



RF TEST REPORT

Applicant Quectel Wireless Solutions Co., Ltd
FCC ID XMR202012BG95MF
Product LTE Cat M1 & Cat NB2 & WIFI Module
Brand Quectel
Model BG95-MF
Report No. R2012A0839-R3V3
Issue Date February 7, 2021

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

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Version	Revision description	Issue Date
Rev.0	Initial issue of report.	January 19, 2021
Rev.1	Update the Band Edge Compliance for NB-IOT 12/71/85.	February 1, 2021
Rev.2	Update the Band Edge Compliance for LTE Band 85; Update LTE Band 13 in page 114.	February 5, 2021
Rev.3	Update frequency range for LTE Band 66 and NB-IOT Band 66.	February 7, 2021
Note: This revised report (Report No. R2012A0839-R3V3) supersedes and replaces the previously issued report (Report No. R2012A0839-R3V2). Please discard or destroy the previously issued report and dispose of it accordingly.		



Summary of Measurement Results

Number	Test Case	Clause in FCC rules	Verdict
1	RF Power Output and Effective Isotropic Radiated Power	2.1046/27.50(d)(4)/27.50(b)(10) /27.50(c)(10)	PASS
2	Occupied Bandwidth	2.1049	PASS
3	Band Edge Compliance	27.53(h)/27.53(g) /27.53(f) /27.53(c)	PASS
4	Peak-to-Average Power Ratio	27.50(d)/KDB971168 D01(5.7)	PASS
5	Frequency Stability	2.1055 / 27.54	PASS
6	Spurious Emissions at Antenna Terminals	2.1051/27.53(h) /27.53(g) /27.53(f) /27.53(c)	PASS
7	Radiates Spurious Emission	2.1053 /27.53(h) /27.53(g) /27.53(f) /27.53(c)	PASS
Date of Testing: December 6, 2020 ~January 19, 2021 and January 29, 2021			
Date of Sample Received: December 4, 2020			
Note: PASS: The EUT complies with the essential requirements in the standard. FAIL: The EUT does not comply with the essential requirements in the standard. All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			



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 measurements.

A2LA (Certificate Number: 3857.01)

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

2.1 Applicant and Manufacturer Information

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

2.2 General information

EUT Description			
Model	BG95-MF		
IMEI	860612040005002		
Hardware Version	R1.1		
Software Version	BG95MFLAR02A01		
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.		
Antenna Gain	Band	Frequency(MHz)	Gain(dBi)
	LTE Band 4	1720	1.94
		1740	2.00
		1760	1.57
	LTE Band 12	700	1.66
		710	3.26
		720	3.95
	LTE Band 13	780	4.45
	LTE Band 66	1720	1.94
		1740	2.00
		1760	1.57
	LTE Band 85	700	1.66
		710	3.26
		720	3.95
	NB-IOT Band 4	1720	1.94
		1740	2.00
		1760	1.57
	NB-IOT Band 12	700	1.66
		710	3.26
		720	3.95
	NB-IOT Band 13	780	4.45



		NB-IOT Band 66	1720	1.94
			1740	2.00
			1760	1.57
		NB-IOT Band 71	700	1.66
			NB-IOT Band 85	700
		710		3.26
		720		3.95
Test Mode(s)		LTE Band 4/12/13/66/85; NB-IOT Band 4/12/13/66/71/85;		
LTE	Test Modulation	(LTE)QPSK 16QAM;		
	Category	M1		
NB	Test Modulation	BPSK, QPSK		
	Category	NB2		
	Deployment	stand-alone		
	Sub-carrier spacing	3.75kHz, 15kHz		
	Ntones	single-tone, multi-tone		
Maximum E.I.R.P./ E.R.P.		LTE Band 4:	23.38dBm	
		LTE Band 12:	23.18dBm	
		LTE Band 13:	23.99dBm	
		LTE Band 66:	23.01dBm	
		LTE Band 85:	23.62dBm	
		NB-IOT Band 4:	22.89dBm	
		NB-IOT Band 12:	22.68dBm	
		NB-IOT Band 13:	23.31dBm	
		NB-IOT Band 66:	23.13dBm	
		NB-IOT Band 71:	21.27dBm	
NB-IOT Band 85:	23.04dBm			
Rated Power Supply Voltage:		3.8V		
Extreme Voltage		Minimum: 3.23V Maximum: 4.37V		
Extreme Temperature		Lowest: -30°C Highest: +50°C		
Operating Voltage		Minimum: 3.3V Maximum: 4.3V		
Operating Temperature		Lowest: -35°C Highest: +75°C		
Frequency Range(s)		Mode	Tx (MHz)	Rx (MHz)
		LTE Band 4	1710 ~ 1755	2110 ~ 2155
		LTE Band 12	699 ~ 716	729 ~ 746
		LTE Band 13	777 ~ 787	746 ~ 756
		LTE Band 66	1710 ~ 1780	2110 ~ 2180
		LTE Band 85	698 ~ 716	728 ~ 746
		NB-IOT Band 4	1710 ~ 1755	2110 ~ 2155
		NB-IOT Band 12	699 ~ 716	729 ~ 746



	NB-IOT Band 13	777 ~ 787	746 ~ 756
	NB-IOT Band 66	1710 ~ 1780	2110 ~ 2180
	NB-IOT Band 71	663 ~ 698	617 ~ 652
	NB-IOT Band 85	698 ~ 716	728 ~ 746

Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.



3 Applied Standards

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

Test standards:

FCC CFR47 Part 27C (2019)

ANSI C63.26 (2015)

Reference standard:

FCC CFR47 Part 2 (2019)

KDB 971168 D01 Power Meas License Digital Systems v03r01

4 Test Configuration

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

Test modes are chosen to be reported as the worst case configuration below for NB-IOT Band

4/12/13/66/71/85:

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



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

All mode and data rates and positions and RB size and modulations were investigated.

Subsequently, only the worst case emissions are reported.

The following testing in LTE is set based on the maximum RF Output Power.

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

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

Test items	Modes	Bandwidth (MHz)						Modulation		RB			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	50%	100%	L	M	H
RF Power Output and Effective Isotropic Radiated Power	LTE 4	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	LTE 12	O	O	O	O	-	-	O	O	O	O	O	O	O	O
	LTE 13	-	-	O	O	-	-	O	O	O	O	O	O	O	O
	LTE 66	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	LTE 85	-	-	O	O	-	-	O	O	O	O	O	O	O	O
Occupied Bandwidth	LTE 4	O	O	O	O	O	O	O	O	-	-	O	-	O	-
	LTE 12	O	O	O	O	-	-	O	O	-	-	O	-	O	-
	LTE 13	-	-	O	O	-	-	O	O	-	-	O	-	O	-
	LTE 66	O	O	O	O	O	O	O	O	-	-	O	-	O	-
	LTE 85	-	-	O	O	-	-	O	O	-	-	O	-	O	-
Band Edge Compliance	LTE 4	O	O	O	O	O	O	O	O	O	-	O	O	-	O
	LTE 12	O	O	O	O	-	-	O	O	O	-	O	O	-	O
	LTE 13	-	-	O	O	-	-	O	O	O	-	O	O	-	O



	LTE 66	O	O	O	O	O	O	O	O	O	-	O	O	-	O
	LTE 85	-	-	O	O	-	-	O	O	O	-	O	O	-	O
Peak-to-Average Power Ratio	LTE 4	O	O	O	O	O	O	O	O	-	-	O	-	O	-
	LTE 12	O	O	O	O	-	-	O	O	-	-	O	-	O	-
	LTE 13	-	-	O	O	-	-	O	O	-	-	O	-	O	-
	LTE 66	O	O	O	O	O	O	O	O	-	-	O	-	O	-
	LTE 85	-	-	O	O	-	-	O	O	-	-	O	-	O	-
Frequency Stability	LTE 4	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	LTE 12	O	O	O	O	-	-	O	O	O	O	O	O	O	O
	LTE 13	-	-	O	O	-	-	O	O	O	O	O	O	O	O
	LTE 66	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	LTE 85	-	-	O	O	-	-	O	O	O	O	O	O	O	O
Spurious Emissions at Antenna Terminals	LTE 4	O	O	O	O	O	O	O	-	O	-	-	O	O	O
	LTE 12	O	O	O	O	-	-	O	-	O	-	-	O	O	O
	LTE 13	-	-	O	O	-	-	O	-	O	-	-	O	O	O
	LTE 66	O	O	O	O	O	O	O	-	O	-	-	O	O	O
	LTE 85	-	-	O	O	-	-	O	-	O	-	-	O	O	O
Radiates Spurious Emission	LTE 4	O	-	O	-	-	O	O	-	O	-	-	-	O	-
	LTE 12	O	-	O	O	-	-	O	-	O	-	-	-	O	-
	LTE 13	-	-	O	O	-	-	O	-	O	-	-	-	O	-
	LTE 66	O	-	O	-	-	O	O	-	O	-	-	-	O	-
	LTE 85	-	-	O	O	-	-	O	-	O	-	-	-	O	-
Note	1. The mark "O" means that this configuration is chosen for testing. 2. The mark "-" means that this configuration is not testing.														

5 Test Case Results

5.1 RF Power Output and Effective Isotropic Radiated Power

Ambient condition

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

Methods of Measurement

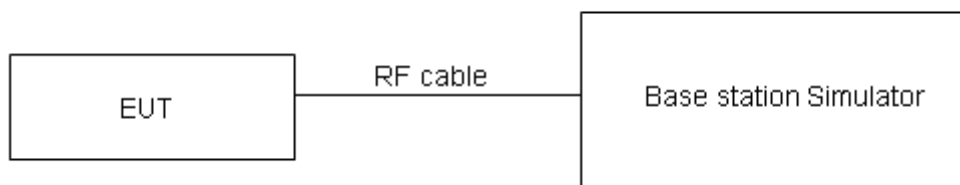
During the process of the testing, The EUT was connected to the Base Station Simulator with a known loss. The EUT is controlled by the Base Station Simulator test set to ensure max power transmission with proper modulation.

ERP can then be calculated as follows:

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

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

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



Test Setup

Limits

No specific RF power output requirements in part 2.1046.

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

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

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

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



Measurement Uncertainty

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



Test Results

LTE Band 4	Channel/ Frequency(MHz)	Index	RB# RBstart	Maximum Output Power(dBm)		EIRP (dBm)	
				QPSK	16QAM	QPSK	16QAM
1.4MHz	19957/1710.7	0	1#0	21.01	20.47	22.95	22.41
		0	6#0	18.86	18.77	20.80	20.71
	20175/1732.5	0	1#0	21.38	19.77	23.38	21.77
		0	6#0	18.73	19.02	20.73	21.02
	20393/1754.3	0	1#5	21.01	19.48	22.58	21.05
		0	6#0	18.65	19.01	20.22	20.58
3MHz	19965/1711.5	0	1#0	21.04	19.63	22.98	21.57
		0	6#0	18.97	19.27	20.91	21.21
	20175/1732.5	0	1#0	20.87	19.43	22.87	21.43
		0	6#0	18.78	19.00	20.78	21.00
	20385/1753.5	1	1#5	20.56	19.07	22.13	20.64
		0	6#0	18.67	18.93	20.24	20.50
5MHz	19975/1712.5	3	1#0	21.07	20.55	23.01	22.49
		0	6#0	19.85	19.92	21.79	21.86
	20175/1732.5	0	1#0	20.85	20.37	22.85	22.37
		0	6#0	19.72	19.72	21.72	21.72
	20375/1752.5	0	1#5	20.53	20.22	22.10	21.79
		0	6#0	19.61	19.57	21.18	21.14
10MHz	20000/1715	3	1#0	21.04	20.75	22.98	22.69
		0	4#0	21.09	21.06	23.03	23.00
	20175/1732.5	0	1#0	20.92	20.50	22.92	22.50
		0	4#0	20.83	20.87	22.83	22.87
	20350/1750	4	1#5	20.57	20.21	22.14	21.78
		7	4#2	20.72	20.77	22.29	22.34
15MHz	20025/1717.5	3	1#0	21.17	20.55	23.11	22.49
		0	6#0	20.94	21.04	22.88	22.98
	20175/1732.5	0	1#0	20.91	20.55	22.91	22.55
		0	6#0	20.87	20.98	22.87	22.98
	20325/1747.5	8	1#5	20.63	20.16	22.63	22.16
		11	6#0	20.61	20.57	22.61	22.57
20MHz	20050/1720	3	1#0	20.81	20.50	22.75	22.44
		0	6#0	20.86	20.93	22.80	22.87
	20175/1732.5	0	1#0	20.98	20.38	22.98	22.38
		0	6#0	20.83	20.92	22.83	22.92
	20300/1745	12	1#5	20.47	20.09	22.47	22.09
		15	6#0	20.63	20.59	22.63	22.59
LTE Band12	Channel/ Frequency(MHz)	Index	RB# RBstart	Maximum Output Power(dBm)		ERP (dBm)	
				QPSK	16QAM	QPSK	16QAM
1.4MHz	23017/699.7	0	1#0	21.06	20.13	20.57	19.64



	23095/707.5	0	6#0	19.25	19.78	18.76	19.29
		0	1#0	21.09	20.12	22.20	21.23
		0	6#0	19.33	19.76	20.44	20.87
	23173/715.3	0	1#5	21.38	20.06	23.18	21.86
		0	6#0	19.33	19.79	21.13	21.59
3MHz	23025/700.5	0	1#0	21.20	20.27	20.71	19.78
		0	6#0	19.38	19.62	18.89	19.13
	23095/707.5	0	1#0	21.31	20.67	22.42	21.78
		0	6#0	19.34	19.37	20.45	20.48
	23165/714.5	1	1#5	21.22	20.16	22.33	21.27
		0	6#0	19.35	19.63	20.46	20.74
5MHz	23035/701.5	3	1#0	21.48	21.12	20.99	20.63
		0	6#0	20.40	20.60	19.91	20.11
	23095/707.5	0	1#0	21.56	21.22	22.67	22.33
		0	6#0	20.41	20.61	21.52	21.72
	23155/713.5	0	1#5	21.40	20.93	22.51	22.04
		0	6#0	20.33	20.55	21.44	21.66
10MHz	23060/704	3	1#0	21.52	21.10	21.03	20.61
		0	4#0	21.52	21.98	21.03	21.49
	23095/707.5	0	1#0	21.32	21.64	22.43	22.75
		0	4#0	21.50	21.85	22.61	22.96
	23130/711	4	1#5	21.37	21.04	22.48	22.15
		7	4#2	21.47	21.95	22.58	23.06
LTE Band13	Channel/ Frequency(MHz)	Index	RB# RBstart	Maximum Output Power(dBm)		ERP (dBm)	
				QPSK	16QAM	QPSK	16QAM
5MHz	23205/779.5	3	1#0	21.34	20.98	23.64	23.28
		0	6#0	20.27	20.48	22.57	22.78
	23230/782	0	1#0	21.25	21.62	23.55	23.92
		0	6#0	20.34	20.55	22.64	22.85
	23255/784.5	0	1#5	21.24	20.69	23.54	22.99
		0	6#0	20.35	20.51	22.65	22.81
10MHz	23230/782	0	1#0	21.30	21.69	23.60	23.99
		0	4#0	20.30	20.67	22.60	22.97
LTE Band66	Channel/ Frequency(MHz)	Index	RB# RBstart	Maximum Output Power(dBm)		EIRP (dBm)	
				QPSK	16QAM	QPSK	16QAM
1.4MHz	19957 1710.7	0	1#0	21.07	19.36	23.01	21.30
		0	6#0	18.31	18.72	20.25	20.66
	20175/1732.5	0	1#0	20.85	19.14	22.85	21.14
		0	6#0	18.14	18.46	20.14	20.46
	20393/1754.3	0	1#5	20.50	19.03	22.07	20.60
		0	6#0	18.32	18.47	19.89	20.04
3MHz	19965/1711.5	0	1#0	20.54	19.04	22.48	20.98
		0	6#0	18.42	18.65	20.36	20.59



	20175/1732.5	0	1#0	20.29	18.88	22.29	20.88
		0	6#0	18.24	18.45	20.24	20.45
	20385/1753.5	1	1#5	19.89	18.43	21.46	20.00
		0	6#0	17.91	18.03	19.48	19.60
5MHz	19975/1712.5	3	1#0	20.57	20.09	22.51	22.03
		0	6#0	19.27	19.37	21.21	21.31
	20175/1732.5	0	1#0	20.53	19.86	22.53	21.86
		0	6#0	19.46	19.24	21.46	21.24
	20375/1752.5	0	1#5	19.94	20.15	21.51	21.72
		0	6#0	19.05	19.16	20.62	20.73
10MHz	20000/1715	3	1#0	20.59	20.22	22.53	22.16
		0	4#0	20.57	20.60	22.51	22.54
	20175/1732.5	0	1#0	20.54	20.15	22.54	22.15
		0	4#0	20.35	20.39	22.35	22.39
	20350/1750	4	1#5	19.94	20.05	21.51	21.62
		7	4#2	20.02	19.84	21.59	21.41
15MHz	20025/1717.5	3	1#0	20.65	20.18	22.59	22.12
		0	6#0	20.55	20.65	22.49	22.59
	20175/1732.5	0	1#0	20.58	20.12	22.58	22.12
		0	6#0	20.41	20.54	22.41	22.54
	20325/1747.5	8	1#5	20.05	19.77	22.05	21.77
		11	6#0	20.06	20.07	22.06	22.07
20MHz	20050/1720	3	1#0	20.60	20.21	22.54	22.15
		0	6#0	20.52	20.57	22.46	22.51
	20175/1732.5	0	1#0	20.52	20.12	22.52	22.12
		0	6#0	20.42	20.45	22.42	22.45
	20300/1745	12	1#5	20.00	19.77	22.00	21.77
		15	6#0	20.06	20.06	22.06	22.06
LTE Band85	Channel/ Frequency(MHz)	Index	RB# RBstart	Maximum Output Power(dBm)		ERP (dBm)	
				QPSK	16QAM	QPSK	16QAM
5MHz	134027/700.5	3	1#0	21.74	21.90	21.25	21.41
		0	6#0	20.65	20.83	20.16	20.34
	134092/707	0	1#0	21.80	22.07	22.91	23.18
		0	6#0	20.66	20.69	21.77	21.80
	134157/713.5	0	1#5	21.63	21.82	23.43	23.62
		0	6#0	20.64	20.63	22.44	22.43
10MHz	134052/703	3	1#0	21.71	21.88	21.22	21.39
		0	4#0	21.63	21.39	21.14	20.90
	134092/707	0	1#0	21.71	21.90	22.82	23.01
		0	4#0	21.58	21.54	22.69	22.65
	134132/711	4	1#5	21.63	21.93	22.74	23.04
		7	4#2	21.56	21.42	22.67	22.53



Mode	Modulation	Sub-carrier spacing (kHz)	Ntones	Maximum Output Power(dBm) for low/middle/high channel			EIRP (dBm)		
				19952/ 1710.2 MHz	20175/ 1732.5 MHz	20398/ 1754.8 MHz	19952/ 1710.2 MHz	20175/ 1732.5 MHz	20398/ 1754.8 MHz
NB-IOT Band 4	BPSK	3.75	1@0	20.95	20.75	20.68	22.89	22.75	22.25
			1@47	20.88	20.75	21.02	22.82	22.75	22.59
		15	1@0	20.81	20.88	20.59	22.75	22.88	22.16
			1@11	20.85	20.84	20.60	22.79	22.84	22.17
	QPSK	3.75	1@0	20.93	20.74	20.94	22.87	22.74	22.51
			1@47	20.83	20.68	20.74	22.77	22.68	22.31
		15	1@0	20.78	20.80	20.64	22.72	22.80	22.21
			1@11	20.92	20.80	20.57	22.86	22.80	22.14
		15	12@0	18.80	18.67	18.43	20.74	20.67	20.00
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Maximum Output Power(dBm) for low/middle/high channel			ERP (dBm)		
				23012/ 699.2 MHz	23095/ 707.5 MHz	23178/ 715.8 MHz	23012/ 699.2 MHz	23095/ 707.5 MHz	23178/ 715.8 MHz
NB-IOT Band 12	BPSK	3.75	1@0	20.84	20.75	20.84	20.35	21.86	22.64
			1@47	20.69	20.83	20.83	20.20	21.94	22.63
		15	1@0	20.73	20.86	20.82	20.24	21.97	22.62
			1@11	20.68	20.86	20.84	20.19	21.97	22.64
	QPSK	3.75	1@0	20.79	20.90	20.88	20.30	22.01	22.68
			1@47	20.70	20.83	20.83	20.21	21.94	22.63
		15	1@0	20.73	20.95	20.81	20.24	22.06	22.61
			1@11	20.61	20.83	20.83	20.12	21.94	22.63
		15	12@0	18.51	18.80	18.80	18.02	19.91	20.60
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Maximum Output Power(dBm) for low/middle/high channel			ERP (dBm)		
				23182/ 777.2 MHz	23230/ 782 MHz	23278/ 786.8 MHz	23182/ 777.2 MHz	23230/ 782 MHz	23278/ 786.8 MHz
NB-IOT Band 13	BPSK	3.75	1@0	20.85	20.88	20.92	23.15	23.18	22.40
			1@47	20.76	20.85	20.84	23.06	23.15	22.32
		15	1@0	20.94	20.86	20.84	23.24	23.16	22.32
			1@11	20.95	20.83	20.77	23.25	23.13	22.25
	QPSK	3.75	1@0	20.82	21.01	20.94	23.12	23.31	22.42
			1@47	20.74	20.95	20.87	23.04	23.25	22.35
		15	1@0	20.93	20.95	20.90	23.23	23.25	22.38
			1@11	20.91	20.90	20.93	23.21	23.20	22.41
		15	12@0	18.81	18.78	18.60	21.11	21.08	20.08
Mode	Modulation	Sub-carrier	Ntones	Maximum Output Power(dBm)			EIRP (dBm)		



		spacing (KHz)		for low/middle/high channel					
				131974/ 1710.2 MHz	132322/ 1745 MHz	132670/ 1779.8 MHz	131974/ 1710.2 MHz	132322/ 1745 MHz	132670/ 1779.8 MHz
NB-IOT Band 66	BPSK	3.75	1@0	20.93	20.78	20.72	22.93	22.78	21.69
			1@47	20.98	20.91	20.41	22.98	22.91	21.38
		15	1@0	20.87	20.90	21.13	22.87	22.90	22.10
			1@11	20.82	20.86	21.13	22.82	22.86	22.10
	QPSK	3.75	1@0	21.04	21.13	20.57	23.04	23.13	21.54
			1@47	21.01	20.78	20.66	23.01	22.78	21.63
		15	1@0	20.85	20.94	21.24	22.85	22.94	22.21
			1@11	20.86	20.65	21.10	22.86	22.65	22.07
		15	12@0	18.73	18.77	18.95	20.73	20.77	19.92
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Maximum Output Power(dBm) for low/middle/high channel			ERP (dBm)		
				133124/ 663.2 MHz	133297/ 680.5 MHz	133470/ 697.8 MHz	133124/ 663.2 MHz	133297/ 680.5 MHz	133470/ 697.8 MHz
NB-IOT Band 71	BPSK	3.75	1@0	21.70	21.42	21.40	21.21	20.93	20.91
			1@47	21.56	21.51	21.33	21.07	21.02	20.84
		15	1@0	21.65	21.48	21.21	21.16	20.99	20.72
			1@11	21.61	21.37	21.12	21.12	20.88	20.63
	QPSK	3.75	1@0	21.65	21.49	21.52	21.16	21.00	21.03
			1@47	21.56	21.43	21.54	21.07	20.94	21.05
		15	1@0	21.65	21.51	21.09	21.16	21.02	20.60
			1@11	21.76	21.48	21.25	21.27	20.99	20.76
		15	12@0	19.41	19.23	19.00	18.92	18.74	18.51
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Maximum Output Power(dBm) for low/middle/high channel			ERP (dBm)		
				134004/ 698.2 MHz	134092/ 707 MHz	134180/ 715.8 MHz	134004/ 698.2 MHz	134092/ 707 MHz	134180/ 715.8 MHz
NB-IOT Band 85	BPSK	3.75	1@0	20.76	20.78	21.03	20.27	21.89	22.83
			1@47	20.65	20.75	20.90	20.16	21.86	22.70
		15	1@0	20.94	20.81	21.21	20.45	21.92	23.01
			1@11	20.86	20.88	21.11	20.37	21.99	22.91
	QPSK	3.75	1@0	20.76	20.84	21.15	20.27	21.95	22.95
			1@47	20.69	20.72	21.09	20.20	21.83	22.89
		15	1@0	20.90	20.76	21.16	20.41	21.87	22.96
			1@11	21.03	20.86	21.24	20.54	21.97	23.04
		15	12@0	18.89	18.75	19.05	18.40	19.86	20.85

5.2 Occupied Bandwidth

Ambient condition

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

Method of Measurement

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

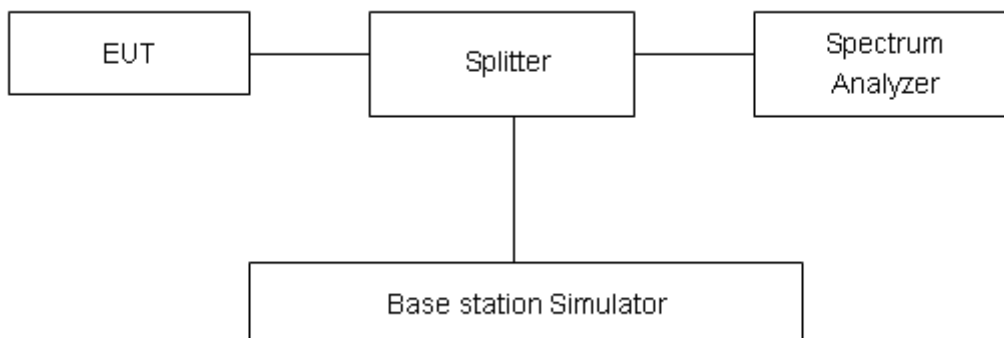
RBW is set to 51kHz, VBW is set to 160kHz for LTE Band 4/12/13/66/85.

RBW is set to 2kHz, VBW is set to 6.2kHz for NB-IOT Band 4/12/13/66/71/85(1@0).

RBW is set to 3.9kHz, VBW is set to 12kHz for NB-IOT Band 4/12/13/66/71/85(12@0).

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

Test Setup



Limits

No specific occupied bandwidth requirements in part 2.1049.

Measurement Uncertainty

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



Test Result

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Bandwidth(MHz)	
				99% Power	-26dBc
LTE Band4	1.4MHz	QPSK	20175/1732.5	1.1027	1.2840
		16QAM	20175/1732.5	0.9415	1.1460
	3MHz	QPSK	20175/1732.5	1.1065	1.3750
		16QAM	20175/1732.5	0.9487	1.1620
	5MHz	QPSK	20175/1732.5	1.1134	1.4090
		16QAM	20175/1732.5	0.9459	1.1870
	10MHz	QPSK	20175/1732.5	1.1113	1.3050
		16QAM	20175/1732.5	0.9517	1.1930
	15MHz	QPSK	20175/1732.5	1.1298	1.3410
		16QAM	20175/1732.5	0.9689	1.1680
LTE Band12	1.4MHz	QPSK	23095/707.5	1.1024	1.3510
		16QAM	23095/707.5	0.9448	1.1700
	3MHz	QPSK	23095/707.5	1.1020	1.3780
		16QAM	23095/707.5	0.9398	1.1630
	5MHz	QPSK	23095/707.5	1.1064	1.3190
		16QAM	23095/707.5	0.9509	1.1670
	10MHz	QPSK	23095/707.5	1.1151	1.3400
		16QAM	23095/707.5	0.9536	1.1440
LTE Band13	5MHz	QPSK	23230/782	1.1108	1.3180
		16QAM	23230/782	0.9467	1.1900
	10MHz	QPSK	23230/782	1.1137	1.3210
		16QAM	23230/782	0.9484	1.2290
LTE Band66	1.4MHz	QPSK	20175/1732.5	1.1046	1.3100
		16QAM	20175/1732.5	0.9385	1.1560
	3MHz	QPSK	20175/1732.5	1.1085	1.3080
		16QAM	20175/1732.5	0.9402	1.1640
	5MHz	QPSK	20175/1732.5	1.1095	1.3190
		16QAM	20175/1732.5	0.9496	1.1880
	10MHz	QPSK	20175/1732.5	1.1138	1.3240
		16QAM	20175/1732.5	0.9475	1.2370
	15MHz	QPSK	20175/1732.5	1.1154	1.3450
		16QAM	20175/1732.5	0.9475	1.2370



	20MHz	16QAM	20175/1732.5	0.9579	1.2290
		QPSK	20175/1732.5	1.1262	1.4530
		16QAM	20175/1732.5	0.9502	1.1540
Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Bandwidth(MHz)	
				99% Power	-26dBc
LTE Ban85	5MHz	QPSK	134092/707	1.1233	1.3480
		16QAM	134092/707	0.9422	1.1360
	10MHz	QPSK	134092/707	1.1256	1.3680
		16QAM	134092/707	0.9596	1.1870

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/middle/high channel					
				19952/1710.2 MHz		20175/1732.5 MHz		20398/1754.8 MHz	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IOT Band 4	BPSK	3.75	1@0	60.36	40.87	59.69	40.91	59.67	41.27
	QPSK	3.75	1@0	70.13	42.55	68.05	40.36	69.59	40.38
	BPSK	15	1@0	121.05	102.50	129.17	105.80	122.47	103.90
	QPSK	15	1@0	119.36	117.60	128.05	117.60	118.00	117.10
	QPSK	15	12@0	185.73	243.30	186.37	246.40	184.12	237.50
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/middle/high channel					
				23012/699.2 MHz		23095/707.5 MHz		23178/715.8 MHz	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IOT Band 12	BPSK	3.75	1@0	56.62	41.13	56.49	38.18	57.23	41.54
	QPSK	3.75	1@0	68.67	42.00	65.68	40.31	65.13	39.20
	BPSK	15	1@0	133.55	127.80	130.44	116.20	120.07	104.70
	QPSK	15	1@0	126.41	118.40	117.87	103.70	121.01	117.80
	QPSK	15	12@0	184.62	261.60	185.94	256.30	183.63	256.10
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/middle/high channel					
				23182/777.2 MHz		23230/782 MHz		23278/786.8 MHz	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IOT Band 13	BPSK	3.75	1@0	57.80	41.53	57.67	41.47	57.23	41.81
	QPSK	3.75	1@0	65.72	39.75	64.90	40.32	66.03	41.36
	BPSK	15	1@0	122.45	102.40	131.00	117.70	128.90	101.70
	QPSK	15	1@0	117.36	115.90	117.91	118.40	121.72	115.40
	QPSK	15	12@0	185.20	244.90	187.62	237.90	184.48	243.20
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/middle/high channel					
				131974/1710.2 MHz		132322/1745 MHz		132670/1779.8 MHz	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IOT Band 66	BPSK	3.75	1@0	59.74	40.81	60.66	39.53	60.70	41.00
	QPSK	3.75	1@0	66.23	39.94	68.82	40.16	68.55	40.18
	BPSK	15	1@0	119.90	103.00	123.31	104.10	119.32	100.80
	QPSK	15	1@0	117.31	131.10	114.73	115.00	119.49	117.00



	QPSK	15	12@0	187.12	241.90	183.41	241.00	187.04	243.10
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/middle/high channel					
				133124/663.2 MHz		133297/680.5 MHz		133470/697.8 MHz	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IOT Band 71	BPSK	3.75	1@0	57.20	40.49	56.77	40.54	56.97	38.76
	QPSK	3.75	1@0	68.25	40.12	66.13	39.48	65.97	39.92
	BPSK	15	1@0	118.98	103.70	120.98	104.50	124.84	104.00
	QPSK	15	1@0	124.49	117.80	124.44	131.50	118.71	116.20
	QPSK	15	12@0	186.00	251.50	184.02	262.90	184.22	248.70
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/middle/high channel					
				134004/698.2 MHz		134081/705.9 MHz		134180/715.8 MHz	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IOT Band 85	BPSK	3.75	1@0	57.35	41.41	58.04	41.44	57.24	41.43
	QPSK	3.75	1@0	68.18	40.31	68.26	40.56	65.81	39.28
	BPSK	15	1@0	124.22	105.60	126.64	102.60	122.08	103.70
	QPSK	15	1@0	125.35	130.40	119.11	103.60	117.95	115.80
	QPSK	15	12@0	184.66	254.00	188.37	251.40	187.01	249.10

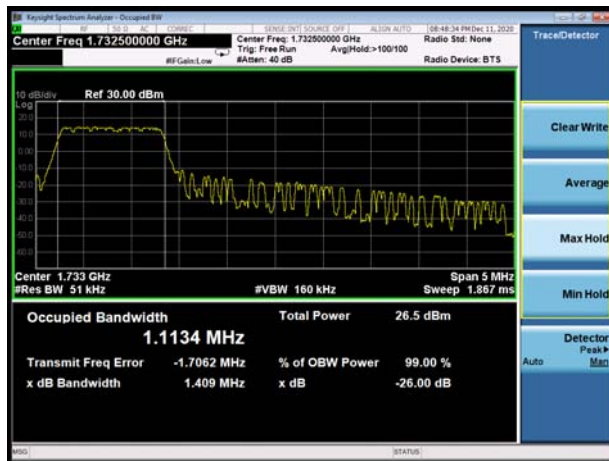
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LTE Band 4 QPSK 3MHz CH-Middle



LTE Band 4 QPSK 5MHz CH-Middle



LTE Band 4 QPSK 10MHz CH-Middle



LTE Band 4 QPSK 15MHz CH-Middle



LTE Band 4 QPSK 20MHz CH-Middle





LTE Band 4 16QAM 1.4MHz CH-Middle



LTE Band 4 16QAM 3MHz CH-Middle



LTE Band 4 16QAM 5MHz CH-Middle



LTE Band 4 16QAM 10MHz CH-Middle



LTE Band 4 16QAM 15MHz CH-Middle



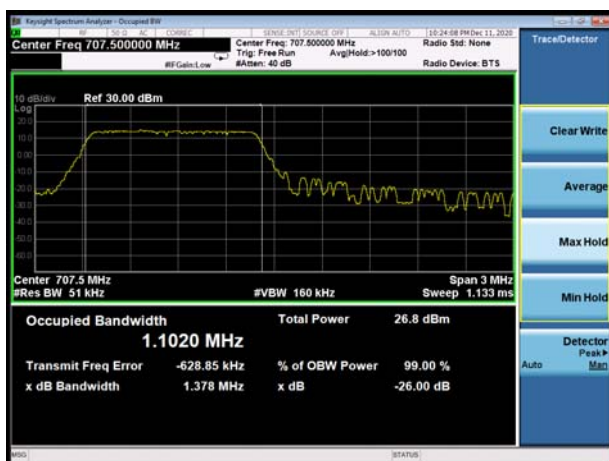
LTE Band 4 16QAM 20MHz CH-Middle



LTE Band 12 QPSK 1.4MHz CH-Middle



LTE Band 12 QPSK 3MHz CH-Middle



LTE Band 12 QPSK 5MHz CH-Middle



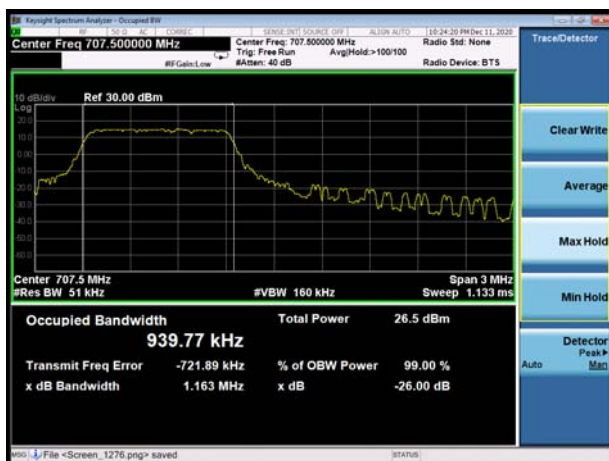
LTE Band 12 QPSK 10MHz CH-Middle



LTE Band 12 16QAM 1.4MHz CH-Middle



LTE Band 12 16QAM 3MHz CH-Middle



LTE Band 12 16QAM 5MHz CH-Middle



LTE Band 12 16QAM 10MHz CH-Middle



LTE Band 13 QPSK 5MHz CH-Middle



LTE Band 13 QPSK 10MHz CH-Middle



LTE Band 13 16QAM 5MHz CH-Middle



LTE Band 13 16QAM 10MHz CH-Middle



LTE Band 66 QPSK 1.4MHz CH-Middle



LTE Band 66 QPSK 3MHz CH-Middle



LTE Band 66 QPSK 5MHz CH-Middle



LTE Band 66 QPSK 10MHz CH-Middle



LTE Band 66 QPSK 15MHz CH-Middle

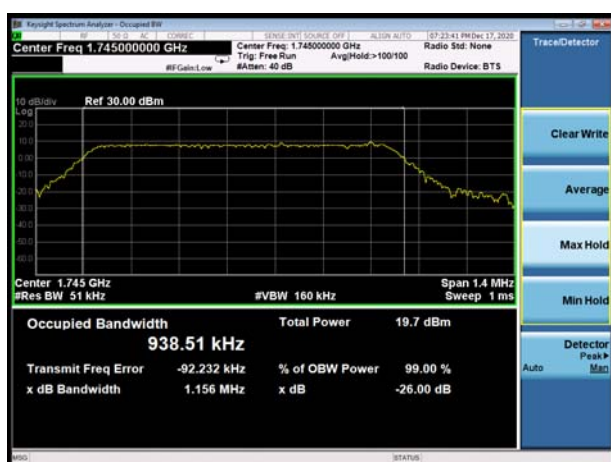


LTE Band 66 QPSK 20MHz CH-Middle





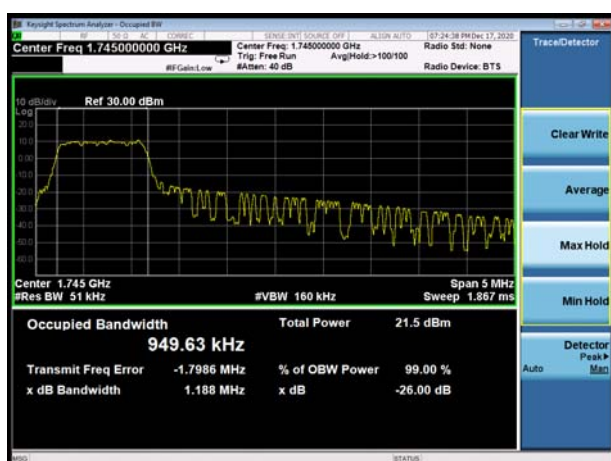
LTE Band 66 16QAM 1.4MHz CH-Middle



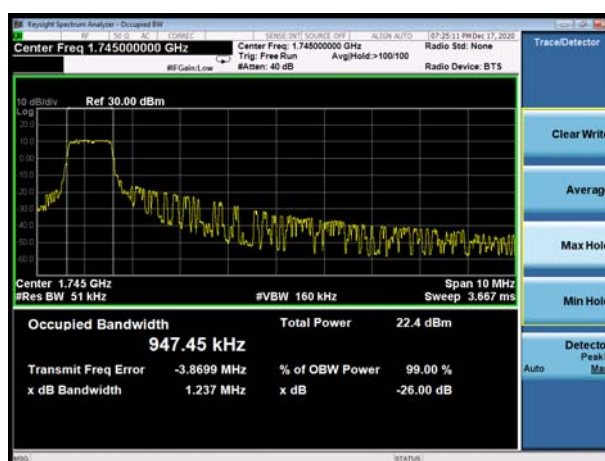
LTE Band 66 16QAM 3MHz CH-Middle



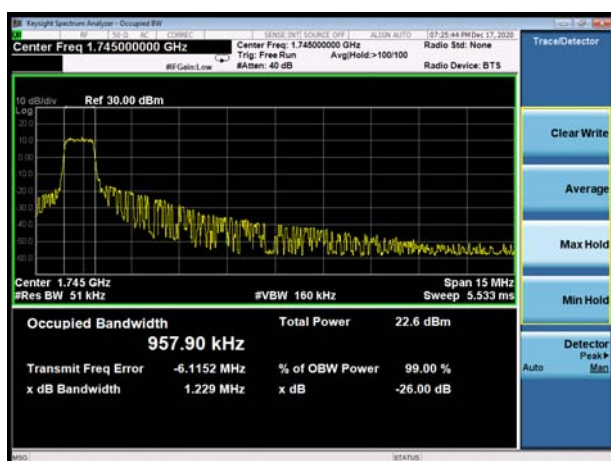
LTE Band 66 16QAM 5MHz CH-Middle



LTE Band 66 16QAM 10MHz CH-Middle



LTE Band 66 16QAM 15MHz CH-Middle



LTE Band 66 16QAM 20MHz CH-Middle





LTE Band 85 QPSK 5MHz CH-Middle



LTE Band 85 QPSK 10MHz CH-Middle



LTE Band 85 16QAM 5MHz CH-Middle

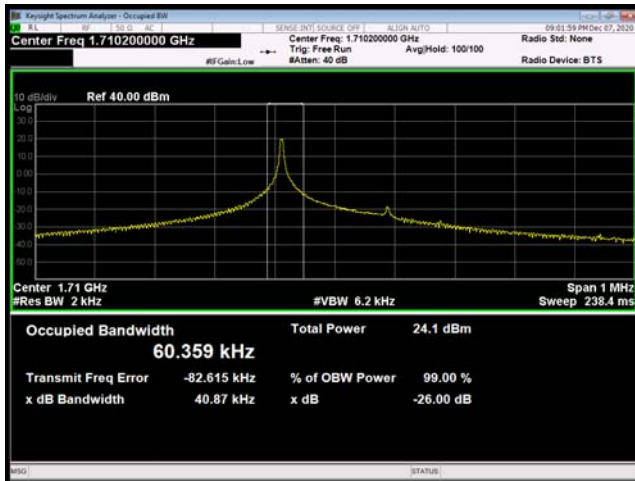


LTE Band 85 16QAM 10MHz CH-Middle





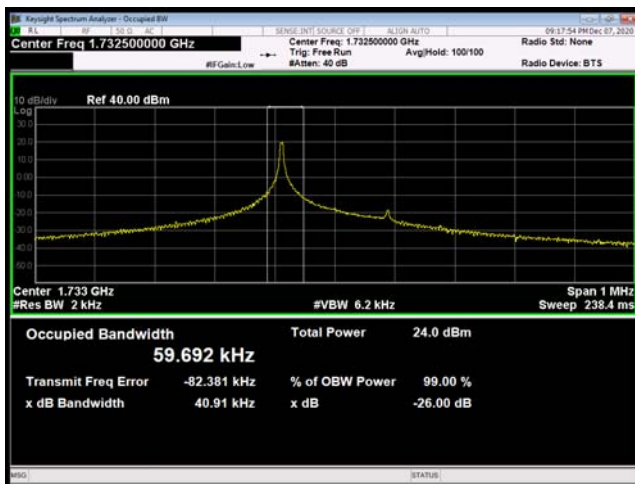
NB-IOT Band 4 BPSK 3.75KHz 1@0 CH-Low



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



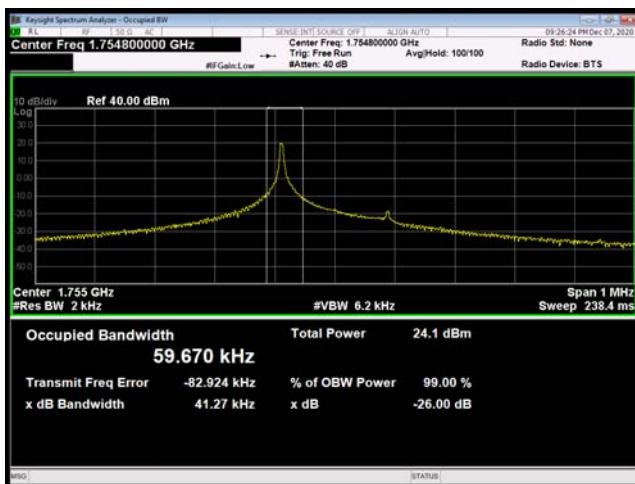
NB-IOT Band 4 BPSK 3.75KHz 1@0 CH-Middle



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



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

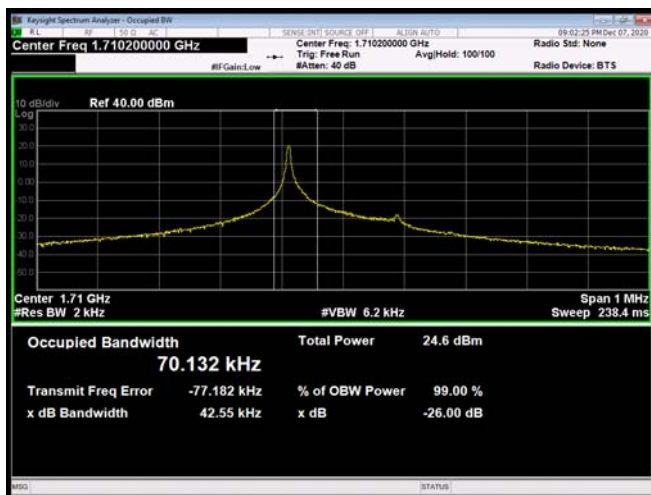


NB-IOT Band 4 BPSK 15KHz 1@0 CH-High

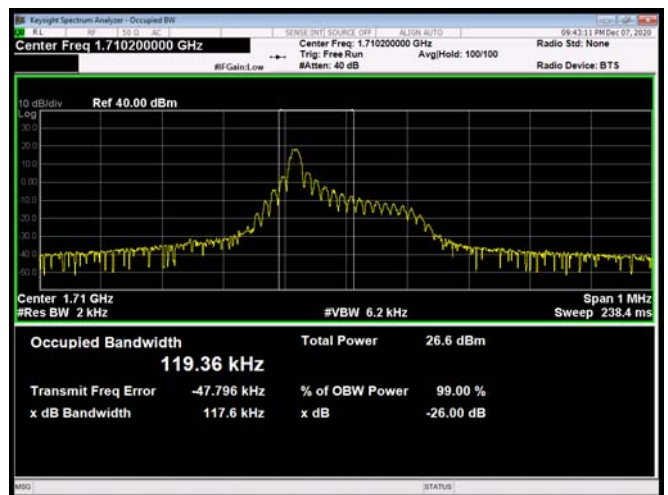




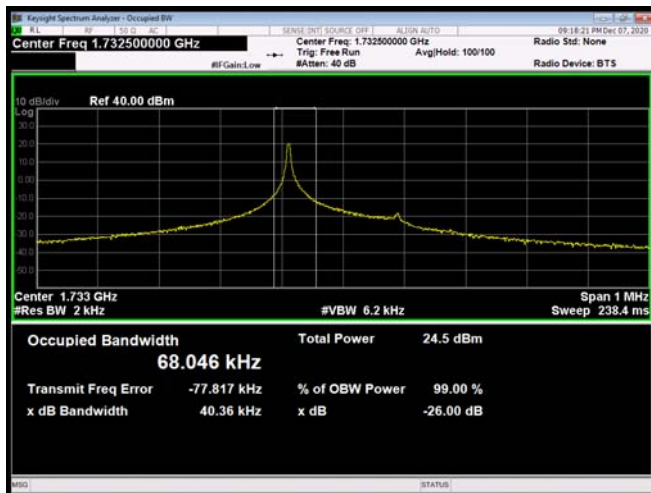
NB-IOT Band 4 QPSK 3.75KHz 1@0 CH-Low



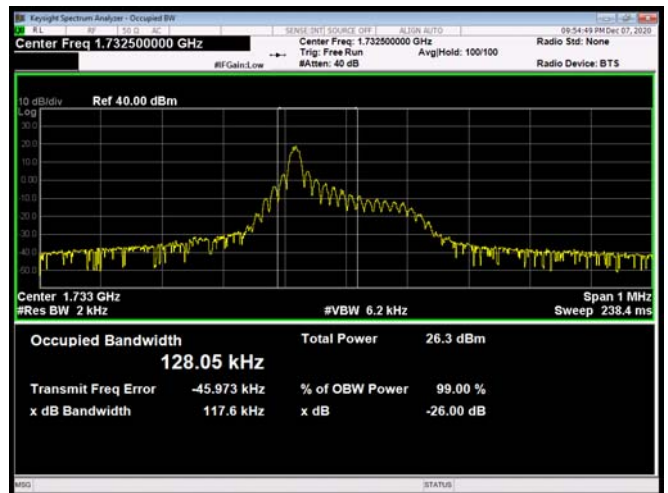
NB-IOT Band 4 QPSK 15KHz 1@0 CH-Low



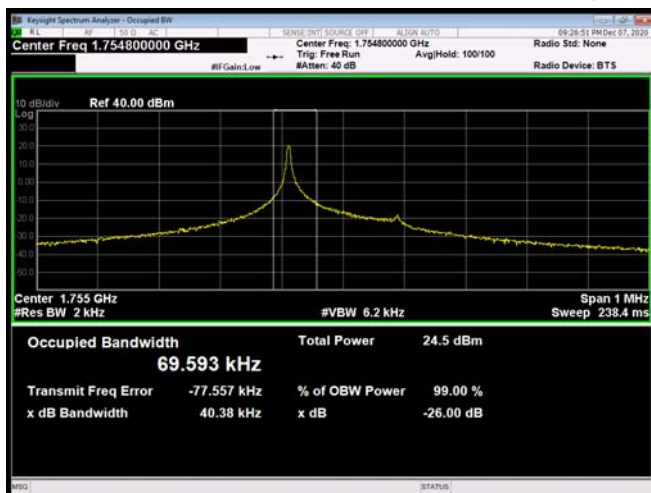
NB-IOT Band 4 QPSK 3.75KHz 1@0 CH-Middle



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



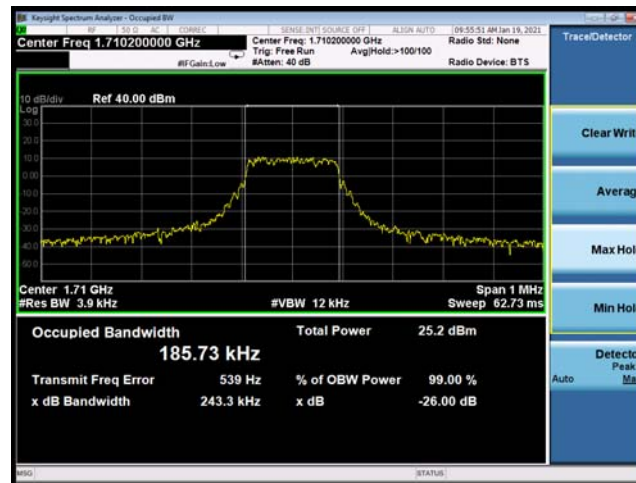
NB-IOT Band 4 QPSK 3.75KHz 1@0 CH-High



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



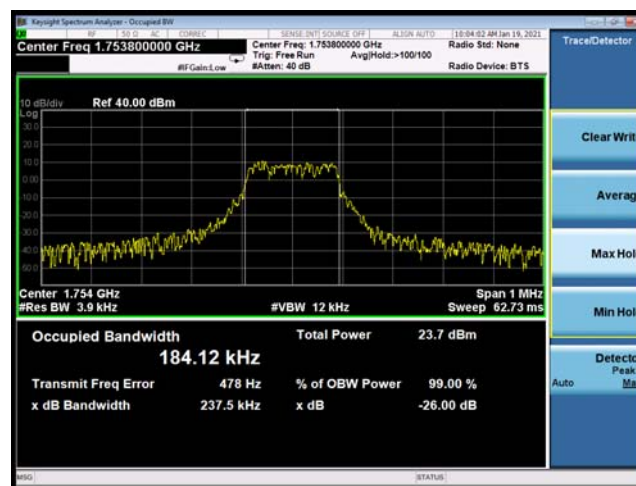
NB-IOT Band 4 QPSK 15KHz 12@0 CH-Low



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



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



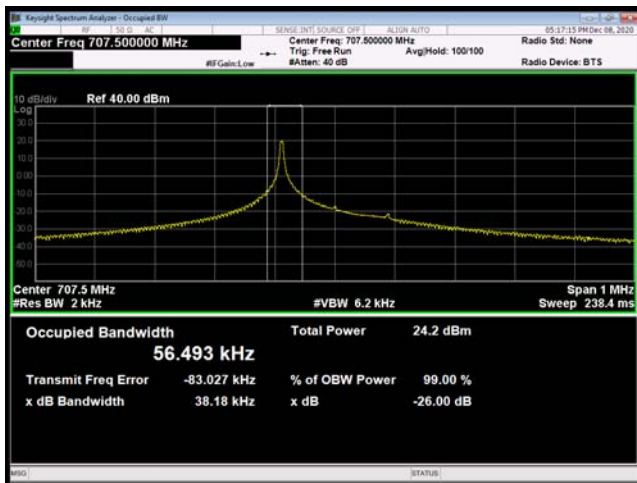
NB-IOT Band 12 BPSK 3.75KHz 1@0 CH-Low



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



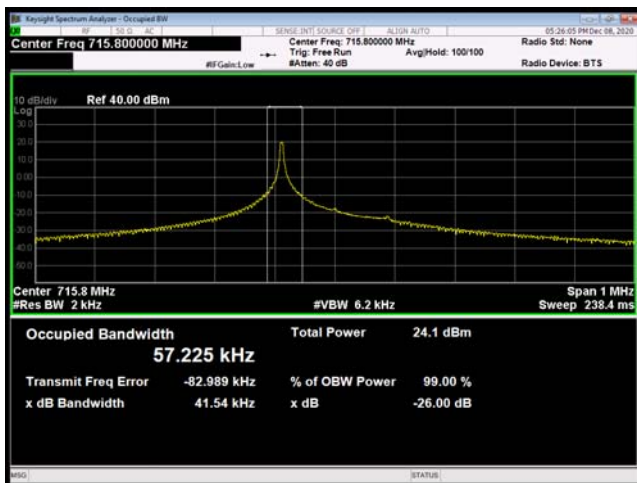
NB-IOT Band 12 BPSK 3.75KHz 1@0 CH-Middle



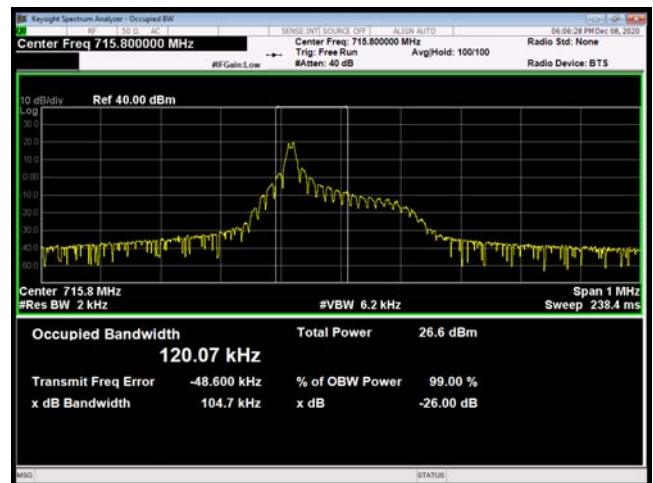
NB-IOT Band 12 BPSK 15KHz 1@0 CH-Middle



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

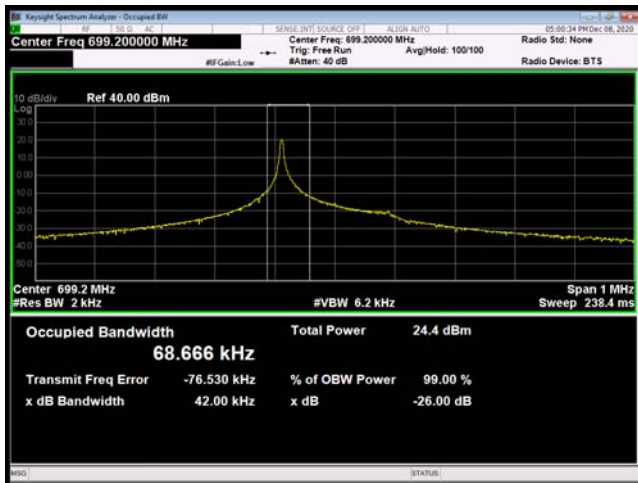


NB-IOT Band 12 BPSK 15KHz 1@0 CH-High





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



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



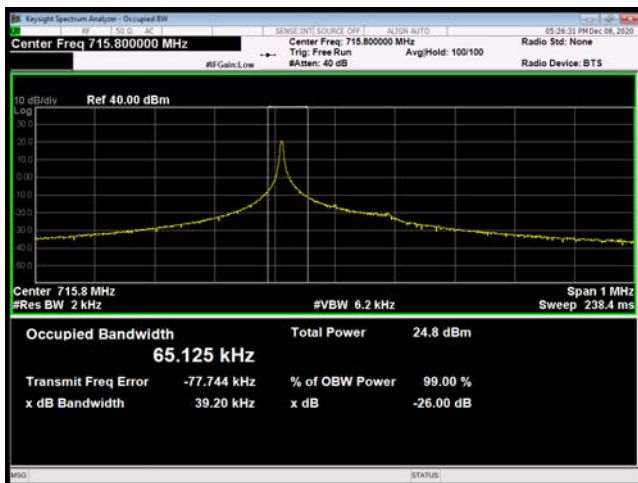
NB-IOT Band 12 QPSK 3.75KHz 1@0 CH-Middle



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



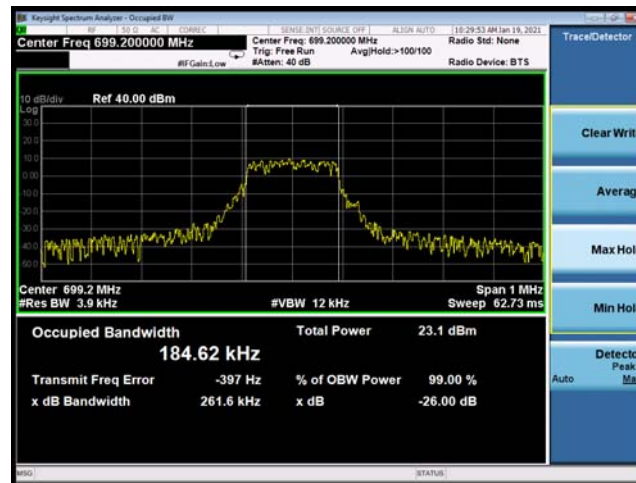
NB-IOT Band 12 QPSK 3.75KHz 1@0 CH-High



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



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



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

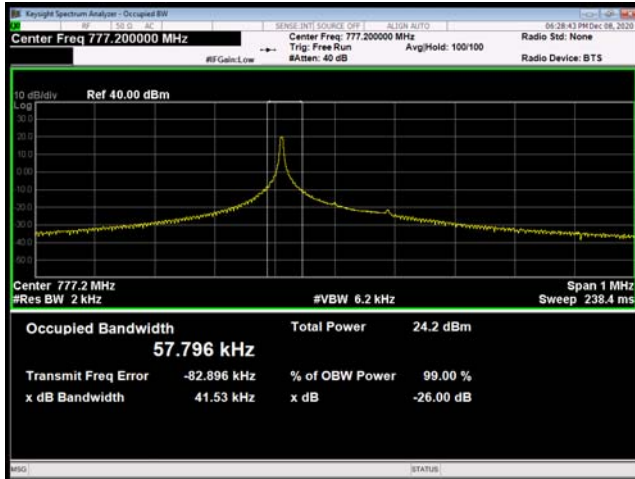


NB-IOT Band 12 QPSK 15KHz 12@0 CH-High





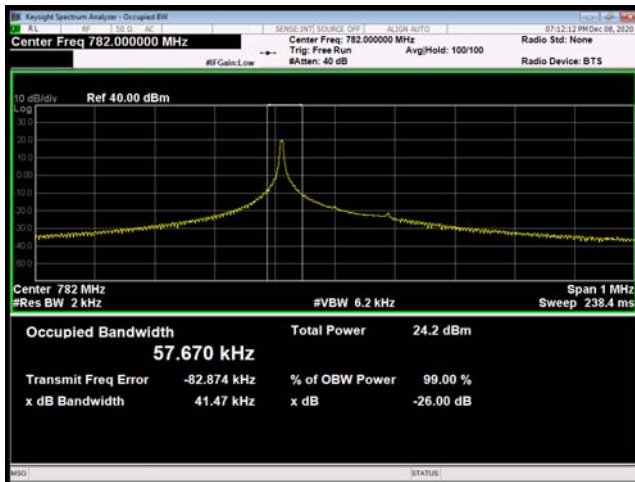
NB-IOT Band 13 BPSK 3.75KHz 1@0 CH-Low



NB-IOT Band 13 BPSK15KHz 1@0 CH-Low



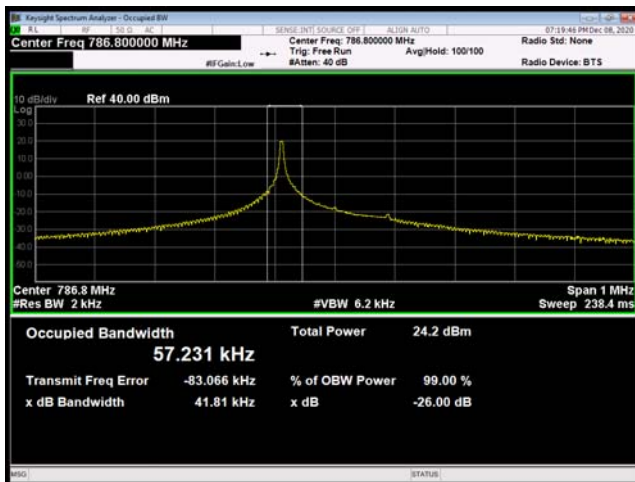
NB-IOT Band 13 BPSK 3.75KHz 1@0 CH-Middle



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



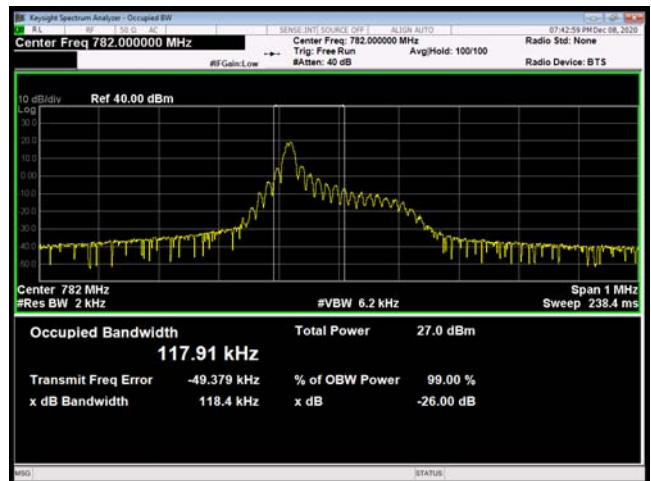
NB-IOT Band 13 QPSK 15KHz 1@0 CH-Low



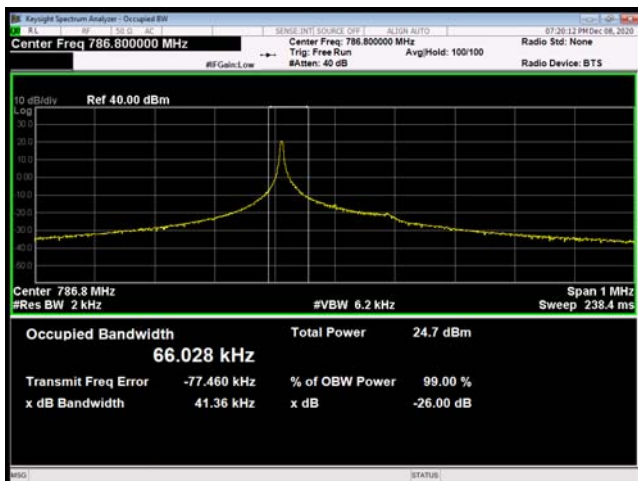
NB-IOT Band 13 QPSK 3.75KHz 1@0 CH-Middle



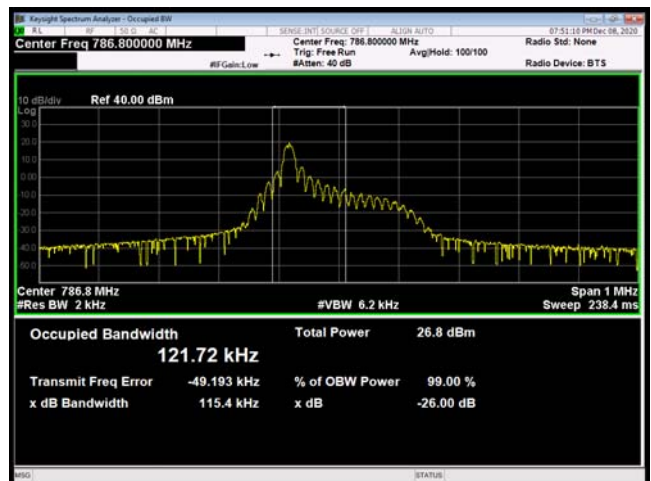
NB-IOT Band 13 QPSK 15KHz 1@0 CH-Middle



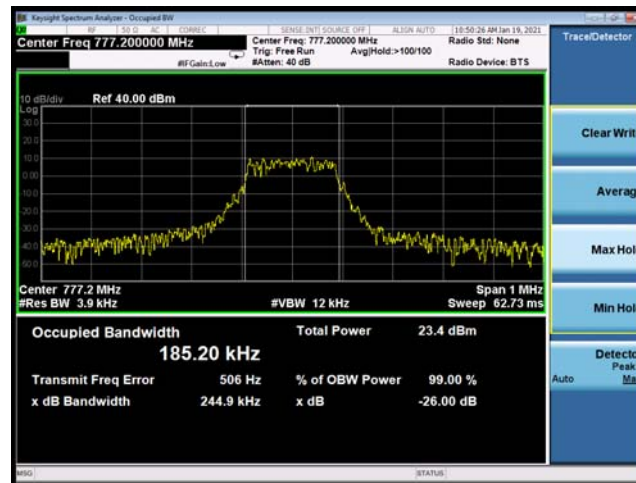
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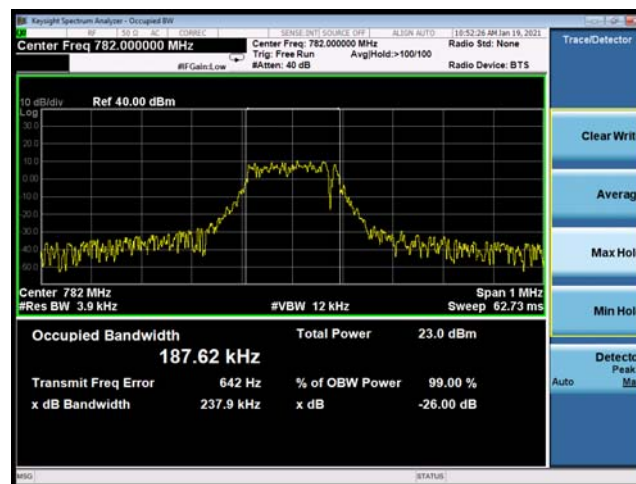
NB-IOT Band 13 QPSK 15KHz 1@0 CH-High



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



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

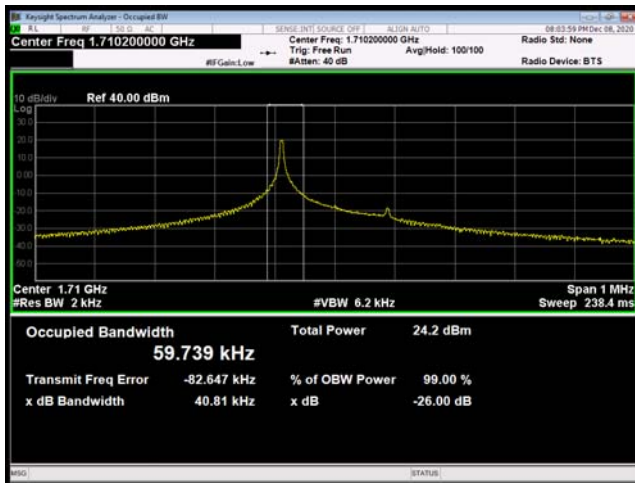


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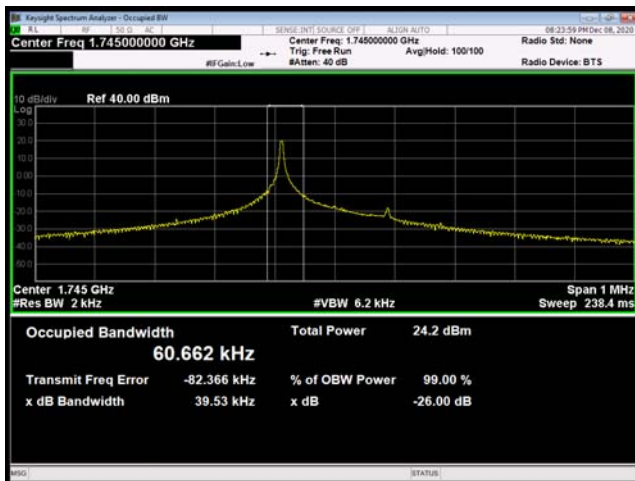
NB-IOT Band 66 BPSK 3.75KHz 1@0 CH-Low



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



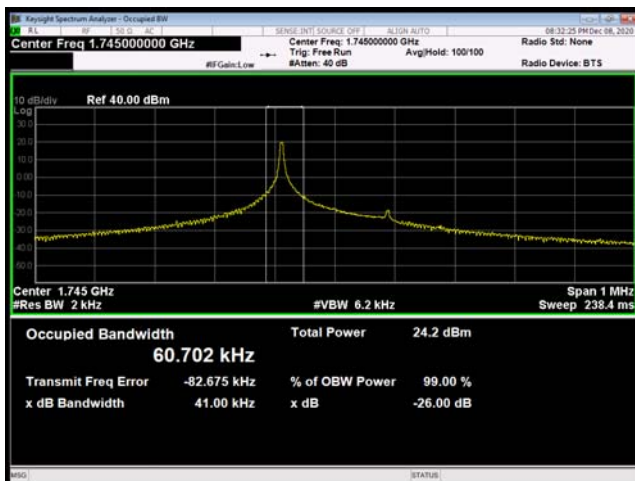
NB-IOT Band 66 BPSK 3.75KHz 1@0 CH-Middle



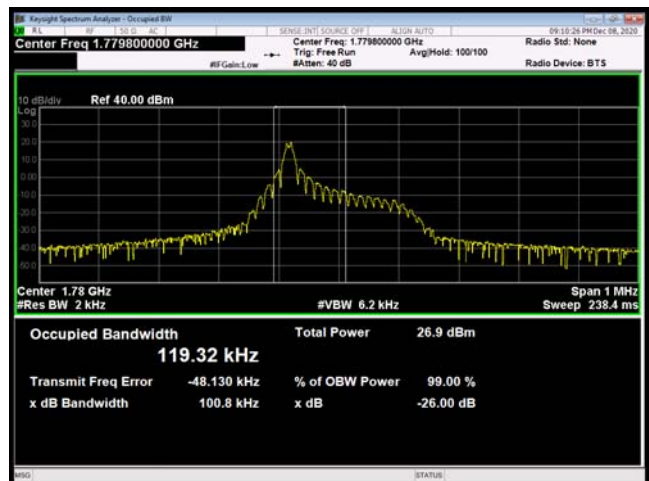
NB-IOT Band 66 BPSK 15KHz 1@0 CH-Middle



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

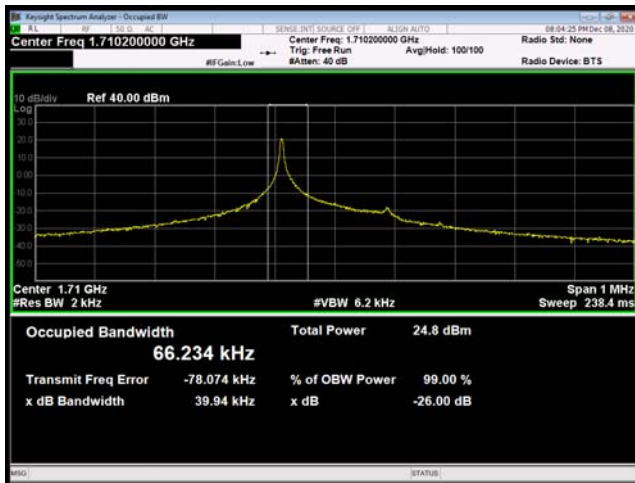


NB-IOT Band 66 BPSK 15KHz 1@0 CH-High

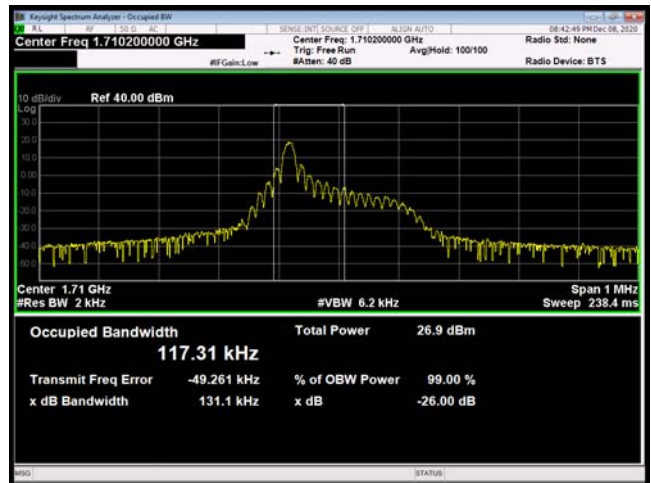




NB-IOT Band 66 QPSK 3.75KHz 1@0 CH-Low



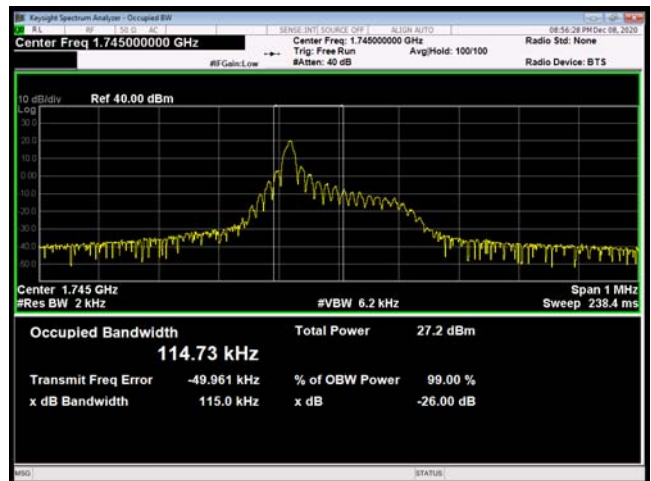
NB-IOT Band 66 QPSK 15KHz 1@0 CH-Low



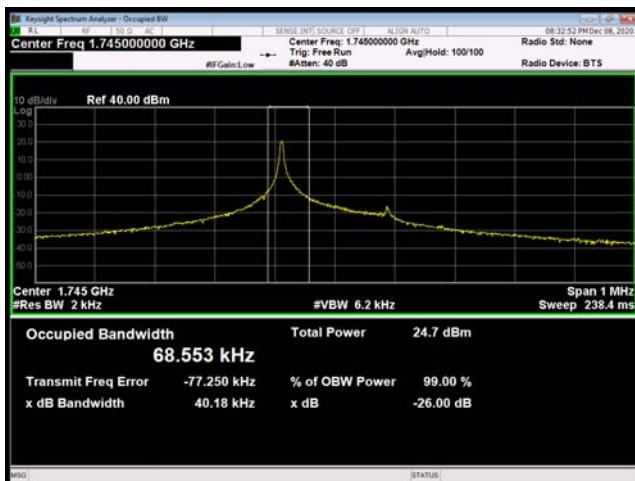
NB-IOT Band 66 QPSK 3.75KHz 1@0 CH-Middle



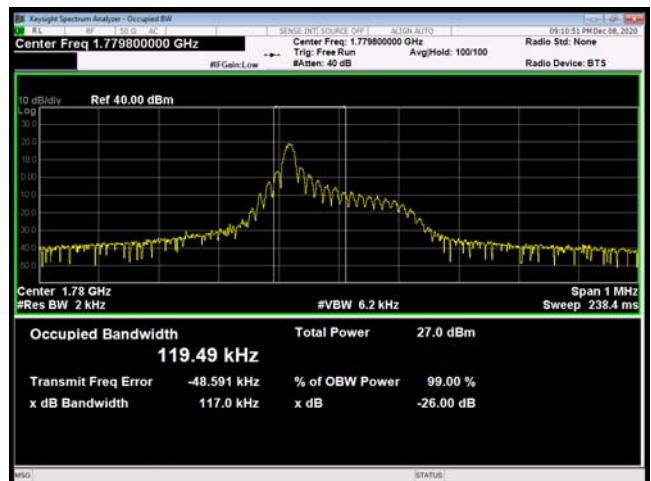
NB-IOT Band 66 QPSK 15KHz 1@0 CH-Middle



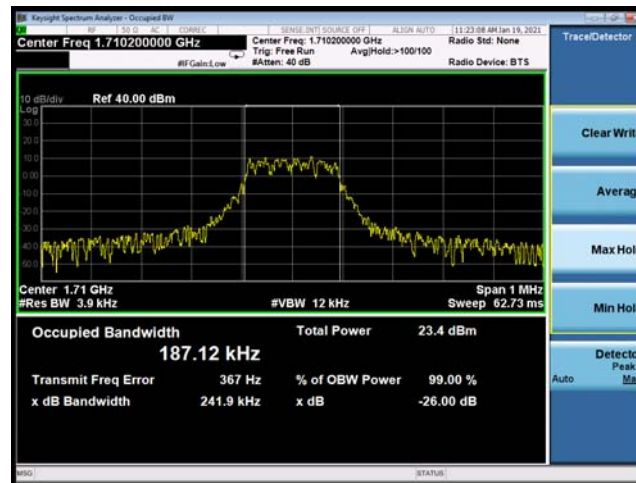
NB-IOT Band 66 QPSK 3.75KHz 1@0 CH-High



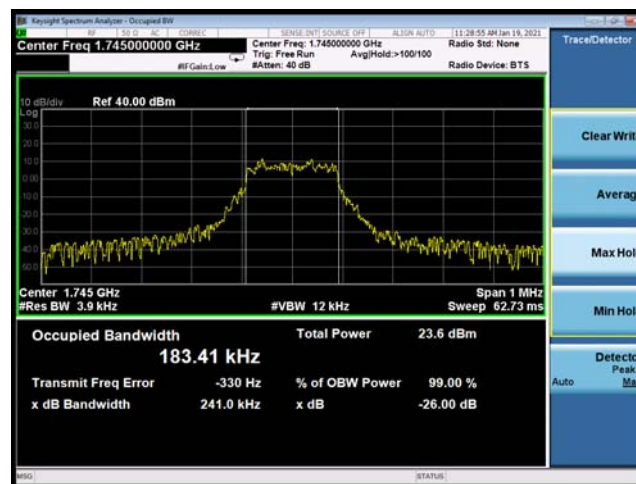
NB-IOT Band 66 QPSK 15KHz 1@0 CH-High



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



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



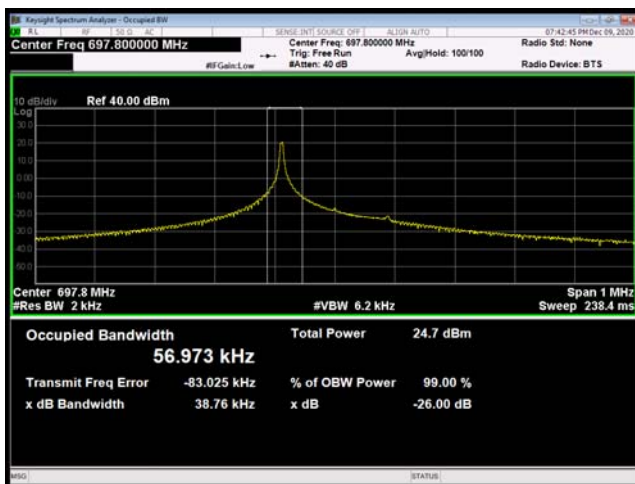
NB-IOT Band 71 BPSK 3.75KHz 1@0 CH-Middle



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



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

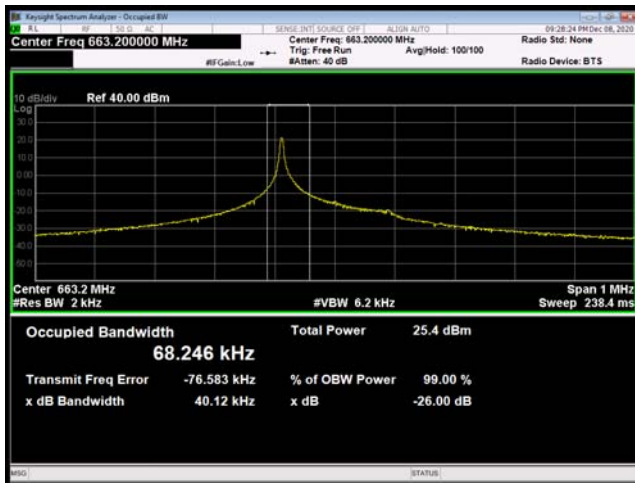


LTE Band71 BPSK 15KHz 1@0 CH-High





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



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



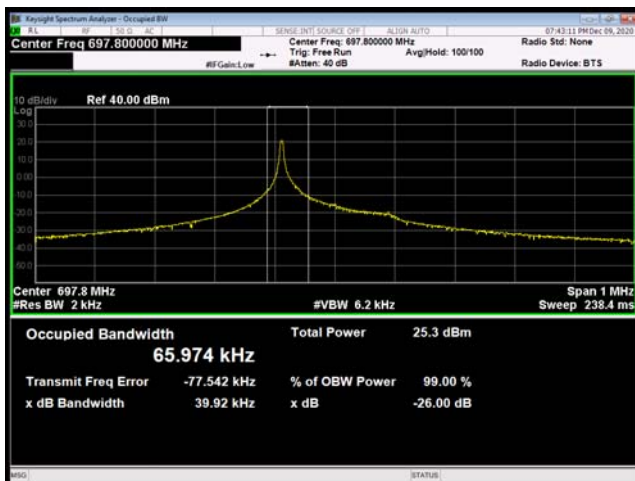
NB-IOT Band 71 QPSK 3.75KHz 1@0 CH-Middle



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



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



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



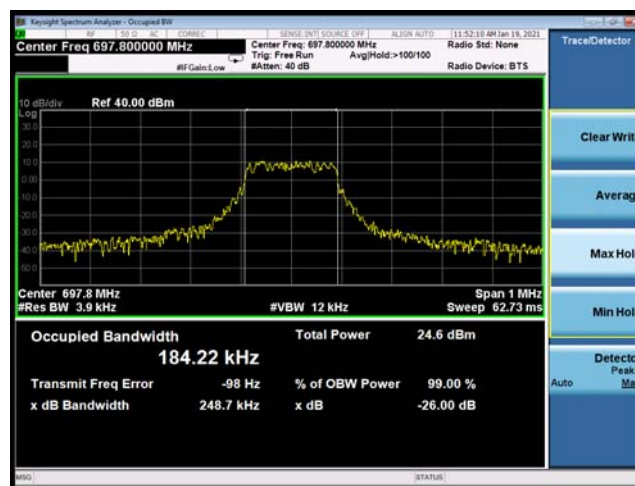
NB-IOT Band 71 QPSK 15KHz 12@0 CH-Low



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



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





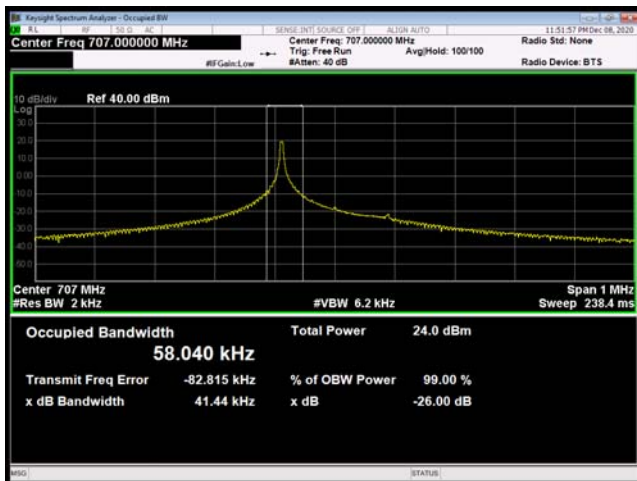
NB-IOT Band 85 BPSK 3.75KHz 1@0 CH-Low



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



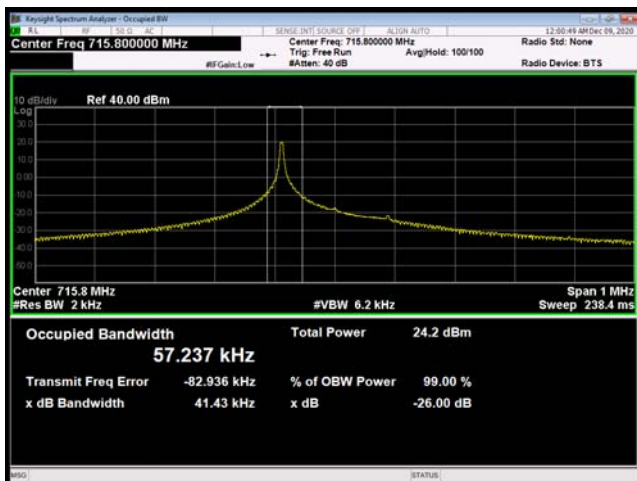
NB-IOT Band 85 BPSK 3.75KHz 1@0 CH-Middle



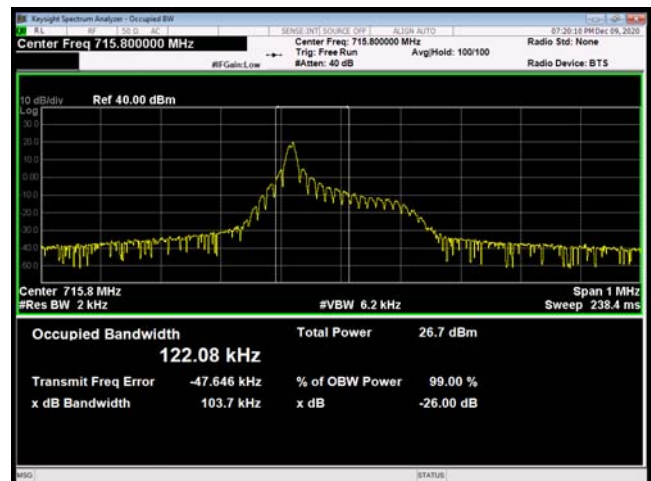
LTE Band 85 BPSK 15KHz 1@0 CH-Middle



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



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



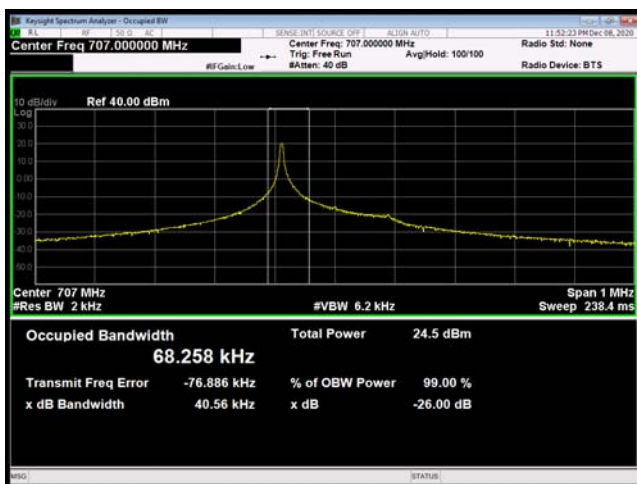
NB-IOT Band 85 QPSK 3.75KHz 1@0 CH-Low



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



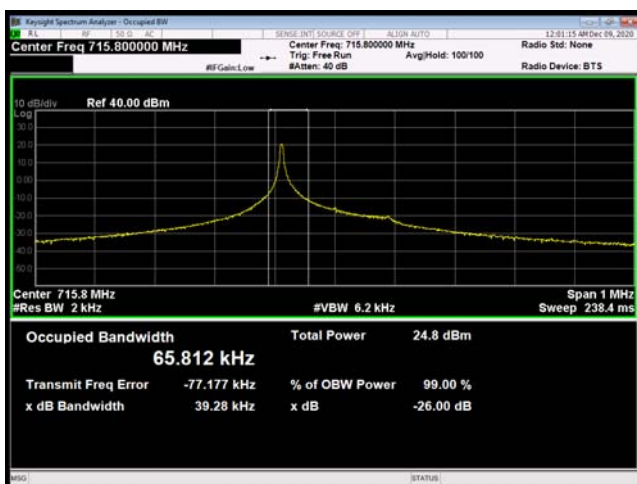
NB-IOT Band 85 QPSK 3.75KHz 1@0 CH-Middle



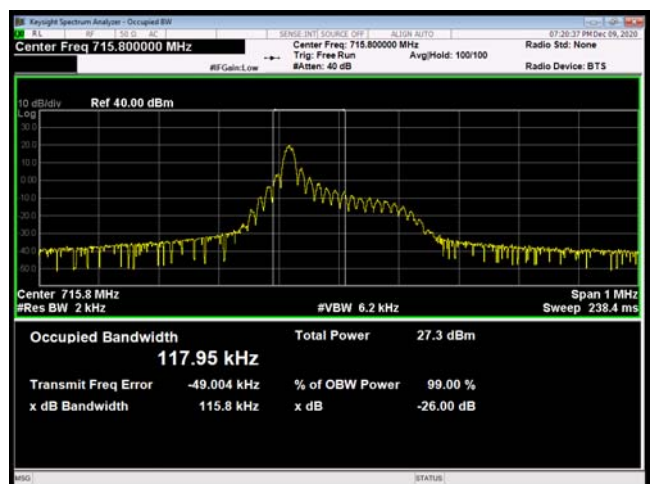
NB-IOT Band 85 QPSK 15KHz 1@0 CH-Middle



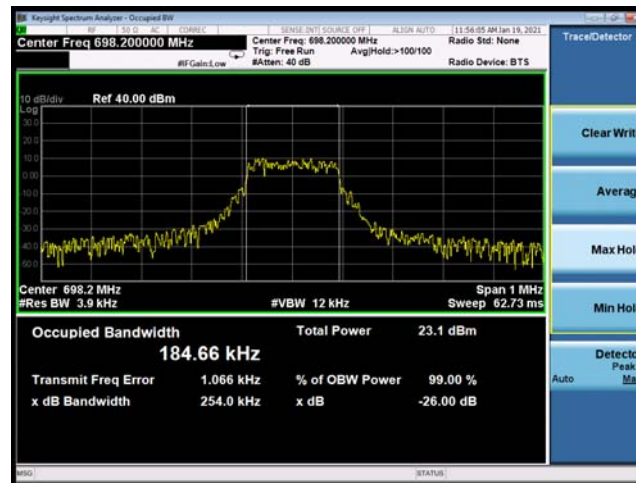
NB-IOT Band 85 QPSK 3.75KHz 1@0 CH-High



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



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



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



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



5.3 Band Edge Compliance

Ambient condition

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

Method of Measurement

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

The testing follows KDB 971168 D01 v03r01 Section 6.0

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

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

RBW is set to 51kHz, VBW is set to 160kHz for LTE Band 4/12/66/85

RBW is set to 6.25 kHz, VBW is set to 3x RBW for LTE Band 13 (763MHz~775MHz).

RBW is set to 100 kHz, VBW is set to 3x RBW for LTE Band 13 (775MHz~776MHz).

RBW is set to 200 kHz, VBW is set to 3x RBW for LTE Band 13 (776MHz~788MHz).

RBW is set to 100 kHz, VBW is set to 3x RBW for LTE Band 13 (788MHz~793MHz).

RBW is set to 6.25 kHz, VBW is set to 3x RBW for LTE Band 13 (793MHz~805MHz).

RBW is set to $\geq 1\%$ EBW, VBW is set to 3x RBW for NB-IOT Band 4/12/13/66/71/85.

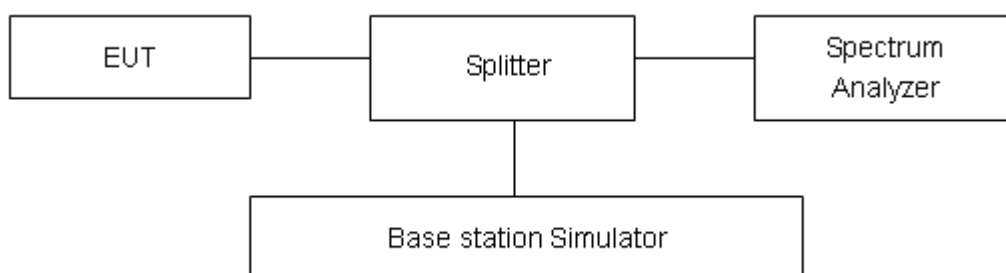
on spectrum analyzer.

Set spectrum analyzer with RMS detector.

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

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

Test Setup



Limits

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

Rule Part 27.53(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the



transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

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

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

- (1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- (2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- (3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $76 + 10 \log (P)$ dB in a 6.25 kHz band segment, for base and fixed stations;
- (4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;
- (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

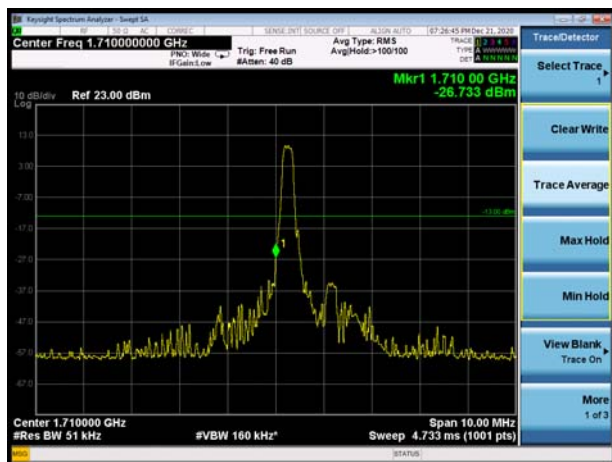
Measurement Uncertainty

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

Test Result

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

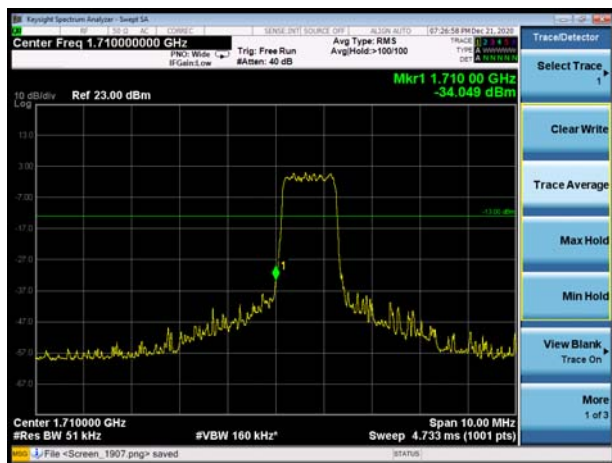
LTE Band 4 QPSK 1.4MHz CH-Low, 1 RB



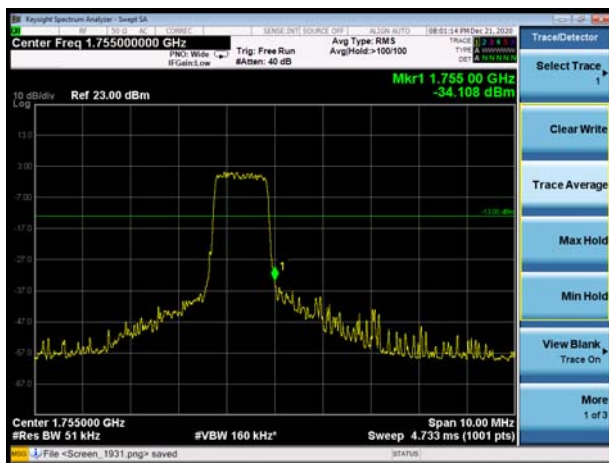
LTE Band 4 QPSK 1.4MHz CH-High, 1 RB



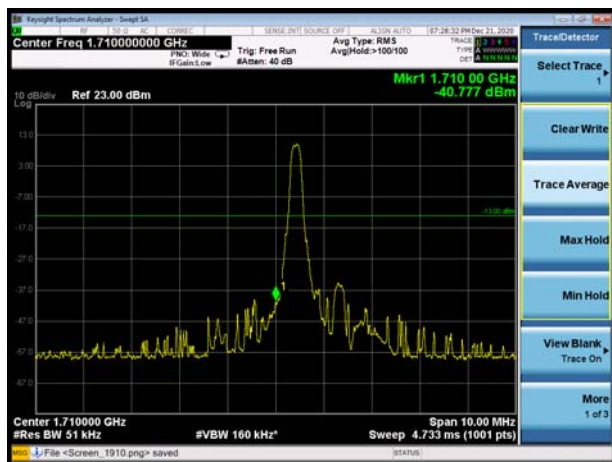
LTE Band 4 QPSK 1.4MHz CH-Low, 100%RB



LTE Band 4 QPSK 1.4MHz CH-High, 100%RB



LTE Band 4 QPSK 3MHz CH-Low, 1 RB

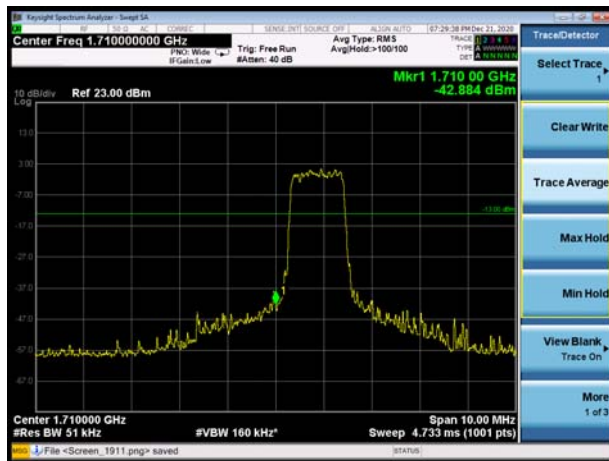


LTE Band 4 QPSK 3MHz CH-High, 1 RB

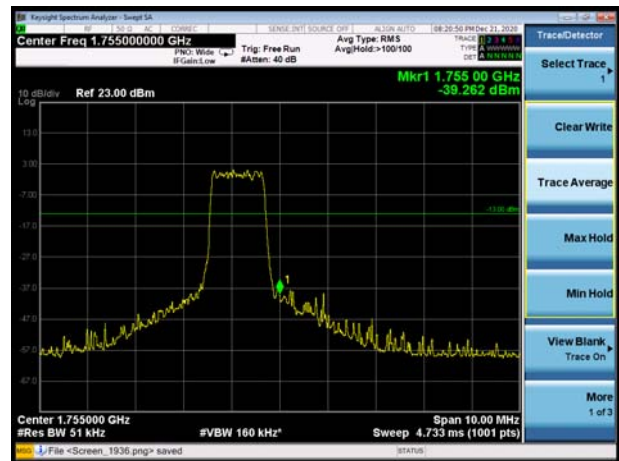




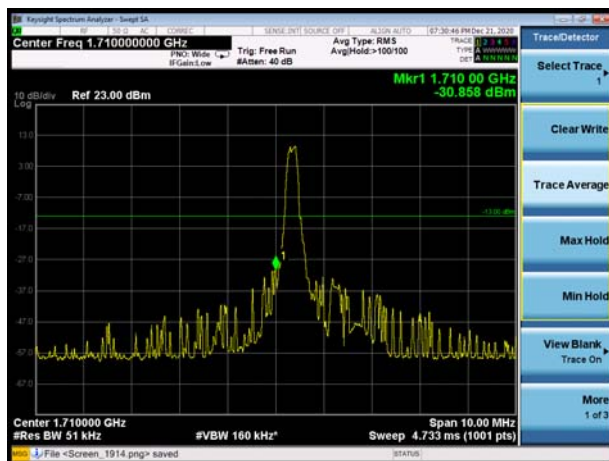
LTE Band 4 QPSK 3MHz CH-Low, 100%RB



LTE Band 4 QPSK 3MHz CH-High, 100%RB



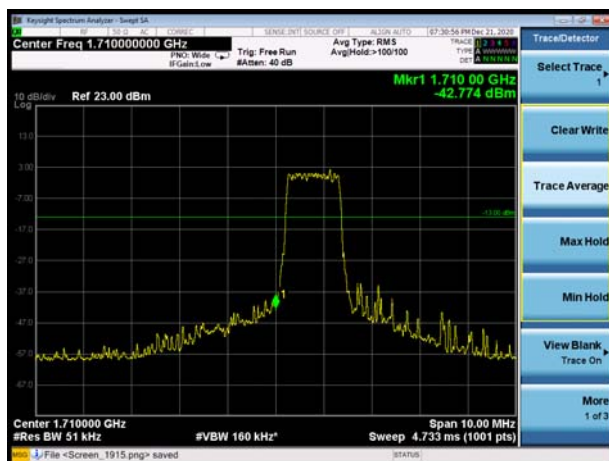
LTE Band 4 QPSK 5MHz CH-Low, 1 RB



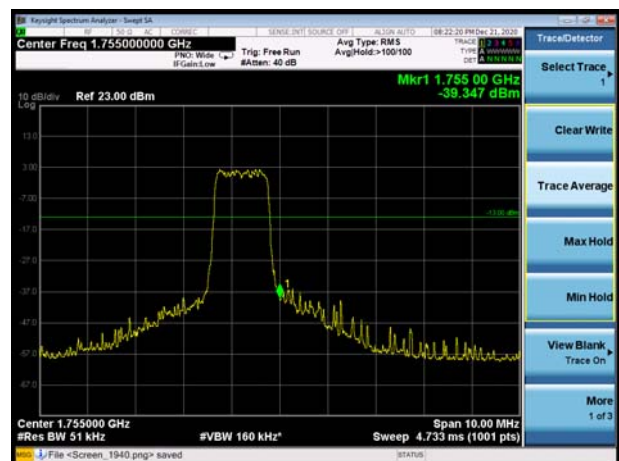
LTE Band 4 QPSK 5MHz CH-High, 1 RB



LTE Band 4 QPSK 5MHz CH-Low, 100%RB

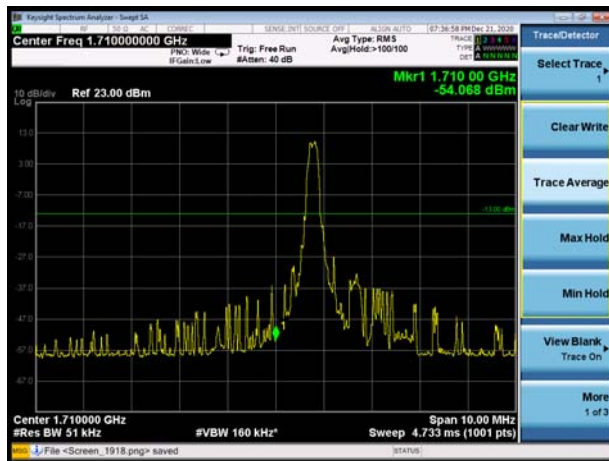


LTE Band 4 QPSK 5MHz CH-High, 100%RB

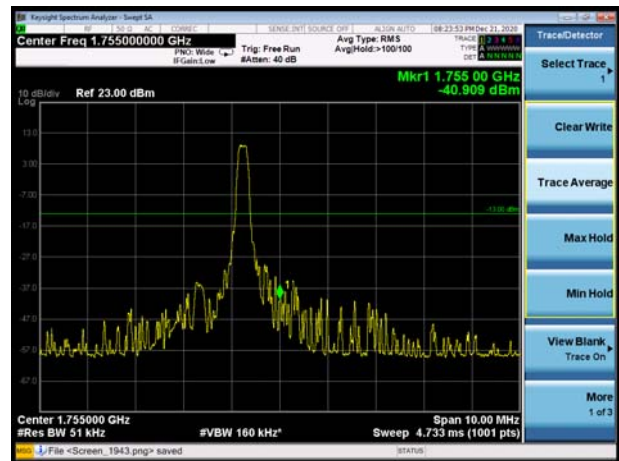




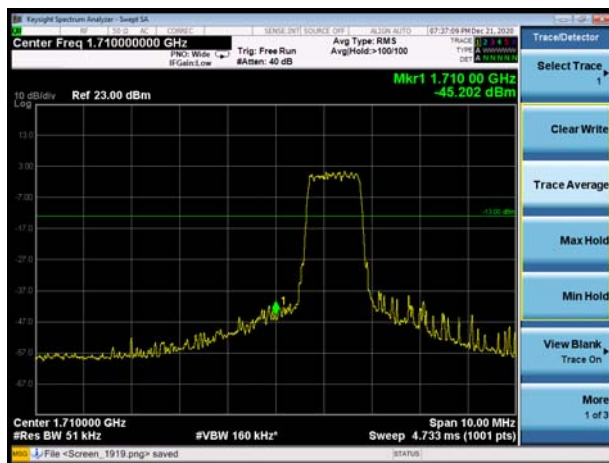
LTE Band 4 QPSK 10MHz CH-Low, 1 RB



LTE Band 4 QPSK 10MHz CH-High, 1 RB



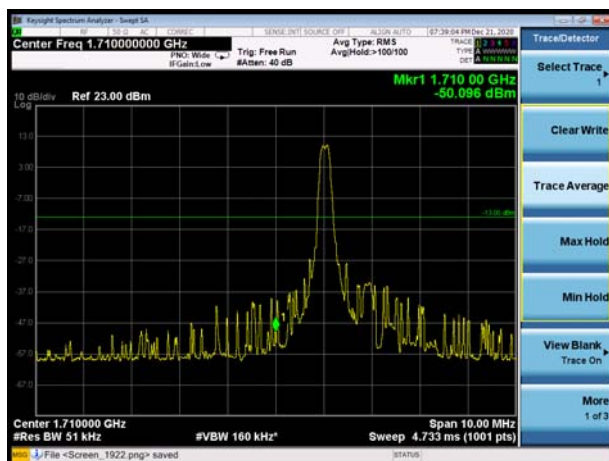
LTE Band 4 QPSK 10MHz CH-Low, 100%RB



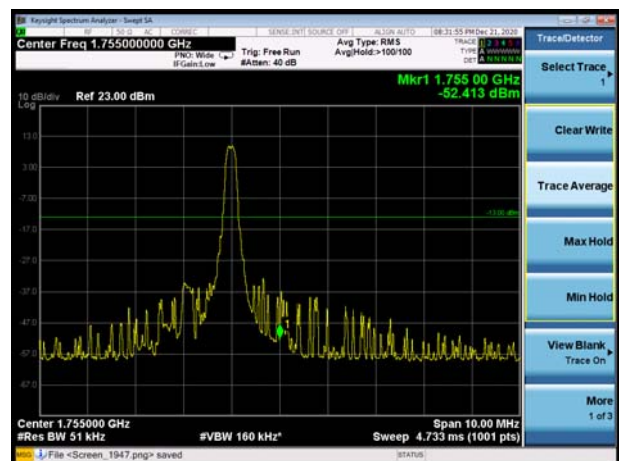
LTE Band 4 QPSK 10MHz CH-High, 100%RB



LTE Band 4 QPSK 15MHz CH-Low, 1 RB

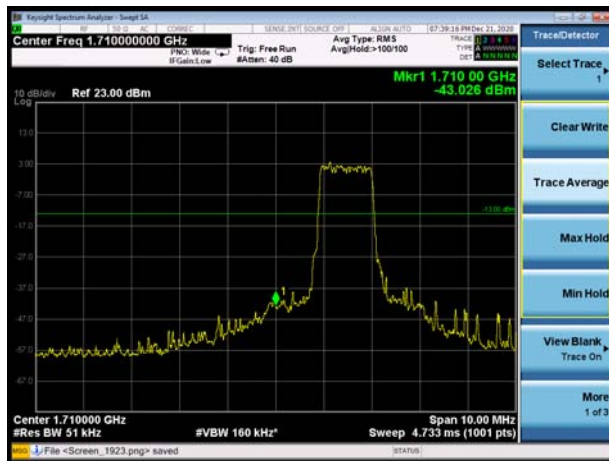


LTE Band 4 QPSK 15MHz CH-High, 1 RB

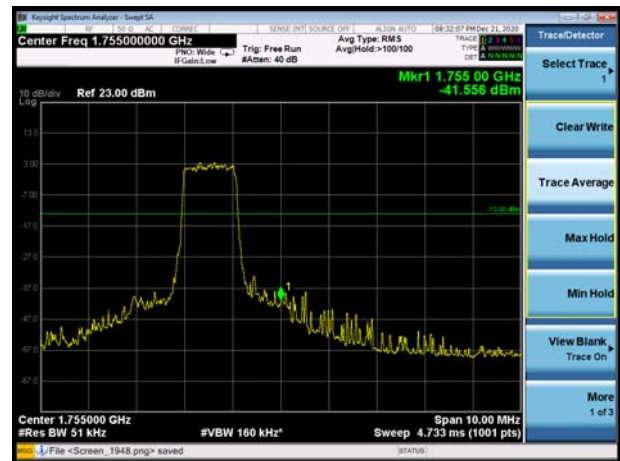




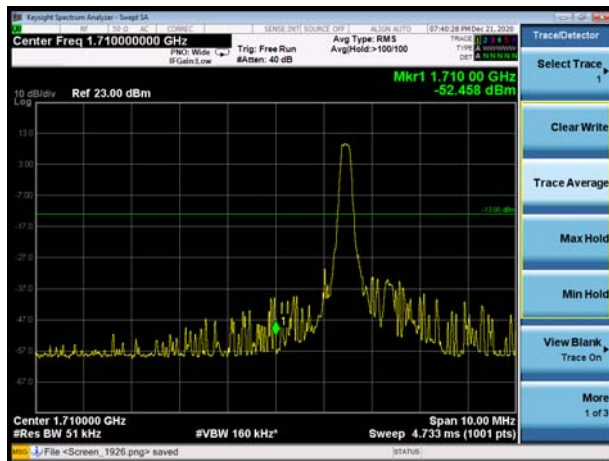
LTE Band 4 QPSK 15MHz CH-Low, 100%RB



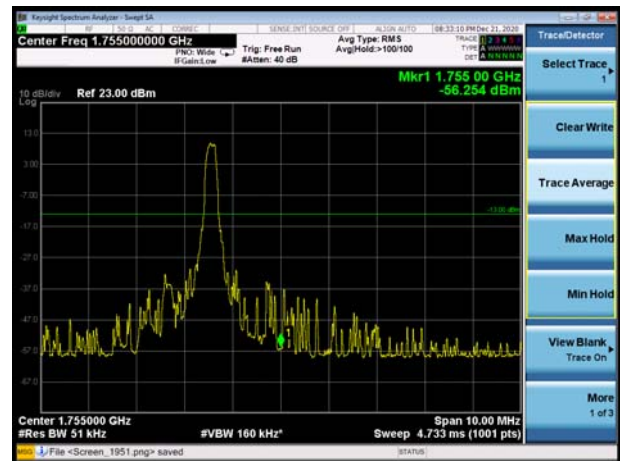
LTE Band 4 QPSK 15MHz CH-High, 100%RB



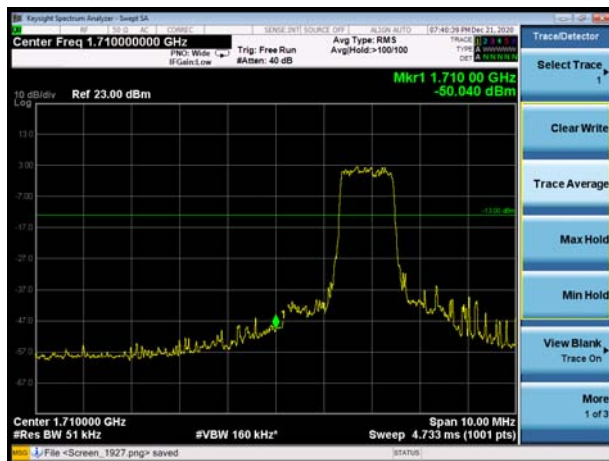
LTE Band 4 QPSK 20MHz CH-Low, 1 RB



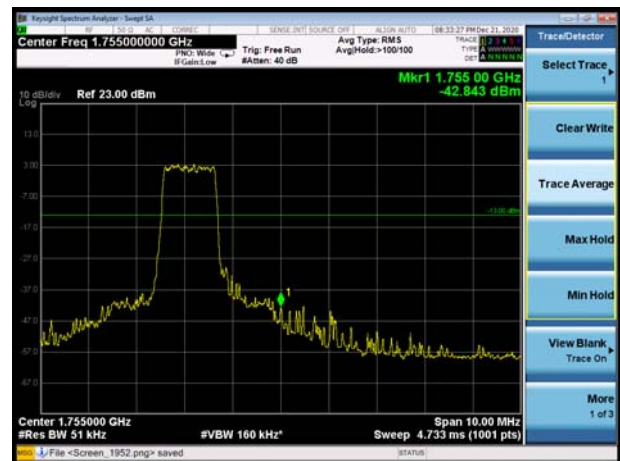
LTE Band 4 QPSK 20MHz CH-High, 1 RB



LTE Band 4 QPSK 20MHz CH-Low, 100%RB

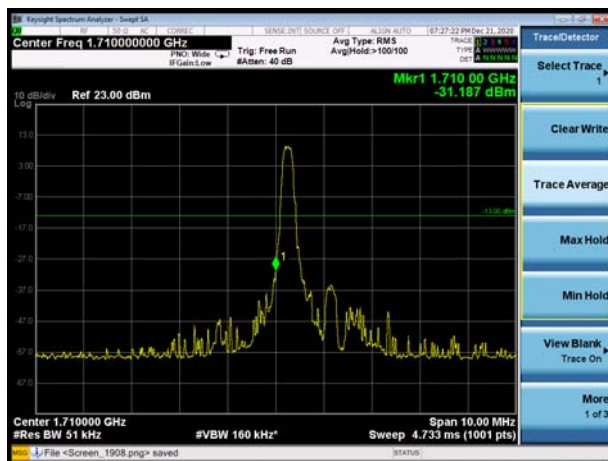


LTE Band 4 QPSK 20MHz CH-High, 100%RB

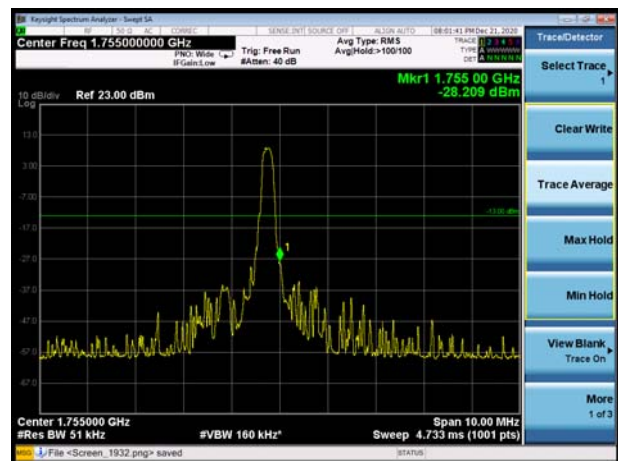




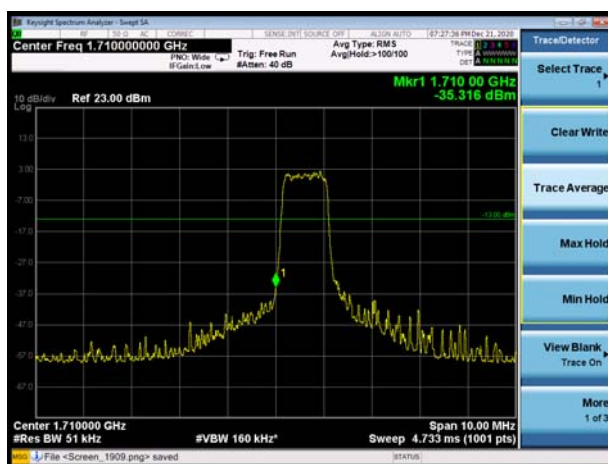
LTE Band 4 16QAM 1.4MHz CH-Low, 1 RB



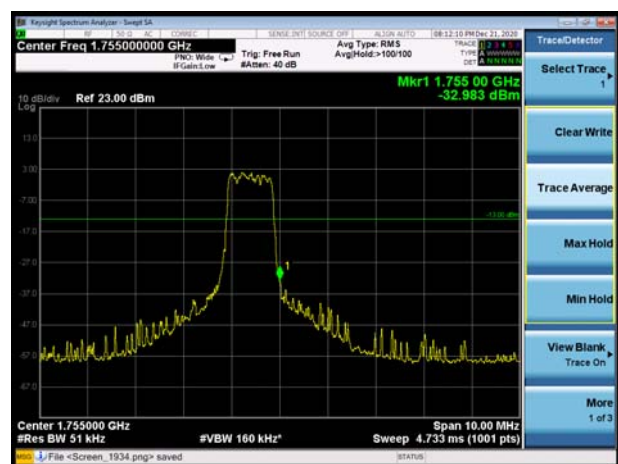
LTE Band 4 16QAM 1.4MHz CH-High, 1 RB



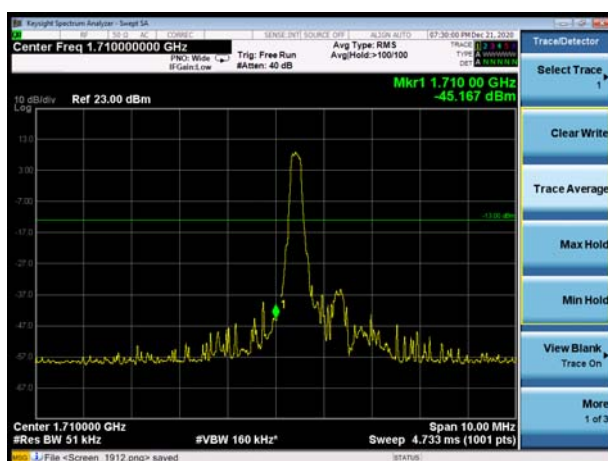
LTE Band 4 16QAM 1.4MHz CH-Low, 100%RB



LTE Band 4 16QAM 1.4MHz CH-High, 100%RB



LTE Band 4 16QAM 3MHz CH-Low, 1 RB



LTE Band 4 16QAM 3MHz CH-High, 1 RB

