



**LTE;
Evolved Universal Terrestrial Radio Access (E-UTRA) and
Evolved Universal Terrestrial Radio
Access Network (E-UTRAN);
Derivation of test points for radio transmission and
reception conformance test cases
(3GPP TR 36.905 version 14.2.0 Release 14)**



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Foreword

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1 Scope

The present document specifies and contains the derivation of Test Points for RF test cases, thereby 3GPP TSG RAN WG5 will have a way of storing the input contributions provided. The test cases are described in TS36.521-1[2].

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

The present document is applicable from Release 10 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.
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- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 36.521-1: "User Equipment (UE) conformance specification, Radio transmission and reception Part 1: conformance testing".
- [3] 3GPP TS 36.101: "E-UTRA UE radio transmission and reception".
- [4] 3GPP TS 36.521-2: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 2: Implementation Conformance Statement (ICS)".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

Other definitions used in the present document are listed in 3GPP TS 36.521-1 [2] or 3GPP TS 36.101 [3].

3.2 Symbols

Symbols used in the present document are listed in 3GPP TR 21.905 [1], 3GPP TS 36.521-1 [2] or 3GPP TS 36.101 [3].

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 36.521-1 [2] or 3GPP TS 36.101 [3].

4 Test coverage analysis

4.1 Test point selection in Additional Maximum Power Reduction (A-MPR) test cases

When deriving test points for these test cases the calculation of maximum output power backoff and determination of possible worst cases for out-of-band emissions are non-trivial and therefore require an analysis which is documented here.

4.1.1 A-MPR test case for single carrier

This section contains information on test point selection for test case 6.2.4 in [2], Additional Maximum Power Reduction (A-MPR).

Test points in this test were added in the past, and no selection information is therefore available prior the NS values in table 4.1.1-1.

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.

Table 4.1.1-1: NS value specific test points for A-MPR

NS value	Justification	Comments
NS_05	See attachment "TpAnalysisAMPR(NS_05)_6.2.4_v2.zip"	Added at RAN5#73
NS_24	See attachment "TpAnalysisAMPR_6.2.4(NS_24 and NS_25).zip"	Added at RAN5#72
NS_25	See attachment "TpAnalysisAMPR_6.2.4(NS_24 and NS_25).zip"	Added at RAN5#72
NS_04 (Power Class 2)	See attachment "TpAnalysisAMPR_6.2.4_1(NS_04_PC2).zip"	Added at RAN5#74

The analyses for UE category M1 are performed per NS-value in table 4.1.1-2. The general principles for selection of test points are:

- For Additional spurious emissions, requirements are the same for all bandwidths. Since channel bandwidth is not judged to have any impact on the UE transmit signal for category M1, only one bandwidth needs to be tested. The lowest bandwidth with emissions requirement has lowest guard band and is therefore the most stringent.
- For NS-values with Additional SEM requirement and without any allowed A-MPR, same test points as in SEM test case 6.6.2.1EA can be used.
- For NS-values with Additional Spurious requirement and without any allowed A-MPR, same test points as in spurious test case 6.6.3EA.1 can be used
- For Additional SEM, test frequency is selected as in SEM test case.
- For Additional spurious emissions, test frequency selection depends on if protected range is above or below the UE transmit signal in frequency. If protected range is in higher frequency High frequency is selected, if lower frequency Low range is selected.

Table 4.1.1-2: NS value specific test points for A-MPR UE category M1

NS value	Operating band	Applicable test case	RB allocation and modulation	Bandwidth	Test frequency	Comments
NS_03	2, 4	6.6.2.2EA	SEM (Note 1)	Lowest, 5MHz, 10MHz, Highest	Low, Mid, High	
NS_04	41	6.6.2.2EA	TBD			
NS_05	1	6.6.3EA.3	Spur (Note 2)	5 MHz	Low	
NS_06	12, 13	6.6.2.2EA	SEM (Note 1)	Lowest, 5MHz, 10MHz, Highest	Low, Mid, High	
NS_07	13	6.6.2.2EA	See attachment "TpAnalysisAMPR(NS_07)_6.2.4EA.zip"	10MHz	Low, Mid, High	Testing only 10 MHz to align with legacy LTE test case
		6.6.3EA.3		10 MHz	Low	Emission requirements are only defined for 10 MHz channel bandwidth
NS_08	19	6.6.3EA.3	Spur (Note 2)	5 MHz	High	
NS_09	21	6.6.3EA.3	Spur (Note 2)	5 MHz	High	
NS_10	20	N/A				Not tested due to missing requirements
NS_12	26	6.6.3EA.3	TBD			
NS_13	26	6.6.3EA.3	Spur (Note 2)	1.4 MHz	Low (Note 3)	
NS_14	26	6.6.3EA.3	Spur (Note 2)	10 MHz	Low (Note 3)	
NS_15	26	6.6.3EA.3	See attachment "TpAnalysisAMPR(NS_15)_6.2.4EA.zip"	1.4 MHz	High, High – 4 MHz	
NS_16	27	6.6.3EA.3	Spur (Note 2)	1.4 MHz	Low	
NS_17	28	6.6.3EA.3	Spur (Note 2)	5 MHz	Low (Note 3)	
NS_18	28	6.6.3EA.3	Spur (Note 2)	5 MHz	Low	

Note 1: No A-MPR allowed, same test points as SEM test case 6.6.2.1EA can be used for Additional SEM
Note 2: No A-MPR allowed, same test points as Spurious test case 6.6.3EA.1 can be used for Additional Spurious
Note 3: Protected range below UE transmit signal, and restricted carrier frequency. Use lowest allowed frequency

4.1.2 A-MPR test case for intra-band contiguous UL CA

This section contains information on test point selection for test case 6.2.4A.1 in [2], Additional Maximum Power Reduction (A-MPR) for CA (intra-band contiguous DL CA and UL CA).

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

4.1.3 A-MPR test case for inter-band UL CA

This section contains information on test point selection for test case 6.2.4A.2 in [2], Additional Maximum Power Reduction (A-MPR) for CA (inter-band DL CA and UL CA).

TS 36.101 [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 4.1.3-1.

Table 4.1.3-1: 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		Applicable test case	Comment/Justification
CA_1A-3A	NS_05	NS_01	6.6.3.3A.2	Note 3
CA_1A-5A	NS_05	NS_01	6.6.3.3A.2	Note 3
CA_1A-7A	NS_05	NS_01	6.6.3.3A.2	Note 3
CA_1A-8A	NS_05	NS_01	6.6.3.3A.2	Note 3
CA_1A-18A	NS_05	NS_01	6.6.3.3A.2	Note 3
CA_1A-19A	NS_05	NS_08	6.6.3.3A.2	Note 3
CA_1A-21A	NS_05	NS_09	6.6.3.3A.2	Note 3
CA_1A-26A	NS_05	NS_01	6.6.3.3A.2	Note 3
CA_1A-28A	NS_05	NS_17	6.6.3.3A.2	Note 3
CA_1A-42A	NS_05	NS_01	6.6.3.3A.2	Note 3
CA_2A-4A	NS_03	NS_03	6.6.2.2A.2	
CA_2A-5A	NS_03	NS_01	6.6.2.2A.2	
CA_2A-12A	NS_03	NS_06	6.6.2.2A.2	
CA_2A-13A	NS_03	NS_06	6.6.2.2A.2	
CA_2A-13A	NS_03	NS_07	6.6.2.2A.2, 6.6.3.3A.2	
CA_3A-5A	NS_01	NS_01	N/A	Note 2
CA_3A-7A	NS_01	NS_01	N/A	Note 2
CA_3A-8A	NS_01	NS_01	N/A	Note 2
CA_3A-19A	NS_01	NS_08	6.6.3.3A.2	
CA_3A-20A	NS_01	NS_10	N/A	Note 4
CA_3A-26A	NS_01	NS_12, NS_13, NS_14, NS_15	6.6.3.3A.2	Note 3
CA_4A-5A	NS_03	NS_01	6.6.2.2A.2	
CA_4A-7A	NS_03	NS_01	6.6.2.2A.2	
CA_4A-12A	NS_03	NS_06	6.6.2.2A.2	
CA_4A-13A	NS_03	NS_06	6.6.2.2A.2	
CA_4A-13A	NS_03	NS_07	6.6.2.2A.2, 6.6.3.3A.2	
CA_4A-17A	NS_03	NS_06	6.6.2.2A.2	
CA_5A-7A	NS_01	NS_01	N/A	Note 2
CA_5A-12A	NS_01	NS_06	6.6.2.2A.2	
CA_5A-17A	NS_01	NS_06	6.6.2.2A.2	
CA_7A-20A	NS_01	NS_10	N/A	
CA_7A-28A	NS_01	NS_17	6.6.3.3A.2	Note 3
CA_7A-28A	NS_01	NS_18	6.6.3.3A.2	Note 3
CA_18A-28A	NS_01	NS_17	6.6.3.3A.2	Note 3
CA_19A-21A	NS_08	NS_09	6.6.3.3A.2	Note 3
CA_39A-41A	NS_01	NS_01	N/A	
Note 1:	As per TS 36.101 V12.10.1			
Note 2:	No test required since band combinations where only NS_01 is possible have no additional requirements, covered by section 6.2.3 test cases in TS 36.521-1 [2]			
Note 3:	No test required since only A-Spur requirements apply, and the frequency range to test is unaffected by intermodulation products as described in section 4.3.			
Note 4:	No test required since no A_SEM and/or A-Spur requirements apply			

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 MPR + A-MPR value
- Test the maximum MPR + A-MPR value
- Test the maximum unbalanced total power backoff among CCs (max $P_{\text{cm}axc}$ difference).

The analyses are done for QPSK/16QAM test cases. For 64QAM test cases no analysis is made due to that it follows the same selection principle.

4.2 Test frequency and bandwidth selection in Reference sensitivity test cases

The determination of test frequency and channel bandwidths are made considering test time, possible worst cases and operator deployments. This is non-trivial and requires an analysis which is documented here.

4.2.1 Reference sensitivity level for single carrier

This section contains information on test point selection for test case 7.3 in [2], Reference sensitivity level

Test points in this test were added in the past, and no selection information is therefore available.

4.2.2 Reference sensitivity level for intra-band contiguous CA

This section contains information on test point selection for test cases 7.3A.1 - Reference sensitivity level for CA (intra-band contiguous DL CA and UL CA) and 7.3A.2 - Reference sensitivity level for CA (intra-band contiguous DL CA without UL CA).

In this test case, there are no CA configuration specific test points. The general rule of Low, High test frequency and Lowest N_{RB_agg} , Highest N_{RB_agg} is chosen for any CA configuration.

4.2.3 Reference sensitivity level for inter-band CA

This section contains information on test point selection for test case 7.3A.3 - Reference sensitivity level for CA (inter-band DL CA without UL CA)

In this test case, there are default test points to be used unless CA configuration specific test points are over-ruling in table 4.2.3-1. The default rule of Mid test frequency and Highest N_{RB_agg} is chosen for any CA configuration.

Table 4.2.3-1: CA configuration specific test points for inter-band CA with 2 CC

CA config	Justification	Comments
CA_1A-3A	-	
CA_1A-11A	-	
CA_1A-18A	-	
CA_1A-19A	-	
CA_1A-21A	-	
CA_1A-26A	-	
CA_1A-28A	-	
CA_1A-41A	-	
CA_2A-13A	-	
CA_3A-8A	-	
CA_3A-19A	-	
CA_3A-26A	-	
CA_3A-27A	-	
CA_3A-28A	-	
CA_3A-42A	Test points are selected based on RAN4 defined exceptions	
CA_4A-5A	-	
CA_4A-13A	-	
CA_4A-17A	-	
CA_8A-11A	-	
CA_11A-18A	-	
CA_18A-28A	-	
CA_19A-21A	-	
CA_26A-41A	-	
CA_28A-41A	Test points are selected based on the industrial reason	
CA_28A-42A	Test points are selected based on RAN4 defined exceptions	
CA_39A-41A	-	
CA_7A-28A	-	

4.2.4 Reference sensitivity level for intra-band non-contiguous CA

This section contains information on test point selection for test case 7.3A.4 Reference sensitivity level for CA (intra-band non-contiguous DL CA without UL CA).

Testpoint choice is based on the Table 7.3A.0-3. Only largest PCC BW + largest SCC BW and largest PCC BW + smallest SCC BW are tested. All corner cases VS W_{gap} specified for those 2 BW combinations in the Table 7.3A.0-3 are tested, larger W_{gap} being considered worse. PCC is allocated to the upper carrier, unless DL Band is below UL Band. Most testpoint IDs for FDD bands have to be tested twice, once with RB allocation applicable to PCC REFSSENS test, which is the standard single carrier RB allocation, and once with RB Allocation applicable to SCC REFSSENS test, as per Table 7.3A.0-3.

4.2.5 Reference sensitivity level for 3DL CA

This section contains information on test point selection for test case 7.3A.5 Reference sensitivity level for 3DL CA.

In the applicability conditions in TS 36.521-2 [4] it is defined that if the 3DL test is performed, testing of some fallback cases can be skipped, specifically:

- 2DL fallback 3DL/1UL -> 2DL/1UL: Test of fallback can be skipped in many cases. Analysis supplied per CA configuration later in this clause.
- 2DL fallback 3DL/2UL -> 2DL/2UL: It is FFS if fallback need to be tested
- 1UL fallback 3DL/2UL -> 3DL/1UL: Test of fallback is required due to different minimum requirements.

This implies that the test point analysis described later in this section currently only considers 1UL.4.2.5.1 Intra-band

In this case, there are default test points to be used unless CA configuration specific test points are over-ruling. The default rule of Low and High test frequency, Lowest and Highest $N_{\text{RB_agg}}$ is chosen for any CA configuration.

Editor's note: The specific test points for reference sensitivity level and 3DL CA Intra-band are under investigation.

4.2.5.2 Inter-band

In this case, there are default test points to be used unless CA configuration specific test points are over-ruling in table 4.2.5.2-1. The default rule of Mid test frequency and Highest $N_{\text{RB_agg}}$ is chosen for any CA configuration. For CA configurations where default test points are used and 2DL fallback cases also use default test points there is no need for justification in Table 4.2.5.2-1.

Selection of test points should include some possible worst combinations and these can be based on operator preference in case of the CA configuration is operator specific. The number of test points should not exceed the total number of the maximum number of the test points to cover fallback of 2DL CA case.

Table 4.2.5.2-1: CA configuration specific test points for 3DL CA (Inter-band)

CA config	Justification	Comments
CA_1A-3A-5A	See attachment "TpAnalysis3DLRefSens_7.3A.5(1A-3A-5A).zip"	
CA_1A-3A-7A	See attachment "TpAnalysis3DLRefSens_7.3A.5(1A-3A-7A)_V2.zip"	Added at RAN5#70 Modified at RAN5#73
CA_1A-3A-8A	See attachment "TpAnalysis3DLRefSens_7.3A.5(1A-3A-8A).xls"	Added at RAN5#69
CA_1A-3A-19A	-	
CA_1A-3A-20A	See attachment "TpAnalysis3DLRefSens_7.3A.5(1A-3A-20A).zip"	Added at RAN5#70
CA_1A-3A-28A	See attachment "TpAnalysis3DLRefSens_7.3A.5(1A-3A-28A).zip"	Added at RAN5#74
CA_1A-3A-41A	See attachment "TpAnalysis3DLRefSens_7.3A.5(1A-3A-41A).zip"	Added at RAN5#73
CA_1A-3A-42A	See attachment "TpAnalysis3DLRefSens_7.3A.5(1A-3A-42A).zip"	Added RAN5#70
CA_1A-8A-11A	See attachment "TpAnalysis3DLRefSens_7.3A.5(1A-8A-11A).zip"	Added at RAN5#71
CA_1A-8A-28A	See attachment "TpAnalysis3DLRefSens_7.3A.5(1A-8A-28A).zip"	Added at RAN5#74
CA_1A-11A-18A	See attachment "TpAnalysis3DLRefSens_7.3A.5(1A-11A-18A).zip"	Added at RAN5#73
CA_1A-18A-28A	See attachment "TpAnalysis3DLRefSens_7.3A.5(1A-18A-28A).zip"	Added at RAN5#74
CA_1A-19A-21A	-	
CA_1A-19A-28A	See attachment "TpAnalysis3DLRefSens_7.3A.5(1A-19A-28A).zip"	Added RAN5#70
CA_1A-41A-42A	See attachment "TpAnalysis3DLRefSens_7.3A.5(1A-41A-42A).zip"	Added at RAN5#72
CA_2A-4A-5A	See attachment "TpAnalysis3DLRefSens_7.3A.5.zip"	Added at RAN5#69
CA_2A-4A-12A	See attachment "TpAnalysis3DLRefSens_7.3A.5(2A-4A-12A).zip"	
CA_2A-4A-13A	See attachment "TpAnalysis3DLRefSens_7.3A.5(2A-4A-13A).zip"	
CA_2A-4A-30A	See attachment "TpAnalysis3DLRefSens_7.3A.5(2A-4A-30A).zip"	Added at RAN5#74
CA_2A-4A-29A	See attachment "TpAnalysis3DLRefSens_7.3A.5(2A-4A-29A).zip"	Added at RAN5#74
CA_2A-5A-13A	See attachment "TpAnalysis3DLRefSens_7.3A.5(2A-5A-13A).zip"	Added at RAN5#68
CA_3A-7A-8A	See attachment "TpAnalysis3DLRefSens_7.3A.5(3A-7A-8A).zip"	Added at RAN5#71
CA_3A-8A-28A	See attachment "TpAnalysis3DLRefSens_7.3A.5(3A-8A-28A).zip"	Added at RAN5#74
CA_3A-19A-42A	See attachment "TpAnalysis3DLRefSens_7.3A.5(3A-19A-42A).zip"	Added RAN5#70
CA_3A-28A-41A	See attachment "TpAnalysis3DLRefSens_7.3A.5(3A-28A-41A).zip"	Added at RAN5#74
CA_4A-5A-13A	See attachment "TpAnalysis3DLRefSens_7.3A.5(4A-5A-13A).zip"	Added at RAN5#68
CA_4A-5A-30A	See attachment "TpAnalysis3DLRefSens_7.3A.5(4A-5A-30A)_v2.zip"	Added at RAN5#73

4.2.5.3 Intra-band contiguous + Inter-band

In this test case, there are default test points to be used unless CA configuration specific test points are over-ruling in table 4.2.5.3-1. The default rule of Low and High test frequency for the band with 2 CC and Mid test frequency for the band with 1CC, Lowest and Highest N_{RB_agg} for the band with 2 CC and Highest N_{RB_agg} for the band with 1 CC is chosen for any CA configuration. For CA configurations where default test points are used and 2DL fallback cases also use default test points there is no need for justification in Table 4.2.5.3-1.

Table 4.2.5.3-1: CA configuration specific test points for 3DL CA (Intra-band contiguous + Inter-band)

CA config	Justification	Comments
CA_1A-3C	TpAnalysis3DLRefSens_CA_1A-3C.zip	Added at RAN5#72
CA_1C-3A	See attachment "TpAnalysis3DLRefSens_7.3A.5(1C-3A).zip"	Added at RAN5#74
CA_2C-30A	See attachment "TpAnalysis3DLRefSens_7.3A.5(2C-30A).zip"	Added at RAN5#74
CA_3A-42C	Exception of Test configuration for CA_3A-42C is needed and test points are selected based on RAN4 defined exception points	Added at RAN5#68
CA_5A-12B	See attachment "TpAnalysis3DLRefSens_7.3A.5(5A-12B).zip"	Added at RAN5#74
CA_8A-42C	See attachment "TpAnalysis3DLRefSens_7.3A.5(8A-42C).zip"	Added at RAN5#72
CA_28A-41C	See attachment "TpAnalysis3DLRefSens_7.3A.5(28A-41C).zip"	Added at RAN5#71
CA_28A-42C	See attachment "TpAnalysis3DLRefSens_7.3A.5(28A-42C).zip"	Added at RAN5#71
CA_39A-41C, CA_39C-41A	Choose Mid range for B41, choose Low, mid, high range for B39 according to the real deploy condition	Added at RAN5#68
CA_41A-42C	-	

4.2.5.4 Intra-band non-contiguous + Inter-band

In this test case, there are default test points for each intra-band non-contiguous band to be used unless CA configuration specific test points are over-ruling in table 4.2.5.4-1. The default test points are based on fallback non-contiguous CA test points, with the inter-band CC using Max N_{RB} and Mid test frequency, as per default Inter-Band test points. For CA configurations where default test points are used and 2DL fallback cases also use default test points there is no need for justification in Table 4.2.5.4-1.

Table 4.2.5.4-1: CA configuration specific test points for 3DL CA (Intra-band non-contiguous + Inter-band)

CA config	Justification	Comments
CA_2A-2A-5A	See attachment "TpAnalysis3DLRefSens_7.3A.5(2A-2A-XA).zip"	Added at RAN5#68 Modified at RAN5#69
CA_2A-2A-13A	See attachment "TpAnalysis3DLRefSens_7.3A.5(2A-2A-XA).zip"	
CA_3A-3A-XA	Test point choice based on fallback CA_3A-3A test points,	Added at RAN5#69
CA_4A-4A-5A	See attachment "TpAnalysis3DLRefSens_7.3A.5(4A-4A-XA).zip"	Added at RAN5#68 Modified at RAN5#69
CA_4A-4A-7A	See attachment "TpAnalysis3DLRefSens_7.3A.5(4A-4A-XA).zip"	
CA_XA-42A-42A	Test point choice based on fallback CA_42A-42A test points,	Added at RAN5#69
CA_4A-4A-12A	Exception of Test configuration for CA_4A-4A-12A is needed due to H3 of B12 TX falling into B4 RX if B12 is PCC. Test points are selected based on RAN4 defined exception points.	Added at RAN5#69

4.2.5.5 Intra-band non-contiguous + Intra-band contiguous

Testpoint choice is based on the Table 7.3A.0-3. Only largest PCC sub-block BW / N_{RB_agg} + largest SCC-only sub-block BW / N_{RB_agg} and largest PCC sub-block BW / N_{RB_agg} + smallest SCC-only sub-block BW / N_{RB_agg} are tested. All corner cases VS W_{gap} specified for those 2 BW combinations in the Table 7.3A.0-3 are tested, larger W_{gap} being considered worse. PCC is allocated to the highest carrier, unless DL Band is below UL Band. Most testpoint IDs for FDD bands have to be tested twice, once with RB allocation applicable to PCC REFSSENS test, which is the standard single carrier RB allocation, and once with RB Allocation applicable to SCC REFSSENS test, as per Table 7.3A.0-3.

4.2.6 Reference sensitivity level for 4DL CA

This section contains information on test point selection for test case 7.3A.9 Reference sensitivity level for 4DL CA.

In the applicability conditions in TS 36.521-2 [4] it is defined that if the 4DL test is performed, testing of any 3DL or 2DL fallbacks can be skipped specifically:

- 3DL fallback 4DL/1UL -> 3DL/1UL: Test of fallback can be skipped in many cases. Analysis supplied per CA configuration later in this clause.
- 3DL fallback 4DL/2UL -> 3DL/2UL: It is FFS if fallback need to be tested.
- 1UL fallback 4DL/2UL -> 4DL/1UL: Test of fallback is required due to different minimum requirements.

This implies that the test point analysis described later in this section currently only considers 1UL.

4.2.6.1 Intra-band contiguous

FFS

4.2.6.2 Inter-band

In this case, there are default test points to be used unless CA configuration specific test points are over-ruling in table 4.2.5.6-1. The default rule of Mid test frequency and Highest N_{RB_agg} is chosen for any CA configuration. For CA configurations where default test points are used and the 3DL fallback cases also use default test points there is no need for justification in Table 4.2.6.2-1.

Selection of test points should include some possible worst combinations and these can be based on operator preference in case of the CA configuration is operator specific. The number of test points should not exceed the total number of the maximum number of the test points to cover fallback of 2DL and 3DL CA case.

Table 4.2.6.2-1: CA configuration specific test points for 4DL CA (Inter-band)

CA config	Justification	Comments
CA_1A-3A-19A-42A	See attachment "TpAnalysis4DLRefSens_7.3A.9(1A-3A-19A-42A).zip"	Added at RAN5#72
CA_1A-19A-21A-42A	See attachment "TpAnalysis4DLRefSens_7.3A.9(1A-19A-21A-42A).zip"	Added at RAN5#72
CA_2A-4A-5A-12A	See attachment "TpAnalysis4DLRefSens_7.3A.9(2A-4A-5A-12A).zip"	Added at RAN5#74
CA_2A-4A-5A-30A	See attachment "TpAnalysis4DLRefSens_7.3A.9(2A-4A-5A-30A).zip"	Added at RAN5#72
CA_2A-4A-12A-30A	See attachment "TpAnalysis4DLRefSens_7.3A.9(2A-4A-12A-30A).zip"	Added at RAN5#74
CA_2A-4A-29A-30A	See attachment "TpAnalysis4DLRefSens_7.3A.9(2A-4A-29A-30A).zip"	Added at RAN5#74

4.2.6.3 Intra-band contiguous + Inter-band

In this test case, there are default test points to be used unless CA configuration specific test points are over-ruling in table 4.2.6.3-1. The default rule of Low and High test frequency for the band with 2 CC and Mid test frequency for the band with 1CC, Lowest and Highest N_{RB_agg} for the band with 2 CC and Highest N_{RB_agg} for the band with 1 CC is chosen for any CA configuration. For CA configurations where default test points are used and the 3DL fallback cases also use default test points there is no need for justification in Table 4.2.6.2-1.

Table 4.2.6.3-1: CA configuration specific test points for 4DL CA (Intra-band contiguous + Inter-band)

CA config	Justification	Comments
CA_1A-3A-42C	See attachment "TpAnalysis4DLRefSens_7.3A.9(1A-3A-42C)_v2.zip"	Added at RAN5#73
CA_1A-19A-42C	See attachment "TpAnalysis4DLRefSens_7.3A.9(1A-19A-42C)_v2.zip"	Added at RAN5#73
CA_1A-21A-42C	See attachment "TpAnalysis4DLRefSens_7.3A.9(1A-21A-42C)_v2.zip"	Added at RAN5#73
CA_1A-41A-42C	See attachment "TpAnalysis4DLRefSens_7.3A.9(1A-41A-42C).zip"	Added at RAN5#74
CA_1A-41C-42A	See attachment "TpAnalysis4DLRefSens_7.3A.9(1A-41C-42A).zip"	Added at RAN5#74
CA_2A-5A-12B	See attachment "TpAnalysis4DLRefSens_7.3A.9(2A-5A-12B).zip"	Added at RAN5#74
CA_2C-12A-30A	See attachment "TpAnalysis4DLRefSens_7.3A.9(2C-12A-30A).zip"	Added at RAN5#74
CA_2C-29A-30A	See attachment "TpAnalysis4DLRefSens_7.3A.9(2C-29A-30A).zip"	Added at RAN5#74
CA_3A-19A-42C	See attachment "TpAnalysis4DLRefSens_7.3A.9(3A-19A-42C)_v2.zip"	Added at RAN5#73
CA_19A-21A-42C	See attachment "TpAnalysis4DLRefSens_7.3A.9(19A-21A-42C)_v2.zip"	Added at RAN5#73
CA_41C-42C	See attachment "TpAnalysis4DLRefSens_7.3A.9(41C-42C).zip"	Added at RAN5#73

4.2.6.4 Intra-band non-contiguous + Inter-band

In this test case, there are default test points for each intra-band non-contiguous band to be used unless CA configuration specific test points are over-ruling in table 4.2.6.4-1. The default test points are based on fallback non-contiguous CA test points, with the inter-band CC using Max N_{RB} and Mid test frequency, as per default Inter-Band test points. For CA configurations where default test points are used and the 3DL fallback cases also use default test points there is no need for justification in Table 4.2.6.2-1.

Table 4.2.6.4-1: CA configuration specific test points for 4DL CA (Intra-band non-contiguous + Inter-band)

CA config	Justification	Comments
CA_2A-2A-4A-5A	See attachment "TpAnalysis4DLRefSens_7.3A.9(2A-2A-4A-5A).zip"	Added at RAN5#73
CA_2A-2A-5A-12A	See attachment "TpAnalysis4DLRefSens_7.3A.9(2A-2A-5A-12A).zip"	Added at RAN5#73
CA_4A-4A-5A-30A	See attachment "TpAnalysis4DLRefSens_7.3A.9(4A-4A-5A-30A).zip"	Added at RAN5#73
CA_4A-4A-12A-30A	See attachment "TpAnalysis4DLRefSens_7.3A.9(4A-4A-12A-30A).zip"	Added at RAN5#73
CA_4A-4A-29A-30A	See attachment "TpAnalysis4DLRefSens_7.3A.9(4A-4A-29A-30A).zip"	Added at RAN5#73

4.2.6.5 Intra-band non-contiguous + Intra-band contiguous

Table 4.2.6.5-1: CA configuration specific test points for 4DL CA (Intra-band non-contiguous + Intra-band contiguous)

CA config	Justification	Comments
CA_2A-2A-12B	See attachment "TpAnalysis4DLRefSens_7.3A.9(2A-2A-12B).zip"	Added at RAN5#73

4.2.6.6 Intra-band non-contiguous + Intra-band non-contiguous

In this test case, there are default test points for each intra-band non-contiguous band to be used unless CA configuration specific test points are over-ruling in table 4.2.6.6-1. The default test points are based on fallback non-contiguous CA test points For CA configurations where default test points are used and the 3DL fallback cases also use default test points there is no need for justification in Table 4.2.6.2-1.

Table 4.2.6.6-1: CA configuration specific test points for 4DL (Intra-band non-contiguous + Intra-band non-contiguous)

CA config	Justification	Comments
CA_2A-2A-4A-4A	See attachment "TpAnalysis4DLRefSens_7.3A.9(2A-2A-4A-4A).zip"	Added at RAN5#72

4.3 Test points selection and Frequency ranges to cover in Tx spurious emissions test cases for 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 4.3-1: Frequency range analysis availability per CA configuration

CA config	File name	Comments
CA_1A-3A	TpAnalysisSpur(1A-3A)_v3.zip	Added at RAN5#73
CA_1A-5A	TpAnalysisSpur(1A-5A)_v2.zip	Added at RAN5#73_v2
CA_1A-7A	TpAnalysisSpur(1A-7A).zip	Added at RAN5#73
CA_1A-8A	TpAnalysisSpur(1A-8A)_v2.zip	Added at RAN5#73
CA_1A-18A	TpAnalysisSpur(1A-18A).zip	Added at RAN5#73
CA_1A-19A	TpAnalysisSpur(1A-19A)_v2.zip	Added at RAN5#72
CA_1A-21A	TpAnalysisSpur(1A-21A_v2).zip	Added at RAN5#72
CA_1A-26A	TpAnalysisSpur(1A-26A)_v2.zip	Added at RAN5#74
CA_1A-28A	TpAnalysisSpur(1A-28A)_v2.zip	Added at RAN5#74
CA_1A-42A	TpAnalysisSpur(1A-42A)_v2.zip	Added at RAN5#74
CA_2A-4A	TpAnalysisSpur(2A-4A)_v2.zip	Added at RAN5#73
CA_2A-5A	TpAnalysisSpur(2A-5A).zip	Added at RAN5#73
CA_2A-12A	TpAnalysisSpur(2A-12A).zip	Added at RAN5#73
CA_2A-13A	TpAnalysisSpur(2A-13A)_v2.zip	Added at RAN5#73
CA_3A-5A	TpAnalysisSpur(3A-5A)_v2.zip	Added at RAN5#73
CA_3A-7A	TpAnalysisSpur(3A-7A)_v2.zip	Added at RAN5#73
CA_3A-8A	TpAnalysisSpur(3A-8A)_v2.zip	Added at RAN5#73
CA_3A-19A	TpAnalysisSpur(3A-19A).zip	Added at RAN5#70
CA_3A-20A	TpAnalysisSpur(3A-20A)_v2.zip	Added at RAN5#73
CA_3A-26A	TpAnalysisSpur(3A-26A)_v2.zip	Added at RAN5#73
CA_4A-5A	TpAnalysisSpur(4A-5A)_v2.zip	Added at RAN5#73
CA_4A-7A	TpAnalysisSpur(4A-7A)_v3.zip	Added at RAN5#73
CA_4A-12A	TpAnalysisSpur(4A-12A)_v2.zip	Added at RAN5#73
CA_4A-13A	TpAnalysisSpur(4A-13A)_v2.zip	Added at RAN5#73
CA_4A-17A	TpAnalysisSpur(4A-17A)_v2.zip	Added at RAN5#73
CA_5A-7A	TpAnalysisSpur(5A-7A)_v2.zip	Added at RAN5#73
CA_5A-12A	TpAnalysisSpur(5A-12A)_v3.zip	Added at RAN5#73
CA_5A-17A	TpAnalysisSpur(5A-17A)_v2.zip	Added at RAN5#73
CA_7A-20A	TpAnalysisSpur(7A-20A)_v2.zip	Added at RAN5#73
CA_7A-28A	TpAnalysisSpur(7A-28A)_v2.zip	Added at RAN5#73
CA_18A-28A	TpAnalysisSpur(18A-28A)_v2.zip	Added at RAN5#74
CA_19A-21A	TpAnalysisSpur(19A-21A)_v2.zip	Added at RAN5#72
CA_39A-41A	TpAnalysisSpur(39A-41A)_v2.zip	Added at RAN5#73

4.4 Test points selection in 3DL Receiver test cases to align with 2DL test cases and skipping of 2DL fallback

This section contains information, per test case, for 2DL and 3DL CA Receiver test cases about alignment of test parameters between 2DL and 3DL variant of the same test, and recommendation on possible skipping of 2DL test if 3DL test is performed.

Editor's note: Information about alignment of test parameters between 2DL and 3DL variant of the same test will be added in this section for relevant test cases.

Annex A: Derivation documents

The documents (and spreadsheets where applicable) 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 files in the same area, e.g. "TestReqTxSpur2UL".
- Include Test Case Number(s), e.g. "6.6.3.1A.2+6.6.3.2A.2".
- 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: "TestReqTxSpur2UL_6.6.3.1A.2+6.6.3.2A.2(1A-3A).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. "TestReqTxSpur2UL_6.6.3.1A.2+6.6.3.2A.2(1A-3A)_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.

Annex B: Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
2015-04	RAN5#67	R5-152110	-	-	TR 36.905 Skeleton proposed for RAN5#67	-	0.0.1
2015-09	RAN5#68	R5-154027	-	-	Text proposal to TR 36.905 v0.0.1	0.0.1	0.0.2
2015-11	RAN5#69	R5-155414	-	-	Text proposal to TR 36.905 v0.0.1 (Justification of Reference sensitivity level for CA_3A-42A)	0.0.2	2.0.0
2015-11	RAN5#69	R5-155669	-	-	Text proposal to TR 36.905 v0.0.2 - Test point selection for CA_2A-4A-5A in Reference sensitivity test case 7.3A.5	0.0.2	2.0.0
2015-11	RAN5#69	R5-155854	-	-	Addition of Test Points for CA_1A-3A-8A to TR 36.905 v0.0.2	0.0.2	2.0.0
2015-11	RAN5#69	R5-155858	-	-	Add test point's analysis for 7.3A.5 Reference sensitivity level for CA(Intra-band non-contiguous + Inter-band)	0.0.2	2.0.0
2015-12	RAN#70	-	-	-	brought under change control by MCC	2.0.0	12.0.0
2016-03	RAN#71	R5-160830	0008	1	Add Test point analysis for Reference sensitivity test case 7.3A.5 for CA_4A-4A-13A	12.0.0	12.1.0
2016-03	RAN#71	R5-160832	0003	1	Addition of test point derivation explanation for 3DL CA REFSSENS testcases, Intel combinations	12.0.0	12.1.0
2016-03	RAN#71	R5-160842	0006	1	Test coverage analysis for Inter-band CA A-MPR test case	12.0.0	12.1.0
2016-03	RAN#71	R5-160843	0007	1	Add Test point analysis for A-MPR test case 6.2.4A.2	12.0.0	12.1.0
2016-03	RAN#71	R5-160844	0001	1	Addition of test points selection for 2UL inter-band CA spurious test cases	12.0.0	12.1.0
2016-03	RAN#71	R5-161011	0005	1	36.905 Addition of Test Points for CA_1A-3A-7A	12.0.0	12.1.0
2016-03	RAN#71	R5-161013	0004	1	36.905 Addition of Test Points for CA_1A-3A-20A	12.0.0	12.1.0
2016-03	RAN#71	R5-161060	0002	1	Addition of test points analysis for CA_1A-3A-42A, CA_1A-19A-28A and CA_3A-19A-42A	12.0.0	12.1.0
2016-06	RAN#72	R5-162871	0015	1	Addition of test points selection for 2UL inter-band CA spurious test cases	12.1.0	12.2.0
2016-06	RAN#72	R5-162998	0013	1	A-MPR band coverage for inter-band UL CA	12.1.0	12.2.0
2016-06	RAN#72	R5-162999	0014	1	Test point analysis for A-MPR test case 6.2.4A.2	12.1.0	12.2.0
2016-06	RAN#72	R5-162360	0010	-	Test point and test requirements analysis for CA_4A-5A spurious test cases	12.2.0	13.0.0
2016-06	RAN#72	R5-162845	0011	1	36.905 Addition of Test Points for CA_3A-7A-8A	12.2.0	13.0.0
2016-06	RAN#72	R5-162988	0012	1	New CA band combinations CA_28A-41A, CA_28A-41C, CA_28A-42A and CA_28A-42C - Updates of test points analysis	12.2.0	13.0.0
2016-06	RAN#72	R5-163020	0016	-	Addition of test points analysis for CA_1A-8A-11A	12.2.0	13.0.0
2016-09	RAN#73	R5-166032	0018	1	Introduction of test point analysis for CA_8A-42C (3DL) and test case 7.3A.5	13.0.0	13.1.0
2016-09	RAN#73	R5-166110	0026	1	36.905 Addition of test points selection for 2UL inter-band CA spurious test cases	13.0.0	13.1.0
2016-09	RAN#73	R5-166130	0025	1	Test point analysis for NS_24 and NS_25	13.0.0	13.1.0
2016-09	RAN#73	R5-166144	0023	1	Addition of test point analysis for TC 7.3A.9 Reference sensitivity level for 4DL CA	13.0.0	13.1.0
2016-09	RAN#73	R5-166146	0019	1	Addition of test points analysis for CA_1A-3C to 36.905	13.0.0	13.1.0
2016-09	RAN#73	R5-166153	0024	1	Change of test points and requirements for NS_05 A-MPR - Updates of test points analysis	13.0.0	13.1.0
2016-09	RAN#73	R5-166052	0021	1	New CA band combinations CA_1A-41A-42A - Updates of test points analysis	13.1.0	14.0.0
2016-12	RAN#74	R5-168559	0041	-	Update of the test point analysis for TC 7.3A.9 REFSSENS 4DL CA	14.0.0	14.1.0
2016-12	RAN#74	R5-168793	0047	-	Test point analysis of A-MPR test cases for Category M1	14.0.0	14.1.0
2016-12	RAN#74	R5-169162	0059	-	Addition of test point analysis for TC 7.3A.9 Reference sensitivity level	14.0.0	14.1.0
2016-12	RAN#74	R5-169171	0058	-	Correction of test point analysis for CA_4A-5A-30A	14.0.0	14.1.0
2016-12	RAN#74	R5-169538	0043	-	New CA band combination CA_1A-11A-18A - Updates of test points analysis	14.0.0	14.1.0
2016-12	RAN#74	R5-169540	0044	-	New CA band combination CA_41C-42C - Updates of test points analysis	14.0.0	14.1.0
2016-12	RAN#74	R5-169542	0045	-	New CA band combination CA_1A-18A, 1A-26A, 1A-28A, 1A-42A and 18A-28A - Updates of test points analysis	14.0.0	14.1.0
2016-12	RAN#74	R5-169551	0048	-	Correction of invalid test point for CA_1A-3A-7A	14.0.0	14.1.0
2016-12	RAN#74	R5-169555	0030	-	Addition of test points analysis for CA_2A-2A-12B to 36.905	14.0.0	14.1.0
2016-12	RAN#74	R5-169556	0031	-	Addition of test points analysis for CA_2A-2A-5A-12A to 36.905	14.0.0	14.1.0
2016-12	RAN#74	R5-169557	0032	-	Addition of test points analysis for CA_2A-2A-4A-5A to 36.905	14.0.0	14.1.0
2016-12	RAN#74	R5-169566	0028	-	Addition of test points analysis for CA_1A-3A-41A to 36.905	14.0.0	14.1.0
2016-12	RAN#74	R5-169614	0029	-	Update of section 4.3 with TPs selection analyses	14.0.0	14.1.0
2016-12	RAN#74	R5-169717	0042	-	Correction of test point analysis for NS_05 A-MPR	14.0.0	14.1.0
2017-03	RAN#75	R5-171255	0082	-	Clarification of Test point analysis process for 3DL and 4DL CA Reference sensitivity test cases	14.1.0	14.2.0
2017-03	RAN#75	R5-171710	0073	1	Addition of test points analysis for CA_1A-8A-28A	14.1.0	14.2.0
2017-03	RAN#75	R5-171713	0074	1	Addition of test points analysis for CA_3A-8A-28A	14.1.0	14.2.0
2017-03	RAN#75	R5-171716	0075	1	Addition of test points analysis for CA_3A-28A-41A	14.1.0	14.2.0
2017-03	RAN#75	R5-171723	0060	1	Addition of test points analysis for CA_1C-3A to 36.905	14.1.0	14.2.0
2017-03	RAN#75	R5-171724	0080	1	New CA band combinations CA_1A-41A-42C and 1A-41C-42A - Updates of test points analysis	14.1.0	14.2.0
2017-03	RAN#75	R5-171815	0081	1	Test point analysis of A-MPR test cases for Category M1	14.1.0	14.2.0

2017-03	RAN#75	R5-171820	0062	1	Addition of CA_1A-3A-28A in 36.905	14.1.0	14.2.0
2017-03	RAN#75	R5-171822	0063	1	Addition of test points analysis for CA_2A-4A-30A to36.905	14.1.0	14.2.0
2017-03	RAN#75	R5-171824	0064	1	Addition of test points analysis for CA_2A-4A-12A-30A to36.905	14.1.0	14.2.0
2017-03	RAN#75	R5-171826	0065	1	Addition of test points analysis for CA_2A-4A-29A to36.905	14.1.0	14.2.0
2017-03	RAN#75	R5-171827	0066	1	Addition of test points analysis for CA_2A-4A-29A-30A to 36.905	14.1.0	14.2.0
2017-03	RAN#75	R5-171828	0068	1	Addition of test points analysis for CA_5A-12B to36.905	14.1.0	14.2.0
2017-03	RAN#75	R5-171830	0067	1	Addition of test points analysis for CA_2A-5A-12B to36.905	14.1.0	14.2.0
2017-03	RAN#75	R5-171831	0069	1	Addition of test points analysis for CA_2A-4A-5A-12A to 36.905	14.1.0	14.2.0
2017-03	RAN#75	R5-171833	0070	1	Addition of test points analysis for CA_2C-12A-30A to 36.905	14.1.0	14.2.0
2017-03	RAN#75	R5-171835	0071	1	Addition of test points analysis for CA_2C-29A-30A to 36.905	14.1.0	14.2.0
2017-03	RAN#75	R5-171836	0072	1	Addition of test points analysis for CA_2C-30A to 36.905	14.1.0	14.2.0
2017-03	RAN#75	R5-171841	0077	1	Update of A-MPR analyses for (NS_03+NS_01) and (NS_03+NS_06)	14.1.0	14.2.0
2017-03	RAN#75	R5-171843	0078	1	CA band combinations CA_1A-26A, 1A-28A, 1A-42A and 18A-28A - Updates of test points analysis	14.1.0	14.2.0
2017-03	RAN#75	R5-171845	0079	1	CA band combinations CA_1A-18A-28A - Updates of test points analysis	14.1.0	14.2.0
2017-03	RAN#75	R5-171895	0076	1	Update for NS_04 Power Class 2 Test points	14.1.0	14.2.0
2017-03	RAN#75	R5-171903	0061	1	Update TR 36.905 with Test Points Analysis for Band 48	14.1.0	14.2.0

History

Document history		
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