# 3 MSR generic unwanted emission characteristics

MSR requirements in the present document cover multi-RAT operation as well as single RAT E‑UTRA operation. For the purpose of defining the MSR BS requirements, the operating bands are divided into three band categories as follows:

– Band category 1 (BC1): Bands for NR FDD, E-UTRA FDD and/or UTRA FDD operation. Bands in this category are also used for NB-IoT operation (all modes).

– Band category 2 (BC2): Bands for NR FDD, E-UTRA FDD, UTRA FDD and/or GSM/EDGE operation. Bands in this category are also used for NB-IoT operation (all modes).

– Band category 3 (BC3): Bands for NR TDD, E-UTRA TDD and/or UTRA TDD operation. Bands in this category are also used for NB-IoT operation (all modes).

Band category 1 aspects (BC1)

For each BC1 band, BC1 requirements for receiver and transmitter shall apply with a frequency offset **Foffset, RAT** from the lowest and highest carriers to the Base Station RF Bandwidth edges and sub-block edges (if any) as defined in Table 3-1.

TABLE 3-1

*Foffset, RAT*for band category 1

|  |  |
| --- | --- |
| RAT | *Foffset, RAT* |
| 1.4, 3 MHz E-UTRA | *BWChannel*/2 + 200 kHz |
| 5, 10, 15, 20 MHz E-UTRA and NR | *BWChannel*/2 |
| UTRA FDD | 2.5 MHz |
| Standalone NB-IoT | 200 kHz |

Band category 2 aspects (BC2)

For each BC2 band, BC2 requirements for receiver and transmitter shall apply with a frequency offset **Foffset, RAT** from the lowest and highest carriers to the Base Station RF Bandwidth edges and sub-block edges (if any) as defined in Table 3-2.

TABLE 3-2

*Foffset, RAT*for band category 2

|  |  |
| --- | --- |
| RAT | *Foffset, RAT* |
| E-UTRA and NR | *BWChannel*/2 |
| UTRA FDD | 2.5 MHz |
| GSM/EDGE | 200 kHz |
| Standalone NB-IoT | 200 kHz |

Band category 3 aspects (BC3)

For each BC3 band, BC3 requirements for receiver and transmitter shall apply with a frequency offset **Foffset, RAT** from the lowest and highest carriers to the Base Station RF Bandwidth edges and sub-block edges (if any) as defined in Table 3-3.

TABLE 3-3

Foffset, RAT for band category 3

|  |  |
| --- | --- |
| RAT | *Foffset, RAT* |
| 1.4, 3 MHz E-UTRA | *BWChannel*/2 + 200 kHz |
| 5, 10, 15, 20 MHz E-UTRA and NR | *BWChannel*/2 |
| 1.28 Mcps UTRA TDD | 1 MHz |
| Standalone NB-IoT | 200 kHz |

## 3.1 Definitions

**Band category**: group of operating bands for which the same MSR scenarios apply.

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

NOTE – In single 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 NR, E-UTRA, UTRA or GSM/EDGE physical channels.

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

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

NOTE 1 – The channel bandwidth is measured in MHz and is used as a reference for transmitter and receiver RF requirements.

NOTE 2 – The term channel bandwidth is referred to as BS channel bandwidth in the NR specifications, since for NR the BS and UE may operate with differing bandwidths.

**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.

**Carrier power**: power at the antenna connector in the channel bandwidth of the carrier averaged over at least one subframe for NR or E-UTRA, at least one slot for UTRA and the useful part of the burst for GSM/EDGE.

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

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

**Highest carrier**: carrier with the highest carrier centre frequency transmitted/received in the specified operating band(s).

**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 NR or E-UTRA component carriers in different operating bands.

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

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

**Intra-band contiguous carrier aggregation**: contiguousNR orE-UTRAcarriers aggregated in the same operating band.

**Intra-band non-contiguous carrier aggregation**: non-contiguousNR orE-UTRAcarriers aggregated in the same operating band.

**Lowest carrier**: carrier with the lowest carrier centre frequency transmitted/received in the specified operating band(s).

**Lower Base Station RF Bandwidth edge**: frequency of the lower Base Station RF Bandwidth edge, used as a frequency reference point for transmitter and receiver requirements.

**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.

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

NOTE – The maximum Base Station RF Bandwidth for BS configured for contiguous and non-contiguous operation within each supported operating band is declared separately.

**Maximum carrier output power**: carrier power available at the antenna connector for 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 total output power**: sum of the power of all carriers available at the antenna connector for a specified reference condition.

**MB-MSR base station**: MSR 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).

**Mean power**: power measured in the bandwidth and period of measurement applicable for each RAT.

NOTE – Mean power for an E-UTRA carrier is defined in TS 36.141 and mean power for a UTRA carrier is defined in TS 25.141. In case of multiple carriers, the mean power is the sum of the mean power of all carriers.

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

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

**Multi-band connector**: *antenna* connector of the *BS type 1-C* associated with a transmitter or receiver that is 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* than the other carrier(s) and where this different *operating band* is not a sub-band or superseding-band of another supported operating band.

**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.

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

**NB-IoT operation in NR guard band:** NB-IoT is operating in guard band when it is located within a NR BS channel bandwidth but is not NB-IoT operation in NR in-band.

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

NOTE – The operating band(s) for a base station is declared by the manufacturer.

**Sub-band:** 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 use by the same base station.

NOTE – There may be multiple instances of sub-blocks within an 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:** superseding-band of an operating band includes the whole of the uplink and downlink frequency range of the operating band.

**Single-RAT operation**: operation of a base station in an operating band with only one RAT configured in that operating band.

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

**Total output power:** sum of all carrier powers for all carriers transmitted by the base station.

**Transmission bandwidth:** bandwidth of an instantaneous NR or E-UTRA transmission from a UE or base station, measured in resource block units.

**Transmission bandwidth configuration:** highest NR or E-UTRA 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 base station transmitter is not allowed to transmit.

**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 Base Station RF Bandwidth edge**: frequency of the upper Base Station RF Bandwidth edge, used as a frequency reference point for transmitter and receiver requirements.

**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

*BWChannel* Channel bandwidth (for E-UTRA and NR).

*BWConfig* Transmission bandwidth configuration (for E-UTRA), expressed in MHz, where *BWConfig* = *N*RB × 180 kHz in the uplink and *BWConfi*g = 15 kHz + *N*RB × 180 kHz in the downlink. Transmission bandwidth configuration (for NR), where BWConfig = *N*RB x SCS x 12.

*f*  Frequency

Δ*f*  Separation between the Base Station RF Bandwidth edge frequency and the nominal
–3dB point of the measuring filter closest to the carrier frequency.

Δ*f*max The largest value of Δ*f* used for defining the requirement.

ΔfOBUE Maximum offset of the operating band unwanted emissions mask from the downlink operating band edge.

ΔfOOB Maximum offset of the out-of-band boundary from the uplink operating band edge.

Ffilter  Filter centre frequency.

*f\_offset* Separation between the Base Station RF Bandwidth edge frequency and the centre of the measuring filter.

*f\_offset*max The maximum value of *f\_offset* used for defining the requirement.

FBW RF,high Upper Base Station RF Bandwidth edge, where FBW RF,high = FC,high + Foffset, RAT

FBW RF,low Lower Base Station RF Bandwidth edge, where FBW RF,low = FC,low - Foffset, RAT

*Foffset, RAT* Frequency offset from the centre frequency of the highest transmitted/received carrier to the Upper Base Station RF Bandwidth edge, sub-block edge or Inter RF Bandwidth edge, or from the centre frequency of the lowest transmitted/received carrier to the Lower Base Station RF Bandwidth edge, sub-block edge or Inter RF Bandwidth edge for a specific RAT.

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.

GBChannel Minimum guard band defined in TS 38.104.

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 carrier output power.

*Wgap* Sub-block gap size or Inter RF Bandwidth gap size.

## 3.3 Operating band unwanted emissions

The Operating band unwanted emission limits are defined from ΔfOBUE below the lowest frequency of each supported downlink operating band to the Lower Base Station RF Bandwidth edge located at *FBW RF,low* and from the Upper Base Station RF Bandwidth edge located at *FBW RF,high*up to ΔfOBUE above the highest frequency of each supported downlink operating band. In addition, for a BS operating in non-contiguous spectrum, it applies inside any sub-block gap. In addition, for a BS operating in multiple bands, it applies inside any Inter RF Bandwidth gap. The values of ΔfOBUE are defined in table 6.6-1.

The requirements shall apply whatever the type of transmitter considered and for all transmission modes foreseen by the manufacturer's specification.

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

The out-of-band emissions requirement for the BS transmitter is specified in terms of an Operating band unwanted emissions requirement that defines limits for emissions in each supported downlink operating band plus the frequency ranges ΔfOBUE above and ΔfOBUE below each band. Emissions outside of this frequency range are limited by a spurious emissions requirement. The values of ΔfOBUE are defined in table 3.3-1. For a BS with multi-RAT operation where the individual RATs are in different RAT specific bands that partially or fully overlap; ΔfOBUE is according to the combined frequency range occupied by the overlapping bands.

Table 3.3-1

Maximum offset of OBUE outside the downlink operating band

|  |  |
| --- | --- |
| Operating band characteristics | ΔfOBUE (MHz) |
| FDL\_high – FDL\_low ≤ 200 MHz | 10  |
| 200 MHz < FDL\_high – FDL\_low ≤ 900 MHz | 40  |

### 3.3.1 Operating band unwanted emissions for band categories 1 and 3

For a wide area BS operating in band category 1 or band category 3, the requirement applies outside the Base Station RF Bandwidth edges. In addition, for a wide area BS operating in non-contiguous spectrum, it applies inside any sub-block gap. In addition, for a wide area BS operating in multiple bands, it applies inside any Inter RF Bandwidth gap.

For a medium range BS operating in band category 1 the requirement applies outside the Base Station RF Bandwidth edges. In addition, for a medium range BS operating in non-contiguous spectrum, it applies inside any sub-block gap. In addition, for a medium range BS operating in multiple bands, it applies inside any Inter RF Bandwidth gap.

For a local area BS operating in band category 1 the requirement applies outside the Base Station RF Bandwidth edges. In addition, for a local area BS operating in non-contiguous spectrum, it applies inside any sub-block gap. In addition, for a local area BS operating in multiple bands, it applies inside any Inter RF Bandwidth gap.

Outside the Base Station RF Bandwidth edges, emissions shall not exceed the maximum levels specified in Tables 3.3.1-1 to 3.3.1-4a below, where:

– Δ*f* is the separation between the Base Station RF Bandwidth edge frequency and the nominal −3 dB 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\_offset*max is the offset to the frequency ΔfOBUE outside the downlink operating band.

– Δ*f*max is equal to f\_offsetmax minus half of the bandwidth of the measuring filter.

For a BS operating in multiple bands, inside any Inter RF Bandwidth gaps with Wgap < 2\* ΔfOBUE, 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 3.3.1-1 to 3.3.1-4a below, where in this case:

– Δ*f* is the separation between the Base Station RF Bandwidth edge frequency and the nominal –3 dB 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\_ offset*max is equal to the Inter RF Bandwidth gap.

– Δ*f*max 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 carriers transmitted, in the case where there are carriers 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 clause for the largest frequency offset (Δfmax), of a band where there are no carriers transmitted shall apply from ΔfOBUE below the lowest frequency, up to ΔfOBUE above the highest frequency of the supported downlink operating band without any carrier transmitted. And no cumulative limits are applied in the inter-band gap between a supported downlink band with carrier(s) transmitted and a downlink band without any carrier transmitted.

Inside any sub-block gap for a BS operating in non-contiguous spectrum, emissions 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 3.3.1-1 to 3.3.1-4a below, where in this case:

– Δ*f* 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 frequency.

– *f\_offset* is the separation between the sub‑block edge frequency and the centre of the measuring filter.

– *f\_offset*max is equal to the sub‑block gap bandwidth minus half of the bandwidth of the measuring filter.

– Δ*f*max is equal to *f\_offset*max minus half of the bandwidth of the measuring filter.

For Band 41 NR operation in Japan, the operating band unwanted emissions limits shall be applied to the sum of the emission power over all antenna connectors.

Applicability of wide area operating band unwanted emission requirements in Tables 3.3.1-1/1a, 3.3.1-1c and 3.3.1-1d/1e is specified in Table 3.3.1-0.

NOTE – Option 1 and Option 2 correspond to the Category B option 1/2 operating band unwanted emissions defined in the E-UTRA and NR specifications TS 36.104 and TS 38.104. Option 2 also corresponds to the UTRA spectrum emission mask as defined in TS 25.104.

TABLE 3.3.1-0

**Applicability of operating band unwanted emission requirements for BC1 and BC3 WA BS**

|  |  |  |
| --- | --- | --- |
| NR band operation | Standalone NB-IoT carrier adjacent to the BS RF bandwidth edge or UTRA supported | Applicable requirement table |
| None | Y/N | 3.3.1-1/1a (option 2) |
| In certain regions (NOTE), bands 1, 7, 38, 65 | N | 3.3.1-1/1a (option 2) |
| Any | Y | 3.3.1-1/1a (option 2) |
| Any below 1GHz | N | 3.3.1-1c (option 1) |
| Any above 1GHz except for, in certain regions (NOTE), bands 1, 7, 38, 65 | N | 3.3.1-1d/1e (option 1) |

NOTE 1 – Applicable only for operation in regions where Category B limits as defined in ITU-R Recommendation SM.329 are used for which category B option 2 operating band unwanted emissions requirements as defined in TS 36.104 and TS 38.104 are applied.

TABLE 3.3.1-1

WA BS OBUE in BC1 and BC3 bands ≤ 3 GHz – option 2

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δ*f*< 0.2 MHz | 0.015 MHz ≤ *f\_offset* < 0.215MHz | −12.5 dBm | 30 kHz |
| 0.2 MHz ≤ Δ*f*< 1 MHz | 0.215 MHz ≤ *f\_offset* < 1.015MHz | (Note 4) | 30 kHz |
| (Note 5) | 1.015 MHz ≤ *f\_offset*< 1.5 MHz | −24.5 dBm (Note 4) | 30 kHz |
| 1 MHz ≤ Δ*f* ≤min(Δ*f*max, 10 MHz) | 1.5 MHz ≤ *f\_offset* < min(*f\_offset*max, 10.5 MHz) | −11.5 dBm (Note 4) | 1 MHz |
| 10 MHz ≤ Δ*f* ≤ Δ*f*max | 10.5 MHz ≤ *f\_offset* < *f\_offset*max | −15 dBm (Note 4, 7) | 1 MHz |
| NOTE 1 – For MSR 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 Δ*f* ≥ 10 MHz from both adjacent sub‑blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be −15 dBm/MHz (for MSR BS supporting multi-band operation, either this limit or -16dBm/100kHz with correspondingly adjusted f\_offset shall apply for this frequency offset range for operating bands < 1 GHz).NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the test requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or Base Station RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or Base Station RF Bandwidth.NOTE 3 – For operation with a standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge, the limits in Table 3.3.1-1b apply for 0 MHz ≤ Δf < 0.15 MHz.NOTE 4 – For MSR BS supporting multi-band operation, either this limit or -16dBm/100kHz with correspondingly adjusted f\_offset shall apply for this frequency offset range for operating bands < 1 GHz. |

TABLE 3.3.1-1a

WA BS OBUE in BC1 and
BC3 bands > 3 GHz – option 2

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 4) |
| 0 MHz ≤ Δ*f*< 0.2 MHz | 0.015 MHz ≤ *f\_offset* < 0.215 MHz | −12.2 dBm | 30 kHz |
| 0.2 MHz ≤ Δ*f*< 1 MHz | 0.215 MHz ≤ *f\_offset* < 1.015 MHz |  | 30 kHz |
| (Note 3) | 1.015 MHz ≤ *f\_offset*< 1.5 MHz | −24.2 dBm | 30 kHz |
| 1 MHz ≤ Δ*f* ≤min(Δ*f*max, 10 MHz) | 1.5 MHz ≤ *f\_offset* < min(*f\_offset*max,10.5 MHz) | −11.2 dBm | 1 MHz |
| 10 MHz ≤ Δ*f* ≤ Δ*f*max | 10.5 MHz ≤ *f\_offset* < *f\_offset*max | −15 dBm (Note 7) | 1 MHz |
| NOTE 1 – For MSR 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 Δ*f* ≥ 10 MHz from both adjacent sub‑blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be −15 dBm/MHz.NOTE2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the test requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or Base Station RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or Base Station RF Bandwidth. |

TABLE 3.3.1-1b

WA BS OBUE in BC1 and BC3 bands ≤ 3 GHz applicable for: BS with standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δf | Frequency offset of measurement filter centre frequency, *f\_offset* | Test 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  |

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 MSR 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 MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap.

NOTE 4 – In case the carrier adjacent to the Base Station 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 Base Station RF Bandwidth edge. In other cases, X = 0.

TABLE 3.3.1-1c

WA BS OBUE in BC1 and BC3 bands ≤ 1 GHz - option 1

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB 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 | - 5.5dBm - 7/5(f\_offset/MHz-0.05)dB | 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 7) | 100 kHz  |

NOTE 1 – For MSR BS supporting non-contiguous spectrum operation within any operating band, the minimum requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block or Base Station RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or Base Station RF Bandwidth. Exception is Δf ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the minimum requirement within sub-block gaps shall be -16dBm/100kHz.

NOTE 2 – For MSR BS supporting multi-band operation with Inter Base Station RF Bandwidth gap < 2×ΔfOBUE the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or Base Station RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or Base Station RF Bandwidth.

TABLE 3.3.1-1d

WA BS OBUE in BC1 and BC3 bands > 1 GHz and ≤ 3 GHz - option 1

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δf | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz | - 5.5dBm - 7/5(f\_offset/MHz-0.05)dB | 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 7) | 1MHz  |

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

NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or Base Station RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or Base Station RF Bandwidth.

TABLE 3.3.1-1e

WA BS OBUE in BC1 and BC3 bands above 3 GHz - option 1

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δf | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz | - 5.2dBm - 7/5(f\_offset/MHz-0.05)dB | 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 7) | 1MHz  |

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

NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or Base Station RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or Base Station RF Bandwidth.

TABLE 3.3.1-2

MR BS OBUE in BC1 bands ≤ 3 GHz applicable for: BS with maximum output power 31 < PRated,c ≤ 38 dBm and not supporting NR; or BS with maximum output power 31 < PRated,c ≤ 38 dBm, supporting NR, and supporting UTRA

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δf | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δ*f* < 0.6 MHz | 0.015 MHz ≤ *f\_offset* < 0.615MHz |  | 30 kHz |
| 0.6 MHz ≤ Δ*f*< 1 MHz | 0.615 MHz ≤ *f\_offset* < 1.015MHz |  | 30 kHz |
| (Note 5) | 1.015MHz ≤ *f\_offset*< 1.5 MHz | *P* – 63.5 dB | 30 kHz |
| 1 MHz ≤ Δ*f*≤ 2.6 MHz | 1.5 MHz ≤ *f\_offset*< 3.1 MHz | *P* – 50.5 dB | 1 MHz |
| 2.6 MHz ≤ Δ*f*≤ 5 MHz | 3.1 MHz ≤ *f\_offset*< 5.5 MHz | min(*P* − 50.5 dB, −13.5dBm) | 1 MHz |
| 5 MHz ≤ Δ*f* ≤ min(Δ*f*max, 10MHz) | 5.5 MHz ≤ *f\_offset* < min (*f\_offset*max, 10.5 MHz) | *P* − 54.5 dB | 1 MHz |

TABLE 3.3.1-2 (*end*)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δf | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 6) |
| 10 MHz ≤ Δ*f* ≤ Δ*f*max | 10.5 MHz ≤ *f\_offset* < *f\_offset*max | *P* − 56dB (Note 7) | 1 MHz |
| NOTE 1– For MSR 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 (*P* – 56 dB)/MHz.NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the test requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or Base Station RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or Base Station RF Bandwidth.NOTE 3 – For operation with a standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge, the limits in Table 3.3.1-2b apply for 0 MHz ≤ Δf < 0.15 MHz. |

TABLE 3.3.1-2a

MR BS OBUE in BC1 for
bands > 3 GHz applicable for: BS with maximum output power 31 < PRated,c ≤ 38 dBm and not supporting NR; or BS with maximum output power 31 < PRated,c ≤ 38 dBm supporting NR, and supporting UTRA

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δ*f*< 0.6 MHz | 0.015MHz ≤ *f\_offset* < 0.615MHz |  | 30 kHz |
| 0.6 MHz ≤ Δ*f*< 1 MHz | 0.615MHz ≤ *f\_offset* < 1.015MHz |  | 30 kHz |
| (Note 5) | 1.015MHz ≤ *f\_offset*< 1.5 MHz | *P* − 63.2 dB | 30 kHz |
| 1 MHz ≤ Δ*f*≤ 2.6 MHz | 1.5 MHz ≤ *f\_offset*< 3.1 MHz | *P* − 50.2 dB | 1 MHz |
| 2.6 MHz ≤ Δ*f*≤ 5 MHz | 3.1 MHz ≤ *f\_offset*< 5.5 MHz | min(*P* – 50.2 dB, -13.2dBm) | 1 MHz |
| 5 MHz ≤ Δ*f* ≤ min(Δ*f*max, 10MHz) | 5.5 MHz ≤ *f\_offset* < min(*f\_offset*max ,10.5MHz) | *P* – 54.2 dB | 1 MHz |
| 10 MHz ≤ Δ*f* ≤ Δfmax | 10.5 MHz ≤ *f\_offset* < *f\_offset*max | *P* − 56dB (Note 7) | 1 MHz |
| NOTE 1 – For MSR 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 Δ*f* ≥ 10 MHz from both adjacent sub‑blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be (*P* − 56) dB/MHz.NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the test requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or Base Station RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or Base Station RF Bandwidth. |

TABLE 3.3.1-2b

MR BS OBUE in BC1 bands ≤ 3 GHz applicable for: BS with maximum output power 31 < PRated ≤ 38 dBm and with standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2, 3) | Measurement bandwidth (Note 7) |
| 0 MHz ≤ Δf < 0.05 MHz(Note 1) | 0.015 MHz ≤ f\_offset < 0.065 MHz  | PRated,c - 36.5dB - 60(f\_offset/MHz-0.015)dB  | 30 kHz  |
| 0.05 MHz ≤ Δf < 0.15 MHz | 0.065 MHz ≤ f\_offset < 0.165 MHz  | PRated,c - 39.5dB - 160(f\_offset/MHz-0.065)dB  | 30 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 MSR 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 MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap.

TABLE 3.3.1-2c

MR BS OBUE in BC1 bands ≤ 3 GHz applicable for: BS with maximum output power 31 < PRated,c ≤ 38 dBm, supporting NR, and not supporting UTRA

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz | PRated,c – 51.5dB - 7/5(f\_offset/MHz-0.05)dB | 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,c-60dB, -25dBm) (Note 7) | 100 kHz |

NOTE 1 – For MSR BS supporting non-contiguous spectrum operation within any operating band the minimum requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is Δf ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the minimum requirement within sub-block gaps shall be Min(PRated,c-60dB, -25dBm)/100kHz.

NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block.

NOTE 3 – For operation with a standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge, the limits in Table 3.3.1-2b apply for 0 MHz ≤ Δf < 0.15 MHz

TABLE 3.3.1-2d

MR BS OBUE in BC1 bands >3 GHz applicable for: BS with maximum output power 31 < PRated,c ≤ 38 dBm, supporting NR, and not supporting UTRA

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz | PRated,c – 51.2dB - 7/5(f\_offset/MHz-0.05)dB | 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 7) | 100 kHz |

NOTE 1 – For MSR BS supporting non-contiguous spectrum operation within any operating band the minimum requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is Δf ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the minimum requirement within sub-block gaps shall be Min(PRated,c-60dB, -25dBm)/100kHz.

NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block.

TABLE 3.3.1-3

MR BS OBUE in BC1 for
bands ≤ 3 GHz applicable for: BS with maximum output power PRated,c ≤ 31 dBm and not supporting NR; or BS with maximum output power PRated,c ≤ 31 dBm supporting NR, and supporting UTRA

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δ*f* < 0.6 MHz | 0.015MHz ≤ *f\_offset* < 0.615 MHz |  | 30 kHz |
| 0.6 MHz ≤ Δ*f* < 1 MHz | 0.615MHz ≤ *f\_offset* < 1.015 MHz |  | 30 kHz |
| (Note 5) | 1.015MHz ≤ f\_offset< 1.5 MHz | −32.5 dBm | 30 kHz |
| 1 MHz ≤ Δ*f* ≤ 5 MHz | 1.5 MHz ≤ f\_offset< 5.5 MHz | −19.5 dBm | 1 MHz |
| 5 MHz ≤ Δ*f* ≤ min(Δ*f*max,10MHz) | 5.5 MHz ≤ *f\_offset* < min(*f\_offset*max,10.5MHz) | −23.5 dBm | 1 MHz |
| 10 MHz ≤ Δ*f* ≤ Δ*f*max | 10.5 MHz ≤ *f\_offset* < *f\_offset*max | −25 dBm (Note 7) | 1 MHz |
| NOTE 1 – For MSR 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 Δ*f* ≥ 10 MHz from both adjacent sub‑blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be −25 dBm/MHz.NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the test requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or Base Station RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or Base Station RF Bandwidth.NOTE 3 – For operation with a standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge, the limits in Table 3.3.1-3b apply for 0 MHz ≤ Δf < 0.15 MHz |

TABLE 3.3.1-3a

MR BS OBUE in BC1 for
bands > 3 GHz applicable for: BS with maximum output power PRated,c ≤ 31 dBm and not supporting NR; or BS with maximum output power PRated,c ≤ 31 dBm supporting NR, and supporting UTRA

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δ*f*< 0.6 MHz | 0.015 MHz ≤ *f\_offset*< 0.615 MHz |  | 30 kHz |
| 0.6 MHz ≤ Δ*f*< 1 MHz | 0.615 MHz ≤ *f\_offset*< 1.015 MHz |  | 30 kHz |
| (Note 5) | 1.015 MHz ≤ *f\_offset*< 1.5 MHz | −32.2 dBm | 30 kHz |
| 1 MHz ≤ Δ*f*≤ 5 MHz | 1.5 MHz ≤ *f\_offset*< 5.5 MHz | −19.2 dBm | 1 MHz |
| 5 MHz ≤ Δ*f* ≤ min(Δ*f*max,10MHz) | 5.5 MHz ≤ *f\_offset* < min(*f\_offset*max,10.5MHz) | −23.2 dBm | 1 MHz |

TABLE 3.3.1-3a (*end*)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 4) |
| 10 MHz ≤ Δ*f* ≤ Δfmax | 10.5 MHz ≤ *f\_offset* < *f\_offset*max | −25 dBm (Note 7) | 1 MHz |
| NOTE 1 – For MSR 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 Δ*f* ≥ 10 MHz from both adjacent sub‑blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be −25 dBm/MHz.NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the test requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or Base Station RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or Base Station RF Bandwidth. |

TABLE 3.3.1-3b

MR BS OBUE in BC1 bands ≤ 3 GHz applicable for: BS with maximum output power PRated,c ≤ 31 dBm BS and standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2, 3, 4) | Measurement bandwidth (Note 7) |
| 0 MHz ≤ Δf < 0.05 MHz(Note 1) | 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  |

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 MSR 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 MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap.

NOTE 4 – In case the carrier adjacent to the Base Station 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 Base Station RF Bandwidth edge. In other cases, X = 0.

TABLE 3.3.1-3c

MR BS OBUE in BC1 bands ≤ 3 GHz applicable for: BS with maximum output power PRated,c ≤ 31 dBm, supporting NR, and not supporting UTRA

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz | - 20.5dBm - 7/5(f\_offset/MHz-0.05)dB | 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 7) | 100 kHz |

NOTE 1 – For MSR BS supporting non-contiguous spectrum operation within any operating band the minimum requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is Δf ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the minimum requirement within sub-block gaps shall be -29dBm/100kHz.

NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block.

NOTE 3 – For operation with a standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge, the limits in Table 3.3.1-3b apply for 0 MHz ≤ Δf < 0.15 MHz.

TABLE 3.3.1-3d

MR BS OBUE in BC1 bands >3 GHz applicable for: BS with maximum output power PRated,c ≤ 31 dBm, supporting NR, and not supporting UTRA

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz | - 20.2dBm - 7/5(f\_offset/MHz-0.05)dB | 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 7) | 100 kHz |

NOTE 1 – For MSR BS supporting non-contiguous spectrum operation within any operating band the minimum requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is Δf ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the minimum requirement within sub-block gaps shall be -29dBm/100kHz.

NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block.

TABLE 3.3.1-4

LA BS OBUE in BC1 for bands ≤ 3 GHz

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Note 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δ*f*< 5 MHz | 0.05 MHz ≤ *f\_offset*< 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δ*f* < min(10 MHz, Δ*f*max) | 5.05 MHz ≤ *f\_offset* < min(10.05 MHz, *f\_offset*max) | −35.5 dBm | 100 kHz |
| 10 MHz ≤ Δ*f* ≤ Δ*f*max | 10.05 MHz ≤ *f\_offset* < *f\_offset*max | −37 dBm (Note 7) | 100 kHz |
| NOTE 1 – For MSR 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 Δ*f* ≥ 10 MHz from both adjacent sub‑blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be −37 dBm/100 kHz.NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the test requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap.NOTE 3 – For operation with a standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge, the limits in Table 3.3.1-4b apply for 0 MHz ≤ Δf < 0.15 MHz. |

TABLE 3.3.1-4a

LA BS OBUE in BC1 for bands > 3 GHz

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δ*f*< 5 MHz | 0.05 MHz ≤ *f\_offset*< 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δ*f* < min(10 MHz, Δ*f*max) | 5.05 MHz ≤ *f\_offset* < min(10.05 MHz, *f\_offset*max) | −35.2 dBm | 100 kHz |
| 10 MHz ≤ Δ*f* ≤ Δ*f*max | 10.05 MHz ≤ *f\_offset* < *f\_offset*max | −37 dBm (Note 7) | 100 kHz |
| NOTE 1 – For MSR 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 Δ*f* ≥ 10 MHz from both adjacent sub‑blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be −37 dBm/100 kHz.NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the test requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap. |
| TABLE 3.3.1-4bLA BS OBUE in BC1 bands ≤ 3 GHz applicable for: BS with standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 6) |
| 0 MHz ≤ Δf < 0.05 MHz(Note 1) | 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  |

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 MSR 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 MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap.NOTE 4 – In case the carrier adjacent to the Base Station 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 Base Station RF Bandwidth edge. In other cases, X = 0.The following Notes are common to Tables 3.3.1‑1 to 3.3.1‑4a.NOTE 5 – This frequency range ensures that the range of values of *f\_offset* is continuous.NOTE 6 – As a general rule for the requirements in the present clause, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.NOTE 7 – The requirement is not applicable when Δ*f*max < ΔfOBUE. |

### 3.3.2 Operating band unwanted emissions for band category 2

For a BS operating in band category 2 the requirement applies outside the Base Station RF Bandwidth edges. In addition, for a BS operating in non-contiguous spectrum, it applies inside any sub-block gap.

Outside the Base Station RF Bandwidth edges, emissions shall not exceed the maximum levels specified in Table 3.3.2-1 to 3.3.2-8 below, where:

– Δ*f* is the separation between the Base Station RF Bandwidth edge frequency and the nominal −3 dB 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\_offset*max is the offset to the frequency ΔfOBUE outside the downlink operating band;

– Δ*f*max is equal to *f\_offset*max minus half of the bandwidth of the measuring filter.

For a BS operating in multiple bands, inside any Inter RF Bandwidth gaps with *Wgap* < 2\* ΔfOBUE, 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 3.3.2-1 to 3.3.2-8 below, where in this case:

– Δ*f* is the separation between the Base Station RF Bandwidth edge frequency and the nominal –3 dB 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\_offset*max is equal to the Inter RF Bandwidth gap minus half of the bandwidth of the measuring filter.

– Δ*f*max is equal to *f\_offset*max minus half of the bandwidth of the measuring filter.

For a BS capable of multi-band operation where multiple bands are mapped on the same antenna connector and where there is no carrier transmitted in an operating band, the operating band unwanted emission limit, as defined in the tables of the present clause for the largest frequency offset (Δfmax), of a band where there are no carriers transmitted shall apply from ΔfOBUE below the lowest frequency, up to ΔfOBUE above the highest frequency of the supported downlink operating band without any carrier transmitted. And no cumulative limits are applied in the inter-band gap between a supported downlink band with carrier(s) transmitted and a supported downlink band without any carrier transmitted.

Inside any sub-block gap for a BS operating in non-contiguous spectrum, emissions shall not exceed the cumulative sum of the test requirement 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 3.3.2‑1 to 3.3.2‑8 below, where in this case:

– Δ*f* 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\_offset*max is equal to the sub‑block gap bandwidth minus half of the bandwidth of the measuring filter;

– Δ*f*max is equal to *f\_offset*max minus half of the bandwidth of the measuring filter.

Applicability of Wide Area operating band unwanted emission requirements in Tables 3.3.2-1, 3.3.2-2a and 3.3.2-2b is specified in Table 3.3.2-0.

NOTE – Option 1 and option 2 correspond to the Category B option 1/2 operating band unwanted emissions defined in the E-UTRA and NR specifications TS 36.104 and TS 38.104. Option 2 also corresponds to the UTRA spectrum emission mask as defined in TS 25.104 with GSM related modifications.

TABLE 3.3.2-0

Applicability of operating band unwanted emission requirements for BC2 WA BS

|  |  |  |
| --- | --- | --- |
| NR band operation | Standalone NB-IoT carrier adjacent to the BS RF bandwidth edge or UTRA supported | Applicable requirement table |
| None | Y/N | 3.3.2-1 (option 2) |
| In certain regions (NOTE), bands 3, 8 | N | 3.3.2-1 (option 2) |
| Any | Y | 3.3.2-1 (option 2) |
| Any below 1GHz except for, in certain regions (NOTE), band 8 | N | 3.3.2-2a (option 1) |
| Any above 1GHz except for, in certain regions (NOTE), bands 3 | N | 3.3.2-2b (option 1) |

NOTE – Applicable only for operation in regions where Category B limits as defined in ITU-R Recommendation SM.329 are used for which category B option 2 operating band unwanted emissions requirements as defined in TS 36.104 and TS 38.104 are applied.

TABLE 3.3.2-1

WA BS OBUE in BC2- option 2

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 2, 3) | Measurement bandwidth (Note 9) |
| 0 MHz ≤ Δ*f*< 0.2 MHz(Note 1) | 0.015 MHz ≤ *f\_offset*< 0.215 MHz | −12.5 dBm | 30 kHz |
| 0.2 MHz ≤ Δ*f*< 1 MHz | 0.215 MHz ≤ *f\_offset*< 1.015 MHz | (Note 4) | 30 kHz |
| (Note 8) | 1.015 MHz ≤ *f\_offset*< 1.5 MHz | −24.5 dBm (Note 4) | 30 kHz |
| 1 MHz ≤ Δ*f* ≤min(Δ*f*max, 10 MHz) | 1.5 MHz ≤ *f\_offset* < min(*f\_offset*max, 10.5 MHz) | −11.5 dBm (Note 4) | 1 MHz |
| 10 MHz ≤ Δ*f* ≤ Δ*f*max | 10.5 MHz ≤ *f\_offset* < *f\_offset*max | −15 dBm (Note 4, 10) | 1 MHz |
| NOTE 1 – For operation with a GSM/EDGE or standalone NB-IoT or an E-UTRA 1.4 or 3 MHz carrier adjacent to the Base Station RF Bandwidth edge, the limits in Table 3.3.2-2 apply for 0 MHz ≤ Δ*f* < 0.15 MHz.NOTE 2 – For MSR 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 Δ*f* ≥ 10 MHz from both adjacent sub‑blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be −15 dBm/MHz (for MSR BS supporting multi-band operation, either this limit or -16dBm/100kHz with correspondingly adjusted f\_offset shall apply for this frequency offset range for operating bands <1GHz).NOTE 3 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE operation the test requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or Base Station RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or Base Station RF Bandwidth.NOTE 4 – For MSR BS supporting multi-band operation, either this limit or -16dBm/100kHz with correspondingly adjusted f\_offset shall apply for this frequency offset range for operating bands <1GHz. |

TABLE 3.3.2-2

WA BS OBUE in BC2 bands applicable for: BS with GSM/EDGE or standalone NB-IoT or E-UTRA 1.4 or 3 MHz carriers adjacent to the Base Station RF Bandwidth edge

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter−3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 5, 6, 7, 8) | Measurement bandwidth (Note 9) |
| 0 MHz ≤ Δ*f*< 0.05 MHz | 0.015 MHz ≤ *f\_offset*< 0.065 MHz |  | 30 kHz |

TABLE 3.3.2-2 (*end*)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter−3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 5, 6, 7) | Measurement bandwidth (Note 9) |
| 0.05 MHz ≤ Δ*f*< 0.15 MHz | 0.065 MHz ≤ *f\_offset*< 0.165 MHz |  | 30 kHz |
| NOTE 4 – The limits in this table only apply for operation with a GSM/EDGE or standalone NB-IoT or an E-UTRA 1.4 or 3 MHz carrier adjacent to the Base Station RF Bandwidth edge.NOTE 5 – For MSR 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. NOTE 6 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the test requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gapNOTE 7 – In case the carrier adjacent to the Base Station RF Bandwidth edge is a GSM/EDGE carrier, the value of *X* = *PGSMcarrier* – 43, where *PGSMcarrier* is the power level of the GSM/EDGE carrier adjacent to the Base Station RF Bandwidth edge. In other cases, *X* = 0.NOTE 8 – In case the carrier adjacent to the Base Station RF Bandwidth edge is a NB-IoT carrier, the value of X = PNB-IoTcarrier – 43, where PNB-IoTcarrier is the power level of the NB-IoT carrier adjacent to the Base Station RF Bandwidth edge. In other cases, X = 0. |

TABLE 3.3.2-2a

WA BS OBUE in BC2 bands ≤ 1 GHz - option 1

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter−3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 9) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz | - 5.5dBm - 7/5(f\_offset/MHz-0.05)dB | 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 10) | 100 kHz  |

NOTE 1 – For MSR BS supporting non-contiguous spectrum operation within any operating band, the minimum requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block or Base Station RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or Base Station RF Bandwidth. Exception is Δf ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the minimum requirement within sub-block gaps shall be -16dBm/100kHz.

NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or Base Station RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or Base Station RF Bandwidth.

NOTE 3 – For operation with an E-UTRA 1.4 or 3MHz carrier adjacent to the Base Station RF Bandwidth edge, the limits in Table 3.3.2-2 apply for 0 MHz ≤ Δf < 0.15 MHz.

TABLE 3.3.2-2b

WA BS OBUE in BC2 bands > 1 GHz - option 1

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter−3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 9) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz | - 5.5dBm - 7/5(f\_offset/MHz-0.05)dB | 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 10) | 1MHz  |

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

NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or Base Station RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or Base Station RF Bandwidth.

NOTE 3 – For operation with an E-UTRA 1.4 or 3MHz carrier adjacent to the Base Station RF Bandwidth edge, the limits in Table 3.3.2-2 apply for 0 MHz ≤ Δf < 0.15 MHz

TABLE 3.3.2-3

MR BS OBUE in BC2 bands applicable for: BS with maximum output power 31 < PRated,c ≤ 38 dBm and not supporting NR; or BS with maximum output power 31 < PRated,c ≤ 38 dBm and supporting NR with UTRA and/or GSM

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 2, 3) | Measurement bandwidth (Note 9) |
| 0 MHz ≤ Δ*f*< 0.6 MHz(Note 1) | 0.015MHz ≤ *f\_offset*< 0.615 MHz | PRated,c - 56.5dB - 7/5(f\_offset/MHz-0.015)dB  | 30 kHz |
| 0.6 MHz ≤ Δ*f*< 1 MHz | 0.615MHz ≤ *f\_offset*< 1.015 MHz | PRated,c - 51.5dB - 15(f\_offset/MHz-0.215)dB  | 30 kHz |
| (Note 8) | 1.015MHz ≤ *f\_offset*< 1.5 MHz | PRated,c – 63.5 dB | 30 kHz |
| 1 MHz ≤ Δ*f*≤ 2.8 MHz | 1.5 MHz ≤ *f\_offset*< 3.3 MHz | PRated,c – 50.5 dB | 1 MHz |
| 2.8 MHz ≤ Δ*f*≤ 5 MHz | 3.3 MHz ≤ *f\_offset*< 5.5 MHz | min(PRated,c – 50.5 dB, -13.5dBm) | 1 MHz |
| 5 MHz ≤ Δ*f* ≤ min(Δ*f*max, 10 MHz) | 5.5 MHz ≤ *f\_offset* < min(*f\_offset*max,10.5MHz) | PRated,c – 54.5 dB | 1 MHz |
| 10 MHz ≤ Δ*f* ≤ Δ*f*max | 10.5 MHz ≤ *f\_offset* < *f\_offset*max | PRated,c -56dB (Note 10) | 1 MHz |
| NOTE 1 – For operation with a GSM/EDGE or standalone NB-IoT or an E-UTRA 1.4 or 3 MHz carrier adjacent to the Base Station RF Bandwidth edge, the limits in Table 3.3.2-5 apply for 0 MHz ≤ Δ*f* < 0.15 MHz.NOTE 2 – For MSR 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 Δ*f* ≥ 10 MHz from both adjacent sub‑blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be (PRated,c – 56)dB/MHz.NOTE 3 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the test requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or Base Station RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or Base Station RF Bandwidth. |

TABLE 3.3.2-3a

MR BS OBUE in BC2 bands applicable for: BS with maximum output power 31 < PRated,c ≤ 38 dBm, supporting NR, not supporting UTRA, and not supporting GSM

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 9) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz | PRated,c – 51.5dB - 7/5(f\_offset/MHz-0.05)dB | 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,c-60dB, -25dBm) (Note 10) | 100 kHz |

NOTE 1 – For MSR BS supporting non-contiguous spectrum operation within any operating band the minimum requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is Δf ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the minimum requirement within sub-block gaps shall be Min(PRated,c-60dB, -25dBm)/100kHz.

NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block.

NOTE 3 – For operation with a standalone NB-IoT or an E-UTRA 1.4 or 3MHz carrier adjacent to the Base Station RF Bandwidth edge, the limits in Table 3.3.2-5 apply for 0 MHz ≤ Δf < 0.15 MHz.

TABLE 3.3.2-4

MR BS OBUE in BC2 bands applicable for: BS with maximum output power PRated,c ≤ 31 dBm and not supporting NR; or BS with maximum output power PRated,c ≤ 31 dBm and supporting NR with UTRA and/or GSM

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 2, 3) | Measurement bandwidth (Note 9) |
| 0 MHz ≤ Δ*f* <0.6 MHz(Note 1) | 0.015MHz ≤ *f\_offset*< 0.615MHz |  | 30 kHz |
| 0.6 MHz ≤ Δ*f*< 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 ≤ Δ*f* ≤ 5 MHz | 1.5 MHz ≤ *f\_offset*< 5.5 MHz | −19.5 dBm | 1 MHz |
| 5 MHz ≤ Δ*f* ≤ min(Δfmax,10MHz) | 5.5 MHz ≤ *f\_offset* < min(*f\_offset*max,10.5MHz) | −23.5 dBm | 1 MHz |
| 10 MHz ≤ Δ*f* ≤ Δ*f*max | 10.5 MHz ≤ *f\_offset* < *f\_offset*max | −25 dBm (Note 10) | 1 MHz |
| NOTE 1 – For operation with a GSM/EDGE or standalone NB-IoT or an E-UTRA 1.4 or 3 MHz carrier adjacent to the Base Station RF Bandwidth edge, the limits in Table 3.3.2-6 apply for 0 MHz ≤ Δ*f* < 0.15 MHz.NOTE 2 – For MSR 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 Δ*f* ≥ 10 MHz from both adjacent sub‑blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be −25 dBm/MHz.NOTE 3 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the test requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block or Base Station RF Bandwidth shall be scaled according to the measurement bandwidth of the near-end sub-block or Base Station RF Bandwidth.TABLE 3.3.2-4aMR BS OBUE in BC2 bands applicable for: BS with maximum output power PRated,c ≤ 31 dBm BS, supporting NR, not supporting UTRA, and not supporting GSM

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 1, 2) | Measurement bandwidth (Note 9) |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz | - 20.5dBm - 7/5(f\_offset/MHz-0.05)dB | 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 10) | 100 kHz |

 |

NOTE 1 – For MSR BS supporting non-contiguous spectrum operation within any operating band the minimum requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block. Exception is Δf ≥ 10MHz from both adjacent sub blocks on each side of the sub-block gap, where the minimum requirement within sub-block gaps shall be -29dBm/100kHz.

NOTE 2 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap, where the contribution from the far-end sub-block shall be scaled according to the measurement bandwidth of the near-end sub-block.

NOTE 3 – For operation with a standalone NB-IoT or an E-UTRA 1.4 or 3MHz carrier adjacent to the Base Station RF Bandwidth edge, the limits in Table 3.3.2-6 apply for 0 MHz ≤ Δf < 0.15 MHz.

TABLE 3.3.2-5

MR BS OBUE in BC2 bands applicable for: BS with maximum output power 31 < PRated,c ≤ 38 dBm and with GSM/EDGE or E-UTRA 1.4 or 3 MHz carriers or standalone NB-IoT adjacent to the Base Station RF Bandwidth edge

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 5, 6) | Measurement bandwidth (Note 9) |
| 0 MHz ≤ Δ*f* < 0.05 MHz | 0.015 MHz ≤ *f\_offset*< 0.065 MHz | PRated,c - 36.5dB - 60(f\_offset/MHz-0.015)dB  | 30 kHz |
| 0.05 MHz ≤ Δ*f*< 0.15 MHz | 0.065 MHz ≤ *f\_offset*< 0.165 MHz | PRated,c - 39.5dB - 160(f\_offset/MHz-0.065)dB  | 30 kHz |
| NOTE 4 – The limits in this table only apply for operation with a GSM/EDGE or an E-UTRA 1.4 or 3 MHz carrier adjacent to the Base Station RF Bandwidth edge.NOTE 5 – For MSR 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.NOTE 6 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the test requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap. |

TABLE 3.3.2-6

MR BS OBUE in BC2 bands applicable for: BS with maximum output power PRated,c ≤ 31 dBm and with GSM/EDGE or E-UTRA 1.4 or 3 MHz carriers or standalone NB-IoT adjacent to the Base Station RF Bandwidth edge

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement(Notes 5, 6, 7) | Measurement bandwidth (Note 9) |
| 0 MHz ≤ Δ*f*< 0.05 MHz | 0.015 MHz ≤ *f\_offset*< 0.065 MHz |  | 30 kHz |
| 0.05 MHz ≤ Δ*f*< 0.15 MHz | 0.065 MHz ≤ *f\_offset*< 0.165 MHz |  | 30 kHz |
| NOTE 4 – The limits in this table only apply for operation with a GSM/EDGE or an E-UTRA 1.4 or 3 MHz carrier adjacent to the Base Station RF Bandwidth edge.NOTE 5 – For MSR 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.NOTE 6 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the test requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap.NOTE 7 – In case the carrier adjacent to the Base Station RF Bandwidth edge is a GSM/EDGE carrier, the value of *X* = *PGSMcarrier* – 31, where *PGSMcarrier* is the power level of the GSM/EDGE carrier adjacent to the Base Station RF Bandwidth edge. In other cases, *X* = 0.NOTE 8 – In case the carrier adjacent to the Base Station RF Bandwidth edge is a NB-IoT carrier, the value of X = PNB-IoTcarrier – 31, where PNB-IoTcarrier is the power level of the NB-IoT carrier adjacent to the Base Station RF Bandwidth edge. In other cases, X = 0. |

TABLE 3.3.2-7

LA BS OBUE in BC2 bands

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 2, 3) | Measurement bandwidth (Note 9) |
| 0 MHz ≤ Δ*f*< 5 MHz(Note 1) | 0.05 MHz ≤ *f\_offset*< 5.05 MHz |  | 100 kHz |
| 5 MHz ≤ Δ*f* < min(10 MHz, Δ*f*max) | 5.05 MHz ≤ *f\_offset* < min(10.05 MHz, *f\_offset*max) | −35.5 dBm | 100 kHz |
| 10 MHz ≤ Δ*f* ≤ Δ*f*max | 10.05 MHz ≤ *f\_offset* < *f\_offset*max | −37 dBm (Note 7) | 100 kHz |
| NOTE 1 – For operation with a GSM/EDGE or standalone NB-IoT or an E-UTRA 1.4 or 3 MHz carrier adjacent to the Base Station RF Bandwidth edge, the limits in Table 3.3.2-8 apply for 0 MHz ≤ Δ*f* < 0.16 MHz.NOTE 2 – For MSR BS supporting non-contiguous spectrum operation within any operating band the test requirement within sub‑block gaps is calculated as a cumulative sum contributions from adjacent sub‑blocks on each side of the sub‑block gap. Exception is Δ*f* ≥ 10 MHz from both adjacent sub‑blocks on each side of the sub-block gap, where the test requirement within sub-block gaps shall be −37 dBm/100 kHz.NOTE 3 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the test requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap. |

TABLE 3.3.2-8

L LA BS OBUE in BC2 bands applicable for: BS with GSM/EDGE or E-UTRA 1.4 or 3 MHz carriers or standalone NB-IoT adjacent to the Base Station RF Bandwidth edge

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter −3 dB point, Δ*f* | Frequency offset of measurement filter centre frequency, *f\_offset* | Test requirement (Notes 5, 6, 7) | Measurement bandwidth (Note 9) |
| 0 MHz ≤ Δ*f* < 0.05 MHz | 0.015 MHz ≤ *f\_offset*< 0.065 MHz |  | 30 kHz |
| 0.05 MHz ≤ Δ*f*< 0.16 MHz | 0.065 MHz ≤ *f\_offset*< 0.175 MHz |  | 30 kHz |
| NOTE 4 – The limits in this table only apply for operation with a GSM/EDGE or an E-UTRA 1.4 or 3 MHz carrier adjacent to the Base Station RF Bandwidth edge.NOTE 5 – For MSR 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.NOTE 6 – For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < 2×ΔfOBUE the test requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or Base Station RF Bandwidth on each side of the Inter RF Bandwidth gap.NOTE 7 – In case the carrier adjacent to the Base Station RF Bandwidth edge is a GSM/EDGE carrier, the value of *X* = *PGSMcarrier* – 24, where *PGSMcarrier* is the power level of the GSM/EDGE carrier adjacent to the Base Station RF Bandwidth edge. In other cases, *X* = 0. |
| The following Notes are common to Tables 3.3.2‑1 to 3.3.2‑8.NOTE 8 – This frequency range ensures that the range of values of *f\_offset* is continuous.NOTE 9 – As a general rule for the requirements in the present clause, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.NOTE 10 – The requirement is not applicable when Δ*f*max < ΔfOBUE. |

### 3.3.4 Additional requirements

#### 3.3.4.1 Limits in FCC Title 47

In addition to the requirements in §§ 3.3.1 and 3.3.2, the BS may have to comply with the applicable emission limits established by FCC Title 47, when deployed in regions where those limits are applied, and under the conditions declared by the manufacturer.

#### 3.3.4.2 Unsynchronized operation for BC3

In certain regions, the following requirements may apply to a TDD BS operating in BC3 in the same geographic area and in the same operating band as another TDD system without synchronisation. For this case the emissions shall not exceed −52 dBm/MHz in the downlink operating band except in:

– The frequency range from 10 MHz below the Lower Base Station RF Bandwidth edge to the frequency 10 MHz above the Upper Base Station RF Bandwidth edge.

NOTE 1 – Local or regional regulations may specify another excluded frequency range, which may include frequencies where synchronised TDD systems operate.

NOTE 2 – TDD base stations that are synchronized and operating in BC3 can transmit without these additional co-existence requirements.

NOTE 3 – Unsynchronized operation for BC3 BS with any NR configuration is FFS.

#### 3.3.4.3 Protection of DTT

In certain regions the following requirement may apply for protection of DTT. For a BS operating in Band 20, the level of emissions in the band 470-790 MHz, measured in an 8 MHz filter bandwidth on centre frequencies *Ffilter* according to Table 3.3.4.3-1, 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 3.3.4.3-1

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 e.i.r.p. 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. |

#### 3.3.4.4 Void

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |

#### 3.3.4.5 Void

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |

#### 3.3.4.6 Additional band 32, 50, 51, 74, 75 and 76 unwanted emissions

In certain regions, the following requirements may apply to BS operating in Band 32 within 1 452-1 492 MHz, in Band 75 within 1432-1517 MHz and in Band 76 within 1427-1432 MHz. The level of operating band unwanted emissions, measured on centre frequencies f\_offset with filter bandwidth, according to Table 3.3.4.6-1, shall neither exceed the maximum emission level *PEM,B*32*,*B75,B76,*a* , *PEM,B*32*,*B75,B76,*b*nor *PEM,B*32*,*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 3.3.4.6-1

Declared operating band 32, 75 and 76 unwanted emission within 1427-1517MHz

|  |  |  |
| --- | --- | --- |
| Frequency offset of measurement filter centre frequency, *f\_offset* | Declared emission level (dBm) | Measurement bandwidth  |
| 2.5 MHz | PEM,B32,B75,B76,a | 5 MHz  |
| 7.5 MHz | PEM,B32,B75,B76,b | 5 MHz  |
| 12.5 MHz ≤ *f\_offset* ≤ *f\_offset*max | PEM,B32,B75,B76,c | 5 MHz |
| NOTE – For Band 32, when non-MFCN services are deployed in the adjacent bands, *f\_offset*max denotes the frequency difference between the Lower Base Station RF Bandwidth edge and 1 454.5 MHz, and the frequency difference between the Upper Base Station RF Bandwidth edge and 1 489.5 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 Base Station RF Bandwidth edge and 1429.5 MHz, and the frequency difference between the upper Base Station RF Bandwidth edge and 1514.5 MHz for the set channel position. |

NOTE – The regional requirement 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.

In certain regions, the following requirement may apply to BS operating in Band 32 within 1 452-1 492 MHz for the protection of non-MFCN services in spectrum adjacent to the frequency range 1 452-
1 492 MHz. The level of emissions, measured on centre frequencies Ffilter with filter bandwidth according to Table 3.3.4.6-2, 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 1 429-1 518 MHz even though part of the range falls in the spurious domain.

TABLE 3.3.4.6-2

Operating band 32 declared emission outside 1 452-1 492 MHz

|  |  |  |
| --- | --- | --- |
| Filter centre frequency, *Ffilter* | Declared emission level (dBm) | Measurement bandwidth |
| 1 429.5 MHz ≤ *Ffilter* ≤ 1 448.5 MHz | PEM,B32,d | 1 MHz |
| *Ffilter* = 1 450.5 MHz | PEM,B32,e | 3 MHz |
| *Ffilter* = 1 493.5 MHz | PEM,B32,e | 3 MHz |
| 1 495.5 MHz ≤ *Ffilter* ≤ 1 517.5 MHz  | PEM,B32,d | 1 MHz |

NOTE – The regional requirement 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.

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 3.3.4.6-3, shall neither exceed the maximum emission level PEM,B50,B74,B75,a nor PEM,B50,B74,B75,b declared by the manufacturer.

TABLE 3.3.4.6-3

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 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.

In certain regions, the following requirement may apply to E-UTRA or NR 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 3.3.4.6-4.

TABLE 3.3.4.6-4

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* | Declared emission level (dBm) | Measurement bandwidth |
| Ffilter = 1413.5 MHz | -42 | 27 MHz |

#### 3.3.4.7 Additional requirements for band 48

The following requirement may apply to BS operating in Band 48 in certain regions. Emissions shall not exceed the maximum levels specified in Table 3.3.4.7-1.

TABLE 3.3.4.7-1

Additional operating band unwanted emission limits for Band 48

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel bandwidth | Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Minimum requirement | Measurement bandwidth |
| All | 0 MHz ≤ Δf < 10 MHz | 0.5 MHz ≤ f\_offset < 9.5 MHz | -13 dBm | 1 MHz |

#### 3.3.4.8 Additional requirements for band 53

The following requirement may apply to BS operating in Band 53 in certain regions. Emissions shall not exceed the maximum levels specified in Table 3.3.4.8-1.

TABLE 3.3.4.8-1

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 |
| 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 |