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Recommendation ITU-R M.1581-3
(10/2009)

Generic unwanted emission characteristics of mobile stations using the terrestrial radio interfaces of IMT-2000

M Series

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Note: *This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.*

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RECOMMENDATION ITU-R M.1581-3*

Generic unwanted emission characteristics of mobile stations using the terrestrial radio interfaces of IMT-2000

(Question ITU-R 229/8)

(2002-2003-2007-2009)

Scope

This Recommendation provides the generic unwanted emission characteristics of mobile stations using the terrestrial radio interfaces of IMT-2000, suitable for establishing the technical basis for global circulation of IMT-2000 terminals.

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-2000 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-2000 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-2000 terminals shall comply with the limits specified in RR Appendix 3;

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

k) 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;

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

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* This Recommendation should be brought to the attention of Radiocommunication Study Group 1.

m) that additional work is needed in order to define unwanted emission limits for equipment operating in the bands identified for IMT-2000 at the World Radiocommunication Conference (Istanbul, 2000) (WRC-2000);

n) that unwanted emission limits are dependent on the transmitter emission characteristics in addition to depending on services operating in other bands,

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-2000 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,

recommends

1 that the unwanted emission characteristics of IMT-2000 MSs should be based on the limits contained in the technology specific Annexes 1 to 6 which correspond to the radio interface specifications described in § 5.1 to 5.6 of Recommendation ITU-R M.1457.

NOTE 1 – Except the cases stated in Notes 2, 3, 4 and 5, the unwanted emission limits are only defined for mobile stations operating according to the following arrangement: frequency division duplex (FDD) uplink in the band 1 920-1 980 MHz, FDD downlink in the band 2 110-2 170 MHz and time division duplex (TDD) in the bands 1 885-1 980 and 2 010-2 025 MHz. Future versions of this Recommendation will include limits applicable to other frequency bands. Subject to further study, it is anticipated that such limits would be similar to those already contained in this Recommendation.

NOTE 2 – The unwanted emission limits defined in Annex 1 are for MS operating one of or a combination of the following arrangements:

- Frequency division duplex (FDD) uplink in the band 1 920-1 980 MHz, FDD downlink in the band 2 110-2 170 MHz, in Annex 1 referred to as FDD Band I in UTRA or Band 1 in E-UTRA.
- FDD uplink in the band 1 850-1 910 MHz, FDD downlink in the band 1 930-1 990 MHz, in Annex 1 referred to as FDD Band II in UTRA or Band 2 in E-UTRA.
- FDD uplink in the band 1 710-1 785 MHz, FDD downlink in the band 1 805-1 880 MHz, in Annex 1 referred to as FDD Band III in UTRA or Band 3 in E-UTRA.
- FDD uplink in the band 1 710-1 755 MHz, FDD downlink in the band 2 110-2 155 MHz, in Annex 1 referred to as FDD Band IV in UTRA or Band 4 in E-UTRA.
- FDD uplink in the band 824-849 MHz, FDD downlink in the band 869-894 MHz, in Annex 1 referred to as FDD Band V in UTRA or Band 5 in E-UTRA.
- FDD uplink in the band 830-840 MHz, FDD downlink in the band 875-885 MHz, in Annex 1 referred to as FDD Band VI in UTRA or Band 6 in E-UTRA.
- FDD uplink in the band 2 500-2 570 MHz, FDD downlink in the band 2 620-2 690 MHz, in Annex 1 referred to as FDD Band VII in UTRA or Band 7 in E-UTRA.
- FDD uplink in the band 880-915 MHz, FDD downlink in the band 925-960 MHz, in Annex 1 referred to as FDD Band VIII in UTRA or Band 8 in E-UTRA.
- FDD uplink in the band 1 749.9-1 784.9 MHz, FDD downlink in the band 1 844.9-1 879.9 MHz, in Annex 1 referred to as FDD Band IX in UTRA or Band 9 in E-UTRA.

– FDD uplink in the band 1 710-1 770 MHz, FDD downlink in the band 2 110-2 170 MHz, in Annex 1 referred to as FDD Band X in UTRA or Band 10 in E-UTRA.

– FDD uplink in the band 1 427.9-1 452.9 MHz, FDD downlink in the band 1 475.9-1 500.9 MHz, in Annex 1 referred to as FDD Band XI in UTRA or Band 11 in E UTRA.

– FDD uplink in the band 698-716 MHz, FDD downlink in the band 728-746 MHz, in Annex 1 referred to as FDD Band XII in UTRA.

– FDD uplink in the band 777-787 MHz, FDD downlink in the band 746-756 MHz, in Annex 1 referred to as FDD Band XIII in UTRA or Band 13 in E-UTRA.

– FDD uplink in the band 788-798 MHz, FDD downlink in the band 758-768 MHz, in Annex 1 referred to as FDD Band XIV in UTRA or Band 14 in E-UTRA.

Future versions of this Recommendation will include limits applicable to other frequency bands. Subject to further study, it is anticipated that such limits would be similar to those already contained in this Recommendation.

NOTE 3 – The unwanted emission limits defined in Annex 2 are for MS operating in the following arrangements (as named by 3GPP2) and apply to both cdma2000 and HRPD operating modes except as noted:

Band class	Name	MS transmit frequency (MHz)	BS transmit frequency (MHz)
0	800 MHz band	824-849	869-894
1	1 900 MHz band	1 850-1 910	1 930-1 990
2	TACS band	872-915	917-960
3	JTACS band	887-925	832-870
4	Korean PCS band	1 750-1 780	1 840-1 870
5	450 MHz band	411-484	421-494
6	2 GHz band	1 920-1 980	2 110-2 170
7	Upper 700 MHz band	776-788	746-758
8	1 800 MHz band	1 710-1 785	1 805-1 880
9	900 MHz band	880-915	925-960
10	Secondary 800 MHz band	806-901	851-940
11	400 MHz European PAMR band	411-484	421-494
12	800 MHz PAMR band	870-876	915-921
13	2.5 GHz IMT-2000 extension band	2 500-2 570	2 620-2 690
14	US PCS 1.9 GHz band	1 850-1 915	1 930-1 995
15	AWS band	1 710-1 755	2 110-2 155
16[1]	US 2.5 GHz band	2 502-2 568	2 624-2 690
17[1]	US 2.5 GHz forward link only band	N/A	2 624-2 690
18[1]	700 MHz public safety band	787-799	757-769
19[1]	Lower 700 MHz band	698-716	728-746

[1] No emissions specifications at this time.

NOTE 4 – The unwanted emission limits defined in Annex 3 are for MS operating one of, or a combination of, the following arrangements:

– Time division duplex (TDD) in the band 1 900-1 920 MHz and 2 010-2 025 MHz referred to as Band b) in UTRA or Band 33 and 34, respectively, in E-UTRA.
– TDD in the band 1 850-1 910 MHz and 1 930-1 990 MHz referred to as Band b) in UTRA or Band 35 and 36, respectively, in E-UTRA.
– TDD in the band 1 910-1 930 MHz referred to as Band c) in UTRA or Band 37 in E-UTRA TDD.
– TDD in the band 2 570-2 620 MHz referred to as Band d) in UTRA or Band 38 in E-UTRA TDD.
– TDD in the band 1 880-1 920 MHz referred to as Band 39 in E-UTRA.
– TDD in the band 2 300-2 400 MHz referred to as Band e) in UTRA or Band 40 in E-UTRA.

Future versions of this Recommendation will include limits applicable to other frequency bands. Subject to further study, it is anticipated that such limits would be similar to those already contained in this Recommendation.

NOTE 5 – The out-of-band emission limits defined in Annex 6 are for MS operating in the following arrangement:

– TDD in the band 2 300-2 400 MHz;
– TDD in the band 2 500-2 690 MHz;
– TDD in the band 3 400-3 600 MHz.

NOTE 6 – It should be noted that significant differences can exist between adjacent channel leakage power ratio (ACLR) information calculated from the integration of the envelope of the absolute spectrum masks compared to the specified values. This is because some or all of the spectrum masks are absolute (rather than relative to in-band power level) masks. Indeed, different margins exist between the guaranteed masks (used for compliance tests) and the shape of the actual emissions. If it represented a realistic transmit scenario, the specified ACLR values could not be met.

However, both the specified mask and the specified ACLR figures are to be met in accordance with, and compliance to, local/regional regulations wherever applicable. Caution is therefore advised when considering the emissions envelope mask for frequency sharing studies and when considering the emissions envelope mask for the actual transmission schemes as the ACLR values would not be met, if the transmissions were to fill the mask envelope. Where spectrum emission information is needed for adjacent band sharing studies the relevant specified ACLR data should be preferably used if it is available for the relevant frequency offset and bandwidth.

When the ACLR values are specified but are not applicable (e.g. studying the compatibility involving a system with a bandwidth for which the ACLR values are not applicable, e.g. 8 MHz) or when the ACLR values are not specified in this Recommendation, then ACLR values may be calculated from the spectrum mask and receiver filter characteristics if needed. An estimate derived from this calculation can be seen as a worst case. For the particular case of Europe, the mask used for deriving the ACLR value is the relevant ETSI mask (e.g. EN 302 544 for OFDMA TDD WMAN in the 2 500-2 690 MHz band).

Annex 1

CDMA Direct Spread (universal terrestrial radio access (UTRA) FDD) mobile stations

1 Measurement uncertainty

Values specified in this annex differ from those specified in Recommendation ITU-R M.1457 since values in this annex incorporate test tolerances defined in Recommendation ITU-R M.1545.

2 Spectrum mask

2.1 UTRA spectrum mask

The spectrum emission mask of the MS applies to frequencies, which are between 2.5 MHz and 12.5 MHz away from the MS centre carrier frequency. The out-of-channel emission is specified relative to the root raised cosine (RRC) filtered mean power of the user equipment (UE) carrier, where the RRC filtered mean power is the mean power measured through a root raised cosine filter with a roll-off factor of 0.22 and a bandwidth equal to the chip rate of 3.84 MHz. The power of any UE emission should not exceed the levels specified in Table 1.

The absolute requirement is based on a −48.5 dBm/3.84 MHz minimum power threshold for the UE. This limit is expressed for the narrower measurement bandwidths as −54.3 dBm/1 MHz and –69.6 dBm/30 kHz.

TABLE 1

Spectrum emission mask requirement (UTRA FDD MS)

Δf (MHz) (Note 1)	**Minimum requirement (Note 2)**		**Additional requirements Band II, Band IV, Band V and Band X (Note 3)**	**Measurement bandwidth (Note 6)**
	Relative requirement	**Absolute requirement (in measurement bandwidth)**		
2.5-3.5	$\left\{-33.5-15\cdot\left(\frac{\Delta f}{\text{MHz}}-2.5\right)\right\}$ dBc	−69.6 dBm	−15 dBm	30 kHz (Note 4)
3.5-7.5	$\left\{-33.5-1\cdot\left(\frac{\Delta f}{\text{MHz}}-3.5\right)\right\}$ dBc	−54.3 dBm	−13 dBm (Note 7)	1 MHz (Note 5)
7.5-8.5	$\left\{-37.5-10\cdot\left(\frac{\Delta f}{\text{MHz}}-7.5\right)\right\}$ dBc	−54.3 dBm	−13 dBm (Note 7)	1 MHz (Note 5)
8.5-12.5	−47.5 dBc	−54.3 dBm	−13 dBm (Note 7)	1 MHz (Note 5)

NOTE 1 – Δf is the separation between the carrier frequency and the centre of the measurement bandwidth.

NOTE 2 – The minimum requirement is calculated from the relative requirement or the absolute requirement, whichever is the higher power.

NOTE 3 – For operation in Band II, Band IV, Band V and Band X only, the minimum requirement is calculated in Note 2 or the additional requirement for Bands II, IV, V and X, whichever is the lower power.

NOTE 4 – The first and last measurement positions with a 30 kHz filter at Δf equals 2.515 MHz and 3.485 MHz.

NOTE 5 – The first and last measurement positions with a 1 MHz filter at Δf equals 4 MHz and 12 MHz.

NOTE 6 – 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.

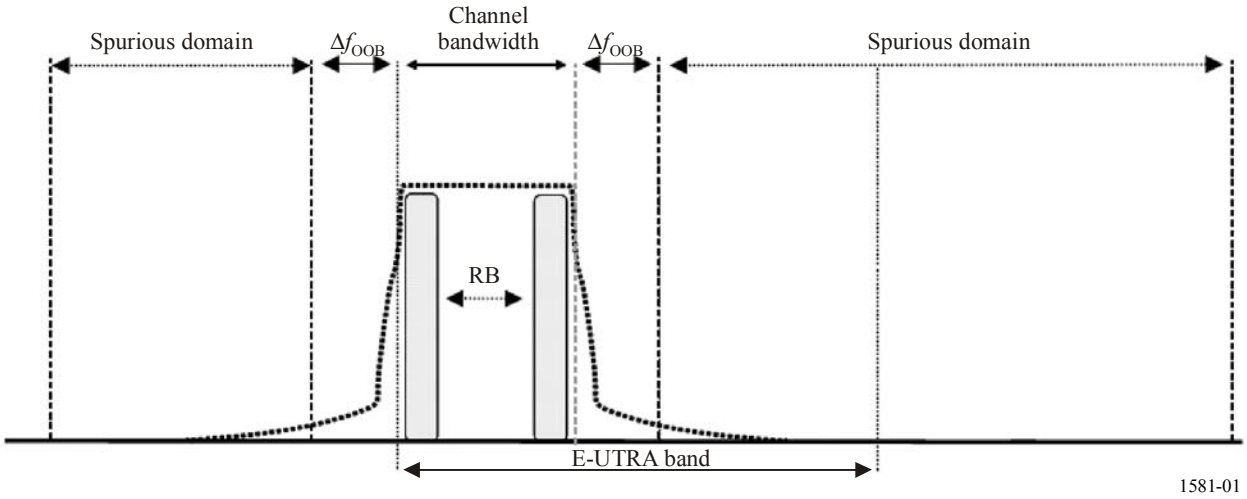
NOTE 7 – For operation in Band V, the measurement bandwidth of this requirement shall be 100 kHz.

2.2 E-UTRA spectrum mask

The output UE transmitter spectrum consists of the three components; the emission within the occupied bandwidth (channel bandwidth), the out of band (OOB) emissions and the far-out spurious emission domain (Fig. 1).

The spectrum emission mask of the MS applies to frequencies (Δf_{OOB}) starting from the ± edges of the assigned E-UTRA channel bandwidth. For frequencies greater than (Δf_{OOB}) as specified in Table 1a the spurious requirements in § 4 are applicable.

FIGURE 1



2.2.1 E-UTRA spectrum mask

The power of any MS emission shall not exceed the levels specified in Table 1a for the specified channel bandwidths.

TABLE 1a

E-UTRA spectrum emission mask

Δf_{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			–13.5	–16.5	–18.5	–19.5	30 kHz
±1-2.5			–8.5	–8.5	–8.5	–8.5	1 MHz
±2.5-2.8			–8.5	–8.5	–8.5	–8.5	1 MHz
±2.8-5			–8.5	–8.5	–8.5	–8.5	1 MHz
±5-6			–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

NOTE 1 – 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.

NOTE 2 – The values for 1.4 MHz and 3.0 MHz channel bandwidths will be addressed at a later stage.

3 Adjacent channel leakage power ratio (ACLR)

3.1 UTRA ACLR

ACLR is the ratio of the RRC filtered mean power centred on the assigned channel frequency to the RRC filtered mean power centred on an adjacent channel frequency.

The limit for ACLR should be as specified in Table 2.

TABLE 2

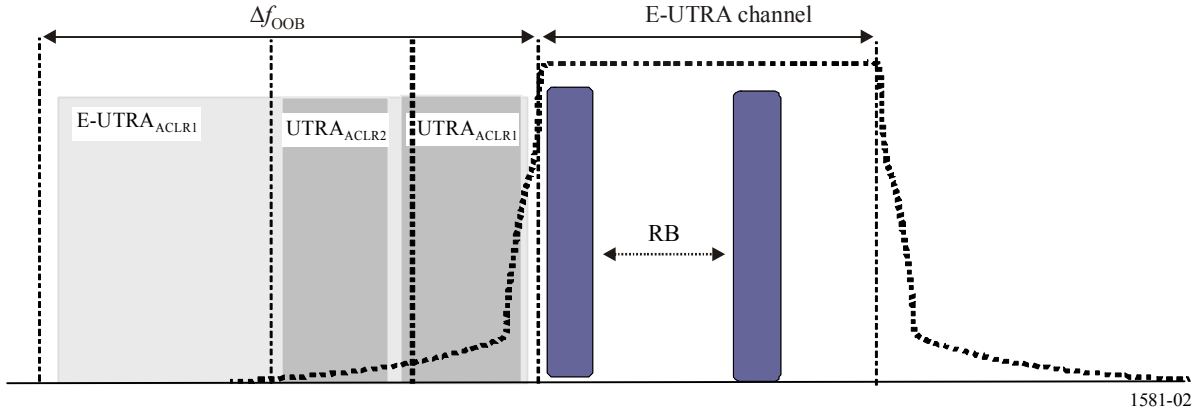
MS ACLR limits

Power class	MS channel offset below the first or above the last carrier frequency used (MHz)	ACLR limit (dB)
3, 4	5	32.2
3, 4	10	42.2

3.2 E-UTRA ACLR

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. The ACLR requirements are specified for two scenarios: for (an) adjacent E-UTRA and/or UTRA channels (see Fig. 2).

FIGURE 2



3.2.1 Limits for E-UTRA

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. The E-UTRA on channel and adjacent channel power is measured with a rectangular measurement bandwidth filter. The limits should be as specified in Table 2a.

TABLE 2a

General requirements for E-UTRAACLR

	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	–	–	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UE channel	–	–	+5 MHz or −5 MHz	+10 MHz or −10 MHz	+15 MHz or −15 MHz	+20 MHz or −20 MHz

3.2.2 Limits for E-UTRA for UTRA coexistence in the same geographical area

For adjacent UTRA carriers the limits should be as specified in Table 2b.

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 5 MHz adjacent channel (UTRAACLR1) and the 2nd UTRA 5 MHz adjacent channel (UTRAACLR2). The UTRA channel is measured with a 3.84 MHz RRC bandwidth filter with roll-off factor $\alpha = 0.22$. The E-UTRA channel is measured with a rectangular measurement bandwidth filter.

TABLE 2b

Additional requirements

	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 (MHz)	–	–	2.5+BWUTRA/2	5+BWUTRA/2	7.5+BWUTRA/2	10+BWUTRA/2
UTRAACLR2	–	–	35.2 dB	35.2 dB	35.2 dB	35.2 dB
Adjacent channel centre frequency offset (MHz)	–	–	2.5+3*BWUTRA/2	5+3*BWUTRA/2	7.5+3*BWUTRA/2	10+3*BWUTRA/2
E-UTRA channel measurement bandwidth	–	–	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UTRA 5 MHz channel measurement bandwidth[(1)]	–	–	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz
UTRA 1.6 MHz channel measurement bandwidth[(2)]	–	–	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz

(1) Applicable for E-UTRA FDD coexistence with UTRA FDD in paired spectrum.

(2) Applicable for E-UTRA TDD coexistence with UTRA TDD in unpaired spectrum.

3.2.3 Additional ACLR limits

Additional ACLR 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.

The additional ACLR limits are specified for the 2nd UTRA 5 MHz adjacent channel (UTRAACLR2). The UTRA channel is measured with a 3.84 MHz RRC bandwidth filter with roll-off factor $\alpha = 0.22$. The E-UTRA channel is measured with a rectangular measurement bandwidth filter.

TABLE 2c

Additional requirements (UTRAACLR2)

	Channel bandwidth/UTRAACLR2/measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
UTRAACLR2bis	–	–	42.2 dB	42.2 dB	–	–
E-UTRA channel measurement bandwidth	–	–	4.5 MHz	9.0 MHz	–	–
UTRA channel measurement bandwidth	–	–	3.84 MHz	3.84 MHz	–	–
UE channel for UTRAACLR2bis	+7.5 MHz from upper band edge or −7.5 MHz from lower band edge					

4 Transmitter spurious emissions (conducted)

4.1 Transmitter spurious emissions for UTRA

For UTRA, the limits shown in Tables 3 and 4 are only applicable for frequencies which are greater than 12.5 MHz away from the MS centre carrier frequency.

TABLE 3

General spurious emissions requirements

Frequency bandwidth	**Measurement bandwidth**	**Minimum requirement (dBm)**
9 kHz ≤ f < 150 kHz	1 kHz	–36
150 kHz ≤ f < 30 MHz	10 kHz	–36
30 MHz ≤ f < 1 000 MHz	100 kHz	–36
1 GHz ≤ f < 12.75 GHz	1 MHz	–30

TABLE 4

Additional spurious emissions requirements for UTRA

Operating Band	Frequency bandwidth	Measurement bandwidth	Minimum requirement
I	860 MHz ≤ f ≤ 895 MHz	3.84 MHz	−60 dBm
	921 MHz ≤ f < 925 MHz	100 kHz	−60 dBm (see Note 1)
	925 MHz ≤ f ≤ 935 MHz	100 kHz 3.84 MHz	−67 dBm (see Note 1) −60 dBm
	935 MHz < f ≤ 960 MHz	100 kHz	−79 dBm (see Note 1)
	1 475.9 MHz ≤ f ≤ 1 500.9 MHz	3.84 MHz	–60 dBm
	1 805 MHz ≤ f ≤ 1 880 MHz	100 kHz	−71 dBm (see Note 1)
	1 844.9 MHz ≤ f ≤ 1 879.9 MHz	3.84 MHz	−60 dBm
	1 884.5 MHz < f < 1 919.6 MHz	300 kHz	−41 dBm
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm
	2 620 MHz ≤ f ≤ 2 690 MHz	3.84 MHz	−60 dBm
II	869 MHz ≤ f ≤ 894 MHz	3.84 MHz	−60 dBm
	1 930 MHz ≤ f ≤ 1 990 MHz	3.84 MHz	−60 dBm
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm
III	921 MHz ≤ f < 925 MHz	100 kHz	−60 dBm (see Note 1)
	925 MHz ≤ f ≤ 935 MHz	100 kHz 3.84 MHz	−67 dBm (see Note 1) −60 dBm
	935 MHz < f ≤ 960 MHz	100 kHz	−79 dBm (see Note 1)
	1 805 MHz ≤ f ≤ 1 880 MHz	3.84 MHz	−60 dBm
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm
	2 620 MHz ≤ f ≤ 2 690 MHz	3.84 MHz	−60 dBm
IV	869 MHz ≤ f ≤ 894 MHz	3.84 MHz	−60 dBm
	1 930 MHz ≤ f ≤ 1 990 MHz	3.84 MHz	−60 dBm
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm
V	869 MHz ≤ f ≤ 894 MHz	3.84 MHz	−60 dBm
	1 930 MHz ≤ f ≤ 1 990 MHz	3.84 MHz	−60 dBm
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm
VI	860 MHz ≤ f < 875 MHz	1 MHz	−37 dBm
	875 MHz ≤ f ≤ 895 MHz	3.84 MHz	−60 dBm
	1 475.9 MHz ≤ f ≤ 1 500.9 MHz	3.84 MHz	–60 dBm
	1 844.9 MHz ≤ f ≤ 1 879.9 MHz	3.84 MHz	−60 dBm
	1 884.5 MHz ≤ f ≤ 1 919.6 MHz	300 kHz	−41 dBm
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm

TABLE 4 (*end*)

Operating Band	Frequency bandwidth	Measurement bandwidth	Minimum requirement
VII	921 MHz ≤ f < 925 MHz	100 kHz	−60 dBm (see Note 1)
	925 MHz ≤ f ≤ 935 MHz	100 kHz 3.84 MHz	−67 dBm (see Note 1) −60 dBm
	935 MHz < f ≤ 960 MHz	100 kHz	−79 dBm (see Note 1)
	1 805 MHz ≤ f ≤ 1 880 MHz	100 kHz	−71 dBm (see Note 1)
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm
	2 620 MHz ≤ f ≤ 2 690 MHz	3.84 MHz	−60 dBm
	2 590 MHz ≤ f ≤ 2 620 MHz	3.84 MHz	−50 dBm
VIII	925 MHz ≤ f ≤ 935 MHz	100 kHz 3.84 MHz	−67 dBm (see Note 1) −60 dBm
	935 MHz < f ≤ 960 MHz	100 kHz 3.84 MHz	−79 dBm (see Note 1) −60 dBm
	1 805 MHz < f ≤ 1 830 MHz	100 kHz 3.84 MHz	−71 dBm (see Notes 1 and 2) −60 dBm (see Note 2)
	1 830 MHz < f ≤ 1 880 MHz	100 kHz 3.84 MHz	−71 dBm (see Note 1) −60 dBm
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm
	2 620 MHz ≤ f ≤ 2 640 MHz	3.84 MHz	−60 dBm
	2 640 MHz < f ≤ 2 690 MHz	3.84 MHz	−60 dBm (see Note 2)
IX	860 MHz ≤ f ≤ 895 MHz	3.84 MHz	−60 dBm
	1 475.9 MHz ≤ f ≤ 1 500.9 MHz	3.84 MHz	−60 dBm
	1 844.9 MHz ≤ f ≤ 1 879.9 MHz	3.84 MHz	−60 dBm
	1 884.5 MHz ≤ f ≤ 1 919.6 MHz	300 kHz	−41 dBm
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm
X	869 MHz ≤ f ≤ 894 MHz	3.84 MHz	−60 dBm
	1 930 MHz ≤ f ≤ 1 990 MHz	3.84 MHz	−60 dBm
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm
XI	860 MHz ≤ f ≤ 895 MHz	3.84 MHz	−60 dBm
	1 475.9 MHz ≤ f ≤ 1 500.9 MHz	3.84 MHz	−60 dBm
	1 844.9 MHz ≤ f ≤ 1 879.9 MHz	3.84 MHz	−60 dBm
	1 884.5 MHz ≤ f ≤ 1 919.6 MHz	300 kHz	−41 dBm
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm

NOTE 1 – The measurements are made on frequencies which are integer multiples of 200 kHz. As exceptions, up to five measurements with a level up to the applicable requirements defined in Table 3 are permitted for each channel used in the measurement.

NOTE 2 – The measurements are made on frequencies which are integer multiples of 200 kHz. As exceptions, measurements with a level up to the applicable requirements defined in Table 3 are permitted for each channel used in the measurement due to second or third harmonic spurious emissions.

4.2 Transmitter spurious emissions for E-UTRA

For E-UTRA, the spurious emission limits apply for frequency ranges that are more than Δf_{OOB} (MHz) from the edge of the channel bandwidth (Table 4a).

TABLE 4a

Boundary between E-UTRA Δf_{OOB} and spurious emission domain

Channel bandwidth	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Δf_{OOB} (MHz)			10	15	20	25

NOTE 1 – The values for 1.4 MHz and 3.0 MHz channel bandwidths will be addressed at a later stage.

The spurious emission limits in Table 4b apply for all E-UTRA transmitter band configurations and channel bandwidths.

TABLE 4b

Spurious emissions limits

Frequency range	Measurement bandwidth	Maximum level
9 kHz ≤ f < 150 kHz	1 kHz	–36 dBm
150 kHz ≤ f < 30 MHz	10 kHz	–36 dBm
30 MHz ≤ f < 1 000 MHz	100 kHz	–36 dBm
1 GHz ≤ f < 12.75 GHz	1 MHz	–30 dBm

Table 4c specifies the requirements for the specified E-UTRA band.

TABLE 4c

Spurious emissions requirements for UE coexistence in E-UTRA bands

E-UTRA Band	Spurious emission						
	Protected band	Frequency range (MHz)			Level (dBm)	Bandwidth (MHz)	Comment
1	E-UTRA Band 1, 3, 7, 8, 9, 11, 34, 38, 40	FDL_low	–	FDL_high	–50	1	
	Frequency range	860	–	895	–50	1	
	Frequency range	1 884.5	–	1 919.6	–41	0.3	
	E-UTRA Band 33	1 900	–	1 920	–50	1	Note 3
	E-UTRA Band 39	1 880	–	1 920	–50	1	Note 3
2	E-UTRA Band 2, 4, 5, 10, 13, 14	FDL_low	–	FDL_high	–50	1	
3	E-UTRA Band 1, 3, 7, 8, 9, 11, 33, 34, 38	FDL_low	–	FDL_high	–50	1	
4	E-UTRA Band 2, 4, 5, 10, 13, 14	FDL_low	–	FDL_high	–50	1	
5	E-UTRA Band 2, 4, 5, 10, 13, 14	FDL_low	–	FDL_high	–50	1	

TABLE 4c (*end*)

E-UTRA Band	Spurious emission						
	Protected band	Frequency range (MHz)			Level (dBm)	Bandwidth (MHz)	Comment
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	1 884.5	–	1 919.6	–41	0.3	
7	E-UTRA Band 1, 3, 7, 8, 33, 34	FDL_low	–	FDL_high	–50	1	
	E-UTRA Band 38	2 570	–	2 620	–50	1	Note 3
8	E-UTRA Band 1, 8, 7, 33, 34, 38, 39, 40	FDL_low	–	FDL_high	–50	1	
	E-UTRA Band 3	1 805	–	1 830	–50	1	Note 4
	E-UTRA Band 3	1 805	–	1 880	–36	0.1	Notes 2, 4
	E-UTRA Band 3	1 830	–	1 880	–50	1	Note 4
	E-UTRA Band 7	2 640	–	2 690	–50	1	Note 4
	E-UTRA Band 7	2 640	–	2 690	36	0.1	Notes 2, 4
9	E-UTRA Band 1, 9, 11, 34	FDL_low	–	FDL_high	–50	1	
	Frequency range	860	–	895	–50	1	
	Frequency range	1 884.5	–	1 919.6	–41	0.3	
10	E-UTRA Band 2, 4, 5, 10, 13, 14	FDL_low	–	FDL_high	–50	1	
11	E-UTRA Band 1, 9, 11, 34	FDL_low	–	FDL_high	–50	1	
	Frequency range	860	–	895	–50	1	
	Frequency range	1 884.5	–	1 919.6	–41	0.3	
13	E-UTRA Band 2, 4, 5, 10, 13, 14	FDL_low	–	FDL_high	–50	1	
	Frequency range	763	–	775	–35	0.00625	
14	E-UTRA Band 2, 4, 5, 10, 13, 14	FDL_low	–	FDL_high	–50	1	
	Frequency range	763	–	775	–35	0.00625	

NOTE 1 – FDL_low and FDL_high refer to each E-UTRA frequency band specified in Note 2 of *recommends* 1.

NOTE 2 – As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd or 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RE within the transmission bandwidth (see Fig. 5.4.2-1) 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.

NOTE 3 – To meet these requirements some restriction will be needed for either the operating band or protected band.

NOTE 4 – Requirements are specified in terms of E-UTRA sub-bands.

NOTE 5 – For non-synchronized TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band.

5 Receiver spurious emissions (conducted)

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

5.1 Receiver spurious emissions for UTRA

For UTRA, the power of any narrow-band continuous wave (CW) spurious emission should not exceed the maximum level specified in Tables 5 and 6.

TABLE 5

General receiver spurious emission requirements

Frequency band	Measurement bandwidth	Maximum level	Note
30 MHz ≤ f < 1 GHz	100 kHz	−57 (dBm)	
1 GHz ≤ f ≤ 12.75 GHz	1 MHz	−47 (dBm)	
30 MHz ≤ f < 1 GHz			

For UTRA the following additional spurious emission limits are applicable.

TABLE 6

Additional receiver spurious emission requirements

Band	Frequency band	Measurement bandwidth	Maximum level	Note
I	1 475.9 MHz ≤ f ≤1 500.9 MHz	3.84 MHz	−60 dBm	
	1 844.9 MHz ≤ f ≤1 879.9 MHz	3.84 MHz	−60 dBm	
	1 920 MHz ≤ f ≤ 1 980 MHz	3.84 MHz	−60 dBm	UE transmit band
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm	UE receive band
II	1 850 MHz ≤ f ≤ 1 910 MHz	3.84 MHz	−60 dBm	UE transmit band
	1 930 MHz ≤ f ≤ 1 990 MHz	3.84 MHz	−60 dBm	UE receive band
III	1 710 MHz ≤ f ≤ 1 785 MHz	3.84 MHz	−60 dBm	UE transmit band
	1 805 MHz ≤ f ≤ 1 880 MHz	3.84 MHz	−60 dBm	UE receive band
IV	869 MHz ≤ f < 894 MHz	3.84 MHz	−60 dBm	
	1 710 MHz ≤ f < 1 755 MHz	3.84 MHz	−60 dBm	UE transmit band in URA_PCH, Cell_PCH and idle state
	1 930 MHz ≤ f ≤ 1 990 MHz	3.84 MHz	−60 dBm	
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm	UE receive band (see Note 1)
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm	UE receive band (see Note 2)
V	824 MHz ≤ f ≤ 849 MHz	3.84 MHz	−60 dBm	UE transmit band
	869 MHz ≤ f < 894 MHz	3.84 MHz	−60 dBm	UE receive band
VI	815 MHz ≤ f ≤ 850 MHz	3.84 MHz	−60 dBm	
	860 MHz ≤ f ≤ 895 MHz	3.84 MHz	−60 dBm	
	1 475.9 MHz ≤ f ≤ 1 500.9 MHz	3.84 MHz	−60 dBm	
	1 844.9 MHz ≤ f ≤ 1 879.9 MHz	3.84 MHz	−60 dBm	
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm	

TABLE 6 (*end*)

Band	Frequency band	Measurement bandwidth	Maximum level	Note
VII	921 MHz ≤ f < 925 MHz	100 kHz	−60 dBm[1]	
	925 MHz ≤ f ≤ 935 MHz	100 kHz −3.84 MHz	−67 dBm[1] −60 dBm	
	935 MHz < f ≤ 960 MHz	100 kHz	−79 dBm[1]	
	1 805 MHz ≤ f ≤ 1 880 MHz	100 kHz	−71 dBm[1]	
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm	
	2 500 MHz ≤ f ≤ 2 570 MHz	3.84 MHz	−60 dBm	UE transmit band
	2 620 MHz ≤ f ≤ 2 690 MHz	3.84 MHz	−60 dBm	UE receive band
VIII	880 MHz ≤ f ≤ 915 MHz	3.84 MHz	−60 dBm	
	921 MHz ≤ f < 925 MHz	100 kHz	−60 dBm[1]	
	925 MHz ≤ f ≦ 935 MHz	100 kHz 3.84 MHz	−67 dBm[1] −60 dBm	
	935 MHz < f ≤ 960 MHz	100 kHz	−79 dBm[1]	
	1 805 MHz < f ≤ 1 880 MHz	3.84 MHz	−60 dBm	
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm	
	2 620 MHz ≤ f ≤ 2 690 MHz	3.84 MHz	−60 dBm	
IX	860 MHz ≤ f ≤ 895 MHz	3.84 MHz	−60 dBm	
	1 475.9 MHz ≤ f ≤ 1 500.9 MHz	3.84 MHz	−60 dBm	
	1 749.9 MHz ≤ f ≤ 1 784.9 MHz	3.84 MHz	−60 dBm	UE transmit band
	1 844.9 MHz ≤ f ≤ 1 879.9 MHz	3.84 MHz	−60 dBm	UE receive band
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm	
X	869 MHz ≤ f < 894 MHz	3.84 MHz	−60 dBm	
	1 710 MHz ≤ f < 1 770 MHz	3.84 MHz	−60 dBm	UE transmit band
	1 930 MHz ≤ f ≤ 1 990 MHz	3.84 MHz	−60 dBm	
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm	UE receive band
XI	860 MHz ≤ f ≤ 895 MHz	3.84 MHz	−60 dBm	
	1 427.9 MHz ≤ f ≤ 1 452.9 MHz	3.84 MHz	−60 dBm	UE transmit band
	1 475.9 MHz ≤ f ≤1 500.9 MHz	3.84 MHz	−60 dBm	UE receive band
	1 844.9 MHz ≤ f ≤1 879.9 MHz	3.84 MHz	−60 dBm	
	2 110 MHz ≤ f ≤ 2 170 MHz	3.84 MHz	−60 dBm	

[1] The measurements are made on frequencies which are integer multiples of 200 kHz. As exceptions, up to five measurements with a level up to the applicable requirements defined in Table 5 are permitted for each channel used in the measurement.

NOTE 1 – For UEs that conform to Release 6 and support Band IV shall support the defined frequency bandwidth.

NOTE 2 – For UEs that conform to Release 7 and later releases and support Band IV shall support the defined frequency bandwidth.

5.2 Receiver spurious emissions for E-UTRA

The power of any narrow-band CW spurious emission shall not exceed the maximum level specified in Table 7.

TABLE 7

General receiver spurious emission requirements for E-UTRA

Frequency band	Measurement bandwidth	Maximum level	Note
30 MHz ≤ f < 1 GHz	100 kHz	−57 dBm	
1 GHz ≤ f ≤ 12.75 GHz	1 MHz	−47 dBm	

Annex 2

IMT 2000 CDMA Multi-Carrier (CDMA-2000) mobile stations

NOTE 1 – Single carrier HRPD spectrum emission mask or spurious emission limits are only applicable for spreading rate 1.

1 Spectrum mask

1.1 Spreading rate 1

When transmitting with spreading rate 1, the spectrum emissions for Band Classes 0, 2, 5, 7, 9, 10, 11 and 12 shall be less than the limits specified in Table 8.

TABLE 8

Band Classes 0, 2, 5, 7, 9, 10, 11 and 12 spectrum emission mask for spreading rate 1

For $\|\Delta f\|$ within the range (MHz)	Emission limit
885-1.98	Less stringent of –42 dBc/30 kHz or –54 dBm/1.23 MHz
1.25 to 4.00 (Band Class 10 only)	–13 dBm/30 kHz
1.98-4.00	Less stringent of –54 dBc/30 kHz or –54 dBm/1.23 MHz
2.25-4.00 (Band Class 7 only)	–35 dBm/6.25 kHz

NOTE 1 – All frequencies in the measurement bandwidth shall satisfy the restrictions on $|\Delta f|$ where Δf = centre frequency – closer edge frequency, f, of the measurement filter.

When transmitting with spreading rate 1, the spectrum emissions for Band Classes 1, 4, 6, 8, 13, 14 and 15 shall be less than the limits specified in Table 9.

TABLE 9

Band Classes 1, 4, 6, 8, 13, 14 and 15 spectrum emission mask for spreading rate 1

For $\|\Delta f\|$ within the range (MHz)	Emission limit
1.25 to 1.98	Less stringent of –42 dBc/30 kHz or –54 dBm/1.23 MHz
1.98 to 4.00	Less stringent of –50 dBc/30 kHz or –54 dBm/1.23 MHz
2.25 to 4.00 (Band Classes 6, 8 and 13 only)	$(13 + 1 \times (\Delta f - 2.25\ \text{MHz}))$ dBm/1 MHz

NOTE 1 – All frequencies in the measurement bandwidth shall satisfy the restrictions on $|\Delta f|$ where Δf = centre frequency – closer edge frequency, f, of the measurement filter.

When transmitting in Band Class 3, the spectrum emissions shall be less than the limits specified in Table 10.

TABLE 10

Band Class 3 spectrum emission mask for spreading rate 1

Measurement frequency (MHz)	For $\|\Delta f\|$ within the range	Emission limit
> 815 and ≤ 850, > 887 and ≤ 889, > 893 and ≤ 901, > 915 and ≤ 925	≥ 900 kHz and < 1.98 MHz	−42 dBc/30 kHz
	≥ 1.98 MHz	25 µW (−16 dBm)/100 kHz; Pout ≤ 30 dBm −54 dBc/100 kHz; Pout > 30 dBm
> 885 and ≤ 958, except > 887 and ≤ 889, > 893 and ≤ 901, > 915 and ≤ 925	< 1.98 MHz	25 µW (−16 dBm)/30 kHz; Pout ≤ 30 dBm Less stringent of −60 dBc/30 kHz or 2.5 µW (−26 dBm)/30 kHz; Pout > 30 dBm
	≥ 1.98 MHz	25 µW (−16 dBm)/100 kHz; Pout ≤ 30 dBm Less stringent of −60 dBc/100 kHz or 2.5 µW (−26 dBm)/100 kHz; Pout > 30 dBm
≤ 885 and > 958, except 815-850	< 1.98 MHz	25 µW (−16 dBm)/30 kHz; Pout ≤ 30 dBm Less stringent of −60 dBc/30 kHz or 2.5 µW (−26 dBm)/30 kHz; Pout > 30 dBm
	≥ 1.98 MHz	25 µW (−16 dBm)/1 MHz; Pout ≤ 44 dBm More stringent of −60 dBc/1 MHz and 20 mW (13 dBm)/1 MHz; Pout > 44 dBm

NOTE 1 – All frequencies in the measurement bandwidth shall satisfy the restrictions on $|\Delta f|$ where Δf = centre frequency – closer measurement edge frequency, f. The lower and upper limits of the frequency measurement are currently 10 MHz and 3 GHz in Japanese radio measurement documents.

When transmitting in Band Class 11 or 12 with spreading rate 1, the spectrum emissions shall also be less than the requirements in Table 11a for cdma2000 and Table 11b for HRPD.

TABLE 11a

Additional cdma2000 Band Classes 11 and 12 spectrum emission mask for spreading rate 1

For $\|\Delta f\|$ within the range	Emission limit
885 to 1.125	$-47 - 7 \times (\|\Delta f\| - 885)/240$ dBc in 30 kHz
1.125 to 1.98	$-54 - 13 \times (\|\Delta f\| - 1\,125)/855$ dBc in 30 kHz
1.98 to 4.00	$-67 - 15 \times (\|\Delta f\| - 1\,980)/2\,020$ dBc in 30 kHz
4.00 to 10.00	−51 dBm in 100 kHz

NOTE 1 – All frequencies in the measurement bandwidth shall satisfy the restrictions on $|\Delta f|$ where Δf = centre frequency – closer measurement edge frequency, f. Δf is positive offset from the highest valid CDMA channel in the band subclass or negative offset from the lowest valid CDMA channel in the band subclass. The emission limits for Band Classes 11 and 12 (European PAMR bands) are designed to allow coexistence with incumbent services in Europe and are tighter than ITU Category B requirements.

TABLE 11b

Additional HRPD Band Classes 11 and 12 spectrum emission mask

For $\|\Delta f\|$ within the range (MHz)	Emission limit Band Class 11 Subclasses 4, 5; Band Class 12 Subclass 1	Emission limit Band Class 11 Subclasses 0, 1, 2, 3; Band Class 12 Subclass 0
885 to 1.12	$-47 - 7 \times (\|\Delta f\| - 885)/235$ dBc in 30 kHz	Not specified
1.12 to 1.98	$-54 - 13 \times (\|\Delta f\| - 1\,120)/860$ dBc in 30 kHz	Not specified
1.98 to 4.00	$-67 - 15 \times (\|\Delta f\| - 1\,980)/2\,020$ dBc in 30 kHz	Not specified

NOTE 1 – All frequencies in the measurement bandwidth shall satisfy the restrictions on $|\Delta f|$ where Δf = centre frequency – closer measurement edge frequency, f. Δf is positive offset from the highest valid CDMA channel in the band subclass or negative offset from the lowest valid CDMA channel in the band subclass. The emission limits for Band Classes 11 and 12 (European PAMR bands) are designed to allow coexistence with incumbent services in Europe and are tighter than ITU Category B requirements.

1.2 Multi-carrier HRPD

When transmitting in Band Classes 0, 2, 3, 5, 7, 9, 10, 11 or 12 for a HRPD Rev B capable terminal configured with two reverse link channels with maximum frequency separation, the spectrum emissions with ten or more averages shall be less than the limits specified in Table 12a.

TABLE 12a

Band Classes 0, 2, 3, 5, 7, 9, 10, 11 and 12 spectrum emission mask for multi-carrier HRPD

For $\|\Delta f\|$ within the range (MHz)	Emission limit
885 kHz to 1.885	6 dBm/1 MHz
> 1.885	−13 dBm/1 MHz

NOTE 1 – All frequencies in the measurement bandwidth shall satisfy the restrictions on $|\Delta f|$ where Δf is measured as the frequency offset from the centre frequency of each reverse CDMA channel.

Emission limits shall apply between the reverse CDMA channels when maximum reverse link bandwidth $\geq 4 \times 1.23$ MHz.

When transmitting in Band Classes 1, 4, 6 or 8 for a HRPD Rev B capable terminal configured with two reverse link channels with maximum frequency separation, the spectrum emissions with ten or more averages shall be less than the limits specified in Table 12b.

TABLE 12b

Band Classes 1, 4, 6 and 8 spectrum emission mask for multi-carrier HRPD

For $\|\Delta f\|$ within the range (MHz)	Emission limit
1.25 to 2.25	6 dBm/1 MHz
> 2.25	−13 dBm/1 MHz

NOTE 1 – All frequencies in the measurement bandwidth shall satisfy the restrictions on $|\Delta f|$ where Δf where Δf is measured as the frequency offset from the centre frequency of each channel.

Emission limits shall apply between the carriers when maximum reverse link bandwidth $\geq 4 \times 1.25$ MHz.

A single exception will be allowed for spurious emission frequencies between the two reverse CDMA channels (for both Tables 12a and 12b).

For adjacent reverse CDMA channels, the spectrum emissions with ten or more averages shall be less than the limits specified in Tables 13a and 13b.

TABLE 13a

Adjacent multi-carrier spectrum emission limits for number of adjacent reverse CDMA channels, $N = 3$

For $\|\Delta f\|$ within the range (MHz)	Emission limit
2.5 to 2.7	−14 dBm/30 kHz
2.7 to 3.5	$(14 + 15 \times (\Delta f - 2.7\ \text{MHz}))$ dB /30 kHz
3.08 (Band Class 6 only)	–33 dBc/3.84 MHz
3.5 to 7.5	$(13 + 1 \times (\Delta f - 3.5\ \text{MHz}))$ dBm/1 MHz
7.5 to 8.5	$(17 + 10 \times (\Delta f - 7.5\ \text{MHz}))$ dBm/1 MHz
8.08 (Band Class 6 only)	−43 dBc/3.84 MHz
8.5 to 12.5	−27 dBm/1 MHz

NOTE 1 – All frequencies in the measurement bandwidth shall satisfy the restrictions on $|\Delta f|$ where Δf = centre frequency of the middle reverse CDMA channel – closer measurement edge frequency (f). The requirements at offsets of 3.08 and 8.08 MHz are equivalent to ACLR requirements of 33 and 43 dB from a spreading rate 3 mobile station transmitter into a spreading rate 3 or IMT-DS mobile station receiver offset by 5 and 10 MHz respectively. ITU Category B is intended to apply to only Band Classes 6, 8, 9, 11 and 12.

TABLE 13b

Adjacent multi-carrier spectrum emission limits for number of adjacent reverse CDMA channels, $N \neq 3$

For $\|\Delta f\|$ within the range (MHz)	Emission limit
$2.5 + \Delta f$ to $3.5 + \Delta$	−13 dBm/(12.5 kHz × N) kHz
$3.5 + \Delta f$ to $3.125 \times (N+1)$	−13 dBm/1 MHz

NOTE 1 – All frequencies in the measurement bandwidth shall satisfy the restrictions on $|\Delta f|$ where Δf = centre frequency – closer measurement edge frequency, f. ITU Category B is intended to apply to only Band Classes 6, 8, 9, 11 and 12. $\Delta f = (N–3) \times 625$ kHz, where N is the number of carriers ($N \geq 2$). Operation outside North America is for future study.

1.3 Spreading rate 3

When transmitting with spreading rate 3, the spectrum emissions shall be less than the limits specified in Table 14.

TABLE 14

Spectrum emission limits for spreading rate 3

For $\|\Delta f\|$ within the range (MHz)	Emission limit
2.5-2.7	–14 dBm/30 kHz
2.7-3.5	$-(14 + 15 \times (\Delta f - 2.7\ \text{MHz}))$ dBm/30 kHz
3.08 (Band Class 6 only)	–33 dBc/3.84 MHz
3.5-7.5	$-(13 + 1 \times (\Delta f - 3.5\ \text{MHz}))$ dBm/1 MHz
7.5-8.5	$-(17 + 10 \times (\Delta f - 7.5\ \text{MHz}))$ dBm/1 MHz
8.08 (Band Class 6 only)	–43 dBc/3.84 MHz
8.5-12.5	–27 dBm/1 MHz

NOTE 1 – All frequencies in the measurement bandwidth shall satisfy the restrictions on $|\Delta f|$ where Δf = centre frequency – closer edge frequency, f, of the measurement filter.

The requirements at offsets of 3.08 and 8.08 MHz are equivalent to ACLR requirements of 33 and 43 dB from a spreading rate 3 mobile station transmitter into a spreading rate 3 or IMT-2000 CDMA Direct Spread MS receiver offset by 5 and 10 MHz respectively. ITU Category B is intended to apply to only Band Classes 5, 6, 8, 9, 11 and 12.

2 Transmitter spurious emissions (conducted)

When transmitting with spreading rate 1 or spreading rate 3, the spurious emissions shall be less than the limits specified in Tables 15a and 15b.

TABLE 15a

Transmitter spurious emission limits for spreading rates 1 and 3, respectively (Category A)

For $\|\Delta f\|$ within the range	Frequency bandwidth	Measurement bandwidth	Emission limit (dBm)
> 4 MHz for spreading rate 1	9 kHz < f < 150 kHz 150 kHz < f < 30 MHz	1 kHz 10 kHz	–13 –13
> 12.5 MHz for spreading rate 3	30 MHz < f < 1 GHz 1 GHz < f < 12.75 GHz	100 kHz 1 MHz	–13 –13

NOTE 1 – All frequencies in the measurement bandwidth shall satisfy the restrictions on $|\Delta f|$ where Δf = centre frequency – closer edge frequency, f, of the measurement filter.

TABLE 15b

Transmitter spurious emission limits for spreading rates 1 and 3, respectively (Category B)

For $\|\Delta f\|$ within the range	Frequency bandwidth	Measurement bandwidth	Emission limit (dBm)
> 4 MHz for spreading rate 1	9 kHz < f < 150 kHz 150 kHz < f < 30 MHz	1 kHz 10 kHz	–36 –36
> 12.5 MHz for spreading rate 3	30 MHz < f < 1 GHz 1 GHz < f < 12.75 GHz	100 kHz 1 MHz	–36 –30

NOTE 1 – All frequencies in the measurement bandwidth shall satisfy the restrictions on $|\Delta f|$ where Δf = centre frequency – closer edge frequency, f, of the measurement filter.

When transmitting with spreading rate 1 or spreading rate 3 in Band Class 6, the spurious emissions shall be less than the limits specified in Table 16.

TABLE 16

Additional Band Class 6 transmitter spurious emission limits for spreading rates 1 and 3, respectively

Measurement frequency (MHz)	Measurement bandwidth (kHz)	Emission limit (dBm)	Victim band
1 884.5-1 919.6	300	–41	PHS
925-935	100	–67	GSM 900
935-960	100	–79	GSM 900
1 805-1 880	100	–71	DCS 1800

NOTE 1 – Measurements apply only when the measurement frequency is at least 11.25 MHz (spreading rate 1) or 12.5 MHz (spreading rate 3) from the CDMA centre frequency. The non-PHS system band measurements are made on frequencies which are integer multiples of 200 kHz. As exceptions, up to five measurements with a level up to the spurious emission limits in Table 15b are allowed.

When transmitting in Band Class 7, the transmitter spurious emissions with ten or more averages shall also be less than the requirements in Table 17.

TABLE 17

Additional Band Class 7 transmitter spurious emission limits

Transmission frequency (MHz)	Measurement frequency (MHz)	Emission limit	Victim band
776-788	763-775	−35 dBm/6.25 kHz	Public safety
788-793	769-775	−35 dBm/6.25 kHz	Public safety
776-788	793-805	−35 dBm/6.25 kHz	Public safety
788-793	799-805	−35 dBm/6.25 kHz	Public safety

When transmitting in Band Classes 11 and 12, the transmitter spurious emissions with ten or more averages shall also be less than the requirements in Table 18.

TABLE 18

Additional Band Classes 11 and 12 transmitter spurious emission limits

For $\|\Delta f\|$ within the range	Emission limit Band Class 11 Subclasses 4, 5; Band Class 12 Subclass 1	Emission limit Band Class 11 Subclasses 0, 1, 2, 3; Band Class 12 Subclass 0
4.00 MHz to 10.0 MHz	−51 dBm in 100 kHz	Not specified

NOTE 1 – All frequencies in the measurement bandwidth shall satisfy the restrictions on $|\Delta f|$ where Δf = centre frequency – closer measurement edge frequency, f. Δf is positive offset from the highest valid CDMA channel in the band subclass or negative offset from the lowest valid CDMA channel in the band subclass. The emission limits for Band Classes 11 and 12 (European PAMR bands) are designed to allow coexistence with incumbent services in Europe and are tighter than ITU Category B requirements.

3 Adjacent channel leakage power ratio

For cdma2000 ACLR calculation, both the transmitted power and received power are measured with a rectangular filter. For cdma2000 system, the first adjacent channel offset is 2.5 MHz and the second adjacent channel offset is 3.75 MHz for band classes in 1 900 MHz. For cellular band in 800 or 450 MHz, the first adjacent channel offset is 1.5 MHz (1.515 MHz for Band Class 3) and the second adjacent channel offset is 2.73 MHz (2.745 MHz for Band Class 3). The receiver bandwidth is 1.23 MHz.

The ACLR calculated from the masks are as given in Table 19 (assuming 23 dBm as transmit power).

4 Receiver spurious emissions (conducted)

The conducted spurious emissions when not transmitting for a MS shall be less than the limits in Table 20.

TABLE 19

Mobile station ACLR limits

Band Class	ACLR1 (dB)	ACLR2 (dB)
0	26.34	37.87
1	32.38	35.37
2	26.34	37.87
3	26.09	28.10
4	32.38	35.37
5	26.34	37.87
6	33.13	37.89
7	26.34	35.29
8	33.13	37.89
9	26.34	37.87
10	20.96	19.87
11	26.34 (HRPD) 39.31 (cdma2000 1x) 39.41 (HRPD: band subclasses 4 and 5 only)	37.87 (HRPD) 55.67 (cdma2000 1x; HRPD: band subclasses 4 and 5 only)
12	26.34 (HRPD) 39.31 (cdma20001x) 39.41 (HRPD: band subclass 1)	37.87 (HRPD) 55.67 (cdma2000 1x; HRPD: band subclass 1 only)
13	33.13	37.89
14	32.38	35.37
15	32.38	35.37

For the cdma2000 system, the first adjacent channel offset is 2.5 MHz (ACLR1) and the second adjacent channel offset is 3.75 MHz for band classes in 1 900 MHz (ACLR2). for cellular band in 800 or 450 MHz, the first adjacent channel offset is 1.5 MHz (1.515 MHz for Band Class 3) (ACLR1) and the second adjacent channel offset is 2.73 MHz (2.745 MHz for Band Class 3) (ACLR2).

TABLE 20

General receiver spurious emission requirements

Frequency band	Measurement bandwidth	Maximum level (dBm)	Note
30 MHz ≤ f < 1 GHz	100 kHz	–57	Band Class 6 only
1 GHz ≤ f ≤ 12.75 GHz	30 kHz	–54	With the exception of the frequencies covered by Table 21, for which additional receiver spurious emission requirements apply Band Class 3 only
1 GHz ≤ f ≤ 12.75 GHz	1 MHz	–47	With the exception of the frequencies covered by Table 19, for which additional receiver spurious emission requirements apply
1 GHz ≤ f ≤ 12.75 GHz	30 kHz	–47	With the exception of the frequencies covered by Table 21, for which additional receiver spurious emission requirements apply All Band Classes except 3 and 6

For all frequencies within the mobile station receive and transmit bands, the conducted emissions shall be below the limits in Table 21.

TABLE 21

Additional receiver spurious emission requirements

Measurement bandwidth (MHz)	Maximum level (dBm)	Note
1	–61	Mobile transmit band
1	–76	Mobile receive band All Band Classes except Band Class 3
1	–81	Mobile receive band Band Class 3

Annex 3

CDMA TDD (UTRA TDD) mobile stations

1 Measurement uncertainty

Values specified in this annex differ from those specified in Recommendation ITU-R M.1457 since values in this annex incorporate test tolerances defined in Recommendation ITU-R M.1545.

2 Spectrum mask

2.1 Spectrum mask (3.84 Mchip/s UTRA TDD option)

The spectrum emission mask of the MS applies to frequency offsets (Δf) between 2.5 and 12.5 MHz on both sides of the carrier frequency.

The out-of-channel emission is specified as a power level relative to the MS output power in a frequency band of 3.84 MHz bandwidth.

The power of any MS emission should not exceed −48.5 dBm/3.84 MHz or the levels specified in Table 22a, whichever is higher.

TABLE 22a

Spectrum emission mask requirement (3.84 Mchip/s TDD option)

Δf[(1)] (MHz)	Minimum requirement	Measurement bandwidth
2.5-3.5	−33.5 − 15(1) (Δf/MHz − 2.5) dBc	30 kHz[(2)]
3.5-7.5	–33.5 − 1(1) (Δf/MHz − 3.5) dBc	1 MHz[(3)]
7.5-8.5	−37.5 − 10(1) (Δf/MHz − 7.5) dBc	1 MHz[(3)]
8.5-12.5	−47.5 dBc	1 MHz[(3)]

(1) Δf is the separation between the carrier frequency and the centre of the measuring filter.

(2) The first and last measurement positions with a 30 kHz filter at Δf equals 2.515 MHz and 3.485 MHz.

(3) The first and last measurement positions with a 1 MHz filter at Δf equals 4 MHz and 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.

NOTE 1 – The lower limit should be −48.5 dBm/3.84 MHz or the minimum requirement presented in this table, whichever is the higher.

2.2 Spectrum mask (1.28 Mchip/s UTRA TDD option)

The spectrum emission mask of the MS applies to frequency offsets between 0.8 and 4.0 MHz on both sides of the carrier frequency.

The out-of-channel emission is specified as a power level relative to the MS output power in a frequency band of 1.6 MHz bandwidth.

TABLE 22b

Spectrum emission mask requirement (1.28 Mchip/s TDD option)

Δf[(1)] (MHz)	Minimum requirement	Measurement bandwidth
0.8	−33.5 dBc[(3)]	30 kHz[(2)]
0.8-1.8	−33.5 − 14(1)(Δf/MHz − 0.8) dBc[(3)]	30 kHz[(2)]
1.8-2.4	−47.5 − 17(1)(Δf/MHz − 1.8) dBc[(3)]	30 kHz[(2)]
2.4-4.0	−42.5 dBc[(3)]	1 MHz[(3)]

(1) Δf is the separation between the carrier frequency and the centre of the measuring filter.

(2) The first and last measurement positions with a 30 kHz filter at Δf equals to 0.815 MHz and 2.385 MHz.

(3) The first and last measurement positions with a 1 MHz filter at Δf equals 2.9 MHz and 3.5 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.

NOTE 1 – The lower limit should be −53.5 dBm/1.28 MHz or the minimum requirement presented in this table, whichever is the higher.

2.3 Spectrum mask (7.68 Mchip/s UTRA TDD option)

The spectrum emission mask of the UE applies to frequencies which are between 5 MHz and 25 MHz from the UE centre carrier frequency. The out-of-channel emission is specified relative to the RRC filtered mean power of the UE carrier.

The power of any UE emission should not exceed the levels specified in Table 22c.

TABLE 22c

Spectrum emission mask requirement (7.68 Mchip/s TDD option)

Δf[(1)] (MHz)	Minimum requirement	Measurement bandwidth
5.0-5.75	$\left\{-36.5-10.67\left(\frac{\Delta f}{\text{MHz}}-5.0\right)\right\}$ dBc	30 kHz[(2)]
5.75-7.0	$\left\{-44.5-5.6\left(\frac{\Delta f}{\text{MHz}}-5.75\right)\right\}$ dBc	30 kHz[(2)]
7.0-15	$\left\{-36.5-0.5\left(\frac{\Delta f}{\text{MHz}}-7.0\right)\right\}$ dBc	1 MHz[(3)]
15.0-17.0	$\left\{-40.5-5.0\left(\frac{\Delta f}{\text{MHz}}-15.0\right)\right\}$ dBc	1 MHz[(3)]
17.0-25.0	−51.5 dBc	1 MHz[(3)]

(1) Δf is the separation between the carrier frequency and the centre of the measuring filter.

(2) The first and last measurement positions with a 30 kHz filter at Δf equals 5.015 MHz and 6.985 MHz.

(3) The first and last measurement positions with a 1 MHz filter at Δf equals 7.5 MHz and 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.

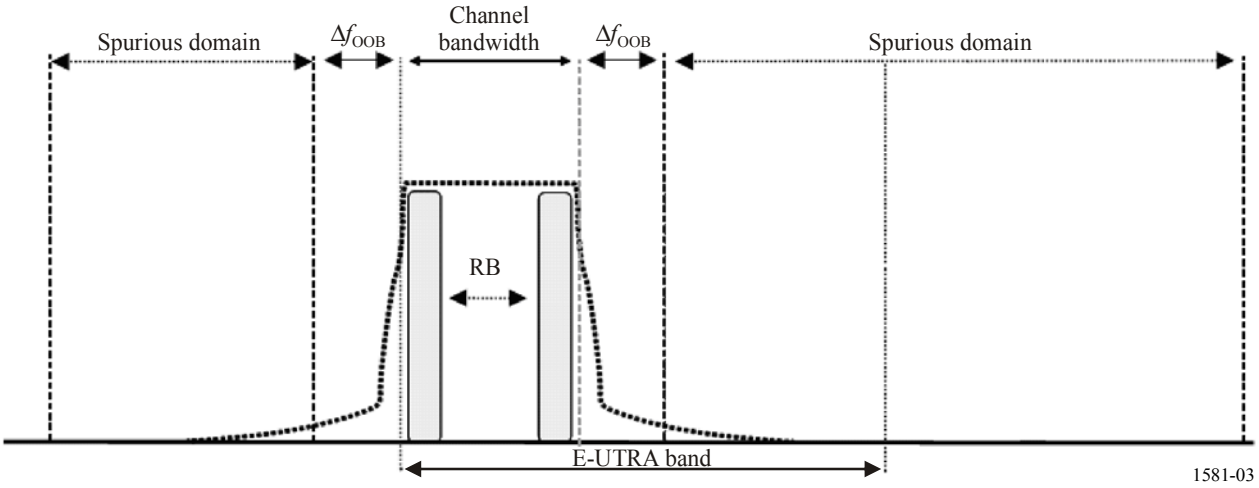
NOTE 1 – The lower limit should be −47 dBm/7.68 MHz or the minimum requirement presented in this table, whichever is the higher.

2.4 E-UTRA spectrum 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 (see Fig. 3).

The spectrum emission mask of the MS applies to frequencies (Δf_{OOB}) starting from the ± edges of the assigned E-UTRA channel bandwidth. For frequencies greater than (Δf_{OOB}) as specified in Table 22d the spurious requirements in § 4 are applicable.

FIGURE 3



2.4.1 General E-UTRA spectrum mask

The power of any MS emission shall not exceed the levels specified in Table 22d for the specified channel bandwidths.

TABLE 22d

General E-UTRA spectrum emission mask

Δf_{OOB} (MHz)	Spectrum emission limit (dBm)/Channel bandwidth						
	1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Measurement bandwidth**
±0-1			−13.5	−16.5	−18.5	−19.5	30 kHz
±1-2.5			−8.5	−8.5	−8.5	−8.5	1 MHz
±2.5-2.8			−8.5	−8.5	−8.5	−8.5	1 MHz
±2.8-5			−8.5	−8.5	−8.5	−8.5	1 MHz
±5-6			−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

NOTE 1 – The values for 1.4 MHz and 3.0 MHz channel bandwidths will be addressed at a later stage.

NOTE 2 – 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 ACLR

3.1 ACLR for UTRA

ACLR is the ratio of the transmitted power to the power measured after a receiver filter in the adjacent channel(s). Both the transmitted power and the received power are measured through a matched filter (root raised cosine and roll-off 0.22) with a noise power bandwidth equal to the chip

rate. The requirements should apply whatever the type of transmitter considered (single carrier or multi-carrier). It applies for all transmission modes foreseen by the manufacturer's specification. The limit for ACLR should be as specified in Tables 23a) to 23c).

TABLE 23

a) MS ACLR limits for 3.84 Mchip/s TDD option

Power class	Adjacent channel	ACLR limit (dB)
2, 3	MS channel ± 5 MHz	32.2
2, 3	MS channel ± 10 MHz	42.2

b) MS ACLR limits for 1.28 Mchip/s TDD option

Power class	Adjacent channel	ACLR limit (dB)
2, 3	MS channel ± 1.6 MHz	32.2
2, 3	MS channel ± 3.2 MHz	42.2

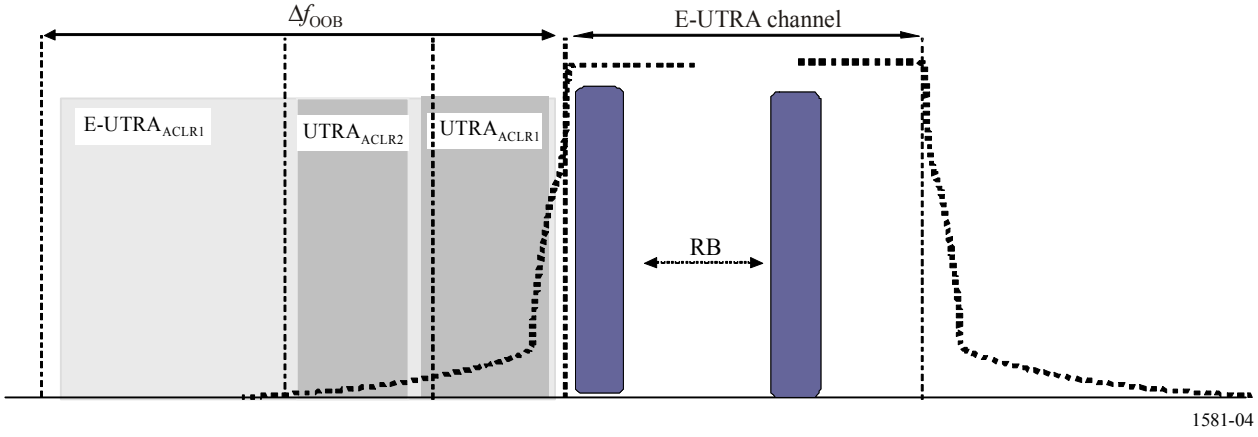
c) MS ACLR limits for 7.68 Mchip/s TDD option

Power class	Adjacent channel	Chip rate for RRC measurement filter (MHz)	ACLR limit (dB)
2, 3	MS channel ± 7.5 MHz	3.84	32.2
2, 3	MS channel ± 12.5 MHz	3.84	42.2
2, 3	MS channel ± 10.0 MHz	7.68	32.2
2, 3	MS channel ± 20.0 MHz	7.68	42.2

3.2 ACLR for E-UTRA

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. The ACLR requirements are specified for two scenarios: for (an) adjacent E-UTRA and/or UTRA channels (see Fig. 4).

FIGURE 4



3.2.1 Limits for E-UTRA

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. The E-UTRA on channel and adjacent channel power is measured with a rectangular measurement bandwidth filter. The limits should be as specified in Table 23d.

TABLE 23d

General requirements for E-UTRAACLR

	Channel bandwidth/E-UTRAACLR1/measurement bandwidth					
	1.4 MHz	**3 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			4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UE channel			+5 MHz or −5 MHz	+10 MHz or −10 MHz	+15 MHz or −15 MHz	+20 MHz or −20 MHz

3.2.2 Limits for E-UTRA for UTRA coexistence in the same geographical area

For adjacent UTRA carriers the limits should be as specified in Table 23e.

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 5 MHz adjacent channel (UTRAACLR1) and the 2nd UTRA 5 MHz adjacent channel (UTRAACLR2). The UTRA channel is measured with a 3.84 MHz RRC bandwidth filter with roll-off factor $\alpha = 0.22$. The E-TRA channel is measured with a rectangular measurement bandwidth filter.

TABLE 23e

Additional requirements

	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 (MHz)	–	–	2.5+BWUTRA/2	5+BWUTRA/2	7.5+BWUTRA/2	10+BWUTRA/2
UTRAACLR2	–	–	35.2 dB	35.2 dB	35.2 dB	35.2 dB
Adjacent channel centre frequency offset (MHz)	–	–	2.5+3*BWUTRA/2	5+3*BWUTRA/2	7.5+3*BWUTRA/2	10+3*BWUTRA/2
E-UTRA channel measurement bandwidth	–	–	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UTRA 5 MHz channel measurement bandwidth[(1)]	–	–	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz
UTRA 1.6 MHz channel measurement bandwidth[(2)]	–	–	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz

(1) Applicable for E-UTRA FDD coexistence with UTRA FDD in paired spectrum.

(2) Applicable for E-UTRA TDD coexistence with UTRA TDD in unpaired spectrum.

3.2.3 Additional ACLR limits

Additional ACLR 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.

The additional ACLR limits are specified for the 2nd UTRA adjacent channel (UTRAACLR2). The UTRA channel is measured with a 3.84 MHz RRC bandwidth filter with roll-off factor $\alpha = 0.22$. The E-UTRA channel is measured with a rectangular measurement bandwidth filter.

TABLE 23f

Additional requirements (UTRAACLR2)

	Channel bandwidth/UTRAACLR2/measurement bandwidth					
	1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
UTRAACLR2bis	–	–	42.2 dB	42.2 dB	–	–
E-UTRA channel measurement bandwidth	–	–	4.5 MHz	9.0 MHz	–	–
UTRA channel measurement bandwidth	–	–	3.84 MHz	3.84 MHz	–	–
UE channel for UTRAACLR2bis	+7.5 MHz from upper band edge or −7.5 MHz from lower band edge					

4 Transmitter spurious emissions (conducted)

4.1 Transmitter spurious emissions for UTRA

For UTRA, the spurious emissions should be less than the limits specified in Tables 24 and 25a) to 25c). The following requirements are only applicable for MS centre carrier frequency offsets greater than 12.5 MHz (3.84 Mchip/s TDD option), 4 MHz (1.28 Mchip/s TDD option) or 25 MHz (7.68 Mchip/s TDD option).

TABLE 24

General spurious emissions requirements for UTRA

Frequency band	**Measurement bandwidth**	**Minimum requirement (dBm)**
9 kHz ≤ f < 150 kHz	1 kHz	–36
150 kHz ≤ f < 30 MHz	10 kHz	–36
30 MHz ≤ f < 1 000 MHz	100 kHz	–36
1 GHz ≤ f < 12.75 GHz	1 MHz	–30

TABLE 25

a) Additional spurious emissions requirements (3.84 Mchip/s TDD option)

Frequency bandwidth	Measurement bandwidth	Minimum requirement (dBm)
925 MHz ≤ f ≤ 935 MHz	100 kHz	−67 (Note 1)
935 MHz < f ≤ 960 MHz	100 kHz	−79 (Note 1)
1 805 MHz ≤ f ≤ 1 880 MHz	100 kHz	−71 (Note 1)
1 884.5 MHz ≤ f ≤ 1 919.6 MHz	300 kHz	−41 (Note 2)

NOTE 1 – The measurements are made on frequencies which are integer multiples of 200 kHz. As exceptions, up to five measurements with a level up to the applicable requirements defined in Table 24 are permitted for each absolute RF channel used in the measurement.

NOTE 2 – Applicable for transmission in 2 010-2 025 MHz.

b) Additional spurious emissions requirements (1.28 Mchip/s TDD option)

Operating band	Frequency bandwidth	Measurement bandwidth	Minimum requirement
a	921 MHz ≤ f < 925 MHz	100 kHz	−60 dBm (Note 1)
	925 MHz ≤ f ≤ 935 MHz	100 kHz	−67 dBm (Note 1)
	935 MHz < f ≤ 960 MHz	100 kHz	−79 dBm (Note 1)
	1 805 MHz ≤ f ≤ 1 880 MHz	100 kHz	−71 dBm (Note 1)
	2 010 MHz ≤ f ≤ 2 025 MHz	1 MHz	−65 dBm (Note 2)
	1 900 MHz ≤ f ≤ 1 920 MHz	1 MHz	−65 dBm (Note 3)
b	1 850 MHz ≤ f ≤ 1 910 MHz	1 MHz	−65 dBm (Note 4)
	1 930 MHz ≤ f ≤ 1 990 MHz	1 MHz	−65 dBm (Note 5)
	2 010 MHz ≤ f ≤ 2 025 MHz	1 MHz	−65 dBm
c	2 010 MHz ≤ f ≤ 2 025 MHz	1 MHz	−65 dBm
d	1 900 MHz ≤ f ≤ 1 920 MHz	1 MHz	−65 dBm
	2 010 MHz ≤ f ≤ 2 025 MHz	1 MHz	−65 dBm
	2 620 MHz ≤ f ≤ 2 690 MHz	3.84 MHz	−37 dBm
e	921 MHz ≤ f < 925 MHz	100 kHz	−60 dBm (Note 1)
	925 MHz ≤ f ≤ 935 MHz	100 kHz	−67 dBm (Note 1)
	935 MHz < f ≤ 960 MHz	100 kHz	−79 dBm (Note 1)
	1 805 MHz ≤ f ≤ 1 880 MHz	100 kHz	−71 dBm (Note 1)
	1 900 MHz ≤ f ≤ 1 920 MHz	1 MHz	−65 dBm
	2 010 MHz ≤ f ≤ 2 025 MHz	1 MHz	−65 dBm

NOTE 1 – The measurements are made on frequencies which are integer multiples of 200 kHz. As exceptions, up to five measurements with a level up to the applicable requirements defined in Table 15c are permitted for each UTRA absolute radio frequency channel number (UARFCN) used in the measurement.

NOTE 2 – This requirement is only applicable when UE operating in 1 900-1 920 MHz of band a.

NOTE 3 – This requirement is only applicable when UE operating in 2 010-2 025 MHz of band a.

NOTE 4 – This requirement is only applicable when UE operating in 1 930-1 990 MHz of band b.

NOTE 5 – This requirement is only applicable when UE operating in 1 850-1 910 MHz of band b.

TABLE 25 (*end*)

c) Additional spurious emissions requirements (7.68 Mchip/s TDD option)

Frequency bandwidth	Measurement bandwidth	Minimum requirement (dBm)
921 MHz ≤ f < 925 MHz	100 kHz	−60 (Note 1)
925 MHz ≤ f ≤ 935 MHz	100 kHz	−67 (Note 1)
935 MHz < f ≤ 960 MHz	100 kHz	−79 (Note 1)
1 805 MHz ≤ f ≤ 1 880 MHz	100 kHz	−71 (Note 1)
2 620 MHz ≤ f ≤ 2 690 MHz	3.84 MHz	−37 (Note 1)
1 884.5 MHz ≤ f ≤ 1 919.6 MHz	300 kHz	−41 (Note 2)

NOTE 1 – The measurements are made on frequencies which are integer multiples of 200 kHz. As exceptions, up to five measurements with a level up to the applicable requirements defined in Table 24 are permitted for each absolute RF channel used in the measurement.

NOTE 2 – Applicable for transmission in 2 010-2 025 MHz.

4.2 Transmitter spurious emissions for E-UTRA

For E-UTRA, the spurious emission limits apply for frequency ranges that are more than Δf_{OOB} (MHz) from the edge of the channel bandwidth (Table 25d).

TABLE 25d

Boundary between E-UTRA Δf_{OOB} and spurious emission domain

Channel bandwidth	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Δf_{OOB} (MHz)			10	15	20	25

NOTE 1 − The values for 1.4 MHz and 3.0 MHz channel bandwidths will be addressed at a later stage.

The spurious emission limits in Table 25e apply for all E-UTRA transmitter band configurations and channel bandwidths.

TABLE 25e

General spurious emissions requirements for E-UTRA

Frequency band	Measurement bandwidth	Minimum requirement (dBm)
9 kHz ≤ f < 150 kHz	1 kHz	–36
150 kHz ≤ f < 30 MHz	10 kHz	–36
30 MHz ≤ f < 1 000 MHz	100 kHz	–36
1 GHz ≤ f < 12.75 GHz	1 MHz	–30

TABLE 25f

Spurious emissions requirements for UE coexistence in E-UTRA bands

E-UTRA band	Spurious emission						
	Protected band	Frequency range (MHz)			Level (dBm)	Bandwidth (MHz)	Comment
33	E-UTRA Band 1, 3, 8, 34, 38, 39, 40	FDL_low	–	FDL_high	–50	1	Note 2
34	E-UTRA Band 1, 3, 7, 8, 9, 11, 33, 38, 39, 40	FDL_low	–	FDL_high	–50	1	Note 2
	Frequency range	860	–	895	–50	1	
	Frequency range	1 884.5	–	1 919.6	–41	0.3	
35							
36							
37			–				
38	E-UTRA Band 1, 3, 33, 34	FDL_low	–	FDL_high	–50	1	
39	E-UTRA Band 34, 40	FDL_low	–	FDL_high	–50	1	
40	E-UTRA Band 1, 3, 33, 34, 39	FDL_low	–	FDL_high	–50	1	

NOTE 1 – FDL_low and FDL_high refer to each E-UTRA frequency band specified in Note 3 of *recommends* 1.

NOTE 2 – For non-synchronized TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band.

5 Receiver spurious emissions (conducted)

5.1 Receiver spurious emissions for UTRA

For UTRA, the power of any spurious emissions from the receiver should not exceed the limits given in Tables 26a) to 26c).

TABLE 26

a) Receiver spurious emission requirements (3.84 Mchip/s UTRA TDD option)

Band	Maximum level	Measurement bandwidth	Note
30 MHz-1 GHz	−57 dBm	100 kHz	
1 GHz-1.9 GHz and 1.92 GHz-2.01 GHz and 2.025 GHz-2.11 GHz and 2.17 GHz-2.57 GHz	−47 dBm	1 MHz	
1.9 GHz-1.92 GHz and 2.01 GHz-2.025 GHz and 2.11 GHz-2.170 GHz and 2.57 GHz-2.69 GHz	−60 dBm	3.84 MHz	
2.69 GHz-12.75 GHz	−47 dBm	1 MHz	

TABLE 26 (*end*)

b) Receiver spurious emission requirements (1.28 Mchip/s UTRA TDD option)

Band	Maximum level	Measurement bandwidth	Note
30 MHz-1 GHz	−57 dBm	100 kHz	
1 GHz-1.9 GHz and 1.92 GHz-2.01 GHz and 2.025 GHz-2.11 GHz and 2.17 GHz-2.30 GHz and 2.40 GHz-2.57 GHz	−47 dBm	1 MHz	
1.9 GHz-1.92 GHz and 2.01 GHz-2.025 GHz and 2.11 GHz-2.170 GHz and 2.30 GHz-2.40 GHz and 2.57 GHz-2.69 GHz	−64 dBm	1.28 MHz	
2.69 GHz 12.75 GHz	−47 dBm	1 MHz	

c) Receiver spurious emission requirements (7.68 Mchip/s UTRA TDD option)

Band	Maximum level	Measurement bandwidth	Note
30 MHz-1 GHz	−57 dBm	100 kHz	
1 GHz-1.9 GHz and 1.92 GHz-2.01 GHz and 2.025 GHz-2.11 GHz and 2.17 GHz-2.57 GHz	−47 dBm	1 MHz	With the exception of frequencies between 25 MHz below the first carrier frequency and 25 MHz above the last carrier frequency used by the MS
1.9 GHz-1.92 GHz and 2.01 GHz-2.025 GHz and 2.11 GHz-2.170 GHz and 2.57 GHz-2.69 GHz	−57 dBm	7.68 MHz	With the exception of frequencies between 25 MHz below the first carrier frequency and 25 MHz above the last carrier frequency used by the MS
2.69 GHz-12.75 GHz	−47 dBm	1 MHz	

5.2 Receiver spurious emissions for E-UTRA

The power of any narrow-band CW spurious emission shall not exceed the maximum level specified in Table 27.

TABLE 27

General receiver spurious emission requirements for E-UTRA

Frequency band	Measurement bandwidth	Maximum level	Note
30 MHz ≤ f < 1 GHz	100 kHz	−57 dBm	
1 GHz ≤ f ≤ 12.75 GHz	1 MHz	−47 dBm	

Annex 4

TDMA Single-Carrier (UWC-136) mobile stations

Part A

Conformance requirements (30 kHz)

1 Spectrum mask

Spectrum noise suppression is the restraint of sideband energy outside the active transmit channel. This RF spectrum is the result of power ramping, modulation and all sources of noise. The spectrum is primarily the result of events that do not occur at the same time: digital modulation and power ramping (switching transients). The RF spectrum from these two events are specified separately.

Adjacent and first or second alternate channel power is that part of the mean power output of the transmitter resulting from the modulation and noise which falls within a specified passband centred on either of the adjacent or first or second alternate channels.

The emission power should not exceed the limits specified in Table 28.

TABLE 28

Adjacent and alternate channel power requirements

Channel	Maximum level
In either adjacent channel, centred ±30 kHz from the centre frequency	26 dB below the mean output power
In either alternate channel, centred ±60 kHz from the centre frequency	45 dB below the mean output power
In either second alternate channel centred ±90 kHz from the centre frequency	45 dB below the mean output power or –13 dBm measured in 30 kHz bandwidth, whichever is the lower power

OoB power arising from switching transients is the peak power of the spectrum, arising from the ramping-on and ramping-off of the transmitter, that fall within defined frequency bands outside the active transmit channel.

The peak emission power should not exceed the limits specified in Table 29.

TABLE 29

Switching transients requirements

Channel	Maximum level
In either adjacent channel, centred ±30 kHz from the centre frequency	26 dB below the peak output power reference
In either alternate channel, centred ±60 kHz from the centre frequency	45 dB below the peak output power reference
In either second alternate channel centred ±90 kHz from the centre frequency	45 dB below the peak output power reference or –13 dBm measured in 30 kHz bandwidth, whichever is the lower power

2 Transmitter spurious emissions (conducted)

The power of any spurious emission should not exceed the limits specified in Table 30.

TABLE 30

MS spurious emission limits

Band (f)[1]	Maximum level (dBm)	Measurement bandwidth	Note
9 kHz ≤ f ≤ 150 kHz	–36	1 kHz	[2]
150 kHz < f ≤ 30 MHz	–36	10 kHz	[2]
30 MHz < f ≤ 1 000 MHz	–36	100 kHz	[2]
1 000 MHz < f < 1 920 MHz	–30	1 MHz	[2]
1 920 MHz ≤ f ≤ 1 980 MHz	–30	30 kHz	[3]
1 980 MHz < f < 2 110 MHz	–30	1 MHz	[2]
2 110 MHz ≤ f ≤ 2 170 MHz	–70	30 kHz	[4]
2 170 MHz < f ≤ 12.75 GHz	–30	1 MHz	[2]

[1] f is the frequency of the spurious emission.

[2] In accordance with the applicable clauses of Recommendation ITU-R SM.329.

[3] MS transmit band.

[4] MS receive band.

2.1 Coexistence with services in adjacent frequency bands

This requirement provides for the protection of receivers operating in bands adjacent to the MS transmit frequency band of 1 920 to 1 980 MHz: GSM 900, R-GSM and UTRA TDD.

NOTE 1 – UTRA FDD operates in the same frequency band as UWC-136.

The power of any spurious emission should not exceed the limits specified in Table 31.

TABLE 31

Additional spurious emissions requirements

Service	Frequency band	Measurement bandwidth (kHz)	Limit (dBm)
R-GSM	$921 \le f \le 925$ MHz	100	–60
R-GSM	$925 < f \le 935$ MHz	100	–67
GSM 900/R-GSM	$935 < f \le 960$ MHz	100	–79
DCS 1800	$1\,805 \le f \le 1\,880$ MHz	100	–71
UTRA TDD	$1\,900 \le f \le 1\,920$ MHz	100	–62
UTRA TDD	$2\,010 \le f \le 2\,025$ MHz	100	–62

NOTE 1 – The measurements are made on frequencies which are integer multiples of 200 kHz. Up to five exceptions of up to –36 dBm are permitted in the GSM 900, DCS 1800 and UTRA bands, and up to three exceptions of up to –36 dBm are permitted in the GSM 400 bands.

3 Receiver spurious emissions (idle mode)

The power of any spurious emissions should not exceed the limits given in Table 32.

TABLE 32

General receiver spurious emission requirements

Frequency band	Measurement bandwidth	Maximum level (dBm)	Note
$30\text{ MHz} \le f < 1\text{ GHz}$	100 kHz	–57	
$1\text{ GHz} \le f \le 12.75\text{ GHz}$	1 MHz	– 47	With the exception of the frequencies covered by the table below, for which additional receiver spurious emission requirements apply(1)

(1) *Editorial Note* – In TFES Harmonized Standard v1.0.2, no additional receiver spurious emission is specified; yet, it is expected that there will be a table added, in the same form as for the other technologies (see Tables 5 (Annex 1), 21 (Annex 2) and 26 (Annex 3)).

Part B

Conformance requirements (200 kHz)

The 200 kHz channel provides packet data service and employs both 8-level phase shift keying (8-PSK) and Gaussian minimum shift keying (GMSK) modulations.

1 Spectrum mask

Output RF spectrum is the relationship between the frequency offset from the carrier and the power, measured in a specified bandwidth and time, produced by the MS due to the effects of modulation and power ramping.

The specifications contained in this subclause apply in frequency hopping as well as in non-frequency hopping modes.

Due to the bursty nature of the signal, the output RF spectrum results from two effects: the modulation process, and the power ramping up and down (switching transients).

– The level of the output RF spectrum due to GMSK and 8-PSK modulations should be no more than that given in Tables 33 and 34.

– The level of the output RF spectrum due to switching transients should be no more than that given in Table 35.

– The power emitted should not exceed –71 dBm in frequency band 2 110-2 170 MHz.

2 Spectrum due to the modulation and wideband noise

The output RF modulation spectrum is specified in Tables 33 and 34. This specification applies for all RF channels supported by the equipment.

The specification applies to the entire relevant transmit band and up to 2 MHz either side.

The limits should be met under the following measurement conditions:

– Zero frequency scan, filter bandwidth and video bandwidth of 30 kHz up to 1 800 kHz from the carrier and 100 kHz at 1 800 kHz and above from the carrier, with averaging done over 50% to 90% of the useful part of the transmitted bursts, excluding the midamble, and then averaged over at least 200 such burst measurements. Above 1 800 kHz from the carrier, only measurements centred on 200 kHz multiples are taken with averaging over 50 bursts.

– When tests are done in frequency hopping mode, the averaging should include only bursts transmitted when the hopping carrier corresponds to the nominal carrier of the measurement. The limits then apply to the measurement results for any of the hopping frequencies.

The figures in Table 33, at the vertically listed power level (dBm) and at the horizontally listed frequency offset from the carrier (kHz), are then the maximum allowed level (dB) relative to a measurement in 30 kHz on the carrier.

NOTE 1 – This approach of specification has been chosen for convenience and speed of testing. It does however require careful interpretation if there is a need to convert figures in the following tables into spectral density values, in that only part of the power of the carrier is used as the relative reference, and in addition different measurement bandwidths are applied at different offsets from the carrier.

TABLE 33

Relative maximum level due to modulation

Carrier power (dBm)	**Frequency offset (kHz)**							
	100	200	250	400	≥ 600 < 1 200	≥ 1 200 < 1 800	≥ 1 800 < 6 000	≥ 6 000
≥ 33	+0.5	–30	–33	–60	–60	–60	–68	–76
32	+0.5	–30	–33	–60	–60	–60	–67	–75
30	+0.5	–30	–33	–60	–60[1]	–60	–65	–73
28	+0.5	–30	–33	–60	–60[1]	–60	–63	–71
26	+0.5	–30	–33	–60	–60[1]	–60	–61	–69
≤ 24	+0.5	–30	–33	–60	–60[1]	–60	–59	–67

[1] For equipment supporting 8-PSK, the requirement for 8-PSK modulation is –54 dB.

The following exceptions should apply, using the same measurement conditions as specified above:

– In the combined range of 600 kHz to 6 MHz above and below the carrier, in up to three bands of 200 kHz width centred on a frequency which is an integer multiple of 200 kHz, exception levels of up to –36 dBm are allowed.

– Above 6 MHz offset from the carrier in up to 12 bands of 200 kHz width centred on a frequency which is an integer multiple of 200 kHz, exception levels of up to –36 dBm are allowed.

Using the same measurement conditions as specified above, if a requirement in Table 33 results in lower than the power limit given in Table 34, then the latter should be applied instead.

TABLE 34

Absolute maximum level due to modulation

Frequency offset from the carrier (kHz)	Level (dBm)
< 600	–36
≥ 600, <1 800	–56
≥ 1 800	–51

3 Spectrum due to switching transients

These effects are also measured in the time domain and the specifications assume the following measurement conditions: zero frequency scan, filter bandwidth 30 kHz, peak hold, and video bandwidth 100 kHz. Table 35 specifies the limits.

TABLE 35

Maximum levels due to switching transients

Carrier power level (dBm)	Maximum level measured at various frequency offsets			
	400 kHz	600 kHz	1 200 kHz	1 800 kHz
39	–21 dBm	–26 dBm	–32 dBm	–36 dBm
≤ 37	–23 dBm	–26 dBm	–32 dBm	–36 dBm

NOTE 1 – The relaxation for carrier power level 39 dBm is in line with the modulated spectra and thus causes negligible additional interference to an analogue system by an UWC-136 200 kHz signal.

NOTE 2 – The near-far dynamics with this specification has been estimated to be approximately 58 dB for MS operating at a power level of 8 W or 49 dB for MSs operating at a power level of 1 W. The near-far dynamics then gradually decreases by 2 dB per power level down to 32 dB for MSs operating in cells with a maximum allowed output power of 20 mW or 29 dB for MS operating at 10 mW.

NOTE 3 – The possible performance degradation due to switching transient leaking into the beginning or the end of a burst, was estimated and found to be acceptable with respect to the BER due to co-channel interference, *C*/*I*.

4 Transmitter spurious emissions (conducted)

The power of any spurious emission should not exceed the limits specified in Table 36.

TABLE 36

MS spurious emission limits

Band (f)[1]	Measurement bandwidth	Maximum level (dBm)	Note
9 kHz ≤ f ≤ 150 kHz	1 kHz	–36	[2]
150 kHz < f ≤ 30 MHz	10 kHz	–36	[2]
30 MHz < f ≤ 1 000 MHz	100 kHz	–36	[2]
1 000 MHz < f < 1 920 MHz	1 MHz	–30	[2]
1 920 MHz ≤ f ≤ 1 980 MHz	100 kHz	–36	[3]
1 980 MHz < f < 2 110 MHz	1 MHz	–30	[2]
2 110 MHz ≤ f ≤ 2 170 MHz	100 kHz	–66	[4]
2 170 MHz < f ≤ 12.75 GHz	1 MHz	–30	[2]

[1] f is the frequency of the spurious emission.

[2] In accordance with the applicable clauses of Recommendation ITU-R SM.329.

[3] MS transmit band.

[4] MS receive band.

5 Coexistence with services in adjacent frequency bands

This requirement provides for the protection of receivers operating in bands adjacent to the MS transmit frequency band of 1 920 MHz to 1 980 MHz: GSM 900, R-GSM, UTRA TDD.

The power of any spurious emission should not exceed the limits specified in Table 37.

TABLE 37

Additional spurious emissions requirements

Service	Frequency band	Measurement bandwidth (kHz)	Minimum requirement (dBm)
R-GSM	921 ≤ f ≤ 925 MHz	100	–60
R-GSM	925 < f ≤ 935 MHz	100	–67
GSM 900/R-GSM	935 < f ≤ 960 MHz	100	–79
DCS 1800	1 805 ≤ f ≤ 1 880 MHz	100	–71
UTRA TDD	1 900 ≤ f ≤ 1 920 MHz	100	–62
UTRA TDD	2 010 ≤ f ≤ 2 025 MHz	100	–62

NOTE 1 – The measurements are made on frequencies which are integer multiples of 200 kHz. Up to five exceptions of up to –36 dBm are permitted in the GSM 900, DCS 1800 and UTRA bands, and up to three exceptions of up to –36 dBm are permitted in the GSM 400 bands.

6 Receiver spurious emissions (idle mode)

The power of any spurious emissions should not exceed the limits given in Table 38.

TABLE 38

General receiver spurious emission requirements

Frequency band	Measurement bandwidth	Maximum level (dBm)	Note
30 MHz ≤ f < 1 GHz	100 kHz	–57	
1 GHz ≤ f ≤ 12.75 GHz	1 MHz	–47	With the exception of the frequencies covered by the table below, for which additional receiver spurious emission requirements apply(1)

(1) *Editorial Note* – In TFES Harmonized Standard v1.0.2, no additional receiver spurious emission is specified; yet, it is expected that there will be a table added, in the same form as for the other technologies (see Tables 5 (Annex 1), 21 (Annex 2) and 26 (Annex 3)).

Annex 5

FDMA/TDMA (digital enhanced cordless telecommunications (DECT)) mobile stations

1 Spectrum mask

If the equipment under test (EUT) is equipped with antenna diversity, the EUT should have the diversity operation defeated for the following tests.

2 Emissions due to modulation

The unwanted emission(s) due to modulation is the power measured in any DECT RF channel other than the one in which the EUT is transmitting, integrated over a bandwidth of 1 MHz.

With transmissions on physical channel Ra (K, L, M, N) in successive frames, the power in physical channel Ra (K, L, Y, N) should be less than the values given in Table 39.

TABLE 39

Emissions modulation

Emissions on RF channel "Y"	Measurement bandwidth	Maximum power level
$Y = M \pm 1$	(1)	160 µW (–8 dBm)
$Y = M \pm 2$	(1)	1 µW (–30 dBm)
$Y = M \pm 3$	(1)	80 nW (–41 dBm)
Y = any other DECT channel	(1)	40 nW (–44 dBm)(2)

(1) The power in RF channel Y is defined by integration over a bandwidth of 1 MHz centred on the nominal centre frequency, F_Y, averaged over at least 60% but less than 80% of the physical packet, and starting before 25% of the physical packet has been transmitted but after the synchronization word.

(2) For Y = "any other DECT channel", the maximum power level should be less than 40 nW (−44 dBm) except for one instance of a 500 nW (–33 dBm) signal.

3 Emissions due to transmitter transients

The power level of all modulation products (including AM components due to the switching on or off of the modulated RF carrier) in a DECT RF channel as a result of a transmission on another DECT RF channel.

The power level of all modulation products (including AM products due to the switching on or off of a modulated RF carrier) arising from a transmission on RF channel M should, when measured using a peak hold technique, be less than the values given in Table 40.

TABLE 40

Emissions due to transmitter transients

Emissions on RF channel "*Y*"	Measurement bandwidth	Maximum power level
$Y = M \pm 1$	(1)	250 µW (–6 dBm)
$Y = M \pm 2$	(1)	40 µW (–14 dBm)
$Y = M \pm 3$	(1)	4 µW (–24 dBm)
Y = any other DECT channel	(1)	1 µW (–30 dBm)

(1) The measurement bandwidth should be 100 kHz and the power should be integrated over a 1 MHz bandwidth centred on the DECT frequency, F_Y.

4 Transmitter spurious emissions (conducted)

4.1 Spurious emissions when allocated a transmit channel

The spurious emissions, when a radio end point has an allocated physical channel, should meet the requirements of Table 41. The requirements of Table 41 are only applicable for frequencies which are greater than 12.5 MHz away from the centre frequency, f_c, of a carrier.

TABLE 41

Spurious emissions requirements

Frequency	Minimum requirement/ Reference bandwidth
30 MHz ≤ f < 1 000 MHz	–36 dBm/100 kHz
1 GHz ≤ f < 12.75 GHz	–30 dBm/1 MHz
f_c – 12.5 MHz < f < f_c + 12.5 MHz	Not defined

Measurements should not be made for transmissions on the RF channel closest to the nearest band edge for frequency offsets of up to 2 MHz.

5 Receiver spurious emissions (idle mode)

5.1 Spurious emissions when the EUT has no allocated transmit channel

The power level of any spurious emissions when the radio end point has no allocated transmit channel should not exceed the limits specified in Table 42.

TABLE 42

Receiver spurious emissions

Frequency band	Measurement bandwidth	Maximum level (dBm)	Note
30 MHz ≤ f < 1 GHz	100 kHz(1)	–57	
1 GHz ≤ f ≤ 12.75 GHz	1 MHz(1)	–47	With the exception of the frequencies within the DECT band, covered by Table 43

(1) The power should be measured using a peak hold technique.

5.2 In the DECT band

The power level of any receiver spurious emissions within the DECT band should not exceed the limit in Table 43.

TABLE 43

Receiver spurious emissions within DECT band

Frequency band (MHz)	Measurement bandwidth (MHz)	Maximum level (dBm)
1 900-1 920 2 010-2 025	1	–57(1)

(1) The following exceptions are allowed:

- in one 1 MHz band, the maximum allowable e.r.p. should be less than 20 nW;
- in up to two bands of 30 kHz, the maximum e.r.p. should be less than 250 nW.

Annex 6

IMT-2000 OFDMA TDD WMAN mobile stations

This annex defines the unwanted emission limits for IMT-2000 OFDMA TDD WMAN mobile stations.

1 Spectrum emission mask

1.1 Spectrum emission mask for equipment operating in the band 2 300-2 400 MHz

The spectrum emission mask of user equipment applies to frequencies between 2.5 MHz and 12.5 MHz away from the user equipment centre frequency for the 5 MHz carrier and between 5 MHz and 25 MHz away from the user equipment centre frequency for the 10 MHz carrier. For user equipment with 8.75 MHz channel bandwidth, the spectrum emissions mask applies to frequencies between 4.77 MHz and 21.875 MHz away from the centre frequency.

Tables 44 to 47 specify the spectrum emission for TDD mobile stations with 10, 5 and 8.75 MHz channel bandwidths.

TABLE 44

Spectrum emission mask for 10 MHz carrier

Segment number	Offset from channel centre frequency (MHz)	Integration bandwidth (kHz)	Allowed emission level (dBm/integration bandwidth)
1	5 to < 6	100	−13.00
2	6 to < 10	1 000	−13.00
3	10 to < 11	1 000	$-13 - 12(\Delta f - 10)$
4	11 to < 15	1 000	−25.00
5	15 to < 20	1 000	−25.00
6	20 to < 25	1 000	−25.00

In Table 44:

– Channel bandwidth is 10 MHz.

– Integration bandwidth refers to the frequency range over which the emission power is integrated.

Δf: defined as the frequency offset (MHz) from the channel centre frequency.

TABLE 45

Spectrum emission mask for 5 MHz carrier

Segment number	Offset from channel centre frequency (MHz)	Integration bandwidth (kHz)	Allowed emission level (dBm/integration bandwidth)
1	2.5 to < 3.5	50	−13.00
2	3.5 to < 7.5	1 000	−13.00
3	7.5 to < 8	1 000	−13.00
4	8 to < 10.4	1 000	−25.00
5	10.4 to < 12.5	1 000	−25.00

In Table 45:

– Channel bandwidth is 5 MHz.

– Integration bandwidth refers to the frequency range over which the emission power is integrated.

For all combination of transmit power and centre frequencies, the spectral mask measurements shall not exceed the limits specified in Tables 44 and 45 for 10 and 5 MHz channel bandwidth sizes respectively.

The specification of Tables 46 and 47 are attenuations of out-of-band emission per integration bandwidth relative to the transmit power calculated over the same frequency interval as integration bandwidth.

TABLE 46

Spectrum emission mask for 8.75 MHz carrier for *PTx* < 23 dBm

Segment number	Offset from channel centre frequency (MHz)	Integration bandwidth (kHz)	Specification
1	4.77 to < 9.27	100	$-(26 + 7 \times (\lvert \Delta f \rvert - 4.77)/4.5)$ dB
2	9.27 to < 13.23	100	$-(33 + 4 \times (\lvert \Delta f \rvert - 9.27)/3.96)$ dB
3	13.23 to < 17.73	100	$-(37 + 2 \times (\lvert \Delta f \rvert - 13.23)/4.5)$ dB
4	17.73 to < 21.875	100	−39 dB

TABLE 47

Spectrum emission mask for 8.75 MHz carrier for *PTx* ≥ 23 dBm

Segment number	Offset from channel centre frequency (MHz)	Integration bandwidth (kHz)	Specification
1	4.77 to < 9.27	100	$-((PTx-23) + 26 + 7 \times (\lvert \Delta f \rvert - 4.77)/4.5)$ dB
2	9.27 to < 13.23	100	$-((PTx-23) + 33 + 4 \times (\lvert \Delta f \rvert - 9.27)/3.96)$ dB
3	13.23 to < 17.73	100	$-((PTx-23) + 37 + 2 \times (\lvert \Delta f \rvert - 13.23)/4.5)$ dB
4	17.73 to < 21.875	100	$-(PTx-23) + 39$ dB

In Tables 46 and 47:

PTx: measured power (dBm) into the antenna

Δf: defined as the frequency offset (MHz) from the channel centre frequency.

1.2 Spectrum emission mask for equipment operating in the band 2 500-2 690 MHz

The spectrum emission mask of user equipment applies to frequencies between 2.5 MHz and 12.5 MHz away from the user equipment centre frequency for the 5 MHz carrier and between 5 MHz and 25 MHz away from the user equipment centre frequency for the 10 MHz carrier.

Tables 48 and 49 specify the spectrum emission for TDD mobile stations with 10 and 5 MHz channel bandwidths.

TABLE 48

Spectrum emission mask for 10 MHz carrier

Segment number	Offset from channel centre frequency (MHz)	Integration bandwidth (kHz)	Allowed emission level (dBm/integration bandwidth)
1	5 to < 6	100	−13.00
2	6 to < 10	1 000	−13.00
3	10 to < 11	1 000	$-13 - 12(\Delta f - 10)$
4	11 to < 15	1 000	−25.00
5	15 to < 20	1 000	If $PTx \leq +23$ dBm and $2\,550 \leq f_c \leq 2\,620$ MHz then $-21 - 32/19 \times (\Delta f - 10.5)$ else −25
6	20 to < 25	1 000	If $PTx \leq +23$ dBm and $2\,550 \leq f_c \leq 2\,620$ MHz then −37 else −25

NOTE 1 – Maximum transmitter output power of user equipment is 23 dBm or smaller in Japan, and the frequency band of operation is limited to 2 545-2 625 MHz.

In Table 48:

– Channel bandwidth is 10 MHz.

– Integration bandwidth refers to the frequency range over which the emission power is integrated.

Δf: defined as the frequency offset (MHz) from the channel centre frequency

PTx: measured power (dBm) into the antenna

f_c: channel centre frequency (MHz).

TABLE 49

Spectrum emission mask for 5 MHz carrier

Segment number	Offset from channel centre frequency (MHz)	Integration bandwidth (kHz)	Allowed emission level (dBm/integration bandwidth)
1	2.5 to < 3.5	50	−13.00
2	3.5 to < 7.5	1 000	−13.00
3	7.5 to < 8	1 000	If $PTx \leq +23$ dBm and $2\,547.5 \leq f_c \leq 2\,622.5$ MHz then $-20 - 2.28 \times (\Delta f - 7.5)$ else −13.00
4	8 to < 10.4	1 000	−25.00
5	10.4 to < 12.5	1 000	If $PTx \leq +23$ dBm and $2\,547.5 \leq f_c \leq 2\,622.5$ MHz then $-21 - 1.68 \times (\Delta f - 8)$ else −25

NOTE 1 – Maximum transmitter output power of user equipment is 23 dBm or smaller in Japan, and the frequency band of operation is limited to 2 545-2 625 MHz.

In Table 49:

– Channel bandwidth is 5 MHz.

– Integration bandwidth refers to the frequency range over which the emission power is integrated.

PTx: measured power (dBm) into the antenna

Δf: defined as the frequency offset (MHz) from the channel centre frequency

fc: channel centre frequency (MHz).

1.3 Spectrum emission mask for equipment operating in the band 3 400-3 600 MHz

1.3.1 5 MHz channel bandwidth

The spectrum emission mask of the mobile station applies to frequency offsets between 2.5 MHz and 12.5 MHz on both sides of the mobile station centre 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 mobile station carrier measured in the 5 MHz channel.

Table 50 specifies the spectrum emission for TDD mobile stations with 5 MHz channel bandwidth. The mobile station emission shall not exceed the levels specified in Table 50. Assuming specific power classes, relative requirements of Table 50 can be converted to absolute values for testing purposes. A test tolerance value of 1.5 dB is included here.

TABLE 50

Spectrum emission mask requirement for 5 MHz channel bandwidth

Frequency offset, Δf	Minimum requirement	Measurement bandwidth
2.5 MHz to 3.5 MHz	$\left\{-33.5-15\times\left(\frac{\Delta f}{\text{MHz}}-2.5\right)\right\}$ dBc	30 kHz
3.5 to 7.5 MHz	$\left\{-33.5-1\times\left(\frac{\Delta f}{\text{MHz}}-3.5\right)\right\}$ dBc	1 MHz
7.5 to 8.5 MHz	$\left\{-37.5-10\times\left(\frac{\Delta f}{\text{MHz}}-7.5\right)\right\}$ dBc	1 MHz
8.5 to 12.5 MHz	–47.5 dBc	1 MHz

NOTE 1 – Δf is the separation between the carrier frequency and the centre of the measuring filter.

NOTE 2 – 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.

NOTE 3 – 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.

NOTE 4 – Note that an 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.

1.3.2 7 MHz channel bandwidth

The spectrum emission mask of the mobile station applies to frequency offsets between 3.5 MHz and 17.5 MHz on both sides of the mobile station centre carrier frequency. The out-of-channel emission is specified as a power level measured over the specified measurement bandwidth relative to the total mean power of the mobile station carrier measured in the 7 MHz channel.

Table 51 specifies the spectrum emission for TDD mobile stations with a 7 MHz channel bandwidth. The mobile station emission shall not exceed the levels specified in Table 51. Assuming specific power classes, relative requirements of Table 51 can be converted to absolute values. A test tolerance value of 1.5 dB is included here.

TABLE 51

Spectrum emission mask requirement for 7 MHz channel bandwidth

Frequency offset, Δf	Minimum requirement	Measurement bandwidth
3.5 MHz to 4.75 MHz	$\left\{-33.5-13.5\times\left(\frac{\Delta f}{\text{MHz}}-3.5\right)\right\}$ dBc	30 kHz
4.75 to 10.5 MHz	$\left\{-35.0-0.7\times\left(\frac{\Delta f}{\text{MHz}}-4.75\right)\right\}$ dBc	1 MHz
10.5 to 11.9 MHz	$\left\{-39.0-7\times\left(\frac{\Delta f}{\text{MHz}}-10.5\right)\right\}$ dBc	1 MHz
11.9 to 17.5 MHz	–49.0 dBc	1 MHz

NOTE 1 – Δf is the separation between the carrier frequency and the centre of the measuring filter.

NOTE 2 – The first measurement position with a 30 kHz filter is at Δf equals to 3.515 MHz; the last is at Δf equals to 4.735 MHz.

NOTE 3 – The first measurement position with a 1 MHz filter is at Δf equals to 5.25 MHz; the last is at Δf equals to 17 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.

NOTE 4 – Note that an equivalent PSD type mask can be derived by applying 10 log((7 MHz)/(30 kHz)) = 23.7 dB and 10 log((7 MHz)/(1 MHz)) = 8.5 dB scaling factor for 30 kHz and 1 MHz measurement bandwidth respectively.

1.3.3 10 MHz channel bandwidth

The spectrum emission mask of the mobile station applies to frequency offsets between 5.0 MHz and 25.0 MHz on both sides of the mobile station centre carrier frequency. The out-of-channel emission is specified as a power level measured over the specified measurement bandwidth relative to the total mean power of the mobile station carrier measured in the 10 MHz channel.

Table 52 specifies the spectrum emission for TDD mobile stations with a 10 MHz channel bandwidth. The mobile station emission shall not exceed the levels specified in Table 52. Assuming specific power classes, relative requirements of Table 52 can be converted to absolute values. A test tolerance value of 1.5 dB is included here.

TABLE 52

Spectrum emission mask requirement for 10 MHz channel bandwidth

Frequency offset, Δf	Minimum requirement	Measurement bandwidth
5.0 MHz to 7.0 MHz	$\left\{-33.5-9\times\left(\frac{\Delta f}{\text{MHz}}-5.0\right)\right\}$ dBc	30 kHz
7.0 to 15.0 MHz	$\left\{-36.5-0.5\times\left(\frac{\Delta f}{\text{MHz}}-7.0\right)\right\}$ dBc	1 MHz
15.0 to 17.0 MHz	$\left\{-40.5-5\times\left(\frac{\Delta f}{\text{MHz}}-15.0\right)\right\}$ dBc	1 MHz
17.0 to 25.0 MHz	−50.5 dBc	1 MHz

NOTE 1 – Δf is the separation between the carrier frequency and the centre of the measuring filter.

NOTE 2 – The first measurement position with a 30 kHz filter is at Δf equals to 5.015 MHz; the last is at Δf equals to 6.985 MHz.

NOTE 3 – 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.

NOTE 4 – 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.

2 Transmitter spurious emissions (conducted)

2.1 Spurious emissions for equipment operating in the band 2 300-2 400 MHz

The limits shown in Tables 53 to 55 are for frequency offsets which are greater than 2.5 times the channel bandwidth from the mobile station centre frequency. In the table $|\Delta f|$ is $f_c - f$, where f is the frequency of the spurious domain emissions and f_c is the mobile station transmit centre frequency. All spurious emission specifications are of conducted type.

Tables 53 to 55 specify the spurious emission for TDD mobile stations with 5, 8.75 and 10 MHz channel bandwidths.

TABLE 53

Spurious emissions for 5 MHz channel size; relevant to 2 302.5 MHz ≤ f_c ≤ 2 397.5 MHz

Row	Spurious frequency (f) range	Measurement bandwidth	Minimum specification (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 < 19 GHz	30 kHz If 12.5 ≤ $\|\Delta f\|$ < 50 300 kHz If 50 ≤ $\|\Delta f\|$ < 60 1 MHz If 60 ≤ $\|\Delta f\|$	−30

TABLE 54

Spurious emissions for 8.75 MHz channel bandwidth

Row	Spurious frequency (f) range	Measurement bandwidth	Minimum requirement (dBm)
1	30 MHz ≤ f < 1 000 MHz	100 kHz	−13
2	1 GHz ≤ f ≤ 12 GHz	1 MHz	−13

TABLE 55

Spurious emissions for 10 MHz channel size; relevant to 2 305 MHz ≤ f_c ≤ 2 395 MHz

Row	Spurious frequency (f) range	Measurement bandwidth	Minimum specification (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 < 19 GHz	30 kHz If 25 ≤ $\|\Delta f\|$ < 100 300 kHz If 100 ≤ $\|\Delta f\|$ < 120 1 MHz If 120 ≤ $\|\Delta f\|$	−30

2.2 Spurious emissions for equipment operating in the band 2 500-2 690 MHz

IMT-2000 OFDMA TDD WMAN user equipment complies with the limits recommended in Recommendation ITU-R SM.329-10. The limits for the 5 MHz carrier, shown in Tables 56, 57 and 58 are only applicable for frequency offsets which are greater than 12.5 MHz away from the user equipment centre frequency, while the limits for the 10 MHz carrier shown in Tables 59 to 61 apply only for frequency offsets greater than 25 MHz. f is the frequency of the spurious domain emissions. f_c is the user equipment centre frequency.

Tables 56 to 61 specify the general and additional spurious emission for TDD mobile stations with 5 and 10 MHz channel bandwidths.

TABLE 56

General user equipment spurious emissions limit for 5 MHz channel size; relevant to 2 502.5 MHz ≤ f_c ≤ 2 687.5 MHz

Band	Measurement bandwidth	Allowed emission level (dBm)
9 kHz ≤ f < 150 kHz	1 kHz	−13
150 kHz ≤ f < 30 MHz	10 kHz	−13
30 MHz ≤ f < 1 000 MHz	100 kHz	–36
1 GHz ≤ f < 13.45 GHz	30 kHz If 12.5 MHz ≤ $\|f_c - f\|$ < 50 MHz 300 kHz If 50 MHz ≤ $\|f_c - f\|$ < 60 MHz 1 MHz If 60 MHz ≤ $\|f_c - f\|$	–30

TABLE 57

Additional user equipment spurious emission limit for 5 MHz channel size; the requirements of table are relevant to 2 547.5 MHz ≤ f_c ≤ 2 622.5 MHz

Frequency bandwidth	Measurement bandwidth	Minimum requirement (dBm)	Note
1 000 MHz ≤ f < 2 505 MHz	1 MHz	−13	
2 505 MHz ≤ f < 2 530 MHz	1 MHz	−37	
2 530 MHz ≤ f < 2 535 MHz	1 MHz	$1.7f$ − 4 338	
2 535 MHz ≤ f < 2 630 MHz	1 MHz	−21 − 1.68*(Δf − 8) 12.5 MHz < Δf < 17.5 MHz −37 17.5 MHz < Δf < 22.5 MHz −18 22.5 MHz < Δf	
2 630 MHz ≤ f < 2 630.5 MHz	1 MHz	−13 − 8/3.5 × (f − 2 627)	
2 630.5 MHz ≤ f < 2 640 MHz	1 MHz	−21 − 16/9.5 × (f − 2 630.5)	
2 640 MHz ≤ f < 2 655 MHz	1 MHz	−37	
2 655 MHz ≤ f	1 MHz	−13	

NOTE 1 – The allowed emission level shall be applied for the frequency range greater than 2.5 times the channel size from the centre frequency. Δf is the offset from channel centre frequency.

NOTE 2 – This additional requirement provides for the protection of satellite systems in the bands 2 500-2 535 MHz and 2 630-2 690 MHz in Japan, and applies only to terminals operating in the frequency band 2 545-2 625 MHz with powers of 23 dBm or smaller.

TABLE 58

Additional user equipment spurious emissions for 5 MHz channel size; relevant to 2 502.5 MHz ≤ f_c ≤ 2 687.5 MHz

Row	Spurious frequency (f) range	Measurement bandwidth	Minimum requirement (dBm)
1	2 620 MHz ≤ f < 2 690 MHz	1 MHz	−40

NOTE 1 – This additional requirement is for the purpose of compliance to ETSI EN 302-544-2.

TABLE 59

General user equipment spurious emissions limit for 10 MHz channel size; relevant to 2 505 MHz ≤ f_c ≤ 2 685 MHz

Spurious frequency (f) range	Measurement bandwidth		Allowed emission level (dBm)
9 kHz ≤ f < 150 kHz	1 kHz		−36
150 kHz ≤ f < 30 MHz	10 kHz		−36
30 MHz ≤ f < 1 000 MHz	100 kHz		–36
1 GHz ≤ f < 13.45 GHz	30 kHz 300 kHz 1 MHz	If 25 ≤ $\lvert f_c - f \rvert$ < 100 If 100 ≤ $\lvert f_c - f \rvert$ < 120 If 120 ≤ $\lvert f_c - f \rvert$	–30

TABLE 60

Additional user equipment spurious emission limit for 10 MHz channel size, the requirements of table are relevant to 2 550 MHz ≤ f_c ≤ 2 620 MHz

Spurious frequency (f) range	Measurement bandwidth	Minimum requirement (dBm)	Note
1 000 MHz ≤ f < 2 505 MHz	1 MHz	−13	
2 505 MHz ≤ f < 2 530 MHz	1 MHz	−37	
2 530 MHz ≤ f < 2 535 MHz	1 MHz	$1.7f$ − 4 338	
2 535 MHz ≤ f < 2 630 MHz	1 MHz	−18 25 MHz < Δf	
2 630 MHz ≤ f < 2 630.5 MHz	1 MHz	−13 − 8/3.5 × (f − 2 627)	
2 630.5 MHz ≤ f < 2 640 MHz	1 MHz	−21 − 16/9.5 × (f − 2 630.5)	
2 640 MHz ≤ f < 2 655 MHz	1 MHz	−37	
2 655 MHz ≤ f	1 MHz	−13	

NOTE 1 – The allowed emission level shall be applied for the frequency range greater than 2.5 times the channel size from the centre frequency. Δf is the offset from channel centre frequency.

NOTE 2 – This additional requirement provides for the protection of satellite systems in the bands 2 500-2 535 MHz and 2 630-2 690 MHz in Japan, and applies only to terminals operating in the frequency band 2 545-2 625 MHz with powers of 23 dBm or smaller.

TABLE 61

Additional user equipment spurious emissions for 10 MHz channel size; relevant to 2 505 MHz ≤ f_c ≤ 2 685 MHz

Row	Spurious frequency (f) range	Measurement bandwidth	Minimum requirement (dBm)
1	2 620 MHz ≤ f < 2 690 MHz	1 MHz	–40

NOTE 1 – This additional requirement is for the purpose of compliance to ETSI EN 302-544-2.

2.3 Spurious emission for equipment operating in the band 3 400-3 600 MHz

The limits shown in Tables 62 to 64 are for frequency offsets which are greater than 2.5 times the channel bandwidth from the mobile station centre frequency. In the table $|\Delta f|$ is $f_c - f$, where f is the frequency of the spurious domain emissions and fc is the mobile station transmit centre frequency. All spurious emission specifications are of conducted type.

Tables 62 to 64 specify the spurious emission for TDD mobile stations with 5, 7 and 10 MHz channel bandwidths.

TABLE 62

Spurious emissions for 5 MHz channel size; relevant to 3 402.5 MHz ≤ f_c ≤ 3 797.5 MHz

Row	Spurious frequency (f) range	Measurement bandwidth		Minimum specification (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 < 19 GHz	30 kHz 300 kHz 1 MHz	If 12.5 MHz ≤ $\|\Delta f\|$ < 50 MHz If 50 MHz ≤ $\|\Delta f\|$ < 60 MHz If 60 MHz ≤ $\|\Delta f\|$	−30

TABLE 63

Spurious emissions for 7 MHz channel size; relevant to 3 403.5 MHz ≤ f_c ≤ 3 796.5 MHz

Row	Spurious frequency (f) range	Measurement bandwidth		Minimum specification (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 < 19 GHz	30 kHz 300 kHz 1 MHz	If 17.5 MHz ≤ $\|\Delta f\|$ < 70 MHz If 70 MHz ≤ $\|\Delta f\|$ < 84 MHz If 84 MHz ≤ $\|\Delta f\|$	−30

TABLE 64

Spurious emissions for 10 MHz channel size; relevant to 3 405 MHz ≤ f_c ≤ 3 795 MHz

Row	Spurious frequency (f) range	Measurement bandwidth		Minimum specification (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 < 19 GHz	30 kHz 300 kHz 1 MHz	If 25 MHz ≤ $\|\Delta f\|$ < 100 MHz If 100 MHz ≤ $\|\Delta f\|$ < 120 MHz If 120 MHz ≤ $\|\Delta f\|$	−30

3 Receiver spurious emissions (conducted)

3.1 Spurious emissions for equipment operating in the band 2 500-2 690 MHz

Table 65 specifies the spurious emissions for TDD mobile stations with 10 and 5 MHz channel bandwidths. The power of any narrow-band spurious emission should not exceed the maximum level specified in Table 65.

TABLE 65

General receiver spurious emission requirements

Band	Measurement bandwidth		Allowed emission level (dBm)
30 MHz ≤ f < 1 GHz	100 kHz		−57
1 GHz ≤ f ≤ 13.45 GHz	30 kHz 300 kHz 1 MHz	If 2.5 × BW ≤ $\lvert f_c - f \rvert$ < 10 × BW If 10 × BW ≤ $\lvert f_c - f \rvert$ < 12 × BW If 12 × BW ≤ $\lvert f_c - f \rvert$	−47

4 Adjacent channel leakage ratio

Within this annex, and in a similar manner to other annexes, the ACLR is defined as the ratio of the on-channel transmitted power to the power transmitted in adjacent channels as measured at the output of the receiver filter. In order to measure ACLR, it is necessary to consider a measurement filter for the transmitted signal as well as a receiver measurement bandwidth for the adjacent channel (victim) system.

4.1 ACLR of equipment operating in the frequency range 2 300-2 400 MHz

ACLR is therefore specified considering the following receiver bandwidths:

When the adjacent system is OFDMA TDD WMAN:

– 4.75 MHz for a 5 MHz channelized system,

– 8.3125 MHz for a 8.75 MHz channelized system, and

– 9.5 MHz for a 10 MHz channelized system.

The measurement bandwidth for the measurement of on-channel power of the OFDMA TDD WMAN carrier is:

– 4.75 MHz for a 5 MHz channelized system,

– 8.3125 MHz for a 8.75 MHz channelized system, and

– 9.5 MHz for a 10 MHz channelized system.

The passband of the receiver filter is centred on the first or second adjacent channel centre frequency. In the case where the adjacent system is OFDMA TDD WAN, both the transmitted power and the received power are measured with a rectangular filter. For adjacent UTRA systems the transmitted power is measured using a rectangular filter and the received power using a RRC filter with a roll-off factor of 0.22.

Tables 66 to 68 specify the ACLR for TDD mobile stations with 5, 8.75 and 10 MHz channel bandwidths.

TABLE 66

Mobile station ACLR for 5 MHz channel bandwidth

Adjacent channel centre frequency	Minimum required ACLR relative to assigned channel frequency (dB)
Mobile station channel centre frequency ± 5 MHz	30
Mobile station channel centre frequency ± 10 MHz	44

TABLE 67

Mobile station ACLR for 8.75 MHz channel bandwidth

Adjacent channel centre frequency	Minimum required ACLR relative to assigned channel frequency (dB)
Mobile station channel centre frequency ± 8.75 MHz	30
Mobile station channel centre frequency ± 17.5 MHz	44

TABLE 68

Mobile station ACLR for 10 MHz channel bandwidth

Adjacent channel centre frequency	Minimum required ACLR relative to assigned channel frequency (dB)
Mobile station channel centre frequency ± 10 MHz	30
Mobile station channel centre frequency ± 20 MHz	44

4.2 ACLR of equipment operating in the frequency range 2 500-2 690 MHz

In this section, data is provided that is relevant to the case where the adjacent system is OFDMA TDD WMAN (intra-system) or the case where the adjacent system is UTRA (inter-system).

ACLR is therefore specified considering the following receiver bandwidths:

When the adjacent system is OFDMA TDD WMAN:

– 4.75 MHz for a 5 MHz channelized system, and
– 9.5 MHz for a 10 MHz channelized system.

When the adjacent system is UTRA:

– 3.84 MHz for a 5 MHz channelized system, and
– 7.68 MHz for a 10 MHz channelized system.

The measurement bandwidth for the measurement of on-channel power of the OFDMA TDD WMAN carrier is:

– 4.75 MHz for a 5 MHz channelized system, and

– 9.5 MHz for a 10 MHz channelized system.

The passband of the receiver filter is centred on the first or second adjacent channel centre frequency. In the case where the adjacent system is OFDMA TDD WAN, both the transmitted power and the received power are measured with a rectangular filter. For adjacent UTRA systems the transmitted power is measured using a rectangular filter and the received power using a RRC filter with a roll-off factor of 0.22.

The ACLR values for TDD mobile stations relevant to the two cases are provided in the Tables 69 and 70 for 5 and 10 MHz channel bandwidths respectively.

TABLE 69

MS ACLR for 5 MHz channel bandwidth

	Minimum required ACLR relative to assigned channel frequency (dB)	
Adjacent channel centre frequency	OFDMA TDD WMAN case	UTRA[(1)] case
MS channel centre frequency ± 5 MHz	30	33
MS channel centre frequency ± 10 MHz	44	43

(1) These are similar to the minimum requirements for UTRA systems (see Annexes 1 and 3 to this Recommendation) and in practice may be expected to be larger.

TABLE 70

MS ACLR for 10 MHz channel bandwidth

	Minimum required ACLR relative to assigned channel frequency (dB)	
Adjacent channel centre frequency	OFDMA TDD WMAN case	UTRA[(1)] case
MS channel centre frequency ± 10 MHz	30	33
MS channel centre frequency ± 20 MHz	44	43

(1) These are similar to the minimum requirements for UTRA systems (see Annexes 1 and 3 to this Recommendation) and in practice may be expected to be larger.

Additional information may be provided in future revisions of this Recommendation.

NOTE 1 – Further study is necessary for other systems wherever applicable.

4.3 ACLR of equipment operating in the frequency range 3 400-3 600 MHz

In this section, data is provided that is relevant to the case where the adjacent system is OFDMA TDD WMAN (intra-system).

ACLR is therefore specified considering the following receiver bandwidth.

When the adjacent system is OFDMA TDD WMAN:

– 4.75 MHz for a 5 MHz channelized system,

– 6.7 MHz for a 7 MHz channelized system, and

– 9.5 MHz for a 10 MHz channelized system.

The measurement bandwidth for the measurement of on-channel power of the OFDMA TDD WMAN carrier is:

– 4.75 MHz for a 5 MHz channelized system,

– 6.7 MHz for a 7 MHz channelized system, and

– 9.5 MHz for a 10 MHz channelized system.

The passband of the receiver filter is centred on the first or second adjacent channel centre frequency. In the case where the adjacent system is OFDMA TDD WAN, both the transmitted power and the received power are measured with a rectangular filter.

Tables 71 to 73 specify the ACLR for TDD mobile stations with 5 and 10 MHz channel bandwidths. The values listed in the tables are applicable when the adjacent channel mean power is greater than −55 dBm.

TABLE 71

Mobile station ACLR for 5 MHz channel bandwidths

Adjacent channel centre frequency	ACLR limit relative to assigned channel frequency (dB)
Mobile station channel centre frequency ± 5 MHz	33
Mobile station channel centre frequency ± 10 MHz	43

TABLE 72

Mobile station ACLR for 7 MHz channel bandwidths

Adjacent channel centre frequency	ACLR limit relative to assigned channel frequency (dB)
Mobile station channel centre frequency ± 7 MHz	33
Mobile station channel centre frequency ± 14 MHz	43

TABLE 73

Mobile station ACLR for 10 MHz channel bandwidths

Adjacent channel centre frequency	ACLR limit relative to assigned channel frequency (dB)
Mobile station channel centre frequency ± 10 MHz	33
Mobile station channel centre frequency ± 20 MHz	43

5 Test tolerance

In this annex, the test tolerances (as defined in Recommendation ITU-R M.1545) corresponding to various specifications are 0 dB unless stated otherwise in the corresponding section.

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.