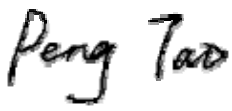
RF TEST REPORT

Applicant	Quectel Wireless Solutions Co., Ltd
FCC ID	XMR201910BG95M3
Product	LTE Cat M1 & Cat NB2 & EGPRS Module
Brand	Quectel
Marketing	Quectel BG95-M3
Model	BG95-M3
Report No.	R1907A0446-R6V1
Issue Date	September 27, 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.



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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(b)(10)/27.50(c)(10)	PASS
3	Occupied Bandwidth	2.1049	PASS
4	Band Edge Compliance	27.53(h)/27.53(g) /27.53(f) /27.53(c)	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) /27.53(f) /27.53(c)	PASS
8	Radiates Spurious Emission	2.1053 /27.53(h) /27.53(g) /27.53(f) /27.53(c)	PASS
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.			
Date of Testing: August 12, 2019~ September 5, 2019			

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.

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	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

General information

EUT Description		
Model	BG95-M3	
IMEI	864475040001835	
Hardware Version	R2.1	
Software Version	BG95M3LAR02A01	
Power Supply	External Power Supply	
Antenna Type	External Antenna	
Antenna Gain	NB-IOT 4: 1.9dBi NB-IOT 12: 4dBi NB-IOT 13: 4.5dBi NB-IOT 66: 2dBi NB-IOT 71: 3dBi NB-IOT 85: 4dBi	
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, multi-tone	
Maximum E.I.R.P.	NB-IOT 4:	22.09dBm
	NB-IOT 66:	22.09dBm
Maximum E.R.P.	NB-IOT 12:	32.12dBm
	NB-IOT 13:	23.05dBm
	NB-IOT 71:	21.39dBm
	NB-IOT 85:	22.70dBm
Rated Power Supply Voltage:	3.8V	
Extreme Voltage	Minimum: 3.3V Maximum: 4.3V	
Extreme Temperature	Lowest: -40°C Highest: +85°C	

	Mode	Tx (MHz)	Rx (MHz)
Operating Frequency Range(s)	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 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, 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	Deployment mode	Subcarrier Spacing (kHz)		Modulation		Test Channel		
	Stand-alone	3.75	15	BPSK	QPSK	L	M	H
RF power output	O	O	O	O	O	O	O	O
Effective Isotropic Radiated power	O	O	O	O	O	O	O	O
Occupied Bandwidth	O	O	O	O	O	O	O	O
Band Edge Compliance	O	O	O	O	O	O	-	O
Peak-to-Average Power Ratio	O	O	O	O	O	-	O	-
Frequency Stability	O	O	O	O	O	O	O	O
Conducted Spurious Emissions	O	-	O	-	O	O	O	O
Radiates Spurious Emission	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

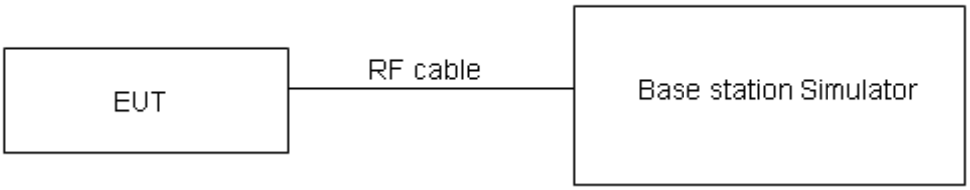
Ambient condition

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
Band 4 Standalone	BPSK	3.75	1@0	19.73	20.02	19.95
			1@47	19.70	19.91	19.74
		15	1@0	19.55	19.96	20.12
			1@11	19.46	19.86	20.03
	QPSK	3.75	1@0	19.84	19.97	19.90
			1@47	19.74	19.83	19.75
		15	1@0	19.91	19.90	20.19
			1@11	19.80	19.78	20.09
		15	12@0	18.54	18.56	18.77
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	20.40	20.37	20.44
			1@47	20.35	20.22	20.27
		15	1@0	20.52	20.46	20.66
			1@11	20.42	20.38	20.54
	QPSK	3.75	1@0	20.41	20.34	20.42
			1@47	20.36	30.27	20.32
		15	1@0	20.50	20.44	20.50
			1@11	20.46	20.35	20.38
		15	12@0	19.05	10.07	19.04
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel		
				23181/777.1	23230/782	23279/786.9
Band 13 Standalone	BPSK	3.75	1@0	20.57	20.50	20.34
			1@47	20.43	20.36	20.20
		15	1@0	20.66	20.51	20.47
			1@11	20.57	20.42	20.37
	QPSK	3.75	1@0	20.37	20.37	20.61
			1@47	20.26	20.32	20.54
		15	1@0	20.51	20.57	20.70
			1@11	20.47	20.49	20.59
		15	12@0	19.10	19.13	19.41
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	19.75	19.73	19.70
			1@47	19.62	19.51	19.56
		15	1@0	19.36	19.78	20.09

			1@11	19.34	19.70	20.01
	QPSK	3.75	1@0	19.22	19.76	19.59
			1@47	19.08	19.66	19.31
		15	1@0	19.37	19.72	20.07
			1@11	19.33	19.75	19.92
		15	12@0	18.07	18.46	18.51
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	20.47	20.54	20.40
			1@47	20.45	20.42	20.33
		15	1@0	20.33	20.53	20.54
			1@11	20.26	20.49	20.45
	QPSK	3.75	1@0	20.21	20.50	20.48
			1@47	20.10	20.43	20.40
		15	1@0	20.48	20.46	20.45
			1@11	20.42	20.41	20.37
		15	12@0	19.42	19.52	19.64
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel		
				134003/698.1	134081/705.9	134181/715.9
Band 85 Standalone	BPSK	3.75	1@0	20.50	20.54	20.76
			1@47	20.43	20.45	20.60
		15	1@0	20.39	20.73	20.85
			1@11	20.32	20.61	20.76
	QPSK	3.75	1@0	20.35	20.52	20.58
			1@47	20.30	20.41	20.49
		15	1@0	20.76	20.63	20.81
			1@11	20.67	20.57	20.69
		15	12@0	19.20	19.17	19.36

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:

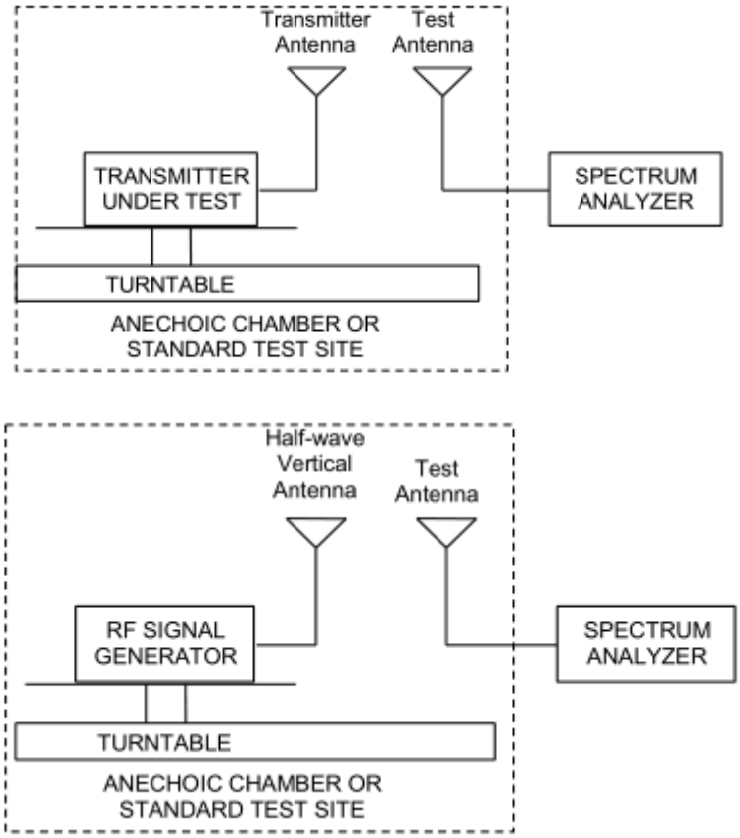
EIRP (dBm) = Output Power (dBm) - Losses (dB) + Antenna Gain (dBi)

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 stand-up position (Z axis) and the worst case was recorded.

Limits

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	≤ 3 W (34.77 dBm)
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	Modulation	Sub-carrier spacing (KHz)	Ntones	EIRP(dBm)			Limit (dBm)	Conclusion
				19951/1710.1	20175/1732.5	20399/1754.9		
Band 4 Standalone	BPSK	3.75	1@0	21.63	21.92	21.85	30	Pass
			1@47	21.60	21.81	21.64	30	Pass
		15	1@0	21.45	21.86	22.02	30	Pass
			1@11	21.36	21.76	21.93	30	Pass
	QPSK	3.75	1@0	21.74	21.87	21.80	30	Pass
			1@47	21.64	21.73	21.65	30	Pass
		15	1@0	21.81	21.80	22.09	30	Pass
			1@11	21.70	21.68	21.99	30	Pass
		15	12@0	20.44	20.46	20.67	30	Pass
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	ERP(dBm)			Limit (dBm)	Conclusion
				23011/699.1	23095/707.5	23179/715.9		
Band 12 Standalone	BPSK	3.75	1@0	22.25	22.22	22.29	34.77	Pass
			1@47	22.20	22.07	22.12	34.77	Pass
		15	1@0	22.37	22.31	22.51	34.77	Pass
			1@11	22.27	22.23	22.39	34.77	Pass
	QPSK	3.75	1@0	22.26	22.19	22.27	34.77	Pass
			1@47	22.21	32.12	22.17	34.77	Pass
		15	1@0	22.35	22.29	22.35	34.77	Pass
			1@11	22.31	22.20	22.23	34.77	Pass
		15	12@0	20.90	11.92	20.89	34.77	Pass
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	ERP (dBm)			Limit (dBm)	Conclusion
				23181/777.1	23230/782	23279/786.9		
Band 13 Standalone	BPSK	3.75	1@0	22.92	22.85	22.69	34.77	Pass
			1@47	22.78	22.71	22.55	34.77	Pass
		15	1@0	23.01	22.86	22.82	34.77	Pass
			1@11	22.92	22.77	22.72	34.77	Pass
	QPSK	3.75	1@0	22.72	22.72	22.96	34.77	Pass
			1@47	22.61	22.67	22.89	34.77	Pass
		15	1@0	22.86	22.92	23.05	34.77	Pass
			1@11	22.82	22.84	22.94	34.77	Pass
		15	12@0	21.45	21.48	21.76	34.77	Pass
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	EIRP(dBm)			Limit (dBm)	Conclusion
				131973 /1710.1	132322 /1745	132671 /1779.9		

Band 66 Standalone	BPSK	3.75	1@0	21.75	21.73	21.70	30	Pass
			1@47	21.62	21.51	21.56	30	Pass
		15	1@0	21.36	21.78	22.09	30	Pass
			1@11	21.34	21.70	22.01	30	Pass
	QPSK	3.75	1@0	21.22	21.76	21.59	30	Pass
			1@47	21.08	21.66	21.31	30	Pass
		15	1@0	21.37	21.72	22.07	30	Pass
			1@11	21.33	21.75	21.92	30	Pass
		15	12@0	20.07	20.46	20.51	30	Pass
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	EIRP(dBm)			Limit (dBm)	Conclusion
				133123/663.1	133297/680.5	133471/697.9		
Band 71 Standalone	BPSK	3.75	1@0	21.32	21.39	21.25	34.77	Pass
			1@47	21.30	21.27	21.18	34.77	Pass
		15	1@0	21.18	21.38	21.39	34.77	Pass
			1@11	21.11	21.34	21.30	34.77	Pass
	QPSK	3.75	1@0	21.06	21.35	21.33	34.77	Pass
			1@47	20.95	21.28	21.25	34.77	Pass
		15	1@0	21.33	21.31	21.30	34.77	Pass
			1@11	21.27	21.26	21.22	34.77	Pass
		15	12@0	20.27	20.37	20.49	34.77	Pass
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	ERP(dBm)			Limit (dBm)	Conclusion
				134003/698.1	134081/705.9	134181/715.9		
Band 85 Standalone	BPSK	3.75	1@0	22.35	22.39	22.61	34.77	Pass
			1@47	22.28	22.30	22.45	34.77	Pass
		15	1@0	22.24	22.58	22.70	34.77	Pass
			1@11	22.17	22.46	22.61	34.77	Pass
	QPSK	3.75	1@0	22.20	22.37	22.43	34.77	Pass
			1@47	22.15	22.26	22.34	34.77	Pass
		15	1@0	22.61	22.48	22.66	34.77	Pass
			1@11	22.52	22.42	22.54	34.77	Pass
		15	12@0	21.05	21.02	21.21	34.77	Pass

Note: 1. EIRP= E.R.P+2.15

5.3 Occupied Bandwidth

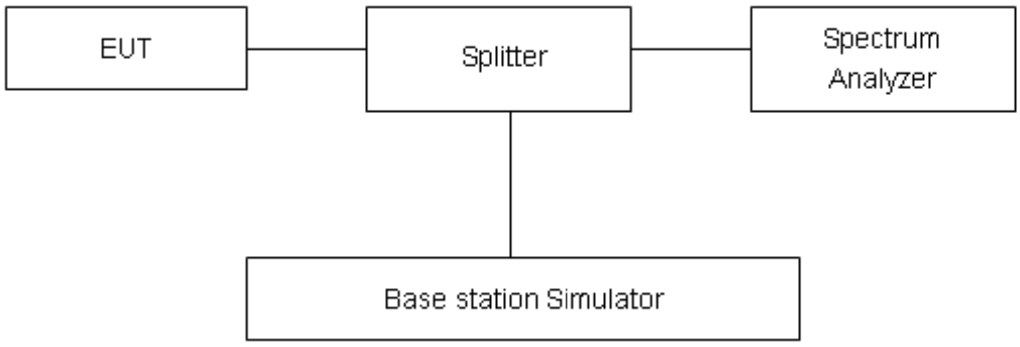
Ambient condition

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 4/12/13/66/71/85.
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

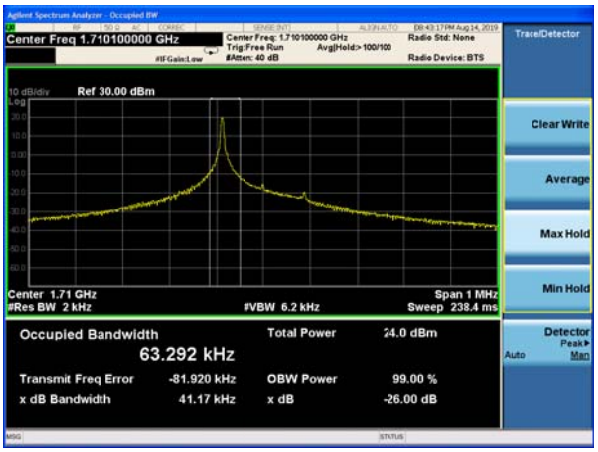
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U=624Hz.

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	63.29	41.17	62.58	40.26	62.71	41.39
	QPSK	3.75	1@0	67.06	39.66	69.04	41.86	67.79	40.00
	BPSK	15	1@0	129.75	117.30	120.17	101.50	123.04	102.70
	QPSK	15	1@0	123.47	117.70	116.55	117.50	115.09	103.30
	QPSK	15	12@0	185.22	250.00	183.27	238.50	183.55	240.80
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	64.27	40.34	61.11	41.48	60.20	41.24
	QPSK	3.75	1@0	67.57	40.02	69.79	44.32	68.69	43.12
	BPSK	15	1@0	121.73	105.00	122.21	106.20	121.79	103.60
	QPSK	15	1@0	112.95	116.90	118.93	118.20	125.68	129.30
	QPSK	15	12@0	184.04	250.70	183.58	238.90	182.91	251.60
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				23181/777.1		23230/782		23279/786.9	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
Band 13 Standalone	BPSK	3.75	1@0	60.19	40.94	60.23	40.81	60.58	41.15
	QPSK	3.75	1@0	68.50	41.90	66.20	40.00	68.36	39.56
	BPSK	15	1@0	120.94	104.00	126.64	103.50	129.15	118.00
	QPSK	15	1@0	127.58	132.20	118.65	117.80	124.88	117.60
	QPSK	15	12@0	183.91	260.50	184.71	249.80	185.03	246.50
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	61.51	40.73	63.11	41.26	63.84	41.12
	QPSK	3.75	1@0	68.77	39.61	69.39	40.49	67.74	40.31
	BPSK	15	1@0	119.99	112.70	127.94	103.80	129.50	120.50
	QPSK	15	1@0	120.90	127.60	117.00	114.80	123.22	117.00
	QPSK	15	12@0	184.28	245.40	184.62	248.10	184.74	259.50
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

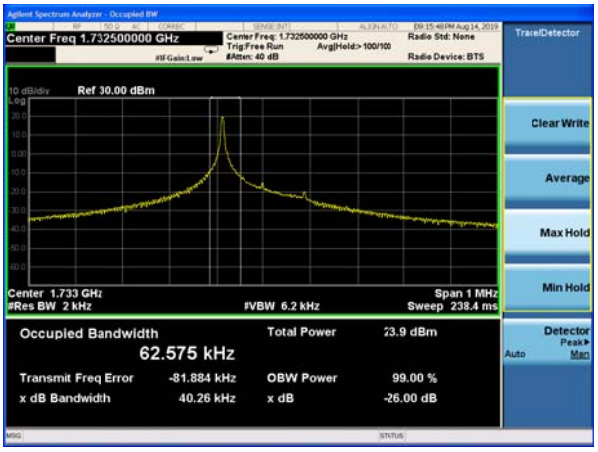
Band 71 Standalone	BPSK	3.75	1@0	59.03	41.29	58.61	40.76	60.38	40.95
	QPSK	3.75	1@0	68.64	42.25	69.95	39.63	71.17	42.65
	BPSK	15	1@0	119.77	102.80	127.33	102.50	125.22	118.40
	QPSK	15	1@0	134.06	131.20	116.51	103.60	118.36	114.30
	QPSK	15	12@0	184.17	245.10	182.50	261.30	183.06	236.50
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				134003/698.1		134081/705.9		134181/715.9	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
Band 85 Standalone	BPSK	3.75	1@0	60.90	40.82	61.33	41.38	61.04	41.13
	QPSK	3.75	1@0	69.50	40.14	69.69	40.01	68.56	40.64
	BPSK	15	1@0	124.90	113.00	127.93	112.70	122.41	104.80
	QPSK	15	1@0	132.44	131.30	119.15	117.30	117.63	116.60
	QPSK	15	12@0	182.36	235.60	183.78	240.10	183.66	247.50

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



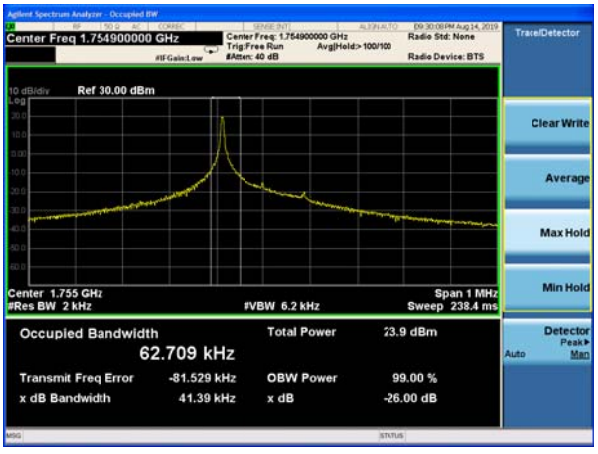
NB-IOT Band 4 BPSK 15kHz 1@0 CH-Low

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



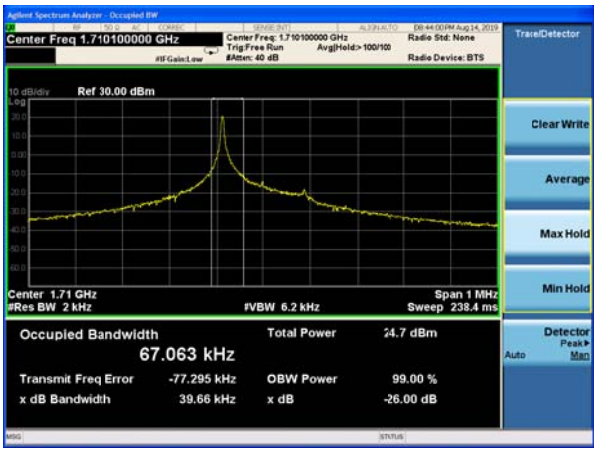
NB-IOT Band 4 BPSK 15kHz 1@0 CH-Middle

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



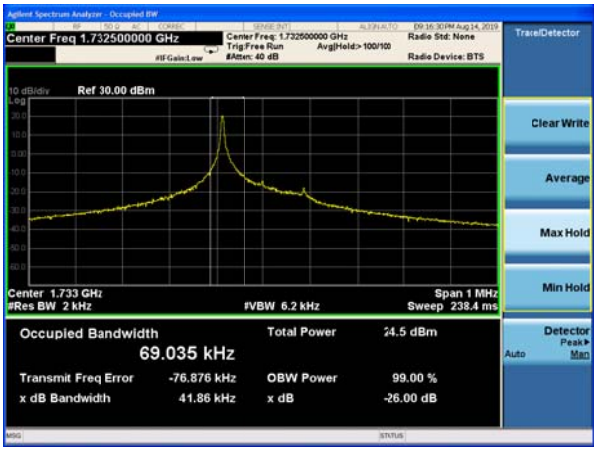
NB-IOT Band 4 BPSK 15kHz 1@0 CH-High

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



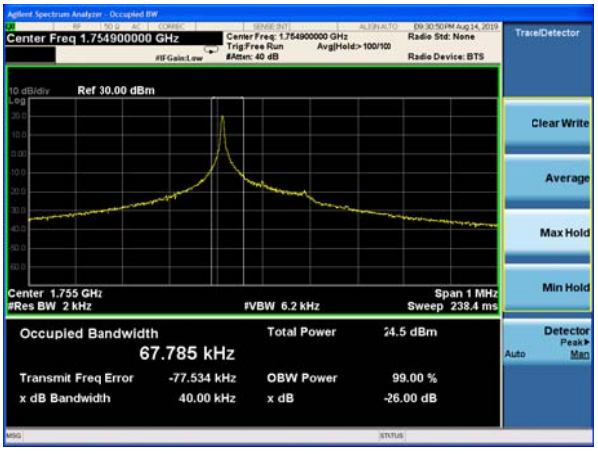
NB-IOT Band 4 QPSK 15kHz 1@0 CH-Low

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



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

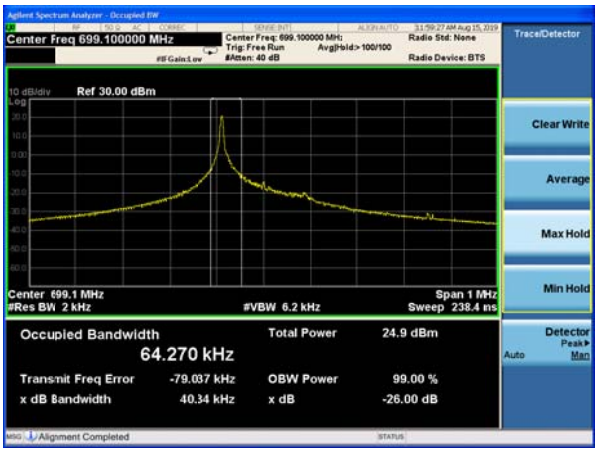
NB-IOT Band 4 QPSK 3.75kHz 1@0 CH-High



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

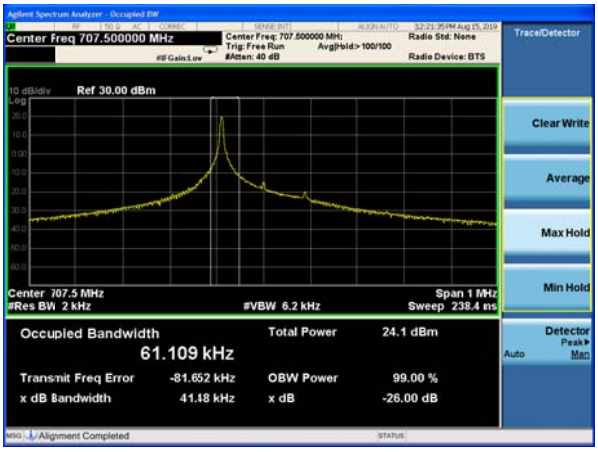
NB-IOT Band 4 QPSK 15kHz 12@0 CH-Low

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



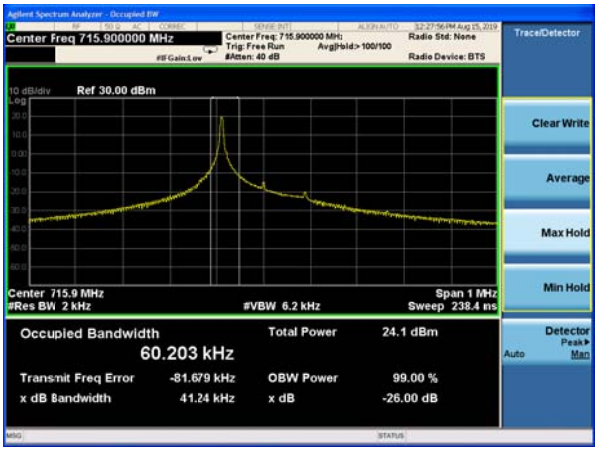
NB-IOT Band 4 QPSK 15kHz 12@0 CH-Middle

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

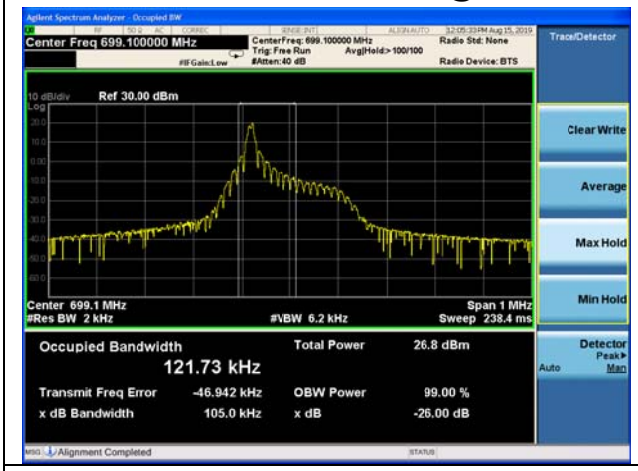


NB-IOT Band 4 QPSK 15kHz 12@0 CH-High

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



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

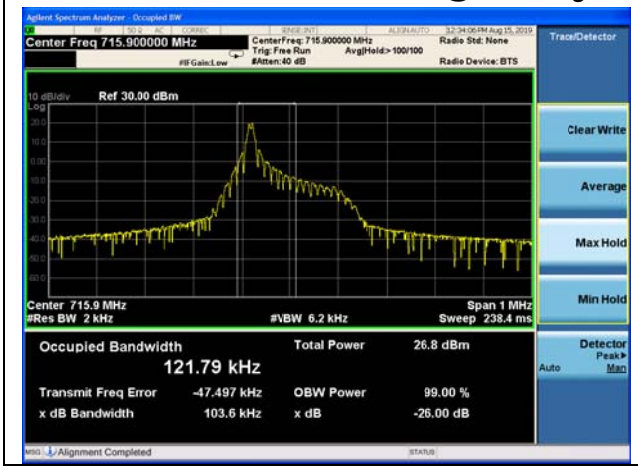


NB-IOT Band 12 QPSK 3.75kHz 1@0 CH-Low

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

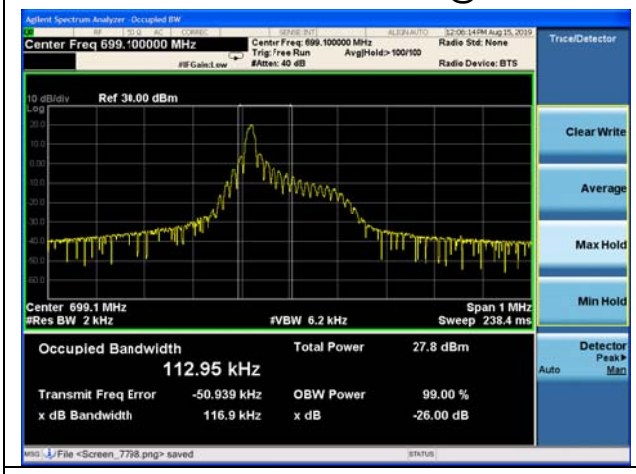
NB-IOT Band 12 QPSK 3.75kHz 1@0 CH-Middle

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



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

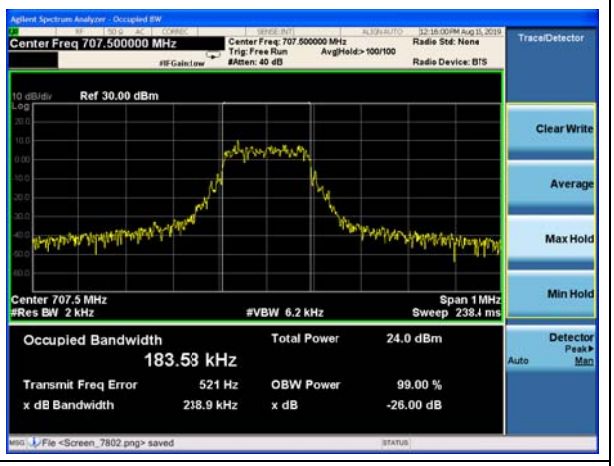
NB-IOT Band 12 QPSK 15kHz 1@0 CH-Low



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

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

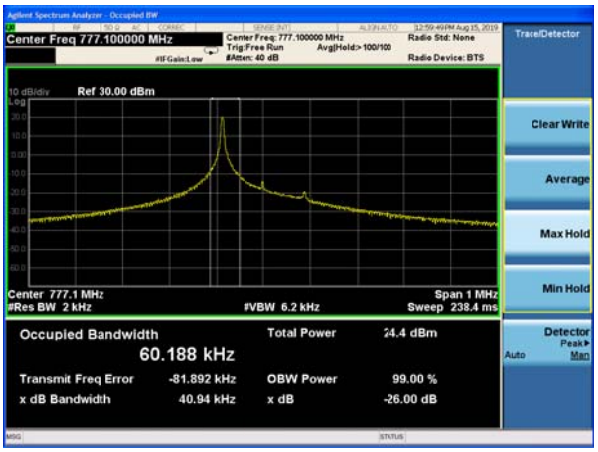
NB-IOT Band 12 QPSK 15kHz 12@0 CH-Middle



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

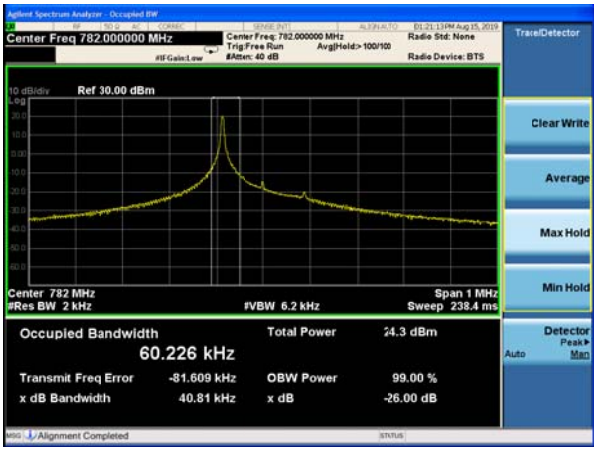
NB-IOT Band 12 QPSK 15kHz 12@0 CH-High

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



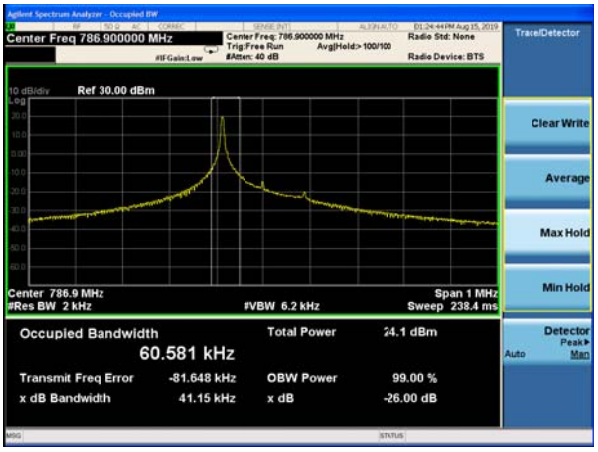
NB-IOT Band 13 BPSK 15kHz 1@0 CH-Low

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



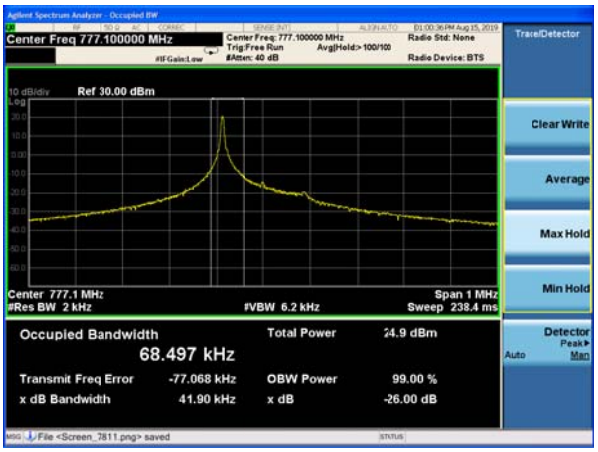
NB-IOT Band 13 BPSK 15kHz 1@0 CH-Middle

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



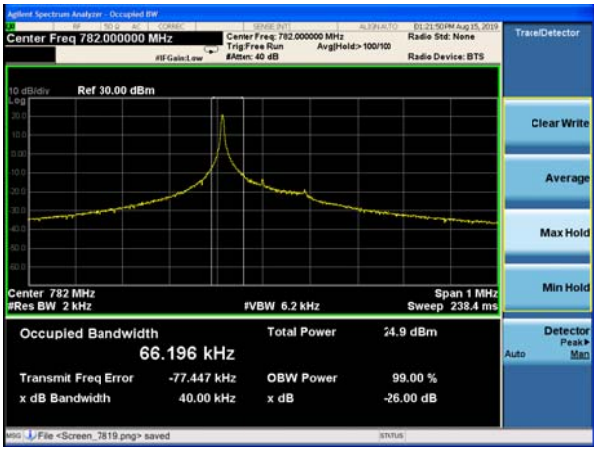
NB-IOT Band 13 BPSK 15kHz 1@0 CH-High

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



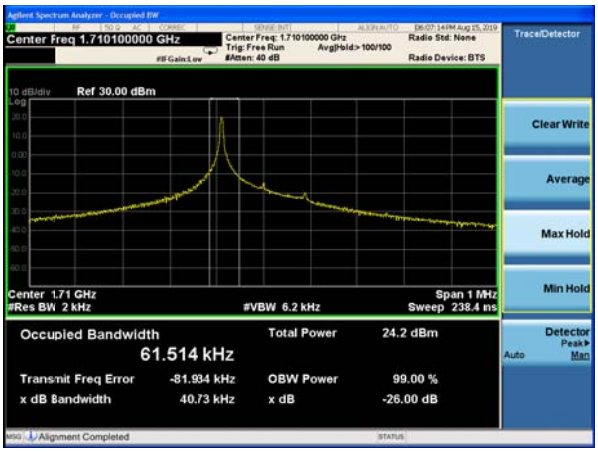
NB-IOT Band 13 QPSK 15kHz 1@0 CH-Middle

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

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

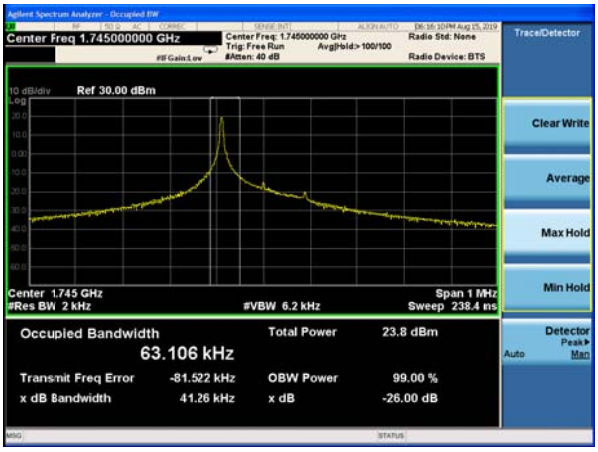
NB-IOT Band 13 QPSK 15kHz 12@0 CH-Low

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



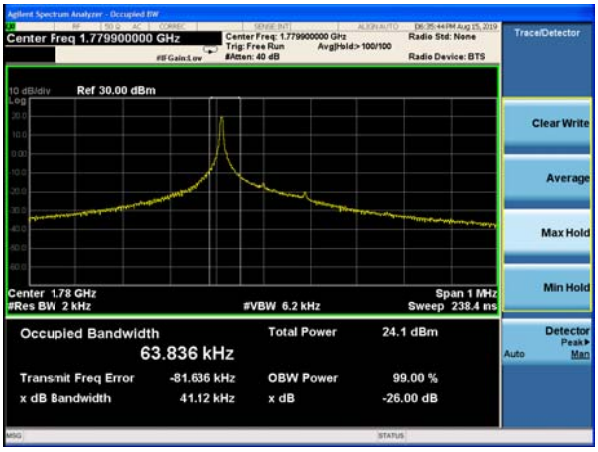
NB-IOT Band 13 QPSK 15kHz 12@0 CH-Middle

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



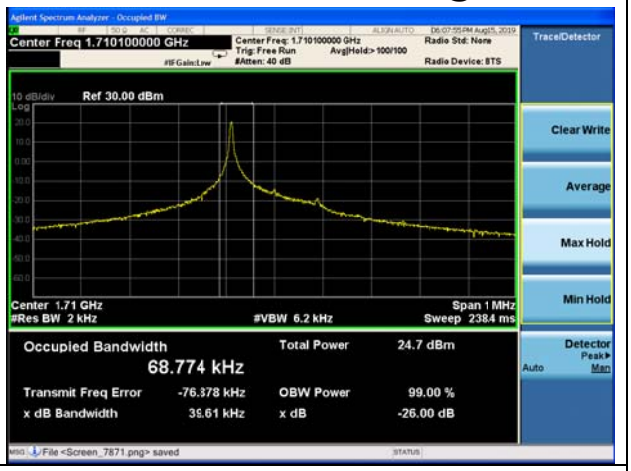
NB-IOT Band 13 QPSK 15kHz 12@0 CH-High

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



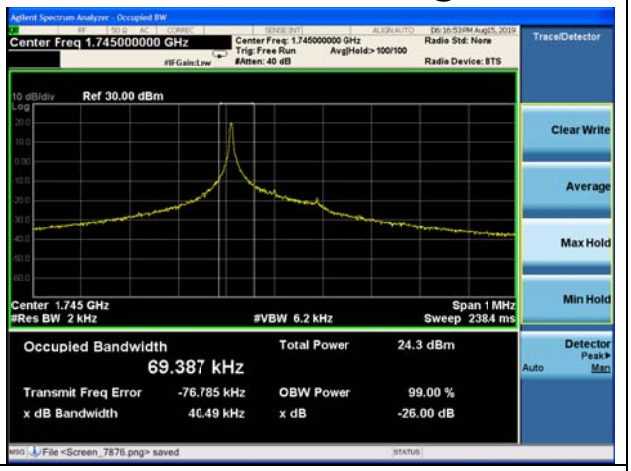
NB-IOT Band 66 BPSK 15kHz 1@0 CH-Low

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



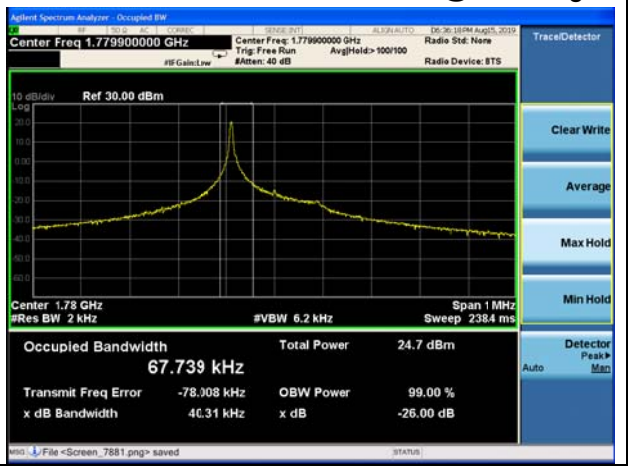
NB-IOT Band 66 BPSK 15kHz 1@0 CH-Middle

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



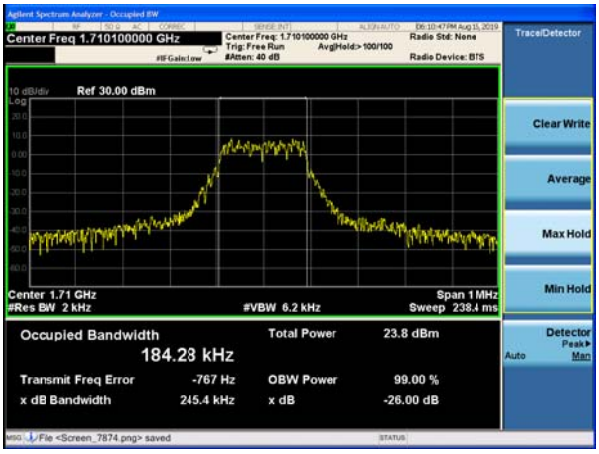
NB-IOT Band 66 BPSK 15kHz 1@0 CH-High

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

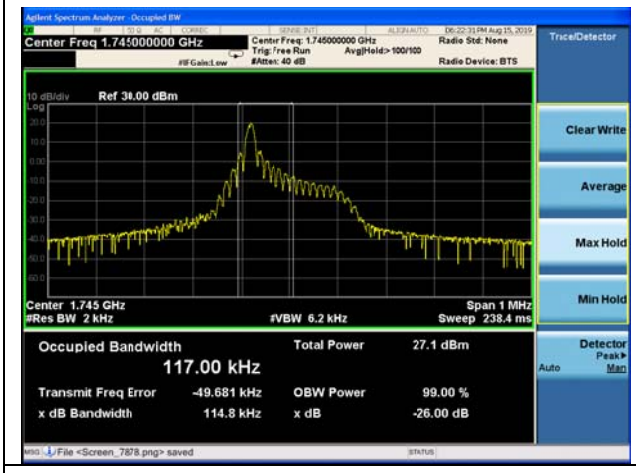


NB-IOT Band 66 QPSK 15kHz 1@0 CH-Low

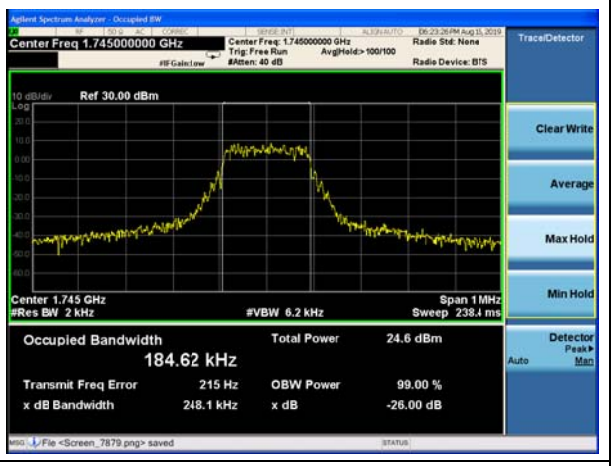
NB-IOT Band 66 QPSK 15kHz 12@0 CH-Low



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

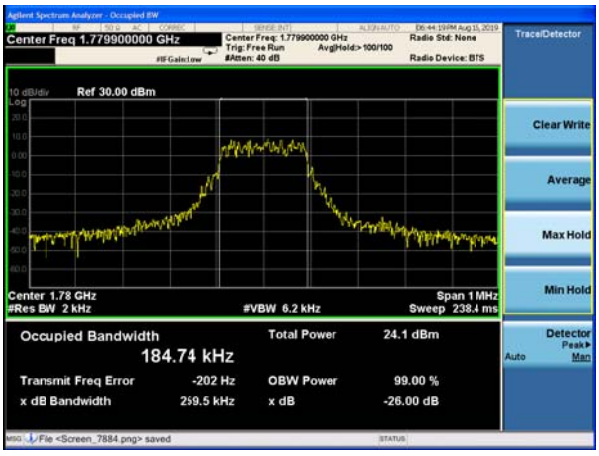


NB-IOT Band 66 QPSK 15kHz 12@0 CH-Middle

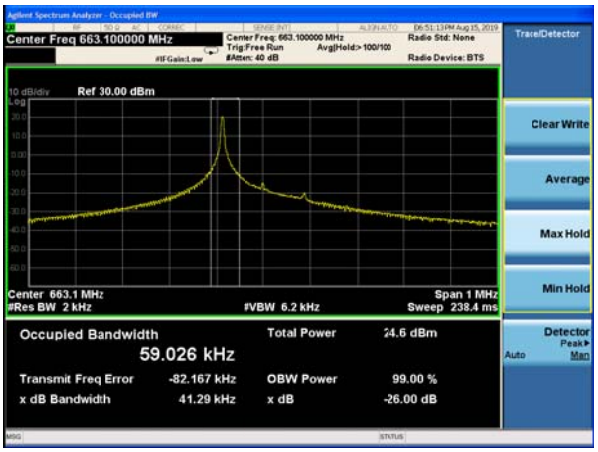


NB-IOT Band 66 QPSK 15kHz 1@0 CH-High

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

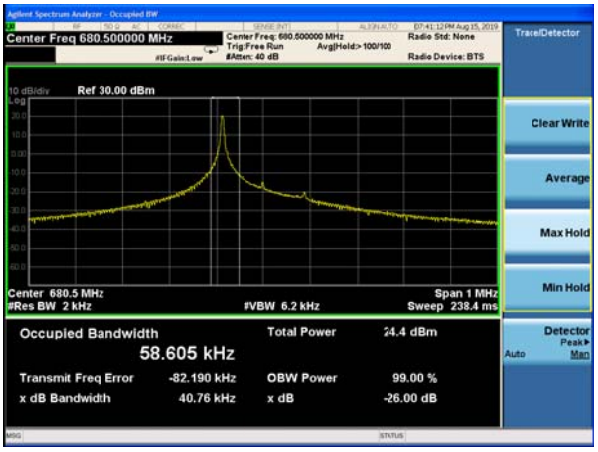


NB-IOT Band 71 BPSK 3.75kHz 1@0 CH-Low



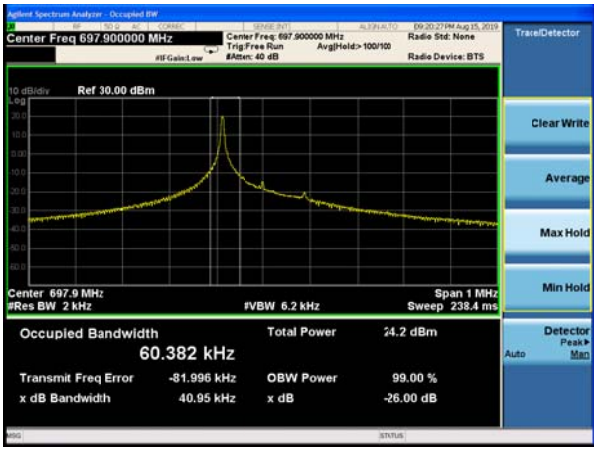
NB-IOT Band 71 BPSK 15kHz 1@0 CH-Low

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



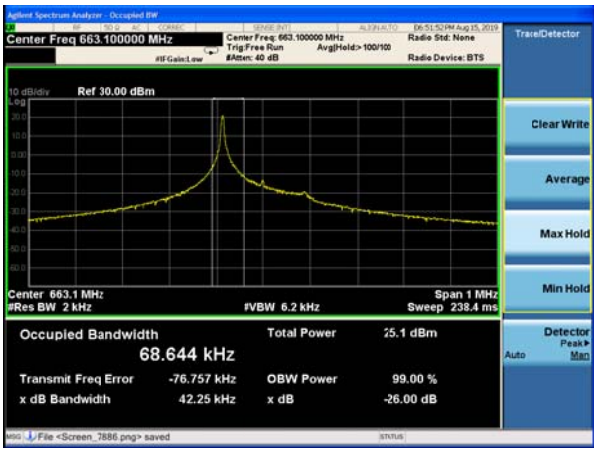
NB-IOT Band 71 BPSK 15kHz 1@0 CH-Middle

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

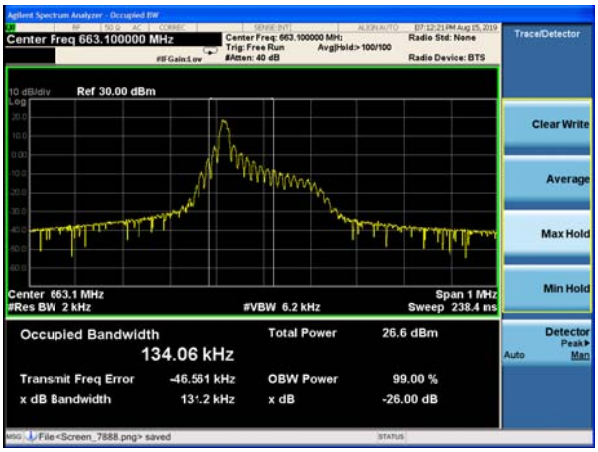


NB-IOT Band 71 BPSK 15kHz 1@0 CH-High

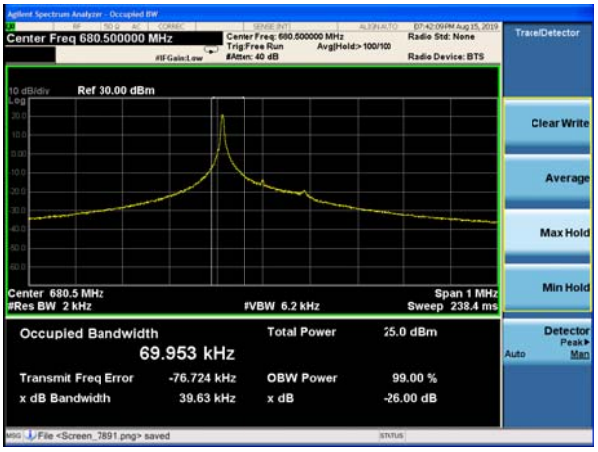
NB-IOT Band 71 QPSK 3.75kHz 1@0 CH-Low



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

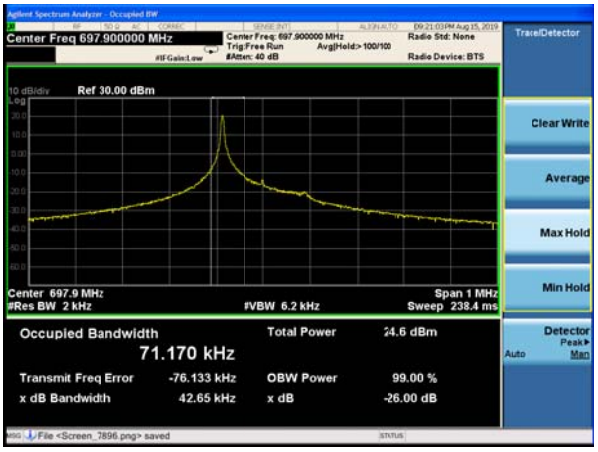


NB-IOT Band 71 QPSK 3.75kHz 1@0 CH-Middle



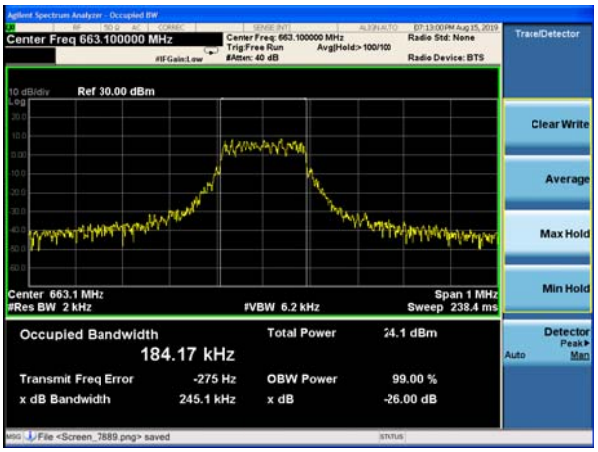
NB-IOT Band 71 QPSK 15kHz 1@0 CH-Middle

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

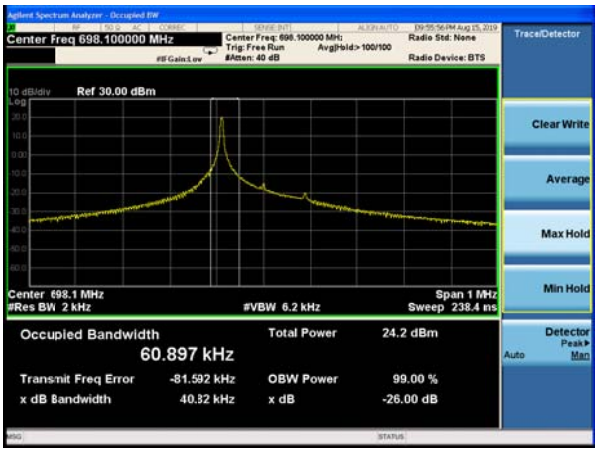


NB-IOT Band 71 QPSK 15kHz 1@0 CH-High

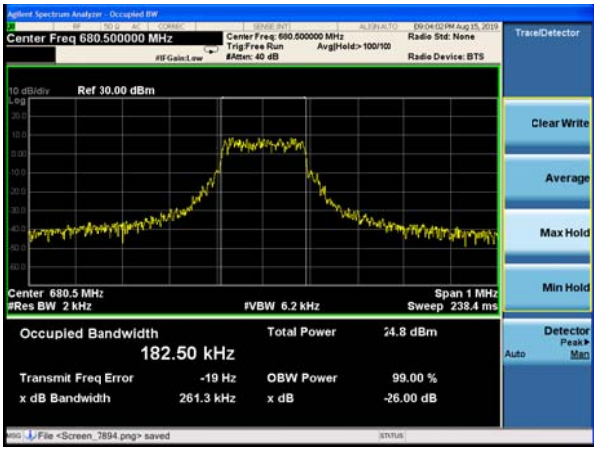
NB-IOT Band 71 QPSK 15kHz 12@0 CH-Low



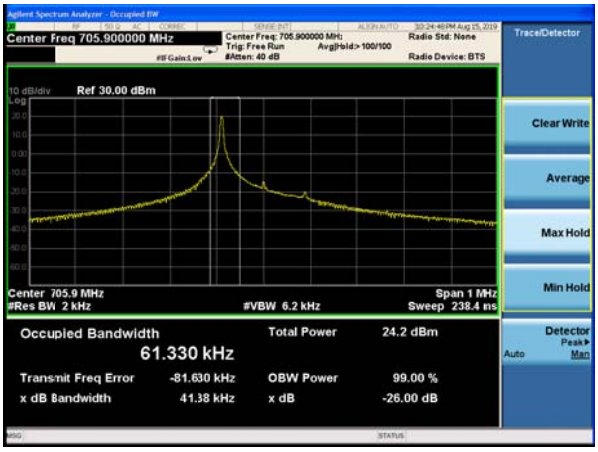
NB-IOT Band 85 BPSK 3.75kHz 1@0 CH-Low



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

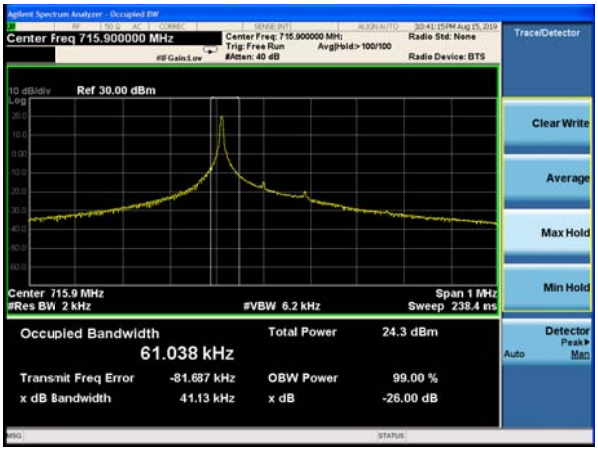


NB-IOT Band 85 BPSK 3.75kHz 1@0 CH-Middle

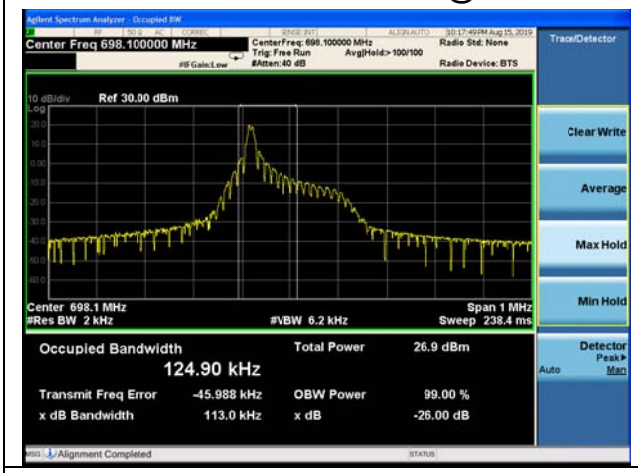


NB-IOT Band 71 QPSK 15kHz 12@0 CH-High

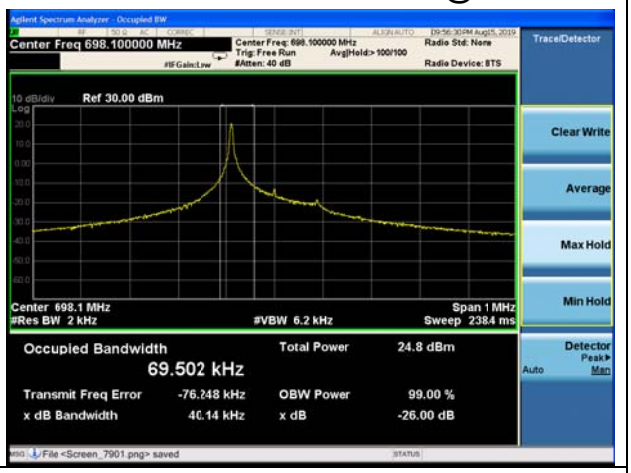
NB-IOT Band 85 BPSK 3.75kHz 1@0 CH-High



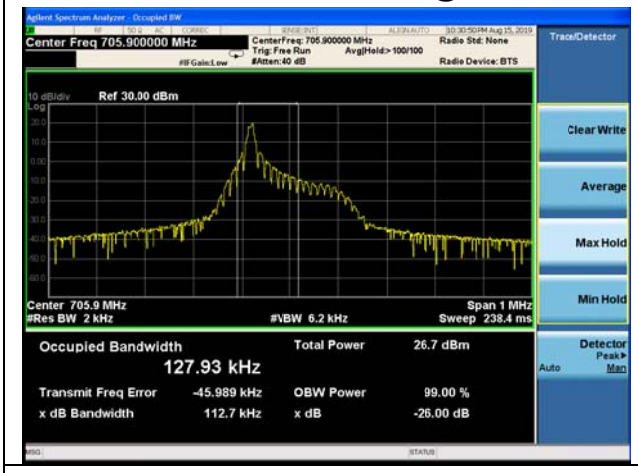
NB-IOT Band 85 BPSK 15kHz 1@0 CH-Low



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

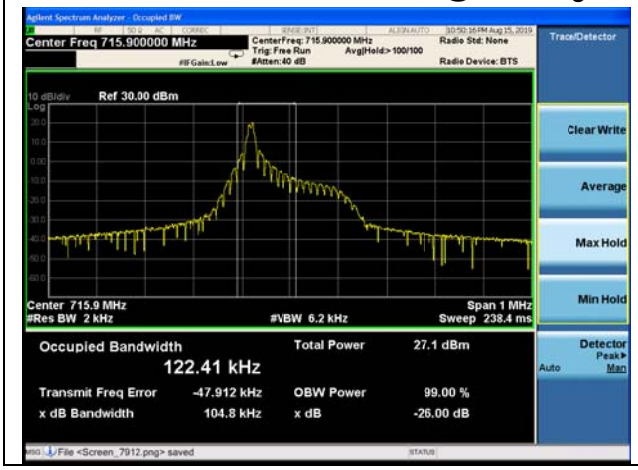


NB-IOT Band 85 BPSK 15kHz 1@0 CH-Middle



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

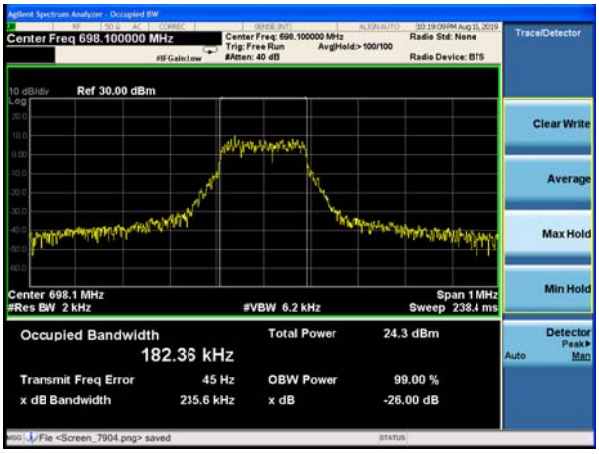
NB-IOT Band 85 BPSK 15kHz 1@0 CH-High



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

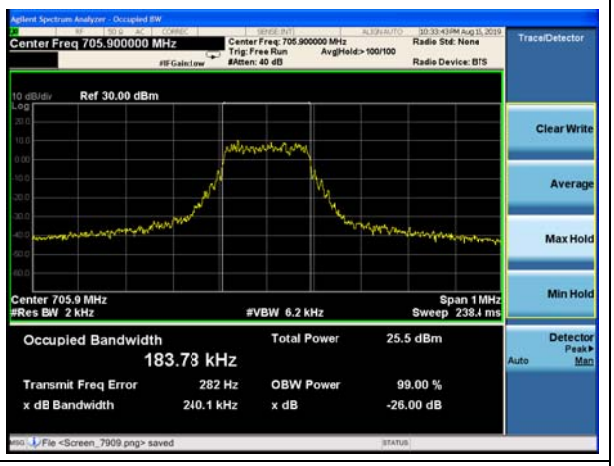
NB-IOT Band 85 QPSK 15kHz 1@0 CH-Low

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

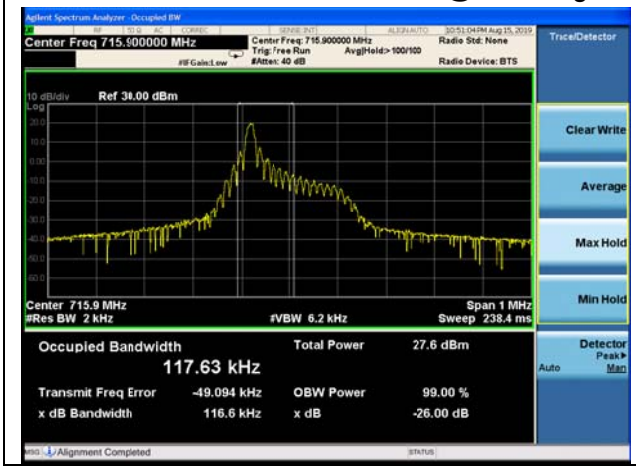


NB-IOT Band 85 QPSK 15kHz 1@0 CH-Middle

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



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



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

5.4 Band Edge Compliance

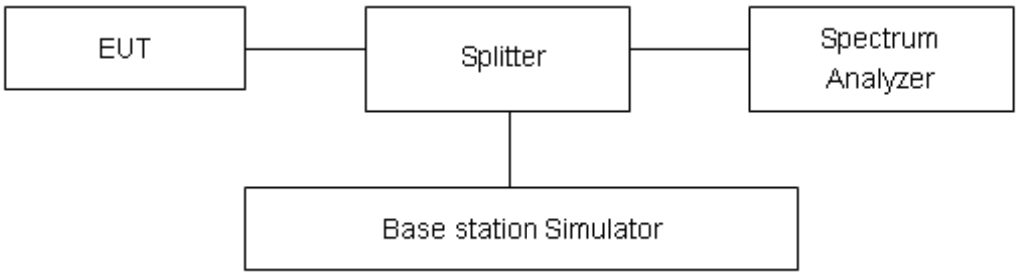
Ambient condition

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
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 680kHz, VBW is set to 2.2kHz for 3.75KHz single carrier,
RBW is set to 1.3kHz, VBW is set to 3.9kHz for 15KHz single carrier,
RBW is set to 2kHz, VBW is set to 6.2KHz for 15KHz full carrier.
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.

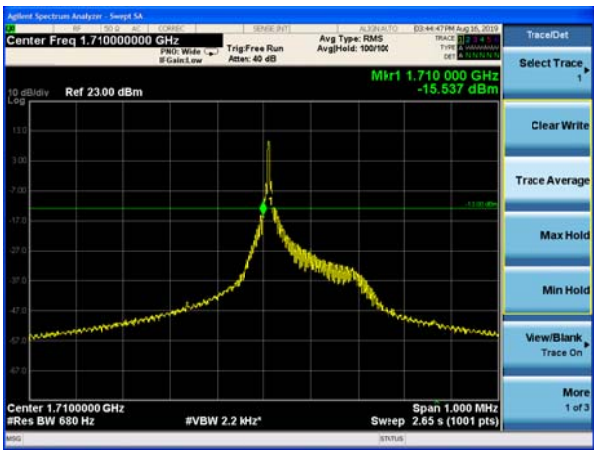
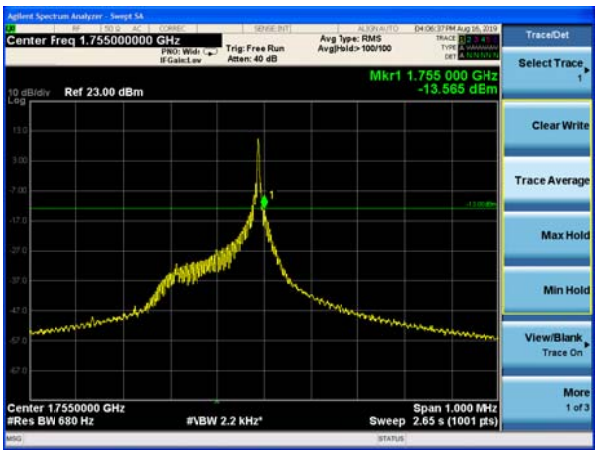
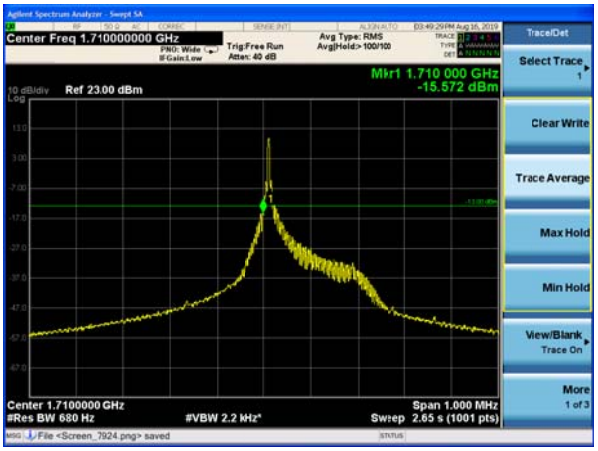
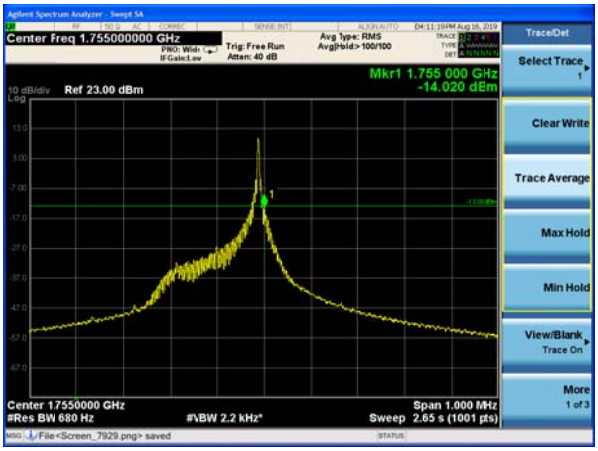
Rule Part 27.53 (c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the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

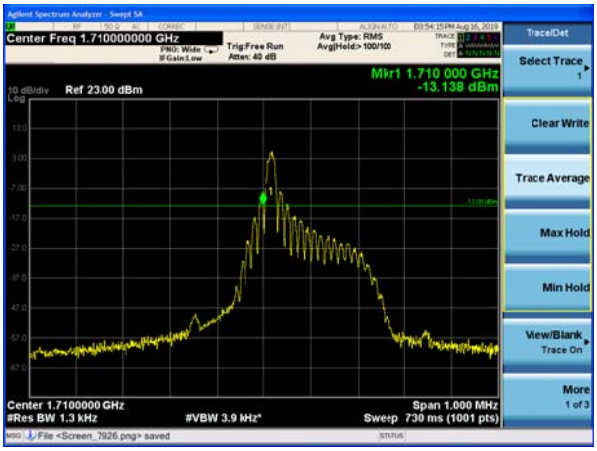
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96, U=0.684dB.

Test Result

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

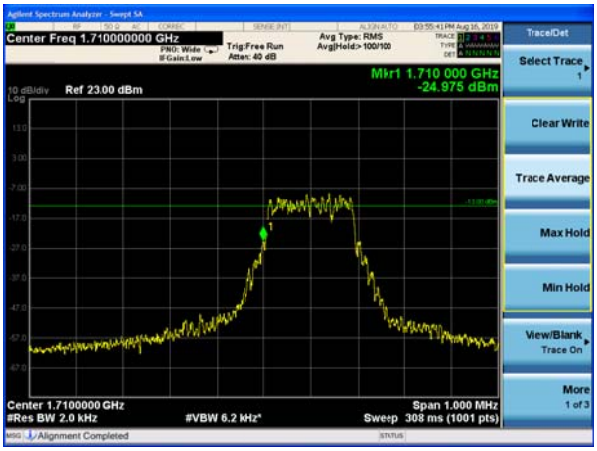
NB-IOT Band 4 BPSK 3.75kHz 1@0 CH-Low	NB-IOT Band 4 BPSK 3.75kHz 1@47 CH-High
	
NB-IOT Band 4 BPSK 15kHz 1@0 CH-Low	NB-IOT Band 4 BPSK 15kHz 1@11 CH-High
	
NB-IOT Band 4 QPSK 3.75kHz 1@0 CH-Low	NB-IOT Band 4 QPSK 3.75kHz 1@47 CH-High
	

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

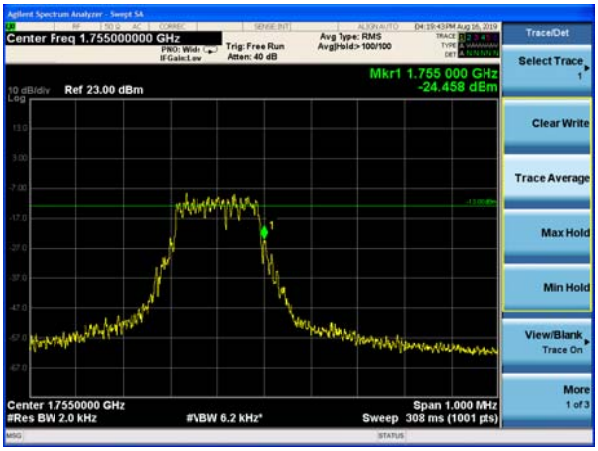


NB-IOT Band 4 QPSK 15kHz 1@11 CH-High

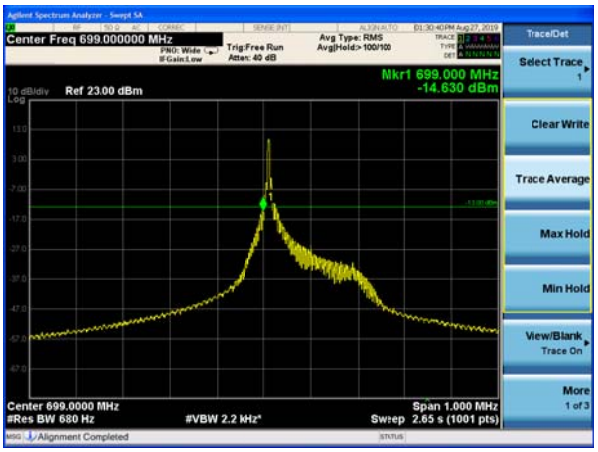
NB-IOT Band 4 QPSK 15kHz 12@0 CH-Low



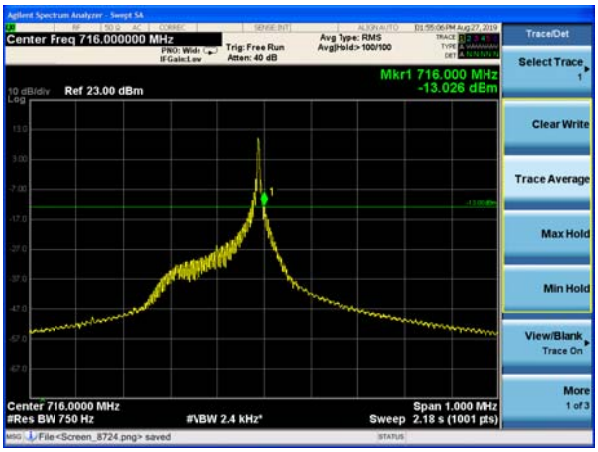
NB-IOT Band 4 QPSK 15kHz 12@0 CH-High



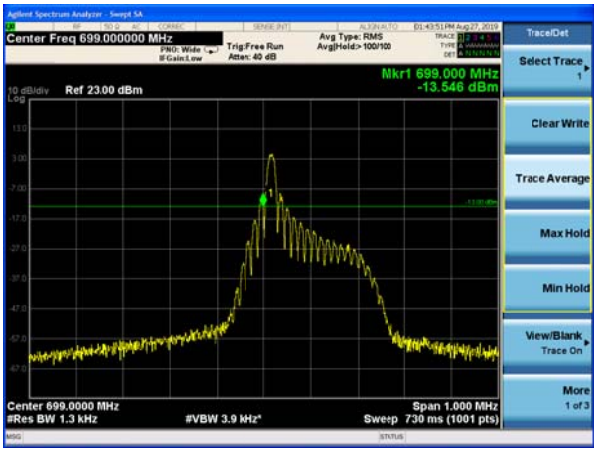
NB-IOT Band 12 BPSK 3.75kHz 1@0 CH-Low



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

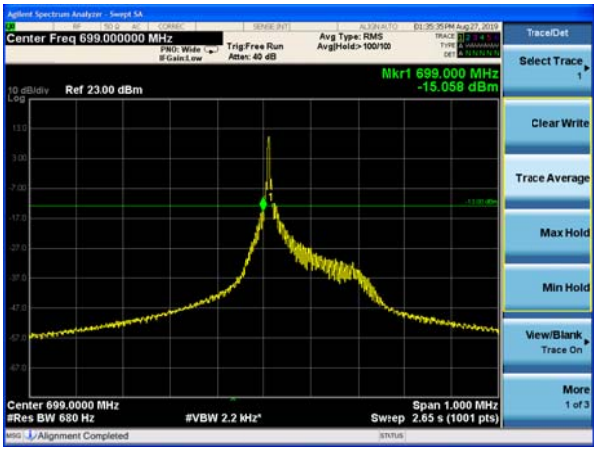


NB-IOT Band 12 BPSK 15kHz 1@0 CH-Low

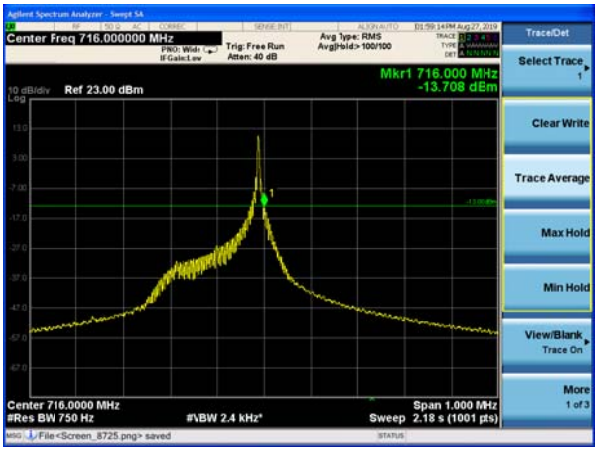


NB-IOT Band 12 BPSK 15kHz 1@11 CH-High

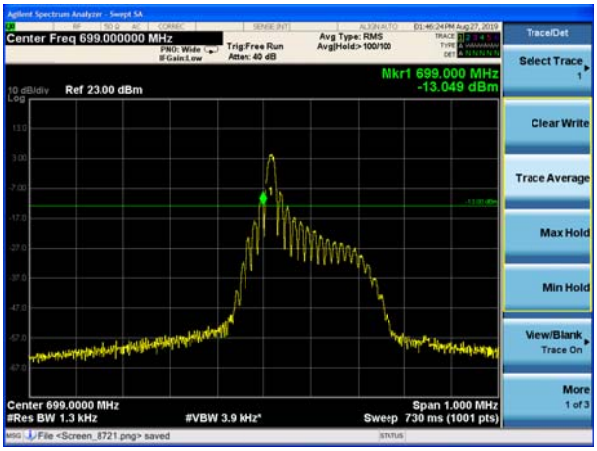
NB-IOT Band 12 QPSK 3.75kHz 1@0 CH-Low



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

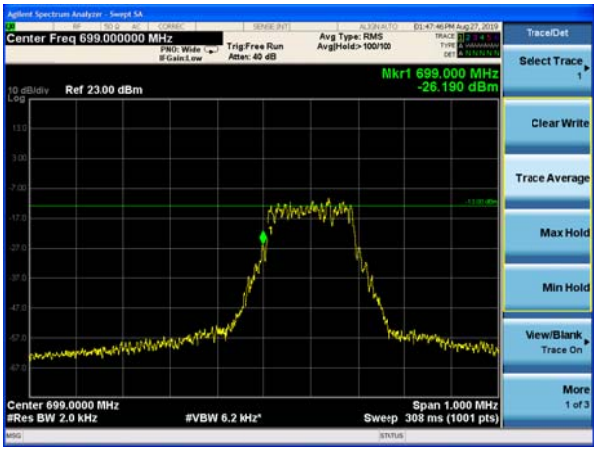


NB-IOT Band 12 QPSK 15kHz 1@0 CH-Low

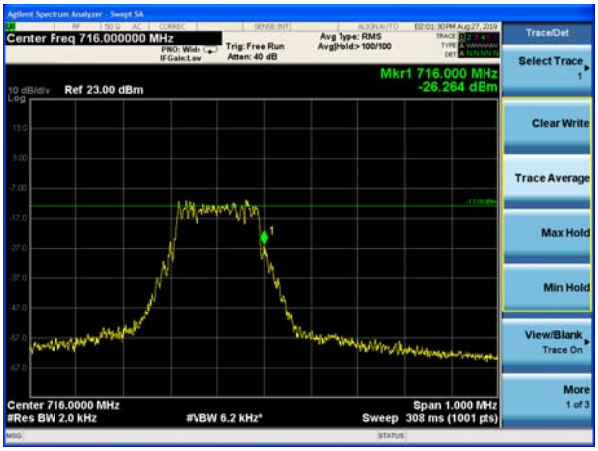


NB-IOT Band 12 QPSK 15kHz 1@11 CH-High

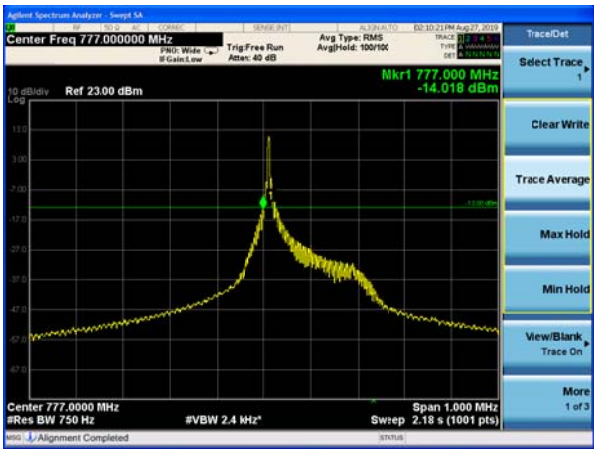
NB-IOT Band 12 QPSK 15kHz 12@0 CH-Low



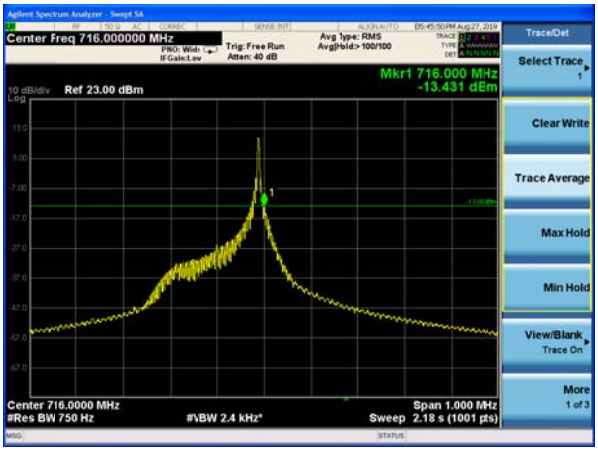
NB-IOT Band 12 QPSK 15kHz 12@0 CH-High



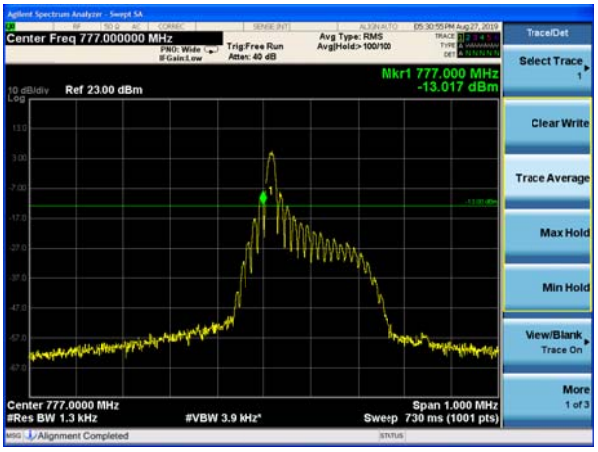
NB-IOT Band 13 BPSK 3.75kHz 1@0 CH-Low



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

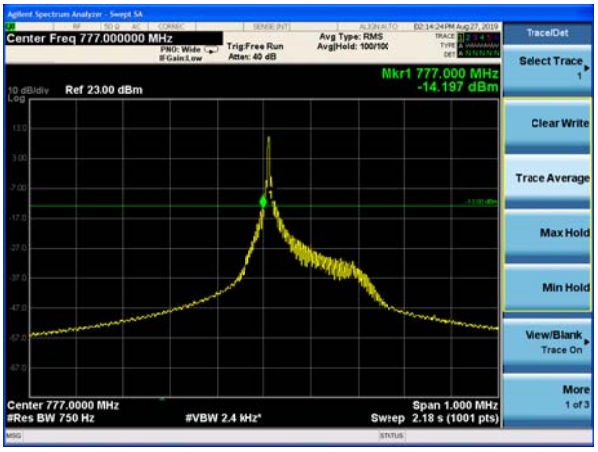


NB-IOT Band 13 BPSK 15kHz 1@0 CH-Low



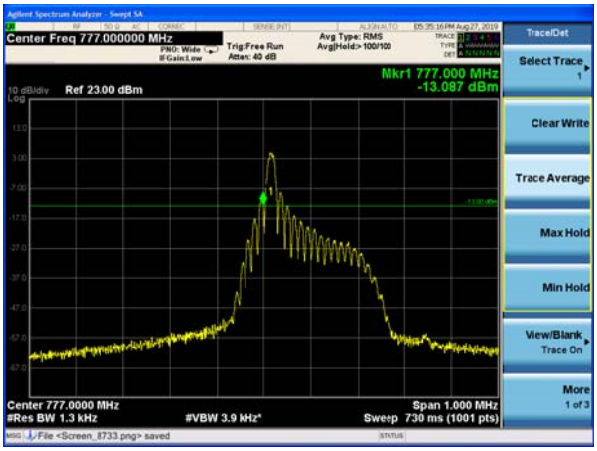
NB-IOT Band 13 BPSK 15kHz 1@11 CH-High

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



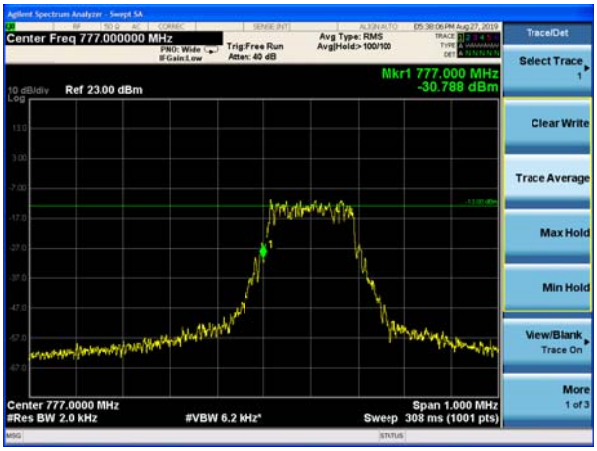
NB-IOT Band 13 QPSK 3.75kHz 1@47 CH-High

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

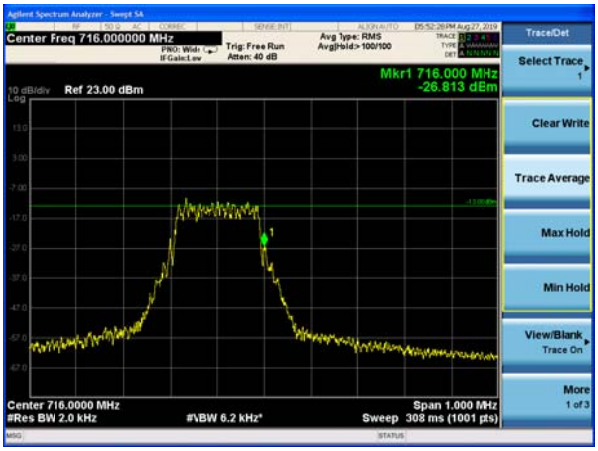


NB-IOT Band 13 QPSK 15kHz 1@11 CH-High

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



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

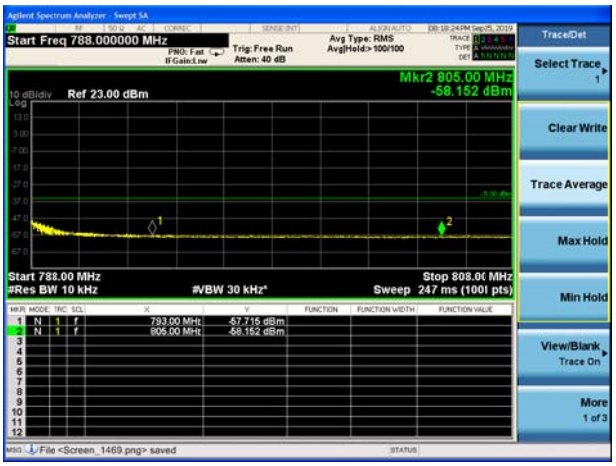


NB-IOT Band 13 BPSK 3.75kHz
(763MHz ~775MHz)

NB-IOT Band 13 BPSK 3.75kHz
(793MHz ~805MHz)

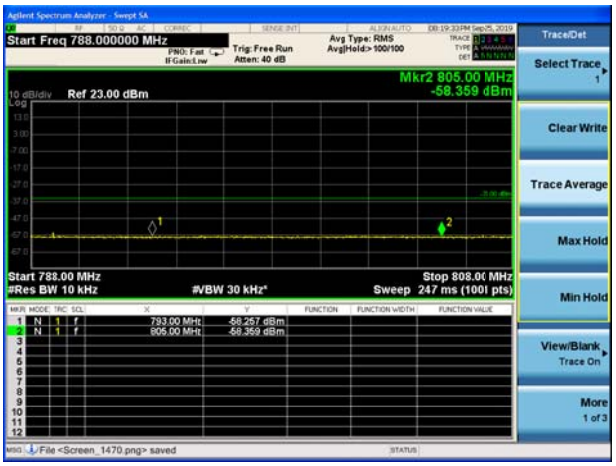
NB-IOT Band 13 QPSK 3.75kHz
(763MHz ~775MHz)

NB-IOT Band 13 QPSK 3.75kHz
(793MHz ~805MHz)



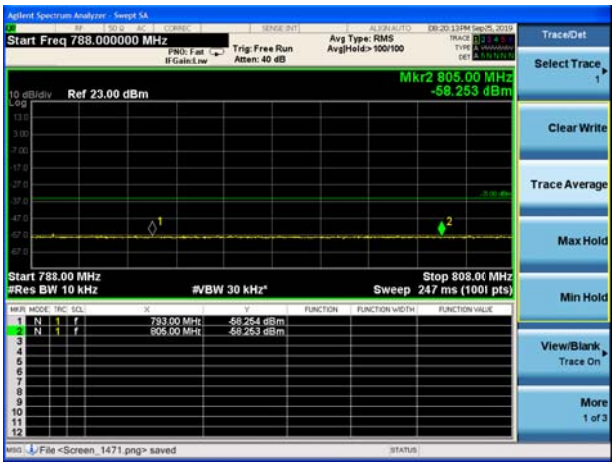
NB-IOT Band 13 BPSK 15kHz
(763MHz ~775MHz)

NB-IOT Band 13 BPSK 15kHz
(793MHz ~805MHz)

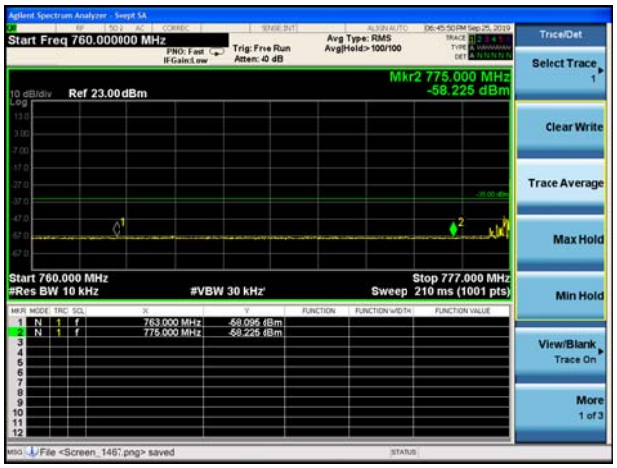


NB-IOT Band 13 QPSK 15kHz
(763MHz ~775MHz)

NB-IOT Band 13 QPSK 15kHz
(793MHz ~805MHz)



NB-IOT Band 13 QPSK 15kHz 12@0
(763MHz ~775MHz)



NB-IOT Band 13 QPSK 15kHz 12@0
(793MHz ~805MHz)