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Mobile Radio Specifications

Release 2

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WiMAX Forum Proprietary

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1 Introduction

The purpose of this document is to provide WiMAX Forum® mobile radio specifications for Release 2.

1.1 Scope

This document specifies the WiMAX Forum® mobile radio specifications for Mobile Stations and Base Stations for various Mobile WiMAX™ band classes as specified in the band class list of Section 2.

1.2 References

The following documents contain provisions that, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, subsequent revisions do apply.

[1] DRAFT-T21-TBD-R020, Requirements for WiMAX Air Interface System Profile Release 2

[2] WORKING DOCUMENT TOWARDS A PRELIMINARY DRAFT REVISION, Frequency arrangements for implementation of the terrestrial component of International Mobile Telecommunications (IMT) in the bands identified for IMT in the Radio Regulations (RRs)

[3] WMF-T23-001-R020, WiMAX Forum® Air Interface Specifications, WiMAX Forum® Mobile System Profile

[4] TGE_54188_r16_TWG_Device_Categorization, Baseline Device Categorization for 802.16m based Mobile WiMAX releases

1.3 Definitions, Symbols and Acronyms

1.3.1 Definitions

This section provides the list of definitions used throughout the document.

Integration Bandwidth: Integration Bandwidth refers to the frequency range over which the emission power is integrated.

1.3.2 Symbols

This section provides the list of symbols used throughout the document along with their descriptions.

f	frequency in MHz unless specified otherwise.
f_c	center frequency in MHz unless specified otherwise.
f_{cN}	RF channel center frequency number
Δf	absolute value of frequency offset of frequency f from the center frequency of the channel ($ f_c - f $). The offset is in MHz unless specified otherwise.
ΔF_c	center frequency step
F_{start}	start frequency for a specific band,
N_{range}	range values for the n parameter
PTx	measured transmit power into antenna in dBm
PTx,max	measured maximum transmit power into antenna in dBm
$RFChannel_n$	center frequency of RF Channel n
F_{UL-le}	Lower edge of uplink portion of the band
F_{UL-ue}	Upper edge of uplink portion of the band
F_{ue}	Upper edge of the band (either uplink or downlink whichever larger)
F_{DL-le}	Lower edge of downlink portion of the band
F_{DL-ue}	Upper edge of downlink portion of the band

1.3.3 Acronyms

This section provides the list of acronyms and abbreviations used throughout the document.

ACLR	adjacent channel leakage ratio
ACR	adjacent channel rejection
BCG	band class group
BS	base station
BW	bandwidth
ChBW	channel bandwidth
MS	mobile station
RF	radio frequency
Pnom	nominal max output power measured at antenna port(s); total for multiple antennas

2 Band Classes

The purpose of this section is to provide the list of Mobile WiMAX Release 2 Band Class Groups along with the supported channel bandwidths. In this section, Band Classes are defined for supporting both Single Carrier and Multi-carrier operations.

Table 1 lists Release 2 BCGs along with Release 1.0/1.5 BCGs for Single Carrier operation. Unlike in Release 1.0/1.5 where specific channel bandwidth sizes are specified for various BCGs and two BCGs may differ only on supported channel bandwidth sizes, all R2 BCGs, by default, support 5, 10 and 20 MHz channel bandwidth sizes unless the band allocation size is too small to allocate certain channel bandwidth size. Supports of other channel bandwidth sizes for R2 BCGs are considered in a case by case basis.

Table 1. List of Band Classes for Single Carrier Operation

Band Class Group	Frequency Range (MHz)		Duplex Mode	Release	Channel Bandwidth Size (MHz)						
	Uplink	Downlink			3.5	5	7	8	8.75	10	20
1.A ¹	2300-2400	2300-2400	TDD	1.0					Y		
1.B ¹	2300-2400	2300-2400	TDD	1.0		Y				Y	
1.C	2300-2400	2300-2400	TDD	2.0		Y				Y	Y
2.D ¹	2305-2320, 2345-2360	2305-2320, 2345-2360	TDD	1.0	Y	Y				Y	
2.E ¹	2345-2360	2305-2320	FDD	1.5	Y	Y				Y	
2.F ¹²	2345-2360	2305-2320	FDD	1.5		AUL				ADL	
3.A ¹	2496-2690	2496-2690	TDD	1.0		Y				Y	

¹ Release 1.0 and 1.5 legacy Band Class Groups are listed for reference. [Editor Note: Legacy BCGs may be removed later.]

² BCG 2.F is defined by Asymmetric channel bandwidths in UL (AUL) and DL (ADL).

3.B ¹	2496-2572	2614-2690	FDD	1.5		Y				Y	
3.C	2496-2690	2496-2690	TDD	2.0		Y				Y	Y
3.D	2496-2572	2614-2690	FDD	2.0		Y				Y	Y
4.A ¹	3300-3400	3300-3400	TDD	1.0		Y					
4.B ¹	3300-3400	3300-3400	TDD	1.0			Y				
4.C ¹	3300-3400	3300-3400	TDD	1.0						Y	
4.D	3300-3400	3300-3400	TDD	2.0		Y				Y	Y
5L.A ¹	3400-3600	3400-3600	TDD	1.0		Y					
5L.B ¹	3400-3600	3400-3600	TDD	1.0			Y				
5L.C ¹	3400-3600	3400-3600	TDD	1.0						Y	
5L.D ¹	3400-3500	3500-3600	FDD	1.5		Y	Y			Y	
5L.E	3400-3600	3400-3600	TDD	2.0		Y				Y	Y
5L.F	3400-3500	3500-3600	FDD	2.0		Y				Y	Y
5H.A ¹	3600-3800	3600-3800	TDD	1.0		Y					
5H.B ¹	3600-3800	3600-3800	TDD	1.0			Y				
5H.C ¹	3600-3800	3600-3800	TDD	1.0						Y	
5H.D	3600-3800	3600-3800	TDD	2.0		Y				Y	Y
6.A ¹	1710-1770	2110-2170	FDD	1.5		Y				Y	
6.B ¹	1920-1980	2110-2170	FDD	1.5		Y				Y	Y
6.C ¹	1710-1785	1805-1880	FDD	1.5		Y				Y	
6.D	1710-1770	2110-2170	FDD	2.0		Y				Y	Y
6.E	1920-1980	2110-2170	FDD	2.0		Y				Y	Y
6.F	1710-1785	1805-1880	FDD	2.0		Y				Y	Y
6.G	1710-1755	2110-2155	FDD	2.0		Y				Y	Y
6.H	1850-1910	1930-1990	FDD	2.0		Y				Y	Y

6.I	1710-1785, 1920-1980	1805-1880, 2110-2170	FDD	2.0		Y				Y	Y
6.J	1850-1910, 1710-1770	1930-1990, 2110-2170	FDD	2.0		Y				Y	Y
7.A ¹	698-862	698-862	TDD	1.0		Y	Y			Y	
7.B ¹	776-787	746-757	FDD	1.5		Y				Y	
7.C ¹	788-793, 793-798	758-763, 763-768	FDD	1.5						Y	
7.D ¹	788-798	758-768	FDD	1.5		Y					
7.E ¹	698-862	698-862	TDD/ FDD	1.5		Y	Y			Y	
7.F ¹	698-862	698-862	TDD	1.0				Y			
7.G ¹	880-915	925-960	FDD	1.5		Y				Y	
7.H	698-862	698-862	TDD	2.0		Y				Y	Y
7.I	824-849	869-894	FDD	2.0		Y				Y	Y
7.J	698-716, 776-793	728-746, 746-763	FDD	2.0		Y				Y	
7.K	791-821	832-862	FDD	2.0		Y				Y	Y
7.L	797-862	797-862	TDD	2.0		Y				Y	Y
7.M	756-806	698-748	FDD	2.0		Y				Y	Y
7.X[*]	730-770, 890-903, 915-950	730-770, 890-903, 915-950	TDD	1.5		Y				Y	
8.A ¹	1785-1805, 1880-1920, 1910-1930, 2010-2025, 1900-1920	1785-1805, 1880-1920, 1910-1930, 2010-2025, 1900-1920	TDD	1.5		Y				Y	
8.B	1785-1805	1785-1805	TDD	2.0		Y				Y	Y
8.C	1880-1920	1880-1920	TDD	2.0		Y				Y	Y
8.D	1910-1930	1910-1930	TDD	2.0		Y				Y	Y
8.E	2010-2025	2010-2025	TDD	2.0		Y				Y	

8.F	1900-1920	1900-1920	TDD	2.0		Y				Y	Y
8.G	1800-1830	1800-1830	TDD	1.0		Y				Y	
9.A	450-470	450-470	TDD	2.0		Y				Y	Y
9.B	450.0-457.5	462.5-470.0	FDD	2.0		Y					
9.C	450-455	465-470	FDD	2.0		Y					
9.D	170 -202.5	170-202.5	TDD	1.0		Y					
10.A	5000-5150	5000-5150	TDD	1.0		Y				Y	

[*Note: The details of Band Class Group 7.X including ACLR specifications are under development pending finalization of Japanese regulations.]

In Table 1, in the case of FDD channel bandwidth sizes are for uplink or downlink segments in a symmetric allocation.

For each Band Class Group, Mobile Stations are required to support operation over entire band as specified by Mobile WiMAX channel center frequency lists of Section 3.2. Base Stations are required to support at least three consecutive channels and only one channel bandwidth size.

Table 2 lists Release 2 BCGs supporting intra-band Multi-carrier operation.

Table 2. List of Band Classes for Intra-band Multi-carrier Operation

Band Class Group	Frequency Range (MHz)		Duplex Mode	Release	Channel Bandwidth Size (MHz)						
	Uplink	Downlink			3.5	5	7	8	8.75	10	20
1.C	2300-2400	2300-2400	TDD	2.0		Y				Y	Y
3.C	2496-2690	2496-2690	TDD	2.0		Y				Y	Y
5L.E	3400-3600	3400-3600	TDD	2.0		Y				Y	Y

For details of Multi-carrier (Carrier Aggregation) configuration, refer to [4].

3 Radio Frequency channel arrangement

3.1 Center frequency step size

The center frequency step size for Release 2 is 100 KHz.

For all Release 2 devices operating in legacy Release 1 mode (including mixed mode) for Release 1 BCGs, the center frequency step size of 250 KHz is also supported for backward compatibility purposes. Table 3 also lists the 250 KHz center frequencies related to the relevant BCGs.

From the perspective of the Release 2 BS, it is to the discretion of Base Station vendors to choose the center frequency based on the 100 KHz or 250 KHz step size. More specifically, if the BS supports mixed 16e/16m mode through mixed frame structure, the BS needs to operate in center frequencies based on 250 KHz step size to be able to serve Release 1 devices. If the BS operates only in Release 2 TDD mode, the center frequencies can be chosen based on 100 KHz or 250 KHz step size.

3.2 RF channel center frequencies

Table 3 provides the set of RF channel center frequency numbers for various Band Class Groups. From Table 3, the RF channel center frequencies can be derived as a function of RF channel center frequency numbers using the following equation.

$$f_c = 0.05 \times f_{cN}$$

In here the RF channel center frequency (f_c) is in MHz. The RF channel center frequency number (f_{cN}) is a number between 9050 and 75950 corresponding to 452.5 MHz and 3797.5 MHz RF channel center frequencies respectively.

In Table 3, for each combination of Band Class Group and channel bandwidth size, the RF Channel Center Frequency Number Sets are specified using the following triple

$(f_{cNstart}, f_{cNstop}, step)$

where $f_{cNstart}$ is the starting RF channel center frequency number assigned to the first RF channel center frequency in the BCG, f_{cNstop} is the ending RF channel center frequency number assigned to the last RF channel center frequency in the BCG and $step$ is the RF channel center frequency number step size between $f_{cNstart}$ and f_{cNstop} .

Table 3. RF Channel Center Frequency Numbers

Band Class Group	Frequency Range (MHz)		Duplex Mode	Channel BW	RF Channel Center Frequency Number Set	
	Uplink	Downlink			Uplink	Downlink
1.C	2300-2400	2300-2400	TDD	5	(46050, 47950, 2), (46050, 47950, 5)	(46050, 47950, 2), (46050, 47950, 5)
				10	(46100, 47900, 2), (46100, 47900, 5)	(46100, 47900, 2), (46100, 47900, 5)
				20	(46200, 47800, 2), (46200, 47800, 5)	(46200, 47800, 2), (46200, 47800, 5)
3.C	2496-2690	2496-2690	TDD	5	(49970, 53750, 2), (49970, 53750, 5)	(49970, 53750, 2), (49970, 53750, 5)
				10	(50020, 53700, 2), (50020, 53700, 5)	(50020, 53700, 2), (50020, 53700, 5)
				20	(50120, 53600, 2), (50120, 53600, 5)	(50120, 53600, 2), (50120, 53600, 5)
3.D	2496-2572	2614-2690	FDD	2x5	(49970, 51390, 2)	(52330, 53750, 2)
				2x10	(50020, 51340, 2)	(52380, 53700, 2)
				2x20	(50120, 51240, 2)	(52480, 53600, 2)
4.D	3300-3400	3300-3400	TDD	5	(66050, 67950, 2),	(66050, 67950, 2),

					(66050, 67950, 5)	(66050, 67950, 5)
				10	(66100, 67900, 2), (66100, 67900, 5)	(66100, 67900, 2), (66100, 67900, 5)
				20	(66200, 67800, 2), (66200, 67800, 5)	(66200, 67800, 2), (66200, 67800, 5)
5L.E	3400-3600	3400-3600	TDD	5	(68050, 71950, 2), (68050, 71950, 5)	(68050, 71950, 2), (68050, 71950, 5)
				10	(68100, 71900, 2), (68100, 71900, 5)	(68050, 71900, 2), (68100, 71900, 5)
				20	(68200, 71800, 2), (68200, 71800, 5)	(68200, 71800, 2), (68200, 71800, 5)
5L.F	3400-3500	3500-3600	FDD	2x5	(68050, 69950, 2)	(70050, 71950, 2)
				2x10	(68100, 69900, 2)	(70100, 71900, 2)
				2x20	(68200, 69800, 2)	(70200, 71800, 2)
5H.D	3600-3800	3600-3800	TDD	5	(72050, 75950, 2), (72050, 75950, 5)	(72050, 75950, 2), (72050, 75950, 5)
				10	(72100, 75900, 2), (72100, 75900, 5)	(72100, 75900, 2), (72100, 75900, 5)
				20	(72200, 75800, 2), (72200, 75800, 5)	(72200, 75800, 2), (72200, 75800, 5)
6.D	1710-1770	2110-2170	FDD	2x5	(34250, 35350, 2)	(42250, 43350, 2)
				2x10	(34300, 35300, 2)	(42300, 43300, 2)
				2x20	(34400, 35200, 2)	(42400, 43200, 2)
6.E	1920-1980	2110-2170	FDD	2x5	(38450, 39550, 2)	(42250, 43350, 2)
				2x10	(38500, 39500, 2)	(42300, 43300, 2)
				2x20	(38600, 39400, 2)	(42400, 43200, 2)

6.F	1710-1785	1805-1880	FDD	2x5	(34250, 35650, 2)	(36150, 37550, 2)
				2x10	(34300, 35600, 2)	(36200, 37500, 2)
				2x20	(34200, 35500, 2)	(36300, 37400, 2)
6.G	1710-1755	2110-2155	FDD	2x5	(34250, 35050, 2)	(42250, 43050, 2)
				2x10	(34300, 35000, 2)	(42300, 43000, 2)
				2x20	(34400, 34900, 2)	(42400, 42900, 2)
6.H	1850-1910	1930-1990	FDD	2x5	(37050, 38150, 2)	(38650, 39750, 2)
				2x10	(37100, 38100, 2)	(38700, 39700, 2)
				2x20	(37200, 38000, 2)	(38800, 39600, 2)
6.I	1710-1785, 1920-1980	1805-1880, 2110-2170	FDD	2x5	(34250, 35650, 2), (38450, 39550, 2)	(36150, 37550, 2), (42250, 43350, 2)
				2x10	(34300, 35600, 2), (38500, 39500, 2)	(36200, 37500, 2), (42300, 43300, 2)
				2x20	(34200, 35500, 2), (38600, 39400, 2)	(36300, 37400, 2), (42400, 43200, 2)
6.J	1850-1910, 1710-1770	1930-1990, 2110-2170	FDD	2x5	(37050, 38150, 2), (34250, 35350, 2)	(38650, 39750, 2), (42250, 43350, 2)
				2x10	(37100, 38100, 2), (34300, 35300, 2)	(38700, 39700, 2), (42300, 43300, 2)
				2x20	(37200, 38000, 2), (34400, 35200, 2)	(38800, 39600, 2), (42400, 43200, 2)
7.H	698-862	698-862	TDD	5	(14010, 17190, 2), (14010, 17190, 5)	(14010, 17190, 2), (14010, 17190, 5)
				10	(14060, 17140, 2), (14060, 17140, 5)	(14060, 17140, 2), (14060, 17140, 5)
				20	(14160, 17040, 2), (14160, 17040, 5)	(14160, 17040, 2), (14160, 17040, 5)
7.I	824-849	869-894	FDD	2x5	(16530, 16930, 2)	(17430, 17830, 2)

				2x10	(16620, 16880, 2)	(17480, 17780, 2)
				2x20	(16720, 16780, 2)	(17580, 17680, 2)
7.J	698-716, 776-793	728-746, 746-763	FDD	2x5	(14010, 14270, 2), (15570, 15810, 2)	(14610, 14870, 2), (14970, 15210, 2)
				2x10	(14060, 14220, 2), (15620, 15760, 2)	(14610, 14870, 2), (15020, 15160, 2)
7.K	791-821	832-862	FDD	2x5	(15870, 16370, 2)	(16690, 17190, 2)
				2x10	(15920, 16320, 2)	(16740, 17140, 2)
				2x20	(16020, 16220, 2)	(16840, 17040, 2)
7.L	797-862	797-862	TDD	5	(15990, 17190, 2)	(15990, 17190, 2)
				10	(16040, 17140, 2)	(16040, 17140, 2)
				20	(16140, 17040, 2)	(15990, 17040, 2)
7.M	756-806	698-748	FDD	2x5	(15190, 16070, 2)	(14010, 14910, 2)
				2x10	(15250, 16020, 2)	(14060, 14860, 2)
				2x20	(15350, 15920, 2)	(14160, 14760, 2)
8.B	1785-1805	1785-1805	TDD	5	(35750, 36050, 2), (35750, 36050, 5)	(35750, 36050, 2), (35750, 36050, 5)
				10	(35800, 36000, 2), (35800, 36000, 5)	(35800, 36000, 2), (35800, 36000, 5)
				20	(35900, 35900, 2), (35900, 35900, 5)	(35900, 35900, 2), (35900, 35900, 5)
8.C	1880-1920	1880-1920	TDD	5	(37650, 38350, 2), (37650, 38350, 5)	(37650, 38350, 2), (37650, 38350, 5)
				10	(37700, 38300, 2), (37700, 38300, 5)	(37700, 38300, 2), (37700, 38300, 5)
				20	(38700, 38200, 2), (38700, 38200, 5)	(38700, 38200, 2), (38700, 38200, 5)

8.D	1910-1930	1910-1930	TDD	5	(38250, 38550, 2), (38250, 38550, 5)	(38250, 38550, 2), (38250, 38550, 5)
				10	(38300, 38500, 2), (38300, 38500, 5)	(38300, 38500, 2), (38300, 38500, 5)
				20	(38400, 38400, 2), (38400, 38400, 5)	(38400, 38400, 2), (38400, 38400, 5)
8.E	2010-2025	2010-2025	TDD	5	(40250, 40450, 2), (40250, 40450, 5)	(37650, 38350, 2), (40250, 40450, 2)
				10	(40300, 40400, 2), (40300, 40400, 5)	(40300, 40400, 2), (40300, 40400, 5)
8.F	1900-1920	1900-1920	TDD	5	(38050, 38350, 2), (38050, 38350, 5)	(38050, 38350, 2), (38050, 38350, 5)
				10	(38100, 38300, 2), (38100, 38300, 5)	(38100, 38300, 2), (38100, 38300, 5)
				20	(38200, 38200, 2), (38200, 38200, 5)	(38200, 38200, 2), (38200, 38200, 5)
9.A	450-470	450-470	TDD	5	(9050, 9350, 2)	(9050, 9350, 2)
				10	(9100, 9300, 2)	(9100, 9300, 2)
				20	(9200, 9250, 2)	(9200, 9250, 2)
9.B	450.0-457. 5	462.5-470. 0	FDD	2x5	(9050, 9100, 2)	(9300, 9350, 2)
9.C	450-455	465-470	FDD	2x5	(9050, 905, 2)	(9350, 9350, 2)

4 Power Classes

The purpose of this section is to specify the Power Class options for Mobile WiMAX Release 2.

4.1 Mobile Station

Table 4 provides the list of Mobile Station Power Classes per Band Class Groups.

[Per BCG power reduction capability is TBD for consideration.]

Table 4. Mobile Station Power Classes

Band Class Group	Power Class 1 Pnom (dBm)	Power Class 2 Pnom (dBm)	Power Class 3 Pnom (dBm)	Power Class 4 Pnom (dBm)	Power Class 5 Pnom (dBm)
1.C	Reserved	20	23	26	Reserved
3.C	Reserved	20	23	26	Reserved
3.D	Reserved	20	23	26	Reserved
4.D	Reserved	20	23	26	Reserved
5.EL	Reserved	20	23	26	Reserved
5.FL	Reserved	20	23	26	Reserved
5.DH	Reserved	20	23	26	Reserved
6.D	Reserved	20	23	26	Reserved
6.E	Reserved	20	23	26	Reserved
6.F	Reserved	20	23	26	Reserved
6.G	Reserved	20	23	26	Reserved
6.H	Reserved	20	23	26	Reserved
6.I	Reserved	20	23	26	Reserved
6.J	Reserved	20	23	26	Reserved
7.H	Reserved	20	23	26	Reserved

7.I	Reserved	20	23	26	Reserved
7.J	Reserved	20	23	26	Reserved
7.K	Reserved	20	23	26	Reserved
7.L	Reserved	20	23	26	Reserved
7.M	Reserved	20	23	26	Reserved
8.B	Reserved	20	23	26	Reserved
8.C	Reserved	20	23	26	Reserved
8.D	Reserved	20	23	26	Reserved
8.E	Reserved	20	23	26	Reserved
8.F	Reserved	20	23	26	Reserved
9.A	Reserved	20	23	26	Reserved
9.B	Reserved	20	23	26	Reserved
9C	Reserved	20	23	26	Reserved

5 Radio specifications

5.1 Out of Band and Spurious Emission Regions

The default out of band emission, where Channel Spectral Mask specifications is applicable, is the absolute value of $\pm 250\%$ of channel bandwidth size from channel center frequency or lower and upper bound of the target band whichever is smaller. For frequencies beyond out of band region, the Spurious Emission specifications are applicable.

5.2 Mobile Station

The purpose of this section is to provide radio specification for Mobile Station.

5.2.1 Default Specifications

5.2.1.1 Default Channel Spectral Mask

Unless otherwise specified in other sub sections of Section 5 for specific bands, the spectrum masks of Table 5 and Table 6 are applicable.

Table 5. Channel Mask for 5 MHz Bandwidth

No	Δf , offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$2.5 \leq \Delta f < 3.5$	50	-13
2	$3.5 \leq \Delta f < 7.5$	1000	-10
3	$7.5 \leq \Delta f < 8.5$	1000	-13
4	$8.5 \leq \Delta f < 12.5$	1000	-25

Note: The first measurement position with a 50 kHz filter is at Δf equals to 2.525 MHz; the last is at Δf equals to 3.475 MHz. The first measurement position with a 1 MHz filter is at Δf equals to 4.0 MHz; the last is at Δf equals to 12.0 MHz.

Table 6. Channel Mask for 10 MHz Bandwidth

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5 \leq \Delta f < 6$	100	-13
2	$6 \leq \Delta f < 10$	1000	-10
3	$10 \leq \Delta f < 15$	1000	-13
4	$15 \leq \Delta f < 25$	1000	-25

Note: The first measurement position with a 100 kHz filter is at Δf equals to 5.050 MHz; the last is at Δf equals to 5.950 MHz. The first measurement position with a 1 MHz filter is at Δf equals to 6.5 MHz; the last is at Δf equals to 24.5 MHz.

Table 7. Channel Mask for 20 MHz Bandwidth

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$10 \leq \Delta f < 11$	200	-13
2	$11 \leq \Delta f < 15$	1000	-10
3	$15 \leq \Delta f < 30$	1000	-13
4	$30 \leq \Delta f < 50$	1000	-25

Note: The first measurement position with a 100 kHz filter is at Δf equals to 10.050 MHz; the last is at Δf equals to 10.950 MHz. The first measurement position with a 1 MHz filter is at Δf equals to 11.5 MHz; the last is at Δf equals to 49.5 MHz.

5.2.1.2 Default Spurious Emission

Unless otherwise specified in sub sections of Section 5 for specific bands, the default spurious emission specifications of Table 8 are applicable.

Table 8. Default Spurious Emissions; Relevant to $F_{UL-le} + ChBW/2 \leq f_c \leq F_{UL-ue} - ChBW/2$

No	Spurious frequency (f) range	Measurement bandwidth	Maximum Emission Level (dBm)
1	$9 \text{ kHz} \leq f < 150 \text{ kHz}$	1 kHz	-36
2	$150 \text{ kHz} \leq f < 30 \text{ MHz}$	10 kHz	-36
3	$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	100 kHz	-36
4	$1 \text{ GHz} \leq f < 5 \times F_{ue}$	30 kHz If $2.5 \times ChBW \leq \Delta f < 10 \times ChBW$ 300 kHz If $10 \times ChBW \leq \Delta f < 12 \times ChBW$ 1 MHz If $12 \times ChBW \leq \Delta f$	-30

5.2.2 Band Class 1

5.2.2.1 Band Class Group 1.C

5.2.2.1.1 Channel Spectral Mask

The channel mask for 5 MHz bandwidth is specified in Table 9.

Table 9. Channel Mask for 5 MHz Bandwidth (BCG 1.C)

No	Δf offset from channel center (MHz)	Integration Bandwidth (kHz)	Allowed Emission Level (dBm/integration BW) at the antenna port.
1	$2.5 \leq \Delta f < 3.5$	50	-13
2	$3.5 \leq \Delta f < 7.5$	1000	-13
3	$7.5 \leq \Delta f < 8$	500	-16
4	$8 \leq \Delta f < 10.4$	1000	-25
5	$10.4 \leq \Delta f < 12.5$	1000	-25

The channel mask for 10 MHz bandwidth is specified in Table 10.

Table 10. Channel Mask for 10 MHz Bandwidth (BCG 1.C)

No	Δf offset from channel center (MHz)	Integration Bandwidth (kHz)	Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5 \leq \Delta f < 6$	100	-13
2	$6 \leq \Delta f < 10$	1000	-13
3	$10 \leq \Delta f < 11$	1000	-13-12(Δf -10)
4	$11 \leq \Delta f < 15$	1000	-25
5	$15 \leq \Delta f < 20$	1000	-25
6	$20 \leq \Delta f \leq 25$	1000	-25

5.2.2.1.2 Spurious Emission Specification

Table 11. Additional Spurious Emissions for 5 MHz Channel Size (BCG 1.C)

No	Spurious frequency (f) range (MHz)	Measurement bandwidth (MHz)	Maximum Emission Level (dBm)
1	$2110 \leq f < 2170$	1	-50
2	$1805 \leq f < 1880$	1	-50
3	$2496 \leq f < 2690$	1	-50
4	$925 \leq f < 960$	1	-50
5	$1900 \leq f < 1920$	1	-50
6	$2010 \leq f < 2025$	1	-50
7	$2570 \leq f < 2620$	1	-50
8	$791 \leq f < 821$	1	-50

5.2.3 Band Class 3

5.2.3.1 Band Class Group 3.C

5.2.3.1.1 Channel Spectral Mask

The channel mask for 5 MHz, 10 MHz and 20 MHz channel bandwidths are specified in Table 12 through

Table 14.

In this section, the unwanted emission requirements for the first adjacent channel, specified as maximum allowed Adjacent Channel Power, are captured as a single point measurement for the first segment of the mask.

Table 12. Channel Mask for 5 MHz Bandwidth (BCG 3.C)

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$\Delta f = 5$	4800	-1
2	$7.5 \leq \Delta f < 8$	1000	$-23 - 2.28(\Delta f - 7.5)$
3	$8 \leq \Delta f < 17.5$	1000	$-24 - 1.68(\Delta f - 8)$
4	$17.5 \leq \Delta f < 22.5$	1000	-40

Table 13. Channel Mask for 10 MHz Bandwidth (BCG 3.C)

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$\Delta f = 10$	9500	-3
2	$15 \leq \Delta f < 20$	1000	$-24 - 32(\Delta f - 10.5)/19$
3	$20 \leq \Delta f < 25$	1000	-40

Table 14. Channel Mask for 20 MHz Bandwidth (BCG 3.C)

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$\Delta f = 20$	19500	-3
2	$30 \leq \Delta f < 35$	1000	-25
3	$35 \leq \Delta f < 50$	1000	-30

5.2.3.1.2 Transmitter Spurious Emission

In addition to the default Spurious Emission specifications, the requirements of Table 15 through Table 19 are applicable.

Table 15. Additional Spurious Emissions for 5 MHz Channel Size (BCG 3.C)

No	Spurious frequency (f) range (MHz)	Measurement bandwidth (MHz)	Maximum Emission Level (dBm)
1	$2505 \leq f < 2530$	1	-37
2	$2530 \leq f < 2535$	1	1.7f-4338
3	$2535 \leq f < 2630$	1	-21-1.68(Δf-8) 12.5 MHz < Δf < 17.5 MHz -37 17.5 MHz < Δf < 22.5 MHz -18 22.5 MHz < Δf
4	$2\ 630 \leq f < 2630$	1	$-13 - 8(f - 2\ 627)/3.5$
5	$2\ 630.5 \leq f < 2640$	1	$-21 - 16(f - 2\ 630.5)/9.5$
6	$2\ 640 \leq f < 2655$	1	-37

Table 16. Additional Spurious Emissions for 5 MHz Channel Size (BCG 3.C)

No	Spurious frequency (f) range (MHz)	Measurement bandwidth (MHz)	Maximum Emission Level (dBm)
1	$2620 \leq f < 2690$	1	-40

Note: With respect to Table 16, for each RF channel used, up to five measurements in 2620-2635.84 and 2655-2690 MHz are exempt from the -40 dBm specification of Row 1 where a relaxed level of -30 dBm of Row 4 of Table 8 is applicable.

Table 17. Additional Spurious Emissions for 10 MHz Channel Size (BCG 3.C)

No	Spurious frequency (f) range (MHz)	Measurement bandwidth (MHz)	Maximum Emission Level (dBm)
1	$2505 \leq f < 2530$	1	-37
2	$2530 \leq f < 2535$	1	$1.7f-4338$
3	$2535 \leq f < 2630$	1	-18 $25 \text{ MHz} < \Delta f$
4	$2630 \leq f < 2630.5$	1	$-13 - 8(f - 2627)/3.5$
5	$2630.5 \leq f < 2640$	1	$-21 - 16(f - 2630.5)/9.5$
6	$2640 \leq f < 2655$	1	-37

Table 18. Spurious Emissions for 10 MHz Channel Size (BCG 3.C)

No	Spurious frequency (f) range (MHz)	Measurement bandwidth (MHz)	Maximum Emission Level (dBm)
1	$2620 \leq f < 2690$	1	-40

Note: With respect to Table 17, for each RF channel used, up to five measurements in 2620-2635.84 and 2655-2690 MHz are exempt from the -40 dBm specification of Row 1 where a relaxed level of -30 dBm of Row 4 of Table 8 is applicable.

Table 19. Mobile station spurious emission limit, Japan (BCG 3.C)

No	Frequency bandwidth	Measurement bandwidth	Allowed emission level (dBm)
1	$9 \text{ kHz} \leq f < 150 \text{ kHz}$	1 kHz	-16
2	$150 \text{ kHz} \leq f < 30 \text{ MHz}$	10 kHz	-16
3	$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	100 kHz	-16
4	$1000 \text{ MHz} \leq f < 2505 \text{ MHz}$	1 MHz	-16
5	$2505 \text{ MHz} \leq f < 2530 \text{ MHz}$	1 MHz	-40
6	$2530 \text{ MHz} \leq f < 2535 \text{ MHz}$	1 MHz	$1.7f-4341$
7	$2535 \text{ MHz} \leq f < 2655 \text{ MHz}$	1 MHz	-21
8	$2655 \text{ MHz} \leq f$	1 MHz	-16

Note: The allowed emission level for the frequency band between 2 535 MHz and 2 655 MHz shall be applied for the frequency range greater than 2.5 times the channel size away from the centre frequency.

5.2.3.2 Band Class Group 3.D

5.2.3.2.1 Channel Spectral Mask

The channel mask for 10 MHz bandwidth is specified in Table 20.

Table 20. Channel Mask for 10 MHz Bandwidth (BCG 3.D)

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5 \leq \Delta f < 6$	100	-13
2	$6 \leq \Delta f < 10$	1000	-13
3	$10 \leq \Delta f < 11$	1000	$-13-12(\Delta f-10)$
4	$11 \leq \Delta f < 15$	1000	-25
5	$15 \leq \Delta f < 20$	1000	-25
6	$20 \leq \Delta f \leq 25$	1000	-25

The channel mask for 5 MHz bandwidth is specified in Table 21.

Table 21. Channel Mask for 5 MHz Bandwidth (BCG 3.D)

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/integration BW) at the antenna port.
1	$2.5 \leq \Delta f < 3.5$	50	-13
2	$3.5 \leq \Delta f < 7.5$	1000	-13
3	$7.5 \leq \Delta f < 8$	500	-16
4	$8 \leq \Delta f < 10.4$	1000	-25
5	$10.4 \leq \Delta f < 12.5$	1000	-25

5.2.3.2.2 Transmitter Spurious Emission

In addition to the default Spurious Emission specifications, the requirements of Table 22 are applicable.

Table 22. Additional Spurious Emissions (BCG 3.D)

No	Spurious frequency (f) range (MHz)	Measurement bandwidth (MHz)	Maximum Emission Level (dBm)
1	2110-2170	1	-50
2	1805-1880	1	-50
3	2620-2690	1	-50
4	925-960	1	-50
5	1900-1920	1	-50
6	2010-2025	1	-50
7	2570-2620	1	-50

5.2.4 Band Class 5

5.2.4.1 Band Class Group 5L.E

5.2.4.1.1 Channel Spectral Mask

Table 23. Channel Mask for 5 MHz Channel Bandwidth (BCG 5L.E)

No	Frequency offset Δf (MHz)	Maximum Emission Level (dBc)	Measurement bandwidth
1	$2.5 \leq \Delta f < 3.5$	$-33.5-15(\Delta f-2.5)$	30 kHz
2	$3.5 \leq \Delta f < 7.5$	$-33.5-1(\Delta f-3.5)$	1 MHz
3	$7.5 \leq \Delta f < 8.5$	$-37.5-10(\Delta f-7.5)$	1 MHz
4	$8.5 \leq \Delta f \leq 12.5$	-47.5	1 MHz

Notes:

1. The out-of-channel emission is specified as power level measured over the specified measurement bandwidth relative to the total mean power of the MS carrier measured in the 5 MHz channel.
2. The MS emission shall not exceed the levels specified in Table 23. Assuming specific power classes, relative specifications of Table 23 can be converted to absolute values for testing purposes.
3. In additions, for center carrier frequencies within 3650-3700 MHz range, all emission levels shall not exceed -13 dBm/MHz.

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4. The first measurement position with a 30 kHz filter is at Δf equals to 2.515 MHz; the last is at Δf equals to 3.485 MHz.
 5. The first measurement position with a 1 MHz filter is at Δf equals to 4 MHz; the last is at Δf equals to 12 MHz. As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be different from the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.
 6. Note that equivalent PSD type mask can be derived by applying $10 \cdot \log((5 \text{ MHz})/(30 \text{ kHz})) = 22.2 \text{ dB}$ and $10 \cdot \log((5 \text{ MHz})/(1 \text{ MHz})) = 7 \text{ dB}$ scaling factor for 30 kHz and 1 MHz measurement bandwidth respectively.

Table 24. Channel Mask for 10 MHz Channel Bandwidth (BCG 5L.E)

No	Frequency offset Δf (MHz)	Maximum Emission Level (dBc)	Measurement bandwidth
1	$5.0 \leq \Delta f < 7.0$	$-33.5-9(\Delta f-5.0)$	30 kHz
2	$7.0 \leq \Delta f < 15.0$	$-36.5-0.5(\Delta f-7.0)$	1 MHz
3	$15.0 \leq \Delta f < 17.0$	$-40.5-5(\Delta f-15.0)$	1 MHz
4	$17.0 \leq \Delta f \leq 25.0$	-50.5	1 MHz

Notes:

1. The spectrum emission mask of the MS applies to frequency offsets between 5.0 MHz and 25.0 MHz on both sides of the MS center carrier frequency. The out-of-channel emission is specified as power level measured over the specified measurement bandwidth relative to the total mean power of the MS carrier measured in the 10 MHz channel.
2. The MS emission shall not exceed the levels specified in Table 24. Assuming specific power classes, relative specifications of Table 24 can be converted to absolute values for testing purposes.
3. In additions, for center carrier frequencies within 3650-3700 MHz range, all emission levels shall not exceed -13 dBm/MHz.
4. The first measurement position with a 30 kHz filter is at Δf equals to 510.015 MHz; the last is at Δf equals to 6.985 MHz.
5. The first measurement position with a 1 MHz filter is at Δf equals to 7.5 MHz; the last is at Δf equals to 24.5 MHz. As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be different from the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.
6. Equivalent PSD type mask can be derived by applying $10 \cdot \log((10 \text{ MHz})/(30 \text{ kHz})) = 25.2 \text{ dB}$ and $10 \cdot \log((10 \text{ MHz})/(1 \text{ MHz})) = 10 \text{ dB}$ scaling factor for 30 kHz and 1 MHz measurement bandwidth respectively.

5.2.5 Band Class 6

5.2.5.1 Band Class Group 6.D

5.2.5.1.1 Channel Spectral Mask

Table 25 and Table 26 specify the spectrum emission for FDD Mobile Stations with 5 and 10 MHz channel bandwidths.

Table 25. Channel Mask for 5 MHz Bandwidth (BCG 6.D)

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/integration BW) at the antenna port
1	$2.5 \leq \Delta f < 3.5$	50	-13
2	$3.5 \leq \Delta f \leq 12.5$	1000	-13

Table 26. Channel Mask for 10 MHz Bandwidth (BCG 6.D)

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5 \leq \Delta f < 6$	100	-13
2	$6 \leq \Delta f \leq 25$	1000	-13

5.2.5.1.2 Spurious Emission Specifications

In addition to the default Spurious Emission specifications, the requirements of Table 27 are applicable.

Table 27. Spurious Emissions (BCG 6.D)

No	Measurement frequency range	Measurement bandwidth (MHz)	Maximum Emission Level (dBm)
1	$30 \text{ MHz} \leq f < 8.850 \text{ GHz}$	1	-13

5.2.5.2 Band Class Group 6.E

5.2.5.2.1 Transmitter Spurious Emission Specification

Table 28 and Table 29 specify the additional spurious emission limits.

Table 28. Spurious Emissions (BCG 6.E)

No	Measurement frequency range	Measurement bandwidth	Maximum Emission Level (dBm)
1	$9 \text{ kHz} \leq f < 150 \text{ kHz}$	1 kHz	-36
2	$150 \text{ kHz} \leq f < 30 \text{ MHz}$	10 kHz	-36
3	$30 \text{ MHz} \leq f < 1000 \text{ GHz}$	100 kHz	-36
4	$1 \text{ GHz} \leq f < 9.900 \text{ GHz}$	1 MHz	-30

Table 29. Additional Spurious Emissions (BCG 6.E)

No	Spurious frequency (f) range (MHz)	Measurement bandwidth	Maximum Emission Level (dBm)
1	2110-2170	1 MHz	-50
2	1805-1880	1 MHz	-50
3	2620-2690	1 MHz	-50
4	925-960	1 MHz	-50
5	1844.9-1879.9	1 MHz	-50
6	1475.9-1500.9	1 MHz	-50
7	1900-1920	1 MHz	-50
8	2010-2025	1 MHz	-50
9	2570-2620	1 MHz	-50
11	1880-1920	1 MHz	-50
12	2300-2400	1 MHz	-50
13	860-895	1 MHz	-50
14	1884.5-1919.6	300 KHz	-41

5.2.5.3 Band Class Group 6.F

5.2.5.3.1 Transmitter Spurious Emission Specification

Table 30 specifies the additional spurious emission limits.

Table 30. Additional Spurious Emission (BCG 6.F)

No	Transmitter Center Frequency (f_c) (MHz)	Spurious Frequency (f) Range (MHz)	Measurement Bandwidth (MHz)	Maximum Emission Level (dBm)
1.	1710-1785	925-960	1	-50
2.	1710-1785	1475.9–1500.9	1	-50
3.	1710-1785	1805-1880	1	-50
4.	1710-1785	1844.9–1879.9	1	-50
5.	1710-1785	1900–1920	1	-50
6.	1710-1785	2010–2025	1	-50
7.	1710-1785	2110-2170	1	-50
8.	1710-1785	2570–2620	1	-50
9.	1710-1785	2620-2690	1	-50
10.	1710-1785	2300–2400	1	-50
11.	1710-1785	791-821	1	-50

5.2.5.4 Band Class Group 6.G

5.2.5.4.1 Channel Spectral Mask

Table 31 and Table 32 specify the spectrum emission for FDD Mobile Stations with 5 and 10 MHz channel bandwidths.

Table 31. Channel Mask for 5 MHz Bandwidth (BCG 6.G)

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/integration BW) at the antenna port
1	$2.5 \leq \Delta f < 3.5$	50	-13
2	$3.5 \leq \Delta f \leq 12.5$	1000	-13

Table 32. Channel Mask for 10 MHz Bandwidth (BCG 6.G)

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5 \leq \Delta f < 6$	100	-13
2	$6 \leq \Delta f \leq 25$	1000	-13

5.2.5.4.2 Spurious Emission Specifications

In addition to the default Spurious Emission specifications, the requirements of Table 33 are applicable.

Table 33. Spurious Emissions (BCG 6.G)

No	Measurement frequency range	Measurement bandwidth (MHz)	Maximum Emission Level (dBm)
1	$30 \text{ MHz} \leq f < 8.775 \text{ GHz}$	1	-13

5.2.5.5 Band Class Group 6.H

5.2.5.5.1 Channel Spectral Mask

Table 34 and Table 35 specify the spectrum emission for FDD Mobile Stations with 5 and 10 MHz channel bandwidths.

Table 34. Channel Mask for 5 MHz Bandwidth (BCG 6.H)

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/integration BW) at the antenna port
1	$2.5 \leq \Delta f < 3.5$	50	-13
2	$3.5 \leq \Delta f \leq 12.5$	1000	-13

Table 35. Channel Mask for 10 MHz Bandwidth (BCG 6.H)

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5 \leq \Delta f < 6$	100	-13
2	$6 \leq \Delta f \leq 25$	1000	-13

5.2.5.5.2 Spurious Emission Specifications

In addition to the default Spurious Emission specifications, the requirements of Table 36 are applicable.

Table 36. Spurious Emissions (BCG 6.G)

No	Measurement frequency range	Measurement bandwidth (MHz)	Maximum Emission Level (dBm)
1	$30 \text{ MHz} \leq f < 9.550 \text{ GHz}$	1	-13

5.2.5.6 Band Class Group 6.J

5.2.5.6.1 Channel Spectral Mask

Table 37 and Table 38 specify the spectrum emission for FDD Mobile Stations with 5 and 10 MHz channel bandwidths.

Table 37. Channel Mask for 5 MHz Bandwidth (BCG 6.J)

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/integration BW) at the antenna port
1	$2.5 \leq \Delta f < 3.5$	50	-13
2	$3.5 \leq \Delta f \leq 12.5$	1000	-13

Table 38. Channel Mask for 10 MHz Bandwidth (BCG 6.J)

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5 \leq \Delta f < 6$	100	-13
2	$6 \leq \Delta f \leq 25$	1000	-13

5.2.5.6.2 Spurious Emission Specifications

In addition to the default Spurious Emission specifications, the requirements of Table 39 are applicable.

Table 39. Spurious Emissions (BCG 6.J)

No	Measurement frequency range	Measurement bandwidth (MHz)	Maximum Emission Level (dBm)
1	$30 \text{ MHz} \leq f < 9.550 \text{ GHz}$	1	-13

5.2.6 Band Class 7

5.2.6.1 Band Class Group 7.H

5.2.6.1.1 Channel Spectral Mask

Table 40 and Table 41 specify the spectrum emission mask with 5 MHz channel bandwidths.

Table 40. Channel Mask for 5 MHz Bandwidth: $700.5 \leq f_c \leq 795.5$ (BCG 7.H)

No	Frequency offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$2.5 \leq \Delta f < 2.6$	30	-13
2	$2.6 \leq \Delta f < 12.5$	100	-13

Notes: The first measurement position with a 30 kHz filter is at Δf equals to 2.515 MHz; the last is at Δf equals to 2.585 MHz. The first measurement position with a 100 kHz filter is at Δf equals to 2.650 MHz; the last is at Δf equals to 12.450 MHz.

Table 41. Channel Mask for 5 MHz Bandwidth: $799.5 \leq f_c \leq 859.5$ (BCG 7.H)

No	Frequency offset Δf from channel center (MHz)	Integration Bandwidth (MHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$2.5 \leq \Delta f < 7.5$	5	1.6
2	$7.5 \leq \Delta f < 12.5$	2	-10

Notes: The measurement position with a 5 MHz filter is at Δf equals to 5 MHz. The first measurement position with a 2 MHz filter is at Δf equals to 8.5 MHz; the last is at Δf equals to 11.5 MHz.

Table 42 and Table 43 specify the spectrum emission mask with 10 MHz channel bandwidths.

Table 42. Channel Mask for 10 MHz Bandwidth: $703 \leq f_c \leq 793$ (BCG 7.H)

No	Frequency offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5.0 \leq \Delta f < 5.1$	30	-13
2	$5.1 \leq \Delta f \leq 25.0$	100	-13

Notes: The first measurement position with a 30 kHz filter is at Δf equals to 5.015 MHz; the last is at Δf equals to 5.085 MHz. The first measurement position with a 100 kHz filter is at Δf equals to 5.150 MHz; the last is at Δf equals to 24.950 MHz.

Table 43. Channel Mask for 10 MHz Bandwidth: $802 \leq f_c \leq 857$ (BCG 7.H)

No	Frequency offset Δf from channel center (MHz)	Integration Bandwidth (MHz)	Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5 \leq \Delta f < 10$	5	1.6
2	$10 \leq \Delta f \leq 25$	2	-10

Notes: The measurement position with a 5 MHz filter is at Δf equals to 7.5 MHz. The first measurement position with a 2 MHz filter is at Δf equals to 11 MHz; the last is at Δf equals to 24 MHz.

5.2.6.1.2 Transmitter Spurious Emission Specification

Table 44 specify the additional spurious emission limits.

Table 44. Spurious Emissions (BCG 7.H)

No	Transmit frequency range (MHz)	Measurement frequency range (MHz)	Measurement bandwidth (KHz)	Maximum Emission Level (dBm)
1	698-798	$30 \leq f < 4310$	100	-13
2	746-758, 776-788	$763 \leq f \leq 775, 793 \leq f \leq 805$	6.25	-35
3	758-763, 763-768, 788-793, 793-798	$769 \leq f \leq 775, 799 \leq f \leq 805$	6.25	-35

4	797-862	$797 \leq f \leq 862$	5000	-37
5	797-862	$790 \leq f \leq 791$	1000	-44
6	797-862	$470 \leq f \leq 790$	8000	-65

5.2.7 Band Class 8

5.2.7.1 Band Class Group 8.C

5.2.7.1.1 Transmitter Spurious Emission Specification

Table 45 specify the additional spurious emission limits.

Table 45. Additional Spurious Emissions (BCG 8.C)

No	Spurious frequency (f) range (MHz)	Measurement bandwidth (KHz)	Maximum Emission Level (dBm)
1	2010–2025 2300-2400	1000	-50

5.2.7.2 Band Class Group 8.E

5.2.7.2.1 Transmitter Spurious Emission Specification

Table 46 specify the additional spurious emission limits.

Table 46. Additional Spurious Emissions (BCG 8.E)

No	Spurious frequency (f) range (MHz)	Measurement bandwidth (KHz)	Maximum Emission Level (dBm)
1	2110-2170 1805-1880 2620-2690 925-960 1844.9-1879.9 1475.9-1500.9 1900-1920 2570-2620 1880-1920 2300-2400	1000	-50
2	860-895	1000	-50
3	1884.5-1919.6	300	-41

5.2.7.3 Band Class Group 8.F

5.2.7.3.1 Transmitter Spurious Emission Specification

Table 47 specify the additional spurious emission limits.

Table 47. Additional Spurious Emissions (BCG 8.F)

No	Spurious frequency (f) range (MHz)	Measurement bandwidth (KHz)	Maximum Emission Level (dBm)
1	925-960 1880-1920 1930-1990 2010-2025 2110-2170 2300-2400 2570-2620	1000	-50

5.3 Base Station

The purpose of this section is to provide radio specification recommendations for Base Station. The specifications of this section are recommendations only and are not required or intended to be a basis for certification of Base Stations.

5.3.1 Default Specifications

5.3.1.1 Default Channel Spectral Mask

The spectrum masks of Table 48 and Table 49 are applicable to all bands and all regions unless specific mask for a band or a region is specified in other relevant sub section of Section 5.3.

Table 48. Channel Mask for 5 MHz Bandwidth

No	Offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$2.5 \leq \Delta f < 7.5$	100	$-7-7(\Delta f-2.55)/5$
2	$7.5 \leq \Delta f \leq 12.5$	100	-14

Notes:

1. Δf is the absolute value of separation in MHz between the carrier frequency and the centre of the measuring filter.
2. The first measurement position with a 100 kHz filter is at Δf equals to 2.550 MHz; the last is at Δf equals to 12.450 MHz.
3. Integration Bandwidth refers to the frequency range over which the emission power is integrated.

Table 49. Channel Mask for 10 MHz Bandwidth

No	Offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5 \leq \Delta f < 10$	100	$-7-7(\Delta f-5.05)/5$
2	$10 \leq \Delta f < 15$	100	-14
3	$15 \leq \Delta f \leq 25$	1000	-13

Notes:

1. Δf is the absolute value of separation in MHz between the carrier frequency and the centre of the measuring filter.
2. The first measurement position with a 100 kHz filter is at Δf equals to 5.05 MHz; the last is at Δf equals to 14.95 MHz. The first measurement position with a 1 MHz filter is at Δf equals to 15.5 MHz; the last is at Δf equals to 24.5 MHz.
3. Integration Bandwidth refers to the frequency range over which the emission power is integrated.

Table 50. Channel Mask for 20 MHz Bandwidth

No	Offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5 \leq \Delta f < 10$	100	$-7-7(\Delta f-5.05)/5$
2	$10 \leq \Delta f < 15$	100	-14
3	$15 \leq \Delta f \leq 35$	1000	-13

Notes:

1. Δf is the absolute value of separation in MHz between the carrier frequency and the centre of the measuring filter.
2. The first measurement position with a 100 kHz filter is at Δf equals to 10.05 MHz; the last is at Δf equals to 14.95 MHz. The first measurement position with a 1 MHz filter is at Δf equals to 15.5 MHz; the last is at Δf equals to 34.5 MHz.
3. Integration Bandwidth refers to the frequency range over which the emission power is integrated.

5.3.1.2 Default Spurious Emission

Unless otherwise specified in other sub sections of Section 5.3 for specific bands, the default spurious emission specifications of Table 51 are applicable.

Table 51. Default Spurious Emissions; Relevant to $F_{DL-le} + ChBW/2 \leq f_c \leq F_{DL-ue} - ChBW/2$

No	Spurious frequency (f) range	Measurement bandwidth	Maximum Emission Level (dBm)
1	$9 \text{ kHz} \leq f < 150 \text{ kHz}$	1 kHz	-36
2	$150 \text{ kHz} \leq f < 30 \text{ MHz}$	10 kHz	-36
3	$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	100 kHz	-36
4	$1 \text{ GHz} \leq f < 5 \times F_{ue}$	30 kHz If $2.5 \times ChBW \leq \Delta f < 10 \times ChBW$ 300 kHz If $10 \times ChBW \leq \Delta f < 12 \times ChBW$ 1 MHz If $12 \times ChBW \leq \Delta f$	-30

5.3.2 Band Class 1

5.3.2.1 Band Class Group 1.C

5.3.2.1.1 Channel Spectral Mask

The Spectrum Emission Mask for 5 and 10 MHz bandwidth is specified in Table 52 and Table 53.

Table 52. Channel Mask for 5 MHz (BCG 1.C)

No	Frequency offset from centre	Allowed emission level	Measurement bandwidth
1	$2.5 \leq \Delta f < 3.5 \text{ MHz}$	-13 dBm	50 kHz
2	$3.5 \leq \Delta f < 12.5 \text{ MHz}$	-13 dBm	1 MHz

Table 53. Channel Mask for 10 MHz (BCG 1.C)

No	Frequency offset from centre	Allowed emission level	Measurement bandwidth
1	$5 \leq \Delta f < 6 \text{ MHz}$	-13 dBm	100 kHz
2	$6 \leq \Delta f < 25 \text{ MHz}$	-13 dBm	1 MHz

5.3.2.1.2 Transmitter Spurious Emission specification

Table 54. Base station spurious emission limit, Category A (BCG 1.C)

No	Band	Allowed emission level	Measurement bandwidth	Note
1	30 MHz-1 GHz	-13 dBm	100 kHz	Bandwidth as in Recommendation ITU-R SM.329-10, § 4.1
2	1 GHz-13.45 GHz		1 MHz	Upper frequency as in Recommendation ITU-R SM.329-10, § 2.5, Table 1

Table 55. Base station spurious emissions limit, Category B (BCG 1.C)

No	Band	Measurement bandwidth	Allowed emission level
1	$9 \text{ kHz} \leq f < 150 \text{ kHz}$	1 kHz	-36 dBm
2	$150 \text{ kHz} \leq f < 30 \text{ MHz}$	10 kHz	-36 dBm
3	$30 \text{ MHz} \leq f < 1\,000 \text{ MHz}$	100 kHz	-36 dBm
4	$1 \text{ GHz} \leq f < 13.45 \text{ GHz}$	30 kHz If $2.5 \times BW \leq f_c - f < 10 \times BW$ 300 kHz If $10 \times BW \leq f_c - f < 12 \times BW$ 1 MHz If $12 \times BW \leq f_c - f $	-30 dBm

Table 56. Additional Spurious Emissions (BCG 1.C)

No	Spurious frequency (f) range (MHz)	Measurement bandwidth (MHz)	Maximum Emission Level (dBm)
1	$791 \leq f < 821$	1	-52
2	$831 \leq f < 862$	1	-49
3	$876 \leq f < 915$	1	-51
4	$921 \leq f < 925$	1	-47
5	$925 \leq f < 960$	1	-52
6	$1710 \leq f < 1785$	1	-51
7	$1805 \leq f < 1880$	1	-52
8	$1920 \leq f < 1980$	1	-49
9	$2110 \leq f < 2170$	1	-52

10	$1900 \leq f < 1920$	1	-52
11	$2010 \leq f < 2025$	1	-52
12	$2500 \leq f < 2570$	1	-49
13	$2570 \leq f < 2620$	1	-52
14	$2620 \leq f < 2690$	1	-52

5.3.3 Band Class 3

5.3.3.1 Band Class Group 3.C

5.3.3.1.1 Channel Spectral Mask

The Spectrum Emission Mask for 5 MHz bandwidth is specified in Table 57 and Table 58.

In this section, the unwanted emission requirements for Japan for the first adjacent channel, specified as maximum allowed Adjacent Channel Power, are captured as a single point measurement for the first segment of the mask.

Table 57. Channel Mask for 5 MHz Bandwidth (BCG 3.C)

No	Frequency offset from centre	Allowed emission level	Measurement bandwidth
1	$2.5 \leq \Delta f < 3.5$ MHz	-13 dBm	50 kHz
2	$3.5 \leq \Delta f < 12.5$ MHz	-13 dBm	1 MHz

Table 58. Channel Mask for 5 MHz Bandwidth– Japan (BCG 3.C)

No	Frequency offset from centre	Allowed emission level	Measurement bandwidth
1	$\Delta f = 5$	7	4.8 MHz
2	$7.5 \text{ MHz} \leq \Delta f < 12.25$	$-15 - 1.4 \times (\Delta f - 7.5)$ dBm	1 MHz
3	$12.25 \leq \Delta f < 22.5$ MHz	-22 dBm	1 MHz

The Spectrum Emission Mask for 10 MHz bandwidth is specified in Table 59 and Table 60.

Table 59. Channel Mask for 10 MHz Bandwidth (BCG 3.C)

No	Frequency offset from centre	Allowed emission level	Measurement bandwidth
1	$5 \leq \Delta f < 6$ MHz	–13 dBm	100 kHz
2	$6 \leq \Delta f < 25$ MHz	–13 dBm	1 MHz

Table 60. Channel Mask for 10 MHz Bandwidth– Japan (BCG 3.C)

No	Frequency offset from centre	Allowed emission level	Measurement bandwidth
1	$\Delta f = 10$	3	9.5 MHz
2	$15 \leq \Delta f < 25$ MHz	–22 dBm	1 MHz

The Spectrum Emission Mask for 20 MHz bandwidth is specified in Table 61.

Table 61. Channel Mask for 20 MHz Bandwidth– Japan (BCG 3.C)

No	Frequency offset from centre	Allowed emission level	Measurement bandwidth
1	$\Delta f = 20$	6	19.5 MHz
2	$30 \leq \Delta f < 50$ MHz	–22 dBm	1 MHz

5.3.3.1.2 Transmitter Spurious Emission specification

Table 62. Base station spurious emission limit, Category A (BCG 3.C)

No	Band	Allowed emission level	Measurement bandwidth	Note
1	30 MHz-1 GHz	–13 dBm	100 kHz	Bandwidth as in Recommendation ITU-R SM.329-10, § 4.1
2	1 GHz-13.45 GHz		1 MHz	Upper frequency as in Recommendation ITU-R SM.329-10, § 2.5, Table 1

Table 63. Base station spurious emissions limit, Category B (BCG 3.C)

No	Band	Measurement bandwidth	Allowed emission level
1	$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	100 kHz	−36 dBm
2	$1 \text{ GHz} \leq f < 13.45 \text{ GHz}$	30 kHz If $2.5 \times \text{BW} \leq f_c - f < 10 \times \text{BW}$ 300 kHz If $10 \times \text{BW} \leq f_c - f < 12 \times \text{BW}$ 1 MHz If $12 \times \text{BW} \leq f_c - f $	−30 dBm

Note: In

Table 63, BW is the signal channel bandwidth of 5 or 10 MHz.

Table 64. Base station spurious emission limit, Japan (BCG 3.C)

No	Frequency bandwidth	Measurement bandwidth	Allowed emission level (dBm)
1	$9 \text{ kHz} \leq f < 150 \text{ kHz}$	1 kHz	−13
2	$150 \text{ kHz} \leq f < 30 \text{ MHz}$	10 kHz	−13
3	$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	100 kHz	−13
4	$1 \text{ 000 MHz} \leq f < 2505 \text{ MHz}$	1 MHz	−13
5	$2 \text{ 505 MHz} \leq f < 2 \text{ 535 MHz}$	1 MHz	−42
6	$2 \text{ 535 MHz} \leq f$	1 MHz	−13

Note: The allowed emission level for the frequency band between 2 535 MHz and 2 655 MHz shall be applied for the frequency range greater than 2.5 times the channel size from the centre frequency.

5.3.3.2 Band Class Group 3.D

5.3.3.2.1 Channel Spectral Mask

The Spectrum Emission Mask of

Table 65 and Table 66 apply to US region.

Table 65. Channel Mask for 5 MHz Bandwidth -US (BCG 3.D)

No	Offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$2.5 \leq \Delta f < 3.5$	50	-13
2	$3.5 \leq \Delta f \leq 12.5$	1000	-13

Notes:

1. The first measurement position with a 50 kHz filter is at Δf equals to 2.525 MHz; the last is at Δf equals to 3.475 MHz. The first measurement position with a 1 MHz filter is at Δf equals to 4.0 MHz; the last is at Δf equals to 12.0 MHz.
2. Integration Bandwidth refers to the frequency range over which the emission power is integrated.

Table 66. Channel Mask for 10 MHz Bandwidth -US (BCG 3.D)

No	Offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5 \leq \Delta f \leq 6$	100	-13
2	$6 \leq \Delta f \leq 25$	1000	-13

Notes:

1. The first measurement position with a 100 kHz filter is at Δf equals to 5.050 MHz; the last is at Δf equals to 5.950 MHz. The first measurement position with a 1 MHz filter is at Δf equals to 6.5 MHz; the last is at Δf equals to 24.5 MHz.
2. Integration Bandwidth refers to the frequency range over which the emission power is integrated.

The Spectrum Emission Mask of Table 67 and Table 68 apply to Europe region.

Table 67. Channel Mask for 5 MHz Bandwidth-Europe (BCG 3.D)

No	Offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$2.5 \leq \Delta f < 7.5$	100	$-7-7(\Delta f-2.55)/5$
2	$7.5 \leq \Delta f \leq 12.5$	100	-14

Notes:

1. The first measurement position with a 100 kHz filter is at Δf equals to 2.550 MHz; the last is at Δf equals to 12.450 MHz.
2. Integration Bandwidth refers to the frequency range over which the emission power is integrated.

Table 68. Channel Mask for 10 MHz Bandwidth-Europe (BCG 3.D)

No	Offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5 \leq \Delta f < 10$	100	$-7-7(\Delta f-5.05)/5$
2	$10 \leq \Delta f < 15$	100	-14
3	$15 \leq \Delta f \leq 25$	1000	-13

Notes:

1. The first measurement position with a 100 kHz filter is at Δf equals to 5.05 MHz; the last is at Δf equals to 14.95 MHz. The first measurement position with a 1 MHz filter is at Δf equals to 15.5 MHz; the last is at Δf equals to 24.5 MHz.
2. Integration Bandwidth refers to the frequency range over which the emission power is integrated.

5.3.3.2.2 Transmitter Spurious Emission specification

Table 69. Spurious Emissions -US (BCG 3.D)

No	Measurement frequency range	Measurement bandwidth (MHz)	Maximum Emission Level (dBm)
1	$30 \text{ MHz} < f < 13.450 \text{ GHz}$	1	-13

Table 70. Spurious Emissions for 5 MHz Bandwidth-Europe (BCG 3.D)

No	Spurious frequency (f) range	Measurement bandwidth	Maximum Emission Level (dBm)
1	$9 \text{ kHz} \leq f < 150 \text{ kHz}$	1 kHz	-36
2	$150 \text{ kHz} \leq f < 30 \text{ MHz}$	10 kHz	-36
3	$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	100 kHz	-36
4	$1 \text{ GHz} \leq f < 13450 \text{ MHz}$	30 kHz If $12.5 \text{ MHz} \leq \Delta f < 50 \text{ MHz}$ 300 kHz If $50 \text{ MHz} \leq \Delta f < 60 \text{ MHz}$ 1 MHz If $60 \text{ MHz} \leq \Delta f$	-30

Table 71. Spurious Emissions for 10 MHz Bandwidth-Europe (BCG 3.D)

No	Spurious frequency (f) range	Measurement bandwidth	Maximum Emission Level (dBm)
1	$9 \text{ kHz} \leq f < 150 \text{ kHz}$	1 kHz	-36
2	$150 \text{ kHz} \leq f < 30 \text{ MHz}$	10 kHz	-36
3	$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	100 kHz	-36
4	$1 \text{ GHz} \leq f < 13450 \text{ MHz}$	30 kHz If $25 \text{ MHz} \leq \Delta f < 100 \text{ MHz}$ 300 kHz If $100 \text{ MHz} \leq \Delta f < 120 \text{ MHz}$ 1 MHz If $120 \text{ MHz} \leq \Delta f$	-30

Table 72 specify limits to protect BS receivers against its intra-system BS transmit emissions.

Table 72. BS Spurious Emissions Limits for protection of the BS receiver (BCG 3.D)

No	Spurious Frequency (f) Range (MHz)	Measurement Bandwidth	Maximum Level
1.	2496-2572	100 kHz	-96 dBm

5.3.4 Band Class 5

5.3.4.1 Channel Spectral Mask: BCG 5L.E

The Spectrum Emission Mask for 5 and 10 MHz bandwidth sizes are specified in Table 73 and Table 74. Table 73 specifies breakpoints of the underlying piecewise linear power spectral density mask. This mask is a relative mask and conditionally applicable depending on the base station P_{nom} power level.

Table 74 specifies the emission levels of an underlying piecewise step function applicable conditionally only to some of P_{nom} power levels.

Table 73. Relative Transmit Spectral Power Density Channel Mask (BCG 5L.E)

No	Power	Frequency Offset				
		0.5*BW	0.71*BW	1.06*BW	2.0*BW	2.5*BW
1	$39 \text{ dBm} < P_{nom}$	-20 dB	-27 dB	-32 dB	-50dB	-50dB
2	$33 \text{ dBm} < P_{nom} \leq 39 \text{ dBm}$	-20 dB	-27 dB	-32 dB	$-50 \text{ dB} + (39 \text{ dBm} - P_{nom})$	Refer to Table 74

Table 74. Absolute Spectral Emission Channel Mask (BCG 5L.E)

No	Power	Frequency Offset			
		$0.50 \text{ BW} \leq \Delta f < 0.71 \text{ BW}$	$0.71 \text{ BW} \leq \Delta f < 1.06 \text{ BW}$	$1.06 \text{ BW} \leq \Delta f < 2.00 \text{ BW}$	$2.00 \text{ BW} \leq \Delta f \leq 2.50 \text{ BW}$
1	$33 \text{ dBm} < P_{nom} \leq 39 \text{ dBm}$	Refer to Table 73	Refer to Table 73	Refer to Table 73	$-21 + x$ dBm/MHz
2	$P_{nom} \leq 33 \text{ dBm}$	-5.5 dBm/MHz	-5.5 dBm/MHz	-23.5 dBm/MHz	-23.5 dBm/MHz

Notes: In Table 74, $x = -10 \log(BW/10)$

5.3.5 Band Class 6

5.3.5.1 Band Class Group 6.D

5.3.5.1.1 Channel Spectral Mask

Table 75 and Table 76 specify the spectrum emission for FDD Base Stations with 5 and 10 MHz channel bandwidths.

Table 75. Channel Mask for 5 MHz Bandwidth (BCG 6.D)

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/integration BW) at the antenna port.
1	$2.5 \leq \Delta f < 3.5$	50	-13
2	$3.5 \leq \Delta f \leq 12.5$	1000	-13

Table 76. Channel Mask for 10 MHz Bandwidth (BCG 6.D)

No	Offset from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5 \leq \Delta f < 6$	100	-13
2	$6 \leq \Delta f \leq 25$	1000	-13

5.3.5.1.2 Transmitter Spurious Emission specification

Table 77. Spurious Emissions (BCG 6.D)

No	Measurement frequency range	Measurement bandwidth (MHz)	Maximum Emission Level (dBm)
1	$30 \text{ MHz} < f < 10.775 \text{ GHz}$	1	-13

5.3.5.2 Band Class Group 6.E

5.3.5.2.1 Channel Spectral Mask

Table 78 and Table 79 specify the spectrum emission for FDD Base Stations with 5 and 10 MHz channel bandwidths.

Table 78. Channel Mask for 5 MHz Bandwidth (BCG 6.E)

No	Frequency offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$2.5 \leq \Delta f < 7.5$	100	$-7.0 - 7(\Delta f - 2.55)/5$
2	$7.5 \leq \Delta f < 12.5$	100	-14

Notes:

1. The first measurement position with a 100 kHz filter is at Δf equals to 2.550 MHz; the last is at Δf equals to 12.450 MHz.
2. Integration Bandwidth refers to the frequency range over which the emission power is integrated.

Table 79. Channel Mask for 10 MHz Bandwidth (BCG 6.E)

No	Frequency offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5 \leq \Delta f < 10$	100	$-7.0-7(\Delta f-5.05)/5$
2	$10 \leq \Delta f < 15$	100	-14
3	$15 \leq \Delta f < 25$	1000	-13

Notes:

1. The first measurement position with a 100 kHz filter is at Δf equals to 5.05 MHz; the last is at Δf equals to 14.95 MHz. The first measurement position with a 1 MHz filter is at Δf equals to 15.5 MHz; the last is at Δf equals to 24.5 MHz.
2. Integration Bandwidth refers to the frequency range over which the emission power is integrated.

Table 80 specifies the spectrum emission mask for FDD Base Stations with 20 MHz channel bandwidth.

Table 80. Channel Mask for 20 MHz Bandwidth (BCG 6.E)

No	Frequency offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$10 \leq \Delta f < 15$	100	$-7-7(\Delta f-10.05)/5$
2	$15 \leq \Delta f < 20$	100	-14
3	$20 \leq \Delta f < 50$	1000	-13

Notes:

1. The first measurement position with a 100 kHz filter is at Δf equals to 10.05 MHz; the last is at Δf equals to 19.95 MHz. The first measurement position with a 1 MHz filter is at Δf equals to 20.5 MHz; the last is at Δf equals to 49.5 MHz.
2. Integration Bandwidth refers to the frequency range over which the emission power is integrated.

5.3.5.2.2 Transmitter Spurious Emission specification

Table 81 specifies the spurious emission limits while Table 82 specify the additional spurious emission limits.

Table 81. Spurious Emissions (BCG 6.E)

No	Measurement frequency range	Measurement bandwidth	Maximum Emission Level (dBm)
1	$9 \text{ kHz} \leq f < 150 \text{ kHz}$	1 kHz	-36
2	$150 \text{ kHz} \leq f < 30 \text{ MHz}$	10 kHz	-36
3	$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	100 kHz	-36
4	$1 \text{ GHz} \leq f < 10.775 \text{ GHz}$	1 MHz	-30

Table 82. Additional Spurious Emissions (BCG 6.E)

No	Measurement frequency range (MHz)	Measurement bandwidth	Maximum Emission Level (dBm)
1.	921 - 960	100 kHz	-57
2.	876 - 915	100 kHz	-61
3.	1805 - 1880	100 kHz	-47
4.	1710 - 1785	100 kHz	-61
5.	1930 - 1990	100 kHz	-47
6.	1850 - 1910	100 kHz	-61
7.	869 - 894	100 kHz	-57
8.	824 - 849	100 kHz	-61
9.	1930 - 1990	1 MHz	-52
10.	1850 - 1910	1 MHz	-49
11.	1805 - 1880	1 MHz	-52
12.	1710 - 1785	1 MHz	-49
13.	2110 - 2155	1 MHz	-52
14.	1710 - 1755	1 MHz	-49
15.	869 - 894	1 MHz	-52
16.	824 - 849	1 MHz	-49
17.	860 - 895	1 MHz	-52
18.	815 - 850	1 MHz	-49
19.	2620 - 2690	1 MHz	-52
20.	2500 - 2570	1 MHz	-49
21.	925 - 960	1 MHz	-52
22.	880 - 915	1 MHz	-49
23.	1844.9 - 1879.9	1 MHz	-52
24.	1749.9 - 1784.9	1 MHz	-49
25.	2110 - 2170	1 MHz	-52
26.	1710 - 1770	1 MHz	-49
27.	1475.9 - 1500.9	1 MHz	-52
28.	1427.9 - 1452.9	1 MHz	-49

29.	728 - 746	1 MHz	-52
30.	698 - 716	1 MHz	-49
31.	746 - 756	1 MHz	-52
32.	777 - 787	1 MHz	-49
33.	758 - 768	1 MHz	-52
34.	788 - 798	1 MHz	-49
35.	1900 - 1920	1 MHz	-52
36.	2010 - 2025	1 MHz	-52
37.	1850 – 1910	1 MHz	-52
38.	1930 - 1990	1 MHz	-52
39.	1910 - 1930	1 MHz	-52
40.	2570 – 2620	1 MHz	-52
41.	1880 – 1920	1 MHz	-52
42.	2300 – 2400	1 MHz	-52

5.3.5.3 Band Class Group 6.F

5.3.5.3.1 Channel Spectral Mask

Table 83 specifies BS Spectrum Emission Mask for 5 MHz channel bandwidth while Table 84 specifies BS Spectrum Emission Mask for 10 MHz channel bandwidth.

Table 83. Channel Mask - Europe: 5 MHz (BCG 6.F)

No	Offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$2.515 \leq \Delta f < 2.715$	30	-14
2	$2.715 \leq \Delta f < 3.515$	30	$-14-15(\Delta f-2.715)$
3	$3.515 \leq \Delta f < 4.0$	30	-26
4	$4.0 \leq \Delta f < 12.5$	1000	-13

Table 84. Channel Mask - Europe: 10 MHz (BCG 6.F)

No	Offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5.015 \leq \Delta f < 5.215$	30	-14
2	$5.215 \leq \Delta f < 6.015$	30	-14-15(Δf -52.2715)
3	$6.015 \leq \Delta f < 6.5$	30	-26
4	$6.5 \leq \Delta f < 15.50$	1000	-13
5	$15.50 \leq \Delta f \leq 25.0$	1000	-15

5.3.5.3.2 Transmitter Spurious Emission specification

Table 85. Spurious Emission for 5 MHz Channel Bandwidth Size(BCG 6.F)

No	Transmitter Center Frequency (f_c) (MHz)	Spurious Frequency (f) Range	Integration Bandwidth	Maximum Emission Level (dBm)
1.	1805-1880	$9 \text{ kHz} \leq f < 150 \text{ kHz}$	1 kHz	-36
2.	1805-1880	$150 \text{ kHz} \leq f < 30 \text{ MHz}$	10 kHz	-36
3.	1805-1880	$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	100 kHz	-36
4.	1805-1880	$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$	30 kHz, If $12.5 \text{ MHz} \leq \Delta f < 50 \text{ MHz}$ 300 kHz, If $50 \text{ MHz} \leq \Delta f < 60 \text{ MHz}$ 1 MHz, If $60 \text{ MHz} \leq \Delta f$	-30

Table 86. Spurious Emission for 10 MHz Channel Bandwidth Size(BCG 6.F)

No	Spurious frequency (f) range	Measurement bandwidth	Maximum Emission Level (dBm)
1	$9 \text{ kHz} \leq f < 150 \text{ kHz}$	1 kHz	-36
2	$150 \text{ kHz} \leq f < 30 \text{ MHz}$	10 kHz	-36
3	$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	100 kHz	-36
4	$1 \text{ GHz} \leq f < 13450 \text{ MHz}$	30 kHz If $25 \text{ MHz} \leq \Delta f < 100 \text{ MHz}$ 300 kHz If $100 \text{ MHz} \leq \Delta f < 120 \text{ MHz}$	-30

		1 MHz If 120 MHz $\leq \Delta f$	
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Table 87 specifies limits to protect BS receivers against its intra-system BS transmit emissions.

Table 87. Spurious Emissions Limits for protection of the BS receiver (BCG 6.F)

No	Transmitter Center Frequency (f_c) (MHz)	Spurious Frequency (f) Range (MHz)	Measurement Bandwidth	Maximum Level
1.	1805-1880	1710 - 1785	100 kHz	-96 dBm

The spurious emission limits specified in Table 88 may be required by local or regional regulations.

Table 88. Additional Spurious Emission (BCG 6.F)

No	Transmitter Center Frequency (f_c) (MHz)	Spurious Frequency (f) Range (MHz)	Measurement Bandwidth	Maximum Emission Level (dBm)
1.	1805-1880	791-821	1 MHz	-52
2.		831-862	1 MHz	-49
3.		1805-1880	100 KHz	-47
4.		1710-1785	100 KHz	-61
5.		1805-1880	1 MHz	-52
6.		1710-1785	1 MHz	-49

5.3.6 Band Class 7

5.3.6.1 Band Class Group 7.A to 7.E

5.3.6.1.1 Channel Spectral Mask

The Spectrum Emission Mask of Table 89 and Table 90 apply to US region.

Table 89. Channel Mask for 5 MHz Bandwidth -US (BCG 7.A-7.E)

No	Offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$2.5 \leq \Delta f < 2.6$	30	-13
2	$2.6 \leq \Delta f \leq 12.5$	100	-13

Notes:

1. Δf is the separation between the carrier frequency and the centre of the measuring filter.
2. The first measurement position with a 30 kHz filter is at Δf equals to 2.515 MHz; the last is at Δf equals to 2.585 MHz. The first measurement position with a 100 kHz filter is at Δf equals to 2.650 MHz; the last is at Δf equals to 12.450 MHz.

Table 90. Channel Mask for 10 MHz Bandwidth -US (BCG 7.A-7.E)

No	Offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5.0 \leq \Delta f < 5.1$	30	-13
2	$5.1 \leq \Delta f \leq 25.0$	100	-13

Notes:

1. Δf is the separation between the carrier frequency and the centre of the measuring filter.
2. The first measurement position with a 30 kHz filter is at Δf equals to 5.015 MHz; the last is at Δf equals to 5.085 MHz. The first measurement position with a 100 kHz filter is at Δf equals to 5.150 MHz; the last is at Δf equals to 24.950 MHz.

The Spectrum Emission Mask of Table 91 and Table 92 apply to Europe region.

Table 91. Channel Mask for 5 MHz Bandwidth -Europe (BCG 7.A-7.E)

No	Offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$2.5 \leq \Delta f < 7.5$	100	$-7-7(\Delta f-2.55)/5$
2	$7.5 \leq \Delta f \leq 12.5$	100	-14

Notes:

1. Δf is the absolute value of separation in MHz between the carrier frequency and the centre of the measuring filter.
2. The first measurement position with a 100 kHz filter is at Δf equals to 2.550 MHz; the last is at Δf equals to 12.450 MHz.
3. Integration Bandwidth refers to the frequency range over which the emission power is integrated.

Table 92. Channel Mask for 10 MHz Bandwidth -Europe (BCG 7.A-7.E)

No	Offset Δf from channel center (MHz)	Integration Bandwidth (kHz)	Maximum Allowed Emission Level (dBm/Integration Bandwidth) as measured at the antenna port
1	$5 \leq \Delta f < 10$	100	$-7-7(\Delta f-5.05)/5$
2	$10 \leq \Delta f < 15$	100	-14
3	$15 \leq \Delta f \leq 25$	1000	-13

Notes:

1. Δf is the absolute value of separation in MHz between the carrier frequency and the centre of the measuring filter.
2. The first measurement position with a 100 kHz filter is at Δf equals to 5.05 MHz; the last is at Δf equals to 24.95 MHz.
3. Integration Bandwidth refers to the frequency range over which the emission power is integrated.