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| **Radiocommunication Study Groups** |  |
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| **17 November 2014** |
| **English only** |
| Working Party 5D | |
| DRAFT NEW RECOMMENDATION ITU-R M.[IMT.OOBE MS] | |
| Generic unwanted emission characteristics of mobile stations using  the terrestrial radio interfaces of IMT-Advanced | |

Summary

This Recommendation provides the generic unwanted emission characteristics (spurious and out‑of‑band (OoB) emissions) of mobile stations using the terrestrial radio interfaces of IMT‑Advanced, suitable for establishing the technical basis for global circulation of IMT-Advanced terminals.

PRELIMINARY DRAFT NEW   
RECOMMENDATION ITU-R M.[IMT.OOBE MS][[1]](#footnote-1)\*

Generic unwanted emission characteristics of mobile stations using   
the terrestrial radio interfaces of IMT-Advanced

(Question ITU-R 229 3/5)

Scope

This Recommendation provides the generic unwanted emission characteristics of mobile stations using the terrestrial radio interfaces of IMT-Advanced, suitable for establishing the technical basis for global circulation of IMT-Advanced terminals. Implementation of characteristics of mobile stations using the terrestrial radio interfaces of IMT-Advanced in any of the bands included in this Recommendation is subject to compliance with the Radio Regulations.

Keywords

IMT-Advanced, emission characteristics, out-of-band, unwanted, mobile station

The ITU Radiocommunication Assembly,

considering

*a)* that unwanted emissions consist of both spurious and out-of-band (OoB) emissions according to No. **1.146** of the Radio Regulations (RR) and that spurious and OoB emissions are defined in RR Nos. **1.145** and **1.144**, respectively;

*b)* that limitation of the maximum permitted levels of unwanted emissions of IMT‑Advanced mobile stations (MSs) is necessary to protect other radio systems and services from interference and to enable coexistence between different technologies;

*c)* that too stringent limits may lead to an increase in size or in complexity of IMT‑Advanced radio equipment;

*d)* that every effort should be made to keep limits for unwanted emissions at the lowest possible values taking account of economic factors and technological limitations;

*e)* that Recommendation ITU-R SM.329 relates to the effects, measurements and limits to be applied to spurious domain emissions;

*f)* that the same spurious emission limits apply equally to MSs of all radio interfaces;

*g)* that Recommendation ITU-R SM.1541 relating to OoB emission specifies generic limits in the OoB domain which generally constitute the least restrictive OoB emission limits and encourages the development of more specific limits for each system;

*h)* that the levels of spurious emissions of IMT-Advanced terminals shall comply with the limits specified in RR Appendix **3**;

*i)* that Recommendation ITU-R M.1579 establishes the technical basis for global circulation of IMT-2000 and IMT-Advanced MSs;

*j)* that one of the basic requirements of global circulation is that the MS does not cause harmful interference in any country where it is taken;

*k)* that the harmonization of unwanted emission limits will facilitate global use and access to a global market;

*l)* that unwanted emission limits are dependent on the transmitter emission characteristics in addition to depending on services operating in other bands;

*m)* that the technology used by a system and its conformance with the recommended specifications and standards in Recommendation ITU-R M.2012 defines that system as IMT‑Advanced regardless of the frequency band of operation;

*n)* that harmonised frequency arrangements for the bands identified for IMT are addressed in Recommendation ITU-R M.1036, which also indicates that “some administrations may deploy IMT-Advanced systems in bands other than those identified in the RR”,

noting

*a)* the work carried out by standardization bodies to define limits to protect other radio systems and services from interference and to enable coexistence between different technologies;

*b)* that IMT-Advanced mobile stations must comply with local, regional, and international regulations for out-of-band and spurious emissions relevant to their operations, wherever such regulations apply;

*c)* that the notes and annexes of this Recommendation – being based on the ongoing work in standardization bodies – in order to reflect the wide applicability of IMT-Advanced technologies and to maintain consistency with the technology specifications, may contain material which reflects information related to the technology applications in bands other than those identified for IMT,

recommends

1 that the unwanted emission characteristics of IMT-Advanced mobile stations should be based on the limits contained in the technology specific Annexes 1 and 2 which correspond to the terrestrial radio interface specifications referenced in *recommends* 1 of Recommendation ITU‑R M.2012;

2 that the unwanted emission characteristics of IMT-Advanced mobile stations in Annexes 1 and 2 apply in Regions and countries in which corresponding bands are identified for IMT in the Radio regulations[[2]](#footnote-2)\*\*.

Annex 1 – LTE-Advanced[[3]](#footnote-3)

Annex 2 – WirelessMAN-Advanced[[4]](#footnote-4)

Annex 1

LTE-Advanced

The present Annex includes unwanted emission requirements from 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 |
| 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 | 3410 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 |
| ... |  |  |  |  |  |  |  |
| 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 |

|  |
| --- |
| NOTE 1: Band 6 is not applicable.  NOTE 2: Restricted to E-UTRA operation when carrier aggregation is configured. The downlink operating band is paired with the uplink operating band (external) of the carrier aggregation configuration that is supporting the configured 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 Carrier Aggregation (CA) arrangements in Table 1-3:

Table 1-2

E-UTRA Intra-band contiguous carrier aggregation bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| E-UTRA CA Band | E-UTRA Band | Uplink (UL) operating band | | | Downlink (DL) operating band | | | Duplex Mode |
| BS receive / UE transmit | | | BS transmit / UE receive | | |
| FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | |
| CA\_1 | 1 | 1 920 MHz | – | 1 980 MHz | 2 110 MHz | – | 2 170 MHz | FDD |
| CA\_7 | 7 | 2 500 MHz | – | 2 570 MHz | 2 620 MHz | – | 2 690 MHz | FDD |
| CA\_38 | 38 | 2 570 MHz | – | 2 620 MHz | 2 570MHz | – | 2 620 MHz | TDD |
| CA\_40 | 40 | 2 300 MHz | – | 2 400 MHz | 2 300 MHz | – | 2 400 MHz | TDD |
| CA\_41 | 41 | 2 496 MHz |  | 2 690 MHz | 2 496 MHz |  | 2 690 MHz | TDD |

The unwanted emission limits defined in the present Annex are for E-UTRA MS operating at least one of the intra-band non-contiguous Carrier Aggregation (CA) arrangements in Table 1-4:

Table 1-3

E-UTRA Intra-band non-contiguous carrier aggregation bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| E-UTRA CA Band | E-UTRA Band | Uplink (UL) operating band | | | Downlink (DL) operating band | | | Duplex Mode |
| BS receive / UE transmit | | | BS transmit / UE receive | | |
| FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | |
| CA\_25-25 | 25 | 1 850 MHz | – | 1 915 MHz | 1 930 MHz | – | 1 995 MHz | FDD |

The unwanted emission limits defined in the present Annex are for E-UTRA MS operating at least one of the inter-band Carrier Aggregation (CA) combinations in Table 1-5:

Table 1-4

E-UTRA Inter-band carrier aggregation bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| E-UTRA CA Band | E-UTRA Band | Uplink (UL) operating band | | | Downlink (DL) operating band | | | Duplex Mode |
| BS receive / UE transmit | | | BS transmit / UE receive | | |
| FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | |
| CA\_1-5 | 1 | 1 920 MHz | – | 1 980 MHz | 2 110 MHz | – | 2 170 MHz | FDD |
| 5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz |
| CA\_1-18 | 1 | 1 920 MHz | – | 1 980 MHz | 2 110 MHz | – | 2 170 MHz | FDD |
| 18 | 815 MHz | – | 830 MHz | 860 MHz | – | 875 MHz |
| CA\_1-19 | 1 | 1 920 MHz | – | 1 980 MHz | 2 110 MHz | – | 2 170 MHz | FDD |
| 19 | 830 MHz | – | 845 MHz | 875 MHz | – | 890 MHz |
| CA\_1-21 | 1 | 1 920 MHz | – | 1 980 MHz | 2 110 MHz | – | 2 170 MHz | FDD |
| 21 | 1 447.9 MHz | – | 1 462.9 MHz | 1 495.9 MHz | – | 1 510.9 MHz |
| CA\_2-17 | 2 | 1 850 MHz | – | 1 910 MHz | 1 930 MHz | – | 1 990 MHz | FDD |
| 17 | 704 MHz | – | 716 MHz | 734 MHz | – | 746 MHz |
| CA\_2-29 | 2 | 1 850 MHz | – | 1 910 MHz | 1 930 MHz | – | 1 990 MHz | FDD |
| 29 | N/A | | | 717 MHz | – | 728 MHz |
| CA\_3-5 | 3 | 1 710 MHz | – | 1 785 MHz | 1 805 MHz | – | 1 880 MHz | FDD |
| 5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz |
| CA\_3-7 | 3 | 1 710 MHz | – | 1 785 MHz | 1 805 MHz | – | 1 880 MHz | FDD |
| 7 | 2 500 MHz | – | 2 570 MHz | 2 620 MHz | – | 2 690 MHz |
| CA\_3-8 | 3 | 1 710 MHz |  | 1 785 MHz | 1 805 MHz |  | 1 880 MHz | FDD |
| 8 | 880 MHz |  | 915 MHz | 925 MHz |  | 960 MHz |
| CA\_3-20 | 3 | 1 710 MHz | – | 1 785 MHz | 1 805 MHz | – | 1 880 MHz | FDD |
| 20 | 832 MHz | – | 862 MHz | 791 MHz | – | 821 MHz |
| CA\_4-5 | 4 | 1 710 MHz | – | 1 755 MHz | 2 110 MHz | – | 2 155 MHz | FDD |
| 5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz |
| CA\_4-7 | 4 | 1 710 MHz |  | 1 755 MHz | 2 110 MHz |  | 2 155 MHz | FDD |
| 7 | 2 500 MHz |  | 2 570 MHz | 2 620 MHz |  | 2 690 MHz |
| CA\_4-12 | 4 | 1 710 MHz | – | 1 755 MHz | 2 110 MHz | – | 2 155 MHz | FDD |
| 12 | 699 MHz | – | 716 MHz | 729 MHz | – | 746 MHz |
| CA\_4-13 | 4 | 1 710 MHz | – | 1 755 MHz | 2 110 MHz | – | 2 155 MHz | FDD |
| 13 | 777 MHz | – | 787 MHz | 746 MHz | – | 756 MHz |
| CA\_4-17 | 4 | 1 710 MHz | – | 1 755 MHz | 2 110 MHz | – | 2 155 MHz | FDD |
| 17 | 704 MHz | – | 716 MHz | 734 MHz | – | 746 MHz |
| CA\_4-29 | 4 | 1 710 MHz | – | 1 755 MHz | 2 110 MHz | – | 2 155 MHz | FDD |
| 29 | N/A | | | 717 MHz | – | 728 MHz |
| CA\_5-12 | 5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| 12 | 699 MHz | – | 716 MHz | 729 MHz | – | 746 MHz |
| CA\_5-17 | 5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| 17 | 704 MHz | – | 716 MHz | 734 MHz | – | 746 MHz |
| CA\_7-20 | 7 | 2 500 MHz | – | 2 570 MHz | 2 620 MHz | – | 2 690 MHz | FDD |
| 20 | 832 MHz | – | 862 MHz | 791 MHz | – | 821 MHz |
| CA\_8-20 | 8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| 20 | 832 MHz | – | 862 MHz | 791 MHz | – | 821 MHz |
| CA\_11-18 | 11 | 1 427.9 MHz | – | 1 447.9 MHz | 1 475.9 MHz | – | 1 495.9 MHz | FDD |
| 18 | 815 MHz | – | 830 MHz | 860 MHz | – | 875 MHz |

## 1.1 Channel bandwidth

Requirements in 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 |  |  |
| 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 |
| ... |  |  |  |  |  |  |
| 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 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| E-UTRA band | 1.4 MHz | 3 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| 42 |  |  | Yes | Yes | Yes | Yes |
| 43 |  |  | Yes | Yes | Yes | Yes |
| 44 |  | Yes | Yes | Yes | Yes | Yes |
| NOTE 1: 1 refers to the bandwidth for which a relaxation of the specified UE receiver sensitivity requirement is allowed.  NOTE 2: 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: 3 refersto 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 (Clause 4.3). | | | | | | |

### 1.1.2 Channel bandwidths per operating band for CA

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

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

Requirements for intra-band contiguous carrier aggregation are defined for the carrier aggregation configurations and bandwidth combination sets specified in Table 1.1.2-1. Requirements for inter-band carrier aggregation are defined for the carrier aggregation configurations and bandwidth combination sets specified in Table 1.1.2-2.

The DL component carrier combinations for a given CA configuration shall be symmetrical in relation to channel centre unless stated otherwise in Table 1.1.2-1 or 1.1.2-2.

Table 1.1.2-1

E-UTRA CA configurations and bandwidth combination sets defined for intra-band contiguous CA

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| E-UTRA CA configuration / Bandwidth combination set | | | | | | |
| E-UTRA CA Configuration | 50RB+100RB  (10 MHz + 20 MHz) | 75RB+75RB  (15 MHz + 15 MHz) | 75RB+100RB  (15 MHz + 20 MHz) | 100RB+100RB  (20 MHz + 20 MHz) | Maximum aggregated bandwidth  [MHz] | Bandwidth Combination Set |
| CA\_1C |  | Yes |  | Yes | 40 | 0 |
| CA\_7C |  | Yes |  | Yes | 40 | 0 |
| CA\_38C |  | Yes |  | Yes | 40 | 0 |
| CA\_40C | Yes | Yes |  | Yes | 40 | 0 |
| CA\_41C | Yes | Yes | Yes | Yes | 40 | 0 |
| NOTE 1: The CA Configuration refers to an operating band and a CA bandwidth class specified in Table 1.1.2-4 (the indexing letter). Absence of a CA bandwidth class for an operating band implies support of all classes.  NOTE 2: For the supported CC bandwidth combinations, the CC downlink and uplink bandwidths are equal | | | | | | |

Table 1.1.2-2

E-UTRA CA configurations and bandwidth combination sets defined for inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| E-UTRA CA configuration / Bandwidth combination set | | | | | | | | | | |
| E-UTRA CA Configuration | E-UTRA Bands | 1.4 MHz | 3 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz | Maximum aggregated bandwidth  [MHz] | Bandwidth combination set |
| CA\_1A-5A | 1 |  |  |  | Yes |  |  | 20 | 0 |
| 5 |  |  |  | Yes |  |  |
| CA\_1A-18A | 1 |  |  | Yes | Yes | Yes | Yes | 35 | 0 |
| 18 |  |  | Yes | Yes | Yes |  |
| CA\_1A-19A | 1 |  |  | Yes | Yes | Yes | Yes | 35 | 0 |
| 19 |  |  | Yes | Yes | Yes |  |
| CA\_1A-21A | 1 |  |  | Yes | Yes | Yes | Yes | 35 | 0 |
| 21 |  |  | Yes | Yes | Yes |  |
| CA\_2A-17A | 2 |  |  | Yes | Yes |  |  | 20 | 0 |
| 17 |  |  | Yes | Yes |  |  |
| CA\_2A-29A | 2 |  |  | Yes | Yes |  |  | 20 | 0 |
| 29 |  | Yes | Yes | Yes |  |  |
| CA\_3A-5A | 3 |  |  |  | Yes | Yes | Yes | 30 | 0 |
| 5 |  |  | Yes | Yes |  |  |
| 3 |  |  |  | Yes |  |  | 20 | 1 |
| 5 |  |  | Yes | Yes |  |  |
| CA\_3A-7A | 3 |  |  | Yes | Yes | Yes | Yes | 40 | 0 |
| 7 |  |  |  | Yes | Yes | Yes |
| CA\_3A-8A | 3 |  |  |  | Yes | Yes | Yes | 30 | 0 |
| 8 |  |  | Yes | Yes |  |  |
| 3 |  |  |  | Yes |  |  | 20 | 1 |
| 8 |  |  | Yes | Yes |  |  |
| CA\_3A-20A | 3 |  |  | Yes | Yes | Yes | Yes | 30 | 0 |
| 20 |  |  | Yes | Yes |  |  |
| CA\_4A-5A | 4 |  |  | Yes | Yes |  |  | 20 | 0 |
| 5 |  |  | Yes | Yes |  |  |
| CA\_4A-7A | 4 |  |  | Yes | Yes |  |  | 30 | 0 |
| 7 |  |  | Yes | Yes | Yes | Yes |
| CA\_4A-12A | 4 | Yes | Yes | Yes | Yes |  |  | 20 | 0 |
| 12 |  |  | Yes | Yes |  |  |
| CA\_4A-13A | 4 |  |  | Yes | Yes | Yes | Yes | 30 | 0 |
| 13 |  |  |  | Yes |  |  |
| 4 |  |  | Yes | Yes |  |  | 20 | 1 |
| 13 |  |  |  | Yes |  |  |
| CA\_4A-17A | 4 |  |  | Yes | Yes |  |  | 20 | 0 |
| 17 |  |  | Yes | Yes |  |  |
| CA\_4A-29A | 4 |  |  | Yes | Yes |  |  | 20 | 0 |
| 29 |  | Yes | Yes | Yes |  |  |
| CA\_5A -12A | 5 |  |  | Yes | Yes |  |  | 20 | 0 |
| 12 |  |  | Yes | Yes |  |  |
| CA\_5A-17A | 5 |  |  | Yes | Yes |  |  | 20 | 0 |
| 17 |  |  | Yes | Yes |  |  |
| CA\_7A-20A | 7 |  |  |  | Yes | Yes | Yes | 30 | 0 |
| 20 |  |  | Yes | Yes |  |  |
| CA\_8A-20A | 8 |  |  | Yes | Yes |  |  | 20 | 0 |
| 20 |  |  | Yes | Yes |  |  |
| CA\_11A-18A | 11 |  |  | Yes | Yes |  |  | 25 | 0 |
| 18 |  |  | Yes | Yes | Yes |  |
| NOTE 1: The CA Configuration refers to a combination of an operating band and a CA bandwidth class specified in Table 1.1.2-4 (the indexing letter). Absence of a CA bandwidth class for an operating band implies support of all classes.  NOTE 2: For each band combination, all combinations of indicated bandwidths belong to the set.  NOTE 3: For the supported CC bandwidth combinations, the CC downlink and uplink bandwidths are equal. | | | | | | | | | |

Table 1.1.2-3

Supported E-UTRA bandwidths for intra-band non-contiguous CA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| CA operating band / channel bandwidth | | | | | | | |
| E-UTRA CA Band | E-UTRA Bands | 1.4 MHz | 3 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| CA\_25A-25A | 25 |  |  | Yes | Yes |  |  |

Table 1.1.2-4

CA bandwidth classes and corresponding nominal guard bands

|  |  |  |  |
| --- | --- | --- | --- |
| CA Bandwidth Class | Aggregated Transmission Bandwidth Configuration | Maximum number of CC | Nominal Guard Band BWGB |
| A | NRB,agg ≤ 100 | 1 | 0.05 BWChannel(1) |
| B | NRB,agg ≤ 100 | 2 | Under discussion |
| C | 100 < NRB,agg ≤ 200 | 2 | 0.05 *max*(BWChannel(1), BWChannel(2)) |
| D | 200 < NRB,agg ≤ [300] | FFS | Under discussion |
| E | [300] < NRB,agg ≤ [400] | FFS | Under discussion |
| F | [400] < NRB,agg ≤ [500] | FFS | Under discussion |
| NOTE 1: BWChannel(1) and BWChannel(2) are channel bandwidths of two E-UTRA component carriers according to Table 1.1-1.  NOTE 2: The guard bands in the table only apply to the uplink. | | | |

# 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.

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

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

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

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

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

**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.

## 2.2 Symbols

For the purposes of the present document, 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.

 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

 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

FInterferer (offset) Frequency offset of the interferer

FInterferer Frequency of the interferer

FC Frequency of the carrier centre frequency

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

FCA\_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\_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.*

 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

 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

 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

 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 The length of a contiguous resource block allocation

Ncp Cyclic prefix length

NDL Downlink EARFCN

 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

 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.

 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.

 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

NOffs-DL Offset used for calculating downlink EARFCN

NOffs-UL Offset used for calculating uplink EARFCN

 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.

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. Same as IE *P-Max,* defined in [7].

PEMAX,*c* Maximum allowed UE output power signalled by higher layers for serving cell *c*. Same as IE *P-Max,* defined in [7].

PInterferer Modulated mean power of the interferer

PPowerClass PPowerClass is the nominal UE power (i.e., no tolerance).

PUMAX The measured configured maximum UE output power.

RBstart Indicates the lowest RB index of transmitted resource blocks.

ΔFOOB Δ Frequency of Out Of Band emission.

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

ΔTIB,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*.

## 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 CA for band X where X is the applicable E-UTRA operating band

CA\_X-Y CA for band X and Band Y where X and Y are the applicable E-UTRA operating band

CC Component Carriers

CPE Customer Premise Equipment

CPE\_X Customer Premise Equipment for E-UTRA operating band X

CW Continuous Wave

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

MCS Modulation and Coding Scheme

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

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 |
| 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 |
| 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\_32 | - | - | - |
| Note 1: The signalling is for purposes other than Additional emission requirements. | | | |

Table 3-2

Additional emission requirements for CA indicated by Network Signalling (NS) values

|  |  |  |
| --- | --- | --- |
| CA Network Signalling 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 |

## 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*f*OOB) starting from the ± edges of the assigned E-UTRA channel bandwidth. For frequencies greater than (Δ*f*OOB) 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*f*OOB (MHz) | Spectrum emission limit (dBm)/channel bandwidth | | | | | | |
| 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz | Measurement bandwidth |
| ±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 |

Table 3.1.1-2

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Δ*f*OOB (MHz) | Spectrum emission limit (dBm)/channel bandwidth | | | | | | |
| 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz | Measurement bandwidth |
| ±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 measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

### 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.

For intra-band contiguous carrier aggregation the spectrum emission mask of the UE applies to frequencies (ΔfOOB) 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 | | | | | |
| ΔfOOB  (MHz) | 50RB+100RB  (29.9 MHz) | 75RB+75RB (30 MHz) | 75RB+100RB  (34.85 MHz) | 100RB+100RB  (39.8 MHz) | Measurement bandwidth |
| ± 0-1 | -21 | -21 | -22 | -22.5 | 30 kHz |
| ± 1-5 | -8.5 | -8.5 | -8.5 | -8.5 | 1 MHz |
| ± 5-29.9 | -11.5 | -11.5 | -11.5 | -11.5 | 1 MHz |
| ± 29.9-30 | -23.5 | 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 | 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 | | | | | |
| ΔfOOB  (MHz) | 50RB+100RB  (29.9 MHz) | 75RB+75RB (30 MHz) | 75RB+100RB  (34.85 MHz) | 100RB+100RB  (39.8 MHz) | Measurement bandwidth |
| ± 0-1 | -20.7 | -20.7 | -21.7 | -22.2 | 30 kHz |
| ± 1-5 | -8.2 | -8.2 | -8.2 | -8.2 | 1 MHz |
| ± 5-29.9 | -11.2 | -11.2 | -11.2 | -11.2 | 1 MHz |
| ± 29.9-30 | -23.2 | 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 Network Signalled Value of “NS\_03”, “NS\_11” and “NS\_20”

When "NS\_03" or "NS\_11" 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 | | | | | | |
| ΔfOOB  (MHz) | 1.4  MHz | 3.0  MHz | 5  MHz | 10  MHz | 15  MHz | 20  MHz | Measurement bandwidth |
| 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 |
| 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 ΔfOOB 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 +0.5MHz and -0.5MHz, 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 network signalling 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 ΔfOOB 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 | | | | | | |
| ΔfOOB  (MHz) | 1.4  MHz | 3.0  MHz | 5  MHz | 10  MHz | 15  MHz | 20  MHz | Measurement bandwidth |
| 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 |
| 20-25 |  |  |  |  |  | -23.2 | 1 MHz |
| Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB 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 +0.5MHz and -0.5MHz, 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 network signalling 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 ΔfOOB equals to 3 MHz. | | | | | | | |

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

## 3.1.3.2 Additional E-UTRAN spectrum emission with Network Signalled 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 | | | | | | |
| ΔfOOB  (MHz) | 1.4  MHz | 3.0  MHz | 5  MHz | 10  MHz | 15  MHz | 20  MHz | Measurement bandwidth |
| 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 ΔfOOB 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 network signalling 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 ΔfOOB 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 | | | | | | |
| ΔfOOB  (MHz) | 1.4  MHz | 3.0  MHz | 5  MHz | 10  MHz | 15  MHz | 20  MHz | Measurement bandwidth |
| 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 | -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 ΔfOOB 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 network signalling 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 ΔfOOB equals to 3 MHz. | | | | | | | |

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

## 3.1.3.3 Additional E-UTRAN spectrum emission with Network Signalled 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 | | | | |
| ΔfOOB (MHz) | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | Measurement bandwidth |
| 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 ΔfOOB equals to 0.015 MHz and 0.085 MHz. The first and last measurement position with a 100 kHz filter is at ΔfOOB 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 +0.5MHz 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 network signalling 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 ΔfOOB 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 | Measurement bandwidth |
| 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 |
| Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.085 MHz. The first and last measurement position with a 100 kHz filter is at ΔfOOB 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 network signalling 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 ΔfOOB equals to 3 MHz. | | | | | |

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

### 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 Network Signalled 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+100RB  (29.9 MHz) | 75+75B (30 MHz) | 75+100RB (34.85 MHz) | 100+100RB (39.8 MHz) | Measurement bandwidth |
| ± 0-1 | -21 | -21 | -22 | -22.5 | 30 kHz |
| ± 1-5.5 | -11.5 | -11.5 | -11.5 | -11.5 | 1 MHz |
| ± 5.5-34.9 | -23.5 | -23.5 | -23.5 | -23.5 | 1 MHz |
| ± 34.9-35 |  | -23.5 | -23.5 | -23.5 | 1 MHz |
| ± 35-39.85 |  |  | -23.5 | -23.5 | 1 MHz |
| ± 39.85-44.8 |  |  |  | -23.5 | 1 MHz |
| Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB 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 network signalling 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 measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

## 3.2 Adjacent Channel Leakage Ratio (ACLR)

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 measurement bandwidths 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 UE’s with 23 dBm output power

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Channel bandwidth / E-UTRAACLR1 / measurement bandwidth | | | | | |
|  | 1.4  MHz | 3.0  MHz | 5  MHz | 10  MHz | 15  MHz | 20  MHz |
| E-UTRAACLR1 | 29.2 dB | 29.2 dB | 29.2 dB | 29.2 dB | 29.2 dB | 29.2 dB |
| E-UTRA channel Measurement bandwidth | 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 | +5MHz or  -5MHz | +10MHz or  -10MHz | +15MHz or -15MHz | +20MHz or  -20MHz |

Table 3.2.1-2

Additional E-UTRAACLR requirements UE’s with 31dBm output power   
(applicable for operating band 14 only)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Channel bandwidth / E-UTRAACLR1 / Measurement bandwidth | | | | | |
| 1.4  MHz | 3.0  MHz | 5  MHz | 10  MHz | 15  MHz | 20  MHz |
| E-UTRAACLR1 |  |  | 37 dB | 37 dB |  |  |
| E-UTRA channel Measurement bandwidth |  |  | 4.5 MHz | 9.0 MHz |  |  |
| Adjacent channel centre frequency offset [MHz] |  |  | +5  /  -5 | +10  /  -10 |  |  |
| NOTE 1: E-UTRAACLR1 shall be applicable for >23 dBm. | | | | | | |

### 3.2.2 UTRA ACLR

UTRA Adjacent Channel Leakage power Ratio (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 Adjacent Channel Leakage power Ratio is specified for both the first UTRA adjacent channel (UTRAACLR1) and the 2nd UTRA adjacent channel (UTRAACLR2). The UTRA channel power is measured with a RRC bandwidth filter with roll-off factor =0.22. The assigned E-UTRA channel power is measured with a rectangular filter with measurement bandwidth specified in Table 3.1.1-1. If the measured UTRA channel power is greater than –50dBm then the UTRAACLR shall be higher than the value specified in Table 3.2.2-1.

Table 3.2.2-1

General requirements for UTRAACLR1/2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Channel bandwidth / UTRAACLR1/2  / measurement bandwidth | | | | | |
| 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 (in 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 (in 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 Measurement bandwidth | 1.08 MHz | 2.7 MHz | 4.5 MHz | 9.0 MHz | 13.5 MHz | 18 MHz |
| UTRA 5MHz channel Measurement bandwidth1 | 3.84 MHz | 3.84 MHz | 3.84 MHz | 3.84 MHz | 3.84 MHz | 3.84 MHz |
| UTRA 1.6MHz channel measurement bandwidth2 | 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 5MHz and for UTRA TDD is 1.6 MHz. | | | | | | |

### 3.2.3 UTRA ACLR for CA

For intra-band contiguous carrier aggregation the UTRA Adjacent Channel Leakage power Ratio (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.

UTRA Adjacent Channel Leakage power Ratio is specified for both the first UTRA adjacent channel (UTRAACLR1) and the 2nd UTRA adjacent channel (UTRAACLR2). 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 measurement bandwidth 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 UTRAACLR1/2

|  |  |
| --- | --- |
|  | CA bandwidth class / UTRAACLR1/2 / measurement bandwidth |
| CA bandwidth class C (Table 1.1.2-4) |
| UTRAACLR1 | 32.2 dB |
| Adjacent channel centre frequency offset (in MHz) | + BWChannel\_CA /2 + BWUTRA/2  /  - BWChannel\_CA / 2 - BWUTRA/2 |
| UTRAACLR2 | 35.2 dB |
| Adjacent channel centre frequency offset (in MHz) | + BWChannel\_CA /2 + 3\*BWUTRA/2  /  - BWChannel\_CA /2 – 3\*BWUTRA/2 |
| CA E-UTRAchannel Measurement bandwidth | BWChannel\_CA - 2\* BWGB |
| UTRA 5MHz channel Measurement bandwidth (Note 1) | 3.84 MHz |
| UTRA 1.6MHz channel measurement bandwidth (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-UTRA ACLR

For intra-band contiguous carrier aggregation the carrier aggregation E-UTRA Adjacent Channel Leakage power Ratio (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 measurement bandwidths specified in Table 3.2.4-1. If the measured adjacent channel power is greater than –50dBm 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 / Measurement bandwidth |
| CA bandwidth class C (Table 1.1.2-4) |
| CA E-UTRAACLR | 29.2 dB |
| CA E-UTRAchannel Measurement bandwidth | BWChannel\_CA - 2\* BWGB |
| Adjacent channel centre frequency offset (in MHz) | + BWChannel\_CA  /  - BWChannel\_CA |

# 3A Out of band emission mask for UL-MIMO

For UE supporting UL-MIMO, the requirements for Out of band 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 out of band emissions unless otherwise stated. The spurious emission limits are specified in terms of general requirements in line with 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 measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

## 4.1 General spurious emissions requirements

Unless otherwise stated, the spurious emission limits apply for the frequency ranges that are more than ΔfOOB (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 ΔfOOB and spurious emission domain

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Channel bandwidth** | **1.4**  **MHz** | **3.0**  **MHz** | **5**  **MHz** | **10**  **MHz** | **15**  **MHz** | **20**  **MHz** |
| ΔfOOB (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 ΔfOOB (MHz) from the edge of the channel bandwidth, the minimum offset of the measurement frequency from each edge of the channel should be ΔfOOB + MBW/2. MBW denotes the measurement bandwidth defined in Table 4.1-2.

Table 4.1-2

Spurious emissions limits

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range | Maximum Level | Measurement Bandwidth | **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 1: Applies for Band 22, Band 42 and Band 43. | | | |

## 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 ΔfOOB (MHz) in Table 4.2-1 from the ± edge of the aggregated channel bandwidth. For frequencies ΔfOOB greater than FOOB as specified in Table 4.2-1 the spurious requirements in Table 4-2 are applicable.

Table 4.2-1

Boundary between E-UTRA ΔfOOB and spurious emission domain   
for intra-band contiguous carrier aggregation

|  |  |
| --- | --- |
| CA Bandwidth Class | OOB boundary FOOB  (MHz) |
| A | Table 4-1 |
| B | Under discussion |
| 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 measurement bandwidth 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) | Note | |
| 1 | E-UTRA Band 1, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 38, 40, 41, 42, 43, 44 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| E-UTRA Band 3, 34 | FDL\_low | - | FDL\_high | -50 | 1 | 15 | |
| 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 | |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 6, 8, 15 | |
| Frequency range | 1839.9 | - | 1879.9 | -50 | 1 | 15 | |
| 2 | E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 26, 27, 28, 29, 41, 42 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| E-UTRA Band 2, 25 | FDL\_low | - | FDL\_high | -50 | 1 | 15 | |
| E-UTRA Band 43 | FDL\_low | - | FDL\_high | -50 | 1 | 2 | |
| 3 | E-UTRA Band 1, 7, 8, 20, 26, 27, 28, 33, 34, 38, 41, 43, 44 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| E-UTRA Band 3 | FDL\_low | - | FDL\_high | -50 | 1 | 15 | |
| E-UTRA Band 11, 18, 19, 21 | FDL\_low | - | FDL\_high | -50 | 1 | 13 | |
| E-UTRA Band 22, 42 | FDL\_low | - | FDL\_high | -50 | 1 | 2 | |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 13 | |
| 4 | E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 25, 26, 27, 28, 29, 41, 43 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| E-UTRA Band 42 | FDL\_low | - | FDL\_high | -50 | 1 | 2 | |
| 5 | E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 25, 28, 29,42, 43 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| E-UTRA Band 41 | FDL\_low | - | FDL\_high | -50 | 1 | 2 | |
| E-UTRA Band 26 | 859 | - | 869 | -27 | 1 |  | |
| 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, 3, 7, 8, 20, 22, 27, 28, 29, 33, 34, 42, 43 | 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, 33, 34, 38, 39, 40 | 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 | 15 | |
| E-UTRA Band 22, 41, 42, 43 | FDL\_low | - | FDL\_high | -50 | 1 | 2 | |
| 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, 11, 18, 19, 21, 26, 28, 34 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 | |
| Frequency range | 945 | - | 960 | -50 | 1 |  | |
| Frequency range | 1839.9 | - | 1879.9 | -50 | 1 |  | |
| Frequency range | 2545 | - | 2575 | -50 | 1 |  | |
| 10 | E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 28, 29, 41, 43 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| E-UTRA Band 22, 42 | FDL\_low | - | FDL\_high | -50 | 1 | 2 | |
| 11 | E-UTRA Band 1, 11, 18, 19, 21, 28, 34 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 | |
| Frequency range | 945 | - | 960 | -50 | 1 |  | |
| Frequency range | 1839.9 | - | 1879.9 | -50 | 1 |  | |
| Frequency range | 2545 | - | 2575 | -50 | 1 |  | |
| 12 | E-UTRA Band 2, 5, 13, 14, 17, 23, 24, 25, 26, 27, 41 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| E-UTRA Band 4, 10 | FDL\_low | - | FDL\_high | -50 | 1 | 2 | |
| E-UTRA Band 12 | FDL\_low | - | FDL\_high | -50 | 1 | 15 | |
| 13 | E-UTRA Band 2, 4, 5, 10, 12, 13, 17, 23, 25, 26, 27, 29, 41 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| Frequency range | 769 | - | 775 | -35 | 0.00625 | 15 | |
| Frequency range | 799 | - | 805 | -35 | 0.00625 | 11, 15 | |
| E-UTRA Band 14 | FDL\_low | - | FDL\_high | -50 | 1 | 15 | |
| E-UTRA Band 24 | FDL\_low | - | FDL\_high | -50 | 1 | 2 | |
| 14 | E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 29, 41 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| Frequency range | 769 | - | 775 | -35 | 0.00625 | 12, 15 | |
| Frequency range | 799 | - | 805 | -35 | 0.00625 | 11, 12, 15 | |
| 17 | E-UTRA Band 2, 5, 13, 14, 17, 23, 24, 25, 26, 27, 41 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| E-UTRA Band 4, 10 | FDL\_low | - | FDL\_high | -50 | 1 | 2 | |
| E-UTRA Band 12 | FDL\_low | - | FDL\_high | -50 | 1 | 15 | |
| 18 | E-UTRA Band 1, 11, 21, 34 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| Frequency range | 860 | - | 890 | -40 | 1 |  | |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 | |
| Frequency range | 758 | - | 799 | -50 | 1 |  | |
| Frequency range | 799 | - | 803 | -40 | 1 | 15 | |
| Frequency range | 945 | - | 960 | -50 | 1 |  | |
| Frequency range | 1839.9 | - | 1879.9 | -50 | 1 |  | |
| Frequency range | 2545 | - | 2575 | -50 | 1 |  | |
| 19 | E-UTRA Band 1, 11, 21, 28, 34 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| Frequency range | 860 | - | 890 | -40 | 1 | 9, 15 | |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 | |
| Frequency range | 945 | - | 960 | -50 | 1 |  | |
| Frequency range | 1839.9 | - | 1879.9 | -50 | 1 |  | |
| Frequency range | 2545 | - | 2575 | -50 | 1 |  | |
| 20 | E-UTRA Band 1, 3, 7, 8, 20, 22, 33, 34, 43 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| E-UTRA Band 20 | FDL\_low | - | FDL\_high | -50 | 1 | 15 | |
| E-UTRA Band 38, 42 | FDL\_low | - | FDL\_high | -50 | 1 | 2 | |
| 21 | E-UTRA Band 11 | FDL\_low | - | FDL\_high | -35 | 1 | 10, 15 | |
| E-UTRA Band 1, 18, 19, 28, 34 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| E-UTRA Band 21 | FDL\_low | - | FDL\_high | -50 | 1 | 10 | |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 | |
| Frequency range | 945 | - | 960 | -50 | 1 |  | |
| Frequency range | 1839.9 | - | 1879.9 | -50 | 1 |  | |
| Frequency range | 2545 | - | 2575 | -50 | 1 |  | |
| 22 | E-UTRA Band 1, 3, 7, 8, 20, 26, 27, 28, 33, 34, 38, 39, 40, 43 | 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, 10, 12, 13, 14, 17, 23, 24, 26, 27, 29, 41 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| E-UTRA Band 2 | FDL\_low | - | FDL\_high | -50 | 1 | 14, 15 | |
| Frequency range | 1998 | - | 1999 | -21 | 1 | 14, 15 | |
| Frequency range | 1997 | - | 1998 | -27 | 1 | 14, 15 | |
| Frequency range | 1996 | - | 1997 | -32 | 1 | 14, 15 | |
| Frequency range | 1995 | - | 1996 | -37 | 1 | 14, 15 | |
| Frequency range | 1990 | - | 1995 | -40 | 1 | 14, 15 | |
| Frequency range | 1990 |  | 1999 | -40 | 1 | 15, 28 | |
| Frequency range | 1999 |  | 2000 | -40 | Note 29 | 15, 28 | |
| 24 | E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 26, 29, 41 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| 25 | E-UTRA Band 4, 5, 10,12, 13, 14, 17, 22, 23, 24, 26, 27, 28, 29, 41, 42 | 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 | FDL\_low | - | FDL\_high | -50 | 1 | 2 | |
| 26 | E-UTRA Band 1, 2, 3, 4, 5, 10, 11, 12, 13, 14, 17, 18,19, 21, 22, 23, 24, 25, 26, 29, 34, 40, 42, 43 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| E-UTRA Band 41 | FDL\_low | - | FDL\_high | -50 | 1 | 2 | |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 | |
| Frequency range | 703 | - | 799 | -50 | 1 |  | |
| 799 | - | 803 | -40 | 1 | 15 | |
| Frequency range | 851 | - | 859 | -53 | 0.00625 | 20 | |
| E-UTRA Band 27 | FDL\_low | - | 859 | -32 | 1 | 20 | |
| Frequency range | 945 | - | 960 | -50 | 1 |  | |
| Frequency range | 1839.9 | - | 1879.9 | -50 | 1 |  | |
| 27 | E-UTRA Band 1, 2, 3, 4, 5, 7, 10, 12, 13, 14, 17, 22, 23, 25, 26, 27, 29, 41, 42, 43 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| Frequency range | 799 | - | 805 | -35 | 0.00625 |  | |
| E-UTRA Band 28 | 790 | - | FDL\_high | -32 | 1 | 16 | |
| FDL\_low | - | 790 | -50 | 1 |  | |
| 28 | E-UTRA Band 2, 3, 5, 7, 8, 18, 19, 25, 26, 27, 34, 38, 41 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| E-UTRA Band 1, 4, 10, 22, 42, 43 | FDL\_low | - | FDL\_high | -50 | 1 | 2 | |
| E-UTRA Band 11, 21 | FDL\_low | - | FDL\_high | -50 | 1 | 19, 24 | |
| E-UTRA Band 1 | FDL\_low | - | FDL\_high | -50 | 1 | 19, 25 | |
| Frequency range | 758 | - | 773 | -32 | 1 | 15 | |
| Frequency range | 773 | - | 803 | -50 | 1 |  | |
| Frequency range | 662 | - | 694 | -26.2 | 6 | 15 | |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8, 19 | |
| Frequency range | 1839.9 | - | 1879.9 | -50 | 1 |  | |
| … |  |  |  |  |  |  |  | |
| 33 | E-UTRA Band 1, 7, 8, 20, 22, 34, 38, 39, 40, 42, 43 | 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, 33, 38,39, 40, 41, 42, 43, 44 | FDL\_low | - | FDL\_high | -50 | 1 | 5 | |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 | |
| Frequency range | 1839.9 | - | 1879.9 | -50 | 1 | 5 | |
| 35 |  |  |  |  |  |  |  | |
| 36 |  |  |  |  |  |  |  | |
| 37 |  |  | - |  |  |  |  | |
| 38 | E-UTRA Band 1,3, 8, 20, 22, 28, 29, 33, 34, 42, 43 | 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 22, 34, 40, 41, 42, 44 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| 40 | E-UTRA Band 1, 3, 22, 26, 27, 33, 34, 39, 41, 42, 43, 44 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| 41 | E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 23, 24, 25, 26, 27, 28, 29, 34, 39, 40, 42, 44 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| E-UTRA Band 9, 11, 18, 19, 21 | FDL\_low | - | FDL\_high | -50 | 1 | 30 | |
| Frequency range | 1839.9 |  | 1879.9 | -50 | 1 | 30 | |
| Frequency range | 1884.5 |  | 1915.7 | -41 | 0.3 | 8, 30 | |
| 42 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 20, 25, 26, 27, 28, 33, 34, 38, 40, 41, 44 | FDL\_low | - | FDL\_high | -50 | 1 |  | |
| E-UTRA Band 43 | FDL\_low | - | FDL\_high | -50 | 1 | 3 | |
| 43 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 20, 25, 26, 27, 28, 33, 34, 38, 40 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 42 | FDL\_low | - | FDL\_high | -50 | 1 | 3 |
| E-UTRA Band 22 | FDL\_low | - | FDL\_high | [-50] | [1] | 3 |
| 44 | E-UTRA Band 3, 5, 8, 34, 39, 41 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 1, 40, 42 | FDL\_low | - | FDL\_high |  | -50 | 2 |

|  |
| --- |
| 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. 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: 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-synchronised TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band  NOTE 6: Applicable when NS\_05 in section 4.5.1 is signalled by the network.  NOTE 7: Applicable when co-existence with 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: Applicable when NS\_08 in section 4.5.3 is signalled by the network  NOTE 10: Applicable when NS\_09 in section 4.5.4 is signalled by the network  NOTE 11: Whether the applicable frequency range should be 793-805 MHz instead of 799-805 MHz is TBD  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 1 744.9MHz and 1 784.9MHz.  NOTE 14: To meet this requirement NS\_11 value shall be signalled when operating in 2 000-2 020 MHz  NOTE 15: These requirements also apply for the frequency ranges that are less than FOOB (MHz) in Table 4-1 and Table 4.2-1 from the edge of the channel bandwidth.  NOTE 16: Applicable when NS\_16 in section 4.5.9 is signalled by the network.  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: Applicable when NS\_15 in section 4.5.8 is signalled by the network.  NOTE21: This requirement is applicable 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 2 560.5-2 562.5 MHz and for carriers of 20 MHz bandwidth when carrier center frequency is within the range 2 552-2 560 MHz. No other restrictions apply for carriers with bandwidths confined in 2 500-2 570 MHz.  NOTE22: This requirement is applicable 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 2 605.5-2607.5 MHz and for carriers of 20 MHz bandwidth when carrier center frequency is within the range 2 597-2 605 MHz. No other restrictions apply for carriers with bandwidths confined in 2 570-2 615 MHz. For assigned carriers with bandwidths overlapping the frequency range 2 615-2 620 MHz the requirements apply with the maximum output power configured to +20 dBm in the IE *P-Max*.  NOTE 23: For carriers of 5 MHz channel bandwidth with carrier center frequencies (Fc) in the range 902.5MHz ≤ Fc  < 907.5 MHz, the requirement applies for uplink transmission bandwidths less than or equal to 20 RB. No restrictions apply in the range 907.5 MHz ≤ Fc ≤ 912.5 MHz. For carriers of 10 MHz channel bandwidth, the requirement only applies for Fc = 910 MHz and uplink transmission bandwidths 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 measurement bandwidth (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 measurement bandwidth (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 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 1 927.5-1 929.5 MHz and for carriers of 20 MHz bandwidth when carrier center frequency is within the range 1 930-1 938 MHz. This requirement is applicable without any other uplink transmission bandwidth restriction for channel bandwidths within the range 1 920-1 980 MHz.  NOTE 28: Applicable when NS\_20 is signalled by the network.  NOTE 29: The measurement bandwidth is 1% of the applicable E-UTRA channel bandwidth.  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 |

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

This clause specifies the requirements for the specified carrier aggregation 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 measurement bandwidth defined for the protected band.

Table 4.4-1

Spurious emissions band UE co-existence limits

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| E-UTRA CA Configuration | Spurious emission | | | | | | |
| Protected band | Frequency range (MHz) | | | Maximum Level (dBm) | MBW (MHz) | Note |
| CA\_1C | E-UTRA Band 1, 3, 7, 8, 9, 11, 18, 19, 20, 21, 22, 38, 40, 41, 42, 43 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 34 | FDL\_low | - | FDL\_high | -50 | 1 | 4,6,7 |
| Frequency range | 1900 |  | 1915 | -15.5 | 5 | 6,10,12 |
| Frequency range | 1915 |  | 1920 | +1.6 | 5 | 6,7,10, 12 |
| Frequency range | 1880 |  | 1895 | -40 | 1 | 7,10 |
| Frequency range | 1895 |  | 1915 | -15.5 | 5 | 7,10 |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 4, 5 |
| CA\_7C | E-UTRA Band 1, 3, 7, 8, 20, 22, 33, 34, 42, 43 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 2570 | - | 2575 | +1.6 | 5 | 12 |
| Frequency range | 2575 | - | 2595 | -15.5 | 5 | 8, 12 |
| Frequency range | 2595 | - | 2620 | -40 | 1 | 8 |
| CA\_38C | E-UTRA Band 1,3, 8, 20, 22, 33, 34, 42, 43 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 2620 | - | 2645 | -15.5 | 5 | 9, 10, 11, 12 |
| Frequency range | 2645 | - | 2690 | -40 | 1 | 9, 10,11 |
| CA\_40C | E-UTRA Band 1, 3, 33, 34, 39, 41, 42, 43 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| CA\_41C | E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 23, 24, 25, 26, 34, 39, 40, 42, 44 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| 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 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).  NOTE 3: To meet these requirements some restriction will be needed for either the operating band or protected band  NOTE 4: Applicable when CA\_NS\_01 in section 4.6.1 is signalled by the network.  NOTE 5: Applicable when co-existence with PHS system operating in 1 884.5-1 915.7 MHz.  NOTE 6: Applicable when CA\_NS\_02 in section 4.6.2 is signalled by the network.  NOTE 7: Applicable when CA\_NS\_03 in section 4.6.3 is signalled by the network.  NOTE 8: Applicable when CA\_NS\_06 in section 4.6.3 is signalled by the network.  NOTE 9: Applicable when CA\_NS\_05 in section 4.6.3 is signalled by the network.  NOTE 10: The requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 4-1 and Table 4.2-1 from the edge of the channel bandwidth.  NOTE 11: This requirement is applicable for carriers with bandwidths confined in 2 570-2 615 MHz. For assigned carriers with bandwidths overlapping the frequency range 2 615-2 620 MHz the requirements apply with the maximum output power configured to +20 dBm in the IE *P-Max*.  NOTE 12: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band. | | | | | | | |

## 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 ΔfOOB (MHz) in Table 4-1 from the edge of the channel bandwidth.

Table 4.5.1-1

Additional requirements (PHS)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | | | | **Measurement bandwidth** | **Note** |
| **5**  **MHz** | **10**  **MHz** | **15**  **MHz** | **20**  **MHz** |
| 1884.5 f 1915.7 | -41 | -41 | -41 | -41 | 300 KHz | 2 |
| 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 (1915.7 MHz) + 4 MHz+ the channel BW assigned, where channel BW is as defined in section 1.1. Additional restrictions apply for operations below this point. | | | | | | |

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 measurement bandwidth (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 ΔfOOB (MHz) in Table 4-1 from the edge of the channel bandwidth.

Table 4.5.2-1

Additional requirements

|  |  |  |
| --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **Measurement bandwidth** |
| **10 MHz** |
| 769 ≤ f ≤ 775 | -57 | 6.25 kHz |
| NOTE: The emissions measurement shall be sufficiently power averaged to ensure standard 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 measurement bandwidth (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 from the edge of the channel bandwidth.

Table 4.5.3-1

Additional requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | | | **Measurement bandwidth** |
| **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 measurement bandwidth (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 ΔfOOB (MHz) in Table 4-1 from the edge of the channel bandwidth.

Table 4.5.4-1

Additional requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Frequency band (MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | | | **Measurement bandwidth** |
| **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 measurement bandwidth (1 MHz).

### 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 4.5.4-1. This requirement also applies for the frequency ranges that are less than ΔfOOB (MHz) in Table 4-1 from the edge of the channel bandwidth.

Table 4.5.5-1

Additional requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency band  (MHz) | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth | Note |
| 1.4, 3, 5 MHz |
| 806 ≤ f ≤ 813.5 | -42 | 6.25 kHz | 1 |
| NOTE 1: The emission limit applies at an offset of greater than or equal to 0.7 MHz below the E‑UTRA channel edge | | | |

### 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 ΔfOOB (MHz) in Table 4-1 from the edge of the channel bandwidth.

Table 4.5.6-1

Additional requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency band  (MHz) | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth | Note |
| 5 MHz |
| 806 ≤ f ≤ 816 | -42 | 6.25 kHz | 1 |
| NOTE 1: The emission limit applies at an offset of greater than or equal to 3 MHz below the E-UTRA channel edge | | | |

### 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 ΔfOOB (MHz) in Table 4-1 from the edge of the channel bandwidth.

Table 4.5.7-1

Additional requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency band  (MHz) | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth | Note |
| 10, 15 MHz |
| 806 ≤ f ≤ 816 | -42 | 6.25 kHz | 1 |
| NOTE 1: The emission limit applies at an offset of greater than or equal 8 MHz below the of E-UTRA channel edge. | | | |

### 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 ΔfOOB (MHz) in Table 4-1 from the edge of the channel bandwidth.

Table 4.5.8-1

Additional requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency band  (MHz) | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth | Note |
| 1.4, 3, 5, 10, 15 MHz |
| 851 ≤ f ≤ 859 | -53 | 6.25 kHz |  |
| NOTE: The emissions measurement shall be sufficiently power averaged to ensure standard 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 ΔfOOB (MHz) in Table 4-1 from the edge of the channel bandwidth.

Table 4.5.9-1

Additional requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency band  (MHz) | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth | 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 ΔfOOB (MHz) in Table 4-1 from the edge of the channel bandwidth.

Table 4.5.10-1

Additional requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency band  (MHz) | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth | 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 ΔfOOB (MHz) in Table 4-1 from the edge of the channel bandwidth.

Table 4.5.11-1

Additional requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency band  (MHz) | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth | 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 ΔfOOB (MHz) in Table 4-1 from the edge of the channel bandwidth.

Table 4.5.12-1

Additional requirements

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

## 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 ΔfOOB (MHz) in Table 4-1 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 | 1884.5 | - | 1919.6 | -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 measurement bandwidth (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 ΔfOOB (MHz) in Table 4-1 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 | 1900 | - | 1915 | -15.5 | 5 |
| Frequency range | 1915 | - | 1920 | +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 ΔfOOB (MHz) in Table 4-1 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 | 1880 | - | 1895 | -40 | 1 |
| Frequency range | 1895 | - | 1915 | -15.5 | 5 |
| Frequency range | 1915 | - | 1920 | +1.6 | 5 |

## 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 | Measurement  bandwidth | Maximum level | Note |
| 30 MHz ≤ f < 1GHz | 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 | | | |

Appendix 1

Definition of test tolerance

Test tolerance

With reference to Recommendation ITU-R M.1545, “test tolerance” is the relaxation value referred to in *recommends* 2 of Recommendation ITU-R M.1545, i.e. the difference between the core specification value and the test limit, evaluated applying the shared risk principle as per Figs 2 and 3 of Annex 1 of Recommendation ITU-R M.1545. In case the core specification value is equal to the test limit (Fig. 3 of Annex 1 of Recommendation ITU-R M.1545) the “test tolerances” are equal to 0.

Annex 2

WirelessMAN-Advanced

Out of band and spurious emission regions

The default out of band emission, where channel spectral mask specifications is applicable, is the absolute value of ±250% of channel bandwidth size from channel center frequency or lower and upper bound of the target band whichever is smaller. For frequencies beyond out of band region, the Spurious Emission specifications are applicable

# 1 Default specifications

## 1.1 Default channel spectral mask

Unless otherwise specified in other sub sections of this Annex, the spectrum masks of Table 1 and Table 2 are applicable.

Table 1

Channel mask for 5 MHz bandwidth

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | ***∆f,* offset from channel center (MHz)** | **Integration bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port** |
| 1 | 2.5 ≤ *f* < 3.5 | 50 | -13 |
| 2 | 3.5 ≤ *f* < 7.5 | 1000 | -10 |
| 3 | 7.5 ≤ *f* < 8.5 | 1000 | -13 |
| 4 | 8.5 ≤ *f* < 12.5 | 1000 | -25 |

Note: The first measurement position with a 50 kHz filter is at Δf equals to 2.525 MHz; the last is at *Δf* equals to 3.475 MHz. The first measurement position with a 1 MHz filter is at *Δf* equals to 4.0 MHz; the last is at *Δf* equals to 12.0 MHz.

Table 2

Channel mask for 10 MHz bandwidth

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port** |
| 1 | 5 ≤ *f* < 6 | 100 | -13 |
| 2 | 6 ≤ *f* < 10 | 1000 | -10 |
| 3 | 10 ≤ *f* < 15 | 1000 | -13 |
| 4 | 15 ≤ *f* < 25 | 1000 | -25 |

Note: The first measurement position with a 100 kHz filter is at Δf equals to 5.050 MHz; the last is at *Δf* equals to 5.950 MHz. The first measurement position with a 1 MHz filter is at *Δf* equals to 6.5 MHz; the last is at *Δf* equals to 24.5 MHz.

Table 3

Channel Mask for 20 MHz Bandwidth

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port** |
| 1 | 10 ≤ *f* < 11 | 200 | -13 |
| 2 | 11 ≤ *f* < 15 | 1000 | -10 |
| 3 | 15 ≤ *f* < 30 | 1000 | -13 |
| 4 | 30 ≤ *f* < 50 | 1000 | -25 |

Note: The first measurement position with a 100 kHz filter is at Δf equals to 10.050 MHz; the last is at *Δf* equals to 10.950 MHz. The first measurement position with a 1 MHz filter is at *Δf* equals to 11.5 MHz; the last is at *Δf* equals to 49.5 MHz.

## 1.2 Default Spurious Emission

Unless otherwise specified in other sub sections of this Annex, the default spurious emission specifications of Table 4 are applicable.

Table 4

Default Spurious Emissions; Relevant to FUL-le +ChBW/2 ≤ *fc* ≤ FUL-ue- ChBW/2

|  |  |  |  |
| --- | --- | --- | --- |
| No | Spurious frequency (*f*) range | Measurement bandwidth | Maximum Emission Level (dBm) |
| 1 | 9 kHz ≤ *f* < 150 kHz | 1 kHz | -36 |
| 2 | 150 kHz ≤ *f* < 30 MHz | 10 kHz | -36 |
| 3 | 30 MHz ≤ *f* < 1 000 MHz | 100 kHz | -36 |
| 4 | 1 GHz ≤ *f* < 5 x Fue | 30 kHz If 2.5 x ChBW <= *∆f* < 10 x ChBW  300 kHz If 10 x ChBW MHz<= *∆f* < 12 x ChBW  1 MHz If 12 x ChBW <= *∆f* | -30 |

# 2 Band Class 1

## 2.1 Band Class Group 1.C

### 2.1.1 Channel spectral mask

The channel mask for 5 MHz bandwidth is specified in Table 5.

Table 5

Channel Mask for 5 MHz Bandwidth (BCG 1.C)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | ***f* offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Allowed Emission Level (dBm/integration BW) at the antenna port.** |
| 1 | 2.5 ≤ *f* < 3.5 | 50 | -13 |
| 2 | 3.5 ≤ *f* < 7.5 | 1000 | -13 |
| 3 | 7.5 ≤ *f* < 8 | 500 | -16 |
| 4 | 8 ≤ *f* < 10.4 | 1000 | -25 |
| 5 | 10.4 ≤ *f* < 12.5 | 1000 | -25 |

The channel mask for 10 MHz bandwidth is specified in Table 6.

Table 6

Channel Mask for 10 MHz Bandwidth (BCG 1.C)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | ***f* offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port** |
| 1 | 5 ≤ *f* <6 | 100 | -13 |
| 2 | 6 ≤ *f* <10 | 1000 | -13 |
| 3 | 10 ≤ *f* <11 | 1000 | -13-12(*f* -10) |
| 4 | 11 ≤ *f* <15 | 1000 | -25 |
| 5 | 15 ≤ *f* <20 | 1000 | -25 |
| 6 | 20≤ *f* ≤25 | 1000 | -25 |

##### 2.1.2 Spurious Emission Specification

Table 7

Additional Spurious Emissions for 5 MHz Channel Size (BCG 1.C)

|  |  |  |  |
| --- | --- | --- | --- |
| No | Spurious frequency (*f*) range (MHz) | Measurement bandwidth (MHz) | Maximum Emission Level (dBm) |
| 1 | 2 110 ≤ *f* < 2 170 | 1 | -50 |
| 2 | 1 805 ≤ *f* < 1 880 | 1 | -50 |
| 3 | 2 496 ≤ *f* < 2 690 | 1 | -50 |
| 4 | 925 ≤ *f* < 960 | 1 | -50 |
| 5 | 1 900 ≤ *f* < 1 920 | 1 | -50 |
| 6 | 2 010 ≤ *f* < 2 025 | 1 | -50 |
| 7 | 2 570 ≤ *f* < 2 620 | 1 | -50 |
| 8 | 791 ≤ *f* < 821 | 1 | -50 |

# 3 Band Class 3

## 3.1 Band Class Group 3.C

### 3.1.1 Channel Spectral Mask

The channel mask for 5 MHz, 10 MHz and 20 MHz channel bandwidths are specified in Table 8 through Table 10.

In this section, the unwanted emission requirements for the first adjacent channel, specified as maximum allowed Adjacent Channel Power, are captured as a single point measurement for the first segment of the mask.

Table 8

Channel Mask for 5 MHz Bandwidth (BCG 3.C)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port** |
| 1 | *f* = 5 | 4800 | -1 |
| 2 | 7.5 ≤ *f* <8 | 1000 | −23−2.28(*f* −7.5) |
| 3 | 8 ≤ *f* <17.5 | 1000 | −24−1.68(*f* −8) |
| 4 | 17.5 ≤ *f* <22.5 | 1000 | −40 |

Table 9

Channel Mask for 10 MHz Bandwidth (BCG 3.C)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port** |
| 1 | *f* = 10 | 9500 | -3 |
| 2 | 15 ≤ *f* <20 | 1000 | −24−32(*f* –10.5)/19 |
| 3 | 20 ≤ *f* <25 | 1000 | −40 |

Table 10

Channel Mask for 20 MHz Bandwidth (BCG 3.C)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port** |
| 1 | *f* = 20 | 19500 | -3 |
| 2 | 30 ≤ *f* <35 | 1000 | −25 |
| 3 | 35 ≤ *f* <50 | 1000 | −30 |

##### 3.1.2 Transmitter Spurious Emission

In addition to the default Spurious Emission specifications, the requirements of Table 11 through Table 15 are applicable.

Table 11

Additional Spurious Emissions for 5 MHz Channel Size (BCG 3.C)

|  |  |  |  |
| --- | --- | --- | --- |
| No | Spurious frequency (*f*) range (MHz) | Measurement bandwidth (MHz) | Maximum Emission Level (dBm) |
| 1 | 2 505 ≤ *f* < 2 530 | 1 | -37 |
| 2 | 2 530 ≤ *f* < 2 535 | 1 | 1.7*f*-4338 |
| 3 | 2 535 ≤ *f* < 2 630 | 1 | -21-1.68(*f* -8) 12.5 MHz < *f* < 17.5 MHz  -37 17.5 MHz < *f* < 22.5 MHz  -18 22.5 MHz < *f* |
| 4 | 2 630 ≤ *f* < 2 630 | 1 | −13 − 8(*f* − 2 627)/3.5 |
| 5 | 2 630.5 ≤ *f* < 2 640 | 1 | −21 − 16(*f* − 2 630.5)/9.5 |
| 6 | 2 640 ≤ *f* < 2 655 | 1 | −37 |

Table 12

Additional Spurious Emissions for 5 MHz Channel Size (BCG 3.C)

|  |  |  |  |
| --- | --- | --- | --- |
| No | Spurious frequency (*f*) range (MHz) | Measurement bandwidth (MHz) | Maximum Emission Level (dBm) |
| 1 | 2 620 ≤ *f* < 2 690 | 1 | -40 |

Note: With respect to Table 12, for each RF channel used, up to five measurements in 2 620‑2 635.84 and 2 655-2 690 MHz are exempt from the -40 dBm specification of Row 1 where a relaxed level of -30 dBm of Row 4 of Table 4 is applicable.

Table 13

Additional Spurious Emissions for 10 MHz Channel Size (BCG 3.C)

|  |  |  |  |
| --- | --- | --- | --- |
| No | Spurious frequency (*f*) range (MHz) | Measurement bandwidth (MHz) | Maximum Emission Level (dBm) |
| 1 | 2 505 ≤ *f* < 2 530 | 1 | -37 |
| 2 | 2 530 ≤ *f* < 2 535 | 1 | 1.7f-4338 |
| 3 | 2 535 ≤ *f* < 2 630 | 1 | -18 25 MHz < *f* |
| 4 | 2 630 ≤ *f* < 2 630.5 | 1 | −13 − 8(*f* − 2 627)/3.5 |
| 5 | 2 630.5 ≤ *f* < 2 640 | 1 | −21 − 16(*f* − 2 630.5)/9.5 |
| 6 | 2 640 ≤ *f* < 2 655 | 1 | −37 |

Table 14

Spurious Emissions for 10 MHz Channel Size (BCG 3.C)

|  |  |  |  |
| --- | --- | --- | --- |
| No | Spurious frequency (*f*) range (MHz) | Measurement bandwidth (MHz) | Maximum Emission Level (dBm) |
| 1 | 2 620 ≤ *f* < 2 690 | 1 | -40 |

Note: With respect to Table 13, for each RF channel used, up to five measurements in 2 620‑2 635.84 and 2 655-2 690 MHz are exempt from the -40 dBm specification of Row 1 where a relaxed level of -30 dBm of Row 4 of Table 4 is applicable.

Table 15

Mobile station spurious emission limit,   
Japan (BCG 3.C)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Frequency bandwidth** | **Measurement bandwidth** | **Allowed emission level (dBm)** |
| 1 | 9 kHz ≤ *f* < 150 kHz | 1 kHz | −16 |
| 2 | 150 kHz ≤ *f* < 30 MHz | 10 kHz | −16 |
| 3 | 30 MHz ≤ *f* < 1 000 MHz | 100 kHz | −16 |
| 4 | 1 000 MHz ≤ *f* < 2 505 MHz | 1 MHz | −16 |
| 5 | 2 505 MHz ≤ *f* < 2 530 MHz | 1 MHz | −40 |
| 6 | 2 530 MHz ≤ *f* < 2 535 MHz | 1 MHz | 1.7f−4341 |
| 7 | 2 535 MHz ≤ *f* < 2 655 MHz | 1 MHz | −21 |
| 8 | 2 655 MHz ≤ *f* | 1 MHz | −16 |
| Note: The allowed emission level for the frequency band between 2 535 MHz and 2 655 MHz shall be applied for the frequency range greater than 2.5 times the channel size away from the centre frequency. | | | |

## 3.2 Band Class Group 3.D

### 3.2.1 Channel Spectral Mask

The channel mask for 10 MHz bandwidth is specified in Table 16.

Table 16

Channel Mask for 10 MHz Bandwidth (BCG 3.D)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port** |
| 1 | 5 ≤ *f* <6 | 100 | -13 |
| 2 | 6 ≤ *f* <10 | 1000 | -13 |
| 3 | 10 ≤ *f* <11 | 1000 | -13-12(*f* -10) |
| 4 | 11 ≤ *f* <15 | 1000 | -25 |
| 5 | 15 ≤ *f* <20 | 1000 | -25 |
| 6 | 20 ≤ *f* ≤ 25 | 1000 | -25 |

The channel mask for 5 MHz bandwidth is specified in Table 17.

Table 17

Channel Mask for 5 MHz Bandwidth (BCG 3.D)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/integration BW) at the antenna port.** |
| 1 | 2.5 ≤ *f* <3.5 | 50 | -13 |
| 2 | 3.5 ≤ *f* <7.5 | 1000 | -13 |
| 3 | 7.5 ≤ *f* <8 | 500 | -16 |
| 4 | 8 ≤ *f* <10.4 | 1000 | -25 |
| 5 | 10.4 ≤ *f* < 12.5 | 1000 | -25 |

##### 3.2.2 Transmitter Spurious Emission

In addition to the default Spurious Emission specifications, the requirements of Table 18 are applicable.

Table 18

Additional Spurious Emissions (BCG 3.D)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Spurious frequency (*f*) range (MHz)** | **Measurement bandwidth (MHz)** | **Maximum Emission Level (dBm)** |
| 1 | 2 110-2 170 | 1 | -50 |
| 2 | 1 805-1 880 | 1 | -50 |
| 3 | 2 620-2 690 | 1 | -50 |
| 4 | 925-960 | 1 | -50 |
| 5 | 1 900-1 920 | 1 | -50 |
| 6 | 2 010-2 025 | 1 | -50 |
| 7 | 2 570-2 620 | 1 | -50 |

# 4 Band Class 5

## 4.1 Band Class Group 5L.E

### 4.1.1 Channel Spectral Mask

Table 19

Channel Mask for 5 MHz Channel Bandwidth   
(BCG 5L.E)

|  |  |  |  |
| --- | --- | --- | --- |
| No | Frequency offset *Δf* (MHz) | Maximum Emission Level (dBc) | Measurement bandwidth |
| 1 | 2.5 ≤ *f* < 3.5 | -33.5-15(*∆f*-2.5) | 30 kHz |
| 2 | 3.5 ≤ *f* < 7.5 | -33.5-1(*∆f*-3.5) | 1 MHz |
| 3 | 7.5 ≤ *f* < 8.5 | -37.5-10(*∆f*-7.5) | 1 MHz |
| 4 | 8.5 ≤ *f* ≤ 12.5 | -47.5 | 1 MHz |
| Notes:   1. The out-of-channel emission is specified as power level measured over the specified measurement bandwidth relative to the total mean power of the MS carrier measured in the 5 MHz channel. 2. The MS emission shall not exceed the levels specified in Table 19. Assuming specific power classes, relative specifications of Table 19 can be converted to absolute values for testing purposes. 3. In additions, for center carrier frequencies within 3 650-3 700 MHz range, all emission levels shall not exceed -13 dBm/MHz. 4. The first measurement position with a 30 kHz filter is at Δf equals to 2.515 MHz; the last is at *Δf* equals to 3.485 MHz. 5. The first measurement position with a 1 MHz filter is at Δf equals to 4 MHz; the last is at Δf equals to 12 MHz. As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be different from the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth. 6. Note that equivalent PSD type mask can be derived by applying 10\*log ((5 MHz)/(30 kHz))= 22.2 dB and 10\*log((5 MHz)/(1 MHz))= 7 dB scaling factor for 30 kHz and 1 MHz measurement bandwidth respectively. | | | |

Table 20

Channel Mask for 10 MHz Channel Bandwidth  
(BCG 5L.E)

|  |  |  |  |
| --- | --- | --- | --- |
| No | Frequency offset *Δf* (MHz) | Maximum Emission Level (dBc) | Measurement bandwidth |
| **1** | 5.0 ≤ *f* < 7.0 | -33.5-9(*∆f*-5.0) | 30 kHz |
| **2** | 7.0 ≤ *f* < 15.0 | -36.5-0.5(*∆f*-7.0) | 1 MHz |
| **3** | 15.0 ≤ *f* < 17.0 | -40.5-5(*∆f*-15.0) | 1 MHz |
| **4** | 17.0 ≤ *f* ≤ 25.0 | -50.5 | 1 MHz |
| Notes:   1. The spectrum emission mask of the MS applies to frequency offsets between 5.0 MHz and 25.0 MHz on both sides of the MS center carrier frequency. The out-of-channel emission is specified as power level measured over the specified measurement bandwidth relative to the total mean power of the MS carrier measured in the 10 MHz channel. 2. The MS emission shall not exceed the levels specified in Table 20. Assuming specific power classes, relative specifications of Table 20 can be converted to absolute values for testing purposes. 3. In additions, for center carrier frequencies within 3650-3700 MHz range, all emission levels shall not exceed  -13 dBm/MHz. 4. The first measurement position with a 30 kHz filter is at Δ*f* equals to 510.015 MHz; the last is at Δ*f* equals to 6.985 MHz. 5. The first measurement position with a 1 MHz filter is at *Δf* equals to 7.5 MHz; the last is at Δf equals to 24.5 MHz. As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be different from the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth. 6. Equivalent PSD type mask can be derived by applying 10\*log ((10 MHz)/(30 kHz))= 25.2 dB and  10\*log((10 MHz)/(1 MHz))= 10 dB scaling factor for 30 kHz and 1 MHz measurement bandwidth respectively. | | | |

# 5 Band Class 6

## 5.1 Band Class Group 6.D

### 5.1.1 Channel Spectral Mask

Table 21 and Table 22 specify the spectrum emission for FDD Mobile Stations with 5 and 10 MHz channel bandwidths.

Table 21

Channel Mask for 5 MHz Bandwidth (BCG 6.D)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/integration BW) at the antenna port** |
| 1 | 2.5 ≤ *f* < 3.5 | 50 | -13 |
| 2 | 3.5 ≤ *f* ≤ 12.5 | 1000 | -13 |

Table 22

Channel Mask for 10 MHz Bandwidth (BCG 6.D)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port** |
| 1 | 5 ≤ *f* < 6 | 100 | -13 |
| 2 | 6 ≤ *f* ≤ 25 | 1000 | -13 |

### 5.1.2 Spurious Emission Specifications

In addition to the default Spurious Emission specifications, the requirements of Table 23 are applicable.

Table 23

Spurious Emissions (BCG 6.D)

|  |  |  |  |
| --- | --- | --- | --- |
| No | Measurement frequency range | Measurement bandwidth (MHz) | Maximum Emission Level (dBm) |
| 1 | 30 MHz ≤ *f* < 8.850 GHz | 1 | -13 |

#### 

## 5.2 Band Class Group 6.E

### 5.2.1 Transmitter Spurious Emission Specification

Table 24 and Table 25 specify the additional spurious emission limits.

Table 24

Spurious Emissions (BCG 6.E)

|  |  |  |  |
| --- | --- | --- | --- |
| No | Measurement frequency range | Measurement bandwidth | Maximum Emission Level (dBm) |
| 1 | 9 kHz ≤ *f* < 150 kHz | 1 kHz | -36 |
| 2 | 150 kHz ≤ *f* < 30 MHz | 10 kHz | -36 |
| 3 | 30 MHz ≤ *f* < 1 000 GHz | 100 kHz | -36 |
| 4 | 1 GHz ≤ *f* < 9.900 GHz | 1 MHz | -30 |

Table 25

Additional Spurious Emissions (BCG 6.E)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Spurious frequency (*f*) range (MHz)** | **Measurement bandwidth** | **Maximum Emission Level (dBm)** |
| 1 | 2 110-2 170 | 1 MHz | -50 |
| 2 | 1 805-1 880 | 1 MHz | -50 |
| 3 | 2 620-2 690 | 1 MHz | -50 |
| 4 | 925-960 | 1 MHz | -50 |
| 5 | 1 844.9-1 879.9 | 1 MHz | -50 |
| 6 | 1 475.9-1 500.9 | 1 MHz | -50 |
| 7 | 1 900-1 920 | 1 MHz | -50 |
| 8 | 2 010-2 025 | 1 MHz | -50 |
| 9 | 2 570-2 620 | 1 MHz | -50 |
| 11 | 1 880-1 920 | 1 MHz | -50 |
| 12 | 2 300-2 400 | 1 MHz | -50 |
| 13 | 860-895 | 1 MHz | -50 |
| 14 | 1 884.5-1 919.6 | 300 KHz | -41 |

## 5.3 Band Class Group 6.F

### 5.3.1 Transmitter Spurious Emission Specification

Table 26 specifies the additional spurious emission limits.

Table 26

Additional Spurious Emission (BCG 6.F)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No** | **Transmitter Center Frequency (fc) (MHz)** | **Spurious Frequency (*f*) Range (MHz)** | **Measurement Bandwidth (MHz)** | **Maximum Emission Level (dBm)** |
|  | 1 710-1 785 | 925-960 | 1 | -50 |
|  | 1 710-1 785 | 1 475.9–1 500.9 | 1 | -50 |
|  | 1 710-1 785 | 1 805-1 880 | 1 | -50 |
|  | 1 710-1 785 | 1 844.9–1 879.9 | 1 | -50 |
|  | 1 710-1 785 | 1 900–1 920 | 1 | -50 |
|  | 1 710-1 785 | 2 010–2 025 | 1 | -50 |
|  | 1 710-1 785 | 2 110-2 170 | 1 | -50 |
|  | 1 710-1 785 | 2 570–2 620 | 1 | -50 |
|  | 1 710-1 785 | 2 620-2 690 | 1 | -50 |
|  | 1 710-1 785 | 2 300–2 400 | 1 | -50 |
|  | 1 710-1 785 | 791-821 | 1 | -50 |

## 5.4 Band Class Group 6.G

### 5.4.1 Channel Spectral Mask

Table 27 and Table 28 specify the spectrum emission for FDD Mobile Stations with 5 and 10 MHz channel bandwidths.

Table 27

Channel Mask for 5 MHz Bandwidth (BCG 6.G)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/integration BW) at the antenna port** |
| 1 | 2.5 ≤ *f* < 3.5 | 50 | -13 |
| 2 | 3.5 ≤ *f* ≤ 12.5 | 1000 | -13 |

Table 28

Channel Mask for 10 MHz Bandwidth (BCG 6.G)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port** |
| 1 | 5 ≤ *f* < 6 | 100 | -13 |
| 2 | 6 ≤ *f* ≤ 25 | 1000 | -13 |

### 5.4.2 Spurious Emission Specifications

In addition to the default Spurious Emission specifications, the requirements of Table 29 are applicable.

Table 29

Spurious Emissions (BCG 6.G)

|  |  |  |  |
| --- | --- | --- | --- |
| No | Measurement frequency range | Measurement bandwidth (MHz) | Maximum Emission Level (dBm) |
| 1 | 30 MHz ≤ *f* < 8.775 GHz | 1 | -13 |

## 5.5 Band Class Group 6.H

### 5.5.1 Channel Spectral Mask

Table 30 and Table 31 specify the spectrum emission for FDD Mobile Stations with 5 and 10 MHz channel bandwidths.

Table 30

Channel Mask for 5 MHz Bandwidth (BCG 6.H)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/integration BW) at the antenna port** |
| 1 | 2.5 ≤ *f* < 3.5 | 50 | -13 |
| 2 | 3.5 ≤ *f* ≤ 12.5 | 1000 | -13 |

Table 31

Channel Mask for 10 MHz Bandwidth (BCG 6.H)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port** |
| 1 | 5 ≤ *f* < 6 | 100 | -13 |
| 2 | 6 ≤ *f* ≤ 25 | 1000 | -13 |

### 5.5.2 Spurious Emission Specifications

In addition to the default Spurious Emission specifications, the requirements of Table 32 are applicable.

Table 32

Spurious Emissions (BCG 6.G)

|  |  |  |  |
| --- | --- | --- | --- |
| No | Measurement frequency range | Measurement bandwidth (MHz) | Maximum Emission Level (dBm) |
| 1 | 30 MHz ≤ *f* < 9.550 GHz | 1 | -13 |

## 5.6 Band Class Group 6.J

### 5.6.1 Channel Spectral Mask

Table 33 and Table 34 specify the spectrum emission for FDD Mobile Stations with 5 and 10 MHz channel bandwidths.

Table 33

Channel Mask for 5 MHz Bandwidth (BCG 6.J)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/integration BW) at the antenna port** |
| 1 | 2.5 ≤ *f* < 3.5 | 50 | -13 |
| 2 | 3.5 ≤ *f* ≤ 12.5 | 1000 | -13 |

Table 34

Channel Mask for 10 MHz Bandwidth (BCG 6.J)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Offset from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port** |
| 1 | 5 ≤ *f* < 6 | 100 | -13 |
| 2 | 6 ≤ *f* ≤ 25 | 1000 | -13 |

##### 5.6.2 Spurious Emission Specifications

In addition to the default Spurious Emission specifications, the requirements of Table 35 are applicable.

Table 35

Spurious Emissions (BCG 6.J)

|  |  |  |  |
| --- | --- | --- | --- |
| No | Measurement frequency range | Measurement bandwidth (MHz) | Maximum Emission Level (dBm) |
| 1 | 30 MHz ≤ *f* < 9.550 GHz | 1 | -13 |

# 6 Band Class 7

## 6.1 Band Class Group 7.H

### 6.1.1 Channel Spectral Mask

Table 36 and Table 37 specify the spectrum emission mask with 5 MHz channel bandwidths.

Table 36

Channel Mask for 5 MHz Bandwidth: 700.5 ≤*fc* ≤ 795.5 (BCG 7.H)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Frequency offset Δf from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port** |
| 1 | 2.5 ≤ *f* 2.6 | 30 | -13 |
| 2 | 2.6 ≤ *f* 12.5 | 100 | -13 |

Notes: The first measurement position with a 30 kHz filter is at Δf equals to 2.515 MHz; the last is at Δf equals to 2.585 MHz. The first measurement position with a 100 kHz filter is at Δf equals to 2.650 MHz; the last is at Δf equals to 12.450 MHz.

Table 37

Channel Mask for 5 MHz Bandwidth: 799.5 ≤*fc* ≤ 859.5 (BCG 7.H)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Frequency offset Δf from channel center (MHz)** | **Integration Bandwidth (MHz)** | **Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port** |
| 1 | 2.5 ≤ *f* 7.5 | 5 | 1.6 |
| 2 | 7.5 ≤ *f* 12.5 | 2 | -10 |

Notes: The measurement position with a 5 MHz filter is at Δf equals to 5 MHz. The first measurement position with a 2 MHz filter is at Δf equals to 8.5 MHz; the last is at Δf equals to 11.5 MHz.

Table 38 and Table 39 specify the spectrum emission mask with 10 MHz channel bandwidths.

Table 38

Channel Mask for 10 MHz Bandwidth: 703 ≤*fc* ≤ 793 (BCG 7.H)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Frequency offset Δf from channel center (MHz)** | **Integration Bandwidth (kHz)** | **Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port** |
| 1 | 5.0 ≤ *f* < 5.1 | 30 | -13 |
| 2 | 5.1 ≤ *f* ≤ 25.0 | 100 | -13 |

Notes: The first measurement position with a 30 kHz filter is at Δf equals to 5.015 MHz; the last is at Δf equals to 5.085 MHz. The first measurement position with a 100 kHz filter is at Δf equals to 5.150 MHz; the last is at Δf equals to 24.950 MHz.

Table 39

Channel Mask for 10 MHz Bandwidth: 802 ≤*fc* ≤ 857 (BCG 7.H)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Frequency offset Δf from channel center (MHz)** | **Integration Bandwidth (MHz)** | **Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port** |
| 1 | 5 ≤ *f* <to 10 | 5 | 1.6 |
| 2 | 10 ≤ *f* ≤to 25 | 2 | -10 |

Notes: The measurement position with a 5 MHz filter is at Δf equals to 7.5 MHz. The first measurement position with a 2 MHz filter is at Δf equals to 11 MHz; the last is at Δf equals to 24 MHz.

### 6.1.2 Transmitter Spurious Emission Specification

Table 40 specify the additional spurious emission limits.

Table 40

Spurious Emissions (BCG 7.H)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Transmit frequency range (MHz) | Measurement frequency range (MHz) | Measurement bandwidth (KHz) | Maximum Emission Level (dBm) |
| 1 | 698-798 | 30 ≤ *f* < 4310 | 100 | -13 |
| 2 | 746-758, 776-788 | 763≤ *f* ≤ 775, 793≤ *f* ≤ 805 | 6.25 | -35 |
| 3 | 758-763, 763-768, 788-793, 793-798 | 769≤*f* ≤ 775, 799≤ *f* ≤ 805 | 6.25 | -35 |
| 4 | 797-862 | 797 ≤ *f* ≤ 862 | 5000 | -37 |
| 5 | 797-862 | 790 ≤ *f* ≤ 791 | 1000 | -44 |
| 6 | 797-862 | 470 ≤ *f* ≤ 790 | 8000 | -65 |

# 7 Band Class 8

## 7.1 Band Class Group 8.C

### 7.1.1 Transmitter Spurious Emission Specification

Table 41 specify the additional spurious emission limits.

Table 41

Additional Spurious Emissions (BCG 8.C)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Spurious frequency (*f*) range (MHz)** | **Measurement bandwidth (KHz)** | **Maximum Emission Level (dBm)** |
| 1 | 2 010-2 025  2 300-2 400 | 1000 | -50 |

## 7.2 Band Class Group 8.E

### 7.2.1 Transmitter Spurious Emission Specification

Table 42 specify the additional spurious emission limits.

Table 42

Additional Spurious Emissions (BCG 8.E)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Spurious frequency (*f*) range (MHz)** | **Measurement bandwidth (KHz)** | **Maximum Emission Level (dBm)** |
| 1 | 2 110-2 170  1 805-1 880  2 620-2 690  925-960  1 844.9-1 879.9  1 475.9-1 500.9  1 900-1 920  2 570-2 620  1 880-1 920  2 300-2 400 | 1000 | -50 |
| 2 | 860-895 | 1000 | -50 |
| 3 | 1 884.5-1 919.6 | 300 | -41 |

## 7.3 Band Class Group 8.F

### 7.3.1 Transmitter Spurious Emission Specification

Table 43 specify the additional spurious emission limits.

Table 43

Additional Spurious Emissions (BCG 8.F)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Spurious frequency (*f*) range (MHz)** | **Measurement bandwidth (KHz)** | **Maximum Emission Level (dBm)** |
| 1 | 925-960  1 880-1 920  1 930-1 990  2 010-2 025  2 110-2 170  2 300-2 400  2 570-2 620 | 1000 | -50 |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. \* This Recommendation should be brought to the attention of Radiocommunication Study Group 1. [↑](#footnote-ref-1)
2. \*\* In other cases the unwanted emission characteristics of IMT-Advanced mobile stations in Annexes 1 and 2 are provided for information. Administrations may choose to apply the unwanted characteristics in Annexes 1 and 2 for the bands not identified for IMT at their national level, bearing in mind global circulation aspects. [↑](#footnote-ref-2)
3. Developed by 3GPP as LTE Release 10 and Beyond (LTE-Advanced). [↑](#footnote-ref-3)
4. Developed by IEEE as the WirelessMAN-Advanced specification incorporated in IEEE Std 802.16 beginning with approval of IEEE Std 802.16m. [↑](#footnote-ref-4)