**3GPP TSG-RAN WG5 Meeting #92-e R5-21xxxx**

**Electronic Meeting, August 16-27, 2021**

**Source:** Huawei, HiSilicon

**Title:** WP5D LS on unwanted emission of IMT-Advanced

**Agenda item:** 4.5.3

**Document for:** Discussion

# 1 Introduction

RAN has received the LS from WP5D on revision of recommendations ITU-R M.2070 and ITU -R M.2071 on Unwanted Emissions of IMT-Advanced (RP-210747). RAN5 has been assigned to respond the LS from WP5D. In the contribution, we provide the needed update for the revision of ITU -R M.2071.

# 2 Discussion

The current inforce version of ITU-R M.2071 is M.2071-1 (02/2017), where the unwanted emission characteristics are developed by 3GPP as LTE Release 10 and Beyond (LTE-Advanced) and developed by IEEE as the WirelessMAN-Advanced specification incorporated in IEEE Std 802.16 beginning with approval of IEEE Std 802.16m. LTE-Advanced parts is included in Annex 1 which is divided into three parts:

– Chapter 1 specifies the Operating bands for which the requirements in the present Annex apply.

– Chapter 2 specifies Definitions, Symbols and Abbreviations.

– Chapters 3, 4 and 5 contains the E-UTRA MS unwanted emission requirements.

We provide updates to M.2071 according to 2021-06 version of 3GPP specifications in the Annex. It is noted that we proposed to refer to 3GPP specification on the list of CA bands/combinations rather than a long page copies.

# Proposed update to ITU-R M.2071-1

**Annex 1  
  
LTE-Advanced**

The present Annex includes unwanted emission requirements from evolved Universal Mobile Telecommunications System (UMTS) terrestrial radio access (E-UTRA) carriers for E-UTRA Mobile Stations.

This Annex is divided into three parts:

– Chapter 1 specifies the Operating bands for which the requirements in the present Annex apply.

– Chapter 2 specifies Definitions, Symbols and Abbreviations.

– Chapters 3, 4 and 5 contains the E-UTRA MS unwanted emission requirements.

Values specified in the present Annex incorporate test tolerances defined in Recommendation ITU‑R M.1545.

**1 Operating bands**

TABLE 1-1

**E-UTRA operating bands**

| **E‑UTRA operating band** | **Uplink (UL) operating band BS receive UE transmit** | | | **Downlink (DL) operating band BS transmit  UE receive** | | | **Duplex mode** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***FUL\_low – FUL\_high*** | | | ***FDL\_low – FDL\_high*** | | |
| 1 | 1 920 MHz | – | 1 980 MHz | 2 110 MHz | – | 2 170 MHz | FDD |
| 2 | 1 850 MHz | – | 1 910 MHz | 1 930 MHz | – | 1 990 MHz | FDD |
| 3 | 1 710 MHz | – | 1 785 MHz | 1 805 MHz | – | 1 880 MHz | FDD |
| 4 | 1 710 MHz | – | 1 755 MHz | 2 110 MHz | – | 2 155 MHz | FDD |
| 5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| 61 | 830 MHz | – | 840 MHz | 875 MHz | – | 885 MHz | FDD |
| 7 | 2 500 MHz | – | 2 570 MHz | 2 620 MHz | – | 2 690 MHz | FDD |
| 8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| 9 | 1 749.9 MHz | – | 1 784.9 MHz | 1 844.9 MHz | – | 1 879.9 MHz | FDD |
| 10 | 1 710 MHz | – | 1 770 MHz | 2110 MHz | – | 2 170 MHz | FDD |
| 11 | 1 427.9 MHz | – | 1 447.9 MHz | 1 475.9 MHz | – | 1 495.9 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 |

TABLE 1-1 (*end*)

| **E‑UTRA operating band** | **Uplink (UL) operating band BS receive UE transmit** | | | **Downlink (DL) operating band BS transmit  UE receive** | | | | **Duplex mode** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***FUL\_low – FUL\_high*** | | | ***FDL\_low – FDL\_high*** | | | |
| 20 | 832 MHz | – | 862 MHz | 791 MHz | – | 821 MHz | | FDD |
| 21 | 1 447.9 MHz | – | 1 462.9 MHz | 1 495.9 MHz | – | 1 510.9 MHz | | FDD |
| 22 | 3 410 MHz | – | 3 490 MHz | 3 510 MHz | – | 3 590 MHz | | FDD |
| 23 | 2 000 MHz | – | 2 020 MHz | 2 180 MHz | – | 2 200 MHz | | FDD |
| 24# | 1 626.5 MHz | – | 1 660.5 MHz | 1 525 MHz | – | | 1 559 MHz | FDD |
| 25 | 1 850 MHz | – | 1 915 MHz | 1 930 MHz | – | | 1 995 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 | N/A | | | 717 MHz | – | 728 MHz | | FDD2 |
| 30 | 2 305 MHz | – | 2 315 MHz | 2 350 MHz | – | 2 360 MHz | | FDD |
| 31 | 452.5 MHz | – | 457.5 MHz | 462.5 MHz | – | 467.5 MHz | | FDD |
| 32 | N/A | | | 1 452 MHz | – | 1 496 MHz | | FDD2 |
| 33 | 1 900 MHz | – | 1 920 MHz | 1 900 MHz | – | 1 920 MHz | | TDD |
| 34 | 2 010 MHz | – | 2 025 MHz | 2 010 MHz | – | 2 025 MHz | | TDD |
| 35 | 1 850 MHz | – | 1 910 MHz | 1 850 MHz | – | 1 910 MHz | | TDD |
| 36 | 1 930 MHz | – | 1 990 MHz | 1 930 MHz | – | 1 990 MHz | | TDD |
| 37 | 1 910 MHz | – | 1 930 MHz | 1 910 MHz | – | 1 930 MHz | | TDD |
| 38 | 2 570 MHz | – | 2 620 MHz | 2 570 MHz | – | 2 620 MHz | | TDD |
| 39 | 1 880 MHz | – | 1 920 MHz | 1 880 MHz | – | 1 920 MHz | | TDD |
| 40 | 2 300 MHz | – | 2 400 MHz | 2 300 MHz | – | 2 400 MHz | | TDD |
| 41 | 2 496 MHz |  | 2 690 MHz | 2 496 MHz |  | 2 690 MHz | | TDD |
| 42 | 3 400 MHz | – | 3 600 MHz | 3 400 MHz | – | 3 600 MHz | | TDD |
| 43# | 3 600 MHz | – | 3 800 MHz | 3 600 MHz | – | 3 800 MHz | | TDD |
| 44 | 703 MHz | – | 803 MHz | 703 MHz | – | 803 MHz | | TDD |
| 45 | 1447 MHz | – | 1467 MHz | 1447 MHz | – | 1467 MHz | | TDD |
| 46 | 5150 MHz | – | 5925 MHz | 5150 MHz | – | 5925 MHz | | TDD8 |
| 47 | 5855 MHz | – | 5925 MHz | 5855 MHz | – | 5925 MHz | | TDD11 |
| 48 | 3550 MHz | – | 3700 MHz | 3550 MHz | – | 3700 MHz | | TDD |
| 49 | 3550 MHz | – | 3700 MHz | 3550 MHz | – | 3700 MHz | | TDD |
| 50 | 1432 MHz | - | 1517 MHz | 1432 MHz | - | 1517 MHz | | TDD |
| 51 | 1427 MHz | - | 1432 MHz | 1427 MHz | - | 1432 MHz | | TDD |
| 52 | 3300 MHz | - | 3400 MHz | 3300 MHz | - | 3400 MHz | | TDD |
| 53 | 2483.5 MHz | - | 2495 MHz | 2483.5 MHz | - | 2495 MHz | | TDD |
| … |  |  |  |  |  |  | |  |
| 64 | Reserved |  |  | Reserved |  |  | |  |
| 65 | 1920 MHz | – | 2010 MHz | 2110 MHz | – | 2200 MHz | | FDD |
| 66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | | FDD |
| 67 |  | N/A |  | 738 MHz | – | 758 MHz | | FDD2 |
| 68 | 698 MHz | – | 728 MHz | 753 MHz | – | 783 MHz | | FDD |
| 69 |  | N/A |  | 2570 MHz | – | 2620 MHz | | FDD2 |
| 70 | 1695 MHz | – | 1710 MHz | 1995 MHz | – | 2020 MHz | | FDD |
| 71 | 663 MHz | – | 698 MHz | 617 MHz | – | 652 MHz | | FDD |
| 72 | 451 MHz | – | 456 MHz | 461 MHz | – | 466 MHz | | FDD |
| 73 | 450 MHz | – | 455 MHz | 460 MHz | – | 465 MHz | | FDD |
| 74 | 1427 MHz | – | 1470 MHz | 1475 MHz | – | 1518 MHz | | FDD |
| 75 |  | N/A |  | 1432 MHz | – | 1517 MHz | | FDD2 |
| 76 |  | N/A |  | 1427 MHz | – | 1432 MHz | | FDD2 |
| 85 | 698 MHz | – | 716 MHz | 728 MHz | – | 746 MHz | | FDD |
| 87 | 410 MHz | – | 415 MHz | 420 MHz | – | 425 MHz | | FDD |
| 88 | 412 MHz | – | 417 MHz | 422 MHz | – | 427 MHz | | FDD |
| 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 (CA) configuration that is supporting the configured Primary Cell (Pcell) – Primary Cell: the cell, operating on the primary frequency, in which the UE either performs the initial connection establishment procedure or initiates the connection re‑establishment procedure, or the cell indicated as the primary cell in the handover procedure.  NOTE 3 – All frequency bands or parts of the bands referenced in this Recommendation which are not identified for IMT in the ITU Radio Regulations have been marked with “#”. | | | | | | | | |

The unwanted emission limits defined in the present Annex are for E-UTRA MS operating at least one of the intra-band contiguous CA arrangements specified in TS 36.101V17.2.0, subclause 5.5A Table. 5.5A-1



The unwanted emission limits defined in the present Annex are for E-UTRA MS operating at least one of the intra-band non-contiguous CA arrangements specified in TS 36.101V17.2.0, subclause 5.5A Table 5.5A-3, 5.5A-4 and 5.5A-5:



The unwanted emission limits defined in the present Annex are for E-UTRA MS operating at least one of the two bands inter-band CA combinations specified in TS 36.101V17.2.0, subclause 5.5A Table 5.5A-2:















The unwanted emission limits defined in the present Annex are for E-UTRA MS operating at least one of the three bands inter-band CA combinations specified in TS 36.101V17.2.0, subclause 5.5A Table 5.5A-2a.











The unwanted emission limits defined in the present Annex are for E-UTRA MS operating at least one of the four bands inter-band CA combinations specified in TS 36.101V17.2.0, subclause 5.5A Table 5.5A-2b.

The unwanted emission limits defined in the present Annex are for E-UTRA MS operating at least one of the five bands inter-band CA combinations specified in TS 36.101V17.2.0, subclause 5.5A Table 5.5A-2c.

The unwanted emission limits defined in the present Annex are for E-UTRA MS operating at least one of the six bands inter-band CA combinations specified in TS 36.101V17.2.0, subclause 5.5A Table 5.5A-2d.

The unwanted emission limits defined in the present Annex are for E-UTRA MS operating at least one of the dual connectivity (DC) combinations specified in TS 36.101V17.2.0, subclause 5.5C in Table 5.5C-1 for two bands and Table 5.5C-2 for three bands:











**1.1 Channel bandwidth**

Requirements in the present document are specified for the channel bandwidths listed in Table 1.1-1.

TABLE 1.1-1

**Transmission bandwidth configuration *NRB* in E-UTRA channel bandwidths**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Channel bandwidth BWChannel (MHz)** | **1.4** | **3** | **5** | **10** | **15** | **20** |
| Transmission bandwidth configuration NRB | 6 | 15 | 25 | 50 | 75 | 100 |

**1.1.1 Channel bandwidths per operating band**

TABLE 1.1.1-1

**E-UTRA channel bandwidth**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA band / Channel bandwidth** | | | | | | |
| **E-UTRA band** | **1.4 MHz** | **3 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** |
| 1 |  |  | Yes | Yes | Yes | Yes |
| 2 | Yes | Yes | Yes | Yes | Yes1 | Yes1 |
| 3 | Yes | Yes | Yes | Yes | Yes1 | Yes1 |
| 4 | Yes | Yes | Yes | Yes | Yes | Yes |
| 5 | Yes | Yes | Yes | Yes1 |  |  |
| 6 |  |  | Yes | Yes1 |  |  |
| 7 |  |  | Yes | Yes | Yes3 | Yes1, 3 |
| 8 | Yes | Yes | Yes | Yes1 |  |  |
| 9 |  |  | Yes | Yes | Yes1 | Yes1 |
| 10 |  |  | Yes | Yes | Yes | Yes |
| 11 |  |  | Yes | Yes1 |  |  |
| 12 | Yes | Yes | Yes1 | Yes1 |  |  |
| 13 |  |  | Yes1 | Yes1 |  |  |

TABLE 1.1.1-1 (*end*)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA band / Channel bandwidth** | | | | | | | | |
| **E-UTRA band** | **1.4 MHz** | **3 MHz** | **5 MHz** | **10 MHz** | | **15 MHz** | | **20 MHz** |
| 14 |  |  | Yes1 | Yes1 | |  | |  |
| ... |  |  |  |  | |  | |  |
| 17 |  |  | Yes1 | Yes1 | |  | |  |
| 18 |  |  | Yes | Yes1 | | Yes1 | |  |
| 19 |  |  | Yes | Yes1 | | Yes1 | |  |
| 20 |  |  | Yes | Yes1 | | Yes1 | | Yes1 |
| 21 |  |  | Yes | Yes1 | | Yes1 | |  |
| 22 |  |  | Yes | Yes | | Yes1 | | Yes1 |
| 23 | Yes | Yes | Yes | Yes | | Yes1 | | Yes1 |
| 24 |  |  | Yes | Yes | |  | |  |
| 25 | Yes | Yes | Yes | Yes | | Yes1 | | Yes1 |
| 26 | Yes | Yes | Yes | Yes1 | | Yes1 | |  |
| 27 | Yes | Yes | Yes | Yes1 | |  | |  |
| 28 |  | Yes | Yes | Yes1 | | Yes1 | | Yes1, 2 |
| 30 |  |  | Yes | Yes1 | |  | |  |
| 31 | Yes | Yes1 | Yes1 |  | |  | |  |
| ... |  |  |  |  | |  | |  |
| 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 | | Yes3 | Yes3 |
| 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 |
| 45 |  |  | Yes | | Yes | | Yes | Yes |
| 46 |  |  |  | | Yes | |  | Yes |
| 47 |  |  |  | | Yes | |  | Yes |
| 48 |  |  | Yes | | Yes | | Yes | Yes |
| 49 |  |  |  | | Yes | |  | Yes |
| 50 |  | Yes | Yes | | Yes | | Yes | Yes |
| 51 |  | Yes | Yes | |  | |  |  |
| 52 |  |  | Yes | | Yes | | Yes | Yes |
| 53 | Yes | Yes | Yes | | Yes | |  |  |
| … |  |  |  | |  | |  |  |
| 65 | Yes | Yes | Yes | | Yes | | Yes | Yes |
| 66 | Yes | Yes | Yes | | Yes | | Yes | Yes |
| 68 |  |  | Yes | | Yes | | Yes |  |
| 70 |  |  | Yes | | Yes | | Yes | Yes |
| 71 |  |  | Yes | | Yes1 | | Yes1 | Yes1 |
| 72 | Yes | Yes1 | Yes1 | |  | |  |  |
| 73 | Yes | Yes | Yes | |  | |  |  |
| 74 | Yes | Yes | Yes | | Yes1 | | Yes1 | Yes1 |
| 85 |  |  | Yes1 | | Yes1 | |  |  |
| 87 | Yes | Yes1 | Yes1 | |  | |  |  |
| 88 | Yes | Yes1 | Yes1 | |  | |  |  |
| NOTE 1 – Refers to the bandwidth for which a relaxation of the specified UE receiver sensitivity requirement 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 the 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 (§ 4.3). | | | | | | | | |

### 1.1.2 Channel bandwidths per operating band for CA

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

For each CA 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 CA are defined for the CA configurations and bandwidth combination sets specified in TS 36.101V17.2.0, subclause 5.6A Table 5.6A.1-1.

Requirements for inter-band CA are defined for the CA configurations and bandwidth combination sets specified in TS 36.101V17.2.0, subclause 5.6A Table 5.6A.1-2, 5.6A.1-2a, 5.6A.1-2b, 5.6A.1-2c and 5.6A.1-2d.

Requirements for intra-band non-contiguous CA are defined for the CA configurations and bandwidth combination sets specified in TS 36.101V17.2.0, subclause 5.6A Table 5.6A.1-3, 5.6A.1-4 and 5.6A.1-5.























































**2 Definitions, symbols and abbreviations**

**2.1 Definitions**

**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.

**Composite spectrum emission mask:** Emission mask requirement for intraband non-contiguous carrier aggregation which is a combination of individual sub-block spectrum emissions masks.

**Composite spurious emission requirement:** Spurious emission requirement for intraband non-contiguous carrier aggregation which is a combination of individual sub-block spurious emission 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.

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

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

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

**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.

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

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

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

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

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

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

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

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

**2.2 Symbols**

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

*BWChannel* Channel bandwidth

*BWChannel\_CA* Aggregated channel bandwidth, expressed in MHz

*BWGB* Virtual guard band to facilitate transmitter (receiver) filtering above/below edge CCs

*ERS* 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

*Ês* The received energy per RE of the wanted signal during the useful part of the symbol, i.e. excluding the cyclic prefix, averaged across the allocated RB(s) (average power within the allocated RB(s), divided by the number of RE within this allocation, and normalized to the subcarrier spacing) at the UE antenna connector

*F* Frequency

*Fagg\_alloc\_low*Aggregated Transmission Bandwidth Configuration. The lowest frequency of the simultaneously transmitted resource blocks

*Fagg\_alloc\_high*Aggregated Transmission Bandwidth Configuration. The highest frequency of the simultaneously transmitted resource blocks

*FInterferer*(offset) Frequency offset of the interferer

*FInterferer* Frequency of the interferer

*FC*Frequency of the carrier centre frequency

*FC\_agg*Aggregated Transmission Bandwidth Configuration. Center frequency of the aggregated carriers

*FC,block, high*Center frequency of the highest transmitted/received carrier in a sub-block

*FC,block, low*Center frequency of the lowest transmitted/received carrier in a sub-block

*FC\_low* The centre frequency of the *lowest carrier*, expressed in MHz

*FC\_high* The centre frequency of the *highest carrier*, expressed in MHz

*FDL\_low*The lowest frequency of the downlink operating band

*FDL\_high*The highest frequency of the downlink operating band

*FUL\_low*The lowest frequency of the uplink operating band

*FUL\_high*The highest frequency of the uplink operating band

*Fedge,block,low* The lower sub-block edge, where *Fedge,block,low*= *FC,block,low*− *Foffset*.

*Fedge,block,high* The upper sub-block edge, where *Fedge,block,high*= *FC,block,high*+ *Foffset*.

*Fedge\_low* The *lower edge* of aggregated channel bandwidth, expressed in MHz

*Fedge\_high* The *higher edge* of aggregated channel bandwidth, expressed in MHz

*Foffset* Frequency offset from *FC\_high* to the *higher edge* or *FC\_low* to the *lower edge*

*Foffset,block,low*Separation between lower edge of a sub-block and the center of the lowest component carrier within the sub-block

*Foffset,block,high*Separation between higher edge of a sub-block and the center of the highest component carrier within the sub-block

*FOOB* The boundary between the E-UTRA out of band emission and spurious emission domains

*Io* 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

*Ior* 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

*Îor* 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

*Iot* 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

*LCRB*Transmission bandwidth which represents the length of a contiguous resource block allocation expressed in units of resources blocks

*Ncp*Cyclic prefix length

*NDL* Downlink EARFCN

*Noc* 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

*Noc*1 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

*Noc*2 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

*Noc*3 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

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



*NOffs-DL* Offset used for calculating downlink EARFCN

*NOffs-UL* Offset used for calculating uplink EARFCN

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

*NRB* Transmission bandwidth configuration, expressed in units of resource blocks

*NRB\_agg*Aggregated transmission bandwidth configuration. The number of the aggregated RBs within the fully allocated aggregated channel bandwidth

*NRB\_alloc*Total number of simultaneously transmitted resource blocks in aggregated channel bandwidth configuration

*NRB,c*The transmission bandwidth configuration of component carrier *c*, expressed in units of resource blocks

*NRB,largest BW*The largest transmission bandwidth configuration of the component carriers in the bandwidth combination, expressed in units of resource blocks

*NUL* Uplink EARFCN

*Rav* Minimum average throughput per RB

*PCMAX*The configured maximum UE output power

*PCMAX,c* The configured maximum UE output power for serving cell *c*

*PEMAX*  Maximum allowed UE output power signalled by higher layers

*PEMAX,c* Maximum allowed UE output power signalled by higher layers for serving cell *c*

*PInterferer* Modulated mean power of the interferer

*PPowerClass*Nominal UE power (i.e. no tolerance)

*PUMAX* The measured configured maximum UE output power

*Puw* Power of an unwanted DL signal

*Pw* Power of a wanted DL signal

*RBstart* Indicates the lowest RB index of transmitted resource blocks

*RBend* Indicates the highest RB index of transmitted resource blocks

Δ*fOoB*Δ Frequency of out-of-band emission

Δ*RIB,c*Allowed reference sensitivity relaxation due to support for inter-band CA operation, for serving cell *c*

Δ*TIB,c*Allowed maximum configured output power relaxation due to support for inter-band CA operation, for serving cell *c*

*TC*Allowed operating band edge transmission power relaxation

*TC,c*Allowed operating band edge transmission power relaxation for serving cell *c*

*Wgap* Sub-block gap size

**2.3 Abbreviations**

ABS Almost blank subframe

ACLR Adjacent channel leakage ratio

ACS Adjacent channel selectivity

A-MPR Additional maximum power reduction

AWGN Additive white gaussian noise

BS Base station

CA Carrier aggregation

CA\_X Intra-band contiguous CA of component carriers in one sub-block within Band X where X is the applicable E-UTRA operating band

CA\_X-X Intra-band non-contiguous CA of component carriers in two sub-blocks within Band X where X is the applicable E-UTRA operating band

CA\_X-Y Inter-band CA of component carrier(s) in one sub-block within Band X and component carrier(s) in one sub-block within Band Y where X and Y are the applicable E-UTRA operating band

CA\_X-X-Y CA of component carriers in two sub-blocks within Band X and component carrier(s) in one sub-block within Band Y where X and Y are the applicable E‑UTRA operating bands

CC Component carriers

CG Carrier Group

CPE Customer premise equipment

CPE\_X Customer premise equipment for E-UTRA operating band X

CW Continuous wave

DC Dual Connectivity

DL Downlink

DIP Dominant interferer proportion

eDL-MIMO Down link multiple antenna transmission

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

HD-FDD Half-duplex FDD

MBW Measurement bandwidth

MCS Modulation and coding scheme

MCG Main Carrier Group

MOP Maximum output power

MPR Maximum power reduction

MSD Maximum sensitivity degradation

OCNG OFDMA channel noise generator

OFDMA Orthogonal frequency division multiple access

OoB Out-of-band

PA Power amplifier

PCC Primary component carrier

P-MPR Power management maximum power reduction

PSS Primary synchronization signal

PSS\_RA PSS-to-RS EPRE ratio for the channel PSS

RE Resource element

REFSENS Reference sensitivity power level

r.m.s Root mean square

SCC Secondary component carrier

SCG Secondary Carrier Group

SEM Spectrum emission mask

SINR Signal-to-interference-and-noise ratio

SNR Signal-to-noise ratio

SSS Secondary synchronization signal

SSS\_RA SSS-to-RS EPRE ratio for the channel SSS

TDD Time division duplex

UE User equipment

UL Uplink

UL-MIMO Up link multiple antenna transmission

UMTS Universal mobile telecommunications system

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

**3 Generic unwanted emission characteristics**

TABLE 3-1

**Additional emission requirements indicated by network signalling (NS) values**

|  |  |  |  |
| --- | --- | --- | --- |
| **Network signalling value** | **Requirements (subclause)** | **E-UTRA Band** | **Channel bandwidth (MHz)** |
| NS\_01 | N/A (Note 1) | Table 1-1 | 1.4, 3, 5, 10, 15, 20 |
| NS\_03 | 3.1.4.1 | 2, 4,10, 23, 25, 35, 36 | 3 |
| 5 |
| 10 |
| 15 |
| 20 |
| NS\_04 | 3.1.4.2 | 41 | 5 |
| 10, 15, 20 |
| NS\_05 | 4.5.1 | 1 | 10,15,20 |
| NS\_06 | 3.1.4.3 | 12, 13, 14, 17 | 1.4, 3, 5, 10 |
| NS\_07 | 3.1.4.3  4.5.2 | 13 | 10 |
| NS\_08 | 4.5.3 | 19 | 10, 15 |
| NS\_09 | 4.5.4 | 21 | 10, 15 |
|
| NS\_10 |  | 20 | 15, 20 |
| NS\_11 | 3.1.4.1 | 23 | 1.4, 3, 5, 10, 15, 20 |
| NS\_12 | 4.5.5 | 26 | 1.4, 3, 5, 10, 15 |
| NS\_13 | 4.5.6 | 26 | 5 |
| NS\_14 | 4.5.7 | 26 | 10, 15 |
| NS\_15 | 4.5.8 | 26 | 1.4, 3, 5, 10, 15 |
| NS\_16 | 4.5.9 | 27 | 3, 5, 10 |

TABLE 3-1 (*end*)

|  |  |  |  |
| --- | --- | --- | --- |
| **Network signalling value** | **Requirements (subclause)** | **E-UTRA Band** | **Channel bandwidth (MHz)** |
| NS\_17 | 4.5.10 | 28 | 5, 10 |
| NS\_18 | 4.5.11 | 28 | 5 |
| 10, 15, 20 |
| NS\_19 | 4.5.12 | 44 | 10, 15, 20 |
| NS\_20 | 3.1.4.1 | 23 | 5, 10, 15, 20 |
| NS\_21 | 3.1.4.1 | 30 | 5, 10 |
| NS\_22 | 4.5.13 | 42, 43 | 5, 10, 15, 20 |
| ... |  |  |  |
| NS\_23 | To be updated | 42, 43 | 5, 10, 15, 20 |
| NS\_24 | To be updated | 65 | 5, 10, 15, 20 |
| NS\_25 | To be updated | 65 | 5, 10, 15, 20 |
| NS\_26 | To be updated | 68 | 10, 15 |
| NS\_27 | To be updated | 48 | 5, 10, 15, 20 |
| NS\_28 | To be updated | 46 | 20 |
| NS\_29 | To be updated | 46 | 20 |
| NS\_30 | To be updated | 46 | 20 |
| NS\_31 | To be updated | 46 | 20 |
| NS\_32 | To be updated | - | - |
| … | To be updated |  |  |
| NS\_35 | To be updated | 71 | 5, 10, 15, 20 |
| NS\_36 | To be updated | 68 | 5, 10, 15 |
| NS\_38 | To be updated | 74 | 1.4, 3, 5, 10, 15, 20 |
| NS\_39 | To be updated | 74 | 10, 15, 20 |
| NS\_40 | To be updated | 51 | 3, 5 |
| NS\_41 | To be updated | 50 | 3, 5, 10, 15, 20 |
| NS\_42 | To be updated | 50 | 3, 5, 10, 15, 20 |
| NS\_43 | To be updated | 49 | 20 |
| NS\_44 | To be updated | 38 | 5, 10, 15, 20 |
| NS\_45 | To be updated | 53 | 1.4, 3, 5, 10 |
| .. | To be updated |  |  |
| NS\_56 | To be updated | 24 | 5, 10 |
| NS\_32 | - | - | - |
| NOTE 1 – The signalling is for purposes other than additional emission requirements. | | | |

TABLE 3-2

**Additional emission requirements for CA indicated by NS values**

|  |  |  |
| --- | --- | --- |
| **CA NS value** | **Requirements (sub-clause)** | **Uplink CA configuration** |
| CA\_NS\_01 | 4.6.1 | CA\_1C |
| CA\_NS\_02 | 4.6.2 | CA\_1C |
| CA\_NS\_03 | 4.6.3 | CA\_1C |
| CA\_NS\_04 | 3.1.5.1 | CA\_41C |
| CA\_NS\_05 | 4.4 | CA\_38C |
| CA\_NS\_06 | 4.4 | CA\_7C |
| CA\_NS\_07 | 4.6.4 | CA\_39C |
| CA\_NS\_08 | To be updated | CA\_42C |
| CA\_NS\_09 | To be updated | CA\_66B |
| To be updated | CA\_66C |
| CA\_NS\_10 | To be updated | CA\_48B, CA\_48C |

**3.1 Spectrum emission mask**

The output UE transmitter spectrum consists of the three components; the emission within the occupied bandwidth (channel bandwidth), the OoB emissions and the far-out spurious emission domain.

The spectrum emission mask of the MS applies to frequencies (Δ*fOoB*) starting from the ± edges of the assigned E-UTRA channel bandwidth. For frequencies greater than (Δ*fOoB*) as specified in Tables 3.1.1-1 and 3.1.1-2 the spurious requirements in clause 4 are applicable.

**3.1.1 General spectrum emission mask**

The power of any MS emission shall not exceed the levels specified in Table 3.1.1-1 or Table  3.1.1‑2 for the specified channel bandwidths.

TABLE 3.1.1-1

**E-UTRA spectrum emission mask, E‑UTRA bands ≤ 3 GHz**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Δ*fOoB* (MHz)** | **Spectrum emission limit (dBm)/channel bandwidth** | | | | | | |
| **1.4 MHz** | **3.0 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** | **MBW** |
| ±0-1 | –8.5 | –11.5 | –13.5 | –16.5 | –18.5 | –19.5 | 30 kHz |
| ±1-2.5 | –8.5 | –8.5 | –8.5 | –8.5 | –8.5 | –8.5 | 1 MHz |
| ±2.5-2.8 | –23.5 | –8.5 | –8.5 | –8.5 | –8.5 | –8.5 | 1 MHz |
| ±2.8-5 |  | –8.5 | –8.5 | –8.5 | –8.5 | –8.5 | 1 MHz |
| ±5-6 |  | –23.5 | –11.5 | –11.5 | –11.5 | –11.5 | 1 MHz |
| ±6-10 |  |  | –23.5 | –11.5 | –11.5 | –11.5 | 1 MHz |
| ±10-15 |  |  |  | –23.5 | –11.5 | –11.5 | 1 MHz |
| ±15-20 |  |  |  |  | –23.5 | –11.5 | 1 MHz |
| ±20-25 |  |  |  |  |  | –23.5 | 1 MHz |
| MBW – measurement bandwidth | | | | | | | |

TABLE 3.1.1-2

**E-UTRA spectrum emission mask, 3 GHz < E‑UTRA bands ≤ 4.2 GHz**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Δ*fOoB* (MHz)** | **Spectrum emission limit (dBm)/Channel bandwidth** | | | | | | |
| **1.4 MHz** | **3.0 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** | **MBW** |
| ±0-1 | –8.2 | –11.2 | –13.2 | –16.2 | –18.2 | –19.2 | 30 kHz |
| ±1-2.5 | –8.2 | –8.2 | –8.2 | –8.2 | –8.2 | –8.2 | 1 MHz |
| ±2.5-2.8 | –23.2 | –8.2 | –8.2 | –8.2 | –8.2 | –8.2 | 1 MHz |
| ±2.8-5 |  | –8.2 | –8.2 | –8.2 | –8.2 | –8.2 | 1 MHz |
| ±5-6 |  | –23.2 | –11.2 | –11.2 | –11.2 | –11.2 | 1 MHz |
| ±6-10 |  |  | –23.2 | –11.2 | –11.2 | –11.2 | 1 MHz |
| ±10-15 |  |  |  | –23.2 | –11.2 | –11.2 | 1 MHz |
| ±15-20 |  |  |  |  | –23.2 | –11.2 | 1 MHz |
| ±20-25 |  |  |  |  |  | –23.2 | 1 MHz |
| NOTE – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the MBW. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the MBW. When the resolution bandwidth is smaller than the MBW, the result should be integrated over the MBW in order to obtain the equivalent noise bandwidth of the MBW. | | | | | | | |

**3.1.2 Spectrum emission mask for CA**

For inter-band carrier aggregation with uplink assigned to one E-UTRA band, the power of any UE emission shall not exceed the levels specified in Table 3.1.2-1 or Table 3.1.2-2. If for some frequency spectrum emission masks of component carriers overlap then spectrum emission mask allowing higher power spectral density applies for that frequency. If for some frequency a component carrier spectrum emission mask overlaps with the channel bandwidth of another component carrier, then the emission mask does not apply for that frequency.

For intra-band contiguous carrier aggregation the spectrum emission mask of the UE applies to frequencies (Δ*fOoB*) starting from the ± edge of the aggregated channel bandwidth (Table 1.1.2-4) For intra-band contiguous carrier aggregation the bandwidth class C (Table 1.1.2-4), the power of any UE emission shall not exceed the levels specified in Table 3.1.2-1 or Table 3.1.2-2 for the specified channel bandwidth.

TABLE 3.1.2-1

**General E-UTRA spectrum emission mask CA BW Class C, E UTRA bands ≤ 3 GHz**

| **Spectrum emission limit (dBm)/*BWChannel\_CA*** | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Δ*fOoB* (MHz)** | **25RB+100RB (24.95 MHz)** | **50RB+100RB (29.9 MHz)** | | **75RB+75RB (30 MHz)** | **75RB+100RB (34.85 MHz)** | | **100RB+100RB (39.8 MHz)** | **MBW** |
| ±0-1 | −20.5 | −21 | | −21 | −22 | | −22.5 | 30 kHz |
| ±1-5 | −8.5 | −8.5 | | −8.5 | −8.5 | | −8.5 | 1 MHz |
| ±5-24.95 | −11.5 | −11.5 | | −11.5 | −11.5 | | −11.5 | 1 MHz |
| ±24.95-29.9 | −23.5 | 1 MHz |
| ±29.9-29.95 |  | −23.5 | |  |  | |  | 1 MHz |
| ±29.95-30 |  | 1 MHz |
| ±30-34.85 |  | −23.5 | 1 MHz |
| ±34.85-34.9 |  | −23.5 | | 1 MHz |
| ±34.9-35 |  |  | |  |  | |  | 1 MHz |
| ±35-39.8 |  |  | |  | 1 MHz |
| ±39.8-39.85 |  | |  |  | −23.5 | −23.5 | | 1 MHz |
| ±39.85-44.8 |  | |  |  |  | 1 MHz |

TABLE 3.1.2-2

**General E-UTRA spectrum emission mask CA BW Class C, 3GHz <   
E‑UTRA bands ≤ 4.2 GHz**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Spectrum emission limit (dBm)/*BWChannel\_CA*** | | | | | | |
| **Δ*fOoB* (MHz)** | **25RB+100RB (24.95 MHz)** | **50RB+100RB (29.9 MHz)** | **75RB+75RB (30 MHz)** | **75RB+100RB (34.85 MHz)** | **100RB+100RB (39.8 MHz)** | **MBW** |
| ±0-1 | -20.2 | −20.7 | −20.7 | −21.7 | −22.2 | 30 kHz |
| ±1-5 | −8.2 | −8.2 | −8.2 | −8.2 | −8.2 | 1 MHz |
| ±5-24.95 | −11.2 | −11.2 | −11.2 | −11.2 | −11.2 | 1 MHz |
| ±24.95-29.9 | −23.2 | 1 MHz |

TABLE 3.1.2-2 (*continued*)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Spectrum emission limit (dBm)/*BWChannel\_CA*** | | | | | | |
| **Δ*fOoB* (MHz)** | **25RB+100RB (24.95 MHz)** | **50RB+100RB (29.9 MHz)** | **75RB+75RB (30 MHz)** | **75RB+100RB (34.85 MHz)** | **100RB+100RB (39.8 MHz)** | **MBW** |
| ±29.9-29.95 |  | −23.2 |  |  |  | 1 MHz |
| ±29.95-30 |  | 1 MHz |
| ±30-34.85 |  | −23.2 | 1 MHz |
| ±34.85-34.9 |  | −23.2 | 1 MHz |
| ±34.9-35 |  |  | 1 MHz |
| ±35-39.8 |  |  |  | 1 MHz |
| ±39.8-39.85 |  |  |  | −23.2 | 1 MHz |
| ±39.85-44.8 |  |  |  |  | 1 MHz |

TABLE 3.1.2-3

**UL-MIMO configuration in closed-loop spatial multiplexing scheme**

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

**3.1.3 Additional spectrum emission mask**

Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message. See Table 3-1.

**3.1.3.1 Additional E-UTRAN spectrum emission with NS value of “NS\_03”, “NS\_11”, “NS\_20” and “NS\_21”**

When “NS\_03”, “NS\_11”, “NS\_20” or “NS\_21” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Tables 3.1.3.1-1 and 3.1.3.1-2.

TABLE 3.1.3.1-1

**Additional requirements, E‑UTRA bands ≤ 3 GHz**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Spectrum emission limit (dBm)/Channel bandwidth** | | | | | | |
| **Δ*fOoB* (MHz)** | **1.4 MHz** | **3.0 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** | **MBW** |
| 0-1 | −8.5 | −11.5 | −13.5 | −16.5 | −18.5 | −19.5 | 30 kHz |
| 1-2.5 | −11.5 | −11.5 | −11.5 | −11.5 | −11.5 | −11.5 | 1 MHz |
| 2.5-2.8 | −23.5 | 1 MHz |
| 2.8-5 |  | 1 MHz |
| 5-6 |  | −23.5 | 1 MHz |
| 6-10 |  |  | −23.5 | 1 MHz |

TABLE 3.1.3.1-1 (*end*)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Spectrum emission limit (dBm)/Channel bandwidth** | | | | | | |
| **Δ*fOoB* (MHz)** | **1.4 MHz** | **3.0 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** | **MBW** |
| 10-15 |  |  |  | −23.5 |  |  | 1 MHz |
| 15-20 |  |  |  |  | −23.5 | 1 MHz |
| 20-25 |  |  |  |  |  | −23.5 | 1 MHz |
| NOTE 1 – The first and last measurement position with a 30 kHz filter is at Δ*fOoB* equals to 0.015 MHz and 0.985 MHz.  NOTE 2 – At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5 MHz and −0.5 MHz, respectively.  NOTE 3 – The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel.  NOTE 4 – Above spectrum emission mask (SEM) requirement applies to bands corresponding to NS value NS\_03 as defined in Table 3-1.  NOTE 5 – For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δ*fOoB* equals to 3 MHz. | | | | | | | |

TABLE 3.1.3.1-2

**Additional requirements, 3 GHz < E‑UTRA bands ≤ 4.2 GHz**

| **Spectrum emission limit (dBm)/Channel bandwidth** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Δ*fOoB* (MHz)** | **1.4 MHz** | **3.0 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** | **MBW** |
| 0-1 | −8.2 | −11.2 | −13.2 | −16.2 | −18.2 | −19.2 | 30 kHz |
| 1-2.5 | −11.2 | −11.2 | −11.2 | −11.2 | −11.2 | −11.2 | 1 MHz |
| 2.5-2.8 | −23.2 | 1 MHz |
| 2.8-5 |  | 1 MHz |
| 5-6 |  | −23.2 | 1 MHz |
| 6-10 |  |  | −23.2 | 1 MHz |
| 10-15 |  |  |  | −23.2 | 1 MHz |
| 15-20 |  |  |  |  | −23.2 | 1 MHz |
| NOTE 1 – The first and last measurement position with a 30 kHz filter is at Δ*fOoB* equals to 0.015 MHz and 0.985 MHz.  NOTE 2 – At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5 MHz and −0.5 MHz, respectively.  NOTE 3 – The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel.  NOTE 4 – Above SEM requirement applies to bands corresponding to NS value NS\_03 as defined in Table 3‑1.  NOTE 5 – For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δ*fOoB* equals to 3 MHz. | | | | | | | |

NOTE – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the MBW. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the MBW. When the resolution bandwidth is smaller than the MBW, the result should be integrated over the MBW in order to obtain the equivalent noise bandwidth of the MBW.

**3.1.3.2 Additional E-UTRAN spectrum emission with NS value of “NS\_04”**

When “NS\_04” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Tables 3.1.3.2-1 and 3.1.3.2-2.

TABLE 3.1.3.2-1

**Additional requirements, E‑UTRA bands ≤ 3 GHz**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Spectrum emission limit (dBm)/Channel bandwidth** | | | | | | | |
| **Δ*fOoB* (MHz)** | **1.4 MHz** | **3.0 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** | **MBW** |
| 0-1 | −8.5 | −11.5 | −13.5 | −16.5 | −18.5 | −19.5 | 30 kHz |
| 1-2.5 | −11.5 | −11.5 | −11.5 | −11.5 | −11.5 | −11.5 | 1 MHz |
| 2.5-2.8 | −23.5 | 1 MHz |
| 2.8-5 |  | 1 MHz |
| 5-6 |  | −23.5 | −23.5 | −23.5 | −23.5 | −23.5 | 1 MHz |
| 6-10 |  |  | 1 MHz |
| 10-15 |  |  |  | 1 MHz |
| 15-20 |  |  |  |  | 1 MHz |
| 20-25 |  |  |  |  |  | 1 MHz |
| NOTE 1 – The first and last measurement position with a 30 kHz filter is at Δ*fOoB* equals to 0.015 MHz and 0.985 MHz.  NOTE 2 – At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5 MHz and −0.5 MHz, respectively.  NOTE 3 – The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel.  NOTE 4 – Above SEM requirement applies to bands corresponding to NS value NS\_04 as defined in Table 3‑1.  NOTE 5 – For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δ*fOoB* equals to 3 MHz. | | | | | | | |

TABLE 3.1.3.2-2

**Additional requirements, 3 GHz < E‑UTRA bands ≤ 4.2 GHz**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Spectrum emission limit (dBm)/Channel bandwidth** | | | | | | | |
| **Δ*fOoB* (MHz)** | **1.4 MHz** | **3.0 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** | **MBW** |
| 0-1 | −8.2 | −11.2 | −13.2 | −16.2 | −18.2 | −19.2 | 30 kHz |
| 1-2.5 | −11.2 | −11.2 | −11.2 | −11.2 | −11.2 | −11.2 | 1 MHz |

TABLE 3.1.3.2-2 (*end*)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Spectrum emission limit (dBm)/Channel bandwidth** | | | | | | | |
| **Δ*fOoB* (MHz)** | **1.4 MHz** | **3.0 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** | **MBW** |
| 2.5-2.8 | −23.2 |  |  |  |  |  | 1 MHz |
| 2.8-5 |  | 1 MHz |
| 5-6 |  | −23.2 | −23.2 | −23.2 | −23.2 | −23.2 | 1 MHz |
| 6-10 |  |  | 1 MHz |
| 10-15 |  |  |  | 1 MHz |
| 15-20 |  |  |  |  | 1 MHz |
| 20-25 |  |  |  |  |  | 1 MHz |
| NOTE 1 – The first and last measurement position with a 30 kHz filter is at Δ*fOoB* equals to 0.015 MHz and 0.985 MHz.  NOTE 2 – At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5 MHz and −0.5 MHz, respectively.  NOTE 3 – The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel.  NOTE 4 – Above SEM requirement applies to bands corresponding to NS value NS\_04 as defined in Table 3‑1.  NOTE 5 – For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δ*fOoB* equals to 3 MHz. | | | | | | | |

NOTE – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the MBW. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the MBW. When the resolution bandwidth is smaller than the MBW, the result should be integrated over the MBW in order to obtain the equivalent noise bandwidth of the MBW.

**3.1.3.3 Additional E-UTRAN spectrum emission with NS value of “NS\_06” or “NS\_07”**

When “NS\_06” or “NS\_07” are indicated in the cell, the power of any UE emission shall not exceed the levels specified in Tables 3.1.3.3-1 and 3.1.3.3-2.

TABLE 3.1.3.3-1

**Additional requirements, E‑UTRA bands ≤ 3 GHz**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Spectrum emission limit (dBm)/Channel bandwidth** | | | | | |
| **Δ*fOoB* (MHz)** | **1.4 MHz** | **3.0 MHz** | **5 MHz** | **10 MHz** | **MBW** |
| 0-0.1 | −11.5 | −11.5 | −13.5 | −16.5 | 30 kHz |
| 0.1-1 | −11.5 | −11.5 | −11.5 | −11.5 | 100 kHz |
| 1-2.5 | −11.5 | −11.5 | −11.5 | −11.5 | 1 MHz |
| 2.5-2.8 | −23.5 | 1 MHz |
| 2.8-5 |  | 1 MHz |
| 5-6 |  | −23.5 | 1 MHz |
| 6-10 |  |  | −23.5 | 1 MHz |
| 10-15 |  |  |  | −23.5 | 1 MHz |
| NOTE 1 – The first and last measurement position with a 30 kHz filter is at Δ*fOoB* equals to 0.015 MHz and 0.085 MHz. The first and last measurement position with a 100 kHz filter is at Δ*fOoB* equals to 0.15 MHz and 0.95 MHz.  NOTE 2 – At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5 MHz and −0.5 MHz, respectively.  NOTE 3 – The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel.  NOTE 4 – Above SEM requirement applies to bands corresponding to NS value NS\_06 and NS\_07 as defined in Table 3-1.  NOTE 5 – For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δ*fOoB* equals to 3 MHz. | | | | | |

TABLE 3.1.3.3-2

**Additional requirements, 3GHz < E‑UTRA bands ≤ 4.2 GHz**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Spectrum emission limit (dBm)/Channel bandwidth** | | | | | |
| **ΔfOoB (MHz)** | **1.4 MHz** | **3.0 MHz** | **5 MHz** | **10 MHz** | **MBW** |
| 0-0.1 | −11.2 | −11.2 | −13.2 | −16.2 | 30 kHz |
| 0.1-1 | −11.2 | −11.2 | −11.2 | −11.2 | 100 kHz |
| 1-2.5 | −11.2 | −11.2 | −11.2 | −11.2 | 1 MHz |
| 2.5-2.8 | −23.2 | 1 MHz |
| 2.8-5 |  | 1 MHz |
| 5-6 |  | −23.2 | 1 MHz |
| 6-10 |  |  | −23.2 | 1 MHz |
| 10-15 |  |  |  | −23.2 | 1 MHz |

|  |
| --- |
| *Notes to Table 3.1.3.3-2*  NOTE 1 – The first and last measurement position with a 30 kHz filter is at Δ*fOoB* equals to 0.015 MHz and 0.085 MHz. The first and last measurement position with a 100 kHz filter is at Δ*fOoB* equals to 0.15 MHz and 0.95 MHz.  NOTE 2 – At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5 MHz and −0.5 MHz, respectively.  NOTE 3 – The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel.  NOTE 4 – Above SEM requirement applies to bands corresponding to NS value NS\_06 and NS\_07 as defined in Table 3-1.  NOTE 5 – For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δ*fOoB* equals to 3 MHz. |

NOTE – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the MBW. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the MBW. When the resolution bandwidth is smaller than the MBW, the result should be integrated over the MBW in order to obtain the equivalent noise bandwidth of the MBW.

**3.1.3.4 Additional E-UTRAN spectrum emission with NS value of “NS\_27”**

When “NS\_27” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Tables 3.1.3.4-1.

TABLE 3.1.3.4-1

**Additional requirements**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Spectrum emission limit (dBm)/ Channel bandwidth | | | | |
| ΔfOOB  (MHz) | 5  MHz | 10  MHz | 15  MHz | 20  MHz | MBW |
| ± 0-1 | -11.2 | -11.2 | -11.2 | -11.2 | Note 1 |
| ± 1-10 | -11.2 | -11.2 | -11.2 | -11.2 | 1 MHz |
| ± 10-15 |  | -23.2 | -23.2 | -23.2 | 1 MHz |
| ± 15-20 |  |  | -23.2 | -23.2 | 1 MHz |
| ± 20-25 |  |  |  | -23.2 | 1 MHz |

NOTE 1 – The measurement bandwidth is 1% of the applicable E-UTRA channel bandwidth.

**3.1.3.5 Additional E-UTRAN spectrum emission with NS value of “NS\_35”**

When “NS\_35” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Tables 3.1.3.5-1.

TABLE 3.1.3.5-1

**Additional requirements**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ΔfOOB  (MHz) | 5  MHz | 10  MHz | 15 MHz | 20 MHz | MBW |
| ± 0-0.1 | -13.5 | -16.5 | -18.5 | -19.5 | 30 kHz |
| ± 0.1-6 | -11.5 | -11.5 | -11.5 | -11.5 | 100 kHz |
| ± 6-10 | -23.51 | -11.5 | -11.5 | -11.5 | 100 kHz |
| ± 10-15 |  | -23.51 | -11.5 | -11.5 | 100 kHz |
| ± 15-20 |  |  | -23.51 | -11.5 | 100 kHz |
| ± 20-25 |  |  |  | -23.5 | 1 MHz |

NOTE 1 –The measurement bandwidth shall be 1 MHz.

**3.1.4 Additional spectrum emission mask for CA**

Additional spectrum emission requirements for CA are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message. See Table 3-2.

**3.1.4.1 Additional E-UTRAN spectrum emission mask for CA with NS value of “CA\_NS\_04”**

When “CA\_NS\_04” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 3.1.4.1-1.

TABLE 3.1.4.1-1

**Additional requirements**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Spectrum emission limit [dBm]/BWChannel\_CA | | | | | | | |
| ΔfOOB  (MHz) | 50+75RB  (24.75 MHz) | 25+100RB  (24.95 MHz) | 50+100RB  (29.9 MHz) | 75+75RB (30 MHz) | 75+100RB (34.85 MHz) | 100+100RB (39.8 MHz) | MBW |
| ± 0-1 | -22 | -22 | -22.5 | -23 | -23.5 | -24 | 30 kHz |
| ± 1-5 | -10 | -10 | -10 | -10 | -10 | -10 | 1 MHz |
| ± 5-22.95 | -13 | -13 | -13 | -13 | -13 | -13 | 1 MHz |
| ± 22.95-23.25 | -13 | -25 | -13 | -13 | -13 | -13 | 1 MHz |
| ±23.25-27.9 | -25 | -25 | -13 | -13 | -13 | -13 | 1 MHz |
| ± 27.9-28.5 | -25 | -25 | -25 | -13 | -13 | -13 | 1 MHz |
| ± 28.5-29.75 | -25 | -25 | -25 | -25 | -13 | -13 | 1 MHz |
| ± 29.75-29.95 |  | -25 | -25 | -25 | -13 | -13 | 1 MHz |
| ± 29.95-32.85 |  |  | -25 | -25 | -13 | -13 | 1 MHz |
| ± 32.85-34.9 |  |  | -25 | -25 | -25 | -13 | 1 MHz |
| ± 34.9-35 |  |  |  | -25 | -25 | -13 | 1 MHz |
| ± 35-37.8 |  |  |  |  | -25 | -13 | 1 MHz |
| ± 37.8-39.85 |  |  |  |  | -25 | -25 | 1 MHz |
| ± 39.85-44.8 |  |  |  |  |  | -25 | 1 MHz |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
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| *Notes to Table 3.1.4.1-1:*  NOTE 1 – The first and last measurement position with a 30 kHz filter is at Δ*fOoB* equals to 0.015 MHz and 0.985 MHz.  NOTE 2 – At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5 MHz and −0.5 MHz, respectively.  NOTE 3 –The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel.  NOTE 4 – Above SEM requirement applies to bands corresponding to NS value CA\_NS\_04 as defined in Table 3-2. |

NOTE – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the MBW. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the MBW. When the resolution bandwidth is smaller than the MBW, the result should be integrated over the MBW in order to obtain the equivalent noise bandwidth of the MBW.

**3.2 Adjacent channel leakage ratio**

Adjacent channel leakage power ratio (ACLR) is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency.

**3.2.1 E-UTRA ACLR**

E-UTRA adjacent channel leakage power ratio (*E-UTRAACLR*) is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency at nominal channel spacing. The assigned E-UTRA channel power and adjacent E-UTRA channel power are measured with rectangular filters with MBW specified in Table 3.2.1-1 and Table 3.2.1-2. If the measured adjacent channel power is greater than –50 dBm then the *E‑UTRAACLR* shall be higher than the value specified in Table 3.2.1-1 and Table 3.2.1-2.

TABLE 3.2.1-1

**General requirements for *E-UTRAACLR*for UEs with 23 dBm output power**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Channel bandwidth / *E-UTRAACLR*1 / MBW** | | | | | | |
|  | **1.4 MHz** | **3.0 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** |
| ***E-UTRAACLR*1** | 29.2 dB | 29.2 dB | 29.2 dB | 29.2 dB | 29.2 dB | 29.2 dB |
| **E-UTRA channel MBW** | 1.08 MHz | 2.7 MHz | 4.5 MHz | 9.0 MHz | 13.5 MHz | 18 MHz |
| **UE channel** | +1.4 MHz or −1.4 MHz | +3 MHz or −3 MHz | +5 MHz or −5 MHz | +10 MHz or −10 MHz | +15 MHz or −15 MHz | +20 MHz or −20 MHz |

TABLE 3.2.1-2

**Additional *E-UTRAACLR*requirements UEs with 31 dBm output power   
(applicable for operating band 14 only)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Channel bandwidth / *E-UTRAACLR*1 / MBW** | | | | | |
| **1.4 MHz** | **3.0 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** |
| ***E-UTRAACLR*1** |  |  | 36.2 dB | 36.2 dB |  |  |
| **E-UTRA channel MBW** |  |  | 4.5 MHz | 9.0 MHz |  |  |
| **Adjacent channel centre frequency offset (MHz)** |  |  | +5/−5 | +10/−10 |  |  |
| NOTE – *E-UTRAACLR*1 shall be applicable for >23 dBm. | | | | | | |

**3.2.1.1 E-UTRA ACLR for multi clustered PUSCH**

For multi clustered PUSCH allocation, the E-UTRA ACLR requirements in Tables 3.2.1-1 and 3.2.1‑2 apply as appropriate.

**3.2.2 UTRA ACLR**

*UTRAACLR* is the ratio of the filtered mean power centred on the assigned E-UTRA channel frequency to the filtered mean power centred on an adjacent(s) UTRA channel frequency.

UTRA ACLR is specified for both the first UTRA adjacent channel (*UTRAACLR*1) and the 2nd UTRA adjacent channel (*UTRAACLR*2). The UTRA channel power is measured with a Radio resource Control (RRC) bandwidth filter with roll-off factor α = 0.22. The assigned E-UTRA channel power is measured with a rectangular filter with MBW specified in Table 3.1.1-1. If the measured UTRA channel power is greater than –50 dBm then the *UTRAACLR* shall be higher than the value specified in Table 3.2.2-1.

TABLE 3.2.2-1

**General requirements for *UTRAACLR*1/2**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Channel bandwidth / *UTRAACLR*1/2 / MBW** | | | | | |
| **1.4 MHz** | **3.0 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** |
| ***UTRAACLR1*** | 32.2 dB | 32.2 dB | 32.2 dB | 32.2 dB | 32.2 dB | 32.2 dB |
| **Adjacent channel centre frequency offset (MHz)** | 0.7+BWUTRA/2 / −0.7−BWUTRA/2 | 1.5+BWUTRA/2 / −1.5−BWUTRA/2 | 2.5+BWUTRA/2 / −2.5−BWUTRA/2 | 5+BWUTRA/2 / –5−BWUTRA/2 | 7.5+BWUTRA / 2/−7.5−BWUTRA/2 | 10+BWUTRA/2 / −10−BWUTRA/2 |
| ***UTRAACLR2*** | – | – | 35.2 dB | 35.2 dB | 35.2 dB | 35.2 dB |
| **Adjacent channel centre frequency offset (MHz)** | – | – | 2.5+3\*BWUTRA/2 / −2.5−3\*BWUTRA/2 | 5+3\*BWUTRA/2 / −5−3\*BWUTRA/2 | 7.5+3\*BWUTRA/2 / −7.5−3\*BWUTRA/2 | 10+3\*BWUTRA/2 / −10−3\*BWUTRA/2 |
| **E-UTRAchannel MBW** | 1.08 MHz | 2.7 MHz | 4.5 MHz | 9.0 MHz | 13.5 MHz | 18 MHz |

TABLE 3.2.2-1 (*end*)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Channel bandwidth / *UTRAACLR*1/2 / MBW** | | | | | |
| **1.4 MHz** | **3.0 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** |
| **UTRA 5MHz channel MBW1** | 3.84 MHz | 3.84 MHz | 3.84 MHz | 3.84 MHz | 3.84 MHz | 3.84 MHz |
| **UTRA 1.6MHz channel MBW2** | 1.28 MHz | 1.28 MHz | 1.28 MHz | 1.28 MHz | 1.28 MHz | 1.28 MHz |
| NOTE 1 – Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum.  NOTE 2 – Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum.  NOTE 3 – BWUTRA for UTRA FDD is 5 MHz and for UTRA TDD is 1.6 MHz. | | | | | | |

**3.2.2.1 UTRA ACLR for multi clustered PUSCH**

For multi clustered PUSCH allocation, the UTRA ACLR requirements in Table 3.2.2-1 apply.

**3.2.3 UTRA ACLR for CA**

For intra-band contiguous carrier aggregation the *UTRAACLR* is the ratio of the filtered mean power centred on the aggregated channel bandwidth to the filtered mean power centred on an adjacent(s) UTRA channel frequency.

*UTRAACLR* is specified for both the first UTRA adjacent channel (*UTRAACLR*1) and the 2nd UTRA adjacent channel (*UTRAACLR*2). The UTRA channel power is measured with a RRC bandwidth filter with roll-off factor =0.22. The assigned aggregated channel bandwidth power is measured with a rectangular filter with MBW specified in Table 3.2.3-1. If the measured UTRA channel power is greater than –50 dBm then the *UTRAACLR* shall be higher than the value specified in Table 3.2.3-1.

TABLE 3.2.3-1

**General requirements for CA *UTRAACLR*1/2**

|  |  |
| --- | --- |
|  | **CA bandwidth class / *UTRAACLR*1/2 / MBW** |
| **CA bandwidth class C (Table 1.1.2-4)** |
| ***UTRAACLR*1** | 32.2 dB |
| **Adjacent channel centre frequency offset (MHz)** | + BWChannel\_CA /2 + BWUTRA/2  /  −BWChannel\_CA / 2 − BWUTRA/2 |
| ***UTRAACLR*2** | 35.2 dB |
| **Adjacent channel centre frequency offset (MHz)** | + BWChannel\_CA /2 + 3\*BWUTRA/2  /  −WChannel\_CA /2 – 3\*BWUTRA/2 |
| **CA E-UTRAchannel MBW** | BWChannel\_CA − 2\* BWGB |
| **UTRA 5 MHz channel MBW (Note 1)** | 3.84 MHz |
| **UTRA 1.6 MHz channel MBW (Note 2)** | 1.28 MHz |
| NOTE 1 – Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum.  NOTE 2 – Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum. | |

**3.2.4 CA E-UTRAACLR**

For intra-band contiguous carrier aggregation the carrier aggregation E-UTRA (CA *E-UTRAACLR*) is the ratio of the filtered mean power centred on the aggregated channel bandwidth to the filtered mean power centred on an adjacent aggregated channel bandwidth at nominal channel spacing.

The assigned aggregated channel bandwidth power and adjacent aggregated channel bandwidth power are measured with rectangular filters with MBW specified in Table 3.2.4-1. If the measured adjacent channel power is greater than –50 dBm then the *E-UTRAACLR* shall be higher than the value specified in Table 3.2.4-1.

TABLE 3.2.4-1

**General requirements for CA *E-UTRAACLR***

|  |  |
| --- | --- |
|  | **CA bandwidth class / CA *E-UTRAACLR* / MBW** |
| **CA bandwidth class C (Table 1.1.2-4)** |
| **CA *E-UTRAACLR*** | 29.2 dB |
| **CA *E-UTRA* channel MBW** | BWChannel\_CA – 2\* BWGB |
| **Adjacent channel centre frequency offset (MHz)** | +BWChannel\_CA  /  −BWChannel\_CA |

**3.3 Out of band emission mask for UL-MIMO**

For UE supporting UL-MIMO, the requirements for OoB emissions resulting from the modulation process and non-linearity in the transmitters are specified at each transmit antenna connector.

For UEs with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the requirements in § 3 apply to each transmit antenna connector. The requirements shall be met with the UL-MIMO configurations specified in Table 3.1.3-1.

For single-antenna port scheme, the requirements in § 3 apply.

**4 Transmitter spurious emissions**

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products, but exclude OoB emissions unless otherwise stated. The spurious emission limits are specified in terms of general requirements in line with Recommendation ITU-R SM.329 and E-UTRA operating band requirement to address UE co-existence.

To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the MBW. When the resolution bandwidth is smaller than the MBW, the result should be integrated over the MBW in order to obtain the equivalent noise bandwidth of the MBW.

**4.1 General spurious emissions requirements**

Unless otherwise stated, the spurious emission limits apply for the frequency ranges that are more than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth. The spurious emission limits in Table 4.1-2 apply for all transmitter band configurations, *NRB*, and channel bandwidths.

TABLE 4.1-1

**Boundary between E-UTRA Δ*fOoB* and spurious emission domain**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Channel bandwidth** | **1.4 MHz** | **3.0 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** |
| **Δ*fOoB* (MHz)** | 2.8 | 6 | 10 | 15 | 20 | 25 |

NOTE – In order that the measurement of spurious emissions falls within the frequency ranges that are more than Δ*fOoB* (MHz) from the edge of the channel bandwidth, the minimum offset of the measurement frequency from each edge of the channel should be Δ*fOoB* + MBW/2. MBW denotes the MBW defined in Table 4.1-2.

TABLE 4.1-2

**Spurious emissions limits**

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency range** | **Maximum level** | **MBW** | **Notes** |
| 9 kHz ≤ *f* < 150 kHz | −36 dBm | 1 kHz |  |
| 150 kHz ≤ *f* < 30 MHz | −36 dBm | 10 kHz |  |
| 30 MHz ≤ *f* < 1 000 MHz | −36 dBm | 100 kHz |  |
| 1 GHz ≤ *f* < 12.75 GHz | −30 dBm | 1 MHz |  |
| 12.75 GHz ≤ *f* < 5th harmonic of the upper frequency edge of the UL operating band in GHz | −30 dBm | 1 MHz | Note 1 |
| NOTE – Applies for Band 22, Band 42 and Band 43. | | | |

**4.1.1 Spurious emissions requirements for multi clustered PUSCH**

For multi clustered PUSCH allocation, the boundary between E-UTRA Δ*fOoB* and spurious domain in Table 4.1-1 and the spurious emissions requirements in Table 4.1-2 apply.

**4.2 Spurious emissions requirements for CA**

For intra-band contiguous carrier aggregation the spurious emission limits apply for the frequency ranges that are more than Δ*fOoB* (MHz) in Table 4.2-1 from the ± edge of the aggregated channel bandwidth. For frequencies Δ*fOoB* greater than *FooB* as specified in Table 4.2-1 the spurious requirements in Table 4.1-2 are applicable.

TABLE 4.2-1

**Boundary between E-UTRA Δ*fOoB* and spurious emission domain   
for intra-band contiguous carrier aggregation**

|  |  |
| --- | --- |
| **CA bandwidth class** | **OoB boundary *FooB*(MHz)** |
| A | Table 4.1-1 |
| B | BWChannel\_CA + 5 |
| C | BWChannel\_CA + 5 |

NOTE – See Table 1.1.2-4 for CA bandwidth class definitions.

**4.3 Spurious emission band UE co-existence**

This clause specifies the requirements for the specified E-UTRA band, for coexistence with protected bands.

NOTE – For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the MBW defined for the protected band.

TABLE 4.3-1

**Spurious emissions band UE co-existence limits**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| E-UTRA Band | Spurious emission | | | | | | |
| Protected band | Frequency range (MHz) | | | Maximum Level (dBm) | MBW (MHz) | Comment |
| 1 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 68, 69, 72, 73, 74, 75, 76, 87, 88  NR Band n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 34 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1880 |  | 1895 | -40 | 1 | 15, 27 |
| Frequency range | 1895 |  | 1915 | -15.5 | 5 | 15, 26, 27 |
| Frequency range | 1915 |  | 1920 | +1.6 | 5 | 15, 26, 27, 44 |
| 2 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 42, 48, 50, 51, 53, 66, 70, 71, 74, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 2, 25 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| E-UTRA Band 43  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| 3 | E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 26, 27, 28, 31, 32, 33, 34, 38, 39, 40, 41, 43, 44, 45, 50, 51, 65, 67, 68, 69, 72, 73,74, 75, 76, 87, 88  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 3 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| E-UTRA Band 22, 42, 52  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |  |
| 4 | E-UTRA Band 2, 4, 5, 7, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 41, 43, 48, 50, 51, 53, 66, 70, 71, 74, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 42,  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| 5 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 24, 25, 28, 29, 30, 31, 34, 38, 40, 42, 43, 45, 48, 50, 51, 65, 66, 70, 71, 73, 74, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 26 | 859 | - | 869 | -27 | 1 |  |
| E-UTRA Band 41, 52, 53  NR Band n77, n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 18, 19 | FDL\_low | - | FDL\_high | -40 | 1 | 39 |
| E-UTRA Band 11, 21 | FDL\_low | - | FDL\_high | -50 | 1 | 39 |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8, 39 |
| 6 | E-UTRA Band 1, 9, 11, 34 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 860 | - | 875 | -37 | 1 |  |
| Frequency range | 875 | - | 895 | -50 | 1 |  |
| Frequency range | 1884.5 | - | 1919.6 | -41 | 0.3 | 7 |
| 1884.5 | - | 1915.7 | 8 |
| 7 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 20, 22, 26, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 50, 51, 52, 65, 66, 67, 68, 72, 74, 75, 76, 85, 87, 88  NR Band n77,n78 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 2570 | - | 2575 | +1.6 | 5 | 15, 21, 26 |
| Frequency range | 2575 | - | 2595 | -15.5 | 5 | 15, 21, 26 |
| Frequency range | 2595 | - | 2620 | -40 | 1 | 15, 21 |
| 8 | E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76, 87, 88 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 3, 7, 22, 41, 42, 43, 52  NR Band n77, n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 8 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| E-UTRA Band 11, 21 | FDL\_low | - | FDL\_high | -50 | 1 | 23 |
| Frequency range | 860 | - | 890 | -40 | 1 | 15, 23 |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8, 23 |
| 9 | E-UTRA Band 1, 3, 11, 18, 19, 21, 26, 28, 34 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 42 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 945 | - | 960 | -50 | 1 |  |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| Frequency range | 2545 | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | - | 2645 | -50 | 1 |  |
| 10 | E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 41, 43, 66, 70, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 22, 42,  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| 11 | E-UTRA Band 1, 3, 11, 18, 19, 21, 28, 34, 40, 42, 65  NR Band n77, n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 945 | - | 960 | -50 | 1 |  |
|  |  |  |  |  |  |  |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| Frequency range | 2545 | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | - | 2645 | -50 | 1 |  |
| 12 | E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 26, 27, 30, 41, 53, 70, 71, 74 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 4, 48, 50, 51, 66  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 12, 85 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| 13 | E-UTRA Band 2, 4, 5, 12, 13, 17, 25, 26, 27, 29, 41, 48, 50, 51, 53, 66, 70, 71, 74, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 14 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| E-UTRA Band 24, 30,  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 769 | - | 775 | -35 | 0.00625 | 15 |
| Frequency range | 799 | - | 805 | -35 | 0.00625 | 15 |
| 14 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 23, 24, 25, 26, 27, 29, 30, 41, 48, 53, 66, 70, 71, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 769 | - | 775 | -35 | 0.00625 | 12, 15 |
| Frequency range | 799 | - | 805 | -35 | 0.00625 | 12, 15 |
| 17 | E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 26, 27, 30, 41, 71, 74 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 4, 50, 51, 53, 66, 70,  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 12, 48, 85 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| 18 | E-UTRA Band 1, 3, 11, 21, 34, 40, 42, 65  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 758 | - | 799 | -50 | 1 |  |
| Frequency range | 799 | - | 803 | -40 | 1 | 15 |
| Frequency range | 860 | - | 890 | -40 | 1 |  |
| Frequency range | 945 | - | 960 | -50 | 1 |  |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| Frequency range | 2545 | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | - | 2645 | -50 | 1 |  |
| 19 | E-UTRA Band 1, 3, 11, 21, 28, 34, 40, 42, 65  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 945 | - | 960 | -50 | 1 |  |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| Frequency range | 2545 | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | - | 2645 | -50 | 1 |  |
| 20 | E-UTRA Band 1, 3, 7, 8, 22, 31, 32, 33, 34, 40, 43, 50, 51, 65, 67, 68, 72, 74, 75, 76, 87, 88 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 20 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| E-UTRA Band 38, 42, 52, 69  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 758 | - | 788 | -50 | 1 |  |
| 21 | E-UTRA Band 1, 3, 18, 19, 28, 34, 40, 42, 65  NR Band n77, n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 945 | - | 960 | -50 | 1 |  |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| Frequency range | 2545 | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | - | 2645 | -50 | 1 |  |
| 22 | E-UTRA Band 1, 3, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 40, 43, 65, 67, 68, 69, 72, 75, 76, 87, 88 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 3510 | - | 3525 | -40 | 1 | 15 |
| Frequency range | 3525 | - | 3590 | -50 | 1 |  |
| 23 | E-UTRA Band 4, 5, 12, 13, 14, 17, 23, 24, 26, 27, 29, 30, 41, 66 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| 24 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 48, 66, 70, 71, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| 25 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 42, 48, 53, 66, 70, 71, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 2 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| E-UTRA Band 25 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| E-UTRA Band 43,  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| 26 | E-UTRA Band 1, 2, 3, 4, 5, 11, 12, 13, 14, 17, 18,19, 21, 24, 25, 26, 29, 30, 31, 34, 39, 40, 42, 43, 48, 50, 51, 65, 66, 70, 71, 73,74, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 41, 53  NR Band n77, n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 703 | - | 799 | -50 | 1 |  |
| Frequency range | 799 | - | 803 | -40 | 1 | 15 |
| Frequency range | 945 | - | 960 | -50 | 1 |  |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| 27 | E-UTRA Band 1, 2, 3, 4, 5, 7, 12, 13, 14, 17, 25, 26, 27, 29, 30, 31, 38, 40, 41, 42, 43, 65, 66, 73, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 28 | FDL\_low | - | 790 | -50 | 1 |  |
| NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 799 | - | 805 | -35 | 0.00625 |  |
| 28 | E-UTRA Band 1, 4, 22, 32, 42, 43, 50, 51, 65, 66, 73, 74, 75, 76  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 1 | FDL\_low | - | FDL\_high | -50 | 1 | 19, 25 |
| E-UTRA Band 2, 3, 5, 7, 8, 18, 19, 20, 25, 26, 27, 31, 34, 38, 40, 41, 52, 72, 87, 88  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 11, 21 | FDL\_low | - | FDL\_high | -50 | 1 | 19, 24 |
| Frequency range | 470 | - | 694 | -42 | 8 | 15, 35 |
| Frequency range | 470 | - | 710 | -26.2 | 6 | 34 |
| Frequency range | 662 | - | 694 | -26.2 | 6 | 15 |
| Frequency range | 758 | - | 773 | -32 | 1 | 15 |
| Frequency range | 773 | - | 803 | -50 | 1 |  |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8, 19 |
| 30 | E-UTRA Band 2, 4, 5, 7, 12, 13, 14, 17, 24, 25, 26, 27, 29, 30, 38, 41, 48, 53, 66, 70, 71, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| 31 | E-UTRA Band 1, 5, 7, 8, 20, 22, 26, 27, 28, 31, 32, 33, 34, 38, 40, 42, 43, 50, 51, 52, 65, 67, 68, 69, 74, 75, 76, 87, 88 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 3 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 470 | - | 694 | -42 | 8 |  |
| … |  |  |  |  |  |  |  |
| 33 | E-UTRA Band 1, 7, 8, 20, 22, 28, 31, 32, 34, 38, 40, 42, 43, 52, 65, 67, 69, 72, 73, 75, 76, 87, 88 | FDL\_low | - | FDL\_high | -50 | 1 | 5 |
| E-UTRA Band 3 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| 34 | E-UTRA Band 1, 3, 7, 8, 11, 18, 19, 20, 21, 22, 26, 28, 31, 32, 33, 38,39, 40, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 69, 72, 73, 74, 75, 76, 87, 88  NR Band n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 | 5 |
| NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2, 5 |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| 35 |  |  |  |  |  |  |  |
| 36 |  |  |  |  |  |  |  |
| 37 |  |  | - |  |  |  |  |
| 38 | E-UTRA Band 1, 2, 3, 4, 5, 8, 12, 13, 14, 17, 20, 22, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 50, 51, 52, 65, 66, 67, 68, 72, 74, 75, 76, 85, 87, 88  NR Band n77, n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 2620 | - | 2645 | -15.5 | 5 | 15, 22, 26 |
| Frequency range | 2645 | - | 2690 | -40 | 1 | 15, 22 |
| 39 | E-UTRA Band 1, 8, 22, 26, 28, 34, 40, 41, 42, 44, 45, 50, 51, 52, 73, 74  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1805 |  | 1855 | -40 | 1 | 33 |
| Frequency range | 1855 |  | 1880 | -15.5 | 5 | 15,26,33 |
| 40 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 33, 34, 38, 39, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 68, 69, 72, 73, 74, 75, 76, 87, 88  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| 41 | E-UTRA Band 1, 2, 3, 4, 5, 8, 12, 13 , 14, 17, 24, 25, 26, 27, 28, 29, 30, 34, 39, 40, 42, 44, 45, 48, 50, 51, 52, 65, 66, 70, 71, 73, 74, 85  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 9, 11, 18, 19, 21 | FDL\_low | - | FDL\_high | -50 | 1 | 30 |
| NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1884.5 |  | 1915.7 | -41 | 0.3 | 8, 30 |
| 42 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 11, 18, 19, 20, 21, 25, 26, 27, 28, 31, 32, 33, 34, 38, 40, 41, 44, 45, 50, 51, 65, 66, 67, 68, 69, 72, 73, 74, 75, 76, 87, 88  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| 43 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 20, 25, 26, 27, 28, 31,32, 33, 34, 38, 40, 50, 51, 65, 66, 67, 68, 69, 72, 73, 74, 75, 76, 85, 87, 88 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| 44 | E-UTRA Band 1, 40, 42, 45 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 3, 5, 8, 34, 39, 41, 73 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| 45 | E-UTRA Band 1, 3, 5, 8, 34, 39, 40, 41, 42, 44, 52, 73 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| … |  |  |  |  |  |  |  |
| 47 | E-UTRA Band 1, 3, 5, 7, 8, 22, 26, 28, 34, 39, 40, 41, 42, 44, 45, 65, 68, 72, 73  NR band n77, n78 , n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 5925 | - | 5950 | -30 EIRP | 1 | 38, 40, 43 |
| Frequency range | 5815 | - | 5855 | -30 EIRP | 1 | 38, 43, 45 |
| 48 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 50, 51, 66, 70, 71, 74, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| 50 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 20, 26, 28, 29, 31, 34, 38, 39, 40, 41, 42, 43, 48, 52, 65, 66, 67, 68, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| 51 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 20, 26, 28, 29, 31, 34, 38, 39, 40, 41, 42, 43, 48, 52, 65, 66, 67, 68, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| 52 | E-UTRA Band 1, 3, 5, 7, 8, 20, 28, 31, 33, 34, 38, 39, 40, 41, 45, 47, 50, 51, 68, 72, 73, 74, 87, 88 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| 53 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 48, 66, 70, 71, 85,  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| 65 | E-UTRA Band 1, 3, 7, 8, 20, 22, 28, 31, 32, 38, 40, 42, 43, 50, 51, 65, 68, 69, 72, 74, 75, 76, 87, 88  NR Band n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 5, 11, 18, 19, 21, 26, 27, 41 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 34 | FDL\_low | - | FDL\_high | -50 | 1 | 36 |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 37 |
| Frequency range | 1900 | - | 1915 | -15.5 | 5 | 15, 26, 27 |
| Frequency range | 1915 | - | 1920 | +1.6 | 5 | 15, 26, 27 |
| 66 | E-UTRA Band 2, 4, 5, 7, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 38, 41, 43, 50, 51, 53, 66, 70, 71, 74, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 42, 48,  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| 68 | E-UTRA Band 3, 7, 8, 20, 28, 31, 38, 40, 47, 72, 74, 87, 88 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 1, 22, 42, 43, 50, 51, 52, 65 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| … |  |  |  |  |  |  |  |
| 70 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 48, 53, 66, 70, 71, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| 71 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 30, 48, 53, 66, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 2, 25, 41, 70,  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 29 | FDL\_low | - | FDL\_high | -38 | 1 | 15 |
| E-UTRA Band 71 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| 72 | E-UTRA Band 1, 7, 20, 22, 28, 31, 32, 33, 34, 38, 42, 43, 47, 52, 65, 68, 72, 87, 88 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 3, 8, 40 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 470 | - | 694 | -42 | 8 |  |
| 73 | E-UTRA Band 1, 26, 28, 33, 34, 39, 41, 42, 43, 44, 45, 47, 52 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 3, 5, 8, 27, 40 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| 74 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 18, 19, 20, 26, 28, 29, 31, 34, 38, 39, 40, 41, 42, 43, 48, 52, 65, 66, 67, 68, 85  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| Frequency range | 1400 | - | 1427 | -32 | 27 | 15, 41 |
| Frequency range | 1475 | - | 1488 | -50 | 1 | 42 |
| Frequency range | 1488 | - | 1518 | -50 | 1 | 15 |
| 85 | E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 26, 27, 30, 41, 53, 70, 71, 74 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 4, 48, 51, 66  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 26, 27, 30, 41, 53, 70, 71, 74 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| 87 | E-UTRA Band 1, 3, 7, 8, 22, 28, 31, 32, 33, 34, 38, 40, 42, 43, 47, 52, 65, 68, 72 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band, 20 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 87, 88 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| Frequency range | 470 | - | 694 | -42 | 8 |  |
| 88 | E-UTRA Band 1, 3, 7, 8, 20, 22, 28, 31, 32, 33, 34, 38, 40, 42, 43, 47, 52, 65, 68, 72 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 87 | FDL\_low | - | FDL\_high | -20 | 1 | 15 |
| E-UTRA Band 88 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| Frequency range | 470 | - | 694 | -42 | 8 |  |



















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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NOTE 1 – FDL\_low and FDL\_high refer to each E-UTRA frequency band specified.  NOTE 2 – As exceptions, measurements with a level up to the applicable requirements defined in Table 4-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th (or 5th) harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2 MHz + N × LCRB × 180 kHz), where N is 2, 3, 4, (5) for the 2nd, 3rd, 4th (or 5th) harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval..  NOTE 3 – To meet these requirements some restriction will be needed for either the operating band or protected band.  NOTE 4 – N/A  NOTE 5 – For non-synchronized TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band.  NOTE 6 – N/A | | | | | | | | |

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| --- |
| NOTE 7 – Applicable when co-existence with personal handyphone system (PHS) system operating in 1 884.5−1 919. 6 MHz.  NOTE 8 – Applicable when co-existence with PHS system operating in 1 884.5−1 915.7 MHz.  NOTE 9 – N/A  NOTE 10 – N/A  NOTE 11 – Whether the applicable frequency range should be 793-805 MHz instead of 799-805 MHz is to be defined.  NOTE 12 – The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.  NOTE 13 – This requirement applies for 5, 10, 15 and 20 MHz E−UTRA channel bandwidth allocated within 1 744.9 MHz. and 1 784.9 MHz.  NOTE 14 – N/A  NOTE 15 – These requirements also apply for the frequency ranges that are less than *FooB* (MHz) in Table 4.1-1 and Table 4.2−1 from the edge of the channel bandwidth.  NOTE 16 – N/A  NOTE 17 – N/A  NOTE 18 – N/A  NOTE 19 – Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.  NOTE 20 – N/A  NOTE21 – This requirement is applicable for any channel bandwidths within the range 2 500-2 570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2 560.5‑2 562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2 552‑2 560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.  NOTE22 – This requirement is applicable for any channel bandwidths within the range 2 570‑2 615 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2 605.5‑2 607.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2 597‑2 605 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB. For carriers with channel bandwidth overlapping the frequency range 2 615‑2 620 MHz the requirement applies with the maximum output power configured to +19 dBm in the IE *P-Max*.  NOTE 23 – This requirement is applicable only for the following cases:  – for carriers of 5 MHz channel bandwidth when carrier centre frequency (Fc) is within the range 902.5 MHz ≤ Fc < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB  – for carriers of 5 MHz channel bandwidth when carrier centre frequency (Fc) is within the range 907.5 MHz ≤ Fc ≤ 912.5 MHz without any restriction on uplink transmission bandwidth.  – for carriers of 10 MHz channel bandwidth when carrier centre frequency (Fc) is Fc = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RBstart > 3.  NOTE 24 – As exceptions, measurements with a level up to the applicable requirement of −38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth for which the 2nd harmonic totally or partially overlaps the MBW.  NOTE 25 – As exceptions, measurements with a level up to the applicable requirement of −36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth for which the 3rd harmonic totally or partially overlaps the MBW.  NOTE 26 – For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band. |
| NOTE 27 – This requirement is applicable for any channel bandwidths within the range 1 920‑1 980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1 927.5‑1 929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1 930‑1 938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.  NOTE 28 – N/A  NOTE 29 – N/A  NOTE 30 – This requirement applies when the E-UTRA carrier is confined within 2 545-2 575 MHz and the channel bandwidth is 10 or 20 MHz.  NOTE 31 – N/A  NOTE 32 – N/A  NOTE 33 – This requirement is only applicable for carriers with bandwidth confined within 1 885-1 920 MHz (requirement for carriers with at least 1RB confined within 1 880-1 885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to (54 RB) for carriers of 15 MHz bandwidth when carrier center frequency is within the range 1 892.5-1 894.5 MHz and for carriers of 20 MHz bandwidth when carrier center frequency is within the range 1 895-1 903 MHz.  NOTE 34 – This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718‑728 MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart<48.  NOTE 35 – This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of –25 dBm with a measurement bandwidth of 8 MHz applies. |

NOTE 36: This requirement is applicable for E-UTRA channel bandwidth allocated within 1920-1980 MHz.

NOTE 37: Applicable when the upper edge of the channel bandwidth frequency is greater than 1980MHz.

NOTE 38: Applicable when NS\_33 or NS\_34 is configured by the pre-configured radio parameters.

NOTE 39: Applicable only when the assigned E-UTRA carrier is confined within 824 MHz and 849 MHz for UE category M1, M2 and UE category NB1 and NB2.

NOTE 40: In the frequency range x-5950MHz, SE requirement of -30dBm/MHz should be applied; where x = max (5925, fc + 15), where fc is the channel centre frequency.

NOTE 41: Applicable for all bandwidths, and when the lower edge of the assigned E-UTRA UL channel bandwidth frequency is greater than or equal to 1427 MHz + the channel BW assigned for 1.4, 3, 5 and 10 MHz bandwidth, and when the lower edge of the assigned E-UTRA UL channel bandwidth frequency is greater than or equal to 1440 MHz for 15 and 20 MHz bandwidth. This requirement shall be verified with UE transmission power of 15 dBm.

NOTE 42: Applicable for 1.4 , 3 and 5 MHz bandwidth, and when the upper edge of the assigned E-UTRA UL channel bandwidth frequency is less than or equal to 1467 MHz assigned for10 MHz bandwidth, and when the upper edge of the assigned E-UTRA UL channel bandwidth frequency is less than or equal to 1463.8 MHz for 15 MHz bandwidth, and when the upper edge of the assigned E-UTRA UL channel bandwidth frequency is less than or equal to 1460.8 MHz for 20 MHz bandwidth.

NOTE 43: The EIRP requirement is converted to conducted requirement depend on the supported post antenna connector gain Gpost connector declared by the UE following the principle described in annex I.

NOTE 44: For category NB1 and NB2 UE when carrier centre frequency is 1920.1 MHz, in case of single-tone uplink transmission the requirement is applicable only for sub-carrier index > 2.

NOTE 45: Resolution BW is 10% of the measurement BW and the result should be integrated to achieve the measurement bandwidth. The sweep time shall be set at least as (sweep points)\*(symbol length) to improve the measurement accuracy.

**4.4 Spurious emission band UE co-existence for CA**

This clause specifies the requirements for the specified CA configurations for coexistence with protected bands.

NOTE – For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the MB defined for the protected band.

For inter-band carrier aggregation with the uplink assigned to two E-UTRA bands, the requirements in Table 4.4-0 apply on each component carrier with both component carriers are active.

NOTE – For inter-band carrier aggregation with uplink assigned to two E-UTRA bands the requirements in Table 4.4-0 could be verified by measuring spurious emissions at the specific frequencies where second and third order intermodulation products generated by the two transmitted carriers can occur; in that case, the requirements for remaining applicable frequencies in Table 4.4-0 would be considered to be verified by the measurements verifying the one uplink inter-band CA UE to UE co-existence requirements.

TABLE 4.4-0

**Spurious emissions band UE co-existence limits for dual-uplink inter-band Carrier Aggregation**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| E-UTRA CA Configuration | Spurious emission | | | | | | | |
| Protected band | Frequency range (MHz) | | | | Maximum Level (dBm) | MBW (MHz) | NOTE |
| CA\_1-3 | E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 26, 27, 28, 31, 32, 38, 40, 41, 43, 44, 50, 51, 65, 67, 72, 73, 74, 75, 76  NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 3, 34 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA band 22, 42, 52  NR Band n77, n78 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
|  |  | |  |  |  |  |  |
| Frequency range | 1880 | |  | 1895 | -40 | 1 | 3,12 |
| Frequency range | 1895 | |  | 1915 | -15.5 | 5 | 3, 12, 13 |
| Frequency range | 1915 | |  | 1920 | +1.6 | 5 | 3, 12, 13 |
| CA\_1-5 | E-UTRA Band 1, 5, 7, 8, 22, 28, 31, 38, 40, 42, 43, 50, 51, 65, 73, 74 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 3,34 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA band 26 | 859 | | - | 869 | -27 | 1 |  |
| E-UTRA band 41, 52  NR Band n77, n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| CA\_1-7 | E-UTRA Band 1, 5, 7, 8, 20, 22, 26, 27, 28, 31,32, 40, 42, 43, 50, 51, 52, 65, 67, 72, 74, 75, 76  NR Band n78 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 3, 34 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1880 | |  | 1895 | -40 | 1 | 3,12 |
| Frequency range | 1895 | |  | 1915 | -15.5 | 5 | 3, 12, 13 |
| Frequency range | 1915 | |  | 1920 | +1.6 | 5 | 3, 12, 13 |
| Frequency range | 2570 | | - | 2575 | +1.6 | 5 | 3, 13, 14 |
| Frequency range | 2575 | | - | 2595 | -15.5 | 5 | 3, 13, 14 |
| Frequency range | 2595 | | - | 2620 | -40 | 1 | 3, 14 |
| CA\_1-8 | E-UTRA Band 1, 20, 28, 31, 32, 38, 40, 50, 51, 65, 67, 72, 73, 74, 75, 76 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 3, 7, 22, 41, 42, 43, 52  NR Band n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 8, 34 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA band 11, 21 | FDL\_low | | - | FDL\_high | -50 | 1 | 11 |
| Frequency range | 860 | | - | 890 | -40 | 1 | 3, 11 |
| NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1880 | |  | 1895 | -40 | 1 | 3,12 |
| Frequency range | 1895 | |  | 1915 | -15.5 | 5 | 3, 12, 13 |
| Frequency range | 1915 | |  | 1920 | +1.6 | 5 | 3, 12, 13 |
| CA\_1-11 | E-UTRA Band 1, 3, 11, 18, 19, 21, 28, 34, 40, 42, 65  NR Band n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| Frequency range | 2545 | | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | | - | 2645 | -50 | 1 |  |
| CA\_1-18 | E-UTRA Band 1, 3, 11, 21, 40, 42, 65  NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 34 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| NR Band n77, n78 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 758 | | - | 799 | -50 | 1 |  |
| Frequency range | 799 | | - | 803 | -40 | 1 | 3 |
| Frequency range | 860 | | - | 890 | -40 | 1 |  |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
|  |  | |  |  |  |  |  |
| Frequency range | 2545 | | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | | - | 2645 | -50 | 1 |  |
| CA\_1-19 | E-UTRA Band 1, 3, 11, 21, 28, 40, 42, 65  NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 34 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| NR Band n77, n78 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
|  |  | |  |  |  |  |  |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
|  |  | |  |  |  |  |  |
| Frequency range | 2545 | | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | | - | 2645 | -50 | 1 |  |
| CA\_1-20 | E-UTRA Band 1, 3, 7, 8, 22, 31, 32, 34, 40, 43, 50, 51, 65, 67, 68, 72, 75, 76 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 20 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 38, 42, 69  NR Band n77, n78 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 758 | | - | 788 | -50 | 1 |  |
| CA\_1-21 | NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 1, 3, 18, 19, 28, 34, 40, 42, 65  NR Band n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
|  |  | |  |  |  |  |  |
|  |  | |  |  |  |  |  |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| Frequency range | 2545 | | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | | - | 2645 | -50 | 1 |  |
| CA\_1-26 | E-UTRA Band 1, 5, 7, 11, 18, 19, 21, 22, 26, 31, 38, 40, 42, 43, 50, 51, 65, 73, 74  NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| Frequency range | 1880 | | - | 1895 | -40 | 1 | 3, 12 |
| Frequency range | 1895 | | - | 1915 | -15.5 | 5 | 3, 12, 13 |
| Frequency range | 1915 | | - | 1920 | +1.6 | 5 | 3, 12, 13 |
|  |  | |  |  |  |  |  |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| E-UTRA Band 41  NR Band n77, n78 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 3, 34 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| Frequency range | 703 | | - | 799 | -50 | 1 |  |
| 799 | | - | 803 | -40 | 1 | 3 |
| CA\_1-28 | E-UTRA Band 3, 5, 7, 8, 18, 19, 20, 26, 27, 31, 38, 40, 41, 72, 73 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 22, 32, 42, 43, 50, 51, 52, 74, 75, 76  NR Band n77, n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 34 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 11, 21 | FDL\_low | | - | FDL\_high | -50 | 1 | 5, 21 |
| E-UTRA Band 1, 65 | FDL\_low | | - | FDL\_high | -50 | 1 | 5, 6 |
| Frequency range | 470 | | - | 694 | -42 | 8 | 3, 22 |
| Frequency range | 470 | | - | 710 | -26.2 | 6 | 23 |
| Frequency range | 758 | | - | 773 | -32 | 1 | 3 |
| Frequency range | 773 | | - | 803 | -50 | 1 |  |
| Frequency range | 662 | | - | 694 | -26.2 | 6 | 3 |
| Frequency range | 1880 | |  | 1895 | -40 | 1 | 3,12 |
| Frequency range | 1895 | |  | 1915 | -15.5 | 5 | 3, 12, 13 |
| Frequency range | 1915 | |  | 1920 | +1.6 | 5 | 3, 12, 13 |
|  |  | |  |  |  |  |  |
| CA\_1-41 | E-UTRA Band 1, 3, 5, 8, 26, 27, 28, 40, 42, 44, 45, 50, 51, 52, 65, 73, 74  NR Band n78 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 34 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| NR Band n77, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1880 | |  | 1895 | -40 | 1 | 3,12 |
| Frequency range | 1895 | |  | 1915 | -15.5 | 5 | 3, 12, 13 |
| Frequency range | 1915 | |  | 1920 | +1.6 | 5 | 3, 12, 13 |
| E-UTRA Band 11, 18, 19, 21 | FDL\_low | | - | FDL\_high | -50 | 1 | 30 |
|  |  | |  |  |  |  |  |
| CA\_1-42 | E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 26, 27, 28, 31, 32, 38, 40, 41, 44, 50, 51, 65, 67, 72, 73, 74, 75, 76  NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 3, 34 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| Frequency range | 1880 | |  | 1895 | -40 | 1 | 3,12 |
| Frequency range | 1895 | |  | 1915 | -15.5 | 5 | 3, 12, 13 |
| Frequency range | 1915 | |  | 1920 | +1.6 | 5 | 3, 12, 13 |
|  |  | |  |  |  |  |  |
| CA\_2-4 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 50, 51, 53, 66, 70, 71, 74, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 2, 25 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 22, 42, 43,  NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| CA\_2-5 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 28, 29, 30, 42, 50, 51, 66, 70, 71, 74, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 2, 25 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 26 | 859 | | - | 869 | -27 | 1 |  |
| E-UTRA Band 41, 43, 53  NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| CA\_2-7 | E-UTRA Band 2, 4, 5, 7, 12, 13, 14, 17, 26, 27, 29, 30, 42, 50, 51, 65, 66, 70, 74, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 43 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| CA\_2-12 | E-UTRA Band 5, 13, 14, 17, 24, 26, 27, 30, 41, 50, 53, 71, 74 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 2, 12, 25, 85 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 4, 51, 66, 70,  NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| CA\_2-13 | E-UTRA Band 4, 5,12,13,17, 22, 26, 27, 29, 41, 42, 50, 51, 53, 66, 70, 71, 74, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 2,14, 25 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 24, 30, 43,  NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 769 | | - | 775 | -35 | 0.00625 | 3 |
| Frequency range | 799 | | - | 805 | -35 | 0.00625 | 3 |
| CA\_2-14 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 27, 29, 30, 41, 48, 53, 66, 70, 71, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 2, 25 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 769 | | - | 775 | -35 | 0.00625 | 3 |
| Frequency range | 799 | | - | 805 | -35 | 0.00625 | 3, 9 |
| CA\_2-48 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 50, 51, 53, 66, 70, 71, 74, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| CA\_2-49 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 50, 51, 53, 66, 70, 71, 74, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| CA\_3-5 | E-UTRA Band 1, 5, 7, 8, 28, 31, 38, 40, 43, 50, 51, 65, 73, 74 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 3,34 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 22, 42, 52 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA band 26 | 859 | | - | 869 | -27 | 1 |  |
| CA\_3-7 | E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 40, 43, 44, 50, 51, 65, 67, 72, 74, 75, 76 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 3 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA band 22, 42, 52  NR Band n77, n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 2570 | | - | 2575 | +1.6 | 5 | 3, 13, 14 |
| Frequency range | 2575 | | - | 2595 | -15.5 | 5 | 3, 13, 14 |
| Frequency range | 2595 | | - | 2620 | -40 | 1 | 3, 14 |
| CA\_3-8 | E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 44, 50, 51, 65, 67, 72, 73, 74, 75, 76 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 3, 8 | FDL\_low | | - | FDL\_high | -50 | 1 | 2, 3 |
| E-UTRA band 11, 21 | FDL\_low | | - | FDL\_high | -50 | 1 | 10,11 |
| E-UTRA band 7, 22, 41, 42, 43, 52  NR Band n77, n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4, 10, 11 |
| Frequency range | 860 | | - | 890 | -40 | 1 | 3,11,17 |
| CA\_3A-11A | E-UTRA Band 1, 18, 19, 28, 34, 40, 65 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 3 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 42 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4 |
| Frequency range | 2545 | | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | | - | 2645 | -50 | 1 |  |
| CA\_3-18 | E-UTRA Band 1, 3, 11, 21, 28, 34, 40, 65  NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| NR Band n77, n78, | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4 |
| Frequency range | 2545 | | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | | - | 2645 | -50 | 1 |  |
| CA\_3-19 | E-UTRA Band 1, 11, 21, 28, 40, 65 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 3, 34 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 42  NR Band n77, n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
|  |  | |  |  |  |  |  |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 3, 4 |
| Frequency range | 2545 | | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | | - | 2645 | -50 | 1 |  |
| CA\_3-20 | E-UTRA Band 1, 7, 8, 31, 32, 33, 34, 40, 43, 50, 51, 65, 67, 72, 74, 75, 76 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 3, 20 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 22, 38, 42, 52 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 758 | | - | 788 | -50 | 1 |  |
| CA\_3-21 | E-UTRA Band 1, 18, 19, 28, 34, 40, 65  NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 3 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 42  NR Band n77, n78, | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4 |
| Frequency range | 2545 | | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | | - | 2645 | -50 | 1 |  |
| CA\_3-26 | E-UTRA Band 1, 5, 7, 11, 18, 19, 21, 26, 34, 39, 40, 43, 50, 51, 65, 73, 74 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 3 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA band 22, 41, 42  NR Band n77, n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4 |
| Frequency range | 703 | | - | 799 | -50 | 1 |  |
| 799 | | - | 803 | -40 | 1 | 3 |
|  |  | |  |  |  |  |  |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| CA\_3-28 | E-UTRA Band 1, 11, 18, 19, 21, 22, 32, 42, 43, 50, 51, 52, 65, 74, 75, 76  NR Band n77, n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 1 | FDL\_low | | - | FDL\_high | -50 | 1 | 5, 6 |
| E-UTRA band 3 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 5, 7, 8, 20, 26, 27, 31, 34, 38, 40, 41, 72, 73 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
|  |  | |  |  |  |  |  |
| Frequency range | 470 | | - | 710 | -26.2 | 6 | 23 |
| Frequency range | 758 | | - | 773 | -32 | 1 | 3 |
| Frequency range | 773 | | - | 803 | -50 | 1 |  |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4, 5 |
| CA\_3-40 | E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 26, 27, 28, 31, 32, 33, 34, 38, 39, 41, 43, 44. 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 3 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 22, 42, 52  NR Band n77, n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 |  |
| CA\_3-41 | E-UTRA Band 1, 5, 8, 26, 28, 33, 34, 39, 40, 44, 45, 50, 51, 65, 73, 74 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 3 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 11, 18, 19, 21 | FDL\_low | | - | FDL\_high | -50 | 1 | 18 |
| NR Band n77, n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1884.5 | |  | 1915.7 | -41 | 0.3 | 4, 18 |
| CA\_3-42 | E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 40, 41, 44, 45, 50, 51, 65, 67, 72, 73, 74, 75, 76  NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 3 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 11, 18, 19, 21 | FDL\_low | | - | FDL\_high | -50 | 1 | 13 |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4 |
| CA\_4-5 | E-UTRA Band 2, 4, 5, 7, 12, 13, 14, 17, 24, 25, 28, 29, 30, 43, 50, 51, 66, 70, 71, 74, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 26 | 859 | | - | 869 | -27 | 1 |  |
| E-UTRA band 41, 42, 53  NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| CA\_4-7 | E-UTRA Band 2, 4, 5, 7, 12, 13, 14, 17, 26, 27, 28, 29, 30, 43, 50, 51, 66, 74, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 42 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 2570 | | - | 2575 | +1.6 | 5 | 3, 13, 14 |
| Frequency range | 2575 | | - | 2595 | -15.5 | 5 | 3, 13, 14 |
| Frequency range | 2595 | | - | 2620 | -40 | 1 | 3, 14 |
| CA\_4-12 | E-UTRA Band 2, 5, 7,13, 14, 17, 24, 25, 26, 27, 30, 41, 43, 50, 53, 71, 74 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 4, 22, 42, 51, 66, 70,  NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 12, 85 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| CA\_4-13 | E-UTRA Band 2,4, 5, 7, 12,13,17,25, 26, 27, 29, 41, 43, 50, 51, 53, 66, 70, 71, 74, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 14 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 22, 24, 30, 42,  NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 769 | | - | 775 | -35 | 0.00625 | 3 |
| Frequency range | 799 | | - | 805 | -35 | 0.00625 | 3 |
| CA\_4-17 | E-UTRA Band 2, 5, 7,13, 14, 17, 24, 25, 26, 27, 30, 41, 43, 50, 53, 71, 74 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 4, 22, 42, 51, 66, 70,  NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 12, 85 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| CA\_4-28 | E-UTRA Band 2, 5, 7, 14, 24, 25, 26, 27, 30, 41, 53, 70, 71 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 4, 42, 43, 48 50, 51, 66, 74 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 470 | | - | 710 | -26.2 | 6 | 23 |
| Frequency range | 758 | |  | 773 | -32 | 1 | 3 |
| Frequency range | 773 | |  | 803 | -50 | 1 |  |
| CA\_5-7 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 22, 28, 29, 30, 31, 40, 42, 43, 50, 51, 65, 66, 74, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 52  NR Band n77, n78 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA band 26 | 859 | | - | 869 | -27 | 1 |  |
| Frequency range | 2570 | | - | 2575 | +1.6 | 5 | 3, 13, 14 |
| Frequency range | 2575 | | - | 2595 | -15.5 | 5 | 3, 13, 14 |
| Frequency range | 2595 | | - | 2620 | -40 | 1 | 3, 14 |
| CA\_5-12 | E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 30, 31, 43, 50, 53, 71, 74 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 4, 22, 41, 42, 51, 66, 70,  NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA band 26 | 859 | | - | 869 | -27 | 1 |  |
| E-UTRA band 12, 85 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| CA\_5-17 | E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 30, 31, 43, 50, 71, 74 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 4, 22, 41, 42, 51, 53, 66, 70,  NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA band 26 | 859 | | - | 869 | -27 | 1 |  |
| E-UTRA band 12, 85 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| CA\_5-40 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 21, 28, 31, 34, 38, 42, 43, 45, 65, 73, 74 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 26 | 859 | | - | 869 | -27 | 1 |  |
| E-UTRA band 41, 52  NR Band n77, n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4 |
| CA\_7-8 | E-UTRA Band 1, 20, 27, 28, 31, 32, 34, 40, 50, 51, 65, 67, 68, 72, 74, 75, 76 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 3, 7, 22, 42, 43, 52  NR Band n77, n78 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 8 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| Frequency range | 2570 | | - | 2575 | +1.6 | 5 | 3, 13, 14 |
| Frequency range | 2575 | | - | 2595 | -15.5 | 5 | 3, 13, 14 |
| Frequency range | 2595 | | - | 2620 | -40 | 1 | 3, 14 |
| CA\_7-20 | E-UTRA Band 1,3, 7, 8, 22, 28, 31, 32, 33, 34, 40, 43, 50, 51, 65, 67, 72, 74, 75, 76 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 20 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 42, 52  NR Band n77, n78 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 2570 | | - | 2575 | +1.6 | 5 | 2, 3, 13, 14 |
| Frequency range | 2575 | | - | 2595 | -15.5 | 5 | 2, 3, 13, 14 |
| Frequency range | 2595 | | - | 2620 | -40 | 1 | 3, 14 |
| CA\_7-26 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 22, 29, 30, 31, 40, 42, 43, 65, 66, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| NR Band n77, n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 2570 | | - | 2575 | +1.6 | 5 | 3, 13, 14 |
| Frequency range | 2575 | | - | 2595 | -15.5 | 5 | 3, 13, 14 |
| Frequency range | 2595 | | - | 2620 | -40 | 1 | 3, 14 |
| Frequency range | 703 | | - | 799 | -50 | 1 |  |
| Frequency range | 799 | | - | 803 | -40 | 1 | 3 |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 7 |
| CA\_7-28 | E-UTRA Band 2, 3, 5, 7, 8, 20, 26, 27, 31, 34, 40, 72  NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 1, 4, 22, 32, 42, 43, 50, 51, 52, 65, 66, 74, 75, 76  NR Band n77, n78 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 1 | FDL\_low | | - | FDL\_high | -50 | 1 | 5, 6 |
| Frequency range | 758 | | - | 773 | -32 | 1 | 3 |
| Frequency range | 773 | | - | 803 | -50 | 1 |  |
| Frequency range | 2570 | | - | 2575 | +1.6 | 5 | 3, 13, 14 |
| Frequency range | 2575 | | - | 2595 | -15.5 | 5 | 3, 13, 14 |
| Frequency range | 2595 | | - | 2620 | -40 | 1 | 3, 14 |
| CA\_8-20 | E-UTRA Band 1, 28, 31, 32, 33, 34, 39, 40, 45, 50, 51, 65, 67, 68, 72, 73, 74, 75, 76, 87, 88 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 3, 7, 22, 38, 41, 42, 43, 52, 69  NR Band n77, n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 8, 20 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 11, 21 | FDL\_low | | - | FDL\_high | -50 | 1 | 11 |
| Frequency range | 758 | | - | 788 | -50 | 1 |  |
| Frequency range | 860 | | - | 890 | -40 | 1 | 3, 11 |
| CA\_8-28 | E-UTRA Band 3, 4, 7, 22, 32, 41, 42, 43, 50, 51, 52, 65, 66, 73, 74, 75, 76  NR Band n77, n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 1 | FDL\_low | | - | FDL\_high | -50 | 1 | 2, 5, 21 |
| E-UTRA Band 8 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 2, 18, 20, 25, 27, 28, 31, 33, 34, 38, 39, 40, 68, 69, 72, 87, 88 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 11, 21, 45 | FDL\_low | | - | FDL\_high | -50 | 1 | 21 |
| Frequency range | 470 | | - | 694 | -42 | 8 | 3, 22 |
| Frequency range | 470 | | - | 710 | -26.2 | 6 | 23 |
| Frequency range | 662 | | - | 694 | -26.2 | 6 | 3 |
| Frequency range | 758 | | - | 773 | -32 | 1 | 3 |
| Frequency range | 773 | | - | 803 | -50 | 1 |  |
| Frequency range | 860 | | - | 890 | -40 | 1 | 3, 11 |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4, 5, 11 |
| CA\_8-39 | E-UTRA Band 1, 28, 40, 45, 50, 51, 73, 74 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 22, 41, 42, 52  NR band n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 8 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| CA\_8-41 | E-UTRA Band 1, 28, 34, 39, 40, 45, 50, 51, 65, 73, 74 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 3, 42, 52  NR Band n77, n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA band 11, 21 | FDL\_low | | - | FDL\_high | -50 | 1 | 11 |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4, 11 |
| CA\_11-18 | E-UTRA Band 1, 3, 11, 21, 28, 34, 40, 42, 65  NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| NR Band n77, n78 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 860 | | - | 890 | -40 | 1 | 3 |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4 |
| Frequency range | 2545 | | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | | - | 2645 | -50 | 1 |  |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| CA\_11-26 | E-UTRA Band 1, 3, 11, 18, 19, 21, 26, 28, 34, 40, 42, 65 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 1, 3, 11, 18, 19, 21, 26, 28, 34, 40, 42, 65 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4 |
| Frequency range | 2545 | | - | 2575 | -50 | 1 | 2 |
| Frequency range | 2595 | | - | 2645 | -50 | 1 |  |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| CA\_13-66 | E-UTRA Band 2, 4, 5, 12, 13, 17, 25, 26, 27, 29, 41, 50, 51, 53, 66, 70, 71, 74, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 14 | FDL\_low | | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 24, 30, 48,  NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 769 | | - | 775 | -35 | 0.00625 | 3 |
| Frequency range | 799 | | - | 805 | -35 | 0.00625 | 3, 9 |
| CA\_14-30 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 27, 29, 30, 41, 48, 53, 66, 70, 71, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 769 | | - | 775 | -35 | 0.00625 | 3 |
| Frequency range | 799 | | - | 805 | -35 | 0.00625 | 3, 9 |
| CA\_14-66 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 27, 29, 30, 41, 53, 66, 70, 71, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 48,  NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 769 | | - | 775 | -35 | 0.00625 | 3 |
| Frequency range | 799 | | - | 805 | -35 | 0.00625 | 3, 9 |
| CA\_18-28 | E-UTRA Band 11, 21 | FDL\_low | | - | FDL\_high | -50 | 1 | 5, 21 |
| E-UTRA Band 1, 65 | FDL\_low | | - | FDL\_high | -50 | 1 | 5, 6 |
| E-UTRA Band 42, 43  NR Band n77, n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 3, 34, 40 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| Frequency range | 470 | | - | 710 | -26.2 | 6 | 23 |
| Frequency range | 758 | | - | 773 | -32 | 1 | 3 |
| Frequency range | 773 | | - | 799 | -50 | 1 |  |
| Frequency range | 799 | | - | 803 | -40 | 1 | 3 |
| Frequency range | 860 | | - | 890 | -40 | 1 |  |
| Frequency range | 945 | | - | 960 | -50 | 1 | 3 |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4 |
| Frequency range | 2545 | | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | | - | 2645 | -50 | 1 |  |
| CA\_19-21 | E-UTRA Band 1, 3, 28, 34, 40, 42, 65  NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
|  |  | |  |  |  |  |  |
|  |  | |  |  |  |  |  |
| NR Band n77, n78, | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
|  |  | |  |  |  |  |  |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4 |
| Frequency range | 2545 | | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | | - | 2645 | -50 | 1 |  |
| CA\_19-42 | E-UTRA Band 1, 3, 11, 21, 28, 34, 40, 65  NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4 |
| Frequency range | 2545 | | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | | - | 2645 | -50 | 1 |  |
| CA\_21-28 | E-UTRA Band 1, 42, 65  NR Band n77, n78 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 1 | FDL\_low | | - | FDL\_high | -50 | 1 | 5, 6 |
| E-UTRA Band 3, 18, 19, 34, 40  NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| Frequency range | 470 | | - | 710 | -26.2 | 6 | 23 |
| Frequency range | 773 | | - | 803 | -50 | 1 |  |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4, 5 |
| Frequency range | 2545 | | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | | - | 2645 | -50 | 1 |  |
| CA\_21-42 | E-UTRA Band 1, 3, 18, 19, 28, 34, 40, 65  NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4 |
| Frequency range | 2545 | | - | 2575 | -50 | 1 |  |
| Frequency range | 2595 | | - | 2645 | -50 | 1 |  |
| CA\_25-26 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 29, 30, 42, 48, 66, 70, 71, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 53  NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| CA\_25-41 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 42, 45, 48, 66, 70, 71 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 2, 25,  NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| CA\_26-46 | E-UTRA Band 1, 2, 3, 4, 5, 11, 12, 13, 14, 17, 18,19, 21, 24, 25, 26, 29, 30, 31, 34, 39, 40, 42, 43, 48, 65, 66, 70, 71, 85 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 41, 53,  NR Band n77 | FDL\_low | | - | FDL\_high | -50 | 1 | 1, 2 |
| Frequency range | 703 | | - | 799 | -50 | 1 |  |
| Frequency range | 799 | | - | 803 | -40 | 1 | 2 |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 3 |
| CA\_26-48 | E-UTRA Band 1, 2, 3, 4, 5, 11, 12, 13, 14, 17, 18,19, 21, 24, 25, 26, 29, 30, 31, 34, 39, 40, 50, 51, 65, 66, 70, 71, 73, 74 | FDL\_low | | - | FDL\_high | -50 | 1 | 1, 2 |
| E-UTRA Band 41 | FDL\_low | | - | FDL\_high | -50 | 1 | 1 |
| Frequency range | 703 | | - | 799 | -50 | 1 |  |
| Frequency range | 799 | | - | 803 | -40 | 1 | 2 |
| Frequency range | 945 | | - | 960 | -50 | 1 |  |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 3 |
| CA\_28-41 | E-UTRA Band E-UTRA Band 1, 4, 22, 32, 42, 45, 43, 48, 52, 65, 66  NR Band n77, n78, n79 | FDL\_low | - | | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 1 | FDL\_low | - | | FDL\_high | -50 | 1 | 5, 6 |
| E-UTRA band 2, 3, 5, 8, 20, 25, 26, 27, 31, 33, 34, 40 | FDL\_low | - | | FDL\_high | -50 | 1 |  |
| E-UTRA band 11, 21 | FDL\_low | - | | FDL\_high | -50 | 1 | 5, 18, 21 |
| E-UTRA band 9, 18, 19 | FDL\_low | - | | FDL\_high | -50 | 1 | 5, 18 |
| Frequency range | 470 | - | | 694 | -42 | 8 | 3, 22 |
| Frequency range | 470 | - | | 710 | -26.2 | 6 | 23 |
| Frequency range | 662 | - | | 694 | -26.2 | 6 | 3 |
| Frequency range | 758 | - | | 773 | -32 | 1 | 3 |
| Frequency range | 773 | - | | 803 | -50 | 1 |  |
| Frequency range | 1884.5 | - | | 1915.7 | -41 | 0.3 | 4, 5, 18 |
| CA\_28-42 | E-UTRA Band 1, 4, 32, 50, 51, 66, 65, 74, 75, 76 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 1 | FDL\_low | | - | FDL\_high | -50 | 1 | 5, 6 |
| E-UTRA Band 2, 3, 5, 7, 8, 18, 19, 20, 25, 26, 27, 31, 34, 38, 40, 41, 72, 73  NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 11, 21 | FDL\_low | | - | FDL\_high | -50 | 1 | 5, 21 |
| Frequency range | 470 | | - | 710 | -26.2 | 6 | 23 |
| Frequency range | 758 | | - | 773 | -32 | 1 | 3 |
| Frequency range | 773 | | - | 803 | -50 | 1 |  |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 4, 5 |
| CA\_39-41 | E-UTRA Band 1, 8, 26, 28, 34, 40, 42, 44, 50, 51, 52, 73, 74 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| NR Band n77, n78, n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1805 | | - | 1855 | -40 | 1 | 20 |
| Frequency range | 1855 | | - | 1880 | -15.5 | 5 | 3, 13, 20 |
| CA\_40-42 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 11, 12, 13, 14, 17, 18, 19, 20, 21, 24, 25, 26, 27, 28, 29, 31, 32, 33, 34, 38, 39, 41, 44, 45, 50, 51, 65, 66, 67, 68, 69, 70, 72, 73, 74, 75, 76 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1884.5 | | - | 1915.7 | -41 | 0.3 | 8 |
| CA\_41-42 | E-UTRA Band 1, 3, 5, 8, 26, 28, 33, 34, 39, 40, 44, 45, 50, 51, 65, 73, 74 | FDL\_low | | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 9, 11, 18, 19, 21 | FDL\_low | | - | FDL\_high | -50 | 1 | 18 |
| NR Band n79 | FDL\_low | | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1884.5 | |  | 1915.7 | -41 | 0.3 | 4, 18 |















|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NOTE 1 – FDL\_low and FDL\_high refer to each E-UTRA frequency band specified in Table 1-1.  NOTE 2 – As exceptions, measurements with a level up to the applicable requirements defined in Table 4.1‑2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th (or 5th) harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth for which the 2nd, 3rd or 4th harmonic totally or partially overlaps the measurement bandwidth (MBW).  NOTE 3 – These requirements also apply for the frequency ranges that are less than *FOOB*(MHz) in Table 4.1‑1 and Table 4.2-1 from the edge of the aggregated channel bandwidth.  NOTE 4 – Applicable when co-existence with PHS system operating in 1 884.5-1 915.7 MHz.  NOTE 5 – Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz. | | | | | | | |

|  |
| --- |
| *Notes to Table 4.4-0 (end):*  NOTE 6 – As exceptions, measurements with a level up to the applicable requirement of −36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).  NOTE 7 – Applicable when NS\_05 in § 4.5.1 is signalled by the network.  NOTE 8 – Applicable when NS\_08 in § 4.5.3 is signalled by the network.  NOTE 9 – Whether the applicable frequency range should be 793-805 MHz instead of 799-805 MHz is TBD.  NOTE 10 – This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1 744.9 MHz and 1 784.9 MHz.  NOTE 11 – This requirement is applicable only for the following cases:  – for carriers of 5 MHz channel bandwidth when carrier centre frequency (Fc) is within the range 902.5 MHz ≤ Fc < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB  – for carriers of 5 MHz channel bandwidth when carrier centre frequency (Fc) is within the range 907.5 MHz ≤ Fc ≤ 912.5 MHz without any restriction on uplink transmission bandwidth.  – for carriers of 10 MHz channel bandwidth when carrier centre frequency (Fc) is Fc = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RBstart > 3.  NOTE 12 – This requirement is applicable for any channel bandwidths within the range 1 920‑1 980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1 927.5‑1 929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1 930‑1 938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.  NOTE13 – For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.  NOTE14 – This requirement is applicable for any channel bandwidths within the range 2 500‑2 570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2 560.5‑2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2 552‑2 560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.  NOTE 15 – Applicable when NS\_15 in § 4.5.8 is signalled by the network.  NOTE 16 – Applicable when NS\_09 in § 4.5.4 is signalled by the network  NOTE 17 – This requirement is applicable only when Band 3 transmission frequency is less than or equal to 1 765 MHz.  NOTE 18 – This requirement applies when the E-UTRA carrier is confined within 2 545-2 575 MHz or 2 595‑2 645 MHz and the channel bandwidth is 10 or 20 MHz  NOTE 19 – N/A  NOTE 20 – This requirement is only applicable for carriers with bandwidth confined within 1 885‑1 920 MHz (requirement for carriers with at least 1RB confined within 1 880‑1 885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to (54 RB) for carriers of 15 MHz bandwidth when carrier center frequency is within the range 1 892.5‑1 894.5 MHz and for carriers of 20 MHz bandwidth when carrier center frequency is within the range 1 895‑1 903 MHz. |

NOTE 20 – This requirement is only applicable for carriers with bandwidth confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier center frequency is within the range 1892.5 - 1894.5 MHz and for carriers of 20 MHz bandwidth when carrier center frequency is within the range 1895 - 1903 MHz.

NOTE 21 – As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).

NOTE 22 – This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.

NOTE 23 – This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart<48.NOTE 24: Void

NOTE 25 – N/A

TABLE 4.4-1

**Spurious emissions band UE co-existence limits for intra band Carrier Aggregation**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| E-UTRA CA Configuration | Spurious emission | | | | | | |
| Protected band | Frequency range (MHz) | | | Maximum Level (dBm) | MBW (MHz) | NOTE |
| CA\_1 | E-UTRA Band 1, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 44, 50, 51, 52, 65, 67, 72, 73, 74, 75, 76  NR Band n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 3 | FDL\_low | - | FDL\_high | -50 | 1 | 10 |
| NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| CA\_3 | E-UTRA Band 1, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 40, 41, 43, 44, 50, 51, 65, 67, 72, 73, 74, 75, 76  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 3 | FDL\_low | - | FDL\_high | -50 | 1 | 10 |
| E-UTRA Band 22, 42, 52  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| CA\_5 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 24, 25, 28, 29, 30, 31, 34, 38, 40, 42, 43, 45, 48, 65, 66, 70, 71, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 52, 53  NR Band n77, n78,n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| CA\_7 | E-UTRA Band 1, 3, 7, 8, 20, 22, 27, 28, 29, 30. 31, 32, 33, 34, 40, 42, 43, 50, 51, 52, 65, 67, 72, 74, 75, 76  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| CA\_8 | E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 50, 51, 72, 73, 74, 75, 76 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 3 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA band 7 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 8 | FDL\_low | - | FDL\_high | -50 | 1 | 10 |
| E-UTRA Band 22, 41, 42, 43, 52  NR Band n77, n78,n79 | FDL\_low |  | FDL\_high | -50 | 1 | 2 |
| CA\_38 | E-UTRA Band 1,3, 8, 20, 22, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 50, 51, 52, 65, 67, 72, 74, 75, 76 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| CA\_39 | E-UTRA Band 22, 34, 40, 41, 42, 44, 50, 51, 52, 73, 74  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| CA\_40 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 33, 34, 38, 39, 41, 42, 43, 44, 50, 51, 52, 65, 67, 72, 73, 74, 75, 76  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 15 |
| CA\_41 | E-UTRA Band 1, 2, 3, 4, 5, 8, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 34, 39, 40, 42, 44, 50, 51, 52, 65, 66, 70, 71, 73, 74, 85  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| CA\_42 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 11, 18, 19, 20, 21, 25, 26, 27, 28, 31, 32, 33, 34, 38, 40, 41, 44, 50, 51, 65, 66, 67, 72, 73, 74, 75, 76  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |  |
| CA\_48 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 50, 51, 66, 70, 71, 74, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| CA\_66 | E-UTRA Band 2, 4, 5, 7, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 38, 41, 43, 50, 51, 66, 70, 71, 74, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 42, 48, 49, 52,  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |



|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NOTE1 – FDL\_low and FDL\_high refer to each E-UTRA frequency band specified.  NOTE 2 – As exceptions, measurements with a level up to the applicable requirements defined in Table 4-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th (or 5th) harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2 MHz + *N* × *LCRB* × 180 kHz), where *N* is 2, 3, 4, (5) for the 2nd, 3rd, 4th (or 5th) harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval  NOTE 3 – To meet these requirements some restriction will be needed for either the operating band or protected band.  NOTE 4 –N/A  NOTE 5 –N/A NOTE 6 –N/A NOTE 7 –N/A  NOTE 8 –N/A  NOTE 9 –N/A | | | | | | | |
| NOTE 10 – The requirement also applies for the frequency ranges that are less than *FOoB*(MHz) in Table 4.1-1 and Table 4.2-1 from the edge of the channel bandwidth.  NOTE 11 –N/A  NOTE 12: N/A  NOTE 13: N/A  NOTE 14: N/A  NOTE 15: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz | | | | | | | |

TABLE 4.4-2

**Spurious emissions band UE co-existence limits for intra band   
non-contiguous carrier aggregation**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA CA Configuration** | **Spurious emission** | | | | | | |
| **Protected band** | **Frequency range (MHz)** | | | **Maximum Level (dBm)** | **MBW (MHz)** | **Note** |
| CA\_4A-4A | E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 22, 23, 24, 25, 26, 27, 28, 29, 30, 41, 43, 50, 51, 53, 66, 70, 71, 74, 85 | FDL\_low | - | FDL\_high | −50 | 1 |  |
| E-UTRA Band 22, 42  NR Band n7 | FDL\_low | - | FDL\_high | −50 | 1 | 2 |
| NOTE1 – FDL\_low and FDL\_high refer to each E-UTRA frequency band specified.  NOTE 2 – As exceptions, measurements with a level up to the applicable requirements defined in Table 4.1-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd or 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RE within the transmission bandwidth for which the 2nd or 3rd harmonic, i.e. the frequency equal to two or three times the frequency of that RE, is within the measurement bandwidth (MBW). | | | | | | | |

**4.5 Additional spurious emissions**

These requirements are specified in terms of an additional spectrum emission requirement. Additional spurious emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message. See Table 3-1 above.

**4.5.1 Requirement (network signalled value “NS\_05”)**

When “NS\_05” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.1-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

TABLE 4.5.1-1

**Additional requirements (PHS)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | | | | **MBW** | **Note** |
| **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** |
| 1 884.5 *f* 1 915.7 | −41 | −41 | −41 | −41 | 300 kHz | 1 |
| NOTE 1 – Applicable when the lower edge of the assigned E-UTRA UL channel bandwidth frequency is larger than or equal to the upper edge of PHS band (1 915.7 MHz) + 4 MHz + the channel BW assigned, where channel BW is as defined in § 1.1. Additional restrictions apply for operations below this point. | | | | | | |

The requirements in Table 4.5.1-1 apply with the additional restrictions specified in Table 4.5.1-2 when the lower edge of the assigned E-UTRA UL channel bandwidth frequency is less than the upper edge of PHS band (1 915.7 MHz) + 4 MHz + the channel BW assigned.

TABLE 4.5.1-2

**RB restrictions for additional requirement (PHS)**

|  |  |  |  |
| --- | --- | --- | --- |
| **15 MHz channel bandwidth with *fc* = 1 932.5 MHz** | | | |
| *RBstart* | 0-7 | 8-66 | 67-74 |
| *LCRB* | N/A | ≤ MIN(30, 67 – *RBstart*) | N/A |
| **20 MHz channel bandwidth with *fc* = 1 930 MHz** | | | |
| *RBstart* | 0-23 | 24-75 | 76-99 |
| *LCRB* | N/A | ≤ MIN(24, 76 – *RBstart*) | N/A |

NOTE – For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the MB (300 kHz).

**4.5.2 Requirement (network signalled value “NS\_07”)**

When “NS\_07” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.2-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

TABLE 4.5.2-1

**Additional requirements**

|  |  |  |
| --- | --- | --- |
| **Frequency band (MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **MBW** |
| **10 MHz** |
| 769 ≤ *f* ≤ 775 | −57 | 6.25 kHz |
| NOTE – The emissions measurement shall be sufficiently power averaged to ensure standard deviation < 0.5 dB. | | |

NOTE – For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the MB (6.25 kHz).

**4.5.3 Requirement (network signalled value “NS\_08”)**

When “NS 08” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.3-1. This requirement also applies for the frequency ranges that are less than *ΔfOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

TABLE 4.5.3-1

**Additional requirements**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | | | **MBW** |
| **5 MHz** | **10 MHz** | **15 MHz** |
| 860 ≤ *f* ≤ 895 | −40 | −40 | −40 | 1 MHz |

NOTE – For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the MBW (1 MHz).

**4.5.4 Requirement (network signalled value “NS\_09”)**

When “NS 09” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.4-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

TABLE 4.5.4-1

**Additional requirements**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Frequency band (MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | | | **MBW** |
| **5 MHz** | **10 MHz** | **15 MHz** |
| 1 475.9 ≤ *f* ≤ 1 510.9 | −35 | −35 | −35 | 1 MHz |

NOTE 1 – For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the MBW (1 MHz).

NOTE 2 – To improve measurement accuracy, A-MPR values for NS\_09 specified in Table 3-1 in subclause 3 are derived based on both the above Note 1 and 100 kHz RBW.

**4.5.5 Requirement (network signalled value “NS\_12”)**

When “NS 12” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.5-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

TABLE 4.5.5-1

**Additional requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **MBW** | **Note** |
| **1.4, 3, 5 MHz** |
| 806 ≤ *f* ≤ 813.5 | −42 | 6.25 kHz | 1 |
| NOTE 1 – The requirement applies for E-UTRA carriers with lower channel edge at or above 814.2 MHz.  NOTE 2 – The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB. | | | |

**4.5.6 Requirement (network signalled value “NS\_13”)**

When “NS 13” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.6-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

TABLE 4.5.6-1

**Additional requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **MBW** | **Note** |
| **5 MHz** |
| 806 ≤ *f* ≤ 816 | −42 | 6.25 kHz | 1 |
| NOTE 1 – The requirement applies for E-UTRA carriers with lower channel edge at or above 819 MHz.  NOTE 2 – The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB. | | | |

**4.5.7 Requirement (network signalled value “NS\_14”)**

When “NS 14” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.7-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

TABLE 4.5.7-1

**Additional requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **MBW** | **Note** |
| **10, 15 MHz** |
| 806 ≤ *f* ≤ 816 | −42 | 6.25 kHz | 1 |
| NOTE 1 – The requirement applies for E-UTRA carriers with lower channel edge at or above 824 MHz.  NOTE 2 – The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB. | | | |

**4.5.8 Requirement (network signalled value “NS\_15”)**

When “NS 15” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.8-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

TABLE 4.5.8-1

**Additional requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **MBW** | **Note** |
| **1.4, 3, 5, 10, 15 MHz** |
| 851 ≤ *f* ≤ 859 | −53 | 6.25 kHz |  |
| NOTE 1 – The emissions measurement shall be sufficiently power averaged to ensure standard deviation < 0.5 dB. | | | |

**4.5.9 Requirement (network signalled value “NS\_16”)**

When “NS 16” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.9-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

TABLE 4.5.9-1

**Additional requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **MBW** | **Note** |
| **1.4, 3, 5, 10 MHz** |
| 790 ≤ *f* ≤ 803 | −32 | 1 MHz |  |

**4.5.10 Requirement (network signalled value “NS\_17”)**

When “NS 17” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.10-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

TABLE 4.5.10-1

**Additional requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **MBW** | **Note** |
| **5, 10 MHz** |
| 470 ≤ *f* ≤ 710 | −26.2 | 6 MHz | 1 |
| NOTE 1 – Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz. | | | |

**4.5.11 Requirement (network signalled value “NS\_18”)**

When “NS 18” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.11-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

TABLE 4.5.11-1

**Additional requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **MBW** | **Note** |
| **5, 10, 15, 20 MHz** |
| 692−698 | −26.2 | 6 MHz |  |

**4.5.12 Requirement (network signalled value “NS\_19”)**

When “NS 19” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.12-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

Table 4.5.12-1

**Additional requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **MBW** | **Note** |
| **3, 5, 10, 15, 20 MHz** |
| 662 ≤ *f* ≤ 694 | −25 | 8 MHz |  |

**4.5.13 Requirement (network signalled value “NS\_11”)**

When “NS 11” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.13-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

TABLE 4.5.13-1

**Additional requirements**

|  |  |  |
| --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **Measurement bandwidth** |
| **1.4, 3, 5, 10, 15, 20 MHz** |
| E-UTRA Band 2 | −50 | 1 MHz |
| 1998 ≤ *f* ≤ 1999 | −21 | 1 MHz |
| 1997 ≤ *f* < 1998 | −27 | 1 MHz |
| 1996 ≤ *f* < 1997 | −32 | 1 MHz |
| 1995 ≤ *f* < 1996 | −37 | 1 MHz |
| 1990 ≤ *f* < 1995 | −40 | 1 MHz |

**4.5.14 Requirement (network signalled value “NS\_20”)**

When “NS 20” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.14-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

TABLE 4.5.14-1

**Additional requirements**

|  |  |  |
| --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **Measurement bandwidth** |
| **5, 10, 15, 20 MHz** |
| 1990 ≤ *f* < 1999 | −40 | 1 MHz |
| 1999 ≤ *f* ≤ 2000 | −40 | Note 1 |
| NOTE 1 – The measurement bandwidth is 1% of the applicable E-UTRA channel bandwidth. | | |

**4.5.15 Requirement (network signalled value “NS\_21”)**

When “NS 21” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.15-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

TABLE 4.5.15-1

**Additional requirements**

|  |  |  |
| --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **Measurement bandwidth** |
| **5, 10 MHz** |
| 2200 ≤ *f* < 2288 | −40 | 1 MHz |
| 2288 ≤ *f* < 2292 | −37 | 1 MHz |
| 2292 ≤ *f* < 2296 | −31 | 1 MHz |
| 2296 ≤ *f* < 2300 | −25 | 1 MHz |
| 2320 ≤ *f* < 2324 | −25 | 1 MHz |
| 2324 ≤ *f* < 2328 | −31 | 1 MHz |
| 2328 ≤ *f* < 2332 | −37 | 1 MHz |
| 2332 ≤ *f* ≤ 2395 | −40 | 1 MHz |

**4.5.16 Requirement (network signalled value “NS\_22”)**

When “NS 22” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.16-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

TABLE 4.5.16-1

**Additional requirements**

|  |  |  |
| --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **MBW** |
| **5, 10, 15, 20 MHz** |
| 3400 ≤ *f* ≤ 3800 | −23 (Note 1, Note 3) | 5 MHz |
| −40 (Note 2) | 1 MHz |
| NOTE 1 – This requirement applies within an offset between 5 MHz and 25 MHz from the lower and from the upper edge of the channel bandwidth.  NOTE 2 – This requirement applies from 3400 MHz up to 25 MHz below the lower E-UTRA channel edge and from 25 MHz above the upper E-UTRA channel edge up to 3800 MHz.  NOTE 3 – This emission limit might imply risk of harmful interference to UE(s) operating in the protected operating band | | |

NOTE – For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth.

**4.5.17 Requirement (network signalled value “NS\_23”)**

When “NS 23” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.5.17-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the channel bandwidth.

TABLE 4.5.17-1

**Additional requirements**

|  |  |  |
| --- | --- | --- |
| **Frequency band (MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **MBW** |
| **5, 10, 15, 20 MHz** |
| 3 400 ≤ *f* ≤ 3 800 | −23 (Note 1, Note 3) | 5 MHz |
| −40 (Note 2) | 1 MHz |
| NOTE 1 – This requirement applies within an offset between 5 MHz + Foffset\_NS\_23 and 25 MHz + Foffset\_NS\_23 from the lower and from the upper edges of the channel bandwidth, whenever these frequencies overlap with the specified frequency band.  NOTE 2 – This requirement applies from 3 400 MHz to 25 MHz + Foffset\_NS\_23 below the lower E‑UTRA channel edge and from 25 MHz + Foffset\_NS\_23 above the upper E-UTRA channel edge to 3 800 MHz.  NOTE 3 – Foffset\_NS\_23 is:  0 MHz for 5 MHz channel BW,  5 MHz for 10 MHz channel BW,  9 MHz for 15 MHz channel BW and  12 MHz for 20 MHz channel BW.  NOTE 4 – This emission limit might imply risk of harmful interference to UE(s) operating in the protected operating band. | | |

NOTE – For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth.

**4.6 Additional spurious emissions for CA**

These requirements are specified in terms of an additional spectrum emission requirement. Additional spurious emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell reconfiguration message.

**4.6.1 Requirement for CA\_1C (network signalled value “CA\_NS\_01”)**

When “CA\_NS\_01” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.6.1-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the aggregated channel bandwidth.

TABLE 4.6.1-1

**Additional requirements (PHS)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Protected band** | **Frequency range  (MHz)** | | | **Maximum level  (dBm)** | **MBW  (MHz)** | **Note** |
| E-UTRA band 34 | FDL\_low | − | FDL\_high | −50 | 1 |  |
| Frequency range | 1 884.5 | − | 1 919.6 | −41 | 0.3 | 1 |
| NOTE 1 – Applicable when the aggregated channel bandwidth is confined within frequency range 1 940‑1 980 MHz. | | | | | | |

NOTE – For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the MBW (300 kHz).

**4.6.2 Requirement for CA\_1C (network signalled value “CA\_NS\_02”)**

When “CA\_NS\_02” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.6.2-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the aggregated channel bandwidth.

TABLE 4.6.2-1

**Additional requirements**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Protected band** | **Frequency range  (MHz)** | | | **Maximum level  (dBm)** | **MBW  (MHz)** |
| E−UTRA band 34 | FDL\_low | − | FDL\_high | −50 | 1 |
| Frequency range | 1 900 | − | 1 915 | −15.5 | 5 |
| Frequency range | 1 915 | − | 1 920 | +1.6 | 5 |

**4.6.3 Requirement for CA\_1C (network signalled value “CA\_NS\_03”)**

When “CA\_NS\_03” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.6.3-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the aggregated channel bandwidth.

TABLE 4.6.3-1

**Additional requirements**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Protected band** | **Frequency range  (MHz)** | | | **Maximum level  (dBm)** | **MBW  (MHz)** |
| E−UTRA band 34 | FDL\_low | − | FDL\_high | −50 | 1 |
| Frequency range | 1 880 | − | 1 895 | −40 | 1 |
| Frequency range | 1 895 | − | 1 915 | −15.5 | 5 |
| Frequency range | 1 915 | − | 1 920 | +1.6 | 5 |

**4.6.4 Requirement for CA\_38C (network signalled value “CA\_NS\_05”)**

When “CA\_NS\_05” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.6.4-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the aggregated channel bandwidth.

TABLE 4.6.4-1

**Additional requirements**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Protected band** | **Frequency range (MHz)** | | | **Maximum Level (dBm)** | **MBW (MHz)** |
| Frequency range | 2 620 | – | 2 645 | –15.5 | 5 |
| Frequency range | 2 645 | – | 2 690 | –40 | 1 |

**4.6.5 Requirement for CA\_7C (network signalled value “CA\_NS\_06”)**

When “CA\_NS\_06” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.6.5-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the aggregated channel bandwidth.

TABLE 4.6.5-1

**Additional requirements**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Protected band** | **Frequency range (MHz)** | | | **Maximum Level (dBm)** | **MBW (MHz)** |
| Frequency range | 2 570 | – | 2 575 | +1.6 | 5 |
| Frequency range | 2 575 | – | 2 595 | –15.5 | 5 |
| Frequency range | 2 595 | – | 2 620 | –40 | 1 |

**4.6.6 Requirement for CA\_39C (network signalled value “CA\_NS\_07”)**

When “CA\_NS\_07” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 4.6.6-1. This requirement also applies for the frequency ranges that are less than Δ*fOoB* (MHz) in Table 4.1-1 from the edge of the aggregated channel bandwidth.

TABLE 4.6.6-1

**Additional requirements**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Protected band** | **Frequency range (MHz)** | | | **Maximum level (dBm)** | **MBW (MHz)** |
| Frequency range | 1805 | – | 1855 | −401 | 1 |
| Frequency range | 1855 | – | 1880 | −15.51,2,3 | 5 |
| NOTE 1 – This requirement is applicable for carriers with aggregated channel bandwidths confined in 1 885-1 920 MHz.  NOTE 2 – The requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 4.1-1 and Table 4.2-1 from the edge of the channel bandwidth.  NOTE 3 – For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band. | | | | | |

**4.7 Spurious emission for UL−MIMO**

For UE with multiple transmit antenna connectors, the requirements for spurious emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products are specified at each transmit antenna connector.

For UEs with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the requirements in § 3 apply to each transmit antenna connector. The requirements shall be met with the UL-MIMO configurations specified in Table 3.1.3-1.

For single-antenna port scheme, the requirements in § 3 apply.

**5 Receiver spurious emissions**

The spurious emissions power is the power of emissions generated or amplified in a receiver that appear at the UE antenna connector.

The power of any narrow band CW spurious emission shall not exceed the maximum level specified in Table 5-1.

TABLE 5-1

**General receiver spurious emission requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency band** | **MBW** | **Maximum level** | **Note** |
| 30 MHz ≤ *f* < 1 GHz | 100 kHz | −57 dBm |  |
| 1 GHz ≤ *f* ≤ 12.75 GHz | 1 MHz | −47 dBm |  |
| 12.75 GHz ≤ *f* ≤ 5th harmonic of the upper frequency edge of the DL operating band in GHz | 1 MHz | −47 dBm | 1 |
| NOTE 1 – Applies only for Band 22, Band 42 and Band 43. | | | |