# 3 Definitions, symbols and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

**Aggregated Channel Bandwidth:** RF bandwidth in which a base station transmits and/or receives multiple contiguously aggregated carriers.

NOTE: The Aggregated Channel Bandwidth is measured in MHz.

**Base station receive period:** time during which the base station is receiving data subframes or UpPTS.

**Base Station RF Bandwidth:** RF bandwidth in which a base station transmits and/or receives single or multiple carrier(s) within a supported operating band.

NOTE: In single E-UTRA carrier operation, the Base Station RF Bandwidth is equal to the channel bandwidth.

**Base Station RF Bandwidth edge:** frequency of one of the edges of the Base Station RF Bandwidth.

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

**Carrier aggregation:** aggregation of two or more component carriers in order to support wider transmission bandwidths

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

NOTE: Carrier aggregation band(s) for an E-UTRA BS is declared by the manufacturer according to the designations in Tables 5.5-2 to 5.5-4

**Channel bandwidth:** RF bandwidth supporting a single E-UTRA RF carrier with the transmission bandwidth configured in the uplink or downlink of a cell.

NOTE The channel bandwidth is measured in MHz and is used as a reference for transmitter and receiver RF requirements.

**Channel edge:** lowest or highest frequency of the E-UTRA carrier.

NOTE: Channel edges are separated by the channel bandwidth.

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

**Contiguous spectrum**: spectrum consisting of a contiguous block of spectrum with no sub-block gap(s).

**DL RS power:** resource element power of Downlink Reference Symbol.

**DL NRS power:** resource element power of Downlink Narrowband Reference Signal.

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

**Enhanced performance requirements type A:** This defines performance requirements assuming baseline receiver as demodulation reference signal based linear minimum mean square error interference rejection combining.

**Enhanced performance requirements type B**: This defines performance requirements assuming baseline receiver as code word level interference cancellation for intra-cell inter-user interference plus demodulation reference signal based linear minimum mean square error interference rejection combining for inter-cell interference.

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

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

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

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

**Inter-band gap**: The frequency gap between two supported consecutive operating bands.

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

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

**Lower sub-block edge:** frequency at the lower edge of one sub-block.

NOTE: It is used as a frequency reference point for both transmitter and receiver requirements.

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

**Maximum Base Station RF Bandwidth:** maximum Base Station RF Bandwidth supported by a BS within each supported operating band.

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

**Maximum Radio Bandwidth:** maximum frequency difference between the upper edge of the highest used carrier and the lower edge of the lowest used carrier.

**Maximum throughput:** maximum achievable throughput for a reference measurement channel.

**Mean power:** power measured in the channel bandwidth of the carrier.

NOTE: The period of measurement shall be at least one subframe (1ms), unless otherwise stated.

**Multi-band Base Station:**base station characterized by the ability of its transmitter and/or receiver to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different operating band (which is not a sub-band or superseding-band of another supported operating band) than the other carrier(s).

**Multi-carrier transmission configuration:** set of one or more contiguous or non-contiguous carriers that a BS is able to transmit simultaneously according to the manufacturer’s specification.

**Multi-band transmitter:** transmitter characterized by the ability to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different operating band (which is not a sub-band or superseding-band of another supported operating band) than the other carrier(s).

**Multi-band receiver:** receiver characterized by the ability to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different operating band (which is not a sub-band or superseding-band of another supported operating band) than the other carrier(s).

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

**NB-IoT In-band operation:** NB-IoT is operating in-band when it utilizes the resource block(s) within a normal E-UTRA carrier

**NB-IoT guard band operation:** NB-IoT is operating in guard band when it utilizes the unused resource block(s) within a E-UTRA carrier’s guard-band.

**NB-IoT standalone operation:** NB-IoT is operating standalone when it utilizes its own spectrum, for example the spectrum currently being used by GERAN systems as a replacement of one or more GSM carriers, as well as scattered spectrum for potential IoT deployment.

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

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

NOTE: The operating band(s) for an E-UTRA BS is declared by the manufacturer according to the designations in Table 5.5-1.

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

**Rated output power:** mean power level per carrier that the manufacturer has declared to be available at the antenna connector.

**RE power control dynamic range:** difference between the power of a RE and the average RE power for a BS at maximum output power for a specified reference condition.

**Reference bandwidth**: RF bandwidth in which an emission level is specified.

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

NOTE 1: The RRC filtered mean power of a perfectly modulated W-CDMA signal is 0.246 dB lower than the mean power of the same signal.

**sTTI**: A transmission time interval (TTI) of either one slot or one subslot as defined in TS 36.211 [12] on either uplink or downlink.

**Sub-band:** A sub-band of an operating band contains a part of the uplink and downlink frequency range of the operating band.

**Sub-block:** one contiguous allocated block of spectrum for transmission and reception by the same Base Station.

NOTE: There may be multiple instances of sub-blocks within a Base Station RF Bandwidth.

**Sub-block bandwidth:** RF bandwidth of one sub-block.

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

**Superseding-band:** A superseding-band of an operating band includes the whole of the uplink and downlink frequency range of the operating band.

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

**Throughput:** he number of payload bits successfully received per second for a reference measurement channel in a specified reference condition.

**Total power dynamic range:** difference between the maximum and the minimum transmit power of an OFDM symbol for a specified reference condition.

**Total RF Bandwidth**: maximum sum of Base Station RF Bandwidths in all supported operating bands.

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

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

**Transmitter OFF period:** time period during which the BS transmitter is not allowed to transmit.

**Transmitter ON period:** time period during which the BS transmitter is transmitting data and/or reference symbols, i.e. data subframes or DwPTS.

**Transmitter transient period:** time period during which the transmitter is changing from the OFF period to the ON period or vice versa.

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

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

**Upper sub-block edge:** frequency at the upper edge of one sub-block.

NOTE: It is used as a frequency reference point for both transmitter and receiver requirements.

## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

 Roll-off factor

β Percentage of the mean transmitted power emitted outside the occupied bandwidth on the assigned channel

BWChannel Channel bandwidth

BWChannel\_CA Aggregated Channel Bandwidth, expressed in MHz. BWChannel\_CA= Fedge\_high- Fedge\_low.

BWChannel,block Sub-block bandwidth, expressed in MHz. BWChannel,block= Fedge,block,high- Fedge,block,low.

BWConfig Transmission bandwidth configuration, expressed in MHz, where BWConfig = *N*RB x 180 kHz in the uplink and BWConfig = 15 kHz + NRB x 180 kHz in the downlink.

BWmax Maximum Radio Bandwidth

BWtot Total RF Bandwidth

CA\_X Intra-band contiguous CA of component carriers in one sub-block within band X where X is the applicable E-UTRA operating band

CA\_X-X Intra-band non-contiguous CA of component carriers in two sub-blocks within band X where X is the applicable E-UTRA operating band

CA\_X-Y Inter-band CA of component carrier(s) in one sub-blocks within band X and component carrier(s) in one sub-block within Band Y where X and Y are the applicable E-UTRA operating bands

CA\_X-X-Y CA of component carriers in two sub-blocks within Band X and component carrier(s) in one sub-block within Band Y where X and Y are the applicable E-UTRA operating bands

f Frequency

Δf Separation between the channel edge frequency and the nominal -3dB point of the measuring filter closest to the carrier frequency

Δfmax The largest value of Δf used for defining the requirement

FC Carrier centre frequency

FC,block, high Centre frequency of the highest transmitted/received carrier in a sub-block.

FC,block, low Centre frequency of the lowest transmitted/received carrier in a sub-block.

FC\_high The carrier centre frequency of the highest carrier, expressed in MHz.

FC\_low The carrier centre frequency of the lowest carrier, expressed in MHz.

Fedge\_low The lower edge of Aggregated Channel Bandwidth, expressed in MHz. Fedge\_low = FC\_low - Foffset.

Fedge\_high The upper edge of Aggregated Channel Bandwidth, expressed in MHz. Fedge\_high = FC\_high + Foffset.

Fedge,block,low The lower sub-block edge, where Fedge,block,low = FC,block,low - Foffset.

Fedge,block,high The upper sub-block edge, where Fedge,block,high = FC,block,high + Foffset.

Foffset Frequency offset from FC\_high to the upper Base Station RF Bandwidth edge or from F C,block, high to the upper sub-block edge, FC\_low to the lower Base Station RF Bandwidth edge or from FC,block, low to the lower sub-block edge.

Ffilter Filter centre frequency

f\_offset Separation between the channel edge frequency and the centre of the measuring filter

f\_offsetmax The maximum value of f\_offset used for defining the requirement

EA: EPRE (energy per resource element) of PDSCH REs (resource elements) type A, i.e. REs in OFDM symbols that do not include reference symbols

EB: EPRE of PDSCH REs type B, i.e. REs in OFDM symbols that include reference symbols

ERS: EPRE of reference symbols REs

FDL\_low The lowest frequency of the downlink operating band

FDL\_high The highest frequency of the downlink operating band

FUL\_low The lowest frequency of the uplink operating band

FUL\_high The highest frequency of the uplink operating band

MDL Offset of NB-IoT Downlink channel number to Downlink EARFCN

MUL Offset of NB-IoT Uplink channel number to Uplink EARFCN

NDL Downlink EARFCN

NOffs-DL  Offset used for calculating downlink EARFCN

NOffs-UL  Offset used for calculating uplink EARFCN

 Physical layer cell identity

*NCS* Number of Cyclic shifts for preamble generation in PRACH

*N*RB Transmission bandwidth configuration, expressed in units of resource blocks

 Downlink bandwidth configuration, expressed in multiples of 

NUL Uplink EARFCN

 Resource block size in the frequency domain, expressed as a number of subcarriers

 System frame number

 Physical resource block number

 Radio network temporary identifier

 Slot number within a radio frame

 Antenna port number

Pd Probability of PRACH preamble detection

Pfa Total probability of false detection of the PRACH preamble

Pout Output power

PEM,N Declared emission level for channel N

PEM,B32,B75,B76,ind Declared emission level in Band 32, Band 75 and Band 76, ind=a, b, c

PEM,B32,ind Declared emission level in Band 32, ind= d, e

PEM,B50,B74,B75,ind Declared emission level for Band 50, Band 74 and Band 75, ind=a,b

Prated,c Rated output power (per carrier)

Prated,t Rated Total Output PowerPmax,c Maximum carrier output power

PREFSENS Reference sensitivity power level

 Code word number

TA Timing advance command, as defined in [16]

 Basic time unit, as defined in [12]

Wgap Sub-block gap or Inter RF Bandwidth gap size



Figure 3.2-1: Illustration of Maximum Radio Bandwidth BWmax and Total RF Bandwidth BWtot for multi-band base station

## 3.3 Abbreviations

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

AC Alternating Current

ACLR Adjacent Channel Leakage Ratio

CACLR Cumulative ACLR

ACK Acknowledgement (in HARQ protocols)

ACS Adjacent Channel Selectivity

ATT Attenuator

AWGN Additive White Gaussian Noise

B Bottom RF channel (for testing purposes)

BL/CEBandwidth-reduced Low-complexity or Coverage Enhanced

BS Base Station

C Contiguous

CA Carrier Aggregation

BW Bandwidth

CCE Control Channel Element

CP Cyclic prefix

CW Continuous Wave

DC Direct Current

DFT Discrete Fourier Transformation

DIP Dominant Interferer Proportion

DTT Digital Terrestrial Television

DUT Device Under Test

EPRE Energy per resource element

E-TM E-UTRA Test Model

E-UTRA Evolved UTRA

EARFCN E-UTRA Absolute Radio Frequency Channel Number

EIRP Effective Isotropic Radiated Power

EPA Extended Pedestrian A model

ETC E-UTRA Test Configuration

ETU Extended Typical Urban model

EVA Extended Vehicular A model

EVM Error Vector Magnitude

FDD Frequency Division Duplex

FFT Fast Fourier Transformation

FRC Fixed Reference Channel

GSM Global System for Mobile communications

HARQ Hybrid Automatic Repeat Request

ICS In-Channel Selectivity

IQ In-phase - *Quadrature* phase

ITU‑R Radiocommunication Sector of the ITU

Iuant E-Node B internal logical interface between the implementation specific O&M function and the RET antennas and TMAs control unit function of the E-Node B

LA Local Area

M Middle RF channel (for testing purposes)

MC Multi-carrier

MFCN Mobile/Fixed Communications Network

MIMO Multiple Input Multiple Output

MCS Modulation and Coding Scheme

MR Medium Range

NB-IoT Narrowband – Internet of Things

NC Non-Contiguous

NPDSCH Narrowband Physical Downlink Shared Channel

NPUSCH Narrowband Physical Uplink Shared Channel

NRS Narrowband Reference Signal

OBW Occupied Band Width

OFDM Orthogonal Frequency Division Multiplex

OOB Out-Of-Band

PBCH Physical Broadcast Channel

PCFICH Physical control format indicator channel

PDCCH Physical downlink control channel

PDSCH Physical downlink shared channel

PHICH Physical hybrid-ARQ indicator channel

PUCCH Physical Uplink Control CHannel

PRACH Physical Random Access Channel

PRB Physical Resource Block

PSD Power Spectral Density

QAM Quadrature Amplitude Modulation

QPSK Quadrature Phase-Shift Keying

RAT Radio Access Technology

RB Resource Block

RE Resource Element

REG Resource Element Group

RF Radio Frequency

RS Reference Symbol

RX Receive

RRC Root Raised Cosine

sCCE short Control Channel Element

SINR Signal-to-Interference-and-Noise Ratio

SNR Signal-to-Noise Ratio

sPDCCH shortened Physical Downlink Control Channel

sPDSCH shortened Physical Downlink Shared Channel

SQRT SQuare RooT

sREG short Resource-Element Group

SC Single Carrier

SRS Sounding Reference Signal

T Top RF channel (for testing purposes)

TA Timing Advance

TC Test Configuration

TDD Time Division Duplex

TT Test Tolerance

TX Transmit

UE User Equipment

UMTS Universal Mobile Telecommunications System

UTRA UMTS Terrestrial Radio Access

WA Wide Area

# 4 General test conditions and declarations

Many of the tests in this specification measure a parameter relative to a value that is not fully specified in the E-UTRA specifications. For these tests, the Minimum Requirement is determined relative to a nominal value specified by the manufacturer.

Certain functions of a BS are optional in the E-UTRA specifications. Some requirements for the BS may be regional as listed in subclause 4.3.

When specified in a test, the manufacturer shall declare the nominal value of a parameter, or whether an option is supported.

## 4.1 Measurement uncertainties and Test Requirements

### 4.1.1 General

The requirements of this clause apply to all applicable tests in this specification.

The Minimum Requirements are given in 36.104 [2] and test requirements are given in this specification. Test Tolerances are defined in Annex G of this specification. Test Tolerances are individually calculated for each test. The Test Tolerances are used to relax the Minimum Requirements in 36.104 [2] to create Test Requirements.

### 4.1.2 Acceptable uncertainty of Test System

The maximum acceptable uncertainty of the Test System is specified below for each test, where appropriate. The Test System shall enable the stimulus signals in the test case to be adjusted to within the specified tolerance and the equipment under test to be measured with an uncertainty not exceeding the specified values. All tolerances and uncertainties are absolute values, and are valid for a confidence level of 95 %, unless otherwise stated.

A confidence level of 95% is the measurement uncertainty tolerance interval for a specific measurement that contains 95% of the performance of a population of test equipment.

For RF tests, it should be noted that the uncertainties in subclause 4.1.2 apply to the Test System operating into a nominal 50 ohm load and do not include system effects due to mismatch between the DUT and the Test System.

Unless otherwise stated, the uncertainties in subclause 4.1.2 apply to the Test System for testing BS that supports E-UTRA or E-UTRA with NB-IoT in-band/guard band operation or NB-IoT standalone operation.

#### 4.1.2.1 Measurement of transmitter

Table 4.1.2-1: Maximum Test System Uncertainty for transmitter tests

|  |  |  |
| --- | --- | --- |
| Subclause | Maximum Test System Uncertainty | Derivation of Test System Uncertainty |
| 6.2. Base station output power | ±0.7 dB, f ≤ 3.0GHz  ±1.0 dB, 3.0GHz < f ≤ 4.2GHz  ±1.5 dB, 4.2GHz < f ≤ 6.0GHz  ±1.0 dB for standalone NB-IoT |  |
| 6.3.2 Total power dynamic range | ± 0.4 dB | Relative error of two OFDM Symbol TX power (OSTP) measurements |
| 6.3.3 NB-IoT RB power dynamic range for in-band or guard band operation | ± 0.4 dB |  |
| 6.4.1 Transmitter OFF power | ±2.0 dB, f ≤ 3.0GHz  ±2.5 dB, 3.0GHz < f ≤ 4.2GHz  ±3 dB, 4.2GHz < f ≤ 6.0GHz |  |
| 6.4.2 Transmitter transient period | N/A |  |
| 6.5.1 Frequency error | ± 12 Hz |  |
| 6.5.2 EVM | ± 1 % |  |
| 6.5.3 Time alignment error | ± 25 ns |  |
| 6.5.4 DL RS power | ±0.8 dB, f ≤ 3.0GHz  ±1.1 dB, 3.0GHz < f ≤ 4.2GHz  ±1.6 dB, 4.2GHz < f ≤6.0GHz |  |
| 6.6.1 Occupied bandwidth | 1.4MHz, 3MHz Channel BW: 30kHz  5MHz, 10MHz Channel BW: 100kHz  15MHz, ≥20MHz: Channel BW: 300kHz |  |
| 6.6.2 Adjacent Channel Leakage power Ratio (ACLR) | ACLR ±0.8 dB  Absolute power ±2.0 dB, f ≤ 3.0GHz  Absolute power ±2.5 dB, 3.0GHz < f ≤ 4.2GHz  Absolute power ±3.0 dB, 4.2GHz < f ≤ 6.0GHz  CACLR±0.8 dB  Absolute power ±2.0 dB, f ≤ 3.0GHz  Absolute power ±2.5 dB, 3.0GHz < f ≤ 4.2GHz  Absolute power ±3.0 dB, 4.2GHz < f ≤ 6.0GHz |  |
| 6.6.3 Operating band unwanted emissions | ±1.5 dB, f ≤ 3.0GHz  ±1.8 dB, 3.0GHz < f ≤ 4.2GHz  ±2.2 dB, 4.2GHz < f ≤ 6.0GHz |  |
| 6.6.4.5.1 Transmitter spurious emissions, Mandatory Requirements | 9 kHz < f ≤ 4 GHz: ±2.0 dB  4 GHz < f ≤ 19 GHz: ±4.0 dB |  |
| 6.6.4.5.2 Transmitter spurious emissions, Mandatory Requirements | 9 kHz < f ≤ 4 GHz:±2.0 dB  4 GHz < f ≤ 19 GHz:±4.0 dB |  |
| 6.6.4.5.3 Transmitter spurious emissions, Protection of BS receiver | ±3.0 dB |  |
| 6.6.4.5.4 Transmitter spurious emissions, Additional spurious emissions requirements | ±2.0 dB for > -60dBm, f ≤ 3.0GHz  ±2.5 dB, 3.0GHz < f ≤ 4.2GHz  ±3.0 dB, 4.2GHz < f ≤ 6.0GHz  ±3.0 dB for ≤ -60dBm, f ≤ 3.0GHz  ±3.5 dB, 3.0GHz < f ≤ 4.2GHz  ±4.0 dB, 4.2GHz < f ≤ 6.0GHz |  |
| 6.6.4.5.5 Transmitter spurious emissions, Co-location | ± 3.0 dB |  |
| 6.7 Transmitter intermodulation (interferer requirements) | The value below applies only to the interference signal and is unrelated to the measurement uncertainty of the tests (6.6.2, 6.6.3 and 6.6.4) which shall be carried out in the presence of the interferer.  .  ±1,0 dB | The uncertainty of interferer has double the effect on the result due to the frequency offset. |

#### 4.1.2.2 Measurement of receiver

Table 4.1.2-2: Maximum Test System Uncertainty for receiver tests

|  |  |  |
| --- | --- | --- |
| Subclause | Maximum Test System Uncertainty1 | Derivation of Test System Uncertainty |
| 7.2 Reference sensitivity level | ±0.7 dB, f ≤ 3.0GHz  ±1.0 dB, 3.0GHz < f ≤ 4.2GHz  ±1.5 dB, 4.2GHz < f ≤ 6.0GHz |  |
| 7.3 Dynamic range | ±0.3 dB | Overall system uncertainty for static conditions is equal to signal-to-noise ratio uncertainty.  Signal-to-noise ratio uncertainty ±0.3 dB  Definitions of signal-to-noise ratio, AWGN and related constraints are given in Table 4.1.2-3. |
| 7.4 In-channel selectivity | ±1.4 dB, f ≤ 3.0GHz  ±1.8 dB, 3.0GHz < f ≤ 4.2GHz  ±2.5 dB, 4.2GHz < f ≤ 6.0GHz | Overall system uncertainty comprises three quantities:  1. Wanted signal level error  2. Interferer signal level error  3. Additional impact of interferer leakage  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared to provide the ratio error of the two signals. The interferer leakage effect is systematic, and is added aritmetically.  Test System uncertainty = [SQRT (wanted\_level\_error2 + interferer\_level\_error2)] + leakage effect.  f ≤ 3.0GHz  Wanted signal level ± 0.7dB  Interferer signal level ± 0.7dB  3.0GHz < f ≤ 4.2GHz  Wanted signal level ± 1.0dB  Interferer signal level ± 1.0dB  4.2GHz < f ≤ 6.0GHz  Wanted signal level ± 1.5dB  Interferer signal level ± 1.5dB  f ≤ 6.0GHz  Impact of interferer leakage 0.4dB. |
| 7.5 Adjacent Channel Selectivity (ACS) and narrow-band blocking | ±1.4 dB, f ≤ 3.0GHz  ±1.8 dB, 3.0GHz < f ≤ 4.2GHz  ±2.5 dB, 4.2GHz < f ≤ 6.0GHz | Overall system uncertainty comprises three quantities:  1. Wanted signal level error  2. Interferer signal level error  3. Additional impact of interferer ACLR  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared to provide the ratio error of the two signals. The interferer ACLR effect is systematic, and is added aritmetically.  Test System uncertainty = [SQRT (wanted\_level\_error2 + interferer\_level\_error2)] + ACLR effect.  f ≤ 3.0GHz  Wanted signal level ± 0.7dB  Interferer signal level ± 0.7dB  3.0GHz < f ≤ 4.2GHz  Wanted signal level ± 1.0dB  Interferer signal level ± 1.0dB  4.2GHz < f ≤ 6.0GHz  Wanted signal level ± 1.5dB  Interferer signal level ± 1.5dB  f ≤ 6.0GHz  Impact of interferer ACLR 0.4dB. See Note 2. |
| 7.6.5.1 Blocking (General requirements) | In-band blocking, using modulated interferer:  ±1.6 dB, f ≤ 3.0GHz  ±2.0 dB, 3.0GHz < f ≤ 4.2GHz  ±2.7 dB, 4.2GHz < f ≤ 6.0GHz  Out of band blocking, using CW interferer:  fwanted ≤ 3GHz  1MHz < finterferer ≤ 3 GHz: ±1.3 dB  3.0GHz < finterferer ≤ 4.2 GHz: ±1.5 dB  4.2GHz < finterferer ≤ 12.75 GHz: ±3.2 dB  3GHz < fwanted ≤ 4.2GHz:  1MHz < finterferer ≤ 3 GHz: ±1.5 dB  3.0GHz < finterferer ≤ 4.2 GHz: ±1.7 dB  4.2GHz < finterferer ≤ 12.75 GHz: ±3.3 dB  4.2GHz < fwanted ≤ 6.0GHz:  1MHz < finterferer ≤ 3 GHz: ±1.9 dB  3.0GHz < finterferer ≤ 4.2 GHz: ±2.0 dB  4.2GHz < finterferer ≤ 12.75 GHz: ±3.5 dB | Overall system uncertainty can have these contributions:  1. Wanted signal level error  2. Interferer signal level error  3. Interferer ACLR  4. Interferer broadband noise  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared to provide the ratio error of the two signals. The Interferer ACLR or Broadband noise effect is systematic, and is added aritmetically.  Test System uncertainty = [SQRT (wanted\_level\_error2 + interferer\_level\_error2)] + ACLR effect + Broadband noise effect.  In-band blocking, using modulated interferer:  f ≤ 3.0GHz  Wanted signal level ± 0.7dB  Interferer signal level ± 1.0dB  3.0GHz < f ≤ 4.2GHz  Wanted signal level ± 1.0dB  Interferer signal level ± 1.2dB  4.2GHz < f ≤ 6.0GHz  Wanted signal level ± 1.5dB  Interferer signal level ± 1.8dB  f ≤ 6.0GHz  Interferer ACLR 0.4dB  Broadband noise not applicable  Out of band blocking, using CW interferer:  Wanted signal level:  ± 0.7dB f ≤ 3.0GHz  ± 1.0dB 3.0GHz < f ≤ 4.2GHz  ± 1.5dB 4.2GHz < f ≤ 6.0GHz  Interferer signal level:  ± 1.0dB up to 3GHz  ± 1.2dB 3.0GHz < f ≤ 4.2GHz  ± 3.0dB up to 12.75GHz  Interferer ACLR not applicable  Impact of interferer Broadband noise 0.1dB |
| 7.6.5.2 Blocking (Co-location with other base stations) | Co-location blocking, using CW interferer:  ±2.5 dB, f ≤ 3.0GHz  ±2.6 dB, 3.0GHz < f ≤ 4.2GHz  ±2.9 dB, 4.2GHz < f ≤ 6.0GHz | Co-location blocking, using CW interferer:  f ≤ 3.0GHz  Wanted signal level ± 0.7dB  3.0GHz < f ≤ 4.2GHz  Wanted signal level ± 1.0dB  4.2GHz < f ≤ 6.0GHz  Wanted signal level ± 1.5dB  f ≤ 6.0GHz  Interferer signal level:  ± 2.0dB  Interferer ACLR not applicable  Impact of interferer Broadband noise 0.4dB |
| 7.7 Receiver spurious emissions | 30 MHz ≤ f ≤ 4 GHz:±2.0 dB  4 GHz < f ≤ 19 GHz: ±4.0 dB |  |
| 7.8 Receiver intermodulation | ±1.8 dB, f ≤ 3.0GHz  ±2.4 dB, 3.0GHz < f ≤ 4.2GHz  ±3.3 dB, 4.2GHz < f ≤ 6.0GHz | Overall system uncertainty comprises four quantities:  1. Wanted signal level error  2. CW Interferer level error  3. Modulated Interferer level error  4. Impact of interferer ACLR  The effect of the closer CW signal has twice the effect.  Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared to provide the combined effect of the three signals. The interferer ACLR effect is systematic, and is added aritmetically.  Test System uncertainty = SQRT [(2 x CW\_level\_error)2 +(mod interferer\_level\_error)2 +(wanted signal\_level\_error)2] + ACLR effect.  f ≤ 3.0GHz  Wanted signal level ± 0.7dB  CW Interferer level ± 0.5dB  Mod Interferer level ± 0.7dB  3.0GHz < f ≤ 4.2GHz  Wanted signal level ± 1.0dB  CW Interferer level ± 0.7dB  Mod Interferer level ± 1.0dB  4.2GHz < f ≤ 6.0GHz  Wanted signal level ± 1.5dB  CW Interferer level ± 1.0dB  Mod Interferer level ± 1.5dB  f ≤ 6.0GHz  Impact of interferer ACLR 0.4dB |
| Note 1: Unless otherwise noted, only the Test System stimulus error is considered here. The effect of errors in the throughput measurements due to finite test duration is not considered. | | |
| Note 2: The Test equipment ACLR requirement for a specified uncertainty contribution is calculated as below:  a) The wanted signal to noise ratio for Reference sensitivity is calculated based on a 5dB noise figure  b) The same wanted signal to (noise + interference) ratio is then assumed at the desensitisation level according to the ACS test conditions  c) The noise is subtracted from the total (noise + interference) to compute the allowable BS adjacent channel interference. From this an equivalent BS ACS figure can be obtained  d) The contribution from the Test equipment ACLR is calculated to give a 0.4dB additional rise in interference. This corresponds to a Test equipment ACLR which is 10.2 dB bettter than the BS ACS  e) This leads to the following Test equipment ACLR requirements for the interfering signal:  Adjacent channel Selectivity  E-UTRA 1.4MHz channel bandwidth: 56dB  E-UTRA 3MHz channel bandwidth: 56dB  E-UTRA 5MHz channel bandwidth and above: 56dB  Stand-alone NB-IoT 200kHz channel bandwidth: 56dB  Narrow band blocking  E-UTRA 1.4MHz channel bandwidth: 65dB  E-UTRA 3MHz channel bandwidth: 61dB  E-UTRA 5MHz channel bandwidth and above: 59dB  Stand-alone NB-IoT 200kHz channel bandwidth: 66dB | | |

#### 4.1.2.3 Measurement of performance requirement

Table 4.1.2-3: Maximum Test System Uncertainty for Performance Requirements

|  |  |  |
| --- | --- | --- |
| Subclause | Maximum Test System Uncertainty1 | Derivation of Test System Uncertainty |
| 8.2.1 Performance requirements of PUSCH in multipath fading propagation conditions transmission on single antenna port | ± 0.6 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB |
| 8.2.1A Performance requirements of PUSCH in multipath fading propagation conditions transmission on two antenna ports | ± 0.8 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.7 dB for MIMO |
| 8.2.2 Performance requirements for UL timing adjustment | ± 0.6 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB |
| ± 0.3 dB | Overall system uncertainty for static conditions is equal to signal-to-noise ratio uncertainty.  Signal-to-noise ratio uncertainty ±0.3 dB |
| 8.2.3 Performance requirements for HARQ-ACK multiplexed on PUSCH | ± 0.6 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB |
| 8.2.4 Performance requirements for High Speed Train conditions | ± 0.3 dB | Overall system uncertainty for static conditions is equal to signal-to-noise ratio uncertainty.  Signal-to-noise ratio uncertainty ±0.3 dB |
| 8.3.1 ACK missed detection for single user PUCCH format 1a transmission on single antenna port | ± 0.6 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB |
| 8.3.2 CQI missed detection for PUCCH format 2 transmission on single antenna port | ± 0.6 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB |
| 8.3.3 ACK missed detection for multi user PUCCH format 1a | ± 0.6 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB |
| 8.3.4 ACK missed detection for PUCCH format 1b with Channel Selection | ± 0.6 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB |
| 8.3.5 ACK missed detection for PUCCH format 3 | ± 0.6 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB |
| 8.3.6 NACK to ACK detection for PUCCH format 3 | ± 0.6 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB |
| 8.3.7 ACK missed detection for PUCCH format 1a transmission on two antenna ports | ± 0.8 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.7 dB for Tx diversity |
| 8.3.8 CQI performance requirements for PUCCH format 2 transmission on two antenna ports | ± 0.8 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.7 dB for Tx diversity |
| 8.3.9 CQI performance requirements for PUCCH format 2 with DTX detection | ± 0.6 dB for one antenna port  ± 0.8 dB for two  antenna ports | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB for transmission on one antenna port and ±0.7 dB for transmission on two antenna ports |
| 8.4.1 PRACH false alarm probability and missed detection | ± 0.6 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB |
| ± 0.3 dB | Overall system uncertainty for static conditions is equal to signal-to-noise ratio uncertainty.  Signal-to-noise ratio uncertainty ±0.3 dB |
| In addition, the following Test System uncertainties and related constraints apply:   |  |  | | --- | --- | | AWGN Bandwidth | ≥ 1.08MHz, 2.7MHz, 4.5MHz, 9MHz, 13.5MHz, 18MHz; NRB x 180kHz according to BWConfig | | AWGN absolute power uncertainty, averaged over BWConfig | ±1.5 dB | | AWGN flatness and signal flatness, max deviation for any resource block, relative to average over BWConfig | ±2 dB | | AWGN flatness over BWChannel, max deviation for any resource block, relative to average over BWConfig | +2 dB | | AWGN flatness and signal flatness, max difference between adjacent resource blocks | ±0.5 dB | | AWGN peak to average ratio | ≥10 dB @0.001% | | Signal-to noise ratio uncertainty, averaged over uplink transmission Bandwidth | ±0.3 dB | | Fading profile power uncertainty | Test-specific | | Fading profile delay uncertainty, relative to frame timing | ±5 ns (excludes absolute errors related to baseband timing) | | | |
| Note 1: Only the overall stimulus error is considered here. The effect of errors in the throughput measurements due to finite test duration is not considered. | | |

### 4.1.3 Interpretation of measurement results

The measurement results returned by the Test System are compared - without any modification - against the Test Requirements as defined by the Shared Risk principle.

The Shared Risk principle is defined in ITU-R M.1545 [3].

The actual measurement uncertainty of the Test System for the measurement of each parameter shall be included in the test report.

The recorded value for the Test System uncertainty shall be, for each measurement, equal to or lower than the appropriate figure in subclause 4.1.2 of this specification.

If the Test System for a test is known to have a measurement uncertainty greater than that specified in subclause 4.1.2, it is still permitted to use this apparatus provided that an adjustment is made as follows.

Any additional uncertainty in the Test System over and above that specified in subclause 4.1.2 shall be used to tighten the Test Requirement, making the test harder to pass. (For some tests e.g. receiver tests, this may require modification of stimulus signals). This procedure (defined in Annex G) will ensure that a Test System not compliant with subclause 4.1.2 does not increase the chance of passing a device under test where that device would otherwise have failed the test if a Test System compliant with subclause 4.1.2 had been used.

## 4.2 Base station classes

The requirements in this specification apply to Wide Area Base Station, Medium Range Base Station, Local Area Base Station and Home Base Station unless other wise stated.

Wide Area Base Stations are characterised by requirements derived from Macro Cell scenarios with a BS to UE minimum coupling loss equals to 70 dB. The Wide Area Base Station class has the same requirements as the base station for General Purpose application in Release 8.

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.

Home Base Stations are characterised by requirements derived from Femto Cell scenarios.

The manufacturer shall declare the intended class of the BS under test.

## 4.3 Regional requirements

Some requirements in the present document may only apply in certain regions either as optional requirements or set by local and regional regulation as mandatory requirements. It is normally not stated in the 3GPP specifications under what exact circumstances that the requirements apply, since this is defined by local or regional regulation.

Table 4.3-1 lists all requirements that may be applied differently in different regions.

Table 4.3-1: List of regional requirements

|  |  |  |
| --- | --- | --- |
| Clause number | Requirement | Comments |
| 5.5 | Operating bands | Some bands may be applied regionally. |
| 5.6 | Channel bandwidth | Some channel bandwidths may be applied regionally. |
| 5.7 | Channel arrangement | The requirement is applied according to what operating bands in Clause 5.5 that are supported by the BS. |
| 6.2. | Base station maximum output power | In certain regions, the minimum requirement for normal conditions may apply also for some conditions outside the range of conditions defined as normal. |
| In certain regions, additional regional requirement specified in subclause 6.2.2 in [1] is applied for rated output power declared by the manufacturer.  In addition for Band 46 operation, the BS may have to comply with the applicable BS power limits established regionally, when deployed in regions where those limits apply and under the conditions declared by the manufacturer. |
| 6.6.1 | Occupied bandwidth | For Band 46 operation in certain regions, the occupied bandwidth for each 20MHz channel bandwidth E-UTRA carrier shall be less than or equal to 19MHz or 19.7MHz. |
| 6.6.3.5.1 | Operating band unwanted emissions (Category A) | This requirement is mandatory for regions where Category A limits for spurious emissions, as defined in ITU-R Recommendation SM.329 [5] apply. |
| 6.6.3.5.2 | Operating band unwanted emissions (Category B) | This requirement is mandatory for regions where Category B limits for spurious emissions, as defined in ITU-R Recommendation SM.329 [5], apply. |
| 6.6.3.5.3 | Additional requirements | These requirements may apply in certain regions as additional Operating band unwanted emission limits. |
| 6.6.4.5.1 | Spurious emissions (Category  A) | This requirement is mandatory for regions where Category A limits for spurious emissions, as defined in ITU-R Recommendation SM.329 [5] apply. |
| 6.6.4.5.2 | Spurious emissions (Category  B) | This requirement is mandatory for regions where Category B limits for spurious emissions, as defined in ITU-R Recommendation SM.329 [5], apply. |
| 6.6.4.5.4 | Additional spurious emission requirements | These requirements may be applied for the protection of system operating in frequency ranges other than the E-UTRA BS operating band.  In addition for Band 46 operation, 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. |
| 6.6.4.5.5 | Co-location with other base stations | These requirements may be applied for the protection of other BS receivers when a BS operating in another frequency band is co‑located with an E‑UTRA BS. |
| 6.7.2A | Additional requirements for Band 41 | These requirements may apply in certain regions for Band 41. |
| 6.7.6 | Additional test requirements for Band 41 | These requirements may apply in certain regions for Band 41. |
| 7.6.5.2 | Co-location with other base stations | These requirements may be applied for the protection of the BS receivers when a BS operating in another frequency band is co‑-located with an E-UTRA BS. |

## 4.4 Selection of configurations for testing

Most tests in the present document are only performed for a subset of the possible combinations of test conditions. For instance:

- Not all transceivers in the configuration may be specified to be tested;

- Only one RF channel may be specified to be tested;

- Not all channel bandwidths may be specified to be tested.

## 4.5 BS Configurations

### 4.5.1 Transmit configurations

Unless otherwise stated, the transmitter characteristics in clause 6 are specified at the BS antenna connector (test port  A) with a full complement of transceivers for the configuration in normal operating conditions. If any external apparatus such as a TX amplifier, a filter or the combination of such devices is used, requirements apply at the far end antenna connector (test port B).



Figure 4.5-1: Transmitter test ports

#### 4.5.1.1 Transmission with multiple transmitter antenna connectors

Unless otherwise stated, for the tests in clause 6 of the present document, the requirement applies for each transmitter antenna connector in the case of transmission with multiple transmitter antenna connectors.

Transmitter requirements are tested at the antenna connector, with the remaining antenna connector(s) being terminated. If the manufacturer has declared the transmitter paths to be equivalent, it is sufficient to measure the signal at any one of the transmitter antenna connectors,.

### 4.5.2 Receive configurations

Unless otherwise stated, the receiver characteristics in clause 7 are specified at the BS antenna connector (test port A) with a full complement of transceivers for the configuration in normal operating conditions. If any external apparatus such as a RX amplifier, a filter or the combination of such devices is used, requirements apply at the far end antenna connector (test port B).



Figure 4.5-2: Receiver test ports

#### 4.5.2.1 Reception with multiple receiver antenna connectors, receiver diversity

For the tests in clause 7 of the present document, the requirement applies at each receiver antenna connector for receivers with antenna diversity or in the case of multi-carrier reception with multiple receiver antenna connectors.

Receiver requirements are tested at the antenna connector, with the remaining receiver(s) disabled or their antenna connector(s) being terminated. If the manufacturer has declared the receiver paths to be equivalent, it is sufficient to apply the specified test signal at any one of the receiver antenna connectors.

For a multi-band BS, multi-band tests for ACS, blocking and intermodulation are performed with the interferer(s) applied to each antenna connector mapped to the receiver for the wanted signal(s), however only to one antenna at a time. Antenna connectors to which no signals are applied are terminated.

### 4.5.3 Duplexers

The requirements of the present document shall be met with a duplexer fitted, if a duplexer is supplied as part of the BS. If the duplexer is supplied as an option by the manufacturer, sufficient tests should be repeated with and without the duplexer fitted to verify that the BS meets the requirements of the present document in both cases.

The following tests shall be performed with the duplexer fitted, and without it fitted if this is an option:

1) subclause 6.2, base station output power, for the highest static power step only, if this is measured at the antenna connector;

2) subclause 6.6, unwanted emissions; outside the BS transmit band;

3) subclause 6.6.4.5.3, protection of the BS receiver;

4) subclause 6.7, transmit intermodulation; for the testing of conformance, the carrier frequencies should be selected to minimize intermodulation products from the transmitters falling in receive channels.

The remaining tests may be performed with or without the duplexer fitted.

NOTE 1: When performing receiver tests with a duplexer fitted, it is important to ensure that the output from the transmitters does not affect the test apparatus. This can be achieved using a combination of attenuators, isolators and filters.

NOTE 2: When duplexers are used, intermodulation products will be generated, not only in the duplexer but also in the antenna system. The intermodulation products generated in the antenna system are not controlled by 3GPP specifications, and may degrade during operation (e.g. due to moisture ingress). Therefore, to ensure continued satisfactory operation of a BS, an operator will normally select EARFCNs to minimize intermodulation products falling on receive channels. For testing of complete conformance, an operator may specify the EARFCNs to be used.

### 4.5.4 Power supply options

If the BS is supplied with a number of different power supply configurations, it may not be necessary to test RF parameters for each of the power supply options, provided that it can be demonstrated that the range of conditions over which the equipment is tested is at least as great as the range of conditions due to any of the power supply configurations.

This applies particularly if a BS contains a DC rail which can be supplied either externally or from an internal mains power supply. In this case, the conditions of extreme power supply for the mains power supply options can be tested by testing only the external DC supply option. The range of DC input voltages for the test should be sufficient to verify the performance with any of the power supplies, over its range of operating conditions within the BS, including variation of mains input voltage, temperature and output current.

### 4.5.5 Ancillary RF amplifiers

The requirements of the present document shall be met with the ancillary RF amplifier fitted. At tests according to clauses 6 and 7 for TX and RX respectively, the ancillary amplifier is connected to the BS by a connecting network (including any cable(s), attenuator(s), etc.) with applicable loss to make sure the appropriate operating conditions of the ancillary amplifier and the BS. The applicable connecting network loss range is declared by the manufacturer. Other characteristics and the temperature dependence of the attenuation of the connecting network are neglected. The actual attenuation value of the connecting network is chosen for each test as one of the applicable extreme values. The lowest value is used unless otherwise stated.

Sufficient tests should be repeated with the ancillary amplifier fitted and, if it is optional, without the ancillary RF amplifier to verify that the BS meets the requirements of the present document in both cases.

When testing, the following tests shall be repeated with the optional ancillary amplifier fitted according to the table below, where x denotes that the test is applicable:

Table 4.5-1: Tests applicable to Ancillary RF Amplifiers

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Receiver Tests | Subclause | TX amplifier only | RX amplifier only | TX/RX amplifiers combined (Note) |
| 7.2 |  | X | X |
| 7.5 (Narrowband blocking) |  | X | X |
| 7.6 |  | X | X |
| 7.7 |  | x | X |
| 7.8 |  | x |  |
| Transmitter Tests | 6.2 | x |  | X |
| 6.6.1 | X |  | X |
| 6.6.2 | X |  | x |
| 6.6.3 | X |  | x |
| 6.6.4 | x |  | X |
| 6.7 | x |  | X |

NOTE: Combining can be by duplex filters or any other network. The amplifiers can either be in RX or TX branch or in both. Either one of these amplifiers could be a passive network.

In test according to subclauses 6.2 and 7.2 highest applicable attenuation value is applied.

### 4.5.6 BS with integrated Iuant BS modem

Unless otherwise stated, for the tests in the present document, the integrated Iuant BS modem shall be switched off. Spurious emissions according to clauses 6.6.4 and 7.7 shall be measured only for frequencies above 20MHz with the integrated Iuant BS modem switched on.

### 4.5.7 BS using antenna arrays

A BS may be configured with a multiple antenna port connection for some or all of its transceivers or with an antenna array related to one cell (not one array per transceiver). This subclause applies to a BS which meets at least one of the following conditions:

- the transmitter output signals from one or more transceiver appear at more than one antenna port; or

- there is more than one receiver antenna port for a transceiver or per cell and an input signal is required at more than one port for the correct operation of the receiver thus the outputs from the transmitters as well as the inputs to the receivers are directly connected to several antennas (known as "aircombining"); or

- transmitters and receivers are connected via duplexers to more than one antenna.

In case of diversity or spatial multiplexing, multiple antennas are not considered as an antenna array.

If a BS is used, in normal operation, in conjunction with an antenna system which contains filters or active elements which are necessary to meet the E-UTRA requirements, the conformance tests may be performed on a system comprising the BS together with these elements, supplied separately for the purposes of testing. In this case, it must be demonstrated that the performance of the configuration under test is representative of the system in normal operation, and the conformance assessment is only applicable when the BS is used with the antenna system.

For conformance testing of such a BS, the following procedure may be used.

#### 4.5.7.1 Receiver tests

For each test, the test signals applied to the receiver antenna connectors shall be such that the sum of the powers of the signals applied equals the power of the test signal(s) specified in the test.

An example of a suitable test configuration is shown in figure 4.5.7.1-1.



Figure 4.5.7.1-1: Receiver test set-up

For spurious emissions from the receiver antenna connector, the test may be performed separately for each receiver antenna connector.

#### 4.5.7.2 Transmitter tests

For each test, the test signals applied to the transmitter antenna connectors **(Pi)** shall be such that the sum of the powers of the signals applied equals the power of the test signal(s) **(Ps)** specified in the test. This may be assessed by separately measuring the signals emitted by each antenna connector and summing the results, or by combining the signals and performing a single measurement. The characteristics (e.g. amplitude and phase) of the combining network should be such that the power of the combined signal is maximised.

An example of a suitable test configuration is shown in figure 4.5.7.2-1.



Figure 4.5.7.2-1: Transmitter test set-up

For Intermodulation attenuation, the test may be performed separately for each transmitter antenna connector.

## 4.6 Manufacturer’s declarations of regional and optional requirements

### 4.6.1 Operating band and frequency range

The manufacturer shall declare which operating band(s) specified in clause 5.5 that is supported by the BS under test and if applicable, which frequency ranges within the operating band(s) that the base station can operate in. Requirements for other operating bands and frequency ranges need not be tested.

The manufacturer shall declare which operating band(s) specified in clause 5.5 are supported by the BS under test for carrier aggregation.

The manufacturer shall declare which NB-IoT operating mode (standalone, in-band and/or guard band) the BS supports for the declared supported band.

For standalone NB-IoT operating mode, the manufacturer shall declare the number of supported NB-IoT carriers.

### 4.6.2 Channel bandwidth

The manufacturer shall declare which of the channel bandwidths specified in TS36.104 [2] subclause 5.6 that are supported by the BS under test. Requirements for other channel bandwidths need not be tested.

For each supported channel bandwidth, the manufacturer shall declare if BS supports NB-IoT in-band and/or guard band operation and the number of supported NB-IoT PRBs.

### 4.6.3 Base station output power

The manufacturer shall declare for the BS under test the rated output power for each supported transmit channel bandwidth.

### 4.6.4 Spurious emissions Category

The manufacturer shall declare one of the following:

a) The BS is tested against Category A limits for spurious emissions, as defined in ITU-R Recommendation SM.329 [5]. In this case

- conformance with the operating band unwanted emissions requirements in clause 6.6.3.5.1 is mandatory, and the requirements specified in clause 6.6.3.5.2 need not be tested..

- conformance with the spurious emissions requirements in clause 6.6.4.5.1 is mandatory, and the requirements specified in clause 6.6.4.5.2 need not be tested.

b) The BS is tested against Category B limits for spurious emissions, as defined in ITU-R Recommendation SM.329 [5]. In this case,

- conformance with the operating band unwanted emissions requirements in clause 6.6.3.5.2 is mandatory, and the requirements specified in clause 6.6.3.5.1 need not be tested.

- conformance with the spurious emissions requirements in clause 6.6.4.5.2 is mandatory, and the requirements specified in clause 6.6.4.5.1 need not be tested.

### 4.6.5 Additional operating band unwanted emissions

The manufacturer shall declare whether the BS under test is intended to operate in geographic areas where the additional operating band unwanted emission limits defined in clause 6.6.3.5.3 apply. If this is the case, compliance with the test requirement specified in Tables 6.6.3.5.3-1, 6.6.3.5.3-2 or 6.6.3.5.3-3 are mandatory; otherwise these requirements need not be tested.

For a BS declared to support Band 20 and to operate in geographic areas within the CEPT in which frequencies are allocated to broadcasting (DTT) service, the manufacturer shall additionally declare the following quantities associated with the applicable test conditions of Table 6.6.3.5.3-4 and information in annex G of [2] :

PEM,N Declared emission level for channel N

P10MHz Maximum output Power in 10 MHz

For a BS declared to support Band 24 and intended to operate in geographic areas in which the conditions for emissions falling into the 1559-1610 MHz band according to FCC Order DA 10-534 apply, the manufacturer shall additionally declare the following quantities associated with the applicable test conditions of Table 6.6.4.5.4-4:

PE\_1kHz Declared emission level (measurement bandwidth = 1kHz)

PE\_1MHz Declared emission level (measurement bandwidth = 1MHz)

For a BS declared to support Band 32, 75 or 76 and to intended operate in geographic areas within the CEPT, the manufacturer shall additionally declare the following quantities associated with the applicable test conditions of Table 6.6.3.5.3-8 and Table 6.6.3.5.3-9:

PEM,B32,B75,B76,ind Declared emission level in Band 32, Band 75 and Band 76, ind=a, b, c

PEM,B32,ind Declared emission level in Band 32, ind= d, e

For a BS declared to support Band 50, 74 or 75 and to operate in geographic areas where the additional unwanted emission limit defined in Table 6.6.3.5.3-10 applies, the manufacturer shall additionally declare the following quantity associated with the applicable test conditions of Table 6.6.3.5.3-10:

PEM,B50,B74,B75,ind Declared emission level for Band 50, Band 74 and Band 75, ind=a,b

### 4.6.6 Co-existence with other systems

The manufacturer shall declare whether the BS under test is intended to operate in geographic areas where one or more of the systems GSM850, GSM900, DCS1800, PCS1900, UTRA FDD, UTRA TDD, E-UTRA and/or PHS operating in another band are deployed. If this is the case, compliance with the applicable test requirement for spurious emissions specified in clause 6.6.4.5.4 shall be tested.

### 4.6.7 Co-location with other base stations

The manufacturer shall declare whether the BS under test is intended to operate co-located with base stations of one or more of the systems GSM850, GSM900, DCS1800, PCS1900, UTRA FDD, UTRA TDD and/or E-UTRA operating in another band. If this is the case,

- compliance with the applicable test requirement for spurious emissions specified in clause 6.6.4.5.5 shall be tested.

- compliance with the applicable test requirement for receiver blocking specified in clause 7.6 shall be tested.

### 4.6.8 Manufacturer's declarations of supported RF configurations

The manufacturer shall declare which operational configurations the BS supports by declaring the following parameters:

- Support of the BS in non-contiguous spectrum operation. If the BS does not support non-contiguous spectrum operation the parameters for non-contiguous spectrum operation below shall not be declared.

- The supported operating bands defined in subclause 5.5 for E-UTRA;

- The frequency range within the above operating band(s) supported by the BS for E-UTRA;

- The supported operating band defined in subclause 5.5 for NB-IoT and the operating mode(s);

- The frequency range within the above operating band supported by the BS for NB-IoT;

- The maximum Base Station RF Bandwidth supported by a BS within each operating band;

• for contiguous spectrum operation

• for non-contiguous spectrum operation

- The supported operating configurations (multi-carrier, carrier aggregation, and/or single carrier) within each operating band.

- The supported component carrier combinations at nominal channel spacing within each operating band and sub-block.

- The rated output power per carrier;

- for contiguous spectrum operation

- for non-contiguous spectrum operation

NOTE 1: Different rated output powers may be declared for different operating configurations.

NOTE 2: If a BS is capable of 256QAM DL operation then two rated output power declarations may be made. One declaration is applicable when configured for 256QAM transmissions and the other declaration is applicable when not configured for 256QAM transmissions.

NOTE 3: If a BS is capable of 1024QAM DL operation then up to three rated output power declarations may be made. One declaration is applicable when configured for 1024QAM transmissions, a different declaration is applicable when configured for 256QAM transmissions and the other declaration is applicable when configured neither for 256 nor 1024QAM transmissions.

- The rated total output power Prated,t as a sum of all carriers;

- for contiguous spectrum operation

- for non-contiguous spectrum operation

NOTE 1: If a BS is capable of 256QAM DL operation then two rated output power declarations may be made. One declaration is applicable when configured for 256QAM transmissions and the other declaration is applicable when not configured for 256QAM transmissions.

NOTE 2: If a BS is capable of 1024QAM DL operation then up to three rated output power declarations may be made. One declaration is applicable when configured for 1024QAM transmissions, a different declaration is applicable when configured for 256QAM transmissions and the other declaration is applicable when configured neither for 256 nor 1024QAM transmissions.

- Maximum number of supported carriers within each band;

- for contiguous spectrum operation

- for non-contiguous spectrum operation

If the rated total output power Prated,t and total number of supported carriers are not simultaneously supported, the manufacturer shall declare the following additional parameters:

- The reduced number of supported carriers at the rated total output power Prated,t;

- The reduced total output power at the maximum number of supported carriers.

For BS capable of multi-band operation, the parameters above shall be declared for each supported operating band, in which declarations of the maximum Base Station RF Bandwidth, the rated output power per carrier, the rated total output power Prated,t and maximum number of supported carriers are applied for single-band operation only. In addition the manufacturer shall declare the following additional parameters for BS capable of multi-band operation:

- Supported operating band combinations of the BS

- Supported operating band(s) of each antenna connector

- Support of multi-band transmitter and/or multi-band receiver, including mapping to antenna connector(s)

- Total number of supported carriers for the declared band combinations of the BS

- Maximum number of supported carriers per band in multi-band operation

- Total RF Bandwidth BWtot of transmitter and receiver for the declared band combinations of the BS

- Maximum Base Station RF Bandwidth of each supported operating band in multi-band operation

- Maximum Radio Bandwidth BWmax in transmit and receive direction for the declared band combinations of the BS

- Any other limitations under simultaneous operation in the declared band combinations of the BS which have any impact on the test configuration generation

- Total output power as a sum over all supported operating bands in the declared band combinations of the BS

- Maximum supported power difference between any two carriers in any two different supported operating bands

- The rated output power per carrier in multi-band operation

- Rated total output power Prated,t of each supported operating band in multi-band operation

### 4.6.9 NB-IoT sub-carrier spacing

If the BS supports NB-IoT, manufacturer shall declare if it supports 15 kHz sub-carrier spacing, 3.75 kHz sub-carrier spacing, or both for NPUSCH.

### 4.6.10 NB-IoT power dynamic range

If the BS supports E-UTRA with NB-IoT operating in-band and/or in guard band, manufacturer shall declare the maximum power dynamic range it could support with a minimum of +6dB as mentioned in TS 36.104 [2] clause 6.3.3.

If the BS supports 5 MHZ E-UTRA with NB-IoT operating in guard band, manufacturer shall declare the maximum power that could be allocated to this NB-IoT carrier.

### 4.6.11 Sub-PRB allocation

Manufacturer shall declare subPRB allocation support for BL/CE UE and comply with the REFSENS for sub-PRB allocation as mentioned in TS 36.104 [2] clause 7.1.

## 4.7 Specified frequency range and supported channel bandwidth

Unless otherwise stated, the test shall be performed with a lowest and the highest bandwidth supported by the BS. The manufacturer shall declare that the requirements are fulfilled for all other bandwidths supported by the BS which are not tested.

The manufacturer shall declare:

- Which of the E-UTRA operating bands defined in subclause 5.5 are supported by the BS.

- The E-UTRA frequency range within the above frequency band(s) supported by the BS.

- Which NB-IoT operating band defined in subclause 5.5 is supported by the BS.

- The NB-IoT frequency range within the above frequency band supported by the BS.

- The E-UTRA channel bandwidths supported by the BS.

- For each E-UTRA channel bandwidth, the NB-IoT operating mode(s) supported by the BS.

For CA specific testing in clause 4.7.2, the manufacturer’s declaration in clause 4.6.8 will be applied.

For the single carrier testing many tests in this TS are performed with appropriate frequencies in the bottom, middle and top channels of the supported frequency range of the BS. These are denoted as RF channels B (bottom), M (middle) and T (top).

Unless otherwise stated, the test shall be performed with a single carrier at each of the RF channels B, M and T.

Unless otherwise stated, the NB-IoT standalone test shall be performed with a single carrier at each of the RF channels B (bottom), M (middle) and T (top).

When a test is performed by a test laboratory, the EARFCNs to be used for RF channels B, M and T shall be specified by the laboratory. The laboratory may consult with operators, the manufacturer or other bodies.

When a test is performed by a manufacturer, the EARFCNs to be used for RF channels B, M and T may be specified by an operator.

### 4.7.1 Base Station RF Bandwidth position for multi-carrier and/or CA testing

Many tests in this TS are performed with the maximum Base Station RF Bandwidth located at the bottom, middle and top of the supported frequency range in each operating band. These are denoted as BRFBW(bottom), MRFBW (middle) and TRFBW (top).

Unless otherwise stated, the test shall be performed at BRFBW, MRFBW and TRFBW defined as following:

- BRFBW: maximum Base Station RF Bandwidth located at the bottom of the supported frequency range in each operating band;

- MRFBW: maximum Base Station RF Bandwidth located in the middle of the supported frequency range in each operating band;

- TRFBW: maximum Base Station RF Bandwidth located at the top of the supported frequency range in each operating band.

For BS capable of multi-band operation, unless otherwise stated, the test shall be performed at BRFBW\_T’RFBW and B’RFBW\_TRFBW defined as following:

- BRFBW\_ T’RFBW: the Base Station RF Bandwidths located at the bottom of the supported frequency range in the lowest operating band and at the highest possible simultaneous frequency position, within the Maximum Radio Bandwidth, BWmax, in the highest operating band. The Base Station RF Bandwidth(s) are located at the bottom of the supported frequency range(s) in the middle band(s).

- B’RFBW\_TRFBW: the Base Station RF Bandwidths located at the top of the supported frequency range in the highest operating band and at the lowest possible simultaneous frequency position, within the Maximum Radio Bandwidth, BWmax, in the lowest operating band. The Base Station RF Bandwidth(s) are located at the top of the supported frequency range(s) in the middle band(s).

NOTE: BRFBW\_T’RFBW = B’RFBW\_TRFBW = BRFBW\_TRFBW when the declared Maximum Radio Bandwidth BWmax, spans all operating bands. BRFBW\_TRFBW means the Base Station RF Bandwidths are located at the bottom of the supported frequency range in the lowest operating band and at the top of the supported frequency range in the highest operating band, and the Base Station RF Bandwidth(s) are located at the bottom of the supported frequency range(s) in the middle band(s) in the first test and then at the top of the supported frequency range(s) in the middle band(s) in the second test.

When a test is performed by a test laboratory, the position of BRFBW, MRFBW and TRFBW in each supported operating band, as well as the position of BRFBW\_T’RFBW and B’RFBW\_TRFBW in the supported operating band combinations, shall be specified by the laboratory. The laboratory may consult with operators, the manufacturer or other bodies.

### 4.7.2 Aggregated Channel Bandwidth position for Contiguous CA occupied bandwidth testing

Occupied bandwidth test in this TS is performed with the Aggregated Channel Bandwidth and sub-block bandwidths located at the bottom, middle and top of the supported frequency range in the operating band. These are denoted as BBW Channel CA(bottom), MBW Channel CA (middle) and TBW Channel CA (top) for contiguous spectrum operation.

Unless otherwise stated, the test for contiguous spectrum operation shall be performed at BBW Channel CA, MBW Channel CA and TBW Channel CA defined as following:

- BBW Channel CA: Aggregated Channel Bandwidth located at the bottom of the supported frequency range in each operating band;

- MBW Channel CA: Aggregated Channel Bandwidth located close in the middle of the supported frequency range in each operating band, with the center frequency of each component carrier aligned to the channel raster;

- TBW Channel CA: Aggregated Channel Bandwidth located at the top of the supported frequency range in each operating band.

When a test is performed by a test laboratory, the position of BBW Channel CA, MBW Channel CA and TBW Channel CA forcontiguous spectrum operation in the operating band shall be specified by the laboratory. The laboratory may consult with operators, the manufacturer or other bodies.

### 4.7.3 NB-IoT testing

Unless otherwise stated, the NB-IoT standalone Rx test shall be performed by using one tone at one or both NB-IoT PRB’s edge positions; those are denoted BNB-IoT and TNB-IoT.

Unless otherwise stated, the NB-IoT in-band test shall be performed by puncturing one E-UTRA PRB at the eligible (as specified in clause 5.7.3) in-band position closest to E-UTRA guard band; those are denoted LNB-IoT (Left) and RNB-IoT (Right).

Unless otherwise stated, the NB-IoT in-band Rx test shall be performed by using the tone located on the NB-IoT PRB’s edge, which is closest to E-UTRA guard band; those are denoted BNB-IoT for LNB-IoT and TNB-IoT for RNB-IoT.

Unless otherwise stated, the NB-IoT guard band test shall be performed by selecting the eligible (as specified in clause 5.7.3) guard band position closest to E-UTRA PRBs; those are denoted LNB-IoT (Left) and RNB-IoT (Right),

Unless otherwise stated, the NB-IoT guard band Rx test shall be performed by using the tone located on the NB-IoT PRB’s edge, which is closest to E-UTRA channel edge; those are denoted BNB-IoT for LNB-IoT and TNB-IoT for RNB-IoT.

## 4.8 Format and interpretation of tests

Each test in the following clauses has a standard format:

**X Title**

All tests are applicable to all equipment within the scope of the present document, unless otherwise stated.

**X.1 Definition and applicability**

This subclause gives the general definition of the parameter under consideration and specifies whether the test is applicable to all equipment or only to a certain subset. Required manufacturer declarations may be included here.

**X.2 Minimum Requirement**

This subclause contains the reference to the subclause to the 3GPP reference (or core) specification which defines the Minimum Requirement.

**X.3 Test Purpose**

This subclause defines the purpose of the test.

**X.4 Method of test**

**X.4.1 Initial conditions**

This subclause defines the initial conditions for each test, including the test environment, the RF channels to be tested and the basic measurement set-up.

**X.4.2 Procedure**

This subclause describes the steps necessary to perform the test and provides further details of the test definition like point of access (e.g. test port), domain (e.g. frequency-span), range, weighting (e.g. bandwidth), and algorithms (e.g. averaging).

**X.5 Test Requirement**

This subclause defines the pass/fail criteria for the equipment under test. See subclause 4.1.2.5 Interpretation of measurement results.

## 4.9 Applicability of requirements

For BS that is E-UTRA (single-RAT) capable only, the requirements in the present document are applicable and additional conformance to TS 37.141 [18] is optional. For a BS additionally conforming to TS 37.141 [18], conformance to some of the RF requirements in the present document can be demonstrated through the corresponding requirements in TS 37.141 [18] as listed in Table 4.9-1

Table 4.9-1: Alternative RF test requirements for a BS additionally conforming to TS 37.141 [18]

|  |  |  |
| --- | --- | --- |
| **RF requirement** | **Clause in the present document** | **Alternative clause in TS 37.141 [18]** |
| Base station output power | 6.2.5 | 6.2.1.5 |
| Transmit ON/OFF power | 6.4 | 6.4 |
| Unwanted emissions |  | |
| Transmitter spurious emissions | 6.6.4.5 | 6.6.1.5 (except for 6.6.1.5.3) |
| Operating band unwanted emissions | 6.6.3.5.1, 6.6.3.5.2  (NOTE 1) | 6.6.2.5 (except for 6.6.2.5.3 and 6.6.2.5.4) |
| Transmitter intermodulation | 6.7.5 | 6.7.5.1 |
| Narrowband blocking | 7.5.5 | 7.4.5.2 |
| Blocking | 7.6.5.1 | 7.4.5.1 |
| Out-of-band blocking | 7.6.5.1 | 7.5.5.1 |
| Co-location with other base stations | 7.6.5.2 | 7.5.5.2 |
| Receiver spurious emissions | 7.7.5 | 7.6.5.1 |
| Intermodulation | 7.8.5 | 7.7.5.1 |
| Narrowband intermodulation | 7.8.5 | 7.7.5.2 |
| NOTE 1: This does not apply when the lowest or highest carrier frequency is configured as 1.4 or 3 MHz carrier in bands of Band Category 1 or 3 according to clause 4.4 in TS 37.141 [18]. | | |

## 4.10 Test configurations for multi-carrier and/or CA operation

The test configurations shall be constructed using the methods defined below, subject to the parameters declared by the manufacturer for the supported RF configurations as listed in subclause 4.6.8. The test configurations to use for conformance testing are defined for each supported RF configuration in subclause 4.11.

The applicable test models for generation of the carrier transmit test signal are defined in subclause 6.1.1.

### 4.10.1 ETC1: Contiguous spectrum operation

The purpose of test configuration ETC1 is to test all BS requirements excluding CA occupied bandwidth.

For ETC1 used in receiver tests only the two outermost carriers within each supported operating band need to be generated by the test equipment.

#### 4.10.1.1 ETC1 generation

ETC1 shall be constructed on a per band basis using the following method:

- Declared maximum Base Station RF Bandwidth supported for contiguous spectrum operation shall be used;

- Select the narrowest supported carrier and place it adjacent to the lower Base Station RF Bandwidth edge. Place a 5 MHz carrier adjacent to the upper Base Station RF Bandwidth edge.

- For transmitter tests, select as many 5 MHz carriers that the BS supports within a band and fit in the rest of the declared maximum Base Station RF Bandwidth. Place the carriers adjacent to each other starting from the upper Base Station RF Bandwidth edge. The nominal carrier spacing defined in subclause 5.7 shall apply;

- If 5 MHz carriers are not supported by the BS the narrowest supported channel BW shall be selected instead.

The test configuration should be constructed on a per band basis for all component carriers of the inter-band CA bands declared to be supported by the BS and are transmitted using the same antenna port. All configured component carriers are transmitted simultaneously in the tests where the transmitter should be on.

#### 4.10.1.2 ETC1 power allocation

*For a BS declared to support MC operation,*

Set the power of each carrier to the same level so that the sum of the carrier powers equals the rated total output power Prated,t according to the manufacturer’s declaration in subclause 4.6.8.

*For a BS declared to support only CA operation,*

Set the power spectral density of each carrier to the same level so that the sum of the carrier powers equals the rated total output power Prated,t according to the manufacturer’s declaration in subclause 4.6.8.

### 4.10.2 ETC2: Contiguous CA occupied bandwidth

ETC2 in this subclause is used to test CA occupied bandwidth.

#### 4.10.2.1 ETC2 generation

The CA specific test configuration should be constructed on a per band basis using the following method:

- Of all component carrier combinations supported by the BS, those which have smallest or largest sum of channel bandwidth of component carriers, shall be tested. Of all component carrier combinations which have smallest or largest sum of channel bandwidth of component carriers supported by the BS, only one combination having largest sum and one combination having smallest sum shall be tested irrespective of the number of component carriers.

- Of all component carrier combinations which have same sum of channel bandwidth of component carrier, select those with the narrowest carrier at the lower Base Station RF Bandwidth edge.

- Of the combinations selected in the previous step, select one with the narrowest carrier at the upper Base Station RF Bandwidth edge.

- If there are multiple combinations fulfilling previous steps, select the one with the smallest number of component carrier.

- If there are multiple combinations fulfilling previous steps, select the one with the widest carrier being adjacent to the lowest carrier.

- If there are multiple combinations fulfilling previous steps, select the one with the widest carrier being adjacent to the highest carrier

- If there are multiple combinations fulfilling previous steps, select the one with the widest carrier being adjacent to the carrier which has been selected in the previous step.

- If there are multiple combinations fulfilling previous steps, repeat the previous step until there is only one combination left.

- The nominal carrier spacing defined in subclause 5.7.1A shall apply.

#### 4.10.2.2 ETC2 power allocation

Set the power spectral density of each carrier to be the same level so that the sum of the carrier powers equals the rated total output power Prated,t for E-UTRA according to the manufacturer’s declaration in subclause 4.6.8.

### 4.10.3 ETC3: Non-contiguous spectrum operation

The purpose of ETC3 is to test all BS requirements excluding CA occupied bandwidth.

For ETC3 used in receiver tests, outermost carriers for each sub-block need to be generated by the test equipment.

#### 4.10.3.1 ETC3 generation

ETC3 is constructed on a per band basis using the following method:

- The Base Station RF Bandwidth shall be the maximum Base Station RF Bandwidth supported for non-contiguous spectrum operation. The Base Station RF Bandwidth consists of one sub-block gap and two sub-blocks located at the edges of the declared maximum supported Base Station RF Bandwidth.

- For transmitter tests, place a 5MHz carrier adjacent to the upper Base Station RF Bandwidth edge and a 5MHz carrier adjacent to the lower Base Station RF Bandwidth edge. If 5 MHz carriers are not supported by the BS, the narrowest supported channel BW shall be selected instead.

- For receiver tests, place a 5MHz carrier adjacent to the upper Base Station RF Bandwidth edge and a 5MHz carrier adjacent to the lower Base Station RF Bandwidth edge. If 5 MHz E-UTRA carriers are not supported by the BS, the narrowest supported channel BW shall be selected instead.

- For single-band operation receiver tests, if the remaining gap is at least 15 MHz plus two times the channel BW used in the previous step and the BS supports at least 4 carriers, place a carrier of this BW adjacent to each already placed carrier for each sub-block. The nominal carrier spacing defined in subclause 5.7 shall apply.

- The sub-block edges adjacent to the sub-block gap shall be determined using the specified FOffset for the carrier adjacent to the sub-block gap.

#### 4.10.3.2 ETC3 power allocation

Set the power of each carrier to the same level so that the sum of the carrier powers equals the rated total output power Prated,t according to the manufacturer’s declaration in subclause 4.6.8.

#### 4.10.3.24 VOID

### 4.10.4 ETC4: Multi-band test configuration for full carrier allocation

The purpose of ETC4 is to test multi-band operation aspects considering maximum supported number of carriers.

#### 4.10.4.1 ETC4 generation

ETC4 is based on re-using the existing test configuration applicable per band involved in multi-band operation. It is constructed using the following method:

- The Base Station RF Bandwidth of each supported operating band shall be the declared maximum Base Station RF Bandwidth in multi-band operation.

- The number of carriers of each supported operating band shall be the declared maximum number of supported carriers in multi-band operation. Carriers shall first be placed at the outermost edges of the declared Maximum Radio Bandwidth for outermost bands and at the Base Station RF Bandwidths edges for middle band(s) if any. Additional carriers shall next be placed at the Base Station RF Bandwidths edges, if possible.

- The allocated Base Station RF Bandwidth of the outermost bands shall be located at the outermost edges of the declared Maximum Radio Bandwidth.

- Each concerned band shall be considered as an independent band and the carrier placement in each band shall be according to ETC1, where the declared parameters for multi-band operation shall apply. The mirror image of the single-band test configuration shall be used in each alternate band(s) and in the highest band being tested for the BS to ensure a narrowband carrier being placed at both edges of the Maximum Radio Bandwidth.

- If only one carrier can be placed for the concerned band(s), the carrier(s) shall be placed at the outermost edges of the declared maximum radio bandwidth for outermost band(s) and at one of the outermost edges of the supported frequency range within the Base Station RF Bandwidths for middle band(s) if any.

- If the sum of the maximum Base Station RF Bandwidths of each supported operating bands is larger than the declared Total RF Bandwidth of transmitter and receiver for the declared band combinations of the BS, repeat the steps above for test configurations where the Base Station RF Bandwidth of one of the operating band shall be reduced so that the Total RF Bandwidth BWtot of transmitter and receiver is not exceeded and vice versa.

- If the sum of the maximum number of supported carrier of each supported operating bands in multi-band operation is larger than the declared total number of supported carriers for the declared band combinations of the BS, repeat the steps above for test configurations where in each test configuration the number of carriers of one of the operating band shall be reduced so that the total number of supported carriers is not exceeded and vice versa.

#### 4.10.4.2 ETC4 power allocation

Unless otherwise stated, set the power of each carrier in all supported operating bands to the same power so that the sum of the carrier powers equals the total output power according to the manufacturer’s declaration.

If the allocated power of a supported operating band(s) exceeds the declared rated total output power Prated,t of the operating band(s) in multi-band operation, the exceeded part shall, if possible, be reallocated into the other band(s). If the power allocated for a carrier exceeds the rated output power declared for that carrier, the exceeded power shall, if possible, be reallocated into the other carriers.

### 4.10.5 ETC5: Multi-band test configuration with high PSD per carrier

The purpose of ETC5 is to test multi-band operation aspects considering higher PSD cases with reduced number of carriers and non-contiguous operation (if supported) in multi-band mode.

#### 4.10.5.1 ETC5 generation

ETC5 is based on re-using the existing test configuration applicable per band involved in multi-band operation. It is constructed using the following method:

- The Base Station RF Bandwidth of each supported operating band shall be the declared maximum Base Station RF Bandwidth in multi-band operation.

- The allocated Base Station RF Bandwidth of the outermost bands shall be located at the outermost edges of the declared Maximum Radio Bandwidth.

- The maximum number of carriers is limited to two per band. Carriers shall first be placed at the outermost edges of the declared Maximum Radio Bandwidth for outermost bands and at the Base Station RF Bandwidths edges for middle band(s) if any. Additional carriers shall next be placed at the Base Station RF Bandwidths edges, if possible.

- Each concerned band shall be considered as an independent band and the carrier placement in each band shall be according to ETC3, where the declared parameters for multi-band operation shall apply. Narrowest supported E-UTRA channel bandwidth shall be used in the test configuration.

- If only one carrier can be placed for the concerned band(s), the carrier(s) shall be placed at the outermost edges of the declared maximum radio bandwidth for outermost band(s) and at one of the outermost edges of the supported frequency range within the Base Station RF Bandwidths for middle band(s) if any.

- If the sum of the maximum Base Station RF Bandwidth of each supported operating bands is larger than the declared Total RF Bandwidth BWtot of transmitter and receiver for the declared band combinations of the BS, repeat the steps above for test configurations where the Base Station RF Bandwidth of one of the operating band shall be reduced so that the Total RF Bandwidth BWtot of transmitter and receiver is not exceeded and vice versa.

#### 4.10.5.2 ETC5 power allocation

Unless otherwise stated, set the power of each carrier in all supported operating bands to the same power so that the sum of the carrier powers equals the total output power according to the manufacturer’s declaration.

If the allocated power of a supported operating band(s) exceeds the declared rated total output power Prated,t of the operating band(s) in multi-band operation, the exceeded part shall, if possible, be reallocated into the other band(s). If the power allocated for a carrier exceeds the rated output power declared for that carrier, the exceeded power shall, if possible, be reallocated into the other carriers.

### 4.10.6 ETC6: NB-IoT standalone multi-carrier operation

The purpose of the ETC6 is to test NB-IoT standalone multi-carrier aspects.

#### 4.10.6.1 ETC6 generation

ETC6 is constructed using the following method:

- The Base Station RF Bandwidth shall be the declared maximum Base Station RF Bandwidth.

- Place a NB-IoT carrier at the upper edge and a NB-IoT carrier at the lower Base Station RF Bandwidth edge.

- For transmitter tests, add NB-IoT carriers at the edges using 600 kHz spacing until no more NB-IoT carriers are supported or no more NB-IoT carriers fit.

#### 4.10.6.2 ETC6 power allocation

Set the power of each carrier to the same level so that the sum of the carrier powers equals the rated total output power Prated,t according to the manufacturer’s declaration in subclause 4.6.8.

### 4.10.7 ETC7: E-UTRA and NB-IoT standalone multi-carrier operation

The purpose of the ETC7 is to test E-UTRA and NB-IoT standalone multi-carrier aspects.

#### 4.10.7.1 ETC7 generation

ETC7 is constructed using the following method:

- The Base Station RF Bandwidth shall be the declared maximum Base Station RF Bandwidth.

- For receiver tests, place a NB-IoT carrier at the lower edge and a 5MHz E-UTRA carrier at the upper Base Station RF Bandwidth edge. If the BS does not support 5 MHz channel BW use the narrowest supported BW.

- For transmitter tests and in the case of a BS supporting only one NB-IoT carrier, place a NB-IoT carrier at the lower edge and a 5MHz E-UTRA carrier at the upper Base Station RF Bandwidth edge. If the BS does not support 5 MHz channel BW use the narrowest supported BW. Add additional E-UTRA carriers of the same bandwidth as the already allocated E-UTRA carriers in the middle if possible.

- For transmitter tests and in the case of a BS supporting more than one NB-IoT carrier, carry out the following steps.

- Place a NB-IoT carrier at the upper edge and a NB-IoT carrier at the lower Base Station RF Bandwidth edge.

- Place two 5 MHz E-UTRA carriers in the middle of the Base Station RF Bandwidth. If the BS does not support 5 MHz channel BW use the narrowest supported BW, if only one carrier is supported or two carriers do not fit place only one carrier.

- Add NB-IoT carriers at the edges using 600 kHz spacing until no more NB-IoT carriers are supported or no more NB-IoT carriers fit.

- Add additional E-UTRA carriers of the same bandwidth as the already allocated E-UTRA carriers in the middle if possible.

#### 4.10.7.2 ETC7 power allocation

Set the power of each carrier to the same level so that the sum of the carrier powers equals the rated total output power Prated,t according to the manufacturer’s declaration in subclause 4.6.8.

### 4.10.8 ETC8: E-UTRA and NB-IoT in-band multi-carrier operation

The purpose of the ETC8 is to test E-UTRA and NB-IoT in-band multi-carrier aspects.

#### 4.10.8.1 ETC8 generation

ETC8 is constructed using the following method:

- The Base Station RF Bandwidth shall be the declared maximum Base Station RF Bandwidth.

- Place a 5 MHz E-UTRA carrier adjacent to the lower Base Station RF Bandwidth edge. Place the power boosted NB-IoT PRB at the outermost in-band position eligible for NB-IoT PRB at the lower Base Station RF Bandwidth edge. Place a 5 MHz E-UTRA carrier adjacent to the upper Base Station RF Bandwidth edge. In the case of a BS supporting more than one NB-IoT in-band carrier, place the power boosted NB-IoT PRB at the outermost in-band position eligible for NB-IoT PRB at the upper Base Station RF Bandwidth edge.

- For transmitter tests, select as many 5 MHz E-UTRA carriers that the BS supports and that fit in the rest of the Base Station RF Bandwidth. Place the carriers adjacent to each other starting from the high Base Station RF Bandwidth edge. The nominal carrier spacing defined in subclause 5.7 shall apply.

- If 5 MHz E-UTRA carriers are not supported by the BS the narrowest supported channel BW shall be selected instead.

#### 4.10.8.2 ETC8 power allocation

Set the power of each carrier to the same level so that the sum of the carrier powers equals the rated total output power Prated,t according to the manufacturer’s declaration in subclause 4.6.8.

### 4.10.9 ETC9: E-UTRA and NB-IoT guard-band multi-carrier operation

The purpose of the ETC9 is to test E-UTRA and NB-IoT guard-band multi-carrier aspects.

#### 4.10.9.1 ETC9 generation

ETC9 is constructed using the following method:

- The Base Station RF Bandwidth shall be the declared maximum Base Station RF Bandwidth.

- Place a 10 MHz E-UTRA carrier adjacent to the lower Base Station RF Bandwidth edge. Place the power boosted NB-IoT PRB at the outermost guard-band position eligible for NB-IoT PRB at the lower Base Station RF Bandwidth edge and adjacent to the E-UTRA PRB edge as close as possible (i.e., away from the lower Base Station RF Bandwidth edge). Place a 10 MHz E-UTRA carrier adjacent to the upper Base Station RF Bandwidth edge. In the case of a BS supporting more than one NB-IoT guard-band carrier, place the power boosted NB-IoT PRB at the outermost guard-band position eligible for NB-IoT PRB at the upper Base Station RF Bandwidth edge and adjacent to the E-UTRA PRB edge as close as possible (i.e., away from the upper Base Station RF Bandwidth edge).

- For transmitter tests, select as many 10 MHz E-UTRA carriers that the BS supports and that fit in the rest of the Base Station RF Bandwidth. Place the carriers adjacent to each other starting from the high Base Station RF Bandwidth edge. The nominal carrier spacing defined in subclause 5.7 shall apply.

- If 10 MHz E-UTRA carriers are not supported by the BS the narrowest supported channel BW shall be selected instead.

#### 4.10.9.2 ETC9 power allocation

Set the power of each carrier to the same level so that the sum of the carrier powers equals the rated total output power Prated,t according to the manufacturer’s declaration in subclause 4.6.8.

## 4.11 Applicability of test configurations

The present subclause defines for each RF test requirement the set of mandatory test configurations which shall be used for demonstrating conformance. The applicable test configurations are specified in the tables below for each the supported RF configuration, which shall be declared according to subclause 4.6.8. The generation and power allocation for each test configuration is defined in subclause 4.10.

For a E-UTRA BS declared to be capable of single carrier operation only, a single carrier (SC) shall be used for testing.

For a E-UTRA BS declared to be capable of multi-carrier and/or CA operation in contiguous spectrum operation in single band only, the test configurations in Table 4.11-1 shall be used for testing.

Table 4.11-1: Test configurations for a E-UTRA BS capable of multi-carrier and/or CA operation in contiguous spectrum in single band only

|  |  |
| --- | --- |
| BS test case | Contiguous spectrum capable BS |
| 6.2 Base station output power | ETC1 |
| 6.3 Output power dynamics |  |
| 6.3.1 RE Power control dynamic range | Tested with Error Vector Magnitude |
| 6.3.2 Total power dynamic range | SC |
| 6.4 Transmit ON/OFF power (only applied for E-UTRA TDD BS) | ETC1 |
| 6.5 Transmitted signal quality | - |
| 6.5.1 Frequency error | Tested with Error Vector Magnitude |
| 6.5.2 Error Vector Magnitude | ETC1 |
| 6.5.3 Time alignment error | ETC1 |
| 6.5.4 DL RS power | SC |
| 6.6 Unwanted emissions | - |
| 6.6.1 Occupied bandwidth | SC, ETC2 (Note) |
| 6.6.2 Adjacent Channel Leakage power Ratio (ACLR) | ETC1 |
| 6.6.3 Operating band unwanted emissions | ETC1 |
| 6.6.4 Transmitter spurious emissions | ETC1 |
| 6.7 Transmitter intermodulation | ETC1 |
| 7.2 Reference sensitivity level | SC |
| 7.3 Dynamic range | SC |
| 7.4 In-channel selectivity | SC |
| 7.5 Adjacent Channel Selectivity(ACS) and narrow-band blocking | ETC1 |
| 7.6 Blocking | ETC1 |
| 7.7 Receiver spurious emissions | ETC1 |
| 7.8 Receiver intermodulation | ETC1 |
| Note: ETC2 is only applicable when contiguous CA is supported. | |

For a E-UTRA BS declared to be capable of multi-carrier and/or CA operation in contiguous and non-contiguous spectrum in single band and where the parameters in the manufacture’s declaration according to subclause 4.6.8 are identical for contiguous (C) and non-contiguous (NC) spectrum operation, the test configurations in the second column of Table 4.11‑2 shall be used for testing.

For a E-UTRA BS declared to be capable of multi-carrier and/or CA operation in contiguous and non-contiguous spectrum and in single band where the parameters in the manufacture’s declaration according to subclause 4.6.8 are not identical for contiguous and non-contiguous spectrum operation, the test configurations in the third column of Table 4.11‑2 shall be used for testing.

Table 4.11-2: Test configuration for a E-UTRA BS capable of multi-carrier and/or CA operation in both contiguous and non-contiguous spectrum in single band

|  |  |  |
| --- | --- | --- |
| BS test case | C and NC capable BS with identical parameters | C and NC capable BS with different parameters |
| 6.2 Base station output power | ETC1 | ETC1, ETC3 |
| 6.3 Output power dynamics |  |  |
| 6.3.1 RE Power control dynamic range | Tested with Error Vector Magnitude | Tested with Error Vector Magnitude |
| 6.3.2 Total power dynamic range | SC | SC |
| 6.4 Transmit ON/OFF power (only applied for E-UTRA TDD BS) | ETC1 | ETC1, ETC3 |
| 6.5 Transmitted signal quality | - | - |
| 6.5.1 Frequency error | Tested with Error Vector Magnitude | Tested with Error Vector Magnitude |
| 6.5.2 Error Vector Magnitude | ETC1 | ETC1, ETC3 |
| 6.5.3 Time alignment error | ETC1 | ETC1, ETC3 |
| 6.5.4 DL RS power | SC | SC |
| 6.6 Unwanted emissions | - | - |
| 6.6.1 Occupied bandwidth | SC, ETC2 (Note) | SC, ETC2 (Note) |
| 6.6.2 Adjacent Channel Leakage power Ratio (ACLR) | ETC3 | ETC1, ETC3 |
| 6.6.2.2 Cumulative ACLR requirement in non-contiguous spectrum | ETC3 | ETC3 |
| 6.6.3 Operating band unwanted emissions | ETC1, ETC3 | ETC1, ETC3 |
| 6.6.4 Transmitter spurious emissions | ETC3 | ETC1, ETC3 |
| 6.7 Transmitter intermodulation | Same TC as used in 6.6 | Same TC as used in 6.6 |
| 7.2 Reference sensitivity level | SC | SC |
| 7.3 Dynamic range | SC | SC |
| 7.4 In-channel selectivity | SC | SC |
| 7.5 Adjacent Channel Selectivity(ACS) and narrow-band blocking | ETC3 | ETC1, ETC3 |
| 7.6 Blocking | ETC3 | ETC1, ETC3 |
| 7.7 Receiver spurious emissions | ETC3 | ETC1, ETC3 |
| 7.8 Receiver intermodulation | ETC3 | ETC1, ETC3 |
| Note: ETC2 is only applicable when contiguous CA is supported. | | |

For a E-UTRA BS declared to be capable of multi-band operation, the test configuration in Table 4.11-3 shall be used for testing. In the case where multiple bands are mapped on common antenna connector, the test configuration in the second column of Table 4.11-3 shall be used. In the case where multiple bands are mapped on separate antenna connectors, the test configuration in the third column of Table 4.11-3 shall be used.

Table 4.11-3: Test configuration for a E-UTRA BS capable of multi-band operation

|  |  |  |
| --- | --- | --- |
| BS test case | Test configuration | |
|  | Common antenna connector | Separate antenna connector |
| 6.2 Base station output power | ETC1/3 (Note 1), ETC4 | ETC1/3 (Note 1), ETC4 |
| 6.3 Output power dynamics |  |  |
| 6.3.1 RE Power control dynamic range | Tested with Error Vector Magnitude | Tested with Error Vector Magnitude |
| 6.3.2 Total power dynamic range | SC | SC |
| 6.4 Transmit ON/OFF power (only applied for E-UTRA TDD BS) | ETC4 | ETC4 |
| 6.5 Transmitted signal quality |  |  |
| 6.5.1 Frequency error | Tested with Error Vector Magnitude | Tested with Error Vector Magnitude |
| 6.5.2 Error Vector Magnitude | ETC1/3 (Note 1), ETC4 | ETC1/3 (Note 1), ETC4 |
| 6.5.3 Time alignment error | ETC1/3 (Note 1), ETC5 (Note 2) | ETC1/3 (Note 1), ETC5 (Note 2) |
| 6.5.4 DL RS power | SC | SC |
| 6.6 Unwanted emissions |  |  |
| 6.6.1 Occupied bandwidth | SC, ETC2 (Note 3) | SC, ETC2 (Note 3) |
| 6.6.2 Adjacent Channel Leakage power Ratio (ACLR) | ETC1/3 (Note 1), ETC5 (Note 4) | ETC1/3 (Note 1, 5), ETC5 (Note 4, 5) |
| 6.6.2.6 Cumulative ACLR requirement in non-contiguous spectrum | ETC3 (Note 1), ETC5 (Note 4) | ETC3 (Note 1, 5) |
| 6.6.3 Operating band unwanted emissions | ETC1/3 (Note 1), ETC5 | ETC1/3 (Note 1, 5), ETC5 (Note 5) |
| 6.6.4 Transmitter spurious emissions | ETC1/3 (Note 1), ETC5 | ETC1/3 (Note 1, 5), ETC5 (Note 5) |
| 6.7 Transmitter intermodulation | ETC1/3 (Note 1) | ETC1/3 (Note 1, 5) |
| 7.2 Reference sensitivity level | SC | SC |
| 7.3 Dynamic range | SC | SC |
| 7.4 In-channel selectivity | SC | SC |
| 7.5 Adjacent Channel Selectivity(ACS) and narrow-band blocking | ETC5 | ETC1/3 (Note 1), ETC5 (Note 6) |
| 7.6 Blocking | ETC5 | ETC1/3 (Note 1), ETC5 (Note 6) |
| 7.7 Receiver spurious emissions | ETC1/3 (Note 1), ETC5 | ETC1/3 (Note 1, 5), ETC5 (Note 5) |
| 7.8 Receiver intermodulation | ETC5 | ETC1/3 (Note 1), ETC5 (Note 6) |
| Note 1: ETC1 and/or ETC3 shall be applied in each supported operating band according to Tables 4.11-1 and 4.11-2.  Note 2: ETC5 is only applicable when inter-band CA is supported.  Note 3: ETC2 is only applicable when contiguous CA is supported.  Note 4: ETC5 may be applied for Inter RF Bandwidth gap only.  Note 5: Single-band requirement apply to each antenna connector for both multi-band operation test and single-band operation test. For single-band operation test, other antenna connector(s) is (are) terminated.  Note 6: ETC5 is only applicable for multi-band receiver. | | |

For a NB-IoT standalone BS declared to be capable of single carrier operation only, a single carrier (SCNS) shall be used for testing.

For a NB-IoT standalone BS declared to be capable of multi-carrier in contiguous spectrum operation in single band only, the test configurations in Table 4.11-4 shall be used for testing.

Table 4.11-4: Test configurations for a NB-IoT standalone BS capable of multi-carrier in contiguous spectrum in single band only

|  |  |
| --- | --- |
| BS test case | Contiguous spectrum capable BS |
| 6.2 Base station output power | ETC6 |
| 6.3 Output power dynamics |  |
| 6.3.1 RE Power control dynamic range | Not applicable |
| 6.3.2 Total power dynamic range | Not applicable |
| 6.3.3 NB-IoT RB power dynamic range for in-band or guard band operation | Not applicable |
| 6.4 Transmit ON/OFF power (only applied for NB-IoT TDD BS) | SCNS |
| 6.5 Transmitted signal quality | - |
| 6.5.1 Frequency error | Tested with Error Vector Magnitude |
| 6.5.2 Error Vector Magnitude | ETC6 |
| 6.5.3 Time alignment error | ETC6 |
| 6.5.4 DL RS power | SCNS |
| 6.6 Unwanted emissions | - |
| 6.6.1 Occupied bandwidth | SCNS |
| 6.6.2 Adjacent Channel Leakage power Ratio (ACLR) | ETC6 |
| 6.6.3 Operating band unwanted emissions | ETC6 |
| 6.6.4 Transmitter spurious emissions | ETC6 |
| 6.7 Transmitter intermodulation | ETC6 |
| 7.2 Reference sensitivity level | SCNS |
| 7.3 Dynamic range | SCNS |
| 7.4 In-channel selectivity | Not applicable |
| 7.5 Adjacent Channel Selectivity(ACS) and narrow-band blocking | ETC6 |
| 7.6 Blocking | ETC6 |
| 7.7 Receiver spurious emissions | ETC6 |
| 7.8 Receiver intermodulation | ETC6 |

For a BS supporting NB-IoT in-band and declared to be capable of single NB-IoT carrier operation only, a single carrier (SCNI) shall be used for testing. For a BS supporting NB-IoT in guard band and declared to be capable of single NB-IoT carrier operation only, a single carrier (SCNG) shall be used for testing.

For a E-UTRA with NB-IoT operating in-band and/or guard band BS declared to be capable of multi-carrier in contiguous spectrum operation in single band only, the test configurations in Table 4.11-5 shall be used for testing.

Table 4.11-5: Test configurations for a E-UTRA with NB-IoT operating in-band and/or guard band BS capable of multi-carrier in contiguous spectrum in single band only

|  |  |  |
| --- | --- | --- |
| BS test case | NB-IoT operating in-band | NB-IoT operating in guard band or NB-IoT operating in-band and in guard band |
| 6.2 Base station output power | ETC8 | ETC9 |
| 6.3 Output power dynamics |  |  |
| 6.3.1 RE Power control dynamic range | Tested with Error Vector Magnitude | Tested with Error Vector Magnitude |
| 6.3.2 Total power dynamic range | SC (Note 1) | SC (Note 1) |
| 6.3.3 NB-IoT RB power dynamic range for in-band or guard band operation | Tested with Unwanted Emission | Tested with Unwanted Emission |
| 6.4 Transmit ON/OFF power (only applied for E-UTRA and E-UTRA with NB-IoT TDD BS) | ETC8 | ETC9 |
| 6.5 Transmitted signal quality | - |  |
| 6.5.1 Frequency error | Tested with Error Vector Magnitude | Tested with Error Vector Magnitude |
| 6.5.2 Error Vector Magnitude | ETC1 (Note 1) | ETC1 (Note 1) |
| 6.5.3 Time alignment error | ETC1 (Note 1) | ETC1 (Note 1) |
| 6.5.4 DL RS power | SC and SCNI | SC and SCNG |
| 6.6 Unwanted emissions | - |  |
| 6.6.1 Occupied bandwidth | SC and SCNI | SC and SCNG |
| 6.6.2 Adjacent Channel Leakage power Ratio (ACLR) | ETC8, ETC1 | ETC9, ETC1 |
| 6.6.3 Operating band unwanted emissions | ETC8, ETC1 | ETC9, ETC1 |
| 6.6.4 Transmitter spurious emissions | ETC8 | ETC9 |
| 6.7 Transmitter intermodulation | ETC8 | ETC9 |
| 7.2 Reference sensitivity level | SC and SCNI | SC and SCNG |
| 7.3 Dynamic range | SC and SCNI | SC and SCNG |
| 7.4 In-channel selectivity | SC and SCNI | SC and SCNI (Note 2) |
| 7.5 Adjacent Channel Selectivity(ACS) and narrow-band blocking | ETC8 | ETC9 |
| 7.6 Blocking | ETC8 | ETC9 |
| 7.7 Receiver spurious emissions | ETC8 | ETC9 |
| 7.8 Receiver intermodulation | ETC8 | ETC9 |
| Note 1: There is no specific test with NB-IoT for those requirements, tests could be performed using E-UTRA signal only, without NB-IoT.  Note 2: Applicable only if BS supports NB-IoT operating in-band and guard band | | |

For a E-UTRA and NB-IoT standalone BS declared to be capable of multi-carrier in contiguous spectrum operation in single band only, the test configurations in Table 4.11-6 shall be used for testing.

Table 4.11-6: Test configurations for a E-UTRA and NB-IoT standalone BS capable of multi-carrier in contiguous spectrum in single band only

|  |  |
| --- | --- |
| BS test case | Contiguous spectrum capable BS |
| 6.2 Base station output power | ETC7 |
| 6.3 Output power dynamics |  |
| 6.3. RE Power control dynamic range | Tested with Error Vector Magnitude |
| 6.3.2 Total power dynamic range | SC |
| 6.3.3 NB-IoT RB power dynamic range for in-band or guard band operation | Not applicable |
| 6.4 Transmit ON/OFF power (only applied for E-UTRA and NB-IoT TDD BS) | ETC7 |
| 6.5 Transmitted signal quality | - |
| 6.5.1 Frequency error | Tested with Error Vector Magnitude |
| 6.5.2 Error Vector Magnitude | ETC7 |
| 6.5.3 Time alignment error | ETC7 |
| 6.5.4 DL RS power | SC and SCNS |
| 6.6 Unwanted emissions | - |
| 6.6.1 Occupied bandwidth | SC and SCNS |
| 6.6.2 Adjacent Channel Leakage power Ratio (ACLR) | ETC7 |
| 6.6.3 Operating band unwanted emissions | ETC7 |
| 6.6.4 Transmitter spurious emissions | ETC7 |
| 6.7 Transmitter intermodulation | ETC7 |
| 7.2 Reference sensitivity level | SC and SCNS |
| 7.3 Dynamic range | SC and SCNS |
| 7.4 In-channel selectivity | SC |
| 7.5 Adjacent Channel Selectivity(ACS) and narrow-band blocking | ETC7 |
| 7.6 Blocking | ETC7 |
| 7.7 Receiver spurious emissions | ETC7 |
| 7.8 Receiver intermodulation | ETC7 |

## 4.12 Requirements for BS capable of multi-band operation

For BS capable of multi-band operation, the RF requirements in clause 6 and 7 apply for each supported operating band unless otherwise stated. For some requirements it is explicitly stated that specific additions or exclusions to the requirement apply for BS capable of multi-band operation.

For BS capable of multi-band operation, various structures in terms of combinations of different transmitter and receiver implementations (multi-band or single band) with mapping of transceivers to one or more antenna port(s) in different ways are possible. In the case where multiple bands are mapped on an antenna connector, the exclusions or provisions for multi-band capable BS are applicable to this antenna connector. In the case where a single band is mapped on an antenna connector, the following applies:

- Single-band ACLR, operating band unwanted emissions, transmitter spurious emissions, transmitter intermodulation and receiver spurious emissions requirements apply to this antenna connector that is mapped to single-band.

- If the BS is configured for single-band operation, single-band requirements shall apply to this antenna connector configured for single-band operation and no exclusions or provisions for multi-band capable BS are applicable. Single-band requirements are tested separately at the antenna connector configured for single-band operation, with all other antenna connectors terminated.

For a band supported by a Base Station where the transmitted carriers are not processed in active RF components together with carriers in any other band, single-band transmitter requirements shall apply. For a band supported by a Base Station where the received carriers are not processed in active RF components together with carriers in any other band, single-band receiver requirements shall apply.

For a BS capable of multi-band operation supporting bands for TDD, the RF requirements in the present specification assume synchronized operation, where no simultaneous uplink and downlink occur between the supported operating bands.

The RF requirements in the present specification are FFS for multi-band operation supporting bands for both FDD and TDD.

## 4.13 Tests for BS capable of multi-band operation with three or more bands

For BS supports multiple multi-band combinations, the test(s) shall be applied using the following principles:

1) The supported multi-band combination covering the widest radio bandwidth should be tested.

2) Among the remaining supported multi-band combinations, the following ones should also be tested:

- Those with a larger rated total output power (per band or per band combination).

- Those with a larger total number of supported carriers (per band or per band combination).

- Those with a larger Maximum Base Station RF Bandwidth (per band).

# 5 Operating bands and channel arrangement

## 5.1 General

The channel arrangements presented in this clause are based on the operating bands and channel bandwidths defined in the present release of specifications.

NOTE: Other operating bands and channel bandwidths may be considered in future releases.

## 5.2 Void

## 5.3 Void

## 5.4 Void

## 5.5 Operating bands

E-UTRA is designed to operate in the operating bands defined in Table 5.5-1. Unless stated otherwise, requirements specified for the TDD duplex mode apply for downlink and uplink operations in Frame Structure Type 2.

NB-IoT is designed to operate in the E-UTRA operating bands 1, 2, 3, 4, 5, 7, 8, 11, 12, 13, 14, 17, 18, 19, 20, 21, 25, 26, 28, 31, 41 (in certain regions), 42, 43, 65, 66, 70, 71, 72, 73, 74, 85, 87, 88 which are defined in Table 5.5-1.

Table 5.5-1: E-UTRA operating bands

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| E-UTRA Operating Band | Uplink (UL) operating band BS receive UE transmit | | | Downlink (DL) operating band BS transmit  UE receive | | | Duplex Mode |
| FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | |
| 1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| 2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| 3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| 4 | 1710 MHz | – | 1755 MHz | 2110 MHz | – | 2155 MHz | FDD |
| 5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894MHz | FDD |
| 6  (NOTE 1) | 830 MHz | – | 840 MHz | 875 MHz | – | 885 MHz | FDD |
| 7 | 2500 MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | FDD |
| 8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| 9 | 1749.9 MHz | – | 1784.9 MHz | 1844.9 MHz | – | 1879.9 MHz | FDD |
| 10 | 1710 MHz | – | 1770 MHz | 2110 MHz | – | 2170 MHz | FDD |
| 11 | 1427.9 MHz | – | 1447.9 MHz | 1475.9 MHz | – | 1495.9 MHz | FDD |
| 12 | 699 MHz | – | 716 MHz | 729 MHz | – | 746 MHz | FDD |
| 13 | 777 MHz | – | 787 MHz | 746 MHz | – | 756 MHz | FDD |
| 14 | 788 MHz | – | 798 MHz | 758 MHz | – | 768 MHz | FDD |
| 15 | Reserved |  |  | Reserved |  |  | FDD |
| 16 | Reserved |  |  | Reserved |  |  | FDD |
| 17 | 704 MHz |  | 716 MHz | 734 MHz |  | 746 MHz | FDD |
| 18 | 815 MHz | – | 830 MHz | 860 MHz | – | 875 MHz | FDD |
| 19 | 830 MHz | – | 845 MHz | 875 MHz | – | 890 MHz | FDD |
| 20 | 832 MHz | – | 862 MHz | 791 MHz | – | 821 MHz | FDD |
| 21 | 1447.9 MHz | – | 1462.9 MHz | 1495.9 MHz | – | 1510.9 MHz | FDD |
| 22 | 3410 MHz | – | 3490 MHz | 3510 MHz | – | 3590 MHz | FDD |
| 231 | 2000 MHz | – | 2020 MHz | 2180 MHz | – | 2200 MHz | FDD |
| 24  (NOTE 9) | 1626.5 MHz | – | 1660.5 MHz | 1525 MHz | – | 1559 MHz | FDD |
| 25 | 1850 MHz | – | 1915 MHz | 1930 MHz | – | 1995 MHz | FDD |
| 26 | 814 MHz | – | 849 MHz | 859 MHz | – | 894 MHz | FDD |
| 27 | 807 MHz | – | 824 MHz | 852 MHz | – | 869 MHz | FDD |
| 28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |
| 29 | N/A | | | 717 MHz | – | 728 MHz | FDD |
| 30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD  (NOTE 2) |
| 31 | 452.5 MHz | – | 457.5 MHz | 462.5 MHz | – | 467.5 MHz | FDD |
| 32 |  | N/A |  | 1452 MHz | – | 1496 MHz | FDD  (NOTE 2) |
| 33 | 1900 MHz | – | 1920 MHz | 1900 MHz | – | 1920 MHz | TDD |
| 34 | 2010 MHz | – | 2025 MHz | 2010 MHz | – | 2025 MHz | TDD |
| 35 | 1850 MHz | – | 1910 MHz | 1850 MHz | – | 1910 MHz | TDD |
| 36 | 1930 MHz | – | 1990 MHz | 1930 MHz | – | 1990 MHz | TDD |
| 37 | 1910 MHz | – | 1930 MHz | 1910 MHz | – | 1930 MHz | TDD |
| 38 | 2570 MHz | – | 2620 MHz | 2570 MHz | – | 2620 MHz | TDD |
| 39 | 1880 MHz | – | 1920 MHz | 1880 MHz | – | 1920 MHz | TDD |
| 40 | 2300 MHz | – | 2400 MHz | 2300 MHz | – | 2400 MHz | TDD |
| 41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |
| 42 | 3400 MHz | – | 3600 MHz | 3400 MHz | – | 3600 MHz | TDD |
| 43 | 3600 MHz | – | 3800 MHz | 3600 MHz | – | 3800 MHz | TDD |
| 44 | 703 MHz | – | 803 MHz | 703 MHz | – | 803 MHz | TDD |
| 45 | 1447 MHz | – | 1467 MHz | 1447 MHz | – | 1467 MHz | TDD |
| 46 | 5150 MHz | – | 5925 MHz | 5150 MHz | – | 5925 MHz | TDD  (NOTE 3, NOTE 4) |
| 47 | 5855 MHz | – | 5925 MHz | 5855 MHz | – | 5925 MHz | TDD |
| 48 | 3550 MHz | – | 3700 MHz | 3550 MHz | – | 3700 MHz | TDD |
| 49 | 3550 MHz | – | 3700 MHz | 3550 MHz | – | 3700 MHz | TDD  (NOTE 8) |
| 50 | 1432 MHz | - | 1517 MHz | 1432 MHz | - | 1517 MHz | TDD |
| 51 | 1427 MHz | - | 1432 MHz | 1427 MHz | - | 1432 MHz | TDD |
| 52 | 3300 MHz | – | 3400 MHz | 3300 MHz | – | 3400 MHz | TDD |
| 53 | 2483.5 MHz | - | 2495 MHz | 2483.5 MHz | - | 2495 MHz | TDD |
| 65 | 1920 MHz | – |  | 2110 MHz | – |  | FDD |
| 66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD (NOTE 5) |
| 67 |  | N/A |  | 738 MHz | – | 758 MHz | FDD  (NOTE 2) |
| 68 | 698 MHz | – | 728 MHz | 753 MHz | – | 783 MHz | FDD |
| 69 |  | N/A |  | 2570 MHz | – | 2620 MHz | FDD  (NOTE 2) |
| 70 | 1695 MHz | – | 1710 MHz | 1995 MHz | – |  | FDD  (NOTE 6) |
| 71 | 663 MHz | – | 698 MHz | 617 MHz | – | 652 MHz | FDD |
| 72 | 451 MHz | – | 456 MHz | 461 MHz | – | 466 MHz | FDD |
| 73 | 450 MHz | – | 455 MHz | 460 MHz | – | 465 MHz | FDD |
| 74 | 1427 MHz | – | 1470 MHz | 1475 MHz | – | 1518 MHz | FDD |
| 75 |  | N/A |  | 1432 MHz | - | 1517 MHz | FDD  (NOTE 2) |
| 76 |  | N/A |  | 1427 MHz | - | 1432 MHz | FDD  (NOTE 2) |
| 85 | 698 MHz | – | 716 MHz | 728 MHz | – | 746 MHz | FDD |
| 87 | 410 MHz | – | 415 MHz | 420 MHz | – | 425 MHz | FDD |
| 88 | 412 MHz | – | 417 MHz | 422 MHz | – | 427 MHz | FDD |
| NOTE 1: Band 6, 23 are not applicable.  NOTE 2: Restricted to E-UTRA operation when carrier aggregation is configured. The downlink operating band is paired with the uplink operating band (external) of the carrier aggregation configuration that is supporting the configured Pcell.  NOTE 3: This band is an unlicensed band restricted to licensed-assisted operation using Frame Structure Type 3.  NOTE 4: Band 46 is divided into four sub-bands as in Table 5.5-1A.  NOTE 5: The range 2180 – 2200 MHz of the DL operating band is restricted to E-UTRA operation when carrier aggregation is configured.  NOTE 6: The range 2010-2020 MHz of the DL operating band is restricted to E-UTRA operation when carrier aggregation is configured and TX-RX separation is 300 MHz. The range 2005-2020 MHz of the DL operating band is restricted to E-UTRA operation when carrier aggregation is configured and TX-RX separation is 295 MHz.  NOTE 7: Void  NOTE 8: This band is restricted to licensed-assisted operation using Frame Structure Type 3.  NOTE 9: DL operation is restricted to 1526-1536 MHz frequency range. UL operation is restricted to 1627.5 – 1637.5 MHz and 1646.5 – 1656.5 MHz per FCC Order DA 20-48. | | | | | | | |

Table 5.5-1A Sub-bands for Band 46

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| E‑UTRA Operating Band | Uplink (UL) operating band BS receive UE transmit | | | Downlink (DL) operating band BS transmit  UE receive | | |
| FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | |
| 46a | 5150 MHz | – | 5250 MHz | 5150 MHz | – | 5250 MHz |
| 46b | 5250 MHz | – | 5350 MHz | 5250 MHz | – | 5350 MHz |
| 46c | 5470 MHz | – | 5725 MHz | 5470 MHz | – | 5725 MHz |
| 46d | 5725 MHz | – | 5925 MHz | 5725 MHz | – | 5925 MHz |

Table 5.5-2: Void

Table 5.5-3: Void



Table 5.5-3A: Void







Table 5.5-3B: Void

Table 5.5-3C. Void

Table 5.5-4: Void

Table 5.5-5: Void

Table 5.5-6: Void

## 5.6 Channel bandwidth

For E-UTRA, requirements in present document are specified for the channel bandwidths listed in Table 5.6-1.

Table 5.6-1: Transmission bandwidth configuration *N*RB in E-UTRA channel bandwidths

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Channel bandwidth BWChannel [MHz] | 1.4 | 3 | 5 | 10 | 15 | 20 |
| Transmission bandwidth configuration *N*RB | 6 | 15 | 25 | 50 | 75 | 100 |

For E-UTRA, figure 5.6-1 shows the relation between the Channel bandwidth (BWChannel) and the Transmission bandwidth configuration (NRB). The channel edges are defined as the lowest and highest frequencies of the carrier separated by the channel bandwidth, i.e. at FC +/- BWChannel /2.



Figure 5.6-1: Definition of Channel Bandwidth and Transmission Bandwidth Configuration   
for one E-UTRA carrier.

Figure 5.6-2 illustrates the Aggregated Channel Bandwidth for intra-band carrier aggregation.



Figure 5.6-2: Definition of Aggregated Channel Bandwidth for intra-band carrier aggregation

The lower edge of the Aggregated Channel Bandwidth (BWChannel\_CA) is defined as Fedge\_low = FC\_low - Foffset. The upper edge of the Aggregated Channel Bandwidth is defined as Fedge\_high = FC\_high + Foffset. The Aggregated Channel Bandwidth, BWChannel\_CA**,** is defined as follows:

BWChannel\_CA = Fedge\_high - Fedge\_low [MHz]

Figure 5.6-3: illustrates the sub-block bandwidth for a BS operating in non-contiguous spectrum.



Figure 5.6-3: Definition of Sub-block Bandwidth for intra-band non-contiguous spectrum

The lower sub-block edge of the sub-block bandwidth (BWChannel,block) is defined as Fedge,block, low = FC,block,low - Foffset. The upper sub-block edge of the sub-block bandwidth is defined as Fedge,block,high = FC,block,high + Foffset. The sub-block bandwidth, BWChannel,block**,** is defined as follows:

BWChannel,block = Fedge,block,high - Fedge,block,low [MHz]

Foffset is defined in Table 5.6-2 below where BWChannel is defined in Table 5.6-1.

Table 5.6-2: Definition of Foffset

|  |  |
| --- | --- |
| Channel Bandwidth of the Lowest or Highest Carrier: BWChannel[MHz] | Foffset[MHz] |
| 5, 10, 15, 20 | BWChannel/2 |

NOTE 1: Foffset is calculated separately for each Base Station RF Bandwidth edge / sub-block edge.

NOTE 2: The values of BWChannel\_CA /sub-block bandwidth for UE and BS are the same if the channel bandwidths of lowest and the highest component carriers are identical.

For NB-IoT, requirements in present document are specified for the channel bandwidths listed in Table 5.6-3.

Table 5.6-3: Transmission bandwidth configuration *N*RB, *N*tone 15kHz and *N*tone 3.75kHz in NB-IoT channel bandwidth

|  |  |  |  |
| --- | --- | --- | --- |
| NB-IoT | Standalone | In-band | Guard Band |
| Channel bandwidth BWChannel [kHz] | 200 | E-UTRA channel bandwidth in Table 5.6-1 for BWChannel>1.4MHz | E-UTRA channel bandwidth in Table 5.6-1 for BWChannel>3MHz |
| Transmission bandwidth configuration *N*RB | 1 | 1 | 1 |
| Transmission bandwidth configuration *N*tone 15kHz | 12 | 12 | 12 |
| Transmission bandwidth configuration *N*tone 3.75kHz | 48 | 48 | 48 |

For NB-IoT standalone operation, figure 5.6-4 shows the relation between the channel bandwidth (BWChannel) and the transmission bandwidth configuration (*N*RB, *N*tone 15kHz and *N*tone 3.75kHz) for NB-IoT standalone operation. The channel edges are defined as the lowest and highest frequencies of the carrier separated by the channel bandwidth, i.e. at FC +/- BWChannel /2.

For NB-IoT standalone operation, NB-IoT requirements for receiver and transmitter shall apply with a frequency offset **Foffset**as defined in Table 5.6-3A.

Table 5.6-3A: Foffset for NB-IoT standalone operation

|  |  |
| --- | --- |
| Lowest or Highest Carrier | Foffset |
| Standalone NB-IoT | 200 kHz |



Figure 5.6-4 Definition of Channel Bandwidth and Transmission Bandwidth Configuration for NB-IoT standalone operation

For NB-IoT in-band operation, figure 5.6-5 shows the relation between the channel bandwidth (BWChannel) and the transmission bandwidth configuration (*N*RB, *N*tone 15kHz and *N*tone 3.75kHz). The channel edges are defined as the lowest and highest frequencies of the carrier separated by the channel bandwidth, i.e. at FC +/- BWChannel /2.



Figure 5.6-5 Definition of Channel Bandwidth and Transmission Bandwidth Configuration for NB-IoT in-band operation

For NB-IoT guard band operation, figure 5.6-6 shows the relation between the channel bandwidth (BWChannel) and the transmission bandwidth configuration (*N*RB, *N*tone 15kHz and *N*tone 3.75kHz). The channel edges are defined as the lowest and highest frequencies of the carrier separated by the channel bandwidth, i.e. at FC +/- BWChannel /2.



Figure 5.6-6 Definition of Channel Bandwidth and Transmission Bandwidth Configuration for NB-IoT guard band operation

## 5.7 Channel arrangement

### 5.7.1 Channel spacing

The spacing between carriers will depend on the deployment scenario, the size of the frequency block available and the channel bandwidths. The nominal channel spacing between two adjacent E-UTRA carriers is defined as following:

Nominal Channel spacing = (BWChannel(1) + BWChannel(2))/2

where BWChannel(1) and BWChannel(2) are the channel bandwidths of the two respective E-UTRA carriers. The channel spacing can be adjusted to optimize performance in a particular deployment scenario.

For 20MHz carriers in Band 46, the requirements apply for both 19.8 MHz and 20.1 MHz nominal carrier spacing.

### 5.7.1A CA Channel spacing

For intra-band contiguously aggregated carriers the channel spacing between adjacent component carriers shall be multiple of 300 kHz.

The nominal channel spacing between two adjacent aggregated E-UTRA carriers is defined as follows:



where BWChannel(1) and BWChannel(2) are the channel bandwidths of the two respective E-UTRA component carriers according to Table 5.6-1 with values in MHz. The channel spacing for intra-band contiguous carrier aggregation can be adjusted to any multiple of 300 kHz less than the nominal channel spacing to optimize performance in a particular deployment scenario.

For intra-band contiguous carrier aggregation with two or more 20MHz component carriers in Band 46, the requirements apply for both 19.8 MHz and 20.1 MHz nominal carrier spacing.

### 5.7.2 Channel raster

The channel raster is 100 kHz for all bands, which means that the carrier centre frequency must be an integer multiple of 100 kHz.

### 5.7.3 Carrier frequency and EARFCN

The carrier frequency in the uplink and downlink is designated by the E-UTRA Absolute Radio Frequency Channel Number (EARFCN) in the range 0 - 262143. The relation between EARFCN and the carrier frequency in MHz for the downlink is given by the following equation, where FDL\_low and NOffs-DL are given in table 5.7.3-1 and NDL is the downlink EARFCN.

FDL = FDL\_low + 0.1(NDL – NOffs-DL)

The relation between EARFCN and the carrier frequency in MHz for the uplink is given by the following equation where FUL\_low and NOffs-UL are given in table 5.7.3-1 and NUL is the uplink EARFCN.

FUL = FUL\_low + 0.1(NUL – NOffs-UL)

The carrier frequency of NB-IoT in the downlink is designated by the E-UTRA Absolute Radio Frequency Channel Number (EARFCN) in the range 0 – 262143 and the Offset of NB-IoT Channel Number to EARFCN in the range {-10,-9,-8,-7,-6,-5,-4,-3,-2,-1,-0.5,0,1,2,3,4,5,6,7,8,9} for FDD and in the range {-10,-9,-8.5,-8,-7,-6,-5,-4.5,-4,-3,-2,-1,-0.5,0,1,2,3,3.5,4,5,6,7,7.5,8,9} for TDD. The relation between EARFCN, Offset of NB-IoT Channel Number to EARFCN and the carrier frequency in MHz for the downlink is given by the following equation, where FDL is the downlink carrier frequency of NB-IoT, FDL\_low and NOffs-DL are given in table 5.7.3-1, NDL is the downlink EARFCN, MDL is the Offset of NB-IoT Channel Number to downlink EARFCN.

FDL = FDL\_low + 0.1(NDL – NOffs-DL) + 0.0025\*(2MDL+1)

The carrier frequency of NB-IoT in the uplink is designated by the E-UTRA Absolute Radio Frequency Channel Number (EARFCN) in the range 0 –262143, and the Offset of NB-IoT Channel Number to EARFCN in the range {-10,-9,-8,-7,-6,-5,-4,-3,-2,-1,0,1,2,3,4,5,6,7,8,9} for FDD and in the range {-11,-10,-9.5,-9,-8.5,-8,-7.5,-7,-6.5,-6,-5.5,-5, -4.5,-4,-3.5,-3,-2.5,-2,-1.5,-1,-0.5,0,0.5,1,1.5,2,2.5,3,3.5,4,4.5,5,5.5,6,6.5,7,7.5,8,8.5,9,9.5,10, 11} for TDD. The relation between EARFCN, Offset of NB-IoT Channel Number to EARFCN and the carrier frequency in MHz for the uplink is given by the following equation, where FUL is the uplink carrier frequency of NB-IoT, FUL\_low and NOffs-UL are given in table 5.7.3-1, NUL is the uplink EARFCN, MUL is the Offset of NB-IoT Channel Number to uplink EARFCN.

FUL = FUL\_low + 0.1(NUL – NOffs-UL) + 0.0025\*(2MUL)

NOTE 1 For NB-IoT, NDL or NUL is different than the value of EARFCN that corresponds to E-UTRA downlink or uplink carrier frequency for in-band and guard band operation.

NOTE 2 For FDD MDL = -0.5 is not applicable for in-band and guard band operation. For TDD MDL {-0.5,+3.5,-4.5,+7.5,-8.5} is not applicable for in-band and guard band operation.

NOTE 3: For the carrier including NPSS/NSSS for in-band and guard band operation, MDL is selected from {-2,-1,0,1}.

NOTE 4: For the carrier including NPSS/NSSS for stand-alone operation, MDL = -0.5.

Table 5.7.3-1: E-UTRA channel numbers

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| E-UTRA Operating Band | **Downlink** | | | **Uplink** | | | | |
| **FDL\_low [MHz]** | **NOffs-DL** | **Range of NDL** | **FUL\_low [MHz]** | | **NOffs-UL** | **Range of NUL** | |
| 1 | 2110 | 0 | 0 – 599 | 1920 | | 18000 | 18000 – 18599 | |
| 2 | 1930 | 600 | 6001199 | 1850 | | 18600 | 18600 – 19199 | |
| 3 | 1805 | 1200 | 1200 – 1949 | 1710 | | 19200 | 19200 – 19949 | |
| 4 | 2110 | 1950 | 1950 – 2399 | 1710 | | 19950 | 19950 – 20399 | |
| 5 | 869 | 2400 | 2400 – 2649 | 824 | | 20400 | 20400 – 20649 | |
| 6 | 875 | 2650 | 2650 – 2749 | 830 | | 20650 | 20650 – 20749 | |
| 7 | 2620 | 2750 | 2750 – 3449 | 2500 | | 20750 | 20750 – 21449 | |
| 8 | 925 | 3450 | 3450 – 3799 | 880 | | 21450 | 21450 – 21799 | |
| 9 | 1844.9 | 3800 | 3800 – 4149 | 1749.9 | | 21800 | 21800 – 22149 | |
| 10 | 2110 | 4150 | 4150 – 4749 | 1710 | | 22150 | 22150 – 22749 | |
| 11 | 1475.9 | 4750 | 4750 – 4949 | 1427.9 | | 22750 | 22750 – 22949 | |
| 12 | 729 | 5010 | 5010 – 5179 | 699 | | 23010 | 23010 – 23179 | |
| 13 | 746 | 5180 | 5180 – 5279 | 777 | | 23180 | 23180 – 23279 | |
| 14 | 758 | 5280 | 5280 – 5379 | 788 | | 23280 | 23280 – 23379 | |
| … |  |  |  |  | |  |  | |
| 17 | 734 | 5730 | 5730 – 5849 | 704 | | 23730 | 23730 – 23849 | |
| 18 | 860 | 5850 | 5850 – 5999 | 815 | | 23850 | 23850 – 23999 | |
| 19 | 875 | 6000 | 6000 – 6149 | 830 | | 24000 | 24000 – 24149 | |
| 20 | 791 | 6150 | 6150 - 6449 | 832 | | 24150 | 24150 - 24449 | |
| 21 | 1495.9 | 6450 | 6450 – 6599 | 1447.9 | | 24450 | 24450 – 24599 | |
| 22 | 3510 | 6600 | 6600-7399 | 3410 | | 24600 | 24600-25399 | |
| 23 | 2180 | 7500 | 7500 – 7699 | 2000 | | 25500 | 25500 – 25699 | |
| 24 | 1525 | 7700 | 7700 – 8039 | 1626.5 | | 25700 | 25700 – 26039 | |
| 25 | 1930 | 8040 | 8040 – 8689 | 1850 | | 26040 | 26040 – 26689 | |
| 26 | 859 | 8690 | 8690 – 9039 | 814 | | 26690 | 26690 - 27039 | |
| 27 | 852 | 9040 | 9040 – 9209 | 807 | | 27040 | 27040 – 27209 | |
| 28 | 758 | 9210 | 9210 – 9659 | 703 | | 27210 | 27210 – 27659 | |
| 29  (NOTE 2) | 717 | 9660 | 9660 – 9769 | N/A | | | | |
| 30 | 2350 | 9770 | 9770 – 9869 | 2305 | | 27660 | 27660 – 27759 | |
| 31 | 462.5 | 9870 | 9870 – 9919 | 452.5 | | 27760 | 27760 – 27809 | |
| 32  (NOTE 2) | 1452 | 9920 | 9920 – 10359 | N/A | |  |  | |
| 33 | 1900 | 36000 | 36000 – 36199 | 1900 | | 36000 | 36000 – 36199 | |
| 34 | 2010 | 36200 | 36200 – 36349 | 2010 | | 36200 | 36200 – 36349 | |
| 35 | 1850 | 36350 | 36350 – 36949 | 1850 | | 36350 | 36350 – 36949 | |
| 36 | 1930 | 36950 | 36950 – 37549 | 1930 | | 36950 | 36950 – 37549 | |
| 37 | 1910 | 37550 | 37550 – 37749 | 1910 | | 37550 | 37550 – 37749 | |
| 38 | 2570 | 37750 | 37750 – 38249 | 2570 | | 37750 | 37750 – 38249 | |
| 39 | 1880 | 38250 | 38250 – 38649 | 1880 | | 38250 | 38250 – 38649 | |
| 40 | 2300 | 38650 | 38650 – 39649 | 2300 | | 38650 | 38650 – 39649 | |
| 41 | 2496 | 39650 | 39650 – 41589 | 2496 | | 39650 | 39650 – 41589 | |
| 42 | 3400 | 41590 | 41590 – 43589 | 3400 | | 41590 | 41590 – 43589 | |
| 43 | 3600 | 43590 | 43590 – 45589 | 3600 | | 43590 | 43590 – 45589 | |
| 44 | 703 | 45590 | 45590 – 46589 | 703 | | 45590 | 45590 – 46589 | |
| 45 | 1447 | 46590 | 46590 – 46789 | 1447 | | 46590 | 46590 – 46789 | |
| 46  (NOTE 3) | 5150 | 46790 | 46790 – 54539 | 5150 | | 46790 | 46790 – 54539 | |
| 47 | 5855 | 54540 | 54540 – 55239 | 5855 | | 54540 | 54540 – 55239 | |
| 48 | 3550 | 55240 | 55240 – 56739 | 3550 | | 55240 | 55240 – 56739 | |
| 49 | 3550 | 56740 | 56740 – 58239 | 3550 | | 56740 | 56740 – 58239 | |
| 50 | 1432 | 58240 | 58240 - 59089 | 1432 | | 58240 | 58240 - 59089 | |
| 51 | 1427 | 59090 | 59090 - 59139 | 1427 | | 59090 | 59090 - 59139 | |
| 52 | 3300 | 59140 | 59140 – 60139 | 3300 | | 59140 | 59140 – 60139 | |
| 53 | 2483.5 | 60140 | 60140 - 60254 | 2483.5 | | 60140 | 60140 - 60254 | |
| 65 | 2110 | 65536 | 65536 – 66435 | 1920 | | 131072 | 131072 – 131971 | |
| 66  (NOTE 4) | 2110 | 66436 | 66436 – 67335 | 1710 | | 131972 | 131972 – 132671 | |
| 67  (NOTE 2) | 738 | 67336 | 67336 – 67535 |  | | N/A |  | |
| 68 | 753 | 67536 | 67536 - 67835 | 698 | | 132672 | 132672 - 132971 | |
| 69  (NOTE 2) | 2570 | 67836 | 67836 - 68335 | N/A | | | | |
| 70  (NOTE 5) | 1995 | 68336 | 68336 - 68585 | 1695 | | 132972 | 132972 - 133121 | |
| 71 | 617 | 68586 | 68586-68935 | 663 | | 133122 | 133122-133471 | |
| 72 | 461 | 68936 | 68936-68985 | 451 | | 133472 | 133472-133521 | |
| 73 | 460 | 68986 | 68986-69035 | 450 | | 133522 | 133522-133571 | |
| 74 |  | 69036 | 69036 - 69465 | 1427 | | 133572 | 133572 - 134001 | |
| 75  (NOTE 2) | 1432 | 69466 | 69466 - 70315 | N/A | | | | |
| 76  (NOTE 2) | 1427 | 70316 | 70316 - 70365 | N/A | | | | |
| 85 | 728 | 70366 | 70366 - 70545 | 698 | 134002 | | | 134002 - 134181 |
| 87 | 420 | 70546 | 70546 - 70595 | 410 | 134182 | | | 134182 - 134231 |
| 88 | 422 | 70596 | 70596 - 70645 | 412 | 134232 | | | 134232 - 134281 |
| NOTE 1: The channel numbers that designate carrier frequencies so close to the operating band edges that the carrier extends beyond the operating band edge shall not be used. This implies that the first 7, 15, 25, 50, 75 and 100 channel numbers at the lower operating band edge and the last 6, 14, 24, 49, 74 and 99 channel numbers at the upper operating band edge shall not be used for channel bandwidths of 1.4, 3, 5, 10, 15 and 20 MHz respectively.  NOTE 2: Restricted to E-UTRA operation when carrier aggregation is configured.  NOTE 3: The following NDL and NUL are allowed for operation in Band 46 assuming 20MHz channel bandwidth: NDL =NUL = {n-2, n-1, n, n+1, n+2 | n = 46890 (5160 MHz), 47090 (5180 MHz), 47290 (5200 MHz), 47490 (5220 MHz), 47690 (5240 MHz), 47890 (5260 MHz), 48090 (5280 MHz), 48290 (5300 MHz), 48490 (5320 MHz), 48690 (5340 MHz), 50090 (5480 MHz), 50290 (5500 MHz), 50490 (5520 MHz), 50690 (5540 MHz), 50890 (5560 MHz), 51090 (5580 MHz), 51290 (5600 MHz), 51490 (5620 MHz), 51690 (5640 MHz), 51890 (5660 MHz), 52090 (5680 MHz), 52290 (5700 MHz), 52490 (5720 MHz), 52740 (5745 MHz), 52940 (5765 MHz), 53140 (5785 MHz), 53340 (5805 MHz), 53540 (5825 MHz), 53740 (5845 MHz), 53940 (5865 MHz), 54140 (5885 MHz), 54340 (5905 MHz)}. And the following NDL and NUL are allowed for operation in Band 46 assuming 10MHz channel bandwidth:  NDL =NUL = {n-2, n-1, n, n+1, n+2 | n = 52590 (5730 MHz), 53590 (5830 MHz)}. 10 MHz channel bandwidth shall only apply in certain regions where the absence of non 3GPP technologies can be guaranteed on a long term basis in this version of specification.  NOTE 4: Downlink frequency range 2180 – 2200 MHz is restricted to E-UTRA operation when carrier aggregation is configured.  NOTE 5: The range 2010-2020 MHz of the DL operating band is restricted to E-UTRA operation when carrier aggregation is configured and TX-RX separation is 300 MHz. The range 2005-2020 MHz of the DL operating band is restricted to E-UTRA operation when carrier aggregation is configured and TX-RX separation is 295 MHz. | | | | | | | | |

## 5.8 Requirements for contiguous and non-contiguous spectrum

A spectrum allocation where the BS operates can either be contiguous or non-contiguous. Unless otherwise stated, the requirements in the present specification apply for BS configured for both contiguous spectrum operation and non-contiguous spectrum operation.

For BS operation in non-contiguous spectrum, some requirements apply also inside the sub-block gaps. For each such requirement, it is stated how the limits apply relative to the sub-block edges.

# 6 Transmitter characteristics

## 6.1 General

General test conditions for transmitter tests are given in Clause 4, including interpretation of measurement results and configurations for testing. BS configurations for the tests are defined in Clause 4.5, while Annex H provides an informative description of E-UTRAN test cases.

Unless otherwise stated, a BS declared to be capable of E-UTRA with NB-IoT in-band or guard band operations is only required to pass the transmitter tests for E-UTRA with NB-IoT in-band or guard band; it is not required to perform the transmitter tests again for E-UTRA only.

Unless otherwise stated, a BS declared to be capable of E-UTRA with NB-IoT in-band and guard band operations needs only to pass the transmitter tests for E-UTRA with guard band operation.

### 6.1.1 E-UTRA Test Models

The set-up of physical channels for transmitter tests shall be according to one of the E-UTRA test models (E-TM) below. A reference to the applicable test model is made within each test.

The following general parameters are used by all E-UTRA test models:

- The test models are defined for a single antenna port (using *p* = 0); 1 code word (*q* = 0), 1 layer, precoding is not used; unless specified otherwise

- Duration is 10 subframes (10 ms)

- Normal CP

- Virtual resource blocks of localized type, no intra-subframe hopping for PDSCH

- UE-specific reference signals are not used

Power settings of physical channels are defined by physical channel EPRE relative to the EPRE of the RS. The relative accuracy of the physical channel EPRE as referred to the EPRE of the RS shall have a tolerance of ±0.5 dB.

For E-UTRA TDD, test models are derived based on the uplink/downlink configuration 3 and special subframe configuration 8 defined in TS36.211, i.e. as showing in the table 6.1.1-1 (excluding Channel access procedure test for downlink operation in Band 46 where Frame structure Type 3 isdefined in TS 36.211 clause 4.3 is used). Number of frames for the test models is 2.

For E-UTRA TDD with NB-IoT operating in-band and/or guard band, test models are derived based on the uplink/downlink configuration 1 and special subframe configuration 8 defined in TS 36.211 [12], i.e. as showing in the table 6.1.1-1. Number of frames for the test models is 3.

Table 6.1.1-1: Configurations of TDD eNB test models

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| TDD Configuration | Downlink-to-Uplink  Switch-point periodicity | Number of UL/DL sub-frames per radio frame (10 ms) | | DwPTS | GP | UpPTS |
| DL | UL |
| 1 | 5 ms | 4 | 4 |  |  |  |
| 3 | 10ms | 6 | 3 |  |  |  |

#### 6.1.1.1 E-UTRA Test Model 1.1 (E-TM1.1)

This model shall be used for tests on:

- BS output power

- Unwanted emissions

- Occupied bandwidth

- ACLR

- Operating band unwanted emissions

- Transmitter spurious emissions

- Transmitter intermodulation

- RS absolute accuracy

Table 6.1.1.1-1: Physical channel parameters of E-TM1.1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **1.4 MHz** | **3 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** |
| **Reference, Synchronisation Signals** |  |  |  |  |  |  |
| RS boosting, PB = EB/EA | 1 | 1 | 1 | 1 | 1 | 1 |
| Synchronisation signal EPRE / ERS [dB] | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| **PBCH** |  |  |  |  |  |  |
| PBCH EPRE / ERS [dB] | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| **PCFICH** |  |  |  |  |  |  |
| # of symbols used for control channels | 2 | 1 | 1 | 1 | 1 | 1 |
| PCFICH EPRE / ERS [dB] | 3.222 | 0 | 0 | 0 | 0 | 0 |
| **PHICH** |  |  |  |  |  |  |
| # of PHICH groups | 1 | 1 | 1 | 2 | 2 | 3 |
| # of PHICH per group | 2 | 2 | 2 | 2 | 2 | 2 |
| PHICH BPSK symbol power / ERS [dB] | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 |
| PHICH group EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 | 0 |
| **PDCCH** |  |  |  |  |  |  |
| # of available REGs | 23 | 23 | 43 | 90 | 140 | 187 |
| # of PDCCH | 2 | 2 | 2 | 5 | 7 | 10 |
| # of CCEs per PDCCH | 1 | 1 | 2 | 2 | 2 | 2 |
| # of REGs per CCE | 9 | 9 | 9 | 9 | 9 | 9 |
| # of REGs allocated to PDCCH | 18 | 18 | 36 | 90 | 126 | 180 |
| # of <NIL> REGs added for padding | 5 | 5 | 7 | 0 | 14 | 7 |
| PDCCH REG EPRE / ERS [dB] | 0.792 | 2.290 | 1.880 | 1.065 | 1.488 | 1.195 |
| <NIL> REG EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| **PDSCH** |  |  |  |  |  |  |
| # of QPSK PDSCH PRBs which are boosted | 6 | 15 | 25 | 50 | 75 | 100 |
| PRB PA = EA/ERS [dB] | 0 | 0 | 0 | 0 | 0 | 0 |
| # of QPSK PDSCH PRBs which are de-boosted | 0 | 0 | 0 | 0 | 0 | 0 |
| PRB PA = EA/ERS [dB] | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |

#### 6.1.1.2 E-UTRA Test Model 1.2 (E-TM1.2)

This model shall be used for tests on:

- Unwanted emissions

- ACLR

- Operating band unwanted emissions

Table 6.1.1.2-1: Physical channel parameters of E-TM1.2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **1.4 MHz** | **3 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** |
| **Reference, Synchronisation Signals** |  |  |  |  |  |  |
| RS boosting, PB = EB/EA | 1 | 1 | 1 | 1 | 1 | 1 |
| Synchronisation signal EPRE / ERS [dB] | 0.000 | -4.730 | -4.730 | -4.730 | -4.730 | -4.730 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| **PBCH** |  |  |  |  |  |  |
| PBCH EPRE / ERS [dB] | 0.000 | -4.730 | -4.730 | -4.730 | -4.730 | -4.730 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| **PCFICH** |  |  |  |  |  |  |
| # of symbols used for control channels | 2 | 1 | 1 | 1 | 1 | 1 |
| PCFICH EPRE / ERS [dB] | 3.222 | 0 | 0 | 0 | 0 | 0 |
| **PHICH** |  |  |  |  |  |  |
| # of PHICH groups | 1 | 1 | 1 | 2 | 2 | 3 |
| # of PHICH per group | 2 | 2 | 2 | 2 | 2 | 2 |
| PHICH BPSK symbol power / ERS [dB] | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 |
| PHICH group EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 | 0 |
| **PDCCH** |  |  |  |  |  |  |
| # of available REGs | 23 | 23 | 43 | 90 | 140 | 187 |
| # of PDCCH | 2 | 2 | 2 | 5 | 7 | 10 |
| # of CCEs per PDCCH | 1 | 1 | 2 | 2 | 2 | 2 |
| # of REGs per CCE | 9 | 9 | 9 | 9 | 9 | 9 |
| # of REGs allocated to PDCCH | 18 | 18 | 36 | 90 | 126 | 180 |
| # of dummy REGs added for padding | 5 | 5 | 7 | 0 | 14 | 7 |
| PDCCH REG EPRE / ERS [dB] | 0.792 | 2.290 | 1.880 | 1.065 | 1.488 | 1.195 |
| <NIL> REG EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| **PDSCH** |  |  |  |  |  |  |
| # of QPSK PDSCH PRBs which are boosted | 2 | 6 | 10 | 20 | 30 | 40 |
| PRB PA = EA/ERS [dB] | 3 (Note 1) | 3 | 3 | 3 | 3 | 3 |
| # of QPSK PDSCH PRBs which are de-boosted | 4 | 9 | 15 | 30 | 45 | 60 |
| PRB PA = EA/ERS [dB] | -2.990 (Note 1) | -4.730 | -4.730 | -4.730 | -4.730 | -4.730 |
| Note 1: In subframes containing PBCH or synchronisation signal REs, no PRB boosting/deboosting shall be applied, i.e. PRB PA = EA/ERS = 0 [dB]. | | | | | | |

Table 6.1.1.2-2: Numbers () of the boosted PRBs (FDD)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 0 | Subframe 1 | Subframe 2 | Subframe 3 | Subframe 4 | Subframe 5 | Subframe 6 | Subframe 7 | Subframe 8 | Subframe 9 |
| **1.4 MHz** | N.A. | 1 3 | 1 3 | 2 3 | 2 5 | N.A. | 0 2 | 0 5 | 2 5 | 1 5 |
| **3 MHz** | 0 1 2 11 12 13 | 0 4 10 11 12 13 | 0 3 5 6 11 13 | 0 1 4 5 7 12 | 0 2 3 4 9 10 | 1 2 3 11 12 14 | 4 6 8 11 13 14 | 2 5 6 12 13 14 | 0 3 4 7 8 11 | 1 3 4 5 11 12 |
| **5 MHz** | 0 1 3 6 7 8 16 18 20 21 | 0 1 4 5 9 10 12 17 18 24 | 0 1 2 12 13 14 19 20 23 24 | 0 5 8 12 13 15 17 20 21 24 | 0 4 6 7 12 13 15 16 22 23 | 0 1 2 3 8 16 18 21 22 24 | 1 3 5 7 9 10 12 15 21 22 | 0 1 2 3 7 10 14 18 20 21 | 1 4 8 9 10 12 15 16 18 20 | 1 2 3 5 6 9 10 13 16 17 |
| **10 MHz** | 1 2 7 8 9 10 11 16 20 31 32 33 35 36 39 40 42 46 47 48 | 5 6 7 9 11 15 20 21 22 24 25 27 34 35 36 37 40 44 46 49 | 3 5 11 12 14 17 18 19 20 22 26 27 28 29 31 34 38 41 42 49 | 1 2 3 5 8 14 16 22 23 26 28 30 32 34 38 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 16 18 21 23 31 33 41 42 45 46 47 | 0 2 3 4 5 7 9 10 11 12 15 19 20 28 29 30 31 34 36 48 | 0 1 4 6 8 9 10 16 17 19 20 21 24 29 30 31 35 37 38 47 | 2 3 4 5 6 9 10 12 16 17 19 22 24 25 26 30 34 37 42 48 | 7 9 14 15 16 21 22 28 30 31 32 34 35 41 42 43 44 46 48 49 | 11 13 16 17 18 21 24 27 28 29 30 32 37 38 40 42 45 47 48 49 |
| **15 MHz** | 0 1 2 3 5 7 8 9 12 18 19 20 21 23 24 25 29 30 31 32 33 42 47 48 49 63 65 68 71 73 | 0 1 3 4 5 6 7 11 18 20 21 24 26 30 31 38 46 47 49 50 51 53 54 57 60 67 68 70 73 74 | 2 11 12 15 18 21 22 24 25 26 29 32 33 34 42 45 46 47 50 51 52 54 58 59 60 64 68 70 72 74 | 2 3 4 7 9 11 12 15 17 20 24 27 33 34 35 39 42 43 45 46 48 56 59 60 62 67 70 71 73 74 | 4 5 6 8 13 17 22 25 27 29 31 32 33 34 35 41 44 46 48 50 52 56 59 60 64 67 69 70 71 74 | 0 2 3 4 7 8 18 20 23 24 25 27 29 42 43 45 47 49 50 54 56 60 62 65 66 67 70 71 72 73 | 2 11 14 15 18 25 26 28 30 31 32 33 36 37 38 39 41 43 45 50 53 54 58 59 62 65 67 68 70 71 | 3 4 7 12 19 23 24 26 27 28 30 33 34 35 41 42 49 53 54 58 59 60 61 62 65 67 69 70 71 73 | 0 3 8 9 10 13 14 15 17 18 19 22 23 24 25 26 27 32 37 39 47 50 53 56 61 63 69 71 73 74 | 0 3 7 8 11 13 14 16 18 23 25 30 32 35 44 46 47 48 53 55 57 59 61 62 64 67 68 69 70 71 |
| **20 MHz** | 0 6 10 13 15 16 20 23 25 28 29 30 31 32 33 39 41 42 44 45 54 56 57 63 66 67 68 76 77 79 82 84 85 88 92 94 95 97 98 99 | 1 3 7 9 10 13 19 20 21 22 23 25 26 27 30 33 34 35 36 47 49 50 51 53 55 57 60 61 64 68 76 77 80 83 84 86 87 89 95 99 | 1 2 3 6 8 10 11 15 16 17 19 21 25 26 28 29 32 35 39 41 42 43 44 51 52 54 60 64 69 76 79 81 84 86 88 89 90 93 94 99 | 5 7 9 10 12 15 16 21 23 24 27 28 29 30 33 34 35 36 39 47 49 54 55 56 57 64 66 70 72 76 77 80 81 86 87 90 91 92 98 99 | 2 3 4 5 6 7 14 17 19 21 22 24 26 37 42 44 47 49 51 56 57 62 63 65 67 70 71 73 76 77 81 83 85 86 87 89 94 95 97 99 | 1 2 5 6 8 9 12 13 21 22 25 26 28 32 35 39 40 43 45 46 57 59 61 62 64 66 68 71 73 77 78 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 22 25 26 27 29 31 32 33 36 38 39 43 45 49 53 55 59 62 63 64 71 72 73 75 77 78 81 84 89 97 98 | 0 1 3 4 5 7 11 18 19 20 21 26 27 29 30 31 33 35 39 40 41 43 44 46 47 50 53 55 56 62 64 66 67 69 70 72 74 92 93 98 | 2 3 4 7 11 13 15 16 24 25 27 29 35 36 40 43 44 45 46 51 52 55 56 57 63 64 65 68 71 77 78 81 82 83 84 85 86 90 94 98 | 0 4 7 8 10 11 16 18 22 26 29 32 35 37 43 44 46 47 48 49 53 54 57 59 60 61 64 66 67 69 70 76 78 81 84 87 89 91 95 96 |

Table 6.1.1.2-3: Numbers () of the boosted PRBs (TDD)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Frame1 | Subframe 0 | Subframe 1 | Subframe 5 | Subframe 6 | Subframe 7 | Subframe 8 | Subframe 9 |
| **1.4 MHz** | N.A. | N.A. | N.A. | N.A. | 4 5 | 2 5 | 0 3 |
| **3 MHz** | 0 1 3 11 12 14 | 1 2 3 11 12 14 | 0 1 2 3 1113 | 1 3 11 12 13 14 | 1 4 8 10 11 12 | 1 6 8 9 1112 | 0 2 3 4 5 6 |
| **5 MHz** | 1 2 5 8 17 18 19 21 23 24 | 1 3 5 6 7 17 19 20 23 24 | 0 3 4 5 8 17 18 19 21 22 | 2 3 6 7 8 17 18 19 20 24 | 1 2 11 13 15 17 18 19 20 21 | 1 2 4 5 6 7 8 9 10 12 | 1 3 4 8 10 12 16 19 20 22 |
| **10 MHz** | 2 4 6 7 10 11 13 17 18 19 34 35 37 38 41 42 46 47 48 49 | 1 3 6 7 9 11 14 15 17 18 19 28 29 30 35 37 38 39 43 44 | 3 4 5 6 10 11 12 14 16 18 30 34 35 36 37 39 40 41 43 48 | 2 4 6 7 8 9 10 13 14 16 19 20 21 29 32 34 39 41 44 45 | 2 4 7 12 14 16 20 21 24 26 28 29 34 41 43 44 45 46 47 48 | 2 5 8 9 11 12 13 16 18 21 22 23 27 29 30 31 32 33 46 47 | 1 4 7 11 12 13 14 15 20 21 27 31 34 37 38 41 42 46 48 49 |
| **15 MHz** | 3 5 6 9 10 13 15 17 20 23 25 26 27 28 29 33 44 45 51 53 56 57 58 61 63 66 70 71 73 74 | 1 5 7 8 9 10 11 13 15 19 21 24 26 42 45 46 51 52 53 55 56 57 58 59 60 61 62 64 65 72 | 3 4 6 7 9 10 11 13 14 15 16 20 22 24 25 28 31 32 33 43 49 52 55 58 61 62 66 67 70 73 | 3 4 7 8 12 13 14 16 18 19 20 22 24 27 28 30 32 41 42 43 44 46 49 50 51 65 67 68 69 71 | 2 6 8 9 10 11 13 16 18 19 21 22 26 30 31 41 45 46 47 48 51 55 57 58 62 63 64 69 73 74 | 0 2 7 11 13 17 19 20 23 27 28 31 39 40 41 43 45 46 47 48 51 55 57 58 63 65 66 70 71 73 | 1 2 3 7 8 9 10 12 13 17 19 21 22 23 24 28 30 32 37 40 41 46 48 53 56 58 61 65 69 73 |
| **20 MHz** | 2 4 7 8 12 13 14 18 20 21 23 27 28 31 34 35 37 38 39 44 46 53 56 58 60 68 70 71 74 75 76 78 82 85 87 88 93 95 97 99 | 4 5 6 7 8 9 10 11 12 14 17 19 20 22 25 27 28 29 32 33 37 38 41 43 53 58 61 65 69 70 73 74 78 79 80 82 83 86 90 97 | 4 5 9 11 13 14 16 19 22 24 25 27 29 32 33 37 40 42 43 45 46 53 54 57 58 62 66 67 68 69 83 86 88 89 90 91 92 93 95 97 | 2 3 8 9 10 11 12 14 15 17 18 22 24 26 28 30 35 36 40 41 42 53 55 60 61 62 63 64 65 68 74 77 82 84 85 87 93 97 98 99 | 0 3 10 13 14 17 23 25 27 28 30 31 36 37 38 40 41 43 49 50 54 55 57 58 60 61 63 64 70 74 76 77 81 84 85 87 88 94 95 98 | 2 3 4 10 11 12 15 18 21 22 23 26 30 31 32 36 37 39 40 41 42 43 48 50 53 54 56 58 61 64 66 71 72 77 81 82 89 92 98 99 | 4 9 12 13 17 19 20 21 22 29 31 36 37 39 40 41 42 46 48 49 54 56 57 60 64 66 73 74 75 80 83 86 87 89 90 92 94 96 98 99 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Frame2 | Subframe 0 | Subframe 1 | Subframe 5 | Subframe 6 | Subframe 7 | Subframe 8 | Subframe 9 |
| **1.4 MHz** | N.A. | N.A. | N.A. | N.A. | 4 5 | 1 2 | 1 3 |
| **3 MHz** | 0 1 2 11 12 13 | 0 1 2 3 13 14 | 0 1 2 3 12 14 | 0 1 2 3 11 13 | 0 3 4 6 10 12 | 2 6 9 11 13 14 | 1 5 7 9 13 14 |
| **5 MHz** | 1 2 3 8 17 20 21 22 23 24 | 1 2 4 5 6 7 16 17 22 23 | 1 2 4 6 8 16 18 21 23 24 | 0 3 5 6 7 17 19 20 21 24 | 2 3 8 10 13 15 16 21 23 24 | 0 4 6 7 13 14 15 16 19 24 | 0 2 5 9 14 18 19 21 22 23 |
| **10 MHz** | 1 4 5 6 8 11 12 13 15 17 20 28 30 31 32 42 43 46 48 49 | 0 1 7 15 18 19 20 21 29 30 32 34 35 37 38 40 42 43 44 47 | 1 2 5 6 8 9 11 13 14 15 16 18 20 30 32 33 40 41 46 49 | 6 7 10 11 15 18 19 20 21 28 29 33 35 36 38 40 41 43 44 49 | 2 4 10 11 18 20 23 24 28 30 32 37 40 41 43 44 45 46 47 48 | 6 8 9 10 11 14 15 16 18 19 20 21 23 24 27 28 36 37 47 49 | 2 5 7 8 9 14 16 18 23 30 32 33 34 37 41 42 44 45 46 49 |
| **15 MHz** | 3 7 10 11 15 16 17 23 27 29 30 31 32 42 43 48 49 50 53 54 57 60 62 64 65 66 67 69 72 74 | 8 9 11 12 14 15 17 22 23 24 27 28 29 31 41 42 45 48 51 54 55 56 62 63 67 68 70 71 73 74 | 1 3 9 11 13 17 21 22 23 24 25 28 29 46 48 49 51 52 53 54 55 57 61 64 65 67 68 72 73 74 | 0 2 4 6 10 11 13 14 15 16 17 20 22 23 28 29 43 44 46 47 51 53 54 56 59 61 63 69 71 72 | 0 1 3 5 9 11 14 15 16 19 24 25 26 27 28 31 33 34 38 40 42 43 46 48 50 52 59 61 67 74 | 0 4 5 8 9 10 12 13 15 20 22 30 32 33 35 37 38 42 44 45 46 47 48 51 52 55 59 60 66 69 | 1 5 8 9 10 13 14 15 20 21 23 26 27 28 29 32 33 34 39 43 44 57 60 62 64 65 69 71 72 73 |
| **20 MHz** | 1 4 10 14 15 17 18 19 23 29 30 31 32 33 37 38 39 42 46 55 61 64 65 66 68 69 70 72 73 76 82 83 84 86 89 90 93 95 97 99 | 0 1 3 5 8 12 14 15 17 19 20 22 23 25 26 28 29 30 37 38 39 45 58 59 62 63 68 71 72 75 78 82 84 85 91 92 93 94 96 98 | 0 2 4 5 6 7 11 12 13 14 16 19 20 21 27 30 32 33 35 37 41 44 46 53 56 58 60 61 62 64 65 67 68 70 73 79 82 90 92 98 | 0 2 4 6 7 11 12 13 17 18 19 20 27 28 31 35 37 38 40 43 45 56 57 59 63 68 70 71 77 79 80 82 85 87 89 92 95 96 97 98 | 3 5 6 7 9 16 20 21 23 24 25 26 31 32 35 37 41 42 43 44 46 48 51 54 59 60 61 62 64 67 76 77 78 79 82 84 86 87 88 95 | 1 4 7 10 13 18 19 25 26 27 28 30 32 35 37 38 41 46 47 50 51 52 53 54 57 60 62 70 71 73 78 79 81 83 84 87 91 95 98 99 | 0 1 2 3 5 7 8 10 11 15 19 20 21 24 26 28 31 32 33 34 44 45 54 58 59 61 63 65 67 69 70 77 85 88 89 90 92 94 98 99 |

#### 6.1.1.3 E-UTRA Test Model 2 (E-TM2)

This model shall be used for tests on:

- Total power dynamic range (lower OFDM symbol power limit at min power),

- EVM of single 64QAM PRB allocation (at min power)

- Frequency error (at min power)

Table 6.1.1.3-1: Physical channel parameters of E-TM2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **1.4 MHz** | **3 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** |
| **Reference, Synchronisation Signals** |  |  |  |  |  |  |
| RS boosting, PB = EB/EA | 1 | 1 | 1 | 1 | 1 | 1 |
| Synchronisation signal EPRE / ERS [dB] | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| **PBCH** |  |  |  |  |  |  |
| PBCH EPRE / ERS [dB] | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| **PCFICH** |  |  |  |  |  |  |
| # of symbols used for control channels | 2 | 1 | 1 | 1 | 1 | 1 |
| PCFICH EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 | 0 |
| **PHICH** |  |  |  |  |  |  |
| # of PHICH groups | 1 | 1 | 1 | 2 | 2 | 3 |
| # of PHICH per group | 2 | 2 | 2 | 2 | 2 | 2 |
| PHICH BPSK symbol power / ERS [dB] | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 |
| PHICH group EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 | 0 |
| **PDCCH** |  |  |  |  |  |  |
| # of available REGs | 23 | 23 | 43 | 90 | 140 | 187 |
| # of PDCCH | 1 | 1 | 1 | 1 | 1 | 1 |
| # of CCEs per PDCCH | 1 | 1 | 2 | 2 | 2 | 2 |
| # of REGs per CCE | 9 | 9 | 9 | 9 | 9 | 9 |
| # of REGs allocated to PDCCH | 9 | 9 | 18 | 18 | 18 | 18 |
| # of <NIL> REGs added for padding | 14 | 14 | 25 | 72 | 122 | 169 |
| PDCCH REG EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 | 0 |
| <NIL> REG EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| **PDSCH** |  |  |  |  |  |  |
| # of 64QAM PDSCH PRBs within a slot for which EVM is measured | 1 | 1 | 1 | 1 | 1 | 1 |
| PRB PA = EA/ERS [dB] | 0 | 0 | 0 | 0 | 0 | 0 |
| # of PDSCH PRBs which are not allocated | 5 | 14 | 24 | 49 | 74 | 99 |
| PRB PA = EA/ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |

Table 6.1.1.3-2: Numbers () of the allocated PRB (64QAM) (FDD)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 0 | Subframe 1 | Subframe 2 | Subframe 3 | Subframe 4 | Subframe 5 | Subframe 6 | Subframe 7 | Subframe 8 | Subframe 9 |
| **1.4 MHz** | 4 | 1 | 1 | 2 | 5 | 3 | 0 | 0 | 5 | 4 |
| **3 MHz** | 13 | 11 | 13 | 5 | 9 | 14 | 6 | 13 | 0 | 1 |
| **5 MHz** | 8 | 17 | 21 | 8 | 22 | 2 | 9 | 14 | 0 | 13 |
| **10 MHz** | 16 | 36 | 19 | 26 | 42 | 30 | 17 | 48 | 9 | 0 |
| **15 MHz** | 32 | 46 | 18 | 72 | 22 | 4 | 31 | 58 | 27 | 3 |
| **20 MHz** | 63 | 34 | 44 | 7 | 94 | 2 | 97 | 19 | 56 | 32 |

Table 6.1.1.3-3: Numbers () of the allocated PRB (64QAM) (TDD)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Frame1 | Subframe 0 | Subframe 1 | Subframe 5 | Subframe 6 | Subframe 7 | Subframe 8 | Subframe 9 |
| **1.4 MHz** | 4 | 5 | 5 | 2 | 0 | 0 | 3 |
| **3 MHz** | 10 | 14 | 12 | 5 | 0 | 1 | 7 |
| **5 MHz** | 17 | 24 | 21 | 8 | 1 | 2 | 12 |
| **10 MHz** | 35 | 49 | 42 | 17 | 2 | 4 | 25 |
| **15 MHz** | 53 | 74 | 63 | 26 | 3 | 6 | 38 |
| **20 MHz** | 71 | 99 | 85 | 35 | 4 | 8 | 51 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Frame2 | Subframe 0 | Subframe 1 | Subframe 5 | Subframe 6 | Subframe 7 | Subframe 8 | Subframe 9 |
| **1.4 MHz** | 4 | 5 | 2 | 1 | 3 | 1 | 4 |
| **3 MHz** | 11 | 14 | 5 | 3 | 8 | 3 | 11 |
| **5 MHz** | 18 | 23 | 8 | 5 | 13 | 5 | 19 |
| **10 MHz** | 37 | 46 | 17 | 10 | 26 | 11 | 38 |
| **15 MHz** | 56 | 70 | 25 | 15 | 40 | 17 | 57 |
| **20 MHz** | 75 | 93 | 34 | 20 | 53 | 23 | 76 |

Table 6.1.1.3-4: Numbers () of the allocated PRB (64QAM) (TDD with NB-IoT inband/guard band)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Frame 1 | Subframe 0 | Subframe 1 | Subframe 4 | Subframe 5 | Subframe 6 | Subframe 9 |
| **3 MHz** | 10 | 14 | 0 | 12 | 14 | 7 |
| **5 MHz** | 17 | 24 | 1 | 21 | 24 | 12 |
| **10 MHz** | 35 | 49 | 2 | 42 | 49 | 25 |
| **15 MHz** | 53 | 74 | 3 | 63 | 74 | 38 |
| **20 MHz** | 71 | 99 | 4 | 85 | 99 | 51 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Frame 2 | Subframe 0 | Subframe 1 | Subframe 4 | Subframe 5 | Subframe 6 | Subframe 9 |
| **3 MHz** | 11 | 14 | 1 | 5 | 14 | 11 |
| **5 MHz** | 18 | 23 | 2 | 8 | 24 | 19 |
| **10 MHz** | 37 | 46 | 4 | 17 | 49 | 38 |
| **15 MHz** | 56 | 70 | 6 | 25 | 74 | 57 |
| **20 MHz** | 75 | 93 | 8 | 34 | 99 | 76 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Frame 3 | Subframe 0 | Subframe 1 | Subframe 4 | Subframe 5 | Subframe 6 | Subframe 9 |
| **3 MHz** | 8 | 14 | 3 | 5 | 14 | 3 |
| **5 MHz** | 13 | 24 | 5 | 8 | 24 | 5 |
| **10 MHz** | 26 | 49 | 11 | 17 | 49 | 10 |
| **15 MHz** | 40 | 74 | 17 | 26 | 74 | 15 |
| **20 MHz** | 53 | 99 | 23 | 35 | 99 | 20 |

#### 6.1.1.3a E-UTRA Test Model 2a (E-TM2a)

This model shall be used for tests on:

- Total power dynamic range (lower OFDM symbol power limit at min power),

- EVM of single 256QAM PRB allocation (at min power)

- Frequency error (at min power)

Physical channel parameters and numbers of the allocated PRB are defined in Tables 6.1.1.3-1, 6.1.1.3-2, 6.1.1.3-3, 6.1.1.3-4, with all 64QAM PDSCH PRBs replaced by 256QAM PDSCH PRBs.

#### 6.1.1.3b E-UTRA Test Model 2b (E-TM2b)

This model shall be used for tests on:

- Total power dynamic range (lower OFDM symbol power limit at min power),

- EVM of single 1024QAM PRB allocation (at min power)

- Frequency error (at min power)

Physical channel parameters and numbers of the allocated PRB are defined in Tables 6.1.1.3-1, 6.1.1.3-2, 6.1.1.3-3, 6.1.1.3-4, with all 64QAM PDSCH PRBs replaced by 1024QAM PDSCH PRBs.

#### 6.1.1.3c E-UTRA subslot TTI Test Model 2-1 (sE-TM2-1)

This model shall be used for subslot TTI tests on:

- Total power dynamic range (lower OFDM symbol power limit at min power),

- EVM of single 64QAM PRB allocation (at min power)

- Frequency error (at min power)

Table 6.1.1.3c-1: Physical channel parameters of sE-TM2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | 3 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Reference, Synchronisation Signals |  |  |  |  |  |
| RS boosting, PB = EB/EA | 1 | 1 | 1 | 1 | 1 |
| Synchronisation signal EPRE / ERS [dB] | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| PBCH |  |  |  |  |  |
| PBCH EPRE / ERS [dB] | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| PCFICH |  |  |  |  |  |
| # of symbols used for control channels | 1 | 1 | 1 | 1 | 1 |
| PCFICH EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| PHICH |  |  |  |  |  |
| # of PHICH groups | 1 | 1 | 2 | 2 | 3 |
| # of PHICH per group | 2 | 2 | 2 | 2 | 2 |
| PHICH BPSK symbol power / ERS [dB] | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 |
| PHICH group EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| sPDCCH |  |  |  |  |  |
| # of available sREGs | 30 (2OS) 45 (3OS) | 50 (2OS) 75 (3OS) | 100 (2OS) 150 (3OS) | 150 (2OS) 225 (3OS) | 200 (2OS) 300 (3OS) |
| # of sPDCCH | 1 | 1 | 1 | 1 | 1 |
| # of sCCEs per sPDCCH | 1 | 2 | 2 | 2 | 2 |
| # of sREGs per sCCE | 4 (2OS) 6 (3OS) | 4 (2OS) 6 (3OS) | 4 (2OS) 6 (3OS) | 4 (2OS) 6 (3OS) | 4 (2OS) 6 (3OS) |
| # of sREGs allocated to sPDCCH | 4 (2OS) 6 (3OS) | 8 (2OS) 12 (3OS) | 8 (2OS) 12 (3OS) | 8 (2OS) 12 (3OS) | 8 (2OS) 12 (3OS) |
| # of <NIL> sREGs added for padding | 26 (2OS) 39 (3OS) | 42 (2OS) 63 (3OS) | 92 (2OS) 138 (3OS) | 142 (2OS) 213 (3OS) | 192 (2OS) 288 (3OS) |
| sPDCCH sREG EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| <NIL> sREG EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| sPDSCH |  |  |  |  |  |
| # of 64QAM sPDSCH PRBs within a subslot for which EVM is measured | 1 | 1 | 1 | 1 | 1 |
| PRB PA = EA/ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| # of sPDSCH PRBs which are not allocated | 14 | 24 | 49 | 74 | 99 |
| PRB PA = EA/ERS [dB] | -inf | -inf | -inf | -inf | -inf |

Table 6.1.1.3c-2: Numbers () of the allocated PRB (64QAM) (FDD)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 0 | | | | | | Subframe 1 | | | | | | Subframe 2 | | | | | |
| Subslot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 13 | 11 | 13 | 5 | 9 | 14 | 6 | 13 | 0 | 1 | 13 | 11 | 13 | 5 | 9 | 14 | 6 | 13 |
| **5 MHz** | 8 | 17 | 21 | 8 | 22 | 2 | 9 | 14 | 0 | 13 | 8 | 17 | 21 | 8 | 22 | 2 | 9 | 14 |
| **10 MHz** | 16 | 36 | 19 | 26 | 42 | 30 | 17 | 48 | 9 | 0 | 16 | 36 | 19 | 26 | 42 | 30 | 17 | 48 |
| **15 MHz** | 32 | 46 | 18 | 72 | 22 | 4 | 31 | 58 | 27 | 3 | 32 | 46 | 18 | 72 | 22 | 4 | 31 | 58 |
| **20 MHz** | 63 | 34 | 44 | 7 | 94 | 2 | 97 | 19 | 56 | 32 | 63 | 34 | 44 | 7 | 94 | 2 | 97 | 19 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 3 | | | | | | Subframe 4 | | | | | | Subframe 5 | | | | | |
| SubSlot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 0 | 1 | 13 | 11 | 13 | 5 | 9 | 14 | 6 | 13 | 0 | 1 | 13 | 11 | 13 | 5 | 9 | 14 |
| **5 MHz** | 0 | 13 | 8 | 17 | 21 | 8 | 22 | 2 | 9 | 14 | 0 | 13 | 8 | 17 | 21 | 8 | 22 | 2 |
| **10 MHz** | 9 | 0 | 16 | 36 | 19 | 26 | 42 | 30 | 17 | 48 | 9 | 0 | 16 | 36 | 19 | 26 | 42 | 30 |
| **15 MHz** | 27 | 3 | 32 | 46 | 18 | 72 | 22 | 4 | 31 | 58 | 27 | 3 | 32 | 46 | 18 | 72 | 22 | 4 |
| **20 MHz** | 56 | 32 | 63 | 34 | 44 | 7 | 94 | 2 | 97 | 19 | 56 | 32 | 63 | 34 | 44 | 7 | 94 | 2 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 6 | | | | | | Subframe 7 | | | | | | Subframe 8 | | | | | |
| SubSlot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 6 | 13 | 0 | 1 | 13 | 11 | 13 | 5 | 9 | 14 | 6 | 13 | 0 | 1 | 13 | 11 | 13 | 5 |
| **5 MHz** | 9 | 14 | 0 | 13 | 8 | 17 | 21 | 8 | 22 | 2 | 9 | 14 | 0 | 13 | 8 | 17 | 21 | 8 |
| **10 MHz** | 17 | 48 | 9 | 0 | 16 | 36 | 19 | 26 | 42 | 30 | 17 | 48 | 9 | 0 | 16 | 36 | 19 | 26 |
| **15 MHz** | 31 | 58 | 27 | 3 | 32 | 46 | 18 | 72 | 22 | 4 | 31 | 58 | 27 | 3 | 32 | 46 | 18 | 72 |
| **20 MHz** | 97 | 19 | 56 | 32 | 63 | 34 | 44 | 7 | 94 | 2 | 97 | 19 | 56 | 32 | 63 | 34 | 44 | 7 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 9 | | | | | |
| SubSlot | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 9 | 14 | 6 | 13 | 0 | 1 |
| **5 MHz** | 22 | 2 | 9 | 14 | 0 | 13 |
| **10 MHz** | 42 | 30 | 17 | 48 | 9 | 0 |
| **15 MHz** | 22 | 4 | 31 | 58 | 27 | 3 |
| **20 MHz** | 94 | 2 | 97 | 19 | 56 | 32 |

#### 6.1.1.3d E-UTRA subslot TTI Test Model 2a (sE-TM2a-1)

This model shall be used for subslot TTI tests on:

- Total power dynamic range (lower OFDM symbol power limit at min power),

- EVM of single 256QAM PRB allocation (at min power)

- Frequency error (at min power)

Physical channel parameters and numbers of the allocated PRB are defined in Tables 6.1.1.3c-1, 6.1.1.3c-2 with all 64QAM sPDSCH PRBs replaced by 256QAM sPDSCH PRBs.ee

#### 6.1.1.3e E-UTRA slot TTI Test Model 2-1 (sE-TM2-1)

This model shall be used for slot TTI tests on:

- Total power dynamic range (lower OFDM symbol power limit at min power),

- EVM of single 64QAM PRB allocation (at min power)

- Frequency error (at min power)

Table 6.1.1.3e-1: Physical channel parameters of sE-TM2-2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | 3 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Reference, Synchronisation Signals |  |  |  |  |  |
| RS boosting, PB = EB/EA | 1 | 1 | 1 | 1 | 1 |
| Synchronisation signal EPRE / ERS [dB] | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| PBCH |  |  |  |  |  |
| PBCH EPRE / ERS [dB] | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| PCFICH |  |  |  |  |  |
| # of symbols used for control channels | 1 | 1 | 1 | 1 | 1 |
| PCFICH EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| PHICH |  |  |  |  |  |
| # of PHICH groups | 1 | 1 | 2 | 2 | 3 |
| # of PHICH per group | 2 | 2 | 2 | 2 | 2 |
| PHICH BPSK symbol power / ERS [dB] | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 |
| PHICH group EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| sPDCCH |  |  |  |  |  |
| # of available sREGs | 105 | 155 | 350 | 525 | 700 |
| # of sPDCCH | 1 | 1 | 1 | 1 | 1 |
| # of sCCEs per sPDCCH | 1 | 2 | 2 | 2 | 2 |
| # of sREGs per CCE | 4 | 4 | 4 | 4 | 4 |
| # of sREGs allocated tos PDCCH | 4 | 8 | 8 | 8 | 8 |
| # of <NIL> sREGs added for padding | 101 | 147 | 342 | 517 | 692 |
| sPDCCH sREG EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| <NIL> sREG EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| sPDSCH |  |  |  |  |  |
| # of 64QAM sPDSCH PRBs within a slot for which EVM is measured | 1 | 1 | 1 | 1 | 1 |
| PRB PA = EA/ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| # of sPDSCH PRBs which are not allocated | 14 | 24 | 49 | 74 | 99 |
| PRB PA = EA/ERS [dB] | -inf | -inf | -inf | -inf | -inf |

Table 6.1.1.3e-2: Numbers () of the allocated PRB (64QAM) (FDD)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 0 | | Subframe 1 | | Subframe 2 | | Subframe 3 | | Subframe 4 | | Subframe 5 | | Subframe 6 | | Subframe 7 | | Subframe 8 | | Subframe 9 | |
| Slot | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| **3 MHz** | 13 | 11 | 13 | 5 | 9 | 14 | 6 | 13 | 0 | 1 | 13 | 11 | 13 | 5 | 9 | 14 | 6 | 13 | 0 | 1 |
| **5 MHz** | 8 | 17 | 21 | 8 | 22 | 2 | 9 | 14 | 0 | 13 | 8 | 17 | 21 | 8 | 22 | 2 | 9 | 14 | 0 | 13 |
| **10 MHz** | 16 | 36 | 19 | 26 | 42 | 30 | 17 | 48 | 9 | 0 | 16 | 36 | 19 | 26 | 42 | 30 | 17 | 48 | 9 | 0 |
| **15 MHz** | 32 | 46 | 18 | 72 | 22 | 4 | 31 | 58 | 27 | 3 | 32 | 46 | 18 | 72 | 22 | 4 | 31 | 58 | 27 | 3 |
| **20 MHz** | 63 | 34 | 44 | 7 | 94 | 2 | 97 | 19 | 56 | 32 | 63 | 34 | 44 | 7 | 94 | 2 | 97 | 19 | 56 | 32 |

Table 6.1.1.3e-3: Numbers () of the allocated PRB (64QAM) (TDD)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Frame1 | Subframe 0 | | Subframe 1 | | Subframe 5 | | Subframe 6 | | Subframe 7 | | Subframe 8 | | Subframe 9 | |
| **Slot** | **0** | **1** | **0** | **1** | **0** | **1** | **0** | **1** | **0** | **1** | **0** | **1** | **0** | **1** |
| **3 MHz** | 10 | 14 | 12 | 5 | 0 | 1 | 7 | 10 | 14 | 12 | 5 | 0 | 1 | 7 |
| **5 MHz** | 17 | 24 | 21 | 8 | 1 | 2 | 12 | 17 | 24 | 21 | 8 | 1 | 2 | 12 |
| **10 MHz** | 35 | 49 | 42 | 17 | 2 | 4 | 25 | 35 | 49 | 42 | 17 | 2 | 4 | 25 |
| **15 MHz** | 53 | 74 | 63 | 26 | 3 | 6 | 38 | 53 | 74 | 63 | 26 | 3 | 6 | 38 |
| **20 MHz** | 71 | 99 | 85 | 35 | 4 | 8 | 51 | 71 | 99 | 85 | 35 | 4 | 8 | 51 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Frame2 | Subframe 0 | | Subframe 1 | | Subframe 5 | | Subframe 6 | | Subframe 7 | | Subframe 8 | | Subframe 9 | |
| **Slot** | **0** | **1** | **0** | **1** | **0** | **1** | **0** | **1** | **0** | **1** | **0** | **1** | **0** | **1** |
| **3 MHz** | 11 | 14 | 5 | 3 | 8 | 3 | 11 | 11 | 14 | 5 | 3 | 8 | 3 | 11 |
| **5 MHz** | 18 | 23 | 8 | 5 | 13 | 5 | 19 | 18 | 23 | 8 | 5 | 13 | 5 | 19 |
| **10 MHz** | 37 | 46 | 17 | 10 | 26 | 11 | 38 | 37 | 46 | 17 | 10 | 26 | 11 | 38 |
| **15 MHz** | 56 | 70 | 25 | 15 | 40 | 17 | 57 | 56 | 70 | 25 | 15 | 40 | 17 | 57 |
| **20 MHz** | 75 | 93 | 34 | 20 | 53 | 23 | 76 | 75 | 93 | 34 | 20 | 53 | 23 | 76 |

#### 6.1.1.3f E-UTRA slot TTI Test Model 2a (sE-TM2a-2)

This model shall be used for slot TTI tests on:

- Total power dynamic range (lower OFDM symbol power limit at min power),

- EVM of single 256QAM PRB allocation (at min power)

- Frequency error (at min power)

Physical channel parameters and numbers of the allocated PRB are defined in Tables 6.1.1.3e-1, 6.1.1.3e-2, 6.1.1.3e-3, with all 64QAM sPDSCH PRBs replaced by 256QAM sPDSCH PRBs.

#### 6.1.1.4 E-UTRA Test Model 3.1 (E-TM3.1)

This model shall be used for tests on:

- Output power dynamics

- Total power dynamic range (upper OFDM symbol power limit at max power with all 64QAM PRBs allocated)

- Transmitted signal quality

- Frequency error

- EVM for 64QAM modulation (at max power)

Table 6.1.1.4-1: Physical channel parameters of E-TM3.1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | 1.4 MHz | 3 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Reference, Synchronisation Signals |  |  |  |  |  |  |
| RS boosting, PB = EB/EA | 1 | 1 | 1 | 1 | 1 | 1 |
| Synchronisation signal EPRE / ERS [dB] | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| PBCH |  |  |  |  |  |  |
| PBCH EPRE / ERS [dB] | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| PCFICH |  |  |  |  |  |  |
| # of symbols used for control channels | 2 | 1 | 1 | 1 | 1 | 1 |
| PCFICH EPRE / ERS [dB] | 3.222 | 0 | 0 | 0 | 0 | 0 |
| PHICH |  |  |  |  |  |  |
| # of PHICH groups | 1 | 1 | 1 | 2 | 2 | 3 |
| # of PHICH per group | 2 | 2 | 2 | 2 | 2 | 2 |
| PHICH BPSK symbol power / ERS [dB] | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 |
| PHICH group EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 | 0 |
| PDCCH |  |  |  |  |  |  |
| # of available REGs | 23 | 23 | 43 | 90 | 140 | 187 |
| # of PDCCH | 2 | 2 | 2 | 5 | 7 | 10 |
| # of CCEs per PDCCH | 1 | 1 | 2 | 2 | 2 | 2 |
| # of REGs per CCE | 9 | 9 | 9 | 9 | 9 | 9 |
| # of REGs allocated to PDCCH | 18 | 18 | 36 | 90 | 126 | 180 |
| # of <NIL> REGs added for padding | 5 | 5 | 7 | 0 | 14 | 7 |
| PDCCH REG EPRE / ERS [dB] | 0.792 | 2.290 | 1.880 | 1.065 | 1.488 | 1.195 |
| <NIL> REG EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| PDSCH |  |  |  |  |  |  |
| # of 64QAM PDSCH PRBs within a slot for which EVM is measured | 6 | 15 | 25 | 50 | 75 | 100 |
| PRB PA = EA/ERS [dB] | 0 | 0 | 0 | 0 | 0 | 0 |
| # of PDSCH PRBs within a slot for which EVM is not measured (used for power balancing only) | 0 | 0 | 0 | 0 | 0 | 0 |
| PRB PA = EA/ERS [dB] | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |

#### 6.1.1.4a E-UTRA Test Model 3.1a (E-TM3.1a)

This model shall be used for tests on:

- Output power dynamics

- Total power dynamic range (upper OFDM symbol power limit at max power with all 256QAM PRBs allocated)

- Transmitted signal quality

- Frequency error

- EVM for 256QAM modulation (at max power)

Physical channel parameters are defined in Table 6.1.1.4-1, with all 64QAM PDSCH PRBs replaced by 256QAM PDSCH PRBs.

#### 6.1.1.4b E-UTRA Test Model 3.1b (E-TM3.1b)

This model shall be used for tests on:

- Output power dynamics

- Total power dynamic range (upper OFDM symbol power limit at max power with all 1024QAM PRBs allocated)

- Transmitted signal quality

- Frequency error

- EVM for 1024QAM modulation (at max power)

Physical channel parameters are defined in Table 6.1.1.4-1, with all 64QAM PDSCH PRBs replaced by 1024QAM PDSCH PRBs.

#### 6.1.1.4c E-UTRA subslot TTI Test Model 3.1 (sE-TM3.1-1)

This model shall be used for subslot TTI tests on:

- Output power dynamics

- Total power dynamic range (upper OFDM symbol power limit at max power with all 64QAM PRBs allocated)

- Transmitted signal quality

- Frequency error

- EVM for 64QAM modulation (at max power)

Table 6.1.1.4c-1: Physical channel parameters of sE-TM3.1-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | 3 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Reference, Synchronisation Signals |  |  |  |  |  |
| RS boosting, PB = EB/EA | 1 | 1 | 1 | 1 | 1 |
| Synchronisation signal EPRE / ERS [dB] | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| PBCH |  |  |  |  |  |
| PBCH EPRE / ERS [dB] | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| PCFICH |  |  |  |  |  |
| # of symbols used for control channels | 1 | 1 | 1 | 1 | 1 |
| PCFICH EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| PHICH |  |  |  |  |  |
| # of PHICH groups | 1 | 1 | 2 | 2 | 3 |
| # of PHICH per group | 2 | 2 | 2 | 2 | 2 |
| PHICH BPSK symbol power / ERS [dB] | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 |
| PHICH group EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| sPDCCH |  |  |  |  |  |
| # of available sREGs | 30 (2OS) 45 (3OS) | 50 (2OS) 75 (3OS) | 100 (2OS) 150 (3OS) | 150 (2OS) 225 (3OS) | 200 (2OS) 300 (3OS) |
| # of sPDCCH | 2 | 2 | 5 | 7 | 10 |
| # of sCCEs per sPDCCH | 1 | 2 | 2 | 2 | 2 |
| # of sREGs per CCE | 4 (2OS) 6 (3OS) | 4 (2OS) 6 (3OS) | 4 (2OS) 6 (3OS) | 4 (2OS) 6 (3OS) | 4 (2OS) 6 (3OS) |
| # of sREGs allocated to sPDCCH | 8 (2OS) 12 (3OS) | 16 (2OS) 24 (3OS) | 40 (2OS) 60 (3OS) | 56 (2OS) 84 (3OS) | 80 (2OS) 120 (3OS) |
| # of <NIL> sREGs added for padding | 22 (2OS) 33 (3OS) | 34 (2OS) 51 (3OS) | 60 (2OS) 90 (3OS) | 94 (2OS) 161 (3OS) | 120 (2OS) 180 (3OS) |
| sPDCCH sREG EPRE / ERS [dB] | 2.290 | 1.880 | 1.065 | 1.488 | 1.195 |
| <NIL> sREG EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| sPDSCH |  |  |  |  |  |
| # of 64QAM sPDSCH PRBs within a subslot for which EVM is measured | 15 | 25 | 50 | 75 | 100 |
| PRB PA = EA/ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| # of sPDSCH PRBs within a subslot for which EVM is not measured (used for power balancing only) | 0 | 0 | 0 | 0 | 0 |
| PRB PA = EA/ERS [dB] | n.a. | n.a. | n.a. | n.a. | n.a. |

#### 6.1.1.4d E-UTRA subslot TTI Test Model 3.1a (sE-TM3.1a-1)

This model shall be used for subslot TTI tests on:

- Output power dynamics

- Total power dynamic range (upper OFDM symbol power limit at max power with all 256QAM PRBs allocated)

- Transmitted signal quality

- Frequency error

- EVM for 256QAM modulation (at max power)

Physical channel parameters are defined in Table 6.1.1.4c-1, with all 64QAM PDSCH PRBs replaced by 256QAM PDSCH PRBs.

#### 6.1.1.4e E-UTRA slot TTI Test Model 3.1 (sE-TM3.1-2)

This model shall be used for slot TTI tests on:

- Output power dynamics

- Total power dynamic range (upper OFDM symbol power limit at max power with all 64QAM PRBs allocated)

- Transmitted signal quality

- Frequency error

- EVM for 64QAM modulation (at max power)

Table 6.1.1.4e-1: Physical channel parameters of sE-TM3.1-2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | 3 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Reference, Synchronisation Signals |  |  |  |  |  |
| RS boosting, PB = EB/EA | 1 | 1 | 1 | 1 | 1 |
| Synchronisation signal EPRE / ERS [dB] | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| PBCH |  |  |  |  |  |
| PBCH EPRE / ERS [dB] | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| PCFICH |  |  |  |  |  |
| # of symbols used for control channels | 1 | 1 | 1 | 1 | 1 |
| PCFICH EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| PHICH |  |  |  |  |  |
| # of PHICH groups | 1 | 1 | 2 | 2 | 3 |
| # of PHICH per group | 2 | 2 | 2 | 2 | 2 |
| PHICH BPSK symbol power / ERS [dB] | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 |
| PHICH group EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| sPDCCH |  |  |  |  |  |
| # of available sREGs | 105 | 155 | 350 | 525 | 700 |
| # of sPDCCH | 2 | 2 | 5 | 7 | 10 |
| # of sCCEs per sPDCCH | 1 | 2 | 2 | 2 | 2 |
| # of sREGs per sCCE | 4 | 4 | 4 | 4 | 4 |
| # of sREGs allocated to sPDCCH | 8 | 16 | 40 | 56 | 80 |
| # of <NIL> sREGs added for padding | 97 | 139 | 310 | 469 | 620 |
| sPDCCH sREG EPRE / ERS [dB] | 2.290 | 1.880 | 1.065 | 1.488 | 1.195 |
| <NIL> sREG EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| sPDSCH |  |  |  |  |  |
| # of 64QAM PDSCH sPRBs within a subslot for which EVM is measured | 15 | 25 | 50 | 75 | 100 |
| PRB PA = EA/ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| # of sPDSCH PRBs within a subslot for which EVM is not measured (used for power balancing only) | 0 | 0 | 0 | 0 | 0 |
| PRB PA = EA/ERS [dB] | n.a. | n.a. | n.a. | n.a. | n.a. |

#### 6.1.1.4f E-UTRA slot TTI Test Model 3.1a (sE-TM3.1a-2)

This model shall be used for slot TTI tests on:

- Output power dynamics

- Total power dynamic range (upper OFDM symbol power limit at max power with all 256QAM PRBs allocated)

- Transmitted signal quality

- Frequency error

- EVM for 256QAM modulation (at max power)

Physical channel parameters are defined in Table 6.1.1.4e-1, with all 64QAM PDSCH PRBs replaced by 256QAM PDSCH PRBs.

#### 6.1.1.5 E-UTRA Test Model 3.2 (E-TM3.2)

This model shall be used for tests on:

- Transmitted signal quality

- Frequency error

- EVM for 16QAM modulation

Table 6.1.1.5-1: Physical channel parameters of E-TM3.2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **1.4 MHz** | **3 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** |
| **Reference, Synchronisation Signals** |  |  |  |  |  |  |
| RS boosting, PB = EB/EA | 1 | 1 | 1 | 1 | 1 | 1 |
| Synchronisation signal EPRE / ERS [dB] | 0.000 | 1.573 | 2.426 | 2.426 | 3.005 | 2.426 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| **PBCH** |  |  |  |  |  |  |
| PBCH EPRE / ERS [dB] | 0.000 | 1.573 | 2.426 | 2.426 | 3.005 | 2.426 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| **PCFICH** |  |  |  |  |  |  |
| # of symbols used for control channels | 2 | 1 | 1 | 1 | 1 | 1 |
| PCFICH EPRE / ERS [dB] | 3.222 | 0 | 0 | 0 | 0 | 0 |
| PHICH |  |  |  |  |  |  |
| # of PHICH groups | 1 | 1 | 1 | 2 | 2 | 3 |
| # of PHICH per group | 2 | 2 | 2 | 2 | 2 | 2 |
| PHICH BPSK symbol power / ERS [dB] | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 |
| PHICH group EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 | 0 |
| **PDCCH** |  |  |  |  |  |  |
| # of available REGs | 23 | 23 | 43 | 90 | 140 | 187 |
| # of PDCCH | 2 | 2 | 2 | 5 | 7 | 10 |
| # of CCEs per PDCCH | 1 | 1 | 2 | 2 | 2 | 2 |
| # of REGs per CCE | 9 | 9 | 9 | 9 | 9 | 9 |
| # of REGs allocated to PDCCH | 18 | 18 | 36 | 90 | 126 | 180 |
| # of <NIL> REGs added for padding | 5 | 5 | 7 | 0 | 14 | 7 |
| PDCCH REG EPRE / ERS [dB] | 0.792 | 2.290 | 1.880 | 1.065 | 1.488 | 1.195 |
| <NIL> REG EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| **PDSCH** |  |  |  |  |  |  |
| # of 16QAM PDSCH PRBs within a slot for which EVM is measured | 4 | 7 | 15 | 30 | 50 | 60 |
| PRB PA = EA/ERS [dB] | -3 (Note 1) | -3 | -3 | -3 | -3 | -3 |
| # of QPSK PDSCH PRBs within a slot for which EVM is not measured (used for power balancing only) | 2 | 8 | 10 | 20 | 25 | 40 |
| PRB PA = EA/ERS [dB] | 3.005 (Note 1) | 1.573 | 2.426 | 2.426 | 3.005 | 2.426 |
| Note 1: In subframes containing PBCH or synchronisation signal REs, no PRB boosting/deboosting shall be applied, i.e. PRB PA = EA/ERS = 0 [dB]. | | | | | | |

Table 6.1.1.5-2: Numbers () of the 16QAM PRBs (FDD)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 0 | Subframe 1 | Subframe 2 | Subframe 3 | Subframe 4 | Subframe 5 | Subframe 6 | Subframe 7 | Subframe 8 | Subframe 9 |
| **1.4 MHz** | 1 3 4 5 | 1 2 3 5 | 0 1 3 4 | 1 2 3 5 | 0 2 3 5 | 0 1 2 4 | 0 1 2 5 | 0 2 4 5 | 1 2 3 5 | 0 1 3 5 |
| **3 MHz** | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 |
| **5 MHz** | 0 1 3 4 6 7 8 16 17 18 19 20 21 23 24 | 0 1 2 3 4 5 6 9 10 12 13 17 18 20 24 | 0 1 2 3 7 8 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 11 12 13 15 17 18 20 21 22 24 | 0 1 2 4 6 7 12 13 14 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 17 18 21 22 23 24 | 1 3 4 5 7 9 10 11 12 13 14 15 21 22 24 | 0 1 2 3 4 7 8 10 13 14 18 19 20 21 24 | 1 4 8 9 10 11 12 13 15 16 18 20 22 23 24 | 1 2 3 4 5 6 9 10 11 12 13 16 17 21 23 |
| **10 MHz** | 1 2 3 4 5 6 7 8 9 10 11 15 16 17 20 21 28 30 31 32 33 35 36 39 40 42 44 46 47 48 | 0 1 2 4 5 6 7 9 10 11 13 15 18 20 21 22 24 25 27 28 29 34 35 36 37 40 43 44 46 49 | 0 1 3 4 5 6 7 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 32 34 38 41 42 45 49 | 0 1 2 3 5 6 8 12 14 15 16 17 18 22 23 26 28 29 30 32 34 35 38 39 40 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 15 16 17 18 21 23 25 28 31 33 37 38 39 41 42 44 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 14 15 19 20 28 29 30 31 34 36 37 38 39 40 42 44 45 48 49 | 0 1 3 4 5 6 8 9 10 13 14 16 17 18 19 20 21 23 24 29 30 31 32 35 37 38 39 40 47 48 | 0 1 2 3 4 5 6 7 9 10 12 14 16 17 18 19 22 24 25 26 27 28 30 31 32 34 37 42 45 48 | 2 5 7 8 9 10 11 14 15 16 17 21 22 27 28 29 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 1 3 6 9 11 13 15 16 17 18 21 24 25 26 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 |
| **15 MHz** | 0 1 2 3 5 6 7 8 9 12 14 16 17 18 19 20 21 23 24 25 26 28 29 30 31 32 33 41 42 45 47 48 49 50 52 53 56 57 60 62 63 64 65 67 68 69 70 71 72 73 | 0 1 2 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 33 36 37 38 39 40 43 45 46 47 48 49 50 51 53 54 55 57 58 59 60 61 65 67 68 69 70 71 73 74 | 1 2 3 4 9 11 12 13 14 15 17 18 20 21 22 24 25 26 28 29 31 32 33 34 40 42 43 44 45 46 47 48 50 51 52 54 56 58 59 60 61 62 63 64 68 70 71 72 73 74 | 2 3 4 6 7 9 11 12 14 15 17 18 20 22 24 25 27 28 29 30 31 33 34 35 38 39 40 42 43 45 46 47 48 49 55 56 59 60 61 62 63 65 66 67 68 69 70 71 73 74 | 2 4 5 6 8 10 13 15 16 17 18 20 22 24 25 26 27 28 29 30 31 32 33 34 35 38 40 41 44 45 46 47 48 50 51 52 53 54 56 59 60 63 64 67 69 70 71 72 73 74 | 0 2 3 4 5 7 8 11 12 14 16 18 20 22 23 24 25 27 28 29 30 31 33 42 43 45 46 47 48 49 50 51 53 54 56 58 60 61 62 63 64 65 66 67 68 69 70 71 72 73 | 0 1 2 3 9 11 12 14 15 17 18 20 23 25 26 28 29 30 31 32 33 36 37 38 39 41 42 43 45 46 50 52 53 54 57 58 59 60 61 62 63 64 65 67 68 70 71 72 73 74 | 0 1 3 4 5 6 7 8 11 12 14 19 20 21 23 24 26 27 28 30 31 33 34 35 38 40 41 42 44 45 46 49 51 52 53 54 55 58 59 60 61 62 63 65 67 69 70 71 72 73 | 0 1 2 3 7 8 9 10 12 13 14 15 17 18 19 21 22 23 24 25 26 27 28 29 32 33 34 36 37 39 40 43 46 47 48 49 50 53 54 56 61 62 63 66 68 69 71 72 73 74 | 0 1 3 7 8 11 13 14 16 18 19 20 21 22 23 25 27 28 29 30 32 34 35 36 40 41 42 43 44 45 46 47 48 50 51 53 54 55 57 59 61 62 63 64 66 67 68 69 70 71 |
| **20 MHz** | 0 1 4 6 7 8 9 10 11 13 14 15 16 20 21 22 23 25 26 28 29 30 31 32 33 34 36 39 41 42 44 45 54 56 57 58 60 61 63 66 67 68 72 75 76 77 79 81 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 5 6 7 9 10 13 17 19 20 21 22 23 24 25 26 27 28 30 32 33 34 35 36 39 41 47 48 49 50 51 53 54 55 57 58 59 60 61 64 65 67 68 75 76 77 79 80 81 83 84 86 87 89 90 91 93 95 99 | 0 1 2 3 6 8 10 11 15 16 17 19 21 22 23 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 53 54 57 59 60 62 63 64 65 67 69 71 72 73 76 79 81 84 86 88 89 90 92 93 94 99 | 5 6 7 9 10 12 14 15 16 17 21 22 23 24 27 28 29 30 31 33 34 35 36 37 39 41 44 45 47 49 50 53 54 55 56 57 59 64 65 66 68 70 72 75 76 77 80 81 84 85 86 87 90 91 92 94 95 97 98 99 | 0 2 3 4 5 6 7 11 12 14 15 17 19 21 22 24 26 32 36 37 40 42 43 44 47 48 49 50 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 79 81 82 83 84 85 86 87 89 91 94 95 96 97 98 99 | 1 2 5 6 8 9 11 12 13 15 21 22 25 26 27 28 29 30 31 32 34 35 38 39 40 41 43 44 45 46 53 57 58 59 61 62 63 64 65 66 68 69 71 72 73 75 77 78 80 82 83 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 13 14 16 22 25 26 27 28 29 31 32 33 34 36 37 38 39 43 44 45 46 48 49 52 53 55 59 61 62 63 64 70 71 72 73 74 75 77 78 80 81 82 84 86 89 90 91 93 97 98 99 | 0 1 3 4 5 7 8 10 11 15 18 19 20 21 26 27 29 30 31 33 35 37 38 39 40 41 43 44 45 46 47 48 49 50 52 53 55 56 58 60 62 64 65 66 67 69 70 71 72 73 74 81 83 84 86 92 93 94 96 98 | 2 3 4 5 7 9 11 13 15 16 17 21 23 24 25 27 28 29 31 33 35 36 40 42 43 44 45 46 48 49 51 52 53 54 55 56 57 59 61 63 64 65 68 71 76 77 78 81 82 83 84 85 86 87 90 91 93 94 98 99 | 0 3 4 6 7 8 10 11 13 16 18 21 22 23 25 26 28 29 32 35 36 37 38 43 44 46 47 48 49 53 54 57 58 59 60 61 64 66 67 68 69 70 72 76 77 78 80 81 82 83 84 86 87 88 89 91 92 94 95 96 |

Table 6.1.1.5-3: Numbers () of the 16QAM PRBs (TDD)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Frame1 | Subframe 0 | Subframe 1 | Subframe 5 | Subframe 6 | Subframe 7 | Subframe 8 | Subframe 9 |
| **1.4 MHz** | 0 3 4 5 | 1 2 3 4 | 0 1 2 4 | 0 1 3 4 | 0 2 4 5 | 2 3 4 5 | 1 2 4 5 |
| **3 MHz** | 0 1 2 3 11 12 14 | 0 1 2 3 11 12 13 | 0 1 2 3 11 12 14 | 0 1 2 3 11 12 13 | 1 2 7 8 10 13 14 | 2 3 4 6 8 13 14 | 0 3 6 8 9 10 14 |
| **5 MHz** | 1 2 3 4 5 6 7 8 17 18 19 20 21 23 24 | 0 2 3 4 5 6 7 8 17 18 19 20 21 22 24 | 1 2 3 4 5 6 7 8 16 17 18 19 20 21 22 | 1 2 3 4 5 6 7 8 16 17 20 21 22 23 24 | 1 2 4 6 7 8 9 11 14 15 16 18 21 23 24 | 0 2 3 5 6 7 10 13 15 16 17 19 20 21 24 | 0 2 3 4 6 7 8 13 14 15 16 19 21 23 24 |
| **10 MHz** | 1 2 3 4 6 7 9 10 11 13 14 15 17 18 19 28 29 30 34 35 37 38 39 41 42 44 46 47 48 49 | 2 3 4 5 6 7 8 9 10 11 12 13 14 16 17 18 19 21 30 32 34 35 36 37 39 40 41 43 45 48 | 2 4 5 6 7 8 9 11 12 13 14 16 18 20 21 28 29 30 31 32 33 34 41 43 44 45 46 47 48 49 | 1 4 5 6 7 8 11 12 13 14 15 17 19 20 21 28 29 30 31 32 34 37 38 41 42 44 46 47 48 49 | 0 1 2 5 6 7 8 11 13 14 15 16 18 20 21 24 25 27 30 32 34 35 37 38 40 41 43 46 47 49 | 2 4 5 6 7 9 10 11 15 18 19 20 21 24 25 26 28 29 30 32 33 35 36 38 40 41 43 44 48 49 | 2 5 6 7 8 9 10 11 14 15 16 18 19 20 21 23 27 28 30 32 33 34 37 41 42 44 45 46 47 49 |
| **15 MHz** | 1 3 4 5 6 7 8 9 10 11 13 15 16 17 19 20 21 22 23 24 25 26 27 28 29 33 42 44 45 46 51 52 53 55 56 57 58 59 60 61 62 63 64 65 66 70 71 72 73 74 | 2 3 4 6 7 8 9 10 11 12 13 14 15 16 18 19 20 22 24 25 27 28 30 31 32 41 42 43 44 45 46 48 49 50 51 52 55 58 61 62 63 65 66 67 68 69 70 71 73 74 | 0 1 2 3 6 7 8 9 10 11 12 13 16 17 18 19 20 21 22 23 24 26 27 28 30 31 32 41 43 45 46 47 48 51 53 55 56 57 58 61 62 63 64 65 66 69 70 71 73 74 | 3 7 8 9 10 11 12 13 14 15 16 17 22 23 24 27 28 29 30 31 32 41 42 43 45 46 48 49 50 53 54 55 56 57 58 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 | 0 1 2 3 4 6 9 10 11 13 14 15 16 17 20 21 22 23 24 25 28 29 34 37 43 44 46 47 48 49 51 52 53 54 55 57 59 61 62 63 64 65 67 68 69 70 71 72 73 74 | 0 1 3 4 5 8 9 10 11 12 13 14 15 16 19 20 22 24 25 26 27 28 31 32 33 34 35 36 37 38 40 42 43 44 45 46 47 48 50 51 52 55 56 59 60 61 66 67 69 74 | 1 3 4 5 7 8 9 10 12 13 14 15 16 17 19 20 21 23 26 27 28 29 30 31 32 33 34 36 37 38 39 42 43 44 45 46 52 53 57 58 59 60 62 63 64 65 69 71 72 73 |
| **20 MHz** | 2 4 5 6 7 8 9 10 11 12 13 14 17 18 19 20 21 22 23 25 27 28 29 31 32 33 34 35 37 38 39 43 44 46 53 56 58 60 61 68 69 70 71 73 74 75 76 78 79 80 82 83 85 86 87 88 93 95 97 99 | 2 4 5 8 9 10 11 12 13 14 16 17 18 19 22 24 25 26 27 29 30 32 33 36 37 38 40 41 42 43 45 46 53 54 55 57 58 60 62 64 65 66 67 68 69 74 78 82 83 84 86 88 89 90 91 92 93 95 97 99 | 0 2 3 4 9 10 11 12 13 14 15 17 18 21 22 23 24 25 26 27 28 30 31 32 35 36 37 38 40 41 42 43 53 54 55 57 60 61 63 64 65 66 68 70 74 76 77 81 82 84 85 87 88 89 93 94 95 97 98 99 | 1 4 9 10 12 13 14 15 17 18 19 20 21 22 23 29 30 31 32 33 36 37 39 40 41 42 43 46 53 54 55 56 57 58 60 61 64 66 68 69 71 72 73 74 75 80 82 83 84 86 87 89 90 92 93 94 95 96 98 99 | 0 1 3 4 5 7 8 12 13 14 15 17 19 20 22 23 25 26 28 30 31 33 35 37 38 39 41 45 48 49 50 51 58 59 62 63 65 67 68 69 70 71 72 73 75 76 78 82 84 85 86 89 90 91 92 93 94 96 97 98 | 0 2 4 5 6 7 11 12 13 14 16 17 18 19 20 21 23 27 28 30 31 32 35 37 38 40 43 44 45 46 47 50 51 53 56 57 58 59 60 61 62 63 64 65 68 70 71 73 77 79 80 82 85 87 89 92 95 96 97 98 | 1 3 4 5 6 7 9 10 13 16 18 20 21 24 25 26 27 28 30 31 32 35 37 38 41 42 43 44 46 47 48 50 51 52 53 54 57 59 60 61 62 64 67 70 71 73 76 77 78 79 81 82 84 86 87 88 91 95 98 99 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Frame2 | Subframe 0 | Subframe 1 | Subframe 5 | Subframe 6 | Subframe 7 | Subframe 8 | Subframe 9 |
| **1.4 MHz** | 0 2 4 5 | 1 2 4 5 | 0 1 3 4 | 0 2 3 5 | 0 1 2 4 | 1 2 3 4 | 1 2 3 5 |
| **3 MHz** | 0 1 2 3 12 13 14 | 0 1 2 3 11 12 13 | 1 2 3 11 12 13 14 | 0 1 2 11 12 13 14 | 2 4 7 8 9 10 11 | 0 1 3 4 5 13 14 | 0 4 6 8 9 11 12 |
| **5 MHz** | 0 2 3 4 5 6 7 16 17 18 19 20 21 22 23 | 0 1 2 3 4 5 7 8 16 17 18 19 20 23 24 | 1 2 3 4 5 7 8 16 17 18 20 21 22 23 24 | 0 1 3 4 5 7 8 16 17 18 19 20 21 22 24 | 0 1 3 6 7 9 12 14 17 18 20 21 22 23 24 | 2 3 4 5 6 7 9 11 12 14 15 17 18 21 24 | 0 1 3 4 5 8 10 11 12 14 16 17 20 22 24 |
| **10 MHz** | 0 1 2 6 7 8 9 11 13 14 15 16 19 29 30 32 34 35 36 37 38 39 41 42 43 44 45 47 48 49 | 0 2 3 4 6 7 8 9 10 11 12 15 16 17 18 19 20 29 31 33 34 35 36 37 42 45 46 47 48 49 | 0 1 2 3 5 6 7 8 9 10 13 14 15 16 18 20 21 28 29 30 31 32 34 35 39 40 41 42 44 46 | 1 2 3 4 5 6 8 9 10 11 12 13 15 16 17 18 19 21 30 35 38 39 40 41 42 43 46 47 48 49 | 1 2 3 5 6 13 14 15 16 17 19 20 23 25 26 27 29 30 31 32 33 35 38 39 40 41 43 44 47 49 | 0 1 2 5 9 12 13 14 16 17 18 22 25 26 27 28 29 30 31 33 35 36 38 39 41 42 44 45 47 49 | 0 1 2 3 4 5 7 8 9 10 12 13 14 15 16 18 22 27 28 29 30 31 32 33 34 42 43 45 46 49 |
| **15 MHz** | 0 1 2 3 4 5 6 7 8 10 11 14 15 16 18 19 20 21 23 24 25 26 27 28 31 32 33 41 43 44 45 46 47 48 50 52 53 55 57 58 59 61 63 65 66 67 68 69 71 74 | 1 2 3 4 5 6 7 8 9 10 11 13 14 15 16 18 20 21 22 23 27 28 29 30 33 42 43 45 46 47 49 50 51 54 55 56 58 59 60 61 64 65 66 68 69 70 71 72 73 74 | 0 1 2 4 5 6 7 8 9 10 11 12 13 14 15 16 18 20 22 24 25 26 29 32 33 44 45 46 49 50 51 52 55 56 57 58 59 60 61 63 64 65 66 68 69 70 71 72 73 74 | 0 1 2 3 4 5 6 7 8 9 10 11 13 14 15 16 17 18 19 21 23 24 26 29 30 33 41 42 45 46 47 49 50 51 53 54 55 56 57 58 60 62 63 66 67 69 71 72 73 74 | 1 3 4 5 6 7 9 10 11 12 14 15 16 17 18 19 20 21 22 24 26 29 30 32 33 34 35 36 38 39 41 42 44 45 47 48 49 50 52 55 56 57 61 62 63 69 70 71 73 74 | 1 3 4 6 7 8 10 11 13 14 15 21 22 23 24 26 27 28 29 30 31 32 35 39 40 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 63 64 65 66 68 71 74 | 0 1 2 5 6 7 10 11 12 16 17 18 19 22 23 25 27 28 29 30 31 33 34 35 36 37 39 40 43 45 46 47 48 49 50 52 54 55 56 58 61 62 63 64 66 67 68 69 71 73 |
| **20 MHz** | 0 1 2 3 4 5 7 8 9 10 11 15 17 19 20 21 24 26 27 28 29 31 32 33 34 36 37 44 45 54 56 57 58 59 60 61 63 65 67 68 69 70 73 77 79 83 85 86 87 88 89 90 91 92 93 94 95 96 98 99 | 0 2 3 4 7 8 10 11 12 13 14 15 16 17 18 19 20 22 24 25 27 30 35 37 39 41 42 44 53 56 57 59 61 62 63 66 67 69 70 73 74 75 76 77 78 79 80 81 82 84 85 86 88 89 90 91 92 94 96 98 | 0 1 2 4 5 6 7 10 11 12 13 14 15 16 18 19 20 21 23 24 25 29 32 33 34 40 42 43 44 45 46 53 54 55 57 59 60 61 62 63 67 68 71 72 73 75 77 81 82 84 85 87 91 92 93 95 96 97 98 99 | 0 1 2 3 4 6 7 8 9 12 13 15 16 18 19 20 22 24 25 27 28 29 30 32 35 39 40 42 43 44 57 59 60 61 63 64 65 66 67 68 69 70 72 73 74 75 76 81 82 83 84 88 89 90 92 94 95 97 98 99 | 0 1 2 4 6 8 9 10 11 14 15 18 19 20 21 25 29 31 32 34 36 37 38 40 41 42 47 52 53 54 57 58 59 60 62 63 64 65 67 68 69 70 71 73 74 75 76 77 78 79 80 84 85 86 87 88 90 92 95 99 | 0 1 2 3 7 8 9 13 15 16 21 23 24 25 29 30 31 33 34 36 37 38 39 40 41 42 44 45 46 47 48 49 52 53 57 60 62 63 64 65 66 69 72 73 74 75 77 81 82 83 84 86 88 89 90 91 92 93 95 97 | 3 4 6 7 9 10 11 12 13 14 15 17 19 22 23 25 26 27 33 34 37 39 40 41 43 45 46 47 48 49 50 53 55 56 58 60 61 62 63 65 69 71 72 73 74 76 77 78 79 80 82 83 85 87 91 92 94 95 96 99 |

Table 6.1.1.5-4: Numbers () of the 16QAM PRBs (TDD with NB-IoT inband/guard band)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Frame 1 | Subframe 0 | Subframe 1 | Subframe 4 | Subframe 5 | Subframe 6 | Subframe 9 |
| **3 MHz** | 0 1 2 3 11 12 14 | 0 1 2 3 11 12 13 | 1 2 7 8 10 13 14 | 0 1 2 3 11 12 14 | 0 1 2 3 11 12 13 | 0 3 6 8 9 10 14 |
| **5 MHz** | 1 2 3 4 5 6 7 8 17 18 19 20 21 23 24 | 0 2 3 4 5 6 7 8 17 18 19 20 21 22 24 | 1 2 4 6 7 8 9 11 14 15 16 18 21 23 24 | 1 2 3 4 5 6 7 8 16 17 18 19 20 21 22 | 0 2 3 4 5 6 7 8 17 18 19 20 21 22 24 | 0 2 3 4 6 7 8 13 14 15 16 19 21 23 24 |
| **10 MHz** | 1 2 3 4 6 7 9 10 11 13 14 15 17 18 19 28 29 30 34 35 37 38 39 41 42 44 46 47 48 49 | 2 3 4 5 6 7 8 9 10 11 12 13 14 16 17 18 19 21 30 32 34 35 36 37 39 40 41 43 45 48 | 0 1 2 5 6 7 8 11 13 14 15 16 18 20 21 24 25 27 30 32 34 35 37 38 40 41 43 46 47 49 | 2 4 5 6 7 8 9 11 12 13 14 16 18 20 21 28 29 30 31 32 33 34 41 43 44 45 46 47 48 49 | 2 3 4 5 6 7 8 9 10 11 12 13 14 16 17 18 19 21 30 32 34 35 36 37 39 40 41 43 45 48 | 2 5 6 7 8 9 10 11 14 15 16 18 19 20 21 23 27 28 30 32 33 34 37 41 42 44 45 46 47 49 |
| **15 MHz** | 1 3 4 5 6 7 8 9 10 11 13 15 16 17 19 20 21 22 23 24 25 26 27 28 29 33 42 44 45 46 51 52 53 55 56 57 58 59 60 61 62 63 64 65 66 70 71 72 73 74 | 2 3 4 6 7 8 9 10 11 12 13 14 15 16 18 19 20 22 24 25 27 28 30 31 32 41 42 43 44 45 46 48 49 50 51 52 55 58 61 62 63 65 66 67 68 69 70 71 73 74 | 0 1 2 3 4 6 9 10 11 13 14 15 16 17 20 21 22 23 24 25 28 29 34 37 43 44 46 47 48 49 51 52 53 54 55 57 59 61 62 63 64 65 67 68 69 70 71 72 73 74 | 0 1 2 3 6 7 8 9 10 11 12 13 16 17 18 19 20 21 22 23 24 26 27 28 30 31 32 41 43 45 46 47 48 51 53 55 56 57 58 61 62 63 64 65 66 69 70 71 73 74 | 2 3 4 6 7 8 9 10 11 12 13 14 15 16 18 19 20 22 24 25 27 28 30 31 32 41 42 43 44 45 46 48 49 50 51 52 55 58 61 62 63 65 66 67 68 69 70 71 73 74 | 1 3 4 5 7 8 9 10 12 13 14 15 16 17 19 20 21 23 26 27 28 29 30 31 32 33 34 36 37 38 39 42 43 44 45 46 52 53 57 58 59 60 62 63 64 65 69 71 72 73 |
| **20 MHz** | 2 4 5 6 7 8 9 10 11 12 13 14 17 18 19 20 21 22 23 25 27 28 29 31 32 33 34 35 37 38 39 43 44 46 53 56 58 60 61 68 69 70 71 73 74 75 76 78 79 80 82 83 85 86 87 88 93 95 97 99 | 2 4 5 8 9 10 11 12 13 14 16 17 18 19 22 24 25 26 27 29 30 32 33 36 37 38 40 41 42 43 45 46 53 54 55 57 58 60 62 64 65 66 67 68 69 74 78 82 83 84 86 88 89 90 91 92 93 95 97 99 | 0 1 3 4 5 7 8 12 13 14 15 17 19 20 22 23 25 26 28 30 31 33 35 37 38 39 41 45 48 49 50 51 58 59 62 63 65 67 68 69 70 71 72 73 75 76 78 82 84 85 86 89 90 91 92 93 94 96 97 98 | 0 2 3 4 9 10 11 12 13 14 15 17 18 21 22 23 24 25 26 27 28 30 31 32 35 36 37 38 40 41 42 43 53 54 55 57 60 61 63 64 65 66 68 70 74 76 77 81 82 84 85 87 88 89 93 94 95 97 98 99 | 2 4 5 8 9 10 11 12 13 14 16 17 18 19 22 24 25 26 27 29 30 32 33 36 37 38 40 41 42 43 45 46 53 54 55 57 58 60 62 64 65 66 67 68 69 74 78 82 83 84 86 88 89 90 91 92 93 95 97 99 | 1 3 4 5 6 7 9 10 13 16 18 20 21 24 25 26 27 28 30 31 32 35 37 38 41 42 43 44 46 47 48 50 51 52 53 54 57 59 60 61 62 64 67 70 71 73 76 77 78 79 81 82 84 86 87 88 91 95 98 99 |

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| --- | --- | --- | --- | --- | --- | --- |
| Frame 2 | Subframe 0 | Subframe 1 | Subframe 4 | Subframe 5 | Subframe 6 | Subframe 9 |
| **3 MHz** | 0 1 2 3 12 13 14 | 0 1 2 3 11 12 13 | 2 3 4 6 8 13 14 | 1 2 3 11 12 13 14 | 0 1 2 3 11 12 13 | 0 4 6 8 9 11 12 |
| **5 MHz** | 0 2 3 4 5 6 7 16 17 18 19 20 21 22 23 | 0 1 2 3 4 5 7 8 16 17 18 19 20 23 24 | 0 2 3 5 6 7 10 13 15 16 17 19 20 21 24 | 1 2 3 4 5 7 8 16 17 18 20 21 22 23 24 | 0 2 3 4 5 6 7 8 17 18 19 20 21 22 24 | 0 1 3 4 5 8 10 11 12 14 16 17 20 22 24 |
| **10 MHz** | 0 1 2 6 7 8 9 11 13 14 15 16 19 29 30 32 34 35 36 37 38 39 41 42 43 44 45 47 48 49 | 0 2 3 4 6 7 8 9 10 11 12 15 16 17 18 19 20 29 31 33 34 35 36 37 42 45 46 47 48 49 | 2 4 5 6 7 9 10 11 15 18 19 20 21 24 25 26 28 29 30 32 33 35 36 38 40 41 43 44 48 49 | 0 1 2 3 5 6 7 8 9 10 13 14 15 16 18 20 21 28 29 30 31 32 34 35 39 40 41 42 44 46 | 2 3 4 5 6 7 8 9 10 11 12 13 14 16 17 18 19 21 30 32 34 35 36 37 39 40 41 43 45 48 | 0 1 2 3 4 5 7 8 9 10 12 13 14 15 16 18 22 27 28 29 30 31 32 33 34 42 43 45 46 49 |
| **15 MHz** | 0 1 2 3 4 5 6 7 8 10 11 14 15 16 18 19 20 21 23 24 25 26 27 28 31 32 33 41 43 44 45 46 47 48 50 52 53 55 57 58 59 61 63 65 66 67 68 69 71 74 | 1 2 3 4 5 6 7 8 9 10 11 13 14 15 16 18 20 21 22 23 27 28 29 30 33 42 43 45 46 47 49 50 51 54 55 56 58 59 60 61 64 65 66 68 69 70 71 72 73 74 | 0 1 3 4 5 8 9 10 11 12 13 14 15 16 19 20 22 24 25 26 27 28 31 32 33 34 35 36 37 38 40 42 43 44 45 46 47 48 50 51 52 55 56 59 60 61 66 67 69 74 | 0 1 2 4 5 6 7 8 9 10 11 12 13 14 15 16 18 20 22 24 25 26 29 32 33 44 45 46 49 50 51 52 55 56 57 58 59 60 61 63 64 65 66 68 69 70 71 72 73 74 | 2 3 4 6 7 8 9 10 11 12 13 14 15 16 18 19 20 22 24 25 27 28 30 31 32 41 42 43 44 45 46 48 49 50 51 52 55 58 61 62 63 65 66 67 68 69 70 71 73 74 | 0 1 2 5 6 7 10 11 12 16 17 18 19 22 23 25 27 28 29 30 31 33 34 35 36 37 39 40 43 45 46 47 48 49 50 52 54 55 56 58 61 62 63 64 66 67 68 69 71 73 |
| **20 MHz** | 0 1 2 3 4 5 7 8 9 10 11 15 17 19 20 21 24 26 27 28 29 31 32 33 34 36 37 44 45 54 56 57 58 59 60 61 63 65 67 68 69 70 73 77 79 83 85 86 87 88 89 90 91 92 93 94 95 96 98 99 | 0 2 3 4 7 8 10 11 12 13 14 15 16 17 18 19 20 22 24 25 27 30 35 37 39 41 42 44 53 56 57 59 61 62 63 66 67 69 70 73 74 75 76 77 78 79 80 81 82 84 85 86 88 89 90 91 92 94 96 98 | 0 2 4 5 6 7 11 12 13 14 16 17 18 19 20 21 23 27 28 30 31 32 35 37 38 40 43 44 45 46 47 50 51 53 56 57 58 59 60 61 62 63 64 65 68 70 71 73 77 79 80 82 85 87 89 92 95 96 97 98 | 0 1 2 4 5 6 7 10 11 12 13 14 15 16 18 19 20 21 23 24 25 29 32 33 34 40 42 43 44 45 46 53 54 55 57 59 60 61 62 63 67 68 71 72 73 75 77 81 82 84 85 87 91 92 93 95 96 97 98 99 | 2 4 5 8 9 10 11 12 13 14 16 17 18 19 22 24 25 26 27 29 30 32 33 36 37 38 40 41 42 43 45 46 53 54 55 57 58 60 62 64 65 66 67 68 69 74 78 82 83 84 86 88 89 90 91 92 93 95 97 99 | 3 4 6 7 9 10 11 12 13 14 15 17 19 22 23 25 26 27 33 34 37 39 40 41 43 45 46 47 48 49 50 53 55 56 58 60 61 62 63 65 69 71 72 73 74 76 77 78 79 80 82 83 85 87 91 92 94 95 96 99 |

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| --- | --- | --- | --- | --- | --- | --- |
| Frame 3 | Subframe 0 | Subframe 1 | Subframe 4 | Subframe 5 | Subframe 6 | Subframe 9 |
| **3 MHz** | 2 4 7 8 9 10 11 | 0 1 2 3 11 12 13 | 0 1 3 4 5 13 14 | 0 1 2 3 11 12 13 | 0 1 2 3 11 12 13 | 0 1 2 11 12 13 14 |
| **5 MHz** | 0 1 3 6 7 9 12 14 17 18 20 21 22 23 24 | 0 2 3 4 5 6 7 8 17 18 19 20 21 22 24 | 2 3 4 5 6 7 9 11 12 14 15 17 18 21 24 | 1 2 3 4 5 6 7 8 16 17 20 21 22 23 24 | 0 2 3 4 5 6 7 8 17 18 19 20 21 22 24 | 0 1 3 4 5 7 8 16 17 18 19 20 21 22 24 |
| **10 MHz** | 1 2 3 5 6 13 14 15 16 17 19 20 23 25 26 27 29 30 31 32 33 35 38 39 40 41 43 44 47 49 | 2 3 4 5 6 7 8 9 10 11 12 13 14 16 17 18 19 21 30 32 34 35 36 37 39 40 41 43 45 48 | 0 1 2 5 9 12 13 14 16 17 18 22 25 26 27 28 29 30 31 33 35 36 38 39 41 42 44 45 47 49 | 1 4 5 6 7 8 11 12 13 14 15 17 19 20 21 28 29 30 31 32 34 37 38 41 42 44 46 47 48 49 | 2 3 4 5 6 7 8 9 10 11 12 13 14 16 17 18 19 21 30 32 34 35 36 37 39 40 41 43 45 48 | 1 2 3 4 5 6 8 9 10 11 12 13 15 16 17 18 19 21 30 35 38 39 40 41 42 43 46 47 48 49 |
| **15 MHz** | 1 3 4 5 6 7 9 10 11 12 14 15 16 17 18 19 20 21 22 24 26 29 30 32 33 34 35 36 38 39 41 42 44 45 47 48 49 50 52 55 56 57 61 62 63 69 70 71 73 74 | 2 3 4 6 7 8 9 10 11 12 13 14 15 16 18 19 20 22 24 25 27 28 30 31 32 41 42 43 44 45 46 48 49 50 51 52 55 58 61 62 63 65 66 67 68 69 70 71 73 74 | 1 3 4 6 7 8 10 11 13 14 15 21 22 23 24 26 27 28 29 30 31 32 35 39 40 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 63 64 65 66 68 71 74 | 3 7 8 9 10 11 12 13 14 15 16 17 22 23 24 27 28 29 30 31 32 41 42 43 45 46 48 49 50 53 54 55 56 57 58 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 | 2 3 4 6 7 8 9 10 11 12 13 14 15 16 18 19 20 22 24 25 27 28 30 31 32 41 42 43 44 45 46 48 49 50 51 52 55 58 61 62 63 65 66 67 68 69 70 71 73 74 | 0 1 2 3 4 5 6 7 8 9 10 11 13 14 15 16 17 18 19 21 23 24 26 29 30 33 41 42 45 46 47 49 50 51 53 54 55 56 57 58 60 62 63 66 67 69 71 72 73 74 |
| **20 MHz** | 0 1 2 4 6 8 9 10 11 14 15 18 19 20 21 25 29 31 32 34 36 37 38 40 41 42 47 52 53 54 57 58 59 60 62 63 64 65 67 68 69 70 71 73 74 75 76 77 78 79 80 84 85 86 87 88 90 92 95 99 | 2 4 5 8 9 10 11 12 13 14 16 17 18 19 22 24 25 26 27 29 30 32 33 36 37 38 40 41 42 43 45 46 53 54 55 57 58 60 62 64 65 66 67 68 69 74 78 82 83 84 86 88 89 90 91 92 93 95 97 99 | 0 1 2 3 7 8 9 13 15 16 21 23 24 25 29 30 31 33 34 36 37 38 39 40 41 42 44 45 46 47 48 49 52 53 57 60 62 63 64 65 66 69 72 73 74 75 77 81 82 83 84 86 88 89 90 91 92 93 95 97 | 1 4 9 10 12 13 14 15 17 18 19 20 21 22 23 29 30 31 32 33 36 37 39 40 41 42 43 46 53 54 55 56 57 58 60 61 64 66 68 69 71 72 73 74 75 80 82 83 84 86 87 89 90 92 93 94 95 96 98 99 | 2 4 5 8 9 10 11 12 13 14 16 17 18 19 22 24 25 26 27 29 30 32 33 36 37 38 40 41 42 43 45 46 53 54 55 57 58 60 62 64 65 66 67 68 69 74 78 82 83 84 86 88 89 90 91 92 93 95 97 99 | 0 1 2 3 4 6 7 8 9 12 13 15 16 18 19 20 22 24 25 27 28 29 30 32 35 39 40 42 43 44 57 59 60 61 63 64 65 66 67 68 69 70 72 73 74 75 76 81 82 83 84 88 89 90 92 94 95 97 98 99 |

#### 6.1.1.5a E-UTRA subslot TTI Test Model 3.2 (sE-TM3.2-1)

This model shall be used for subslot TTI tests on:

- Transmitted signal quality

- Frequency error

- EVM for 16QAM modulation

Table 6.1.1.5a-1: Physical channel parameters of sE-TM3.2-1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **3 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** | |
| **Reference, Synchronisation Signals** |  |  |  |  |  | |
| RS boosting, PB = EB/EA | 1 | 1 | 1 | 1 | 1 | |
| Synchronisation signal EPRE / ERS [dB] | 1.573 | 2.426 | 2.426 | 3.005 | 2.426 | |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | |
| **PBCH** |  |  |  |  |  | |
| PBCH EPRE / ERS [dB] | 1.573 | 2.426 | 2.426 | 3.005 | 2.426 | |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | |
| **PCFICH** |  |  |  |  |  | |
| # of symbols used for control channels | 1 | 1 | 1 | 1 | 1 | |
| PCFICH EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 | |
| PHICH |  |  |  |  |  | |
| # of PHICH groups | 1 | 1 | 2 | 2 | 3 | |
| # of PHICH per group | 2 | 2 | 2 | 2 | 2 | |
| PHICH BPSK symbol power / ERS [dB] | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 | |
| PHICH group EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 | |
| **sPDCCH** |  |  |  |  |  | |
| # of available sREGs | 30 (2OS) 45 (3OS) | 50 (2OS) 75 (3OS) | 100 (2OS) 150 (3OS) | 150 (2OS) 225 (3OS) | 200 (2OS) 300 (3OS) | |
| # of sPDCCH | 2 | 2 | 5 | 7 | 10 | |
| # of sCCEs per sPDCCH | 1 | 2 | 2 | 2 | 2 | |
| # of sREGs per sCCE | 4 (2OS) 6 (3OS) | 4 (2OS) 6 (3OS) | 4 (2OS) 6 (3OS) | 4 (2OS) 6 (3OS) | 4 (2OS) 6 (3OS) | |
| # of sREGs allocated to sPDCCH | 8 (2OS) 12 (3OS) | 16 (2OS) 24 (3OS) | 40 (2OS) 60 (3OS) | 56 (2OS) 84 (3OS) | 80 (2OS) 120 (3OS) | |
| # of <NIL> sREGs added for padding | 22 (2OS) 33 (3OS) | 34 (2OS) 51 (3OS) | 60 (2OS) 90 (3OS) | 94 (2OS) 161 (3OS) | 120 (2OS) 180 (3OS) | |
| sPDCCH sREG EPRE / ERS [dB] | 2.290 | 1.880 | 1.065 | 1.488 | 1.195 | |
| <NIL> sREG EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | |
| **sPDSCH** |  |  |  |  |  | |
| # of 16QAM sPDSCH PRBs within a subslot for which EVM is measured | 7 | 15 | 30 | 50 | 60 | |
| PRB PA = EA/ERS [dB] | -3 | -3 | -3 | -3 | -3 | |
| # of QPSK sPDSCH PRBs within a subslot for which EVM is not measured (used for power balancing only) | 8 | 10 | 20 | 25 | 40 | |
| PRB PA = EA/ERS [dB] | 1.573 | 2.426 | 2.426 | 3.005 | 2.426 | |
| NOTE 1: In subframes containing PBCH or synchronisation signal REs, no PRB boosting/deboosting shall be applied, i.e. PRB PA = EA/ERS = 0 [dB]. | | | | | |

Table 6.1.1.5a-2: Numbers () of the 16QAM PRBs (FDD)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 0 | | | | | | Subframe 1 | | | | | |
| Subslot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 |
| **5 MHz** | 0 1 3 4 6 7 8 16 17 18 19 20 21 23 24 | 0 1 2 3 4 5 6 9 10 12 13 17 18 20 24 | 0 1 2 3 7 8 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 11 12 13 15 17 18 20 21 22 24 | 0 1 2 4 6 7 12 13 14 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 17 18 21 22 23 24 | 1 3 4 5 7 9 10 11 12 13 14 15 21 22 24 | 0 1 2 3 4 7 8 10 13 14 18 19 20 21 24 | 1 4 8 9 10 11 12 13 15 16 18 20 22 23 24 | 1 2 3 4 5 6 9 10 11 12 13 16 17 21 23 | 0 1 3 4 6 7 8 16 17 18 19 20 21 23 24 | 0 1 2 3 4 5 6 9 10 12 13 17 18 20 24 |
| **10 MHz** | 1 2 3 4 5 6 7 8 9 10 11 15 16 17 20 21 28 30 31 32 33 35 36 39 40 42 44 46 47 48 | 0 1 2 4 5 6 7 9 10 11 13 15 18 20 21 22 24 25 27 28 29 34 35 36 37 40 43 44 46 49 | 0 1 3 4 5 6 7 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 32 34 38 41 42 45 49 | 0 1 2 3 5 6 8 12 14 15 16 17 18 22 23 26 28 29 30 32 34 35 38 39 40 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 15 16 17 18 21 23 25 28 31 33 37 38 39 41 42 44 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 14 15 19 20 28 29 30 31 34 36 37 38 39 40 42 44 45 48 49 | 0 1 3 4 5 6 8 9 10 13 14 16 17 18 19 20 21 23 24 29 30 31 32 35 37 38 39 40 47 48 | 0 1 2 3 4 5 6 7 9 10 12 14 16 17 18 19 22 24 25 26 27 28 30 31 32 34 37 42 45 48 | 2 5 7 8 9 10 11 14 15 16 17 21 22 27 28 29 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 1 3 6 9 11 13 15 16 17 18 21 24 25 26 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 | 1 2 3 4 5 6 7 8 9 10 11 15 16 17 20 21 28 30 31 32 33 35 36 39 40 42 44 46 47 48 | 0 1 2 4 5 6 7 9 10 11 13 15 18 20 21 22 24 25 27 28 29 34 35 36 37 40 43 44 46 49 |
| **15 MHz** | 0 1 2 3 5 6 7 8 9 12 14 16 17 18 19 20 21 23 24 25 26 28 29 30 31 32 33 41 42 45 47 48 49 50 52 53 56 57 60 62 63 64 65 67 68 69 70 71 72 73 | 0 1 2 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 33 36 37 38 39 40 43 45 46 47 48 49 50 51 53 54 55 57 58 59 60 61 65 67 68 69 70 71 73 74 | 1 2 3 4 9 11 12 13 14 15 17 18 20 21 22 24 25 26 28 29 31 32 33 34 40 42 43 44 45 46 47 48 50 51 52 54 56 58 59 60 61 62 63 64 68 70 71 72 73 74 | 2 3 4 6 7 9 11 12 14 15 17 18 20 22 24 25 27 28 29 30 31 33 34 35 38 39 40 42 43 45 46 47 48 49 55 56 59 60 61 62 63 65 66 67 68 69 70 71 73 74 | 2 4 5 6 8 10 13 15 16 17 18 20 22 24 25 26 27 28 29 30 31 32 33 34 35 38 40 41 44 45 46 47 48 50 51 52 53 54 56 59 60 63 64 67 69 70 71 72 73 74 | 0 2 3 4 5 7 8 11 12 14 16 18 20 22 23 24 25 27 28 29 30 31 33 42 43 45 46 47 48 49 50 51 53 54 56 58 60 61 62 63 64 65 66 67 68 69 70 71 72 73 | 0 1 2 3 9 11 12 14 15 17 18 20 23 25 26 28 29 30 31 32 33 36 37 38 39 41 42 43 45 46 50 52 53 54 57 58 59 60 61 62 63 64 65 67 68 70 71 72 73 74 | 0 1 3 4 5 6 7 8 11 12 14 19 20 21 23 24 26 27 28 30 31 33 34 35 38 40 41 42 44 45 46 49 51 52 53 54 55 58 59 60 61 62 63 65 67 69 70 71 72 73 | 0 1 2 3 7 8 9 10 12 13 14 15 17 18 19 21 22 23 24 25 26 27 28 29 32 33 34 36 37 39 40 43 46 47 48 49 50 53 54 56 61 62 63 66 68 69 71 72 73 74 | 0 1 3 7 8 11 13 14 16 18 19 20 21 22 23 25 27 28 29 30 32 34 35 36 40 41 42 43 44 45 46 47 48 50 51 53 54 55 57 59 61 62 63 64 66 67 68 69 70 71 | 0 1 2 3 5 6 7 8 9 12 14 16 17 18 19 20 21 23 24 25 26 28 29 30 31 32 33 41 42 45 47 48 49 50 52 53 56 57 60 62 63 64 65 67 68 69 70 71 72 73 | 0 1 2 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 33 36 37 38 39 40 43 45 46 47 48 49 50 51 53 54 55 57 58 59 60 61 65 67 68 69 70 71 73 74 |
| **20 MHz** | 0 1 4 6 7 8 9 10 11 13 14 15 16 20 21 22 23 25 26 28 29 30 31 32 33 34 36 39 41 42 44 45 54 56 57 58 60 61 63 66 67 68 72 75 76 77 79 81 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 5 6 7 9 10 13 17 19 20 21 22 23 24 25 26 27 28 30 32 33 34 35 36 39 41 47 48 49 50 51 53 54 55 57 58 59 60 61 64 65 67 68 75 76 77 79 80 81 83 84 86 87 89 90 91 93 95 99 | 0 1 2 3 6 8 10 11 15 16 17 19 21 22 23 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 53 54 57 59 60 62 63 64 65 67 69 71 72 73 76 79 81 84 86 88 89 90 92 93 94 99 | 5 6 7 9 10 12 14 15 16 17 21 22 23 24 27 28 29 30 31 33 34 35 36 37 39 41 44 45 47 49 50 53 54 55 56 57 59 64 65 66 68 70 72 75 76 77 80 81 84 85 86 87 90 91 92 94 95 97 98 99 | 0 2 3 4 5 6 7 11 12 14 15 17 19 21 22 24 26 32 36 37 40 42 43 44 47 48 49 50 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 79 81 82 83 84 85 86 87 89 91 94 95 96 97 98 99 | 1 2 5 6 8 9 11 12 13 15 21 22 25 26 27 28 29 30 31 32 34 35 38 39 40 41 43 44 45 46 53 57 58 59 61 62 63 64 65 66 68 69 71 72 73 75 77 78 80 82 83 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 13 14 16 22 25 26 27 28 29 31 32 33 34 36 37 38 39 43 44 45 46 48 49 52 53 55 59 61 62 63 64 70 71 72 73 74 75 77 78 80 81 82 84 86 89 90 91 93 97 98 99 | 0 1 3 4 5 7 8 10 11 15 18 19 20 21 26 27 29 30 31 33 35 37 38 39 40 41 43 44 45 46 47 48 49 50 52 53 55 56 58 60 62 64 65 66 67 69 70 71 72 73 74 81 83 84 86 92 93 94 96 98 | 2 3 4 5 7 9 11 13 15 16 17 21 23 24 25 27 28 29 31 33 35 36 40 42 43 44 45 46 48 49 51 52 53 54 55 56 57 59 61 63 64 65 68 71 76 77 78 81 82 83 84 85 86 87 90 91 93 94 98 99 | 0 3 4 6 7 8 10 11 13 16 18 21 22 23 25 26 28 29 32 35 36 37 38 43 44 46 47 48 49 53 54 57 58 59 60 61 64 66 67 68 69 70 72 76 77 78 80 81 82 83 84 86 87 88 89 91 92 94 95 96 | 0 1 4 6 7 8 9 10 11 13 14 15 16 20 21 22 23 25 26 28 29 30 31 32 33 34 36 39 41 42 44 45 54 56 57 58 60 61 63 66 67 68 72 75 76 77 79 81 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 5 6 7 9 10 13 17 19 20 21 22 23 24 25 26 27 28 30 32 33 34 35 36 39 41 47 48 49 50 51 53 54 55 57 58 59 60 61 64 65 67 68 75 76 77 79 80 81 83 84 86 87 89 90 91 93 95 99 |

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|  | Subframe 2 | | | | | | Subframe 3 | | | | | |
| Subslot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 |
| **5 MHz** | 0 1 2 3 7 8 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 11 12 13 15 17 18 20 21 22 24 | 0 1 2 4 6 7 12 13 14 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 17 18 21 22 23 24 | 1 3 4 5 7 9 10 11 12 13 14 15 21 22 24 | 0 1 2 3 4 7 8 10 13 14 18 19 20 21 24 | 1 4 8 9 10 11 12 13 15 16 18 20 22 23 24 | 1 2 3 4 5 6 9 10 11 12 13 16 17 21 23 | 0 1 3 4 6 7 8 16 17 18 19 20 21 23 24 | 0 1 2 3 4 5 6 9 10 12 13 17 18 20 24 | 0 1 2 3 7 8 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 11 12 13 15 17 18 20 21 22 24 |
| **10 MHz** | 0 1 3 4 5 6 7 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 32 34 38 41 42 45 49 | 0 1 2 3 5 6 8 12 14 15 16 17 18 22 23 26 28 29 30 32 34 35 38 39 40 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 15 16 17 18 21 23 25 28 31 33 37 38 39 41 42 44 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 14 15 19 20 28 29 30 31 34 36 37 38 39 40 42 44 45 48 49 | 0 1 3 4 5 6 8 9 10 13 14 16 17 18 19 20 21 23 24 29 30 31 32 35 37 38 39 40 47 48 | 0 1 2 3 4 5 6 7 9 10 12 14 16 17 18 19 22 24 25 26 27 28 30 31 32 34 37 42 45 48 | 2 5 7 8 9 10 11 14 15 16 17 21 22 27 28 29 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 1 3 6 9 11 13 15 16 17 18 21 24 25 26 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 | 1 2 3 4 5 6 7 8 9 10 11 15 16 17 20 21 28 30 31 32 33 35 36 39 40 42 44 46 47 48 | 0 1 2 4 5 6 7 9 10 11 13 15 18 20 21 22 24 25 27 28 29 34 35 36 37 40 43 44 46 49 | 0 1 3 4 5 6 7 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 32 34 38 41 42 45 49 | 0 1 2 3 5 6 8 12 14 15 16 17 18 22 23 26 28 29 30 32 34 35 38 39 40 41 42 45 46 47 |
| **15 MHz** | 1 2 3 4 9 11 12 13 14 15 17 18 20 21 22 24 25 26 28 29 31 32 33 34 40 42 43 44 45 46 47 48 50 51 52 54 56 58 59 60 61 62 63 64 68 70 71 72 73 74 | 2 3 4 6 7 9 11 12 14 15 17 18 20 22 24 25 27 28 29 30 31 33 34 35 38 39 40 42 43 45 46 47 48 49 55 56 59 60 61 62 63 65 66 67 68 69 70 71 73 74 | 2 4 5 6 8 10 13 15 16 17 18 20 22 24 25 26 27 28 29 30 31 32 33 34 35 38 40 41 44 45 46 47 48 50 51 52 53 54 56 59 60 63 64 67 69 70 71 72 73 74 | 0 2 3 4 5 7 8 11 12 14 16 18 20 22 23 24 25 27 28 29 30 31 33 42 43 45 46 47 48 49 50 51 53 54 56 58 60 61 62 63 64 65 66 67 68 69 70 71 72 73 | 0 1 2 3 9 11 12 14 15 17 18 20 23 25 26 28 29 30 31 32 33 36 37 38 39 41 42 43 45 46 50 52 53 54 57 58 59 60 61 62 63 64 65 67 68 70 71 72 73 74 | 0 1 3 4 5 6 7 8 11 12 14 19 20 21 23 24 26 27 28 30 31 33 34 35 38 40 41 42 44 45 46 49 51 52 53 54 55 58 59 60 61 62 63 65 67 69 70 71 72 73 | 0 1 2 3 7 8 9 10 12 13 14 15 17 18 19 21 22 23 24 25 26 27 28 29 32 33 34 36 37 39 40 43 46 47 48 49 50 53 54 56 61 62 63 66 68 69 71 72 73 74 | 0 1 3 7 8 11 13 14 16 18 19 20 21 22 23 25 27 28 29 30 32 34 35 36 40 41 42 43 44 45 46 47 48 50 51 53 54 55 57 59 61 62 63 64 66 67 68 69 70 71 | 0 1 2 3 5 6 7 8 9 12 14 16 17 18 19 20 21 23 24 25 26 28 29 30 31 32 33 41 42 45 47 48 49 50 52 53 56 57 60 62 63 64 65 67 68 69 70 71 72 73 | 0 1 2 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 33 36 37 38 39 40 43 45 46 47 48 49 50 51 53 54 55 57 58 59 60 61 65 67 68 69 70 71 73 74 | 1 2 3 4 9 11 12 13 14 15 17 18 20 21 22 24 25 26 28 29 31 32 33 34 40 42 43 44 45 46 47 48 50 51 52 54 56 58 59 60 61 62 63 64 68 70 71 72 73 74 | 2 3 4 6 7 9 11 12 14 15 17 18 20 22 24 25 27 28 29 30 31 33 34 35 38 39 40 42 43 45 46 47 48 49 55 56 59 60 61 62 63 65 66 67 68 69 70 71 73 74 |
| **20 MHz** | 0 1 2 3 6 8 10 11 15 16 17 19 21 22 23 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 53 54 57 59 60 62 63 64 65 67 69 71 72 73 76 79 81 84 86 88 89 90 92 93 94 99 | 5 6 7 9 10 12 14 15 16 17 21 22 23 24 27 28 29 30 31 33 34 35 36 37 39 41 44 45 47 49 50 53 54 55 56 57 59 64 65 66 68 70 72 75 76 77 80 81 84 85 86 87 90 91 92 94 95 97 98 99 | 0 2 3 4 5 6 7 11 12 14 15 17 19 21 22 24 26 32 36 37 40 42 43 44 47 48 49 50 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 79 81 82 83 84 85 86 87 89 91 94 95 96 97 98 99 | 1 2 5 6 8 9 11 12 13 15 21 22 25 26 27 28 29 30 31 32 34 35 38 39 40 41 43 44 45 46 53 57 58 59 61 62 63 64 65 66 68 69 71 72 73 75 77 78 80 82 83 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 13 14 16 22 25 26 27 28 29 31 32 33 34 36 37 38 39 43 44 45 46 48 49 52 53 55 59 61 62 63 64 70 71 72 73 74 75 77 78 80 81 82 84 86 89 90 91 93 97 98 99 | 0 1 3 4 5 7 8 10 11 15 18 19 20 21 26 27 29 30 31 33 35 37 38 39 40 41 43 44 45 46 47 48 49 50 52 53 55 56 58 60 62 64 65 66 67 69 70 71 72 73 74 81 83 84 86 92 93 94 96 98 | 2 3 4 5 7 9 11 13 15 16 17 21 23 24 25 27 28 29 31 33 35 36 40 42 43 44 45 46 48 49 51 52 53 54 55 56 57 59 61 63 64 65 68 71 76 77 78 81 82 83 84 85 86 87 90 91 93 94 98 99 | 0 3 4 6 7 8 10 11 13 16 18 21 22 23 25 26 28 29 32 35 36 37 38 43 44 46 47 48 49 53 54 57 58 59 60 61 64 66 67 68 69 70 72 76 77 78 80 81 82 83 84 86 87 88 89 91 92 94 95 96 | 0 1 4 6 7 8 9 10 11 13 14 15 16 20 21 22 23 25 26 28 29 30 31 32 33 34 36 39 41 42 44 45 54 56 57 58 60 61 63 66 67 68 72 75 76 77 79 81 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 5 6 7 9 10 13 17 19 20 21 22 23 24 25 26 27 28 30 32 33 34 35 36 39 41 47 48 49 50 51 53 54 55 57 58 59 60 61 64 65 67 68 75 76 77 79 80 81 83 84 86 87 89 90 91 93 95 99 | 0 1 2 3 6 8 10 11 15 16 17 19 21 22 23 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 53 54 57 59 60 62 63 64 65 67 69 71 72 73 76 79 81 84 86 88 89 90 92 93 94 99 | 5 6 7 9 10 12 14 15 16 17 21 22 23 24 27 28 29 30 31 33 34 35 36 37 39 41 44 45 47 49 50 53 54 55 56 57 59 64 65 66 68 70 72 75 76 77 80 81 84 85 86 87 90 91 92 94 95 97 98 99 |

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|  | Subframe 4 | | | | | | Subframe 5 | | | | | |
| Subslot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 |
| **5 MHz** | 0 1 2 4 6 7 12 13 14 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 17 18 21 22 23 24 | 1 3 4 5 7 9 10 11 12 13 14 15 21 22 24 | 0 1 2 3 4 7 8 10 13 14 18 19 20 21 24 | 1 4 8 9 10 11 12 13 15 16 18 20 22 23 24 | 1 2 3 4 5 6 9 10 11 12 13 16 17 21 23 | 0 1 3 4 6 7 8 16 17 18 19 20 21 23 24 | 0 1 2 3 4 5 6 9 10 12 13 17 18 20 24 | 0 1 2 3 7 8 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 11 12 13 15 17 18 20 21 22 24 | 0 1 2 4 6 7 12 13 14 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 17 18 21 22 23 24 |
| **10 MHz** | 0 3 6 7 8 9 10 12 13 15 16 17 18 21 23 25 28 31 33 37 38 39 41 42 44 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 14 15 19 20 28 29 30 31 34 36 37 38 39 40 42 44 45 48 49 | 0 1 3 4 5 6 8 9 10 13 14 16 17 18 19 20 21 23 24 29 30 31 32 35 37 38 39 40 47 48 | 0 1 2 3 4 5 6 7 9 10 12 14 16 17 18 19 22 24 25 26 27 28 30 31 32 34 37 42 45 48 | 2 5 7 8 9 10 11 14 15 16 17 21 22 27 28 29 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 1 3 6 9 11 13 15 16 17 18 21 24 25 26 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 | 1 2 3 4 5 6 7 8 9 10 11 15 16 17 20 21 28 30 31 32 33 35 36 39 40 42 44 46 47 48 | 0 1 2 4 5 6 7 9 10 11 13 15 18 20 21 22 24 25 27 28 29 34 35 36 37 40 43 44 46 49 | 0 1 3 4 5 6 7 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 32 34 38 41 42 45 49 | 0 1 2 3 5 6 8 12 14 15 16 17 18 22 23 26 28 29 30 32 34 35 38 39 40 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 15 16 17 18 21 23 25 28 31 33 37 38 39 41 42 44 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 14 15 19 20 28 29 30 31 34 36 37 38 39 40 42 44 45 48 49 |
| **15 MHz** | 2 4 5 6 8 10 13 15 16 17 18 20 22 24 25 26 27 28 29 30 31 32 33 34 35 38 40 41 44 45 46 47 48 50 51 52 53 54 56 59 60 63 64 67 69 70 71 72 73 74 | 0 2 3 4 5 7 8 11 12 14 16 18 20 22 23 24 25 27 28 29 30 31 33 42 43 45 46 47 48 49 50 51 53 54 56 58 60 61 62 63 64 65 66 67 68 69 70 71 72 73 | 0 1 2 3 9 11 12 14 15 17 18 20 23 25 26 28 29 30 31 32 33 36 37 38 39 41 42 43 45 46 50 52 53 54 57 58 59 60 61 62 63 64 65 67 68 70 71 72 73 74 | 0 1 3 4 5 6 7 8 11 12 14 19 20 21 23 24 26 27 28 30 31 33 34 35 38 40 41 42 44 45 46 49 51 52 53 54 55 58 59 60 61 62 63 65 67 69 70 71 72 73 | 0 1 2 3 7 8 9 10 12 13 14 15 17 18 19 21 22 23 24 25 26 27 28 29 32 33 34 36 37 39 40 43 46 47 48 49 50 53 54 56 61 62 63 66 68 69 71 72 73 74 | 0 1 3 7 8 11 13 14 16 18 19 20 21 22 23 25 27 28 29 30 32 34 35 36 40 41 42 43 44 45 46 47 48 50 51 53 54 55 57 59 61 62 63 64 66 67 68 69 70 71 | 0 1 2 3 5 6 7 8 9 12 14 16 17 18 19 20 21 23 24 25 26 28 29 30 31 32 33 41 42 45 47 48 49 50 52 53 56 57 60 62 63 64 65 67 68 69 70 71 72 73 | 0 1 2 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 33 36 37 38 39 40 43 45 46 47 48 49 50 51 53 54 55 57 58 59 60 61 65 67 68 69 70 71 73 74 | 1 2 3 4 9 11 12 13 14 15 17 18 20 21 22 24 25 26 28 29 31 32 33 34 40 42 43 44 45 46 47 48 50 51 52 54 56 58 59 60 61 62 63 64 68 70 71 72 73 74 | 2 3 4 6 7 9 11 12 14 15 17 18 20 22 24 25 27 28 29 30 31 33 34 35 38 39 40 42 43 45 46 47 48 49 55 56 59 60 61 62 63 65 66 67 68 69 70 71 73 74 | 2 4 5 6 8 10 13 15 16 17 18 20 22 24 25 26 27 28 29 30 31 32 33 34 35 38 40 41 44 45 46 47 48 50 51 52 53 54 56 59 60 63 64 67 69 70 71 72 73 74 | 0 2 3 4 5 7 8 11 12 14 16 18 20 22 23 24 25 27 28 29 30 31 33 42 43 45 46 47 48 49 50 51 53 54 56 58 60 61 62 63 64 65 66 67 68 69 70 71 72 73 |
| **20 MHz** | 0 2 3 4 5 6 7 11 12 14 15 17 19 21 22 24 26 32 36 37 40 42 43 44 47 48 49 50 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 79 81 82 83 84 85 86 87 89 91 94 95 96 97 98 99 | 1 2 5 6 8 9 11 12 13 15 21 22 25 26 27 28 29 30 31 32 34 35 38 39 40 41 43 44 45 46 53 57 58 59 61 62 63 64 65 66 68 69 71 72 73 75 77 78 80 82 83 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 13 14 16 22 25 26 27 28 29 31 32 33 34 36 37 38 39 43 44 45 46 48 49 52 53 55 59 61 62 63 64 70 71 72 73 74 75 77 78 80 81 82 84 86 89 90 91 93 97 98 99 | 0 1 3 4 5 7 8 10 11 15 18 19 20 21 26 27 29 30 31 33 35 37 38 39 40 41 43 44 45 46 47 48 49 50 52 53 55 56 58 60 62 64 65 66 67 69 70 71 72 73 74 81 83 84 86 92 93 94 96 98 | 2 3 4 5 7 9 11 13 15 16 17 21 23 24 25 27 28 29 31 33 35 36 40 42 43 44 45 46 48 49 51 52 53 54 55 56 57 59 61 63 64 65 68 71 76 77 78 81 82 83 84 85 86 87 90 91 93 94 98 99 | 0 3 4 6 7 8 10 11 13 16 18 21 22 23 25 26 28 29 32 35 36 37 38 43 44 46 47 48 49 53 54 57 58 59 60 61 64 66 67 68 69 70 72 76 77 78 80 81 82 83 84 86 87 88 89 91 92 94 95 96 | 0 1 4 6 7 8 9 10 11 13 14 15 16 20 21 22 23 25 26 28 29 30 31 32 33 34 36 39 41 42 44 45 54 56 57 58 60 61 63 66 67 68 72 75 76 77 79 81 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 5 6 7 9 10 13 17 19 20 21 22 23 24 25 26 27 28 30 32 33 34 35 36 39 41 47 48 49 50 51 53 54 55 57 58 59 60 61 64 65 67 68 75 76 77 79 80 81 83 84 86 87 89 90 91 93 95 99 | 0 1 2 3 6 8 10 11 15 16 17 19 21 22 23 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 53 54 57 59 60 62 63 64 65 67 69 71 72 73 76 79 81 84 86 88 89 90 92 93 94 99 | 5 6 7 9 10 12 14 15 16 17 21 22 23 24 27 28 29 30 31 33 34 35 36 37 39 41 44 45 47 49 50 53 54 55 56 57 59 64 65 66 68 70 72 75 76 77 80 81 84 85 86 87 90 91 92 94 95 97 98 99 | 0 2 3 4 5 6 7 11 12 14 15 17 19 21 22 24 26 32 36 37 40 42 43 44 47 48 49 50 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 79 81 82 83 84 85 86 87 89 91 94 95 96 97 98 99 | 1 2 5 6 8 9 11 12 13 15 21 22 25 26 27 28 29 30 31 32 34 35 38 39 40 41 43 44 45 46 53 57 58 59 61 62 63 64 65 66 68 69 71 72 73 75 77 78 80 82 83 84 85 86 93 94 95 96 97 99 |

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|  | Subframe 6 | | | | | | Subframe 7 | | | | | |
| Subslot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 |
| **5 MHz** | 1 3 4 5 7 9 10 11 12 13 14 15 21 22 24 | 0 1 2 3 4 7 8 10 13 14 18 19 20 21 24 | 1 4 8 9 10 11 12 13 15 16 18 20 22 23 24 | 1 2 3 4 5 6 9 10 11 12 13 16 17 21 23 | 0 1 3 4 6 7 8 16 17 18 19 20 21 23 24 | 0 1 2 3 4 5 6 9 10 12 13 17 18 20 24 | 0 1 2 3 7 8 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 11 12 13 15 17 18 20 21 22 24 | 0 1 2 4 6 7 12 13 14 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 17 18 21 22 23 24 | 1 3 4 5 7 9 10 11 12 13 14 15 21 22 24 | 0 1 2 3 4 7 8 10 13 14 18 19 20 21 24 |
| **10 MHz** | 0 1 3 4 5 6 8 9 10 13 14 16 17 18 19 20 21 23 24 29 30 31 32 35 37 38 39 40 47 48 | 0 1 2 3 4 5 6 7 9 10 12 14 16 17 18 19 22 24 25 26 27 28 30 31 32 34 37 42 45 48 | 2 5 7 8 9 10 11 14 15 16 17 21 22 27 28 29 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 1 3 6 9 11 13 15 16 17 18 21 24 25 26 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 | 1 2 3 4 5 6 7 8 9 10 11 15 16 17 20 21 28 30 31 32 33 35 36 39 40 42 44 46 47 48 | 0 1 2 4 5 6 7 9 10 11 13 15 18 20 21 22 24 25 27 28 29 34 35 36 37 40 43 44 46 49 | 0 1 3 4 5 6 7 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 32 34 38 41 42 45 49 | 0 1 2 3 5 6 8 12 14 15 16 17 18 22 23 26 28 29 30 32 34 35 38 39 40 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 15 16 17 18 21 23 25 28 31 33 37 38 39 41 42 44 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 14 15 19 20 28 29 30 31 34 36 37 38 39 40 42 44 45 48 49 | 0 1 3 4 5 6 8 9 10 13 14 16 17 18 19 20 21 23 24 29 30 31 32 35 37 38 39 40 47 48 | 0 1 2 3 4 5 6 7 9 10 12 14 16 17 18 19 22 24 25 26 27 28 30 31 32 34 37 42 45 48 |
| **15 MHz** | 0 1 2 3 9 11 12 14 15 17 18 20 23 25 26 28 29 30 31 32 33 36 37 38 39 41 42 43 45 46 50 52 53 54 57 58 59 60 61 62 63 64 65 67 68 70 71 72 73 74 | 0 1 3 4 5 6 7 8 11 12 14 19 20 21 23 24 26 27 28 30 31 33 34 35 38 40 41 42 44 45 46 49 51 52 53 54 55 58 59 60 61 62 63 65 67 69 70 71 72 73 | 0 1 2 3 7 8 9 10 12 13 14 15 17 18 19 21 22 23 24 25 26 27 28 29 32 33 34 36 37 39 40 43 46 47 48 49 50 53 54 56 61 62 63 66 68 69 71 72 73 74 | 0 1 3 7 8 11 13 14 16 18 19 20 21 22 23 25 27 28 29 30 32 34 35 36 40 41 42 43 44 45 46 47 48 50 51 53 54 55 57 59 61 62 63 64 66 67 68 69 70 71 | 0 1 2 3 5 6 7 8 9 12 14 16 17 18 19 20 21 23 24 25 26 28 29 30 31 32 33 41 42 45 47 48 49 50 52 53 56 57 60 62 63 64 65 67 68 69 70 71 72 73 | 0 1 2 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 33 36 37 38 39 40 43 45 46 47 48 49 50 51 53 54 55 57 58 59 60 61 65 67 68 69 70 71 73 74 | 1 2 3 4 9 11 12 13 14 15 17 18 20 21 22 24 25 26 28 29 31 32 33 34 40 42 43 44 45 46 47 48 50 51 52 54 56 58 59 60 61 62 63 64 68 70 71 72 73 74 | 2 3 4 6 7 9 11 12 14 15 17 18 20 22 24 25 27 28 29 30 31 33 34 35 38 39 40 42 43 45 46 47 48 49 55 56 59 60 61 62 63 65 66 67 68 69 70 71 73 74 | 2 4 5 6 8 10 13 15 16 17 18 20 22 24 25 26 27 28 29 30 31 32 33 34 35 38 40 41 44 45 46 47 48 50 51 52 53 54 56 59 60 63 64 67 69 70 71 72 73 74 | 0 2 3 4 5 7 8 11 12 14 16 18 20 22 23 24 25 27 28 29 30 31 33 42 43 45 46 47 48 49 50 51 53 54 56 58 60 61 62 63 64 65 66 67 68 69 70 71 72 73 | 0 1 2 3 9 11 12 14 15 17 18 20 23 25 26 28 29 30 31 32 33 36 37 38 39 41 42 43 45 46 50 52 53 54 57 58 59 60 61 62 63 64 65 67 68 70 71 72 73 74 | 0 1 3 4 5 6 7 8 11 12 14 19 20 21 23 24 26 27 28 30 31 33 34 35 38 40 41 42 44 45 46 49 51 52 53 54 55 58 59 60 61 62 63 65 67 69 70 71 72 73 |
| **20 MHz** | 0 1 2 3 5 8 9 10 12 13 14 16 22 25 26 27 28 29 31 32 33 34 36 37 38 39 43 44 45 46 48 49 52 53 55 59 61 62 63 64 70 71 72 73 74 75 77 78 80 81 82 84 86 89 90 91 93 97 98 99 | 0 1 3 4 5 7 8 10 11 15 18 19 20 21 26 27 29 30 31 33 35 37 38 39 40 41 43 44 45 46 47 48 49 50 52 53 55 56 58 60 62 64 65 66 67 69 70 71 72 73 74 81 83 84 86 92 93 94 96 98 | 2 3 4 5 7 9 11 13 15 16 17 21 23 24 25 27 28 29 31 33 35 36 40 42 43 44 45 46 48 49 51 52 53 54 55 56 57 59 61 63 64 65 68 71 76 77 78 81 82 83 84 85 86 87 90 91 93 94 98 99 | 0 3 4 6 7 8 10 11 13 16 18 21 22 23 25 26 28 29 32 35 36 37 38 43 44 46 47 48 49 53 54 57 58 59 60 61 64 66 67 68 69 70 72 76 77 78 80 81 82 83 84 86 87 88 89 91 92 94 95 96 | 0 1 4 6 7 8 9 10 11 13 14 15 16 20 21 22 23 25 26 28 29 30 31 32 33 34 36 39 41 42 44 45 54 56 57 58 60 61 63 66 67 68 72 75 76 77 79 81 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 5 6 7 9 10 13 17 19 20 21 22 23 24 25 26 27 28 30 32 33 34 35 36 39 41 47 48 49 50 51 53 54 55 57 58 59 60 61 64 65 67 68 75 76 77 79 80 81 83 84 86 87 89 90 91 93 95 99 | 0 1 2 3 6 8 10 11 15 16 17 19 21 22 23 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 53 54 57 59 60 62 63 64 65 67 69 71 72 73 76 79 81 84 86 88 89 90 92 93 94 99 | 5 6 7 9 10 12 14 15 16 17 21 22 23 24 27 28 29 30 31 33 34 35 36 37 39 41 44 45 47 49 50 53 54 55 56 57 59 64 65 66 68 70 72 75 76 77 80 81 84 85 86 87 90 91 92 94 95 97 98 99 | 0 2 3 4 5 6 7 11 12 14 15 17 19 21 22 24 26 32 36 37 40 42 43 44 47 48 49 50 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 79 81 82 83 84 85 86 87 89 91 94 95 96 97 98 99 | 1 2 5 6 8 9 11 12 13 15 21 22 25 26 27 28 29 30 31 32 34 35 38 39 40 41 43 44 45 46 53 57 58 59 61 62 63 64 65 66 68 69 71 72 73 75 77 78 80 82 83 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 13 14 16 22 25 26 27 28 29 31 32 33 34 36 37 38 39 43 44 45 46 48 49 52 53 55 59 61 62 63 64 70 71 72 73 74 75 77 78 80 81 82 84 86 89 90 91 93 97 98 99 | 0 1 3 4 5 7 8 10 11 15 18 19 20 21 26 27 29 30 31 33 35 37 38 39 40 41 43 44 45 46 47 48 49 50 52 53 55 56 58 60 62 64 65 66 67 69 70 71 72 73 74 81 83 84 86 92 93 94 96 98 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 8 | | | | | | Subframe 9 | | | | | |
| Subslot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 |
| **5 MHz** | 1 4 8 9 10 11 12 13 15 16 18 20 22 23 24 | 1 2 3 4 5 6 9 10 11 12 13 16 17 21 23 | 0 1 3 4 6 7 8 16 17 18 19 20 21 23 24 | 0 1 2 3 4 5 6 9 10 12 13 17 18 20 24 | 0 1 2 3 7 8 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 11 12 13 15 17 18 20 21 22 24 | 0 1 2 4 6 7 12 13 14 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 17 18 21 22 23 24 | 1 3 4 5 7 9 10 11 12 13 14 15 21 22 24 | 0 1 2 3 4 7 8 10 13 14 18 19 20 21 24 | 1 4 8 9 10 11 12 13 15 16 18 20 22 23 24 | 1 2 3 4 5 6 9 10 11 12 13 16 17 21 23 |
| **10 MHz** | 2 5 7 8 9 10 11 14 15 16 17 21 22 27 28 29 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 1 3 6 9 11 13 15 16 17 18 21 24 25 26 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 | 1 2 3 4 5 6 7 8 9 10 11 15 16 17 20 21 28 30 31 32 33 35 36 39 40 42 44 46 47 48 | 0 1 2 4 5 6 7 9 10 11 13 15 18 20 21 22 24 25 27 28 29 34 35 36 37 40 43 44 46 49 | 0 1 3 4 5 6 7 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 32 34 38 41 42 45 49 | 0 1 2 3 5 6 8 12 14 15 16 17 18 22 23 26 28 29 30 32 34 35 38 39 40 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 15 16 17 18 21 23 25 28 31 33 37 38 39 41 42 44 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 14 15 19 20 28 29 30 31 34 36 37 38 39 40 42 44 45 48 49 | 0 1 3 4 5 6 8 9 10 13 14 16 17 18 19 20 21 23 24 29 30 31 32 35 37 38 39 40 47 48 | 0 1 2 3 4 5 6 7 9 10 12 14 16 17 18 19 22 24 25 26 27 28 30 31 32 34 37 42 45 48 | 2 5 7 8 9 10 11 14 15 16 17 21 22 27 28 29 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 1 3 6 9 11 13 15 16 17 18 21 24 25 26 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 |
| **15 MHz** | 0 1 2 3 7 8 9 10 12 13 14 15 17 18 19 21 22 23 24 25 26 27 28 29 32 33 34 36 37 39 40 43 46 47 48 49 50 53 54 56 61 62 63 66 68 69 71 72 73 74 | 0 1 3 7 8 11 13 14 16 18 19 20 21 22 23 25 27 28 29 30 32 34 35 36 40 41 42 43 44 45 46 47 48 50 51 53 54 55 57 59 61 62 63 64 66 67 68 69 70 71 | 0 1 2 3 5 6 7 8 9 12 14 16 17 18 19 20 21 23 24 25 26 28 29 30 31 32 33 41 42 45 47 48 49 50 52 53 56 57 60 62 63 64 65 67 68 69 70 71 72 73 | 0 1 2 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 33 36 37 38 39 40 43 45 46 47 48 49 50 51 53 54 55 57 58 59 60 61 65 67 68 69 70 71 73 74 | 1 2 3 4 9 11 12 13 14 15 17 18 20 21 22 24 25 26 28 29 31 32 33 34 40 42 43 44 45 46 47 48 50 51 52 54 56 58 59 60 61 62 63 64 68 70 71 72 73 74 | 2 3 4 6 7 9 11 12 14 15 17 18 20 22 24 25 27 28 29 30 31 33 34 35 38 39 40 42 43 45 46 47 48 49 55 56 59 60 61 62 63 65 66 67 68 69 70 71 73 74 | 2 4 5 6 8 10 13 15 16 17 18 20 22 24 25 26 27 28 29 30 31 32 33 34 35 38 40 41 44 45 46 47 48 50 51 52 53 54 56 59 60 63 64 67 69 70 71 72 73 74 | 0 2 3 4 5 7 8 11 12 14 16 18 20 22 23 24 25 27 28 29 30 31 33 42 43 45 46 47 48 49 50 51 53 54 56 58 60 61 62 63 64 65 66 67 68 69 70 71 72 73 | 0 1 2 3 9 11 12 14 15 17 18 20 23 25 26 28 29 30 31 32 33 36 37 38 39 41 42 43 45 46 50 52 53 54 57 58 59 60 61 62 63 64 65 67 68 70 71 72 73 74 | 0 1 3 4 5 6 7 8 11 12 14 19 20 21 23 24 26 27 28 30 31 33 34 35 38 40 41 42 44 45 46 49 51 52 53 54 55 58 59 60 61 62 63 65 67 69 70 71 72 73 | 0 1 2 3 7 8 9 10 12 13 14 15 17 18 19 21 22 23 24 25 26 27 28 29 32 33 34 36 37 39 40 43 46 47 48 49 50 53 54 56 61 62 63 66 68 69 71 72 73 74 | 0 1 3 7 8 11 13 14 16 18 19 20 21 22 23 25 27 28 29 30 32 34 35 36 40 41 42 43 44 45 46 47 48 50 51 53 54 55 57 59 61 62 63 64 66 67 68 69 70 71 |
| **20 MHz** | 2 3 4 5 7 9 11 13 15 16 17 21 23 24 25 27 28 29 31 33 35 36 40 42 43 44 45 46 48 49 51 52 53 54 55 56 57 59 61 63 64 65 68 71 76 77 78 81 82 83 84 85 86 87 90 91 93 94 98 99 | 0 3 4 6 7 8 10 11 13 16 18 21 22 23 25 26 28 29 32 35 36 37 38 43 44 46 47 48 49 53 54 57 58 59 60 61 64 66 67 68 69 70 72 76 77 78 80 81 82 83 84 86 87 88 89 91 92 94 95 96 | 0 1 4 6 7 8 9 10 11 13 14 15 16 20 21 22 23 25 26 28 29 30 31 32 33 34 36 39 41 42 44 45 54 56 57 58 60 61 63 66 67 68 72 75 76 77 79 81 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 5 6 7 9 10 13 17 19 20 21 22 23 24 25 26 27 28 30 32 33 34 35 36 39 41 47 48 49 50 51 53 54 55 57 58 59 60 61 64 65 67 68 75 76 77 79 80 81 83 84 86 87 89 90 91 93 95 99 | 0 1 2 3 6 8 10 11 15 16 17 19 21 22 23 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 53 54 57 59 60 62 63 64 65 67 69 71 72 73 76 79 81 84 86 88 89 90 92 93 94 99 | 5 6 7 9 10 12 14 15 16 17 21 22 23 24 27 28 29 30 31 33 34 35 36 37 39 41 44 45 47 49 50 53 54 55 56 57 59 64 65 66 68 70 72 75 76 77 80 81 84 85 86 87 90 91 92 94 95 97 98 99 | 0 2 3 4 5 6 7 11 12 14 15 17 19 21 22 24 26 32 36 37 40 42 43 44 47 48 49 50 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 79 81 82 83 84 85 86 87 89 91 94 95 96 97 98 99 | 1 2 5 6 8 9 11 12 13 15 21 22 25 26 27 28 29 30 31 32 34 35 38 39 40 41 43 44 45 46 53 57 58 59 61 62 63 64 65 66 68 69 71 72 73 75 77 78 80 82 83 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 13 14 16 22 25 26 27 28 29 31 32 33 34 36 37 38 39 43 44 45 46 48 49 52 53 55 59 61 62 63 64 70 71 72 73 74 75 77 78 80 81 82 84 86 89 90 91 93 97 98 99 | 0 1 3 4 5 7 8 10 11 15 18 19 20 21 26 27 29 30 31 33 35 37 38 39 40 41 43 44 45 46 47 48 49 50 52 53 55 56 58 60 62 64 65 66 67 69 70 71 72 73 74 81 83 84 86 92 93 94 96 98 | 2 3 4 5 7 9 11 13 15 16 17 21 23 24 25 27 28 29 31 33 35 36 40 42 43 44 45 46 48 49 51 52 53 54 55 56 57 59 61 63 64 65 68 71 76 77 78 81 82 83 84 85 86 87 90 91 93 94 98 99 | 0 3 4 6 7 8 10 11 13 16 18 21 22 23 25 26 28 29 32 35 36 37 38 43 44 46 47 48 49 53 54 57 58 59 60 61 64 66 67 68 69 70 72 76 77 78 80 81 82 83 84 86 87 88 89 91 92 94 95 96 |

#### 6.1.1.5b E-UTRA slot TTI Test Model 3.2 (sE-TM3.2-2)

This model shall be used for slot TTI tests on:

- Transmitted signal quality

- Frequency error

- EVM for 16QAM modulation

Table 6.1.1.5b-1: Physical channel parameters of sE-TM3.2-2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **3 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** | |
| **Reference, Synchronisation Signals** |  |  |  |  |  | |
| RS boosting, PB = EB/EA | 1 | 1 | 1 | 1 | 1 | |
| Synchronisation signal EPRE / ERS [dB] | 1.573 | 2.426 | 2.426 | 3.005 | 2.426 | |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | |
| **PBCH** |  |  |  |  |  | |
| PBCH EPRE / ERS [dB] | 1.573 | 2.426 | 2.426 | 3.005 | 2.426 | |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | |
| **PCFICH** |  |  |  |  |  | |
| # of symbols used for control channels | 1 | 1 | 1 | 1 | 1 | |
| PCFICH EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 | |
| PHICH |  |  |  |  |  | |
| # of PHICH groups | 1 | 1 | 2 | 2 | 3 | |
| # of PHICH per group | 2 | 2 | 2 | 2 | 2 | |
| PHICH BPSK symbol power / ERS [dB] | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 | |
| PHICH group EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 | |
| **sPDCCH** |  |  |  |  |  | |
| # of available sREGs | 105 | 155 | 350 | 525 | 700 | |
| # of sPDCCH | 2 | 2 | 5 | 7 | 10 | |
| # of sCCEs per sPDCCH | 1 | 2 | 2 | 2 | 2 | |
| # of sREGs per sCCE | 4 | 4 | 4 | 4 | 4 | |
| # of sREGs allocated to sPDCCH | 8 | 16 | 40 | 56 | 80 | |
| # of <NIL> sREGs added for padding | 97 | 139 | 310 | 469 | 620 | |
| sPDCCH sREG EPRE / ERS [dB] | 2.290 | 1.880 | 1.065 | 1.488 | 1.195 | |
| <NIL> sREG EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | |
| **sPDSCH** |  |  |  |  |  | |
| # of 16QAM sPDSCH PRBs within a slot for which EVM is measured | 7 | 15 | 30 | 50 | 60 | |
| PRB PA = EA/ERS [dB] | -3 | -3 | -3 | -3 | -3 | |
| # of QPSK sPDSCH PRBs within a slot for which EVM is not measured (used for power balancing only) | 8 | 10 | 20 | 25 | 40 | |
| PRB PA = EA/ERS [dB] | 1.573 | 2.426 | 2.426 | 3.005 | 2.426 | |
| NOTE 1: In subframes containing PBCH or synchronisation signal REs, no PRB boosting/deboosting shall be applied, i.e. PRB PA = EA/ERS = 0 [dB]. | | | | | |

Table 6.1.1.5b-2: Numbers () of the 16QAM PRBs (FDD)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 0 | | Subframe 1 | | Subframe 2 | | Subframe 3 | | Subframe 4 | | Subframe 5 | |
| Slot | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| **3 MHz** | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 |
| **5 MHz** | 0 1 3 4 6 7 8 16 17 18 19 20 21 23 24 | 0 1 2 3 4 5 6 9 10 12 13 17 18 20 24 | 0 1 2 3 7 8 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 11 12 13 15 17 18 20 21 22 24 | 0 1 2 4 6 7 12 13 14 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 17 18 21 22 23 24 | 1 3 4 5 7 9 10 11 12 13 14 15 21 22 24 | 0 1 2 3 4 7 8 10 13 14 18 19 20 21 24 | 1 4 8 9 10 11 12 13 15 16 18 20 22 23 24 | 1 2 3 4 5 6 9 10 11 12 13 16 17 21 23 | 0 1 3 4 6 7 8 16 17 18 19 20 21 23 24 | 0 1 2 3 4 5 6 9 10 12 13 17 18 20 24 |
| **10 MHz** | 1 2 3 4 5 6 7 8 9 10 11 15 16 17 20 21 28 30 31 32 33 35 36 39 40 42 44 46 47 48 | 0 1 2 4 5 6 7 9 10 11 13 15 18 20 21 22 24 25 27 28 29 34 35 36 37 40 43 44 46 49 | 0 1 3 4 5 6 7 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 32 34 38 41 42 45 49 | 0 1 2 3 5 6 8 12 14 15 16 17 18 22 23 26 28 29 30 32 34 35 38 39 40 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 15 16 17 18 21 23 25 28 31 33 37 38 39 41 42 44 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 14 15 19 20 28 29 30 31 34 36 37 38 39 40 42 44 45 48 49 | 0 1 3 4 5 6 8 9 10 13 14 16 17 18 19 20 21 23 24 29 30 31 32 35 37 38 39 40 47 48 | 0 1 2 3 4 5 6 7 9 10 12 14 16 17 18 19 22 24 25 26 27 28 30 31 32 34 37 42 45 48 | 2 5 7 8 9 10 11 14 15 16 17 21 22 27 28 29 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 1 3 6 9 11 13 15 16 17 18 21 24 25 26 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 | 1 2 3 4 5 6 7 8 9 10 11 15 16 17 20 21 28 30 31 32 33 35 36 39 40 42 44 46 47 48 | 0 1 2 4 5 6 7 9 10 11 13 15 18 20 21 22 24 25 27 28 29 34 35 36 37 40 43 44 46 49 |
| **15 MHz** | 0 1 2 3 5 6 7 8 9 12 14 16 17 18 19 20 21 23 24 25 26 28 29 30 31 32 33 41 42 45 47 48 49 50 52 53 56 57 60 62 63 64 65 67 68 69 70 71 72 73 | 0 1 2 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 33 36 37 38 39 40 43 45 46 47 48 49 50 51 53 54 55 57 58 59 60 61 65 67 68 69 70 71 73 74 | 1 2 3 4 9 11 12 13 14 15 17 18 20 21 22 24 25 26 28 29 31 32 33 34 40 42 43 44 45 46 47 48 50 51 52 54 56 58 59 60 61 62 63 64 68 70 71 72 73 74 | 2 3 4 6 7 9 11 12 14 15 17 18 20 22 24 25 27 28 29 30 31 33 34 35 38 39 40 42 43 45 46 47 48 49 55 56 59 60 61 62 63 65 66 67 68 69 70 71 73 74 | 2 4 5 6 8 10 13 15 16 17 18 20 22 24 25 26 27 28 29 30 31 32 33 34 35 38 40 41 44 45 46 47 48 50 51 52 53 54 56 59 60 63 64 67 69 70 71 72 73 74 | 0 2 3 4 5 7 8 11 12 14 16 18 20 22 23 24 25 27 28 29 30 31 33 42 43 45 46 47 48 49 50 51 53 54 56 58 60 61 62 63 64 65 66 67 68 69 70 71 72 73 | 0 1 2 3 9 11 12 14 15 17 18 20 23 25 26 28 29 30 31 32 33 36 37 38 39 41 42 43 45 46 50 52 53 54 57 58 59 60 61 62 63 64 65 67 68 70 71 72 73 74 | 0 1 3 4 5 6 7 8 11 12 14 19 20 21 23 24 26 27 28 30 31 33 34 35 38 40 41 42 44 45 46 49 51 52 53 54 55 58 59 60 61 62 63 65 67 69 70 71 72 73 | 0 1 2 3 7 8 9 10 12 13 14 15 17 18 19 21 22 23 24 25 26 27 28 29 32 33 34 36 37 39 40 43 46 47 48 49 50 53 54 56 61 62 63 66 68 69 71 72 73 74 | 0 1 3 7 8 11 13 14 16 18 19 20 21 22 23 25 27 28 29 30 32 34 35 36 40 41 42 43 44 45 46 47 48 50 51 53 54 55 57 59 61 62 63 64 66 67 68 69 70 71 | 0 1 2 3 5 6 7 8 9 12 14 16 17 18 19 20 21 23 24 25 26 28 29 30 31 32 33 41 42 45 47 48 49 50 52 53 56 57 60 62 63 64 65 67 68 69 70 71 72 73 | 0 1 2 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 33 36 37 38 39 40 43 45 46 47 48 49 50 51 53 54 55 57 58 59 60 61 65 67 68 69 70 71 73 74 |
| **20 MHz** | 0 1 4 6 7 8 9 10 11 13 14 15 16 20 21 22 23 25 26 28 29 30 31 32 33 34 36 39 41 42 44 45 54 56 57 58 60 61 63 66 67 68 72 75 76 77 79 81 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 5 6 7 9 10 13 17 19 20 21 22 23 24 25 26 27 28 30 32 33 34 35 36 39 41 47 48 49 50 51 53 54 55 57 58 59 60 61 64 65 67 68 75 76 77 79 80 81 83 84 86 87 89 90 91 93 95 99 | 0 1 2 3 6 8 10 11 15 16 17 19 21 22 23 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 53 54 57 59 60 62 63 64 65 67 69 71 72 73 76 79 81 84 86 88 89 90 92 93 94 99 | 5 6 7 9 10 12 14 15 16 17 21 22 23 24 27 28 29 30 31 33 34 35 36 37 39 41 44 45 47 49 50 53 54 55 56 57 59 64 65 66 68 70 72 75 76 77 80 81 84 85 86 87 90 91 92 94 95 97 98 99 | 0 2 3 4 5 6 7 11 12 14 15 17 19 21 22 24 26 32 36 37 40 42 43 44 47 48 49 50 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 79 81 82 83 84 85 86 87 89 91 94 95 96 97 98 99 | 1 2 5 6 8 9 11 12 13 15 21 22 25 26 27 28 29 30 31 32 34 35 38 39 40 41 43 44 45 46 53 57 58 59 61 62 63 64 65 66 68 69 71 72 73 75 77 78 80 82 83 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 13 14 16 22 25 26 27 28 29 31 32 33 34 36 37 38 39 43 44 45 46 48 49 52 53 55 59 61 62 63 64 70 71 72 73 74 75 77 78 80 81 82 84 86 89 90 91 93 97 98 99 | 0 1 3 4 5 7 8 10 11 15 18 19 20 21 26 27 29 30 31 33 35 37 38 39 40 41 43 44 45 46 47 48 49 50 52 53 55 56 58 60 62 64 65 66 67 69 70 71 72 73 74 81 83 84 86 92 93 94 96 98 | 2 3 4 5 7 9 11 13 15 16 17 21 23 24 25 27 28 29 31 33 35 36 40 42 43 44 45 46 48 49 51 52 53 54 55 56 57 59 61 63 64 65 68 71 76 77 78 81 82 83 84 85 86 87 90 91 93 94 98 99 | 0 3 4 6 7 8 10 11 13 16 18 21 22 23 25 26 28 29 32 35 36 37 38 43 44 46 47 48 49 53 54 57 58 59 60 61 64 66 67 68 69 70 72 76 77 78 80 81 82 83 84 86 87 88 89 91 92 94 95 96 | 0 1 4 6 7 8 9 10 11 13 14 15 16 20 21 22 23 25 26 28 29 30 31 32 33 34 36 39 41 42 44 45 54 56 57 58 60 61 63 66 67 68 72 75 76 77 79 81 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 5 6 7 9 10 13 17 19 20 21 22 23 24 25 26 27 28 30 32 33 34 35 36 39 41 47 48 49 50 51 53 54 55 57 58 59 60 61 64 65 67 68 75 76 77 79 80 81 83 84 86 87 89 90 91 93 95 99 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 6 | | Subframe 7 | | Subframe 8 | | Subframe 9 | |
| Subslot | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| **3 MHz** | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 |
| **5 MHz** | 0 1 2 3 7 8 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 11 12 13 15 17 18 20 21 22 24 | 0 1 2 4 6 7 12 13 14 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 17 18 21 22 23 24 | 1 3 4 5 7 9 10 11 12 13 14 15 21 22 24 | 0 1 2 3 4 7 8 10 13 14 18 19 20 21 24 | 1 4 8 9 10 11 12 13 15 16 18 20 22 23 24 | 1 2 3 4 5 6 9 10 11 12 13 16 17 21 23 |
| **10 MHz** | 0 1 3 4 5 6 7 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 32 34 38 41 42 45 49 | 0 1 2 3 5 6 8 12 14 15 16 17 18 22 23 26 28 29 30 32 34 35 38 39 40 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 15 16 17 18 21 23 25 28 31 33 37 38 39 41 42 44 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 14 15 19 20 28 29 30 31 34 36 37 38 39 40 42 44 45 48 49 | 0 1 3 4 5 6 8 9 10 13 14 16 17 18 19 20 21 23 24 29 30 31 32 35 37 38 39 40 47 48 | 0 1 2 3 4 5 6 7 9 10 12 14 16 17 18 19 22 24 25 26 27 28 30 31 32 34 37 42 45 48 | 2 5 7 8 9 10 11 14 15 16 17 21 22 27 28 29 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 1 3 6 9 11 13 15 16 17 18 21 24 25 26 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 |
| **15 MHz** | 1 2 3 4 9 11 12 13 14 15 17 18 20 21 22 24 25 26 28 29 31 32 33 34 40 42 43 44 45 46 47 48 50 51 52 54 56 58 59 60 61 62 63 64 68 70 71 72 73 74 | 2 3 4 6 7 9 11 12 14 15 17 18 20 22 24 25 27 28 29 30 31 33 34 35 38 39 40 42 43 45 46 47 48 49 55 56 59 60 61 62 63 65 66 67 68 69 70 71 73 74 | 2 4 5 6 8 10 13 15 16 17 18 20 22 24 25 26 27 28 29 30 31 32 33 34 35 38 40 41 44 45 46 47 48 50 51 52 53 54 56 59 60 63 64 67 69 70 71 72 73 74 | 0 2 3 4 5 7 8 11 12 14 16 18 20 22 23 24 25 27 28 29 30 31 33 42 43 45 46 47 48 49 50 51 53 54 56 58 60 61 62 63 64 65 66 67 68 69 70 71 72 73 | 0 1 2 3 9 11 12 14 15 17 18 20 23 25 26 28 29 30 31 32 33 36 37 38 39 41 42 43 45 46 50 52 53 54 57 58 59 60 61 62 63 64 65 67 68 70 71 72 73 74 | 0 1 3 4 5 6 7 8 11 12 14 19 20 21 23 24 26 27 28 30 31 33 34 35 38 40 41 42 44 45 46 49 51 52 53 54 55 58 59 60 61 62 63 65 67 69 70 71 72 73 | 0 1 2 3 7 8 9 10 12 13 14 15 17 18 19 21 22 23 24 25 26 27 28 29 32 33 34 36 37 39 40 43 46 47 48 49 50 53 54 56 61 62 63 66 68 69 71 72 73 74 | 0 1 3 7 8 11 13 14 16 18 19 20 21 22 23 25 27 28 29 30 32 34 35 36 40 41 42 43 44 45 46 47 48 50 51 53 54 55 57 59 61 62 63 64 66 67 68 69 70 71 |
| **20 MHz** | 0 1 2 3 6 8 10 11 15 16 17 19 21 22 23 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 53 54 57 59 60 62 63 64 65 67 69 71 72 73 76 79 81 84 86 88 89 90 92 93 94 99 | 5 6 7 9 10 12 14 15 16 17 21 22 23 24 27 28 29 30 31 33 34 35 36 37 39 41 44 45 47 49 50 53 54 55 56 57 59 64 65 66 68 70 72 75 76 77 80 81 84 85 86 87 90 91 92 94 95 97 98 99 | 0 2 3 4 5 6 7 11 12 14 15 17 19 21 22 24 26 32 36 37 40 42 43 44 47 48 49 50 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 79 81 82 83 84 85 86 87 89 91 94 95 96 97 98 99 | 1 2 5 6 8 9 11 12 13 15 21 22 25 26 27 28 29 30 31 32 34 35 38 39 40 41 43 44 45 46 53 57 58 59 61 62 63 64 65 66 68 69 71 72 73 75 77 78 80 82 83 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 13 14 16 22 25 26 27 28 29 31 32 33 34 36 37 38 39 43 44 45 46 48 49 52 53 55 59 61 62 63 64 70 71 72 73 74 75 77 78 80 81 82 84 86 89 90 91 93 97 98 99 | 0 1 3 4 5 7 8 10 11 15 18 19 20 21 26 27 29 30 31 33 35 37 38 39 40 41 43 44 45 46 47 48 49 50 52 53 55 56 58 60 62 64 65 66 67 69 70 71 72 73 74 81 83 84 86 92 93 94 96 98 | 2 3 4 5 7 9 11 13 15 16 17 21 23 24 25 27 28 29 31 33 35 36 40 42 43 44 45 46 48 49 51 52 53 54 55 56 57 59 61 63 64 65 68 71 76 77 78 81 82 83 84 85 86 87 90 91 93 94 98 99 | 0 3 4 6 7 8 10 11 13 16 18 21 22 23 25 26 28 29 32 35 36 37 38 43 44 46 47 48 49 53 54 57 58 59 60 61 64 66 67 68 69 70 72 76 77 78 80 81 82 83 84 86 87 88 89 91 92 94 95 96 |

Table 6.1.1.5b-3: Numbers () of the 16QAM PRBs (TDD)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Frame 1 | Subframe 0 | | Subframe 1 | | Subframe 5 | | Subframe 6 | | Subframe 7 | | Subframe 8 | |
| Subslot | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| **3 MHz** | 0 1 2 3 11 12 14 | 0 1 2 3 11 12 13 | 0 1 2 3 11 12 14 | 0 1 2 3 11 12 13 | 1 2 7 8 10 13 14 | 2 3 4 6 8 13 14 | 0 3 6 8 9 10 14 | 0 1 2 3 11 12 14 | 0 1 2 3 11 12 13 | 0 1 2 3 11 12 14 | 0 1 2 3 11 12 13 | 1 2 7 8 10 13 14 |
| **5 MHz** | 1 2 3 4 5 6 7 8 17 18 19 20 21 23 24 | 0 2 3 4 5 6 7 8 17 18 19 20 21 22 24 | 1 2 3 4 5 6 7 8 16 17 18 19 20 21 22 | 1 2 3 4 5 6 7 8 16 17 20 21 22 23 24 | 1 2 4 6 7 8 9 11 14 15 16 18 21 23 24 | 0 2 3 5 6 7 10 13 15 16 17 19 20 21 24 | 0 2 3 4 6 7 8 13 14 15 16 19 21 23 24 | 1 2 3 4 5 6 7 8 17 18 19 20 21 23 24 | 0 2 3 4 5 6 7 8 17 18 19 20 21 22 24 | 1 2 3 4 5 6 7 8 16 17 18 19 20 21 22 | 1 2 3 4 5 6 7 8 16 17 20 21 22 23 24 | 1 2 4 6 7 8 9 11 14 15 16 18 21 23 24 |
| **10 MHz** | 1 2 3 4 6 7 9 10 11 13 14 15 17 18 19 28 29 30 34 35 37 38 39 41 42 44 46 47 48 49 | 2 3 4 5 6 7 8 9 10 11 12 13 14 16 17 18 19 21 30 32 34 35 36 37 39 40 41 43 45 48 | 2 4 5 6 7 8 9 11 12 13 14 16 18 20 21 28 29 30 31 32 33 34 41 43 44 45 46 47 48 49 | 1 4 5 6 7 8 11 12 13 14 15 17 19 20 21 28 29 30 31 32 34 37 38 41 42 44 46 47 48 49 | 0 1 2 5 6 7 8 11 13 14 15 16 18 20 21 24 25 27 30 32 34 35 37 38 40 41 43 46 47 49 | 2 4 5 6 7 9 10 11 15 18 19 20 21 24 25 26 28 29 30 32 33 35 36 38 40 41 43 44 48 49 | 2 5 6 7 8 9 10 11 14 15 16 18 19 20 21 23 27 28 30 32 33 34 37 41 42 44 45 46 47 49 | 1 2 3 4 6 7 9 10 11 13 14 15 17 18 19 28 29 30 34 35 37 38 39 41 42 44 46 47 48 49 | 2 3 4 5 6 7 8 9 10 11 12 13 14 16 17 18 19 21 30 32 34 35 36 37 39 40 41 43 45 48 | 2 4 5 6 7 8 9 11 12 13 14 16 18 20 21 28 29 30 31 32 33 34 41 43 44 45 46 47 48 49 | 1 4 5 6 7 8 11 12 13 14 15 17 19 20 21 28 29 30 31 32 34 37 38 41 42 44 46 47 48 49 | 0 1 2 5 6 7 8 11 13 14 15 16 18 20 21 24 25 27 30 32 34 35 37 38 40 41 43 46 47 49 |
| **15 MHz** | 1 3 4 5 6 7 8 9 10 11 13 15 16 17 19 20 21 22 23 24 25 26 27 28 29 33 42 44 45 46 51 52 53 55 56 57 58 59 60 61 62 63 64 65 66 70 71 72 73 74 | 2 3 4 6 7 8 9 10 11 12 13 14 15 16 18 19 20 22 24 25 27 28 30 31 32 41 42 43 44 45 46 48 49 50 51 52 55 58 61 62 63 65 66 67 68 69 70 71 73 74 | 0 1 2 3 6 7 8 9 10 11 12 13 16 17 18 19 20 21 22 23 24 26 27 28 30 31 32 41 43 45 46 47 48 51 53 55 56 57 58 61 62 63 64 65 66 69 70 71 73 74 | 3 7 8 9 10 11 12 13 14 15 16 17 22 23 24 27 28 29 30 31 32 41 42 43 45 46 48 49 50 53 54 55 56 57 58 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 | 0 1 2 3 4 6 9 10 11 13 14 15 16 17 20 21 22 23 24 25 28 29 34 37 43 44 46 47 48 49 51 52 53 54 55 57 59 61 62 63 64 65 67 68 69 70 71 72 73 74 | 0 1 3 4 5 8 9 10 11 12 13 14 15 16 19 20 22 24 25 26 27 28 31 32 33 34 35 36 37 38 40 42 43 44 45 46 47 48 50 51 52 55 56 59 60 61 66 67 69 74 | 1 3 4 5 7 8 9 10 12 13 14 15 16 17 19 20 21 23 26 27 28 29 30 31 32 33 34 36 37 38 39 42 43 44 45 46 52 53 57 58 59 60 62 63 64 65 69 71 72 73 | 1 3 4 5 6 7 8 9 10 11 13 15 16 17 19 20 21 22 23 24 25 26 27 28 29 33 42 44 45 46 51 52 53 55 56 57 58 59 60 61 62 63 64 65 66 70 71 72 73 74 | 2 3 4 6 7 8 9 10 11 12 13 14 15 16 18 19 20 22 24 25 27 28 30 31 32 41 42 43 44 45 46 48 49 50 51 52 55 58 61 62 63 65 66 67 68 69 70 71 73 74 | 0 1 2 3 6 7 8 9 10 11 12 13 16 17 18 19 20 21 22 23 24 26 27 28 30 31 32 41 43 45 46 47 48 51 53 55 56 57 58 61 62 63 64 65 66 69 70 71 73 74 | 3 7 8 9 10 11 12 13 14 15 16 17 22 23 24 27 28 29 30 31 32 41 42 43 45 46 48 49 50 53 54 55 56 57 58 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 | 0 1 2 3 4 6 9 10 11 13 14 15 16 17 20 21 22 23 24 25 28 29 34 37 43 44 46 47 48 49 51 52 53 54 55 57 59 61 62 63 64 65 67 68 69 70 71 72 73 74 |
| **20 MHz** | 2 4 5 6 7 8 9 10 11 12 13 14 17 18 19 20 21 22 23 25 27 28 29 31 32 33 34 35 37 38 39 43 44 46 53 56 58 60 61 68 69 70 71 73 74 75 76 78 79 80 82 83 85 86 87 88 93 95 97 99 | 2 4 5 8 9 10 11 12 13 14 16 17 18 19 22 24 25 26 27 29 30 32 33 36 37 38 40 41 42 43 45 46 53 54 55 57 58 60 62 64 65 66 67 68 69 74 78 82 83 84 86 88 89 90 91 92 93 95 97 99 | 0 2 3 4 9 10 11 12 13 14 15 17 18 21 22 23 24 25 26 27 28 30 31 32 35 36 37 38 40 41 42 43 53 54 55 57 60 61 63 64 65 66 68 70 74 76 77 81 82 84 85 87 88 89 93 94 95 97 98 99 | 1 4 9 10 12 13 14 15 17 18 19 20 21 22 23 29 30 31 32 33 36 37 39 40 41 42 43 46 53 54 55 56 57 58 60 61 64 66 68 69 71 72 73 74 75 80 82 83 84 86 87 89 90 92 93 94 95 96 98 99 | 0 1 3 4 5 7 8 12 13 14 15 17 19 20 22 23 25 26 28 30 31 33 35 37 38 39 41 45 48 49 50 51 58 59 62 63 65 67 68 69 70 71 72 73 75 76 78 82 84 85 86 89 90 91 92 93 94 96 97 98 | 0 2 4 5 6 7 11 12 13 14 16 17 18 19 20 21 23 27 28 30 31 32 35 37 38 40 43 44 45 46 47 50 51 53 56 57 58 59 60 61 62 63 64 65 68 70 71 73 77 79 80 82 85 87 89 92 95 96 97 98 | 1 3 4 5 6 7 9 10 13 16 18 20 21 24 25 26 27 28 30 31 32 35 37 38 41 42 43 44 46 47 48 50 51 52 53 54 57 59 60 61 62 64 67 70 71 73 76 77 78 79 81 82 84 86 87 88 91 95 98 99 | 2 4 5 6 7 8 9 10 11 12 13 14 17 18 19 20 21 22 23 25 27 28 29 31 32 33 34 35 37 38 39 43 44 46 53 56 58 60 61 68 69 70 71 73 74 75 76 78 79 80 82 83 85 86 87 88 93 95 97 99 | 2 4 5 8 9 10 11 12 13 14 16 17 18 19 22 24 25 26 27 29 30 32 33 36 37 38 40 41 42 43 45 46 53 54 55 57 58 60 62 64 65 66 67 68 69 74 78 82 83 84 86 88 89 90 91 92 93 95 97 99 | 0 2 3 4 9 10 11 12 13 14 15 17 18 21 22 23 24 25 26 27 28 30 31 32 35 36 37 38 40 41 42 43 53 54 55 57 60 61 63 64 65 66 68 70 74 76 77 81 82 84 85 87 88 89 93 94 95 97 98 99 | 1 4 9 10 12 13 14 15 17 18 19 20 21 22 23 29 30 31 32 33 36 37 39 40 41 42 43 46 53 54 55 56 57 58 60 61 64 66 68 69 71 72 73 74 75 80 82 83 84 86 87 89 90 92 93 94 95 96 98 99 | 0 1 3 4 5 7 8 12 13 14 15 17 19 20 22 23 25 26 28 30 31 33 35 37 38 39 41 45 48 49 50 51 58 59 62 63 65 67 68 69 70 71 72 73 75 76 78 82 84 85 86 89 90 91 92 93 94 96 97 98 |

|  |  |  |
| --- | --- | --- |
| Frame 1 | Subframe 9 | |
| Subslot | 0 | 1 |
| **3 MHz** | 2 3 4 6 8 13 14 | 0 3 6 8 9 10 14 |
| **5 MHz** | 0 2 3 5 6 7 10 13 15 16 17 19 20 21 24 | 0 2 3 4 6 7 8 13 14 15 16 19 21 23 24 |
| **10 MHz** | 2 4 5 6 7 9 10 11 15 18 19 20 21 24 25 26 28 29 30 32 33 35 36 38 40 41 43 44 48 49 | 2 5 6 7 8 9 10 11 14 15 16 18 19 20 21 23 27 28 30 32 33 34 37 41 42 44 45 46 47 49 |
| **15 MHz** | 0 1 3 4 5 8 9 10 11 12 13 14 15 16 19 20 22 24 25 26 27 28 31 32 33 34 35 36 37 38 40 42 43 44 45 46 47 48 50 51 52 55 56 59 60 61 66 67 69 74 | 1 3 4 5 7 8 9 10 12 13 14 15 16 17 19 20 21 23 26 27 28 29 30 31 32 33 34 36 37 38 39 42 43 44 45 46 52 53 57 58 59 60 62 63 64 65 69 71 72 73 |
| **20 MHz** | 0 2 4 5 6 7 11 12 13 14 16 17 18 19 20 21 23 27 28 30 31 32 35 37 38 40 43 44 45 46 47 50 51 53 56 57 58 59 60 61 62 63 64 65 68 70 71 73 77 79 80 82 85 87 89 92 95 96 97 98 | 1 3 4 5 6 7 9 10 13 16 18 20 21 24 25 26 27 28 30 31 32 35 37 38 41 42 43 44 46 47 48 50 51 52 53 54 57 59 60 61 62 64 67 70 71 73 76 77 78 79 81 82 84 86 87 88 91 95 98 99 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Frame 2 | Subframe 0 | | Subframe 1 | | Subframe 5 | | Subframe 6 | | Subframe 7 | | Subframe 8 | |
| Subslot | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| **3 MHz** | 0 1 2 3 12 13 14 | 0 1 2 3 11 12 13 | 1 2 3 11 12 13 14 | 0 1 2 11 12 13 14 | 2 4 7 8 9 10 11 | 0 1 3 4 5 13 14 | 0 4 6 8 9 11 12 | 0 1 2 3 12 13 14 | 0 1 2 3 11 12 13 | 1 2 3 11 12 13 14 | 0 1 2 11 12 13 14 | 2 4 7 8 9 10 11 |
| **5 MHz** | 0 2 3 4 5 6 7 16 17 18 19 20 21 22 23 | 0 1 2 3 4 5 7 8 16 17 18 19 20 23 24 | 1 2 3 4 5 7 8 16 17 18 20 21 22 23 24 | 0 1 3 4 5 7 8 16 17 18 19 20 21 22 24 | 0 1 3 6 7 9 12 14 17 18 20 21 22 23 24 | 2 3 4 5 6 7 9 11 12 14 15 17 18 21 24 | 0 1 3 4 5 8 10 11 12 14 16 17 20 22 24 | 0 2 3 4 5 6 7 16 17 18 19 20 21 22 23 | 0 1 2 3 4 5 7 8 16 17 18 19 20 23 24 | 1 2 3 4 5 7 8 16 17 18 20 21 22 23 24 | 0 1 3 4 5 7 8 16 17 18 19 20 21 22 24 | 0 1 3 6 7 9 12 14 17 18 20 21 22 23 24 |
| **10 MHz** | 0 1 2 6 7 8 9 11 13 14 15 16 19 29 30 32 34 35 36 37 38 39 41 42 43 44 45 47 48 49 | 0 2 3 4 6 7 8 9 10 11 12 15 16 17 18 19 20 29 31 33 34 35 36 37 42 45 46 47 48 49 | 0 1 2 3 5 6 7 8 9 10 13 14 15 16 18 20 21 28 29 30 31 32 34 35 39 40 41 42 44 46 | 1 2 3 4 5 6 8 9 10 11 12 13 15 16 17 18 19 21 30 35 38 39 40 41 42 43 46 47 48 49 | 1 2 3 5 6 13 14 15 16 17 19 20 23 25 26 27 29 30 31 32 33 35 38 39 40 41 43 44 47 49 | 0 1 2 5 9 12 13 14 16 17 18 22 25 26 27 28 29 30 31 33 35 36 38 39 41 42 44 45 47 49 | 0 1 2 3 4 5 7 8 9 10 12 13 14 15 16 18 22 27 28 29 30 31 32 33 34 42 43 45 46 49 | 0 1 2 6 7 8 9 11 13 14 15 16 19 29 30 32 34 35 36 37 38 39 41 42 43 44 45 47 48 49 | 0 2 3 4 6 7 8 9 10 11 12 15 16 17 18 19 20 29 31 33 34 35 36 37 42 45 46 47 48 49 | 0 1 2 3 5 6 7 8 9 10 13 14 15 16 18 20 21 28 29 30 31 32 34 35 39 40 41 42 44 46 | 1 2 3 4 5 6 8 9 10 11 12 13 15 16 17 18 19 21 30 35 38 39 40 41 42 43 46 47 48 49 | 1 2 3 5 6 13 14 15 16 17 19 20 23 25 26 27 29 30 31 32 33 35 38 39 40 41 43 44 47 49 |
| **15 MHz** | 0 1 2 3 4 5 6 7 8 10 11 14 15 16 18 19 20 21 23 24 25 26 27 28 31 32 33 41 43 44 45 46 47 48 50 52 53 55 57 58 59 61 63 65 66 67 68 69 71 74 | 1 2 3 4 5 6 7 8 9 10 11 13 14 15 16 18 20 21 22 23 27 28 29 30 33 42 43 45 46 47 49 50 51 54 55 56 58 59 60 61 64 65 66 68 69 70 71 72 73 74 | 0 1 2 4 5 6 7 8 9 10 11 12 13 14 15 16 18 20 22 24 25 26 29 32 33 44 45 46 49 50 51 52 55 56 57 58 59 60 61 63 64 65 66 68 69 70 71 72 73 74 | 0 1 2 3 4 5 6 7 8 9 10 11 13 14 15 16 17 18 19 21 23 24 26 29 30 33 41 42 45 46 47 49 50 51 53 54 55 56 57 58 60 62 63 66 67 69 71 72 73 74 | 1 3 4 5 6 7 9 10 11 12 14 15 16 17 18 19 20 21 22 24 26 29 30 32 33 34 35 36 38 39 41 42 44 45 47 48 49 50 52 55 56 57 61 62 63 69 70 71 73 74 | 1 3 4 6 7 8 10 11 13 14 15 21 22 23 24 26 27 28 29 30 31 32 35 39 40 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 63 64 65 66 68 71 74 | 0 1 2 5 6 7 10 11 12 16 17 18 19 22 23 25 27 28 29 30 31 33 34 35 36 37 39 40 43 45 46 47 48 49 50 52 54 55 56 58 61 62 63 64 66 67 68 69 71 73 | 0 1 2 3 4 5 6 7 8 10 11 14 15 16 18 19 20 21 23 24 25 26 27 28 31 32 33 41 43 44 45 46 47 48 50 52 53 55 57 58 59 61 63 65 66 67 68 69 71 74 | 1 2 3 4 5 6 7 8 9 10 11 13 14 15 16 18 20 21 22 23 27 28 29 30 33 42 43 45 46 47 49 50 51 54 55 56 58 59 60 61 64 65 66 68 69 70 71 72 73 74 | 0 1 2 4 5 6 7 8 9 10 11 12 13 14 15 16 18 20 22 24 25 26 29 32 33 44 45 46 49 50 51 52 55 56 57 58 59 60 61 63 64 65 66 68 69 70 71 72 73 74 | 0 1 2 3 4 5 6 7 8 9 10 11 13 14 15 16 17 18 19 21 23 24 26 29 30 33 41 42 45 46 47 49 50 51 53 54 55 56 57 58 60 62 63 66 67 69 71 72 73 74 | 1 3 4 5 6 7 9 10 11 12 14 15 16 17 18 19 20 21 22 24 26 29 30 32 33 34 35 36 38 39 41 42 44 45 47 48 49 50 52 55 56 57 61 62 63 69 70 71 73 74 |
| **20 MHz** | 0 1 2 3 4 5 7 8 9 10 11 15 17 19 20 21 24 26 27 28 29 31 32 33 34 36 37 44 45 54 56 57 58 59 60 61 63 65 67 68 69 70 73 77 79 83 85 86 87 88 89 90 91 92 93 94 95 96 98 99 | 0 2 3 4 7 8 10 11 12 13 14 15 16 17 18 19 20 22 24 25 27 30 35 37 39 41 42 44 53 56 57 59 61 62 63 66 67 69 70 73 74 75 76 77 78 79 80 81 82 84 85 86 88 89 90 91 92 94 96 98 | 0 1 2 4 5 6 7 10 11 12 13 14 15 16 18 19 20 21 23 24 25 29 32 33 34 40 42 43 44 45 46 53 54 55 57 59 60 61 62 63 67 68 71 72 73 75 77 81 82 84 85 87 91 92 93 95 96 97 98 99 | 0 1 2 3 4 6 7 8 9 12 13 15 16 18 19 20 22 24 25 27 28 29 30 32 35 39 40 42 43 44 57 59 60 61 63 64 65 66 67 68 69 70 72 73 74 75 76 81 82 83 84 88 89 90 92 94 95 97 98 99 | 0 1 2 4 6 8 9 10 11 14 15 18 19 20 21 25 29 31 32 34 36 37 38 40 41 42 47 52 53 54 57 58 59 60 62 63 64 65 67 68 69 70 71 73 74 75 76 77 78 79 80 84 85 86 87 88 90 92 95 99 | 0 1 2 3 7 8 9 13 15 16 21 23 24 25 29 30 31 33 34 36 37 38 39 40 41 42 44 45 46 47 48 49 52 53 57 60 62 63 64 65 66 69 72 73 74 75 77 81 82 83 84 86 88 89 90 91 92 93 95 97 | 3 4 6 7 9 10 11 12 13 14 15 17 19 22 23 25 26 27 33 34 37 39 40 41 43 45 46 47 48 49 50 53 55 56 58 60 61 62 63 65 69 71 72 73 74 76 77 78 79 80 82 83 85 87 91 92 94 95 96 99 | 0 1 2 3 4 5 7 8 9 10 11 15 17 19 20 21 24 26 27 28 29 31 32 33 34 36 37 44 45 54 56 57 58 59 60 61 63 65 67 68 69 70 73 77 79 83 85 86 87 88 89 90 91 92 93 94 95 96 98 99 | 0 2 3 4 7 8 10 11 12 13 14 15 16 17 18 19 20 22 24 25 27 30 35 37 39 41 42 44 53 56 57 59 61 62 63 66 67 69 70 73 74 75 76 77 78 79 80 81 82 84 85 86 88 89 90 91 92 94 96 98 | 0 1 2 4 5 6 7 10 11 12 13 14 15 16 18 19 20 21 23 24 25 29 32 33 34 40 42 43 44 45 46 53 54 55 57 59 60 61 62 63 67 68 71 72 73 75 77 81 82 84 85 87 91 92 93 95 96 97 98 99 | 0 1 2 3 4 6 7 8 9 12 13 15 16 18 19 20 22 24 25 27 28 29 30 32 35 39 40 42 43 44 57 59 60 61 63 64 65 66 67 68 69 70 72 73 74 75 76 81 82 83 84 88 89 90 92 94 95 97 98 99 | 0 1 2 4 6 8 9 10 11 14 15 18 19 20 21 25 29 31 32 34 36 37 38 40 41 42 47 52 53 54 57 58 59 60 62 63 64 65 67 68 69 70 71 73 74 75 76 77 78 79 80 84 85 86 87 88 90 92 95 99 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| e | | Subframe 9 | | |
| Subslot | 0 | | 1 |
| **3 MHz** | 0 1 3 4 5 13 14 | | 0 4 6 8 9 11 12 |
| **5 MHz** | 2 3 4 5 6 7 9 11 12 14 15 17 18 21 24 | | 0 1 3 4 5 8 10 11 12 14 16 17 20 22 24 |
| **10 MHz** | 0 1 2 5 9 12 13 14 16 17 18 22 25 26 27 28 29 30 31 33 35 36 38 39 41 42 44 45 47 49 | | 0 1 2 3 4 5 7 8 9 10 12 13 14 15 16 18 22 27 28 29 30 31 32 33 34 42 43 45 46 49 |
| **15 MHz** | 1 3 4 6 7 8 10 11 13 14 15 21 22 23 24 26 27 28 29 30 31 32 35 39 40 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 63 64 65 66 68 71 74 | | 0 1 2 5 6 7 10 11 12 16 17 18 19 22 23 25 27 28 29 30 31 33 34 35 36 37 39 40 43 45 46 47 48 49 50 52 54 55 56 58 61 62 63 64 66 67 68 69 71 73 |
| **20 MHz** | 0 1 2 3 7 8 9 13 15 16 21 23 24 25 29 30 31 33 34 36 37 38 39 40 41 42 44 45 46 47 48 49 52 53 57 60 62 63 64 65 66 69 72 73 74 75 77 81 82 83 84 86 88 89 90 91 92 93 95 97 | | 3 4 6 7 9 10 11 12 13 14 15 17 19 22 23 25 26 27 33 34 37 39 40 41 43 45 46 47 48 49 50 53 55 56 58 60 61 62 63 65 69 71 72 73 74 76 77 78 79 80 82 83 85 87 91 92 94 95 96 99 |

#### 6.1.1.6 E-UTRA Test Model 3.3 (E-TM3.3)

This model shall be used for tests on:

- Transmitted signal quality

- Frequency error

- EVM for QPSK modulation

Table 6.1.1.6-1: Physical channel parameters of E-TM3.3

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | 1.4 MHz | 3 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| **Reference, Synchronisation Signals** |  |  |  |  |  |  |
| RS boosting, PB = EB/EA | 1 | 1 | 1 | 1 | 1 | 1 |
| Synchronisation signal EPRE / ERS [dB] | 0.000 | 2.189 | 2.580 | 2.427 | 2.477 | 2.427 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| **PBCH** |  |  |  |  |  |  |
| PBCH EPRE / ERS [dB] | 0.000 | 2.189 | 2.580 | 2.427 | 2.477 | 2.427 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| **PCFICH** |  |  |  |  |  |  |
| # of symbols used for control channels | 2 | 1 | 1 | 1 | 1 | 1 |
| PCFICH EPRE / ERS [dB] | 3.222 | 0 | 0 | 0 | 0 | 0 |
| **PHICH** |  |  |  |  |  |  |
| # of PHICH groups | 1 | 1 | 1 | 2 | 2 | 3 |
| # of PHICH per group | 2 | 2 | 2 | 2 | 2 | 2 |
| PHICH BPSK symbol power / ERS [dB] | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 |
| PHICH group EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 | 0 |
| **PDCCH** |  |  |  |  |  |  |
| # of available REGs | 23 | 23 | 43 | 90 | 140 | 187 |
| # of PDCCH | 2 | 2 | 2 | 5 | 7 | 10 |
| # of CCEs per PDCCH | 1 | 1 | 2 | 2 | 2 | 2 |
| # of REGs per CCE | 9 | 9 | 9 | 9 | 9 | 9 |
| # of REGs allocated to PDCCH | 18 | 18 | 36 | 90 | 126 | 180 |
| # of <NIL> REGs added for padding | 5 | 5 | 7 | 0 | 14 | 7 |
| PDCCH REG EPRE / ERS [dB] | 0.792 | 2.290 | 1.880 | 1.065 | 1.488 | 1.195 |
| <NIL> REG EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf | -inf |
| **PDSCH** |  |  |  |  |  |  |
| # of QPSK PDSCH PRBs within a slot for which EVM is measured | 3 | 7 | 13 | 25 | 38 | 50 |
| PRB PA = EA/ERS [dB] | -6 (Note 1) | -6 | -6 | -6 | -6 | -6 |
| # of 16QAM PDSCH PRBs within a slot for which EVM is not measured (used for power balancing only) | 3 | 8 | 12 | 25 | 37 | 50 |
| PRB PA = EA/ERS [dB] | 2.427 (Note 1) | 2.189 | 2.580 | 2.427 | 2.477 | 2.427 |
| Note 1: In subframes containing PBCH or synchronisation signal REs, no PRB boosting/deboosting shall be applied, i.e. PRB PA = EA/ERS = 0 [dB]. | | | | | | |

Table 6.1.1.6-2: Numbers () of the QPSK PRBs (FDD)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 0 | Subframe 1 | Subframe 2 | Subframe 3 | Subframe 4 | Subframe 5 | Subframe 6 | Subframe 7 | Subframe 8 | Subframe 9 |
| **1.4 MHz** | 2 3 5 | 1 2 3 | 0 1 3 | 1 2 3 | 2 3 5 | 1 2 5 | 0 2 5 | 0 2 5 | 1 2 5 | 1 3 5 |
| **3 MHz** | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 |
| **5 MHz** | 0 1 3 6 7 8 16 17 18 20 21 23 24 | 0 1 2 4 5 6 9 10 12 17 18 20 24 | 0 1 2 3 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 12 13 15 17 18 20 21 24 | 0 2 4 6 7 12 13 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 18 21 22 24 | 1 3 4 5 7 9 10 11 12 15 21 22 24 | 0 1 2 3 4 7 10 14 18 19 20 21 24 | 1 4 8 9 10 11 12 13 15 16 18 20 23 | 1 2 3 4 5 6 9 10 11 13 16 17 23 |
| **10 MHz** | 1 2 3 5 6 7 8 9 10 11 15 16 20 28 31 32 33 35 36 39 40 42 46 47 48 | 1 2 4 5 6 7 9 11 15 18 20 21 22 24 25 27 29 34 35 36 37 40 44 46 49 | 0 3 5 6 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 34 38 41 42 49 | 0 1 2 3 5 6 8 14 16 18 22 23 26 28 30 32 34 38 39 40 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 16 17 18 21 23 25 31 33 37 41 42 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 15 19 20 28 29 30 31 34 36 37 42 44 48 49 | 0 1 4 5 6 8 9 10 13 16 17 18 19 20 21 24 29 30 31 32 35 37 38 39 47 | 0 2 3 4 5 6 7 9 10 12 16 17 18 19 22 24 25 26 30 31 34 37 42 45 48 | 5 7 8 9 14 15 16 21 22 27 28 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 3 9 11 13 16 17 18 21 24 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 |
| **15 MHz** | 0 1 2 3 5 6 7 8 9 12 16 17 18 19 20 21 23 24 25 28 29 30 31 32 33 42 47 48 49 53 60 63 65 67 68 70 71 73 | 0 1 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 38 46 47 49 50 51 53 54 55 57 59 60 61 67 68 69 70 73 74 | 2 11 12 13 15 17 18 21 22 24 25 26 29 31 32 33 34 40 42 45 46 47 50 51 52 54 58 59 60 61 62 63 64 68 70 71 72 74 | 2 3 4 6 7 9 11 12 15 17 20 24 27 30 33 34 35 38 39 42 43 45 46 48 49 55 56 59 60 61 62 65 67 69 70 71 73 74 | 4 5 6 8 10 13 17 22 25 26 27 28 29 30 31 32 33 34 35 38 41 44 46 48 50 52 53 54 56 59 60 64 67 69 70 71 73 74 | 0 2 3 4 7 8 11 14 18 20 23 24 25 27 29 42 43 45 46 47 48 49 50 51 54 56 60 62 63 65 66 67 68 69 70 71 72 73 | 1 2 9 11 14 15 18 25 26 28 29 30 31 32 33 36 37 38 39 41 43 45 46 50 53 54 58 59 60 62 63 65 67 68 70 71 72 73 | 3 4 6 7 8 11 12 19 20 23 24 26 27 28 30 33 34 35 40 41 42 46 49 51 53 54 58 59 60 61 62 65 67 69 70 71 72 73 | 0 1 2 3 7 8 9 10 13 14 15 17 18 19 22 23 24 25 26 27 28 32 36 37 39 46 47 50 53 56 61 62 63 68 69 71 73 74 | 0 3 7 8 11 13 14 16 18 19 23 25 27 28 29 30 32 35 41 42 44 46 47 48 50 53 55 57 59 61 62 64 66 67 68 69 70 71 |
| **20 MHz** | 0 1 4 6 10 13 14 15 16 20 22 23 25 26 28 29 30 31 32 33 36 39 41 42 44 45 54 56 57 60 63 66 67 68 72 76 77 79 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 7 9 10 13 19 20 21 22 23 24 25 26 27 30 33 34 35 36 47 48 49 50 51 53 54 55 57 59 60 61 64 65 67 68 75 76 77 80 81 83 84 86 87 89 90 93 95 99 | 1 2 3 6 8 10 11 15 16 17 19 21 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 54 60 62 63 64 65 69 72 76 79 81 84 86 88 89 90 93 94 99 | 5 7 9 10 12 14 15 16 21 22 23 24 27 28 29 30 33 34 35 36 37 39 41 44 45 47 49 54 55 56 57 64 66 68 70 72 76 77 80 81 85 86 87 90 91 92 94 95 98 99 | 2 3 4 5 6 7 14 15 17 19 21 22 24 26 37 40 42 43 44 47 49 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 81 82 83 84 85 86 87 89 94 95 96 97 99 | 1 2 5 6 8 9 12 13 21 22 25 26 27 28 29 31 32 34 35 39 40 43 45 46 53 57 59 61 62 63 64 66 68 69 71 73 75 77 78 82 83 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 13 22 25 26 27 29 31 32 33 36 37 38 39 43 45 48 49 52 53 55 59 62 63 64 71 72 73 74 75 77 78 81 82 84 86 89 91 93 97 98 99 | 0 1 3 4 5 7 10 11 15 18 19 20 21 26 27 29 30 31 33 35 39 40 41 43 44 46 47 49 50 53 55 56 62 64 65 66 67 69 70 71 72 74 83 84 86 92 93 94 96 98 | 2 3 4 7 9 11 13 15 16 24 25 27 29 31 33 35 36 40 43 44 45 46 49 51 52 53 54 55 56 57 59 63 64 65 68 71 77 78 81 82 83 84 85 86 90 91 93 94 98 99 | 0 4 6 7 8 10 11 13 16 18 21 22 23 26 29 32 35 36 37 43 44 46 47 48 49 53 54 57 59 60 61 64 66 67 68 69 70 72 76 78 80 81 82 84 87 89 91 92 95 96 |

Table 6.1.1.6-3: Numbers () of the QPSK PRBs (TDD)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Frame1 | Subframe 0 | Subframe 1 | Subframe 5 | Subframe 6 | Subframe 7 | Subframe 8 | Subframe 9 |
| **1.4 MHz** | 1 3 4 | 1 4 5 | 0 1 2 | 0 2 4 | 2 4 5 | 0 3 4 | 1 2 5 |
| **3 MHz** | 0 1 2 3 11 12 14 | 0 1 2 3 11 12 13 | 0 1 2 3 11 12 14 | 0 1 2 3 11 12 13 | 1 2 7 8 10 13 14 | 2 3 4 6 8 13 14 | 0 3 6 8 9 10 14 |
| **5 MHz** | 1 2 3 5 6 8 17 18 19 20 21 23 24 | 0 1 2 3 4 5 7 8 17 18 19 20 22 | 1 2 3 5 6 7 8 17 18 19 20 21 24 | 1 2 3 4 5 6 8 16 17 19 20 22 23 | 1 2 3 8 12 13 14 17 20 21 22 23 24 | 1 4 5 6 7 10 11 13 14 15 16 22 23 | 1 2 4 6 7 8 9 14 16 18 21 23 24 |
| **10 MHz** | 2 3 4 6 7 10 11 13 15 17 18 19 29 30 34 35 37 38 39 41 42 46 47 48 49 | 1 3 4 5 6 7 9 10 12 14 16 17 28 30 34 35 36 37 38 39 40 41 43 44 48 | 2 3 4 6 7 8 9 10 11 13 14 16 18 19 20 21 29 32 34 39 41 43 44 45 46 | 2 5 8 9 11 12 13 14 16 18 20 21 28 29 30 31 32 33 34 42 44 45 46 47 49 | 1 4 5 6 7 11 12 13 14 15 17 20 21 26 27 31 32 34 37 38 41 42 46 48 49 | 0 1 5 6 7 8 11 12 13 15 19 20 26 28 29 30 31 32 37 38 42 43 44 47 49 | 1 2 5 6 8 11 13 14 15 16 18 20 21 24 25 27 30 32 34 35 37 40 43 46 47 |
| **15 MHz** | 1 3 5 6 9 10 11 13 15 17 20 21 23 24 25 26 27 28 29 33 42 44 45 51 52 53 56 57 58 61 62 63 65 66 70 71 73 74 | 3 4 5 6 7 8 9 10 13 14 15 16 19 20 21 22 24 25 28 31 32 33 43 45 46 49 51 52 55 58 59 60 61 62 64 66 67 72 | 3 4 7 8 10 11 12 13 14 16 18 19 20 22 24 25 27 28 30 32 41 42 43 44 45 46 48 50 51 62 65 67 68 69 70 71 73 74 | 2 6 7 8 9 10 11 13 16 17 18 19 20 21 22 23 26 30 31 41 43 45 46 47 48 51 55 57 58 62 63 64 65 69 70 71 73 74 | 0 1 2 3 7 8 9 10 11 12 17 19 21 22 23 24 27 28 30 31 32 37 40 41 45 48 51 53 55 56 57 58 61 63 65 66 70 73 | 3 7 10 11 13 15 16 17 23 27 29 30 31 32 35 36 37 40 42 43 45 46 48 49 50 53 54 57 60 62 64 65 66 67 68 69 72 74 | 1 3 8 9 11 12 13 14 15 17 22 23 24 25 28 29 30 31 34 37 40 41 42 46 48 49 51 54 55 56 61 62 63 67 70 71 73 74 |
| **20 MHz** | 2 4 7 8 9 10 11 12 13 14 18 20 21 23 25 27 28 31 32 34 35 37 38 39 44 46 53 56 58 60 61 68 69 70 71 74 75 76 78 79 80 82 83 85 87 88 93 95 97 99 | 4 5 6 7 8 9 11 12 13 14 16 17 19 20 22 25 27 29 33 37 38 40 41 42 43 44 45 53 54 57 58 61 62 65 67 68 70 73 78 80 82 83 86 88 89 90 91 93 95 97 | 2 3 4 5 8 9 10 11 12 14 15 17 18 19 22 24 26 27 28 30 32 35 36 37 40 41 42 46 53 55 58 60 61 62 63 64 65 66 68 74 77 82 84 85 87 92 93 97 98 99 | 0 2 3 4 10 11 12 13 14 17 18 22 23 25 26 27 28 30 31 32 36 37 38 40 41 43 54 55 57 58 60 61 63 64 66 68 70 74 76 77 81 82 84 85 87 88 92 94 95 98 | 4 9 12 13 15 17 19 20 21 22 29 30 31 36 37 39 40 41 42 43 46 48 49 50 53 54 56 57 58 60 64 66 71 72 73 74 75 80 82 83 86 87 89 90 92 94 95 96 98 99 | 0 1 4 10 12 14 15 17 18 19 23 28 29 30 31 32 33 37 38 39 42 46 55 61 64 65 66 68 69 70 71 72 73 74 76 78 82 83 84 85 86 89 90 91 93 94 96 97 98 99 | 0 1 3 4 5 7 8 12 13 14 15 17 19 20 22 23 25 26 30 32 33 35 37 38 39 41 44 45 48 49 50 51 58 59 62 63 67 68 70 72 75 82 84 85 90 92 93 94 96 98 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Frame2 | Subframe 0 | Subframe 1 | Subframe 5 | Subframe 6 | Subframe 7 | Subframe 8 | Subframe 9 |
| **1.4 MHz** | 1 2 3 | 1 3 5 | 0 1 4 | 0 3 4 | 1 3 4 | 2 4 5 | 0 1 2 |
| **3 MHz** | 0 1 2 3 12 13 14 | 0 1 2 3 11 12 13 | 1 2 3 11 12 13 14 | 0 1 2 11 12 13 14 | 2 4 7 8 9 10 11 | 0 1 3 4 5 13 14 | 0 4 6 8 9 11 12 |
| **5 MHz** | 0 2 3 5 6 7 8 16 17 19 20 21 24 | 0 2 3 4 5 6 7 16 18 19 22 23 24 | 0 1 2 3 4 5 6 7 17 18 20 21 23 | 1 2 3 4 5 7 8 16 17 19 20 22 24 | 1 2 3 5 7 10 12 14 16 18 20 21 24 | 1 4 5 9 11 13 15 18 20 21 22 23 24 | 3 4 5 7 8 9 10 11 12 13 14 18 24 |
| **10 MHz** | 2 5 6 7 9 10 11 15 19 20 21 28 29 30 32 33 35 36 38 40 41 43 44 48 49 | 2 4 6 8 9 10 11 14 15 16 18 19 20 21 28 30 32 37 40 43 44 45 46 47 49 | 0 2 5 7 8 9 11 14 15 16 18 19 32 33 34 36 38 41 42 43 44 45 46 48 49 | 0 1 2 4 6 7 8 9 11 13 14 18 19 29 34 35 36 39 41 42 44 45 47 48 49 | 0 2 3 6 7 8 10 11 12 15 16 19 20 22 24 25 29 31 33 35 37 42 46 47 49 | 0 1 2 5 6 7 8 9 10 15 16 17 18 22 23 25 26 28 29 30 31 32 39 41 46 | 0 1 3 6 9 10 13 14 20 21 22 23 25 28 29 30 31 34 35 36 39 40 42 44 47 |
| **15 MHz** | 0 2 3 4 6 9 10 11 13 14 15 16 17 20 21 22 23 28 29 43 44 48 51 52 53 54 55 57 59 61 63 64 65 67 68 70 72 73 | 0 1 3 4 5 8 9 10 12 14 15 16 19 20 22 24 25 26 27 28 29 31 33 42 43 46 47 48 50 51 52 56 59 61 67 69 71 74 | 0 1 5 8 9 10 13 14 15 20 21 23 26 27 28 29 30 32 33 42 43 44 45 47 51 52 55 57 59 60 62 64 65 66 69 71 72 73 | 2 3 4 5 7 8 10 12 15 16 17 18 19 23 24 26 28 30 31 32 33 41 44 45 46 47 48 50 52 53 57 58 59 61 63 65 66 71 | 1 2 3 4 5 7 8 14 18 19 20 21 24 25 27 28 33 35 38 40 43 45 46 47 50 52 53 55 58 61 62 63 65 66 67 68 71 74 | 0 1 2 3 4 5 6 7 8 11 13 14 15 16 20 21 23 24 27 33 35 41 43 44 45 47 48 50 51 52 64 65 68 69 70 71 73 74 | 1 3 5 6 8 9 10 11 13 14 16 18 20 22 28 29 30 35 36 37 38 42 43 46 47 49 50 51 55 56 59 60 61 68 69 72 73 74 |
| **20 MHz** | 0 2 5 6 7 11 12 13 14 16 17 18 19 20 21 27 28 30 31 35 37 38 40 43 44 45 46 53 56 57 59 60 61 62 63 64 65 68 70 73 77 79 80 82 85 87 89 92 95 97 | 3 4 5 6 7 9 10 13 16 20 21 23 24 25 26 28 30 31 32 35 37 38 41 42 43 44 46 53 54 59 60 61 62 64 67 70 71 76 77 78 79 81 82 84 86 87 88 95 98 99 | 0 1 2 3 4 5 10 11 15 18 19 20 21 24 25 26 27 28 32 33 34 37 44 54 57 58 59 60 61 62 63 65 67 70 71 73 77 78 83 84 85 88 89 90 91 92 94 95 98 99 | 1 2 3 4 5 7 8 9 11 15 17 19 20 21 22 24 27 28 29 30 31 32 33 36 41 44 45 56 57 61 62 63 66 67 68 69 73 79 80 82 85 86 87 91 92 93 95 96 98 99 | 0 2 3 7 11 12 13 14 15 16 17 18 19 20 22 25 27 30 35 37 39 42 44 48 49 52 53 59 62 63 67 69 73 74 75 76 77 78 79 80 81 84 85 86 88 91 92 94 96 98 | 0 1 2 5 6 8 10 11 12 13 14 15 16 20 21 24 27 29 33 34 39 40 42 43 46 48 50 54 59 60 61 66 70 71 75 76 78 79 82 84 85 87 89 90 91 95 96 97 98 99 | 1 2 3 4 6 7 8 9 15 18 19 20 21 23 24 25 28 29 30 32 35 39 44 45 47 48 51 53 55 57 60 61 62 63 67 68 72 73 74 75 76 77 81 90 92 93 95 96 97 99 |

Table 6.1.1.6-4: Numbers () of the QPSK PRBs (TDD with NB-IoT inband/guard band)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Frame 1 | Subframe 0 | Subframe 1 | Subframe 4 | Subframe 5 | Subframe 6 | Subframe 9 |
| **3 MHz** | 0 1 2 3 11 12 14 | 0 1 2 3 11 12 13 | 1 2 7 8 10 13 14 | 0 1 2 3 11 12 14 | 0 1 2 3 11 12 13 | 0 3 6 8 9 10 14 |
| **5 MHz** | 1 2 3 5 6 8 17 18 19 20 21 23 24 | 0 1 2 3 4 5 7 8 17 18 19 20 22 | 1 2 3 8 12 13 14 17 20 21 22 23 24 | 1 2 3 5 6 7 8 17 18 19 20 21 24 | 0 1 2 3 4 5 7 8 17 18 19 20 22 | 1 2 4 6 7 8 9 14 16 18 21 23 24 |
| **10 MHz** | 2 3 4 6 7 10 11 13 15 17 18 19 29 30 34 35 37 38 39 41 42 46 47 48 49 | 1 3 4 5 6 7 9 10 12 14 16 17 28 30 34 35 36 37 38 39 40 41 43 44 48 | 1 4 5 6 7 11 12 13 14 15 17 20 21 26 27 31 32 34 37 38 41 42 46 48 49 | 2 3 4 6 7 8 9 10 11 13 14 16 18 19 20 21 29 32 34 39 41 43 44 45 46 | 1 3 4 5 6 7 9 10 12 14 16 17 28 30 34 35 36 37 38 39 40 41 43 44 48 | 1 2 5 6 8 11 13 14 15 16 18 20 21 24 25 27 30 32 34 35 37 40 43 46 47 |
| **15 MHz** | 1 3 5 6 9 10 11 13 15 17 20 21 23 24 25 26 27 28 29 33 42 44 45 51 52 53 56 57 58 61 62 63 65 66 70 71 73 74 | 3 4 5 6 7 8 9 10 13 14 15 16 19 20 21 22 24 25 28 31 32 33 43 45 46 49 51 52 55 58 59 60 61 62 64 66 67 72 | 0 1 2 3 7 8 9 10 11 12 17 19 21 22 23 24 27 28 30 31 32 37 40 41 45 48 51 53 55 56 57 58 61 63 65 66 70 73 | 3 4 7 8 10 11 12 13 14 16 18 19 20 22 24 25 27 28 30 32 41 42 43 44 45 46 48 50 51 62 65 67 68 69 70 71 73 74 | 3 4 5 6 7 8 9 10 13 14 15 16 19 20 21 22 24 25 28 31 32 33 43 45 46 49 51 52 55 58 59 60 61 62 64 66 67 72 | 1 3 8 9 11 12 13 14 15 17 22 23 24 25 28 29 30 31 34 37 40 41 42 46 48 49 51 54 55 56 61 62 63 67 70 71 73 74 |
| **20 MHz** | 2 4 7 8 9 10 11 12 13 14 18 20 21 23 25 27 28 31 32 34 35 37 38 39 44 46 53 56 58 60 61 68 69 70 71 74 75 76 78 79 80 82 83 85 87 88 93 95 97 99 | 4 5 6 7 8 9 11 12 13 14 16 17 19 20 22 25 27 29 33 37 38 40 41 42 43 44 45 53 54 57 58 61 62 65 67 68 70 73 78 80 82 83 86 88 89 90 91 93 95 97 | 4 9 12 13 15 17 19 20 21 22 29 30 31 36 37 39 40 41 42 43 46 48 49 50 53 54 56 57 58 60 64 66 71 72 73 74 75 80 82 83 86 87 89 90 92 94 95 96 98 99 | 2 3 4 5 8 9 10 11 12 14 15 17 18 19 22 24 26 27 28 30 32 35 36 37 40 41 42 46 53 55 58 60 61 62 63 64 65 66 68 74 77 82 84 85 87 92 93 97 98 99 | 4 5 6 7 8 9 11 12 13 14 16 17 19 20 22 25 27 29 33 37 38 40 41 42 43 44 45 53 54 57 58 61 62 65 67 68 70 73 78 80 82 83 86 88 89 90 91 93 95 97 | 0 1 3 4 5 7 8 12 13 14 15 17 19 20 22 23 25 26 30 32 33 35 37 38 39 41 44 45 48 49 50 51 58 59 62 63 67 68 70 72 75 82 84 85 90 92 93 94 96 98 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Frame 2 | Subframe 0 | Subframe 1 | Subframe 4 | Subframe 5 | Subframe 6 | Subframe 9 |
| **3 MHz** | 0 1 2 3 12 13 14 | 0 1 2 3 11 12 13 | 2 3 4 6 8 13 14 | 1 2 3 11 12 13 14 | 0 1 2 3 11 12 13 | 0 4 6 8 9 11 12 |
| **5 MHz** | 0 2 3 5 6 7 8 16 17 19 20 21 24 | 0 2 3 4 5 6 7 16 18 19 22 23 24 | 1 4 5 6 7 10 11 13 14 15 16 22 23 | 0 1 2 3 4 5 6 7 17 18 20 21 23 | 0 1 2 3 4 5 7 8 17 18 19 20 22 | 3 4 5 7 8 9 10 11 12 13 14 18 24 |
| **10 MHz** | 2 5 6 7 9 10 11 15 19 20 21 28 29 30 32 33 35 36 38 40 41 43 44 48 49 | 2 4 6 8 9 10 11 14 15 16 18 19 20 21 28 30 32 37 40 43 44 45 46 47 49 | 0 1 5 6 7 8 11 12 13 15 19 20 26 28 29 30 31 32 37 38 42 43 44 47 49 | 0 2 5 7 8 9 11 14 15 16 18 19 32 33 34 36 38 41 42 43 44 45 46 48 49 | 1 3 4 5 6 7 9 10 12 14 16 17 28 30 34 35 36 37 38 39 40 41 43 44 48 | 0 1 3 6 9 10 13 14 20 21 22 23 25 28 29 30 31 34 35 36 39 40 42 44 47 |
| **15 MHz** | 0 2 3 4 6 9 10 11 13 14 15 16 17 20 21 22 23 28 29 43 44 48 51 52 53 54 55 57 59 61 63 64 65 67 68 70 72 73 | 0 1 3 4 5 8 9 10 12 14 15 16 19 20 22 24 25 26 27 28 29 31 33 42 43 46 47 48 50 51 52 56 59 61 67 69 71 74 | 3 7 10 11 13 15 16 17 23 27 29 30 31 32 35 36 37 40 42 43 45 46 48 49 50 53 54 57 60 62 64 65 66 67 68 69 72 74 | 0 1 5 8 9 10 13 14 15 20 21 23 26 27 28 29 30 32 33 42 43 44 45 47 51 52 55 57 59 60 62 64 65 66 69 71 72 73 | 3 4 5 6 7 8 9 10 13 14 15 16 19 20 21 22 24 25 28 31 32 33 43 45 46 49 51 52 55 58 59 60 61 62 64 66 67 72 | 1 3 5 6 8 9 10 11 13 14 16 18 20 22 28 29 30 35 36 37 38 42 43 46 47 49 50 51 55 56 59 60 61 68 69 72 73 74 |
| **20 MHz** | 0 2 5 6 7 11 12 13 14 16 17 18 19 20 21 27 28 30 31 35 37 38 40 43 44 45 46 53 56 57 59 60 61 62 63 64 65 68 70 73 77 79 80 82 85 87 89 92 95 97 | 3 4 5 6 7 9 10 13 16 20 21 23 24 25 26 28 30 31 32 35 37 38 41 42 43 44 46 53 54 59 60 61 62 64 67 70 71 76 77 78 79 81 82 84 86 87 88 95 98 99 | 0 1 4 10 12 14 15 17 18 19 23 28 29 30 31 32 33 37 38 39 42 46 55 61 64 65 66 68 69 70 71 72 73 74 76 78 82 83 84 85 86 89 90 91 93 94 96 97 98 99 | 0 1 2 3 4 5 10 11 15 18 19 20 21 24 25 26 27 28 32 33 34 37 44 54 57 58 59 60 61 62 63 65 67 70 71 73 77 78 83 84 85 88 89 90 91 92 94 95 98 99 | 4 5 6 7 8 9 11 12 13 14 16 17 19 20 22 25 27 29 33 37 38 40 41 42 43 44 45 53 54 57 58 61 62 65 67 68 70 73 78 80 82 83 86 88 89 90 91 93 95 97 | 1 2 3 4 6 7 8 9 15 18 19 20 21 23 24 25 28 29 30 32 35 39 44 45 47 48 51 53 55 57 60 61 62 63 67 68 72 73 74 75 76 77 81 90 92 93 95 96 97 99 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Frame 3 | Subframe 0 | Subframe 1 | Subframe 4 | Subframe 5 | Subframe 6 | Subframe 9 |
| **3 MHz** | 2 4 7 8 9 10 11 | 0 1 2 3 11 12 13 | 0 1 3 4 5 13 14 | 0 1 2 3 11 12 13 | 0 1 2 3 11 12 13 | 0 1 2 11 12 13 14 |
| **5 MHz** | 1 2 3 5 7 10 12 14 16 18 20 21 24 | 0 1 2 3 4 5 7 8 17 18 19 20 22 | 1 4 5 9 11 13 15 18 20 21 22 23 24 | 1 2 3 4 5 6 8 16 17 19 20 22 23 | 0 1 2 3 4 5 7 8 17 18 19 20 22 | 1 2 3 4 5 7 8 16 17 19 20 22 24 |
| **10 MHz** | 0 2 3 6 7 8 10 11 12 15 16 19 20 22 24 25 29 31 33 35 37 42 46 47 49 | 1 3 4 5 6 7 9 10 12 14 16 17 28 30 34 35 36 37 38 39 40 41 43 44 48 | 0 1 2 5 6 7 8 9 10 15 16 17 18 22 23 25 26 28 29 30 31 32 39 41 46 | 2 5 8 9 11 12 13 14 16 18 20 21 28 29 30 31 32 33 34 42 44 45 46 47 49 | 1 3 4 5 6 7 9 10 12 14 16 17 28 30 34 35 36 37 38 39 40 41 43 44 48 | 0 1 2 4 6 7 8 9 11 13 14 18 19 29 34 35 36 39 41 42 44 45 47 48 49 |
| **15 MHz** | 1 2 3 4 5 7 8 14 18 19 20 21 24 25 27 28 33 35 38 40 43 45 46 47 50 52 53 55 58 61 62 63 65 66 67 68 71 74 | 3 4 5 6 7 8 9 10 13 14 15 16 19 20 21 22 24 25 28 31 32 33 43 45 46 49 51 52 55 58 59 60 61 62 64 66 67 72 | 0 1 2 3 4 5 6 7 8 11 13 14 15 16 20 21 23 24 27 33 35 41 43 44 45 47 48 50 51 52 64 65 68 69 70 71 73 74 | 2 6 7 8 9 10 11 13 16 17 18 19 20 21 22 23 26 30 31 41 43 45 46 47 48 51 55 57 58 62 63 64 65 69 70 71 73 74 | 3 4 5 6 7 8 9 10 13 14 15 16 19 20 21 22 24 25 28 31 32 33 43 45 46 49 51 52 55 58 59 60 61 62 64 66 67 72 | 2 3 4 5 7 8 10 12 15 16 17 18 19 23 24 26 28 30 31 32 33 41 44 45 46 47 48 50 52 53 57 58 59 61 63 65 66 71 |
| **20 MHz** | 0 2 3 7 11 12 13 14 15 16 17 18 19 20 22 25 27 30 35 37 39 42 44 48 49 52 53 59 62 63 67 69 73 74 75 76 77 78 79 80 81 84 85 86 88 91 92 94 96 98 | 4 5 6 7 8 9 11 12 13 14 16 17 19 20 22 25 27 29 33 37 38 40 41 42 43 44 45 53 54 57 58 61 62 65 67 68 70 73 78 80 82 83 86 88 89 90 91 93 95 97 | 0 1 2 5 6 8 10 11 12 13 14 15 16 20 21 24 27 29 33 34 39 40 42 43 46 48 50 54 59 60 61 66 70 71 75 76 78 79 82 84 85 87 89 90 91 95 96 97 98 99 | 0 2 3 4 10 11 12 13 14 17 18 22 23 25 26 27 28 30 31 32 36 37 38 40 41 43 54 55 57 58 60 61 63 64 66 68 70 74 76 77 81 82 84 85 87 88 92 94 95 98 | 4 5 6 7 8 9 11 12 13 14 16 17 19 20 22 25 27 29 33 37 38 40 41 42 43 44 45 53 54 57 58 61 62 65 67 68 70 73 78 80 82 83 86 88 89 90 91 93 95 97 | 1 2 3 4 5 7 8 9 11 15 17 19 20 21 22 24 27 28 29 30 31 32 33 36 41 44 45 56 57 61 62 63 66 67 68 69 73 79 80 82 85 86 87 91 92 93 95 96 98 99 |

#### 6.1.1.6a E-UTRA subslot TTI Test Model 3.3 (sE-TM3.3-1)

This model shall be used for subslot TTI tests on:

- Transmitted signal quality

- Frequency error

- EVM for QPSK modulation

Table 6.1.1.6a-1: Physical channel parameters of sE-TM3.3-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | 3 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Reference, Synchronisation Signals |  |  |  |  |  |
| RS boosting, PB = EB/EA | 1 | 1 | 1 | 1 | 1 |
| Synchronisation signal EPRE / ERS [dB] | 2.189 | 2.580 | 2.427 | 2.477 | 2.427 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| PBCH |  |  |  |  |  |
| PBCH EPRE / ERS [dB] | 2.189 | 2.580 | 2.427 | 2.477 | 2.427 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| PCFICH |  |  |  |  |  |
| # of symbols used for control channels | 1 | 1 | 1 | 1 | 1 |
| PCFICH EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| PHICH |  |  |  |  |  |
| # of PHICH groups | 1 | 1 | 2 | 2 | 3 |
| # of PHICH per group | 2 | 2 | 2 | 2 | 2 |
| PHICH BPSK symbol power / ERS [dB] | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 |
| PHICH group EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| sPDCCH |  |  |  |  |  |
| # of available sREGs | 30 (2OS) 45 (3OS) | 50 (2OS) 75 (3OS) | 100 (2OS) 150 (3OS) | 150 (2OS) 225 (3OS) | 200 (2OS) 300 (3OS) |
| # of sPDCCH | 2 | 2 | 5 | 7 | 10 |
| # of sCCEs per sPDCCH | 1 | 2 | 2 | 2 | 2 |
| # of sREGs per sCCE | 4 (2OS) 6 (3OS) | 4 (2OS) 6 (3OS) | 4 (2OS) 6 (3OS) | 4 (2OS) 6 (3OS) | 4 (2OS) 6 (3OS) |
| # of sREGs allocated to sPDCCH | 8 (2OS) 12 (3OS) | 16 (2OS) 24 (3OS) | 40 (2OS) 60 (3OS) | 56 (2OS) 84 (3OS) | 80 (2OS) 120 (3OS) |
| # of <NIL> sREGs added for padding | 22 (2OS) 33 (3OS) | 34 (2OS) 51 (3OS) | 60 (2OS) 90 (3OS) | 94 (2OS) 161 (3OS) | 120 (2OS) 180 (3OS) |
| sPDCCH sREG EPRE / ERS [dB] | 2.290 | 1.880 | 1.065 | 1.488 | 1.195 |
| <NIL> sREG EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| sPDSCH |  |  |  |  |  |
| # of QPSK sPDSCH PRBs within a subslot for which EVM is measured | 7 | 13 | 25 | 38 | 50 |
| PRB PA = EA/ERS [dB] | -6 | -6 | -6 | -6 | -6 |
| # of 16QAM sPDSCH PRBs within a subslot for which EVM is not measured (used for power balancing only) | 8 | 12 | 25 | 37 | 50 |
| PRB PA = EA/ERS [dB] | 2.189 | 2.580 | 2.427 | 2.477 | 2.427 |
| NOTE 1: Void. | | | | | | |

Table 6.1.1.6a-2: Numbers () of the QPSK PRBs (FDD)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 0 | | | | | | Subframe 1 | | | | | |
| Subslot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 |
| **5 MHz** | 0 1 3 6 7 8 16 17 18 20 21 23 24 | 0 1 2 4 5 6 9 10 12 17 18 20 24 | 0 1 2 3 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 12 13 15 17 18 20 21 24 | 0 2 4 6 7 12 13 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 18 21 22 24 | 1 3 4 5 7 9 10 11 12 15 21 22 24 | 0 1 2 3 4 7 10 14 18 19 20 21 24 | 1 4 8 9 10 11 12 13 15 16 18 20 23 | 1 2 3 4 5 6 9 10 11 13 16 17 23 | 0 1 3 6 7 8 16 17 18 20 21 23 24 | 0 1 2 4 5 6 9 10 12 17 18 20 24 |
| **10 MHz** | 1 2 3 5 6 7 8 9 10 11 15 16 20 28 31 32 33 35 36 39 40 42 46 47 48 | 1 2 4 5 6 7 9 11 15 18 20 21 22 24 25 27 29 34 35 36 37 40 44 46 49 | 0 3 5 6 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 34 38 41 42 49 | 0 1 2 3 5 6 8 14 16 18 22 23 26 28 30 32 34 38 39 40 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 16 17 18 21 23 25 31 33 37 41 42 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 15 19 20 28 29 30 31 34 36 37 42 44 48 49 | 0 1 4 5 6 8 9 10 13 16 17 18 19 20 21 24 29 30 31 32 35 37 38 39 47 | 0 2 3 4 5 6 7 9 10 12 16 17 18 19 22 24 25 26 30 31 34 37 42 45 48 | 5 7 8 9 14 15 16 21 22 27 28 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 3 9 11 13 16 17 18 21 24 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 | 1 2 3 5 6 7 8 9 10 11 15 16 20 28 31 32 33 35 36 39 40 42 46 47 48 | 1 2 4 5 6 7 9 11 15 18 20 21 22 24 25 27 29 34 35 36 37 40 44 46 49 |
| **15 MHz** | 0 1 2 3 5 6 7 8 9 12 16 17 18 19 20 21 23 24 25 28 29 30 31 32 33 42 47 48 49 53 60 63 65 67 68 70 71 73 | 0 1 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 38 46 47 49 50 51 53 54 55 57 59 60 61 67 68 69 70 73 74 | 2 11 12 13 15 17 18 21 22 24 25 26 29 31 32 33 34 40 42 45 46 47 50 51 52 54 58 59 60 61 62 63 64 68 70 71 72 74 | 2 3 4 6 7 9 11 12 15 17 20 24 27 30 33 34 35 38 39 42 43 45 46 48 49 55 56 59 60 61 62 65 67 69 70 71 73 74 | 4 5 6 8 10 13 17 22 25 26 27 28 29 30 31 32 33 34 35 38 41 44 46 48 50 52 53 54 56 59 60 64 67 69 70 71 73 74 | 0 2 3 4 7 8 11 14 18 20 23 24 25 27 29 42 43 45 46 47 48 49 50 51 54 56 60 62 63 65 66 67 68 69 70 71 72 73 | 1 2 9 11 14 15 18 25 26 28 29 30 31 32 33 36 37 38 39 41 43 45 46 50 53 54 58 59 60 62 63 65 67 68 70 71 72 73 | 3 4 6 7 8 11 12 19 20 23 24 26 27 28 30 33 34 35 40 41 42 46 49 51 53 54 58 59 60 61 62 65 67 69 70 71 72 73 | 0 1 2 3 7 8 9 10 13 14 15 17 18 19 22 23 24 25 26 27 28 32 36 37 39 46 47 50 53 56 61 62 63 68 69 71 73 74 | 0 3 7 8 11 13 14 16 18 19 23 25 27 28 29 30 32 35 41 42 44 46 47 48 50 53 55 57 59 61 62 64 66 67 68 69 70 71 | 0 1 2 3 5 6 7 8 9 12 16 17 18 19 20 21 23 24 25 28 29 30 31 32 33 42 47 48 49 53 60 63 65 67 68 70 71 73 | 0 1 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 38 46 47 49 50 51 53 54 55 57 59 60 61 67 68 69 70 73 74 |
| **20 MHz** | 0 1 4 6 10 13 14 15 16 20 22 23 25 26 28 29 30 31 32 33 36 39 41 42 44 45 54 56 57 60 63 66 67 68 72 76 77 79 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 7 9 10 13 19 20 21 22 23 24 25 26 27 30 33 34 35 36 47 48 49 50 51 53 54 55 57 59 60 61 64 65 67 68 75 76 77 80 81 83 84 86 87 89 90 93 95 99 | 1 2 3 6 8 10 11 15 16 17 19 21 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 54 60 62 63 64 65 69 72 76 79 81 84 86 88 89 90 93 94 99 | 5 7 9 10 12 14 15 16 21 22 23 24 27 28 29 30 33 34 35 36 37 39 41 44 45 47 49 54 55 56 57 64 66 68 70 72 76 77 80 81 85 86 87 90 91 92 94 95 98 99 | 2 3 4 5 6 7 14 15 17 19 21 22 24 26 37 40 42 43 44 47 49 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 81 82 83 84 85 86 87 89 94 95 96 97 99 | 1 2 5 6 8 9 12 13 21 22 25 26 27 28 29 31 32 34 35 39 40 43 45 46 53 57 59 61 62 63 64 66 68 69 71 73 75 77 78 82 83 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 13 22 25 26 27 29 31 32 33 36 37 38 39 43 45 48 49 52 53 55 59 62 63 64 71 72 73 74 75 77 78 81 82 84 86 89 91 93 97 98 99 | 0 1 3 4 5 7 10 11 15 18 19 20 21 26 27 29 30 31 33 35 39 40 41 43 44 46 47 49 50 53 55 56 62 64 65 66 67 69 70 71 72 74 83 84 86 92 93 94 96 98 | 2 3 4 7 9 11 13 15 16 24 25 27 29 31 33 35 36 40 43 44 45 46 49 51 52 53 54 55 56 57 59 63 64 65 68 71 77 78 81 82 83 84 85 86 90 91 93 94 98 99 | 0 4 6 7 8 10 11 13 16 18 21 22 23 26 29 32 35 36 37 43 44 46 47 48 49 53 54 57 59 60 61 64 66 67 68 69 70 72 76 78 80 81 82 84 87 89 91 92 95 96 | 0 1 4 6 10 13 14 15 16 20 22 23 25 26 28 29 30 31 32 33 36 39 41 42 44 45 54 56 57 60 63 66 67 68 72 76 77 79 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 7 9 10 13 19 20 21 22 23 24 25 26 27 30 33 34 35 36 47 48 49 50 51 53 54 55 57 59 60 61 64 65 67 68 75 76 77 80 81 83 84 86 87 89 90 93 95 99 |

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|  | Subframe 2 | | | | | | Subframe 3 | | | | | |
| Subslot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 |
| **5 MHz** | 0 1 2 3 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 12 13 15 17 18 20 21 24 | 0 2 4 6 7 12 13 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 18 21 22 24 | 1 3 4 5 7 9 10 11 12 15 21 22 24 | 0 1 2 3 4 7 10 14 18 19 20 21 24 | 1 4 8 9 10 11 12 13 15 16 18 20 23 | 1 2 3 4 5 6 9 10 11 13 16 17 23 | 0 1 3 6 7 8 16 17 18 20 21 23 24 | 0 1 2 4 5 6 9 10 12 17 18 20 24 | 0 1 2 3 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 12 13 15 17 18 20 21 24 |
| **10 MHz** | 0 3 5 6 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 34 38 41 42 49 | 0 1 2 3 5 6 8 14 16 18 22 23 26 28 30 32 34 38 39 40 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 16 17 18 21 23 25 31 33 37 41 42 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 15 19 20 28 29 30 31 34 36 37 42 44 48 49 | 0 1 4 5 6 8 9 10 13 16 17 18 19 20 21 24 29 30 31 32 35 37 38 39 47 | 0 2 3 4 5 6 7 9 10 12 16 17 18 19 22 24 25 26 30 31 34 37 42 45 48 | 5 7 8 9 14 15 16 21 22 27 28 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 3 9 11 13 16 17 18 21 24 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 | 1 2 3 5 6 7 8 9 10 11 15 16 20 28 31 32 33 35 36 39 40 42 46 47 48 | 1 2 4 5 6 7 9 11 15 18 20 21 22 24 25 27 29 34 35 36 37 40 44 46 49 | 0 3 5 6 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 34 38 41 42 49 | 0 1 2 3 5 6 8 14 16 18 22 23 26 28 30 32 34 38 39 40 41 42 45 46 47 |
| **15 MHz** | 2 11 12 13 15 17 18 21 22 24 25 26 29 31 32 33 34 40 42 45 46 47 50 51 52 54 58 59 60 61 62 63 64 68 70 71 72 74 | 2 3 4 6 7 9 11 12 15 17 20 24 27 30 33 34 35 38 39 42 43 45 46 48 49 55 56 59 60 61 62 65 67 69 70 71 73 74 | 4 5 6 8 10 13 17 22 25 26 27 28 29 30 31 32 33 34 35 38 41 44 46 48 50 52 53 54 56 59 60 64 67 69 70 71 73 74 | 0 2 3 4 7 8 11 14 18 20 23 24 25 27 29 42 43 45 46 47 48 49 50 51 54 56 60 62 63 65 66 67 68 69 70 71 72 73 | 1 2 9 11 14 15 18 25 26 28 29 30 31 32 33 36 37 38 39 41 43 45 46 50 53 54 58 59 60 62 63 65 67 68 70 71 72 73 | 3 4 6 7 8 11 12 19 20 23 24 26 27 28 30 33 34 35 40 41 42 46 49 51 53 54 58 59 60 61 62 65 67 69 70 71 72 73 | 0 1 2 3 7 8 9 10 13 14 15 17 18 19 22 23 24 25 26 27 28 32 36 37 39 46 47 50 53 56 61 62 63 68 69 71 73 74 | 0 3 7 8 11 13 14 16 18 19 23 25 27 28 29 30 32 35 41 42 44 46 47 48 50 53 55 57 59 61 62 64 66 67 68 69 70 71 | 0 1 2 3 5 6 7 8 9 12 16 17 18 19 20 21 23 24 25 28 29 30 31 32 33 42 47 48 49 53 60 63 65 67 68 70 71 73 | 0 1 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 38 46 47 49 50 51 53 54 55 57 59 60 61 67 68 69 70 73 74 | 2 11 12 13 15 17 18 21 22 24 25 26 29 31 32 33 34 40 42 45 46 47 50 51 52 54 58 59 60 61 62 63 64 68 70 71 72 74 | 2 3 4 6 7 9 11 12 15 17 20 24 27 30 33 34 35 38 39 42 43 45 46 48 49 55 56 59 60 61 62 65 67 69 70 71 73 74 |
| **20 MHz** | 1 2 3 6 8 10 11 15 16 17 19 21 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 54 60 62 63 64 65 69 72 76 79 81 84 86 88 89 90 93 94 99 | 5 7 9 10 12 14 15 16 21 22 23 24 27 28 29 30 33 34 35 36 37 39 41 44 45 47 49 54 55 56 57 64 66 68 70 72 76 77 80 81 85 86 87 90 91 92 94 95 98 99 | 2 3 4 5 6 7 14 15 17 19 21 22 24 26 37 40 42 43 44 47 49 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 81 82 83 84 85 86 87 89 94 95 96 97 99 | 1 2 5 6 8 9 12 13 21 22 25 26 27 28 29 31 32 34 35 39 40 43 45 46 53 57 59 61 62 63 64 66 68 69 71 73 75 77 78 82 83 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 13 22 25 26 27 29 31 32 33 36 37 38 39 43 45 48 49 52 53 55 59 62 63 64 71 72 73 74 75 77 78 81 82 84 86 89 91 93 97 98 99 | 0 1 3 4 5 7 10 11 15 18 19 20 21 26 27 29 30 31 33 35 39 40 41 43 44 46 47 49 50 53 55 56 62 64 65 66 67 69 70 71 72 74 83 84 86 92 93 94 96 98 | 2 3 4 7 9 11 13 15 16 24 25 27 29 31 33 35 36 40 43 44 45 46 49 51 52 53 54 55 56 57 59 63 64 65 68 71 77 78 81 82 83 84 85 86 90 91 93 94 98 99 | 0 4 6 7 8 10 11 13 16 18 21 22 23 26 29 32 35 36 37 43 44 46 47 48 49 53 54 57 59 60 61 64 66 67 68 69 70 72 76 78 80 81 82 84 87 89 91 92 95 96 | 0 1 4 6 10 13 14 15 16 20 22 23 25 26 28 29 30 31 32 33 36 39 41 42 44 45 54 56 57 60 63 66 67 68 72 76 77 79 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 7 9 10 13 19 20 21 22 23 24 25 26 27 30 33 34 35 36 47 48 49 50 51 53 54 55 57 59 60 61 64 65 67 68 75 76 77 80 81 83 84 86 87 89 90 93 95 99 | 1 2 3 6 8 10 11 15 16 17 19 21 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 54 60 62 63 64 65 69 72 76 79 81 84 86 88 89 90 93 94 99 | 5 7 9 10 12 14 15 16 21 22 23 24 27 28 29 30 33 34 35 36 37 39 41 44 45 47 49 54 55 56 57 64 66 68 70 72 76 77 80 81 85 86 87 90 91 92 94 95 98 99 |

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|  | Subframe 4 | | | | | | Subframe 5 | | | | | |
| Subslot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 |
| **5 MHz** | 0 2 4 6 7 12 13 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 18 21 22 24 | 1 3 4 5 7 9 10 11 12 15 21 22 24 | 0 1 2 3 4 7 10 14 18 19 20 21 24 | 1 4 8 9 10 11 12 13 15 16 18 20 23 | 1 2 3 4 5 6 9 10 11 13 16 17 23 | 0 1 3 6 7 8 16 17 18 20 21 23 24 | 0 1 2 4 5 6 9 10 12 17 18 20 24 | 0 1 2 3 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 12 13 15 17 18 20 21 24 | 0 2 4 6 7 12 13 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 18 21 22 24 |
| **10 MHz** | 0 3 6 7 8 9 10 12 13 16 17 18 21 23 25 31 33 37 41 42 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 15 19 20 28 29 30 31 34 36 37 42 44 48 49 | 0 1 4 5 6 8 9 10 13 16 17 18 19 20 21 24 29 30 31 32 35 37 38 39 47 | 0 2 3 4 5 6 7 9 10 12 16 17 18 19 22 24 25 26 30 31 34 37 42 45 48 | 5 7 8 9 14 15 16 21 22 27 28 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 3 9 11 13 16 17 18 21 24 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 | 1 2 3 5 6 7 8 9 10 11 15 16 20 28 31 32 33 35 36 39 40 42 46 47 48 | 1 2 4 5 6 7 9 11 15 18 20 21 22 24 25 27 29 34 35 36 37 40 44 46 49 | 0 3 5 6 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 34 38 41 42 49 | 0 1 2 3 5 6 8 14 16 18 22 23 26 28 30 32 34 38 39 40 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 16 17 18 21 23 25 31 33 37 41 42 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 15 19 20 28 29 30 31 34 36 37 42 44 48 49 |
| **15 MHz** | 4 5 6 8 10 13 17 22 25 26 27 28 29 30 31 32 33 34 35 38 41 44 46 48 50 52 53 54 56 59 60 64 67 69 70 71 73 74 | 0 2 3 4 7 8 11 14 18 20 23 24 25 27 29 42 43 45 46 47 48 49 50 51 54 56 60 62 63 65 66 67 68 69 70 71 72 73 | 1 2 9 11 14 15 18 25 26 28 29 30 31 32 33 36 37 38 39 41 43 45 46 50 53 54 58 59 60 62 63 65 67 68 70 71 72 73 | 3 4 6 7 8 11 12 19 20 23 24 26 27 28 30 33 34 35 40 41 42 46 49 51 53 54 58 59 60 61 62 65 67 69 70 71 72 73 | 0 1 2 3 7 8 9 10 13 14 15 17 18 19 22 23 24 25 26 27 28 32 36 37 39 46 47 50 53 56 61 62 63 68 69 71 73 74 | 0 3 7 8 11 13 14 16 18 19 23 25 27 28 29 30 32 35 41 42 44 46 47 48 50 53 55 57 59 61 62 64 66 67 68 69 70 71 | 0 1 2 3 5 6 7 8 9 12 16 17 18 19 20 21 23 24 25 28 29 30 31 32 33 42 47 48 49 53 60 63 65 67 68 70 71 73 | 0 1 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 38 46 47 49 50 51 53 54 55 57 59 60 61 67 68 69 70 73 74 | 2 11 12 13 15 17 18 21 22 24 25 26 29 31 32 33 34 40 42 45 46 47 50 51 52 54 58 59 60 61 62 63 64 68 70 71 72 74 | 2 3 4 6 7 9 11 12 15 17 20 24 27 30 33 34 35 38 39 42 43 45 46 48 49 55 56 59 60 61 62 65 67 69 70 71 73 74 | 4 5 6 8 10 13 17 22 25 26 27 28 29 30 31 32 33 34 35 38 41 44 46 48 50 52 53 54 56 59 60 64 67 69 70 71 73 74 | 0 2 3 4 7 8 11 14 18 20 23 24 25 27 29 42 43 45 46 47 48 49 50 51 54 56 60 62 63 65 66 67 68 69 70 71 72 73 |
| **20 MHz** | 2 3 4 5 6 7 14 15 17 19 21 22 24 26 37 40 42 43 44 47 49 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 81 82 83 84 85 86 87 89 94 95 96 97 99 | 1 2 5 6 8 9 12 13 21 22 25 26 27 28 29 31 32 34 35 39 40 43 45 46 53 57 59 61 62 63 64 66 68 69 71 73 75 77 78 82 83 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 13 22 25 26 27 29 31 32 33 36 37 38 39 43 45 48 49 52 53 55 59 62 63 64 71 72 73 74 75 77 78 81 82 84 86 89 91 93 97 98 99 | 0 1 3 4 5 7 10 11 15 18 19 20 21 26 27 29 30 31 33 35 39 40 41 43 44 46 47 49 50 53 55 56 62 64 65 66 67 69 70 71 72 74 83 84 86 92 93 94 96 98 | 2 3 4 7 9 11 13 15 16 24 25 27 29 31 33 35 36 40 43 44 45 46 49 51 52 53 54 55 56 57 59 63 64 65 68 71 77 78 81 82 83 84 85 86 90 91 93 94 98 99 | 0 4 6 7 8 10 11 13 16 18 21 22 23 26 29 32 35 36 37 43 44 46 47 48 49 53 54 57 59 60 61 64 66 67 68 69 70 72 76 78 80 81 82 84 87 89 91 92 95 96 | 0 1 4 6 10 13 14 15 16 20 22 23 25 26 28 29 30 31 32 33 36 39 41 42 44 45 54 56 57 60 63 66 67 68 72 76 77 79 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 7 9 10 13 19 20 21 22 23 24 25 26 27 30 33 34 35 36 47 48 49 50 51 53 54 55 57 59 60 61 64 65 67 68 75 76 77 80 81 83 84 86 87 89 90 93 95 99 | 1 2 3 6 8 10 11 15 16 17 19 21 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 54 60 62 63 64 65 69 72 76 79 81 84 86 88 89 90 93 94 99 | 5 7 9 10 12 14 15 16 21 22 23 24 27 28 29 30 33 34 35 36 37 39 41 44 45 47 49 54 55 56 57 64 66 68 70 72 76 77 80 81 85 86 87 90 91 92 94 95 98 99 | 2 3 4 5 6 7 14 15 17 19 21 22 24 26 37 40 42 43 44 47 49 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 81 82 83 84 85 86 87 89 94 95 96 97 99 | 1 2 5 6 8 9 12 13 21 22 25 26 27 28 29 31 32 34 35 39 40 43 45 46 53 57 59 61 62 63 64 66 68 69 71 73 75 77 78 82 83 84 85 86 93 94 95 96 97 99 |

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|  | Subframe 6 | | | | | | Subframe 7 | | | | | |
| Subslot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 |
| **5 MHz** | 1 3 4 5 7 9 10 11 12 15 21 22 24 | 0 1 2 3 4 7 10 14 18 19 20 21 24 | 1 4 8 9 10 11 12 13 15 16 18 20 23 | 1 2 3 4 5 6 9 10 11 13 16 17 23 | 0 1 3 6 7 8 16 17 18 20 21 23 24 | 0 1 2 4 5 6 9 10 12 17 18 20 24 | 0 1 2 3 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 12 13 15 17 18 20 21 24 | 0 2 4 6 7 12 13 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 18 21 22 24 | 1 3 4 5 7 9 10 11 12 15 21 22 24 | 0 1 2 3 4 7 10 14 18 19 20 21 24 |
| **10 MHz** | 0 1 4 5 6 8 9 10 13 16 17 18 19 20 21 24 29 30 31 32 35 37 38 39 47 | 0 2 3 4 5 6 7 9 10 12 16 17 18 19 22 24 25 26 30 31 34 37 42 45 48 | 5 7 8 9 14 15 16 21 22 27 28 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 3 9 11 13 16 17 18 21 24 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 | 1 2 3 5 6 7 8 9 10 11 15 16 20 28 31 32 33 35 36 39 40 42 46 47 48 | 1 2 4 5 6 7 9 11 15 18 20 21 22 24 25 27 29 34 35 36 37 40 44 46 49 | 0 3 5 6 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 34 38 41 42 49 | 0 1 2 3 5 6 8 14 16 18 22 23 26 28 30 32 34 38 39 40 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 16 17 18 21 23 25 31 33 37 41 42 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 15 19 20 28 29 30 31 34 36 37 42 44 48 49 | 0 1 4 5 6 8 9 10 13 16 17 18 19 20 21 24 29 30 31 32 35 37 38 39 47 | 0 2 3 4 5 6 7 9 10 12 16 17 18 19 22 24 25 26 30 31 34 37 42 45 48 |
| **15 MHz** | 1 2 9 11 14 15 18 25 26 28 29 30 31 32 33 36 37 38 39 41 43 45 46 50 53 54 58 59 60 62 63 65 67 68 70 71 72 73 | 3 4 6 7 8 11 12 19 20 23 24 26 27 28 30 33 34 35 40 41 42 46 49 51 53 54 58 59 60 61 62 65 67 69 70 71 72 73 | 0 1 2 3 7 8 9 10 13 14 15 17 18 19 22 23 24 25 26 27 28 32 36 37 39 46 47 50 53 56 61 62 63 68 69 71 73 74 | 0 3 7 8 11 13 14 16 18 19 23 25 27 28 29 30 32 35 41 42 44 46 47 48 50 53 55 57 59 61 62 64 66 67 68 69 70 71 | 0 1 2 3 5 6 7 8 9 12 16 17 18 19 20 21 23 24 25 28 29 30 31 32 33 42 47 48 49 53 60 63 65 67 68 70 71 73 | 0 1 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 38 46 47 49 50 51 53 54 55 57 59 60 61 67 68 69 70 73 74 | 2 11 12 13 15 17 18 21 22 24 25 26 29 31 32 33 34 40 42 45 46 47 50 51 52 54 58 59 60 61 62 63 64 68 70 71 72 74 | 2 3 4 6 7 9 11 12 15 17 20 24 27 30 33 34 35 38 39 42 43 45 46 48 49 55 56 59 60 61 62 65 67 69 70 71 73 74 | 4 5 6 8 10 13 17 22 25 26 27 28 29 30 31 32 33 34 35 38 41 44 46 48 50 52 53 54 56 59 60 64 67 69 70 71 73 74 | 0 2 3 4 7 8 11 14 18 20 23 24 25 27 29 42 43 45 46 47 48 49 50 51 54 56 60 62 63 65 66 67 68 69 70 71 72 73 | 1 2 9 11 14 15 18 25 26 28 29 30 31 32 33 36 37 38 39 41 43 45 46 50 53 54 58 59 60 62 63 65 67 68 70 71 72 73 | 3 4 6 7 8 11 12 19 20 23 24 26 27 28 30 33 34 35 40 41 42 46 49 51 53 54 58 59 60 61 62 65 67 69 70 71 72 73 |
| **20 MHz** | 0 1 2 3 5 8 9 10 12 13 22 25 26 27 29 31 32 33 36 37 38 39 43 45 48 49 52 53 55 59 62 63 64 71 72 73 74 75 77 78 81 82 84 86 89 91 93 97 98 99 | 0 1 3 4 5 7 10 11 15 18 19 20 21 26 27 29 30 31 33 35 39 40 41 43 44 46 47 49 50 53 55 56 62 64 65 66 67 69 70 71 72 74 83 84 86 92 93 94 96 98 | 2 3 4 7 9 11 13 15 16 24 25 27 29 31 33 35 36 40 43 44 45 46 49 51 52 53 54 55 56 57 59 63 64 65 68 71 77 78 81 82 83 84 85 86 90 91 93 94 98 99 | 0 4 6 7 8 10 11 13 16 18 21 22 23 26 29 32 35 36 37 43 44 46 47 48 49 53 54 57 59 60 61 64 66 67 68 69 70 72 76 78 80 81 82 84 87 89 91 92 95 96 | 0 1 4 6 10 13 14 15 16 20 22 23 25 26 28 29 30 31 32 33 36 39 41 42 44 45 54 56 57 60 63 66 67 68 72 76 77 79 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 7 9 10 13 19 20 21 22 23 24 25 26 27 30 33 34 35 36 47 48 49 50 51 53 54 55 57 59 60 61 64 65 67 68 75 76 77 80 81 83 84 86 87 89 90 93 95 99 | 1 2 3 6 8 10 11 15 16 17 19 21 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 54 60 62 63 64 65 69 72 76 79 81 84 86 88 89 90 93 94 99 | 5 7 9 10 12 14 15 16 21 22 23 24 27 28 29 30 33 34 35 36 37 39 41 44 45 47 49 54 55 56 57 64 66 68 70 72 76 77 80 81 85 86 87 90 91 92 94 95 98 99 | 2 3 4 5 6 7 14 15 17 19 21 22 24 26 37 40 42 43 44 47 49 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 81 82 83 84 85 86 87 89 94 95 96 97 99 | 1 2 5 6 8 9 12 13 21 22 25 26 27 28 29 31 32 34 35 39 40 43 45 46 53 57 59 61 62 63 64 66 68 69 71 73 75 77 78 82 83 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 13 22 25 26 27 29 31 32 33 36 37 38 39 43 45 48 49 52 53 55 59 62 63 64 71 72 73 74 75 77 78 81 82 84 86 89 91 93 97 98 99 | 0 1 3 4 5 7 10 11 15 18 19 20 21 26 27 29 30 31 33 35 39 40 41 43 44 46 47 49 50 53 55 56 62 64 65 66 67 69 70 71 72 74 83 84 86 92 93 94 96 98 |

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|  | Subframe 8 | | | | | | Subframe 9 | | | | | |
| Subslot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 |
| **5 MHz** | 1 4 8 9 10 11 12 13 15 16 18 20 23 | 1 2 3 4 5 6 9 10 11 13 16 17 23 | 0 1 3 6 7 8 16 17 18 20 21 23 24 | 0 1 2 4 5 6 9 10 12 17 18 20 24 | 0 1 2 3 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 12 13 15 17 18 20 21 24 | 0 2 4 6 7 12 13 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 18 21 22 24 | 1 3 4 5 7 9 10 11 12 15 21 22 24 | 0 1 2 3 4 7 10 14 18 19 20 21 24 | 1 4 8 9 10 11 12 13 15 16 18 20 23 | 1 2 3 4 5 6 9 10 11 13 16 17 23 |
| **10 MHz** | 5 7 8 9 14 15 16 21 22 27 28 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 3 9 11 13 16 17 18 21 24 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 | 1 2 3 5 6 7 8 9 10 11 15 16 20 28 31 32 33 35 36 39 40 42 46 47 48 | 1 2 4 5 6 7 9 11 15 18 20 21 22 24 25 27 29 34 35 36 37 40 44 46 49 | 0 3 5 6 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 34 38 41 42 49 | 0 1 2 3 5 6 8 14 16 18 22 23 26 28 30 32 34 38 39 40 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 16 17 18 21 23 25 31 33 37 41 42 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 15 19 20 28 29 30 31 34 36 37 42 44 48 49 | 0 1 4 5 6 8 9 10 13 16 17 18 19 20 21 24 29 30 31 32 35 37 38 39 47 | 0 2 3 4 5 6 7 9 10 12 16 17 18 19 22 24 25 26 30 31 34 37 42 45 48 | 5 7 8 9 14 15 16 21 22 27 28 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 3 9 11 13 16 17 18 21 24 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 |
| **15 MHz** | 0 1 2 3 7 8 9 10 13 14 15 17 18 19 22 23 24 25 26 27 28 32 36 37 39 46 47 50 53 56 61 62 63 68 69 71 73 74 | 0 3 7 8 11 13 14 16 18 19 23 25 27 28 29 30 32 35 41 42 44 46 47 48 50 53 55 57 59 61 62 64 66 67 68 69 70 71 | 0 1 2 3 5 6 7 8 9 12 16 17 18 19 20 21 23 24 25 28 29 30 31 32 33 42 47 48 49 53 60 63 65 67 68 70 71 73 | 0 1 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 38 46 47 49 50 51 53 54 55 57 59 60 61 67 68 69 70 73 74 | 2 11 12 13 15 17 18 21 22 24 25 26 29 31 32 33 34 40 42 45 46 47 50 51 52 54 58 59 60 61 62 63 64 68 70 71 72 74 | 2 3 4 6 7 9 11 12 15 17 20 24 27 30 33 34 35 38 39 42 43 45 46 48 49 55 56 59 60 61 62 65 67 69 70 71 73 74 | 4 5 6 8 10 13 17 22 25 26 27 28 29 30 31 32 33 34 35 38 41 44 46 48 50 52 53 54 56 59 60 64 67 69 70 71 73 74 | 0 2 3 4 7 8 11 14 18 20 23 24 25 27 29 42 43 45 46 47 48 49 50 51 54 56 60 62 63 65 66 67 68 69 70 71 72 73 | 1 2 9 11 14 15 18 25 26 28 29 30 31 32 33 36 37 38 39 41 43 45 46 50 53 54 58 59 60 62 63 65 67 68 70 71 72 73 | 3 4 6 7 8 11 12 19 20 23 24 26 27 28 30 33 34 35 40 41 42 46 49 51 53 54 58 59 60 61 62 65 67 69 70 71 72 73 | 0 1 2 3 7 8 9 10 13 14 15 17 18 19 22 23 24 25 26 27 28 32 36 37 39 46 47 50 53 56 61 62 63 68 69 71 73 74 | 0 3 7 8 11 13 14 16 18 19 23 25 27 28 29 30 32 35 41 42 44 46 47 48 50 53 55 57 59 61 62 64 66 67 68 69 70 71 |
| **20 MHz** | 2 3 4 7 9 11 13 15 16 24 25 27 29 31 33 35 36 40 43 44 45 46 49 51 52 53 54 55 56 57 59 63 64 65 68 71 77 78 81 82 83 84 85 86 90 91 93 94 98 99 | 0 4 6 7 8 10 11 13 16 18 21 22 23 26 29 32 35 36 37 43 44 46 47 48 49 53 54 57 59 60 61 64 66 67 68 69 70 72 76 78 80 81 82 84 87 89 91 92 95 96 | 0 1 4 6 10 13 14 15 16 20 22 23 25 26 28 29 30 31 32 33 36 39 41 42 44 45 54 56 57 60 63 66 67 68 72 76 77 79 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 7 9 10 13 19 20 21 22 23 24 25 26 27 30 33 34 35 36 47 48 49 50 51 53 54 55 57 59 60 61 64 65 67 68 75 76 77 80 81 83 84 86 87 89 90 93 95 99 | 1 2 3 6 8 10 11 15 16 17 19 21 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 54 60 62 63 64 65 69 72 76 79 81 84 86 88 89 90 93 94 99 | 5 7 9 10 12 14 15 16 21 22 23 24 27 28 29 30 33 34 35 36 37 39 41 44 45 47 49 54 55 56 57 64 66 68 70 72 76 77 80 81 85 86 87 90 91 92 94 95 98 99 | 2 3 4 5 6 7 14 15 17 19 21 22 24 26 37 40 42 43 44 47 49 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 81 82 83 84 85 86 87 89 94 95 96 97 99 | 1 2 5 6 8 9 12 13 21 22 25 26 27 28 29 31 32 34 35 39 40 43 45 46 53 57 59 61 62 63 64 66 68 69 71 73 75 77 78 82 83 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 13 22 25 26 27 29 31 32 33 36 37 38 39 43 45 48 49 52 53 55 59 62 63 64 71 72 73 74 75 77 78 81 82 84 86 89 91 93 97 98 99 | 0 1 3 4 5 7 10 11 15 18 19 20 21 26 27 29 30 31 33 35 39 40 41 43 44 46 47 49 50 53 55 56 62 64 65 66 67 69 70 71 72 74 83 84 86 92 93 94 96 98 | 2 3 4 7 9 11 13 15 16 24 25 27 29 31 33 35 36 40 43 44 45 46 49 51 52 53 54 55 56 57 59 63 64 65 68 71 77 78 81 82 83 84 85 86 90 91 93 94 98 99 | 0 4 6 7 8 10 11 13 16 18 21 22 23 26 29 32 35 36 37 43 44 46 47 48 49 53 54 57 59 60 61 64 66 67 68 69 70 72 76 78 80 81 82 84 87 89 91 92 95 96 |

#### 6.1.1.6b E-UTRA slot TTI Test Model 3.3 (sE-TM3.3-2)

This model shall be used for slot TTI tests on:

- Transmitted signal quality

- Frequency error

- EVM for QPSK modulation

Table 6.1.1.6b-1: Physical channel parameters of sE-TM3.3-2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | 3 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Reference, Synchronisation Signals |  |  |  |  |  |
| RS boosting, PB = EB/EA | 1 | 1 | 1 | 1 | 1 |
| Synchronisation signal EPRE / ERS [dB] | 2.189 | 2.580 | 2.427 | 2.477 | 2.427 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| PBCH |  |  |  |  |  |
| PBCH EPRE / ERS [dB] | 2.189 | 2.580 | 2.427 | 2.477 | 2.427 |
| Reserved EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| PCFICH |  |  |  |  |  |
| # of symbols used for control channels | 1 | 1 | 1 | 1 | 1 |
| PCFICH EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| PHICH |  |  |  |  |  |
| # of PHICH groups | 1 | 1 | 2 | 2 | 3 |
| # of PHICH per group | 2 | 2 | 2 | 2 | 2 |
| PHICH BPSK symbol power / ERS [dB] | -3.010 | -3.010 | -3.010 | -3.010 | -3.010 |
| PHICH group EPRE / ERS [dB] | 0 | 0 | 0 | 0 | 0 |
| sPDCCH |  |  |  |  |  |
| # of available sREGs | 105 | 155 | 350 | 525 | 700 |
| # of sPDCCH | 2 | 2 | 5 | 7 | 10 |
| # of sCCEs per sPDCCH | 1 | 2 | 2 | 2 | 2 |
| # of sREGs per sCCE | 4 | 4 | 4 | 4 | 4 |
| # of sREGs allocated to sPDCCH | 8 | 16 | 40 | 56 | 80 |
| # of <NIL> sREGs added for padding | 97 | 139 | 310 | 469 | 620 |
| sPDCCH sREG EPRE / ERS [dB] | 2.290 | 1.880 | 1.065 | 1.488 | 1.195 |
| <NIL> sREG EPRE / ERS [dB] | -inf | -inf | -inf | -inf | -inf |
| sPDSCH |  |  |  |  |  |
| # of QPSK sPDSCH sPRBs within a slot for which EVM is measured | 7 | 13 | 25 | 38 | 50 |
| sPRB PA = EA/ERS [dB] | -6 | -6 | -6 | -6 | -6 |
| # of 16QAM sPDSCH sPRBs within a slot for which EVM is not measured (used for power balancing only) | 8 | 12 | 25 | 37 | 50 |
| sPRB PA = EA/ERS [dB] | 2.189 | 2.580 | 2.427 | 2.477 | 2.427 |
| NOTE 1: Void. | | | | | | |

Table 6.1.1.6b-2: Numbers () of the QPSK PRBs (FDD)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 0 | | Subframe 1 | | Subframe 2 | | Subframe 3 | | Subframe 4 | | Subframe 5 | |
| Slot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 | 0 1 2 3 11 12 13 | 0 3 4 10 11 12 13 |
| **5 MHz** | 0 1 3 6 7 8 16 17 18 20 21 23 24 | 0 1 2 4 5 6 9 10 12 17 18 20 24 | 0 1 2 3 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 12 13 15 17 18 20 21 24 | 0 2 4 6 7 12 13 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 18 21 22 24 | 1 3 4 5 7 9 10 11 12 15 21 22 24 | 0 1 2 3 4 7 10 14 18 19 20 21 24 | 1 4 8 9 10 11 12 13 15 16 18 20 23 | 1 2 3 4 5 6 9 10 11 13 16 17 23 | 0 1 3 6 7 8 16 17 18 20 21 23 24 | 0 1 2 4 5 6 9 10 12 17 18 20 24 |
| **10 MHz** | 1 2 3 5 6 7 8 9 10 11 15 16 20 28 31 32 33 35 36 39 40 42 46 47 48 | 1 2 4 5 6 7 9 11 15 18 20 21 22 24 25 27 29 34 35 36 37 40 44 46 49 | 0 3 5 6 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 34 38 41 42 49 | 0 1 2 3 5 6 8 14 16 18 22 23 26 28 30 32 34 38 39 40 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 16 17 18 21 23 25 31 33 37 41 42 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 15 19 20 28 29 30 31 34 36 37 42 44 48 49 | 0 1 4 5 6 8 9 10 13 16 17 18 19 20 21 24 29 30 31 32 35 37 38 39 47 | 0 2 3 4 5 6 7 9 10 12 16 17 18 19 22 24 25 26 30 31 34 37 42 45 48 | 5 7 8 9 14 15 16 21 22 27 28 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 3 9 11 13 16 17 18 21 24 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 | 1 2 3 5 6 7 8 9 10 11 15 16 20 28 31 32 33 35 36 39 40 42 46 47 48 | 1 2 4 5 6 7 9 11 15 18 20 21 22 24 25 27 29 34 35 36 37 40 44 46 49 |
| **15 MHz** | 0 1 2 3 5 6 7 8 9 12 16 17 18 19 20 21 23 24 25 28 29 30 31 32 33 42 47 48 49 53 60 63 65 67 68 70 71 73 | 0 1 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 38 46 47 49 50 51 53 54 55 57 59 60 61 67 68 69 70 73 74 | 2 11 12 13 15 17 18 21 22 24 25 26 29 31 32 33 34 40 42 45 46 47 50 51 52 54 58 59 60 61 62 63 64 68 70 71 72 74 | 2 3 4 6 7 9 11 12 15 17 20 24 27 30 33 34 35 38 39 42 43 45 46 48 49 55 56 59 60 61 62 65 67 69 70 71 73 74 | 4 5 6 8 10 13 17 22 25 26 27 28 29 30 31 32 33 34 35 38 41 44 46 48 50 52 53 54 56 59 60 64 67 69 70 71 73 74 | 0 2 3 4 7 8 11 14 18 20 23 24 25 27 29 42 43 45 46 47 48 49 50 51 54 56 60 62 63 65 66 67 68 69 70 71 72 73 | 1 2 9 11 14 15 18 25 26 28 29 30 31 32 33 36 37 38 39 41 43 45 46 50 53 54 58 59 60 62 63 65 67 68 70 71 72 73 | 3 4 6 7 8 11 12 19 20 23 24 26 27 28 30 33 34 35 40 41 42 46 49 51 53 54 58 59 60 61 62 65 67 69 70 71 72 73 | 0 1 2 3 7 8 9 10 13 14 15 17 18 19 22 23 24 25 26 27 28 32 36 37 39 46 47 50 53 56 61 62 63 68 69 71 73 74 | 0 3 7 8 11 13 14 16 18 19 23 25 27 28 29 30 32 35 41 42 44 46 47 48 50 53 55 57 59 61 62 64 66 67 68 69 70 71 | 0 1 2 3 5 6 7 8 9 12 16 17 18 19 20 21 23 24 25 28 29 30 31 32 33 42 47 48 49 53 60 63 65 67 68 70 71 73 | 0 1 3 4 5 6 7 8 11 18 20 21 24 25 26 27 29 30 31 38 46 47 49 50 51 53 54 55 57 59 60 61 67 68 69 70 73 74 |
| **20 MHz** | 0 1 4 6 10 13 14 15 16 20 22 23 25 26 28 29 30 31 32 33 36 39 41 42 44 45 54 56 57 60 63 66 67 68 72 76 77 79 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 7 9 10 13 19 20 21 22 23 24 25 26 27 30 33 34 35 36 47 48 49 50 51 53 54 55 57 59 60 61 64 65 67 68 75 76 77 80 81 83 84 86 87 89 90 93 95 99 | 1 2 3 6 8 10 11 15 16 17 19 21 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 54 60 62 63 64 65 69 72 76 79 81 84 86 88 89 90 93 94 99 | 5 7 9 10 12 14 15 16 21 22 23 24 27 28 29 30 33 34 35 36 37 39 41 44 45 47 49 54 55 56 57 64 66 68 70 72 76 77 80 81 85 86 87 90 91 92 94 95 98 99 | 2 3 4 5 6 7 14 15 17 19 21 22 24 26 37 40 42 43 44 47 49 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 81 82 83 84 85 86 87 89 94 95 96 97 99 | 1 2 5 6 8 9 12 13 21 22 25 26 27 28 29 31 32 34 35 39 40 43 45 46 53 57 59 61 62 63 64 66 68 69 71 73 75 77 78 82 83 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 13 22 25 26 27 29 31 32 33 36 37 38 39 43 45 48 49 52 53 55 59 62 63 64 71 72 73 74 75 77 78 81 82 84 86 89 91 93 97 98 99 | 0 1 3 4 5 7 10 11 15 18 19 20 21 26 27 29 30 31 33 35 39 40 41 43 44 46 47 49 50 53 55 56 62 64 65 66 67 69 70 71 72 74 83 84 86 92 93 94 96 98 | 2 3 4 7 9 11 13 15 16 24 25 27 29 31 33 35 36 40 43 44 45 46 49 51 52 53 54 55 56 57 59 63 64 65 68 71 77 78 81 82 83 84 85 86 90 91 93 94 98 99 | 0 4 6 7 8 10 11 13 16 18 21 22 23 26 29 32 35 36 37 43 44 46 47 48 49 53 54 57 59 60 61 64 66 67 68 69 70 72 76 78 80 81 82 84 87 89 91 92 95 96 | 0 1 4 6 10 13 14 15 16 20 22 23 25 26 28 29 30 31 32 33 36 39 41 42 44 45 54 56 57 60 63 66 67 68 72 76 77 79 82 84 85 87 88 91 92 94 95 97 98 99 | 1 3 7 9 10 13 19 20 21 22 23 24 25 26 27 30 33 34 35 36 47 48 49 50 51 53 54 55 57 59 60 61 64 65 67 68 75 76 77 80 81 83 84 86 87 89 90 93 95 99 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 6 | | Subframe 7 | | Subframe 8 | | Subframe 9 | |
| slot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 |
| **3 MHz** | 0 2 3 5 6 11 13 | 0 1 4 5 7 10 12 | 0 2 3 4 9 10 13 | 0 1 2 3 11 12 14 | 4 5 6 8 11 13 14 | 2 5 6 9 12 13 14 | 0 3 4 7 8 9 11 | 1 2 3 4 5 11 12 |
| **5 MHz** | 0 1 2 3 9 10 12 13 14 19 20 23 24 | 0 5 6 8 10 12 13 15 17 18 20 21 24 | 0 2 4 6 7 12 13 15 16 17 22 23 24 | 0 1 2 3 4 6 7 8 16 18 21 22 24 | 1 3 4 5 7 9 10 11 12 15 21 22 24 | 0 1 2 3 4 7 10 14 18 19 20 21 24 | 1 4 8 9 10 11 12 13 15 16 18 20 23 | 1 2 3 4 5 6 9 10 11 13 16 17 23 |
| **10 MHz** | 0 3 5 6 11 12 14 17 18 19 20 21 22 24 25 26 27 28 29 31 34 38 41 42 49 | 0 1 2 3 5 6 8 14 16 18 22 23 26 28 30 32 34 38 39 40 41 42 45 46 47 | 0 3 6 7 8 9 10 12 13 16 17 18 21 23 25 31 33 37 41 42 45 46 47 48 49 | 0 2 3 4 5 7 9 10 11 12 13 15 19 20 28 29 30 31 34 36 37 42 44 48 49 | 0 1 4 5 6 8 9 10 13 16 17 18 19 20 21 24 29 30 31 32 35 37 38 39 47 | 0 2 3 4 5 6 7 9 10 12 16 17 18 19 22 24 25 26 30 31 34 37 42 45 48 | 5 7 8 9 14 15 16 21 22 27 28 30 31 32 34 35 37 38 41 42 43 44 46 48 49 | 3 9 11 13 16 17 18 21 24 27 28 29 30 32 34 37 38 39 40 41 42 45 47 48 49 |
| **15 MHz** | 2 11 12 13 15 17 18 21 22 24 25 26 29 31 32 33 34 40 42 45 46 47 50 51 52 54 58 59 60 61 62 63 64 68 70 71 72 74 | 2 3 4 6 7 9 11 12 15 17 20 24 27 30 33 34 35 38 39 42 43 45 46 48 49 55 56 59 60 61 62 65 67 69 70 71 73 74 | 4 5 6 8 10 13 17 22 25 26 27 28 29 30 31 32 33 34 35 38 41 44 46 48 50 52 53 54 56 59 60 64 67 69 70 71 73 74 | 0 2 3 4 7 8 11 14 18 20 23 24 25 27 29 42 43 45 46 47 48 49 50 51 54 56 60 62 63 65 66 67 68 69 70 71 72 73 | 1 2 9 11 14 15 18 25 26 28 29 30 31 32 33 36 37 38 39 41 43 45 46 50 53 54 58 59 60 62 63 65 67 68 70 71 72 73 | 3 4 6 7 8 11 12 19 20 23 24 26 27 28 30 33 34 35 40 41 42 46 49 51 53 54 58 59 60 61 62 65 67 69 70 71 72 73 | 0 1 2 3 7 8 9 10 13 14 15 17 18 19 22 23 24 25 26 27 28 32 36 37 39 46 47 50 53 56 61 62 63 68 69 71 73 74 | 0 3 7 8 11 13 14 16 18 19 23 25 27 28 29 30 32 35 41 42 44 46 47 48 50 53 55 57 59 61 62 64 66 67 68 69 70 71 |
| **20 MHz** | 1 2 3 6 8 10 11 15 16 17 19 21 25 26 28 29 30 32 33 35 38 39 40 41 42 43 44 46 49 51 52 54 60 62 63 64 65 69 72 76 79 81 84 86 88 89 90 93 94 99 | 5 7 9 10 12 14 15 16 21 22 23 24 27 28 29 30 33 34 35 36 37 39 41 44 45 47 49 54 55 56 57 64 66 68 70 72 76 77 80 81 85 86 87 90 91 92 94 95 98 99 | 2 3 4 5 6 7 14 15 17 19 21 22 24 26 37 40 42 43 44 47 49 51 54 56 57 60 62 63 65 66 67 70 71 73 76 77 78 81 82 83 84 85 86 87 89 94 95 96 97 99 | 1 2 5 6 8 9 12 13 21 22 25 26 27 28 29 31 32 34 35 39 40 43 45 46 53 57 59 61 62 63 64 66 68 69 71 73 75 77 78 82 83 84 85 86 93 94 95 96 97 99 | 0 1 2 3 5 8 9 10 12 13 22 25 26 27 29 31 32 33 36 37 38 39 43 45 48 49 52 53 55 59 62 63 64 71 72 73 74 75 77 78 81 82 84 86 89 91 93 97 98 99 | 0 1 3 4 5 7 10 11 15 18 19 20 21 26 27 29 30 31 33 35 39 40 41 43 44 46 47 49 50 53 55 56 62 64 65 66 67 69 70 71 72 74 83 84 86 92 93 94 96 98 | 2 3 4 7 9 11 13 15 16 24 25 27 29 31 33 35 36 40 43 44 45 46 49 51 52 53 54 55 56 57 59 63 64 65 68 71 77 78 81 82 83 84 85 86 90 91 93 94 98 99 | 0 4 6 7 8 10 11 13 16 18 21 22 23 26 29 32 35 36 37 43 44 46 47 48 49 53 54 57 59 60 61 64 66 67 68 69 70 72 76 78 80 81 82 84 87 89 91 92 95 96 |

Table 6.1.1.6b-3: Numbers () of the QPSK PRBs (TDD)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subframe 0 | | Subframe 1 | | Subframe 5 | | Subframe 6 | | Subframe 7 | | Subframe 8 | |
| slot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 0 1 2 3 11 12 14 | 0 1 2 3 11 12 13 | 0 1 2 3 11 12 14 | 0 1 2 3 11 12 13 | 1 2 7 8 10 13 14 | 2 3 4 6 8 13 14 | 0 3 6 8 9 10 14 | 0 1 2 3 11 12 14 | 0 1 2 3 11 12 13 | 0 1 2 3 11 12 14 | 0 1 2 3 11 12 13 | 1 2 7 8 10 13 14 |
| **5 MHz** | 1 2 3 5 6 8 17 18 19 20 21 23 24 | 0 1 2 3 4 5 7 8 17 18 19 20 22 | 1 2 3 5 6 7 8 17 18 19 20 21 24 | 1 2 3 4 5 6 8 16 17 19 20 22 23 | 1 2 3 8 12 13 14 17 20 21 22 23 24 | 1 4 5 6 7 10 11 13 14 15 16 22 23 | 1 2 4 6 7 8 9 14 16 18 21 23 24 | 1 2 3 5 6 8 17 18 19 20 21 23 24 | 0 1 2 3 4 5 7 8 17 18 19 20 22 | 1 2 3 5 6 7 8 17 18 19 20 21 24 | 1 2 3 4 5 6 8 16 17 19 20 22 23 | 1 2 3 8 12 13 14 17 20 21 22 23 24 |
| **10 MHz** | 2 3 4 6 7 10 11 13 15 17 18 19 29 30 34 35 37 38 39 41 42 46 47 48 49 | 1 3 4 5 6 7 9 10 12 14 16 17 28 30 34 35 36 37 38 39 40 41 43 44 48 | 2 3 4 6 7 8 9 10 11 13 14 16 18 19 20 21 29 32 34 39 41 43 44 45 46 | 2 5 8 9 11 12 13 14 16 18 20 21 28 29 30 31 32 33 34 42 44 45 46 47 49 | 1 4 5 6 7 11 12 13 14 15 17 20 21 26 27 31 32 34 37 38 41 42 46 48 49 | 0 1 5 6 7 8 11 12 13 15 19 20 26 28 29 30 31 32 37 38 42 43 44 47 49 | 1 2 5 6 8 11 13 14 15 16 18 20 21 24 25 27 30 32 34 35 37 40 43 46 47 | 2 3 4 6 7 10 11 13 15 17 18 19 29 30 34 35 37 38 39 41 42 46 47 48 49 | 1 3 4 5 6 7 9 10 12 14 16 17 28 30 34 35 36 37 38 39 40 41 43 44 48 | 2 3 4 6 7 8 9 10 11 13 14 16 18 19 20 21 29 32 34 39 41 43 44 45 46 | 2 5 8 9 11 12 13 14 16 18 20 21 28 29 30 31 32 33 34 42 44 45 46 47 49 | 1 4 5 6 7 11 12 13 14 15 17 20 21 26 27 31 32 34 37 38 41 42 46 48 49 |
| **15 MHz** | 1 3 5 6 9 10 11 13 15 17 20 21 23 24 25 26 27 28 29 33 42 44 45 51 52 53 56 57 58 61 62 63 65 66 70 71 73 74 | 3 4 5 6 7 8 9 10 13 14 15 16 19 20 21 22 24 25 28 31 32 33 43 45 46 49 51 52 55 58 59 60 61 62 64 66 67 72 | 3 4 7 8 10 11 12 13 14 16 18 19 20 22 24 25 27 28 30 32 41 42 43 44 45 46 48 50 51 62 65 67 68 69 70 71 73 74 | 2 6 7 8 9 10 11 13 16 17 18 19 20 21 22 23 26 30 31 41 43 45 46 47 48 51 55 57 58 62 63 64 65 69 70 71 73 74 | 0 1 2 3 7 8 9 10 11 12 17 19 21 22 23 24 27 28 30 31 32 37 40 41 45 48 51 53 55 56 57 58 61 63 65 66 70 73 | 3 7 10 11 13 15 16 17 23 27 29 30 31 32 35 36 37 40 42 43 45 46 48 49 50 53 54 57 60 62 64 65 66 67 68 69 72 74 | 1 3 8 9 11 12 13 14 15 17 22 23 24 25 28 29 30 31 34 37 40 41 42 46 48 49 51 54 55 56 61 62 63 67 70 71 73 74 | 1 3 5 6 9 10 11 13 15 17 20 21 23 24 25 26 27 28 29 33 42 44 45 51 52 53 56 57 58 61 62 63 65 66 70 71 73 74 | 3 4 5 6 7 8 9 10 13 14 15 16 19 20 21 22 24 25 28 31 32 33 43 45 46 49 51 52 55 58 59 60 61 62 64 66 67 72 | 3 4 7 8 10 11 12 13 14 16 18 19 20 22 24 25 27 28 30 32 41 42 43 44 45 46 48 50 51 62 65 67 68 69 70 71 73 74 | 2 6 7 8 9 10 11 13 16 17 18 19 20 21 22 23 26 30 31 41 43 45 46 47 48 51 55 57 58 62 63 64 65 69 70 71 73 74 | 0 1 2 3 7 8 9 10 11 12 17 19 21 22 23 24 27 28 30 31 32 37 40 41 45 48 51 53 55 56 57 58 61 63 65 66 70 73 |
| **20 MHz** | 2 4 7 8 9 10 11 12 13 14 18 20 21 23 25 27 28 31 32 34 35 37 38 39 44 46 53 56 58 60 61 68 69 70 71 74 75 76 78 79 80 82 83 85 87 88 93 95 97 99 | 4 5 6 7 8 9 11 12 13 14 16 17 19 20 22 25 27 29 33 37 38 40 41 42 43 44 45 53 54 57 58 61 62 65 67 68 70 73 78 80 82 83 86 88 89 90 91 93 95 97 | 2 3 4 5 8 9 10 11 12 14 15 17 18 19 22 24 26 27 28 30 32 35 36 37 40 41 42 46 53 55 58 60 61 62 63 64 65 66 68 74 77 82 84 85 87 92 93 97 98 99 | 0 2 3 4 10 11 12 13 14 17 18 22 23 25 26 27 28 30 31 32 36 37 38 40 41 43 54 55 57 58 60 61 63 64 66 68 70 74 76 77 81 82 84 85 87 88 92 94 95 98 | 4 9 12 13 15 17 19 20 21 22 29 30 31 36 37 39 40 41 42 43 46 48 49 50 53 54 56 57 58 60 64 66 71 72 73 74 75 80 82 83 86 87 89 90 92 94 95 96 98 99 | 0 1 4 10 12 14 15 17 18 19 23 28 29 30 31 32 33 37 38 39 42 46 55 61 64 65 66 68 69 70 71 72 73 74 76 78 82 83 84 85 86 89 90 91 93 94 96 97 98 99 | 0 1 3 4 5 7 8 12 13 14 15 17 19 20 22 23 25 26 30 32 33 35 37 38 39 41 44 45 48 49 50 51 58 59 62 63 67 68 70 72 75 82 84 85 90 92 93 94 96 98 | 2 4 7 8 9 10 11 12 13 14 18 20 21 23 25 27 28 31 32 34 35 37 38 39 44 46 53 56 58 60 61 68 69 70 71 74 75 76 78 79 80 82 83 85 87 88 93 95 97 99 | 4 5 6 7 8 9 11 12 13 14 16 17 19 20 22 25 27 29 33 37 38 40 41 42 43 44 45 53 54 57 58 61 62 65 67 68 70 73 78 80 82 83 86 88 89 90 91 93 95 97 | 2 3 4 5 8 9 10 11 12 14 15 17 18 19 22 24 26 27 28 30 32 35 36 37 40 41 42 46 53 55 58 60 61 62 63 64 65 66 68 74 77 82 84 85 87 92 93 97 98 99 | 0 2 3 4 10 11 12 13 14 17 18 22 23 25 26 27 28 30 31 32 36 37 38 40 41 43 54 55 57 58 60 61 63 64 66 68 70 74 76 77 81 82 84 85 87 88 92 94 95 98 | 4 9 12 13 15 17 19 20 21 22 29 30 31 36 37 39 40 41 42 43 46 48 49 50 53 54 56 57 58 60 64 66 71 72 73 74 75 80 82 83 86 87 89 90 92 94 95 96 98 99 |

|  |  |  |
| --- | --- | --- |
| Frame 1 | Subframe 9 | |
| subslot | 0 | 1 |
| **3 MHz** | 2 3 4 6 8 13 14 | 0 3 6 8 9 10 14 |
| **5 MHz** | 1 4 5 6 7 10 11 13 14 15 16 22 23 | 1 2 4 6 7 8 9 14 16 18 21 23 24 |
| **10 MHz** | 0 1 5 6 7 8 11 12 13 15 19 20 26 28 29 30 31 32 37 38 42 43 44 47 49 | 1 2 5 6 8 11 13 14 15 16 18 20 21 24 25 27 30 32 34 35 37 40 43 46 47 |
| **15 MHz** | 3 7 10 11 13 15 16 17 23 27 29 30 31 32 35 36 37 40 42 43 45 46 48 49 50 53 54 57 60 62 64 65 66 67 68 69 72 74 | 1 3 8 9 11 12 13 14 15 17 22 23 24 25 28 29 30 31 34 37 40 41 42 46 48 49 51 54 55 56 61 62 63 67 70 71 73 74 |
| **20 MHz** | 0 1 4 10 12 14 15 17 18 19 23 28 29 30 31 32 33 37 38 39 42 46 55 61 64 65 66 68 69 70 71 72 73 74 76 78 82 83 84 85 86 89 90 91 93 94 96 97 98 99 | 0 1 3 4 5 7 8 12 13 14 15 17 19 20 22 23 25 26 30 32 33 35 37 38 39 41 44 45 48 49 50 51 58 59 62 63 67 68 70 72 75 82 84 85 90 92 93 94 96 98 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Frame 2 | Subframe 0 | | Subframe 1 | | Subframe 5 | | Subframe 6 | | Subframe 7 | | Subframe 8 | |
| slot | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| **3 MHz** | 0 1 2 3 12 13 14 | 0 1 2 3 11 12 13 | 1 2 3 11 12 13 14 | 0 1 2 11 12 13 14 | 2 4 7 8 9 10 11 | 0 1 3 4 5 13 14 | 0 4 6 8 9 11 12 | 0 1 2 3 12 13 14 | 0 1 2 3 11 12 13 | 1 2 3 11 12 13 14 | 0 1 2 11 12 13 14 | 2 4 7 8 9 10 11 |
| **5 MHz** | 0 2 3 5 6 7 8 16 17 19 20 21 24 | 0 2 3 4 5 6 7 16 18 19 22 23 24 | 0 1 2 3 4 5 6 7 17 18 20 21 23 | 1 2 3 4 5 7 8 16 17 19 20 22 24 | 1 2 3 5 7 10 12 14 16 18 20 21 24 | 1 4 5 9 11 13 15 18 20 21 22 23 24 | 3 4 5 7 8 9 10 11 12 13 14 18 24 | 0 2 3 5 6 7 8 16 17 19 20 21 24 | 0 2 3 4 5 6 7 16 18 19 22 23 24 | 0 1 2 3 4 5 6 7 17 18 20 21 23 | 1 2 3 4 5 7 8 16 17 19 20 22 24 | 1 2 3 5 7 10 12 14 16 18 20 21 24 |
| **10 MHz** | 2 5 6 7 9 10 11 15 19 20 21 28 29 30 32 33 35 36 38 40 41 43 44 48 49 | 2 4 6 8 9 10 11 14 15 16 18 19 20 21 28 30 32 37 40 43 44 45 46 47 49 | 0 2 5 7 8 9 11 14 15 16 18 19 32 33 34 36 38 41 42 43 44 45 46 48 49 | 0 1 2 4 6 7 8 9 11 13 14 18 19 29 34 35 36 39 41 42 44 45 47 48 49 | 0 2 3 6 7 8 10 11 12 15 16 19 20 22 24 25 29 31 33 35 37 42 46 47 49 | 0 1 2 5 6 7 8 9 10 15 16 17 18 22 23 25 26 28 29 30 31 32 39 41 46 | 0 1 3 6 9 10 13 14 20 21 22 23 25 28 29 30 31 34 35 36 39 40 42 44 47 | 2 5 6 7 9 10 11 15 19 20 21 28 29 30 32 33 35 36 38 40 41 43 44 48 49 | 2 4 6 8 9 10 11 14 15 16 18 19 20 21 28 30 32 37 40 43 44 45 46 47 49 | 0 2 5 7 8 9 11 14 15 16 18 19 32 33 34 36 38 41 42 43 44 45 46 48 49 | 0 1 2 4 6 7 8 9 11 13 14 18 19 29 34 35 36 39 41 42 44 45 47 48 49 | 0 2 3 6 7 8 10 11 12 15 16 19 20 22 24 25 29 31 33 35 37 42 46 47 49 |
| **15 MHz** | 0 2 3 4 6 9 10 11 13 14 15 16 17 20 21 22 23 28 29 43 44 48 51 52 53 54 55 57 59 61 63 64 65 67 68 70 72 73 | 0 1 3 4 5 8 9 10 12 14 15 16 19 20 22 24 25 26 27 28 29 31 33 42 43 46 47 48 50 51 52 56 59 61 67 69 71 74 | 0 1 5 8 9 10 13 14 15 20 21 23 26 27 28 29 30 32 33 42 43 44 45 47 51 52 55 57 59 60 62 64 65 66 69 71 72 73 | 2 3 4 5 7 8 10 12 15 16 17 18 19 23 24 26 28 30 31 32 33 41 44 45 46 47 48 50 52 53 57 58 59 61 63 65 66 71 | 1 2 3 4 5 7 8 14 18 19 20 21 24 25 27 28 33 35 38 40 43 45 46 47 50 52 53 55 58 61 62 63 65 66 67 68 71 74 | 0 1 2 3 4 5 6 7 8 11 13 14 15 16 20 21 23 24 27 33 35 41 43 44 45 47 48 50 51 52 64 65 68 69 70 71 73 74 | 1 3 5 6 8 9 10 11 13 14 16 18 20 22 28 29 30 35 36 37 38 42 43 46 47 49 50 51 55 56 59 60 61 68 69 72 73 74 | 0 2 3 4 6 9 10 11 13 14 15 16 17 20 21 22 23 28 29 43 44 48 51 52 53 54 55 57 59 61 63 64 65 67 68 70 72 73 | 0 1 3 4 5 8 9 10 12 14 15 16 19 20 22 24 25 26 27 28 29 31 33 42 43 46 47 48 50 51 52 56 59 61 67 69 71 74 | 0 1 5 8 9 10 13 14 15 20 21 23 26 27 28 29 30 32 33 42 43 44 45 47 51 52 55 57 59 60 62 64 65 66 69 71 72 73 | 2 3 4 5 7 8 10 12 15 16 17 18 19 23 24 26 28 30 31 32 33 41 44 45 46 47 48 50 52 53 57 58 59 61 63 65 66 71 | 1 2 3 4 5 7 8 14 18 19 20 21 24 25 27 28 33 35 38 40 43 45 46 47 50 52 53 55 58 61 62 63 65 66 67 68 71 74 |
| **20 MHz** | 0 2 5 6 7 11 12 13 14 16 17 18 19 20 21 27 28 30 31 35 37 38 40 43 44 45 46 53 56 57 59 60 61 62 63 64 65 68 70 73 77 79 80 82 85 87 89 92 95 97 | 3 4 5 6 7 9 10 13 16 20 21 23 24 25 26 28 30 31 32 35 37 38 41 42 43 44 46 53 54 59 60 61 62 64 67 70 71 76 77 78 79 81 82 84 86 87 88 95 98 99 | 0 1 2 3 4 5 10 11 15 18 19 20 21 24 25 26 27 28 32 33 34 37 44 54 57 58 59 60 61 62 63 65 67 70 71 73 77 78 83 84 85 88 89 90 91 92 94 95 98 99 | 1 2 3 4 5 7 8 9 11 15 17 19 20 21 22 24 27 28 29 30 31 32 33 36 41 44 45 56 57 61 62 63 66 67 68 69 73 79 80 82 85 86 87 91 92 93 95 96 98 99 | 0 2 3 7 11 12 13 14 15 16 17 18 19 20 22 25 27 30 35 37 39 42 44 48 49 52 53 59 62 63 67 69 73 74 75 76 77 78 79 80 81 84 85 86 88 91 92 94 96 98 | 0 1 2 5 6 8 10 11 12 13 14 15 16 20 21 24 27 29 33 34 39 40 42 43 46 48 50 54 59 60 61 66 70 71 75 76 78 79 82 84 85 87 89 90 91 95 96 97 98 99 | 1 2 3 4 6 7 8 9 15 18 19 20 21 23 24 25 28 29 30 32 35 39 44 45 47 48 51 53 55 57 60 61 62 63 67 68 72 73 74 75 76 77 81 90 92 93 95 96 97 99 | 0 2 5 6 7 11 12 13 14 16 17 18 19 20 21 27 28 30 31 35 37 38 40 43 44 45 46 53 56 57 59 60 61 62 63 64 65 68 70 73 77 79 80 82 85 87 89 92 95 97 | 3 4 5 6 7 9 10 13 16 20 21 23 24 25 26 28 30 31 32 35 37 38 41 42 43 44 46 53 54 59 60 61 62 64 67 70 71 76 77 78 79 81 82 84 86 87 88 95 98 99 | 0 1 2 3 4 5 10 11 15 18 19 20 21 24 25 26 27 28 32 33 34 37 44 54 57 58 59 60 61 62 63 65 67 70 71 73 77 78 83 84 85 88 89 90 91 92 94 95 98 99 | 1 2 3 4 5 7 8 9 11 15 17 19 20 21 22 24 27 28 29 30 31 32 33 36 41 44 45 56 57 61 62 63 66 67 68 69 73 79 80 82 85 86 87 91 92 93 95 96 98 99 | 0 2 3 7 11 12 13 14 15 16 17 18 19 20 22 25 27 30 35 37 39 42 44 48 49 52 53 59 62 63 67 69 73 74 75 76 77 78 79 80 81 84 85 86 88 91 92 94 96 98 |

|  |  |  |
| --- | --- | --- |
| Frame 2 | Subframe 9 | |
| slot | 0 | 1 |
| **3 MHz** | 0 1 3 4 5 13 14 | 0 4 6 8 9 11 12 |
| **5 MHz** | 1 4 5 9 11 13 15 18 20 21 22 23 24 | 3 4 5 7 8 9 10 11 12 13 14 18 24 |
| **10 MHz** | 0 1 2 5 6 7 8 9 10 15 16 17 18 22 23 25 26 28 29 30 31 32 39 41 46 | 0 1 3 6 9 10 13 14 20 21 22 23 25 28 29 30 31 34 35 36 39 40 42 44 47 |
| **15 MHz** | 0 1 2 3 4 5 6 7 8 11 13 14 15 16 20 21 23 24 27 33 35 41 43 44 45 47 48 50 51 52 64 65 68 69 70 71 73 74 | 1 3 5 6 8 9 10 11 13 14 16 18 20 22 28 29 30 35 36 37 38 42 43 46 47 49 50 51 55 56 59 60 61 68 69 72 73 74 |
| **20 MHz** | 0 1 2 5 6 8 10 11 12 13 14 15 16 20 21 24 27 29 33 34 39 40 42 43 46 48 50 54 59 60 61 66 70 71 75 76 78 79 82 84 85 87 89 90 91 95 96 97 98 99 | 1 2 3 4 6 7 8 9 15 18 19 20 21 23 24 25 28 29 30 32 35 39 44 45 47 48 51 53 55 57 60 61 62 63 67 68 72 73 74 75 76 77 81 90 92 93 95 96 97 99 |

### 6.1.2 Data content of Physical channels and Signals for E-TM

Randomisation of the data content is obtained by utilizing the length-31 Gold sequence scrambling of TS36.211, Clause 7.2 [12] which is invoked by all physical channels prior to modulation and mapping to the RE grid. An appropriate number of ‘0’ bits shall be generated prior to the scrambling.

In case multiple carriers are configured with E-TMs, the  shall be incremented by 1 for each additional configured carrier.

Initialization of the scrambler and RE-mappers as defined in TS36.211 [12] use the following additional parameters:

-  = 0 (used for PBCH)

- The E-TM shall start when  = 0

-  = 1 for the lowest configured carrier,  = 2 for the 2nd lowest configured carrier,…,  = n for the nth configured carrier

- *p* = 0 (data generated according to definitions in TS36.211 for antenna port 0). *p* = 0 shall be used for the generation of the E-TM data, even if the signal is transmitted on a physical port other than port 0.

- *q* = 0 (single code word)

#### 6.1.2.1 Reference signals

Sequence generation, modulation and mapping to REs according to TS36.211, clause 6.10.1

#### 6.1.2.2 Primary Synchronization signal

Sequence generation, modulation and mapping to REs according to TS36.211, clause 6.11.1

#### 6.1.2.3 Secondary Synchronization signal

Sequence generation, modulation and mapping to REs according to TS36.211, clause 6.11.2

#### 6.1.2.4 PBCH

- 240 REs (480 bits) are available for PBCH for the duration of the E-UTRA test models (1 frame, 10 ms)

- Generate 480 bits of ‘all 0’ data

- Initialize scrambling generator for each invocation of the E-TM, i.e. set always  = 0

- Perform scrambling according to TS36.211, clause 6.6.1 of the 480 bits

- Perform modulation according to TS36.211, clause 6.6.2

- Perform mapping to REs according to TS36.211, clause 6.6.4

#### 6.1.2.5 PCFICH

- Generate 32 bit CFI codeword according to TS36.212, clause 5.3.4.

- Perform scrambling according to TS36.211, clause 6.7.1

- Perform modulation according to TS36.211, clause 6.7.2

- Perform mapping to REs according to TS36.211, clause 6.7.4

#### 6.1.2.6 PHICH

- PHICH duration is assumed as ‘Normal’ according to TS36.211, clause 6.9.3

- Set  = 1/6 to obtain , see TS36.211, clause 6.9

- Use 2 PHICH per group,  = 0, 4

- For frame structure type 2 the factor  shall not be set as per TS36.211, Table 6.9-1, but instead shall be set to  for all transmitted subframes (Note).

- For each subframe the required amount of HARQ Indicators (HI) is as follows: \*(2 PHICH per group).

- Generate this amount of HIs using ‘0’ data for each HI.

- Generate 3 bit HI codeword according to TS36.212, clause 5.3.5

- Perform scrambling and modulation according to TS36.211, clause 6.9.1

- Perform mapping to REs according to TS36.211, clause 6.9.3

NOTE: This is in order to preserve commonality between FDD and TDD E-TM.

#### 6.1.2.7 PDCCH

- For each subframe the required amount of bits for all PDCCHs is as follows: (# of PDCCH)\*(# of CCE per PDCCH)\* (9 REG per CCE)\*(4 RE per REG)\*(2 bits per RE) with these parameters according to the E-TM definitions in subclause 6.1.1

- Generate this amount of bits according to ‘all 0’ data

- Numbering of CCEs shall be according to TS36.211, clause 6.8.1. Mapping of PDCCHs to the available CCEs is performed as follows: First PDCCH is mapped to CCE(0), second PDCCH to CCE(0+ ‘# of CCEs per PDCCH’), … etc. The remaining resources not used for PDCCH are treated as <NIL> REGs according to TS36.211, clause 6.8.2

- Perform PDCCH multiplexing and scrambling according to TS36.211, clause 6.8.2

- Perform modulation according to TS36.211, clause 6.8.3

- Perform mapping to REs according to TS36.211, clause 6.8.5

#### 6.1.2.8 PDSCH or sPDSCH

- For each subframe generate the required amount of bits for all PRBs according to ‘all 0’ data

- PRB numbering is according to TS36.211, clause 6.2.3

- E-TMs utilize 1 user or 2 user PDSCH transmissions distinguished by . For each E-TM, PRBs are mapped to users () according to their respective PRB attribute as follows:

Table 6.1.2.8-1: Mapping of PRBs to  for each E-TM

|  |  |
| --- | --- |
|  |  |
| E-TM1.1 | 0 for all PRBs |
| E-TM1.2 | 0 for boosted PRBs or those with PA = 0dB  1 for de-boosted PRBs |
| E-TM2 | 0 for all PRBs |
| E-TM3.1 | 0 for all PRBs |
| E-TM3.2 | 0 for QPSKPRBs  1 for 16QAM PRBs |
| E-TM3.3 | 0 for 16QAM PRBs  1 for QPSK PRBs |

- The required amount of PDSCH (sPDSCH for sTTI) ‘0’ bits within a subframes and allocated PRBs shall be generated for each user

- Perform user specific scrambling according to TS36.211, clause 6.3.1. This makes use of .

- Perform modulation of the scrambled bits with the modulation scheme defined for each user according to TS36.211, clause 6.3.2

- Perform mapping of the complex-valued symbols to PRBs according to TS36.211, clause 6.3.5.

#### 6.1.2.9 sPDCCH

- For each subslot (sublsot TTI) the required amount of bits for all sPDCCHs is as follows: (# of sPDCCH)\*(# of sCCE per sPDCCH)\* (NSREG sREG per sCCE)\*(12 RE per sREG)\*(2 bits per RE) with these parameters according to the E-TM definitions in subclause 6.1.1, with NSREG = 4 (for 2 symbols) or 6 (for 3 symbols)

- For each slot (slot TTI) the required amount of bits for all sPDCCHs is as follows: (# of sPDCCH)\*(# of sCCE per sPDCCH)\* (4 sREG per sCCE)\*(12 RE per sREG)\*(2 bits per RE) with these parameters according to the E-TM definitions in subclause 6.1.1

- Generate this amount of bits according to ‘all 0’ data

- Numbering of sCCEs shall be according to TS36.211, clause 6.8C.1. Mapping of sPDCCHs to the available sCCEs is performed as follows: First sPDCCH is mapped to sCCE(0), second sPDCCH to sCCE(0+ ‘# of sCCEs per sPDCCH’), … etc. The remaining resources not used for sPDCCH are treated as <NIL> sREGs according to TS36.211, clause 6.8C.2

- Perform sPDCCH multiplexing and scrambling according to TS36.211, clause 6.8C.2

- Perform modulation according to TS36.211, clause 6.8C.3

- Perform mapping to REs according to TS36.211, clause 6.8C.5

### 6.1.3 NB-IoT Test Model

The set-up of physical channels for transmitter tests shall be according to the NB-IoT Test Model (N-TM) below.

The following general parameters are used:

- The test models are defined for a single antenna port (using *p* = 1000);

- Duration is 10 subframes (10 ms)

- Normal CP

The following physical channel parameters are used:

- The ratio of synchronisation signal EPRE and NRS EPRE is 0 dB

- NPDCCH format 1

For NB-IoT TDD, test models are derived based on the uplink/downlink configuration 1 and special subframe configuration 7 defined in TS 36.211 [12], i.e. as showing in the table 6.1.3-1. Number of frames for the test models is 2.

Table 6.1.3-1: Configurations of TDD eNB test models

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Downlink-to-Uplink  Switch-point periodicity | Number of UL/DL sub-frames per radio frame (10 ms) | | DwPTS | GP | UpPTS |
| DL | UL |
| 5ms | 4 | 4 |  |  |  |

### 6.1.4 Data content of Physical channels and Signals for N-TM

Data content of physical channels and signals for NB-IoT should be fully aligned the specification statement in TS36.211. Detail configuration for the tranmistter characteristic tests are used as follows,

In case multiple NB-IoT carriers are configured with N-TMs, the  for the nth configured NB-IoT carrier shall be equal to 97+6\*n+max(0,m-1), where m is equal to 0 for stand-alone NB-IoT carrier or equal to the Cell ID of the E-UTRA carrier containing the in-band/guard-band NB-IoT carrier.

Initialization of the scrambler and RE-mappers as defined in TS36.211 use the following additional parameters:

-  = 0

- The N-TM shall start when  = 0

- *p* = 1000 shall be used for the generation of the N-TM data

-  = 103 for the lowest configured stand-alone NB-IoT carrier or in-band/guard-band NB-IoT carrier(s) within the lowest E-UTRA carrier,  = 109 for the 2nd lowest configured NB-IoT stand-alone carrier or 110 for the in-band/guard-band NB-IoT carrier(s) within the 2nd lowest E-UTRA carrier,…,  = 97+6\*n+max(0,m-1) for the nth configured NB-IoT stand-alone carrier or in-band/guard-band NB-IoT carrier(s) within the mth E-UTRA carrier

#### 6.1.4.1 Reference signals

Sequence generation, modulation and mapping to REs according to TS36.211, clause 10.2.6.

#### 6.1.4.2 Synchronization signals

Sequence generation, modulation and mapping to REs according to TS36.211, clause 10.2.7.

#### 6.1.4.3 NPBCH

- 100 REs (200 bits) are available for NPBCH for the duration of the NB-IoT test model (1 frame, 10 ms)

- Generate 200 bits of ‘all 0’ data

- Initialize scrambling generator for each invocation of the N-TM, i.e. set always  = 0

- Perform scrambling according to TS36.211, clause 10.2.4.1

- Perform modulation according to TS36.211, clause 10.2.4.2

- Perform mapping to REs according to TS36.211, clause 10.2.4.4

#### 6.1.4.4 NPDCCH

- NPDCCH is on the first of all available subframes which not transmit synchronization signals and NPBCH in the duration of the NB-IoT test model. The number of available bits (304 bits for stand-alone and guard band operation, or 200 bits for in-band operation) for NPDCCH is depended on the higher layer parameter *operationModeInfo* according to TS36.213, clause 16.6.1.

- Generate the amount of NPDCCH bits according to ‘all 0’ data

- Perform NPDCCH scrambling according to TS36.211, clause 10.2.5.2

- Perform modulation according to TS36.211, clause 10.2.5.3

- Perform mapping to REs according to TS36.211, clause 10.2.5.5

#### 6.1.4.5 NPDSCH

- NPDSCH is on the rest of subframes in the duration of NB-IoT test model. The number of available bits (304 bits for stand-alone and guard band operation, or 200 bits for in-band operation) in each subframe for NPDSCH is depended on the higher layer parameter *operationModeInfo* according to TS36.213, clause 16.6.1.

- Generate the required amount of bits according to ‘all 0’ data

- N-TM utilize 1 user NPDSCH transmissions indicated by =1000

- Perform user specific scrambling according to TS36.211, clause 10.2.3.1. This makes use of .

- Perform modulation of the scrambled bits with the modulation scheme defined for each user according to TS36.211, clause 10.2.3.2

- Perform mapping of the complex-valued symbols to PRBs according to TS36.211, clause 10.2.3.4

### 6.1.5 Test Model for NB-IoT guard band operation

The physical channels for transmitter tests shall be configured according to E-TM1.1 on all E-UTRA carriers and N-TM on all NB-IoT carriers.

For guard band transmitter tests, NB-IoT PRB is placed closest to E-UTRA PRBs in the E-UTRA carrier containing the NB-IoT PRB.

The power for E-UTRA PRB and NB-IoT PRB is set by following procedures:

- The average power per PRB over all PRBs (from both NB-IoT and the E-UTRA carrier containing the NB-IoT PRB) is calculated according to manufacturer’s declared rated output power (Prated,c);

Average power per PRB (Pavg) = Prated,c / (NRB + 1) [W]

- The power of boosted NB-IoT PRB (PNB-IoT) is calculated according to manufacturer’s declared rated NB-IoT maximum power dynamic range (X dB >= 6 dB)

Power per boosted NB-IoT PRB (PNB-IoT) = Pavg \* 10(X/10) [W]

- The remaining power is allocated to E-UTRA PRBs.

Power per E-UTRA PRB = (Prated,c - PNB-IoT) / NRB [W]

### 6.1.6 Test Model for NB-IoT in-band operation

The physical channels for transmitter tests shall be configured according to E-TM1.1 on all E-UTRA carriers and N-TM on all NB-IoT carriers.

For in-band transmitter tests, one E-UTRA PRB is punctured and replaced by NB-IoT PRB which also contains certain REs for the hosting E-UTRA carrier.

The power for E-UTRA RE and NB-IoT RE are set by following procedures:

- The average power per RE over all PRBs (from both NB-IoT and the E-UTRA carrier containing the NB-IoT PRB) is calculated according to manufacturer’s declared rated output power (Prated,c);

Average power per RE (Pavg) = Prated,c / (NRB \* ) [W]

- The power per boosted NB-IoT RE (PNB-IoT) is calculated according to manufacturer’s declared rated NB-IoT maximum power dynamic range (X dB >= 6 dB), with the power boosting only applies on the NNB\_IoT REs containing NB-IoT signal.

Power per boosted NB-IoT RE (PNB-IoT) = Pavg \* 10(X/10) [W]

- The remaining power is allocated to NE-UTRA E-UTRA REs.

Power per E-UTRA RE = (Prated,c - PNB-IoT \* NNB\_IoT) / NE-UTRA [W]

## 6.2 Base station output power

### 6.2.1 Definition and applicability

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

Rated total output power (Prated,t) of the base station is the mean power for BS operating in single carrier, multi-carrier, or carrier aggregation configurations that the manufacturer has declared to be available at the antenna connector during the transmitter ON period.

Base station maximum output power (Pmax,c), of the base station is the mean power level per carrier measured at the antenna connector during the transmitter ON period in a specified reference condition.

Rated output power (Prated,c), of the base station is the mean power level per carrier for BS operating in single carrier, multi-carrier, or carrier aggregation configurations that the manufacturer has declared to be available at the antenna connector during the transmitter ON period.

NOTE: Different Prated,c may be declared for different configurations.

NOTE: For NB-IoT in-band and guard band operation, the LTE carrier and NB-IoT carrier shall be seen as a single carrier occupied LTE channel bandwidth, the output power over this carrier is shared between LTE and NB-IoT. This note is applied for Pout, Rated total output power, Pmax,c andPrated,c.

In certain regions, the minimum requirement for normal conditions may apply also for some conditions outside the ranges defined for the Normal test environment in Annex D.

The rated output power, Prated,c, of the BS shall be as specified in Table 6.2.1-1

Table 6.2.1-1: Base Station rated output power

|  |  |
| --- | --- |
| BS class | Prated,c |
| Wide Area BS | (note) |
| Medium Range BS | < + 38 dBm |
| Local Area BS | < + 24 dBm |
| Home BS | < + 20 dBm (for one transmit antenna port)  < + 17 dBm (for two transmit antenna ports)  < + 14 dBm (for four transmit  antenna ports)  < + 11 dBm (for eight transmit antenna ports) |
| NOTE: There is no upper limit required for the rated output power of the Wide Area Base Station. | |

In addition for Band 46 operation, the BS may have to comply with the applicable BS power 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 H of TS 36.104 [2].

In addition for Band 49 operation in US, the BS EIRP power limit established by FCC for Category A CBSDs (Citizens Broadband Radio Service Devices) applies. Assessment of the EIRP level is described in Annex H of TS 36.104 [2].

In addition for Band 85 NB-IoT standalone operation, the BS rated output power limit of 43 dBm applies over the NB-IoT carriers in the range 728-729 MHz of the DL operating band. The BS output power limit of 43 dBm shall be considered as shared among all NB-IoT carriers in the 728-729 MHz frequency range or as the maximum value per NB-IoT carrier in the case where only one NB-IoT carrier is deployed in 728-729 MHz frequency range.

### 6.2.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 6.2.

### 6.2.3 Test purpose

The test purpose is to verify the accuracy of the maximum output power across the frequency range and under normal and extreme conditions for all transmitters in the BS.

### 6.2.4 Method of test

#### 6.2.4.1 Initial conditions

Test environment: normal; see Annex D2.

RF channels to be tested for single carrier: B, M and T; see subclause 4.7

Base Station RF Bandwidth positions to be tested for multi-carrier and/or CA: BRFBW, MRFBW and TRFBW in single-band operation, see subclause 4.7.1; BRFBW\_T’RFBW and B’RFBW\_TRFBW in multi-band operation, see subclause 4.7.1.

In addition, on one RF channel or Base Station RF Bandwidth position in case of multi-carrier and/or CA only, the test shall be performed under extreme power supply as defined in Annex D.5.

NOTE: Tests under extreme power supply also test extreme temperature.

1) Connect the power measuring equipment to the base station antenna connector as shown in Annex I.1.1.

#### 6.2.4.2 Procedure

1) For an E-UTRA BS declared to be capable of single carrier operation only, set the base station to transmit a signal according to E-TM1.1.

For an E-UTRA BS declared to be capable of multi-carrier and/or CA operation, set the base station to transmit according to E-TM1.1 on all carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

- For an E-UTRA BS declared to be capable of NB-IoT in-band operation, start transmission according to E-TM1.1 with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

- For an E-UTRA BS declared to be capable of NB-IoT guard-band operation, start transmission according to E-TM1.1 with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11..

- For a NB-IoT BS declared to be capable of single carrier operation, start transmission according to N-TM at manufacturer’s declared rated output power.

- For a NB-IoT BS declared to be capable of multi-carrier operation, set the base station to transmit according to N-TM on all carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

- For an E-UTRA and NB-IoT standalone BS declared to be capable of multi-carrier operation, start transmission according to E-TM1.1 on all E-UTRA carriers and N-TM on all NB-IoT carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

2) Measure the mean power for each carrier at the antenna connector.

In addition, for a multi-band capable BS, the following step shall apply:

3) For multi-band capable BS and single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carrier activated in the other band. For multi-band capable BS with separate antenna connector, the antenna connector not being under test in case of single-band or multi-band test shall be terminated.

### 6.2.5 Test Requirements

In normal conditions, for E-UTRA the measurement result in step 2 of 6.2.4.2 shall remain:

within +2.7 dB and –2.7 dB of the manufacturer's rated output power, Prated,c, for carrier frequency f ≤ 3.0GHz.

within +3.0 dB and –3.0 dB of the manufacturer's rated output power, Prated,c, for carrier frequency 3.0GHz < f ≤ 4.2GHz.

In extreme conditions, for E-UTRA measurement result in step 2 of 6.2.4.2 shall remain:

within +3.2 dB and –3.2 dB of the manufacturer's rated output power, Prated,c, for carrier frequency f ≤ 3.0GHz.

within +3.5 dB and –3.5 dB of the manufacturer's rated output power, Prated,c, for carrier frequency 3.0GHz < f ≤ 4.2GHz.

In normal conditions, for standalone NB-IoT the measurement result in step 2 of 6.2.4.2 shall remain:

within +3.0 dB and –3.0 dB of the manufacturer's rated output power, Prated,c

In extreme conditions, for standalone NB-IoT measurement result in step 2 of 6.2.4.2 shall remain:

within +3.5 dB and –3.5 dB of the manufacturer's rated output power, Prated,c

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance are given in Annex G.

### 6.2.6 Home BS output power for adjacent UTRA channel protection

#### 6.2.6.1 Definition and applicability

The E-UTRA or NB-IoT Home BS shall be capable of adjusting the transmitter output power to minimize the interference level on the adjacent channels licensed to other operators in the same geographical area while optimize the Home BS coverage. These requirements are only applicable to Home BS. The requirements in this clause are applicable for AWGN radio propagation conditions.

The output power, Pout, of the Home BS shall be as specified in Table 6.2.6-1 under the following input conditions:

- CPICH Êc, measured in dBm, is the code power of the Primary CPICH on one of the adjacent channels present at the Home BS antenna connector for the CPICH received on the adjacent channels. If Tx diversity is applied on the Primary CPICH, CPICH Êc shall be the sum in [W] of the code powers of the Primary CPICH transmitted from each antenna.

- Ioh, measured in dBm, is the total received power density, including signals and interference but excluding the own Home BS signal, present at the Home BS antenna connector on the Home BS operating channel.

In case that both adjacent channels are licensed to other operators, the most stringent requirement shall apply for Pout. In the case when one of the adjacent channels is licensed to an E-UTRA operator while the other adjacent channel is licensed to a UTRA operator, the more stringent requirement of this subclause and subclause 6.2.7 shall apply for Pout. In case the Home BS’s operating channel and both adjacent channels are licensed to the same operator, the requirements of this clause do not apply.

The input conditions defined for the requirements in this clause are specified at the antenna connector of the Home BS. For Home BS receivers with diversity, the requirements apply to each antenna connector separately, with the other one(s) terminated or disabled. The requirements are otherwise unchanged. For Home BS(s) without measurement capability, a reference antenna with a gain of 0 dBi is assumed for converting these power levels into field strength requirements.

Table 6.2.6-1: Home BS output power for adjacent operator UTRA channel protection

|  |  |
| --- | --- |
| Input Conditions | Output power, Pout |
| Ioh > CPICH Êc + 43 dB  And CPICH Êc ≥ -105dBm | ≤ 10 dBm |
| Ioh ≤ CPICH Êc + 43 dB  and CPICH Êc ≥ -105dBm | ≤ max(8 dBm, min(20 dBm, CPICH Êc + 100 dB)) |

NOTE 1: The Home BS transmitter output power specified in Table 6.2.6-1 assumes a Home BS reference antenna gain of 0 dBi, an target outage zone of 47dB around the Home BS for an UE on the adjacent channel, with an allowance of 2 dB for measurement errors, an ACIR of 33 dB, an adjacent channel UE CPICH Ec/Io target of -18 dB and the same CPICH Êc value at the adjacent channel UE as for the Home BS.

NOTE 2: For CPICH Êc < -105 dBm, the requirements in subclause 6.2 apply.

NOTE 3: The output power Pout is the sum transmit power across all the antenna connectors of the Home BS, with each transmit power measured at the respective antenna connectors.

#### 6.2.6.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 6.2.3.

#### 6.2.6.3 Test purpose

The test purpose is to verify the capability of the Home BS to adjust the transmitter output power according to the input conditions, as specified in Table 6.2.6-1, across the frequency range and under normal and extreme conditions for all transmitters in the BS.

#### 6.2.6.4 Method of test

##### 6.2.6.4.1 Initial conditions

Test environment: normal; see Annex D2.

RF channels to be tested for single carrier: M; see subclause 4.7.

In addition, on one UARFCN only, the test shall be performed under extreme power supply as defined in Annex D.5.

NOTE: Tests under extreme power supply also test extreme temperature.

Signal generators delivering co-channel and adjacent channel interferers are switched off.

1) Set-up the equipment as shown as shown in Annex I.1.4.

2) The Home BS is configured such that the adjacent channel is known to belong to another operator.

##### 6.2.6.4.2 Procedure

1) Connect the combined downlink interfering signals (referred to as point D in Figure I.1-4) to the dedicated measurement port (referred to as point 1 in Figure I.1-4) if available, otherwise connect to point 2.

2) Configure the signal generator for co-channel interference to transmit AWGN over a bandwidth according to BWConfig centred on RF channel M.

3) Configure the signal generator for adjacent channel DL signal to transmit test model 1 in subclause 6.1.1.1 in [17] at the centre frequency equal to RF channel M + BWChannel /2 + 2.5 MHz.

4) Switch on signal generators delivering co-channel and adjacent channel interferers, and adjust the ATT1 and ATT2 such that CPICH Êc = -80 dBm and Ioh = -50 dBm.

5) Trigger the Home BS power adjustment mechanism.

6) Configure the E-UTRA Home BS to transmit a signal according to E-TM1.1. Configure the E-UTRA Home BS declared to be capable of NB-IoT in-band operation to transmit a signal according to E-TM1.1 with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power. Configure the E-UTRA Home BS declared to be capable of NB-IoT guard-band operation to transmit a signal according to E-TM1.1 with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power. Configure the NB-IoT Home BS to transmit a signal according to N-TM at manufacturer’s declared rated output power.

NOTE: The signal shall be transmitted with the maximum allowed output power.

7) Measure Home BS output power, Pout, and check it is below the required value according to the CPICH Êc and Ioh values determined in step 4.

8) Repeat steps 3) to 7) with the frequency in step 3 set to RF channel M - BWChannel /2 - 2.5 MHz.

9) Repeat steps 3) to 8) with different settings for ATT1 and ATT2 to arrive the CPICH Êc and Ioh pairs as specified in Table 6.2.6-2.

Table 6.2.6-2: CPICH Êc and Ioh pairs

|  |  |  |
| --- | --- | --- |
| Test Case | CPICH Êc (dBm) | Ioh (dBm) |
| 2 | -90 | -60 |
| 3 | -100 | -70 |
| 4 | -100 | -50 |

#### 6.2.6.5 Test Requirements

In normal operating conditions, the output power, Pout, of the Home BS shall be equal to or less than:

the value specified in Table 6.2.6-1 plus 2.7 dB for carrier frequency f ≤ 3.0GHz.

the value specified in Table 6.2.6-1 plus 3.0 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

In extreme operating conditions, the output power, Pout, of the Home BS shall be equal to or less than:

the value specified in Table 6.2.6-1 plus 3.2 dB for carrier frequency f ≤ 3.0GHz.

the value specified in Table 6.2.6-1 plus 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance are given in Annex G.

### 6.2.7 Home BS output power for adjacent E-UTRA channel protection

#### 6.2.7.1 Definition and applicability

The E-UTRA or NB-IoT Home BS shall be capable of adjusting the transmitter output power to minimize the interference level on the adjacent channels licensed to other operators in the same geographical area while optimize the Home BS coverage. These requirements are only applicable to Home BS. The requirements in this clause are applicable for AWGN radio propagation conditions.

The output power, Pout, of the Home BS shall be as specified in Table 6.2.7-1 under the following input conditions:

- CRS Ês, measured in dBm, is the Reference Signal Received Power per resource element on one of the adjacent channels present at the Home BS antenna connector for the Reference Signal received on the adjacent channels. For CRS Ês determination, the cell-specific reference signal R0 according TS 36.211 [12] shall be used. If the Home BS can reliably detect that multiple TX antennas are used for transmission on the adjacent channel, it may use the average in [W] of the CRS Êc on all detected antennas.

- Ioh, measured in dBm, is the total received power density, including signals and interference but excluding the own Home BS signal, present at the Home BS antenna connector on the Home BS operating channel.

In case that both adjacent channels are licensed to other operators, the most stringent requirement shall apply for Pout. In the case when one of the adjacent channels is licensed to an E-UTRA operator while the other adjacent channel is licensed to a UTRA operator, the more stringent requirement of this subclause and subclause 6.2.6 shall apply for Pout. In case the Home BS’s operating channel and both adjacent channels are licensed to the same operator, the requirements of this clause do not apply.

The input conditions defined for the requirements in this clause are specified at the antenna connector of the Home BS. For Home BS receivers with diversity, the requirements apply to each antenna connector separately, with the other one(s) terminated or disabled. The requirements are otherwise unchanged. For Home BS(s) without measurement capability, a reference antenna with a gain of 0 dBi is assumed for converting these power levels into field strength requirements.

Table 6.2.7-1: Home BS output power for adjacent operator E-UTRA channel protection

|  |  |
| --- | --- |
| Input Conditions | Output power, Pout |
| Ioh > CRS Ês + + 30 dB  and CRS Ês ≥ -127dBm | ≤ 10 dBm |
| Ioh ≤ CRS Ês + + 30 dB  and CRS Ês ≥ -127dBm | ≤ max(8 dBm, min(20 dBm, CRS Ês +  + 85 dB)) |

NOTE 1: The Home BS transmitter output power specified in Table 6.2.7-1 assumes a Home BS reference antenna gain of 0 dBi, an target outage zone of 47dB around the Home BS for an UE on the adjacent channel, with an allowance of 2 dB for measurement errors, an ACIR of 30 dB, an adjacent channel UE Ês/Iot target of -6 dB and the same CRS Ês value at the adjacent channel UE as for the Home BS.

NOTE 2: For CRS Ês < -127 dBm, the requirements in subclause 6.2 apply.

NOTE 3: The output power Pout is the sum transmit power across all the antenna connectors of the Home BS, with each transmit power measured at the respective antenna connectors.

NOTE 4:  is the number of downlink resource blocks in the own Home BS channel.

NOTE 5:  is the number of subcarriers in a resource block, .

#### 6.2.7.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 6.2.4.

#### 6.2.7.3 Test purpose

The test purpose is to verify the capability of the Home BS to adjust the transmitter output power according to the input conditions, as specified in Table 6.2.7-1, across the frequency range and under normal and extreme conditions for all transmitters in the BS.

#### 6.2.7.4 Method of test

##### 6.2.7.4.1 Initial conditions

Test environment: normal; see Annex D2.

RF channels to be tested for single carrier: M; see subclause 4.7.

In addition, on one EARFCN only, the test shall be performed under extreme power supply as defined in Annex D.5.

NOTE: Tests under extreme power supply also test extreme temperature.

Signal generators delivering co-channel and adjacent channel interferers are switched off.

1) Set-up the equipment as shown as shown in Annex I.1.4.

2) The Home BS is configured such that the adjacent channel is known to belong to another operator.

##### 6.2.7.4.2 Procedure

1) Connect the combined downlink interfering signals (referred to as point D in Figure I.1-4) to the dedicated measurement port (referred to as point 1 in Figure I.1-4) if available, otherwise connect to point 2.

2) Configure the signal generator for co-channel interference to transmit AWGN over a bandwidth according to BWConfig centred on RF channel M.

3) Configure the signal generator for adjacent channel DL signal to transmit a signal according to E-TM1.1 at the centre frequency equal to RF channel M + BWChannel MHz.

4) Switch on signal generators delivering co-channel and adjacent channel interferers, and adjust the ATT1 and ATT2 such that CRS Ês = -65 -  dBm and Ioh = -50 dBm.

5) Trigger the Home BS power adjustment mechanism.

6) Configure the E-UTRA Home BS to transmit a signal according to E-TM1.1. Configure the E-UTRA Home BS declared to be capable of NB-IoT in-band operation to transmit a signal according to E-TM1.1 with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power. Configure the E-UTRA Home BS declared to be capable of NB-IoT guard-band operation to transmit a signal according to E-TM1.1 with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power. Configure the NB-IoT Home BS to transmit a signal according to N-TM at manufacturer’s declared rated output power.

NOTE: The signal is transmitted with the maximum allowed output power.

7) Measure Home BS output power, Pout, and check it is below the required value according to the CRS Ês and Ioh values determined in step 4.

8) Repeat steps 3) to 7) with the frequency in step 3 set to RF channel M - BWChannel MHz.

9) Repeat steps 3) to 8) with different settings for ATT1 and ATT2 to arrive the CRS Ês and Ioh pairs as specified in Table 6.2.7-2.

Table 6.2.7-2: CRS Ês and Ioh pairs

|  |  |  |
| --- | --- | --- |
| Test Case | CRS Ês (dBm) | Ioh (dBm) |
| 2 | -75 - | -60 |
| 3 | -90 - | -70 |
| 4 | -90 - | -50 |

#### 6.2.7.5 Test Requirements

In normal operating conditions, the output power, Pout, of the Home BS shall be equal to or less than:

- the value specified in Table 6.2.7-1 plus 2.7 dB for carrier frequency f ≤ 3.0GHz.

- the value specified in Table 6.2.6-1 plus 3.0 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

In extreme operating conditions, the output power, Pout, of the Home BS shall be equal to or less than:

- the value specified in Table 6.2.7-1 plus 3.2 dB for carrier frequency f ≤ 3.0GHz.

- the value specified in Table 6.2.6-1 plus 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance are given in Annex G.

### 6.2.8 Home BS output power for co-channel E-UTRA protection

#### 6.2.8.1 Definition and applicability

To minimize the co-channel DL interference to non-CSG macro UEs operating in close proximity while optimizing the CSG Home BS coverage, Home BS may adjust its output power according to the requirements set out in this clause. These requirements are only applicable to Home BS. The requirements in this clause are applicable for AWGN radio propagation conditions.

For E-UTRA or NB-IoT Home BS that supports the requirements in this clause, the output power, Pout, of the Home BS shall be as specified in Table 6.2.8-1 under the following input conditions:

- CRS Ês, measured in dBm, is the Reference Signal Received Power per resource element present at the Home BS antenna connector received from the co-channel Wide Area BS. For CRS Ês determination, the cell-specific reference signal R0 according TS 36.211 [12] shall be used. If the Home BS can reliably detect that multiple TX antenna ports are used for transmission by the co-channel Wide Area Base Station, it may use the average in [W] of the CRS Ês on all detected TX antenna ports, including R0.

- Ioh, measured in dBm, is the total received DL power, including all interference but excluding the own Home BS signal, present at the Home BS antenna connector on the Home BS operating channel.

- Iob, measured in dBm, is the uplink received interference power, including thermal noise, within one physical resource block’s bandwidth of resource elements as defined in TS 36.214, present at the Home BS antenna connector on the Home BS operating channel.

The input conditions defined for the requirements in this clause are specified at the antenna connector of the Home BS. For Home BS receivers with diversity, the requirements apply to each antenna connector separately, with the other one(s) terminated or disabled. The requirements are otherwise unchanged. For Home BS(s) without measurement capability, a reference antenna with a gain of 0 dBi is assumed for converting these power levels into field strength requirements.

Table 6.2.8-1: Home BS output power for co-channel E-UTRA channel protection

|  |  |
| --- | --- |
| Input Conditions | Output power, Pout |
| Ioh (DL) > CRS Ês + 10log10() + 30 dB  and  Option 1: CRS Ês ≥ -127 dBm or  Option 2: CRS Ês ≥ -127 dBm and Iob > -103 dBm | ≤ 10 dBm |
| Ioh (DL) ≤ CRS Ês + 10log10() + 30 dB  and  Option 1: CRS Ês ≥ -127 dBm or  Option 2. CRS Ês ≥ -127 dBm and Iob > -103 dBm | ≤ max (Pmin, min (Pmax,c, CRS Ês + 10log10() + X ))  30 dB ≤ X ≤ 70 dB  Pmin = - 10 dBm |

Note 1: Only the option supported by the Home BS shall be tested.

Note 2: For CRS Ês < -127dBm, or Iob ≤ -103 dBm when Option 2 is supported, the requirements in clauses 6.2.1 and 6.2.2 apply.

Note 3: The output power Pout is the sum of transmits power across all the antennas of the Home BS, with each transmit power measured at the respective antenna connectors.

Note 4:  is the number of downlink resource blocks in the own Home BS channel.

Note 5:  is the number of subcarriers in a resource block, .

Note 6: X is a network configurable parameter.

Note 7: Pmin can be lower dependent on the Home BS total dynamic range.

Note8: Other input conditions and output power to be applied for network scenarios other than co-channel E-UTRA macro channel protection shall not be precluded.

#### 6.2.8.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 6.2.5.

#### 6.2.8.3 Test purpose

The test purpose is to verify the capability of the Home BS to adjust the transmitter output power according to the input conditions, as specified in Table 6.2.8-1, across the frequency range and under normal and extreme conditions for all transmitters in the BS. For Home BS that supports the requirements in this clause, only the option in Table 6.2.8-1 supported by the Home BS shall be tested.

#### 6.2.8.4 Method of test

##### 6.2.8.4.1 Initial conditions

Test environment: normal; see Annex D2.

RF channels to be tested for single carrier: M; see subclause 4.7.

In addition, on one EARFCN only, the test shall be performed under extreme power supply as defined in Annex D.5.

NOTE: Tests under extreme power supply also test extreme temperature.

Signal generator delivering co-channel interferers is switched off.

1) Set-up the equipment as shown in Annex I.1.5, base on the option supported by Home BS.

2) The co-channel interference should be configured containing at least signals from a neighbouring Marco BS. For option 2 of Table 6.2.8-1, additional signal generator needed to deliver the MUE UL signal.

##### 6.2.8.4.2 Procedure

1) Connect the downlink co-channel interfering signals (referred to as point D in Figure I.1-5) to the dedicated measurement port (referred to as point 1 in Figure I.1-5) if available, otherwise connect to point 2. Specifically for option 2 of Table 6.2.8-1, connect the UL interference to point 2 for UL receiving on the figure of I.1.5-b.

2) Configure the signal generator for co-channel interference to transmit AWGN over a bandwidth according to BWConfig centred on RF channel M.

3) Configure the X as 30 dB. Switch on signal generators delivering interferers, and adjust the ATT such that CRS Ês = -10 -10log10() dBm and Ioh = -50 dBm.

4) Trigger the Home BS power adjustment mechanism.

5) Configure the E-UTRA Home BS to transmit a signal according to E-TM1.1. Configure the E-UTRA Home BS declared to be capable of NB-IoT in-band operation to transmit a signal according to E-TM1.1 with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power. Configure the E-UTRA Home BS declared to be capable of NB-IoT guard-band operation to transmit a signal according to E-TM1.1 with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power. Configure the NB-IoT Home BS to transmit a signal according to N-TM at manufacturer’s declared rated output power.

NOTE: The signal is transmitted with the maximum allowed output power.

6) Measure Home BS output power, Pout, and check it is below the required value according to the CRS Ês and Ioh values determined in step 4. The value of Pmin for testing is -10dBm.

7) Repeat steps 4) to 6) with different settings for ATT to arrive the input parameter pairs as specified in Table 6.2.8-2 or 6.2.8-3, basing the option of Table 6.2.8-1supported by the Home BS.

Table 6.2.8-2: CRS Ês and Ioh pairs for option 1

|  |  |  |
| --- | --- | --- |
| Test Case | CRS Ês (dBm) | Ioh (dBm) |
| 1 | -20- 10log10() | -60 |
| 2 | Pmin-30 -10log10() | -70 |
| 3 | -90 - 10log10() | -50 |

Table 6.2.8-3: CRS Ês, Ioh and Iob pairs for option 2

|  |  |  |  |
| --- | --- | --- | --- |
| Test Case | CRS Ês (dBm) | Ioh (dBm) | Iob (dBm) |
| 1 | -20 - 10log10() | -60 | -98 |
| 2 | Pmin-30 -10log10() | -70 | -98 |
| 3 | -90 - 10log10() | -50 | -98 |

#### 6.2.8.5 Test Requirements

In normal operating conditions, the output power, Pout, of the Home BS shall be equal to or less than the value specified in Table 6.2.8-1 plus 2.7 dB.

In extreme operating conditions, the output power, Pout, of the Home BS shall be equal to or less than the value specified in Table 6.2.8-1 plus 3.2 dB.

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance are given in Annex G.

## 6.3 Output power dynamics

The requirements in subclause 6.3 apply during the transmitter ON period.

### 6.3.1 RE Power control dynamic range

#### 6.3.1.1 Definition and applicability

The RE power control dynamic range is the difference between the power of an RE and the average RE power for a BS at maximum output power for a specified reference condition. Unwanted emissions (as specified in subclause 6.6) and Transmit modulation quality (as specified in subclause 6.5) shall be maintained within the whole power control dynamic range.

#### 6.3.1.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 6.3.1.1.

#### 6.3.1.3 Method of test

No specific test or test requirements are defined for RE Power control dynamic range. The Error Vector Magnitude test, as described in subclause 6.5.2 provides sufficient test coverage for this requirement.

## 6.3.2 Total power dynamic range

#### 6.3.2.1 Definition and applicability

The total power dynamic range is the difference between the maximum and the minimum transmit power of an OFDM symbol for a specified reference condition.

NOTE: The upper limit of the dynamic range is the OFDM symbol power for a BS at maximum output power. The lower limit of the dynamic range is the OFDM symbol power for a BS when one resource block is transmitted. The OFDM symbol shall carry PDSCH or sPDSCH and not contain RS, PBCH or synchronisation signals.

#### 6.3.2.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 6.3.2.1.

#### 6.3.2.3 Test purpose

The test purpose is to verify that the total power dynamic range is met as specified by the minimum requirement.

#### 6.3.2.4 Method of test

##### 6.3.2.4.1 Initial conditions

Test environment: normal; see Annex D.2.

RF channels to be tested for single carrier: B, M and T; see subclause 4.7.

Connect the signal analyzer to the base station antenna connector as shown in Annex I.1.1.

##### 6.3.2.4.2 Procedure

1) Set-up BS transmission at maximum total power as specified by the supplier. Channel set-up shall be according to E-TM 3.1 (or sE-TM3.1-1 for subslot TTI, or sE-TM3.1-2 for slot TTI).

2) Measure the average OFDM symbol power as defined in Annex F.

3) Set the BS to transmit a signal according to E-TM 2 (or sE-TM2-1 for subslot TTI, or sE-TM2-2 for slot TTI).

4) Measure the average OFDM symbol power as defined in Annex F. The measured OFDM symbols shall not contain RS, PBCH or synchronisation signals.

5) Repeat step 1 and 2 for E-TM3.1a (or sE-TM3.1a-1 for subslot TTI, or sE-TM3.1a-2 for slot TTI) and step 3 and 4 for E-TM2a (or sE-TM2a-1 for subslot TTI, or sE-TM2a-2 for slot TTI) for 256QAM, if supported by the BS.

6) Repeat step 1 and 2 for E-TM3.1b and step 3 and 4 for E-TM2b for 1024QAM, if supported by the BS.

In addition, for a multi-band capable BS, the following step shall apply:

7) For multi-band capable BS and single band tests, repeat the steps above per involved band where single carrier test models shall apply with no carrier activated in the other band. For multi-band capable BS with separate antenna connector, the antenna connector not being under test shall be terminated.

#### 6.3.2.5 Test Requirement

The downlink (DL) total power dynamic range for each E-UTRA carrier shall be larger than or equal to the level in Table 6.3.2-1.

Table 6.3.2-1 E-UTRA BS total power dynamic range, paired spectrum

|  |  |
| --- | --- |
| E-UTRA  channel bandwidth (MHz) | Total power dynamic range (dB) |
| 1.4 | 7.3 |
| 3 | 11.3 |
| 5 | 13.5 |
| 10 | 16.5 |
| 15 | 18.3 |
| 20 | 19.6 |

NOTE 1: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in Annex G. The explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex G.

NOTE2: Additional test requirements for the Error Vector Magnitude (EVM) at the lower limit of the dynamic range are defined in subclause 6.5.2.

### 6.3.3 NB-IoT RB power dynamic range for in-band or guard band operation

#### 6.3.3.1 Definition and applicability

The NB-IoT RB power dynamic range (or NB-IoT power boosting) for guard band operation is the difference between the power of NB-IoT RB (which occupies 180kHz in guard band of an E-UTRA carrier) and the average power over all RBs (from both NB-IoT and the E-UTRA carrier containing the NB-IoT RB).

The NB-IoT RB power dynamic range (or NB-IoT power boosting) for in-band operation is the difference between the average power of NB-IoT REs (which occupy certain REs in a RB of an E-UTRA carrier) and the average power over all REs (from both NB-IoT and the E-UTRA carrier containing the NB-IoT REs).

#### 6.3.3.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 6.3.3.1.

#### 6.3.3.3 Test purpose

The test purpose is to verify that the NB-IoT RB power dynamic range for in-band or guard band operation is met as specified by the minimum requirement.

#### 6.3.3.4 Method of test

Requirement is tested together with unwanted emissions test, as described in subclause 6.6.3.

#### 6.3.3.5 Test Requirement

NB-IoT power dynamic range shall be larger than or equal to +5.6 dB, except for guard band operation with E-UTRA 5 MHz channel bandwidth signal where BS manufacturer shall declare the NB-IoT dynamic range power it could support (in this version of the specification).

The +5.6 dB power dynamic range is only required for one NB-IoT RB for both in-band and guard band operation modes.

For guard band operation, this NB-IoT RB should be placed adjacent to the E-UTRA RB edge as close as possible (i.e., away from edge of channel bandwidth).

## 6.4 Transmit ON/OFF power

The requirements in clause 6.4 are only applied for E-UTRA TDD BS.

### 6.4.1 Transmitter OFF power

#### 6.4.1.1 Definition and applicability

Transmitter OFF power is defined as the mean power measured over 70 us filtered with a square filter of bandwidth equal to the transmission bandwidth configuration of the BS (BWConfig) centred on the assigned channel frequency during the transmitter OFF period.

For BS supporting intra-band contiguous CA, the transmitter OFF power is defined as the mean power measured over 70 us filtered with a square filter of bandwidth equal to the Aggregated Channel Bandwidth BWChannel\_CA centred on (Fedge\_high+Fedge\_low)/2 during the transmitter OFF period.

#### 6.4.1.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 6.4.1.1.

#### 6.4.1.3 Test purpose

The purpose of this test is to verify the E-UTRA, E-UTRA with NB-IoT or NB-IoT BS transmitter OFF power is within the limit of the minimum requirement.

#### 6.4.1.4 Method of test

Requirement is tested together with transmitter transient period, as described in subclause 6.4.2.4.

##### 6.4.1.4.1 Void

##### 6.4.1.4.2 Void

#### 6.4.1.5 Test requirement

The conformance testing of transmit OFF power is included in the conformance testing of transmitter transient period; therefore, see subclause 6.4.2.5 for test requirements.

### 6.4.2 Transmitter transient period

#### 6.4.2.1 Definition and applicability

The transmitter transient period is the time period during which the transmitter is changing from the OFF period to the ON period or vice versa. The transmitter transient period is illustrated in Figure 6.4.2.1-1.



Figure 6.4.2.1-1 Illustration of the relations of transmitter ON period, transmitter OFF period and transmitter transient period.

#### 6.4.2.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 6.4.2.1.

#### 6.4.2.3 Test purpose

The purpose of this test is to verify the E-UTRA BS transmitter transient periods are within the limit of the minimum requirement.

#### 6.4.2.4 Method of test

##### 6.4.2.4.1 Initial conditions

Test environment: normal; see Annex D.2.

RF channels to be tested for single carrier: M; see subclause 4.7.

Base Station RF Bandwidth positions to be tested for multi-carrier and/or CA: MRFBW in single-band operation, see subclause 4.7.1; BRFBW\_T’RFBW and B’RFBW\_TRFBW in multi-band operation, see subclause 4.7.1.

Connect the signal analyzer to the BS antenna connector as shown in Annex I.1.1.

As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity, efficiency and avoiding e.g. carrier leakage, 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.

##### 6.4.2.4.2 Procedure

1) For a BS declared to be capable of single carrier operation only, set the BS to transmit a signal according to E-TM1.1 at manufacturer’s declared rated output power.

For a BS declared to be capable of multi-carrier and/or CA operation, set the BS to transmit according to E-TM1.1 on all carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

2) Measure the mean power spectral density over 70μs filtered with a square filter of bandwidth equal to the Transmission bandwidth configuration BWconfig centred on the assigned channel frequency. 70μs average window centre is set from 35μs after end of one transmitter ON period + 17μs to 35μs before start of next transmitter ON period – 17μs.

3) For BS supporting contiguous CA, measure the mean power spectral density over 70μs filtered with a square filter of bandwidth equal to the Aggregated Channel Bandwidth BWChannel\_CA centred on (Fedge\_high+Fedge\_low)/2. 70μs average window centre is set from 35μs after end of one transmitter ON period + 17μs to 35μs before start of next transmitter ON period – 17μs.

For a multi-band capable BS,

with separate antenna connector, the antenna connector not being under test shall be terminated.

#### 6.4.2.5 Test requirement

The measured mean power spectral density shall be less than -83dBm/MHz for carrier frequency f ≤ 3.0GHz.

The measured mean power spectral density shall be less than -82.5dBm/MHz for carrier frequency 3.0GHz < f ≤ 4.2GHz.

For BS capable of multi-band operation, the requirement is only applicable during the transmitter OFF period in all supported operating bands.

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance are given in Annex G.

## 6.5 Transmitted signal quality

The requirements in subclause 6.5 apply to the transmitter ON period.

### 6.5.1 Frequency error

#### 6.5.1.1 Definition and applicability

Frequency error is the measure of the difference between the actual BS transmit frequency and the assigned frequency. The same source shall be used for RF frequency and data clock generation.

It is not possible to verify by testing that the data clock is derived from the same frequency source as used for RF generation. This may be confirmed by the manufacturer’s declaration.

#### 6.5.1.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 6.5.1.

#### 6.5.1.3 Test purpose

To verify that the Frequency Error is within the limit of the minimum requirement.

#### 6.5.1.4 Method of test

Requirement is tested together with Error Vector Magnitude test, as described in subclause 6.5.2.

#### 6.5.1.5 Test requirement

For E-UTRA, the modulated carrier frequency of each E-UTRA carrier configured by the BS shall be accurate to within the accuracy range given in Table 6.5.1-1 observed over a period of one subframe (1ms).

For NB-IoT, the modulated carrier frequency of each NB-IoT carrier configured by the BS shall be accurate to within the accuracy range given in Table 6.5.1-1 observed over a period of one subframe (1ms).

Table 6.5.1-1: Frequency error test requirement

|  |  |
| --- | --- |
| BS class | Accuracy |
| Wide Area BS | ± (0.05 ppm + 12 Hz) |
| Medium Range BS | ± (0.1 ppm + 12 Hz) |
| Local Area BS | ± (0.1 ppm + 12 Hz) |
| Home BS | ± (0.25 ppm + 12 Hz) |

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance are given in Annex G.

### 6.5.2 Error Vector Magnitude

#### 6.5.2.1 Definition and applicability

The Error Vector Magnitude is a measure of the difference between the ideal symbols and the measured symbols after the equalization. This difference is called the error vector. The equaliser parameters are estimated as defined in Annex F. The EVM result is defined as the square root of the ratio of the mean error vector power to the mean reference power expressed in percent.

#### 6.5.2.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 6.5.2.

#### 6.5.2.3 Test purpose

The test purpose is to verify that the Error Vector Magnitude is within the limit specified by the minimum requirement.

#### 6.5.2.4 Method of test

##### 6.5.2.4.1 Initial conditions

Test environment: normal; see Annex D.2.

RF channels to be tested for single carrier: B, M and T; see subclause 4.7.

Base Station RF Bandwidth positions to be tested for multi-carrier and/or CA: BRFBW, MRFBW and TRFBW in single-band operation, see subclause 4.7.1; BRFBW\_T’RFBW and B’RFBW\_TRFBW in multi-band operation, see subclause 4.7.1.

Connect the signal analyzer to the base station antenna connector as shown in Annex I.1.1.

##### 6.5.2.4.2 Procedure

1) For a BS declared to be capable of single carrier operation only, set the BS to transmit a signal according to E-TM 3.1 (or sE-TM3.1-1 for subslot TTI, or sE-TM3.1-2 for slot TTI) at manufacturer’s declared rated output power.

For a BS declared to be capable of multi-carrier and/or CA operation, set the BS to transmit according to E-TM 3.1 (or sE-TM3.1-1 for subslot TTI, or sE-TM3.1-2 for slot TTI) on all carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For a NB-IoT BS declared to be capable of single carrier operation, start transmission according to N-TM at manufacturer’s declared rated output power.

For a NB-IoT BS declared to be capable of multi-carrier operation, set the base station to transmit according to N-TM on all carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For an E-UTRA and NB-IoT standalone BS declared to be capable of multi-carrier operation, start transmission according to E-TM 3.1 on all E-UTRA carriers and N-TM on all NB-IoT carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

2) Measure the EVM and frequency error as defined in Annex F.

3) For E-UTRA repeat steps 1 and 2 for E-TM 3.2 (or sE-TM3.2-1 for subslot TTI, or sE-TM3.2-2 for slot TTI), E-TM 3.3 (or sE-TM3.3-1 for subslot TTI, or sE-TM3.3-2 for slot TTI) and E-TM 2 (or sE-TM2-1 for subslot TTI, or sE-TM2-2 for slot TTI). Repeat steps 1 and 2 for E-TM3.1a (or sE-TM3.1a-1 for subslot TTI, or sE-TM3.1a-2 for slot TTI) and E-TM 2a (or sE-TM2a-1 for subslot TTI, or sE-TM2a-2 for slot TTI) for 256QAM, if supported by the BS. For E-TM2 (or sE-TM2-1 for subslot TTI, or sE-TM2-2 for slot TTI) and E-TM2a (or sE-TM2a-1 for subslot TTI, or sE-TM2a-2 for slot TTI) the OFDM symbol power shall be at the lower limit of the dynamic range according to the test procedure in subclause 6.3.2.4.2 and test requirements in subclause 6.3.2.5. Repeat steps 1 and 2 for E-TM3.1b and E-TM 2b for 1024QAM, if supported by the BS. For E-TM2b the OFDM symbol power shall be at the lower limit of the dynamic range according to the test procedure in subclause 6.3.2.4.2 and test requirements in subclause 6.3.2.5.

In addition, for a multi-band capable BS, the following step shall apply:

4) For multi-band capable BS and single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carrier activated in the other band. For multi-band capable BS with separate antenna connector, the antenna connector not being under test in case of single-band or multi-band test shall be terminated.

#### 6.5.2.5 Test requirement

The EVM of each E-UTRA carrier for different modulation schemes on PDSCH shall be less than the limits in table 6.5.2.5-1:

Table 6.5.2.5-1 EVM requirements for E-UTRA carrier

|  |  |
| --- | --- |
| Modulation scheme for PDSCH or sPDSCH | Required EVM [%] |
| QPSK | 18.5 % |
| 16QAM | 13.5 % |
| 64QAM | 9 % |
| 256QAM | 4.5% |
| 1024QAM | 3.5% |

The EVM of each NB-IoT carrier on NB-PDSCH shall be less than the limits in table 6.5.2.5-1a:

Table 6.5.2.5-1a EVM requirements for NB-IoT carrier

|  |  |
| --- | --- |
| Modulation scheme for NB-PDSCH | Required EVM [%] |
| QPSK | 18.5 % |

The EVM requirement shall be applicable within a time period around the centre of the CP therefore the EVM requirement is tested against the maximum of the RMS average of 10 subframes at the two window W extremities.

Table 6.5.2.5-2 and Table 6.5.2.5-2a specify EVM window length (W) for normal CP, the cyclic prefix length  is 160 for symbols 0 and 144 for symbols 1-6.

Table 6.5.2.5-2 EVM window length for normal CP for E-UTRA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Channel Bandwidth MHz | FFT size | Cyclic prefix length for symbols 0 in FFT samples | Cyclic prefix length for symbols 1‑6 in FFT samples | EVM window length *W* | Ratio of *W* to total CP for symbols 1‑6\* [%] |
| 1.4 | 128 | 10 | 9 | 5 | 55.6 |
| 3 | 256 | 20 | 18 | 12 | 66.7 |
| 5 | 512 | 40 | 36 | 32 | 88.9 |
| 10 | 1024 | 80 | 72 | 66 | 91.7 |
| 15 | 1536 | 120 | 108 | 102 | 94.4 |
| 20 | 2048 | 160 | 144 | 136 | 94.4 |
| \* Note: These percentages are informative and apply to symbols 1 through 6. Symbol 0 has a longer CP and therefore a lower percentage. | | | | | |

Table 6.5.2.5-2a EVM window length for normal CP for NB-IoT

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| FFT size | Cyclic prefix length for symbols 0 in FFT samples | Cyclic prefix length for symbols 1‑6 in FFT samples | EVM window length *W* | Ratio of *W* to total CP for symbols 1‑61 [%] |
| 128 | 10 | 9 | 3 | 33.3 |
| Note 1: These percentages are informative and apply to symbols 1 through 6. Symbol 0 has a longer CP and therefore a lower percentage. | | | | |

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in Annex G. The explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex G.

### 6.5.3 Time alignment error

#### 6.5.3.1 Definition and applicability

Frames of the LTE signals present at the BS transmitter antenna port(s) are not perfectly aligned in time. In relation to each other, the RF signals present at the BS transmitter antenna port(s) experience certain timing differences.

For a specific set of signals/transmitter configuration/transmission mode, time alignment error (TAE) is defined as the largest timing difference between any two signals. This test is only applicable for eNode B supporting TX diversity MIMO transmission, carrier aggregation and their combinations.

#### 6.5.3.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 6.5.3.

#### 6.5.3.3 Test Purpose

To verify that the timing alignment error in TX diversity, MIMO transmission, carrier aggregation and their combinations is within the limit specified by the minimum requirement.

#### 6.5.3.4 Method of Test

##### 6.5.3.4.1 Initial Conditions

Test environment: normal; see Annex D.2.

RF channels to be tested for single carrier: M; see subclause 4.7.

Base Station RF Bandwidth positions to be tested for multi-carrier and/or CA: MRFBW in single-band operation, see subclause 4.7.1; BRFBW\_T’RFBW and B’RFBW\_TRFBW in multi-band operation, see subclause 4.7.1.

1) Connect two base station RF antenna ports to the measurement equipment according to Annex I.1.3. If available terminate the other unused antenna ports.

##### 6.5.3.4.2 Procedure

1) Set the base station to transmit E-TM1.1 or any DL signal using TX diversity, MIMO transmission or carrier aggregation.

NOTE: For TX diversity and MIMO transmission, different ports may be configured in E-TM (using *p* = 0 and 1).

For a BS declared to be capable of single carrier operation only, set the BS to transmit according to manufacturer’s declared rated output power.

If the BS supports intra band contiguous or non-contiguous Carrier Aggregation set the base station to transmit using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

If the BS supports inter band carrier aggregation set the base station to transmit, for each band, a single carrier or all carriers, using the applicable test configuration and corresponding power setting specified in sub clause 4.10 and 4.11.

For a NB-IoT BS declared to be capable of single carrier operation, start transmission according to N-TM at manufacturer’s declared rated output power.

For a NB-IoT BS declared to be capable of multi-carrier operation, set the base station to transmit according to N-TM on all carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For an E-UTRA and NB-IoT standalone BS declared to be capable of multi-carrier operation, start transmission according to E-TM1.1 on all E-UTRA carriers and N-TM on all NB-IoT carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

2) Measure the time alignment error between the reference symbols on the carrier(s) from active antenna port(s).

3) Repeat the step 1 and 2 for any other possible configuration of transmit antennas.

In addition, for a multi-band capable BS, the following step shall apply:

4) For multi-band capable BS and single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carrier activated in the other band. For multi-band capable BS with separate antenna connector, the antenna connector not being under test in case of single-band or multi-band test shall be terminated.

#### 6.5.3.5 Test Requirement

For E-UTRA:

- For MIMO or TX diversity transmissions, at each carrier frequency, TAE shall not exceed 90 ns.

- For intra-band carrier aggregation, with or without MIMO or TX diversity, TAE shall not exceed 155 ns.

- For intra-band non-contiguous carrier aggregation, with or without MIMO or TX diversity, TAE shall not exceed 285 ns.

- For inter-band carrier aggregation, with or without MIMO or TX diversity, TAE shall not exceed 285 ns.

For NB-IoT:

- For TX diversity transmissions, at each carrier frequency, TAE shall not exceed 90 ns.

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance are given in Annex G.

### 6.5.4 DL RS power

#### 6.5.4.1 Definition and applicability

For E-UTRA, DL RS power is the resource element power of Downlink Reference Symbol.

The absolute DL RS power is indicated on the DL-SCH. The absolute accuracy is defined as the maximum deviation between the DL RS power indicated on the DL-SCH and the DL RS power of each E-UTRA carrier at the BS antenna connector.

For NB-IoT, DL NRS power is the resource element power of the Downlink Narrow-band Reference Signal.

The absolute DL NRS power is indicated on the DL-SCH. The absolute accuracy is defined as the maximum deviation between the DL NRS power indicated on the DL-SCH and the DL NRS power of each NB-IoT carrier at the BS antenna connector.

#### 6.5.4.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 6.5.4.

#### 6.5.4.3 Test purpose

The test purpose is to verify that the DL RS/NRS power is within the limit specified by the minimum requirement.

#### 6.5.4.4 Method of test

##### 6.5.4.4.1 Initial conditions

Test environment: normal; see Annex D.2.

RF channels to be tested for single carrier: B, M and T; see subclause 4.7.

Connect the signal analyzer to the base station antenna connector as shown in Annex I.1.1.

##### 6.5.4.4.2 Procedure

For E-UTRA, set-up BS transmission at manufacturer’s declared rated output power. Channel set-up shall be according to E-TM 1.1.

For NB-IoT, Set-up BS transmission at manufacturer’s declared rated output power. Channel set-up shall be according to N-TM.

Measure the RS transmitted power according to annex F.

In addition, for a multi-band capable BS, the following step shall apply:

- For multi-band capable BS and single band tests, repeat the steps above per involved band where single carrier test models shall apply with no carrier activated in the other band. For multi-band capable BS with separate antenna connector, the antenna connector not being under test shall be terminated.

#### 6.5.4.5 Test requirement

For E-UTRA, DL RS power of each E-UTRA carrier shall be:

within ± 2.9 dB of the DL RS power indicated on the DL-SCH for carrier frequency f ≤ 3.0GHz.

within ± 3.2 dB of the DL RS power indicated on the DL-SCH for carrier frequency 3.0GHz < f ≤ 4.2GHz.

For NB-IoT, DL NRS power of each NB-IoT carrier shall be:

within ± 2.9 dB of the DL NRS power indicated on the DL-SCH for carrier frequency f ≤ 3.0GHz.

NOTE 1: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in Annex G. The explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex G.

NOTE 2: PDSCH in E-TM1.1 is configured as "all 0" and DL RS power is not indicated on PDSCH during the measurement. The absolute DL RS power indicated on the DL-SCH can be calculated as Pmax,c – 10log10 (12\* *N*RB) dBm, where *N*RB is the transmission bandwidth configuration of E-TM1.1.

## 6.6 Unwanted emissions

Unwanted emissions consist of out-of-band emissions and spurious emissions [5]. Out of band emissions are unwanted emissions immediately outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emission, intermodulation products and frequency conversion products, but exclude out of band emissions.

The out-of-band emissions requirement for the BS transmitter is specified both in terms of Adjacent Channel Leakage power Ratio (ACLR) and Operating band unwanted emissions. The Operating band unwanted emissions define all unwanted emissions in each supported downlink operating band plus the frequency ranges 10 MHz above and 10 MHz below each band. Unwanted emissions outside of this frequency range are limited by a spurious emissions requirement.

For a BS supporting multi-carrier and/or CA, the unwanted emissions requirements apply to channel bandwidths of the outermost carrier larger than or equal to 5 MHz.

There is in addition a requirement for occupied bandwidth.

### 6.6.1 Occupied bandwidth

#### 6.6.1.1 Definition and applicability

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 a specified percentage /2 of the total mean transmitted power.

The value of /2 shall be taken as 0.5%.

#### 6.6.1.2 Minimum Requirements

The minimum requirement is in TS 36.104 [2] subclause 6.6.1.

#### 6.6.1.3 Test purpose

The occupied bandwidth, defined in the Radio Regulations of the International Telecommunication Union ITU, is a useful concept for specifying the spectral properties of a given emission in the simplest possible manner; see also ITU-R Recommendation SM.328 [4]. The test purpose is to verify that the emission of the BS does not occupy an excessive bandwidth for the service to be provided and is, therefore, not likely to create interference to other users of the spectrum beyond undue limits.

#### 6.6.1.4 Method of test

##### 6.6.1.4.1 Initial conditions

Test environment: normal; see Annex D.2.

RF channels to be tested for single carrier: B, M and T; see subclause 4.7.

Aggregated Channel Bandwidth positions to be tested for contiguous carrier aggregation: BBW Channel CA, MBW Channel CA and TBW Channel CA; see subclause 4.7.2.

1) Connect the Measurement device to the BS antenna connector as shown in Annex I.1.1.

2) For a E-UTRA BS declared to be capable of single carrier operation, start transmission according to E-TM1.1 at manufacturer’s declared rated output power.

For a E-UTRA BS declared to be capable of contiguous carrier aggregation operation, set the base station to transmit according to E-TM1.1 on all carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For a E-UTRA BS declared to be capable of NB-IoT in-band operation, start transmission according to [E-TM1.1] with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power.

For a E-UTRA BS declared to be capable of NB-IoT guard-band operation, start transmission according to E-TM1.1 with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power.

For a NB-IoT BS declared to be capable of single carrier operation, start transmission according to N-TM at manufacturer’s declared rated output power.

For a NB-IoT BS declared to be capable of multi-carrier in contiguous spectrum operation in single band only, start transmission according to N-TM on all carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For a E-UTRA and NB-IoT standalone BS declared to be capable of multi-carrier in contiguous spectrum operation in single band only, start transmission according to E-TM1.1 on all E-UTRA carriers and N-TM on all NB-IoT carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

##### 6.6.1.4.2 Procedure

1) Measure the spectrum emission of the transmitted signal using at least the number of measurement points, and across a span, as listed in Table 6.6.1.4.2-1. The selected resolution bandwidth (RBW) filter of the analyser shall be 30 kHz or less for E-UTRA and 10 kHz or less for NB-IoT.

Table 6.6.1.4.2-1: Span and number of measurement points for OBW measurements

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Channel bandwidth BWChannel [MHz] | 0.2 | 1.4 | 3 | 5 | 10 | 15 | 20 | >20 |
| Span [MHz] | 0.4 | 10 | 10 | 10 | 20 | 30 | 40 |  |
| Minimum number of measurement points | 400 | 1429 | 667 | 400 | 400 | 400 | 400 |  |

NOTE: The detection mode of the spectrum analyzer will not have any effect on the result if the statistical properties of the out-of-OBW power are the same as those of the inside-OBW power. Both are expected to have the Rayleigh distribution of the amplitude of Gaussian noise. In any case where the statistics are not the same, though, the detection mode must be power responding. The analyser may be set to respond to the average of the power (root-mean-square of the voltage) across the measurement cell.

2) Compute the total of the power, P0, (in power units, not decibel units) of all the measurement cells in the measurement span. Compute P1, the power outside the occupied bandwidth on each side. P1 is half of the total power outside the bandwidth. P1 is half of (100 % - (occupied percentage)) of P0. For the occupied percentage of 99 %, P1 is 0.005 times P0.

3) Determine the lowest frequency, f1, for which the sum of all power in the measurement cells from the beginning of the span to f1 exceeds P1.

4) Determine the highest frequency, f2, for which the sum of all power in the measurement cells from f2 to the end of the span exceeds P1.

5) Compute the occupied bandwidth as f2 - f1.

In addition, for a multi-band capable BS, the following step shall apply:

6) For multi-band capable BS and single band tests, repeat the steps above per involved band where single carrier test models shall apply, with no carrier activated in the other band. In addition, when contiguous CA is supported, single band test configurations and test models shall apply with no carrier activated in the other band. For multi-band capable BS with separate antenna connector, the antenna connector not being under test shall be terminated.

#### 6.6.1.5 Test requirements

For E-UTRA, the occupied bandwidth for each E-UTRA carrier shall be less than the channel bandwidth as defined in Table 5.6-1. For contiguous CA, the occupied bandwidth shall be less than or equal to the Aggregated Channel Bandwidth as defined in subclause 5.6. For Band 46 operation in Japan, the occupied bandwidth for each 20MHz channel bandwidth E-UTRA carrier assigned within 5150-5350 MHz and 5470-5725 MHz shall be less than or equal to 19 MHz and 19.7MHz respectively.

For NB-IoT in-band operation, the occupied bandwidth for each E-UTRA carrier with NB-IoT shall be less than the channel bandwidth as defined in Table 5.6-1.

For NB-IoT guard-band operation, the occupied bandwidth for each E-UTRA carrier with NB-IoT shall be less than the channel bandwidth as defined in Table 5.6-1 for channel bandwidth larger than or equal to 5 MHz.

For NB-IoT stand-alone operation, the occupied bandwidth for each NB-IoT carrier shall be less than the channel bandwidth as defined in Table 5.6-3.

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance are given in Annex G.

### 6.6.2 Adjacent Channel Leakage power Ratio (ACLR)

#### 6.6.2.1 Definition and applicability

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 requirements shall apply outside the Base Station RF Bandwidth or Maximum Radio Bandwidth whatever the type of transmitter considered (single carrier, multi-carrier and/or CA) and for all transmission modes foreseen by the manufacturer's specification.

For a BS operating in non-contiguous spectrum, the ACLR also applies for the first adjacent channel inside any sub-block gap with a gap size Wgap ≥ 15MHz or Wgap ≥ 60MHz for Band 46. The ACLR requirement for the second adjacent channel applies inside any sub-block gap with a gap size Wgap ≥ 20 MHz or Wgap ≥ 80MHz for Band 46. The CACLR requirement in subclause 6.6.2.6 applies in sub block gaps for the frequency ranges defined in Table 6.6.2-5/6.

For a BS operating in multiple bands, where multiple bands are mapped onto the same antenna connector, the ACLR also applies for the first adjacent channel inside any Inter RF Bandwidth gap with a gap size Wgap ≥ 15MHz. The ACLR requirement for the second adjacent channel applies inside any Inter RF Bandwidth gap with a gap size Wgap ≥ 20 MHz. The CACLR requirement in subclause 6.6.2.6 applies in Inter RF Bandwidth gaps for the frequency ranges defined in Table 6.6.2-5/6.

The requirement applies during the transmitter ON period.

#### 6.6.2.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 6.6.2.1.

#### 6.6.2.3 Test purpose

To verify that the adjacent channel leakage power ratio requirement shall be met as specified by the minimum requirement.

#### 6.6.2.4 Method of test

##### 6.6.2.4.1 Initial conditions

Test environment: normal; see Annex D.2.

RF channels to be tested for single-carrier: B, M and T; see subclause 4.7.

Base Station RF Bandwidth positions to be tested for multi-carrier and/or CA: BRFBW, MRFBW and TRFBW in single-band operation, see subclause 4.7.1; BRFBW\_T’RFBW and B’RFBW\_TRFBW in multi-band operation, see subclause 4.7.1.

1) Connect measurement device to the base station antenna connector as shown in Annex I.1.1.

2) The measurement device characteristics shall be:

- measurement filter bandwidth: defined in subclause 6.6.2.5;

- detection mode: true RMS voltage or true average power.

3) For a E-UTRA BS declared to be capable of single carrier operation only,set the base station to transmit a signal according to E-TM1.1 at manufacturer’s declared rated output power.

For a E-UTRA BS declared to be capable of multi-carrier and/or CA operation, set the base station to transmit according to E-TM1.1 on all carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For a E-UTRA BS declared to be capable of NB-IoT in-band operation, start transmission according to [E-TM1.1] with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power.

For a E-UTRA BS declared to be capable of NB-IoT guard-band operation, start transmission according to E-TM1.1 with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power.

For a NB-IoT BS declared to be capable of single carrier operation, start transmission according to N-TM at manufacturer’s declared rated output power.

For a NB-IoT BS declared to be capable of multi-carrier in contiguous spectrum operation in single band only, start transmission according to N-TM on all carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For a E-UTRA and NB-IoT standalone BS declared to be capable of multi-carrier in contiguous spectrum operation in single band only, start transmission according to E-TM1.1 on all E-UTRA carriers and N-TM on all NB-IoT carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

4) Set carrier frequency within the frequency band supported by BS.

##### 6.6.2.4.2 Procedure

1) Measure Adjacent channel leakage power ratio for the frequency offsets both side of channel frequency as specified in Table 6.6.2-1 (Paired spectrum case) or Table 6.6.2-2 (Unpaired spectrum case) respectively. In multiple carrier case only offset frequencies below the lowest and above the highest carrier frequency used shall be measured.

2) For the ACLR requirement applied inside sub-block gap for non-contiguous spectrum operation: or inside Inter RF Bandwidth gap for multi-band operation

a) Measure ACLR inside sub-block gap or Inter RF Bandwidth gap as specified in subclause 6.6.2.5, if applicable.

b) For E-UTRA, measure CACLR inside sub-block gap or Inter RF Bandwidth gap as specified in subclause 6.6.2.6, if applicable.

3) For E-UTRA, repeat the test with the channel set-up according to E-TM1.2.

In addition, for a multi-band capable BS, the following step shall apply:

4) For multi-band capable BS and single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carrier activated in the other band. For multi-band capable BS with separate antenna connector, the antenna connector not being under test in case of single-band or multi-band test shall be terminated.

#### 6.6.2.5 Test Requirement

The ACLR is defined with a square filter of bandwidth equal to the transmission bandwidth configuration of the transmitted signal (BWConfig) centred on the assigned channel frequency and a filter centered on the adjacent channel frequency according to the tables below.

For Category A Wide Area BS, either the ACLR limits in the tables below or the absolute limit of -13 dBm/MHz shall apply, whichever is less stringent.

For Category B Wide Area BS, either the ACLR limits in the tables below or the absolute limit of -15 dBm/MHz shall apply, whichever is less stringent.

For Medium Range BS, either the ACLR limits in the tables below or the absolute limit of -25 dBm/MHz shall apply, whichever is less stringent.

For Local Area BS, either the ACLR limits in the tables below or the absolute limit of -32dBm/MHz shall apply, whichever is less stringent.

For Home BS, either the ACLR limits in the tables below or the absolute limit of -50dBm/MHz shall apply, whichever is less stringent.

The ACLR requirements in Tables 6.6.2-1 to 6.6.2-4 (except Table 6.6.2-2b) apply to BS that supports E-UTRA or E-UTRA with NB-IoT (in band and/or guard band), in any operating band, except for Band 46. The ACLR requirements for Band 46 are in Table 6.6.2-2a and 6.6.2-4a. The ACLR requirements in Table 6.6.2-2b apply to BS that supports standalone NB-IoT.

For operation in paired spectrum, the ACLR shall be higher than the value specified in Table 6.6.2‑1.

Table 6.6.2-1: Base Station ACLR in paired spectrum

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel bandwidth of E-UTRA lowest/highest carrier transmitted BWChannel [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 |
| 1.4, 3.0, 5, 10, 15, 20 | BWChannel | E-UTRA of same BW | Square (BWConfig) | 44.2 dB |
| 2 x BWChannel | E-UTRA of same BW | Square (BWConfig) | 44.2 dB |
| BWChannel /2 + 2.5 MHz | 3.84 Mcps UTRA | RRC (3.84 Mcps) | 44.2 dB |
| BWChannel /2 + 7.5 MHz | 3.84 Mcps UTRA | RRC (3.84 Mcps) | 44.2 dB |
| NOTE 1: BWChannel and BWConfig are the channel bandwidth and transmission bandwidth configuration of the E-UTRA lowest/highest/ carrier transmitted on the assigned channel frequency.  NOTE 2: The RRC filter shall be equivalent to the transmit pulse shape filter defined in [15], with a chip rate as defined in this table. | | | | |

For operation in unpaired spectrum, the ACLR shall be higher than the value specified in Table 6.6.2‑2.

Table 6.6.2-2: Base Station ACLR in unpaired spectrum with synchronized operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel bandwidth of E-UTRA lowest/highest carrier transmitted BWChannel [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 |
| 1.4, 3.0 | BWChannel | E-UTRA of same BW | Square (BWConfig) | 44.2 dB |
| 2 x BWChannel | E-UTRA of same BW | Square (BWConfig) | 44.2 dB |
| BWChannel /2 + 0.8 MHz | 1.28 Mcps UTRA | RRC (1.28 Mcps) | 44.2 dB |
| BWChannel /2 + 2.4 MHz | 1.28 Mcps UTRA | RRC (1.28 Mcps) | 44.2 dB |
| 5, 10, 15, 20 | BWChannel | E-UTRA of same BW | Square (BWConfig) | 44.2 dB |
| 2 x BWChannel | E-UTRA of same BW | Square (BWConfig) | 44.2 dB |
| BWChannel /2 + 0.8 MHz | 1.28 Mcps UTRA | RRC (1.28 Mcps) | 44.2 dB |
| BWChannel /2 + 2.4 MHz | 1.28 Mcps UTRA | RRC (1.28 Mcps) | 44.2 dB |
| BWChannel /2 + 2.5 MHz | 3.84 Mcps UTRA | RRC (3.84 Mcps) | 44.2 dB |
| BWChannel /2 + 7.5 MHz | 3.84 Mcps UTRA | RRC (3.84 Mcps) | 44.2 dB |
| BWChannel /2 + 5 MHz | 7.68 Mcps UTRA | RRC (7.68 Mcps) | 44.2 dB |
| BWChannel /2 + 15 MHz | 7.68 Mcps UTRA | RRC (7.68 Mcps) | 44.2 dB |
| NOTE 1: BWChannel and BWConfig are the channel bandwidth and transmission bandwidth configuration of the E-UTRA lowest/highest carrier transmitted on the assigned channel frequency.  NOTE 2: The RRC filter shall be equivalent to the transmit pulse shape filter defined in [15], with a chip rate as defined in this table. | | | | |

For operation in Band 46, the ACLR shall be higher than the value specified in Table 6.6.2‑2a.

Table 6.6.2-2a: Base Station ACLR in Band 46

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel bandwidth of E-UTRA lowest/highest carrier transmitted BWChannel [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 | BWChannel | E-UTRA of same BW | Square (BWConfig) | 34.2 dB |
| 2 x BWChannel | E-UTRA of same BW | Square (BWConfig) | 39.2 dB |
| 20 | BWChannel | E-UTRA of same BW | Square (BWConfig) | 35 dB |
| 2 x BWChannel | E-UTRA of same BW | Square (BWConfig) | 40 dB |
| NOTE 1: BWChannel and BWConfig are the channel bandwidth and transmission bandwidth configuration of the E-UTRA lowest/highest carrier transmitted on the assigned channel frequency. | | | | |

For stand-alone NB-IoT operation in paired spectrum, the ACLR shall be higher than the value specified in Table 6.6.2‑2b.

Table 6.6.2-2b: Base Station ACLR for stand-alone NB-IoT operation in paired spectrum

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel bandwidth of NB-IoT lowest/highest carrier transmitted BWChannel [kHz] | 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 |
| 200 | 300 kHz | Stand-alone NB-IoT | Square (180 kHz) | 39.2 dB |
| 500 kHz | Stand-alone NB-IoT | Square (180 kHz) | 49.2 dB |

For operation in non-contiguous paired spectrum or multiple bands, the ACLR shall be higher than the value specified in Table 6.6.2‑3.

Table 6.6.2-3: Base Station ACLR in non-contiguous paired spectrum or multiple bands

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sub-block or Inter RF Bandwidth gap size (Wgap) where the limit applies | BS adjacent channel centre frequency offset below or above the sub-block edge or the Base Station RF Bandwidth edge (inside the gap) | Assumed adjacent channel carrier (informative) | Filter on the adjacent channel frequency and corresponding filter bandwidth | ACLR limit |
| Wgap ≥ 15 MHz | 2.5 MHz | 3.84 Mcps UTRA | RRC (3.84 Mcps) | 44.2 dB |
| Wgap ≥ 20 MHz | 7.5 MHz | 3.84 Mcps UTRA | RRC (3.84 Mcps) | 44.2 dB |
| NOTE: The RRC filter shall be equivalent to the transmit pulse shape filter defined in TS 25.104 [15], with a chip rate as defined in this table. | | | | |

For operation in non-contiguous unpaired spectrum or multiple bands, the ACLR shall be higher than the value specified in Table 6.6.2‑4.

Table 6.6.2-4: Base Station ACLR in non-contiguous unpaired spectrum or multiple bands

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sub-block or Inter RF Bandwidth gap size (Wgap) where the limit applies | BS adjacent channel centre frequency offset below or above the sub-block edge or the Base Station RF Bandwidth edge (inside the gap) | Assumed adjacent channel carrier (informative) | Filter on the adjacent channel frequency and corresponding filter bandwidth | ACLR limit |
| Wgap ≥ 15 MHz | 2.5 MHz | 5MHz E-UTRA | Square (BWConfig) | 44.2 dB |
| Wgap ≥ 20 MHz | 7.5 MHz | 5MHz E-UTRA | Square (BWConfig) | 44.2 dB |

For operation in non-contiguous spectrum in Band 46, the ACLR shall be higher than the value specified in Table 6.6.2‑4a.

Table 6.6.2-4a: Base Station ACLR in non-contiguous spectrum in Band 46

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sub-block gap size (Wgap) where the limit applies | BS adjacent channel centre frequency offset below or above the sub-block edge (inside the gap) | Assumed adjacent channel carrier (informative) | Filter on the adjacent channel frequency and corresponding filter bandwidth | ACLR limit |
| Wgap ≥ 60 MHz | 10 MHz | 20MHz E-UTRA carrier | Square (BWConfig) | 35 dB |
| Wgap ≥ 80 MHz | 30 MHz | 20MHz E-UTRA carrier | Square (BWConfig) | 40 dB |

#### 6.6.2.6 Cumulative ACLR test requirement in non-contiguous spectrum

The following test requirement applies for the sub-block or Inter RF Bandwidth gap sizes listed in Table 6.6.2-5/6/6a,

- Inside a sub-block gap within an operating band for a BS operating in non-contiguous spectrum.

- Inside an Inter RF Bandwidth gap for a BS operating in multiple bands, where multiple bands are mapped on the same antenna connector.

The Cumulative Adjacent Channel Leakage power Ratio (CACLR) in a sub-block gap or 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 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 6.6.2-5/6. Filters on the assigned channels are defined in Table 6.6.2-7.

For Wide Area Category A BS, either the CACLR limits in Table 6.6.2-5/6 or the absolute limit of -13dBm/MHz shall apply, whichever is less stringent.

For Wide Area Category B BS, either the CACLR limits in Table 6.6.2-5/6 or the absolute limit of -15dBm/MHz shall apply, whichever is less stringent.

For Medium Range BS, either the CACLR limits in Table 6.6.2-5/6 or the absolute limit of -25 dBm/MHz shall apply, whichever is less stringent.

For Local Area BS, either the CACLR limits in Table 6.6.2-5/6 or the absolute limit of -32 dBm/MHz shall apply, whichever is less stringent.

The ACLR requirements in Tables 6.6.2-5 and 6.6.2-6 apply to BS that supports E-UTRA, in any operating band, except for Band 46. The ACLR requirements for Band 46 are in Table 6.6.2-6a.

For operation in non-contiguous spectrum or multiple bands, the CACLR for E-UTRA carriers located on either side of the sub-block gap or Inter RF Bandwidth gap shall be higher than the value specified in Table 6.6.2-5/6.

Table 6.6.2-5: Base Station CACLR in non-contiguous paired spectrum or multiple bands

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sub-block or Inter RF Bandwidth gap size (Wgap) where the limit applies | BS adjacent channel centre frequency offset below or above the sub-block edge or the Base Station RF Bandwidth edge (inside the gap) | Assumed adjacent channel carrier (informative) | Filter on the adjacent channel frequency and corresponding filter bandwidth | CACLR limit |
| 5 MHz ≤ Wgap < 15 MHz | 2.5 MHz | 3.84 Mcps UTRA | RRC (3.84 Mcps) | 44.2 dB |
| 10 MHz < Wgap < 20 MHz | 7.5 MHz | 3.84 Mcps UTRA | RRC (3.84 Mcps) | 44.2 dB |
| NOTE: The RRC filter shall be equivalent to the transmit pulse shape filter defined in TS 25.104 [15], with a chip rate as defined in this table. | | | | |

Table 6.6.2-6: Base Station CACLR in non-contiguous unpaired spectrum or multiple bands

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sub-block or Inter RF Bandwidth gap size (Wgap) where the limit applies | BS adjacent channel centre frequency offset below or above the sub-block edge or the Base Station RF Bandwidth edge (inside the gap) | Assumed adjacent channel carrier (informative) | Filter on the adjacent channel frequency and corresponding filter bandwidth | CACLR limit |
| 5 MHz ≤ Wgap < 15 MHz | 2.5 MHz | 5MHz E-UTRA carrier | Square (BWConfig) | 44.2 dB |
| 10 MHz < Wgap < 20 MHz | 7.5 MHz | 5MHz E-UTRA carrier | Square (BWConfig) | 44.2 dB |

For operation in non-contiguous spectrum in Band 46, the CACLR for E-UTRA carriers located on either side of the sub-block gap shall be higher than the value specified in Table 6.6.2-6a.

Table 6.6.2-6a: Base Station CACLR in non-contiguous spectrum in Band 46

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sub-block gap size (Wgap) where the limit applies | BS adjacent channel centre frequency offset below or above the sub-block edge (inside the gap) | Assumed adjacent channel carrier (informative) | Filter on the adjacent channel frequency and corresponding filter bandwidth | CACLR limit |
| 20 MHz ≤ Wgap < 60 MHz | 10 MHz | 20MHz E-UTRA carrier | Square (BWConfig) | 34.2 dB |
| 40 MHz < Wgap < 80 MHz | 30 MHz | 20MHz E-UTRA carrier | Square (BWConfig) | 34.2 dB |

Table 6.6.2-7: 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 |
| E-UTRA | E-UTRA of same BW |

NOTE: If the above Test Requirements differ from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance are given in Annex G.

### 6.6.3 Operating band unwanted emissions

#### 6.6.3.1 Definition and applicability

Unless otherwise stated, the Operating band unwanted emission limits are defined from 10 MHz below the lowest frequency of each supported downlink operating band up to 10 MHz above the highest frequency of each supported downlink operating band (see Table 5.5-1).

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

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

For a BS supporting E-UTRA with guard band NB-IoT operation, the Operating band unwanted emissions requirements apply to E-UTRA carrier with channel bandwidth larger than or equal to 5 MHz.

The unwanted emission limits in the part of the downlink operating band that falls in the spurious domain are consistent with ITU-R Recommendation SM.329 [5].

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

For Wide Area BS, the requirements of either subclause 6.6.3.5.1 (Category A limits) or subclause 6.6.3.5.2 (Category B limits) shall apply.

For Local Area BS, the requirements of subclause 6.6.3.5.2A shall apply (Category A and B).

For Home BS, the requirements of subclause 6.6.3.5.2B shall apply (Category A and B).

For Medium Range BS, the requirements in subclause 6.6.3.5.2C shall apply (Category A and B).

The application of either Category A or Category B limits shall be the same as for Transmitter spurious emissions (Mandatory Requirements) in subclause 6.6.4.5.

For Category B Operating band unwanted emissions, there are two options for the limits that may be applied regionally. Either the limits in subclause 6.6.3.5.2.1 or subclause 6.6.3.5.2.2 shall be applied.

The requirements of subclauses 6.6.3.5.1 and 6.6.3.5.2 apply to Wide Area BS that supports E-UTRA with NB-IoT (in band and/or guard band). The requirements for Wide Area BS that supports standalone NB-IoT are in subclause 6.6.3.5.2E.

The requirements of subclause 6.6.3.5.2A apply to Local Area BS that supports E-UTRA with NB-IoT (in band and/or guard band). The requirements for Local Area BS that supports standalone NB-IoT are in subclause 6.6.3.5.2F.

The requirements of subclause 6.6.3.5.2B apply to Home BS that supports E-UTRA with NB-IoT (in band and/or guard band). The requirements for Home BS that supports standalone NB-IoT are in subclause 6.6.3.5.2G.

The requirements of subclauses 6.6.3.5.2C apply to Medium Range BS that supports E-UTRA with NB-IoT (in band and/or guard band). The requirements for Medium Range BS that supports standalone NB-IoT are in subclause 6.6.3.5.2H.

#### 6.6.3.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 6.6.3.

#### 6.6.3.3 Test purpose

This test measures the emissions of the BS, close to the assigned channel bandwidth of the wanted signal, while the transmitter is in operation.

#### 6.6.3.4 Method of test

##### 6.6.3.4.1 Initial conditions

Test environment: normal; see Annex D.2.

RF channels to be tested for single carrier: B, M and T; see subclause 4.7.

Base Station RF Bandwidth position to be tested for multi-carrier and/or CA: BRFBW, MRFBW and TRFBW in single-band operation, see subclause 4.7.1; BRFBW\_T’RFBW and B’RFBW\_TRFBW in multi-band operation, see subclause 4.7.1.

1) Connect the signal analyzer to the base station antenna connector as shown in Annex I.1.1.

As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity, efficiency and avoiding e.g. carrier leakage, 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.

2) Detection mode: True RMS.

##### 6.6.3.4.2 Procedure

1) For a E-UTRA BS declared to be capable of single carrier operation only, set the BS transmission at manufacturer’s declared rated output power. Channel set-up shall be according to E-TM 1.1.

For a E-UTRA BS declared to be capable of multi-carrier and/or CA operation, set the base station to transmit according to E-TM1.1 on all carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For a E-UTRA BS declared to be capable of NB-IoT in-band operation, start transmission according to [E-TM1.1] with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power.

For a E-UTRA BS declared to be capable of NB-IoT guard-band operation, start transmission according to E-TM1.1 with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power.

For a NB-IoT BS declared to be capable of single carrier operation, start transmission according to N-TM at manufacturer’s declared rated output power.

For a NB-IoT BS declared to be capable of multi-carrier in contiguous spectrum operation in single band only, start transmission according to N-TM on all carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For a E-UTRA and NB-IoT standalone BS declared to be capable of multi-carrier in contiguous spectrum operation in single band only, start transmission according to E-TM1.1 on all E-UTRA carriers and N-TM on all NB-IoT carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

2) Step the centre frequency of the measurement filter in contiguous steps and measure the emission within the specified frequency ranges with the specified measurement bandwidth. For BS operating in multiple bands or non-contiguous spectrum, the emission within the Inter RF Bandwidth or sub-block gap shall be measured using the specified measurement bandwidth from the closest RF Bandwidth or sub block edge.

3) For E-UTRA, repeat the test with the channel set-up according to E-TM 1.2

In addition, for a multi-band capable BS, the following step shall apply:

4) For multi-band capable BS and single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carrier activated in the other band. For multi-band capable BS with separate antenna connector, the antenna connector not being under test in case of single-band or multi-band test shall be terminated.

#### 6.6.3.5 Test requirement

The measurement results in step 2 of 6.6.3.4.2 shall not exceed the maximum levels specified in the tables below, where:

- Δf is the separation between the Base Station RF Bandwidth edge frequency and the nominal -3dB point of the measuring filter closest to the carrier frequency.

- f\_offset is the separation between the Base Station RF Bandwidth edge frequency and the centre of the measuring filter.

- f\_offsetmax is the offset to the frequency 10 MHz outside the downlink operating band.

- Δfmax is equal to f\_offsetmax minus half of the bandwidth of the measuring filter.

For BS operating in multiple bands, inside any Inter RF Bandwidth gaps with Wgap < 20 MHz, emissions shall not exceed the cumulative sum of the test requirements specified at the Base Station RF Bandwidth edges on each side of the Inter RF Bandwidth gap. The test requirement for Base Station RF Bandwidth edge is specified in Tables 6.6.3.5.1-1 to 6.6.3.5.3-3 below, where in this case:

- Δf is the separation between the Base Station RF Bandwidth edge frequency and the nominal -3 dB point of the measuring filter closest to the Base Station RF Bandwidth edge.

- f\_offset is the separation between the Base Station RF Bandwidth edge frequency and the centre of the measuring filter.

- f\_offsetmax is equal to the Inter RF Bandwidth gap minus half of the bandwidth of the measuring filter.

- Δfmax is equal to f\_offsetmax minus half of the bandwidth of the measuring filter.

For BS capable of multi-band operation where multiple bands are mapped on the same antenna connector, the operating band unwanted emission limits apply also in a supported operating band without any carrier transmitted, in the case where there are carrier(s) transmitted in other supported operating band(s). In this case where there is no carrier transmitted in an operating band, the operating band unwanted emission limit, as defined in the tables of the present subclause for the largest frequency offset (Δfmax), of a band where there is no carrier transmitted shall apply from 10 MHz below the lowest frequency, up to 10 MHz above the highest frequency of the supported downlink operating band without any carrier transmitted. And, no cumulative limit is applied in the inter-band gap between a supported downlink operating band with carrier(s) transmitted and a supported downlink operating band without any carrier transmitted.

In addition inside any sub-block gap for a BS operating in non-contiguous spectrum, measurement results shall not exceed the cumulative sum of the test requirements specified for the adjacent sub blocks on each side of the sub block gap. The test requirement for each sub block is specified in Tables 6.6.3.5.1-1 to 6.6.3.5.3-3 below, where in this case:

- Δf is the separation between the sub block edge frequency and the nominal -3 dB point of the measuring filter closest to the sub block edge.

- f\_offset is the separation between the sub block edge frequency and the centre of the measuring filter.

- f\_offsetmax is equal to the sub block gap bandwidth minus half of the bandwidth of the measuring filter.

- Δfmax is equal to f\_offsetmax minus half of the bandwidth of the measuring filter.

##### 6.6.3.5.1 Test requirements for Wide Area BS (Category A)

For E-UTRA BS operating in Bands 5, 6, 8, 12, 13, 14, 17, 18, 19, 26, 27, 28, 29, 31, 44, 71, 72, 73, 85, 87, 88 emissions shall not exceed the maximum levels specified in Tables 6.6.3.5.1‑1 to 6.6.3.5.1-3.

Table 6.6.3.5.1-1: Wide Area BS operating band unwanted emission limits for 1.4 MHz channel bandwidth (E‑UTRA bands <1GHz) for Category A

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 1.4 MHz | 0.05 MHz ≤ f\_offset < 1.45 MHz |  | 100 kHz |
| 1.4 MHz ≤ Δf < 2.8 MHz | 1.45 MHz ≤ f\_offset < 2.85 MHz | -9.5 dBm | 100 kHz |
| 2.8 MHz ≤ Δf ≤ Δfmax | 2.85 MHz ≤ f\_offset < f\_offsetmax | -13 dBm | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -13dBm/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.1-2: Wide Area BS operating band unwanted emission limits for 3 MHz channel bandwidth (E‑UTRA bands <1GHz) for Category A

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 3 MHz | 0.05 MHz ≤ f\_offset < 3.05 MHz |  | 100 kHz |
| 3 MHz ≤ Δf < 6 MHz | 3.05 MHz ≤ f\_offset < 6.05 MHz | -13.5 dBm | 100 kHz |
| 6 MHz ≤ Δf ≤ Δfmax | 6.05 MHz ≤ f\_offset < f\_offsetmax | -13 dBm | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -13dBm/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.1-3: Wide Area BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (E-UTRA bands <1GHz) for Category A

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δf <  min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset <  min(10.05 MHz, f\_offsetmax) | -12.5 dBm | 100 kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | -13 dBm (Note 5) | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -13dBm/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

For E-UTRA BS operating in Bands 1, 2, 3, 4, 7, 9, 10, 11, 21, 23, 24, 25, 30, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 45, 48, 50, 65, 66, 69, 70, 74, 75 emissions shall not exceed the maximum levels specified in Tables 6.6.3.5.1-4, 6.6.3.5.1-5 and 6.6.3.5.1-6:

For E-UTRA BS operating in Bands 22, 42, 43, 52, emissions shall not exceed the maximum levels specified in Tables 6.6.3.5.1-4a, 6.6.3.5.1-5a and 6.6.3.5.1-6a:

Table 6.6.3.5.1-4: Wide Area BS operating band unwanted emission limits for 1.4 MHz channel bandwidth (1GHz < E‑UTRA bands ≤ 3GHz) for Category A

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 1.4 MHz | 0.05 MHz ≤ f\_offset < 1.45 MHz |  | 100 kHz |
| 1.4 MHz ≤ Δf < 2.8 MHz | 1.45 MHz ≤ f\_offset < 2.85 MHz | -9.5 dBm | 100 kHz |
| 2.8 MHz ≤ Δf ≤ Δfmax | 3.3 MHz ≤ f\_offset < f\_offsetmax | -13 dBm | 1MHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, 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 f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -13dBm/1MHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.1-4a: Wide Area BS operating band unwanted emission limits for 1.4 MHz channel bandwidth (E‑UTRA bands >3GHz) for Category A

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 1.4 MHz | 0.05 MHz ≤ f\_offset < 1.45 MHz |  | 100 kHz |
| 1.4 MHz ≤ Δf < 2.8 MHz | 1.45 MHz ≤ f\_offset < 2.85 MHz | -9.2 dBm | 100 kHz |
| 2.8 MHz ≤ Δf ≤ Δfmax | 3.3 MHz ≤ f\_offset < f\_offsetmax | -13 dBm | 1MHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, 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 f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -13dBm/1MHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.1-5: Wide Area BS operating band unwanted emission limits for 3 MHz channel bandwidth (1GHz < E‑UTRA bands ≤ 3GHz) for Category A

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 3 MHz | 0.05 MHz ≤ f\_offset < 3.05 MHz |  | 100 kHz |
| 3 MHz ≤ Δf < 6 MHz | 3.05 MHz ≤ f\_offset < 6.05 MHz | -13.5 dBm | 100 kHz |
| 6 MHz ≤ Δf ≤ Δfmax | 6.5 MHz ≤ f\_offset < f\_offsetmax | -13 dBm | 1MHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, 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 f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -13dBm/1MHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.1-5a: Wide Area BS operating band unwanted emission limits for 3 MHz channel bandwidth (E‑UTRA bands >3GHz) for Category A

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 3 MHz | 0.05 MHz ≤ f\_offset < 3.05 MHz |  | 100 kHz |
| 3 MHz ≤ Δf < 6 MHz | 3.05 MHz ≤ f\_offset < 6.05 MHz | -13.2 dBm | 100 kHz |
| 6 MHz ≤ Δf ≤ Δfmax | 6.5 MHz ≤ f\_offset < f\_offsetmax | -13 dBm | 1MHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, 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 f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -13dBm/1MHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.1-6: Wide Area BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (1GHz < E-UTRA bands ≤ 3GHz) for Category A

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δf <  min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset <  min(10.05 MHz, f\_offsetmax) | -12.5 dBm | 100 kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.5 MHz ≤ f\_offset < f\_offsetmax | -13 dBm (Note 9) | 1MHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, 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 f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -13dBm/1MHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.1-6a: Wide Area BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (E-UTRA bands >3GHz) for Category A

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δf <  min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset <  min(10.05 MHz, f\_offsetmax) | -12.2 dBm | 100 kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.5 MHz ≤ f\_offset < f\_offsetmax | -13 dBm (Note 9) | 1MHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, 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 f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -13dBm/1MHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

##### 6.6.3.5.2 Test requirements for Wide Area BS (Category B)

For Category B Operating band unwanted emissions, there are two options for the limits that may be applied regionally. Either the limits in subclause 6.6.3.5.2.1 or subclause 6.6.3.5.2.2 shall be applied.

##### 6.6.3.5.2.1 Category B test requirements (Option 1)

For E-UTRA BS operating in Bands 5, 8, 12, 13, 14, 17, 20, 26, 27, 28, 29, 31, 44, 67, 68, 71, 72, 73, 85, 87, 88 emissions shall not exceed the maximum levels specified in Tables 6.6.3.5.2.1-1 to 6.6.3.5.2.1-3:

Table 6.6.3.5.2.1-1: Wide Area BS operating band unwanted emission limits for 1.4 MHz channel bandwidth (E‑UTRA bands <1GHz) for Category B

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 1.4 MHz | 0.05 MHz ≤ f\_offset < 1.45 MHz |  | 100 kHz |
| 1.4 MHz ≤ Δf < 2.8 MHz | 1.45 MHz ≤ f\_offset < 2.85 MHz | -9.5 dBm | 100 kHz |
| 2.8 MHz ≤ Δf ≤ Δfmax | 2.85 MHz ≤ f\_offset < f\_offsetmax | -16 dBm | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -16dBm/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2.1-2: Wide Area BS operating band unwanted emission limits for 3 MHz channel bandwidth (E‑UTRA bands <1GHz) for Category B

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 3 MHz | 0.05 MHz ≤ f\_offset < 3.05 MHz |  | 100 kHz |
| 3 MHz ≤ Δf < 6 MHz | 3.05 MHz ≤ f\_offset < 6.05 MHz | -13.5 dBm | 100 kHz |
| 6 MHz ≤ Δf ≤ Δfmax | 6.05 MHz ≤ f\_offset < f\_offsetmax | -16 dBm | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -16dBm/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2.1-3: Wide Area BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (E-UTRA bands <1GHz) for Category B

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δf <  min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset <  min(10.05 MHz, f\_offsetmax) | -12.5 dBm | 100 kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | -16 dBm (Note 9) | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -16dBm/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

For E-UTRA BS operating in Bands 1, 2, 3, 4, 7, 10, 25, 30, 33, 34, 35, 36, 37, 38, 39, 40, 41, 45, 48, 50, 65, 66, 69, 70, 75 emissions shall not exceed the maximum levels specified in Tables 6.6.3.5.2.1-4, 6.6.3.5.2.1-5 and 6.6.3.5.2.1-6:

For E-UTRA BS operating in Bands 22, 42, 43, 52, emissions shall not exceed the maximum levels specified in Tables 6.6.3.5.2.1-4a, 6.6.3.5.2.1-5a and 6.6.3.5.2.1-6a:

Table 6.6.3.5.2.1-4: Wide Area BS operating band unwanted emission limits for 1.4 MHz channel bandwidth (1GHz < E‑UTRA bands ≤ 3GHz) for Category B

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 1.4 MHz | 0.05 MHz ≤ f\_offset < 1.45 MHz |  | 100 kHz |
| 1.4 MHz ≤ Δf < 2.8 MHz | 1.45 MHz ≤ f\_offset < 2.85 MHz | -9.5 dBm | 100 kHz |
| 2.8 MHz ≤ Δf ≤ Δfmax | 3.3 MHz ≤ f\_offset < f\_offsetmax | -15 dBm | 1MHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, 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 f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -15dBm/1MHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2.1-4a: Wide Area BS operating band unwanted emission limits for 1.4 MHz channel bandwidth (E‑UTRA bands >3GHz) for Category B

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 1.4 MHz | 0.05 MHz ≤ f\_offset < 1.45 MHz |  | 100 kHz |
| 1.4 MHz ≤ Δf < 2.8 MHz | 1.45 MHz ≤ f\_offset < 2.85 MHz | -9.2 dBm | 100 kHz |
| 2.8 MHz ≤ Δf ≤ Δfmax | 3.3 MHz ≤ f\_offset < f\_offsetmax | -15 dBm | 1MHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, 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 f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -15dBm/1MHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2.1-5: Wide Area BS operating band unwanted emission limits for 3 MHz channel bandwidth (1GHz < E‑UTRA bands ≤ 3GHz) for Category B

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 3 MHz | 0.05 MHz ≤ f\_offset < 3.05 MHz |  | 100 kHz |
| 3 MHz ≤ Δf < 6 MHz | 3.05 MHz ≤ f\_offset < 6.05 MHz | -13.5 dBm | 100 kHz |
| 6 MHz ≤ Δf ≤ Δfmax | 6.5 MHz ≤ f\_offset < f\_offsetmax | -15 dBm | 1MHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, 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 f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -15dBm/1MHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2.1-5a: Wide Area BS operating band unwanted emission limits for 3 MHz channel bandwidth (E‑UTRA bands >3GHz) for Category B

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 3 MHz | 0.05 MHz ≤ f\_offset < 3.05 MHz |  | 100 kHz |
| 3 MHz ≤ Δf < 6 MHz | 3.05 MHz ≤ f\_offset < 6.05 MHz | -13.2 dBm | 100 kHz |
| 6 MHz ≤ Δf ≤ Δfmax | 6.5 MHz ≤ f\_offset < f\_offsetmax | -15 dBm | 1MHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, 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 f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -15dBm/1MHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2.1-6: Wide Area BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (1GHz < E-UTRA bands ≤ 3GHz) for Category B

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δf <  min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset <  min(10.05 MHz, f\_offsetmax) | -12.5 dBm | 100 kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.5 MHz ≤ f\_offset < f\_offsetmax | -15 dBm (Note 9) | 1MHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, 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 f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -15dBm/1MHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2.1-6a: Wide Area BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (E-UTRA bands >3GHz) for Category B

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δf <  min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset <  min(10.05 MHz, f\_offsetmax) | -12.2 dBm | 100 kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.5 MHz ≤ f\_offset < f\_offsetmax | -15 dBm (Note 9) | 1MHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, 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 f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -15dBm/1MHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

##### 6.6.3.5.2.2 Category B (Option 2)

The limits in this subclause are intended for Europe and may be applied regionally for BS operating in band 1, 3, 7, 8, 32, 33, 34, 38, 65 or 69.

For a BS operating in band 1, 3, 7, 8, 32, 33, 34, 38, 65 or 69, emissions shall not exceed the maximum levels specified in Table 6.6.3.5.2.2-1 below for 5, 10, 15 and 20 MHz channel bandwidth:

Table 6.6.3.5.2.2-1: Regional Wide Area BS operating band unwanted emission limits in band 1, 3, 7, 8, 32, 33, 34, 38, 65 or 69 for 5, 10, 15 and 20 MHz channel bandwidth for Category B

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 0.2 MHz | 0.015MHz ≤ f\_offset < 0.215MHz | -12.5dBm | 30 kHz |
| 0.2 MHz ≤ Δf < 1 MHz | 0.215MHz ≤ f\_offset < 1.015MHz |  | 30 kHz |
| (Note 8) | 1.015MHz ≤ f\_offset < 1.5 MHz | -24.5dBm | 30 kHz |
| 1 MHz ≤ Δf ≤  min( 10 MHz , Δfmax) | 1.5 MHz ≤ f\_offset <  min(10.5 MHz, f\_offsetmax) | -11.5dBm | 1 MHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.5 MHz ≤ f\_offset < f\_offsetmax | -15 dBm (Note 9) | 1 MHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, 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 f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -15dBm/1MHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

For a BS operating in band 3, 8 or 65, emissions shall not exceed the maximum levels specified in Table 6.6.3.5.2.2‑2 below for 3 MHz channel bandwidth:

Table 6.6.3.5.2.2-2: Regional Wide Area BS operating band unwanted emission limits in band 3, 8 or 65 for 3 MHz channel bandwidth for Category B

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 0.05 MHz | 0.015 MHz ≤ f\_offset < 0.065 MHz |  | 30 kHz |
| 0.05 MHz ≤ Δf < 0.15 MHz | 0. 065 MHz ≤ f\_offset < 0.165 MHz |  | 30 kHz |
| 0.15 MHz ≤ Δf < 0.2 MHz | 0.165MHz ≤ f\_offset < 0.215MHz | -12.5dBm | 30 kHz |
| 0.2 MHz ≤ Δf < 1 MHz | 0.215MHz ≤ f\_offset < 1.015MHz |  | 30 kHz |
| (Note 8) | 1.015MHz ≤ f\_offset < 1.5 MHz | -24.5dBm | 30 kHz |
| 1 MHz ≤ Δf ≤  6 MHz | 1.5MHz ≤ f\_offset < 6.5 MHz, | -11.5dBm | 1 MHz |
| 6 MHz ≤ Δf ≤ Δfmax | 6.5 MHz ≤ f\_offset < f\_offsetmax | -15 dBm | 1 MHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, 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 f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -15dBm/1MHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

For a BS operating in band 3, 8 or 65, emissions shall not exceed the maximum levels specified in Table 6.6.3.5.2.2‑3 below for 1.4 MHz channel bandwidth:

Table 6.6.3.5.2.2-3: Regional Wide Area BS operating band unwanted emission limits in band 3, 8 or 65 for 1.4 MHz channel bandwidth for Category B

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 0.05 MHz | 0.015 MHz ≤ f\_offset < 0.065 MHz |  | 30 kHz |
| 0.05 MHz ≤ Δf < 0.15 MHz | 0. 065 MHz ≤ f\_offset < 0.165 MHz |  | 30 kHz |
| 0.15 MHz ≤ Δf < 0.2 MHz | 0.165MHz ≤ f\_offset < 0.215MHz | -12.5 dBm | 30 kHz |
| 0.2 MHz ≤ Δf < 1 MHz | 0.215MHz ≤ f\_offset < 1.015MHz |  | 30 kHz |
| (Note 8) | 1.015MHz ≤ f\_offset < 1.5 MHz | -24.5 dBm | 30 kHz |
| 1 MHz ≤ Δf ≤ 2.8 MHz | 1.5 MHz ≤ f\_offset < 3.3 MHz | -11.5 dBm | 1 MHz |
| 2.8 MHz ≤ Δf ≤ Δfmax | 3.3 MHz ≤ f\_offset < f\_offsetmax | -15 dBm | 1 MHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, 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 f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -15dBm/1MHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

##### 6.6.3.5.2A Test requirements for Local Area BS (Category A and B)

For Local Area BS in E-UTRA bands ≤3GHz, emissions shall not exceed the maximum levels specified in Tables 6.6.3.5.2A-1, 6.6.3.5.2A-2 and 6.6.3.5.2A-3.

For Local Area BS in E-UTRA bands >3GHz, emissions shall not exceed the maximum levels specified in Tables 6.6.3.5.2A-1a, 6.6.3.5.2A-2a and 6.6.3.5.2A-3a.

Table 6.6.3.5.2A-1: Local Area BS operating band unwanted emission limits for 1.4 MHz channel bandwidth (E-UTRA bands ≤3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 1.4 MHz | 0.05 MHz ≤ f\_offset < 1.45 MHz |  | 100 kHz |
| 1.4 MHz ≤ Δf < 2.8 MHz | 1.45 MHz ≤ f\_offset < 2.85 MHz | -29.5 dBm | 100 kHz |
| 2.8 MHz ≤ Δf ≤ Δfmax | 2.85 MHz ≤ f\_offset < f\_offsetmax | -31 dBm | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -31 dBm/100 kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2A-1a: Local Area BS operating band unwanted emission limits for 1.4 MHz channel bandwidth (E-UTRA bands >3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 1.4 MHz | 0.05 MHz ≤ f\_offset < 1.45 MHz |  | 100 kHz |
| 1.4 MHz ≤ Δf < 2.8 MHz | 1.45 MHz ≤ f\_offset < 2.85 MHz | -29.2 dBm | 100 kHz |
| 2.8 MHz ≤ Δf ≤ Δfmax | 2.85 MHz ≤ f\_offset < f\_offsetmax | -31 dBm | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -31 dBm/100 kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2A-2: Local Area BS operating band unwanted emission limits for 3 MHz channel bandwidth (E-UTRA bands ≤3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 3 MHz | 0.05 MHz ≤ f\_offset < 3.05 MHz |  | 100 kHz |
| 3 MHz ≤ Δf < 6 MHz | 3.05 MHz ≤ f\_offset < 6.05 MHz | -33.5 dBm | 100 kHz |
| 6 MHz ≤ Δf ≤ Δfmax | 6.05 MHz ≤ f\_offset < f\_offsetmax | -35 dBm | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -35 dBm/100 kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2A-2a: Local Area BS operating band unwanted emission limits for 3 MHz channel bandwidth (E-UTRA bands >3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 3 MHz | 0.05 MHz ≤ f\_offset < 3.05 MHz |  | 100 kHz |
| 3 MHz ≤ Δf < 6 MHz | 3.05 MHz ≤ f\_offset < 6.05 MHz | -33.2 dBm | 100 kHz |
| 6 MHz ≤ Δf ≤ Δfmax | 6.05 MHz ≤ f\_offset < f\_offsetmax | -35 dBm | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -35 dBm/100 kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2A-3: Local Area BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (E-UTRA bands ≤3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δf <  min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset <  min(10.05 MHz, f\_offsetmax) | -35.5 dBm | 100 kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | -37 dBm (Note 9) | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -37 dBm/100 kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2A-3a: Local Area BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (E-UTRA bands >3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δf <  min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset <  min(10.05 MHz, f\_offsetmax) | -35.2 dBm | 100 kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | -37 dBm (Note 9) | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -37 dBm/100 kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

##### 6.6.3.5.2B Test requirements for Home BS (Category A and B)

For Home BS in E-UTRA bands ≤3GHz, emissions shall not exceed the maximum levels specified in Tables 6.6.3.5.2B-1, 6.6.3.5.2B-2 and 6.6.3.5.2B-3.

For Home BS in E-UTRA bands >3GHz, emissions shall not exceed the maximum levels specified in Tables 6.6.3.5.2B-1a, 6.6.3.5.2B-2a and 6.6.3.5.2B-3a.

Table 6.6.3.5.2B-1: Home BS operating band unwanted emission limits for 1.4 MHz channel bandwidth (E-UTRA bands ≤3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 1.4 MHz | 0.05 MHz ≤ f\_offset < 1.45 MHz |  | 100 kHz |
| 1.4 MHz ≤ Δf < 2.8 MHz | 1.45 MHz ≤ f\_offset < 2.85 MHz | -34.5 dBm | 100 kHz |
| 2.8 MHz ≤ Δf ≤ Δfmax | 3.3 MHz ≤ f\_offset < f\_offsetmax |  | 1MHz |

Table 6.6.3.5.2B-1a: Home BS operating band unwanted emission limits for 1.4 MHz channel bandwidth (E-UTRA bands >3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 1.4 MHz | 0.05 MHz ≤ f\_offset < 1.45 MHz |  | 100 kHz |
| 1.4 MHz ≤ Δf < 2.8 MHz | 1.45 MHz ≤ f\_offset < 2.85 MHz | -34.2 dBm | 100 kHz |
| 2.8 MHz ≤ Δf ≤ Δfmax | 3.3 MHz ≤ f\_offset < f\_offsetmax |  | 1MHz |

Table 6.6.3.5.2B-2: Home BS operating band unwanted emission limits for 3 MHz channel bandwidth (E-UTRA bands ≤3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 3 MHz | 0.05 MHz ≤ f\_offset < 3.05 MHz |  | 100 kHz |
| 3 MHz ≤ Δf < 6 MHz | 3.05 MHz ≤ f\_offset < 6.05 MHz | -38.5 dBm | 100 kHz |
| 6 MHz ≤ Δf ≤ Δfmax | 6.5 MHz ≤ f\_offset < f\_offsetmax |  | 1MHz |

Table 6.6.3.5.2B-2a: Home BS operating band unwanted emission limits for 3 MHz channel bandwidth (E-UTRA bands >3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 3 MHz | 0.05 MHz ≤ f\_offset < 3.05 MHz |  | 100 kHz |
| 3 MHz ≤ Δf < 6 MHz | 3.05 MHz ≤ f\_offset < 6.05 MHz | -38.2 dBm | 100 kHz |
| 6 MHz ≤ Δf ≤ Δfmax | 6.5 MHz ≤ f\_offset < f\_offsetmax |  | 1MHz |

Table 6.6.3.5.2B-3: Home BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (E-UTRA bands ≤3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δf < min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset < min(10.05 MHz, f\_offsetmax) | -40.5 dBm | 100 kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.5 MHz ≤ f\_offset < f\_offsetmax | (Note 9) | 1MHz |

Table 6.6.3.5.2B-3a: Home BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth (E-UTRA bands >3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δf < min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset < min(10.05 MHz, f\_offsetmax) | -40.2 dBm | 100 kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.5 MHz ≤ f\_offset < f\_offsetmax | (Note 9) | 1MHz |

##### 6.6.3.5.2C Test requirements for Medium Range BS (Category A and B)

For Medium Range BS in E-UTRA bands ≤3GHz, emissions shall not exceed the maximum levels specified in Tables 6.6.3.5.2C-1, 6.6.3.5.2C-2, 6.6.3.5.2C-3, 6.6.3.5.2C-4, 6.6.3.5.2C-5 and 6.6.3.5.2C-6.

For Medium Range BS in E-UTRA bands >3GHz, emissions shall not exceed the maximum levels specified in Tables 6.6.3.5.2C-1a, 6.6.3.5.2C-2a, 6.6.3.5.2C-3a, 6.6.3.5.2C-4a, 6.6.3.5.2C-5a and 6.6.3.5.2C-6a.



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Table 6.6.3.5.2C-1: Medium Range BS operating band unwanted emission limits for 1.4 MHz channel bandwidth, 31 < Prated,c ≤ 38 |  |  |  | |

dBm (E-UTRA bands ≤3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 1.4 MHz | 0.05 MHz ≤ f\_offset < 1.45 MHz |  | 100 kHz |
| 1.4 MHz ≤ Δf < 2.8 MHz | 1.45 MHz ≤ f\_offset < 2.85 MHz | Prated,c-53.5dB | 100 kHz |
| 2.8 MHz ≤ Δf ≤ Δfmax | 2.85 MHz ≤ f\_offset < f\_offsetmax | -25dBm | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -25dBm/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2C-1a: Medium Range BS operating band unwanted emission limits for 1.4 MHz channel bandwidth, 31 < Prated,c ≤ 38 dBm (E-UTRA bands >3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 1.4 MHz | 0.05 MHz ≤ f\_offset < 1.45 MHz |  | 100 kHz |
| 1.4 MHz ≤ Δf < 2.8 MHz | 1.45 MHz ≤ f\_offset < 2.85 MHz | Prated,c-53.2dB | 100 kHz |
|  |  |  |  |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -25dBm/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2C-2: Medium Range BS operating band unwanted emission limits for 1.4 MHz channel bandwidth, Prated,c ≤ 31 dBm (E-UTRA bands ≤3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 1.4 MHz | 0.05 MHz ≤ f\_offset < 1.45 MHz |  | 100 kHz |
| 1.4 MHz ≤ Δf < 2.8 MHz | 1.45 MHz ≤ f\_offset < 2.85 MHz | -22.5 dBm | 100 kHz |
| 2.8 MHz ≤ Δf ≤ Δfmax | 2.85 MHz ≤ f\_offset < f\_offsetmax | -25dBm | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -25dBm/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2C-2a: Medium Range BS operating band unwanted emission limits for 1.4 MHz channel bandwidth, Prated,c ≤ 31 dBm (E-UTRA bands >3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 1.4 MHz | 0.05 MHz ≤ f\_offset < 1.45 MHz |  | 100 kHz |
| 1.4 MHz ≤ Δf < 2.8 MHz | 1.45 MHz ≤ f\_offset < 2.85 MHz | -22.2 dBm | 100 kHz |
| 2.8 MHz ≤ Δf ≤ Δfmax | 2.85 MHz ≤ f\_offset < f\_offsetmax | -25dBm | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -25dBm/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2C-3: Medium Range BS operating band unwanted emission limits for 3 MHz channel bandwidth, 31 < Prated,c ≤ 38 dBm (E-UTRA bands ≤3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 3 MHz | 0.05 MHz ≤ f\_offset < 3.05 MHz |  | 100 kHz |
| 3 MHz ≤ Δf < 6 MHz | 3.05 MHz ≤ f\_offset < 6.05 MHz | Prated,c-57.5dB | 100 kHz |
| 6 MHz ≤ Δf ≤ Δfmax | 6.05 MHz ≤ f\_offset < f\_offsetmax | Min(Prated,c-59dB, -25dBm) | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be Min(Prated,c-59dB, -25dBm)/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2C-3a: Medium Range BS operating band unwanted emission limits for 3 MHz channel bandwidth, 31 < Prated,c ≤ 38 dBm (E-UTRA bands >3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 3 MHz | 0.05 MHz ≤ f\_offset < 3.05 MHz |  | 100 kHz |
| 3 MHz ≤ Δf < 6 MHz | 3.05 MHz ≤ f\_offset < 6.05 MHz | Prated,c-57.2dB | 100 kHz |
| 6 MHz ≤ Δf ≤ Δfmax | 6.05 MHz ≤ f\_offset < f\_offsetmax | Min(Prated,c-59dB, -25dBm) | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be Min(Prated,c-59dB, -25dBm)/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2C-4: Medium Range BS operating band unwanted emission limits for 3 MHz channel bandwidth, Prated,c ≤ 31 dBm (E-UTRA bands ≤3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 3 MHz | 0.05 MHz ≤ f\_offset < 3.05 MHz |  | 100 kHz |
| 3 MHz ≤ Δf < 6 MHz | 3.05 MHz ≤ f\_offset < 6.05 MHz | -26.5 dBm | 100 kHz |
| 6 MHz ≤ Δf ≤ Δfmax | 6.05 MHz ≤ f\_offset < f\_offsetmax | -28 dBm | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -28dBm/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2C-4a: Medium Range BS operating band unwanted emission limits for 3 MHz channel bandwidth, Prated,c ≤ 31 dBm (E-UTRA bands >3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 3 MHz | 0.05 MHz ≤ f\_offset < 3.05 MHz |  | 100 kHz |
| 3 MHz ≤ Δf < 6 MHz | 3.05 MHz ≤ f\_offset < 6.05 MHz | -26.2 dBm | 100 kHz |
| 6 MHz ≤ Δf ≤ Δfmax | 6.05 MHz ≤ f\_offset < f\_offsetmax | -28 dBm | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -28dBm/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |



Table 6.6.3.5.2C-5: Medium Range BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth, 31< Prated,c ≤ 38 dBm (E-UTRA bands ≤3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δf < min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset < min(10.05 MHz, f\_offsetmax) | Prated,c-58.5dB | 100 kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | Min(Prated,c60dB, -25dBm) (Note 9) | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be Min(Prated,c-60dB, -25dBm)/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2C-5a: Medium Range BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth, 31< Prated,c ≤ 38 dBm (E-UTRA bands >3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δf < min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset < min(10.05 MHz, f\_offsetmax) | Prated,c-58.2dB | 100 kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | Min(Prated,c-60dB, -25dBm) (Note 9) | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be Min(Prated,c-60dB, -25dBm)/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2C-6: Medium Range BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth, Prated,c ≤ 31 dBm (E-UTRA bands ≤3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δf < min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset < min(10.05 MHz, f\_offsetmax) | -27.5 dBm | 100 kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | -29 dBm (Note 9) | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -29dBm/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

Table 6.6.3.5.2C-6a: Medium Range BS operating band unwanted emission limits for 5, 10, 15 and 20 MHz channel bandwidth, Prated,c ≤ 31 dBm (E-UTRA bands >3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δf < min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset < min(10.05 MHz, f\_offsetmax) | -27.2 dBm | 100 kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | -29 dBm (Note 9) | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be -29dBm/100kHz.  NOTE 2: For BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz the test 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. | | | |

##### 6.6.3.5.2D Minimum requirements for Local Area and Medium Range BS in Band 46 (Category A and B)

For Local Area and Medium Range BS operating in Band 46, emissions shall not exceed the maximum levels specified in Tables 6.6.3.5.2D-1 and 6.6.3.5.2D-2.

Table 6.6.3.5.2D-1: Local Area and Medium Range BS operating band unwanted emission limits in Band 46 for 20MHz channel bandwidth

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 1 MHz | 0.05 MHz ≤ f\_offset < 1.05 MHz |  | 100 kHz |
| 1 MHz ≤ Δf < min(10 MHz, Δfmax) | 1.05 MHz ≤ f\_offset < min(10.05 MHz, f\_offsetmax) |  | 100 kHz |
| 10 MHz ≤ Δf < min(20 MHz, Δfmax) | 10.05 MHz ≤ f\_offset < min(20.05 MHz, f\_offsetmax) |  | 100 kHz |
| 20 MHz ≤ Δf < min(170 MHz, Δfmax) | 20.05 MHz ≤ f\_offset < min(170.05 MHz, f\_offsetmax) | Max(Prated,c - 62.6dB, -40dBm) | 100 kHz |
| 170 MHz ≤ Δf < min(206 MHz, Δfmax) | 170.05 MHz ≤ f\_offset < min(206.05 MHz, f\_offsetmax) | Max(Prated,c - 64.6dB, -40dBm) | 100 kHz |
| 206 MHz ≤ Δf ≤ Δfmax | 206.05 MHz ≤ f\_offset < f\_offsetmax | Max(Prated,c - 69.6dB, -40dBm) | 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 f ≥ 20 MHz from both adjacent sub blocks on each side of the sub-block gap, where the minimum requirement within sub-block gaps shall be Max (Prated,c - 62.6dB, -40 dBm)/100kHz. | | | |

Table 6.6.3.5.2D-2: Local Area and Medium Range BS operating band unwanted emission limits in Band 46 for 10 MHz channel bandwidth

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement (Note 1) | Measurement bandwidth (Note 8) |
| 0 MHz ≤ Δf < 0.5 MHz | 0.05 MHz ≤ f\_offset < 0.55 MHz |  | 100 kHz |
| 0.5 MHz ≤ Δf < 5 MHz | 0.55 MHz ≤ f\_offset < min(5.05 MHz, f\_offsetmax) |  | 100 kHz |
| 5 MHz ≤ Δf < min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset < min(10.05 MHz, f\_offsetmax) |  | 100 kHz |
| 10 MHz ≤ Δf < min(85 MHz, Δfmax) | 10.05 MHz ≤ f\_offset < min(85.05 MHz, f\_offsetmax) | Max(Prated,c – 57.3dB, -40dBm) | 100 kHz |
| 85 MHz ≤ Δf < min(103 MHz, Δfmax) | 85.05 MHz ≤ f\_offset < min(103.05 MHz, f\_offsetmax) | Max(Prated,c – 59.3dB, -40dBm) | 100 kHz |
| 103 MHz ≤ Δf ≤ Δfmax | 103.05 MHz ≤ f\_offset < f\_offsetmax | Max(Prated,c – 64.3dB, -40dBm) | 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 f ≥ 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 Max (Prated,c – 57.3dB, -40 dBm)/100kHz. | | | |

##### 6.6.3.5.2E Minimum requirements for stand-alone NB-IoT Wide Area BS

For stand-alone NB-IoT BS in E-UTRA bands ≤3GHz, emissions shall not exceed the maximum levels specified in Tables 6.6.3.5.2E-1.

Table 6.6.3.5.2E-1: Stand-alone NB-IoT BS operating band unwanted emission limits (E-UTRA bands ≤3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Minimum requirement (Note 1, 2, 3, 4) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 0.05 MHz | 0.015 MHz ≤ f\_offset < 0.065 MHz |  | 30 kHz |
| 0.05 MHz ≤ Δf < 0.15 MHz | 0.065 MHz ≤ f\_offset < 0.165 MHz |  | 30 kHz |
| 0.15 MHz ≤ Δf < 0.2 MHz | 0.165 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 |  | 30 kHz |
| (Note 8) | 1.015 MHz ≤ f\_offset < 1.5 MHz | -24.5 dBm | 30 kHz |
| 1 MHz ≤ Δf ≤  min(Δfmax, 10 MHz) | 1.5 MHz ≤ f\_offset < min(f\_offsetmax, 10.5 MHz) | -11.5 dBm | 1 MHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.5 MHz ≤ f\_offset < f\_offsetmax | -15 dBm (Note 9) | 1 MHz |
| NOTE 1: The limits in this table only apply for operation with a standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge.  NOTE 2: 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.  NOTE 3: For a BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz 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.]  NOTE 4: In case the carrier adjacent to the RF bandwidth edge is a standalone NB-IoT carrier, the value of X = PNB-IoTcarrier – 43, where PNB-IoTcarrier is the power level of the standalone NB-IoT carrier adjacent to the RF bandwidth edge. In other cases, X = 0.  NOTE 5: For BS that only support E-UTRA and NB-IoT multi-carrier operation, the requirements in this table do not apply to an E-UTRA BS from Release 8, which is upgraded to support E-UTRA and NB-IoT multi-carrier operation, where the upgrade does not affect existing RF parts of the radio unit related to the requirements in this table. In this case, the requirements in subclauses 6.6.3.5.1 and 6.6.3.5.2 shall apply. | | | |

##### 6.6.3.5.2F Minimum requirements for stand-alone NB-IoT Local Area BS

For stand-alone NB-IoT BS in E-UTRA bands ≤3GHz, emissions shall not exceed the maximum levels specified in Table 6.6.3.5.2F-1.

Table 6.6.3.5.2F-1: Stand-alone NB-IoT BS operating band unwanted emission limits (E-UTRA bands ≤3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Minimum requirement (Note 1, 2, 3, 4) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 0.05 MHz | 0.015 MHz ≤ f\_offset < 0.065 MHz |  | 30 kHz |
| 0.05 MHz ≤ Δf < 0.16 MHz | 0.065 MHz ≤ f\_offset < 0.175 MHz |  | 30 kHz |
| 0.16 MHz ≤ Δf < 5 MHz  (Note 8) | 0.175 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δf < min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset < min(10.05 MHz, f\_offsetmax) | -35.5 dBm | 100 kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | -37 dBm (Note 9) | 100 kHz |
| NOTE 1: The limits in this table only apply for operation with a standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge.  NOTE 2: 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.  NOTE 3: For a BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz 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.  NOTE 4: In case the carrier adjacent to the RF bandwidth edge is a standalone NB-IoT carrier, the value of X = PNB-IoTcarrier – 24, where PNB-IoTcarrier is the power level of the standalone NB-IoT carrier adjacent to the RF bandwidth edge. In other cases, X = 0. | | | |

##### 6.6.3.5.2G Minimum requirements for stand-alone NB-IoT Home BS

For stand-alone NB-IoT BS in E-UTRA bands ≤3GHz, emissions shall not exceed the maximum levels specified in Table 6.6.3.5.2G-1.

Table 6.6.3.5.2G-1: Stand-alone NB-IoT BS operating band unwanted emission limits (E-UTRA bands ≤3GHz)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Minimum requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 0.05 MHz | 0.015 MHz ≤ f\_offset < 0.065 MHz |  | 30 kHz |
| 0.05 MHz ≤ Δf < 0.16 MHz | 0.065 MHz ≤ f\_offset < 0.175 MHz |  | 30 kHz |
| 0.16 MHz ≤ Δf < 5 MHz  (Note 8) | 0.175 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δf < min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset < min(10.05 MHz, f\_offsetmax) | -39.5 dBm | 100 kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | -41 dBm (Note 9) | 100 kHz |
| NOTE 1: The limits in this table only apply for operation with a standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge.  NOTE 2: In case the carrier adjacent to the RF bandwidth edge is a standalone NB-IoT carrier, the value of X = PNB-IoTcarrier – 20, where PNB-IoTcarrier is the power level of the standalone NB-IoT carrier adjacent to the RF bandwidth edge. In other cases, X = 0. | | | |

##### 6.6.3.5.2H Minimum requirements for stand-alone NB-IoT Medium Range BS

For stand-alone NB-IoT BS in E-UTRA bands ≤3GHz, emissions shall not exceed the maximum levels specified in Tables 6.6.3.5.2H-1 and 6.6.3.5.2H-2.

Table 6.6.3.5.2H-1: Stand-alone NB-IoT BS operating band unwanted emission limits (E-UTRA bands ≤3GHz), BS maximum output power 31 < Prated,c ≤ 38 dBm

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Minimum requirement (Note 1, 2, 3, 4) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 0.05 MHz | 0.015 MHz ≤ f\_offset < 0.065 MHz |  | 30 kHz |
| 0.05 MHz ≤ Δf < 0.15 MHz | 0.065 MHz ≤ f\_offset < 0.165 MHz |  | 30 kHz |
| 0.15 MHz ≤ Δf < 0.6 MHz (Note 1) | 0.165MHz ≤ f\_offset < 0.615MHz |  | 30 kHz |
| 0.6 MHz ≤ Δf < 1 MHz | 0.615MHz ≤ f\_offset < 1.015MHz |  | 30 kHz |
| (Note 8) | 1.015MHz ≤ f\_offset < 1.5 MHz | Prated,c – 63.5 dB | 30 kHz |
| 1 MHz ≤ Δf ≤ 2.8 MHz | 1.5 MHz ≤ f\_offset < 3.3 MHz | Prated,c – 50.5 dB | 1 MHz |
| 2.8 MHz ≤ Δf ≤ 5 MHz | 3.3 MHz ≤ f\_offset < 5.5 MHz | min(Prated,c – 50.5 dB, -13.5dBm) | 1 MHz |
| 5 MHz ≤ Δf < min(10 MHz, Δfmax) | 5.5 MHz ≤ f\_offset < min(10.5 MHz, f\_offsetmax) | Prated,c – 54.5 dB | 1 MHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.5 MHz ≤ f\_offset < f\_offsetmax | Prated,c -56dB (Note 9) | 1 MHz |
| NOTE 1: The limits in this table only apply for operation with a standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge.  NOTE 2: 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.  NOTE 3: For a BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz 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. | | | |

Table 6.6.3.5.2H-2: Stand-alone NB-IoT BS operating band unwanted emission limits (E-UTRA bands ≤3GHz), BS maximum output power Prated,c ≤ 31 dBm

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency offset of measurement filter ‑3dB point, Δf** | **Frequency offset of measurement filter centre frequency, f\_offset** | **Minimum requirement (Note 1, 2, 3, 4)** | **Measurement bandwidth (Note 6)** |
| 0 MHz ≤ Δf < 0.05 MHz | 0.015 MHz ≤ f\_offset < 0.065 MHz |  | 30 kHz |
| 0.05 MHz ≤ Δf < 0.15 MHz | 0.065 MHz ≤ f\_offset < 0.165 MHz |  | 30 kHz |
| 0.15 MHz ≤ Δf < 0.6 MHz (Note 1) | 0.165MHz ≤ f\_offset < 0.615MHz |  | 30 kHz |
| 0.6 MHz ≤ Δf < 1 MHz | 0.615MHz ≤ f\_offset < 1.015MHz |  | 30 kHz |
| (Note 8) | 1.015MHz ≤ f\_offset < 1.5 MHz | -32.5 dBm | 30 kHz |
| 1 MHz ≤ Δf ≤ 5 MHz | 1.5 MHz ≤ f\_offset < 5.5 MHz | -19.5 dBm | 1 MHz |
| 5 MHz ≤ Δf < min(10 MHz, Δfmax) | 5.5 MHz ≤ f\_offset < min(10.5 MHz, f\_offsetmax) | -23.5 dBm | 1 MHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.5 MHz ≤ f\_offset < f\_offsetmax | -25 dBm (Note 9) | 1 MHz |
| NOTE 1: The limits in this table only apply for operation with a standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge.  NOTE 2: 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.  NOTE 3: For a BS supporting multi-band operation with Inter RF Bandwidth gap < 20MHz 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.  NOTE 4: In case the carrier adjacent to the RF bandwidth edge is a standalone NB-IoT carrier, the value of X = PNB-IoTcarrier – 31, where PNB-IoTcarrier is the power level of the standalone NB-IoT carrier adjacent to the RF bandwidth edge. In other cases, X = 0. | | | |

##### 6.6.3.5.3 Additional requirements

In certain regions the following requirement may apply. For E-UTRA, E-UTRA with NB-IoT and NB-IoT BS operating in Bands 5, 26, 27 or 28, emissions shall not exceed the maximum levels specified in Tables 6.6.3.5.3-1.

Table 6.6.3.5.3-1: Additional operating band unwanted emission limits for E-UTRA bands <1GHz

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel bandwidth | Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement | Measurement bandwidth (Note 6) |
| 200 kHz | 0 MHz ≤ Δf < 1 MHz | 0.005 MHz ≤ f\_offset < 0.995 MHz | -6 dBm | 10 kHz |
| 1.4 MHz | 0 MHz ≤ Δf < 1 MHz | 0.005 MHz ≤ f\_offset < 0.995 MHz | -14 dBm | 10 kHz |
| 3 MHz | 0 MHz ≤ Δf < 1 MHz | 0.015 MHz ≤ f\_offset < 0.985 MHz | -13 dBm | 30 kHz |
| 5 MHz | 0 MHz ≤ Δf < 1 MHz | 0.015 MHz ≤ f\_offset < 0.985 MHz | -15 dBm | 30 kHz |
| 10 MHz | 0 MHz ≤ Δf < 1 MHz | 0.05 MHz ≤ f\_offset < 0.95 MHz | -13 dBm | 100 kHz |
| 15 MHz | 0 MHz ≤ Δf < 1 MHz | 0.05 MHz ≤ f\_offset < 0.95 MHz | -13 dBm | 100 kHz |
| 20 MHz | 0 MHz ≤ Δf < 1 MHz | 0.05 MHz ≤ f\_offset < 0.95 MHz | -13 dBm | 100 kHz |
| All | 1 MHz ≤ Δf < Δfmax | 1.05 MHz ≤ f\_offset < f\_offsetmax | -13 dBm | 100 kHz |

In certain regions the following requirement may apply. For E-UTRA, E-UTRA with NB-IoT and NB-IoT BS operating in Bands 2, 4, 10, 23, 25, 30, 35, 36, 41, 66, 70, emissions shall not exceed the maximum levels specified in Table 6.6.3.5.3-2.

Table 6.6.3.5.3-2: Additional operating band unwanted emission limits for E-UTRA bands>1GHz

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel bandwidth | Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement | Measurement bandwidth (Note 6) |
| 200 kHz | 0 MHz ≤ Δf < 1 MHz | 0.005 MHz ≤ f\_offset < 0.995 MHz | -6 dBm | 10 kHz |
| 1.4 MHz | 0 MHz ≤ Δf < 1 MHz | 0.005 MHz ≤ f\_offset < 0.995 MHz | -14 dBm | 10 kHz |
| 3 MHz | 0 MHz ≤ Δf < 1 MHz | 0.015 MHz ≤ f\_offset < 0.985 MHz | -13 dBm | 30 kHz |
| 5 MHz | 0 MHz ≤ Δf < 1 MHz | 0.015 MHz ≤ f\_offset < 0.985 MHz | -15 dBm | 30 kHz |
| 10 MHz | 0 MHz ≤ Δf < 1 MHz | 0.05 MHz ≤ f\_offset < 0.95 MHz | -13 dBm | 100 kHz |
| 15 MHz | 0 MHz ≤ Δf < 1 MHz | 0.05 MHz ≤ f\_offset < 0.95 MHz | -15 dBm | 100 kHz |
| 20 MHz | 0 MHz ≤ Δf < 1 MHz | 0.05 MHz ≤ f\_offset < 0.95 MHz | -16 dBm | 100 kHz |
| All | 1 MHz ≤ Δf < Δfmax | 1.5 MHz ≤ f\_offset < f\_offsetmax | -13 dBm | 1 MHz |

In certain regions the following requirement may apply. For E-UTRA, E-UTRA with NB-IoT and NB-IoT BS operating in Bands 12, 13, 14, 17, 29, 71, 85 emissions shall not exceed the maximum levels specified in Table 6.6.3.5.3-3.

Table 6.6.3.5.3-3: Additional operating band unwanted emission limits for E-UTRA (bands 12, 13, 14, 17, 29, 71 and 85)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel bandwidth | Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Test requirement | Measurement bandwidth (Note 6) |
| All | 0 MHz ≤ Δf < 100 kHz | 0.015 MHz ≤ f\_offset < 0.085 MHz | -13 dBm | 30 kHz |
| All | 100 kHz ≤ Δf < Δfmax | 150 kHz ≤ f\_offset < f\_offsetmax | -13 dBm | 100 kHz |

In certain regions, the following requirements may apply to an E-UTRA TDD BS operating in the same geographic area and in the same operating band as another E-UTRA TDD system without synchronisation. For this case the emissions shall not exceed -52 dBm/MHz in each supported downlink operating band, except in:

- The frequency range from 10 MHz below the lower channel edge to the frequency 10 MHz above the upper channel edge of each supported band.

In certain regions the following requirement may apply for protection of DTT. For E-UTRA BS operating in Band 20, the level of emissions in the band 470-790 MHz, measured in an 8MHz filter bandwidth on centre frequencies Ffilter according to Table 6.6.3.3-4, shall not exceed the maximum emission level PEM,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 6.6.3.5.3-4: Declared emissions levels for protection of DTT

|  |  |  |
| --- | --- | --- |
| Filter centre frequency, Ffilter | Measurement bandwidth | Declared emission level [dBm] |
| Ffilter = 8\*N + 306 (MHz);  21 ≤ N ≤ 60 | 8 MHz | PEM,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 base station needed to verify compliance with the regional requirement. Compliance with the regional requirement can be determined using the method outlined in Annex G of [2].

Table 6.6.3.5.3-5: Void



In regions where FCC regulation applies, requirements for protection of GPS according to FCC Order DA 20-48 applies for operation in Band 24. The following normative requirement covers the base station, to be used together with other information about the site installation to verify compliance with the requirement in FCC Order DA 20-48. The requirement applies to BS operating in Band 24 to ensure that appropriate interference protection is provided to the 1541 – 1650 MHz band. This requirement applies to the frequency range 1541-1650 MHz, even though part of this range falls within the spurious domain.

The level of emissions in the 1541 – 1650 MHz band, measured in measurement bandwidth according to Table 6.6.3.5.3-6 shall not exceed the maximum emission levels PEM,B24,a, PEM,B24,b, PEM,B24,c, PEM,B24,d, PEM,B24,e and PEM,B24,f declared by the manufacturer.

Table 6.6.3.5.3-6: Declared emissions levels for protection of the 1541-1650 MHz band

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Operating Band | Frequency range | Declared emission level (dBW)  (Measurement bandwidth = 1 MHz) | Declared emission level (dBW) of discrete emissions of less than 700 Hz bandwidth  (Measurement bandwidth = 1 kHz) | Declared emission level (dBW) of discrete emissions of less than 2 kHz bandwidth  (Measurement bandwidth = 1 kHz) |
| 24 | 1541 - 1559 MHz | PEM,B24,a |  | PEM,B24,f |
|  | 1559 - 1610 MHz | PEM,B24,b | PEM,B24,d |  |
|  | 1610 - 1650 MHz | PEM,B24,c | PEM,B24,e |  |

Note: The regional requirements in FCC Order DA 20-48 are 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 EIRP level is calculated using: PEIRP = PE + Gant where PE denotes the BS unwanted emission level at the antenna connector, Gant equals the BS antenna gain minus feeder loss. The requirement defined above provides the characteristics of the base station needed to verify compliance with the regional requirement.

Table 6.6.3.5.3-7: Void

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  | | | | |

In certain regions, the following requirements may apply to E-UTRA BS operating in Band 32 within 1452-1492 MHz, in Band 75 within 1432-1517 MHz and in Band 76 within 1427-1432 MH. The level of operating band unwanted emissions, measured on centre frequencies f\_offset with filter bandwidth, according to Table 6.6.3.5.3-8, shall neither exceed the maximum emission level PEM,B32,B75,B76,a , PEM,B32,B75,B76,b nor PEM,B32,B75,B76,c declared by the manufacturer.

For Band 32, this requirement applies in the frequency range 1452-1492 MHz when non-Mobile/Fixed Communications Network (MFCN) services are deployed in adjacent frequency ranges, while it applies also within 1427-1452 MHz and/or 1492-1517 MHz when MFCN services are deployed in such frequency ranges, even though part of the ranges falls in the spurious domain. For Band 75, this requirement applies in the frequency range 1427-1517 MHz. For Band 76, this requirement applies in the frequency range 1432-1517 MHz even though part of the range falls in the spurious domain.

Table 6.6.3.5.3-8: Declared operating band 32, 75 and 76 unwanted emission within 1427-1517 MHz

|  |  |  |
| --- | --- | --- |
| Frequency offset of measurement filter centre frequency, f\_offset | Declared emission level [dBm] | Measurement bandwidth |
| 2.5 MHz | PEM,B32,a, B75, B76 | 5 MHz |
| 7.5 MHz | PEM,B32,b, B75, B76 | 5 MHz |
| 12.5 MHz ≤ f\_offset ≤ f\_offsetmax,B32 | PEM,B32,c, B75, B76 | 5 MHz |
| NOTE: For Band 32, when non-MFCN services are deployed in the adjacent bands, f\_offsetmax  denotes the frequency difference between the lower channel edge and 1454.5 MHz, and the frequency difference between the upper channel edge and 1489.5 MHz for the set channel position. For Band 32, when MFCN services are deployed in the adjacent frequencies, Band 75 and Band 76, f\_offsetmax denotes the frequency difference between the lower channel edge and 1429.5 MHz, and the frequency difference between the upper channel edge and 1514.5 MHz for the set channel position. | | |

NOTE: The regional requirement, included in [19] and [20], is defined in terms of EIRP per antenna, 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 base station needed to verify compliance with the regional requirement. The assessment of the EIRP level is described in Annex H of TS 36.104 [2].

In certain regions, the following requirement may apply to E-UTRA BS operating in Band 32 within 1452-1492 MHz for the protection of non-MFCN services in spectrum adjacent to the frequency range 1452-1492 MHz. The level of emissions, measured on centre frequencies Ffilter with filter bandwidth according to Table 6.6.3.5.3-9, shall neither exceed the maximum emission level PEM,B32,d nor PEM,B32,e declared by the manufacturer. This requirement applies in the frequency range 1429-1518MHz even though part of the range falls in the spurious domain.

Table 6.6.3.5.3-9: Operating band 32 declared emission outside 1452-1492 MHz

|  |  |  |
| --- | --- | --- |
| Filter centre frequency, Ffilter | Declared emission level [dBm] | Measurement bandwidth |
| 1429.5 MHz ≤ Ffilter ≤ 1448.5 MHz | PEM,B32,d | 1 MHz |
| Ffilter = 1450.5 MHz | PEM,B32,e | 3 MHz |
| Ffilter = 1493.5 MHz | PEM,B32,e | 3 MHz |
| 1495.5 MHz ≤ Ffilter ≤ 1517.5 MHz | PEM,B32,d | 1 MHz |

NOTE: The regional requirement, included in [19], is defined in terms of EIRP, 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 base station needed to verify compliance with the regional requirement. The assessment of the EIRP level is described in Annex H of TS 36.104 [2].

In certain regions, the following requirement may apply to BS operating in Band 50 and Band 75 within 1492-1517 MHz and in Band 74 within 1492-1518 MHz. The level of emissions, measured on centre frequencies Ffilter with filter bandwidth according to Table 6.6.3.5.3-9A, shall neither exceed the maximum emission level PEM,B50,B74,B75,a nor PEM,B50,B74,B75,b declared by the manufacturer.

Table 6.6.3.5.3-9A: Operating band 50, 74 and 75 declared emission above 1518 MHz

|  |  |  |
| --- | --- | --- |
| Filter centre frequency, Ffilter | Declared emission level [dBm] | Measurement bandwidth |
| 1518.5 MHz ≤ Ffilter ≤ 1519.5 MHz | PEM,B50,B74,B75,a | 1 MHz |
| 1520.5 MHz ≤ Ffilter ≤ 1558.5 MHz | PEM,B50,B74,B75,b | 1 MHz |

NOTE: The regional requirement, included in [20], is defined in terms of EIRP, 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 base station needed to verify compliance with the regional requirement. The assessment of the EIRP level is described in Annex H.

In certain regions, the following requirement may apply to E-UTRA BS operating in Band 50 and Band 75 within 1432-1452 MHz, and in Band 51 and Band 76. Emissions shall not exceed the maximum levels specified in Table 6.6.3.5.3-9B.

Table 6.6.3.5.3-9B: Additional operating band unwanted emission limits for BS operating in Band 50 and 75 within 1432-1452 MHz, and in Band 51 and 76

|  |  |  |
| --- | --- | --- |
| Filter centre frequency, Ffilter | Maximum Level [dBm] | Measurement Bandwidth |
| Ffilter = 1413.5 MHz | -42 | 27 MHz |

In certain regions the following requirement may apply to E-UTRA BS operating in Band 45. Emissions shall not exceed the maximum levels specified in Table 6.6.3.5.3-10.

Table 6.6.3.5.3-10: Emissions limits for protection of adjacent band services

|  |  |  |  |
| --- | --- | --- | --- |
| **Operating Band** | **Filter centre frequency, Ffilter** | **Maximum Level [dBm]** | **Measurement Bandwidth** |
| 45 | Ffilter = 1467.5 | -20 | 1 MHz |
| Ffilter = 1468.5 | -23 | 1 MHz |
| Ffilter = 1469.5 | -26 | 1 MHz |
| Ffilter = 1470.5 | -33 | 1 MHz |
| Ffilter = 1471.5 | -40 | 1 MHz |
| 1472.5 MHz ≤ Ffilter ≤ 1491.5 MHz | -47 | 1 MHz |

In addition for Band 46 operation, 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 H of TS 36.104 [2].

The following requirement may apply to E-UTRA BS operating in Band 48 and Band 49 in certain regions. Emissions shall not exceed the maximum levels specified in Table 6.6.3.5.3-11.

Table 6.6.3.5.3-11: Additional operating band unwanted emission limits for Band 48 and Band 49

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel bandwidth | Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Minimum requirement | Measurement bandwidth (Note 6) |
| All | 0 MHz ≤ Δf < 10 MHz | 0.5 MHz ≤ f\_offset < 9.5 MHz | -13 dBm | 1 MHz |

The following requirement may apply to E-UTRA BS operating in Band 53 in certain regions. Emissions shall not exceed the maximum levels specified in Table 6.6.3.5.3-12.

Table 6.6.3.5.3-12: Additional operating band unwanted emission limits for Band 53

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 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 6) |
| 1.4, 3, 5 | 2400 - 2477.5 | 6 MHz ≤ Δf < 83.5 MHz | 6.5 MHz ≤ f\_offset < 83 MHz | -25 dBm | 1 MHz |
| 10 | 2400 - 2473.5 | 10 MHz ≤ Δf < 83.5 MHz | 10.5 MHz ≤ f\_offset < 83 MHz | -25 dBm | 1 MHz |
| 1.4, 3, 5 | 2477.5 - 2478.5 | 5 MHz ≤ Δf < 6 MHz | 5.5 MHz | -13 dBm | 1 MHz |
| 10 | 2473.5 - 2478.5 | 5 MHz ≤ Δf < 10 MHz | 5.5 MHz ≤ f\_offset < 9.5 MHz | -13 dBm | 1 MHz |
| All | 2478.5 - 2483.5 | 0 MHz ≤ Δf < 5 MHz | 0.5 MHz ≤ f\_offset < 4.5 MHz | -10 dBm | 1 MHz |
| 1.4, 3, 5 | 2495 - 2501 | 0 MHz ≤ Δf < 6 MHz | 0.5 MHz ≤ f\_offset < 5.5 MHz | -13 dBm | 1 MHz |
| 10 | 2495 - 2505 | 0 MHz ≤ Δf < 10 MHz | 0.5 MHz ≤ f\_offset < 9.5 MHz | -13 dBm | 1 MHz |
| 1.4, 3, 5 | 2501 - 2690 | 6 MHz ≤ Δf < 195 MHz | 6.5 MHz ≤ f\_offset < 194.5 MHz | -25 dBm | 1 MHz |
| 10 | 2505 - 2690 | 10 MHz ≤ Δf < 195 MHz | 10.5 MHz ≤ f\_offset < 194.5 MHz | -25 dBm | 1 MHz |

The following notes are common to all subclauses in 6.6.3.5:

NOTE 6: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 7: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in Annex G. The explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex G.

NOTE 8: This frequency range ensures that the range of values of f\_offset is continuous.

NOTE 9: The requirement is not applicable when Δfmax < 10 MHz.

NOTE 10: For Home BS, the parameter P is defined as the aggregated maximum output power of all transmit antenna connectors of Home BS.

### 6.6.4 Transmitter spurious emissions

#### 6.6.4.1 Definition and applicability

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emission, intermodulation products and frequency conversion products, but exclude out of band emissions. This is measured at the base station antenna connector.

The transmitter spurious emission limits apply from 9 kHz to 12.75 GHz, excluding the frequency range from 10 MHz below the lowest frequency of the downlink operating band up to 10 MHz above the highest frequency of the downlink operating band (see Table 5.5-1). For BS capable of multi-band operation where multiple bands are mapped on the same antenna connector, this exclusion applies for each supported operating band. For BS capable of multi-band operation where multiple bands are mapped on separate antenna connectors, the single-band requirements apply and the multi-band exclusions and provisions are not applicable.

Exceptions are the requirements in Table 6.6.4.5.4-2, Table 6.6.4.5.4-3, Table 6.6.4.5.4-4, and specifically stated exceptions in Table 6.6.4.5.4-1 and Table 6.6.4.5.4-1a that apply also closer than 10 MHz from the downlink operating band. For some operating bands the upper frequency limit is higher than 12.75 GHz.

The requirements shall apply to BS that supports E-UTRA or E-UTRA with NB-IoT in-band/guard band operation or NB-IoT standalone operation.

The requirements shall apply whatever the type of transmitter considered (single carrier, multi-carrier and/or CA) and for all transmission modes foreseen by the manufacturer's specification.

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

#### 6.6.4.2 Minimum Requirements

The minimum requirement is in TS 36.104 [2] subclause 6.6.4.

#### 6.6.4.3 Test Purpose

This test measures conducted spurious emission from the E-UTRA or NB-IoT BS transmitter antenna connector, while the transmitter is in operation.

#### 6.6.4.4 Method of Test

##### 6.6.4.4.1 Initial conditions

Test environment: normal; see Annex D.2.

RF channels to be tested for single carrier: B, M and T; see subclause 4.7.

Base Station RF Bandwidth positions to be tested for multi-carrier and/or CA: BRFBW, MRFBW and TRFBW in single-band operation, see subclause 4.7.1; BRFBW\_T’RFBW and B’RFBW\_TRFBW in multi-band operation, see subclause 4.7.1.

1) Connect the BS antenna connector to a measurement receiver according to Annex I.1.1 using an attenuator or a directional coupler if necessary

2) Measurements shall use a measurement bandwidth in accordance to the conditions in TS 36.104 [2] subclause 6.6.4.

3) Detection mode: True RMS.

4) Configure the BS with transmitter(s) active.

##### 6.6.4.4.2 Procedure

1) For a E-UTRA BS declared to be capable of single carrier operation only, set the BS to transmit a signal according to E-TM1.1 at manufacturer’s declared rated output power.

For a E-UTRA BS declared to be capable of multi-carrier and/or CA operation, set the base station to transmit according to E-TM1.1 on all carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For a E-UTRA BS declared to be capable of NB-IoT in-band operation, start transmission according to [E-TM1.1] with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power.

For a E-UTRA BS declared to be capable of NB-IoT guard-band operation, start transmission according to E-TM1.1 with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power.

For a NB-IoT BS declared to be capable of single carrier operation, start transmission according to N-TM at manufacturer’s declared rated output power.

For a NB-IoT BS declared to be capable of multi-carrier in contiguous spectrum operation in single band only, start transmission according to N-TM on all carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For a E-UTRA and NB-IoT standalone BS declared to be capable of multi-carrier in contiguous spectrum operation in single band only, start transmission according to E-TM1.1 on all E-UTRA carriers and N-TM on all NB-IoT carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

2) Measure the emission at the specified frequencies with specified measurement bandwidth and note that the measured value does not exceed the specified value.

In addition, for a multi-band capable BS, the following step shall apply:

3) For multi-band capable BS and single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carrier activated in the other band. For multi-band capable BS with separate antenna connector, the antenna connector not being under test in case of single-band or multi-band test shall be terminated.

#### 6.6.4.5 Test requirements

The measurement result in step 2 of 6.6.4.4.2 shall not exceed the maximum level specified in Table 6.6.4.5.1-1 to Table 6.6.4.5.6-1 if applicable for the BS under test.

NOTE: If a Test Requirement in this clause differs from the corresponding Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance are given in Annex  G.

As mandatory requirement, either subclause 6.6.4.5.1 (Category A limits) or subclause 6.6.4.5.2 (Category B limits) shall apply. The application of either Category A or Category B limits shall be the same as for Operating band unwanted emissions in subclause 6.6.3.

##### 6.6.4.5.1 Spurious emissions (Category A)

The power of any spurious emission shall not exceed the limits in Table 6.6.4.5.1-1.

Table 6.6.4.5.1-1: BS Spurious emission limits, Category A

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency range | Maximum level | Measurement Bandwidth | Note |
| 9kHz ‑ 150kHz | -13 dBm | 1 kHz | Note 1 |
| 150kHz ‑ 30MHz | 10 kHz | Note 1 |
| 30MHz ‑ 1GHz | 100 kHz | Note 1 |
| 1GHz – 12.75 GHz | 1 MHz | Note 2 |
| 12.75 GHz – 5th harmonic of the upper frequency edge of the DL operating band in GHz | 1 MHz | Note 2, Note 3 |
| 12.75 GHz - 26 GHz |  | 1 MHz | Note 2, Note 4 |
| NOTE 1: Bandwidth as in ITU-R SM.329 [5] , s4.1  NOTE 2: Bandwidth as in ITU-R SM.329 [5] , s4.1. Upper frequency as in ITU-R SM.329 [5] , s2.5 table 1  NOTE 3: Applies only for Bands 22, 42, 43, 48 and 49.  NOTE 4: Applies only for Band 46. | | | |

##### 6.6.4.5.2 Spurious emissions (Category B)

The power of any spurious emission shall not exceed the limits in Table 6.6.4.5.2-1.

Table 6.6.4.5.2-1: BS Spurious emissions limits, Category B

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency range | Maximum Level | Measurement Bandwidth | Note |
| 9 kHz ↔ 150 kHz | -36 dBm | 1 kHz | Note 1 |
| 150 kHz ↔ 30 MHz | -36 dBm | 10 kHz | Note 1 |
| 30 MHz ↔ 1 GHz | -36 dBm | 100 kHz | Note 1 |
| 1 GHz ↔ 12.75 GHz | -30 dBm | 1 MHz | Note 2 |
| 12.75 GHz ↔ 5th harmonic of the upper frequency edge of the DL operating band in GHz | -30 dBm | 1 MHz | Note 2, Note 3 |
| 12.75 GHz ↔ 26 GHz | -30 dBm | 1 MHz | Note 2, Note 4 |
| NOTE 1: Bandwidth as in ITU-R SM.329 [5] , s4.1  NOTE 2: Bandwidth as in ITU-R SM.329 [5], s4.1. Upper frequency as in ITU-R SM.329 [5] , s2.5 table 1  NOTE 3: Applies only for Bands 22, 42, 43, 48 and 49.  NOTE 4: Applies only for Band 46. | | | |

##### 6.6.4.5.3 Protection of the BS receiver of own or different BS

This requirement shall be applied for E-UTRA FDD operation in paired operating bands in order to prevent the receivers of the BSs being desensitised by emissions from a BS transmitter. It is measured at the transmit antenna port for any type of BS which has common or separate Tx/Rx antenna ports.

The power of any spurious emission shall not exceed the limits in Table 6.6.4.5.3-1.

Table 6.6.4.5.3-1: BS Spurious emissions limits for protection of the BS receiver

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Frequency range | Maximum Level | Measurement Bandwidth | Note |
| Wide Area BS | FUL\_low – FUL\_high | -96 dBm | 100 kHz |  |
| Medium Range BS | FUL\_low – FUL\_high | -91 dBm | 100 kHz |  |
| Local Area BS | FUL\_low – FUL\_high | -88 dBm | 100 kHz |  |
| Home BS | FUL\_low – FUL\_high | -88 dBm | 100 kHz |  |
| Note 1: For E-UTRA Band 28 BS operating in regions where Band 28 is only partially allocated for E-UTRA operations, this requirement only apllies in the UL frequency range of the partial allocation. | | | | |

##### 6.6.4.5.4 Co-existence with other systems in the same geographical area

6.6.4.5.4.1 Void

These requirements may be applied for the protection of system operating in frequency ranges other than the E-UTRA or NB-IoT BS operating band. The limits may apply as an optional protection of such systems that are deployed in the same geographical area as the E-UTRA BS, or they may be set by local or regional regulation as a mandatory requirement for an E-UTRA operating band. It is in some cases not stated in the present document whether a requirement is mandatory or under what exact circumstances that a limit applies, since this is set by local or regional regulation. An overview of regional requirements in the present document is given in Clause 4.3.

Some requirements may apply for the protection of specific equipment (UE, MS and/or BS) or equipment operating in specific systems (GSM, CDMA, UTRA, E-UTRA, NR, etc.) as listed below. The power of any spurious emission shall not exceed the limits of Table 6.6.4.5.4-1 for a BS where requirements for co-existence with the system listed in the first column apply. For BS capable of multi-band operation the exclusions and conditions in the Note column of Table 6.6.4.5.4-1 apply for each supported operating band. For BS capable of multi-band operation where multiple bands are mapped on separate antenna connectors, the exclusions and conditions in the Note column of Table 6.6.4.5.4-1 apply for the operating band supported at that antenna connector.

Table 6.6.4.5.4-1: BS Spurious emissions limits for E-UTRA BS for co-existence with systems operating in other frequency bands

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| System type for E-UTRA to co-exist with | Frequency range for co-existence requirement | Maximum Level | Measurement Bandwidth | Note |
| GSM900 | 921 ‑ 960 MHz | -57 dBm | 100 kHz | This requirement does not apply to E-UTRA BS operating in band 8 |
| 876 - 915 MHz | -61 dBm | 100 kHz | For the frequency range 880-915 MHz, this requirement does not apply to E-UTRA BS operating in band 8, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| DCS1800 | 1805 ‑ 1880 MHz | -47 dBm | 100 kHz | This requirement does not apply to E-UTRA BS operating in band 3. |
| 1710 - 1785 MHz | -61 dBm | 100 kHz | This requirement does not apply to E-UTRA BS operating in band 3, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| PCS1900 | 1930 ‑ 1990 MHz | -47 dBm | 100 kHz | This requirement does not apply to E-UTRA BS operating in frequency band 2, band 25, band 36 or band 70. |
| 1850 ‑ 1910 MHz | -61 dBm | 100 kHz | This requirement does not apply to E-UTRA BS operating in frequency band 2 or 25, since it is already covered by the requirement in subclause 6.6.4.5.3. This requirement does not apply to E-UTRA BS operating in frequency band 35. |
| GSM850 or CDMA850 | 869 - 894 MHz | -57 dBm | 100 kHz | This requirement does not apply to E-UTRA BS operating in frequency band 5 or 26. This requirement applies to E-UTRA BS operating in Band 27 for the frequency range 879-894 MHz. |
| 824 ‑ 849 MHz | -61 dBm | 100 kHz | This requirement does not apply to E-UTRA BS operating in frequency band 5 or 26, since it is already covered by the requirement in subclause 6.6.4.5.3. For E‑UTRA BS operating in Band 27, it applies 3 MHz below the Band 27 downlink operating band. |
| UTRA FDD Band I or  E-UTRA Band 1 or NR band n1 | 2110 - 2170 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 1 or 65. |
| 1920 - 1980 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 1 or 65, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band II or  E-UTRA Band 2 or NR band n2 | 1930 - 1990 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 2, 25 or band 70. |
| 1850 - 1910 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 2 or 25, since it is already covered by the requirement in subclause 6.6.4.5.3 |
| UTRA FDD Band III or  E-UTRA Band 3 or NR band n3 | 1805 - 1880 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 3. |
| 1710 - 1785 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 3 or 9, since it is already covered by the requirement in subclause 6.6.4.5.3.  For E-UTRA BS operating in band 9, it applies for 1710 MHz to 1749.9 MHz and 1784.9 MHz to 1785 MHz, while the rest is covered in clause 6.6.4.5.3. |
| UTRA FDD Band IV or  E-UTRA Band 4 | 2110 - 2155 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 4, 10 or 66 |
| 1710 - 1755 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 4, 10 or 66, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band V or  E-UTRA Band 5 or NR band n5 | 869 - 894 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 5 or 26. This requirement applies to E-UTRA BS operating in Band 27 for the frequency range 879-894 MHz. |
| 824 - 849 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 5 or 26, since it is already covered by the requirement in subclause 6.6.4.5.3. For E‑UTRA BS operating in Band 27, it applies 3 MHz below the Band 27 downlink operating band. |
| UTRA FDD Band VI, XIX or  E-UTRA Band 6, 18, 19 | 860 - 890 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 6, 18, 19. |
| 815 - 830 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 18, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| 830 - 845 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 6, 19, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band VII or  E-UTRA Band 7 or NR band n7 | 2620 - 2690 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 7. |
| 2500 - 2570 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 7, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band VIII or  E-UTRA Band 8 or NR band n8 | 925 - 960 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 8. |
| 880 - 915 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 8, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band IX or  E-UTRA Band 9 | 1844.9 - 1879.9 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 3 or 9. |
| 1749.9 - 1784.9 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 3 or 9, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band X or  E-UTRA Band 10 | 2110 - 2170 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 4, 10 or 66 |
| 1710 - 1770 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 10 or 66, since it is already covered by the requirement in subclause 6.6.4.5.3. For E-UTRA BS operating in Band 4, it applies for 1755 MHz to 1770 MHz, while the rest is covered in clause 6.6.4.5.3. |
| UTRA FDD Band XI or XXI  E-UTRA Band 11 or 21 | 1475.9 - 1510.9 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 11, 21, 32, 50, 74 or 75. |
| 1427.9 - 1447.9 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 11 or 74, since it is already covered by the requirement in subclause 6.6.4.5.3. This requirement does not apply to BS operating in band 32, 50, 51, 75 or 76. |
| 1447.9 - 1462.9 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 21 or 74, since it is already covered by the requirement in subclause 6.6.4.5.3. This requirement does not apply to BS operating in band 32, 50 or 75. |
| UTRA FDD Band XII or  E-UTRA Band 12 or NR band n12 | 729 - 746 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 12 or 85. |
| 699 - 716 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 12 or 85, since it is already covered by the requirement in subclause 6.6.4.5.3. For E‑UTRA BS operating in Band 29, it applies 1 MHz below the Band 29 downlink operating band (Note 6) |
| UTRA FDD Band XIII or  E-UTRA Band 13 | 746 - 756 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 13. |
| 777 - 787 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 13, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band XIV or  E-UTRA Band 14 or NR Band n14 | 758 - 768 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 14. |
| 788 - 798 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 14, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| E-UTRA Band 17 | 734 - 746 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 17. |
| 704 - 716 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 17, since it is already covered by the requirement in subclause 6.6.4.5.3. For E‑UTRA BS operating in Band 29, it applies 1 MHz below the Band 29 downlink operating band (Note 6) |
| 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 E-UTRA BS operating in band 20 or 28. |
| 832 - 862 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 20, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band XXII or  E-UTRA Band 22 | 3510 – 3590 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 22, 42, 48 or 49. |
| 3410 – 3490 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 22, since it is already covered by the requirement in subclause 6.6.4.5.3. This requirement does not apply to E-UTRA BS operating in Band 42 |
| E-UTRA Band 24 | 1525 – 1559 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 24. |
| 1626.5 – 1660.5 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 24, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band XXV or  E-UTRA Band 25 or NR band n25 | 1930 - 1995 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 2, 25 or 70 |
| 1850 - 1915 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 25, since it is already covered by the requirement in subclause 6.6.4.5.3. For E-UTRA BS operating in Band 2, it applies for 1910 MHz to 1915 MHz, while the rest is covered in clause 6.6.4.5.3. |
| 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 E-UTRA BS operating in band 5 or 26. This requirement applies to E-UTRA BS operating in Band 27 for the frequency range 879-894 MHz. |
| 814 – 849 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 26, since it is already covered by the requirement in subclause 6.6.4.5.3. For E-UTRA BS operating in Band 5, it applies for 814 MHz to 824 MHz, while the rest is covered in clause 6.6.4. 5.3. For E‑UTRA BS operating in Band 27, it applies 3 MHz below the Band 27 downlink operating band. |
| E-UTRA Band 27 | 852 – 869 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in Band 5, 26 or 27. |
| 807 – 824 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in Band 27, since it is already covered by the requirement in subclause 6.6.4.5.3. For E-UTRA BS operating in Band 26, it applies for 807 MHz to 814 MHz, while the rest is covered in clause 6.6.4.5.3. This requirement also applies to E-UTRA BS operating in Band 28, starting 4 MHz above the Band 28 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 E-UTRA BS operating in band 20, 28, 44, 67 or 68. |
| 703 - 748 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 28, since it is already covered by the requirement in subclause 6.6.4.5.3. This requirement does not apply to E-UTRA BS operating in Band 44.  For E-UTRA BS operating in Band 67, it applies for 703 MHz to 736 MHz. For E-UTRA BS operating in Band 68, it applies for 728MHz to 733MHz. |
| E-UTRA Band 29 or NR Band n29 | 717 – 728 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in Band 29 or 85. |
| E-UTRA Band 30 or NR Band n30 | 2350 – 2360 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 30 or 40. |
| 2305 – 2315 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 30, since it is already covered by the requirement in subclause 6.6.4.5.3. This requirement does not apply to E-UTRA BS operating in Band 40. |
| E-UTRA Band 31 | 462.5 -467.5 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 31, 72 or 73. |
| 452.5 -457.5 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 31, since it is already covered by the requirement in subclause 6.6.4.5.3. This requirement does not apply to E-UTRA BS operating in band 72 or 73. |
| UTRA FDD band XXXII or E-UTRA band 32 | 1452 – 1496 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 11, 21, 32, 50, 74 or 75. |
| UTRA TDD Band a) or E-UTRA Band 33 | 1900 – 1920 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in Band 33. |
| UTRA TDD Band a) or E-UTRA Band 34 or NR band n34 | 2010 – 2025 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in Band 34. |
| UTRA TDD Band b) or E-UTRA Band 35 | 1850 – 1910 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in Band 35. |
| UTRA TDD Band b) or E-UTRA Band 36 | 1930 – 1990 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in Band 2 and 36. |
| UTRA TDD Band c) or E-UTRA Band 37 | 1910 – 1930 MHz | -52 dBm | 1 MHz | This is not applicable to E-UTRA BS operating in Band 37. This unpaired band is defined in ITU-R M.1036, but is pending any future deployment. |
| UTRA TDD Band d) or E-UTRA Band 38 or NR band n38 | 2570 – 2620 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in Band 38 or 69. |
| UTRA TDD Band f) or E-UTRA Band 39 or NR band n39 | 1880 – 1920MHz | -52 dBm | 1 MHz | This is not applicable to E-UTRA BS operating in Band 39. |
| UTRA TDD Band e) or E-UTRA Band 40 or NR band n40 | 2300 – 2400MHz | -52 dBm | 1 MHz | This is not applicable to E-UTRA BS operating in Band 30 or 40. |
| E-UTRA Band 41 or NR band n41 | 2496 – 2690 MHz | -52 dBm | 1 MHz | This is not applicable to E-UTRA BS operating in Band 41 or 53. |
| E-UTRA Band 42 | 3400 – 3600 MHz | -52 dBm | 1 MHz | This is not applicable to E-UTRA BS operating in Band 22, 42, 43, 48, 49 or 52. |
| E-UTRA Band 43 | 3600 – 3800 MHz | -52 dBm | 1 MHz | This is not applicable to E-UTRA BS operating in Band 42, 43, 48 or 49. |
| E-UTRA Band 44 | 703 - 803 MHz | -52 dBm | 1 MHz | This is not applicable to E-UTRA BS operating in Band 28 or 44 |
| E-UTRA Band 45 | 1447 – 1467 MHz | -52 dBm | 1 MHz | This is not applicable to E-UTRA BS operating in Band 45 |
| E-UTRA Band 46 or NR Band n46 | 5150 - 5925 MHz | -52 dBm | 1 MHz | This is not applicable to E-UTRA BS operating in Band 46. |
| E-UTRA Band 47 | 5855 - 5925 MHz | -52 dBm | 1 MHz |  |
| E-UTRA Band 48 or NR band n48 | 3550 - 3700 MHz | -52 dBm | 1 MHz | This is not applicable to E-UTRA BS operating in Band 22, 42, 43, 48 or 49. |
| E-UTRA Band 49 | 3550 - 3700 MHz | -52 dBm | 1 MHz | This is not applicable to E-UTRA BS operating in Band 22, 42, 43, 48 or 49. |
| E-UTRA Band 50 or NR band n50 | 1432 - 1517 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in Band 11, 21, 32, 45, 50, 51, 74, 75 or 76. |
| E-UTRA Band 51 or NR band n51 | 1427 - 1432 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in Band 50, 51, 75 or 76. |
| E-UTRA Band 52 | 3300 – 3400 MHz | -52 dBm | 1 MHz | This is not applicable to E-UTRA BS operating in Band 42 or 52. |
| E-UTRA Band 53 or NR Band n53 | 2483.5 - 2495 MHz | -52 dBm | 1 MHz | This is not applicable to E-UTRA BS operating in Band 41 or 53. |
| E-UTRA Band 65 or NR band n65 | 2110 - 2200 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 1 or 65, |
| 1920 - 2010 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 65, since it is already covered by the requirement in clause 6.6.4.5.3.  For E-UTRA BS operating in Band 1, it applies for 1980 MHz to 2010 MHz, while the rest is covered in clause 6.6.4.5.3. |
| E-UTRA Band 66 or NR band n66 | 2110 - 2200 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 4, 10, 23 or 66. |
| 1710 - 1780 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 66, since it is already covered by the requirement in clause 6.6.4.5.3. For E-UTRA BS operating in Band 4, it applies for 1755 MHz to 1780 MHz, while the rest is covered in clause 6.6.4.5.3. For E-UTRA BS operating in Band 10, it applies for 1770 MHz to 1780 MHz, while the rest is covered in clause 6.6.4.5.3. |
| E-UTRA Band 67 | 738 - 758 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in Band 28 or 67. |
| E-UTRA Band 68 | 753 -783 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 28, or 68. |
|  | 698-728 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 68, since it is already covered by the requirement in clause 6.6.4.5.3. For E-UTRA BS operating in Band 28, it applies between 698 MHz and 703 MHz, while the rest is covered in clause 6.6.4.5.3. |
| E-UTRA Band 69 | 2570 - 2620 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in Band 38 or 69. |
| E-UTRA Band 70 or NR band n70 | 1995 - 2020 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 2, 25 or 70 |
| 1695 – 1710 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 70, since it is already covered by the requirement in clause 6.6.4.5.3. |
| E-UTRA Band 71 or NR band n71 | 617 - 652 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 71 |
| 663 – 698 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 71, since it is already covered by the requirement in clause 6.6.4.5.3 |
| E-UTRA Band 72 | 461 - 466 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 31, 72 or 73. |
| 451 - 456 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 72, since it is already covered by the requirement in clause 6.6.4.5.3. This requirement does not apply to E-UTRA BS operating in band 73. |
| E-UTRA Band 73 | 460 - 465 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 31, 72 or 73. |
| 450 - 455 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 73, since it is already covered by the requirement in clause 6.6.4.5.3. |
| E-UTRA Band 74 or NR band n74 | 1475 – 1518 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 11, 21, 32, 50, 74 or 75. |
| 1427 – 1470 MHz | -49 dBm | 1MHz | This requirement does not apply to E-UTRA BS operating in Band 74, since it is already covered by the requirement in clause 6.6.4.5.3 This requirement does not apply to BS operating in band 32, 45, 50, 51, 75 or 76. |
| E-UTRA Band 75 or NR band n75 | 1432 – 1517 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 11, 21, 32, 45, 50, 51, 74, 75 or 76. |
| E-UTRA Band 76 or NR band n76 | 1427 – 1432 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 50, 51, 75 or 76. |
| NR band n77 | 3300 – 4200 MHz | -52 dBm | 1 MHz | This is not applicable to E-UTRA BS operating in Band 22, 42, 43, 48, 49 or 52. |
| NRband n78 | 3300 – 3800 MHz | -52 dBm | 1 MHz | This is not applicable to E-UTRA BS operating in Band 22, 42, 43, 48, 49 or 52. |
| NR Band n79 | 4.4 – 5.0 GHz | -52 dBm | 1 MHz |  |
| NR Band n80 | 1710 – 1785 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 3, since it is already covered by the requirement in clause 6.6.4.2.  For E-UTRA BS operating in band 9, it applies for 1710 MHz to 1749.9 MHz and 1784.9 MHz to 1785 MHz, while the rest is covered in clause 6.6.4.2. |
| NR Band n81 | 880 – 915 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 8, since it is already covered by the requirement in clause 6.6.4.2. |
| NR Band n82 | 832 – 862 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 20, since it is already covered by the requirement in subclause 6.6.4.2. |
| NR Band n83 | 703 – 748 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 28, since it is already covered by the requirement in subclause 6.6.4.2. This requirement does not apply to E-UTRA BS operating in Band 44.  For E-UTRA BS operating in Band 67, it applies for 703 MHz to 736 MHz. For E-UTRA BS operating in Band 68, it applies for 728MHz to 733MHz. |
| NR Band n84 | 1920 – 1980 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 1 or 65, since it is already covered by the requirement in clause 6.6.4.2. |
| E-UTRA Band 85 | 728 - 746 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 12, 29 or 85. |
| 698 - 716 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 85, since it is already covered by the requirement in clause 6.6.4.5.3. For E‑UTRA BS operating in Band 29, it applies 1 MHz below the Band 29 downlink operating band (Note 6). |
| NR Band n86 | 1710 - 1780 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 66, since it is already covered by the requirement in clause 6.6.4.2. For E-UTRA BS operating in Band 4, it applies for 1755 MHz to 1780 MHz, while the rest is covered in clause 6.6.4.2. For E-UTRA BS operating in Band 10, it applies for 1770 MHz to 1780 MHz, while the rest is covered in clause 6.6.4.2. |
| E-UTRA Band 87 | 420 - 425 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 87 or 88. |
| 410 – 415 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 87, since it is already covered by the requirement in clause 6.6.4.5.3 |
| E-UTRA Band 88 | 422 - 427 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 87 or 88. |
| 412 - 417 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 88, since it is already covered by the requirement in clause 6.6.4.5.3. This requirement does not apply to E-UTRA BS operating in band 87. |
| NR Band n89 | 824 - 849 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 5 or 26, since it is already covered by the requirement in subclause 6.6.4.5.3. For E‑UTRA BS operating in Band 27, it applies 3 MHz below the Band 27 downlink operating band. |
| NR Band n91 | 1427 – 1432 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in Band 50, 51, 75 or 76. |
| 832 – 862 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 20, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| NR Band n92 | 1432 – 1517 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in Band 11, 21, 32, 45, 50, 51, 74, 75 or 76. |
| 832 – 862 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 20, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| NR Band n93 | 1427 – 1432 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in Band 50, 51, 75 or 76. |
| 880 – 915 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 8, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| NR Band n94 | 1432 – 1517 MHz | -52 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in Band 11, 21, 32, 45, 50, 51, 74, 75 or 76. |
| 880 – 915 MHz | -49 dBm | 1 MHz | This requirement does not apply to E-UTRA BS operating in band 8, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| NR Band n95 | 2010 – 2025 MHz | -52 dBm | 1 MHz |  |
| NR Band n96 | 5925 – 7125 MHz | -52 dBm | 1 MHz | This is not applicable to E-UTRA BS operating in Band 46 |

Additional co-existence requirements in Table 6.6.4.5.4-1-1a may apply for some regions.

Table 6.6.4.5.4-1a: BS Spurious emissions limits for E-UTRA BS for co-existence with systems operating in Band 46

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| System type for E-UTRA to co-exist with | Frequency range for co-existence requirement | Maximum Level | Measurement Bandwidth | Note |
| E-UTRA Band 46a | 5150 - 5250 MHz | -40 dBm | 1 MHz | This is only applicable to E-UTRA BS operating in Band 46c or 46d. |
| E-UTRA Band 46b | 5250 - 5350 MHz | -40 dBm | 1 MHz | This is only applicable to E-UTRA BS operating in Band 46c or 46d. |
| E-UTRA Band 46c | 5470 - 5725 MHz | -40 dBm | 1 MHz | This is only applicable to E-UTRA BS operating in Band 46a or 46b. |
| E-UTRA Band 46d | 5725 - 5925 MHz | -40 dBm | 1 MHz | This is only applicable to E-UTRA BS operating in Band 46a or 46b. |
| NOTE 1: This requirement may apply to E-UTRA BS operating in certain regions. | | | | |

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 25, Band 27, Band 28 or Band 29, the co-existence requirements in Table 6.6.4.5.4-1 do not apply for the 10 MHz frequency range immediately outside the downlink operating band (see Table 5.5-1). Emission limits for this excluded frequency range may be covered by local or regional requirements.

NOTE 2: Table 6.6.4.5.4-1 assumes that two operating bands, where the frequency ranges in Table 5.5-1 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 (except in Band 46), special co-existence requirements may apply that are not covered by the 3GPP specifications.

NOTE 5: For E-UTRA Band 28 BS, specific solutions may be required to fulfil the spurious emissions limits for E-UTRA BS for co-existence with E-UTRA Band 27 UL operating band.

NOTE 6: For E-UTRA Band 29 BS, specific solutions may be required to fulfil the spurious emissions limits for E-UTRA BS for co-existence with UTRA Band XII or E-UTRA Band 12 UL operating band, E-UTRA Band 17 UL operating band or E-UTRA Band 85 UL operating band.

The power of any spurious emission shall not exceed the limits of Table 6.6.4.5.4-1a for a Home BS where requirements for co-existence with a Home BS type listed in the first column apply.

Table 6.6.4.5.4-1a: Home BS Spurious emissions limits for co-existence with Home BS operating in other frequency bands

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type of coexistence BS | Frequency range for co-location requirement | Maximum Level | Measurement Bandwidth | Note |
| UTRA FDD Band I or E-UTRA Band 1 | 1920 - 1980 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 1 or 65, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band II or E-UTRA Band 2 | 1850 - 1910 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 2 or 25, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band III or E-UTRA Band 3 | 1710 - 1785 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 3, since it is already covered by the requirement in subclause 6.6.4.5.3. For Home BS operating in band 9, it applies for 1710 MHz to 1749.9 MHz and 1784.9 MHz to 1785 MHz, while the rest is covered in clause 6.6.4.5.3. |
| UTRA FDD Band IV or E-UTRA Band 4 | 1710 - 1755 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 4, 10 or 66, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band V or E-UTRA Band 5 | 824 - 849 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 5 or 26, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band VI, XIX or E-UTRA Band 6, 18, 19 | 815 - 830 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 18, since it is already covered by the requirement in subclause 6.6.4.5.3. |
|  | 830 - 845 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 6, 19, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band VII or E-UTRA Band 7 | 2500 - 2570 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 7, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band VIII or E-UTRA Band 8 | 880 - 915 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 8, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band IX or E-UTRA Band 9 | 1749.9 - 1784.9 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 3 or 9, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band X or E-UTRA Band 10 | 1710 - 1770 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 10 or 66, since it is already covered by the requirement in subclause 6.6.4.5.3. For Home BS operating in Band 4, it applies for 1755 MHz to 1770 MHz, while the rest is covered in clause 6.6.4.5.3. |
| UTRA FDD Band XI, XXI or E-UTRA Band 11, 21 | 1427.9 - 1447.9 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 11 or 74, since it is already covered by the requirement in subclause 6.6.4.5.3. This requirement does not apply to BS operating in band 32, 50, 51, 75 or 76. |
|  | 1447.9 - 1462.9 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 21 or 74, since it is already covered by the requirement in subclause 6.6.4.5.3.  This requirement does not apply to BS operating in band 32, 50 or 75. |
| UTRA FDD Band XII or  E-UTRA Band 12 | 699 - 716 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 12 or 85, since it is already covered by the requirement in subclause 6.6.4.5.3. For Home BS operating in Band 29, it applies 1 MHz below the Band 29 downlink operating band (Note 5) |
| UTRA FDD Band XIII or  E-UTRA Band 13 | 777 - 787 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 13, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band XIV or  E-UTRA Band 14 | 788 - 798 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 14, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| E-UTRA Band 17 | 704 - 716 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 17, since it is already covered by the requirement in subclause 6.6.4.5.3. For Home BS operating in Band 29, it applies 1 MHz below the Band 29 downlink operating band (Note 5) |
| UTRA FDD Band XX or E-UTRA Band 20 | 832 - 862 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 20, since it is already covered by the requirement in subclause 6.6.4.5.3. |
| UTRA FDD Band XXII or  E-UTRA Band 22 | 3410 - 3490 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 22, since it is already covered by the requirement in clause 6.6.5.3. This requirement does not apply to Home BS operating in Band 42 |
| E-UTRA Band 24 | 1626.5 – 1660.5 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 24, since it is already covered by the requirement in clause 6.6.4.5.3. |
| UTRA FDD Band XXV or  E-UTRA Band 25 | 1850 - 1915 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 25, since it is already covered by the requirement in clause 6.6.4.5.3. |
| UTRA FDD Band XXVI or  E-UTRA Band 26 | 814 - 849 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 26, since it is already covered by the requirement in clause 6.6.4.5.3. For Home BS operating in Band 5, it applies for 814 MHz to 824 MHz, while the rest is covered in clause 6.6.4.5.3. |
| E-UTRA Band 27 | 807 - 824 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 27, since it is already covered by the requirement in clause 6.6.4.5.3. For Home BS operating in Band 26, it applies for 807 MHz to 814 MHz, while the rest is covered in clause 6.6.4.5.3. This requirement also applies to E-UTRA BS operating in Band 28, starting 4 MHz above the Band 28 downlink operating band (Note 4). |
| E-UTRA Band 28 | 703 – 748 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 28, since it is already covered by the requirement in clause 6.6.4.5.3. This requirement does not apply to Home BS operating in Band 44. For E-UTRA BS operating in Band 67, it applies for 703 MHz to 736 MHz. For E-UTRA BS operating in Band 68, it applies for 728MHz to 733MHz. |
| E-UTRA Band 30 | 2305 – 2315 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 30, since it is already covered by the requirement in clause 6.6.4.5.3. This requirement does not apply to Home BS operating in Band 40. |
| UTRA TDD Band a) or E-UTRA Band 33 | 1900 - 1920 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in Band 33. |
| UTRA TDD Band a) or E-UTRA Band 34 | 2010 - 2025 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in Band 34. |
| UTRA TDD Band b) or E-UTRA Band 35 | 1850 - 1910 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in Band 35. |
| UTRA TDD Band b) or E-UTRA Band 36 | 1930 - 1990 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in Band 2 and 36. |
| UTRA TDD Band c) or E-UTRA Band 37 | 1910 - 1930 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in Band 37. This unpaired band is defined in ITU-R M.1036, but is pending any future deployment. |
| UTRA TDD Band d) or E-UTRA Band 38 | 2570 - 2620 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in Band 38. |
| UTRA TDD Band f) or E-UTRA Band 39 | 1880 - 1920MHz | -71 dBm | 100 kHz | This is not applicable to Home BS operating in Band 39. |
| UTRA TDD Band e) or E-UTRA Band 40 | 2300 - 2400MHz | -71 dBm | 100 kHz | This is not applicable to Home BS operating in Band 30 or 40. |
| E-UTRA Band 41 | 2496 – 2690 MHz | -71 dBm | 100 kHz | This is not applicable to Home BS operating in Band 41. |
| E-UTRA Band 42 | 3400 - 3600 MHz | -71 dBm | 100 kHz | This is not applicable to Home BS operating in Band 22, 42, 43, 48 or 52 |
| E-UTRA Band 43 | 3600 - 3800 MHz | -71 dBm | 100 kHz | This is not applicable to Home BS operating in Band 42, 43 or 48 |
| E-UTRA Band 44 | 703 - 803 MHz | -71 dBm | 100 kHz | This is not applicable to Home BS operating in Band 28 or 44 |
| E-UTRA Band 48 | 3550 - 3700 MHz | -71 dBm | 100 kHz | This is not applicable to Home BS operating in Band 22, 42, 43 or 48. |
| E-UTRA Band 50 | 1432 - 1517 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in Band 11, 21, 32, 50, 51, 74, 75 or 76. |
| E-UTRA Band 51 | 1427 - 1432 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in Band 50, 51, 75 or 76. |
| E-UTRA Band 52 | 3300 - 3400 MHz | -71 dBm | 100 kHz | This is not applicable to Home BS operating in Band 42 or 52 |
| E-UTRA Band 65 | 1920 - 2010 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 65, since it is already covered by the requirement in clause 6.6.4.5.3.  For Home BS operating in Band 1, it applies for 1980 MHz to 2010 MHz, while the rest is covered in clause 6.6.4.5.3. |
| E-UTRA Band 66 | 1710 - 1780 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 66, since it is already covered by the requirement in clause 6.6.4.5.3. For Home BS operating in Band 4, it applies for 1755 MHz to 1780 MHz, while the rest is covered in clause 6.6.4.5.3. For Home BS operating in Band 10, it applies for 1770 MHz to 1780 MHz, while the rest is covered in clause 6.6.4.5.3. |
| E-UTRA Band 68 | 698-728 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 68, since it is already covered by the requirement in clause 6.6.4.5.3. For Home BS operating in Band 28, it applies between 698 MHz and 703 MHz, while the rest is covered in clause 6.6.4.5.3. |
| E-UTRA Band 70 | 1695-1710 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 70, since it is already covered by the requirement in clause 6.6.4.5.3. |
| E-UTRA Band 71 | 663 – 698 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 71, since it is already covered by the requirement in clause 6.6.4.5.3. |
| E-UTRA Band 74 | 1427 – 1470 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in Band 74, since it is already covered by the requirement in clause 6.6.4.5.3 This requirement does not apply to BS operating in band 32, 50, 51, 75 or 76. |
| E-UTRA Band 85 | 698 - 716 MHz | -71 dBm | 100 kHz | This requirement does not apply to Home BS operating in band 85, since it is already covered by the requirement in clause 6.6.4.5.3. For Home BS operating in Band 29, it applies 1 MHz below the Band 29 downlink operating band (Note 5). |

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 27, Band 28 or Band 29, the coexistence requirements in Table 6.6.4.5.4-1a do not apply for the 10 MHz frequency range immediately outside the Home BS transmit frequency range of a downlink operating band (see Table 5.5-1). Emission limits for this excluded frequency range may be covered by local or regional requirements.

NOTE 2: Table 6.6.4.5.4-1a assumes that two operating bands, where the frequency ranges in Table 5.5-1 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 E-UTRA Band 28 BS, specific solutions may be required to fulfil the spurious emissions limits for E-UTRA BS for co-existence with E-UTRA Band 27 UL operating band.

NOTE 5: For E-UTRA Band 29 BS, specific solutions may be required to fulfil the spurious emissions limits for E-UTRA BS for co-existence with UTRA Band XII or E-UTRA Band 12 UL operating band, E-UTRA Band 17 UL operating band or E-UTRA Band 85 UL operating band.

The following requirement may be applied for the protection of PHS. This requirement is also applicable at specified frequencies falling between 10 MHz below the lowest BS transmitter frequency of the downlink operating band and 10 MHz above the highest BS transmitter frequency of the downlink operating band (see Table 5.5-1).

The power of any spurious emission shall not exceed:

Table 6.6.4.5.4-2: E-UTRA BS Spurious emissions limits for BS for co-existence with PHS

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency range | Maximum Level | Measurement Bandwidth | Note |
| 1884.5 ‑ 1915.7 MHz | -41 dBm | 300 kHz | Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz |

The following requirement shall be applied to BS operating in Bands 13 and 14 to ensure that appropriate interference protection is provided to 700 MHz public safety operations. This requirement is also applicable at the frequency range from 10 MHz below the lowest frequency of the BS transmitter operating band up to 10 MHz above the highest frequency of the BS transmitter operating band. The power of any spurious emission shall not exceed:

Table 6.6.4.5.4-3: BS Spurious emissions limits for protection of 700 MHz public safety operations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Operating Band | Band | Maximum Level | Measurement Bandwidth | Note |
| 13 | 763 - 775 MHz | -46 dBm | 6.25 kHz |  |
| 13 | 793 - 805 MHz | -46 dBm | 6.25 kHz |  |
| 14 | 769 - 775 MHz | -46 dBm | 6.25 kHz |  |
| 14 | 799 - 805 MHz | -46 dBm | 6.25 kHz |  |

Table 6.6.4.5.4-4: Void

The following requirement shall be applied to BS operating in Band 26 to ensure that appropriate interference protection is provided to 800 MHz public safety operations. This requirement is also applicable at the frequency range from 10 MHz below the lowest frequency of the BS downlink operating band up to 10 MHz above the highest frequency of the BS downlink operating band.

The power of any spurious emission shall not exceed:

Table 6.6.4.5.4-5: BS Spurious emissions limits for protection of 800 MHz public safety operations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Operating Band | Frequency range | Maximum Level | Measurement Bandwidth | Note |
| 26 | 851 - 859 MHz | -13 dBm | 100 kHz | Applicable for offsets > 37.5kHz from the channel edge |

The following requirement may apply to E-UTRA BS operating in Band 41 in certain regions. This requirement is also applicable at the frequency range from 10 MHz below the lowest frequency of the BS downlink operating band up to 10 MHz above the highest frequency of the BS downlink operating band.

The power of any spurious emission shall not exceed:

Table 6.6.4.5.4-6: Additional E-UTRA BS Spurious emissions limits for Band 41

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency range | Maximum Level | Measurement Bandwidth | Note |
| 2505 MHz – 2535 MHz | -42 dBm | 1 MHz |  |
|  |  |  |  |
| NOTE: This requirement applies for 10 or 20 MHz E-UTRA carriers allocated within 2545-2645 MHz. | | | |

The following requirement may apply to E-UTRA BS operating in Band 30 in certain regions. This requirement is also applicable at the frequency range from 10 MHz below the lowest frequency of the BS downlink operating band up to 10 MHz above the highest frequency of the BS downlink operating band.

The power of any spurious emission shall not exceed:

Table 6.6.4.5.4-7: Additional E-UTRA BS Spurious emissions limits for Band 30

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency range | Maximum Level | Measurement Bandwidth | Note |
| 2200MHz – 2345MHz | -45dBm | 1 MHz |  |
| 2362.5MHz – 2365MHz | -25dBm | 1 MHz |  |
| 2365MHz – 2367.5MHz | -40dBm | 1 MHz |  |
| 2367.5MHz – 2370MHz | -42dBm | 1 MHz |  |
| 2370MHz – 2395MHz | -45dBm | 1 MHz |  |

In addition for Band 46 operation, the BS may have to comply with the applicable spurious 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 H of TS 36.104 [2].

The following requirement may apply to E-UTRA BS operating in Band 48 and Band 49 in certain regions. The power of any spurious emission shall not exceed:

Table 6.6.4.5.4-8: Additional E-UTRA BS Spurious emissions limits for Band 48 and Band 49

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency range | Maximum Level | Measurement Bandwidth | Note |
| 3530MHz – 3720MHz | -25dBm | 1 MHz | Applicable 10MHz from the assigned channel edge |
| 3100MHz – 3530MHz  3720MHz – 4200MHz | -40dBm | 1 MHz |  |

##### 6.6.4.5.5 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 an E-UTRA or NB-IoT 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 power of any spurious emission shall not exceed the limits of Table 6.6.4.5.5-1 for a Wide Area BS where requirements for co-location with a BS type listed in the first column apply. For BS capable of multi-band operation, the exclusions and conditions in the Note column of Table 6.6.4.5.5-1 apply for each supported operating band. For BS capable of multi-band operation where multiple bands are mapped on separate antenna connectors, the exclusions and conditions in the Note column of Table 6.6.4.5.5-1 apply for the operating band supported at that antenna connector.

Table 6.6.4.5.5-1: BS Spurious emissions limits for Wide Area BS co-located with another BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type of co-located BS | Frequency range for co-location requirement | Maximum Level | Measurement Bandwidth | Note |
| Macro GSM900 | 876-915 MHz | -98 dBm | 100 kHz |  |
| Macro DCS1800 | 1710 - 1785 MHz | -98 dBm | 100 kHz |  |
| Macro PCS1900 | 1850 - 1910 MHz | -98 dBm | 100 kHz |  |
| Macro GSM850 or CDMA850 | 824 - 849 MHz | -98 dBm | 100 kHz |  |
| WA UTRA FDD Band I or E-UTRA Band 1 or NR band n1 | 1920 - 1980 MHz | -96 dBm | 100 kHz |  |
| WA UTRA FDD Band II or E-UTRA Band 2 or NR band n2 | 1850 - 1910 MHz | -96 dBm | 100 kHz |  |
| WA UTRA FDD Band III or E-UTRA Band 3 or NR band n3 | 1710 - 1785 MHz | -96 dBm | 100 kHz |  |
| WA UTRA FDD Band IV or E-UTRA Band 4 | 1710 - 1755 MHz | -96 dBm | 100 kHz |  |
| WA UTRA FDD Band V or E-UTRA Band 5 or NR band n5 | 824 - 849 MHz | -96 dBm | 100 kHz |  |
| WA UTRA FDD Band VI, XIX or  E-UTRA Band 6, 19 | 830 - 845 MHz | -96 dBm | 100 kHz |  |
| WA UTRA FDD Band VII or E-UTRA Band 7 or Nrband n7 | 2500 - 2570 MHz | -96 dBm | 100 kHz |  |
| WA UTRA FDD Band VIII or E-UTRA Band 8 or NR band n8 | 880 - 915 MHz | -96 dBm | 100 kHz |  |
| WA UTRA FDD Band IX or E-UTRA Band 9 | 1749.9 - 1784.9 MHz | -96 dBm | 100 kHz |  |
| WA UTRA FDD Band X or E-UTRA Band 10 | 1710 - 1770 MHz | -96 dBm | 100 kHz |  |
| WA UTRA FDD Band XI or E-UTRA Band 11 | 1427.9 –1447.9 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 50 or 75 |
| WA UTRA FDD Band XII or  E-UTRA Band 12 or NR band n12 | 699 - 716 MHz | -96 dBm | 100 kHz |  |
| WA UTRA FDD Band XIII or  E-UTRA Band 13 | 777 - 787 MHz | -96 dBm | 100 kHz |  |
| WA UTRA FDD Band XIV or  E-UTRA Band 14 or NR Band n14 | 788 - 798 MHz | -96 dBm | 100 kHz |  |
| WA E-UTRA Band 17 | 704 - 716 MHz | -96 dBm | 100 kHz |  |
| WA E-UTRA Band 18 | 815 - 830 MHz | -96 dBm | 100 kHz |  |
| WA UTRA FDD Band XX E-UTRA Band 20 or NR band n20 | 832 - 862 MHz | -96 dBm | 100 kHz |  |
| WA E-UTRA Band 24 | 1626.5 – 1660.5 MHz | -96 dBm | 100 kHz |  |
| WA UTRA FDD Band XXI or  E-UTRA Band 21 | 1447.9 – 1462.9 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 32, 50 or 75 |
| WA UTRA FDD Band XXII or E-UTRA Band 22 | 3410 – 3490 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 42 |
| WA E-UTRA Band 23 | 2000 - 2020 MHz | -96 dBm | 100 kHz |  |
| WA UTRA FDD Band XXV or  E-UTRA Band 25 or NR Band n25 | 1850 – 1915 MHz | -96 dBm | 100 kHz |  |
| WA UTRA FDD Band XXVI or  E-UTRA Band 26 or NR Band n26 | 814 – 849 MHz | -96 dBm | 100 kHz |  |
| WA E-UTRA Band 27 | 807 - 824 MHz | -96 dBm | 100 kHz |  |
| WA E-UTRA Band 28 or NR band n28 | 703 – 748 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 44 |
| WA E-UTRA Band 30 or NR Band n30 | 2305 – 2315 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 40 |
| WA E-UTRA Band 31 | 452.5 – 457.5 MHz | -96 dBm | 100 kHz |  |
| WA UTRA TDD Band a) or E-UTRA Band 33 | 1900 - 1920 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 33 |
| WA UTRA TDD Band a) or E-UTRA Band 34 or NR band n34 | 2010 - 2025 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 34 |
| WA UTRA TDD Band b) or E-UTRA Band 35 | 1850 – 1910 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 35 |
| WA UTRA TDD Band b) or E-UTRA Band 36 | 1930 - 1990 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 2 and 36 |
| WA UTRA TDD Band c) or E-UTRA Band 37 | 1910 - 1930 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 37. This unpaired band is defined in ITU-R M.1036, but is pending any future deployment. |
| WA UTRA TDD Band d) or E-UTRA Band 38 or NR band n38 | 2570 – 2620 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 38. |
| WA UTRA TDD Band f) or E-UTRA Band 39 or NR band n39 | 1880 – 1920MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 33 and 39 |
| WA UTRA TDD Band e) or E-UTRA Band 40 or NR band n40 | 2300 – 2400MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 30 or 40 |
| WA E-UTRA Band 41 or NR band n41 | 2496 – 2690 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 41 |
| WA E-UTRA Band 42 | 3400 – 3600 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 22, 42, 43, 48 or 52 |
| WA E-UTRA Band 43 | 3600 – 3800 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 42, 43 or 48 |
| WA E-UTRA Band 44 | 703 – 803 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 28 or 44 |
| WA E-UTRA Band 45 | 1447 – 1467 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 45 |
| WA E-UTRA Band 48 or NR band n48 | 3550 – 3700 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 42, 43 or 48 |
| WA E-UTRA Band 50 or NR band n50 | 1432 – 1517 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 11, 21, 32, 74 or 75 |
| WA E-UTRA Band 52 | 3300 – 3400 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 42 or 52 |
| WA E-UTRA Band 65 or NR band n65 | 1920 - 2010 MHz | -96 dBm | 100 kHz |  |
| WA E-UTRA Band 66 or NR band n66 | 1710 - 1780 MHz | -96 dBm | 100 kHz |  |
| WA E-UTRA Band 68 | 698 - 728 MHz | -96 dBm | 100 kHz |  |
| WA E-UTRA Band 70 or NR band n70 | 1695 - 1710 MHz | -96 dBm | 100 kHz |  |
| WA E-UTRA Band 71 or NR band n71 | 663 - 698 MHz | -96 dBm | 100 kHz |  |
| WA E-UTRA Band 72 | 451 - 456 MHz | -96 dBm | 100 kHz |  |
| WA E-UTRA Band 73 | 450 - 455 MHz | -96 dBm | 100 kHz |  |
| WA E-UTRA Band 74 or NR band n74 | 1427 – 1470 MHz | -96 dBm | 100 kHz | This is not applicabe to E-UTRA BS operating in Band 50 |
| WA NR band n77 | 3300 – 4200 MHz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 22, 42, 43, 48 or 52 |
| WA NR band n78 | 3300 – 3800 Mz | -96 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 22, 42, 43, 48 or 52 |
| WA NR Band n79 | 4.4 – 5.0 GHz | -96 dBm | 100 kHz |  |
| WA NR Band n80 | 1710 – 1785 MHz | -96 dBm | 100 kHz |  |
| WA NR Band n81 | 880 – 915 MHz | -96 dBm | 100 kHz |  |
| WA NR Band n82 | 832 – 862 MHz | -96 dBm | 100 kHz |  |
| WA NR Band n83 | 703 – 748 MHz | -96 dBm | 100 kHz |  |
| WA NR Band n84 | 1920 – 1980 MHz | -96 dBm | 100 kHz |  |
| WA E-UTRA Band 85 | 698 - 716 MHz | -96 dBm | 100 kHz |  |
| WA NR Band n86 | 1710 – 1780 MHz | -96 dBm | 100 kHz |  |
| WA E-UTRA Band 87 | 410 - 415 MHz | -96 dBm | 100 kHz |  |
| WA E-UTRA Band 88 | 412 - 417 MHz | -96 dBm | 100 kHz |  |
| WA NR Band n89 | 824 – 849 MHz | -96 dBm | 100 kHz |  |
| WA NR Band n92 | 832 – 862 MHz | -96 dBm | 100 kHz |  |
| WA NR Band n94 | 880 – 915 MHz | -96 dBm | 100 kHz |  |
| WA NR Band n95 | 2010 - 2025 MHz | -96 dBm | 100 kHz |  |

The power of any spurious emission shall not exceed the limits of Table 6.6.4.5.5-2 for a Local Area BS where requirements for co-location with a BS type listed in the first column apply. For BS capable of multi-band operation, the exclusions and conditions in the Note column of Table 6.6.4.5.5-2 apply for each supported operating band. For BS capable of multi-band operation where multiple bands are mapped on separate antenna connectors, the exclusions and conditions in the Note column of Table 6.6.4.5.5-2 apply for the operating band supported at that antenna connector.

Table 6.6.4.5.5-2: BS Spurious emissions limits for Local Area BS co-located with another BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type of co-located BS | Frequency range for co-location requirement | Maximum Level | Measurement Bandwidth | Note |
| Pico GSM900 | 876-915 MHz | -70 dBm | 100 kHz |  |
| Pico DCS1800 | 1710 - 1785 MHz | -80 dBm | 100 kHz |  |
| Pico PCS1900 | 1850 - 1910 MHz | -80 dBm | 100 kHz |  |
| Pico GSM850 | 824 - 849 MHz | -70 dBm | 100 kHz |  |
| LA UTRA FDD Band I or E-UTRA Band 1 or NR band n1 | 1920 - 1980 MHz | -88 dBm | 100 kHz |  |
| LA UTRA FDD Band II or E-UTRA Band 2 or NR band n2 | 1850 - 1910 MHz | -88 dBm | 100 kHz |  |
| LA UTRA FDD Band III or E-UTRA Band 3 or NR band n3 | 1710 - 1785 MHz | -88 dBm | 100 kHz |  |
| LA UTRA FDD Band IV or E-UTRA Band 4 | 1710 - 1755 MHz | -88 dBm | 100 kHz |  |
| LA UTRA FDD Band V or E-UTRA Band 5 or NR band n5 | 824 - 849 MHz | -88 dBm | 100 kHz |  |
| LA UTRA FDD Band VI, XIX or E-UTRA Band 6, 19 | 830 - 845 MHz | -88 dBm | 100 kHz |  |
| LA UTRA FDD Band VII or E-UTRA Band 7 or NR band n7 | 2500 - 2570 MHz | -88 dBm | 100 kHz |  |
| LA UTRA FDD Band VIII or E-UTRA Band 8 or NR band n8 | 880 - 915 MHz | -88 dBm | 100 kHz |  |
| LA UTRA FDD Band IX or E-UTRA Band 9 | 1749.9 - 1784.9 MHz | -88 dBm | 100 kHz |  |
| LA UTRA FDD Band X or E-UTRA Band 10 | 1710 - 1770 MHz | -88 dBm | 100 kHz |  |
| LA UTRA FDD Band XI or E-UTRA Band 11 | 1427.9 - 1447.9 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 50, 51, 75 or 76 |
| LA UTRA FDD Band XII or E-UTRA Band 12 or NR band n12 | 699 - 716 MHz | -88 dBm | 100 kHz |  |
| LA UTRA FDD Band XIII or E-UTRA Band 13 | 777 - 787 MHz | -88 dBm | 100 kHz |  |
| LA UTRA FDD Band XIV or E-UTRA Band 14 or NR Band n14 | 788 - 798 MHz | -88 dBm | 100 kHz |  |
| LA E-UTRA Band 17 | 704 - 716 MHz | -88 dBm | 100 kHz |  |
| LA E-UTRA Band 18 | 815 - 830 MHz | -88 dBm | 100 kHz |  |
| LA UTRA FDD Band XX or E-UTRA Band 20 or NR band n20 | 832 - 862 MHz | -88 dBm | 100 kHz |  |
| LA UTRA FDD Band XXI or E-UTRA Band 21 | 1447.9 – 1462.9 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 32, 50 or 75 |
| LA UTRA FDD Band XXII or E-UTRA Band 22 | 3410 – 3490 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 42 |
| LA E-UTRA Band 23 | 2000 - 2020 MHz | -88 dBm | 100 kHz |  |
| LA E-UTRA Band 24 | 1626.5 – 1660.5 MHz | -88 dBm | 100 kHz |  |
| LA UTRA FDD Band XXV or E-UTRA Band 25 or NR band n25 | 1850 – 1915 MHz | -88 dBm | 100 kHz |  |
| LA UTRA FDD Band XXVI or  E-UTRA Band 26 or NR Band n26 | 814 – 849 MHz | -88 dBm | 100 kHz |  |
| LA E-UTRA Band 27 | 807 - 824 MHz | -88 dBm | 100 kHz |  |
| LA E-UTRA Band 28 or NR band n28 | 703 – 748 MHz | -88 dBm | 100 KHz | This is not applicable to E-UTRA BS operating in Band 44 |
| LA E-UTRA Band 30 or NR Band n30 | 2305 – 2315 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 40 |
| LA E-UTRA Band 31 | 452.5 – 457.5 MHz | -88 dBm | 100 kHz |  |
| LA UTRA TDD Band a) or E-UTRA Band 33 | 1900 - 1920 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 33 |
| LA UTRA TDD Band a) or E-UTRA Band 34 or NR band n34 | 2010 - 2025 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 34 |
| LA UTRA TDD Band b) or E-UTRA Band 35 | 1850 – 1910 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 35 |
| LA UTRA TDD Band b) or E-UTRA Band 36 | 1930 - 1990 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 2 and 36 |
| LA UTRA TDD Band c) or E-UTRA Band 37 | 1910 - 1930 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 37. This unpaired band is defined in ITU-R M.1036, but is pending any future deployment. |
| LA UTRA TDD Band d) or E-UTRA Band 38 or NR band n38 | 2570 – 2620 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 38. |
| LA UTRA TDD Band f) or E-UTRA Band 39 or NR band n39 | 1880 – 1920MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 33 and 39 |
| LA UTRA TDD Band e) or E-UTRA Band 40 or NR band n40 | 2300 – 2400MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 30 or 40 |
| LA E-UTRA Band 41 or NR band n41 | 2496 – 2690 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 41 or 53 |
| LA E-UTRA Band 42 | 3400 – 3600 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 22, 42, 43, 48, 49 or 52 |
| LA E-UTRA Band 43 | 3600 – 3800 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 42, 43, 48 or 49 |
| LA E-UTRA Band 44 | 703 – 803 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 28 or 44 |
| LA E-UTRA Band 45 | 1447 – 1467 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 45 |
| LA E-UTRA Band 46 or NR Band n46 | 5150 – 5925 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 46 |
| LA E-UTRA Band 48 or NR band n48 | 3550 – 3700 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 42, 43, 48 or 49 |
| LA E-UTRA Band 49 | 3550 – 3700 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 42, 43, 48 or 49 |
| LA E-UTRA Band 50 or NR band n50 | 1432 – 1517 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 11, 21, 32, 51, 74, 75 or 76 |
| LA E-UTRA Band 51 or NR band n51 | 1427 – 1432 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 50, 75 or 76 |
| LA E-UTRA Band 52 | 3300 – 3400 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 42 or 52 |
| LA E-UTRA Band 53 or NR Band n53 | 2483.5 – 2495 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 41 or 53 |
| LA E-UTRA Band 65 or NR band n65 | 1920 - 2010 MHz | -88 dBm | 100 kHz |  |
| LA E-UTRA Band 66 or NR band n66 | 1710 - 1780 MHz | -88 dBm | 100 kHz |  |
| LA E-UTRA Band 68 | 698 - 728 MHz | -88 dBm | 100 kHz |  |
| LA E-UTRA Band 70 or NR band n70 | 1695 - 1710 MHz | -88 dBm | 100 kHz |  |
| LA E-UTRA Band 71 or NR band n71 | 663 - 698 MHz | -88 dBm | 100 kHz |  |
| LA E-UTRA Band 72 | 451 - 456 MHz | -88 dBm | 100 kHz |  |
| LA E-UTRA Band 73 | 450 - 455 MHz | -88 dBm | 100 kHz |  |
| LA E-UTRA Band 74 or NR band n74 | 1427 – 1470 MHz | -88 dBm | 100 kHz | This is not applicabe to E-UTRA BS operating in Band 50 or 51 |
| LA NR band n77 | 3300 – 4200 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 22, 42, 43, 48, 49 or 52 |
| LA NR band n78 | 3300 – 3800 MHz | -88 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 22, 42, 43, 48, 49 or 52 |
| LA NR Band n79 | 4.4 – 5.0 GHz | -88 dBm | 100 kHz |  |
| LA NR Band n80 | 1710 – 1785 MHz | -88 dBm | 100 kHz |  |
| LA NR Band n81 | 880 – 915 MHz | -88 dBm | 100 kHz |  |
| LA NR Band n82 | 832 – 862 MHz | -88 dBm | 100 kHz |  |
| LA NR Band n83 | 703 – 748 MHz | -88 dBm | 100 kHz |  |
| LA NR Band n84 | 1920 – 1980 MHz | -88 dBm | 100 kHz |  |
| LA E-UTRA Band 85 | 698 - 716 MHz | -88 dBm | 100 kHz |  |
| LA NR Band n86 | 1920 – 1980 MHz | -88 dBm | 100 kHz |  |
| LA E-UTRA Band 87 | 410 - 415 MHz | -88 dBm | 100 kHz |  |
| LA E-UTRA Band 88 | 412 - 417 MHz | -88 dBm | 100 kHz |  |
| LA NR Band n89 | 824 – 849 MHz | -88 dBm | 100 kHz |  |
| LA NR Band n91 | 832 – 862 MHz | -88 dBm | 100 kHz |  |
| LA NR Band n92 | 832 – 862 MHz | -88 dBm | 100 kHz |  |
| LA NR Band n93 | 880 – 915 MHz | -88 dBm | 100 kHz |  |
| LA NR Band n94 | 880 – 915 MHz | -88 dBm | 100 kHz |  |
| LA NR Band n95 | 2010 - 2025 MHz | -88 dBm | 100 kHz |  |
| LA NR Band n96 | 5925 - 7125 MHz | -87 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 46 |

The power of any spurious emission shall not exceed the limits of Table 6.6.4.5.5-3 for a Medium Range BS where requirements for co-location with a BS type listed in the first column apply. For BS capable of multi-band operation, the exclusions and conditions in the Note column of Table 6.6.4.5.5-3 apply for each supported operating band. For BS capable of multi-band operation where multiple bands are mapped on separate antenna connectors, the exclusions and conditions in the Note column of Table 6.6.4.5.5-3 apply for the operating band supported at that antenna connector.

Table 6.6.4.5.5-3: BS Spurious emissions limits for Medium range BS co-located with another BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type of co-located BS | Frequency range for co-location requirement | Maximum Level | Measurement Bandwidth | Note |
| Micro/MR GSM900 | 876-915 MHz | -91 dBm | 100 kHz |  |
| Micro/MR DCS1800 | 1710 - 1785 MHz | -91 dBm | 100 kHz |  |
| Micro/MR PCS1900 | 1850 - 1910 MHz | -91 dBm | 100 kHz |  |
| Micro/MR GSM850 | 824 - 849 MHz | -91 dBm | 100 kHz |  |
| MR UTRA FDD Band I or E-UTRA Band 1 or NR band n1 | 1920 - 1980 MHz | -91 dBm | 100 kHz |  |
| MR UTRA FDD Band II or E-UTRA Band 2 or NR band n2 | 1850 - 1910 MHz | -91 dBm | 100 kHz |  |
| MR UTRA FDD Band III or E-UTRA Band 3 or NR band n3 | 1710 - 1785 MHz | -91 dBm | 100 kHz |  |
| MR UTRA FDD Band IV or E-UTRA Band 4 | 1710 - 1755 MHz | -91 dBm | 100 kHz |  |
| MR UTRA FDD Band V or E-UTRA Band 5 or NR band n5 | 824 - 849 MHz | -91 dBm | 100 kHz |  |
| MR UTRA FDD Band VI, XIX or E-UTRA Band 6, 19 | 830 - 850 MHz | -91 dBm | 100 kHz |  |
| MR UTRA FDD Band VII or E-UTRA Band 7 or NR band n7 | 2500 - 2570 MHz | -91 dBm | 100 KHz |  |
| MR UTRA FDD Band VIII or E-UTRA Band 8 or NR band n8 | 880 - 915 MHz | -91 dBm | 100 KHz |  |
| MR UTRA FDD Band IX or E-UTRA Band 9 | 1749.9 - 1784.9 MHz | -91 dBm | 100 KHz |  |
| MR UTRA FDD Band X or E-UTRA Band 10 | 1710 - 1770 MHz | -91 dBm | 100 kHz |  |
| MR UTRA FDD Band XI or E-UTRA Band 11 | 1427.9 - 1447.9 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 50 or 75 |
| MR UTRA FDD Band XII or E-UTRA Band 12 or NR band n12 | 699 - 716 MHz | -91 dBm | 100 kHz |  |
| MR UTRA FDD Band XIII or E-UTRA Band 13 | 777 - 787 MHz | -91 dBm | 100 kHz |  |
| MR UTRA FDD Band XIV or E-UTRA Band 14 or NR Band n14 | 788 - 798 MHz | -91 dBm | 100 kHz |  |
| MR E-UTRA Band 17 | 704 - 716 MHz | -91 dBm | 100 kHz |  |
| MR E-UTRA Band 18 | 815 - 830 MHz | -91 dBm | 100 KHz |  |
| MR UTRA FDD Band XX or E-UTRA Band 20 or NR band n20 | 832 - 862 MHz | -91 dBm | 100 KHz |  |
| MR UTRA FDD Band XXI or E-UTRA Band 21 | 1447.9 - 1462.9 MHz | -91 dBm | 100 KHz | This is not applicable to E-UTRA BS operating in Band 32, 50 or 75 |
| MR UTRA FDD Band XXII or E-UTRA Band 22 | 3410 – 3490 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 42 |
| MR E-UTRA Band 23 | 2000 - 2020 MHz | -91 dBm | 100 kHz |  |
| MR E-UTRA Band 24 | 1626.5 – 1660.5 MHz | -91 dBm | 100 KHz |  |
| MR UTRA FDD Band XXV or E-UTRA Band 25 or NR band n25 or NR Band n26 | 1850 – 1915 MHz | -91 dBm | 100 kHz |  |
| MR UTRA FDD Band XXVI or  E-UTRA Band 26 | 814 – 849 MHz | -91 dBm | 100 kHz |  |
| MR E-UTRA Band 27 | 807 - 824 MHz | -91 dBm | 100 kHz |  |
| MR E-UTRA Band 28 or NR band n28 | 703 – 748 MHz | -91 dBm | 100 KHz | This is not applicable to E-UTRA BS operating in Band 44 |
| MR E-UTRA Band 30 or NR Band n30 | 2305 – 2315 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 40 |
| MR E-UTRA Band 31 | 452.5 – 457.5 MHz | -91 dBm | 100 kHz |  |
| MR E-UTRA Band 33 | 1900 - 1920 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 33 |
| MR E-UTRA Band 34 or NR band n34 | 2010 - 2025 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 34 |
| MR E-UTRA Band 35 | 1850 – 1910 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 35 |
| MR E-UTRA Band 36 | 1930 - 1990 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 2 and 36 |
| MR E-UTRA Band 37 | 1910 - 1930 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 37. This unpaired band is defined in ITU-R M.1036, but is pending any future deployment. |
| MR E-UTRA Band 38 or NR band n38 | 2570 – 2620 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 38. |
| MR E-UTRA Band 39 or NR band n39 | 1880 – 1920MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 33 and 39 |
| MR E-UTRA Band 40 or NR band n40 | 2300 – 2400MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 30 or 40 |
| MR E-UTRA Band 41 or NR band n41 | 2496 – 2690 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 41 or 53 |
| MR E-UTRA Band 42 | 3400 – 3600 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 22, 42, 43, 48 or 52 |
| MR E-UTRA Band 43 | 3600 – 3800 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 42, 43 or 48 |
| MR E-UTRA Band 44 | 703 – 803 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 28 or 44 |
| MR E-UTRA Band 45 | 1447 – 1467 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 45 |
| MR E-UTRA Band 46 or NR Band n46 | 5150 – 5925 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 46 |
| MR E-UTRA Band 48 or NR band n48 | 3550 – 3700 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 42, 43 or 48 |
| MR E-UTRA Band 50 or NR band n50 | 1432 – 1517 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 11, 21, 32, 51, 74, 75 or 76 |
| MR E-UTRA Band 52 | 3300 – 3400 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 42 or 52 |
| MR E-UTRA Band 53 or NR Band n53 | 2483.5 – 2495 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 41 or 53 |
| MR E-UTRA Band 65 or NR band n65 | 1920 - 2010 MHz | -91 dBm | 100 kHz |  |
| MR E-UTRA Band 66 or NR band n66 | 1710 - 1780 MHz | -91 dBm | 100 kHz |  |
| MR E-UTRA Band 68 | 698 - 728 MHz | -91 dBm | 100 kHz |  |
| MR E-UTRA Band 70 or NR band n70 | 1695 - 1710 MHz | -91 dBm | 100 kHz |  |
| MR E-UTRA Band 71 | 663 - 698 MHz | -91 dBm | 100 kHz |  |
| MR E-UTRA Band 72 | 451 - 456 MHz | -91 dBm | 100 kHz |  |
| MR E-UTRA Band 73 | 450 - 455 MHz | -91 dBm | 100 kHz |  |
| MR E-UTRA Band 74 or NR band n74 | 1427 – 1470 MHz | -91 dBm | 100 kHz | This is not applicabe to E-UTRA BS operating in Band 50 |
| MR NR band n77 | 3300 – 4200 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 22, 42, 43, 48 or 52 |
| MR NR band n78 | 3300 – 3800 MHz | -91 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 22, 42, 43, 48 or 52 |
| MR NR Band n79 | 4.4 – 5.0 GHz | -91 dBm | 100 kHz |  |
| MR NR Band n80 | 1710 – 1785 MHz | -91 dBm | 100 kHz |  |
| MR NR Band n81 | 880 – 915 MHz | -91 dBm | 100 kHz |  |
| MR NR Band n82 | 832 – 862 MHz | -91 dBm | 100 kHz |  |
| MR NR Band n83 | 703 – 748 MHz | -91 dBm | 100 kHz |  |
| MR NR Band n84 | 1920 – 1980 MHz | -91 dBm | 100 kHz |  |
| MR E-UTRA Band 85 | 698 - 716 MHz | -91 dBm | 100 kHz |  |
| MR NR Band n86 | 1710 – 1780 MHz | -91 dBm | 100 kHz |  |
| MR E-UTRA Band 87 | 410 - 415 MHz | -91 dBm | 100 kHz |  |
| MR E-UTRA Band 88 | 412 - 417 MHz | -91 dBm | 100 kHz |  |
| MR NR Band n89 | 824 – 849 MHz | -91 dBm | 100 kHz |  |
| MR NR Band n92 | 832 – 862 MHz | -91 dBm | 100 kHz |  |
| MR NR Band n94 | 880 – 915 MHz | -91 dBm | 100 kHz |  |
| MR NR Band n95 | 2010 - 2025 MHz | -91 dBm | 100 kHz |  |
| MR NR Band n96 | 5925 - 7125 MHz | -90 dBm | 100 kHz | This is not applicable to E-UTRA BS operating in Band 46 |

NOTE 1: As defined in the scope for spurious emissions in this clause, the co-location requirements in Table 6.6.4.5.5-1 to Table 6.6.4.5.5-3 do not apply for the 10 MHz frequency range immediately outside the BS transmit frequency range of a downlink operating band (see Table 5.5-1). 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 [11].

NOTE 2: Tables 6.6.4.5.5-1 to 6.6.4.5.5-3 assume that two operating bands, where the corresponding eNode B transmit and receive frequency ranges in Table 5.3-1 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.

## 6.7 Transmitter intermodulation

### 6.7.1 Definition and applicability

The transmitter intermodulation requirement is a measure of the capability of the transmitter to inhibit the generation of signals in its non-linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna. The requirement applies during the transmitter ON period and the transmitter transient period.

For BS capable of multi-band operation where multiple bands are mapped on separate antenna connectors, the single-band requirements apply regardless of the interfering signals position relative to the Inter RF Bandwidth gap.

The transmit intermodulation level is the power of the intermodulation products when an E-UTRA signal of channel bandwidth 5 MHz as an interfering signal is injected into an antenna connector at a power level of 30 dB lower than that of the rated total output power in the operating band.

The wanted signal is E-UTRA single carrier or multi-carrier, or multiple contiguously aggregated carriers, for both contiguous and non-contiguous spectrum operation.

The interfering signal centre frequency offset shall be as in Table 6.7.1-1.

Table 6.7.1-1: Interfering signal centre frequency offset

|  |  |
| --- | --- |
| Parameter | Value |
| Interfering signal centre frequency offset from the lower/upper edge of the wanted signal or edge of sub-block inside a sub-block gap | ± 2.5 MHz  ± 7.5 MHz  ± 12.5 MHz |
| NOTE 1: Interfering signal positions that are partially or completely outside of the downlink operating band of the base station are excluded from the requirement, unless the interfering signal positions fall within the frequency range of adjacent downlink operating bands in the same geographical area.  NOTE 2: In certain regions, NOTE 1 is not applied in Band 1, 3, 8, 9, 11, 18, 19, 21, 28, 32 operating within 1475.9-1495.9MHz, 34, 74. | |

The wanted signal channel bandwidth BWChannel shall be the maximum channel bandwidth supported by the base station.

The requirements shall apply whatever the type of transmitter considered (single carrier, multi-carrier and/or CA) and for all transmission modes foreseen by the manufacturer's specification.

In case that none of the interfering signal positions according to the conditions of Table 6.7.1-1 is applicable, a wanted signal channel bandwidth BWChannel less than the maximum channel bandwidth supported by the base station shall be selected so that at least one applicable interfering signal position according to Table 6.7.1-1 is obtained.

### 6.7.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 6.7.1.

### 6.7.2A Additional requirement for Band 41

The additional requirement for Band 41 in certain regions is in TS 36.104 [2] subclause 6.7.2.

### 6.7.3 Test purpose

The test purpose is to verify the ability of the BS transmitter to restrict the generation of intermodulation products in its non-linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna to below specified levels.

### 6.7.4 Method of test

#### 6.7.4.1 Initial conditions

Test environment: normal; see Annex D.2.

RF channels to be tested for single carrier: B, M and T; see subclause 4.7.

Base Station RF Bandwidth positions to be tested for multi-carrier and/or CA: BRFBW, MRFBW and TRFBW; see subclause 4.7.1.

Connect the signal analyzer to the base station antenna connector as shown in Annex I.1.2.

#### 6.7.4.2 Procedures

1) For a n E-UTRABS declared to be capable of single carrier operation only, generate the wanted signal according to E-TM1.1 at manufacturer’s declared rated output power.

For a n E-UTRABS declared to be capable of multi-carrier and/or CA operation, set the base station to transmit according to E-TM1.1 on all carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For an E-UTRA BS declared to be capable of NB-IoT in-band operation, start transmission according to E-TM1.1 with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For an E-UTRA BS declared to be capable of NB-IoT guard-band operation, start transmission according to E-TM1.1 with the NB-IoT PRB constructed according to N-TM at manufacturer’s declared rated output power using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For a NB-IoT BS declared to be capable of single carrier operation, start transmission according to N-TM at manufacturer’s declared rated output power.

For a NB-IoT BS declared to be capable of multi-carrier operation, set the base station to transmit according to N-TM on all carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For an E-UTRA and NB-IoT standalone BS declared to be capable of multi-carrier operation, start transmission according to E-TM1.1 on all E-UTRA carriers and N-TM on all NB-IoT carriers configured using in the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

2) Generate the interfering signal according to E-TM1.1, with 5 MHz channel bandwidth and a centre frequency offset according to the conditions of Table 6.7.1-1 but exclude interfering frequencies that are outside of the allocated downlink operating band or interfering frequencies that are not completely within the sub-block gap or within the Inter RF Bandwidth gap.

3) Adjust ATT1 so that level of the E-UTRA interfering signal is as defined in subclause 6.7.5.

4) Perform the Out-of-band emission tests as specified in subclauses 6.6.2 and 6.6.3, for all third and fifth order intermodulation products which appear in the frequency ranges defined in subclauses 6.6.2 and 6.6.3. The width of the intermodulation products shall be taken into account.

5) Perform the Transmitter spurious emissions test as specified in subclause 6.6.4, for all third and fifth order intermodulation products which appear in the frequency ranges defined in subclause 6.6.4. The width of the intermodulation products shall be taken into account.

6) Verify that the emission level does not exceed the required level with the exception of interfering signal frequencies.

7) Repeat the test for the remaining interfering signal centre frequency offsets according to the conditions of Table 6.7.1-1.

In addition, for a multi-band capable BS, the following step shall apply:

8) For multi-band capable BS and single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carrier activated in the other band.

NOTE: The third order intermodulation products are centred at 2F1±F2 and 2F2±F1. The fifth order intermodulation products are centred at 3F1±2F2, 3F2±2F1, 4F1±F2, and 4F2±F1 where F1 represents the wanted signal centre frequency or centre frequency of each sub-block and F2 represents the interfering signal centre frequency.  
The width of intermodulation products are:

- (n\*BWF1 + m\*5MHz) for the nF1±mF2 products

- (n\*5MHz + m\*BWF1) for the nF2±mF1 products

where BWF1 represents the wanted signal RF bandwidth, or channel bandwidth in case of single carrier, or sub-block bandwidth.

### 6.7.5 Test Requirements

In the frequency range relevant for this test, the transmit intermodulation level shall not exceed the out-of-band emission requirements of subclauses 6.6.2 and 6.6.3 and transmitter spurious emissions requirements of subclause 6.6.4 in the presence of a E-UTRA interfering signal with a power level 30 dB below the rated total output power in the operating band.

The requirement is applicable outside the Base Station RF Bandwidth or Maximum Radio Bandwidth. The interfering signal offset is defined relative to the Base Station RF Bandwidth edges or Maximum Radio Bandwidth edges.

For a BS operating in non-contiguous spectrum, the requirement is also applicable inside a sub-block gap for interfering signal offsets where the interfering signal falls completely within the sub-block gap. The interfering signal offset is defined relative to the sub-block edges.

For a BS capable of multi-band operation, the requirement applies relative to the Base Station RF Bandwidth edge of each supported operating band. In case the Inter RF Bandwidth gap is less than 15 MHz, the requirement in the gap applies only for interfering signal offsets where the interfering signal falls completely within the Inter RF Bandwidth gap.

The measurements for out-of-band emissions and spurious emission requirements due to intermodulation can be limited to the frequency ranges of all third and fifth order intermodulation products, considering the width of these products and excluding the bandwidths of the wanted and interfering signals.

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in Annex G. The explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex G.

### 6.7.6 Additional test requirements for Band 41

In the frequency range relevant for this test, the transmitter intermodulation level shall not exceed the maximum levels according to Table 6.6.2-2 with a square filter in the first adjacent channel, and Table 6.6.4.5.4-6 in the presence of a wanted signal and an interfering signal according to Table 6.7.2‑1 in TS 36.104 [2] for a BS operating in Band 41. The measurement may be limited to frequencies on which third and fifth order intermodulation products appear, considering the width of these products and excluding the bandwidths of the wanted and interfering signals.

# 7 Receiver characteristics

## 7.1 General

General test conditions for receiver tests are given in Clause 4, including interpretation of measurement results and configurations for testing. BS configurations for the tests are defined in Clause 4.5, while Annex H provides an informative description of E-UTRAN test cases.

Unless otherwise stated the requirements in clause 7 apply during the base station receive period.

The throughput requirements defined for the receiver characteristics in this clause do not assume HARQ transmissions.

When the BS is configured to receive multiple carriers, all the throughput requirements are applicable for each received carrier. For ACS, blocking and intermodulation characteristics, the negative offsets of the interfering signal apply relative to the lower Base Station RF Bandwidth edge and positive offsets of the interfering signal apply relative to the upper Base Station RF Bandwidth edge.

Unless otherwise stated, a BS declared to be capable of E-UTRA with NB-IoT in-band or guard band operations is only required to pass the receiver tests for E-UTRA with NB-IoT in-band or guard band; it is not required to perform the receiver tests again for E-UTRA only.

For a BS declared to be capable of E-UTRA with NB-IoT in-band operations, it is not required to perform the receiver test for subPRB allocation.

## 7.2 Reference sensitivity level

### 7.2.1 Definition and applicability

The reference sensitivity power level PREFSENS is the minimum mean power received at the antenna connector at which a throughput requirement shall be met for a specified reference measurement channel.

The test is set up according to Annex I.2.1 and performed without interfering signal power applied to the BS antenna connector. For duplex operation, the measurement configuration principle is indicated for one duplex branch in Annex I.2.1. The reference point for signal power is at the input of the receiver (antenna connector).

### 7.2.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 7.2.1.

### 7.2.3 Test purpose

To verify that at the BS Reference sensitivity level the throughput requirement shall be met for a specified reference measurement channel.

### 7.2.4 Method of testing

#### 7.2.4.1 Initial conditions

Test environment: normal; see subclause D.2

RF channels to be tested for single carrier: B, M and T; see subclause 4.7.

The following additional tests shall be performed:

a) On each of B, M and T, the test shall be performed under extreme power supply as defined in subclause D.5

NOTE: Tests under extreme power supply also test extreme temperature.

1) Connect the test equipment as shown in Annex I.2.1.

#### 7.2.4.2 Procedure

1) a) For FDD BS start BS transmission according to E-TM 1.1 at manufacturer’s declared rated output power.

b) For NB-IoT BS start BS transmission according to N-TM at manufacturer’s declared rated output power.

2) Set the test signal mean power as specified in table 7.2-1 for E-UTRA Wide Area BS, in Table 7.2-2 for E-UTRA Local Area BS, in Table 7.2-3 for E-UTRA Home BS, in Table 7.2-4 for E-UTRA Medium Range BS, in Table 7.2-5 for NB-IoT Wide Area BS, in Table 7.2-6 for NB-IoT Local Area BS, in Table 7.2-7 for NB-IoT Home BS and in Table 7.2-8 for NB-IoT Medium Range BS, in Table 7.2-9 for subPRB allocation for Wide Area BS, in Table 7.2-10 for subPRB allocation for Local Area BS, in Table 7.2-11 for subPRB allocation for Home BS and in Table 7.2-12 for subPRB allocation for Medium Range BS.

3) Measure the throughput according to Annex E.

4) Repeat the measurement for the other RX port(s).

In addition, for a multi-band capable BS, the following step shall apply:

5) For multi-band capable BS and single band tests, repeat the steps above per involved band where single carrier test models shall apply with no carrier activated in the other band.

### 7.2.5 Test requirement

For each measured E-UTRA carrier, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A.1 with parameters specified in Table 7.2.5-1 for Wide Area BS, in Table 7.2.5-2 for Local Area BS, in Table 7.2.5-3 for Home BS and in Table 7.2.5-4 for Medium Range BS.

Table 7.2-1: E-UTRA Wide Area BS reference sensitivity levels

|  |  |  |  |
| --- | --- | --- | --- |
| E-UTRA  channel bandwidth [MHz] | Reference measurement channel | Reference sensitivity power level, PREFSENS  [dBm] | |
|  |  | f ≤ 3.0GHz | 3.0GHz < f ≤ 4.2GHz |
| 1.4 | FRC A1-1 in Annex A.1 | -106.1 | -105.8 |
| 3 | FRC A1-2 in Annex A.1 | -102.3 | -102.0 |
| 3 | FRC A1-6 in Annex A.1 for E-UTRA with NB-IoT in-band operation Note 3 | -102.3 Note 2 | N/A |
| 5 | FRC A1-3 in Annex A.1 | -100.8 | -100.5 |
| 5 | FRC A1-7 in Annex A.1 for E-UTRA with NB-IoT in-band operation | -100.8 Note 2 | N/A |
| 10 | FRC A1-3 in Annex A.1 Note 1 | -100.8 | -100.5 |
| 10 | FRC A1-7 in Annex A.1 for E-UTRA with NB-IoT in-band operation Note 4 | -100.8 Note 2 | N/A |
| 15 | FRC A1-3 in Annex A.1 Note 1 | -100.8 | -100.5 |
| 15 | FRC A1-7 in Annex A.1 for E-UTRA with NB-IoT in-band operation Note 4 | -100.8 Note 2 | N/A |
| 20 | FRC A1-3 in Annex A.1 Note 1 | -100.8 | -100.5 |
| 20 | FRC A1-7 in Annex A.1 for E-UTRA with NB-IoT in-band operation Note 4 | -100.8 Note 2 | N/A |
| Note 1: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for each consecutive application of a single instance of FRC A1-3 mapped to disjoint frequency ranges with a width of 25 resource blocks each.  Note 2: The requirements apply to BS that supports E-UTRA with NB-IoT in-band operation.  Note 3: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for a single instance of FRC A1-6 mapped to the 12 E-UTRA resource blocks adjacent to the NB-IoT PRB.  Note 4: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for a single instance of FRC A1-7 mapped to the 24 E-UTRA resource blocks adjacent to the NB-IoT PRB (location of which is specified in clause 4.7.3), and for each consecutive application of a single instance of FRC A1-3 mapped to disjoint frequency ranges with a width of 25 resource blocks each | | | |



Table 7.2-2: E-UTRA Local Area BS reference sensitivity levels

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth [MHz] | Reference measurement channel | Reference sensitivity power level, PREFSENS  [dBm] | | |
|  |  | f ≤ 3.0GHz | 3.0GHz < f ≤ 4.2GHz | 4.2GHz < f ≤ 6.0GHz |
| 1.4 | FRC A1-1 in Annex A.1 | -98.1 | -97.8 |  |
| 3 | FRC A1-2 in Annex A.1 | -94.3 | -94.0 |  |
| 3 | FRC A1-6 in Annex A.1 for E-UTRA with NB-IoT in-band operation(Note 4) | -94.3(Note 3) |  |  |
| 5 | FRC A1-3 in Annex A.1 | -92.8 | -92.5 |  |
| 5 | FRC A1-7 in Annex A.1 for E-UTRA with NB-IoT in-band operation | -92.8 (Note 3) |  |  |
| 10 | FRC A1-3 in Annex A.1 (Note 1)  FRC A1-8 in Annex A.1 (Note 2) | -92.8 | -92.5 | -94.7 |
| 10 | FRC A1-7 in Annex A.1 for E-UTRA with NB-IoT in-band operation(Note 5) | -92.8 (Note 3) |  |  |
| 15 | FRC A1-3 in Annex A.1 (Note 1) | -92.8 | -92.5 |  |
| 15 | FRC A1-7 in Annex A.1 for E-UTRA with NB-IoT in-band operation(Note 5) | -92.8 (Note 3) |  |  |
| 20 | FRC A1-3 in Annex A.1 (Note 1)  FRC A1-9 in Annex A.1 (Note 2) | -92.8 | -92.5 | -94.7 |
| 20 | FRC A1-7 in Annex A.1 for E-UTRA with NB-IoT in-band operation(Note 5) | -92.8 (Note 3) |  |  |
| Note 1: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for each consecutive application of a single instance of FRC A1-3 mapped to disjoint frequency ranges with a width of 25 resource blocks each. This reference measurement channel is not applied for Band 46 and Band 49.  Note 2: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be tested for at least one interlace of FRC A1-8 (if supported) and A1-9. This reference measurement channel is only applied for Band 46 and Band 49.  Note 3: The requirements apply to BS that supports E-UTRA with NB-IoT in-band operation.  Note 4: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for a single instance of FRC A1-6 mapped to the 12 E-UTRA resource blocks adjacent to the NB-IoT PRB.  Note 5: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for a single instance of FRC A1-7 mapped to the 24 E-UTRA resource blocks adjacent to the NB-IoT PRB (location of which is specified in clause 4.7.3), and for each consecutive application of a single instance of FRC A1-3 mapped to disjoint frequency ranges with a width of 25 resource blocks each. | | | | |

Table 7.2-3: E-UTRA Home BS reference sensitivity levels

|  |  |  |  |
| --- | --- | --- | --- |
| E-UTRA  channel bandwidth [MHz] | Reference measurement channel | Reference sensitivity power level, PREFSENS  [dBm] | |
|  |  | f ≤ 3.0GHz | 3.0GHz < f ≤ 4.2GHz |
| 1.4 | FRC A1-1 in Annex A.1 | -98.1 | -97.8 |
| 3 | FRC A1-2 in Annex A.1 | -94.3 | -94.0 |
| 3 | FRC A1-6 in Annex A.1 for E-UTRA with NB-IoT in-band operation(Note 3) | -94.3(Note 2) |  |
| 5 | FRC A1-3 in Annex A.1 | -92.8 | -92.5 |
| 5 | FRC A1-7 in Annex A.1 for E-UTRA with NB-IoT in-band operation | -92.8 (Note 2) |  |
| 10 | FRC A1-3 in Annex A.1 (Note 1) | -92.8 | -92.5 |
| 10 | FRC A1-7 in Annex A.1 for E-UTRA with NB-IoT in-band operation(Note 4) | -92.8 (Note 2) |  |
| 15 | FRC A1-3 in Annex A.1 (Note 1) | -92.8 | -92.5 |
| 15 | FRC A1-7 in Annex A.1 for E-UTRA with NB-IoT in-band operation(Note 4) | -92.8 (Note 2) |  |
| 20 | FRC A1-3 in Annex A.1 (Note 1) | -92.8 | -92.5 |
| 20 | FRC A1-7 in Annex A.1 for E-UTRA with NB-IoT in-band operation(Note 4) | -92.8 (Note 2) |  |
| Note 1: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for each consecutive application of a single instance of FRC A1-3 mapped to disjoint frequency ranges with a width of 25 resource blocks each  Note 2: The requirements apply to BS that supports E-UTRA with NB-IoT in-band operation.  Note 3: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for a single instance of FRC A1-6 mapped to the 12 E-UTRA resource blocks adjacent to the NB-IoT PRB.  Note 4: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for a single instance of FRC A1-7 mapped to the 24 E-UTRA resource blocks adjacent to the NB-IoT PRB (location of which is specified in clause 4.7.3), and for each consecutive application of a single instance of FRC A1-3 mapped to disjoint frequency ranges with a width of 25 resource blocks each. | | | |

Table 7.2-4: E-UTRA Medium Range BS reference sensitivity levels

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth [MHz] | Reference measurement channel | Reference sensitivity power level, PREFSENS  [dBm] | | |
|  |  | f ≤ 3.0GHz | 3.0GHz < f ≤ 4.2GHz | 4.2GHz < f ≤ 6.0GHz |
| 1.4 | FRC A1-1 in Annex A.1 | -101.1 | -97.8 |  |
| 3 | FRC A1-2 in Annex A.1 | -97.3 | -94.0 |  |
| 3 | FRC A1-6 in Annex A.1 for E-UTRA with NB-IoT in-band operation(Note 4) | -97.3 (Note 3) |  |  |
| 5 | FRC A1-3 in Annex A.1 | -95.8 | -92.5 |  |
| 5 | FRC A1-7 in Annex A.1 for E-UTRA with NB-IoT in-band operation | -95.8 (Note 3) |  |  |
| 10 | FRC A1-3 in Annex A.1 (Note 1)  FRC A1-8 in Annex A.1 (Note 2) | -95.8 | -92.5 | -97.7 |
| 10 | FRC A1-7 in Annex A.1 for E-UTRA with NB-IoT in-band operation(Note 5) | -95.8 (Note 3) |  |  |
| 15 | FRC A1-3 in Annex A.1 (Note 1) | -95.8 | -92.5 |  |
| 15 | FRC A1-7 in Annex A.1 for E-UTRA with NB-IoT in-band operation(Note 5) | -95.8 (Note 3) |  |  |
| 20 | FRC A1-3 in Annex A.1 (Note 1)  FRC A1-9 in Annex A.1 (Note 2) | -95.8 | -92.5 | -97.7 |
| 20 | FRC A1-7 in Annex A.1 for E-UTRA with NB-IoT in-band operation(Note 5) | -95.8 (Note 3) |  |  |
| Note 1: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for each consecutive application of a single instance of FRC A1-3 mapped to disjoint frequency ranges with a width of 25 resource blocks each. This reference measurement channel is not applied for Band 46.  Note 2: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be tested for at least one interlace of FRC A1-8 (if supported) and A1-9. This reference measurement channel is only applied for Band 46.  Note 3: The requirements apply to BS that supports E-UTRA with NB-IoT in-band operation.  Note 4: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for a single instance of FRC A1-6 mapped to the 12 E-UTRA resource blocks adjacent to the NB-IoT PRB.  Note 5: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for a single instance of FRC A1-7 mapped to the 24 E-UTRA resource blocks adjacent to the NB-IoT PRB (location of which is specified in clause 4.7.3), and for each consecutive application of a single instance of FRC A1-3 mapped to disjoint frequency ranges with a width of 25 resource blocks each. | | | | |

For NB-IoT standalone BS or E-UTRA BS with NB-IoT (in-band and/or guard band), NB-IoT throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A with parameters specified in Table 7.2-5 for Wide Area BS, Table 7.2-6 for Local Area BS, Table 7.2-7 for Home BS and Table 7.2-8 for Medium Range BS.

Table 7.2-5: NB-IoT Wide Area BS reference sensitivity levels

|  |  |  |  |
| --- | --- | --- | --- |
| NB-IoT  channel bandwidth [kHz] | NB-IoT  Sub-carrier spacing  [kHz] | Reference measurement channel | Reference sensitivity power level, PREFSENS  [dBm] (f≤3.0 GHz) |
| 200 | 15 | FRC A14-1 in Annex A.14 | -126.6 |
| 200 | 3.75 | FRC A14-2 in Annex A.14 | -132.6 |

Table 7.2-6: NB-IoT Local Area BS reference sensitivity levels

|  |  |  |  |
| --- | --- | --- | --- |
| NB-IoT  channel bandwidth [kHz] | NB-IoT  Sub-carrier spacing  [kHz] | Reference measurement channel | Reference sensitivity power level, PREFSENS  [dBm] (f≤3.0 GHz) |
| 200 | 15 | FRC A14-1 in Annex A.14 | -118.6 |
| 200 | 3.75 | FRC A14-2 in Annex A.14 | -124.6 |

Table 7.2-7: NB-IoT Home BS reference sensitivity levels

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NB-IoT  channel bandwidth [kHz] | NB-IoT  Sub-carrier spacing  [kHz] | Reference measurement channel | Reference sensitivity power level, PREFSENS  [dBm] | |
| f ≤ 3.0 GHz | 3.0 GHz < f ≤ 4.2 GHz |
| 200 | 15 | FRC A14-1 in Annex A.14 | -118.6 | -118.3 |
| 200 | 3.75 | FRC A14-2 in Annex A.14 | -124.6 | -124.3 |

Table 7.2-8: NB-IoT Medium Range BS reference sensitivity levels

|  |  |  |  |
| --- | --- | --- | --- |
| NB-IoT  channel bandwidth [kHz] | NB-IoT  Sub-carrier spacing  [kHz] | Reference measurement channel | Reference sensitivity power level, PREFSENS  [dBm] (f≤3.0 GHz) |
| 200 | 15 | FRC A14-1 in Annex A.14 | -121.6 |
| 200 | 3.75 | FRC A14-2 in Annex A.14 | -127.6 |

For E-UTRA BS with subPRB allocation, subPRB allocation throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A with parameters specified in Table 7.2-9 for Wide Area BS, in Table 7.2-10for Local Area BS, in Table 7.2-11 for Home BS and in Table 7.2-12 for Medium Range BS.

Table 7.2-9: SubPRB allocation for Wide Area BS reference sensitivity levels

|  |  |  |  |
| --- | --- | --- | --- |
| SubPRB  transmission bandwidth [kHz] | subPRB  Sub-carrier spacing  [kHz] | Reference measurement channel | Reference sensitivity power level, PREFSENS  [dBm] |
| 30 | 15 | FRC A23-1 in Annex A. | -124 |

Table 7.2-10: subPRB allocation for Local Area BS reference sensitivity levels

|  |  |  |  |
| --- | --- | --- | --- |
| SubPRB  transmission bandwidth [kHz] | subPRB  Sub-carrier spacing  [kHz] | Reference measurement channel | Reference sensitivity power level, PREFSENS  [dBm] |
| 30 | 15 | FRC A23-1 in Annex A. | -116 |

Table 7.2-11: subPRB allocation for Home BS reference sensitivity levels

|  |  |  |  |
| --- | --- | --- | --- |
| SubPRB  transmission bandwidth [kHz] | subPRB  Sub-carrier spacing  [kHz] | Reference measurement channel | Reference sensitivity power level, PREFSENS  [dBm] |
| 30 | 15 | FRC A23-1 in Annex A. | -116 |

Table 7.2-12: subPRB allocation for Medium Range BS reference sensitivity levels

|  |  |  |  |
| --- | --- | --- | --- |
| SubPRB  transmission bandwidth [kHz] | subPRB  Sub-carrier spacing  [kHz] | Reference measurement channel | Reference sensitivity power level, PREFSENS  [dBm] |
| 30 | 15 | FRC A23-1 in Annex A. | -119 |

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The relationship between Minimum Requirements and Test Requirements is defined in subclause 4.1 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex G.

## 7.3 Dynamic range

### 7.3.1 Definition and applicability

The dynamic range is specified as a measure of the capability of the receiver to receive a wanted signal in the presence of an interfering signal inside the received channel bandwidth. In this condition a throughput requirement shall be met for a specified reference measurement channel. The interfering signal for the dynamic range requirement is an AWGN signal.

### 7.3.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 7.3.1.

### 7.3.3 Test purpose

To verify that at the BS receiver dynamic range, the relative throughput shall fulfil the specified limit.

### 7.3.4 Method of testing

#### 7.3.4.1 Initial conditions

Test environment: normal; see subclause D.2

RF channels to be tested for single carrier: B, M and T; see subclause 4.7

1) Connect the test equipment as shown in Annex I.2.2.

#### 7.3.4.2 Procedure

For E-UTRA and E-UTRA with NB-IoT in-band or guard band operation:

For each supported E-UTRA channel BW:

1) Adjust the signal generator for the wanted signal as specified in Table 7.3-1 for E-UTRA Wide Area BS, in Table7.3-2 for E-UTRA Local Area BS, in Table 7.3-3 for E-UTRA Home BS and in table 7.3-4 for E-UTRA Medium Range BS.

For a BS declared to be capable of NB-IoT in-band or guard band operation for the tested E-UTRA channel BW, adjust the signal generator for the wanted signal in Table 7.3-6 for Wide Area BS.

2) Adjust the AWGN generator level as specified in Table 7.3-1 for E-UTRA Wide Area BS, in Table7.3-2 for E-UTRA Local Area BS, in Table 7.3-3 for E-UTRA Home BS, in table 7.3-4 for E-UTRA Medium Range BS, in tables 7.3-5 and 7.3-6 for NB-IoT Wide Area BS, in tables 7.3-7 and 7.3-8 for NB-IoT Local Area BS, in tables 7.3-9 and 7.3-10 for NB-IoT Home BS, in tables 7.3-11 and 7.3-12 for NB-IoT Medium Range BS and set the frequency to the same frequency as the tested channel.

3) Measure the E-UTRA throughput according to Annex E and verify that it is within the specified level.

4) Repeat the measurement for the other RX port(s).

For a BS declared to be capable of NB-IoT in-band or guard band operation for the tested E-UTRA channel BW, measure the NB-IoT throughput according to Annex E and verify that it is within the specified level.

In addition, for a multi-band capable BS, the following step shall apply:

5) For multi-band capable BS and single band tests, repeat the steps above per involved band with no carrier activated in the other band. For multi-band capable BS with separate antenna connector, the antenna connector not being under test shall be terminated.

For NB-IoT standalone BS:

1) Adjust the signal generator for the wanted signal as specified in Table 7.3-5.

2) Adjust the AWGN generator level as specified in Table 7.3-5 and set the frequency to the same frequency as the tested channel.

3) Measure the NB-IoT throughput according to Annex E and verify that it is within the specified level.

### 7.3.5 Test Requirements

For each measured E-UTRA carrier, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A with parameters specified in Table 7.3-1 for Wide Area BS, in Table7.3-2 for Local Area BS, in Table 7.3-3 for Home BS and in Table 7.3-4 for Medium Range BS.

Table 7.3-1: Wide Area BS dynamic range for E-UTRA carrier

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth [MHz] | Reference measurement channel | Wanted signal mean power [dBm] | Interfering signal mean power [dBm] / BWConfig | Type of interfering signal |
| 1.4 | FRC A2-1 in Annex A.2 | -76.0 | -88.7 | AWGN |
| 3 | FRC A2-2 in Annex A.2 | -72.1 | -84.7 | AWGN |
| 5 | FRC A2-3 in Annex A.2 | -69.9 | -82.5 | AWGN |
| 10 | FRC A2-3 in Annex A.2\* | -69.9 | -79.5 | AWGN |
| 15 | FRC A2-3 in Annex A.2\* | -69.9 | -77.7 | AWGN |
| 20 | FRC A2-3 in Annex A.2\* | -69.9 | -76.4 | AWGN |
| Note\*: The wanted signal mean power is the power level of a single instance of the reference measurement channel. This requirement shall be met for each consecutive application of a single instance of FRC A2-3 mapped to disjoint frequency ranges with a width of 25 resource blocks each | | | | |

Table 7.3-2: Local Area BS dynamic range for E-UTRA carrier

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth [MHz] | Reference measurement channel | Wanted signal mean power [dBm] | Interfering signal mean power [dBm] / BWConfig | Type of interfering signal |
| 1.4 | FRC A2-1 in Annex A.2 | -68.0 | -80.7 | AWGN |
| 3 | FRC A2-2 in Annex A.2 | -64.1 | -76.7 | AWGN |
| 5 | FRC A2-3 in Annex A.2 | -61.9 | -74.5 | AWGN |
| 10 | FRC A2-3 in Annex A.2 (Note 1)  FRC A2-4 in Annex A.2 (Note 2) | -61.9  -65.0 | -71.5 | AWGN |
| 15 | FRC A2-3 in Annex A.2 (Note 1) | -61.9 | -69.7 | AWGN |
| 20 | FRC A2-3 in Annex A.2 (Note 1)  FRC A2-5 in Annex A.2 (Note 1) | -61.9  -65.0 | -68.4 | AWGN |
| Note 1: The wanted signal mean power is the power level of a single instance of the reference measurement channel. This requirement shall be met for each consecutive application of a single instance of FRC A2-3 mapped to disjoint frequency ranges with a width of 25 resource blocks each. This reference measurement channel is not applied for Band 46 and Band 49.  Note 2: The wanted signal mean power is the power level of a single instance of the reference measurement channel. This requirement shall be tested for at least one interlace of FRC A2-4 (if supported) and A2-5. This reference measurement channel is only applied for Band 46 and Band 49. | | | | |

Table 7.3-3: Home BS dynamic range for E-UTRA carrier

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth [MHz] | Reference measurement channel | Wanted signal mean power [dBm] | Interfering signal mean power [dBm] / BWConfig | Type of interfering signal |
| 1.4 | FRC A2-1 in Annex A.2 | -31.5 | -44.2 | AWGN |
| 3 | FRC A2-2 in Annex A.2 | -27.6 | -40.2 | AWGN |
| 5 | FRC A2-3 in Annex A.2 | -25.4 | -38 | AWGN |
| 10 | FRC A2-3 in Annex A.2\* | -25. 4 | -35 | AWGN |
| 15 | FRC A2-3 in Annex A.2\* | -25. 4 | -33.2 | AWGN |
| 20 | FRC A2-3 in Annex A.2\* | -25. 4 | -31.9 | AWGN |
| Note\*: The wanted signal mean power is the power level of a single instance of the reference measurement channel. This requirement shall be met for each consecutive application of a single instance of FRC A2-3 mapped to disjoint frequency ranges with a width of 25 resource blocks each | | | | |

Table 7.3-4: Medium Range BS dynamic range for E-UTRA carrier

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth [MHz] | Reference measurement channel | Wanted signal mean power [dBm] | Interfering signal mean power [dBm] / BWConfig | Type of interfering signal |
| 1.4 | FRC A2-1 in Annex A.2 | -71.0 | -83.7 | AWGN |
| 3 | FRC A2-2 in Annex A.2 | -67.1 | -79.7 | AWGN |
| 5 | FRC A2-3 in Annex A.2 | -64.9 | -77.5 | AWGN |
| 10 | FRC A2-3 in Annex A.2 (Note 1)  FRC A2-4 in Annex A.2 (Note 2) | -64.9  -68.0 | -74.5 | AWGN |
| 15 | FRC A2-3 in Annex A.2 (Note 1) | -64.9 | -72.7 | AWGN |
| 20 | FRC A2-3 in Annex A.2 (Note 1)  FRC A2-5 in Annex A.2(Note 2) | -64.9  -68.0 | -71.4 | AWGN |
| Note 1: The wanted signal mean power is the power level of a single instance of the reference measurement channel. This requirement shall be met for each consecutive application of a single instance of FRC A2-3 mapped to disjoint frequency ranges with a width of 25 resource blocks each. This reference measurement channel is not applied for Band 46.  Note 2: The wanted signal mean power is the power level of a single instance of the reference measurement channel. This requirement shall be tested for at least one interlace of FRC A2-4 (if supported) and A2-5. This reference measurement channel is only applied for Band 46. | | | | |

For NB-IoT standalone operation, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A with parameters specified in Table 7.3-5 for Wide Area BS.

Table 7.3-5: Wide Area BS dynamic range for NB-IoT standalone operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NB-IoT  channel bandwidth [kHz] | Reference measurement channel | Wanted signal mean power [dBm] | Interfering signal mean power [dBm] / BWChannel | Type of interfering signal |
| 200 | FRC A15-1 in Annex A.15 | -99.4 | -96 | AWGN |
| 200 | FRC A15-2 in Annex A.15 | -105.3 | -96 | AWGN |

For NB-IoT in-band or guard band operation, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A with parameters specified in Table 7.3-6 for Wide Area BS.

Table 7.3-6: Wide Area BS dynamic range for NB-IoT in-band or guard band operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NB-IoT  channel bandwidth [MHz] | Reference measurement channel | Wanted signal mean power [dBm] | Interfering signal mean power [dBm] / BWChannel | Type of interfering signal |
| 3 (Note 1) | FRC A15-1 in Annex A.15 | -99.4 | -84.2 | AWGN |
| FRC A15-2 in Annex A.15 | -105.3 |
| 5 | FRC A15-1 in Annex A.15 | -99.4 | -82.0 | AWGN |
| FRC A15-2 in Annex A.15 | -105.3 |
| 10 | FRC A15-1 in Annex A.15 | -99.4 | -79.0 | AWGN |
| FRC A15-2 in Annex A.15 | -105.3 |
| 15 | FRC A15-1 in Annex A.15 | -99.4 | -77.2 | AWGN |
| FRC A15-2 in Annex A.15 | -105.3 |
| 20 | FRC A15-1 in Annex A.15 | -99.4 | -76.0 | AWGN |
| FRC A15-2 in Annex A.15 | -105.3 |
| Note 1: 1.4 MHz and 3 MHz channel bandwidth is not applicable to guard band operation. | | | | |

For NB-IoT standalone operation, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A with parameters specified in Table 7.3-7 for Local Area BS.

Table 7.3-7: Local Area BS dynamic range for NB-IoT standalone operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NB-IoT**  **channel bandwidth [kHz]** | **Reference measurement channel** | **Wanted signal mean power [dBm]** | **Interfering signal mean power [dBm] / BWChannel** | **Type of interfering signal** |
| 200 | FRC A15-1 in Annex A.15 | -91.4 | -88 | AWGN |
| 200 | FRC A15-2 in Annex A.15 | -97.3 | -88 | AWGN |

For NB-IoT in-band or guard band operation, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A with parameters specified in Table 7.3-8 for Local Area BS.

Table 7.3-8: Local Area BS dynamic range for NB-IoT in-band or guard band operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NB-IoT**  **channel bandwidth [MHz]** | **Reference measurement channel** | **Wanted signal mean power [dBm]** | **Interfering signal mean power [dBm] / BWChannel** | **Type of interfering signal** |
| 3 (Note 1) | FRC A15-1 in Annex A.15 | -91.4 | -76.2 | AWGN |
| FRC A15-2 in Annex A.15 | -97.3 |
| 5 | FRC A15-1 in Annex A.15 | -91.4 | -74.0 | AWGN |
| FRC A15-2 in Annex A.15 | -97.3 |
| 10 | FRC A15-1 in Annex A.15 | -91.4 | -71.0 | AWGN |
| FRC A15-2 in Annex A.15 | -97.3 |
| 15 | FRC A15-1 in Annex A.15 | -91.4 | -69.2 | AWGN |
| FRC A15-2 in Annex A.15 | -97.3 |
| 20 | FRC A15-1 in Annex A.15 | -91.4 | -68.0 | AWGN |
| FRC A15-2 in Annex A.15 | -97.3 |
| Note 1: 1.4 MHz and 3 MHz channel bandwidth is not applicable to guard band operation. | | | | |

For NB-IoT standalone operation, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A with parameters specified in Table 7.3-9 for Home BS.

Table 7.3-9: Home BS dynamic range for NB-IoT standalone operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NB-IoT**  **channel bandwidth [kHz]** | **Reference measurement channel** | **Wanted signal mean power [dBm]** | **Interfering signal mean power [dBm] / BWChannel** | **Type of interfering signal** |
| 200 | FRC A15-1 in Annex A.15 | -54.9 | -51.5 | AWGN |
| 200 | FRC A15-2 in Annex A.15 | -60.8 | -51.5 | AWGN |

For NB-IoT in-band or guard band operation, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A with parameters specified in Table 7.3-10 for Home BS.

Table 7.3-10: Home BS dynamic range for NB-IoT in-band or guard band operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NB-IoT  channel bandwidth [MHz] | Reference measurement channel | Wanted signal mean power [dBm] | Interfering signal mean power [dBm] / BWChannel | Type of interfering signal |
| 3 (Note 1) | FRC A15-1 in Annex A.15 | -54.9 | -39.7 | AWGN |
| FRC A15-2 in Annex A.15 | -60.8 |
| 5 | FRC A15-1 in Annex A.15 | -54.9 | -37.5 | AWGN |
| FRC A15-2 in Annex A.15 | -60.8 |
| 10 | FRC A15-1 in Annex A.15 | -54.9 | -34.5 | AWGN |
| FRC A15-2 in Annex A.15 | -60.8 |
| 15 | FRC A15-1 in Annex A.15 | -54.9 | -32.7 | AWGN |
| FRC A15-2 in Annex A.15 | -60.8 |
| 20 | FRC A15-1 in Annex A.15 | -54.9 | -31.5 | AWGN |
| FRC A15-2 in Annex A.15 | -60.8 |
| Note 1: 1.4 MHz and 3 MHz channel bandwidth is not applicable to guard band operation. | | | | |

For NB-IoT standalone operation, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A with parameters specified in Table 7.3-11 for Medium Range BS.

Table 7.3-11: Medium Range BS dynamic range for NB-IoT standalone operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NB-IoT**  **channel bandwidth [kHz]** | **Reference measurement channel** | **Wanted signal mean power [dBm]** | **Interfering signal mean power [dBm] / BWChannel** | **Type of interfering signal** |
| 200 | FRC A15-1 in Annex A.15 | -94.4 | -91 | AWGN |
| 200 | FRC A15-2 in Annex A.15 | -100.3 | -91 | AWGN |

For NB-IoT in-band or guard band operation, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A with parameters specified in Table 7.3-12 for Medium Range BS.

Table 7.3-12: Medium Range BS dynamic range for NB-IoT in-band or guard band operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NB-IoT**  **channel bandwidth [MHz]** | **Reference measurement channel** | **Wanted signal mean power [dBm]** | **Interfering signal mean power [dBm] / BWChannel** | **Type of interfering signal** |
| 3 (Note 1) | FRC A15-1 in Annex A.15 | -94.4 | -79.2 | AWGN |
| FRC A15-2 in Annex A.15 | -100.3 |
| 5 | FRC A15-1 in Annex A.15 | -94.4 | -77.0 | AWGN |
| FRC A15-2 in Annex A.15 | -100.3 |
| 10 | FRC A15-1 in Annex A.15 | -94.4 | -74.0 | AWGN |
| FRC A15-2 in Annex A.15 | -100.3 |
| 15 | FRC A15-1 in Annex A.15 | -94.4 | -72.2 | AWGN |
| FRC A15-2 in Annex A.15 | -100.3 |
| 20 | FRC A15-1 in Annex A.15 | -94.4 | -71.0 | AWGN |
| FRC A15-2 in Annex A.15 | -100.3 |
| Note 1: 1.4 MHz and 3 MHz channel bandwidth is not applicable to guard band operation. | | | | |

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The relationship between Minimum Requirements and Test Requirements is defined in subclause 4.1 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex G.

## 7.4 In-channel selectivity

### 7.4.1 Definition and applicability

In-channel selectivity (ICS) is a measure of the receiver ability to receive a wanted signal at its assigned resource block locations in the presence of an interfering signal received at a larger power spectral density. In this condition a throughput requirement shall be met for a specified reference measurement channel. The interfering signal shall be an E-UTRA signal as specified in Annex C and shall be time aligned with the wanted signal.

### 7.4.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 7.4.1.

### 7.4.3 Test purpose

The purpose of this test is to verify the BS receiver ability to suppress the IQ leakage.

### 7.4.4 Method of testing

#### 7.4.4.1 Initial conditions

Test environment: normal; see subclause D.2.

RF channels to be tested for single carrier: B, M and T; see subclause 4.7

1) Connect the test equipment as shown in Annex I.2.3.

#### 7.4.4.2 Procedure

For each supported E-UTRA channel BW:

1) Adjust the signal generator for the wanted E-UTRA signal as specified in Table 7.4-1 for Wide Area BS, in Table 7.4-2 for Local Area BS, in Table 7.4-3 for Home BS and in Table 7.4-4 for Medium Range BS on one side of the FC.

2) Adjust the signal generator for the interfering signal as specified in Table 7.4-1 for Wide Area BS, in Table 7.4-2 for Local Area BS, in Table 7.4-3 for Home BS and in Table 7.4-4 for Medium Range BS at opposite side of the FC and adjacent to the wanted signal.

3) Measure the throughput according to Annex E.

4) Repeat the measurement with the wanted signal on the other side of the FC, and the interfering signal at opposite side of the FC and adjacent to the wanted signal.

5) Repeat the measurement for the other RX port(s).

In addition, for a multi-band capable BS, the following step shall apply:

6) For multi-band capable BS and single band tests, repeat the steps above per involved band with no carrier activated in the other band. For multi-band capable BS with separate antenna connector, the antenna connector not being under test shall be terminated.

For each supported E-UTRA channel BW with NB-IoT in-band operation:

1) Adjust the signal generator for the wanted NB-IoT signal as specified in Table 7.4-5 for Wide Area BS, in Table 7.4-7 for Local Area BS, in Table 7.4-9 for Home BS, in Table 7.4-11 for Medium Range BS with 15 kHz channel spacing and in Table 7.4-6 for Wide Area BS, in Table 7.4-8 for Local Area BS, in Table 7.4-10 for Home BS, in Table 7.4-12 for Medium Range BS with 3.75 kHz channel spacing on one side of the FC.

2) Adjust the signal generator for the interfering signal as specified in Table 7.4-5 for Wide Area BS, in Table 7.4-7 for Local Area BS, in Table 7.4-9 for Home BS, in Table 7.4-11 for Medium Range BS with 15 kHz channel spacing and in Table 7.4-6 for Wide Area BS, in Table 7.4-8 for Local Area BS, in Table 7.4-10 for Home BS, in Table 7.4-12 for Medium Range BS with 3.75 kHz spacing at opposite side of the FC.

3) Measure the throughput according to Annex E.

4) Repeat the measurement with the wanted signal on the other side of the FC, and the interfering signal at opposite side of the FC.

5) Repeat the measurement for the other RX port(s).

### 7.4.5 Test Requirements

For each measured E-UTRA carrier, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A with parameters specified in Table 7.4-1 for Wide Area BS, in Table7.4-2 for Local Area BS, in Table 7.4-3 for Home BS and in Table 7.4-4 for Medium Range BS.

Table 7.4-1: Wide Area BS in-channel selectivity for E-UTRA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth (MHz) | Reference measurement channel | Wanted signal mean power [dBm] | | Interfering signal mean power [dBm] | Type of interfering signal |
|  |  | f ≤ 3.0GHz | 3.0GHz < f ≤ 4.2GHz |  |  |
| 1.4 | A1-4 in Annex A.1 | -105.5 | -105.1 | -87 | 1.4 MHz E-UTRA signal, 3 RBs |
| 3 | A1-5 in Annex A.1 | -100.7 | -100.3 | -84 | 3 MHz E-UTRA signal, 6 RBs |
| 5 | A1-2 in Annex A.1 | -98.6 | -98.2 | -81 | 5 MHz E-UTRA signal, 10 RBs |
| 10 | A1-3 in Annex A.1 | -97.1 | -96.7 | -77 | 10 MHz E-UTRA signal, 25 RBs |
| 15 | A1-3 in Annex A.1\* | -97.1 | -96.7 | -77 | 15 MHz E-UTRA signal, 25 RBs\* |
| 20 | A1-3 in Annex A.1\* | -97.1 | -96.7 | -77 | 20 MHz E-UTRA signal, 25 RBs\* |
| Note\*: Wanted and interfering signal are placed adjacently around FC | | | | | |

Table 7.4-2: Local Area BS in-channel selectivity for E-UTRA

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth (MHz) | Reference measurement channel | Wanted signal mean power [dBm] | | | Interfering signal mean power [dBm] | Type of interfering signal |
|  |  | f ≤ 3.0GHz | 3.0GHz < f ≤ 4.2GHz | 4.2GHz < f ≤ 6.0GHz |  |  |
| 1.4 | A1-4 in Annex A.1 | -97.5 | -97.1 |  | -79 | 1.4 MHz E-UTRA signal, 3 RBs |
| 3 | A1-5 in Annex A.1 | -92.7 | -92.3 |  | -76 | 3 MHz E-UTRA signal, 6 RBs |
| 5 | A1-2 in Annex A.1 | -90.6 | -90.2 |  | -73 | 5 MHz E-UTRA signal, 10 RBs |
| 10 | A1-3 in Annex A.1 (Note 3)  A1-8 in Annex A.1 (Note 2) | -89.1 | -88.7 | -90.7 | -69  -71.8 | 10 MHz E-UTRA signal, 25 RBs (Note 3)  10 MHz E-UTRA interlace signal, 10 RBs (Note 2) |
| 15 | A1-3 in Annex A.1 (Note 1) | -89.1 | -88.7 |  | -69 | 15 MHz E-UTRA signal, 25 RBs (Note 1) |
| 20 | A1-3 in Annex A.1 (Note 1)  A1-9 in Annex A.1 (Note 2) | -89.1 | -88.7 | -90.7 | -69  -71.8 | 20 MHz E-UTRA signal, 25 RBs (Note 1)  20 MHz E-UTRA interlace signal, 10 RBs (Note 2) |
| Note 1: Wanted and interfering signal are placed adjacently around Fc, this reference measurement channel and interfering signal are not applied for Band 46 and Band 49.  Note 2: Wanted and interfering signal interlaces are mirrored around Fc, this reference measurement channel and interfering signal are only applied for Band 46 and Band 49.  Note 3: This reference measurement channel and interfering signal are not applied for Band 46 and Band 49. | | | | | | |

Table 7.4-3: Home BS in-channel selectivity for E-UTRA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth (MHz) | Reference measurement channel | Wanted signal mean power [dBm] | | Interfering signal mean power [dBm] | Type of interfering signal |
|  |  | f ≤ 3.0GHz | 3.0GHz < f ≤ 4.2GHz |  |  |
| 1.4 | A1-4 in Annex A.1 | -97.5 | -97.1 | -79 | 1.4 MHz E-UTRA signal, 3 RBs |
| 3 | A1-5 in Annex A.1 | -92.7 | -92.3 | -76 | 3 MHz E-UTRA signal, 6 RBs |
| 5 | A1-2 in Annex A.1 | -90.6 | -90.2 | -73 | 5 MHz E-UTRA signal, 10 RBs |
| 10 | A1-3 in Annex A.1 | -89.1 | -88.7 | -69 | 10 MHz E-UTRA signal, 25 RBs |
| 15 | A1-3 in Annex A.1\* | -89.1 | -88.7 | -69 | 15 MHz E-UTRA signal, 25 RBs\* |
| 20 | A1-3 in Annex A.1\* | -89.1 | -88.7 | -69 | 20 MHz E-UTRA signal, 25 RBs\* |
| Note\*: Wanted and interfering signal are placed adjacently around Fc | | | | | |

Table 7.4-4: Medium Range BS in-channel selectivity for E-UTRA

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth (MHz) | Reference measurement channel | Wanted signal mean power [dBm] | | | Interfering signal mean power [dBm] | Type of interfering signal |
|  |  | f ≤ 3.0GHz | 3.0GHz < f ≤ 4.2GHz | 4.2GHz < f ≤ 6.0GHz |  |  |
| 1.4 | A1-4 in Annex A.1 | -100.5 | -100.1 |  | -82 | 1.4 MHz E-UTRA signal, 3 RBs |
| 3 | A1-5 in Annex A.1 | -95.7 | -95.3 |  | -79 | 3 MHz E-UTRA signal, 6 RBs |
| 5 | A1-2 in Annex A.1 | -93.6 | -93.2 |  | -76 | 5 MHz E-UTRA signal, 10 RBs |
| 10 | A1-3 in Annex A.1 (Note 3)  A1-8 in Annex A.1 (Note 2) | -92.1 | -91.7 | -93.7 | -72  -74.8 | 10 MHz E-UTRA signal, 25 RBs (Note 3)  10 MHz E-UTRA interlace signal, 10 RBs (Note 2) |
| 15 | A1-3 in Annex A.1 (Note 1) | -92.1 | -91.7 |  | -72 | 15 MHz E-UTRA signal, 25 RBs (Note 1) |
| 20 | A1-3 in Annex A.1 (Note 1)  A1-9 in Annex A.1 (Note 2) | -92.1 | -91.7 | -93.7 | -72  -74.8 | 20 MHz E-UTRA signal, 25 RBs (Note 1)  20 MHz E-UTRA interlace signal, 10 RBs (Note 2) |
| Note 1: Wanted and interfering signal are placed adjacently around Fc, this reference measurement channel and interfering signal are not applied for Band 46.  Note 2: Wanted and interfering signal interlaces are mirrored around Fc, this reference measurement channel and interfering signal are only applied for Band 46.  Note 3: This reference measurement channel and interfering signal are not applied for Band 46. | | | | | | |

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The relationship between Minimum Requirements and Test Requirements is defined in subclause 4.1 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex G.

For NB-IoT in-band operation carrier, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A with parameters specified in Table 7.4-5 for Wide Area BS with 15 kHz channel spacing and in Table 7.4-6 for Wide Area BS with 3.75 kHz channel spacing.

Table 7.4-5: Wide Area BS in-channel selectivity for NB-IoT in-band operation with 15kHz channel spacing

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| E-UTRA channel bandwidth (MHz) | Reference measurement channel | Wanted signal mean power [dBm] (f≤3.0 GHz)) | Interfering signal mean power [dBm] | Type of interfering signal |
| 3 | FRC A14-1 in Annex A.14 | -122.9 | -84 | 3 MHz E-UTRA signal, 6 RBs (Note 2) |
| 5 | FRC A14-1 in Annex A.14 | -122.9 | -81 | 5 MHz E-UTRA signal, 10 RBs (Note 1) |
| 10 | FRC A14-1 in Annex A.14 | -122.9 | -77 | 10 MHz E-UTRA signal, 25 RBs (Note 1) |
| 15 | FRC A14-1 in Annex A.14 | -122.9 | -77 | 15 MHz E-UTRA signal, 25 RBs (Note 1) |
| 20 | FRC A14-1 in Annex A.14 | -122.9 | -77 | 20 MHz E-UTRA signal, 25 RBs (Note 1) |
| Note 1: Interfering signal is placed in one side of the Fc, while the NB-IoT PRB is placed on the other side. Both interfering signal and NB-IoT PRB are placed at the middle of the available PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB.  Note 2: Interfering signal is placed from the edge of BWConfig, while the NB-IoT PRB is placed at the middle of the remaining PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB. | | | | |

Table 7.4-6: Wide Area BS in-channel selectivity for NB-IoT in-band operation with 3.75kHz channel spacing

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| E-UTRA channel bandwidth (MHz) | Reference measurement channel | Wanted signal mean power [dBm] (f≤3.0 GHz)) | Interfering signal mean power [dBm] | Type of interfering signal |
| 3 | FRC A14-2 in Annex A.14 | -128.8 | -84 | 3 MHz E-UTRA signal, 6 RBs (Note 2) |
| 5 | FRC A14-2 in Annex A.14 | -128.8 | -81 | 5 MHz E-UTRA signal, 10 RBs (Note 1) |
| 10 | FRC A14-2 in Annex A.14 | -128.8 | -77 | 10 MHz E-UTRA signal, 25 RBs (Note 1) |
| 15 | FRC A14-2 in Annex A.14 | -128.8 | -77 | 15 MHz E-UTRA signal, 25 RBs (Note 1) |
| 20 | FRC A14-2 in Annex A.14 | -128.8 | -77 | 20 MHz E-UTRA signal, 25 RBs (Note 1) |
| Note 1: Interfering signal is placed in one side of the Fc, while the NB-IoT PRB is placed on the other side. Both interfering signal and NB-IoT PRB are placed at the middle of the available PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB.  Note 2: Interfering signal is placed from the edge of BWConfig, while the NB-IoT PRB is placed at the middle of the remaining PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB. | | | | |

For NB-IoT in-band operation carrier, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A with parameters specified in Table 7.4-7 for Local Area BS with 15 kHz channel spacing and in Table 7.4-8 for Local Area BS with 3.75 kHz channel spacing.

Table 7.4-7: Local Area BS in-channel selectivity for NB-IoT in-band operation with 15kHz channel spacing

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **E-UTRA channel bandwidth (MHz)** | **Reference measurement channel** | **Wanted signal mean power [dBm] (f≤3.0 GHz))** | **Interfering signal mean power [dBm]** | **Type of interfering signal** |
| 3 | FRC A14-1 in Annex A.14 | -114.9 | -76 | 3 MHz E-UTRA signal, 6 RBs (Note 2) |
| 5 | FRC A14-1 in Annex A.14 | -114.9 | -73 | 5 MHz E-UTRA signal, 10 RBs (Note 1) |
| 10 | FRC A14-1 in Annex A.14 | -114.9 | -69 | 10 MHz E-UTRA signal, 25 RBs (Note 1) |
| 15 | FRC A14-1 in Annex A.14 | -114.9 | -69 | 15 MHz E-UTRA signal, 25 RBs (Note 1) |
| 20 | FRC A14-1 in Annex A.14 | -114.9 | -69 | 20 MHz E-UTRA signal, 25 RBs (Note 1) |
| Note 1: Interfering signal is placed in one side of the Fc, while the NB-IoT PRB is placed on the other side. Both interfering signal and NB-IoT PRB are placed at the middle of the available PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB.  Note 2: Interfering signal is placed from the edge of BWConfig, while the NB-IoT PRB is placed at the middle of the remaining PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB. | | | | |

Table 7.4-8: Local Area BS in-channel selectivity for NB-IoT in-band operation with 3.75kHz channel spacing

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **E-UTRA channel bandwidth (MHz)** | **Reference measurement channel** | **Wanted signal mean power [dBm] (f≤3.0 GHz))** | **Interfering signal mean power [dBm]** | **Type of interfering signal** |
| 3 | FRC A14-2 in Annex A.14 | -120.8 | -76 | 3 MHz E-UTRA signal, 6 RBs (Note 2) |
| 5 | FRC A14-2 in Annex A.14 | -120.8 | -73 | 5 MHz E-UTRA signal, 10 RBs (Note 1) |
| 10 | FRC A14-2 in Annex A.14 | -120.8 | -69 | 10 MHz E-UTRA signal, 25 RBs (Note 1) |
| 15 | FRC A14-2 in Annex A.14 | -120.8 | -69 | 15 MHz E-UTRA signal, 25 RBs (Note 1) |
| 20 | FRC A14-2 in Annex A.14 | -120.8 | -69 | 20 MHz E-UTRA signal, 25 RBs (Note 1) |
| Note 1: Interfering signal is placed in one side of the Fc, while the NB-IoT PRB is placed on the other side. Both interfering signal and NB-IoT PRB are placed at the middle of the available PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB.  Note 2: Interfering signal is placed from the edge of BWConfig, while the NB-IoT PRB is placed at the middle of the remaining PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB. | | | | |

For NB-IoT in-band operation carrier, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A with parameters specified in Table 7.4-9 for Home BS with 15 kHz channel spacing and in Table 7.4-10 for Home BS with 3.75 kHz channel spacing.

Table 7.4-9: Home BS in-channel selectivity for NB-IoT in-band operation with 15kHz channel spacing

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **E-UTRA channel bandwidth (MHz)** | **Reference measurement channel** | **Wanted signal mean power [dBm] (f≤3.0 GHz))** | **Interfering signal mean power [dBm]** | **Type of interfering signal** |
| 3 | FRC A14-1 in Annex A.14 | -114.9 | -76 | 3 MHz E-UTRA signal, 6 RBs (Note 2) |
| 5 | FRC A14-1 in Annex A.14 | -114.9 | -73 | 5 MHz E-UTRA signal, 10 RBs (Note 1) |
| 10 | FRC A14-1 in Annex A.14 | -114.9 | -69 | 10 MHz E-UTRA signal, 25 RBs (Note 1) |
| 15 | FRC A14-1 in Annex A.14 | -114.9 | -69 | 15 MHz E-UTRA signal, 25 RBs (Note 1) |
| 20 | FRC A14-1 in Annex A.14 | -114.9 | -69 | 20 MHz E-UTRA signal, 25 RBs (Note 1) |
| Note 1: Interfering signal is placed in one side of the Fc, while the NB-IoT PRB is placed on the other side. Both interfering signal and NB-IoT PRB are placed at the middle of the available PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB.  Note 2: Interfering signal is placed from the edge of BWConfig, while the NB-IoT PRB is placed at the middle of the remaining PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB. | | | | |

Table 7.4-10: Home BS in-channel selectivity for NB-IoT in-band operation with 3.75kHz channel spacing

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **E-UTRA channel bandwidth (MHz)** | **Reference measurement channel** | **Wanted signal mean power [dBm] (f≤3.0 GHz))** | **Interfering signal mean power [dBm]** | **Type of interfering signal** |
| 3 | FRC A14-2 in Annex A.14 | -120.8 | -76 | 3 MHz E-UTRA signal, 6 RBs (Note 2) |
| 5 | FRC A14-2 in Annex A.14 | -120.8 | -73 | 5 MHz E-UTRA signal, 10 RBs (Note 1) |
| 10 | FRC A14-2 in Annex A.14 | -120.8 | -69 | 10 MHz E-UTRA signal, 25 RBs (Note 1) |
| 15 | FRC A14-2 in Annex A.14 | -120.8 | -69 | 15 MHz E-UTRA signal, 25 RBs (Note 1) |
| 20 | FRC A14-2 in Annex A.14 | -120.8 | -69 | 20 MHz E-UTRA signal, 25 RBs (Note 1) |
| Note 1: Interfering signal is placed in one side of the Fc, while the NB-IoT PRB is placed on the other side. Both interfering signal and NB-IoT PRB are placed at the middle of the available PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB.  Note 2: Interfering signal is placed from the edge of BWConfig, while the NB-IoT PRB is placed at the middle of the remaining PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB. | | | | |

For NB-IoT in-band operation carrier, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A with parameters specified in Table 7.4-11 for Medium Range BS with 15 kHz channel spacing and in Table 7.4-12 for Medium Range BS with 3.75 kHz channel spacing.

Table 7.4-11: Medium Range BS in-channel selectivity for NB-IoT in-band operation with 15kHz channel spacing

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **E-UTRA channel bandwidth (MHz)** | **Reference measurement channel** | **Wanted signal mean power [dBm] (f≤3.0 GHz))** | **Interfering signal mean power [dBm]** | **Type of interfering signal** |
| 3 | FRC A14-1 in Annex A.14 | -117.9 | -79 | 3 MHz E-UTRA signal, 6 RBs (Note 2) |
| 5 | FRC A14-1 in Annex A.14 | -117.9 | -76 | 5 MHz E-UTRA signal, 10 RBs (Note 1) |
| 10 | FRC A14-1 in Annex A.14 | -117.9 | -72 | 10 MHz E-UTRA signal, 25 RBs (Note 1) |
| 15 | FRC A14-1 in Annex A.14 | -117.9 | -72 | 15 MHz E-UTRA signal, 25 RBs (Note 1) |
| 20 | FRC A14-1 in Annex A.14 | -117.9 | -72 | 20 MHz E-UTRA signal, 25 RBs (Note 1) |
| Note 1: Interfering signal is placed in one side of the Fc, while the NB-IoT PRB is placed on the other side. Both interfering signal and NB-IoT PRB are placed at the middle of the available PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB.  Note 2: Interfering signal is placed from the edge of BWConfig, while the NB-IoT PRB is placed at the middle of the remaining PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB. | | | | |

Table 7.4-12: Medium Range BS in-channel selectivity for NB-IoT in-band operation with 3.75kHz channel spacing

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **E-UTRA channel bandwidth (MHz)** | **Reference measurement channel** | **Wanted signal mean power [dBm] (f≤3.0 GHz))** | **Interfering signal mean power [dBm]** | **Type of interfering signal** |
| 3 | FRC A14-2 in Annex A.14 | -123.8 | -79 | 3 MHz E-UTRA signal, 6 RBs (Note 2) |
| 5 | FRC A14-2 in Annex A.14 | -123.8 | -76 | 5 MHz E-UTRA signal, 10 RBs (Note 1) |
| 10 | FRC A14-2 in Annex A.14 | -123.8 | -72 | 10 MHz E-UTRA signal, 25 RBs (Note 1) |
| 15 | FRC A14-2 in Annex A.14 | -123.8 | -72 | 15 MHz E-UTRA signal, 25 RBs (Note 1) |
| 20 | FRC A14-2 in Annex A.14 | -123.8 | -72 | 20 MHz E-UTRA signal, 25 RBs (Note 1) |
| Note 1: Interfering signal is placed in one side of the Fc, while the NB-IoT PRB is placed on the other side. Both interfering signal and NB-IoT PRB are placed at the middle of the available PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB.  Note 2: Interfering signal is placed from the edge of BWConfig, while the NB-IoT PRB is placed at the middle of the remaining PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB. | | | | |

## 7.5 Adjacent Channel Selectivity (ACS) and narrow-band blocking

### 7.5.1 Definition and applicability

Adjacent channel selectivity (ACS) is a measure of the receiver’s ability to receive a wanted signal at its assigned channel frequency in the presence of an adjacent channel signal with a specified centre frequency offset of the interfering signal to the band edge of a victim system.

The interfering signal shall be an E-UTRA signal as specified in Annex C.

Unless otherwise stated, a BS declared to be capable of E-UTRA with NB-IoT in-band and guard band operations is only required to pass the ACS and narrow-band blocking receiver tests for E-UTRA with guard band operation; it is not required to perform the ACS and narrow-band blocking receiver tests again for E-UTRA with in-band operation.

### 7.5.2 Minimum Requirement

The minimum requirement is in TS 36.104 [2] subclause 7.5.

### 7.5.3 Test purpose

The test purpose is to verify the ability of the BS receiver filter to suppress interfering signals in the channels adjacent to the wanted channel.

### 7.5.4 Method of test

#### 7.5.4.1 Initial conditions

Test environment: normal; see subclause D.2.

RF channels to be tested for single carrier: B, M and T; see subclause 4.7.

Base Station RF Bandwidth edge position to be tested for multi-carrier and/or CA: MRFBW in single-band operation, see subclause 4.7.1; BRFBW\_T’RFBW and B’RFBW\_TRFBW in multi-band operation, see subclause 4.7.1.

1) Set-up the measurement system as shown in Annex I.2.4.

#### 7.5.4.2 Procedure for Adjacent Channel Selectivity

For E-UTRA and E-UTRA with NB-IoT in-band or guard band operation:

1) Generate the E-UTRA wanted signal using the applicable test configuration specified in subclause 4.10 and 4.11 and adjust the input level to the base station under test to the level specified in Table 7.5-3 for E-UTRA Wide Area BS, in Table 7.5-4 for E-UTRA Local Area BS, in Table 7.5-5 for E-UTRA Home BS and in Table 7.5-6 for E-UTRA Medium Range BS.

For a BS declared to be capable of NB-IoT in-band or guard band operation, generate the NB-IoT wanted signal using the applicable test configuration specified in subclause 4.10 and 4.11 and adjust the input level to the base station under test to the level specified in Table 7.5-3a for NB-IoT in-band operation Wide Area BS and Table 7.5-3b for NB-IoT in guard band operation Wide Area BS, in Table 7.5-4a for NB-IoT in-band operation Local Area BS and Table 7.5-4b for NB-IoT in guard band operation Local Area BS, in Table 7.5-5a for NB-IoT in-band operation Home BS and Table 7.5-5b for NB-IoT in guard band operation Home BS, in Table 7.5-6a for NB-IoT in-band operation Medium Range BS and Table 7.5-6b for NB-IoT in guard band operation Medium Range BS.

2) Set-up the interfering signal at the adjacent channel frequency and adjust the interfering signal level at the base station input to the level defined in Table 7.5-3 for E-UTRA Wide Area BS, in Table 7.5-4 for E-UTRA Local Area BS, in Table 7.5-5 for E-UTRA Home BS, in Table 7.5-6 for E-UTRA Medium Range BS, in Table 7.5-3a for NB-IoT in-band operation Wide Area BS and Table 7.5-3b for NB-IoT in guard band operation Wide Area BS, in Table 7.5-4a for NB-IoT in-band operation Local Area BS and Table 7.5-4b for NB-IoT in guard band operation Local Area BS, in Table 7.5-5a for NB-IoT in-band operation Home BS and Table 7.5-5b for NB-IoT in guard band operation Home BS, in Table 7.5-6a for NB-IoT in-band operation Medium Range BS and Table 7.5-6b for NB-IoT in guard band operation Medium Range BS.

3) Measure the E-UTRA throughput according to Annex E, for multi-carrier and/or CA operation the throughput shall be measured for relevant carriers specified by the test configuration specified in subclause 4.10 and 4.11.

For a BS declared to be capable of NB-IoT in-band or guard band operation, measure the NB-IoT throughput according to Annex E, for multi-carrier the throughput shall be measured for relevant carriers specified by the test configuration specified in subclause 4.10 and 4.11.

4) Repeat the test for the port(s), which was (were) terminated.

In addition, for a multi-band capable BS with separate antenna connectors, the following steps shall apply:

5) For single band tests, repeat the steps above per involved band where single band test configurations shall apply with no carrier activated in the other band.

Interfering signal shall first be applied on the same port as the wanted signal. The test shall be repeated with the interfering signal applied on the other port (if any) mapped to the same receiver as the wanted signal. Any antenna connector with no signal applied in case of single-band or multi-band test shall be terminated.

6) Repeat step 5) with the wanted signal for the other band(s) applied on the respective port(s).

For NB-IoT standalone operation:

1) Generate the NB-IoT wanted signal using the applicable test configuration specified in subclause 4.10 and 4.11 and adjust the input level to the base station under test to the level specified in Table 7.5-3c for NB-IoT standalone Wide Area BS, in Table 7.5-4c for NB-IoT standalone Local Area BS, in Table 7.5-5c for NB-IoT standalone Home BS and in Table 7.5-6c for NB-IoT standalone Medium Range BS.

2) Set-up the interfering signal at the adjacent channel frequency and adjust the interfering signal level at the base station input to the level defined in Table 7.5-3c for NB-IoT standalone Wide Area BS, in Table 7.5-4c for NB-IoT standalone Local Area BS, in Table 7.5-5c for NB-IoT standalone Home BS and in Table 7.5-6c for NB-IoT standalone Medium Range BS.

3) Measure NB-IoT throughput according to Annex E.

4) Repeat the test for the port(s), which was (were) terminated.

#### 7.5.4.3 Procedure for narrow-band blocking

For E-UTRA and E-UTRA with NB-IoT in-band or guard band BS:

1) For FDD BS declared to be capable of single carrier operation only, start BS transmission according to E-TM 1.1 at manufacturer’s declared rated output power.

For a FDD BS declared to be capable of multi-carrier and/or CA operation, set the BS to transmit according to E-TM 1.1 on all carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For BS declared to be capable of NB-IoT in-band or guard band operation single carrier only, start BS transmission according to N-TM at manufacturer’s declared rated output power.

For a BS declared to be capable of NB-IoT multi-carrier, set the BS to transmit according to N-TM on all carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

2) Generate the E-UTRA wanted signal using the applicable test configuration specified in subclause 4.10 and 4.11 and adjust the input level to the base station under test to the level specified in Table 7.5-1.

For a BS declared to be capable of NB-IoT in-band or guard band operation, generate the NB-IoT wanted signal using the applicable test configuration specified in subclause 4.10 and 4.11 and adjust the input level to the base station under test to the level specified in Table 7.5-1a for NB-IoT in-band operation and Table 7.5-1b for NB-IoT guard band operation.

3) Adjust the interfering signal level at the base station input to the level defined in Table 7.5-1 for E-UTRA, in Table 7.5-1a for NB-IoT in-band operation and Table 7.5-1b for NB-IoT guard band operation. Set-up and sweep the interfering RB centre frequency offset to the channel edge of the wanted signal according to Table 7.5-2.

4) Measure the E-UTRA throughput according to Annex E, for multi-carrier and/or CA operation the throughput shall be measured for relevant carriers specified by the test configuration specified in subclause 4.10 and 4.11.

For a BS declared to be capable of NB-IoT in-band or guard band operation, measure the NB-IoT throughput according to Annex E, for multi-carrier the throughput shall be measured for relevant carriers specified by the test configuration specified in subclause 4.10 and 4.11.

5) Repeat the test for the port(s), which was (were) terminated.

In addition, for a multi-band capable BS with separate antenna connectors, the following steps shall apply:

6) For single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carrier activated in the other band.

7) Interfering signal shall first be applied on the same port as the wanted signal. The test shall be repeated with the interfering signal applied on the other port (if any) mapped to the same receiver as the wanted signal. Any antenna connector with no signal applied in case of single-band or multi-band test shall be terminated.

8) Repeat step 7) with the wanted signal for the other band(s) applied on the respective port(s).

For NB-IoT standalone BS:

1) For BS declared to be capable of NB-IoT standalone single carrier only, start BS transmission according to N-TM at manufacturer’s declared rated output power.

For a BS declared to be capable of NB-IoT multi-carrier, set the BS to transmit according to N-TM on all carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

2) Generate the NB-IoT wanted signal using the applicable test configuration specified in subclause 4.10 and 4.11 and adjust the input level to the base station under test to the level specified in Table 7.5-1c.

3) Adjust the interfering signal level at the base station input to the level defined in Table 7.5-1c. Set-up and sweep the interfering RB centre frequency offset to the channel edge of the wanted signal according to Table 7.5-2a.

4) Measure the NB-IoT throughput according to Annex E, for multi-carrier the throughput shall be measured for relevant carriers specified by the test configuration specified in subclause 4.10 and 4.11.

5) Repeat the test for the port(s), which was (were) terminated.

For E-UTRA and NB-IoT standalone BS:

1) Set the BS to transmit according to E-TM 1.1 on all E-UTRA carriers and according to N-TM on all NB-IoT carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

2) Generate the E-UTRA wanted signal using the applicable test configuration specified in subclause 4.10 and 4.11 and adjust the input level to the base station under test to the level specified in Table 7.5-1.

Generate the NB-IoT wanted signal using the applicable test configuration specified in subclause 4.10 and 4.11 and adjust the input level to the base station under test to the level specified in Table 7.5-1c.

3) a) On the side where E-UTRA signal is positioned:

Adjust the interfering signal level at the base station input to the level defined in Table 7.5-1 for E-UTRA. Set-up and sweep the interfering RB centre frequency offset to the channel edge of the wanted signal according to Table 7.5-2.

b) On the side where NB-IoT signal is positioned:

Adjust the interfering signal level at the base station input to the level defined in Table 7.5-1c. Set-up and sweep the interfering RB centre frequency offset to the channel edge of the wanted signal according to Table 7.5-2a.

4) Measure the E-UTRA throughput and the NB-IoT throughput according to Annex E, for multi-carrier the throughput shall be measured for relevant carriers specified by the test configuration specified in subclause 4.10 and 4.11.

5) Repeat the test for the port(s), which was (were) terminated.

### 7.5.5 Test Requirements

For each measured E-UTRA carrier, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel.

For each measured NB-IoT carrier, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel.

For E-UTRA Wide Area BS, the wanted and the interfering signal coupled to the BS antenna input are specified in Table 7.5-1 and 7.5-2 for narrowband blocking and 7.5-3 for ACS. The reference measurement channel for the wanted signal is specified in Table 7.2-1 for each channel bandwidth and further specified in Annex A.

For E-UTRA Medium Range BS, the wanted and the interfering signal coupled to the BS antenna input are specified in Tables 7.5-1 and 7.5-2 for narrowband blocking and in Table 7.5-6 for ACS. Narrowband blocking requirements are not applied for Band 46. The reference measurement channel for the wanted signal is specified in Table 7.2-4 for each channel bandwidth and further specified in Annex A.

For E-UTRA Local Area BS, the wanted and the interfering signal coupled to the BS antenna input are specified in Tables 7.5-1 and 7.5-2 for narrowband blocking and 7.5-4 for ACS. Narrowband blocking requirements are not applied for Band 46. The reference measurement channel for the wanted signal is specified in Table 7.2-2 for each channel bandwidth and further specified in Annex A.

For E-UTRA Home BS, the wanted and the interfering signal coupled to the BS antenna input are specified in Table 7.5-1 and 7.5-2 for narrowband blocking and 7.5-5 for ACS. The reference measurement channel for the wanted signal is specified in Table 7.2-3 for each channel bandwidth and further specified in Annex A.

For E-UTRA Wide Area BS declared to be capable of NB-IoT in-band, the E-UTRA wanted, the NB-IoT wanted and the interfering signal coupled to the BS antenna input are specified in Table 7.5-1, 7.5-1a and 7.5-2 for narrowband blocking and 7.5-3 and 7.5-3a for ACS. The reference measurement channel for the E-UTRA wanted signal is specified in Table 7.2-1 for each channel bandwidth and further specified in Annex A. The reference measurement channel for the NB-IoT wanted signal is specified in Table 7.2-5 for each sub-carrier spacing and further specified in Annex A.

For E-UTRA Wide Area BS declared to be capable of NB-IoT guard band, the E-UTRA wanted, the NB-IoT wanted and the interfering signal coupled to the BS antenna input are specified in Table 7.5-1, 7.5-1b and 7.5-2 for narrowband blocking and 7.5-3 and 7.5-3b for ACS. The reference measurement channel for the E-UTRA wanted signal is specified in Table 7.2-1 for each channel bandwidth and further specified in Annex A. The reference measurement channel for the NB-IoT wanted signal is specified in Table 7.2-5 for each sub-carrier spacing and further specified in Annex A.

For NB-IoT standalone Wide Area BS, the NB-IoT wanted and the interfering signal coupled to the BS antenna input are specified in Table 7.5-1c and 7.5-2a for narrowband blocking and 7.5-3c for ACS. The reference measurement channel for the NB-IoT wanted signal is specified in Table 7.2-5 for each sub-carrier spacing and further specified in Annex A.

For E-UTRA Local Area BS declared to be capable of NB-IoT in-band, the E-UTRA wanted, the NB-IoT wanted and the interfering signal coupled to the BS antenna input are specified in Table 7.5-1, 7.5-1a and 7.5-2 for narrowband blocking and 7.5-4 and 7.5-4a for ACS. The reference measurement channel for the E-UTRA wanted signal is specified in Table 7.2-1 for each channel bandwidth and further specified in Annex A. The reference measurement channel for the NB-IoT wanted signal is specified in Table 7.2-5 for each sub-carrier spacing and further specified in Annex A.

For E-UTRA Local Area BS declared to be capable of NB-IoT guard band, the E-UTRA wanted, the NB-IoT wanted and the interfering signal coupled to the BS antenna input are specified in Table 7.5-1, 7.5-1b and 7.5-2 for narrowband blocking and 7.5-4 and 7.5-4b for ACS. The reference measurement channel for the E-UTRA wanted signal is specified in Table 7.2-1 for each channel bandwidth and further specified in Annex A. The reference measurement channel for the NB-IoT wanted signal is specified in Table 7.2-5 for each sub-carrier spacing and further specified in Annex A.

For NB-IoT standalone Local Area BS, the NB-IoT wanted and the interfering signal coupled to the BS antenna input are specified in Table 7.5-1c and 7.5-2a for narrowband blocking and 7.5-4c for ACS. The reference measurement channel for the NB-IoT wanted signal is specified in Table 7.2-5 for each sub-carrier spacing and further specified in Annex A.

For E-UTRA Home BS declared to be capable of NB-IoT in-band, the E-UTRA wanted, the NB-IoT wanted and the interfering signal coupled to the BS antenna input are specified in Table 7.5-1, 7.5-1a and 7.5-2 for narrowband blocking and 7.5-5 and 7.5-5a for ACS. The reference measurement channel for the E-UTRA wanted signal is specified in Table 7.2-1 for each channel bandwidth and further specified in Annex A. The reference measurement channel for the NB-IoT wanted signal is specified in Table 7.2-5 for each sub-carrier spacing and further specified in Annex A.

For E-UTRA Home BS declared to be capable of NB-IoT guard band, the E-UTRA wanted, the NB-IoT wanted and the interfering signal coupled to the BS antenna input are specified in Table 7.5-1, 7.5-1b and 7.5-2 for narrowband blocking and 7.5-5 and 7.5-5b for ACS. The reference measurement channel for the E-UTRA wanted signal is specified in Table 7.2-1 for each channel bandwidth and further specified in Annex A. The reference measurement channel for the NB-IoT wanted signal is specified in Table 7.2-5 for each sub-carrier spacing and further specified in Annex A.

For NB-IoT standalone Home BS, the NB-IoT wanted and the interfering signal coupled to the BS antenna input are specified in Table 7.5-1c and 7.5-2a for narrowband blocking and 7.5-5c for ACS. The reference measurement channel for the NB-IoT wanted signal is specified in Table 7.2-5 for each sub-carrier spacing and further specified in Annex A.

For E-UTRA Medium Range BS declared to be capable of NB-IoT in-band, the E-UTRA wanted, the NB-IoT wanted and the interfering signal coupled to the BS antenna input are specified in Table 7.5-1, 7.5-1a and 7.5-2 for narrowband blocking and 7.5-6 and 7.5-6a for ACS. The reference measurement channel for the E-UTRA wanted signal is specified in Table 7.2-1 for each channel bandwidth and further specified in Annex A. The reference measurement channel for the NB-IoT wanted signal is specified in Table 7.2-5 for each sub-carrier spacing and further specified in Annex A.

For E-UTRA Medium Range BS declared to be capable of NB-IoT guard band, the E-UTRA wanted, the NB-IoT wanted and the interfering signal coupled to the BS antenna input are specified in Table 7.5-1, 7.5-1b and 7.5-2 for narrowband blocking and 7.5-6 and 7.5-6b for ACS. The reference measurement channel for the E-UTRA wanted signal is specified in Table 7.2-1 for each channel bandwidth and further specified in Annex A. The reference measurement channel for the NB-IoT wanted signal is specified in Table 7.2-5 for each sub-carrier spacing and further specified in Annex A.

For NB-IoT standalone Medium Range BS, the NB-IoT wanted and the interfering signal coupled to the BS antenna input are specified in Table 7.5-1c and 7.5-2a for narrowband blocking and 7.5-6c for ACS. The reference measurement channel for the NB-IoT wanted signal is specified in Table 7.2-5 for each sub-carrier spacing and further specified in Annex A.

The ACS and narrowband blocking requirement is always applicable outside the Base Station RF Bandwidth or Maximum Radio Bandwidth. The interfering signal offset is defined relative to the Base station RF Bandwidth edges or Maximum Radio Bandwidth edges.

For a BS operating in non-contiguous spectrum within any operating band, the ACS requirement applies in addition inside any sub-block gap, in case the sub-block gap size is at least as wide as the E-UTRA interfering signal in Tables 7.5-3, 7.5-4 and 7.5-6. The interfering signal offset is defined relative to the sub-block edges inside the sub-block gap.

For a BS capable of multi-band operation, the ACS requirement applies in addition inside any Inter RF Bandwidth gap, in case the Inter RF Bandwidth gap size is at least as wide as the E-UTRA interfering signal in Tables 7.5-3, 7.5-4 and 7.5-6. The interfering signal offset is defined relative to the Base Station RF Bandwidth edges inside the Inter RF Bandwidth gap.

For a BS operating in non-contiguous spectrum within any operating band, the narrowband blocking requirement applies in addition inside any sub-block gap, in case the sub-block gap size is at least as wide as the channel bandwidth of the E-UTRA interfering signal in Table 7.5-2. The interfering signal offset is defined relative to the sub-block edges inside the sub-block gap.

For a BS capable of multi-band operation, the narrowband blocking requirement applies in addition inside any Inter RF Bandwidth gap, in case the Inter RF Bandwidth gap size is at least as wide as the E-UTRA interfering signal in Table 7.5-2. The interfering signal offset is defined relative to the Base Station RF Bandwidth edges inside the Inter RF Bandwidth gap.

Table 7.5-1: Narrowband blocking requirement

|  |  |  |  |
| --- | --- | --- | --- |
|  | Wanted signal mean power [dBm] | Interfering signal mean power [dBm] | Type of interfering signal |
| Wide Area BS | PREFSENS + 6dB\* | -49 | See Table 7.5-2 |
| Medium Range BS | PREFSENS + 6dB\* | -44 | See Table 7.5-2 |
| Local Area BS | PREFSENS +6dB\* | -41 | See Table 7.5-2 |
| Home BS | PREFSENS + 14dB\* | -33 | See Table 7.5-2 |
| Note\*: PREFSENS depends on the channel bandwidth as specified in TS 36.104 [2] subclause 7.2.1. | | | |

Table 7.5-1a: Narrowband blocking requirement for NB-IoT in-band operation BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | E-UTRA channel  BW of the lowest/highest carrier received [MHz] | NB-IoT Wanted signal mean power [dBm] | Interfering signal mean power [dBm] | Type of interfering signal |
| Wide Area BS | 3 | PREFSENS + 11 dB\* | -49 | See Table 7.5.2 |
| 5 | PREFSENS + 8 dB\* | -49 | See Table 7.5.2 |
| 10 | PREFSENS + 6 dB\* | -49 | See Table 7.5.2 |
| 15 | PREFSENS + 6 dB\* | -49 | See Table 7.5.2 |
| 20 | PREFSENS + 6 dB\* | -49 | See Table 7.5.2 |
| Local Area BS | 3 | PREFSENS + 11 dB\* | -41 | See Table 7.5.2 |
| 5 | PREFSENS + 8 dB\* | -41 | See Table 7.5.2 |
| 10 | PREFSENS + 6 dB\* | -41 | See Table 7.5.2 |
| 15 | PREFSENS + 6 dB\* | -41 | See Table 7.5.2 |
| 20 | PREFSENS + 6 dB\* | -41 | See Table 7.5.2 |
| Home BS | 3 | PREFSENS + 19 dB\* | -33 | See Table 7.5.2 |
| 5 | PREFSENS + 16 dB\* | -33 | See Table 7.5.2 |
| 10 | PREFSENS + 14 dB\* | -33 | See Table 7.5.2 |
| 15 | PREFSENS + 14 dB\* | -33 | See Table 7.5.2 |
| 20 | PREFSENS + 14 dB\* | -33 | See Table 7.5.2 |
| Medium Range BS | 3 | PREFSENS + 11 dB\* | -44 | See Table 7.5.2 |
| 5 | PREFSENS + 8 dB\* | -44 | See Table 7.5.2 |
| 10 | PREFSENS + 6 dB\* | -44 | See Table 7.5.2 |
| 15 | PREFSENS + 6 dB\* | -44 | See Table 7.5.2 |
| 20 | PREFSENS + 6 dB\* | -44 | See Table 7.5.2 |
| Note\*: PREFSENS depends on the sub-carrier spacing as specified in TS 36.104 [2] subclause 7.2.1.. | | | | |

Table 7.5-1b: Narrowband blocking requirement for NB-IoT guard band operation BS

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | E-UTRA channel  BW of the lowest/highest carrier received [MHz] | | NB-IoT Wanted signal mean power [dBm] | | Interfering signal mean power [dBm] | | Type of interfering signal | |
| Wide Area BS | | 5 | | PREFSENS + 11 dB\* | | -49 | | See Table 7.5.2 | |
| 10 | | PREFSENS + 6 dB\* | | -49 | | See Table 7.5.2 | |
| 15 | | PREFSENS + 6 dB\* | | -49 | | See Table 7.5.2 | |
| 20 | | PREFSENS + 6 dB\* | | -49 | | See Table 7.5.2 | |
| Local Area BS | | 5 | | PREFSENS + 11 dB\* | | -41 | | See Table 7.5.2 | |
| 10 | | PREFSENS + 6 dB\* | | -41 | | See Table 7.5.2 | |
| 15 | | PREFSENS + 6 dB\* | | -41 | | See Table 7.5.2 | |
| 20 | | PREFSENS + 6 dB\* | | -41 | | See Table 7.5.2 | |
| Home BS | | 5 | | PREFSENS + 19 dB\* | | -33 | | See Table 7.5.2 | |
| 10 | | PREFSENS + 14 dB\* | | -33 | | See Table 7.5.2 | |
| 15 | | PREFSENS + 14 dB\* | | -33 | | See Table 7.5.2 | |
| 20 | | PREFSENS + 14 dB\* | | -33 | | See Table 7.5.2 | |
| Medium Range BS | | 5 | | PREFSENS + 11 dB\* | | -41 | | See Table 7.5.2 | |
| 10 | | PREFSENS + 6 dB\* | | -44 | | See Table 7.5.2 | |
| 15 | | PREFSENS + 6 dB\* | | -44 | | See Table 7.5.2 | |
| 20 | | PREFSENS + 6 dB\* | | -44 | | See Table 7.5.2 | |
| Note: The mentioned desens values consider only one NB-IoT PRB in the guard band, which is placed adjacent to the E-UTRA PRB edge as close as possible (i.e., away from edge of channel bandwidth).  Note\*: PREFSENS depends on the sub-carrier spacing as specified in TS 36.104 [2] subclause 7.2.1. | | | | | | | | | |

Table 7.5-1c: Narrowband blocking requirement for NB-IoT standalone

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | NB-IoT  channel bandwidth of the lowest/highest carrier received [kHz] | Wanted signal mean power [dBm] | Interfering signal mean power [dBm] | Type of interfering signal |
| Wide Area BS | 200 | PREFSENS + 12 dB\* | -49 | See Table 7.5.2a |
| Local Area BS | 200 | PREFSENS + 12 dB\* | -41 | See Table 7.5.2a |
| Home BS | 200 | PREFSENS + 20 dB\* | -33 | See Table 7.5.2a |
| Medium Range BS | 200 | PREFSENS + 12 dB\* | -44 | See Table 7.5.2a |
| Note\*: PREFSENS depends on the sub-carrier spacing as specified in TS 36.104 [2] subclause 7.2.1. | | | | |

Table 7.5-2: Interfering signal for Narrowband blocking requirement for E-UTRA BS

|  |  |  |
| --- | --- | --- |
| E-UTRA  channel BW of the lowest/highest carrier received [MHz] | Interfering RB centre frequency offset to the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [kHz] | Type of interfering signal |
| 1.4 | ±(252.5+m\*180),  m=0, 1, 2, 3, 4, 5 | 1.4 MHz E-UTRA signal, 1 RB\* |
| 3 | ±(247.5+m\*180),  m=0, 1, 2, 3, 4, 7, 10, 13 | 3 MHz E-UTRA signal, 1 RB\* |
| 5 | ±(342.5+m\*180),  m=0, 1, 2, 3, 4, 9, 14, 19, 24 | 5 MHz E-UTRA signal, 1 RB\* |
| 10 | ±(347.5+m\*180),  m=0, 1, 2, 3, 4, 9, 14, 19, 24 | 5 MHz E-UTRA signal, 1 RB\* |
| 15 | ±(352.5+m\*180),  m=0, 1, 2, 3, 4, 9, 14, 19, 24 | 5 MHz E-UTRA signal, 1 RB\* |
| 20 | ±(342.5+m\*180),  m=0, 1, 2, 3, 4, 9, 14, 19, 24 | 5 MHz E-UTRA signal, 1 RB\* |
| Note\*: Interfering signal consisting of one resource block is positioned at the stated offset, the channel bandwidth of the interfering signal is located adjacently to the lower/upper Base Station RF Bandwidth edge. | | |

Table 7.5-2a: Interfering signal for Narrowband blocking requirement for NB-IoT standalone operation BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NB-IoT  channel bandwidth of the lowest/highest carrier received [kHz] |  |  | Interfering RB centre frequency offset to the lower/upper Base Station RF Bandwdith edge or sub-block edge inside a sub-block gap [kHz] | Type of interfering signal |
| 200 | | | ±(240 +m\*180),  m=0, 1, 2, 3, 4, 9, 14 | 3 MHz E-UTRA signal, 1 RB\* |
| Note\*: Interfering signal consisting of one resource block is positioned at the stated offset, the channel bandwidth of the interfering signal is located adjacently to the lower/upper Base Station RF Bandwidth edge. | | | | |

Table 7.5-3: Adjacent channel selectivity for E-UTRA Wide Area BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth of the lowest/highest carrier received [MHz] | Wanted signal mean power [dBm] | Interfering signal mean power [dBm] | Interfering signal centre frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz] | Type of interfering signal |
| 1.4 | PREFSENS + 11dB\* | -52 | ±0.7025 | 1.4MHz E-UTRA signal |
| 3 | PREFSENS + 8dB\* | -52 | ±1.5075 | 3MHz E-UTRA signal |
| 5 | PREFSENS + 6dB\* | -52 | ±2.5025 | 5MHz E-UTRA signal |
| 10 | PREFSENS + 6dB\* | -52 | ±2.5075 | 5MHz E-UTRA signal |
| 15 | PREFSENS + 6dB\* | -52 | ±2.5125 | 5MHz E-UTRA signal |
| 20 | PREFSENS + 6dB\* | -52 | ±2.5025 | 5MHz E-UTRA signal |
| Note\*: PREFSENS depends on the channel bandwidth as specified in TS 36.104 [2] subclause 7.2.1. | | | | |

Table 7.5-3a: Adjacent channel selectivity for NB-IoT in-band operation Wide Area BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth of the lowesthighest carrier received [MHz] | NB-IoT wanted signal mean power [dBm] | Interfering signal mean power [dBm] | Interfering signal centre frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz] | Type of interfering signal |
| 3 | PREFSENS + 8dB\* | -52 | ±1.5075 | 3MHz E-UTRA signal |
| 5 | PREFSENS + 6dB\* | -52 | ±2.5025 | 5MHz E-UTRA signal |
| 10 | PREFSENS + 6dB\* | -52 | ±2.5075 | 5MHz E-UTRA signal |
| 15 | PREFSENS + 6dB\* | -52 | ±2.5125 | 5MHz E-UTRA signal |
| 20 | PREFSENS + 6dB\* | -52 | ±2.5025 | 5MHz E-UTRA signal |
| Note\*: PREFSENS depends on the sub-carrier spacing as specified in TS 36.104 [2] subclause 7.2.1. | | | | |

Table 7.5-3b: Adjacent channel selectivity NB-IoT guard band operation Wide Area BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth of the lowesthighest carrier received [MHz] | NB-IoT wanted signal mean power [dBm] | Interfering signal mean power [dBm] | Interfering signal centre frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz] | Type of interfering signal |
| 5 | PREFSENS + 10 dB\* | -52 | ±2.5025 | 5MHz E-UTRA signal |
| 10 | PREFSENS + 8 dB\* | -52 | ±2.5075 | 5MHz E-UTRA signal |
| 15 | PREFSENS + 6 dB\* | -52 | ±2.5125 | 5MHz E-UTRA signal |
| 20 | PREFSENS + 6 dB\* | -52 | ±2.5025 | 5MHz E-UTRA signal |
| Note\*: PREFSENS depends on the sub-carrier spacing as specified in TS 36.104 [2] subclause 7.2.1. | | | | |

Table 7.5-3c: Adjacent channel selectivity for NB-IoT standalone Wide Area BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NB-IoT  channel bandwidth of the lowest/highest carrier received [kHz] | Wanted signal mean power [dBm] | Interfering signal mean power [dBm] | Interfering signal centre frequency offset to the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [kHz] | Type of interfering signal |
| 200 | PREFSENS + 19.5dB\* | -52 | ±100 | 180 kHz NB-IoT signal |
| Note\*: PREFSENS depends on the sub-carrier spacing as specified in TS 36.104 [2] subclause 7.2.1. | | | | |

Table 7.5-4: Adjacent channel selectivity for E-UTRA Local Area BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth of the lowest/highest carrier received [MHz] | Wanted signal mean power [dBm] | Interfering signal mean power [dBm] | Interfering signal centre frequency offset from the lowerupper Base Station RF Bandwidth edge or sub-block edge inside a  sub-block gap [MHz] | Type of interfering signal |
| 1.4 | PREFSENS + 11dB\* | -44 | ±0.7025 | 1.4MHz E-UTRA signal |
| 3 | PREFSENS + 8dB\* | -44 | ±1.5075 | 3MHz E-UTRA signal |
| 5 | PREFSENS + 6dB\* | -44 | ±2.5025 | 5MHz E-UTRA signal |
| 10 | PREFSENS + 6dB\* | -44 | ±2.5075  ±10.0175 | 5MHz E-UTRA signal\*\*  20 MHz E-UTRA signal\*\*\* |
| 15 | PREFSENS + 6dB\* | -44 | ±2.5125 | 5MHz E-UTRA signal |
| 20 | PREFSENS + 6dB\* | -44 | ±2.5025  ±10.0175 | 5MHz E-UTRA signal\*\*  20 MHz E-UTRA signal\*\*\* |
| Note\*: PREFSENS depends on the channel bandwidth as specified in TS 36.104 [2] subclause 7.2.1.  Note\*\*: This type of interfering signal is not applied for Band 46.  Note\*\*\*: This type of interfering signal is only applied for Band 46. | | | | |

Table 7.5-4a: Adjacent channel selectivity for NB-IoT in-band operation Local Area BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **E-UTRA**  **channel bandwidth of the lowesthighest carrier received [MHz]** | **NB-IoT wanted signal mean power [dBm]** | **Interfering signal mean power [dBm]** | **Interfering signal centre frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz]** | **Type of interfering signal** |
| 3 | PREFSENS + 8dB\* | -44 | ±1.5075 | 3MHz E-UTRA signal |
| 5 | PREFSENS + 6dB\* | -44 | ±2.5025 | 5MHz E-UTRA signal |
| 10 | PREFSENS + 6dB\* | -44 | ±2.5075 | 5MHz E-UTRA signal |
| 15 | PREFSENS + 6dB\* | -44 | ±2.5125 | 5MHz E-UTRA signal |
| 20 | PREFSENS + 6dB\* | -44 | ±2.5025 | 5MHz E-UTRA signal |
| Note\*: PREFSENS depends on the sub-carrier spacing as specified in TS 36.104 [2] subclause 7.2.1. | | | | |

Table 7.5-4b: Adjacent channel selectivity NB-IoT guard band operation Local Area BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **E-UTRA**  **channel bandwidth of the lowesthighest carrier received [MHz]** | **NB-IoT wanted signal mean power [dBm]** | **Interfering signal mean power [dBm]** | **Interfering signal centre frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz]** | **Type of interfering signal** |
| 5 | PREFSENS + 10 dB\* | -44 | ±2.5025 | 5MHz E-UTRA signal |
| 10 | PREFSENS + 8 dB\* | -44 | ±2.5075 | 5MHz E-UTRA signal |
| 15 | PREFSENS + 6 dB\* | -44 | ±2.5125 | 5MHz E-UTRA signal |
| 20 | PREFSENS + 6 dB\* | -44 | ±2.5025 | 5MHz E-UTRA signal |
| Note\*: PREFSENS depends on the sub-carrier spacing as specified in TS 36.104 [2] subclause 7.2.1. | | | | |

Table 7.5-4c: Adjacent channel selectivity for NB-IoT standalone Local Area BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NB-IoT**  **channel bandwidth of the lowest/highest carrier received [kHz]** | **Wanted signal mean power [dBm]** | **Interfering signal mean power [dBm]** | **Interfering signal centre frequency offset to the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [kHz]** | **Type of interfering signal** |
| 200 | PREFSENS + 19.5dB\* | -44 | ±100 | 180 kHz NB-IoT signal |
| Note\*: PREFSENS depends on the sub-carrier spacing as specified in TS 36.104 [2] subclause 7.2.1. | | | | |

Table 7.5-5: Adjacent channel selectivity for E-UTRA Home BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth [MHz] | Wanted signal mean power [dBm] | Interfering signal mean power [dBm] | Interfering signal centre frequency offset from the channel edge of the wanted signal [MHz] | Type of interfering signal |
| 1.4 | PREFSENS + 27dB\* | -28 | 0.7025 | 1.4MHz E-UTRA signal |
| 3 | PREFSENS + 24dB\* | -28 | 1.5075 | 3MHz E-UTRA signal |
| 5 | PREFSENS + 22dB\* | -28 | 2.5025 | 5MHz E-UTRA signal |
| 10 | PREFSENS + 22dB\* | -28 | 2.5075 | 5MHz E-UTRA signal |
| 15 | PREFSENS + 22dB\* | -28 | 2.5125 | 5MHz E-UTRA signal |
| 20 | PREFSENS + 22dB\* | -28 | 2.5025 | 5MHz E-UTRA signal |
| Note\*: PREFSENS depends on the channel bandwidth as specified in TS 36.104 [2] subclause 7.2.1. | | | | |

Table 7.5-5a: Adjacent channel selectivity for NB-IoT in-band operation Home BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **E-UTRA**  **channel bandwidth of the lowesthighest carrier received [MHz]** | **NB-IoT wanted signal mean power [dBm]** | **Interfering signal mean power [dBm]** | **Interfering signal centre frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz]** | **Type of interfering signal** |
| 3 | PREFSENS + 24dB\* | -28 | ±1.5075 | 3MHz E-UTRA signal |
| 5 | PREFSENS + 22dB\* | -28 | ±2.5025 | 5MHz E-UTRA signal |
| 10 | PREFSENS + 22dB\* | -28 | ±2.5075 | 5MHz E-UTRA signal |
| 15 | PREFSENS + 22dB\* | -28 | ±2.5125 | 5MHz E-UTRA signal |
| 20 | PREFSENS + 22dB\* | -28 | ±2.5025 | 5MHz E-UTRA signal |
| Note\*: PREFSENS depends on the sub-carrier spacing as specified in TS 36.104 [2] subclause 7.2.1. | | | | |

Table 7.5-5b: Adjacent channel selectivity NB-IoT guard band operation Home BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **E-UTRA**  **channel bandwidth of the lowesthighest carrier received [MHz]** | **NB-IoT wanted signal mean power [dBm]** | **Interfering signal mean power [dBm]** | **Interfering signal centre frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz]** | **Type of interfering signal** |
| 5 | PREFSENS + 26 dB\* | -28 | ±2.5025 | 5MHz E-UTRA signal |
| 10 | PREFSENS + 24 dB\* | -28 | ±2.5075 | 5MHz E-UTRA signal |
| 15 | PREFSENS + 22 dB\* | -28 | ±2.5125 | 5MHz E-UTRA signal |
| 20 | PREFSENS + 22 dB\* | -28 | ±2.5025 | 5MHz E-UTRA signal |
| Note\*: PREFSENS depends on the sub-carrier spacing as specified in TS 36.104 [2] subclause 7.2.1. | | | | |

Table 7.5-5c: Adjacent channel selectivity for NB-IoT standalone Home BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NB-IoT**  **channel bandwidth of the lowest/highest carrier received [kHz]** | **Wanted signal mean power [dBm]** | **Interfering signal mean power [dBm]** | **Interfering signal centre frequency offset to the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [kHz]** | **Type of interfering signal** |
| 200 | PREFSENS + 35.5dB\* | -28 | ±100 | 180 kHz NB-IoT signal |
| Note\*: PREFSENS depends on the sub-carrier spacing as specified in TS 36.104 [2] subclause 7.2.1. | | | | |

Table 7.5-6: Adjacent channel selectivity for E-UTRA Medium Range BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth of the lowest/highest carrier received [MHz] | Wanted signal mean power [dBm] | Interfering signal mean power [dBm] | Interfering signal centre frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz] | Type of interfering signal |
| 1.4 | PREFSENS + 11dB\* | -47 | ±0.7025 | 1.4MHz E-UTRA signal |
| 3 | PREFSENS + 8dB\* | -47 | ±1.5075 | 3MHz E-UTRA signal |
| 5 | PREFSENS + 6dB\* | -47 | ±2.5025 | 5MHz E-UTRA signal |
| 10 | PREFSENS + 6dB\* | -47 | ±2.5075  ±10.0175 | 5MHz E-UTRA signal\*\*  20 MHz E-UTRA signal\*\*\* |
| 15 | PREFSENS + 6dB\* | -47 | ±2.5125 | 5MHz E-UTRA signal |
| 20 | PREFSENS + 6dB\* | -47 | ±2.5025  ±10.0175 | 5MHz E-UTRA signal\*\*  20 MHz E-UTRA signal\*\*\* |
| Note\*: PREFSENS depends on the channel bandwidth as specified in TS 36.104 [2] subclause 7.2.1.  Note\*\*: This type of interfering signal is not applied for Band 46.  Note\*\*\*: This type of interfering signal is only applied for Band 46. | | | | |

Table 7.5-6a: Adjacent channel selectivity for NB-IoT in-band operation Medium Range BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth of the lowesthighest carrier received [MHz] | NB-IoT wanted signal mean power [dBm] | Interfering signal mean power [dBm] | Interfering signal centre frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz] | Type of interfering signal |
| 3 | PREFSENS + 8dB\* | -47 | ±1.5075 | 3MHz E-UTRA signal |
| 5 | PREFSENS + 6dB\* | -47 | ±2.5025 | 5MHz E-UTRA signal |
| 10 | PREFSENS + 6dB\* | -47 | ±2.5075 | 5MHz E-UTRA signal |
| 15 | PREFSENS + 6dB\* | -47 | ±2.5125 | 5MHz E-UTRA signal |
| 20 | PREFSENS + 6dB\* | -47 | ±2.5025 | 5MHz E-UTRA signal |
| Note\*: PREFSENS depends on the sub-carrier spacing as specified in TS 36.104 [2] subclause 7.2.1. | | | | |

Table 7.5-6b: Adjacent channel selectivity NB-IoT guard band operation Medium Range BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| E-UTRA  channel bandwidth of the lowesthighest carrier received [MHz] | NB-IoT wanted signal mean power [dBm] | Interfering signal mean power [dBm] | Interfering signal centre frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz] | Type of interfering signal |
| 5 | PREFSENS + 10 dB\* | -47 | ±2.5025 | 5MHz E-UTRA signal |
| 10 | PREFSENS + 8 dB\* | -47 | ±2.5075 | 5MHz E-UTRA signal |
| 15 | PREFSENS + 6 dB\* | -47 | ±2.5125 | 5MHz E-UTRA signal |
| 20 | PREFSENS + 6 dB\* | -47 | ±2.5025 | 5MHz E-UTRA signal |
| Note\*: PREFSENS depends on the sub-carrier spacing as specified in TS 36.104 [2] subclause 7.2.1. | | | | |

Table 7.5-6c: Adjacent channel selectivity for NB-IoT standalone Medium Range BS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NB-IoT  channel bandwidth of the lowest/highest carrier received [kHz] | Wanted signal mean power [dBm] | Interfering signal mean power [dBm] | Interfering signal centre frequency offset to the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [kHz] | Type of interfering signal |
| 200 | PREFSENS + 19.5dB\* | -47 | ±100 | 180 kHz NB-IoT signal |
| Note\*: PREFSENS depends on the sub-carrier spacing as specified in TS 36.104 [2] subclause 7.2.1. | | | | |

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The relationship between Minimum Requirements and Test Requirements is defined in subclause 4.1 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex G.

## 7.6 Blocking

### 7.6.1 Definition and applicability

The blocking characteristics is a measure of the receiver ability to receive a wanted signal at its assigned channel in the presence of an unwanted interferer, which are either a 1.4MHz, 3MHz or 5MHz E-UTRA signal for in‑band blocking or a CW signal for out-of-band blocking. The interfering E-UTRA signal shall be as specified in Annex C.

The blocking performance requirement applies as specified in the Tables 7.6-1, 7.6-1a, 7.6-1b, 7.6-1c, 7.6-1d, 7.6-1e, 7.6-2 and 7.6-2a in clause 7.6.5.

Unless otherwise stated, a BS declared to be capable of E-UTRA with NB-IoT in-band and guard band operations is only required to pass the blocking receiver tests for E-UTRA with guard band operation; it is not required to perform the blocking receiver tests again for E-UTRA with in-band operation.

### 7.6.2 Minimum Requirements

The minimum requirement is in TS 36.104 [2] subclause 7.6.1.

### 7.6.3 Test purpose

The test stresses the ability of the BS receiver to withstand high-level interference from unwanted signals at specified frequency offsets without undue degradation of its sensitivity.

### 7.6.4 Method of test

#### 7.6.4.1 Initial conditions

Test environment: normal; see subclause D.2.

RF channels to be tested for single carrier: M see subclause 4.7. The BS shall be configured to operate as close to the centre of the operating band (see Table 5.5-1) as possible.

Base Station RF Bandwidth positions to be tested for multi-carrier and/or CA: MRFBW in single-band operation, see subclause 4.7.1; BRFBW\_T’RFBW and B’RFBW\_TRFBW in multi-band operation, see subclause 4.7.1.

In addition, in multi-band operation:

- For BRFBW\_T’RFBW, out-of-band blocking testing above the highest operating band may be omitted

- For B’RFBW\_TRFBW, out-of-band blocking testing below the lowest operating band may be omitted

Channel bandwidths to be tested:

a) In the interferer frequency range (FUL\_low -20) MHz to (FUL\_high +20) MHz the requirement shall be tested with the lowest and the highest bandwidth supported by the BS.

b) In the interferer frequency ranges 1 MHz to (FUL\_low -20) MHz and (FUL\_high +20) MHz to 12750 MHz the requirement shall be tested only with the lowest bandwidth supported by the BS.

1) Connect the signal generator for the wanted signal and the signal generator for the interfering signal to the antenna connector of one Rx port as shown in Annex I.2.5.

2) Terminate any other Rx port(s) not under test.

3) Generate the wanted signal according to reference measurement channel in annex A.1 to the BS under test. The level of the wanted signal measured at the BS antenna connector shall be set to the level specified in subclause 7.6.5.

#### 7.6.4.2 Procedure

For E-UTRA and E-UTRA with NB-IoT in-band or guard band BS:

1) For FDD BS declared to be capable of single carrier operation only, start BS transmission according to E-TM 1.1 at manufacturer’s declared rated output power.

For a FDD BS declared to be capable of multi-carrier and/or CA operation, set the BS to transmit according to E-TM 1.1 on all carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For BS declared to be capable of NB-IoT in-band or guard band operation single carrier operation only, start BS transmission according to E-TM 1.1 and N-TM at manufacturer’s declared rated output power.

For a BS declared to be capable of NB-IoT in-band or guard band operation multi-carrier, set the BS to transmit according to E-TM 1.1 on all E-UTRA carriers and to N-TM on all NB-IoT carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

The transmitter may be turned off for the out-of-band blocker tests when the frequency of the blocker is such that no IM2 or IM3 products fall inside the bandwidth of the wanted signal.

2) Adjust the signal generators to the type of interfering signals, levels and the frequency offsets as specified in Tables 7.6-1, 7.6-2 and 7.6-3 for E-UTRA Wide Area BS, in Tables 7.6-1a, 7.6-2 and 7.6-4 for E-UTRA Local Area BS, in Table 7.6-1b and 7.6-2 for E-UTRA Home BS, in Table 7.6-1c, 7.6.2 and 7.6-5 for E-UTRA Medium Range BS, in Tables 7.6-1e, 7.6-2b and 7.6-3 for NB-IoT in-band/guard band operation Wide Area BS, in Tables 7.6-1g, 7.6-2b and 7.6-3 for NB-IoT in-band/guard band operation Local Area BS, in Tables 7.6-1i, 7.6-2b and 7.6-3 for NB-IoT in-band/guard band operation Home BS, in Tables 7.6-1k, 7.6-2b and 7.6-3 for NB-IoT in-band/guard band operation Medium Range BS. The E-UTRA interfering signal shall be swept with a step size of 1 MHz starting from the minimum offset to the channel edges of the wanted signal as specified in Table 7.6-2. The CW interfering signal shall be swept with a step size of 1 MHz within the range specified in Tables 7.6-1 and 7.6-3 for E-UTRA Wide Area BS, in Tables 7.6-1a and 7.6-4 for E-UTRA Local Area BS, in Tables 7.6-1b for E-UTRA Home BS, in Tables 7.6-1c and 7.6-5 for E-UTRA Medium Range and in Tables 7.6-1e and 7.6-3 for NB-IoT in-band/guard band operation Wide Area BS, in Tables 7.6-1g and 7.6-3 for NB-IoT in-band/guard band operation Local Area BS, in Tables 7.6-1i and 7.6-3 for NB-IoT in-band/guard band operation Home BS, in Tables 7.6-1k and 7.6-3 for NB-IoT in-band/guard band operation Medium Range BS.

3) Measure the E-UTRA throughput of the wanted signal at the BS receiver according to Annex E, for multi-carrier and/or CA operation the throughput shall be measured for relevant carriers specified by the test configuration specified in subclause 4.10 and 4.11.

For BS declared to be capable of NB-IoT in-band or guard band operation, measure the NB-IoT throughput of the wanted signal at the BS receiver according to Annex E, for multi-carrier the throughput shall be measured for relevant carriers specified by the test configuration specified in subclause 4.10 and 4.11.

4) Interchange the connections of the BS Rx ports and repeat the measurements according to steps (1) to (3).

In addition, for a multi-band capable BS with separate antenna connectors, the following steps shall apply:

5) For single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carrier activated in the other band.

Interfering signal shall first be applied on the same port as the wanted signal. The test shall be repeated with the interfering signal applied on the other port (if any) mapped to the same receiver as the wanted signal. Any antenna connector with no signal applied in case of single-band or multi-band test shall be terminated.

6) Repeat step 5) with the wanted signal for the other band(s) applied on the respective port(s).

For NB-IoT standalone BS:

1) For BS declared to be capable of NB-IoT standalone single carrier only, start BS transmission according to N-TM at manufacturer’s declared rated output power.

For a BS declared to be capable of NB-IoT multi-carrier, set the BS to transmit according to N-TM on all carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

The transmitter may be turned off for the out-of-band blocker tests when the frequency of the blocker is such that no IM2 or IM3 products fall inside the bandwidth of the wanted signal.

2) Adjust the signal generators to the type of interfering signals, levels and the frequency offsets as specified in Tables 7.6-1d, 7.6-2a and 7.6-3 for Wide Area BS, in Tables 7.6-1f, 7.6-2a and 7.6-3 for Local Area BS, in Tables 7.6-1h, 7.6-2a and 7.6-3 for Home BS, in Tables 7.6-1j, 7.6-2a and 7.6-3 for Medium Range BS. The E-UTRA interfering signal shall be swept with a step size of 1 MHz starting from the minimum offset to the channel edges of the wanted signal as specified in Table 7.6-2a. The CW interfering signal shall be swept with a step size of 1 MHz within the range specified in Table 7.6-1d and 7.6-3.

3) Measure the NB-IoT throughput of the wanted signal at the BS receiver according to Annex E, for multi-carrier the throughput shall be measured for relevant carriers specified by the test configuration specified in subclause 4.10 and 4.11.

For E-UTRA and NB-IoT standalone BS:

1) Set the BS to transmit according to E-TM 1.1 on all E-UTRA carriers and according to N-TM on all NB-IoT carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

The transmitter may be turned off for the out-of-band blocker tests when the frequency of the blocker is such that no IM2 or IM3 products fall inside the bandwidth of the wanted signal.

2) a) On the side where E-UTRA signal is positioned:

Adjust the signal generators to the type of interfering signals, levels and the frequency offsets as specified in Tables 7.6-1, 7.6-2 and 7.6-3. The E-UTRA interfering signal shall be swept with a step size of 1 MHz starting from the minimum offset to the channel edges of the wanted signal as specified in Table 7.6-2. The CW interfering signal shall be swept with a step size of 1 MHz within the range specified in Table 7.6-1 and 7.6-3.

b) On the side where NB-IoT signal is positioned:

Adjust the signal generators to the type of interfering signals, levels and the frequency offsets as specified in Tables 7.6-1d, 7.6-2a and 7.6-3 for Wide Area BS, in Tables 7.6-1f, 7.6-2a and 7.6-3 for Local Area BS, in Tables 7.6-1h, 7.6-2a and 7.6-3 for Home BS, in Tables 7.6-1j, 7.6-2a and 7.6-3 for Medium Range BS. The E-UTRA interfering signal shall be swept with a step size of 1 MHz starting from the minimum offset to the channel edges of the wanted signal as specified in Table 7.6-2a. The CW interfering signal shall be swept with a step size of 1 MHz within the range specified in Table 7.6-1d and 7.6-3

3) Measure the E-UTRA throughput of the E-UTRA wanted signal and the NB-IoT throughput of the NB-IoT wanted signal at the BS receiver according to Annex E, for multi-carrier operation the throughput shall be measured for relevant carriers specified by the test configuration specified in subclause 4.10 and 4.11.

4) Interchange the connections of the BS Rx ports and repeat the measurements according to steps (1) to (3).

NOTE 1: For the Public Safety LTE BS in Korea from 718 to 728 MHz in band 28, adjust the input level to the base station under test to the level specified in Table G-2.2 for Wide Area BS, in Table G-2.3 for Local Area BS, in Table G-2.4 for Home BS and in Table G-2.5 for Medium Range BS in annex G.2 of [2].

NOTE 2: For the Public Safety LTE BS in Korea from 718 to 728 MHz in band 28, adjust the interfering signal level to the base station under test to the level specified in Table G-2.2 for Wide Area BS, in Table G-2.3 for Local Area BS, in Table G-2.4 for Home BS and in Table G-2.5 for Medium Range BS in annex G.2 of [2].

### 7.6.5 Test Requirements

#### 7.6.5.1 General requirement

For each measured E-UTRA carrier, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel, with a wanted and an interfering signal coupled to BS antenna input using the parameters in Tables 7.6-1, 7.6-1a, 7.6-1b, 7.6-1c and 7.6-2. The reference measurement channel for the wanted signal is specified in Tables 7.2-1, 7.2-2, 7.2-3 and 7.2-4 for each channel bandwidth and further specified in Annex A.

For each measured NB-IoT carrier, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel, with a wanted and an interfering signal coupled to BS antenna input using the parameters in Tables 7.6-1d, 7.6-1e, 7.6-1f, 7.6-1g, 7.6-1h, 7.6-1i, 7.6-1j, 7.6-1k, 7.6-2a and 7.6-2b. The reference measurement channel for the wanted signal is specified in Table 7.2-5 for each subcarrier spacing option and further specified in Annex A.

The blocking requirement is always applicable outside the Base Station RF Bandwidth or Maximum Radio Bandwidth. The interfering signal offset is defined relative to the Base Station RF Bandwidth edges or Maximum Radio Bandwidth edges.

For a BS operating in non-contiguous spectrum within any operating band, the blocking requirement applies in addition inside any sub-block gap, in case the sub-block gap size is at least as wide as twice the interfering signal minimum offset in Table 7.6-2. The interfering signal offset is defined relative to the sub-block edges inside the sub-block gap.

For a BS capable of multi-band operation, the requirement in the in-band blocking frequency ranges applies for each supported operating band. The requirement applies in addition inside any Inter RF Bandwidth gap, in case the Inter RF Bandwidth gap size is at least as wide as twice the interfering signal minimum offset in Table 7.6-2.

For a BS capable of multi-band operation, the requirement in the out-of-band blocking frequency ranges apply for each operating band, with the exception that the in-band blocking frequency ranges of all supported operating bands according to Tables 7.6-1, 7.6-1a and 7.6-1c shall be excluded from the out-of-band blocking requirement.

For the Public Safety LTE BS in Korea from 718 to 728 MHz in band 28, the wanted and the interfering signal coupled to the BS antenna input are specified in Tables G-2.2, G-2.3, G-2.4 and G-2.5 for the band blocking requirements in annex G.2 of [2]. The reference measurement channel for the wanted signal is A.1-3 for 10 MHz channel bandwidth and further specified in Annex A.

Table 7.6-1: Blocking performance requirement for Wide Area BS for E-UTRA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Operating Band | Centre Frequency of Interfering Signal [MHz] | | | Interfering Signal mean power [dBm] | Wanted Signal mean power [dBm] \* | Interfering signal centre frequency minimum frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz] | Type of Interfering Signal |
| 1-7, 9-11, 13, 14, 18, 19, 21-23, 24, 27, 30, 33-45, 48, 50, 52, 65, 66, 68, 70 | (FUL\_low -20) | to | (FUL\_high +20) | -43 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +20) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 8, 26, 28 | (FUL\_low -20) | to | (FUL\_high +10) | -43 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +10) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 12 | (FUL\_low -20) | to | (FUL\_high +13) | -43 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +13) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 17 | (FUL\_low -20) | to | (FUL\_high +18) | -43 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +18) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 20, 71 | (FUL\_low -11) | to | (FUL\_high +20) | -43 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +20) | to  to | (FUL\_low -11)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 25 | (FUL\_low -20) | to | (FUL\_high +15) | -43 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +15) | to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 31, 72, 73, 74, 87, 88 | (FUL\_low -20) | to | (FUL\_high +5) | -43 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +5) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 85 | (FUL\_low -20) | to | (FUL\_high +12) | -43 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 | |
| 1  (FUL\_high +12) | to  to | (FUL\_low -20) | -15 | PREFSENS +6dB | ⎯ | CW carrier | |
| Note\*: PREFSENS depends on the channel bandwidth as specified in TS 36.104 [2] subclause 7.2.1.  Note\*\*: For a BS capable of multiband operation, in case of interfering signal that is not in the in-band blocking frequency range of the operating band where the wanted signal is present, and not in the in-band blocking frequency range of an adjacent or overlapping operating band, the wanted signal mean power is equal to PREFSENS + 1.4 dB. | | | | | | | |

NOTE: Table 7.6-1 assumes that two operating bands, where the downlink operating band (see Table 5.5-1) of one band would be within the in-band blocking region of the other band, are not deployed in the same geographical area.

Table 7.6-1a: Blocking performance requirement for Local Area BS for E-UTRA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Operating Band | Centre Frequency of Interfering Signal [MHz] | | | Interfering Signal mean power [dBm] | Wanted Signal mean power [dBm] \* | Interfering signal centre frequency minimum frequency offset from the lower(upper) edge or sub-block edge inside a sub-block gap [MHz] | Type of Interfering Signal |
| 1-7, 9-11, 13-14, 18,19,21-23, 24, 27, 30, 33-45, 48-53, 65, 66, 68, 70 | (FUL\_low -20) | to | (FUL\_high +20) | -35 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +20) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 8, 26, 28 | (FUL\_low -20) | to | (FUL\_high +10) | -35 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +10) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 12 | (FUL\_low -20) | to | (FUL\_high +13) | -35 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +13) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 17 | (FUL\_low -20) | to | (FUL\_high +18) | -35 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +18) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 20, 71 | (FUL\_low -11) | to | (FUL\_high +20) | -35 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +20) | to  to | (FUL\_low -11)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 25 | (FUL\_low -20) | to | (FUL\_high +15) | -35 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +15) | to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 31, 72, 73, 74, 87, 88 | (FUL\_low -20) | to | (FUL\_high +5) | -35 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +5) | to  to | (FUL\_low -20) | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 46 | (FUL\_low -20) | to | (FUL\_high +20) | -35 | PREFSENS +6dB\* | See table 7.6-2 | See table 7.6-2 |
| (FUL\_low -500)  (FUL\_high +20) | to  to | (FUL\_low -20)  (FUL\_high +500) | -35 | PREFSENS +6dB\* | ⎯ | CW carrier |
| 1  (FUL\_high +500) | to  to | (FUL\_low -500)  12750 | -15 | PREFSENS +6dB\* | ⎯ | CW carrier |
| 85 | (FUL\_low -20) | to | (FUL\_high +12) | -35 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 | |
| 1  (FUL\_high +12) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier | |
| Note\*: PREFSENS depends on the channel bandwidth as specified in TS 36.104 [2] subclause 7.2.1.  Note\*\*: For a BS capable of multiband operation, in case of interfering signal that is not in the in-band blocking frequency range of the operating band where the wanted signal is present, and not in the in-band blocking frequency range of an adjacent or overlapping operating band, the wanted signal mean power is equal to PREFSENS + 1.4 dB. | | | | | | | |

NOTE: Table 7.6-1a assumes that two operating bands, where the downlink operating band (see Table 5.5-1) of one band would be within the in-band blocking region of the other band, are not deployed in the same geographical area.

Table 7.6-1b: Blocking performance requirement for Home BS for E-UTRA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Operating Band | Centre Frequency of Interfering Signal [MHz] | | | Interfering Signal mean power [dBm] | Wanted Signal mean power [dBm] \* | Interfering signal centre frequency minimum frequency offset from the channel edge of the wanted signal [MHz] | Type of Interfering Signal |
| 1-7, 9-11, 13, 14, 18,19, 21-23, 24, 27, 30, 33-44, 48, 50-52, 65, 66, 68, 70 | (FUL\_low -20) | to | (FUL\_high +20) | -27 | PREFSENS +14dB | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +20) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +14dB | ⎯ | CW carrier |
| 8, 26, 28 | (FUL\_low -20) | to | (FUL\_high +10) | -27 | PREFSENS +14dB | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +10) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +14dB | ⎯ | CW carrier |
| 12 | (FUL\_low -20) | to | (FUL\_high +13) | -27 | PREFSENS +14dB | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +13) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +14dB | ⎯ | CW carrier |
| 17 | (FUL\_low -20) | to | (FUL\_high +18) | -27 | PREFSENS +14dB | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +18) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +14dB | ⎯ | CW carrier |
| 20, 71 | (FUL\_low -11) | to | (FUL\_high +20) | -27 | PREFSENS +14dB | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +20) | to  to | (FUL\_low -11)  12750 | -15 | PREFSENS +14dB | ⎯ | CW carrier |
| 25 | (FUL\_low -20) | to | (FUL\_high +15) | -27 | PREFSENS +14dB | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +15) | to | (FUL\_low -20)  12750 | -15 | PREFSENS +14dB | ⎯ | CW carrier |
| 74 | (FUL\_low -20) | to | (FUL\_high +5) | -27 | PREFSENS +14dB | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +5) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +14dB | ⎯ | CW carrier |
| 85 | (FUL\_low -20) | to | (FUL\_high +12) | -27 | PREFSENS +14dB | See table 7.6-2 | See table 7.6-2 | |
| 1  (FUL\_high +12) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +14dB | ⎯ | CW carrier | |
| Note\*: PREFSENS depends on the channel bandwidth as specified in TS 36.104 [2] subclause 7.2.1. | | | | | | | |

NOTE: Table 7.6-1b assumes that two operating bands, where the downlink operating band (see Table 5.5-1) of one band would be within the in-band blocking region of the other band, are not deployed in the same geographical area.

Table 7.6-1c: Blocking performance requirement for Medium Range BS for E-UTRA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Operating Band | Centre Frequency of Interfering Signal [MHz] | | | Interfering Signal mean power [dBm] | Wanted Signal mean power [dBm] \* | Interfering signal centre frequency minimum frequency offset to the lower (higher) edge or sub-block edge inside a sub-block gap [MHz] | Type of Interfering Signal |
| 1-7, 9-11, 13, 14, 18,19, 21-23, 24, 27, 30, 33-45, 48, 50, 52-53, 65, 66, 68, 70 | (FUL\_low -20) | to | (FUL\_high +20) | -38 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +20) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 8, 26, 28 | (FUL\_low -20) | to | (FUL\_high +10) | -38 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +10) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 12 | (FUL\_low -20) | to | (FUL\_high +13) | -38 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +13) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 17 | (FUL\_low -20) | to | (FUL\_high +18) | -38 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +18) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 20, 71 | (FUL\_low -11) | to | (FUL\_high +20) | -38 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +20) | to  to | (FUL\_low -11)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 25 | (FUL\_low -20) | to | (FUL\_high +15) | -38 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +15) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 31, 72, 73, 74, 87, 88 | (FUL\_low -20) | to | (FUL\_high +5) | -38 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 |
| 1  (FUL\_high +5) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier |
| 46 | (FUL\_low -20) | to | (FUL\_high +20) | -38 | PREFSENS +6dB\* | See table 7.6-2 | See table 7.6-2 |
| (FUL\_low -500)  (FUL\_high +20) | to  to | (FUL\_low -20)  (FUL\_high +500) | -35 | PREFSENS +6dB\* | ⎯ | CW carrier |
| 1  (FUL\_high +500) | to  to | (FUL\_low -500)  12750 | -15 | PREFSENS +6dB\* | ⎯ | CW carrier |
| 85 | (FUL\_low -20) | to | (FUL\_high +12) | -38 | PREFSENS +6dB\*\* | See table 7.6-2 | See table 7.6-2 | |
| 1  (FUL\_high +12) | to  to | (FUL\_low -20)  12750 | -15 | PREFSENS +6dB | ⎯ | CW carrier | |
| Note\*: PREFSENS depends on the channel bandwidth as specified in TS 36.104 [2] subclause 7.2.1.  Note\*\*: For a BS capable of multiband operation, in case of interfering signal that is not in the in-band blocking frequency range of the operating band where the wanted signal is present, and not in the in-band blocking frequency range of an adjacent or overlapping operating band, the wanted signal mean power is equal to PREFSENS + 1.4 dB. | | | | | | | |

NOTE: Table 7.6-1c assumes that two operating bands, where the downlink operating band (see Table 5.5-1) of one band would be within the in-band blocking region of the other band, are not deployed in the same geographical area.

Table 7.6.1d: Blocking performance requirement for Wide Area BS for NB-IoT standalone operation

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Operating Band | | Centre Frequency of Interfering Signal [MHz] | | | Interfering Signal mean power [dBm] | Wanted Signal mean power [dBm] | Interfering signal centre frequency minimum frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz] | Type of Interfering Signal |
| 1-5, 7, 11, 13-14,18,19, 21, 26, 42, 43, 65, 66, 70 | | (FUL\_low -20) | to | (FUL\_high +20) | -43 | PREFSENS +6dB\* | See table 7.6.2a | See table 7.6. 2a |
| 1  (FUL\_high +20) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 8, 26, 28 | | (FUL\_low -20) | to | (FUL\_high +10) | -43 | PREFSENS +6dB\* | See table 7.6.2a | See table 7.6. 2a |
| 1  (FUL\_high +10) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 12 | | (FUL\_low -20) | to | (FUL\_high +13) | -43 | PREFSENS +6dB\* | See table 7.6. 2a | See table 7.6. 2a |
| 1  (FUL\_high +13) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 17 | | (FUL\_low -20) | to | (FUL\_high +18) | -43 | PREFSENS +6dB\* | See table 7.6. 2a | See table 7.6. 2a |
| 1  (FUL\_high +18) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 20, 71 | | (FUL\_low -11) | to | (FUL\_high +20) | -43 | PREFSENS +6dB\* | See table 7.6. 2a | See table 7.6. 2a |
| 1  (FUL\_high +20) | to  to | (FUL\_low -11)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 25 | | (FUL\_low -20) | to | (FUL\_high +15) | -43 | PREFSENS +6dB\* | See table 7.6-2a | See table 7.6-2a |
| 1  (FUL\_high +15) | to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 31, 72, 73, 74, 87, 88 | | (FUL\_low -20) | to | (FUL\_high +5) | -43 | PREFSENS +6dB\* | See table 7.6-2a | See table 7.6-2a |
| 1  (FUL\_high +5) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 85 | | (FUL\_low -20) | to | (FUL\_high +12) | -43 | PREFSENS +6dB\* | See table 7.6. 2a | See table 7.6. 2a | |
| 1  (FUL\_high +12) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier | |
|  |  | Note\*: PREFSENS is specified in TS 36.104 [2] subclause 7.2.1  Note\*\*: Up to 24 exceptions are allowed for spurious response frequencies in each wanted signal frequency when measured using a 1MHz step size. For these exceptions the above throughput requirement shall be met when the blocking signal is set to a level of -40 dBm for 15 kHz subcarrier spacing and -46 dBm for 3.75 kHz subcarrier spacing. In addition, each group of exceptions shall not exceed three contiguous measurements using a 1MHz step size. | | | | | | |

NOTE: Table 7.6.1d assumes that two operating bands, where the downlink operating band (see Table 5.5-1) of one band would be within the in-band blocking region of the other band, are not deployed in the same geographical area.

Table 7.6.1e: Blocking performance requirement for Wide Area BS for E-UTRA with NB-IoT in-band/guard band operation

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Operating Band | Centre Frequency of Interfering Signal [MHz] | | | Interfering Signal mean power [dBm] | Wanted Signal mean power [dBm] | Interfering signal centre frequency minimum frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz] | Type of Interfering Signal |
| 1-5, 7, 11, 13-14,18,19, 21, 26, 42, 43, 65, 66, 70 | (FUL\_low -20) | to | (FUL\_high +20) | -43 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +20) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 8, 26, 28 | (FUL\_low -20) | to | (FUL\_high +10) | -43 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +10) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 12 | (FUL\_low -20) | to | (FUL\_high +13) | -43 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +13) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 17 | (FUL\_low -20) | to | (FUL\_high +18) | -43 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +18) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 20, 71 | (FUL\_low -11) | to | (FUL\_high +20) | -43 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +20) | to  to | (FUL\_low -11)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 25 | (FUL\_low -20) | to | (FUL\_high +15) | -43 | PREFSENS +6dB\* | See table 7.6-2b | See table 7.6-2b |
| 1  (FUL\_high +15) | to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 31, 72, 73, 74, 87, 88 | (FUL\_low -20) | to | (FUL\_high +5) | -43 | PREFSENS +6dB\* | See table 7.6-2b | See table 7.6-2b |
| 1  (FUL\_high +5) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 85 | (FUL\_low -20) | to | (FUL\_high +12) | -43 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b | |
| 1  (FUL\_high +12) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier | |
| Note\*: PREFSENS depends on the channel bandwidth or supported subcarrier spacing as specified in TS 36.104 [2] subclause 7.2.1.  Note\*\*: For a BS capable of multiband operation, in case of interfering signal that is not in the in-band blocking frequency range of the operating band where the wanted signal is present, the wanted signal mean power is equal to PREFSENS + 1.4 dB.  Note\*\*\*: For NB-IoT, up to 24 exceptions are allowed for spurious response frequencies in each wanted signal frequency when measured using a 1MHz step size. For these exceptions the above throughput requirement shall be met when the blocking signal is set to a level of -40 dBm for 15 kHz subcarrier spacing and -46 dBm for 3.75 kHz subcarrier spacing. In addition, each group of exceptions shall not exceed three contiguous measurements using a 1MHz step size. | | | | | | | |

NOTE: Table 7.6.1e assumes that two operating bands, where the downlink operating band (see Table 5.5-1) of one band would be within the in-band blocking region of the other band, are not deployed in the same geographical area.

Table 7.6.1f: Blocking performance requirement for Local Area BS for NB-IoT standalone operation

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Operating Band** | **Centre Frequency of Interfering Signal [MHz]** | | | **Interfering Signal mean power [dBm]** | **Wanted Signal mean power [dBm]** | **Interfering signal centre frequency minimum frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz]** | **Type of Interfering Signal** |
| 1-5, 7, 11, 13-14,18,19, 21, 26, 42, 43, 65, 66, 70 | (FUL\_low -20) | to | (FUL\_high +20) | -35 | PREFSENS +6dB\* | See table 7.6.2a | See table 7.6. 2a |
| 1  (FUL\_high +20) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 8, 26, 28 | (FUL\_low -20) | to | (FUL\_high +10) | -35 | PREFSENS +6dB\* | See table 7.6.2a | See table 7.6. 2a |
| 1  (FUL\_high +10) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 12 | (FUL\_low -20) | to | (FUL\_high +13) | -35 | PREFSENS +6dB\* | See table 7.6. 2a | See table 7.6. 2a |
| 1  (FUL\_high +13) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 17 | (FUL\_low -20) | to | (FUL\_high +18) | -35 | PREFSENS +6dB\* | See table 7.6. 2a | See table 7.6. 2a |
| 1  (FUL\_high +18) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 20, 71 | (FUL\_low -11) | to | (FUL\_high +20) | -35 | PREFSENS +6dB\* | See table 7.6. 2a | See table 7.6. 2a |
| 1  (FUL\_high +20) | to  to | (FUL\_low -11)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 25 | (FUL\_low -20) | to | (FUL\_high +15) | -35 | PREFSENS +6dB\* | See table 7.6-2a | See table 7.6-2a |
| 1  (FUL\_high +15) | to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 31, 72, 74, 87, 88 | (FUL\_low -20) | to | (FUL\_high +5) | -35 | PREFSENS +6dB\* | See table 7.6-2a | See table 7.6-2a |
| 1  (FUL\_high +5) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 85 | (FUL\_low -20) | to | (FUL\_high +12) | -35 | PREFSENS +6dB\* | See table 7.6. 2a | See table 7.6. 2a | |
| 1  (FUL\_high +12) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier | |
| Note\*: PREFSENS is specified in TS 36.104 [2] subclause 7.2.1  Note\*\*: Up to 24 exceptions are allowed for spurious response frequencies in each wanted signal frequency when measured using a 1MHz step size. For these exceptions the above throughput requirement shall be met when the blocking signal is set to a level of -40 dBm for 15 kHz subcarrier spacing and -46 dBm for 3.75 kHz subcarrier spacing. In addition, each group of exceptions shall not exceed three contiguous measurements using a 1MHz step size. | | | | | | | |

NOTE: Table 7.6.1f assumes that two operating bands, where the downlink operating band (see Table 5.5-1) of one band would be within the in-band blocking region of the other band, are not deployed in the same geographical area.

Table 7.6.1g: Blocking performance requirement for Local Area BS for E-UTRA with NB-IoT in-band/guard band operation

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Operating Band** | **Centre Frequency of Interfering Signal [MHz]** | | | **Interfering Signal mean power [dBm]** | **Wanted Signal mean power [dBm]** | **Interfering signal centre frequency minimum frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz]** | **Type of Interfering Signal** |
| 1-5, 7, 11, 13-14,18,19, 21, 26, 42, 43, 65, 66, 70 | (FUL\_low -20) | to | (FUL\_high +20) | -35 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +20) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 8, 26, 28 | (FUL\_low -20) | to | (FUL\_high +10) | -35 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +10) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 12 | (FUL\_low -20) | to | (FUL\_high +13) | -35 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +13) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 17 | (FUL\_low -20) | to | (FUL\_high +18) | -35 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +18) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 20, 71 | (FUL\_low -11) | to | (FUL\_high +20) | -35 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +20) | to  to | (FUL\_low -11)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 25 | (FUL\_low -20) | to | (FUL\_high +15) | -35 | PREFSENS +6dB\* | See table 7.6-2b | See table 7.6-2b |
| 1  (FUL\_high +15) | to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 31, 72, 74, 87, 88 | (FUL\_low -20) | to | (FUL\_high +5) | -35 | PREFSENS +6dB\* | See table 7.6-2b | See table 7.6-2b |
| 1  (FUL\_high +5) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 85 | (FUL\_low -20) | to | (FUL\_high +12) | -35 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b | |
| 1  (FUL\_high +12) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier | |
| Note\*: PREFSENS depends on the channel bandwidth or supported subcarrier spacing as specified in TS 36.104 [2] subclause 7.2.1.  Note\*\*: For a BS capable of multiband operation, in case of interfering signal that is not in the in-band blocking frequency range of the operating band where the wanted signal is present, the wanted signal mean power is equal to PREFSENS + 1.4 dB.  Note\*\*\*: For NB-IoT, up to 24 exceptions are allowed for spurious response frequencies in each wanted signal frequency when measured using a 1MHz step size. For these exceptions the above throughput requirement shall be met when the blocking signal is set to a level of -40 dBm for 15 kHz subcarrier spacing and -46 dBm for 3.75 kHz subcarrier spacing. In addition, each group of exceptions shall not exceed three contiguous measurements using a 1MHz step size. | | | | | | | |

NOTE: Table 7.6.1g assumes that two operating bands, where the downlink operating band (see Table 5.5-1) of one band would be within the in-band blocking region of the other band, are not deployed in the same geographical area.

Table 7.6.1h: Blocking performance requirement for Home BS for NB-IoT standalone operation

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Operating Band** | **Centre Frequency of Interfering Signal [MHz]** | | | **Interfering Signal mean power [dBm]** | **Wanted Signal mean power [dBm]** | **Interfering signal centre frequency minimum frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz]** | **Type of Interfering Signal** |
| 1-5, 7,11, 13-14,18,19, 21, 26, 42, 43, 65, 66, 70 | (FUL\_low -20) | to | (FUL\_high +20) | -27 | PREFSENS +14dB\* | See table 7.6.2a | See table 7.6. 2a |
| 1  (FUL\_high +20) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +14dB\* | ⎯ | CW carrier |
| 8, 26, 28 | (FUL\_low -20) | to | (FUL\_high +10) | -27 | PREFSENS +14dB\* | See table 7.6.2a | See table 7.6. 2a |
| 1  (FUL\_high +10) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +14dB\* | ⎯ | CW carrier |
| 12 | (FUL\_low -20) | to | (FUL\_high +13) | -27 | PREFSENS +14dB\* | See table 7.6. 2a | See table 7.6. 2a |
| 1  (FUL\_high +13) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +14dB\* | ⎯ | CW carrier |
| 17 | (FUL\_low -20) | to | (FUL\_high +18) | -27 | PREFSENS +14dB\* | See table 7.6. 2a | See table 7.6. 2a |
| 1  (FUL\_high +18) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +14B\* | ⎯ | CW carrier |
| 20, 71 | (FUL\_low -11) | to | (FUL\_high +20) | -27 | PREFSENS +14dB\* | See table 7.6. 2a | See table 7.6. 2a |
| 1  (FUL\_high +20) | to  to | (FUL\_low -11)  12750 | -15\*\* | PREFSENS +14dB\* | ⎯ | CW carrier |
| 25 | (FUL\_low -20) | to | (FUL\_high +15) | -27 | PREFSENS +14dB\* | See table 7.6-2a | See table 7.6-2a |
| 1  (FUL\_high +15) | to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +14dB\* | ⎯ | CW carrier |
| 74 | (FUL\_low -20) | to | (FUL\_high +5) | -27 | PREFSENS +14dB\* | See table 7.6-2a | See table 7.6-2a |
| 1  (FUL\_high +5) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +14dB\* | ⎯ | CW carrier |
| 85 | (FUL\_low -20) | to | (FUL\_high +12) | -27 | PREFSENS +14dB\* | See table 7.6. 2a | See table 7.6. 2a | |
| 1  (FUL\_high +12) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +14dB\* | ⎯ | CW carrier | |
| Note\*: PREFSENS is specified in TS 36.104 [2] subclause 7.2.1  Note\*\*: Up to 24 exceptions are allowed for spurious response frequencies in each wanted signal frequency when measured using a 1MHz step size. For these exceptions the above throughput requirement shall be met when the blocking signal is set to a level of -40 dBm for 15 kHz subcarrier spacing and -46 dBm for 3.75 kHz subcarrier spacing. In addition, each group of exceptions shall not exceed three contiguous measurements using a 1MHz step size. | | | | | | | |

NOTE: Table 7.6.1h assumes that two operating bands, where the downlink operating band (see Table 5.5-1) of one band would be within the in-band blocking region of the other band, are not deployed in the same geographical area.

Table 7.6.1i: Blocking performance requirement for Home BS for E-UTRA with NB-IoT in-band/guard band operation

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Operating Band** | **Centre Frequency of Interfering Signal [MHz]** | | | **Interfering Signal mean power [dBm]** | **Wanted Signal mean power [dBm]** | **Interfering signal centre frequency minimum frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz]** | **Type of Interfering Signal** |
| 1-5, 7, 11, 13-14,18,19, 21, 26, 42, 43, 65, 66, 70 | (FUL\_low -20) | to | (FUL\_high +20) | -27 | PREFSENS +14dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +20) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +14dB\* | ⎯ | CW carrier |
| 8, 26, 28 | (FUL\_low -20) | to | (FUL\_high +10) | -27 | PREFSENS +14dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +10) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +14dB\* | ⎯ | CW carrier |
| 12 | (FUL\_low -20) | to | (FUL\_high +13) | -27 | PREFSENS +14dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +13) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +14dB\* | ⎯ | CW carrier |
| 17 | (FUL\_low -20) | to | (FUL\_high +18) | -27 | PREFSENS +14dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +18) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +14dB\* | ⎯ | CW carrier |
| 20, 71 | (FUL\_low -11) | to | (FUL\_high +20) | -27 | PREFSENS +14dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +20) | to  to | (FUL\_low -11)  12750 | -15\*\* | PREFSENS +14dB\* | ⎯ | CW carrier |
| 25 | (FUL\_low -20) | to | (FUL\_high +15) | -27 | PREFSENS +14dB\* | See table 7.6-2b | See table 7.6-2b |
| 1  (FUL\_high +15) | to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +14dB\* | ⎯ | CW carrier |
| 74 | (FUL\_low -20) | to | (FUL\_high +5) | -27 | PREFSENS +14dB\* | See table 7.6-2b | See table 7.6-2b |
| 1  (FUL\_high +5) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +14dB\* | ⎯ | CW carrier |
| 85 | (FUL\_low -20) | to | (FUL\_high +12) | -27 | PREFSENS +14dB\* | See table 7.6.2b | See table 7.6.2b | |
| 1  (FUL\_high +12) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +14dB\* | ⎯ | CW carrier | |
| Note\*: PREFSENS depends on the channel bandwidth or supported subcarrier spacing as specified in TS 36.104 [2] subclause 7.2.1.  Note\*\*: For NB-IoT, up to 24 exceptions are allowed for spurious response frequencies in each wanted signal frequency when measured using a 1MHz step size. For these exceptions the above throughput requirement shall be met when the blocking signal is set to a level of -40 dBm for 15 kHz subcarrier spacing and -46 dBm for 3.75 kHz subcarrier spacing. In addition, each group of exceptions shall not exceed three contiguous measurements using a 1MHz step size. | | | | | | | |

NOTE: Table 7.6.1i assumes that two operating bands, where the downlink operating band (see Table 5.5-1) of one band would be within the in-band blocking region of the other band, are not deployed in the same geographical area.

Table 7.6.1j: Blocking performance requirement for Medium Range BS for NB-IoT standalone operation

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Operating Band** | **Centre Frequency of Interfering Signal [MHz]** | | | **Interfering Signal mean power [dBm]** | **Wanted Signal mean power [dBm]** | **Interfering signal centre frequency minimum frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz]** | **Type of Interfering Signal** |
| 1-5, 7, 11, 13-14,18,19, 21, 26, 42, 43, 65, 66, 70 | (FUL\_low -20) | to | (FUL\_high +20) | -38 | PREFSENS +6dB\* | See table 7.6.2a | See table 7.6. 2a |
| 1  (FUL\_high +20) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 8, 26, 28 | (FUL\_low -20) | to | (FUL\_high +10) | -38 | PREFSENS +6dB\* | See table 7.6.2a | See table 7.6. 2a |
| 1  (FUL\_high +10) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 12 | (FUL\_low -20) | to | (FUL\_high +13) | -38 | PREFSENS +6dB\* | See table 7.6. 2a | See table 7.6. 2a |
| 1  (FUL\_high +13) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 17 | (FUL\_low -20) | to | (FUL\_high +18) | -38 | PREFSENS +6dB\* | See table 7.6. 2a | See table 7.6. 2a |
| 1  (FUL\_high +18) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 20, 71 | (FUL\_low -11) | to | (FUL\_high +20) | -38 | PREFSENS +6dB\* | See table 7.6. 2a | See table 7.6. 2a |
| 1  (FUL\_high +20) | to  to | (FUL\_low -11)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 25 | (FUL\_low -20) | to | (FUL\_high +15) | -38 | PREFSENS +6dB\* | See table 7.6-2a | See table 7.6-2a |
| 1  (FUL\_high +15) | to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 31, 72, 74, 87, 88 | (FUL\_low -20) | to | (FUL\_high +5) | -38 | PREFSENS +6dB\* | See table 7.6-2a | See table 7.6-2a |
| 1  (FUL\_high +5) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 85 | (FUL\_low -20) | to | (FUL\_high +12) | -38 | PREFSENS +6dB\* | See table 7.6. 2a | See table 7.6. 2a | |
| 1  (FUL\_high +12) | to  to | (FUL\_low -20)  12750 | -15\*\* | PREFSENS +6dB\* | ⎯ | CW carrier | |
| Note\*: PREFSENS is specified in TS 36.104 [2] subclause 7.2.1  Note\*\*: Up to 24 exceptions are allowed for spurious response frequencies in each wanted signal frequency when measured using a 1MHz step size. For these exceptions the above throughput requirement shall be met when the blocking signal is set to a level of -40 dBm for 15 kHz subcarrier spacing and -46 dBm for 3.75 kHz subcarrier spacing. In addition, each group of exceptions shall not exceed three contiguous measurements using a 1MHz step size. | | | | | | | |

NOTE: Table 7.6.1j assumes that two operating bands, where the downlink operating band (see Table 5.5-1) of one band would be within the in-band blocking region of the other band, are not deployed in the same geographical area.

Table 7.6.1k: Blocking performance requirement for Medium Range BS for E-UTRA with NB-IoT in-band/guard band operation

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Operating Band** | **Centre Frequency of Interfering Signal [MHz]** | | | **Interfering Signal mean power [dBm]** | **Wanted Signal mean power [dBm]** | **Interfering signal centre frequency minimum frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz]** | **Type of Interfering Signal** |
| 1-5, 7, 11, 13-14,18,19, 21, 26, 42, 43, 65, 66, 70 | (FUL\_low -20) | to | (FUL\_high +20) | -38 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +20) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 8, 26, 28 | (FUL\_low -20) | to | (FUL\_high +10) | -38 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +10) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 12 | (FUL\_low -20) | to | (FUL\_high +13) | -38 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +13) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 17 | (FUL\_low -20) | to | (FUL\_high +18) | -38 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +18) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 20, 71 | (FUL\_low -11) | to | (FUL\_high +20) | -38 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +20) | to  to | (FUL\_low -11)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 25 | (FUL\_low -20) | to | (FUL\_high +15) | -38 | PREFSENS +6dB\* | See table 7.6-2b | See table 7.6-2b |
| 1  (FUL\_high +15) | to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 31, 72, 74, 87, 88 | (FUL\_low -20) | to | (FUL\_high +5) | -38 | PREFSENS +6dB\* | See table 7.6-2b | See table 7.6-2b |
| 1  (FUL\_high +5) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| 85 | (FUL\_low -20) | to | (FUL\_high +12) | -38 | PREFSENS +6dB\* | See table 7.6.2b | See table 7.6.2b |
| 1  (FUL\_high +12) | to  to | (FUL\_low -20)  12750 | -15\*\*\* | PREFSENS +6dB\* | ⎯ | CW carrier |
| Note\*: PREFSENS depends on the channel bandwidth or supported subcarrier spacing as specified in TS 36.104 [2] subclause 7.2.1.  Note\*\*: For a BS capable of multiband operation, in case of interfering signal that is not in the in-band blocking frequency range of the operating band where the wanted signal is present, the wanted signal mean power is equal to PREFSENS + 1.4 dB.  Note\*\*\*: For NB-IoT, up to 24 exceptions are allowed for spurious response frequencies in each wanted signal frequency when measured using a 1MHz step size. For these exceptions the above throughput requirement shall be met when the blocking signal is set to a level of -40 dBm for 15 kHz subcarrier spacing and -46 dBm for 3.75 kHz subcarrier spacing. In addition, each group of exceptions shall not exceed three contiguous measurements using a 1MHz step size. | | | | | | | |

NOTE: Table 7.6.1k assumes that two operating bands, where the downlink operating band (see Table 5.5-1) of one band would be within the in-band blocking region of the other band, are not deployed in the same geographical area.

Table 7.6-2: Interfering signals for blocking performance requirement

|  |  |  |
| --- | --- | --- |
| E-UTRA  channel BW of the lowest/highest carrier received [MHz] | Interfering signal centre frequency minimum offset to the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz] | Type of interfering signal |
| 1.4 | ±2.1 | 1.4MHz E-UTRA signal |
| 3 | ±4.5 | 3MHz E-UTRA signal |
| 5 | ±7.5 | 5MHz E-UTRA signal |
| 10 | ±7.5 | 5MHz E-UTRA signal |
| 15 | ±7.5 | 5MHz E-UTRA signal |
| 20 | ±7.5 | 5MHz E-UTRA signal (Note 1) |
| 20 | ±30 | 20 MHz E-UTRA signal (Note 2) |
| Note 1: This type of interfering signal is not applied for Band 46.  Note 2: This type of interfering signal is only applied for Band 46. | | |

Table 7.6.2a: Interfering signals for blocking performance requirement for NB-IoT standalone operation

|  |  |  |
| --- | --- | --- |
| NB-IoT channel BW of the lowest/highest carrier received [MHz] | Interfering signal centre frequency minimum offset to the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz] | Type of interfering signal |
| 0.2 | ±7.5 | 5MHz E-UTRA signal |

Table 7.6-2b: Interfering signals for blocking performance requirement for E-UTRA with NB-IoT in-band/guard band operation

|  |  |  |
| --- | --- | --- |
| E-UTRA  channel BW of the lowest/highest carrier received [MHz] | Interfering signal centre frequency minimum offset to the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap [MHz] | Type of interfering signal |
| 3 | ±4.5 | 3MHz E-UTRA signal |
| 5 | ±7.5 | 5MHz E-UTRA signal |
| 10 | ±7.5 | 5MHz E-UTRA signal |
| 15 | ±7.5 | 5MHz E-UTRA signal |
| 20 | ±7.5 | 5MHz E-UTRA signal |

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The relationship between Minimum Requirements and Test Requirements is defined in subclause 4.1 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex G.

#### 7.6.5.2 Co-location with other base stations

This additional blocking requirement may be applied for the protection of E-UTRA BS or NB-IoT receivers when GSM, CMDA, UTRA, NR or E-UTRA BS operating in a different frequency band are co-located with an E-UTRA or NB-IoT BS. The requirement is applicable to all channel bandwidths supported by the E-UTRA BS.

The requirements in this clause assume a 30 dB coupling loss between interfering transmitter and E-UTRA or NB-IoT BS receiver and are based on co-location with base stations of the same class.

For each measured E-UTRA carrier, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel, with a wanted and an interfering signal coupled to BS antenna input using the parameters in Table 7.6-3 for Wide Area BS, in Table 7.6-4 for Local Area BS and in Table 7.6-5 for Medium Range BS. The reference measurement channel for the wanted signal is specified in Tables 7.2-1, 7.2-2 and 7.2-4 for each channel bandwidth and further specified in Annex A.

For each measured NB-IoT carrier, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel, with a wanted and an interfering signal coupled to BS antenna input using the parameters in Table 7.6-3 for Wide Area BS. The reference measurement channel for the wanted signal is specified in Tables 7.2-5 for each channel sub-carrier spacing option and further specified in Annex A.

Table 7.6-3: Blocking performance requirement for E-UTRA and NB-IoT Wide Area BS when co-located with BS in other frequency bands.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Co-located BS type | Centre Frequency of Interfering Signal (MHz) | Interfering Signal mean power (dBm) | Wanted Signal mean power (dBm) | Type of Interfering Signal |
| Macro GSM850 or CDMA850 | 869 – 894 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| Macro GSM900 | 921 – 960 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| Macro DCS1800 | 1805 – 1880 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| Macro PCS1900 | 1930 – 1990 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band I or E-UTRA Band 1 or NR band n1 | 2110 – 2170 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band II or E-UTRA Band 2 or NR band n2 | 1930 – 1990 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band III or E-UTRA Band 3 or NR band n3 | 1805 – 1880 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band IV or E-UTRA Band 4 | 2110 – 2155 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band V or E-UTRA Band 5 or NR band n5 | 869 – 894 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band VI or E-UTRA Band 6 | 875 – 885 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band VII or E-UTRA Band 7 or NR band n7 | 2620 – 2690 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band VIII or E-UTRA Band 8 or NR band n8 | 925 – 960 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band IX or E-UTRA Band 9 | 1844.9 – 1879.9 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band X or E-UTRA Band 10 | 2110 – 2170 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band XI or E-UTRA Band 11 | 1475.9 –1495.9 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band XII or E-UTRA Band 12 or NR band n12 | 729 - 746 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band XIIII or E-UTRA Band 13 | 746 - 756 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band XIV or E-UTRA Band 14 or NR Band n14 | 758 - 768 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 17 | 734 - 746 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 18 | 860 - 875 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band XIX or E-UTRA Band 19 | 875 - 890 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band XX or E-UTRA Band 20 or NR band n20 | 791 - 821 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 24 | 1525 – 1559 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band XXI or E-UTRA Band 21 | 1495.9 – 1510.9 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band XXII or E-UTRA Band 22 | 3510 – 3590 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 23 | 2180-2200 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band XXV or E-UTRA Band 25 or NR band n25 | 1930 – 1995 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band XXVI or E-UTRA Band 26 or NR Band n26 | 859 – 894 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 27 | 852 - 869 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 28 or NR band n28 | 758 – 803 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 29 or NR Band n29 | 717 – 728 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 30 or NR Band n30 | 2350 – 2360 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 31 | 462.5 – 467.5 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA FDD Band XXXII or E-UTRA Band 32 | 1452-1496  (NOTE 3) | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA TDD Band a) or E-UTRA in Band 33 | 1900-1920 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA TDD Band a) or E-UTRA in Band 34 or NR band n34 | 2010-2025 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA TDD Band b) or E-UTRA in Band 35 | 1850-1910 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA TDD Band b) or E-UTRA in Band 36 | 1930-1990 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA TDD Band c) or E-UTRA Band 37 | 1910-1930 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA TDD Band d) or E-UTRA Band 38 or NR band n38 | 2570-2620 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA TDD Band f) or E-UTRA Band 39 or NR band n39 | 1880-1920 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA UTRA TDD Band e) or E-UTRA Band 40 or NR band n40 | 2300-2400 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 41 or NR band n41 | 2496-2690 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 42 | 3400 - 3600 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 43 | 3600 - 3800 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 44 | 703-803 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 45 | 1447-1467 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 48 or NR band n48 | 3550-3700 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 50 or NR band n50 | 1432 – 1517 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 52 | 3300 - 3400 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 65 or NR band n65 | 2110 – 2200 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 66 or NR band n66 | 2110 – 2200 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 67 | 738-758 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 68 | 753-783 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 69 | 2570-2620 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 70 or NR band n70 | 1995-2020 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 71 or NR band n71 | 617 – 652 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 72 | 461 – 466 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 73 | 460 – 465 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 74 or NR band n74 | 1475 - 1518 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 75 or NR band n75 | 1432 – 1517 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA NR Band n77 | 3300 – 4200 MHz | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA NR Band n78 | 3300 – 3800 MHz | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA NR band n79 | 4400-5000 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 85 | 728 - 746 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 87 | 420 – 425 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA E-UTRA Band 88 | 422 – 427 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA NR band n92 | 1432 – 1517 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| WA NR band n94 | 1432 – 1517 | +16\*\* | PREFSENS + 6dB\* | CW carrier |
| Note\*: PREFSENS is related to the channel bandwidth and specified in TS 36.104 [2] subclause 7.2.1.  Note\*\*: For NB-IoT, up to 24 exceptions are allowed for spurious response frequencies in each wanted signal frequency when measured using a 1MHz step size. For these exceptions the above throughput requirement shall be met when the blocking signal is set to a level of -40 dBm for 15 kHz subcarrier spacing and -46 dBm for 3.75 kHz subcarrier spacing. In addition, each group of exceptions shall not exceed three contiguous measurements using a 1MHz step size. | | | | |
| NOTE 1: Except for a BS operating in Band 13, these requirements do not apply when the interfering signal falls within any of the supported uplink operating band or in the 10 MHz immediately outside any of the supported uplink operating band. For a BS operating in band 13 the requirements do not apply when the interfering signal falls within the frequency range 768-797 MHz.  NOTE 2: Some combinations of bands may not be possible to co-site based on the requirements above. The current state-of-the-art technology does not allow a single generic solution for co-location of UTRA TDD or E-UTRA TDD with E-UTRA FDD 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 [11].  NOTE 3: For a BS operating in band 11, 21 or 74, the requirement for co-location with Band 32 applies for interfering signal within the frequency range 1475.9-1495.9 MHz.  NOTE 4: Co-located TDD base stations that are synchronized and using the same or adjacent operating band can receive without special co-location requirements. For unsynchronized base stations, special co-location requirements may apply that are not covered by the 3GPP specifications. | | | | |

Table 7.6-4: Blocking performance requirement for E-UTRA and NB-IoT Local Area BS when co-located with BS in other frequency bands.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Co-located BS type | Centre Frequency of Interfering Signal (MHz) | Interfering Signal mean power (dBm) | Wanted Signal mean power (dBm) | Type of Interfering Signal |
| Pico GSM850 | 869 – 894 | -7\*\* | PREFSENS + 6dB\* | CW carrier |
| Pico GSM900 | 921 – 960 | -7\*\* | PREFSENS + 6dB\* | CW carrier |
| Pico DCS1800 | 1805 – 1880 | -4\*\* | PREFSENS + 6dB\* | CW carrier |
| Pico PCS1900 | 1930 – 1990 | -4\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band I or E-UTRA Band 1 or NR band n1 | 2110 – 2170 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band II or E-UTRA Band 2 or NR band n2 | 1930 – 1990 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band III or E-UTRA Band 3 or NR band n3 | 1805 – 1880 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band IV or E-UTRA Band 4 | 2110 – 2155 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band V or E-UTRA Band 5 or NR band n5 | 869 – 894 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band VI or E-UTRA Band 6 | 875 – 885 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band VII or E-UTRA Band 7 or NR band n7 | 2620 – 2690 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band VIII or E-UTRA Band 8 or NR band n8 | 925 – 960 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band IX or E-UTRA Band 9 | 1844.9 – 1879.9 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band X or E-UTRA Band 10 | 2110 – 2170 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band XI or E-UTRA Band 11 | 1475.9 - 1495.9 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band XII or E-UTRA Band 12 or NR band n12 | 729 - 746 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band XIIII or E-UTRA Band 13 | 746 - 756 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band XIV or E-UTRA Band 14 or NR Band n14 | 758 - 768 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 17 | 734 - 746 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 18 | 860 - 875 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band XIX or E-UTRA Band 19 | 875 - 890 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band XX or E-UTRA Band 20 or NR band n20 | 791 - 821 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band XXI or E-UTRA Band 21 | 1495.9 – 1510.9 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band XXII or E-UTRA Band 22 | 3510 – 3590 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 23 | 2180-2200 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 24 | 1525 – 1559 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band XXV or E-UTRA Band 25 or NR band n25 | 1930 – 1995 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band XXVI or E-UTRA Band 26 or NR Band n26 | 859 – 894 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 27 | 852 - 869 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 28 or NR band n28 | 758 – 803 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 29 or NR Band n29 | 717 – 728 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 30 or NR Band n30 | 2350 – 2360 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 31 | 462.5 – 467.5 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA FDD Band XXXII or E-UTRA Band 32 | 1452-1496  (NOTE 3) | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA TDD Band a) or E-UTRA Band 33 | 1900-1920 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA TDD Band a) or E-UTRA Band 34 or NR band n34 | 2010-2025 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA TDD Band b) or E-UTRA Band 35 | 1850-1910 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA TDD Band b) or E-UTRA Band 36 | 1930-1990 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA TDD Band c) or E-UTRA Band 37 | 1910-1930 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA TDD in Band d) or E-UTRA Band 38 or NR band n38 | 2570-2620 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA TDD in Band f) or E-UTRA Band 39 or NR band n39 | 1880-1920 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA UTRA TDD in Band e) or E-UTRA Band 40 or NR band n40 | 2300-2400 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 41 or NR band n41 | 2496-2690 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 42 | 3400 - 3600 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 43 | 3600 - 3800 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 44 | 703-803 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 45 | 1447-1467 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 46 or NR Band n46 | 5150-5925 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 48 or NR band n48 | 3550-3700 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 49 | 3550-3700 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 50 or NR band n50 | 1432 - 1517 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 51 or NR band n51 | 1427 - 1432 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 52 | 3300 - 3400 | -6 | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 53 or NR Band n53 | 2483.5 - 2495 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 65 or NR band n65 | 2110 – 2200 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 66 or NR band n66 | 2110 – 2200 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 67 | 738-758 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 68 | 753-783 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 69 | 2570-2620 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 70 or NR band n70 | 1995-2020 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 71 or NR band n71 | 617 – 652 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 72 | 461 – 466 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 73 | 460 – 465 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 74 or NR band n74 | 1475 - 1518 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 75 or NR band n75 | 1432 - 1517 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 76 or NR band n76 | 1427 - 1432 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA NR band n77 | 3300 – 4200 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA NR band n78 | 3300 - 3800 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA NR band n79 | 4400-5000 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 85 | 728 - 746 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 87 | 420 – 425 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA E-UTRA Band 88 | 422 – 427 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA NR band n91 | 1427 – 1432 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA NR band n92 | 1432 – 1517 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA NR band n93 | 1427 – 1432 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA NR band n94 | 1432 – 1517 | -6\*\* | PREFSENS + 6dB\* | CW carrier |
| LA NR band n96 | 5925 – 7125 | -6 | PREFSENS + 6dB\* | CW carrier |
| Note\*: PREFSENS is related to the channel bandwidth and specified in TS 36.104 [2] subclause 7.2.1.  Note\*\*: For NB-IoT, up to 24 exceptions are allowed for spurious response frequencies in each wanted signal frequency when measured using a 1MHz step size. For these exceptions the above throughput requirement shall be met when the blocking signal is set to a level of -40 dBm for 15 kHz subcarrier spacing and -46 dBm for 3.75 kHz subcarrier spacing. In addition, each group of exceptions shall not exceed three contiguous measurements using a 1MHz step size. | | | | |
| NOTE 1: Except for a BS operating in Band 13, these requirements do not apply when the interfering signal falls within any of the supported uplink operating band or in the 10 MHz immediately outside any of the supported uplink operating band. For a BS operating in band 13 the requirements do not apply when the interfering signal falls within the frequency range 768-797 MHz.  NOTE 2: Some combinations of bands may not be possible to co-site based on the requirements above. The current state-of-the-art technology does not allow a single generic solution for co-location of UTRA TDD or E-UTRA TDD with E-UTRA FDD 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 [11].  NOTE 3: For a BS operating in band 11, 21 or 74, the requirement for co-location with Band 32 applies for interfering signal within the frequency range 1475.9-1495.9 MHz.  NOTE 4: Co-located TDD base stations that are synchronized and using the same or adjacent operating band can receive without special co-location requirements. For unsynchronized base stations, special co-location requirements may apply that are not covered by the 3GPP specifications. | | | | |

Table 7.6-5: Blocking performance requirement for E-UTRA and NB-IoT Medium Range BS when co-located with BS in other frequency bands.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Co-located BS type | Centre Frequency of Interfering Signal (MHz) | Interfering Signal mean power (dBm) | Wanted Signal mean power (dBm) | Type of Interfering Signal |
| Micro/MR GSM850 | 869 – 894 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| Micro/MR GSM900 | 921 – 960 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| Micro/MR DCS1800 | 1805 – 1880 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| Micro/MR PCS1900 | 1930 – 1990 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band I or E-UTRA Band 1 or NR band n1 | 2110 – 2170 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band II or E-UTRA Band 2 or NR band n2 | 1930 – 1990 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band III or E-UTRA Band 3 or NR band n3 | 1805 – 1880 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band IV or E-UTRA Band 4 | 2110 – 2155 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band V or E-UTRA Band 5 or NR band n5 | 869 – 894 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band VI or E-UTRA Band 6 | 875 – 885 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band VII or E-UTRA Band 7 or NR band n7 | 2620 – 2690 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band VIII or E-UTRA Band 8 or NR band n8 | 925 – 960 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band IX or E-UTRA Band 9 | 1844.9 – 1879.9 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band X or E-UTRA Band 10 | 2110 – 2170 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band XI or E-UTRA Band 11 | 1475.9 –1495.9 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band XII or E-UTRA Band 12 or NR band n12 | 729 - 746 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band XIIII or E-UTRA Band 13 | 746 - 756 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band XIV or E-UTRA Band 14 or NR Band n14 | 758 - 768 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 17 | 734 - 746 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 18 | 860 - 875 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band XIX or E-UTRA Band 19 | 875 - 890 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band XX or E-UTRA Band 20 or Nr band n20 | 791 - 821 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band XXI or E-UTRA Band 21 | 1495.9 – 1510.9 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band XXII or E-UTRA Band 22 | 3510 – 3590 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 23 | 2180 - 2200 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 24 | 1525 – 1559 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band XXV or E-UTRA Band 25 or NR band n25 | 1930 – 1995 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band XXVI or E-UTRA Band 26 or NR Band n26 | 859 – 894 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 27 | 852 - 869 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 28 or NR band n28 | 758 – 803 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 29 or NR Band n29 | 717 – 728 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 30 or NR Band n30 | 2350 – 2360 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 31 | 462.5 – 467.5 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR UTRA FDD Band XXXII or E-UTRA Band 32 | 1452-1496  (NOTE 3) | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 33 | 1900-1920 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 34 or NR band n34 | 2010-2025 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 35 | 1850-1910 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 36 | 1930-1990 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 37 | 1910-1930 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 38 or NR band n38 | 2570-2620 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 39 or NR band n39 | 1880-1920 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 40 or NR band n40 | 2300-2400 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 41 or NR band n41 | 2496 - 2690 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 42 | 3400-3600 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 43 | 3600-3800 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 44 | 703-803 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 45 | 1447-1467 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 46 or NR Band n46 | 5150-5925 | +8 | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 48 or NR band n48 | 3550-3700 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 50 or NR band n50 | 1432 - 1517 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 52 | 3300-3400 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 53 or NR Band n53 | 2483.5 - 2495 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 65 or NR band n65 | 2110 – 2200 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 66 or NR band n66 | 2110 – 2200 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 67 | 738-758 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 69 | 2570-2620 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 70 or NR band n70 | 1695-1710 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 68 | 753-783 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 71 or NR band n71 | 617 – 652 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 72 | 461 – 466 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 73 | 460 – 465 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 74 or NR band n74 | 1475 - 1518 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 75 or NR band n75 | 1432 - 1517 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR NR Band n77 | 3300 – 4200 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR NR Band n78 | 3300 - 3800 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR NR band n79 | 4400-5000 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 85 | 728 - 746 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 87 | 420 – 425 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR E-UTRA Band 88 | 422 – 427 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR NR band n92 | 1432 – 1517 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR NR band n94 | 1432 – 1517 | +8\*\* | PREFSENS + 6dB\* | CW carrier |
| MR NR band n96 | 5925 – 7125 | +8 | PREFSENS + 6dB\* | CW carrier |
| Note\*: PREFSENS is related to the channel bandwidth and specified in TS 36.104 [2] subclause 7.2.1.  Note\*\*: For NB-IoT, up to 24 exceptions are allowed for spurious response frequencies in each wanted signal frequency when measured using a 1MHz step size. For these exceptions the above throughput requirement shall be met when the blocking signal is set to a level of -40 dBm for 15 kHz subcarrier spacing and -46 dBm for 3.75 kHz subcarrier spacing. In addition, each group of exceptions shall not exceed three contiguous measurements using a 1MHz step size. | | | | |
| NOTE 1: Except for a BS operating in Band 13, these requirements do not apply when the interfering signal falls within any of the supported uplink operating band or in the 10 MHz immediately outside any of the supported uplink operating band. For a BS operating in band 13 the requirements do not apply when the interfering signal falls within the frequency range 768-797 MHz.  NOTE 2: Some combinations of bands may not be possible to co-site based on the requirements above. The current state-of-the-art technology does not allow a single generic solution for co-location of UTRA TDD or E-UTRA TDD with E-UTRA FDD 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 [11].  NOTE 3: For a BS operating in band 11, 21 or 74, the requirement for co-location with Band 32 applies for interfering signal within the frequency range 1475.9-1495.9 MHz.  NOTE 4: Co-located TDD base stations that are synchronized and using the same or adjacent operating band can receive without special co-location requirements. For unsynchronized base stations, special co-location requirements may apply that are not covered by the 3GPP specifications. | | | | |

## 7.7 Receiver spurious emissions

### 7.7.1 Definition and applicability

The spurious emissions power is the power of emissions generated or amplified in a receiver that appear at the BS receiver antenna connector. The requirements apply to all BS with separate RX and TX antenna ports. The test shall be performed when both TX and RX are on, with the TX port terminated.

For TDD BS with common RX and TX antenna port the requirement applies during the Transmitter OFF period. For FDD BS with common RX and TX antenna port the transmitter spurious emission as specified in clause 6.6.4 is valid.

For BS capable of multi-band operation where multiple bands are mapped on separate antenna connectors, the single-band requirements apply and the excluded frequency range is only applicable for the operating band supported on each antenna connector.

Unless otherwise stated, a BS declared to be capable of E-UTRA with NB-IoT in-band and guard band operations is only required to pass the receiver spurious emissions tests for E-UTRA with guard band operation; it is not required to perform the receiver spurious emissions tests again for E-UTRA with in-band operation.

### 7.7.2 Minimum Requirements

The minimum requirement is in TS 36.104 [2] subclause 7.7.1.

### 7.7.3 Test purpose

The test purpose is to verify the ability of the BS to limit the interference caused by receiver spurious emissions to other systems.

### 7.7.4 Method of test

#### 7.7.4.1 Initial conditions

Test environment: normal; see subclause D.2.

RF channels to be tested for single carrier: M, see subclause 4.7.

Base Station RF Bandwidth edge positions to be tested for multi-carrier and/or CA: MRFBW in single-band operation, see subclause 4.7.1; BRFBW\_T’RFBW and B’RFBW\_TRFBW in multi-band operation, see subclause 4.7.1.

1) Connect a measurement receiver to the BS antenna connector as shown in Annex I.2.6.

2) Enable the BS receiver.

3) Terminate the BS Tx antenna connector as shown in Annex I.2.6.

#### 7.7.4.2 Procedure

1) For a E-UTRA FDD FDD BS declared to be capable of single carrier operation only, start BS transmission according to E-TM 1.1 at manufacturer’s declared rated output power.

For a E-UTRA FDD FDD BS declared to be capable of multi-carrier and/or CA operation, set the BS to transmit according to E-TM 1.1 on all carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11

For E-UTRA BS declared to be capable of NB-IoT in-band or guard band operation single carrier operation only, start BS transmission according to E-TM 1.1. and N-TM at manufacturer’s declared rated output power.

For a E-UTRA BS declared to be capable of NB-IoT in-band or guard band operation multi-carrier, set the BS to transmit according to E-TM 1.1 on all E-UTRA carriers and to N-TM on all NB-IoT carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11.

For a BS declared to be capable of NB-IoT standalone single carrier operation only, start BS transmission according to N-TM at manufacturer’s declared rated output power.

For a BS declared to be capable of NB-IoT standalone multi-carrier operation, set the BS to transmit according to N-TM on all carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11

For a E-UTRA and NB-IoT standalone BS, set the BS to transmit according to E-TM 1.1 on all E-UTRA carriers and according to N-TM on all NB-IoT carriers configured using the applicable test configuration and corresponding power setting specified in clause 4.10 and 4.11

2) Set measurement equipment parameters as specified in table 7.7-1.

3) Measure the spurious emissions over each frequency range described in subclause 7.7.5.

4) Repeat the test for the Rx port(s), which was (were) terminated.

In addition, for a multi-band capable BS, the following step shall apply:

5) For multi-band capable BS and single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carrier activated in the other band. For multi-band capable BS with separate antenna connector, the antenna connector not being under test in case of single-band or multi-band test shall be terminated.

### 7.7.5 Test requirements

The power of any spurious emission shall not exceed the levels in Table 7.7-1.

In addition to the requirements in Table 7.7-1, the power of any spurious emission shall not exceed the levels specified for Protection of the E-UTRA FDD BS receiver of own or different BS in Clause 6.6.4.5.3 and for Co-existence with other systems in the same geographical area in Clause 6.6.4.5.4. In addition, the co-existence requirements for co-located base stations specified in subclause 6.6.4.5.5 may also be applied.

Table 7.7-1: General spurious emission test requirement

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency range | Maximum level | Measurement Bandwidth | Note |
| 30MHz ‑ 1 GHz | -57 dBm | 100 kHz |  |
| 1 GHz ‑ 12.75 GHz | -47 dBm | 1 MHz |  |
| 12.75 GHz ‑ 5th harmonic of the upper frequency edge of the UL operating band in GHz | -47 dBm | 1 MHz | Applies only for Bands 22, 42, 43, 48 or 49. |
| 12.75 GHz ‑ 26 GHz | -47 dBm | 1 MHz | Applies only for Band 46 |
| NOTE: The frequency range between 2.5 \* BWChannel below the first carrier frequency and 2.5 \* BWChannel above the last carrier frequency transmitted by the BS, where BWChannel is the channel bandwidth according to Table 5.6‑1, may be excluded from the requirement. However, frequencies that are more than 10 MHz below the lowest frequency of any of the BS supported downlink operating band or more than 10 MHz above the highest frequency of any of the BS supported downlink operating band (see Table 5.5-1) shall not be excluded from the requirement.  For BS capable of multi-band operation, the excluded frequency range applies for all supported operating bands. For BS capable of multi-band operation where multiple bands are mapped on separate antenna connectors, the single-band requirements apply and the excluded frequency range is only applicable for the operating band supported on each antenna connector. | | | |

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The relationship between Minimum Requirements and Test Requirements is defined in subclause 4.1 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex G.