RECOMMENDATION ITU-R M.1580*, **

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

(Question ITU-R 229/8)

(2002)

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.

** *Note by the BR Secretariat* – Tables 1 to 4, 16 and 17 in this Recommendation were amended editorially in February 2004.

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) existing current national and regional unwanted emission limits have been taken into account, however some administrations have yet to define unwanted emission limits for IMT-2000 systems and will need to be taken into consideration,

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 5 which correspond to the radio interface specifications described in § 5.1 to 5.5 of Recommendation ITU-R M.1457.

NOTE 1 – The unwanted emission limits are only 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.

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)) 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 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:

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

  – Δf_{max} is equal to $\text{f\_offset}_{\text{max}}$ 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	Maximum level	Measurement bandwidth
$2.5 \leq \Delta f < 2.7$ MHz	2.515 MHz ≤ f_offset < 2.715 MHz	–12.5 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	30 kHz
	3.515 MHz ≤ f_offset < 4.0 MHz	–24.5 dBm	30 kHz
$3.5 \leq \Delta f < 7.5$ MHz	4.0 MHz ≤ f_offset < 8.0 MHz	–11.5 dBm	1 MHz
$7.5 \leq \Delta f$ MHz	8.0 MHz ≤ f_offset < $\text{f\_offset}_{\text{max}}$	–11.5 dBm	1 MHz

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	Maximum level	Measurement bandwidth
$2.5 \leq \Delta f < 2.7$ MHz	2.515 MHz ≤ f_offset < 2.715 MHz	–12.5 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	30 kHz
	3.515 MHz ≤ f_offset < 4.0 MHz	–24.5 dBm	30 kHz
$3.5 \leq \Delta f < 7.5$ MHz	4.0 MHz ≤ f_offset < 8.0 MHz	–11.5 dBm	1 MHz
$7.5 \leq \Delta f$ MHz	8.0 MHz ≤ f_offset < $\text{f\_offset}_{\text{max}}$	P – 54.5 dBm	1 MHz

TABLE 3

Spectrum emission mask values, BS maximum output power $31 \leq P < 39$ dBm

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
$2.5 \leq \Delta f < 2.7$ MHz	2.515 MHz ≤ f_offset < 2.715 MHz	P – 51.5 dBm	30 kHz
$2.7 \leq \Delta f < 3.5$ MHz	2.715 MHz ≤ f_offset < 3.515 MHz	P – 51.5 – 15 · (f_offset – 2.715) dBm	30 kHz
	3.515 MHz ≤ f_offset < 4.0 MHz	P – 63.5 dBm	30 kHz
$3.5 \leq \Delta f < 7.5$ MHz	4.0 MHz ≤ f_offset < 8.0 MHz	P – 50.5 dBm	1 MHz
$7.5 \leq \Delta f$ MHz	8.0 MHz ≤ f_offset < f_offset_{max}	P – 54.5 dBm	1 MHz

TABLE 4

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	Measurement bandwidth
$2.5 \leq \Delta f < 2.7$ MHz	2.515 MHz ≤ f_offset < 2.715 MHz	–20.5 dBm	30 kHz
$2.7 \leq \Delta f < 3.5$ 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
$3.5 \leq \Delta f < 7.5$ MHz	4.0 MHz ≤ f_offset < 8.0 MHz	–19.5 dBm	1 MHz
$7.5 \leq \Delta f$ MHz	8.0 MHz ≤ f_offset < f_offset_{max}	–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

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.).

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 Tables 6a) and 6b).

TABLE 6

a) 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

TABLE 6 (*end*)

b) Spurious emission limits for coexistence with other services in addition to Category A limits in areas where a personal handyphone system (PHS) is deployed

Band	Measurement bandwidth	Maximum level	Note
1 893.5 to 1 919.6 MHz	300 kHz	–41 dBm	PHS

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 spurious emission limits, 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 ↔ Fc1 – 60 MHz or 2 100 MHz whichever is the higher	–30 dBm	1 MHz	(1)
Fc1 – 60 MHz or 2 100 MHz whichever is the higher ↔ Fc1 – 50 MHz or 2 100 MHz whichever is the higher	–25 dBm	1 MHz	(2)
Fc1 – 50 MHz or 2 100 MHz whichever is the higher ↔ Fc2 + 50 MHz or 2 180 MHz whichever is the lower	–15 dBm	1 MHz	(2)
Fc2 + 50 MHz or 2 180 MHz whichever is the lower ↔ Fc2 + 60 MHz or 2 180 MHz whichever is the lower	–25 dBm	1 MHz	(2)
Fc2 + 60 MHz or 2 180 MHz whichever is the lower ↔ 12.75 GHz	–30 dBm	1 MHz	(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) Bandwidth as in Recommendation ITU-R SM.329, § 4.1. Upper frequency as in Recommendation ITU-R SM.329, § 2.5 Table 1.

Fc1: Centre frequency of first carrier frequency used by the BS.

Fc2: Centre frequency of last carrier frequency used by the BS.

TABLE 7 (*end*)

b) Spurious emission limits for coexistence with other services in addition to Category B limits

Band	Measurement bandwidth	Maximum level	Note
921 to 960 MHz	100 kHz	–57 dBm	Protection of GSM 900 MS receiver
1 805 to 1 880 MHz	100 kHz	–47 dBm	Protection of DCS 1800 MS receiver
2 100 to 2 105 MHz	1 MHz	–30 + 3.4 (f – 2 100 MHz) dBm	Protection of services in bands adjacent to the band 2 110-2 170 MHz in geographic areas where both an adjacent band service and UTRA are deployed
2 175 to 2 180 MHz	1 MHz	–30 + 3.4 (2 180 MHz – f) dBm	
1 900 to 1 920 MHz	1 MHz	–52 dBm	Protection of UTRA-TDD receiver
2 010 to 2 025 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 Table 8.

TABLE 8

Receiver spurious emission limits

Band	Maximum level	Measurement bandwidth	Note
1 900-1 980 MHz and 2 010-2 025 MHz	–78 dBm	3.84 MHz	
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

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 9. 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 9

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 10a) and 10b).

TABLE 10

a) BS spurious emission limits, Category A

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

TABLE 10 (*end*)

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 11a) and 11b). The emission limits in Table 11a) should be met when transmitting on all RF carriers supported by the BS. The emission limits in Table 11b) 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 11

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 12 and 13.

TABLE 12

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 13, for which additional receiver spurious emission requirements apply

TABLE 13

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

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 14 to 17 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), 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 14 to 17 for the appropriate BS rated output power.

TABLE 14

Test requirements for spectrum emission mask values, BS rated output power ≥ 43 dBm

Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2.515 MHz ≤ f_offset < 2.715 MHz	–12.5 dBm	30 kHz
2.715 MHz ≤ f_offset < 3.515 MHz	–12.5 – 15 · (f_offset – 2.715) dBm	30 kHz
3.515 MHz ≤ f_offset < 4.0 MHz	–24.5 dBm	30 kHz
4.0 MHz ≤ f_offset < 8.0 MHz	–11.5 dBm	1 MHz
8.0 MHz ≤ f_offset < f_offset_{max}	–11.5 dBm	1 MHz

TABLE 15

Test requirements for spectrum emission mask values, BS rated output power 39 ≤ *P* < 43 dBm

Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2.515 MHz ≤ f_offset < 2.715 MHz	–12.5 dBm	30 kHz
2.715 MHz ≤ f_offset < 3.515 MHz	–12.5 – 15 · (f_offset – 2.715) dBm	30 kHz
3.515 MHz ≤ f_offset < 4.0 MHz	–24.5 dBm	30 kHz
4.0 MHz ≤ f_offset < 8.0 MHz	–11.5 dBm	1 MHz
8.0 MHz ≤ f_offset < f_offset_{max}	*P* – 54.5 dBm	1 MHz

TABLE 16

Test requirements for spectrum emission mask values, BS rated output power 31 ≤ *P* < 39 dBm

Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2.515 MHz ≤ f_offset < 2.715 MHz	*P* – 51.5 dBm	30 kHz
2.715 MHz ≤ f_offset < 3.515 MHz	*P* – 51.5 – 15 · (f_offset – 2.715) dBm	30 kHz
3.515 MHz ≤ f_offset < 4.0 MHz	*P* – 63.5 dBm	30 kHz
4.0 MHz ≤ f_offset < 8.0 MHz	*P* – 50.5 dBm	1 MHz
8.0 MHz ≤ f_offset < f_offset_{max}	*P* – 54.5 dBm	1 MHz

TABLE 17

Test requirements for spectrum emission mask values, BS rated output power *P* < 31 dBm

Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2.515 MHz ≤ f_offset < 2.715 MHz	–20.5 dBm	30 kHz
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
4.0 MHz ≤ f_offset < 8.0 MHz	–19.5 dBm	1 MHz
8.0 MHz ≤ f_offset < f_offset_{max}	–23.5 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 should be equal to or greater than the limits given in Tables 18a) and 18b).

TABLE 18

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

BS adjacent channel offset (MHz)	ACLR limit (dB)
± 5	44.2
± 10	54.2

TABLE 18 (*end*)

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

BS adjacent channel offset (MHz)	ACLR limit (dB)
± 1.6	39.2
± 3.2	49.2

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.

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 19a).

TABLE 19

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, § 2.5 Table 1

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 19b), 19c) and 20.

TABLE 19 (*continued*)

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

Band	Maximum level	Measurement bandwidth	Notes
9 ↔ 150kHz	–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 ↔ Fc2 + 50 MHz or Fu + 10 MHz whichever is the lower	–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)

(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.

TABLE 19 (*end*)

c) 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 – 3.2 MHz whichever is the higher	–30 dBm	1 MHz	(1)
Fc1 – 19.2 MHz or Fl – 3.2 MHz whichever is the higher ↔ Fc1 – 16 MHz or Fl – 3.2 MHz whichever is the higher	–25 dBm	1 MHz	(2)
Fc1 – 16 MHz or Fl – 3.2 MHz whichever is the higher ↔ Fc1 + 16 MHz or Fl + 3.2 MHz whichever is the lower	–15 dBm	1 MHz	(2)
Fc1 + 16 MHz or Fl + 3.2 MHz whichever is the lower ↔ Fc1 + 19.2 MHz or Fl + 3.2 MHz whichever is the lower	–25 dBm	1 MHz	(2)
Fc1 + 19.2 MHz or Fl + 3.2 MHz whichever is the lower ↔ 12.5 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.

TABLE 20

Spurious emission limits for coexistence with other services in addition to Category B limits

Band	Measurement bandwidth	Maximum level	Note
921 to 960 MHz	100 kHz	–57 dBm	Protection of GSM 900 MS receiver
1 805 to 1 880 MHz	100 kHz	–47 dBm	Protection of DCS 1800 MS receiver
2 100 to 2 105 MHz	1 MHz	–30 + 3.4 (f – 2 100 MHz) dBm	Protection of services in bands adjacent to the band 2 110-2 170 MHz in geographic areas where both an adjacent band service and UTRA are deployed
2 175 to 2 180 MHz	1 MHz	–30 + 3.4 (2 180 MHz – f) dBm	
1 920 to 1 980 MHz	1 MHz	–32 dBm	Protection of UTRA-FDD receiver
2 110 to 2 170 MHz	1 MHz	–52 dBm	

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 Tables 21a) and 21b).

TABLE 21

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

Band	Maximum level	Measurement bandwidth	Note
30 MHz-1 GHz	–57 dBm	100 kHz	–
1-1.9 GHz	–47 dBm	1 MHz	(1)
1 900-1 980 MHz	–78 dBm	3.84 MHz	(1)
1 980-2 010 MHz	–47 dBm	1 MHz	(1)
2 010-2 025 MHz	–78 dBm	3.84 MHz	(1)
2 025 MHz-12.75 GHz	–47 dBm	1 MHz	(1)

(1) 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 21 (*end*)

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

Band	Maximum level	Measurement bandwidth	Note
30 MHz-1 GHz	–57 dBm	100 kHz	–
1-1.9 GHz	–47 dBm	1 MHz	(1)
1 900-1 980 MHz	–83 dBm	1.28 MHz	(1)
1 980-2 010 MHz	–47 dBm	1 MHz	(1)
2 010-2 025 MHz	–83 dBm	1.28 MHz	(1)
2 025 MHz-12.75 GHz	–47 dBm	1 MHz	(1)

(1) 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.

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 22.

TABLE 22

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 23a).

TABLE 23

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 23b) and 24.

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 24.

TABLE 24

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 25 and 26.

TABLE 25

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 26, for which additional receiver spurious emission requirements apply

TABLE 26

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 27 to 29. 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 27 through 29, 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 27

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 28

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 29

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 27 through 29 is tighter than the limit given in Tables 30 and 31, the latter should be applied instead.

TABLE 30

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

TABLE 31

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 32, or –36 dBm, whichever is the higher.

TABLE 32

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 33 and 34, 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 33

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 34

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 35.

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

TABLE 35

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 36	See Table 36	(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 33)	(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 34 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 36.

TABLE 36

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 35.

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 37.

TABLE 37

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 38.

TABLE 38

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 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 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 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 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 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 $\leq f <$ 1 000 MHz	–36 dBm/100 kHz
1 GHz $\leq f <$ 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 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 42.

TABLE 42

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 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 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.