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Derivation of test points for radio transmission and reception User Equipment (UE) conformance test cases
(3GPP TR 38.905 version 16.7.0 Release 16)

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650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
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Contents

Foreword

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

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1 Scope

The present document specifies and contains the derivation of Test Points for NR RF test cases, thereby 3GPP TSG RAN WG5 will have a way of storing the input contributions provided. The test cases are described in TS38.521-1[2], TS38.521-2[3] and TS38.521-3[4],

The test cases which have been analysed to determine Test Points are included as .zip files.

The present document is applicable from Release 15 up to the release indicated on the front page of the present Terminal conformance specifications.

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

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

[2] 3GPP TS 38.521-1: "NR; UE conformance specification; Radio transmission and reception; Part 1: NR range 1".

[3] 3GPP TS 38.521-2: "NR; UE conformance specification; Radio transmission and reception; Part 2: NR range 2".

[4] 3GPP TS 38.521-3: "NR; UE conformance specification; Radio transmission and reception; Part 3: NR interworking between NR range1 + NR range2 and between NR and LTE".

[5] 3GPP TS 38.101-1: “NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone”.

[6] 3GPP TS 38.101-2: “NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone”.

[7] 3GPP TS 38.101-3: “NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios”.

[8] 3GPP TS 36.101: Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception”.

[9] R5-206841: “Discussion on test points in Receiver test cases for EN-DC configurations with exception requirements”.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

Other definitions used in the present document are listed in 3GPP TS 38.521-1 [2], 3GPP TS 38.521-2 [3] or 3GPP TS 38.521-3 [4].

Editor's note: intended to capture definitions

3.2 Symbols

Symbols used in the present document are listed in 3GPP TR 21.905 [1], 3GPP TS 38.521-1 [2], 3GPP TS 38.521-2 [3] or 3GPP TS 38.521-3 [4].

Editor's note: intended to capture definitions

3.3 Abbreviations

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

Other abbreviations used in the present document are listed in 3GPP TS 38.521-1 [2], or 3GPP, 3GPP TS 38.521-1 [2], 3GPP TS 38.521-2 [3] or 3GPP TS 38.521-3 [4].

A-SE	Additional spurious emissions
A-SEM	Spectrum Emission Mask

4 Test coverage analysis

This clause contains information on test point analysis and test point selection for RX and TX test configuration tables in [2], [3] and [4]. The test point analysis should include selection of:

- Test environment
- Test frequencies
- Test channel bandwidth
- Test Subcarrier Spacing (SCS)
- Downlink configuration including modulation and RB allocation
- Uplink configuration including modulation and RB allocation
- Number of test points

4.1 Test point analysis for FR1 test cases in TS 38.521-1

4.1.1 Test point analysis per test case

4.1.1.1 FR1 single carrier, NR CA and UL MIMO test cases

This clause contains information on test point analysis and test point selection for single carrier, NR CA and UL MIMO test cases in [2] clause 6 and 7 with information about transmitting test point selection for FR1 listed in table 4.1.1.1-1 and receiver test point selection in table 4.1.1.1-2.

Table 4.1.1.1-1: NR UE transmitter test point selection for FR1

Subclause	Number of test points	Justification in attachment	Comments
6.2.1 UE maximum output power	540	“38.521-1_TPanalysis_6.2.1_MaxOP_v3.zip”	RAN5#89-e
6.2.2 Maximum Power Reduction (MPR)	contiguous allocation: 920 (1040[1],1000[2,3]) almost contiguous allocation: 120	”38.521-1_TPanalysis_6.2.2_MPR_6.5.2.2_SEM_6.5.2.4.1_NR_ACLR_v2.zip”	RAN5#89-e
6.2.3 UE A-MPR	See clause 4.1.2.1	See clause 4.1.2.1	See clause 4.1.2.1
6.2.4 Configured Transmitted Power	30	“38.521-1_TPanalysis_6.2.4_ConfigTP.zip”	RAN5#82
6.2A.1.1 UE maximum output power for CA (2UL CA)	240	“38.521-1_TP analysis_6.2A.1_MOP”	RAN5#83
6.2A.2 Maximum power reduction (MPR) for CA	For inter-band CA:1440 For intra-band contiguous CA: 720 (contiguous RB allocation)	“38.521-1_TPanalysis_6.2A.2_MPR_v1.zip”	RAN5#88-e
6.2A.4 Configured transmitted power for CA	Inter-band CA:20 Intra-band contiguous CA (contiguous RB allocation): 20	“38.521-1_TPanalysis_6.2A.4_ConfigTP_v1.zip”	RAN5#88-e
6.2C.1 Configured UE transmitted Output Power	270	“38.521-1_TPanalysis_6.2C.1_ConfigOPSUL.zip”	RAN5#80
6.2D.1 UE maximum output power for UL-MIMO	UL MIMO with ULFPTx: 540 UL MIMO with 2-layer: 0	“38.521-1_TPanalysis_6.2.1_MaxOP_v3.zip”	RAN5#89-e
6.2D.2 Maximum Power Reduction (MPR)	power class 3: 400 power class 2: 400	“38.521-1_TPanalysis_6.2.2_MPR_v3.zip”	RAN5#85
6.2D.3 UE additional maximum output power reduction for UL-MIMO	Table 4.1.2.1-1	Table 4.1.2.1-1	See Table 4.1.2.1-1
6.2D.4 Configured Transmitted Power for UL-MIMO	15	“38.521-1_TPanalysis_6.2D.4_ConfigTP.zip”	RAN5#82
6.3.1 Minimum output power	45	“38.521-1_TPanalysis_6.3.1_MinOP_v3.zip”	RAN5#5-5G-NR Adhoc
6.3.3.2 General ON/OFF time mask	TBD	“38.521-1_TPanalysis_6.3.3.2_OnOff_M_v2.zip”	RAN5#5-5G-NR Adhoc
6.3.3.6 SRS time mask	30	“38.521-1_TPanalysis_6.3.3.3_SRS.zip”	RAN5#82
6.3.4.2 Absolute power tolerance	6	“38.521-1_TPanalysis_6.3.4.2_AbsPtol_v2.zip”	RAN5#83
6.3.4.3 Relative power tolerance	TBD	“38.521-1_TPanalysis_6.3.4.3_RelPtol_v2.zip”	RAN5#83
6.3.4.4 Aggregate power tolerance	PUCCH: 6 PUSCH: 6	“38.521-1_TPanalysis_6.3.4.4_AggPtol_v2.zip”	RAN5#83
6.3A.1.1 Minimum output power for CA (2UL CA)	20	38.521-1_TPanalysis_6.3A.1.1_MinOP_CA.zip	RAN5#83
6.3A.3.1 Transmit ON/OFF time mask for CA (2UL CA)	40	“38.521-1_TPanalysis_6.3A.3.1_ OnOff_M_CA.zip”	RAN5#83

6.3A.3.1_1 Time mask for switching between two uplink carriers	1	"38.521-1_TPanalysis_6.3A.3.1_1_TxSwitch_M.zip"	RAN5#90-e
6.3A.4.1 Absolute power tolerance for CA (2UL CA)	4	"38.521-1_TPanalysis_6.3A.4.1_Abs_PTol_CA.zip"	RAN5#89
6.3A.4.2 Relative power tolerance for CA (2UL CA)	TBD	"38.521-1_TPanalysis_6.3A.4.2_Rel_PTol_CA.zip"	RAN5#89
6.3A.4.3 Aggregate power tolerance for CA (2UL CA)	PUCCH:4 PUSCH:4	"38.521-1_TPanalysis_6.3A.4.3_Agg_PTol_CA.zip"	RAN5#89
6.3D.1 Minimum output power for UL-MIMO	45	"38.521-1_TPanalysis_6.3.1_MinOP_v3.zip"	RAN5#5-5G-NR Adhoc
6.3D.3 Transmit ON/OFF time mask for UL-MIMO	TBD	"38.521-1_TPanalysis_6.3.3.2_OnOff_M_v2.zip"	RAN5#5-5G-NR Adhoc
6.3D.4.1 Absolute Power tolerance for UL-MIMO	6	"38.521-1_TPanalysis_6.3.4.2_AbsPtol_v2.zip"	RAN5#83
6.3D.4.2 Relative Power Tolerance for UL-MIMO	TBD	"38.521-1_TPanalysis_6.3.4.3_RelPtol_v2.zip"	RAN5#83
6.3D.4.3 Aggregate Power tolerance for UL-MIMO	PUCCH: 6 PUSCH: 6	"38.521-1_TPanalysis_6.3.4.4_AggPtol_v2.zip"	RAN5#83
6.4.1 Frequency error	5	"38.521-1_TPanalysis_6.4.1_FreqErr_v3.zip"	RAN5#84
6.4.2.1 Error Vector Magnitude	PUSCH: 252 PUCCH: 36 PRACH: 36	"38.521-1_TPanalysis_6.4.2.1_EVM_v2.zip"	RAN5#84
6.4.2.2 Carrier leakage	3	"38.521-1_TPanalysis_6.4.2.2_CarrLeak_v2.zip"	RAN5#84
6.4.2.3 In-band emissions	36	"38.521-1_TPanalysis_6.4.2.3_IE_2.zip"	RAN5#84
6.4.2.4 EVM equalizer spectrum flatness	90	"38.521-1 TPanalysis_6.4.2.4_EVMequalizerSpectrumFlatness_v3.zip"	RAN5#84
6.4.2.5 EVM equalizer spectrum flatness for Pi/2 BPSK	9	"38.521-1 TPanalysis_6.4.2.5_EVMequalizerSpectrumFlatness_BPSK_v1.zip"	RAN5#90-e
6.4A.1.1 Frequency error for CA (2UL CA)	5	"38.521-1_TPanalysis on 6.4A.1.1_FreqErr.zip"	RAN5#82
6.4A.2.1.1 Error Vector Magnitude for CA (2UL CA)	168	"38.521-1_TPanalysis on 6.4A.2.1.1_EVM.zip"	RAN5#82
6.4A.2.2.1 Carrier leakage for CA (2UL CA)	2	"38.521-1_TPanalysis on 6.4A.2.2.1_CarrLeak.zip"	RAN5#82
6.4A.2.3.1 In-band emissions for CA (2UL CA)		"38.521-1_TPanalysis on 6.4A.2.2.1_IBE.zip"	RAN5#82
6.4D.1 Frequency error	5	"38.521-1_TPanalysis_6.4.1_FreqErr_v3.zip"	RAN5#84
6.4D.2.1 Error Vector Magnitude for UL MIMO	PUSCH: 108	"38.521-1_TPanalysis on 6.4.2.1_EVM_v2.zip"	RAN5#84
6.4D.2.2 Carrier leakage for UL MIMO	3	"38.521-1_TPanalysis on 6.4.2.2_CarrLeak_v2.zip"	RAN5#84
6.4D.2.3 In-band emissions for UL MIMO	18	"38.521-1_TPanalysis_6.4.2.3_IE_2.zip"	RAN5#84
6.4D.2.4 EVM equalizer spectrum flatness for UL MIMO	45	"38.521-1_TPanalysis_6.4.2.4_EVMequalizerSpectrumFlatness_v3.zip"	RAN5#84
6.4D.3 Time alignment error for UL-MIMO	6	"38.521-1_TPanalysis_6.4D.3_TAE_MIMO.zip"	RAN5#82
6.5.1 Occupied bandwidth	10	"38.521-1_TPanalysis_6.5.1_OccBW_v2.zip	RAN5#82

6.5.2.2 Spectrum Emission Mask	contiguous allocation: 144 (168[1], 160[2,3]) almost contiguous allocation: 24	"38.521-1_TPanalysis_6.2.2_MPR_6.5.2.2_SEM_6.5.2.4.1_NR_ACLR_v2.zip"	RAN5#89-e
6.5D.2.3 Additional spectrum emission mask for UL-MIMO	Table 4.1.2.1-1	Table 4.1.2.1-1	See Table 4.1.2.1-1
6.5.2.4.1 NR Adjacent channel leakage ratio	contiguous allocation: 920 (1040[1], 1000[2,3]) almost contiguous allocation: 120	"38.521-1_TPanalysis_6.2.2_MPR_6.5.2.2_SEM_6.5.2.4.1_NR_ACLR_v2.zip"	RAN5#89-e
6.5.2.4.2 UTRA ACLR	Same as NS_3U, NS_5U ,NS_43U, and NS_100 in Table 4.1.1.1-1	"38.521-1_TPanalysis_6.5.2.4.2_UTRA ACLR_v2.zip"	RAN5#85
6.5.3.1 General spurious emissions	27	"38.521-1_TP analysis_6.5.3.1_TX_Spurious_Emission_v1.zip"	RAN5#89-e
6.5.3.2 Spurious emissions for UE co-existence	27	"38.521-1_TP analysis_6.5.3.1_TX_Spurious_Emission_v1.zip"	RAN5#89-e
6.5.3.3 Additional spurious emissions	See Table 4.1.2.1-1	See Table 4.1.2.1-1	See Table 4.1.2.1-1
6.5.4 Transmit intermodulation	8	"38.521-1_TPanalysis_6.5.4_TxIm.zip"	RAN5#80
6.5A.1.1 Occupied bandwidth for CA (2UL CA)	Inter-band: 2 Intra-band contiguous: 1	"38.521-1_TPanalysis_6.5A.1.1_OccBW_v1.zip"	RAN5#89-e
6.5A.2.2.1 Spectrum emission mask for CA (2UL CA)	112	"38.521-1_TPanalysis on 6.5A.2.2.1_SEM.zip"	RAN5#82
6.5A.2.4.1.1 NR ACLR for CA (2UL CA)	840	"38.521-1_TPanalysis on 6.5A.2.4.1.1_NR ACLR.zip"	RAN5#82
6.5A.2.4.2.1 UTRA ACLR for CA (2UL CA)	840	"38.521-1_TPanalysis on 6.5A.2.4.2.1 UTRA ACLR .zip"	RAN5#82
6.5A.3.1.1 General spurious emissions for CA (2UL CA)	12	"38.521-1_TPanalysis on 6.5A.3.1.1_Spurious_v1.zip"	RAN5#90
6.5A.3.2.1 Spurious emissions for UE co-existence for CA (2UL CA)	3 for CA_n3A-n78A 4 for CA_n8A-n78A	"38.521-1_TPanalysis on 6.5A.3.2.1_SECoex.zip"	RAN5#82
6.5A.4.1 Transmit intermodulation for CA (2UL CA)	840	"38.521-1_TPanalysis on 6.5A.4.1_TxIM.zip"	RAN5#82
6.5D.1 Occupied bandwidth for UL-MIMO		38.521-1_TPanalysis_6.5.1_OBW_v2.zip	RAN5#82
6.5D.2.4.1 NR ACLR for UL-MIMO		"38.521-1_TPanalysis_6.5.2.4_ACLR_v3.zip"	RAN5#82
6.5D.2.4.2 UTRA ACLR for UL-MIMO	96 for NS_3U	"38.521-1_TPanalysis_6.5D.2.4.2_UTRA ALCR_NS_3U_v1.zip"	RAN5#5-5G-NR Adhoc
6.5D.2_1.4.2 UTRA ACLR for UL MIMO (Rel-16 onward)	216 for NS_3U	"38.521-1_TPanalysis_6.5D.2.4.2_UTRA ALCR_NS_3U_v1.zip"	RAN5#90e
6.5D.3.1 General spurious emissions	27	"38.521-1_TP analysis_6.5.3.1_TX_Spurious_Emission_v1.zip"	RAN5#89-e
6.5D.3.2 Spurious emissions for UE co-existence for UL-MIMO	27	"38.521-1_TP analysis_6.5.3.1_TX_Spurious_Emission_v1.zip"	RAN5#89-e
6.5D.3.3 Additional spurious emissions for UL-MIMO	Table 4.1.2.1-1	Table 4.1.2.1-1	RAN5#5-5G-NR Adhoc

6.5D.3_1.1 General spurious emissions (Rel-16 onward)	27	"38.521-1_TP analysis_6.5.3.1_TX_Spurious_Emission_v1.zip"	RAN5#89-e
6.5D.3_1.2 Spurious emissions for UE co-existence for UL-MIMO (Rel-16 onward)	27	"38.521-1_TP analysis_6.5.3.1_TX_Spurious_Emission_v1.zip"	RAN5#89-e
6.5D.3_1.3 Additional spurious emissions for UL-MIMO (Rel-16 onward)	Table 4.1.1.1-1	Table 4.1.1.1-1	RAN5#89-e
6.5D.4 Transmit intermodulation for UL-MIMO		"38.521-1_TPanalysis_6.5.4_TxIm_v2.zip"	RAN5#82
NOTE 1: For power class 3 UE operating in bands n40, n41, n77, n78 and n79. NOTE 2: UE operating in FDD mode, or in TDD mode in bands other than n40, n41, n77, n78 and n79, or in TDD mode the IE powerBoostPi2BPSK is set to 0 for bands n40, n41, n77, n78 and n79. NOTE 3: UEs supporting pi/2 BPSK DMRS and the corresponding IE [DMRSPi2BPSK] is set to 1. NOTE 4: The maximum number of test point is 24 if only default points are applied.			

Table 4.1.1.1-2: NR UE receiver test point selection for FR1

Subclause	Number of test points	Justification in attachment	Comments
7.3 Reference sensitivity power level	45	"38.521-1_TPanalysis_7.3_RefSense_v3.zip"	RAN5#5-5G-NR Adhoc
7.3A Reference sensitivity for CA	See clause 4.1.3	See clause 4.1.3	See clause 4.1.3
7.3D.2 Reference sensitivity power level for UL-MIMO		"38.521-1_TPanalysis_7.3_RefSense_v2.zip"	RAN5#82
7.4 Maximum input level	6	"38.521-1_TPanalysis_7.4_Maximun input level_v2.zip"	RAN5#82
7.4A Maximum input level for CA	2CC:2 3CC:2	"38.521-1_TP analysis 7.4A maxIL for CA_v1.zip"	RAN5#89-e
7.4D Maximum input level for UL-MIMO		"38.521-1_TPanalysis_7.4_Maximun input level_v2.zip"	RAN5#82
7.5 Adjacent Channel Selectivity	3	"38.521-1_TPanalysis_7.5_ACS_v2.zip"	RAN5#82
7.5A Adjacent channel selectivity for DL CA	intra-band contiguous CA: 2 inter-band CA: 1	"38.521-1_TPanalysis_7.5A.1_ACS_2CA.zip"	RAN5#83
7.5D Adjacent Channel Selectivity for UL-MIMO		"38.521-1_TPanalysis_7.5_ACS_v2.zip"	RAN5#82
7.6.2 In Band Blocking	3	"38.521-1_TPanalysis_7.6.2_InB_Block_v2.zip"	RAN5#5-5G-NR Adhoc
7.6.3 Out-of-band blocking	3	"38.521-1_TPanalysis_7.6.3_OobBlocking_v2.zip"	RAN5#5-5G-NR Adhoc
7.6.4 Narrow band blocking	3	"38.521-1_TPanalysis_7.6.4_NarrowbBlocking_v2.zip"	RAN5#5-5G-NR Adhoc
7.6A.2 Inband blocking for CA 2CC: 3CC:1	1	"38.521-1_TP analysis 7.6A.2 IBB for CA_v1.zip"	RAN5#89-e
7.6A.3 Out-of-band blocking for CA	1	"38.521-1_TPanalysis_7.6A.3 Out-of-band blocking for CA_v1.zip"	RAN5#86-e
7.6A.4 Narrow band blocking for CA	1	"38.521-1_TPanalysis_7.6A.4 Narrow band blocking for CA_v1.zip"	RAN5#86-e
7.6D.2 Inband blocking for UL-MIMO	3	"38.521-1_TPanalysis_7.6.2_InB_Block_v2.zip"	RAN5#5-5G-NR Adhoc
7.6D.3 Out-of-band blocking for UL-MIMO	3	"38.521-1_TPanalysis_7.6.3_OobBlocking_v2.zip"	RAN5#5-5G-NR Adhoc
7.6D.4 Narrow band blocking for UL-MIMO	3	"38.521-1_TPanalysis_7.6.4_NarrowbBlocking_v2.zip"	RAN5#5-5G-NR Adhoc
7.7 Spurious response	3	"38.521-1_TPanalysis_7.7_Spurious response.zip"	RAN5#4-5G-NR Adhoc
7.7D Spurious response for UL-MIMO	3	"38.521-1_TPanalysis_7.6.3_OobBlocking_v2.zip"	RAN5#83
7.8.2 Wide band Intermodulation	3	"38.521-1_TPanalysis_7.8.2_WidebandIntermod_v2.zip"	RAN5#5-5G-NR Adhoc
7.8A Wide band Intermodulation for CA	1	"38.521-1_TPanalysis_7.8A Wide band Intermodulation for CA_v1.zip"	RAN5#86-e
7.8D.2 Wide band Intermodulation for UL-MIMO	3	"38.521-1_TPanalysis_7.8.2_WidebandIntermod_v2.zip"	RAN5#5-5G-NR Adhoc
7.9 Spurious emissions	3	"38.521-1_TPanalysis_7.9_RxSpurious.zip"	RAN5#81

4.1.1.2 FR1 SUL test cases

This section contains information on test point selection for SUL test cases in [2]. The basic principle is following the same rules for test point selection in single carrier test cases. In these SUL test cases, there are default test points to be used unless SUL configuration specific test points are over-ruling.

Basic rules for Tx SUL test cases:

For Test environment: Adopt the same selection of test environment in corresponding single carrier test cases.

For Test frequency: Considering that Non-SUL carrier should have no impact on SUL carrier testing results, for any SUL configurations, Mid range is chosen as default for Non-SUL carrier. Select the same test frequency in corresponding single carrier test cases for SUL carrier.

For Test SCS: Considering only 15 kHz SCS is supported for SUL bands, it's reasonable to select 15 kHz SCS for SUL carrier and Non-SUL carrier regardless of SUL configurations.

For Test channel bandwidths: Under the limit of 15 kHz SCS, only the lowest channel bandwidth is supported for current Non-SUL bands in SUL configurations, which are band n78 and n79. Select the lowest channel bandwidth that support 15kHz SCS for Non-SUL carrier. Select the same test channel bandwidths as in corresponding single carrier test cases for SUL carrier.

For waveform, modulation and RB allocations: Adopt the same selection of test configurations as in corresponding single carrier test cases for SUL carrier.

Basic rules for Rx SUL test cases:

In Rx testing for SUL, test point selection in clause 7.3C and 7.6C need to be defined. Considering the focus of Rx test cases is testing DL bands, the configuration of SUL carrier shall be selected to ensure the test coverage without costing too much testing time. The configuration of Non-SUL carrier shall be selected based on the same principle as single carrier test cases. The basic test point selection rule for Rx SUL test cases is specified as below:

For Test environment: Adopt the same selection of test environment in corresponding single carrier test cases.

For Test frequency: The Non-SUL carrier should select the same test frequency as corresponding single carrier test cases. Select Mid range as default for SUL carrier.

For Test SCS: Since the REFSENS requirement for SUL is specified for 15 kHz SCS for SUL band and the test point selection of clause 7.6C is also based on that of clause 7.3C, 15 kHz SCS should be selected for SUL carrier. For the Non-SUL carrier the SCS should be selected following the same rule as single carrier testing.

For test channel bandwidths: Highest channel bandwidth when SCS =15 kHz for SUL shall be selected for SUL carrier. For the Non-SUL carrier the channel bandwidth should be selected following the same rule as single carrier testing.

For waveform, modulation and RB allocations: Adopt the same selection of test configurations as single carrier test cases for Non-SUL carrier. SUL carrier select DFT-s-OFDM QPSK. The RB allocation of SUL carrier shall fulfill the requirement in clause 7.3C.0 in TS 38.521-1.

Number of test points for SUL test cases in FR1 are listed in table 4.1.1.2-1 and table 4.1.1.2-2.

Table 4.1.1.2-1: Number of test points for SUL test cases in FR1 (NR UE Transmitter test)

Subclause	Number of test points	Comments
6.2C.1 Configured transmitted power for SUL	30	RAN5#86e
6.2C.3 UE maximum output power for SUL	270	RAN5#86e
6.2C.4 UE maximum output power reduction for SUL	460 (500[1])	RAN5#90e
6.2C.5 UE additional maximum output power reduction for SUL	Table 4.1.1.1-1	RAN5#87e
6.3C.1 Minimum output power for SUL	45	RAN5#87e
6.3C.3 Transmit ON/OFF time mask for SUL	45	RAN5#87e
6.3C.4.1 Absolute power tolerance for SUL	3	RAN5#87e
6.3C.4.2 Power Control Relative power tolerance for SUL	TBD	RAN5#87e
6.3C.4.3 Aggregate power tolerance for SUL	PUCCH: 3 PUSCH: 3	RAN5#87e
6.4C.1 Frequency error for SUL	5	RAN5#86e
6.4C.2.1 Error Vector Magnitude for SUL	PUSCH: 84 PUCCH: 24 PRACH: 12	RAN5#86e
6.4C.2.2 Carrier leakage for SUL	3	RAN5#90e
6.4C.2.3 In-band emissions for SUL	36	RAN5#90e
6.4C.2.4 EVM equalizer spectrum flatness for SUL	90	RAN5#90e
6.4C.2.5 EVM equalizer spectrum flatness for Pi/2 BPSK for SUL	9	RAN5#90e
6.5C.1 Occupied bandwidth for SUL	18	RAN5#86e
6.5C.2.2 Spectrum Emission Mask for SUL	72 (80[1])	RAN5#90e
6.5C.2.3 Additional spectrum emission mask for SUL	27	RAN5#86e
6.5C.2.4.1 NR ACLR for SUL	460 (500[1])	RAN5#90e
6.5C.2.4.2 UTRA ACLR for SUL	Table 4.1.1.1-1	RAN5#86e
6.5C.3.1 General spurious emissions for SUL	27	RAN5#86e
6.5C.3.2 Spurious emission for UE co-existence for SUL	27	RAN5#86e
6.5C.3.3 Additional spurious emissions for SUL	115 for NS_05 28 for NS_43	RAN5#87e
6.5C.4 Transmit intermodulation for SUL	4	RAN5#86e
NOTE 1: UEs supporting pi/2 BPSK DMRS and the corresponding IE [DMRSPi2BPSK] is set to 1.		

Table 4.1.1.2-2: Number of test points for SUL test cases in FR1 (NR UE Receiver test)

Subclause	Number of test points	Comments
7.3C.2 Reference sensitivity power level for SUL	General test points:45 SUL configuration specific test points: SUL_n78-n80: 2	RAN5#90e
7.6C.2 Inband Blocking for SUL	3	RAN5#87e
7.6C.3 Out-of-band blocking for SUL	3	RAN5#87e

4.1.2 Test point analysis per NS value

4.1.2.1 A-MPR, A-SEM and A-SE FR1 test cases for single carrier and UL MIMO

This section contains information on test point selection for single carrier test cases 6.2.3, Additional Maximum Power Reduction (A-MPR), 6.5.2.3 Additional spectrum emission mask (A-SEM) and 6.5.3.3 Additional spurious emissions (A-SE); and for correspondent UL-MIMO test cases in 6.2D.3 and 6.5D.3.3 in [2].

Selection of test points should include some possible worst combinations based on the A-MPR characteristics specified for each NS value and these shall be selected so that they match with corresponding spectrum emission requirements test points. The number of test points should be realistic.

For pi/2 BPSK with Rel-16 DMRS, the correspondent A-MPR requirements are the same as that for Rel-15 DMRS but the PAPR is lower. Given the UE can pass the requirements using Rel-15 DMRS, it can be expected that the UE can pass the requirements using Rel-16 DMRS. Therefore there is no need to additionally test A-MPR, A-SEM and A-SE for Rel-16 DMRS.

Table 4.1.2.1-1 lists number of test points for A-MPR, A-SEM and A-SE single carrier test cases and for different NS values.

Table 4.1.2.1-1: NS value specific test points for A-MPR, A-SEM and A-SE single carrier

NS label	Number of test points for A-MPR	Number of test points A-SEM	Number of test points A-SE	Justification	Comments
NS_03	6.2.3: 80 40 for SUL testing			"38.521-1_TPanalysis_6.2.3_AMPR_NS_03.zip"	RAN5#85
NS_04	6.2.3: 220 6.2D.3: 112 6.5D.3.3:112			"38.521-1_TPanalysis_6.2.3_AMPR_NS_04_v2.zip"	RAN5#5-5G-NR Adhoc
NS_05	6.5.3.3: 432			"38.521-1_TP analysis_6.5.3.3_TX_Additional_Spurious_Emission_NS_05.zip"	RAN5#87-e
NS_05, NS_05U	6.2.3: 288			"38.521-1_TPanalysis_6.2.3_AMPR_NS_05_v2.zip"	RAN5#86
NS_12	48			"38.521-1_TPanalysis_6.2.3_AMPR_NS_12_13_14_15.zip"	RAN5#90-e
NS_13	21			"38.521-1_TPanalysis_6.2.3_AMPR_NS_12_13_14_15.zip"	RAN5#90-e
NS_14	50			"38.521-1_TPanalysis_6.2.3_AMPR_NS_12_13_14_15.zip"	RAN5#90-e
NS_15	102			"38.521-1_TPanalysis_6.2.3_AMPR_NS_12_13_14_15.zip"	RAN5#90-e
NS_17	6.5.3.3: 4			"38.521-1_TPanalysis_6.5.3.3_TX_Additional_Spurious_Emission_NS_17.zip"	RAN5#88-e
NS_18	88 6.2.3: 108 6.5.3.3: 54			"38.521-1_TPanalysis_6.2.3_AMPR_6.5.3.3_ASE_NS_18_v3.zip"	RAN5#89-e
NS_21	180			"38.521-1_TPanalysis_6.2.3_AMPR_NS_21.zip"	RAN5#89-e
NS_24	6.2.3: 300			"38.521-1_TPanalysis_6.2.3_AMPR_NS_24.zip"	RAN5#87
NS_27	6.2.3: 252			"38.521-1_TPanalysis_6.2.3_AMPR_NS_27.zip"	RAN5#87
NS_35	6.2.3: 144 6.2.3: 72			"38.521-1_TPanalysis_6.2.3_AMPR_NS_35_v2.zip"	RAN5#5-5G-NR-Adhoc
NS_37	6.2.3: 48			"38.521-1_TPanalysis_6.2.3_AMPR_NS_37.zip"	RAN5#86
NS_38	6.2.3: 96			"38.521-1_TPanalysis_6.2.3_AMPR_NS_38.zip"	RAN5#86
NS_39	6.2.3: 54			"38.521-1_TPanalysis_6.2.3_AMPR_NS_39.zip"	RAN5#86
NS_40	6.2.3: 24			"38.521-1_TPanalysis_6.2.3_AMPR_NS_40.zip"	RAN5#87
NS_41	6.2.3: 72			"38.521-1_TPanalysis_6.2.3_AMPR_NS_41.zip"	RAN5#87
NS_42	6.2.3: 108			"38.521-1_TPanalysis_6.2.3_AMPR_NS_42.zip"	RAN5#87
NS_43	6.2.3: 28			"38.521-1_TPanalysis_6.2.3_AMPR_NS_43_v2.zip"	RAN5#86
	6.5.3.3: 81			"38.521-1_TP analysis_6.5.3.3_TX_Additional_Spurious_Emission_NS_43.zip"	RAN5#87-e
NS_43U	6.2.3: 72			"38.521-1_TPanalysis_6.2.3_AMPR_NS_43U.zip"	RAN5#85
NS_44	360	N/A	180	"38.521-1_TPanalysis_6.2.3_AMPR_6.5.3.3_ASE_NS_44.zip"	RAN5#90-e
NS_45	24			"38.521-1_TPanalysis_6.2.3_AMPR_NS_45.zip"	RAN5#89-e
NS_46	176			"38.521-1_TPanalysis_6.2.3_AMPR_NS_46.zip"	RAN5#89-e
NS_47	70			"38.521-1_TPanalysis_6.2.3_AMPR_NS_47.zip"	RAN5#87
NS_48	192	N/A	96	"38.521-1_TPanalysis_6.2.3_AMPR_6.5.3.3_ASE_NS_48_v1.zip"	RAN5#90-e
NS_49	224	N/A	112	"38.521-1_TPanalysis_6.2.3_AMPR_6.5.3.3_ASE_NS_49.zip"	RAN5#90-e
NS_100	72			"38.521-1_TPanalysis_6.2.3_AMPR_NS_100.zip"	RAN5#85

4.1.2.2 A-MPR test cases for FR1 UL CA

This section contains information on test point selection for test case 6.2A.3.1 in [2], UE additional maximum output power reduction for CA.

TS 38.101 [3] specifies band dependent NS-values, which in the inter-band UL CA test cases become a combination of two NS-values. Testing all possible combinations would lead to too excessive testing and the combinations that are realistic should therefore be prioritized. This selection is documented in table 4.1.1.1-1.

Table 4.1.2.2-1: A-MPR test coverage per CA configuration for inter-band CA with 2 CC

CA config with UL CA support (Note 1)	NS values in same order as Uplink CA Configuration column		Number of test points	Applicable test case	Justification	Comment
CA_n3-n78 CA_n8-n78	NS_100	NS_01	24	N/A	“38.521-1_TP analysis 6.2A.3 NS_100+NS_01.zip”	RAN5#87-e
CA_n8-n78	NS_43	NS_01	12	N/A	“38.521-1_TP analysis 6.2A.3 NS_43+NS_01.zip”	RAN5#88-e
CA_n8-n78	NS_43U	NS_01	12	N/A	“38.521-1_TP analysis 6.2A.3 NS_43U+NS_01.zip”	RAN5#88-e
Note 1: As per TS 38.101.						

The analyses are performed per NS-value and are stored as zip-files as defined in annex A. The general principle for selection of test points is:

- Test the minimum Total power backoff value
- Test the maximum Total power backoff value
- Test the maximum unbalanced Total power backoff among CCs (max $P_{CMAX,c}$ difference).

Where the Total power backoff value means: MAX[MPR, A-MPR]

4.1.3 Test point analysis per NR CA configuration

4.1.3.1 Reference Sensitivity test cases for FR1 NR CA

Editor's note:

- Not all CA configurations completed in TS 38.521-1 refsens test cases are listed in Table 4.1.3.1-1.
- Columns for “Refsens exception, victim band” vs. "Need to test fallback" in Table 4.1.3.1-1 need to be clarified.

This clause contains information on test point analysis and status for FR1 NR CA test cases in TS 38.521-1 [2] clause 7. The analyses are performed per CA configuration in Table 4.1.3.1-1.

Table 4.1.3.1-1: Reference Sensitivity test cases per CA configuration

CA config	Number of test points	Refsens exception, victim band	Other limitation	Need to test fallback	Fallback CA config.	Test point analysis updated
CA_n41C		–	–	No	–	RAN5#89-e
CA_n66B		–	–	No	–	RAN5#86-e
CA_n66(2A)		–	–	No	–	RAN5#86-e
CA_n78C			–	No	–	RAN5#87-e
CA_n1A-n77A	2	n77	–	No	–	RAN5#89-e
CA_n1A-n78A	1	–	–	No	–	RAN5#89-e
CA_n3A-n77A	2	n78	–	No	–	RAN5#84
CA_n3A-n78A	4	n3, n78	–	No	–	RAN5#87-e
CA_n8A-n78A	2	n8, n78	–	No	–	RAN5#87-e
CA_n41A-n79A		–	–	No	–	RAN5#83
CA_n70A-n71A	3	n70	–	No	–	RAN5#85
CA_n66A-n70A-n71A		n66	–	No	–	RAN5#87-e
CA_n29A-n66A-n70A		–	–	No	–	RAN5#89-e

4.1.3.2 Spurious emissions test cases for FR1 UL CA

In this case, it is sufficient to verify the minimum requirements in frequency ranges affected by 2nd and 3rd order intermodulation products. The frequency ranges and UL RB allocations used in the test are calculated here.

The analyses are performed per CA configuration and are stored as zip-files as defined in annex A.

Table 4.1.3.2-1: Frequency range analysis availability per CA configuration

CA config	Justification	Comments
CA_n1A-n78A	38.521-1_TpAnalysisSpur(CA_n1A-n78A)v2.zip	Added at RAN5#88e
CA_n3A-n78A	TpAnalysisSpur(n3A-n78A).zip	Added at RAN5#82
CA_n8A-n78A	TpAnalysisSpur(n8A-n78A).zip	Added at RAN5#82
CA_n41A-n79A	TpAnalysisSpur(n41A-n79A).zip	Added at RAN5#83

4.2 Test point analysis for FR2 test cases in TS 38.521-2

4.2.1 Test point analysis per test case

4.2.1.1 FR2 single carrier, NR CA and UL MIMO test cases

This clause contains information on test point analysis and test point selection for single carrier, NR CA and UL MIMO test cases in [3] clause 6 and 7 with information about transmitting test point selection for FR2 listed in table 4.2.1.1-1 and receiver test point selection in table 4.2.1.1-2.

Table 4.2.1.1-1: NR UE transmitter test point selection for FR2

Subclause	Number of test points	Justification in attachment	Comments
6.2.1 UE maximum output power	x	"38.521-2_TPanalysis_6.2.1_MOP_v2.zip"	RAN5#5-5G-NR Adhoc
6.2.2 UE maximum output power reduction	power class 1: 90 power class 2&3&4: 84	"38.521-2_TPanalysis_6.2.2_MPR_6.5.2.1_SEM_6.5.2.3_NR_ACLR_v2.zip"	RAN5#89-e RAN5#90-e
6.2A.1.1 UE maximum output power - EIRP and TRP for CA	TRP: 4 EIRP: 20	"38.521-2_TPanalysis_6.2A.1.x_MOP_Spherical Coverage_CA_v1"	RAN5#84
6.2A.1.2 UE maximum output power - Spherical coverage for CA	20	"38.521-2_TPanalysis_6.2A.1.x_MOP_Spherical Coverage_CA_v1"	RAN5#84
6.2A.2 UE maximum output power reduction for CA	FFS	"38.521-2_TPanalysis_6.2A.2_MPR for CA"	RAN5#84
6.3.1 Minimum output power	9	"38.521-2_TP analysis_6.3.1_MinOP_v2.zip"	RAN5#84
6.3.2 Transmit OFF power	3	"38.521-2_TPanalysis_6.3.2_Tx_OFF_power"	RAN5#83
6.3.4.3 Relative power tolerance	FFS	"38.521-2_TPanalysis_6.3.4.3_RelPtol.zip"	RAN5#82
6.3.4.4 Aggregate power tolerance	PUCCH: 6 PUSCH: 6	"38.521-2_TPanalysis_6.3.4.4_AggPtol.zip"	RAN5#82
6.3A.1.1 Minimum output power for CA (2UL CA)	4	"38.521-2_TP analysis_6.3A.1.1_MinOP.zip"	RAN5#83
6.3A.2.1 Transmit OFF power for CA (2UL CA)	3	"38.521-2_TPanalysis_6.3A.2.1_Tx_OFF_Power_CA.zip"	RAN5#88-e

6.3A.4.2.1 Absolute power tolerance for CA (2UL CA)	6	38.521-2_TP analysis_6.3A.4.2.1_AbsPCTol_CA.zip	RAN5#85
6.3A.4.2.2 Absolute power tolerance for CA (3UL CA)	6	38.521-2_TP analysis_6.3A.4.2.1_AbsPCTol_CA.zip	RAN5#85
6.3A.4.2.3 Absolute power tolerance for CA (4UL CA)	6	38.521-2_TP analysis_6.3A.4.2.1_AbsPCTol_CA.zip	RAN5#85
6.3A.4.2.4 Absolute power tolerance for CA (5UL CA)	6	38.521-2_TP analysis_6.3A.4.2.1_AbsPCTol_CA.zip	RAN5#85
6.3A.4.2.5 Absolute power tolerance for CA (6UL CA)	6	38.521-2_TP analysis_6.3A.4.2.1_AbsPCTol_CA.zip	RAN5#85
6.3A.4.2.6 Absolute power tolerance for CA (7UL CA)	6	38.521-2_TP analysis_6.3A.4.2.1_AbsPCTol_CA.zip	RAN5#85
6.3A.4.2.7 Absolute power tolerance for CA (8UL CA)	6	38.521-2_TP analysis_6.3A.4.2.1_AbsPCTol_CA.zip	RAN5#85
6.3D.1 Minimum output power for UL MIMO	9	“38.521-2_TP analysis_6.3.1_MinOP_v2.zip“	RAN5#84
6.3D.3.4 SRS time mask for UL-MIMO	18	“38.521-2_TP analysis_6.3.3.2_SRS_M_UL-MIMO.zip“	RAN5#85
6.4.1 Frequency error	1	“38.521-2_TPanalysis_6.4.1_FreqErr.zip”	RAN5#80
6.4.2.1 Error Vector Magnitude	PUSCH: 168 PUCCH: 24 PRACH: 24	“38.521-2_TPanalysis_6.4.2.1_EVM.zip”	RAN5#3-5G-NR Adhoc
6.4.2.2 Carrier leakage	3	“38.521-2_TPanalysis_6.4.2.2_CarrLeak_v2.zip”	RAN5#89-e
6.4.2.3 In-band emissions	PUSCH: 36 PUCCH: 18	“38.521-1_TPanalysis_6.4.2.3_IE_v2.zip”	RAN5#89-e
6.4.2.4 EVM equalizer spectrum flatness	18	“38.521-2_TPanalysis_6.4.2.4_6.4.2.5_EVMequalizerSpectrumFlatness.zip”	RAN5#3-5G-NR Adhoc
6.4.2.5 EVM spectral flatness for pi/2 BPSK modulation with spectrum shaping	9	“38.521-2_TPanalysis_6.4.2.4_6.4.2.5_EVMequalizerSpectrumFlatness.zip”	RAN5#3-5G-NR Adhoc
6.4A.1 Frequency error for CA	N (1 test point per UL carrier)	“38.521-2_TPanalysis_6.4A.1_FreqErr_CA_v2.zip”	RAN5#87-e RAN5#90-e
6.4A.2.2 Carrier leakage for CA	2	“38.521-2_TPanalysis_6.4A.2.2_CarrLeak_CA_v2.zip”	RAN5#89-e
6.5.1 Occupied Bandwidth	12	“38.521-2_TPanalysis_6.5.1_OccBW_v2.zip”	RAN5#89-e
6.5.2.1 Spectrum Emission Mask	90	”38.521-2_TPanalysis_6.2.2_MPR_6.5.2.1_SEM_6.5.2.3_NR_ACLR_v2.zip”	RAN5#2-5G-NR Adhoc RAN5#79 RAN5#80 RAN5#89-e RAN5#90-e
6.5.2.3 Adjacent Channel Leakage Ratio	TBD	”38.521-2_TPanalysis_6.2.2_MPR_6.5.2.1_SEM_6.5.2.3_NR_ACLR_v2.zip”	RAN5#2-5G-NR Adhoc RAN5#89-e RAN5#90-e
6.5.3.1 Spurious emissions	2	“38.521-2_TPanalysis_6.5.3_TxSpurious_v2.zip”	RAN5#84
6.5.3.2 Spurious emissions UE band co-existence	2	“38.521-2_TPanalysis_6.5.3_TxSpurious_v2.zip”	RAN5#84
6.5.3.3 Additional spurious emission	NS202: 4 NS203: 4	“38.521-2_TPanalysis_6.2.3_AMPR_NS_202.zip” “38.521-2_TPanalysis_6.2.3_AMPR_NS_203.zip”	RAN5#90-e
6.5A.2.1 Spectrum Emission Mask for CA	30	“38.521-2_TPanalysis_6.5A.2.1_SEM_CA.zip”	RAN5#89-e
6.5A.2.2 Adjacent channel leakage ratio for CA	52	“38.521-2_TPanalysis_6.5A.2.2_ACLR_CA.zip”	RAN5#89-e

6.6 Beam Correspondence	6	"38.521-2_TPanalysis_6.6_Beam_Correspond_v1.zip"	RAN5#85

Table 4.2.1.1-2: NR UE receiver test point selection for FR2

Subclause	Number of test points	Justification in attachment	Comments
7.3 Reference sensitivity	9	"38.521-2_TPanalysis_7.3_RefSense.zip"	RAN5#80
7.3A Reference sensitivity for CA	9	"38.521-2_TPanalysis_7.3A_RefSenseCA.zip"	RAN5#86-e
7.4 Maximum input level	3	"38.521-2_TPanalysis_7.4_Maximun input level.zip"	RAN5#81
7.4A Maximum input level for CA	1	"38.521-2_TPanalysis_7.4_Maximun input level.zip"	RAN5#90-e
7.5 Adjacent channel selectivity	3	"38.521-2_TPanalysis_7.5 ACS_v1.zip"	RAN5#83
7.6.2 In Band Blocking	3	"38.521-2_TPanalysis_7.6.2 InB_Block_v1.zip"	RAN5#83

4.2.2 Test point analysis per NS value

4.2.2.1 A-MPR and A-SE FR2 test cases for single carrier

This section contains information on test point selection for test case 6.2.3 in [3] Additional Maximum Power Reduction (A-MPR) as well as the related spectrum emissions test case 6.5.3.3 in [3] Additional Spurious emission (A-SE). Selection of test points should include some possible worst combinations based on the A-MPR and spectrum emissions characteristics specified for each NS value. The number of test points should be realistic.

Since A-MPR is defined by RAN4 together with A-Spurious requirements, a combined analysis is required. In general, the following non-compliant UE behaviours need to be checked:

a) UE apply too much A-MPR (more than RAN4 allow)

b) UE apply to little A-MPR (causing too much spectrum emissions)

Case A can be verified in A-MPR test case

Case B can be verified in A-SE test case if it is ensured that the same test point is tested inside A-MPR test. Therefore, the test points in spectrum emissions test case must be a subset of the test points in the A-MPR test case.

Note: Even if there are identical test points in the MPR test case the A-MPR test case is still needed to verify UE output power when NS-value is signalled.

Table 4.2.2.1-1: NS value specific test points for A-MPR single carrier

NS label	Number of test points	Justification	Comments
NS_201	6.2.3: 2 6.5.3.3: 2	"38.521-2_TPanalysis_6.2.3_AMPR_NS_201_v2.zip"	RAN5#86-e

4.2.3 Test point analysis per NR CA configuration

4.2.3.1 Reference Sensitivity test cases for FR2 NR CA

Editor's note: TP analyses for FR2 NR CA will be added to this clause.

4.3 Test point analysis for test cases in TS 38.521-3

4.3.1 Test point analysis per test case

4.3.1.1 EN-DC test cases

Table 4.3.1.1-1: NR UE transmitter test point selection for EN-DC

Subclause	Number of test points	Justification in attachment	Comments
6.2B.1.1 UE Maximum Output Power for Intra-Band Contiguous EN-DC	20	"38.521-3_TPanalysis_6.2B.1.1 _MOP_Intra_B_contig_v4.zip"	RAN5#88-e
6.2B.1.2 UE Maximum Output Power for Intra-Band Non-Contiguous EN-DC	40	"38.521-3_TPanalysis_6.2B.1.2_MOP_Intra_B_non-contig_v2.zip"	RAN5#87-e
6.2B.1.3 UE Maximum Output Power for Inter-Band EN-DC	600	"38.521-3_TPanalysis_6.2B.1.3 _MOP_Inter_B_Config_v2.zip"	RAN5#86-e
6.2B.2.1 UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC	1880	"38.521-3_TPanalysis_6.2B.2.1_MPR_6.5B.2.1_SEM_6.5B.2.1.3_ACLR.zip"	RAN5#87-e
6.2B.2.2 UE Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC	Same as 6.2B.2.1	Same as 6.2B.2.1	RAN5#85
6.2B.2.3 UE Maximum Output Power reduction for Inter-Band EN-DC within FR1	Same as Table 4.1.1-1, test case 6.5.2	Same as Table 4.1.1.1-1, test case 6.5.2.	RAN5#3-5G-NR Adhoc
6.2B.2.4 UE Maximum Output Power reduction for Inter-Band EN-DC including FR2	Same as Table 4.1.1-1, test case 6.2.2	Same as Table 4.1.1.1-1, test case 6.2.2	RAN5#5-5G-NR-Adhoc
6.2B.3.1 UE Additional Maximum Output Power reduction for Intra-band contiguous EN-DC	340	"38.521-3_TPanalysis_6.2B.3.1_AMPR_NS_04_v3.zip"	RAN5#81
	8	"38.521-3_TPanalysis_6.2B.3.1_AMPR_NS_35.zip"	RAN5#3-5G-NR Adhoc
6.2B.4.1.1 Configured Output Power Level for Intra-Band Contiguous EN-DC	-UE not supporting DPS: 90 -UE supporting DPS: 120	"38.521-3_TPanalysis_6.2B.4.1.1_ConfiguredTP_Intra_B_Contig_v2.zip"	RAN5#86-e
6.2B.4.1.2 Configured Output Power for Intra-Band Non-Contiguous EN-DC	-UE not supporting DPS: 70 -UE supporting DPS: 100	"38.521-3_TPanalysis_6.2B.4.1.2_ConfiguredTP_Intra_B_Non-contig_v2.zip"	RAN5#86-e
6.2B.4.1.3 Configured Output Power for Inter-Band EN-DC within FR1	-UE not supporting DPS: 90 -UE supporting DPS: 140	"38.521-3_TPanalysis_6.2B.4.1.3_ConfiguredTP_Inter_B_within_FR1_v2.zip"	RAN5#86-e
6.4B.2.1.3 In-band emissions for intra-band contiguous EN-DC	36	"38.521-3_TPanalysis_6.4B.2.1.3_IBE_Intra_B_contig.zip"	RAN5#83
6.5B.1.1 Occupied bandwidth for Intra-Band Contiguous EN-DC	X= intra-band ENDC channel BWs supported by UE	"38.521-3_TPanalysis_6.5B.1.1_OBW_Intra_B_contig.zip"	RAN5#3-5G-NR adhoc
6.5B.2.1.1 Spectrum emissions mask for intra-band contiguous EN-DC	304	"38.521-3_TPanalysis_6.2B.2.1_MPR_6.5B.2.1_SEM_6.5B.2.1.3_ACLR.zip"	RAN5#87-e
6.5B.2.1.3 Adjacent channel leakage ratio for intra-band contiguous EN-DC	2160	38.521-3_TPanalysis_6.2B.2.1_MPR_6.5B.2.1_SEM_6.5B.2.1.3_ACLR.zip""	RAN5#87-e
6.5B.2.2.1 Spectrum emissions mask for intra-band non-contiguous EN-DC	108	"38.521-3_TP analysis_6.5B.2.2.1_SEM Intra-band non-contiguous_v1.zip"	RAN5#90-e

6.5B.2.2.3 Adjacent channel leakage ratio for intra-band non-contiguous EN-DC	540	“38.521-3_TP analysis_6.5B.2.2.3_ACLR Intra-band non-contiguous_v1.zip”	RAN5#90-e
6.5B.3.1 Spurious Emissions for intra-band contiguous EN-DC	12	38.521-3_TP_analysis_6.5B.3_TX_SpurEmission_EN-DC_V2“.zip”	RAN5#88e
6.5B.3.2 Spurious emission for intra-band non-contiguous EN-DC	12	38.521-3_TP_analysis_6.5B.3_TX_SpurEmission_EN-DC_V2“.zip	RAN5#88e
6.5B.3.3 Spurious Emissions for Inter-band EN-DC within FR1	24	“38.521-3_TP_analysis_38.905_6.5B.3_TX_SpurEmission_EN-DC.zip”	RAN5#82
6.5B.3.3.2 Spurious Emissions band UE co-existence for Inter-band within FR1	Note 1	“38.521-3_TP_analysis_38.905_6.5B.3.3.2_TX_SpurEmission_EN-DC.zip”	RAN5#87-e
Note 1: The maximum number of test point is 24 if only default points are applied.			

Table 4.3.1.1-2: NR UE receiver test point selection for EN-DC

Subclause	Number of test points	Justification in attachment	Comments
7.3B Reference sensitivity for EN-DC		"38.521-3_TP analysis_7.3B_RxSense_EN-DC with FR1_v2.zip"	RAN5#89-e
7.4B.1 Maximum Input Level for Intra-Band Contiguous EN-DC	6	"38.521-3_TPanalysis_7.4B.1.1_MaxIL_Intra_B_contig.zip"	RAN5#82
7.4B.2 Maximum Input Level for Intra-Band Non-Contiguous EN-DC	6	"38.521-3_TPanalysis_7.4B.2_MaxIL_Intra_B_noncontig.zip"	RAN5#82
7.5B.1 Adjacent Channel Selectivity for intra-band contiguous EN-DC (2 CCs)	Same as Table 7.3B.2.1.4.1-1, test case 7.3B.2.1.	Same as Table 7.3B.2.1.4.1-1, test case 7.3B.2.1.	RAN5#85
7.6B.2.1 Inband blocking for intra-band contiguous EN-DC in FR1 (2 CCs)	2	"38.521-3_TPanalysis_7.6B.2.1_IBB_Intra_B_contig.zip"	RAN5#87-e
7.6B.2.2 Inband blocking for intra-band non-contiguous EN-DC in FR1 (2 CCs)	1	"38.521-3_TPanalysis_7.6B.2.2_IBB_Intra_B_non-contig.zip"	RAN5#87-e
7.6B.2.3 Inband blocking for inter-band EN-DC within FR1 (2 CCs)	Same as Table 4.1-2, test case 7.6.2.	Same as Table 4.1-2, test case 7.6.2.	RAN5#87-e
7.6B.3.1 Out-of-band blocking for intra-band contiguous EN-DC in FR1 (2 CCs)	1	"38.521-3_TPanalysis_7.6B.3.1_OOBB_Intra_B_contig.zip"	RAN5#87-e
7.6B.3.2 Out-of-band blocking for intra-band non-contiguous EN-DC in FR1 (2 CCs)	1	"38.521-3_TPanalysis_7.6B.3.2_OOBB_Intra_B_non-contig.zip"	RAN5#87-e
7.6B.3.3 Out-of-band blocking for inter-band EN-DC within FR1 (2 CCs)	1	"38.521-3_TPanalysis_7.6B.3.3_OOBB_Inter_B_within FR1.zip"	RAN5#87-e
7.6B.4.1 Narrow band blocking for intra-band contiguous EN-DC in FR1 (2 CCs)	2	"38.521-3_TPanalysis_7.6B.4.1_NBB_Intra_B_contig.zip"	RAN5#87-e
7.6B.4.2 Narrow band blocking for intra-band non-contiguous EN-DC in FR1 (2 CCs)	1	"38.521-3_TPanalysis_7.6B.4.2_NBB_Intra_B_non-contig.zip"	RAN5#87-e
7.6B.4.3 Narrow band blocking for inter-band EN-DC within FR1 (2 CCs)	Same as Table 4.1-2, test case 7.6.4.	Same as Table 4.1-2, test case 7.6.4.	RAN5#87-e
7.7B.1 Spurious Response for intra-band contiguous EN-DC in FR1 (2 CCs)	Same as Table 4.3-2, test case 7.6B.3.1.	Same as Table 4.3-2, test case 7.6B.3.1.	RAN5#87-e
7.7B.2 Spurious Response for intra-band non-contiguous EN-DC in FR1 (2 CCs)	Same as Table 4.3-2, test case 7.6B.3.2.	Same as Table 4.3-2, test case 7.6B.3.2.	RAN5#87-e
7.7B.3 Spurious Response for inter-band EN-DC within FR1 (2 CCs)	Same as Table 4.3-2, test case 7.6B.3.3.	Same as Table 4.3-2, test case 7.6B.3.3.	RAN5#87-e
7.8B.2.3 Wideband Intermodulation for inter-band EN-DC within FR1	Same as Table 4.1-2, test case 7.8.2.	Same as Table 4.1-2, test case 7.8.2.	RAN5#81
7.9A.1 Spurious emission for 2DL CA	3	"38.521-1_TPanalysis_7.9A_Spurious Emission_DL CA.zip"	RAN5#82

7.9B.3 Spurious Emissions for inter-band EN-DC within FR1	Same as Table 4.1-2, test case 7.9.	Same as Table 4.1-2, test case 7.9.	RAN5#81

4.3.2 Test point analysis per NS value

4.3.2.1 A-MPR and A-SE test cases for EN-DC

FFS

4.3.3 Test point analysis per EN-DC configuration

4.3.3.1 Reference sensitivity test cases for EN-DC

This clause contains information on test point analysis and status for FR1 NR CA test cases in TS 38.521-3 [4] clause 7. The analyses are performed per CA configuration in Table 4.3.3.1-1, Table 4.3.3.1-2 and Table 4.3.3.1-3.

Table 4.3.3.1-1: Reference Sensitivity test cases per EN-DC configuration (2CC)

Band or band configuration	Single UL	Refsens exception, victim band (Note 2)	Requirement coverage (Note 2)	Comments
DC_(n)XAA				
5	Only single UL requirements defined	5		
12	Only single UL requirements defined	12		
38	Only single UL requirements defined	N/A	NE	Added at RAN5#88-e
41	Yes	N/A	NE	Added at RAN5#88-e
48	Only single UL requirements defined	N/A	NE	Added at RAN5#88-e
71	Yes	71	Exception	Added at RAN5#88-e
DC_XA_nXA				
DC_2A_n2A	Only single UL requirements defined	N/A	NE	Added at RAN5#88-e
DC_3A_n3A	Yes	3	Exception	Added at RAN5#88-e
DC_5A_n5A	Only single UL requirements defined	N/A	NE	Added at RAN5#88-e
DC_7A_n7A	Only single UL requirements defined	N/A	NE	Added at RAN5#88-e
DC_8A_n77A	No	8 (HD4), 8 (IMD4)	NE (HD avoid), HD, IMD	Added at RAN5#90-e
DC_11A_n79A	No	11 (HM |2*fB11DL-1*fB79|)	NE (HM avoid), HM	Added at RAN5#90-e
DC_26A_n41A	No	n41 (HD3), 26 (IMD3)	NE (HD avoid), HD, IMD	Added at RAN5#90-e
DC_26A_n77A	No	n41 (HD4), 26 (IMD4)	NE (HD avoid), HD, IMD	Added at RAN5#90-e
DC_26A_n78A	No	n41 (HD4), 26 (IMD4)	NE (HD avoid), HD, IMD	Added at RAN5#90-e
DC_26A_n79A	No	26 (HM |4*fB26DL-1*fB79|)	NE (HM avoid), HM	Added at RAN5#90-e
DC_41A_n41A	Only single UL requirements defined	N/A	NE	Added at RAN5#88-e
DC_41A_n77A (Note 3)	No	41 (HM |3*fB41DL-2*fB77|), 41 (CBI)	HM, CBI	Added at RAN5#90-e HM and CBI cannot be avoided with aggressor still active (n77 UL). Therefore, no NE test point is added.
DC_41A_n78A (Note 3)	No	41 (HM |3*fB41DL-2*fB77|), 41 (CBI)	HM, CBI	Added at RAN5#90-e HM and CBI cannot be avoided with aggressor still active (n77 UL).
DC_48(n)n48AA	Only single UL requirements defined	N/A	NE	Added at RAN5#88-e
DC_66A_n66A	Only single UL requirements defined	N/A	NE	Added at RAN5#88-e
DC_XA-nYA (Note 1)				
DC_1A_n3A	Yes	1 (IMD3) CBI	NE (Note 1) IMD3 CBI	Added at RAN5#89-e
DC_1A_n78A	No	1 (IMD4)	IMD4	Added at RAN5#88-e
DC_3A_n1A	Yes	1 (IMD3) CBI	NE (Note 1) IMD3 CBI	Added at RAN5#89-e

DC_3A_n78A	Yes	3 (IMD2) 3 (IMD4) 3 (HD) n78 (HM)	NE (Note 1) IMD2 PC2&PC3 IMD4 PC2&PC3 HD HM	Added at RAN5#89-e
DC_7A_n1A	No	N/A	NE	Added at RAN5#90-e
DC_7A_n3A	No	7 (IMD4|3*fB3-1*fB7|)	NE, IMD4	Added at RAN5#90-e
DC_7A_n78A	No	N/A	NE	Added at RAN5#89-e
DC_8A_n1A	No	n1 (IMD4 |2*fB1-2*fB8|)	NE, IMD4	Added at RAN5#90-e
DC_8A_n3A	No	8 (IMD4 |3*fB8-1*fB3|), n3A (IMD5 |4*fB8-1*fB3|)	NE, IMD4 IMD5	Added at RAN5#90-e
DC_19A_n79A	No	19 (HM |5*fB19DL-1*fB79|),	NE (HM avoid), HM	Added at RAN5#90-e
DC_20A_n1A	No	N/A	NE	Added at RAN5#90-e
DC_20A_n3A	No	n3 (IMD4), 20 (IMD4)	IMD4, IMD4	Added at RAN5#89-e
DC_20A_n78A	No	20 (IMD4), n78A (HD)	IMD4, HD	Added at RAN5#88-e
DC_40A_n1A	No	N/A	NE	Added at RAN5#89-e
DC_40A_n78A	No	40 (HM),	HM	Added at RAN5#89-e

NOTE 1: If single UL is allowed in a DC_XA-nYA configuration the IMD requirements does not apply for a single UL UE and non-exception requirements are tested.

NOTE 2: Notations used

NE: Non-exception as defined in TS 38.101-3 [7], meaning standalone LTE in TS 36.101 [8] and NR in 38.101-1 [5] requirements apply.

HD: UL Harmonic Distortion, as defined in TS 38.101-3 [7], 7.3B.2.3.1

HM: RX Harmonic Mixing, as defined in TS 38.101-3 [7], 7.3B.2.3.2

IMD: Intermodulation Distortion, as defined in TS 38.101-3 [7], 7.3B.2.3.5

CBI: Cross Band Isolation, as defined in TS 38.101-3 [7], 7.3B.2.3.4

Table 4.3.3.1-2: Reference Sensitivity test cases per EN-DC configuration (3CC)

Band or band configuration	Single UL	UL config	Refsens exception, victim band	Requirement coverage (Note 2)	Fallback CA configurations	Comments
DC_(n)XCA						
41	Yes	DC_(n)41AA	N/A	None	DC_(n)41AA DC_41A_n41A	Added at RAN5#89-e
41	Yes	DC_41A_n41A	N/A	Non-exception	DC_(n)41AA DC_41A_n41A	Added at RAN5#89-e
48	Only single UL requirements defined	DC_(n)48AA	N/A	None	DC_(n)48AA DC_48A_n48A	Added at RAN5#89-e
48	Only single UL requirements defined	DC_48A_n48A	N/A	Non-exception	DC_(n)48AA DC_48A_n48A	Added at RAN5#89-e
DC_XA-nYC						
FFS						
DC_XA-nY(2A)						
FFS						
DC_XA-nYA-nZA						
FFS						
DC_XA-YA-nZA						
DC_1A-7A_n3A	Yes	DC_1A_n3A	No 3CC exception	No test required		
	No	DC_7A_n3A				
DC_1A-7A_n78A	No	DC_1A_n78A	7 (IMD4 |3*fB1-1*fB78|)	IMD4		
	No	DC_7A_n78A	1 (IMD4 |2*fB7-2*fB78|)	IMD4		
DC_1A-8A_n3A	Yes	DC_1A_n3A	No 3CC exception	No test required		
	No	DC_8A_n3A				
DC_1A-20A_n3A	Yes	DC_1A_n3A	No 3CC exception	No test required		
	No	DC_20A_n3A				
DC_1A-20A_n78A	No	DC_1A_n78A	20 (IMD5 |	IMD5		
	No	DC_20A_n78A	1 (IMD3	IMD3		
DC_1A-28A_n3A	Yes	DC_1A_n3A	1 (3 band IMD4)	IMD4	Yes	Added at RAN5#90-e
	No	DC_28A_n3A	No 3CC exception	-	No	
DC_3A-7A_n1A	Yes	DC_3A_n1A	No 3CC exception	No test required		Added at RAN5#90-e
	No	DC_7A_n1A	No 3CC exception			
DC_3A-20A_n1	Yes	DC_3A_n1A	No 3CC exception	No test required		
	No	DC_20A_n1A				
DC_3A-20A_n78	Yes	DC_3A_n78A	No 3CC exception			
	No	DC_20A_n78A	3 (3 band IMD3)	IMD3		
DC_3A-40A_n1A	Yes	DC_3A_n1A	40 (3 band IMD5)	IMD5 if UE supporting dual UL		
	No	DC_40A_n1A	No 3CC exception			
DC_7A-20A_n1A	No	DC_20A_n1A	20 (3 band IMD5)	IMD5		Added at RAN5#90-e
	No	DC_7A_n1A	No 3CC exception	–		
DC_7A-20A_n3A	No	DC_7A_n3A	20 (IMD2 |1*fB7-1*fB3)	NE, IMD2		
	No	DC_20A_n3A	7 (IMD2 |1*fB3+1*fB20)	NE, IMD2		
DC_7A-20A_n78A	No	DC_7A_n78A	20 (3 band IMD2) 20 (3 band IMD5)	IMD2, IMD5		
	No	2 DC_0A_n78A	7 (3 band IMD2)	IMD2		
DC_7A-28A_n3A	No	DC_7A_n3A	28 (3 band IMD2)	IMD2		Added at RAN5#90-e

	No	DC_28A_n3A	7 (3 band IMD3)	IMD3		
DC_(n)XAA-nYA						
FFS						
DC_XA_nXA_nYA						
FFS						

NOTE 1: If single UL is allowed in a DC_XA-nYA configuration the IMD requirements does not apply for a single UL UE
NOTE 2: Notations used
NE: Non-exception as defined in TS 38.101-3 [7], meaning standalone LTE in TS 36.101 [8] and NR in 38.101-1 [5] requirements apply.
HD: UL Harmonic Distortion, as defined in TS 38.101-3 [7], 7.3B.2.3.1
HM: RX Harmonic Mixing, as defined in TS 38.101-3 [7], 7.3B.2.3.2
IMD: Intermodulation Distortion, as defined in TS 38.101-3 [7], 7.3B.2.3.5
CBI: Cross Band Isolation, as defined in TS 38.101-3 [7], 7.3B.2.3.4

Table 4.3.3.1-3: Reference Sensitivity test cases per EN-DC configuration (4CC)

Band or band configuration	Single UL	UL config	Refsens exception, victim band	Requirement coverage (Note 2)	Fallback CA configurations	Comments
DC_(n)XCA						
41	Yes	DC_(n)41AA	N/A	None	DC_(n)41CA DC_41C_n41A	Added at RAN5#89-e
41	Yes	DC_41A_n41A	N/A	Non-exception	N/A	Added at RAN5#89-e
48	Only single UL requirements defined	DC_(n)48AA	N/A	None	DC_(n)48CA DC_48C_n48A	Added at RAN5#89-e
48	Only single UL requirements defined	DC_48A_n48A	N/A	Non-exception	N/A	Added at RAN5#89-e
DC_XA-nY(2A)-nZA						
FFS						
DC_XA-nYA-nZC						
FFS						

NOTE 1: If single UL is allowed in a DC_XA-nYA configuration the IMD requirements does not apply for a single UL UE.
NOTE 2: Notations used
NE: Non-exception as defined in TS 38.101-3 [7], meaning standalone LTE in TS 36.101 [8] and NR in 38.101-1 [5] requirements apply.
HD: UL Harmonic Distortion, as defined in TS 38.101-3 [7], 7.3B.2.3.1
HM: RX Harmonic Mixing, as defined in TS 38.101-3 [7], 7.3B.2.3.2
IMD: Intermodulation Distortion, as defined in TS 38.101-3 [7], 7.3B.2.3.5
CBI: Cross Band Isolation, as defined in TS 38.101-3 [7], 7.3B.2.3.4

4.3.3.2 Spurious emissions test cases for EN-DC

In this case, it is sufficient to verify the minimum requirements in frequency ranges affected by 2nd and 3rd order intermodulation products. The frequency ranges and UL RB allocations used in the test are calculated here.

The analyses are performed per EN-DC configuration and are stored as zip-files as defined in annex A.

Table 4.3.3.2-1: Frequency range analysis availability per EN-DC configuration

EN-DC config	Justification	Comments
DC_1A_n3A	38.521-3_TpAnalysisSpur(DC_1A-n3A).zip	Added at RAN5#89-e
DC_1A_n78A	38.521-3_TpAnalysisSpur(DC_1A_n78A).zip	Added at RAN5#88-e
DC_2A_n5A	38.521-3_TpAnalysisSpur(DC_2A_n5A).zip	Added at RAN5#89-e
DC_2A_n41A	38.521-3_TpAnalysisSpur(DC_2A_n41A).zip	Added at RAN5#90-e
DC_2A_n66A	38.521-3_TpAnalysisSpur(DC_2A_n66A).zip	Added at RAN5#88-e
DC_2A_n78A	38.521-3_TpAnalysisSpur(DC_2A_n78A).zip	Added at RAN5#88-e
DC_3A_n1A	38.521-3_TpAnalysisSpur(DC_3A_n1A).zip	Added at RAN5#88-e
DC_3A_n7A	38.521-3_TpAnalysisSpur(DC_3A_n7A).zip	Added at RAN5#88-e
DC_3A_n41A	38.521-3_TpAnalysisSpur(DC_3A-n41A)_v1.zip	Added at RAN5#86-e
DC_3A_n78A	38.521-3_TpAnalysisSpur(DC_3A_n78A).zip	Added at RAN5#88-e
DC_3A_n79A	38.521-3_TpAnalysisSpur(DC_3A-n79A).zip	Added at RAN5#83
DC_5A_n2A	38.521-3_TpAnalysisSpur(DC_5A_n2A).zip	Added at RAN5#90-e
DC_5A_n66A	38.521-3_TpAnalysisSpur(DC_5A_n66A)_v1.zip	Added at RAN5#88-e
DC_5A_n78A	38.521-3_TpAnalysisSpur(DC_5A_n78A)_v1.zip	Added at RAN5#88-e
DC_7A_n1A	38.521-3_TpAnalysisSpur(DC_7A_n1A).zip	Added at RAN5#88-e
DC_7A_n3A	38.521-3_TpAnalysisSpur(DC_7A_n3A).zip	Added at RAN5#90-e
DC_7A_n66A	38.521-3_TpAnalysisSpur(DC_7A_n66A).zip	Added at RAN5#88-e
DC_7A_n78A	38.521-3_TpAnalysisSpur(DC_7A_n78A).zip	Added at RAN5#88-e
DC_8A_n1A	38.521-3_TpAnalysisSpur(DC_8A_n1A).zip	Added at RAN5#88-e
DC_8A_n3A	38.521-3_TpAnalysisSpur(DC_8A_n3A).zip	Added at RAN5#90-e
DC_8A_n41A	38.521-3_TpAnalysisSpur(DC_8A-n41A)_v1.zip	Added at RAN5#86-e
DC_8A_n77A	38.521-3_TpAnalysisSpur(DC_8A_n77A).zip	Added at RAN5#90-e
DC_8A_n78A	38.521-3_TpAnalysisSpur(DC_8A_n78A).zip	Added at RAN5#89-e
DC_11A_n77A	38.521-3_TpAnalysisSpur(DC_11A_n77A).zip	Added at RAN5#90-e
DC_11A_n78A	38.521-3_TpAnalysisSpur(DC_11A_n78A).zip	Added at RAN5#90-e
DC_11A_n79A	38.521-3_TpAnalysisSpur(DC_11A_n79A).zip	Added at RAN5#90-e
DC_12A_n66A	38.521-3_TpAnalysisSpur(DC_12A_n66A).zip	Added at RAN5#89-e
DC_12A_n78A	38.521-3_TpAnalysisSpur(DC_12A_n78A).zip	Added at RAN5#88-e
DC_13A_n2A	38.521-3_TpAnalysisSpur(DC_13A_n2A).zip	Added at RAN5#90-e
DC_13A_n66A	38.521-3_TpAnalysisSpur(DC_13A_n66A).zip	Added at RAN5#89-e
DC_20A_n1A	38.521-3_TpAnalysisSpur(DC_20A-n1A).zip	Added at RAN5#90-e
DC_20A_n3A	38.521-3_TpAnalysisSpur(DC_20A-n3A).zip	Added at RAN5#89-e
DC_25A_n41A	38.521-3_TpAnalysisSpur(DC_25A_n41A).zip	Added at RAN5#90-e
DC_26A_n41A	38.521-3_TpAnalysisSpur(DC_26A_n41A).zip	Added at RAN5#90-e
DC_26A_n77A	38.521-3_TpAnalysisSpur(DC_26A_n77A).zip	Added at RAN5#90-e
DC_26A_n78A	38.521-3_TpAnalysisSpur(DC_26A_n78A).zip	Added at RAN5#90-e
DC_26A_n79A	38.521-3_TpAnalysisSpur(DC_26A_n79A).zip	Added at RAN5#90-e
DC_28A_n3A	38.521-3_TpAnalysisSpur(DC_28A_n3A).zip	Added at RAN5#88-e
DC_30A_n5A	38.521-3_TpAnalysisSpur(DC_30A_n5A).zip	Added at RAN5#89-e
DC_39A_n41A	38.521-3_TpAnalysisSpur(DC_39A-n41A).zip	Added at RAN5#83
DC_39A_n79A	38.521-3_TpAnalysisSpur(DC_39A-n79A).zip	Added at RAN5#83
DC_40A_n1A	38.521-3_TpAnalysisSpur(DC_40A_n1A).zip	Added at RAN5#88-e
DC_40A_n41A	38.521-3_TpAnalysisSpur(DC_40A-n41A).zip	Added at RAN5#83
DC_40A_n78A	38.521-3_TpAnalysisSpur(DC_40A_n78A).zip	Added at RAN5#88-e
DC_41A_n77A	38.521-3_TpAnalysisSpur(DC_41A_n77A).zip	Added at RAN5#90-e
DC_41A_n78A	38.521-3_TpAnalysisSpur(DC_41A_n78A).zip	Added at RAN5#90-e
DC_41A_n79A	38.521-3_TpAnalysisSpur(DC_41A-n79A).zip	Added at RAN5#83
DC_48A_n5A	38.521-3_TpAnalysisSpur(DC_48A_n5A).zip	Added at RAN5#90-e
DC_48A_n66A	38.521-3_TpAnalysisSpur(DC_48A_n66A).zip	Added at RAN5#90-e
DC_66A_n2A	38.521-3_TpAnalysisSpur(DC_66A_n2A).zip	Added at RAN5#88-e
DC_66A_n5A	38.521-3_TpAnalysisSpur(DC_66A-n5A).zip	Added at RAN5#87-e
DC_66A_n41A	38.521-3_TpAnalysisSpur(DC_66A-n41A).zip	Added at RAN5#90-e
DC_66A_n78A	38.521-3_TpAnalysisSpur(DC_66A_n78A)_v1.zip	Added at RAN5#88-e

Annex A: Derivation documents

The documents and spreadsheets used to give the background for the selected test points for each test case are included in the present document as zip files.

The name of the zip shall:

- Include a prefix allowing easier grouping of fi"*38.521-1_TPanalysis*", "*38.521-2_TPanalysis*" or "*38.521-3_TPanalysis*".les in the same area, e.g. .
- Include Test Case Number(s) and an abbreviation Test Case Name, e.g. "*6.2.1_MOP*", "*7.6.2.InB_Block*" or "*6.2.1_MOP+6.2.2_MPR*".
- In cases where multiple analysis is needed per test cases, e.g. for different CA configurations, include the CA band combination applicable in the parentheses, e.g. add "*(1A-3A)*" for CA_1A-3A.

Concatenated example file name: "*38.521-1_TPanalysis_6.2.1_MOP.zip*".

If there is an update of test points for a test case the old corresponding zip file shall be replaced with a new zip file with a version stepping in the file name. e.g. "nnn_v2.zip". The aim is to provide a reference to completed test cases, so that test points for similar test cases can be selected on a common basis.

For cases when no spreadsheet is used then the principles for selecting reference sensitivity test points are described in Annex B, C or D.

Annex B:
Principles for test point selection for NR CA reference sensitivity test cases

B.1 General

From TS 38.521-1 [2] (Table 7.3.2.4.1-1), the initial conditions used for NR RX reference sensitivity is given below.

Initial Conditions				
Test Environment as specified in TS 38.508-1 [5] subclause 4.1			Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 38.508-1 [5] subclause4.3.1			Low range, Mid range, High range (NOTE 4)	
Test Channel Bandwidths as specified in TS 38.508-1 [5] subclause 4.3.1			Lowest, Mid, Highest (NOTE 4) Lowest UL / Lowest DL, Lowest UL / Highest DL (NOTE 3)	
Test SCS as specified in Table 5.3.5-1			Lowest	
Test Parameters				
Test ID	**Downlink Configuration**		**Uplink Configuration**	
	Modulation	**RB allocation**	**Modulation**	**RB allocation**
1	CP-OFDM QPSK	Full RB (NOTE 1)	DFT-s-OFDM QPSK	REFERENCE SENSITIVITY (NOTE 2)
NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2. NOTE 2: REFERENCE SENSITIVITY refers to Table 7.3.2.4.1-3 which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band. NOTE 3: According to asymmetric channel bandwidths specified in clause 5.3.6. NOTE 4: For n70, in addition to default test configurations, additional configurations shall be used to verify reference sensitivity requirements with the UE TX-RX frequency separation of 295MHz (table 5.4.4-1): 5 MHz CH BW with DL @ low range, UL @ mid range 5 MHz CH BW with DL @ mid range, UL @ high range 10 MHz CH BW with DL @ low range, UL @ high range				

For reference, the initial test condition for E-UTRA-CA (inter-band DL CA and UL CA) is listed below: (Table 7.3B.4.1-1 in TS 38.521-1 [2])

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1				NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2				B: Low range, High range C: Low range, High range (Note 4)					
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.				Lowest N_{RB_agg}, Highest N_{RB_agg} (Notes 3, 4)					
Test Parameters for CA Configurations									
CA Configuration / N_{RB_agg}		**DL Allocation**		**UL Allocation**					
PCC N_{RB}	**SCCs N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
6	25	QPSK	6+25	QPSK	6	P_6@0	-	-	-
15	50	QPSK	15+50	QPSK	15	P_15@0	-	-	-
25	25	QPSK	25+25	QPSK	20	P_20@0	-	-	-

B.2 Test case structure

This approach which is described in this clause is relying on certain properties of the RAN4 CA requirements and applies to both NR CA and EN-DC.

1. For E-UTRA, fallbacks are skipped unless there is a documented exception in TS36.521-2. This may cause that a fallback is skipped even if no technical analysis has been made leading to insufficient testing of demanding CA configurations. For NR fallback can only be skipped if there has been a technical analysis performed in TR 38.905.

2. The RAN4 decision to only specify the affected (aggressor and victim) bands for an exception enables a different approach than in E-UTRA that in most cases makes fallback analysis redundant. This is not entirely true for requirements under clause 7.3A.5 and 7.3A.6 of TS38.101-1 [5] but it is assumed that the same approach can be used also in those cases as it greatly simplifies test cases.

3. Test cases can be split into *default* and *additional* test cases where default test cases only test where there is no exception (single carrier requirements apply), and additional only test the exceptions in TS 38.101-1 [5] clause 7.3A.

4. Default test cases need to be defined from 2 up to 5 CCs. Since they cover no exception, no fallback analysis is required, and the applicability rule should say that only highest CC number is required (similar to other Rx tests).

5. As the *default* test cases are not covering any CA exceptions, there is no need to configure UL CA in these test cases. Single UL configuration is sufficient to fulfil the test purpose.

6. Additional test cases only need to be defined for 2CC (and for intermodulation also 3CC) since this is sufficient for testing the exception. Adding more CCs is not considered to affect the test result and does not add any value.

7. Additional test cases only need to consider pure inter-band configurations since requirements are the same for intra-band contiguous or non-contiguous, and the essential aspect to test is the interference between bands.

8. It is important for sufficient test coverage to ensure that all band combinations with the highest number of CCs supported in the UE can always be tested.

9. The highest supported CC number may be with a band including an exception that can be avoided by setting a different test frequency (e.g. harmonic interference). In such cases, there is a need to include test points in the *default* test case so that this CA configuration can be tested without an exception (see example 1 below).

10. The highest supported CC number may be with a band including an exception that cannot be avoided by setting a different test frequency (e.g. cross band isolation). In this case the test requirements of the *default* test that are normally general for any CA config need to include this specific exception requirement. In addition, one fallback configuration needs to be tested to ensure test coverage of the single carrier requirement for the victim band that applies in this case. In order to simplify test applicability this fallback configuration will be specified inside the higher order test case (see example 2 below).

11. The highest supported CC number may be with a band including a limitation that is not present in the lower order fallback (e.g. UL is not possible in one of the bands). In this case, one fallback configuration needs to be tested to ensure test coverage of the single carrier requirement with UL active in the band. In order to simplify test applicability this fallback configuration will be specified inside the higher order test case.

12. To ensure that it has been checked that the CA configuration has been fully analysed with regard to test configuration and fallback testing, the CA configuration is listed in TR 38.905.

B.3 Test Environment

Reference sensitivity is one of the critical test cases for NR. Considering NR CA testing scenario is very similar to E-UTRA_CA test case, similar Test Environment shall be used for NR CA testing, i.e. NC, TL/VL, TL/VH, TH/VL, TH/VH.

B.4 Test Frequencies selection

In E-UTRA DL CA and UL CA reference sensitivity testing, Low range and High range are selected for intra-band CA testing. Mid range is selected for inter band E-UTRA CA testing.

Considering NR CA testing scenario is very similar to E-UTRA_CA test case, similar Test Frequencies should be used for NR CA default case.

It is proposed that Low and High Range are tested as default for intra-band and mid range for inter-band. For CA combinations containing intra-band configuration in an inter-band CA configuration it is proposed that low and high range are tested for intra-band CA and mid channel for inter-band without intra-band component. It is also proposed that the fallback configurations from intra-band configuration to single carrier component do not need to be tested even if the test frequency would differ (e.g. XA-YC -> XA-YA fallback does not need to be tested even if YC is tested with low/high frequency and YA would be tested with mid frequency).

For CA configurations affected by exceptions the test frequency cannot be freely chosen. One test frequency per exception requirement is sufficient to test the requirement, in addition to testing the case where the exception is avoided. This is indicated in table 2.3-2. Exceptions in TS 38.101-1 [5] clause 7.3A.5 (2UL intermodulation) are not specified since the test frequency and channel bandwidth is already specified in TS 38.101-1 [5].

Table B.4-1: Test frequency selection per band pair for UL harmonics exception

Band pair (Note 2)	Frequency	Channel BW [MHz]	Comment
n1A / n77A	Mid / Low	Highest/Highest	Non-exception. To be used in test cases 7.3A.1 to 7.3A.4
	Mid / 3900	20/ Highest	Exception Note 2 of TS 38.101 table 7.3A.4-1
	Mid / 3870	20/20	Exception Note 3 of TS 38.101 table 7.3A.4-1
n3A / n77A	TBD/TBD	Highest/Highest	Non-exception. To be used in test cases 7.3A.1 to 7.3A.4
	TBD/TBD	Highest/Highest	Exception Note 2 of TS38.101 table 7.3A.4-1
	TBD/TBD	20/20	Exception Note 3 of TS38.101 table 7.3A.4-1
n3A / n78A	Mid/High	Highest/Highest	Non-exception. To be used in test cases 7.3A.1 to 7.3A.4
	Mid/3495 MHz	Highest/Highest	Exception Note 2 of TS38.101 table 7.3A.4-1
	Mid/3465 MHz	20/20	Exception Note 3 of TS38.101 table 7.3A.4-1
n8A / n78A	Mid/High	Highest/Highest	Non-exception. To be used in test cases 7.3A.1 to 7.3A.4
	Mid/3590 MHz	Highest/Highest	Exception Note 5 of TS38.101 table 7.3A.4-1
n70A / **n71A**	Mid/High	Highest/Highest	Non-exception. To be used in test cases 7.3A.1 to 7.3A.4
	Low/Low	Highest / 10	Exception Note 9 of TS38.101 table 7.3A.4-1 n71 UL RB allocation 20@10
	Low/Low	5 / 5	Exception Note 9 of TS38.101 table 7.3A.4-1 n71 UL RB allocation 8@10

NOTE 1: This selection is used in test case 7.3A.1_1 unless otherwise stated.
NOTE 2: Aggressor band in bold.

Proposal 2a: Low range and high range for intra band CA and mid range for inter-band CA shall be selected for NR in *default* test cases 7.3A.1 to 7.3A.4 in general, but final selection is band dependent. For CA combinations containing intra-band configuration in an inter-band CA configuration low and high range shall be selected for intra-band CA and mid channel for inter-band without intra-band component. The fallback configurations from intra-band configuration to single carrier component do not need to be tested even if the test frequency would differ.

Proposal 2b: In the *additional* test case, one test frequency per exception is selected.

B.5 Test Channel Bandwidth selection

The objective is how to verify the NR CA reference sensitivity. In intra-band E-UTRA CA reference sensitivity testing, two extreme bandwidth combinations corresponding to Lowest NRB_agg Highest NRB_agg are selected. Highest NRB_agg is selected for inter band E-UTRA CA testing.

As a simplification the highest aggregated channel bandwidth is proposed to test NR CA reference sensitivity.

Proposal 3: Highest aggregated channel bandwidth combinations shall be selected for NR CA reference sensitivity measurement. (Highest NRB_agg).

B.6 Modulation selections

QPSK is used for both uplink and downlink modulations for E-UTRA reference sensitivity measurement which is the same as for E-UTRA standalone reference sensitivity testing. There is no particular reason to deviate from current E-UTRA configurations of modulation scheme selection. NR modulations shall also follow what is selected in standalone NR testing.

B.7 Examples

Example 1 (highest CC number has an exception that can be avoided):

- UE supports CA_XA-YA-ZA-RA (4DL CA)
  - CA_X-Y has an exception if testing Low+Low freq
  - CA_X-Y has no exception if testing Mid+Mid freq
  - Other bands pairs have no exception

Applicable Test cases for the example:

7.3A.1 2CC non-exception/“default”

Skip test (no fallback analysis required)

7.3B 3CC non-exception/“default”

Skip test (no fallback analysis required)

7.3A.3 4CC non-exception/“default”

Test CA_XA-YA-ZA-RA in Mid+Mid freq in bands X and Y respectively avoiding the exception

7.3A.1_1 2CC exception/“additional”

Test CA_X-Y in Low+Low freq

Example 2 (highest CC number has an exception that cannot be avoided):

- UE supports CA_XA-YA-ZA-RA (4DL CA)
  - CA_X-Y has an exception always (e.g. cross band isolation) with band Y being the victim
  - Other bands pairs have no exception

Applicable Test cases for the example:

7.3A.1 2CC non-exception/“default”

Skip test (no fallback analysis required)

7.3A.2 3CC non-exception/“default”

Skip test (no fallback analysis required)

7.3A.3 4CC non-exception/“default”

Test CA_XA-YA-ZA-RA and add exception in test requirements

Add test points for 3CC fallback avoiding the exception CA_YA-ZA-RA

7.3A.1_1 2CC exception/“additional”

Test CA_X-Y

B.8 Current test completion status per CA configuration

The completion status per EN-DC configuration is documented in clause 4.3.3.1.

Annex C: Principles for test point selection for FR2 NR CA reference sensitivity test cases

FFS

Annex D: Principles for test point selection for EN-DC reference sensitivity test cases

D.1 General

The purpose of this Annex is to describe the test point selection of NR and E-UTRA carriers for RX sensitivity testing within FR1. Considering the high number of EN-DC band combinations the procedure has been developed to carefully reduce the number of test points. Since the objective of TS 38.521-3 [4] specification is providing conformance testing requirement for NR in the case of EN-DC scenarios, the number of E-UTRA test points can be reduced.

TS 38.521-3 [4] include exception test cases and non-exception test cases for inter-band EN-DC with FR1. The exceptional test cases must be tested as per configurations defined in TS 38.521-3 [4]. The procedure covers selection of both non-exceptional case and exception cases.

When no NR or E-UTRA exception or additional requirements exist, the E-UTRA anchor is configured such that it does not interfere with NR operation (based on TS 38.101-3 [7] clause 6.1 and 7.1). The EN-DC testing is performed in E-UTRA anchor-agnostic mode. E-UTRA is tested but in SA as per TS 38.521-1 [2].

General initial conditions to be used for NR RX sensitivity testing are:

Table D.1-1: Initial test condition for standalone NR RX sensitivity

Initial Conditions				
Test Environment as specified in TS 38.508-1 [5] subclause 4.1			Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 38.508-1 [5] subclause 4.3.1			Low range, Mid range, High range	
Test Channel Bandwidths as specified in TS 38.508-1 [5] subclause 4.3.1			Lowest, Mid, Highest	
Test SCS as specified in Table 5.3.5-1			Lowest supported SCS per test channel BW	
Test Parameters				
Test ID	**Downlink Configuration**		**Uplink Configuration**	
	Modulation	**RB allocation**	**Modulation**	**RB allocation**
1	CP-OFDM QPSK	Full RB (Note 1)	DFT-s-OFDM QPSK	REFERENCE SENSITIVITY (Note 2)

D.2 Requirements

D.2.1 Defined EN-DC configurations

Downlink EN-DC configurations in 38.101-3 V16.5.0 clause 5.5B are:
Currently defined downlink EN-DC configurations in 38.101-3 [7] V16.6.0 clause 5.5B are:

- Intra-band contiguous EN-DC configurations within a single band includes max 2 NR CCs and max 3 E-UTRA CC, but in total max 4 CCs.
  - Intra-band non-contiguous EN-DC configurations within a single band does not include NR CA (max 1NR CC), only E-UTRA CA (max 3 E-UTRA CC)
  - Inter-band EN-DC configurations include up to 6 bands and 8 CCs but for NR the maximum is:
    - 2 NR CCs in 1 band (nXC or nX(2A))
    - 4 NR CCs in 2 bands (nXA-nYA, nXA-nYC, nXA-nY(2A), nX(2A)-nY(2A))
    - Combinations of intra-band contiguous EN-DC + inter-band E-UTRA/NR CA.
      - Combinations of intra-band non-contiguous EN-DC + inter-band E-UTRA/NR CA.

Currently defined uplink EN-DC configurations in TS 38.101-3 [7] V16.6.0 clause 5.5B are:

- The UL configuration contains at least 1 E-UTRA CC and 1 NR CC, meaning 2 UL CC.

  - 3 UL CC configurations are also defined only with intra-band contiguous CA on either E-UTRA or NR (DC_XA-nYC or DC_XC-nYA).

D.2.2 Definition of exception requirements

Before going into the test case details, the term “exception” needs to be clarified since it is different for EN-DC compared to SA. We can have the following situations:

1. EN-DC config without exception

a. Anchor agnostic, only need to be tested for UE not supporting SA

2. EN-DC config with exception when the exception applies

b. Need to be tested for all EN-DC UEs

3. EN-DC config with exception when the exception does not apply (single carrier requirement applies)

c. Need to be tested for some exception types. Which exception types that need to this test coverage is defined in clause D.2.9.3.

d. In some cases, it is not possible to avoid the exception.

e. Anchor agnostic approach shall not be followed. It is important that E-UTRA aggressor is active to test performance when the interferer falls outside of the victim carrier

D.2.3 Reference sensitivity

Intra-band

Unlike for standalone NR, there are exceptions for intra-band operation, currently limited to band 3 for non-contiguous operation and band 71 for contiguous operation.

The exceptions in band 3 is due to 2UL intermodulation interference making it similar to the corresponding inter-band intermodulation case. This scenario did not happen in standalone NR mode due to that there is no UL CA defined for CA_n3(2A).

It can therefore be treated in the same way as inter-band intermodulation and added in the “additional” test case.

The intra-band contiguous exceptions are not expected to be very common. Currently only band 71 is affected, which can be added in the “additional” test case.

Inter-band

For both SA and NSA there are 4 different types of interference related to inter-band operation that results in refsens exception if the frequency relation of the exception is fulfilled.

Table D.2.3-1: Exception types for inter-band (2 bands)

Exception types	Aggressor	Victim	Frequency relation
UL harmonic interference (HD)	Low band UL	High band DL	$a*f_{UL\_LB} = f_{DL\_HB}$
Receiver Harmonic Mixing (HM)	Low band DL LO and High band UL	Low band DL	$b*f_{DL\_LB} + c*f_{UL\_HB} = f_{DL\_LB}$
Intermodulation due to Dual uplink (IMD)	Low band UL and High band UL	DL	$a*f_{UL\_LB} + c*f_{UL\_HB} = f_{DL\_LB}$ or $a*f_{UL\_LB} + c*f_{UL\_HB} = f_{DL\_HB}$
Cross band isolation (CBI)	UL on other than victim band	DL	

The exception requirements for dual uplink intermodulation apply only for a RAN4 specified test frequency setting per UL configuration.

More details on how the exception requirements were derived by RAN4 can be found in TR 37.863 (Rel-15), TR 37.716 (Rel-16) and TR 37.817 (Rel-17). These RAN4 TRs can be used to identify all the applicable requirements for a certain EN-DC configuration which are otherwise spread out over multiple sections in TS 38.101-3 [7]. Additionally, the TRs specify exactly which aggressors that contribute to the exception for IMD which is not defined in the TS. Some terminology from the mentioned TRs are re-used here to calculate test frequency for avoiding the exceptions, namely:

BW_{INT}: Effective bandwidth of the interference falling into the victim band.

F_{INT}: Interference centre frequency. If $|F_{INT}| \geq (BW_{INT}+BW_{victim})/2$ the interference is not overlapping the victim carrier and exception requirements do not apply.

RAN5 have agreed for SA tests that all the interference types except intermodulation can be tested with 1UL. Doing the same for NSA would simplify the test cases and would also mean that the main interferer (the aggressor) can be tested with higher power.

Most other Rx requirements than reference sensitivity in intra-band contiguous EN-DC configuration require a configuration with 2UL however, meaning the “default” test cases need to be tested with 2UL active in this scenario

There are combinations of intra-band contiguous/non-contiguous EN-DC + inter-band E-UTRA/NR CA which are listed in the inter-band EN-DC configuration tables of T S38.101-3 [7]. These configurations do not add any exception requirements and are therefore proposed not to be tested unless they contain maximum number of NR CCs supported by the UE.

D.2.4 Rx requirements other than reference sensitivity

The requirements are in some cases referring back to standalone requirements in TS 36.101/ TS 38.101-1. In other cases, specific exceptions for EN-DC are defined in TS 38.101-3 [7]. This is summarized in Table 2.1.3-1.

Table D.2.4-1: Rx requirements

Clause	Title	Requirement		
		Intra-band contiguous	Intra-band non-contiguous	Inter-band
7.4B	Max input level	Exception with 2UL	Standalone	Standalone
7.5B	ACS	Exception with 2UL	Standalone	Standalone
7.6B.2	IBB	Exception with 2UL	Standalone	Standalone
7.6B.3	OOBB	Exception with 2UL	Standalone	Standalone (only 2 band needed)
7.6B.4	NBB	Exception with 2UL	Standalone	Standalone
7.7B	Spurious response	Exception with 2UL	Standalone	Standalone (only 2 band needed)
7.8B	Intermodulation	Exception with 2UL	Standalone	Standalone
7.9B	Rx spurious	Standalone	Standalone	Standalone

D.2.5 Test case structure and test coverage

As seen above, the EN-DC requirements are similar to the SA requirements from a structure point of view. Therefore, the same test case structure as for SA where test cases are separated into “default” and “additional” test cases can be considered for EN-DC which can greatly reduce complexity in the RAN5 spec as well as reducing the need to complicated fallback test analysis. However, the additional complexity of EN-DC requirements means that a clear separation between exception (“additional”) test cases and “default” test cases is not as straightforward.

The following principles are suggested for EN-DC Rx test cases:

1. Let the 2CC test cases cover all reference sensitivity exceptions. Include test coverage of reference sensitivity when exception is avoided.

2. The 2CC test cases always need to be tested even for UE supporting more CCs since some of the exceptions are not covered in >2CC test cases.

3. Let the 3CC-5CC test cases cover mainly non-exceptions, for EN-DC configurations where no exception apply (anchor agnostic testing), and when the exception is avoided (not anchor agnostic). 2UL 3 band intermodulation exception exceptions are tested in the 3CC test.

4. Highest number of NR CCs per band combination supported in the UE need to be tested. Anchor agnostic testing unless the EN-DC configuration has an exception requirement. Only 1 E-UTRA CC need to be tested for intra-band non-contiguous EN-DC and inter-band EN-DC. Maximum number of E-UTRA CCs need to be tested for intra-band contiguous EN-DC (1 band). This is further explained in clause 3.2.6.

5. Since requirements for 3UL and 2UL for the Rel-16 EN-DC configurations are the same there is no technical reason to test receiver requirements with 3UL configured. This may change in Rel-17 but will not have an impact on structure if we can add 3UL as new test points in existing tests.

6. The test configuration shall be with 1UL or 2UL active depending on the exception type as indicated in Table D.2.5-1.

Table D.2.5-1: UL configuration to test

Exception type	Intra-band contiguous EN-DC	Intra-band non-contiguous EN-DC	Inter-band EN-DC
Intra-band contiguous (band 71)	2UL[1]	-	-
Intra-band non-contiguous (band 3)	-	2UL[1]	-
UL harmonics, Rx mixing, cross band isolation	-	-	2UL
2UL Intermodulation	-	-	2UL[1]
EN-DC config w/o exception	2UL[2]	1UL (anchor agnostic)[3]	1UL (anchor agnostic)
NOTE 1: Exception requirements in this apply only with 2UL and apply only for one test frequency/BW setting. NOTE 2: Other than refsens requirements in this configuration mandate 2UL NOTE 3: Requirements in this configuration mandate 2UL (TS 38.101-3, 7.1) unless UE supports only single UL. However, there is no Rel-16 configuration w/o exception where 2UL is supported meaning only 1UL is configured in the test case			

7. Void

8. Other than reference sensitivity test cases should use the MSD=0 test points defined in reference sensitivity test case, or minimum achievable MSD. This is currently ensured by using anchor agnostic configuration for inter-band EN-DC, but other solutions are not precluded.

9. Test cases need to be defined from 2 up to 5 CCs for Rel-16. The number of CCs may increase in Rel-17. The reason for not needing more than 5CC is that it is sufficient to test max number of NR CCs as well as all defined exceptions.

D.2.6 EN-DC configurations to test

D.2.6.1 Lower order fallbacks

In E-UTRA RAN5 specifications, the lower order CA fallback cases are important in the test point analysis. If requirements are the same in the lower order fallback, then the fallback can be skipped to save test time. The same principle can be applied for EN-DC, but there is a need to keep in mind that this is only for CA fallback and not EN-DC fallback. Additionally, lower order CA fallbacks can be split into E-UTRA CA fallbacks and NR CA fallbacks.

EN-DC fallback

EN-DC fallback does not need to be handled since this would mean falling back to pure E-UTRA operation, which is covered by TS 36.521-1 test cases.

E-UTRA CA fallback

Since it has been agreed to use anchor agnostic approach for EN-DC test cases (TS 38.521-3 [4], clause 4.6), it is enough to test with 1 E-UTRA CC unless more CCs are needed to test an exception requirement in TS 38.101-3 [7].

There are exception requirements in TS 38.101-3 [7]for intra-band-contiguous EN-DC (not reference sensitivity, but other Rx requirements as shown in clause D.2.3) meaning the maximum number of E-UTRA CCs need to be tested in this scenario.

E-UTRA CA fallback in intra-band contiguous EN-DC can result in change of EN-DC config from contiguous to non-contiguous (e.g. DC_(n)41DA -> DC_41C_n41A). This change means requirements are different, but since the non-contiguous requirement is same as the standalone requirement it does not need to be tested.

E-UTRA CA fallback in inter-band contiguous EN-DC can result in change of EN-DC config to intra-band contiguous (e.g. DC_1A-(n)41AA->DC_(n)41AA). This change means requirements are different, implying that both EN-DC config types may need to be tested. See clause D.2.6.2.

NR CA fallback

As shown in clause D.2.1, the maximum number of NR CCs for Rel-16 is 4, which only occurs in inter-band EN-DC (2 NR bands). The fallback to 2-3 NR CCs (2 bands) don't need to be tested since requirements are still the same. The fallback to single NR band with 1CC may need to be tested in the cases where the 2CC configuration had a reference sensitivity exception that is avoided in the higher order case.

Table D.2.6.1-1: EN-DC configurations requiring testing and max number of CCs

Clause number	Title	Requirement coverage	EN-DC configuration type		
			Intra-band cont EN-DC	Intra-band non-cont EN-DC	Inter-band EN-DC
7.3B.2.1	Reference sensitivity for Intra-band Contiguous EN-DC (2 CCs)	1. Band n71 exceptions 2. standalone NR requirements	Yes	-	-
7.3B.2.2	Reference sensitivity for Intra-band non-contiguous EN-DC (2 CCs)	1. Band n3 exceptions 2. standalone NR requirements	-	Yes	-
7.3B.2.3	Reference sensitivity for Inter-band EN-DC within FR1 (2 CCs)	1. UL harmonics, harmonic mixing, cross band isolation, 2UL intermodulation (2 band) 2. standalone NR requirements	-	-	Yes
7.3B.2.3_1.1	Reference sensitivity for EN-DC within FR1 (3 CCs)	1. standalone NR requirements, 2. 2UL intermodulation (3 band)	Yes (2E-UTRA+1NR, Note 1)	-	Yes (1E-UTRA+2NR, 2E-UTRA+1NR, Note 2)
7.3B.2.3_1.2	Reference sensitivity for EN-DC within FR1 (4 CCs)	1. standalone NR requirements	Yes (3E-UTRA+1NR, Note 1)	-	Yes (1E-UTRA+3NR, Note 4)
7.3B.2.3_1.2	Reference sensitivity for EN-DC within FR1 (5 CCs)	1. standalone NR requirements	-	-	Yes (1E-UTRA+4NR, Note 4)

NOTE 1: This is needed for other than refsens Rx test case that refers back to refsens test config table
NOTE 2: For EN-DC configs affected by 2UL intermodulation, 2E-UTRA+1NR may need to be tested when E-UTRA CC1 is aggressor and E-UTRA CC2 is victim or when E-UTRA CC1 and CC2 are aggressors and NR CC is victim)
NOTE 3: Void
NOTE 4: Test of max number of NR CCs. Anchor agnostic testing unless the EN-DC configuration has an exception requirement

D.2.6.2 EN-DC configurations requiring testing and max number of CCs

There is an issue in only requiring highest CC number to be tested, since this rule can only be applied within one EN-DC configuration type. For example, if the UE supports 3E-UTRA+1NR intra-band contiguous EN-DC and 1E-UTRA+2NR inter-band EN-DC, both configurations need to be tested for sufficient test coverage of core requirements. Another problem is that highest CC number to test within Inter-band EN-DC is not easy to determine it shall include 1 or 2 E-UTRA CCs, not more.

D.2.6.3 Test coverage

As explained in clause D.2.1 only certain configurations are specified in TS 38.101-3 [7].

Additionally, some configurations may not need to be tested for reasons like:

1) To test an exception, it is sufficient to test with fewer CCs (“No test needed” in tables below)

2) No exception requirement exists (“N/A” in tables below)

3) No such configuration is defined in TS 38.101-3[7] clause 5.5B (“N/A” in tables below)

For configurations that need to be tested, anchor agnostic approach can be used for E-UTRA when testing a non-exception requirement. In other cases, the E-UTRA carrier need to be fully configured.

The different cases that may happen for 3CC and 4CC configurations, and the proposed test coverage are listed in the tables below where the following general rules have been applied:

- Harmonic exceptions are only tested in the 2CC test and need not be considered in >2CC test cases. 2CC test cases are always run

- Any inter-band EN-DC configuration with more than 2 E-UTRA bands will not be tested

- Any inter-band EN-DC configuration with more than 1 E-UTRA CC per band will not be tested

Table D.2.6.3-1: 3CC test coverage

EN-DC type	E-UTRA CA	NR CA	Notation	Test coverage		
				Exception type		
				No exception	UL harmonics, harmonic mixing, cross band isolation	2UL intermodulation
Intra-band contiguous EN-DC (1 band)	No	Yes	DC_(n)XAC Note 1	N/A	N/A	N/A
	Yes	No	DC_(n)XCA	Test needed due to other than refsens exception in intra-band EN-DC	N/A	N/A
Intra-band non-contiguous EN-DC (1 band)	Yes (cont)	No	DC_XC_nXA	No test needed. Only 2CC need to be tested	N/A	N/A
	Yes (non-cont)	No	DC_XA-XA_nXA	No test needed. Only 2CC need to be tested	N/A	N/A
	No	Yes (cont)	Note 1	N/A	N/A	N/A
	No	Yes (non-cont)	Note 1	N/A	N/A	N/A
Inter-band EN-DC	No	Yes (intra-cont)	DC_XA-nYC	Test needed (if max NR CC) – anchor agnostic	Test needed (if max NR CC)	Test needed (if max NR CC)
	No	Yes (intra-non-cont)	DC_XA-nY(2A)	Test needed (if max NR CC) – anchor agnostic	Test needed (if max NR CC)	Test needed (if max NR CC)
	No	Yes (inter)	DC_XA-nYA-nZA	Test needed (if max NR CC) – anchor agnostic	Test needed (if max NR CC)	Test needed (if max NR CC or IMD 3 band)
	Yes (intra-cont)	No	DC_XC-nYA	No test needed. Only 2CC need to be tested	No test needed. Only 2CC need to be tested	No test needed. Only 2CC need to be tested
	Yes (intra-non-cont)	No	DC_XA_XA-nYA	No test needed. Only 2CC need to be tested	No test needed. Only 2CC need to be tested	No test needed. Only 2CC need to be tested
	Yes (inter)	No	DC_XA-YA-nZA	No test needed. Only 2CC need to be tested	No test needed. Only 2CC need to be tested	Test needed if IMD(3band)
Intra-band contiguous EN-DC (2 band)	No	Yes	DC_(n)XAA-nYA	Test needed (if max NR CC) – anchor agnostic	Test needed (if max NR CC)	Test needed (if max NR CC)
	Yes	No	DC_XA-(n)YAA	No test needed. Only 2CC need to be tested	No test needed. Only 2CC need to be tested	No test needed. Only 2CC need to be tested
Intra-band non-contiguous EN-DC (2 band)	No	Yes	DC_XA_nXA_nYA	Test needed (if max NR CC) – anchor agnostic	Test needed (if max NR CC)	Test needed (if max NR CC)
	Yes	No	DC_XA_YA_nYA	No test needed. Only 2CC need to be tested	No test needed. Only 2CC need to be tested	No test needed. Only 2CC need to be tested

NOTE 1: No such config in TS 38.101-3 [7] V16.5.0
NOTE 2: CC BW class C is indicated in the table. The same rules apply to BW class B
NOTE 3: Different test coverage is indicated by color coding in this table.

Table A.4.2.6.3-2: 4CC test coverage

EN-DC type	E-UTRA CA	NR CA	Notation	Test coverage		
				Exception type		
				No exception	UL harmonics, harmonic mixing, cross band isolation	2UL intermodulation
Intra-band contiguous EN-DC (1 band)	No	Yes	Note 1	N/A	N/A	N/A
	Yes	No	DC_(n)XDA	Test needed due to other than refsens exception in intra-band EN-DC	N/A	N/A
Intra-band non-contiguous EN-DC (1 band)	Yes (cont)	No	DC_XD_nXA	No test needed. Only 2CC need to be tested	N/A	N/A
	Yes (non-cont)	No	DC_XA-XC_nXA	No test needed. Only 2CC need to be tested	N/A	N/A
	No	Yes (cont)	Note 1	N/A	N/A	N/A
	No	Yes (non-cont)	Note 1	N/A	N/A	N/A
Inter-band EN-DC	No	Yes (cont)	Note 1	N/A	N/A	N/A
	No	Yes (non-cont)	DC_XA-nY(2A)-nZA	Test needed (if max NR CC) – anchor agnostic	Test needed (if max NR CC)	Test needed (if max NR CC)
	No	Yes (inter)	DC_XA-nYA-nZC	Test needed (if max NR CC) – anchor agnostic	Test needed (if max NR CC)	Test needed (if max NR CC)
	Yes (all types)	No	DC_XD-nYA, DC_XA-YC_nZA, DC_XA-XA-YA-nZA, DC_XA-YA-ZA_nRA	No test needed. Only 2CC need to be tested	No test needed. Only 2CC need to be tested	No test needed. 3CC need to be tested if IMD(3band)
	Yes (all types)	Yes (cont)	DC_XC_nYC, DC_XA-XA_nYC, DC_XA-YA_nYC	No test needed. 3CC need to be tested if max NR CC	No test needed. 3CC need to be tested if max NR CC	No test needed. 3CC need to be tested if max NR CC
		Yes (non-cont)	DC_XC_nY(2A), DC_XC_nY(2A), DC_XA-YA_nY(2A)	No test needed. 3CC need to be tested if max NR CC	No test needed. 3CC need to be tested if max NR CC	No test needed. 3CC need to be tested if max NR CC
		Yes (inter)	DC_XC-nYA-nZA, DC_XA-XA_nYA-nZA, DC_XA-YA_nZA-nRA	No test needed. 3CC need to be tested if max NR CC	No test needed. 3CC need to be tested if max NR CC	No test needed. 3CC need to be tested if max NR CC or IMD(3band)
Intra-band contiguous EN-DC (2-3 band)	No	Yes	Note 1	N/A		
	Yes	No	DC_XA-YA_(n)ZAA, DC_XC_(n)YAA	No test needed. Only 2CC need to be tested	No test needed. Only 2CC need to be tested	No test needed. Only 2CC need to be tested
	Yes	Yes	DC_(n)XCA-nYA	No test needed. 3CC need to be tested if max NR CC	No test needed. 3CC need to be tested if max NR CC	No test needed. 3CC need to be tested if max NR CC
Intra-band non contiguous EN-DC (2-3 band)	No	Yes	Note 1	N/A		
	Yes	No	DC_XA-YA-ZA_nZA	No test needed. Only 2CC need to be tested	No test needed. Only 2CC need to be tested	No test needed. Only 2CC need to be tested
	Yes	Yes	DC_XA-YA_nYA-nZA	No test needed. 3CC need to be tested if max NR CC	No test needed. 3CC need to be tested if max NR CC	No test needed. 3CC need to be tested if max NR CC or IMD(3band)

NOTE 1: No such config in TS 38.101-3 [7] V16.5.0
NOTE 2: 2CC BW class C is indicated in the table. The same rules apply to BW class B
NOTE 3: Different test coverage is indicated by color coding in this table.

D.2.7 Test Environment

The test environment for FR1 EN-DC RX sensitivity measurement is Normal, TL/VL, TL/VH, TH/VL, TH/VH (same as for NR CA).

D.2.8 Test Frequencies selections for EN-DC

In E-UTRA DL CA and UL CA reference sensitivity testing, Low range and High range are selected for intra-band CA testing. Mid range is selected for inter band E-UTRA CA testing.

In standalone NR CA reference sensitivity testing, Low and High Range are tested as default for intra-band and Mid range for inter-band. For CA combinations containing intra-band configuration in an inter-band CA configuration, low and high range are tested for intra-band CA and mid channel for inter-band without intra-band component.

The same principle shall apply for EN-DC testing.

For EN-DC configurations affected by exceptions the test frequency cannot be freely chosen. One test frequency per exception requirement is sufficient to test the requirement. This is indicated in Table D.2.8-1 following the frequency relation formulas defined in clause D.2.3. Exceptions in TS 38.101-3 clause 7.3A.5 (2UL intermodulation) are not specified since the test frequency and channel bandwidth is already specified in TS 38.101-1.

Table D.2.8-1: Test frequency selection per band pair for exceptions avoidable by test frequency setting (UL harmonics, Rx mixing, cross band isolation)

Band set (Note 2)	Frequency	Channel BW [MHz]	Exception type	Comments
1A / n3A	Mid/Mid	Highest/Highest	-	Non-Exception.
	Low/High	20 / 40	Cross band isolation	Exception in TS 38.101-3 table 7.3B.2.3.4-1
3A / n1A	Mid/Mid	Highest/Highest	-	Non-Exception.
	High/Low	20 / 20	Cross band isolation	Exception in TS 38.101-3 table 7.3B.2.3.4-1
3A / n41A				CMCC CR R5-205929
3A / n78A	Mid/High	Highest/Highest	-	Non-Exception.
	Mid/3495	Highest/Highest	UL Harmonic Interference	Exception Note 2 of TS 38.101-3 table 7.3B.2.3.1-1
	Mid/3525	20/20	UL Harmonic Interference	Exception Note 3 of TS 38.101-3 table 7.3B.2.3.1-1
	Mid /3685	20/20	Receiver Harmonic Mixing	Receiver Harmonic Mixing Exception in TS 38.101-3 Table 7.3B.2.3.2-1
8A / n77A	Mid (UL 897.5 MHz) / 3590	Highest (10 MHz) / Highest (100 MHz)	UL Harmonic Interference HD4	Exception Note 7 of TS38.101-3 table 7.3B.2.3.1-1
	Mid (UL 897.5 MHz) / 3520	Highest (10 MHz) / Highest (100 MHz)		Non-Exception. Not overlapping interference since BW_{INT}=40 MHz, F_{INT} = (40+100)/2 = 70
11A / n79A	Mid (DL 1485.9 MHz) / 4457.7	Highest (10 MHz) / Highest (100 MHz)	Receiver Harmonic Mixing HM3	Receiver Harmonic Mixing Exception in TS38.101-3 Table 7.3B.2.3.2-1
	Mid (DL 1485.9 MHz) / 4512.7 MHz	Highest (10 MHz) / Highest (100 MHz)		Non-Exception. Not overlapping interference since BW_{INT}=100 MHz, F_{INT} = (100+10)/2 = 55
19A / n79A	DL 884 MHz / Low (4420.02 MHz)	10 MHz / 40 MHz	Receiver Harmonic Mixing HM3	Receiver Harmonic Mixing Exception in TS38.101-3 Table 7.3B.2.3.2-1
	DL 884 MHz / Low (4445.02 MHz)	10 MHz / 40 MHz		Non-Exception. Not overlapping interference since BW_{INT}=40 MHz, F_{INT} = (40+10)/2 = 25
20A / n78A	Mid/Mid	Highest/Highest	-	Non-Exception.
	Mid/3388	Highest/Highest	UL Harmonic Interference	Exception Note 7 of TS 38.101-3 table 7.3B.2.3.1-1
26A / n41A	High (UL 841.5 MHz) / 2524.5 MHz)	Highest (15 MHz) / 50 MHz	UL Harmonic Interference HD3	Exception Note 9 of TS38.101-3 table 7.3B.2.3.1-1
	High (UL 841.5 MHz) / 2572 MHz	Highest (15 MHz) / 50 MHz		Non-Exception. Not overlapping interference since BW_{INT}=45 MHz, F_{INT} = (45+50)/2 = 47.5
26A / n77A **26A** / n78A	High (UL 841.5 MHz) / 3366 MHz	Highest (15 MHz) / Highest (100 MHz)	UL Harmonic Interference HD4	Exception Note 7 of TS38.101-3 table 7.3B.2.3.1-1
	High (UL 841.5 MHz) / 3446 MHz	Highest (15 MHz) / Highest (100 MHz)		Non-Exception. Not overlapping interference since BW_{INT}=60 MHz, F_{INT} = (60+100)/2 = 80
26A / n79A	High (DL 886.5 MHz) / 4432.5 MHz)	Highest (15 MHz) / 60 MHz	Receiver Harmonic Mixing HM5	Receiver Harmonic Mixing Exception in TS38.101-3 Table 7.3B.2.3.2-1
	High (DL 886.5 MHz) / 4470.5 MHz)	Highest (15 MHz) / 60 MHz		Non-Exception. Not overlapping interference since BW_{INT}=60 MHz, F_{INT} = (60+15)/2 = 37.5
40A / n78A	Low/Mid	Highest/Highest	-	Non-Exception.
	Mid/3525	20/20	Receiver Harmonic Mixing	Receiver Harmonic Mixing Exception Note 8 in TS38.101-3 Table 7.3B.2.3.2-1
41A / n77A **41A / n78A**	Mid (DL 2593 MHz) / 3889.5 MHz)	Highest (20 MHz) / Highest (100 MHz)	Receiver Harmonic Mixing HM4	Receiver Harmonic Mixing Exception in TS38.101-3 Table 7.3B.2.3.2-1
	Mid (DL 2593 MHz) / 3974.5 MHz)	Highest (20 MHz) / Highest (100 MHz)	Cross band isolation	Not overlapping HM interference since BW_{INT}=240 MHz, F_{INT} = (240+100)/2 = 170
	Mid / Mid	Highest / Highest	-	Non-Exception only possible with 1UL in band 41

66A / n78A				Qualcomm CR R5-206142
NOTE 1: This selection is used in test case 7.3B.2.3 unless otherwise stated NOTE 2: Aggressor band in bold				

For EN-DC configurations affected by IMD exceptions where the exception is avoided, the test frequency and bandwidth are FFS.

D.2.8.1 Test point selection EN-DC configuration without exception

Follow similar arguments for frequency points selection, for regular inter-band EN-DC testing, the NR channel bandwidths shall follow what is specified in SA scenario. Since the objective is to test NR performance, it is sufficient to select 5 MHz channel bandwidth for E-UTRA carrier, which is common for all E-UTRA bands.

D.2.8.2 Test point selection EN-DC configuration without exception

For inter-band EN-DC configuration with exception requirement due to UL harmonics, Rx mixing and cross band isolation, maximum aggregated BW shall be tested.

For inter-band EN-DC configuration with exception requirement due to 2UL intermodulation, the test channel bandwidth selection for both NR and E-UTRA are EN-DC combo dependent. There are fixed channel bandwidth pairs required for these exceptional test scenarios.

For intra-band EN-DC configuration with exception requirement, the test channel bandwidth selection for both NR and E-UTRA are EN-DC combo dependent. There are fixed channel bandwidth pairs required for these exceptional test scenarios.

Only 5 MHz channel bandwidth shall be employed by E-UTRA band, Lowest, Mid, Highest channel bandwidth shall be selected for NR carrier for EN-DC non- exceptional testing.

For testing of exceptional test scenarios for EN-DC RX sensitivity due to UL harmonics, Rx mixing and cross band isolation, channel bandwidth selection for both NR and E-UTRA carriers shall be maximum aggregated BW.

For testing of exceptional test scenarios for EN-DC RX sensitivity due to 2UL intermodulation, channel bandwidth selection for both NR and E-UTRA carriers shall follow the value given in the core spec.

D.2.9 RB allocation and RB location selections

D.2.9.1 Test point selection EN-DC configuration without exception

Following the E-UTRA anchor-agnostic proposed in R5-185916 [6], E-UTREA operation does not interfere with NR connection, 0 RB were proposed for both UL and DL channels for non-exceptional test scenarios.

There is no reason to deviate from current NR configurations for RB allocation selection employed in standalone testing.

D.2.9.2 Test point selection EN-DC configuration with exception when exception applies

For EN-DC inter-band and intra-band EN-DC exceptional test scenarios, the RB allocation for both NR and E-UTRA are selected as specified in TS 38.101-3 [7] for the EN-DC band combination.

Based on the E-UTRA anchor-agnostic approach, 0 RB shall be used for both UL and DL channels for non-exceptional test scenarios. RB allocation for NR carrier in inter-band EN-DC non- exceptional testing shall follow what is selected for standalone testing.

For testing of exceptional test scenarios for inter-band EN-DC RX sensitivity, the RB allocation selection for both NR and E-UTRA carriers shall follow the values provided in the spec.

D.2.9.3 Test point selection EN-DC configuration with exception when exception does not apply

According to the test principle outlined in clause D.2.5, there is a need to verify the UE performance when the exception is avoided and MSD=0 dB applies. Detailed background can be found in [9].

The calculation of test frequency for avoiding exceptions is presented in clause 2.5. The UL configuration also need to be determined any may be with one or two simultaneous UL CCs depending on the scenario.

For HD and HM exceptions when the victim band is TDD there is no need from an interference point of view to have UL active on the victim band, meaning this can be verified with 1UL. The same can apply for EN-DC configurations where single switched Tx is allowed. In the case of FDD victim band when 2UL Is mandatory, both UL CCs should be active since this represents the worst case.

For CBI exceptions the requirements are defined in two different ways depending on the EN-DC configuration:

1. Exception applies for any frequency separation as long as aggressor UL is active. In this case, the only way to avoid the exception is to not have UL active on the aggressor band. The test point then becomes very similar to the standalone test and then does not need to be tested for a SA and NSA capable UE

2. Exception applies only if separation is small. Just like for HD and HM exceptions, the exception can be avoided by configuring a larger separation with aggressor signal still active.

For 2-band IMD exceptions, the exception is avoided by changing the frequency of one of the CCs such that the intermodulation does not overlap with the victim CC anymore. In the case of multiple IMD affecting the same victim band, only the worst case IMD may be tested.

For 3-band IMD exceptions there are a separate set of IMD depending on the UL configuration (selecting 2UL among 3 bands gives two cases). Within a UL configuration, the same test point selection as for 2-band IMD can be used.

D.2.10 Modulation scheme selections

The modulation scheme for both non-exceptional and exceptional EN-DC intra-band and inter-band test scenarios are selected as:

- For E-UTRA: QPSK (same as used for E-UTRA reference sensitivity testing in TS 36-521-1 [9])

- For NR: Use same modulation scheme as used for NR standalone testing.

D.2.11 Current test completion status per EN-DC configuration

The completion status per EN-DC configuration is documented in clause 4.3.3.1.

Annex B:
Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2017-09	RAN5#76	R5-174704	-	-	-	Draft skeleton TR 38.905	0.0.1
2018-04	RAN5#2-5G-NR Adhoc	R5-181954	-	-	-	Agreed Text Proposal in RAN5#2-5G-NR Adhoc: **R5-181889**, " TP to update TR 38.905 with information on test point analysis " Agreed Test Point Analysis in RAN5#78: **R5-180885**, "Discussion on test point selection for NR Occupied Bandwidth in FR1" **R5-180886**, "Discussion on test point selection for NR SEM in FR1" **R5-180887**, "Discussion on test point selection for NR ACLR in FR1" **R5-181524**, "Discussion on test point selection for Absolute Power Tolerance in FR1" **R5-181525**, "Discussion on test point selection for Aggregate Power Tolerance in FR1" Agreed Test Point Analysis in RAN5#2-5G-NR Adhoc: **R5-182019**, "Discussion of NR FR1 Test Point for TX Spurious Emission test cases " **R5-182024**, "Discussion on test point selection for NR Frequency Error in FR1" **R5-181830**, "Discussion on test point selection for Maximum Output Power in FR1" **R5-181831**, "Discussion on test point selection for Minimum Output Power in FR1**R5-181832**, "Discussion on test point selection for General ON/OFF Time Mask in FR1" **R5-181879**, "Discussion on test point selection for NR In-Band in FR1" **R5-181880**, "Discussion on test point selection for NR ACS in FR1" **R5-182025**, "Discussion on test point selection for NR Frequency Error in FR1" **R5-181905**, "Discussion on test point selection for NR Occupied Bandwidth in FR2" **R5-182030**, "Discussion on test point selection for NR ACLR in FR2" **R5-182042**, "Discussion on test point selection for NR In-Band blocking in FR2" **R5-182044**, "Discussion on test point selection for NR ACS in FR2"	0.1.0
2018-05	RAN5#79	R5-183078	-	-	-	Document title corrected. Agreed Text Proposal in RAN WG5#79: **R5-183963**, "Test Point analysis for FR1 RefSens test case"	0.2.0
2018-08	RAN5#80	R5-185134	-	-	-	**R5-184923**, "Test Point analysis for FR2 RefSense test case" **R5-184961**, "TP for updating TR 38.905 with FR2 Frequency Error test point analysis" **R5-185307**, "TP for updating TR38.905 with FR1 AMPR test point analyses with NS_35" **R5-185309**, "Test Point analysis for FR1 Configured Output Power for SUL" **R5-185311**, "TP for updating TR 38.905 with FR1 Carrier Leakage test point analysis" **R5-185314**, "TP for updating TR 38.905 with FR1 EVM equalizer spectrum flatness test point analysis" **R5-185316**, "TP for updating TR 38.905 with FR1 Frequency Error test point analysis" **R5-185412**, "TP for updating TR 38.905 with EVM test point analysis" **R5-185491**, "Test Point analysis for FR2 TxSpurious test case" **R5-185215**, "TP for updating TR 38.905 with FR2 SEM test point analysis" **R5-185334**, "Discussion of LTE Test point selection for EN-DC with FR1 Tx Spurious emission Test" **R5-185301**, "Discussion on test point selection for NR Out-of-band in FR1" **R5-185423**, "Discussion on Uplink configuration for NR Transmit Intermodulation in FR1" **R5-185216**, "TP for updating TR38.905 with UE AMPR for NS_04 Intra-band contiguous EN-DC" **R5-185319**, "TP for updating TR 38.905 with FR1 In-band Emissions test point analysis"	1.0.0
2018-09	RAN#81	-	-	-	-	raised to v15.0.0 with editorial changes only	15.0.0
2018-12	RAN#82	R5-186454	0016	-	F	TP analysis for test case 6.5.2.4.2	15.1.0
2018-12	RAN#82	R5-186455	0017	-	F	TP analysis for EN-DC test case 6.2B.2.3	15.1.0

2018-12	RAN#82	R5-186609	0018	-	F	TP_analysis for TX spurious emission UE co-existence for intra-band contiguous EN-DC with FR1	15.1.0
2018-12	RAN#82	R5-186610	0019	-	F	TP analysis for Reference sensitivity for Intra-band Contiguous EN-DC with FR1	15.1.0
2018-12	RAN#82	R5-186611	0020	-	F	TP analysis for Reference sensitivity for Inter-band EN-DC with FR1	15.1.0
2018-12	RAN#82	R5-186674	0021	-	F	Test point analysis for AMPR Intra-band contiguous EN-DC in FR1 for NS_35	15.1.0
2018-12	RAN#82	R5-186710	0022	-	F	TP analysis for test case 6.2B.2.4, UE Maximum Output Power reduction for Inter-Band EN-DC including FR2	15.1.0
2018-12	RAN#82	R5-186791	0028	-	F	TP analysis OBW intraband contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-186792	0029	-	F	TP analysis SEM intraband contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-187035	0031	-	F	Update test points analysis for multiple FR1 test cases	15.1.0
2018-12	RAN#82	R5-187396	0037	-	F	Update of TR 38.905 with SA FR1 A-MPR test point analyses, NS_04	15.1.0
2018-12	RAN#82	R5-188240	0039	1	F	Update of TR 38.905 with EN-DC A-MPR test point analyses, NS_04	15.1.0
2018-12	RAN#82	R5-188227	0041	1	F	Test Point analysis for FR2 Maximum Output Power	15.1.0
2018-12	RAN#82	R5-187489	0042	-	F	TP analysis for FR1 test case 6.3.4.3, relative power tolerance	15.1.0
2018-12	RAN#82	R5-187582	0043	-	F	Discussion on test point selection for EVM in FR2	15.1.0
2018-12	RAN#82	R5-187583	0044	-	F	Discussion on test point selection for Carrier Leakage in FR2	15.1.0
2018-12	RAN#82	R5-187584	0045	-	F	Update of test point selection for EVM equalizer spectrum flatness in FR1	15.1.0
2018-12	RAN#82	R5-187587	0046	-	F	Discussion on test point selection for In-band Emissions in FR2	15.1.0
2018-12	RAN#82	R5-187589	0047	-	F	Discussion on test point selection for EVM equalizer spectrum flatness in FR2	15.1.0
2018-12	RAN#82	R5-187593	0048	-	F	Discussion on test point selection for EVM equalizer spectrum flatness for Pi/2 BPSK in FR1	15.1.0
2018-12	RAN#82	R5-187806	0023	1	F	Test Point analysis for FR1 7.4 Maximum input level	15.1.0
2018-12	RAN#82	R5-187808	0035	1	F	TP analysis for receiver spurious emission tests for FR1 SA	15.1.0
2018-12	RAN#82	R5-187809	0036	1	F	TP analysis for wideband intermodulation tests for FR1 SA	15.1.0
2018-12	RAN#82	R5-187817	0033	1	F	TP analysis for receiver spurious emission tests for FR1 inter-band EN-DC	15.1.0
2018-12	RAN#82	R5-187818	0034	1	F	TP analysis for wideband intermodulation tests for FR1 inter-band EN-DC	15.1.0
2018-12	RAN#82	R5-187836	0025	1	F	Test Point analysis for FR2 7.4 Maximum input level	15.1.0
2018-12	RAN#82	R5-187907	0024	1	F	Test Point analysis for FR1 MPR test case	15.1.0
2019-03	RAN#83	R5-191257	0077	-	F	Test Point analysis for TC 6.3.3.4 PRACH time mask in FR1	15.2.0
2019-03	RAN#83	R5-191260	0078	-	F	Test Point analysis for NR Narrow band in FR1	15.2.0
2019-03	RAN#83	R5-191261	0079	-	F	Test Point analysis for NR spurious response in FR1	15.2.0
2019-03	RAN#83	R5-191337	0081	-	F	Adding test case 6.2B.2.1 to 38.905	15.2.0
2019-03	RAN#83	R5-191678	0086	-	F	Addition of TP analysis of FR2 6.3.1 Minimum output power	15.2.0
2019-03	RAN#83	R5-191811	0087	-	F	Test Point analysis update for FR2 TxSpurious test case	15.2.0
2019-03	RAN#83	R5-191855	0091	-	F	TP_analysis_38.905_6.5.3.1_TX_SpurEmission	15.2.0
2019-03	RAN#83	R5-192002	0104	-	F	Adding test case 7.4B.1 to 38.905	15.2.0
2019-03	RAN#83	R5-192003	0105	-	F	Adding test case 7.4B.2 to 38.905	15.2.0
2019-03	RAN#83	R5-192007	0106	-	F	Adding test case 6.2B.1.1 to 38.905	15.2.0
2019-03	RAN#83	R5-192008	0107	-	F	Adding test case 6.2B.1.2 to 38.905	15.2.0
2019-03	RAN#83	R5-192009	0108	-	F	Adding test case 6.2B.1.3 to 38.905	15.2.0
2019-03	RAN#83	R5-192239	0116	-	F	TP analysis of FR1 time alignment error for UL MIMO	15.2.0
2019-03	RAN#83	R5-192401	0085	1	F	Addition of TP analysis of FR1 6.2.4 Configured transmitted power	15.2.0
2019-03	RAN#83	R5-192404	0099	1	F	TP analysis for FR1 6.5A.2.4.1.1 NR ACLR for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192405	0100	1	F	TP analysis for FR1 6.5A.2.4.2.1 UTRA ACLR for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192406	0103	1	F	TP analysis for FR1 6.5A.4.1 Transmit intermodulation for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192410	0110	1	F	Update of TP analysis of FR1 6.3.1 Minimum Output Power	15.2.0
2019-03	RAN#83	R5-192444	0113	1	F	Addition of TP analysis for EN-DC 6.2B.4.1.3 Configured transmitted power inter-band within FR1	15.2.0
2019-03	RAN#83	R5-192449	0080	1	F	Adding FR2 test case 6.3.4.3 to 38.905	15.2.0
2019-03	RAN#83	R5-192546	0082	1	F	Test Point analysis for FR1 6.3.3.6 SRS time mask	15.2.0
2019-03	RAN#83	R5-192568	0095	1	F	TP analysis for FR1 6.4A.2.1.1 Error Vector Magnitude for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192569	0094	1	F	TP analysis for FR1 6.4A.1.1 Frequency error for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192571	0096	1	F	TP analysis for FR1 6.4A.2.2.1 Carrier leakage for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192572	0097	1	F	TP analysis for FR1 6.4A.2.3.1 In-band emissions for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192573	0098	1	F	TP analysis for FR1 6.5A.2.2.1 Spectrum emission mask for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192574	0101	1	F	TP analysis for FR1 6.5A.3.1.1 General spurious emissions for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192575	0102	1	F	TP analysis for FR1 6.5A.3.2.1 Spurious emissions for UE co-existence for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192582	0109	1	F	Add Tp analysis statements for MIMO tests	15.2.0
2019-03	RAN#83	R5-192599	0084	1	F	Update of TP analysis of FR1 6.2.1 MOP	15.2.0
2019-03	RAN#83	R5-192624	0115	1	F	TP_analysis_38.905_6.5B.3_TX_SpurEmission	15.2.0

2019-03	RAN#83	R5-192647	0092	1	F	Addition of Test Point analysis of FR2 6.3.4.4 Aggregate power tolerance	15.2.0
2019-03	RAN#83	R5-192684	0073	1	F	TP analysis for FR1 Rx 7.9A.1 Spurious Emission for 2DL CA	15.2.0
2019-03	RAN#83	R5-192691	0111	1	F	Addition of TP analysis for EN-DC 6.2B.4.1.1 Configured transmitted power Intra-band contiguous	15.2.0
2019-03	RAN#83	R5-192692	0112	1	F	Addition of TP analysis for EN-DC 6.2B.4.1.2 Configured transmitted power Intra-band non-contiguous	15.2.0
2019-03	RAN#83	R5-192846	0114	2	F	Introduction of new section for Tp analysis of Tx spurious	15.2.0
2019-06	RAN#84	R5-193543	0137	-	F	Additional TT analysis for 38.521-3 MPR intra-band contiguous	15.3.0
2019-06	RAN#84	R5-193808	0147	-	F	Addition of TP analysis for power control for UL-MIMO	15.3.0
2019-06	RAN#84	R5-193916	0148	-	F	Update of TP analysis of 6.2D.3 A-MPR for UL-MIMO	15.3.0
2019-06	RAN#84	R5-193919	0149	-	F	Add SA FR1 RF 6.5D.2.4.2 to 38.905	15.3.0
2019-06	RAN#84	R5-194010	0151	-	F	Test Point analysis update for FR2 TxSpurious UE coexistence test case	15.3.0
2019-06	RAN#84	R5-194168	0152	-	F	Updating Annex A; Derivation documents	15.3.0
2019-06	RAN#84	R5-194169	0153	-	F	Update of test points analysis for NS_35 A-MPR FR1 test case	15.3.0
2019-06	RAN#84	R5-194170	0154	-	F	Test point analysis for A-MPR Intra-band contiguous EN-DC; NS_04	15.3.0
2019-06	RAN#84	R5-194257	0155	-	F	TP analysis for Asymmetric CH BWs in Reference Sensitivity Requirements in FR1	15.3.0
2019-06	RAN#84	R5-194402	0158	-	F	Test Point analysis for EN-DC In-band emissions for intra-band contiguous	15.3.0
2019-06	RAN#84	R5-194459	0160	-	F	Update to TP analysis for FR2 Maximum Output Power	15.3.0
2019-06	RAN#84	R5-194904	0142	1	F	Addition of TP analysis for 38.521-1 7.6D.3	15.3.0
2019-06	RAN#84	R5-194907	0163	1	F	Addition of TP analysis for 38.521-1 6.3A.3	15.3.0
2019-06	RAN#84	R5-194909	0164	1	F	Addition of TP analysis for 38.521-1 6.3A.1 FR1	15.3.0
2019-06	RAN#84	R5-194913	0165	-	F	Addition of TP analysis for ACS for 2DL CA in FR1	15.3.0
2019-06	RAN#84	R5-194914	0166	-	F	Addition of TP analysis for FR1 MOP for CA	15.3.0
2019-06	RAN#84	R5-194927	0162	1	F	Addition of test frequency selection of spurious co-existence inter-band for DC 3-n79	15.3.0
2019-06	RAN#84	R5-194931	0141	1	F	Addition of TP analysis for 38.521-1 7.6D.2	15.3.0
2019-06	RAN#84	R5-194932	0143	1	F	Addition of TP analysis for 38.521-1 7.6D.4	15.3.0
2019-06	RAN#84	R5-194933	0144	1	F	Addition of TP analysis for 38.521-1 7.8D.2	15.3.0
2019-06	RAN#84	R5-194959	0167	-	F	Addition of TP analysis for UL-MIMO cases of 6.3D.1 and 6.3D.3	15.3.0
2019-06	RAN#84	R5-194961	0157	1	F	TP analysis for FR2 Tx 6.3A.1.1 Minimum output power for CA 2UL CA	15.3.0
2019-06	RAN#84	R5-194963	0161	1	F	Update SCS test points for FR2 ACS and Inband blocking test cases	15.3.0
2019-06	RAN#84	R5-195146	0138	1	F	Addition of TP analysis for SA FR2 6.2.2	15.3.0
2019-06	RAN#84	R5-195148	0139	1	F	Addition of TP analysis for SA FR2 6.3.2	15.3.0
2019-06	RAN#84	R5-195190	0145	1	F	TPanalysis of 7.7D Spurious response for UL-MIMO	15.3.0
2019-06	RAN#84	R5-193730	0146	-	F	Addition of test frequency selection of 6.5A.3.2 for Rel-16 CA_n41A-n79A	16.0.0
2019-06	RAN#84	R5-195055	0150	1	F	Addition of test frequency selection of 6.5B.3.3.2 spurious co-existence inter-band for Rel-16 DC configurations	16.0.0
2019-09	RAN#85	R5-196435	0184	-	F	Update of TP analysis of FR2 minimum output power to add UL MIMO	16.1.0
2019-09	RAN#85	R5-196445	0185	-	F	Correction of 4.5 to add DC_3A-n41	16.1.0
2019-09	RAN#85	R5-197315	0175	1	F	Addition of TP analysis for FR1 MPR for CA	16.1.0
2019-09	RAN#85	R5-197317	0176	1	F	Addition of TP analysis for FR1 ConfigTP for CA	16.1.0
2019-09	RAN#85	R5-197320	0179	1	F	Addition of TP analysis of FR1 6.4D.2.1 EVM for UL MIMO	16.1.0
2019-09	RAN#85	R5-197322	0180	1	F	Addition of TP analysis of FR1 6.4D.2.2 Carrier leakage for UL MIMO	16.1.0
2019-09	RAN#85	R5-197323	0181	1	F	Addition of TP analysis of FR1 6.4D.2.3 Inband emission for UL MIMO	16.1.0
2019-09	RAN#85	R5-197325	0182	1	F	Addition of TP analysis of FR1 6.4D.2.4 EVM equalizer spectrum flatness for UL MIMO	16.1.0
2019-09	RAN#85	R5-197326	0186	1	F	Test Point analysis for Occupied bandwidth for 2UL CA in FR1	16.1.0
2019-09	RAN#85	R5-197524	0187	1	F	TP_analysis_38.905_7.3A._CA_ref_sensitivity	16.1.0
2019-09	RAN#85	R5-197589	0168	1	F	New addition of TP analysis for MOP & MOP Spherical Coverage for UL CA in SA FR2	16.1.0
2019-09	RAN#85	R5-197590	0169	1	F	New addition of TP analysis for Carrier leakage for UL CA in SA FR2	16.1.0
2019-09	RAN#85	R5-197591	0170	1	F	Adding test case 6.5B.2.1.3 to 38.905	16.1.0
2019-09	RAN#85	R5-197592	0173	1	F	Addition of TP analysis of FR2 6.6 Beam Correspondence	16.1.0
2019-09	RAN#85	R5-197593	0174	1	F	Test Point analysis update for FR2 Tx Spurious test case	16.1.0
2019-09	RAN#85	R5-197594	0177	1	F	Addition of TP analysis of FR1 Maximum input level for CA	16.1.0
2019-09	RAN#85	R5-197595	0178	1	F	Addition of TP analysis of FR1 6.4D.1 Frequency error for UL MIMO	16.1.0
2019-09	RAN#85	R5-197596	0183	1	F	Addition of TP analysis of FR2 6.2A.2 MPR for 2 UL CA	16.1.0
2019-09	RAN#85	R5-197597	0191	1	F	Addition of TP analysis for FR2 AMPR with NS_201	16.1.0
2019-09	RAN#85	R5-197628	0192	2	F	Updates of TP analysis for EN-DC MPR test case 6.2.B.2.1	16.1.0
2019-12	RAN#86	R5-198384	0203		F	Addition of TP analysis of FR2 6.6 Beam Correspondence v1	16.2.0
2019-12	RAN#86	R5-198392	0205		F	Addition of TP analysis of FR2 6.3D.3.4 SRS time mask for UL-MIMO	16.2.0
2019-12	RAN#86	R5-198490	0206		F	TPanalysis of TC 7.5B.1 ACS for intra-band contiguous EN-DC 2CCs	16.2.0

2019-12	RAN#86	R5-198523	0208		F	Test points analysis for NS_03 A-MPR FR1 test case	16.2.0
2019-12	RAN#86	R5-198527	0210		F	Test points analysis for NS_43 and NS_43U A_MPR FR1 test case	16.2.0
2019-12	RAN#86	R5-199326	0209	1	F	Test points analysis for NS_05 and NS_05U A_MPR FR1 test case	16.2.0
2019-12	RAN#86	R5-199327	0211	1	F	Test points analysis for NS_100 A_MPR FR1 test case	16.2.0
2019-12	RAN#86	R5-199328	0200	1	F	Addition of test point analysis for SA FR1 TC 7.6A.3 Out-of-band blocking for CA	16.2.0
2019-12	RAN#86	R5-199372	0197	1	F	Update of test point analysis for SA FR2 TC 6.2.2	16.2.0
2019-12	RAN#86	R5-199410	0199	1	F	Update of test point analysis for SA FR1 TC 6.2.2 to add almost contiguous allocation test points	16.2.0
2019-12	RAN#86	R5-199487	0202	1	F	Addition of test point analysis for SA FR1 TC 7.8A Wide band Intermodulation for CA	16.2.0
2019-12	RAN#86	R5-199488	0201	1	F	Addition of test point analysis for SA FR1 TC 7.6A.4 Narrow band blocking for CA	16.2.0
2019-12	RAN#86	R5-199489	0207	1	F	Addition of TP analysis for ACS for 3DL CA in FR1	16.2.0
2019-12	RAN#86	R5-199501	0198	1	F	Update of test point analysis for SA FR1 TC 6.5.2.4.2	16.2.0
2019-12	RAN#86	R5-199507	0196	1	F	TP analysis for test case 6.2B.2.2, UE Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC	16.2.0
2019-12	RAN#86	R5-199509	0194	1	F	TP analysis for MOP for EN-DC	16.2.0
2019-12	RAN#86	R5-199549	0204	1	F	Addition to TP analysis of FR2 TC 6.3A.4.2.1 Absolute Power Control for CA	16.2.0
2020-03	RAN#87	R5-200402	0215	-	F	Updating TP of MOP for inter-band EN-DC	16.3.0
2020-03	RAN#87	R5-200412	0221	-	F	Editorial change of replacing zip file of FR2 6.3.1 by v2	16.3.0
2020-03	RAN#87	R5-200419	0222	-	F	Update of test point analysis for 7.6A.3 Out-of-band blocking for CA	16.3.0
2020-03	RAN#87	R5-200459	0223	-	F	Update of test point analysis for 7.6A.4 Narrow band blocking for CA	16.3.0
2020-03	RAN#87	R5-200460	0224	-	F	Update of test point analysis for 7.8A Wide band Intermodulation for CA	16.3.0
2020-03	RAN#87	R5-200574	0226	-	F	Addition of Test point selection for FR1 in SUL test cases	16.3.0
2020-03	RAN#87	R5-200603	0227	-	F	Test Point analysis for FR2 ref sens for CA	16.3.0
2020-03	RAN#87	R5-200758	0229	-	F	Correction of NS_05 test points analysis	16.3.0
2020-03	RAN#87	R5-200762	0231	-	F	Test points analysis for NS_38 A-MPR FR1 test case	16.3.0
2020-03	RAN#87	R5-200764	0232	-	F	Test points analysis for NS_39 A-MPR FR1 test case	16.3.0
2020-03	RAN#87	R5-200766	0233	-	F	Test points analysis for NS_43 A-MPR FR1 test case	16.3.0
2020-03	RAN#87	R5-200768	0234	-	F	Test points analysis for NS_43U A-MPR FR1 test case	16.3.0
2020-03	RAN#87	R5-200799	0236	-	F	Updated test point analysis for FR2 A-MPR test case	16.3.0
2020-03	RAN#87	R5-200815	0237	-	F	Update of Test Point Analysis for UE Coexistence for DC_3A-n41A and DC_8A-n41A	16.3.0
2020-03	RAN#87	R5-200990	0238	1	F	Addition of TP analysis for FR1 In-band blocking for CA	16.3.0
2020-03	RAN#87	R5-201182	0216	1	F	Updating TP of configured output power for inter-band EN-DC	16.3.0
2020-03	RAN#87	R5-201184	0218	1	F	Updating TP of configured output power for intra-band contiguous EN-DC	16.3.0
2020-03	RAN#87	R5-201186	0220	1	F	Updating TP of configured output power for intra-band non-contiguous EN-DC	16.3.0
2020-03	RAN#87	R5-201237	0230	1	F	Test points analysis for NS_37 A-MPR FR1 test case	16.3.0
2020-03	RAN#87	R5-201239	0235	1	F	Test points analysis for NS_18 A-MPR FR1 test case	16.3.0
2020-06	RAN#88	R5-201746	0242	-	F	Addition of Number of test points for FR1 in SUL test cases	16.4.0
2020-06	RAN#88	R5-201747	0243	-	F	Addition of TP analysis for FR1 A-MPR for CA	16.4.0
2020-06	RAN#88	R5-201765	0246	-	F	Test points analysis for NS_27 A_MPR FR1 test case	16.4.0
2020-06	RAN#88	R5-201767	0247	-	F	Test points analysis for NS_40 A_MPR FR1 test case	16.4.0
2020-06	RAN#88	R5-201773	0250	-	F	Test points analysis for NS_47 A_MPR FR1 test case	16.4.0
2020-06	RAN#88	R5-201871	0253	-	F	Update of test points analysis in UE co-existence for inter-band EN-DC	16.4.0
2020-06	RAN#88	R5-201872	0254	-	F	Update of Test Point Analysis for UE Co-existence for DC_5A-n66A	16.4.0
2020-06	RAN#88	R5-201873	0255	-	F	Update of Test Point Analysis for UE Co-existence for DC_5A-n78A	16.4.0
2020-06	RAN#88	R5-201874	0256	-	F	Update of Test Point Analysis for UE Co-existence for DC_66A-n5A	16.4.0
2020-06	RAN#88	R5-201875	0257	-	F	Update of Test Point Analysis for UE Co-existence for DC_66A-n78A	16.4.0
2020-06	RAN#88	R5-201929	0258	-	F	Cleanup in 38.905	16.4.0
2020-06	RAN#88	R5-201931	0260	-	F	Combined TP analysis for MPR, ACLR and SEM intra-band contiguous EN-DC test cases	16.4.0
2020-06	RAN#88	R5-202029	0261	-	F	Introduction of test point analysis for 2CCs EN-DC TCs in FR1 in 7.6B Blocking characteristics for DC and 7.7B Spurious response for DC	16.4.0
2020-06	RAN#88	R5-202111	0262	-	F	NS_24 TP analysis to TR 38.905	16.4.0
2020-06	RAN#88	R5-202524	0267	-	F	TP_analysis_6.5.3.3_TX_Additional_SpurEmission_NS_43	16.4.0
2020-06	RAN#88	R5-202755	0248	1	F	Test points analysis for NS_41 A_MPR FR1 test case	16.4.0
2020-06	RAN#88	R5-202756	0249	1	F	Test points analysis for NS_42 A_MPR FR1 test case	16.4.0
2020-06	RAN#88	R5-202757	0264	1	F	TP_analysis_6.5.3.3_TX_Additional_SpurEmission_NS_05	16.4.0
2020-06	RAN#88	R5-202918	0239	1	F	Test Point analysis for FR2 Frequency Error for CA	16.4.0
2020-06	RAN#88	R5-202926	0266	1	F	Addition of TPanalysis 6.5A.3.2.1_SECoex for CA_n1A-n78A	16.4.0
2020-06	RAN#88	R5-202932	0244	1	F	Addition of TP analysis for FR1 Maximum input level for 3DL CA	16.4.0
2020-06	RAN#88	R5-202933	0245	1	F	Addition of TP analysis for FR1 In-band blocking for 3DL CA	16.4.0
2020-06	RAN#88	R5-202952	0251	1	F	Updating TP of MOP for intra-band contiguous EN-DC	16.4.0

2020-06	RAN#88	R5-202953	0252	1	F	Updating TP of MOP for intra-band non-contiguous EN-DC	16.4.0
2020-06	RAN#88	R5-202954	0259	1	F	Combined TP analysis for MPR, NR ACLR and SEM FR1 test cases	16.4.0
2020-06	RAN#88	R5-202955	0263	1	F	Updated TP analysis for 7.3A Reference sensitivity for CA	16.4.0
2020-09	RAN#89	R5-203642	0269	-	F	Introduction of spurious emission TP analysis for Rel-16 EN-DC configuration DC_40A_n1A	16.5.0
2020-09	RAN#89	R5-203643	0270	-	F	Introduction of spurious emission TP analysis for Rel-16 EN-DC configuration DC_40A_n78A	16.5.0
2020-09	RAN#89	R5-203751	0275	-	F	Editorial correction to references to EN-DC configurations	16.5.0
2020-09	RAN#89	R5-204720	0299	1	F	Add_TP_analysis_table for TX_spurious_emission	16.5.0
2020-09	RAN#89	R5-204726	0278	1	F	Addition of test point analysis in Tx spurious emissions	16.5.0
2020-09	RAN#89	R5-204727	0273	1	F	Updating TP analysis for 6.2A.2-MPR for CA	16.5.0
2020-09	RAN#89	R5-204728	0279	1	F	Update of test point analysis of MOP for intra-band contiguous EN-DC	16.5.0
2020-09	RAN#89	R5-204789	0271	1	F	Update of TP analysis for NS_43 and NS_01 in FR1 A-MPR for CA	16.5.0
2020-09	RAN#89	R5-204790	0272	1	F	Update of TP analysis for NS_43U and NS_01 in FR1 A-MPR for CA	16.5.0
2020-09	RAN#89	R5-204791	0280	1	F	Updating test point analysis for DC_1A-n78A for spurious emissions UE co-existence	16.5.0
2020-09	RAN#89	R5-204792	0281	1	F	Updating test point analysis for DC_2A-n66A for spurious emissions UE co-existence	16.5.0
2020-09	RAN#89	R5-204793	0282	1	F	Updating test point analysis for DC_2A-n78A for spurious emissions UE co-existence	16.5.0
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2020-09	RAN#89	R5-204817	0286	1	F	Updating test point analysis for DC_3A-n1A for spurious emissions UE co-existence	16.5.0
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2020-09	RAN#89	R5-204959	0301	1	F	Update of TPanalysis 6.5A.3.2.1_SECoex for CA_n1A-n78A	16.5.0
2020-09	RAN#89	R5-204963	0276	1	F	Update test point analysis for A-MPR NS_18 with CBW being 30MHz	16.5.0
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2021-03	RAN#91	R5-211733	0340	1	F	Updated TP analysis for 7.3B Reference sensitivity for EN-DC in FR1	16.7.0
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2021-03	RAN#91	R5-211743	0375	1	F	Introduction of spurious emission TP analysis for Rel-15 EN-DC configuration DC_26A_n77A	16.7.0
2021-03	RAN#91	R5-211744	0376	1	F	Introduction of spurious emission TP analysis for Rel-15 EN-DC configuration DC_26A_n78A	16.7.0
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2021-03	RAN#91	R5-211779	0364	1	F	Spur emission TP analysis R16 DC_48A_n5A	16.7.0
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2021-03	RAN#91	R5-211810	0351	1	F	Update of TP analysis for EVM equalizer spectrum flatness for half Pi BPSK	16.7.0
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2021-03	RAN#91	R5-211893	0346	1	F	Update of test point analysis for FR2 MPR, SEM and ACLR test cases	16.7.0
2021-03	RAN#91	R5-211894	0359	1	F	Addition of reference sensitivity test point analyses for FR1 NR CA and EN-DC	16.7.0
2021-03	RAN#91	R5-211895	0360	1	F	Moving of principles for reference sensitivity test point selection from attachments to annexes	16.7.0
2021-03	RAN#91	R5-211897	0382	1	F	TP analysis for DC_8A_n77A	16.7.0
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2021-03	RAN#91	R5-211899	0384	1	F	TP analysis for DC_26A_n41A	16.7.0
2021-03	RAN#91	R5-211900	0385	1	F	TP analysis for DC_26A_n77A and DC_26A_n78A	16.7.0
2021-03	RAN#91	R5-211901	0386	1	F	TP analysis for DC_26A_n79A	16.7.0
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2021-03	RAN#91	R5-211914	0358	1	F	Adding TP analysis for NR test case-Time mask for UL carrier switching	16.7.0

History

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