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Radiocommunication Sector of ITU

Recommendation ITU-R M.2070-1
(02/2017)

**Generic unwanted emission characteristic of
base stations using the terrestrial radio
interfaces of IMT-Advanced**

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

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RECOMMENDATION ITU-R M.2070-1

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

(Question ITU-R 229-3/5)

(2015-2017)

Scope

This Recommendation provides the generic unwanted emission characteristics of base stations using the terrestrial radio interfaces of IMT-Advanced. The information about unwanted emissions included in this Recommendation could also be used as guidance by Administrations for cases not specifically covered herein. Implementation of characteristics of base stations using the terrestrial radio interfaces of IMT-Advanced in any of the bands included in this Recommendation is subject to compliance with the Radio Regulations.

Keywords

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

The ITU Radiocommunication Assembly,

considering

- a) that unwanted emissions consist of both spurious and out-of-band (OoB) emissions according to No. **1.146** of the Radio Regulations (RR) and that spurious and OoB emissions are defined in RR Nos **1.145** and **1.144**, respectively;
- b) that limitation of the maximum permitted levels of unwanted emissions of IMT-Advanced 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-Advanced 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 all radio interfaces;
- g) that Recommendation ITU-R SM.1541 relating to OoB emission specifies generic limits in the OoB domain which generally constitute the least restrictive OoB emission limits and encourages the development of more specific limits for each system;
- h) that the levels of spurious emissions of IMT-Advanced BS shall comply with the limits specified in RR Appendix 3;
- i) 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;
- j) 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;
- k) that the technology used by a system and its conformance with the recommended specifications and standards in Recommendation ITU-R M.2012 defines that system as IMT-Advanced regardless of the frequency band of operation,

noting

- a) the work carried out by standardization bodies to define limits to protect other radio systems and services from interference and to enable coexistence between different technologies;
- b) that IMT-Advanced 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) that the notes and annexes of this Recommendation – being based on the ongoing work in standardization bodies – in order to reflect the wide applicability of IMT-Advanced technologies and to maintain consistency with the technology specifications, may contain material which reflects information related to the technology applications in bands other than those identified for IMT,

noting further

- 1 that there are ongoing studies within ITU-R regarding the protection of other services from unwanted emissions of IMT-Advanced stations to address further cases of compatibility,

recommends

- 1 that the unwanted emission characteristics of IMT-Advanced base stations should be based on the limits contained in the technology specified in Annexes 1 and 2 which correspond to the terrestrial radio interface specifications referenced in *recommends* 1 of Recommendation ITU-R M.2012;
- 2 that the unwanted emission characteristics of IMT-Advanced base stations in Annexes 1 and 2 should apply in Regions and countries in which corresponding bands are identified for IMT in the Radio Regulations**.

Annex 1: LTE-Advanced¹

Annex 2: WirelessMAN-Advanced²

Annex 1

LTE-Advanced

The present Annex includes unwanted emission requirements from E-UTRA carriers for E-UTRA and multi standard radio (MSR) base stations.

An E-UTRA base station is characterized by the ability of its receiver and transmitter to process only E-UTRA carriers.

** In other cases the unwanted emission characteristics of IMT-Advanced base stations in Annexes 1 and 2 are provided for information. Administrations may choose to apply the unwanted characteristics in Annexes 1 and 2 for the bands not identified for IMT at their national level.

¹ Developed by 3GPP as LTE Release 10 and Beyond (LTE-Advanced).

² Developed by IEEE as the WirelessMAN-Advanced specification incorporated in IEEE Std. 802.16 beginning with approval of IEEE Std 802.16m.

An MSR base station is characterized by the ability of its receiver and transmitter to process two or more carriers in common active RF components simultaneously in a declared RF bandwidth, where at least one carrier is of a different Radio Access Technology (RAT) than the other carrier(s).

This Annex is divided into three parts:

- Chapter 1 specifies the operating bands for which the requirements in the present Annex apply.
- Chapter 2.1 and Chapter 2.2 specifies definitions, symbols and abbreviations.
- Chapter 2.3 ff. includes the E-UTRA BS unwanted emission requirements.
- Chapter 3 includes the MSR BS unwanted emission requirements.

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

1 Operating bands

The unwanted emission limits defined in the present Annex are for MSR or E-UTRA BS operating at least one of the bands in Table 1-1 or Table 1-2:

TABLE 1-1

Paired bands in E-UTRA, UTRA and GSM/EDGE

MSR and E-UTRA band number (Note 1)	UTRA band number	GSM/EDGE band designation	Uplink (UL) BS receive UE transmit	Downlink (DL) BS transmit UE receive	Band category (Note 2)
1	I	–	1920 MHz – 1980 MHz	2110 MHz – 2170 MHz	1
2	II	PCS 1900	1850 MHz – 1910 MHz	1930 MHz – 1990 MHz	2
3	III	DCS 1800	1710 MHz – 1785 MHz	1805 MHz – 1880 MHz	2
4	IV	–	1710 MHz – 1755 MHz	2110 MHz – 2155 MHz	1
5	V	GSM 850	824 MHz – 849 MHz	869 MHz – 894 MHz	2
6 ⁽¹⁾	VI	–	830 MHz – 840 MHz	875 MHz – 885 MHz	1 ⁽¹⁾
7	VII	–	2500 MHz – 2570 MHz	2620 MHz – 2690 MHz	1
8	VIII	E-GSM	880 MHz – 915 MHz	925 MHz – 960 MHz	2
9	IX	–	1749.9 MHz – 1784.9 MHz	1844.9 MHz – 1879.9 MHz	1
10	X	–	1710 MHz – 1770 MHz	2110 MHz – 2170 MHz	1
11	XI	–	1427.9 MHz – 1447.9 MHz	1475.9 MHz – 1495.9 MHz	1
12	XII	–	699 MHz – 716 MHz	729 MHz – 746 MHz	1
13	XIII	–	777 MHz – 787 MHz	746 MHz – 756 MHz	1
14	XIV	–	788 MHz – 798 MHz	758 MHz – 768 MHz	1
15	XV	–	Reserved	Reserved	
16	XVI	–	Reserved	Reserved	
17	–	–	704 MHz – 716 MHz	734 MHz – 746 MHz	1 ⁽²⁾
18	–	–	815 MHz – 830 MHz	860 MHz – 875 MHz	1 ⁽²⁾
19	XIX	–	830 MHz – 845 MHz	875 MHz – 890 MHz	1
20	XX	–	832 MHz – 862 MHz	791 MHz – 821 MHz	1
21	XXI	–	1447.9 MHz – 1462.9 MHz	1495.9 MHz – 1510.9 MHz	1
22	XXII	–	3410 MHz – 3490 MHz	3510 MHz – 3590 MHz	1
23	–	–	2000 MHz – 2020 MHz	2180 MHz – 2200 MHz	1 ⁽²⁾
24#	–	–	1626.5 MHz – 1660.5 MHz	1525 MHz – 1559 MHz	1 ⁽²⁾
25	XXV	–	1850 MHz – 1915 MHz	1930 MHz – 1995 MHz	1
26	XXVI	–	814 MHz – 849 MHz	859 MHz – 894 MHz	1
27	–	–	807 MHz – 824 MHz	852 MHz – 869 MHz	1 ⁽²⁾

TABLE 1-1 (*end*)

MSR and E-UTRA band number (Note 1)	UTRA band number	GSM/EDGE band designation	Uplink (UL) BS receive UE transmit	Downlink (DL) BS transmit UE receive	Band category (Note 2)
28	–	–	703 MHz – 748 MHz	758 MHz – 803 MHz	1 ⁽²⁾
29	–	–	N/A	717 MHz – 728 MHz	1 ^(2, 3)
30	–	–	2305 MHz–2315 MHz	2350 MHz – 2360 MHz	1 ⁽²⁾
31	–	–	452.5 MHz–457.5 MHz	462.5 – 467.5 MHz	1 ⁽²⁾
32	XXXII	–	N/A	1452 MHz – 1496 MHz	1 ^(3, 4)

⁽¹⁾ The band is for UTRA only.

⁽²⁾ The band is for E-UTRA only.

⁽³⁾ Restricted to E-UTRA operation when carrier aggregation is configured. The downlink operating band is paired with the uplink operating band (external) of the carrier aggregation configuration that is supporting the configured Primary Cell (Pcell): the cell, operating on the primary frequency, in which the UE either performs the initial connection establishment procedure or initiates the connection re-establishment procedure, or the cell indicated as the primary cell in the handover procedure.

⁽⁴⁾ Restricted to UTRA operation when dual band is configured (e.g., DB-DC-HSDPA or dual band 4C-HSDPA). The down link frequenc(ies) of this band are paired with the uplink frequenc(ies) of the other FDD band (external) of the dual band configuration.

NOTE 1 – All frequency bands or parts of the bands referenced in this Recommendation which are not identified for IMT in the ITU Radio Regulations have been marked with “#”.

NOTE 2 – Band Category 1 (BC1): Bands for E-UTRA FDD and UTRA FDD operation.

– Band Category 2 (BC2): Bands for E-UTRA FDD, UTRA FDD and GSM/EDGE operation.

– Band Category 3 (BC3): Bands for E-UTRA TDD and UTRA TDD operation.

TABLE 1-2

Unpaired bands in E-UTRA and UTRA

MSR and E-UTRA band number	UTRA band number	Uplink (UL) BS receive UE transmit	Downlink (DL) BS transmit UE receive	Band category (NOTE)
33	a)	1900 MHz – 1920 MHz	1900 MHz – 1920 MHz	3
34	a)	2010 MHz – 2025 MHz	2010 MHz – 2025 MHz	3
35	b)	1850 MHz – 1910 MHz	1850 MHz – 1910 MHz	3
36	b)	1930 MHz – 1990 MHz	1930 MHz – 1990 MHz	3
37	c)	1910 MHz – 1930 MHz	1910 MHz – 1930 MHz	3
38	d)	2570 MHz – 2620 MHz	2570 MHz – 2620 MHz	3
39	f)	1880 MHz – 1920 MHz	1880 MHz – 1920 MHz	3
40	e)	2300 MHz – 2400 MHz	2300 MHz – 2400 MHz	3
41	–	2496 MHz – 2690 MHz	2496 MHz – 2690 MHz	3
42	–	3400 MHz – 3600 MHz	3400 MHz – 3600 MHz	3
43#	–	3600 MHz – 3800 MHz	3600 MHz – 3800 MHz	3
44	–	703 MHz – 803 MHz	703 MHz – 803 MHz	3

NOTE – Band Category 1 (BC1): Bands for E-UTRA FDD and UTRA FDD operation.

– Band Category 2 (BC2): Bands for E-UTRA FDD, UTRA FDD and GSM/EDGE operation.

– Band Category 3 (BC3): Bands for E-UTRA TDD and UTRA TDD operation.

The unwanted emission limits defined in the present Annex are for MSR or E-UTRA BS operating at least one of the intra-band contiguous carrier aggregation (CA) arrangements in Table 1-3:

TABLE 1-3

E-UTRA Intra-band contiguous CA bands

CA Band	E-UTRA operating band
CA_1	1
CA_2	2
CA_3	3
CA_7	7
CA_12	12
CA_23	23
CA_27	27
CA_38	38
CA_39	39
CA_40	40
CA_41	41
CA_42	42

The unwanted emission limits defined in the present Annex are for MSR or E-UTRA BS operating at least one of the intra-band non-contiguous CA arrangements in Table 1-4:

TABLE 1-4

E-UTRA Intra-band non-contiguous CA bands (with two sub-blocks)

CA Band	E-UTRA operating band
CA_2-2	2
CA_3-3	3
CA_4-4	4
CA_7-7	7
CA_23-23	23
CA_25-25	25
CA_41-41	41
CA_42-42	42

The unwanted emission limits defined in the present Annex are for MSR or E-UTRA BS operating at least one of the inter-band CA combinations in Table 1-5:

TABLE 1-5

E-UTRA Inter-band CA bands (two bands)

CA Band	E-UTRA operating bands
CA_1-3	1
	3
CA_1-5	1
	5
CA_1-7	1
	7
CA_1-8	1
	8
CA_1-11	1
	11
CA_1-18	1
	18
CA_1-19	1
	19
CA_1-20	1
	20
CA_1-21	1
	21
CA_1-26	1
	26
CA_1-28	1
	28
CA_1-41	1
	41
CA_1-42	1
	42
CA_2-4	2
	4
CA_2-4-4	2
	4
CA_2-5	2
	5
CA_2-2-5	2
	5

TABLE 1-5 (continued)

CA Band	E-UTRA operating bands
CA_2-12	2
	12
CA_2-13	2
	13
CA_2-2-13	2
	13
CA_2-17	2
	17
CA_2-29	2
	29
CA_2-30	2
	30
CA_3-5	3
	5
CA_3-7	3
	7
CA_3-8	3
	8
CA_3-19	3
	19
CA_3-20	3
	20
CA_3-26	3
	26
CA_3-27	3
	27
CA_3-28	3
	28
CA_4-5	4
	5
CA_4-4-5	4
	5
CA_4-7	4
	7

TABLE 1-5 (continued)

CA Band	E-UTRA operating bands
CA_4-4-7	4
	7
CA_4-12	4
	12
CA_4-4-12	4
	12
CA_4-13	4
	13
CA_4-4-13	4
	13
CA_4-17	4
	17
CA_4-27	4
	27
CA_4-29	4
	29
CA_4-30	4
	30
CA_5-7	5
	7
CA_5-12	5
	12
CA_5-13	5
	13
CA_5-17	5
	17
CA_5-25	5
	25
CA_5-30	5
	30
CA_7-8	7
	8
CA_7-12	7
	12

TABLE 1-5 (*end*)

CA Band	E-UTRA operating bands
CA_7-20	7
	20
CA_7-28	7
	28
CA_8-11	8
	11
CA_8-20	8
	20
CA_8-40	8
	40
CA_11-18	11
	18
CA_12-25	12
	25
CA_12-30	12
	30
CA_18-28	18
	28
CA_19-21	19
	21
CA_19-42	19
	42
CA_20-32	20
	32
CA_23-29	23
	29
CA_25-41	25
	41
CA_26-41	26
	41
CA_29-30	29
	30
CA_39-41	39
	41
CA_41-42	41
	42

The unwanted emission limits defined in the present Annex are for MSR or E-UTRA BS operating at least one of the inter-band CA combinations in Table 1-6:

TABLE 1-6
E-UTRA Inter-band CA bands (three bands)

CA Band	E-UTRA operating bands
CA_1-3-5	1
	3
	5
CA_1-3-8	1
	3
	8
CA_1-3-19	1
	3
	19
CA_1-3-20	1
	3
	20
CA_1-3-26	1
	3
	26
CA_1-5-7	1
	5
	7
CA_1-7-20	1
	7
	20
CA_1-18-28	1
	18
	28
CA_1-19-21	1
	19
	21
CA_2-4-5	2
	4
	5

TABLE 1-6 (continued)

CA Band	E-UTRA operating bands
CA_2-4-12	2
	4
	12
CA_2-4-13	2
	4
	13
CA_2-4-29	2
	4
	29
CA_2-5-12	2
	5
	12
CA_2-5-13	2
	5
	13
CA_2-5-30	2
	5
	30
CA_2-12-30	2
	12
	30
CA_2-29-30	2
	29
	30
CA_3-7-20	3
	7
	20
CA_4-5-12	4
	5
	12
CA_4-5-13	4
	5
	13

TABLE 1-6 (*end*)

CA Band	E-UTRA operating bands
CA_4-5-30	4
	5
	30
CA_4-7-12	4
	7
	12
CA_4-12-30	4
	12
	30
CA_4-29-30	4
	29
	30
CA_7-8-20	7
	8
	20

2 E-UTRA generic unwanted emission characteristics

2.1 Definitions

Aggregated channel bandwidth: the RF bandwidth in which a BS transmits and/or receives multiple contiguously aggregated carriers. The aggregated channel bandwidth is measured in MHz.

Base station RF bandwidth edge: the frequency of one of the edges of the base station RF bandwidth.

Base station RF bandwidth: the bandwidth in which a BS transmits and/or receives multiple carriers within a supported operating band.

Carrier: the modulated waveform conveying the E-UTRA or UTRA (WCDMA) physical channels.

Carrier aggregation: aggregation of two or more E-UTRA component carriers in order to support wider transmission bandwidths.

Carrier aggregation band: a set of one or more operating bands across which multiple carriers are aggregated with a specific set of technical requirements.

NOTE – Carrier aggregation band(s) for an E-UTRA BS is declared by the manufacturer.

Channel bandwidth: the RF bandwidth supporting a single E-UTRA RF carrier with the transmission bandwidth configured in the uplink or downlink of a cell. The channel bandwidth is measured in MHz and is used as a reference for transmitter and receiver RF requirements.

Channel edge: the lowest and highest frequency of the E-UTRA carrier, separated by the channel bandwidth.

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

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

Downlink operating band: the part of the operating band designated for downlink.

Highest carrier: the carrier with the highest carrier centre frequency transmitted/received in a specified operating band.

Inter RF bandwidth gap: the frequency gap between two consecutive RF bandwidths that are placed within two supported operating bands.

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

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

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

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

Lower edge: the lowest frequency in the base station RF bandwidth, or the lowest frequency in the channel bandwidth of a single E-UTRA carrier, used as a frequency reference point for transmitter and receiver requirements.

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

Lowest carrier: the carrier with the lowest carrier centre frequency transmitted/received in a specified operating band.

Maximum Base Station RF bandwidth: the maximum RF bandwidth supported by a BS within each supported operating band.

Maximum output power: the mean power level per carrier of the base station measured at the antenna connector in a specified reference condition.

Maximum radio bandwidth: maximum frequency difference between the upper edge of the highest used carrier and the lower edge of the lowest used carrier.

Mean power: when applied to E-UTRA transmission this is the power measured in the channel bandwidth of the carrier. The period of measurement shall be at least one subframe (1ms), unless otherwise stated.

Multi-band Base Station: Base Station characterized by the ability of its transmitter and/or receiver to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different non-overlapping operating band than the other carrier(s).

Multi-band transmitter: transmitter characterized by the ability to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different non-overlapping operating band than the other carrier(s).

Multi-band receiver: receiver characterized by the ability to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different non-overlapping operating band than the other carrier(s).

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

Occupied bandwidth: the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage $\beta/2$ of the total mean power of a given emission.

Operating band: a frequency range (paired or unpaired) that is defined with a specific set of technical requirements, in which E-UTRA operates.

NOTE – The operating band(s) for an E-UTRA BS is declared by the manufacturer according to the designations in Tables 1-1 and 1-2.

Output power: the mean power of one carrier of the base station, delivered to a load with resistance equal to the nominal load impedance of the transmitter.

Rated output power: rated output power of the base station is the mean power level per carrier that the manufacturer has declared to be available at the antenna connector.

Reference bandwidth: the bandwidth in which an emission level is specified.

RRC filtered mean power: the mean power as measured through a root raised cosine filter with roll-off factor α and a bandwidth equal to the chip rate of the radio access mode.

NOTE – The RRC filtered mean power of a perfectly modulated W-CDMA signal is 0.246 dB lower than the mean power of the same signal.

Sub-block: this is one contiguous allocated block of spectrum for use by the same base station. There may be multiple instances of sub-blocks within an RF bandwidth.

Sub-block bandwidth: the bandwidth of one sub-block.

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

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

Total RF bandwidth: maximum sum of RF bandwidths in all supported operating bands.

Transmission bandwidth: bandwidth of an instantaneous transmission from a UE or BS, measured in resource block units.

Transmission bandwidth configuration: the highest transmission bandwidth allowed for uplink or downlink in a given channel bandwidth, measured in resource block units.

Unsynchronized operation: operation of TDD in two different systems, where the conditions for synchronized operation are not met.

Uplink operating band: the part of the operating band designated for uplink.

Upper edge: the highest frequency in the base station RF Bandwidth or the highest frequency in the channel bandwidth of a single E-UTRA carrier; used as a frequency reference point for transmitter and receiver requirements.

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

2.2 Symbols and Abbreviations

2.2.1 Symbols

$BW_{Channel}$	Channel bandwidth
BWConfig	Transmission bandwidth configuration, expressed in MHz, where BWConfig = $NRB \times 180$ kHz in the uplink and BWConfig = 15 kHz + $NRB \times 180$ kHz in the downlink.
CA_X	Intra-band contiguous CA of component carriers in one sub-block within band X where X is the applicable E-UTRA operating band
CA_X-X	Intra-band non-contiguous CA of component carriers in two sub-blocks withinband X where X is the applicable E-UTRA operating band
CA_X-Y	Inter-band CA of component carrier(s) in one sub-blocks within band X and component carrier(s) in one sub-block withinband Y where X and Y are the applicable E-UTRA operating bands
CA_X-X-Y	CA of component carriers in two sub-blocks within Band X and component carrier(s) in one sub-block within Band Y where X and Y are the applicable E-UTRA operating bands
f	Frequency
Δf	Separation between the channel edge frequency and the nominal -3 dB point of the measuring filter closest to the carrier frequency
Δf_{max}	The largest value of Δf used for defining the requirement
F_{filter}	Filter centre frequency
f_{offset}	Separation between the channel edge frequency and the centre of the measuring filter
$f_{offset_{max}}$	The maximum value of f_{offset} used for defining the requirement
$F_{DL_{low}}$	The lowest frequency of the downlink operating band
$F_{DL_{high}}$	The highest frequency of the downlink operating band
$F_{UL_{low}}$	The lowest frequency of the uplink operating band
$F_{UL_{high}}$	The highest frequency of the uplink operating band
$P_{EM,N}$	Declared emission level for channel N
$P_{EM,B32,ind}$	Declared emission level in Band 32, ind=a, b, c, d, e
W_{gap}	Sub-block gap or inter RF bandwidth gap size

2.2.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

ACLR	Adjacent channel leakage ratio
ACK	Acknowledgement (in HARQ protocols)
ACS	Adjacent channel selectivity
AWGN	Additive white Gaussian noise
BS	Base station
C	Contiguous

CA	Carrier aggregation
CACLR	Cumulative ACLR
CP	Cyclic prefix
CRC	Cyclic redundancy check
CW	Continuous wave
DC	Direct current
DFT	Discrete Fourier transformation
DTT	Digital terrestrial television
DTX	Discontinuous transmission
DwPTS	Downlink part of the special subframe (for TDD operation)
EARFCN	E-UTRA Absolute radio frequency channel number
e.i.r.p.	Effective isotropic radiated power
EPA	Extended pedestrian A model
ETU	Extended typical urban model
E-UTRA	Evolved UTRA
EVA	Extended vehicular A model
EVM	Error vector magnitude
FDD	Frequency division duplex
FFT	Fast Fourier transformation
FRC	Fixed reference channel
GP	Guard period (for TDD operation)
HARQ	Hybrid automatic repeat request
ICS	In-channel selectivity
ITU-R	Radiocommunication Sector of the ITU
LA	Local area
LNA	Low noise amplifier
MC	Multi-carrier
MCS	Modulation and coding scheme
MR	Medium range
MSR	Multi standard radio
NC	Non-contiguous
OFDM	Orthogonal Frequency Division Multiplex
OoB	Out-of-band
PA	Power amplifier
PBCH	Physical broadcast channel
PDCCH	Physical downlink control channel

PDSCH	Physical downlink shared channel
PUSCH	Physical uplink shared channel
PUCCH	Physical uplink control channel
PRACH	Physical random access channel
QAM	Quadrature amplitude modulation
QPSK	Quadrature phase-shift keying
RAT	Radio access technology
RB	Resource block
RE	Resource element
RF	Radio frequency
RMS	Root mean square (value)
RS	Reference symbol
RRC	Root raised cosine
RX	Receiver
SNR	Signal-to-noise ratio
TA	Timing advance
TDD	Time division duplex
TX	Transmitter
UE	User equipment
UEM	Unwanted emission mark
WA	Wide area

2.3 Operating band unwanted emissions

Unless otherwise stated, the operating band unwanted emission limits are defined from 10 MHz below the lowest frequency of each supported downlink operating band up to 10 MHz above the highest frequency of each supported downlink operating band.

The requirements shall apply whatever the type of transmitter considered (single carrier, multi-carrier and/or CA) and for all transmission modes foreseen by the manufacturer's specification. In addition, for a BS operating in non-contiguous spectrum, the requirements apply inside any sub-block gap. In addition, for a BS operating in multiple bands, the requirements apply inside any inter RF bandwidth gap.

For BS capable of multi-band operation where multiple bands are mapped on separate antenna connectors, the single-band requirements apply and the cumulative evaluation of the emission limit in the inter RF bandwidth gap are not applicable.

The unwanted emission limits in the part of the downlink operating band that falls in the spurious domain are consistent with Recommendation ITU-R SM.329.

For a multicarrier E-UTRA BS or BS configured for intra-band contiguous or non-contiguous carrier aggregation the definitions above apply to the lower edge of the carrier transmitted at the lowest carrier frequency and the upper edge of the carrier transmitted at the highest carrier frequency within a specified operating band.

For wide area BS, the requirements of either § 2.3.1 (category A limits) or § 2.3.2 (category B limits) shall apply.

For local area BS, the requirements of § 2.3.2A shall apply (category A and B).

For home BS, the requirements of § 2.3.2B shall apply (category A and B).

For medium range BS, the requirements in § 2.3.2C shall apply (category A and B).

The application of either category A or category B limits shall be the same as for transmitter spurious emissions (mandatory requirements) in § 2.6.

For category B operating band unwanted emissions, there are two options for the limits that may be applied regionally. Either the limits in § 2.3.2.1 or § 2.3.2.2 shall be applied.

Emissions shall not exceed the maximum levels specified in the Tables below, where:

- Δf is the separation between the channel edge frequency and the nominal -3dB point of the measuring filter closest to the carrier frequency.
- f_{offset} is the separation between the channel edge frequency and the centre of the measuring filter.
- $f_{\text{offset}_{\text{max}}}$ is the offset to the frequency 10 MHz outside the downlink operating band.
- Δf_{max} is equal to $f_{\text{offset}_{\text{max}}}$ minus half of the bandwidth of the measuring filter.

For BS operating in multiple bands, inside any inter RF bandwidth gaps with $W_{\text{gap}} < 20\text{ MHz}$, emissions shall not exceed the cumulative sum of the test requirements specified at the RF bandwidth edges on each side of the inter RF bandwidth gap. The test requirement for RF bandwidth edge is specified in Tables 2.3.1-1 to 2.3.3-3 below, where in this case:

- Δf is the separation between the RF bandwidth edge frequency and the nominal -3 dB point of the measuring filter closest to the RF bandwidth edge.
- f_{offset} is the separation between the RF bandwidth edge frequency and the centre of the measuring filter.
- $f_{\text{offset}_{\text{max}}}$ is equal to the inter RF bandwidth gap divided by two.
- Δf_{max} is equal to $f_{\text{offset}_{\text{max}}}$ minus half of the bandwidth of the measuring filter.

In addition inside any sub-block gap for a BS operating in non-contiguous spectrum, measurement results shall not exceed the cumulative sum of the test requirements specified for the adjacent sub blocks on each side of the sub block gap. The test requirement for each sub block is specified in Tables 2.3.1-1 to 2.3.3-3 below, where in this case:

- Δf is the separation between the sub block edge frequency and the nominal -3 dB point of the measuring filter closest to the sub block edge.
- f_{offset} is the separation between the sub block edge frequency and the centre of the measuring filter.
- $f_{\text{offset}_{\text{max}}}$ is equal to the sub block gap bandwidth divided by two.
- Δf_{max} is equal to $f_{\text{offset}_{\text{max}}}$ minus half of the bandwidth of the measuring filter.

2.3.1 Operating band unwanted emissions for wide area BS (category A)

For E-UTRA BS operating in Bands 5, 6, 8, 12, 13, 14, 17, 18, 19, 26, 27, 28, 29, 31, 44 emissions shall not exceed the maximum levels specified in Tables 2.3.1-1 to 2.3.1-3.

TABLE 2.3.1-1

**Wide area BS operating band unwanted emission limits for 1.4 MHz channel bandwidth
(E-UTRA bands <1 GHz) for category A**

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 1.4 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 1.45 \text{ MHz}$	$+0.5\text{dBm} - \frac{10}{1.4} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{dB}$	100 kHz
$1.4 \text{ MHz} \leq \Delta f < 2.8 \text{ MHz}$	$1.45 \text{ MHz} \leq f_{\text{offset}} < 2.85 \text{ MHz}$	–9.5 dBm	100 kHz
$2.8 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$2.85 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	–13 dBm	100 kHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10 \text{ MHz}$ from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be –13 dBm/100 kHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.1-2

**Wide area BS operating band unwanted emission limits for 3 MHz channel bandwidth
(E-UTRA bands <1 GHz) for category A**

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 3 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 3.05 \text{ MHz}$	$-3.5\text{dBm} - \frac{10}{3} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{dB}$	100 kHz
$3 \text{ MHz} \leq \Delta f < 6 \text{ MHz}$	$3.05 \text{ MHz} \leq f_{\text{offset}} < 6.05 \text{ MHz}$	–13.5 dBm	100 kHz
$6 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$6.05 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	–13 dBm	100 kHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10 \text{ MHz}$ from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be –13 dBm/100 kHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.1-3

Wide area BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (E-UTRA bands <1 GHz) for category A

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 4)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 5 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 5.05 \text{ MHz}$	$-5.5 \text{ dBm} - \frac{7}{5} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$5 \text{ MHz} \leq \Delta f < \min(10 \text{ MHz}, \Delta f_{\text{max}})$	$5.05 \text{ MHz} \leq f_{\text{offset}} < \min(10.05 \text{ MHz}, f_{\text{offset}_{\text{max}}})$	-12.5 dBm	100 kHz
$10 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$10.05 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	-13 dBm (Note 3)	100 kHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10 \text{ MHz}$ from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -13 dBm/100 kHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – The requirement is not applicable when $\Delta f_{\text{max}} < 10 \text{ MHz}$.

NOTE 4 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

For E-UTRA BS operating in Bands 1, 2, 3, 4, 7, 9, 10, 11, 21, 23, 24, 25, 30, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, emissions shall not exceed the maximum levels specified in Tables 2.3.1-4, 2.3.1-5 and 2.3.1-6:

For E-UTRA BS operating in Bands 22, 42, 43, emissions shall not exceed the maximum levels specified in Tables 2.3.1-4a, 2.3.1-5a and 2.3.1-6a:

TABLE 2.3.1-4

Wide area BS operating band unwanted emission limits for 1.4 MHz channel bandwidth (1 GHz < E-UTRA bands ≤ 3 GHz) for category A

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 1.4 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 1.45 \text{ MHz}$	$+0.5 \text{ dBm} - \frac{10}{1.4} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$1.4 \text{ MHz} \leq \Delta f < 2.8 \text{ MHz}$	$1.45 \text{ MHz} \leq f_{\text{offset}} < 2.85 \text{ MHz}$	-9.5 dBm	100 kHz
$2.8 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$3.3 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	-13 dBm	1 MHz

Note to Table 2.3.1-4:

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10$ MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -13 dBm/1 MHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.1-4a

**Wide area BS operating band unwanted emission limits for 1.4 MHz channel bandwidth
(E-UTRA bands >3 GHz) for category A**

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 1.4 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 1.45 \text{ MHz}$	$+0.8 \text{ dBm} - \frac{10}{1.4} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$1.4 \text{ MHz} \leq \Delta f < 2.8 \text{ MHz}$	$1.45 \text{ MHz} \leq f_{\text{offset}} < 2.85 \text{ MHz}$	-9.2 dBm	100 kHz
$2.8 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$3.3 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	-13 dBm	1 MHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10$ MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -13 dBm/1 MHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.1-5

**Wide area BS operating band unwanted emission limits for 3 MHz channel bandwidth
(1 GHz $<$ E-UTRA bands ≤ 3 GHz) for category A**

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 3 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 3.05 \text{ MHz}$	$-3.5 \text{ dBm} - \frac{10}{3} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$3 \text{ MHz} \leq \Delta f < 6 \text{ MHz}$	$3.05 \text{ MHz} \leq f_{\text{offset}} < 6.05 \text{ MHz}$	-13.5 dBm	100 kHz
$6 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$6.5 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	-13 dBm	1 MHz

Note to Table 2.3.1-5:

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10$ MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -13 dBm/1 MHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.1-5a

**Wide area BS operating band unwanted emission limits for 3 MHz channel bandwidth
(E-UTRA bands > 3 GHz) for category A**

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 3 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 3.05 \text{ MHz}$	$-3.2 \text{ dBm} - \frac{10}{3} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$3 \text{ MHz} \leq \Delta f < 6 \text{ MHz}$	$3.05 \text{ MHz} \leq f_{\text{offset}} < 6.05 \text{ MHz}$	-13.2 dBm	100 kHz
$6 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$6.5 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	-13 dBm	1 MHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10$ MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -13 dBm/1 MHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.1-6

Wide area BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (1 GHz $<$ E-UTRA bands ≤ 3 GHz) for category A

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 5 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 5.05 \text{ MHz}$	$-5.5 \text{ dBm} - \frac{7}{5} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$5 \text{ MHz} \leq \Delta f < \min(10 \text{ MHz}, \Delta f_{\text{max}})$	$5.05 \text{ MHz} \leq f_{\text{offset}} < \min(10.05 \text{ MHz}, f_{\text{offset}_{\text{max}}})$	-12.5 dBm	100 kHz
$10 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$10.5 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	-13 dBm (Note 3)	1 MHz

Notes to Table 2.3.1-6:

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10$ MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -13 dBm/1 MHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – The requirement is not applicable when $\Delta f_{\max} < 10$ MHz.

NOTE 4 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.1-6a

Wide area BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (E-UTRA bands > 3 GHz) for category A

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 4)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 5 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 5.05 \text{ MHz}$	$-5.2 \text{ dBm} - \frac{7}{5} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$5 \text{ MHz} \leq \Delta f < \min(10 \text{ MHz}, \Delta f_{\max})$	$5.05 \text{ MHz} \leq f_{\text{offset}} < \min(10.05 \text{ MHz}, f_{\text{offset}_{\max}})$	-12.2 dBm	100 kHz
$10 \text{ MHz} \leq \Delta f \leq \Delta f_{\max}$	$10.5 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\max}}$	-13 dBm (Note 3)	1 MHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10$ MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -13 dBm/1 MHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – The requirement is not applicable when $\Delta f_{\max} < 10$ MHz.

NOTE 4 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

2.3.2 Operating band unwanted emissions for wide area BS (category B)

For category B operating band unwanted emissions, there are two options for the limits that may be applied regionally. Either the limits in § 2.3.2.1 or § 2.3.2.2 shall be applied.

2.3.2.1 Operating band unwanted emissions for wide area BS, category B (Option 1)

For E-UTRA BS operating in Bands 5, 8, 12, 13, 14, 17, 20, 26, 27, 28, 29, 31, 44 emissions shall not exceed the maximum levels specified in Tables 2.3.2.1-1 to 2.3.2.1-3:

TABLE 2.3.2.1-1

**Wide area BS operating band unwanted emission limits for 1.4 MHz channel bandwidth
(E-UTRA bands <1 GHz) for category B**

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 1.4 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 1.45 \text{ MHz}$	$+0.5 \text{ dBm} - \frac{10}{1.4} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$1.4 \text{ MHz} \leq \Delta f < 2.8 \text{ MHz}$	$1.45 \text{ MHz} \leq f_{\text{offset}} < 2.85 \text{ MHz}$	–9.5 dBm	100 kHz
$2.8 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$2.85 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	–16 dBm	100 kHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10 \text{ MHz}$ from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be –16 dBm/100 kHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.2.1-2

**Wide area BS operating band unwanted emission limits for 3 MHz channel bandwidth
(E-UTRA bands <1 GHz) for category B**

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 3 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 3.05 \text{ MHz}$	$-3.5 \text{ dBm} - \frac{10}{3} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$3 \text{ MHz} \leq \Delta f < 6 \text{ MHz}$	$3.05 \text{ MHz} \leq f_{\text{offset}} < 6.05 \text{ MHz}$	–13.5 dBm	100 kHz
$6 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$6.05 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	–16 dBm	100 kHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10 \text{ MHz}$ from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be –16 dBm/100 kHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.2.1-3

Wide area BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (E-UTRA bands <1 GHz) for category B

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 4)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 5 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 5.05 \text{ MHz}$	$-5.5 \text{ dBm} - \frac{7}{5} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$5 \text{ MHz} \leq \Delta f < \min(10 \text{ MHz}, \Delta f_{\text{max}})$	$5.05 \text{ MHz} \leq f_{\text{offset}} < \min(10.05 \text{ MHz}, f_{\text{offset}_{\text{max}}})$	–12.5 dBm	100 kHz
$10 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$10.05 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	–16 dBm (Note 3)	100 kHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10 \text{ MHz}$ from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be –16 dBm/100 kHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – The requirement is not applicable when $\Delta f_{\text{max}} < 10 \text{ MHz}$.

NOTE 4 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap

For E-UTRA BS operating in Bands 1, 2, 3, 4, 7, 10, 25, 30, 33, 34, 35, 36, 37, 38, 39, 40, 41, emissions shall not exceed the maximum levels specified in Tables 2.3.2.1-4, 2.3.2.1-5 and 2.3.2.1-6:

For E-UTRA BS operating in Bands 22, 42, 43, emissions shall not exceed the maximum levels specified in Tables 2.3.2.1-4a, 2.3.2.1-5a and 2.3.2.1-6a:

TABLE 2.3.2.1-4

Wide area BS operating band unwanted emission limits for 1.4 MHz channel bandwidth (1 GHz < E-UTRA bands ≤ 3 GHz) for category B

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 1.4 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 1.45 \text{ MHz}$	$+0.5 \text{ dBm} - \frac{10}{1.4} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$1.4 \text{ MHz} \leq \Delta f < 2.8 \text{ MHz}$	$1.45 \text{ MHz} \leq f_{\text{offset}} < 2.85 \text{ MHz}$	–9.5 dBm	100 kHz
$2.8 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$3.3 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	–15 dBm	1 MHz

Notes to Table 2.3.2.1-4:

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10$ MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -15 dBm/1 MHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.2.1-4a

**Wide area BS operating band unwanted emission limits for 1.4 MHz channel bandwidth
(E-UTRA bands > 3 GHz) for category B**

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 1.4 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 1.45 \text{ MHz}$	$+0.8 \text{ dBm} - \frac{10}{1.4} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$1.4 \text{ MHz} \leq \Delta f < 2.8 \text{ MHz}$	$1.45 \text{ MHz} \leq f_{\text{offset}} < 2.85 \text{ MHz}$	-9.2 dBm	100 kHz
$2.8 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$3.3 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset,max}}$	-15 dBm	1 MHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10$ MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -15 dBm/1 MHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.2.1-5

**Wide area BS operating band unwanted emission limits for 3 MHz channel bandwidth
(1 GHz $<$ E-UTRA bands ≤ 3 GHz) for category B**

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 3 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 3.05 \text{ MHz}$	$-3.5 \text{ dBm} - \frac{10}{3} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$3 \text{ MHz} \leq \Delta f < 6 \text{ MHz}$	$3.05 \text{ MHz} \leq f_{\text{offset}} < 6.05 \text{ MHz}$	-13.5 dBm	100 kHz
$6 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$6.5 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset,max}}$	-15 dBm	1 MHz

Notes to Table 2.3.2.1-5:

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10$ MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -15 dBm/1 MHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.2.1-5a

**Wide area BS operating band unwanted emission limits for 3 MHz channel bandwidth
(E-UTRA bands > 3 GHz) for category B**

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 3 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 3.05 \text{ MHz}$	$-3.2 \text{ dBm} - \frac{10}{3} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$3 \text{ MHz} \leq \Delta f < 6 \text{ MHz}$	$3.05 \text{ MHz} \leq f_{\text{offset}} < 6.05 \text{ MHz}$	-13.2 dBm	100 kHz
$6 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$6.5 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	-15 dBm	1 MHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10$ MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -15 dBm/1 MHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.2.1-6

Wide area BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth ($1 \text{ GHz} < \text{E-UTRA bands} \leq 3 \text{ GHz}$) for category B

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 4)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 5 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 5.05 \text{ MHz}$	$-5.5 \text{ dBm} - \frac{7}{5} \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$5 \text{ MHz} \leq \Delta f < \min(10 \text{ MHz}, \Delta f_{\text{max}})$	$5.05 \text{ MHz} \leq f_{\text{offset}} < \min(10.05 \text{ MHz}, f_{\text{offset}_{\text{max}}})$	-12.5 dBm	100 kHz
$10 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$10.5 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	-15 dBm (Note 3)	1 MHz

Notes to Table 2.3.2.1-6:

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10$ MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -15 dBm/1 MHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – The requirement is not applicable when $\Delta f_{\max} < 10$ MHz.

NOTE 4 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.2.1-6a

Wide area BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (E-UTRA bands > 3 GHz) for category B

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 4)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 5 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 5.05 \text{ MHz}$	$-5.2 \text{ dBm} - \frac{7}{5} \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$5 \text{ MHz} \leq \Delta f < \min(10 \text{ MHz}, \Delta f_{\max})$	$5.05 \text{ MHz} \leq f_{\text{offset}} < \min(10.05 \text{ MHz}, f_{\text{offset}_{\max}})$	-12.2 dBm	100 kHz
$10 \text{ MHz} \leq \Delta f \leq \Delta f_{\max}$	$10.5 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\max}}$	-15 dBm (Note 3)	1 MHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10$ MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -15 dBm/1 MHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – The requirement is not applicable when $\Delta f_{\max} < 10$ MHz.

NOTE 4 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

2.3.2.2 Operating band unwanted emissions for wide area BS, category B (Option 2)

The limits in this subclause are intended for Europe and may be applied regionally for BS operating in band 1, 3, 8, 32, 33 or 34.

For a BS operating in bands 1, 3, 8, 32, 33 or 34, emissions shall not exceed the maximum levels specified in Table 2.3.2.2-1 below for 5, 10, 15 and 20 MHz channel bandwidth:

TABLE 2.3.2.2-1

Regional wide area BS operating band unwanted emission limits in bands 1, 3, 8, 32, 33 or 34 for 5, 10, 15 and 20 MHz channel bandwidth for category B

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 5)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 0.2 \text{ MHz}$	$0.015 \text{ MHz} \leq f_{\text{offset}} < 0.215 \text{ MHz}$	–12.5dBm	30 kHz
$0.2 \text{ MHz} \leq \Delta f < 1 \text{ MHz}$	$0.215 \text{ MHz} \leq f_{\text{offset}} < 1.015 \text{ MHz}$	$-12.5 \text{ dBm} - 15 \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.215 \right) \text{ dB}$	30 kHz
(Note 4)	$1.015 \text{ MHz} \leq f_{\text{offset}} < 1.5 \text{ MHz}$	–24.5dBm	30 kHz
$1 \text{ MHz} \leq \Delta f \leq \min(10 \text{ MHz}, \Delta f_{\text{max}})$	$1.5 \text{ MHz} \leq f_{\text{offset}} < \min(10.5 \text{ MHz}, f_{\text{offset}_{\text{max}}})$	–11.5dBm	1 MHz
$10 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$10.5 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	–15 dBm (Note 3)	1 MHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10 \text{ MHz}$ from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be –15 dBm/1 MHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – The requirement is not applicable when $\Delta f_{\text{max}} < 10 \text{ MHz}$.

NOTE 4 – This frequency range ensures that the range of values of f_{offset} is continuous.

NOTE 5 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

For a BS operating in bands 3 or 8, emissions shall not exceed the maximum levels specified in Table 2.3.2.2-2 below for 3 MHz channel bandwidth:

TABLE 2.3.2.2-2

Regional wide area BS operating band unwanted emission limits in bands 3 or 8 for 3 MHz channel bandwidth for category B

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 4)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 0.05 \text{ MHz}$	$0.015 \text{ MHz} \leq f_{\text{offset}} < 0.065 \text{ MHz}$	$6.5\text{dBm} - 60 \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.015 \right) \text{dB}$	30 kHz
$0.05 \text{ MHz} \leq \Delta f < 0.15 \text{ MHz}$	$0.065 \text{ MHz} \leq f_{\text{offset}} < 0.165 \text{ MHz}$	$3.5\text{dBm} - 160 \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.065 \right) \text{dB}$	30 kHz
$0.15 \text{ MHz} \leq \Delta f < 0.2 \text{ MHz}$	$0.165 \text{ MHz} \leq f_{\text{offset}} < 0.215 \text{ MHz}$	–12.5dBm	30 kHz
$0.2 \text{ MHz} \leq \Delta f < 1 \text{ MHz}$	$0.215 \text{ MHz} \leq f_{\text{offset}} < 1.015 \text{ MHz}$	$-12.5\text{dBm} - 15 \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.215 \right) \text{dB}$	30 kHz
(Note 3)	$1.015 \text{ MHz} \leq f_{\text{offset}} < 1.5 \text{ MHz}$	–24.5dBm	30 kHz
$1 \text{ MHz} \leq \Delta f \leq 6 \text{ MHz}$	$1.5 \text{ MHz} \leq f_{\text{offset}} < 6.5 \text{ MHz}$	–11.5dBm	1 MHz
$6 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$6.5 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	–15 dBm	1 MHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10 \text{ MHz}$ from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be –15 dBm/1 MHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – This frequency range ensures that the range of values of f_{offset} is continuous.

NOTE 4 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

For a BS operating in bands 3 or 8, emissions shall not exceed the maximum levels specified in Table 2.3.2.2-3 below for 1.4 MHz channel bandwidth:

TABLE 2.3.2.2-3

Regional wide area BS operating band unwanted emission limits in bands 3 or 8 for 1.4 MHz channel bandwidth for category B

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 4)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 0.05 \text{ MHz}$	$0.015 \text{ MHz} \leq f_{\text{offset}} < 0.065 \text{ MHz}$	$6.5\text{dBm} - 60 \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.015 \right) \text{dB}$	30 kHz
$0.05 \text{ MHz} \leq \Delta f < 0.15 \text{ MHz}$	$0.065 \text{ MHz} \leq f_{\text{offset}} < 0.165 \text{ MHz}$	$3.5\text{dBm} - 160 \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.065 \right) \text{dB}$	30 kHz
$0.15 \text{ MHz} \leq \Delta f < 0.2 \text{ MHz}$	$0.165 \text{ MHz} \leq f_{\text{offset}} < 0.215 \text{ MHz}$	–12.5 dBm	30 kHz
$0.2 \text{ MHz} \leq \Delta f < 1 \text{ MHz}$	$0.215 \text{ MHz} \leq f_{\text{offset}} < 1.015 \text{ MHz}$	$-12.5\text{dBm} - 15 \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.215 \right) \text{dB}$	30 kHz
(Note 3)	$1.015 \text{ MHz} \leq f_{\text{offset}} < 1.5 \text{ MHz}$	–24.5 dBm	30 kHz
$1 \text{ MHz} \leq \Delta f \leq 2.8 \text{ MHz}$	$1.5 \text{ MHz} \leq f_{\text{offset}} < 3.3 \text{ MHz}$	–11.5 dBm	1 MHz
$2.8 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$3.3 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	–15 dBm	1 MHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10 \text{ MHz}$ from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be –15 dBm/1 MHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – This frequency range ensures that the range of values of f_{offset} is continuous.

NOTE 4 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

2.3.2A Operating band unwanted emissions for local area BS (category A and B)

For Local Area BS in E-UTRA bands $\leq 3 \text{ GHz}$, emissions shall not exceed the maximum levels specified in Tables 2.3.2A-1, 2.3.2A-2 and 2.3.2A-3.

For Local Area BS in E-UTRA bands $> 3 \text{ GHz}$, emissions shall not exceed the maximum levels specified in Tables 2.3.2A-1a, 2.3.2A-2a and 2.3.2A-3a.

TABLE 2.3.2A-1

**Local area BS operating band unwanted emission limits for 1.4 MHz channel bandwidth
(E-UTRA bands ≤3 GHz)**

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 1.4 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 1.45 \text{ MHz}$	$-19.5 \text{ dBm} - \frac{10}{1.4} \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$1.4 \text{ MHz} \leq \Delta f < 2.8 \text{ MHz}$	$1.45 \text{ MHz} \leq f_{\text{offset}} < 2.85 \text{ MHz}$	–29.5 dBm	100 kHz
$2.8 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$2.85 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	–31 dBm	100 kHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10 \text{ MHz}$ from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be –31 dBm/100 kHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.2A-1a

**Local area BS operating band unwanted emission limits for 1.4 MHz channel bandwidth
(E-UTRA bands >3 GHz)**

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 1.4 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 1.45 \text{ MHz}$	$-19.2 \text{ dBm} - \frac{10}{1.4} \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$1.4 \text{ MHz} \leq \Delta f < 2.8 \text{ MHz}$	$1.45 \text{ MHz} \leq f_{\text{offset}} < 2.85 \text{ MHz}$	–29.2 dBm	100 kHz
$2.8 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$2.85 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	–31 dBm	100 kHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10 \text{ MHz}$ from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be –31 dBm/100 kHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.2A-2

**Local area BS operating band unwanted emission limits for 3 MHz channel bandwidth
(E-UTRA bands ≤ 3 GHz)**

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 3 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 3.05 \text{ MHz}$	$-23.5 \text{ dBm} - \frac{10}{3} \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$3 \text{ MHz} \leq \Delta f < 6 \text{ MHz}$	$3.05 \text{ MHz} \leq f_{\text{offset}} < 6.05 \text{ MHz}$	–33.5 dBm	100 kHz
$6 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$6.05 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	–35 dBm	100 kHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10 \text{ MHz}$ from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be –35 dBm/100 kHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.2A-2a

**Local area BS operating band unwanted emission limits for 3 MHz channel bandwidth
(E-UTRA bands > 3 GHz)**

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 3)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 3 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 3.05 \text{ MHz}$	$-23.2 \text{ dBm} - \frac{10}{3} \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$3 \text{ MHz} \leq \Delta f < 6 \text{ MHz}$	$3.05 \text{ MHz} \leq f_{\text{offset}} < 6.05 \text{ MHz}$	–33.2 dBm	100 kHz
$6 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$6.05 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	–35 dBm	100 kHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10 \text{ MHz}$ from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be –35 dBm/100 kHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.2A-3

Local area BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (E-UTRA bands ≤ 3 GHz)

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 4)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 5 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 5.05 \text{ MHz}$	$-28.5 \text{ dBm} - \frac{7}{5} \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$5 \text{ MHz} \leq \Delta f < \min(10 \text{ MHz}, \Delta f_{\text{max}})$	$5.05 \text{ MHz} \leq f_{\text{offset}} < \min(10.05 \text{ MHz}, f_{\text{offset}_{\text{max}}})$	–35.5 dBm	100 kHz
$10 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$10.05 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	–37 dBm (Note 3)	100 kHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10$ MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be –37 dBm/100 kHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – The requirement is not applicable when $\Delta f_{\text{max}} < 10$ MHz.

NOTE 4 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

TABLE 2.3.2A-3a

Local area BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (E-UTRA bands > 3 GHz)

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement (Notes 1, 4)	Measurement bandwidth (Note 2)
$0 \text{ MHz} \leq \Delta f < 5 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 5.05 \text{ MHz}$	$-28.2 \text{ dBm} - \frac{7}{5} \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$5 \text{ MHz} \leq \Delta f < \min(10 \text{ MHz}, \Delta f_{\text{max}})$	$5.05 \text{ MHz} \leq f_{\text{offset}} < \min(10.05 \text{ MHz}, f_{\text{offset}_{\text{max}}})$	–35.2 dBm	100 kHz
$10 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$10.05 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	–37 dBm (Note 3)	100 kHz

NOTE 1 – For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is $\Delta f \geq 10$ MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be –37 dBm/100 kHz.

NOTE 2 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 3 – The requirement is not applicable when $\Delta f_{\text{max}} < 10$ MHz.

NOTE 4 – For BS supporting multi-band operation with inter RF bandwidth gap < 20 MHz the test requirement within the inter RF bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks on each side of the inter RF bandwidth gap.

2.3.2B Operating band unwanted emissions for home BS (category A and B)

For home BS in E-UTRA bands ≤ 3 GHz, emissions shall not exceed the maximum levels specified in Tables 2.3.2B-1, 2.3.2B-2 and 2.3.2B-3.

For home BS in E-UTRA bands > 3 GHz, emissions shall not exceed the maximum levels specified in Tables 2.3.2B-1a, 2.3.2B-2a and 2.3.2B-3a.

TABLE 2.3.2B-1

Home BS operating band unwanted emission limits for 1.4 MHz channel bandwidth (E-UTRA bands ≤ 3 GHz)

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement	Measurement bandwidth (Note 1)
$0 \text{ MHz} \leq \Delta f < 1.4 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 1.45 \text{ MHz}$	$-28.5 \text{ dBm} + \frac{6}{1.4} \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$1.4 \text{ MHz} \leq \Delta f < 2.8 \text{ MHz}$	$1.45 \text{ MHz} \leq f_{\text{offset}} < 2.85 \text{ MHz}$	–34.5 dBm	100 kHz
$2.8 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$3.3 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	$\begin{cases} P - 52 \text{ dB}, 2 \text{ dBm} \leq P \leq 20 \text{ dBm} \\ -50 \text{ dBm}, P < 2 \text{ dBm} \end{cases}$	1 MHz

NOTE 1 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

TABLE 2.3.2B-1a

Home BS operating band unwanted emission limits for 1.4 MHz channel and width (E-UTRA bands > 3 GHz)

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement	Measurement bandwidth (Note 1)
$0 \text{ MHz} \leq \Delta f < 1.4 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 1.45 \text{ MHz}$	$-28.2 \text{ dBm} - \frac{6}{1.4} \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$1.4 \text{ MHz} \leq \Delta f < 2.8 \text{ MHz}$	$1.45 \text{ MHz} \leq f_{\text{offset}} < 2.85 \text{ MHz}$	–34.2 dBm	100 kHz
$2.8 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$3.3 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	$\begin{cases} P - 52 \text{ dB}, 2 \text{ dBm} \leq P \leq 20 \text{ dBm} \\ -50 \text{ dBm}, P < 2 \text{ dBm} \end{cases}$	1 MHz

NOTE 1 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

TABLE 2.3.2B-2

**Home BS operating band unwanted emission limits for 3 MHz channel bandwidth
(E-UTRA bands ≤ 3 GHz)**

Frequency offset of measurement filter –3dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement	Measurement bandwidth (Note 1)
$0 \text{ MHz} \leq \Delta f < 3 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 3.05 \text{ MHz}$	$-32.5 \text{ dBm} - 2 \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$3 \text{ MHz} \leq \Delta f < 6 \text{ MHz}$	$3.05 \text{ MHz} \leq f_{\text{offset}} < 6.05 \text{ MHz}$	–38.5 dBm	100 kHz
$6 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$6.5 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	$\begin{cases} P - 52 \text{ dB}, 2 \text{ dBm} \leq P \leq 20 \text{ dBm} \\ -50 \text{ dBm}, P < 2 \text{ dBm} \end{cases}$	1 MHz

NOTE 1 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

TABLE 2.3.2B-2a

**Home BS operating band unwanted emission limits for 3 MHz channel bandwidth
(E-UTRA bands > 3 GHz)**

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Test requirement	Measurement bandwidth (Note 1)
$0 \text{ MHz} \leq \Delta f < 3 \text{ MHz}$	$0.05 \text{ MHz} \leq f_{\text{offset}} < 3.05 \text{ MHz}$	$-32.2 \text{ dBm} - 2 \cdot \left(\frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$3 \text{ MHz} \leq \Delta f < 6 \text{ MHz}$	$3.05 \text{ MHz} \leq f_{\text{offset}} < 6.05 \text{ MHz}$	–38.2 dBm	100 kHz
$6 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$6.5 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	$\begin{cases} P - 52 \text{ dB}, 2 \text{ dBm} \leq P \leq 20 \text{ dBm} \\ -50 \text{ dBm}, P < 2 \text{ dBm} \end{cases}$	1 MHz

NOTE 1 – As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.