TEST REPORT

APPLICANT	:	Borqs BeiJing Ltd.
PRODUCT NAME	:	Lively Mobile 2
MODEL NAME	:	GCR4
BRAND NAME	:	GreatCall
FCC ID	:	2ABDK-GCR4
STANDARD(S)	:	47 CFR Part 22, Subpart H 47 CFR Part 24, Subpart E 47 CFR Part 27, Subpart F&L
RECEIPT DATE	:	2018-09-29
TEST DATE	:	2018-10-28 to 2019-01-18
ISSUE DATE	:	2019-01-22

Edited by: Zeng Xiaoying (Rapporteur)

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Change History		
Version	**Date**	**Reason for change**
1.0	2019-01-22	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Borqs BeiJing Ltd.
Applicant Address:	Tower A, Building B23, Universal Business Park, No. 10 Jiuxianqiao Road, Chaoyang District Beijing, 100015 China
Manufacturer:	Borqs BeiJing Ltd.
Manufacturer Address:	Tower A, Building B23, Universal Business Park, No. 10 Jiuxianqiao Road, Chaoyang District Beijing, 100015 China

1.2. Equipment Under Test (EUT) Description

Product Name:	Lively Mobile 2	
Serial No:	(N/A, marked #1 by test site)	
Hardware Version:	DVT3	
Software Version:	054	
Modulation Type:	QPSK, 16QAM	
Operation Band:	Band 2 / 4 / 5 / 13	
Frequency Range:	LTE Band 2	Tx: 1850.7MHz -1909.3MHz
		Rx: 1930.7MHz -1989.3MHz
	LTE Band 4	Tx: 1710.7MHz -1754.3MHz
		Rx: 2110.7MHz - 2154.3MHz
	LTE Band 5	Tx: 824.7MHz -848.3MHz
		Rx: 869.7MHz – 893.3MHz
	LTE Band 13	Tx: 779.5MHz – 784.5MHz
		Rx: 748.5MHz – 753.5MHz
Channel Bandwidth	LTE Band 2	1.4MHz, 3 MHz, 5 MHz, 10MHz, 15 MHz, 20 MHz
	LTE Band 4	1.4MHz, 3 MHz, 5 MHz, 10MHz, 15 MHz, 20 MHz
	LTE Band 5	1.4MHz, 3 MHz, 5 MHz, 10MHz
	LTE Band 13	5 MHz, 10MHz

Antenna Type:	FPC Antenna	
Antenna Gain:	LTE Band 2	-0.2 dBi
	LTE Band 4	-0.5 dBi
	LTE Band 5	0.3 dBi
	LTE Band 13	0.7 dBi
Accessory Information:	Battery	
	Brand Name:	N/A
	Model No.:	ZWD553634V
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	930mAh
	Rated Voltage:	3.8V
	Charge Limit:	4.35V

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

1.3. Emission Designator

LTE B2	Emission Designator (99%OBW)	
BW(MHz)	QPSK	16QAM
1.4	1M11G7D	1M11W7D
3	2M71G7D	2M73W7D
5	4M52G7D	4M53W7D
10	9M00G7D	8M99W7D
15	13M6G7D	13M5W7D
20	18M0G7D	18M1W7D
LTE B4	**Emission Designator (99%OBW)**	
BW(MHz)	QPSK	16QAM
1.4	1M10G7D	1M10W7D
3	2M70G7D	2M71W7D
5	4M52G7D	4M52W7D
10	9M00G7D	9M00W7D
15	13M5G7D	13M5W7D
20	18M0G7D	18M1W7D
LTE B5	**Emission Designator (99%OBW)**	
BW(MHz)	QPSK	16QAM
1.4	1M10G7D	1M10W7D
3	2M69G7D	2M68W7D
5	4M51G7D	4M54W7D
10	9M05G7D	9M07W7D
LTE B13	**Emission Designator (99%OBW)**	
BW(MHz)	QPSK	16QAM
5	4M53G7D	4M52W7D
10	9M00G7D	9M01W7D

1.4. Test Standards and Results

The objective of the report is to perform testing according to Part 2, Part 22, 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 22	Public Mobile Services
3	47 CFR Part 24	Personal Communications Services
4	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
2.1046, 22.913(a)(2), 24.232(c), 27.50(b)(10), 27.50(h)(2)	Transmitter Conducted Output Power and ERP/EIRP	Oct 29, 2018 Jan 18, 2019	Tu Ya'nan Wang Dalong	PASS
2.1049	Occupied Bandwidth	Oct 29, 2018	Tu Ya'nan	PASS
2.1055, 22.355, 24.235, 27.54	Frequency Stability	Oct 29, 2018	Tu Ya'nan	PASS
24.232(d), 27.50(d)(5)	Peak to Average Radio	Oct 29, 2018	Tu Ya'nan	PASS
2.1051, 22.917(a), 24.238, 27.53(h), 27.53(c)(2)	Conducted Spurious Emissions	Oct 29, 2018	Tu Ya'nan	PASS
2.1051, 22.917(a), 24.238, 27.53(h), 27.53(c)(2)	Band Edge	Oct 29, 2018	Tu Ya'nan	PASS
2.1051, 22.917(a), 24.238, 27.53(h), 27.53(c)(2)(4)	Radiated Spurious Emissions	Jan 18, 2019	Wang Dalong	PASS

Note 1: The tests were performed according to the method of measurements prescribed in KDB971168 D01 v03 (Oct 27, 2017) and ANSI C63.26 2015.

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 17.5dB contains three parts that cable loss 3.5dB, power splitter 4dB and Attenuator 10dB.

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 22H, Part 24E and 27F&L Requirements

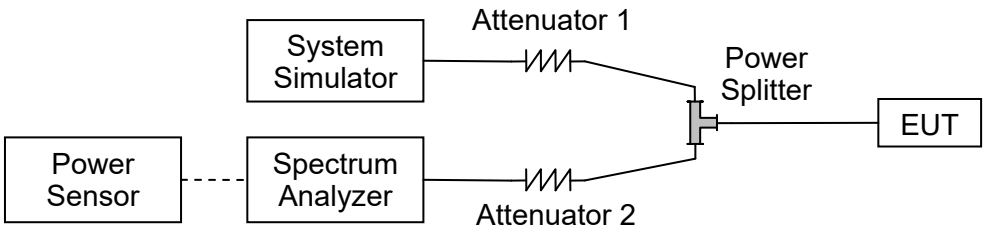
2.1. Transmitter Conducted Output Power And ERP/EIRP

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.
According to FCC section22.913 (a.2) for LTE Band 5, the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.
According to FCC section 27.50 (b) for LTE Band 13, 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.

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) = EIRP (dBm) - 2.15

2.1.4. Result

Transmitter Conducted Output Power

LTE Band2						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				18700	18900	19100
Frequency (MHz)				1860	1880	1900
20	QPSK	1	0	21.28	21.24	21.26
20	QPSK	1	49	21.48	21.58	21.57
20	QPSK	1	99	21.12	21.10	21.39
20	QPSK	50	0	20.53	20.33	20.46
20	QPSK	50	24	20.6	20.42	20.36
20	QPSK	50	50	20.37	20.34	20.5
20	QPSK	100	0	20.61	20.31	20.43
20	16QAM	1	0	20.29	19.67	20.14
20	16QAM	1	49	20.66	20.72	20.55
20	16QAM	1	99	20.09	19.67	20.40
20	16QAM	50	0	19.49	19.46	19.36
20	16QAM	50	24	19.53	19.54	19.44
20	16QAM	50	50	19.51	19.39	19.56
20	16QAM	100	0	19.61	19.37	19.37
Channel				18675	18900	19125
Frequency (MHz)				1857.5	1880	1902.5
15	QPSK	1	0	21.28	20.74	20.94
15	QPSK	1	37	21.60	21.42	21.60
15	QPSK	1	74	21.10	21.06	21.44
15	QPSK	36	0	20.32	20.43	20.39
15	QPSK	36	20	20.43	20.33	20.47
15	QPSK	36	39	20.26	20.35	20.43
15	QPSK	75	0	20.33	20.41	20.37
15	16QAM	1	0	20.27	20.19	20.38
15	16QAM	1	37	20.79	20.15	20.57
15	16QAM	1	74	20.06	19.87	20.59
15	16QAM	36	0	19.42	19.27	19.33
15	16QAM	36	20	19.34	19.36	19.59
15	16QAM	36	39	19.35	19.37	19.58
15	16QAM	75	0	19.28	19.40	19.45

LTE Band2						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				18650	18900	19150
Frequency (MHz)				1855	1880	1905
10	QPSK	1	0	21.18	21.07	20.96
10	QPSK	1	25	21.33	21.52	21.68
10	QPSK	1	49	21.12	20.89	21.35
10	QPSK	25	0	20.23	20.21	20.45
10	QPSK	25	12	20.24	20.24	20.44
10	QPSK	25	25	20.25	20.27	20.47
10	QPSK	50	0	20.35	20.29	20.40
10	16QAM	1	0	19.69	20.49	20.27
10	16QAM	1	25	20.39	20.49	20.73
10	16QAM	1	49	20.27	19.76	20.25
10	16QAM	25	0	19.42	19.36	19.54
10	16QAM	25	12	19.57	19.31	19.58
10	16QAM	25	25	19.48	19.22	19.56
10	16QAM	50	0	19.30	19.41	19.43
Channel				18625	18900	19175
Frequency (MHz)				1852.5	1880	1907.5
5	QPSK	1	0	21.20	21.17	21.15
5	QPSK	1	12	21.19	21.20	21.42
5	QPSK	1	24	21.22	21.22	21.11
5	QPSK	12	0	20.25	20.24	20.44
5	QPSK	12	7	20.29	20.30	20.53
5	QPSK	12	13	20.30	20.28	20.49
5	QPSK	25	0	20.35	20.32	20.45
5	16QAM	1	0	19.91	20.20	19.94
5	16QAM	1	12	19.89	19.82	20.78
5	16QAM	1	24	19.93	20.27	20.22
5	16QAM	12	0	19.41	19.26	19.59
5	16QAM	12	7	19.24	19.37	19.63
5	16QAM	12	13	19.16	19.35	19.68
5	16QAM	25	0	19.27	19.49	19.65

LTE Band2						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				18615	18900	19185
Frequency (MHz)				1851.5	1880	1908.5
3	QPSK	1	0	21.40	21.17	21.37
3	QPSK	1	8	21.35	21.37	21.55
3	QPSK	1	14	21.45	21.41	21.17
3	QPSK	8	0	20.36	20.36	20.38
3	QPSK	8	4	20.35	20.37	20.59
3	QPSK	8	7	20.30	20.31	20.41
3	QPSK	15	0	20.30	20.30	20.43
3	16QAM	1	0	20.49	20.03	20.25
3	16QAM	1	8	20.48	19.96	20.24
3	16QAM	1	14	20.42	20.01	20.28
3	16QAM	8	0	19.51	19.46	19.85
3	16QAM	8	4	19.43	19.23	19.41
3	16QAM	8	7	19.49	19.39	19.74
3	16QAM	15	0	19.49	19.23	19.47
Channel				18607	18900	19193
Frequency (MHz)				1850.7	1880	1909.3
1.4	QPSK	1	0	21.30	21.19	21.44
1.4	QPSK	1	3	21.35	21.11	21.43
1.4	QPSK	1	5	21.28	21.03	21.33
1.4	QPSK	3	0	21.40	21.21	21.42
1.4	QPSK	3	1	21.42	21.47	21.58
1.4	QPSK	3	3	21.41	21.42	21.44
1.4	QPSK	6	0	20.35	20.19	20.55
1.4	16QAM	1	0	20.40	20.03	20.51
1.4	16QAM	1	3	20.26	20.28	20.50
1.4	16QAM	1	5	20.00	20.11	20.54
1.4	16QAM	3	0	20.28	20.21	20.46
1.4	16QAM	3	1	20.17	20.35	20.45
1.4	16QAM	3	3	20.24	20.32	20.36
1.4	16QAM	6	0	19.35	19.35	19.50

LTE Band4						
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	19.77	20.21	20.19
20	QPSK	1	49	20.54	20.58	20.61
20	QPSK	1	99	19.89	20.39	19.73
20	QPSK	50	0	19.34	19.11	19.48
20	QPSK	50	24	19.42	19.24	19.44
20	QPSK	50	50	19.20	19.31	19.04
20	QPSK	100	0	19.43	19.29	19.43
20	16QAM	1	0	19.21	19.40	19.13
20	16QAM	1	49	19.08	19.08	18.95
20	16QAM	1	99	18.63	19.11	18.97
20	16QAM	50	0	18.47	18.26	18.63
20	16QAM	50	24	18.47	18.43	18.53
20	16QAM	50	50	18.27	18.42	18.04
20	16QAM	100	0	18.34	18.38	18.40
Channel				20025	20175	20325
Frequency (MHz)				1717.5	1732.5	1747.5
15	QPSK	1	0	19.98	20.00	20.32
15	QPSK	1	37	20.25	20.31	20.42
15	QPSK	1	74	19.95	20.33	19.89
15	QPSK	36	0	19.35	19.13	19.46
15	QPSK	36	20	19.32	19.29	19.23
15	QPSK	36	39	19.37	19.29	19.04
15	QPSK	75	0	19.42	19.27	19.18
15	16QAM	1	0	18.91	18.69	19.54
15	16QAM	1	37	19.71	19.59	19.01
15	16QAM	1	74	18.38	19.40	18.66
15	16QAM	36	0	18.39	18.18	18.44
15	16QAM	36	20	18.34	18.36	18.32
15	16QAM	36	39	18.26	18.32	18.05
15	16QAM	75	0	18.52	18.47	18.26

LTE Band4						
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	19.90	19.83	20.16
10	QPSK	1	25	20.19	20.37	19.87
10	QPSK	1	49	20.13	20.10	19.77
10	QPSK	25	0	19.32	19.20	19.33
10	QPSK	25	12	19.35	19.19	19.03
10	QPSK	25	25	19.19	19.27	19.04
10	QPSK	50	0	19.26	19.24	19.01
10	16QAM	1	0	18.87	18.50	19.60
10	16QAM	1	25	19.41	19.48	19.47
10	16QAM	1	49	18.98	19.15	18.63
10	16QAM	25	0	18.39	18.23	18.50
10	16QAM	25	12	18.50	18.48	18.22
10	16QAM	25	25	18.44	18.33	18.19
10	16QAM	50	0	18.39	18.34	18.14
Channel				19975	20175	20375
Frequency (MHz)				1712.5	1732.5	1752.5
5	QPSK	1	0	19.94	19.95	20.17
5	QPSK	1	12	20.58	20.40	20.05
5	QPSK	1	24	20.09	20.17	19.71
5	QPSK	12	0	19.03	19.22	19.18
5	QPSK	12	7	19.24	19.39	19.00
5	QPSK	12	13	19.27	19.35	19.04
5	QPSK	25	0	19.13	19.30	19.01
5	16QAM	1	0	18.96	19.07	19.10
5	16QAM	1	12	19.02	19.66	18.99
5	16QAM	1	24	18.78	19.26	18.97
5	16QAM	12	0	18.26	18.38	18.18
5	16QAM	12	7	18.34	18.33	17.89
5	16QAM	12	13	18.49	18.47	17.99
5	16QAM	25	0	18.47	18.63	18.04

LTE Band4						
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	20.13	20.02	19.85
3	QPSK	1	8	20.25	20.23	19.71
3	QPSK	1	14	20.2	20.19	19.74
3	QPSK	8	0	19.22	19.28	18.96
3	QPSK	8	4	19.35	19.44	18.92
3	QPSK	8	7	19.4	19.23	18.86
3	QPSK	15	0	19.28	19.32	18.97
3	16QAM	1	0	19.35	19.17	18.66
3	16QAM	1	8	18.61	19.16	19.15
3	16QAM	1	14	19.25	19.45	18.88
3	16QAM	8	0	18.42	18.43	17.74
3	16QAM	8	4	18.31	18.39	17.96
3	16QAM	8	7	18.43	18.39	17.95
3	16QAM	15	0	18.24	18.27	17.76
Channel				19957	20175	20393
Frequency (MHz)				1710.7	1732.5	1754.3
1.4	QPSK	1	0	20.10	20.15	19.92
1.4	QPSK	1	3	20.18	20.26	19.90
1.4	QPSK	1	5	20.23	20.19	19.80
1.4	QPSK	3	0	20.13	20.25	19.90
1.4	QPSK	3	1	20.56	20.37	19.96
1.4	QPSK	3	3	20.36	20.13	19.95
1.4	QPSK	6	0	19.26	19.25	18.95
1.4	16QAM	1	0	19.25	19.10	18.78
1.4	16QAM	1	3	19.50	18.95	18.66
1.4	16QAM	1	5	18.93	19.33	19.08
1.4	16QAM	3	0	19.49	19.16	18.97
1.4	16QAM	3	1	19.19	19.32	19.01
1.4	16QAM	3	3	19.49	19.23	18.88
1.4	16QAM	6	0	18.17	18.19	18.14

LTE Band5						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				20450	20525	20600
Frequency (MHz)				829	836.5	844
10	QPSK	1	0	21.01	20.71	20.95
10	QPSK	1	25	21.43	21.43	21.31
10	QPSK	1	49	20.96	21.19	20.92
10	QPSK	25	0	20.39	20.37	20.35
10	QPSK	25	12	20.17	20.41	20.20
10	QPSK	25	25	20.18	20.35	20.16
10	QPSK	50	0	20.22	20.28	20.16
10	16QAM	1	0	20.17	19.75	19.88
10	16QAM	1	25	20.44	20.49	20.49
10	16QAM	1	49	19.72	19.96	19.95
10	16QAM	25	0	19.27	19.25	19.48
10	16QAM	25	12	19.20	19.32	19.45
10	16QAM	25	25	19.16	19.47	19.25
10	16QAM	50	0	19.44	19.34	19.29
Channel				20425	20525	20625
Frequency (MHz)				826.5	836.5	846.5
5	QPSK	1	0	20.30	20.28	20.49
5	QPSK	1	12	20.35	20.32	20.45
5	QPSK	1	24	19.91	20.20	19.94
5	QPSK	12	0	19.89	19.82	20.78
5	QPSK	12	7	19.93	20.27	20.22
5	QPSK	12	13	19.41	19.26	19.59
5	QPSK	25	0	19.24	19.37	19.63
5	16QAM	1	0	19.16	19.35	19.68
5	16QAM	1	12	19.27	19.49	19.65
5	16QAM	1	24	20.18	20.36	20.31
5	16QAM	12	0	20.04	20.24	20.33
5	16QAM	12	7	19.89	20.11	20.45
5	16QAM	12	13	19.60	19.46	19.52
5	16QAM	25	0	19.46	19.32	19.70

LTE Band5						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				20415	20525	20635
Frequency (MHz)				825.5	836.5	847.5
3	QPSK	1	0	20.75	20.70	20.51
3	QPSK	1	8	20.74	20.45	20.45
3	QPSK	1	14	20.45	20.74	20.56
3	QPSK	8	0	20.25	20.02	20.14
3	QPSK	8	4	20.16	20.05	20.19
3	QPSK	8	7	20.91	20.58	20.20
3	QPSK	15	0	20.91	20.69	20.25
3	16QAM	1	0	20.44	20.87	20.83
3	16QAM	1	8	20.41	20.54	20.62
3	16QAM	1	14	20.39	20.62	20.80
3	16QAM	8	0	20.86	20.54	20.75
3	16QAM	8	4	20.87	20.64	20.68
3	16QAM	8	7	20.91	20.66	20.61
3	16QAM	15	0	20.91	20.55	20.43
Channel				20407	20525	20643
Frequency (MHz)				824.7	836.5	848.3
1.4	QPSK	1	0	20.79	20.59	20.48
1.4	QPSK	1	3	21.06	21.11	21.02
1.4	QPSK	1	5	20.98	20.63	21.02
1.4	QPSK	3	0	21.05	20.85	20.85
1.4	QPSK	3	1	20.26	20.71	20.43
1.4	QPSK	3	3	20.28	20.59	21.07
1.4	QPSK	6	0	21.00	21.01	21.06
1.4	16QAM	1	0	20.80	21.09	20.57
1.4	16QAM	1	3	20.98	20.67	20.43
1.4	16QAM	1	5	20.86	20.63	20.37
1.4	16QAM	3	0	20.88	20.65	20.38
1.4	16QAM	3	1	20.85	20.75	21.10
1.4	16QAM	3	3	20.78	20.72	21.03
1.4	16QAM	6	0	20.80	20.59	20.60

LTE Band13						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				/	23230	/
Frequency (MHz)				/	782	/
10	QPSK	1	0	/	23.46	/
10	QPSK	1	25	/	24.02	/
10	QPSK	1	49	/	23.31	/
10	QPSK	25	0	/	22.69	/
10	QPSK	25	12	/	22.76	/
10	QPSK	25	25	/	22.81	/
10	QPSK	50	0	/	22.80	/
10	16QAM	1	0	/	22.20	/
10	16QAM	1	25	/	22.53	/
10	16QAM	1	49	/	22.75	/
10	16QAM	25	0	/	21.80	/
10	16QAM	25	12	/	21.74	/
10	16QAM	25	25	/	21.80	/
10	16QAM	50	0	/	21.83	/
Channel				23205	23230	23255
Frequency (MHz)				779.5	782	784.5
5	QPSK	1	0	23.69	23.11	23.96
5	QPSK	1	12	23.97	24.11	23.80
5	QPSK	1	24	23.60	23.54	23.47
5	QPSK	12	0	22.57	22.84	22.89
5	QPSK	12	7	22.89	23.02	22.75
5	QPSK	12	13	22.80	22.92	22.74
5	QPSK	25	0	22.74	22.96	22.74
5	16QAM	1	0	22.46	22.16	22.47
5	16QAM	1	12	22.57	22.97	22.61
5	16QAM	1	24	22.26	22.55	22.21
5	16QAM	12	0	21.59	21.78	21.94
5	16QAM	12	7	21.86	22.06	21.80
5	16QAM	12	13	21.96	21.78	21.68
5	16QAM	25	0	22.11	21.86	21.87

Effective Radiated Power and Effective Isotropic Radiated Power

LTE Band2				**Measured EIRP**		
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.
Channel				18700	18900	19100
Frequency (MHz)				1860	1880	1900
20	QPSK	1	0	21.08	21.04	21.06
20	QPSK	1	49	21.28	**21.38**	21.37
20	QPSK	1	99	20.92	20.90	21.19
20	QPSK	50	0	20.33	20.13	20.26
20	QPSK	50	24	20.40	20.22	20.16
20	QPSK	50	50	20.17	20.14	20.30
20	QPSK	100	0	20.41	20.11	20.23
20	16QAM	1	0	20.09	19.47	19.94
20	16QAM	1	49	20.46	20.52	20.35
20	16QAM	1	99	19.89	19.47	20.2
20	16QAM	50	0	19.29	19.26	19.16
20	16QAM	50	24	19.33	19.34	19.24
20	16QAM	50	50	19.31	19.19	19.36
20	16QAM	100	0	19.41	19.17	19.17
Channel				18675	18900	19125
Frequency (MHz)				1857.5	1880	1902.5
15	QPSK	1	0	21.08	20.54	20.74
15	QPSK	1	37	21.40	**21.22**	21.40
15	QPSK	1	74	20.90	20.86	21.24
15	QPSK	36	0	20.12	20.23	20.19
15	QPSK	36	20	20.23	20.13	20.27
15	QPSK	36	39	20.06	20.15	20.23
15	QPSK	75	0	20.13	20.21	20.17
15	16QAM	1	0	20.07	19.99	20.18
15	16QAM	1	37	20.59	19.95	20.37
15	16QAM	1	74	19.86	19.67	20.39
15	16QAM	36	0	19.22	19.07	19.13
15	16QAM	36	20	19.14	19.16	19.39
15	16QAM	36	39	19.15	19.17	19.38
15	16QAM	75	0	19.08	19.20	19.25

LTE Band2				Measured EIRP		
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.
Channel				18650	18900	19150
Frequency (MHz)				1855	1880	1905
10	QPSK	1	0	20.98	20.87	20.76
10	QPSK	1	25	21.13	21.32	**21.48**
10	QPSK	1	49	20.92	20.69	21.15
10	QPSK	25	0	20.03	20.01	20.25
10	QPSK	25	12	20.04	20.04	20.24
10	QPSK	25	25	20.05	20.07	20.27
10	QPSK	50	0	20.15	20.09	20.20
10	16QAM	1	0	19.49	20.29	20.07
10	16QAM	1	25	20.19	20.29	20.53
10	16QAM	1	49	20.07	19.56	20.05
10	16QAM	25	0	19.22	19.16	19.34
10	16QAM	25	12	19.37	19.11	19.38
10	16QAM	25	25	19.28	19.02	19.36
10	16QAM	50	0	19.10	19.21	19.23
Channel				18625	18900	19175
Frequency (MHz)				1852.5	1880	1907.5
5	QPSK	1	0	21.00	20.97	20.95
5	QPSK	1	12	20.99	21.00	**21.22**
5	QPSK	1	24	21.02	21.02	20.91
5	QPSK	12	0	20.05	20.04	20.24
5	QPSK	12	7	20.09	20.10	20.33
5	QPSK	12	13	20.10	20.08	20.29
5	QPSK	25	0	20.15	20.12	20.25
5	16QAM	1	0	19.71	20.00	19.74
5	16QAM	1	12	19.69	19.62	20.58
5	16QAM	1	24	19.73	20.07	20.02
5	16QAM	12	0	19.21	19.06	19.39
5	16QAM	12	7	19.04	19.17	19.43
5	16QAM	12	13	18.96	19.15	19.48
5	16QAM	25	0	19.07	19.29	19.45

LTE Band2				Measured EIRP		
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.
Channel				18615	18900	19185
Frequency (MHz)				1851.5	1880	1908.5
3	QPSK	1	0	21.20	20.97	21.17
3	QPSK	1	8	21.15	21.17	**21.35**
3	QPSK	1	14	21.25	21.21	20.97
3	QPSK	8	0	20.16	20.16	20.18
3	QPSK	8	4	20.15	20.17	20.39
3	QPSK	8	7	20.10	20.11	20.21
3	QPSK	15	0	20.10	20.10	20.23
3	16QAM	1	0	20.29	19.83	20.05
3	16QAM	1	8	20.28	19.76	20.04
3	16QAM	1	14	20.22	19.81	20.08
3	16QAM	8	0	19.31	19.26	19.65
3	16QAM	8	4	19.23	19.03	19.21
3	16QAM	8	7	19.29	19.19	19.54
3	16QAM	15	0	19.29	19.03	19.27
Channel				18607	18900	19193
Frequency (MHz)				1850.7	1880	1909.3
1.4	QPSK	1	0	21.10	20.99	21.24
1.4	QPSK	1	3	21.15	20.91	21.23
1.4	QPSK	1	5	21.08	20.83	21.13
1.4	QPSK	3	0	21.20	21.01	21.22
1.4	QPSK	3	1	21.22	21.27	**21.38**
1.4	QPSK	3	3	21.21	21.22	21.24
1.4	QPSK	6	0	20.15	19.99	20.35
1.4	16QAM	1	0	20.20	19.83	20.31
1.4	16QAM	1	3	20.06	20.08	20.30
1.4	16QAM	1	5	19.80	19.91	20.34
1.4	16QAM	3	0	20.08	20.01	20.26
1.4	16QAM	3	1	19.97	20.15	20.25
1.4	16QAM	3	3	20.04	20.12	20.16
1.4	16QAM	6	0	19.15	19.15	19.30

LTE Band4				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
20	QPSK	1	0	19.27	19.71	19.69
20	QPSK	1	49	19.94	19.97	**20.11**
20	QPSK	1	99	19.39	19.89	19.23
20	QPSK	50	0	18.84	18.61	18.98
20	QPSK	50	24	18.92	18.74	18.94
20	QPSK	50	50	18.70	18.81	18.54
20	QPSK	100	0	18.93	18.79	18.93
20	16QAM	1	0	18.71	18.9	18.63
20	16QAM	1	49	18.58	18.58	18.45
20	16QAM	1	99	18.13	18.61	18.47
20	16QAM	50	0	17.97	17.76	18.13
20	16QAM	50	24	17.97	17.93	18.03
20	16QAM	50	50	17.77	17.92	17.54
20	16QAM	100	0	17.84	17.88	17.90
Channel				20025	20175	20325
Frequency (MHz)				1717.5	1732.5	1747.5
15	QPSK	1	0	18.98	19.50	19.82
15	QPSK	1	37	19.25	19.81	**19.92**
15	QPSK	1	74	18.95	19.83	19.39
15	QPSK	36	0	18.35	18.63	18.96
15	QPSK	36	20	18.32	18.79	18.73
15	QPSK	36	39	18.37	18.79	18.54
15	QPSK	75	0	18.42	18.77	18.68
15	16QAM	1	0	17.91	18.19	19.04
15	16QAM	1	37	18.71	19.09	18.51
15	16QAM	1	74	17.38	18.9	18.16
15	16QAM	36	0	17.39	17.68	17.94
15	16QAM	36	20	17.34	17.86	17.82
15	16QAM	36	39	17.26	17.82	17.55
15	16QAM	75	0	17.52	17.97	17.76

LTE Band4				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
10	QPSK	1	0	19.40	19.33	19.66
10	QPSK	1	25	19.69	**19.87**	19.37
10	QPSK	1	49	19.63	19.60	19.27
10	QPSK	25	0	18.82	18.70	18.83
10	QPSK	25	12	18.85	18.69	18.53
10	QPSK	25	25	18.69	18.77	18.54
10	QPSK	50	0	18.76	18.74	18.51
10	16QAM	1	0	18.37	18.00	19.10
10	16QAM	1	25	18.91	18.98	18.97
10	16QAM	1	49	18.48	18.65	18.13
10	16QAM	25	0	17.89	17.73	18.00
10	16QAM	25	12	18.00	17.98	17.72
10	16QAM	25	25	17.94	17.83	17.69
10	16QAM	50	0	17.89	17.84	17.64
Channel				19975	20175	20375
Frequency (MHz)				1712.5	1732.5	1752.5
5	QPSK	1	0	19.44	19.45	19.67
5	QPSK	1	12	**20.08**	19.90	19.55
5	QPSK	1	24	19.59	19.67	19.21
5	QPSK	12	0	18.53	18.72	18.68
5	QPSK	12	7	18.74	18.89	18.50
5	QPSK	12	13	18.77	18.85	18.54
5	QPSK	25	0	18.63	18.8	18.51
5	16QAM	1	0	18.46	18.57	18.60
5	16QAM	1	12	18.52	19.16	18.49
5	16QAM	1	24	18.28	18.76	18.47
5	16QAM	12	0	17.76	17.88	17.68
5	16QAM	12	7	17.84	17.83	17.39
5	16QAM	12	13	17.99	17.97	17.49
5	16QAM	25	0	17.97	18.13	17.54

LTE Band4				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
3	QPSK	1	0	19.63	19.52	19.35
3	QPSK	1	8	**19.75**	19.73	19.21
3	QPSK	1	14	19.70	19.69	19.24
3	QPSK	8	0	18.72	18.78	18.46
3	QPSK	8	4	18.85	18.94	18.42
3	QPSK	8	7	18.90	18.73	18.36
3	QPSK	15	0	18.78	18.82	18.47
3	16QAM	1	0	18.85	18.67	18.16
3	16QAM	1	8	18.11	18.66	18.65
3	16QAM	1	14	18.75	18.95	18.38
3	16QAM	8	0	17.92	17.93	17.24
3	16QAM	8	4	17.81	17.89	17.46
3	16QAM	8	7	17.93	17.89	17.45
3	16QAM	15	0	17.74	17.77	17.26
Channel				19957	20175	20393
Frequency (MHz)				1710.7	1732.5	1754.3
1.4	QPSK	1	0	19.60	19.65	19.42
1.4	QPSK	1	3	19.68	19.76	19.40
1.4	QPSK	1	5	19.73	19.69	19.30
1.4	QPSK	3	0	19.63	19.75	19.40
1.4	QPSK	3	1	20.06	**19.87**	19.46
1.4	QPSK	3	3	19.86	19.63	19.45
1.4	QPSK	6	0	18.76	18.75	18.45
1.4	16QAM	1	0	18.75	18.60	18.28
1.4	16QAM	1	3	19.00	18.45	18.16
1.4	16QAM	1	5	18.43	18.83	18.58
1.4	16QAM	3	0	18.99	18.66	18.47
1.4	16QAM	3	1	18.69	18.82	18.51
1.4	16QAM	3	3	18.99	18.73	18.38
1.4	16QAM	6	0	17.67	17.69	17.64

LTE Band5				Measured ERP		
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.
Channel				20450	20525	20600
Frequency (MHz)				829	836.5	844
10	QPSK	1	0	19.16	18.86	19.1
10	QPSK	1	25	19.28	**19.58**	19.46
10	QPSK	1	49	19.11	19.34	19.07
10	QPSK	25	0	18.54	18.52	18.50
10	QPSK	25	12	18.32	18.56	18.35
10	QPSK	25	25	18.33	18.50	18.31
10	QPSK	50	0	18.37	18.43	18.31
10	16QAM	1	0	18.32	17.90	18.03
10	16QAM	1	25	18.59	18.64	18.64
10	16QAM	1	49	17.87	18.11	18.10
10	16QAM	25	0	17.42	17.4	17.63
10	16QAM	25	12	17.35	17.47	17.6
10	16QAM	25	25	17.31	17.62	17.4
10	16QAM	50	0	17.59	17.49	17.44
Channel				20425	20525	20625
Frequency (MHz)				826.5	836.5	846.5
5	QPSK	1	0	18.45	18.43	18.64
5	QPSK	1	12	18.50	18.47	18.60
5	QPSK	1	24	18.06	18.35	18.09
5	QPSK	12	0	18.04	17.97	**18.93**
5	QPSK	12	7	18.08	18.42	18.37
5	QPSK	12	13	17.56	17.41	17.74
5	QPSK	25	0	17.39	17.52	17.78
5	16QAM	1	0	17.31	17.50	17.83
5	16QAM	1	12	17.42	17.64	17.8
5	16QAM	1	24	18.33	18.51	18.46
5	16QAM	12	0	18.19	18.39	18.48
5	16QAM	12	7	18.04	18.26	18.60
5	16QAM	12	13	17.75	17.61	17.67
5	16QAM	25	0	17.61	17.47	17.85

LTE Band5				Measured ERP		
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.
Channel				20415	20525	20635
Frequency (MHz)				825.5	836.5	847.5
3	QPSK	1	0	18.90	18.85	18.66
3	QPSK	1	8	18.89	18.60	18.60
3	QPSK	1	14	18.60	18.89	18.71
3	QPSK	8	0	18.40	18.17	18.29
3	QPSK	8	4	18.31	18.20	18.34
3	QPSK	8	7	19.06	18.73	18.35
3	QPSK	15	0	19.06	18.84	18.4
3	16QAM	1	0	18.59	19.02	18.98
3	16QAM	1	8	18.56	18.69	18.77
3	16QAM	1	14	18.54	18.77	18.95
3	16QAM	8	0	19.01	18.69	18.90
3	16QAM	8	4	19.02	18.79	18.83
3	16QAM	8	7	**19.06**	18.81	18.76
3	16QAM	15	0	19.06	18.70	18.58
Channel				20407	20525	20643
Frequency (MHz)				824.7	836.5	848.3
1.4	QPSK	1	0	18.94	18.74	18.63
1.4	QPSK	1	3	19.21	**19.26**	19.17
1.4	QPSK	1	5	19.13	18.78	19.17
1.4	QPSK	3	0	19.20	19.00	19.00
1.4	QPSK	3	1	18.41	18.86	18.58
1.4	QPSK	3	3	18.43	18.74	19.22
1.4	QPSK	6	0	19.15	19.16	19.21
1.4	16QAM	1	0	18.95	19.24	18.72
1.4	16QAM	1	3	19.13	18.82	18.58
1.4	16QAM	1	5	19.01	18.78	18.52
1.4	16QAM	3	0	19.03	18.80	18.53
1.4	16QAM	3	1	19.00	18.90	19.25
1.4	16QAM	3	3	18.93	18.87	19.18
1.4	16QAM	6	0	18.95	18.74	18.75

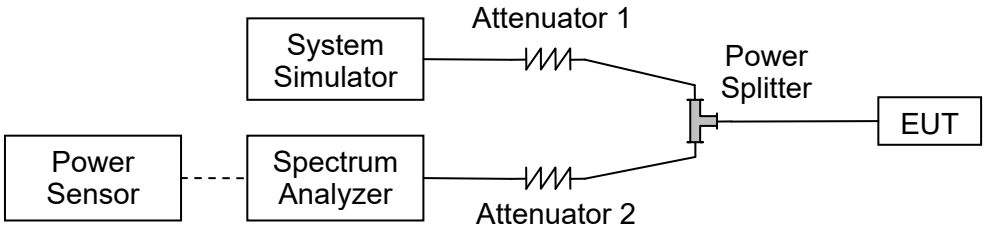
LTE Band13				Measured ERP		
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				/	23230	/
Frequency (MHz)				/	782	/
10	QPSK	1	0	/	22.01	/
10	QPSK	1	25	/	**22.57**	/
10	QPSK	1	49	/	21.86	/
10	QPSK	25	0	/	21.24	/
10	QPSK	25	12	/	21.31	/
10	QPSK	25	25	/	21.36	/
10	QPSK	50	0	/	21.35	/
10	16QAM	1	0	/	20.75	/
10	16QAM	1	25	/	21.08	/
10	16QAM	1	49	/	21.3	/
10	16QAM	25	0	/	20.35	/
10	16QAM	25	12	/	20.29	/
10	16QAM	25	25	/	20.35	/
10	16QAM	50	0	/	20.38	/
Channel				23205	23230	23255
Frequency (MHz)				779.5	782.0	784.5
5	QPSK	1	0	22.24	21.66	22.51
5	QPSK	1	12	22.52	22.66	22.35
5	QPSK	1	24	22.15	**22.09**	22.02
5	QPSK	12	0	21.12	21.39	21.44
5	QPSK	12	7	21.44	21.57	21.3
5	QPSK	12	13	21.35	21.47	21.29
5	QPSK	25	0	21.29	21.51	21.29
5	16QAM	1	0	21.01	20.71	21.02
5	16QAM	1	12	21.12	21.52	21.16
5	16QAM	1	24	20.81	21.10	20.76
5	16QAM	12	0	20.14	20.33	20.49
5	16QAM	12	7	20.41	20.61	20.35
5	16QAM	12	13	20.51	20.33	20.23
5	16QAM	25	0	20.66	20.41	20.42

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

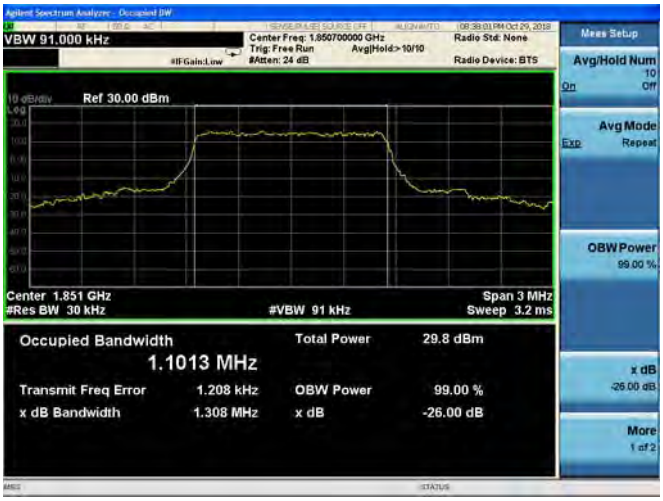
LTE Band 2, BW: 1.4MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
18607	1850.7	1.098	1.306	1.101	1.308
18900	1880.0	1.115	1.892	1.106	1.305
19192	1909.2	1.098	1.325	1.103	1.313

LTE Band 2, BW: 3MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
18615	1851.5	2.711	3.014	2.718	2.984
18900	1880.0	2.709	2.998	2.730	3.014
19184	1908.4	2.709	2.979	2.707	3.012
LTE Band 2, BW: 5MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
18625	1852.5	4.523	4.993	4.513	5.018
18900	1880.0	4.520	5.002	4.518	5.038
19175	1907.5	4.512	4.988	4.528	5.028
LTE Band 2, BW: 10MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
18650	1855.0	8.975	9.919	8.992	9.792
18900	1880.0	8.963	9.900	8.970	9.769
19150	1905.0	8.999	9.895	8.986	9.835
LTE Band 2, BW: 15MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
18675	1857.5	13.500	14.62	13.494	14.61
18900	1880.0	13.371	14.56	13.424	14.57
19125	1902.5	13.553	14.75	13.522	14.71
LTE Band 2, BW: 20MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
18700	1860.0	18.007	19.49	18.053	19.61
18900	1880.0	17.797	19.31	17.848	19.24
19100	1900.0	18.060	19.62	18.098	23.71

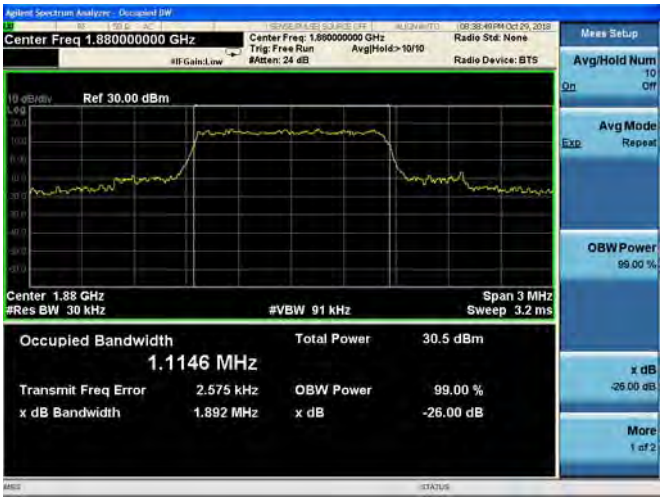
LTE Band 2 99%&26dB Bandwidth

1.4MHz/QPSK/Low CH

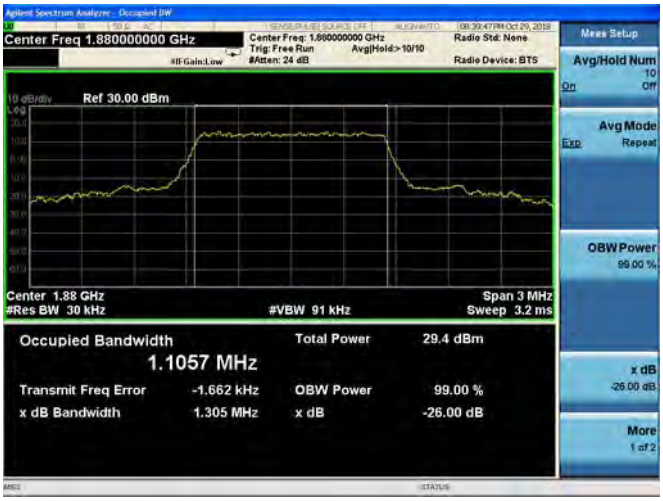
1.4MHz/16QAM/Low CH



1.4MHz/QPSK/Mid CH



1.4MHz/16QAM/Mid CH



1.4MHz/QPSK/High CH	1.4MHz/16QAM/High CH

3MHz/QPSK/Low CH

3MHz/16QAM/Low CH

3MHz/QPSK/Mid CH

3MHz/16QAM/Mid CH

3MHz/QPSK/High CH

3MHz/16QAM/High CH

5MHz/QPSK/Low CH

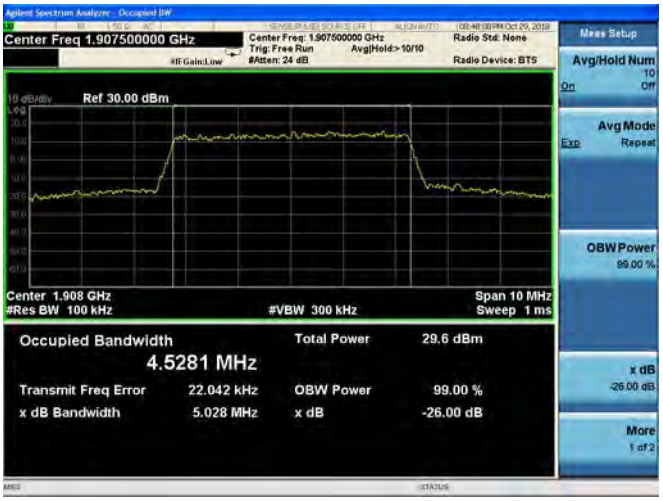
5MHz/16QAM/Low CH

5MHz/QPSK/Mid CH

5MHz/16QAM/Mid CH

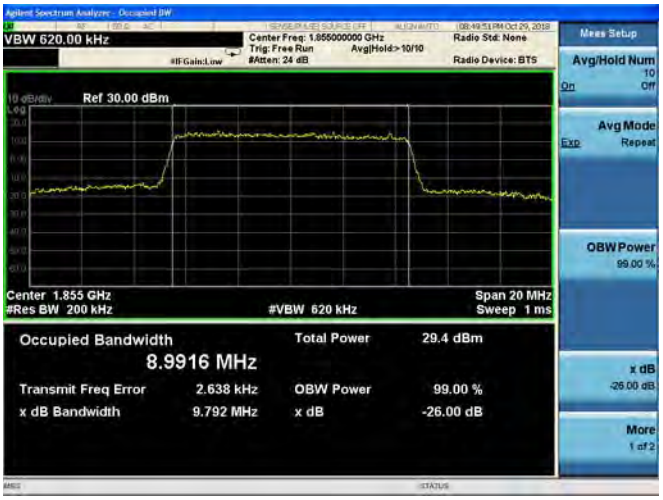
5MHz/QPSK/High CH

5MHz/16QAM/High CH



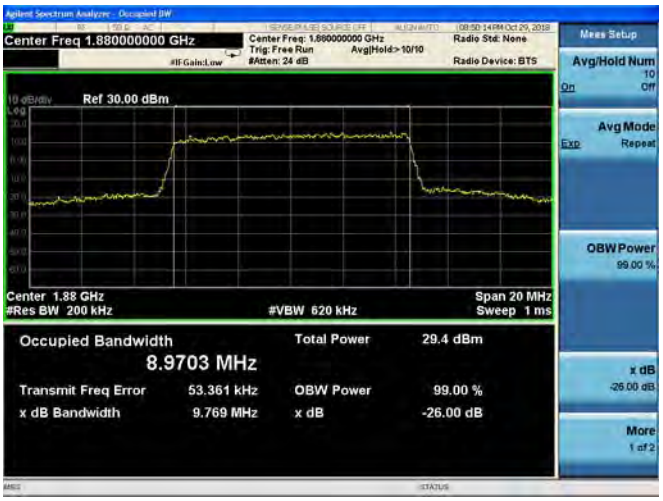
10MHz/QPSK/Low CH

10MHz/16QAM/Low CH



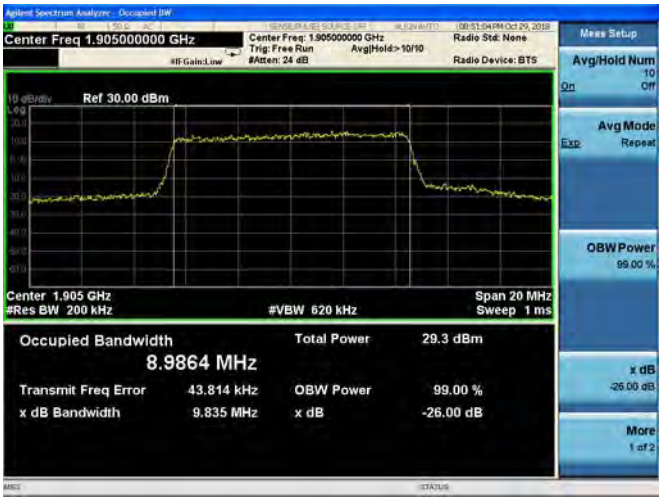
10MHz/QPSK/Mid CH

10MHz/16QAM/Mid CH



10MHz/QPSK/High CH

10MHz/16QAM/High CH



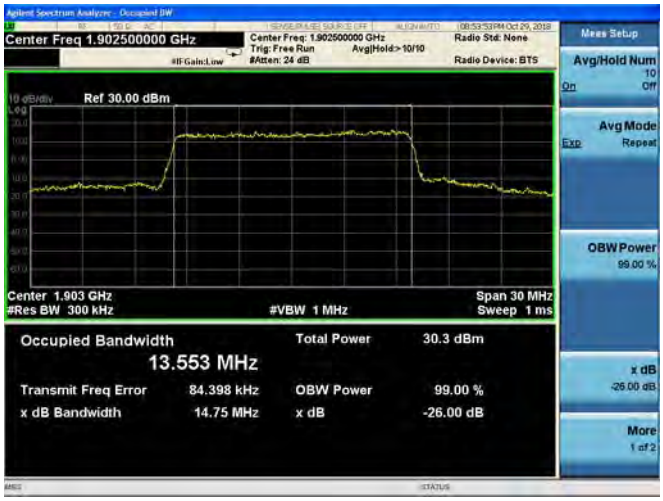
15MHz/QPSK/Low CH

15MHz/16QAM/Low CH

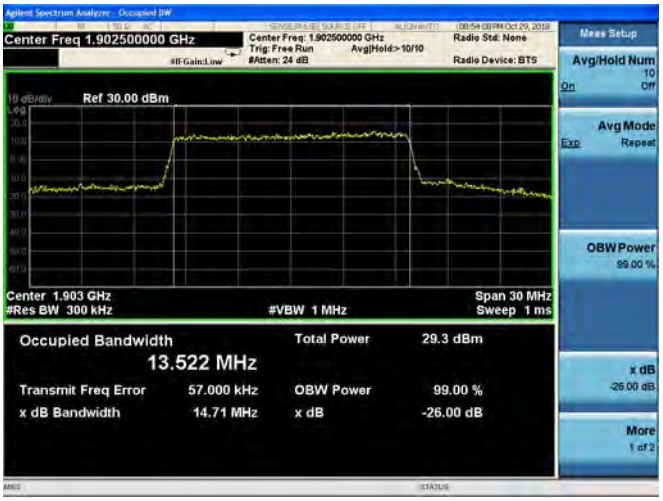
15MHz/QPSK/Mid CH

15MHz/16QAM/Mid CH

15MHz/QPSK/High CH

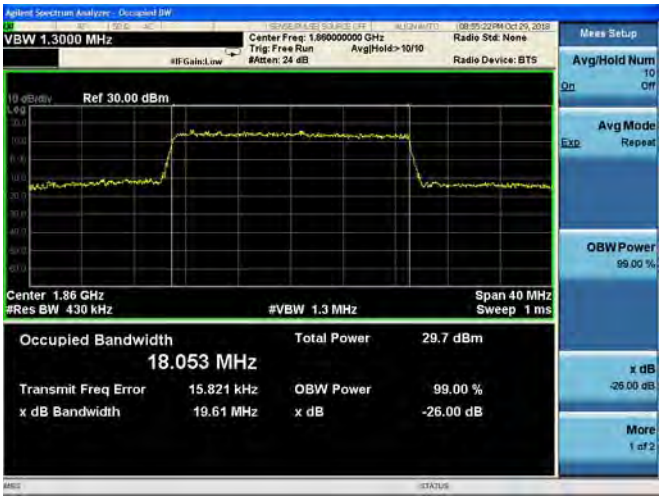


15MHz/16QAM/High CH



20MHz/QPSK/Low CH

20MHz/16QAM/Low CH



20MHz/QPSK/Mid CH

20MHz/16QAM/Mid CH

20MHz/QPSK/High CH

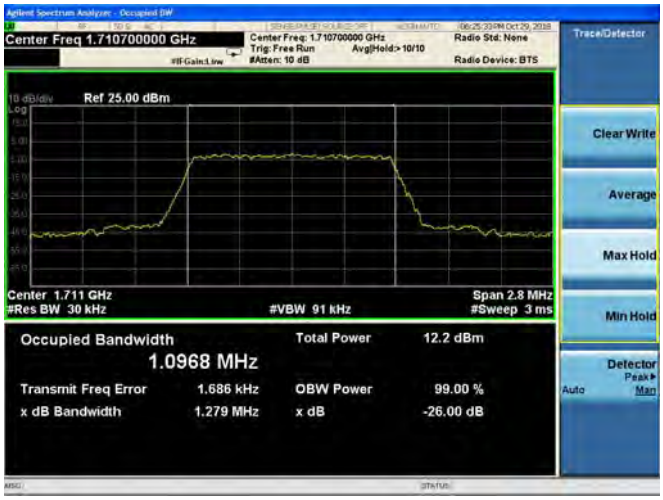
20MHz/16QAM/High CH

LTE Band 4, BW: 1.4MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
19957	1710.7	1.097	1.279	1.094	1.262
20175	1732.5	1.094	1.268	1.099	1.280
20392	1754.2	1.104	1.262	1.096	1.269
LTE Band 4, BW: 3MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
19965	1711.5	2.702	2.972	2.701	2.971
20175	1732.5	2.704	2.960	2.711	2.964
20384	1753.4	2.707	2.975	2.701	2.971
LTE Band 4, BW: 5MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
19975	1712.5	4.518	5.085	4.511	5.026
20175	1732.5	4.522	5.047	4.511	5.078
20375	1752.5	4.507	5.055	4.517	5.063
LTE Band 4, BW: 10MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
20000	1715.0	8.994	9.883	8.997	9.935
20175	1732.5	8.978	9.956	9.000	9.918
20350	1750.0	9.004	10.01	8.989	9.929
LTE Band 4, BW: 15MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
20025	1717.5	13.458	14.74	13.458	14.72
20175	1732.5	13.483	14.91	13.485	14.91
20325	1747.5	13.475	14.74	13.478	14.80

LTE Band 4, BW: 20MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
20050	1720.0	18.028	19.75	17.968	19.53
20175	1732.5	18.022	19.55	18.066	19.80
20300	1745.0	17.927	19.57	17.968	19.68

LTE Band 4 99%&26dB Bandwidth

1.4MHz/QPSK/Low CH



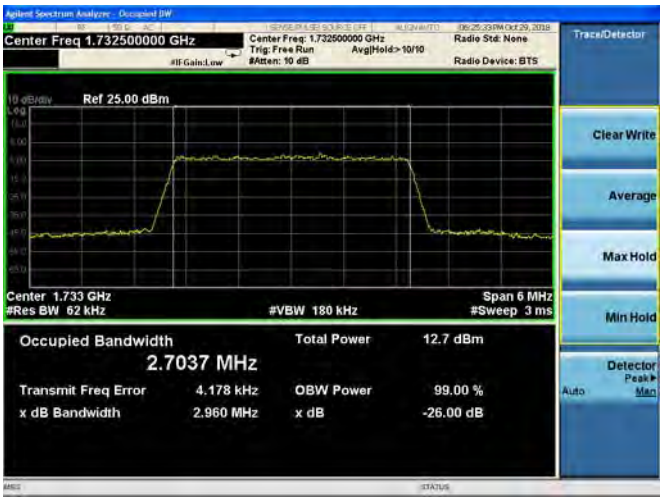
1.4MHz/16QAM/Low CH

1.4MHz/QPSK/Mid CH

1.4MHz/16QAM/Mid CH

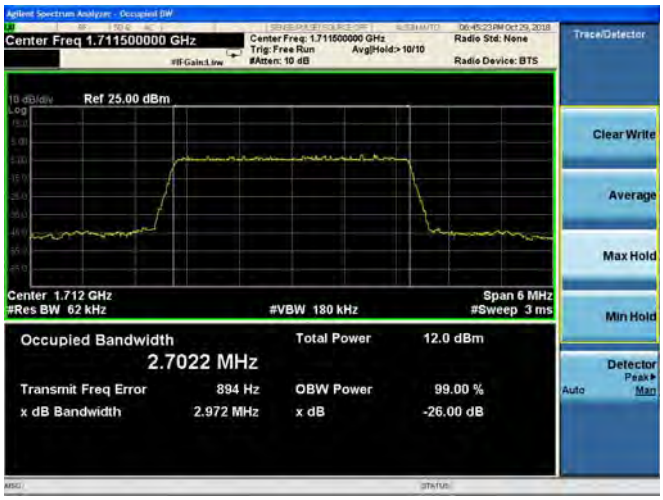
1.4MHz/QPSK/High CH	1.4MHz/16QAM/High CH

3MHz/QPSK/Low CH

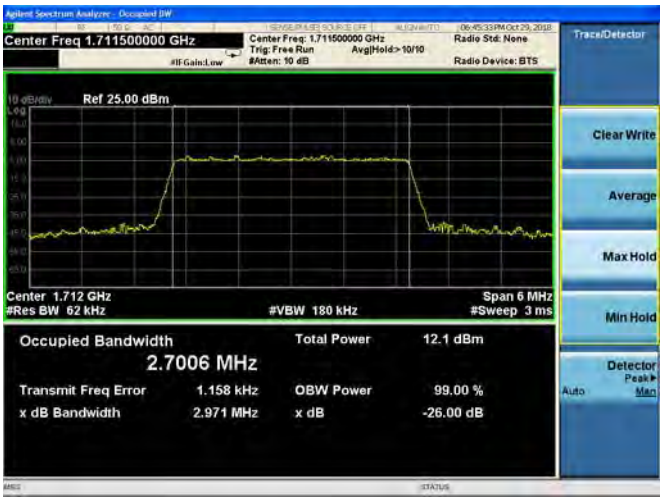


3MHz/16QAM/Low CH

3MHz/QPSK/Mid CH

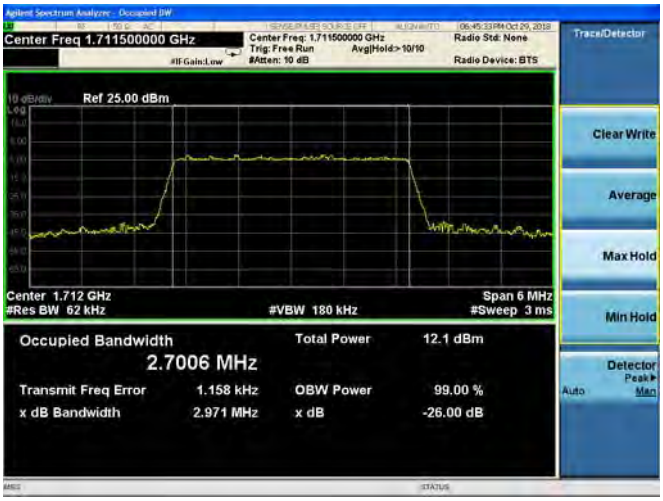


3MHz/16QAM/Mid CH



3MHz/QPSK/High CH

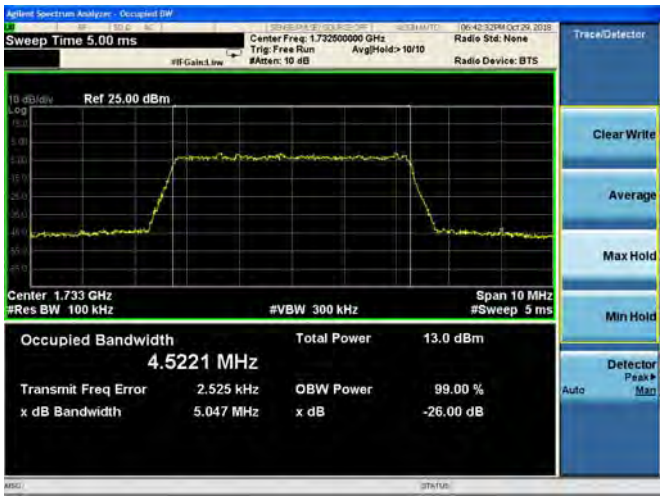
3MHz/16QAM/High CH



5MHz/QPSK/Low CH

5MHz/16QAM/Low CH

5MHz/QPSK/Mid CH

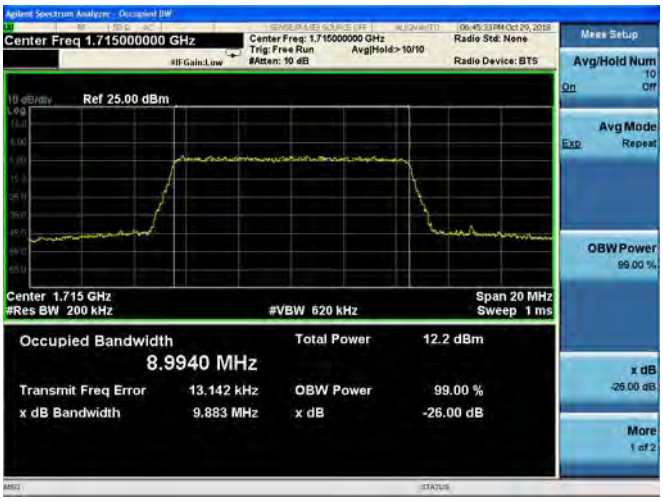


5MHz/16QAM/Mid CH

5MHz/QPSK/High CH

5MHz/16QAM/High CH

10MHz/QPSK/Low CH



10MHz/16QAM/Low CH

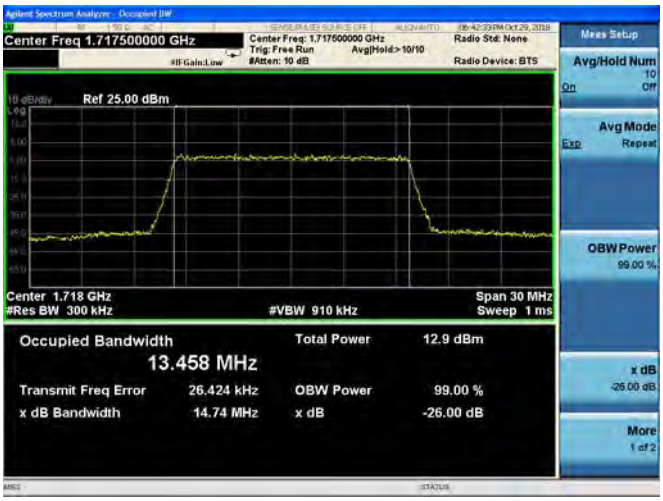
10MHz/QPSK/Mid CH

10MHz/16QAM/Mid CH

10MHz/QPSK/High CH

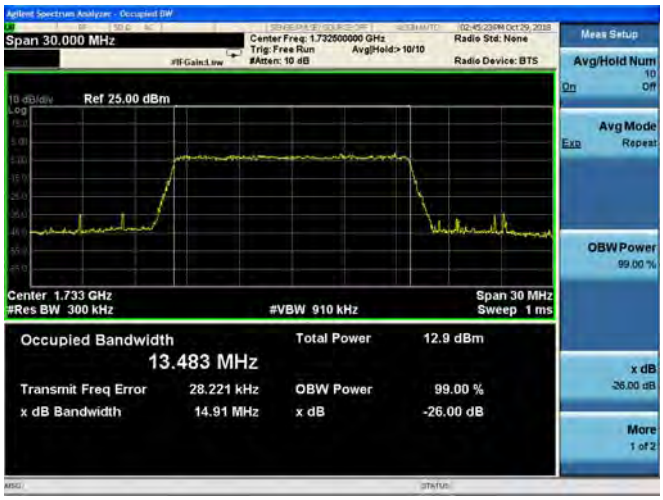
10MHz/16QAM/High CH

15MHz/QPSK/Low CH



15MHz/16QAM/Low CH

15MHz/QPSK/Mid CH



15MHz/16QAM/Mid CH

15MHz/QPSK/High CH

15MHz/16QAM/High CH

20MHz/QPSK/Low CH

20MHz/16QAM/Low CH

20MHz/QPSK/Mid CH

20MHz/16QAM/Mid CH

20MHz/QPSK/High CH

20MHz/16QAM/High CH

LTE Band 5, BW: 1.4MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
20407	824.7	1.100	1.293	1.095	1.299
20525	836.5	1.094	1.294	1.093	1.309
20643	848.3	1.005	1.292	1.055	1.296
LTE Band 5, BW: 3MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
20415	825.5	2.634	2.908	2.684	2.933
20525	836.5	2.686	2.922	2.684	2.913
20635	847.5	2.683	2.953	2.683	2.923
LTE Band 5, BW: 5MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
20425	826.5	4.505	4.992	4.538	5.005
20525	836.5	4.513	5.012	4.534	5.007
20625	846.5	4.504	4.948	4.503	4.948
LTE Band 5, BW: 10MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
20450	829.0	9.053	9.938	9.072	10.06
20525	836.5	9.053	10.06	9.053	10.06
20600	844.0	9.034	9.995	9.048	9.957

LTE Band 5 99%&26dB Bandwidth

1.4MHz/QPSK/Low CH

1.4MHz/16QAM/Low CH

1.4MHz/QPSK/Mid CH

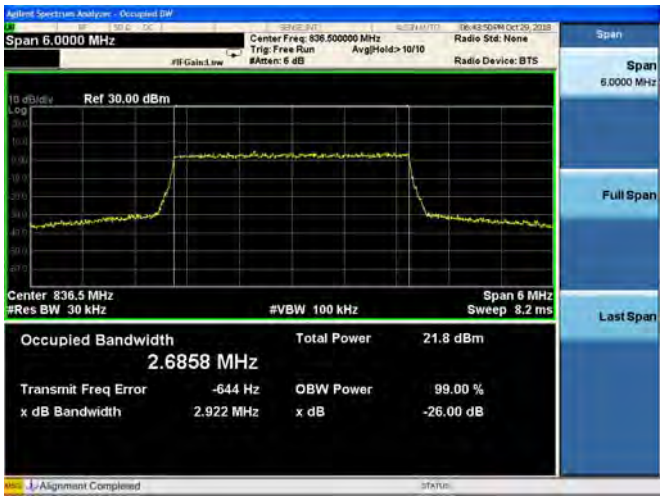
1.4MHz/16QAM/Mid CH

1.4MHz/QPSK/High CH	1.4MHz/16QAM/High CH

3MHz/QPSK/Low CH

3MHz/16QAM/Low CH

3MHz/QPSK/Mid CH



3MHz/16QAM/Mid CH

3MHz/QPSK/High CH

3MHz/16QAM/High CH

5MHz/QPSK/Low CH

5MHz/16QAM/Low CH

5MHz/QPSK/Mid CH

5MHz/16QAM/Mid CH

5MHz/QPSK/High CH

5MHz/16QAM/High CH

10MHz/QPSK/Low CH

10MHz/16QAM/Low CH

10MHz/QPSK/Mid CH

10MHz/16QAM/Mid CH

10MHz/QPSK/High CH

10MHz/16QAM/High CH

LTE Band 13, BW: 5MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
23205	779.5	4.528	5.052	4.519	5.006
23230	782.0	4.495	4.949	4.500	4.950
23255	784.5	4.526	4.976	4.518	5.014
LTE Band 13, BW: 10MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
23230	782.0	8.999	9.929	9.005	9.926

LTE Band 7 99%&26dB Bandwidth

5MHz/QPSK/Low CH

5MHz/16QAM/Low CH

5MHz/QPSK/Mid CH

5MHz/16QAM/Mid CH

5MHz/QPSK/High CH

5MHz/16QAM/High CH

10MHz/QPSK/Mid CH

10MHz/16QAM/Mid CH

2.3. Frequency Stability

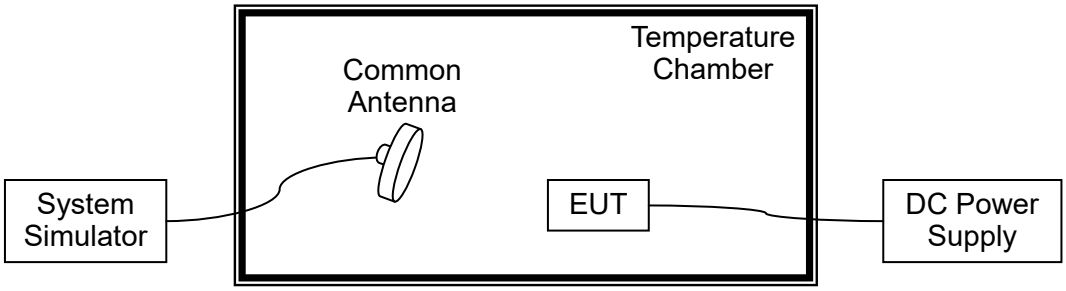
2.3.1. Requirement

According to FCC section 2.1055 & 27.54&24.235, 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°C to +50°C at intervals of not more than 10°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.

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 3.8VDC, 4.35VDC and 3.5VDC, which are specified by the applicant; the normal temperature here used is 20°C.

LTE Band 2, QPSK, Channel 18900, Frequency 1880.0MHz Limit =Within Authorized Band					
Voltage (%)	**Power (VDC)**	**Temp (°C)**	**Fre. Dev. (Hz)**	**Deviation (ppm)**	**Result**
100	3.8	-30	-25	-0.013	PASS
100		-20	-18	-0.010	
100		-10	9	0.005	
100		0	12	0.006	
100		+10	23	0.012	
100		+20	32	0.017	
100		+30	-15	-0.008	
100		+40	12	0.006	
100		+50	26	0.014	
115	4.37	+20	-8	-0.004	
85	3.23	+20	17	0.009	

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	3.8	-30	33	0.019	PASS
100		-20	28	0.016	
100		-10	22	0.013	
100		0	20	0.012	
100		+10	-12	-0.007	
100		+20	18	0.010	
100		+30	15	0.009	
100		+40	-20	-0.012	
100		+50	18	0.010	
115	4.37	+20	25	0.014	
85	3.23	+20	26	0.015	

LTE Band 5, QPSK, Channel 20525, Frequency 836.5MHz Limit=±2.5ppm					
Voltage (%)	**Power (VDC)**	**Temp (°C)**	**Fre. Dev. (Hz)**	**Deviation (ppm)**	**Result**
100	3.8	-30	36	0.043	PASS
100		-20	34	0.041	
100		-10	38	0.045	
100		0	-21	-0.025	
100		+10	25	0.030	
100		+20	27	0.032	
100		+30	24	0.029	
100		+40	-12	-0.014	
100		+50	38	0.045	
115	4.37	+20	-30	-0.036	
85	3.23	+20	-8	-0.010	

LTE Band 13, QPSK, Channel 23230, Frequency 782.0MHz Limit= Within Authorized Band					
Voltage (%)	**Power (VDC)**	**Temp (°C)**	**Fre. Dev. (Hz)**	**Deviation (ppm)**	**Result**
100	3.8	-30	26	0.033	PASS
100		-20	32	0.041	
100		-10	-15	-0.019	
100		0	-36	-0.046	
100		+10	34	0.043	
100		+20	25	0.032	
100		+30	-19	-0.024	
100		+40	34	0.043	
100		+50	41	0.052	
115	4.37	+20	-23	-0.029	
85	3.23	+20	28	0.036	

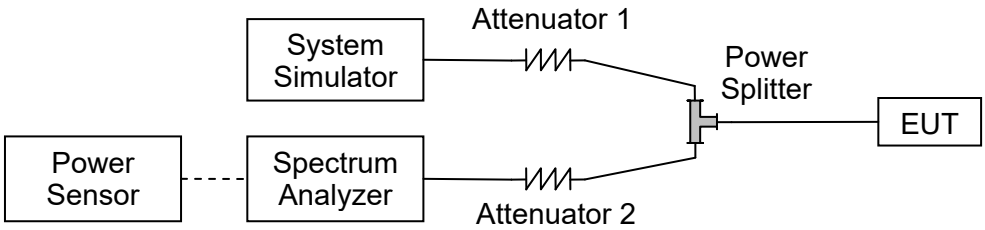
2.4. Peak to Average Radio

2.4.1. Requirement

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

2.4.2. Test Description

A. 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

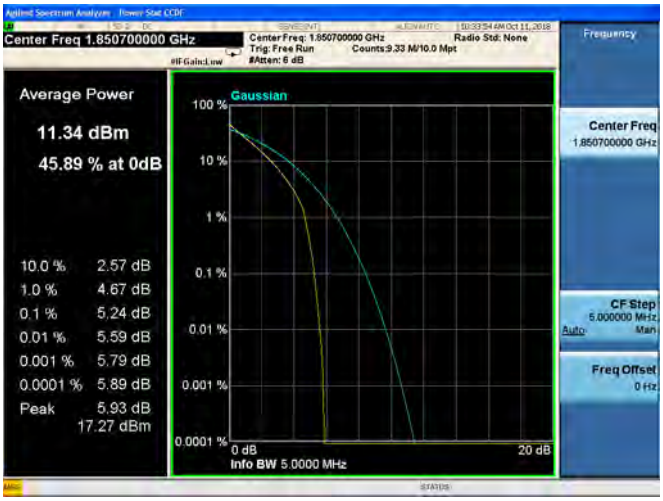
Record the maximum PAPR level associated with a probability of 0.1%.

LTE Band 2, BW: 1.4MHz			
Channel	Frequency (MHz)	Peak to Average Radio(dB)	
		QPSK	16QAM
18607	1850.7	5.23	5.24
18900	1880.0	5.45	5.65
19192	1909.2	5.50	5.50
LTE Band 2, BW: 3MHz			
Channel	Frequency (MHz)	Peak to Average Radio(dB)	
		QPSK	16QAM
18615	1851.5	5.32	5.32
18900	1880.0	5.46	5.46
19184	1908.4	5.51	5.52
LTE Band 2, BW: 5MHz			
Channel	Frequency (MHz)	Peak to Average Radio(dB)	
		QPSK	16QAM
18625	1852.5	5.33	5.31
18900	1880.0	5.31	5.32
19175	1907.5	5.42	5.41
LTE Band 2, BW: 10MHz			
Channel	Frequency (MHz)	Peak to Average Radio(dB)	
		QPSK	16QAM
18650	1855.0	4.76	4.76
18900	1880.0	4.77	4.77
19150	1905.0	4.80	4.80
LTE Band 2, BW: 15MHz			
Channel	Frequency (MHz)	Peak to Average Radio(dB)	
		QPSK	16QAM
18675	1857.5	5.84	5.84
18900	1880.0	5.82	5.63
19125	1902.5	5.85	5.85
LTE Band 2, BW: 20MHz			
Channel	Frequency (MHz)	Peak to Average Radio(dB)	
		QPSK	16QAM
18700	1860.0	6.46	6.43
18900	1880.0	6.44	6.45
19100	1900.0	6.45	6.45

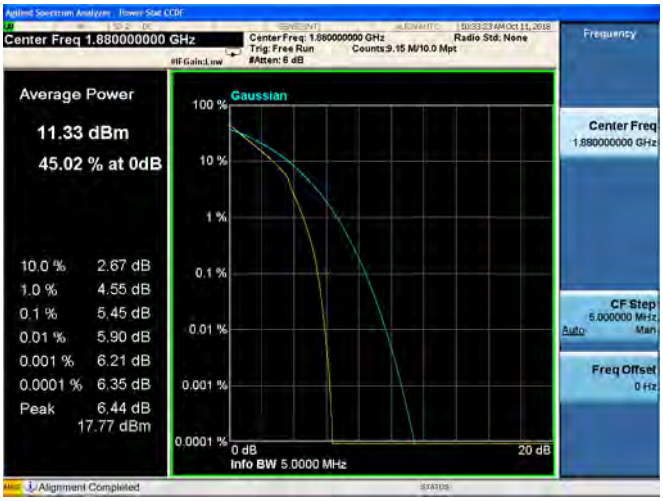
LTE Band 2 Peak to Average Radio

1.4MHz/QPSK/Low CH

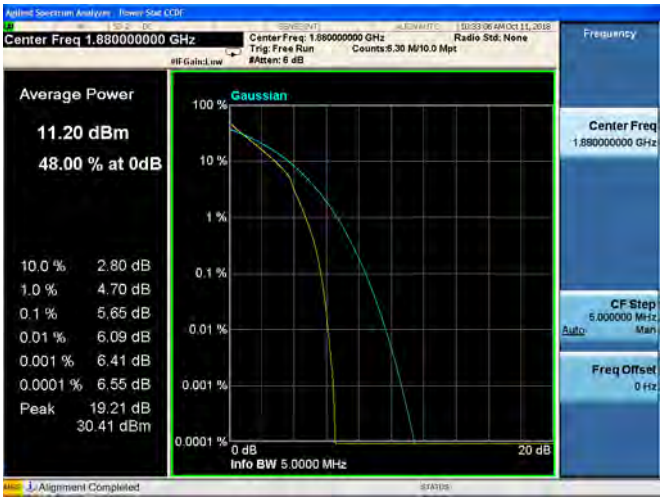
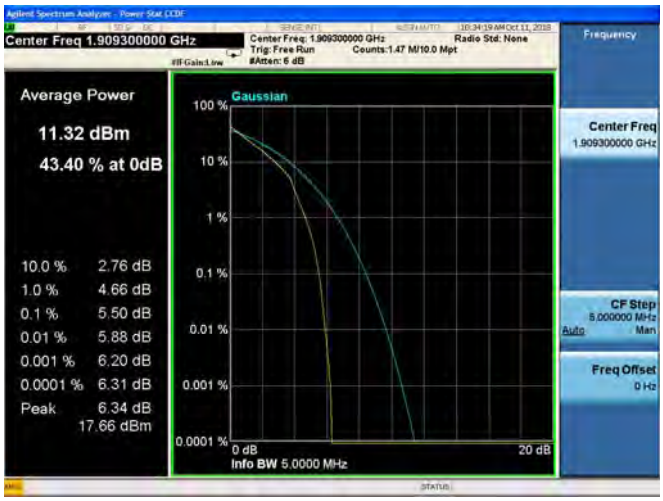
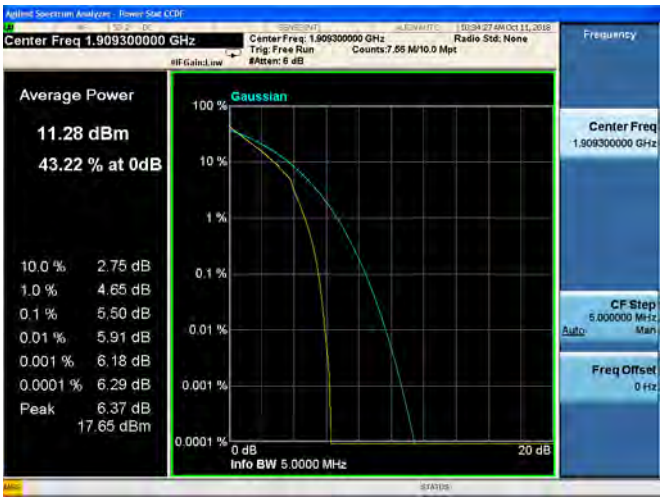
1.4MHz/16QAM/Low CH



1.4MHz/QPSK/Mid CH



1.4MHz/16QAM/Mid CH



1.4MHz/QPSK/High CH	1.4MHz/16QAM/High CH