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

(Release 11)

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Foreword

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

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

Version x.y.z

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- x the first digit:
 - 1 presented to TSG for information;
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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

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

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

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

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

1 Scope

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

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

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

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 36.101: "E-UTRA UE radio transmission and reception".
- [3] ITU-R Recommendation SM.329-10, "Unwanted emissions in the spurious domain"
- [4] 3GPP TS 36.133: "E-UTRA requirements for support of radio resource management".
- [5] 3GPP TS 36.331: "E-UTRA Radio Resource Control (RRC): protocol specification".
- [6] 3GPP TS 36.304: "E-UTRA UE procedures in idle mode".
- [7] 3GPP TS 36.508: "Common test environments for User Equipment (UE)".
- [8] 3GPP TS 36.211: "Physical Channels and Modulation".
- [9] 3GPP TS 36.212: "E-UTRA Multiplexing and channel coding".
- [10] 3GPP TS 36.213: "E-UTRA Physical layer procedures".
- [11] 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)".
- [12] 3GPP TS 36.521-3: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 3: Radio Resource Management (RRM) conformance testing".
- [13] 3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification".
- [14] 3GPP TS 36.423: "X2 application protocol (X2AP) ".
- [15] 3GPP TS 36.306: "E-UTRA User Equipment (UE) radio access capabilities".

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3.2 Symbols

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

| | |
|----------------------------------|--|
| BW_{Channel} | Channel bandwidth |
| $BW_{\text{Channel_CA}}$ | Aggregated channel bandwidth, expressed in MHz. |
| BW_{GB} | Virtual guard band to facilitate transmitter (receiver) filtering above / below edge CCs. |
| E_{RS} | Transmitted energy per RE for reference symbols during the useful part of the symbol, i.e. excluding the cyclic prefix, (average power normalized to the subcarrier spacing) at the eNode B transmit antenna connector |
| \hat{E}_s | The averaged received energy per RE of the wanted signal during the useful part of the symbol, i.e. excluding the cyclic prefix, at the UE antenna connector; average power is computed within a set of REs used for the transmission of physical channels (including user specific RSs when present), divided by the number of REs within the set, and normalized to the subcarrier spacing |
| $F_{\text{Interferer (offset)}}$ | Frequency |
| $F_{\text{Interferer}}$ | Frequency offset of the interferer |
| F_C | Frequency of the interferer |
| F_C | Frequency of the carrier centre frequency |
| F_{CA_low} | Frequency of the carrier centre frequency |
| F_{CA_high} | The centre frequency of the <i>lowest carrier</i> , expressed in MHz. |
| F_{DL_low} | The centre frequency of the <i>highest carrier</i> , expressed in MHz. |
| F_{DL_high} | The lowest frequency of the downlink operating band |
| F_{UL_low} | The highest frequency of the downlink operating band |
| F_{UL_high} | The lowest frequency of the uplink operating band |
| F_{edge_low} | The highest frequency of the uplink operating band |
| F_{edge_high} | The <i>lower edge</i> of aggregated channel bandwidth, expressed in MHz. |
| F_{offset} | The <i>higher edge</i> of aggregated channel bandwidth, expressed in MHz. |
| I_o | Frequency offset from F_{C_high} to the <i>higher edge</i> or F_{C_low} to the <i>lower edge</i> . |
| I_o | The power spectral density of the total input signal (power averaged over the useful part of the symbols within the transmission bandwidth configuration, divided by the total number of RE for this configuration and normalised to the subcarrier spacing) at the UE antenna connector, including the own-cell downlink signal |
| I_{or} | The total transmitted power spectral density of the own-cell downlink signal (power averaged over the useful part of the symbols within the transmission bandwidth configuration, divided by the total number of RE for this configuration and normalised to the subcarrier spacing) at the eNode B transmit antenna connector |
| \hat{I}_{or} | The total received power spectral density of the own-cell downlink signal (power averaged over the useful part of the symbols within the transmission bandwidth configuration, divided by the total number of RE for this configuration and normalised to the subcarrier spacing) at the UE antenna connector |
| I_{ot} | The received power spectral density of the total noise and interference for a certain RE (average power obtained within the RE and normalized to the subcarrier spacing) as measured at the UE antenna connector |
| L_{CRBs} | The length of a contiguous resource block allocation. |
| N_{cp} | Cyclic prefix length |
| N_{DL} | Downlink EARFCN |
| N_{oc} | The power spectral density of a white noise source (average power per RE normalised to the subcarrier spacing), simulating interference from cells that are not defined in a test procedure, as measured at the UE antenna connector. |

| | |
|--------------------------|--|
| N_{oc1} | The power spectral density of a white noise source (average power per RE normalized to the subcarrier spacing), simulating interference in non-CRS symbols in ABS subframe from cells that are not defined in a test procedure, as measured at the UE antenna connector. |
| N_{oc2} | The power spectral density of a white noise source (average power per RE normalized to the subcarrier spacing), simulating interference in CRS symbols in ABS subframe from all cells that are not defined in a test procedure, as measured at the UE antenna connector. |
| N_{oc3} | The power spectral density of a white noise source (average power per RE normalised to the subcarrier spacing), simulating interference in non-ABS subframe from cells that are not defined in a test procedure, as measured at the UE antenna connector. |
| $N_{\text{Offs-DL}}$ | Offset used for calculating downlink EARFCN |
| $N_{\text{Offs-UL}}$ | Offset used for calculating uplink EARFCN |
| N_{otx} | The power spectral density of a white noise source (average power per RE normalised to the subcarrier spacing) simulating eNode B transmitter impairments as at the eNode B transmit antenna connector |
| N_{RB} | Transmission bandwidth configuration, expressed in units of resource blocks |
| N_{RB_agg} | Aggregated Transmission Bandwidth Configuration The number of the aggregated RBs within the fully allocated Aggregated Channel bandwidth. |
| N_{RB_alloc} | Total number of simultaneously transmitted resource blocks in Aggregated Channel Bandwidth configuration. |
| N_{UL} | Uplink EARFCN |
| P | Number of cell-specific antenna ports |
| p | Antenna port number |
| P_{CMAX} | The measured configured maximum UE output power. |
| $P_{CMAX,c}$ | The configured maximum UE output power for serving cell c . |
| P_{EMAX} | Maximum allowed UE output power signalled by higher layers. Same as IE $P\text{-Max}$, defined in [5]. |
| $P_{EMAX,c}$ | Maximum allowed UE output power signalled by higher layers for serving cell c . Same as IE $P\text{-Max}$, defined in [7]. |
| $P_{\text{Interferer}}$ | Modulated mean power of the interferer |
| $P_{\text{PowerClass}}$ | $P_{\text{PowerClass}}$ is the nominal UE power (i.e., no tolerance). |
| P_{UMAX} | Maximum UE Power with possible power reduction due to modulation type, network signalling values and location near the edge of the band; it equals P_{CMAX} when the IE $P\text{-Max}$, defined in [5], is not signalled. |
| R_{av} | Minimum average throughput per RB |
| $RB \#$ | Position of the RB in the channel bandwidth. |
| RB_{start} | Indicates the lowest RB index of transmitted resource blocks. |
| ΔF_{OOB} | Δ Frequency of Out Of Band emission |
| $\Delta R_{\text{IB},c}$ | Allowed reference sensitivity relaxation due to support for inter-band CA operation, for serving cell c . |
| $\Delta T_{\text{IB},c}$ | Allowed maximum configured output power relaxation due to support for inter-band CA operation, for serving cell c . |
| ΔT_C | Allowed operating band edge transmission power relaxation. |
| $\Delta T_{C,c}$ | Allowed operating band edge transmission power relaxation for serving cell c . |
| σ | Test specific auxiliary variable used for the purpose of downlink power allocation, defined in Annex C.3.2. |

3.3 Abbreviations

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

| | |
|-------|------------------------------------|
| ABS | Almost Blank Subframe |
| ACLR | Adjacent Channel Leakage Ratio |
| ACS | Adjacent Channel Selectivity |
| A-MPR | Additional Maximum Power Reduction |
| AWGN | Additive White Gaussian Noise |
| BCCH | Broadcast Control Channel |
| BCH | Broadcast Channel |
| BS | Base Station |

| | |
|----------|---|
| CA | Carrier Aggregation |
| CA_X | CA for band X where X is the applicable E-UTRA operating band |
| CA_X-Y | CA for band X and Band Y where X and Y are the applicable E-UTRA operating band |
| CC | Component Carriers |
| CP | Cyclic Prefix |
| CPE | Customer Premise Equipment |
| CPE_X | Customer Premise Equipment for E-UTRA operating band X |
| CQI | Channel Quality Indicator |
| CW | Continuous Wave |
| DCI | Downlink Control Information |
| eDL-MIMO | Down Link Multiple Antenna transmission |
| DL | Downlink |
| DTX | Discontinuous Transmission |
| DwPTS | Downlink Pilot Time-Slot |
| EARFCN | E-UTRA Absolute Radio Frequency Channel Number |
| EPRE | Energy Per Resource Element |
| E-UTRA | Evolved UMTS Terrestrial Radio Access |
| EUTRAN | Evolved UMTS Terrestrial Radio Access Network |
| EVM | Error Vector Magnitude |
| FDD | Frequency Division Duplex |
| FRC | Fixed Reference Channel |
| FSTD | Frequency-Shift Time Diversity |
| HARQ | Hybrid ARQ |
| HD-FDD | Half- Duplex FDD |
| MAC | Medium Access Control |
| MBMS | Multimedia Broadcast Multicast Service |
| MCS | Modulation and Coding Scheme |
| MOP | Maximum Output Power |
| MPR | Maximum Power Reduction |
| MSR | Maximum Sensitivity Reduction |
| OCNG | OFDMA Channel Noise Generator |
| OFDMA | Orthogonal Frequency Division Multiple Access |
| OOB | Out-of-band |
| P-MPR | Power Management Maximum Power Reduction |
| PA | Power Amplifier |
| PBCH | Physical Broadcast Channel |
| PCC | Primary Component Carrier |
| PCCH | Paging Control Channel |
| PCFICH | Physical Control Format Indicator Channel |
| PDCCH | Physical Downlink Control Channel |
| PDSCH | Physical Downlink Shared Channel |
| PDU | Packet Data Unit |
| PHICH | Physical Hybrid ARQ Indicator Channel |
| Pm-dsg | Probability of miss-detection of the Downlink Scheduling Grant |
| PMI | Precoding Matrix Indicator |
| PRACH | Physical Random Access Channel |
| PRB | Physical Resource Block |
| PSS | Primary Synchronization Signal |
| PSS_RA | PSS-to-EPRE ratio for the channel PSS |
| PUCCH | Physical Uplink Control Channel |
| PUSCH | Physical Uplink Shared Channel |
| RE | Resource Element |
| REFSENS | Reference Sensitivity power level |
| RI | Rank Indicator |
| RLC | Radio Link Control |
| RMC | Reference Measurement Channel |
| r.m.s | Root Mean Square |
| RNTI | Radio Network Temporary Identifier |
| RRC | Radio Resource Control |
| RS | Reference Signal |
| RSRP | Reference Signal Received Power |
| SCC | Secondary Component Carrier |
| SCH | Synchronization Channel |

| | |
|---------|--|
| SDU | Service Data Unit |
| SFBC | Space-Frequency Block Coding |
| SNR | Signal-to-Noise Ratio |
| SRS | Sounding Reference Signal |
| SSS | Secondary Synchronization Signal |
| SSS_RA | SSS-to-RS EPRE ratio for the channel SSS |
| TDD | Time Division Duplex |
| TPC | Transmit Power Control |
| TPMI | Transmitted Precoding Matrix Indicator |
| TTI | Transmission Time Interval |
| UE | User Equipment |
| UL | Uplink |
| UL-MIMO | Up Link Multiple Antenna transmission |
| UMTS | Universal Mobile Telecommunications System |
| UpPTS | Uplink Pilot Time-Slot |
| UTRA | UMTS Terrestrial Radio Access |
| UTRAN | UMTS Terrestrial Radio Access Network |
| xCH_RA | xCH-to-RS EPRE ratio for the channel xCH in all transmitted OFDM symbols not containing RS |
| xCH_RB | xCH-to-RS EPRE ratio for the channel xCH in all transmitted OFDM symbols containing RS |

4 General

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

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

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

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

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

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

In clauses 6 and 7 TX and RX test cases for FDD/TDD test cases are defined. FDD and TDD test scenarios/requirements are included within the same test case. For test cases with any difference between the FDD and TDD branches the test description part of the test case has been separated in two sections to cover the two technologies. The applicability for the FDD and TDD branches are specified in TS 36.521-2.

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

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

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

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

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

4.1 Categorization of test requirements in CA, UL-MIMO, eDL-MIMO

The test requirements for Clauses 6 (Tx Characteristics) and 7 (Rx Characteristics), which are specific to CA, UL-MIMO, and eDL-MIMO are specified as suffix A, B, C, D where;

- a) Suffix A additional requirements need to support CA
- b) Suffix B additional requirements need to support UL-MIMO
- c) Suffix C additional requirements need to support TBD
- d) Suffix D additional requirements need to support eDL-MIMO

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

A terminal which supports more than one feature (CA, UL-MIMO, and eDL-MIMO) shall meet all of the separate corresponding requirements.

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

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

The frequency bands and channel arrangement for CA, UL-MIMO, and eDL-MIMO are specified in Clause 5, where;

- a) The clauses with suffix A specify the operating bands and channel arrangement related information for CA
- b) The clauses with suffix B specify the operating bands and channel arrangement related information for UL-MIMO
- c) The clauses with suffix C specify the operating bands and channel arrangement related information for [TBD]
- d) The clauses with suffix D specify the operating bands and channel arrangement related information for eDL-MIMO

5 Frequency bands and channel arrangement

5.1 General

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

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

5.2 Operating bands

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

Table 5.2-1: E-UTRA operating bands

| E-UTRA Operating Band | Uplink (UL) eNode B receive UE transmit | Downlink (DL) eNode B transmit UE receive | Duplex Mode |
|-----------------------------|---|---|----------------|
| | $F_{UL,low} - F_{UL,high}$ | $F_{DL,low} - F_{DL,high}$ | |

| | | | |
|----------------|-------------------------|-------------------------|------------------|
| 1 | 1920 MHz – 1980 MHz | 2110 MHz – 2170 MHz | FDD |
| 2 | 1850 MHz – 1910 MHz | 1930 MHz – 1990 MHz | FDD |
| 3 | 1710 MHz – 1785 MHz | 1805 MHz – 1880 MHz | FDD |
| 4 | 1710 MHz – 1755 MHz | 2110 MHz – 2155 MHz | FDD |
| 5 | 824 MHz – 849 MHz | 869 MHz – 894 MHz | FDD |
| 6 ^T | 830 MHz – 840 MHz | 875 MHz – 885 MHz | FDD |
| 7 | 2500 MHz – 2570 MHz | 2620 MHz – 2690 MHz | FDD |
| 8 | 880 MHz – 915 MHz | 925 MHz – 960 MHz | FDD |
| 9 | 1749.9 MHz – 1784.9 MHz | 1844.9 MHz – 1879.9 MHz | FDD |
| 10 | 1710 MHz – 1770 MHz | 2110 MHz – 2170 MHz | FDD |
| 11 | 1427.9 MHz – 1447.9 MHz | 1475.9 MHz – 1495.9 MHz | FDD |
| 12 | 699 MHz – 716 MHz | 729 MHz – 746 MHz | FDD |
| 13 | 777 MHz – 787 MHz | 746 MHz – 756 MHz | FDD |
| 14 | 788 MHz – 798 MHz | 758 MHz – 768 MHz | FDD |
| 15 | Reserved | Reserved | FDD |
| 16 | Reserved | Reserved | FDD |
| 17 | 704 MHz – 716 MHz | 734 MHz – 746 MHz | FDD |
| 18 | 815 MHz – 830 MHz | 860 MHz – 875 MHz | FDD |
| 19 | 830 MHz – 845 MHz | 875 MHz – 890 MHz | FDD |
| 20 | 832 MHz – 862 MHz | 791 MHz – 821 MHz | FDD |
| 21 | 1447.9 MHz – 1462.9 MHz | 1495.9 MHz – 1510.9 MHz | FDD |
| 22 | 3410 MHz – 3490 MHz | 3510 MHz – 3590 MHz | FDD |
| 23 | 2000 MHz – 2020 MHz | 2180 MHz – 2200 MHz | FDD |
| 24 | 1626.5 MHz – 1660.5 MHz | 1525 MHz – 1559 MHz | FDD |
| 25 | 1850 MHz – 1915 MHz | 1930 MHz – 1995 MHz | FDD |
| 26 | 814 MHz – 849 MHz | 859 MHz – 894 MHz | FDD |
| 27 | 807 MHz – 824 MHz | 852 MHz – 869 MHz | FDD |
| 28 | 703 MHz – 748 MHz | 758 MHz – 803 MHz | FDD |
| 29 | NA | 717 MHz – 728 MHz | FDD ² |
| ... | | | |
| 33 | 1900 MHz – 1920 MHz | 1900 MHz – 1920 MHz | TDD |
| 34 | 2010 MHz – 2025 MHz | 2010 MHz – 2025 MHz | TDD |
| 35 | 1850 MHz – 1910 MHz | 1850 MHz – 1910 MHz | TDD |
| 36 | 1930 MHz – 1990 MHz | 1930 MHz – 1990 MHz | TDD |
| 37 | 1910 MHz – 1930 MHz | 1910 MHz – 1930 MHz | TDD |
| 38 | 2570 MHz – 2620 MHz | 2570 MHz – 2620 MHz | TDD |
| 39 | 1880 MHz – 1920 MHz | 1880 MHz – 1920 MHz | TDD |
| 40 | 2300 MHz – 2400 MHz | 2300 MHz – 2400 MHz | TDD |
| 41 | 2496 MHz – 2690 MHz | 2496 MHz – 2690 MHz | TDD |
| 42 | 3400 MHz – 3600 MHz | 3400 MHz – 3600 MHz | TDD |
| 43 | 3600 MHz – 3800 MHz | 3600 MHz – 3800 MHz | TDD |
| 44 | 703 MHz – 803 MHz | 703 MHz – 803 MHz | TDD |

Note 1: Band 6 is not applicable.
Note 2: Restricted to E-UTRA operation when carrier aggregation is configured. The downlink operating band is paired with the uplink operating band (external) of the carrier aggregation configuration that is supporting the configured Pcell.

5.2A Operating bands for CA

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

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

| E-UTRA CA Band | E-UTRA Band | Uplink (UL) operating band | | Downlink (DL) operating band | | Duplex Mode | | |
|----------------|-------------|------------------------------|---|------------------------------|----------|-------------|----------|-----|
| | | BS receive / UE transmit | | BS transmit / UE receive | | | | |
| | | $F_{UL_low} - F_{UL_high}$ | | $F_{DL_low} - F_{DL_high}$ | | | | |
| CA_1 | 1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| CA_7 | 7 | 2500 MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | FDD |
| CA_38 | 38 | 2570 MHz | – | 2620 MHz | 2570 MHz | – | 2620 MHz | TDD |
| CA_40 | 40 | 2300 MHz | – | 2400 MHz | 2300 MHz | – | 2400 MHz | TDD |
| CA_41 | 41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |

Table 5.2A-2: Inter-band CA operating bands

| E-UTRA CA Band | E-UTRA Band | Uplink (UL) operating band | | | Downlink (DL) operating band | | | Duplex Mode |
|----------------|-------------|----------------------------|---|----------------|------------------------------|---|----------------|-------------|
| | | BS receive / UE transmit | | | BS transmit / UE receive | | | |
| | | $F_{UL, low}$ | – | $F_{UL, high}$ | $F_{DL, low}$ | – | $F_{DL, high}$ | |
| CA_1-5 | 1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| | 5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | |
| CA_1-18 | 1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| | 18 | 815 MHz | – | 830 MHz | 860 MHz | – | 875 MHz | |
| CA_1-19 | 1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| | 19 | 830 MHz | – | 845 MHz | 875 MHz | – | 890 MHz | |
| CA_1-21 | 1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| | 21 | 1447.9 MHz | – | 1462.9 MHz | 1495.9 MHz | – | 1510.9 MHz | |
| CA_2-17 | 2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| | 17 | 704 MHz | – | 716 MHz | 734 MHz | – | 746 MHz | |
| CA_2-29 | 2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| | 29 | N/A | | | 717 MHz | – | 728 MHz | |
| CA_3-5 | 3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| | 5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | |
| CA_3-7 | 3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| | 7 | 2500 MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | |
| CA_3-8 | 3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| | 8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | |
| CA_3-20 | 3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| | 20 | 832 MHz | – | 862 MHz | 791 MHz | – | 821 MHz | |
| CA_4-12 | 4 | 1710 MHz | – | 1755 MHz | 2110 MHz | – | 2155 MHz | FDD |
| | 12 | 699 MHz | – | 716 MHz | 729 MHz | – | 746 MHz | |
| CA_4-13 | 4 | 1710 MHz | – | 1755 MHz | 2110 MHz | – | 2155 MHz | FDD |
| | 13 | 777 MHz | – | 787 MHz | 746 MHz | – | 756 MHz | |
| CA_4-17 | 4 | 1710 MHz | – | 1755 MHz | 2110 MHz | – | 2155 MHz | FDD |
| | 17 | 704 MHz | – | 716 MHz | 734 MHz | – | 746 MHz | |
| CA_7-20 | 7 | 2500 MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | FDD |
| | 20 | 832 MHz | – | 862 MHz | 791 MHz | – | 821 MHz | |
| CA_11-18 | 11 | 1427.9 MHz | – | 1447.9 MHz | 1475.9 MHz | – | 1495.9 MHz | FDD |
| | 18 | 815 MHz | – | 830 MHz | 860 MHz | – | 875 MHz | |

5.2B Operating bands for UL-MIMO

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

5.3 TX–RX frequency separation

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

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

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

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

5.3A TX–RX frequency separation for CA

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

5.4 Channel arrangement

5.4.1 Channel spacing

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

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

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

5.4.1A Channel spacing for CA

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

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

where $BW_{Channel(1)}$ and $BW_{Channel(2)}$ are the channel bandwidths of the two respective E-UTRA component carriers according to Table 5.2-1 with values in MHz. The channel spacing for intra-band contiguous carrier aggregation can be adjusted to any multiple of 300 kHz less than the nominal channel spacing to optimize performance in a particular deployment scenario.

5.4.2 Channel bandwidth

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

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

| Channel bandwidth BW _{Channel} [MHz] | 1.4 | 3 | 5 | 10 | 15 | 20 |
|--|-----|----|----|----|----|-----|
| Transmission bandwidth configuration N _{RB} | 6 | 15 | 25 | 50 | 75 | 100 |

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

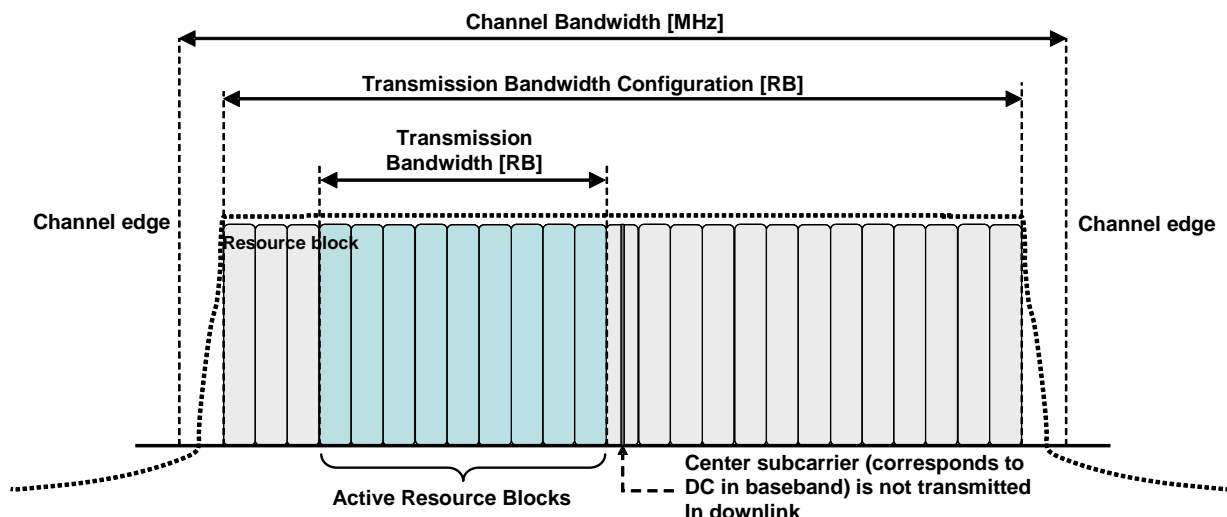


Figure 5.4.2-1: Definition of channel bandwidth and transmission bandwidth configuration for one E-UTRA carrier

5.4.2.1 Channel bandwidths per operating band

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

Table 5.4.2.1-1: E-UTRA channel bandwidth

| E-UTRA Band | E-UTRA band / channel bandwidth | | | | | |
|-------------|--|-------|------------------|--------------------|--------------------|----------------------|
| | 1.4 MHz | 3 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| 1 | | | Yes | Yes | Yes | Yes |
| 2 | Yes | Yes | Yes | Yes | Yes ¹ | Yes ¹ |
| 3 | Yes | Yes | Yes | Yes | Yes ¹ | Yes ¹ |
| 4 | Yes | Yes | Yes | Yes | Yes | Yes |
| 5 | Yes | Yes | Yes | Yes ¹ | | |
| 6 | | | Yes | Yes ¹ | | |
| 7 | | | Yes | Yes | Yes ³ | Yes ^{1, 3]} |
| 8 | Yes | Yes | Yes | Yes ^[1] | | |
| 9 | | | Yes | Yes | Yes ¹ | Yes ¹ |
| 10 | | | Yes | Yes | Yes | Yes |
| 11 | | | Yes | Yes ¹ | | |
| 12 | Yes | Yes | Yes ¹ | Yes ¹ | | |
| 13 | | | Yes ¹ | Yes ¹ | | |
| 14 | | | Yes ¹ | Yes ¹ | | |
| ... | | | | | | |
| 17 | | | Yes ¹ | Yes ¹ | | |
| 18 | | | Yes | Yes ¹ | Yes ¹ | |
| 19 | | | Yes | Yes ¹ | Yes ¹ | |
| 20 | | | Yes | Yes ¹ | Yes ¹ | Yes ¹ |
| 21 | | | Yes | Yes ¹ | Yes ¹ | |
| 22 | | | Yes | Yes | Yes ¹ | Yes ¹ |
| 23 | Yes | Yes | Yes | Yes | Yes ^[1] | Yes ^[1] |
| 24 | | | Yes | Yes | | |
| 25 | Yes | Yes | Yes | Yes | Yes ^[1] | Yes ^[1] |
| 26 | Yes | Yes | Yes | Yes ¹ | Yes ¹ | |
| 27 | Yes | Yes | Yes | Yes ¹ | | |
| 28 | | Yes | Yes | Yes ¹ | Yes ¹ | Yes ^{1, 2} |
| ... | | | | | | |
| 33 | | | Yes | Yes | Yes | Yes |
| 34 | | | Yes | Yes | Yes | |
| 35 | Yes | Yes | Yes | Yes | Yes | Yes |
| 36 | Yes | Yes | Yes | Yes | Yes | Yes |
| 37 | | | Yes | Yes | Yes | Yes |
| 38 | | | Yes | Yes | Yes ³ | Yes ³ |
| 39 | | | Yes | Yes | Yes | Yes |
| 40 | | | Yes | Yes | Yes | Yes |
| 41 | | | Yes | Yes | Yes | Yes |
| 42 | | | Yes | Yes | Yes | Yes |
| 43 | | | Yes | Yes | Yes | Yes |
| 44 | | Yes | Yes | Yes | Yes | Yes |
| Note 1: | refers to the bandwidth for which a relaxation of the specified UE receiver sensitivity requirement (Clause 7.3) is allowed. | | | | | |
| Note 2: | For the 20 MHz bandwidth, the minimum requirements are specified for E-UTRA UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz | | | | | |
| Note 3: | refers to bandwidth for which the uplink transmission bandwidth can be restricted by the network for some channel assignments in FDD/TDD co-existence scenarios in order to meet unwanted emissions requirements (Clause 6.6.3.2). | | | | | |

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

5.4.2A Channel bandwidth for CA

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

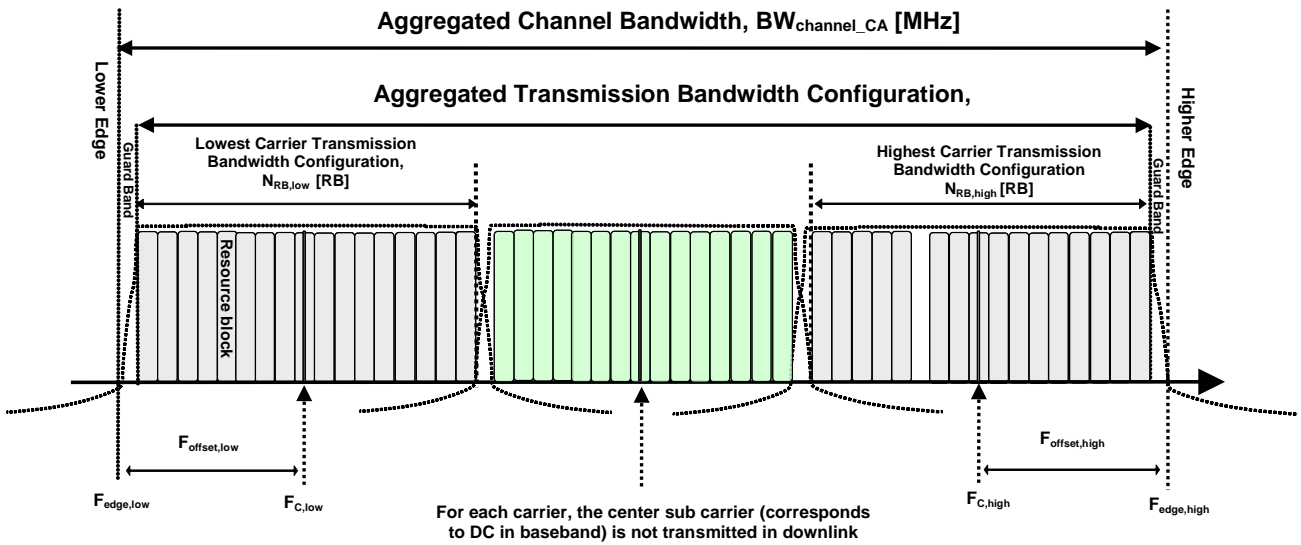


Figure 5.4.2A-1: Definition of Aggregated channel bandwidth and aggregated carrier channel bandwidth edges

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

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

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

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

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

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

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

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

where $N_{\text{RB,low}}$ and $N_{\text{RB,high}}$ are the transmission bandwidth configurations according to Table 5.2-1 for the lowest and highest assigned component carrier, respectively. BW_{GB} denotes the *Nominal Guard Band* and is defined in Table 5.4.2A-1, and the factor 0.18 is the PRB bandwidth in MHz.

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

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

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

| CA Bandwidth Class | Aggregated Transmission Bandwidth Configuration | Maximum number of CC | Nominal Guard Band BW_{GB} |
|---|---|----------------------|---|
| A | $N_{RB,agg} \leq 100$ | 1 | $0.05BW_{Channel(1)}$ |
| B | $N_{RB,agg} \leq 100$ | 2 | FFS |
| C | $100 < N_{RB,agg} \leq 200$ | 2 | $0.05 \max(BW_{Channel(1)}, BW_{Channel(2)})$ |
| D | $200 < N_{RB,agg} \leq [300]$ | FFS | FFS |
| E | $[300] < N_{RB,agg} \leq [400]$ | FFS | FFS |
| F | $[400] < N_{RB,agg} \leq [500]$ | FFS | FFS |
| Note 1: $BW_{Channel(1)}$ and $BW_{Channel(2)}$ are channel bandwidths of two E-UTRA component carriers according to Table 5.2-1. | | | |

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

5.4.2A.1 Channel bandwidths per operating band for CA

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

For each carrier aggregation configuration, requirements are specified for all bandwidth combinations contained in a *bandwidth combination set*, which is indicated per supported band combination in the UE radio access capability. A UE can indicate support of several bandwidth combination sets per band combination. Furthermore, if the UE indicates support of a bandwidth combination set that is a superset of another applicable bandwidth combination set, the latter is supported by the UE even if not indicated.

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

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

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

| CA Configuration / $N_{RB,agg}$ | | | | | | | |
|--|-------------|---------------------------------|--------------------------------|--------------------------------|----------------------------------|------------------------------------|---------------------------|
| CA Configuration | E-UTRA Band | 50RB+100RB (10 MHz + 20 MHz) | 75RB+75RB (15 MHz + 15 MHz) | 75RB+100RB (15MHz + 20 MHz) | 100RB+100RB (20 MHz + 20 MHz) | Maximum aggregated bandwidth [MHz] | Bandwidth Combination Set |
| CA_1C | 1 | | Yes | | Yes | 40 | 0 |
| CA_7C | 7 | | Yes | | Yes | | |
| CA_38C | 38 | | Yes | | Yes | | |
| CA_40C | 40 | Yes | Yes | | Yes | 40 | 0 |
| CA_41C | 41 | Yes | Yes | Yes | Yes | 40 | 0 |
| NOTE 1: The CA Configuration refers to an operating band and a CA bandwidth class specified in Table 5.4.2A-1 (the indexing letter). Absence of a CA bandwidth class for an operating band implies support of all classes. | | | | | | | |
| NOTE 2: For the supported CC bandwidth combinations, the CC downlink and uplink bandwidths are equal | | | | | | | |

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

| CA operating / Channel bandwidth | | | | | | | | | |
|----------------------------------|--------------|---------|-------|-------|--------|--------|--------|------------------------------------|---------------------------|
| CA Configuration | E-UTRA Bands | 1.4 MHz | 3 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz | Maximum aggregated bandwidth [MHz] | Bandwidth combination set |
| CA_1A-5A | 1 | | | | Yes | | | 20 | 0 |
| | 5 | | | | Yes | | | | |
| CA_1A-18A | 1 | | | Yes | Yes | Yes | Yes | | |
| | 18 | | | Yes | Yes | Yes | | | |
| CA_1A-19A | 1 | | | Yes | Yes | Yes | Yes | 35 | 0 |
| | 19 | | | Yes | Yes | Yes | | | |
| CA_1A-21A | 1 | | | Yes | Yes | Yes | Yes | | |
| | 21 | | | Yes | Yes | Yes | | | |
| CA_2A-17A | 2 | | | Yes | Yes | | | 20 | 0 |
| | 17 | | | Yes | Yes | | | | |
| CA_2A-29A | 2 | | | Yes | Yes | | | | |
| | 29 | | Yes | Yes | Yes | | | | |
| CA_3A-5A | 3 | | | | Yes | Yes | Yes | 30 | 0 |
| | 5 | | | Yes | Yes | | | | |
| | 3 | | | | Yes | | | | |
| CA_3A-7A | 5 | | | Yes | Yes | | | 20 | 1 |
| | 7 | | | | Yes | Yes | Yes | | |
| CA_3A-8A | 3 | | | Yes | Yes | Yes | Yes | 30 | 0 |
| | 8 | | | Yes | Yes | | | | |
| CA_3A-20A | 3 | | | Yes | Yes | Yes | Yes | 20 | 1 |
| | 20 | | | Yes | Yes | | | | |
| CA_4A-12A | 4 | Yes | Yes | Yes | Yes | | | | |
| | 12 | | | Yes | Yes | | | | |
| CA_4A-13A | 4 | | | Yes | Yes | Yes | Yes | | |
| | 13 | | | | Yes | | | | |
| CA_4A-17A | 4 | | | Yes | Yes | | | 20 | 0 |
| | 17 | | | Yes | Yes | | | | |
| CA_7A-20A | 7 | | | | Yes | Yes | Yes | | |
| | 20 | | | Yes | Yes | | | | |
| CA_11A-18A | 11 | | | Yes | Yes | | | | |
| | 18 | | | Yes | Yes | Yes | | | |

NOTE 1: The CA Configuration refers to a combination of an operating band and a CA bandwidth class specified in Table 5.4.2A-1 (the indexing letter). Absence of a CA bandwidth class for an operating band implies support of all classes.

NOTE 2: For each band combination, all combinations of indicated bandwidths belong to the set

NOTE 3: For the supported CC bandwidth combinations, the CC downlink and uplink bandwidths are equal

5.4.2B Channel bandwidth for UL-MIMO

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

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

5.4.3 Channel raster

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

5.4.3A Channel raster for CA

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

5.4.4 Carrier frequency and EARFCN

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

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

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

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

Table 5.4.4-1: E-UTRA channel numbers

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

| | | | | | | |
|-----------------|--------|-------|---------------|--------|-------|---------------|
| 1 | 2110 | 0 | 0 – 599 | 1920 | 18000 | 18000 – 18599 |
| 2 | 1930 | 600 | 600 – 1199 | 1850 | 18600 | 18600 – 19199 |
| 3 | 1805 | 1200 | 1200 – 1949 | 1710 | 19200 | 19200 – 19949 |
| 4 | 2110 | 1950 | 1950 – 2399 | 1710 | 19950 | 19950 – 20399 |
| 5 | 869 | 2400 | 2400 – 2649 | 824 | 20400 | 20400 – 20649 |
| 6 | 875 | 2650 | 2650 – 2749 | 830 | 20650 | 20650 – 20749 |
| 7 | 2620 | 2750 | 2750 – 3449 | 2500 | 20750 | 20750 – 21449 |
| 8 | 925 | 3450 | 3450 – 3799 | 880 | 21450 | 21450 – 21799 |
| 9 | 1844.9 | 3800 | 3800 – 4149 | 1749.9 | 21800 | 21800 – 22149 |
| 10 | 2110 | 4150 | 4150 – 4749 | 1710 | 22150 | 22150 – 22749 |
| 11 | 1475.9 | 4750 | 4750 – 4949 | 1427.9 | 22750 | 22750 – 22949 |
| 12 | 729 | 5010 | 5010 – 5179 | 699 | 23010 | 23010 – 23179 |
| 13 | 746 | 5180 | 5180 – 5279 | 777 | 23180 | 23180 – 23279 |
| 14 | 758 | 5280 | 5280 – 5379 | 788 | 23280 | 23280 – 23379 |
| ... | | | | | | |
| 17 | 734 | 5730 | 5730 – 5849 | 704 | 23730 | 23730 – 23849 |
| 18 | 860 | 5850 | 5850 – 5999 | 815 | 23850 | 23850 – 23999 |
| 19 | 875 | 6000 | 6000 – 6149 | 830 | 24000 | 24000 – 24149 |
| 20 | 791 | 6150 | 6150 – 6449 | 832 | 24150 | 24150 – 24449 |
| 21 | 1495.9 | 6450 | 6450 – 6599 | 1447.9 | 24450 | 24450 – 24599 |
| 22 | 3510 | 6600 | 6600 – 7399 | 3410 | 24600 | 24600 – 25399 |
| 23 | 2180 | 7500 | 7500 – 7699 | 2000 | 25500 | 25500 – 25699 |
| 24 | 1525 | 7700 | 7700 - 8039 | 1626.5 | 25700 | 25700 – 26039 |
| 25 | 1930 | 8040 | 8040 - 8689 | 1850 | 26040 | 26040 - 26689 |
| 26 | 859 | 8690 | 8690 - 9039 | 814 | 26690 | 26690 - 27039 |
| 27 | 852 | 9040 | 9040 – 9209 | 807 | 27040 | 27040 – 27209 |
| 28 | 758 | 9210 | 9210 – 9659 | 703 | 27210 | 27210 – 27659 |
| 29 ² | 717 | 9660 | 9660 – 9769 | | N/A | |
| ... | | | | | | |
| 33 | 1900 | 36000 | 36000 – 36199 | 1900 | 36000 | 36000 – 36199 |
| 34 | 2010 | 36200 | 36200 – 36349 | 2010 | 36200 | 36200 – 36349 |
| 35 | 1850 | 36350 | 36350 – 36949 | 1850 | 36350 | 36350 – 36949 |
| 36 | 1930 | 36950 | 36950 – 37549 | 1930 | 36950 | 36950 – 37549 |
| 37 | 1910 | 37550 | 37550 – 37749 | 1910 | 37550 | 37550 – 37749 |
| 38 | 2570 | 37750 | 37750 – 38249 | 2570 | 37750 | 37750 – 38249 |
| 39 | 1880 | 38250 | 38250 – 38649 | 1880 | 38250 | 38250 – 38649 |
| 40 | 2300 | 38650 | 38650 – 39649 | 2300 | 38650 | 38650 – 39649 |
| 41 | 2496 | 39650 | 39650 - 41589 | 2496 | 39650 | 39650 - 41589 |
| 42 | 3400 | 41590 | 41590 – 43589 | 3400 | 41590 | 41590 – 43589 |
| 43 | 3600 | 43590 | 43590 – 45589 | 3600 | 43590 | 43590 – 45589 |
| 44 | 703 | 45590 | 45590 – 46589 | 703 | 45590 | 45590 – 46589 |

Note 1: The channel numbers that designate carrier frequencies so close to the operating band edges that the carrier extends beyond the operating band edge shall not be used. This implies that the first 7, 15, 25, 50, 75 and 100 channel numbers at the lower operating band edge and the last 6, 14, 24, 49, 74 and 99 channel numbers at the upper operating band edge shall not be used for channel bandwidths of 1.4, 3, 5, 10, 15 and 20 MHz respectively.

Note 2: Restricted to E-UTRA operation when carrier aggregation is configured.

6 Transmitter Characteristics

6.1 General

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

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

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

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

Table 6.1-1: Common Test Parameters

| Parameter | Value | Comments |
|--------------------------|----------------|----------|
| Cross carrier scheduling | Not configured | |

6.2 Transmit power

6.2.1 Void

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

6.2.2 UE Maximum Output Power

6.2.2.1 Test purpose

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

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

6.2.2.2 Test applicability

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

6.2.2.3 Minimum conformance requirements

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

Table 6.2.2.3-1: UE Power Class

| EUTRA band | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 4 (dBm) | Tolerance (dB) |
|------------|---|----------------|---------------|----------------|---------------|----------------------|---------------|----------------|
| 1 | | | | | 23 | ±2 | | |
| 2 | | | | | 23 | ±2 ² | | |
| 3 | | | | | 23 | ±2 ² | | |
| 4 | | | | | 23 | ±2 | | |
| 5 | | | | | 23 | ±2 | | |
| 6 | | | | | 23 | ±2 | | |
| 7 | | | | | 23 | ±2 ² | | |
| 8 | | | | | 23 | ±2 ² | | |
| 9 | | | | | 23 | ±2 | | |
| 10 | | | | | 23 | ±2 | | |
| 11 | | | | | 23 | ±2 | | |
| 12 | | | | | 23 | ±2 ² | | |
| 13 | | | | | 23 | ±2 | | |
| 14 | | | | | 23 | ±2 | | |
| ... | | | | | | | | |
| 17 | | | | | 23 | ±2 | | |
| 18 | | | | | 23 | ±2 | | |
| 19 | | | | | 23 | ±2 | | |
| 20 | | | | | 23 | ±2 ² | | |
| 21 | | | | | 23 | ±2 | | |
| 22 | | | | | 23 | +2/-3.5 ² | | |
| 23 | | | | | 23 | ±2 | | |
| 24 | | | | | 23 | ±2 | | |
| 25 | | | | | 23 | ±2 ² | | |
| 26 | | | | | 23 | ±2 ² | | |
| 27 | | | | | 23 | ±2 | | |
| 28 | | | | | 23 | +2/-2.5 | | |
| ... | | | | | | | | |
| 33 | | | | | 23 | ±2 | | |
| 34 | | | | | 23 | ±2 | | |
| 35 | | | | | 23 | ±2 | | |
| 36 | | | | | 23 | ±2 | | |
| 37 | | | | | 23 | ±2 | | |
| 38 | | | | | 23 | ±2 | | |
| 39 | | | | | 23 | ±2 | | |
| 40 | | | | | 23 | ±2 | | |
| 41 | | | | | 23 | ±2 ² | | |
| 42 | | | | | 23 | +2/-3 | | |
| 43 | | | | | 23 | +2/-3 | | |
| 44 | | | | | 23 | +2/[-3] | | |
| ... | | | | | | | | |
| Note 1: | The above tolerances are applicable for UE(s) that support up to 4 E-UTRA operating bands. For UE(s) that support 5 or more E-UTRA bands the maximum output power is expected to decrease with each additional band and is FFS | | | | | | | |
| Note 2: | For transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB | | | | | | | |
| Note 3: | $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance | | | | | | | |
| Note 4: | For the UE which supports both Band 11 and Band 21 operating frequencies, the tolerance is FFS. | | | | | | | |

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

6.2.2.4 Test description

6.2.2.4.1 Initial condition

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

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

Table 6.2.2.4.1-1: Test Configuration Table

| Initial Conditions | | | | |
|--|-------------------------------------|------------------------------------|---------------|-----|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 | | Low range, Mid range, High range | | |
| Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1 | | Lowest, 5MHz, Highest | | |
| Test Parameters for Channel Bandwidths | | | | |
| | Downlink Configuration | Uplink Configuration | | |
| Ch BW | N/A for Max UE output power testing | Mod'n | RB allocation | |
| | | | FDD | TDD |
| 1.4MHz | | QPSK | 1 | 1 |
| 1.4MHz | | QPSK | 5 | 5 |
| 3MHz | | QPSK | 1 | 1 |
| 3MHz | | QPSK | 4 | 4 |
| 5MHz | | QPSK | 1 | 1 |
| 5MHz | | QPSK | 8 | 8 |
| 10MHz | | QPSK | 1 | 1 |
| 10MHz | | QPSK | 12 | 12 |
| 15MHz | | QPSK | 1 | 1 |
| 15MHz | | QPSK | 16 | 16 |
| 20MHz | | QPSK | 1 | 1 |
| 20MHz | | QPSK | 18 | 18 |
| <p>Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.</p> <p>Note 2: For E-UTRA bands not applied with Note 2 in Table 6.2.2.3-1:</p> <ul style="list-style-type: none"> - The 1 RB allocation shall be tested at RB#0 for low and mid range, RB #max for high range test frequency. - The RBstart of non-1RB allocation shall be RB #0 for low and mid range, RB# (max +1 - RB allocation) for high range test frequency. <p>Note 3: For E-UTRA bands applied with Note 2 in Table 6.2.2.3-1:</p> <ul style="list-style-type: none"> - If the test channel bandwidth is larger than 4MHz, then the 1 RB allocation shall be tested at both RB #0 and RB #max. - If the test channel bandwidth is smaller or equal to 4MHz, then the 1 RB allocation shall be tested at RB #0. - If the test channel bandwidth = (FUL_high - FUL_low) specified by the operating band, then only one frequency range shall be tested and the 1 RB allocation shall be tested at RB #0, RB # $\lceil N_{RB}^{UL} / 2 \rceil$ and RB #max. - For non-1RB allocation, test frequency is middle range, and the RBstart shall be RB #0. <p>Note 4: For E-UTRA band 28, when the test frequency is high range for lower duplexer, 20MHz bandwidth is only testable.</p> | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.2.4.3.

6.2.2.4.2 Test procedure

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

6.2.2.4.3 Message contents

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

6.2.2.5 Test requirements

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

Table 6.2.2.5-1: UE Power Class test requirements

| EUTRA band | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 4 (dBm) | Tolerance (dB) |
|------------|--|----------------|---------------|----------------|---------------|-------------------|---------------|----------------|
| 1 | | | | | 23 | ±2.7 | | |
| 2 | | | | | 23 | ±2.7 ² | | |
| 3 | | | | | 23 | ±2.7 ² | | |
| 4 | | | | | 23 | ±2.7 | | |
| 5 | | | | | 23 | ±2.7 | | |
| 6 | | | | | 23 | ±2.7 | | |
| 7 | | | | | 23 | ±2.7 ² | | |
| 8 | | | | | 23 | ±2.7 ² | | |
| 9 | | | | | 23 | ±2.7 | | |
| 10 | | | | | 23 | ±2.7 | | |
| 11 | | | | | 23 | ±2.7 | | |
| 12 | | | | | 23 | ±2.7 ² | | |
| 13 | | | | | 23 | ±2.7 | | |
| 14 | | | | | 23 | ±2.7 | | |
| ... | | | | | | | | |
| 17 | | | | | 23 | ±2.7 | | |
| 18 | | | | | 23 | ±2.7 | | |
| 19 | | | | | 23 | ±2.7 | | |
| 20 | | | | | 23 | ±2.7 ² | | |
| 21 | | | | | 23 | ±2.7 | | |
| 22 | | | | | 23 | +3.0/-4.5 | | |
| 23 | | | | | 23 | ±2.7 | | |
| 24 | | | | | 23 | ±2.7 | | |
| 25 | | | | | 23 | ±2.7 ² | | |
| 26 | | | | | 23 | ±2.7 ² | | |
| 27 | | | | | 23 | ±2.7 | | |
| 28 | | | | | 23 | +2.7/-3.2 | | |
| ... | | | | | | | | |
| 33 | | | | | 23 | ±2.7 | | |
| 34 | | | | | 23 | ±2.7 | | |
| 35 | | | | | 23 | ±2.7 | | |
| 36 | | | | | 23 | ±2.7 | | |
| 37 | | | | | 23 | ±2.7 | | |
| 38 | | | | | 23 | ±2.7 | | |
| 39 | | | | | 23 | ±2.7 | | |
| 40 | | | | | 23 | ±2.7 | | |
| 41 | | | | | 23 | ±2.7 ² | | |
| 42 | | | | | 23 | +3.0/-4.0 | | |
| 43 | | | | | 23 | +3.0/-4.0 | | |
| 44 | | | | | 23 | +2.7/[-3.7] | | |
| ... | | | | | | | | |
| Note 1: | The above tolerances are applicable for UE(s) that support up to 4 E-UTRA operating bands. For UE(s) that support 5 or more E-UTRA bands the maximum output power is expected to decrease with each additional band and is FFS | | | | | | | |
| Note 2: | For transmission bandwidths (Figure 5.4.2-1, Table 5.4.4-1) confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB | | | | | | | |
| Note 3: | For the UE which supports both Band 11 and Band 21 operating frequencies, the tolerance is FFS. | | | | | | | |

6.2.2A UE Maximum Output Power for CA

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

6.2.2A.1.1 Test purpose

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

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

6.2.2A.1.2 Test applicability

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

6.2.2A.1.3 Minimum conformance requirements

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

- For inter-band carrier aggregation with uplink assigned to one E-UTRA band the requirements in subclause 6.2.2 apply.
- For intra-band contiguous carrier aggregation the maximum output power is specified in Table 6.2.2A.1.3-1.

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

Table 6.2.2A.1.3-1: CA UE Power Class

| EUTRA band | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 4 (dBm) | Tolerance (dB) |
|------------|---|----------------|---------------|----------------|---------------|--------------------|---------------|----------------|
| CA_1C | | | | | 23 | +2/-2 | | |
| CA_7C | | | | | 23 | +2/-2 ² | | |
| CA_38C | | | | | 23 | +2/-2 | | |
| CA_40C | | | | | 23 | +2/-2 | | |
| CA_41C | | | | | 23 | +2/-2 ² | | |
| Note 1: | The above tolerances are applicable for UE(s) that support up to 4 E-UTRA operating bands. For UE(s) that support 5 or more E-UTRA bands the maximum output power is expected to decrease with each additional band and is FFS | | | | | | | |
| Note 2: | For transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB | | | | | | | |
| Note 3: | $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance | | | | | | | |
| Note 4: | For intra-band contiguous carrier aggregation the maximum power requirement should apply to the total transmitted power over all component carriers (per UE). | | | | | | | |

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

6.2.2A.1.4 Test description

6.2.2A.1.4.1 Initial conditions

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

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

Table 6.2.2A.1.4.1-1: Test Configuration Table

| 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. | | | | C: Low and High range | | | | |
| Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration | | | | Lowest N_{RB_agg} Highest N_{RB_agg} | | | | |
| Test Parameters for CA Configurations | | | | | | | | |
| CA Configuration / N_{RB_agg} | | DL Allocation | CC MOD | UL Allocation | | | | |
| PCC N_{RB} | SCCs N_{RB} | PCC & SCC RB allocation | | N_{RB_alloc} | PCC & SCC RB allocations (L_{CRB} @ RB_{start}) | | | |
| 75 | 75 | N/Afor this test | QPSK | 1 | P_1@0 | S_0@0 | - | - |
| 75 | 75 | | QPSK | 16 | P_16@0 | S_0@0 | - | - |
| 100 | 50 | | QPSK | 1 | P_1@0 | S_0@0 | - | - |
| 100 | 50 | | QPSK | 12 | P_12@0 | S_0@0 | - | - |
| 100 | 75 | | QPSK | 1 | P_1@0 | S_0@0 | | |
| 100 | 75 | | QPSK | 16 | P_16@0 | S_0@0 | | |
| 100 | 100 | | QPSK | 1 | P_1@0 | S_0@0 | - | - |
| 100 | 100 | | QPSK | 18 | P_18@0 | S_0@0 | - | - |
| Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1 | | | | | | | | |

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

6.2.2A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.2.2A.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.2A.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach P_{UMAX} level.
6. Measure the mean transmitted power over all component carriers in the CA configuration of the radio access mode. The period of measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.2A.1.4.3 Message contents

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

6.2.2A.1.5 Test Requirements

The maximum output power for the CA configuration, derived in step 3 shall be within the range prescribed by the CA UE Power Class and tolerance in Table 6.2.2A.1.5-1.

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

| CA Conf | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 4 (dBm) | Tolerance (dB) |
|---------|---|----------------|---------------|----------------|---------------|----------------|---------------|----------------|
| CA_1C | | | | | 23 | ± 2.7 | | |
| CA_7C | | | | | 23 | $\pm 2.7^2$ | | |
| CA_38C | | | | | 23 | ± 2.7 | | |
| CA_40C | | | | | 23 | ± 2.7 | | |
| CA_41C | | | | | 23 | $\pm 2.7^2$ | | |
| Note 1: | The above tolerances are applicable for UE(s) that support up to 4 E-UTRA operating bands. For UE(s) that support 5 or more E-UTRA bands the maximum output power is expected to decrease with each additional band and is FFS | | | | | | | |
| Note 2: | For transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB | | | | | | | |
| Note 3: | $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance | | | | | | | |
| Note 4: | For intra-band contiguous carrier aggregation the maximum power requirement should apply to the total transmitted power over all component carriers (per UE). | | | | | | | |

6.2.2B UE Maximum Output Power for UL-MIMO

Editor's notes: The following items are missing:

- Test Tolerance

6.2.2B.1 Test purpose

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

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

6.2.2B.2 Test applicability

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

6.2.2B.3 Minimum conformance requirements

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

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

| EUTRA band | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 4 (dBm) | Tolerance (dB) |
|------------|---|----------------|---------------|----------------|---------------|--------------------|---------------|----------------|
| 1 | | | | | 23 | +2/-3 | | |
| 2 | | | | | 23 | +2/-3 ² | | |
| 3 | | | | | 23 | +2/-3 ² | | |
| 4 | | | | | 23 | +2/-3 | | |
| 5 | | | | | 23 | +2/-3 | | |
| 6 | | | | | 23 | +2/-3 | | |
| 7 | | | | | 23 | +2/-3 ² | | |
| 8 | | | | | 23 | +2/-3 ² | | |
| 9 | | | | | 23 | +2/-3 | | |
| 10 | | | | | 23 | +2/-3 | | |
| 11 | | | | | 23 | +2/-3 | | |
| 12 | | | | | 23 | +2/-3 ² | | |
| 13 | | | | | 23 | +2/-3 | | |
| 14 | | | | | 23 | +2/-3 | | |
| ... | | | | | | | | |
| 17 | | | | | 23 | +2/-3 | | |
| 18 | | | | | 23 | +2/-3 | | |
| 19 | | | | | 23 | +2/-3 | | |
| 20 | | | | | 23 | +2/-3 ² | | |
| 21 | | | | | 23 | +2/-3 | | |
| 22 | | | | | 23 | +2/-4.52 | | |
| 23 | | | | | 23 | +2/-3 | | |
| 24 | | | | | 23 | +2/-3 | | |
| 25 | | | | | 23 | +2/-3 ² | | |
| 26 | | | | | 23 | +2/-3 ² | | |
| 27 | | | | | 23 | +2/-3 | | |
| ... | | | | | | | | |
| 33 | | | | | 23 | +2/-3 | | |
| 34 | | | | | 23 | +2/-3 | | |
| 35 | | | | | 23 | +2/-3 | | |
| 36 | | | | | 23 | +2/-3 | | |
| 37 | | | | | 23 | +2/-3 | | |
| 38 | | | | | 23 | +2/-3 | | |
| 39 | | | | | 23 | +2/-3 | | |
| 40 | | | | | 23 | +2/-3 | | |
| 41 | | | | | 23 | +2/-3 ² | | |
| 42 | | | | | 23 | +2/-4 | | |
| 43 | | | | | 23 | +2/-4 | | |
| 44 | | | | | 23 | +2/[-3] | | |
| Note 1: | The above tolerances are applicable for UE(s) that support up to 4 E-UTRA operating bands. For UE(s) that support 5 or more E-UTRA bands the maximum output power is expected to decrease with each additional band and is FFS | | | | | | | |
| Note 2: | For transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB | | | | | | | |
| Note 3: | For the UE which supports both Band 11 and Band 21 operating frequencies, the tolerance is FFS. | | | | | | | |
| Note 4: | $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance | | | | | | | |

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

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

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

6.2.2B.4 Test description

6.2.2B.4.1 Initial condition

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

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

Table 6.2.2B.4.1-1: Test Configuration Table

| Initial Conditions | | | | |
|---|---|--|---------------|-----|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 | Low range, Mid range, High range | | | |
| Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1 | Lowest, 5MHz, Highest | | | |
| Test Parameters for Channel Bandwidths | | | | |
| Ch BW | Downlink Configuration | Uplink Configuration | | |
| | | Mod'n | RB allocation | |
| | N/A for Max UE output power testing | | FDD | TDD |
| 1.4MHz | | QPSK | 1 | 1 |
| 1.4MHz | | QPSK | 5 | 5 |
| 3MHz | | QPSK | 1 | 1 |
| 3MHz | | QPSK | 4 | 4 |
| 5MHz | | QPSK | 1 | 1 |
| 5MHz | | QPSK | 8 | 8 |
| 10MHz | | QPSK | 1 | 1 |
| 10MHz | | QPSK | 12 | 12 |
| 15MHz | | QPSK | 1 | 1 |
| 15MHz | | QPSK | 16 | 16 |
| 20MHz | | QPSK | 1 | 1 |
| 20MHz | | QPSK | 18 | 18 |
| Note 1: | | Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. | | |
| Note 2: | For E-UTRA bands not applied with Note 2 in Table 6.2.2B.3-1: - The 1 RB allocation shall be tested at RB#0 for low and mid range, RB #max for high range test frequency. - The starting resource block of non-1RB allocation shall be RB #0 for low and mid range, RB# (max +1 - RB allocation) for high range test frequency. | | | |
| Note 3: | For E-UTRA bands applied with Note 2 in Table 6.2.2B.3-1: - If the test channel bandwidth is larger than 4MHz, then the 1 RB allocation shall be tested at both RB #0 and RB #max. - If the test channel bandwidth is smaller or equal to 4MHz, then the 1 RB allocation shall be tested at RB #0. - If the test channel bandwidth = (F _{UL_high} - F _{UL_low}) specified by the operating band, then only one frequency range shall be tested and the 1 RB allocation shall be tested at RB #0, RB # $\lceil N_{RB}^{UL} / 2 \rceil$ and RB #max. - For non-1RB allocation, test frequency is middle range, and the starting resource block shall be RB #0. | | | |

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

6.2.2B.4.2 Test procedure

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

6.2.2B.4.3 Message contents

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

6.2.2B.5 Test requirements

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

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

| EUTRA band | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 4 (dBm) | Tolerance (dB) |
|------------|---|----------------|---------------|----------------|---------------|---------------------------|---------------|----------------|
| 1 | | | | | 23 | (+2/-3)±TT | | |
| 2 | | | | | 23 | (+2/-3)±TT ² | | |
| 3 | | | | | 23 | (+2/-3)±TT ² | | |
| 4 | | | | | 23 | (+2/-3)±TT | | |
| 5 | | | | | 23 | (+2/-3)±TT | | |
| 6 | | | | | 23 | (+2/-3)±TT | | |
| 7 | | | | | 23 | (+2/-3)±TT ² | | |
| 8 | | | | | 23 | (+2/-3)±TT ² | | |
| 9 | | | | | 23 | (+2/-3)±TT | | |
| 10 | | | | | 23 | (+2/-3)±TT | | |
| 11 | | | | | 23 | (+2/-3)±TT | | |
| 12 | | | | | 23 | (+2/-3)±TT ² | | |
| 13 | | | | | 23 | (+2/-3)±TT | | |
| 14 | | | | | 23 | (+2/-3)±TT | | |
| ... | | | | | | | | |
| 17 | | | | | 23 | (+2/-3)±TT | | |
| 18 | | | | | 23 | (+2/-3)±TT | | |
| 19 | | | | | 23 | (+2/-3)±TT | | |
| 20 | | | | | 23 | (+2/-3)±TT ² | | |
| 21 | | | | | 23 | (+2/-3)±TT | | |
| 22 | | | | | 23 | (+2/-4.5)±TT ² | | |
| 23 | | | | | 23 | (+2/-3)±TT | | |
| 24 | | | | | 23 | (+2/-3)±TT | | |
| 25 | | | | | 23 | (+2/-3)±TT ² | | |
| 26 | | | | | 23 | (+2/-3)±TT | | |
| ... | | | | | | | | |
| 33 | | | | | 23 | (+2/-3)±TT | | |
| 34 | | | | | 23 | (+2/-3)±TT | | |
| 35 | | | | | 23 | (+2/-3)±TT | | |
| 36 | | | | | 23 | (+2/-3)±TT | | |
| 37 | | | | | 23 | (+2/-3)±TT | | |
| 38 | | | | | 23 | (+2/-3)±TT | | |
| 39 | | | | | 23 | (+2/-3)±TT | | |
| 40 | | | | | 23 | (+2/-3)±TT | | |
| 41 | | | | | 23 | (+2/-3)±TT ² | | |
| 42 | | | | | 23 | (+2/-4)±TT | | |
| 43 | | | | | 23 | (+2/-4)±TT | | |
| 44 | | | | | 23 | (+2/[-3]) ±TT | | |
| Note 1: | The above tolerances are applicable for UE(s) that support up to 4 E-UTRA operating bands. For UE(s) that support 5 or more E-UTRA bands the maximum output power is expected to decrease with each additional band and is FFS | | | | | | | |
| Note 2: | For transmission bandwidths (Figure 5.4.2-1) confined within F _{UL,low} and F _{UL,low} + 4 MHz or F _{UL,high} - 4 MHz and F _{UL,high} , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB | | | | | | | |
| Note 3: | For the UE which supports both Band 11 and Band 21 operating frequencies, the tolerance is FFS. | | | | | | | |
| Note 4: | P _{PowerClass} is the maximum UE power specified without taking into account the tolerance | | | | | | | |

6.2.3 Maximum Power Reduction (MPR)

6.2.3.1 Test purpose

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

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

6.2.3.2 Test applicability

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

6.2.3.3 Minimum conformance requirements

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

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

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

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

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

6.2.3.4 Test description

6.2.3.4.1 Initial condition

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

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

Table 6.2.3.4.1-1: Test Configuration Table

| Initial Conditions | | | | |
|---|---|--|----------------------|---------------|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 | Low range, Mid range, High range | | | |
| Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1 | Lowest, 5MHz, 10MHz, Highest | | | |
| Test Parameters for Channel Bandwidths | | | | |
| | Downlink Configuration | | Uplink Configuration | |
| Ch BW | N/A for Maximum Power Reduction (MPR) test case | | Mod'n | RB allocation |
| | | | | FDD |

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

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

6.2.3.4.2 Test procedure

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

6.2.3.4.3 Message contents

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

6.2.3.5 Test requirements

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

Table 6.2.3.5-1: UE Power Class test requirements

| E-UTRA Band | Class 1 (dBm) | Tol. (Db) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | QPSK partial RB allocation Tol. (dB) | QPSK full RB allocation Tol. (dB) | 16QAM partial RB allocation Tol. (dB) | 16QAM full RB allocation Tol. (dB) |
|-------------|---------------|-----------|---------------|-----------|---------------|--------------------------------------|-----------------------------------|---------------------------------------|------------------------------------|
| 1 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 2 | | | | | 23 | ±2.7 ¹ | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -4.7 |
| 3 | | | | | 23 | ±2.7 ¹ | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -4.7 |
| 4 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 5 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 6 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 7 | | | | | 23 | ±2.7 ¹ | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -4.7 |
| 8 | | | | | 23 | ±2.7 ¹ | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -4.7 |
| 9 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 10 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 11 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 12 | | | | | 23 | ±2.7 ¹ | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -4.7 |
| 13 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 14 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| ... | | | | | | | | | |
| 17 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 18 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 19 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 20 | | | | | 23 | ±2.7 ¹ | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -4.7 |
| 21 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 22 | | | | | 23 | +3.0/-4.5 | +3.0/-5.5 | +3.0/-5.5 | +3.0/-6.5 |
| 23 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 24 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 25 | | | | | 23 | ±2.7 ¹ | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -4.7 |
| 26 | | | | | 23 | ±2.7 ¹ | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -4.7 |
| 27 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 28 | | | | | 23 | +2.7/-3.2 | +2.7/-4.2 | +2.7/-4.2 | +2.7/-5.2 |
| ... | | | | | | | | | |
| 33 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 34 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 35 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 36 | | | | | 23 | ±2.7 | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |

| | | | | | | | | | |
|---|--|--|--|----|----------------|--|-------------------------------|-------------------------------|-------------------------------|
| | | | | | | | -3.7 | -3.7 | -4.7 |
| 37 | | | | 23 | ± 2.7 | | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 38 | | | | 23 | ± 2.7 | | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 39 | | | | 23 | ± 2.7 | | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 40 | | | | 23 | ± 2.7 | | +2.7 / -3.7 | +2.7 / -3.7 | +2.7 / -4.7 |
| 41 | | | | 23 | $\pm 2.7^1$ | | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -3.7 | +2.7 / ^{1,2} -4.7 |
| 42 | | | | 23 | +3.0 / -4.0 | | +3.0 / -5.0 | +3.0 / -5.0 | +3.0 / -6.0 |
| 43 | | | | 23 | +3.0 / -4.0 | | +3.0 / -5.0 | +3.0 / -5.0 | +3.0 / -6.0 |
| Note 1: For transmission bandwidths (Figure 5.4.2-1) confined within FUL_low and FUL_low + 4 MHz or FUL_high – 4 MHz and FUL_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB. Note 2: For the UE maximum output power modified by MPR, the power limits specified in Table 6.2.5.3-1 apply | | | | | | | | | |

6.2.3A Maximum Power Reduction (MPR) for CA

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

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- Additional test points need to be investigated and checked against to 6.6.2.3A.1.4.1-1
- The Test Tolerances applicable to this test are undefined.

6.2.3A.1.1 Test purpose

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

6.2.3A.1.2 Test applicability

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

6.2.3A.1.3 Minimum conformance requirements

The following is specified for maximum power reduction (MPR) for CA.

- For inter-band carrier aggregation with uplink assigned to one E-UTRA band the requirements in clause 6.2.3 apply.
- For intra-band contiguous carrier aggregation the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2A.1.3-1 due to higher order modulation and contiguously aggregated transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3A.1.3-1. In case the modulation format is different on different component carriers then the MPR is determined by the rules applied to higher order of those modulations.

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

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

For intra-band contiguous CA Bandwidth Class C the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2A.1.3-1 due to multi cluster transmission is specified as follows:

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

Where M_A is defined as follows:

$$M_A = 8.2 ; 0 \leq A < 0.025,$$

$$9.2 - 40A ; 0.025 \leq A < 0.05,$$

$$8 - 16A ; 0.05 \leq A < 0.25,$$

$$4.83 - 3.33A ; 0.25 \leq A \leq 0.4,$$

$$3.83 - 0.83A ; 0.4 \leq A \leq 1$$

Where

$$A = N_{\text{RB_alloc}} / N_{\text{RB_agg}}$$

CEIL $\{M_A, 0.5\}$ means rounding upwards to closest 0.5dB, i.e. $\text{MPR} \in [3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5]$

For the UE maximum output power modified by MPR, the power limits specified in sub-clause 6.2.5A.1 apply.

The normative reference for this requirement is in TS 36.101 [2] clause 6.2.3A.

6.2.3A.1.4 Test description

6.2.3A.1.4.1 Initial condition

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.3A.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.3A.1.4.1-1: Test Configuration Table

| 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. | | | | C: Low and High range | | | |
| Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration | | | | Lowest N_{RB_agg} Highest N_{RB_agg} | | | |
| Test Parameters for CA Configurations | | | | | | | |
| CA Configuration / N_{RB_agg} | | DL Allocation | CC MOD | UL Allocation | | | |
| PCC N_{RB} | SCCs N_{RB} | PCC & SCC RB allocation | | N_{RB_alloc} | PCC & SCC RB allocations (L_{CRB} @ RB_{start}) | | |
| 75 | 75 | N/A for this test | QPSK | 16 | P_16@0 | S_0@0 | |
| 75 | 75 | | QPSK | 75 | P_75@0 | S_0@0 | |
| 75 | 75 | | QPSK | 150 | P_75@0 | S_75@0 | |
| 75 | 75 | | 16QAM | 16 | P_16@0 | S_0@0 | |
| 75 | 75 | | 16QAM | 75 | P_75@0 | S_0@0 | |
| 75 | 75 | | 16QAM | 150 | P_75@0 | S_75@0 | |
| 100 | 50 | | QPSK | 12 | P_12@0 | S_0@0 | |
| 100 | 50 | | QPSK | 50 | P_50@0 | S_0@0 | |
| 100 | 50 | | QPSK | 150 | P_100@0 | S_50@0 | |
| 100 | 50 | | 16QAM | 12 | P_12@0 | S_0@0 | |
| 100 | 50 | | 16QAM | 50 | P_50@0 | S_0@0 | |
| 100 | 50 | | 16QAM | 150 | P_100@0 | S_50@0 | |
| 100 | 100 | | QPSK | 18 | P_18@0 | S_0@0 | |
| 100 | 100 | | QPSK | 100 | P_100@0 | S_0@0 | |
| 100 | 100 | | QPSK | 200 | P_100@0 | S_100@0 | |
| 100 | 100 | | 16QAM | 18 | P_18@0 | S_0@0 | |
| 100 | 100 | | 16QAM | 100 | P_100@0 | S_0@0 | |
| 100 | 100 | | 16QAM | 200 | P_100@0 | S_100@0 | |

NOTE 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508[7] Annex A, Figure group A.32 as appropriate .
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.3A.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.3A.1.4.3.

6.2.3A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1, and Annex C.3.0 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.2.3A.1.4.3.
3. SS activates SCC by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.5A.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control “up” commands in the uplink scheduling information to the UE to ensure that the UE transmits at P_{UMAX} level.
6. Measure the mean power over all component carriers in the CA configuration of the radio access mode. The period of measurement shall be at least the continuous duration one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.3A.1.4.3 Message contents

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

6.2.3A.1.5 Test Requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3A.1.5-1.

Table 6.2.3A.1.5-1: CA UE Power Class test requirements

| EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | 50RB + 100RB Tol. (dB) | 75RB +75RB Tol. (dB) | 100RB + 100RB Tol. (dBm) |
|------------|---------------|-----------|---------------|-----------|---------------|------------------------|----------------------|--------------------------|
| CA_1C | | | | | 23 | +2/-2 ±TT | +2/-2 ±TT | +2/-2 ±TT |
| CA_40C | | | | | 23 | +2/[-2] ±TT | +2/[-2] ±TT | +2/[-2] ±TT |

NOTE 1: For transmission configurations (Figure 5.4.2-1) confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.

NOTE 2: For the UE maximum output power modified by MPR, the power limits specified in Table 6.2.5A.1.3-1 apply.

NOTE 3: For intra-band contiguous carrier aggregation the maximum power requirement should apply to the total transmitted power over all component carriers (per UE).

6.2.3B Maximum Power Reduction (MPR) for UL-MIMO

6.2.3B.1 Test purpose

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

6.2.3B.2 Test applicability

The requirements of this test apply in test cases 6.6.2.3B Adjacent Channel Leakage power Ratio to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

6.2.3B.3 Minimum conformance requirements

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the maximum output power is measured as the sum of the maximum output power at each UE antenna connector. For UE Power Class 3, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2B.3-1 due to higher order modulation

and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3B.3-1 with UL-MIMO configurations defined in Table 6.2.2B.3-2.

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

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

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

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

6.2.3B.4 Test description

6.2.3B.4.1 Initial condition

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in clause 5.4.2B.1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.3B.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.3B.4.1-1: Test Configuration Table

| Initial Conditions | | | | |
|---|---|----------------------|-----------------|----------------|
| Test Environment as specified in TS 36.508[7] clause 4.1 | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | |
| Test Frequencies as specified in TS36.508 [7] clause 4.3.1 | Low range, Mid range, High range | | | |
| Test Channel Bandwidths as specified in TS 36.508 [7] clause 4.3.1 | Lowest, 5MHz, 10MHz, Highest | | | |
| Test Parameters for Channel Bandwidths | | | | |
| Ch BW | Downlink Configuration | Uplink Configuration | | |
| | N/A for Maximum Power Reduction (MPR) test case | Mod'n | RB allocation | |
| | | FDD | TDD | |
| 1.4MHz | | QPSK | 5 | 5 |
| 1.4MHz | | QPSK | 6 | 6 |
| 1.4MHz | | 16QAM | 5 | 5 |
| 1.4MHz | | 16QAM | 6 | 6 |
| 3.0MHz | | QPSK | 4 | 4 |
| 3.0MHz | | QPSK | 15 | 15 |
| 3.0MHz | | 16QAM | 4 | 4 |
| 3.0MHz | | 16QAM | 15 | 15 |
| 5MHz | | QPSK | 8 | 8 |
| 5MHz | | QPSK | 25 | 25 |
| 5MHz | | 16QAM | 8 | 8 |
| 5MHz | | 16QAM | 25 | 25 |
| 10MHz | | QPSK | 12 | 12 |
| 10MHz | | QPSK | 50 | 50 |
| 10MHz | | 16QAM | 12 | 12 |
| 10MHz | | 16QAM | 50 (Note 3) | 50 (Note 3) |
| 15MHz | | QPSK | 16 | 16 |
| 15MHz | | QPSK | 75 | 75 |
| 15MHz | 16QAM | 16 | 16 | |
| 15MHz | 16QAM | 75 (Note 3) | 75 (Note 3) | |
| 20MHz | QPSK | 18 | 18 | |
| 20MHz | QPSK | 100 | 100 | |
| 20MHz | 16QAM | 18 | 18 | |
| 20MHz | 16QAM | 100 (Note 3) | 100 (Note 3) | |
| Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2: The RB _{start} of partial RB allocation shall be RB#0 and RB# (max + 1 - RB allocation) of the channel bandwidth. Note 3: Applies only for UE-Categories 2-5. | | | | |

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.2.3B.4.1-1.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.3B.4.3.

6.2.3B.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.2.3B.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure that the UE transmits at PUMAX level.
3. Measure the sum of mean power of the UE at each transmit antenna connector in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.3B.4.3 Message contents

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

6.2.3B.5 Test requirements

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

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

| E- UTRA Band | Class 1 (dBm) | Tol. (Db) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | QPSK partial RB allocation Tol. (dB) | QPSK full RB allocation Tol. (dB) | 16QAM partial RB allocation Tol. (dB) | 16QAM full RB allocation Tol. (dB) |
|--------------------|---------------------|--------------|---------------------|--------------|---------------------|---|--|---|---|
| 1 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 2 | | | | | 23 | (+2/-3)±TT ¹ | (+2/-4) ^{1,2} ±TT | (+2/-4) ^{1,2} ±TT | (+2/-5) ^{1,2} ±TT |
| 3 | | | | | 23 | (+2/-3)±TT ¹ | (+2/-4) ^{1,2} ±TT | (+2/-4) ^{1,2} ±TT | (+2/-5) ^{1,2} ±TT |
| 4 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 5 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 6 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 7 | | | | | 23 | (+2/-3)±TT ¹ | (+2/-4) ^{1,2} ±TT | (+2/-4) ^{1,2} ±TT | (+2/-5) ^{1,2} ±TT |
| 8 | | | | | 23 | (+2/-3)±TT ¹ | (+2/-4) ^{1,2} ±TT | (+2/-4) ^{1,2} ±TT | (+2/-5) ^{1,2} ±TT |
| 9 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 10 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 11 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 12 | | | | | 23 | (+2/-3)±TT ¹ | (+2/-4) ^{1,2} ±TT | (+2/-4) ^{1,2} ±TT | (+2/-5) ^{1,2} ±TT |
| 13 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 14 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| ... | | | | | | | | | |
| 17 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 18 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 19 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 20 | | | | | 23 | (+2/-3)±TT ¹ | (+2/-4) ^{1,2} ±TT | (+2/-4) ^{1,2} ±TT | (+2/-5) ^{1,2} ±TT |
| 21 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 22 | | | | | 23 | (+2/-4.5)±TT | (+2/-5.5) ±TT | (+2/-5.5) ±TT | (+2/-6.5) ±TT |
| ... | | | | | | | | | |
| 23 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 24 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 25 | | | | | 23 | (+2/-3)±TT ¹ | (+2/-[4]) ^{1,2} ±TT | (+2/-[4]) ^{1,2} ±TT | (+2/-[5]) ^{1,2} ±TT |
| 26 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| ... | | | | | | | | | |

| | | | | | | | | | |
|---|--|--|--|--|----|-------------------------|--------------------------------|--------------------------------|--------------------------------|
| 33 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 34 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 35 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 36 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 37 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 38 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 39 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 40 | | | | | 23 | (+2/-3)±TT | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 41 | | | | | 23 | (+2/-3)±TT ¹ | (+2/-4) ±TT | (+2/-4) ±TT | (+2/-5) ±TT |
| 42 | | | | | 23 | (+2/-4)±TT | (+2/-5 ^{1,2}) ±TT | (+2/-5 ^{1,2}) ±TT | (+2/-6 ^{1,2}) ±TT |
| 43 | | | | | 23 | (+2/-4)±TT | (+2/-5) ±TT | (+2/-5) ±TT | (+2/-6) ±TT |
| <p>Note 1: For transmission configurations (Figure 5.4.2-1) confined within FUL_low and FUL_low + 4 MHz or FUL_high – 4 MHz and FUL_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.</p> <p>Note 2: For the UE maximum output power modified by MPR, the power limits specified in Table 6.2.5B.3-1 apply</p> | | | | | | | | | |

6.2.4 Additional Maximum Power Reduction (A-MPR)

Editor's note: In test points and test requirements definition for NS 15 when E-UTRA channel highest edge is below 845 MHz, it has been assumed that RB_start1 should refer to RBend.

6.2.4.1 Test purpose

Additional ACLR and spectrum emission requirements can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction A-MPR is allowed for the output power as specified in Table 6.2.2.3-1. Unless stated otherwise, an A-MPR of 0 dB shall be used.

6.2.4.2 Test applicability

The requirements of this test apply in test case 6.6.2.2 Additional Spectrum Emission Mask for network signalled values NS_03, NS_04, NS_06, NS_07, and NS_11 to all types of E-UTRA UE release 8 and forward.

The requirements of this test apply in test case 6.6.3.3 Additional Spurious Emissions for network signalled values NS_05, NS_07, NS_08, NS_09, NS_12, NS_13, NS_14, NS_15 and NS_16 to all types of E-UTRA UE release 8 and forward.

6.2.4.3 Minimum conformance requirements

For UE Power Class 3 the specific requirements and identified sub-clauses are specified in Table 6.2.4.3-1 along with the allowed A-MPR values that may be used to meet these requirements. The allowed A-MPR values specified below in Table 6.2.4.3-1 and 6.2.4.3-2 are in addition to the allowed MPR requirements specified in clause 6.2.3. For the UE maximum output power modified by A-MPR, the power limits specified in clause 6.2.5 apply.

Table 6.2.4.3-1: Additional Maximum Power Reduction (A-MPR) / Spectrum Emission requirements

| Network Signalling value | Requirements (sub-clause) | E-UTRA Band | Channel bandwidth (MHz) | Resources Blocks (N_{RB}) | A-MPR (dB) |
|--------------------------|----------------------------|----------------------|-------------------------|---|--------------------------------------|
| NS_01 | 6.6.2.1.1 | Table 5.2-1 | 1.4,3,5,10,15,20 | Table 5.4.2-1 | NA |
| NS_03 | 6.6.2.2.3.1 | 2,4,10, 23, 25,35,36 | 3 | >5 | ≤ 1 |
| | | | 5 | >6 | ≤ 1 |
| | | | 10 | >6 | ≤ 1 |
| | | | 15 | >8 | ≤ 1 |
| | | | 20 | >10 | ≤ 1 |
| NS_04 | 6.6.2.2.3.2 | 41 | 5 | >6 | ≤ 1 |
| | | | 10, 15, 20 | Table 6.2.4.3-4 | |
| NS_05 | 6.6.3.3.3.1 | 1 | 10,15,20 | ≥ 50 | ≤ 1 |
| NS_06 | 6.6.2.2.3.3 | 12, 13, 14, 17 | 1.4, 3, 5, 10 | Table 5.4.2-1 | n/a |
| NS_07 | 6.6.2.2.3.3 6.6.3.3.3.2 | 13 | 10 | Table 6.2.4.3-2 | Table 6.2.4.3-2 |
| NS_08 | 6.6.3.3.3.3 | 19 | 10, 15 | > 44 | ≤ 3 |
| NS_09 | 6.6.3.3.3.4 | 21 | 10, 15 | > 40 | ≤ 1 |
| | | | | > 55 | ≤ 2 |
| NS_10 | | 20 | 15, 20 | Table 6.2.4.3-3 | Table 6.2.4.3-3 |
| NS_11 | 6.6.2.2.1 | 23 ¹ | 1.4, 3, 5, 10,15,20 | Table 6.2.4.3-5 | Table 6.2.4.3-5 |
| NS_12 | 6.6.3.3.5 | 26 | 1.4, 3, 5 | Table 6.2.4.3-6 | Table 6.2.4.3-6 |
| NS_13 | 6.6.3.3.6 | 26 | 5 | Table 6.2.4.3-7 | Table 6.2.4.3-7 |
| NS_14 | 6.6.3.3.7 | 26 | 10, 15 | Table 6.2.4.3-8 | Table 6.2.4.3-8 |
| NS_15 | 6.6.3.3.8 | 26 | 1.4, 3, 5, 10, 15 | Table 6.2.4.3-9 Table 6.2.4.3-10 | Table 6.2.4.3-9, Table 6.2.4.3-10 |
| NS_16 | 6.6.3.3.9 | 27 | 3, 5, 10 | Table 6.2.4.3-11, Table 6.2.4.3-12, Table 6.2.4.3-13 | |
| NS_17 | 6.6.3.3.10 | 28 | 5, 10 | Table 5.4.2-1 | n/a |
| NS_18 | 6.6.3.3.11 | 28 | 5 | ≥ 2 | ≤ 1 |
| .. | | | | | |
| NS_32 | - | - | - | - | - |

Table 6.2.4.3-2: A-MPR for "NS_07"

| Parameters | Region A | | Region B | | | | Region C | |
|---|----------|-----------------|----------|-----------|---------|-----------|----------|----|
| RB_{start}^1 | 0 – 12 | | 13 – 18 | | 19 – 42 | | 43 – 49 | |
| $LCRB^2$ [RBs] | 6 – 8 | 1 to 5 and 9-50 | <8 | ≥ 8 | <18 | ≥ 18 | ≤ 2 | >2 |
| A-MPR [dB] | ≤ 8 | ≤ 12 | 0 | ≤ 12 | 0 | ≤ 6 | ≤ 3 | 0 |
| Note 1: RB_{start} indicates the lowest RB index of transmitted resource blocks Note 2: $LCRB$ is the length of a contiguous resource block allocation Note 3: For intra-subframe frequency hopping between two regions, notes 1 and 2 apply on a per slot basis. Note 4: For intra-subframe frequency hopping between two regions, the larger A-MPR value of the two regions may be applied for both slots in the subframe. | | | | | | | | |

Table 6.2.4.3-3: A-MPR for "NS_10"

| Channel BW | Parameters | Region A |
|------------|----------------|----------|
| 15 | RB_{start}^1 | 0 – 10 |
| | $LCRB$ [RBs] | 1 -20 |
| | A-MPR [dB] | ≤ 2 |
| 20 | RB_{start}^1 | 0 – 15 |
| | $LCRB$ [RBs] | 1 -20 |
| | A-MPR [dB] | ≤ 5 |

| | |
|---------|--|
| Note 1: | RB_{start} indicates the lowest RB index of transmitted resource blocks. |
| Note 2: | L_{CRB} is the length of a contiguous resource block allocation. |
| Note 3: | For intra-subframe frequency hopping which intersects Region A, notes 1 and 2 apply on a per slot basis. |
| Note 4: | For intra-subframe frequency hopping which intersect Region A, the larger A-MPR value may be applied for both slots in the subframe. |

Table 6.2.4.3-4: A-MPR for NS_04 for bandwidths > 5MHz

| Channel BW | Parameters | Region A | Region B | | Region C |
|------------|--|----------------|----------|------|----------------|
| 10 | RB_{start}^1 | 0 – 12 | 13 – 36 | | 37 – 49 |
| | $RB_{start}^1 + L_{CRB}^2$ [RBs] | NA (Note 3) | 14 - 37 | >37 | NA (Note 3) |
| | A-MPR [dB] | ≤3dB | 0 | ≤2dB | ≤3dB |
| 15 | RB_{start}^1 | 0 – 18 | 19 – 55 | | 56 – 74 |
| | $RB_{start}^1 + L_{CRB}^2$ [RBs] | NA (Note 3) | 20 - 56 | >56 | NA (Note 3) |
| | A-MPR [dB] | ≤3dB | 0 | ≤2dB | ≤3dB |
| 20 | RB_{start}^1 | 0 – 24 | 25 – 74 | | 75 – 99 |
| | $RB_{start}^1 + L_{CRB}^2$ [RBs] | NA (Note 3) | 26 - 75 | >75 | NA (Note 3) |
| | A-MPR [dB] | ≤3dB | 0 | ≤2dB | ≤3dB |
| Note 1: | RB_{start} indicates the lowest RB index of transmitted resource blocks. | | | | |
| Note 2: | L_{CRB} is the length of a contiguous resource block allocation. | | | | |
| Note 3: | Any RB allocation that starts in Region A or C is allowed the specified A-MPR. | | | | |
| Note 4: | For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis. | | | | |
| Note 5: | For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe. | | | | |

Table 6.2.4.3-5: A-MPR for NS_11

| Channel Bandwidth | Parameters | | | | | | |
|-------------------|---------------------------|-----------|---------|-----------------------------|-------------------------------|---------|-----|
| 3 | F _c (MHz) | <2004 | | ≥2004 | | | |
| | L _{CRB} (RBs) | 1-15 | | >5 | | | |
| | A-MPR | ≤5 | | ≤1 | | | |
| 5 | F _c (MHz) | <2004 | | 2004 ≤ F _c <2007 | | ≥2007 | |
| | L _{CRB} (RBs) | 1-25 | | 1-6 & 15-25 | 8-12 | >6 | |
| | A-MPR | ≤7 | | ≤4 | 0 | ≤1 | |
| 10 | F _c (MHz) | 2005 | | | | | |
| | RB _{start} (RBs) | 0-49 | | | | | |
| | L _{CRB} (RBs) | 1-50 | | | | | |
| | A-MPR | ≤12 | | | | | |
| 15 | F _c (MHz) | [<2012.5] | | | | | |
| | RB _{start} (RBs) | [0-4] | [5-21] | | [22-56] | [57-74] | |
| | L _{CRB} (RBs) | ≥1 | [7-50] | [0-6 & ≥50] | ≤25 | >25 | >0 |
| | A-MPR | ≤15 | ≤7 | ≤10 | [0] | ≤6 | ≤15 |
| | F _c (MHz) | [2012.5] | | | | | |
| | RB _{start} (RBs) | [0-12] | [13-39] | | [40-65] | [66-74] | |
| | L _{CRB} (RBs) | ≥1 | ≥30 | <30 | ≥ (69 – RB _{start}) | ≥1 | |
| | A-MPR | ≤10 | ≤6 | [0] | ≤2 | ≤6.5 | |
| 20 | F _c (MHz) | 2010 | | | | | |
| | RB _{start} (RBs) | [0-12] | [13-29] | | [30-68] | [69-99] | |
| | L _{CRB} (RBs) | ≥1 | [10-60] | [1-9 & >60] | [1-24] | ≥25 | ≥1 |
| | A-MPR | ≤15 | ≤7 | ≤10 | [0] | ≤7 | ≤15 |

Table 6.2.4.3-6: A-MPR for "NS_12"

| Channel BW | Parameters | Region A | | Region B |
|------------|------------------------|----------|---------------|----------|
| 1.4 | RB _{start} | 0 | | 1-2 |
| | L _{CRB} [RBs] | ≤3 | ≥4 | ≥4 |
| | A-MPR [dB] | ≤3 | ≤6 | ≤3 |
| 3 | RB _{start} | 0-3 | | 4-5 |
| | L _{CRB} [RBs] | 4-9 | 1-3 and 10-15 | ≥9 |
| | A-MPR [dB] | ≤4 | ≤3 | ≤3 |
| 5 | RB _{start} | 0-6 | | 7-9 |
| | L _{CRB} [RBs] | ≤8 | ≥9 | ≥15 |
| | A-MPR [dB] | ≤5 | ≥3 | ≤3 |

Table 6.2.4.3-7: A-MPR for "NS_13"

| Channel BW | Parameters | Region A | |
|------------|------------------------|----------|-----|
| 5 | RB _{start} | 0-2 | |
| | L _{CRB} [RBs] | ≤5 | ≥18 |
| | A-MPR [dB] | ≤3 | ≤2 |

Table 6.2.4.3-8: A-MPR for "NS_14"

| Channel BW | Parameters | Region A | |
|------------|------------------------|----------|-----|
| 10 | RB _{start} | 0 | |
| | L _{CRB} [RBs] | ≤5 | ≥50 |
| | A-MPR [dB] | ≤3 | ≤1 |
| 15 | RB _{start} | ≤8 | |
| | L _{CRB} [RBs] | ≤16 | ≥50 |
| | A-MPR [dB] | ≤3 | ≤1 |

Table 6.2.4.3-9: A-MPR for "NS_15" for E-UTRA highest channel edge > 845 MHz and ≤ 849 MHz

| Channel BW | Parameters | Region A | | Region B | Region C | |
|------------|------------------------|----------|-------|----------|----------|----|
| 1.4 | RB _{end} | 4-5 | | | | |
| | L _{CRB} [RBs] | ≤3 | ≥4 | | | |
| | A-MPR [dB] | ≤2 | ≤3 | | | |
| 3 | RB _{end} | 0-1 | 8-12 | 13-14 | | |
| | L _{CRB} [RBs] | ≤1 | ≥8 | >0 | | |
| | A-MPR [dB] | ≤2 | ≤4 | ≤8 | | |
| 5 | RB _{end} | 0-4 | 12-15 | 16-19 | 20-24 | |
| | L _{CRB} [RBs] | ≤1 | ≥12 | ≥8 | >0 | |
| | A-MPR [dB] | ≤2 | ≤3 | ≤5 | ≤8 | |
| 10 | RB _{end} | 0-12 | 23-30 | 31-36 | 37-49 | |
| | L _{CRB} [RBs] | =1 | ≥20 | ≥15 | ≥4 | ≤3 |
| | A-MPR [dB] | ≤2 | ≤4 | ≤6 | ≤5 | ≤9 |
| 15 | RB _{end} | 0-20 | 26-44 | 45-53 | 54-74 | |
| | L _{CRB} [RBs] | ≤1 | ≥27 | ≥20 | >0 | |
| | A-MPR [dB] | ≤2 | ≤3 | ≤5 | ≤9 | |

Table 6.2.4.3-10: A-MPR for "NS_15" for E-UTRA highest channel edge ≤ 845 MHz

| Channel BW | Parameters | Region A | Region B | Region C | Region D | |
|------------|------------------------|----------|----------|----------|----------|--|
| 5 | RB _{start1} | 19-24 | | | | |
| | L _{CRB} [RBs] | ≥18 | | | | |
| | A-MPR [dB] | ≤2 | | | | |
| 10 | RB _{start1} | 0-4 | 29-37 | 38-44 | 45-49 | |
| | L _{CRB} [RBs] | ≤1 | ≥27 | ≥24 | >0 | |
| | A-MPR [dB] | ≤2 | ≤1 | ≤4 | ≤8 | |
| 15 | RB _{start1} | 0-12 | 44-56 | 57-61 | 62-74 | |
| | L _{CRB} [RBs] | ≤1 | ≥32 | ≥20 | >0 | |
| | A-MPR [dB] | ≤2 | ≤3 | ≤5 | ≤8 | |

Table 6.2.4.3-11: A-MPR for "NS_16" with channel lower edge at ≥807 MHz and <808.5 MHz

| CBW | Parameter | Region A | Region B | Region C | Region D | Region E |
|--------|------------------------|----------|----------|----------|----------|----------|
| 3 MHz | RB _{start} | 0 | 1-2 | | | |
| | L _{CRB} [RBs] | ≥12 | 12 | | | |
| | A-MPR [dB] | ≤2 | ≤1 | | | |
| 5 MHz | RB _{start} | 0-1 | 2 | 2-9 | 2-5 | |
| | L _{CRB} [RBs] | 1 - 25 | 12 | 15-18 | 20 | |
| | A-MPR [dB] | ≤5 | ≤1 | ≤2 | ≤3 | |
| 10 MHz | RB _{start} | 0 - 8 | 0-14 | | 15-20 | 15-24 |
| | L _{CRB} [RBs] | 1 - 12 | 15-20 | ≥24 | ≥30 | 24-27 |
| | A-MPR [dB] | ≤5 | ≤3 | ≤7 | ≤3 | ≤1 |

Table 6.2.4.3-12: A-MPR for “NS_16” with channel lower edge at ≥808.5 MHz and <812 MHz

| CBW | Parameter | Region A | Region B | Region C | Region D | Region E |
|--------|------------------------|----------|----------|----------|----------|----------|
| 5 MHz | RB _{start} | 0 | 0-1 | 1-5 | | |
| | L _{CRB} [RBs] | 16-20 | ≥24 | 16-20 | | |
| | A-MPR [dB] | ≤2 | ≤3 | ≤1 | | |
| 10 MHz | RB _{start} | 0-6 | | 0-10 | 0-14 | 11-20 |
| | L _{CRB} [RBs] | 1-12 | 15-20 | 24-32 | ≥36 | 24-32 |
| | A-MPR [dB] | ≤5 | ≤2 | ≤4 | ≤5 | ≤1 |

Table 6.2.4.3-13: A-MPR for “NS_16” with channel lower edge at ≥812 MHz

| CBW | Parameter | Region A | Region B | Region C | Region D |
|--------|------------------------|----------|----------|----------|----------|
| 10 MHz | RB _{start} | 0 - 9 | 0 | 1-14 | 0-5 |
| | L _{CRB} [RBs] | 27-32 | 36-40 | 36-40 | ≥45 |
| | A-MPR [dB] | ≤1 | ≤2 | ≤1 | ≤3 |

The normative reference for this requirement is TS 36.101 clause 6.2.4.

6.2.4.4 Test description

6.2.4.4.1 Initial condition

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in tables 6.2.4.4.1-1 through table 6.2.4.4.1-13. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.4.4.1-1: Test Configuration Table (network signalled value "NS_03")

| Initial Conditions | | | | | | |
|--|-------|------------------------|---------------|----------------------------------|----------------------|---------------|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | | | | NC | | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | | | | Low range, Mid range, High range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | | | | Lowest, 5MHz, 10MHz, Highest | | |
| Test Parameters for NS_03 A-MPR | | | | | | |
| | | Downlink Configuration | | | Uplink Configuration | |
| Configuration ID | Ch BW | Mod'n | RB allocation | | Mod'n | RB allocation |
| | | | FDD | TDD | | FDD |

| | | | | | |
|----|--------|------------------------|-------|-----------------|-----------------|
| 1 | 1.4MHz | N/A for A-MPR testing. | QPSK | 6 | 6 |
| 2 | 1.4MHz | | QPSK | 5 | 5 |
| 3 | 1.4MHz | | 16QAM | 5 | 5 |
| 4 | 3MHz | | QPSK | 15 | 15 |
| 5 | 3MHz | | QPSK | 4 | 4 |
| 6 | 3MHz | | 16QAM | 15 | 15 |
| 7 | 3MHz | | 16QAM | 4 | 4 |
| 8 | 5MHz | | QPSK | 25 | 25 |
| 9 | 5MHz | | QPSK | 8 | 8 |
| 10 | 5MHz | | QPSK | 6 | 6 |
| 11 | 5MHz | | 16QAM | 25 | 25 |
| 12 | 5MHz | | 16QAM | 8 | 8 |
| 13 | 10MHz | | QPSK | 50 | 50 |
| 14 | 10MHz | | QPSK | 12 | 12 |
| 15 | 10MHz | | QPSK | 6 | 6 |
| 16 | 10MHz | | 16QAM | 50 (Note 4) | 50 (Note 4) |
| 17 | 10MHz | | 16QAM | 12 | 12 |
| 18 | 15MHz | | QPSK | 75 | 75 |
| 19 | 15MHz | | QPSK | 16 | 16 |
| 20 | 15MHz | | QPSK | 8 | 8 |
| 21 | 15MHz | | 16QAM | 75 (Note 4) | 75 (Note 4) |
| 22 | 15MHz | | 16QAM | 16 | 16 |
| 23 | 20MHz | | QPSK | 100 | 100 |
| 24 | 20MHz | | QPSK | 18 | 18 |
| 25 | 20MHz | | QPSK | 10 | 10 |
| 26 | 20MHz | | 16QAM | 100 (Note 4) | 100 (Note 4) |
| 27 | 20MHz | | 16QAM | 18 | 18 |

- Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.
- Note 2: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
- Note 3: The RB_{start} of partial RB allocation shall be $RB\# 0$ and $RB\# (max +1 - RB\ allocation)$ of the channel bandwidth.
- Note 4: Applies only for UE-Categories ≥ 2 .
- Note 5: For band 23, above table only applies to mid and high range test frequencies. Low range test frequencies will be covered by NS_11 test configuration table.

Table 6.2.4.4.1-2: Test Configuration Table (network signalled value "NS_04")

| Initial Conditions | | | | | | |
|--|---|------------------------|-------------------|----------------------------------|-------------------|-------------------------|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | | | | NC | | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | | | | Low range, Mid range, High range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | | | | 5MHz, 10 MHz, 15 MHz, 20MHz | | |
| Test Parameters for NS_04 A-MPR | | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | | |
| | | Mod'n | RB allocation TDD | Mod'n | RB allocation TDD | RB _{start} TDD |
| 1 | 5MHz | N/A for A-MPR testing | | QPSK | 25 | Note 3 |
| 2 | 5MHz | | | QPSK | 8 | Note 3 |
| 3 | 5MHz | | | QPSK | 6 | Note 3 |
| 4 | 5MHz | | | 16QAM | 25 | Note 3 |
| 5 | 5MHz | | | 16QAM | 8 | Note 3 |
| 6 | 10MHz | | | QPSK | 1 | 0 |
| 7 | 10MHz | | | QPSK | 12 | 0 |
| 8 | 10MHz | | | QPSK | 50 | 0 |
| 9 | 10MHz | | | 16QAM | 50 (Note 4) | 0 |
| 10 | 10MHz | | | QPSK | 24 | 13 |
| 11 | 10MHz | | | 16QAM | 24 | 13 |
| 12 | 10MHz | | | QPSK | 36 | 13 |
| 13 | 10MHz | | | QPSK | 12 | 37 |
| 14 | 10MHz | | | QPSK | 1 | 49 |
| 15 | 15MHz | | | QPSK | 1 | 0 |
| 16 | 15MHz | | | QPSK | 16 | 0 |
| 17 | 15MHz | | | QPSK | 75 | 0 |
| 18 | 15MHz | | | 16QAM | 75 (Note 4) | 0 |
| 19 | 15MHz | | | QPSK | 36 | 19 |
| 20 | 15MHz | | | 16QAM | 36 (Note 4) | 19 |
| 21 | 15MHz | | | QPSK | 50 | 19 |
| 22 | 15MHz | | | QPSK | 18 | 56 |
| 23 | 15MHz | | | QPSK | 1 | 74 |
| 24 | 20MHz | | | QPSK | 1 | 0 |
| 25 | 20MHz | | | QPSK | 18 | 0 |
| 26 | 20MHz | | | QPSK | 100 | 0 |
| 27 | 20MHz | | | 16QAM | 100 (Note 4) | 0 |
| 28 | 20MHz | | | QPSK | 50 | 25 |
| 29 | 20MHz | | | 16QAM | 50 (Note 4) | 25 |
| 30 | 20MHz | | | QPSK | 75 | 25 |
| 31 | 20MHz | | | QPSK | 25 | 75 |
| 32 | 20MHz | | | QPSK | 1 | 99 |
| Note 1: | Test Channel Bandwidths are checked separately for E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. | | | | | |
| Note 2: | The configuration ID will be used to map the applicable Test Configuration to be corresponding Test Requirement in subclause 6.2.4 as not all combinations are necessarily required based on the applicability of the UE. | | | | | |
| Note 3: | The RB _{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth. | | | | | |
| Note 4: | Applies only for UE-Categories ≥2. | | | | | |

Table 6.2.4.4.1-3: Test Configuration Table (network signalled value "NS_05")

| Initial Conditions | | | | | |
|--|-------|------------------------|---|----------------------|-------------------|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | | | Normal | | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | | | Low range, Mid range In case of Low range: - For 5MHz channel bandwidth: UL 1927.2MHz (N_UL = 18072), DL 2117.2MHz (N_DL = 72) - For 10MHz: UL 1934.7MHz (N_UL = 18147), DL 2124.7MHz (N_DL = 147) - For 20MHz channel bandwidth: Not available | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | | | 5MHz, 10MHz, 15MHz, 20MHz | | |
| Test Parameters for NS_05 A-MPR | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | |
| | | Mod'n | RB allocation FDD | Mod'n | RB allocation FDD |
| 1 | 5MHz | N/A for A-MPR testing | | QPSK | 1 |
| 2 | 5MHz | | | QPSK | 25 |
| 3 | 10MHz | | | QPSK | 1 |
| 4 | 10MHz | | | QPSK | 12 |
| 5 | 10MHz | | | QPSK | 48 |
| 6 | 10MHz | | | QPSK | 50 |
| 7 | 10MHz | | 16QAM | 50 (Note 4) | |
| 8 | 15MHz | | QPSK | 1 | |
| 9 | 15MHz | | QPSK | 16 | |
| 10 | 15MHz | | QPSK | 48 | |
| 11 | 15MHz | | QPSK | 75 | |
| 12 | 15MHz | | 16QAM | 75 (Note 4) | |
| 13 | 20MHz | | QPSK | 1 | |
| 14 | 20MHz | | QPSK | 18 | |
| 15 | 20MHz | | QPSK | 48 | |
| 16 | 20MHz | | QPSK | 100 | |
| 17 | 20MHz | | 16QAM | 100 (Note 4) | |
| <p>Note 1: The 1 RB allocation shall be tested at both RB #0 and RB #max.</p> <p>Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.</p> <p>Note 3: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.</p> <p>Note 4: Applies only for UE-Categories ≥2.</p> | | | | | |

Table 6.2.4.4.1-4: Test Configuration Table (network signalled value "NS_06")

| Initial Conditions | | | | | |
|--|--|----------------------------------|--|----------------------|--|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | | Normal | | | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | | Low range, Mid range, High range | | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | | Lowest, 5MHz, 10MHz, Highest | | | |
| Test Parameters for NS_06 A-MPR | | | | | |
| | | Downlink Configuration | | Uplink Configuration | |
| | | | | | |

| Configuration ID | Ch BW | Mod'n | RB allocation FDD | Mod'n | RB allocation FDD |
|--|--------|-----------------------|-------------------|-------|-------------------|
| 1 | 1.4MHz | N/A for A-MPR testing | | QPSK | 6 |
| 2 | 1.4MHz | | | QPSK | 5 |
| 3 | 1.4MHz | | | 16QAM | 5 |
| 4 | 3MHz | | | QPSK | 15 |
| 5 | 3MHz | | | QPSK | 4 |
| 6 | 3MHz | | | 16QAM | 4 |
| 7 | 5MHz | | | QPSK | 25 |
| 8 | 5MHz | | | QPSK | 8 |
| 9 | 5MHz | | | 16QAM | 8 |
| 10 | 10MHz | | | QPSK | 50 |
| 11 | 10MHz | | | QPSK | 12 |
| 12 | 10MHz | | | 16QAM | 12 |
| 13 | 15MHz | | | QPSK | 75 |
| 14 | 15MHz | | | QPSK | 16 |
| 15 | 15MHz | | | 16QAM | 16 |
| 16 | 20MHz | | | QPSK | 100 |
| 17 | 20MHz | | | QPSK | 18 |
| 18 | 20MHz | | | 16QAM | 18 |
| <p>Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.</p> <p>Note 2: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.</p> <p>Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.</p> | | | | | |

Table 6.2.4.4.1-5: Test Configuration Table (network signalled value "NS_07")

| Initial Conditions | |
|--|-----------------------------|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | NC |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | Mid range |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | 10MHz |
| Test Parameters for NS_07 A-MPR | |
| | |
| Downlink Configuration | Uplink Configuration |

| Configuration ID | Ch BW | Mod'n | RB allocation FDD | Mod'n | RB allocation FDD | RB _{start} FDD |
|------------------|-------|-----------------------|-------------------|-------|-------------------|-------------------------|
| 1 | 10MHz | N/A for A-MPR testing | | QPSK | 1 | 0 |
| 2 | 10MHz | | | QPSK | 8 | 0 |
| 3 | 10MHz | | | QPSK | 6 | 13 |
| 4 | 10MHz | | | QPSK | 20 | 13 |
| 5 | 10MHz | | | QPSK | 12 | 13 |
| 6 | 10MHz | | | 16QAM | 36 (Note 2) | 13 |
| 7 | 10MHz | | | QPSK | 16 | 19 |
| 8 | 10MHz | | | QPSK | 12 | 19 |
| 9 | 10MHz | | | 16QAM | 16 | 19 |
| 10 | 10MHz | | | QPSK | 30 | 19 |
| 11 | 10MHz | | | 16QAM | 30 (Note 2) | 19 |
| 12 | 10MHz | | | QPSK | 6 | 43 |
| 13 | 10MHz | | | QPSK | 2 | 48 |
| 14 | 10MHz | | | QPSK | 50 | 0 |
| 15 | 10MHz | | | QPSK | 12 | 0 |
| 16 | 10MHz | | | 16QAM | 50 (Note 2) | 0 |

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.

Note 2: Applies only for UE-Categories ≥2.

Table 6.2.4.4.1-6: Test Configuration Table (network signalled value "NS_08")

| Initial Conditions | | | | | |
|--|-------|------------------------|--------------------|----------------------|-------------------|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | | | Normal | | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | | | High range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | | | 5MHz, 10MHz, 15MHz | | |
| Test Parameters for NS_08 A-MPR | | | | | |
| | | Downlink Configuration | | Uplink Configuration | |
| Configuration ID | Ch BW | Mod'n | RB allocation FDD | Mod'n | RB allocation FDD |
| 1 | 5MHz | N/A for A-MPR testing | | QPSK | 1 |
| 2 | 5MHz | | | QPSK | 8 |
| 3 | 5MHz | | | QPSK | 25 |
| 4 | 10MHz | | | QPSK | 1 |
| 5 | 10MHz | | | QPSK | 12 |
| 6 | 10MHz | | | QPSK | 40 |
| 7 | 10MHz | | | QPSK | 50 |
| 8 | 10MHz | | | 16QAM | 50 (Note 4) |
| 9 | 15MHz | | | QPSK | 1 |
| 10 | 15MHz | | | QPSK | 16 |
| 11 | 15MHz | | | QPSK | 40 |
| 12 | 15MHz | | | QPSK | 75 |
| 13 | 15MHz | | | 16QAM | 75 (Note 4) |

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.

Note 2: The 1 RB allocation shall be tested at both RB #0 and RB #max.

Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max + 1 - RB allocation) of the channel bandwidth

Note 4: Applies only for UE-Categories ≥2.

Table 6.2.4.4.1-7: Test Configuration Table (network signalled value "NS_09")

| Initial Conditions | | | | | |
|--|-------|------------------------|--------------------|----------------------|-------------------|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | | | Normal | | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | | | High range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | | | 5MHz, 10MHz, 15MHz | | |
| Test Parameters for Channel Bandwidths | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | |
| | | Mod'n | RB allocation FDD | Mod'n | RB allocation FDD |
| 1 | 5MHz | N/A for A-MPR testing | | QPSK | 1 |
| 2 | 5MHz | | | QPSK | 8 |
| 3 | 5MHz | | | QPSK | 25 |
| 4 | 10MHz | | | QPSK | 1 |
| 5 | 10MHz | | | QPSK | 12 |
| 6 | 10MHz | | | QPSK | 40 |
| 7 | 10MHz | | | QPSK | 50 |
| 8 | 10MHz | | | 16QAM | 50 (Note 4) |
| 9 | 15MHz | | | QPSK | 1 |
| 10 | 15MHz | | | QPSK | 16 |
| 11 | 15MHz | | | QPSK | 40 |
| 12 | 15MHz | | | QPSK | 54 |
| 13 | 15MHz | | | QPSK | 75 |
| 14 | 15MHz | | | 16QAM | 75 (Note 4) |
| <p>Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.</p> <p>Note 2: The 1 RB allocation shall be tested at both RB #0 and RB #max.</p> <p>Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max + 1 - RB allocation) of the channel bandwidth</p> <p>Note 4: Applies only for UE-Categories ≥2.</p> | | | | | |

Table 6.2.4.4.1-8: Test Configuration Table (network signalled value "NS_10")

Void, not tested

Table 6.2.4.4.1-9: Test Configuration Table (network signalled value "NS_11")

| Initial Conditions | | | | | |
|--|-------|------------------------|---|----------------------|-------------------|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | | | Normal | | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | | | Low range For 3 MHz Channel Bandwidth: a. UL 2001.5 MHz (N_UL=25515), DL 2181.5 MHz(N_DL=7515) b. UL 2004.5 MHz (N_UL=25545), DL 2184.5 (N_DL=7545) For 5 MHz Channel Bandwidth a. UL 2002.5 MHz (N_UL=25525), DL 2182.5 MHz(N_DL=7525) b. UL 2004.5 MHz (N_UL=25545), DL 2184.5 MHz(N_DL=7545) c. UL 2007.5 MHz (N_UL=25575), DL 2187.5 MHz(N_DL=7575) For 10 MHz Channel Bandwidth UL 2005 MHz (N_UL=25550), DL 2185 MHz (N_DL=7550) | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | | | 1.4MHz, 3MHz, 5MHz, 10MHz | | |
| Test Parameters for NS_11 A-MPR | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | |
| | | Mod'n | RB allocation FDD | Mod'n | RB allocation FDD |
| 1 | 3MHz | N/A for A-MPR testing | | QPSK | 6 |
| 2 | 3MHz | | | QPSK | 15 |
| 3 | 3MHz | | | 16QAM | 6 |
| 4 | 3MHz | | | 16QAM | 15 |
| 5 | 5MHz | | | QPSK | 1 |
| 6 | 5MHz | | | QPSK | 8 |
| 7 | 5MHz | | | QPSK | 25 |
| 8 | 5MHz | | | 16QAM | 8 |
| 9 | 5MHz | | | 16QAM | 25 |
| 10 | 10MHz | | | QPSK | 1 |
| 11 | 10MHz | | | QPSK | 12 |
| 12 | 10MHz | | | QPSK | 50 |
| 13 | 10MHz | | | 16QAM | 12 |
| 14 | 10MHz | | | 16QAM | 50 |
| (Note 3) | | | | | |
| Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE. Note 2: The RB _{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth. Note 3: Applies only for UE-Categories ≥2. | | | | | |

Table 6.2.4.4.1-10: Test Configuration Table (network signalled value "NS_12")

| Initial Conditions | | | | | | |
|--|---------|------------------------|---------------|--------------------------|-------------------|-------------|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | | | | NC | | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | | | | Mid range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | | | | 1.4 MHz, 3 MHz and 5 MHz | | |
| Test Parameters for Channel Bandwidths | | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | | |
| | | Mod'n | RB allocation | Mod'n | RB allocation FDD | RBstart FDD |
| 1 | 1.4 MHz | N/A for A-MPR testing. | | QPSK | 1 | 0 |
| 2 | 1.4 MHz | | | QPSK | 6 | 0 |
| 3 | 1.4 MHz | | | QPSK | 1 | 1 |
| 4 | 1.4 MHz | | | QPSK | 5 | 1 |
| 5 | 1.4 MHz | | | 16QAM | 6 | 0 |
| 6 | 3 MHz | | | QPSK | 4 | 0 |
| 7 | 3 MHz | | | QPSK | 10 | 0 |
| 8 | 3 MHz | | | QPSK | 4 | 4 |
| 9 | 3 MHz | | | QPSK | 10 | 4 |
| 10 | 3 MHz | | | 16QAM | 15 | 0 |
| 11 | 5 MHz | | | QPSK | 8 | 0 |
| 12 | 5 MHz | | | QPSK | 15 | 0 |
| 13 | 5 MHz | | | QPSK | 8 | 7 |
| 14 | 5 MHz | | | QPSK | 15 | 7 |
| 15 | 5 MHz | | | 16QAM | 25 | 0 |

Table 6.2.4.4.1-11: Test Configuration Table (network signalled value "NS_13")

| Initial Conditions | | | | | | |
|--|-------|------------------------|---------------|----------------------|-------------------|-------------|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | | | | NC | | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | | | | Mid range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | | | | 5 MHz | | |
| Test Parameters for Channel Bandwidths | | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | | |
| | | Mod'n | RB allocation | Mod'n | RB allocation FDD | RBstart FDD |
| 1 | 5 MHz | N/A for A-MPR testing. | | QPSK | 1 | 0 |
| 2 | 5 MHz | | | QPSK | 25 | 0 |
| 3 | 5 MHz | | | QPSK | 15 | 0 |
| 4 | 5 MHz | | | QPSK | 15 | 7 |
| 5 | 5 MHz | | | 16QAM | 25 | 0 |

Table 6.2.4.4.1-12: Test Configuration Table (network signalled value "NS_14")

| Initial Conditions | | | | | | |
|--|--------|------------------------|---------------|----------------------|-------------------|-------------|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | | | | NC | | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | | | | Mid range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | | | | 10 MHz, 15 MHz | | |
| Test Parameters for Channel Bandwidths | | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | | |
| | | Mod'n | RB allocation | Mod'n | RB allocation FDD | RBstart FDD |
| 1 | 10 MHz | N/A for A-MPR testing. | | QPSK | 1 | 0 |
| 2 | 10 MHz | | | QPSK | 25 | 0 |
| 3 | 10 MHz | | | QPSK | 50 | 0 |
| 4 | 10 MHz | | | QPSK | 25 | 1 |
| 5 (Note 1) | 10 MHz | | | 16QAM | 50 | 0 |
| 6 | 15 MHz | | | QPSK | 8 | 0 |
| 7 | 15 MHz | | | QPSK | 25 | 0 |
| 8 | 15 MHz | | | QPSK | 75 | 0 |
| 9 | 15 MHz | | | QPSK | 50 | 15 |
| 10 (Note 1) | 15 MHz | | | 16QAM | 75 | 0 |
| Note 1: Applies only for UE-Categories ≥ 2 . | | | | | | |

Table 6.2.4.4.1-13: Test Configuration Table (network signalled value "NS_15")

| Initial Conditions | | | | | | |
|--|---------|------------------------|---------------|--|-------------------|-------------|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | | | | NC | | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | | | | For 1.4 MHz and 3 MHz Channel Bandwidth: High range For 5 MHz, 10 MHz and 15 MHz Channel Bandwidth: Low range, high range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | | | | 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz | | |
| Test Parameters for Channel Bandwidths | | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | | |
| | | Mod'n | RB allocation | Mod'n | RB allocation FDD | RBstart FDD |
| 1 (Note 3) | 1.4 MHz | N/A for A-MPR testing. | | QPSK | 3 | 2 |
| 2 (Note 3) | 1.4 MHz | N/A for A-MPR testing. | | QPSK | 4 | 1 |
| 3 (Note 3) | 1.4 MHz | N/A for A-MPR testing. | | 16QAM | 5 | 1 |
| 4 (Note 3) | 3 MHz | N/A for A-MPR testing. | | QPSK | 1 | 0 |
| 5 (Note 3) | 3 MHz | N/A for A-MPR testing. | | QPSK | 10 | 2 |
| 6 (Note 3) | 3 MHz | N/A for A-MPR testing. | | QPSK | 15 | 0 |
| 7 (Note 3) | 3 MHz | N/A for A-MPR testing. | | 16QAM | 15 | 0 |
| 8 (Note 3) | 5 MHz | N/A for A-MPR testing. | | QPSK | 1 | 0 |
| 9 (Note 3) | 5 MHz | N/A for A-MPR testing. | | QPSK | 15 | 0 |
| 10 (Note 3) | 5 MHz | N/A for A-MPR testing. | | QPSK | 18 | 0 |
| 11 (Note 3) | 5 MHz | N/A for A-MPR testing. | | QPSK | 25 | 0 |
| 12 (Note 3) | 5 MHz | N/A for A-MPR testing. | | 16QAM | 25 | 0 |
| 13 (Note 2) | 5 MHz | N/A for A-MPR testing. | | QPSK | 20 | 0 |
| 14 (Note 2) | 5 MHz | N/A for A-MPR testing. | | 16QAM | 25 | 0 |
| 15 (Note 3) | 10 MHz | N/A for A-MPR testing. | | QPSK | 1 | 0 |
| 16 (Note 3) | 10 MHz | N/A for A-MPR testing. | | QPSK | 25 | 0 |
| 17 (Note 3) | 10 MHz | N/A for A-MPR testing. | | QPSK | 36 | 0 |
| 18 (Note 3) | 10 MHz | N/A for A-MPR testing. | | QPSK | 50 | 0 |
| 19 (Note 3) | 10 MHz | N/A for A-MPR testing. | | QPSK | 1 | 49 |

| | | | | | |
|--|--------|--|-------|----|----|
| 20 (Note 1, 3) | 10 MHz | | 16QAM | 50 | 0 |
| 21 (Note 2) | 10 MHz | | QPSK | 1 | 0 |
| 22 (Note 2) | 10 MHz | | QPSK | 30 | 0 |
| 23 (Note 2) | 10 MHz | | QPSK | 40 | 0 |
| 24 (Note 2) | 10 MHz | | QPSK | 50 | 0 |
| 25 (Note 1, 2) | 10 MHz | | 16QAM | 50 | 0 |
| 26 (Note 3) | 15 MHz | | QPSK | 1 | 0 |
| 27 (Note 3) | 15 MHz | | QPSK | 36 | 0 |
| 28 (Note 3) | 15 MHz | | QPSK | 50 | 0 |
| 29 (Note 3) | 15 MHz | | QPSK | 75 | 0 |
| 30 (Note 1, 3) | 15 MHz | | 16QAM | 75 | 0 |
| 31 (Note 2) | 15 MHz | | QPSK | 1 | 0 |
| 32 (Note 2) | 15 MHz | | QPSK | 50 | 0 |
| 33 (Note 2) | 15 MHz | | QPSK | 50 | 10 |
| 34 (Note 2) | 15 MHz | | QPSK | 75 | 0 |
| 35 (Note 1, 2) | 15 MHz | | 16QAM | 75 | 0 |
| Note 1: Applies only for UE-Categories ≥ 2 . Note 2: Applicable only to low range frequency testing Note 3: Applicable only to high range frequency testing | | | | | |

Table 6.2.4.4.1-14: Test Configuration Table (network signalled value "NS_16")

| Initial Conditions | | | | | | |
|--|--------|------------------------|---|----------------------|-------------------|-------------|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | | | NC | | | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | | | For 3 MHz Channel Bandwidth: Low range For 5 MHz Channel Bandwidth: Low range, 811 MHz ($N_{DL} = 9080$, $N_{UL} = 27080$) For 10 MHz Channel Bandwidth: Low range, 813.5 MHz ($N_{DL} = 9105$, $N_{UL} = 27105$), 817 MHz ($N_{DL} = 9140$, $N_{UL} = 27140$) | | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | | | 3 MHz, 5 MHz, 10 MHz | | | |
| Test Parameters for Channel Bandwidths | | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | | |
| | | Mod'n | RB allocation | Mod'n | RB allocation FDD | RBstart FDD |
| 1 | 3 MHz | N/A for A-MPR testing. | | QPSK | 12 | 1 |
| 2 | 3 MHz | | | QPSK | 15 | 0 |
| 3 (Note 1) | 3 MHz | | | 16QAM | 15 | 0 |
| 4 | 5 MHz | | | QPSK | 1 | 0 |
| 5 | 5 MHz | | | QPSK | 12 | 2 |
| 6 | 5 MHz | | | QPSK | 18 | 2 |
| 7 | 5 MHz | | | QPSK | 20 | 0 |
| 8 | 5 MHz | | | QPSK | 20 | 2 |
| 9 | 5 MHz | | | QPSK | 25 | 0 |
| 10 (Note 1) | 5 MHz | | | 16QAM | 25 | 0 |
| 11 | 10 MHz | | | QPSK | 1 | 0 |
| 12 (Note 2) | 10 MHz | | | QPSK | 20 | 0 |
| 13 (Note 2) | 10 MHz | | | QPSK | 27 | 15 |
| 14 (Note 2) | 10 MHz | | | QPSK | 32 | 15 |
| 15 | 10 MHz | | | QPSK | 32 | 0 |
| 16 | 10 MHz | | | QPSK | 50 | 0 |
| 17 (Note 1) | 10 MHz | | | 16QAM | 50 | 0 |

| | | | | |
|--|--------|------|----|---|
| 18 (Note 3) | 10 MHz | QPSK | 40 | 0 |
| 19 (Note 3) | 10 MHz | QPSK | 40 | 1 |
| Note 1: Applies only for UE-Categories ≥ 2 . Note 2: Applies only for 10 MHz channel for Low Range, and 813.5 MHz Note 3: Applies only for 10 MHz channel for 817 MHz range | | | | |

Table 6.2.4.4.1-15: Test Configuration Table (network signalled value "NS_17")

| Initial Conditions | | | | | |
|---|-------|------------------------|-------------------|----------------------|-------------------|
| Test Environment (as specified in TS 36.508[7] subclause 4.1) | | | Normal | | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | | | Low range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | | | 5MHz, 10MHz | | |
| Test Parameters for Channel Bandwidths | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | |
| | | Mod'n | RB allocation FDD | Mod'n | RB allocation FDD |
| 1 | 5MHz | N/A for A-MPR testing | | QPSK | 1 |
| 2 | 5MHz | | | QPSK | 8 |
| 3 | 5MHz | | | QPSK | 25 |
| 4 | 5MHz | | | 16QAM | 25 (Note 3) |
| 5 | 10MHz | | | QPSK | 1 |
| 6 | 10MHz | | | QPSK | 12 |
| 7 | 10MHz | | | QPSK | 50 |
| 8 | 10MHz | | | 16QAM | 50 (Note 3) |
| Note 1: The 1 RB allocation shall be tested at both RB #0 and RB #max. Note 2: The RBstart of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth. Note 3: Applies only for UE-Categories ≥ 2 . | | | | | |

Table 6.2.4.4.1-16: Test Configuration Table (network signalled value "NS_18")

| Initial Conditions | | | | | |
|--|-------|------------------------|---------------------------|----------------------|-------------------|
| Test Environment (as specified in TS 36.508[7] subclause 4.1) | | | Normal | | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | | | Low range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | | | 5MHz, 10MHz, 15MHz, 20MHz | | |
| Test Parameters for Channel Bandwidths | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | |
| | | Mod'n | RB allocation FDD | Mod'n | RB allocation FDD |
| 1 | 5MHz | N/A for A-MPR testing | | QPSK | 1 |
| 2 | 5MHz | | | QPSK | 8 |

| | | | |
|----|-------|-------|-----------------|
| 3 | 5MHz | QPSK | 25 |
| 4 | 5MHz | 16QAM | 25 (Note 3) |
| 5 | 10MHz | QPSK | 1 |
| 6 | 10MHz | QPSK | 12 |
| 7 | 10MHz | QPSK | 50 |
| 8 | 10MHz | 16QAM | 50 (Note 3) |
| 9 | 15MHz | QPSK | 1 |
| 10 | 15MHz | QPSK | 16 |
| 11 | 15MHz | QPSK | 75 |
| 12 | 15MHz | 16QAM | 75 (Note 3) |
| 13 | 20MHz | QPSK | 1 |
| 14 | 20MHz | QPSK | 18 |
| 15 | 20MHz | QPSK | 100 |
| 16 | 20MHz | 16QAM | 100 (Note 3) |

Note 1: The 1 RB allocation shall be tested at both RB #0 and RB #max.
Note 2: The RBstart of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories ≥ 2 .

Editor's note: The following lines belong at the end of section 6.2.4.4.1. As new tables are added to this section, these lines should always follow the tables.

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to the applicable table from Table 6.2.4.4.1-1 to Table 6.2.4.4.1-6.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.4.4.3.

6.2.4.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to the applicable table from Table 6.2.4.4.1-1 to Table 6.2.4.4.1-16. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6, with the following exceptions for each network signalled value.

6.2.4.4.3.1 Message contents exceptions (network signalled value "NS_03")

1. Information element `additionalSpectrumEmission` is set to NS_03. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.1-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_03"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 3 (NS_03) | | |

6.2.4.4.3.2 Message contents exceptions (network signalled value "NS_04")

1. Information element `additionalSpectrumEmission` is set to NS_04. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.2-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_04"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 4 (NS_04) | | |

6.2.4.4.3.3 Message contents exceptions (network signalled value "NS_05")

1. Information element `additionalSpectrumEmission` is set to NS_05. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.3-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_05"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 5 (NS_05) | | |

6.2.4.4.3.4 Message contents exceptions (network signalled value "NS_06")

1. Information element `additionalSpectrumEmission` is set to NS_06. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.4-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_06"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 6 (NS_06) | | |

6.2.4.4.3.5 Message contents exceptions (network signalled value "NS_07")

1. Information element `additionalSpectrumEmission` is set to NS_07. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.5-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_07"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 7 (NS_07) | | |

6.2.4.4.3.6 Message contents exceptions (network signalled value "NS_08")

1. Information element `additionalSpectrumEmission` is set to NS_08. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.6-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_08"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 8 (NS_08) | | |

6.2.4.4.3.7 Message contents exceptions (network signalled value "NS_09")

1. Information element `additionalSpectrumEmission` is set to NS_09. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.7-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_09"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 9 (NS_09) | | |

6.2.4.4.3.8 Message contents exceptions (network signalled value "NS_10")

Void

6.2.4.4.3.9 Message contents exceptions (network signalled value "NS_11")

1. Information element `additionalSpectrumEmission` is set to NS_11. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.9-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_11"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 11 (NS_11) | | |

6.2.4.4.3.10 Message contents exceptions (network signalled value "NS_12")

1. Information element `additionalSpectrumEmission` is set to NS_12. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.10-1: SystemInformationBlockType2 :Additional spurious emissions test requirement for "NS_12"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 12 (NS_12) | | |

6.2.4.4.3.11 Message contents exceptions (network signalled value "NS_13")

1. Information element `additionalSpectrumEmission` is set to NS_13. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.11-1: SystemInformationBlockType2 :Additional spurious emissions test requirement for "NS_13"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 13 (NS_13) | | |

6.2.4.4.3.12 Message contents exceptions (network signalled value "NS_14")

1. Information element `additionalSpectrumEmission` is set to NS_14. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.12-1: SystemInformationBlockType2 :Additional spurious emissions test requirement for "NS_14"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 14 (NS_14) | | |

6.2.4.4.3.13 Message contents exceptions (network signalled value "NS_15")

1. Information element `additionalSpectrumEmission` is set to NS_15. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.13-1: SystemInformationBlockType2 :Additional spurious emissions test requirement for "NS_15"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 15 (NS_15) | | |

6.2.4.4.3.14 Message contents exceptions (network signalled value "NS_16")

1. Information element `additionalSpectrumEmission` is set to NS_16. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.13-1: SystemInformationBlockType2 :Additional spurious emissions test requirement for "NS_16"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| additionalSpectrumEmission | 16 (NS_16) | | |

6.2.4.4.3.15 Message contents exceptions (network signalled value "NS_17")

1. Information element additionalSpectrumEmission is set to NS_17. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.15-1: SystemInformationBlockType2 :Additional spurious emissions test requirement for "NS_17"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| additionalSpectrumEmission | 17 (NS_17) | | |

6.2.4.4.3.16 Message contents exceptions (network signalled value "NS_18")

1. Information element additionalSpectrumEmission is set to NS_18. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.16-1: SystemInformationBlockType2 :Additional spurious emissions test requirement for "NS_18"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| additionalSpectrumEmission | 18 (NS_18) | | |

6.2.4.5 Test requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in the applicable table from Table 6.2.4.5-1 to Table 6.2.4.5-16. The allowed A-MPR values specified in Table 6.2.4.3-1 are in addition to the allowed MPR requirements specified in clause 6.2.3. For the UE maximum output power modified by MPR and/or A-MPR, the power limits specified in Table 6.2.5.3-1 apply.

**Table 6.2.4.5-1: UE Power Class test requirements (network signalled value "NS_03")
(for Bands 4, 10, 23, 35, and 36)**

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|---------------|---------------|-----------|---------------|-----------|---------------|-------------|
| 1 | 4,10,23,35,36 | | | | | 23 | +2.7 / -3.7 |
| 2 | 4,10,23,35,36 | | | | | 23 | +2.7 / -2.7 |
| 3 | 4,10,23,35,36 | | | | | 23 | +2.7 / -3.7 |
| 4 | 4,10,23,35,36 | | | | | 23 | +2.7 / -4.7 |
| 5 | 4,10,23,35,36 | | | | | 23 | +2.7 / -2.7 |
| 6 | 4,10,23,35,36 | | | | | 23 | +2.7 / -6.2 |
| 7 | 4,10,23,35,36 | | | | | 23 | +2.7 / -3.7 |
| 8 | 4,10,23,35,36 | | | | | 23 | +2.7 / -4.7 |
| 9 | 4,10,23,35,36 | | | | | 23 | +2.7 / -3.7 |
| 10 | 4,10,23,35,36 | | | | | 23 | +2.7 / -2.7 |
| 11 | 4,10,23,35,36 | | | | | 23 | +2.7 / -6.2 |
| 12 | 4,10,23,35,36 | | | | | 23 | +2.7 / -4.7 |
| 13 | 4,10,23,35,36 | | | | | 23 | +2.7 / -4.7 |
| 14 | 4,10,23,35,36 | | | | | 23 | +2.7 / -3.7 |
| 15 | 4,10,23,35,36 | | | | | 23 | +2.7 / -2.7 |
| 16 | 4,10,23,35,36 | | | | | 23 | +2.7 / -6.2 |
| 17 | 4,10,23,35,36 | | | | | 23 | +2.7 / -4.7 |
| 18 | 4,10,35,36 | | | | | 23 | +2.7 / -4.7 |
| 19 | 4,10,35,36 | | | | | 23 | +2.7 / -3.7 |
| 20 | 4,10,35,36 | | | | | 23 | +2.7 / -2.7 |
| 21 | 4,10,35,36 | | | | | 23 | +2.7 / -6.2 |
| 22 | 4,10,35,36 | | | | | 23 | +2.7 / -4.7 |
| 23 | 4,10,35,36 | | | | | 23 | +2.7 / -4.7 |
| 24 | 4,10,35,36 | | | | | 23 | +2.7 / -3.7 |
| 25 | 4,10,35,36 | | | | | 23 | +2.7 / -2.7 |
| 26 | 4,10,35,36 | | | | | 23 | +2.7 / -6.2 |
| 27 | 4,10,35,36 | | | | | 23 | +2.7 / -4.7 |

**Table 6.2.4.5-2: UE Power Class test requirements (network signalled value "NS_03")
(for Bands 2 and 25)**

| Configuration ID | EUTRA band | Test Freq. | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|--|---------------|-----------|---------------|-----------|---------------|-------------|
| 1 | 2, 25 | Mid | | | | | 23 | +2.7 / -3.7 |
| 1 | 2, 25 | Low, High | | | | | 23 | +2.7 / -5.7 |
| 2 | 2, 25 | Mid | | | | | 23 | +2.7 / -2.7 |
| 2 | 2, 25 | Low, High | | | | | 23 | +2.7 / -4.2 |
| 3 | 2, 25 | Mid | | | | | 23 | +2.7 / -3.7 |
| 3 | 2, 25 | Low, High | | | | | 23 | +2.7 / -5.7 |
| 4 | 2, 25 | Mid | | | | | 23 | +2.7 / -4.7 |
| 4 | 2, 25 | Low, High | | | | | 23 | +2.7 / -7.7 |
| 5 | 2, 25 | Mid | | | | | 23 | +2.7 / -2.7 |
| 5 | 2, 25 | Low, High | | | | | 23 | +2.7 / -4.2 |
| 6 | 2, 25 | Mid | | | | | 23 | +2.7 / -6.2 |
| 6 | 2, 25 | Low, High | | | | | 23 | +2.7 / -9.2 |
| 7 | 2, 25 | Mid | | | | | 23 | +2.7 / -3.7 |
| 7 | 2, 25 | Low, High | | | | | 23 | +2.7 / -5.7 |
| 8 | 2, 25 | All | | | | | 23 | +2.7 / -4.7 |
| 9 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.7 / -3.7 |
| 9 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.7 / -5.7 |
| 10 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.7 / -2.7 |
| 10 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.7 / -4.2 |
| 11 | 2, 25 | All | | | | | 23 | +2.7 / -6.2 |
| 12 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.7 / -4.7 |
| 12 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.7 / -7.7 |
| 13 | 2, 25 | All | | | | | 23 | +2.7 / -4.7 |
| 14 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.7 / -3.7 |
| 14 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.7 / -5.7 |

| | | | | | | | | |
|----|-------|--|--|--|--|--|----|----------------|
| | | allocation) | | | | | | |
| 15 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.7 / -2.7 |
| 15 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.7 / -4.2 |
| 16 | 2, 25 | All | | | | | 23 | +2.7 / -6.2 |
| 17 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.7 / -4.7 |
| 17 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.7 / -7.7 |
| 18 | 2, 25 | All | | | | | 23 | +2.7 / -4.7 |
| 19 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.7 / -3.7 |
| 19 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.7 / -5.7 |
| 20 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.7 / -2.7 |
| 20 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.7 / -4.2 |
| 21 | 2, 25 | All | | | | | 23 | +2.7 / -6.2 |
| 22 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.7 / -4.7 |
| 22 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.7 / -7.7 |
| 23 | 2, 25 | All | | | | | 23 | +2.7 / -4.7 |
| 24 | 2, 25 | All | | | | | 23 | +2.7 / -3.7 |
| 25 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.7 / -2.7 |
| 25 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.7 / -4.2 |
| 26 | 2, 25 | All | | | | | 23 | +2.7 / -6.2 |
| 27 | 2, 25 | All | | | | | 23 | +2.7 / -4.7 |

Table 6.2.4.5-3: UE Power Class test requirements (network signalled value "NS_04")

| Configuration ID | EUTRA band | Bandwidth (MHz) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|-----------------|---------------|-------------|
| 1 | 41 | 5 MHz | 23 | +2.7 / -4.7 |
| 2 | 41 | 5 MHz | 23 | +2.7 / -3.7 |
| 3 | 41 | 5 MHz | 23 | +2.7 / -2.7 |
| 4 | 41 | 5 MHz | 23 | +2.7 / -6.2 |
| 5 | 41 | 5 MHz | 23 | +2.7 / -4.7 |
| 6 | 41 | 10MHz | 23 | +2.7 / -6.2 |
| 7 | 41 | 10MHz | 23 | +2.7 / -6.2 |
| 8 | 41 | 10MHz | 23 | +2.7 / -8.2 |
| 9 | 41 | 10MHz | 23 | +2.7 / -9.7 |
| 10 | 41 | 10MHz | 23 | +2.7 / -3.7 |
| 11 | 41 | 10MHz | 23 | +2.7 / -4.7 |
| 12 | 41 | 10MHz | 23 | +2.7 / -6.2 |
| 13 | 41 | 10MHz | 23 | +2.7 / -6.2 |
| 14 | 41 | 10MHz | 23 | +2.7 / -6.2 |
| 15 | 41 | 15MHz | 23 | +2.7 / -6.2 |
| 16 | 41 | 15MHz | 23 | +2.7 / -6.2 |
| 17 | 41 | 15MHz | 23 | +2.7 / -8.2 |
| 18 | 41 | 15MHz | 23 | +2.7 / -9.7 |
| 19 | 41 | 15MHz | 23 | +2.7 / -3.7 |
| 20 | 41 | 15MHz | 23 | +2.7 / -4.7 |
| 21 | 41 | 15MHz | 23 | +2.7 / -6.2 |
| 22 | 41 | 15MHz | 23 | +2.7 / -8.2 |
| 23 | 41 | 15MHz | 23 | +2.7 / -6.2 |
| 24 | 41 | 20MHz | 23 | +2.7 / -6.2 |
| 25 | 41 | 20MHz | 23 | +2.7 / -6.2 |
| 26 | 41 | 20MHz | 23 | +2.7 / -8.2 |
| 27 | 41 | 20MHz | 23 | +2.7 / -9.7 |
| 28 | 41 | 20MHz | 23 | +2.7 / -3.7 |
| 29 | 41 | 20MHz | 23 | +2.7 / -4.7 |
| 30 | 41 | 20MHz | 23 | +2.7 / -6.2 |
| 31 | 41 | 20MHz | 23 | +2.7 / -8.2 |
| 32 | 41 | 20MHz | 23 | +2.7 / |

| | | | | |
|--|--|--|--|------|
| | | | | -6.2 |
|--|--|--|--|------|

Table 6.2.4.5-4: UE Power Class test requirements (network signalled value "NS_05")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|-------------|
| 1 | 1 | | | | | 23 | +2.7 / -2.7 |
| 2 | 1 | | | | | 23 | +2.7 / -3.7 |
| 3 | 1 | | | | | 23 | +2.7 / -2.7 |
| 4 | 1 | | | | | 23 | +2.7 / -2.7 |
| 5 | 1 | | | | | 23 | +2.7 / -3.7 |
| 6 | 1 | | | | | 23 | +2.7 / -4.7 |
| 7 | 1 | | | | | 23 | +2.7 / -6.2 |
| 8 | 1 | | | | | 23 | +2.7 / -2.7 |
| 9 | 1 | | | | | 23 | +2.7 / -2.7 |
| 10 | 1 | | | | | 23 | +2.7 / -3.7 |
| 11 | 1 | | | | | 23 | +2.7 / -4.7 |
| 12 | 1 | | | | | 23 | +2.7 / -6.2 |
| 13 | 1 | | | | | 23 | +2.7 / -2.7 |
| 14 | 1 | | | | | 23 | +2.7 / -2.7 |
| 15 | 1 | | | | | 23 | +2.7 / -3.7 |
| 16 | 1 | | | | | 23 | +2.7 / -4.7 |
| 17 | 1 | | | | | 23 | +2.7 / -6.2 |

**Table 6.2.4.5-5: UE Power Class test requirements (network signalled value "NS_06")
(for Bands 13, 14, and 17)**

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|-------------|
| 1 | 13,14,17 | | | | | 23 | +2.7 / -3.7 |
| 2 | 13,14,17 | | | | | 23 | +2.7 / -2.7 |
| 3 | 13,14,17 | | | | | 23 | +2.7 / -2.7 |
| 4 | 13,14,17 | | | | | 23 | +2.7 / -3.7 |
| 5 | 13,14,17 | | | | | 23 | +2.7 / -2.7 |
| 6 | 13,14,17 | | | | | 23 | +2.7 / -3.7 |
| 7 | 13,14,17 | | | | | 23 | +2.7 / -3.7 |
| 8 | 13,14,17 | | | | | 23 | +2.7 / -2.7 |
| 9 | 13,14,17 | | | | | 23 | +2.7 / -3.7 |
| 10 | 13,14,17 | | | | | 23 | +2.7 / -3.7 |
| 11 | 13,14,17 | | | | | 23 | +2.7 / -2.7 |
| 12 | 13,14,17 | | | | | 23 | +2.7 / -3.7 |
| 13 | 13,14,17 | | | | | 23 | +2.7 / -3.7 |
| 14 | 13,14,17 | | | | | 23 | +2.7 / -2.7 |
| 15 | 13,14,17 | | | | | 23 | +2.7 / -3.7 |
| 16 | 13,14,17 | | | | | 23 | +2.7 / -3.7 |
| 17 | 13,14,17 | | | | | 23 | +2.7 / -2.7 |
| 18 | 13,14,17 | | | | | 23 | +2.7 / -3.7 |

**Table 6.2.4.5-6: UE Power Class test requirements (network signalled value "NS_06")
(for Band 12)**

| Configuration ID | EUTRA band | Test Freq. | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|--|---------------|-----------|---------------|-----------|---------------|-------------|
| 1 | 12 | Mid | | | | | 23 | +2.7 / -3.7 |
| 1 | 12 | Low, High | | | | | 23 | +2.7 / -5.7 |
| 2 | 12 | Mid | | | | | 23 | +2.7 / -2.7 |
| 2 | 12 | Low, High | | | | | 23 | +2.7 / -4.2 |
| 3 | 12 | Mid | | | | | 23 | +2.7 / -2.7 |
| 3 | 12 | Low, High | | | | | 23 | +2.7 / -4.2 |
| 4 | 12 | Mid | | | | | 23 | +2.7 / -3.7 |
| 4 | 12 | Low, High | | | | | 23 | +2.7 / -5.7 |
| 5 | 12 | Mid | | | | | 23 | +2.7 / -2.7 |
| 5 | 12 | Low, High | | | | | 23 | +2.7 / -4.2 |
| 6 | 12 | Mid | | | | | 23 | +2.7 / -3.7 |
| 6 | 12 | Low, High | | | | | 23 | +2.7 / -5.7 |
| 7 | 12 | All | | | | | 23 | +2.7 / -3.7 |
| 8 | 12 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.7 / -2.7 |
| 8 | 12 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.7 / -4.2 |
| 9 | 12 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.7 / -3.7 |
| 9 | 12 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.7 / -5.7 |
| 10 | 12 | All | | | | | 23 | +2.7 / -3.7 |
| 11 | 12 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.7 / -2.7 |
| 11 | 12 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.7 / -4.2 |
| 12 | 12 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.7 / -3.7 |
| 12 | 12 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.7 / -5.7 |

Table 6.2.4.5-7: UE Power Class test requirements (network signalled value "NS_07")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|--------------|
| 1 | 13 | | | | | 23 | +2.7 / -18.7 |
| 2 | 13 | | | | | 23 | +2.7 / -13.7 |
| 3 | 13 | | | | | 23 | +2.7 / -2.7 |
| 4 | 13 | | | | | 23 | +2.7 / -19.7 |
| 5 | 13 | | | | | 23 | +2.7 / -18.7 |
| 6 | 13 | | | | | 23 | +2.7 / -20.7 |
| 7 | 13 | | | | | 23 | +2.7 / -3.7 |
| 8 | 13 | | | | | 23 | +2.7 / -2.7 |
| 9 | 13 | | | | | 23 | +2.7 / -4.7 |
| 10 | 13 | | | | | 23 | +2.7 / -12.7 |
| 11 | 13 | | | | | 23 | +2.7 / -13.7 |
| 12 | 13 | | | | | 23 | +2.7 / -2.7 |
| 13 | 13 | | | | | 23 | +2.7 / -6.2 |
| 14 | 13 | | | | | 23 | +2.7 / -19.7 |
| 15 | 13 | | | | | 23 | +2.7 / -18.7 |
| 16 | 13 | | | | | 23 | +2.7 / -20.7 |

Table 6.2.4.5-8: UE Power Class test requirements (network signalled value "NS_08")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|-------------|
| 1 | 19 | | | | | 23 | +2.7 / -2.7 |
| 2 | 19 | | | | | 23 | +2.7 / -2.7 |
| 3 | 19 | | | | | 23 | +2.7 / -3.7 |
| 4 | 19 | | | | | 23 | +2.7 / -2.7 |
| 5 | 19 | | | | | 23 | +2.7 / -2.7 |
| 6 | 19 | | | | | 23 | +2.7 / -3.7 |
| 7 | 19 | | | | | 23 | +2.7 / -8.2 |
| 8 | 19 | | | | | 23 | +2.7 / -9.7 |
| 9 | 19 | | | | | 23 | +2.7 / -2.7 |
| 10 | 19 | | | | | 23 | +2.7 / -2.7 |
| 11 | 19 | | | | | 23 | +2.7 / -3.7 |
| 12 | 19 | | | | | 23 | +2.7 / -8.2 |
| 13 | 19 | | | | | 23 | +2.7 / -9.7 |

Table 6.2.4.5-9: UE Power Class test requirements (network signalled value "NS_09")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|-------------|
| 1 | 21 | | | | | 23 | +2.7 / -2.7 |
| 2 | 21 | | | | | 23 | +2.7 / -2.7 |
| 3 | 21 | | | | | 23 | +2.7 / -3.7 |
| 4 | 21 | | | | | 23 | +2.7 / -2.7 |
| 5 | 21 | | | | | 23 | +2.7 / -2.7 |
| 6 | 21 | | | | | 23 | +2.7 / -3.7 |
| 7 | 21 | | | | | 23 | +2.7 / -4.7 |
| 8 | 21 | | | | | 23 | +2.7 / -6.2 |
| 9 | 21 | | | | | 23 | +2.7 / -2.7 |
| 19 | 21 | | | | | 23 | +2.7 / -2.7 |
| 11 | 21 | | | | | 23 | +2.7 / -3.7 |
| 12 | 21 | | | | | 23 | +2.7 / -4.7 |
| 13 | 21 | | | | | 23 | +2.7 / -6.2 |
| 14 | 21 | | | | | 23 | +2.7 / -8.2 |

Table 6.2.4.5-10: UE Power Class test requirements (network signalled value "NS_10")

| |
|------------------|
| Void, not tested |
|------------------|

Table 6.2.4.5-11: UE Power Class test requirements (network signalled value "NS_11 for Band 23")

| Configuration ID | EUTRA Band | Centre Frequency | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|--------------------------------|---------------|-----------|---------------|-----------|---------------|------------------|
| 1a | 23 | UL 2001.5 MHz DL 2181.5 MHz | | | | | | + 2.7 / -11.7 |
| 1b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.7 / -4.7 |
| 2a | 23 | UL 2001.5 MHz DL 2181.5 MHz | | | | | | + 2.7 / -11.7 |
| 2b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.7 / -4.7 |
| 3a | 23 | UL 2001.5 MHz DL 2181.5 MHz | | | | | | + 2.7 / -12.7 |
| 3b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.7 / -6.2 |
| 4a | 23 | UL 2001.5 MHz DL 2181.5 MHz | | | | | | + 2.7 / -12.7 |
| 4b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.7 / -6.2 |
| 5a | 23 | UL 2002.5 MHz DL 2182.5 MHz | | | | | | + 2.7 / -12.7 |
| 5b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.7 / -8.2 |
| 5c | 23 | UL 2007.5 MHz DL 2187.5 MHz | | | | | | + 2.7 / -2.7 |
| 6a | 23 | UL 2002.5 MHz DL 2182.5 MHz | | | | | | + 2.7 / -12.7 |
| 6b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.7 / -2.7 |
| 6c | 23 | UL 2007.5 MHz DL 2187.5 MHz | | | | | | + 2.7 / -3.7 |
| 7a | 23 | UL 2002.5 MHz DL 2182.5 MHz | | | | | | + 2.7 / -13.7 |
| 7b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.7 / -9.7 |
| 7c | 23 | UL 2007.5 MHz DL 2187.5 MHz | | | | | | + 2.7 / -4.7 |
| 8a | 23 | UL 2002.5 MHz | | | | | | + 2.7 / |

| Configuration ID | EUTRA Band | Centre Frequency | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|--------------------------------|---------------|-----------|---------------|-----------|---------------|------------------|
| | | DL 2182.5 MHz | | | | | | -13.7 |
| 8b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.7 / -3.7 |
| 8c | 23 | UL 2007.5 MHz DL 2187.5 MHz | | | | | | + 2.7 / -4.7 |
| 9a | 23 | UL 2002.5 MHz DL 2182.5 MHz | | | | | | + 2.7 / -14.7 |
| 9b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.7 / -11.7 |
| 9c | 23 | UL 2007.5 MHz DL 2187.5 MHz | | | | | | + 2.7 / -6.2 |
| 10 | 23 | UL 2005 MHz DL 2185 MHz | | | | | | + 2.7 / -18.7 |
| 11 | 23 | UL 2005 MHz DL 2185 MHz | | | | | | + 2.7 / -18.7 |
| 12 | 23 | UL 2005 MHz DL 2185 MHz | | | | | | + 2.7 / -19.7 |
| 13 | 23 | UL 2005 MHz DL 2185 MHz | | | | | | + 2.7 / -19.7 |
| 14 | 23 | UL 2005 MHz DL 2185 MHz | | | | | | + 2.7 / -20.7 |

Table 6.2.4.5-12: UE Power Class test requirements (network signalled value "NS_12")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|--------------|
| 1 | 26 | | | | | 23 | +2.7 / -6.2 |
| 2 | 26 | | | | | 23 | +2.7 / -12.7 |
| 3 | 26 | | | | | 23 | +2.7 / -2.7 |
| 4 | 26 | | | | | 23 | +2.7 / -6.2 |
| 5 | 26 | | | | | 23 | +2.7 / -13.7 |
| 6 | 26 | | | | | 23 | +2.7 / -8.2 |
| 7 | 26 | | | | | 23 | +2.7 / -8.2 |
| 8 | 26 | | | | | 23 | +2.7 / -2.7 |
| 9 | 26 | | | | | 23 | +2.7 / -8.2 |
| 10 | 26 | | | | | 23 | +2.7 / -9.7 |
| 11 | 26 | | | | | 23 | +2.7 / -9.7 |
| 12 | 26 | | | | | 23 | +2.7 / -8.2 |
| 13 | 26 | | | | | 23 | +2.7 / -2.7 |
| 14 | 26 | | | | | 23 | +2.7 / -8.2 |
| 15 | 26 | | | | | 23 | +2.7 / -9.7 |

Table 6.2.4.5-13: UE Power Class test requirements (network signalled value "NS_13")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|-------------|
| 1 | 26 | | | | | 23 | +2.7 / -6.2 |
| 2 | 26 | | | | | 23 | +2.7 / -6.2 |
| 3 | 26 | | | | | 23 | +2.7 / -3.7 |
| 4 | 26 | | | | | 23 | +2.7 / -3.7 |
| 5 | 26 | | | | | 23 | +2.7 / -8.2 |

Table 6.2.4.5-14: UE Power Class test requirements (network signalled value "NS_14")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|-------------|
| 1 | 26 | | | | | 23 | +2.7 / -6.2 |
| 2 | 26 | | | | | 23 | +2.7 / -3.7 |
| 3 | 26 | | | | | 23 | +2.7 / -4.7 |
| 4 | 26 | | | | | 23 | +2.7 / -3.7 |
| 5 | 26 | | | | | 23 | +2.7 / -6.2 |
| 6 | 26 | | | | | 23 | +2.7 / -6.2 |
| 7 | 26 | | | | | 23 | +2.7 / -3.7 |
| 8 | 26 | | | | | 23 | +2.7 / -4.7 |
| 9 | 26 | | | | | 23 | +2.7 / -3.7 |
| 10 | 26 | | | | | 23 | +2.7 / -6.2 |

Table 6.2.4.5-15: UE Power Class test requirements (network signalled value "NS_15")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|--------------|
| 1 | 26 | | | | | 23 | +2.7 / -7.7 |
| 2 | 26 | | | | | 23 | +2.7 / -9.2 |
| 3 | 26 | | | | | 23 | +2.7 / -9.2 |
| 4 | 26 | | | | | 23 | +2.7 / -7.7 |
| 5 | 26 | | | | | 23 | +2.7 / -12.2 |
| 6 | 26 | | | | | 23 | +2.7 / -17.2 |
| 7 | 26 | | | | | 23 | +2.7 / -18.2 |
| 8 | 26 | | | | | 23 | +2.7 / -2.7 |
| 9 | 26 | | | | | 23 | +2.7 / -8.2 |
| 10 | 26 | | | | | 23 | +2.7 / -11.7 |
| 11 | 26 | | | | | 23 | +2.7 / -14.7 |
| 12 | 26 | | | | | 23 | +2.7 / -15.7 |
| 13 | 26 | | | | | 23 | +2.7 / -9.2 |
| 14 | 26 | | | | | 23 | +2.7 / -8.2 |
| 15 | 26 | | | | | 23 | +2.7 / -4.7 |
| 16 | 26 | | | | | 23 | +2.7 / -9.7 |
| 17 | 26 | | | | | 23 | +2.7 / -12.7 |
| 18 | 26 | | | | | 23 | +2.7 / -11.7 |
| 19 | 26 | | | | | 23 | +2.7 / -17.2 |
| 20 | 26 | | | | | 23 | +2.7 / -12.7 |
| 21 | 26 | | | | | 23 | +2.7 / -7.7 |
| 22 | 26 | | | | | 23 | +2.7 / -4.7 |
| 23 | 26 | | | | | 23 | +2.7 / -9.2 |
| 24 | 26 | | | | | 23 | +2.7 / -14.7 |
| 25 | 26 | | | | | 23 | +2.7 / -15.7 |
| 26 | 26 | | | | | 23 | +2.7 / -4.7 |
| 27 | 26 | | | | | 23 | +2.7 / -3.7 |
| 28 | 26 | | | | | 23 | +2.7 / -11.7 |
| 29 | 26 | | | | | 23 | +2.7 / -15.7 |
| 30 | 26 | | | | | 23 | +2.7 / -17.7 |
| 31 | 26 | | | | | 23 | +2.7 / -7.7 |
| 32 | 26 | | | | | 23 | +2.7 / -8.2 |
| 33 | 26 | | | | | 23 | +2.7 / -11.7 |
| 34 | 26 | | | | | 23 | +2.7 / -14.7 |
| 35 | 26 | | | | | 23 | +2.7 / -15.7 |

Table 6.2.4.5-16A: UE Power Class test requirements (network signalled value "NS_16") when lower channel edge is at 807 MHz

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|--------------|
| 1 | 27 | | | | | 23 | +2.7 / -4.7 |
| 2 | 27 | | | | | 23 | +2.7 / -6.2 |
| 3 | 27 | | | | | 23 | +2.7 / -8.2 |
| 4 | 27 | | | | | 23 | +2.7 / -9.7 |
| 5 | 27 | | | | | 23 | +2.7 / -4.7 |
| 6 | 27 | | | | | 23 | +2.7 / -6.2 |
| 7 | 27 | | | | | 23 | +2.7 / -11.7 |
| 8 | 27 | | | | | 23 | +2.7 / -8.2 |
| 9 | 27 | | | | | 23 | +2.7 / -11.7 |
| 10 | 27 | | | | | 23 | +2.7 / -12.7 |
| 11 | 27 | | | | | 23 | +2.7 / -9.7 |
| 12 | 27 | | | | | 23 | +2.7 / -8.2 |
| 13 | 27 | | | | | 23 | +2.7 / -4.7 |
| 14 | 27 | | | | | 23 | +2.7 / -8.2 |
| 15 | 27 | | | | | 23 | +2.7 / -13.7 |
| 16 | 27 | | | | | 23 | +2.7 / -13.7 |
| 17 | 27 | | | | | 23 | +2.7 / -14.7 |
| 18 | 27 | | | | | 23 | +2.7 / -13.7 |
| 19 | 27 | | | | | 23 | +2.7 / -13.7 |

NOTE: This is applicable for 3MHz, 5MHz and 10MHz Channel BW.

Table 6.2.4.5-16B: UE Power Class test requirements (network signalled value "NS_16") when lower channel edge is at 808.5 MHz

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|--------------|
| 1 | 27 | | | | | 23 | +2.7 / -3.7 |
| 2 | 27 | | | | | 23 | +2.7 / -3.7 |
| 3 | 27 | | | | | 23 | +2.7 / -4.7 |
| 4 | 27 | | | | | 23 | +2.7 / -2.7 |
| 5 | 27 | | | | | 23 | +2.7 / -3.7 |
| 6 | 27 | | | | | 23 | +2.7 / -4.7 |
| 7 | 27 | | | | | 23 | +2.7 / -6.2 |
| 8 | 27 | | | | | 23 | +2.7 / -6.2 |
| 9 | 27 | | | | | 23 | +2.7 / -8.2 |
| 10 | 27 | | | | | 23 | +2.7 / -9.7 |
| 11 | 27 | | | | | 23 | +2.7 / -9.7 |
| 12 | 27 | | | | | 23 | +2.7 / -6.2 |
| 13 | 27 | | | | | 23 | +2.7 / -4.7 |
| 14 | 27 | | | | | 23 | +2.7 / -4.7 |
| 15 | 27 | | | | | 23 | +2.7 / -9.7 |
| 16 | 27 | | | | | 23 | +2.7 / -11.7 |
| 17 | 27 | | | | | 23 | +2.7 / -12.7 |
| 18 | 27 | | | | | 23 | +2.7 / -11.7 |
| 19 | 27 | | | | | 23 | +2.7 / -11.7 |

NOTE: This is applicable for 5MHz and 10MHz Channel BW

Table 6.2.4.5-16C: UE Power Class test requirements (network signalled value "NS_16") when lower channel edge is at 812 MHz

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|-------------|
| 1 | 27 | | | | | 23 | +2.7 / -3.7 |
| 2 | 27 | | | | | 23 | +2.7 / -3.7 |
| 3 | 27 | | | | | 23 | +2.7 / -4.7 |
| 4 | 27 | | | | | 23 | +2.7 / -2.7 |
| 5 | 27 | | | | | 23 | +2.7 / -3.7 |
| 6 | 27 | | | | | 23 | +2.7 / -3.7 |
| 7 | 27 | | | | | 23 | +2.7 / -3.7 |
| 8 | 27 | | | | | 23 | +2.7 / -3.7 |
| 9 | 27 | | | | | 23 | +2.7 / -3.7 |
| 10 | 27 | | | | | 23 | +2.7 / -4.7 |
| 11 | 27 | | | | | 23 | +2.7 / -2.7 |
| 12 | 27 | | | | | 23 | +2.7 / -3.7 |
| 13 | 27 | | | | | 23 | +2.7 / -3.7 |
| 14 | 27 | | | | | 23 | +2.7 / -3.7 |
| 15 | 27 | | | | | 23 | +2.7 / -4.7 |
| 16 | 27 | | | | | 23 | +2.7 / -8.2 |
| 17 | 27 | | | | | 23 | +2.7 / -9.7 |
| 18 | 27 | | | | | 23 | +2.7 / -6.2 |
| 19 | 27 | | | | | 23 | +2.7 / -4.7 |

NOTE: This is applicable for 10 MHz Channel BW.

Table 6.2.4.5-17: UE Power Class test requirements (network signalled value "NS_17")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|-------------|
| 1 | 28 | | | | | 23 | +2.7 / -3.2 |
| 2 | 28 | | | | | 23 | +2.7 / -3.2 |
| 3 | 28 | | | | | 23 | +2.7 / -4.2 |
| 4 | 28 | | | | | 23 | +2.7 / -5.2 |
| 5 | 28 | | | | | 23 | +2.7 / -3.2 |
| 6 | 28 | | | | | 23 | +2.7 / -3.2 |
| 7 | 28 | | | | | 23 | +2.7 / -4.2 |
| 8 | 28 | | | | | 23 | +2.7 / -5.2 |

Table 6.2.4.5-18: UE Power Class test requirements (network signalled value "NS_18")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|-----------|
|------------------|------------|---------------|-----------|---------------|-----------|---------------|-----------|

| | | | | | | | |
|----|----|--|--|--|--|----|--------------|
| 1 | 28 | | | | | 23 | +2.7 / -3.2 |
| 2 | 28 | | | | | 23 | +2.7 / -4.2 |
| 3 | 28 | | | | | 23 | +2.7 / -5.2 |
| 4 | 28 | | | | | 23 | +2.7 / -5.2 |
| 5 | 28 | | | | | 23 | +2.7 / -7.2 |
| 6 | 28 | | | | | 23 | +2.7 / -7.2 |
| 7 | 28 | | | | | 23 | + 2.7 / -8.7 |
| 8 | 28 | | | | | 23 | +2.7 / -10.2 |
| 9 | 28 | | | | | 23 | +2.7 / -7.2 |
| 10 | 28 | | | | | 23 | +2.7 / -7.2 |
| 11 | 28 | | | | | 23 | +2.7 / -8.7 |
| 12 | 28 | | | | | 23 | +2.7 / -10.2 |
| 13 | 28 | | | | | 23 | +2.7 / -7.2 |
| 14 | 28 | | | | | 23 | +2.7 / -7.2 |
| 15 | 28 | | | | | 23 | +2.7 / -8.7 |
| 16 | 28 | | | | | 23 | +2.7 / -10.2 |

6.2.4A Additional Maximum Power Reduction (A-MPR) for CA

6.2.4A.1 Additional Maximum Power Reduction (A-MPR) for CA (intra-band contiguous DL CA and UL CA)

Editor's notes: The following items are missing or incomplete:

- Missing Test Configurations are waiting for RAN4 updates
- Brackets in Test tolerances and requirements are incomplete. Waiting for RAN4 decision

6.2.4A.1.1 Test purpose

Additional ACLR, spectrum emission and spurious emission requirements for carrier aggregation can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction (A-MPR) is allowed for the CA Power Class as specified in Table 6.2.2A-1.

6.2.4A.1.2 Test applicability

The requirements of this test apply in test case 6.6.3.3A.1 Additional spurious emissions for CA (intra-band contiguous DL CA and UL CA) for network signalled values CA_NS_01, CA_NS_02 and CA_NS_03, CA_NS_05 to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.2.4A.1.3 Minimum conformance requirements

If the UE is configured for carrier aggregation and receives CA_NS value indicated by IE *additionalSpectrumEmissionSCell-r10*, the allowed maximum output power reduction is specified in Table 6.2.4A.1.3-1 and clause 6.2.3A.1 does not apply, i.e. carrier aggregation MPR = 0.

Table 6.2.4A.1.3-1: Additional Maximum Power Reduction (A-MPR) for CA

| CA Network Signalling value | Requirements (clause) | Uplink CA Configuration | A-MPR (dB) (clause) |
|-----------------------------|-----------------------|-------------------------|---------------------|
| CA_NS_01 | 6.6.3.3A.1.2.1 | CA_1C | 6.2.4A.1.3.1 |
| CA_NS_02 | 6.6.3.3A.1.2.2 | CA_1C | 6.2.4A.1.3.2 |
| CA_NS_03 | 6.6.3.3A.1.2.3 | CA_1C | 6.2.4A.1.3.3 |
| CA_NS_04 | TBD | CA_41C | 6.2.4A.1.3.4 |
| CA_NS_05 | 6.6.3.2A.1.3 | CA_38C | 6.2.4A.1.3.5 |

For intra-band contiguous carrier aggregation if the UE is configured for CA and it receives CA_NS value indicated by IE *additionalSpectrumEmissionSCell-r10* and if UE has configured the transmitter for transmissions within the aggregated channel bandwidth the requirements for applicable CA_NS value indicated by IE *additionalSpectrumEmissionSCell-r10* according to Table 6.2.4A.1.3-1 apply. If UE has configured the transmitter for transmissions within E-UTRA channel bandwidths the requirements for NS value indicated in the PCC IE *additionalSpectrumEmission* according to subclause 6.2.4 apply. For the UE maximum output power modified by A-MPR specified in table 6.2.4A.1.3-1, the power limits specified in subclause 6.2.5A.1 apply.

6.2.4A.1.3.1 A-MPR for CA_NS_01 for CA_1C

If the UE is configured to CA_1C and it receives IE CA_NS_01 the allowed maximum output power reduction applied to transmissions on the PCC and the SCC for contiguously aggregated signals is specified in table 6.2.4A.1.3.1-1.

Table 6.2.4A.1.3.1-1: Contiguous allocation A-MPR for CA_NS_01

| CA_1C | RB_start | L_CRB [RBs] | RB_start + L_CRB [RBs] | A-MPR for QPSK and 16-QAM[dB] |
|-----------------|-----------------|----------------|------------------------|-------------------------------|
| 100 RB / 100 RB | 0 – 23& 176-199 | >0 | n/a | ≤12.0 |
| | 24 – 105 | >64 | n/a | ≤6.0 |
| | 106-175 | n/a | >175 | ≤5.0 |
| 75 RB / 75 RB | 0 – 6 & 143-149 | 0 < L_CRB ≤ 10 | n/a | ≤ 11.0 |
| | | >10 | n/a | ≤ 6.0 |
| | 7-90 | >44 | n/a | ≤ 5.0 |
| | 91-142 | n/a | >142 | ≤ 2.0 |

Note 1: RB_start indicates the lowest RB index of transmitted resource blocks

Note 2: L_CRB is the length of a contiguous resource block allocation

Note 3: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis

Note 4: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe

If the UE is configured to CA_1C and it receives IE CA_NS_01 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell due to multi-cluster transmission is defined as follows

$$A\text{-MPR} = \text{CEIL} \{M_A, 0.5\}$$

Where M_A is defined as follows.

$$M_A = -22.5 A + 17 \quad ; 0 \leq A < 0.20$$

$$-11.0 A + 14.7 \quad ; 0.20 \leq A < 0.70$$

$$-1.7 A + 8.2 \quad ; 0.70 \leq A \leq 1$$

Where $A = N_{\text{RB_alloc}} / N_{\text{RB_agg}}$

The normative reference for requirement is in TS 36.101 [2] clause 6.2.4A

6.2.4A.1.3.2 A-MPR for CA_NS_02 for CA_1C
TBD

6.2.4A.1.3.3 A-MPR for CA_NS_03 for CA_1C
TBD

6.2.4A.1.3.4 A-MPR for CA_NS_04 for CA_41C

If the UE is configured to CA_41C and it receives IE CA_NS_04 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.1.3.4-1.

Table 6.2.4A.1.3.4-1: Contiguous Allocation A-MPR for CA_NS_04

| CA Bandwidth Class C | RB _{Start} | L _{CRB} [RBs] | RB _{start} + L _{CRB} [RBs] | A-MPR for QPSK [dB] | A-MPR for 16QAM [dB] |
|----------------------|----------------------|------------------------|--|---------------------|----------------------|
| 50RB / 100 RB | 0 – 44 and 105 – 149 | >0 | n/a | ≤4dB | ≤4dB |
| | 45 – 104 | n/a | >105 | ≤3dB | ≤4dB |
| 75 RB / 75 RB | 0 – 44 and 105 – 149 | >0 | n/a | ≤4dB | ≤4dB |
| | 45 – 104 | n/a | >105 | ≤4dB | ≤4dB |
| 100 RB / 75 RB | 0 – 49 and 125 – 174 | >0 | n/a | ≤4dB | ≤4dB |
| | 50 - 124 | n/a | >125 | ≤3dB | ≤4dB |
| 100 RB / 100 RB | 0 – 59 and 140 – 199 | >0 | n/a | ≤3dB | ≤4dB |
| | 60– 139 | n/a | >140 | ≤3dB | ≤4dB |

NOTE 1: RB_{start} indicates the lowest RB index of transmitted resource blocks
NOTE 2: L_{CRB} is the length of a contiguous resource block allocation
NOTE 3: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis
NOTE 4: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe

If the UE is configured to CA_41C and it receives IE CA_NS_04 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell due to multi-cluster transmission is defined as follows

$$A\text{-MPR} = \text{CEIL} \{M_A, 0.5\}$$

Where M_A is defined as follows

$$\begin{aligned} M_A &= 10.5, & 0 \leq A < 0.05 \\ &= -50.0A + 13.00, & 0.05 \leq A < 0.15 \\ &= -4.0A + 6.10, & 0.15 \leq A < 0.40 \\ &= -0.83A + 4.83, & 0.40 \leq A \leq 1 \end{aligned}$$

Where $A = N_{\text{RB_alloc}} / N_{\text{RB_agg}}$.

6.2.4A.1.3.5 A-MPR for CA_NS_05 for CA_38C

If the UE is configured to CA_38C and it receives IE CA_NS_05 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.1.3.5-1.

Table 6.2.4A.1.3.5-1: Contiguous Allocation A-MPR for CA_NS_05

| CA_38C | RB _{end} | L _{CRB} [RBs] | A-MPR for QPSK and 16-QAM[dB] |
|---|-------------------|--------------------------|-------------------------------|
| 100RB/100RB | 0 – 12 | >0 | ≤ 5 dB |
| | 13 – 79 | > RB _{End} – 13 | ≤ 2 dB |
| | 80 – 180 | >60 | ≤ 6 dB |
| | 181 – 199 | > 0 | ≤ 11 dB |
| 75RB/75RB | 0 – 70 | >RB _{end} -10 | ≤ 2 dB |
| | 71- 108 | > 60 | ≤ 5 dB |
| | 109 – 140 | >0 | ≤ 5 dB |
| | 140 – 149 | ≤ 70 | ≤ 2 dB |
| | 140 – 149 | >70 | ≤ 6 dB |
| NOTE 1: RB _{end} indicates the lowest RB index of transmitted resource blocks NOTE 2: L _{CRB} is the length of a contiguous resource block allocation NOTE 3: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis NOTE 4: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe | | | |

If the UE is configured to CA_38C and it receives IE CA_NS_05 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell due to multi-cluster transmission is defined as follows

$$A\text{-MPR} = \text{CEIL} \{M_A, 0.5\}$$

Where MA is defined as follows

$$M_A = -14.17 A + 16.50 \quad ; 0 \leq A < 0.60$$

$$-2.50 A + 9.50 \quad ; 0.60 \leq A \leq 1$$

Where $A = N_{\text{RB_alloc}} / N_{\text{RB_agg}}$.

6.2.4A.1.4 Test description

6.2.4A.1.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in tables 6.2.4A.1.4.1-1 to 6.2.4A.1.4.1-5. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.4A.1.4.1-1: Test Configuration Table (network signalled value "CA_NS_01")

| Initial Conditions | | | | | | | | | |
|---|----------------------------------|---------------|------------------------------|--------|----------------------------|-------------------|---|---------|---------|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | | | | | NC | | | | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes. | | | | | C: Low and High range | | | | |
| Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration | | | | | As in Table 6.2.4A.1.3.1-1 | | | | |
| Test Parameters for CA Configurations | | | | | | | | | |
| ID | CA Configuration / N_{RB_agg} | | DL Allocation (PDCCH on PCC) | CC MOD | UL Allocation | | | | |
| | PCC N_{RB} | SCCs N_{RB} | | | PCC & SCC RB allocation | $N_{RB_allo\ c}$ | PCC & SCC RB allocations (L_{CRB} @ RB_{start}) | | |
| 1 | 75 | 75 | N/A | QPSK | | | 150 | P_75@0 | S_75@0 |
| 2 | 75 | 75 | | QPSK | 1 | P_1@0 | S_0@0 | | |
| 3 | 75 | 75 | | QPSK | 40 | P_40@7 | S_0@0 | | |
| 4 | 75 | 75 | | QPSK | 128 | P_53@22 | S_75@0 | | |
| 5 | 75 | 75 | | QPSK | 50 | P_0@0 | S_50@17 | | |
| 6 | 75 | 75 | | QPSK | 2 | P_1@0 | S_1@74 | | |
| 7 | 75 | 75 | | QPSK | 30 | P_10@0 | P_5@50 | S_5@25 | S_10@65 |
| 8 | 75 | 75 | | QPSK | 105 | P_35@0 | P_20@55 | S_15@0 | S_35@40 |
| 9 | 100 | 100 | | QPSK | 200 | P_100@0 | S_100@0 | | |
| 10 | 100 | 100 | | QPSK | 1 | P_1@0 | S_0@0 | | |
| 11 | 100 | 100 | | QPSK | 175 | P_75@25 | S_100@0 | | |
| 12 | 100 | 100 | | QPSK | 25 | P_0@0 | S_25@75 | | |
| 13 | 100 | 100 | | QPSK | 64 | P_64@24 | S_0@0 | | |
| 14 | 100 | 100 | | QPSK | 2 | P_1@0 | S_1@99 | | |
| 15 | 100 | 100 | | QPSK | 40 | P_10@0 | P_10@65 | S_10@35 | S_10@90 |
| 16 | 100 | 100 | | QPSK | 150 | P_40@0 | P_35@65 | S_35@0 | S_40@60 |

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1

Table 6.2.4A.1.4.1-2: Test Configuration Table (network signalled value "CA_NS_02")

TBD

Table 6.2.4A.1.4.1-3: Test Configuration Table (network signalled value "CA_NS_03")

TBD

Table 6.2.4A.1.4.1-4: Test Configuration Table (network signalled value "CA_NS_04")

TBD

Table 6.2.4A.1.4.1-5: Test Configuration Table (network signalled value "CA_NS_05")

| Initial Conditions | | | | | | | | | |
|---|----------------------------------|---------------|------------------------------|--------|----------------------------|-------------------|---|--------|-------|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | | | | | NC | | | | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes. | | | | | C: Low and High range | | | | |
| Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration | | | | | As in Table 6.2.4A.1.3.5-1 | | | | |
| Test Parameters for CA Configurations | | | | | | | | | |
| ID | CA Configuration / N_{RB_agg} | | DL Allocation (PDCCH on PCC) | CC MOD | UL Allocation | | | | |
| | PCC N_{RB} | SCCs N_{RB} | | | PCC & SCC RB allocation | $N_{RB_allo\ c}$ | PCC & SCC RB allocations (L_{CRB} @ RB_{start}) | | |
| 1 | 75 | 75 | N/A | QPSK | | | 40 | P_40@0 | S_0@0 |
| 2 | 75 | 75 | | QPSK | 80 | P_50@25 | S_30@0 | | |

| | | | | | | | | | |
|----|-----|-----|--|------|-----|---------|---------|---------|---------|
| 3 | 75 | 75 | | QPSK | 60 | P_10@65 | S_50@0 | | |
| 4 | 75 | 75 | | QPSK | 69 | P_1@74 | S_68@0 | | |
| 5 | 75 | 75 | | QPSK | 90 | P_20@55 | S_70@0 | | |
| 6 | 75 | 75 | | QPSK | 2 | P_1@0 | S_1@74 | | |
| 7 | 75 | 75 | | QPSK | 90 | P_30@0 | P_15@40 | S_15@25 | S_30@45 |
| 8 | 100 | 100 | | QPSK | 8 | P_8@0 | S_0@0 | | |
| 9 | 100 | 100 | | QPSK | 40 | P_40@0 | S_0@0 | | |
| 10 | 100 | 100 | | QPSK | 80 | P_50@50 | S_30@0 | | |
| 11 | 100 | 100 | | QPSK | 150 | P_60@40 | S_90@0 | | |
| 12 | 100 | 100 | | QPSK | 2 | P_1@0 | S_1@99 | | |
| 13 | 100 | 100 | | QPSK | 120 | P_30@0 | P_30@45 | S_30@25 | S_30@70 |

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to the applicable table from Table 6.2.4A.1.1.4.1-1 to 6.2.4A.1.4.1-3.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.4A.1.4.3.

6.2.4A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.2.4A.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to the applicable from Table 6.2.4A.1.4.1-1 to Table 6.2.4A.1.4.1-3 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach P_{UMAX} level.
6. Measure the mean transmitted power over all component carriers in the CA configuration of the radio access mode. The period of measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.4A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. The following exceptions apply for each network signalled value.

6.2.4A.1.4.3.1 Message contents exceptions (network signalled value "CA_NS_01")

1. Information element `additionalSpectrumEmissionSCell-r10` is set to CA_NS_01. This can be set in the `RadioResourceConfigCommonSCell-r10-DEFAULT` as part of the common RRC messages. This exception indicates that the UE shall meet the additional spectrum emission requirement for a specific deployment scenario.

Table 6.2.4A.1.4.3.1-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "CA_NS_01"

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| additionalSpectrumEmissionSCell-r10 | 1 (CA_NS_01) | | |

6.2.4A.1.4.3.2 Message contents exceptions (network signalled value "CA_NS_02")

- Information element additionalSpectrumEmissionSCell-r10 is set to CA_NS_02. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spectrum emission requirement for a specific deployment scenario.

Table 6.2.4A.1.4.3.2-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "CA_NS_02"

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| additionalSpectrumEmissionSCell-r10 | 2 (CA_NS_02) | | |

6.2.4A.1.4.3.3 Message contents exceptions (network signalled value "CA_NS_03")

- Information element additionalSpectrumEmissionSCell-r10 is set to CA_NS_03. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spectrum emission requirement for a specific deployment scenario.

Table 6.2.4A.1.4.3.3-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "CA_NS_03"

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| additionalSpectrumEmissionSCell-r10 | 3 (CA_NS_03) | | |

6.2.4A.1.4.3.4 Message contents exceptions (network signalled value "CA_NS_04")

- Information element additionalSpectrumEmissionSCell-r10 is set to CA_NS_04. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spectrum emission requirement for a specific deployment scenario.

Table 6.2.4A.1.4.3.4-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "CA_NS_04"

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| additionalSpectrumEmissionSCell-r10 | 4 (CA_NS_04) | | |

6.2.4A.1.4.3.5 Message contents exceptions (network signalled value "CA_NS_05")

- Information element additionalSpectrumEmissionSCell-r10 is set to CA_NS_05. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spectrum emission requirement for a specific deployment scenario.

Table 6.2.4A.1.4.3.5-1: RadioResourceConfigCommonSCell-r10-DEFAULT: Additional spectrum emission test requirement for "CA_NS_05"

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| additionalSpectrumEmissionSCell-r10 | 5 (CA_NS_05) | | |

6.2.4A.1.5 Test requirements

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in the applicable table from Table 6.2.4A.1.5-1 to Table 6.2.4A.1.5-3. The allowed maximum output power reduction is specified in Table 6.2.4A.1.3-1 and clause 6.2.3A.1 does not apply, i.e. carrier aggregation MPR = 0. For the UE maximum output power modified by A-MPR specified in table 6.2.4A.1.3-1, the power limits specified in Table 6.2.5A.1.3-2 apply.

Table 6.2.4A.1.5-1 Test requirement (network signalled value "CA_NS_01")

| Configuration ID | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|---------------|-----------|---------------|-----------|---------------|--------------|
| 1 | | | | | 23 | +2.7 / -17.7 |
| 2 | | | | | 23 | +2.7 / -17.7 |
| 3 | | | | | 23 | +2.7 / -11.7 |
| 4 | | | | | 23 | +2.7 / -9.7 |
| 5 | | | | | 23 | +2.7 / -2.7 |
| 6 | | | | | 23 | +2.7 / -23.7 |
| 7 | | | | | 23 | +2.7 / -20.2 |
| 8 | | | | | 23 | +2.7 / -13.2 |
| 9 | | | | | 23 | +2.7 / -18.7 |
| 10 | | | | | 23 | +2.7 / -18.7 |
| 11 | | | | | 23 | +2.7 / -11.7 |
| 12 | | | | | 23 | +2.7 / -9.7 |
| 13 | | | | | 23 | +2.7 / -2.7 |
| 14 | | | | | 23 | +2.7 / -23.7 |
| 15 | | | | | 23 | +2.7 / -20.2 |
| 16 | | | | | 23 | +2.7 / -12.7 |

Table 6.2.4A.1.5-2 Test requirement (network signalled value "CA_NS_02")

TBD

Table 6.2.4A.1.5-3 Test requirement (network signalled value "CA_NS_03")

TBD

Table 6.2.4A.1.5-4 Test requirement (network signalled value "CA_NS_04")

TBD

Table 6.2.4A.1.5-3 Test requirement (network signalled value "CA_NS_05")

| Configuration ID | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|---------------|-----------|---------------|-----------|---------------|--------------|
| 1 | | | | | 23 | +2.7 / -6.2 |
| 2 | | | | | 23 | +2.7 / -12.7 |
| 3 | | | | | 23 | +2.7 / -11.7 |
| 4 | | | | | 23 | +2.7 / -6.2 |
| 5 | | | | | 23 | +2.7 / -13.7 |
| 6 | | | | | 23 | +2.7 / -32.7 |
| 7 | | | | | 23 | +2.7 / -18.2 |
| 8 | | | | | 23 | +2.7 / -9.7 |
| 9 | | | | | 23 | +2.7 / -6.2 |
| 10 | | | | | 23 | +2.7 / -12.7 |
| 11 | | | | | 23 | +2.7 / -19.7 |
| 12 | | | | | 23 | +2.7 / -32.7 |
| 13 | | | | | 23 | +2.7 / -18.2 |

6.2.4B Additional Maximum Power Reduction (A-MPR) for UL-MIMO

Editor's notes: the following item is missing:

- Test Tolerance

6.2.4B.1 Test purpose

Additional ACLR and spectrum emission requirements can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction A-MPR is allowed for the sum output power at each antenna connector as specified in Table 6.2.2B.3-1. Unless stated otherwise, an A-MPR of 0 dB shall be used.

6.2.4B.2 Test applicability

The requirements of this test apply in test case 6.6.2.2 Additional Spectrum Emission Mask for network signalled values NS_03, NS_04, NS_06 and NS_07 to all types of E-UTRA UE release 10 and forward that support UL MIMO.

The requirements of this test apply in test case 6.6.3.3 Additional Spurious Emissions for network signalled values NS_05, NS_07 and NS_08, NS_09 to all types of E-UTRA UE release 10 and forward that support UL MIMO.

6.2.4B.3 Minimum conformance requirements

For UE Power Class 3 the specific requirements and identified clauses are specified in Table 6.2.4B.3-1 along with the allowed A-MPR values that may be used to meet these requirements. The allowed A-MPR values specified below in

Table 6.2.4B.3.-1 and 6.2.4B.3-2 are in addition to the allowed MPR requirements specified in clause 6.2.3B. For the UE maximum output power modified by A-MPR, the power limits specified in clause 6.2.5B apply.

Table 6.2.4B.3-1: Additional Maximum Power Reduction (A-MPR) / Spectrum Emission requirements

| Network Signalling value | Requirements (sub-clause) | E-UTRA Band | Channel bandwidth (MHz) | Resources Blocks (N_{RB}) | A-MPR (dB) |
|--------------------------|---------------------------|----------------------|-------------------------|---|-------------------------------------|
| NS_01 | 6.6.2.1.1 | Table 5.2-1 | 1.4,3,5,10,15,20 | Table 5.4.2-1 | NA |
| NS_03 | 6.6.2.2.3.1 | 2,4,10, 23, 25,35,36 | 3 | >5 | ≤ 1 |
| | | | 5 | >6 | ≤ 1 |
| | | | 10 | >6 | ≤ 1 |
| | | | 15 | >8 | ≤ 1 |
| | | | 20 | >10 | ≤ 1 |
| NS_04 | 6.6.2.2.3.2 | 41 | 5 | >6 | ≤ 1 |
| | | | 10, 15, 20 | See Table 6.2.4B.3-4 | |
| NS_05 | 6.6.3.3.3.1 | 1 | 10,15,20 | ≥ 50 | ≤ 1 |
| NS_06 | 6.6.2.2.3.3 | 12, 13, 14, 17 | 1.4, 3, 5, 10 | Table 5.4.2-1 | n/a |
| NS_07 | 6.6.2.2.3.3 | 13 | 10 | Table 6.2.4B.3-2 | Table 6.2.4B.3-2 |
| | 6.6.3.3.3.2 | | | | |
| NS_08 | 6.6.3.3.3.3 | 19 | 10, 15 | > 44 | ≤ 3 |
| NS_09 | 6.6.3.3.3.4 | 21 | 10, 15 | > 40 | ≤ 1 |
| | | | | > 55 | ≤ 2 |
| | | | | Table 6.2.4B.3-3 | |
| NS_10 | | 20 | 15, 20 | Table 6.2.4B.3-3 | Table 6.2.4B.3-3 |
| NS_11 | 6.6.2.2.1 | 231 | 1.4, 3, 5, 10 | Table 6.2.4B.3-5 | Table 6.2.4B.3-5 |
| NS_12 | 6.6.3.3.5 | 26 | 1.4, 3, 5 | Table 6.2.4B.3-6 | Table 6.2.4B.3-6 |
| NS_13 | 6.6.3.3.6 | 26 | 5 | Table 6.2.4B.3-7 | Table 6.2.4B.3-7 |
| NS_14 | 6.6.3.3.7 | 26 | 10, 15 | Table 6.2.4B.3-8 | Table 6.2.4B.3-8 |
| NS_15 | 6.6.3.3.9 | 26 | 1.4, 3, 5, 10, 15 | Table 6.2.4B.3-9 | Table 6.2.4B.3-9, Table 6.2.4B.3-10 |
| | | | | Table 6.2.4B.3-10 | |
| NS_16 | 6.6.3.3.9 | 27 | 3, 5, 10 | Table 6.2.4B.3-11, Table 6.2.4B.3-12, Table 6.2.4B.3-13 | |
| .. | | | | | |
| NS_32 | - | - | - | - | - |

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

Table 6.2.4B.3-2: A-MPR for "NS_07"

| Parameters | Region A | | Region B | | | | Region C | |
|--|----------|-----------------|----------|-----------|---------|-----------|----------|----|
| RB_{start}^1 | 0 – 12 | | 13 – 18 | | 19 – 42 | | 43 – 49 | |
| L_{CRB}^2 [RBs] | 6 – 8 | 1 to 5 and 9-50 | <8 | ≥ 8 | <18 | ≥ 18 | ≤ 2 | >2 |
| A-MPR [dB] | ≤ 8 | ≤ 12 | 0 | ≤ 12 | 0 | ≤ 6 | ≤ 3 | 0 |
| Note 1: RB_{start} indicates the lowest RB index of transmitted resource blocks Note 2: L_{CRB} is the length of a contiguous resource block allocation Note 3: For intra-subframe frequency hopping between two regions, notes 1 and 2 apply on a per slot basis. Note 4: For intra-subframe frequency hopping between two regions, the larger A-MPR value of the two regions may be applied for both slots in the subframe. | | | | | | | | |

Table 6.2.4B.3-3: A-MPR for "NS_10"

| Channel BW | Parameters | Region A |
|------------|-----------------|----------|
| 15 | RB_{start}^1 | 0 – 10 |
| | L_{CRB} [RBs] | 1 -20 |
| | A-MPR [dB] | ≤ 2 |
| 20 | RB_{start}^1 | 0 – 15 |
| | L_{CRB} [RBs] | 1 -20 |
| | A-MPR [dB] | ≤ 5 |

Note 1: RB_{start} indicates the lowest RB index of transmitted resource blocks.
 Note 2: L_{CRB} is the length of a contiguous resource block allocation.
 Note 3: For intra-subframe frequency hopping which intersects Region A, notes 1 and 2 apply on a per slot basis.
 Note 4: For intra-subframe frequency hopping which intersect Region A, the larger A-MPR value may be applied for both slots in the subframe.

Table 6.2.4B.3-4: A-MPR for NS_04 for bandwidths > 5MHz

| Channel BW | Parameters | Region A | Region B | | Region C |
|---|----------------------------------|----------------|----------|------|----------------|
| 10 | RB_{start}^1 | 0 – 12 | 13 – 36 | | 37 – 49 |
| | $RB_{start}^1 + L_{CRB}^2$ [RBs] | NA (Note 3) | 14 - 37 | >37 | NA (Note 3) |
| | A-MPR [dB] | ≤3dB | 0 | ≤2dB | ≤3dB |
| 15 | RB_{start}^1 | 0 – 18 | 19 – 55 | | 56 – 74 |
| | $RB_{start}^1 + L_{CRB}^2$ [RBs] | NA (Note 3) | 20 - 56 | >56 | NA (Note 3) |
| | A-MPR [dB] | ≤3dB | 0 | ≤2dB | ≤3dB |
| 20 | RB_{start}^1 | 0 – 24 | 25 – 74 | | 75 – 99 |
| | $RB_{start}^1 + L_{CRB}^2$ [RBs] | NA (Note 3) | 26 - 75 | >75 | NA (Note 3) |
| | A-MPR [dB] | ≤3dB | 0 | ≤2dB | ≤3dB |
| Note 1: RB_{start} indicates the lowest RB index of transmitted resource blocks. Note 2: L_{CRB} is the length of a contiguous resource block allocation. Note 3: Any RB allocation that starts in Region A or C is allowed the specified A-MPR. Note 4: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis. Note 5: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe. | | | | | |

Table 6.2.4B.3-5: A-MPR for "NS_11"

| Channel Bandwidth | Parameters | | | |
|-------------------|---------------------------|-------|-----------------------------|---------|
| 3 | F _c (MHz) | <2004 | ≥2004 | |
| | L _{CRB} (RBs) | 1-15 | >5 | |
| | A-MPR | ≤5 | ≤ 1 | |
| 5 | F _c (MHz) | <2004 | 2004 ≤ F _c <2007 | ≥2007 |
| | L _{CRB} (RBs) | 1-25 | 1-6 & 15-25 | 8-12 >6 |
| | A-MPR | ≤7 | ≤ 4 | 0 ≤ 1 |
| 10 | F _c (MHz) | 2005 | | |
| | RB _{start} (RBs) | 0-49 | | |
| | L _{CRB} (RBs) | 1-50 | | |
| | A-MPR | ≤ 12 | | |

Table 6.2.4B.3-6: A-MPR for "NS_12"

| Channel BW | Parameters | Region A | | Region B |
|------------|------------------------|----------|---------------|----------|
| 1.4 | RB _{start} | 0 | | 1-2 |
| | L _{CRB} [RBs] | ≤3 | ≥4 | ≥4 |
| | A-MPR [dB] | ≤3 | ≤6 | ≤3 |
| 3 | RB _{start} | 0-3 | | 4-5 |
| | L _{CRB} [RBs] | 4-9 | 1-3 and 10-15 | ≥9 |
| | A-MPR [dB] | ≤4 | ≤3 | ≤3 |
| 5 | RB _{start} | 0-6 | | 7-9 |
| | L _{CRB} [RBs] | ≤8 | ≥9 | ≥15 |
| | A-MPR [dB] | ≤5 | ≥3 | ≤3 |

Table 6.2.4B.3-7: A-MPR for "NS_13"

| Channel BW | Parameters | Region A | |
|------------|------------------------|----------|-----|
| 5 | RB _{start} | 0-2 | |
| | L _{CRB} [RBs] | ≤5 | ≥18 |
| | A-MPR [dB] | ≤3 | ≤2 |

Table 6.2.4B.3-8: A-MPR for "NS_14"

| Channel BW | Parameters | Region A | |
|------------|------------------------|----------|-----|
| 10 | RB _{start} | 0 | |
| | L _{CRB} [RBs] | ≤5 | ≥50 |
| | A-MPR [dB] | ≤3 | ≤1 |
| 15 | RB _{start} | ≤8 | |
| | L _{CRB} [RBs] | ≤16 | ≥50 |
| | A-MPR [dB] | ≤3 | ≤1 |

Table 6.2.4B.3-9: A-MPR for "NS_15" for E-UTRA highest channel edge > 845 MHz and ≤ 849 MHz

| Channel BW | Parameters | Region A | | Region B | Region C | |
|------------|------------------------|----------|-------|----------|----------|----|
| 1.4 | RB _{end} | 4-5 | | | | |
| | L _{CRB} [RBs] | ≤3 | ≥4 | | | |
| | A-MPR [dB] | ≤2 | ≤3 | | | |
| 3 | RB _{end} | 0-1 | 8-12 | 13-14 | | |
| | L _{CRB} [RBs] | ≤1 | ≥8 | >0 | | |
| | A-MPR [dB] | ≤2 | ≤4 | ≤8 | | |
| 5 | RB _{end} | 0-4 | 12-15 | 16-19 | 20-24 | |
| | L _{CRB} [RBs] | ≤1 | ≥12 | ≥8 | >0 | |
| | A-MPR [dB] | ≤2 | ≤3 | ≤5 | ≤8 | |
| 10 | RB _{end} | 0-12 | 23-30 | 31-36 | 37-49 | |
| | L _{CRB} [RBs] | =1 | ≥20 | ≥15 | ≥4 | ≤3 |
| | A-MPR [dB] | ≤2 | ≤4 | ≤6 | ≤5 | ≤9 |
| 15 | RB _{end} | 0-20 | 26-44 | 45-53 | 54-74 | |
| | L _{CRB} [RBs] | ≤1 | ≥27 | ≥20 | >0 | |
| | A-MPR [dB] | ≤2 | ≤3 | ≤5 | ≤9 | |

Table 6.2.4B.3-10: A-MPR for "NS_15" for E-UTRA highest channel edge ≤ 845 MHz

| Channel BW | Parameters | Region A | Region B | Region C | Region D | |
|------------|------------------------|----------|----------|----------|----------|--|
| 5 | RB _{start1} | 19-24 | | | | |
| | L _{CRB} [RBs] | ≥18 | | | | |
| | A-MPR [dB] | ≤2 | | | | |
| 10 | RB _{start1} | 0-4 | 29-37 | 38-44 | 45-49 | |
| | L _{CRB} [RBs] | ≤1 | ≥27 | ≥24 | >0 | |
| | A-MPR [dB] | ≤2 | ≤1 | ≤4 | ≤8 | |
| 15 | RB _{start1} | 0-12 | 44-56 | 57-61 | 62-74 | |
| | L _{CRB} [RBs] | ≤1 | ≥32 | ≥20 | >0 | |
| | A-MPR [dB] | ≤2 | ≤3 | ≤5 | ≤8 | |

Table 6.2.4B.3-11: A-MPR for “NS_16” with channel lower edge at ≥ 807 MHz and < 808.5 MHz

| CBW | Parameter | Region A | Region B | Region C | Region D | Region E |
|--------|-----------------|-----------|----------|-----------|-----------|----------|
| 3 MHz | RB_{start} | 0 | 1-2 | | | |
| | L_{CRB} [RBs] | ≥ 12 | 12 | | | |
| | A-MPR [dB] | ≤ 2 | ≤ 1 | | | |
| 5 MHz | RB_{start} | 0-1 | 2 | 2-9 | 2-5 | |
| | L_{CRB} [RBs] | 1 - 25 | 12 | 15-18 | 20 | |
| | A-MPR [dB] | ≤ 5 | ≤ 1 | ≤ 2 | ≤ 3 | |
| 10 MHz | RB_{start} | 0 - 8 | 0-14 | | 15-20 | 15-24 |
| | L_{CRB} [RBs] | 1 - 12 | 15-20 | ≥ 24 | ≥ 30 | 24-27 |
| | A-MPR [dB] | ≤ 5 | ≤ 3 | ≤ 7 | ≤ 3 | ≤ 1 |

Table 6.2.4B.3-12: A-MPR for “NS_16” with channel lower edge at ≥ 808.5 MHz and < 812 MHz

| CBW | Parameter | Region A | Region B | Region C | Region D | Region E |
|--------|-----------------|----------|-----------|----------|-----------|----------|
| 5 MHz | RB_{start} | 0 | 0-1 | 1-5 | | |
| | L_{CRB} [RBs] | 16-20 | ≥ 24 | 16-20 | | |
| | A-MPR [dB] | ≤ 2 | ≤ 3 | ≤ 1 | | |
| 10 MHz | RB_{start} | 0-6 | | 0-10 | 0-14 | 11-20 |
| | L_{CRB} [RBs] | 1-12 | 15-20 | 24-32 | ≥ 36 | 24-32 |
| | A-MPR [dB] | ≤ 5 | ≤ 2 | ≤ 4 | ≤ 5 | ≤ 1 |

Table 6.2.4B.3-13: A-MPR for “NS_16” with channel lower edge at ≥ 812 MHz

| CBW | Parameter | Region A | Region B | Region C | Region D |
|--------|-----------------|----------|----------|----------|-----------|
| 10 MHz | RB_{start} | 0 - 9 | 0 | 1-14 | 0-5 |
| | L_{CRB} [RBs] | 27-32 | 36-40 | 36-40 | ≥ 45 |
| | A-MPR [dB] | ≤ 1 | ≤ 2 | ≤ 1 | ≤ 3 |

6.2.4B.4 Test description

6.2.4B.4.1 Initial condition

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in tables 6.2.4B.4.1-1 through table 6.2.4B.4.1-12. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.4B.4.1-1: Test Configuration Table (network signalled value "NS_03")

| Initial Conditions | | | | | | | |
|--|--|------------------------|---------------|----------------------------------|----------------------|---------------|-----|
| Test Environment (as specified in TS 36.508 [7] clause 4.1) | | | | NC | | | |
| Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1) | | | | Low range, Mid range, High range | | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1) | | | | Lowest, 5MHz, 10MHz, Highest | | | |
| Test Parameters for NS_03 A-MPR | | | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | | Uplink Configuration | | |
| | | Mod'n | RB allocation | | Mod'n | RB allocation | |
| | | | FDD | TDD | | FDD | TDD |
| 1 | 1.4MHz | N/A for A-MPR testing. | | | QPSK | 6 | 6 |
| 2 | 1.4MHz | | | | QPSK | 5 | 5 |
| 3 | 1.4MHz | | | | 16QAM | 5 | 5 |
| 4 | 3MHz | | | | QPSK | 15 | 15 |
| 5 | 3MHz | | | | QPSK | 4 | 4 |
| 6 | 3MHz | | | | 16QAM | 15 | 15 |
| 7 | 3MHz | | | | 16QAM | 4 | 4 |
| 8 | 5MHz | | | | QPSK | 25 | 25 |
| 9 | 5MHz | | | | QPSK | 8 | 8 |
| 10 | 5MHz | | | | QPSK | 6 | 6 |
| 11 | 5MHz | | | | 16QAM | 25 | 25 |
| 12 | 5MHz | | | | 16QAM | 8 | 8 |
| 13 | 10MHz | | | | QPSK | 50 | 50 |
| 14 | 10MHz | | | | QPSK | 12 | 12 |
| 15 | 10MHz | | | | QPSK | 6 | 6 |
| 16 | 10MHz | | | | 16QAM | 50 | 50 |
| 17 | 10MHz | | | | 16QAM | 12 | 12 |
| 18 | 15MHz | | | | QPSK | 75 | 75 |
| 19 | 15MHz | | | | QPSK | 16 | 16 |
| 20 | 15MHz | | | | QPSK | 8 | 8 |
| 21 | 15MHz | | | | 16QAM | 75 | 75 |
| 22 | 15MHz | | | | 16QAM | 16 | 16 |
| 23 | 20MHz | | | | QPSK | 100 | 100 |
| 24 | 20MHz | | | | QPSK | 18 | 18 |
| 25 | 20MHz | | | | QPSK | 10 | 10 |
| 26 | 20MHz | | | | 16QAM | 100 | 100 |
| 27 | 20MHz | | | | 16QAM | 18 | 18 |
| Note 1: | Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. | | | | | | |
| Note 2: | The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in clause 6.2.4B.5 as not all combinations are necessarily required based on the applicability of the UE. | | | | | | |
| Note 3: | The RB _{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth. | | | | | | |
| Note 4: | For band 23, above table only applies to mid and high range test frequencies. Low range test frequencies will be covered by NS_11 test configuration table. | | | | | | |

Table 6.2.4B.4.1-2: Test Configuration Table (network signalled value "NS_04")

| Initial Conditions | | | | | | |
|--|-------|----------------------------------|-------------------|----------------------|-------------------|-------------------------|
| Test Environment (as specified in TS 36.508 [7] clause 4.1) | | NC | | | | |
| Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1) | | Low range, Mid range, High range | | | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1) | | Lowest, 5MHz, 10MHz, Highest | | | | |
| Test Parameters for NS_03 A-MPR | | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | | |
| | | Mod'n | RB allocation TDD | Mod'n | RB allocation TDD | RB _{start} TDD |
| 1 | 5MHz | N/A for A-MPR testing. | | QPSK | 25 | Note 3 |
| 2 | 5MHz | | | QPSK | 8 | Note 3 |
| 3 | 5MHz | | | QPSK | 6 | Note 3 |
| 4 | 5MHz | | | 16QAM | 25 | Note 3 |
| 5 | 5MHz | | | 16QAM | 8 | Note 3 |
| 6 | 10MHz | | | QPSK | 1 | 0 |
| 7 | 10MHz | | | QPSK | 12 | 0 |
| 8 | 10MHz | | | QPSK | 50 | 0 |
| 9 | 10MHz | | | 16QAM | 50 | 0 |
| 10 | 10MHz | | | QPSK | 24 | 13 |
| 11 | 10MHz | | | 16QAM | 24 | 13 |
| 12 | 10MHz | | | QPSK | 36 | 13 |
| 13 | 10MHz | | | QPSK | 12 | 37 |
| 14 | 10MHz | | | QPSK | 1 | 49 |
| 15 | 15MHz | | | QPSK | 1 | 0 |
| 16 | 15MHz | | | QPSK | 16 | 0 |
| 17 | 15MHz | | | QPSK | 75 | 0 |
| 18 | 15MHz | | | 16QAM | 75 | 0 |
| 19 | 15MHz | | | QPSK | 36 | 19 |
| 20 | 15MHz | | | 16QAM | 36 | 19 |
| 21 | 15MHz | | | QPSK | 50 | 19 |
| 22 | 15MHz | | | QPSK | 18 | 56 |
| 23 | 15MHz | | | QPSK | 1 | 74 |
| 24 | 20MHz | | | QPSK | 1 | 0 |
| 25 | 20MHz | | | QPSK | 18 | 0 |
| 26 | 20MHz | | | QPSK | 100 | 0 |
| 27 | 20MHz | | | 16QAM | 100 | 0 |
| 28 | 20MHz | | | QPSK | 50 | 25 |
| 29 | 20MHz | | | 16QAM | 50 | 25 |
| 30 | 20MHz | | | QPSK | 75 | 25 |
| 31 | 20MHz | | | QPSK | 25 | 75 |
| 32 | 20MHz | | | QPSK | 1 | 99 |
| <p>Note 1: Test Channel Bandwidths are checked separately for E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.</p> <p>Note 2: The configuration ID will be used to map the applicable Test Configuration to be corresponding Test Requirement in clause 6.2.4B as not all combinations are necessarily required based on the applicability of the UE.</p> <p>Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.</p> | | | | | | |

Table 6.2.4B.4.1-3: Test Configuration Table (network signalled value "NS_05")

| Initial Conditions | | | | | |
|--|-------|------------------------|--|----------------------|-------------------|
| Test Environment (as specified in TS 36.508 [7] clause 4.1) | | | Normal | | |
| Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1) | | | Low range, Mid range In case of Low range: <ul style="list-style-type: none"> - For 5MHz channel bandwidth: UL 1927.2MHz (N_UL = 18072), DL 2117.2MHz (N_DL = 72) - For 10MHz: UL 1934.7MHz (N_UL = 18147), DL 2124.7MHz (N_DL = 147) - For 20MHz channel bandwidth: Not available | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1) | | | 5MHz, 10MHz, 15MHz, 20MHz | | |
| Test Parameters for NS_05 A-MPR | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | |
| | | Mod'n | RB allocation FDD | Mod'n | RB allocation FDD |
| 1 | 5MHz | N/A for A-MPR testing | | QPSK | 1 |
| 2 | 5MHz | | | QPSK | 25 |
| 3 | 10MHz | | | QPSK | 1 |
| 4 | 10MHz | | | QPSK | 12 |
| 5 | 10MHz | | | QPSK | 48 |
| 6 | 10MHz | | | QPSK | 50 |
| 7 | 10MHz | | | 16QAM | 50 |
| 8 | 15MHz | | | QPSK | 1 |
| 9 | 15MHz | | | QPSK | 16 |
| 10 | 15MHz | | | QPSK | 48 |
| 11 | 15MHz | | | QPSK | 75 |
| 12 | 15MHz | | | 16QAM | 75 |
| 13 | 20MHz | | | QPSK | 1 |
| 14 | 20MHz | | | QPSK | 18 |
| 15 | 20MHz | | | QPSK | 48 |
| 16 | 20MHz | | | QPSK | 100 |
| 17 | 20MHz | | | 16QAM | 100 |
| Note 1: The 1 RB allocation shall be tested at both RB #0 and RB #max. Note 2: The RB _{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth. Note 3: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in clause 6.2.4B.5 as not all combinations are necessarily required based on the applicability of the UE. | | | | | |

Table 6.2.4B.4.1-4: Test Configuration Table (network signalled value "NS_06")

| Initial Conditions | | | | | |
|---|--|------------------------|----------------------------------|----------------------|-------------------|
| Test Environment (as specified in TS 36.508 [7] clause 4.1) | | | Normal | | |
| Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1) | | | Low range, Mid range, High range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1) | | | Lowest, 5MHz, 10MHz, Highest | | |
| Test Parameters for NS_05 A-MPR | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | |
| | | Mod'n | RB allocation FDD | Mod'n | RB allocation FDD |
| 1 | 1.4MHz | N/A for A-MPR testing | | QPSK | 6 |
| 2 | 1.4MHz | | | QPSK | 5 |
| 3 | 1.4MHz | | | 16QAM | 5 |
| 4 | 3MHz | | | QPSK | 15 |
| 5 | 3MHz | | | QPSK | 4 |
| 6 | 3MHz | | | 16QAM | 4 |
| 7 | 5MHz | | | QPSK | 25 |
| 8 | 5MHz | | | QPSK | 8 |
| 9 | 5MHz | | | 16QAM | 8 |
| 10 | 10MHz | | | QPSK | 50 |
| 11 | 10MHz | | | QPSK | 12 |
| 12 | 10MHz | | | 16QAM | 12 |
| 13 | 15MHz | | | QPSK | 75 |
| 14 | 15MHz | | | QPSK | 16 |
| 15 | 15MHz | | | 16QAM | 16 |
| 16 | 20MHz | | | QPSK | 100 |
| 17 | 20MHz | | | QPSK | 18 |
| 18 | 20MHz | | | 16QAM | 18 |
| Note 1: | Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. | | | | |
| Note 2: | The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in clause 6.2.4B.5 as not all combinations are necessarily required based on the applicability of the UE. | | | | |
| Note 3: | The RBstart of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth. | | | | |

Table 6.2.4B.4.1-5: Test Configuration Table (network signalled value "NS_07")

| Initial Conditions | | | | | | |
|--|-------|------------------------|-------------------|----------------------|-------------------|-------------------------|
| Test Environment (as specified in TS 36.508 [7] clause 4.1) | | | | NC | | |
| Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1) | | | | Mid range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1) | | | | 10MHz | | |
| Test Parameters for NS_07 A-MPR | | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | | |
| | | Mod'n | RB allocation FDD | Mod'n | RB allocation FDD | RB _{start} FDD |
| 1 | 10MHz | N/A for A-MPR testing | | QPSK | 1 | 0 |
| 2 | 10MHz | | | QPSK | 8 | 0 |
| 3 | 10MHz | | | QPSK | 6 | 13 |
| 4 | 10MHz | | | QPSK | 20 | 13 |
| 5 | 10MHz | | | QPSK | 12 | 13 |
| 6 | 10MHz | | | 16QAM | 36 | 13 |
| 7 | 10MHz | | | QPSK | 16 | 19 |
| 8 | 10MHz | | | QPSK | 12 | 19 |
| 9 | 10MHz | | | 16QAM | 16 | 19 |
| 10 | 10MHz | | | QPSK | 30 | 19 |
| 11 | 10MHz | | | 16QAM | 30 | 19 |
| 12 | 10MHz | | | QPSK | 6 | 43 |
| 13 | 10MHz | | | QPSK | 2 | 48 |
| 14 | 10MHz | | | QPSK | 50 | 0 |
| 15 | 10MHz | | | QPSK | 12 | 0 |
| 16 | 10MHz | | | 16QAM | 50 | 0 |
| Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in clause 6.2.4B.5 as not all combinations are necessarily required based on the applicability of the UE. | | | | | | |

Table 6.2.4B.4.1-6: Test Configuration Table (network signalled value "NS_08")

| Initial Conditions | | | | | |
|---|-------|------------------------|--------------------|----------------------|-------------------|
| Test Environment (as specified in TS 36.508 [7] clause 4.1) | | | Normal | | |
| Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1) | | | High range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1) | | | 5MHz, 10MHz, 15MHz | | |
| Test Parameters for NS_08 A-MPR | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | |
| | | Mod'n | RB allocation FDD | Mod'n | RB allocation FDD |
| 1 | 5MHz | N/A for A-MPR testing | | QPSK | 1 |
| 2 | 5MHz | | | QPSK | 8 |
| 3 | 5MHz | | | QPSK | 25 |
| 4 | 10MHz | | | QPSK | 1 |
| 5 | 10MHz | | | QPSK | 12 |
| 6 | 10MHz | | | QPSK | 40 |
| 7 | 10MHz | | | QPSK | 50 |
| 8 | 10MHz | | | 16QAM | 50 |
| 9 | 15MHz | | | QPSK | 1 |
| 10 | 15MHz | | | QPSK | 16 |
| 11 | 15MHz | | | QPSK | 40 |
| 12 | 15MHz | | | QPSK | 75 |
| 13 | 15MHz | | | 16QAM | 75 |
| <p>Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in clause 6.2.4B.5 as not all combinations are necessarily required based on the applicability of the UE.</p> <p>Note 2: The 1 RB allocation shall be tested at both RB #0 and RB #max.</p> <p>Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max + 1 - RB allocation) of the channel bandwidth.</p> | | | | | |

Table 6.2.4B.4.1-7: Test Configuration Table (network signalled value “NS_09”)

| Initial Conditions | | | | | |
|---|-------|------------------------|--------------------|----------------------|-------------------|
| Test Environment (as specified in TS 36.508 [7] clause 4.1) | | | Normal | | |
| Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1) | | | High range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1) | | | 5MHz, 10MHz, 15MHz | | |
| Test Parameters for Channel Bandwidths | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | |
| | | Mod'n | RB allocation FDD | Mod'n | RB allocation FDD |
| 1 | 5MHz | N/A for A-MPR testing | | QPSK | 1 |
| 2 | 5MHz | | | QPSK | 8 |
| 3 | 5MHz | | | QPSK | 25 |
| 4 | 10MHz | | | QPSK | 1 |
| 5 | 10MHz | | | QPSK | 12 |
| 6 | 10MHz | | | QPSK | 40 |
| 7 | 10MHz | | | QPSK | 50 |
| 8 | 10MHz | | | 16QAM | 50 |
| 9 | 15MHz | | | QPSK | 1 |
| 10 | 15MHz | | | QPSK | 16 |
| 11 | 15MHz | | | QPSK | 40 |
| 12 | 15MHz | | | QPSK | 54 |
| 13 | 15MHz | | | QPSK | 75 |
| 14 | 15MHz | | | 16QAM | 75 |
| <p>Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in clause 6.2.4B.5 as not all combinations are necessarily required based on the applicability of the UE.</p> <p>Note 2: The 1 RB allocation shall be tested at both RB #0 and RB #max.</p> <p>Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max + 1 - RB allocation) of the channel bandwidth.</p> | | | | | |

Table 6.2.4B.4.1-8: Test Configuration Table (network signalled value "NS_11")

| Initial Conditions | | | | | |
|--|-------|------------------------|---|----------------------|-------------------|
| Test Environment (as specified in TS 36.508 [7] clause 4.1) | | | Normal | | |
| Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1) | | | Low range For 3 MHz Channel Bandwidth: a. UL 2001.5 MHz (N_UL=25515), DL 2181.5 MHz(N_DL=7515) b. UL 2004.5 MHz (N_UL=25545), DL 2184.5 (N_DL=7545) For 5 MHz Channel Bandwidth: a. UL 2002.5 MHz (N_UL=25525), DL 2182.5 MHz(N_DL=7525) b. UL 2004.5 MHz (N_UL=25545), DL 2184.5 MHz(N_DL=7545) c. UL 2007.5 MHz (N_UL=25575), DL 2187.5 MHz(N_DL=7575) For 10 MHz Channel Bandwidth: UL 2005 MHz (N_UL=25550), DL 2185 MHz (N_DL=7550) | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1) | | | 1.4MHz, 3MHz, 5MHz, 10MHz | | |
| Test Parameters for NS_11 A-MPR | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | |
| | | Mod'n | RB allocation FDD | Mod'n | RB allocation FDD |
| 1 | 3MHz | N/A for A-MPR testing | | QPSK | 6 |
| 2 | 3MHz | | | QPSK | 15 |
| 3 | 3MHz | | | 16QAM | 6 |
| 4 | 3MHz | | | 16QAM | 15 |
| 5 | 5MHz | | | QPSK | 1 |
| 6 | 5MHz | | | QPSK | 8 |
| 7 | 5MHz | | | QPSK | 25 |
| 8 | 5MHz | | | 16QAM | 8 |
| 9 | 5MHz | | | 16QAM | 25 |
| 10 | 10MHz | | | QPSK | 1 |
| 11 | 10MHz | | | QPSK | 12 |
| 12 | 10MHz | | | QPSK | 50 |
| 13 | 10MHz | | | 16QAM | 12 |
| 14 | 10MHz | | | 16QAM | 50 |
| Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in clause 6.2.4B.5 as not all combinations are necessarily required based on the applicability of the UE. Note 2: The RB _{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth. | | | | | |

Table 6.2.4B.4.1-9: Test Configuration Table (network signalled value "NS_12")

| Initial Conditions | | | | | | |
|---|---------|------------------------|---------------|--------------------------|-------------------|-------------|
| Test Environment (as specified in TS 36.508 [7] clause 4.1) | | | | NC | | |
| Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1) | | | | Mid range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1) | | | | 1.4 MHz, 3 MHz and 5 MHz | | |
| Test Parameters for Channel Bandwidths | | | | | | |
| Test Number | Ch BW | Downlink Configuration | | Uplink Configuration | | |
| | | Mod'n | RB allocation | Mod'n | RB allocation FDD | RBstart FDD |
| 1 | 1.4 MHz | N/A for A-MPR testing. | | QPSK | 1 | 0 |
| 2 | 1.4 MHz | | | QPSK | 6 | 0 |
| 3 | 1.4 MHz | | | QPSK | 1 | 1 |
| 4 | 1.4 MHz | | | QPSK | 5 | 1 |
| 5 | 1.4 MHz | | | 16QAM | 6 | 0 |
| 6 | 3 MHz | | | QPSK | 4 | 0 |
| 7 | 3 MHz | | | QPSK | 6 | 0 |
| 8 | 3 MHz | | | QPSK | 4 | 4 |
| 9 | 3 MHz | | | QPSK | 6 | 4 |
| 10 | 3 MHz | | | 16QAM | 15 | 0 |
| 11 | 5 MHz | | | QPSK | 8 | 0 |
| 12 | 5 MHz | | | QPSK | 15 | 0 |
| 13 | 5 MHz | | | QPSK | 8 | 7 |
| 14 | 5 MHz | | | QPSK | 15 | 7 |
| 15 | 5 MHz | | | 16QAM | 25 | 0 |

Table 6.2.4B.4.1-10: Test Configuration Table (network signalled value "NS_13")

| Initial Conditions | | | | | | |
|---|-------|------------------------|---------------|----------------------|-------------------|-------------|
| Test Environment (as specified in TS 36.508 [7] clause 4.1) | | | | NC | | |
| Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1) | | | | Mid range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1) | | | | 5 MHz | | |
| Test Parameters for Channel Bandwidths | | | | | | |
| Test Number | Ch BW | Downlink Configuration | | Uplink Configuration | | |
| | | Mod'n | RB allocation | Mod'n | RB allocation FDD | RBstart FDD |
| 1 | 5 MHz | N/A for A-MPR testing. | | QPSK | 1 | 0 |
| 2 | 5 MHz | | | QPSK | 25 | 0 |
| 3 | 5 MHz | | | QPSK | 15 | 0 |
| 4 | 5 MHz | | | QPSK | 15 | 7 |
| 5 | 5 MHz | | | 16QAM | 25 | 0 |

Table 6.2.4B.4.1-11: Test Configuration Table (network signalled value "NS_14")

| Initial Conditions | | | | | | |
|---|--------|------------------------|---------------|----------------------|-------------------|-------------|
| Test Environment (as specified in TS 36.508 [7] clause 4.1) | | | | NC | | |
| Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1) | | | | Mid range | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1) | | | | 10 MHz, 15 MHz | | |
| Test Parameters for Channel Bandwidths | | | | | | |
| Test Number | Ch BW | Downlink Configuration | | Uplink Configuration | | |
| | | Mod'n | RB allocation | Mod'n | RB allocation FDD | RBstart FDD |
| 1 | 10 MHz | N/A for A-MPR testing. | | QPSK | 1 | 0 |
| 2 | 10 MHz | | | QPSK | 25 | 0 |
| 3 | 10 MHz | | | QPSK | 50 | 0 |
| 4 | 10 MHz | | | QPSK | 25 | 1 |
| 5 | 10 MHz | | | 16QAM | 50 | 0 |
| 6 | 15 MHz | | | QPSK | 8 | 0 |
| 7 | 15 MHz | | | QPSK | 25 | 0 |
| 8 | 15 MHz | | | QPSK | 75 | 0 |
| 9 | 15 MHz | | | QPSK | 50 | 15 |
| 10 | 15 MHz | | | 16QAM | 75 | 0 |

Table 6.2.4B.4.1-12: Test Configuration Table (network signalled value "NS_15")

| Initial Conditions | | | | | | |
|--|---------|------------------------|---|----------------------|-------------------|-------------|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | | | NC | | | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | | | For 1.4 MHz and 3 MHz Channel Bandwidth: Low range For 5 MHz, 10 MHz and 15 MHz Channel Bandwidth: Low range, high range | | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | | | 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz | | | |
| Test Parameters for Channel Bandwidths | | | | | | |
| Test Number | Ch BW | Downlink Configuration | | Uplink Configuration | | |
| | | Mod'n | RB allocation | Mod'n | RB allocation FDD | RBstart FDD |
| 1 (Note 2) | 1.4 MHz | N/A for A-MPR testing. | | QPSK | 3 | 2 |
| 2 (Note 2) | 1.4 MHz | | | QPSK | 4 | 1 |
| 3 (Note 2) | 1.4 MHz | | | 16QAM | 4 | 1 |
| 4 (Note 2) | 3 MHz | | | QPSK | 1 | 0 |
| 5 (Note 2) | 3 MHz | | | QPSK | 8 | 2 |
| 6 (Note 2) | 3 MHz | | | QPSK | 15 | 0 |
| 7 (Note 2) | 3 MHz | | | 16QAM | 15 | 0 |
| 8 (Note 2) | 5 MHz | | | QPSK | 1 | 0 |
| 9 (Note 2) | 5 MHz | | | QPSK | 15 | 0 |
| 10 (Note 2) | 5 MHz | | | QPSK | 18 | 0 |
| 11 (Note 2) | 5 MHz | | | QPSK | 25 | 0 |
| 12 (Note 2) | 5 MHz | | | 16QAM | 25 | 0 |
| 13 (Note 1) | 5 MHz | | | QPSK | 20 | 0 |
| 14 (Note 1) | 5 MHz | | | 16QAM | 20 | 0 |
| 15 (Note 2) | 10 MHz | | | QPSK | 1 | 0 |
| 16 (Note 2) | 10 MHz | | | QPSK | 25 | 0 |
| 17 (Note 2) | 10 MHz | | | QPSK | 35 | 0 |
| 18 (Note 2) | 10 MHz | | | QPSK | 50 | 0 |
| 19 (Note 2) | 10 MHz | | | QPSK | 1 | 49 |

| | | | | | |
|--|--------|--|-------|----|----|
| 20 (Note 2) | 10 MHz | | 16QAM | 50 | 0 |
| 21 (Note 1) | 10 MHz | | QPSK | 1 | 0 |
| 22 (Note 1) | 10 MHz | | QPSK | 30 | 0 |
| 23 (Note 1) | 10 MHz | | QPSK | 40 | 0 |
| 24 (Note 1) | 10 MHz | | QPSK | 50 | 0 |
| 25 (Note 1) | 10 MHz | | 16QAM | 50 | 0 |
| 26 (Note 2) | 15 MHz | | QPSK | 1 | 0 |
| 27 (Note 2) | 15 MHz | | QPSK | 30 | 0 |
| 28 (Note 2) | 15 MHz | | QPSK | 50 | 0 |
| 29 (Note 2) | 15 MHz | | QPSK | 75 | 0 |
| 30 (Note 2) | 15 MHz | | 16QAM | 75 | 0 |
| 31 (Note 1) | 15 MHz | | QPSK | 1 | 0 |
| 32 (Note 1) | 15 MHz | | QPSK | 50 | 0 |
| 33 (Note 1) | 15 MHz | | QPSK | 50 | 10 |
| 34 (Note 1) | 15 MHz | | QPSK | 75 | 0 |
| 35 (Note 1) | 15 MHz | | 16QAM | 75 | 0 |
| Note 1: Applicable only to low range frequency testing. | | | | | |
| Note 2: Applicable only to high range frequency testing. | | | | | |

Table 6.2.4B.4.1-13: Test Configuration Table (network signalled value "NS_16")

| Initial Conditions | | | | | | |
|--|--------|------------------------|---------------|---|-------------------|-------------|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | | | | NC | | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | | | | For 3 MHz Channel Bandwidth: Low range For 5 MHz Channel Bandwidth: Low range, 811 MHz ($N_{DL} = 9080$, $N_{UL} = 27080$) For 10 MHz Channel Bandwidth: Low range, 813.5 MHz ($N_{DL} = 9105$, $N_{UL} = 27105$), 817 MHz ($N_{DL} = 9140$, $N_{UL} = 27140$) | | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | | | | 3 MHz, 5 MHz, 10 MHz | | |
| Test Parameters for Channel Bandwidths | | | | | | |
| Configuration ID | Ch BW | Downlink Configuration | | Uplink Configuration | | |
| | | Mod'n | RB allocation | Mod'n | RB allocation FDD | RBstart FDD |
| 1 | 3 MHz | N/A for A-MPR testing. | | QPSK | 12 | 1 |
| 2 | 3 MHz | | | QPSK | 15 | 0 |
| 3 (Note 1) | 3 MHz | | | 16QAM | 15 | 0 |
| 4 | 5 MHz | | | QPSK | 1 | 0 |
| 5 | 5 MHz | | | QPSK | 12 | 2 |
| 6 | 5 MHz | | | QPSK | 18 | 2 |
| 7 | 5 MHz | | | QPSK | 20 | 0 |
| 8 | 5 MHz | | | QPSK | 20 | 2 |
| 9 | 5 MHz | | | QPSK | 25 | 0 |
| 10 (Note 1) | 5 MHz | | | 16QAM | 25 | 0 |
| 11 | 10 MHz | | | QPSK | 1 | 0 |
| 12 (Note 2) | 10 MHz | | | QPSK | 20 | 0 |
| 13 (Note 2) | 10 MHz | | | QPSK | 27 | 15 |
| 14 (Note 2) | 10 MHz | | | QPSK | 32 | 15 |
| 15 | 10 MHz | | | QPSK | 32 | 0 |
| 16 | 10 MHz | | | QPSK | 50 | 0 |
| 17 (Note 1) | 10 MHz | | | 16QAM | 50 | 0 |

| | | | | |
|--|--------|------|----|---|
| 18 (Note 3) | 10 MHz | QPSK | 40 | 0 |
| 19 (Note 3) | 10 MHz | QPSK | 40 | 1 |
| Note 1: Applies only for UE-Categories ≥ 2 . Note 2: Applies only for 10 MHz channel for Low Range, and 813.5 MHz Note 3: Applies only for 10 MHz channel for 817 MHz range | | | | |

Editor’s note: The following lines belong at the end of section 6.2.4B.4.1. As new tables are added to this section, these lines should always follow the tables.

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to the applicable table from Table 6.2.4.4.1-1 to Table 6.2.4.4.1-6.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.4.4.3.

6.2.4B.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to the applicable table from Table 6.2.4B.4.1-1 to Table 6.2.4B.4.1-6. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
3. Measure the output power for UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.4B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6, with the following exceptions for each network signalled value.

6.2.4B.4.3.1 Message contents exceptions (network signalled value "NS_03")

1. Information element additionalSpectrumEmission is set to NS_03. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4B.4.3.1-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_03"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| additionalSpectrumEmission | 3 (NS_03) | | |

6.2.4B.4.3.2 Message contents exceptions (network signalled value "NS_04")

1. Information element `additionalSpectrumEmission` is set to NS_04. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4B.4.3.2-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_04"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 4 (NS_04) | | |

6.2.4B.4.3.3 Message contents exceptions (network signalled value "NS_05")

1. Information element `additionalSpectrumEmission` is set to NS_05. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4B.4.3.3-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_05"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 5 (NS_05) | | |

6.2.4B.4.3.4 Message contents exceptions (network signalled value "NS_06")

1. Information element `additionalSpectrumEmission` is set to NS_06. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4B.4.3.4-1: SystemInformationBlockType2 :Additional spurious emissions test requirement for "NS_06"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 6 (NS_06) | | |

6.2.4B.4.3.5 Message contents exceptions (network signalled value "NS_07")

1. Information element `additionalSpectrumEmission` is set to NS_07. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4B.4.3.5-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_07"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 7 (NS_07) | | |

6.2.4B.4.3.6 Message contents exceptions (network signalled value "NS_08")

1. Information element `additionalSpectrumEmission` is set to NS_08. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4B.4.3.6-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_08"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| additionalSpectrumEmission | 8 (NS_08) | | |

6.2.4B.4.3.7 Message contents exceptions (network signalled value "NS_09")

- Information element additionalSpectrumEmission is set to NS_09. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4B.4.3.7-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_09"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| additionalSpectrumEmission | 9 (NS_09) | | |

6.2.4B.4.3.8 Message contents exceptions (network signalled value "NS_11")

- Information element additionalSpectrumEmission is set to NS_11. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4B.4.3.8-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_11"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| additionalSpectrumEmission | 11 (NS_11) | | |

6.2.4B.4.3.9 Message contents exceptions (network signalled value "NS_12")

- Information element additionalSpectrumEmission is set to NS_12. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4B.4.3.9-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_12"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| additionalSpectrumEmission | 12 (NS_12) | | |

6.2.4B.4.3.10 Message contents exceptions (network signalled value "NS_13")

- Information element additionalSpectrumEmission is set to NS_13. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4B.4.3.10-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_13"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| additionalSpectrumEmission | 13 (NS_13) | | |

6.2.4B.4.3.11 Message contents exceptions (network signalled value "NS_14")

1. Information element `additionalSpectrumEmission` is set to NS_14. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4B.4.3.11-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_14"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 14 (NS_14) | | |

6.2.4B.4.3.12 Message contents exceptions (network signalled value "NS_15")

1. Information element `additionalSpectrumEmission` is set to NS_15. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4B.4.3.12-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_15"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 15 (NS_15) | | |

6.2.4B.4.3.13 Message contents exceptions (network signalled value "NS_16")

1. Information element `additionalSpectrumEmission` is set to NS_16. This can be set in the *SystemInformationBlockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4B.4.3.13-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_16"

| Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| <code>additionalSpectrumEmission</code> | 16 (NS_16) | | |

6.2.4B.5 Test requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in the applicable table from Table 6.2.4B.5-1 to Table 6.2.4B.5-15. The allowed A-MPR values specified in Table 6.2.4B.3-1 are in addition to the allowed MPR requirements specified in clause 6.2.3B. For the UE maximum output power modified by MPR and/or A-MPR, the power limits specified in Table 6.2.5B.3-1 apply.

**Table 6.2.4B.5-1: UE Power Class test requirements (network signalled value "NS_03")
(for Bands 4, 10, 23, 35, and 36)**

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|---------------|---------------|-----------|---------------|-----------|---------------|------------------|
| 1 | 4,10,23,35,36 | | | | | 23 | +2.0 / -3.0±TT |
| 2 | 4,10,23,35,36 | | | | | 23 | +2.0 / -2.0±TT |
| 3 | 4,10,23,35,36 | | | | | 23 | +2.0 / -3.0+ ±TT |
| 4 | 4,10,23,35,36 | | | | | 23 | +2.0 / -4.0±TT |
| 5 | 4,10,23,35,36 | | | | | 23 | +2.0 / -2.0±TT |
| 6 | 4,10,23,35,36 | | | | | 23 | +2.0 / -5.5±TT |
| 7 | 4,10,23,35,36 | | | | | 23 | +2.0 / -3.0±TT |
| 8 | 4,10,23,35,36 | | | | | 23 | +2.0 / -4.0±TT |
| 9 | 4,10,23,35,36 | | | | | 23 | +2.0 / -3.0±TT |
| 10 | 4,10,23,35,36 | | | | | 23 | +2.0 / -2.0±TT |
| 11 | 4,10,23,35,36 | | | | | 23 | +2.0 / -5.5±TT |
| 12 | 4,10,23,35,36 | | | | | 23 | +2.0 / -4.0±TT |
| 13 | 4,10,23,35,36 | | | | | 23 | +2.0 / -4.0±TT |
| 14 | 4,10,23,35,36 | | | | | 23 | +2.0 / -3.0±TT |
| 15 | 4,10,23,35,36 | | | | | 23 | +2.0 / -2.0±TT |
| 16 | 4,10,23,35,36 | | | | | 23 | +2.0 / -5.5±TT |
| 17 | 4,10,23,35,36 | | | | | 23 | +2.0 / -4.0±TT |
| 18 | 4,10,35,36 | | | | | 23 | +2.0 / -4.0±TT |
| 19 | 4,10,35,36 | | | | | 23 | +2.0 / -3.0±TT |
| 20 | 4,10,35,36 | | | | | 23 | +2.0 / -2.0±TT |
| 21 | 4,10,35,36 | | | | | 23 | +2.0 / -5.5±TT |
| 22 | 4,10,35,36 | | | | | 23 | +2.0 / -4.0±TT |
| 23 | 4,10,35,36 | | | | | 23 | +2.0 / -4.0±TT |
| 24 | 4,10,35,36 | | | | | 23 | +2.0 / -3.0±TT |
| 25 | 4,10,35,36 | | | | | 23 | +2.7 / -2.7±TT |
| 26 | 4,10,35,36 | | | | | 23 | +2.0 / -5.5±TT |
| 27 | 4,10,35,36 | | | | | 23 | +2.0 / -4.0±TT |

**Table 6.2.4B.5-2: UE Power Class test requirements (network signalled value "NS_03")
(for Bands 2 and 25)**

| Configuration ID | EUTRA band | Test Freq. | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|--|---------------|-----------|---------------|-----------|---------------|--------------------|
| 1 | 2, 25 | Mid | | | | | 23 | +2.0 / - 3.0±TT |
| 1 | 2, 25 | Low, High | | | | | 23 | +2.0 / - 5.0±TT |
| 2 | 2, 25 | Mid | | | | | 23 | +2.0 / - 2.0±TT |
| 2 | 2, 25 | Low, High | | | | | 23 | +2.0 / - 3.5±TT |
| 3 | 2, 25 | Mid | | | | | 23 | +2.0 / - 3.0±TT |
| 3 | 2, 25 | Low, High | | | | | 23 | +2.0 / - 5.0±TT |
| 4 | 2, 25 | Mid | | | | | 23 | +2.0 / - 4.0±TT |
| 4 | 2, 25 | Low, High | | | | | 23 | +2.0 / - 7.0±TT |
| 5 | 2, 25 | Mid | | | | | 23 | +2.0 / - 2.0±TT |
| 5 | 2, 25 | Low, High | | | | | 23 | +2.0 / - 3.5±TT |
| 6 | 2, 25 | Mid | | | | | 23 | +2.0 / - 5.5±TT |
| 6 | 2, 25 | Low, High | | | | | 23 | +2.0 / - 8.5±TT |
| 7 | 2, 25 | Mid | | | | | 23 | +2.0 / - 3.0±TT |
| 7 | 2, 25 | Low, High | | | | | 23 | +2.0 / - 5.0±TT |
| 8 | 2, 25 | All | | | | | 23 | +2.0 / - 4.0±TT |
| 9 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.0 / - 3.0±TT |
| 9 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.0 / - 5.0±TT |
| 10 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.0 / - 2.0±TT |
| 10 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.0 / - 3.5±TT |
| 11 | 2, 25 | All | | | | | 23 | +2.0 / - |

| | | | | | | | | |
|----|-------|--|--|--|--|--|----|-----------------------|
| | | | | | | | | 5.5±TT |
| 12 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.0 / - 4.0±TT |
| 12 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.0 / - 7.0±TT |
| 13 | 2, 25 | All | | | | | 23 | +2.0 / - 4.0±TT |
| 14 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.0 / - 3.0±TT |
| 14 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.0 / - 5.0±TT |
| 15 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.0 / - 2.0±TT |
| 15 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.0 / - 3.5±TT |
| 16 | 2, 25 | All | | | | | 23 | +2.0 / - 5.5±TT |
| 17 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.0 / - 4.0±TT |
| 17 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.0 / - 7.0±TT |
| 18 | 2, 25 | All | | | | | 23 | +2.0 / - 4.0±TT |
| 19 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.0 / - 3.0±TT |
| 19 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.0 / - 5.0±TT |
| 20 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.0 / - 2.0±TT |
| 20 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.0 / - 3.5±TT |
| 21 | 2, 25 | All | | | | | 23 | +2.0 / - 5.5±TT |
| 22 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.0 / - 4.0±TT |
| 22 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.0 / - 7.0±TT |
| 23 | 2, 25 | All | | | | | 23 | +2.0 / - 4.0±TT |
| 24 | 2, 25 | All | | | | | 23 | +2.0 / - |

| | | | | | | | | |
|----|-------|--|--|--|--|--|----|-----------------------|
| | | | | | | | | 3.0±TT |
| 25 | 2, 25 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.0 / - 2.0±TT |
| 25 | 2, 25 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.0 / - 3.5±TT |
| 26 | 2, 25 | All | | | | | 23 | +2.0 / - 5.5±TT |
| 27 | 2, 25 | All | | | | | 23 | +2.0 / - 4.0±TT |

Table 6.2.4B.5-3: UE Power Class test requirements (network signalled value "NS_04")

| Configuration ID | EUTRA band | Bandwidth (MHz) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|-----------------|---------------|----------------|
| 1 | 41 | 5 MHz | 23 | +2.0 / -4.0±TT |
| 2 | 41 | 5 MHz | 23 | +2.0 / -3.0±TT |
| 3 | 41 | 5 MHz | 23 | +2.7 / -2.7±TT |
| 4 | 41 | 5 MHz | 23 | +2.0/ -5.5±TT |
| 5 | 41 | 5 MHz | 23 | +2.0 / -4.0±TT |
| 6 | 41 | 10MHz | 23 | +2.0/ -5.5±TT |
| 7 | 41 | 10MHz | 23 | +2.0/ -5.5±TT |
| 8 | 41 | 10MHz | 23 | +2.0/ -7.5±TT |
| 9 | 41 | 10MHz | 23 | +2.9/ -9.9±TT |
| 10 | 41 | 10MHz | 23 | +2.0 / -3.0±TT |
| 11 | 41 | 10MHz | 23 | +2.0 / -4.0±TT |
| 12 | 41 | 10MHz | 23 | +2.0/ -5.5±TT |
| 13 | 41 | 10MHz | 23 | +2.0/ -5.5±TT |
| 14 | 41 | 10MHz | 23 | +2.0/ -5.5±TT |
| 15 | 41 | 15MHz | 23 | +2.0/ -5.5±TT |
| 16 | 41 | 15MHz | 23 | +2.0/ -5.5±TT |
| 17 | 41 | 15MHz | 23 | +2.0/ -7.5±TT |
| 18 | 41 | 15MHz | 23 | +2.9/ -9.9±TT |
| 19 | 41 | 15MHz | 23 | +2.0 / -3.0±TT |
| 20 | 41 | 15MHz | 23 | +2.0 / -4.0±TT |
| 21 | 41 | 15MHz | 23 | +2.0/ -5.5±TT |
| 22 | 41 | 15MHz | 23 | +2.0/ -7.5±TT |
| 23 | 41 | 15MHz | 23 | +2.0/ -5.5±TT |
| 24 | 41 | 20MHz | 23 | +2.0/ -5.5±TT |
| 25 | 41 | 20MHz | 23 | +2.0/ -5.5±TT |
| 26 | 41 | 20MHz | 23 | +2.0/ -7.5±TT |
| 27 | 41 | 20MHz | 23 | +2.9/ -9.9±TT |
| 28 | 41 | 20MHz | 23 | +2.0 / -3.0±TT |
| 29 | 41 | 20MHz | 23 | +2.0 / -4.0±TT |
| 30 | 41 | 20MHz | 23 | +2.0/ -5.5±TT |
| 31 | 41 | 20MHz | 23 | +2.0/ -7.5±TT |
| 32 | 41 | 20MHz | 23 | +2.0/ |

| | | | | |
|--|--|--|--|---------|
| | | | | -5.5±TT |
|--|--|--|--|---------|

Table 6.2.4B.5-4: UE Power Class test requirements (network signalled value "NS_05")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|----------------|
| 1 | 1 | | | | | 23 | +2.0 / -2.0±TT |
| 2 | 1 | | | | | 23 | +2.0 / -3.0±TT |
| 3 | 1 | | | | | 23 | +2.0 / -2.0±TT |
| 4 | 1 | | | | | 23 | +2.0 / -2.0±TT |
| 5 | 1 | | | | | 23 | +2.0 / -3.0±TT |
| 6 | 1 | | | | | 23 | +2.0 / -4.0±TT |
| 7 | 1 | | | | | 23 | +2.0 / -5.5±TT |
| 8 | 1 | | | | | 23 | +2.0 / -2.0±TT |
| 9 | 1 | | | | | 23 | +2.0 / -2.0±TT |
| 10 | 1 | | | | | 23 | +2.0 / -3.0±TT |
| 11 | 1 | | | | | 23 | +2.0 / -4.0±T |
| 12 | 1 | | | | | 23 | +2.0 / -5.5±TT |
| 13 | 1 | | | | | 23 | +2.0 / -2.0±TT |
| 14 | 1 | | | | | 23 | +2.0 / -2.0±TT |
| 15 | 1 | | | | | 23 | +2.0 / -3.0±TT |
| 16 | 1 | | | | | 23 | +2.0 / -4.0±T |
| 17 | 1 | | | | | 23 | +2.0 / -5.5±TT |

**Table 6.2.4B.5-5: UE Power Class test requirements (network signalled value "NS_06")
(for Bands 13, 14, and 17)**

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|----------------|
| 1 | 13,14,17 | | | | | 23 | +2.0 / -3.0±TT |
| 2 | 13,14,17 | | | | | 23 | +2.0 / -2.0±TT |
| 3 | 13,14,17 | | | | | 23 | +2.0 / -2.0±TT |
| 4 | 13,14,17 | | | | | 23 | +2.0 / -3.0±TT |
| 5 | 13,14,17 | | | | | 23 | +2.0 / -2.0±TT |
| 6 | 13,14,17 | | | | | 23 | +2.0 / -3.0±TT |
| 7 | 13,14,17 | | | | | 23 | +2.0 / -3.0±TT |
| 8 | 13,14,17 | | | | | 23 | +2.0 / -2.0±TT |
| 9 | 13,14,17 | | | | | 23 | +2.0 / -3.0±TT |
| 10 | 13,14,17 | | | | | 23 | +2.0 / -3.0±TT |
| 11 | 13,14,17 | | | | | 23 | +2.0 / -2.0±TT |
| 12 | 13,14,17 | | | | | 23 | +2.0 / -3.0±TT |
| 13 | 13,14,17 | | | | | 23 | +2.0 / -3.0±TT |
| 14 | 13,14,17 | | | | | 23 | +2.0 / -2.0±TT |
| 15 | 13,14,17 | | | | | 23 | +2.0 / -3.0±TT |
| 16 | 13,14,17 | | | | | 23 | +2.0 / -3.0±TT |
| 17 | 13,14,17 | | | | | 23 | +2.0 / -2.0±TT |
| 18 | 13,14,17 | | | | | 23 | +2.0 / -3.0±TT |

**Table 6.2.4B.5-6: UE Power Class test requirements (network signalled value "NS_06")
(for Band 12)**

| Configuration ID | EUTRA band | Test Freq. | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|--|---------------|-----------|---------------|-----------|---------------|-----------------------------|
| 1 | 12 | Mid | | | | | 23 | +2.0 / -2.0±TT |
| 1 | 12 | Low, High | | | | | 23 | +2.0 / -5.0±TT |
| 2 | 12 | Mid | | | | | 23 | +2.0 / -2.0±TT |
| 2 | 12 | Low, High | | | | | 23 | +2.0 / -3.5±TT |
| 3 | 12 | Mid | | | | | 23 | +2.0 / -2.0±TT |
| 3 | 12 | Low, High | | | | | 23 | +2.0 / -3.5±TT |
| 4 | 12 | Mid | | | | | 23 | +2.0 / -3.0±TT |
| 4 | 12 | Low, High | | | | | 23 | +2.0 / -5.0±TT |
| 5 | 12 | Mid | | | | | 23 | +2.0 / -2.0±TT |
| 5 | 12 | Low, High | | | | | 23 | +2.0 / -3.5±TT |
| 6 | 12 | Mid | | | | | 23 | +2.0 / -3.0±TT |
| 6 | 12 | Low, High | | | | | 23 | +2.0 / -5.0±TT |
| 7 | 12 | All | | | | | 23 | +2.0 / -3.0±TT |
| 8 | 12 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.0 / -2.0±TT |
| 8 | 12 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.0 / -3.5±TT |
| 9 | 12 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.0 / -3.0±TT |
| 9 | 12 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.0 / -5.0±TT |
| 10 | 12 | All | | | | | 23 | +2.0 / -3.0±TT |
| 11 | 12 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.0 / -2.0±TT |
| 11 | 12 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.0 / -3.5±TT |
| 12 | 12 | Low @ RB#(max+1-RB allocation), Mid, High @ RB#0 | | | | | 23 | +2.0 / -3.0±TT |
| 12 | 12 | Low @ RB#0, High @ RB#(max+1-RB allocation) | | | | | 23 | +2.0 / -5.0+2.0 / -3.5±TTTT |

Table 6.2.4B.5-7: UE Power Class test requirements (network signalled value "NS_07")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|-----------------|
| 1 | 13 | | | | | 23 | +2.0 / -18.0±TT |
| 2 | 13 | | | | | 23 | +2.0 / -13.0±TT |
| 3 | 13 | | | | | 23 | +2.0 / -2.0±TT |
| 4 | 13 | | | | | 23 | +2.0 / -19.0±TT |
| 5 | 13 | | | | | 23 | +2.0 / -18.0±TT |
| 6 | 13 | | | | | 23 | +2.0 / -20.0±TT |
| 7 | 13 | | | | | 23 | +2.0 / -3.0±TT |
| 8 | 13 | | | | | 23 | +2.0 / -2.0±TT |
| 9 | 13 | | | | | 23 | +2.0 / -4.0±TT |
| 10 | 13 | | | | | 23 | +2.0 / -12.0±TT |
| 11 | 13 | | | | | 23 | +2.0 / -13.0±TT |
| 12 | 13 | | | | | 23 | +2.0 / -2.0±TT |
| 13 | 13 | | | | | 23 | +2.0 / -5.5±TT |
| 14 | 13 | | | | | 23 | +2.0 / -19.0±TT |
| 15 | 13 | | | | | 23 | +2.0 / -18.0±TT |
| 16 | 13 | | | | | 23 | +2.0 / -20.0±TT |

Table 6.2.4B.5-8: UE Power Class test requirements (network signalled value "NS_08")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|----------------|
| 1 | 19 | | | | | 23 | +2.0 / -2.0±TT |
| 2 | 19 | | | | | 23 | +2.0 / -2.0±TT |
| 3 | 19 | | | | | 23 | +2.0 / -3.0±TT |
| 4 | 19 | | | | | 23 | +2.0 / -2.0±TT |
| 5 | 19 | | | | | 23 | +2.0 / -2.0±TT |
| 6 | 19 | | | | | 23 | +2.0 / -3.0±TT |
| 7 | 19 | | | | | 23 | +2.0 / -7.5±TT |
| 8 | 19 | | | | | 23 | +2.0 / -9.0±TT |
| 9 | 19 | | | | | 23 | +2.0 / -2.0±TT |
| 10 | 19 | | | | | 23 | +2.0 / -2.0±TT |
| 11 | 19 | | | | | 23 | +2.0 / -3.0±TT |
| 12 | 19 | | | | | 23 | +2.0 / -7.5±TT |
| 13 | 19 | | | | | 23 | +2.0 / -9.0±TT |

Table 6.2.4B.5-9: UE Power Class test requirements (network signalled value "NS_09")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|----------------|
| 1 | 21 | | | | | 23 | +2.0 / -2.0±TT |
| 2 | 21 | | | | | 23 | +2.0 / -2.0±TT |
| 3 | 21 | | | | | 23 | +2.0 / -3.0±TT |
| 4 | 21 | | | | | 23 | +2.0 / -2.0±TT |
| 5 | 21 | | | | | 23 | +2.0 / -2.0±TT |
| 6 | 21 | | | | | 23 | +2.0 / -3.0±TT |
| 7 | 21 | | | | | 23 | +2.0 / -4.0±TT |
| 8 | 21 | | | | | 23 | +2.0 / -5.5±TT |
| 9 | 21 | | | | | 23 | +2.0 / -2.0±TT |
| 19 | 21 | | | | | 23 | +2.0 / -2.0±TT |
| 11 | 21 | | | | | 23 | +2.0 / -3.0±TT |
| 12 | 21 | | | | | 23 | +2.0 / -4.0±TT |
| 13 | 21 | | | | | 23 | +2.0 / -5.5±TT |
| 14 | 21 | | | | | 23 | +2.0 / -7.5±TT |

Table 6.2.4B.5-10: UE Power Class test requirements (network signalled value "NS_11 for Band 23")

| Configuration ID | EUTRA band | Center Frequency | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|--------------------------------|---------------|-----------|---------------|-----------|---------------|---------------------|
| 1a | 23 | UL 2001.5 MHz DL 2181.5 MHz | | | | | | + 2.0 / -11.0±TT |
| 1b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.0 / -4.0±TT |
| 2a | 23 | UL 2001.5 MHz DL 2181.5 MHz | | | | | | + 2.0 / -11.0±TT |
| 2b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.0 / -4.0±TT |
| 3a | 23 | UL 2001.5 MHz DL 2181.5 MHz | | | | | | + 2.0 / -12.0±TT |
| 3b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.0 / -5.5±TT |
| 4a | 23 | UL 2001.5 MHz DL 2181.5 MHz | | | | | | + 2.0 / -12.0±TT |
| 4b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.0 / -5.5±TT |
| 5a | 23 | UL 2002.5 MHz DL 2182.5 MHz | | | | | | + 2.0 / -12.0±TT |
| 5b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.0 / -7.5±TT |
| 5c | 23 | UL 2007.5 MHz DL 2187.5 MHz | | | | | | + 2.0 / -2.0±TT |
| 6a | 23 | UL 2002.5 MHz DL 2182.5 MHz | | | | | | + 2.0 / -12.0±TT |
| 6b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.0 / -2.0±TT |
| 6c | 23 | UL 2007.5 MHz DL 2187.5 MHz | | | | | | + 2.0 / -3.0±TT |
| 7a | 23 | UL 2002.5 MHz DL 2182.5 MHz | | | | | | + 2.0 / -13.0±TT |
| 7b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.0 / -9.0±TT |
| 7c | 23 | UL 2007.5 MHz DL 2187.5 MHz | | | | | | + 2.0 / -4.0±TT |
| 8a | 23 | UL 2002.5 MHz DL 2182.5 MHz | | | | | | + 2.0 / -13.0±TT |
| 8b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.0 / -3.0±TT |
| 8c | 23 | UL 2007.5 MHz DL 2187.5 MHz | | | | | | + 2.0 / -4.0±TT |
| 9a | 23 | UL 2002.5 MHz DL 2182.5 MHz | | | | | | + 2.0 / -14.0±TT |
| 9b | 23 | UL 2004.5 MHz DL 2184.5 MHz | | | | | | + 2.0 / -11.0±TT |
| 9c | 23 | UL 2007.5 MHz DL 2187.5 MHz | | | | | | + 2.0 / -6.2±TT |
| 10 | 23 | UL 2005 MHz DL 2185 MHz | | | | | | + 2.0 / -18.0±TT |
| 11 | 23 | UL 2005 MHz DL 2185 MHz | | | | | | + 2.0 / -18.0±TT |
| 12 | 23 | UL 2005 MHz DL 2185 MHz | | | | | | + 2.0 / -19.0±TT |
| 13 | 23 | UL 2005 MHz DL 2185 MHz | | | | | | + 2.0 / -19.0±TT |
| 14 | 23 | UL 2005 MHz DL 2185 MHz | | | | | | + 2.0 / -20.0±TT |

Table 6.2.4B.5-11: UE Power Class test requirements (network signalled value "NS_12")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|-----------------|
| 1 | 26 | | | | | 23 | +2.0 / -5.5±TT |
| 2 | 26 | | | | | 23 | +2.0 / -12.0±TT |
| 3 | 26 | | | | | 23 | +2.0 / -2.0±TT |
| 4 | 26 | | | | | 23 | +2.0 / -5.5±TT |
| 5 | 26 | | | | | 23 | +2.0 / -13.0±TT |
| 6 | 26 | | | | | 23 | +2.0 / -7.5±TT |
| 7 | 26 | | | | | 23 | +2.0 / -7.5±TT |
| 8 | 26 | | | | | 23 | +2.0 / -2.0±TT |
| 9 | 26 | | | | | 23 | +2.0 / -7.5±TT |
| 10 | 26 | | | | | 23 | +2.0 / -11.0±TT |
| 11 | 26 | | | | | 23 | +2.0 / -9.0±TT |
| 12 | 26 | | | | | 23 | +2.0 / -7.5±TT |
| 13 | 26 | | | | | 23 | +2.0 / -2.0±TT |
| 14 | 26 | | | | | 23 | +2.0 / -7.5±TT |
| 15 | 26 | | | | | 23 | +2.0 / -9.0±TT |

Table 6.2.4B.5-12: UE Power Class test requirements (network signalled value "NS_13")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|----------------|
| 1 | 26 | | | | | 23 | +2.0 / -5.5±TT |
| 2 | 26 | | | | | 23 | +2.0 / -5.5±TT |
| 3 | 26 | | | | | 23 | +2.0 / -3.0±TT |
| 4 | 26 | | | | | 23 | +2.0 / -3.0±TT |
| 5 | 26 | | | | | 23 | +2.0 / -7.5±TT |

Table 6.2.4B.5-13: UE Power Class test requirements (network signalled value "NS_14")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|----------------|
| 1 | 26 | | | | | 23 | +2.0 / -5.5±TT |
| 2 | 26 | | | | | 23 | +2.0 / -3.0±TT |
| 3 | 26 | | | | | 23 | +2.0 / -4.0±TT |
| 4 | 26 | | | | | 23 | +2.0 / -3.0±TT |
| 5 | 26 | | | | | 23 | +2.0 / -5.5±TT |
| 6 | 26 | | | | | 23 | +2.0 / -5.5±TT |
| 7 | 26 | | | | | 23 | +2.0 / -3.0±TT |
| 8 | 26 | | | | | 23 | +2.0 / -4.0±TT |
| 9 | 26 | | | | | 23 | +2.0 / -3.0±TT |
| 10 | 26 | | | | | 23 | +2.0 / -5.5±TT |

Table 6.2.4B.5-14: UE Power Class test requirements (network signalled value "NS_15")

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|-----------------|
| 1 | 26 | | | | | 23 | +2.0 / -4.0±TT |
| 2 | 26 | | | | | 23 | +2.0 / -5.5±TT |
| 3 | 26 | | | | | 23 | +2.0 / -5.5±TT |
| 4 | 26 | | | | | 23 | +2.0 / -4.0±TT |
| 5 | 26 | | | | | 23 | +2.0 / -9.0±TT |
| 6 | 26 | | | | | 23 | +2.0 / -14.0±TT |
| 7 | 26 | | | | | 23 | +2.0 / -15.0±TT |
| 8 | 26 | | | | | 23 | +2.0 / -4.0±TT |
| 9 | 26 | | | | | 23 | +2.0 / -7.5±TT |
| 10 | 26 | | | | | 23 | +2.0 / -11.0±TT |
| 11 | 26 | | | | | 23 | +2.0 / -14.0±TT |
| 12 | 26 | | | | | 23 | +2.0 / -15.0±TT |
| 13 | 26 | | | | | 23 | +2.0 / -5.5±TT |
| 14 | 26 | | | | | 23 | +2.0 / -7.5±TT |
| 15 | 26 | | | | | 23 | +2.0 / -4.0±TT |
| 16 | 26 | | | | | 23 | +2.0 / -9.0±TT |
| 17 | 26 | | | | | 23 | +2.0 / -12.0±TT |
| 18 | 26 | | | | | 23 | +2.0 / -11.0±TT |
| 19 | 26 | | | | | 23 | +2.0 / -15.0±TT |
| 20 | 26 | | | | | 23 | +2.0 / -12.0±TT |
| 21 | 26 | | | | | 23 | +2.0 / -4.0±TT |
| 22 | 26 | | | | | 23 | +2.0 / -4.0±TT |
| 23 | 26 | | | | | 23 | +2.0 / -9.0±TT |
| 24 | 26 | | | | | 23 | +2.0 / -14.0±TT |
| 25 | 26 | | | | | 23 | +2.0 / -15.0±TT |
| 26 | 26 | | | | | 23 | +2.0 / -4.0±TT |
| 27 | 26 | | | | | 23 | +2.0 / -7.5±TT |
| 28 | 26 | | | | | 23 | +2.0 / -11.0±TT |
| 29 | 26 | | | | | 23 | +2.0 / -15.0±TT |
| 30 | 26 | | | | | 23 | +2.0 / -17.0±TT |
| 31 | 26 | | | | | 23 | +2.0 / -4.0±TT |
| 32 | 26 | | | | | 23 | +2.0 / - |

| | | | | | | | |
|----|----|--|--|--|--|----|---------------------|
| | | | | | | | 7.5±TT |
| 33 | 26 | | | | | 23 | +2.0 / - 11.0±TT |
| 34 | 26 | | | | | 23 | +2.0 / - 14.0±TT |
| 35 | 26 | | | | | 23 | +2.0 / - 15.0±TT |

Table 6.2.4B.5-15A: UE Power Class test requirements (network signalled value "NS_16") when lower channel edge is at 807 MHz

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|---------------------|
| 1 | 27 | | | | | 23 | +2.7 / - 4.7+TT |
| 2 | 27 | | | | | 23 | +2.7 / - 6.2+TT |
| 3 | 27 | | | | | 23 | +2.7 / - 8.2+TT |
| 4 | 27 | | | | | 23 | +2.7 / - 9.7+TT |
| 5 | 27 | | | | | 23 | +2.7 / - 4.7+TT |
| 6 | 27 | | | | | 23 | +2.7 / - 6.2+TT |
| 7 | 27 | | | | | 23 | +2.7 / - 11.7+TT |
| 8 | 27 | | | | | 23 | +2.7 / - 8.2+TT |
| 9 | 27 | | | | | 23 | +2.7 / - 11.7+TT |
| 10 | 27 | | | | | 23 | +2.7 / - 12.7+TT |
| 11 | 27 | | | | | 23 | +2.7 / - 9.7+TT |
| 12 | 27 | | | | | 23 | +2.7 / - 8.2+TT |
| 13 | 27 | | | | | 23 | +2.7 / - 4.7+TT |
| 14 | 27 | | | | | 23 | +2.7 / - 8.2+TT |
| 15 | 27 | | | | | 23 | +2.7 / - 13.7+TT |
| 16 | 27 | | | | | 23 | +2.7 / - 13.7+TT |
| 17 | 27 | | | | | 23 | +2.7 / - 14.7+TT |
| 18 | 27 | | | | | 23 | +2.7 / - 13.7+TT |
| 19 | 27 | | | | | 23 | +2.7 / - 13.7+TT |

NOTE: This is applicable for 3MHz, 5MHz and 10MHz Channel BW

Table 6.2.4B.5-15B: UE Power Class test requirements (network signalled value "NS_16") when lower channel edge is at 808.5 MHz

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|-----------------|
| 1 | 27 | | | | | 23 | +2.7 / -3.7+TT |
| 2 | 27 | | | | | 23 | +2.7 / -3.7+TT |
| 3 | 27 | | | | | 23 | +2.7 / -4.7+TT |
| 4 | 27 | | | | | 23 | +2.7 / -2.7+TT |
| 5 | 27 | | | | | 23 | +2.7 / -3.7+TT |
| 6 | 27 | | | | | 23 | +2.7 / -4.7+TT |
| 7 | 27 | | | | | 23 | +2.7 / -6.2+TT |
| 8 | 27 | | | | | 23 | +2.7 / -6.2+TT |
| 9 | 27 | | | | | 23 | +2.7 / -8.2+TT |
| 10 | 27 | | | | | 23 | +2.7 / -9.7+TT |
| 11 | 27 | | | | | 23 | +2.7 / -9.7+TT |
| 12 | 27 | | | | | 23 | +2.7 / -6.2+TT |
| 13 | 27 | | | | | 23 | +2.7 / -4.7+TT |
| 14 | 27 | | | | | 23 | +2.7 / -4.7+TT |
| 15 | 27 | | | | | 23 | +2.7 / -9.7+TT |
| 16 | 27 | | | | | 23 | +2.7 / -11.7+TT |
| 17 | 27 | | | | | 23 | +2.7 / -12.7+TT |
| 18 | 27 | | | | | 23 | +2.7 / -11.7+TT |
| 19 | 27 | | | | | 23 | +2.7 / -11.7+TT |

NOTE: This is applicable for 5MHz and 10MHz Channel BW

Table 6.2.4B.5-15C: UE Power Class test requirements (network signalled value "NS_16") when lower channel edge is at 812 MHz

| Configuration ID | EUTRA band | Class 1 (dBm) | Tol. (dB) | Class 2 (dBm) | Tol. (dB) | Class 3 (dBm) | Tol. (dB) |
|------------------|------------|---------------|-----------|---------------|-----------|---------------|----------------|
| 1 | 27 | | | | | 23 | +2.7 / -3.7+TT |
| 2 | 27 | | | | | 23 | +2.7 / -3.7+TT |
| 3 | 27 | | | | | 23 | +2.7 / -4.7+TT |
| 4 | 27 | | | | | 23 | +2.7 / -2.7+TT |
| 5 | 27 | | | | | 23 | +2.7 / -3.7+TT |
| 6 | 27 | | | | | 23 | +2.7 / -3.7+TT |
| 7 | 27 | | | | | 23 | +2.7 / -3.7+TT |
| 8 | 27 | | | | | 23 | +2.7 / -3.7+TT |
| 9 | 27 | | | | | 23 | +2.7 / -3.7+TT |
| 10 | 27 | | | | | 23 | +2.7 / -4.7+TT |
| 11 | 27 | | | | | 23 | +2.7 / -2.7+TT |
| 12 | 27 | | | | | 23 | +2.7 / -3.7+TT |
| 13 | 27 | | | | | 23 | +2.7 / -3.7+TT |
| 14 | 27 | | | | | 23 | +2.7 / -3.7+TT |
| 15 | 27 | | | | | 23 | +2.7 / -4.7+TT |
| 16 | 27 | | | | | 23 | +2.7 / -8.2+TT |
| 17 | 27 | | | | | 23 | +2.7 / -9.7+TT |
| 18 | 27 | | | | | 23 | +2.7 / -6.2+TT |
| 19 | 27 | | | | | 23 | +2.7 / -4.7+TT |

NOTE: This is applicable for 10 MHz Channel BW.

6.2.5 Configured UE transmitted Output Power

6.2.5.1 Test purpose

To verify the UE does not exceed the minimum between the P_{EMAX} maximum allowed UL TX Power signalled by the E-UTRAN and the P_{UMAX} maximum UE power for the UE power class.

6.2.5.2 Test applicability

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

6.2.5.3 Minimum conformance requirements

The UE is allowed to set its configured maximum output power P_{CMAX} . The configured maximum output power P_{CMAX} is set within the following bounds:

$$P_{CMAX_L} \leq P_{CMAX} \leq P_{CMAX_H}$$

Where

- $P_{\text{CMAX_L}} = \text{MIN} \{ P_{\text{EMAX}} - \Delta T_{\text{C}}, P_{\text{PowerClass}} - \text{MAX}(\text{MPR} + \text{A-MPR}, \text{P-MPR}) - \Delta T_{\text{C}} \}$
- $P_{\text{CMAX_H}} = \text{MIN} \{ P_{\text{EMAX}}, P_{\text{PowerClass}} \}$
- P_{EMAX} is the value given to IE *P-Max*, defined in [5]
- $P_{\text{PowerClass}}$ is the maximum UE power specified in Table 6.2.2.3-1 without taking into account the tolerance specified in the Table 6.2.2.3-1
- MPR and A-MPR are specified in Section 6.2.3 and Section 6.2.4, respectively
- P-MPR is the allowed maximum output power reduction for;
 - a) Ensuring compliance with applicable electromagnetic energy absorption requirements and addressing unwanted emissions / self desense requirements in case of simultaneous transmissions on multiple RAT(s) for scenarios not in scope of 3GPP RAN specifications.
 - b) Ensuring compliance with applicable electromagnetic energy absorption requirements in case of proximity detection is used to address such requirements that require a lower maximum output power.

The UE shall apply P-MPR only for the above cases. For UE conducted conformance testing P-MPR shall be 0 dB

NOTE 1: P-MPR was introduced in the P_{CMAX} equation such that the UE can report to the eNB the available maximum output transmit power. This information can be used by the eNB for scheduling decisions.

NOTE 2: P-MPR may impact the maximum uplink performance for the selected UL transmission path.

- $\Delta T_{\text{C}} = 1.5$ dB when Note 2 in Table 6.2.2.3-1 applies
- $\Delta T_{\text{C}} = 0$ dB when Note 2 in Table 6.2.2.3-1 does not apply

The measured maximum output power P_{CMAX} shall be within the following bounds:

$$P_{\text{CMAX_L}} - T(P_{\text{CMAX_L}}) \leq P_{\text{CMAX}} \leq P_{\text{CMAX_H}} + T(P_{\text{CMAX_H}})$$

Where

$T(P_{\text{CMAX}})$ is defined by the tolerance table below and applies to $P_{\text{CMAX_L}}$ and $P_{\text{CMAX_H}}$ separately.

Table 6.2.5.3-1: P_{CMAX} tolerance

| P_{CMAX} (dBm) | Tolerance $T(P_{\text{CMAX}})$ (dB) |
|-----------------------------------|--|
| $21 \leq P_{\text{CMAX}} \leq 23$ | 2.0 |
| $20 \leq P_{\text{CMAX}} < 21$ | 2.5 |
| $19 \leq P_{\text{CMAX}} < 20$ | 3.5 |
| $18 \leq P_{\text{CMAX}} < 19$ | 4.0 |
| $13 \leq P_{\text{CMAX}} < 18$ | 5.0 |
| $8 \leq P_{\text{CMAX}} < 13$ | 6.0 |
| $-40 \leq P_{\text{CMAX}} < 8$ | 7.0 |

The normative reference for this requirement is TS 36.101 [2] clause 6.2.5.

6.2.5.4 Test description

6.2.5.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.5.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.5.4.1-1: Test Configuration Table

| Initial Conditions | | | | | |
|--|--|------------------------------------|---------------|----------------------|--|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 | | Mid range | | | |
| Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1 | | Lowest, 5MHz, Highest | | | |
| Test Parameters for Channel Bandwidths | | | | | |
| | | Downlink Configuration | | Uplink Configuration | |
| Ch BW | N/A for Configured UE transmitted Output Power test case | Mod'n | RB allocation | | |
| | | | FDD | TDD | |
| 1.4MHz | | QPSK | 5 | 5 | |
| 3MHz | | QPSK | 4 | 4 | |
| 5MHz | | QPSK | 8 | 8 | |
| 10MHz | | QPSK | 12 | 12 | |
| 15MHz | | QPSK | 16 | 16 | |
| 20MHz | | QPSK | 18 | 18 | |
| Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. | | | | | |
| Note 2: For the uplink RB allocation the RB _{start} shall be RB #0. | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.5.4.1-1
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.5.4.3.

6.2.5.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.5.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send transmit uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach the P_{max} level of the test point.
3. Measure the mean power of the UE in the channel bandwidth for each test point in table 6.2.5.5-1 according to the test configuration from Table 6.2.5.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.5.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.2.5.4.3-1: SystemInformationBlockType1: Test point 1

| Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-Max | -10 | | |

Table 6.2.5.4.3-2: SystemInformationBlockType1: Test point 2

| Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-Max | 10 | | |

Table 6.2.5.4.3-3: SystemInformationBlockType1: Test point 3

| Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-Max | 15 | | |

6.2.5.5 Test requirement

The maximum output power measured shall not exceed the values specified in Table 6.2.5.5-1.

Table 6.2.5.5-1: P_{C_{MAX}} configured UE output power

| | Channel bandwidth / maximum output power | | | | | |
|---------------------------------------|--|---------|-------|--------|--------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Measured UE output power test point 1 | For carrier frequency $f \leq 3.0\text{GHz}$: $-10 \text{ dBm} \pm 7.7$ For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $-10 \text{ dBm} \pm 8.0$ | | | | | |
| Measured UE output power test point 2 | For carrier frequency $f \leq 3.0\text{GHz}$: $10 \text{ dBm} \pm 6.7$ For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $10 \text{ dBm} \pm 7.0$ | | | | | |
| Measured UE output power test point 3 | For carrier frequency $f \leq 3.0\text{GHz}$: $15 \text{ dBm} \pm 5.7$ For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $15 \text{ dBm} \pm 6.0$ | | | | | |
| Note: | In addition note 2 in Table 6.2.2.3-1 shall apply to the tolerances. | | | | | |

6.2.5A Configured transmitted power for CA

6.2.5A.1 Configured UE transmitted Output Power for CA (intra-band contiguous DL CA and UL CA)

6.2.5A.1.1 Test purpose

To verify the UE does not exceed the minimum between the P_{EMAX,c} maximum allowed UL TX Power signalled by the E-UTRAN and the P_{UMAX} maximum UE power for the UE power class.

6.2.5A.1.2 Test applicability

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

6.2.5A.1.3 Minimum conformance requirements

For carrier aggregation the UE is allowed to set its configured maximum output power P_{C_{MAX,c}} on serving cell c and its total configured maximum output power P_{C_{MAX}}.

The configured maximum output power on serving cell c shall be set within the following bounds:

$$P_{C_{MAX_L,c}} \leq P_{C_{MAX,c}} \leq P_{C_{MAX_H,c}}$$

For intra-band contiguous carrier aggregation:

$$- P_{C_{MAX_L,c}} = \text{MIN} \{ P_{E_{MAX,c}} - \Delta T_{C,c}, P_{PowerClass} - \text{MAX}(MPR_c + A - MPR_c, P - MPR_c) - \Delta T_{C,c} \}$$

For inter-band carrier aggregation:

- $P_{\text{CMAX_L},c} = \text{MIN} \{ P_{\text{EMAX},c} - \Delta T_{\text{C},c}, P_{\text{PowerClass}} - \text{MAX}(\text{MPR}_c + \text{A-MPR}_c + \Delta T_{\text{IB},c}, \text{P-MPR}_c) - \square T_{\text{C},c} \}$
- $P_{\text{CMAX_H},c} = \text{MIN} \{ P_{\text{EMAX},c}, P_{\text{PowerClass}} \}$
- $P_{\text{EMAX},c}$ is the value given by IE *P-Max* for serving cell c in [5].
- $P_{\text{PowerClass}}$ is the maximum UE power specified in Table 6.2.2.3-1 without taking into account the tolerance specified in the Table 6.2.2.3-1.
- $\Delta T_{\text{IB},c}$ is the additional tolerance for serving cell c as specified in Table 6.2.5A.1.3-3.

For inter-band carrier aggregation, MPR_c and A-MPR_c apply per serving cell c and are specified in clause 6.2.3 and clause 6.2.4, respectively. For intra-band contiguous carrier aggregation, $\text{MPR}_c = \text{MPR}$ and $\text{A-MPR}_c = \text{A-MPR}$ with MPR and A-MPR specified in clause 6.2.3A and clause 6.2.4A respectively.

- P-MPR_c accounts for power management for serving cell c . For intra-band contiguous carrier aggregation, there is one power management term for the UE, P-MPR , and $\text{P-MPR}_c = \text{P-MPR}$.
- $\Delta T_{\text{C},c} = 1.5$ dB when Note 2 in Table 6.2.2.3-1 applies to the serving cell c .
- $\Delta T_{\text{C},c} = 0$ dB when Note 2 in Table 6.2.2.3-1 does not apply to the serving cell c .

For inter-band carrier aggregation with one UL serving cell the total configured maximum output power P_{CMAX} shall be set within the following bounds:

$$P_{\text{CMAX_L}} \leq P_{\text{CMAX}} \leq P_{\text{CMAX_H}}$$

where

- $P_{\text{CMAX_L}} = P_{\text{CMAX_L},c}$
- $P_{\text{CMAX_H}} = P_{\text{CMAX_H},c}$

For intra-band contiguous carrier aggregation, $P_{\text{CMAX},c}$ is calculated under the assumption that the transmit power is increased by the same amount in dB on all component carriers.

For inter-band carrier aggregation, $P_{\text{CMAX},c}$ is calculated under the assumption that the transmit power is increased independently on all component carriers.

The measured maximum output power P_{UMAX} shall be within the following bounds:

- $P_{\text{CMAX_L}} - T(P_{\text{CMAX_L}}) \leq P_{\text{UMAX}} \leq P_{\text{CMAX_H}} + T(P_{\text{CMAX_H}})$

$T(P_{\text{CMAX}})$ is defined by the table below and applies to $P_{\text{CMAX_L}}$ and $P_{\text{CMAX_H}}$ separately.

Table 6.2.5A.1.3-1: P_{CMAX} tolerance

| P_{CMAX} (dBm) | Tolerance $T(P_{\text{CMAX}})$ (dB) |
|-----------------------------------|--|
| $21 \leq P_{\text{CMAX}} \leq 23$ | 2.0 |
| $20 \leq P_{\text{CMAX}} < 21$ | 2.5 |
| $19 \leq P_{\text{CMAX}} < 20$ | 3.5 |
| $18 \leq P_{\text{CMAX}} < 19$ | 4.0 |
| $13 \leq P_{\text{CMAX}} < 18$ | 5.0 |
| $8 \leq P_{\text{CMAX}} < 13$ | 6.0 |
| $-40 \leq P_{\text{CMAX}} < 8$ | 7.0 |

For carrier aggregation with two UL serving cells, the total configured maximum output power P_{CMAX} shall be set within the following bounds:

$$P_{\text{CMAX_L_CA}} \leq P_{\text{CMAX}} \leq P_{\text{CMAX_H_CA}}$$

For intra-band contiguous carrier aggregation,

- $P_{\text{CMAX_L_CA}} = \text{MIN}\{10 \log_{10} \sum P_{\text{EMAX},c} - \Delta T_C, P_{\text{PowerClass}} - \text{MAX}(\text{MPR} + \text{A-MPR}, \text{P-MPR}) - \Delta T_C\}$
- $P_{\text{CMAX_H_CA}} = \text{MIN}\{10 \log_{10} \sum P_{\text{EMAX},c}, P_{\text{PowerClass}}\}$

where

- $P_{\text{EMAX},c}$ is the linear value of $P_{\text{EMAX},c}$ which is given by IE *P-Max* for serving cell c in [5].
- $P_{\text{PowerClass}}$ is the maximum UE power specified in Table 6.2.2A.1.3-1 without taking into account the tolerance specified in the Table 6.2.2A.1.3-1.
- MPR and A-MPR specified in clause 6.2.3A and clause 6.2.4A respectively.
- P-MPR is the power management term for the UE.
- ΔT_C is the highest value $\Delta T_{C,c}$ among all serving cells c in the subframe over both timeslots. $\Delta T_{C,c} = 1.5$ dB when Note 2 in Table 6.2.2A.3-1 applies to the serving cell c . $\Delta T_{C,c} = 0$ dB when Note 2 in Table 6.2.2A.1.3-1 does not apply to the serving cell c .

For inter-band carrier aggregation with up to one serving cell c per operating band:

$$P_{\text{CMAX_L_CA}} = \text{MIN}\{10 \log_{10} \sum \text{MIN}[P_{\text{EMAX},c}/(\Delta t_{C,c}), P_{\text{PowerClass}}/(\text{mpr}_c - \text{a-mpr}_c - \Delta t_{C,c} - \Delta t_{\text{IB},c}), P_{\text{PowerClass}}/(\text{pmpr}_c - \Delta t_{C,c})], P_{\text{PowerClass}}\}$$

$$P_{\text{CMAX_H_CA}} = \text{MIN}\{10 \log_{10} \sum P_{\text{EMAX},c}, P_{\text{PowerClass}}\}$$

where

- $P_{\text{EMAX},c}$ is the linear value of $P_{\text{EMAX},c}$ which is given by IE *P-Max* for serving cell c in [5].
- $P_{\text{PowerClass}}$ is the maximum UE power specified in Table 6.2.2A.1.3-1 without taking into account the tolerance specified in the Table 6.2.2A.1.3-1. $P_{\text{PowerClass}}$ is the linear value of $P_{\text{PowerClass}}$.
- MPR_c and A-MPR_c apply per serving cell c and are specified in clause 6.2.3 and clause 6.2.4, respectively. mpr_c is the linear value of MPR_c , a-mpr_c is the linear value of A-MPR_c .
- P-MPR_c accounts for power management for serving cell c . pmpr_c is the linear value of P-MPR_c .
- $\Delta t_{C,c} = 1.41$ when Note 2 in Table 6.2.2.3-1 applies for a serving cell c
- $\Delta t_{C,c} = 1$ when Note 2 in Table 6.2.2.3-1 does not apply for a serving cell c
- $\Delta t_{\text{IB},c}$ is the linear value of the inter-band relaxation term of the serving cell c $\Delta t_{\text{IB},c}$. $\Delta t_{\text{IB},c} = 1$ □when no inter band relaxation is allowed..

The measured maximum output power PUMAX over all serving cells shall be within the following range:

$$P_{\text{CMAX_L_CA}} - T(P_{\text{CMAX_L_CA}}) \leq P_{\text{UMAX}} \leq P_{\text{CMAX_H_CA}} + T(P_{\text{CMAX_H_CA}})$$

$$P_{\text{UMAX}} = 10 \log_{10} \sum P_{\text{UMAX},c}$$

where

- $P_{\text{UMAX},c}$ denotes the measured maximum output power for serving cell c expressed in linear scale.

The tolerance $T(P_{\text{CMAX}})$ is defined by the table below and applies to $P_{\text{CMAX_L_CA}}$ and $P_{\text{CMAX_H_CA}}$ separately.

Table 6.2.5A.1.3-2: P_{CMAX} tolerance

| P_{CMAX} (dBm) | Tolerance T(P_{CMAX}) Intra-band with two active UL serving cells (dB) | Tolerance T(P_{CMAX}) Inter-band with two active UL serving cells (dB) |
|-----------------------------------|---|---|
| $21 \leq P_{\text{CMAX}} \leq 23$ | 2.0 | 2.0 |
| $20 \leq P_{\text{CMAX}} < 21$ | [2.5] | TBD |
| $19 \leq P_{\text{CMAX}} < 20$ | [3.5] | TBD |
| $18 \leq P_{\text{CMAX}} < 19$ | [4.0] | TBD |
| $13 \leq P_{\text{CMAX}} < 18$ | [5.0] | TBD |
| $8 \leq P_{\text{CMAX}} < 13$ | [6.0] | TBD |
| $-40 \leq P_{\text{CMAX}} < 8$ | [7.0] | TBD |

For the UE which supports inter-band carrier aggregation configurations with uplink assigned to one E-UTRA band the $\Delta T_{\text{IB,c}}$ is defined for applicable bands in Table 6.2.5A.1.3-3.

Table 6.2.5A.1.3-3: $\Delta T_{\text{IB,c}}$

| Inter-band CA Configuration | E-UTRA Band | $\Delta T_{\text{IB,c}}$ [dB] |
|-----------------------------|-------------|-------------------------------|
| CA_1A-5A | 1 | 0.3 |
| | 5 | 0.3 |
| CA_1A-18A | 1 | 0.3 |
| | 18 | 0.3 |
| CA_1A-19A | 1 | 0.3 |
| | 19 | 0.3 |
| CA_1A-21A | 1 | 0.3 |
| | 21 | 0.3 |
| CA_2A-17A | 2 | 0.3 |
| | 17 | 0.8 |
| CA_4A-17A | 4 | 0.3 |
| | 17 | 0.8 |
| CA_4A-5A | 4 | 0.3 |
| | 5 | 0.3 |
| CA_4A-13A | 4 | 0.3 |
| | 13 | 0.3 |
| CA_2A-29A | 2 | 0.3 |
| CA_3A-8A | 3 | 0.3 |
| | 8 | 0.3 |
| CA_11A-18A | 11 | 0.6 |
| | 18 | 0.6 |

NOTE: The $\Delta T_{\text{IB,c}}$ in Table 6.2.5A.1.3-3 has been derived for a UE supporting a single interband LTE CA band combination. For a UE supporting additional interband LTE CA band combinations, the $\Delta T_{\text{IB,c}}$ for all bands supported by the UE, need to be studied.

The normative reference for this requirement is TS 36.101 [2] clause 6.2.5A.

6.2.5A.1.4 Test description

6.2.5A.1.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.5A.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.5A.1.4.1-1: Test Configuration Table

| 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. | | | | | C: Mid range | | | |
| Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration | | | | | Lowest N_{RB_agg} Highest N_{RB_agg} | | | |
| Test Parameters for CA Configurations | | | | | | | | |
| CA Configuration / N_{RB_agg} | | DL Allocation | CC MOD | UL Allocation | | | | |
| PCC N_{RB} | SCCs N_{RB} | PCC & SCC RB allocation | | N_{RB_alloc} | PCC & SCC RB allocations (L_{CRB} @ RB_{start}) | | | |
| 75 | 75 | N/A for this test | QPSK | 16 | P_16@0 | S_0@0 | - | - |
| 100 | 50 | | QPSK | 12 | P_12@0 | S_0@0 | - | - |
| 100 | 100 | | QPSK | 18 | P_18@0 | S_0@0 | - | - |
| Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1 | | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.5A.1.4.1-1
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.5A.1.4.3.

6.2.5A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1, and Annex C.3.0 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.2.5A.1.4.3.
3. SS activates SCC by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.5A.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send transmit uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach the P_{UMAX} level of the test point.

6. Measure the mean power over all component carriers in the CA configuration for each test point in table 6.2.5A.1.5-1 according to the test configuration from Table 6.2.5A.1.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.5A.1.4.3 Message contents

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

Table 6.2.5A.1.4.3-1: SystemInformationBlockType1: Test point 1

| Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-Max | -10 | | |

Table 6.2.5A.1.4.3-2: SystemInformationBlockType1: Test point 2

| Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-Max | 10 | | |

Table 6.2.5A.1.4.3-3: SystemInformationBlockType1: Test point 3

| Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-Max | 15 | | |

6.2.5A.1.5 Test requirement

The maximum output power measured shall not exceed the values specified in Table 6.2.5A.1.5-1.

Table 6.2.5A.1.5-1: P_{C_{MAX}} configured UE output power

| | Channel bandwidth / maximum output power | | |
|---------------------------------------|--|----------------------------------|------------------------------------|
| | 50RB+100RB (10 MHz + 20 MHz) | 75RB + 75RB (15 MHz + 15 MHz) | 100RB + 100RB (20 MHz + 20 MHz) |
| Measured UE output power test point 1 | For carrier frequency $f \leq 3.0\text{GHz}$: $-10 \text{ dBm} \pm 7.7$ For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $-10 \text{ dBm} \pm 8.0$ | | |
| Measured UE output power test point 2 | For carrier frequency $f \leq 3.0\text{GHz}$: $10 \text{ dBm} \pm 6.7$ For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $10 \text{ dBm} \pm 7.0$ | | |
| Measured UE output power test point 3 | For carrier frequency $f \leq 3.0\text{GHz}$: $15 \text{ dBm} \pm 5.7$ For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $15 \text{ dBm} \pm 6.0$ | | |
| Note: | In addition note 2 in Table 6.2.2A.1.3-1 shall apply to the tolerances. | | |

6.2.5A.2 Configured UE transmitted Output Power for CA (inter-band DL CA without UL CA)

Editor's note: Test requirements need a different format due to CA configuration specific tolerances.

6.2.5A.2.1 Test purpose

Same as in clause 6.2.5A.1.1.

6.2.5A.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support inter-band DL CA but no UL CA.

6.2.5A.2.3 Minimum conformance requirements

Same as in clause 6.2.5A.1.3.

6.2.5A.2.4 Test description

6.2.5A.2.4.1 Initial conditions

Same as in clause 6.2.5A.1.4.1 with the following exceptions:

- Instead of Table 6.2.5A.1.4.1-1 → use Table 6.2.5A.2.4.1-1.

Table 6.2.5A.2.4.1-1: Test Configuration Table

| 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. | | | | A: Mid range for PCC and SCC | | |
| Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration | | | | Lowest N_{RB_agg} Highest N_{RB_agg} | | |
| Test Parameters for CA Configurations | | | | | | |
| CA Configuration / N_{RB_agg} | | DL Allocation | CC MOD | UL Allocation | | |
| PCC N_{RB} | SCCs N_{RB} | PCC & SCC RB allocation | | N_{RB_alloc} | PCC RB allocations (LCRB @ RB _{start}) | |
| 6 | 25 | N/A for this test | QPSK | 5 | P_5@0 | - |
| 15 | 25 | | QPSK | 4 | P_4@0 | - |
| 25 | 50 | | QPSK | 8 | P_8@0 | - |
| 50 | 75 | | QPSK | 12 | P_12@0 | - |
| 75 | 100 | | QPSK | 16 | P_16@0 | - |
| 100 | 75 | | QPSK | 18 | P_18@0 | - |
| Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1 | | | | | | |
| Note 2: PCC and SCC shall be switched and tested in each configuration. | | | | | | |

6.2.5A.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1, and Annex C.3.0 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.2.5A.2.4.3.
3. SS activates SCC by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.

4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.5A.2.4.1-1 on PCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send transmit uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach the P_{UMAX} level of the test point.
6. Measure the mean power over all component carriers in the CA configuration for each test point in table 6.2.5A.2.5-1 according to the test configuration from Table 6.2.5A.2.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.5A.2.4.3 Message contents

Same as in clause 6.2.5A.1.1.

6.2.5A.2.5 Test requirement

The maximum output power measured shall not exceed the values specified in Table 6.2.5A.2.5-1.

Table 6.2.5A.2.5-1: P_{CMAX} configured UE output power

| | Channel bandwidth / maximum output power | | | | | |
|---------------------------------------|--|---------|-------|--------|--------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Measured UE output power test point 1 | For carrier frequency $f \leq 3.0\text{GHz}$: $-10 \text{ dBm} \pm 7.7$ For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $-10 \text{ dBm} \pm 8.0$ | | | | | |
| Measured UE output power test point 2 | For carrier frequency $f \leq 3.0\text{GHz}$: $10 \text{ dBm} \pm 6.7$ For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $10 \text{ dBm} \pm 7.0$ | | | | | |
| Measured UE output power test point 3 | For carrier frequency $f \leq 3.0\text{GHz}$: $15 \text{ dBm} \pm 5.7$ For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $15 \text{ dBm} \pm 6.0$ | | | | | |
| Note: | In addition note 2 in Table 6.2.2.3-1 shall apply to the tolerances. | | | | | |

6.2.5B Configured UE transmitted Output Power for UL-MIMO

Editor's notes: The following items are missing or incomplete:

- Test Tolerance

6.2.5B.1 Test purpose

To verify the UE does not exceed the minimum between the P_{EMAX} maximum allowed UL TX Power for UL-MIMO signalled by the E-UTRAN and the P_{UMAX} maximum UE power for the UE power class.

6.2.5B.2 Test applicability

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

6.2.5B.3 Minimum conformance requirements

For UE with multiple transmit antenna connectors, the transmitted power is configured per each UE.

The definitions of configured maximum output power P_{CMAX} , the lower bound $P_{CMAX,L}$, and the higher bound $P_{CMAX,H}$ specified in Section 6.2.5 shall apply to UE with multiple transmit antenna connectors, where

- $P_{PowerClass}$ and ΔT_C are specified in Section 6.2.2B
- MPR is specified in Section 6.2.3B
- A-MPR is specified in Section 6.2.4B

The measured configured maximum output power P_{UMAX} shall be within the following bounds:

$$P_{CMAX_L} - T_{LOW}(P_{CMAX_L}) \leq P_{UMAX} \leq P_{CMAX_H} + T_{HIGH}(P_{CMAX_H})$$

where $T_{LOW}(P_{CMAX_L})$ and $T_{HIGH}(P_{CMAX_H})$ are defined as the tolerance and applies to P_{CMAX_L} and P_{CMAX_H} separately.

For UE with two transmit antenna connectors, the tolerance is specified in Table 6.2.5B.3-1 with UL-MIMO configurations specified in Table 6.2.2B.3-2.

Table 6.2.5B.3-1: P_{CMAX} tolerance in closed-loop spatial multiplexing scheme

| P_{CMAX} (dBm) | Tolerance $T_{LOW}(P_{CMAX_L})$ (dB) | Tolerance $T_{HIGH}(P_{CMAX_H})$ (dB) |
|------------------------------|--|---|
| $P_{CMAX}=23$ | 3.0 | 2.0 |
| $[22] \leq P_{CMAX} < [23]$ | [5.0] | [2.0] |
| $[21] \leq P_{CMAX} < [22]$ | [5.0] | [3.0] |
| $[20] \leq P_{CMAX} < [21]$ | [6.0] | [4.0] |
| $[16] \leq P_{CMAX} < [20]$ | [5.0] | |
| $[11] \leq P_{CMAX} < [16]$ | [6.0] | |
| $[-40] \leq P_{CMAX} < [11]$ | [7.0] | |

The normative reference for this requirement is TS 36.101 [2] clause 6.2.5B.

6.2.5B.4 Test description

6.2.5B.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.5B.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.5B.4.1-1: Test Configuration Table

| Initial Conditions | | | | | |
|--|--|------------------------------------|----------------------|---------------|----|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 | | Mid range | | | |
| Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1 | | Lowest, 5MHz, Highest | | | |
| Test Parameters for Channel Bandwidths | | | | | |
| Ch BW | Downlink Configuration | | Uplink Configuration | | |
| | N/A for Configured UE transmitted Output Power test case | | Mod'n | RB allocation | |
| FDD | | | | TDD | |
| 1.4MHz | | | QPSK | 5 | 5 |
| 3MHz | | | QPSK | 4 | 4 |
| 5MHz | | | QPSK | 8 | 8 |
| 10MHz | | | QPSK | 12 | 12 |
| 15MHz | | | QPSK | 16 | 16 |
| 20MHz | | | QPSK | 18 | 18 |
| Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. | | | | | |
| Note 2: For the uplink RB allocation the RB_{start} shall be RB #0. | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.5B.4.1-1
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.5B.4.3.

6.2.5B.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.2.5B.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send transmit uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach the P_{umax} level of the test point.
3. Measure the sum mean power of the UE at each UE antenna connector in the associated measurement bandwidth for each test point in table 6.2.5B.5-1 according to the test configuration from Table 6.2.5B.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.5B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 6.2.5B.4.3-1: SystemInformationBlockType1: Test point 1

| Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-Max | -10 | | |

Table 6.2.5B.4.3-2: SystemInformationBlockType1: Test point 2

| Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-Max | 13 | | |

Table 6.2.5B.4.3-3: SystemInformationBlockType1: Test point 3

| Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-Max | 18 | | |

6.2.5B.5 Test requirement

The maximum output power measured shall not exceed the values specified in Table 6.2.5B.5-1.

Table 6.2.5B.5-1: P_{CMAX} configured UE output power

| | Channel bandwidth / maximum output power | | | | | |
|--|--|---------|-------|--------|--------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| | | | | | | |

| | |
|---------------------------------------|--|
| Measured UE output power test point 1 | For carrier frequency $f \leq 3.0\text{GHz}$: $-10 \text{ dBm} \pm 7+\text{TT}$ For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $-10 \text{ dBm} \pm 7+\text{TT}$ |
| Measured UE output power test point 2 | For carrier frequency $f \leq 3.0\text{GHz}$: $13 \text{ dBm} \pm 6+\text{TT}$ For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $13 \text{ dBm} \pm 6+\text{TT}$ |
| Measured UE output power test point 3 | For carrier frequency $f \leq 3.0\text{GHz}$: $18 \text{ dBm} \pm 5+\text{TT}$ For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $18 \text{ dBm} \pm 5+\text{TT}$ |
| Note: | In addition note 2 in Table 6.2.2B.3-1 shall apply to the tolerances. |

6.3 Output Power Dynamics

6.3.1 Void

6.3.2 Minimum Output Power

6.3.2.1 Test purpose

To verify the UE's ability to transmit with a broadband output power below the value specified in the test requirement when the power is set to a minimum value.

6.3.2.2 Test applicability

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

6.3.2.3 Minimum conformance requirements

The minimum output power is defined as the mean power in one sub-frame (1ms). The minimum output power shall not exceed the values specified in Table 6.3.2.3-1.

Table 6.3.2.3-1: Minimum output power

| | Channel bandwidth / minimum output power / measurement bandwidth | | | | | |
|-----------------------|--|---------|---------|---------|----------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Minimum output power | -40 dBm | | | | | |
| Measurement bandwidth | 1.08 MHz | 2.7 MHz | 4.5 MHz | 9.0 MHz | 13.5 MHz | 18 MHz |

The normative reference for this requirement is TS 36.101 [2] clause 6.3.2.1.

Minimum output power test verifies the UE's ability to transmit with a broadband output power below the specified limit when the power is set to a minimum value. The broadband output power is defined as the power in the channel bandwidth, for all transmit bandwidth configurations (resource blocks).

An excess minimum output power potentially increases the Rise Over Thermal (RoT) and therefore reduces the cell coverage area for other UEs.

6.3.2.4 Test description

6.3.2.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.2.4.1-1: Test Configuration Table

| Initial Conditions | | | | |
|--|-------------------------------|------------------------------------|---------------|-----|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 | | Low range, Mid range, High range | | |
| Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1 | | Lowest, 5MHz, Highest | | |
| Test Parameters for Channel Bandwidths | | | | |
| | Downlink Configuration | Uplink Configuration | | |
| Ch BW | N/A for min output power test | Mod'n | RB allocation | |
| | | | FDD | TDD |
| 1.4MHz | | QPSK | 6 | 6 |
| 3MHz | | QPSK | 15 | 15 |
| 5MHz | | QPSK | 25 | 25 |
| 10MHz | | QPSK | 50 | 50 |
| 15MHz | | QPSK | 75 | 75 |
| 20MHz | | QPSK | 100 | 100 |
| Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.2.4.3.

6.3.2.4.2 Test procedure

SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.3.2.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC

2. Send continuous uplink power control "down" commands in the uplink scheduling information to the UE to ensure that the UE transmits at its minimum output power.
3. Measure the mean power of the UE in the associated measurement bandwidth specified in Table 6.3.2.5-1 for the specific channel bandwidth under test. The period of measurement shall be the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.3.2.4.3 Message contents

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

6.3.2.5 Test requirement

The minimum output power measured shall not exceed the values specified in Table 6.3.2.5-1.

Table 6.3.2.5-1: Minimum output power

| | Channel bandwidth / minimum output power / measurement bandwidth | | | | | |
|--------------------------------|--|---------|---------|---------|----------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Minimum output power | For carrier frequency $f \leq 3.0\text{GHz}$: ≤ -39 dBm For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: ≤ -38.7 dBm | | | | | |
| Measurement bandwidth (Note 1) | 1.08 MHz | 2.7 MHz | 4.5 MHz | 9.0 MHz | 13.5 MHz | 18 MHz |
| Note 1: | Different implementations such as FFT or spectrum analyzer approach are allowed. For spectrum analyzer approach the measurement bandwidth is defined as an equivalent noise bandwidth. | | | | | |

6.3.2A Minimum Output Power for CA

6.3.2A.1 Minimum Output Power for CA (intra-band contiguous DL CA and UL CA)

6.3.2A.1.1 Test purpose

To verify the UE's ability to transmit with a broadband output power below the value specified in the test requirement when the power on each component carrier is set to a minimum value.

6.3.2A.1.2 Test applicability

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

6.3.2A.1.3 Minimum conformance requirements

For intra-band contiguous carrier aggregation, the minimum controlled output power of the UE is defined as the transmit power of the UE per component carrier, i.e., the power in the channel bandwidth of each component carrier for all transmit bandwidth configurations (resource blocks), when the power on both component carriers are set to a minimum value.

For intra-band contiguous carrier aggregation the minimum output power is defined as the mean power in one sub-frame (1ms). The minimum output power shall not exceed the values specified in Table 6.3.2A.1.3-1.

Table 6.3.2A.1.3-1: Minimum output power for intra-band contiguous CA UE

| | CC Channel bandwidth / Minimum output power / Measurement bandwidth | | | | | |
|-----------------------|---|---------|-------|---------|----------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Minimum output power | -40 dBm | | | | | |
| Measurement bandwidth | | | | 9.0 MHz | 13.5 MHz | 18 MHz |

The normative reference for this requirement is TS 36.101 [2] clause 6.3.2A.

6.3.2A.1.4 Test description

6.3.2A.1.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.2A.1.4.1-1. The details of the uplink reference

measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.2A.1.4.1-1: Test Configuration Table

| 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. | | | | | C: Low and High range | | | | |
| Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration | | | | | Lowest N_{RB_agg} Highest N_{RB_agg} | | | | |
| Test Parameters for CA Configurations | | | | | | | | | |
| CA Configuration / N_{RB_agg} | | DL Allocation | | CC MOD | UL Allocation | | | | |
| PCC N_{RB} | SCCs N_{RB} | PCC & SCC RB allocation | | | N_{RB_alloc} | PCC & SCC RB allocations (L_{CRB} @ RB_{start}) | | | |
| 75 | 75 | | | QPSK | 150 | P_75@0 | S_75@0 | - | - |
| 100 | 50 | | | QPSK | 150 | P_100@0 | S_50@0 | - | - |
| 100 | 100 | | | QPSK | 200 | P_100@0 | S_100@0 | - | - |
| Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1 | | | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.2A.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.2A.1.4.3.

6.3.2A.1.4.2 Test procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.3.2A.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.3.2A.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "down" commands in every uplink scheduling information to the UE to ensure that the UE transmits at its minimum output power.

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

6.3.2A.1.4.3 Message contents

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

6.3.2A.1.5 Test requirements

For each component carrier, the minimum output power measured shall not exceed the values specified in Table 6.3.2A.1.5-1.

Table 6.3.2A.1.5-1: Minimum output power for intra-band contiguous CA UE

| | CC Channel bandwidth / Minimum output power / Measurement bandwidth | | | | | |
|-----------------------|--|---------|-------|---------|----------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Minimum output power | For carrier frequency $f \leq 3.0\text{GHz}$: $\leq -39\text{ dBm}$ For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $\leq -38.7\text{ dBm}$ | | | | | |
| Measurement bandwidth | | | | 9.0 MHz | 13.5 MHz | 18 MHz |
| Note 1: | Different implementations such as FFT or spectrum analyzer approach are allowed. For spectrum analyzer approach the measurement bandwidth is defined as an equivalent noise bandwidth. | | | | | |

6.3.2B Minimum Output Power for UL-MIMO

Editor's notes: The following items are missing or incomplete:

- Test Tolerance

6.3.2B.1 Test purpose

To verify the UE's ability to transmit with a UL-MIMO broadband output power below the value specified in the test requirement when the power is set to a minimum value.

6.3.2B.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO

6.3.2B.3 Minimum conformance requirements

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the minimum output power is defined as the sum of the mean power at each UE antenna connector in one sub-frame (1ms). The minimum output power shall not exceed the values specified in Table 6.3.2B.3-1.

Table 6.3.2B.3-1: Minimum output power

| | Channel bandwidth / Minimum output power / Measurement bandwidth | | | | | |
|-----------------------|--|---------|---------|---------|----------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Minimum output power | -40 dBm | | | | | |
| Measurement bandwidth | 1.08 MHz | 2.7 MHz | 4.5 MHz | 9.0 MHz | 13.5 MHz | 18 MHz |

The normative reference for this requirement is TS 36.101 [2] clause 6.3.2B.1.

6.3.2B.4 Test description

6.3.2B.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.2B.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.2B.4.1-1: Test Configuration Table

| Initial Conditions | | | | |
|--|------------------------------------|----------------------|---------------|-----|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 | Low range, Mid range, High range | | | |
| Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1 | Lowest, 5MHz, Highest | | | |
| Test Parameters for Channel Bandwidths | | | | |
| Ch BW | Downlink Configuration | Uplink Configuration | | |
| | | Mod'n | RB allocation | |
| | N/A for min output power test | | FDD | TDD |
| 1.4MHz | | QPSK | 6 | 6 |
| 3MHz | | QPSK | 15 | 15 |
| 5MHz | | QPSK | 25 | 25 |
| 10MHz | | QPSK | 50 | 50 |
| 15MHz | | QPSK | 75 | 75 |
| 20MHz | | QPSK | 100 | 100 |
| Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.2B.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.2B.4.3.

6.3.2B.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.3.2B.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuous uplink power control "down" commands in the uplink scheduling information to the UE to ensure that the UE transmits at its minimum output power.
3. Measure the sum of mean power of the UE at each UE antenna connector in the associated measurement bandwidth specified in Table 6.3.2B.5-1 for the specific channel bandwidth under test. The period of measurement shall be the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.3.2B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.6.3.2B.5 Test requirement

The minimum sum of mean output power of the UE at each antenna connector measured shall not exceed the values specified in Table 6.3.2B.5-1.

Table 6.3.2B.5-1: Minimum output power

| | Channel bandwidth / minimum output power / measurement bandwidth | | | | | |
|--------------------------------|--|---------|---------|---------|----------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Minimum output power | For carrier frequency $f \leq 3.0\text{GHz}$: $\leq -40 + \text{TT dBm}$ For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $\leq -40 + \text{TT dBm}$ | | | | | |
| Measurement bandwidth (Note 1) | 1.08 MHz | 2.7 MHz | 4.5 MHz | 9.0 MHz | 13.5 MHz | 18 MHz |
| Note 1: | Different implementations such as FFT or spectrum analyzer approach are allowed. For spectrum analyzer approach the measurement bandwidth is defined as an equivalent noise bandwidth. | | | | | |

6.3.3 Transmit OFF power

6.3.3.1 Test purpose

To verify that the UE transmit OFF power is lower than the value specified in the test requirement.

6.3.3.2 Test applicability

The requirements of this test apply in test cases 6.3.4.1 General ON/OFF time mask and 6.3.4.2 PRACH and SRS time mask to all types of E-UTRA UE release 8 and forward.

6.3.3.3 Minimum conformance requirement

The transmit OFF power is defined as the mean power in a duration of at least one sub-frame (1ms) excluding any transient periods. The requirement for the transmit OFF power shall not exceed the values specified in Table 6.3.3.3-1.

Table 6.3.3.3-1: Transmit OFF power

| | Channel bandwidth / Transmit OFF power / measurement bandwidth | | | | | |
|-----------------------|--|---------|---------|---------|----------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Transmit OFF power | -50 dBm | | | | | |
| Measurement bandwidth | 1.08 MHz | 2.7 MHz | 4.5 MHz | 9.0 MHz | 13.5 MHz | 18 MHz |

The normative reference for this requirement is TS 36.101 [2] clause 6.3.3.

Transmit OFF power is defined as the mean power when the transmitter is OFF. The transmitter is considered to be OFF when the UE is not allowed to transmit or during periods when the UE is not transmitting a sub-frame. During DTX and measurements gaps, the UE is not considered to be OFF.

An excess transmit OFF power potentially increases the Rise Over Thermal (RoT) and therefore reduces the cell coverage area for other UEs

6.3.3.4 Test description

This test is covered by clause 6.3.4.1 General ON/OFF time mask and 6.3.4.2 PRACH and SRS time mask.

6.3.3.5 Test requirement

The requirement for the transmit OFF power shall not exceed the values specified in Table 6.3.3.5-1.

Table 6.3.3.5-1: Transmit OFF power

| | Channel bandwidth / Transmit OFF power / measurement bandwidth | | | | | |
|-----------------------|--|---------|---------|---------|----------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Transmit OFF power | For carrier frequency $f \leq 3.0\text{GHz}$: ≤ -48.5 dBm For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: ≤ -48.2 dBm | | | | | |
| Measurement bandwidth | 1.08 MHz | 2.7 MHz | 4.5 MHz | 9.0 MHz | 13.5 MHz | 18 MHz |

6.3.3A UE Transmit OFF power for CA

6.3.3A.1 UE Transmit OFF power for CA (intra-band contiguous DL CA and UL CA)

6.3.3A.1.1 Test purpose

For intra-band contiguous carrier aggregation the transmit OFF power is defined as the mean power per component carrier when the transmitter is OFF on both component carriers. The transmitter is considered to be OFF when the UE is not allowed to transmit or during periods when the UE is not transmitting a sub-frame. During measurements gaps, the UE is not considered to be OFF.

To verify that the UE transmit OFF power for CA is lower than the value specified in the test requirement.

6.3.3A.1.2 Test applicability

The requirements of this test case apply in test cases 6.3.4A.1 General ON/OFF time mask for CA and 6.3.4.2 PRACH and SRS time mask to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.3.3A.1.3 Minimum conformance requirements

For intra-band contiguous carrier aggregation the transmit OFF power is defined as the mean power in a duration of at least one sub-frame (1ms) excluding any transient periods. The transmit OFF power shall not exceed the values specified in Table 6.3.3A.1.3-1.

Table 6.3.3A.1.3-1: Transmit OFF power for intra-band contiguous CA UE

| | Channel bandwidth / Minimum output power / measurement bandwidth | | | | | |
|-----------------------|--|---------|-------|---------|----------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Transmit OFF power | -50 dBm | | | | | |
| Measurement bandwidth | | | | 9.0 MHz | 13.5 MHz | 18 MHz |

The normative reference for this requirement is TS 36.101[2] clause 6.3.3A

6.3.3A.1.4 Test description

This test is covered by clause 6.3.4A.1.1 General ON/OFF time mask for CA and 6.3.4.2 PRACH and SRS time mask.

6.3.3A.1.5 Test Requirements

Table 6.3.3A.1.5-1: Transmit OFF power for intra-band contiguous CA UE

| | Channel bandwidth / Minimum output power / Measurement bandwidth | | | | | |
|-----------------------|--|---------|-------|---------|----------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Transmit OFF power | -48.5 dBm | | | | | |
| Measurement bandwidth | | | | 9.0 MHz | 13.5 MHz | 18 MHz |

6.3.3B UE Transmit OFF power for UL-MIMO

Editor's notes: The following items are missing or incomplete:

- Test Tolerance

6.3.3B.1 Test purpose

To verify that the UE transmit OFF power for UL-MIMO is lower than the value specified in the test requirement.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.3B.2 Test applicability

The requirements of this test apply in test cases 6.3.4B.1 General ON/OFF time mask to all types of E-UTRA UE release 10 and forward that support UL-MIMO

6.3.3B.3 Minimum conformance requirement

The transmit OFF power is defined as the mean power at each transmit connector in a duration of at least one sub-frame (1ms) excluding any transient periods. The transmit OFF power at each transmit connector shall not exceed the values specified in Table 6.3.3B.3-1.

Table 6.3.3B.3-1: Transmit OFF power per antenna port

| | Channel bandwidth / Minimum output power / Measurement bandwidth | | | | | |
|-----------------------|--|---------|---------|---------|----------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Transmit OFF power | -50 dBm | | | | | |
| Measurement bandwidth | 1.08 MHz | 2.7 MHz | 4.5 MHz | 9.0 MHz | 13.5 MHz | 18 MHz |

The normative reference for this requirement is TS 36.101 [2] clause 6.3.3B.1.

6.3.3B.4 Test description

This test is covered by clause 6.3.4B.1 General ON/OFF time mask.

6.3.3B.5 Test requirement

The requirement for the transmit OFF power at each transmit antenna connector shall not exceed the values specified in Table 6.3.3B.5-1.

Table 6.3.3B.5-1: Transmit OFF power

| | Channel bandwidth / Transmit OFF power / measurement bandwidth |
|--|--|
| | |

| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
|-----------------------|--|---------|---------|---------|----------|--------|
| Transmit OFF power | For carrier frequency $f \leq 3.0\text{GHz}$: $\leq -50 + \text{TT dBm}$ For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $\leq -50 + \text{TT dBm}$ | | | | | |
| Measurement bandwidth | 1.08 MHz | 2.7 MHz | 4.5 MHz | 9.0 MHz | 13.5 MHz | 18 MHz |

6.3.4 ON/OFF time mask

6.3.4.1 General ON/OFF time mask

Editor's note: The measurement period in the minimum requirement is defined to be 1 subframe (14 symbols). Due to practical reasons the TDD measurement period for off power prior the PUSCH is 10 symbols. It is FFS, if this deviation is acceptable.

6.3.4.1.1 Test purpose

To verify that the general ON/OFF time mask meets the requirements given in 6.3.4.1.5.

The time mask for transmit ON/OFF defines the ramping time allowed for the UE between transmit OFF power and transmit ON power.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.4.1.2 Test applicability

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

6.3.4.1.3 Minimum conformance requirement

The General ON/OFF time mask defines the observation period between Transmit OFF and ON power and between Transmit ON and OFF power. ON/OFF scenarios include; the beginning or end of DTX, measurement gap, contiguous, and non contiguous transmission

The OFF power measurement period is defined in a duration of at least one sub-frame excluding any transient periods. The ON power is defined as the mean power over one sub-frame excluding any transient period.

There are no additional requirements on UE transmit power beyond that which is required in clause 6.2.2 and clause 6.6.2.3.

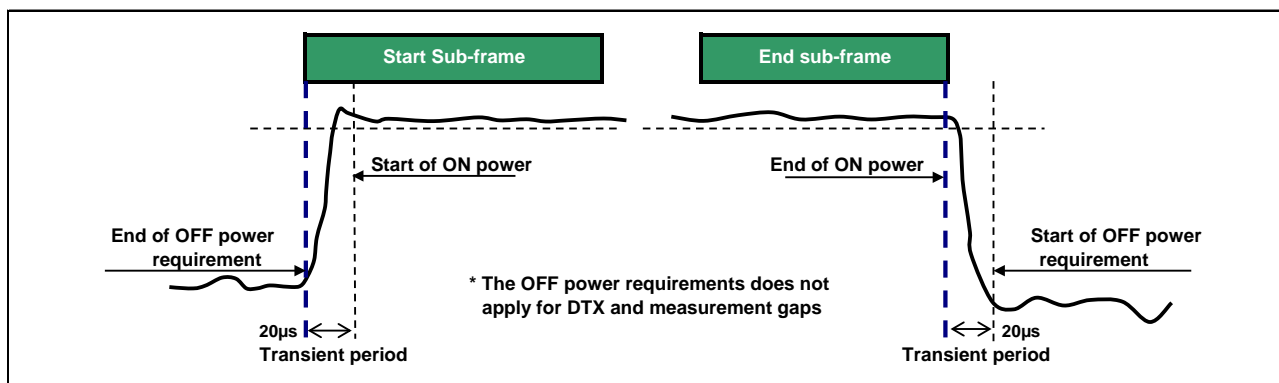


Figure 6.3.4.1.3-1: General ON/OFF time mask

The normative reference for this requirement is TS 36.101 [2] clause 6.3.4.1.

6.3.4.1.4 Test description

6.3.4.1.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.4.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2

Table 6.3.4.1.4.1-1: Test Configuration Table

| Initial Conditions | | | | | | |
|--|--|------------------------------------|----------------------|---------------|-----|--|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 | | Low range, Mid range, High range | | | | |
| Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1 | | Lowest, 5MHz, Highest | | | | |
| Test Parameters for Channel Bandwidths | | | | | | |
| | Downlink Configuration | | Uplink Configuration | | | |
| Ch BW | N/A for General On/Off Time Mask test case | | Mod'n | RB allocation | | |
| | | | | FDD | TDD | |
| 1.4MHz | | | QPSK | 6 | 6 | |
| 3MHz | | | QPSK | 15 | 15 | |
| 5MHz | | | QPSK | 25 | 25 | |
| 10MHz | | | QPSK | 50 | 50 | |
| 15MHz | | | QPSK | 75 | 75 | |
| 20MHz | | | QPSK | 100 | 100 | |
| Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 6.3.4.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.4.1.4.3. Note that PDCCH DCI format 0 sent after resetting uplink power with RRC Connection Reconfiguration, should have TPC command 0dB.

6.3.4.1.4.2 Test procedure

1. SS sends uplink scheduling information via PDCCH DCI format 0 with TPC command 0dB for C_RNTI to schedule the UL RMC according to Table 6.3.4.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. The UL assignment is such that the UE transmits on UL sub-frame 2 of every radio frame.
2. For FDD: Measure the UE transmission OFF power during the sub-frame prior to the PUSCH subframe. For TDD: Measure the UE transmission OFF power during the 10 SCFDMA symbols prior to the PUSCH subframe.
3. Measure the output power of the UE PUSCH transmission during one sub-frame, excluding a transient period of 20 μ s at the beginning of the subframe.

4. Measure the UE transmission OFF power during one sub-frame following the PUSCH subframe, excluding a transient period of 20 μ s at the beginning of the subframe.

6.3.4.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.3.4.1.4.3-1: UplinkPowerControlCommon: Test point 1

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT | | | |
|--|--------------|---|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH | -105 | Test point 1 to verify a UE relative low initial power transmission | |

Table 6.3.4.1.4.3-2: PhysicalConfigDedicated

| Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT | | | |
|--|-------------------------------------|---------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| PhysicalConfigDedicated-DEFAULT ::= SEQUENCE { UplinkPowerControlDedicated | UplinkPowerControlDedicated-DEFAULT | See subclause 4.6.3 | SRB1 |
| | UplinkPowerControlDedicated-DEFAULT | See subclause 4.6.3 | RBC |

Table 6.3.4.1.4.3-3: UplinkPowerControlDedicated

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT | | | |
|---|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE { p0-UE-PUSCH | 1 | | SRB1 |
| | 0 | | RBC |
| } | | | |

Table 6.3.4.1.3-4: TDD-Config-DEFAULT: On/OFF time mask measurement

| Derivation Path: 36.508 clause 5.3.1 Table 5.3.1-1 (<i>SystemInformationBlockType1</i>) | | | |
|---|--------------|---|-----------|
| Information Element | Value/remark | Comment | Condition |
| TDD-Config-DEFAULT ::= SEQUENCE { subframeAssignment | sa1 | | |
| specialSubframePatterns | ssp5 | To enable two symbol UpPTS, and to have 9 symbols GP. | |
| } | | | |

6.3.4.1.5 Test requirement

The requirement for the power measured in steps (2), (3) and (4) of the test procedure shall not exceed the values specified in Table 6.3.4.1.5-1.

Table 6.3.4.1.5-1: General ON/OFF time mask

| | Channel bandwidth / minimum output power / measurement bandwidth | | | | | |
|--|--|---------|-------|--------|--------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| | | | | | | |

| Transmit OFF power | For carrier frequency $f \leq 3.0\text{GHz}$: ≤ -48.5 dBm For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: ≤ -48.2 dBm | | | | | |
|--|--|--|--|--|--|--|
| Transmission OFF Measurement bandwidth | 1.08 MHz | 2.7 MHz | 4.5 MHz | 9.0 MHz | 13.5 MHz | 18 MHz |
| Expected Transmission ON Measured power | -14.8 dBm | -10.8 dBm | -8.6 dBm | -5.6 dBm | -3.9 dBm | -2.6 dBm |
| ON power tolerance $f \leq 3.0\text{GHz}$ $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ |

6.3.4.2 PRACH and SRS time mask

6.3.4.2.1 PRACH time mask

6.3.4.2.1.1 Test purpose

To verify that the PRACH time mask meets the requirements given in 6.3.4.2.1.5.

The time mask for PRACH time mask defines the ramping time allowed for the UE between transmit OFF power and transmit ON power when transmitting the PRACH.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.4.2.1.2 Test applicability

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

6.3.4.2.1.3 Minimum conformance requirement

For the PRACH Power / Time mask defines the observation period for PRACH transmissions. The PRACH ON power is specified as the mean power over the PRACH measurement period excluding any transient periods. The measurement period for different PRACH preamble format is specified in Table 6.3.4.2.1.3-1.

There are no additional requirements on UE transmit power beyond that which is required in clause 6.2.2 and clause 6.6.2.3

Table 6.3.4.2.1.3-1: PRACH ON power measurement period

| PRACH preamble format | Measurement period (ms) |
|-----------------------|-------------------------|
| 0 | 0.9031 |
| 1 | 1.4844 |
| 2 | 1.8031 |
| 3 | 2.2844 |
| 4 | 0.1479 |

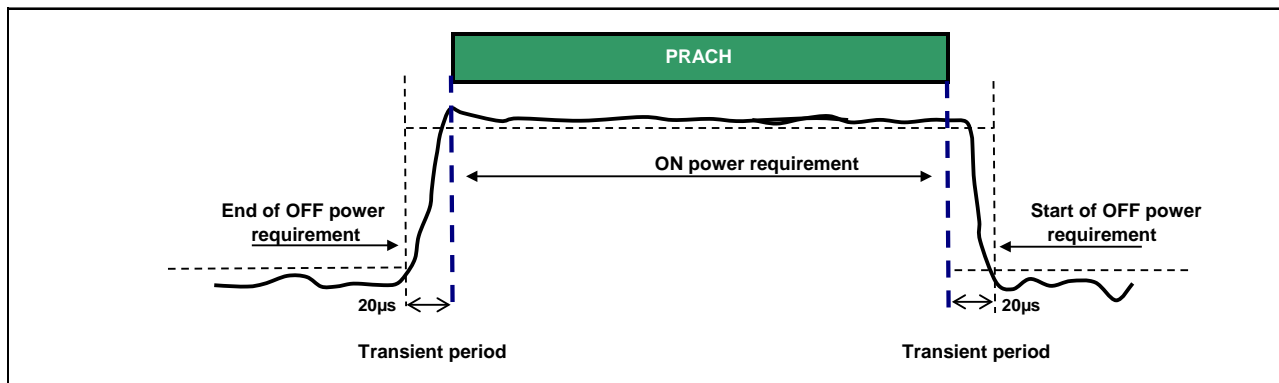


Figure 6.3.4.2.1.3-1: PRACH ON/OFF time mask

The normative reference for this requirement is TS 36.101 [2] clause 6.3.4.2.1.

6.3.4.2.1.4 Test description

6.3.4.2.1.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.4.2.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3.

Table 6.3.4.2.1.4.1-1: Test Configuration Table

| Initial Conditions | | |
|--|------------------------------------|-----|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | Normal, TL/VL, TL/VH, TH/VL, TH/VH | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | Mid range | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | Lowest, 5MHz, Highest | |
| PRACH preamble format | | |
| | FDD | TDD |
| PRACH Configuration Index | 3 | 51 |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.4.2.1.4.3.

6.3.4.2.1.4.2 Test procedure

1. The SS shall signal a Random Access Preamble ID via a PDCCH order to the UE and initiate a Non-contention based Random Access procedure.
2. The UE shall send the signalled preamble to the SS.

3. For FDD UE, the SS measure the UE transmission OFF power during the sub-frame preceding the PRACH preamble excluding a transient period of 20 μs according to Figure 6.3.4.2.1.3-1. For TDD UE, the SS measure the UE transmission OFF power starting (20us+the duration of 8 OFDM symbols) before the PRACH starts, and ending 20us before PRACH starts. Note, the nominal PRACH timing for TDD is not aligned with the sub frame and symbol raster.
4. Measure the output power of the transmitted PRACH preamble according to Figure 6.3.4.2.1.3-1.
5. Measure the UE transmission OFF power, starting 20 μs after the PRACH preamble ends for a measurement period of 980 μs..

6.3.4.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.3.4.2.1.4.3-1: RACH-ConfigCommon-DEFAULT: PRACH measurement

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-12 RACH-ConfigCommon-DEFAULT | | | |
|---|--------------|---------|----------------|
| Information Element | Value/remark | Comment | Condition |
| RACH-ConfigCommon-DEFAULT ::= SEQUENCE { | | | |
| powerRampingParameters SEQUENCE { | | | |
| powerRampingStep | dB0 | | |
| preambleInitialReceivedTargetPower | dBm-104 | | PRACH Format 0 |
| | dBm-112 | | PRACH Format 4 |
| } | | | |
| } | | | |

Table 6.3.4.2.1.4.3-2: PRACH-Config-DEFAULT: PRACH measurement for TDD

| Derivation Path: TS 36.508 [7] clause 5.3.1, Table 5.3.1-3: PRACH-Config-DEFAULT | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| PRACH-Config-DEFAULT ::= SEQUENCE { | | | |
| prach-ConfigIndex | 51 | | TDD |
| } | | | |

Table 6.3.4.2.1.4.3-3: TDD-Config-DEFAULT: PRACH measurement for TDD

| Derivation Path: TS 36.508 [7] clause 5.3.1, Table 5.3.1-1: TDD-Config-DEFAULT | | | |
|--|--------------|---|-----------|
| Information Element | Value/remark | Comment | Condition |
| TDD-Config-DEFAULT ::= SEQUENCE { | | | |
| subframeAssignment | sa1 | | |
| specialSubframePatterns | ssp5 | To enable two symbol UpPTS, and to have 9 symbols GP. | |
| } | | | |

6.3.4.2.1.5 Test requirement

The requirement for the power measured in steps (3), (4) and (5) of the test procedure shall not exceed the values specified in Table 6.3.4.2.1.5-1.

Table 6.3.4.2.1.5-1: PRACH time mask

| | Channel bandwidth / Output Power [dBm] / measurement bandwidth | | | | | |
|--|--|---------|-------|--------|--------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| | | | | | | |

| | | | | | | |
|--|--|--|--|--|--|--|
| Transmit OFF power | For carrier frequency $f \leq 3.0\text{GHz}$: $\leq -48.5\text{ dBm}$ For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $\leq -48.2\text{ dBm}$ | | | | | |
| Transmission OFF Measurement bandwidth | 1.08 MHz | 2.7 MHz | 4.5 MHz | 9.0 MHz | 13.5 MHz | 18 MHz |
| Expected PRACH Transmission ON Measured power | -1 dBm | -1 dBm | -1 dBm | -1 dBm | -1 dBm | -1 dBm |
| ON power tolerance $f \leq 3.0\text{GHz}$ $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ |

6.3.4.2.2 SRS time mask

6.3.4.2.2.1 Test purpose

To verify that the SRS time mask meets the requirements given in 6.3.4.2.2.5.

The time mask for SRS time mask defines the ramping time allowed for the UE between transmit OFF power and transmit ON power when transmitting the SRS.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.4.2.2.2 Test applicability

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

6.3.4.2.2.3 Minimum conformance requirement

In the case a single SRS transmission, the ON power is defined as the mean power for each symbol duration excluding any transient period. Figure 6.3.4.2.2.3-1.

In the case a dual SRS transmission, the ON power is defined as the mean power for each symbol duration excluding any transient period. Figure 6.3.4.2.2.3-2.

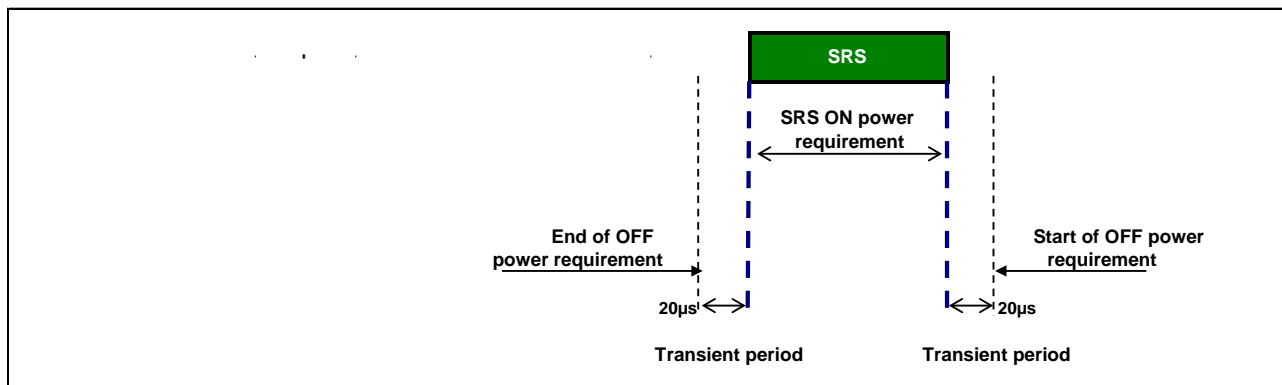


Figure 6.3.4.2.2.3-1: Single SRS time mask

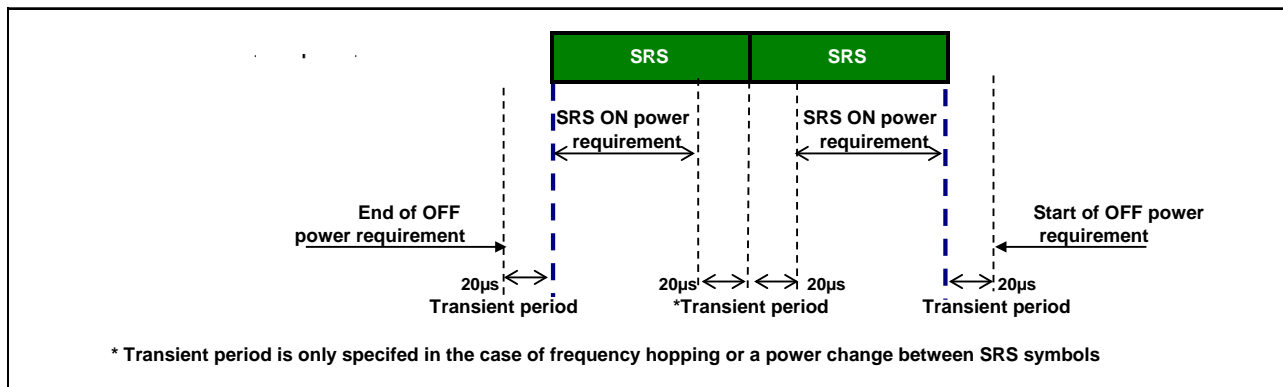


Figure 6.3.4.2.3-2: Dual SRS time mask for the case of UpPTS transmissions

6.3.4.2.2.4 Test description

6.3.4.2.2.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.4.2.2.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3.

Table 6.3.4.2.2.4.1-1: Test Configuration Table

| Initial Conditions | | |
|--|------------------------------------|---|
| Test Environment (as specified in TS 36.508 [7] subclause 4.1) | Normal, TL/VL, TL/VH, TH/VL, TH/VH | |
| Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) | Mid range | |
| Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1) | Lowest, 5MHz, Highest | |
| SRS configuration | | |
| | FDD | TDD |
| srs-BandwidthConfig | bw7 | bw7 (for BW 1.4 MHz) bw5 (for BW 3 MHz) bw2 (for BW 5 MHz) bw0 (for BW 10, 15, 20 MHz) |
| srs-SubframeConfig | sc3 | sc0 |
| ackNackSRS-SimultaneousTransmission | FALSE | FALSE |
| srsMaxUpPts | N/A | N/A |
| srs-Bandwidth | bw3 | bw3 |
| srs-HoppingBandwidth | hbw3 | hbw0 |
| freqDomainPosition | 0 | 0 |
| Duration | TRUE | TRUE |
| srs-ConfigIndex | 7 | 0 |
| transmissionComb | 0 | 0 |
| cyclicShift | cs0 | cs0 |

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

4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.4.2.2.4.3. Note that PDCCH DCI format 0 sent after resetting uplink power with RRC Connection Reconfiguration, should have TPC command 0dB.

6.3.4.2.2.4.2 Test procedure

1. For FDD UE, the SS measure the UE transmission OFF power during the 13 symbols preceding the SRS symbol excluding a transient period of 20 μ s according to Figure 6.3.4.2.2.3-1. For TDD UE, the SS measure the UE transmission OFF power during the 8 symbols preceding the two SRS symbols excluding a transient period of 20 μ s according to Figure 6.3.4.2.2.3-2.
2. Measure the output power of the transmitted SRS according to Figure 6.3.4.2.2.3-1 for FDD UE and according to Figure 6.3.4.2.2.3-2 for TDD UE, The transient periods are excluded from measurement accordingly.
3. Measure the UE transmission OFF power during the sub-frame following the SRS under test, excluding a transient period of 20 μ s according to Figure 6.3.4.2.2.3-1 for FDD UE and according to Figure 6.3.4.2.2.3-2 for TDD UE.

6.3.4.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.3.4.2.2.4.3-1: RadioResourceConfigCommonSIB-DEFAULT: SRS measurement

| Derivation Path: 36.508 clause 5.3.1 Table 5.3.1-2 RadioResourceConfigCommonSIB-DEFAULT | | | |
|---|---|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| RadioResourceConfigCommon-DEFAULT ::= SEQUENCE { | | | |
| rach-ConfigCommon | RACH-ConfigCommon-DEFAULT | | |
| bcch-Config | BCCH-Config-DEFAULT | | |
| pcch-Config | PCCH-Config-DEFAULT | | |
| prach-Config | PRACH-ConfigSIB-DEFAULT | | |
| pdsch-ConfigCommon | PDSCH-ConfigCommon-DEFAULT | | |
| pusch-ConfigCommon | PUSCH-ConfigCommon-DEFAULT | | |
| pucch-ConfigCommon | PUCCH-ConfigCommon-DEFAULT | | |
| soundingRSUL-ConfigCommon | <i>SoundingRS-UL-ConfigCommon-DEFAULT</i> | | |
| uplinkPowerControlCommon | UplinkPowerControlCommon-DEFAULT | | |
| ul-CyclicPrefixLength | len1 | | |
| } | | | |

Table 6.3.4.2.2.4.3-2: SoundingRS-UL-ConfigCommon-DEFAULT: SRS time mask measurement

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-21 SoundingRS-UL-ConfigCommon-DEFAULT | | | |
|--|--------------|---------------------------------------|-------------------------|
| Information Element | Value/remark | Comment | Condition |
| SoundingRS-UL-ConfigCommon-DEFAULT ::= SEQUENCE { | | | |
| setup SEQUENCE { | | | |
| srs-BandwidthConfig | bw7 | | FDD |
| | bw7 | | TDD (BW 1.4 MHz) |
| | bw5 | | TDD (BW 3 MHz) |
| | bw2 | | TDD (BW 5 MHz) |
| | bw0 | | TDD (BW 10, 15, 20 MHz) |
| srs-SubframeConfig | sc3 | Periodicity of 5ms, with offset of 0. | FDD |
| | sc0 | Periodicity of 5ms, with offset of 1. | TDD |
| ackNackSRS-SimultaneousTransmission | FALSE | | |
| srsMaxUpPts | Not present | | |
| } | | | |
| } | | | |

Table 6.3.4.2.2.4.3-3: PhysicalConfigDedicated-DEFAULT: SRS time mask measurement

| Derivation Path: 36.508 clause 5.5.1 Table 5.5.1.2-1: PhysicalConfigDedicated-DEFAULT | | | |
|---|---|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| PhysicalConfigDedicated-DEFAULT ::= SEQUENCE { | | | |
| cqi-ReportConfig | Not present | | |
| soundingRS-UL-ConfigDedicated | <i>SoundingRSUL-ConfigDedicated-DEFAULT</i> | | |
| } | | | |

Table 6.3.4.2.2.4.3-4: SoundingRSUL-ConfigDedicated-DEFAULT: SRS time mask measurement

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-22 SoundingRS-UL-ConfigDedicated-DEFAULT | | | |
|---|--------------|--|-----------|
| Information Element | Value/remark | Comment | Condition |
| SoundingRS-UL-ConfigDedicated-DEFAULT ::= CHOICE { | | | |
| setup SEQUENCE { | | | |
| srs-Bandwidth | bw3 | bw3 used to ensure that the bandwidth is constantly 4 RBs irrespective of channel bandwidth. | |
| srs-HoppingBandwidth | hbw3 | This is selected so that hopping is disabled | FDD |
| | hbw0 | This is selected so that hopping is enabled | TDD |
| freqDomainPosition | 0 | | |
| Duration | TRUE | Indefinite duration | |
| srs-ConfigIndex | 7 | SRS periodicity of 10ms, Toffset=0. | FDD |
| | 0 | SRS periodicity of 2ms, Ksrs=0,1, this is two symbols UpPTS in first half subframe. | TDD |
| transmissionComb | 0 | | |
| cyclicShift | cs0 | No cyclic shift | |
| } | | | |
| } | | | |

Table 6.3.4.2.2.4.3-5: TDD-Config-DEFAULT: SRS time mask measurement

| Derivation Path: 36.508 331 clause 65.3.21 Table 5.3.1-1 (<i>SystemInformationBlockType1</i>) | | | |
|---|--------------|---|-----------|
| Information Element | Value/remark | Comment | Condition |
| TDD-Config-DEFAULT ::= SEQUENCE { | | | |
| subframeAssignment | sa1 | | |
| specialSubframePatterns | ssp5 | To enable two symbol UpPTS, and to have 9 symbols GP. | |
| } | | | |

Table 6.3.4.2.2.4.3-6: PhysicalConfigDedicated

| Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT | | | |
|--|-------------------------------------|---------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| PhysicalConfigDedicated-DEFAULT ::= SEQUENCE { | | | |
| uplinkPowerControlDedicated | UplinkPowerControlDedicated-DEFAULT | See subclause 4.6.3 | SRB1 |
| | UplinkPowerControlDedicated-DEFAULT | See subclause 4.6.3 | RBC |

Table 6.3.4.2.2.4.3-7: UplinkPowerControlDedicated

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT | | | |
|---|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE { | | | |
| p0-UE-PUSCH | 1 | | SRB1 |
| | 0 | | RBC |
| } | | | |

| Condition | Explanation |
|-----------|----------------------|
| FDD | FDD cell environment |
| TDD | TDD cell environment |

6.3.4.2.2.5 Test requirement

The requirement for the power measured in steps (1), (2) and (3) of the test procedure shall not exceed the values specified in Table 6.3.4.2.2.5-1.

Table 6.3.4.2.2.5-1: SRS time mask

| | Channel bandwidth / Output Power [dBm] / measurement bandwidth | | | | | |
|--|--|--|--|--|--|--|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Transmit OFF power | For carrier frequency $f \leq 3.0\text{GHz}$: ≤ -48.5 dBm For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: ≤ -48.2 dBm | | | | | |
| Transmission OFF Measurement bandwidth | 1.08 MHz | 2.7 MHz | 4.5 MHz | 9.0 MHz | 13.5 MHz | 18 MHz |
| Expected SRS Transmission ON Measured power | -2.6 dBm | -2.6 dBm | -2.6 dBm | -2.6 dBm | -2.6 dBm | -2.6 dBm |
| ON power tolerance $f \leq 3.0\text{GHz}$ $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ | $\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$ |

6.3.4A ON/OFF time mask for CA

6.3.4A.1 General ON/OFF time mask for CA

6.3.4A.1.1 General ON/OFF time mask for CA (intra-band contiguous DL CA and UL CA)

6.3.4A.1.1.1 Test purpose

To verify that the general ON/OFF time mask for CA meets the requirements given in 6.3.4A.1.1.5.

The time mask for transmit ON/OFF for CA defines the ramping time allowed for the UE between transmit OFF power and transmit ON power for CA.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.4A.1.1.2 Test applicability

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

6.3.4A.1.1.3 Minimum conformance requirements

For intra-band contiguous carrier aggregation, the general output power ON/OFF time mask specified in subclause 6.3.4.1.3 is applicable for each component carrier during the ON power period and transient period. The OFF period as specified in subclause 6.3.4.1.3 shall only be applicable for each component carrier when all the component carriers are OFF.

The normative reference for this requirement is TS 36.101[2] clause 6.3.4A.

6.3.4A.1.1.4 Test description

6.3.4A.1.1.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.4A.1.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annex A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.4A.1.1.4.1-1: Test Configuration Table

| Initial Conditions | | | | | | | | |
|--|---------------|-------------------------|---------------|---|---|---------|---|---|
| Test Environment as specified in TS 36.508 [7] clause 4.1 | | | | NC, TL/VL, TL/VH, TH/VL, TH/VH | | | | |
| Test Frequencies as specified in TS 36.508 [7] clause 4.3.1 for different CA bandwidth classes. | | | | C: Low range, High range | | | | |
| Test CC Combination setting (N_{RB_agg}) as specified in clause 5.4.2A.1 for the CA Configuration | | | | Lowest N_{RB_agg} Highest N_{RB_agg} | | | | |
| Test Parameters for CA Configurations | | | | | | | | |
| CA Configuration / N_{RB_agg} | | DL Allocation | UL Allocation | | | | | |
| PCC N_{RB} | SCCs N_{RB} | PCC & SCC RB allocation | CC MOD | N_{RB_alloc} | PCC & SCC RB allocations ($L_{CRB} @ RB_{start}$) | | | |
| 75 | 75 | N/A for this test | QPSK | 150 | P_75@0 | S_75@0 | - | - |
| 100 | 50 | | QPSK | 150 | P_100@0 | S_50@0 | - | - |
| 100 | 100 | | QPSK | 200 | P_100@0 | S_100@0 | - | - |
| Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1 | | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.4A.1.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.4A.1.1.4.3.

6.3.4A.1.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.5.1A 3.4A.1.1.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.2A.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. The each UL assignment is such that the UE transmits on UL sub-frame 2 of every radio frame.
5. For FDD: Measure the UE transmission OFF power for each component carrier during the sub-frame prior to the PUSCH subframe. For TDD: Measure the UE transmission OFF power during the 10 SCFDMA symbols prior to the PUSCH subframe.
6. Measure the output power of the UE PUSCH transmission for each component carrier during one sub-frame, excluding a transient period of 20 μ s at the beginning of the subframe.
7. Measure the UE transmission OFF power for each component carrier during one sub-frame following the PUSCH subframe, excluding a transient period of 20 μ s at the beginning of the subframe.

6.3.4A.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 6.3.4A.1.1.4.3-1: UplinkPowerControlCommon: Test point 1

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT | | | |
|--|--------------|---|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH | -105 | Test point 1 to verify a UE relative low initial power transmission for PCC | |

Table 6.3.4A.1.1.4.3-2: PhysicalConfigDedicated

| Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT | | | |
|--|-------------------------------------|---------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| PhysicalConfigDedicated-DEFAULT ::= SEQUENCE { UplinkPowerControlDedicated | UplinkPowerControlDedicated-DEFAULT | See subclause 4.6.3 | RBC |
| | UplinkPowerControlDedicated-DEFAULT | See subclause 4.6.3 | UL CA |

Table 6.3.4A.1.1.4.3-3: UplinkPowerControlDedicated

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT | | | |
|---|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE { p0-UE-PUSCH | 1 | | RBC |
| | 0 | | UL CA |
| } | | | |

Table 6.3.4A.1.1.4.3-4: UplinkPowerControlCommonSCell-r10: Test point 1

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25A UplinkPowerControlCommonSCell-r10-DEFAULT | | | |
|--|--------------|---|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlCommonSCell-r10 ::= SEQUENCE { | | | |
| p0-NominalPUSCH-r10 | -105 | Test point 1 to verify a UE relative low initial power transmission for SCC | |

6.3.4A.1.1.5 Test requirement

The requirement for the power measured in steps 5, 6 and 7 of the test procedure shall not exceed the values specified in Table 6.3.4.1.5-1.6.3.4B ON/OFF time mask for UL-MIMO

6.3.4B.1 General ON/OFF time mask for UL-MIMO

Editor's note: The measurement period in the minimum requirement is defined to be 1 subframe (14 symbols). Due to practical reasons the TDD measurement period for off power prior the PUSCH is 10 symbols. It is FFS, if this deviation is acceptable.

Editor's notes: The following items are missing or incomplete:

- Test Tolerance
- The initial conditions and test procedure are subject to further investigation

6.3.4B.1.1 Test purpose

To verify that the general ON/OFF time mask for UL-MIMO meets the requirements given in 6.3.4B.1.5.

The time mask for transmit ON/OFF defines the ramping time allowed for each transmit antenna of UE between transmit OFF power and transmit ON power.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.4B.1.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO

6.3.4B.1.3 Minimum conformance requirement

For UE with multiple transmit antenna connectors, the ON/OFF time mask requirements in subclause 6.3.4.1.3 apply to each transmit antenna connector.

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the general ON/OFF time mask requirements specified in subclause 6.3.4.1.3 apply to each transmit antenna connector with the UL-MIMO configurations specified in Table 6.2.2B.3-2.

The normative reference for this requirement is TS 36.101 [2] clause 6.3.4B

6.3.4B.1.4 Test description

6.3.4B.1.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.4B.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2

Table 6.3.4B.1.4.1-1: Test Configuration Table

| Initial Conditions | | | | | |
|--|--|------------------------------------|----------------------|---------------|-----|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 | | Low range, Mid range, High range | | | |
| Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1 | | Lowest, 5MHz, Highest | | | |
| Test Parameters for Channel Bandwidths | | | | | |
| | Downlink Configuration | | Uplink Configuration | | |
| Ch BW | N/A for General On/Off Time Mask test case | | Mod'n | RB allocation | |
| | | | | FDD | TDD |
| 1.4MHz | | | QPSK | 6 | 6 |
| 3MHz | | | QPSK | 15 | 15 |
| 5MHz | | | QPSK | 25 | 25 |
| 10MHz | | | QPSK | 50 | 50 |
| 15MHz | | | QPSK | 75 | 75 |
| 20MHz | | | QPSK | 100 | 100 |
| Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 6.3.4B.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.4B.1.4.3. Note that PDCCH DCI format 4 sent after resetting uplink power with RRC Connection Reconfiguration, should have TPC command 0dB.

6.3.4B.1.4.2 Test procedure

1. SS sends uplink scheduling information via PDCCH with DCI format 4 and TPC command 0dB for C_RNTI to schedule the UL RMC according to Table 6.3.4B.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. The UL assignment is such that the UE transmits on UL sub-frame 2 of every radio frame.
2. For FDD: Measure the UE transmission OFF power during the sub-frame prior to the PUSCH subframe. For TDD: Measure the UE transmission OFF power during the 10 SCFDMA symbols prior to the PUSCH subframe.
3. Measure the output power of the UE PUSCH transmission during one sub-frame, excluding a transient period of 20 μ s at the beginning of the subframe.
4. Measure the UE transmission OFF power during one sub-frame following the PUSCH subframe, excluding a transient period of 20 μ s at the beginning of the subframe.
5. Repeat step 2) until 4) for each of transmit antenna of the UE.

6.3.4B.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 6.3.4B.1.4.3-1: UplinkPowerControlCommon: Test point 1

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT | | | |
|--|--------------|---|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH | -105 | Test point 1 to verify a UE relative low initial power transmission | |

Table 6.3.4B.1.4.3-2: PhysicalConfigDedicated

| Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT | | | |
|--|-------------------------------------|------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| PhysicalConfigDedicated-DEFAULT ::= SEQUENCE { | | | |
| UplinkPowerControlDedicated | UplinkPowerControlDedicated-DEFAULT | See clause 4.6.3 | SRB1 |
| | UplinkPowerControlDedicated-DEFAULT | See clause 4.6.3 | RBC |

Table 6.3.4B.1.4.3-3: UplinkPowerControlDedicated

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT | | | |
|---|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE { | | | |
| p0-UE-PUSCH | 1 | | SRB1 |
| | 0 | | RBC |
| } | | | |

Table 6.3.4B.1.3-4: TDD-Config-DEFAULT: On/OFF time mask measurement

| Derivation Path: 36.508 clause 5.3.1 Table 5.3.1-1 (<i>SystemInformationBlockType1</i>) | | | |
|---|--------------|---|-----------|
| Information Element | Value/remark | Comment | Condition |
| TDD-Config-DEFAULT ::= SEQUENCE { | | | |
| subframeAssignment | sa1 | | |
| specialSubframePatterns | ssp5 | To enable two symbol UpPTS, and to have 9 symbols GP. | |
| } | | | |

6.3.4B.1.5 Test requirement

The requirement for the power measured in steps (2), (3) and (4) of the test procedure shall not exceed the values specified in Table 6.3.4B.1.5-1.

Table 6.3.4B.1.5-1: General ON/OFF time mask

| | Channel bandwidth / minimum output power / measurement bandwidth | | | | | |
|--|--|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Transmit OFF power | For carrier frequency $f \leq 3.0\text{GHz}$: $\leq -50+TT$ dBm For carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $\leq -50+TT$ dBm | | | | | |
| Transmission OFF Measurement bandwidth | 1.08 MHz | 2.7 MHz | 4.5 MHz | 9.0 MHz | 13.5 MHz | 18 MHz |
| Expected Transmission ON Measured power | -14.8 dBm | -10.8 dBm | -8.6 dBm | -5.6 dBm | -3.9 dBm | -2.6 dBm |
| ON power tolerance $f \leq 3.0\text{GHz}$ $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $\pm 6.0+TT$ dB $\pm 6.0+TT$ dB | $\pm 6.0+TT$ dB $\pm 6.0+TT$ dB | $\pm 6.0+TT$ dB $\pm 6.0+TT$ dB | $\pm 6.0+TT$ dB $\pm 6.0+TT$ dB | $\pm 6.0+TT$ dB $\pm 6.0+TT$ dB | $\pm 6.0+TT$ dB $\pm 6.0+TT$ dB |

6.3.5 Power Control

Power control is used to limit the interference level and compensate the channel fading. The UE power is defined as the mean power in a subframe or ON power duration, whichever is available.

The UE transmission can be in two contiguity modes, i.e. contiguous transmission and non-contiguous transmission. The former has a transmission gap of 0 and the latter has a transmission gap larger than 0. The transmission gap is the time interval between the end of the last UE transmission subframe and the beginning of the next UE transmission subframe or the UpPTS (for TDD).

6.3.5.1 Power Control Absolute power tolerance

6.3.5.1.1 Test purpose

To verify the ability of the UE transmitter to set its initial output power to a specific value at the start of a contiguous transmission or non-contiguous transmission with a long transmission gap, i.e. transmission gap is larger than 20 ms.

6.3.5.1.2 Minimum conformance requirement

Absolute power tolerance is the ability of the UE transmitter to set its initial output power to a specific value for the first sub-frame at the start of a contiguous transmission or non-contiguous transmission with a transmission gap larger than 20ms.

The minimum requirement on absolute power tolerance is given in Table 6.3.5.1.2-1 over the power range bounded by the Maximum output power as defined in sub-clause 6.2.2 and the Minimum output power as defined in sub-clause 6.3.2.

For operating bands under Note 2 in Table 6.2.2.3-1, the absolute power tolerance as specified in Table 6.3.5.1.2-1 is relaxed by reducing the lower limit by 1.5 dB when the transmission bandwidth is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} .

Table 6.3.5.1.2-1: Absolute power tolerance

| Conditions | Tolerance |
|--------------------|---------------|
| Normal conditions | ± 9.0 dB |
| Extreme conditions | ± 12.0 dB |

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5.1.1.

6.3.5.1.3 Test applicability

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

6.3.5.1.4 Test description

6.3.5.1.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5.1.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5.1.4.1-1: Test Configuration Table

| Initial Conditions | | | | | |
|--|--|------------------------------------|----------------------|---------------|-----|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 | | Mid range | | | |
| Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1 | | Lowest, 5MHz, Highest | | | |
| Test Parameters for Channel Bandwidths | | | | | |
| | Downlink Configuration | | Uplink Configuration | | |
| Ch BW | N/A for Power Control Absolute power tolerance test case | | Mod'n | RB allocation | |
| | | | | FDD | TDD |
| 1.4MHz | | | QPSK | 6 | 6 |
| 3MHz | | | QPSK | 15 | 15 |
| 5MHz | | | QPSK | 25 | 25 |
| 10MHz | | | QPSK | 50 | 50 |
| 15MHz | | | QPSK | 75 | 75 |
| 20MHz | | | QPSK | 100 | 100 |
| Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.5.1.4.1-1.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5.1.4.3. Note that PDCCH DCI format 0 sent after resetting uplink power with RRC Connection Reconfiguration, should have TPC command 0dB.

6.3.5.1.4.2 Test procedure

1. SS sends uplink scheduling information via PDCCH DCI format 0 with TPC command 0dB for C_RNTI to schedule the UL RMC according to Table 6.3.5.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Measure the initial output power of the first subframe of UE PUSCH first transmission. The transient periods of 20us are excluded.
3. Repeat for the two test points as indicated in section 6.3.5.1.4.3. The timing of the execution between the two test points shall be larger than 20ms.

6.3.5.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.3.5.1.4.3-1: UplinkPowerControlCommon: Test point 1

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT | | | |
|--|--------------|---|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH | -105 | Test point 1 to verify a UE relative low initial power transmission | |

Table 6.3.5.1.4.3-2: UplinkPowerControlCommon: Test point 2

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT | | | |
|--|--------------|--|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH | -93 | Test point 2 to verify a UE relative high initial power transmission | |

Table 6.3.5.1.4.3-3: PhysicalConfigDedicated

| Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT | | | |
|--|-------------------------------------|---------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| PhysicalConfigDedicated-DEFAULT ::= SEQUENCE { | | | |
| uplinkPowerControlDedicated | UplinkPowerControlDedicated-DEFAULT | See subclause 4.6.3 | SRB1 |
| | UplinkPowerControlDedicated-DEFAULT | See subclause 4.6.3 | RBC |

Table 6.3.5.1.4.3-4: UplinkPowerControlDedicated

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT | | | |
|---|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE { | | | |
| p0-UE-PUSCH | 1 | | SRB1 |
| | 0 | | RBC |
| } | | | |

6.3.5.1.5 Test requirement

The requirement for the power measured in step (2) of the test procedure is not to exceed the values specified in Table 6.3.5.1.5-1 and 6.3.5.1.5-2.

Table 6.3.5.1.5-1: Absolute power tolerance: test point 1

| | Channel bandwidth / expected output power (dBm) | | | | | |
|--|---|---------|-------|--------|--------|--------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |

| | | | | | | |
|--|--|--|--|--|--|--|
| Expected Measured power Normal conditions | -14.8 dBm | -10.8 dBm | -8.6 dBm | -5.6 dBm | -3.9 dBm | -2.6 dBm |
| Power tolerance $f \leq 3.0\text{GHz}$ $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ |
| Expected Measured power Extreme conditions | -14.8 dBm | -10.8 dBm | -8.6 dBm | -5.6 dBm | -3.9 dBm | -2.6 dBm |
| Power tolerance $f \leq 3.0\text{GHz}$ $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ |
| Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2.3 | | | | | | |

Table 6.3.5.1.5-2: Absolute power tolerance: test point 2

| | Channel bandwidth / expected output power (dBm) | | | | | |
|--|---|--|--|--|--|--|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Expected Measured power Normal conditions | -2.8 dBm | 1.2 dBm | 3.4 dBm | 6.4 dBm | 8.2 dBm | 9.4 dBm |
| Power tolerance $f \leq 3.0\text{GHz}$ $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ |
| Expected Measured power Extreme conditions | -2.8 dBm | 1.2 dBm | 3.4 dBm | 6.4 dBm | 8.2 dBm | 9.4 dBm |
| Power tolerance $f \leq 3.0\text{GHz}$ $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ |
| Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2.3 | | | | | | |

6.3.5.2 Power Control Relative power tolerance

6.3.5.2.1 Test purpose

To verify the ability of the UE transmitter to set its output power relatively to the power in a target sub-frame relatively to the power of the most recently transmitted reference sub-frame if the transmission gap between these sub-frames is ≤ 20 ms.

6.3.5.2.2 Test applicability

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

6.3.5.2.3 Minimum conformance requirement

The UE shall meet the requirements specified in Table 6.3.5.2.3-1.

To account for RF Power amplifier mode changes 2 exceptions are allowed for each of two test patterns. The test patterns are a monotonically increasing power sweep and a monotonically decreasing power sweep over a range bounded by the requirements of minimum power and maximum power specified in clauses 6.3.2.3 and 6.2.2.3. For these exceptions the power tolerance limit is a maximum of ± 6.0 dB in Table 6.3.5.2.3-1.

Table 6.3.5.2.3-1 Relative Power Tolerance for Transmission (normal conditions)

| Power step ΔP (Up or down) [dB] | All combinations of PUSCH and PUCCH transitions [dB] | All combinations of PUSCH/PUCCH and SRS transitions between sub- frames [dB] | PRACH [dB] |
|---|---|--|------------|
| $\Delta P < 2$ | ± 2.5 (Note 3) | ± 3.0 | ± 2.5 |
| $2 \leq \Delta P < 3$ | ± 3.0 | ± 4.0 | ± 3.0 |
| $3 \leq \Delta P < 4$ | ± 3.5 | ± 5.0 | ± 3.5 |
| $4 \leq \Delta P \leq 10$ | ± 4.0 | ± 6.0 | ± 4.0 |
| $10 \leq \Delta P < 15$ | ± 5.0 | ± 8.0 | ± 5.0 |
| $15 \leq \Delta P$ | ± 6.0 | ± 9.0 | ± 6.0 |
| Note 1: For extreme conditions an additional ± 2.0 dB relaxation is allowed Note 2: For operating bands under Note 2 in Table 6.2.2.3-1, the relative power tolerance is relaxed by increasing the upper limit by 1.5 dB if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges; if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges, then the tolerance is relaxed by reducing the lower limit by 1.5 dB. Note 3: For PUSCH to PUSCH transitions with the allocated resource blocks fixed in frequency and no transmission gaps other than those generated by downlink subframes, DwPTS fields or Guard Periods for TDD: for a power step $\Delta P \leq 1$ dB, the relative power tolerance for transmission is ± 1.0 dB. | | | |

The power step (ΔP) is defined as the difference in the calculated setting of the UE Transmit power between the target and reference sub-frames with the power setting according to Clause 5.1 of TS 36.213. The error is the difference between ΔP and the power change measured at the UE antenna port with the power of the cell-specific reference signals kept constant. The error shall be less than the relative power tolerance specified in Table 6.3.5.2.3-1.

The normative reference for this requirement is TS 36.101 clause 6.3.5.2.

6.3.5.2.4 Test description

6.3.5.2.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5.2.4.1-1: Test Configuration Table

| Initial Conditions | |
|---|------------------------------------|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | Normal, TL/VL, TL/VH, TH/VL, TH/VH |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 | Low range |
| Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1 | Lowest, 5MHz, Highest |
| Test Parameters for Channel Bandwidths | |
| Downlink Configuration | Uplink Configuration |

| Ch BW | N/A for Power Control Relative power tolerance test case | Mod'n | RB allocation | |
|--|--|-------|---|---|
| | | | FDD | TDD |
| 1.4MHz | | QPSK | See table 6.3.5.2.5-1 6.3.5.2.5-2 6.3.5.2.5-13 | See table 6.3.5.2.5-1 6.3.5.2.5-2 6.3.5.2.5-13 |
| 3MHz | | QPSK | See table 6.3.5.2.5-3 6.3.5.2.5-4 6.3.5.2.5-13 | See table 6.3.5.2.5-3 6.3.5.2.5-4 6.3.5.2.5-13 |
| 5MHz | | QPSK | See table 6.3.5.2.5-5 6.3.5.2.5-6 6.3.5.2.5-13 | See table 6.3.5.2.5-5 6.3.5.2.5-6 6.3.5.2.5-13 |
| 10MHz | | QPSK | See table 6.3.5.2.5-7 6.3.5.2.5-8 6.3.5.2.5-13 | See table 6.3.5.2.5-7 6.3.5.2.5-8 6.3.5.2.5-13 |
| 15MHz | | QPSK | See table 6.3.5.2.5-9 6.3.5.2.5-10 6.3.5.2.5-13 | See table 6.3.5.2.5-9 6.3.5.2.5-10 6.3.5.2.5-13 |
| 20MHz | | QPSK | See table 6.3.5.2.5-11 6.3.5.2.5-12 6.3.5.2.5-13 | See table 6.3.5.2.5-11 6.3.5.2.5-12 6.3.5.2.5-13 |
| Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1 Note 2: The starting resource block shall be RB# 0. | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to table 6.3.5.2.4.1-1
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5.2.4.3.

6.3.5.2.4.2 Test procedure

The procedure is separated in various subtests to verify different aspects of relative power control. The power patterns of the subtests are described in figure 6.3.5.2.4.2-1.

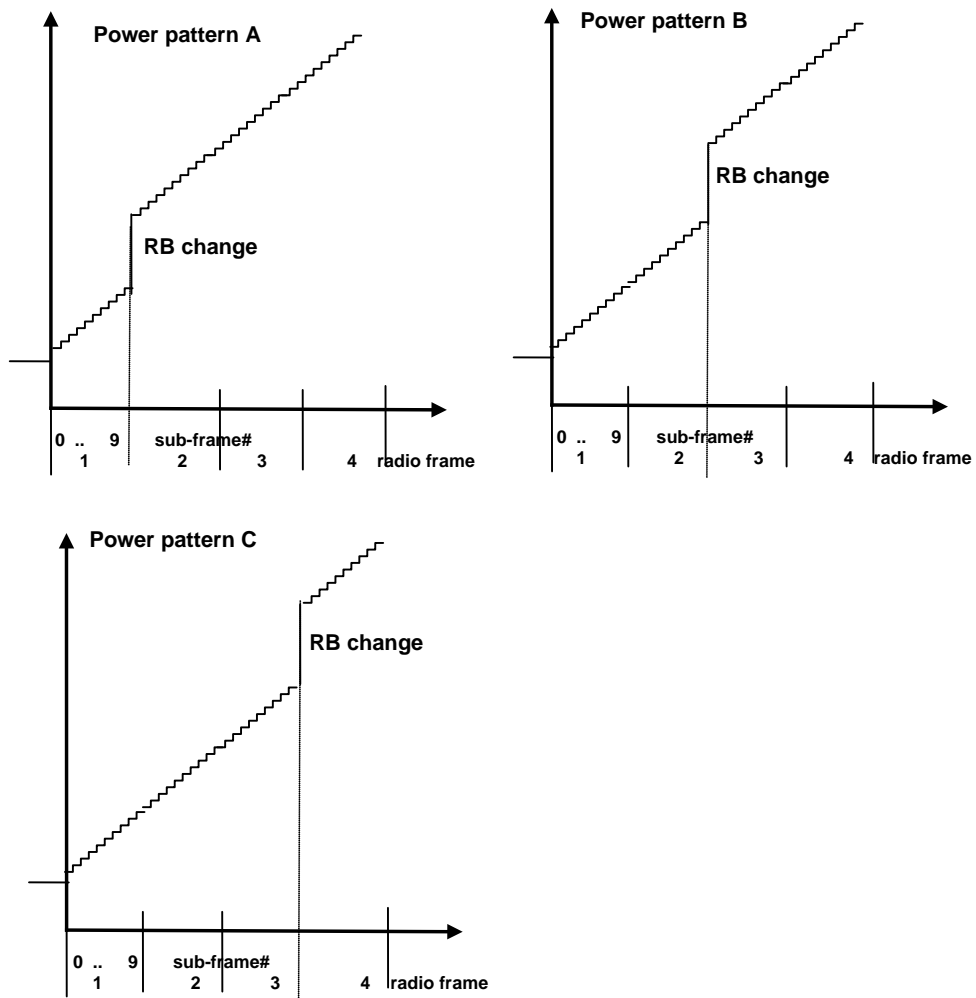


Figure 6.3.5.2.4.2-1: FDD ramping up test power patterns

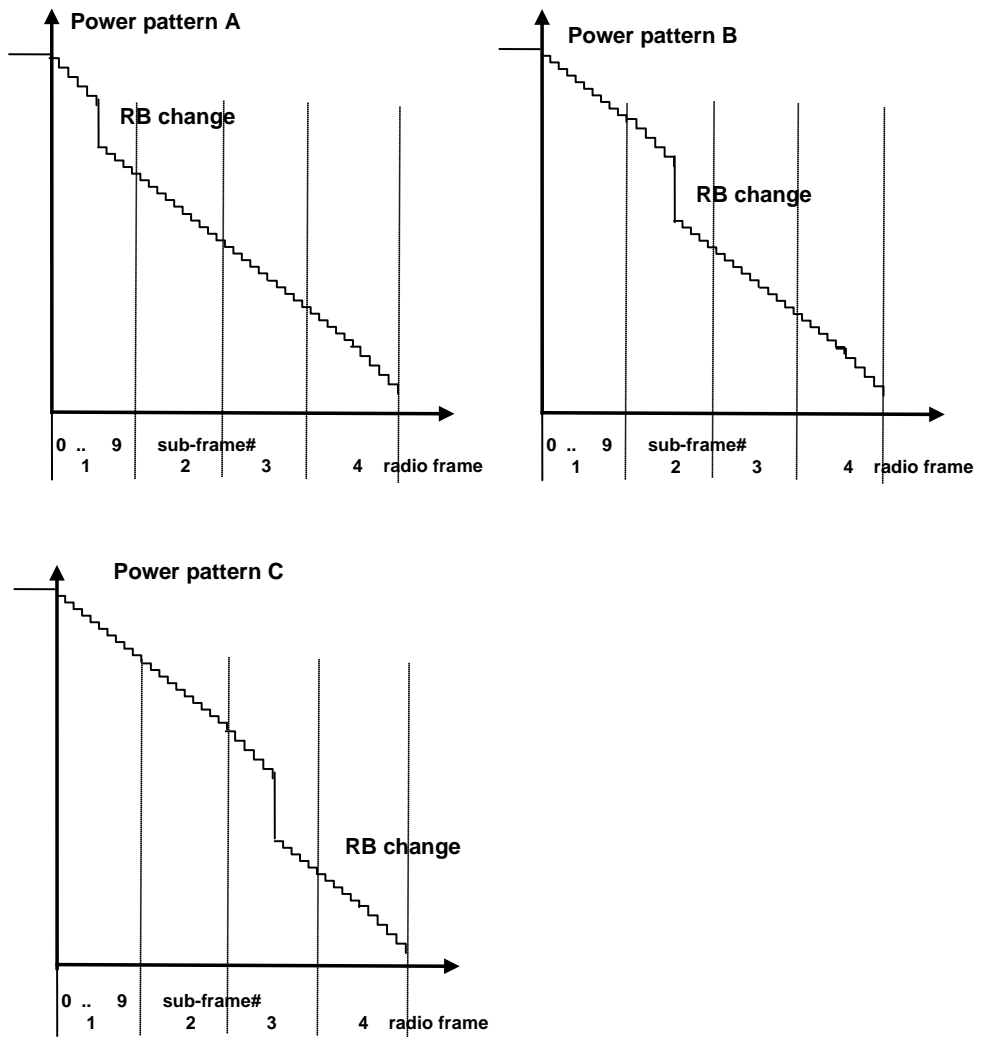


Figure 6.3.5.2.4.2-2: FDD ramping down test power patterns

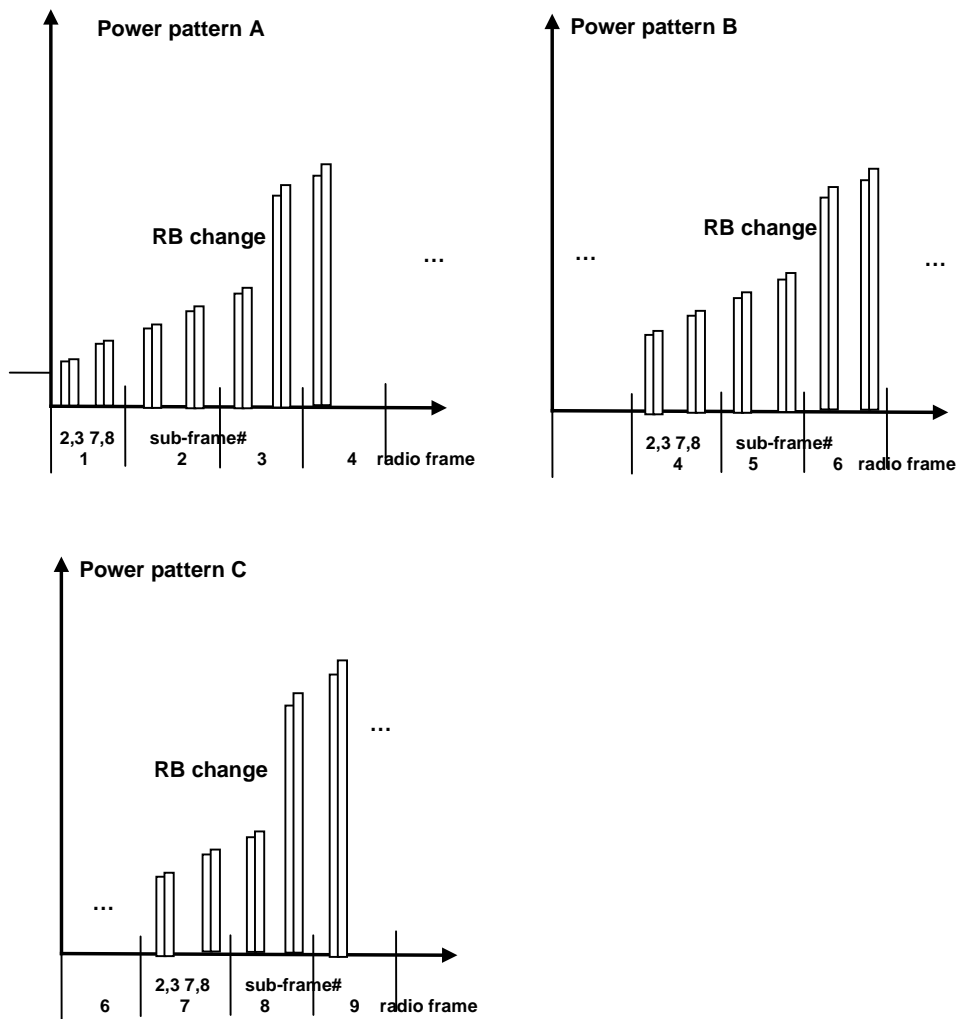


Figure 6.3.5.2.4.2-3: TDD ramping up test power patterns

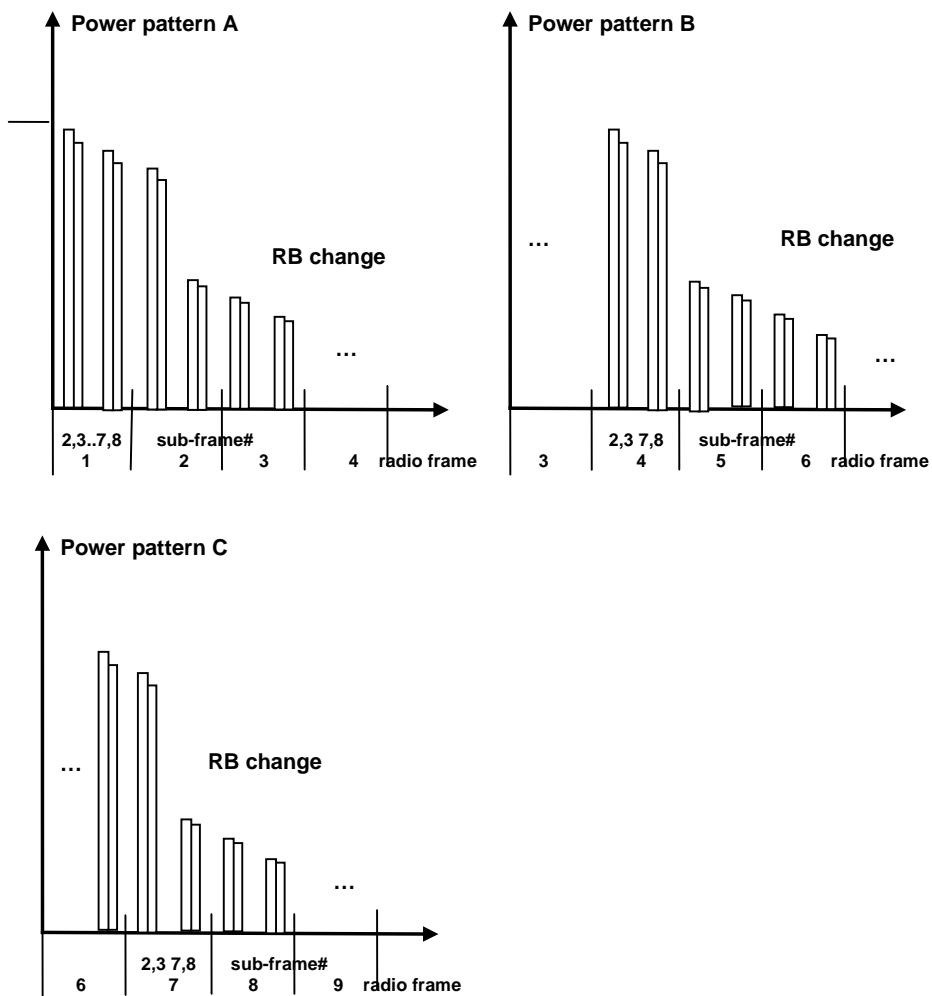


Figure 6.3.5.2.4.2-4: TDD ramping down test power patterns

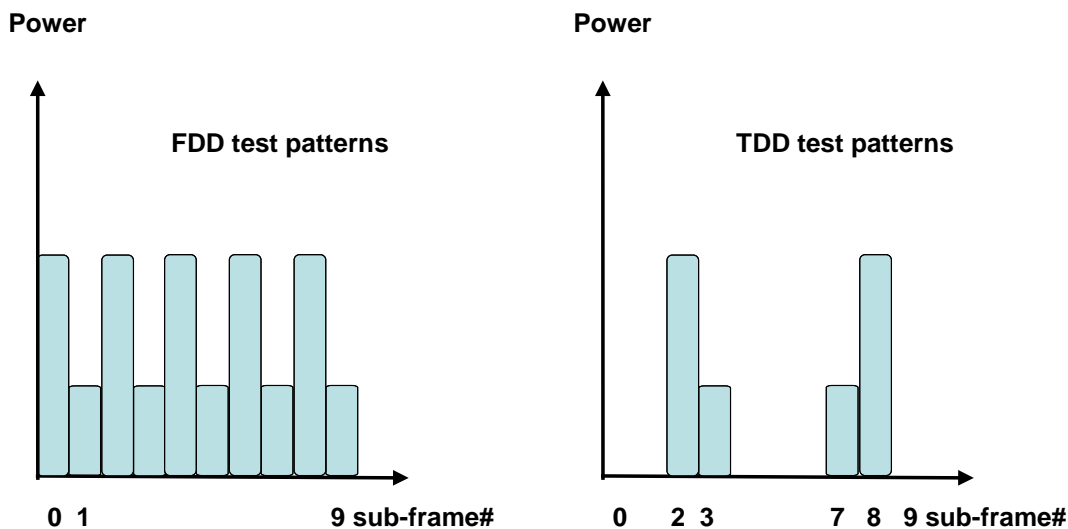


Figure 6.3.5.2.4.2-5: Alternating Test Power patterns

1. Sub test: ramping up pattern

- 1.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at $-36.8\text{dBm} \pm 3.2\text{ dB}$ for carrier frequency $f \leq 3.0\text{GHz}$ or at $-36.5\text{dBm} \pm 3.5\text{ dB}$ for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$.
- 1.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5.2.4.2-1 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5.2.4.2-3 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5.2.5-1 thru 6.3.5.2.5-12 depending on channel bandwidth. On the PDCCH format 0 for the scheduling of the PUSCH the SS will transmit a +1dB TPC command. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.
- 1.3. Measure the power of PUSCH transmissions to verify the UE relative power control meet test requirements 6.3.5.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/OFF transients, transient periods of 20 us at the beginning of the subframe are excluded.
- 1.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5.2.5-1 thru Table 6.3.5.2.5-12 to force bigger UE power steps at various points in the power range.

2. Sub test: ramping down pattern

- 2.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at $+18.0\text{dBm} \pm 3.2\text{ dB}$ for carrier frequency $f \leq 3.0\text{GHz}$ or at $+17.7\text{dBm} \pm 3.5\text{ dB}$ for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$.
- 2.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5.2.4.2-2 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5.2.4.2-4 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5.2.5-1 thru 6.3.5.2.5-12 depending on channel bandwidth. On the PDCCH format 0 for the scheduling of the PUSCH the SS will transmit a -1dB TPC command. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.

- 2.3. Measure the power of PUSCH transmissions to verify the UE relative power control meet test requirements 6.3.5.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.
- 2.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5.2.5-1 thru Table 6.3.5.2.5-12 to force bigger UE power steps at various points in the power range.
- 3. Sub test: alternating pattern
 - 3.1 SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at -10dBm +/- 3.2 dB for carrier frequency $f \leq 3.0\text{GHz}$ or at -10dBm +/- 3.5 dB for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$. The initial uplink RB allocation is defined as the smaller uplink RB allocation value specified in tables 6.3.5.2.5-13. The power level and RB allocation are reset for each sub-test.
 - 3.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5.2.4.2-5for 10 sub-frames with an uplink RB allocation alternating pattern as defined in table 6.3.5.2.5-13 while transmitting 0dB TPC command for PUSCH via the PDCCH.
 - 3.3. Measure the power of PUSCH transmissions to verify the UE relative power control meet test requirements specified in clause 6.3.5.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

6.3.5.2.4.3 Message contents

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

6.3.5.2.5 Test requirement

Each UE power step measured in the test procedure 6.3.5.2.4.2 should satisfy the test requirements specified in Table 6.3.5.2.5-1, thru 6.3.5.2.5-13 for normal conditions; for extreme conditions an additional ± 2.0 dB relaxation is allowed.

To account for RF Power amplifier mode changes 2 exceptions are allowed for each of ramping up and ramping down test patterns. For these exceptions the power tolerance limit is a maximum of ± 6.7 dB. If there is an exception in the power step caused by the RB change for all test patterns (A, B, C) then fail the UE.

Table 6.3.5.2.5-1: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 1.4MHz (ramping up)

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|--------------------|----------------------|-------------|--|---|-------------------|
|--------------------|----------------------|-------------|--|---|-------------------|

| | | | | | |
|---|------------------------|----------|------|------------------------|--|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 1 to 6 RBs | TPC=+1dB | 8.78 | $4 \leq \Delta P < 10$ | $8.78 \pm (4.7)$ Note 2 $8.78 +6.2/-4.7$ Note 3 |
| Subframes after RB change | Fixed = 6 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes Pattern B the position of RB uplink allocation change is after 20 active uplink subframes Pattern C the position of RB uplink allocation change is after 30 active uplink subframes</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5.2.5-2: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 1.4MHz (ramping down)

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|---|------------------------|-------------|--|---|--|
| Subframes before RB change | Fixed = 5 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 5 to 1 RBs | TPC=-1dB | 7.99 | $4 \leq \Delta P < 1$ | $7.99 \pm (4.7)$ Note 2 $7.99 +4.7/-6.2$ Note 4 |
| Subframes after RB change | Fixed = 1 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes Pattern B the position of RB uplink allocation change is after 16 active uplink subframes Pattern C the position of RB uplink allocation change is after 26 active uplink subframes</p> <p>Note 2: When Note 4 does not apply.</p> <p>Note 3: N/A</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5.2.5-3: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 3MHz (ramping up)

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|---|------------------------|-------------|--|---|--|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 1 to 4 RBs | TPC=+1dB | 7.02 | $4 \leq \Delta P < 10$ | $7.02 \pm (4.7)$ Note 2 $7.02 +6.2/-4.7$ Note 3 |
| Subframes after RB change | Fixed =4 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes Pattern B the position of RB uplink allocation change is after 20 active uplink subframes Pattern C the position of RB uplink allocation change is after 30 active uplink subframes</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5.2.5-4: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 3MHz (ramping down)

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|----------------------|----------------------|-------------|--|---|-------------------|
|----------------------|----------------------|-------------|--|---|-------------------|

| | | | | | |
|---|-------------------------|----------|-------|-------------------------|--|
| Subframes before RB change | Fixed = 15 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 15 to 1 RBs | TPC=-1dB | 12.76 | $10 \leq \Delta P < 15$ | $12.76 \pm (5.7)$ Note 2 $12.76 +5.7/-7.2$ Note 4 |
| Subframes after RB change | Fixed =1 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes Pattern A the position of RB uplink allocation change is after 16 active uplink subframes Pattern C the position of RB uplink allocation change is after 26 active uplink subframes</p> <p>Note 2: When Note 4 does not apply.</p> <p>Note 3: N/A</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5.2.5-5: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 5MHz (ramping up)

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|---|----------------------|-------------|--|---|--|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 1 to 20 | TPC=+1dB | 14.01 | $10 \leq \Delta P < 15$ | $14.01 \pm (5.7)$ Note 2 $14.01 +7.2/-5.7$ Note 3 |
| Subframes after RB change | Fixed = 20 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes Pattern B the position of RB uplink allocation change is after 20 active uplink subframes Pattern C the position of RB uplink allocation change is after 30 active uplink subframes</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5.2.5-6: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 5MHz (ramping down)

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|---|----------------------|-------------|--|---|--|
| Subframes before RB change | Fixed = 25 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 25 to 1 | TPC=-1dB | 14.98 | $10 \leq \Delta P < 15$ | $14.98 \pm (5.7)$ Note 2 $14.98 +5.7/-7.2$ Note 4 |
| Subframes after RB change | Fixed = 1 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes Pattern B the position of RB uplink allocation change is after 16 active uplink subframes Pattern C the position of RB uplink allocation change is after 26 active uplink subframes</p> <p>Note 2: When Note 4 does not apply.</p> <p>Note 3: N/A</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5.2.5-7: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 10MHz (ramping up)

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|--------------------|----------------------|-------------|--|---|-------------------|
|--------------------|----------------------|-------------|--|---|-------------------|

| | | | | | |
|---|---------------------|----------|-------|-------------------------|---|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 1 to 25 | TPC=+1dB | 14.98 | $10 \leq \Delta P < 15$ | $14.98 \pm (5.7)$ Note 2 $14.98 + 7.2/-5.7$ Note 3 |
| Subframes after RB change | Fixed = 25 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes Pattern B the position of RB uplink allocation change is after 20 active uplink subframes Pattern C the position of RB uplink allocation change is after 30 active uplink subframes</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5.2.5-8: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 10MHz (ramping down)

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|----------------------|----------------------|-------------|--|---|-------------------|
|----------------------|----------------------|-------------|--|---|-------------------|

| | | | | | |
|---|--|----------|----------------|------------------|--|
| Subframes before RB change | Fixed = 50 (UE Cat 2-5) Fixed = 48 (UE Cat 1) | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 50 to 1 (UE cat 2-5) Change from 48 to 1 (UE cat 1) | TPC=-1dB | 17.99 17.81 | $15 \leq \Delta$ | $17.99 \pm (6.7)$ Note 2 $17.99 +6.7/-8.2$ Note 4 $17.81 \pm (6.7)$ Note 2 $17.81 +6.7/-8.2$ Note 4 |
| Subframes after RB change | Fixed = 1 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes Pattern B the position of RB uplink allocation change is after 16 active uplink subframes Pattern C the position of RB uplink allocation change is after 26 active uplink subframes</p> <p>Note 2: When Note 4 does not apply. Note 3: N/A Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges. Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed. Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5.2.5-9: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping up)

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|--------------------|----------------------|-------------|--|---|---------------|
|--------------------|----------------------|-------------|--|---|---------------|

| | | | | | |
|---|---------------------|----------|-------|--------------------|--|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 1 to 50 | TPC=+1dB | 17.99 | $15 \leq \Delta P$ | $17.99 \pm (6.7)$ Note 2 $17.99 + 8.2 / - 6.7$ Note 3 |
| Subframes after RB change | Fixed = 50 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes Pattern B the position of RB uplink allocation change is after 20 active uplink subframes Pattern C the position of RB uplink allocation change is after 30 active uplink subframes</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5.2.5-10: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping down)

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|----------------------|----------------------|-------------|--|---|-------------------|
|----------------------|----------------------|-------------|--|---|-------------------|

| | | | | | |
|---|--|----------|--------------------|--------------------|--|
| Subframes before RB change | Fixed = 75 (UE Cat 2-5) Fixed = 50 (UE Cat 1) | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 75 to 1 (UE Cat 2-5) Change from 50 to 1 (UE Cat 1) | TPC=-1dB | 19.75 17.99 | $15 \leq \Delta P$ | $19.75 \pm (6.7)$ Note 2 $19.75 +6.7/-8.2$ Note 4 $17.99 \pm (6.7)$ Note 2 $17.99 +6.7/-8.2$ Note 4 |
| Subframes after RB change | Fixed = 1 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes Pattern B the position of RB uplink allocation change is after 16 active uplink subframes Pattern C the position of RB uplink allocation change is after 26 active uplink subframes</p> <p>Note 2: When Note 4 does not apply.</p> <p>Note 3: N/A</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5.2.5-11: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping up)

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|--------------------|----------------------|-------------|--|---|-------------------|
|--------------------|----------------------|-------------|--|---|-------------------|

| | | | | | |
|---|---------------------|----------|-------|--------------------|---|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 1 to 75 | TPC=+1dB | 19.75 | $15 \leq \Delta P$ | $19.75 \pm (6.7)$ Note 2 $19.75 + 8.2/-6.7$ Note 3 |
| Subframes after RB change | Fixed = 75 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes Pattern B the position of RB uplink allocation change is after 20 active uplink subframes Pattern C the position of RB uplink allocation change is after 30 active uplink subframes</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5.2.5-12: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping down)

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|----------------------|----------------------|-------------|--|---|-------------------|
|----------------------|----------------------|-------------|--|---|-------------------|

| | | | | | |
|---|---|----------|---------------|--------------------|--|
| Subframes before RB change | Fixed = 100 (UE Cat 2-5) Fixed = 75 (UE Cat 1) | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 100 to 1 (UE Cat 2-5) Change from 75 to 1 (UE Cat 1) | TPC=-1dB | 21.0 19.75 | $15 \leq \Delta P$ | $21.0 \pm (6.7)$ Note 2 $21.0 + 6.7/-8.2$ Note 4 $19.75 \pm (6.7)$ Note 2 $19.75 + 6.7/-8.2$ Note 4 |
| Subframes after RB change | Fixed = 1 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes Pattern B the position of RB uplink allocation change is after 16 active uplink subframes Pattern C the position of RB uplink allocation change is after 26 active uplink subframes</p> <p>Note 2: When Note 4 does not apply. Note 3: N/A Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges. Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed. Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5.2.5-13: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) (Alternating pattern)

| Sub-test | Uplink RB allocation | TPC command | Expected power step size (Up or down) ΔP [dB] | Power step size range (Up or down) ΔP [dB] | PUSCH [dB] |
|----------|----------------------|-------------|--|---|---------------|
| | | | | | |

| | | | | | |
|---|---|----------------|-------|-------------------------|--|
| 1.4 MHz | Alternating 1 and 6 | TPC=0dB | 7.78 | $4 \leq \Delta P < 10$ | 7.78 ± (6.7) Note 1,2 7.78 +8.2/-6.7 Note 3 7.78 +6.7/-8.2 Note 4 |
| 3 MHz | Alternating 1 and 15 | TPC=0dB | 11.76 | $10 \leq \Delta P < 15$ | 11.76 ± (6.7) Note 1,2 11.76 +8.2/-6.7 Note 3 11.76 +6.7/-8.2 Note 4 |
| 5 MHz | Alternating 1 and 25 | TPC=0dB | 13.98 | $10 \leq \Delta P < 15$ | 13.98 ± (6.7) Note 1,2 13.98 +8.2/-6.7 Note 3 13.98 +6.7/-8.2 Note 4 |
| 10 MHz | Alternating 1 and 50 (UE Cat 2-5) | TPC=0dB | 16.99 | $15 \leq \Delta P$ | 16.99 ± (6.7) Note 1,2 16.99 +8.2/-6.7 Note 3 16.99 +6.7/-8.2 Note 4 |
| | Alternating 1 and 48 (UE Cat 1) | | 16,81 | | 16.81 ± (6.7) Note 1,2 16.81 +8.2/-6.7 Note 3 16.81 +6.7/-8.2 Note 4 |
| 15 MHz | Alternating 1 and 75 (UE Cat 2-5) | TPC=0dB | 18.75 | $15 \leq \Delta P$ | 18.75 ± (6.7) Note 1,2 18.75 +8.2/-6.7 Note 3 18.75 +6.7/-8.2 Note 4 |
| | Alternating 1 and 50 (UE Cat 1) | | 16.99 | | 16.99 ± (6.7) Note 1,2 16.99 +8.2/-6.7 Note 3 16.99 +6.7/-8.2 Note 4 |
| 20 MHz | Alternating 1 and 100 (UE Cat 2-5) | TPC=0dB | 20.00 | $15 \leq \Delta P$ | 20.00 ± (6.7) Note 1,2 20.00 +8.2/-6.7 Note 3 20.00 +6.7/-8.2 Note 4 |
| | Alternating 1 and 75 (UE Cat 1) | | 18.75 | | 18.75 ± (6.7) Note 1,2 18.75 +8.2/-6.7 Note 3 18.75 +6.7/-8.2 Note 4 |
| <p>Note 1: Test tolerance +/- 6.7 dB was selected to allow PA switch possible exceptions to occur.</p> <p>Note 2: When neither Note 3 nor Note 4 applies.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

6.3.5.3 Aggregate power control tolerance

6.3.5.3.1 Test purpose

To verify the ability of the UE to maintain its power level in non-contiguous transmission within 21 ms in response to 0 dB TPC commands with respect to the first UE transmission, when the power control parameters specified in TS 36.213 are constant.

6.3.5.3.2 Test applicability

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

6.3.5.3.3 Minimum conformance requirement

The UE shall meet the requirements specified in Table 6.3.5.3.3-1 for relative power control over the power range bounded by the minimum output power as defined in sub clause 6.3.2 and the maximum output power in sub-clause 6.2.2.

Table 6.3.5.3.3-1: Power control tolerance

| TPC command | UL channel | Aggregate power tolerance within 21 ms |
|--|------------|--|
| 0 dB | PUCCH | ± 2.5 dB |
| 0 dB | PUSCH | ± 3.5 dB |
| Note 1: The UE transmission gap is 4 ms. TPC command is transmitted via PDCCH 4 subframes preceding each PUCCH/PUSCH transmission. | | |

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5.3.1.

6.3.5.3.4 Test description

6.3.5.3.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5.3.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5.3.4.1-1: Test Configuration Table: PUCCH sub-test

| Initial Conditions | | | | |
|--|-------|---------------|-----------------------|---|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | | | Normal | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 | | | Mid range | |
| Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1 | | | Lowest, 5MHz, Highest | |
| Test Parameters for Channel Bandwidths | | | | |
| Downlink Configuration | | | Uplink Configuration | |
| Ch BW | Mod'n | RB allocation | | FDD: PUCCH format = Format 1a TDD: PUCCH format = Format 1a/1b |
| | | FDD | TDD | |

| | | | | |
|--|------|----|----|--|
| 1.4MHz | QPSK | 3 | 3 | |
| 3MHz | QPSK | 4 | 4 | |
| 5MHz | QPSK | 8 | 8 | |
| 10MHz | QPSK | 16 | 16 | |
| 15MHz | QPSK | 25 | 25 | |
| 20MHz | QPSK | 30 | 30 | |
| Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. | | | | |

Table 6.3.5.3.4.1-2: Test Configuration Table: PUSCH sub-test

| Initial Conditions | | | | | |
|--|------------------------|-----------------------|----------------------|---------------|-----|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | | Normal | | | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 | | Mid range | | | |
| Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1 | | Lowest, 5MHz, Highest | | | |
| Test Parameters for Channel Bandwidths | | | | | |
| | Downlink Configuration | | Uplink Configuration | | |
| Ch BW | N/A for PUSCH sub-test | | Mod'n | RB allocation | |
| | | | | FDD | TDD |
| 1.4MHz | | | QPSK | 1 | 1 |
| 3MHz | | | QPSK | 4 | 4 |
| 5MHz | | | QPSK | 8 | 8 |
| 10MHz | | | QPSK | 12 | 12 |
| 15MHz | | | QPSK | 16 | 16 |
| 20MHz | | | QPSK | 18 | 18 |
| Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 6.3.5.3.4.1-1 (PUCCH sub-test) and Table 6.3.5.3.4.1-2 (PUSCH sub-test).
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5.3.4.3.

6.3.5.3.4.2 Test procedure

The procedure is separated in two subtests to verify PUCCH and PUSCH aggregate power control tolerance respectively. The uplink transmission patterns are described in figure 6.3.5.3.4.2-1.

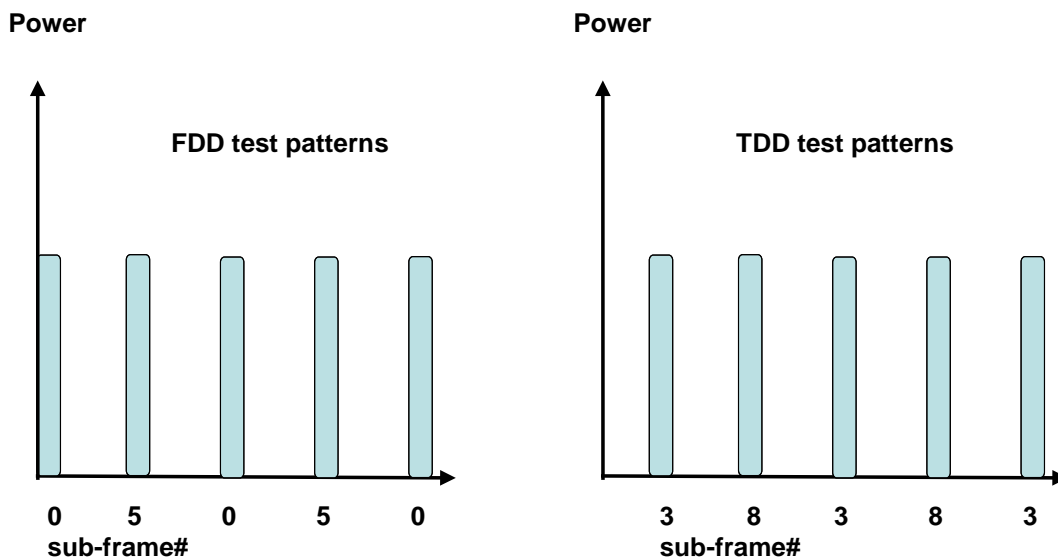


Figure 6.3.5.3.4.2-1 Test uplink transmission

1. PUCCH sub test:

1.1 The SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 6.3.5.3.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The transmission of PDSCH will make the UE send uplink ACK/NACK using PUCCH. Send the appropriate TPC commands for PUCCH to the UE to ensure that the UE transmits PUCCH at 0dBm +/- 3.2 dB for carrier frequency $f \leq 3.0\text{GHz}$ or at 0dBm +/- 3.5 dB for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$.

1.2. Every 5 subframes transmit to the UE downlink PDSCH MAC padding bits as well as 0 dB TPC command for PUCCH via the PDCCH to make the UE transmit ACK/NACK on the PUCCH with transmission gap of 4 subframes. The downlink transmission is scheduled in the appropriate sub-frames to make the UE transmit PUCCH as described in figure 6.3.5.3.4.2-1.

1.3. Measure the power of 5 consecutive PUCCH transmissions to verify the UE transmitted PUCCH power is maintained within 21 ms. The transient periods of 20us are excluded from the power measurement.

2. PUSCH sub test:

2.1. The SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at 0dBm +/- 3.2.dB for carrier frequency $f \leq 3.0\text{GHz}$ or at 0dBm +/- 3.5 dB for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$.

2.2. Every 5 subframes schedule the UE's PUSCH data transmission and transmit 0 dB TPC command for PUSCH via the PDCCH to make the UE transmit PUSCH with 4 subframes gap. The uplink transmission patterns are described in figure 6.3.5.3.4.2-1.

2.3. Measure the power of 5 consecutive PUSCH transmissions to verify the UE transmitted PUSCH power is maintained within 21 ms. The transient periods of 20us are excluded from the power measurement.

6.3.5.3.4.3 Message contents

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

6.3.5.3.5 Test requirement

The requirement for the power measurements made in step (1.3) and (2.3) of the test procedure shall not exceed the values specified in Table 6.3.5.3.5-1. The power measurement period shall be 1 sub-frame excluding transient periods.

Table 6.3.5.3.5-1: Power control tolerance

| TPC command | UL channel | Test requirement measured power |
|--|------------|--|
| 0 dB | PUCCH | Given 5 power measurements in the pattern, the 2 nd , 3 rd , 4 th , and 5 th measurements shall be within ± 3.2 dB of the 1 st measurement. |
| 0 dB | PUSCH | Given 5 power measurements in the pattern, the 2 nd , 3 rd , 4 th , and 5 th measurements shall be within ± 4.2 dB of the 1 st measurement. |
| Note 1: The UE transmission gap is 4 ms. TPC command is transmitted via PDCCH 4 subframes preceding each PUCCH/PUSCH transmission. | | |

6.3.5A Power Control for CA

6.3.5A.1 Power Control Absolute power tolerance for CA

6.3.5A.1.1 Power Control Absolute power tolerance for CA (intra-band contiguous DL CA and UL CA)

6.3.5A.1.1.1 Test purpose

To verify the ability of the UE transmitter to set its initial output power to a specific value for the first sub-frame at the start of a contiguous transmission or non-contiguous transmission with a transmission gap on each active component carriers larger than 20ms.

6.3.5A.1.1.2 Test applicability

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

6.3.5A.1.1.3 Minimum conformance requirements

The absolute power tolerance is the ability of the UE transmitter to set its initial output power to a specific value for the first sub-frame at the start of a contiguous transmission or non-contiguous transmission with a transmission gap on each active component carriers larger than 20ms. The requirement can be tested by time aligning any transmission gaps on the component carriers.

For intra-band contiguous carrier aggregation bandwidth class C the absolute power control tolerance per component carrier is given in Table 6.3.5A.1.1.3-1.

The requirements apply for one single PUCCH, PUSCH or SRS transmission of contiguous PRB allocation per component carrier.

Table 6.3.5A.1.1.3-1: Absolute power tolerance for intra-band contiguous CA

| Conditions | Tolerance |
|--------------------|---------------|
| Normal conditions | ± 9.0 dB |
| Extreme conditions | ± 12.0 dB |

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5A.1.1.

6.3.5A.1.1.4 Test description

6.3.5A.1.1.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.5A.1.1.4.1-1. The details of the uplink reference

measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5A.1.1.4.1-1: Test Configuration Table

| Initial Conditions | | | | | | | |
|---|----------------------|-------------------------|--------|---|--|---------|--|
| Test Environment as specified in TS 36.508[7] clause 4.1 | | | | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | |
| Test Frequencies as specified in TS36.508 [7] clause [4.3.1] for different CA bandwidth classes. | | | | C: Mid range | | | |
| Test CC Combination setting (NRB_agg) as specified in clause 5.4.2A.1 for the CA Configuration | | | | Lowest N _{RB_agg} Highest N _{RB_agg} | | | |
| Test Parameters for CA Configurations | | | | | | | |
| CA Configuration / N _{RB_agg} | | DL Allocation | CC MOD | UL Allocation | | | |
| PCC N _{RB} | SCCs N _{RB} | PCC & SCC RB allocation | | N _{RB_alloc} | PCC & SCC RB allocations (L _{CRB} @ RB _{start}) | | |
| 75 | 75 | N/A for this test | QPSK | 150 | P_75@0 | S_75@0 | |
| 100 | 50 | | QPSK | 150 | P_100@0 | S_50@0 | |
| 100 | 100 | | QPSK | 200 | P_100@0 | S_100@0 | |
| Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1. | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.5A.1.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5A.1.1.4.3. Any PDCCH DCI format 0 sent to the UE during the configuration should have TPC command 0dB.

6.3.5A.1.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for UplinkPowerControlCommonSCell-r10 are defined in tables 6.3.5A.1.1.4.3-2, 6.3.5A.1.1.4.3-4 and 6.3.5A.1.1.4.3-7. Any PDCCH DCI format 0 sent to the UE during the configuration should have TPC command 0dB.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 with TPC command 0dB for C_RNTI to schedule the UL RMC according to Table 6.3.5A.1.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Measure the initial output power of the first subframe of the UE PUSH first transmission for each component carrier. The transient periods of 20us are excluded.
6. Repeat for the two test points as indicated in section 6.3.5A.1.1.4.3. The timing of the execution between the two test points shall be larger than 20ms.

6.3.5A.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions.

Table 6.3.5A.1.1.4.3-1: UplinkPowerControlCommon: Test point 1

| Derivation Path: TS 36.508 [7] clause 6.3.2, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT | | | |
|--|--------------|---|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH | -105 | Test point 1 to verify a UE relative low initial power transmission | |

Table 6.3.5A.1.1.4.3-2: UplinkPowerControlCommonSCell-r10: Test point 1

| Derivation Path: TS 36.508 [7] clause 6.3.2, Table 4.6.3-25A UplinkPowerControlCommonSCell-r10-DEFAULT | | | |
|--|--------------|---|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlCommonSCell-r10 ::= SEQUENCE { p0-NominalPUSCH | -105 | Test point 1 to verify a UE relative low initial power transmission | |

Table 6.3.5A.1.1.4.3-3: UplinkPowerControlCommon: Test point 2

| Derivation Path: TS 36.508 [7] clause 6.3.2, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT | | | |
|--|--------------|--|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH | -93 | Test point 2 to verify a UE relative high initial power transmission | |

Table 6.3.5A.1.1.4.3-4: UplinkPowerControlCommonSCell-r10: Test point 2

| Derivation Path: TS 36.508 [7] clause 6.3.2, Table 4.6.3-25A UplinkPowerControlCommonSCell-r10-DEFAULT | | | |
|--|--------------|--|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlCommonSCell-r10 ::= SEQUENCE { p0-NominalPUSCH | -93 | Test point 2 to verify a UE relative high initial power transmission | |

Table 6.3.5A.1.1.4.3-5: PhysicalConfigDedicated

| Derivation Path: TS 36.508 [7] clause 6.3.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT | | | |
|--|-------------------------------------|---------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| PhysicalConfigDedicated-DEFAULT ::= SEQUENCE { uplinkPowerControlDedicated | UplinkPowerControlDedicated-DEFAULT | See subclause 4.6.3 | SRB1 |
| | UplinkPowerControlDedicated-DEFAULT | See subclause 4.6.3 | RBC |

Table 6.3.5A.1.1.4.3-6: UplinkPowerControlDedicated

| Derivation Path: TS 36.508 [7] clause 6.3.2, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT | | | |
|---|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE { | | | |
| p0-UE-PUSCH | 1 | | SRB1 |
| | 0 | | RBC |
| } | | | |

Table 6.3.5A.1.1.4.3-7: UplinkPowerControlDedicatedSCell-r10

| Derivation Path: TS 36.508 [7] clause 6.3.2, Table 4.6.3-26B UplinkPowerControlDedicatedSCell-r10-DEFAULT | | | |
|---|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlDedicatedSCell-r10 ::= SEQUENCE { | | | |
| p0-UE-PUSCH | 1 | | SRB1 |
| | 0 | | RBC |
| } | | | |

6.3.5A.1.1.5 Test requirement

For intra-band contiguous carrier aggregation bandwidth class C, the absolute power control tolerance per component carrier measured in step (5) of the test procedure is not to exceed the values specified in Table 6.3.5A.1.1.5-1 and 6.3.5A.1.1.5-2. The test requirement tables are originated from tables 6.3.5.1.5-1 and 6.3.5.1.5-2.

Table 6.3.5A.1.1.5-1: Absolute power tolerance for intra-band contiguous CA: test point 1

| | Channel bandwidth / expected output power (dBm) | | | | | |
|--|---|-----------|----------|----------|----------|----------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Expected Measured power Normal conditions | -14.8 dBm | -10.8 dBm | -8.6 dBm | -5.6 dBm | -3.9 dBm | -2.6 dBm |
| Power tolerance f ≤ 3.0GHz | ± 10.0dB | ± 10.0dB | ± 10.0dB | ± 10.0dB | ± 10.0dB | ± 10.0dB |
| 3.0GHz < f ≤ 4.2GHz | ± 10.4dB | ± 10.4dB | ± 10.4dB | ± 10.4dB | ± 10.4dB | ± 10.4dB |
| Expected Measured power Extreme conditions | -14.8 dBm | -10.8 dBm | -8.6 dBm | -5.6 dBm | -3.9 dBm | -2.6 dBm |
| Power tolerance f ≤ 3.0GHz | ± 13.0dB | ± 13.0dB | ± 13.0dB | ± 13.0dB | ± 13.0dB | ± 13.0dB |
| 3.0GHz < f ≤ 4.2GHz | ± 13.4dB | ± 13.4dB | ± 13.4dB | ± 13.4dB | ± 13.4dB | ± 13.4dB |
| Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2.3 | | | | | | |

Table 6.3.5A.1.1.5-2: Absolute power tolerance for intra-band contiguous CA: test point 2

| | Channel bandwidth / expected output power (dBm) | | | | | |
|--|---|--|--|--|--|--|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Expected Measured power Normal conditions | -2.8 dBm | 1.2 dBm | 3.4 dBm | 6.4 dBm | 8.2 dBm | 9.4 dBm |
| Power tolerance $f \leq 3.0\text{GHz}$ $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ | $\pm 10.0\text{dB}$ $\pm 10.4\text{dB}$ |
| Expected Measured power Extreme conditions | -2.8 dBm | 1.2 dBm | 3.4 dBm | 6.4 dBm | 8.2 dBm | 9.4 dBm |
| Power tolerance $f \leq 3.0\text{GHz}$ $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ | $\pm 13.0\text{dB}$ $\pm 13.4\text{dB}$ |
| Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2.3 | | | | | | |

6.3.5A.2 Power Control Relative power tolerance for CA

6.3.5A.2.1 Power Control Relative power tolerance for CA (intra-band contiguous DL CA and UL CA)

In the minimum conformance paragraph and in the test procedure the alignment ($\pm[2]$) of the two component carriers needs to be confirmed.

6.3.5A.2.1.1 Test purpose

To verify the ability of the UE transmitter to change the output power in both assigned component carrier in the uplink with a defined power step sizes between sub-frames on the two respective component carrier.

6.3.5A.2.1.2 Test applicability

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

6.3.5A.2.1.3 Minimum conformance requirement

The requirements apply when the power of the target and reference sub-frames on each component carrier exceed the minimum output power as defined in subclause 6.3.2A and the total power is limited by P_{UMAX} as defined in subclause 6.2.5A.

For intra-band contiguous carrier aggregation bandwidth class C, the UE transmitter shall have the capability of changing the output power in both assigned component carrier in the uplink with a step sizes of ΔP between subframes on the two respective component carrier as follows

- The requirements for all combinations of PUSCH and PUCCH transitions per component carrier is given in Table 6.3.5A.2.1.3-1, when the average transmit power per PRB for the transmission on the assigned carriers are aligned to within $\pm[2]$ dB in the reference sub-frame and the target subframe after the transition.
- For SRS the requirements for combinations of PUSCH/PUCCH and SRS transitions between sub-frames given in Table 6.3.5A.2.1.3-1 apply per component carrier when the target and reference subframes are configured for either simultaneous SRS or simultaneous PUSCH and with the average transmit power per PRB for the transmissions on the assigned carrier aligned to within $\pm[2]$ dB in the reference sub-frame and the target subframe after the transition.
- For RACH the requirements apply for the primary cell and are given in Table 6.3.5A.2.1.3-1.

Table 6.3.5A.2.1.3-1 Relative Power Tolerance for Transmission (normal conditions)

| Power step ΔP (Up or down) [dB] | All combinations of PUSCH and PUCCH transitions [dB] | All combinations of PUSCH/PUCCH and SRS transitions between sub- frames [dB] | PRACH [dB] |
|---|---|--|------------|
| $\Delta P < 2$ | ± 2.5 (Note 3) | ± 3.0 | ± 2.5 |
| $2 \leq \Delta P < 3$ | ± 3.0 | ± 4.0 | ± 3.0 |
| $3 \leq \Delta P < 4$ | ± 3.5 | ± 5.0 | ± 3.5 |
| $4 \leq \Delta P \leq 10$ | ± 4.0 | ± 6.0 | ± 4.0 |
| $10 \leq \Delta P < 15$ | ± 5.0 | ± 8.0 | ± 5.0 |
| $15 \leq \Delta P$ | ± 6.0 | ± 9.0 | ± 6.0 |
| <p>Note 1: For extreme conditions an additional ± 2.0 dB relaxation is allowed</p> <p>Note 2: For operating bands under Note 2 in Table 6.2.2.3-1, the relative power tolerance is relaxed by increasing the upper limit by 1.5 dB if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges; if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges, then the tolerance is relaxed by reducing the lower limit by 1.5 dB.</p> <p>Note 3: For PUSCH to PUSCH transitions with the allocated resource blocks fixed in frequency and no transmission gaps other than those generated by downlink subframes, DwPTS fields or Guard Periods for TDD: for a power step $\Delta P \leq 1$ dB, the relative power tolerance for transmission is ± 1.0 dB.</p> | | | |

The power step (ΔP) is defined as the difference in the calculated setting of the UE Transmit power between the target and reference sub-frames with the power setting according to Clause 5.1 of TS 36.213. The error is the difference between ΔP and the power change measured at the UE antenna port with the power of the cell-specific reference signals kept constant. The error shall be less than the relative power tolerance specified in Table 6.3.5A.2.1.3-1.

The normative reference for this requirement is TS 36.101 clause 6.3.5A.2.

6.3.5A.2.1.4 Test description

6.3.5A.2.1.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.5A.2.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5A.2.1.4.1-1: Test Configuration Table

| Initial Conditions | | | | | | | | |
|--|----------------------|-------------------------|--------|---|--|---------|---|---|
| Test Environment as specified in TS 36.508[7] clause 4.1 | | | | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | | |
| Test Frequencies as specified in TS36.508 [7] clause [4.3.1] for different CA bandwidth classes. | | | | C: Mid range | | | | |
| Test CC Combination setting (NRB_agg) as specified in clause 5.4.2A.1 for the CA Configuration | | | | Lowest N _{RB_agg} Highest N _{RB_agg} | | | | |
| Test Parameters for CA Configurations | | | | | | | | |
| CA Configuration / N _{RB_agg} | | DL Allocation | CC MOD | UL Allocation | | | | |
| PCC N _{RB} | SCCs N _{RB} | PCC & SCC RB allocation | | N _{RB_alloc} | PCC & SCC RB allocations (L _{CRB} @ RB _{start}) | | | |
| 75 | 75 | N/A for this test | QPSK | 150 | P_75@0 | S_75@0 | - | - |
| 100 | 50 | | QPSK | 150 | P_100@0 | S_50@0 | - | - |
| 100 | 100 | | QPSK | 200 | P_100@0 | S_100@0 | - | - |
| Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1 | | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate .
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to table 6.3.5A.2.1.4.1-1
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5A.2.1.4.3.

6.3.5A.2.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. The procedure is separated in various subtests to verify different aspects of relative power control. The power patterns of the subtests are described in figure 6.3.5.2.4.2-1, 6.3.5.2.4.2-2, 6.3.5.2.4.2-3, 6.3.5.2.4.2-4 and 6.3.5.2.4.2-5.
5. Sub test: ramping up pattern
 - 5.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.3.5A.1.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH at -36.8dBm +/- 3.2 dB for carrier frequency $f \leq 3.0\text{GHz}$ or at -36.5dBm +/- 3.5 dB for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$. In addition, considering that PCC and SCC uplink RB allocations are both active, the average transmit power per PRB for the transmission on the assigned carriers shall aligned within $\pm[2]$ dB in the reference sub-frame and the target subframe after the transition. In case they are not aligned, SS shall send appropriate TPC commands for PUSCH on the relevant component in order to be aligned before continuing the test.
 - 5.2. Schedule the UE's PUSCH data transmission on each component carrier as described in Figure 6.3.5.2.4.2-1 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5.2.4.2-3 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink

- sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5.2.5-1 thru 6.3.5.2.5-12 depending on channel bandwidth. On the PDCCH format 0 for the scheduling of the PUSCH of each component carrier the SS will transmit a +1dB TPC command. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.
- 5.3. Measure the power of PUSCH transmissions on each component carrier to verify the UE relative power control meet test requirements 6.3.5.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.
 - 5.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5.2.5-1 thru Table 6.3.5.2.5-12 to force bigger UE power steps at various points in the power range on each component carrier.
 6. Sub test: ramping down pattern
 - 6.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.3.5A.1.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH at +18.0dBm +/- 3.2 dB for carrier frequency $f \leq 3.0\text{GHz}$ or at +17.7dBm +/- 3.5 dB for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$. In addition, considering that PCC and SCC uplink RB allocations are both active, the average transmit power per PRB for the transmission on the assigned carriers shall aligned within $\pm[2]$ dB in the reference sub-frame and the target subframe after the transition. In case they are not aligned, SS shall send appropriate TPC commands for PUSCH on the relevant component in order to be aligned before continuing the test.
 - 6.2. Schedule the UE's PUSCH data transmission on each component carrier as described in Figure 6.3.5.2.4.2-2 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5.2.4.2-4 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5.2.5-1 thru 6.3.5.2.5-12 depending on channel bandwidth. On the PDCCH format 0 for the scheduling of the PUSCH of each component carrier the SS will transmit a -1dB TPC command. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.
 - 6.3. Measure the power of PUSCH transmissions on each component carrier to verify the UE relative power control meet test requirements 6.3.5.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.
 - 6.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5.2.5-1 thru Table 6.3.5.2.5-12 to force bigger UE power steps at various points in the power range on each component carrier.
 7. Sub test: alternating pattern
 - 7.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.3.5A.1.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH at -10dBm +/- 3.2 dB for carrier frequency $f \leq 3.0\text{GHz}$ or at -10dBm +/- 3.5 dB for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$. The initial uplink RB allocation is defined as the smaller uplink RB allocation value specified in tables 6.3.5.2.5-13. The power level and RB allocation are reset for each sub-test.
 - 7.2. Schedule the UE's PUSCH data transmission on each component carrier as described in Figure 6.3.5.2.4.2-5 for 10 sub-frames with an uplink RB allocation alternating pattern as defined in table 6.3.5.2.5-13 while transmitting 0dB TPC command for PUSCH via the PDCCH.
 - 7.3. Measure the power of PUSCH transmissions on each component carrier to verify the UE relative power control meet test requirements specified in clause 6.3.5.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

6.3.5A.2.1.4.3 Message contents

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

6.3.5A.2.1.5 Test requirement

For intra-band contiguous carrier aggregation bandwidth class C, the relative power control tolerance per component carrier measured in steps (5), (6) and (7) of the test procedure should satisfy the test requirements specified in Tables 6.3.5A.2.1.5-1, thru 6.3.5A.2.1.5-13 for normal conditions; for extreme conditions an additional ± 2.0 dB relaxation is allowed. The test requirement tables are originated from tables 6.3.5.2.5-1, thru 6.3.5.2.5-13.

To account for RF Power amplifier mode changes 2 exceptions are allowed for each of ramping up and ramping down test patterns. For these exceptions the power tolerance limit is a maximum of ±6.7 dB. If there is an exception in the power step caused by the RB change for all test patterns (A, B, C) then fail the UE.

Table 6.3.5A.2.1.5-1: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 1.4MHz (ramping up) for intra-band contiguous DL CA and UL CA

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|---|------------------------|-------------|--|---------------------------------------|--|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | ΔP < 2 | 1 ± (1.7) |
| RB change | Change from 1 to 6 RBs | TPC=+1dB | 8.78 | 4 ≤ ΔP < 10 | 8.78 ± (4.7) Note 2 8.78 +6.2/-4.7 Note 3 |
| Subframes after RB change | Fixed = 6 | TPC=+1dB | 1 | ΔP < 2 | 1 ± (1.7) |
| Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes Pattern B the position of RB uplink allocation change is after 20 active uplink subframes Pattern C the position of RB uplink allocation change is after 30 active uplink subframes Note 2: When Note 3 does not apply. Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F _{UL_low} and F _{UL_low} + 4 MHz or F _{UL_high} – 4 MHz and F _{UL_high} and the target sub-frame is not confined within any one of these frequency ranges. Note 4: N/A Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed. Note 6: The starting resource block shall be RB# 0. | | | | | |

Table 6.3.5A.2.1.5-2: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 1.4MHz (ramping down) for intra-band contiguous DL CA and UL CA

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|----------------------|----------------------|-------------|--|---|---------------|
| | | | | | |

| | | | | | |
|---|------------------------|----------|------|-----------------------|---|
| Subframes before RB change | Fixed = 5 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 5 to 1 RBs | TPC=-1dB | 7.99 | $4 \leq \Delta P < 1$ | $7.99 \pm (4.7)$ Note 2 $7.99 + 4.7/-6.2$ Note 4 |
| Subframes after RB change | Fixed = 1 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes Pattern B the position of RB uplink allocation change is after 16 active uplink subframes Pattern C the position of RB uplink allocation change is after 26 active uplink subframes</p> <p>Note 2: When Note 4 does not apply.</p> <p>Note 3: N/A</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5A.2.1.5-3: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 3MHz (ramping up) for intra-band contiguous DL CA and UL CA

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|---|------------------------|-------------|---|--|---|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 1 to 4 RBs | TPC=+1dB | 7.02 | $4 \leq \Delta P < 10$ | $7.02 \pm (4.7)$ Note 2 $7.02 + 6.2/-4.7$ Note 3 |
| Subframes after RB change | Fixed =4 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes Pattern B the position of RB uplink allocation change is after 20 active uplink subframes Pattern C the position of RB uplink allocation change is after 30 active uplink subframes</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5A.2.1.5-4: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 3MHz (ramping down) for intra-band contiguous DL CA and UL CA

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|---|-------------------------|-------------|---|--------------------------------------|--|
| Subframes before RB change | Fixed = 15 | TPC=-1dB | 1 | ΔP < 2 | 1 ± (1.7) |
| RB change | Change from 15 to 1 RBs | TPC=-1dB | 12.76 | 10 ≤ ΔP < 15 | 12.76 ± (5.7) Note 2 12.76 +5.7/-7.2 Note 4 |
| Subframes after RB change | Fixed =1 | TPC=-1dB | 1 | ΔP < 2 | 1 ± (1.7) |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes Pattern A the position of RB uplink allocation change is after 16 active uplink subframes Pattern C the position of RB uplink allocation change is after 26 active uplink subframes</p> <p>Note 2: When Note 4 does not apply.</p> <p>Note 3: N/A</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5A.2.1.5-5: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 5MHz (ramping up) for intra-band contiguous DL CA and UL CA

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|--------------------|----------------------|-------------|---------------------------------------|------------------------------------|------------|
| | | | | | |

| | | | | | |
|---|---------------------|----------|-------|-------------------------|---|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 1 to 20 | TPC=+1dB | 14.01 | $10 \leq \Delta P < 15$ | $14.01 \pm (5.7)$ Note 2 $14.01 + 7.2/-5.7$ Note 3 |
| Subframes after RB change | Fixed = 20 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes Pattern B the position of RB uplink allocation change is after 20 active uplink subframes Pattern C the position of RB uplink allocation change is after 30 active uplink subframes</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5A.2.1.5-6: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 5MHz (ramping down) for intra-band contiguous DL CA and UL CA

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|---|----------------------|-------------|--|---|---|
| Subframes before RB change | Fixed = 25 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 25 to 1 | TPC=-1dB | 14.98 | $10 \leq \Delta P < 15$ | $14.98 \pm (5.7)$ Note 2 $14.98 + 5.7/-7.2$ Note 4 |
| Subframes after RB change | Fixed = 1 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes Pattern B the position of RB uplink allocation change is after 16 active uplink subframes Pattern C the position of RB uplink allocation change is after 26 active uplink subframes</p> <p>Note 2: When Note 4 does not apply.</p> <p>Note 3: N/A</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5A.2.1.5-7: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 10MHz (ramping up) for intra-band contiguous DL CA and UL CA

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|---|----------------------|-------------|--|---|---|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 1 to 25 | TPC=+1dB | 14.98 | $10 \leq \Delta P < 15$ | $14.98 \pm (5.7)$ Note 2 $14.98 + 7.2/-5.7$ Note 3 |
| Subframes after RB change | Fixed = 25 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes Pattern B the position of RB uplink allocation change is after 20 active uplink subframes Pattern C the position of RB uplink allocation change is after 30 active uplink subframes</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5A.2.1.5-8: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 10MHz (ramping down) for intra-band contiguous DL CA and UL CA

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|----------------------|----------------------|-------------|--|---|-------------------|
|----------------------|----------------------|-------------|--|---|-------------------|

| | | | | | |
|---|--|----------|----------------|------------------|--|
| Subframes before RB change | Fixed = 50 (UE Cat 2-5) Fixed = 48 (UE Cat 1) | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 50 to 1 (UE cat 2-5) Change from 48 to 1 (UE cat 1) | TPC=-1dB | 17.99 17.81 | $15 \leq \Delta$ | $17.99 \pm (6.7)$ Note 2 $17.99 +6.7/-8.2$ Note 4 $17.81 \pm (6.7)$ Note 2 $17.81 +6.7/-8.2$ Note 4 |
| Subframes after RB change | Fixed = 1 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes Pattern B the position of RB uplink allocation change is after 16 active uplink subframes Pattern C the position of RB uplink allocation change is after 26 active uplink subframes</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: N/A</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5A.2.1.5-9: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping up) for intra-band contiguous DL CA and UL CA

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|--------------------|----------------------|-------------|--|---|---------------|
|--------------------|----------------------|-------------|--|---|---------------|

| | | | | | |
|---|---------------------|----------|-------|--------------------|---|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 1 to 50 | TPC=+1dB | 17.99 | $15 \leq \Delta P$ | $17.99 \pm (6.7)$ Note 2 $17.99 + 8.2 / -6.7$ Note 3 |
| Subframes after RB change | Fixed = 50 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes Pattern B the position of RB uplink allocation change is after 20 active uplink subframes Pattern C the position of RB uplink allocation change is after 30 active uplink subframes</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5A.2.1.5-10: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping down) for intra-band contiguous DL CA and UL CA

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|----------------------|----------------------|-------------|--|---|---------------|
|----------------------|----------------------|-------------|--|---|---------------|

| | | | | | |
|---|----------------------------------|----------|-------|--------------------|--|
| Subframes before RB change | Fixed = 75 (UE Cat 2-5) | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Fixed = 50 (UE Cat 1) | TPC=-1dB | 19.75 | $15 \leq \Delta P$ | 19.75 \pm (6.7) Note 2 19.75 +6.7/-8.2 Note 4 |
| | Change from 75 to 1 (UE Cat 2-5) | | 17.99 | | |
| Subframes after RB change | Fixed = 1 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes Pattern B the position of RB uplink allocation change is after 16 active uplink subframes Pattern C the position of RB uplink allocation change is after 26 active uplink subframes</p> <p>Note 2: When Note 4 does not apply.</p> <p>Note 3: N/A</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5A.2.1.5-11: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping up) for intra-band contiguous DL CA and UL CA

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|--------------------|----------------------|-------------|--|---|---------------|
|--------------------|----------------------|-------------|--|---|---------------|

| | | | | | |
|---|---------------------|----------|-------|--------------------|---|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 1 to 75 | TPC=+1dB | 19.75 | $15 \leq \Delta P$ | $19.75 \pm (6.7)$ Note 2 $19.75 + 8.2/-6.7$ Note 3 |
| Subframes after RB change | Fixed = 75 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes Pattern B the position of RB uplink allocation change is after 20 active uplink subframes Pattern C the position of RB uplink allocation change is after 30 active uplink subframes</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5A.2.1.5-12: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping down) for intra-band contiguous DL CA and UL CA

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|----------------------|----------------------|-------------|--|---|---------------|
|----------------------|----------------------|-------------|--|---|---------------|

| | | | | | |
|---|---|----------|---------------|--------------------|--|
| Subframes before RB change | Fixed = 100 (UE Cat 2-5) Fixed = 75 (UE Cat 1) | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| RB change | Change from 100 to 1 (UE Cat 2-5) Change from 75 to 1 (UE Cat 1) | TPC=-1dB | 21.0 19.75 | $15 \leq \Delta P$ | $21.0 \pm (6.7)$ Note 2 $21.0 + 6.7/-8.2$ Note 4 $19.75 \pm (6.7)$ Note 2 $19.75 + 6.7/-8.2$ Note 4 |
| Subframes after RB change | Fixed = 1 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm (1.7)$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes Pattern B the position of RB uplink allocation change is after 16 active uplink subframes Pattern C the position of RB uplink allocation change is after 26 active uplink subframes</p> <p>Note 2: When Note 4 does not apply.</p> <p>Note 3: N/A</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5A.2.1.5-13: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) (Alternating pattern) for intra-band contiguous DL CA and UL CA

| Sub-test | Uplink RB allocation | TPC command | Expected power step size (Up or down) ΔP [dB] | Power step size range (Up or down) ΔP [dB] | PUSCH [dB] |
|----------|----------------------|-------------|--|---|-------------------|
|----------|----------------------|-------------|--|---|-------------------|

| | | | | | |
|---|---|---------|-------|-------------------------|--|
| 1.4 MHz | Alternating 1 and 6 | TPC=0dB | 7.78 | $4 \leq \Delta P < 10$ | 7.78 ± (6.7) Note 1,2 7.78 +8.2/-6.7 Note 3 7.78 +6.7/-8.2 Note 4 |
| 3 MHz | Alternating 1 and 15 | TPC=0dB | 11.76 | $10 \leq \Delta P < 15$ | 11.76 ± (6.7) Note 1,2 11.76 +8.2/-6.7 Note 3 11.76 +6.7/-8.2 Note 4 |
| 5 MHz | Alternating 1 and 25 | TPC=0dB | 13.98 | $10 \leq \Delta P < 15$ | 13.98 ± (6.7) Note 1,2 13.98 +8.2/-6.7 Note 3 13.98 +6.7/-8.2 Note 4 |
| 10 MHz | Alternating 1 and 50 (UE Cat 2-5) Alternating 1 and 48 (UE Cat 1) | TPC=0dB | 16.99 | $15 \leq \Delta P$ | 16.99 ± (6.7) Note 1,2 16.99 +8.2/-6.7 Note 3 16.99 +6.7/-8.2 Note 4 |
| | | | 16.81 | | 16.81 ± (6.7) Note 1,2 16.81 +8.2/-6.7 Note 3 16.81 +6.7/-8.2 Note 4 |
| 15 MHz | Alternating 1 and 75 (UE Cat 2-5) Alternating 1 and 50 (UE Cat 1) | TPC=0dB | 18.75 | $15 \leq \Delta P$ | 18.75 ± (6.7) Note 1,2 18.75 +8.2/-6.7 Note 3 18.75 +6.7/-8.2 Note 4 |
| | | | 16.99 | | 16.99 ± (6.7) Note 1,2 16.99 +8.2/-6.7 Note 3 16.99 +6.7/-8.2 Note 4 |
| 20 MHz | Alternating 1 and 100 (UE Cat 2-5) Alternating 1 and 75 (UE Cat 1) | TPC=0dB | 20.00 | $15 \leq \Delta P$ | 20.00 ± (6.7) Note 1,2 20.00 +8.2/-6.7 Note 3 20.00 +6.7/-8.2 Note 4 |
| | | | 18.75 | | 18.75 ± (6.7) Note 1,2 18.75 +8.2/-6.7 Note 3 18.75 +6.7/-8.2 Note 4 |
| <p>Note 1: Test tolerance +/- 6.7 dB was selected to allow PA switch possible exceptions to occur.</p> <p>Note 2: When neither Note 3 nor Note 4 applies.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

6.3.5A.3 Aggregate power control tolerance for CA

6.3.5A.3.1 Aggregate power control tolerance for CA (intra-band contiguous DL CA and UL CA)

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

- Test tolerances are missing

6.3.5A.3.1.1 Test purpose

To verify the ability of a UE to maintain its power in non-contiguous transmission within 21 ms in response to 0 dB TPC commands with respect to the first UE transmission, when the power control parameters specified in [TS 36.213] are constant on all active component carriers.

6.3.5A.3.1.2 Test applicability

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

6.3.5A.3.1.3 Minimum conformance requirements

For intra-band contiguous carrier aggregation bandwidth class C, the aggregate power tolerance per component carrier is given in Table 6.3.5A.3.1.3-1 with simultaneous PUCCH and PUSCH configured if supported. The requirement can be tested with the transmission gaps time aligned between component carriers.

Table 6.3.5A.3.1.3-1: Aggregate power control tolerance for intra-band contiguous CA

| TPC command | UL channel | Aggregate power tolerance within 21 ms |
|--|------------|--|
| 0 dB | PUCCH | ± 2.5 dB |
| 0 dB | PUSCH | ± 3.5 dB |
| NOTE: The UE transmission gap is 4 ms. TPC command is transmitted via PDCCH 4 subframes preceding each PUCCH/PUSCH transmission. | | |

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5A.3.1.

6.3.5A.3.1.4 Test description

6.3.5A.3.1.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.5A.3.1.4.1-1 and table 6.3.5A.3.1.4.1-2. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5A.3.1.4.1-1: Test Configuration Table: PUCCH sub-test

| Initial Conditions | | | | |
|--|---------------|---------------|---|--|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | | | Normal | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes. | | | C: Mid range | |
| Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration | | | Lowest N_{RB_agg} Highest N_{RB_agg} | |
| Test Parameters for CA Configurations | | | | |
| CA Configuration / N_{RB_agg} | | DL Allocation | | Uplink Configuration FDD: PUCCH format = Format 1b with channel selection/Format 3 TDD: PUCCH format = Format 1b with channel selection/Format 3 |
| PCC N_{RB} | SCCs N_{RB} | CC Mod | PCC & SCC RB allocation | |
| 75 | 75 | QPSK | 75+75 | |
| 100 | 50 | QPSK | 100+50 | |
| 100 | 100 | QPSK | 100+100 | |
| Note 1 :CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1 | | | | |

Table 6.3.5A.3.1.4.1-2: Test Configuration Table: PUSCH sub-test

| Initial Conditions | | | | | | | |
|--|----------------------|-------------------------|--|---|-----------------------|--|---------|
| Test Environment as specified in TS 36.508[7] clause 4.1 | | | | Normal | | | |
| Test Frequencies as specified in TS36.508 [7] clause 4.3.1 for different CA bandwidth classes. | | | | C: Mid range | | | |
| Test CC Combination setting (NRB_agg) as specified in clause 5.4.2A.1 for the CA Configuration | | | | Lowest N _{RB_agg} Highest N _{RB_agg} | | | |
| Test Parameters for CA Configurations | | | | | | | |
| CA Configuration / N _{RB_agg} | | DL Allocation | | CC MOD | UL Allocation | | |
| PCC N _{RB} | SCCs N _{RB} | PCC & SCC RB allocation | | | N _{RB_alloc} | PCC & SCC RB allocations (L _{CRB} @ RB _{start}) | |
| 75 | 75 | N/A | | QPSK | 150 | P_75@0 | S_75@0 |
| 100 | 50 | | | QPSK | 150 | P_100@0 | S_50@0 |
| 100 | 100 | | | QPSK | 200 | P_100@0 | S_100@0 |
| Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1 | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channel is set according to Table 6.3.5A.3.1.4.1-1 (PUCCH sub-test) and Table 6.3.5A.3.1.4.1-2 (PUSCH sub-test).
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5A.3.1.4.3.

6.3.5A.3.1.4.2 Test procedure

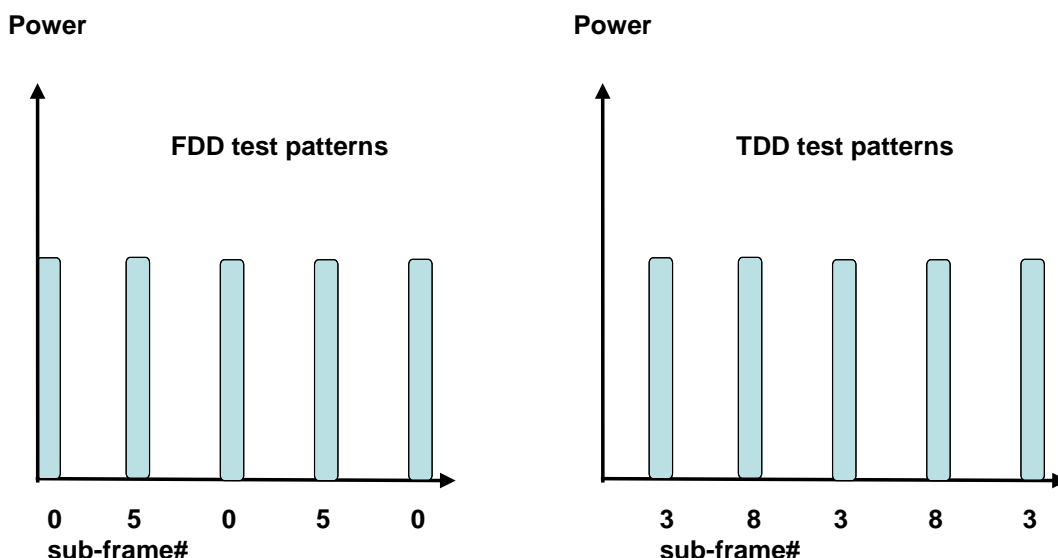


Figure 6.3.5A.3.1.4.2-1: Test uplink transmission

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. The procedure is separated in two subtests to verify PUCCH and PUSCH aggregate power control tolerance respectively. The uplink transmission patterns are described in figure 6.3.5A.3.1.4.2-1.
5. PUCCH sub test:
 - 5.1 The SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 6.3.5A.3.1.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC. The transmission of PDSCH will make the UE send uplink ACK/NACK using PUCCH on PCC. Send the appropriate TPC commands for PUCCH to the UE to ensure that the UE transmits PUCCH at 0dBm +/- 3.2 dB for carrier frequency $f \leq 3.0\text{GHz}$ or at 0dBm +/- 3.5 dB for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$.
 - 5.2 Every 5 subframes transmit to the UE downlink PDSCH MAC padding bits as well as 0 dB TPC command for PUCCH via the PDCCH to make the UE transmit ACK/NACK on the PUCCH with transmission gap of 4 subframes. The downlink transmission is scheduled in the appropriate sub-frames to make the UE transmit PUCCH as described in figure 6.3.5A.3.1.4.2-1.
 - 5.3 Measure the power of 5 consecutive PUCCH transmissions on PCC to verify the UE transmitted PUCCH power is maintained within 21 ms. The transient periods of 20us are excluded from the power measurement.
6. PUSCH sub test:
 - 6.1 The SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.3.5A.3.1.4.1-2 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at 0dBm +/- 3.2dB for carrier frequency $f \leq 3.0\text{GHz}$ or at 0dBm +/- 3.5 dB for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$.
 - 6.2 Every 5 subframes schedule the UE's PUSCH data transmission and transmit 0 dB TPC command for PUSCH via the PDCCH to make the UE transmit PUSCH with 4 subframes gap. The uplink transmission patterns are described in figure 6.3.5A.3.1.4.2-1.
 - 6.3 Measure the power on both PCC and SCC of 5 consecutive PUSCH transmissions to verify the UE transmitted PUSCH power is maintained within 21 ms on each component carrier. The transient periods of 20us are excluded from the power measurement.

6.3.5A.3.1.4.3 Message contents

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

6.3.5A.3.1.5 Test requirement

For intra-band contiguous carrier aggregation bandwidth class C, the aggregate power control tolerance per component carrier measured in step (2) of the test procedure is not to exceed the values specified in Table 6.3.5A.3.1.5-1.

Table 6.3.5A.3.1.5-1: Aggregate power control tolerance for intra-band contiguous CA

| TPC command | UL channel | Aggregate power tolerance within 21 ms |
|--|------------|--|
| 0 dB | PUCCH | $\pm 2.5 \text{ dB} \pm \text{TT}$ |
| 0 dB | PUSCH | $\pm 3.5 \text{ dB} \pm \text{TT}$ |
| NOTE: The UE transmission gap is 4 ms. TPC command is transmitted via PDCCH 4 subframes preceding each PUCCH/PUSCH transmission. | | |

6.3.5B Power Control for UL- MIMO

6.3.5B.1 Power Control Absolute Power Tolerance for UL- MIMO

Editor's notes: The following items are missing or incomplete:

- Test Tolerance

6.3.5B.1.1 Test purpose

To verify the ability of the UE transmitter for UL-MIMO to set its initial output power to a specific value at the start of a contiguous transmission or non-contiguous transmission with a long transmission gap, i.e. transmission gap is larger than 20 ms.

6.3.5B.1.2 Minimum conformance requirement

For UE with multiple transmit antenna connectors, the power control tolerance applies to the sum of output power at each transmit antenna connector.

The power control requirements specified in subclause 6.3.5 apply to UE with two transmit antenna connectors with UL-MIMO configurations specified in Table 6.2.2B.3-2 for closed-loop spatial multiplexing scheme, wherein

- The Maximum output power requirements for UL-MIMO are specified in subclause 6.2.2B
- The Minimum output power requirements for UL-MIMO are specified in subclause 6.3.2B

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5B.

6.3.5B.1.3 Test applicability

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

6.3.5B.1.4 Test description

6.3.5B.1.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5B.1.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5B.1.4.1-1: Test Configuration Table

| Initial Conditions | | | | | |
|--|--|--|----------------------|---------------|-----|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 | Mid range | | | | |
| Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1 | Lowest, 5MHz, Highest | | | | |
| Test Parameters for Channel Bandwidths | | | | | |
| Ch BW | Downlink Configuration | | Uplink Configuration | | |
| | N/A for Power Control Absolute power tolerance test case | | Mod'n | RB allocation | |
| | | | FDD | TDD | |
| 1.4MHz | | | QPSK | 6 | 6 |
| 3MHz | | | QPSK | 15 | 15 |
| 5MHz | | | QPSK | 25 | 25 |
| 10MHz | | | QPSK | 50 | 50 |
| 15MHz | | | QPSK | 75 | 75 |
| 20MHz | | | QPSK | 100 | 100 |
| Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.5B.1.4.1-1.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5B.1.4.3. Note that PDCCH DCI format 4 sent after resetting uplink power with RRC Connection Reconfiguration, should have TPC command 0dB.

6.3.5B.1.4.2 Test procedure

1. SS sends uplink scheduling information via PDCCH DCI format 4 with TPC command 0dB for C_RNTI to schedule the UL RMC according to Table 6.3.5B.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Measure the initial sum power of the first subframe of UE PUSCH first transmission at each UE antenna connector. The transient periods of 20us are excluded.
3. Repeat for the two test points as indicated in section 6.3.5B.1.4.3. The timing of the execution between the two test points shall be larger than 20ms.

6.3.5B.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 6.3.5B.1.4.3-1: UplinkPowerControlCommon: Test point 1

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT | | | |
|--|--------------|---|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH | -105 | Test point 1 to verify a UE relative low initial power transmission | |

Table 6.3.5B.1.4.3-2: UplinkPowerControlCommon: Test point 2

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT | | | |
|--|--------------|--|-----------|
| Information Element | Value/remark | Comment | Condition |
| PhysicalConfigDedicated-DEFAULT ::= SEQUENCE { | -93 | Test point 2 to verify a UE relative high initial power transmission | |

Table 6.3.5B.1.4.3-3: PhysicalConfigDedicated

| Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT | | | |
|--|-------------------------------------|------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH | | | |
| uplinkPowerControlDedicated | UplinkPowerControlDedicated-DEFAULT | See clause 4.6.3 | SRB1 |
| | UplinkPowerControlDedicated-DEFAULT | See clause 4.6.3 | RBC |

Table 6.3.5B.1.4.3-4: UplinkPowerControlDedicated

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT | | | |
|---|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE { | | | |
| p0-UE-PUSCH | 1 | | SRB1 |
| | 0 | | RBC |
| } | | | |

6.3.5B.1.5 Test requirement

The requirement for the power measured in step (2) of the test procedure is not to exceed the values specified in Table 6.3.5B.1.5-1 and 6.3.5B.1.5-2.

Table 6.3.5B.1.5-1: Absolute power tolerance: test point 1

| | Channel bandwidth / expected output power (dBm) | | | | | |
|--|---|--------------|--------------|--------------|--------------|--------------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Expected Measured power Normal conditions | -14.8 dBm | -10.8 dBm | -8.6 dBm | -5.6 dBm | -3.9 dBm | -2.6 dBm |
| Power tolerance f ≤ 3.0GHz | ± 9.0dB±TT | ± 9.0dB±T | ± 9.0dB±T | ± 9.0dB±T | ± 9.0dB±TT | ± 9.0dB±T |
| 3.0GHz < f ≤ 4.2GHz | ± 9.0dB±TT | ± 9.0dB±T | ± 9.0dB±T | ± 9.0dB±T | ± 9.0dB±TT | ± 9.0dB±T |
| Expected Measured power Extreme conditions | -14.8 dBm | -10.8 dBm | -8.6 dBm | -5.6 dBm | -3.9 dBm | -2.6 dBm |
| Power tolerance f ≤ 3.0GHz | ± 12.0dB± TT | ± 12.0dB± TT | ± 12.0dB± TT | ± 12.0dB± TT | ± 12.0dB± TT | ± 12.0dB± TT |
| 3.0GHz < f ≤ 4.2GHz | ± 12.0dB± TT | ± 12.0dB± TT | ± 12.0dB± TT | ± 12.0dB± TT | ± 12.0dB± TT | ± 12.0dB± TT |
| Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2.3 | | | | | | |

Table 6.3.5B.1.5-2: Absolute power tolerance: test point 2

| | Channel bandwidth / expected output power (dBm) | | | | | |
|--|---|-----------------------------|-----------------------------|-----------------------------|------------------------------|-----------------------------|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Expected Measured power Normal conditions | -2.8 dBm | 1.2 dBm | 3.4 dBm | 6.4 dBm | 8.2 dBm | 9.4 dBm |
| Power tolerance $f \leq 3.0\text{GHz}$ $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | \pm 9.0dB \pm TT | \pm 9.0dB \pm T T | \pm 9.0dB \pm T T | \pm 9.0dB \pm T T | \pm 9.0dB \pm TT | \pm 9.0dB \pm T T |
| | \pm 9.0dB \pm TT | \pm 9.0dB \pm T T | \pm 9.0dB \pm T T | \pm 9.0dB \pm T T | \pm 9.0dB \pm TT | \pm 9.0dB \pm T T |
| Expected Measured power Extreme conditions | -2.8 dBm | 1.2 dBm | 3.4 dBm | 6.4 dBm | 8.2 dBm | 9.4 dBm |
| Power tolerance $f \leq 3.0\text{GHz}$ $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $\pm 12.0\text{dB}\pm$ TT | \pm 12.0dB \pm TT | \pm 12.0dB \pm TT | \pm 12.0dB \pm TT | $\pm 12.0\text{dB}\pm$ TT | \pm 12.0dB \pm TT |
| | $\pm 12.0\text{dB}\pm$ TT | \pm 12.0dB \pm TT | \pm 12.0dB \pm TT | \pm 12.0dB \pm TT | $\pm 12.0\text{dB}\pm$ TT | \pm 12.0dB \pm TT |
| Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2.3 | | | | | | |

6.3.5B.2 Power Control Relative power tolerance

Editor's notes: The following items is missing or incomplete:

- Test Tolerance

6.3.5B.2.1 Test purpose

To verify the ability of the UE transmitter to set its output power relatively to the power in a target sub-frame relatively to the power of the most recently transmitted reference sub-frame if the transmission gap between these sub-frames is ≤ 20 ms.

6.3.5B.2.2 Test applicability

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

6.3.5B.2.3 Minimum conformance requirement

For UE with multiple transmit antenna connectors, the power control tolerance applies to the sum of output power at each transmit antenna connector.

The power control requirements specified in clause 6.3.5 apply to UE with two transmit antenna connectors with UL-MIMO configurations specified in Table 6.2.2B.3-2 for closed-loop spatial multiplexing scheme, wherein:

- The Maximum output power requirements for UL-MIMO are specified in clause 6.2.2B
- The Minimum output power requirements for UL-MIMO are specified in clause 6.3.2B

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5B.

6.3.5B.2.4 Test description

6.3.5B.2.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5B.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5B.2.4.1-1: Test Configuration Table

| Initial Conditions | | | | |
|---|--|------------------------------------|---|---|
| Test Environment as specified in TS 36.508 [7] clause 4.1 | | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | |
| Test Frequencies as specified in TS 36.508 [7] clause 4.3.1 | | Low range | | |
| Test Channel Bandwidths as specified in TS 36.508 [7] clause 4.3.1 | | Lowest, 5MHz, Highest | | |
| Test Parameters for Channel Bandwidths | | | | |
| Ch BW | Downlink Configuration N/A for Power Control Relative power tolerance test case | Mod'n | Uplink Configuration | |
| | | | RB allocation | |
| | | | FDD | TDD |
| 1.4MHz | | QPSK | See table 6.3.5B.2.5-1 6.3.5B.2.5-2 6.3.5B.2.5-13 | See table 6.3.5B.2.5-1 6.3.5B.2.5-2 6.3.5B.2.5-13 |
| 3MHz | | QPSK | See table 6.3.5B.2.5-3 6.3.5B.2.5-4 6.3.5B.2.5-13 | See table 6.3.5B.2.5-3 6.3.5B.2.5-4 6.3.5B.2.5-13 |
| 5MHz | | QPSK | See table 6.3.5B.2.5-5 6.3.5B.2.5-6 6.3.5B.2.5-13 | See table 6.3.5B.2.5-5 6.3.5B.2.5-6 6.3.5B.2.5-13 |
| 10MHz | | QPSK | See table 6.3.5B.2.5-7 6.3.5B.2.5-8 6.3.5B.2.5-13 | See table 6.3.5B.2.5-7 6.3.5B.2.5-8 6.3.5B.2.5-13 |
| 15MHz | | QPSK | See table 6.3.5B.2.5-9 6.3.5B.2.5-10 6.3.5B.2.5-13 | See table 6.3.5B.2.5-9 6.3.5B.2.5-10 6.3.5B.2.5-13 |
| 20MHz | | QPSK | See table 6.3.5B.2.5-11 6.3.5B.2.5-12 6.3.5B.2.5-13 | See table 6.3.5B.2.5-11 6.3.5B.2.5-12 6.3.5B.2.5-13 |
| Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1 | | | | |
| Note 2: The starting resource block shall be RB# 0. | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to table 6.3.5B.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5B.2.4.3.

6.3.5B.2.4.2 Test procedure

The procedure is separated in various subtests to verify different aspects of relative power control. The power patterns of the subtests are described in figure 6.3.5B.2.4.2-1.

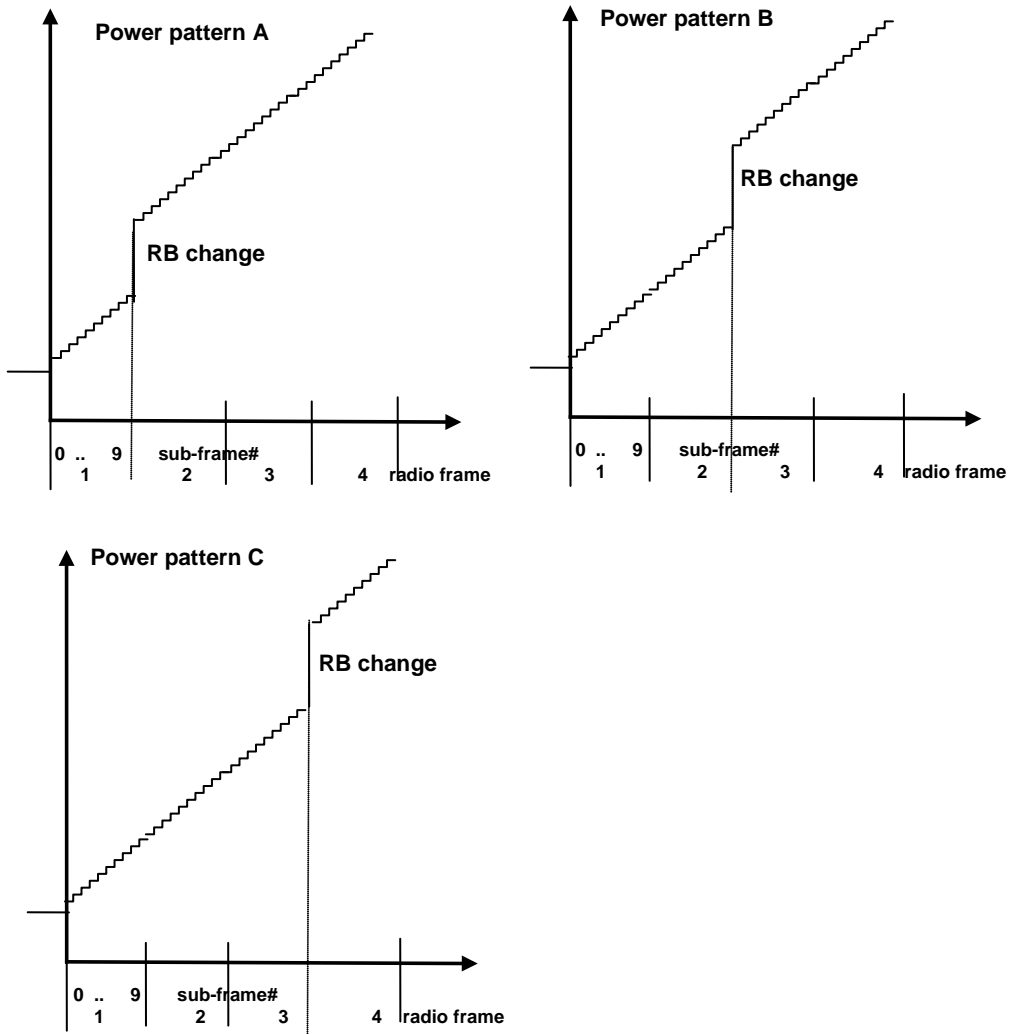


Figure 6.3.5B.2.4.2-1: FDD ramping up test power patterns

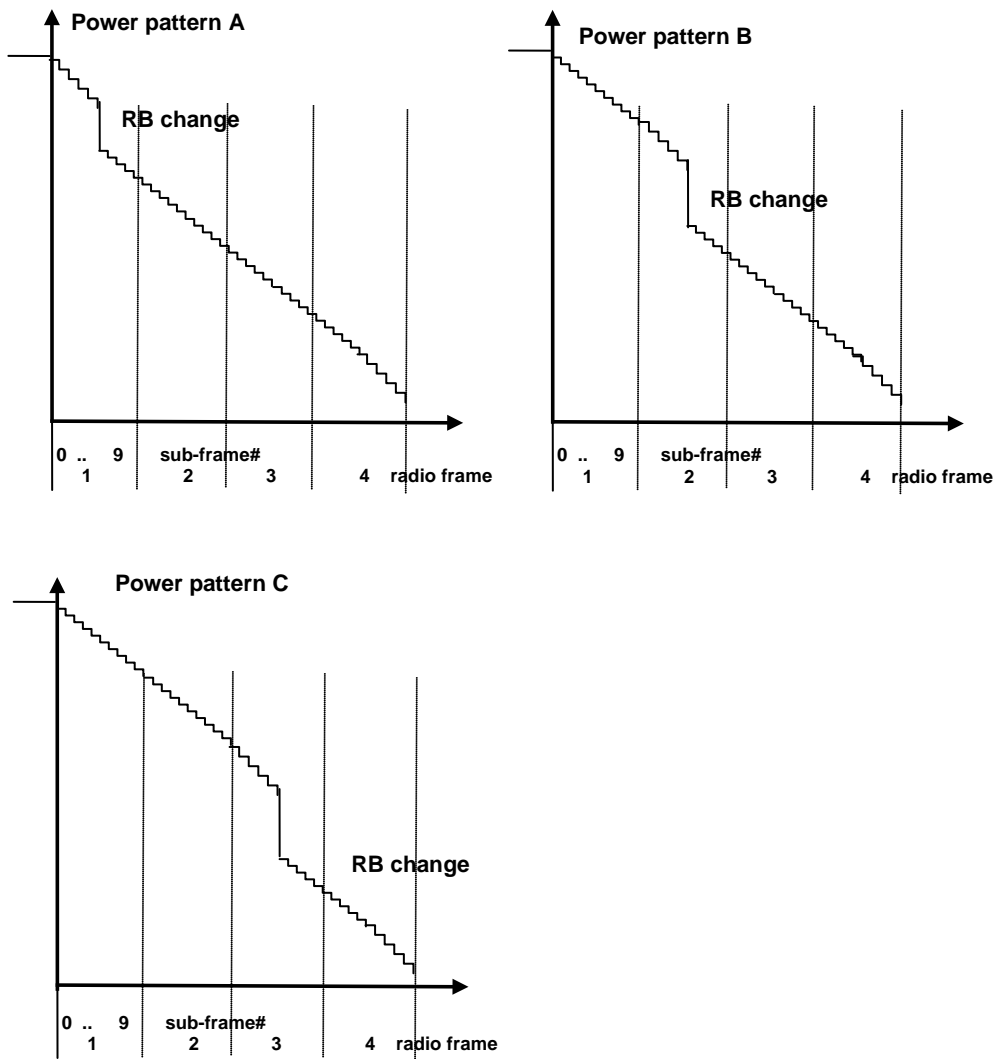


Figure 6.3.5B.2.4.2-2: FDD ramping down test power patterns

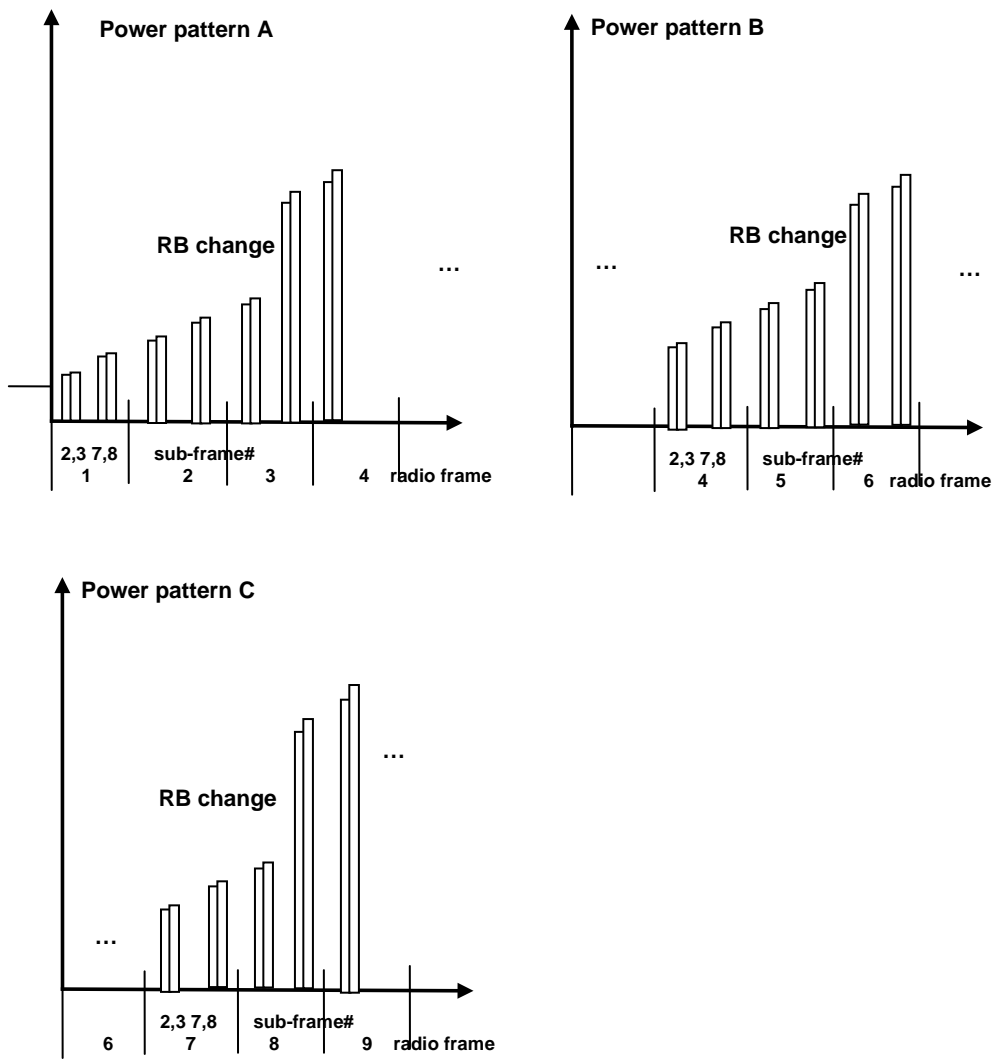


Figure 6.3.5B.2.4.2-3: TDD ramping up test power patterns

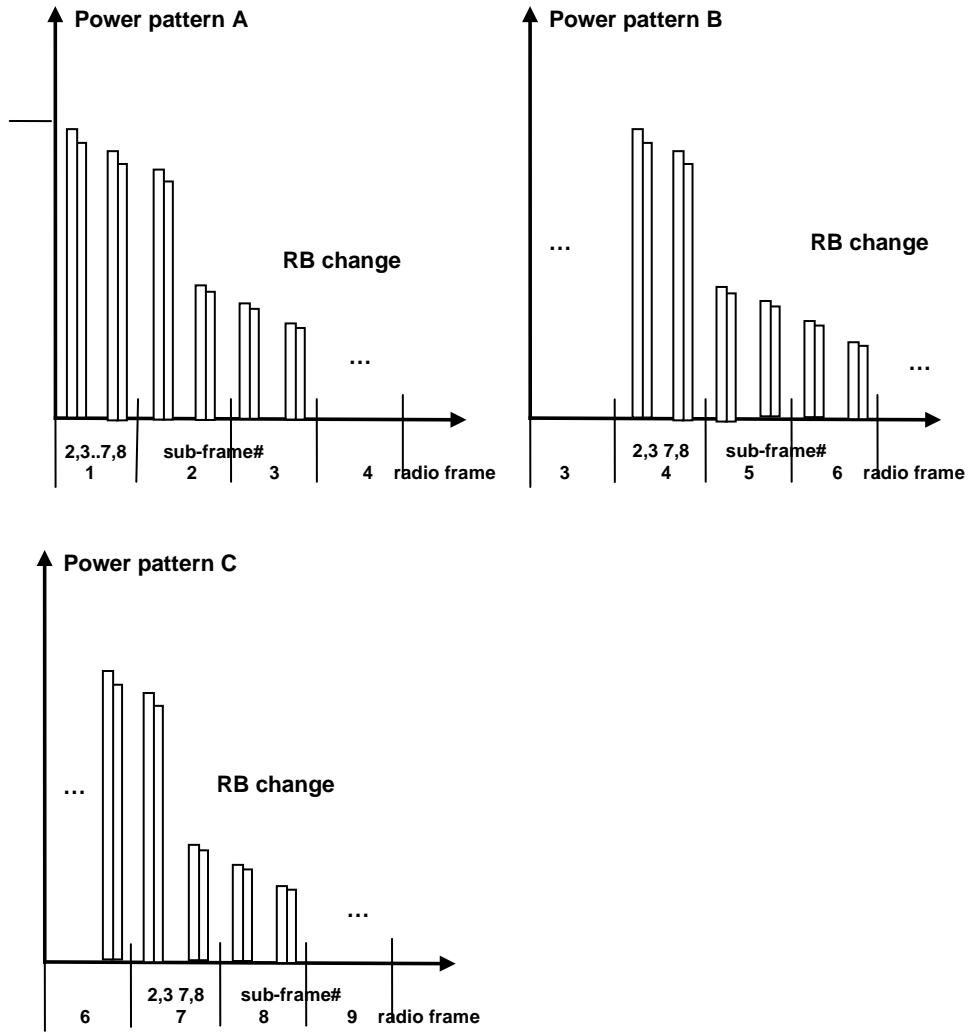


Figure 6.3.5B.2.4.2-4: TDD ramping down test power patterns

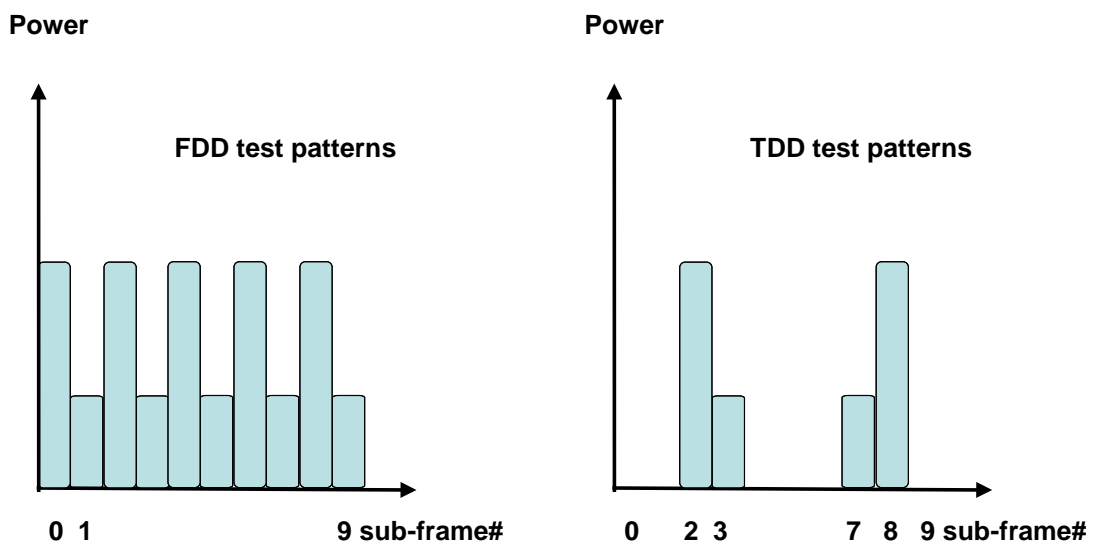


Figure 6.3.5B.2.4.2-5: Alternating Test Power patterns

1. Sub test: ramping up pattern

- 1.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.3.5B.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at $-36.8\text{dBm} \pm 3.2\text{ dB}$ for carrier frequency $f \leq 3.0\text{GHz}$ or at $-36.5\text{dBm} \pm 3.5\text{ dB}$ for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$.
- 1.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5B.2.4.2-1 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5B.2.4.2-3 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5B.2.5-1 thru 6.3.5B.2.5-12 depending on channel bandwidth. On the PDCCH format 4 for the scheduling of the PUSCH the SS will transmit a +1dB TPC command. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.
- 1.3. Measure the mean sum power at each antenna connector for PUSCH transmissions to verify the UE relative power control meet test requirements 6.3.5B.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.
- 1.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5B.2.5-1 thru Table 6.3.5B.2.5-12 to force bigger UE power steps at various points in the power range.

2. Sub test: ramping down pattern

- 2.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.3.5B.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at $+18.0\text{dBm} \pm 3.2\text{ dB}$ for carrier frequency $f \leq 3.0\text{GHz}$ or at $+17.7\text{dBm} \pm 3.5\text{ dB}$ for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$.
- 2.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5B.2.4.2-2 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5B.2.4.2-4 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5B.2.5-1 thru 6.3.5B.2.5-12 depending on channel bandwidth. On the PDCCH format 4 for the scheduling of the PUSCH the SS will transmit a -1dB TPC command. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.
- 2.3. Measure the mean sum power at each antenna connector for PUSCH transmissions to verify the UE relative power control meet test requirements 6.3.5B.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.
- 2.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5B.2.5-1 thru Table 6.3.5B.2.5-12 to force bigger UE power steps at various points in the power range.

3. Sub test: alternating pattern

- 3.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.3.5B.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at $-10\text{dBm} \pm 3.2\text{ dB}$ for carrier frequency $f \leq 3.0\text{GHz}$ or at $-10\text{dBm} \pm 3.5\text{ dB}$ for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$. The initial uplink RB allocation is defined as the smaller uplink RB allocation value specified in tables 6.3.5B.2.5-13. The power level and RB allocation are reset for each sub-test.
- 3.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5B.2.4.2-5 for 10 sub-frames with an uplink RB allocation alternating pattern as defined in table 6.3.5B.2.5-13 while transmitting 0dB TPC command for PUSCH via the PDCCH.

- 3.3. Measure the mean sum power of each antenna connector for PUSCH transmissions to verify the UE relative power control meet test requirements specified in clause 6.3.5B.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/OFF transients, transient periods of 20 us at the beginning of the subframe are excluded.

6.3.5B.2.4.3 Message contents

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

6.3.5B.2.5 Test requirement

Each UE power step measured in the test procedure 6.3.5B.2.4.2 should satisfy the test requirements specified in Table 6.3.5B.2.5-1, thru 6.3.5B.2.5-13 for normal conditions; for extreme conditions an additional ± 2.0 dB relaxation is allowed.

To account for RF Power amplifier mode changes 2 exceptions are allowed for each of ramping up and ramping down test patterns. For these exceptions the power tolerance limit is a maximum of $\pm 6.7 + TT$ dB. If there is an exception in the power step caused by the RB change for all test patterns (A, B, C) then fail the UE.

Table 6.3.5B.2.5-1: Test Requirements Relative Power Tolerance for Transmission (normal conditions - Note 5) channel bandwidth 1.4MHz (ramping up)

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|---|------------------------|-------------|---|--|--|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm 1.0 \pm TT$ |
| RB change | Change from 1 to 6 RBs | TPC=+1dB | 8.78 | $4 \leq \Delta P < 10$ | $8.78 \pm 4.0 \pm TT$ Note 2 $8.78 + 5.5 / - 4.0 \pm TT$ Note 3 |
| Subframes after RB change | Fixed = 6 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm 1.0 \pm TT$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes. Pattern B the position of RB uplink allocation change is after 20 active uplink subframes. Pattern C the position of RB uplink allocation change is after 30 active uplink subframes.</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5B.2.5-2: Test Requirements Relative Power Tolerance for Transmission (normal conditions - Note 5) channel bandwidth 1.4MHz (ramping down)

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|--|------------------------|-------------|---|--------------------------------------|--|
| Subframes before RB change | Fixed = 5 | TPC=-1dB | 1 | ΔP < 2 | 1 ± 1.0 ±TT |
| RB change | Change from 5 to 1 RBs | TPC=-1dB | 7.99 | 4 ≤ ΔP < 1 | 7.99 ± 4.0±TT Note 2 7.99 +4.0/-5.5±TT Note 4 |
| Subframes after RB change | Fixed = 1 | TPC=-1dB | 1 | ΔP < 2 | 1 ± 1.0 ±TT |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes. Pattern B the position of RB uplink allocation change is after 16 active uplink subframes. Pattern C the position of RB uplink allocation change is after 26 active uplink subframes.</p> <p>Note 2: When Note 4 does not apply.</p> <p>Note 3: N/A.</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5B.2.5-3: Test Requirements Relative Power Tolerance for Transmission (normal conditions - Note 5) channel bandwidth 3MHz (ramping up)

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|--|------------------------|-------------|---------------------------------------|------------------------------------|--|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | ΔP < 2 | 1 ± 1.0 ±TT |
| RB change | Change from 1 to 4 RBs | TPC=+1dB | 7.02 | 4 ≤ ΔP < 10 | 7.02 ± 4.0 ±TT Note 2 7.02 +5.5/-4.0 ±TT Note 3 |
| Subframes after RB change | Fixed =4 | TPC=+1dB | 1 | ΔP < 2 | 1 ± 1.0 ±TT |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes. Pattern B the position of RB uplink allocation change is after 20 active uplink subframes. Pattern C the position of RB uplink allocation change is after 30 active uplink subframes.</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5B.2.5-4: Test Requirements Relative Power Tolerance for Transmission (normal conditions - Note 5) channel bandwidth 3MHz (ramping down)

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|--|-------------------------|-------------|---|--------------------------------------|--|
| Subframes before RB change | Fixed = 15 | TPC=-1dB | 1 | ΔP < 2 | 1 ± 1.0 ±TT |
| RB change | Change from 15 to 1 RBs | TPC=-1dB | 12.76 | 10 ≤ ΔP < 15 | 12.76 ± 5.0±TT Note 2 12.76 +5.0/-6.5±TT Note 4 |
| Subframes after RB change | Fixed =1 | TPC=-1dB | 1 | ΔP < 2 | 1 ± 1.0 ±TT |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes. Pattern A the position of RB uplink allocation change is after 16 active uplink subframes. Pattern C the position of RB uplink allocation change is after 26 active uplink subframes.</p> <p>Note 2: When Note 4 does not apply.</p> <p>Note 3: N/A.</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5B.2.5-5: Test Requirements Relative Power Tolerance for Transmission (normal conditions - Note 5) channel bandwidth 5MHz (ramping up)

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|--|----------------------|-------------|---------------------------------------|------------------------------------|--|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | ΔP < 2 | 1 ± 5.0 ±TT |
| RB change | Change from 1 to 20 | TPC=+1dB | 14.01 | 10 ≤ ΔP < 15 | 14.01 ± 5.0 ±TT Note 2 14.01 +6.5/-5.0 ±TT Note 3 |
| Subframes after RB change | Fixed = 20 | TPC=+1dB | 1 | ΔP < 2 | 1 ± 5.0 ±TT |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes. Pattern B the position of RB uplink allocation change is after 20 active uplink subframes. Pattern C the position of RB uplink allocation change is after 30 active uplink subframes.</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5B.2.5-6: Test Requirements Relative Power Tolerance for Transmission (normal conditions - Note 5) channel bandwidth 5MHz (ramping down)

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|--|----------------------|-------------|---|--------------------------------------|--|
| Subframes before RB change | Fixed = 25 | TPC=-1dB | 1 | ΔP < 2 | 1 ± 5.0 ±TT |
| RB change | Change from 25 to 1 | TPC=-1dB | 14.98 | 10 ≤ ΔP < 15 | 14.98 ± 5.0±TT Note 2 14.98 +5.0/-6.5±TT Note 4 |
| Subframes after RB change | Fixed = 1 | TPC=-1dB | 1 | ΔP < 2 | 1 ± 5.0 ±TT |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes. Pattern B the position of RB uplink allocation change is after 16 active uplink subframes. Pattern C the position of RB uplink allocation change is after 26 active uplink subframes.</p> <p>Note 2: When Note 4 does not apply.</p> <p>Note 3: N/A.</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5B.2.5-7: Test Requirements Relative Power Tolerance for Transmission (normal conditions - Note 5) channel bandwidth 10MHz (ramping up)

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|--|----------------------|-------------|---------------------------------------|------------------------------------|--|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | ΔP < 2 | 1 ± 1.0 ±TT |
| RB change | Change from 1 to 25 | TPC=+1dB | 14.98 | 10 ≤ ΔP < 15 | 14.98 ± 5.0 ±TT Note 2 14.98 +6.5/-5.0 ±TT Note 3 |
| Subframes after RB change | Fixed = 25 | TPC=+1dB | 1 | ΔP < 2 | 1 ± 1.0 ±TT |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes. Pattern B the position of RB uplink allocation change is after 20 active uplink subframes. Pattern C the position of RB uplink allocation change is after 30 active uplink subframes.</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5B.2.5-8: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 10MHz (ramping down)

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|--|--|-------------|---|--------------------------------------|--|
| Subframes before RB change | Fixed = 50 (UE Cat 2-5) Fixed = 48 (UE Cat 1) | TPC=-1dB | 1 | ΔP < 2 | 1 ± 1.0 ±TT |
| RB change | Change from 50 to 1 (UE cat 2-5) Change from 48 to 1 (UE cat 1) | TPC=-1dB | 17.99 17.81 | 15 ≤ Δ | 17.99 ± 5.5 ±TT Note 2 17.99 +6.0/-7.5 ±TT Note 4 17.81 ± 5.5 ±TT Note 2 17.81 +6.0/-7.5 ±TT Note 4 |
| Subframes after RB change | Fixed = 1 | TPC=-1dB | 1 | ΔP < 2 | 1 ± 1.0 ±TT |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes. Pattern B the position of RB uplink allocation change is after 16 active uplink subframes. Pattern C the position of RB uplink allocation change is after 26 active uplink subframes.</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: N/A.</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5B.2.5-9: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping up)

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|---|----------------------|-------------|---|--|--|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm 1.0 \pm TT$ |
| RB change | Change from 1 to 50 | TPC=+1dB | 17.99 | $15 \leq \Delta P$ | $17.99 \pm 6.0 \pm TT$ Note 2 $17.99 + 7.5 / - 6.0 \pm TT$ Note 3 |
| Subframes after RB change | Fixed = 50 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm 1.0 \pm TT$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes. Pattern B the position of RB uplink allocation change is after 20 active uplink subframes. Pattern C the position of RB uplink allocation change is after 30 active uplink subframes.</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5B.2.5-10: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping down)

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|---|--|-------------|---|--|---|
| Subframes before RB change | Fixed = 75 (UE Cat 2-5) Fixed = 50 (UE Cat 1) | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm 1.0 \pm TT$ |
| RB change | Change from 75 to 1 (UE Cat 2-5) Change from 50 to 1 (UE Cat 1) | TPC=-1dB | 19.75 17.99 | $15 \leq \Delta P$ | $19.75 \pm 6.0 \pm TT$ Note 2 $19.75 + 6.0/7.5 \pm TT$ Note 4 $17.99 \pm 6.0 \pm TT$ Note 2 $17.99 + 6.0/-7.5 \pm TT$ Note 4 |
| Subframes after RB change | Fixed = 1 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm 1.0 \pm TT$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes. Pattern B the position of RB uplink allocation change is after 16 active uplink subframes. Pattern C the position of RB uplink allocation change is after 26 active uplink subframes.</p> <p>Note 2: When Note 4 does not apply.</p> <p>Note 3: N/A.</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5B.2.5-11: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping up)

| Sub-test (ramp up) | Uplink RB allocation | TPC command | Expected power step size (Up) ΔP [dB] | Power step size range (Up) ΔP [dB] | PUSCH [dB] |
|---|----------------------|-------------|---|--|---|
| Subframes before RB change | Fixed = 1 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm 1.0 \pm TT$ |
| RB change | Change from 1 to 75 | TPC=+1dB | 19.75 | $15 \leq \Delta P$ | $19.75 \pm 6.0 \pm TT$ Note 2 $19.75 + 7.5/-6.0 \pm TT$ Note 3 |
| Subframes after RB change | Fixed = 75 | TPC=+1dB | 1 | $\Delta P < 2$ | $1 \pm 1.0 \pm TT$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 10 active uplink subframes. Pattern B the position of RB uplink allocation change is after 20 active uplink subframes. Pattern C the position of RB uplink allocation change is after 30 active uplink subframes.</p> <p>Note 2: When Note 3 does not apply.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: N/A.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5B.2.5-12: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping down)

| Sub-test (ramp down) | Uplink RB allocation | TPC command | Expected power step size (down) ΔP [dB] | Power step size range (down) ΔP [dB] | PUSCH [dB] |
|---|---|-------------|---|--|--|
| Subframes before RB change | Fixed = 100 (UE Cat 2-5) Fixed = 75 (UE Cat 1) | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm 1.0 \pm TT$ |
| RB change | Change from 100 to 1 (UE Cat 2-5) Change from 75 to 1 (UE Cat 1) | TPC=-1dB | 21.0 19.75 | $15 \leq \Delta P$ | $21.0 \pm 6.0 \pm TT$ Note 2 $21.0 + 6.0/-7.5 \pm TT$ Note 4 $19.75 \pm 6.0 \pm TT$ Note 2 $19.75 + 6.0/-7.5 \pm TT$ Note 4 |
| Subframes after RB change | Fixed = 1 | TPC=-1dB | 1 | $\Delta P < 2$ | $1 \pm 1.0 \pm TT$ |
| <p>Note 1: Position of RB change: Pattern A the position of RB uplink allocation change is after 6 active uplink subframes. Pattern B the position of RB uplink allocation change is after 16 active uplink subframes. Pattern C the position of RB uplink allocation change is after 26 active uplink subframes.</p> <p>Note 2: When Note 4 does not apply.</p> <p>Note 3: N/A.</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

Table 6.3.5B.2.5-13: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) (Alternating pattern)

| Sub-test | Uplink RB allocation | TPC command | Expected power step size (Up or down) ΔP [dB] | Power step size range (Up or down) ΔP [dB] | PUSCH [dB] |
|---|------------------------------------|-------------|---|--|---|
| 1.4 MHz | Alternating 1 and 6 | TPC=0dB | 7.78 | $4 \leq \Delta P < 10$ | 7.78 ± 6.0 ±TT Note 1,2 7.78 +7.5/-6.0±TT Note 3 7.78 +6.0/-7.5±TT Note 4 |
| 3 MHz | Alternating 1 and 15 | TPC=0dB | 11.76 | $10 \leq \Delta P < 15$ | 11.76 ± 6.0 ±TT Note 1,2 11.76 +7.5/-6.0±TT Note 3 11.76 +6.0/-7.5±TT Note 4 |
| 5 MHz | Alternating 1 and 25 | TPC=0dB | 13.98 | $10 \leq \Delta P < 15$ | 13.98 ± 6.0 ±TT Note 1 13.98 +7.5/-6.0±TT Note 2 13.98 +6.0/-7.5±TT Note 3 |
| 10 MHz | Alternating 1 and 50 (UE Cat 2-5) | TPC=0dB | 16.99 | $15 \leq \Delta P$ | 16.99 ± 6.0 ±TT Note 1,2 16.99 +7.5/-6.0±TT Note 3 16.99 +6.0/-7.5±TT Note 4 |
| | Alternating 1 and 48 (UE Cat 1) | | 16,81 | | 16.81 ± 6.0 ±TT Note 1,2 16.81 +7.5/-6.0±TT Note 3 16.81 +6.0/-7.5±TT Note 4 |
| 15 MHz | Alternating 1 and 75 (UE Cat 2-5) | TPC=0dB | 18.75 | $15 \leq \Delta P$ | 18.75 ± 6.0 ±TT Note 1,2 18.75 +7.58.2/-6.0±TT Note 3 18.75 +6.0/-7.5±TT Note 4 |
| | Alternating 1 and 50 (UE Cat 1) | | 16.99 | | 16.99 ± 6.0 ±TT Note 1,2 16.99 +7.5/-6.0±TT Note 3 16.99 +6.0/-7.5±TT Note 4 |
| 20 MHz | Alternating 1 and 100 (UE Cat 2-5) | TPC=0dB | 20.00 | $15 \leq \Delta P$ | 20.00 ± 6.0 ±TT Note 1,2 20.00 +7.5/-6.0±TT Note 3 20.00 +6.0/-7.5±TT Note 4 |
| | Alternating 1 and 75 (UE Cat 1) | | 18.75 | | 18.75 ± 6.0 ±TT Note 1,2 18.75 +7.5/-6.0±TT Note 3 18.75 +6.0/-7.5±TT Note 4 |
| <p>Note 1: Test tolerance +/- 6.7 dB was selected to allow PA switch possible exceptions to occur.</p> <p>Note 2: When neither Note 3 nor Note 4 applies.</p> <p>Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.</p> <p>Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.</p> <p>Note 6: The starting resource block shall be RB# 0.</p> | | | | | |

6.3.5B.3 Aggregate power control tolerance

Editor's notes: The following items is missing or incomplete:

- Test Tolerance

6.3.5B.3.1 Test purpose

To verify the ability of the UE with UL-MIMO to maintain its power level in non-contiguous transmission within 21 ms in response to 0 dB TPC commands with respect to the first UE transmission, when the power control parameters specified in TS 36.213 are constant.

6.3.5B.3.2 Test applicability

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

6.3.5B.3.3 Minimum conformance requirement

For UE with multiple transmit antenna connectors, the power control tolerance applies to the sum of output power at each transmit antenna connector.

The power control requirements specified in clause 6.3.5 apply to UE with two transmit antenna connectors with UL-MIMO configurations specified in Table 6.2.2B.3-2 for closed-loop spatial multiplexing scheme, wherein:

- The Maximum output power requirements for UL-MIMO are specified in clause 6.2.2B.
- The Minimum output power requirements for UL-MIMO are specified in clause 6.3.2B.

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5B.

6.3.5B.3.4 Test description

6.3.5B.3.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5B.3.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5B.3.4.1-1: Test Configuration Table: PUCCH sub-test

| Initial Conditions | | | |
|--|------------------------|-----------------------|----------------------|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | | Normal | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 | | Mid range | |
| Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1 | | Lowest, 5MHz, Highest | |
| Test Parameters for Channel Bandwidths | | | |
| Ch BW | Downlink Configuration | | Uplink Configuration |
| | Mod'n | RB allocation | |
| | | FDD | TDD |
| 1.4MHz | QPSK | 3 | 3 |
| 3MHz | QPSK | 4 | 4 |
| 5MHz | QPSK | 8 | 8 |
| 10MHz | QPSK | 16 | 16 |
| 15MHz | QPSK | 25 | 25 |
| 20MHz | QPSK | 30 | 30 |
| Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. | | | |

Table 6.3.5B.3.4.1-2: Test Configuration Table: PUSCH sub-test

| Initial Conditions | | | | |
|--|------------------------|-----------------------|----------------------|---------------|
| Test Environment as specified in TS 36.508[7] subclause 4.1 | | Normal | | |
| Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 | | Mid range | | |
| Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1 | | Lowest, 5MHz, Highest | | |
| Test Parameters for Channel Bandwidths | | | | |
| Ch BW | Downlink Configuration | | Uplink Configuration | |
| | N/A for PUSCH sub-test | | Mod'n | RB allocation |
| | | | FDD | TDD |
| 1.4MHz | | QPSK | 1 | 1 |
| 3MHz | | QPSK | 4 | 4 |
| 5MHz | | QPSK | 8 | 8 |
| 10MHz | | QPSK | 12 | 12 |
| 15MHz | | QPSK | 16 | 16 |
| 20MHz | | QPSK | 18 | 18 |
| Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 6.3.5B.3.4.1-1 (PUCCH sub-test) and Table 6.3.5B.3.4.1-2 (PUSCH sub-test).
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5B.3.4.3.

6.3.5B.3.4.2 Test procedure

The procedure is separated in two subtests to verify PUCCH and PUSCH aggregate power control tolerance respectively. The uplink transmission patterns are described in figure 6.3.5B.3.4.2-1.

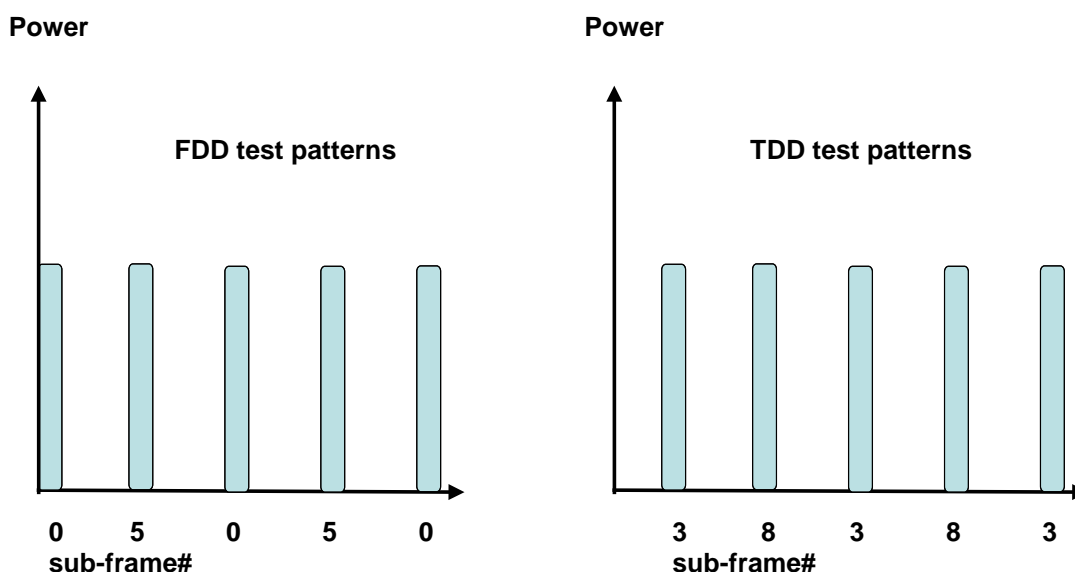


Figure 6.3.5B.3.4.2-1 Test uplink transmission

1. PUCCH sub test:

- 1.1 The SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 6.3.5B.3.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The transmission of PDSCH will make the UE send uplink ACK/NACK using PUCCH. Send the appropriate TPC commands for PUCCH to the UE to ensure that the UE transmits PUCCH at 0dBm +/- 3.2 dB for carrier frequency $f \leq 3.0\text{GHz}$ or at 0dBm +/- 3.5 dB for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$.
 - 1.2. Every 5 subframes transmit to the UE downlink PDSCH MAC padding bits as well as 0 dB TPC command for PUCCH via the PDCCH to make the UE transmit ACK/NACK on the PUCCH with transmission gap of 4 subframes. The downlink transmission is scheduled in the appropriate sub-frames to make the UE transmit PUCCH as described in figure 6.3.5B.3.4.2-1.
 - 1.3. Measure the mean sum power at each antenna connector for UE of 5 consecutive PUCCH transmissions to verify the UE transmitted PUCCH power is maintained within 21 ms. The transient periods of 20us are excluded from the power measurement.
2. PUSCH sub test:
- 2.1. The SS sends uplink scheduling information via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.3.5B.3.4.1-2. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at 0dBm +/- 3.2.dB for carrier frequency $f \leq 3.0\text{GHz}$ or at 0dBm +/- 3.5 dB for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$.
 - 2.2. Every 5 subframes schedule the UE's PUSCH data transmission and transmit 0 dB TPC command for PUSCH via the PDCCH to make the UE transmit PUSCH with 4 subframes gap. The uplink transmission patterns are described in figure 6.3.5B.3.4.2-1.
 - 2.3. Measure the mean sum power at each antenna connector for UE of 5 consecutive PUSCH transmissions to verify the UE transmitted PUSCH power is maintained within 21 ms. The transient periods of 20us are excluded from the power measurement.

6.3.5B.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 6.3.5B.3.4.3-1: PUCCH-ConfigDedicated-v1020-DEFAULT

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-9A: PUCCH-ConfigDedicated-v1020-DEFAULT | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| PUCCH-ConfigDedicated-v1020 ::= SEQUENCE { | | | |
| twoAntennaPortActivatedPUCCH-Format1a1b-r10 | true | | |
| } | | | |

6.3.5B.3.5 Test requirement

The requirement for the power measurements made in step (1.3) and (2.3) of the test procedure shall not exceed the values specified in Table 6.3.5B.3.5-1. The power measurement period shall be 1 sub-frame excluding transient periods.

Table 6.3.5B.3.5-1: Power control tolerance

| TPC command | UL channel | Test requirement measured power |
|--|------------|---|
| 0 dB | PUCCH | Given 5 power measurements in the pattern, the 2 nd , 3 rd , 4 th , and 5 th measurements shall be within $\pm 2.5 \pm TT$ dB of the 1 st measurement. |
| 0 dB | PUSCH | Given 5 power measurements in the pattern, the 2 nd , 3 rd , 4 th , and 5 th measurements shall be within $\pm 3.5 \pm TT$ dB of the 1 st measurement. |
| Note 1: The UE transmission gap is 4 ms. TPC command is transmitted via PDCCH 4 subframes preceding each PUCCH/PUSCH transmission. | | |

6.4 Void