RECOMMENDATION ITU-R M.1580-2*

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

(Question ITU-R 229/8)

(2002-2005-2007)

Scope

This Recommendation provides the generic unwanted emission characteristics of base stations using the terrestrial radio interfaces of IMT-2000.

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 Regulation (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 base stations (BS) 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 complexity of IMT-2000 BS;

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 BS 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 BS shall comply with the limits specified in RR Appendix 3;

j) that the harmonization of unwanted emission limits will facilitate global use and access to a global market; however national/regional variations in unwanted emission limits may exist;

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

l) that unwanted emission limits are dependent on the transmitter emission characteristics, ITU spurious emission limits and national standards and regulations in addition to depending on services operating in other bands,

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

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 base stations must comply with local, regional, and international regulations for out-of-band and spurious emissions relevant to their operations, wherever such regulations apply;

c) with regard to Annex 6, IMT-2000 OFDMA TDD WMAN, additional urgent work, in particular on emission mask and ACLR, is needed to ensure geographical coexistence with other IMT-2000 radio interfaces,

recommends

1 that the unwanted emission characteristics of IMT-2000 base stations 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 Note 2, Note 3 and Note 4, the unwanted emission limits are defined for BS 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 band 1 885-1 980 MHz 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 BS 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.
– 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.
– 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.
– 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.
– 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.
– 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.
– 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.
– 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.
– 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 to referred as FDD Band IX.
– 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.

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 3 are for BS 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;

– TDD in the band 1 850-1 910 MHz and 1 930-1 990 MHz;

– TDD in the band 1 910-1 930 MHz;

– TDD in the band 2 570-2 620 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 4 – The unwanted emission limits defined in Annex 6 are for BS operating in the following arrangement:

– TDD in the band 2 500-2 690 MHz.

Annexes

Annex 1 – IMT-2000 code division multiple access (CDMA) direct spread (universal terrestrial radio access (UTRA) FDD) base stations

Annex 2 – IMT-2000 CDMA multi-carrier (cdma-2000) base stations

Annex 3 – IMT-2000 CDMA TDD (UTRA TDD) base stations

Annex 4 – IMT-2000 time division multiple access (TDMA) single-carrier (UWC-136) base stations

Annex 5 – IMT-2000 frequency division multiple access (FDMA)/TDMA (digital enhanced cordless telecommunications (DECT))

Annex 6 – IMT-2000 OFDMA TDD WMAN base stations.

Annex 1

IMT-2000 (code division multiple access (CDMA) direct spread (universal terrestrial radio access (UTRA) FDD) base 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

The mask defined in Tables 1 to 4 below may be mandatory in certain regions. In other regions this mask may not be applied.

For regions where this clause applies, the requirement should be met by a BS transmitting on a single radio frequency (RF) carrier configured in accordance with the manufacturer's specification. Emissions should not exceed the maximum level specified in Tables 1 to 4 for the appropriate BS maximum output power, in the frequency range from $\Delta f = 2.5$ MHz to Δf_{max} from the carrier frequency, where:

– Δf is the separation between the carrier frequency and the nominal –3 dB point of the measuring filter closest to the carrier frequency.

– f_offset is the separation between the carrier frequency and the centre of the measurement filter:

  – $\text{f\_offset}_{\max}$ is either 12.5 MHz or the offset to the BS transmit band edge, whichever is the greater.

  – Δf_{max} is equal to $\text{f\_offset}_{\max}$ minus half of the bandwidth of the measuring filter.

TABLE 1

Spectrum emission mask values, BS maximum output power $P \geq 43$ dBm

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Requirement Bands I, II, III, IV, V, VII, VIII, X	Additional requirements Bands II, IV, V, X[1]	Measurement bandwidth
$2.5 \leq \Delta f < 2.7$ MHz	2.515 MHz ≤ f_offset < 2.715 MHz	–12.5 dBm	−15 dBm	30 kHz
$2.7 \leq \Delta f < 3.5$ MHz	2.715 MHz ≤ f_offset < 3.515 MHz	–12.5 – 15· (f_offset – 2.715) dBm	−15 dBm	30 kHz
	3.515 MHz ≤ f_offset < 4.0 MHz	–24.5 dBm	NA	30 kHz
$3.5 \leq \Delta f < 7.5$ MHz	4.0 MHz ≤ f_offset < 8.0 MHz	–11.5 dBm	−13 dBm	1 MHz
$7.5 \leq \Delta f$ MHz	8.0 MHz ≤ f_offset < f_offset_{max}	–11.5 dBm	−13 dBm	1 MHz

(1) The minimum requirement for operation in Bands II, IV, V, X is the lower power of the minimum requirement for Bands I, II, III, IV, V, VII, VIII and the additional requirement for Bands II, IV, V, X.

TABLE 2

Spectrum emission mask values, BS maximum output power $39 \leq P < 43$ dBm

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Requirement Bands I, II, III, IV, V, VII, VIII, X	Additional requirements Bands II, IV, V, X[1]	Measurement bandwidth
2.5 ≤ Δf < 2.7 MHz	2.515 MHz ≤ f_offset < 2.715 MHz	–12.5 dBm	−15 dBm	30 kHz
2.7 ≤ Δf < 3.5 MHz	2.715 MHz ≤ f_offset < 3.515 MHz	–12.5 – 15· (f_offset – 2.715) dBm	−15 dBm	30 kHz
	3.515 MHz ≤ f_offset < 4.0 MHz	–24.5 dBm	NA	30 kHz
3.5 ≤ Δf < 7.5 MHz	4.0 MHz ≤ f_offset < 8.0 MHz	–11.5 dBm	−13 dBm	1 MHz
7.5 ≤ Δf MHz	8.0 MHz ≤ f_offset < f_offsetmax	P – 54.5 dBm	−13 dBm	1 MHz

(1) The minimum requirement for operation in Bands II, IV, V, X is the lower power of the minimum requirement for Bands I, II, III, IV, V, VII, VIII and the additional requirement for Bands II, IV, V, X.

TABLE 3

Spectrum emission mask values, BS maximum output power 31 ≤ *P* < 39 dBm

Frequency offset of measurement filter –3 dB point, Δ*f*	Frequency offset of measurement filter centre frequency, f_offset	Requirement Bands I, II, III, IV, V, VII, VIII, X	Additional requirements Bands II, IV, V, X(1)	Measurement bandwidth
2.5 ≤ Δf < 2.7 MHz	2.515 MHz ≤ f_offset < 2.715 MHz	P – 51.5 dBm	−15 dBm	30 kHz
2.7 ≤ Δf < 3.5 MHz	2.715 MHz ≤ f_offset < 3.515 MHz	P – 51.5 – 15 (f_offset – 2.715) dBm	−15 dBm	30 kHz
	3.515 MHz ≤ f_offset < 4.0 MHz	P – 63.5 dBm	NA	30 kHz
3.5 ≤ Δf < 7.5 MHz	4.0 MHz ≤ f_offset < 8.0 MHz	P – 50.5 dBm	−13 dBm	1 MHz
7.5 ≤ Δf MHz	8.0 MHz ≤ f_offset < f_offsetmax	P – 54.5 dBm	−13 dBm	1 MHz

(1) The minimum requirement for operation in Bands II, IV, V, X is the lower power of the minimum requirement for Bands I, II, III, IV, V, VII, VIII and the additional requirement for Bands II, IV, V, X.

TABLE 4

Spectrum emission mask values, BS maximum output power *P* < 31 dBm

Frequency offset of measurement filter –3 dB point, Δ*f*	Frequency offset of measurement filter centre frequency, f_offset	Requirement Bands I, II, III, IV, V, VII, VIII, X	Measurement bandwidth
2.5 ≤ Δf < 2.7 MHz	2.515 MHz ≤ f_offset < 2.715 MHz	–20.5 dBm	30 kHz
2.7 ≤ Δf < 3.5 MHz	2.715 MHz ≤ f_offset < 3.515 MHz	–20.5 – 15· (f_offset – 2.715) dBm	30 kHz
	3.515 MHz ≤ f_offset < 4.0 MHz	–32.5 dBm	30 kHz
3.5 ≤ Δf < 7.5 MHz	4.0 MHz ≤ f_offset < 8.0 MHz	–19.5 dBm	1 MHz
7.5 ≤ Δf MHz	8.0 MHz ≤ f_offset < f_offsetmax	–23.5 dBm	1 MHz

3 Adjacent channel leakage power ratio

Adjacent channel leakage power ratio (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 Table 5.

TABLE 5

BS ACLR limits

BS channel offset below the first or above the last carrier frequency used (MHz)	ACLR limit (dB)
5	44.2
10	49.2

NOTE 1 – In certain regions, the adjacent channel power (the root raised cosine (RRC) filtered mean power centred on an adjacent channel frequency) should be less than or equal to −7.2 dBm/3.84 MHz (for Band I, Band IX) or +2.8 dBm/3.84 MHz (for Band VI) or as specified by the ACLR limit, whichever is the higher.

4 Transmitter spurious emission (conducted)

The spurious emission is measured at the BS RF output port.

The requirement applies at frequencies within the specified frequency ranges, which are more than 12.5 MHz under the first carrier frequency used or more than 12.5 MHz above the last carrier frequency used.

The requirement below 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.

Unless otherwise stated, all requirements are measured as mean power (r.m.s.).

4.1 Mandatory requirements

The requirements of either§ 4.1.1 or§ 4.1.2 applies.

4.1.1 Category A

The following requirements should be met in areas where Category A limits for spurious emissions, as defined in Recommendation ITU-R SM.329, are applied.

The power of any spurious emission should not exceed the limit specified in Table 6.

TABLE 6

BS spurious emission limit, Category A

Band	Maximum level	Measurement bandwidth	Note
9 kHz-150 kHz	–13 dBm	1 kHz	Bandwidth as in Recommendation ITU-R SM.329, § 4.1
150 kHz-30 MHz		10 kHz	Bandwidth as in Recommendation ITU-R SM.329, § 4.1
30 MHz-1 GHz		100 kHz	Bandwidth as in Recommendation ITU-R SM.329, § 4.1
1 GHz-12.75 GHz		1 MHz	Upper frequency as in Recommendation ITU-R SM.329, § 2.5 Table 1

4.1.2 Category B

The following requirements should be met in areas where Category B limits for spurious emissions, as defined in Recommendation ITU-R SM.329, are applied.

The power of any spurious emission should not exceed the limit specified in Tables 7a) and 7b).

TABLE 7

a) BS mandatory spurious emission limits, operating Band I, II, III, IV, VII, X (Category B)

Band	Maximum level	Measurement bandwidth	Note
9 ↔ 150 kHz	–36 dBm	1 kHz	(1)
150 kHz ↔ 30 MHz	–36 dBm	10 kHz	(1)
30 MHz ↔ 1 GHz	–36 dBm	100 kHz	(1)
1 GHz ↔ F_{low} – 10 MHz	–30 dBm	1 MHz	(1)
F_{low} – 10 MHz ↔ F_{high} + 10 MHz	–15 dBm	1 MHz	(2)
F_{high} + 10 MHz ↔ 12.75 GHz	–30 dBm	1 MHz	(3)

b) BS mandatory spurious emission limits, operating Band V, VIII (Category B)

Band	Maximum level	Measurement bandwidth	Note
9 ↔ 150 kHz	–36 dBm	1 kHz	(1)
150 kHz ↔ 30 MHz	–36 dBm	10 kHz	(1)
30 MHz ↔ F_{low} – 10 MHz	–36 dBm	100 kHz	(1)
F_{low} – 10 MHz ↔ F_{high} + 10 MHz	–16 dBm	100 kHz	(2)
F_{high} + 10 MHz ↔ 1 GHz	–36 dBm	100 kHz	(1)
1 GHz ↔ 12.75 GHz	–30 dBm	1 MHz	(3)

(1) Bandwidth as in Recommendation ITU-R SM.329, § 4.1.

(2) Limit based on Recommendation ITU-R SM.329, § 4.3 and Annex 7.

(3) Bandwidth as in Recommendation ITU-R SM.329, § 4.1. Upper frequency as in Recommendation ITU-R SM.329, § 2.5 Table 1.

F_{low}:the lowest downlink frequency of the operating band.

F_{high}: the highest downlink frequency of the operating band.

4.2 Coexistence with other systems in the same geographical area

These requirements may be applied for the protection of UE, MS and/or BS operating in other frequency bands in the same geographical area. The requirements may apply in geographic areas in which both UTRA FDD operating in frequency Bands I to X and a system operating in another frequency band than the FDD operating band are deployed. The system operating in the other frequency band may be GSM900, DCS1800, PCS1900, GSM850 and/or FDD operating in Bands I to X.

The power of any spurious emission should not exceed the limits of Table 8 for a BS where requirements for coexistence with the system listed in the first column apply.

TABLE 8

BS spurious emission limits for UTRA BS in geographic coverage area of systems operating in other frequency bands

System type operating in the same geographical area	Band for coexistence requirement	Maximum level	Measurement bandwidth	Note
GSM900	921-960 MHz	−57 dBm	100 kHz	This requirement does not apply to UTRA FDD operating in Band VIII
	876-915 MHz	−61 dBm	100 kHz	For the frequency range 880-915 MHz, this requirement does not apply to UTRA FDD operating in Band VIII
DCS1800	1 805-1 880 MHz	−47 dBm	100 kHz	This requirement does not apply to UTRA FDD operating in Band III
	1 710-1 785 MHz	−61 dBm	100 kHz	This requirement does not apply to UTRA FDD operating in Band III
PCS1900	1 930-1 990 MHz	−47 dBm	100 kHz	This requirement does not apply to UTRA FDD BS operating in frequency band II
	1 850-1 910 MHz	−61 dBm	100 kHz	This requirement does not apply to UTRA FDD BS operating in frequency band II
GSM850	869-894 MHz	−57 dBm	100 kHz	This requirement does not apply to UTRA FDD BS operating in frequency band V
	824-849 MHz	−61 dBm	100 kHz	This requirement does not apply to UTRA FDD BS operating in frequency band V
FDD Band I	2 110-2 170 MHz	−52 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band I
	1 920-1 980 MHz	−49 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in band I
FDD Band II	1 930-1 990 MHz	−52 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band II
	1 850-1 910 MHz	−49 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in band II

TABLE 8 (*end*)

System type operating in the same geographical area	Band for coexistence requirement	Maximum level	Measurement bandwidth	Note
FDD Band III	1 805-1 880 MHz	−52 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band III
	1 710-1 785 MHz	−49 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band III
FDD Band IV	2 110-2 155 MHz	−52 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band IV
	1 710-1 755 MHz	−49 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band IV
FDD Band V	869-894 MHz	−52 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band V
	824-849 MHz	−49 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band V
FDD Band VI	860-895 MHz	−52 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band VI
	815-850 MHz	−49 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band VI
FDD Band VII	2 620-2 690 MHz	−52 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band VII
	2 500-2 570 MHz	−49 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band VII
FDD Band VIII	925-960 MHz	−52 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band VIII
	880-915 MHz	−49 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band VIII
FDD Band IX	1 844.9-1 879.9 MHz	−52 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band IX
	1 749.9-1 784.9 MHz	−49 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band IX
FDD Band X	2 110-2 170 MHz	−52 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band X
	1 710-1 770 MHz	−49 dBm	1 MHz	This requirement does not apply to UTRA FDD BS operating in Band X

4.3 Coexistence with PHS

This requirement may be applied for the protection of PHS in geographic areas in which both PHS and UTRA FDD are deployed. This requirement is also applicable at specified frequencies falling between 12.5 MHz below the first carrier frequency used and 12.5 MHz above the last carrier frequency used.

The power of any spurious emission should not exceed:

TABLE 9

BS spurious emission limits for BS in geographic coverage area of PHS

Band	Measurement bandwidth	Maximum level	Note
1 884.5 to 1 919.6 MHz	300 kHz	–41 dBm	

4.4 Coexistence with UTRA-TDD

This requirement may be applied to geographic areas in which both UTRA-TDD and UTRA-FDD are deployed.

The power of any spurious emission should not exceed:

TABLE 10

BS spurious emission limits for BS in geographic coverage area of UTRA-TDD

Band	Measurement bandwidth	Maximum level	Note
1 900 to 1 920 MHz	1 MHz	–52 dBm	
2 010 to 2 025 MHz	1 MHz	–52 dBm	
2 570 to 2 610 MHz	1 MHz	–52 dBm	

5 Receiver spurious emission

The requirements apply to all BS with separate receiver and transmitter antenna port. The test should be performed when both transmitter and receiver are on with the transmitter port terminated.

For all BS with common receiver and transmitter antenna ports the transmitter spurious emission as specified above is valid.

The power of any spurious emission should not exceed the limit specified in Tables 11a) and 11b).

TABLE 11

a) Receiver spurious emission limits

Band	Maximum level	Measurement bandwidth	Note
30 MHz-1 GHz	–57 dBm	100 kHz	
1-12.75 GHz	–47 dBm	1 MHz	With the exception of frequencies between 12.5 MHz below the first carrier frequency and 12.5 MHz above the last carrier frequency used by the BS transmitter

TABLE 11 (*end*)

b) Additional spurious emission requirements

Operating Band	Band	Maximum level	Measurement bandwidth	Note
I	1 920-1 980 MHz	−78 dBm	3.84 MHz	
II	1 850-1 910 MHz	−78 dBm	3.84 MHz	
III	1 710-1 785 MHz	−78 dBm	3.84 MHz	
IV	1 710-1 755 MHz	−78 dBm	3.84 MHz	
V	824-849 MHz	−78 dBm	3.84 MHz	
VI	815-850 MHz	−78 dBm	3.84 MHz	
VII	2 500-2 570 MHz	−78 dBm	3.84 MHz	
VIII	880-915 MHz	−78 dBm	3.84 MHz	
IX	1 749.9-1 784.9 MHz	−78 dBm	3.84 MHz	
X	1 710-1 770 MHz	−78 dBm	3.84 MHz	

In addition, the requirements in Table 11c) may be applied to geographic areas in which both IMT-2000 CDMA TDD and IMT-2000 CDMA DS are deployed.

c) Additional spurious emission requirements for the TDD bands

Operating Band	Band	Maximum level	Measurement bandwidth	Note
I	1 900-1 920 MHz 2 010-2 025 MHz	−78 dBm	3.84 MHz	Not applicable in Japan
	2 010-2 025 MHz	−52 dBm	1 MHz	Applicable in Japan
VI, IX	2 010-2 025 MHz	−52 dBm	1 MHz	

Annex 2

IMT-2000 CDMA multi-carrier (cdma-2000) base stations

1 Spectrum mask

The emissions when transmitting on a single or all RF carriers supported by the BS and configured in accordance with the manufacturer's specification should be less than the limits specified in Table 12. The emission limits in Table 9 should be met when transmitting on a single or all RF carriers supported by the BS as indicated by the entries in the column Active carriers.

TABLE 12

Transmitter spurious emission limits

For $\|\Delta f\|$ within the range	Active carriers	Emission limit
885 kHz to 1.25 MHz	Single	–45 dBc/30 kHz
1.25 to 1.45 MHz	All	–13 dBm/30 kHz
1.45 to 2.25 MHz	All	$-[13 + 17 \times (\Delta f - 1.45\ \text{MHz})]$ dBm/30 kHz
2.25 to 4.00 MHz	All	–13 dBm/1 MHz

NOTE 1 – All frequencies in the measurement bandwidth should satisfy the restrictions on $|\Delta f|$ where Δf = centre frequency – closer edge frequency (f) of the measurement filter. For multiple-carrier testing, Δf is defined for positive Δf as the centre frequency of the highest carrier – closer measurement edge frequency (f) and for negative Δf as the centre frequency of the lowest carrier – closer measurement edge frequency (f).

2 Transmitter spurious emission

In areas where Category A limits for spurious emissions, as defined in Recommendation ITU-R SM.329, are applied, the spurious emissions when transmitting on all RF carriers supported by the BS and configured in accordance with the manufacturer's specification should be less than the limits specified in Tables 13a) and 13b).

TABLE 13

a) BS spurious emission limits, Category A

For $\|\Delta f\|$ within the range	Emission limit	
> 4.00 MHz	9 kHz < f < 150 kHz 150 kHz < f < 30 MHz 30 MHz < f < 1 GHz 1 GHz < f < 12.75 GHz	–13 dBm/1 kHz –13 dBm/10 kHz –13 dBm/100 kHz –13 dBm/1 MHz

NOTE 1 – All frequencies in the measurement bandwidth should satisfy the restrictions on $|\Delta f|$ where Δf = centre frequency – closer edge frequency (f) of the measurement filter. For multiple-carrier testing, Δf is defined for positive Δf as the centre frequency of the highest carrier – closer measurement edge frequency (f) and for negative Δf as the centre frequency of the lowest carrier – closer measurement edge frequency (f).

b) Additional transmitter spurious emission limits in addition to Category A limits in areas where PHS is deployed

Measurement frequency	Measurement bandwidth	Emission limit	For protection of
1 893.5 to 1 919.6 MHz	300 kHz	–41 dBm	PHS

In areas where Category B limits for spurious emissions, as defined in Recommendation ITU-R SM.329, are applied, the spurious emissions when transmitting on a single or all RF carriers supported by the BS and configured in accordance with the manufacturer's specification should be less than the limits specified in Tables 14a) and 14b). The emission limits in Table 14a) should be met when transmitting on all RF carriers supported by the BS. The emission limits in Table 14b) should be met when transmitting on a single or all RF carriers supported by the BS as indicated by the entries in the column Active carriers.

TABLE 14

a) Transmitter spurious emission limits, Category B

For $\|\Delta f\|$ within the range	Emission limit	
> 4.00 MHz	9 kHz < f < 150 kHz 150 kHz < f < 30 MHz 30 MHz < f < 1 GHz 1 GHz < f < 12.75 GHz	–36 dBm/1 kHz –36 dBm/10 kHz –36 dBm/100 kHz –30 dBm/1 MHz

NOTE 1 – All frequencies in the measurement bandwidth should satisfy the restrictions on $|\Delta f|$ where Δf = centre frequency – closer edge frequency (f) of the measurement filter. For multiple-carrier testing, Δf is defined for positive Δf as the centre frequency of the highest carrier – closer measurement edge frequency (f) and for negative Δf as the centre frequency of the lowest carrier – closer measurement edge frequency (f).

b) Additional transmitter spurious emission limits in addition to Category B limits

Measurement frequency	Active carriers	Emission limit	For protection of
921 to 960 MHz	All	–57 dBm/100 kHz	GSM 900 MS receive band
1 805 to 1 880 MHz	All	–47 dBm/100 kHz	DCS 1800 MS receive band
1 900 to 1 920 MHz 2 010 to 2 025 MHz	All	–52 dBm/1 MHz	IMT-2000 CDMA TDD
1 920 to 1 980 MHz	Single	–86 dBm/1 MHz	FDD BS receive band

3 Receiver spurious emission

This requirement only applies if the BS is equipped with a separate RF input port. The conducted spurious emissions at the BS RF input ports should be not greater than the limits in Tables 15 and 16.

TABLE 15

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	With the exception of the frequencies covered by Table 16, for which additional receiver spurious emission requirements apply

TABLE 16

Additional receiver spurious emission requirements

Frequency band	Measurement bandwidth	Maximum level	Note
1 920 MHz ≤ f ≤ 1 980 MHz	30 kHz	–80 dBm	Base receive band
2 110 MHz ≤ f ≤ 2 170 MHz	30 kHz	–60 dBm	Base transmit band

Annex 3

IMT-2000 CDMA TDD (UTRA TDD) base 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 3.84 Mchip/s TDD option

The spectrum emission mask specifies the limit of the transmitter OoB emissions at frequency offsets from the assigned channel frequency of the wanted signal between 2.5 MHz and 12.5 MHz.

The requirement should be met by a BS transmitting on a single RF carrier configured in accordance with the manufacturer's specification. Emissions should not exceed the maximum level specified in Tables 17 to 20 in the frequency range of f_offset from 2.515 MHz to Δf_{max} from the carrier frequency, where:

– f_offset is the separation between the carrier frequency and the centre of the measurement filter:

– f_offset_{max} is either 12.5 MHz or the offset to the universal mobile telecommunications system (UMTS) transmit band edge (uplink and downlink transmission in the following bands: 1 900-1 920 MHz and 2 010-2 025 MHz, 1 850-1 910 MHz and 1 930-1 990 MHz used in ITU Region 2, 1 910-1 930 MHz used in ITU Region 2, 2 570-2 620 MHz used in ITU Region 1), whichever is the greater.

– Δf_{max} is equal to f_offset_{max} minus half of the bandwidth of the measuring filter.

The spectrum emissions measured should not exceed the maximum level specified in Tables 17a to 20a for the appropriate BS rated output power.

TABLE 17a

Spectrum emission mask values, BS maximum output power $P \geq 43$ dBm

Frequency offset of measurement filter −3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measure-ment bandwidth
2.5 MHz ≤ Δf < 2.7 MHz	2.515 MHz ≤ f_offset < 2.715 MHz	−12.5 dBm	30 kHz
2.7 MHz ≤ Δf < 3.5 MHz	2.715 MHz ≤ f_offset < 3.515 MHz	$-12.5\ \text{dBm} - 15\left(\frac{\text{f\_offset}}{\text{MHz}} - 2.715\right)\text{dB}$	30 kHz
(see Note)	3.515 MHz ≤ f_offset < 4.0 MHz	−24.5 dBm	30 kHz
3.5 MHz ≤ $\Delta f \leq \Delta f_{max}$	4.0 MHz ≤ f_offset < $\text{f\_offset}_{\text{max}}$	−11.5 dBm	1 MHz

TABLE 18a

Spectrum emission mask values, BS maximum output power $39 \leq P < 43$ dBm

Frequency offset of measurement filter −3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measure-ment bandwidth
2.5 MHz ≤ Δf < 2.7 MHz	2.515 MHz ≤ f_offset < 2.715 MHz	−12.5 dBm	30 kHz
2.7 MHz ≤ Δf < 3.5 MHz	2.715 MHz ≤ f_offset < 3.515 MHz	$-12.5\ \text{dBm} - 15\left(\frac{\text{f\_offset}}{\text{MHz}} - 2.715\right)\text{dB}$	30 kHz
(see Note)	3.515 MHz ≤ f_offset < 4.0 MHz	−24.5 dBm	30 kHz
3.5 MHz ≤ Δf < 7.5 MHz	4.0 MHz ≤ f_offset < 8.0 MHz	−11.5 dBm	1 MHz
7.5 MHz ≤ $\Delta f \leq \Delta f_{max}$	8.0 MHz ≤ f_offset < $\text{f\_offset}_{\text{max}}$	P – 54.5 dB	1 MHz

TABLE 19a

Spectrum emission mask values, BS maximum output power 31 ≤ *P* < 39 dBm

Frequency offset of measurement filter −3 dB point, Δ*f*	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measure-ment bandwidth
2.5 MHz ≤ Δ*f* < 2.7 MHz	2.515 MHz ≤ f_offset < 2.715 MHz	*P* – 51.5 dB	30 kHz
2.7 MHz ≤ Δ*f* < 3.5 MHz	2.715 MHz ≤ f_offset < 3.515 MHz	$P - 51.5\text{ dB} - 15\left(\frac{\text{f\_offset}}{\text{MHz}} - 2.715\right)\text{dB}$	30 kHz
(see Note)	3.515 MHz ≤ f_offset < 4.0 MHz	*P* – 63.5 dB	30 kHz
3.5 MHz ≤ Δ*f* < 7.5 MHz	4.0 MHz ≤ f_offset < 8.0 MHz	*P* – 50.5 dB	1 MHz
7.5 MHz ≤ Δ*f* ≤ Δf_{max}	8.0 MHz ≤ f_offset < f_offset$_{max}$	*P* – 54.5 dB	1 MHz

TABLE 20a

Spectrum emission mask values, BS maximum output power *P* < 31 dBm dB

Frequency offset of measurement filter −3 dB point, Δ*f*	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measure-ment bandwidth
2.5 MHz ≤ Δ*f* < 2.7 MHz	2.515 MHz ≤ f_offset < 2.715 MHz	−20.5 dBm	30 kHz
2.7 MHz ≤ Δ*f* < 3.5 MHz	2.715 MHz ≤ f_offset < 3.515 MHz	$-20.5\text{ dBm} - 15\left(\frac{\text{f\_offset}}{\text{MHz}} - 2.715\right)\text{dB}$	30 kHz
(see Note)	3.515 MHz ≤ f_offset < 4.0 MHz	−32.5 dBm	30 kHz
3.5 MHz ≤ Δ*f* < 7.5 MHz	4.0 MHz ≤ f_offset < 8.0 MHz	−19.5 dBm	1 MHz
7.5 MHz ≤ Δ*f* ≤ Δf_{max}	8.0 MHz ≤ f_offset < f_offset$_{max}$	−23.5 dBm	1 MHz

2.2 1.28 Mchip/s TDD option

The spectrum emission mask specifies the limit of the transmitter OoB emissions at frequency offsets from the assigned channel frequency of the wanted signal between 0.8 MHz and 4.0 MHz.

The requirement should be met by a BS transmitting on a single RF carrier configured in accordance with the manufacturer's specification. Emissions should not exceed the maximum level specified in Tables 21 to 23 in the frequency range of f_offset from 0.815 MHz to Δf_{max} from the carrier frequency, where:

– f_offset is the separation between the carrier frequency and the centre of the measurement filter:

– f_offset_{max} is either 4.0 MHz or the offset to the universal mobile telecommunication system (UMTS) transmit band edge (uplink and downlink transmission in the following bands: 1 900-1 920 MHz and 2 010-2 025 MHz, 1 850-1 910 MHz and 1 930-1 990 MHz used in ITU Region 2, 1 910-1 930 MHz used in ITU Region 2, 2 570-2 620 MHz used in ITU Region 1), whichever is the greater.

– Δf_{max} is equal to f_offset_{max} minus half of the bandwidth of the measuring filter.

The spectrum emissions measured should not exceed the maximum level specified in Tables 17b to 19b for the appropriate BS rated output power.

TABLE 17b

Spectrum emission mask values, BS maximum output power $P \geq 34$ dBm

Frequency offset of measurement filter −3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measure-ment bandwidth
0.8 MHz ≤ Δf < 1.0 MHz	0.815 MHz ≤ f_offset < 1.015 MHz	−18.5 dBm	30 kHz
1.0 MHz ≤ Δf < 1.8 MHz	1.015 MHz ≤ f_offset < 1.815 MHz	$-18.5\ \text{dBm} - 10\left(\frac{\text{f\_offset}}{\text{MHz}} - 1.015\right)\ \text{dB}$	30 kHz
(see Note)	1.815 MHz ≤ f_offset < 2.3 MHz	−26.5 dBm	30 kHz
1.8 MHz ≤ $\Delta f \leq \Delta f_{max}$	2.3 MHz ≤ f_offset < f_offset_{max}	−11.5 dBm	1 MHz

TABLE 18b

Spectrum emission mask values, BS maximum output power $26 \leq P < 34$ dBm

Frequency offset of measurement filter −3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measure-ment bandwidth
0.8 MHz ≤ Δf < 1.0 MHz	0.815 MHz ≤ f_offset < 1.015 MHz	P − 52.5 dB	30 kHz
1.0 MHz ≤ Δf < 1.8 MHz	1.015 MHz ≤ f_offset < 1.815 MHz	$P - 52.5\ \text{dB} - 10\left(\frac{\text{f\_offset}}{\text{MHz}} - 1.015\right)\ \text{dB}$	30 kHz
(see Note)	1.815 MHz ≤ f_offset < 2.3 MHz	P − 60.5 dB	30 kHz
1.8 MHz ≤ $\Delta f \leq \Delta f_{max}$	2.3 MHz ≤ f_offset < f_offset_{max}	P − 45.5 dB	1 MHz

TABLE 19b

Spectrum emission mask values, BS maximum output power $P < 26$ dBm

Frequency offset of measurement filter −3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measure-ment bandwidth
0.8 MHz ≤ Δf < 1.0 MHz	0.815 MHz ≤ f_offset < 1.015 MHz	−26.5 dBm	30 kHz
1.0 MHz ≤ Δf < 1.8 MHz	1.015 MHz ≤ f_offset < 1.815 MHz	$-26.5\text{ dB} - 10\left(\frac{\text{f\_offset}}{\text{MHz}} - 1.015\right)\text{dB}$	30 kHz
(see Note)	1.815 MHz ≤ f_offset < 2.3 MHz	−34.5 dBm	30 kHz
1.8 MHz ≤ $\Delta f \leq \Delta f_{max}$	2.3 MHz ≤ f_offset < $\text{f\_offset}_{\text{max}}$	−19.5 dBm	1 MHz

2.3 7.68 Mchip/s TDD option

The spectrum emission mask specifies the limit of the transmitter OoB emissions at frequency offsets from the assigned channel frequency of the wanted signal between 5 MHz and 25 MHz.

The requirement should be met by a BS transmitting on a single RF carrier configured in accordance with the manufacturer's specification. Emissions should not exceed the maximum level specified in Tables 20 to 23 in the frequency range of f_offset from 5.015 MHz to Δf_{max} from the carrier frequency, where:

– f_offset is the separation between the carrier frequency and the centre of the measurement filter:

– $\text{f\_offset}_{\text{max}}$ is either 25 MHz or the offset to the universal mobile telecommunications system (UMTS) transmit band edge (uplink and downlink transmission in the following bands: 1 900-1 920 MHz and 2 010-2 025 MHz, 1 850-1 910 MHz and 1 930-1 990 MHz used in ITU Region 2, 1 910-1 930 MHz used in ITU Region 2, 2 570-2 620 MHz used in ITU Region 1), whichever is the greater.

– Δf_{max} is equal to $\text{f\_offset}_{\text{max}}$ minus half of the bandwidth of the measuring filter.

The spectrum emissions measured should not exceed the maximum level specified in Tables 17c to 19c for the appropriate BS rated output power.

TABLE 17c

Spectrum emission mask values, BS maximum output power $P \geq 43$ dBm

Frequency offset of measurement filter −3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measure-ment bandwidth
5 MHz ≤ Δf < 5.2 MHz	5.015 MHz ≤ f_offset < 5.215 MHz	−15.5 dBm	30 kHz
5.2 MHz ≤ Δf < 6 MHz	5.215 MHz ≤ f_offset < 6.015 MHz	$-15.5\ \text{dBm} - 15\left(\frac{\text{f\_offset}}{\text{MHz}} - 5.215\right)\text{dB}$	30 kHz
(see Note)	6.015 MHz ≤ f_offset < 6.5 MHz	−27.5 dBm	30 kHz
6 MHz ≤ $\Delta f \leq \Delta f_{max}$	6.5 MHz ≤ f_offset < $\text{f\_offset}_{\text{max}}$	−14.5 dBm	1 MHz

TABLE 18c

Spectrum emission mask values, BS maximum output power $39 \leq P < 43$ dBm

Frequency offset of measurement filter −3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measure-ment bandwidth
5 MHz ≤ Δf < 5.2 MHz	5.015 MHz ≤ f_offset < 5.215 MHz	−15.5 dBm	30 kHz
5.2 MHz ≤ Δf < 6 MHz	5.215 MHz ≤ f_offset < 6.015 MHz	$-15.5\ \text{dBm} - 15\left(\frac{\text{f\_offset}}{\text{MHz}} - 5.215\right)\text{dB}$	30 kHz
(see Note)	6.015 MHz ≤ f_offset < 6.5 MHz	−27.5 dBm	30 kHz
6 MHz ≤ Δf < 15 MHz	6.5 MHz ≤ f_offset < 15.5 MHz	−14.5 dBm	1 MHz
15 MHz ≤ $\Delta f \leq \Delta f_{max}$	15.5 MHz ≤ f_offset < $\text{f\_offset}_{\text{max}}$	P – 57.5 dB	1 MHz

TABLE 19c

Spectrum emission mask values, BS maximum output power 31 ≤ *P* < 39 dBm

Frequency offset of measurement filter −3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measure-ment bandwidth
5 MHz ≤ Δf < 5.2 MHz	5.015 MHz ≤ f_offset < 5.215 MHz	P – 54.5 dB	30 kHz
5.2 MHz ≤ Δf < 6 MHz	5.215 MHz ≤ f_offset < 6.015 MHz	$P - 54.5\ \text{dBm} - 15\left(\frac{\text{f\_offset}}{\text{MHz}} - 5.215\right)\ \text{dB}$	30 kHz
(see Note)	6.015 MHz ≤ f_offset < 6.5 MHz	P – 66.5 dB	30 kHz
6 MHz ≤ Δf < 15 MHz	6.5 MHz ≤ f_offset < 15.5 MHz	P – 53.5 dB	1 MHz
15 MHz ≤ $\Delta f \le \Delta f_{max}$	15.5 MHz ≤ f_offset < $\text{f\_offset}_{\text{max}}$	P – 57.5 dB	1 MHz

TABLE 20c

Spectrum emission mask values, BS maximum output power *P* < 31 dBm

Frequency offset of measurement filter −3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measure-ment bandwidth
5 MHz ≤ Δf < 5.2 MHz	5.015 MHz ≤ f_offset < 5.215 MHz	−23.5 dBm	30 kHz
5.2 MHz ≤ Δf < 6 MHz	5.215 MHz ≤ f_offset < 6.015 MHz	$-23.5\ \text{dBm} - 15\left(\frac{\text{f\_offset}}{\text{MHz}} - 5.215\right)\ \text{dB}$	30 kHz
(see Note)	6.015 MHz ≤ f_offset < 6.5 MHz	−35.5 dBm	30 kHz
6 MHz ≤ Δf < 15 MHz	6.5 MHz ≤ f_offset < 15.5 MHz	−22.5 dBm	1 MHz
15 MHz ≤ $\Delta f \le \Delta f_{max}$	15.5 MHz ≤ f_offset < $\text{f\_offset}_{\text{max}}$	−26.5 dBm	1 MHz

3 ACLR

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 ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies should be higher than the value specified in Tables 21a), 21b) and 21c).

TABLE 21

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

BS adjacent channel offset below the first or above the last carrier frequency used (MHz)	ACLR limit (dB)
5	44.2
10	54.2

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

BS adjacent channel offset below the first or above the last carrier frequency used (MHz)	ACLR limit (dB)
1.6	39.2
3.2	44.2

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

BS adjacent channel offset below the first or above the last carrier frequency used (MHz)	Chip rate for RRC measurement filter (Mchip/s)	ACLR limit (dB)
7.5	3.84	44.2
12.5	3.84	54.2
10.0	7.68	44.2
20.0	7.68	54.2

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements should be applied individually to the single carriers or group of single carriers.

4 Transmitter spurious emission (conducted)

The conducted spurious emissions are measured at the BS RF output port.

Unless otherwise stated, all requirements are measured as mean power.

The requirements should apply to BS intended for general-purpose applications.

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.

Either requirement applies at frequencies within the specified frequency ranges which are more than 12.5 MHz under the first carrier frequency used or more than 12.5 MHz above the last carrier frequency used.

For the 3.84 Mchip/s TDD option, either requirement (except the case of coexistence with PHS) applies at frequencies within the specified frequency ranges which are more than 12.5 MHz under the first carrier frequency used or more than 12.5 MHz above the last carrier frequency used.

For the 1.28 Mchip/s TDD option, either requirement applies at frequencies within the specified frequency ranges which are more than 4 MHz under the first carrier frequency used or more than 4 MHz above the last carrier frequency used.

For the 7.68 Mchip/s TDD option, either requirement (except the case of coexistence with PHS) applies at frequencies within the specified frequency ranges which are more than 25 MHz under the first carrier frequency used or more than 25 MHz above the last carrier frequency used.

In areas where Category A limits for spurious emissions, as defined in Recommendation ITU-R SM.329, are applied, the power of any spurious emission should not exceed the maximum levels given in Table 22a.

TABLE 22a

BS Mandatory spurious emissions limits, Category A

Band	Maximum level	Measurement bandwidth	Note
9-150 kHz	–13 dBm	1 kHz	Bandwidth as in Recommendation ITU-R SM.329, § 4.1
150 kHz-30 MHz		10 kHz	Bandwidth as in Recommendation ITU-R SM.329, § 4.1
30 MHz-1 GHz		100 kHz	Bandwidth as in Recommendation ITU-R SM.329, § 4.1
1-12.75 GHz		1 MHz	Upper frequency as in Recommendation ITU-R SM.329, § 2.5, Table 1

NOTE 1 – The requirements reported in the present table are applicable for the 3.84 Mchip/s, 1.28 Mchip/s and 7.68 Mchip/s TDD options.

In areas where Category B limits for spurious emissions, as defined in Recommendation ITU-R SM.329, are applied, the power of any spurious emission should not exceed the maximum levels given in Tables 22b, 22c and 22d.

TABLE 22b

BS spurious emission limits for 3.84 Mchip/s option, Category B

Band	Maximum level	Measurement bandwidth	Notes
9 ↔ 150 kHz	–36 dBm	1 kHz	(1)
150 kHz ↔ 30 MHz	–36 dBm	10 kHz	(1)
30 MHz ↔ 1 GHz	–36 dBm	100 kHz	(1)
1 GHz ↔ Fc1 – 60 MHz or Fl – 10 MHz whichever is the higher	–30 dBm	1 MHz	(1)
Fc1 – 60 MHz or Fl – 10 MHz whichever is the higher ↔ Fc1 – 50 MHz or Fl – 10 MHz whichever is the higher	–25 dBm	1 MHz	(2)
Fc1 – 50 MHz or Fl – 10 MHz whichever is the higher ↔ Fc1 + 50 MHz or Fl + 10 MHz whichever is the lover	–15 dBm	1 MHz	(2)
Fc2 + 50 MHz or Fu + 10 MHz whichever is the lower ↔ Fc2 + 60 MHz or Fu + 10 MHz whichever is the lower	–25 dBm	1 MHz	(2)
Fc2 + 60 MHz or Fu + 10 MHz whichever is the lower ↔ 12.5 GHz	–30 dBm	1 MHz	(1), (3)

TABLE 22c

BS spurious emission limits for 1.28 Mchip/s option, Category B

Band	Maximum level	Measurement bandwidth	Notes
9 ↔ 150 kHz	–36 dBm	1 kHz	(1)
150 kHz ↔ 30 MHz	–36 dBm	10 kHz	(1)
30 MHz ↔ 1 GHz	–36 dBm	100 kHz	(1)
1 GHz ↔ Fc1 – 19.2 MHz or Fl – 10 MHz whichever is the higher	–30 dBm	1 MHz	(1)
Fc1 – 19.2 MHz or Fl – 10 MHz whichever is the higher ↔ Fc1 – 16 MHz or Fl – 10 MHz whichever is the higher	–25 dBm	1 MHz	(2)
Fc1 – 16 MHz or Fl – 10 MHz whichever is the higher ↔ Fc1 + 16 MHz or Fl + 10 MHz whichever is the lower	–15 dBm	1 MHz	(2)
Fc1 + 16 MHz or Fl + 10 MHz whichever is the lower ↔ Fc1 + 19.2 MHz or Fl + 10 MHz whichever is the lower	–25 dBm	1 MHz	(2)
Fc1 + 19.2 MHz or Fl + 10 MHz whichever is the lower ↔ 12.5 GHz	–30 dBm	1 MHz	(1), (3)

TABLE 22d

BS spurious emission limits for 7.68 Mchip/s option, Category B

Band	Maximum level	Measurement bandwidth	Notes
9 ↔ 150 kHz	–36 dBm	1 kHz	(1)
150 kHz ↔ 30 MHz	–36 dBm	10 kHz	(1)
30 MHz ↔ 1 GHz	–36 dBm	100 kHz	(1)
1 GHz ↔ Fc1 – 60 MHz or Fl – 10 MHz whichever is the higher	–30 dBm	1 MHz	(1)
Fc1 – 60 MHz or Fl – 10 MHz whichever is the higher ↔ Fc1 – 50 MHz or Fl – 10 MHz whichever is the higher	–25 dBm	1 MHz	(2)
Fc1 – 50 MHz or Fl – 10 MHz whichever is the higher ↔ Fc1 + 50 MHz or Fl + 10 MHz whichever is the lower	–15 dBm	1 MHz	(2)
Fc1 + 50 MHz or Fl + 10 MHz whichever is the lower ↔ Fc1 + 60 MHz or Fl + 10 MHz whichever is the lower	–25 dBm	1 MHz	(2)
Fc1 + 60 MHz or Fl + 10 MHz whichever is the lower ↔ 12.75 GHz	–30 dBm	1 MHz	(1), (3)

(1) Bandwidth as in Recommendation ITU-R SM.329, § 4.1.

(2) Specification in accordance with Recommendation ITU-R SM.329, § 4.3 and Annex 7.

(3) Upper frequency as in Recommendation ITU-R SM.329, § 2.5, Table 1.

Fc1: Centre frequency of emission of the first carrier transmitted by the BS.

Fc2: Centre frequency of emission of the last carrier transmitted by the BS.

Fl: Lower frequency of the band in which TDD operates.

Fu: Upper frequency of the band in which TDD operates.

4.1 Coexistence with GSM 900

This requirement may be applied for the protection of GSM 900 MS and GSM 900 BTS receivers in geographic areas in which both GSM 900 and UTRA are deployed.

TABLE 23a

BS spurious emissions limits for BS in geographic coverage area of GSM 900 MS and GSM 900 BTS receivers

Band	Maximum level	Measurement bandwidth	Note
876-915 MHz	−61 dBm	100 kHz	
921-960 MHz	−57 dBm	100 kHz	

4.2 Coexistence with DCS 1800

This requirement may be applied for the protection of DCS 1800 MS and DCS 1800 BTS receivers in geographic areas in which both DCS 1800 and UTRA are deployed.

TABLE 23b

BS spurious emissions limits for BS in geographic coverage area of DCS 1800 MS and DCS 1800 BTS receivers

Band	Maximum level	Measurement bandwidth	Note
1 710-1 785 MHz	−61 dBm	100 kHz	
1 805-1 880 MHz	−47 dBm	100 kHz	

4.3 Coexistence with UTRA-FDD

This requirement may be applied to geographic areas in which both UTRA-TDD and UTRA-FDD operating in bands specified in Table 23c are deployed.

For TDD base stations which use carrier frequencies within the band 2 010-2 025 MHz the requirements apply at all frequencies within the specified frequency bands in Table 6.16. For the 3.84 Mchip/s TDD option base stations which use a carrier frequency within the band 1 900-1 920 MHz, the requirement apply at frequencies within the specified frequency range which are more than 12.5 MHz above the last carrier used in the frequency band 1 900-1 920 MHz. For the 1.28 Mchip/s TDD option base stations which use carrier frequencies within the band 1 900-1 920 MHz, the requirement applies at frequencies within the specified frequency range which are more than 4 MHz above the last carrier used in the frequency band 1 900-1 920 MHz. For the 7.68 Mchip/s TDD option base stations which use a carrier frequency within the band 1 900-1 920 MHz, the requirement applies at frequencies within the specified frequency range which are more than 25 MHz above the last carrier used in the frequency band 1 900-1 920 MHz.

The power of any spurious emission should not exceed values reported in Table 23c.

TABLE 23c

BS spurious emissions limits for BS in geographic coverage area of UTRA-FDD

BS class	Band	Maximum level	Measurement bandwidth	Note
Wide area BS	1 920-1 980 MHz	−43 dBm[(1)]	3.84 MHz	
Wide area BS	2 110-2 170 MHz	−52 dBm	1 MHz	
Wide area BS	2 500-2 570 MHz	−43 dBm[(2)]	3.84 MHz	
Wide area BS	2 620-2 690 MHz	−52 dBm	1 MHz	
Wide area BS	815-850 MHz	−43 dBm[(3)]	3.84 MHz	Applicable in Japan
Wide area BS	860-895 MHz	−52 dBm[(3)]	1 MHz	Applicable in Japan
Wide area BS	1 427.9 MHz-1 452.9 MHz	−43 dBm[(4)]	3.84 MHz	Wide area BS
Wide area BS	1 475.9 MHz-1 500.9 MHz	−52 dBm[(4)]	1 MHz	Wide area BS
Wide area BS	1 749.9-1 784.9 MHz	−43 dBm[(3)]	3.84 MHz	Applicable in Japan
Wide area BS	1 844.9-1 879.9 MHz	−52 dBm[(3)]	1 MHz	Applicable in Japan
Local area BS	1 920-1 980 MHz	−40 dBm[(1)]	3.84 MHz	
Local area BS	2 110-2 170 MHz	−52 dBm	1 MHz	
Local area BS	2 500-2 570 MHz	−40 dBm[(2)]	3.84 MHz	
Local area BS	2 620-2 690 MHz	−52 dBm	1 MHz	

(1) For the 3.84 Mchip/s TDD option base stations which use carrier frequencies within the band 1 900-1 920 MHz, the requirement should be measured RRC filtered mean power with the lowest centre frequency of measurement at 1 922.6 MHz or 15 MHz above the highest TDD carrier used, whichever is higher. For the 1.28 Mchip/s TDD option base stations which use carrier frequencies within the band 1 900-1 920 MHz, the requirement should be measured RRC filtered mean power with the lowest centre frequency of measurement at 1 922.6 MHz or 6.6 MHz above the highest TDD carrier used, whichever is higher. For the 7.68 Mchip/s TDD option base stations which use carrier frequencies within the band 1 900-1 920 MHz, the requirement should be measured RRC filtered mean power with the lowest centre frequency of measurement at 1 922.6 MHz or 30 MHz above the highest TDD carrier used, whichever is higher.

(2) For the 3.84 Mchip/s TDD option base stations which use carrier frequencies within the band 2 570-2 620 MHz, the requirement should be measured RRC filtered mean power with the highest centre frequency of measurement at 2 567.5 MHz or 15 MHz below the lowest TDD carrier used, whichever is lower. For the 1.28 Mchip/s TDD option base stations which use carrier frequencies within the band 2 570-2 620 MHz, the requirement should be measured RRC filtered mean power with the highest centre frequency of measurement at 2 567.5 MHz or 6.6 MHz below the lowest TDD carrier used, whichever is lower. For the 7.68 Mchip/s TDD option base stations which use carrier frequencies within the band 2 570-2 620 MHz, the requirement should be measured RRC filtered mean power with the highest centre frequency of measurement at 2 567.5 MHz or 30 MHz below the lowest TDD carrier used, whichever is lower.

(3) This is applicable only in Japan for the 3.84 Mchip/s and 7.68 Mchip/s TDD options operating in 2 010-2 025 MHz.

(4) This is applicable only to the 7.68 Mchip/s TDD option operating in 2 010-2 025 MHz.

The requirements for wide area BS in Table 23c are based on a coupling loss of 67 dB between the TDD and FDD base stations. The requirements for local area BS in Table 23c are based on a coupling loss of 70 dB between TDD and FDD wide area base stations.

4.4 Coexistence with PHS

This requirement may be applied for the protection of PHS in geographic areas in which both PHS and UTRA TDD are deployed. For the 3.84 Mchip/s TDD option, this requirement is also applicable at specified frequencies falling between 12.5 MHz below the first carrier frequency used and 12.5 MHz above the last carrier frequency used. For the 7.68 Mchip/s TDD option, this requirement is also applicable at specified frequencies falling between 25 MHz below the first carrier frequency used and 25 MHz above the last carrier frequency used.

The power of any spurious emission should not exceed values reported in Table 23d.

TABLE 23d

BS spurious emissions limits for BS in geographic coverage area of PHS (3.84 Mchip/s and 7.68 Mchip/s TDD options)

Band	Maximum level	Measurement bandwidth	Note
1 884.5-1 919.6 MHz	−41 dBm	300 kHz	Applicable for transmission in 2 010-2 025 MHz

5 Receiver spurious emission

The requirements apply to all BS with separate receive and transmit antenna ports. The test should be performed when both transmitter and receiver are on with the transmitter port terminated.

For BS equipped with only a single antenna connector for both transmitter and receiver, the requirements of transmitter spurious emissions should apply to this port, and this test need not be performed.

The requirements in this subclause should apply to BS intended for general-purpose applications.

The power of any spurious emission should not exceed the values given in the Tables below.

5.1 3.84 Mchip/s TDD option

TABLE 24a

Receiver spurious emission requirements

Band	Maximum level	Measurement bandwidth	Note
30 MHz-1 GHz	−57 dBm	100 kHz	
1 GHz-1.9 GHz, 1.98 GHz-2.01 GHz and 2.025 GHz-2.5 GHz	−47 dBm	1 MHz	With the exception of frequencies between 12.5 MHz below the first carrier frequency and 12.5 MHz above the last carrier frequency used by the BS
1.9 GHz-1.98 GHz, 2.01 GHz-2.025 GHz and 2.5 GHz-2.62 GHz	−78 dBm	3.84 MHz	With the exception of frequencies between 12.5 MHz below the first carrier frequency and 12.5 MHz above the last carrier frequency used by the BS
2.62 GHz-12.75 GHz	−47 dBm	1 MHz	With the exception of frequencies between 12.5 MHz below the first carrier frequency and 12.5 MHz above the last carrier frequency used by the BS

TABLE 24b

Additional receiver spurious emission requirements

Band	Maximum level	Measurement bandwidth	Note
815 MHz-850 MHz 1 749.9 MHz-1 784.9 MHz	−78 dBm	3.84 MHz	Applicable in Japan. With the exception of frequencies between 12.5 MHz below the first carrier frequency and 12.5 MHz above the last carrier frequency used by the BS

5.2 1.28 Mchip/s TDD option

TABLE 24c

Receiver spurious emission requirements

Band	Maximum level	Measurement bandwidth	Note
30 MHz-1 GHz	−57 dBm	100 kHz	
1 GHz-1.9 GHz, 1.98 GHz-2.01 GHz and 2.025 GHz-2.50 GHz	−47 dBm	1 MHz	With the exception of frequencies between 4 MHz below the first carrier frequency and 4 MHz above the last carrier frequency used by the BS
1.9 GHz-1.98 GHz, 2.01 GHz-2.025 GHz and 2.5 GHz-2.62 GHz	−83 dBm	1.28 MHz	With the exception of frequencies between 4 MHz below the first carrier frequency and 4 MHz above the last carrier frequency used by the BS
2.62 GHz-12.75 GHz	−47 dBm	1 MHz	With the exception of frequencies between 4 MHz below the first carrier frequency and 4 MHz above the last carrier frequency used by the BS

5.3 7.68 Mchip/s TDD option

TABLE 24d

Receiver spurious emission requirements

Band	Maximum level	Measurement bandwidth	Note
30 MHz-1 GHz	−57 dBm	100 kHz	
1 GHz-1.9 GHz, 1.98 GHz-2.01 GHz 2.025 GHz-2.5 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 BS
1.9 GHz-1.98 GHz, 2.01 GHz-2.025 GHz 2.5 GHz-2.62 GHz	−75 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 BS
2.62 GHz-12.75 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 BS

TABLE 24e

Additional receiver spurious emission requirements

Band	Maximum level	Measurement bandwidth	Note
815 MHz-850 MHz 1 427.9 MHz-1 452.9 MHz 1 749.9 MHz-1 784.9 MHz	−78 dBm	3.84 MHz	Applicable in Japan. With the exception of frequencies between 25 MHz below the first carrier frequency and 25 MHz above the last carrier frequency used by the BS

Annex 4

IMT-2000 time division multiple access (TDMA) single-carrier (UWC-136) base stations

PART A

Conformance requirements (30 kHz)

1 Spectrum mask

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 25.

TABLE 25

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	For output powers ≤ 50 W: 45 dB below the mean output power or –13 dBm measured in 30 kHz bandwidth, whichever is the lower power	For output powers > 50 W: 45 dB below the mean output power

2 Spurious emissions (conducted)

In areas where Category A limits for spurious emissions, as defined in Recommendation ITU-R SM.329, are applied, the power of any spurious emission should not exceed the limits specified in Table 26a).

TABLE 26

a) BS spurious emission limits, Category A

Band	Maximum level	Measurement bandwidth	Note
9-150 kHz	–13 dBm	1 kHz	Bandwidth as in Recommendation ITU-R SM.329, § 4.1
150 kHz-30 MHz		10 kHz	Bandwidth as in Recommendation ITU-R SM.329, § 4.1
30 MHz-1 GHz		100 kHz	Bandwidth as in Recommendation ITU-R SM.329, § 4.1
1-12.75 GHz		1 MHz	Upper frequency as in Recommendation ITU-R SM.329, § 2.6

In areas where Category B limits for spurious emissions, as defined in Recommendation ITU-R SM.329, are applied, the power of any spurious emission should not exceed the limits specified in Tables 26b) and 27.

TABLE 26

b) BS spurious emission limits, Category B

Band (f[(1)])	Maximum level	Measurement bandwidth	Notes
9 kHz ≤ f ≤ 150 kHz	–36 dBm	1 kHz	(2)
150 kHz < f ≤ 30 MHz	–36 dBm	10 kHz	(2)
30 MHz < f ≤ 1 000 MHz	–36 dBm	100 kHz	(2)
1 000 MHz < f < 1 920 MHz	–30 dBm	1 MHz	(2)
1 920 MHz ≤ f ≤ 1 980 MHz	–70 dBm	30 kHz	(3)
1 980 MHz < f < 2 110 MHz	–30 dBm	1 MHz	(2)
2 110 MHz ≤ f ≤ 2 170 MHz	–13 dBm	30 kHz	(4)
2 170 MHz < f ≤ 12.75 GHz	–30 dBm	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) BS receive band.

(4) BS transmit band.

2.1 Coexistence with other systems

This requirement provides for the protection of MS receivers of served by the following GSM and 3G systems: GSM 900, DCS 1800, UTRA-TDD.

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

The power of any spurious emission should not exceed the limits specified in Table 27.

TABLE 27

Additional spurious emission requirements in addition to Category B limits

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

NOTE 1 – The measurements are made on frequencies which are integer multiples of 200 kHz.

NOTE 2 – 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

The power of any spurious emissions should not exceed the limits given in Tables 28 and 29.

TABLE 28

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	With the exception of the frequencies covered by Table 29, for which additional receiver spurious emission requirements apply

TABLE 29

Additional receiver spurious emission requirements

Frequency band	Measurement bandwidth	Maximum level	Note
1 920 MHz ≤ f ≤ 1 980 MHz	30 kHz	–80 dBm	Base receive band
2 110 MHz ≤ f ≤ 2 170 MHz	30 kHz	–60 dBm	Base transmit band

PART B

Conformance requirements (200 kHz)

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

1 Spectrum mask

The specifications contained in this clause apply to base transmit stations (BTS) in frequency hopping as well as in non-frequency hopping mode, except that beyond 1 800 kHz offset from the carrier the BTS is not tested in frequency hopping mode.

Due to the bursty nature of the signal, the output RF spectrum results from two effects:

– the modulation process;

– the power ramping up and down (switching transients).

The two effects are specified separately; the measurement method used to analyse separately those two effects is specified in GSM 11.21. It is based on the ringing effect during the transients, and is a measurement in the time domain, at each point in frequency.

The limits specified thereunder are based on a 5-pole synchronously tuned measurement filter.

Unless otherwise stated, only one transmitter is active for the tests of this clause.

1.1 Spectrum due to the modulation and wideband noise

The output RF modulation spectrum is specified in Tables 30 to32. This specification applies for all RF channels supported by the equipment.

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

The specification should be met under the following measurement conditions:

– Up to 1 800 kHz from the carrier:
  – 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.

– At 1 800 kHz and above from the carrier:
  – Swept measurement with filter and video bandwidth of 100 kHz, minimum sweep time of 75 ms, averaging over 200 sweeps. All slots active, frequency hopping disabled.
  – 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 specifications then apply to the measurement results for any of the hopping frequencies.

The figures in Tables 30 through 32, 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. Appropriate conversion factors for this purpose are given in GSM 05.50.

The power level is the "actual absolute output power" defined in clause 4.1.2 of GSM 05.05. If the power level falls between two of the values in the table, the requirement should be determined by linear interpolation.

TABLE 30

Normal BTS

	100	**200**	**250**	**400**	**≥ 600 < 1 200**	**≥ 1 200 < 1 800**	**≥ 1 800 < 6 000**	**≥ 6 000**
≥ 43	+0.5	–30	–33	–60[1]	–70	–73	–75	–80
41	+0.5	–30	–33	–60[1]	–68	–71	–73	–80
39	+0.5	–30	–33	–60[1]	–66	–69	–71	–80
37	+0.5	–30	–33	–60[1]	–64	–67	–69	–80
35	+0.5	–30	–33	–60[1]	–62	–65	–67	–80
≤ 33	+0.5	–30	–33	–60[1]	–60	–63	–65	–80

[1] For equipment supporting 8-PSK, the requirement for 8-PSK modulation is –56 dB.

TABLE 31

Micro-BTS

	100	**200**	**250**	**400**	**≥ 600 < 1 200**	**≥ 1 200 < 1 800**	**≥ 1 800**
35	+0.5	–30	–33	–60[1]	–62	–65	–76[2]
≤ 33	+0.5	–30	–33	–60[1]	–60	–63	–76[2]

[1] For equipment supporting 8-PSK, the requirement for 8-PSK modulation is –56 dB.

[2] These are average levels in a measurement bandwidth of 100 kHz relative to a measurement in 30 kHz on carrier. The measurement will be made in non-frequency hopping mode under the conditions specified for the normal BTS.

TABLE 32

Pico-BTS

	100	**200**	**250**	**400**	**≥ 600 < 1 200**	**≥ 1 200 < 1 800**	**≥ 1 800**
≤ 23	+0.5	–30	–33	–60[1]	–60	–63	–76

[1] For equipment supporting 8-PSK, the requirement for 8-PSK modulation is –56 dB.

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

– In the combined range 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, exceptions at 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, exceptions at up to –36 dBm are allowed. Only one transmitter is active for this test.

Using the same measurement conditions as specified above, if a requirement in Tables 30 through 32 is tighter than the limit given in Tables 33 and 34, the latter should be applied instead.

TABLE 33

For normal BTS

Frequency offset from the carrier	Limit
< 1 800 kHz	max {–88 dB, –57 dBm}
≥ 1 800 kHz	max {–83 dB, –57 dBm}

NOTE 1 – The levels given here in dB are relative to the output power of the BTS at the lowest static power level measured in 30 kHz.

Table 34 applies to the micro and pico-BTS, at 1 800 kHz and above offset from the carrier.

TABLE 34

Micro and Pico BTS

Power class	Limit (dBm)
M1	–57
M2	–62
M3	–67
P1	–65

1.2 Spectrum due to switching transients

Those 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.

The maximum level measured, after any filters and combiners, at the indicated offset from the carrier, is as shown in Table 35, or –36 dBm, whichever is the higher.

TABLE 35

Spectrum emission mask limits

Modulation	Maximum level measured			
	400 kHz	**600 kHz**	**1 200 kHz**	**1 800 kHz**
GMSK	–50 dBc	–58 dBc	–66 dBc	–66 dBc
8-PSK	–50 dBc	–58 dBc	–66 dBc	–66 dBc

NOTE 1 – dBc means relative to the output power at the BTS, measured at the same point and in a filter bandwidth of 300 kHz.

2 Transmitter conducted spurious emissions

The spurious transmissions (whether modulated or unmodulated) and the switching transients are specified together by measuring the peak power in a given bandwidth at various frequencies. The bandwidth is increased as the frequency offset between the measurement frequency and, either the carrier, or the edge of the BTS transmit band, increases. The effect for spurious signals of widening the measurement bandwidth is to reduce the allowed total spurious energy per MHz. The effect for switching transients is to effectively reduce the allowed level of the switching transients (the peak level of a switching transient increases by 6 dB for each doubling of the measurement bandwidth). The measurement bandwidths are specified in Tables 36 and 37, and a peak-hold measurement being assumed.

NOTE 1 – The measurement conditions for radiated and conducted spurious are specified separately in GSM 11.21. The frequency bands where these are actually measured may differ from one type to the other (see GSM 11.21).

TABLE 36

Measurement bandwidths, in-band

Band (MHz)	**Frequency offset (MHz)**	**Measurement bandwidth (kHz)**
2 110 to 2 170	(offset from carrier)	
	≥ 1.8	30
	≥ 6	100

TABLE 37

Measurement bandwidths, out-of-band

Band	Frequency offset	Measurement bandwidth
100 kHz to 50 MHz	–	10 kHz
50 to 500 MHz outside the relevant transmit band	(offset from edge of the relevant transmit band)	
	≥ 2 MHz	30 kHz
	≥ 5 MHz	100 kHz
Above 500 MHz outside the relevant transmit band	(offset from edge of the relevant transmit band)	
	≥ 2 MHz	30 kHz
	≥ 5 MHz	100 kHz
	≥ 10 MHz	300 kHz
	≥ 20 MHz	1 MHz
	≥ 30 MHz	3 MHz

The measurement settings assumed, correspond, for the resolution bandwidth, to the value of the measurement bandwidth in the Table, and for the video bandwidth to approximately three times this value.

The limits specified hereunder are based on a 5-pole synchronously tuned measurement filter and are specified in Table 38.

Editorial Note – These limits are coming from GSM specifications and are applied worldwide, including in countries where Category A limits normally applies.

TABLE 38

BS spurious emission limits

Band (f[(1)])	Maximum level	Measurement bandwidth[(2)]	Note
9 kHz ≤ f ≤ 150 kHz	–36 dBm	1 kHz	(3)
150 kHz < f ≤ 30 MHz	–36 dBm	10 kHz	(3)
30 MHz < f ≤ 1 000 MHz	–36 dBm	100 kHz	(3)
1 000 MHz < f < 1 920 MHz	–30 dBm	1 MHz	(3)
1 920 MHz ≤ f ≤ 1 980 MHz	See Table 39	See Table 39	(4)
1 980 MHz < f < 2 110 MHz	–30 dBm	1 MHz	(3)
2 110 MHz ≤ f ≤ 2 170 MHz	–36 dBm	30 kHz, 100 kHz (Table 37)	(5)
2 170 MHz < f ≤ 12.75 GHz	–30 dBm	1 MHz	(3)

(1) f is the frequency of the spurious emission.

(2) The measurement bandwidth is also dependant on the offset from the carrier frequency. The values in Table 37 should be used when appropriate.

(3) In accordance with the applicable clauses of Recommendation ITU-R SM.329.

(4) BTS receive band.

(5) BTS transmit band.

In the BTS receive band, the power measured with a filter and video bandwidth of 100 kHz, should be no more than that shown in Table 39.

TABLE 39

BTS receive-band spurious emission limits

BTS type	Limit (dBm)
Normal BTS	–98
Micro BTS M1	–96
Micro BTS M2	–91
Micro BTS M3	–86
Pico BTS P1	–80

NOTE 1 – These values assume a 30 dB coupling loss between transmitter and receiver. If BTSs of different classes are co-sited, the coupling loss must be increased by the difference between the corresponding values from Table 38.

2.1 Coexistence with other systems

This requirement provides for the protection of MS receivers served by the following GSM and 3G systems: GSM 900, DCS 1800, 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 40.

TABLE 40

Additional spurious emission requirements

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

NOTE 1 – The measurements are made on frequencies which are integer multiples of 200 kHz.

NOTE 2 – 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

The spurious emissions from a BTS receiver should be no more than the limits specified in Table 41.

TABLE 41

General receiver spurious emission requirements

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

Annex 5

IMT-2000 frequency division multiple access (FDMA)/TDMA (digital enhanced cordless telecommunications (DECT)

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 42.

TABLE 42

Emissions modulation

Emissions on RF channel Y	Measurement bandwidth	Maximum power level
Y = M ± 1	(1)	160 μW (–8 dBm)
Y = M ± 2	(1)	1 μW (–30 dBm)
Y = M ± 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 amplitude modulation (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 43.

TABLE 43

Emissions due to transmitter transients

Emissions on RF channel Y	Measurement bandwidth	Maximum power level
Y = M ± 1	(1)	250 µW (–6 dBm)
Y = M ± 2	(1)	40 µW (–14 dBm)
Y = M ± 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 shall 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 44. The requirements of Table 44 are only applicable for frequencies, which are greater than 12.5 MHz away from the centre frequency, f_c, of a carrier.

TABLE 44

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
fc – 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 base station 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 45.

TABLE 45

Receiver spurious emissions

Frequency band	Measurement bandwidth	Maximum level	Note
30 MHz ≤ f < 1 GHz	100 kHz(1)	–57 dBm	
1 GHz ≤ f ≤ 12.75 GHz	1 MHz(1)	–47 dBm	With the exception of the frequencies within the DECT band, covered by Table 46

(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 46.

TABLE 46

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 effective radiated power (e.r.p.) should be less than 20 nW;
- in up to two bands of 30 kHz, the maximum e.r.p. shall be less than 250 nW.

Annex 6

IMT-2000 OFDMA TDD WMAN base stations

1 Introduction

This Annex identifies unwanted emission limits for IMT-2000 OFDMA TDD WMAN base stations.

2 Spectrum emission mask

The spectrum emission mask of base stations applies to frequency offsets between 2.5 MHz and 12.5 MHz away from the base station centre frequency for the 5 MHz carrier and between 5 MHz and 25 MHz away from the base station centre frequency for the 10 MHz carrier. Δf is defined as the frequency offset in MHz from the channel centre frequency.

TABLE 47

Spectrum emission mask for 5 MHz carrier – generic

Frequency offset from centre	Allowed emission level	Measurement bandwidth
$2.5 \le \Delta f < 3.5$ MHz	−13 dBm	50 kHz
$3.5 \le \Delta f < 12.5$ MHz	−13 dBm	1 MHz

TABLE 48

Spectrum emission mask for 10 MHz carrier – generic

Frequency offset from centre	Allowed emission level	Measurement bandwidth
$5 \le \Delta f < 6$ MHz	−13 dBm	100 kHz
$6 \le \Delta f < 25$ MHz	−13 dBm	1 MHz

TABLE 49

Adjacent channel leakage power – Japan

Channel size	Measurement frequency range (MHz)	Allowed adjacent channel leakage power (dBm)
5 MHz	$2.6 < \Delta f < 7.4$	7
10 MHz	$5.25 < \Delta f < 14.75$	3

TABLE 50

Spectrum emission mask for 5 MHz carrier – Japan

Frequency Offset from centre	Allowed emission level	Measurement bandwidth
7.5 MHz ≤ Δf < 12.25	−15−1.4 × (Δf −7.5) dBm	1 MHz
12.25 ≤ Δf < 22.5 MHz	−22 dBm	1 MHz

NOTE – The adjacent channel leakage power for the 5 MHz channel from 2.6 MHz to 7.4 MHz is shown in Table 49.

TABLE 51

Spectrum emission mask for 10 MHz carrier – Japan

Frequency offset from centre	Allowed emission level	Measurement bandwidth
15 ≤ Δf < 25 MHz	−22 dBm	1 MHz

NOTE – The adjacent channel leakage power for the 10 MHz channel from 5.25 MHz to 14.75 MHz is shown in Table 49.

3 Transmitter spurious emissions (conducted)

3.1 Transmitter spurious emissions

IMT-2000 OFDMA TDD WMAN base stations comply with the limits recommended in Recommendation ITU-R SM.329-10. The limits shown in Tables 52 and 53 are only applicable for frequency offsets which are greater than 12.5 MHz away from the base station centre frequency for the 5 MHz carrier and greater than 25 MHz for the 10 MHz carrier. f is the frequency of the spurious domain emissions. f_c is the base station centre frequency.

The emission levels in Table 52 should be met in areas where Category A limits for spurious emissions, as defined in Recommendation ITU-R SM.329-10, are applicable. The emission levels in Table 53 should be met in areas where Category B limits for spurious emissions, as defined in Recommendation ITU-R SM.329-10, are applicable.

TABLE 52

Base station spurious emission limit, Category A

Band	Allowed emission level	Measurement bandwidth	Note
30 MHz-1 GHz	−13 dBm	100 kHz	Bandwidth as in Recommendation ITU-R SM.329-10, § 4.1
1 GHz-13.45 GHz		1 MHz	Upper frequency as in Recommendation ITU-R SM.329-10, § 2.5, Table 1

TABLE 53

Base station spurious emissions limit, Category B

Band	Measurement bandwidth		Allowed emission level
30 MHz ≤ f < 1 000 MHz	100 kHz		–36 dBm
1 GHz ≤ f < 13.45 GHz	30 kHz	If 2.5 × BW <= | $f_c - f$ | < 10 × BW	–30 dBm
	300 kHz	If 10 × BW <= | $f_c - f$ | < 12 × BW	
	1 MHz	If 12 × BW <= | $f_c - f$ |	

TABLE 54

Base station spurious emission limit, Japan

Frequency bandwidth	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	−13
1 000 MHz ≤ f < 2 505 MHz	1 MHz	−13
2 505 MHz ≤ f < 2 535 MHz	1 MHz	−42
2 535 MHz ≤ f < 2 630 MHz	1 MHz	−13[(1)]
2 630 MHz ≤ f < 2 634.75 MHz	1 MHz	−15 − 7/5 × (f −2 629.75)
2 634.75 MHz ≤ f < 2 655 MHz	1 MHz	−22
2 655 MHz ≤ f	1 MHz	−13

(1) The allowed emission level for the frequency band between 2 535 MHz and 2 630 MHz shall be applied for the frequency range greater than 2.5 times the channel size from the centre frequency.

3.2 Coexistence with other systems in the same geographical/service area

These requirements may be applied for the protection of UE, MS and/or BS operating in other frequency bands in the same geographical area. The requirements may apply in geographical/service areas as applicable in which both OFDMA-TDD-WMAN and a system operating in another frequency band than the OFDMA-TDD-WMAN operating band are deployed. The systems operating in the other frequency band may be GSM900, DCS1800, PCS1900, GSM850, PHS, UTRA-TDD (3.84 Mchip/s, 7.68 Mchip/s, 1.28 Mchip/s options) and UTRA-FDD.

The power of any spurious emission should not exceed the limits of Table 57 for a BS where requirements for coexistence with the system listed in the first column apply.

TABLE 55

BS spurious emission limits for OFDMA-TDD-WMAN BS in geographic coverage area of systems operating in other frequency bands

System type operating in the same geographical area	Band for coexistence requirement	Maximum level	Measurement bandwidth	Note
GSM900	921-960 MHz	−57 dBm	100 kHz	
	876-915 MHz	−61 dBm	100 kHz	
DCS1800	1 805-1 880 MHz	−47 dBm	100 kHz	
	1 710-1 785 MHz	−61 dBm	100 kHz	
PCS1900	1 930-1 990 MHz	−47 dBm	100 kHz	
	1 850-1 910 MHz	−61 dBm	100 kHz	
GSM850	869-894 MHz	−57 dBm	100 kHz	
	824-849 MHz	−61 dBm	100 kHz	
PHS	1 884.5-1 919.6 MHz	–41 dBm	300 kHz	
FDD Band I	2 110-2 170 MHz	−52 dBm	1 MHz	
	1 920-1 980 MHz	−49 dBm	1 MHz	
FDD Band II	1 930-1 990 MHz	−52 dBm	1 MHz	
	1 850-1 910 MHz	−49 dBm	1 MHz	
FDD Band III	1 805-1 880 MHz	−52 dBm	1 MHz	
	1 710-1 785 MHz	−49 dBm	1 MHz	
FDD Band IV	2 110-2 155 MHz	−52 dBm	1 MHz	
	1 710-1 755 MHz	−49 dBm	1 MHz	
FDD Band V	869-894 MHz	−52 dBm	1 MHz	
	824-849 MHz	−49 dBm	1 MHz	
FDD Band VI	860-895 MHz	−52 dBm	1 MHz	
	815-850 MHz	−49 dBm	1 MHz	
FDD Band VII	2 620-2 690 MHz	−52 dBm	1 MHz	This requirement does not apply to IP-OFDMA TDD WMAN operating in Band VII
	2 500-2 570 MHz	−49 dBm	1 MHz	This requirement does not apply to IP-OFDMA TDD WMAN operating in Band VII
FDD Band VIII	925-960 MHz	−52 dBm	1 MHz	
	880-915 MHz	−49 dBm	1 MHz	

TABLE 55 (*end*)

System type operating in the same geographical area	Band for coexistence requirement	Maximum level	Measurement bandwidth	Note
FDD Band IX	1 844.9-1 879.9 MHz	−52 dBm	1 MHz	
	1 749.9-1 784.9 MHz	−49 dBm	1 MHz	
FDD Band X	2 110-2 170 MHz	−52 dBm	1 MHz	
	1 710-1 770 MHz	−49 dBm	1 MHz	
UTRA-TDD	1 900-1 920 MHz	–52 dBm	1 MHz	
	2 010-2 025 MHz	–52 dBm	1 MHz	
	2 300-2 400 MHz	–52 dBm	1 MHz	
	2 570-2 610 MHz	–52 dBm	1 MHz	This requirement does not apply to OFDMA TDD WMAN operating in the Band 2 500-2 690 MHz

NOTE 1 – The values in this Table are considered as preliminary values only, and are subject to further study that could lead to a revision of this Recommendation.

4 Receiver spurious emissions (conducted)

The receiver spurious emissions in Table 56 are applied in Japan.

TABLE 56

Receiver spurious emission requirements

Frequency band	Total allowed emission level (dBm)
$f < 1$ GHz	–54
1 GHz ≤ f	–47

5 Adjacent channel leakage ratio (ACLR)

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.

5.1 Inter-system and intra-system scenarios

There are two specific coexistence requirements that must be considered; the intra-system and inter-system. In this section only the following scenarios are considered:

– OFDMA TDD WMAN adjacent to OFDMA TDD WMAN within the same network;

– OFDMA TDD WMAN adjacent to UTRA technologies, which might operate using FDD or unsynchronized TDD techniques. The ACLR in this case also takes into account the boundary coexistence conditions between an OFDMA TDD WMAN system and a UTRA system, which could happen in the case of deployments in adjacently assigned spectrum blocks.

In this text, only one inter-system scenario is discussed, that pertaining to UTRA. Two classes of ACLR figures are defined in this Annex to describe the two relevant scenarios as follows:

Intra-system scenario: A classification that identifies a level of minimum required ACLR performance generally appropriate for intra-system operation in contiguous channel assignments within the same network, i.e. OFDMA TDD WMAN adjacent to OFDMA TDD WMAN. In this Annex, intra-system ACLR is based on the following receiver bandwidths with the OFDMA TDD WMAN system operated on-channel and adjacent channel:

– 4.75 MHz for a 5 MHz channelized system, and

– 9.5 MHz for a 10 MHz channelized system.

UTRA scenario: A classification that identifies a level of minimum required ACLR performance appropriate for more demanding interoperator/coexistence scenarios at adjacent frequency block boundaries.

The following receiver bandwidths are assumed for the UTRA system.

– 3.84 MHz for a 5 MHz channelized system, and

– 7.68 MHz for a 10 MHz channelized system.

In each scenario, 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 the two relevant scenarios are provided in the following Tables.

TABLE 57

a) BS ACLR for 5 MHz channel bandwidth – intra-system scenario

Adjacent channel centre frequency	Minimum required ACLR (dB)
BS channel centre frequency ± 5 MHz	45
BS channel centre frequency ± 10 MHz	55

TABLE 57 (*end*)

b) BS ACLR for 5 MHz channel bandwidth – UTRA scenario

Adjacent channel centre frequency	Minimum required ACLR (dB)
BS channel centre frequency ± 5 MHz	53.5
BS channel centre frequency ± 10 MHz	66

c) BS ACLR for 10 MHz channel bandwidth – intra-system scenario

Adjacent channel centre frequency	Minimum required ACLR (dB)
BS channel centre frequency ± 10.0 MHz	45
BS channel centre frequency ± 20.0 MHz	55

d) BS ACLR for 10 MHz channel bandwidth –UTRA scenario

Adjacent channel centre frequency	Minimum required ACLR (dB)
BS channel centre frequency ± 10.0 MHz	53.5
BS channel centre frequency ± 20.0 MHz	66

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

NOTE 1 – Further study is necessary for other systems wherever applicable, as well as the relationship between ACLR and the emission mask.