RF TEST REPORT

Applicant	Sichuan AI-Link Technology Co.,Ltd.
FCC ID	2AOKI-AI-NB25
Product	NB-IOT Module
Brand	AI-LINK
Model	AI-NB25
Report No.	R1902A0057-R2
Issue Date	March 20, 2019

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2018)/ FCC CFR47 Part 27C (2018)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Peng Tao	Kai Xu
Performed by: Peng Tao	*Approved by: Kai Xu*

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Summary of Measurement Results

Number	Test Case	Clause in FCC rules	Verdict
1	RF power output	2.1046	PASS
2	Effective Isotropic Radiated power	27.50(d)(4)/27.50(c)(10)	PASS
3	Occupied Bandwidth	2.1049	PASS
4	Band Edge Compliance	27.53(h) /27.53(g)	PASS
5	Peak-to-Average Power Ratio	27.50(d)/KDB971168 D01(5.7)	PASS
6	Frequency Stability	2.1055 / 27.54	PASS
7	Spurious Emissions at Antenna Terminals	2.1051 /27.53(h)/27.53(g)	PASS
8	Radiates Spurious Emission	2.1053 /27.53(h) /27.53(g)	PASS
Date of Testing: February 14, 2019 ~ March 11, 2019			
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.			

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

CNAS (accreditation number: L2264)

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

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.

IC (recognition number is 8510A)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

VCCI (recognition number is C-4595, T-2154, R-4113, G-10766)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

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.
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City:	Shanghai
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2 General Description of Equipment under Test

Client Information

Applicant	Sichuan AI-Link Technology Co.,Ltd.
Applicant address	Anzhou,Industrial park,Mianyang,Sichuan China
Manufacturer	Sichuan AI-Link Technology Co.,Ltd.
Manufacturer address	Anzhou,Industrial park,Mianyang,Sichuan China

General information

EUT Description			
Model	AI-NB25		
IMEI	864647040001425		
Hardware Version	NB25-JUI7.820.0349_V1.0		
Software Version	NB25-V1.8.0-V1.0		
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	NB-IOT Band 4:2.71dBi NB-IOT Band 12:0.93 dBi NB-IOT Band 66: 2.71dBi NB-IOT Band 71: 0.93dBi		
Test Mode(s)	NB-IOT Band 4/12/66/71;		
Test Modulation	BPSK, QPSK		
Category	NB1		
Deployment	stand-alone		
Sub-carrier spacing	3.75KHz, 15KHz		
Ntones	single, multi-tone		
Maximum E.I.R.P./ E.R.P.	NB-IOT Band 4:	24.89dBm	
	NB-IOT Band 12:	23.88dBm	
	NB-IOT Band 66:	25.12dBm	
	NB-IOT Band 71:	24.12dBm	
Rated Power Supply Voltage:	3.3V		
Extreme Voltage	Minimum: 2.5V Maximum: 3.63V		
Extreme Temperature	Lowest:-30°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 66	1710 ~ 1780	2110 ~ 2200
	NB-IOT Band 71	663 ~ 698	617 ~ 652
Note: 1. The information of the EUT is declared by the manufacturer.			

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 2 (2018)

FCC CFR47 Part 27C (2018)

ANSI C63.26 (2015)

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 (X axis, vertical 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 4/12/66/71:

Test items	Mode	Deployment mode	Subcarrier Spacing (kHz)		Modulation		Test Channel		
		Stand-alone	3.75	15	BPSK	QPSK	L	M	H
RF power output	NB-IOT B4	O	O	O	O	O	O	O	O
	NB-IOT B12	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
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 B66	O	O	O	O	O	O	O	O
	NB-IOT B71	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 B66	O	O	O	O	O	O	O	O
	NB-IOT B71	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 B66	O	O	O	O	O	O	-	O
	NB-IOT B71	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 B66	O	O	O	O	O	-	O	-
	NB-IOT B71	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 B66	O	O	O	O	O	O	O	O

	NB-IOT B71	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 B66	O	-	O	-	O	O	O	O
	NB-IOT B71	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 B66	O	-	O	-	O	O	O	O
	NB-IOT B71	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

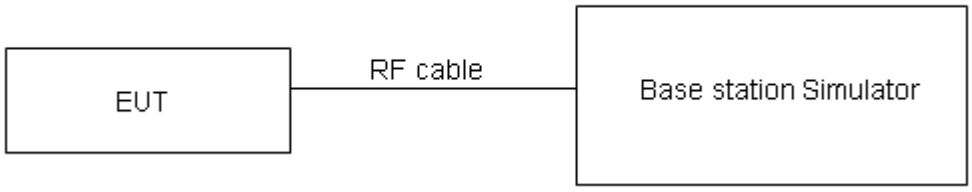
Ambient condition

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.

Test Setup



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

Limits

No specific RF power output requirements in part 2.1046.

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)	Ntones	Conducted Power (dBm) for low/mid/high channel		
				19951/1710.1	20175/1732.5	20399/1754.9
Band4 Standalone	BPSK	3.75	1@0	24.09	24.21	24.26
			1@47	24.05	24.18	24.22
		15	1@0	23.93	24.03	24.17
			1@11	23.98	23.97	24.18
	QPSK	3.75	1@0	24.03	24.22	24.31
			1@47	24.08	24.19	24.28
		15	1@0	23.99	24.02	24.14
			1@11	24.01	23.99	24.11
		15	12@0	22.22	22.32	22.49

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel		
				23011/699.1	23095/707.5	23179/715.9
Band 12 Standalone	BPSK	3.75	1@0	23.52	23.75	23.75
			1@47	23.47	23.68	23.73
		15	1@0	23.35	23.57	23.55
			1@11	23.41	23.56	23.57
	QPSK	3.75	1@0	23.51	23.72	23.72
			1@47	23.48	23.70	23.72
		15	1@0	23.27	23.61	23.59
			1@11	23.30	23.49	23.59
		15	12@0	21.49	21.68	21.84

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel		
				131973/1710.1	132322/1745	132671/1779.9
Band 66 Standalone	BPSK	3.75	1@0	24.04	24.12	24.45
			1@47	24.01	24.06	24.39
		15	1@0	23.73	23.70	24.19
			1@11	23.80	23.79	24.20
	QPSK	3.75	1@0	24.03	24.05	24.40
			1@47	24.05	24.10	24.39
		15	1@0	23.83	23.77	24.23
			1@11	23.74	23.72	24.24
		15	12@0	22.14	22.10	22.50

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel		
				133123/663.1	133297/680.5	133471/697.9
Band 71 Standalone	BPSK	3.75	1@0	23.86	24.04	24.11
			1@47	23.85	23.98	24.06
		15	1@0	23.58	23.73	23.92
			1@11	23.65	23.74	23.85
	QPSK	3.75	1@0	23.81	24.02	24.11
			1@47	23.83	24.05	24.07
		15	1@0	23.61	23.76	23.96
			1@11	23.56	23.71	23.89
		15	12@0	21.78	21.98	22.09

5.2 Effective Isotropic Radiated Power

Ambient condition

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

Methods of Measurement

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 = Generator Output Power (dBm) – 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 (dBm) = LVL (dBm) + LOSS (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:

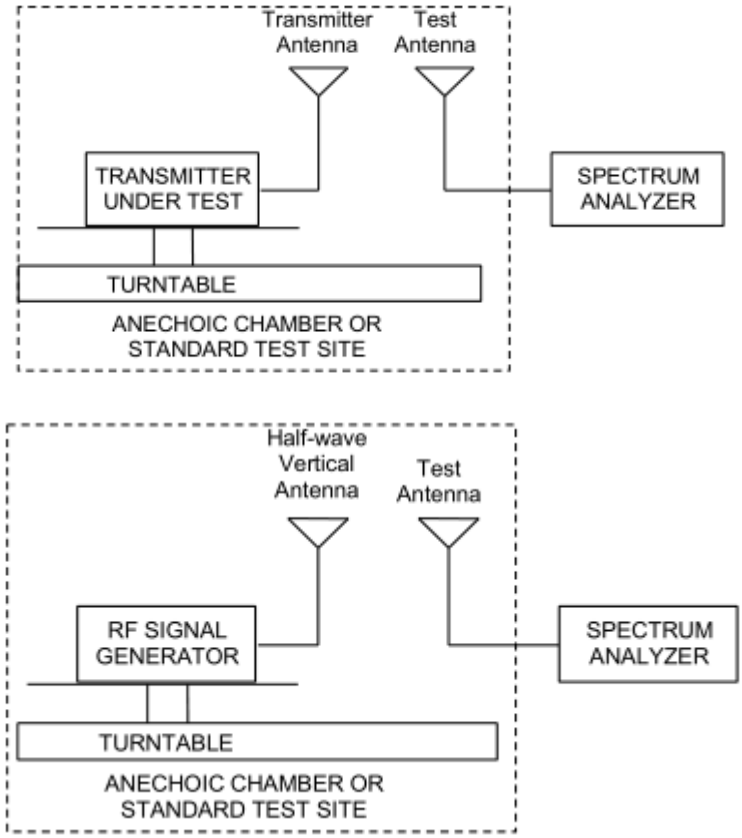
EIRP (dBm) = Output Power (dBm) - Losses (dB) + Antenna Gain (dBi)

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

EIRP (dBm) = ERP (dBm) + 2.15 (dB.)

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

Test setup



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 lie-down position (X axis) and the worst case was recorded.

Limits

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(c)(10)Limit	≤ 3 W (34.77 dBm)
Part 27.50(d)(4)Limit	≤ 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= 1.19 dB

Test Results

The measurement is performed for both of horizontal and vertical antenna Polarization, and only the data of worst mode is recorded in this report.

Mode	Channel	Frequency (MHz)	Modulation	Polarization	Sub-carrier spacing (KHz)	Ntones	EIRP (dBm)	Limit (dBm)	Conclusion
Band4 Standalone	19951	1710.1	BPSK	V	3.75	1@0	24.68	30	Pass
			QPSK	V	3.75	1@0	24.82	30	Pass
			BPSK	V	15	1@0	24.77	30	Pass
			QPSK	V	15	1@0	24.56	30	Pass
	20175	1732.5	BPSK	V	3.75	1@0	24.76	30	Pass
			QPSK	V	3.75	1@0	24.51	30	Pass
			BPSK	V	15	1@0	24.63	30	Pass
			QPSK	V	15	1@0	24.58	30	Pass
	20399	1754.9	BPSK	V	3.75	1@0	24.49	30	Pass
			QPSK	V	3.75	1@0	24.55	30	Pass
			BPSK	V	15	1@0	24.74	30	Pass
			QPSK	V	15	1@0	24.89	30	Pass

Mode	Channel	Frequency (MHz)	Modulation	Polarization	Sub-carrier spacing (KHz)	Ntones	ERP (dBm)	Limit (dBm)	Conclusion
Band12 Standalone	23011	699.1	BPSK	V	3.75	1@0	23.57	34.77	Pass
			QPSK	V	3.75	1@0	23.49	34.77	Pass
			BPSK	V	15	1@0	23.61	34.77	Pass
			QPSK	V	15	1@0	23.43	34.77	Pass
	23095	707.5	BPSK	V	3.75	1@0	23.74	34.77	Pass
			QPSK	V	3.75	1@0	23.61	34.77	Pass
			BPSK	V	15	1@0	23.54	34.77	Pass
			QPSK	V	15	1@0	23.62	34.77	Pass
	23179	715.9	BPSK	V	3.75	1@0	23.49	34.77	Pass
			QPSK	V	3.75	1@0	23.76	34.77	Pass
			BPSK	V	15	1@0	23.88	34.77	Pass
			QPSK	V	15	1@0	23.62	34.77	Pass

Mode	Channel	Frequency (MHz)	Modulation	Polarization	Sub-carrier spacing (KHz)	Ntones	EIRP (dBm)	Limit (dBm)	Conclusion
Band66 Standalone	131973	1710.1	BPSK	H	3.75	1@0	25.01	30	Pass
			QPSK	H	3.75	1@0	25.00	30	Pass
			BPSK	H	15	1@0	24.86	30	Pass
			QPSK	H	15	1@0	24.97	30	Pass
	132322	1745	BPSK	H	3.75	1@0	24.76	30	Pass
			QPSK	H	3.75	1@0	24.89	30	Pass
			BPSK	H	15	1@0	24.95	30	Pass
			QPSK	H	15	1@0	24.74	30	Pass
	132671	1779.9	BPSK	H	3.75	1@0	25.03	30	Pass
			QPSK	H	3.75	1@0	25.12	30	Pass
			BPSK	H	15	1@0	24.86	30	Pass
			QPSK	H	15	1@0	24.96	30	Pass

Mode	Channel	Frequency (MHz)	Modulation	Polarization	Sub-carrier spacing (KHz)	Ntones	ERP (dBm)	Limit (dBm)	Conclusion
Band71 Standalone	133123	663.1	BPSK	H	3.75	1@0	24.02	34.77	Pass
			QPSK	H	3.75	1@0	23.89	34.77	Pass
			BPSK	H	15	1@0	23.98	34.77	Pass
			QPSK	H	15	1@0	23.76	34.77	Pass
	133297	680.5	BPSK	H	3.75	1@0	24.01	34.77	Pass
			QPSK	H	3.75	1@0	23.88	34.77	Pass
			BPSK	H	15	1@0	23.92	34.77	Pass
			QPSK	H	15	1@0	23.75	34.77	Pass
	133471	697.9	BPSK	H	3.75	1@0	24.21	34.77	Pass
			QPSK	H	3.75	1@0	23.89	34.77	Pass
			BPSK	H	15	1@0	23.91	34.77	Pass
			QPSK	H	15	1@0	24.10	34.77	Pass

5.3 Occupied Bandwidth

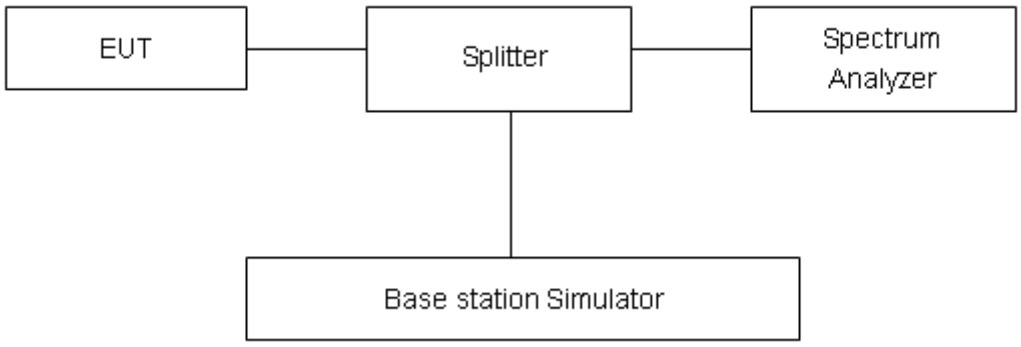
Ambient condition

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 4/12/66/71.
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=624Hz.

Test Result

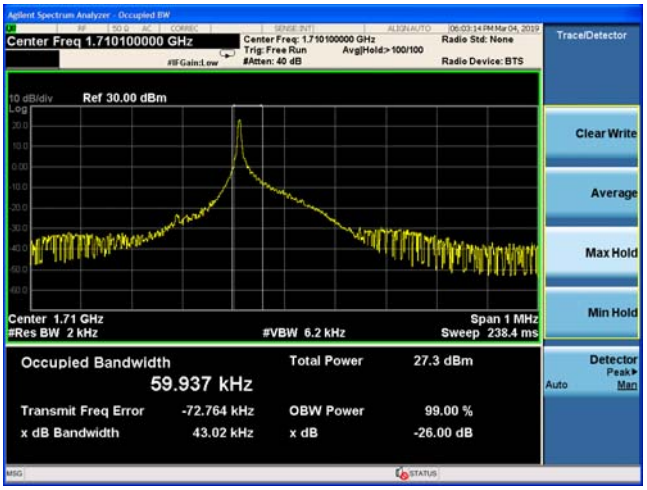
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				19951/1710.1		20175/1732.5		20399/1754.9	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
Band 4 Standalone	BPSK	3.75	1@0	59.94	42.02	63.07	42.10	60.12	41.97
	QPSK	3.75	1@0	67.79	45.78	67.66	46.09	67.31	45.82
	BPSK	15	1@0	111.10	121.00	109.43	113.90	108.72	114.70
	QPSK	15	1@0	114.08	143.80	112.33	130.90	112.37	131.20
	QPSK	15	12@0	182.67	253.80	183.06	247.10	182.94	282.00

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				23011/699.1		23095/707.5		23179/715.9	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
Band 12 Standalone	BPSK	3.75	1@0	58.49	43.13	58.73	43.74	59.17	42.92
	QPSK	3.75	1@0	65.31	45.62	65.51	44.99	66.04	44.94
	BPSK	15	1@0	102.83	118.60	104.98	115.30	108.35	120.50
	QPSK	15	1@0	103.90	129.00	112.50	130.30	112.43	131.70
	QPSK	15	12@0	180.95	252.80	182.17	252.60	182.05	249.40

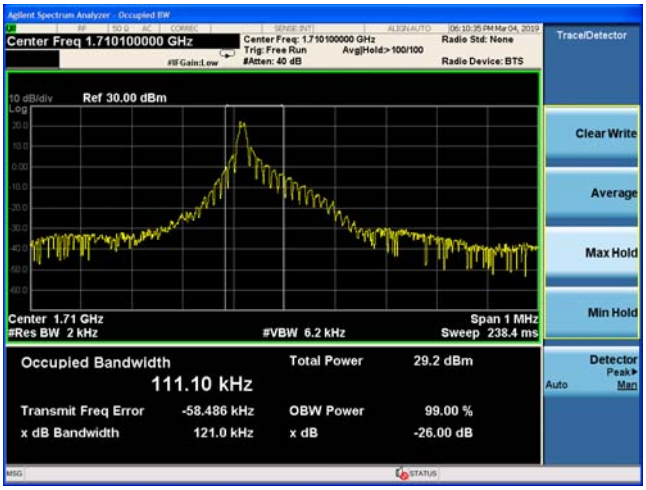
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				131973/1710.1		132322/1745		132671/1779.9	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
Band 66 Standalone	BPSK	3.75	1@0	61.82	41.88	59.55	42.33	61.94	43.20
	QPSK	3.75	1@0	67.78	45.60	67.71	45.03	70.15	45.63
	BPSK	15	1@0	104.78	119.80	109.74	117.80	112.96	125.70
	QPSK	15	1@0	113.96	130.90	116.17	131.80	120.68	144.10
	QPSK	15	12@0	182.79	253.30	184.29	275.00	184.24	289.70

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				133123/663.1		133297/680.5		133471/697.9	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
Band 71 Standalone	BPSK	3.75	1@0	58.01	42.78	58.53	42.89	60.57	43.27
	QPSK	3.75	1@0	65.27	44.76	65.24	42.46	65.88	44.38
	BPSK	15	1@0	103.91	119.80	106.17	120.70	107.61	117.20
	QPSK	15	1@0	114.26	144.30	117.37	132.10	116.57	131.60
	QPSK	15	12@0	182.11	240.40	181.39	250.50	181.64	251.20

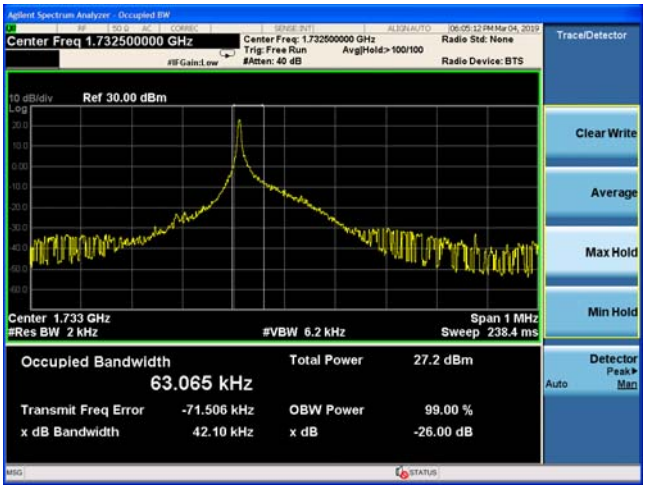
NB-IOT Band 4 BPSK 3.75KHz 1@0 CH-Low



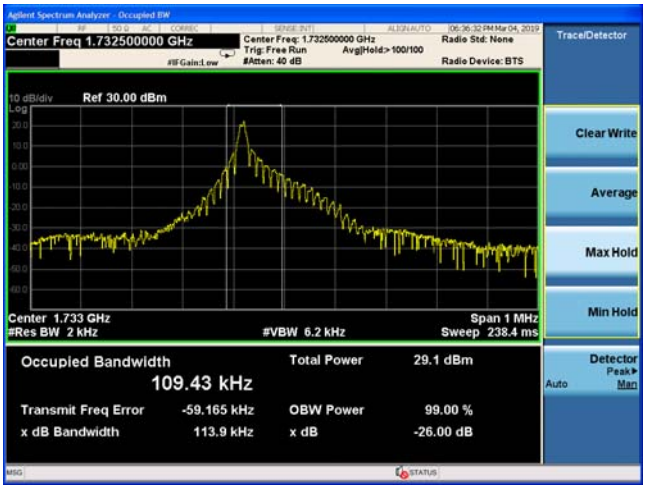
NB-IOT Band 4 BPSK 15KHz 1@0 CH-Low



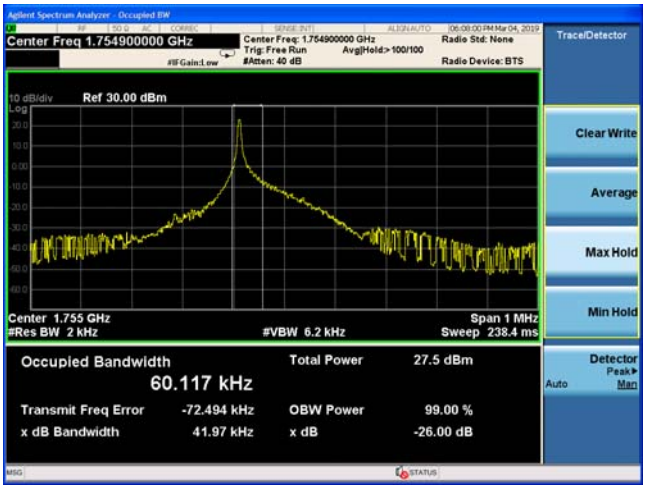
NB-IOT Band 4 BPSK 3.75KHz 1@0 CH-Middle



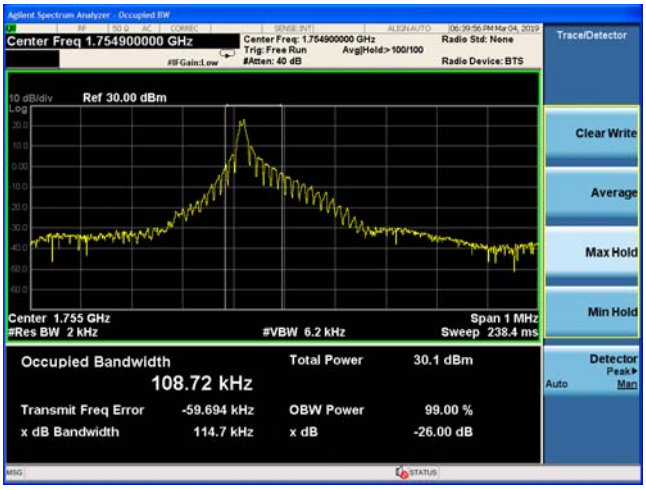
NB-IOT Band 4 BPSK 15KHz 1@0 CH-Middle



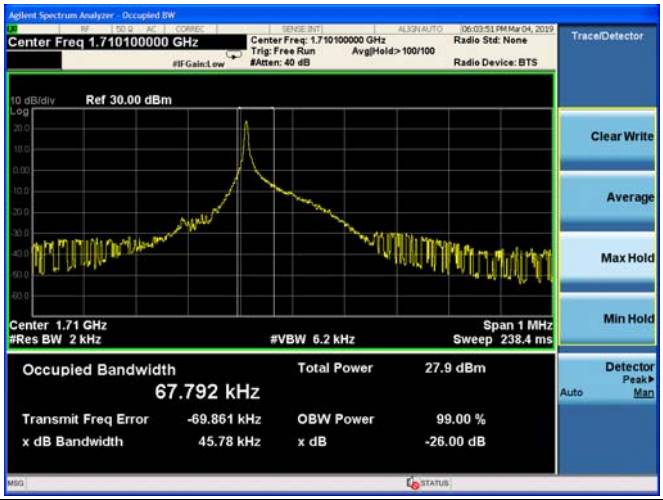
NB-IOT Band 4 BPSK 3.75KHz 1@0 CH-High



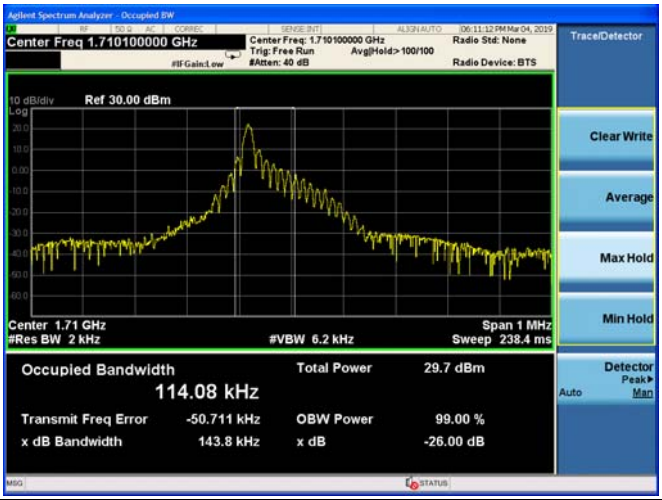
NB-IOT Band 4 BPSK 15KHz 1@0 CH-High



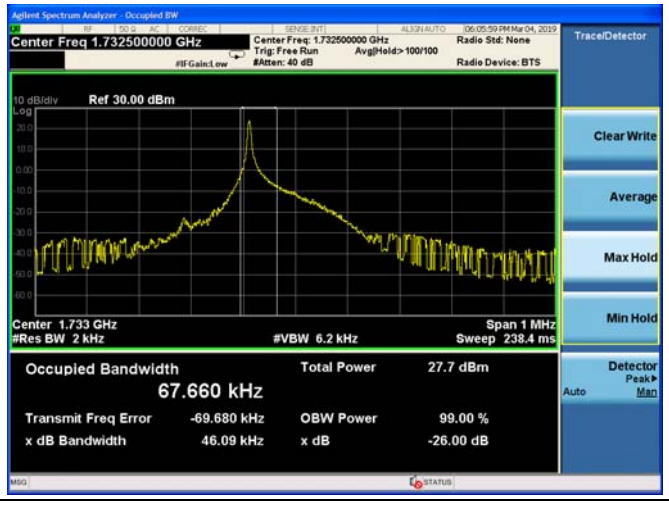
NB-IOT Band 4 QPSK 3.75KHz 1@0 CH-Low



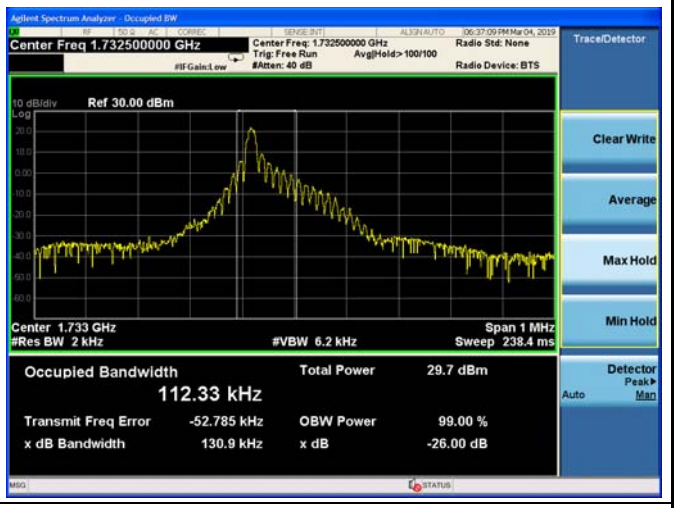
NB-IOT Band 4 QPSK 15KHz 1@0 CH-Low



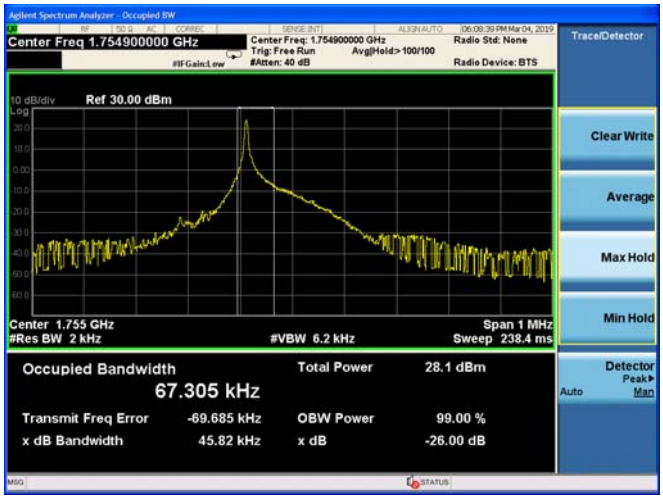
NB-IOT Band 4 QPSK 3.75KHz 1@0 CH-Middle



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

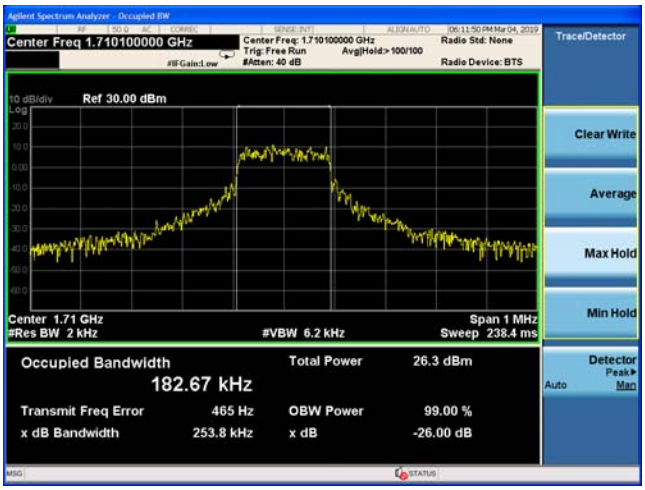


NB-IOT Band 4 QPSK 3.75KHz 1@0 CH-High

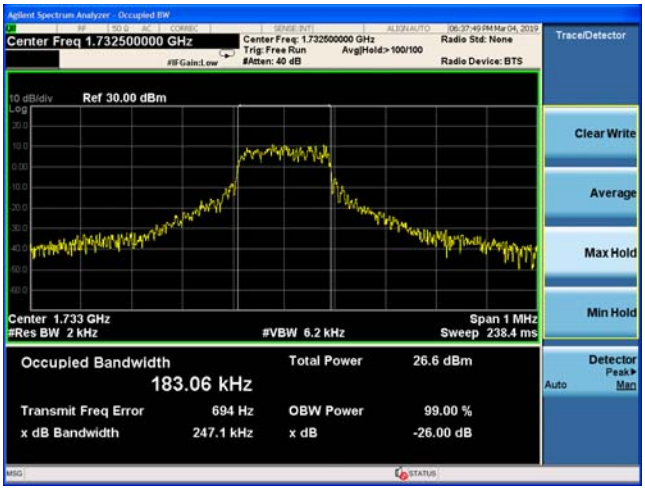


NB-IOT Band 4 QPSK 15KHz 1@0 CH-High

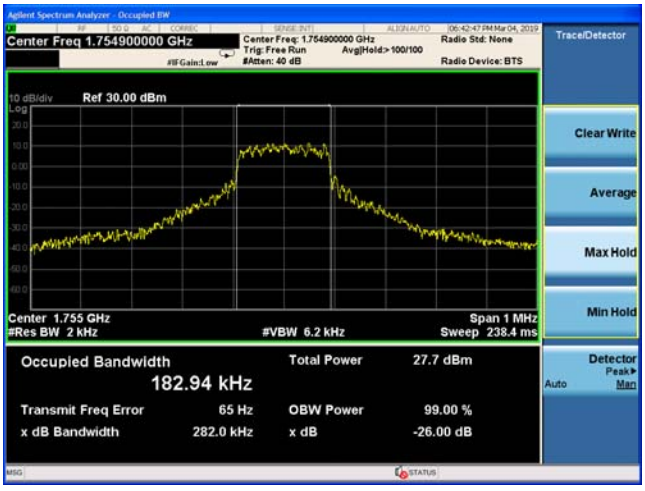
NB-IOT Band 4 QPSK 15KHz 12@0 CH-Low



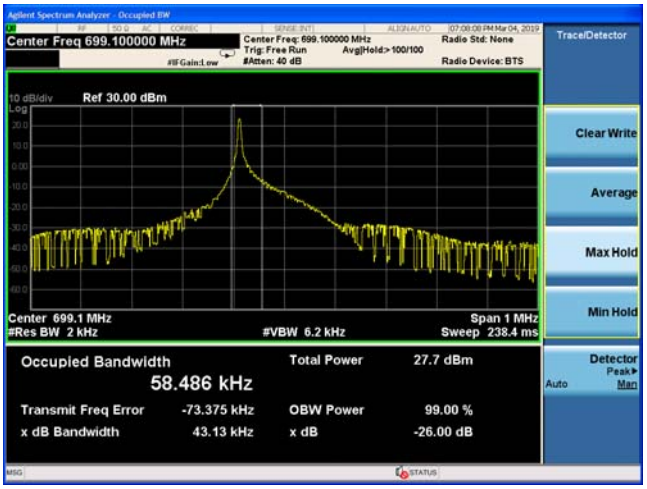
NB-IOT Band 4 QPSK 15KHz 12@0 CH-Middle



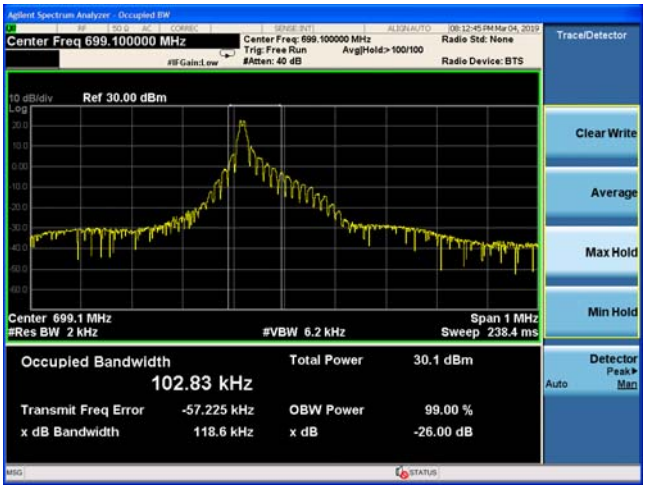
NB-IOT Band 4 QPSK 15KHz 12@0 CH-High



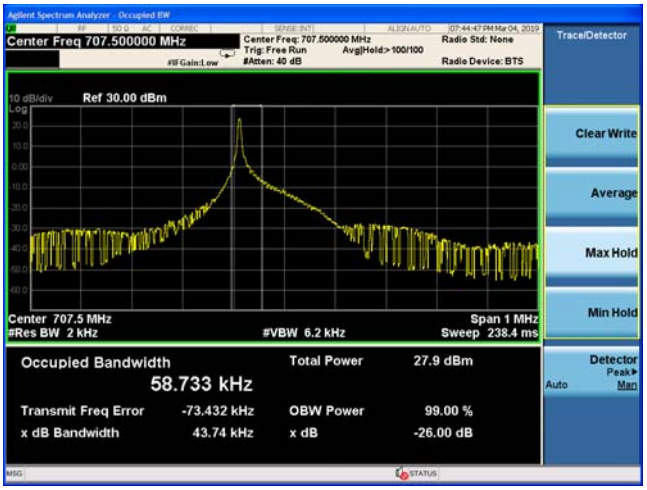
NB-IOT Band 12 BPSK 3.75KHz 1@0 CH-Low



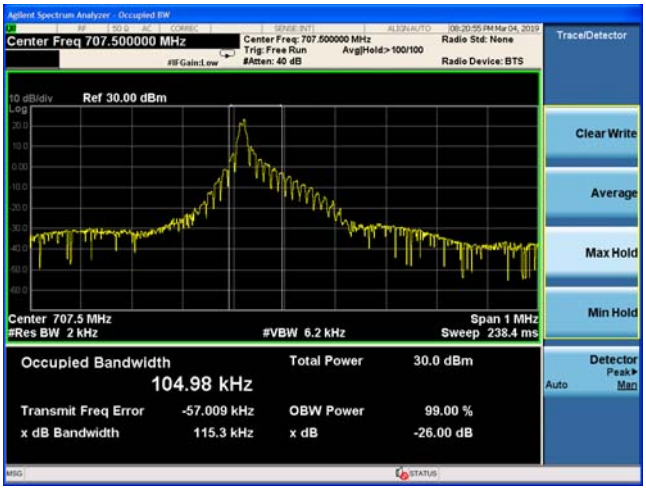
NB-IOT Band 12 BPSK15KHz 1@0 CH-Low



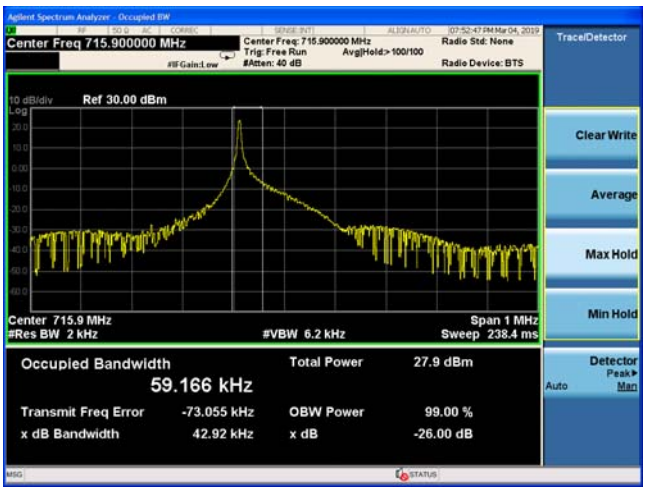
NB-IOT Band 12 BPSK 3.75KHz 1@0 CH-Middle



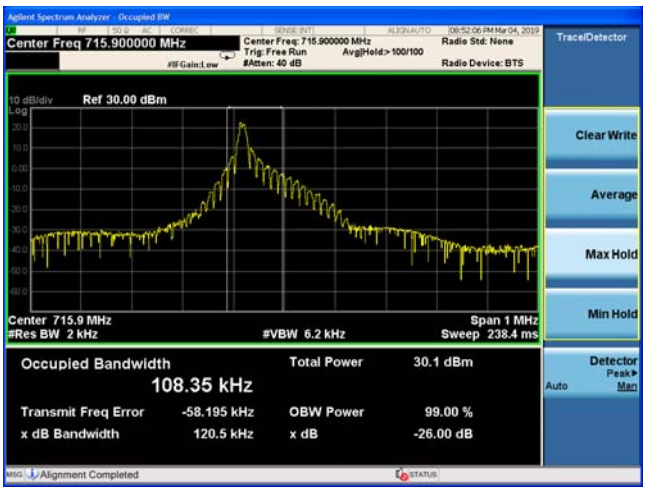
NB-IOT Band 12 BPSK 15KHz 1@0 CH-Middle



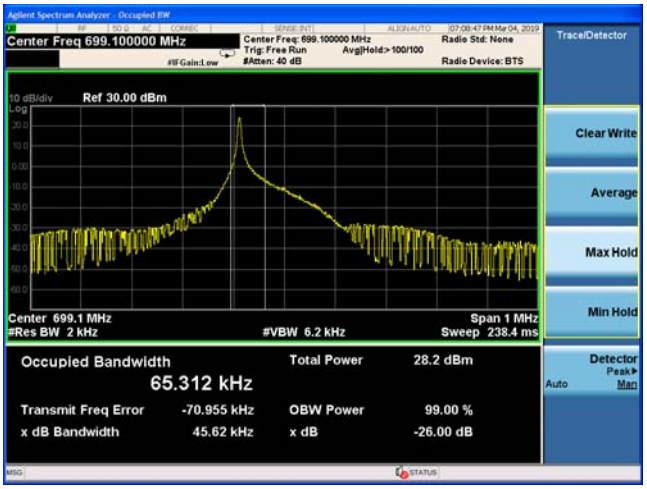
NB-IOT Band 12 BPSK 3.75KHz 1@0 CH-High



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

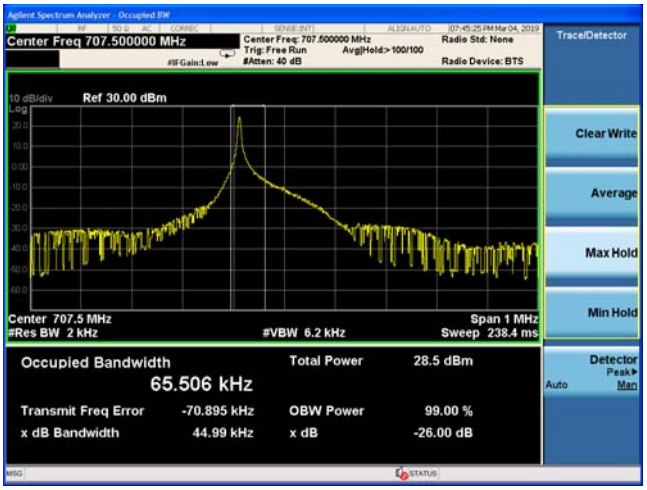


NB-IOT Band 12 QPSK 3.75KHz 1@0 CH-Low



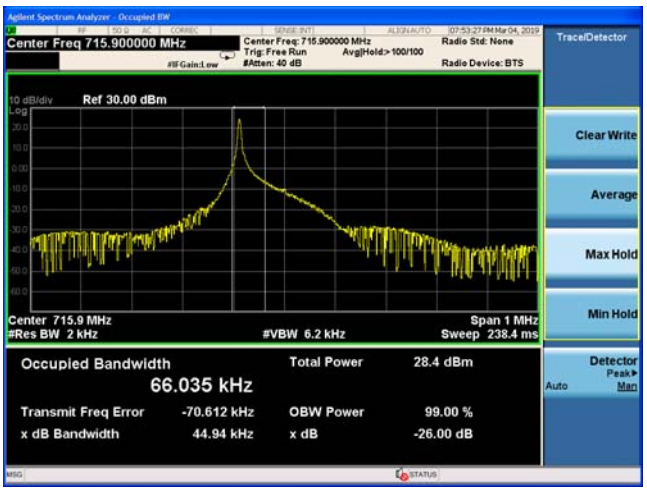
NB-IOT Band 12 QPSK 15KHz 1@0 CH-Low

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

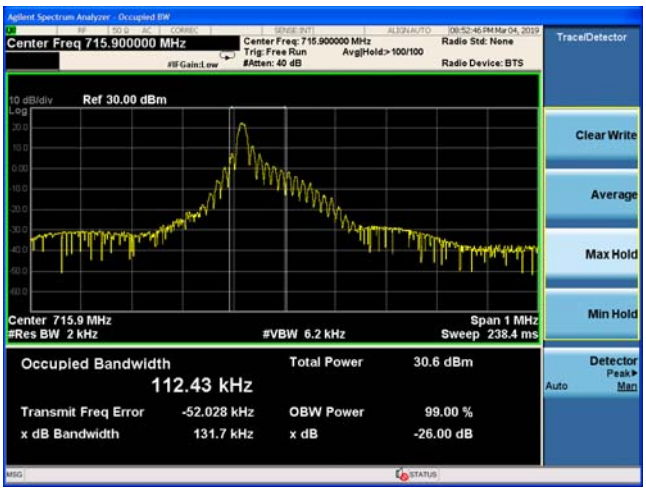


NB-IOT Band 12QPSK 15KHz 1@0 CH-Middle

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

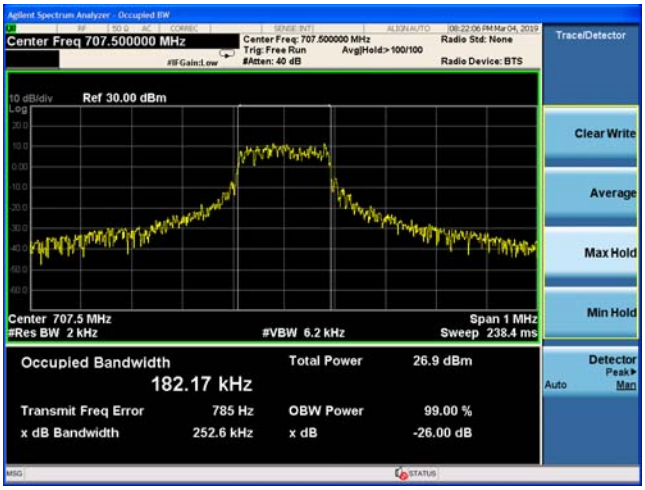


NB-IOT Band 12 QPSK 15KHz 1@0 CH-High



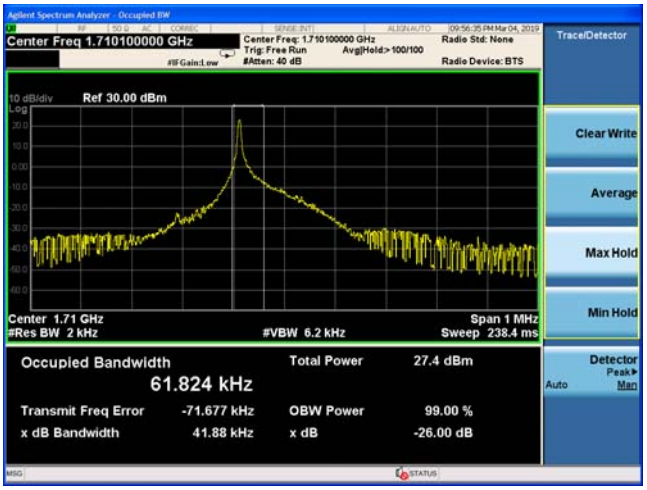
NB-IOT Band 12 QPSK 15KHz 12@0 CH-Low

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

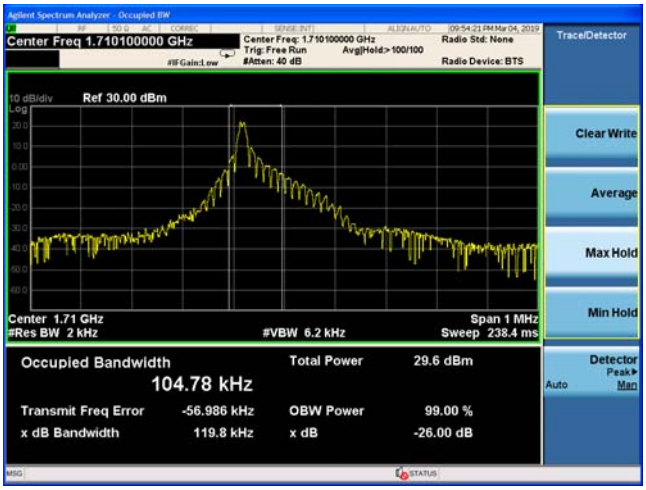


NB-IOT Band 12 QPSK 15KHz 12@0 CH-High

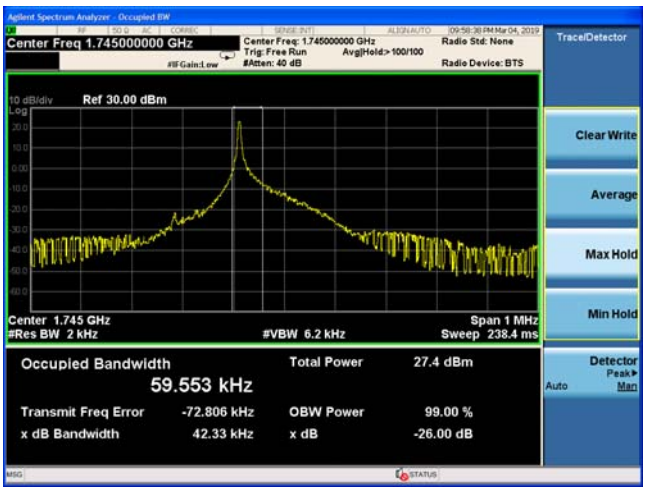
NB-IOT Band 66 BPSK 3.75KHz 1@0 CH-Low



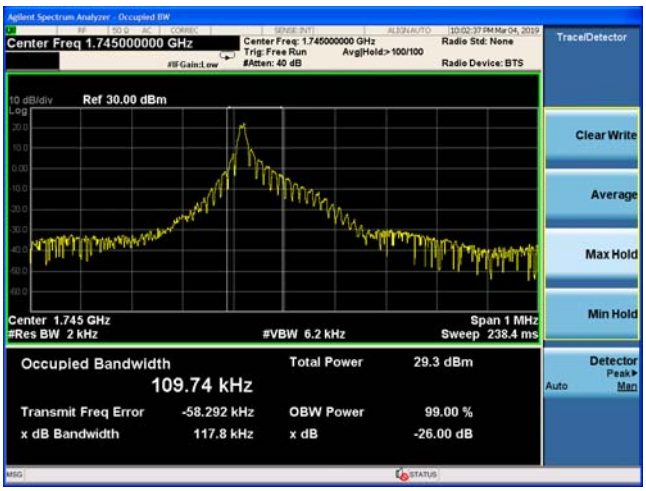
NB-IOT Band 66 BPSK 15KHz 1@0 CH-Low



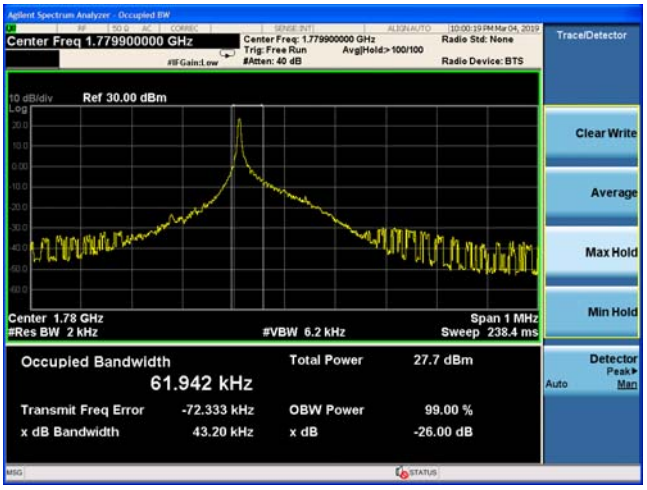
NB-IOT Band 66 BPSK 3.75KHz 1@0 CH-Middle



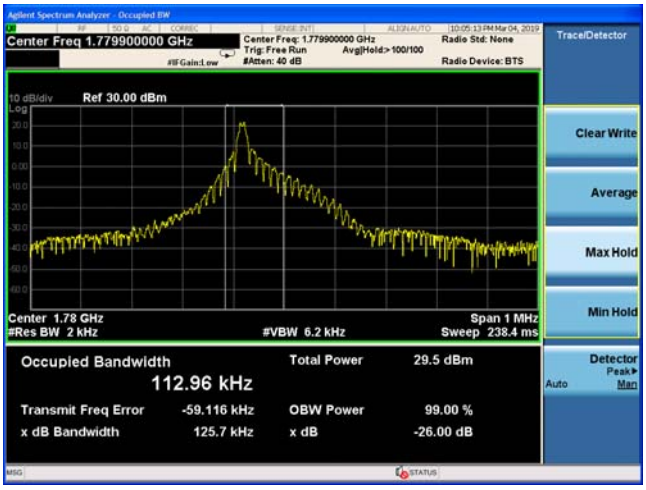
NB-IOT Band 66 BPSK 15KHz 1@0 CH-Middle



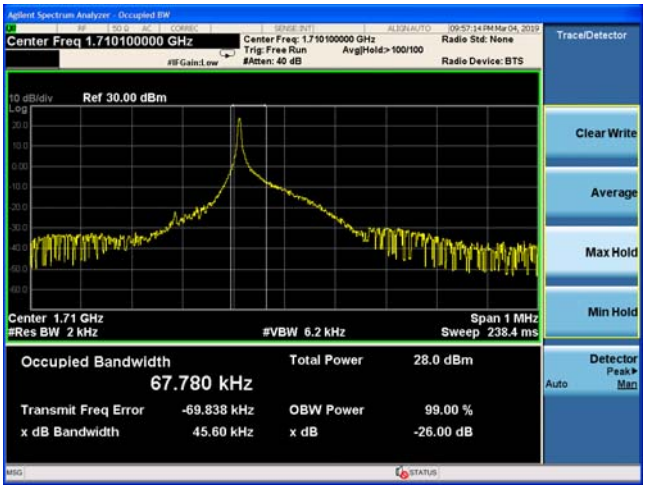
NB-IOT Band 66 BPSK 3.75KHz 1@0 CH-High



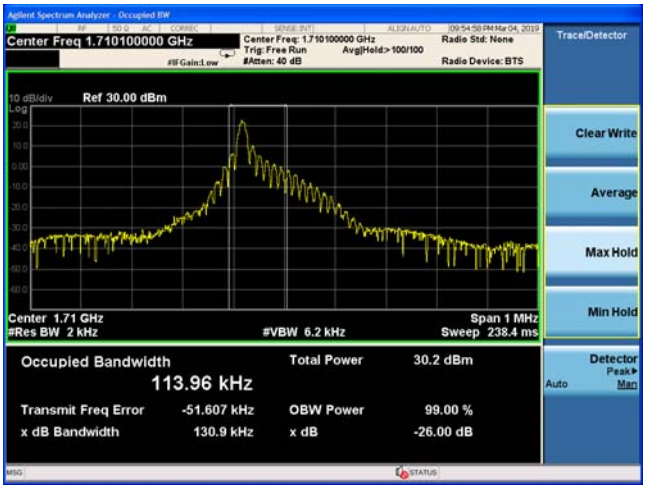
NB-IOT Band 66 BPSK 15KHz 1@0 CH-High



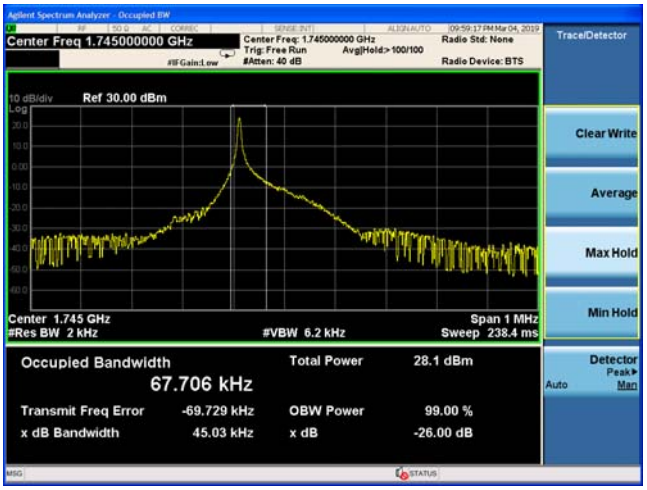
NB-IOT Band 66 QPSK 3.75KHz 1@0 CH-Low



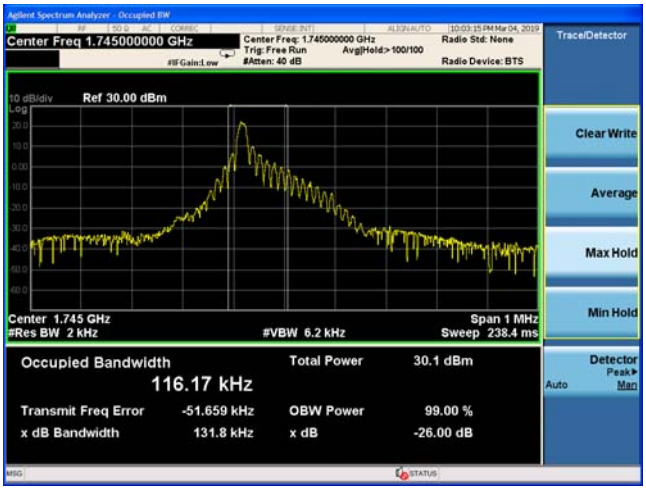
NB-IOT Band 66 QPSK 15KHz 1@0 CH-Low



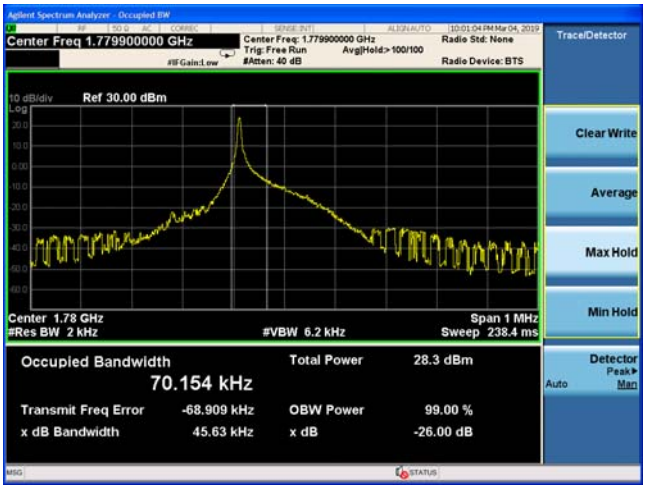
NB-IOT Band 66 QPSK 3.75KHz 1@0 CH-Middle



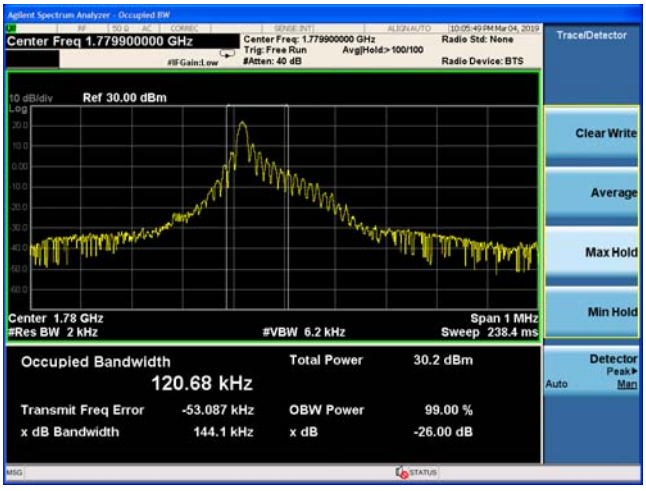
NB-IOT Band 66 QPSK 15KHz 1@0 CH-Middle



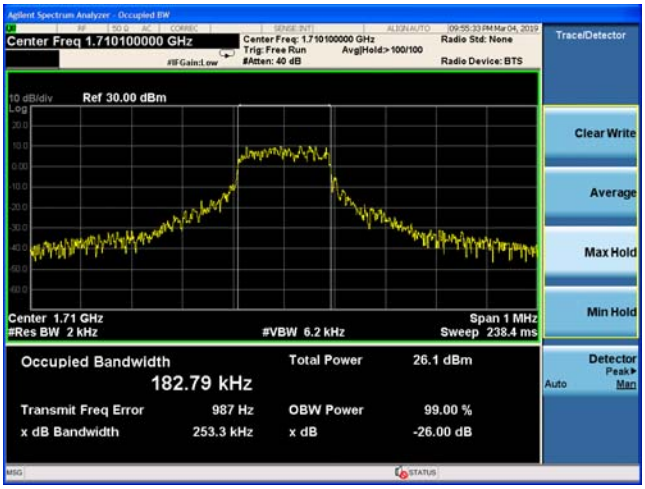
NB-IOT Band 66 QPSK 3.75KHz 1@0 CH-High



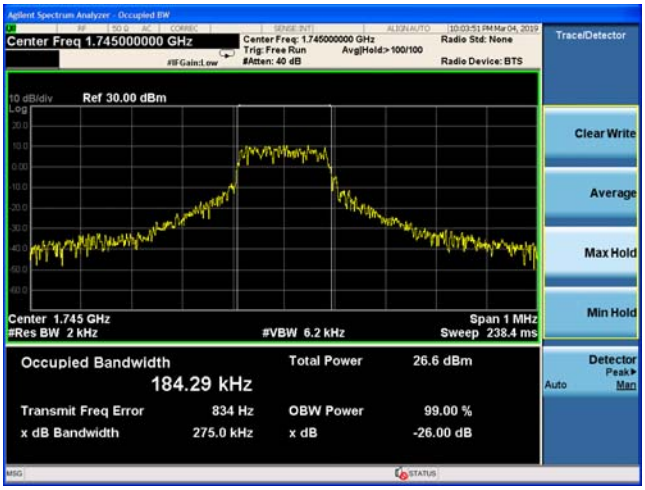
NB-IOT Band 66 QPSK 15KHz 1@0 CH-High



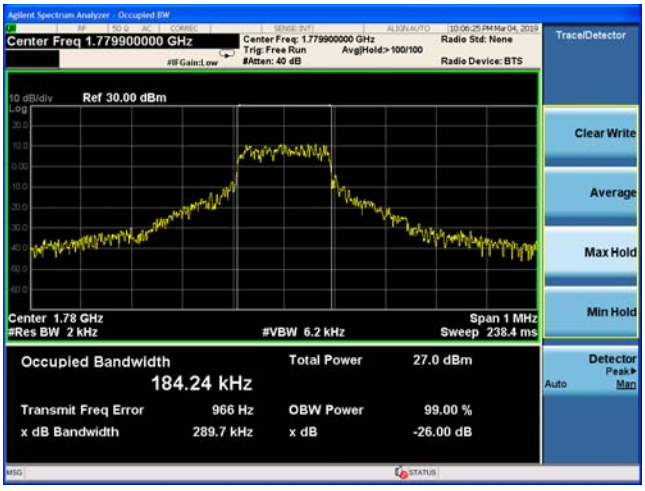
NB-IOT Band 66 QPSK 15KHz 12@0 CH-Low



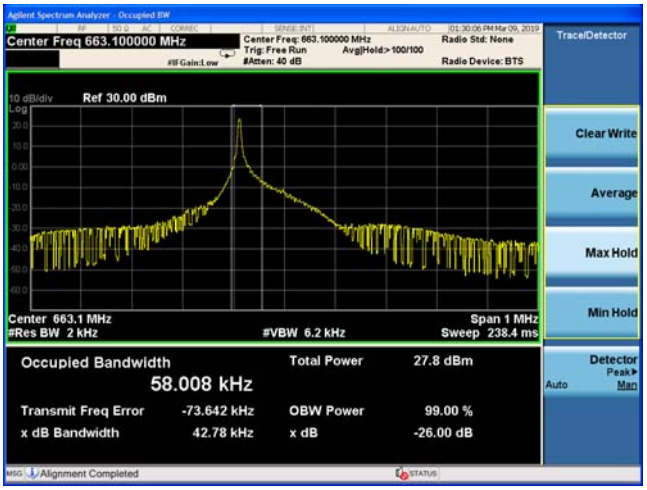
NB-IOT Band 66 QPSK 15KHz 12@0 CH-Middle



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

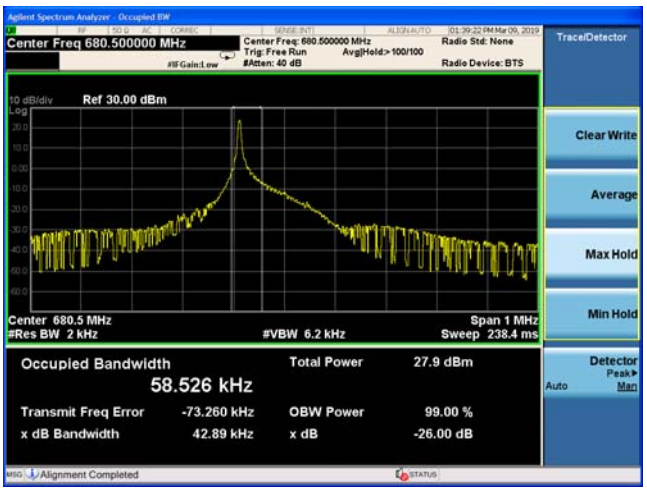


NB-IOT Band 71 BPSK 3.75KHz 1@0 CH-Low

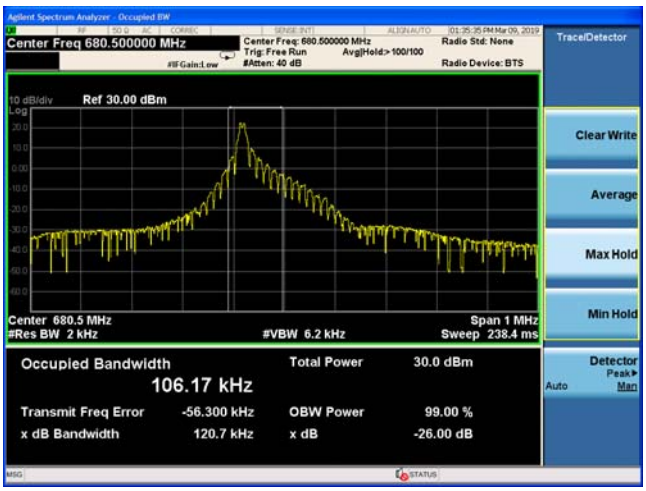


NB-IOT Band 71 BPSK 15KHz 1@0 CH-Low

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

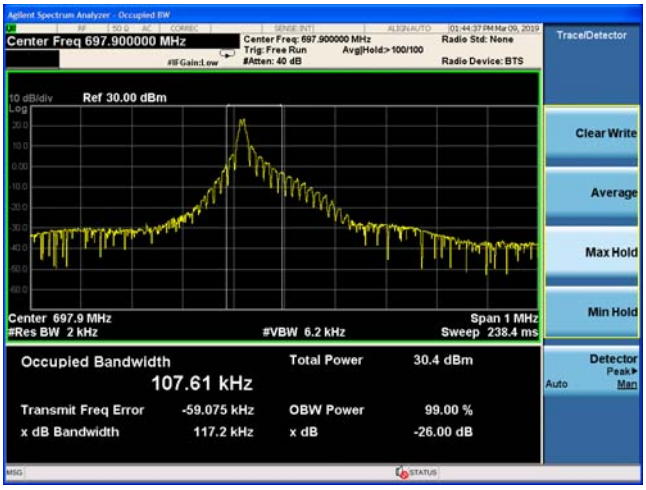


NB-IOT Band 71 BPSK 15KHz 1@0 CH-Middle



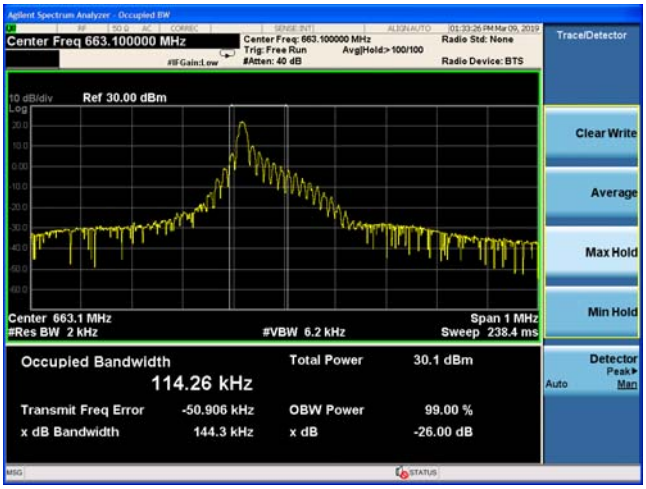
NB-IOT Band 71 BPSK 3.75KHz 1@0 CH-High

NB-IOT Band71 BPSK 15KHz 1@0 CH-High

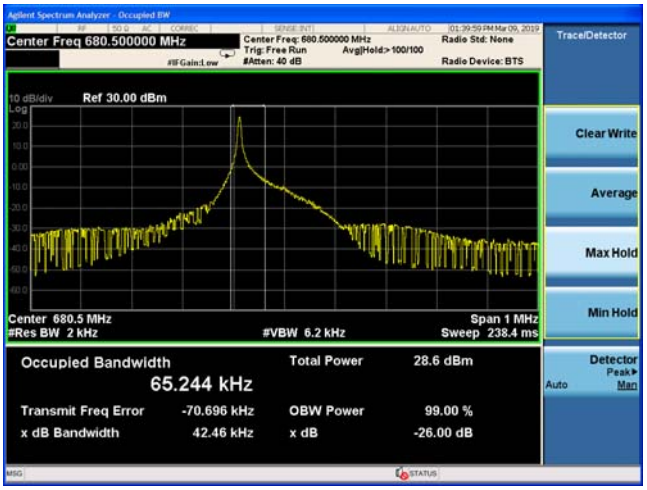


NB-IOT Band 71 QPSK 3.75KHz 1@0 CH-Low

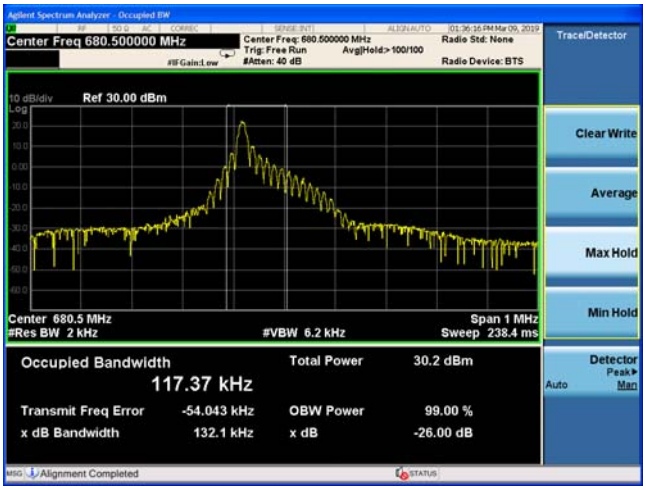
NB-IOT Band 71QPSK 15KHz 1@0 CH-Low



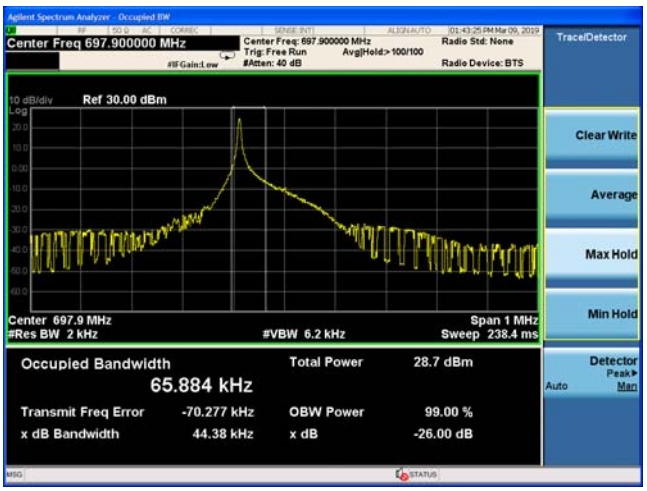
NB-IOT Band 71 QPSK 3.75KHz 1@0 CH-Middle



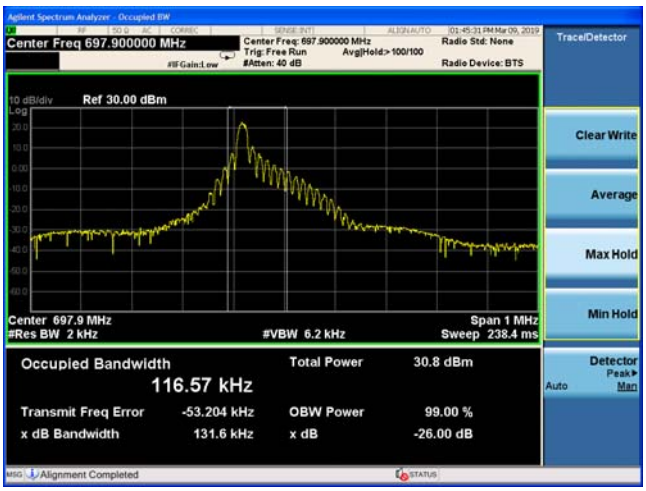
NB-IOT Band 71 QPSK 15KHz 1@0 CH-Middle



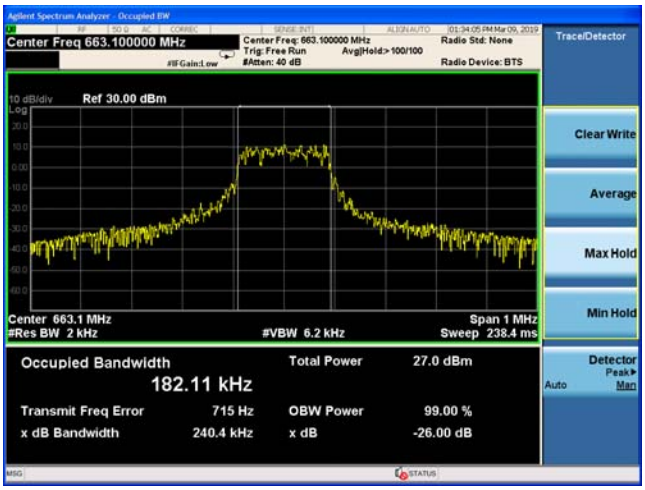
NB-IOT Band 71 QPSK 3.75KHz 1@0 CH-High



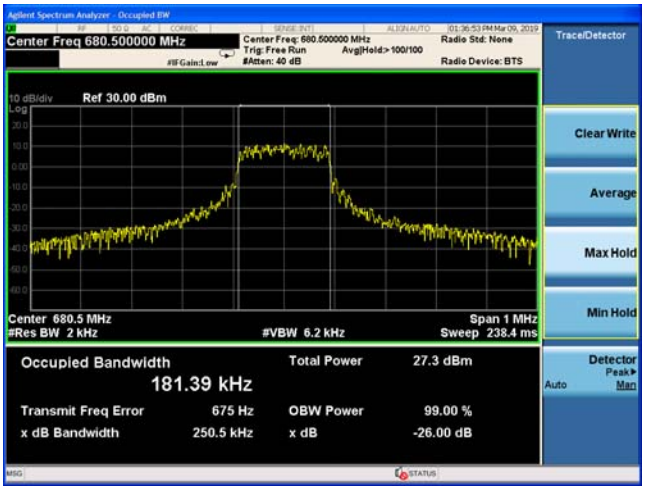
NB-IOT Band 71 QPSK 15KHz 1@0 CH-High



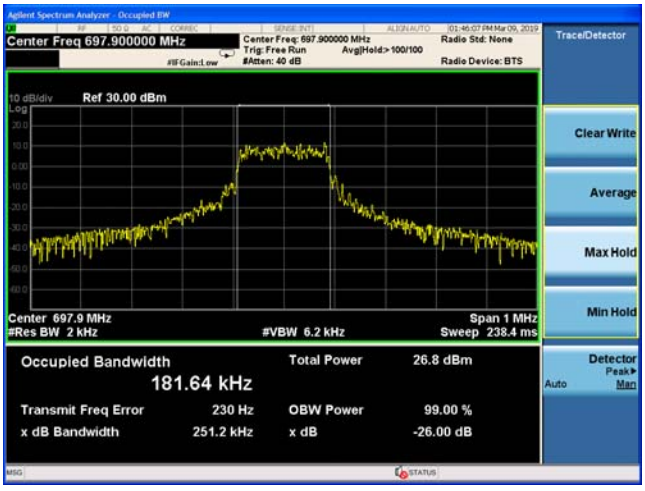
NB-IOT Band 71 QPSK 15KHz 12@0 CH-Low



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



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



5.4 Band Edge Compliance

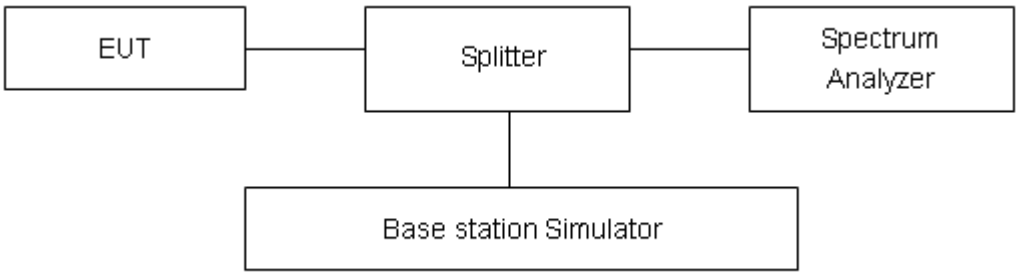
Ambient condition

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
1.The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The band edges of low and high channels for the highest RF powers were measured.
3. RBW is set to 51Hz, VBW is set to 160Hz for 3.75KHz single carrier,
RBW is set to 200Hz, VBW is set to 620Hz for 15KHz single carrier,
RBW is set to 2kHz, VBW is set to 6.2KHz for 15KHz full carrier.
4. Set spectrum analyzer with RMS detector.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. 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.

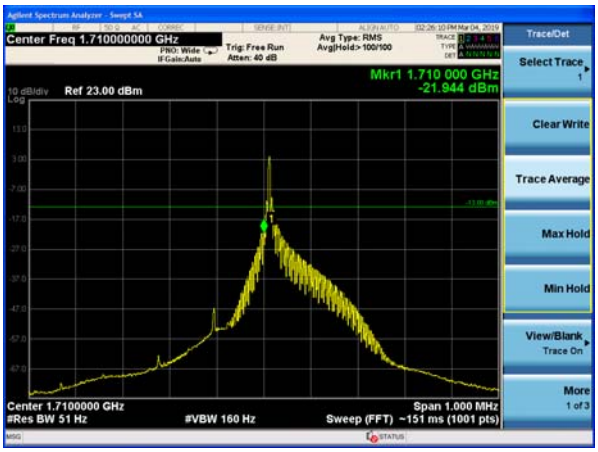
Measurement Uncertainty

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

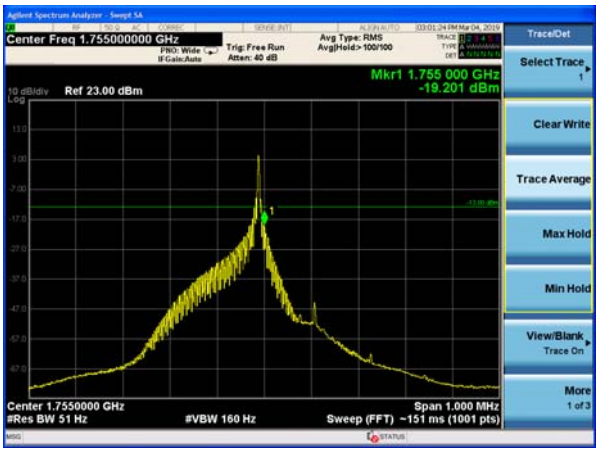
Test Result

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

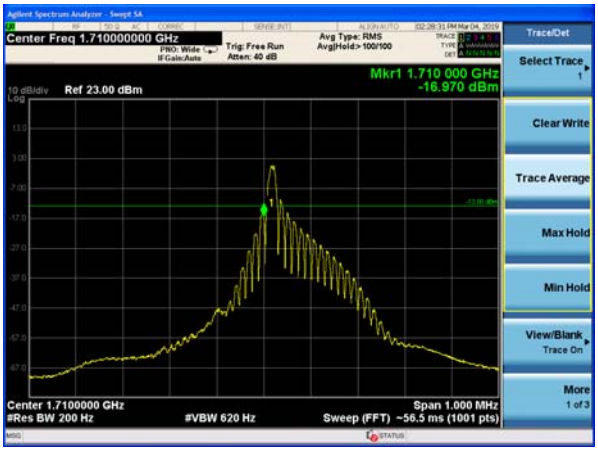
NB-IOT Band 4 QPSK 3.75kHz 1@0 CH-Low



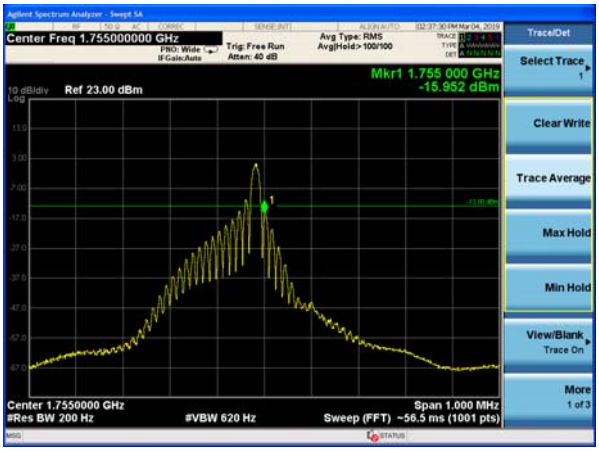
NB-IOT Band 4 QPSK 3.75kHz 1@0 CH-High



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

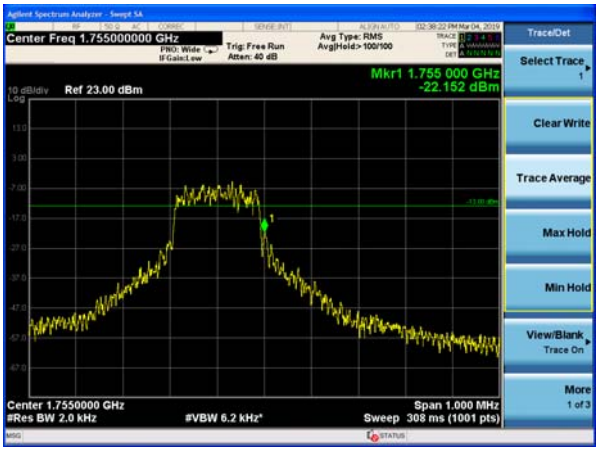


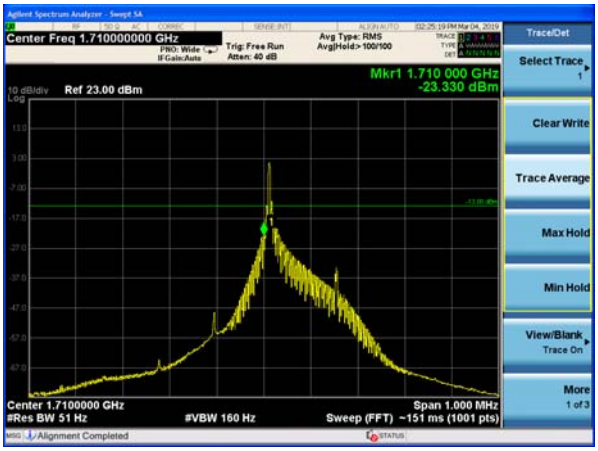
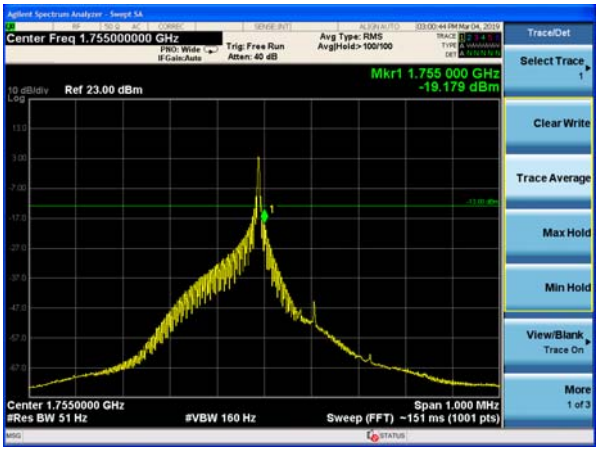
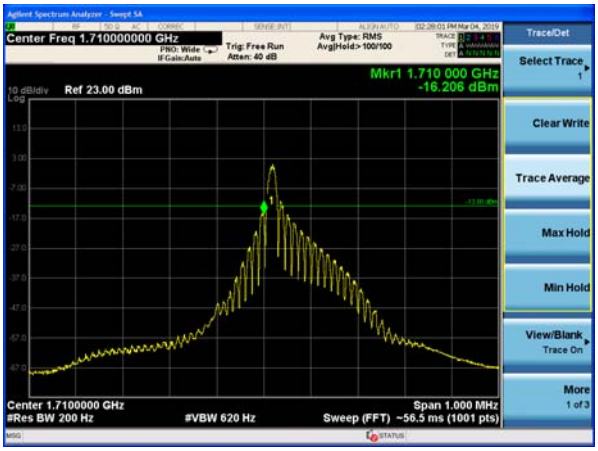
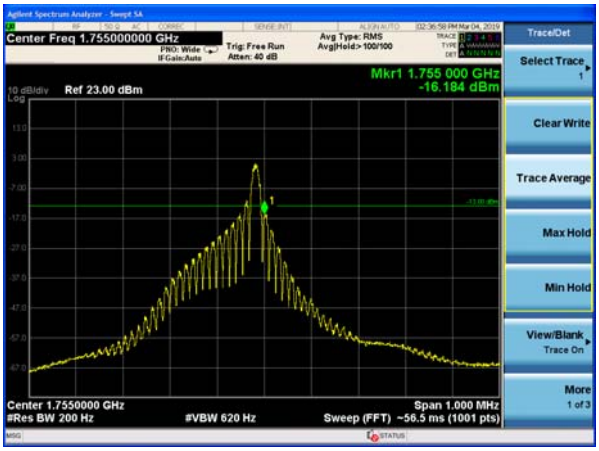
NB-IOT Band 4 QPSK 15kHz 1@0 CH-High



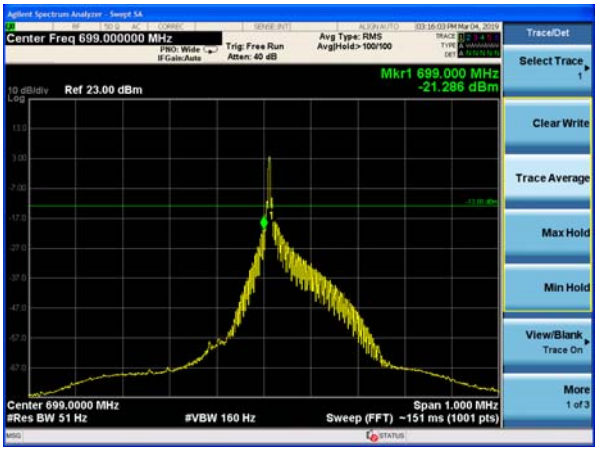
NB-IOT Band 4 QPSK 15kHz 12@0 CH-Low

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

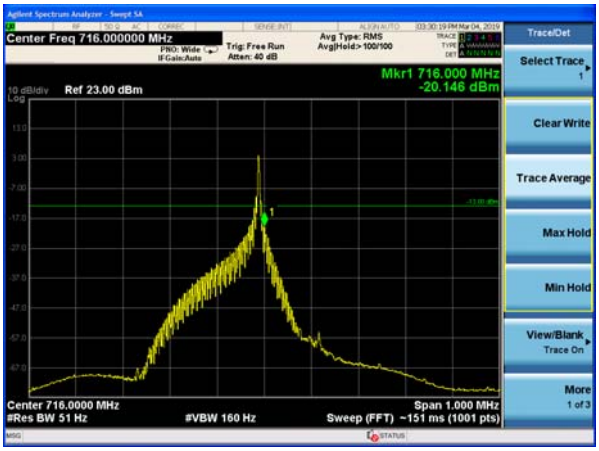


NB-IOT Band 4 BPSK 3.75kHz 1@0 CH-Low	NB-IOT Band 4 BPSK 3.75kHz 1@0 CH-High
	
NB-IOT Band 4 BPSK 15kHz 1@0 CH-Low	NB-IOT Band 4 BPSK 15kHz 1@0 CH-High
	

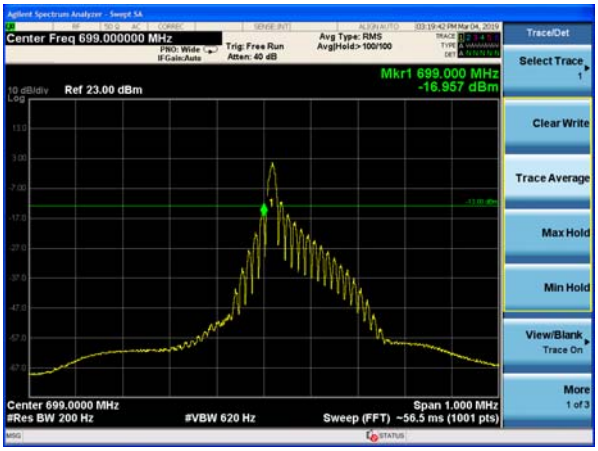
NB-IOT Band 12 QPSK 3.75kHz 1@0 CH-Low



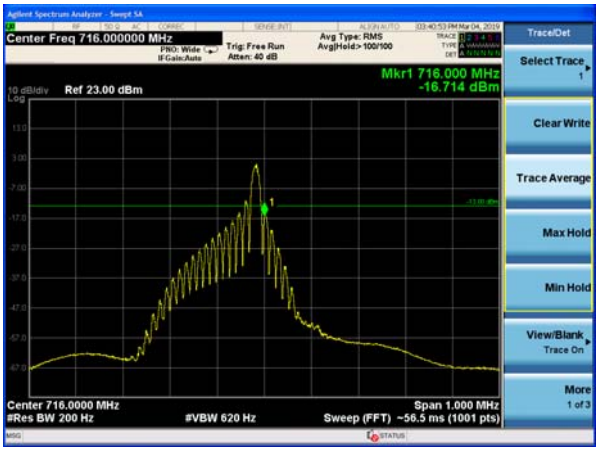
NB-IOT Band 12 QPSK 3.75kHz 1@0 CH-High



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

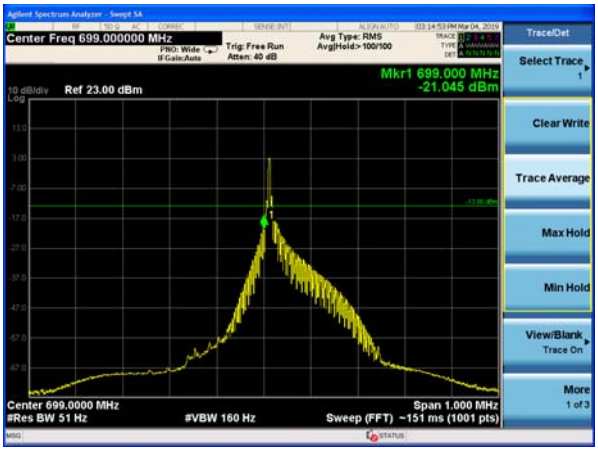
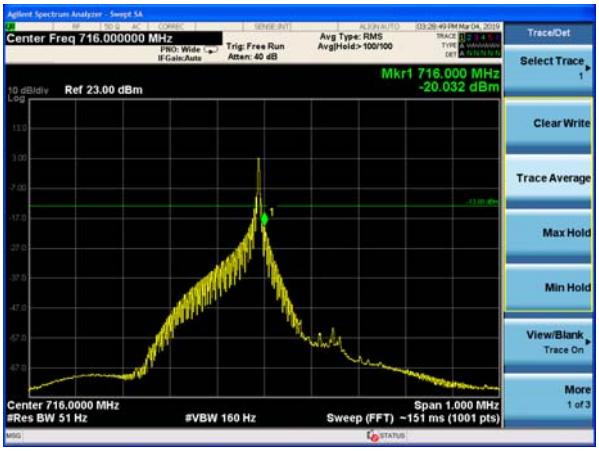
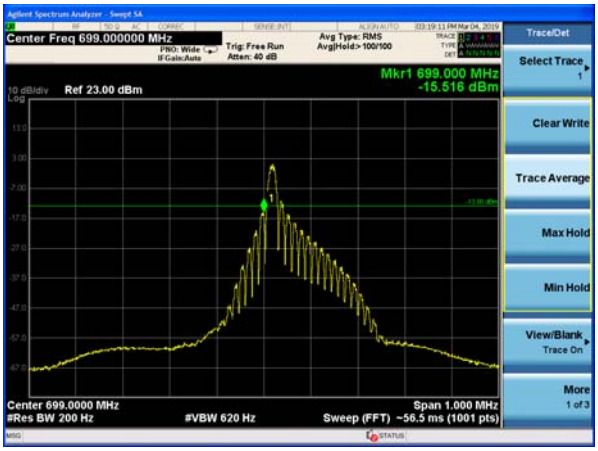
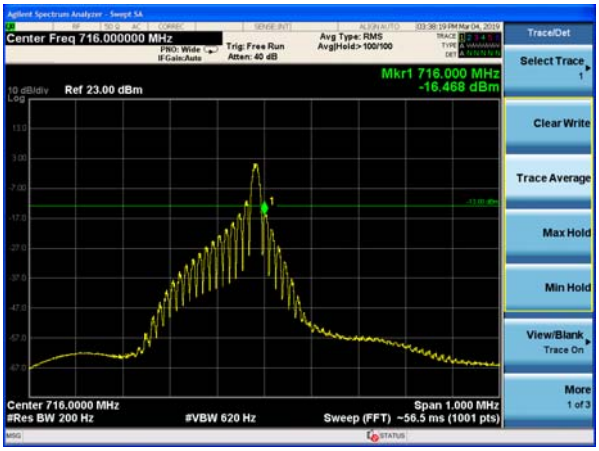


NB-IOT Band 12 QPSK 15kHz 1@0 CH-High

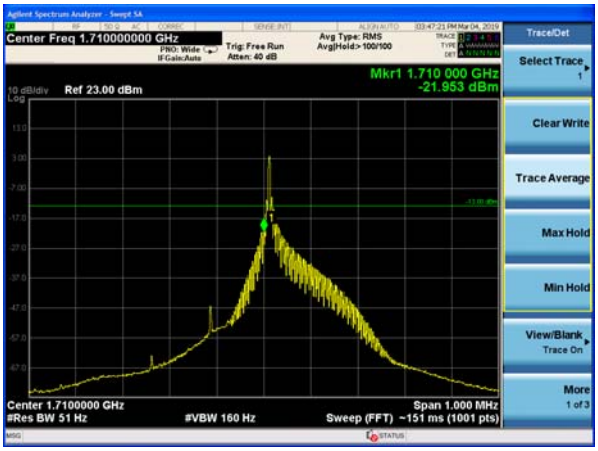


NB-IOT Band 12 QPSK 15kHz 12@0 CH-Low

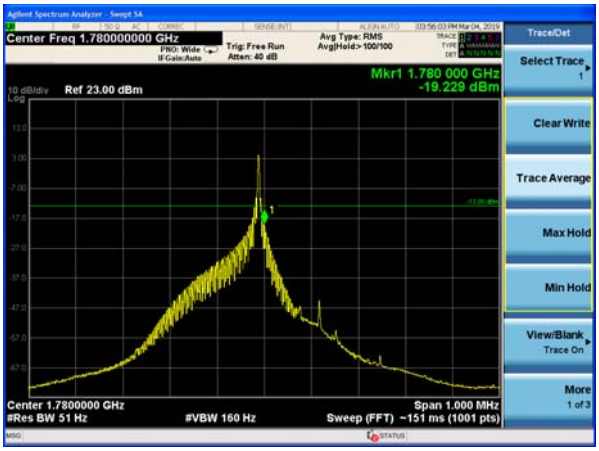
NB-IOT Band 12 QPSK 15kHz 12@0 CH-High

NB-IOT Band 12 BPSK 3.75kHz 1@0 CH-Low	NB-IOT Band 12 BPSK 3.75kHz 1@0 CH-High
	
NB-IOT Band 12 BPSK 15kHz 1@0 CH-Low	NB-IOT Band 12 BPSK 15kHz 1@0 CH-High
	

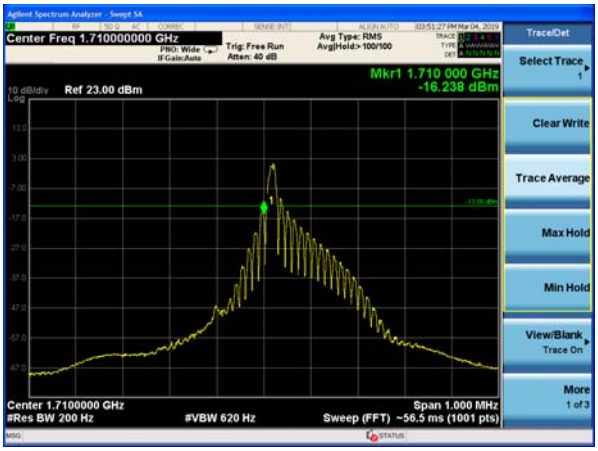
NB-IOT Band 66 QPSK 3.75kHz 1@0 CH-Low



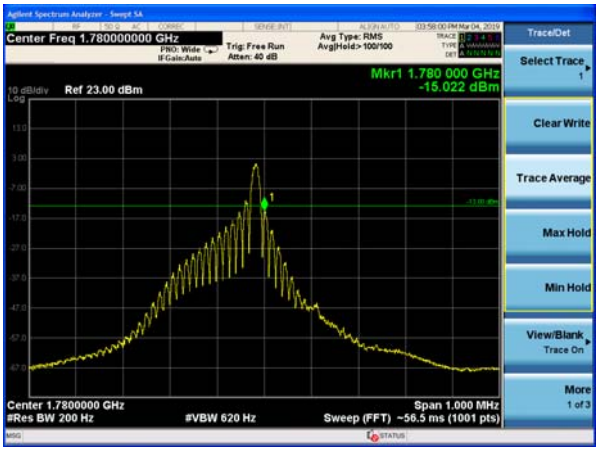
NB-IOT Band 66 QPSK 3.75kHz 1@0 CH-High



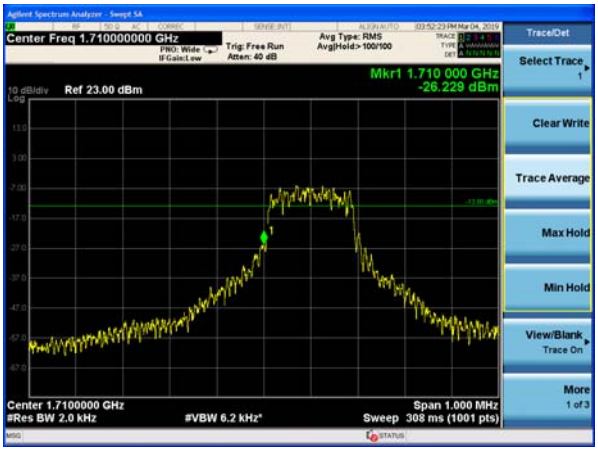
NB-IOT Band 66 QPSK 15kHz 1@0 CH-Low



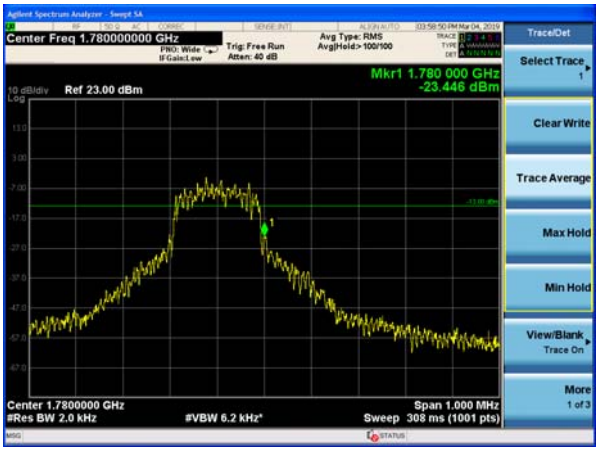
NB-IOT Band 66 QPSK 15kHz 1@0 CH-High

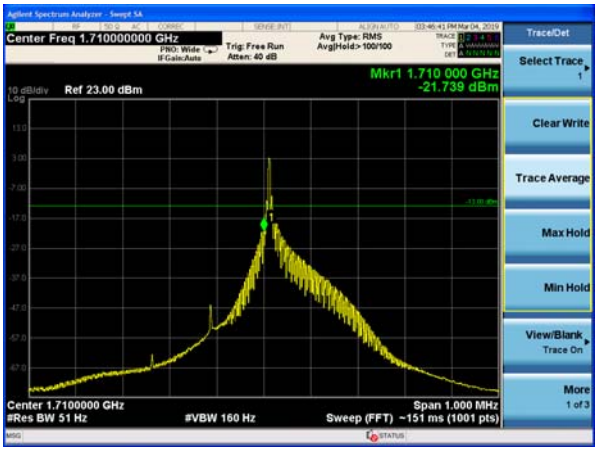
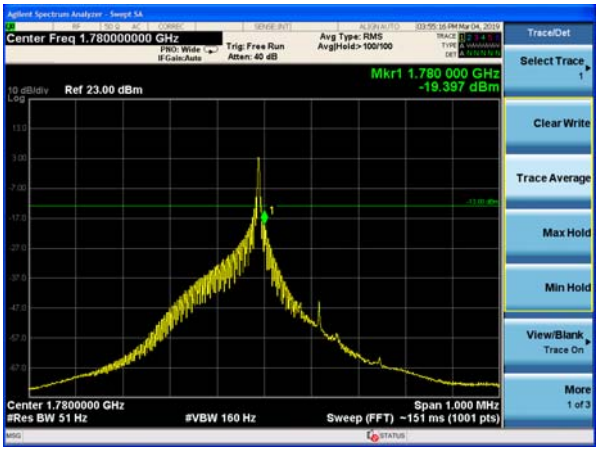
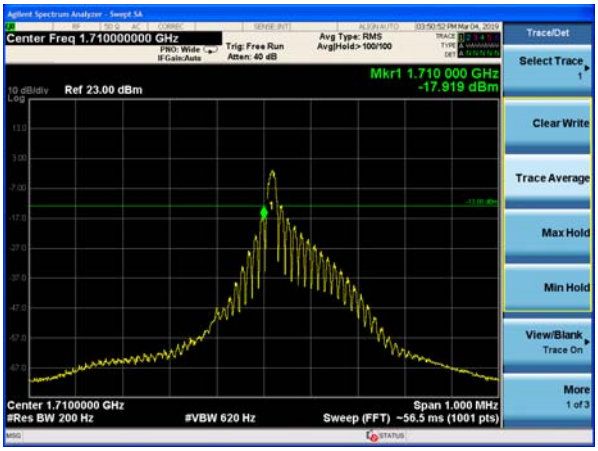
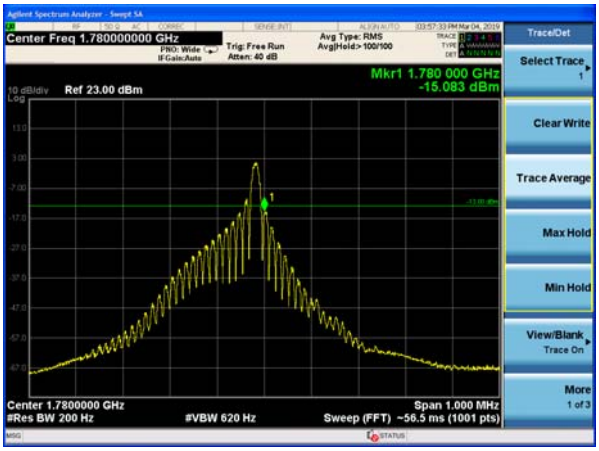


NB-IOT Band 66 QPSK 15kHz 12@0 CH-Low

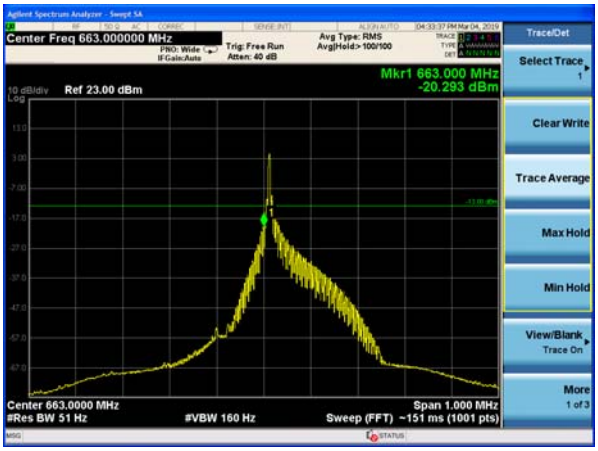


NB-IOT Band 66 QPSK 15kHz 12@0 CH-High

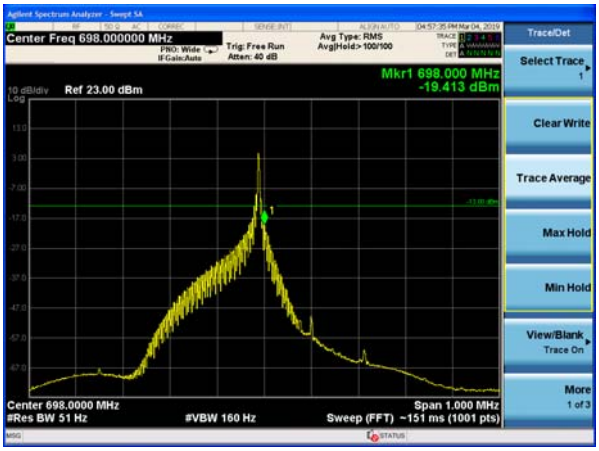


NB-IOT Band 66 BPSK 3.75kHz 1@0 CH-Low	NB-IOT Band 66 BPSK 3.75kHz 1@0 CH-High
	
NB-IOT Band 66 BPSK 15kHz 1@0 CH-Low	NB-IOT Band 66 BPSK 15kHz 1@0 CH-High
	

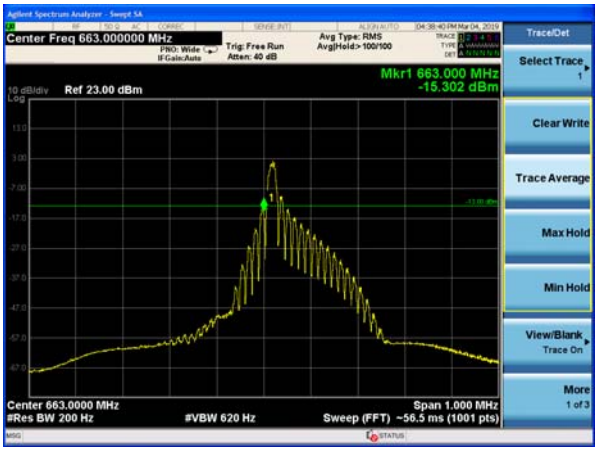
NB-IOT Band 71 QPSK 3.75kHz 1@0 CH-Low



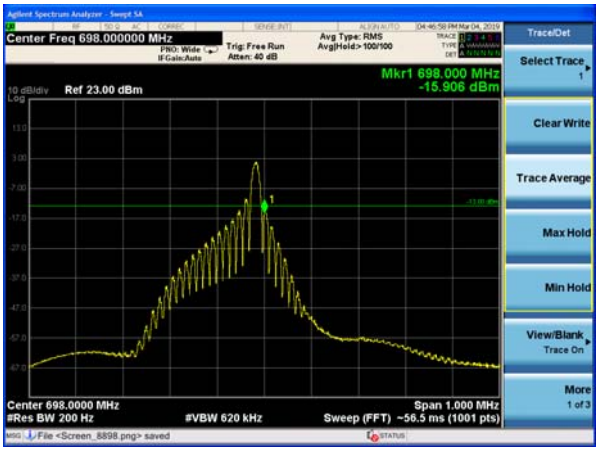
NB-IOT Band 71 QPSK 3.75kHz 1@0 CH-High



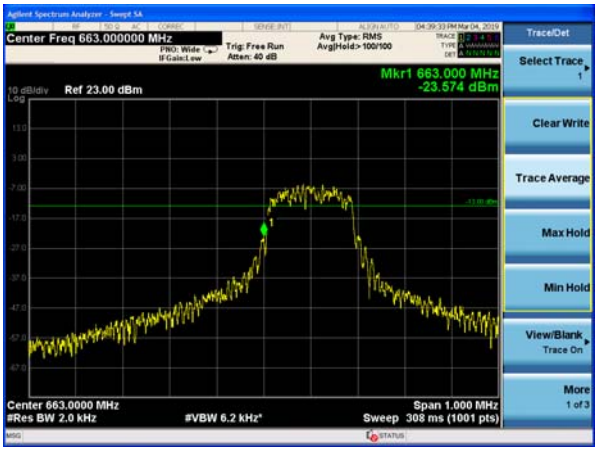
NB-IOT Band 71 QPSK 15kHz 1@0 CH-Low



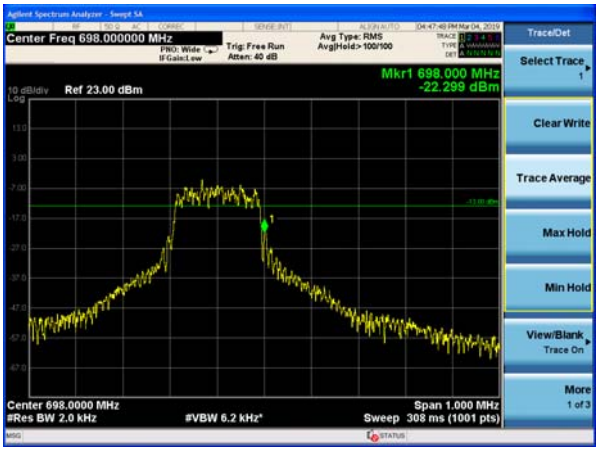
NB-IOT Band 71 QPSK 15kHz 1@0 CH-High

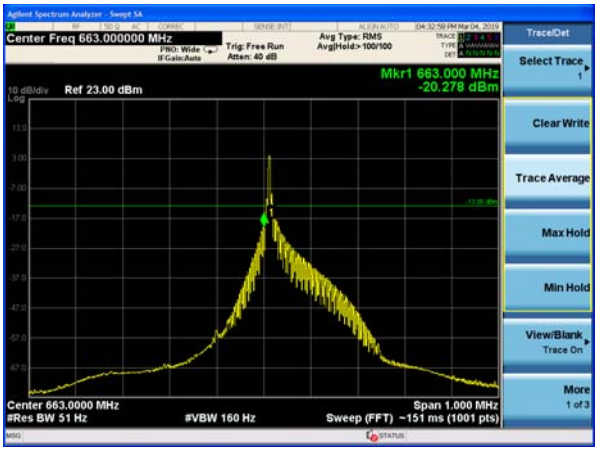
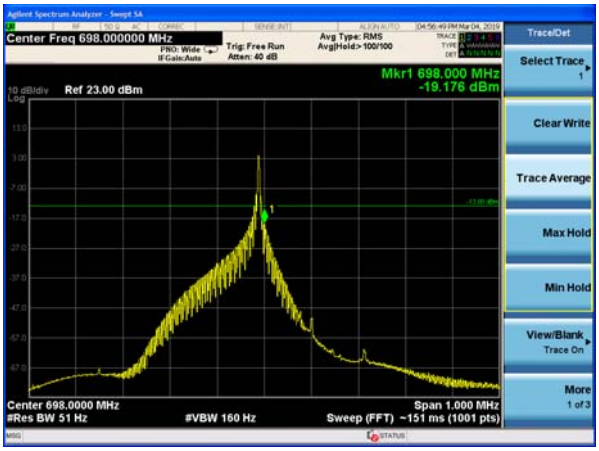
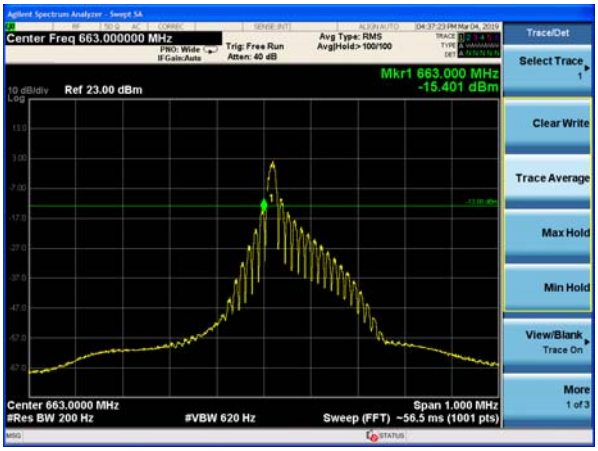
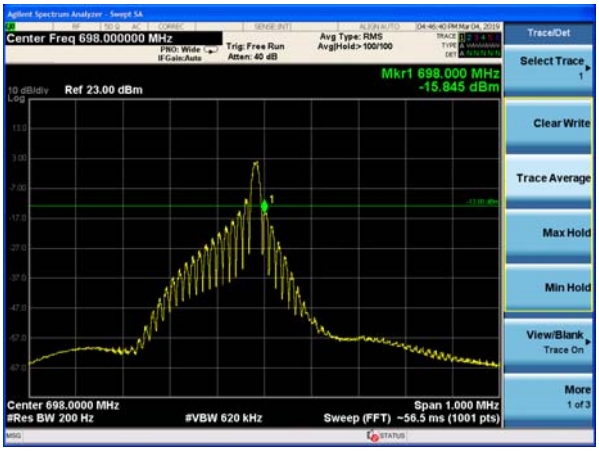


NB-IOT Band 71 QPSK 15kHz 12@0 CH-Low



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



NB-IOT Band 71 BPSK 3.75kHz 1@0 CH-Low	NB-IOT Band 71 BPSK 3.75kHz 1@0 CH-High
	
NB-IOT Band 71 BPSK 15kHz 1@0 CH-Low	NB-IOT Band 71 BPSK 15kHz 1@0 CH-High
	

5.5 Peak-to-Average Power Ratio (PAPR)

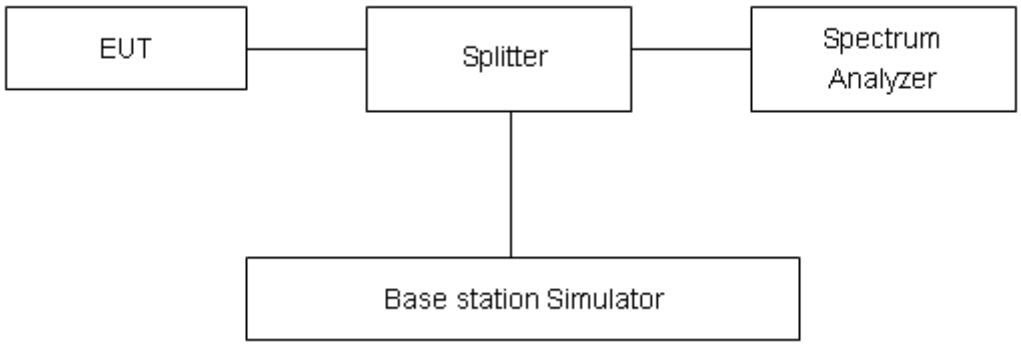
Ambient condition

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:
PAPR (dB) = PPk (dBm) - 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 thenormal 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)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
Band 4 Standalone	BPSK	3.75	20175/1732.5	25.15	21.72	3.43
	QPSK	3.75	20175/1732.5	24.82	21.72	3.10
	BPSK	15	20175/1732.5	24.96	18.70	6.26
	QPSK	15	20175/1732.5	24.82	18.73	6.09

Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
Band 12 Standalone	BPSK	3.75	23095/707.5	25.52	22.13	3.39
	QPSK	3.75	23095/707.5	25.18	22.14	3.04
	BPSK	15	23095/707.5	25.33	19.07	6.26
	QPSK	15	23095/707.5	25.14	19.00	6.14

Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
Band 66 Standalone	BPSK	3.75	132322/1745	25.30	21.89	3.41
	QPSK	3.75	132322/1745	24.99	21.92	3.07
	BPSK	15	132322/1745	24.97	18.65	6.32
	QPSK	15	132322/1745	24.86	18.72	6.14

Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
Band 71 Standalone	BPSK	3.75	133297/680.5	25.87	22.39	3.48
	QPSK	3.75	133297/680.5	25.52	22.42	3.10
	BPSK	15	133297/680.5	25.59	19.34	6.25
	QPSK	15	133297/680.5	25.44	19.32	6.12

5.6 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 -30°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 -30°C to +85°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

Frequency Stability (Voltage Variation)

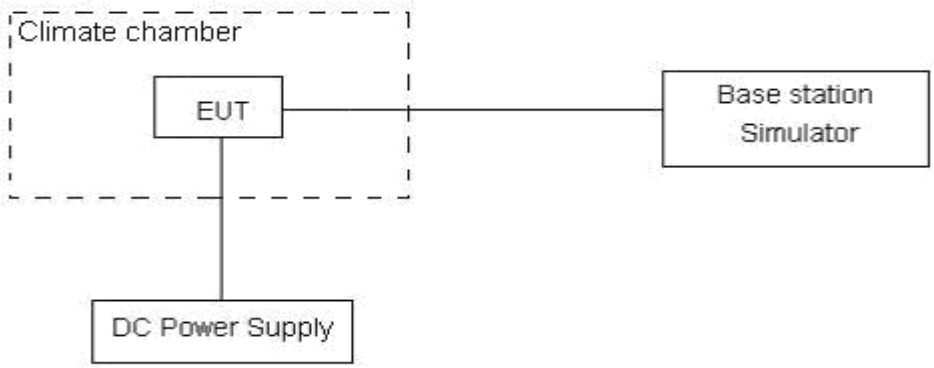
The frequency stability shall be measured with variation of primary supply voltage as follows:

(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 2.5 V and 3.63 V, with a nominal voltage of 3.3V.

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=0.01ppm.

Test Result

NB-IOT Band 4						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
BANDWIDTH	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal（25℃）	Normal	4.96	5.28	0.00264	0.00281	PASS
Extreme（85℃）		8.78	6.75	0.00467	0.00359	PASS
Extreme（80℃）		6.76	14.96	0.00360	0.00795	PASS
Extreme（70℃）		2.65	7.64	0.00141	0.00407	PASS
Extreme（60℃）		14.13	2.07	0.00752	0.00110	PASS
Extreme（50℃）		14.01	7.40	0.00745	0.00393	PASS
Extreme（40℃）		2.75	1.67	0.00146	0.00089	PASS
Extreme（30℃）		15.61	2.11	0.00830	0.00112	PASS
Extreme（20℃）		4.33	11.08	0.00230	0.00589	PASS
Extreme（10℃）		1.68	5.00	0.00089	0.00266	PASS
Extreme（0℃）		3.28	9.11	0.00175	0.00485	PASS
Extreme（-10℃）		15.90	11.37	0.00846	0.00605	PASS
Extreme（-20℃）		1.29	6.93	0.00069	0.00369	PASS
Extreme（-30℃）		13.53	9.27	0.00720	0.00493	PASS
25℃	LV	6.64	10.72	0.00353	0.00570	PASS
	HV	17.63	11.29	0.00938	0.00600	PASS

NB-IOT Band 4						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
BANDWIDTH	15					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal（25℃）	Normal	8.37	14.04	0.00445	0.00747	PASS
Extreme（85℃）		8.19	17.96	0.00436	0.00955	PASS
Extreme（80℃）		15.57	1.16	0.00828	0.00062	PASS
Extreme（70℃）		8.18	8.18	0.00435	0.00435	PASS
Extreme（60℃）		12.04	3.67	0.00641	0.00195	PASS
Extreme（50℃）		17.70	3.23	0.00942	0.00172	PASS
Extreme（40℃）		14.97	14.98	0.00796	0.00797	PASS
Extreme（30℃）		10.33	11.98	0.00550	0.00637	PASS
Extreme（20℃）		7.64	14.32	0.00406	0.00762	PASS
Extreme（10℃）		14.80	5.08	0.00787	0.00270	PASS
Extreme（0℃）		5.75	10.71	0.00306	0.00569	PASS
Extreme（-10℃）		6.05	7.23	0.00322	0.00385	PASS
Extreme（-20℃）		15.23	4.22	0.00810	0.00224	PASS
Extreme（-30℃）		7.94	7.72	0.00422	0.00411	PASS
25℃	LV	8.45	4.42	0.00450	0.00235	PASS
	HV	6.90	10.93	0.00367	0.00581	PASS

NB-IOT Band 12						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
BANDWIDTH	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal（25℃）	Normal	9.60	9.12	0.00511	0.00485	PASS
Extreme（85℃）		14.01	6.60	0.00745	0.00351	PASS
Extreme（80℃）		1.45	15.37	0.00077	0.00817	PASS
Extreme（70℃）		16.68	4.29	0.00887	0.00228	PASS
Extreme（60℃）		1.58	9.55	0.00084	0.00508	PASS
Extreme（50℃）		8.55	17.17	0.00455	0.00913	PASS
Extreme（40℃）		3.87	11.12	0.00206	0.00591	PASS
Extreme（30℃）		11.57	17.33	0.00616	0.00922	PASS
Extreme（20℃）		7.28	5.62	0.00387	0.00299	PASS
Extreme（10℃）		2.46	10.50	0.00131	0.00558	PASS
Extreme（0℃）		7.83	1.63	0.00416	0.00087	PASS
Extreme（-10℃）		16.98	2.87	0.00903	0.00153	PASS
Extreme（-20℃）		4.49	14.01	0.00239	0.00745	PASS
Extreme（-30℃）		8.86	3.87	0.00472	0.00206	PASS
25℃	LV	1.54	4.39	0.00082	0.00234	PASS
	HV	1.41	1.07	0.00075	0.00057	PASS

NB-IOT Band 12						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
BANDWIDTH	15					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal（25℃）	Normal	15.11	4.72	0.00804	0.00251	PASS
Extreme（85℃）		5.75	13.91	0.00306	0.00740	PASS
Extreme（80℃）		14.68	4.57	0.00781	0.00243	PASS
Extreme（70℃）		4.70	14.40	0.00250	0.00766	PASS
Extreme（60℃）		16.77	17.36	0.00892	0.00923	PASS
Extreme（50℃）		5.61	10.37	0.00298	0.00552	PASS
Extreme（40℃）		3.75	7.13	0.00199	0.00379	PASS
Extreme（30℃）		5.40	4.88	0.00287	0.00259	PASS
Extreme（20℃）		1.57	6.58	0.00084	0.00350	PASS
Extreme（10℃）		16.18	2.75	0.00860	0.00146	PASS
Extreme（0℃）		13.15	3.69	0.00700	0.00196	PASS
Extreme（-10℃）		13.89	14.93	0.00739	0.00794	PASS
Extreme（-20℃）		12.97	9.92	0.00690	0.00528	PASS
Extreme（-30℃）		6.44	1.66	0.00343	0.00088	PASS
25℃	LV	5.47	7.20	0.00291	0.00383	PASS
	HV	2.98	15.92	0.00158	0.00847	PASS

NB-IOT Band 66						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
BANDWIDTH	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal（25℃）	Normal	2.61	11.26	0.00139	0.00599	PASS
Extreme（85℃）		3.83	1.42	0.00204	0.00076	PASS
Extreme（80℃）		14.23	17.69	0.00757	0.00941	PASS
Extreme（70℃）		2.18	12.71	0.00116	0.00676	PASS
Extreme（60℃）		2.02	5.57	0.00107	0.00296	PASS
Extreme（50℃）		16.58	3.42	0.00882	0.00182	PASS
Extreme（40℃）		6.31	2.28	0.00335	0.00121	PASS
Extreme（30℃）		17.87	12.82	0.00951	0.00682	PASS
Extreme（20℃）		17.02	7.94	0.00905	0.00422	PASS
Extreme（10℃）		15.61	1.58	0.00830	0.00084	PASS
Extreme（0℃）		10.41	8.48	0.00554	0.00451	PASS
Extreme（-10℃）		13.28	8.31	0.00706	0.00442	PASS
Extreme（-20℃）		6.22	17.28	0.00331	0.00919	PASS
Extreme（-30℃）		8.59	3.23	0.00457	0.00172	PASS
25℃	LV	2.39	14.17	0.00127	0.00754	PASS
	HV	16.25	17.11	0.00864	0.00910	PASS

NB-IOT Band 66						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
BANDWIDTH	15					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal（25℃）	Normal	11.38	3.96	0.00605	0.00211	PASS
Extreme（85℃）		10.25	5.39	0.00545	0.00287	PASS
Extreme（80℃）		7.89	9.91	0.00420	0.00527	PASS
Extreme（70℃）		10.06	15.12	0.00535	0.00804	PASS
Extreme（60℃）		1.09	15.37	0.00058	0.00818	PASS
Extreme（50℃）		2.06	4.62	0.00110	0.00246	PASS
Extreme（40℃）		17.72	17.01	0.00943	0.00905	PASS
Extreme（30℃）		9.90	9.86	0.00527	0.00524	PASS
Extreme（20℃）		13.88	17.45	0.00738	0.00928	PASS
Extreme（10℃）		2.03	6.62	0.00108	0.00352	PASS
Extreme（0℃）		6.51	9.25	0.00346	0.00492	PASS
Extreme（-10℃）		8.76	12.75	0.00466	0.00678	PASS
Extreme（-20℃）		8.94	9.94	0.00475	0.00529	PASS
Extreme（-30℃）		3.31	10.34	0.00176	0.00550	PASS
25℃	LV	10.16	15.40	0.00540	0.00819	PASS
	HV	17.82	1.11	0.00948	0.00059	PASS

NB-IOT Band 71						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
BANDWIDTH	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal（25℃）	Normal	4.06	9.07	0.00216	0.00483	PASS
Extreme（85℃）		9.88	1.21	0.00526	0.00064	PASS
Extreme（80℃）		3.20	5.10	0.00170	0.00271	PASS
Extreme（70℃）		16.80	8.22	0.00893	0.00437	PASS
Extreme（60℃）		4.86	15.50	0.00258	0.00825	PASS
Extreme（50℃）		13.27	13.43	0.00706	0.00714	PASS
Extreme（40℃）		6.71	14.79	0.00357	0.00787	PASS
Extreme（30℃）		11.22	12.76	0.00597	0.00679	PASS
Extreme（20℃）		10.10	9.93	0.00537	0.00528	PASS
Extreme（10℃）		9.16	11.25	0.00487	0.00598	PASS
Extreme（0℃）		17.78	10.68	0.00946	0.00568	PASS
Extreme（-10℃）		8.47	7.49	0.00450	0.00399	PASS
Extreme（-20℃）		6.75	4.08	0.00359	0.00217	PASS
Extreme（-30℃）		4.20	4.28	0.00223	0.00228	PASS
25℃	LV	13.72	7.25	0.00730	0.00386	PASS
	HV	11.21	5.74	0.00596	0.00306	PASS

NB-IOT Band 71						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
BANDWIDTH	15					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal（25℃）	Normal	4.83	3.82	0.00257	0.00203	PASS
Extreme（85℃）		2.91	7.78	0.00155	0.00414	PASS
Extreme（80℃）		12.91	8.48	0.00687	0.00451	PASS
Extreme（70℃）		6.96	11.72	0.00370	0.00623	PASS
Extreme（60℃）		3.72	13.10	0.00198	0.00697	PASS
Extreme（50℃）		17.70	14.70	0.00941	0.00782	PASS
Extreme（40℃）		16.22	6.03	0.00863	0.00321	PASS
Extreme（30℃）		5.80	10.25	0.00309	0.00545	PASS
Extreme（20℃）		8.63	3.26	0.00459	0.00173	PASS
Extreme（10℃）		14.04	5.38	0.00747	0.00286	PASS
Extreme（0℃）		9.78	12.89	0.00520	0.00686	PASS
Extreme（-10℃）		13.23	13.56	0.00704	0.00721	PASS
Extreme（-20℃）		3.01	2.69	0.00160	0.00143	PASS
Extreme（-30℃）		15.68	7.99	0.00834	0.00425	PASS
25℃	LV	6.20	3.10	0.00330	0.00165	PASS
	HV	12.42	3.64	0.00661	0.00194	PASS

5.7 Spurious Emissions at Antenna Terminals

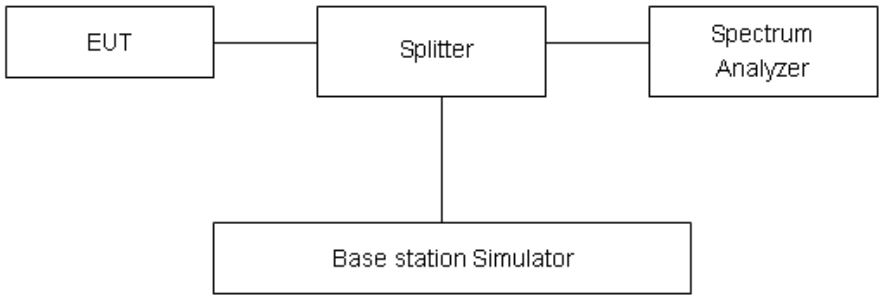
Ambient condition

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 log10 (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.

Part 27.53(h)/(g) Limit	-13 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.

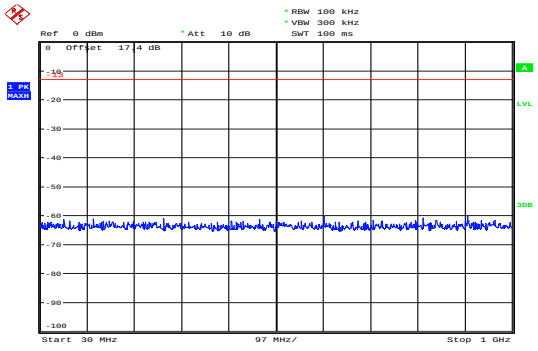
Frequency	Uncertainty
9kHz-1GHz	0.684 dB
1GHz-27GHz	1.407 dB

Test Result

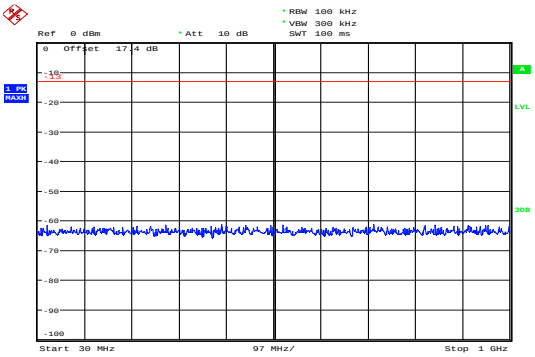
Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

The signal beyond the limit is carrier.

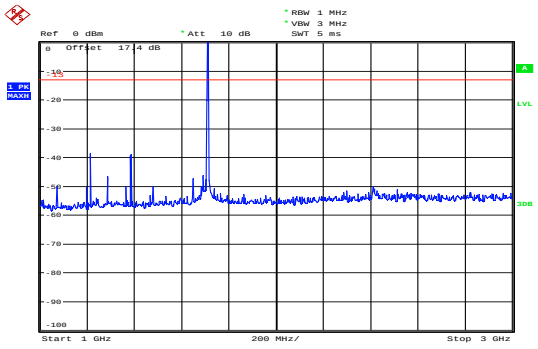
NB-IOT Band 4 QPSK 15KHz CH-Low
30MHz~1GHz



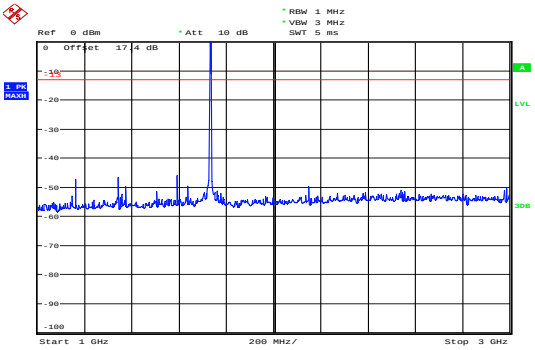
NB-IOT Band 4 QPSK 15KHz CH-Middle
30MHz~1GHz



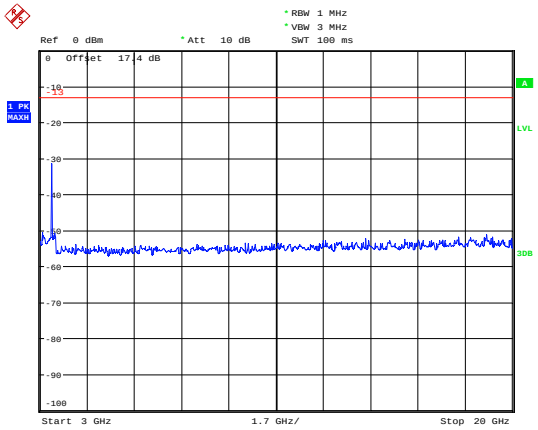
NB-IOT Band 4 QPSK 15KHz CH-Low
1GHz~3GHz



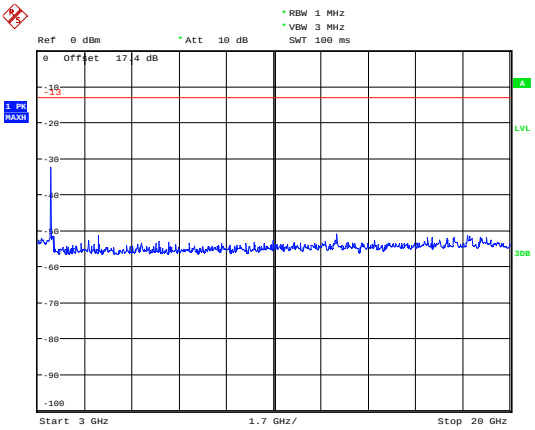
NB-IOT Band 4 QPSK 15KHz CH-Middle
1GHz~3GHz



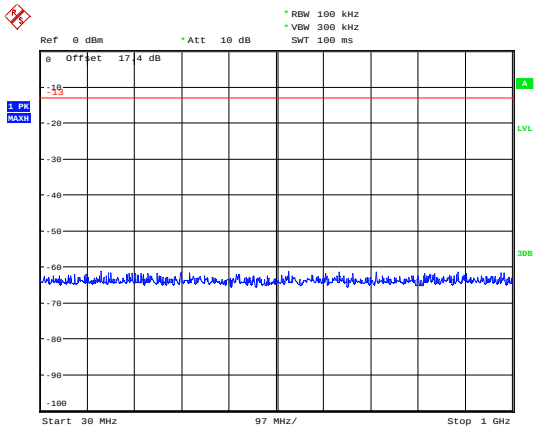
NB-IOT Band 4 QPSK 15KHz CH-Low
3GHz~20GHz



NB-IOT Band 4 QPSK 15KHz CH-Middle
3GHz~20GHz

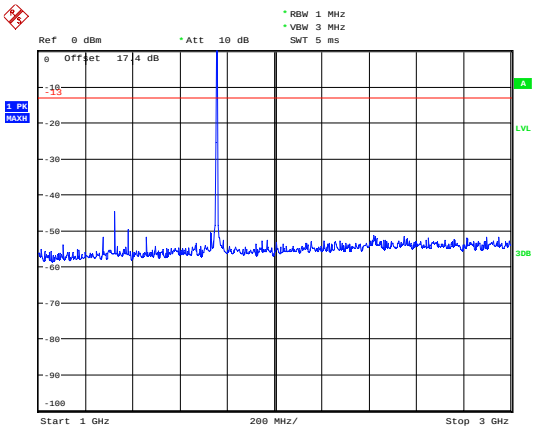


NB-IOT Band 4 QPSK 15KHz CH-High
30MHz~1GHz



Date: 9.MAR.2019 17:51:47

NB-IOT Band 4 QPSK 15KHz CH-High
1GHz~3GHz



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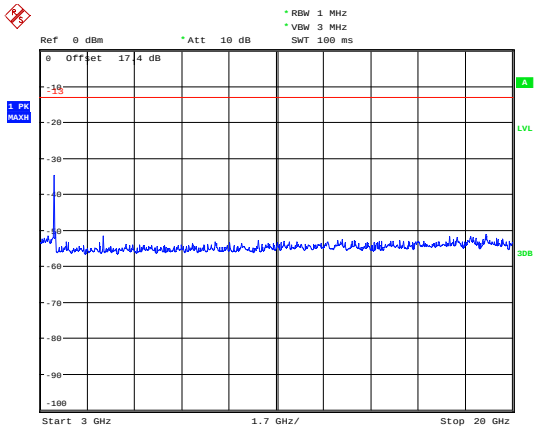
NB-IOT Band 4 QPSK 15KHz CH-High
3GHz~20GHz



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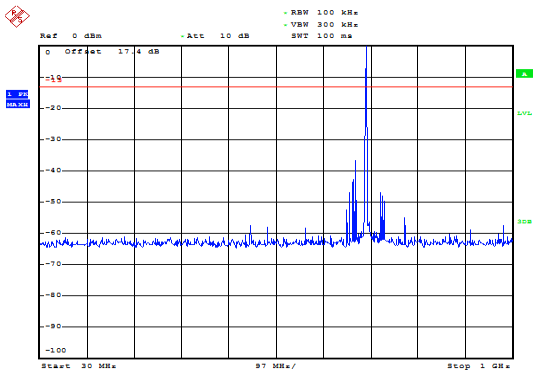
NB-IOT Band 12 QPSK 15KHz CH-Low
30MHz~1GHz



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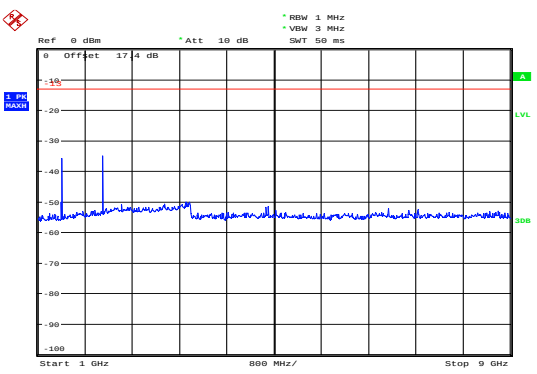
NB-IOT Band 12 QPSK 15KHz CH-Low
1GHz~9GHz



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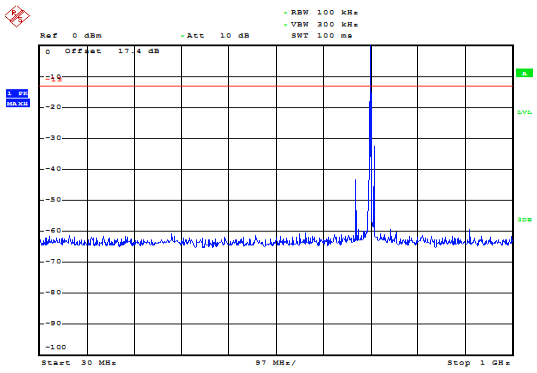
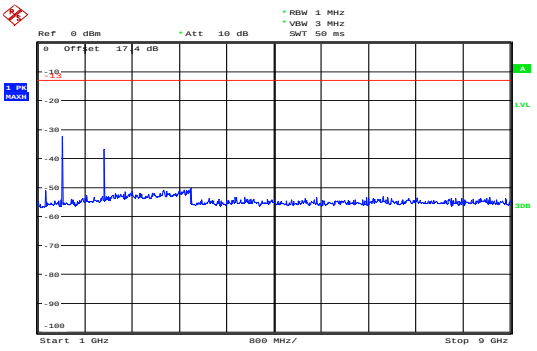
NB-IOT Band 12 QPSK 15KHz CH-Middle
30MHz~1GHz



Date: 9.MAR.2019 18:50:17

NB-IOT Band 12 QPSK 15KHz CH-Middle
1GHz~9GHz



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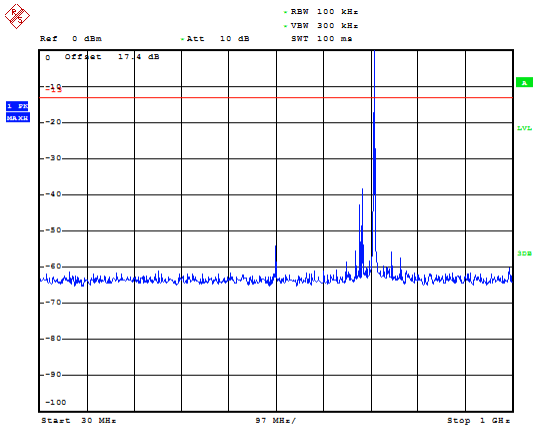
NB-IOT Band 12 QPSK 15KHz CH-High
30MHz~1GHz



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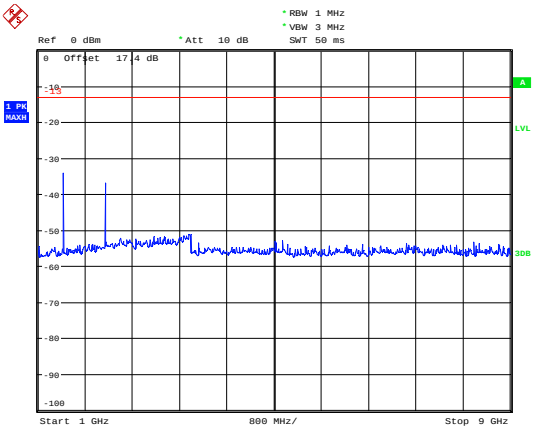
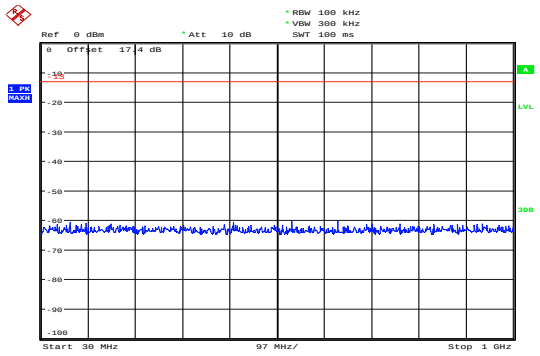
NB-IOT Band 12 QPSK 15KHz CH-High
1GHz~9GHz



Date: 9.MAR.2019 18:59:07

NB-IOT Band 66 QPSK 15KHz CH-Low
30MHz~1GHz



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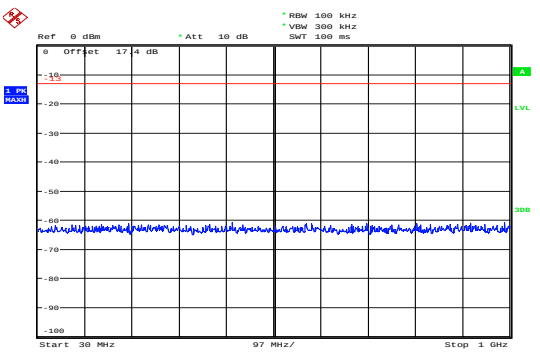
NB-IOT Band 66 QPSK 15KHz CH-Middle
30MHz~1GHz



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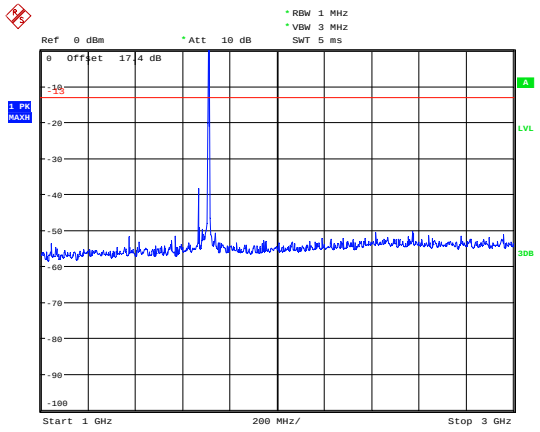
NB-IOT Band 66 QPSK 15KHz CH-Low
1GHz~3GHz



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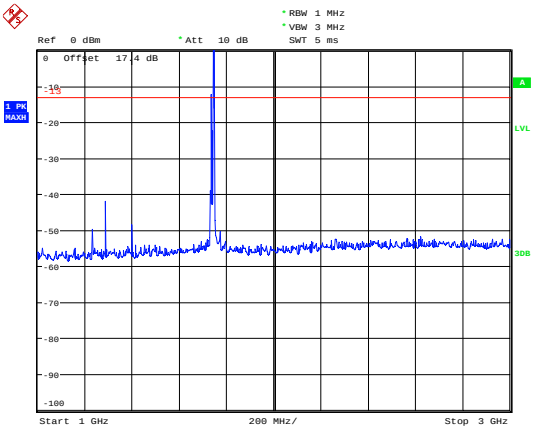
NB-IOT Band 66 QPSK 15KHz CH-Middle
1GHz~3GHz



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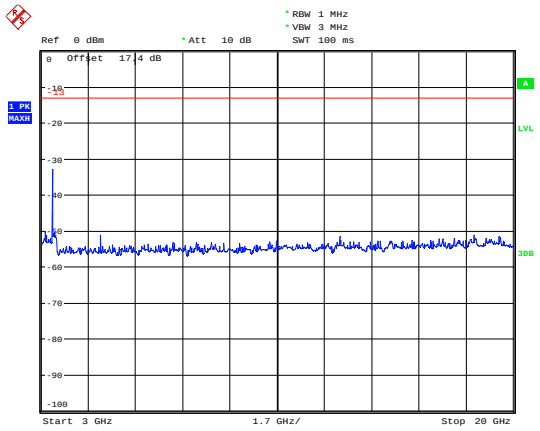
NB-IOT Band 66 QPSK 15KHz CH-Low
3GHz~20GHz



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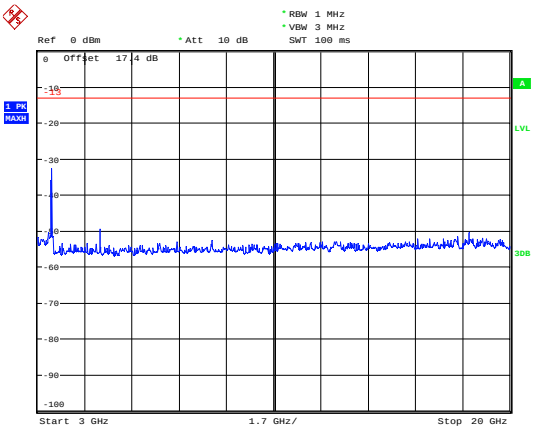
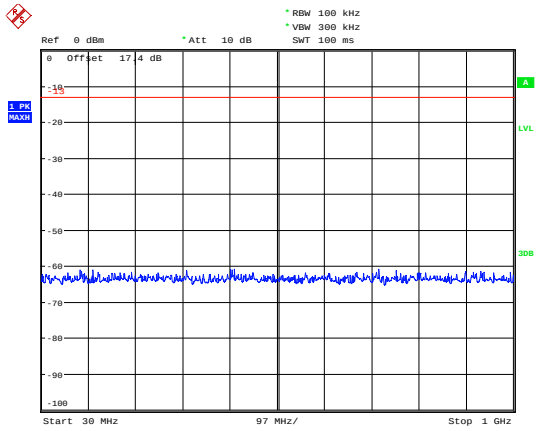
NB-IOT Band 66 QPSK 15KHz CH-Middle
3GHz~20GHz



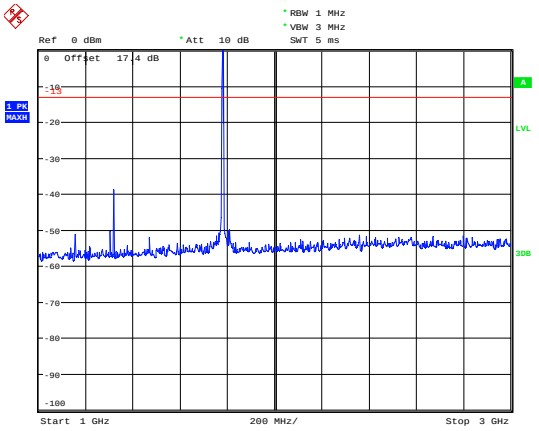
Date: 9.MAR.2019 21:50:07

NB-IOT Band 66 QPSK 15KHz CH-High
30MHz~1GHz



Date: 9.MAR.2019 21:51:56

NB-IOT Band 66 QPSK 15KHz CH-High
1GHz~3GHz



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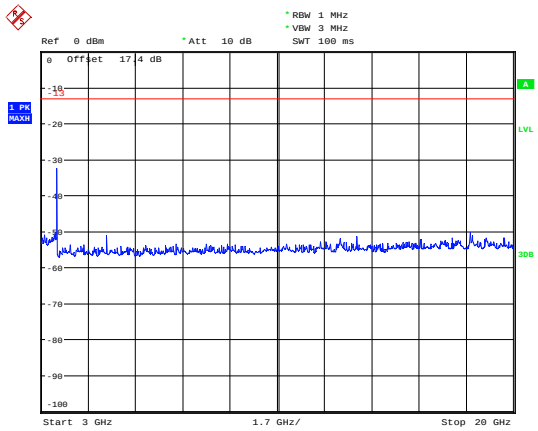
NB-IOT Band 66 QPSK 15KHz CH-High
3GHz~20GHz



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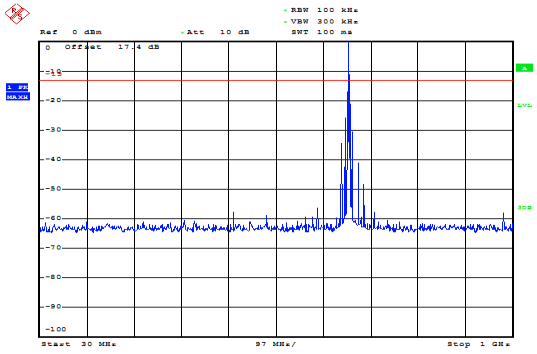
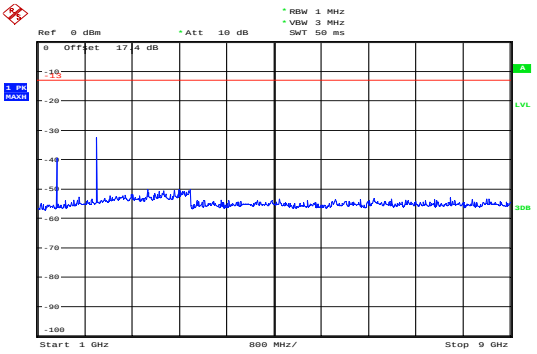
NB-IOT Band 71 QPSK 15KHz CH-Low
30MHz~1GHz



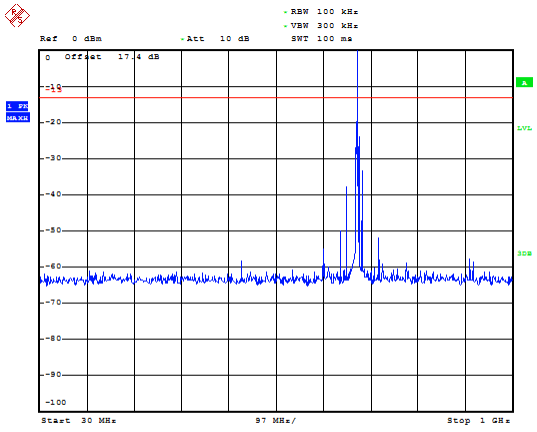
Date: 9.MAR.2019 21:39:14

NB-IOT Band 71 QPSK 15KHz CH-Low
1GHz~9GHz



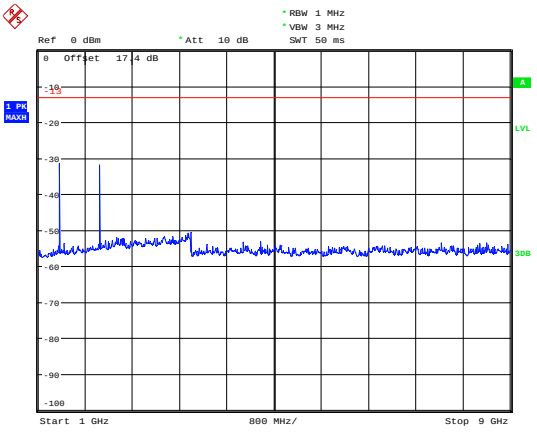
Date: 9.MAR.2019 21:38:48

NB-IOT Band 71 QPSK 15KHz CH-Middle
30MHz~1GHz



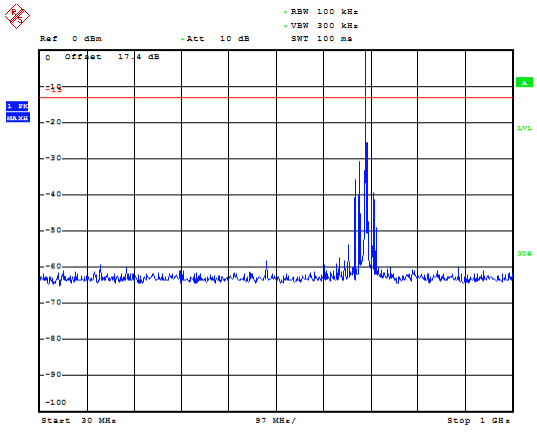
Date: 9.MAR.2019 21:40:18

NB-IOT Band 71 QPSK 15KHz CH-Middle
1GHz~9GHz



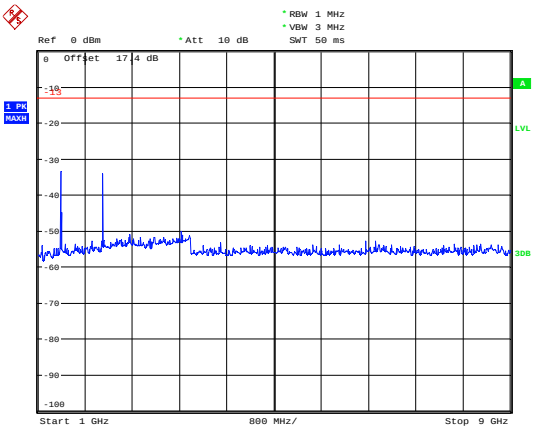
Date: 9.MAR.2019 21:40:51

NB-IOT Band 71 QPSK 15KHz CH-High
30MHz~1GHz



Date: 9.MAR.2019 21:42:50

NB-IOT Band 71 QPSK 15KHz CH-High
1GHz~9GHz



Date: 9.MAR.2019 21:42:25

5.8 Radiates Spurious Emission

Ambient condition

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

Method of Measurement

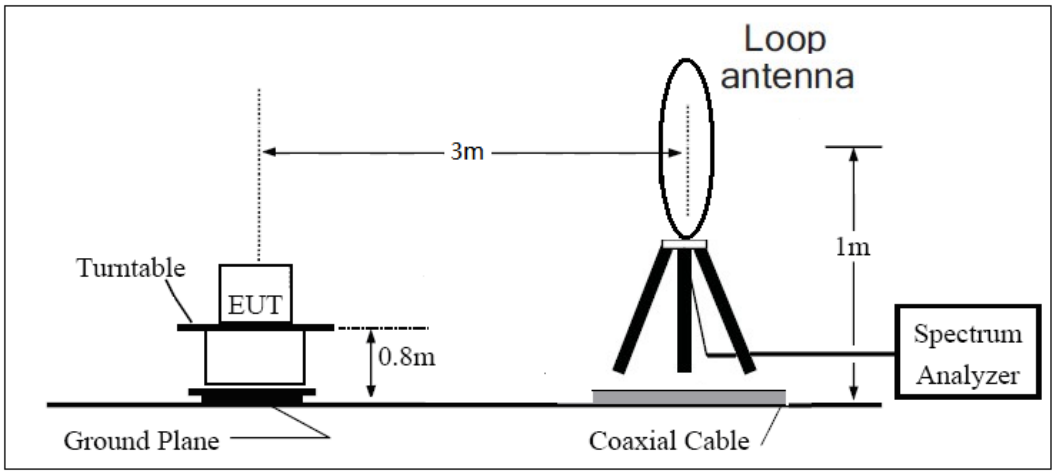
1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI C63.26 (2015).
2. Below 1GHz: The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable 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:
Power(EIRP)=PMea- PAg - Pcl + Ga
The measurement results are amend as described below:
Power(EIRP)=PMea- Pcl + 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.

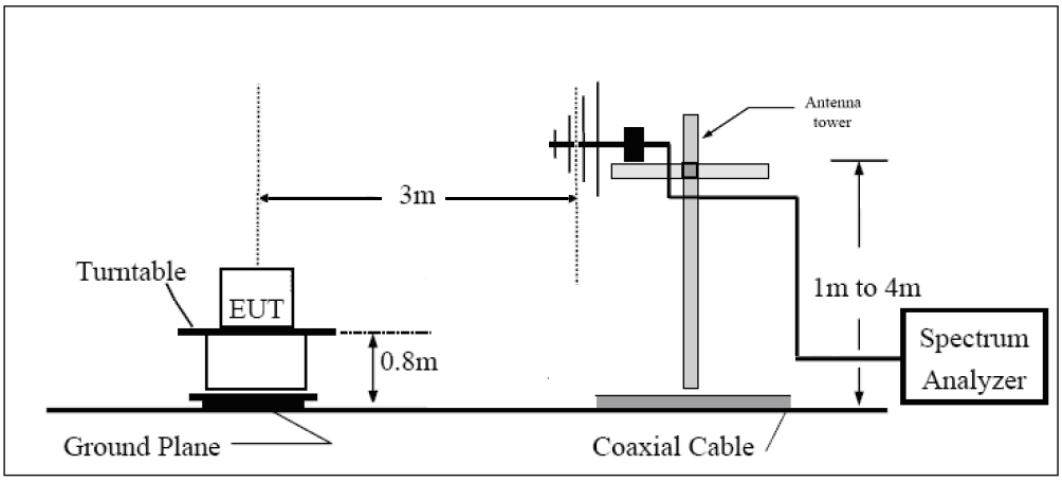
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

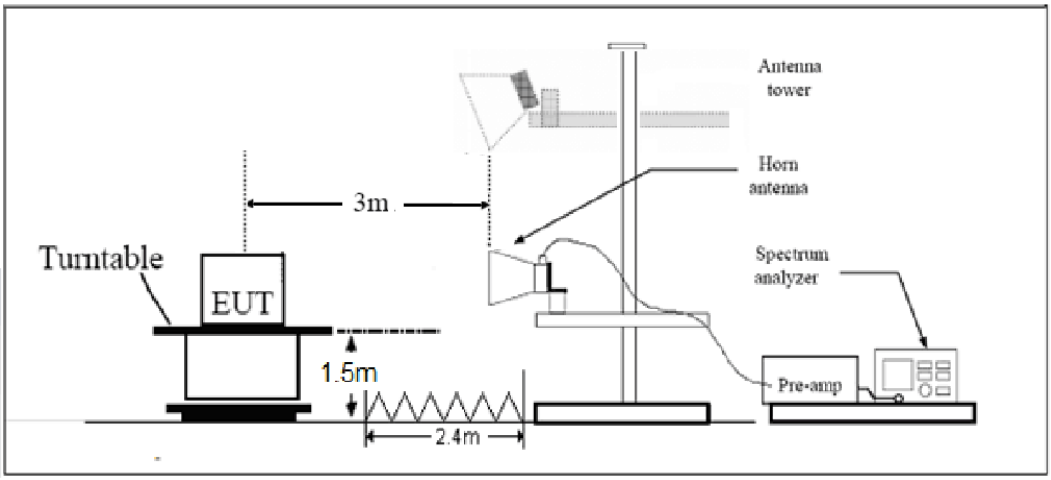
9KHz ~ 30MHz



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 log10 (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.

Part 27.53(h)/(g) Limit	-13 dBm

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95％ confidence level for the normal distribution is with the coverage factor k = ±1.96, U= ±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 3.75KHz+BPSK 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	-61.01	2.6	10.15	Vertical	-53.46	-13.00	40.46	45
3	5130.0	-54.82	2.4	11.35	Vertical	-45.87	-13.00	32.87	0
4	6840.0	-40.90	4.5	10.85	Vertical	-34.55	-13.00	21.55	135
5	8550.0	-54.88	5.1	11.35	Vertical	-48.63	-13.00	35.63	90
6	10260.0	-52.75	5.3	11.95	Vertical	-46.10	-13.00	33.10	225
7	11970.0	-53.39	5.5	13.55	Vertical	-45.34	-13.00	32.34	315
8	13680.0	-51.09	6.3	13.75	Vertical	-43.64	-13.00	30.64	225
9	15390.0	-53.81	6.7	13.85	Vertical	-46.66	-13.00	33.66	270
10	17100.0	-51.10	6.8	14.25	Vertical	-43.65	-13.00	30.65	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 Vertical position.									

NB-IOT Band 4 3.75KHz+BPSK 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	-61.98	2.6	10.75	Vertical	-53.83	-13.00	40.83	0
3	5197.5	-52.57	2.4	11.05	Vertical	-43.92	-13.00	30.92	45
4	6930.0	-39.61	4.5	11.15	Vertical	-32.96	-13.00	19.96	315
5	8662.5	-55.25	5.1	11.35	Vertical	-49.00	-13.00	36.00	135
6	10395.0	-53.49	5.3	11.95	Vertical	-46.84	-13.00	33.84	0
7	12127.5	-53.26	5.5	13.55	Vertical	-45.21	-13.00	32.21	225
8	13860.0	-51.87	6.3	13.75	Vertical	-44.42	-13.00	31.42	45
9	15592.5	-53.65	6.7	13.85	Vertical	-46.50	-13.00	33.50	315
10	17325.0	-50.67	6.8	14.25	Vertical	-43.22	-13.00	30.22	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 Vertical position.									

NB-IOT Band 4 3.75KHz+BPSK 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	-58.59	2.6	10.15	Vertical	-51.04	-13.00	38.04	270
3	5264.7	-48.46	2.4	11.05	Vertical	-39.81	-13.00	26.81	180
4	7019.6	-41.31	4.5	11.15	Vertical	-34.66	-13.00	21.66	0
5	8774.5	-54.64	5.1	11.35	Vertical	-48.39	-13.00	35.39	45
6	10529.4	-55.04	5.3	11.95	Vertical	-48.39	-13.00	35.39	315
7	12284.3	-53.90	5.5	13.55	Vertical	-45.85	-13.00	32.85	45
8	14039.2	-50.41	6.3	13.75	Vertical	-42.96	-13.00	29.96	315
9	15794.1	-53.47	6.7	13.85	Vertical	-46.32	-13.00	33.32	135
10	17549.0	-50.94	6.8	14.25	Vertical	-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 Vertical position.									

NB-IOT Band 12 3.75KHz+BPSK CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1399.4	-38.50	2.00	10.15	Vertical	-32.50	-13.00	19.50	270
3	2099.1	-54.23	2.50	11.35	Vertical	-47.53	-13.00	34.53	180
4	2798.8	-58.39	4.20	10.85	Vertical	-53.89	-13.00	40.89	0
5	3498.5	-61.75	5.20	11.35	Vertical	-57.75	-13.00	44.75	315
6	4198.2	-60.76	5.50	11.95	Vertical	-56.46	-13.00	43.46	225
7	4897.9	-58.85	5.70	13.55	Vertical	-53.15	-13.00	40.15	270
8	5597.6	-54.62	6.30	13.75	Vertical	-49.32	-13.00	36.32	180
9	6297.3	-43.91	6.80	13.85	Vertical	-39.01	-13.00	26.01	0
10	6997.0	-51.64	6.90	14.25	Vertical	-46.44	-13.00	33.44	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 Vertical position.									

NB-IOT Band 12 3.75KHz+BPSK CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1415.0	-40.34	2.00	10.75	Vertical	-33.74	-13.00	20.74	45
3	2122.5	-56.99	2.51	11.05	Vertical	-50.60	-13.00	37.60	315
4	2830.0	-58.86	4.20	11.15	Vertical	-54.06	-13.00	41.06	135
5	3537.5	-61.93	5.20	11.15	Vertical	-58.13	-13.00	45.13	45
6	4245.0	-61.19	5.50	11.95	Vertical	-56.89	-13.00	43.89	315
7	4952.5	-57.28	5.70	13.55	Vertical	-51.58	-13.00	38.58	225
8	5660.0	-55.38	6.30	13.75	Vertical	-50.08	-13.00	37.08	270
9	6367.5	-41.35	6.80	13.85	Vertical	-36.45	-13.00	23.45	180
10	7075.0	-47.51	6.90	14.25	Vertical	-42.31	-13.00	29.31	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 Vertical position.									

NB-IOT Band 12 3.75KHz+BPSK CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1430.6	-40.98	2.00	10.15	Vertical	-34.98	-13.00	21.98	0
3	2145.9	-58.74	2.51	11.05	Vertical	-52.35	-13.00	39.35	225
4	2861.2	-57.87	4.20	11.15	Vertical	-53.07	-13.00	40.07	45
5	3576.5	-62.00	5.20	11.15	Vertical	-58.20	-13.00	45.20	45
6	4291.8	-59.02	5.50	11.95	Vertical	-54.72	-13.00	41.72	315
7	5007.1	-57.77	5.70	13.55	Vertical	-52.07	-13.00	39.07	45
8	5722.4	-51.56	6.30	13.75	Vertical	-46.26	-13.00	33.26	315
9	6437.7	-42.88	6.80	13.85	Vertical	-37.98	-13.00	24.98	225
10	7153.0	-48.57	6.90	14.25	Vertical	-43.37	-13.00	30.37	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 Vertical position.									

NB-IOT Band 66 3.75KHz+BPSK CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3421.4	-60.54	2.6	10.15	Vertical	-52.99	-13.00	39.99	45
3	5131.1	-54.06	2.4	11.35	Vertical	-45.11	-13.00	32.11	315
4	6842.8	-41.35	4.5	10.85	Vertical	-35.00	-13.00	22.00	225
5	8553.5	-53.88	5.1	11.35	Vertical	-47.63	-13.00	34.63	270
6	10264.2	-53.65	5.3	11.95	Vertical	-47.00	-13.00	34.00	180
7	11974.9	-54.32	5.5	13.55	Vertical	-46.27	-13.00	33.27	0
8	13685.6	-52.45	6.3	13.75	Vertical	-45.00	-13.00	32.00	225
9	15396.3	-53.94	6.7	13.85	Vertical	-46.79	-13.00	33.79	45
10	17107	-51.76	6.8	14.25	Vertical	-44.31	-13.00	31.31	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 Vertical position.									

NB-IOT Band 66 3.75KHz+BPSK CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3464.3	-58.84	2.6	10.75	Vertical	-50.69	-13.00	37.69	225
3	5197.5	-50.30	2.4	11.05	Vertical	-41.65	-13.00	28.65	270
4	6930	-40.68	4.5	11.15	Vertical	-34.03	-13.00	21.03	225
5	8662.5	-55.42	5.1	11.35	Vertical	-49.17	-13.00	36.17	45
6	10395	-52.60	5.3	11.95	Vertical	-45.95	-13.00	32.95	315
7	12127.5	-54.09	5.5	13.55	Vertical	-46.04	-13.00	33.04	225
8	13860	-51.23	6.3	13.75	Vertical	-43.78	-13.00	30.78	270
9	15592.5	-53.81	6.7	13.85	Vertical	-46.66	-13.00	33.66	180
10	17325	-51.04	6.8	14.25	Vertical	-43.59	-13.00	30.59	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 Vertical position.									

NB-IOT Band 66 3.75KHz+BPSK CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3507.8	-55.30	2.6	10.15	Vertical	-47.75	-13.00	34.75	45
3	5261.6	-47.89	2.4	11.05	Vertical	-39.24	-13.00	26.24	315
4	7017.2	-35.26	4.5	11.15	Vertical	-28.61	-13.00	15.61	45
5	8771.5	-53.10	5.1	11.35	Vertical	-46.85	-13.00	33.85	45
6	10525.8	-52.46	5.3	11.95	Vertical	-45.81	-13.00	32.81	315
7	12280.1	-53.30	5.5	13.55	Vertical	-45.25	-13.00	32.25	225
8	14034.4	-50.38	6.3	13.75	Vertical	-42.93	-13.00	29.93	270
9	15788.7	-54.03	6.7	13.85	Vertical	-46.88	-13.00	33.88	180
10	17543	-51.15	6.8	14.25	Vertical	-43.70	-13.00	30.70	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 Vertical position.									

NB-IOT Band 71 3.75KHz+BPSK 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	-44.23	2.00	10.15	Vertical	-38.23	-13.00	25.23	225
3	1989.3	-50.76	2.51	11.35	Vertical	-44.07	-13.00	31.07	270
4	2652.4	-60.78	4.20	10.85	Vertical	-56.28	-13.00	43.28	180
5	3315.5	-61.54	5.20	11.35	Vertical	-57.54	-13.00	44.54	225
6	3978.6	-59.66	5.50	11.95	Vertical	-55.36	-13.00	42.36	45
7	4641.7	-59.67	5.70	13.55	Vertical	-53.97	-13.00	40.97	315
8	5304.8	-58.08	6.30	13.75	Vertical	-52.78	-13.00	39.78	225
9	5967.9	-51.81	6.80	13.85	Vertical	-46.91	-13.00	33.91	270
10	6631.0	-43.03	6.90	14.25	Vertical	-37.83	-13.00	24.83	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 Vertical position.									

NB-IOT Band 71 3.75KHz+BPSK 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	-41.85	2.00	10.75	Vertical	-35.25	-13.00	22.25	0
3	2041.5	-50.47	2.51	11.05	Vertical	-44.08	-13.00	31.08	225
4	2722.0	-59.72	4.20	11.15	Vertical	-54.92	-13.00	41.92	45
5	3402.5	-61.66	5.20	11.15	Vertical	-57.86	-13.00	44.86	225
6	4083.0	-58.68	5.50	11.95	Vertical	-54.38	-13.00	41.38	270
7	4763.5	-59.87	5.70	13.55	Vertical	-54.17	-13.00	41.17	225
8	5444.0	-53.76	6.30	13.75	Vertical	-48.46	-13.00	35.46	45
9	6124.5	-48.23	6.80	13.85	Vertical	-43.33	-13.00	30.33	315
10	6805.0	-48.68	6.90	14.25	Vertical	-43.48	-13.00	30.48	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 Vertical position.									

NB-IOT Band 71 3.75KHz+BPSK CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1395.8	-32.71	2.00	10.15	Vertical	-26.71	-13.00	13.71	315
3	2093.7	-52.55	2.51	11.05	Vertical	-46.16	-13.00	33.16	225
4	2791.6	-59.91	4.20	11.15	Vertical	-55.11	-13.00	42.11	270
5	3489.5	-60.87	5.20	11.15	Vertical	-57.07	-13.00	44.07	270
6	4187.4	-59.84	5.50	11.95	Vertical	-55.54	-13.00	42.54	180
7	4885.3	-57.78	5.70	13.55	Vertical	-52.08	-13.00	39.08	225
8	5583.2	-54.77	6.30	13.75	Vertical	-49.47	-13.00	36.47	45
9	6281.1	-47.79	6.80	13.85	Vertical	-42.89	-13.00	29.89	315
10	6979.0	-51.61	6.90	14.25	Vertical	-46.41	-13.00	33.41	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 Vertical position.									

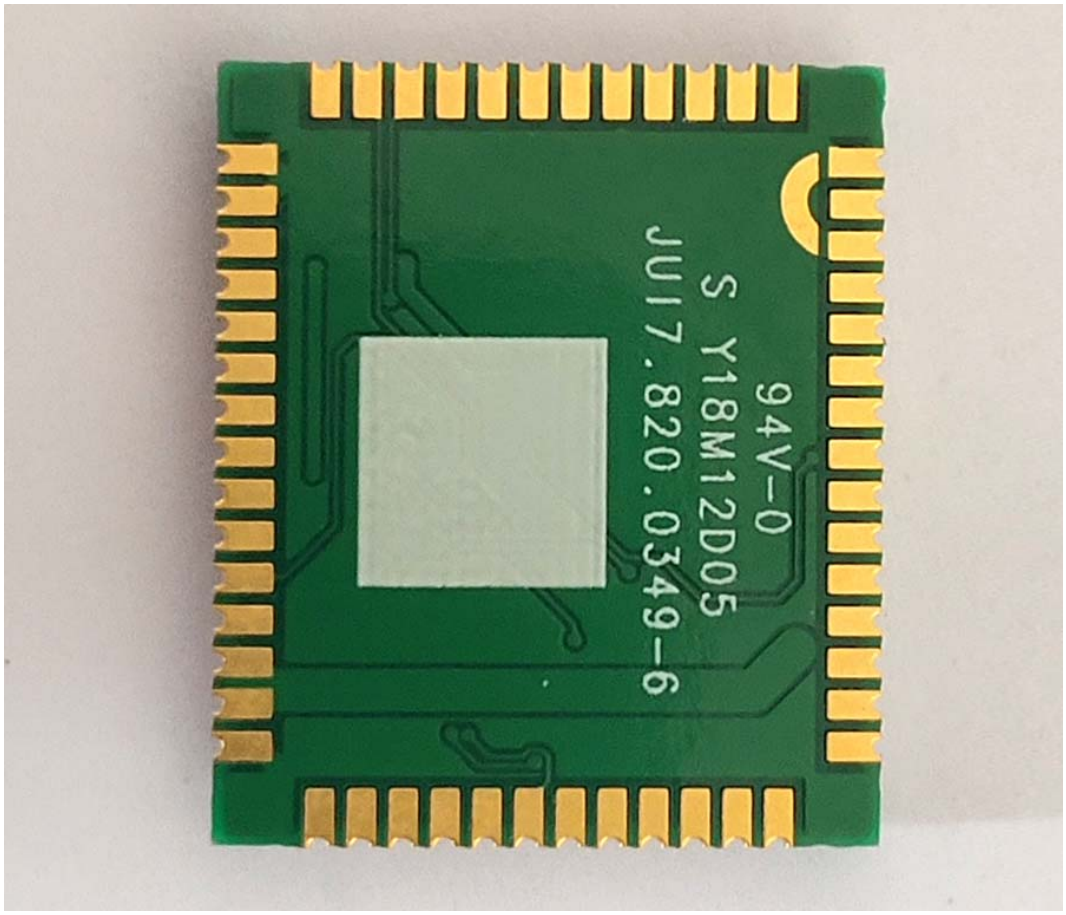
6 Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Base Station Simulator	R&S	CMW500	113824	2018-05-20	2019-05-19
Power Splitter	Hua Xiang	SHX-GF2-2-13	10120101	/	/
Spectrum Analyzer	Key sight	N9010A	MY50210259	2018-05-20	2019-05-19
Signal Analyzer	R&S	FSV30	100815	2018-12-16	2019-12-15
Loop Antenna	SCHWARZBECK	FMZB1519	1519-047	2017-09-26	2019-09-25
Trilog Antenna	SCHWARZBECK	VUBL 9163	9163-201	2017-11-18	2019-11-17
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	2018-05-20	2019-05-19
Climatic Chamber	ESPEC	SU-242	93000506	2017-12-17	2020-12-16
Preampflier	R&S	SCU18	102327	2018-05-20	2019-05-19
MOB COMMS DC SUPPLY	Keysight	66319D	MY43004105	2018-05-21	2019-05-20
RF Cable	Agilent	SMA 15cm	0001	2018-12-16	2019-03-15
Software	R&S	EMC32	9.26.0	/	/

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

ANNEX A: EUT Appearance and Test Setup

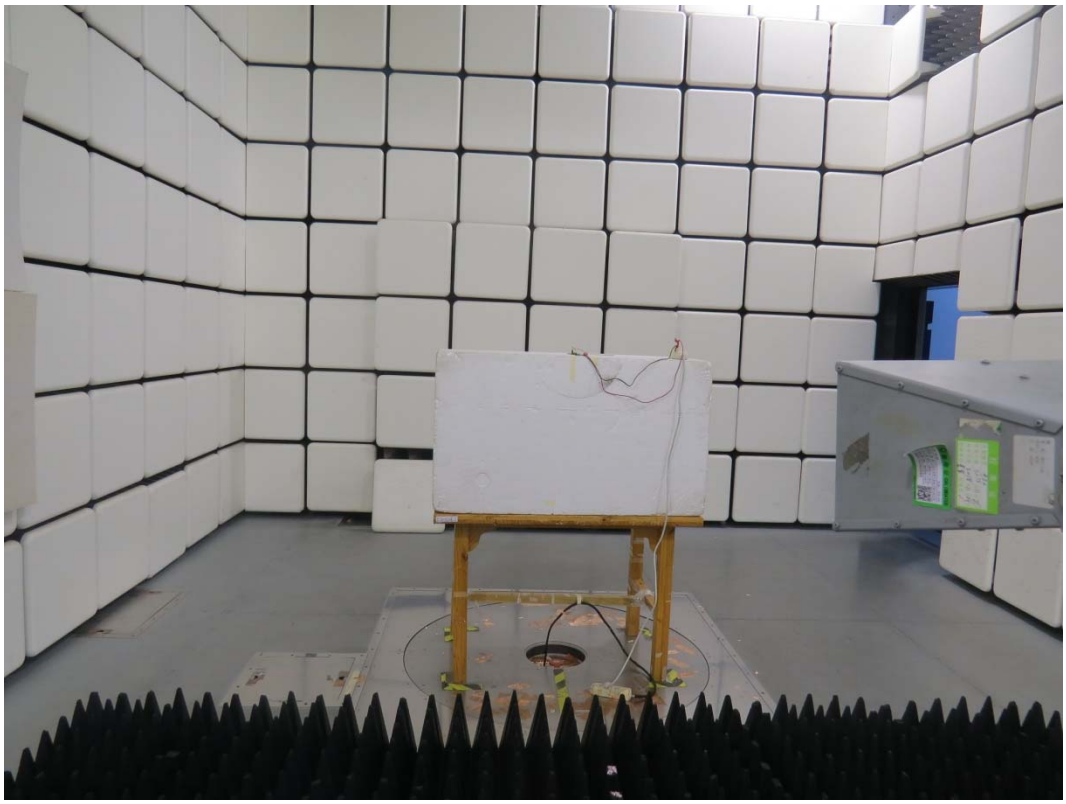
A.1 EUT Appearance



a: EUT

Picture 1 EUT

A.2 Test Setup



Picture 2 Radiated Spurious Emissions Test setup