



# TEST REPORT

**APPLICANT** : Nortek Security & Control LLC

**PRODUCT NAME** : Edge Panel

**MODEL NAME** : 2GIG-EDG-NA-V

**BRAND NAME** : 2GIG

**FCC ID** : EF400228

**STANDARD(S)** : 47 CFR Part 24, Subpart E  
47 CFR Part 27, Subpart H&L

**RECEIPT DATE** : 2020-07-03

**TEST DATE** : 2020-07-16 to 2020-09-07

**ISSUE DATE** : 2022-08-22

Edited by: Li Huaijie  
Li Huaijie (Rapporteur)

Approved by: Shen Junsheng  
Shen Junsheng ( Supervisor )

**NOTE:** This document is issued by Shenzhen Morlab Communications Technology Co., Ltd., the test report shall not be reproduced except in full without prior written permission of the company. The test results apply only to the particular sample(s) tested and to the specific tests carried out which is available on request for validation and information confirmed at our website.





# DIRECTORY

- 1. Technical Information ..... 3**
- 1.1. Applicant and Manufacturer Information ..... 3**
- 1.2. Equipment Under Test (EUT) Description ..... 3**
- 1.3. Maximum ERP/EIRP and Emission Designator ..... 5**
- 1.4. Test Standards and Results ..... 6**
- 1.5. Environmental Conditions ..... 8**
- 2. 47 CFR Part 2, Part 24E and 27H&L Requirements ..... 9**
- 2.1. Transmitter Conducted Output Power And ERP/EIRP ..... 9**
- 2.2. Occupied Bandwidth ..... 26**
- 2.3. Frequency Stability ..... 37**
- 2.4. Peak to Average Ratio ..... 39**
- 2.5. Conducted Spurious Emissions ..... 47**
- 2.6. Band Edge ..... 56**
- 2.7. Radiated Spurious Emissions ..... 65**
- Annex A Test Uncertainty ..... 76**
- Annex B Testing Laboratory Information ..... 77**

Change History		
Version	Date	Reason for change
1.0	2022-08-22	First edition



# 1. Technical Information

**Note:** Provide by applicant.

## 1.1. Applicant and Manufacturer Information

<b>Applicant:</b>	Nortek Security & Control LLC
<b>Applicant Address:</b>	5919 Sea Otter Place, Carlsbad, CA 92010, United States
<b>Manufacturer:</b>	Flextronics Electronics Technology (Shenzhen) Co., Ltd
<b>Manufacturer Address:</b>	89 Yong Fu Road, Tong Fu Yu Industrial Park, Fu Yong Town, Bao An District, Shenzhen, Guangdong, 518103, China

## 1.2. Equipment Under Test (EUT) Description

<b>Product Name:</b>	Edge Panel	
<b>Hardware Version:</b>	A	
<b>Software Version:</b>	0	
<b>IMEI:</b>	863900043268645	
<b>Modulation Type:</b>	QPSK, 16QAM	
<b>Operation Band:</b>	Band 4 / 13	
	LTE Band 4	Tx: 1710MHz -1755MHz
		Rx: 2110MHz - 2155MHz
	LTE Band 13	Tx: 777MHz - 787MHz
		Rx: 746MHz - 756MHz
<b>Channel Bandwidth:</b>	LTE Band 4	1.4MHz, 3 MHz, 5 MHz, 10MHz, 15 MHz, 20 MHz
	LTE Band 13	5 MHz, 10MHz
<b>Antenna Type:</b>	FPC Antenna	
<b>Antenna Gain:</b>	LTE Band 4	1.24 dBi
	LTE Band 13	0.89 dBi



<b>Accessory Information:</b>	<b>Battery</b>	
	Brand Name:	Highpower
	Model No.:	115150
	Capacity:	4020 mAh
	Rated Voltage:	3.80 V
	Charge Limit:	4.40 V
	<b>AC Adapter</b>	
	Brand Name:	ZBPOWER
	Model No.:	ZB-H140017
	Rated Input:	100-240V ~ 50/60Hz 0.6A
	Rated Output:	14.00V=1.70A

**Note 1:** For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

**Note 2:** This test report is variant from the original report (Report No.: SZ21050037W01, Model: 2GIG-EDG-NA-V), apply for a renew application. Only the Zigwave andSUB-1G 900MHzchips were replaced, others are the same as before. No other changes. We have evaluated Conducted Spurious Emissions with no different from the original report.

### 1.3. Maximum ERP/EIRP and Emission Designator

LTE Band 4	Maximum ERP/EIRP (W)		Emission Designator (99%OBW)	
BW(MHz)	QPSK	16QAM	QPSK	16QAM
20	0.327	0.270	18M0G7D	18M0G7D
15	0.318	0.261	13M5G7D	13M5G7D
10	0.308	0.252	9M02G7D	8M97G7D
5	0.299	0.245	4M51G7D	4M51G7D
3	0.292	0.239	2M70G7D	2M71G7D
1.4	0.282	0.232	1M10G7D	1M10G7D
LTE Band 13	Maximum ERP/EIRP (W)		Emission Designator (99%OBW)	
BW(MHz)	QPSK	16QAM	QPSK	16QAM
10	0.179	0.117	8M98G7D	8M97G7D
5	0.169	0.116	4M51G7D	4M52G7D



## 1.4. Test Standards and Results

The objective of the report is to perform testing according to Part 2, Part 24 and Part 27 for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 24	Personal Communications Services
3	47 CFR Part 27	Miscellaneous Wireless Communications Services



Test detailed items/section required by FCC rules and results are as below:

Section	Description	Test Date	Test Engineer	Result	Method Determination /Remark
2.1046, 24.232(c), 27.50	Transmitter Conducted Output Power and ERP/EIRP	Jul 23, 2020	Chen Hao	PASS	No deviation
2.1049	Occupied Bandwidth	Jul 20 to 28, 2020	Zhou Xiaolong	PASS	No deviation
2.1055, 24.235, 27.54	Frequency Stability	Jul 20 to 28, 2020	Zhou Xiaolong	PASS	No deviation
24.232(d), 27.50(d)(5)	Peak to Average Radio	Jul 20 to Sep 07, 2020	Zhou Xiaolong	PASS	No deviation
2.1051, 24.238, 27.53	Conducted Spurious Emissions	Jul 20 to Sep 07, 2020	Zhou Xiaolong	PASS	No deviation
2.1051, 24.238, 27.53	Band Edge	Jul 20 to 28, 2020	Zhou Xiaolong	PASS	No deviation
2.1051, 24.238, 27.53	Radiated Spurious Emissions	Jul 16, 2020	Gao Jianrou	PASS	No deviation

**Note 1:** The tests were performed according to the method of measurements prescribed in KDB971168 D01 v03 and ANSI/TIA-603-E-2016.

**Note 2:** The path loss during the RF test is calibrated to correct the results by the offset setting in the test equipments. The ref offset 23.5dB contains two parts that cable loss 13.5dB and Attenuator 10dB.

**Note 3:** When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.



## 1.5. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106



## 2.47 CFR Part 2, Part 24E and 27H&L Requirements

### 2.1. Transmitter Conducted Output Power And ERP/EIRP

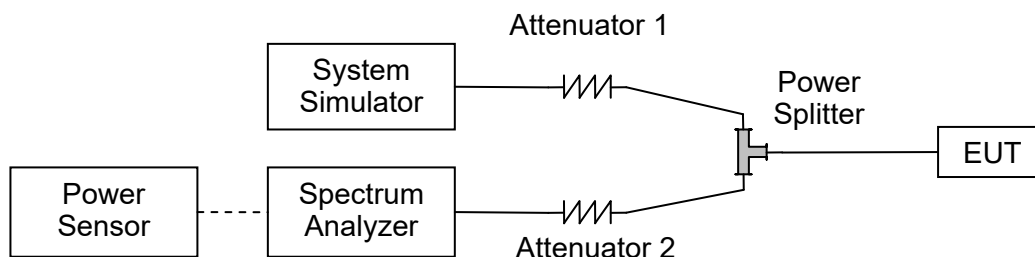
#### 2.1.1. Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

According to FCC section 24.232 (c) for LTE Band 2, Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to FCC section 27.50 (d) for LTE Band 4, fixed, mobile and portable (hand-held) stations in the 1710-1755MHz band are limited to 1wat EIRP.

#### 2.1.2. Test Description



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

**2.1.3. Test procedure**

KDB 971168 D01v03 Section 5.2 and ANSI/TIA-603-E-2016.

EIRP (dBm) = Conducted Output Power (dBm) + Antenna Gain (dBi)

ERP (dBm) = EIPR (dBm) - 2.15

**2.1.4. Result****Conducted Output Power:**

LTE Band 4						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				20050	20175	20300
Frequency (MHz)				1720	1732.5	1745
20	QPSK	1	0	23.87	23.79	23.91
20	QPSK	1	49	23.66	23.64	23.41
20	QPSK	1	99	23.47	23.51	23.49
20	QPSK	50	0	22.90	22.99	23.04
20	QPSK	50	24	23.13	23.01	22.79
20	QPSK	50	50	22.98	23.02	22.80
20	QPSK	100	0	22.96	23.05	22.93
20	16QAM	1	0	22.67	22.63	22.89
20	16QAM	1	49	22.86	22.95	22.58
20	16QAM	1	99	23.08	22.79	22.60
20	16QAM	50	0	22.17	22.13	22.39
20	16QAM	50	24	22.36	22.45	22.08
20	16QAM	50	50	22.48	22.29	22.10
20	16QAM	100	0	22.35	22.44	22.32



LTE Band 4						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				20025	20175	20325
Frequency (MHz)				1717.5	1732.5	1747.5
15	QPSK	1	0	23.74	23.66	23.78
15	QPSK	1	37	23.53	23.51	23.28
15	QPSK	1	74	23.35	23.38	23.36
15	QPSK	36	0	22.77	22.86	22.91
15	QPSK	36	20	23.00	22.87	22.66
15	QPSK	36	39	22.85	22.89	22.67
15	QPSK	75	0	22.83	22.92	22.80
15	16QAM	1	0	22.54	22.50	22.75
15	16QAM	1	37	22.73	22.82	22.44
15	16QAM	1	74	22.92	22.66	22.47
15	16QAM	36	0	22.12	22.08	22.33
15	16QAM	36	20	22.31	22.40	22.02
15	16QAM	36	39	22.50	22.24	22.05
15	16QAM	75	0	22.42	22.51	22.39



LTE Band 4						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				20000	20175	20350
Frequency (MHz)				1715	1732.5	1750
10	QPSK	1	0	23.60	23.52	23.64
10	QPSK	1	25	23.39	23.37	23.14
10	QPSK	1	49	23.25	23.31	23.22
10	QPSK	25	0	22.63	22.69	22.77
10	QPSK	25	12	22.86	22.76	22.52
10	QPSK	25	25	22.71	22.74	22.53
10	QPSK	50	0	22.69	22.78	22.66
10	16QAM	1	0	22.40	22.36	22.61
10	16QAM	1	25	22.59	22.68	22.30
10	16QAM	1	49	22.78	22.52	22.33
10	16QAM	25	0	22.02	21.98	22.23
10	16QAM	25	12	22.21	22.30	21.92
10	16QAM	25	25	22.40	22.14	21.95
10	16QAM	50	0	22.32	22.41	22.29



LTE Band 4						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				19975	20175	20375
Frequency (MHz)				1712.5	1732.5	1752.5
5	QPSK	1	0	23.48	23.40	23.52
5	QPSK	1	12	23.27	23.25	23.02
5	QPSK	1	24	23.13	23.19	23.10
5	QPSK	12	0	22.51	22.57	22.65
5	QPSK	12	7	22.74	22.64	22.40
5	QPSK	12	13	22.59	22.62	22.41
5	QPSK	25	0	22.57	22.66	22.54
5	16QAM	1	0	22.28	22.24	22.49
5	16QAM	1	12	22.47	22.56	22.18
5	16QAM	1	24	22.66	22.40	22.21
5	16QAM	12	0	21.91	21.87	22.12
5	16QAM	12	7	22.10	22.19	21.81
5	16QAM	12	13	22.29	22.03	21.84
5	16QAM	25	0	22.21	22.30	22.18



LTE Band 4						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				19965	20175	20385
Frequency (MHz)				1711.5	1732.5	1753.5
3	QPSK	1	0	23.37	23.29	23.41
3	QPSK	1	8	23.16	23.14	22.91
3	QPSK	1	14	23.02	23.08	22.99
3	QPSK	8	0	22.40	22.46	22.54
3	QPSK	8	4	22.63	22.53	22.29
3	QPSK	8	7	22.48	22.51	22.30
3	QPSK	15	0	22.46	22.55	22.43
3	16QAM	1	0	22.17	22.13	22.38
3	16QAM	1	8	22.36	22.45	22.07
3	16QAM	1	14	22.55	22.29	22.10
3	16QAM	8	0	21.78	21.74	21.99
3	16QAM	8	4	21.97	22.06	21.68
3	16QAM	8	7	22.16	21.90	21.71
3	16QAM	15	0	22.08	22.17	22.05



LTE Band 4						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				19957	20175	20393
Frequency (MHz)				1710.7	1732.5	1754.3
1.4	QPSK	1	0	23.23	23.15	23.27
1.4	QPSK	1	3	23.02	23.00	22.77
1.4	QPSK	1	5	22.88	22.94	22.85
1.4	QPSK	3	0	22.26	22.32	22.40
1.4	QPSK	3	1	22.49	22.39	22.15
1.4	QPSK	3	3	22.34	22.37	22.16
1.4	QPSK	6	0	22.32	22.41	22.29
1.4	16QAM	1	0	22.03	21.99	22.24
1.4	16QAM	1	3	22.22	22.31	21.93
1.4	16QAM	1	5	22.41	22.15	21.96
1.4	16QAM	3	0	21.66	21.62	21.87
1.4	16QAM	3	1	21.85	21.94	21.56
1.4	16QAM	3	3	22.04	21.78	21.59
1.4	16QAM	6	0	21.96	22.05	21.93



LTE Band 13				
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Middle Ch. / Freq.
Channel				23230
Frequency (MHz)				782
10	QPSK	1	0	23.73
10	QPSK	1	25	23.79
10	QPSK	1	49	23.64
10	QPSK	25	0	22.39
10	QPSK	25	12	22.66
10	QPSK	25	25	22.77
10	QPSK	50	0	22.70
10	16QAM	1	0	21.69
10	16QAM	1	25	21.95
10	16QAM	1	49	21.94
10	16QAM	25	0	21.47
10	16QAM	25	12	21.42
10	16QAM	25	25	21.53
10	16QAM	50	0	21.48





LTE Band 13						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				23205	23230	23255
Frequency (MHz)				779.5	782	784.5
5	QPSK	1	0	23.51	23.43	23.40
5	QPSK	1	12	23.22	23.26	23.36
5	QPSK	1	24	23.51	23.53	23.42
5	QPSK	12	0	22.38	22.32	22.41
5	QPSK	12	7	22.41	22.38	22.31
5	QPSK	12	13	22.44	22.46	22.26
5	QPSK	25	0	22.36	22.31	22.11
5	16QAM	1	0	21.74	21.71	21.64
5	16QAM	1	12	21.91	21.88	21.71
5	16QAM	1	24	21.54	21.58	21.59
5	16QAM	12	0	21.34	21.31	21.24
5	16QAM	12	7	21.55	21.54	21.41
5	16QAM	12	13	21.46	21.43	21.34
5	16QAM	25	0	21.49	21.57	21.55



**Effective Radiated Power and Effective Isotropic Radiated Power:**

LTE Band 4				Measured EIRP					
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.		Middle Ch. / Freq.		High Ch. / Freq.	
Channel				20050		20175		20300	
Frequency (MHz)				1720		1732.5		1745	
				dBm	W	dBm	W	dBm	W
20	QPSK	1	0	25.11	0.324	25.03	0.318	25.15	0.327
20	QPSK	1	49	24.90	0.309	24.88	0.308	24.65	0.292
20	QPSK	1	99	24.71	0.296	24.75	0.299	24.73	0.297
20	QPSK	50	0	24.14	0.259	24.23	0.265	24.28	0.268
20	QPSK	50	24	24.37	0.274	24.25	0.266	24.03	0.253
20	QPSK	50	50	24.22	0.264	24.26	0.267	24.04	0.254
20	QPSK	100	0	24.20	0.263	24.29	0.269	24.17	0.261
20	16QAM	1	0	23.91	0.246	23.87	0.244	24.13	0.259
20	16QAM	1	49	24.10	0.257	24.19	0.262	23.82	0.241
20	16QAM	1	99	24.32	0.270	24.03	0.253	23.84	0.242
20	16QAM	50	0	23.41	0.219	23.37	0.217	23.63	0.231
20	16QAM	50	24	23.60	0.229	23.69	0.234	23.32	0.215
20	16QAM	50	50	23.72	0.236	23.53	0.225	23.34	0.216
20	16QAM	100	0	23.59	0.229	23.68	0.233	23.56	0.227



LTE Band 4				Measured EIRP					
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.		Middle Ch. / Freq.		High Ch. / Freq.	
Channel				20025		20175		20325	
Frequency (MHz)				1717.5		1732.5		1747.5	
				dBm	W	dBm	W	dBm	W
15	QPSK	1	0	24.98	0.315	24.90	0.309	25.02	0.318
15	QPSK	1	37	24.77	0.300	24.75	0.299	24.52	0.283
15	QPSK	1	74	24.59	0.288	24.62	0.290	24.60	0.288
15	QPSK	36	0	24.01	0.252	24.10	0.257	24.15	0.260
15	QPSK	36	20	24.24	0.265	24.11	0.258	23.90	0.245
15	QPSK	36	39	24.09	0.256	24.13	0.259	23.91	0.246
15	QPSK	75	0	24.07	0.255	24.16	0.261	24.04	0.254
15	16QAM	1	0	23.78	0.239	23.74	0.237	23.99	0.251
15	16QAM	1	37	23.97	0.249	24.06	0.255	23.68	0.233
15	16QAM	1	74	24.16	0.261	23.90	0.245	23.71	0.235
15	16QAM	36	0	23.36	0.217	23.32	0.215	23.57	0.228
15	16QAM	36	20	23.55	0.226	23.64	0.231	23.26	0.212
15	16QAM	36	39	23.74	0.237	23.48	0.223	23.29	0.213
15	16QAM	75	0	23.66	0.232	23.75	0.237	23.63	0.231



LTE Band 4				Measured EIRP					
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.		Middle Ch. / Freq.		High Ch. / Freq.	
Channel				20000		20175		20350	
Frequency (MHz)				1715		1732.5		1750	
				dBm	W	dBm	W	dBm	W
10	QPSK	1	0	24.84	0.305	24.76	0.299	24.88	0.308
10	QPSK	1	25	24.63	0.290	24.61	0.289	24.38	0.274
10	QPSK	1	49	24.49	0.281	24.55	0.285	24.46	0.279
10	QPSK	25	0	23.87	0.244	23.93	0.247	24.01	0.252
10	QPSK	25	12	24.10	0.257	24.00	0.251	23.76	0.238
10	QPSK	25	25	23.95	0.248	23.98	0.250	23.77	0.238
10	QPSK	50	0	23.93	0.247	24.02	0.252	23.90	0.245
10	16QAM	1	0	23.64	0.231	23.60	0.229	23.85	0.243
10	16QAM	1	25	23.83	0.242	23.92	0.247	23.54	0.226
10	16QAM	1	49	24.02	0.252	23.76	0.238	23.57	0.228
10	16QAM	25	0	23.26	0.212	23.22	0.210	23.47	0.222
10	16QAM	25	12	23.45	0.221	23.54	0.226	23.16	0.207
10	16QAM	25	25	23.64	0.231	23.38	0.218	23.19	0.208
10	16QAM	50	0	23.56	0.227	23.65	0.232	23.53	0.225



LTE Band 4				Measured EIRP					
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.		Middle Ch. / Freq.		High Ch. / Freq.	
Channel				19975		20175		20375	
Frequency (MHz)				1712.5		1732.5		1752.5	
				dBm	W	dBm	W	dBm	W
5	QPSK	1	0	24.72	0.296	24.64	0.291	24.76	0.299
5	QPSK	1	12	24.51	0.282	24.49	0.281	24.26	0.267
5	QPSK	1	24	24.37	0.274	24.43	0.277	24.34	0.272
5	QPSK	12	0	23.75	0.237	23.81	0.240	23.89	0.245
5	QPSK	12	7	23.98	0.250	23.88	0.244	23.64	0.231
5	QPSK	12	13	23.83	0.242	23.86	0.243	23.65	0.232
5	QPSK	25	0	23.81	0.240	23.90	0.245	23.78	0.239
5	16QAM	1	0	23.52	0.225	23.48	0.223	23.73	0.236
5	16QAM	1	12	23.71	0.235	23.80	0.240	23.42	0.220
5	16QAM	1	24	23.90	0.245	23.64	0.231	23.45	0.221
5	16QAM	12	0	23.15	0.207	23.11	0.205	23.36	0.217
5	16QAM	12	7	23.34	0.216	23.43	0.220	23.05	0.202
5	16QAM	12	13	23.53	0.225	23.27	0.212	23.08	0.203
5	16QAM	25	0	23.45	0.221	23.54	0.226	23.42	0.220



LTE Band 4				Measured EIRP					
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.		Middle Ch. / Freq.		High Ch. / Freq.	
Channel				19965		20175		20385	
Frequency (MHz)				1711.5		1732.5		1753.5	
				dBm	W	dBm	W	dBm	W
3	QPSK	1	0	24.61	0.289	24.53	0.284	24.65	0.292
3	QPSK	1	8	24.40	0.275	24.38	0.274	24.15	0.260
3	QPSK	1	14	24.26	0.267	24.32	0.270	24.23	0.265
3	QPSK	8	0	23.64	0.231	23.70	0.234	23.78	0.239
3	QPSK	8	4	23.87	0.244	23.77	0.238	23.53	0.225
3	QPSK	8	7	23.72	0.236	23.75	0.237	23.54	0.226
3	QPSK	15	0	23.70	0.234	23.79	0.239	23.67	0.233
3	16QAM	1	0	23.41	0.219	23.37	0.217	23.62	0.230
3	16QAM	1	8	23.60	0.229	23.69	0.234	23.31	0.214
3	16QAM	1	14	23.79	0.239	23.53	0.225	23.34	0.216
3	16QAM	8	0	23.02	0.200	22.98	0.199	23.23	0.210
3	16QAM	8	4	23.21	0.209	23.30	0.214	22.92	0.196
3	16QAM	8	7	23.40	0.219	23.14	0.206	22.95	0.197
3	16QAM	15	0	23.32	0.215	23.41	0.219	23.29	0.213



LTE Band 4				Measured EIRP					
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.		Middle Ch. / Freq.		High Ch. / Freq.	
Channel				19957		20175		20393	
Frequency (MHz)				1710.7		1732.5		1754.3	
				dBm	W	dBm	W	dBm	W
1.4	QPSK	1	0	24.47	0.280	24.39	0.275	24.51	0.282
1.4	QPSK	1	3	24.26	0.267	24.24	0.265	24.01	0.252
1.4	QPSK	1	5	24.12	0.258	24.18	0.262	24.09	0.256
1.4	QPSK	3	0	23.50	0.224	23.56	0.227	23.64	0.231
1.4	QPSK	3	1	23.73	0.236	23.63	0.231	23.39	0.218
1.4	QPSK	3	3	23.58	0.228	23.61	0.230	23.40	0.219
1.4	QPSK	6	0	23.56	0.227	23.65	0.232	23.53	0.225
1.4	16QAM	1	0	23.27	0.212	23.23	0.210	23.48	0.223
1.4	16QAM	1	3	23.46	0.222	23.55	0.226	23.17	0.207
1.4	16QAM	1	5	23.65	0.232	23.39	0.218	23.20	0.209
1.4	16QAM	3	0	22.90	0.195	22.86	0.193	23.11	0.205
1.4	16QAM	3	1	23.09	0.204	23.18	0.208	22.80	0.191
1.4	16QAM	3	3	23.28	0.213	23.02	0.200	22.83	0.192
1.4	16QAM	6	0	23.20	0.209	23.29	0.213	23.17	0.207



LTE Band 13				Measured ERP					
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.		Middle Ch. / Freq.		High Ch. / Freq.	
Channel				23230					
Frequency (MHz)				782					
				dBm	W	dBm	W	dBm	W
10	QPSK	1	0			22.47	0.177		
10	QPSK	1	25			22.53	0.179		
10	QPSK	1	49			22.38	0.173		
10	QPSK	25	0			21.13	0.130		
10	QPSK	25	12			21.40	0.138		
10	QPSK	25	25			21.51	0.142		
10	QPSK	50	0			21.44	0.139		
10	16QAM	1	0			20.43	0.110		
10	16QAM	1	25			20.69	0.117		
10	16QAM	1	49			20.68	0.117		
10	16QAM	25	0			20.21	0.105		
10	16QAM	25	12			20.16	0.104		
10	16QAM	25	25			20.27	0.106		
10	16QAM	50	0			20.22	0.105		





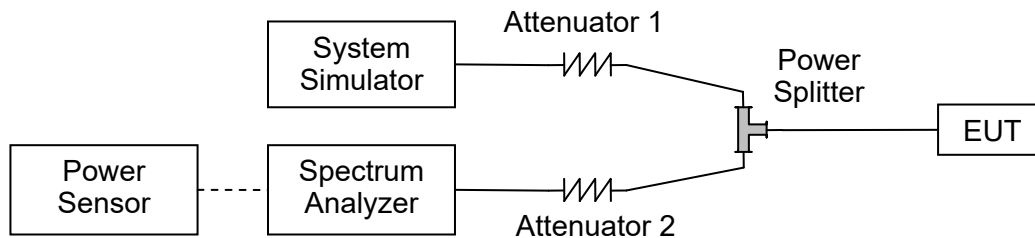
LTE Band 13				Measured ERP					
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.		Middle Ch. / Freq.		High Ch. / Freq.	
Channel				23205		23230		23255	
Frequency (MHz)				779.5		782		784.5	
				dBm	W	dBm	W	dBm	W
5	QPSK	1	0	22.25	0.168	22.17	0.165	22.14	0.164
5	QPSK	1	12	21.96	0.157	22.00	0.158	22.10	0.162
5	QPSK	1	24	22.25	0.168	22.27	0.169	22.16	0.164
5	QPSK	12	0	21.12	0.129	21.06	0.128	21.15	0.130
5	QPSK	12	7	21.15	0.130	21.12	0.129	21.05	0.127
5	QPSK	12	13	21.18	0.131	21.20	0.132	21.00	0.126
5	QPSK	25	0	21.10	0.129	21.05	0.127	20.85	0.122
5	16QAM	1	0	20.48	0.112	20.45	0.111	20.38	0.109
5	16QAM	1	12	20.65	0.116	20.62	0.115	20.45	0.111
5	16QAM	1	24	20.28	0.107	20.32	0.108	20.33	0.108
5	16QAM	12	0	20.08	0.102	20.05	0.101	19.98	0.100
5	16QAM	12	7	20.29	0.107	20.28	0.107	20.15	0.104
5	16QAM	12	13	20.20	0.105	20.17	0.104	20.08	0.102
5	16QAM	25	0	20.23	0.105	20.31	0.107	20.29	0.107

## 2.2. Occupied Bandwidth

### 2.2.1. Requirement

According to FCC section 2.1049, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission. Occupied bandwidth is also known as the 99% emission bandwidth.

### 2.2.2. Test Description



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

### 2.2.3. Test procedure

KDB 971168 D01v03 Section 4.1 and ANSI/TIA-603-E-2016.

### 2.2.4. Test Result



LTE Band 4				
BW(MHz)	Channel Level	Modulation	99% BW(MHz)	26dB BW(MHz)
1.4	Low	QPSK	1.09	1.25
	Low	16QAM	1.10	1.24
	Mid	QPSK	1.09	1.24
	Mid	16QAM	1.10	1.23
	High	QPSK	1.10	1.24
	High	16QAM	1.10	1.23
3	Low	QPSK	2.70	3.01
	Low	16QAM	2.71	3.00
	Mid	QPSK	2.70	3.00
	Mid	16QAM	2.71	3.01
	High	QPSK	2.70	2.99
	High	16QAM	2.71	3.03
5	Low	QPSK	4.51	5.01
	Low	16QAM	4.51	4.98
	Mid	QPSK	4.50	4.99
	Mid	16QAM	4.51	4.99
	High	QPSK	4.51	5.01
	High	16QAM	4.51	4.98
10	Low	QPSK	8.99	9.80
	Low	16QAM	8.96	9.77
	Mid	QPSK	9.00	9.83
	Mid	16QAM	8.97	9.74
	High	QPSK	9.02	9.81
	High	16QAM	8.97	9.79
15	Low	QPSK	13.44	14.65
	Low	16QAM	13.47	14.70
	Mid	QPSK	13.47	14.64
	Mid	16QAM	13.46	14.71
	High	QPSK	13.47	14.70
	High	16QAM	13.45	14.69
20	Low	QPSK	17.97	19.55
	Low	16QAM	17.99	19.50
	Mid	QPSK	17.93	19.52
	Mid	16QAM	17.93	19.54
	High	QPSK	17.90	19.46
	High	16QAM	17.97	19.38



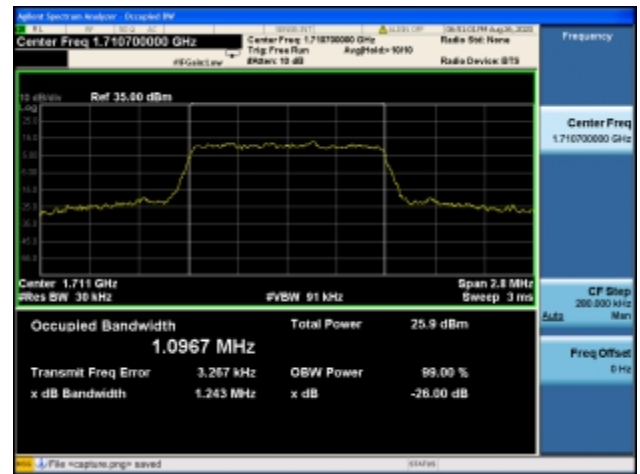
LTE Band 13				
BW(MHz)	Channel Level	Modulation	99% BW(MHz)	26dB BW(MHz)
5	Low	QPSK	4.50	4.98
	Low	16QAM	4.50	4.94
	Mid	QPSK	4.51	5.02
	Mid	16QAM	4.51	4.99
	High	QPSK	4.49	4.99
	High	16QAM	4.51	4.95
10	Mid	QPSK	8.98	9.83
	Mid	16QAM	8.96	9.72



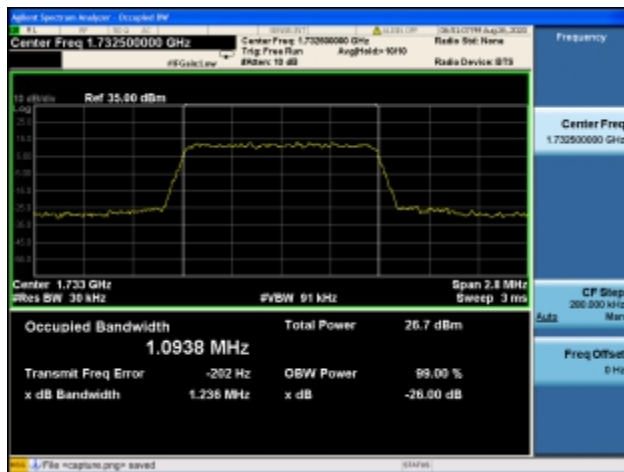
Band 4 / 1.4MHz / Low CH / QPSK



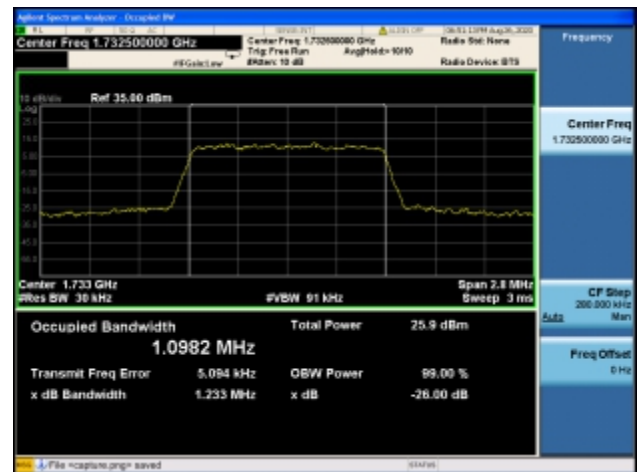
Band 4 / 1.4MHz / Low CH / 16QAM



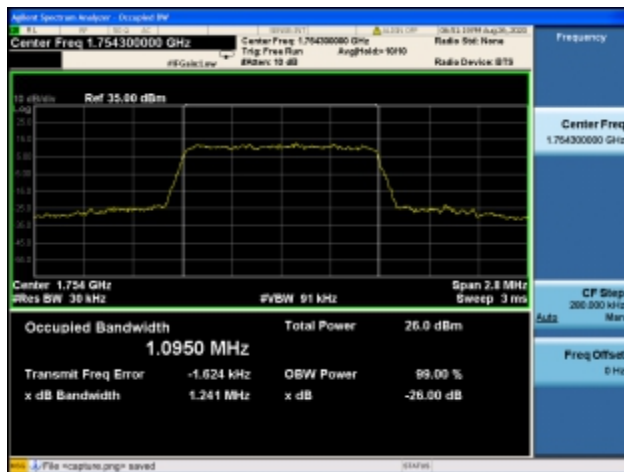
Band 4 / 1.4MHz / Mid CH / QPSK



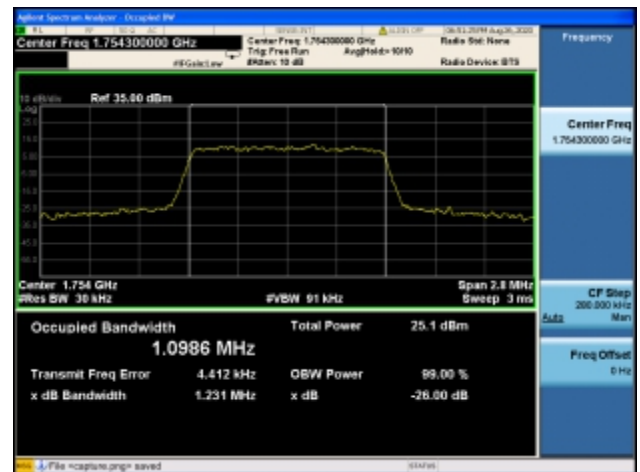
Band 4 / 1.4MHz / Mid CH / 16QAM



Band 4 / 1.4MHz / High CH / QPSK

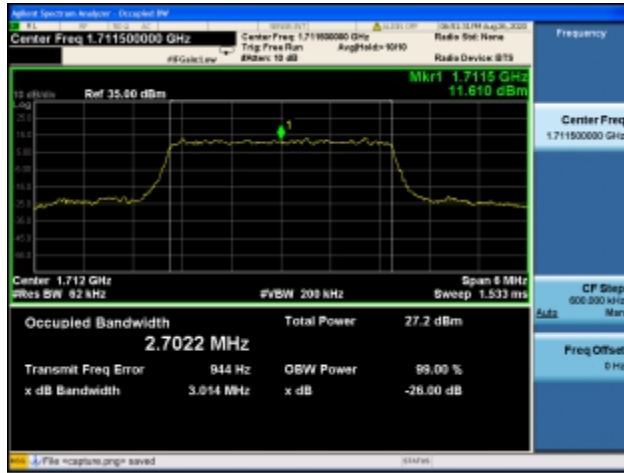


Band 4 / 1.4MHz / High CH / 16QAM





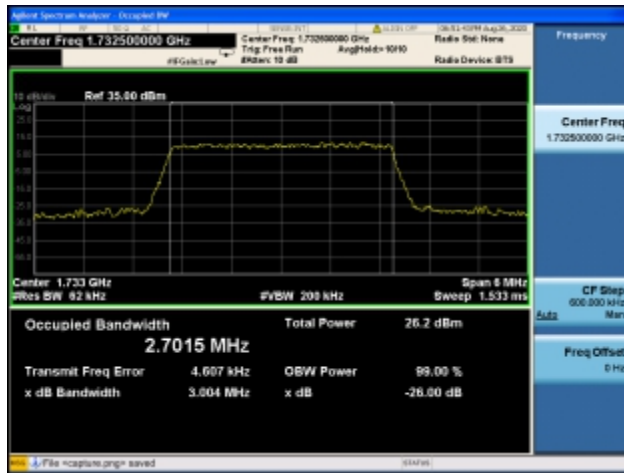
Band 4 / 3MHz / Low CH / QPSK



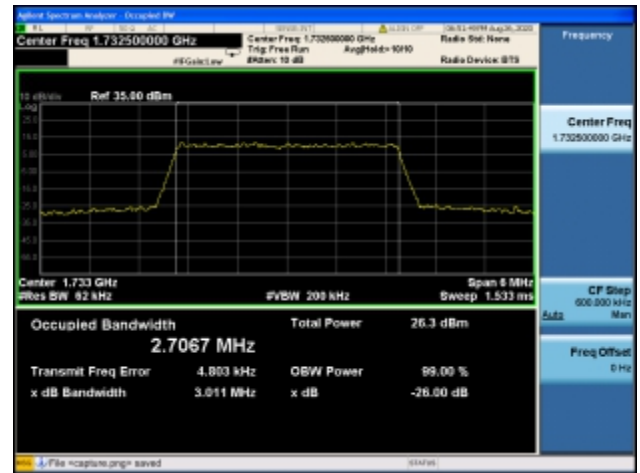
Band 4 / 3MHz / Low CH / 16QAM



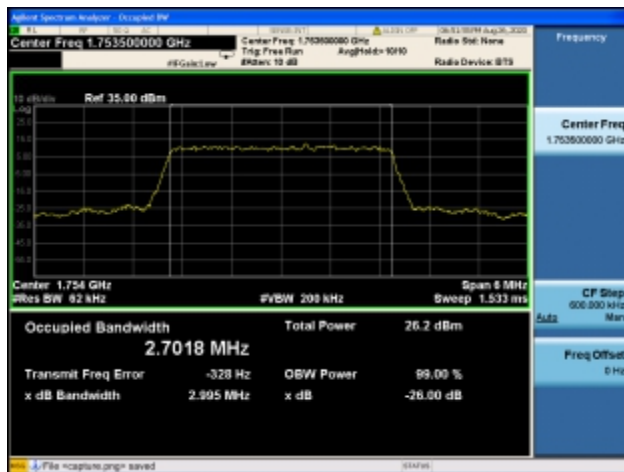
Band 4 / 3MHz / Mid CH / QPSK



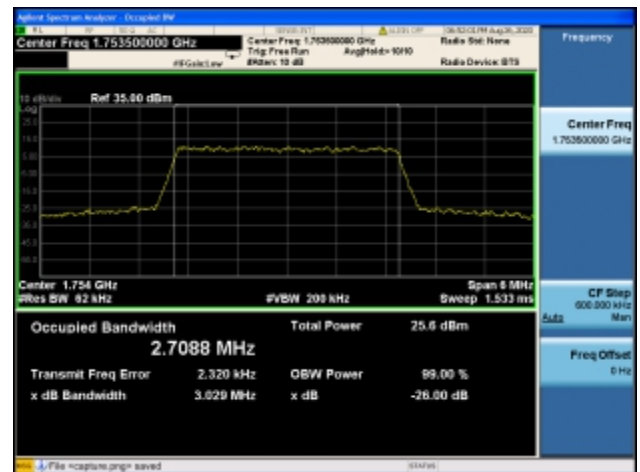
Band 4 / 3MHz / Mid CH / 16QAM



Band 4 / 3MHz / High CH / QPSK

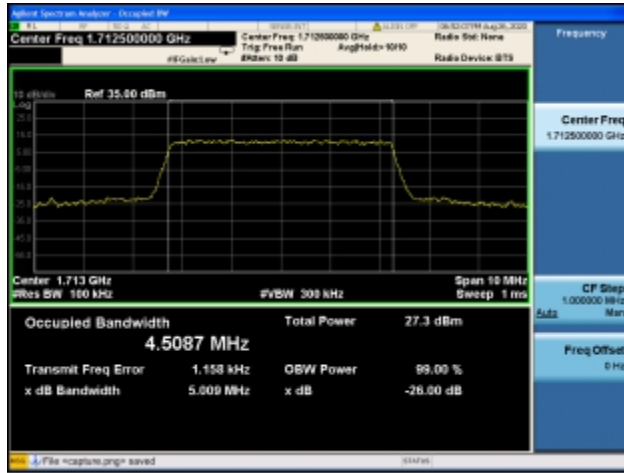


Band 4 / 3MHz / High CH / 16QAM





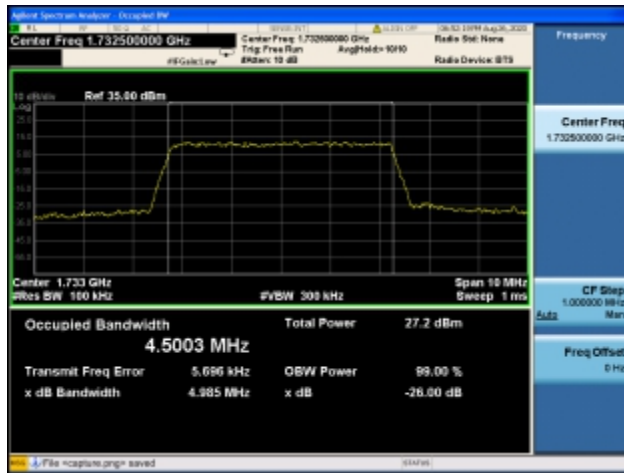
Band 4 / 5MHz / Low CH / QPSK



Band 4 / 5MHz / Low CH / 16QAM



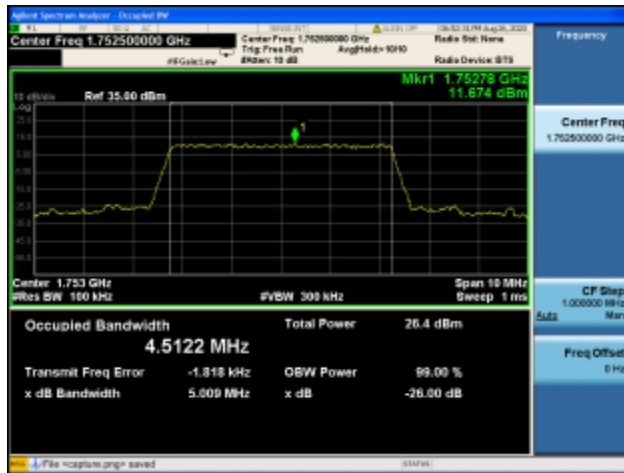
Band 4 / 5MHz / Mid CH / QPSK



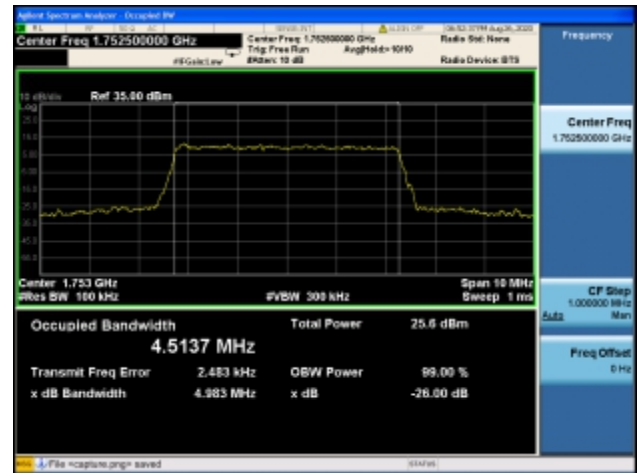
Band 4 / 5MHz / Mid CH / 16QAM



Band 4 / 5MHz / High CH / QPSK

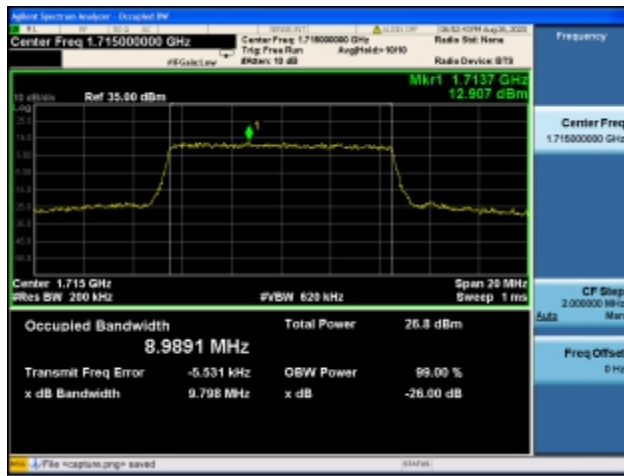


Band 4 / 5MHz / High CH / 16QAM

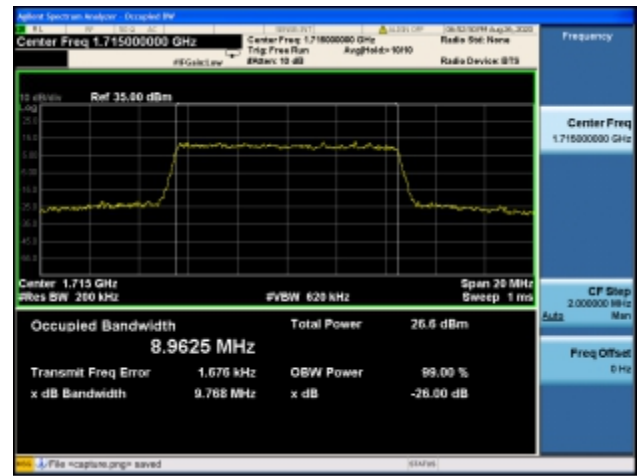




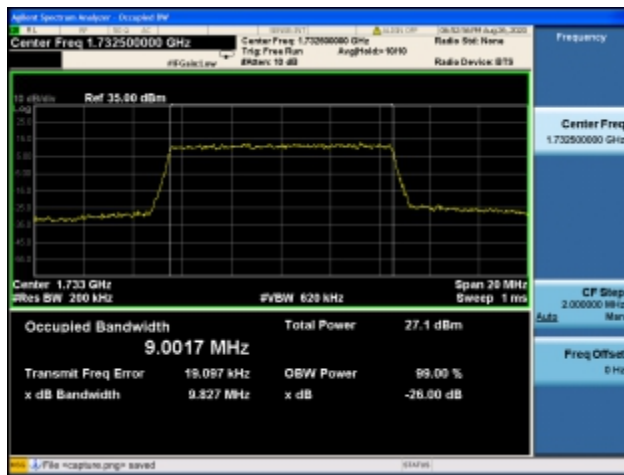
Band 4 / 10MHz / Low CH / QPSK



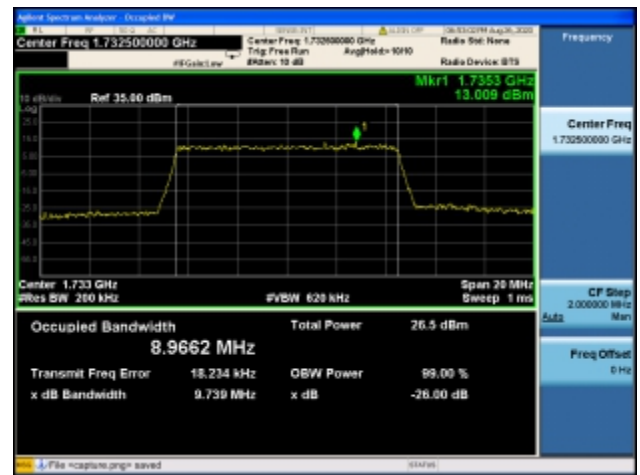
Band 4 / 10MHz / Low CH / 16QAM



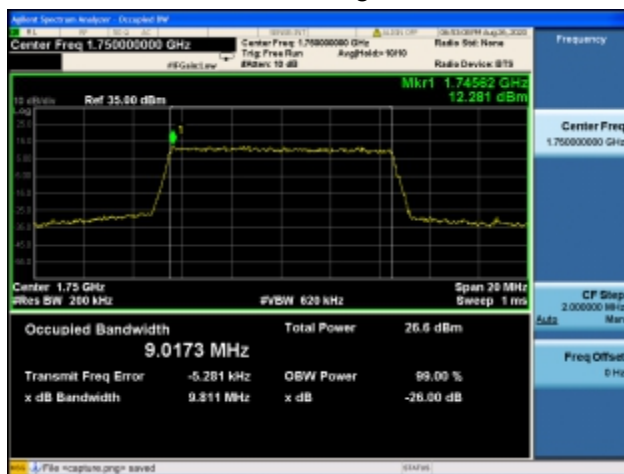
Band 4 / 10MHz / Mid CH / QPSK



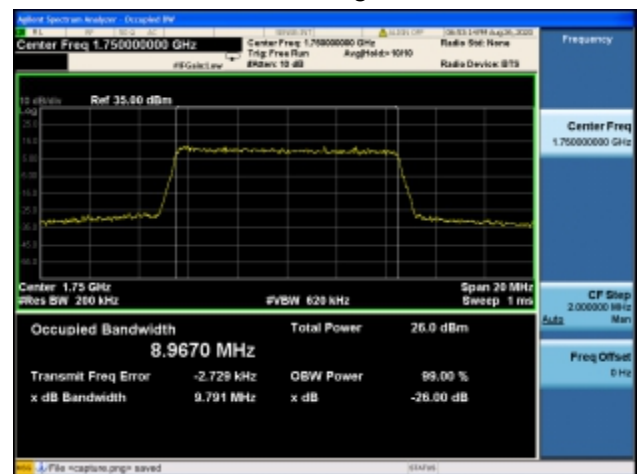
Band 4 / 10MHz / Mid CH / 16QAM



Band 4 / 10MHz / High CH / QPSK



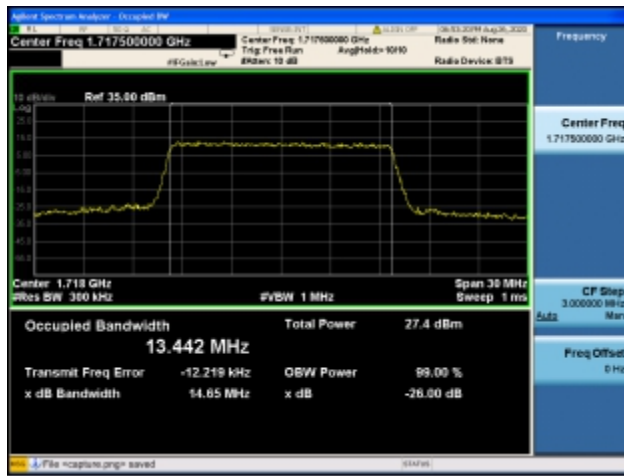
Band 4 / 10MHz / High CH / 16QAM



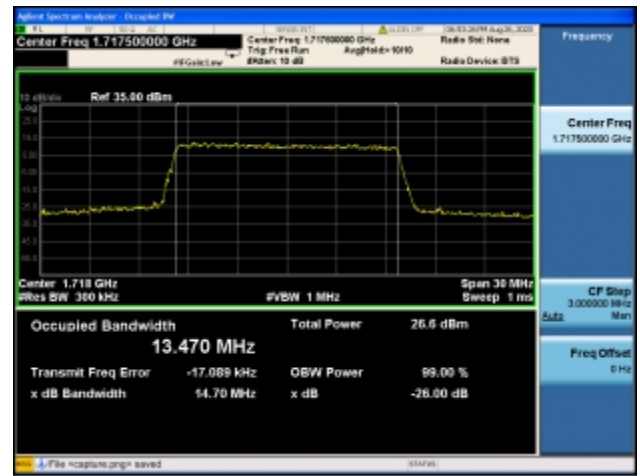




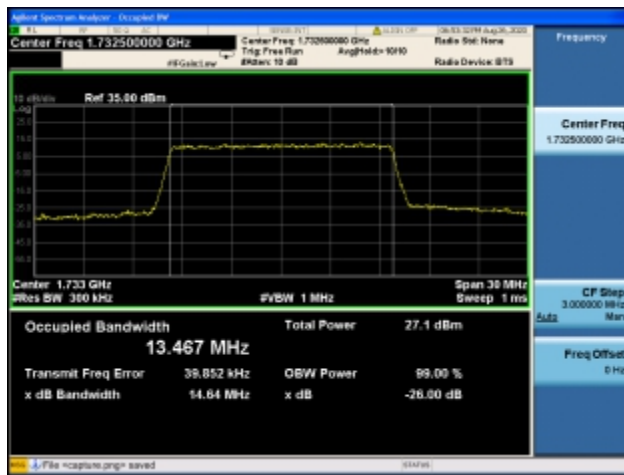
Band 4 / 15MHz / Low CH / QPSK



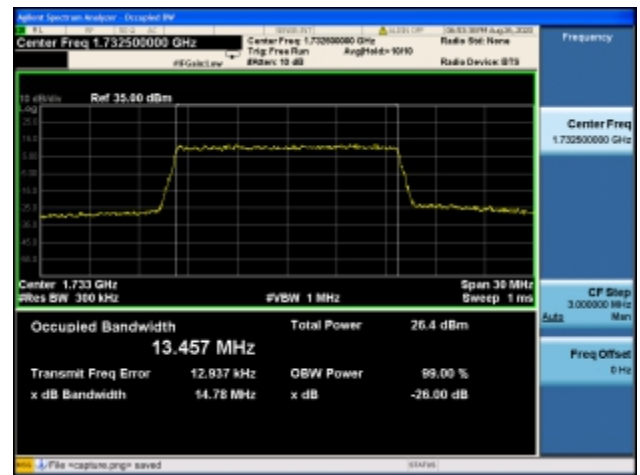
Band 4 / 15MHz / Low CH / 16QAM



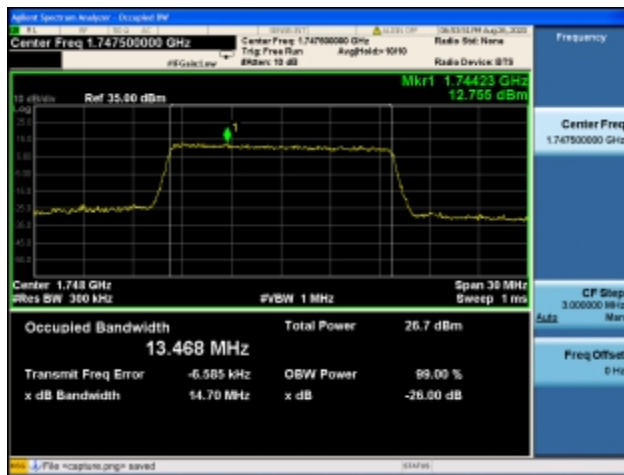
Band 4 / 15MHz / Mid CH / QPSK



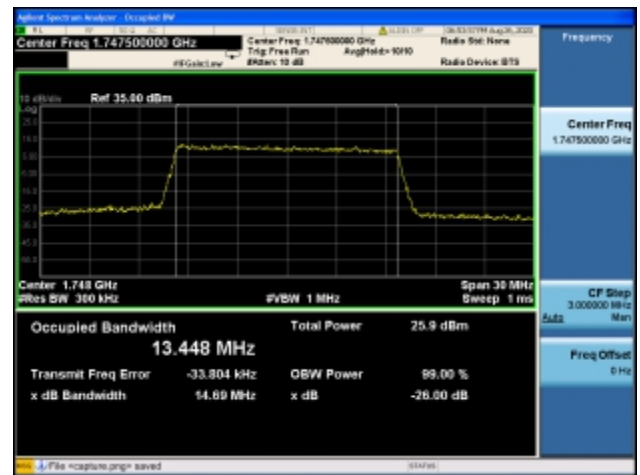
Band 4 / 15MHz / Mid CH / 16QAM



Band 4 / 15MHz / High CH / QPSK

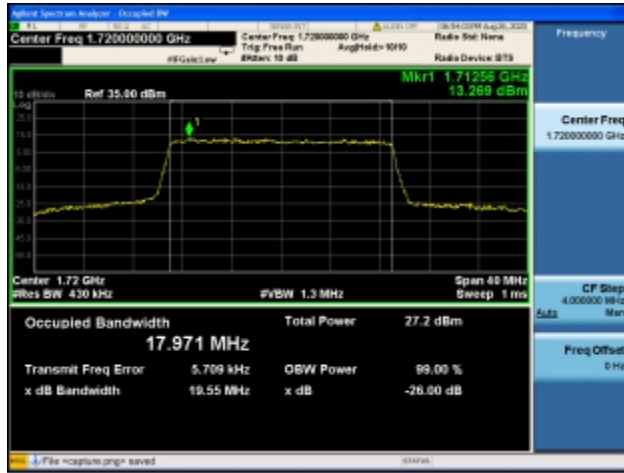


Band 4 / 15MHz / High CH / 16QAM

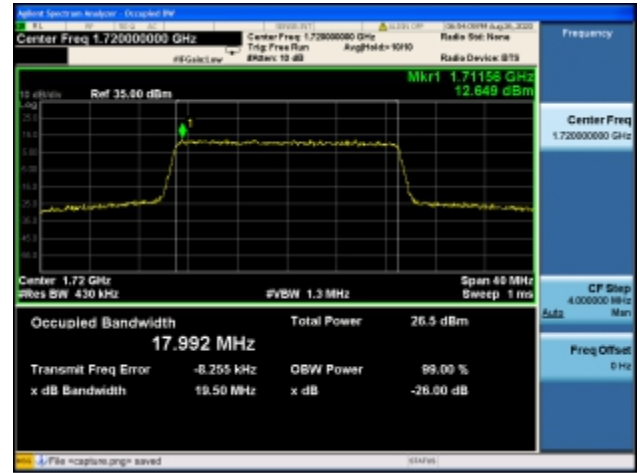




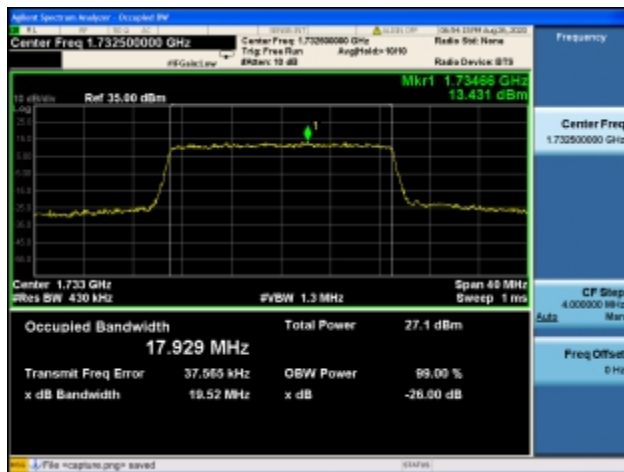
Band 4 / 20MHz / Low CH / QPSK



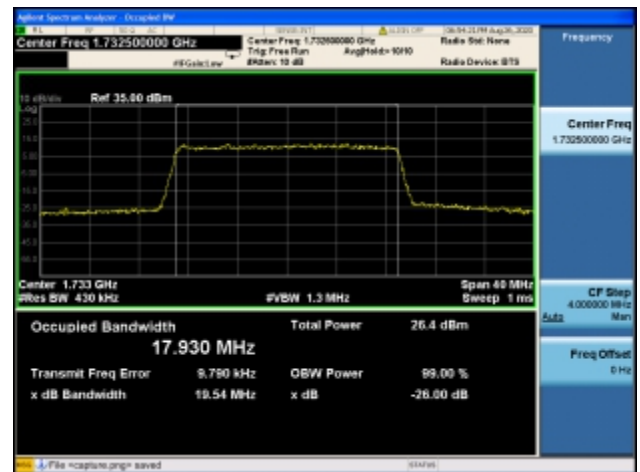
Band 4 / 20MHz / Low CH / 16QAM



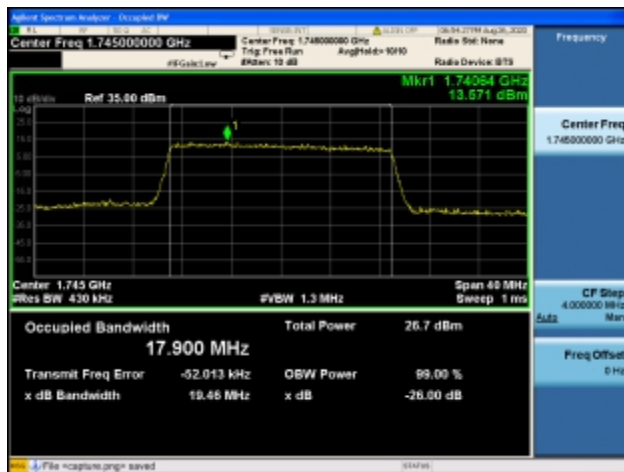
Band 4 / 20MHz / Mid CH / QPSK



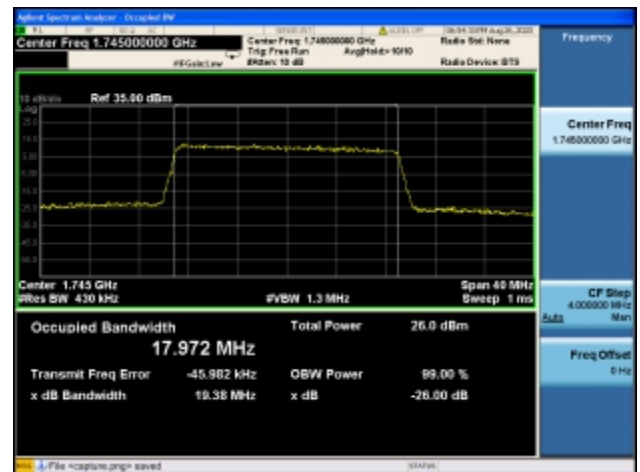
Band 4 / 20MHz / Mid CH / 16QAM



Band 4 / 20MHz / High CH / QPSK

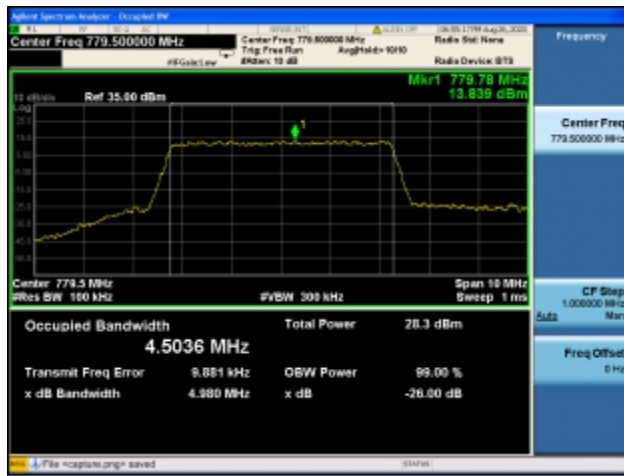


Band 4 / 20MHz / High CH / 16QAM

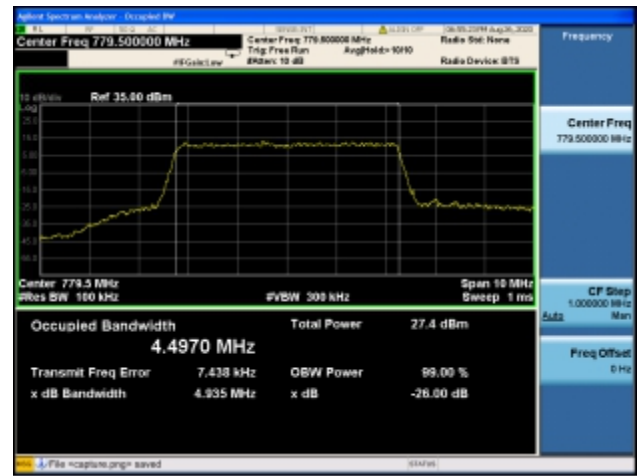




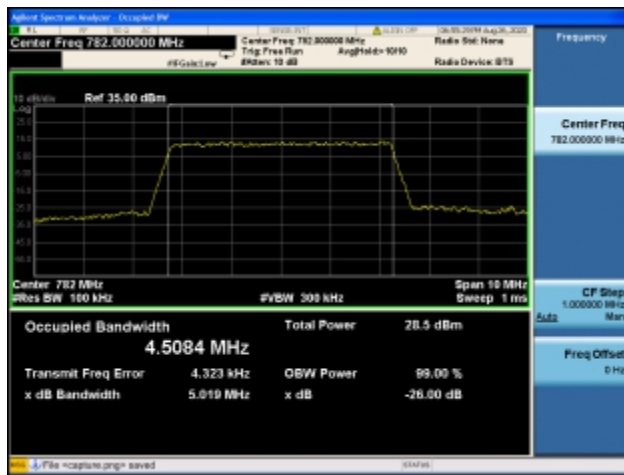
Band 13 / 5MHz / Low CH / QPSK



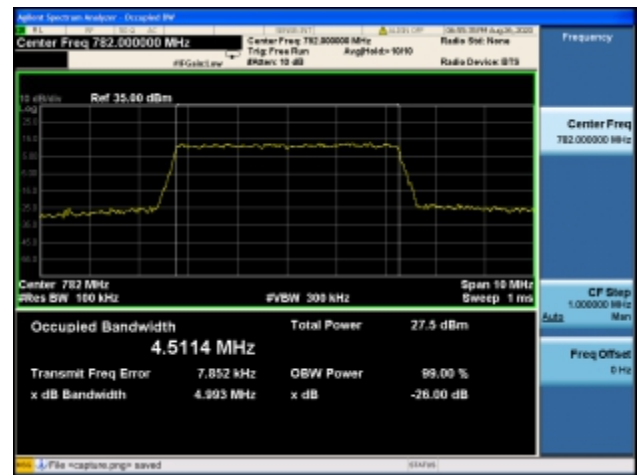
Band 13 / 5MHz / Low CH / 16QAM



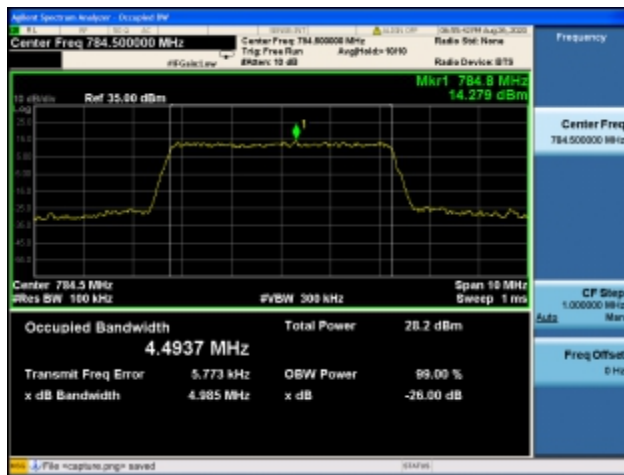
Band 13 / 5MHz / Mid CH / QPSK



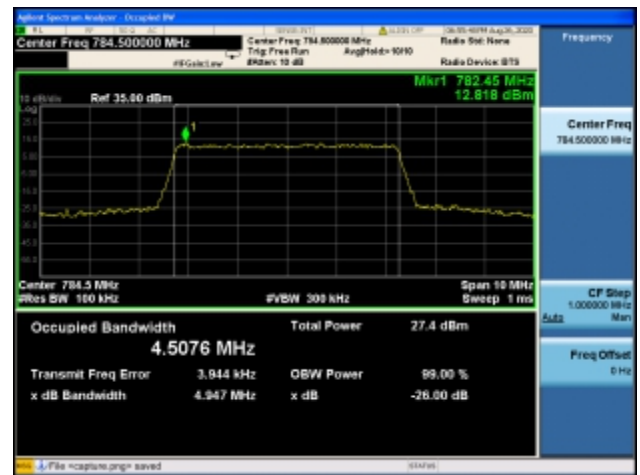
Band 13 / 5MHz / Mid CH / 16QAM



Band 13 / 5MHz / High CH / QPSK

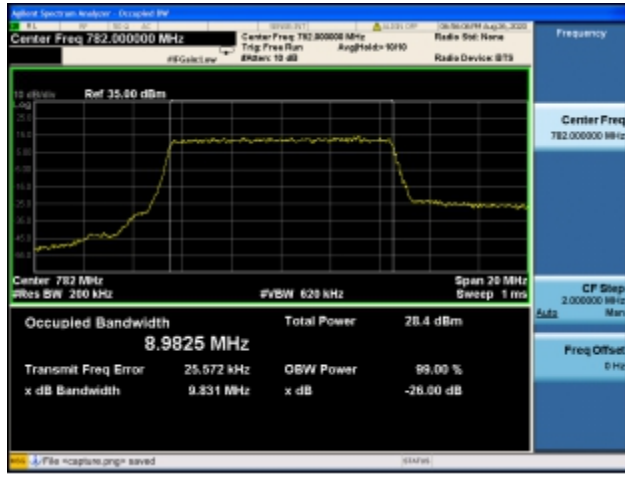


Band 13 / 5MHz / High CH / 16QAM

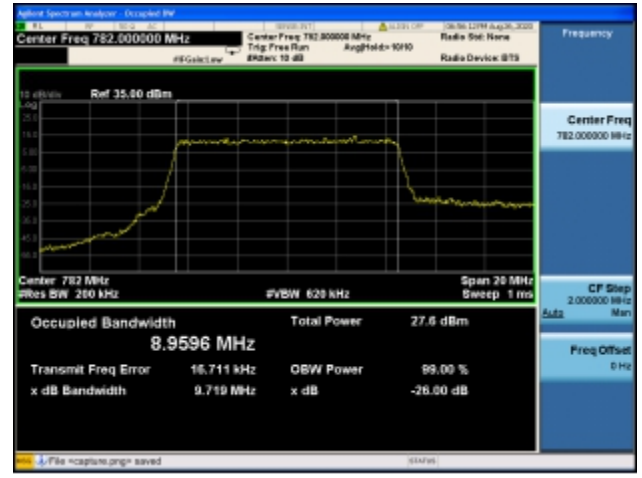




Band 13 / 10MHz / Mid CH / QPSK



Band 13 / 10MHz / Mid CH / 16QAM



## 2.3. Frequency Stability

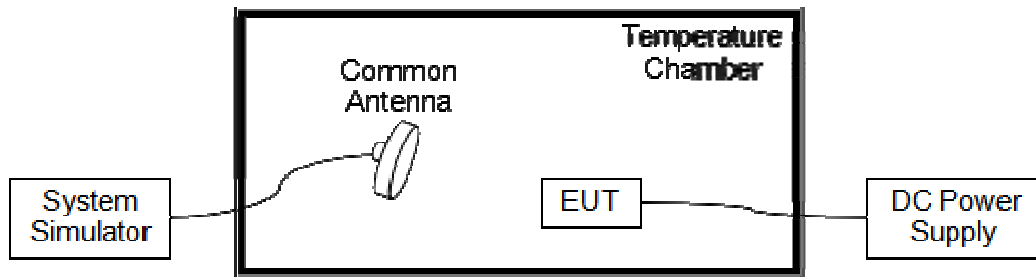
### 2.3.1. Requirement

According to FCC section 2.1055 & 24.235 & 27.54, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

- (a) The temperature is varied from  $-30^{\circ}\text{C}$  to  $50^{\circ}\text{C}$  at intervals of not more than  $10^{\circ}\text{C}$ .
- (b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

Note: Product operating temperature from  $0^{\circ}\text{C}$  to  $40^{\circ}\text{C}$

### 2.3.2. Test Description



The EUT which is powered by the DC Power Supply directly, is located in the Temperature Chamber. The EUT is commanded by the System Simulator (SS) to operate at the maximum output power. A call is established between the EUT and the SS via a Common Antenna.

### 2.3.3. Test procedure

KDB 971168 D01v03 Section 9.0 and ANSI/TIA-603-E-2016.

### 2.3.4. Test Result

The nominal, highest and lowest extreme voltages are separately 12.00VDC, 14.00VDC and 10.00VDC, which are specified by the applicant; the normal temperature here used is  $20^{\circ}\text{C}$ .



LTE Band 4, QPSK, Channel 20175, Frequency 1732.5MHz Limit =Within Authorized Band					
Voltage(%)	Power (VDC)	Temp(°C)	Fre. Dev.(Hz)	Deviation (ppm)	Result
100	12.00	+20 (Ref)	52	-0.030	PASS
100		0	-41	0.024	
100		+10	-44	0.025	
100		+20	32	-0.018	
100		+30	-46	0.027	
100		+40	39	-0.023	
115	14.00	+20	-14	0.008	
85	10.00	+20	51	-0.029	

LTE Band 13, QPSK, Channel 23230, Frequency 782MHz Limit=±2.5ppm					
Voltage (%)	Power (VDC)	Temp (°C)	Fre. Dev. (Hz)	Deviation (ppm)	Result
100	12.00	+20 (Ref)	53	-0.068	PASS
100		0	-42	0.054	
100		+10	-35	0.045	
100		+20	72	-0.092	
100		+30	45	-0.058	
100		+40	-41	0.052	
115	14.00	+20	-42	0.054	
85	10.00	+20	46	-0.059	

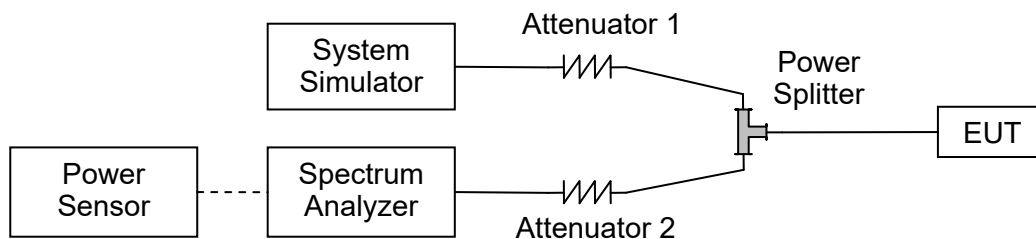
## 2.4. Peak to Average Ratio

### 2.4.1. Requirement

According to FCC section 24.232(d) and 27.50(d), the peak to average ratio (PAR) of the transmission may not exceed 13dB.

### 2.4.2. Test Description

#### Test Set:



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

### 2.4.3. Test procedure

KDB 971168 D01v03 Section 5.7 and ANSI/TIA-603-E-2016.

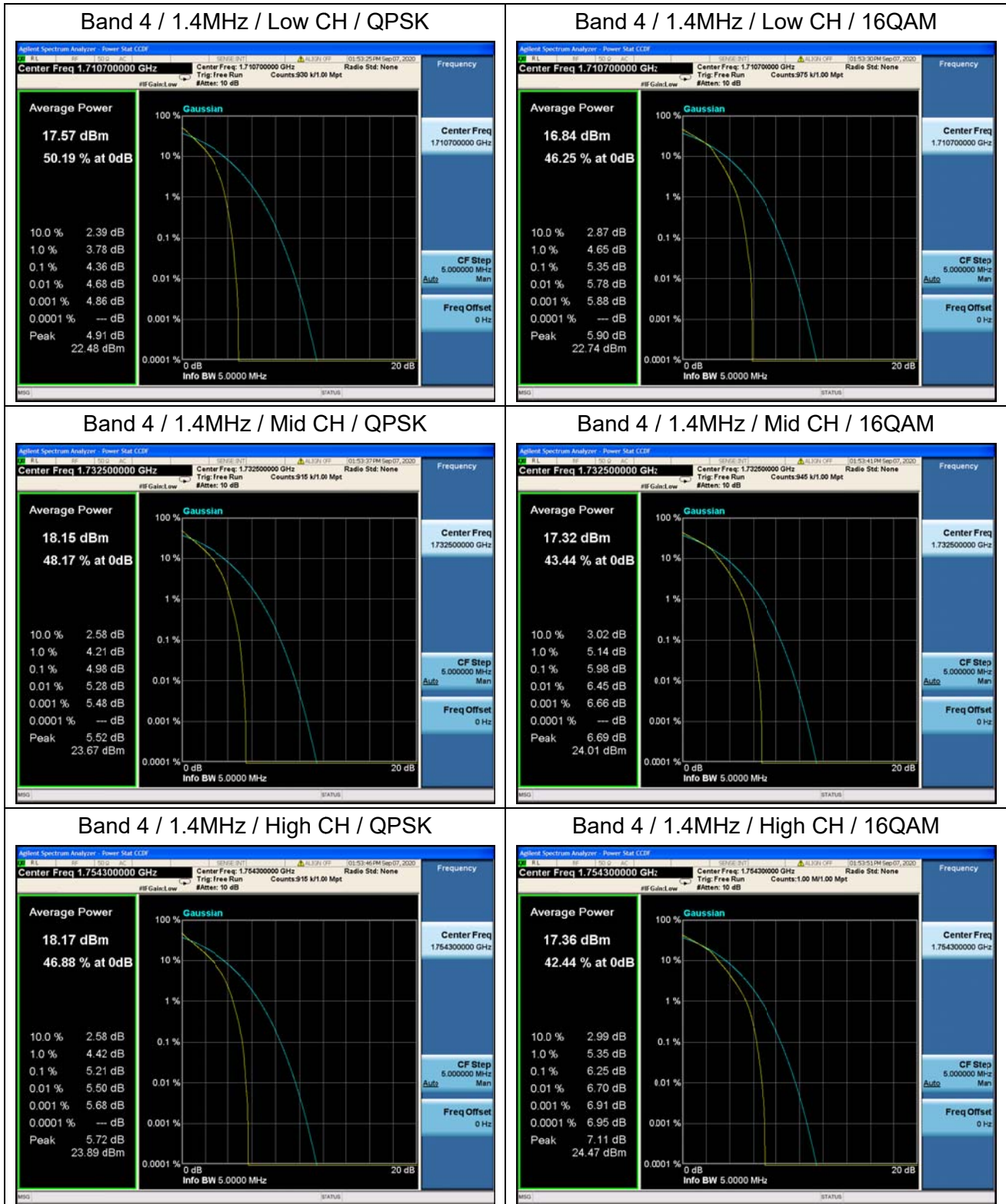
### 2.4.4. Test Result

Record the maximum PAPR level associated with a probability of 0.1%.



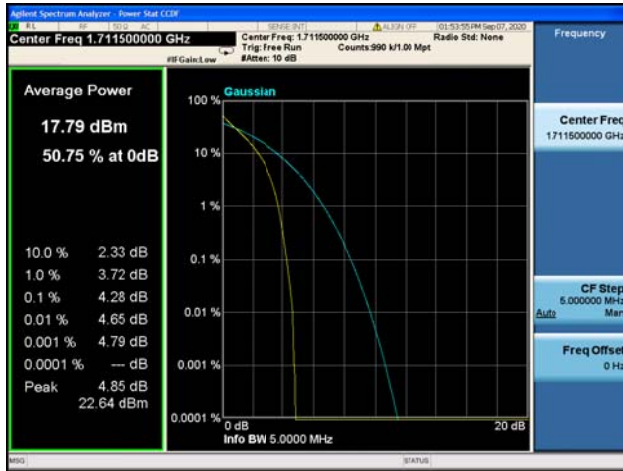
LTE Band 4					
BW(MHz)	Channel Level	Modulation	PAR Radio(dB)	Limit(dB)	Verdict
1.4	Low	QPSK	4.35	<=13	PASS
	Low	16QAM	5.35	<=13	PASS
	Mid	QPSK	4.99	<=13	PASS
	Mid	16QAM	5.98	<=13	PASS
	High	QPSK	5.21	<=13	PASS
	High	16QAM	6.25	<=13	PASS
3	Low	QPSK	4.28	<=13	PASS
	Low	16QAM	5.47	<=13	PASS
	Mid	QPSK	4.82	<=13	PASS
	Mid	16QAM	6.07	<=13	PASS
	High	QPSK	5.04	<=13	PASS
	High	16QAM	6.32	<=13	PASS
5	Low	QPSK	4.72	<=13	PASS
	Low	16QAM	5.60	<=13	PASS
	Mid	QPSK	4.97	<=13	PASS
	Mid	16QAM	6.01	<=13	PASS
	High	QPSK	5.16	<=13	PASS
	High	16QAM	6.16	<=13	PASS
10	Low	QPSK	4.77	<=13	PASS
	Low	16QAM	5.78	<=13	PASS
	Mid	QPSK	4.95	<=13	PASS
	Mid	16QAM	6.03	<=13	PASS
	High	QPSK	4.98	<=13	PASS
	High	16QAM	6.06	<=13	PASS
15	Low	QPSK	4.73	<=13	PASS
	Low	16QAM	5.79	<=13	PASS
	Mid	QPSK	4.95	<=13	PASS
	Mid	16QAM	5.93	<=13	PASS
	High	QPSK	5.25	<=13	PASS
	High	16QAM	5.88	<=13	PASS
20	Low	QPSK	5.10	<=13	PASS
	Low	16QAM	5.93	<=13	PASS
	Mid	QPSK	5.02	<=13	PASS
	Mid	16QAM	5.93	<=13	PASS
	High	QPSK	4.75	<=13	PASS
	High	16QAM	5.85	<=13	PASS







Band 4 / 3MHz / Low CH / QPSK



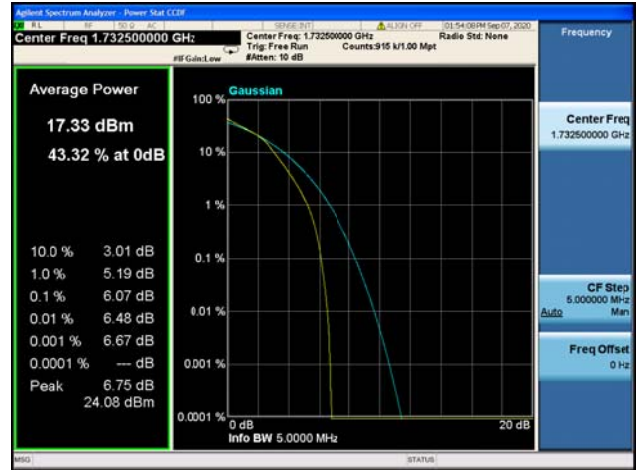
Band 4 / 3MHz / Low CH / 16QAM



Band 4 / 3MHz / Mid CH / QPSK



Band 4 / 3MHz / Mid CH / 16QAM



Band 4 / 3MHz / High CH / QPSK

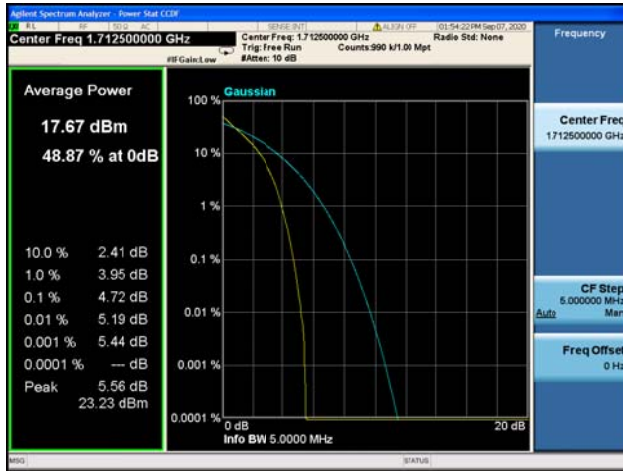


Band 4 / 3MHz / High CH / 16QAM

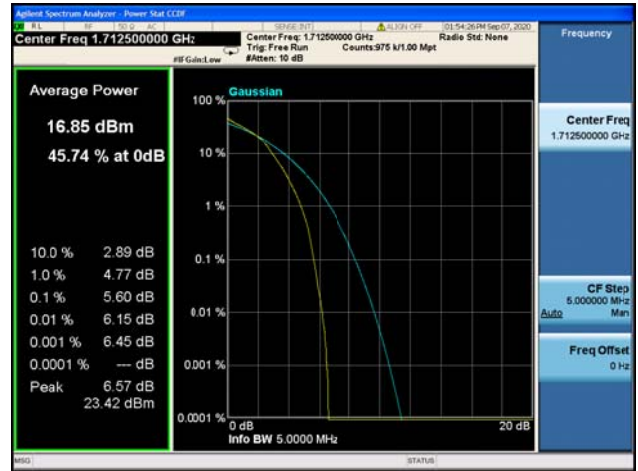




Band 4 / 5MHz / Low CH / QPSK



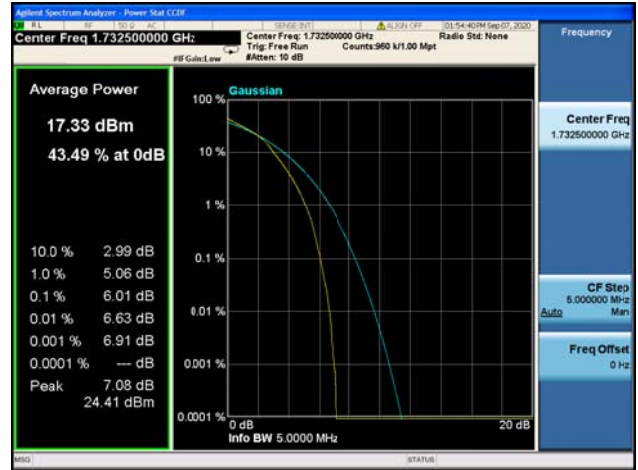
Band 4 / 5MHz / Low CH / 16QAM



Band 4 / 5MHz / Mid CH / QPSK



Band 4 / 5MHz / Mid CH / 16QAM



Band 4 / 5MHz / High CH / QPSK



Band 4 / 5MHz / High CH / 16QAM







Band 4 / 10MHz / Low CH / QPSK



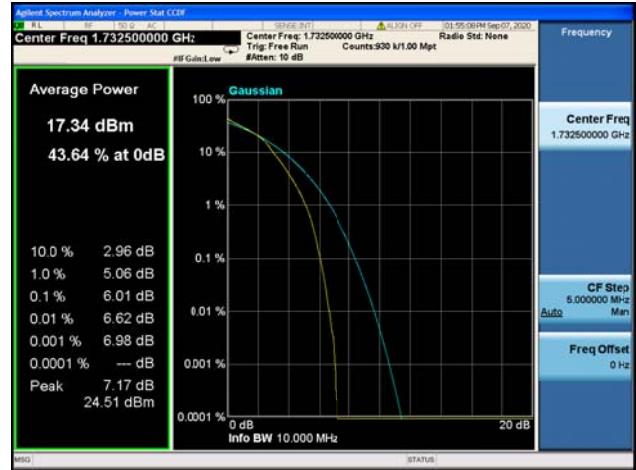
Band 4 / 10MHz / Low CH / 16QAM



Band 4 / 10MHz / Mid CH / QPSK



Band 4 / 10MHz / Mid CH / 16QAM



Band 4 / 10MHz / High CH / QPSK



Band 4 / 10MHz / High CH / 16QAM





Band 4 / 15MHz / Low CH / QPSK



Band 4 / 15MHz / Low CH / 16QAM



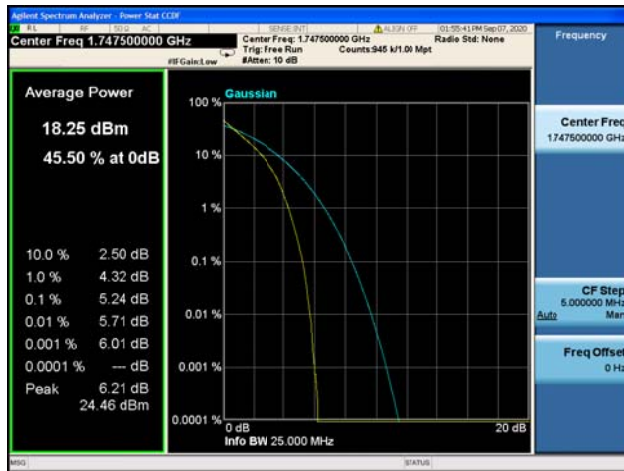
Band 4 / 15MHz / Mid CH / QPSK



Band 4 / 15MHz / Mid CH / 16QAM



Band 4 / 15MHz / High CH / QPSK



Band 4 / 15MHz / High CH / 16QAM

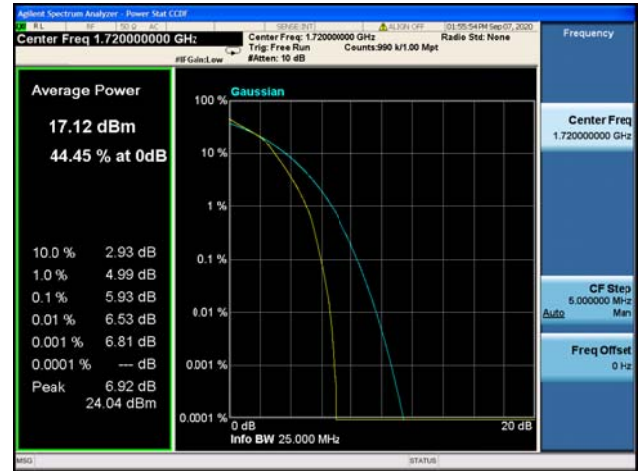




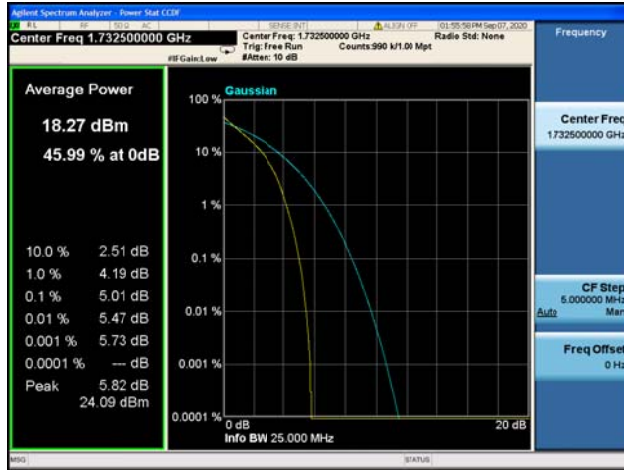
Band 4 / 20MHz / Low CH / QPSK



Band 4 / 20MHz / Low CH / 16QAM



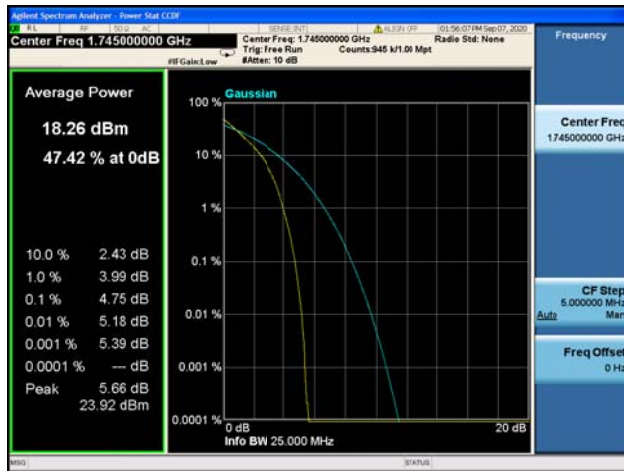
Band 4 / 20MHz / Mid CH / QPSK



Band 4 / 20MHz / Mid CH / 16QAM



Band 4 / 20MHz / High CH / QPSK



Band 4 / 20MHz / High CH / 16QAM

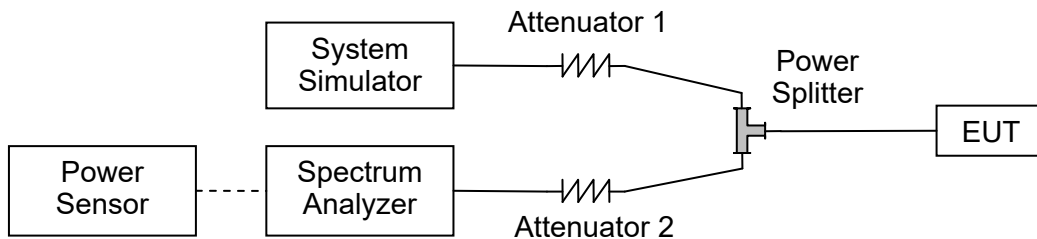


## 2.5. Conducted Spurious Emissions

### 2.5.1. Requirement

According to FCC section 2.1051, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43+10*\log(P)$ dB. This calculated to be -13dBm.

### 2.5.2. Test Description



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

### 2.5.3. Test procedure

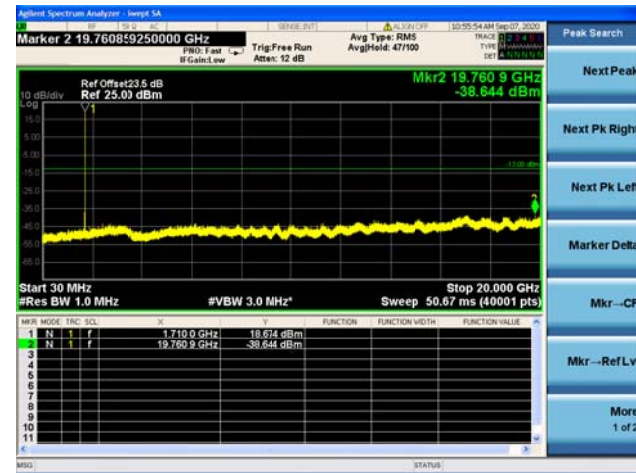
KDB 971168 D01v03 Section 6.0 and ANSI/TIA-603-E-2016.

### 2.5.4. Test Result

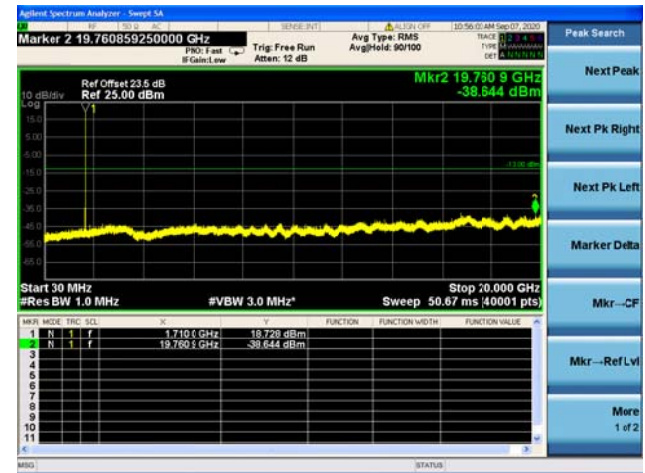




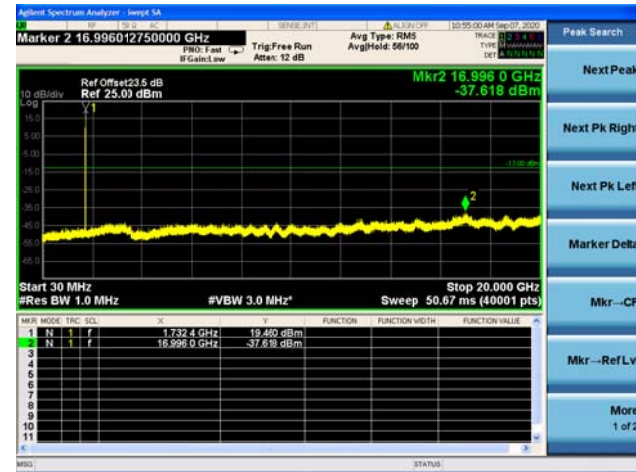
Band 4 / 1.4MHz / Low CH / QPSK



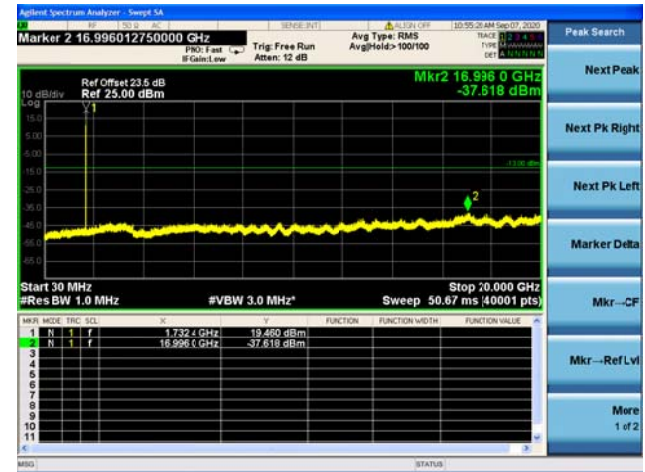
Band 4 / 1.4MHz / Low CH / 16QAM



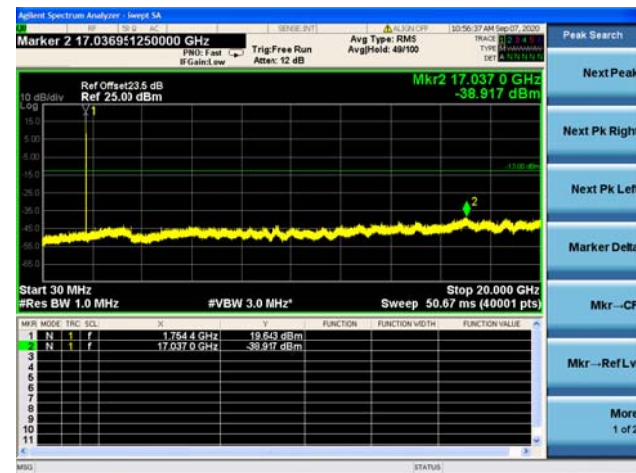
Band 4 / 1.4MHz / Mid CH / QPSK



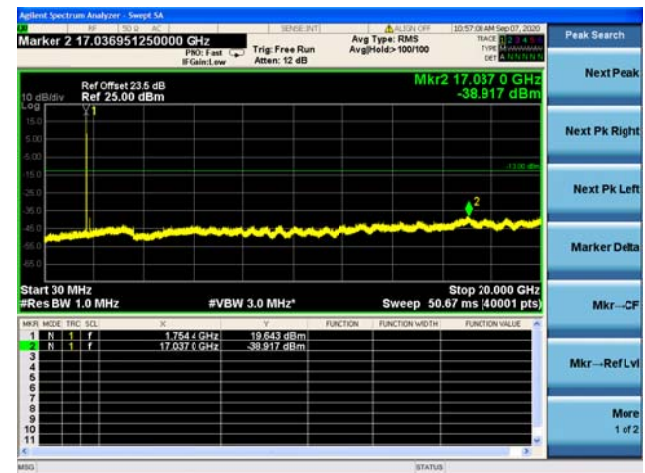
Band 4 / 1.4MHz / Mid CH / 16QAM



Band 4 / 1.4MHz / High CH / QPSK



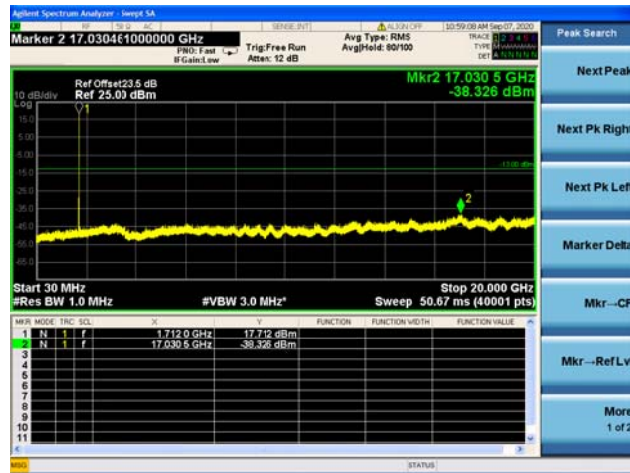
Band 4 / 1.4MHz / High CH / 16QAM



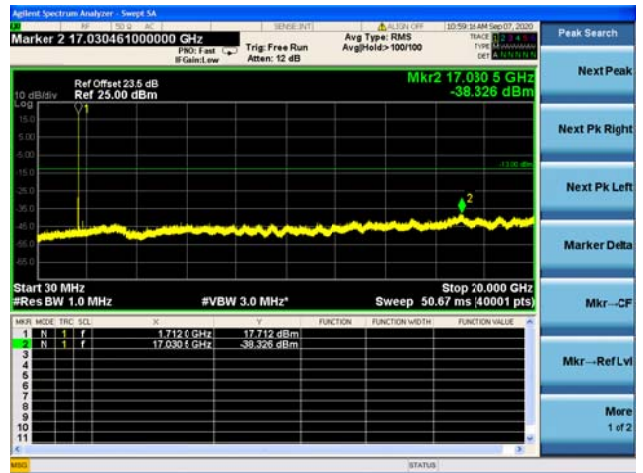




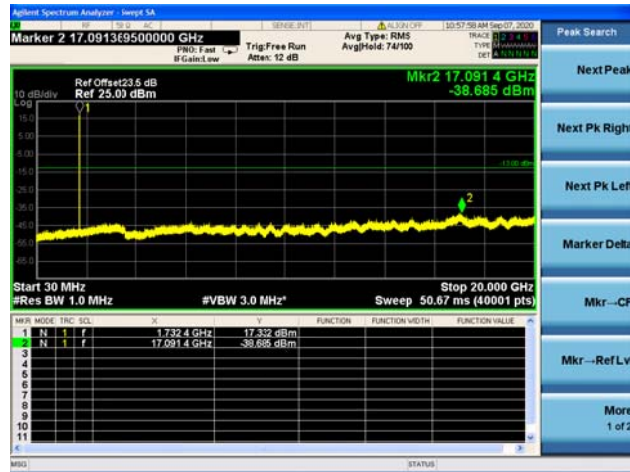
Band 4 / 3MHz / Low CH / QPSK



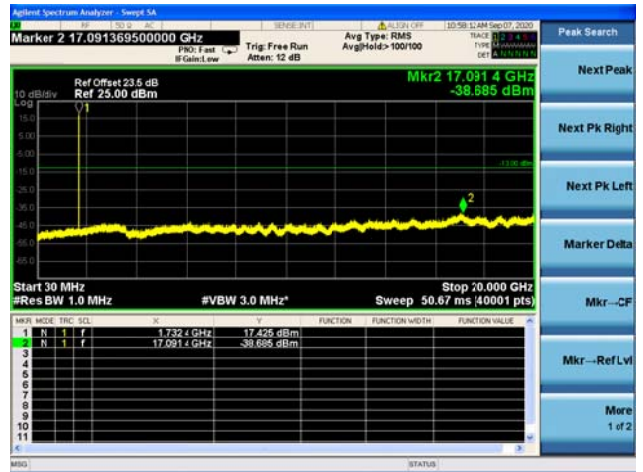
Band 4 / 3MHz / Low CH / 16QAM



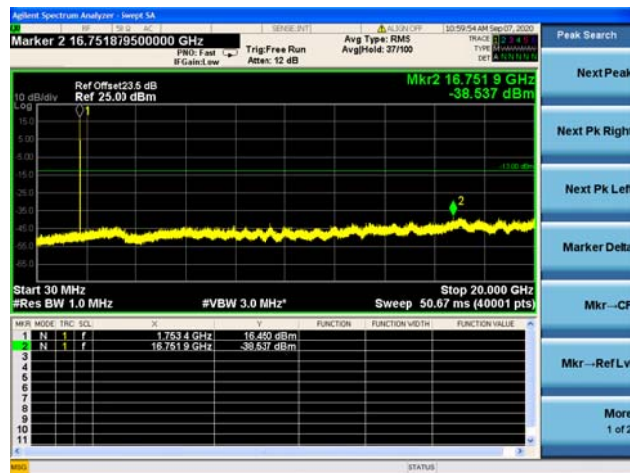
Band 4 / 3MHz / Mid CH / QPSK



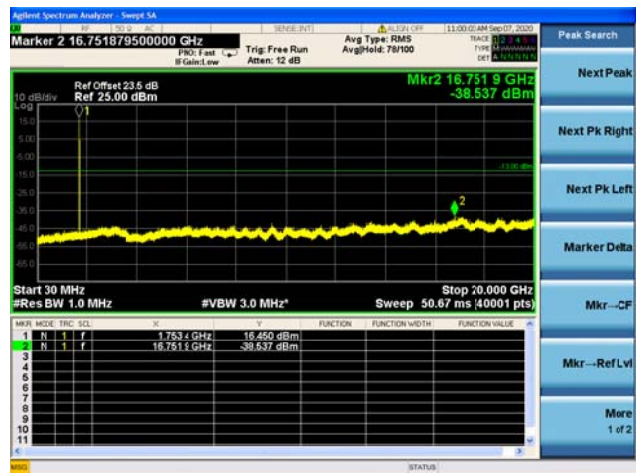
Band 4 / 3MHz / Mid CH / 16QAM



Band 4 / 3MHz / High CH / QPSK

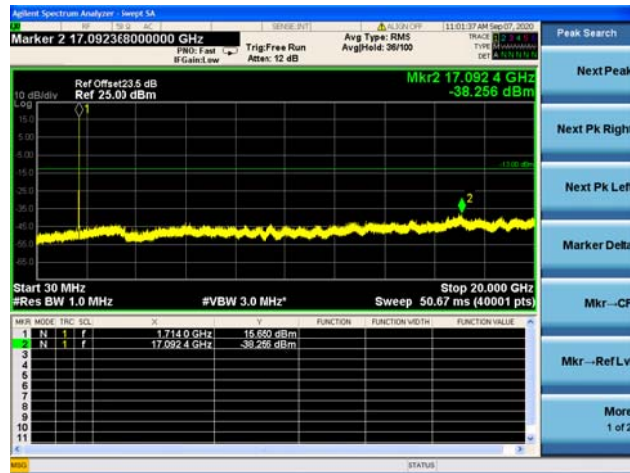


Band 4 / 3MHz / High CH / 16QAM

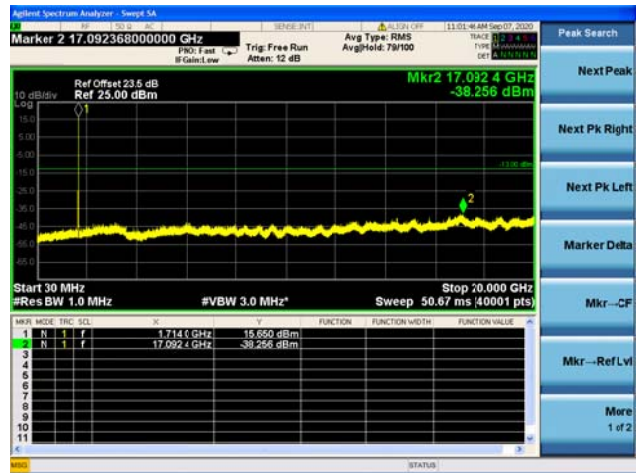




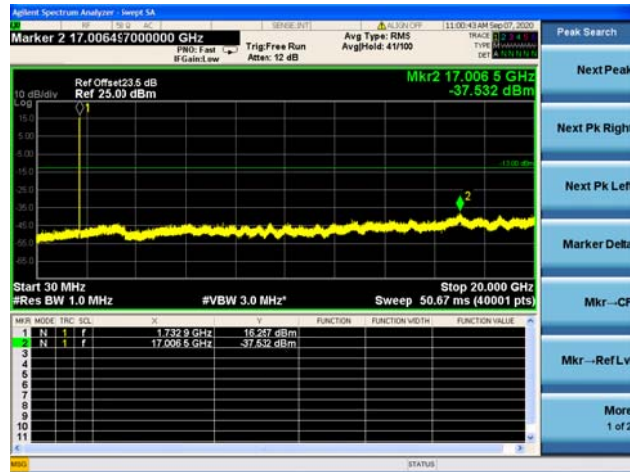
Band 4 / 5MHz / Low CH / QPSK



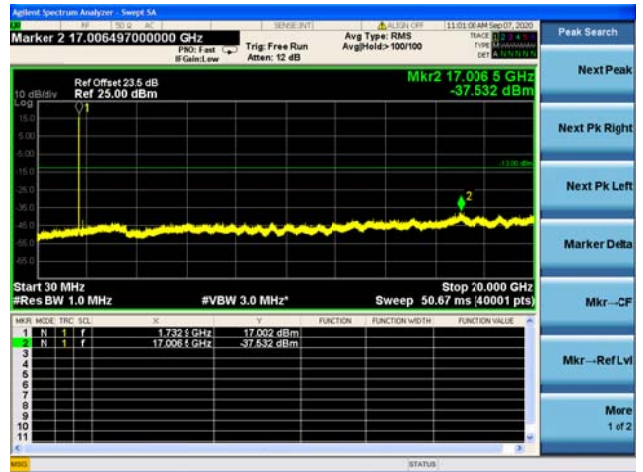
Band 4 / 5MHz / Low CH / 16QAM



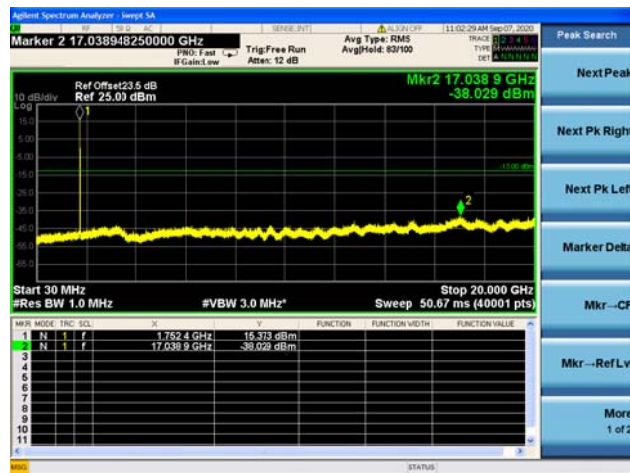
Band 4 / 5MHz / Mid CH / QPSK



Band 4 / 5MHz / Mid CH / 16QAM



Band 4 / 5MHz / High CH / QPSK



Band 4 / 5MHz / High CH / 16QAM

