

RF TEST REPORT

Applicant Quectel Wireless Solutions Co., Ltd
FCC ID XMR202004BG600LM3
Product LTE Cat M1 & Cat NB2 & EGPRS Module
Brand Quectel
Model BG600L-M3
Report No. R2003A0168-R7V1
Issue Date July 6, 2020

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2019)/ FCC CFR47 Part 27C (2019)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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Summary of Measurement Results

Number	Test Case	Clause in FCC rules	Verdict
1	RF Power Output and Effective Isotropic Radiated Power	2.1046 27.50(d)(4) /27.50(b)(10) /27.50(c)(10)	PASS
2	Occupied Bandwidth	2.1049	PASS
3	Band Edge Compliance	27.53(h) /27.53(g) /27.53(f) /27.53(c)	PASS
4	Peak-to-Average Power Ratio	27.50(d)/KDB971168 D01(5.7)	PASS
5	Frequency Stability	2.1055 / 27.54	PASS
6	Spurious Emissions at Antenna Terminals	2.1051 /27.53(h) /27.53(g) /27.53(f) /27.53(c)	PASS
7	Radiates Spurious Emission	2.1053 /27.53(h) /27.53(g) /27.53(f) /27.53(c)	PASS

Date of Testing: April 20, 2020~ May 21, 2020 and June 8, 2020

Note: PASS: The EUT complies with the essential requirements in the standard.

FAIL: The EUT does not comply with the essential requirements in the standard.

All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.

Note: This revised report (Report No.: R2003A0168-R7V1) supersedes and replaces the previously issued report (Report No.: R2003A0168-R7). Please discard or destroy the previously issued report and dispose of it accordingly.



1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2. Test facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

1.3 Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China
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2 General Description of Equipment under Test

2.1 Applicant and Manufacturer Information

Applicant	Quectel Wireless Solutions Co., Ltd
Applicant address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233
Manufacturer	Quectel Wireless Solutions Co., Ltd
Manufacturer address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

2.2 General information

EUT Description		
Model	BG600L-M3	
IMEI	860873040012816	
Hardware Version	R1.2	
Software Version	BG600LM3LAR02A03	
Power Supply	External power supply	
Antenna Type	The EUT don't have standard Antenna, The Antenna used for testing in this report is the after-market accessory (Dipole Antenna)	
Antenna Gain	Frequency(MHz)	Gain(dBi)
	700	1.66
	710	3.26
	780	4.45
	1720	1.94
	1740	2.00
	1780	0.97
Test Mode(s)	NB-IOT Band 4/12/13/66/71/85	
Test Modulation	BPSK, QPSK	
Category	NB2	
Deployment	stand-alone	
Sub-carrier spacing	3.75KHz, 15KHz	
Ntones	single-tone, multi-tone	
Maximum E.I.R.P.	NB-IOT Band 4	23.84dBm
	NB-IOT Band 66	23.77dBm
Maximum E.R.P.	NB-IOT Band 12	23.48dBm
	NB-IOT Band 13	24.03dBm
	NB-IOT Band 71	21.42dBm
	NB-IOT Band 85	23.32dBm

Rated Power Supply Voltage:	3.8V		
Extreme Voltage	Minimum: 3.3V Maximum: 4.3V		
Extreme Temperature	Lowest: -40°C Highest: +85°C		
Operating Frequency Range(s)	Mode	Tx (MHz)	Rx (MHz)
	NB-IOT Band 4	1710 ~ 1755	2110 ~ 2155
	NB-IOT Band 12	699 ~ 716	729 ~ 746
	NB-IOT Band 13	777 ~ 787	746 ~ 756
	NB-IOT Band 66	1710 ~ 1780	2110 ~ 2180
	NB-IOT Band 71	663 ~ 698	617 ~ 652
	NB-IOT Band 85	698 ~ 716	728 ~ 746
Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.			



3 Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards:

FCC CFR47 Part 27C (2019)

ANSI C63.26 (2015)

Reference standard:

FCC CFR47 Part 2 (2019)

KDB 971168 D01 Power Meas License Digital Systems v03r01

4 Test Configuration

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes. EUT stand-up position (Z axis), lie-down position (X, Y axis). Receiver antenna polarization (horizontal and vertical), the worst emission was found in position (Z axis, horizontal polarization) and the worst case was recorded.

All modes as Subcarrier Spacing, modulations, Channel were investigated.

Subsequently, only the worst case emissions are reported.

The following testing in NB-IOT is set based on the maximum RF Output Power.

The following testing in different mode is set to detail in the following table:

Test modes are chosen to be reported as the worst case configuration below for NB-IOT Band 4/12/13/66/71/85:

Test items	Mode	Deployment mode	Subcarrier Spacing (kHz)		Modulation		Test Channel		
		Stand-alone	3.75	15	BPSK	QPSK	L	M	H
RF Power Output and Effective Isotropic Radiated Power	NB-IOT B4	O	O	O	O	O	O	O	O
	NB-IOT B12	O	O	O	O	O	O	O	O
	NB-IOT B13	O	O	O	O	O	O	O	O
	NB-IOT B66	O	O	O	O	O	O	O	O
	NB-IOT B71	O	O	O	O	O	O	O	O
	NB-IOT B85	O	O	O	O	O	O	O	O
Occupied Bandwidth	NB-IOT B4	O	O	O	O	O	O	O	O
	NB-IOT B12	O	O	O	O	O	O	O	O
	NB-IOT B13	O	O	O	O	O	O	O	O
	NB-IOT B66	O	O	O	O	O	O	O	O
	NB-IOT B71	O	O	O	O	O	O	O	O
	NB-IOT B85	O	O	O	O	O	O	O	O
Band Edge Compliance	NB-IOT B4	O	O	O	O	O	O	-	O
	NB-IOT B12	O	O	O	O	O	O	-	O
	NB-IOT B13	O	O	O	O	O	O	-	O
	NB-IOT B66	O	O	O	O	O	O	-	O
	NB-IOT B71	O	O	O	O	O	O	-	O
	NB-IOT B85	O	O	O	O	O	O	-	O
Peak-to-Average Power Ratio	NB-IOT B4	O	O	O	O	O	-	O	-
	NB-IOT B12	O	O	O	O	O	-	O	-
	NB-IOT B13	O	O	O	O	O	-	O	-
	NB-IOT B66	O	O	O	O	O	-	O	-
	NB-IOT B71	O	O	O	O	O	-	O	-
	NB-IOT B85	O	O	O	O	O	-	O	-

Frequency Stability	NB-IOT B4	O	O	O	O	O	O	O	O
	NB-IOT B12	O	O	O	O	O	O	O	O
	NB-IOT B13	O	O	O	O	O	O	O	O
	NB-IOT B66	O	O	O	O	O	O	O	O
	NB-IOT B71	O	O	O	O	O	O	O	O
	NB-IOT B85	O	O	O	O	O	O	O	O
Conducted Spurious Emissions	NB-IOT B4	O	-	O	-	O	O	O	O
	NB-IOT B12	O	-	O	-	O	O	O	O
	NB-IOT B13	O	-	O	-	O	O	O	O
	NB-IOT B66	O	-	O	-	O	O	O	O
	NB-IOT B71	O	-	O	-	O	O	O	O
	NB-IOT B85	O	-	O	-	O	O	O	O
Radiates Spurious Emission	NB-IOT B4	O	-	O	-	O	O	O	O
	NB-IOT B12	O	-	O	-	O	O	O	O
	NB-IOT B13	O	-	O	-	O	O	O	O
	NB-IOT B66	O	-	O	-	O	O	O	O
	NB-IOT B71	O	-	O	-	O	O	O	O
	NB-IOT B85	O	-	O	-	O	O	O	O
Note 1. The mark "O" means that this configuration is chosen for testing. 2. The mark "-" means that this configuration is not testing.									

5 Test Case Results

5.1 RF Power Output and Effective Isotropic Radiated Power

Ambient condition

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

Methods of Measurement

During the process of the testing, The EUT is controlled by the Base Station Simulator to ensure max power transmission and proper modulation.

1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI C63.26 (2015).

a) Connect the equipment as illustrated. Mount the equipment with the manufacturer specified antenna in a vertical orientation on a manufacturer specified mounting surface located on a non-conducting rotating platform of a RF anechoic chamber (preferred) or a standard radiation site.

b) Key the transmitter, then rotate the EUT 360° azimuthally and record spectrum analyzer power level (LVL) measurements at angular increments that are sufficiently small to permit resolution of all peaks. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading at each angular increment. (Note: several batteries may be needed to offset the effect of battery voltage droop, which should not exceed 5% of the manufactured specified battery voltage during transmission).

c) Replace the transmitter under test with a vertically polarized half-wave dipole (or an antenna whose gain is known relative to an ideal half-wave dipole). The center of the antenna should be at the same location as the center of the antenna under test.

d) Connect the antenna to a signal generator with a known output power and record the path loss (in dB) as LOSS. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading. $LOSS = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$

e) Determine the effective radiated output power at each angular position from the readings in steps b) and d) using the following equation: $ERP \text{ (dBm)} = LVL \text{ (dBm)} + LOSS \text{ (dB)}$

f) The maximum ERP is the maximum value determined in the preceding step.

g) When calculating ERP, in addition to knowing the antenna radiation and matching characteristics, it is necessary to know the loss values of all elements (e.g. transmission line attenuation, mismatches, filters, combiners) interposed between the point where transmitter output power is measured, and the point where power is applied to the antenna. ERP can then be calculated as follows:

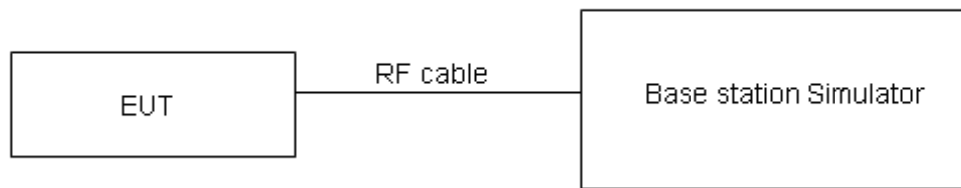
$$EIRP \text{ (dBm)} = \text{Output Power (dBm)} - \text{Losses (dB)} + \text{Antenna Gain (dBi)}$$

where: dBd refers to gain relative to an ideal dipole.

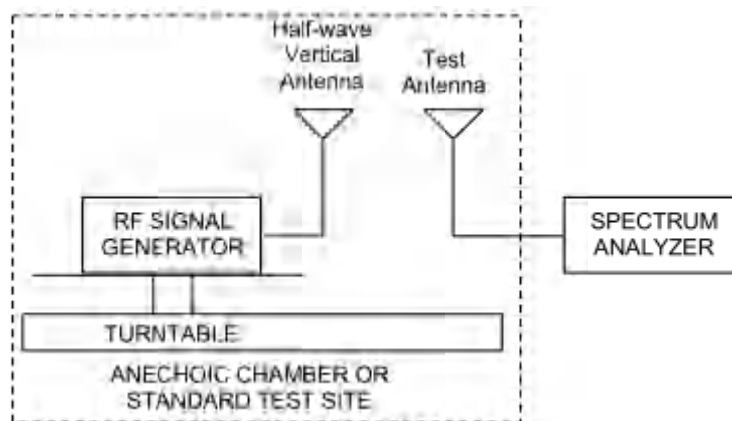
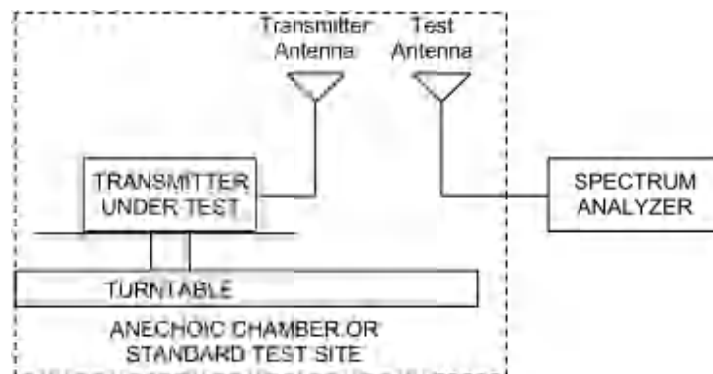
$$EIRP \text{ (dBm)} = ERP \text{ (dBm)} + 2.15 \text{ (dB.)}$$

The RB allocation refers to section 5.1, using the maximum output power configuration.

Test Setup



The loss between RF output port of the EUT and the input port of the tester has been taken into consideration.



Note: Area side:2.4mX3.6m

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the worst case was recorded.

Limits

No specific RF power output requirements in part 2.1046.

Rule Part 27.50(b) (10) specifies that "Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP"

Rule Part 27.50(c) (10) specifies that "Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP"

Rule Part 27.50(d) (4) specifies that “Fixed, mobile and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP”

Part 27.50(b)(10)Limit	$\leq$ 3 W (34.77 dBm)
Part 27.50(c)(10)Limit	$\leq$ 3 W (34.77 dBm)
Part 27.50(d)(4)Limit	$\leq$ 1 W (30 dBm)

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U=0.4$ dB for RF power output, $k = 2$, $U= 1.19$ dB for ERP/EIRP.

Test Results

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/middle/high channel			EIRP(dBm)		
				19952 /1710.2 (MHz)	20175 /1732.5 (MHz)	20398 /1754.8 (MHz)	19952 /1710.2 (MHz)	20175 /1732.5 (MHz)	20398 /1754.8 (MHz)
NB-IOT Band 4 Standalone	BPSK	3.75	1@0	21.56	21.69	21.55	23.50	23.69	23.12
			1@47	21.44	21.61	21.48	23.38	23.61	23.05
		15	1@0	21.57	21.81	21.52	23.51	23.81	23.09
			1@11	21.46	21.72	21.47	23.40	23.72	23.04
	QPSK	3.75	1@0	21.50	21.65	21.49	23.44	23.65	23.06
			1@47	21.51	21.59	21.48	23.45	23.59	23.05
		15	1@0	21.47	21.84	21.48	23.41	23.84	23.05
			1@11	21.50	21.75	21.50	23.44	23.75	23.07
		15	12@0	19.49	19.82	19.45	21.43	21.82	21.02
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/middle/high channel			ERP(dBm)		
				23012 /699.2 (MHz)	23095 /707.5 (MHz)	23178 /715.8 (MHz)	23012 /699.2 (MHz)	23095 /707.5 (MHz)	23178 /715.8 (MHz)
NB-IOT Band 12 Standalone	BPSK	3.75	1@0	21.62	21.65	21.56	21.13	22.76	23.36
			1@47	21.72	21.50	21.46	21.23	22.61	23.26
		15	1@0	21.66	21.65	21.68	21.17	22.76	23.48
			1@11	21.83	21.58	21.54	21.34	22.69	23.34
	QPSK	3.75	1@0	21.78	21.54	21.58	21.29	22.65	23.38
			1@47	21.73	21.52	21.66	21.24	22.63	23.46
		15	1@0	21.85	21.65	21.65	21.36	22.76	23.45
			1@11	21.78	21.67	21.68	21.29	22.78	23.48
		15	12@0	19.64	19.57	19.79	19.15	20.68	21.59
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/middle/high channel			ERP(dBm)		
				23182 /777.2 (MHz)	23230 /782 (MHz)	23278 /786.8 (MHz)	23182 /777.2 (MHz)	23230 /782 (MHz)	23278 /786.8 (MHz)
NB-IOT Band 13 Standalone	BPSK	3.75	1@0	21.58	21.68	21.78	23.88	23.98	23.26
			1@47	21.56	21.61	21.67	23.86	23.91	23.15
		15	1@0	21.56	21.57	21.68	23.86	23.87	23.16
			1@11	21.51	21.55	21.64	23.81	23.85	23.12
	QPSK	3.75	1@0	21.63	21.67	21.63	23.93	23.97	23.11
			1@47	21.55	21.73	21.72	23.85	24.03	23.20
		15	1@0	21.58	21.66	21.72	23.88	23.96	23.20
			1@11	21.61	21.52	21.65	23.91	23.82	23.13
		15	12@0	19.31	19.47	19.72	21.61	21.77	21.20

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/middle/high channel			EIRP(dBm)		
				131974 /1710.2 (MHz)	132322 /1745 (MHz)	132670 /1779.8 (MHz)	131974 /1710.2 (MHz)	132322 /1745 (MHz)	132670 /1779.8 (MHz)
NB-IOT Band 66 Standalone	BPSK	3.75	1@0	21.71	21.69	22.18	23.65	23.69	23.15
			1@47	21.63	21.68	22.09	23.57	23.68	23.06
		15	1@0	21.72	21.74	22.26	23.66	23.74	23.23
			1@11	21.71	21.68	22.21	23.65	23.68	23.18
	QPSK	3.75	1@0	21.59	21.69	22.16	23.53	23.69	23.13
			1@47	21.52	21.68	22.13	23.46	23.68	23.10
		15	1@0	21.76	21.77	22.23	23.70	23.77	23.20
			1@11	21.72	21.74	22.26	23.66	23.74	23.23
		15	12@0	19.64	19.67	19.99	21.58	21.67	20.96
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/middle/high channel			ERP(dBm)		
				133124 /663.2 (MHz)	133297 /680.5 (MHz)	133470 /697.8 (MHz)	133124 /663.2 (MHz)	133297 /680.5 (MHz)	133470 /697.8 (MHz)
NB-IOT Band 71 Standalone	BPSK	3.75	1@0	21.91	21.78	21.50	21.42	21.29	21.01
			1@47	21.84	21.71	21.42	21.35	21.22	20.93
		15	1@0	21.86	21.70	21.62	21.37	21.21	21.13
			1@11	21.78	21.60	21.57	21.29	21.11	21.08
	QPSK	3.75	1@0	21.86	21.77	21.45	21.37	21.28	20.96
			1@47	21.75	21.79	21.53	21.26	21.30	21.04
		15	1@0	21.85	21.66	21.65	21.36	21.17	21.16
			1@11	21.81	21.58	21.66	21.32	21.09	21.17
		15	12@0	19.84	20.04	19.63	19.35	19.55	19.14
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/middle/high channel			ERP(dBm)		
				134004 /698.2 (MHz)	134092 /707 (MHz)	134180 /715.8 (MHz)	134004 /698.2 (MHz)	134092 /707 (MHz)	134180 /715.8 (MHz)
NB-IOT Band 85 Standalone	BPSK	3.75	1@0	21.70	21.39	21.52	21.21	22.50	23.32
			1@47	21.61	21.34	21.49	21.12	22.45	23.29
		15	1@0	21.62	21.53	21.48	21.13	22.64	23.28
			1@11	21.58	21.44	21.40	21.09	22.55	23.20
	QPSK	3.75	1@0	21.66	21.32	21.44	21.17	22.43	23.24
			1@47	21.59	21.33	21.43	21.10	22.44	23.23
		15	1@0	21.61	21.51	21.46	21.12	22.62	23.26
			1@11	21.52	21.39	21.37	21.03	22.50	23.17
		15	12@0	19.53	19.39	19.53	19.04	20.50	21.33



5.2 Occupied Bandwidth

Ambient condition

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

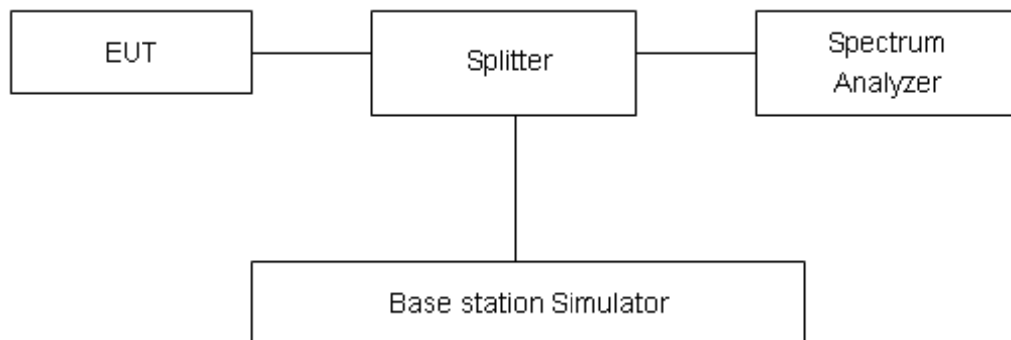
Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer.

RBW is set to 2kHz, VBW is set to 6.2kHz for NB-IOT Band 4/12/13/66/71/85.

99% power and -26dBc occupied bandwidths are recorded. Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

No specific occupied bandwidth requirements in part 2.1049.

Measurement Uncertainty

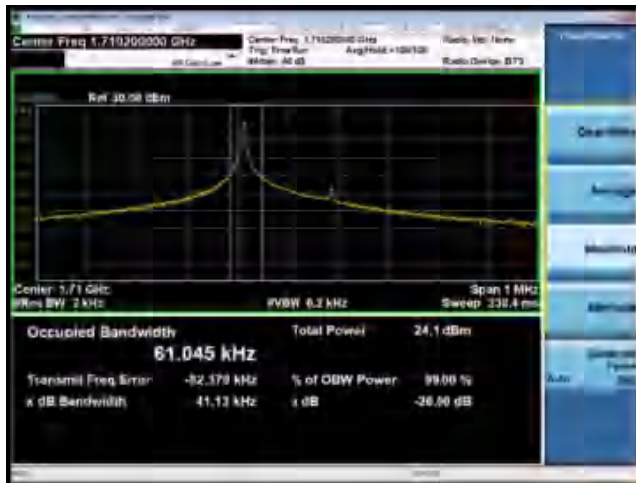
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U=624\text{Hz}$.

Test Result

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/middle/high channel					
				19952/1710.2(MHz)		20175/1732.5(MHz)		20398/1754.8(MHz)	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IOT Band 4 Standalone	BPSK	3.75	1@0	61.05	41.13	58.93	41.06	60.18	41.14
	QPSK	3.75	1@0	66.55	41.32	66.70	41.82	67.27	42.20
	BPSK	15	1@0	126.62	101.20	120.02	104.70	133.60	116.90
	QPSK	15	1@0	132.36	129.60	117.28	117.80	115.76	117.60
	QPSK	15	12@0	183.18	250.60	184.45	235.00	184.02	261.80
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/ middle/high channel					
				23012/699.2(MHz)		23095/707.5(MHz)		23178/715.8(MHz)	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IOT Band 12 Standalone	BPSK	3.75	1@0	57.74	41.11	57.77	41.01	58.39	41.34
	QPSK	3.75	1@0	65.21	39.90	67.22	42.90	64.78	39.58
	BPSK	15	1@0	128.02	106.40	129.20	115.50	130.46	118.60
	QPSK	15	1@0	116.93	117.30	117.20	117.60	120.47	117.30
	QPSK	15	12@0	182.00	239.70	183.47	239.50	183.35	259.50
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/ middle/high channel					
				23182/777.2(MHz)		23230/782(MHz)		23278/786.8(MHz)	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
Band 13 Standalone	BPSK	3.75	1@0	58.02	41.29	57.74	41.14	57.98	40.47
	QPSK	3.75	1@0	66.38	40.52	65.11	40.19	65.57	40.07
	BPSK	15	1@0	120.63	103.10	125.94	103.20	122.05	116.20
	QPSK	15	1@0	117.55	117.30	117.90	116.00	120.65	117.10
	QPSK	15	12@0	184.67	251.70	184.44	238.40	184.70	250.10
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/ middle/high channel					
				131974/1710.2(MHz)		132322/1745(MHz)		132670/1779.8(MHz)	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IOT Band 66 Standalone	BPSK	3.75	1@0	62.54	40.84	60.12	40.68	60.10	40.73
	QPSK	3.75	1@0	66.16	40.11	69.75	42.74	67.43	44.08
	BPSK	15	1@0	129.24	118.70	121.73	115.70	118.87	102.90
	QPSK	15	1@0	114.57	118.40	118.32	128.20	119.68	115.50
	QPSK	15	12@0	182.72	248.50	183.27	235.80	183.59	238.90
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/ middle/high channel					
				133124/663.2(MHz)		133297/680.5(MHz)		133470/697.8(MHz)	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
Band 71 Standalone	BPSK	3.75	1@0	58.98	41.38	58.23	41.03	58.26	41.04
	QPSK	3.75	1@0	65.73	40.12	67.43	43.44	67.29	40.65
	BPSK	15	1@0	120.85	104.50	132.43	120.00	118.45	104.10
	QPSK	15	1@0	121.39	104.70	114.93	113.50	121.46	116.90
	QPSK	15	12@0	183.47	239.60	184.47	245.10	183.24	240.10

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/ middle/high channel					
				134004/698.2(MHz)		134092/707(MHz)		134180/715.8(MHz)	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IOT Band 85 Standalone	BPSK	3.75	1@0	58.79	41.28	59.63	41.13	57.67	41.19
	QPSK	3.75	1@0	66.04	40.55	66.68	40.17	67.26	40.10
	BPSK	15	1@0	126.90	104.00	126.62	105.10	122.69	99.82
	QPSK	15	1@0	115.88	117.40	120.98	118.50	116.67	131.40
	QPSK	15	12@0	183.22	250.10	183.15	237.60	183.51	249.40

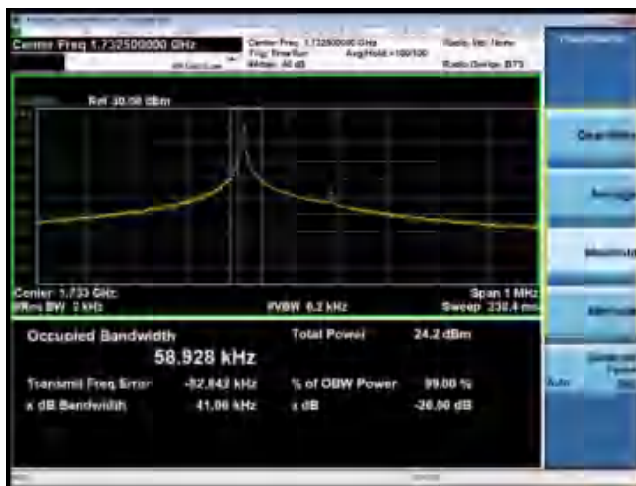
NB-IOT Band 4 BPSK 3.75KHz 1@0 CH-Low



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



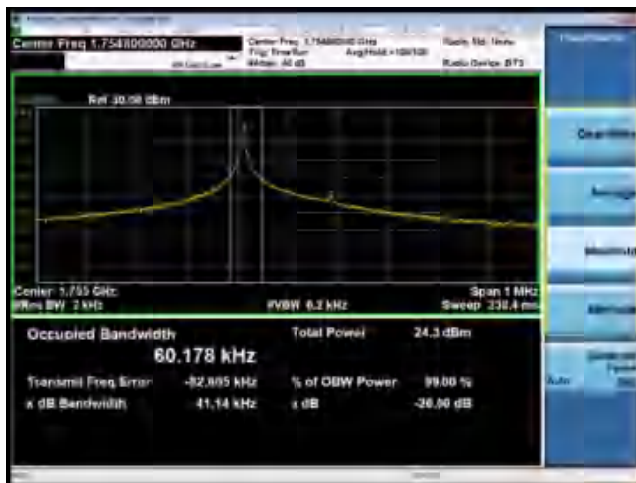
NB-IOT Band 4 BPSK 3.75KHz 1@0 CH-Middle



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



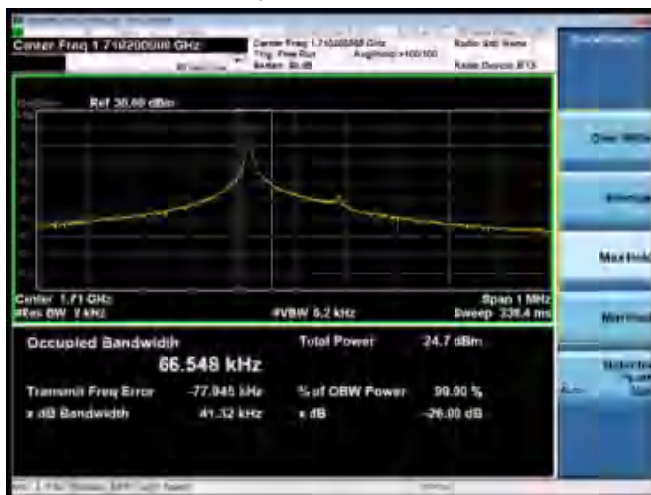
NB-IOT Band 4 BPSK 3.75KHz 1@0 CH-High



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



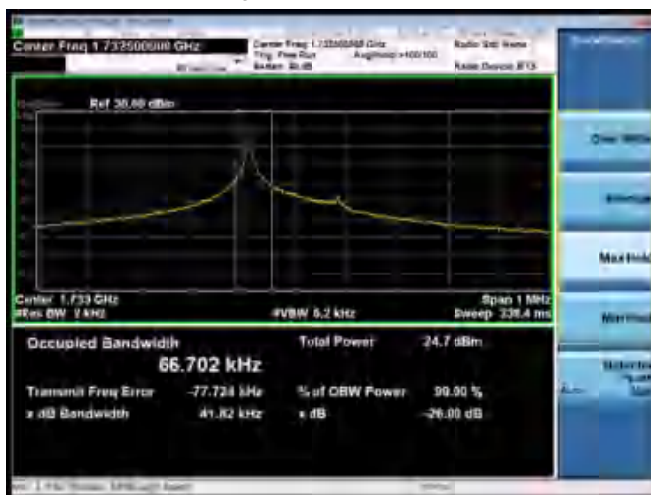
NB-IOT Band 4 QPSK 3.75KHz 1@0 CH-Low



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



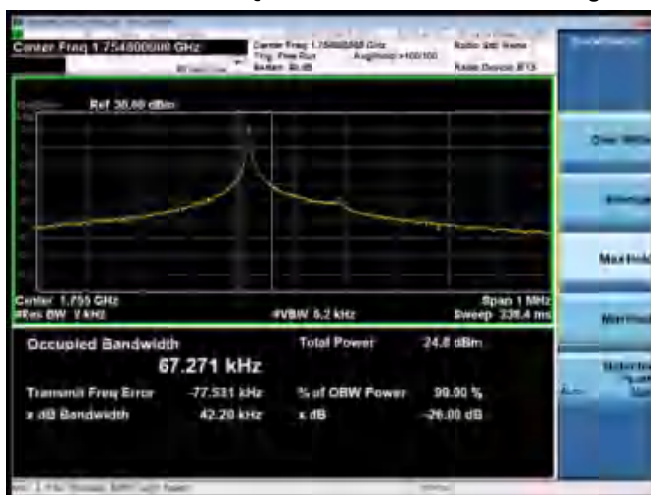
NB-IOT Band 4 QPSK 3.75KHz 1@0 CH-Middle



NB-IOT Band 4 QPSK 15KHz 1@0 CH-Middle



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



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



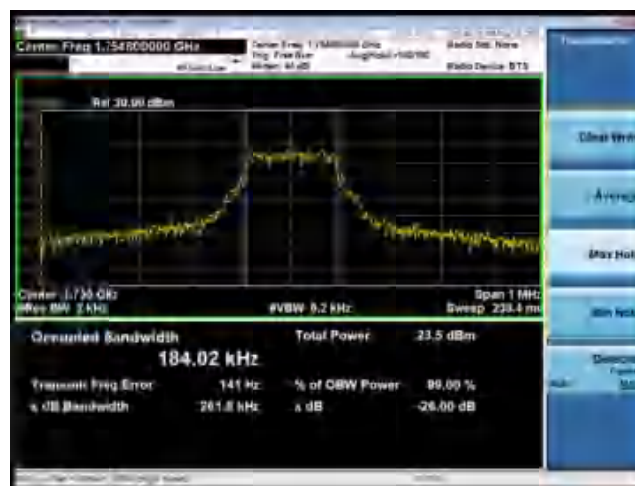
NB-IOT Band 4 QPSK 15KHz 12@0 CH-Low



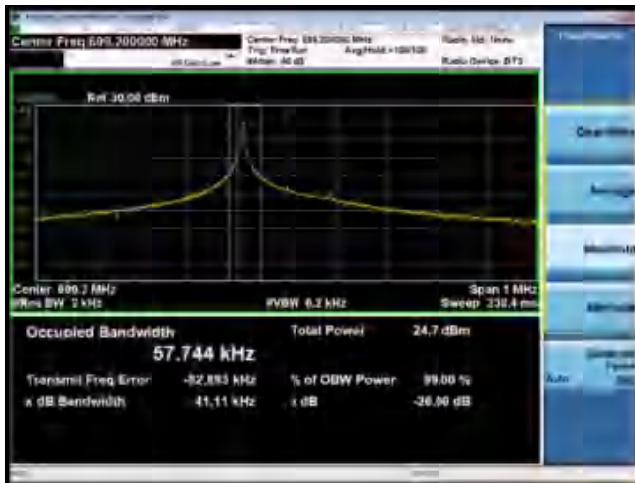
NB-IOT Band 4 QPSK 15KHz 12@0 CH-Middle



NB-IOT Band 4 QPSK 15KHz 12@0 CH-High



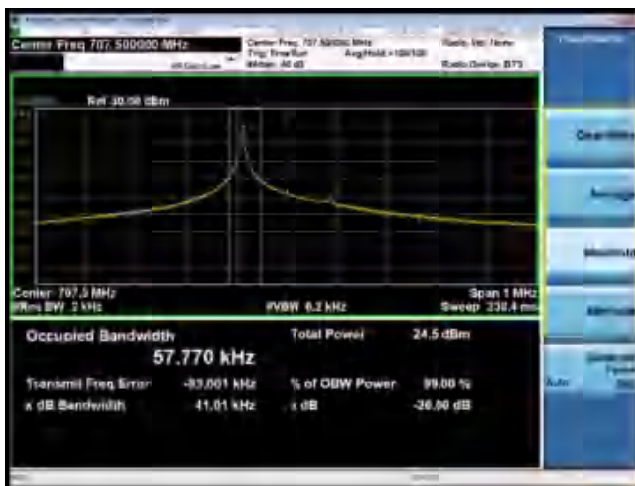
NB-IOT Band 12 BPSK 3.75KHz 1@0 CH-Low



NB-IOT Band 12 BPSK15KHz 1@0 CH-Low



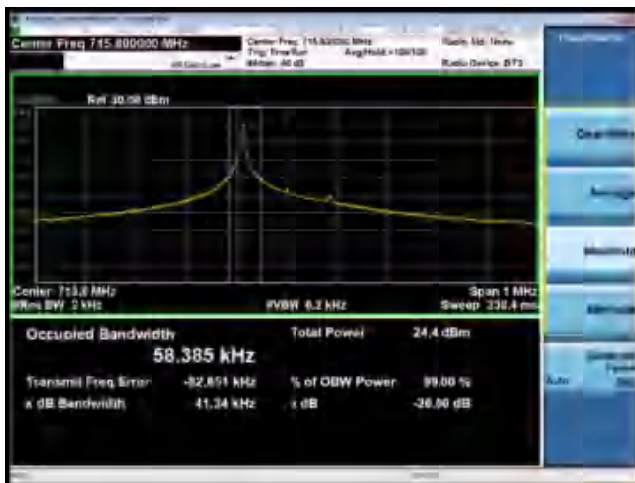
NB-IOT Band 12 BPSK 3.75KHz 1@0 CH-Middle



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



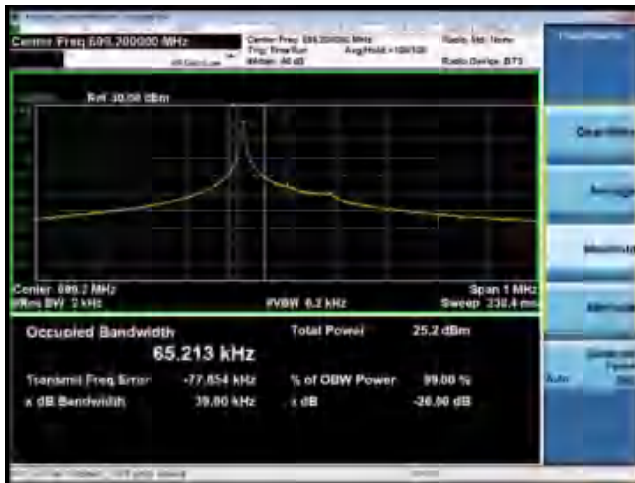
NB-IOT Band 12 BPSK 3.75KHz 1@0 CH-High



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



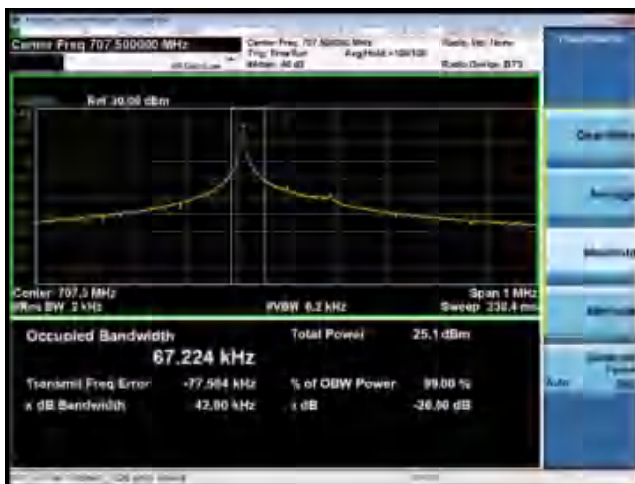
NB-IOT Band 12 QPSK 3.75KHz 1@0 CH-Low



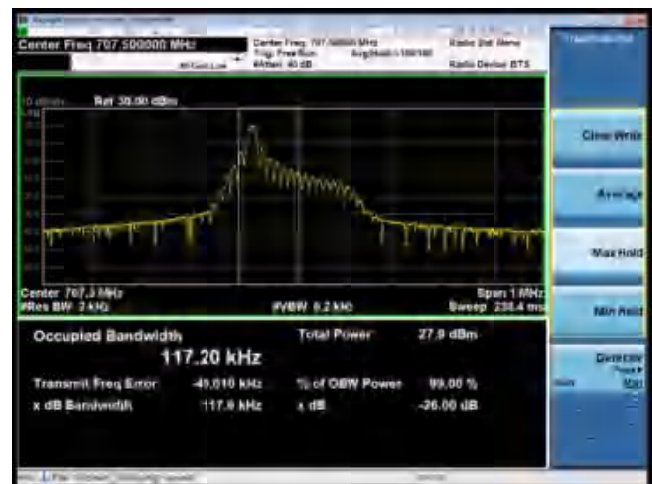
NB-IOT Band 12 QPSK 15KHz 1@0 CH-Low



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



NB-IOT Band 12 QPSK 15KHz 1@0 CH-Middle



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



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



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



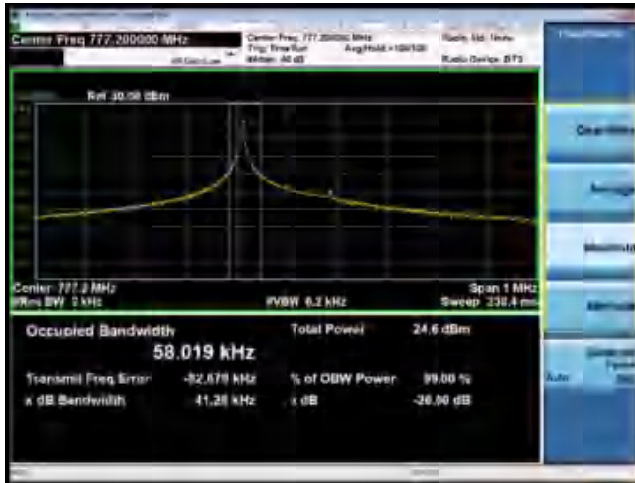
NB-IOT Band 12 QPSK 15KHz 12@0 CH-Middle



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



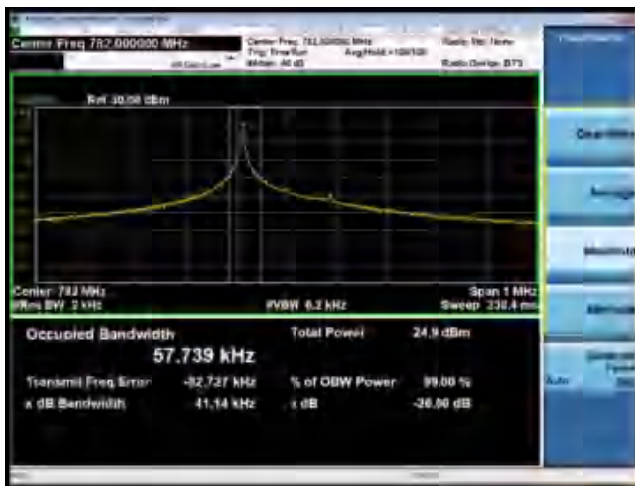
NB-IOT Band 13 BPSK 3.75KHz 1@0 CH-Low



NB-IOT Band 13 BPSK 15KHz 1@0 CH-Low



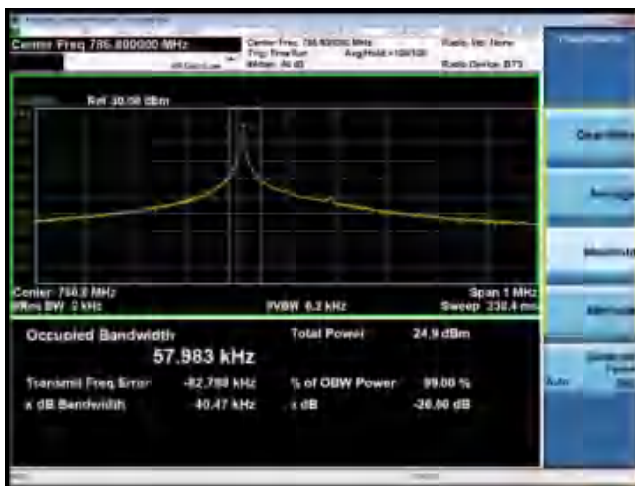
NB-IOT Band 13 BPSK 3.75KHz 1@0 CH-Middle



NB-IOT Band 13 BPSK 15KHz 1@0 CH-Middle



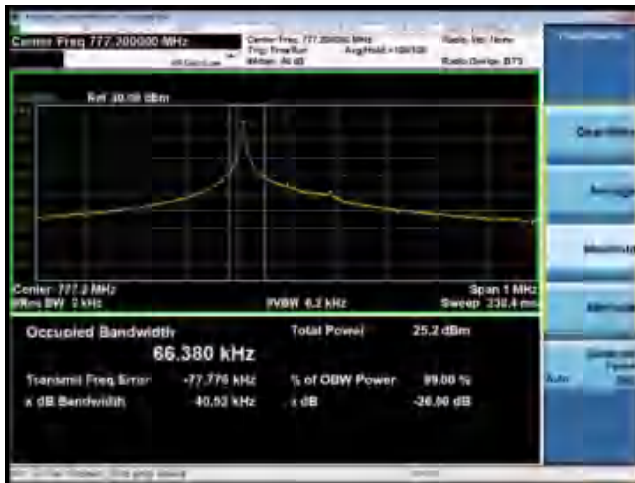
NB-IOT Band 13 BPSK 3.75KHz 1@0 CH-High



NB-IOT Band 13 BPSK 15KHz 1@0 CH-High



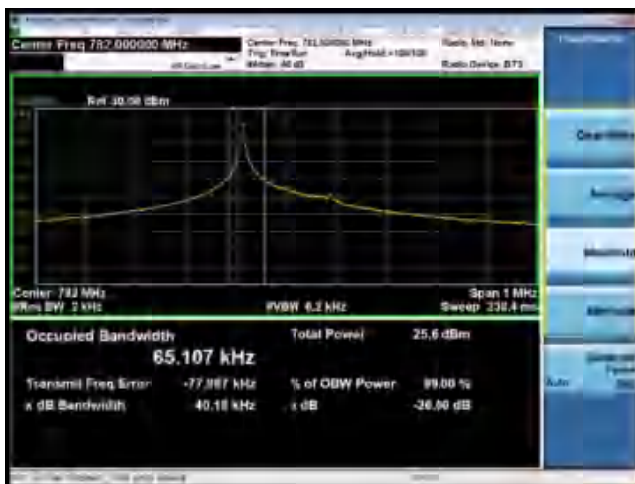
NB-IOT Band 13 QPSK 3.75KHz 1@0 CH-Low



NB-IOT Band 13 QPSK 15KHz 1@0 CH-Low



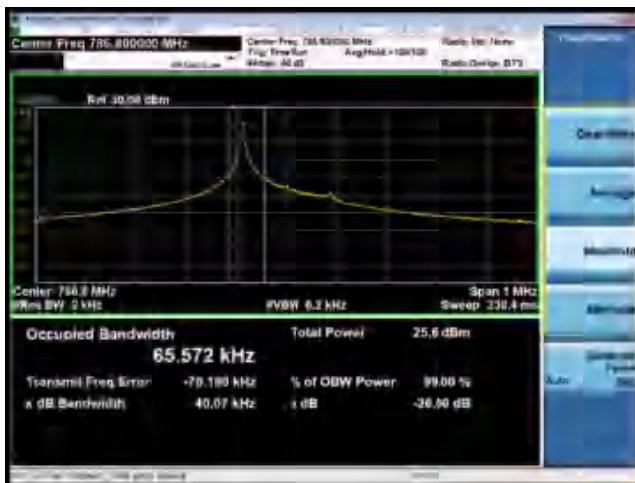
NB-IOT Band 13 QPSK 3.75KHz 1@0 CH-Middle



NB-IOT Band 13 QPSK 15KHz 1@0 CH-Middle



NB-IOT Band 13 QPSK 3.75KHz 1@0 CH-High



NB-IOT Band 13 QPSK 15KHz 1@0 CH-High



NB-IOT Band 13 QPSK 15KHz 12@0 CH-Low



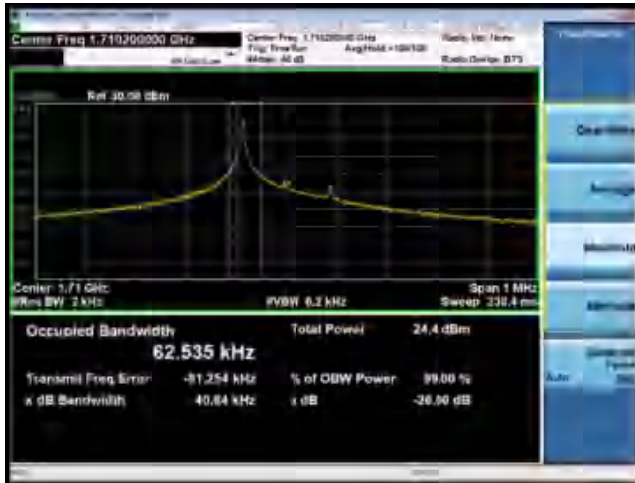
NB-IOT Band 13 QPSK 15KHz 12@0 CH-Middle



NB-IOT Band 13 QPSK 15KHz 12@0 CH-High



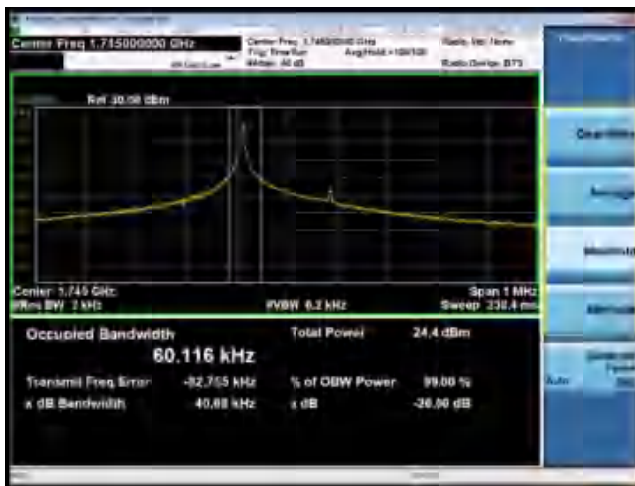
NB-IOT Band 66 BPSK 3.75KHz 1@0 CH-Low



NB-IOT Band 66 BPSK 15KHz 1@0 CH-Low



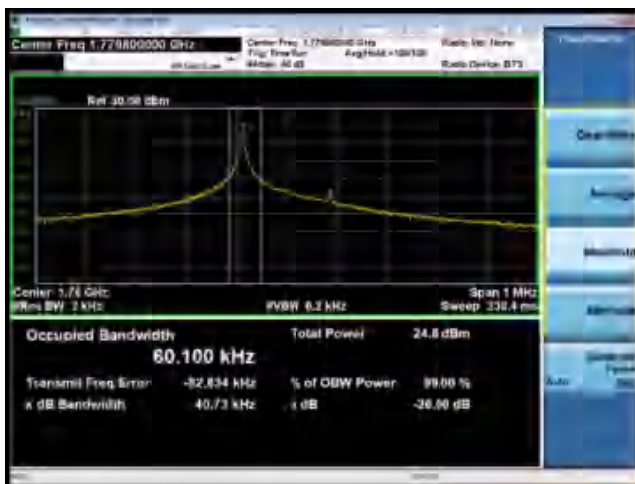
NB-IOT Band 66 BPSK 3.75KHz 1@0 CH-Middle



NB-IOT Band 66 BPSK 15KHz 1@0 CH-Middle



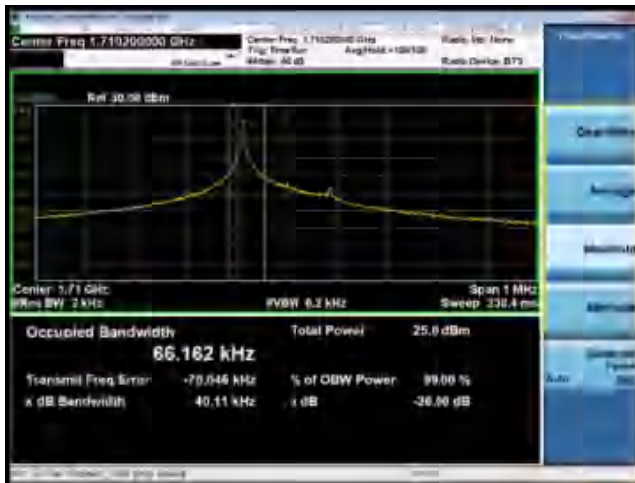
NB-IOT Band 66 BPSK 3.75KHz 1@0 CH-High



NB-IOT Band 66 BPSK 15KHz 1@0 CH-High



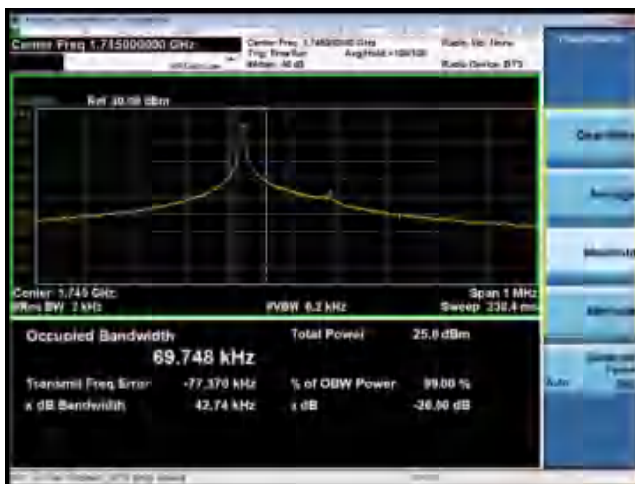
NB-IOT Band 66 QPSK 3.75KHz 1@0 CH-Low



NB-IOT Band 66 QPSK 15KHz 1@0 CH-Low



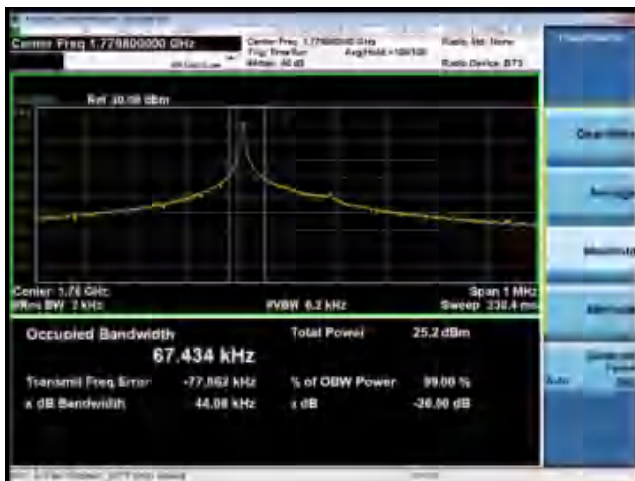
NB-IOT Band 66 QPSK 3.75KHz 1@0 CH-Middle



NB-IOT Band 66 QPSK 15KHz 1@0 CH-Middle



NB-IOT Band 66 QPSK 3.75KHz 1@0 CH-High



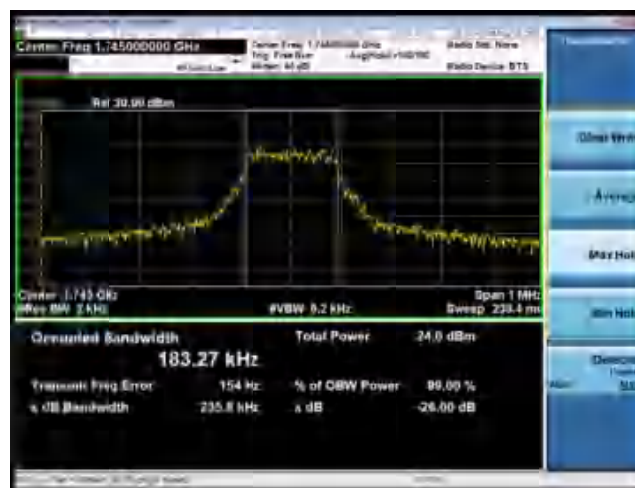
NB-IOT Band 66 QPSK 15KHz 1@0 CH-High



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



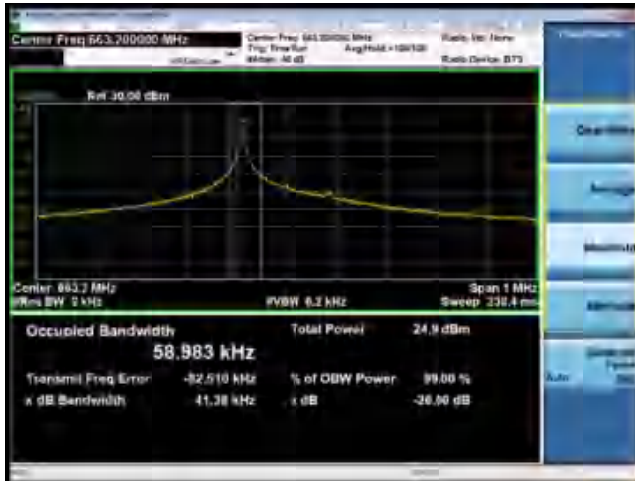
NB-IOT Band 66 QPSK 15KHz 12@0 CH-Middle



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



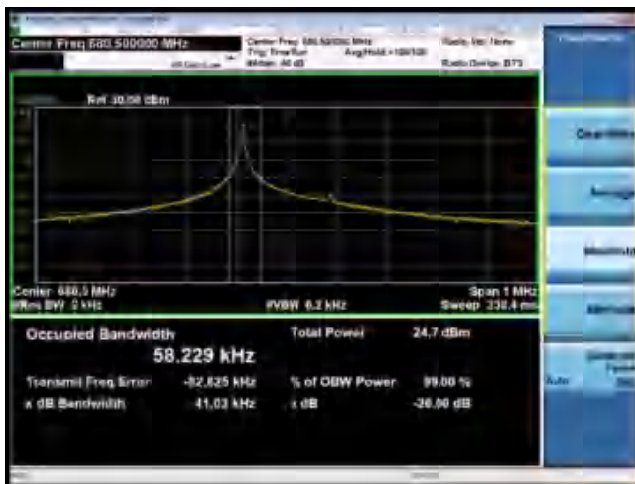
NB-IOT Band 71 BPSK 3.75KHz 1@0 CH-Low



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



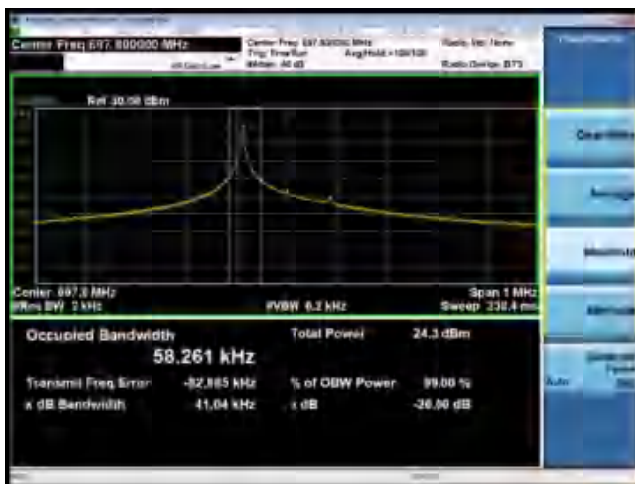
NB-IOT Band 71 BPSK 3.75KHz 1@0 CH-Middle



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



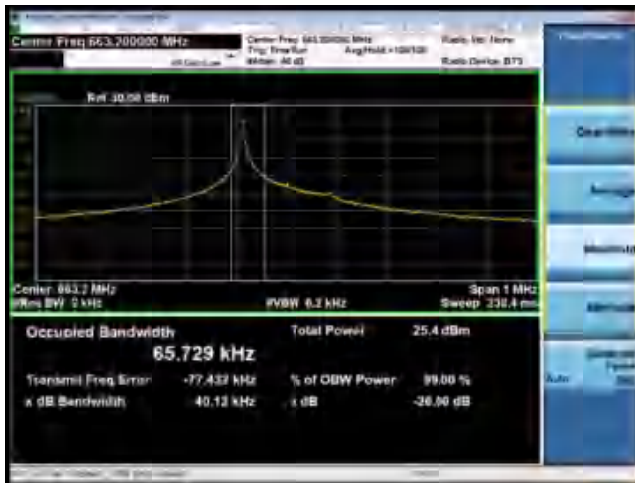
NB-IOT Band 71 BPSK 3.75KHz 1@0 CH-High



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



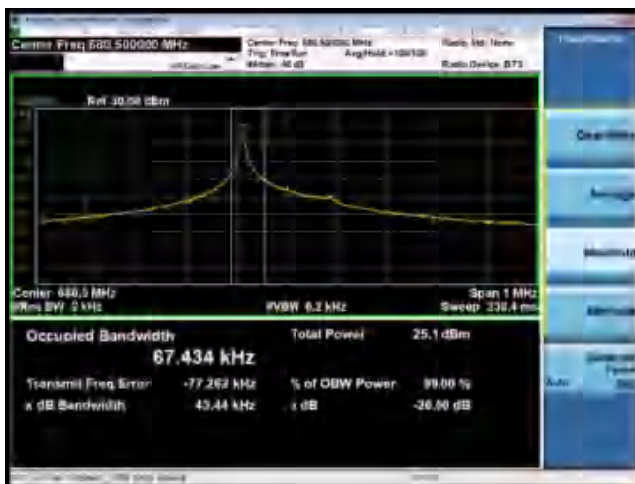
NB-IOT Band 71 QPSK 3.75KHz 1@0 CH-Low



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



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



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



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



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



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



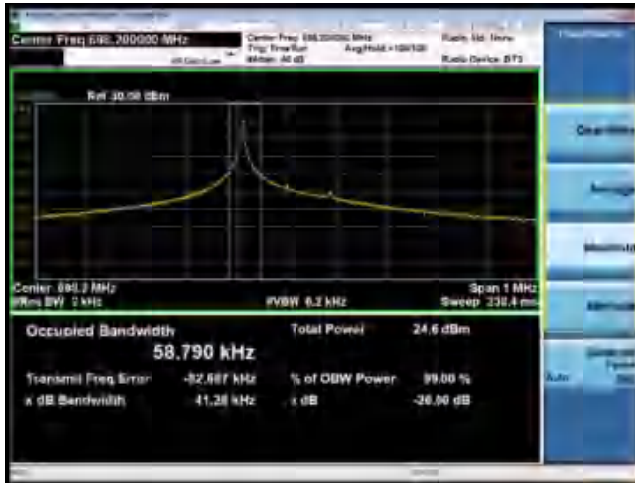
NB-IOT Band 71 QPSK 15KHz 12@0 CH-Middle



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



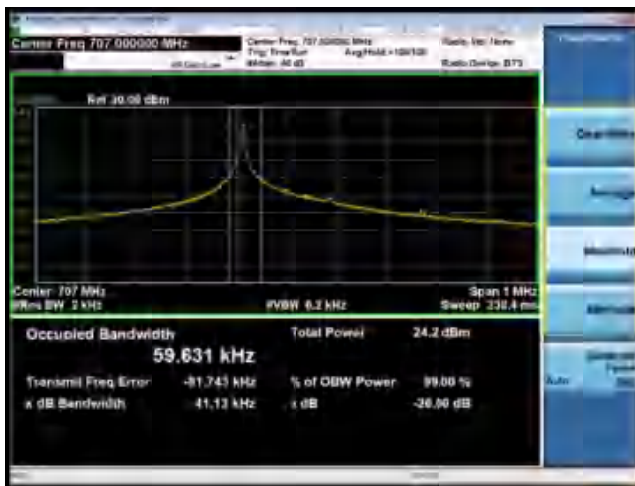
NB-IOT Band 85 BPSK 3.75KHz 1@0 CH-Low



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



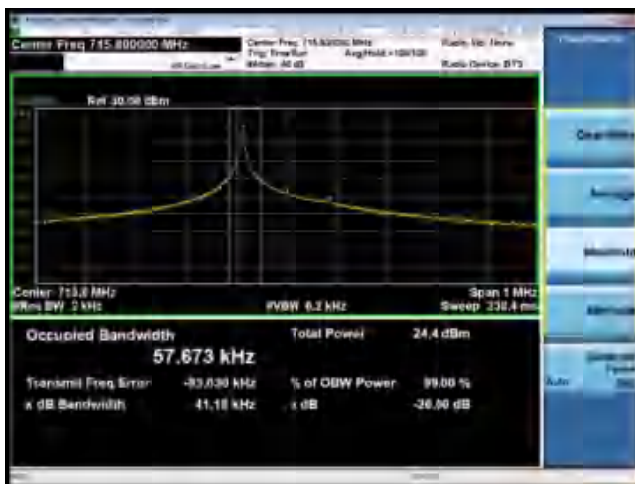
NB-IOT Band 85 BPSK 3.75KHz 1@0 CH-Middle



NB-IOT Band 85 BPSK 15KHz 1@0 CH-Middle



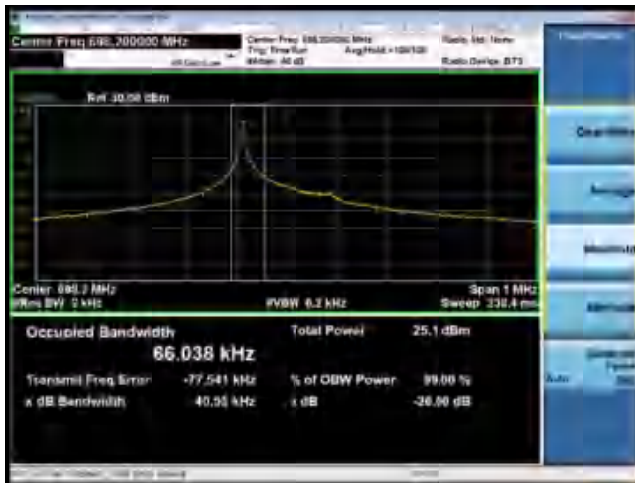
NB-IOT Band 85 BPSK 3.75KHz 1@0 CH-High



NB-IOT Band 85 BPSK 15KHz 1@0 CH-High



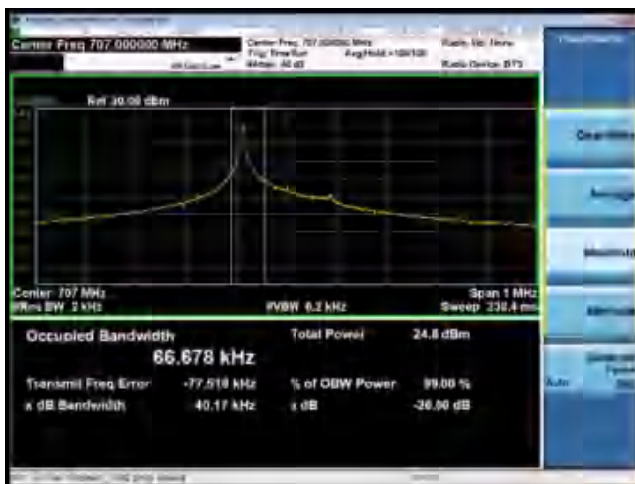
NB-IOT Band 85 QPSK 3.75KHz 1@0 CH-Low



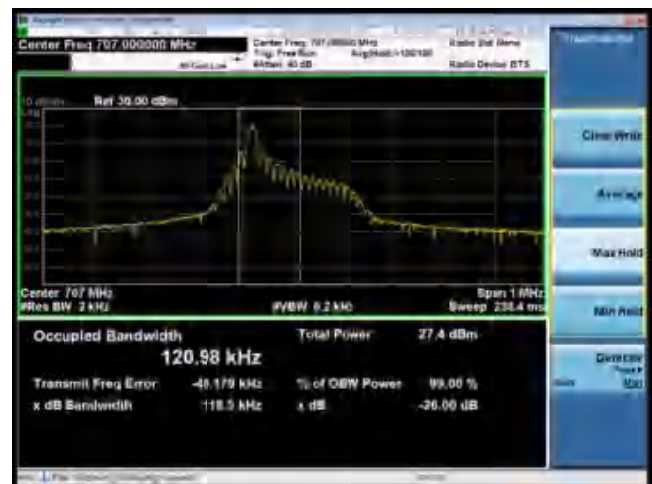
NB-IOT Band 85 QPSK 15KHz 1@0 CH-Low



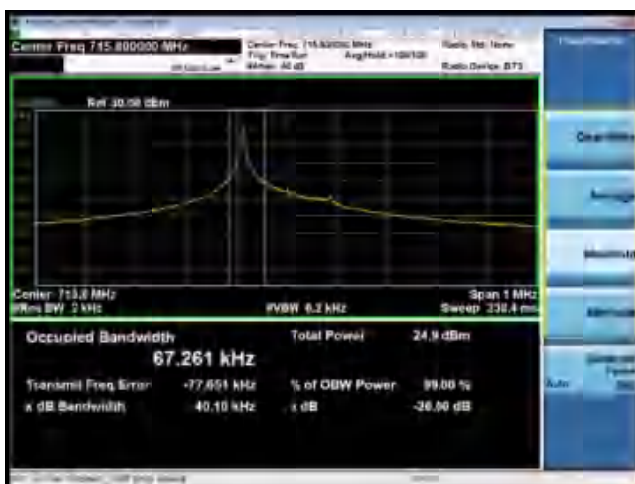
NB-IOT Band 85 QPSK 3.75KHz 1@0 CH-Middle



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



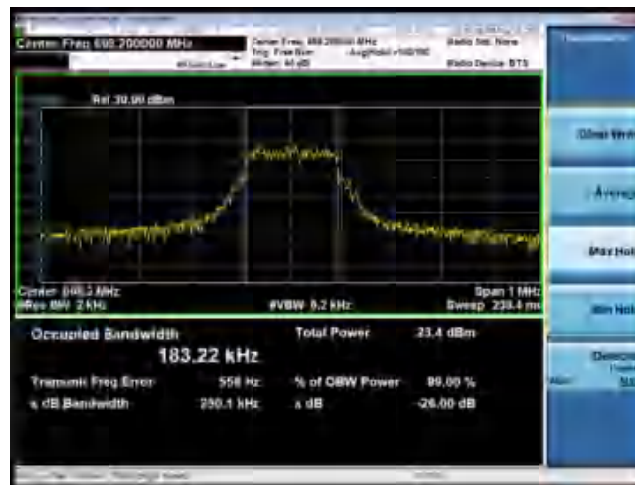
NB-IOT Band 85 QPSK 3.75KHz 1@0 CH-High



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



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



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



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



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 971168 D01 v03r01 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.

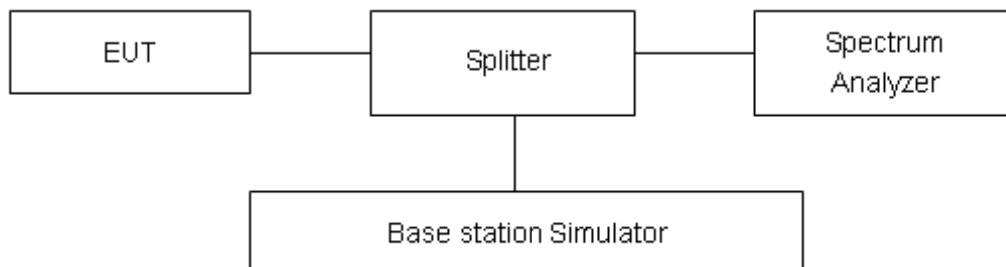
on spectrum analyzer.

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(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's frequency 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 measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

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;

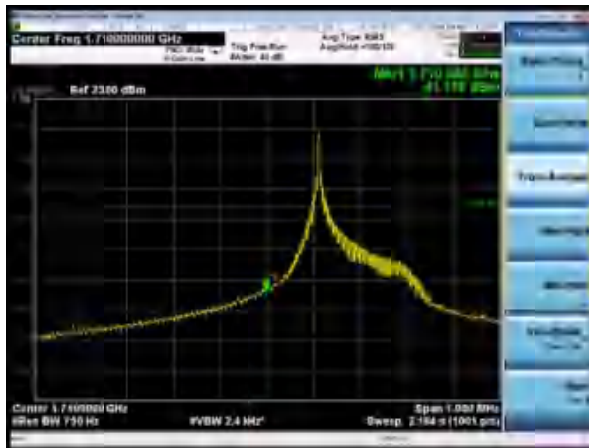
Measurement Uncertainty

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

Test Result

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

NB-IOT Band 4 BPSK 3.75kHz 1@0 CH-Low



NB-IOT Band 4 BPSK 3.75kHz 1@47 CH-High



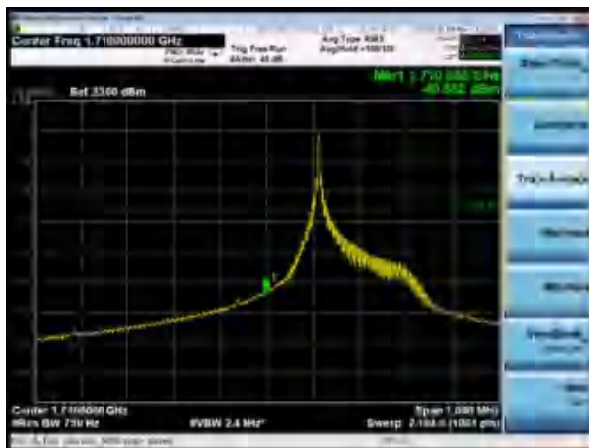
NB-IOT Band 4 BPSK 15kHz 1@0 CH-Low



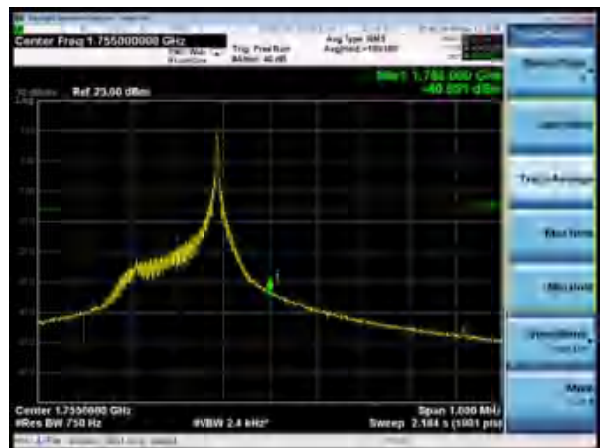
NB-IOT Band 4 BPSK 15kHz 1@11 CH-High



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



NB-IOT Band 4 QPSK 3.75kHz 1@47 CH-High



NB-IOT Band 4 QPSK 15kHz 1@0 CH-Low



NB-IOT Band 4 QPSK 15kHz 1@11 CH-High



NB-IOT Band 4 QPSK 15kHz 12@0 CH-Low



NB-IOT Band 4 QPSK 15kHz 12@0 CH-High



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



NB-IOT Band 12 BPSK 3.75kHz 1@47 CH-High



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



NB-IOT Band 12 BPSK 15kHz 1@11 CH-High



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



NB-IOT Band 12 QPSK 3.75kHz 1@47 CH-High



NB-IOT Band 12 QPSK 15kHz 1@0 CH-Low



NB-IOT Band 12 QPSK 15kHz 1@11 CH-High



NB-IOT Band 12 QPSK 15kHz 12@0 CH-Low



NB-IOT Band 12 QPSK 15kHz 12@0 CH-High



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



NB-IOT Band 13 BPSK 3.75kHz 1@47 CH-High



NB-IOT Band 13 BPSK 15kHz 1@0 CH-Low



NB-IOT Band 13 BPSK 15kHz 1@11 CH-High



NB-IOT Band 13 QPSK 3.75kHz 1@0 CH-Low



NB-IOT Band 13 QPSK 3.75kHz 1@47 CH-High



NB-IOT Band 13 QPSK 15kHz 1@0 CH-Low



NB-IOT Band 13 QPSK 15kHz 1@11 CH-High



NB-IOT Band 13 QPSK 15kHz 12@0 CH-Low



NB-IOT Band 13 QPSK 15kHz 12@0 CH-High



NB-IOT Band 13 BPSK 3.75kHz 1@0
763MHz-775MHz



NB-IOT Band 13 BPSK 3.75kHz 1@47
793MHz -805MHz



NB-IOT Band 13 BPSK 15kHz 1@0
763MHz-775MHz



NB-IOT Band 13 BPSK 15kHz 1@11
793MHz -805MHz



NB-IOT Band 13 QPSK 3.75kHz 1@0
763MHz-775MHz

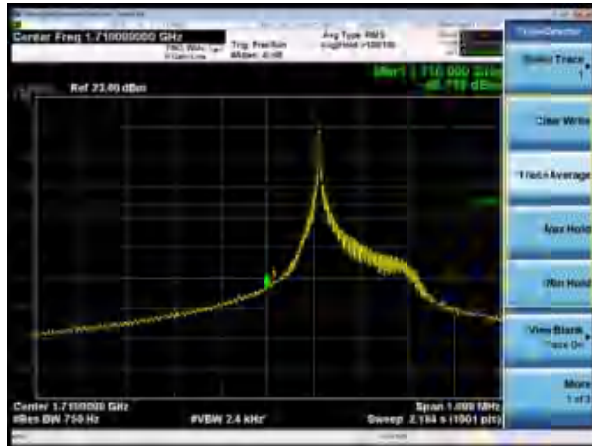


NB-IOT Band 13 QPSK 3.75kHz 1@47
793MHz -805MHz



NB-IOT Band 13 QPSK 15kHz 1@0
763MHz-775MHzNB-IOT Band 13 QPSK 15kHz 1@11
793MHz -805MHzNB-IOT Band 13 QPSK 15kHz 12@0
763MHz-775MHzNB-IOT Band 13 QPSK 15kHz 12@0
793MHz -805MHz

NB-IOT Band 66 BPSK 3.75kHz 1@0 CH-Low



NB-IOT Band 66 BPSK 3.75kHz 1@47 CH-High



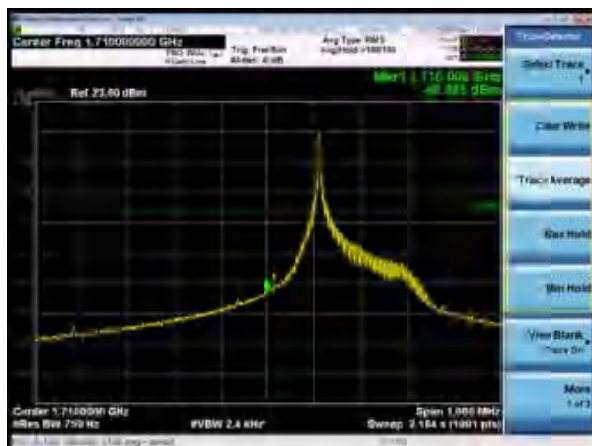
NB-IOT Band 66 BPSK 15kHz 1@0 CH-Low



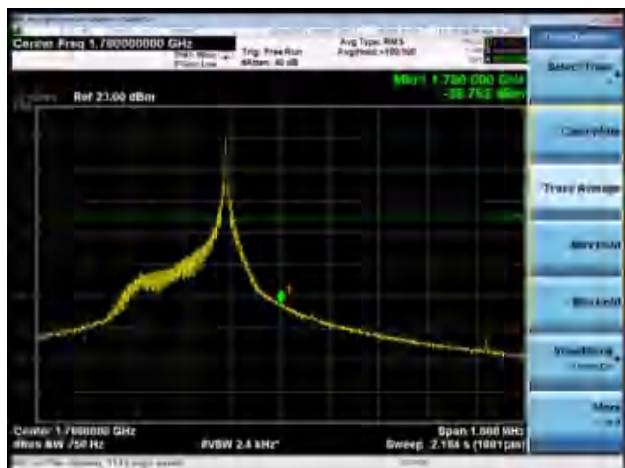
NB-IOT Band 66 BPSK 15kHz 1@11 CH-High



NB-IOT Band 66 QPSK 3.75kHz 1@0 CH-Low



NB-IOT Band 66 QPSK 3.75kHz 1@47 CH-High



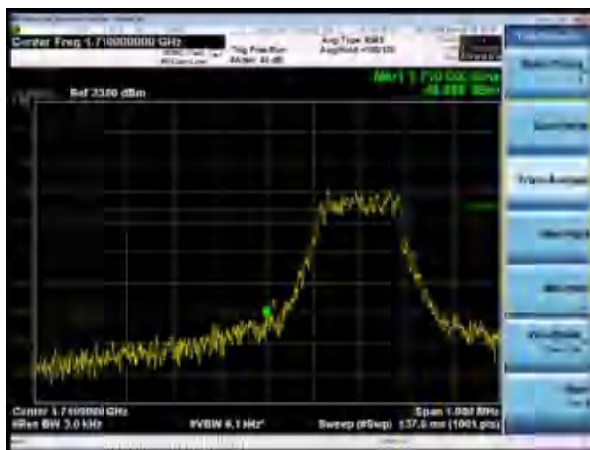
NB-IOT Band 66 QPSK 15kHz 1@0 CH-Low



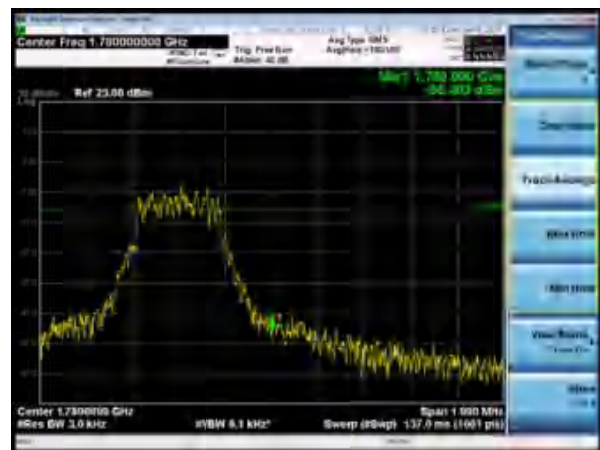
NB-IOT Band 66 QPSK 15kHz 1@11 CH-High



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



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@47 CH-High



NB-IOT Band 71 BPSK 15kHz 1@0 CH-Low



NB-IOT Band 71 BPSK 15kHz 1@11 CH-High



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



NB-IOT Band 71 QPSK 3.75kHz 1@47 CH-High



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



NB-IOT Band 71 QPSK 15kHz 1@11 CH-High



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



NB-IOT Band 71 QPSK 15kHz 12@0 CH-High



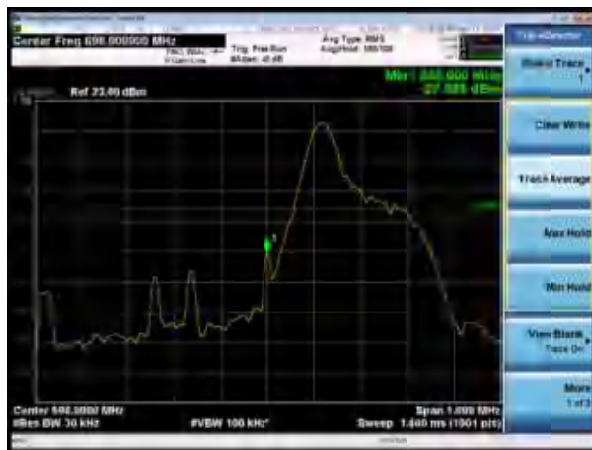
NB-IOT Band 85 BPSK 3.75kHz 1@0 CH-Low



NB-IOT Band 85 BPSK 3.75kHz 1@47 CH-High



NB-IOT Band 85 BPSK 15kHz 1@0 CH-Low



NB-IOT Band 85 BPSK 15kHz 1@11 CH-High



NB-IOT Band 85 QPSK 3.75kHz 1@0 CH-Low



NB-IOT Band 85 QPSK 3.75kHz 1@47 CH-High



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



NB-IOT Band 85 QPSK 15kHz 1@11 CH-High



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



NB-IOT Band 85 QPSK 15kHz 12@0 CH-High



5.4 Peak-to-Average Power Ratio (PAPR)

Ambient condition

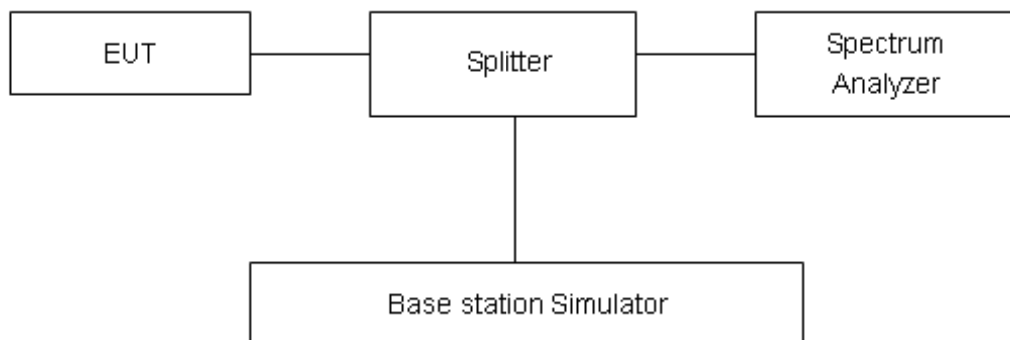
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

Measure the total peak power and record as PPk. And measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

$$\text{PAPR (dB)} = \text{PPk (dBm)} - \text{PAvg (dBm)}.$$

Test Setup



Limits

Rule Part 27.50(d)(5) Equipment employed must be authorized in accordance with the provisions of 24.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 0.4$ dB.

Test Results

Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)			Limit (dB)	Conclusion
				Peak(dBm)	Avg(dBm)	PAPR(dB)		
Band 4 Standalone	BPSK	3.75	20175/1732.5	22.14	17.29	4.85	≤13	PASS
	QPSK	3.75	20175/1732.5	21.50	17.33	4.17	≤13	PASS
	BPSK	15	20175/1732.5	21.66	14.40	7.26	≤13	PASS
	QPSK	15	20175/1732.5	21.31	14.41	6.90	≤13	PASS
Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)			Limit (dB)	Conclusion
				Peak(dBm)	Avg(dBm)	PAPR(dB)		
Band 12 Standalone	BPSK	3.75	23095/707.5	22.55	17.74	4.81	≤13	PASS
	QPSK	3.75	23095/707.5	21.83	17.66	4.17	≤13	PASS
	BPSK	15	23095/707.5	22.11	14.92	7.19	≤13	PASS
	QPSK	15	23095/707.5	21.79	14.91	6.88	≤13	PASS
Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)			Limit (dB)	Conclusion
				Peak(dBm)	Avg(dBm)	PAPR(dB)		
Band 13 Standalone	BPSK	3.75	23230/782	22.82	17.97	4.85	≤13	PASS
	QPSK	3.75	23230/782	22.20	18.04	4.16	≤13	PASS
	BPSK	15	23230/782	22.38	15.17	7.21	≤13	PASS
	QPSK	15	23230/782	22.03	15.12	6.91	≤13	PASS
Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)			Limit (dB)	Conclusion
				Peak(dBm)	Avg(dBm)	PAPR(dB)		
Band 66 Standalone	BPSK	3.75	132322/1745	22.53	17.68	4.85	≤13	PASS
	QPSK	3.75	132322/1745	21.87	17.69	4.18	≤13	PASS
	BPSK	15	132322/1745	22.06	14.81	7.25	≤13	PASS
	QPSK	15	132322/1745	21.71	14.79	6.92	≤13	PASS
Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)			Limit (dB)	Conclusion
				Peak(dBm)	Avg(dBm)	PAPR(dB)		
Band 71 Standalone	BPSK	3.75	133297/680.5	22.85	18.07	4.78	≤13	PASS
	QPSK	3.75	133297/680.5	22.15	17.99	4.16	≤13	PASS
	BPSK	15	133297/680.5	22.45	15.26	7.19	≤13	PASS
	QPSK	15	133297/680.5	22.12	15.27	6.85	≤13	PASS
Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)			Limit (dB)	Conclusion
				Peak(dBm)	Avg(dBm)	PAPR(dB)		
Band 85 Standalone	BPSK	3.75	134092/707	22.41	17.60	4.81	≤13	PASS
	QPSK	3.75	134092/707	21.76	17.58	4.18	≤13	PASS
	BPSK	15	134092/707	22.02	14.83	7.19	≤13	PASS
	QPSK	15	134092/707	21.67	14.79	6.88	≤13	PASS

5.5 Frequency Stability

Ambient condition

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

Method of Measurement

Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -40°C to +85°C in 10°C step size.

(1) With all power removed, the temperature was decreased to -10°C and permitted to stabilize for three hours.

(2) Measure the carrier frequency with the test equipment in a “call mode”. These measurements should be made within 1 minute of powering up the mobile station, to prevent significant self warming.

(3) Repeat the above measurements at 10°C increments from -40°C to +85°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

Frequency Stability (Voltage Variation)

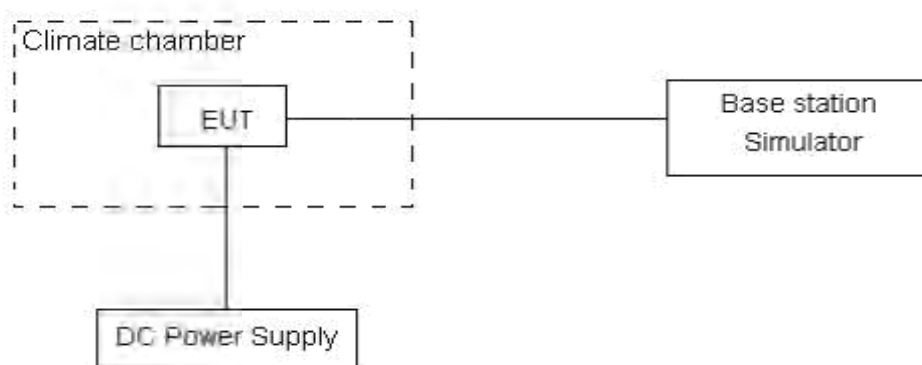
The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery-operating end point which shall be specified by the manufacturer.

This transceiver is specified to operate with an input voltage of between 3.3 V and 4.3 V, with a nominal voltage of 3.8V.

Test setup



Limits

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor $k = 3$, $U = 0.01\text{ppm}$.

Test Result

NB-IOT Band 4						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25℃)	Normal	11.00	11.44	0.00585	0.00608	PASS
Extreme(85℃)		7.44	16.37	0.00396	0.00871	PASS
Extreme(80℃)		9.30	2.62	0.00494	0.00140	PASS
Extreme(70℃)		4.50	17.49	0.00239	0.00931	PASS
Extreme(60℃)		6.87	17.62	0.00365	0.00937	PASS
Extreme(50℃)		3.94	11.97	0.00210	0.00637	PASS
Extreme(40℃)		7.32	15.70	0.00389	0.00835	PASS
Extreme(30℃)		9.02	5.31	0.00480	0.00282	PASS
Extreme(20℃)		2.48	11.26	0.00132	0.00599	PASS
Extreme(10℃)		3.96	2.58	0.00210	0.00137	PASS
Extreme(0℃)		11.60	3.16	0.00617	0.00168	PASS
Extreme(-10℃)		8.50	12.18	0.00452	0.00648	PASS
Extreme(-20℃)		4.95	9.53	0.00263	0.00507	PASS
Extreme(-30℃)		17.76	4.84	0.00945	0.00258	PASS
Extreme(-40℃)		7.04	8.56	0.00375	0.00455	PASS
25℃	LV	1.18	13.35	0.00063	0.00710	PASS
	HV	13.54	5.75	0.00720	0.00306	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	15					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25℃)	Normal	3.58	3.39	0.00191	0.00180	PASS
Extreme(85℃)		5.88	3.14	0.00313	0.00167	PASS
Extreme(80℃)		13.97	5.39	0.00743	0.00287	PASS
Extreme(70℃)		10.71	14.26	0.00570	0.00759	PASS
Extreme(60℃)		13.39	15.95	0.00712	0.00848	PASS
Extreme(50℃)		3.82	3.08	0.00203	0.00164	PASS
Extreme(40℃)		16.67	14.49	0.00887	0.00771	PASS
Extreme(30℃)		5.44	9.89	0.00289	0.00526	PASS
Extreme(20℃)		15.38	13.25	0.00818	0.00705	PASS
Extreme(10℃)		11.25	2.53	0.00599	0.00134	PASS
Extreme(0℃)		5.30	4.01	0.00282	0.00213	PASS
Extreme(-10℃)		10.42	9.45	0.00554	0.00503	PASS
Extreme(-20℃)		10.15	6.82	0.00540	0.00363	PASS

Extreme(-30℃)		14.41	10.38	0.00767	0.00552	PASS
Extreme(-40℃)		17.66	8.48	0.00939	0.00451	PASS
25℃	LV	14.59	13.87	0.00776	0.00738	PASS
	HV	6.71	12.51	0.00357	0.00666	PASS

NB-IOT Band 12						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25℃)	Normal	4.91	13.69	0.00261	0.00728	
Extreme(85℃)		14.44	2.56	0.00768	0.00136	PASS
Extreme(80℃)		3.07	10.57	0.00163	0.00562	PASS
Extreme(70℃)		2.05	12.28	0.00109	0.00653	PASS
Extreme(60℃)		10.99	3.99	0.00584	0.00212	PASS
Extreme(50℃)		6.06	14.50	0.00322	0.00771	PASS
Extreme(40℃)		10.49	15.70	0.00558	0.00835	PASS
Extreme(30℃)		1.59	5.50	0.00084	0.00293	PASS
Extreme(20℃)		1.74	10.99	0.00093	0.00584	PASS
Extreme(10℃)		7.58	15.19	0.00403	0.00808	PASS
Extreme(0℃)		6.19	9.67	0.00329	0.00515	PASS
Extreme(-10℃)		1.75	6.55	0.00093	0.00348	PASS
Extreme(-20℃)		6.17	11.83	0.00328	0.00629	PASS
Extreme(-30℃)		15.78	15.68	0.00839	0.00834	PASS
Extreme(-40℃)		10.93	16.49	0.00582	0.00877	PASS
25℃	LV	12.66	3.75	0.00673	0.00199	PASS
	HV	14.21	7.96	0.00756	0.00423	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	15					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25℃)	Normal	14.67	12.76	0.00780	0.00679	
Extreme(85℃)		16.01	5.78	0.00851	0.00307	PASS
Extreme(80℃)		10.94	15.40	0.00582	0.00819	PASS
Extreme(70℃)		14.71	17.12	0.00782	0.00910	PASS
Extreme(60℃)		5.66	14.60	0.00301	0.00777	PASS
Extreme(50℃)		15.42	11.98	0.00820	0.00637	PASS
Extreme(40℃)		4.85	16.07	0.00258	0.00855	PASS
Extreme(30℃)		14.28	10.85	0.00759	0.00577	PASS

Extreme(20℃)		10.91	5.54	0.00580	0.00295	PASS
Extreme(10℃)		14.70	11.43	0.00782	0.00608	PASS
Extreme(0℃)		15.94	7.99	0.00848	0.00425	PASS
Extreme(-10℃)		12.92	6.85	0.00687	0.00364	PASS
Extreme(-20℃)		3.17	6.60	0.00169	0.00351	PASS
Extreme(-30℃)		3.76	9.70	0.00200	0.00516	PASS
Extreme(-40℃)		7.76	13.00	0.00413	0.00692	PASS
25℃	LV	11.56	17.51	0.00615	0.00932	PASS
	HV	1.02	7.16	0.00054	0.00381	PASS

NB-IOT Band 13						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25℃)	Normal	3.26	16.91	0.00173	0.00899	
Extreme(85℃)		11.68	12.12	0.00621	0.00645	PASS
Extreme(80℃)		15.53	11.85	0.00826	0.00631	PASS
Extreme(70℃)		15.29	17.57	0.00813	0.00935	PASS
Extreme(60℃)		16.32	14.81	0.00868	0.00788	PASS
Extreme(50℃)		14.79	5.60	0.00787	0.00298	PASS
Extreme(40℃)		6.33	11.58	0.00337	0.00616	PASS
Extreme(30℃)		5.77	11.50	0.00307	0.00612	PASS
Extreme(20℃)		4.36	13.52	0.00232	0.00719	PASS
Extreme(10℃)		15.78	6.91	0.00839	0.00367	PASS
Extreme(0℃)		10.15	6.29	0.00540	0.00334	PASS
Extreme(-10℃)		15.72	11.63	0.00836	0.00619	PASS
Extreme(-20℃)		15.33	13.25	0.00816	0.00705	PASS
Extreme(-30℃)		13.89	15.28	0.00739	0.00813	PASS
Extreme(-40℃)		9.05	14.32	0.00481	0.00762	PASS
25℃	LV	11.77	11.33	0.00626	0.00603	PASS
	HV	13.12	12.56	0.00698	0.00668	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	15					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25℃)	Normal	16.82	4.72	0.00895	0.00251	
Extreme(85℃)		10.52	17.33	0.00560	0.00922	PASS
Extreme(80℃)		12.30	3.25	0.00654	0.00173	PASS

Extreme(70℃)		17.10	8.83	0.00909	0.00470	PASS
Extreme(60℃)		15.83	3.22	0.00842	0.00171	PASS
Extreme(50℃)		1.73	9.15	0.00092	0.00487	PASS
Extreme(40℃)		4.54	13.92	0.00242	0.00741	PASS
Extreme(30℃)		15.53	10.47	0.00826	0.00557	PASS
Extreme(20℃)		5.59	10.59	0.00297	0.00563	PASS
Extreme(10℃)		6.02	1.75	0.00320	0.00093	PASS
Extreme(0℃)		17.15	6.53	0.00912	0.00347	PASS
Extreme(-10℃)		7.48	7.54	0.00398	0.00401	PASS
Extreme(-20℃)		17.73	7.74	0.00943	0.00412	PASS
Extreme(-30℃)		16.54	5.81	0.00880	0.00309	PASS
Extreme(-40℃)		8.16	13.55	0.00434	0.00721	PASS
25℃	LV	7.35	11.17	0.00391	0.00594	PASS
	HV	13.99	16.58	0.00744	0.00882	PASS

NB-IOT Band 66						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25℃)	Normal	4.95	15.19	0.00263	0.00808	
Extreme(85℃)		5.37	15.81	0.00286	0.00841	PASS
Extreme(80℃)		14.44	17.73	0.00768	0.00943	PASS
Extreme(70℃)		16.68	16.99	0.00887	0.00904	PASS
Extreme(60℃)		11.17	9.66	0.00594	0.00514	PASS
Extreme(50℃)		8.93	12.76	0.00475	0.00679	PASS
Extreme(40℃)		7.95	1.63	0.00423	0.00087	PASS
Extreme(30℃)		11.45	4.91	0.00609	0.00261	PASS
Extreme(20℃)		17.67	7.72	0.00940	0.00411	PASS
Extreme(10℃)		15.13	6.00	0.00805	0.00319	PASS
Extreme(0℃)		2.54	17.36	0.00135	0.00923	PASS
Extreme(-10℃)		7.84	9.50	0.00417	0.00505	PASS
Extreme(-20℃)		2.45	1.23	0.00130	0.00066	PASS
Extreme(-30℃)		6.54	13.12	0.00348	0.00698	PASS
Extreme(-40℃)		3.07	3.98	0.00163	0.00212	PASS
25℃	LV	12.50	17.03	0.00665	0.00906	PASS
	HV	1.53	8.93	0.00081	0.00475	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing	15					

(KHz)						
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25℃)	Normal	16.82	5.30	0.00895	0.00282	PASS
Extreme(85℃)		15.57	10.07	0.00828	0.00536	PASS
Extreme(80℃)		17.64	2.24	0.00938	0.00119	PASS
Extreme(70℃)		12.03	11.12	0.00640	0.00592	PASS
Extreme(60℃)		3.27	15.43	0.00174	0.00821	PASS
Extreme(50℃)		11.27	9.68	0.00599	0.00515	PASS
Extreme(40℃)		9.56	1.91	0.00509	0.00101	PASS
Extreme(30℃)		9.88	8.83	0.00526	0.00470	PASS
Extreme(20℃)		1.28	5.36	0.00068	0.00285	PASS
Extreme(10℃)		15.19	2.21	0.00808	0.00118	PASS
Extreme(0℃)		2.02	6.03	0.00107	0.00321	PASS
Extreme(-10℃)		10.26	10.67	0.00546	0.00567	PASS
Extreme(-20℃)		12.93	11.33	0.00688	0.00603	PASS
Extreme(-30℃)		5.66	6.30	0.00301	0.00335	PASS
Extreme(-40℃)		5.12	9.69	0.00272	0.00516	PASS
25℃	LV	5.80	1.28	0.00309	0.00068	PASS
	HV	15.93	1.06	0.00847	0.00057	PASS

NB-IOT Band 71						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25℃)	Normal	9.01	13.08	0.00479	0.00696	PASS
Extreme(85℃)		12.66	12.71	0.00673	0.00676	PASS
Extreme(80℃)		16.48	14.59	0.00877	0.00776	PASS
Extreme(70℃)		12.81	7.97	0.00681	0.00424	PASS
Extreme(60℃)		10.52	14.49	0.00559	0.00771	PASS
Extreme(50℃)		9.56	2.85	0.00509	0.00152	PASS
Extreme(40℃)		11.82	5.33	0.00629	0.00284	PASS
Extreme(30℃)		4.35	17.00	0.00232	0.00904	PASS
Extreme(20℃)		6.73	4.60	0.00358	0.00245	PASS
Extreme(10℃)		5.86	10.36	0.00312	0.00551	PASS
Extreme(0℃)		1.86	5.62	0.00099	0.00299	PASS
Extreme(-10℃)		3.50	10.27	0.00186	0.00547	PASS
Extreme(-20℃)		8.23	16.59	0.00438	0.00882	PASS
Extreme(-30℃)		17.71	9.49	0.00942	0.00505	PASS
Extreme(-40℃)		6.69	14.66	0.00356	0.00780	PASS

25℃	LV	13.42	11.76	0.00714	0.00626	PASS
	HV	4.50	3.60	0.00239	0.00192	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	15					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25℃)	Normal	11.59	10.52	0.00616	0.00560	PASS
Extreme(85℃)		14.79	1.17	0.00786	0.00062	PASS
Extreme(80℃)		15.42	2.01	0.00820	0.00107	PASS
Extreme(70℃)		9.18	14.99	0.00488	0.00797	PASS
Extreme(60℃)		8.09	6.07	0.00430	0.00323	PASS
Extreme(50℃)		17.68	7.05	0.00941	0.00375	PASS
Extreme(40℃)		15.42	16.03	0.00820	0.00853	PASS
Extreme(30℃)		17.46	12.74	0.00929	0.00678	PASS
Extreme(20℃)		15.99	12.48	0.00850	0.00664	PASS
Extreme(10℃)		15.34	9.16	0.00816	0.00487	PASS
Extreme(0℃)		12.38	3.11	0.00659	0.00165	PASS
Extreme(-10℃)		6.48	11.20	0.00345	0.00596	PASS
Extreme(-20℃)		14.67	5.74	0.00780	0.00305	PASS
Extreme(-30℃)		14.63	2.48	0.00778	0.00132	PASS
Extreme(-40℃)		10.34	14.47	0.00550	0.00770	PASS
25℃	LV	2.79	5.55	0.00149	0.00295	PASS
	HV	10.28	1.38	0.00547	0.00073	PASS

NB-IOT Band 85						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25℃)	Normal	4.10	12.49	0.00218	0.00665	PASS
Extreme(85℃)		3.42	13.12	0.00182	0.00698	PASS
Extreme(80℃)		9.68	1.22	0.00515	0.00065	PASS
Extreme(70℃)		16.81	3.31	0.00894	0.00176	PASS
Extreme(60℃)		5.24	6.29	0.00279	0.00334	PASS
Extreme(50℃)		3.74	12.04	0.00199	0.00640	PASS
Extreme(40℃)		5.83	3.86	0.00310	0.00206	PASS
Extreme(30℃)		4.85	8.90	0.00258	0.00474	PASS
Extreme(20℃)		13.74	11.63	0.00731	0.00619	PASS
Extreme(10℃)		5.51	5.84	0.00293	0.00311	PASS

Extreme(0℃)		8.06	14.24	0.00428	0.00758	PASS
Extreme(-10℃)		13.84	15.10	0.00736	0.00803	PASS
Extreme(-20℃)		1.23	10.56	0.00065	0.00562	PASS
Extreme(-30℃)		15.31	14.62	0.00814	0.00778	PASS
Extreme(-40℃)		1.62	8.79	0.00086	0.00467	PASS
25℃	LV	2.01	6.62	0.00107	0.00352	PASS
	HV	12.05	10.59	0.00641	0.00563	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	15					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25℃)	Normal	6.47	3.69	0.00344	0.00196	PASS
Extreme(85℃)		3.39	16.86	0.00180	0.00897	PASS
Extreme(80℃)		16.39	1.30	0.00872	0.00069	PASS
Extreme(70℃)		3.25	11.05	0.00173	0.00588	PASS
Extreme(60℃)		10.89	17.13	0.00579	0.00911	PASS
Extreme(50℃)		12.98	9.65	0.00690	0.00513	PASS
Extreme(40℃)		2.35	2.48	0.00125	0.00132	PASS
Extreme(30℃)		1.44	15.75	0.00076	0.00838	PASS
Extreme(20℃)		3.37	13.70	0.00179	0.00729	PASS
Extreme(10℃)		4.46	1.33	0.00237	0.00071	PASS
Extreme(0℃)		9.28	1.92	0.00493	0.00102	PASS
Extreme(-10℃)		6.38	14.18	0.00339	0.00754	PASS
Extreme(-20℃)		3.33	16.33	0.00177	0.00869	PASS
Extreme(-30℃)		3.56	9.17	0.00189	0.00488	PASS
Extreme(-40℃)		6.46	6.82	0.00344	0.00363	PASS
25℃	LV	14.60	6.04	0.00777	0.00321	PASS
	HV	8.21	13.74	0.00437	0.00731	PASS

5.6 Spurious Emissions at Antenna Terminals

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 measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 9kHz to the 10th harmonic of the carrier. The peak detector is used.

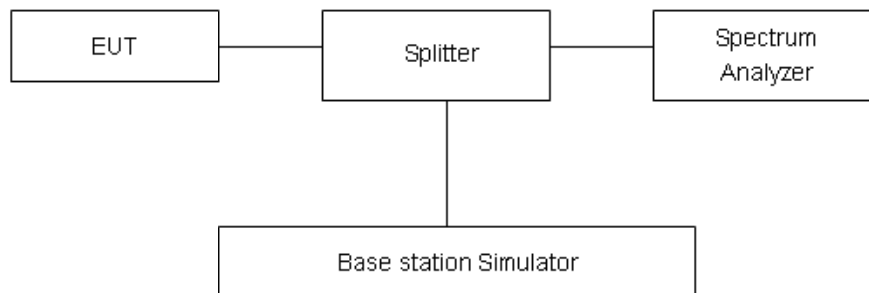
RBW is set to 100kHz, VBW is set to 300kHz for 30MHz~1GHz

RBW is set to 1MHz, VBW is set to 3MHz for above 1GHz, Sweep is set to ATUO.

Of those disturbances below (limit – 20 dB), the mark is not required for the EUT.

The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup



Limits

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's frequency 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 measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

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.

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;

Part 27.53(h)/(g) Limit		-13 dBm
Part 27.53(f) Limit	Limit out of the band 1559-1610 MHz	-13 dBm
	Limit in the band 1559-1610 MHz	-40 dBm

Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

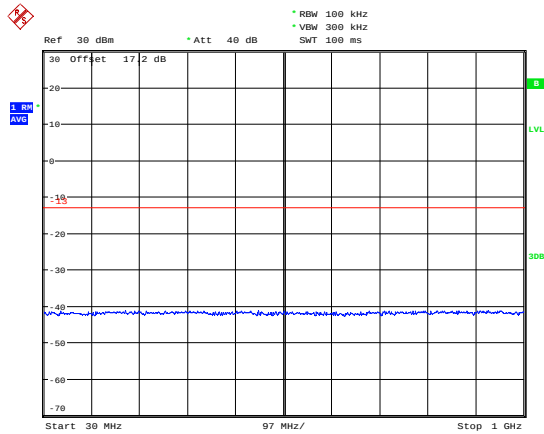
Frequency	Uncertainty
30MHz-1GHz	0.684 dB
1GHz-20GHz	1.407 dB

Test Result

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

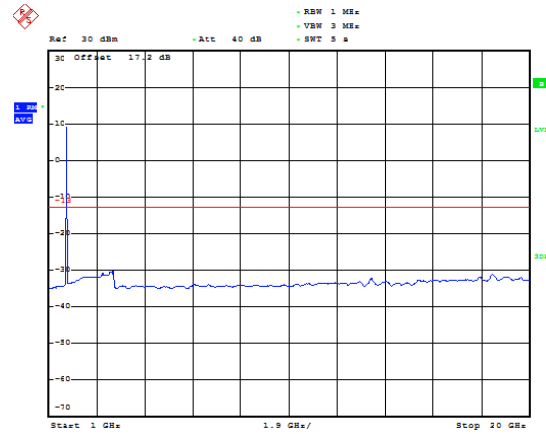
The signal beyond the limit is carrier.

NB-IOT Band 4 CH-Low 30MHz~1GHz



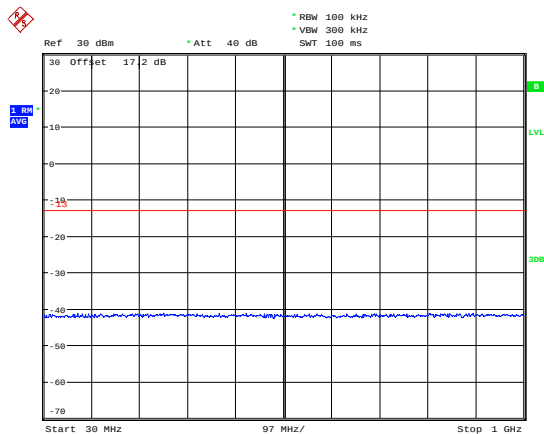
Date: 14.MAY.2020 16:51:53

NB-IOT Band 4 CH-Low 1GHz ~20GHz



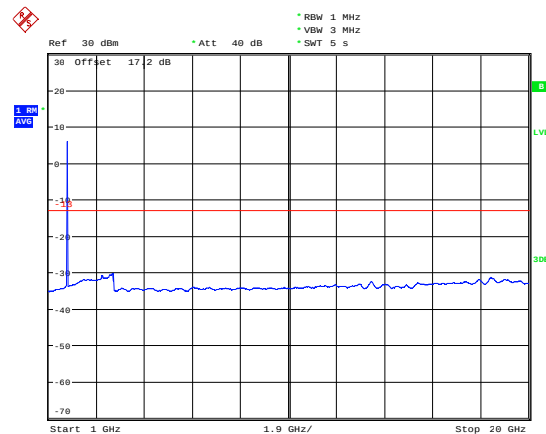
Date: 14.MAY.2020 16:53:19

NB-IOT Band 4 CH-Middle 30MHz~1GHz



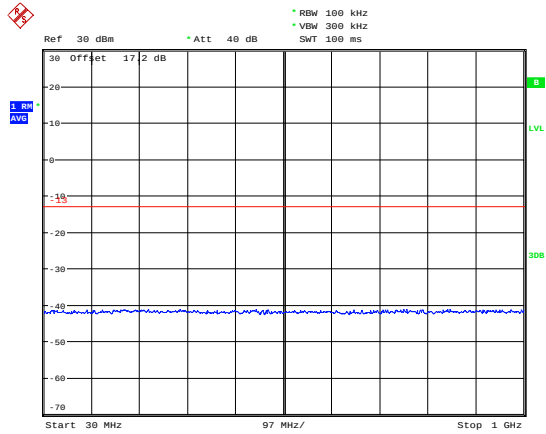
Date: 14.MAY.2020 18:09:12

NB-IOT Band 4 CH-Middle 1GHz ~20GHz



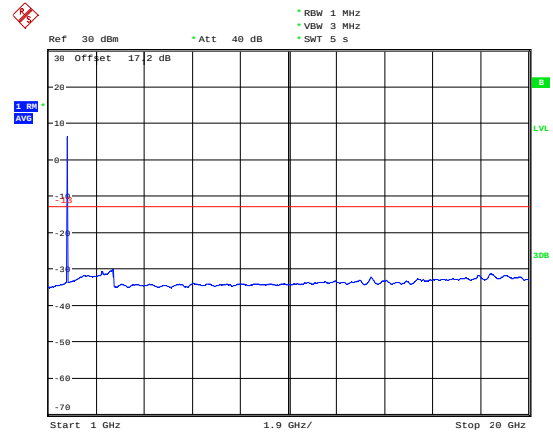
Date: 14.MAY.2020 16:54:07

NB-IOT Band 4 CH-High 30MHz~1GHz



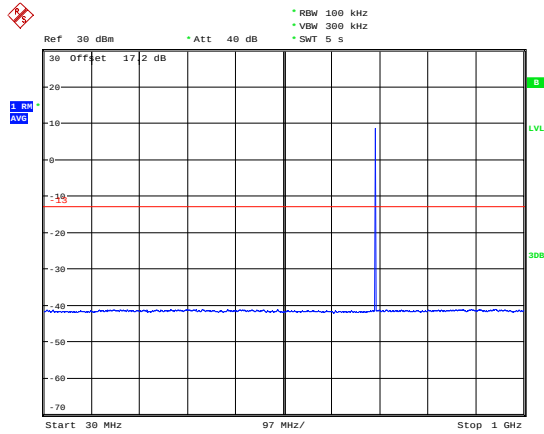
Date: 14.MAY.2020 16:52:13

NB-IOT Band 4 CH-High 1GHz ~20GHz



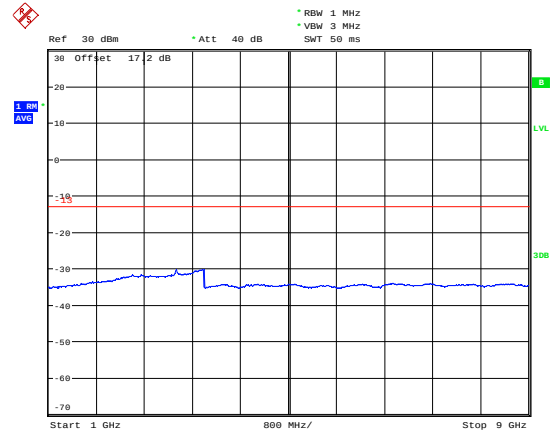
Date: 14.MAY.2020 16:55:19

NB-IOT Band 12 CH-Low 30MHz~1GHz



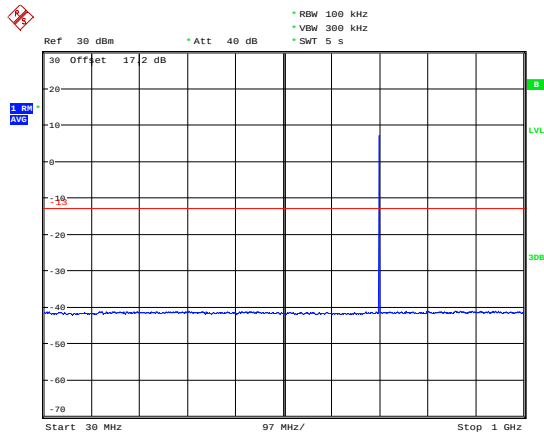
Date: 14.MAY.2020 17:17:50

NB-IOT Band 12 CH-Low 1GHz ~9GHz



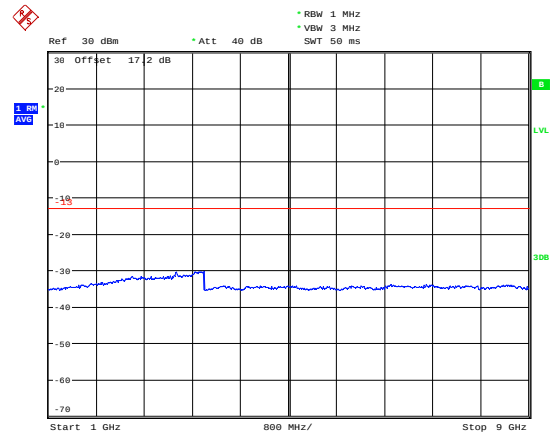
Date: 14.MAY.2020 17:20:42

NB-IOT Band 12 CH-Middle 30MHz~1GHz



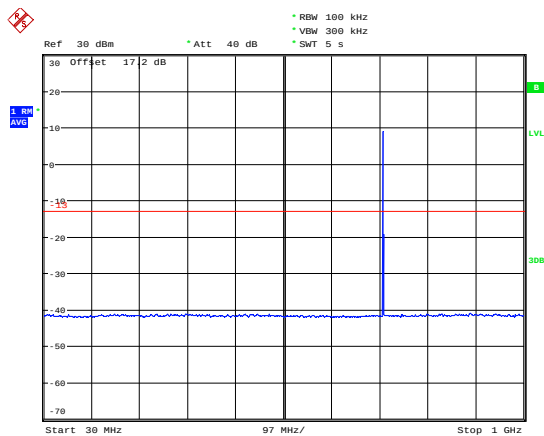
Date: 14.MAY.2020 17:19:08

NB-IOT Band 12 CH-Middle 1GHz ~9GHz



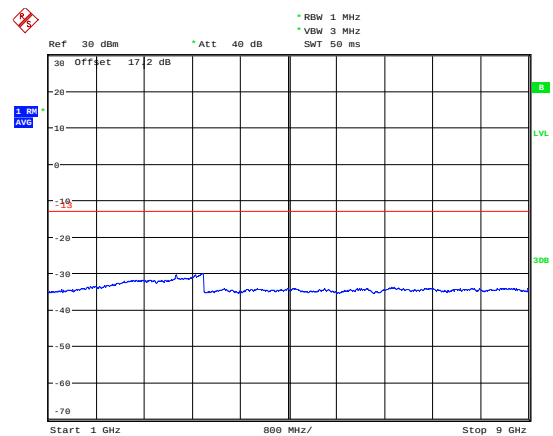
Date: 14.MAY.2020 17:20:50

NB-IOT Band 12 CH-High 30MHz~1GHz



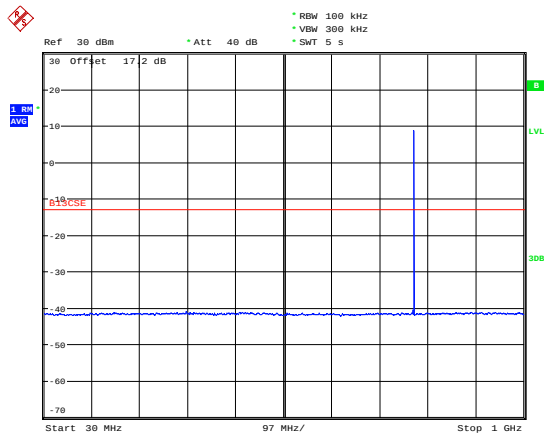
Date: 14.MAY.2020 17:20:12

NB-IOT Band 12 CH-High 1GHz ~9GHz



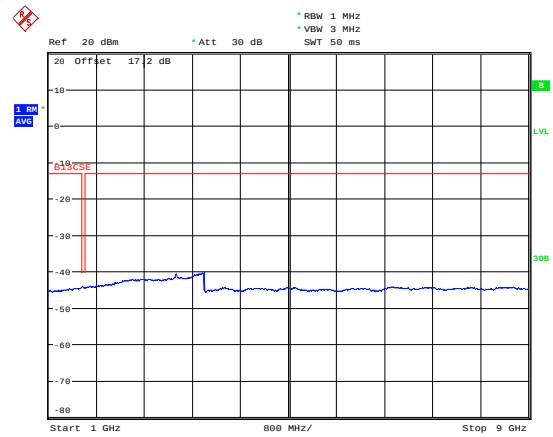
Date: 14.MAY.2020 17:20:59

NB-IOT Band 13 CH-Low 30MHz~1GHz



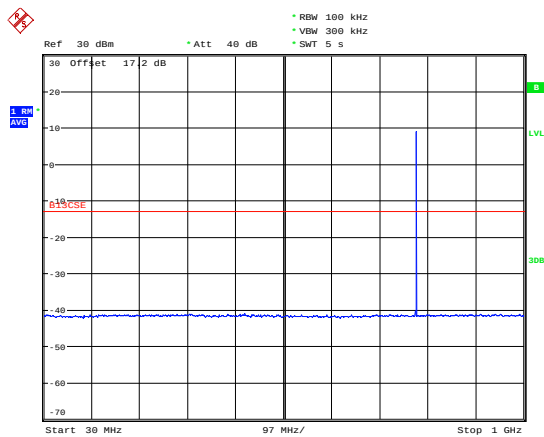
Date: 14.MAY.2020 17:24:21

NB-IOT Band 13 CH-Low 1GHz ~9GHz



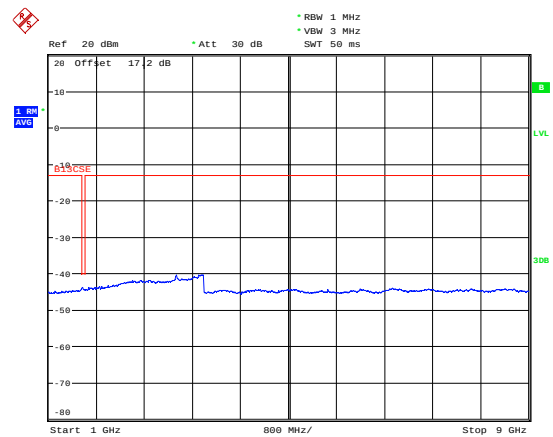
Date: 14.MAY.2020 17:28:09

NB-IOT Band 13 CH-Middle 30MHz~1GHz



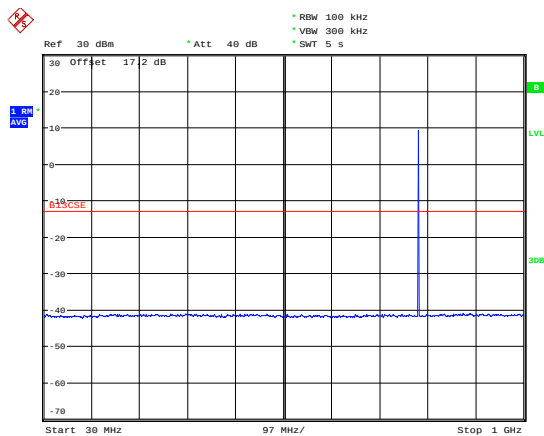
Date: 14.MAY.2020 17:26:06

NB-IOT Band 13 CH-Middle 1GHz ~9GHz



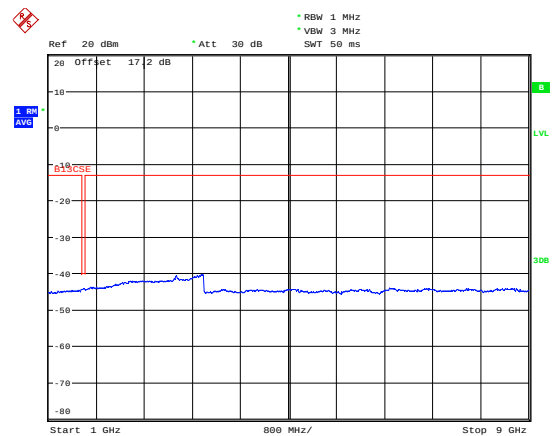
Date: 14.MAY.2020 17:28:17

NB-IOT Band 13 CH-High 30MHz~1GHz



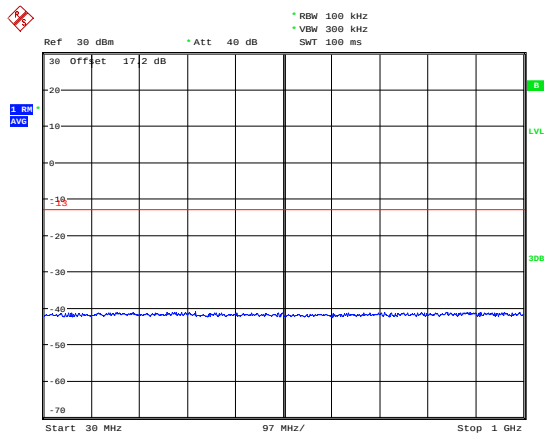
Date: 14.MAY.2020 17:27:17

NB-IOT Band 13 CH-High 1GHz ~9GHz



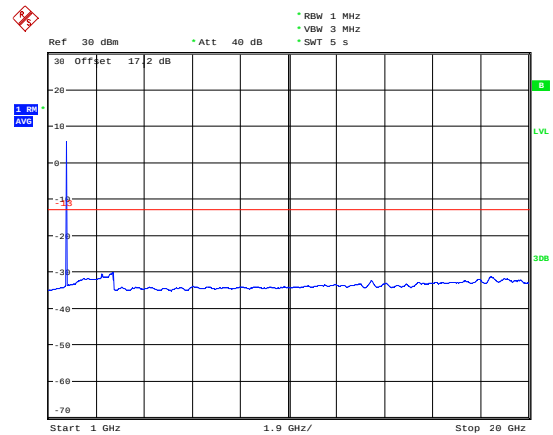
Date: 14.MAY.2020 17:28:24

NB-IOT Band 66 CH-Low 30MHz~1GHz



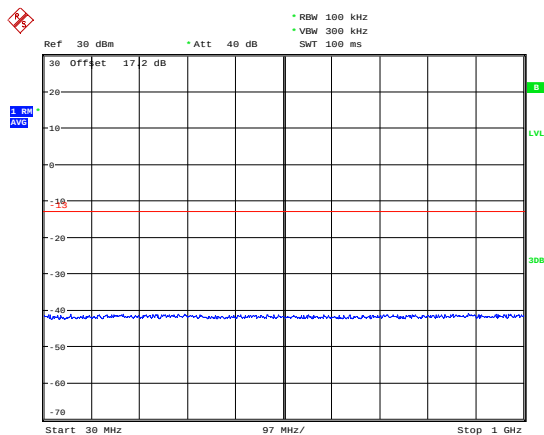
Date: 14.MAY.2020 17:36:52

NB-IOT Band 66 CH-Low 1GHz ~20GHz



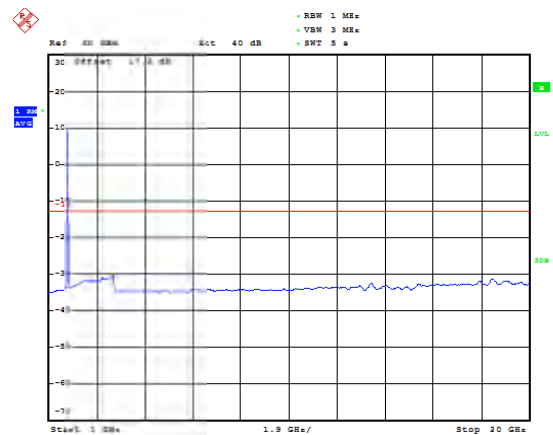
Date: 14.MAY.2020 17:38:13

NB-IOT Band 66 CH-Middle 30MHz~1GHz



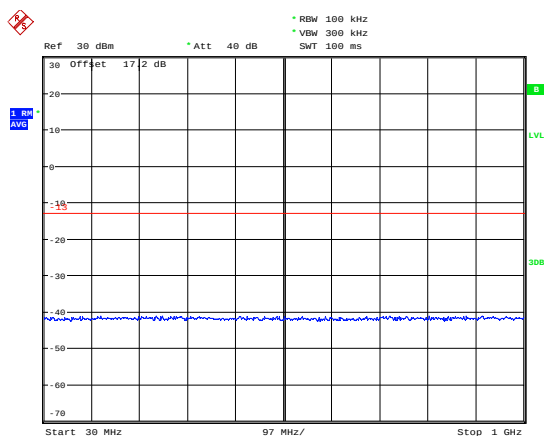
Date: 14.MAY.2020 17:37:02

NB-IOT Band 66 CH-Middle 1GHz ~20GHz



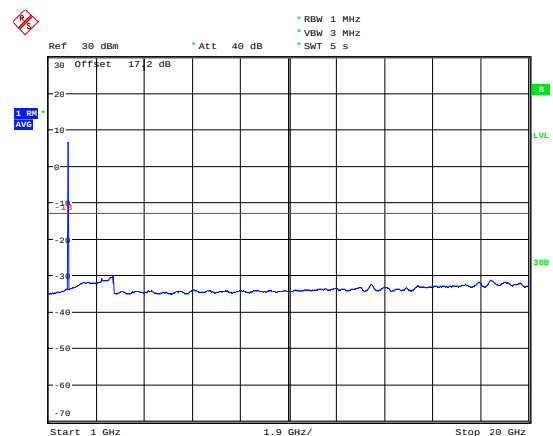
Date: 14.MAY.2020 17:40:19

NB-IOT Band 66 CH-High 30MHz~1GHz



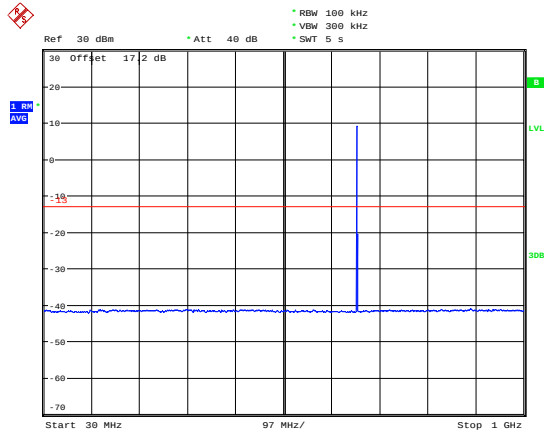
Date: 14.MAY.2020 17:37:10

NB-IOT Band 66 CH-High 1GHz ~20GHz



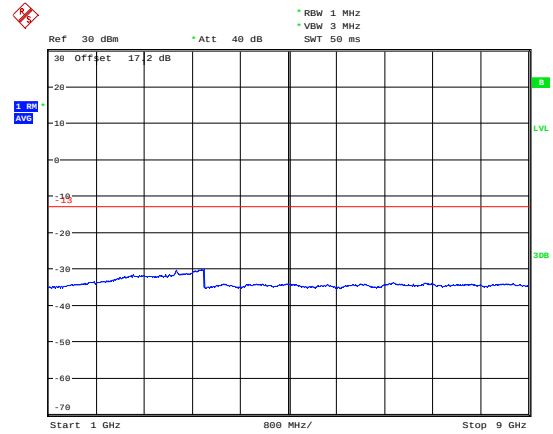
Date: 14.MAY.2020 17:42:42

NB-IOT Band 71 CH-Low 30MHz~1GHz



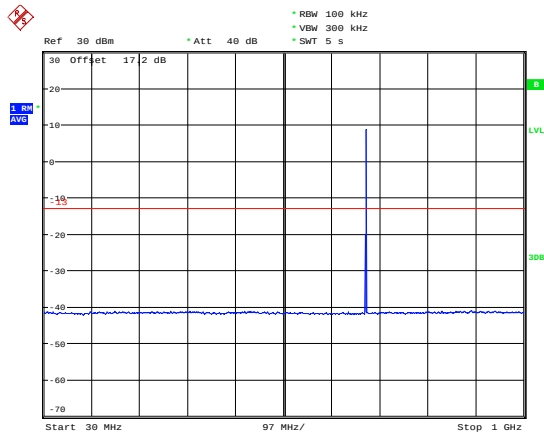
Date: 14.MAY.2020 17:50:34

NB-IOT Band 71 CH-Low 1GHz ~9GHz



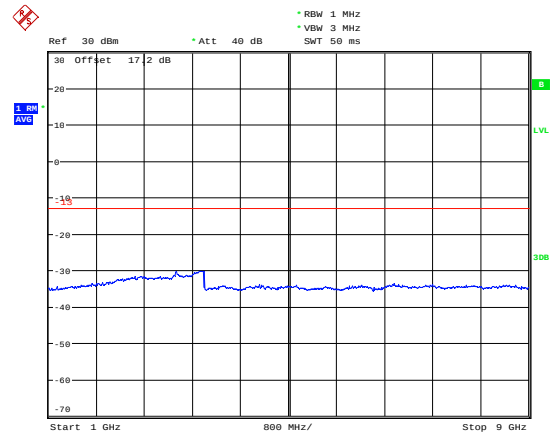
Date: 14.MAY.2020 17:59:10

NB-IOT Band 71 CH-Middle 30MHz~1GHz



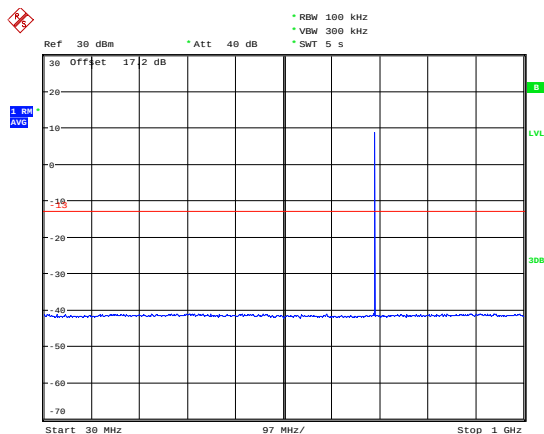
Date: 14.MAY.2020 17:51:45

NB-IOT Band 71 CH-Middle 1GHz ~9GHz



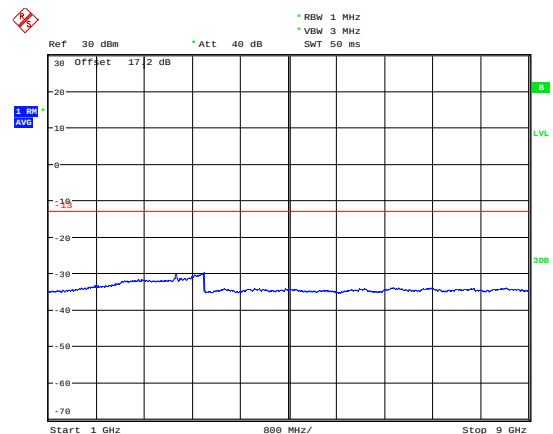
Date: 14.MAY.2020 17:59:23

NB-IOT Band 71 CH-High 30MHz~1GHz



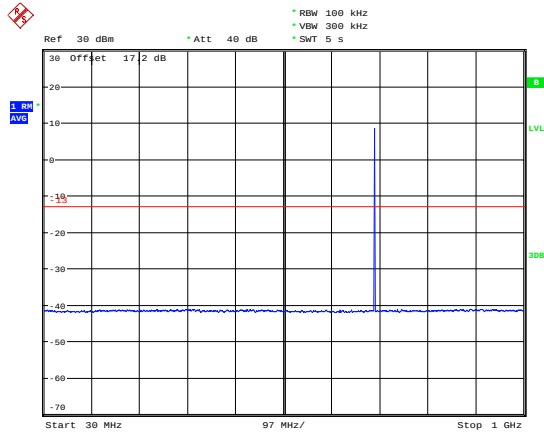
Date: 14.MAY.2020 17:58:41

NB-IOT Band 71 CH-High 1GHz ~9GHz



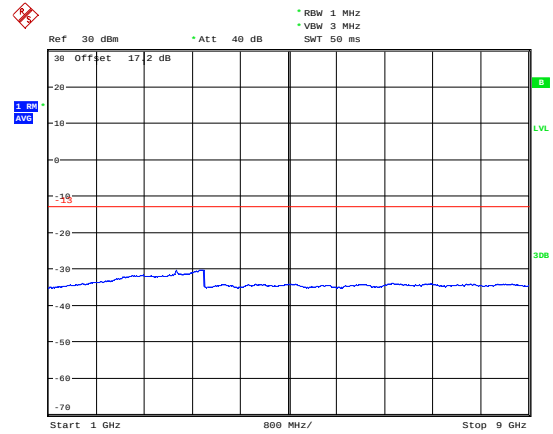
Date: 14.MAY.2020 17:59:32

NB-IOT Band 85 CH-Low 30MHz~1GHz



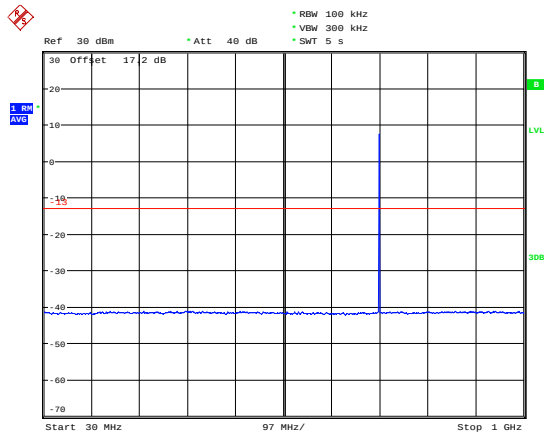
Date: 14.MAY.2020 18:03:13

NB-IOT Band 85 CH-Low 1GHz ~9GHz



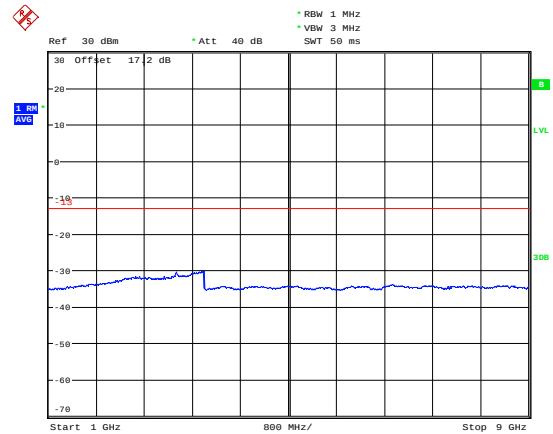
Date: 14.MAY.2020 18:07:08

NB-IOT Band 85 CH-Middle 30MHz~1GHz



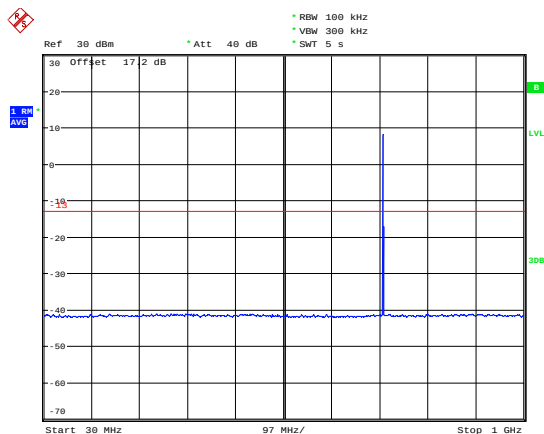
Date: 14.MAY.2020 18:05:36

NB-IOT Band 85 CH-Middle 1GHz ~9GHz



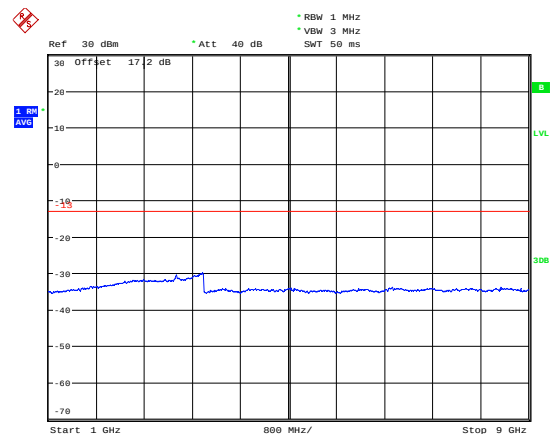
Date: 14.MAY.2020 18:07:17

NB-IOT Band 85 CH-High 30MHz~1GHz



Date: 14.MAY.2020 18:06:33

NB-IOT Band 85 CH-High 1GHz ~9GHz



Date: 14.MAY.2020 18:07:26

5.7 Radiates Spurious Emission

Ambient condition

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

Method of Measurement

1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI C63.26 (2015).
2. Below 1GHz: The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H). Above 1GHz: (Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.) The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).
3. A loop antenna, A log-periodic antenna or horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
4. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=200Hz,VBW=600Hz for 9kHz150kHz , RBW=10kHz, VBW=30kHz 150kHz-30MHz ,RBW=100kHz,VBW=300kHz for 30MHz to 1GHz and RBW=1MHz, VBW=3MHz for above 1GHz And the maximum value of the receiver should be recorded as (Pr).
5. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
6. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
7. The measurement results are obtained as described below:

$$\text{Power(EIRP)} = \text{PMea} - \text{PAg} - \text{Pcl} + \text{Ga}$$
 The measurement results are amend as described below:

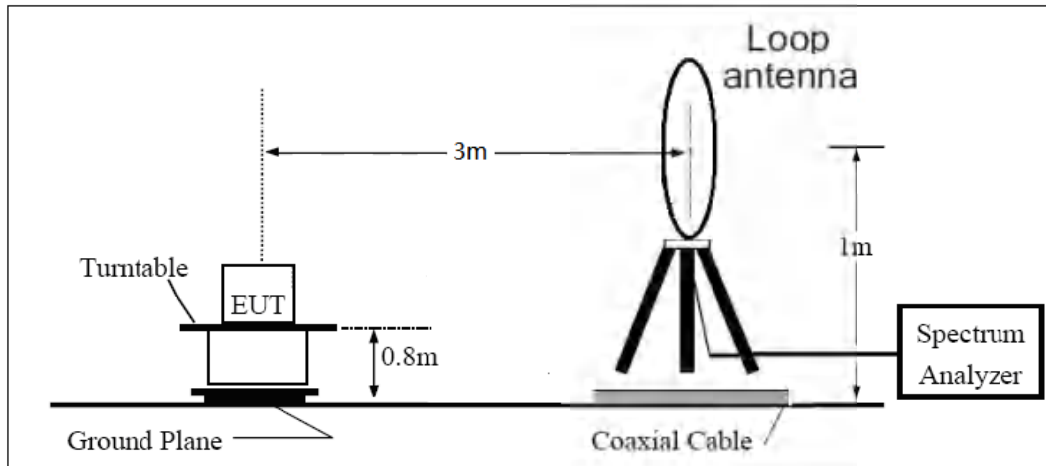
$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$$
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP

= EIRP-2.15dBi.

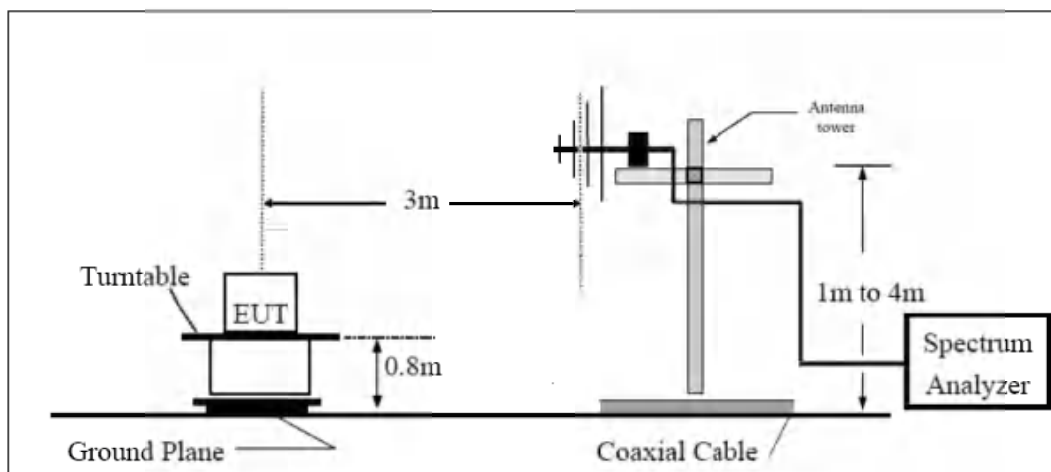
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

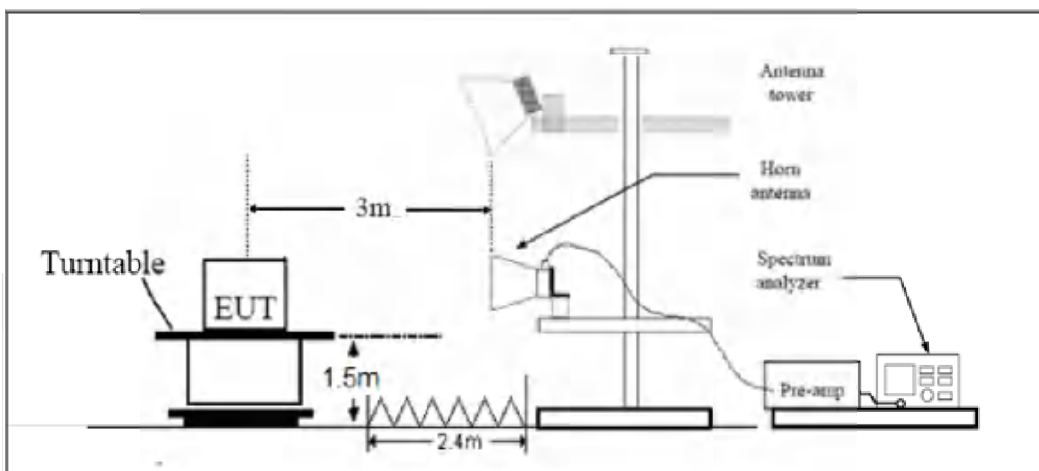
9KHz ~ 30MHz



30MHz ~ 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

Limits

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's frequency 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 measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

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.

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;

Part 27.53 (h)/(g) Limit		-13 dBm
Part 27.53(f) Limit	Limit out of the band 1559-1610 MHz	-13 dBm
	Limit in the band 1559-1610 MHz	-40 dBm



Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = \pm 1.96$, $U = \pm 3.55$ dB.

Test Result

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions below the noise floor will not be recorded in the report.

NB-IOT Band 4 15kHz QPSK CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3420.0	-56.88	2.6	10.15	Horizontal	-49.33	-13.00	36.33	270
3	5130.0	-63.15	2.4	11.35	Horizontal	-54.20	-13.00	41.20	270
4	6840.0	-57.93	4.5	10.85	Horizontal	-51.58	-13.00	38.58	45
5	8550.0	-56.62	5.1	11.35	Horizontal	-50.37	-13.00	37.37	90
6	10260.0	-53.17	5.3	11.95	Horizontal	-46.52	-13.00	33.52	315
7	11970.0	-52.85	5.5	13.55	Horizontal	-44.80	-13.00	31.80	135
8	13680.0	-49.80	6.3	13.75	Horizontal	-42.35	-13.00	29.35	270
9	15390.0	-54.41	6.7	13.85	Horizontal	-47.26	-13.00	34.26	0
10	17100.0	-50.94	6.8	14.25	Horizontal	-43.49	-13.00	30.49	0

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

NB-IOT Band 4 15kHz QPSK CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3465.0	-56.32	2.6	10.75	Horizontal	-48.17	-13.00	35.17	90
3	5197.5	-63.19	2.4	11.05	Horizontal	-54.54	-13.00	41.54	315
4	6930.0	-57.96	4.5	11.15	Horizontal	-51.31	-13.00	38.31	135
5	8662.5	-55.23	5.1	11.35	Horizontal	-48.98	-13.00	35.98	0
6	10395.0	-53.07	5.3	11.95	Horizontal	-46.42	-13.00	33.42	45
7	12127.5	-53.06	5.5	13.55	Horizontal	-45.01	-13.00	32.01	45
8	13860.0	-51.49	6.3	13.75	Horizontal	-44.04	-13.00	31.04	270
9	15592.5	-53.93	6.7	13.85	Horizontal	-46.78	-13.00	33.78	90
10	17325.0	-50.72	6.8	14.25	Horizontal	-43.27	-13.00	30.27	315

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

NB-IOT Band 4 15kHz QPSK CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3509.8	-57.96	2.6	10.15	Horizontal	-50.41	-13.00	37.41	180
3	5264.7	-63.96	2.4	11.05	Horizontal	-55.31	-13.00	42.31	135
4	7019.6	-58.05	4.5	11.15	Horizontal	-51.40	-13.00	38.40	0
5	8774.5	-56.21	5.1	11.35	Horizontal	-49.96	-13.00	36.96	270
6	10529.4	-51.14	5.3	11.95	Horizontal	-44.49	-13.00	31.49	45
7	12284.3	-53.68	5.5	13.55	Horizontal	-45.63	-13.00	32.63	315
8	14039.2	-50.85	6.3	13.75	Horizontal	-43.40	-13.00	30.40	45
9	15794.1	-53.88	6.7	13.85	Horizontal	-46.73	-13.00	33.73	90
10	17549.0	-51.18	6.8	14.25	Horizontal	-43.73	-13.00	30.73	0
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2. The worst emission was found in the antenna is Horizontal position.									

NB-IOT Band 12 15kHz QPSK CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1398.2	-59.75	2.00	10.15	Horizontal	-53.75	-13.00	40.75	45
3	2097.3	-52.31	2.50	11.35	Horizontal	-45.61	-13.00	32.61	45
4	2796.4	-56.63	4.20	10.85	Horizontal	-52.13	-13.00	39.13	180
5	3495.5	-61.05	5.20	11.35	Horizontal	-57.05	-13.00	44.05	270
6	4194.6	-60.25	5.50	11.95	Horizontal	-55.95	-13.00	42.95	45
7	4893.7	-61.65	5.70	13.55	Horizontal	-55.95	-13.00	42.95	0
8	5592.8	-60.16	6.30	13.75	Horizontal	-54.86	-13.00	41.86	180
9	6291.9	-57.82	6.80	13.85	Horizontal	-52.92	-13.00	39.92	135
10	6991.0	-56.35	6.90	14.25	Horizontal	-51.15	-13.00	38.15	45
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2. The worst emission was found in the antenna is Horizontal position.									

NB-IOT Band 12 15kHz QPSK CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1410.2	-62.79	2.00	10.75	Horizontal	-56.19	-13.00	43.19	0
3	2115.3	-57.31	2.51	11.05	Horizontal	-50.92	-13.00	37.92	270
4	2820.4	-57.26	4.20	11.15	Horizontal	-52.46	-13.00	39.46	90
5	3525.5	-61.13	5.20	11.15	Horizontal	-57.33	-13.00	44.33	0
6	4230.6	-60.43	5.50	11.95	Horizontal	-56.13	-13.00	43.13	270
7	4935.7	-60.57	5.70	13.55	Horizontal	-54.87	-13.00	41.87	225
8	5640.8	-59.40	6.30	13.75	Horizontal	-54.10	-13.00	41.10	45
9	6345.9	-57.43	6.80	13.85	Horizontal	-52.53	-13.00	39.53	90
10	7051.0	-54.85	6.90	14.25	Horizontal	-49.65	-13.00	36.65	0

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

NB-IOT Band 12 15kHz QPSK CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1431.8	-61.71	2.00	10.15	Horizontal	-55.71	-13.00	42.71	315
3	2147.7	-57.91	2.51	11.05	Horizontal	-51.52	-13.00	38.52	0
4	2863.6	-58.17	4.20	11.15	Horizontal	-53.37	-13.00	40.37	180
5	3579.5	-60.98	5.20	11.15	Horizontal	-57.18	-13.00	44.18	180
6	4295.4	-61.51	5.50	11.95	Horizontal	-57.21	-13.00	44.21	315
7	5011.3	-60.87	5.70	13.55	Horizontal	-55.17	-13.00	42.17	90
8	5727.2	-59.85	6.30	13.75	Horizontal	-54.55	-13.00	41.55	135
9	6443.1	-58.13	6.80	13.85	Horizontal	-53.23	-13.00	40.23	225
10	7159.0	-54.90	6.90	14.25	Horizontal	-49.70	-13.00	36.70	270

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

NB-IOT Band 13 15kHz QPSK CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1554.2	-60.16	2.00	10.15	Horizontal	-54.16	-13.00	41.16	90
3	2331.3	-55.18	2.50	11.35	Horizontal	-48.48	-13.00	35.48	225
4	3108.4	-56.72	4.20	10.85	Horizontal	-52.22	-13.00	39.22	135
5	3885.5	-61.14	5.20	11.35	Horizontal	-57.14	-13.00	44.14	225
6	4662.6	-61.04	5.50	11.95	Horizontal	-56.74	-13.00	43.74	90
7	5439.7	-61.86	5.70	13.55	Horizontal	-56.16	-13.00	43.16	315
8	6216.8	-60.19	6.30	13.75	Horizontal	-54.89	-13.00	41.89	180
9	6993.9	-57.12	6.80	13.85	Horizontal	-52.22	-13.00	39.22	45
10	7771.0	-55.78	6.90	14.25	Horizontal	-50.58	-13.00	37.58	270

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is Horizontal position.

NB-IOT Band 13 15kHz QPSK CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1564.0	-63.56	2.00	10.75	Horizontal	-54.81	-40.00	14.81	270
Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
3	2346.0	-54.92	2.51	11.05	Horizontal	-48.53	-13.00	35.53	315
4	3128.0	-56.78	4.20	11.15	Horizontal	-51.98	-13.00	38.98	45
5	3910.0	-57.85	5.20	11.15	Horizontal	-54.05	-13.00	41.05	90
6	4692.0	-60.57	5.50	11.95	Horizontal	-56.27	-13.00	43.27	315
7	5474.0	-61.17	5.70	13.55	Horizontal	-55.47	-13.00	42.47	180
8	6256.0	-60.10	6.30	13.75	Horizontal	-54.80	-13.00	41.80	225
9	7038.0	-55.47	6.80	13.85	Horizontal	-50.57	-13.00	37.57	135
10	7820.0	-56.36	6.90	14.25	Horizontal	-51.16	-13.00	38.16	270

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is Horizontal position.

NB-IOT Band 13 15kHz QPSK CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1573.8	-62.95	2.00	10.15	Horizontal	-54.80	-40.00	14.80	180
Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
3	2360.7	-55.02	2.51	11.05	Horizontal	-48.63	-13.00	35.63	45
4	3147.6	-57.26	4.20	11.15	Horizontal	-52.46	-13.00	39.46	315
5	3934.5	-57.35	5.20	11.15	Horizontal	-53.55	-13.00	40.55	45
6	4721.4	-60.31	5.50	11.95	Horizontal	-56.01	-13.00	43.01	180
7	5508.3	-61.47	5.70	13.55	Horizontal	-55.77	-13.00	42.77	255
8	6295.2	-59.98	6.30	13.75	Horizontal	-54.68	-13.00	41.68	90
9	7082.1	-55.49	6.80	13.85	Horizontal	-50.59	-13.00	37.59	135
10	7869.0	-55.02	6.90	14.25	Horizontal	-49.82	-13.00	36.82	270

Note: 1. The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

NB-IOT Band 66 15kHz QPSK CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3420.2	-57.04	2.6	10.15	Horizontal	-49.49	-13.00	36.49	0
3	5130.3	-64.32	2.4	11.35	Horizontal	-55.37	-13.00	42.37	270
4	6840.4	-58.83	4.5	10.85	Horizontal	-52.48	-13.00	39.48	225
5	8550.5	-56.54	5.1	11.35	Horizontal	-50.29	-13.00	37.29	90
6	10260.6	-53.57	5.3	11.95	Horizontal	-46.92	-13.00	33.92	270
7	11970.7	-53.91	5.5	13.55	Horizontal	-45.86	-13.00	32.86	315
8	13680.8	-53.17	6.3	13.75	Horizontal	-45.72	-13.00	32.72	45
9	15390.9	-54.41	6.7	13.85	Horizontal	-47.26	-13.00	34.26	135
10	17101.0	-52.40	6.8	14.25	Horizontal	-44.95	-13.00	31.95	270

Note: 1. The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

NB-IOT Band 66 15kHz QPSK CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3490.0	-57.63	2.6	10.75	Horizontal	-49.48	-13.00	36.48	0
3	5235.0	-64.59	2.4	11.05	Horizontal	-55.94	-13.00	42.94	180
4	6980.0	-58.50	4.5	11.15	Horizontal	-51.85	-13.00	38.85	0
5	8725.0	-56.64	5.1	11.35	Horizontal	-50.39	-13.00	37.39	225
6	10470.0	-54.77	5.3	11.95	Horizontal	-48.12	-13.00	35.12	180
7	12215.0	-54.72	5.5	13.55	Horizontal	-46.67	-13.00	33.67	90
8	13960.0	-52.28	6.3	13.75	Horizontal	-44.83	-13.00	31.83	315
9	15705.0	-55.50	6.7	13.85	Horizontal	-48.35	-13.00	35.35	45
10	17450.0	-52.86	6.8	14.25	Horizontal	-45.41	-13.00	32.41	135

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is Horizontal position.

NB-IOT Band 66 15kHz QPSK CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3559.8	-62.44	2.6	10.15	Horizontal	-54.89	-13.00	41.89	270
3	5339.7	-65.52	2.4	11.05	Horizontal	-56.87	-13.00	43.87	225
4	7119.6	-57.85	4.5	11.15	Horizontal	-51.20	-13.00	38.20	45
5	8899.5	-55.83	5.1	11.35	Horizontal	-49.58	-13.00	36.58	180
6	10679.4	-53.00	5.3	11.95	Horizontal	-46.35	-13.00	33.35	90
7	12459.3	-53.96	5.5	13.55	Horizontal	-45.91	-13.00	32.91	315
8	14239.2	-50.65	6.3	13.75	Horizontal	-43.20	-13.00	30.20	180
9	16019.1	-54.73	6.7	13.85	Horizontal	-47.58	-13.00	34.58	0
10	17799.0	-52.52	6.8	14.25	Horizontal	-45.07	-13.00	32.07	135

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is Horizontal position.

NB-IOT Band 71 15kHz QPSK CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1326.2	-56.15	2.6	10.15	Horizontal	-50.75	-13.00	37.75	225
3	1989.3	-40.30	2.4	11.35	Horizontal	-33.50	-13.00	20.50	180
4	2652.4	-52.66	4.5	10.85	Horizontal	-48.46	-13.00	35.46	315
5	3315.5	-57.26	5.1	11.35	Horizontal	-53.16	-13.00	40.16	90
6	3978.6	-62.03	5.3	11.95	Horizontal	-57.53	-13.00	44.53	180
7	4641.7	-62.95	5.5	13.55	Horizontal	-57.05	-13.00	44.05	225
8	5304.8	-62.06	6.3	13.75	Horizontal	-56.76	-13.00	43.76	0
9	5967.9	-61.36	6.7	13.85	Horizontal	-56.36	-13.00	43.36	315
10	6631.0	-58.61	6.8	14.25	Horizontal	-53.31	-13.00	40.31	45
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2. The worst emission was found in the antenna is Horizontal position.									

NB-IOT Band 71 15kHz QPSK CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1361.0	-54.85	2.6	10.75	Horizontal	-48.85	-13.00	35.85	90
3	2041.5	-43.10	2.4	11.05	Horizontal	-36.60	-13.00	23.60	135
4	2722.0	-50.45	4.5	11.15	Horizontal	-45.95	-13.00	32.95	0
5	3402.5	-62.90	5.1	11.35	Horizontal	-58.80	-13.00	45.80	315
6	4083.0	-62.04	5.3	11.95	Horizontal	-57.54	-13.00	44.54	90
7	4763.5	-61.71	5.5	13.55	Horizontal	-55.81	-13.00	42.81	0
8	5444.0	-61.78	6.3	13.75	Horizontal	-56.48	-13.00	43.48	225
9	6124.5	-59.69	6.7	13.85	Horizontal	-54.69	-13.00	41.69	180
10	6805.0	-57.78	6.8	14.25	Horizontal	-52.48	-13.00	39.48	45
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2. The worst emission was found in the antenna is Horizontal position.									

NB-IOT Band 71 15kHz QPSK CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1359.8	-55.30	2.6	10.15	Horizontal	-49.90	-13.00	36.90	315
3	2039.7	-51.85	2.4	11.05	Horizontal	-45.35	-13.00	32.35	225
4	2719.6	-56.56	4.5	11.15	Horizontal	-52.06	-13.00	39.06	135
5	3399.5	-63.97	5.1	11.35	Horizontal	-59.87	-13.00	46.87	315
6	4079.4	-61.53	5.3	11.95	Horizontal	-57.03	-13.00	44.03	0
7	4759.3	-62.61	5.5	13.55	Horizontal	-56.71	-13.00	43.71	225
8	5439.2	-61.25	6.3	13.75	Horizontal	-55.95	-13.00	42.95	90
9	6119.1	-60.52	6.7	13.85	Horizontal	-55.52	-13.00	42.52	315
10	6799.0	-58.89	6.8	14.25	Horizontal	-53.59	-13.00	40.59	225

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is Horizontal position.

NB-IOT Band 85 15kHz QPSK CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1396.2	-53.95	2.6	10.15	Horizontal	-48.55	-13.00	35.55	180
3	2094.3	-52.51	2.4	11.35	Horizontal	-45.71	-13.00	32.71	225
4	2792.4	-55.61	4.5	10.85	Horizontal	-51.41	-13.00	38.41	45
5	3490.5	-62.38	5.1	11.35	Horizontal	-58.28	-13.00	45.28	180
6	4188.6	-61.41	5.3	11.95	Horizontal	-56.91	-13.00	43.91	45
7	4886.7	-61.63	5.5	13.55	Horizontal	-55.73	-13.00	42.73	315
8	5584.8	-60.72	6.3	13.75	Horizontal	-55.42	-13.00	42.42	90
9	6282.9	-59.95	6.7	13.85	Horizontal	-54.95	-13.00	41.95	225
10	6981.0	-57.19	6.8	14.25	Horizontal	-51.89	-13.00	38.89	180

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is Horizontal position.

NB-IOT Band 85 15kHz QPSK CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1411.8	-58.75	2.6	10.75	Horizontal	-52.75	-13.00	39.75	315
3	2117.7	-56.23	2.4	11.05	Horizontal	-49.73	-13.00	36.73	90
4	2823.6	-56.87	4.5	11.15	Horizontal	-52.37	-13.00	39.37	270
5	3529.5	-62.02	5.1	11.35	Horizontal	-57.92	-13.00	44.92	315
6	4235.4	-61.15	5.3	11.95	Horizontal	-56.65	-13.00	43.65	225
7	4941.3	-62.46	5.5	13.55	Horizontal	-56.56	-13.00	43.56	0
8	5647.2	-61.44	6.3	13.75	Horizontal	-56.14	-13.00	43.14	180
9	6353.1	-59.78	6.7	13.85	Horizontal	-54.78	-13.00	41.78	135
10	7059.0	-56.11	6.8	14.25	Horizontal	-50.81	-13.00	37.81	270
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2. The worst emission was found in the antenna is Horizontal position.									

NB-IOT Band 85 15kHz QPSK CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1431.8	-58.46	2.6	10.15	Horizontal	-53.06	-13.00	40.06	180
3	2147.7	-57.40	2.4	11.05	Horizontal	-50.90	-13.00	37.90	45
4	2863.6	-57.63	4.5	11.15	Horizontal	-53.13	-13.00	40.13	315
5	3579.5	-61.99	5.1	11.35	Horizontal	-57.89	-13.00	44.89	90
6	4295.4	-60.98	5.3	11.95	Horizontal	-56.48	-13.00	43.48	315
7	5011.3	-61.07	5.5	13.55	Horizontal	-55.17	-13.00	42.17	270
8	5727.2	-61.08	6.3	13.75	Horizontal	-55.78	-13.00	42.78	45
9	6443.1	-58.79	6.7	13.85	Horizontal	-53.79	-13.00	40.79	180
10	7159.0	-56.31	6.8	14.25	Horizontal	-51.01	-13.00	38.01	270
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2. The worst emission was found in the antenna is Horizontal position.									

6 Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Base Station Simulator	R&S	CMW500	113824	2019-05-19	2020-05-18
Base Station Simulator	R&S	CMW500	113824	2020-05-18	2021-05-17
Power Splitter	Hua Xiang	SHX-GF2-2-13	10120101	/	/
Spectrum Analyzer	Key sight	N9010A	MY50210259	2019-12-15	2020-12-14
Signal Analyzer	R&S	FSV30	100815	2019-12-15	2020-12-14
Loop Antenna	SCHWARZBECK	FMZB1519	1519-047	2017-09-26	2020-09-25
Trilog Antenna	SCHWARZBECK	VUBL 9163	9163-201	2017-11-18	2020-11-17
Horn Antenna	R&S	HF907	100126	2018-07-07	2020-07-06
Horn Antenna	ETS-Lindgren	3160-09	00102643	2018-06-20	2020-06-19
Signal generator	R&S	SMB 100A	102594	2019-05-19	2020-05-18
Signal generator	R&S	SMB 100A	102594	2020-05-18	2021-05-17
Climatic Chamber	ESPEC	SU-242	93000506	2017-12-17	2020-12-16
Preamplifier	R&S	SCU18	102327	2019-05-19	2020-05-18
Preamplifier	R&S	SCU18	102327	2020-05-18	2021-05-17
MOB COMMS DC SUPPLY	Keysight	66319D	MY43004105	2019-05-19	2020-05-18
MOB COMMS DC SUPPLY	Keysight	66319D	MY43004105	2020-05-18	2021-05-17
RF Cable	Agilent	SMA 15cm	0001	2019-12-13	2020-06-12
Software	R&S	EMC32	9.26.0	/	/

*****END OF REPORT *****