RF TEST REPORT

Applicant	Quectel Wireless Solutions Co., Ltd.
FCC ID	XMR2021BG951AGL
Product	LTE Cat M1/NB Module
Brand	Quectel
Model	BG951A-GL
Report No.	R2111A0947-R6V2
Issue Date	February 23, 2022

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2020)/ FCC CFR47 Part 27C (2020)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Prepared by: Peng Tao

Approved by: Kai Xu

TA Technology (Shanghai) Co., Ltd.

No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China

TEL: +86-021-50791141/2/3

FAX: +86-021-50791141/2/3-8000

TABLE OF CONTENT

Version	Revision description	Issue Date
Rev.0	Initial issue of report.	January 21, 2022
Rev.1	Update information in Page 6.	February 16, 2022
Rev.2	Update Product name.	February 23, 2022
Note: This revised report (Report No. R2111A0947-R6V2) supersedes and replaces the previously issued report (Report No. R2111A0947-R6V1). 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: July 21, 2021 ~ August 5, 2021 Date of Sample Received: July 20, 2021			
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.			

BG951A (Report No.: R2111A0947-R6V2) is a variant model of BG950A (Report No.: R2107A0607-R6V1). The product only change mode, Software version, Hardware version, product name and FCC ID. There is no test in this report. The detailed product change description please refers to the *Difference Declaration Letter*.

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.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China
City:	Shanghai
Post code:	201201
Country:	P. R. China
Contact:	Xu Kai
Telephone:	+86-021-50791141/2/3
Fax:	+86-021-50791141/2/3-8000
Website:	http://www.ta-shanghai.com
E-mail:	xukai@ta-shanghai.com

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	BG951A-GL		
IMEI	869410050002659		
Hardware Version	R1.5		
Software Version	BG951AGLAAR01A01		
Power Supply	External power supply		
Antenna Type	External Antenna		
Antenna Gain	Mode	Frequency (MHz)	Gain (dBi)
	LTE Band 4	1700	1.67
		1720	1.94
		1740	2.00
		1760	1.57
	LTE Band 12	700	1.66
		710	3.26
		720	3.95
	LTE Band 13	770	3.98
		780	4.45
		790	3.63
	LTE Band 66	1700	1.67
		1720	1.94
		1740	2.00
		1760	1.57
		1780	0.97
Test Mode(s)	LTE Band 4/12/13/66;		
Test Modulation	QPSK 16QAM;		
LTE Category	M1		
Maximum E.I.R.P./ E.R.P.	LTE Band 4:	25.99dBm	

	LTE Band 12:	25.08dBm	
	LTE Band 13:	26.08dBm	
	LTE Band 66:	25.86dBm	
Rated Power Supply Voltage	3.3V		
Operating Voltage	Minimum: 2.2V Maximum: 4.35V		
Operating Temperature	Lowest: -35°C Highest: +75°C		
Extreme 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
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 (2020)

ANSI C63.26 (2015)

Reference standard:

FCC CFR47 Part 2 (2020)

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, Y axis, vertical polarization) and the worst case was recorded.

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 detailin the following table:
Test modes are chosen to be reported as the worst case configuration below:

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

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
Occupied Bandwidth	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
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
Peak-to-Average Power Ratio	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
Frequency Stability	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	-
Spurious	LTE 4	O	O	O	O	O	O	O	-	O	-	-	O	O	O

Emissions at Antenna Terminals	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
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	-
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

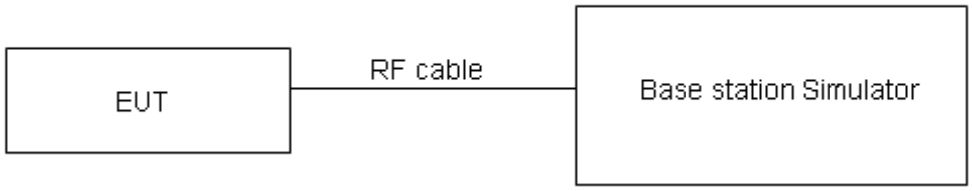
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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:
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.)

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”
Rule Part 27.50(h) (2) specifies that “Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.”
Rule Part 27.50(a) (3) specifies that “(i) For mobile and portable stations transmitting in the

2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. ”

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=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	QPSK	16QAM
1.4MHz	19957/1710.7	0	1#0	1#0	23.70	22.58	25.64	24.52
		0	6#0	5#0	22.31	21.80	24.25	23.74
	20175/1732.5	0	1#0	1#0	23.67	22.47	25.67	24.47
		0	6#0	5#0	23.31	21.81	25.31	23.81
	20393/1754.3	0	1#5	1#5	23.76	22.70	25.33	24.27
		0	6#0	5#0	23.50	21.97	25.07	23.54
3MHz	19965/1711.5	0	1#0	1#0	23.82	22.85	25.76	24.79
		0	6#0	5#0	21.84	21.51	23.78	23.45
	20175/1732.5	0	1#0	1#0	23.82	22.78	25.82	24.78
		0	6#0	5#0	22.14	21.81	24.14	23.81
	20385/1753.5	1	1#5	1#5	23.68	23.02	25.62	24.96
		0	6#0	5#0	22.22	21.96	24.16	23.90
5MHz	19975/1712.5	3	1#0	1#0	23.80	23.81	25.74	25.75
		0	6#0	5#0	23.22	21.71	25.16	23.65
	20175/1732.5	0	1#0	1#0	23.86	23.85	25.86	25.85
		0	6#0	5#0	23.23	21.79	25.23	23.79
	20375/1752.5	0	1#5	1#5	23.52	23.94	25.46	25.88
		0	6#0	5#0	23.36	21.85	25.30	23.79
10MHz	20000/1715	3	1#0	1#0	23.78	23.80	25.72	25.74
		0	4#0	4#0	23.96	22.78	25.90	24.72
	20175/1732.5	0	1#0	1#0	23.83	23.85	25.83	25.85
		0	4#0	4#0	22.95	22.89	24.95	24.89
	20350/1750	4	1#5	1#5	23.59	23.94	25.53	25.88
		7	4#2	4#2	23.81	22.06	25.75	24.00
15MHz	20025/1717.5	3	1#0	1#0	23.78	23.84	25.72	25.78
		0	6#0	5#0	23.61	23.74	25.55	25.68
	20175/1732.5	0	1#0	1#0	23.78	23.75	25.78	25.75
		0	6#0	5#0	23.69	23.70	25.69	25.70
	20325/1747.5	8	1#5	1#5	23.52	23.99	25.52	25.99
		11	6#0	5#0	23.81	23.89	25.81	25.89
20MHz	20050/1720	3	1#0	1#0	23.76	23.78	25.70	25.72
		0	6#0	5#0	23.62	23.64	25.56	25.58
	20175/1732.5	0	1#0	1#0	23.77	23.82	25.77	25.82
		0	6#0	5#0	23.65	23.72	25.65	25.72
	20300/1745	12	1#5	1#5	23.58	23.95	25.58	25.95
		15	6#0	5#0	23.75	23.90	25.75	25.90

LTE Band12	Channel/ Frequency(MHz)	Index	RB# RBstart		Maximum Output Power(dBm)		ERP (dBm)	
			QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
1.4MHz	23017/699.7	0	1#0	1#0	23.78	22.77	23.29	22.28
		0	6#0	5#0	22.43	22.02	21.94	21.53
	23095/707.5	0	1#0	1#0	23.43	22.40	24.54	23.51
		0	6#0	5#0	22.02	21.57	23.13	22.68
	23173/715.3	0	1#5	1#5	23.19	22.00	24.99	23.80
		0	6#0	5#0	21.64	21.16	23.44	22.96
3MHz	23025/700.5	0	1#0	1#0	23.93	23.12	23.44	22.63
		0	6#0	5#0	22.28	22.01	21.79	21.52
	23095/707.5	0	1#0	1#0	23.57	22.72	24.68	23.83
		0	6#0	5#0	21.86	21.58	22.97	22.69
	23165/714.5	1	1#5	1#5	22.35	22.36	23.46	23.47
		0	6#0	5#0	21.56	21.29	22.67	22.40
5MHz	23035/701.5	3	1#0	1#0	23.77	23.84	23.28	23.35
		0	6#0	5#0	23.25	22.03	22.76	21.54
	23095/707.5	0	1#0	1#0	23.62	23.68	24.73	24.79
		0	6#0	5#0	22.93	21.74	24.04	22.85
	23155/713.5	0	1#5	1#5	23.44	23.40	24.55	24.51
		0	6#0	5#0	22.65	21.44	23.76	22.55
10MHz	23060/704	3	1#0	1#0	23.76	23.82	23.27	23.33
		0	4#0	4#0	23.04	23.05	22.55	22.56
	23095/707.5	0	1#0	1#0	23.67	23.80	24.78	24.91
		0	4#0	4#0	23.97	22.89	25.08	24.00
	23130/711	4	1#5	1#5	23.44	23.42	24.55	24.53
		7	4#2	4#2	22.99	21.36	24.10	22.47
LTE Band13	Channel/ Frequency(MHz)	Index	RB# RBstart		Maximum Output Power(dBm)		ERP (dBm)	
			QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
5MHz	23205/779.5	3	1#0	1#0	23.55	23.60	25.85	25.90
		0	6#0	5#0	22.37	21.51	24.67	23.81
	23230/782	0	1#0	1#0	23.54	23.62	25.84	25.92
		0	6#0	5#0	22.82	21.73	25.12	24.03
	23255/784.5	0	1#5	1#5	23.72	23.61	26.02	25.91
		0	6#0	5#0	22.91	21.67	25.21	23.97
10MHz	23230/782	0	1#0	1#0	23.53	23.51	25.83	25.81
		0	4#0	4#0	23.78	22.62	26.08	24.92
LTE Band66	Channel/ Frequency(MHz)	Index	RB# RBstart		Maximum Output Power(dBm)		EIRP (dBm)	
			QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
1.4MHz	131979/1710.7	0	1#0	1#0	23.48	22.31	25.42	24.25
		0	6#0	5#0	23.22	21.70	25.16	23.64

	132322/1745	0	1#0	1#0	23.60	22.44	25.60	24.44
		0	6#0	5#0	22.35	21.81	24.35	23.81
	132665/1779.3	0	1#5	1#5	23.21	22.81	24.18	23.78
		0	6#0	5#0	22.62	22.09	23.59	23.06
3MHz	131987/1711.5	0	1#0	1#0	23.69	22.68	25.63	24.62
		0	6#0	5#0	21.99	21.72	23.93	23.66
	132322/1745	0	1#0	1#0	23.78	22.74	25.78	24.74
		0	6#0	5#0	22.08	21.81	24.08	23.81
	132657/1778.5	1	1#5	1#5	23.02	23.04	23.99	24.01
		0	6#0	5#0	23.25	22.13	24.22	23.10
5MHz	131997/1712.5	3	1#0	1#0	23.68	23.65	25.62	25.59
		0	6#0	5#0	23.05	21.70	24.99	23.64
	132322/1745	0	1#0	1#0	23.79	23.72	25.79	25.72
		0	6#0	5#0	23.17	21.76	25.17	23.76
	132647/1777.5	0	1#5	1#5	22.82	23.90	23.79	24.87
		0	6#0	5#0	23.41	22.03	24.38	23.00
10MHz	132022/1715	3	1#0	1#0	23.65	23.64	25.59	25.58
		0	4#0	4#0	23.85	22.65	25.79	24.59
	132322/1745	0	1#0	1#0	23.71	23.72	25.71	25.72
		0	4#0	4#0	23.77	22.73	25.77	24.73
	132622/1775	4	1#5	1#5	22.93	23.24	23.90	24.21
		7	4#2	4#2	23.93	22.10	24.90	23.07
15MHz	132047/1717.5	3	1#0	1#0	23.66	23.65	25.60	25.59
		0	6#0	5#0	23.65	23.60	25.59	25.54
	132322/1745	0	1#0	1#0	23.70	23.69	25.70	25.69
		0	6#0	5#0	23.74	23.67	25.74	25.67
	132597/1772.5	8	1#5	1#5	22.88	23.97	23.85	24.94
		11	6#0	5#0	23.10	23.99	24.07	24.96
20MHz	132072/1720	3	1#0	1#0	23.92	23.64	25.86	25.58
		0	6#0	5#0	23.65	23.59	25.59	25.53
	132322/1745	0	1#0	1#0	23.68	23.69	25.68	25.69
		0	6#0	5#0	23.68	23.61	25.68	25.61
	132572/1770	12	1#5	1#5	23.12	23.94	24.09	24.91
		15	6#0	5#0	23.04	23.99	24.01	24.96

5.2 Occupied Bandwidth

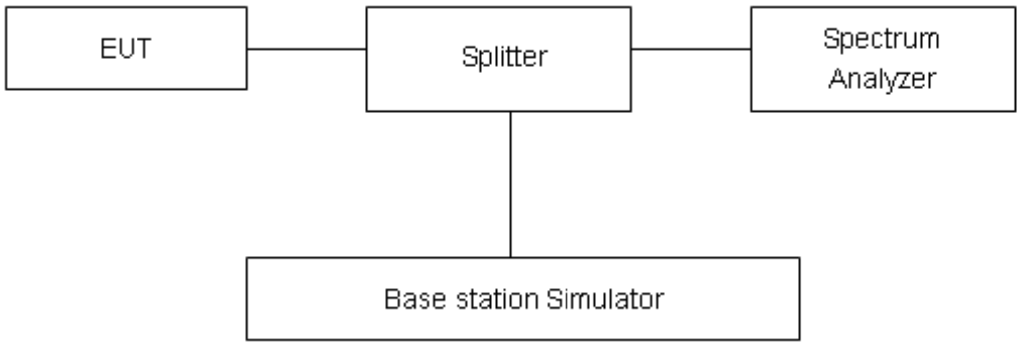
Ambient condition

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
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.

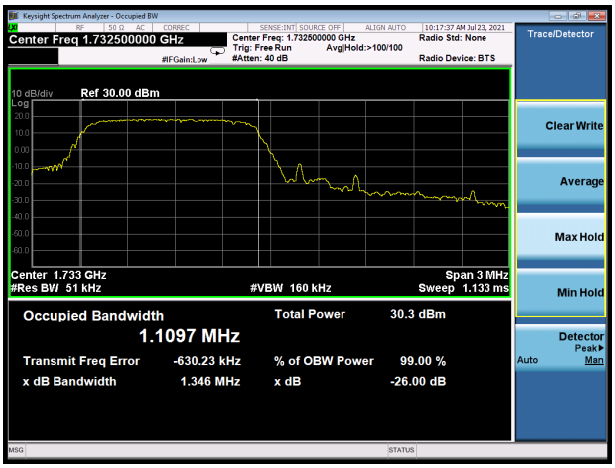
Test Result

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Bandwidth(MHz)	
				99% Power	-26dBc
LTE Band4	1.4MHz	QPSK	20175/1732.5	1.105	1.341
		16QAM	20175/1732.5	0.976	1.342
	3MHz	QPSK	20175/1732.5	1.110	1.346
		16QAM	20175/1732.5	0.961	1.309
	5MHz	QPSK	20175/1732.5	1.100	1.316
		16QAM	20175/1732.5	0.975	1.317
	10MHz	QPSK	20175/1732.5	1.108	1.333
		16QAM	20175/1732.5	0.999	1.333
	15MHz	QPSK	20175/1732.5	1.120	1.344
		16QAM	20175/1732.5	1.001	1.353
	20MHz	QPSK	20175/1732.5	1.113	1.352
		16QAM	20175/1732.5	1.004	1.354
Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Bandwidth(MHz)	
				99% Power	-26dBc
LTE Band12	1.4MHz	QPSK	23095/707.5	0.973	1.327
		16QAM	23095/707.5	0.966	1.302
	3MHz	QPSK	23095/707.5	1.109	1.343
		16QAM	23095/707.5	0.965	1.308
	5MHz	QPSK	23095/707.5	1.099	1.332
		16QAM	23095/707.5	0.977	1.314
	10MHz	QPSK	23095/707.5	1.100	1.332
		16QAM	23095/707.5	0.994	1.322
Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Bandwidth(MHz)	
				99% Power	-26dBc
LTE Band13	5MHz	QPSK	23230/782	1.103	1.331
		16QAM	23230/782	0.976	1.312
	10MHz	QPSK	23230/782	1.107	1.334
		16QAM	23230/782	0.993	1.322
Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Bandwidth(MHz)	
				99% Power	-26dBc
LTE Band66	1.4MHz	QPSK	132322/1745	1.099	1.321
		16QAM	132322/1745	0.952	1.294
	3MHz	QPSK	132322/1745	1.108	1.335
		16QAM	132322/1745	0.958	1.299
	5MHz	QPSK	132322/1745	1.101	1.323
		16QAM	132322/1745	0.995	1.448
	10MHz	QPSK	132322/1745	1.107	1.340
		16QAM	132322/1745	0.994	1.317
	15MHz	QPSK	132322/1745	1.120	1.360

		16QAM	132322/1745	0.991	1.317
	20MHz	QPSK	132322/1745	1.117	1.353
		16QAM	132322/1745	0.997	1.346

LTE Band 4 QPSK 1.4MHz CH-Middle

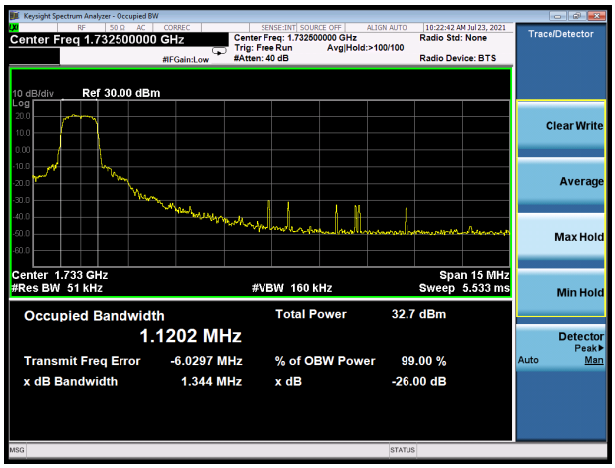
LTE Band 4 QPSK 3MHz CH-Middle



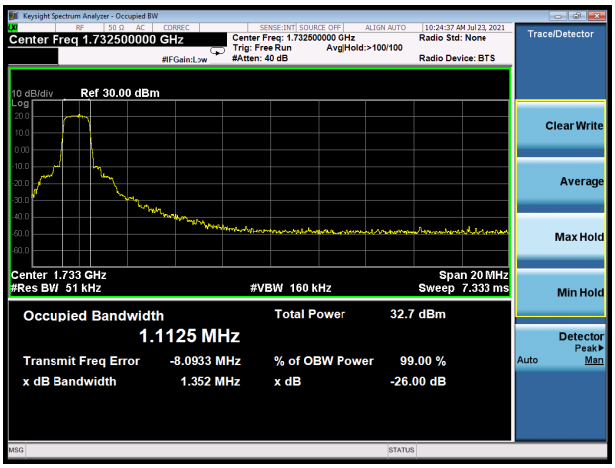
LTE Band 4 QPSK 5MHz CH-Middle

LTE Band 4 QPSK 10MHz CH-Middle

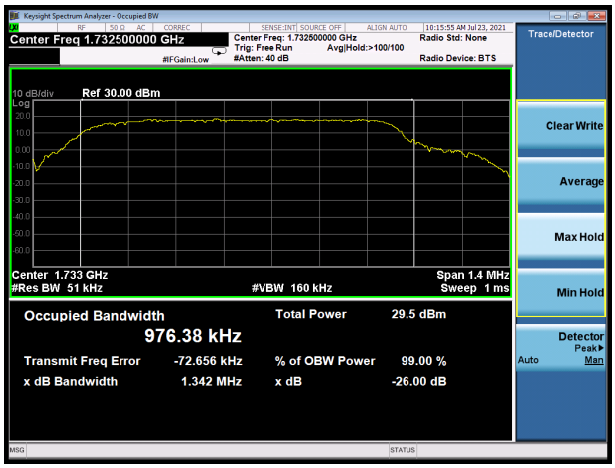
LTE Band 4 QPSK 15MHz CH-Middle



LTE Band 4 QPSK 20MHz CH-Middle



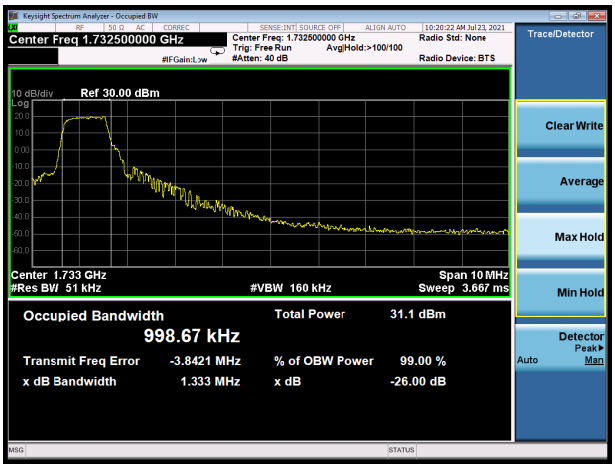
LTE Band 4 16QAM 1.4MHz CH-Middle



LTE Band 4 16QAM 3MHz CH-Middle

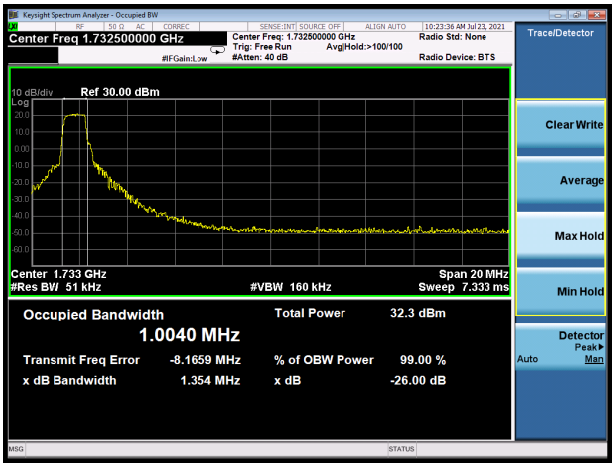
LTE Band 4 16QAM 5MHz CH-Middle

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

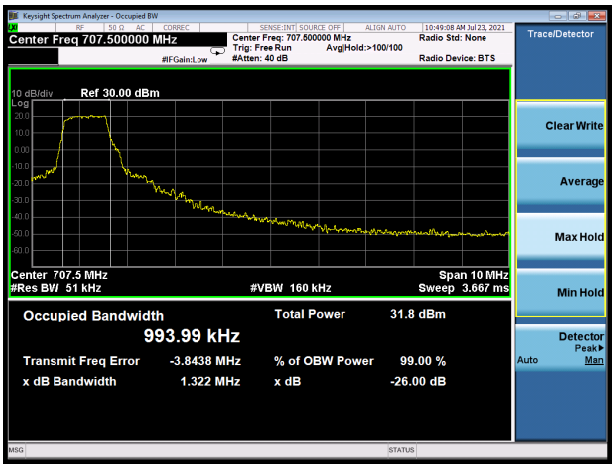
LTE Band 12 QPSK 10MHz CH-Middle

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

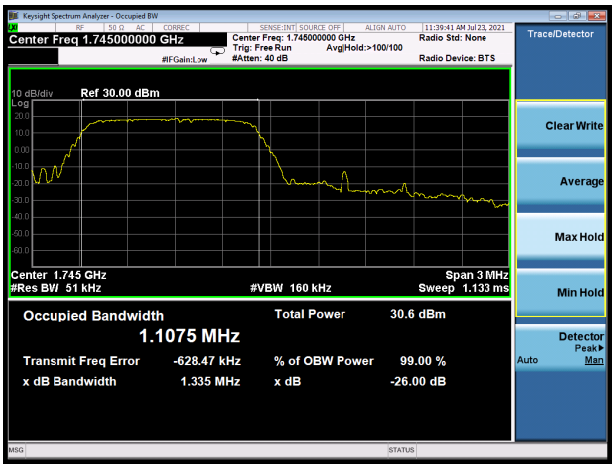
LTE Band 13 QPSK 10MHz CH-Middle

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

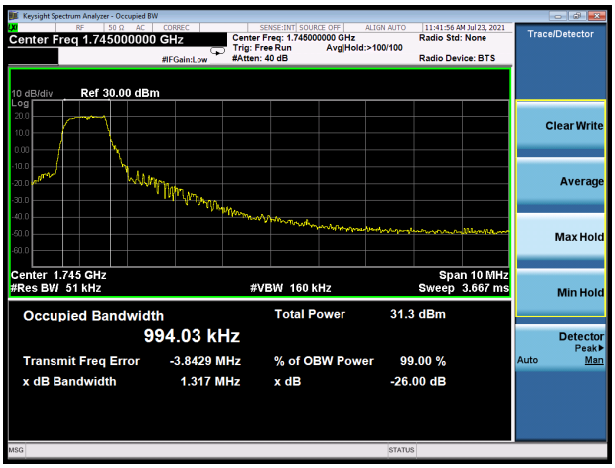
LTE Band 66 QPSK 20MHz CH-Middle

LTE Band 66 16QAM 1.4MHz CH-Middle

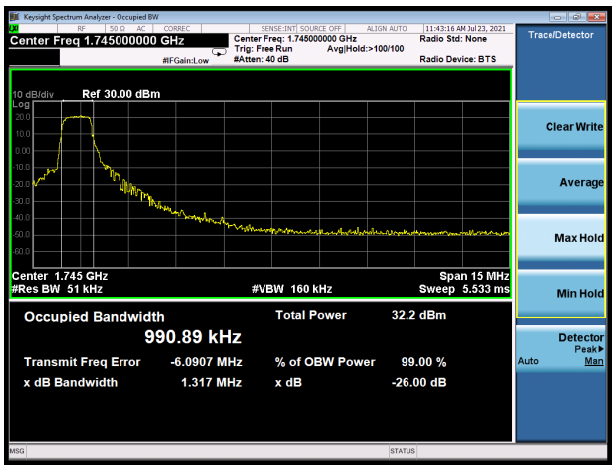
LTE Band 66 16QAM 3MHz CH-Middle

LTE Band 66 16QAM 5MHz CH-Middle

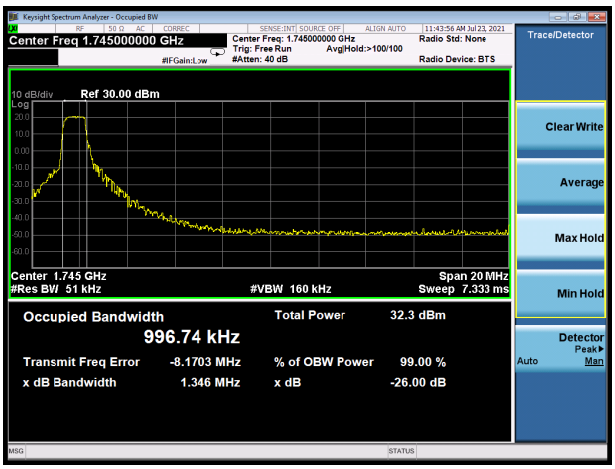
LTE Band 66 16QAM 10MHz CH-Middle



LTE Band 66 16QAM 15MHz CH-Middle



LTE Band 66 16QAM 20MHz CH-Middle



5.3 Band Edge Compliance

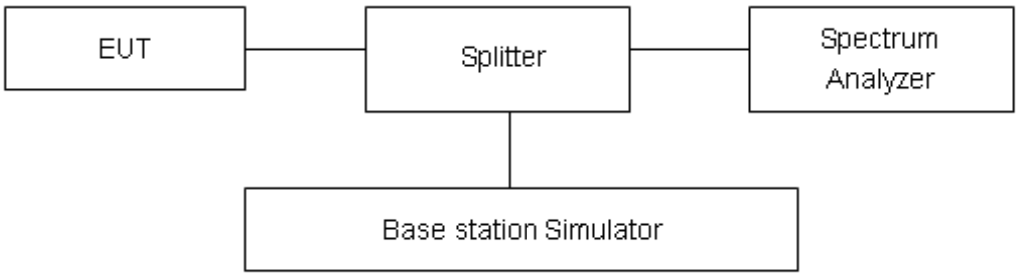
Ambient condition

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 51 kHz, VBW is set to 160 kHz for LTE Band 4/12/13/66 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(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz.
Rule Part 27.53(h) specifies that " for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 $\log_{10}$ (P) dB"
Rule Part 27.53(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee'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.
Example:

The limit line is derived from 43 + 10log (P) dB below the transmitter power P(Watts)
= P(W)- [43 + 10log(P)] (dB)
= [30 + 10log (P)] (dBm) - [43 + 10log(P)] (dB) = -13dBm.
Rule Part 27.53(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.
Rule Part 27.53 (c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;
(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;
(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

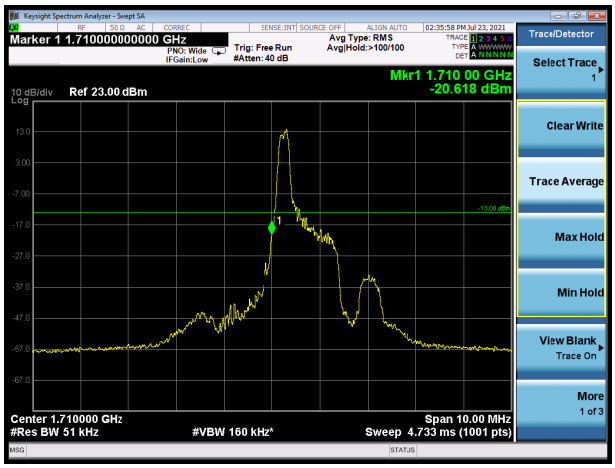
Measurement Uncertainty

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

Test Result

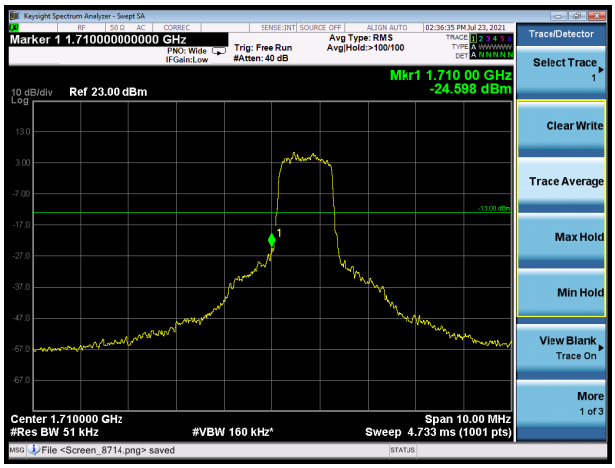
All the test traces in the plots shows the test results clearly.

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

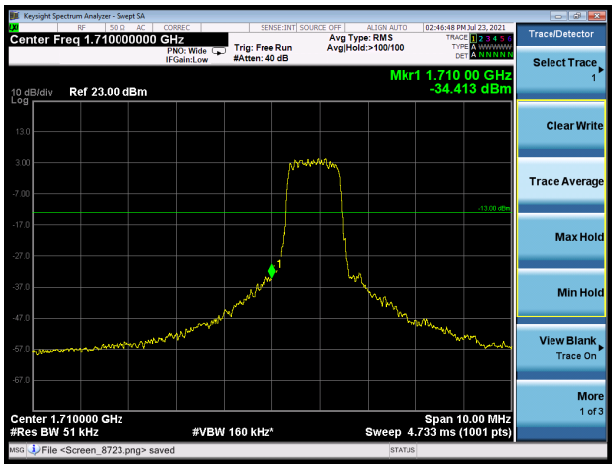


LTE Band 4 QPSK 1.4MHz CH-High, 100%RB

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

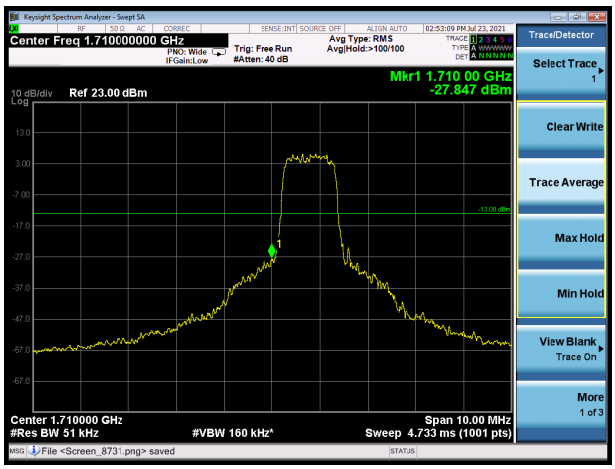


LTE Band 4 QPSK 3MHz CH-High, 100%RB

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

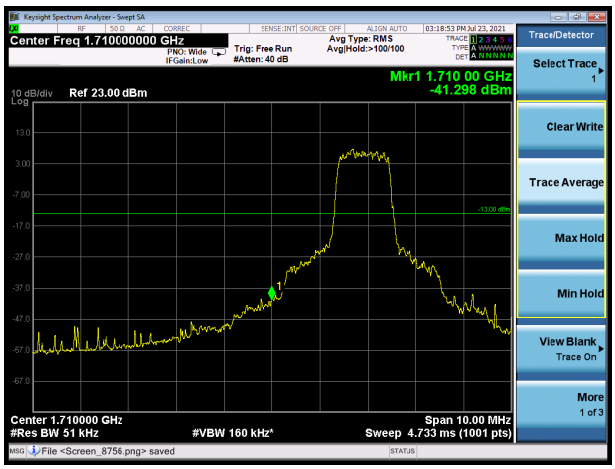
LTE Band 4 QPSK 15MHz CH-Low, 100%RB

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

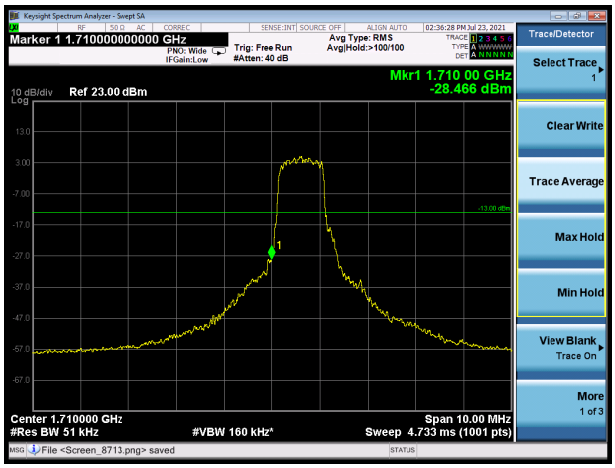


LTE Band 4 QPSK 20MHz CH-High, 100%RB

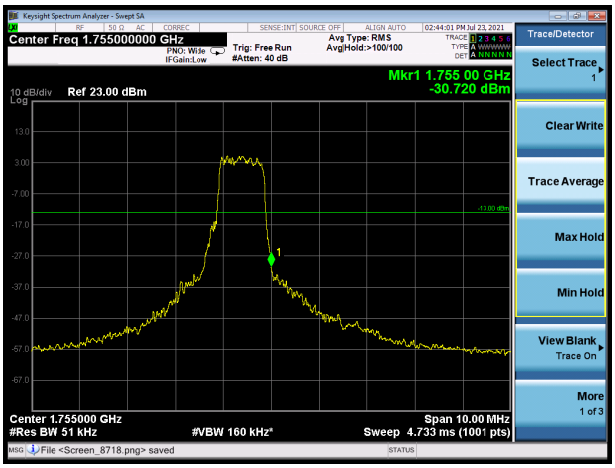
LTE Band 4 16QAM 1.4MHz CH-Low, 1 RB

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

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



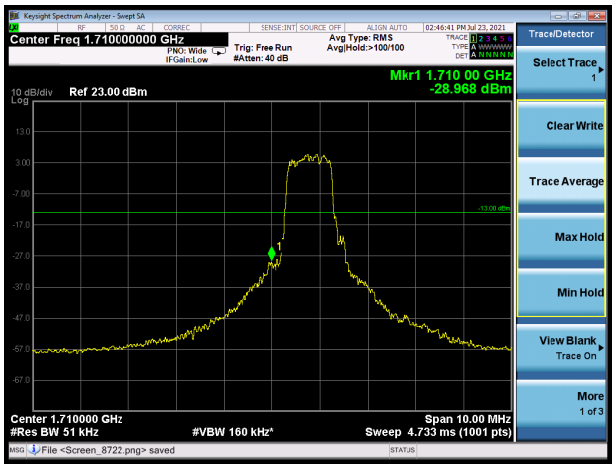
LTE Band 4 16QAM 1.4MHz CH-High, 100%RB



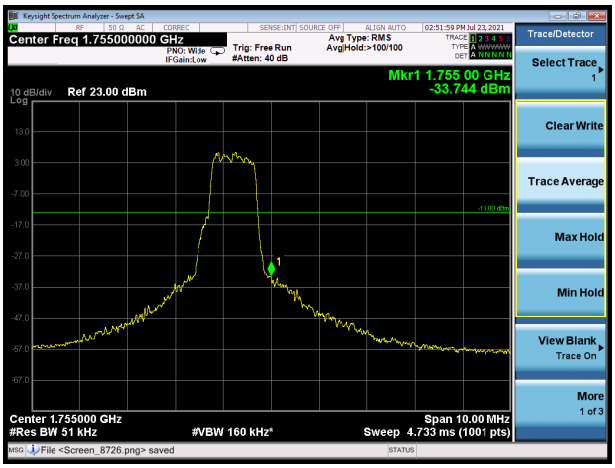
LTE Band 4 16QAM 3MHz CH-Low, 1 RB

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

LTE Band 4 16QAM 3MHz CH-Low, 100%RB



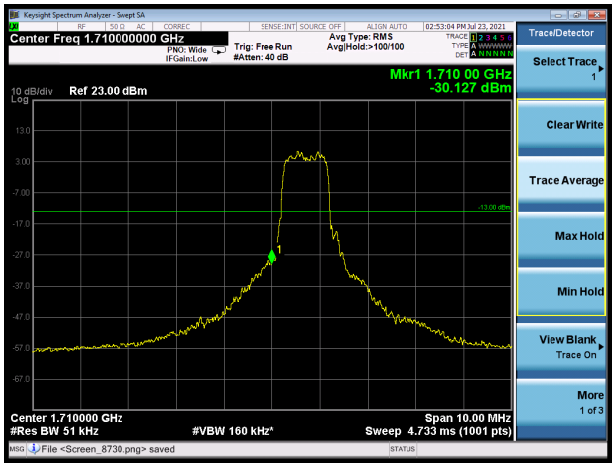
LTE Band 4 16QAM 3MHz CH-High, 100%RB



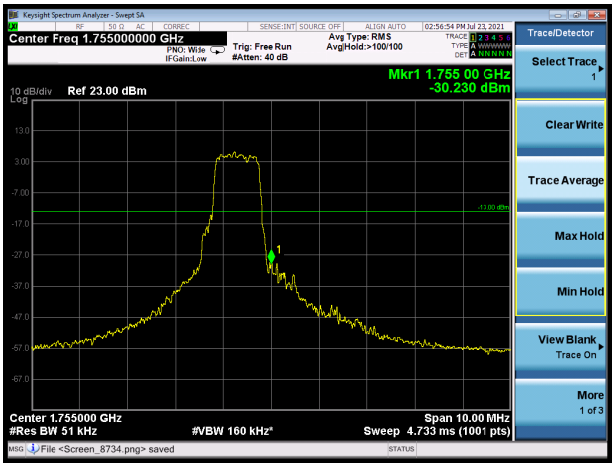
LTE Band 4 16QAM 5MHz CH-Low, 1 RB

LTE Band 4 16QAM 5MHz CH-High, 1 RB

LTE Band 4 16QAM 5MHz CH-Low, 100%RB



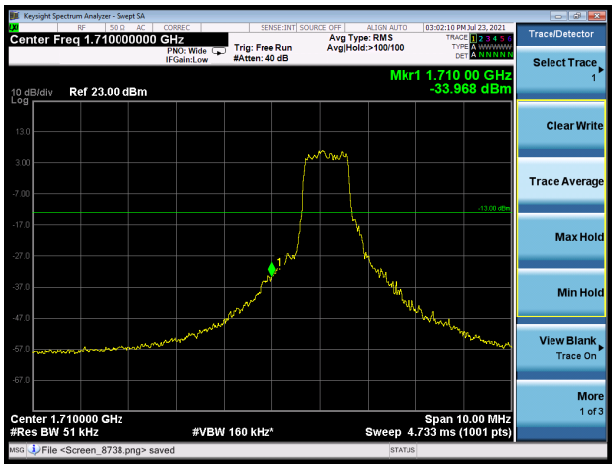
LTE Band 4 16QAM 5MHz CH-High, 100%RB



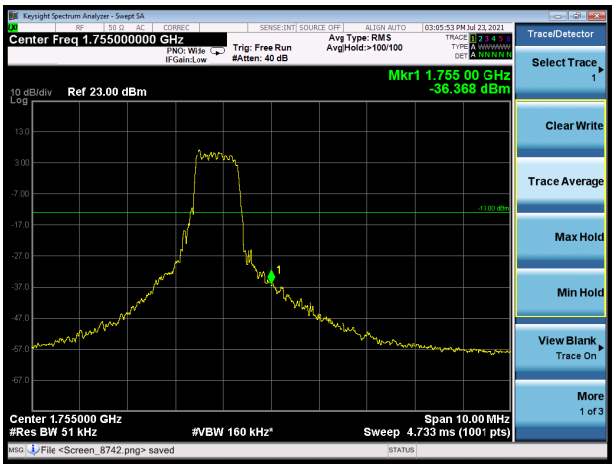
LTE Band 4 16QAM 10MHz CH-Low, 1 RB

LTE Band 4 16QAM 10MHz CH-High, 1 RB

LTE Band 4 16QAM 10MHz CH-Low, 100%RB

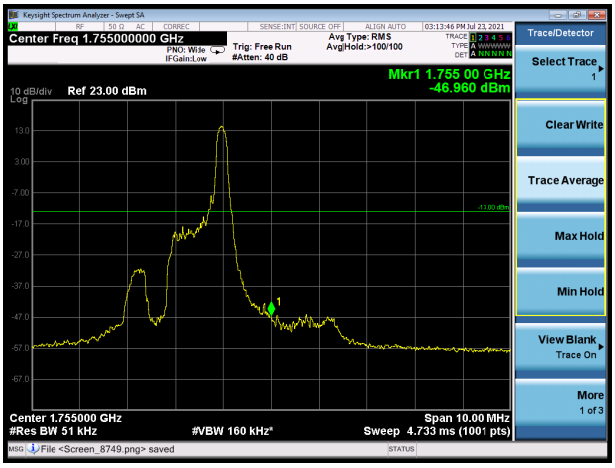


LTE Band 4 16QAM 10MHz CH-High, 100%RB

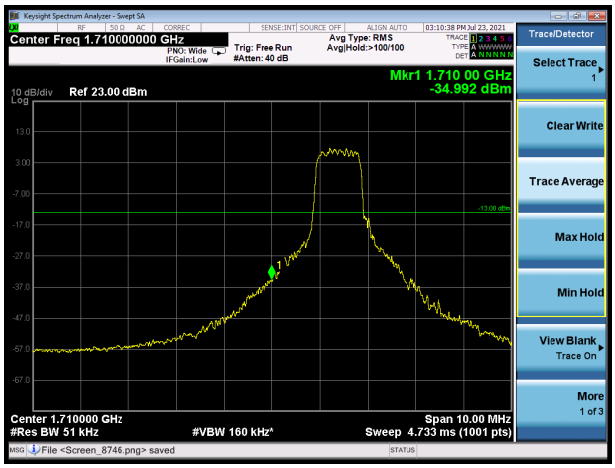


LTE Band 4 16QAM 15MHz CH-Low, 1 RB

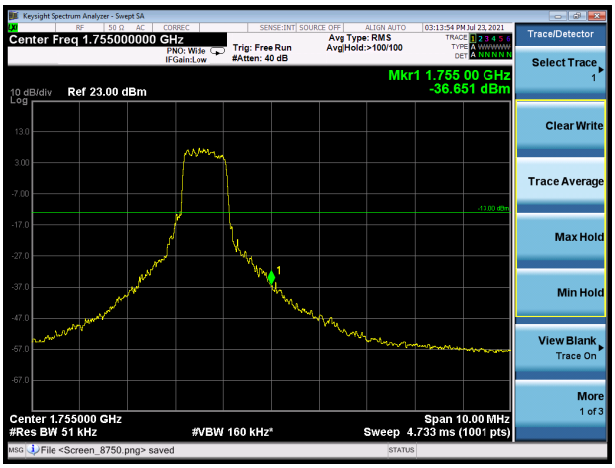
LTE Band 4 16QAM 15MHz CH-High, 1 RB



LTE Band 4 16QAM 15MHz CH-Low, 100%RB



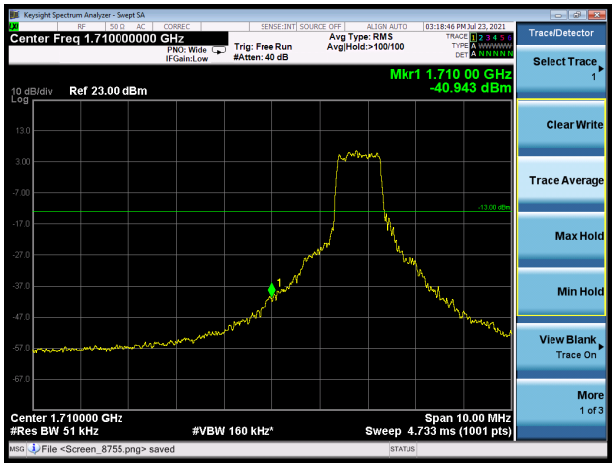
LTE Band 4 16QAM 15MHz CH-High, 100%RB



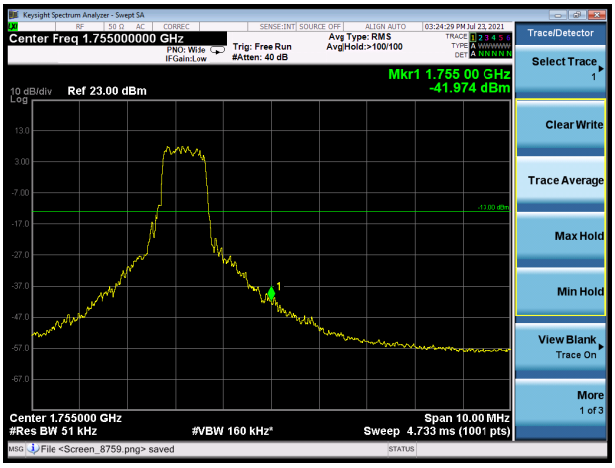
LTE Band 4 16QAM 20MHz CH-Low, 1 RB

LTE Band 4 16QAM 20MHz CH-High, 1 RB

LTE Band 4 16QAM 20MHz CH-Low, 100%RB



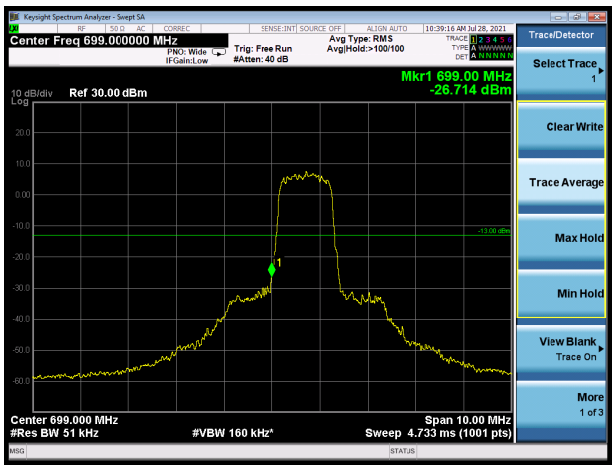
LTE Band 4 16QAM 20MHz CH-High, 100%RB



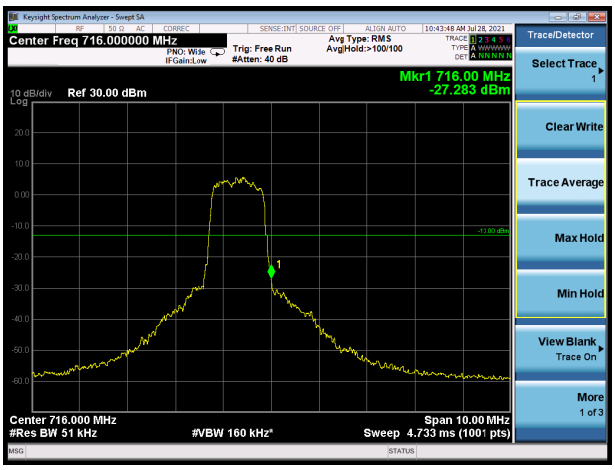
LTE Band 12 QPSK 1.4MHz CH-Low, 1 RB

LTE Band 12 QPSK 1.4MHz CH-High, 1 RB

LTE Band 12 QPSK 1.4MHz CH-Low, 100%RB



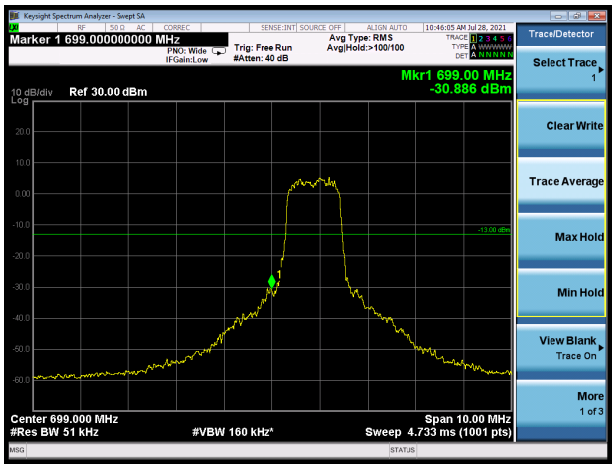
LTE Band 12 QPSK 1.4MHz CH-High, 100%RB



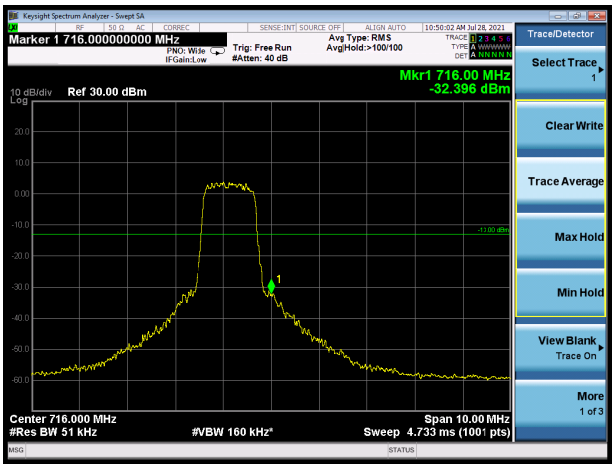
LTE Band 12 QPSK 3MHz CH-Low, 1 RB

LTE Band 12 QPSK 3MHz CH-High, 1 RB

LTE Band 12 QPSK 3MHz CH-Low, 100%RB



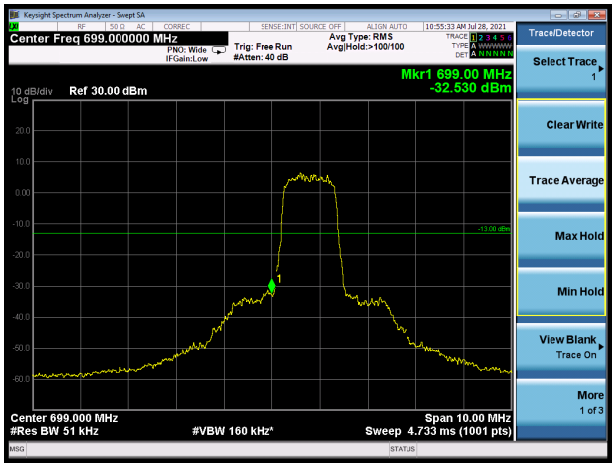
LTE Band 12 QPSK 3MHz CH-High, 100%RB



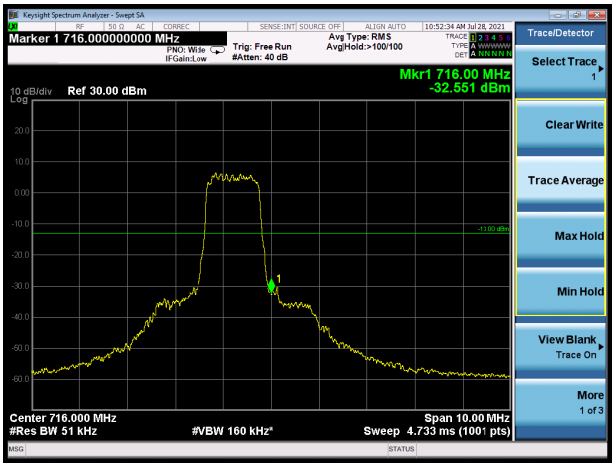
LTE Band 12 QPSK 5MHz CH-Low, 1 RB

LTE Band 12 QPSK 5MHz CH-High, 1 RB

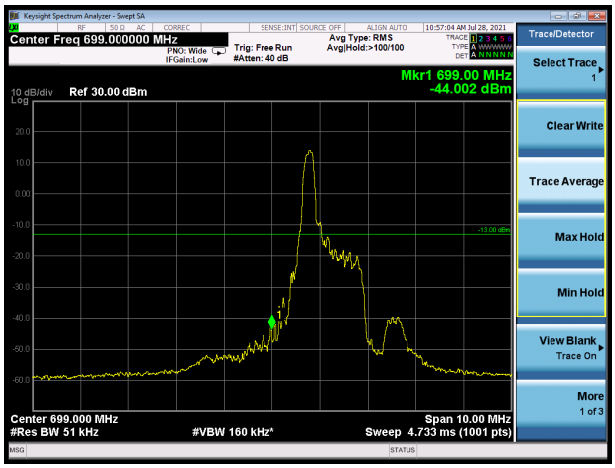
LTE Band 12 QPSK 5MHz CH-Low, 100%RB



LTE Band 12 QPSK 5MHz CH-High, 100%RB

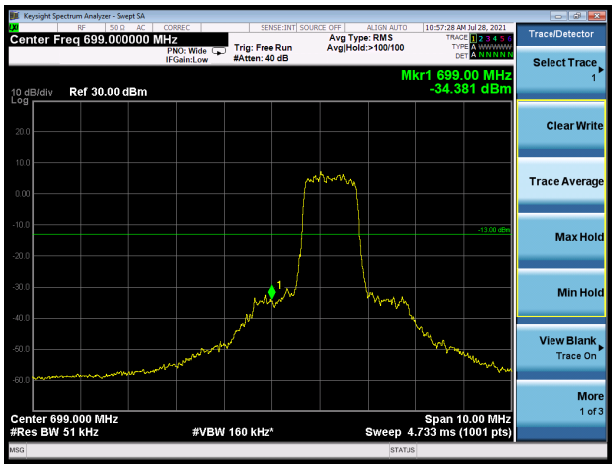


LTE Band 12 QPSK 10MHz CH-Low, 1 RB

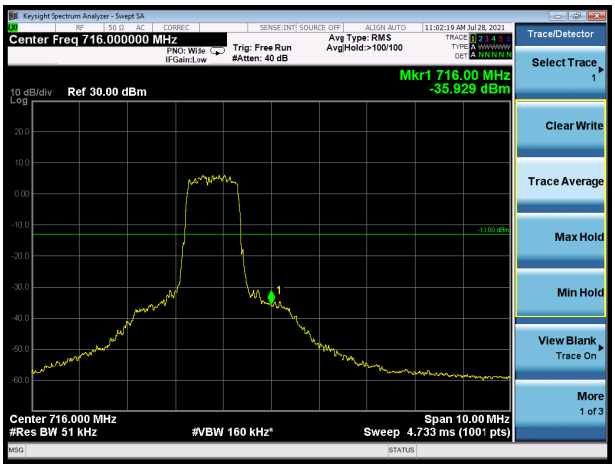


LTE Band 12 QPSK 10MHz CH-High, 1 RB

LTE Band 12 QPSK 10MHz CH-Low, 100%RB



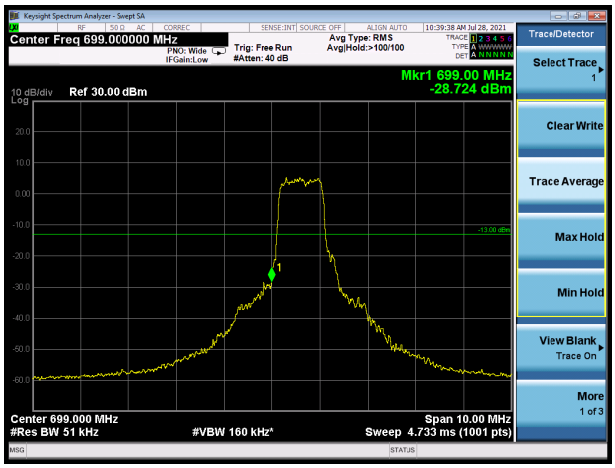
LTE Band 12 QPSK 10MHz CH-High, 100%RB



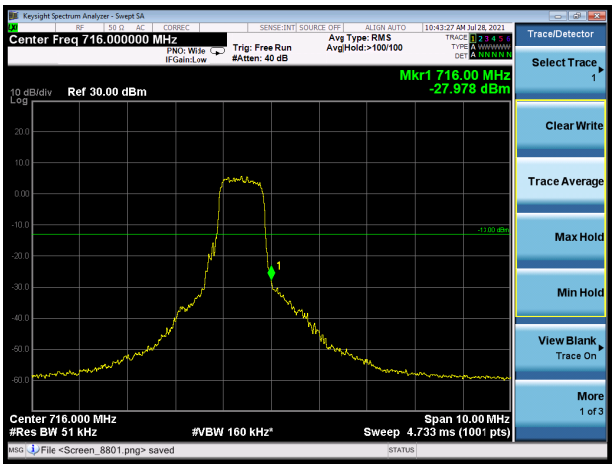
LTE Band 12 16QAM 1.4MHz CH-Low, 1 RB

LTE Band 12 16QAM 1.4MHz CH-High, 1 RB

LTE Band 12 16QAM 1.4MHz CH-Low, 100%RB



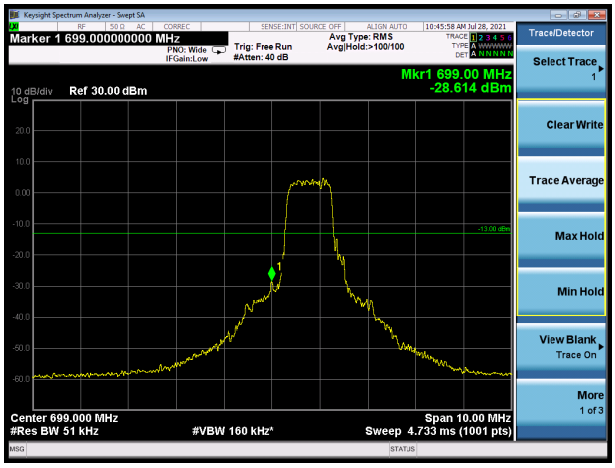
LTE Band 12 16QAM 1.4MHz CH-High, 100%RB



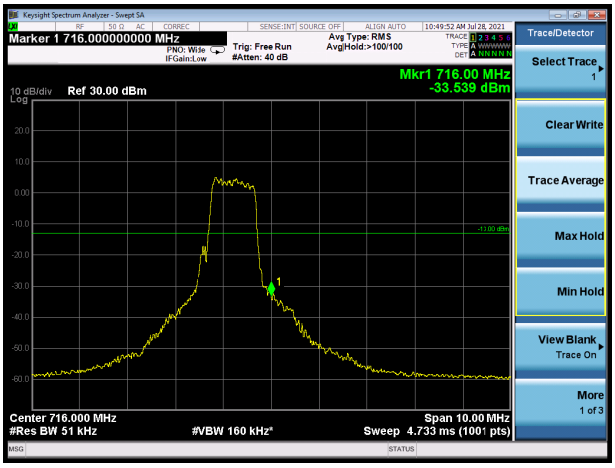
LTE Band 12 16QAM 3MHz CH-Low, 1 RB

LTE Band 12 16QAM 3MHz CH-High, 1 RB

LTE Band 12 16QAM 3MHz CH-Low, 100%RB

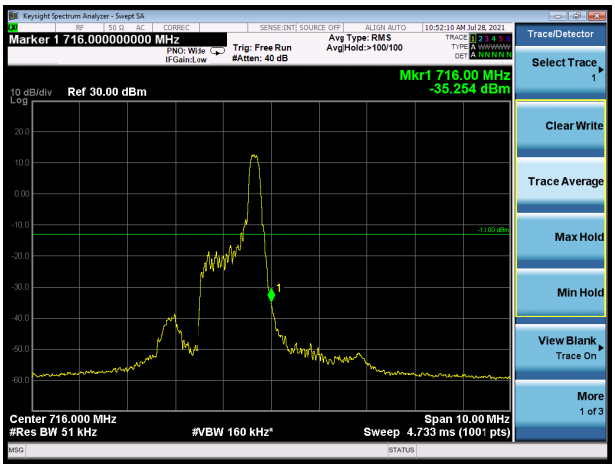


LTE Band 12 16QAM 3MHz CH-High, 100%RB

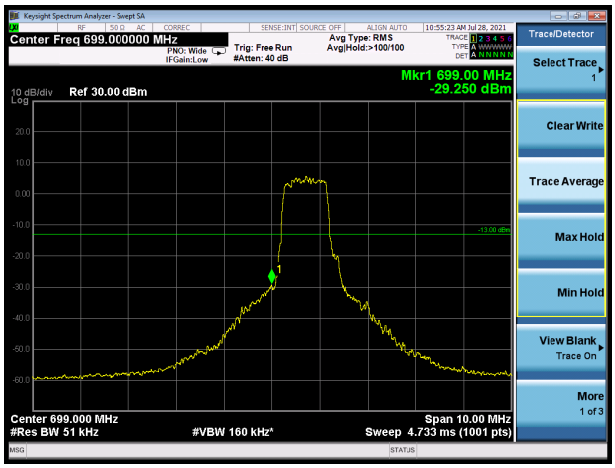


LTE Band 12 16QAM 5MHz CH-Low, 1 RB

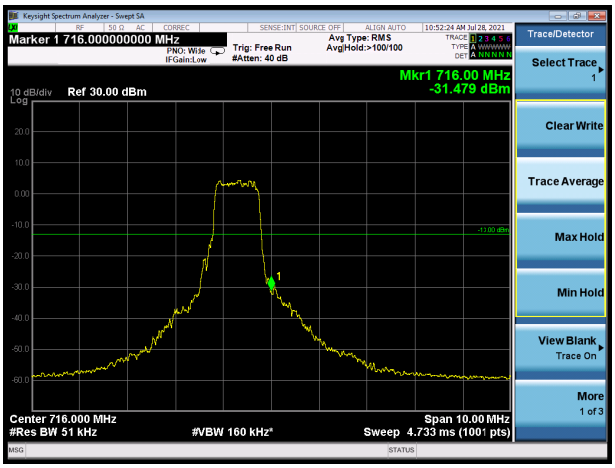
LTE Band 12 16QAM 5MHz CH-High, 1 RB



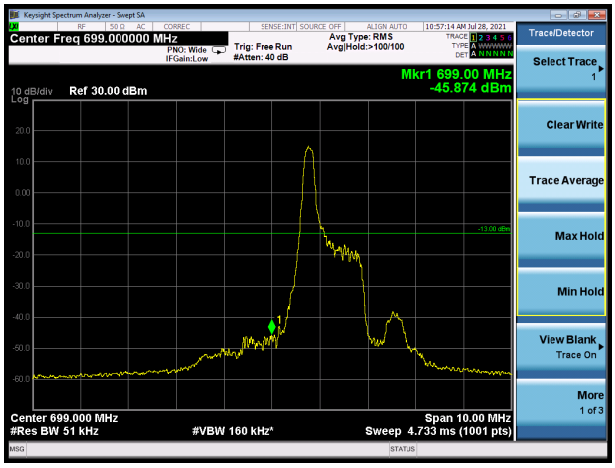
LTE Band 12 16QAM 5MHz CH-Low, 100%RB



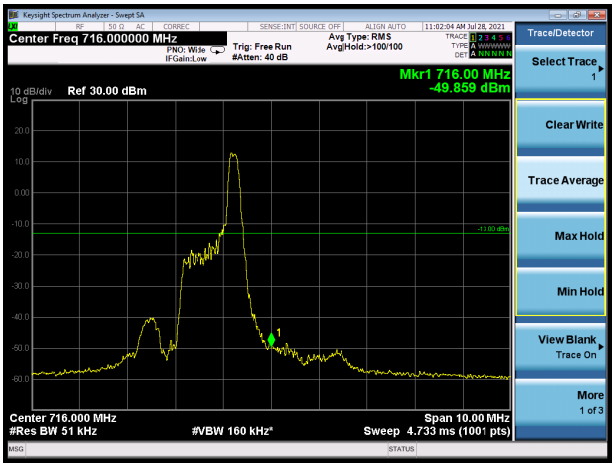
LTE Band 12 16QAM 5MHz CH-High, 100%RB



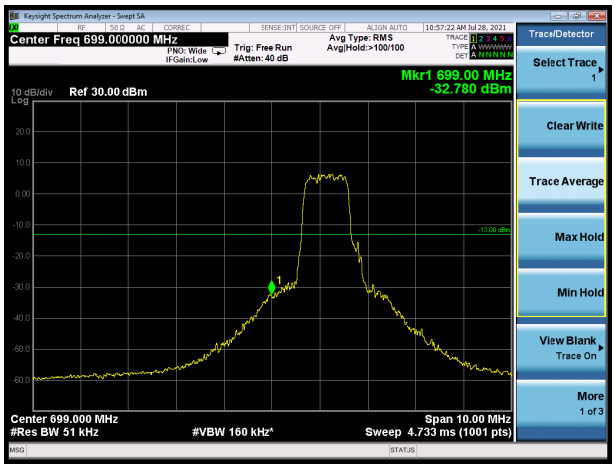
LTE Band 12 16QAM 10MHz CH-Low, 1 RB



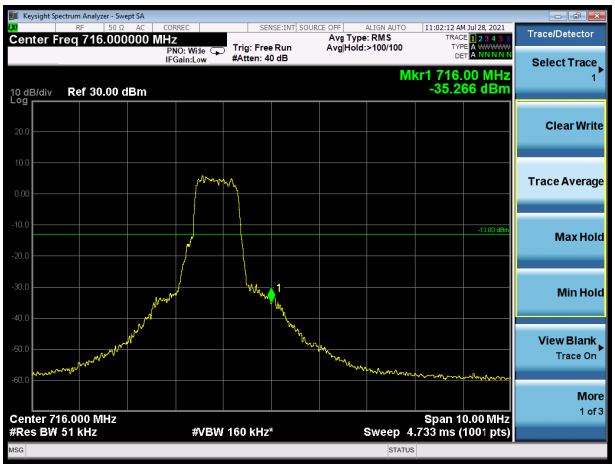
LTE Band 12 16QAM 10MHz CH-High, 1 RB



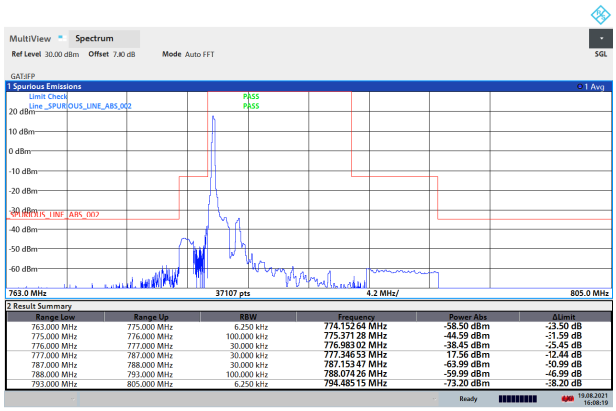
LTE Band 12 16QAM 10MHz CH-Low, 100%RB



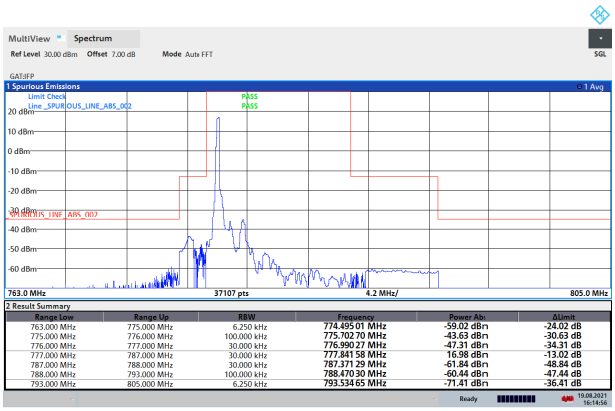
LTE Band 12 16QAM 10MHz CH-High, 100%RB



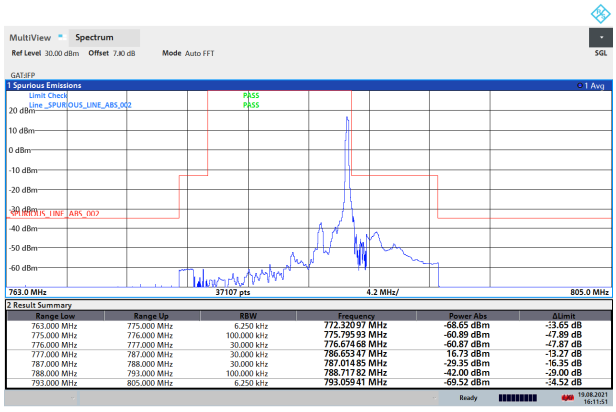
LTE Band 13 QPSK 5MHz CH-Low, 1 RB (763MHz ~775MHz)



LTE Band 13 QPSK 10MHz CH-Low, 1 RB (775MHz ~777MHz)



LTE Band 13 QPSK 5MHz CH-High, 1 RB (787MHz ~793MHz)



LTE Band 13 QPSK 10MHz CH-High, 1 RB (793MHz ~805MHz)