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(02/2026)

M Series: Mobile, radiodetermination, amateur and related satellite services

Unwanted emission characteristics of base stations using the terrestrial radio interface of IMT-2020

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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.2174-0

Unwanted emission characteristics of base stations using the terrestrial radio interface of IMT-2020

(2026)

Scope

This Recommendation provides the unwanted emission characteristics of base stations using radio interfaces of the terrestrial component of IMT-2020 and operating on frequencies within the bands identified for IMT, based on material submitted to the ITU by external organisations.

These unwanted emission characteristics could be used by Administrations to ensure intra-system compatibility between IMT-2020 terrestrial networks, subject to compliance with the Radio Regulations.

Keywords

Base station, emission characteristics, IMT-2020, out-of-band, spurious, unwanted

Abbreviations

ACLR	Adjacent channel leakage ratio
BS	Base stations
CA	Carrier aggregation
CACLR	Cumulative ACLR
CLTA	Co-location test antenna
DFT	Discrete fourier transform
DL	Downlink
DTT	Digital terrestrial television
EIRP	Equivalent isotropically radiated power
FR	Frequency range
GPS	Global positioning system
IMT	International Mobile Telecommunications
MBW	Measurement BANDWIDTH
NR	New radio
OoB	Out-of-band
OTA	Over-the-air
PHS	Personal handyphone system
RDN	Radio distribution network
RIB	Radiated interface boundary
RIT	Radio interface technologies
RR	Radio Regulations
SCS	Sub-carrier spacing
SRIT	Set of radio interface technologies

TAB	Transceiver array boundary
TRP	Total radiated power
TT	Test tolerances
UL	Uplink

Additional terms may be found in document 3GPP TR 21.905 "Vocabulary for 3GPP Specifications".

Related documentation: ITU Recommendations, Reports, Document and Handbook[1]

Recommendation ITU-R SM.329 – Unwanted emissions in the spurious domain

Recommendation ITU-R M.1036 – Frequency arrangements for implementation of the terrestrial component of International Mobile Telecommunications (IMT) in the bands identified for IMT in the Radio Regulations

Recommendation ITU-R SM.1541 – Unwanted emissions in the out-of-band domain

Recommendation ITU-R M.1545 – Measurement uncertainty as it applies to test limits for the terrestrial component of International Mobile Telecommunications-2000

Recommendation ITU-R M.2012 – Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications Advanced (IMT-Advanced)

Recommendation ITU-R M.2070 – Unwanted emission characteristics of base stations using the terrestrial radio interfaces of IMT-Advanced

Recommendation ITU-R M.2071 – Unwanted emission characteristics of mobile stations using the terrestrial radio interfaces of IMT-Advanced

Recommendation ITU-R M.2150 – Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2020 (IMT-2020)

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-2020 base stations (BS) is necessary to protect other radio systems and services from interference and to enable coexistence between different technologies;

c) 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;

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

recognizing

a) provision 3.3 of the Radio Regulations;

b) that Recommendation ITU-R M.1036 provides the frequency arrangements for implementation of the terrestrial component of International Mobile Telecommunications in the bands identified for IMT in the Radio Regulations;

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[1] The latest edition of the Recommendation/Report in force should be used.

c) that Recommendation ITU-R SM.329 provides limits for unwanted emissions in the spurious domain as well as measurement methods of spurious emissions;

d) that Recommendation ITU-R SM.1541 provides limits for unwanted emissions in the OoB domain and encourages the development of more specific limits for each system and each frequency band;

e) that Recommendation ITU-R M.2150 provides "Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2020 (IMT-2020)" and in particular recommends that the terrestrial radio interfaces for IMT-2020 should be "3GPP 5G-SRIT", "3GPP 5G-RIT", "5Gi-RIT" and "DECT 5G-SRIT",

noting

that in order to reflect the wide applicability of IMT-2020 radio interfaces technologies and to maintain consistency with the technology specifications the notes and annexes of this Recommendation – being based on the ongoing work in standardization bodies, may contain material that reflects information related to use of these technologies in bands other than those identified for IMT,

recommends

1 that the unwanted emission characteristics of base stations that correspond to the 3GPP-5G SRIT radio interface specifications for the terrestrial component of IMT-2020 in Annex 1[2] should be considered to ensure compatibility between IMT-2020 terrestrial networks using 3GPP-5G SRIT radio interface;

2 that the unwanted emission characteristics of base stations that correspond to the 3GPP-5G RIT radio interface specifications for the terrestrial component of IMT-2020 in Annex 2, for the bands specified in Tables 1-2A and 1-3A[3] should be considered to ensure compatibility between IMT-2020 terrestrial networks using 3GPP-5G RIT radio interface;

3 that the unwanted emission characteristics of base stations that correspond to the 5Gi radio interface specifications for the terrestrial component of IMT-2020 in Annex 3[4]should be considered to ensure compatibility between IMT-2020 terrestrial networks using 5Gi radio interface;

4 that the unwanted emission characteristics of base stations that correspond to the DECT-2020 NR-RIT Component radio interface specifications for the terrestrial component of IMT-2020 in Annex 4[5] should be considered to ensure compatibility between IMT-2020 terrestrial network using DECT-2020 NR-RIT Component radio interface.

Annexes: 4

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[2] For 3GPP-5G SRIT base stations in bands not identified for IMT in the Radio Regulations, unwanted emission characteristics in Annex 1 are provided for information, which can be used for decisions at a national level.

[3] For 3GPP-5G RIT base stations in the bands specified in Tables 1-2B and 1-3B, unwanted emission characteristics in Annex 2 are provided for information, which can be used for decisions at a national level.

[4] For 5Gi base stations in bands not identified for IMT in the Radio Regulations, unwanted emission characteristics in Annex 3 are provided for information, which can be used for decisions at a national level.

[5] For DECT-2020 NR-RIT Component base stations in bands not identified for IMT in the Radio Regulations, unwanted emission characteristics in Annex 4 are provided for information, which can be used for decisions at a national level.

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Annex 1

3GPP 5G-SRIT[6]

3GPP 5G-SRIT is a set of radio interface technologies (RITs) consisting of E-UTRA/LTE as one component RIT and NR as the other component RIT. The information on unwanted emission characteristics of E-UTRA/LTE base stations is found in Annex 1 of Recommendation ITU-R M.2070. The information on unwanted emission characteristics of NR base stations is found in the following Annex 2 "3GPP 5G-RIT" of this Recommendation.

Annex 2

3GPP 5G-RIT[7]

The Annex includes information on unwanted emission characteristics from NR carriers for NR base stations.

This Annex is outlined as follows:

– Chapter 1 specifies the frequency ranges and operating bands for which the information on unwanted emission characteristics is presented in the Annex.

– Chapter 2 specifies definitions, symbols and abbreviations.

– Chapter 3 includes the NR BS unwanted emission characteristics defined at individual TAB connectors and/or OTA characteristics defined at RIB (for BS type 1-C and BS type 1-H).

– Chapter 4 includes the NR BS unwanted emission characteristics for BS type 1-O and BS type 2-O.

– Chapter 5 specifies references.

Values specified in the Annex incorporate test tolerances defined in Recommendation ITU-R M.1545 [4].

The Annex contains information from transposed standards which are addressed in tables and sections.

Section 3.3 in Recommendation ITU-R SM.329 should be referred to for "Category A" and "Category B" in this Annex.

1 Operating bands

Unwanted emission characteristics throughout the RF specifications are in many cases defined separately for different frequency ranges (FR). The frequency ranges in which NR can operate are described in Table A2-1.

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6 Developed by 3GPP Proponent as "5G, Release 15 and beyond − LTE+NR SRIT".

7 Developed by 3GPP Proponent as "5G, Release 15 and beyond − NR RIT".

TABLE A2-1

NR frequency ranges

Frequency range designation		Corresponding frequency range*
FR1		410-7 125 MHz
FR2	FR2-1	24 250-52 600 MHz
	FR2-2	52 600-71 000 MHz

* Not all frequency bands in these ranges are identified for IMT in RR.

The unwanted emission characteristics defined in the present Annex are for NR BS operating in at least one of the bands in Table A2-2 or Table A2-4.

TABLE A2-2

NR operating bands in FR1

Frequency bands utilized by NR and identified for IMT in the RR

NR operating band number	Uplink (UL) operating band BS receive / UE transmit $F_{UL,low}$ – $F_{UL,high}$	Downlink (DL) operating band BS transmit / UE receive $F_{DL,low}$ – $F_{DL,high}$	Duplex mode	Footnote(s) Identifying the band, or part thereof, for IMT in various countries/Regions
n1	1 920-1 980 MHz	2 110-2 170 MHz	FDD	**5.388**
n2	1 850-1 910 MHz	1 930-1 990 MHz	FDD	**5.384A**, **5.388**
n3	1 710-1 785 MHz	1 805-1 880 MHz	FDD	**5.384A**
n5	824-849 MHz	869-894 MHz	FDD	**5.317A**
n7	2 500-2 570 MHz	2 620-2 690 MHz	FDD	**5.384A**
n8	880-915 MHz	925-960 MHz	FDD	**5.317A**
n12	699-716 MHz	729-746 MHz	FDD	**5.313A, 5.317A**
n13	777-787 MHz	746-756 MHz	FDD	**5.313A, 5.317A**
n14	788-798 MHz	758-768 MHz	FDD	**5.313A, 5.317A**
n18	815-830 MHz	860-875 MHz	FDD	**5.317A**
n20	832-862 MHz	791-821 MHz	FDD	**5.317A**
n25	1 850-1 915 MHz	1 930-1 995 MHz	FDD	**5.384A**, **5.388**
n26	814-849 MHz	859-894 MHz	FDD	**5.317A**
n28	703-748 MHz	758-803 MHz	FDD	**5.313A, 5.317A**
n29	N/A	717-728 MHz	SDL	**5.313A, 5.317A**
n30	2 305-2 315 MHz	2 350-2 360 MHz	FDD	**5.384A**
n34	2 010-2 025 MHz	2 010-2 025 MHz	TDD	**5.388**
n38	2 570-2 620 MHz	2 570-2 620 MHz	TDD	**5.384A**
n39	1 880-1 920 MHz	1 880-1 920 MHz	TDD	**5.384A, 5.388**
n40	2 300-2 400 MHz	2 300-2 400 MHz	TDD	**5.384A**

TABLE A2-2 (*end*)

NR operating band number	Uplink (UL) operating band BS receive / UE transmit $F_{UL,low} - F_{UL,high}$	Downlink (DL) operating band BS transmit / UE receive $F_{DL,low} - F_{DL,high}$	Duplex mode	Footnote(s) Identifying the band, or part thereof, for IMT in various countries/Regions
n48	3 550-3 700 MHz	3 550-3 700 MHz	TDD	**5.430A**, **5.431B**, **5.433A**, **5.433B, 5.434, 5.434B**
n50	1 432-1 517 MHz	1 432-1 517 MHz	TDD	**5.341A**, **5.341B**, **5.341C, 5.346, 5.346A**
n51	1 427-1 432 MHz	1 427-1 432 MHz	TDD	**5.341A**, **5,341B**, **5,341C**
n65	1 920-2 010 MHz	2 110-2 200 MHz	FDD	**5.388**
n66	1 710-1 780 MHz	2 110-2 200 MHz	FDD	**5.384A**, **5.388**
n67	N/A	738-758 MHz	SDL	**5.313A, 5.317A**
n71	663-698 MHz	617-652 MHz	FDD	**5.296A, 5.308A, 5.307A**
n74	1 427-1 470 MHz	1 475-1 518 MHz	FDD	**5.341A**, **5,341B**, **5.341C, 5.346, 5.346A**
n75	N/A	1 432-1 517 MHz	SDL	**5.341A**, **5.341B**, **5.341C, 5.346, 5.346A**
n76	N/A	1 427-1 432 MHz	SDL	**5.341A**, **5.341B**, **5.341C**
n80	1 710-1 785 MHz	N/A	SUL	**5.384A**
n81	880-915 MHz	N/A	SUL	**5.317A**
n82	832-862 MHz	N/A	SUL	**5.317A**
n83	703-748 MHz	N/A	SUL	**5.313A, 5.317A**
n84	1 920-1 980 MHz	N/A	SUL	**5.388**
n85	698-716 MHz	728-746 MHz	FDD	**5.313A, 5.317A**
n86	1 710-1 780 MHz	N/A	SUL	**5.384A**
n89	824-849 MHz	N/A	SUL	**5.317A**
n91	832-862 MHz	1 427-1 432 MHz	FDD[(2)]	**5.317A**, **5.341A**, **5.431B**, **5.341C**
n92	832-862 MHz	1 432-1 517 MHz	FDD[(2)]	**5.317A**, **5.341A**, **5.341B**, **5.341C**, **5.346**, **5.346A**
n93	880-915 MHz	1 427-1 432 MHz	FDD[(2)]	**5.317A**, **5.341A**, **5.431B**, **5.341C**
n94	880-915 MHz	1 432-1 517 MHz	FDD[(2)]	**5.317A**, **5.341A**, **5.341B**, **5.341C**, **5.346**, **5.346A**
n95[(1)]	2 010-2 025 MHz	N/A	SUL	**5.388**
n97[(5)]	2 300-2 400 MHz	N/A	SUL	**5.384A**
n98[(5)]	1 880-1 920 MHz	N/A	SUL	**5.384A**, **5.388**
n101	1 900-1 910 MHz	1 900-1 910 MHz	TDD	**5.388**
n104[(8)]	6 425-7 125 MHz	6 425-7 125 MHz	TDD	**5.457D, 5.457E, 5.457F**

TABLE A2-3

NR operating bands in FR1

Frequency bands utilized by NR and not or not fully identified for IMT in the RR

NR operating band number	Uplink (UL) operating band BS receive / UE transmit $F_{UL,low}$ – $F_{UL,high}$	Downlink (DL) operating band BS transmit / UE receive $F_{DL,low}$ – $F_{DL,high}$	Duplex mode	Footnote(s) Identifying the band, or part thereof, for IMT in various countries/Regions
n24(7)	1 626.5-1 660.5 MHz	1 525-1 559 MHz	FDD	Not Identified for IMT in RR
n41	2 496-2 690 MHz	2 496-2 690 MHz	TDD	**5.384A**
n53	2 483.5-2 495 MHz	2 483.5-2 495 MHz	TDD	Not Identified for IMT in RR
n70	1 695-1 710 MHz	1 995-2 020 MHz	FDD	**5.388**
n77	3 300-4 200 MHz	3 300-4 200 MHz	TDD	**5.429B**, **5.429D**, **5.429F**, **5.430A**, **5.431B**, **5.432A**, **5.432B**, **5.433A**, **5.433B**, **5.434, 5.434B, 5.435B**
n78	3 300-3 800 MHz	3 300-3 800 MHz	TDD	**5.429B**, **5.529D**, **5.429F**, **5.430A**, **5.431B**, **5.432A**, **5.432B**, **5.433A**, **5.433B, 5.434, 5.434B, 5.435B**
n79	4 400-5 000 MHz	4 400-5 000 MHz	TDD	**5.441A**, **5.441B**
n90	2 496-2 690 MHz	2 496-2 690 MHz	TDD	**5.384A**
n99(6)	1 626.5-1 660.5 MHz	N/A	SUL	Not Identified for IMT in RR
n102(4)	5 925-6 425 MHz	5925-6 425 MHz	TDD(3)	Not Identified for IMT in RR

(1) Void

(2) Variable duplex operation does not enable dynamic variable duplex configuration by the network and is used such that DL and UL frequency ranges are supported independently in any valid frequency range for the band.

(3) Void

(4) Void

(5) The requirements for this band are applicable only where no other NR or E-UTRA TDD operating band(s) are used within the frequency range of this band in the same geographical area. For scenarios where other NR or E-UTRA TDD operating band(s) are used within the frequency range of this band in the same geographical area, special co-existence requirements may apply that are not covered by the 3GPP specifications.

(6) Void

(7) Void

TABLE A2-4

NR operating bands in FR2

Frequency bands utilized by NR and identified for IMT in the RR

NR operating band number	Uplink (UL) and Downlink (DL) operating band BS transmit/receive UE transmit/receive $F_{UL,low}$ – $F_{UL,high}$ $F_{DL,low}$ – $F_{DL,high}$	Duplex mode	Footnote(s) Identifying the band, or part thereof, for IMT in various countries/Regions
n258	24 250-27 500 MHz	TDD	**5.532AB**
n259	39 500-43 500 MHz	TDD	**5.550B**
n260	37 000-40 000 MHz	TDD	**5.550B**
n262	47 200-48 200 MHz	TDD	**5.553B**

TABLE A2-5

NR operating bands in FR2

Frequency bands utilized by NR and not or not fully identified for IMT in the RR

NR operating band number	Uplink (UL) and Downlink (DL) operating band BS transmit/receive UE transmit/receive $F_{UL,low}$ – $F_{UL,high}$ $F_{DL,low}$ – $F_{DL,high}$	Duplex mode	Footnote(s) Identifying the band, or part thereof, for IMT in various countries/Regions
n257	26 500-29 500 MHz	TDD	**5.532AB**
n261	27 500-28 350 MHz	TDD	Not Identified for IMT in RR
n263	57 000-71 000 MHz	TDD	**5.559AA**

2 Definitions, symbols and abbreviations

2.1 Definitions

basic limit: emissions limit relating to the power supplied by a single transmitter to a single antenna transmission line in Recommendation ITU-R SM.329 [3] used for the formulation of unwanted emission requirements for FR1.

antenna connector: connector at the conducted interface of the BS type 1-C.

BS type 1-C: NR base station operating at FR1 with requirements set consisting only of conducted requirements defined at individual antenna connectors.

BS type 1-H: NR base station operating at FR1 with a requirement set consisting of conducted requirements defined at individual TAB connectors and OTA requirements defined at RIB.

BS type 1-O: NR base station operating at FR1 with a requirement set consisting only of OTA requirements defined at the RIB.

BS type 2-O: NR base station operating at FR2 with a requirement set consisting only of OTA requirements defined at the RIB.

Inter RF Bandwidth gap: frequency gap between two consecutive Base Station RF Bandwidths that are placed within two supported operating bands.

NB-IoT operation in NR in-band: NB-IoT is operating in-band when it is located within a NR transmission bandwidth configuration plus 15 kHz at each edge but not within the NR minimum guard band $GB_{Channel}$.

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

NOTE – The operating band(s) for a BS is declared by the manufacturer according to the designations in Tables 1-2 and 1-3.

radiated interface boundary: operating band specific radiated requirements reference where the radiated requirements apply.

NOTE – For requirements based on EIRP, the radiated interface boundary is associated to the far-field region.

TAB connector: transceiver array boundary connector.

TAB connector RX min cell group: operating band specific declared group of TAB connectors to which BS type 1-H conducted RX requirements are applied.

NOTE – Within this definition, the group corresponds to the group of TAB connectors which are responsible for receiving a cell when the BS type 1-H setting corresponding to the declared minimum number of cells with reception on all TAB connectors supporting an operating band, but its existence is not limited to that condition.

TAB connector TX min cell group: operating band specific declared group of TAB connectors to which BS type 1-H conducted TX requirements are applied.

NOTE – Within this definition, the group corresponds to the group of TAB connectors which are responsible for transmitting a cell when the BS type 1-H setting corresponding to the declared minimum number of cells with transmission on all TAB connectors supporting an operating band, but its existence is not limited to that condition.

transceiver array boundary: conducted interface between the transceiver unit array and the composite antenna.

2.2 Symbols

BW_{Config}	Transmission bandwidth configuration, expressed in MHz, where $BW_{Config} = N_{RB}$ x SCS x 12 kHz
F_{DL_low}	Lowest frequency of the downlink operating band
F_{DL_high}	Highest frequency of the downlink operating band
F_{UL_low}	Lowest frequency of the uplink operating band
F_{UL_high}	Highest frequency of the uplink operating band
Δf_{OBUE}	Maximum offset of the operating band unwanted emissions mask from the downlink operating band edge
Δf_{max}	f_offset_{max} minus half of the bandwidth of the measuring filter
f_offset_{max}	The offset to the frequency Δf_{OBUE} outside the downlink operating band
N_{RB}	Transmission bandwidth configuration, expressed in resource blocks
$N_{TXU,counted}$	The number of active transmitter units as calculated in clause 3.1, that are taken into account for conducted TX output power limit in clause 3.1.2, and for unwanted TX emissions scaling

$N_{TXU,countedpercell}$ The number of active transmitter units that are taken into account for conducted TX emissions scaling per cell, as calculated in clause 3.1.

2.3 Abbreviations

ACLR Adjacent channel leakage ratio

CA Carrier aggregation

CACLR Cumulative ACLR

CLTA Co-location test antenna

DTT Digital terrestrial television

EIRP Effective isotropic radiated power

FR Frequency range

GPS Global positioning system

OTA Over-the-air

PHS Personal handyphone system

RIB Radiated interface boundary

SCS Sub-carrier spacing

TAB Transceiver array boundary

TRP Total radiated power

2.4 Conducted and radiated reference points

The manufacturer can declare the NR BS to be one of the following BS types:

– BS type 1-C: Requirements are applied at the BS antenna connector (port A) for a single transmitter or receiver with a full complement of transceivers for the configuration in normal operating conditions. If any external apparatus such as an amplifier, a filter or the combination of such devices is used, requirements apply at the far end antenna connector (port B).

FIGURE A2-1

BS type 1-C transmitter interface

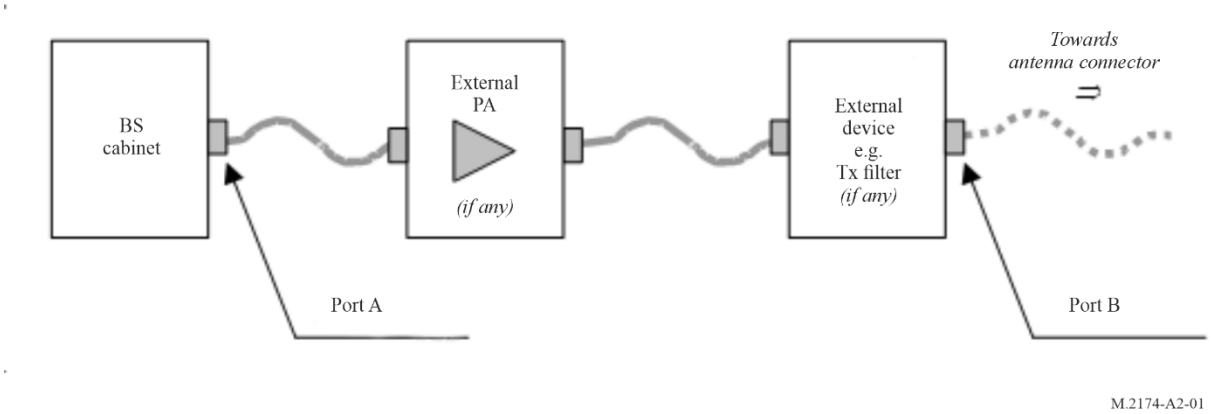
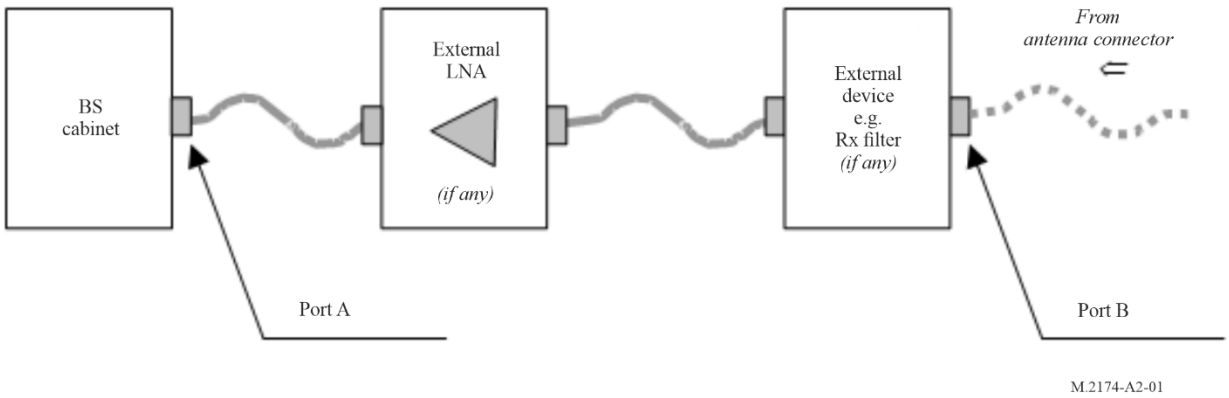


FIGURE A2-2

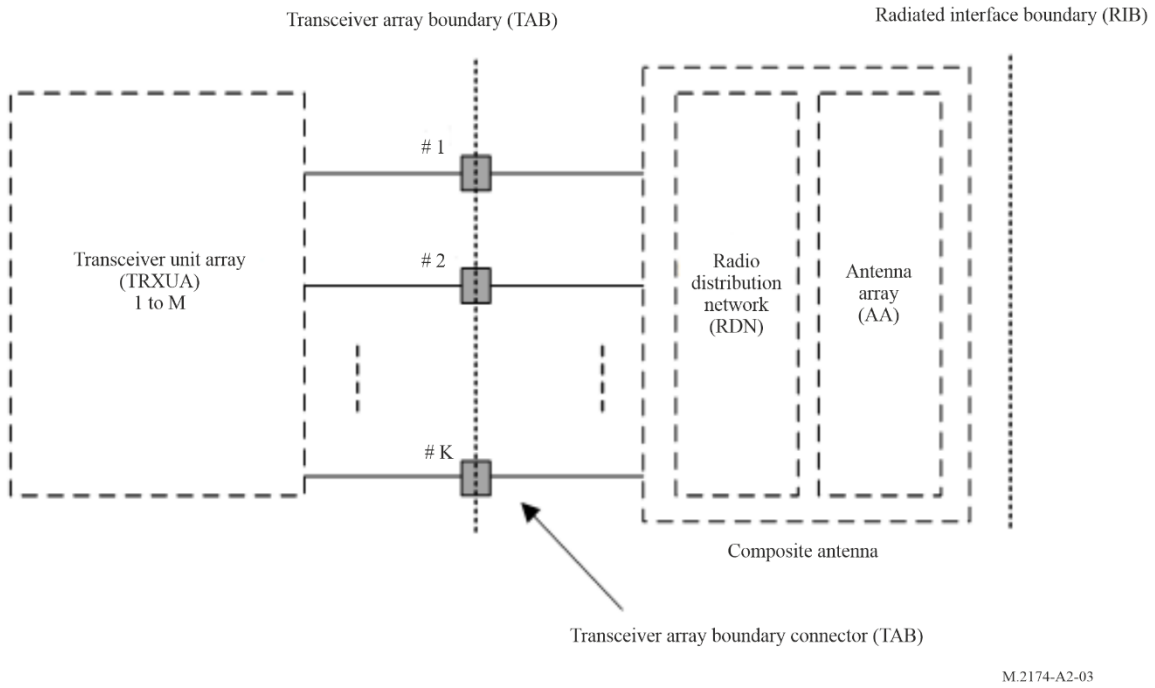
BS type 1-C receiver interface



– BS type 1-H: Requirements are defined for two points of reference, signified by radiated requirements and conducted requirements. Radiated characteristics are defined over the air (OTA), where the operating band specific radiated interface is referred to as the Radiated Interface Boundary (RIB). The (spatial) characteristics in which the OTA requirements apply are detailed for each requirement. Conducted characteristics are defined at individual or groups of TAB connectors at the transceiver array boundary, which is the conducted interface between the transceiver unit array and the composite antenna.

FIGURE A2-3

Radiated and conducted reference points for BS type 1-H



The transceiver unit array is part of the composite transceiver functionality generating modulated transmit signal structures and performing receiver combining and demodulation.

The transceiver unit array contains an implementation specific number of transmitter units and an implementation specific number of receiver units. Transmitter units and receiver units

may be combined into transceiver units. The transmitter/receiver units have the ability to transmit/receive parallel independent modulated symbol streams.

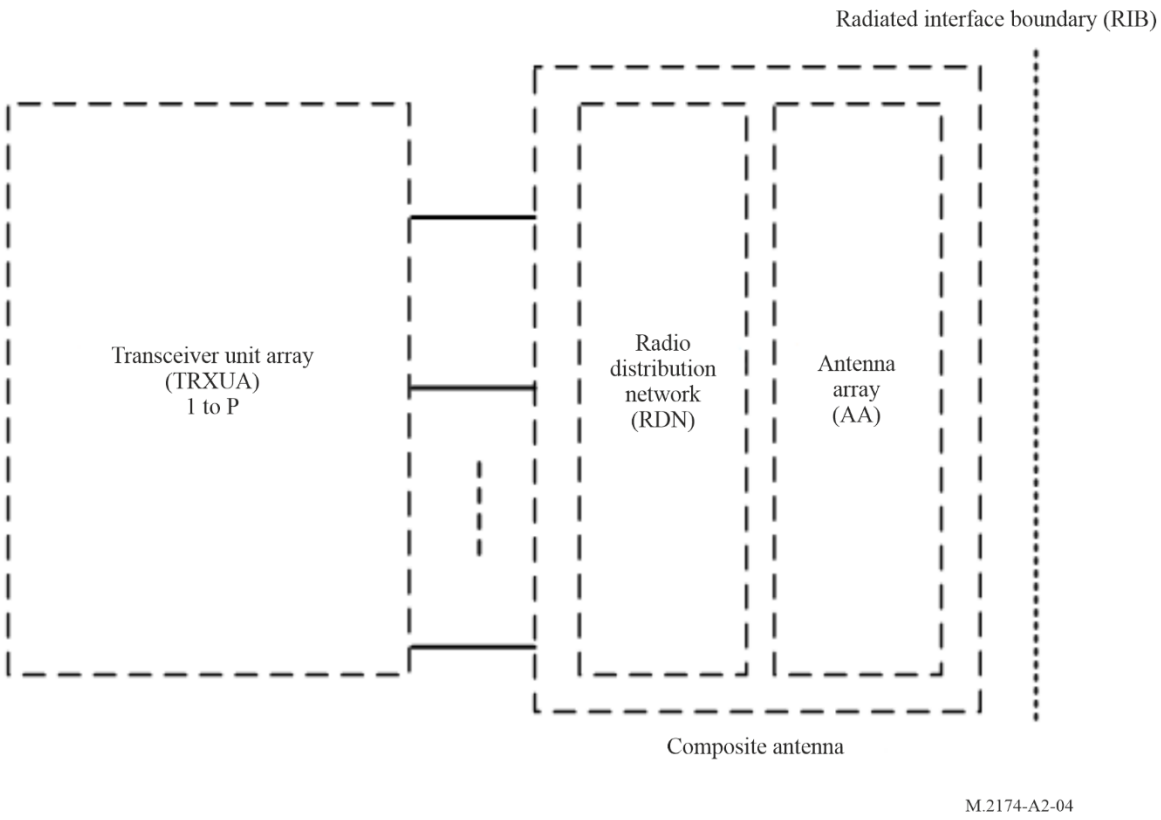
The composite antenna contains a radio distribution network (RDN) and an antenna array. The RDN is a linear passive network which distributes the RF power generated by the transceiver unit array to the antenna array, and/or distributes the radio signals collected by the antenna array to the transceiver unit array, in an implementation specific way.

How a conducted requirement is applied to the transceiver array boundary is requirement specific.

– BS type 1-O: Radiated characteristics for BS type 1-O are defined over the air (OTA) where the operating band specific radiated interface is referred to as the Radiated Interface Boundary (RIB). The (spatial) characteristics in which the OTA requirements apply are requirement specific.

FIGURE A2-4

General architecture of BS type 1-O and BS type 2-O



– BS type 2-O: OTA requirements defined at the RIB only, same as for the BS type 1-O.

2.5 Base station classes

The BS classes for NR are Wide Area Base Stations, Medium Range Base Stations and Local Area Base Stations.

BS classes for BS type 1-C and BS type 1-H are defined as indicated below:

– Wide Area Base Stations are characterised by requirements derived from Macro Cell scenarios with a BS to UE minimum coupling loss equal to 70 dB.

– Medium Range Base Stations are characterised by requirements derived from Micro Cell scenarios with a BS to UE minimum coupling loss equals to 53 dB.

– Local Area Base Stations are characterised by requirements derived from Pico Cell scenarios with a BS to UE minimum coupling loss equal to 45 dB.

BS classes for BS type 1-O and BS type 2-O are defined as indicated below:

– Wide Area Base Stations are characterised by requirements derived from Macro Cell scenarios with a BS to UE minimum distance along the ground equal to 35 m.

– Medium Range Base Stations are characterised by requirements derived from Micro Cell scenarios with a BS to UE minimum distance along the ground equal to 5 m.

– Local Area Base Stations are characterised by requirements derived from Pico Cell scenarios with a BS to UE minimum distance along the ground equal to 2 m.

3 NR Unwanted emission characteristics for BS type 1-C and BS type 1-H

The maximum offset of the operating band unwanted emissions mask from the operating band edge is Δf_{OBUE}. The operating band unwanted emissions define unwanted emissions in each supported downlink operating band plus the frequency ranges Δf_{OBUE} above and Δf_{OBUE} below each band. Unwanted emissions outside of this frequency range are defined by a spurious emissions characteristics.

NOTE – The frequency offset Δf_{OBUE} does not define the boundary between the out-of-band and spurious domain as set out in Recommendation ITU-R SM.1541. As a result, in the range from the operating band edge up to Δf_{OBUE} characteristics of unwanted emissions presented in this Annex may cover only part of the out-of-band domain frequency range. In such case, for the remaining part of out-of-band domain frequency ranges, spurious emissions characteristics should be used.

The values of Δf_{OBUE} are defined in Table A2-6 for the NR operating bands.

TABLE A2-6

Maximum offset of OBUE outside the downlink operating band

BS type	Operating band characteristics	Δf_{OBUE} (MHz)
BS type 1-C	$F_{DL\_high} - F_{DL\_low} \leq 200$ MHz	10
	200 MHz < $F_{DL\_high} - F_{DL\_low} \leq 900$ MHz	40
BS type 1-H	$F_{DL\_high} - F_{DL\_low} < 100$ MHz	10
	100 MHz ≤ $F_{DL\_high} - F_{DL\_low} \leq 900$ MHz	40

For band n96 and n102, the values of Δf_{OBUE} are defined in Table A2-7.

TABLE A2-7

Maximum offset of OBUE outside the downlink operating band

Operating band	Δf_{OBUE} (MHz)
n102	40
n96	50

3.1 Conducted operating band unwanted emissions

3.1.1 Conducted Operating band unwanted emissions for BS type 1-C

The operating band unwanted emissions for BS type 1-C for each antenna connector should be below the applicable basic limits defined in §§ 3.1.3 to 3.1.8.

3.1.2 Conducted Operating band unwanted emissions BS type 1-H

The operating band unwanted emissions for BS type 1-H are that for each TAB connector TX min cell group and each applicable basic limit in §§ 3.1.3 to 3.1.8, the power summation emissions at the TAB connectors of the TAB connector TX min cell group should not exceed a BS limit specified as the basic limit + X, where $X = 10 \log_{10}(N_{TXU,countedpercell})$;

$N_{TXU,countedpercell}$ - scaling factor for the basic limits. $N_{TXU,countedpercell} = \min(N_{TXU,active}, 8 \cdot N_{cells})/N_{cells}$;

N_{cells} – the minimum number of supported geographical cells relates to the BS setting with the minimum amount of cell splitting supported with transmission on all TAB connectors supporting the operating band. The manufacturer should also declare TAB connector TX min cell groups. Every TAB connector supporting transmission in an operating band should map to one TAB connector TX min cell group supporting the same operating band. The mapping of TAB connectors to cells is implementation dependent;

$N_{TXU,active}$ – number of active transmitter units and is independent to the declaration of N_{cells}.

NOTE – Conformance to the BS type 1-H emission requirement can be demonstrated by meeting at least one of the following criteria as determined by the manufacturer:

1) The sum of the emissions power measured on each TAB connector in the TAB connector TX min cell group should be less than or equal to the limit as defined in this clause for the respective frequency span.

Or

2) The unwanted emissions power at each TAB connector should be less than or equal to the BS type 1-H limit as defined in this clause for the respective frequency span, scaled by $-10\log_{10}(n)$, where n is the number of TAB connectors in the TAB connector TX min cell group.

3.1.3 Basic limits for Wide Area BS (Category A)

For BS operating in Bands n5, n8, n12, n13, n14, n18, n26, n28, n29, n71, n85, basic limits are specified in Table 6.6.4.5.2-1 of TS 38.141-1 [1].

TABLE 6.6.4.5.2-1

Wide Area BS operating band unwanted emission limits (NR bands below 1 GHz) for Category A

Frequency offset of measurement filter −3 dB point, Δf	**Frequency offset of measurement filter centre frequency, f_offset**	***Basic limit*** **(Note 1, 2)**	**Measurement bandwidth**
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$-5.5dBm-\frac{7}{5}\cdot\left(\frac{f\_offset}{MHz}-0.05\right)dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−12.5 dBm	
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	−13 dBm (Note 3)	

Note 1: For a BS supporting non-contiguous spectrum operation within any *operating band*, the emission limits 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 □f ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be -13 dBm/100 kHz.

Note 2: For a *multi-band connector* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap.

Note 3: The requirement is not applicable when Δf_{max} < 10 MHz.

For BS operating in Bands n1, n2, n3, n7, n24, n25, n30, n34, n38, n39, n40, n41, n50, n65, n66, n70, n74, n75, n92, n94, basic limits are specified in Table 6.6.4.5.2-2 of TS 38.141-1 [1]:

TABLE 6.6.4.5.2-2

Wide Area BS *operating band* unwanted emission limits (1 GHz < NR bands ≤ 3 GHz) for Category A

Frequency offset of measurement filter -3 dB point, Δf	**Frequency offset of measurement filter centre frequency, f_offset**	***Basic limit*** **(Note 1, 2)**	**Measurement bandwidth**
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$-5.5dBm-\frac{7}{5}\cdot\left(\frac{f\_offset}{MHz}-0.05\right)dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−12.5 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.5 MHz ≤ f_offset < f_offset_{max}	−13 dBm (Note 3)	1 MHz

Note 1: For a BS supporting non-contiguous spectrum operation within any *operating band*, the emission limits within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is $\Delta f \geq 10$ MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −13 dBm/1 MHz.

Note 2: For a *multi-band connector* with Inter RF Bandwidth gap < $2*\Delta f_{OBUE}$ the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or RF Bandwidth.

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

For BS operating in Bands n48, n77, n78, n79, basic limits are specified in Table 6.6.4.5.2-3 of TS 38.141-1 [1].

TABLE 6.6.4.5.2-3

Wide Area BS *operating band* unwanted emission limits (NR bands > 3 GHz) for Category A

Frequency offset of measurement filter -3 dB point, Δf	**Frequency offset of measurement filter centre frequency, f_offset**	***Basic limit* (Note 1, 2)**	**Measurement bandwidth**
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$-5.2dBm - \frac{7}{5} \cdot \left(\frac{f\_offset}{MHz} - 0.05 \right) dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−12.2 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.5 MHz ≤ f_offset < f_offset_{max}	−13 dBm (Note 3)	1 MHz

Note 1: For a BS supporting non-contiguous spectrum operation within any *operating band*, the emission limits within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is $\Delta f \geq 10$ MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −13 dBm/1 MHz.

Note 2: For a *multi-band connector* with Inter RF Bandwidth gap < $2*\Delta f_{OBUE}$ the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or RF Bandwidth.

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

3.1.4 Basic limits for Wide Area BS (Category B)

For Category B Operating band unwanted emissions, there are two options for the basic limits that may be applied regionally. Either the basic limits in § 6.6.4.2.2.1 or § 6.6.4.2.2.2 should be applied.

3.1.4.1 Category B requirements (Option 1)

For BS operating in Bands n5, n8, n12, n20, n26, n28, n29, n67, n71, n85, basic limits are specified in Table 6.6.4.5.3.1-1 of TS 38.141-1 [1].

TABLE 6.6.4.5.3.1-1

Wide Area BS operating band unwanted emission limits (NR bands below 1 GHz) for Category B

Frequency offset of measurement filter −3 dB point, Δf	**Frequency offset of measurement filter centre frequency, f_offset**	***Basic limit*** **(Note 1, 2)**	**Measurement bandwidth**
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$-5.5dBm-\frac{7}{5}\cdot\left(\frac{f\_offset}{MHz}-0.05\right)dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−12.5 dBm	
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	−16 dBm (Note 3)	

Note 1: For a BS supporting non-contiguous spectrum operation within any *operating band*, the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be -16 dBm/100 kHz.

Note 2: For a *multi-band connector* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or RF Bandwidth.

Note 3: The requirement is not applicable when Δf_{max} < 10 MHz.

For BS operating in Bands n1, n2, n3, n7, n25, n34, n38, n39, n40, n41, n50, n65, n66, n70, n75, n92, n94, basic limits are specified in Tables 6.6.4.5.3.1-2 of TS 38.141-1 [1].

TABLE 6.6.4.5.3.1-2

Wide Area BS operating band unwanted emission limits (1 GHz < NR bands ≤ 3 GHz) for Category B

Frequency offset of measurement filter −3 dB point, Δf	**Frequency offset of measurement filter centre frequency, f_offset**	***Basic limit*** **(Note 1, 2)**	**Measurement bandwidth**
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$-5.5dBm-\frac{7}{5}\cdot\left(\frac{f\_offset}{MHz}-0.05\right)dB$	100 kHz

5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−12.5 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.5 MHz ≤ f_offset < f_offset_{max}	−15 dBm (Note 3)	1 MHz

Note 1: For a BS supporting non-contiguous spectrum operation within any operating band, the emission limits within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −15 dBm/1 MHz.

Note 2: For a multi-band connector with Inter RF Bandwidth gap < 2*ΔfOBUE the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or RF Bandwidth.

Note 3: The requirement is not applicable when Δfmax < 10 MHz.

For BS operating in Bands n48, n77, n78, n79, basic limits are specified in Table 6.6.4.5.3.1-3 of TS 38.141-1 [1].

TABLE 6.6.4.5.3.1-3

Wide Area BS operating band unwanted emission limits (NR bands >3 GHz) for Category B

Frequency offset of measurement filter -3 dB point, Δf	**Frequency offset of measurement filter centre frequency, f_offset**	***Basic limit* (Note 1, 2)**	**Measurement bandwidth**
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$-5.2dBm-\frac{7}{5}\cdot\left(\frac{f\_offset}{MHz}-0.05\right)dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−12.2 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.5 MHz ≤ f_offset < f_offset_{max}	−15 dBm (Note 3)	1 MHz

Note 1: For a BS supporting non-contiguous spectrum operation within any operating band, the emission limits within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −15 dBm/1 MHz.

Note 2: For a multi-band connector with Inter RF Bandwidth gap < 2*ΔfOBUE the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or RF Bandwidth.

Note 3: The requirement is not applicable when Δfmax < 10 MHz.

3.1.4.2 Category B requirements (Option 2)

For a BS operating in Bands n1, n3, n8, n65 or BS type 1-C operating in bands n7, n38 or n101 basic limits are specified in Table 6.6.4.5.3.2-1 of TS 38.141-1 [1].

TABLE 6.6.4.5.3.2-1

Regional Wide Area BS operating band unwanted emission limits for Category B

Frequency offset of measurement filter -3dB point, Δf	**Frequency offset of measurement filter centre frequency, f_offset**	***Basic limit*** **(Note 1, 2)**	**Measurement bandwidth**
0 MHz ≤ Δf < 0.2 MHz	0.015 MHz ≤ f_offset < 0.215 MHz	−12.5 dBm	30 kHz
0.2 MHz ≤ Δf < 1 MHz	0.215 MHz ≤ f_offset < 1.015 MHz	$-12.5dBm-15\cdot\left(\frac{f\_offset}{MHz}-0.215\right)dB$	30 kHz
(Note 4)	1.015 MHz ≤ f_offset < 1.5 MHz	−24.5 dBm	30 kHz
1 MHz ≤ Δf ≤ min(10 MHz, Δf_{max})	1.5 MHz ≤ f_offset < min(10.5 MHz, f_offset_{max})	−11.5 dBm	1 MHz
10 MHz ≤ Δf ≤ Δf_{max}	10.5 MHz ≤ f_offset < f_offset_{max}	−15 dBm (Note 3)	1 MHz

Note 1: For a BS supporting non-contiguous spectrum operation within any operating band, the minimum 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, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the minimum requirement within sub-block gaps shall be −15dBm/1MHz.

Note 2: For a multi-band connector with Inter RF Bandwidth gap < 2*ΔfOBUE the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or RF Bandwidth.

Note 3: The requirement is not applicable when Δfmax < 10 MHz.

Note 4: This frequency range ensures that the range of values of f_offset is continuous.

3.1.5 Basic limits for Medium Range BS (Category A and Category B)

For Medium Range BS in NR bands ≤ 3 GHz, basic limits are specified in Table 6.6.4.5.4-1 and Table 6.6.4.5.4-2 of TS 38.141-1 [1].

TABLE 6.6.4.5.4-1

Medium Range BS *operating band* unwanted emission limits, 31< $P_{rated,x}$ ≤ 38 dBm (NR bands ≤ 3 GHz)

Frequency offset of measurement filter −3 dB point, Δf	**Frequency offset of measurement filter centre frequency, f_offset**	***Basic limit*** **(Note 1, 2)**	**Measurement bandwidth**
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$P_{rated,x} - 51.5dB - \frac{7}{5}\left(\frac{f\_offset}{MHz} - 0.05\right) dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	$P_{rated,x}$ - 58.5 dB	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	Min($P_{rated,x}$ – 60 dB, −25 dBm) (Note 3)	100 kHz

Note 1: For a BS supporting non-contiguous spectrum operation within any operating band the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be Min(Prated,x −60 dB, −25 dBm)/100 kHz.

Note 2: For a multi-band connector with Inter RF Bandwidth gap < 2*ΔfOBUE the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap.

Note 3: The requirement is not applicable when Δfmax < 10 MHz.

TABLE 6.6.4.5.4-2

Medium Range BS operating band unwanted emission limits, $P_{rated,x} \leq 31$ dBm (NR bands ≤ 3 GHz)

Frequency offset of measurement filter −3 dB point, Δf	**Frequency offset of measurement filter centre frequency, f_offset**	***Basic limit*** **(Note 1, 2)**	**Measurement bandwidth**
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$-20.5\ \text{dBm} - \frac{7}{5}\left(\frac{f\_offset}{MHz} - 0.05\right) dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−27.5 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	−29 dBm (Note 3)	100 kHz

Note 1: For a BS supporting non-contiguous spectrum operation within any operating band the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −29 dBm/100 kHz.

Note 2: For a multi-band connector with Inter RF Bandwidth gap < 2*ΔfOBUE the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap.

Note 3: The requirement is not applicable when Δfmax < 10 MHz.

For Medium Range BS in NR bands > 3 GHz, basic limits are specified in Table 6.6.4.5.4-3 and Table 6.6.4.5.4-4 of TS 38.141-1 [1].

TABLE 6.6.4.5.4-3

Medium Range BS *operating band* unwanted emission limits, 31< $P_{rated,x}$ ≤ 38 dBm (NR bands >3 GHz)

Frequency offset of measurement filter −3 dB point, Δf	**Frequency offset of measurement filter centre frequency, f_offset**	***Basic limit* (Note 1, 2)**	**Measurement bandwidth**
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$P_{rated,x} - 51.2dB - \frac{7}{5}\left(\frac{f\_offset}{MHz} - 0.05\right) dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	$P_{rated,x}$ - 58.2 dB	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	Min($P_{rated,x}$ – 60 dB, −25 dBm) (Note 3)	100 kHz

Note 1: For a BS supporting non-contiguous spectrum operation within any operating band the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be Min(Prated,x −60 dB, −25 dBm)/100 kHz.

Note 2: For a multi-band connector with Inter RF Bandwidth gap < 2*ΔfOBUE the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap.

Note 3: The requirement is not applicable when Δfmax < 10 MHz.

TABLE 6.6.4.5.4-4

Medium Range BS operating band unwanted emission limits, $P_{rated,x} \leq 31$ dBm (NR bands >3 GHz)

Frequency offset of measurement filter −3 dB point, Δf	**Frequency offset of measurement filter centre frequency, f_offset**	***Basic limit*** **(Note 1, 2)**	**Measurement bandwidth**
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$-20.2\ \text{dBm} - \frac{7}{5}\left(\frac{f\_offset}{MHz} - 0.05\right) dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−27.2 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	−29 dBm (Note 3)	100 kHz

Note 1: For a BS supporting non-contiguous spectrum operation within any operating band the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −29 dBm/100 kHz.

Note 2: For a multi-band connector with Inter RF Bandwidth gap < 2*ΔfOBUE the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap.

Note 3: The requirement is not applicable when Δfmax < 10 MHz.

3.1.6 Basic limits for Local Area BS (Category A and Category B)

For Local Area BS in NR bands ≤ 3 GHz, basic limits are specified in Table 6.6.4.5.5-1 of TS 38.141-1 [1].

TABLE 6.6.4.5.5-1

Local Area BS operating band unwanted emission limits (NR bands ≤3 GHz)

Frequency offset of measurement filter −3dB point, Δf	**Frequency offset of measurement filter centre frequency, f_offset**	***Basic limit*** **(Note 1, 2)**	**Measurement bandwidth**
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$-28.5dBm-\frac{7}{5}\left(\frac{f\_offset}{MHz}-0.05\right)dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−35.5 dBm	
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	−37 dBm (Note 3)	

Note 1: For a BS supporting non-contiguous spectrum operation within any operating band the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −37 dBm/100 kHz.

Note 2: For a multi-band connector with Inter RF Bandwidth gap < 2*ΔfOBUE the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap

Note 3: The requirement is not applicable when Δfmax < 10 MHz.

For Local Area BS in NR bands > 3 GHz, basic limits are specified in Table 6.6.4.5.5-1 of TS 38.141-1 [1].

TABLE 6.6.4.5.5-1

Local Area BS operating band unwanted emission limits (NR bands >3 GHz)

Frequency offset of measurement filter −3 dB point, Δf	**Frequency offset of measurement filter centre frequency, f_offset**	***Basic limit*** **(Note 1, 2)**	**Measurement bandwidth**
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$-28.2dBm-\frac{7}{5}\cdot\left(\frac{f\_offset}{MHz}-0.05\right)dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−35.2 dBm	
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	−37 dBm (Note 3)	

Note 1: For a BS supporting non-contiguous spectrum operation within any operating band the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −37 dBm/100 kHz.

Note 2: For a multi-band connector with Inter RF Bandwidth gap < 2*ΔfOBUE the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap.

Note 3: The requirement is not applicable when Δfmax < 10 MHz.

3.1.7 Basic limits for Local Area and Medium Range BS for band n96 and n102 (Category A and Category B)

For Local Area and Medium Range BS operating in Band n96 and Band n102, basic limits for 20 MHz, 40 MHz, 60 MHz and 80 MHz channel bandwidth are specified in Table 6.6.4.5.5A-2 of TS 38.141-1 [1]. For one non-transmitted channel basic limits are specified in Table 6.6.4.5.5A-3 of TS 38.141-1 [1], and for two non-transmitted channels basic limits are specified in Table 6.6.4.5.5A-4 of TS 38.141-1 [1].

In the case of one or two non-transmitted 20 MHz channels between transmitted channels, when a NR-U channel bandwidth of 60 MHz or 80 MHz have been assigned, the spectrum emission mask for non-transmitted channels specified in Tables 6.6.4.5.5A-3 and 6.6.4.5.5A-4 of TS 38.141-1 [1] applies for one and two non-transmitted channels respectively. The relative power of any BS emission should not exceed the most stringent levels given by Tables 6.6.4.5.5A-2 and 6.6.4.5.5A-3 of TS 38.141-1 [1]in the case of non-transmitted channels between transmitted channels.

TABLE 6.6.4.5.5A-2

Medium Range BS and Local Area BS operating band unwanted emission limits for 20 MHz, 40 MHz, 60 MHz and 80 MHz channel bandwidth for band n96 and n102

Frequency offset of measurement filter -3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Basic limits (Note 1)	Measurement bandwidth
0 MHz ≤ Δf < 1 MHz	0.05 MHz ≤ f_offset < 1.05 MHz	$\mathrm{Max}(P_{\mathrm{rated,x}}\text{-}10\log10\left(\frac{\mathrm{BW_{channel}}}{100kHz}\right) - 20\left(\frac{f_{offset}}{MHz} - 0.05\right) + 2.2dB, -40\mathrm{dBm})$	100 kHz
1 MHz ≤ Δf < min(0.5N MHz, Δf_{max})	1.05 MHz ≤ f_offset < min((0.5N+0.05) MHz, f_offset_{max})	$\mathrm{Max}(P_{\mathrm{rated,x}}\text{-}10\log10\left(\frac{\mathrm{BW_{Channel}}}{100kHz}\right) - 17.8 - \frac{8}{0.5N-1}\left(\frac{f\_offset}{MHz} - 1.05\right)dB, -40\mathrm{dBm})$	100 kHz
0.5N MHz ≤ Δf < min(N MHz, Δf_{max})	(0.5N+0.05) MHz ≤ f_offset < min((N+0.05) MHz, f_offset_{max})	$\mathrm{Max}(P_{\mathrm{rated,x}}\text{-}10\log10\left(\frac{\mathrm{BW_{Channel}}}{100kHz}\right) - 25.8 - \frac{12}{0.5N}\left(\frac{f\_offset}{MHz} - 0.5N - 0.05\right)dB, -40\mathrm{dBm})$	100 kHz
0 MHz ≤ Δf < 1 MHz	0.05 MHz ≤ f_offset < 1.05 MHz	$\mathrm{Max}(P_{\mathrm{rated,x}}\text{-}10\log10\left(\frac{\mathrm{BW_{channel}}}{100kHz}\right) - 20\left(\frac{f_{offset}}{MHz} - 0.05\right) + 2.2dB, -40\mathrm{dBm})$	100 kHz
8.5N MHz ≤ Δf < min(10.3N MHz, Δf_{max})	(8.5N+0.05) MHz ≤ f_offset < min((10.3N+0.05) MHz, f_offset_{max})	$\mathrm{Max}\left(P_{\mathrm{rated,x}}\text{-}10\log10\left(\frac{\mathrm{BW_{Channel}}}{100kHz}\right) - 39.8dB, -40dBm\right)$	100 kHz
10.3N MHz ≤ Δf ≤ Δf_{max}	(10.3N+0.05) MHz ≤ f_offset < f_offset_{max}	$\mathrm{Max}\left(P_{\mathrm{rated,x}}\text{-}10\log10\left(\frac{\mathrm{BW_{Channel}}}{100kHz}\right) - 44.8dB, -40dBm\right)$	100 kHz

Note 1: For a BS supporting non-contiguous spectrum operation within any operating band, the minimum 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 Δf ≥ N MHz from both adjacent sub blocks on each side of the sub-block gap, where the minimum requirement within sub-block gaps shall be $\mathrm{Max}\left(P_{\mathrm{rated,x}}\text{-}10\log10\left(\frac{\mathrm{BW_{Channel}}}{100kHz}\right) - 37.8dB, -40dBm\right)$.

TABLE 6.6.4.5.5A-3

Medium Range BS operating band unwanted emission limits for one non-transmitted channel for 60 MHz and 80MHz channel bandwidth for band n96 and n102

Frequency offset of measurement filter -3dB point, ΔfBE_offset	Frequency offset of measurement filter centre frequency, f_BE_offset	Basic limits	Measurement bandwidth
0 MHz ≤ Δf_{BE_offset} < 1 MHz	0.05 MHz ≤ f_BE_offset < 1.05 MHz	$P_{rated,x}\text{-}10\log10\left(\frac{BW_{Channel}}{100kHz}\right) - 20\left(\frac{f_{BE_{offset}}}{MHz} - 0.05\right) + 2.2dB$	100 kHz
1 MHz ≤ Δf_{BE_offset} < 10 MHz	1.05 MHz ≤ f_BE_offset < 10.05 MHz	$P_{rated,x}\text{-}10\log10\left(\frac{BW_{Channel}}{100kHz}\right) - 17.8 - \frac{1}{3}\left(\frac{f\_BE\_offset}{MHz} - 1.05\right)dB$	100 kHz
10 MHz ≤ Δf_{BE_offset} < 19 MHz	10.05 MHz ≤ f_BE offset < 19.05 MHz	$P_{rated,x}\text{-}10\log10\left(\frac{BW_{Channel}}{100kHz}\right) - 20.8 + \frac{1}{3}\left(\frac{f\_BE\_offset}{MHz} - 10.05\right)dB$	100 kHz
19 MHz ≤ Δf_{BE_offset} < 19.9 MHz	19.05 MHz ≤ f_BE_offset < 19.95 MHz	$P_{rated,x}\text{-}10\log10\left(\frac{BW_{Channel}}{100kHz}\right) - 17.8 + 20\left(\frac{f\_BE\_offset}{MHz} - 19.05\right)dB$	100 kHz

TABLE 6.6.4.5.5A-4

Medium Range BS and Local Area BS operating band unwanted emission limits for two non-transmitted channels of 80 MHz channel bandwidth for band n96 and n102

Frequency offset of measurement filter -3dB point, ΔfBE_offset	Frequency offset of measurement filter centre frequency, f_BE_offset	Basic limits	Measurement bandwidth
0 MHz ≤ Δf_{BE_offset} < 1 MHz	0.05 MHz ≤ f_BE_offset < 1.05 MHz	$P_{rated,x}$-10log10$\left(\frac{BW_{Channel}}{100kHz}\right) - 20\left(\frac{f_{BE_{offset}}}{MHz} - 0.05\right) + 2.2dB$	100 kHz
1 MHz ≤ Δf_{BE_offset} <10 MHz	1.05 MHz ≤ f_BE_offset < 10.05 MHz	$P_{rated,x}$-10log10$\left(\frac{BW_{Channel}}{100kHz}\right) - 17.8 - \frac{5}{9}\left(\frac{f_BE_offset}{MHz} - 1.05\right) dB$	100 kHz
10 MHz ≤ Δf_{BE_offset} <30 MHz	10.05 MHz ≤ f_BE offset < 30.05 MHz	$P_{rated,x}$-10log10$\left(\frac{BW_{Channel}}{100kHz}\right) - 22.8$	100 kHz
30 MHz ≤ Δf_{BE_offset} < 39 MHz	30.05 MHz ≤ f_BE_offset < 39.05 MHz	$P_{rated,x}$-10log10$\left(\frac{BW_{Channel}}{100kHz}\right) - 22.8 + \frac{5}{9}\left(\frac{f_BE_offset}{MHz} - 30.05\right) dB$	100 kHz
39 MHz ≤ Δf_{BE_offset} < 39.9 MHz	39.05 MHz ≤ f_BE_offset < 39.95 MHz	$P_{rated,x}$-10log10$\left(\frac{BW_{Channel}}{100kHz}\right) - 17.8 + 20\left(\frac{f_BE_offset}{MHz} - 39.05\right) dB$	100 kHz

3.1.8 Basic limits for additional requirements

In certain regions the following additional requirements may apply:

– For protection of DTT, the requirement in clause 6.6.4.5.6.2 of TS 38.141-1 [1].

– For operation in Band n48, the requirement in clause 6.6.4.5.6.3 of TS 38.141-1 [1].

– For operation in Band n53, the requirement in clause 6.6.4.5.6.4 of TS 38.141-1 [1].

– For protection of GPS, the requirement in clause 6.6.4.5.6.5 of TS 38.141-1 [1].

– For operation with shared spectrum channel access, the requirement in clause 6.6.4.5.6.6 of TS 38.141-1 [1].

6.6.4.5.6.2 Protection of DTT

In certain regions the following requirement may apply for protection of DTT. For *BS type 1-C* or *BS type 1-H* operating in Band n20, the level of emissions in the band 470-790 MHz, measured in an 8 MHz filter bandwidth on centre frequencies F_{filter} according to Table 6.6.4.5.6.2-1, *basic limit* is $P_{EM,N}$ declared by the manufacturer. This requirement applies in the frequency range 470-790 MHz even though part of the range falls in the spurious domain.

Table 6.6.4.5.6.2-1: Declared emissions *basic limit* for protection of DTT

Filter centre frequency, F_{filter}	Measurement bandwidth	Declared emission *basic limit* (dBm)
F_{filter} = 8*N + 306 (MHz); 21 ≤ N ≤ 60	8 MHz	$P_{EM,N}$

Note: The regional requirement is defined in terms of EIRP (effective isotropic radiated power), which is dependent on both the BS emissions at the *antenna connector* and the deployment (including antenna gain and feeder loss). The requirement defined above provides the characteristics of the BS needed to verify compliance with the regional requirement. Compliance with the regional requirement can be determined using the method outlined in TS 36.104 [22], Annex G.

6.6.4.5.6.3 Additional operating band unwanted emissions limits for Band n48

The following requirement may apply to BS operating in Band n48 in certain regions. Emissions shall not exceed the maximum levels specified in Table 6.6.4.5.6.3-1.

Table 6.6.4.5.6.3-1: Additional operating band unwanted emission limits for Band n48

Channel bandwidth	Frequency offset of measurement filter -3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Minimum requirement	Measurement bandwidth (Note)
All	0 MHz ≤ Δf < 10 MHz	0.5 MHz ≤ f_offset < 9.5 MHz	–13 dBm	1 MHz

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

6.6.4.5.6.4 Additional operating band unwanted emissions limits for Band n53

The following requirement may apply to BS operating in Band n53 in certain regions. Emissions shall not exceed the maximum levels specified in Table 6.6.4.5.6.4-1.

Table 6.6.4.5.6.4-1: Additional operating band unwanted emission limits for Band n53

Channel bandwidth (MHz)	Frequency range (MHz)	Frequency offset of measurement filter -3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Minimum requirement	Measurement bandwidth (Note)
5	2 400-2 477.5	6 MHz ≤ Δf < 83.5 MHz	6.5 MHz ≤ f_offset < 83 MHz	–25 dBm	1 MHz
10	2 400-2 473.5	10 MHz ≤ Δf < 83.5 MHz	10.5 MHz ≤ f_offset < 83 MHz	–25 dBm	1 MHz
5	2 477.5-2 478.5	5 MHz ≤ Δf < 6 MHz	5.5 MHz	–13 dBm	1 MHz
10	2 473.5-2 478.5	5 MHz ≤ Δf < 10 MHz	5.5 MHz ≤ f_offset < 9.5 MHz	–13 dBm	1 MHz
All	2 478.5-2 483.5	0 MHz ≤ Δf < 5 MHz	0.5 MHz ≤ f_offset < 4.5 MHz	–10 dBm	1 MHz
5	2 495-2 501	0 MHz ≤ Δf < 6 MHz	0.5 MHz ≤ f_offset < 5.5 MHz	–13 dBm	1 MHz
10	2 495-2 505	0 MHz ≤ Δf < 10 MHz	0.5 MHz ≤ f_offset < 9.5 MHz	–13 dBm	1 MHz

5	2 501-2 690	6 MHz ≤ Δf < 195 MHz	6.5 MHz ≤ f_offset < 194.5 MHz	–25 dBm	1 MHz
10	2 505-2 690	10 MHz ≤ Δf < 195 MHz	10.5 MHz ≤ f_offset < 194.5 MHz	–25 dBm	1 MHz

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

6.6.4.5.6.5 Protection of GPS

The level of emissions in the 1 541-1 650 MHz band, measured in measurement bandwidth according to Table 6.6.4.5.6.5-1 shall not exceed the *basic limits* $P_{EM\_B24,a}$, $P_{EM\_B24,b}$, $P_{EM\_B24,c}$, $P_{EM\_B24,d}$, $P_{EM\_B24,e}$, and $P_{EM\_B24,f}$ declared by the manufacturer.

Table 6.6.4.5.6.5-1: Declared emissions *basic limits* for protection of GPS

Operating Band	**Frequency range (MHz)**	**Declared emission level (dBW)** (Measurement bandwidth = 1 MHz)	**Declared emission *basic limit* (dBW) of discrete emissions of less than 700 Hz bandwidth** (Measurement bandwidth = 1 kHz)	**Declared emission *basic limit* (dBW) of discrete emissions of less than 2 kHz bandwidth** (Measurement bandwidth = 1 kHz)
n24	1 541-1 559	$P_{EM\_B24,a}$		$P_{EM\_B24,f}$
	1 559-1 610	$P_{EM\_B24,b}$	$P_{EM\_B24,d}$	
	1 610-1 650	$P_{EM\_B24,c}$	$P_{EM\_B24,e}$	

6.6.4.5.6.6 Additional operating band unwanted emissions limits for operation with shared spectrum channel access

In addition, for operation with shared spectrum channel access, the BS may have to comply with the applicable operating band unwanted emission limits established regionally, when deployed in regions where those limits apply and under the conditions declared by the manufacturer. The regional requirements may be in the form of conducted power, power spectral density, EIRP and other types of limits. In case of regulatory limits based on EIRP, assessment of the EIRP level is described in Annex F.2.

3.2 Conducted Adjacent channel leakage ratio (ACLR)

3.2.1 General requirements

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency.

The assumed filter for the adjacent channel frequency is defined in Tables 6.6.3.5.2-1, 6.6.3.5.2-1a, 6.6.3.5.2-3 and 6.6.3.5.2-3a of TS 38.141-1 [1] and a square filter of bandwidth equal to the transmission bandwidth configuration of the transmitted signal (BW_{Config}) centred on the assigned channel frequency.

Table 6.6.3.5.2-1: Base station ACLR limit

BS channel bandwidth **of lowest/highest NR carrier transmitted $BW_{Channel}$ (MHz)**	**BS adjacent channel centre frequency offset below the lowest or above the highest carrier centre frequency transmitted**	**Assumed adjacent channel carrier (informative)**	**Filter on the adjacent channel frequency and corresponding filter bandwidth**	**ACLR limit**
5, 10, 15, 20	$BW_{Channel}$	NR of same BW (Note 2)	Square (BW_{Config})	44.2 dB
	2 x $BW_{Channel}$	NR of same BW (Note 2)	Square (BW_{Config})	44.2 dB
	$BW_{Channel}$ /2 + 2.5 MHz	5 MHz E-UTRA	Square (4.5 MHz)	44.2 dB (NOTE 3)
	$BW_{Channel}$ /2 + 7.5 MHz	5 MHz E-UTRA	Square (4.5 MHz)	44.2 dB (NOTE 3)
25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100	$BW_{Channel}$	NR of same BW (Note 2)	Square (BW_{Config})	43.8 dB
	2 x $BW_{Channel}$	NR of same BW (Note 2)	Square (BW_{Config})	43.8 dB
	$BW_{Channel}$ /2 + 2.5 MHz	5 MHz E-UTRA	Square (4.5 MHz)	43.8 dB (NOTE 3)
	$BW_{Channel}$ /2 + 7.5 MHz	5 MHz E-UTRA	Square (4.5 MHz)	43.8 dB (NOTE 3)

Note 1: $BW_{Channel}$ and BW_{Config} are the *BS channel bandwidth* and transmission bandwidth configuration of the lowest/highest NR carrier transmitted on the assigned channel frequency.
Note 2: With SCS that provides largest transmission bandwidth configuration (BW_{Config}).
Note 3: The requirements are applicable when the band is also defined for E-UTRA or UTRA.

Table 6.6.3.5.2-1a: Base station ACLR limit for band n96 and n102

BS channel bandwidth **of lowest/highest NR carrier transmitted $BW_{Channel}$ (MHz)**	**BS adjacent channel centre frequency offset below the lowest or above the highest carrier centre frequency transmitted**	**Assumed adjacent channel carrier (informative)**	**Filter on the adjacent channel frequency and corresponding filter bandwidth**	**ACLR limit**
10, 20, 40, 60, 80	$BW_{Channel}$	NR of same BW (Note 2)	Square (BW_{Config})	35 dB
	2 x $BW_{Channel}$	NR of same BW (Note 2)	Square (BW_{Config})	40 dB

Note 1: $BW_{Channel}$ and BW_{Config} are the *BS channel bandwidth* and transmission bandwidth configuration of the lowest/highest NR carrier transmitted on the assigned channel frequency.
Note 2: With SCS that provides largest transmission bandwidth configuration (BW_{Config}).

Table 6.6.3.5.2-3: Base Station ACLR limit in non-contiguous spectrum or multiple bands

BS channel bandwidth **of lowest/highest NR carrier transmitted $BW_{Channel}$ (MHz)**	**Sub-block or Inter RF Bandwidth gap size (Wgap) where the limit applies (MHz)**	**BS adjacent channel centre frequency offset below or above the sub-block or Base Station RF Bandwidth edge (inside the gap)**	**Assumed adjacent channel carrier**	**Filter on the adjacent channel frequency and corresponding filter bandwidth**	**ACLR limit**
5, 10, 15, 20	$W_{gap} \geq 15$ (Note 3) $W_{gap} \geq 45$ (Note 4)	2.5 MHz	5 MHz NR (Note 2)	Square (BW_{Config})	44.2 dB
	$W_{gap} \geq 20$ (Note 3) $W_{gap} \geq 50$ (Note 4)	7.5 MHz	5 MHz NR (Note 2)		

25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100	$W_{gap} \geq 60$ (Note 4) $W_{gap} \geq 30$ (Note 3)	10 MHz	20 MHz NR (Note 2)	Square (BW_{Config})	43.8 dB
	$W_{gap} \geq 80$ (Note 4) $W_{gap} \geq 50$ (Note 3)	30 MHz	20 MHz NR (Note 2)		

Note 1: BW_{Config} is the transmission bandwidth configuration of the assumed adjacent channel carrier.
Note 2: With SCS that provides largest transmission bandwidth configuration (BW_{Config}).
Note 3: Applicable in case the *BS channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 5, 10, 15, 20 MHz.
Note 4: Applicable in case the *BS channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 MHz.

Table 6.6.3.5.2-3a: Base Station ACLR limit in non-contiguous spectrum for band n96 and n102

BS channel bandwidth **of lowest/highest NR carrier transmitted $BW_{Channel}$ (MHz)**	**Sub-block or Inter RF Bandwidth gap size (W_{gap}) where the limit applies (MHz)**	**BS adjacent channel centre frequency offset below or above the sub-block or Base Station RF Bandwidth edge (inside the gap)**	**Assumed adjacent channel carrier**	**Filter on the adjacent channel frequency and corresponding filter bandwidth**	**ACLR limit**
10, 20, 40, 60, 80	$W_{gap} \geq 60$	10 MHz	20 MHz NR (Note 2)	Square (BW_{Config})	35 dB
	$W_{gap} \geq 80$	30 MHz	20 MHz NR (Note 2)	Square (BW_{Config})	40 dB

Note 1: BW_{Config} is the transmission bandwidth configuration of the assumed adjacent channel carrier.
Note 2: With SCS that provides largest transmission bandwidth configuration (BW_{Config}).

3.2.2 Limits and basic limits

For operation in paired and unpaired spectrum except for band n96 and n102, the ACLR should be higher than the value specified in Table 6.6.3.5.2-1 of TS 38.141-1 [1].

For operation in non-contiguous spectrum or multiple bands except for band n96 and n102, the ACLR should be higher than the value specified in Table 6.6.3.5.2-3 of TS 38.141-1 [1].

For band n96 and n102, the ACLR should be higher than the value specified in Table 6.6.3.5.2-1a of TS 38.141-1 [1].

The ACLR absolute basic limit is specified in Table 6.6.3.5.2-2 of TS 38.141-1 [1].

Table 6.6.3.5.2-2: Base station ACLR absolute *basic limit*

BS category / BS class	**ACLR absolute *basic limit***
Category A Wide Area BS	–13 dBm/MHz
Category B Wide Area BS	–15 dBm/MHz
Medium Range BS	–25 dBm/MHz
Local Area BS	–32 dBm/MHz

3.2.3 BS type 1-C

For operation in paired and unpaired spectrum except for band n96 and n102, the ACLR test requirements for BS type 1-C are given in Tables 6.6.3.5.2-1 or 6.6.3.5.2-3 of TS 38.141-1 [1] applies per antenna connector. Conformance can be shown by meeting the ACLR limit in Tables 6.6.3.5.2-1 or 6.6.3.5.2-3 of TS 38.141-1 [1], or the absolute basic limits in Table 6.6.3.5.2-2 of TS 38.141-1 [1], whichever is less stringent.

For operation in band n96 and n102, the ACLR test requirements for BS type 1-C are given in Table 6.6.3.5.2-1a or 6.6.3.5.2-3a of TS 38.141-1 [1] applies per antenna connector. Conformance

can be shown by meeting the ACLR limit in Table 6.6.3.5.2-1a or 6.6.3.5.2-3a of TS 38.141-1 [1], or the absolute basic limits in Table 6.6.3.5.2-2 of TS 38.141-1 [1], whichever is less stringent.

3.2.4 BS type 1-H

The ACLR absolute basic limits in Table 6.6.3.5.2-2 of TS 38.141-1 [1] + X (where X = $10\log_{10}(N_{TXU,countedpercell})$) or the ACLR limits in Table 6.6.3.5.2-1 or 6.6.3.5.2-3 of TS 38.141-1 [1], whichever is less stringent, should apply for each TAB connector TX min cell group.

Conformance to the BS type 1-H ACLR limit can be demonstrated by meeting at least one of the following criteria as determined by the manufacturer:

1) The ratio of the sum of the filtered mean power measured on each TAB connector in the TAB connector TX min cell group at the assigned channel frequency to the sum of the filtered mean power measured on each TAB connector in the TAB connector TX min cell group at the adjacent channel frequency should be greater than or equal to the ACLR limit of the BS. This should apply for each TAB connector TX min cell group.

Or

2) The ratio of the filtered mean power at the TAB connector centred on the assigned channel frequency to the filtered mean power at this TAB connector centred on the adjacent channel frequency should be greater than or equal to the ACLR limit of the BS for every TAB connector in the TAB connector TX min cell group, for each TAB connector TX min cell group.

In case the ACLR absolute basic limit of BS type 1-H are applied, the conformance can be demonstrated by meeting at least one of the following criteria as determined by the manufacturer:

1) The sum of the filtered mean power measured on each TAB connector in the TAB connector TX min cell group at the adjacent channel frequency should be less than or equal to the ACLR absolute basic limit + X (where $X = 10\log_{10}(N_{TXU,countedpercell})$) of the BS. This should apply to each TAB connector TX min cell group.

Or

2) The filtered mean power at each TAB connector centred on the adjacent channel frequency should be less than or equal to the ACLR absolute basic limit of the BS scaled by $X - 10\log_{10}(n)$ for every TAB connector in the TAB connector TX min cell group, for each TAB connector TX min cell group, where n is the number of TAB connectors in the TAB connector TX min cell group.

3.3 Conducted Cumulative adjacent channel leakage ratio (CACLR)

3.3.1 General requirements

The Cumulative Adjacent Channel Leakage power Ratio (CACLR) in a sub-block gap or the Inter RF Bandwidth gap is the ratio of:

a) the sum of the filtered mean power centred on the assigned channel frequencies for the two carriers adjacent to each side of the sub-block gap or the Inter RF Bandwidth gap, and

b) the filtered mean power centred on a frequency channel adjacent to one of the respective sub-block edges or Base Station RF Bandwidth edges.

The assumed filter for the adjacent channel frequency is defined in Table 6.6.3.5.2-4 of TS 38.141-1 [1] and the filters on the assigned channels are defined in Table 6.6.3.5.2-6 of TS 38.141-1 [1].

Table 6.6.3.5.2-4: Base station CACLR limit

BS channel bandwidth **of lowest/highest NR carrier transmitted $BW_{Channel}$ (MHz)**	**Sub-block or Inter RF Bandwidth gap size (Wgap) where the limit applies (MHz)**	**BS adjacent channel centre frequency offset below or above the sub-block or Base Station RF Bandwidth edge (inside the gap)**	**Assumed adjacent channel carrier**	**Filter on the adjacent channel frequency and corresponding filter bandwidth**	**CACLR limit**
5, 10, 15, 20	$5 \le W_{gap} < 15$ (Note 3) $5 \le W_{gap} < 45$ (Note 4)	2.5 MHz	5 MHz NR (Note 2)	Square (BW_{Config})	44.2 dB
	$10 < W_{gap} < 20$ (Note 3) $10 \le W_{gap} < 50$ (Note 4)	7.5 MHz	5 MHz NR (Note 2)		
25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100	$20 \le W_{gap} < 60$ (Note 4) $20 \le W_{gap} < 30$ (Note 3)	10 MHz	20 MHz NR (Note 2)	Square (BW_{Config})	43.8 dB
	$40 < W_{gap} < 80$ (Note 4) $40 \le W_{gap} < 50$ (Note 3)	30 MHz	20 MHz NR (Note 2)		

Note 1: BW_{Config} is the transmission bandwidth configuration of the assumed adjacent channel carrier.
Note 2: With SCS that provides largest transmission bandwidth configuration (BW_{Config}).
Note 3: Applicable in case the *BS channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 5, 10, 15, 20 MHz.
Note 4: Applicable in case the *BS channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 MHz.

Table 6.6.3.5.2-6: Filter parameters for the assigned channel

RAT of the carrier adjacent to the sub-block or Inter RF Bandwidth gap	**Filter on the assigned channel frequency and corresponding filter bandwidth**
NR	NR of same BW with SCS that provides largest transmission bandwidth configuration

3.3.2 Limits and basic limits

For operation in non-contiguous spectrum or multiple bands except for band n96 and n102, the CACLR for NR carriers located on either side of the sub-block gap or the Inter RF Bandwidth gap should be higher than the value specified in Table 6.6.3.5.2-4 of TS 38.141-1 [1].

For operation in non-contiguous spectrum for band n96 and n102, the CACLR for NR carriers located on either side of the sub-block gap should be higher than the value specified in Table 6.6.3.5.2-4a of TS 38.141-1 [1].

Table 6.6.3.5.2-4a: Base Station CACLR limit for band n96 and n102

BS channel bandwidth of lowest/highest NR carrier transmitted $BW_{Channel}$ (MHz)	Sub-block or Inter RF Bandwidth gap size (W_{gap}) where the limit applies (MHz)	BS adjacent channel centre frequency offset below or above the sub-block or Base Station RF Bandwidth edge (inside the gap)	Assumed adjacent channel carrier	Filter on the adjacent channel frequency and corresponding filter bandwidth	CACLR limit
10, 20, 40, 60, 80	$20 \leq W_{gap} < 60$	10 MHz	20 MHz NR (Note 2)	Square (BW_{Config})	35 dB
	$40 < W_{gap} < 80$	30 MHz	20 MHz NR (Note 2)	Square (BW_{Config})	40 dB

Note 1: BW_{Config} is the transmission bandwidth configuration of the assumed adjacent channel carrier.
Note 2: With SCS that provides largest transmission bandwidth configuration (BW_{Config}).

The CACLR absolute basic limit is specified in Table 6.6.3.5.2-5 of TS 38.141-1 [1].

Table 6.6.3.5.2-5: Base station CACLR absolute *basic limit*

BS category / BS class	CACLR absolute *basic limit*
Category A Wide Area BS	–13 dBm/MHz
Category B Wide Area BS	–15 dBm/MHz
Medium Range BS	–25 dBm/MHz
Local Area BS	–32 dBm/MHz

3.3.3 BS type 1-C

The CACLR test requirements for BS type 1-C are given in Table 6.6.3.5.2-4 of TS 38.141-1 [1] applies per antenna connector. Conformance can be shown by meeting the CACLR limit in Table 6.6.3.5.2-4 of TS 38.141-1 [1] or the absolute basic limits in Table 6.6.3.5.2-5 of TS 38.141-1 [1], whichever is less stringent.

3.3.4 BS type 1-H

The CACLR absolute basic limits in Table 6.6.3.5.2-5 of TS 38.141-1 [1] + X, (where $X = 10\log_{10}(N_{TXU,countedpercell})$) or the CACLR limits in Table 6.6.3.5.2-4 of TS 38.141-1 [1], whichever is less stringent, should apply for each TAB connector TX min cell group.

Conformance to the BS type 1-H CACLR limit can be demonstrated by meeting at least one of the following criteria as determined by the manufacturer:

1) The ratio of the sum of the filtered mean power measured on each TAB connector in the TAB connector TX min cell group at the assigned channel frequency to the sum of the filtered mean power measured on each TAB connector in the TAB connector TX min cell group at the adjacent channel frequency should be greater than or equal to the CACLR limit of the BS. This should apply for each TAB connector TX min cell group.

Or

2) The ratio of the filtered mean power at the TAB connector centred on the assigned channel frequency to the filtered mean power at this TAB connector centred on the adjacent channel frequency should be greater than or equal to the CACLR limit of the BS for every TAB connector in the TAB connector TX min cell group, for each TAB connector TX min cell group.

In case the CACLR absolute basic limit of BS type 1-H are applied, the conformance can be demonstrated by meeting at least one of the following criteria as determined by the manufacturer:

1) The sum of the filtered mean power measured on each TAB connector in the TAB connector TX min cell group at the adjacent channel frequency should be less than or equal to the CACLR absolute basic limit + X (where $X = 10\log_{10}(N_{TXU,countedpercell})$) of the BS. This should apply to each TAB connector TX min cell group.

Or

2) The filtered mean power at each TAB connector centred on the adjacent channel frequency should be less than or equal to the CACLR absolute basic limit of the BS scaled by $X - 10\log_{10}(n)$ for every TAB connector in the TAB connector TX min cell group, for each TAB connector TX min cell group, where n is the number of TAB connectors in the TAB connector TX min cell group.

3.4 Conducted Transmitter spurious emissions

3.4.1 Conducted transmitter spurious emissions for BS type 1-C

The Tx spurious emissions for BS type 1-C for each antenna connector should not exceed the applicable basic limits defined in §§ 3.4.3-3.4.6.

3.4.2 Conducted transmitter spurious emissions for BS type 1-H

The Tx spurious emissions requirements for BS type 1-H are that for each TAB connector TX min cell group and each applicable basic limit in §§ 3.4.3-3.4.6, the power summation emissions at the TAB connectors of the TAB connector TX min cell group should not exceed a limit specified as the basic limit + X, where $X = 10\log_{10}(N_{TXU,countedpercell})$, unless stated differently in regional regulation.

NOTE: Conformance to the BS type 1-H spurious emission requirement can be demonstrated by meeting at least one of the following criteria as determined by the manufacturer:

1) The sum of the emissions power measured on each TAB connector in the TAB connector TX min cell group should be less than or equal to the limit as defined in this clause for the respective frequency span.

Or

2) The unwanted emissions power at each TAB connector should be less than or equal to the BS type 1-H limit as defined in this clause for the respective frequency span, scaled by $-10\log_{10}(n)$, where n is the number of TAB connectors in the TAB connector TX min cell group.

3.4.3 Basic limits for transmitter spurious emissions

The limits of either Table 6.6.5.5.1.1-1 in TS 38.141-1 [1] for Category A or Table 6.6.5.5.1.1-2 in TS 38.141-1 [1] for Category B should apply. The application of either Category A or Category B limits should be the same as for operating band unwanted emissions in § 3.1, and as declared by the manufacturer.

Table 6.6.5.5.1.1-1: General BS transmitter spurious emission limits in FR1, Category A

Spurious frequency range	*Basic limit*	Measurement bandwidth	Notes
9 kHz – 150 kHz	–13 dBm	1 kHz	Note 1, Note 4
150 kHz – 30 MHz		10 kHz	Note 1, Note 4
30 MHz – 1 GHz		100 kHz	Note 1
1 GHz – 12.75 GHz		1 MHz	Note 1, Note 2
12.75 GHz – 5th harmonic of the upper frequency edge of the DL *operating band* in GHz		1 MHz	Note 1, Note 2, Note 3
12.75 GHz - 26 GHz	–13 dBm	1 MHz	Note 1, Note 2, Note 5

NOTE 1: Measurement bandwidths as in ITU-R SM.329 [5], s4.1.
NOTE 2: Upper frequency as in ITU-R SM.329 [5], s2.5 Table 1.
NOTE 3: This spurious frequency range applies only for *operating bands* for which the 5th harmonic of the upper frequency edge of the DL *operating band* is reaching beyond 12.75 GHz.
NOTE 4: This spurious frequency range applies only to *BS type 1-C* and *BS type 1-H*.
NOTE 5: Applies only for band n96 and n102.

Table 6.6.5.5.1.1-2: General BS transmitter spurious emission limits in FR1, Category B

Spurious frequency range	*Basic limit*	Measurement bandwidth	Notes
9 kHz – 150 kHz	–36 dBm	1 kHz	Note 1, Note 4
150 kHz – 30 MHz		10 kHz	Note 1, Note 4
30 MHz – 1 GHz		100 kHz	Note 1
1 GHz – 12.75 GHz	–30 dBm	1 MHz	Note 1, Note 2
12.75 GHz – 5th harmonic of the upper frequency edge of the DL *operating band* in GHz		1 MHz	Note 1, Note 2, Note 3
12.75 GHz - 26 GHz	–30 dBm	1 MHz	Note 1, Note 2, Note 5

NOTE 1: Measurement bandwidths as in ITU-R SM.329 [5], s4.1.
NOTE 2: Upper frequency as in ITU-R SM.329 [5], s2.5 Table 1.
NOTE 3: This spurious frequency range applies only for *operating bands* for which the 5th harmonic of the upper frequency edge of the DL *operating band* is reaching beyond 12.75 GHz.
NOTE 4: This spurious frequency range applies only to *BS type 1-C* and *BS type 1-H*.
NOTE 5: Applies only for band n102.

3.4.4 Protection of the BS receiver of own or different BS

This requirement should be applied for NR FDD operation in order to prevent the receivers of the BSs being desensitised by emissions from a BS transmitter. It is measured at the transmit antenna connector for BS type 1-C or at the TAB connector for BS type 1-H for any type of BS which has common or separate Tx/Rx antenna connectors / TAB connectors.

The basic limits are provided in Table 6.6.5.5.1.2-1 in TS 38.141-1 [1].

Table 6.6.5.5.1.2-1: BS spurious emissions *basic limits* for protection of the BS receiver

BS class	Frequency range	Basic limit	Measurement bandwidth
Wide Area BS	$F_{UL\_low} – F_{UL\_high}$	–96 dBm	100 kHz
Medium Range BS		–91 dBm	
Local Area BS		–88 dBm	

3.4.5 Additional spurious emission requirements

In certain regions the following additional requirements in TS 38.141-1 [1] may apply:

– For BS co-existence with systems operating in other frequency bands, the requirement in Table 6.6.5.5.1.3-1.

– For protection of PHS, the requirement in Table 6.6.5.5.1.3-2.

– For BS operating in Band n50 and n75 within 1 432-1 452 MHz, and in Band n51 and Band n76, the requirement in Table 6.6.5.5.1.3-4.

– For BS operating in NR Band n50 and n75 within 1 492-1 517 MHz, and in Band n74 within 14 92-1 518 MHz, the requirements in Table 6.6.5.5.1.3-5.

– For BS operating in Band n13 and n14, the requirements in Table 6.6.5.5.1.3-6.

– For BS operating in Band n30, the requirements in Table 6.6.5.5.1.3-7.

– For BS operating in Band n48, the requirements in Table 6.6.5.5.1.3-8.

– For BS operating in Band n26 for protection of 800 MHz public safety operations, the requirements in Table 6.6.5.5.1.3-9.

– For BS operating in 3.45-3.55 GHz in Band n77 in certain regions, the requirements in Table 6.6.5.5.1.3-11.

– For BS operating in Band n101 in CEPT countries, the requirements in Table 6.6.5.5.1.3-12.

– For BS operating in Band n100 in CEPT countries, the requirements in Table 6.6.5.5.1.3-13.

Table 6.6.5.5.1.3-1:
BS spurious emissions limits for BS for co-existence with systems operating in other frequency bands

System type for NR to co-exist with	Frequency range for co-existence requirement	*Basic limit*	Measurement bandwidth	Note
GSM900	921-960 MHz	−57 dBm	100 kHz	This requirement does not apply to BS operating in band n8
	876-915 MHz	−61 dBm	100 kHz	For the frequency range 880−915 MHz, this requirement does not apply to BS operating in band n8, since it is already covered by the requirement in clause 6.6.5.5.1.2.
DCS1800	1 805-1 880 MHz	−47 dBm	100 kHz	This requirement does not apply to BS operating in band n3.
	1 710-1 785 MHz	−61 dBm	100 kHz	This requirement does not apply to BS operating in band n3, since it is already covered by the requirement in clause 6.6.5.5.1.2.
PCS1900	1 930-1 990 MHz	−47 dBm	100 kHz	This requirement does not apply to BS operating in band n2, n25 or band n70.
	1 850-1 910 MHz	−61 dBm	100 kHz	This requirement does not apply to BS operating in band n2 or n25 since it is already covered by the requirement in clause 6.6.5.5.1.2.
GSM850 or CDMA850	869-894 MHz	−57 dBm	100 kHz	This requirement does not apply to BS operating in band n5 or n26.
	824-849 MHz	−61 dBm	100 kHz	This requirement does not apply to BS operating in band n5 or n26, since it is already covered by the requirement in clause 6.6.5.5.1.2.
UTRA FDD Band I or	2 110-2 170 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n1 or n65
E-UTRA Band 1 or NR Band n1	1 920-1 980 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n1 or n65, since it is already covered by the requirement in clause 6.6.5.5.1.2.
UTRA FDD Band II or	1 930-1 990 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n2 or n70.
E−UTRA Band 2 or NR Band n2	1 850-1 910 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n2, since it is already covered by the requirement in clause 6.6.5.5.1.2.
UTRA FDD Band III or	1 805-1 880 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n3.
E-UTRA Band 3 or NR Band n3	1 710-1 785 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n3, since it is already covered by the requirement in clause 6.6.5.5.1.2.
UTRA FDD Band IV or	2 110-2 155 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n66
E-UTRA Band 4	1 710-1 755 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n66, since it is already covered by the requirement in clause 6.6.5.5.1.2.
UTRA FDD Band V or	869-894 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n5 or n26.
E-UTRA Band 5 or NR Band n5	824-849 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n5 or n26, since it is already covered by the requirement in clause 6.6.5.5.1.2.
UTRA FDD Band VI, XIX or	860-890 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n18.
E-UTRA Band 6, 18, 19 or NR Band n18	815-830 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n18, since it is already covered by the requirement in clause 6.6.5.2.2.
	830-845 MHz	−49 dBm	1 MHz	
UTRA FDD Band VII or	2 620-2 690 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n7.

E-UTRA Band 7 or NR Band n7	2 500-2 570 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n7, since it is already covered by the requirement in clause 6.6.5.5.1.2.
UTRA FDD Band VIII or	925-960 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n8 or n100.
E-UTRA Band 8 or NR Band n8	880-915 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n8, since it is already covered by the requirement in clause 6.6.5.5.1.2.
UTRA FDD Band IX or	1 844.9-1 879.9 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n3.
E-UTRA Band 9	1 749.9-1 784.9 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n3, since it is already covered by the requirement in clause 6.6.5.5.1.2.
UTRA FDD Band X or	2 110-2 170 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n66
E-UTRA Band 10	1 710-1 770 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n66, since it is already covered by the requirement in clause 6.6.5.5.1.2.
UTRA FDD Band XI or XXI or	1 475.9-1 510.9 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n74, n75, n92 or n94.
E-UTRA Band 11 or 21	1 427.9-1 447.9 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n74, n75, n76, n91, n92, n93 or n94.
	1 447.9-1 462.9 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n74, n75, n92 or n94.
UTRA FDD Band XII or	729-746 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n12 or n85.
E-UTRA Band 12 or NR Band n12	699-716 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n12 or n85, since it is already covered by the requirement in clause 6.6.5.5.1.2. For NR BS operating in n29, it applies 1 MHz below the Band n29 downlink operating band (Note 5).
UTRA FDD Band XIII or	746-756 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n13.
E-UTRA Band 13 or NR Band n13	777-787 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n13, since it is already covered by the requirement in clause 6.6.5.5.1.2
UTRA FDD Band XIV or	758-768 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n14.
E-UTRA Band 14 or NR Band n14	788-798 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n14, since it is already covered by the requirement in clause 6.6.5.5.1.2
E-UTRA Band 17	734-746 MHz	−52 dBm	1 MHz	
	704-716 MHz	−49 dBm	1 MHz	For NR BS operating in n29, it applies 1 MHz below the Band n29 downlink operating band (Note 5).
UTRA FDD Band XX or E-UTRA Band 20 or NR Band n20	791-821 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n20 or n28.
	832-862 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n20, since it is already covered by the requirement in clause 6.6.5.5.1.2.
UTRA FDD Band XXII or E-UTRA Band 22	3 510-3 590 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n48, n77 or n78.
	3 410-3 490 MHz	−49 dBm	1 MHz	This is not applicable to BS operating in Band n77 or n78.

E-UTRA Band 24 or NR Band n24	1 525-1 559 MHz	−52 dBm	1 MHz	
	1 626.5-1 660.5 MHz	−49 dBm	1 MHz	
UTRA FDD Band XXV or E-UTRA Band 25 or NR band n25	1 930-1 995 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n2, n25 or n70.
	1 850-1 915 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n25 since it is already covered by the requirement in clause 6.6.5.5.1.2. For BS operating in Band n2, it applies for 1 910 MHz to 1915 MHz, while the rest is covered in clause 6.6.5.5.1.2.
UTRA FDD Band XXVI or E-UTRA Band 26 or NR Band n26	859-894 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n5 or n26.
	814-849 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n26 since it is already covered by the requirement in clause 6.6.5.5.1.2. For BS operating in Band n5, it applies for 814 MHz to 824 MHz, while the rest is covered in clause 6.6.5.5.1.2.
E-UTRA Band 27	852-869 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n5.
	807-824 MHz	−49 dBm	1 MHz	This requirement also applies to BS operating in Band n28, starting 4 MHz above the Band n28 downlink *operating band* (Note 5).
E-UTRA Band 28 or NR Band n28	758-803 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n20, n67 or n28.
	703-748 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n28, since it is already covered by the requirement in clause 6.6.5.5.1.2. For BS operating in band n67, it applies for 703 MHz to 736 MHz.
E-UTRA Band 29 or NR Band n29	717-728 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n29 or n85.
E-UTRA Band 30 or NR Band n30	2 350-2 360 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n30.
	2 305-2 315 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n30, since it is already covered by the requirement in clause 6.6.5.5.1.2.
E-UTRA Band 31	462.5-467.5 MHz	−52 dBm	1 MHz	
	452.5-457.5 MHz	−49 dBm	1 MHz	
UTRA FDD band XXXII or E-UTRA band 32	1 452-1 496 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n74, n75, n92 or n94.
UTRA TDD Band a) or E-UTRA Band 33	1 900-1 920 MHz	−52 dBm	1 MHz	
UTRA TDD Band a) or E-UTRA Band 34 or NR band n34	2 010-2 025 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n34.
UTRA TDD Band b) or E-UTRA Band 35	1 850-1 910 MHz	−52 dBm	1 MHz	
UTRA TDD Band b) or E-UTRA Band 36	1 930-1 990 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n2 or n25.

UTRA TDD Band c) or E-UTRA Band 37	1 910-1 930 MHz	−52 dBm	1 MHz	
UTRA TDD Band d) or E-UTRA Band 38 or NR Band n38	2 570-2 620 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n38.
UTRA TDD Band f) or E-UTRA Band 39 or NR band n39	1 880-1 920 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n39.
UTRA TDD Band e) or E-UTRA Band 40 or NR Band n40	2 300-2 400 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Bands n30 or n40.
E-UTRA Band 41 or NR Band n41	2 496-2 690 MHz	−52 dBm	1 MHz	This is not applicable to BS operating in Band n41 or n53.
E-UTRA Band 42	3 400-3 600 MHz	−52 dBm	1 MHz	This is not applicable to BS operating in Band n48, n77 or n78.
E-UTRA Band 43	3 600-3 800 MHz	−52 dBm	1 MHz	This is not applicable to BS operating in Band n48, n77 or n78.
E-UTRA Band 44	703-803 MHz	−52 dBm	1 MHz	This is not applicable to BS operating in Band n28.
E-UTRA Band 45	1447-1467 MHz	−52 dBm	1 MHz	
E-UTRA Band 47	5 855-5 925 MHz	−52 dBm	1 MHz	
E-UTRA Band 48 or NR Band n48	3 550-3 700 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n48, n77 and n78.
E-UTRA Band 50 or NR band n50	1 432-1 517 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n74, n75, n76, n91, n92, n93 or n94.
E-UTRA Band 51 or NR Band n51	1 427-1 432 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n75, n76, n91, n92, n93 or n94.
E-UTRA Band 53 or NR Band n53	2 483.5-2 495 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n41, n53 or n90.
E-UTRA Band 65 or NR Band n65	2 110-2 200 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n1 or n65
	1 920-2 010 MHz	−49 dBm	1 MHz	For BS operating in Band n1, it applies for 1 980 MHz to 2010 MHz, while the rest is covered in clause 6.6.5.5.1.2. This requirement does not apply to BS operating in band n65, since it is already covered by the requirement in clause 6.6.5.5.1.2.
E-UTRA Band 66 or NR Band n66	2 110-2 200 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n66.
	1 710-1 780 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n66, since it is already covered by the requirement in clause 6.6.5.5.1.2.
E-UTRA Band 67 or NR Band n67	738-758 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n28 or n67.

E-UTRA Band 68	753-783 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n28.
	698-728 MHz	−49 dBm	1 MHz	For BS operating in Band n28, this requirement applies between 698 MHz and 703 MHz, while the rest is covered in clause 6.6.5.5.1.2.
E-UTRA Band 69	2 570-2 620 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n38.
E-UTRA Band 70 or NR Band n70	1 995-2 020 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n2, n25 or n70
	1 695-1 710 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n70, since it is already covered by the requirement in clause 66.6.5.5.1.2.
E-UTRA Band 71 or NR Band n71	617-652 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n71
	663-698 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n71, since it is already covered by the requirement in clause 6.6.5.5.1.2.
E-UTRA Band 72	461-466 MHz	−52 dBm	1 MHz	
	451-456 MHz	−49 dBm	1 MHz	
E-UTRA Band 74 or NR Band n74	1 475-1 518 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n75, n75, n92 or n94.
	1 427-1 470 MHz	−49 dBm	1MHz	This requirement does not apply to BS operating in Band n50, n51, n74, n75, n76, n91, n92, n93 or n94.
E-UTRA Band 75 or NR Band n75	1 432-1 517 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n74, n75, n76, n91, n92, n93 or n94.
E-UTRA Band 76 or NR Band n76	1 427-1 432 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n75, n76, n91, n92, n93 or n94.
NR Band n77	3.3-4.2 GHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n48, n77 or n78
NR Band n78	3.3-3.8 GHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n48, n77 or n78
NR Band n79	4.4-5.0 GHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n79
NR Band n80	1 710-1 785 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n3, since it is already covered by the requirement in clause 6.6.5.5.1.2.
NR Band n81	880-915 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n8, since it is already covered by the requirement in clause 6.6.5.5.1.2.
NR Band n82	832-862 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n20, since it is already covered by the requirement in clause 6.6.5.5.1.2.
NR Band n83	703-748 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n28, since it is already covered by the requirement in clause 6.6.5.5.1.2. For BS operating in Band n67, it applies for 703 MHz to 736 MHz.
NR Band n84	1 920-1 980 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n1, since it is already covered by the requirement in clause 6.6.5.5.1.2.
E-UTRA Band 85 or NR Band n85	728-746 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in band n12 or n85.
	698-716 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n12 or n85, since it is already covered by the requirement in clause 6.6.5.5.1.2.

				For NR BS operating in n29, it applies 1 MHz below the Band n29 downlink operating band (Note 5).
NR Band n86	1 710-1 780 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n66, since it is already covered by the requirement in clause 6.6.5.5.1.2.
NR Band n89	824-849 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n5, since it is already covered by the requirement in clause 6.6.5.5.1.2.
NR Band n91	1 427-1 432 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n75 or n76.
	832-862 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n20, since it is already covered by the requirement in clause 6.6.5.5.1.2.
NR Band n92	1 432-1 517 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n74, n75 or n76.
	832-862 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n20, since it is already covered by the requirement in clause 6.6.5.5.1.2.
NR Band n93	1 427-1 432 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n75 or n76.
	880-915 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n8, since it is already covered by the requirement in clause 6.6.5.5.1.2.
NR Band n94	1 432-1 517 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n74, n75 or n76.
	880-915 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n8, since it is already covered by the requirement in clause 6.6.5.5.1.2.
NR Band n95	2 010-2 025 MHz	−52 dBm	1 MHz	
NR Band n96	5 925-7 125 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n96 or n102.
NR Band n97	2 300-2 400 MHz	−52 dBm	1 MHz	
NR Band n98	1 880-1 920 MHz	−52 dBm	1 MHz	
NR Band n99	1 626.5-1 660.5 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n24, since it is already covered by the requirement in clause 6.6.5.5.1.2.
NR Band n100	919.4-925 MHz	−52 dBm	1 MHz	This requirement does not apply to E-UTRA BS operating in Band n8 or n100.
	874.4-880 MHz	−49 dBm	1 MHz	This requirement does not apply to BS operating in band n100, since it is already covered by the requirement in clause 6.6.5.5.1.2.
NR Band n101	1 900-1 910 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n101.
NR Band n102	5 925-6 425 MHz	−52 dBm	1 MHz	This requirement does not apply to BS operating in Band n96 or n102.
E-UTRA Band 103	757-758 MHz	−52 dBm	1 MHz	
	787-788 MHz	−49 dBm	1 MHz	

NOTE 1: As defined in the scope for spurious emissions in this clause, except for the cases where the noted requirements apply to a BS operating in Band n28, the co-existence requirements in Table 6.6.5.5.1.3-1do not apply for the Δf_{OBUE} frequency range immediately outside the downlink *operating band* (see TS 38.104 [2], Table 5.2-1). Emission limits for this excluded frequency range may be covered by local or regional requirements.

NOTE 2: Table 6.6.5.5.1.3-1 assumes that two *operating bands*, where the frequency ranges in TS 38.104 [2], Table 5.2-1 would be overlapping, are not deployed in the same geographical area. For such a case of operation with overlapping frequency arrangements in the same geographical area, special co-existence requirements may apply that are not covered by the 3GPP specifications.

NOTE 3: TDD base stations deployed in the same geographical area, that are synchronized and use the same or adjacent *operating bands* can transmit without additional co-existence requirements. For unsynchronized base stations, special co-existence requirements may apply that are not covered by the 3GPP specifications.

NOTE 4: For Band n28 BS, specific solutions may be required to fulfil the spurious emissions limits for BS for co-existence with E-UTRA Band 27 UL *operating band*.

NOTE 5: For NR Band n29 BS, specific solutions may be required to fulfil the spurious emissions limits for NR BS for co-existence with UTRA Band XII, E-UTRA Band 12 or NR Band n12 UL operating band, E-UTRA Band 17 UL operating band or E-UTRA Band 85 UL or NR Band n85 UL operating band.

Table 6.6.5.5.1.3-2: BS spurious emissions *basic limits* for BS for co-existence with PHS

Frequency range	Basic limit	Measurement bandwidth	Note
1 884.5-1 915.7 MHz	−41 dBm	300 kHz	Applicable when co-existence with PHS system operating in 1 884.5-1 915.7 MHz

Table 6.6.5.5.1.3-4: Additional operating band unwanted emission *basic limits* for BS operating in Band n50 and n75 within 1432-1452 MHz, and in Band 51 and 76

Filter centre frequency, filter	Basic limit	Measurement bandwidth
F_{filter} = 1 413.5 MHz	−42 dBm	27 MHz

Table 6.6.5.5.1.3-5: Operating band n50, n74 and n75 declared emission above 1518 MHz

Filter centre frequency, F_{filter}	Declared emission *basic limit* (dBm)	Measurement bandwidth
1 518.5 MHz ≤ F_{filter} ≤ 1 519.5 MHz	$P_{EM, n50,a}$	1 MHz
1 520.5 MHz ≤ F_{filter} ≤ 1 558.5 MHz	$P_{EM,n50,b}$	1 MHz

Table 6.6.5.5.1.3-6: BS Spurious emissions limits for protection of 700 MHz public safety operations

Operating Band	Frequency range	Maximum Level	Measurement Bandwidth
n13	763-775 MHz	−46 dBm	6.25 kHz
n13	793-805 MHz	−46 dBm	6.25 kHz
n14	769-775 MHz	−46 dBm	6.25 kHz
n14	799-805 MHz	−46 dBm	6.25 kHz

Table 6.6.5.5.1.3-7: Additional NR BS Spurious emissions limits for Band n30

Frequency range	Basic limit	Measurement bandwidth
2 200-2 345 MHz	−45 dBm	1 MHz
2 362.5-2 365 MHz	−25 dBm	
2 365-2 367.5 MHz	−40 dBm	
2 367.5-2 370 MHz	−42 dBm	
2 370-2 395 MHz	−45 dBm	

Table 6.6.5.2.3-8: Additional BS Spurious emissions limits for Band n48

Frequency range	Maximum Level	Measurement Bandwidth (NOTE)	Note
3 530-3 720 MHz	−25 dBm	1 MHz	Applicable 10 MHz from the assigned channel edge
3 100-3 530 MHz 3 720-4 200 MHz	−40 dBm	1 MHz	

NOTE: The resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the

measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

Table 6.6.5.2.3-9: BS Spurious emissions limits for protection of 800 MHz public safety operations

Operating Band	Frequency range	Maximum Level	Measurement Bandwidth	Note
n26	851-859 MHz	−13 dBm	100 kHz	Applicable for offsets > 37.5 kHz from the channel edge

Table 6.6.5.5.1.3-10: Additional BS Spurious emissions limits for Band n41 and n90

Frequency range	*Basic limit*	*Measurement Bandwidth*
2 505-2 535 MHz	−42 dBm	1 MHz
NOTE: This requirement applies for carriers allocated within 2 545-2 645 MHz.		

Table 6.6.5.5.1.3-11: Additional BS spurious emissions limits for Band n77

Channel bandwidth [MHz]	Frequency range [MHz]	Filter centre frequency, F_{filter} [MHz]	Minimum requirement [dBm]	*Measurement bandwidth* [MHz]
All	3 430-3 440 3 560-3 570	$3430.5 \le F_{filter} < 3\,439.5$ $3560.5 \le F_{filter} < 3\,569.5$	−25	1
All	≤ 3 430 > 3 570	$F_{filter} < 3\,429.5$ $3570.5 \le F_{filter}$	−40	1

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

Table 6.6.5.5.1.3-12: Additional BS Spurious emissions limits for Band n101

Frequency range	Maximum Level	*Measurement Bandwidth*	Note
1 920-1 980 MHz	−57 dBm	5 MHz	

Table 6.6.5.5.1.3-13: Additional BS Spurious emissions limits for Band n100

Frequency range	Maximum Level	*Measurement Bandwidth*	Note
880-915 MHz	−62 dBm	5 MHz	

3.4.6 Co-location with other base stations

These requirements may be applied for the protection of other BS receivers when GSM900, DCS1800, PCS1900, GSM850, CDMA850, UTRA FDD, UTRA TDD, E-UTRA and/or NR BS are co-located with a BS.

The requirements assume a 30 dB coupling loss between transmitter and receiver and are based on co-location with base stations of the same class.

The basic limits are in Table 6.6.5.5.1.4-1 in TS 38-141-1 [1] for a BS where requirements for co-location with a BS type listed in the first column apply, depending on the declared BS class. For a multi-band connector, the exclusions and conditions in the Note column of Table 6.6.5.5.1.4-1 should apply for each supported operating band.

Table 6.6.5.5.1.4-1: BS spurious emissions *basic limits* for BS co-located with another BS

Type of co-located BS	Frequency range for co-location requirement	Basic limit			Measurement bandwidth	Note
		WA BS	MR BS	LA BS		
GSM900	876-915 MHz	−98 dBm	−91 dBm	−70 dBm	100 kHz	
DCS1800	1 710-1785 MHz	−98 dBm	−91 dBm	−80 dBm	100 kHz	
PCS1900	1 850-1 910 MHz	−98 dBm	−91 dBm	−80 dBm	100 kHz	
GSM850 or CDMA850	824-849 MHz	−98 dBm	−91 dBm	−70 dBm	100 kHz	
UTRA FDD Band I or E-UTRA Band 1 or NR Band n1	1 920-1 980 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA FDD Band II or E-UTRA Band 2 or NR Band n2	1 850-1 910 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA FDD Band III or E-UTRA Band 3 or NR Band n3	1 710-1 785 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA FDD Band IV or E-UTRA Band 4	1 710-1 755 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA FDD Band V or E-UTRA Band 5 or NR Band n5	824-849 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA FDD Band VI, XIX or E-UTRA Band 6, 19	830-845 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA FDD Band VII or E-UTRA Band 7 or NR Band n7	2 500-2 570 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA FDD Band VIII or E-UTRA Band 8 or NR Band n8	880-915 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA FDD Band IX or E-UTRA Band 9	1 749.9-1 784.9 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA FDD Band X or E-UTRA Band 10	1 710-1 770 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA FDD Band XI or E-UTRA Band 11	1 427.9-1 447.9 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS operating in Band n50, n75, n91, n92, n93 or n94
UTRA FDD Band XII or E-UTRA Band 12 or NR Band n12	699-716 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA FDD Band XIII or E-UTRA Band 13 or NR Band n13	777-787 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA FDD Band XIV or E-UTRA Band 14 or NR Band n14	788-798 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
E-UTRA Band 17	704-716 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
E-UTRA Band 18 or NR Band n18	815-830 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA FDD Band XX or E-UTRA Band 20 or NR Band n20	832-862 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA FDD Band XXI or E-UTRA Band 21	1 447.9-1 462.9 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS operating in Band n50, n75, n92 or n94
UTRA FDD Band XXII or E-UTRA Band 22	3 410-3 490 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS

						operating in Band n48, n77 or n78
E-UTRA Band 24 or NR Band n24	1 626.5-1 660.5 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA FDD Band XXV or E-UTRA Band 25 or NR Band n25	1 850-1 915 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA FDD Band XXVI or E-UTRA Band 26 or NR Band n26	814-849 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
E-UTRA Band 27	807-824 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
E-UTRA Band 28 or NR Band n28	703-748 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
E-UTRA Band 30 or NR Band n30	2 305-2 315 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
E-UTRA Band 31	452.5-457.5 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA TDD Band a) or E-UTRA Band 33	1 900-1 920 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA TDD Band a) or E-UTRA Band 34 or NR band n34	2 010-2 025 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS operating in Band n34
UTRA TDD Band b) or E-UTRA Band 35	1 850-1 910 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA TDD Band b) or E-UTRA Band 36	1 930-1 990 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS operating in Band n2 or band n25
UTRA TDD Band c) or E-UTRA Band 37	1910-1 930 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
UTRA TDD Band d) or E-UTRA Band 38 or NR Band n38	2 570-2620 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS operating in Band n38.
UTRA TDD Band f) or E-UTRA Band 39 or NR band n39	1 880-1 920 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS operating in Band n39
UTRA TDD Band e) or E-UTRA Band 40 or NR Band n40	2 300-2 400 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS operating in Bands n30 or n40.
E-UTRA Band 41 or NR Band n41	2 496-2 690 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS operating in Band n41 or n53
E-UTRA Band 42	3 400-3 600 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS operating in Band n48, n77 or n78
E-UTRA Band 43	3 600-3 800 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS operating in Band n48, n77 or n78
E-UTRA Band 44	703-803 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS operating in Band n28
E-UTRA Band 45	1 447-1 467 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
E-UTRA Band 48 or NR Band n48	3 550-3 700 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS operating in Band n48, n77 or n78
E-UTRA Band 50 or NR band n50	1 432-1 517 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS

						operating in Band n51, n74, n75, n91, n92, n93 or n94
E-UTRA Band 51 or NR Band n51	1 427-1 432 MHz	N/A	N/A	−88 dBm	100 kHz	This is not applicable to BS operating in Band n50, n74, n75, n76, n91, n92, n93 or n94
E-UTRA Band 53 or NR Band n53	2 483.5-2 495 MHz	N/A	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS operating in Band n41, n53 or n90
E-UTRA Band 65 or NR Band n65	1 920-2 010 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
E-UTRA Band 66 or NR Band n66	1 710-1 780 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
E-UTRA Band 68	698-728 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
E-UTRA Band 70 or NR Band n70	1 695-1 710 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
E-UTRA Band 71 or NR Band n71	663-698 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
E-UTRA Band 72	451-456 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
E-UTRA Band 74 or NR Band n74	1 427-1 470 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS operating in Band n50, n51, n91, n92, n93 or n94
NR Band n77	3.3-4.2 GHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS operating in Band n48, n77 or n78
NR Band n78	3.3-3.8 GHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	This is not applicable to BS operating in Band n48, n77 or n78
NR Band n79	4.4-5.0 GHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
NR Band n80	1 710-1 785 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
NR Band n81	880-915 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
NR Band n82	832-862 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
NR Band n83	703-748 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
NR Band n84	1 920-1 980 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
E-UTRA Band 85 or NR Band n85	698-716 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
NR Band n86	1 710-1 780 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
NR Band n89	824-849 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
NR Band n91	832-862 MHz	N/A	N/A	−88 dBm	100 kHz	
NR Band n92	832-862 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
NR Band n93	880-915 MHz	N/A	N/A	−88 dBm	100 kHz	
NR Band n94	880-915 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
NR Band n95	2 010-2 025 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
NR Band n96	5 925-7 125 MHz	N/A	−90 dBm	−87 dBm	100 kHz	This is not applicable to BS operating in Band n96 or n102
NR Band n97	2 300-2 400 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
NR Band n98	1 880-1 920 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
NR Band n99	1 626.5-1 660.5 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	
NR Band n100	874.4-880 MHz	−96 dBm	N/A	N/A	100 kHz	
NR Band n101	1 900-1 910 MHz	−96 dBm	N/A	N/A	100 kHz	
NR Band n102	5 925-6 425 MHz	N/A	−90 dBm	−87 dBm	100 kHz	This is not applicable to BS

						operating in Band n96 or n102
E-UTRA Band 103	787-788 MHz	−96 dBm	−91 dBm	−88 dBm	100 kHz	

NOTE 1: As defined in the scope for spurious emissions in this clause, the co-location requirements in table 6.6.5.5.1.4-1 do not apply for the frequency range extending Δf_{OBUE} immediately outside the BS transmit frequency range of a downlink *operating band* (see TS 38.104 [2] Table 5.2-1). The current state-of-the-art technology does not allow a single generic solution for co-location with other system on adjacent frequencies for 30dB BS-BS minimum coupling loss. However, there are certain site-engineering solutions that can be used. These techniques are addressed in TR 25.942 [15].

NOTE 2: Table 6.6.5.5.1.4-1 assumes that two *operating bands*, where the corresponding BS transmit and receive frequency ranges in TS 38.104 [2] Table 5.2-1 would be overlapping, are not deployed in the same geographical area. For such a case of operation with overlapping frequency arrangements in the same geographical area, special co-location requirements may apply that are not covered by the 3GPP specifications.

NOTE 3: Co-located TDD base stations that are synchronized and using the same or adjacent *operating band* can transmit without special co-locations requirements. For unsynchronized base stations, special co-location requirements may apply that are not covered by the 3GPP specifications.

3.5 Conducted receiver spurious emissions

3.5.1 Conducted receiver spurious emissions BS type 1-C

The receiver spurious emissions for BS type 1-C for each antenna connector should be below the applicable basic limits defined in § 3.5.3.

3.5.2 Conducted receiver spurious emissions BS type 1-H

The receiver spurious emissions for BS type 1-H are that for each TAB connector TX min cell group and each applicable basic limit in § 3.5.3, the power summation emissions at the TAB connectors of the TAB connector TX min cell group should not exceed a BS limit specified as the basic limit + X, where $X = 10\log_{10}(N_{TXU,countedpercell})$, unless stated differently in regional regulation.

NOTE: Conformance to the BS type 1-H emission requirement can be demonstrated by meeting at least one of the following criteria as determined by the manufacturer:

1) The sum of the emissions power measured on each TAB connector in the TAB connector TX min cell group should be less than or equal to the limit as defined in this clause for the respective frequency span.

or

2) The unwanted emissions power at each TAB connector should be less than or equal to the BS type 1-H limit as defined in this clause for the respective frequency span, scaled by $-10\log_{10}(n)$, where n is the number of TAB connectors in the TAB connector TX min cell group.

3.5.3 Basic limits for receiver spurious emissions

Basic limits for receiver spurious emissions are specified in Table 7.6.5.1-1 of TS 38.141-1 [1].

Table 7.6.5.1-1: General BS receiver spurious emissions limits

Spurious frequency range	*Basic limit*	Measurement bandwidth	Notes
30 MHz-1 GHz	-57 dBm	100 kHz	Note 1
1 GHz-12.75 GHz	-47 dBm	1 MHz	Note 1, Note 2
12.75 GHz – 5th harmonic of the upper frequency edge of the UL *operating band* in GHz	-47 dBm	1 MHz	Note 1, Note 2, Note 3
12.75 GHz - 26 GHz	-47 dBm	1 MHz	Note 1, Note 2, Note 6

NOTE 1: Measurement bandwidths as in ITU-R SM.329 [5], s4.1.
NOTE 2: Upper frequency as in ITU-R SM.329 [5], s2.5 Table 1.
NOTE 3: This spurious frequency range applies only for *operating bands* for which the 5th harmonic of the upper frequency edge of the UL *operating band* is reaching beyond 12.75 GHz.
NOTE 4: The frequency range from Δf_{OBUE} below the lowest frequency of the BS transmitter operating band to Δf_{OBUE} above the highest frequency of the BS transmitter *operating band* may be excluded from the requirement. Δf_{OBUE} is defined in clause 6.6.1. For *multi-band connectors*, the exclusion applies for all supported *operating bands*.
NOTE 5: Void.
NOTE 6: Applies only for band n96 and n102.

4 NR Unwanted emission characteristics for BS type 1-O and BS type 2-O

The maximum offset of the operating band unwanted emissions mask from the operating band edge is Δf_{OBUE}. The operating band unwanted emissions define unwanted emissions in each supported downlink operating band plus the frequency ranges Δf_{OBUE} above and Δf_{OBUE} below each band. Unwanted emissions outside of this frequency range are defined by a spurious emissions characteristics.

NOTE: The frequency offset Δf_{OBUE} does not define the boundary between the out-of-band and spurious domain as set out in Recommendation ITU-R SM.1541. As a result, in the range from the operating band edge up to Δf_{OBUE} characteristics of unwanted emissions presented in this Annex may cover only part of out-of-band domain frequency range. In such a case, for the remaining part of out-of-band domain frequency range spurious emissions characteristics should be used.

The value of Δf_{OBUE} is defined in Table A2-8 for BS type 1-O and BS type 2-O for the NR operating bands.

TABLE A2-8

Maximum offset Δf_{OBUE} outside the downlink operating band

BS type	Operating band characteristics	Δf_{OBUE} (MHz)
BS type 1-O	$F_{DL\_high} - F_{DL\_low} < 100$ MHz	10
	100 MHz $\leq F_{DL\_high} - F_{DL\_low} \leq$ 900 MHz	40
BS type 2-O	$F_{DL\_high} - F_{DL\_low} \leq$ 4 000 MHz	1 500

4.1 OTA Operating band unwanted emissions

4.1.1 OTA Operating band unwanted emissions BS type 1-O

For BS type 1-O, for a RIB operating in multi-carrier or contiguous CA, the requirements apply to BS channel bandwidths of the outermost carrier. In addition, for a RIB operating in non-contiguous spectrum, the requirements should apply inside any sub-block gap. In addition, for a multi-band RIB, the requirements should apply inside any Inter RF Bandwidth gap.

4.1.1.1 Wide Area BS (Category A)

For a RIB operating in Bands n5, n8, n12, n13, n14, n26, n28, n29, n71, n85, emissions should not exceed the maximum levels specified in Table 6.7.4.5.1.1-1 of TS 38.141-2 [2].

Table 6.7.4.5.1.1-1: Wide Area BS operating band unwanted emission limits (NR 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 (Note 1, 2, 4)	Measurement bandwidth
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	3.8 dBm - 7/5(f_offset/MHz - 0.05) dB	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−3.2 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	−4 dBm (Note 3)	100 kHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any *operating band*, the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be -4 dBm/100 kHz.
NOTE 2: For a *multi-band RIB* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap.
NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.
NOTE 4: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.
NOTE 5: Void

For a RIB operating in Bands n1, n2, n3, n7, n25, n30, n34, n38, n39, n40, n41, n50, n65, n66, n70, n74, n75, n77, n78, n79, emissions should not exceed the maximum levels specified in Tables 6.7.4.5.1.1-2 to 6.7.4.5.1.1-4 of TS 38.141-2 [2].

Table 6.7.4.5.1.1-2: Wide Area BS *operating band* unwanted emission limits (1 GHz < NR 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 (Note 1, 2, 4)	Measurement bandwidth
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	3.8 dBm-7/5(f_offset/MHz-0.05)dB	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−3.2 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.5 MHz ≤ f_offset < f_offset_{max}	−4 dBm (Note 3)	1 MHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any *operating band*, the emission limits within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −4 dBm/1 MHz.

NOTE 2: For a *multi-band RIB* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or RF Bandwidth.

NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.

NOTE 4: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.

NOTE 5: Void.

Table 6.7.4.5.1.1-4: Wide Area BS *operating band* unwanted emission limits (4.2 GHz < NR bands ≤ 6 GHz) for Category A

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test requirement (Note 1, 2, 4)	Measurement bandwidth
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	4 dBm-7/5(f_offset/MHz-0.05)dB	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−3 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.5 MHz ≤ f_offset < f_offset_{max}	−4 dBm (Note 3)	1 MHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any *operating band*, the emission limits within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be -4 dBm/1 MHz.

NOTE 2: For a *multi-band RIB* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or RF Bandwidth.

NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.

NOTE 4: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.

NOTE 5: Void.

4.1.1.2 Wide Area BS Category B (Option 1)

For a RIB operating in Bands n5, n8, n12, n20, n26, n28, n29, n67, n71, n85, emissions should not exceed the maximum levels specified in Table 6.7.4.5.1.2-1 of TS 38.141-2 [2].

Table 6.7.4.5.1.2-1: Wide Area BS operating band unwanted emission limits (NR 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 (Note 1, 2, 4)	Measurement bandwidth
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	3.8 dBm-7/5(f_offset/MHz-0.05)dB	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	–3.2 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	–7 dBm (Note 3)	100 kHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any *operating band*, the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be -7 dBm/ 100 kHz.

NOTE 2: For a *multi-band RIB* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or RF Bandwidth.

NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.

NOTE 4: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.

NOTE 5: Void.

For a RIB operating in Bands n1, n2, n3, n7, n25, n34, n38, n39, n40, n41, n50, n65, n66, n70, n75, n77, n78, n79, emissions should not exceed the maximum levels specified in Tables 6.7.4.5.1.2-2 to 6.7.4.5.1.2-4 of TS 38.141-2 [2].

Table 6.7.4.5.1.2-2: Wide Area BS operating band unwanted emission limits (1 GHz < NR 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 (Note 1, 2, 4)	Measurement bandwidth
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	3.8 dBm-7/5(f_offset/MHz-0.05)dB	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−3.2 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.5 MHz ≤ f_offset < f_offset_{max}	−6 dBm (Note 3)	1 MHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any *operating band*, the emission limits within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −6 dBm/1 MHz.

NOTE 2: For a *multi-band RIB* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or RF Bandwidth.

NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.

NOTE 4: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.

NOTE 5: Void.

Table 6.7.4.5.1.2-3: Wide Area BS operating band unwanted emission limits (3 GHz < NR bands ≤ 4.2 GHz) for Category B

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test requirement (Note 1, 2, 4)	Measurement bandwidth
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	4 dBm-7/5(f_offset/MHz-0.05)dB	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−3 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.5 MHz ≤ f_offset < f_offset_{max}	−6 dBm (Note 3)	1 MHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any *operating band*, the emission limits within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −6 dBm/1 MHz.

NOTE 2: For a *multi-band RIB* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or RF Bandwidth.

NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.

NOTE 4: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.

NOTE 5: Void

Table 6.7.4.5.1.2-4: Wide Area BS operating band unwanted emission limits (4.2 GHz < NR bands ≤ 6 GHz) for Category B

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test requirement (Note 1, 2, 4)	Measurement bandwidth
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	4 dBm-7/5(f_offset/MHz-0.05)dB	100 kHz

5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset$_{max}$)	−3 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.5 MHz ≤ f_offset < f_offset$_{max}$	−6 dBm (Note 3)	1 MHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any *operating band*, the emission limits within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −6 dBm/1 MHz.

NOTE 2: For a *multi-band RIB* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or RF Bandwidth.

NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.

NOTE 4: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.

NOTE 5: Void

4.1.1.3 Wide Area BS Category B (Option 2)

For a RIB operating in bands n1, n3, n8, n65 emissions should not exceed the maximum levels specified in Table 6.7.4.5.1.3-1 of TS 38.141-2 [2].

Table 6.7.4.5.1.3-1: Regional Wide Area BS operating band unwanted emission limits for Category B

Frequency offset of measurement filter –3 dB point, Δf	**Frequency offset of measurement filter centre frequency, f_offset**	***Basic limit* (Note 1, 2, 5)**	**Measurement bandwidth**
0 MHz ≤ Δf < 0.2 MHz	0.015 MHz ≤ f_offset < 0.215 MHz	−3.2 dBm	30 kHz
0.2 MHz ≤ Δf < 1 MHz	0.215 MHz ≤ f_offset < 1.015 MHz	$-3.2dBm-15\cdot\left(\frac{f\_offset}{MHz}-0.215\right)dB$	30 kHz
(Note 4)	1.015 MHz ≤ f_offset < 1.5 MHz	−15.2 dBm	30 kHz
1 MHz ≤ Δf ≤ min(10 MHz, Δf_{max})	1.5 MHz ≤ f_offset < min(10.5 MHz, f_offset$_{max}$)	−2.2 dBm	1 MHz
10 MHz ≤ Δf ≤ Δf_{max}	10.5 MHz ≤ f_offset < f_offset$_{max}$	−6 dBm (Note 3)	1 MHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band, the minimum 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, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the minimum requirement within sub-block gaps shall be −6 dBm/1 MHz.

NOTE 2: For a *multi-band connector* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or RF Bandwidth.

NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.

NOTE 4: This frequency range ensures that the range of values of f_offset is continuous.

NOTE 5: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.

NOTE 6: Void.

4.1.1.4 Medium Range BS (Category A and Category B)

For Medium Range BS class in NR bands ≤ 3 GHz, emissions should not exceed the maximum levels specified in Tables 6.7.4.5.1.4-1 and 6.7.4.5.1.4-4 of TS 38.141-2 [2].

Table 6.7.4.5.1.4-1: Medium Range BS *operating band* unwanted emission limits, 40 < $P_{rated,c,TRP}$ ≤ 47 dBm (NR bands ≤ 3 GHz)

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test requirement (Note 1, 2, 4)	Measurement bandwidth
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$P_{rated,c,TRP} - 51.2dB - \frac{7}{5}(\frac{f\_offset}{MHz} - 0.05)dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	$P_{rated,c,TRP}$ – 58.2 dB	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	Min($P_{rated,c,TRP}$ −60 dB, −16 dBm) (Note 3)	100 kHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any *operating band* the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be Min($P_{rated,c,TRP}$ −60 dB, −16 dBm)/100 kHz.
NOTE 2: For a *multi-band RIB* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap.
NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.
NOTE 4: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.
NOTE 5: Void.

Table 6.7.4.5.1.4-4: Medium Range BS operating band unwanted emission limits, $P_{rated,c,TRP}$ ≤ 40 dBm

(NR bands ≤ 3 GHz)

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test requirement (Note 1, 2, 4)	Measurement bandwidth
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$-11.2dB - \frac{7}{5}(\frac{f\_offset}{MHz} - 0.05)dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−18.2 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	−20 dBm (Note 3)	100 kHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any *operating band* the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −20 dBm/100 kHz.
NOTE 2: For a *multi-band RIB* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap.
NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.
NOTE 4: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.
NOTE 5: Void.

For Medium Range BS class in 3 GHz <NR bands ≤ 4.2 GHz, emissions should not exceed the maximum levels specified in Tables 6.7.4.5.1.4-2 and 6.7.4.5.1.4-5 of TS 38.141-2 [2].

Table 6.7.4.5.1.4-2: Medium Range BS *operating band* unwanted emission limits, 40 < $P_{rated,c,TRP}$ ≤ 47 dBm (3 GHz < NR bands ≤ 4.2 GHz)

Frequency offset of measurement filter -3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test requirement (Note 1, 2, 4)	Measurement bandwidth
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$P_{rated,c,TRP} - 51dB - \frac{7}{5}(\frac{f\_offset}{MHz} - 0.05)dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	$P_{rated,c,TRP}$ - 58 dB	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	Min($P_{rated,c,TRP}$ −60 dB, −16 dBm) (Note 3)	100 kHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any *operating band* the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be Min($P_{rated,c,TRP}$ −60 dB, −16 dBm)/100 kHz.
NOTE 2: For a *multi-band RIB* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap.
NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.
NOTE 4: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.
NOTE 5: Void.

Table 6.7.4.5.1.4-5: Medium Range BS operating band unwanted emission limits, $P_{rated,c,TRP}$ ≤ 40 dBm (3 GHz < NR bands ≤ 4.2 GHz)

Frequency offset of measurement filter -3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test requirement (Note 1, 2, 4)	Measurement bandwidth
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$-11dB - \frac{7}{5}(\frac{f\_offset}{MHz} - 0.05)dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−18 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	−20 dBm (Note 3)	100 kHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any *operating band* the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −20 dBm/100 kHz.
NOTE 2: For a *multi-band RIB* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap.
NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.
NOTE 4: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.
NOTE 5: Void.

For Medium Range BS class in 4.2 GHz <NR bands ≤ 6 GHz, emissions should not exceed the maximum levels specified in Tables 6.7.4.5.1.4-3 and 6.7.4.5.1.4-6 of TS 38.141-2 [2].

Table 6.7.4.5.1.4-3: Medium Range BS operating band unwanted emission limits, 40 < $P_{rated,c,TRP}$ ≤ 47 dBm (4.2 GHz < NR bands ≤ 6 GHz)

Frequency offset of measurement filter -3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test requirement (Note 1, 2, 4)	Measurement bandwidth
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$P_{rated,c,TRP} - 51dB - \frac{7}{5}(\frac{f\_offset}{MHz} - 0.05)dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	$P_{rated,c,TRP}$ - 58 dB	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	Min($P_{rated,c,TRP}$ – 60 dB, -16 dBm) (Note 3)	100 kHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any *operating band* the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be Min($P_{rated,c,TRP}$ – 60 dB, -16 dBm)/100 kHz.
NOTE 2: For a *multi-band RIB* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap.
NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.
NOTE 4: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.
NOTE 5: Void.

Table 6.7.4.5.1.4-6: Medium Range BS operating band unwanted emission limits, $P_{rated,c,TRP}$ ≤ 40 dBm

(4.2 GHz < NR bands ≤ 6 GHz)

Frequency offset of measurement filter -3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test requirement (Note 1, 2, 4)	Measurement bandwidth
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$-11dB - \frac{7}{5}(\frac{f\_offset}{MHz} - 0.05)dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−18 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	−20 dBm (Note 3)	100 kHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any *operating band* the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −20 dBm/100 kHz.
NOTE 2: For a *multi-band RIB* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap.
NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.
NOTE 4: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.
NOTE 5: Void.

4.1.1.5 Local Area BS (Category A and Category B)

For Local Area BS class in NR bands ≤ 3 GHz, emissions should not exceed the maximum levels specified in Table 6.7.4.5.1.5-1 of TS 38.141-2 [2].

Table 6.7.4.5.1.5-1: Local Area BS operating band unwanted emission limits (NR bands ≤ 3 GHz)

Frequency offset of measurement filter -3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test requirement (Note 1, 2, 4)	Measurement bandwidth
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$-19.2dB-\frac{7}{5}(\frac{f\_offset}{MHz}-0.05)dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−26.2 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	−28 dBm (Note 3)	100 kHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any *operating band* the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −28 dBm/100 kHz.
NOTE 2: For a *multi-band RIB* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap
NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.
NOTE 4: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.
NOTE 5: Void.

For Local Area BS class in 3 GHz < NR bands ≤ 4.2 GHz, emissions should not exceed the maximum levels specified in Table 6.7.4.5.1.5-2 of TS 38.141-2 [2].

Table 6.7.4.5.1.5-2: Local Area BS operating band unwanted emission limits (3 GHz < NR bands ≤ 4.2 GHz)

Frequency offset of measurement filter -3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test requirement (Note 1, 2, 4)	Measurement bandwidth
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$-19dB-\frac{7}{5}(\frac{f\_offset}{MHz}-0.05)dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−26 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	−28 dBm (Note 3)	100 kHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any *operating band* the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −28 dBm/100 kHz.
NOTE 2: For a *multi-band RIB* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap
NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.
NOTE 4: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.
NOTE 5: Void.

For Local Area BS class in 4.2 GHz < NR bands ≤ 6 GHz, emissions should not exceed the maximum levels specified in Table 6.7.4.5.1.5-3 of TS 38.141-2 [2].

Table 6.7.4.5.1.5-3: Local Area BS operating band unwanted emission limits (4.2 GHz < NR bands ≤ 6 GHz)

Frequency offset of measurement filter -3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test requirement (Note 1, 2, 4)	Measurement bandwidth
0 MHz ≤ Δf < 5 MHz	0.05 MHz ≤ f_offset < 5.05 MHz	$-19dB-\frac{7}{5}(\frac{f\_offset}{MHz}-0.05)dB$	100 kHz
5 MHz ≤ Δf < min(10 MHz, Δf_{max})	5.05 MHz ≤ f_offset < min(10.05 MHz, f_offset_{max})	−26 dBm	100 kHz
10 MHz ≤ Δf ≤ Δf_{max}	10.05 MHz ≤ f_offset < f_offset_{max}	−28 dBm (Note 3)	100 kHz

NOTE 1: For a BS supporting non-contiguous spectrum operation within any *operating band* the emission limits 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 Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the emission limits within sub-block gaps shall be −28 dBm/100 kHz.

NOTE 2: For a *multi-band RIB* with Inter RF Bandwidth gap < 2*Δf_{OBUE} the emission limits within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap

NOTE 3: The requirement is not applicable when Δf_{max} < 10 MHz.

NOTE 4: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.

NOTE 5: Void.

4.1.1.6 Additional requirements

In certain regions the following additional requirements may apply:

– For protection of DTT, the requirement in clause 6.7.4.5.1.6.2 of TS 38.141-2 [2].

– For Protection of GPS, the requirement in clause 6.7.4.5.1.6.3 of TS 38.141-2 [2].

– For operation in Bands n50, n51, n74, n75, n76, the requirement in clause 6.7.4.5.1.6.4 of TS 38.141-2 [2].

6.7.4.5.1.6.2 Protection of DTT

In certain regions the following requirement may apply for protection of DTT. For *BS type 1-O* operating in Band n20, the level of emissions in the band 470-790 MHz, measured in an 8 MHz filter bandwidth on centre frequencies F_{filter} according to Table 6.7.4.5.1.6.2-1, shall not exceed the maximum emission TRP level shown in the table. This requirement applies in the frequency range 470-790 MHz even though part of the range falls in the spurious domain.

Table 6.7.4.5.1.6.2-1: Declared emissions levels for protection of DTT

Case	Measurement filter centre frequency	Condition on BS maximum aggregate EIRP / 10 MHz, P_{EIRP_10MHz} (NOTE)	Maximum level $P_{EIRP,N,MAX}$	Measurement bandwidth
A: for DTT frequencies where broadcasting is protected	N*8 + 306 MHz, 21 ≤ N ≤ 60	$P_{EIRP\_10MHz} \geq 59$ dBm	0 dBm	8 MHz
	N*8 + 306 MHz, 21 ≤ N ≤ 60	$36 \leq P_{EIRP\_10MHz} < 59$ dBm	$P_{EIRP\_10MHz} - 59$ dBm	8 MHz
	N*8 + 306 MHz, 21 ≤ N ≤ 60	$P_{EIRP\_10MHz} < 36$ dBm	−23 dBm	8 MHz
B: for DTT frequencies where broadcasting is subject to an intermediate level of protection	N*8 + 306 MHz, 21 ≤ N ≤ 60	$P_{EIRP\_10MHz} \geq 59$ dBm	10 dBm	8 MHz
	N*8 + 306 MHz, 21 ≤ N ≤ 60	$36 \leq P_{EIRP\_10MHz} < 59$ dBm	$P_{EIRP\_10MHz} - 49$ dBm	8 MHz
	N*8 + 306 MHz, 21 ≤ N ≤ 60	$P_{EIRP\_10MHz} < 36$ dBm	−13 dBm	8 MHz
C: for DTT frequencies where broadcasting is not protected	N*8 + 306 MHz, 21 ≤ N ≤ 60	N.A.	22 dBm	8 MHz

NOTE: P_{EIRP_10MHz} (dBm) is defined by $P_{EIRP_10MHz} = P_{10MHz} + G_{ant} + 9$dB, where G_{ant} is 17 dBi.

6.7.4.5.1.6.3 Protection of GPS

The level of emissions in the 1 541-1 650 MHz band, measured in measurement bandwidth according to Table 6.7.4.5.1.6.3-1 shall not exceed the maximum emission TRP limits indicated in the table. This requirement applies in the frequency range 1 541-1 650 MHz even though part of the range falls in the spurious domain.

Table 6.7.4.5.1.6.3-1: Emissions levels for protection of GPS

Operating Band	Frequency range (MHz)	Emission level (dBW) (Measurement bandwidth = 1 MHz)	Emission level (dBW) of discrete emissions of less than 700 Hz bandwidth (Measurement bandwidth = 1 kHz)	Emission level (dBW) of discrete emissions of less than 2 kHz bandwidth (Measurement bandwidth = 1 kHz)
n24	1 541-1 559	P_{EIRP} – 17 dBi + 9 dB		P_{EIRP} – 17 dBi + 9 dB
	1 559-1 610	P_{EIRP} – 17 dBi + 9 dB	P_{EIRP} – 17 dBi + 9 dB	
	1 610-1 650	P_{EIRP} – 17 dBi + 9 dB	P_{EIRP} – 17 dBi + 9 dB	

6.7.4.5.1.6.4 Additional limits for BS operating in Bands n50, n51, n74, n75, n76

For BS operating in bands n50, n51, n74, n75 and n76 additional emission limits that might be applicable in the OBUE frequency domain are specified in clause 6.7.5.4.5.

4.1.2 OTA Operating band unwanted emissions BS type 2-O

For BS type 2-O, for a RIB operating in multi-carrier or contiguous CA, the requirements apply to the frequencies starting from the edge of the contiguous transmission bandwidth. In addition, for a RIB operating in non-contiguous spectrum, the requirements apply inside any sub-block gap.

4.1.2.1 OTA operating band unwanted emission limits (Category A)

The power of unwanted emission should not exceed the limits in Tables 6.7.4.5.2.2-1, 6.7.4.5.2.2-2 or 6.7.4.5.2.2-3 of TS 38.141-2 [2].

Table 6.7.4.5.2.2-1: OBUE limits applicable in the frequency range 24.25 – 33.4 GHz

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test limit	Measurement bandwidth
0 MHz ≤ Δf < 0.1*$BW_{contiguous}$	0.5 MHz ≤ f_offset < 0.1* $BW_{contiguous}$ +0.5 MHz	Min(−2.3 dBm, Max($P_{rated,t,TRP}$ – 32.3 dB, -9.3 dBm))	1 MHz
0.1*$BW_{contiguous}$ ≤ Δf < Δf_{max}	0.1* $BW_{contiguous}$ +0.5 MHz ≤ f_offset < f_ $offset_{max}$	Min(−13 dBm, Max($P_{rated,t,TRP}$ – 43 dB, −20 dBm))	1 MHz

NOTE: For non-contiguous spectrum operation within any operating band the limit within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap.

Table 6.7.4.5.2.2-2: OBUE limits applicable in the frequency range 37 GHz – 43.5 GHz

Frequency offset of measurement filter −3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test limit	Measurement bandwidth
0 MHz ≤ Δf < 0.1*$BW_{contiguous}$	0.5 MHz ≤ f_offset < 0.1* $BW_{contiguous}$ +0.5 MHz	Min(−2.3 dBm, Max($P_{rated,t,TRP}$ – 30.3 dB, −9.3 dBm))	1 MHz
0.1*$BW_{contiguous}$ ≤ Δf < Δf_{max}	0.1* $BW_{contiguous}$ +0.5 MHz ≤ f_offset < f_ $offset_{max}$	Min(-13 dBm, Max($P_{rated,t,TRP}$ – 41 dB, −20 dBm))	1 MHz

NOTE: For non-contiguous spectrum operation within any operating band the limit within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap.

Table 6.7.4.5.2.2-3: OBUE limits applicable in the frequency range 43.5 GHz – 48.2 GHz

Frequency offset of measurement filter −3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test limit	Measurement bandwidth
0 MHz ≤ Δf < 0.1*$BW_{contiguous}$	0.5 MHz ≤ f_offset < 0.1* $BW_{contiguous}$ +0.5 MHz	Min(−2.1 dBm, Max($P_{rated,t,TRP}$ – 30.1 dB, −9.1 dBm))	1 MHz
0.1*$BW_{contiguous}$ ≤ Δf < Δf_{max}	0.1* $BW_{contiguous}$ +0.5 MHz ≤ f_offset < f_ $offset_{max}$	Min(−13 dBm, Max($P_{rated,t,TRP}$ – 41 dB, −20 dBm))	1 MHz

NOTE: For non-contiguous spectrum operation within any operating band the limit within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap.

4.1.2.2 OTA operating band unwanted emission limits (Category B)

The power of unwanted emission should not exceed the limits in Tables 6.7.4.5.2.3-1, 6.7.4.5.2.3-2 or 6.7.4.5.2.3-3 of TS 38.141-2 [2].

Table 6.7.4.5.2.3-1: OBUE limits applicable in the frequency range 24.25 – 33.4 GHz

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test limit	Measurement bandwidth
0 MHz ≤ Δf < 0.1*$BW_{contiguous}$	0.5 MHz ≤ f_offset < 0.1* $BW_{contiguous}$ +0.5 MHz	Min(−2.3 dBm, Max($P_{rated,t,TRP}$ − 32.3 dB, −9.3 dBm))	1 MHz
0.1*$BW_{contiguous}$ ≤ Δf < Δf_B	0.1* $BW_{contiguous}$ +0.5 MHz ≤ f_offset < Δf_B +0.5 MHz	Min(−13 dBm, Max($P_{rated,t,TRP}$ − 43 dB, −20 dBm))	1 MHz
Δf_B ≤ Δf < Δf_{max}	Δf_B +5 MHz ≤ f_offset < f_ $offset_{max}$	Min(−5 dBm, Max($P_{rated,t,TRP}$ − 33 dB, −10 dBm))	10 MHz

NOTE 1: For non-contiguous spectrum operation within any *operating band* the limit within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block.

NOTE 2: Δf_B = 2*$BW_{contiguous}$ when $BW_{contiguous}$ ≤ 500 MHz, otherwise Δf_B = $BW_{contiguous}$ + 500 MHz.

Table 6.7.4.5.2.3-2: OBUE limits applicable in the frequency range 37 – 43.5 GHz

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test limit	Measurement bandwidth
0 MHz ≤ Δf < 0.1*$BW_{contiguous}$	0.5 MHz ≤ f_offset < 0.1* $BW_{contiguous}$ +0.5 MHz	Min(−2.3 dBm, Max($P_{rated,t,TRP}$ − 30.3 dB, −9.3 dBm))	1 MHz
0.1*$BW_{contiguous}$ ≤ Δf < Δf_B	0.1* $BW_{contiguous}$ +0.5 MHz ≤ f_offset < Δf_B +0.5 MHz	Min(−13 dBm, Max($P_{rated,t,TRP}$ − 41 dB, −20 dBm))	1 MHz
Δf_B ≤ Δf < Δf_{max}	Δf_B +5 MHz ≤ f_offset < f_ $offset_{max}$	Min(−5 dBm, Max($P_{rated,t,TRP}$ − 31 dB, −10 dBm))	10 MHz

NOTE 1: For non-contiguous spectrum operation within any *operating band* the limit within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block.

NOTE 2: Δf_B = 2*$BW_{contiguous}$ when $BW_{contiguous}$ ≤ 500 MHz, otherwise Δf_B = $BW_{contiguous}$ + 500 MHz.

Table 6.7.4.5.2.3-3: OBUE limits applicable in the frequency range 43.5 – 48.2 GHz

Frequency offset of measurement filter –3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Test limit	Measurement bandwidth
0 MHz ≤ Δf < 0.1*$BW_{contiguous}$	0.5 MHz ≤ f_offset < 0.1* $BW_{contiguous}$ +0.5 MHz	Min(−2.1 dBm, Max($P_{rated,t,TRP}$ − 30.1 dB, −9.1 dBm))	1 MHz
0.1*$BW_{contiguous}$ ≤ Δf < Δf_B	0.1* $BW_{contiguous}$ +0.5 MHz ≤ f_offset < Δf_B +0.5 MHz	Min(−13 dBm, Max($P_{rated,t,TRP}$ − 41 dB, −20 dBm))	1 MHz
Δf_B ≤ Δf < Δf_{max}	Δf_B +5 MHz ≤ f_offset < f_ $offset_{max}$	Min(−5 dBm, Max($P_{rated,t,TRP}$ − 31 dB, −10 dBm))	10 MHz

NOTE 1: For non-contiguous spectrum operation within any *operating band* the limit within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block.

NOTE 2: Δf_B = 2*$BW_{contiguous}$ when $BW_{contiguous}$ ≤ 500 MHz, otherwise Δf_B = $BW_{contiguous}$ + 500 MHz.

4.1.2.3 Additional OTA operating band unwanted emission limits

The following additional requirement should apply:

– For BS operating in the frequency range 24.25-27.5 GHz, for protection of Earth Exploration Satellite Service, the requirement in Table 6.7.4.5.2.4.1-1 of TS 38.141-2 [2].

Table 6.7.4.5.2.4.1-1: BS radiated limits for protection of EESS

Frequency range	Measurement filter centre frequency range	Limit	Measurement Bandwidth
23.6-24 GHz	23.7-23.9 GHz	−3 dBm (Note 1)	200 MHz
23.6-24 GHz	23.7-23.9 GHz	−9 dBm (Note 2)	200 MHz

NOTE 1: This limit applies to BS brought into use on or before 1 September 2027.
NOTE 2: This limit applies to BS brought into use after 1 September 2027.

4.2 OTA Adjacent channel leakage ratio (ACLR)

4.2.1 BS type 1-O

For the OTA ACLR requirement either the OTA ACLR limits in tables 6.7.3.5.1-1/2a of TS 38.141-2 [2] or the OTA ACLR absolute limits in Table 6.7.3.5.1-2 of TS 38.141-2 [2] should apply, whichever is less stringent.

Table 6.7.3.5.1-1: *BS type 1-O* ACLR limit

BS channel bandwidth **of lowest/highest NR carrier transmitted $BW_{Channel}$ (MHz)**	**BS adjacent channel centre frequency offset below the lowest or above the highest carrier centre frequency transmitted**	**Assumed adjacent channel carrier (informative)**	**Filter on the adjacent channel frequency and corresponding filter bandwidth**	**OTA ACLR limit (0-3 GHz)**	**OTA ACLR limit (3-6 GHz)**
5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90,100	$BW_{Channel}$	NR of same BW (Note 2)	Square (BW_{Config})	44 dB	43.8 dB
	2 x $BW_{Channel}$	NR of same BW (Note 2)	Square (BW_{Config})	44 dB	43.8 dB
	$BW_{Channel}$ /2 + 2.5 MHz	5 MHz E-UTRA	Square (4.5 MHz)	44 dB (Note 3)	43.8 dB (Note 3)
	$BW_{Channel}$ /2 + 7.5 MHz	5 MHz E-UTRA	Square (4.5 MHz)	44 dB (Note 3)	43.8 dB (Note 3)

NOTE 1: $BW_{Channel}$ and BW_{Config} are the *BS channel bandwidth* and transmission bandwidth configuration of the lowest/highest NR carrier transmitted on the assigned channel frequency.
NOTE 2: With SCS that provides largest transmission bandwidth configuration (BW_{Config}).
NOTE 3: The requirements are applicable when the band is also defined for E-UTRA or UTRA.

Table 6.7.3.5.1-2a: *BS type 1-O* ACLR limit in non-contiguous spectrum or multiple bands

BS channel bandwidth **of lowest/highest NR carrier transmitted $BW_{Channel}$ (MHz)**	**Sub-block or Inter RF Bandwidth gap size (Wgap) where the limit applies (MHz)**	**BS adjacent channel centre frequency offset below or above the sub-block or Base Station RF Bandwidth edge (inside the gap)**	**Assumed adjacent channel carrier**	**Filter on the adjacent channel frequency and corresponding filter bandwidth**	**OTA ACLR limit (0-3 GHz)**	**OTA ACLR limit (3-6 GHz)**
5, 10, 15, 20	$W_{gap} \geq 15$ (Note 3) $W_{gap} \geq 45$ (Note 4)	2.5 MHz	5 MHz NR (Note 2)	Square (BW_{Config})	44 dB	43.8 dB
	Wgap ≥ 20 (Note 3) Wgap ≥ 50 (Note 4)	7.5 MHz	5 MHz NR (Note 2)	Square (BW_{Config})	44 dB	43.8 dB
25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100	Wgap ≥ 60 (Note 4) Wgap ≥ 30 (Note 3)	10 MHz	20 MHz NR (Note 2)	Square (BW_{Config})	44 dB	43.8 dB
	Wgap ≥ 80 (Note 4) Wgap ≥ 50 (Note 3)	30 MHz	20 MHz NR (Note 2)	Square (BW_{Config})	44 dB	43.8 dB

NOTE 1: BW_{Config} is the transmission bandwidth configuration of the assumed adjacent channel carrier.
NOTE 2: With SCS that provides largest transmission bandwidth configuration (BW_{Config}).
NOTE 3: Applicable in case the *BS channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 5, 10, 15, 20 MHz.
NOTE 4: Applicable in case the *BS channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 MHz.

Table 6.7.3.5.1-2: *BS type 1-O* ACLR absolute limit

BS category / BS class	**OTA ACLR absolute limit**
Category A Wide Area BS	−4 dBm/MHz
Category B Wide Area BS	−6 dBm/MHz
Medium Range BS	−16 dBm/MHz
Local Area BS	−23 dBm/MHz

NOTE 1: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.
NOTE 2: Void.

The assumed filter for the adjacent channel frequency is defined in Table 6.7.3.5.1-3 of TS 38.141-2 [2] and the filters on the assigned channels are defined in Table 6.7.3.5.1-4 of TS 38.141-2 [2].

Table 6.7.3.5.1-3: *BS type 1-O* CACLR limit

BS channel bandwidth **of lowest/highest NR carrier transmitted $BW_{Channel}$ (MHz)**	**Sub-block or Inter RF Bandwidth gap size (Wgap) where the limit applies (MHz)**	**BS adjacent channel centre frequency offset below or above the sub-block or Base Station RF Bandwidth edge (inside the gap)**	**Assumed adjacent channel carrier**	**Filter on the adjacent channel frequency and corresponding filter bandwidth**	**OTA CACLR limit (0-3 GHz)**	**OTA CACLR limit (3-6 GHz)**
5, 10, 15, 20	5 ≤ Wgap < 15 (Note 3) 5 ≤ Wgap < 45 (Note 4)	2.5 MHz	5 MHz NR (Note 2)	Square (BW_{Config})	44 dB	43.8 dB
	10 < Wgap < 20 (Note 3) 10 ≤ Wgap < 50 (Note 4)	7.5 MHz	5 MHz NR (Note 2)	Square (BW_{Config})	44 dB	43.8 dB
25, 30, 35, 40, 45, 50, 60, 70, 80,90, 100	20 ≤ Wgap < 60 (Note 4) 20 ≤ Wgap < 30 (Note 3)	10 MHz	20 MHz NR (Note 2)	Square (BW_{Config})	44 dB	43.8 dB
	40 < Wgap < 80 (Note 4) 40 ≤ Wgap < 50 (Note 3)	30 MHz	20 MHz NR (Note 2)	Square (BW_{Config})	44 dB	43.8 dB

NOTE 1: BW_{Config} is the transmission bandwidth configuration of the assumed adjacent channel carrier.
NOTE 2: With SCS that provides largest transmission bandwidth configuration (BW_{Config}).
NOTE 3: Applicable in case the *BS channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 5, 10, 15, 20 MHz.
NOTE 4: Applicable in case the *BS channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 MHz.

Table 6.7.3.5.1-4: Filter parameters for the assigned channel

RAT of the carrier adjacent to the sub-block or Inter RF Bandwidth gap	**Filter on the assigned channel frequency and corresponding filter bandwidth**
NR	NR of same BW with SCS that provides largest transmission bandwidth configuration

For operation in paired and unpaired spectrum, the OTA ACLR measurement result should not be less than the OTA ACLR limit specified in Table 6.7.3.5.1-1 of TS 38.141-2 [2].

The absolute total power measurement should not exceed the OTA ACLR absolute limit specified in Table 6.7.3.5.1-2 of TS 38.141-2 [2].

For operation in non-contiguous spectrum or multiple bands, the OTA ACLR measurement result should not be less than the OTA ACLR limit specified in Table 6.7.3.5.1-2a of TS 38.141-2 [2].

4.2.2 BS type 2-O

For the OTA ACLR requirement either the OTA ACLR limits in Tables 6.7.3.5.2-1/3 of TS 38.141-2 [2] or the OTA ACLR absolute limits in Table 6.7.3.5.2-2 of TS 38.141-2 [2] should apply, whichever is less stringent.

Table 6.7.3.5.2-1: *BS type 2-O* ACLR limit

***BS channel bandwidth* of lowest/highest NR carrier transmitted $BW_{Channel}$ (MHz)**	**BS adjacent channel centre frequency offset below the lowest or above the highest carrier centre frequency transmitted**	**Assumed adjacent channel carrier**	**Filter on the adjacent channel frequency and corresponding filter bandwidth**	**OTA ACLR limit (dB)**
50, 100, 200, 400	$BW_{Channel}$	NR of same BW (Note 2)	Square (BW_{Config})	25.7 (Note 3) 23.4 (Note 4) 23.2 (Note 5)

NOTE 1: $BW_{Channel}$ and BW_{Config} are the *BS channel bandwidth* and transmission bandwidth configuration of the lowest/highest NR carrier transmitted on the assigned channel frequency.
NOTE 2: With SCS that provides largest transmission bandwidth configuration (BW_{Config}).
NOTE 3: Applicable to bands defined within the frequency spectrum range of 24.25-33.4 GHz
NOTE 4: Applicable to bands defined within the frequency spectrum range of 37-43.5 GHz
NOTE 5: Applicable to bands defined within the frequency spectrum range of 43.5-48.2 GHz

Table 6.7.3.5.2-2: *BS type 2-O* ACLR absolute limit

BS class	**ACLR absolute limit (Note 1)**	**ACLR absolute limit (Note 2)**
Wide-area BS	−10.3 dBm/MHz	−10.1 dBm/MHz
Medium-range BS	−17.3 dBm/MHz	−17.1 dBm/MHz
Local-area BS	−17.3 dBm/MHz	−17.1 dBm/MHz

NOTE 1: Applicable to bands defined within the frequency spectrum range of 24.25-43.5 GHz
NOTE 2: Applicable to bands defined within the frequency spectrum range of 43.5-48.2 GHz

Table 6.7.3.5.2-3: *BS type 2-O* ACLR limit in non-contiguous spectrum

***BS channel bandwidth* of lowest/highest NR carrier transmitted (MHz)**	**Sub-block gap size (Wgap) where the limit applies (MHz)**	**BS adjacent channel centre frequency offset below or above the sub-block edge (inside the gap)**	**Assumed adjacent channel carrier**	**Filter on the adjacent channel frequency and corresponding filter bandwidth**	**OTA ACLR limit (MHz)**
50, 100	$W_{gap} \geq 100$ (Note 5) $W_{gap} \geq 250$ (Note 6)	25 MHz	50 MHz NR (Note 2)	Square (BW_{Config})	25.7 (Note 3) 23.4 (Note 4) 23.2 (Note 7)
200, 400	Wgap ≥ 400 (Note 6) Wgap ≥ 250 (Note 5)	100 MHz	200 MHz NR (Note 2)	Square (BW_{Config})	25.7 (Note 3) 23.4 (Note 4) 23.2 (Note 7)

NOTE 1: BW_{Config} is the transmission bandwidth configuration of the assumed adjacent channel carrier.
NOTE 2: With SCS that provides largest transmission bandwidth configuration (BW_{Config}).
NOTE 3: Applicable to bands defined within the frequency spectrum range of 24.24-33.4 GHz.
NOTE 4: Applicable to bands defined within the frequency spectrum range of 37-43.5 GHz.
NOTE 5: Applicable in case the *BS channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 50 or 100 MHz.
NOTE 6: Applicable in case the *BS channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 200 or 400 MHz.
NOTE 7: Applicable to bands defined within the frequency spectrum range of 43.5-48.2 GHz.

The assumed filter for the adjacent channel frequency is defined in Table 6.7.3.5.2-4 of TS 38.141-2 [2] and the filters on the assigned channels are defined in Table 6.7.3.5.2-5 of TS 38.141-2 [2].

Table 6.7.3.5.2-4: *BS type 2-O* CACLR limit in non-contiguous spectrum

***BS channel bandwidth* of lowest/highest NR carrier transmitted (MHz)**	**Sub-block gap size (Wgap) where the limit applies (MHz)**	**BS adjacent channel centre frequency offset below or above the sub-block edge (inside the gap)**	**Assumed adjacent channel carrier**	**Filter on the adjacent channel frequency and corresponding filter bandwidth**	**OTA CACLR limit (dB)**
50, 100	50 ≤ Wgap < 100 (Note 5) 50 ≤ Wgap < 250 (Note 6)	25 MHz	50 MHz NR (Note 2)	Square (BW_{Config})	25.7 (Note 3) 23.4 (Note 4) 23.2 (Note 7)
200, 400	200 ≤ Wgap < 400 (Note 6) 200 ≤ Wgap < 250 (Note 5)	100 MHz	200 MHz NR (Note 2)	Square (BW_{Config})	25.7 (Note 3) 23.4 (Note 4) 23.2 (Note 7)

NOTE 1: BW_{Config} is the transmission bandwidth configuration of the assumed adjacent channel carrier.
NOTE 2: With SCS that provides largest transmission bandwidth configuration (BW_{Config}).
NOTE 3: Applicable to bands defined within the frequency spectrum range of 24.24-33.4 GHz.
NOTE 4: Applicable to bands defined within the frequency spectrum range of 37-43.5 GHz.
NOTE 5: Applicable in case the *BS channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 50 or 100 MHz.
NOTE 6: Applicable in case the *BS channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 200 or 400 MHz.
NOTE 7: Applicable to bands defined within the frequency spectrum range of 43.5-48.2 GHz.

Table 6.7.3.5.2-5: Filter parameters for the assigned channel

RAT of the carrier adjacent to the sub-block gap	**Filter on the assigned channel frequency and corresponding filter bandwidth**
NR	NR of same BW with SCS that provides largest transmission bandwidth configuration

The OTA ACLR measurement result should not be less than the OTA ACLR limit specified in Table 6.7.3.5.2-1 of TS 38.141-2 [2].

The absolute total power measurement should not exceed the OTA ACLR absolute limit specified in Table 6.7.3.5.2-2 of TS 38.141-2 [2].

For operation in non-contiguous spectrum, the OTA ACLR measurement result should not be less than the OTA ACLR limit specified in Table 6.7.3.5.2-3 of TS 38.141-2 [2].

4.3 OTA Cumulative adjacent channel leakage ratio (CACLR)

4.3.1 BS type 1-O

The OTA CACLR limits in Table 6.7.3.5.1-3 of TS 38.141-2 [2] or the OTA CACLR absolute limits in Table 6.7.3.5.1-3a of TS 38.141-2 [2] should apply, whichever is less stringent.

Table 6.7.3.5.1-3a: *BS type 1-O* CACLR absolute limit

BS category / BS class	OTA CACLR absolute limit
Category A Wide Area BS	−4 dBm/MHz
Category B Wide Area BS	−6 dBm/MHz
Medium Range BS	−16 dBm/MHz
Local Area BS	−23 dBm/MHz

NOTE 1: The test requirement is derived from the basic limit a scaling factor of 9 dB and any applicable TT.
NOTE 2: Void

The CACLR in a sub-block gap and Inter RF Bandwidth gap is the ratio of:

a) the sum of the filtered mean power centred on the assigned channel frequencies for the two carriers adjacent to each side of the sub-block gap or the Inter RF Bandwidth gap, and

b) the filtered mean power centred on a frequency channel adjacent to one of the respective sub-block edges or Base Station RF Bandwidth edges.

The assumed filter for the adjacent channel frequency is defined in Table 6.7.3.5.1-3 of TS 38.141-2 [2] and the filters on the assigned channels are defined in Table 6.7.3.5.1-4 of TS 38.141-2 [2].

The OTA CACLR measurement result should not less than the OTA CACLR limit specified in Table 6.7.3.5.1-3 of TS 38.141-2 [2].

The absolute total power measurement should not exceed the OTA CACLR absolute limit specified in Table 6.7.3.5.1-3a of TS 38.141-2 [2].

4.3.2 BS type 2-O

The OTA CACLR limits in Table 6.7.3.5.2-4 of TS 38.141-2 [2] or the OTA CACLR absolute limits in Table 6.7.3.5.2-4a of TS 38.141-2 [2] should apply, whichever is less stringent.

Table 6.7.3.5.2-4a: *BS type 2-O* CACLR absolute limit

BS class	CACLR absolute limit (Note 1)	ACLR absolute limit (Note 2)
Wide area BS	−10.3 dBm/MHz	−10.1 dBm/MHz
Medium range BS	−17.3 dBm/MHz	−17.1 dBm/MHz
Local area BS	−17.3 dBm/MHz	−17.1 dBm/MHz
NOTE 1: Applicable to bands defined within the frequency spectrum range of 24.25-43.5 GHz NOTE 2: Applicable to bands defined within the frequency spectrum range of 43.5-48.2 GHz		

The CACLR in a sub-block gap is the ratio of:

a) the sum of the filtered mean power centred on the assigned channel frequencies for the two carriers adjacent to each side of the sub-block gap, and

b) the filtered mean power centred on a frequency channel adjacent to one of the respective sub-block edges.

The assumed filter for the adjacent channel frequency is defined in Table 6.7.3.5.2-4 of TS 38.141-2 [2] and the filters on the assigned channels are defined in Table 6.7.3.5.2-5 of TS 38.141-2 [2].

For operation in non-contiguous spectrum, the CACLR for carriers located on either side of the sub-block gap should be less than the value specified in Table 6.7.3.5.2-4 of TS 38.141-2 [2].

The absolute total power measurement should not exceed the OTA CACLR absolute limit specified in Table 6.7.3.5.2-4a of TS 38.141-2 [2].

4.4 OTA Transmitter spurious emissions

4.4.1 OTA transmitter spurious emissions BS type 1-O

For Category A BS the TRP of any spurious emission should not exceed the limits in Table 6.7.5.2.5.1-1 in TS 38.141-2 [2]. For Category B BS the TRP of any spurious emission should not exceed the limits in Table 6.7.5.2.5.1-2 in TS 38.141-2 [2].

Table 6.7.5.2.5.1-1: General OTA BS transmitter spurious emission limits for *BS type 1-O*, Category A

Spurious frequency range	Test limit	Measurement bandwidth	Notes
30 MHz – 1 GHz	−13 + X dBm	100 kHz	Note 1, Note 6
1 GHz – 12.75 GHz		1 MHz	Note 1, Note 2, Note 6
12.75 GHz – 5th harmonic of the upper frequency edge of the DL *operating band* in GHz		1 MHz	Note 1, Note 2, Note 3, Note 6

NOTE 1: Measurement bandwidths as in ITU-R SM.329 [5], s4.1.
NOTE 2: Upper frequency as in ITU-R SM.329 [5], s2.5 Table 1.
NOTE 3: This spurious frequency range applies only for *operating bands* for which the 5th harmonic of the upper frequency edge of the DL *operating band* is reaching beyond 12.75 GHz.
NOTE 4: Void.
NOTE 5: Void.
NOTE 6: X = 9 dB, unless stated differently in regional regulation.

Table 6.7.5.2.5.1-2: General OTA BS transmitter spurious emission limits for *BS type 1-O*, Category B

Spurious frequency range	Test limit	Measurement bandwidth	Notes
30 MHz – 1 GHz	−36 + X dBm	100 kHz	Note 1, Note 5
1 GHz – 12.75 GHz	−30 + X dBm	1 MHz	Note 1, Note 2, Note 5
12.75 GHz – 5th harmonic of the upper frequency edge of the DL *operating band* in GHz		1 MHz	Note 1, Note 2, Note 3, Note 5

NOTE 1: Measurement bandwidths as in ITU-R SM.329 [5], s4.1.
NOTE 2: Upper frequency as in ITU-R SM.329 [5], s2.5 Table 1.
NOTE 3: This spurious frequency range applies only for *operating bands* for which the 5th harmonic of the upper frequency edge of the DL *operating band* is reaching beyond 12.75GHz.
NOTE 4: Void.
NOTE 5: X = 9 dB, unless stated differently in regional regulation.

4.4.2 OTA transmitter spurious emissions BS type 2-O

For Category A BS the power of any spurious emission should not exceed the limits in Table 6.7.5.2.5.2.2-1 in TS 38.141-2 [2]. For Category B BS the power of any spurious emission should not exceed the limits in Table 6.7.5.2.5.2.3-1 in TS 38.141-2 [2].

Table 6.7.5.2.5.2.2-1: General OTA BS transmitter spurious emission limits for *BS type 2-O*

Spurious frequency range	Test limit	Measurement bandwidth	Notes
30 MHz – 1 GHz	−13 dBm	100 kHz	Note 1
1 GHz – min(2nd harmonic of the upper frequency edge of the DL operating band in GHz; 60 GHz)		1 MHz	Note 1, Note 2

NOTE 1: Measurement bandwidth as in ITU-R SM.329 [5], s4.1.
NOTE 2: Upper frequency as in ITU-R SM.329 [5], s2.5 Table 1.

Table 6.7.5.2.5.2.3-1: BS radiated Tx spurious emission limits in FR2 (Category B)

Frequency range (Note 4)	Test limit	Measurement Bandwidth	Note
30 MHz ↔ 1 GHz	−36 dBm	100 kHz	Note 1
1 GHz ↔ 18 GHz	−30 dBm	1 MHz	Note 1
18 GHz ↔ $F_{step,1}$	−20 dBm	10 MHz	Note 2
$F_{step,1}$ ↔ $F_{step,2}$	−15 dBm	10 MHz	Note 2
$F_{step,2}$ ↔ $F_{step,3}$	−10 dBm	10 MHz	Note 2
$F_{step,4}$ ↔ $F_{step,5}$	−10 dBm	10 MHz	Note 2
$F_{step,5}$ ↔ $F_{step,6}$	−15 dBm	10 MHz	Note 2
$F_{step,6}$ ↔ min(2nd harmonic of the upper frequency edge of the DL operating band in GHz; 60 GHz)	−20 dBm	10 MHz	Note 2, Note 3

NOTE 1: Bandwidth as in ITU-R SM.329 [5], s4.1
NOTE 2: Limit and bandwidth as in ERC Recommendation 74-01 [26], annex 2.
NOTE 3: Upper frequency as in ITU-R SM.329 [5], s2.5 Table 1.
NOTE 4: The step frequencies $F_{step,X}$ are defined in Table 6.7.5.2.5.2.3-2.

4.4.3 Protection of the BS receiver of own or different BS

This requirement should be applied for NR FDD operation in order to prevent the receivers of own or a different BS of the same band being desensitised by emissions from a BS type 1-O.

This requirement is a co-location requirement as defined in clause 4.9, in TS 38.104 [6]. The power levels are specified at the CLTA output, as described in 4.12.2 of TS 38.141-2 [2].

4.9 OTA co-location with other base stations

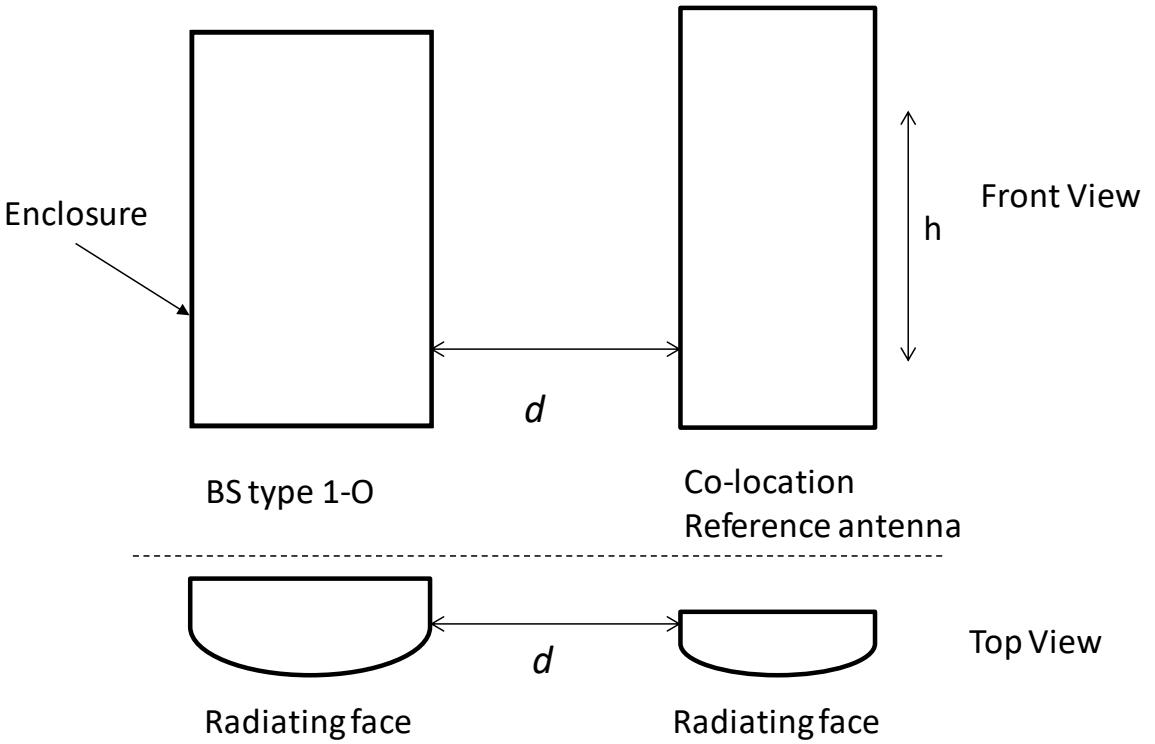
Co-location requirements are requirements which are based on assuming the *BS type 1-O* is co-located with another BS of the same base station class, they ensure that both co-located systems can operate with minimal degradation to each other.

Unwanted emission and out of band blocking co-location requirements are optional requirements based on declaration. TX OFF and TX IMD are mandatory requirements and have the form of a co-location requirement as it represents the worst-case scenario of all the interference cases.

NOTE: Due to the low level of the unwanted emissions for the spurious emissions and TX OFF level co-location is the most suitable method to show conformance.

The *co-location reference antenna* shall be a single column passive antenna which has the same vertical radiating dimension (h), frequency range, polarization, as the composite antenna of the *BS type 1-O* and nominal 65° horizontal half-power beamwidth (suitable for 3-sector deployment) and is placed at a distance *d* from the edge of the *BS type 1-O*, as shown in Figure 4.9-1.

Figure 4.9-1: Illustration of *BS type 1-O* enclosure and co-location reference antenna



Edge-to-edge separation *d* between the *BS type 1-O* and the *co-location reference antenna* shall be set to 0.1 m.

The *BS type 1-O* and the *co-location reference antenna* shall be aligned in a common plane perpendicular to the mechanical bore-sight direction, as shown in Figure 4.9-1.

The *co-location reference antenna* and the *BS type 1-O* can have different width.

The vertical radiating regions of the *co-location reference antenna* and the *BS type 1-O* composite antenna shall be aligned.

For co-location requirements where the frequency range of the signal at the *co-location reference antenna* is different from the *BS type 1-O*, a *co-location reference antenna* suitable for the frequency stated in the requirement is assumed.

OTA co-location requirements are based on the power at the conducted interface of a *co-location reference antenna*, depending on the requirement this interface is either an input or an output. For *BS type 1-O* with dual polarization *the co-location reference antenna* has two conducted interfaces each representing one polarization.

4.12.2 Co-location test antenna

4.12.2.1 General

Co-location requirements are specified as power levels into or out of the conducted interface of the *co-location reference antenna*. For conformance testing the requirements are translated to the input or output of a *co-location test antenna* (CLTA).

A CLTA is a practical antenna which can be used to test conformance to the co-location requirements.

4.12.2.2 Co-location test antenna characteristics

A *co-location test antenna* is a practical passive antenna that is used for conformance testing of the co-location requirements and is based on the definition of the *co-location reference antenna*. A CLTA shall comply with the requirements specified in Table 4.12.2.2-1.

Translation of the requirements to other test antennas are not precluded but suitable translations between the co-location reference antenna and test antenna must be provided to demonstrate that the method is within the specified MU.

NOTE: The currently defined CLTAs are suitable for testing *BS type 1-O* implemented with a planar antenna array. The method for testing BS with other antenna array implementations is not covered by the present release of this specification.

Table 4.12.2.2-1: CLTA characteristics

Parameter	In-band CLTA	Out-of-band CLTAs
Vertical radiating dimension (h)	Test object vertical radiating length ±30%	Test object vertical radiating length ±30% (Note 2)
Horizontal beam width	65° ± 10°	65° ± 10°
Vertical beam width	N/A	The half-power vertical beam width of the CLTA equals the narrowest declared (D.3) vertical beamwidth ±3° (Note 2)
Polarization (Note 3)	Match (Note 4)	Match to in-band (Note 4)
Conducted interface return loss	> 10 dB	> 10 dB

NOTE 1: If a multi-column or multi-band antenna is used the column closest to the NR BS shall be selected while other columns are terminated during testing.
NOTE 2: The vertical radiating dimension definition shall be used instead of the vertical beam width definition when the test chamber dimensions limit the use of vertical beam width definition. Otherwise the vertical beam width definition shall be used.
NOTE 3: For *BS type 1-O* with dual polarization the CLTA has two conducted interfaces each representing one polarization.
NOTE 4: Matched to the polarization of EUT antenna.

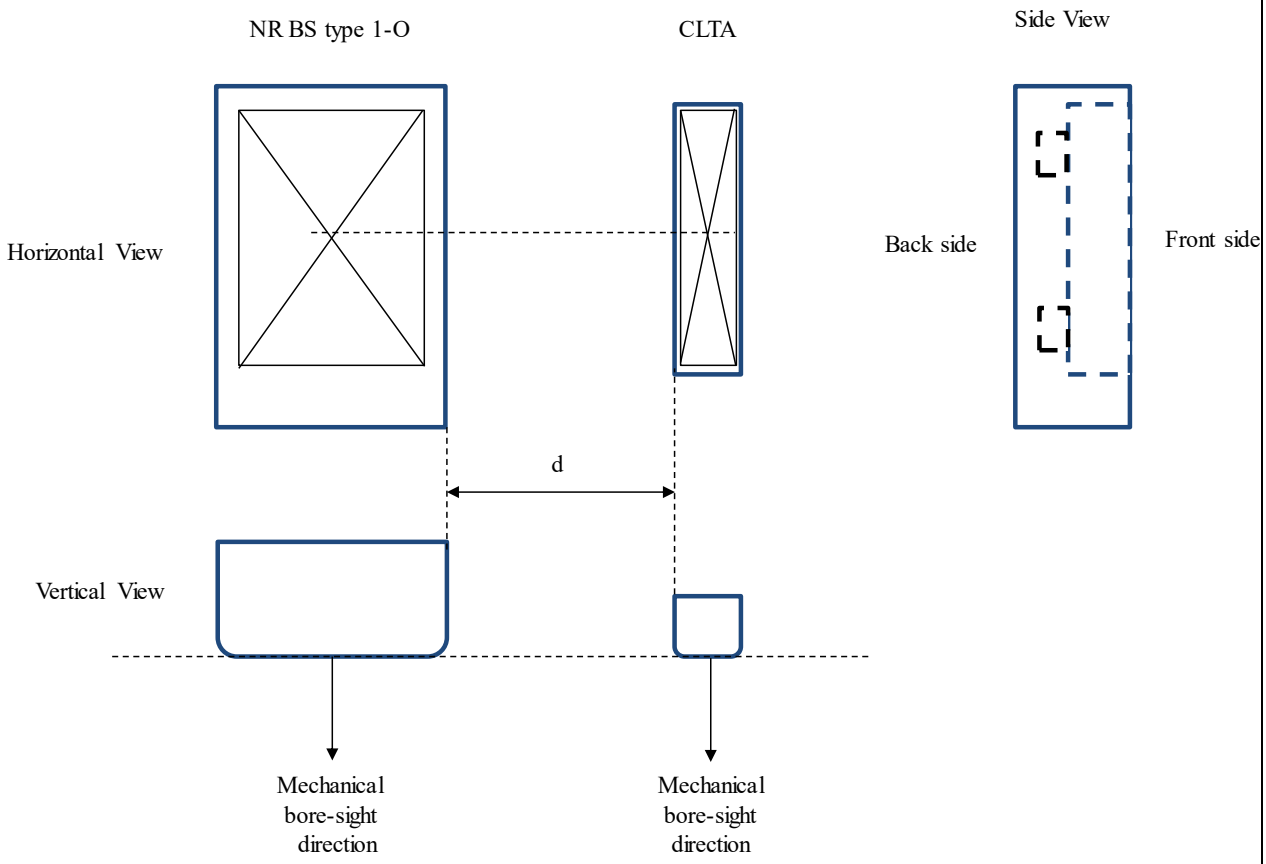
4.12.2.3 Co-location test antenna alignment

The alignment between the NR BS under test and the *co-location test antenna* is described in Table 4.12.2.3-1 and Figure 4.12.2.3-1. The same physical alignment applies to in-band and out-of-band co-location requirements.

Table 4.12.2.3-1: CLTA alignment tolerances

Parameter	
Edge-to-edge separation between the NR BS and the CLTA, d	0.1 m ± 0.01 m
Vertical alignment	Centre ± 0.01 m
Front alignment	Radome front ± 0.01 m

Figure 4.12.2.3-1: Alignment of NR BS and CLTA



The total power of any spurious emission from both polarizations of the CLTA connector output should not exceed the limits in Table 6.7.5.3.5.1-1 in TS 38.141-2 [2].

Table 6.7.5.3.5.1-1: *BS type 1-O* OTA spurious emissions limits for protection of the BS receiver

BS class	Frequency range	Maximum Level for bands below 3GHz	Maximum Level for bands between 3 and 4.2GHz	Maximum Level for bands between 4.2 and 6GHz	Measurement bandwidth
Wide Area BS	F_{UL_low} – F_{UL_high}	−113.9 dBm	−113.7 dBm	−113.6 dBm	100 kHz
Medium Range BS		−108.9 dBm	−108.7 dBm	−108.6 dBm	
Local Area BS		−105.9 dBm	−105.7 dBm	−105.6 dBm	

4.4.4 Additional spurious emissions requirements

In certain regions the following additional requirements in TS 38.141-2 [2] may apply:

For BS co-existence with systems operating in other frequency bands, the requirement in Table 6.7.5.4.5-1.

For protection of PHS, the requirement in Table 6.7.5.4.5-2

For BS operating in Band n50 and n75 within 1432-1452 MHz, and in Band n51 and Band n76, the requirement in Table 6.7.5.4.5-3.

For BS operating in NR Band n50 and n75 within 1492-1517 MHz, and in Band n74 within 1492-1518 MHz, the requirements in Table 6.7.5.4.5-4.

For BS operating in Band n13 and n14 to ensure that appropriate interference protection is provided to 700 MHz public safety operations, the requirements in Table 6.7.5.4.5-5.

For BS operating in Band n30, the requirements in Table 6.7.5.4.5-6.

For BS operating in Band n26 to ensure that appropriate interference protection is provided to 800 MHz public safety operations, the requirements in Table 6.7.5.4.5-7.

Table 6.7.5.4.5-1: BS spurious emissions test limits for BS for co-existence with systems operating in other frequency bands

System type for NR to co-exist with	Frequency range for co-existence requirement	Test limit	Measurement bandwidth	Notes
GSM900	921-960 MHz	−45.4 dBm	100 kHz	This requirement does not apply to BS operating in band n8.
	876-915 MHz	−49.4 dBm	100 kHz	For the frequency range 880-915 MHz, this requirement does not apply to BS operating in band n8, since it is already covered by the requirement in clause 6.7.5.3.
DCS1800	1 805-1 880 MHz	−35.4 dBm	100 kHz	This requirement does not apply to BS operating in band n3.
	1 710-1 785 MHz	−49.4 dBm	100 kHz	This requirement does not apply to BS operating in band n3, since it is already covered by the requirement in clause 6.7.5.3.
PCS1900	1 930-1 990 MHz	−35.4 dBm	100 kHz	This requirement does not apply to BS operating in band n2, n25 or band n70.
	1 850-1 910 MHz	−49.4 dBm	100 kHz	This requirement does not apply to BS operating in band n2 or n25 since it is already covered by the requirement in clause 6.7.5.3.
GSM850 or CDMA850	869-894 MHz	−45.4 dBm	100 kHz	This requirement does not apply to BS operating in band n5 or n26.
	824-849 MHz	−49.4 dBm	100 kHz	This requirement does not apply to BS operating in band n5 or n26, since it is already covered by the requirement in clause 6.7.5.3.
UTRA FDD Band I or E-UTRA Band 1 or NR Band n1	2 110-2 170 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n1 or n65.
	1 920-1 980 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n1 or n65, since it is already covered by the requirement in clause 6.7.5.3.
UTRA FDD Band II or E-UTRA Band 2 or NR Band n2	1 930-1 990 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n2 or n70.
	1 850-1 910 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n2, since it is already covered by the requirement in clause 6.7.5.3.
UTRA FDD Band III or E-UTRA Band 3 or NR Band n3	1 805-1 880 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n3.
	1 710-1 785 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n3, since it is already covered by the requirement in clause 6.7.5.3.
UTRA FDD Band IV or E-UTRA Band 4	2 110-2 155 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n66.
	1 710-1 755 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n66, since it is already covered by the requirement in clause 6.7.5.3.
UTRA FDD Band V or	869-894 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n5 or n26.

E-UTRA Band 5 or NR Band n5	824-849 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n5 or n26, since it is already covered by the requirement in clause 6.7.5.3.
UTRA FDD Band VI, XIX or E-UTRA Band 6, 18, 19	860-890 MHz	−40.4 dBm	1 MHz	
	815-830 MHz	−37.4 dBm	1 MHz	
	830-845 MHz	−37.4 dBm	1 MHz	
UTRA FDD Band VII or E-UTRA Band 7 or NR Band n7	2 620-2 690 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n7.
	2 500-2 570 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n7, since it is already covered by the requirement in clause 6.7.5.3.
UTRA FDD Band VIII or E-UTRA Band 8 or NR Band n8	925-960 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n8.
	880-915 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n8, since it is already covered by the requirement in clause 6.7.5.3.
UTRA FDD Band IX or E-UTRA Band 9	1 844.9-1 879.9 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n3.
	1 749.9-1 784.9 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n3, since it is already covered by the requirement in clause 6.7.5.3.
UTRA FDD Band X or E-UTRA Band 10	2 110-2 170 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n66
	1 710-1 770 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n66, since it is already covered by the requirement in clause 6.7.5.3.
UTRA FDD Band XI or XXI or E-UTRA Band 11 or 21	1 475.9-1 510.9 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n74 or n75.
	1 427.9-1 447.9 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n74, n75 or n76.
	1 447.9-1 462.9 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n74 or n75.
UTRA FDD Band XII or E-UTRA Band 12 or NR Band n12	729-746 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n12 or n85.
	699-716 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n12 or n85, since it is already covered by the requirement in clause 6.7.5.3. For NR BS operating in n29, it applies 1 MHz below the Band n29 downlink operating band (Note 5).
UTRA FDD Band XIII or E-UTRA Band 13 or NR Band n13	746-756 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n13.
	777-787 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n13, since it is already covered by the requirement in clause 6.7.5.3.
UTRA FDD Band XIV or E-UTRA Band 14 or NR Band n14	758-768 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n14.
	788-798 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n14, since it is already covered by the requirement in clause 6.7.5.3.
E-UTRA Band 17	734-746 MHz	−40.4 dBm	1 MHz	
	704-716 MHz	−37.4 dBm	1 MHz	For NR BS operating in n29, it applies 1 MHz below the Band n29 downlink operating band (Note 5).
UTRA FDD Band XX or E-UTRA Band 20 or NR Band n20	791-821 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n20 or n28.
	832-862 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n20, since it is already covered by the requirement in clause 6.7.5.3.
UTRA FDD Band XXII or E-UTRA Band 22	3 510-3 590 MHz	−40 dBm	1 MHz	This requirement does not apply to BS operating in Band n77 or n78.
	3 410-3 490 MHz	−37 dBm	1 MHz	This requirement does not apply to BS operating in Band n77 or n78.

E-UTRA Band 24 or NR Band n24	1 525-1 559 MHz	−40.4 dBm	1 MHz	
	1 626.5-1 660.5 MHz	−37.4 dBm	1 MHz	
UTRA FDD Band XXV or E−UTRA Band 25 or NR band n25	1 930-1 995 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n2, n25 or n70.
	1 850-1 915 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n25 since it is already covered by the requirement in clause 6.7.5.3. For BS operating in Band n2, it applies for 1910 MHz to 1915 MHz, while the rest is covered in clause 6.7.5.3.
UTRA FDD Band XXVI or E-UTRA Band 26 or NR Band n26	859-894 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n5 or n26.
	814-849 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n26 since it is already covered by the requirement in clause 6.7.5.3. For BS operating in Band n5, it applies for 814 MHz to 824 MHz, while the rest is covered in clause 6.7.5.3.
E-UTRA Band 27	852-869 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n5.
	807-824 MHz	−37.4 dBm	1 MHz	This requirement also applies to BS operating in Band n28, starting 4 MHz above the Band n28 downlink *operating band* (Note 5).
E-UTRA Band 28 or NR Band n28	758-803 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n20, n67 or n28.
	703-748 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n28, since it is already covered by the requirement in clause 6.7.5.3. For BS operating in band n67, it applies for 703 MHz to 736 MHz.
E-UTRA Band 29 or NR Band n29	717-728 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n29 or n85.
E-UTRA Band 30 or NR Band n30	2 350-2 360 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n30.
	2 305-2 315 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n30, since it is already covered by the requirement in clause 6.7.5.3.
E-UTRA Band 31	462.5-467.5 MHz	−40.4 dBm	1 MHz	
	452.5-457.5 MHz	−37.4 dBm	1 MHz	
UTRA FDD band XXXII or E-UTRA band 32	1 452-1 496 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n74 or n75.
UTRA TDD Band a) or E-UTRA Band 33	1 900-1 920 MHz	−40.4 dBm	1 MHz	
UTRA TDD Band a) or E-UTRA Band 34 or NR band n34	2 010-2 025 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n34.
UTRA TDD Band b) or E-UTRA Band 35	1 850-1 910 MHz	−40.4 dBm	1 MHz	
UTRA TDD Band b) or E-UTRA Band 36	1 930-1 990 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n2 or n25.
UTRA TDD Band c) or E-UTRA Band 37	1 910-1 930 MHz	−40.4 dBm	1 MHz	
UTRA TDD Band d) or E-	2 570-2 620 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n38.

UTRA Band 38 or NR Band n38				
UTRA TDD Band f) or E-UTRA Band 39 or NR band n39	1 880-1 920 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n39.
UTRA TDD Band e) or E-UTRA Band 40 or NR Band n40	2 300-2 400 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Bands n30 or n40.
E-UTRA Band 41 or NR Band n41	2 496-2 690 MHz	−40.4 dBm	1 MHz	This is not applicable to BS operating in Band n41.
E-UTRA Band 42	3 400-3 600 MHz	−40 dBm	1 MHz	This requirement does not apply to BS operating in Band n77 or n78.
E-UTRA Band 43	3 600-3 800 MHz	−40 dBm	1 MHz	This requirement does not apply to BS operating in Band n77 or n78.
E-UTRA Band 44	703-803 MHz	−40.4 dBm	1 MHz	This is not applicable to BS operating in Band n28.
E-UTRA Band 45	1 447-1 467 MHz	−40.4 dBm	1 MHz	
E-UTRA Band 47	5 855-5 925 MHz	−39.5 dBm	1 MHz	
E-UTRA Band 48	3 550-3 700 MHz	−40 dBm	1 MHz	This requirement does not apply to BS operating in Band n77 or n78.
E-UTRA Band 50 or NR Band n50	1 432-1 517 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n74, n75 or n76.
E-UTRA Band 51 or NR Band n51	1 427-1 432 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n75 or n76.
E-UTRA Band 53 or NR Band n53	2 483.5-2 495 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n41 or n90.
E-UTRA Band 65 or NR Band n65	2 110-2 200 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n1 or n65.
	1 920-2 010 MHz	−37.4 dBm	1 MHz	For BS operating in Band n1, it applies for 1980 MHz to 2010 MHz, while the rest is covered in clause 6.7.5.3. This requirement does not apply to BS operating in band n65, since it is already covered by the requirement in clause 6.7.5.3.
E-UTRA Band 66 or NR Band n66	2 110-2 200 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n66.
	1 710-1 780 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n66, since it is already covered by the requirement in clause 6.7.5.3.
E-UTRA Band 67 or NR Band n67	738-758 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n28 or n67.
E-UTRA Band 68	753-783 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n28.
	698-728 MHz	−37.4 dBm	1 MHz	For BS operating in Band n28, this requirement applies between 698 MHz and 703 MHz, while the rest is covered in clause 6.7.5.3.
E-UTRA Band 69	2 570-2 620 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n38.
E-UTRA Band 70 or NR Band n70	1 995-2 020 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n2, n25 or n70
	1 695-1 710 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n70, since it is already covered by the requirement in clause 6.7.5.3.
E-UTRA Band 71 or	617-652 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n71

NR Band n71	663-698 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n71, since it is already covered by the requirement in clause 6.7.5.3.
E-UTRA Band 72	461-466 MHz	−40.4 dBm	1 MHz	
	451-456 MHz	−37.4 dBm	1 MHz	
E-UTRA Band 74 or NR Band n74	1 475-1 518 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n74 or n75.
	1 427-1 470 MHz	−37.4 dBm	1MHz	This requirement does not apply to BS operating in Band n50, n51, n74, n75 or n76.
E-UTRA Band 75 or NR Band n75	1 432-1 517 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n74, n75 or n76.
E-UTRA Band 76 or NR Band n76	1 427-1 432 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n75 or n76.
NR Band n77	3.3-4.2 GHz	−40 dBm	1 MHz	This requirement does not apply to BS operating in Band n77 or n78
NR Band n78	3.3-3.8 GHz	−40 dBm	1 MHz	This requirement does not apply to BS operating in Band n77 or n78
NR Band n79	4.4-5.0 GHz	−39.5 dBm	1 MHz	This requirement does not apply to BS operating in Band n79
NR Band n80	1 710-1 785 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n3, since it is already covered by the requirement in clause 6.7.5.3.
NR Band n81	880-915 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n8, since it is already covered by the requirement in clause 6.7.5.3.
NR Band n82	832-862 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n20, since it is already covered by the requirement in clause 6.7.5.3.
NR Band n83	703-748 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n28, since it is already covered by the requirement in clause 6.7.5.3.
NR Band n84	1 920-1 980 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n1, since it is already covered by the requirement in clause 6.7.5.3.
E-UTRA Band 85 or NR Band n85	728-746 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in band n12 or n85.
	698-716 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n12 or n85, since it is already covered by the requirement in clause 6.7.5.3. For NR BS operating in n29, it applies 1 MHz below the Band n29 downlink operating band (Note 5).
NR Band n86	1 710-1 780 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n66, since it is already covered by the requirement in clause 6.7.5.3.
NR Band n89	824-849 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n5, since it is already covered by the requirement in clause 6.7.5.3.
NR Band n91	1 427-1 432 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n75 or n76.
	832-862 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n20, since it is already covered by the requirement in clause 6.7.5.3.
NR Band n92	1 432-1 517 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n74, n75 or n76.
	832-862 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n20, since it is already covered by the requirement in clause 6.7.5.3.
NR Band n93	1 427-1 432 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n75 or n76.
	880-915 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n8, since it is already covered by the requirement in clause 6.7.5.3.
NR Band n94	1 432-1 517 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n50, n51, n74, n75 or n76.

	880-915 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n8, since it is already covered by the requirement in clause 6.7.5.3.
NR Band n95	2 010-2 025 MHz	−40.4 dBm	1 MHz	
NR Band n96	5 925-7 125 MHz	−39.5 dBm	1 MHz	This requirement does not apply to BS operating in Band n96 or n102.
NR Band n97	2 300-2 400 MHz	−40.4 dBm	1 MHz	NR Band n97
NR Band n98	1 880-1 920 MHz	−40.4 dBm	1 MHz	
NR Band n99	1 626.5-1 660.5 MHz	−37.4 dBm	1 MHz	This requirement does not apply to BS operating in band n24, since it is already covered by the requirement in clause 6.7.5.3.
NR Band n100	919.4-925 MHz	−40.4 dBm	1 MHz	This requirement does not apply to BS operating in Band n8.
	874.4-880 MHz	−37.4 dBm	1MHz	
NR Band n101	1 900-1 910 MHz	−40.4 dBm	1 MHz	
NR Band n102	6 425-7 125 MHz	−39.5 dBm	1 MHz	This requirement does not apply to BS operating in Band n96 or n102.
E-UTRA Band 103	757-758 MHz	−40.4 dBm	1 MHz	
	787-788 MHz	−37.4 dBm	1 MHz	

NOTE 1: As defined in the scope for spurious emissions in this clause, except for the cases where the noted requirements apply to a BS operating in Band n28, the co-existence requirements in 6.7.5.4.5-1 do not apply for the Δf_{OBUE} frequency range immediately outside the downlink *operating band* (see TS 38.104 [2], Table 5.2-1). Emission limits for this excluded frequency range may be covered by local or regional requirements.

NOTE 2: Table 6.7.5.4.5-1 assumes that two *operating bands*, where the frequency ranges in TS 38.104 [2] Table 5.2-1 would be overlapping, are not deployed in the same geographical area. For such a case of operation with overlapping frequency arrangements in the same geographical area, special co-existence requirements may apply that are not covered by the 3GPP specifications.

NOTE 3: TDD base stations deployed in the same geographical area, that are synchronized and use the same or adjacent *operating bands* can transmit without additional co-existence requirements. For unsynchronized base stations, special co-existence requirements may apply that are not covered by the 3GPP specifications.

NOTE 4: For NR Band n28 BS, specific solutions may be required to fulfil the spurious emissions limits for BS for co-existence with E-UTRA Band 27 UL *operating band*.

NOTE 5: For NR Band n29 BS, specific solutions may be required to fulfil the spurious emissions limits for NR BS for co-existence with UTRA Band XII, E-UTRA Band 12 or NR Band n12 UL operating band, E-UTRA Band 17 UL operating band or E-UTRA Band 85 UL or NR Band n85 UL operating band.

Table 6.7.5.4.5-2: BS spurious emissions test limits for BS for co-existence with PHS

Frequency range	Test limit	Measurement bandwidth	Note
1 884.5-1 915.7 MHz	−32 dBm	300 kHz	Applicable when co-existence with PHS system operating in 1 884.5-1 915.7 MHz

Table 6.7.5.4.5-3: Additional emission test limit for BS operating in Band n50 and n75 within 1432-1452 MHz, and in Band n51 and n76

Filter centre frequency, F_{filter}	Test limit (dBm)	Measurement bandwidth
F_{filter} = 1 413.5 MHz	−42	27 MHz

Table 6.7.5.4.5-4: Operating band n50, n74 and n75 emission test limits above 1518 MHz

Filter centre frequency, F_{filter}	EIRP limit (dBm)	Measurement bandwidth

1 518.5 MHz ≤ F_{filter} ≤ 1 519.5 MHz	−0.8	1 MHz
1 520.5 MHz ≤ F_{filter} ≤ 1 558.5 MHz	−30	1 MHz

Table 6.7.5.4.5-5: BS Spurious emissions limits for protection of 700 MHz public safety operations

Operating Band	Frequency range	Maximum Level	Measurement Bandwidth
n13	763-775 MHz	−37 dBm	6.25 kHz
n13	793-805 MHz	−37 dBm	6.25 kHz
n14	769-775 MHz	−37 dBm	6.25 kHz
n14	799-805 MHz	−37 dBm	6.25 kHz

Table 6.7.5.4.5-6: Additional NR BS Spurious emissions limits for Band n30

Frequency range	Basic limit	Measurement bandwidth
2 200-2 345 MHz	−33.4 dBm	1 MHz
2 362.5-2 365 MHz	−13.4 dBm	
2 365-2 367.5 MHz	−28.4 dBm	
2 367.5-2 370 MHz	−30.4 dBm	
2 370-2 395 MHz	−33.4 dBm	

Table 6.7.5.4.5-7: BS OTA Spurious emissions limits for protection of 800 MHz public safety operations

Operating Band	Frequency range	Maximum Level	Measurement Bandwidth	Note
n26	851-859 MHz	−4 dBm	100 kHz	Applicable for offsets > 37.5 kHz from the channel edge

Table 6.7.5.4.5-8: Additional BS Spurious emissions limits for Band n41 and n90

Frequency range	Test limit	Measurement Bandwidth
2 505-2 535 MHz	−33 dBm	1 MHz

NOTE: This requirement applies for carriers allocated within 2 545-2 645 MHz.

The following additional requirement should apply:

For BS operating in the frequency range 24.25-27.5 GHz, for protection of Earth Exploration Satellite Service, the requirements in Table 6.7.5.4.5.2-1 of TS 38.141-2 [2].

Table 6.7.5.4.5.2-1: BS spurious emissions test limits for protection of Earth Exploration Satellite Service

Frequency range	Limit	Measurement Bandwidth	Note
23.6-24 GHz	−3 dBm	200 MHz	Note 1
23.6-24 GHz	−9 dBm	200 MHz	Note 2

NOTE 1: This limit applies to BS brought into use on or before 1 September 2027.
NOTE 2: This limit applies to BS brought into use after 1 September 2027.

4.4.5 Co-location requirements

These requirements may be applied for the protection of other BS receivers when GSM900, DCS1800, PCS1900, GSM850, CDMA850, UTRA FDD, UTRA TDD, E-UTRA and/or NR BS are co-located with a BS.

The requirements assume co-location with base stations of the same class.

NOTE: For co-location with UTRA, the requirements are based on co-location with UTRA FDD or TDD base stations.

This requirement is a co-location requirement as defined in clause 4.9, in TS 38.104 [6]. The power levels are specified at the CLTA output, as described in 4.12.2 of TS 38.141-2 [2].

The output of the CLTA of any spurious emission should not exceed the test limit in Table 6.7.5.5.5.1-1 in TS 38.141-2 [2].

For a multi-band RIB, the exclusions and conditions in the note column of Table 6.7.5.5.5.1-1 apply for each supported operating band.

Table 6.7.5.5.5.1-1: *BS type 1-O* OTA spurious emissions limits for BS co-located with another BS

Type of co-located BS	Frequency range for co-location requirement	Test limit			Measurement bandwidth	Note
		WA BS	MR BS	LA BS		
GSM900	876-915 MHz	−115.9 dBm	−108.9 dBm	−87.9 dBm	100 kHz	
DCS1800	1 710-1 785 MHz	−115.9 dBm	−108.9 dBm	−97.9 dBm	100 kHz	
PCS1900	1 850-1 910 MHz	−115.9 dBm	−108.9 dBm	−97.9 dBm	100 kHz	
GSM850 or CDMA850	824-849 MHz	−115.9 dBm	−108.9 dBm	−87.9 dBm	100 kHz	
UTRA FDD Band I or E-UTRA Band 1 or NR Band n1	1 920-1 980 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA FDD Band II or E-UTRA Band 2 or NR Band n2	1 850-1 910 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA FDD Band III or E-UTRA Band 3 or NR Band n3	1 710-1 785 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA FDD Band IV or E-UTRA Band 4	1 710-1 755 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA FDD Band V or E-UTRA Band 5 or NR Band n5	824-849 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA FDD Band VI, XIX or E-UTRA Band 6, 19	830-845 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA FDD Band VII or E-UTRA Band 7 or NR Band n7	2 500-2 570 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA FDD Band VIII or E-UTRA Band 8 or NR Band n8	880-915 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA FDD Band IX or E-UTRA Band 9	1 749.9-1 784.9 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA FDD Band X or E-UTRA Band 10	1 710-1 770 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA FDD Band XI or E-UTRA Band 11	1 427.9-1 447.9 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	This is not applicable to BS operating in Band n50 or n75
UTRA FDD Band XII or E-UTRA Band 12	699-716 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA FDD Band XIII or E-UTRA Band 13 or NR Band n13	777-787 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA FDD Band XIV or E-UTRA Band 14 or NR Band n14	788-798 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
E-UTRA Band 17	704-716 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
E-UTRA Band 18	815-830 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA FDD Band XX or E-UTRA Band 20 or NR Band n20	832-862 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA FDD Band XXI or E-UTRA Band 21	1 447.9-1 462.9 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	This is not applicable to BS operating in Band n50 or n75
UTRA FDD Band XXII or E-UTRA Band 22	3 410-3 490 MHz	−113.7 dBm	−108.7 dBm	−105.7 dBm	100 kHz	This is not applicable to BS operating in Band n77 or n78
E-UTRA Band 24 or NR Band n24	1 626.5-1 660.5 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA FDD Band XXV or E-UTRA Band 25	1 850-1 915 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	

UTRA FDD Band XXVI or E-UTRA Band 26 or NR Band n26	814-849 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
E-UTRA Band 27	807-824 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
E-UTRA Band 28 or NR Band n28	703-748 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
E-UTRA Band 30 or NR Band n30	2 305-2 315 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
E-UTRA Band 31	452.5-457.5 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA TDD Band a) or E-UTRA Band 33	1 900-1 920 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA TDD Band a) or E-UTRA Band 34	2 010-2 025 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA TDD Band b) or E-UTRA Band 35	1 850-1 910 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA TDD Band b) or E-UTRA Band 36	1 930-1 990 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	This is not applicable to BS operating in Band n2
UTRA TDD Band c) or E-UTRA Band 37	1 910-1 930 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA TDD Band d) or E-UTRA Band 38 or NR Band n38	2 570-2 620 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	This is not applicable to BS operating in Band n38.
UTRA TDD Band f) or E-UTRA Band 39	1 880-1 920 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
UTRA TDD Band e) or E-UTRA Band 40	2 300-2 400 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
E-UTRA Band 41 or NR Band n41	2 496-2 690 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	This is not applicable to BS operating in Band n41
E-UTRA Band 42	3 400-3 600 MHz	−113.7 dBm	−108.7 dBm	−105.7 dBm	100 kHz	This is not applicable to BS operating in Band n77 or n78
E-UTRA Band 43	3 600-3 800 MHz	−113.7 dBm	−108.7 dBm	−105.7 dBm	100 kHz	This is not applicable to BS operating in Band n77 or n78
E-UTRA Band 44	703-803 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	This is not applicable to BS operating in Band n28
E-UTRA Band 45	1 447-1 467 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
E-UTRA Band 48	3 550-3 700 MHz	−113.7 dBm	−108.7 dBm	−105.7 dBm	100 kHz	This is not applicable to BS operating in Band n77 or n78
E-UTRA Band 50 or NR Band n50	1 432-1 517 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	This is not applicable to BS operating in Band n74 or n75
E-UTRA Band 51 or NR Band n51	1 427-1 432 MHz	N/A	N/A	−105.9 dBm	100 kHz	This is not applicable to BS operating in Band n50, n75 or n76
E-UTRA Band 53 or NR Band n53	2 483.5-2 495 MHz	N/A	−108.9 dBm	−105.9 dBm	100 kHz	This is not applicable to BS operating in Band n41 or n90
E-UTRA Band 65 or NR Band n65	1 920-2 010 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
E-UTRA Band 66 or NR Band n66	1 710-1 780 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	

E-UTRA Band 68	698-728 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
E-UTRA Band 70 or NR Band n70	1 695-1 710 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
E-UTRA Band 71 or NR Band n71	663-698 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
E-UTRA Band 72	451-456 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
E-UTRA Band 74 or NR Band n74	1 427-1 470 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	This is not applicable to BS operating in Band n50
NR Band n77	3.3-4.2 GHz	−113.7 dBm	−108.7 dBm	−105.7 dBm	100 kHz	This is not applicable to BS operating in Band n77 or n78
NR Band n78	3.3-3.8 GHz	−113.7 dBm	−108.7 dBm	−105.7 dBm	100 kHz	This is not applicable to BS operating in Band n77 or n78
NR Band n79	4.4-5.0 GHz	−113.6 dBm	−108.6 dBm	−105.6 dBm	100 kHz	
NR Band n80	1 710-1 785 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
NR Band n81	880-915 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
NR Band n82	832-862 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
NR Band n83	703-748 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
NR Band n84	1 920-1 980 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
E-UTRA Band 85 or NR Band n85	698-716 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
NR Band n86	1 710-1 780 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
NR Band n89	824-849 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
NR Band n95	2 010-2 025 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
NR Band 96	5 925-7 125 MHz	N/A	−107.6 dBm	−104.6 dBm	100 kHz	This is not applicable to BS operating in Band n96 or n102
NR Band n97	2 300-2 400 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
NR Band n98	1 880-1 920 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
NR Band n99	1 626.5-1 660.5 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	
NR band n100	874.4-880 MHz	−113.9 dBm	NA	NA	100 kHz	
NR band n101	1 900-1 910 MHz	−113.9 dBm	NA	NA	100 kHz	
NR Band n102	6 425-7 125 MHz	N/A	−107.6 dBm	−104.6 dBm	100 kHz	This is not applicable to BS operating in Band n96 or n102
E-UTRA Band 103	787-788 MHz	−113.9 dBm	−108.9 dBm	−105.9 dBm	100 kHz	

NOTE 1: As defined in the scope for spurious emissions in this clause, the co-location requirements in Table 6.7.5.5.5.1-1 do not apply for the frequency range extending Δf_{OBUE} immediately outside the BS transmit frequency range of a downlink *operating band* (see Table 5.2-1 in TS 38.104 [2]). The current state-of-the-art technology does not allow a single generic solution for co-location with other system on adjacent frequencies for 30 dB BS-BS minimum coupling loss. However, there are certain site-engineering solutions that can be used. These techniques are addressed in TR 25.942 [27].

NOTE 2: Table 6.7.5.5.5.1-1 assumes that two *operating bands*, where the corresponding BS transmit and receive frequency ranges in Table 5.2-1 in TS 38.104 [2] would be overlapping, are not deployed in the same geographical area. For such a case of operation with overlapping frequency arrangements in the same geographical area, special co-location requirements may apply that are not covered by the 3GPP specifications.

NOTE 3: Co-located TDD base stations that are synchronized and using the same or adjacent *operating band* can transmit without special co-locations requirements. For unsynchronized base station), special co-location requirements may apply that are not covered by the 3GPP specifications.

4.5 OTA receiver spurious emissions

4.5.1 OTA receiver spurious emissions BS type 1-O

The receiver spurious emissions for BS type 1-O at RIB interface should be below the applicable limits defined in Table 7.7.5.1-1 of TS 38.141-2 [2].

Table 7.7.5.1-1: General OTA BS receiver spurious emission limits for *BS type 1-O*

Spurious frequency range	Test limits (Note 6, Note 8)	Measurement bandwidth	Notes
30 MHz – 1 GHz	−36 + X dBm	100 kHz	Note 1, Note 6
1 GHz – 6 GHz	−30 + X dBm	1 MHz	Note 1, Note 2, Note 6
12.75 GHz – 5th harmonic of the upper frequency edge of the UL *operating band* in GHz	−30 + X dBm	1 MHz	Note 1, Note 2, Note 3, Note 6

NOTE 1: Measurement bandwidths as in ITU-R SM.329 [5], s4.1.
NOTE 2: Upper frequency as in ITU-R SM.329 [5], s2.5 Table 1.
NOTE 3: This spurious frequency range applies only for *operating bands* for which the 5th harmonic of the upper frequency edge of the UL *operating band* is reaching beyond 12.75 GHz.
NOTE 4: The frequency range from Δf_{OBUE} below the lowest frequency of the BS transmitter operating band to Δf_{OBUE} above the highest frequency of the BS transmitter *operating band* may be excluded from the requirement. Δf_{OBUE} is defined in clause 6.7.1. For *multi-band RIBs*, the exclusion applies for all supported *operating bands*.
NOTE 5: Void.
NOTE 6: X = 9 dB, unless stated differently in regional regulation.
NOTE 7: Void.
NOTE 8: Additional limits may apply regionally.

4.5.2 OTA receiver spurious emissions BS type 2-O

The receiver spurious emissions for BS type 2-O at RIB interface should be below the applicable limits defined in Table 7.7.5.2-1 of TS 38.141-2 [2], with the step frequencies defined in Table 7.7.5.2-2 of TS 38.141-2 [2]. In addition, the requirement to protect Earth Exploration Satellite Service should apply for BS operating in the frequency range 24.25-27.5 GHz, as defined in Table 7.7.5.2-3 of TS 38.141-2 [2].

Table 7.7.5.2-1: Radiated Rx spurious emission limits for *BS type 2-O*

Spurious frequency range (Note 4)	Limit (Note 5)	Measurement Bandwidth	Note
30 MHz ↔ 1 GHz	−36 dBm	100 kHz	Note 1
1 GHz ↔ 18 GHz	−30 dBm	1 MHz	Note 1
18 GHz ↔ $F_{step,1}$	−20 dBm	10 MHz	Note 2
$F_{step,1}$ ↔ $F_{step,2}$	−15 dBm	10 MHz	Note 2
$F_{step,2}$ ↔ $F_{step,3}$	−10 dBm	10 MHz	Note 2
$F_{step,4}$ ↔ $F_{step,5}$	−10 dBm	10 MHz	Note 2
$F_{step,5}$ ↔ $F_{step,6}$	−15 dBm	10 MHz	Note 2
$F_{step,6}$ ↔ min(2^{nd} harmonic of the upper frequency edge of the UL operating band in GHz; 60 GHz)	−20 dBm	10 MHz	Note 2, Note 3

NOTE 1: Bandwidth as in ITU-R SM.329 [2], s4.1.
NOTE 2: Limit and bandwidth as in ERC Recommendation 74-01 [19], Annex 2.
NOTE 3: Upper frequency as in ITU-R SM.329 [2], s2.5 Table 1.
NOTE 4: The step frequencies $F_{step,X}$ are defined in Table 7.7.5.2-2.
NOTE 5: Additional limits may apply regionally.

Table 7.7.5.2-2: Step frequencies for defining the radiated Rx spurious emission limits for *BS type 2-O*

Operating band	$F_{step,1}$ (GHz)	$F_{step,2}$ (GHz)	$F_{step,3}$ (GHz)	$F_{step,4}$ (GHz)	$F_{step,5}$ (GHz)	$F_{step,6}$ (GHz)
n257	18	23.5	25	31	32.5	41.5
n258	18	21	22.75	29	30.75	40.5
n259	23.5	35.5	38	45	47.5	59.5
n260	25	34	35.5	41.5	43	52
n261	18	25.5	26.0	29.85	30.35	38.35
n262	37.2	45.2	45.7	49.7	50.2	58.2

Table 7.7.5.2-3: Limits for protection of Earth Exploration Satellite Service

Frequency range	Limit	Measurement Bandwidth	Note
23.6 – 24 GHz	−3 dBm	200 MHz	Note 1
23.6 – 24 GHz	−9 dBm	200 MHz	Note 2

NOTE 1: This limit applies to BS brought into use on or before 1 September 2027.
NOTE 2: This limit applies to BS brought into use after 1 September 2027.

5 References

[1] ARIB STD-T120-38.141-1 V17.6.0, ETSI TS 138 141-1 V17.6.0 or TTA TTAT.3G-38.141-1V17.6.0) these standards refer to 3GPP TS 38.141-1 V17.6.0 (2022-06), "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; NR; Base Station (BS) conformance testing Part 1: Conducted conformance testing (Release 17)".

[2] ARIB STD-T120-38.141-2 V.17.6.0, ETSI TS 138 141-2 V17.6.0 or TTA TTAT.3G-38.141-2V17.6.0 these standards refer to 3GPP TS 38.141-2 V17.6.0 (2022-06), "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; NR; Base Station (BS) conformance testing Part 2: Radiated conformance testing (Release 17)".

[3] Recommendation ITU-R SM.329: "Unwanted emissions in the spurious domain".

[4] Recommendation ITU-R M.1545: "Measurement uncertainty as it applies to test limits for the terrestrial component of International Mobile Telecommunications-2000".

[5] ARIB STD-T120-38.104 V17.6.0, ETSI TS 138 104-2 V17.6.0 or TTAT.3G-38.104V17.6.0 these standards refer to 3GPP TS 38.104 V17.6.0 (2022-06), "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; NR; Base Station (BS) radio transmission and reception (Release 17)".

Attachment 1 to Annex 2

Definition of test tolerance

Test tolerance

With reference to Recommendation ITU-R M.1545 [4], "test tolerance" is the relaxation value referred to in *recommends* 2 of Recommendation ITU-R M.1545, i.e. the difference between the core specification value and the test limit, evaluated applying the shared risk principle as per Figure 2 and Figure 3 of Annex 1 of Recommendation ITU-R M.1545. In case the core specification value is equal to the test limit (Figure 3 of Annex 2 of Recommendation ITU-R M.1545) the "test tolerances" are equal to 0 dB.

Annex 3

5Gi RIT[8]

The unwanted emission characteristics in Annex 2 should be applied to 5Gi RIT.

[8] Developed by TSDSI as "5Gi RIT".

Annex 4

DECT-2020 NR-RIT Component

Introduction

The DECT 5G-SRIT consists of two components:

- DECT-2020 NR-RIT Component
- 3GPP NR-RIT Component

This Annex provides the unwanted emission characteristics of base stations (radio equipment in FT-mode) using the DECT-2020 NR radio interface.

The unwanted emission characteristics of base stations using the 3GPP NR radio interface are provided in Annex 2 to this Recommendation.

1 Unwanted emission characteristics for DECT-2020 NR

1.1 Operating bands

Operating band numbering is defined in Tables A4-1 and A4-2. Radio device may implement one or more band support depending on its capabilities.

TABLE A4-1

Operating band numbering

Frequency bands utilized by DECT-2020 NR and identified for IMT in the RR

Band number	Receiving band (MHz)	Transmitting band (MHz)	Footnote(s) Identifying the band, or part thereof, for IMT in various countries/Regions
1	1 880 to 1 900	1 880 to 1 900	**5.388**
2	1 900 to 1 920	1 900 to 1 920	**5.388**
5	450 to 470	450 to 470	**5.286AA**
6	698 to 806	698 to 806	**5.312B 5.317A**
7	716 to 728	716 to 728	**5.312B 5.317A**
8	1 432 to 1 517	1 432 to 1 517	**5.341A**, **5.341B**, **5.341C**
9	1 920 to 1 930	1 920 to 1 930	**5.388**
10	2 010 to 2 025	2 010 to 2 025	**5.388**
11	2 300 to 2 400	2 300 to 2 400	**5.384A**
12	2 500 to 2 620	2 500 to 2 620	**5.384A**
13	3 300 to 3 400	3 300 to 3 400	**5.429G**
14	3 400 to 3 600	3 400 to 3 600	**5.431A 5.431B**
15	3 600 to 3 700	3 600 to 3 700	**5.434**
16	4 800 to 4 990	4 800 to 4 990	**5.440A 5.441A 5.441B**
21	3 700 to 3 800	3 700 to 3 800	**5.435B**
22	1 910 to 1 930	1 910 to 1 930	**5.388**

TABLE A4-2

Operating band numbering

Frequency bands utilized by DECT-2020 NR and not identified for IMT in the RR

Band number	Receiving band (MHz)	Transmitting band (MHz)
3	2 400 to 2 483,5	2 400 to 2 483,5
4	902 to 928	902 to 928
17	5 725 to 5 875	5 725 to 5 875
18	5 150 to 5 350	5 150 to 5 350
19	5 470 to 5 725	5 470 to 5 725
20	3 800 to 4 200	3 800 to 4 200

1.2 Definitions, symbols and abbreviations

1.2.1 Symbols

β Fourier transform scaling factor [2]

μ Subcarrier scaling factor [2]

Δf_{oob} Δ Frequency of the Out of Band emission [1]

B_N Nominal channel bandwidth

B_G Difference between Nominal channel bandwidth and transmission bandwidth

F_c Carrier centre frequency

P_{max} Maximum transmission power of the radio device power class

1.2.2 Abbreviations

ACLR Adjacent channel leakage ratio

DFT Discrete fourier transform

MBW Measurement BANDWIDTH

2 Transmitter spectrum emission characteristics for DECT-2020

2.1 General

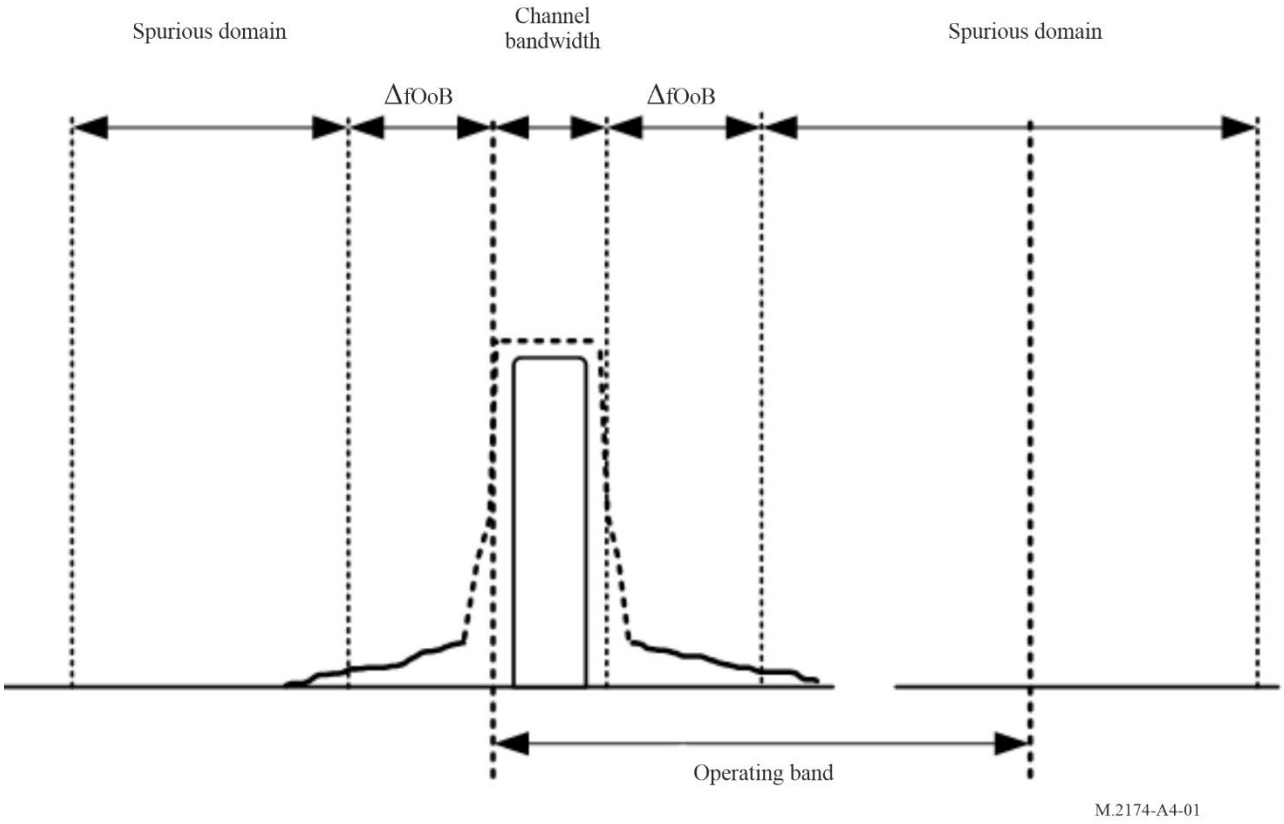
Radio equipment transmitter spectrum emissions are occupied channel emissions, out of band and spurious emissions. The relation of these emission components is illustrated in Fig. A4-1.

The transmitter characteristics are specified at the antenna connector(s) of the radio equipment. For radio equipment with an integral antenna only, a reference antenna(s) with a gain of 0 dBi should be assumed for each antenna port(s).

Power values are applicable for operation without AAS.

FIGURE A4-1

Transmitter RF spectrum



2.2 Occupied channel BW

The occupied bandwidth is 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 0.5% of the total mean transmitted power.

The occupied bandwidth should be less than the nominal channel bandwidth as defined in Table A4-3.

TABLE A4-3

Channel bandwidth

Parameter	Operating channel bandwidth I	Operating channel bandwidth II	Operating channel bandwidth III		
Nominal channel bandwidth (MHz)	1 728	3 456	6 912		
(μ, β)	(1,1)	(1,2)	(2,1)	(1,4)	(2,2)
Transmission channel bandwidth (MHz)	1 539	3 051	6 075	6 102	6 156

2.3 Maximum output power

The maximum output power (P_{max}) is defined as the mean power of the transmitted packet. The maximum transmitter output power is defined in Table A4-4. Radio device may use one or more power classes in its operation.

TABLE A4-4

Maximum output power

Radio device power class	Operating channel bandwidth (MHz)		
	1 728	3 456	6 912
	Output power (dBm)		
Class I	23	23	23
Class II	21	21	21
Class III	19	19	19
Class IV	10	10	10

NOTE 1: The measurement bandwidth equals to the transmission bandwidth of the operating channel bandwidth defined in Table A4-3.

2.4 Out of band emissions

The out-of-band emissions are unwanted emissions immediately outside the assigned channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions.

The spectrum emission mask of the radio device (RD) applies to frequencies (Δf_{OOB}) starting from the ± edge (from $F_c + B_N/2$ or from $F_c - B_N/2$) of the assigned channel. For frequencies offset greater than Δf_{OOB} as specified in Table A4-5, the spurious requirements in § 2.5 are applicable.

TABLE A4-5

Spectrum emission limits 30 kHz measurement bandwidth

Δf_{oob}		Limit (dBm)	Measurement Bandwidth (kHz)
$B_G/2 \geq 1$ MHz	$B_G/2 < 1$ MHz		
-	0 to $B_G/2$	$-10 - 10\log10(B_N/1,728)$	30
-	−0 to $-B_G/2$	$-10 - 10\log10(B_N/1,728)$	30
0 to 1 MHz	$B_G/2$ to 1 MHz	$-21 - 10\log10(B_N/1,728)$	30
0 to −1 MHz	$-B_G/2$ to −1 MHz	$-21 - 10\log10(B_N/1,728)$	30

NOTE 1: The first center frequency for a 30 kHz measurement filter is at Δf_{oob}= 0,015 MHz, which is $B_N/2$ + 0,015MHz from the carrier center frequency.

NOTE 2: The first center frequency for a 30 kHz measurement filter in the range from $B_G/2$ to 1 MHz is at $\Delta f_{oob} = B_G/2 + 0{,}015$ MHz, which is $B_N/2 + B_G/2 + 0{,}015$ MHz from the carrier center frequency.

NOTE 3: Symmetrically similarly as in Note 1 and Note 2 in negative Δf_{oob} frequencies.

TABLE A4-6

Spectrum emission limits 1 MHz measurement

Δf_{oob}	Limit (dbm)		Measurement BandWidth (MBW)
	$B_N \leq 6.912$ MHz	$B_N > 6.912$ MHz	
1 MHz to B_N	-10	$-10 - 10\log10(B_N/6{,}912)$	1 MHz
–1 MHz to $-B_N$	-10	$-10 - 10\log10(B_N/6{,}912)$	1 MHz
B_N to $2B_N$	-25	$-25 - 10\log10(B_N/6{,}912)$	1 MHz
$-B_N$ to $-2B_N$	-25	$-25 - 10\log10(B_N/6{,}912)$	1 MHz

NOTE 1: The first center frequency for a 1 MHz measurement filter in the range 1 MHz to B_N is at Δf_{oob}= 1,5 MHz.

NOTE 2: The first center frequency for a 1 MHz measurement filter in the range B_N to $2B_N$ at Δf_{oob}= B_N + 0,5 MHz.

NOTE 3: Symmetrically similarly as in NOTE 1 and NOTE 2 in negative Δf_{oob} frequencies.

The resolution bandwidth of the measuring equipment should be equal to the Measurement BandWidth (MBW). However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the MBW or rectangular type channel filter with very steep transition response can be used. When the resolution bandwidth is smaller than the MBW, the result should be integrated over the MBW in order to obtain the equivalent noise bandwidth of the MBW.

2.5 Spurious emissions

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products, but exclude out of band emissions unless otherwise stated. The spurious emission limits are specified in terms of general requirements in-line with Recommendation ITU-R SM.329.

Unless otherwise stated, the spurious emission limits apply for the frequency ranges that are more than Δf_{oob} (MHz) in Table A4-4 from the edge of the channel bandwidth. The spurious emission limits in Table A4-5 apply for all transmitter bands and channel bandwidths.

The spurious emissions should be measured during the time period where the transmitter is active excluding any transient periods.

For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

TABLE A4-7

Spurious emission limits

Frequency range	Maximum level (dBm)	Measurement bandwidth
9 kHz ≤ f < 150 kHz	−36	1 kHz
150 kHz ≤ f < 30 MHz	−36	10 kHz
30 MHz ≤ f < 1 000 MHz	−36	100 kHz
1 GHz ≤ f < 12.75 GHz	−30	1 MHz
12.75 GHz ≤ f < 5th harmonic of the upper frequency edge in GHz	−30	1 MHz

2.6 Adjacent channel Leakage Ratio

Adjacent Channel Leakage Ratio (ACLR) is used as a measure of the amount of transmission power leaking into adjacent channels. ACLR is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency with measurement bandwidth equal to the transmission bandwidth.

ACLR is measured with square window on adjacent channel. A DFT of the transmission signal is taken and the energy of the appropriate bins used to calculate the adjacent channel powers.

ACLR requirement of Table A4-8 should be met for all transmission powers from –40 dBm to maximum power class $PMax$.

TABLE A4-8

Adjacent channel leakage ratio limit

Limit (dBc)
–30

3 References

[1] ETSI TS 103 636-2 v1.5.1: DECT-2020 NR New Radio (NR); Part 2: Radio reception and transmission requirements, release 1

[2] ETSI TS 103 636-3 v1.5.1: DECT-2020 NR New Radio (NR); Part 3: Physical layer, release 1

[3] Recommendation ITU-R SM.329: “Unwanted emissions in the spurious domain”.

[4] Recommendation ITU-R M.1545: “Measurement uncertainty as it applies to test limits for the terrestrial component of International Mobile Telecommunications-2000”.

Attachment 1
to Annex 4

Definition of test tolerance

Test tolerance

With reference to Recommendation ITU-R M.1545 [10], "test tolerance" is the relaxation value referred to in *recommends* 2 of Recommendation ITU-R M.1545 [10], i.e. the difference between the core specification value and the test limit, evaluated applying the shared risk principle as per Figures 2 and 3 of Annex 1 of Recommendation ITU-R M.1545 [10]. In case the core specification value is equal to the test limit (Fig. 3 of Annex 1 of Recommendation ITU-R M.1545 [10]) the "test tolerances" are equal to 0.