

NB-IOT Band 66 QPSK 15KHz 12@0 CH-Low

NB-IOT Band 66 QPSK 15KHz 12@0 CH-Middle



NB-IOT Band 66 QPSK 15KHz 12@0 CH-High







NB-IOT Band 71 BPSK 3.75KHz 1@0 CH-Low



NB-IOT Band 71 BPSK 3.75KHz 1@0 CH-Middle



NB-IOT Band 71 BPSK 3.75KHz 1@0 CH-High



LTE Band 71 BPSK 15KHz 1@0 CH-Low

Report No.: R2004A0248-R3



04:40:10PM Oct 25, 20 Radio Std: None Trace/Detector Center Freq 680.500000 MHz Center Freq: 680.500000 MHz Trig: Free Run Avg|Hold>100/100 #Atten: 40 dB Radio Device: BTS Ref 30.00 dBm Clear Wr 1pp Averag adille and a second Max Hol ηŋ Min Ho enter 680.5 MHz Res BW 2 kHz Span 1 MHz Sweep 238.4 ms #VBW 6.2 kHz Occupied Bandwidth Total Powe 26.6 dBm Detecto Peak <u>Ma</u> 126.13 kHz Transmit Freq Error -45.938 kHz OBW Powe 99.00 % x dB Bandwidth 105.4 kHz x dB -26.00 dB

LTE Band 71 BPSK 15KHz 1@0 CH-Middle

LTE Band71 BPSK 15KHz 1@0 CH-High





NB-IOT Band 71 QPSK 3.75KHz 1@0 CH-Low



NB-IOT Band 71 QPSK 3.75KHz 1@0 CH-Middle



NB-IOT Band 71 QPSK 3.75KHz 1@0 CH-High



NB-IOT Band 71 QPSK 15KHz 1@0 CH-Low







NB-IOT Band 71 QPSK 15KHz 1@0 CH-Middle



NB-IOT Band 71 QPSK 15KHz 1@0 CH-High



NB-IOT Band 71 QPSK 15KHz 12@0 CH-Low

NB-IOT Band 71 QPSK 15KHz 12@0 CH-Middle



12:30:19 PM Jan 05 Radio Std: None enter Freq 697.800000 MHz 000 MHz Radio Device: BTS Ref 30.00 dBm Clear Write Average Max Hold Min Hol ter 697.8 MHz s BW 2 kHz Span 1 MHz Sweep 238.4 ms #VBW 6.2 kHz Detecto Peak <u>Ma</u> Occupied Bandwidth Total Powe 24.8 dBm 181.89 kHz 74 Hz OBW Power 99.00 % Transmit Freg Error 238.7 kHz -26.00 dB x dB Bandwidth x dB





NB-IOT Band 85 BPSK 3.75KHz 1@0 CH-Low



NB-IOT Band 85 BPSK 3.75KHz 1@0 CH-Middle



NB-IOT Band 85 BPSK 3.75KHz 1@0 CH-High



<u>Report No.: R2004A0248-R3</u> LTE Band 85 BPSK 15KHz 1@0 CH-Low

12:35:43 PM Jan 09 Radio Std: None SENSE:INT ALIGNAUTI Center Freq: 698.200000 MHz Trig: Free Run Avg|Hold>100/100 #Atten: 40 dB B Avg|Hold>100/100 enter Freq 698.200000 MHz Radio Device: BTS Ref 30.00 dBm Clear Write M Averag Max Hold Min Hol Center 698.2 MHz Res BW 2 kHz Span 1 MH Sweep 238.4 m #VBW 6.2 kHz Detector Peak≯ <u>Man</u> Total Powe 25.9 dBm Occupied Bandwidth 128.50 kHz -44.957 kHz Transmit Freg Error OBW Power 99.00 % 116.0 kHz x dB Bandwidth x dB -26.00 dB



LTE Band 85 BPSK 15KHz 1@0 CH-Middle

LTE Band85 BPSK 15KHz 1@0 CH-High







Ref 30.00 dBm Clear Writ Averag Max Hole Min Hol Center 707 MH #Res BW 2 kHz Span 1 MHz Sweep 238.4 ms #VBW 6.2 kHz Detecto Peak Total Powe 25.3 dBm Occupied Bandwidth 69.648 kHz Auto -76.223 kHz Transmit Freq Error **OBW Power** 99.00 % 41.94 kHz -26.00 dB x dB Bandwidth x dB

NB-IOT Band 85 QPSK 3.75KHz 1@0 CH-High



NB-IOT Band 85 QPSK 15KHz 1@0 CH-Low











NB-IOT Band 85 QPSK 15KHz 12@0 CH-Low

NB-IOT Band 85 QPSK 15KHz 12@0 CH-Middle









5.3 Band Edge Compliance

Ambient condition

Temperature	Relative humidity	Pressure			
23°C ~25°C	45%~50%	101.5kPa			

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The band edge of the lowest and highest channels were measured.

The testing follows KDB 971168D01v03r01 Section 6.0

The EUT was connected to spectrum analyzer and system simulator via a power divider.

The band edges of low and high channels for the highest RF powers were measured.

RBW is set to \geq 1%EBW, VBW is set to 3x RBW.

onspectrumanalyzer.

Set spectrum analyzer with RMS detector.

The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

Checked that all the results comply with the emission limit line.

Test Setup



Limits

Rule Part 27.53(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz.

Rule Part 27.53(h)specifies that " for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}$ (P) dB"



Rule Part 27.53(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee'sfrequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurementinstrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediatelyoutside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Rule Part 27.53(m)(4)/ specifies that "forBRS and EBS stations. For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(4) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS licensees.

Example:

The limit line is derived from 43 + 10log (P) dB below the transmitter power P(Watts)

= P(W) - [43 + 10log(P)] (dB)

 $= [30 + 10\log (P)] (dBm) - [43 + 10\log(P)] (dB) = -13dBm.$

Rule Part 27.53(f)For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Rule Part 27.53 (c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;

(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in



the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96, U=0.684dB.



Test Result

All the test traces in the plots shows the test results clearly.



NB-IOT Band 4 BPSK 3.75KHz 1@O CH-High Image: Character Andrew Meet Andre

NB-IOT Band 4 BPSK 15KHz 1@0 CH-Low



NB-IOT Band 4 QPSK 3.75KHz 1@0 CH-Low

NB-IOT Band 4 BPSK 15KHz 1@0 CH-High





NB-IOT Band 4 QPSK 3.75KHz 1@0 CH-High







NB-IOT Band 12 BPSK 3.75KHz 1@0 CH-Low



NB-IOT Band 12 BPSK 15KHz 1@0 CH-Low



NB-IOT Band 12 QPSK 3.75KHz 1@0 CH-Low



Addend Spectrum Analyser - Sample SA Center Freq 716.000000 MHz FG eint ow 19 Generation 10 Generation 10

NB-IOT Band 12 BPSK 15KHz 1@0 CH-High

NB-IOT Band 12 QPSK 3.75KHz 1@0 CH-High

#VBW 100 kHz*

Span 1.000 Mi Sweep 1.40 ms (1001 p

enter 716.0000 MHz Res BW 30 kHz



Report No.: R2004A0248-R3

NB-IOT Band 12 BPSK3.75KHz 1@0 CH-High







Report No.: R2004A0248-R3

NB-IOT Band 13 BPSK 3.75KHz 1@0 CH-Low



Start Fre	q 760.000	Ω AC CORR 000 MHz PNC	BC): Fast 🕞	SENSE: Trig: Free Ru	INT Avg in Avg	ALIGNAUTO Type: RMS Hold>100/100	10:25:19 AMNov 15, 2019 TRACE 2 3 4 5 6 TYPE A	Trace/Det
10 dB/div	Ref 23.00	IFGa dBm	in:Low	Atten: 40 dB		Mkr	2 775.000 MHz -56.966 dBm	Select Trace 1
13.0 3.00 7.00								Clear Writ
17.0 27.0 37.0							-35.00 deb	Trace Avera
47.0 57.0 67.0	\$) ¹					uuuun ² uuuur	Max Ho
Start 760. Res BW	.000 MHz 10 kHz RC SQL	× 763.000	#VBV	V 30 kHz*	FUNCTION	Sweep FUNCTION WIDTH	Stop 777.000 MHz 210 ms (1001 pts) FUNCTION VALUE	Min Ho
2 N 1 3 4 5 6 7	i	775.000	MHz	-56.966 dBm				View/Blank Trace Or
8 9 10 11 12								Mo 1 o
sG						STATUS		



Agilent Spectrum Analyzer - Swept SA											
Start From	RF 700	50 Q	AC COP	REC	SB	ISE:INT	Ava	ALIGNAUTO	10:33:38 A	MNov 15, 2019	Trace/Det
Start Free	ų 700.	00000	PI IFC	10: Fast 🔾 Sain:Low	Trig: Free Atten: 40	Run dB	Avg H	old>100/100	TY D	PE A MANNER ET A NNNNN	Select Trace
Mkr2 805.00 MHz 10 dB/div Ref 23.00 dBm -58.689 dBm									1		
13.0 3.00											Clear Write
-7.00 -17.0 -27.0										-35.00 dBm	Trace Average
-47.0 -57.0 -67.0	_		\$ ¹						¢ ²		Max Hold
Start 788. #Res BW	00 MH 10 kHz	z	×	#VB\	N 30 kHz*	FU	NCTION	Sweep	Stop 80 247 ms (8.00 MHz (1001 pts)	Min Hold
1 N 1 2 N 1 3 4 5 6 7	f		793.0 805.0	D MHz D MHz	-57.830 dE -58.689 dE	lm lm					View/Blank Trace On
8 9 10 11 12											More 1 of 3
MSG								STATUS			



Report No.: R2004A0248-R3



