FCC Test Report

(PART 24)

Report No.:	RF161124C49A
FCC ID:	HFS-QTAXIA1
Test Model:	QTAXIA1
Received Date:	Nov. 24, 2016
Test Date:	Dec. 12, 2016 ~ Dec. 20, 2016
Issued Date:	Jan. 20, 2017
Applicant:	Quanta Computer Inc.
Address:	No.188, Wenhua 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C)
Test Location (1):	No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.
Test Location (2):	No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan, R.O.C

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Release Control Record

Issue No.	Description	Date Issued
RF161124C49A	Original Release	Jan. 20, 2017

1 Certificate of Conformity

Product: 10" Tablet Computer

Test Model: QTAXIA1

Sample Status: ENGINEERING SAMPLE

Applicant: Quanta Computer Inc.

Test Date: Dec. 12, 2016 ~ Dec. 20, 2016

Standards: FCC Part 24, Subpart E

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Evonne Liu , **Date:** Jan. 20, 2017

Evonne Liu / Specialist

Approved by : Stanley Wu , **Date:** Jan. 20, 2017

Stanley Wu / Assistant Manager

2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	**Test Item**	**Result**	**Remarks**
2.1046 24.232	Effective Isotropic Radiated Power	Pass	Meet the requirement of limit.
2.1046 24.232(d)	Peak to Average Ratio	Pass	Meet the requirement of limit.
2.1055 24.235	Frequency Stability	Pass	Meet the requirement of limit.
2.1049 24.238(b)	Occupied Bandwidth	Pass	Meet the requirement of limit.
24.238(b)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 24.238	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 24.238	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -36.56 dB at 3760 MHz.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	**Frequency**	**Expended Uncertainty (k=2) (±)**
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Test Site And Instruments

Description & Manaufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent Technologies	N9038A	MY52260177	Jun. 21, 2016	Jun. 20, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 13, 2016	Dec. 12, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Jan. 07, 2016	Jan. 06, 2017
HORN Antenna ETS-Lindgren	3117	00143293	Jan. 04, 2016	Jan. 03, 2017
Double Ridge Guide Horn Antenna EMCO	3115	5619	Jan. 04, 2016	Jan. 03, 2017
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Jan. 07, 2016	Jan. 06, 2017
Agilent Communications Tester-Wireless	8960 Series 10	MY53201073	Jul. 03, 2015	Jul. 02, 2017
Preamplifier Agilent	310N	187226	Jun. 24, 2016	Jun. 23, 2017
Preamplifier Agilent	83017A	MY39501357	Jun. 24, 2016	Jun. 23, 2017
Power Meter Anritsu	ML2495A	1232002	Sep. 08, 2016	Sep. 07, 2017
Power Sensor Anritsu	MA2411B	1207325	Sep. 08, 2016	Sep. 07, 2017
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400)	Jun. 24, 2016	Jun. 23, 2017
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC-SMS-100-SMS-24)	Jun. 24, 2016	Jun. 23, 2017
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA
Communications Tester-Wireless Agilent	8960 Series 10	MY53201073	Jul. 03, 2015	Jul. 02, 2017
Radio Communication Analyzer Anritsu	MT8820C	6201240432	Jul. 06, 2015	Jul. 05, 2017
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 02, 2016	Sep. 01, 2017
DC Power Supply Topward	33010D	807748	Oct. 25, 2016	Oct. 24, 2018
Digital Multimeter Fluke	87-III	70360742	Jul. 01, 2016	Jun. 30, 2017
Signal Generator Agilent	N5182B	MY53050430	Oct. 19, 2016	Oct. 18, 2017

Note: 1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HsinTien Chamber 1.
3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The FCC Site Registration No. is 149147.
5. The IC Site Registration No. is IC7450I-1.

3 General Information

3.1 General Description of EUT

Product	10" Tablet Computer	
Test Model	QTAXIA1	
Status of EUT	ENGINEERING SAMPLE	
Power Supply Rating	5.0 Vdc (adapter or host equipment) 3.85 Vdc (Li-ion battery)	
Modulation Type	LTE	QPSK, 16QAM
Frequency Range	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1850.7 ~ 1909.3 MHz
	LTE Band 2 (Channel Bandwidth: 3 MHz)	1851.5 ~ 1908.5 MHz
	LTE Band 2 (Channel Bandwidth: 5 MHz)	1852.5 ~ 1907.5 MHz
	LTE Band 2 (Channel Bandwidth: 10 MHz)	1855.0 ~ 1905.0 MHz
	LTE Band 2 (Channel Bandwidth: 15 MHz)	1857.5 ~ 1902.5 MHz
	LTE Band 2 (Channel Bandwidth: 20 MHz)	1860.0 ~ 1900.0 MHz
Max. EIRP Power	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	102.09 mW
	LTE Band 2 (Channel Bandwidth: 3 MHz)	101.93 mW
	LTE Band 2 (Channel Bandwidth: 5 MHz)	101.46 mW
	LTE Band 2 (Channel Bandwidth: 10 MHz)	102.16 mW
	LTE Band 2 (Channel Bandwidth: 15 MHz)	101.86 mW
	LTE Band 2 (Channel Bandwidth: 20 MHz)	103.28 mW
Emission Designator	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1M08W7D
	LTE Band 2 (Channel Bandwidth: 3 MHz)	2M70W7D
	LTE Band 2 (Channel Bandwidth: 5 MHz)	4M49G7D
	LTE Band 2 (Channel Bandwidth: 10 MHz)	8M98G7D
	LTE Band 2 (Channel Bandwidth: 15 MHz)	13M4W7D
	LTE Band 2 (Channel Bandwidth: 20 MHz)	17M9G7D
Antenna Type	Fixed External Antenna	
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

Note:

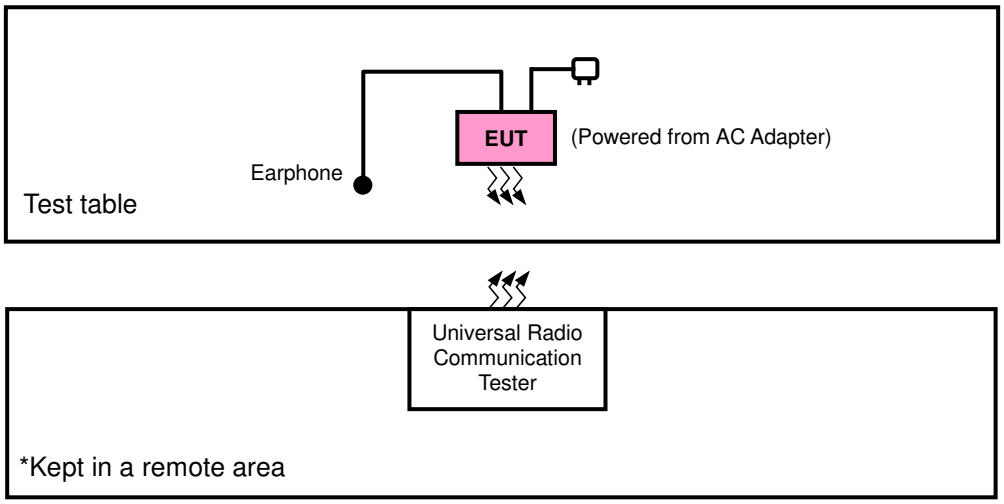
1. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	PI ELECTRONICS	AD2062320006LF	I/P: 100-240 Vac, 50/60 Hz, 0.3 A O/P: 5 Vdc, 2 A 1 m non-shielded cable w/o core
Battery	McNair	MLP2678135-2P	3.85 Vdc, 9300 mAh
LTE Chip	MediaTek	MT6176	--
WLAN Chip	MediaTek	MT6630	--

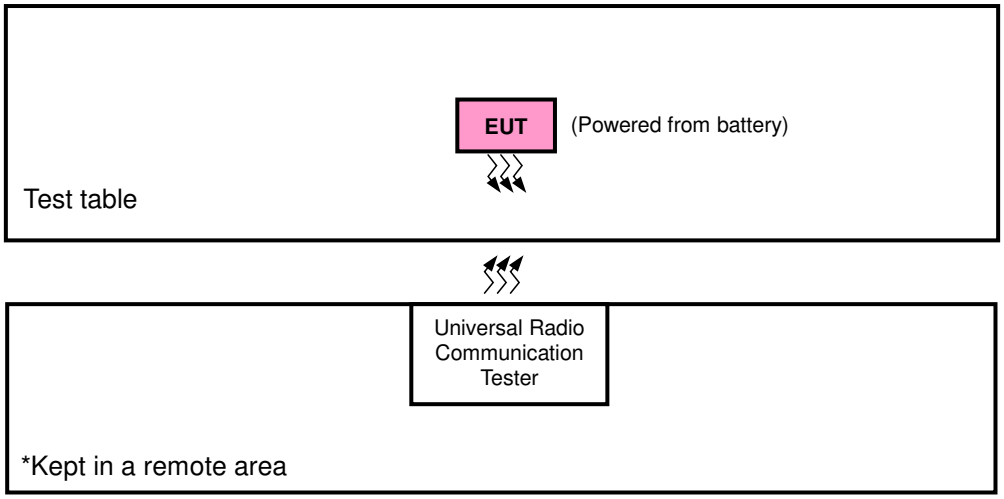
2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test

<Radiated Emission Test>



<E.I.R.P. Test>



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis, and antenna ports.
The worst case was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	EIRP	Radiated Emission
LTE Band 2	Y-plane	Z-axis

LTE Band 2

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Frequency Stability	18607 to 19193	18900	1.4 MHz	QPSK	1 RB / 0 RB Offset
		18615 to 19185	18900	3 MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18900	5 MHz	QPSK	1 RB / 0 RB Offset
		18650 to 19150	18900	10 MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18900	15 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18900	20 MHz	QPSK	1 RB / 0 RB Offset
-	Occupied Bandwidth	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	15 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
-	Peak to Average Ratio	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset

-	Band Edge	18607 to 19193	18607	1.4 MHz	QPSK	1 RB / 0 RB Offset
						6 RB / 0 RB Offset
			19193	1.4 MHz	QPSK	1 RB / 5 RB Offset
						6 RB / 0 RB Offset
		18615 to 19185	18615	3 MHz	QPSK	1 RB / 0 RB Offset
						15 RB / 0 RB Offset
			19185	3 MHz	QPSK	1 RB / 14 RB Offset
						15 RB / 0 RB Offset
		18625 to 19175	18625	5 MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
			19175	5 MHz	QPSK	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		18650 to 19150	18650	10 MHz	QPSK	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
			19150	10 MHz	QPSK	1 RB / 49 RB Offset
						50 RB / 0 RB Offset
		18675 to 19125	18675	15 MHz	QPSK	1 RB / 0 RB Offset
						75 RB / 0 RB Offset
			19125	15 MHz	QPSK	1 RB / 74 RB Offset
						75 RB / 0 RB Offset
		18700 to 19100	18700	20 MHz	QPSK	1 RB / 0 RB Offset
						100 RB / 0 RB Offset
			19100	20 MHz	QPSK	1 RB / 99 RB Offset
						100 RB / 0 RB Offset
-	Conducted Emission	18607 to 19193	18900	1.4 MHz	QPSK	1 RB / 0 RB Offset
		18615 to 19185	18900	3 MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18900	5 MHz	QPSK	1 RB / 0 RB Offset
		18650 to 19150	18900	10 MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18900	15 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18900	20 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission	18700 to 19100	18900	20 MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	26 deg. C, 58 % RH	3.85 Vdc	Carlos Chen
Frequency Stability	26 deg. C, 58 % RH	3.85 Vdc	Carlos Chen
Occupied Bandwidth	26 deg. C, 58 % RH	3.85 Vdc	Carlos Chen
Band Edge	26 deg. C, 58 % RH	3.85 Vdc	Carlos Chen
Peak to Average Ratio	26 deg. C, 58 % RH	3.85 Vdc	Carlos Chen
Condcudeted Emission	26 deg. C, 58 % RH	3.85 Vdc	Carlos Chen
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Charles Hsiao

3.4 EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2
FCC 47 CFR Part 24
KDB 971168 D01 Power Meas License Digital Systems v02r02
ANSI/TIA/EIA-603-D 2010

NOTE: All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 2 watts e.i.r.p.

4.1.2 Test Procedures

EIRP / ERP Measurement:

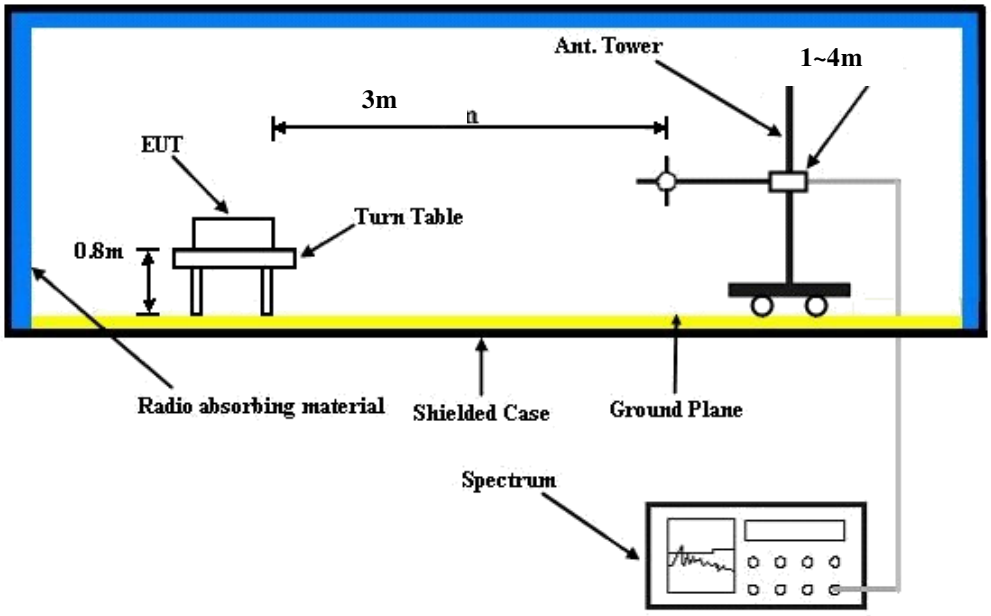
a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1 MHz for GSM, GPRS & EDGE, 5 MHz for WCDMA and CDMA, and 10 MHz for LTE mode.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step b. Record the power level of S.G.
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15 dBi.

Conducted Power Measurement:

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, CDMA, and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

4.1.3 Test Setup

EIRP / ERP Measurement:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

Conducted Power Measurement:

4.1.4 Test Results

Conducted Output Power (dBm)

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18607	Mid Ch 18900	High Ch 19193		Low Ch 18607	Mid Ch 18900	High Ch 19193	
			1850.7 MHz	1880.0 MHz	1909.3 MHz		1850.7 MHz	1880.0 MHz	1909.3 MHz	
2 / 1.4M	1	0	22.71	22.80	22.89	0	21.81	21.90	21.99	1
	1	2	22.56	22.65	22.74	0	21.66	21.75	21.84	1
	1	5	22.78	22.87	22.96	0	21.88	21.97	22.06	1
	3	0	22.60	22.69	22.78	0	21.70	21.79	21.88	1
	3	1	22.50	22.59	22.68	0	21.60	21.69	21.78	1
	3	3	22.61	22.70	22.79	0	21.71	21.80	21.89	1
	6	0	21.68	21.77	21.86	1	20.78	20.87	20.96	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18615	Mid Ch 18900	High Ch 19185		Low Ch 18615	Mid Ch 18900	High Ch 19185	
			1851.5 MHz	1880.0 MHz	1908.5 MHz		1851.5 MHz	1880.0 MHz	1908.5 MHz	
2 / 3M	1	0	22.80	22.89	22.98	0	21.78	21.87	21.96	1
	1	7	22.65	22.74	22.83	0	21.63	21.72	21.81	1
	1	14	22.87	22.96	23.05	0	21.85	21.94	22.03	1
	8	0	21.79	21.88	21.97	1	20.77	20.86	20.95	2
	8	3	21.69	21.78	21.87	1	20.67	20.76	20.85	2
	8	7	21.80	21.89	21.98	1	20.78	20.87	20.96	2
	15	0	21.77	21.86	21.95	1	20.75	20.84	20.93	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18625	Mid Ch 18900	High Ch 19175		Low Ch 18625	Mid Ch 18900	High Ch 19175	
			1852.5 MHz	1880.0 MHz	1907.5 MHz		1852.5 MHz	1880.0 MHz	1907.5 MHz	
2 / 5M	1	0	22.93	23.02	23.11	0	21.91	22.00	22.09	1
	1	12	22.78	22.87	22.96	0	21.76	21.85	21.94	1
	1	24	23.00	23.09	23.18	0	21.98	22.07	22.16	1
	12	0	21.92	22.01	22.10	1	20.90	20.99	21.08	2
	12	6	21.82	21.91	22.00	1	20.80	20.89	20.98	2
	12	13	21.93	22.02	22.11	1	20.91	21.00	21.09	2
	25	0	21.90	21.99	22.08	1	20.88	20.97	21.06	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18650	Mid Ch 18900	High Ch 19150		Low Ch 18650	Mid Ch 18900	High Ch 19150	
			1855.0 MHz	1880.0 MHz	1905.0 MHz		1855.0 MHz	1880.0 MHz	1905.0 MHz	
2 / 10M	1	0	23.05	23.14	23.23	0	22.03	22.12	22.21	1
	1	24	22.90	22.99	23.08	0	21.88	21.97	22.06	1
	1	49	23.12	23.21	23.30	0	22.10	22.19	22.28	1
	25	0	22.04	22.13	22.22	1	21.02	21.11	21.20	2
	25	12	21.94	22.03	22.12	1	20.92	21.01	21.10	2
	25	25	22.05	22.14	22.23	1	21.03	21.12	21.21	2
	50	0	22.02	22.11	22.20	1	21.00	21.09	21.18	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18675	Mid Ch 18900	High Ch 19125		Low Ch 18675	Mid Ch 18900	High Ch 19125	
			1857.5 MHz	1880.0 MHz	1902.5 MHz		1857.5 MHz	1880.0 MHz	1902.5 MHz	
2 / 15M	1	0	23.14	23.23	23.32	0	22.12	22.21	22.30	1
	1	37	22.99	23.08	23.17	0	21.97	22.06	22.15	1
	1	74	23.21	23.30	23.39	0	22.19	22.28	22.37	1
	36	0	22.13	22.22	22.31	1	21.11	21.20	21.29	2
	36	19	22.03	22.12	22.21	1	21.01	21.10	21.19	2
	36	39	22.14	22.23	22.32	1	21.12	21.21	21.30	2
	75	0	22.11	22.20	22.29	1	21.09	21.18	21.27	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18700	Mid Ch 18900	High Ch 19100		Low Ch 18700	Mid Ch 18900	High Ch 19100	
			1860.0 MHz	1880.0 MHz	1900.0 MHz		1860.0 MHz	1880.0 MHz	1900.0 MHz	
2 / 20M	1	0	23.25	23.34	23.43	0	22.23	22.32	22.41	1
	1	50	23.10	23.19	23.28	0	22.08	22.17	22.26	1
	1	99	23.32	23.41	23.50	0	22.30	22.39	22.48	1
	50	0	22.24	22.33	22.42	1	21.22	21.31	21.40	2
	50	25	22.14	22.23	22.32	1	21.12	21.21	21.30	2
	50	50	22.25	22.34	22.43	1	21.23	21.32	21.41	2
	100	0	22.22	22.31	22.40	1	21.20	21.29	21.38	2

EIRP Power (dBm)

LTE Band 2							
Channel Bandwidth: 1.4 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
Y	18607	1850.7	-24.61	44.70	20.09	102.09	H
	18900	1880.0	-24.63	44.70	20.07	101.62	
	19193	1909.3	-24.52	44.57	20.05	101.23	
	18607	1850.7	-30.15	44.27	14.12	25.82	V
	18900	1880.0	-30.79	44.87	14.08	25.59	
	19193	1909.3	-30.53	44.61	14.08	25.60	
Channel Bandwidth: 1.4 MHz / 16QAM							
Y	18607	1850.7	-25.60	44.70	19.10	81.28	H
	18900	1880.0	-25.68	44.70	19.02	79.80	
	19193	1909.3	-25.54	44.57	19.03	80.04	
	18607	1850.7	-31.16	44.27	13.11	20.46	V
	18900	1880.0	-31.77	44.87	13.10	20.42	
	19193	1909.3	-31.54	44.61	13.07	20.29	

LTE Band 2							
Channel Bandwidth: 3 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
Y	18615	1851.5	-24.63	44.70	20.07	101.62	H
	18900	1880.0	-24.62	44.70	20.08	101.86	
	19185	1908.5	-24.49	44.57	20.08	101.93	
	18615	1851.5	-30.15	44.27	14.12	25.82	V
	18900	1880.0	-30.86	44.87	14.01	25.18	
	19185	1908.5	-30.42	44.61	14.19	26.26	
Channel Bandwidth: 3 MHz / 16QAM							
Y	18615	1851.5	-25.58	44.70	19.12	81.66	H
	18900	1880.0	-25.60	44.70	19.10	81.28	
	19185	1908.5	-25.54	44.57	19.03	80.04	
	18615	1851.5	-31.22	44.27	13.05	20.18	V
	18900	1880.0	-31.68	44.87	13.19	20.84	
	19185	1908.5	-31.55	44.61	13.06	20.24	

LTE Band 2							
Channel Bandwidth: 5 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
Y	18625	1852.5	-24.66	44.70	20.04	100.93	H
	18900	1880.0	-24.68	44.70	20.02	100.46	
	19175	1907.5	-24.51	44.57	20.06	101.46	
	18625	1852.5	-30.21	44.27	14.06	25.47	V
	18900	1880.0	-30.84	44.87	14.03	25.29	
	19175	1907.5	-30.52	44.61	14.09	25.66	
Channel Bandwidth: 5 MHz / 16QAM							
Y	18625	1852.5	-25.63	44.70	19.07	80.72	H
	18900	1880.0	-25.60	44.70	19.10	81.28	
	19175	1907.5	-25.54	44.57	19.03	80.04	
	18625	1852.5	-31.15	44.27	13.12	20.51	V
	18900	1880.0	-31.77	44.87	13.10	20.42	
	19175	1907.5	-31.59	44.61	13.02	20.06	

LTE Band 2							
Channel Bandwidth: 10 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
Y	18650	1855.0	-24.59	44.70	20.11	102.57	H
	18900	1880.0	-24.63	44.70	20.07	101.62	
	19150	1905.0	-24.48	44.57	20.09	102.16	
	18650	1855.0	-30.15	44.27	14.12	25.82	V
	18900	1880.0	-30.86	44.87	14.01	25.18	
	19150	1905.0	-30.58	44.61	14.03	25.31	
Channel Bandwidth: 10 MHz / 16QAM							
Y	18650	1855.0	-25.63	44.70	19.07	80.72	H
	18900	1880.0	-25.69	44.70	19.01	79.62	
	19150	1905.0	-25.49	44.57	19.08	80.97	
	18650	1855.0	-31.24	44.27	13.03	20.09	V
	18900	1880.0	-31.87	44.87	13.00	19.95	
	19150	1905.0	-31.46	44.61	13.15	20.67	

LTE Band 2							
Channel Bandwidth: 15 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Y	18675	1857.5	-24.62	44.70	20.08	101.86	H
	18900	1880.0	-24.66	44.70	20.04	100.93	
	19125	1902.5	-24.50	44.57	20.07	101.70	
	18675	1857.5	-30.22	44.27	14.05	25.41	V
	18900	1880.0	-30.79	44.87	14.08	25.59	
	19125	1902.5	-30.60	44.61	14.01	25.19	
Channel Bandwidth: 15 MHz / 16QAM							
Y	18675	1857.5	-25.64	44.70	19.06	80.54	H
	18900	1880.0	-25.63	44.70	19.07	80.72	
	19125	1902.5	-25.54	44.57	19.03	80.04	
	18675	1857.5	-31.22	44.27	13.05	20.18	V
	18900	1880.0	-31.74	44.87	13.13	20.56	
	19125	1902.5	-31.56	44.61	13.05	20.20	

LTE Band 2							
Channel Bandwidth: 20 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Y	18700	1860.0	-24.56	44.70	20.14	103.28	H
	18900	1880.0	-24.70	44.70	20.00	100.00	
	19100	1900.0	-24.49	44.57	20.08	101.93	
	18700	1860.0	-30.16	44.27	14.11	25.76	V
	18900	1880.0	-30.74	44.87	14.13	25.88	
	19100	1900.0	-30.56	44.61	14.05	25.43	
Channel Bandwidth: 20 MHz / 16QAM							
Y	18700	1860.0	-25.63	44.70	19.07	80.72	H
	18900	1880.0	-25.65	44.70	19.05	80.35	
	19100	1900.0	-25.54	44.57	19.03	80.04	
	18700	1860.0	-31.22	44.27	13.05	20.18	V
	18900	1880.0	-31.68	44.87	13.19	20.84	
	19100	1900.0	-31.45	44.61	13.16	20.72	

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stabiliity Measurement

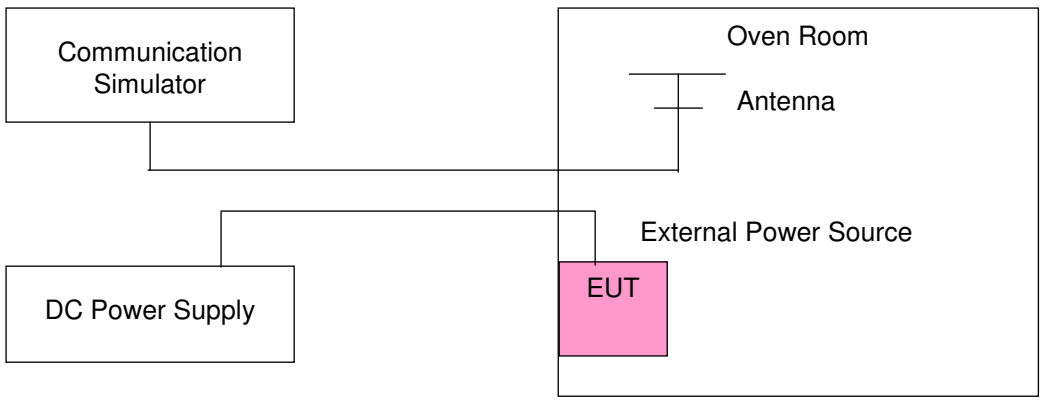
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

4.2.2 Test Procedure

a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5 ℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.2.3 Test Setup



4.2.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	Frequency Error (ppm)						Limit (ppm)
	LTE Band 2						
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
3.85	0.0015	0.0016	0.0021	0.0015	0.0017	0.0010	2.5
3.2725	0.0015	0.0021	0.0016	0.0015	0.0018	0.0005	2.5
4.4275	0.0007	0.0006	0.0013	0.0019	0.0015	0.0012	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.2725 Vdc to 4.4275 Vdc.

Frequency Error vs. Temperature

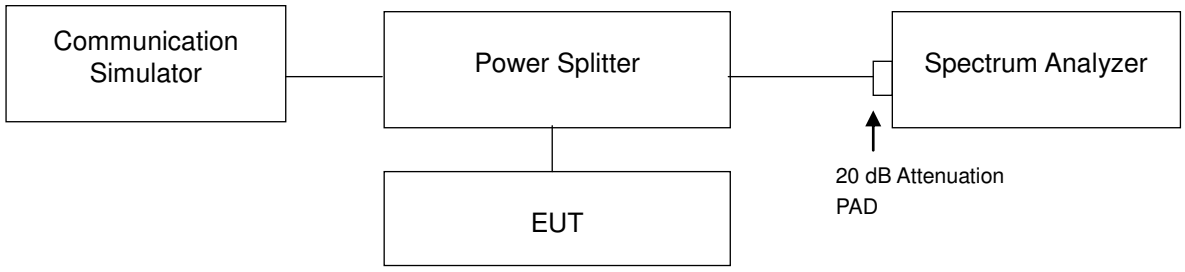
Temp. (℃)	Frequency Error (ppm)						Limit (ppm)
	LTE Band 2						
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
-30	0.0019	0.0015	0.0012	0.0019	0.0010	0.0011	2.5
-20	0.0005	0.0018	0.0016	0.0021	0.0018	0.0006	2.5
-10	0.0011	0.0020	0.0020	0.0015	0.0016	0.0020	2.5
0	0.0011	0.0013	0.0005	0.0015	0.0006	0.0019	2.5
10	0.0013	0.0006	0.0015	0.0009	0.0013	0.0017	2.5
20	-0.0010	-0.0018	-0.0005	-0.0014	-0.0010	-0.0008	2.5
30	-0.0017	-0.0006	-0.0011	-0.0016	-0.0012	-0.0016	2.5
40	-0.0016	-0.0012	-0.0013	-0.0019	-0.0016	-0.0020	2.5
50	-0.0010	-0.0011	-0.0010	-0.0005	-0.0019	-0.0014	2.5
55	-0.0008	-0.0017	-0.0005	-0.0020	-0.0018	-0.0011	2.5

4.3 Occupied Bandwidth Measurement

4.3.1 Test Procedure

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.3.2 Test Setup

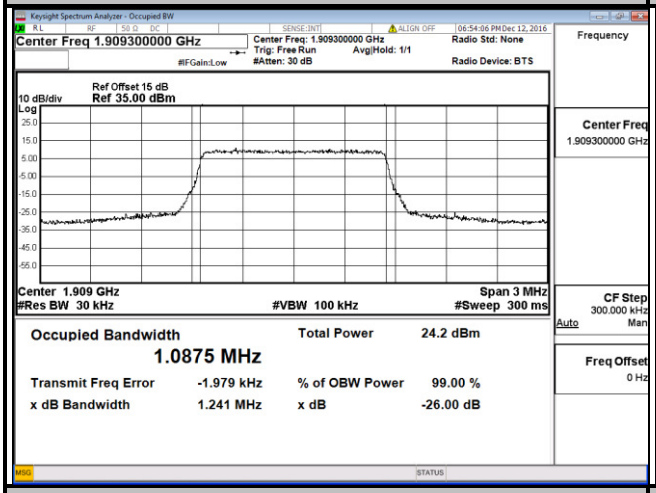


4.3.3 Test Result

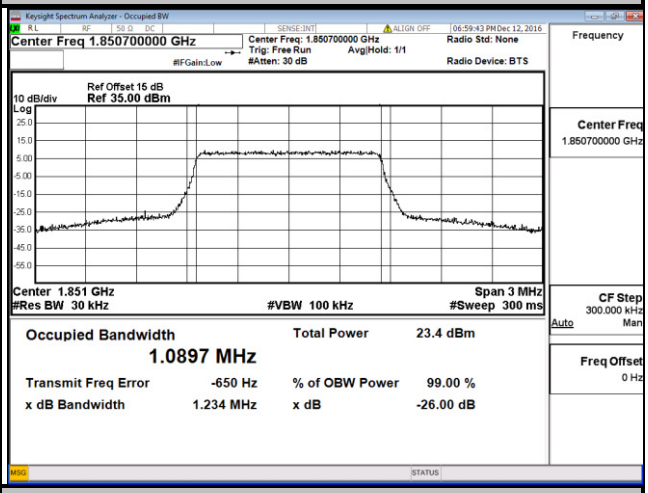
LTE Band 2							
Channel Bandwidth: 1.4 MHz				Channel Bandwidth: 3 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	1.0873	1.0897	18615	1851.5	2.7004	2.6887
18900	1880.0	1.0871	1.0887	18900	1880.0	2.7001	2.7026
19193	1909.3	1.0875	1.0888	19185	1908.5	2.7004	2.7007

Spectrum Plot of Worst Value

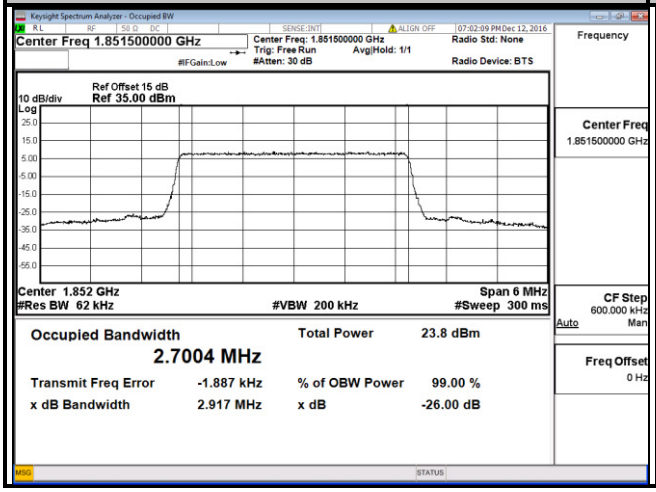
1.4 MHz / QPSK



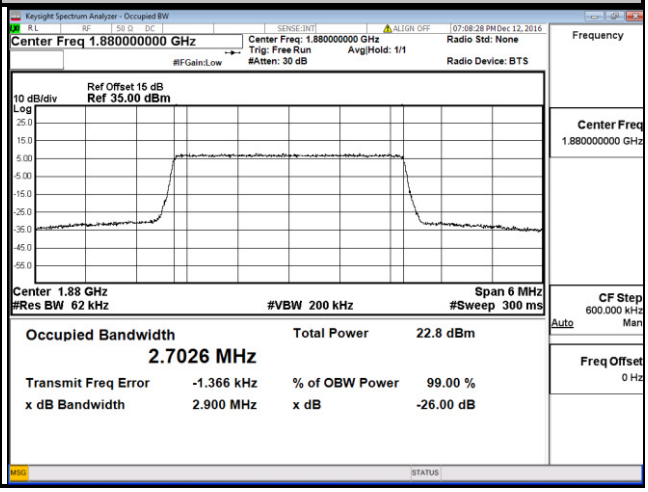
1.4 MHz / 16QAM



3 MHz / QPSK



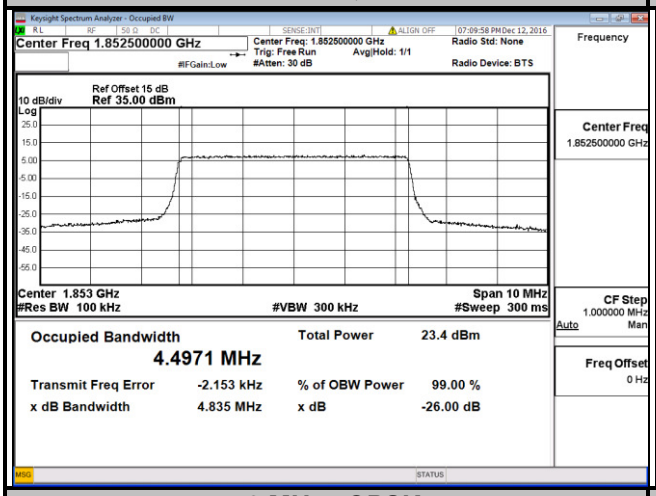
3 MHz / 16QAM



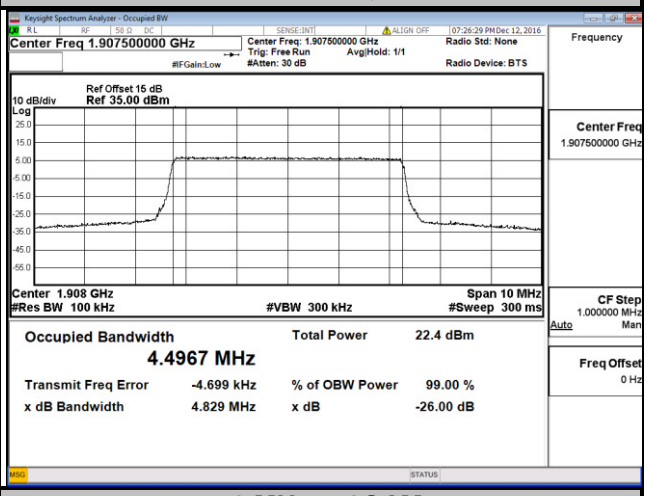
LTE Band 2							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18625	1852.5	4.4971	4.4936	18650	1855.0	8.9831	8.9758
18900	1880.0	4.4947	4.4941	18900	1880.0	8.9819	8.9780
19175	1907.5	4.4911	4.4967	19150	1905.0	8.9749	8.9743

Spectrum Plot of Worst Value

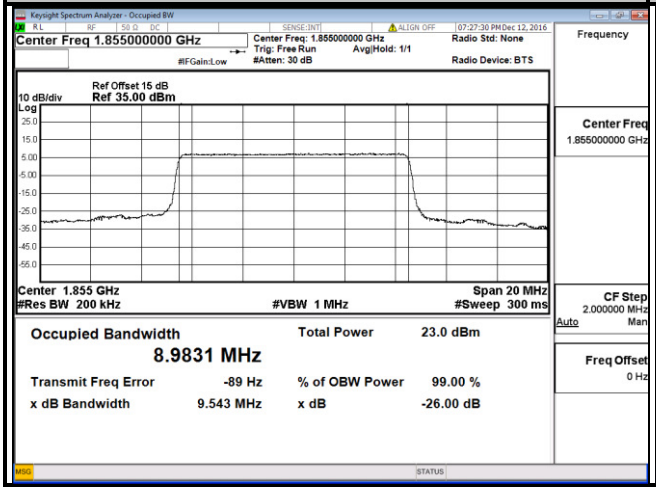
5 MHz / QPSK



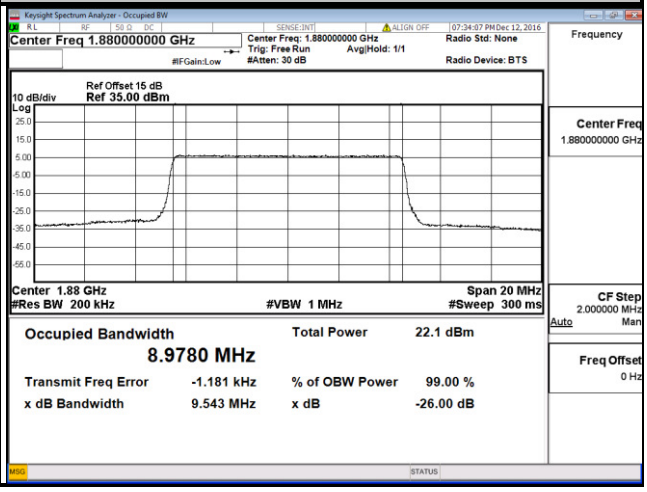
5 MHz / 16QAM



10 MHz / QPSK



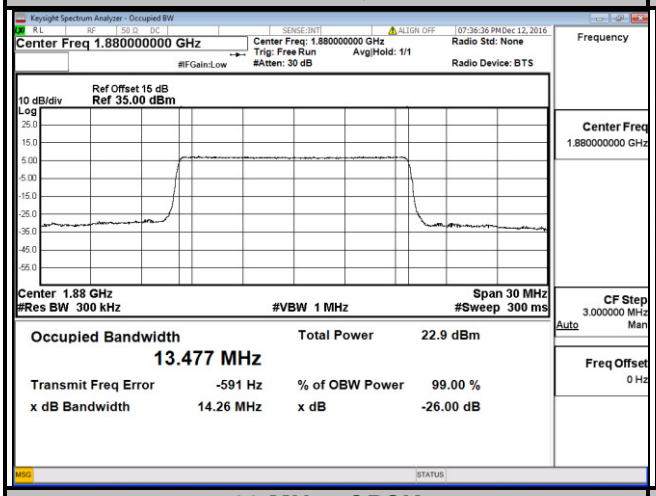
10 MHz / 16QAM



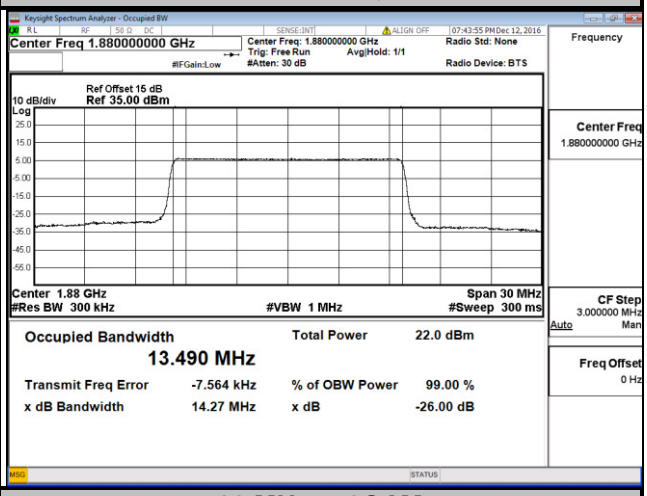
LTE Band 2							
Channel Bandwidth: 15 MHz				Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18675	1857.5	13.4630	13.4640	18700	1860.0	17.9600	17.9590
18900	1880.0	13.4770	13.4900	18900	1880.0	17.9970	17.9880
19125	1902.5	13.4660	13.4600	19100	1900.0	17.9450	17.9380

Spectrum Plot of Worst Value

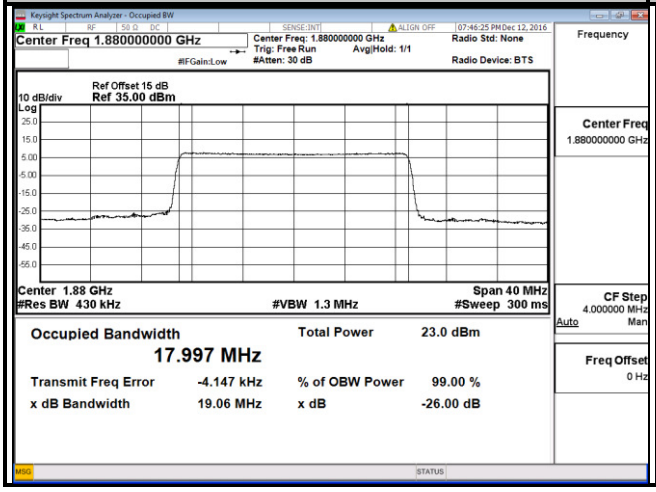
15 MHz / QPSK



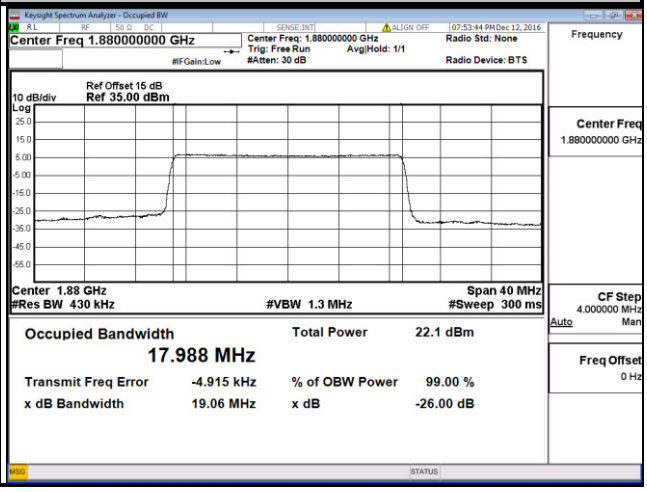
15 MHz / 16QAM



20 MHz / QPSK



20 MHz / 16QAM

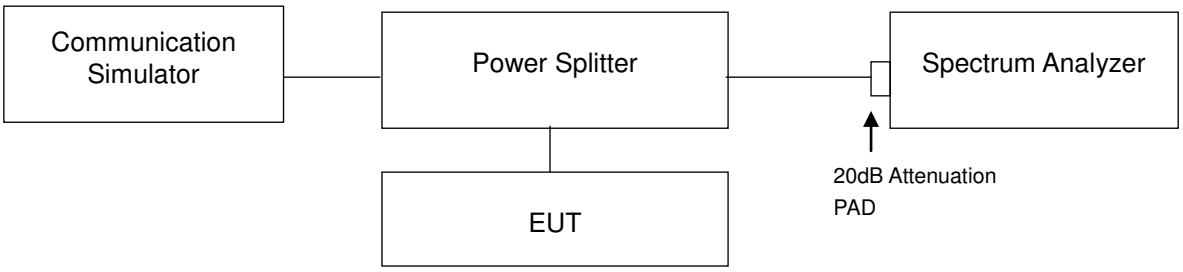


4.4 Band Edge Measurement

4.4.1 Limits of Band Edge Measurement

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. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

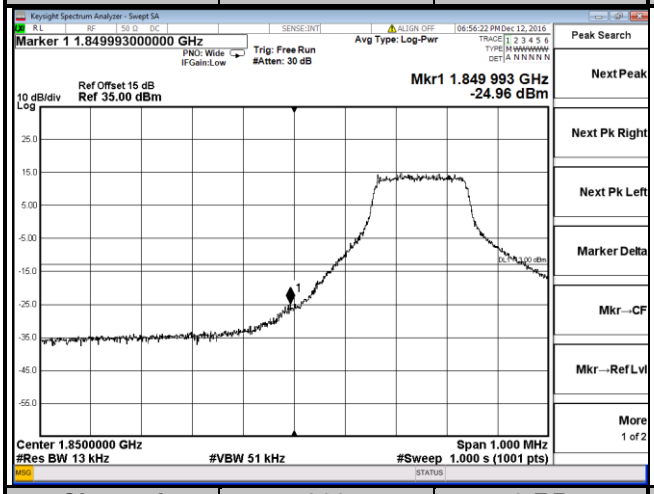
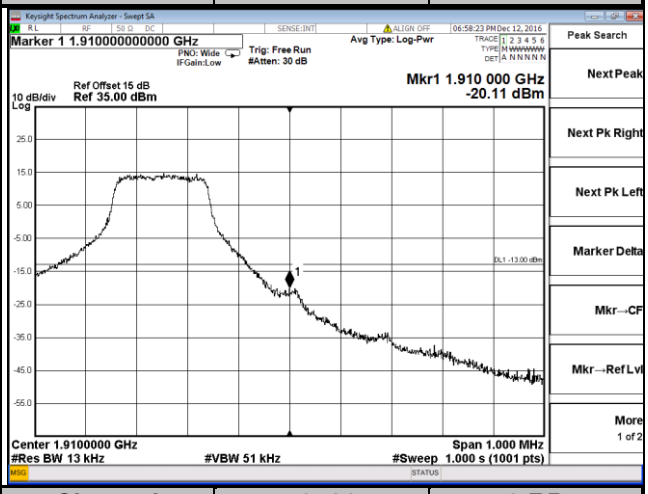
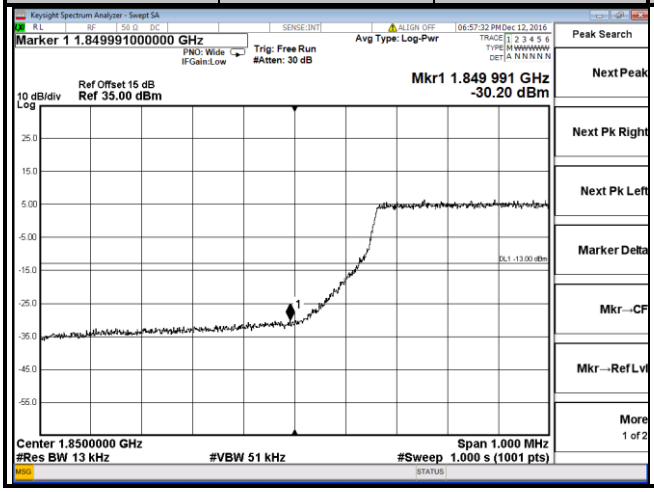
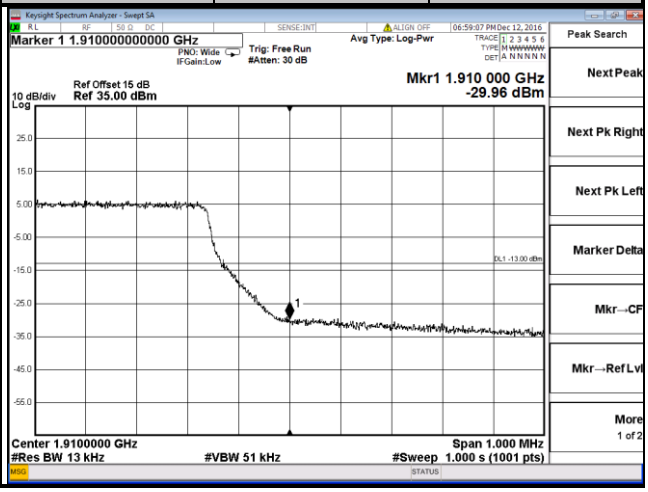
4.4.2 Test Setup

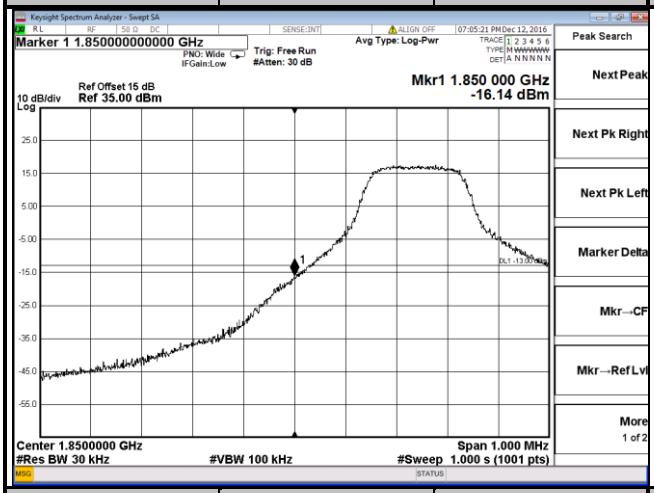
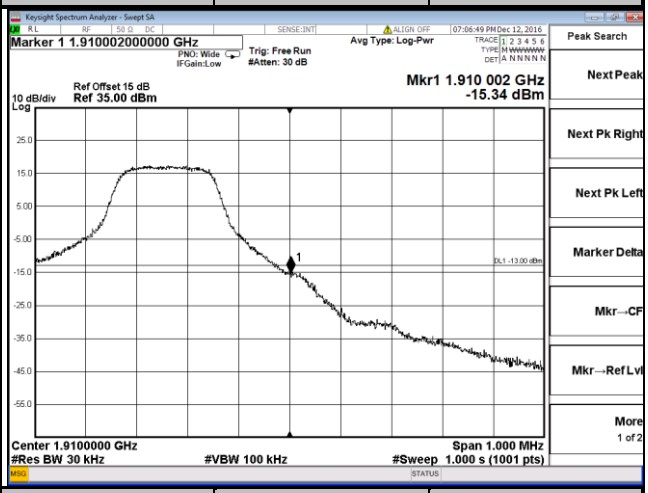
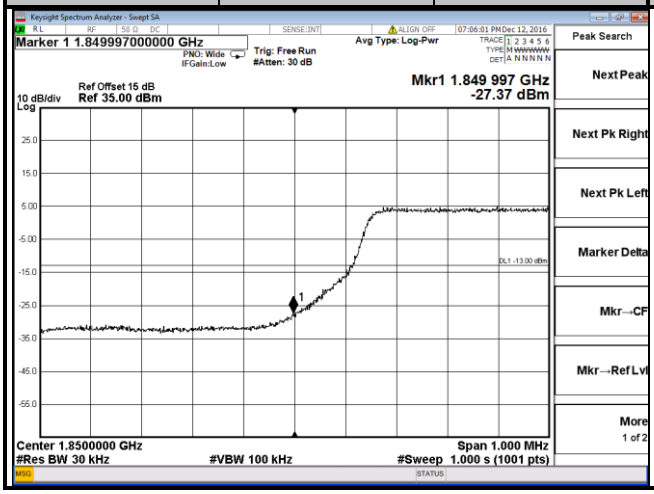
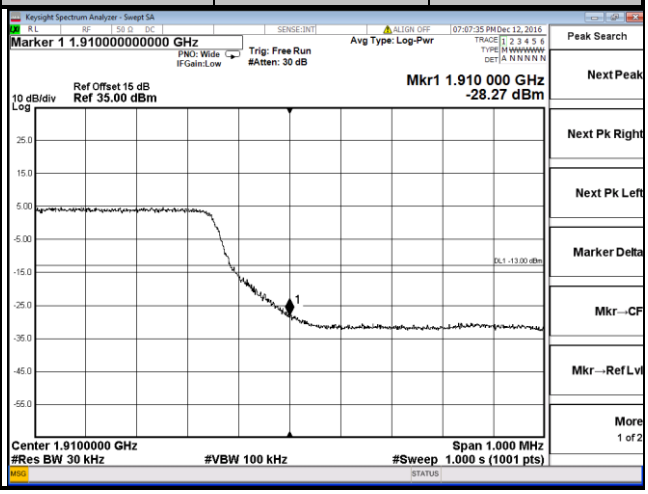


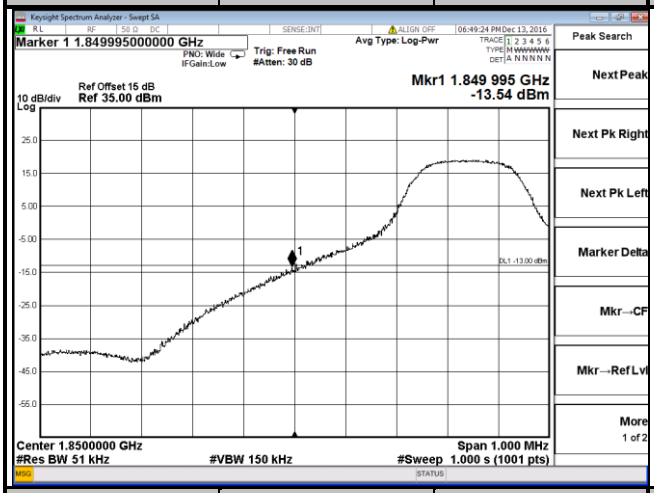
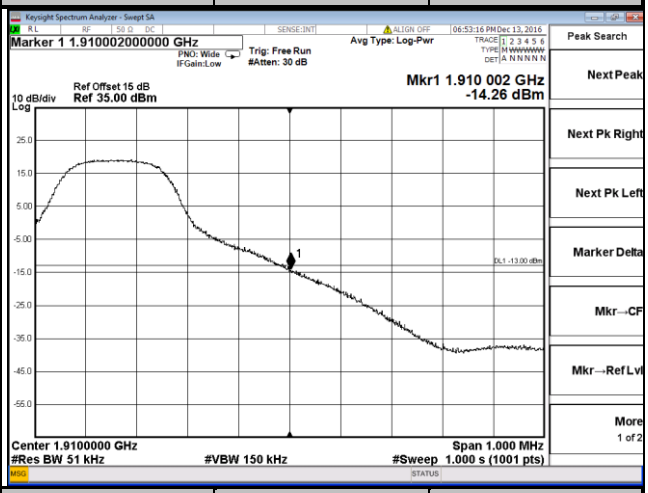
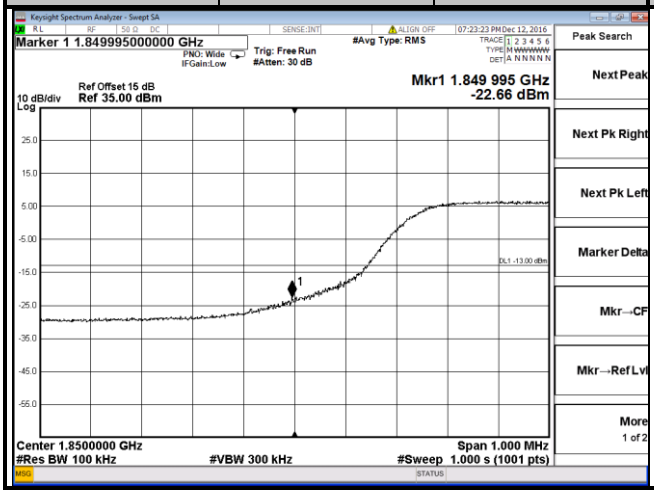
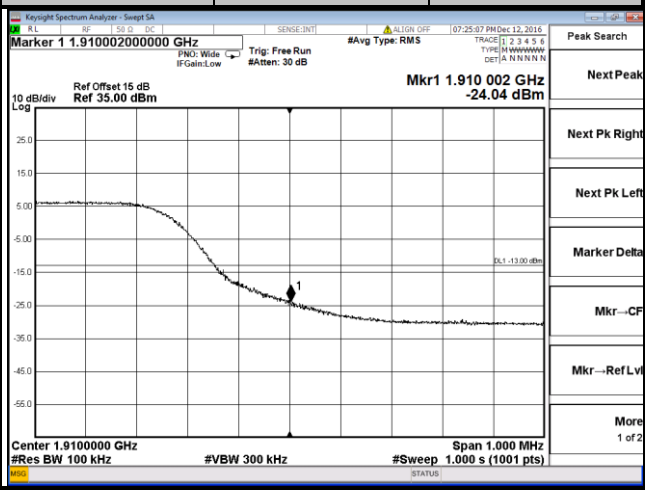
4.4.3 Test Procedures

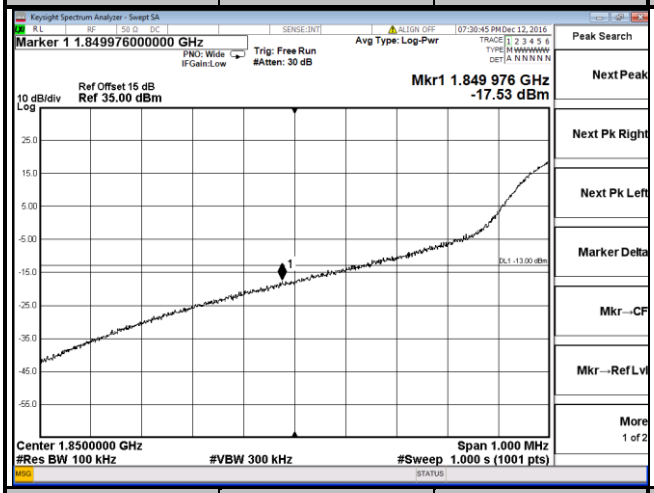
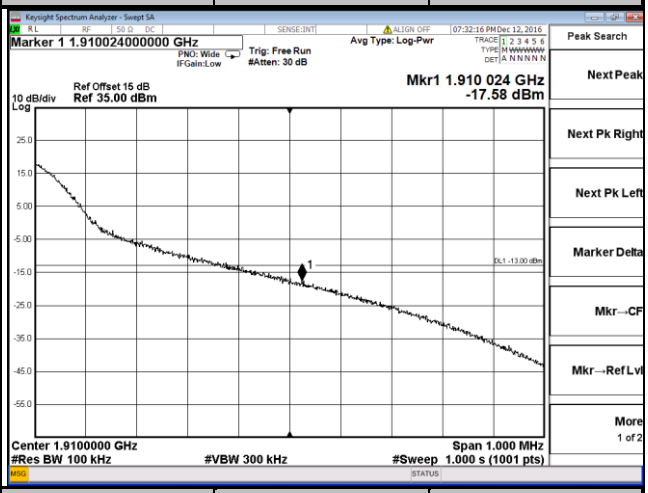
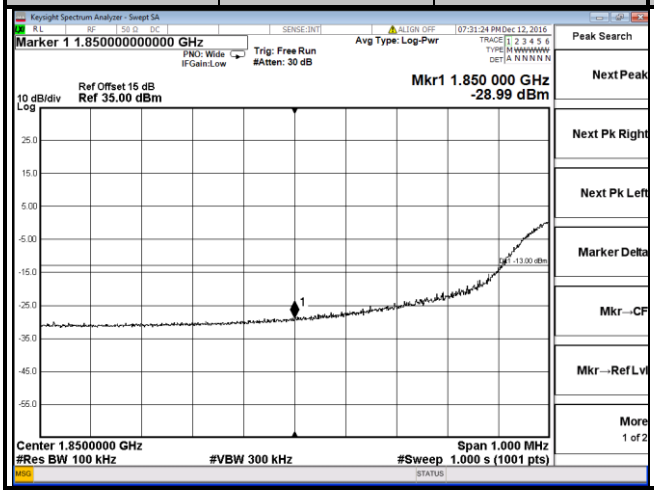
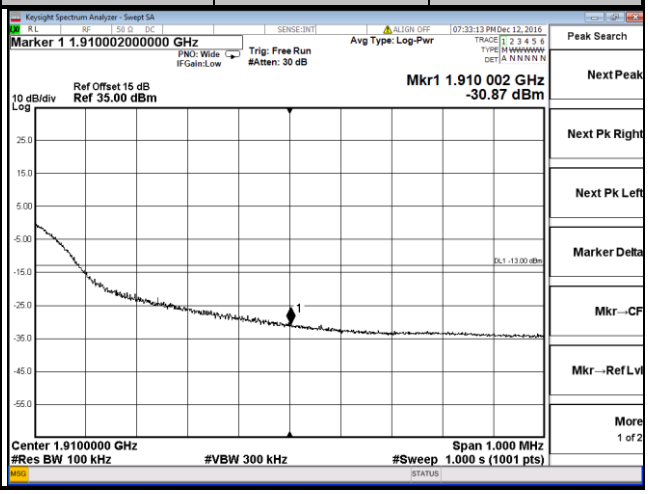
a. All measurements were done at low and high operational frequency range.
b. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 13 kHz and VB of the spectrum is 51 kHz (LTE Bandwidth 1.4 MHz).
c. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 30 kHz and VB of the spectrum is 100 kHz (LTE Bandwidth 3 MHz).
d. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (LTE Bandwidth 5 MHz/10 MHz).
e. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 150 kHz and VB of the spectrum is 470 kHz (LTE Bandwidth 15 MHz).
f. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 180 kHz and VB of the spectrum is 560 kHz (LTE Bandwidth 20 MHz).
g. Record the max trace plot into the test report.

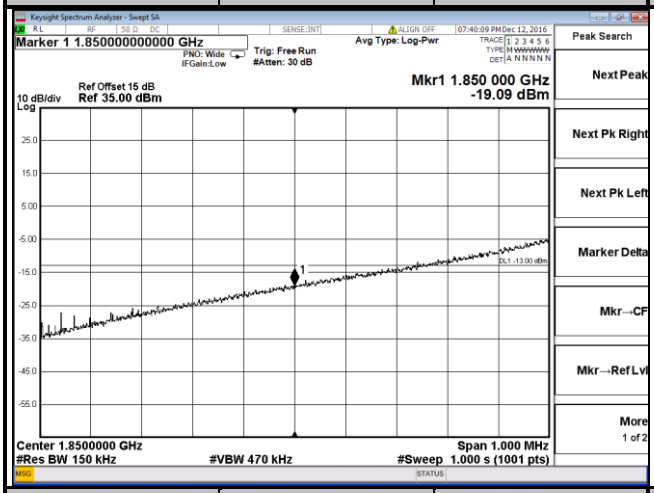
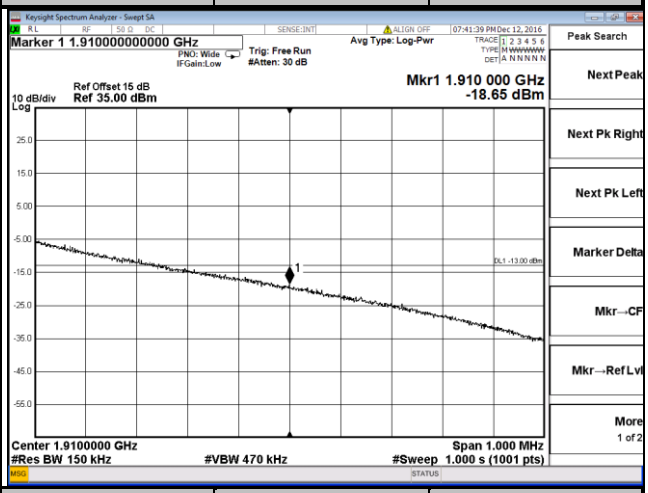
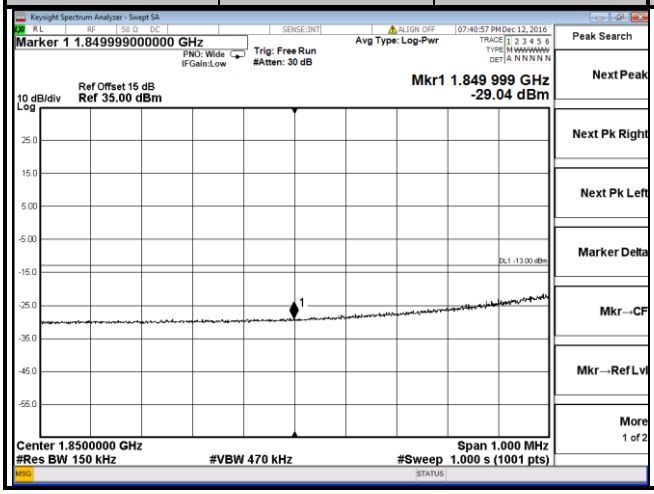
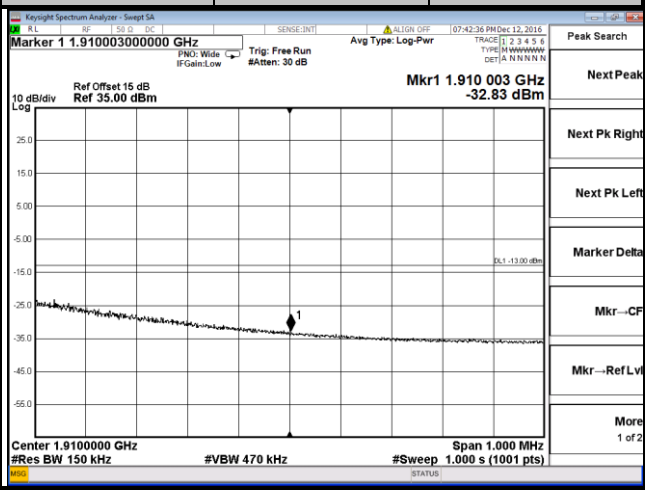
4.4.4 Test Results

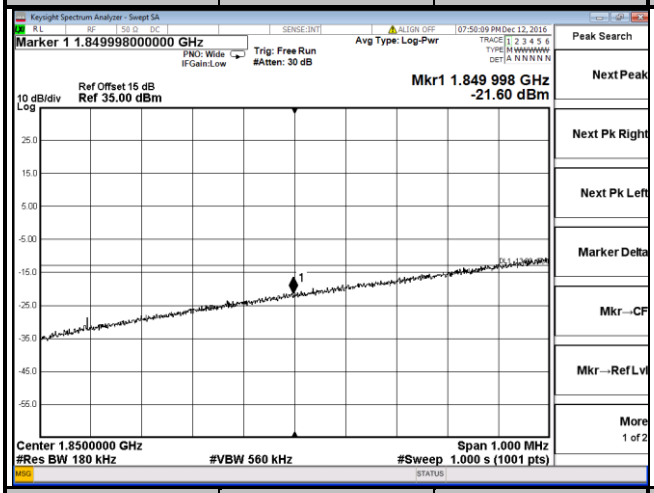
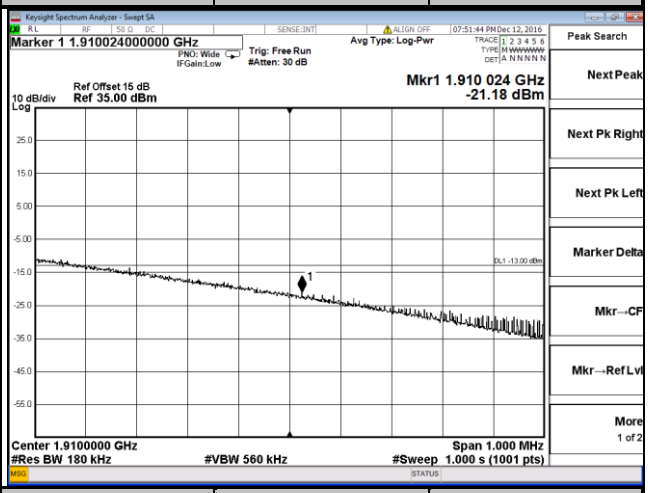
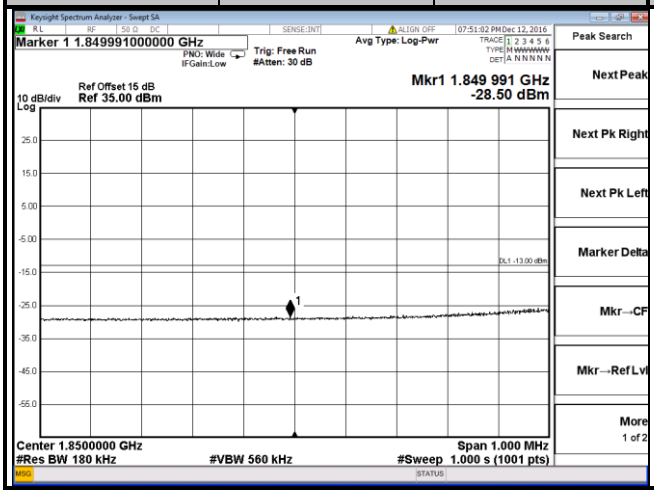
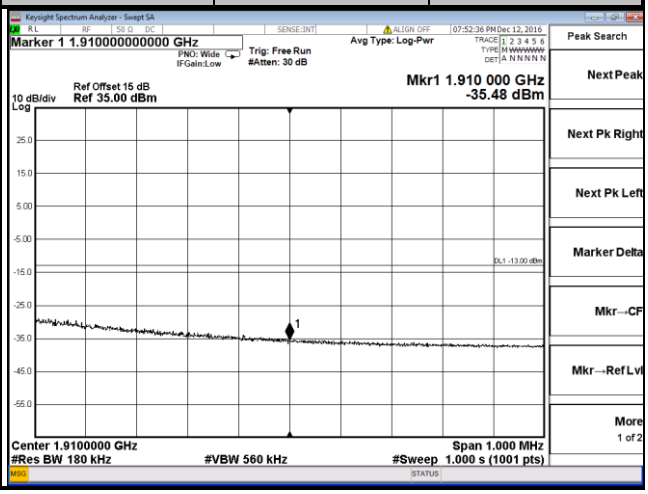
LTE Band 2					
Channel Bandwidth: 1.4 MHz					
Channel	18607	1 RB	Channel	19193	1 RB
					
Channel	18607	6 RB	Channel	19193	6 RB
					

LTE Band 2					
Channel Bandwidth: 3 MHz					
Channel	18615	1 RB	Channel	19185	1 RB
					
Channel	18615	15 RB	Channel	19185	15 RB
					

LTE Band 2					
Channel Bandwidth: 5 MHz					
Channel	18625	1 RB	Channel	19175	1 RB
					
Channel	18625	25 RB	Channel	19175	25 RB
					

LTE Band 2					
Channel Bandwidth: 10 MHz					
Channel	18650	1 RB	Channel	19150	1 RB
					
Channel	18650	50 RB	Channel	19150	50 RB
					

LTE Band 2					
Channel Bandwidth: 15 MHz					
Channel	18675	1 RB	Channel	19125	1 RB
					
Channel	18675	75 RB	Channel L	19125	75 RB
					

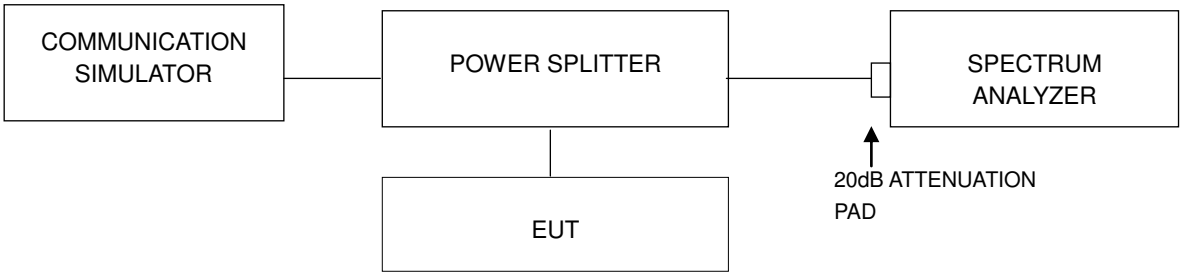
LTE Band 2					
Channel Bandwidth: 20 MHz					
Channel	18700	1 RB	Channel	19100	1 RB
					
Channel	18700	100 RB	Channel	19100	100 RB
					

4.5 Peak to Average Ratio

4.5.1 Limits of Peak to Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

4.5.2 Test Setup



4.5.3 Test Procedures

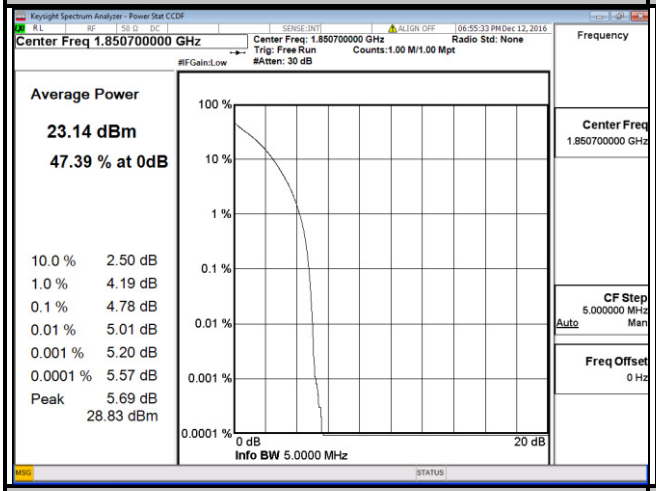
1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

4.5.4 Test Results

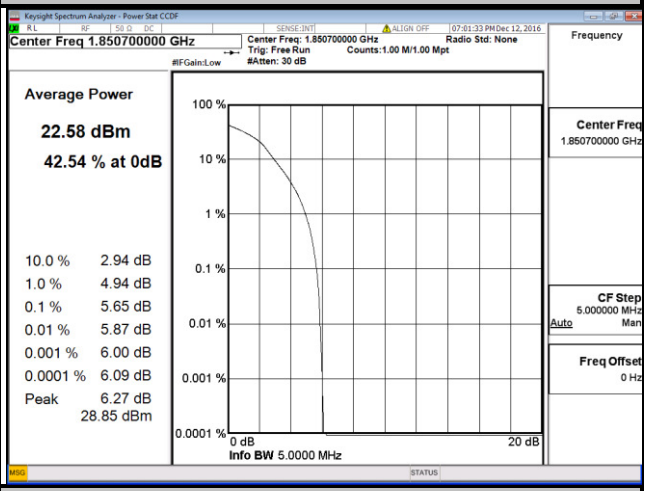
LTE Band 2							
Channel Bandwidth: 1.4 MHz				Channel Bandwidth: 3 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	4.78	5.65	18615	1851.5	4.55	5.53
18900	1880.0	4.66	5.47	18900	1880.0	4.44	5.36
19193	1909.3	4.20	5.07	19185	1908.5	4.01	4.92

Spectrum Plot of Worst Value

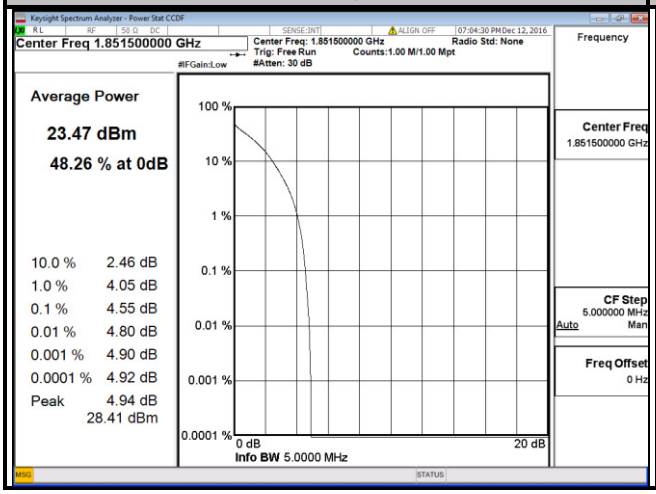
1.4 MHz / QPSK



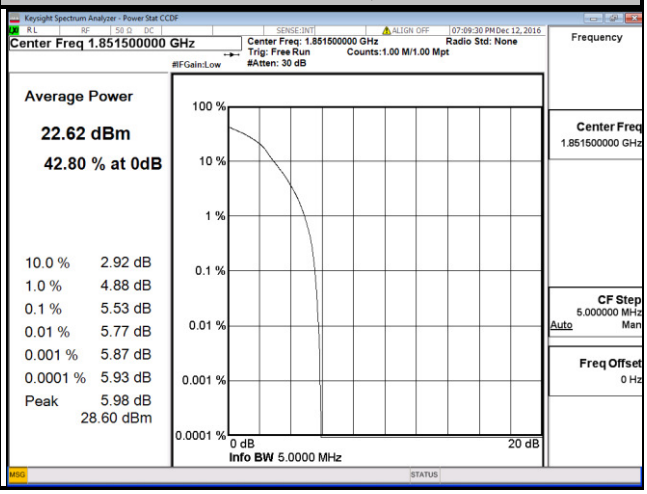
1.4 MHz / 16QAM



3 MHz / QPSK



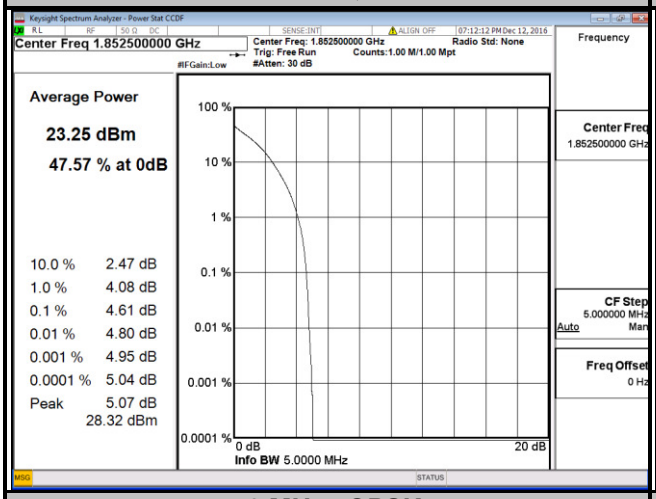
3 MHz / 16QAM



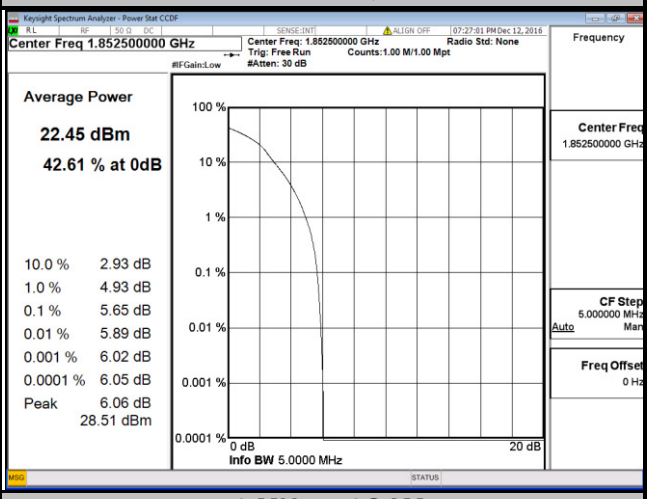
LTE Band 2							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18625	1852.5	4.61	5.65	18650	1855.0	4.65	5.56
18900	1880.0	4.38	5.44	18900	1880.0	4.36	5.28
19175	1907.5	3.93	4.98	19150	1905.0	3.95	4.86

Spectrum Plot of Worst Value

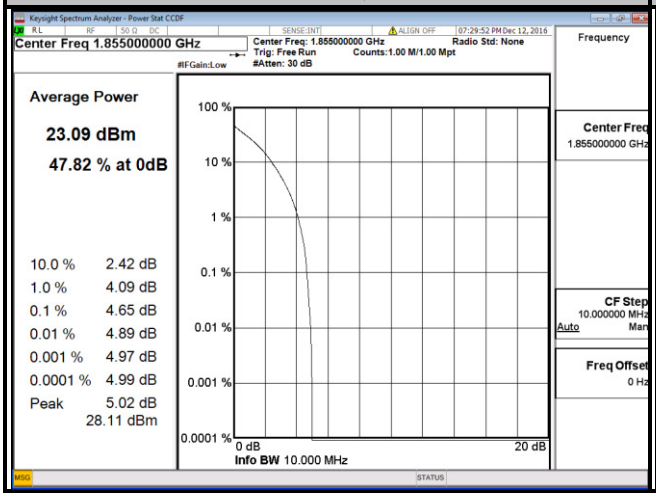
5 MHz / QPSK



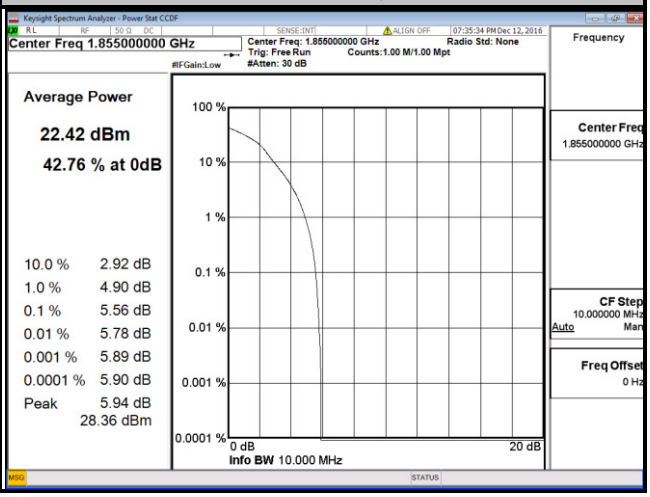
5 MHz / 16QAM



10 MHz / QPSK



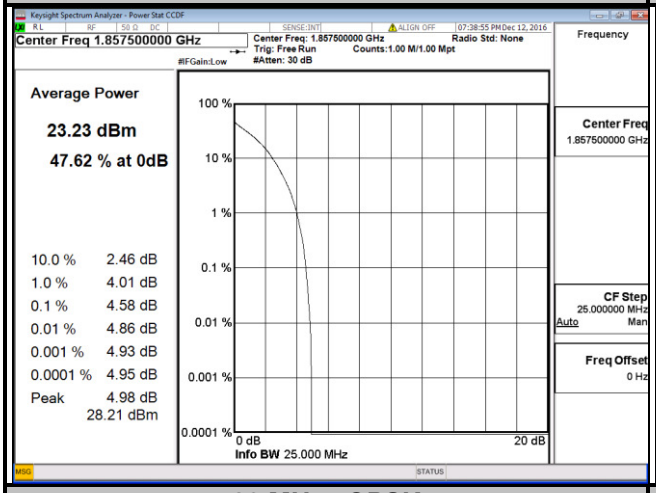
10 MHz / 16QAM



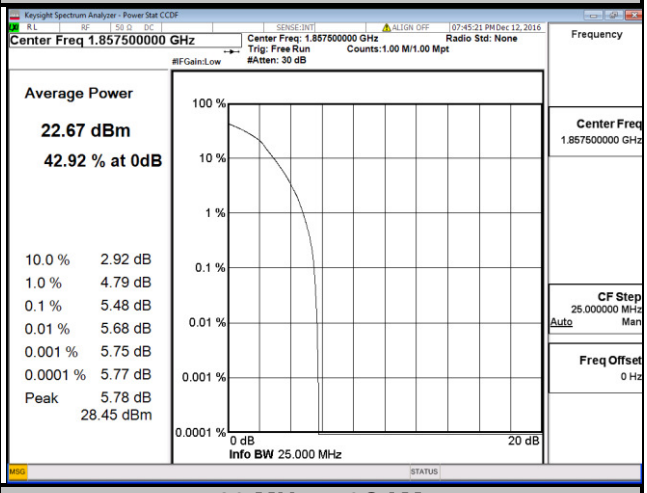
LTE Band 2							
Channel Bandwidth: 15 MHz				Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18675	1857.5	4.58	5.48	18700	1860.0	4.61	5.51
18900	1880.0	4.19	5.18	18900	1880.0	4.10	4.91
19125	1902.5	4.27	5.20	19100	1900.0	4.57	5.50

Spectrum Plot of Worst Value

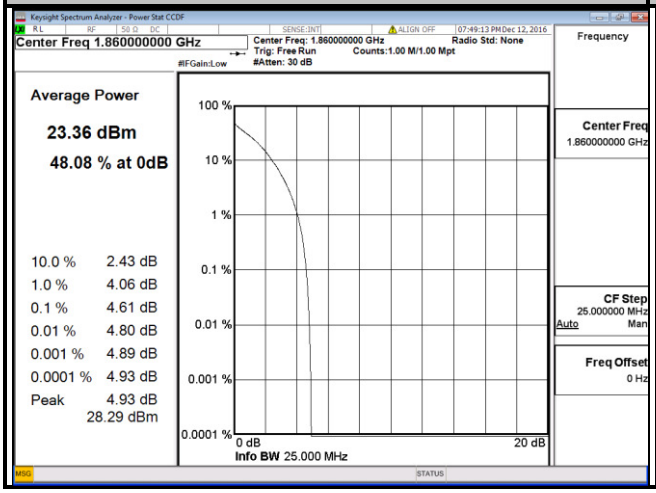
15 MHz / QPSK



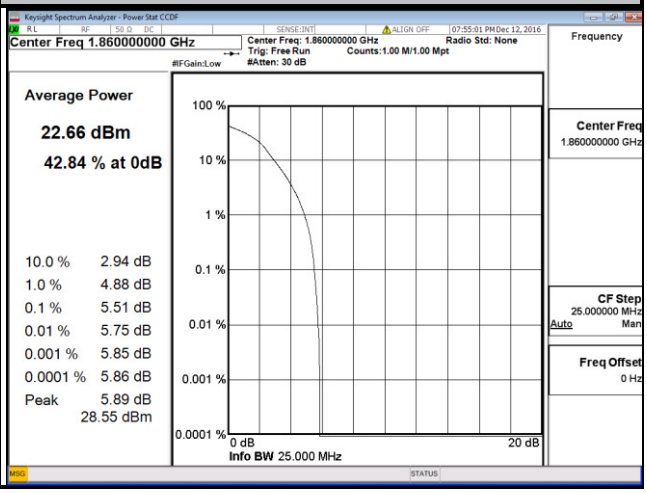
15 MHz / 16QAM



20 MHz / QPSK



20 MHz / 16QAM

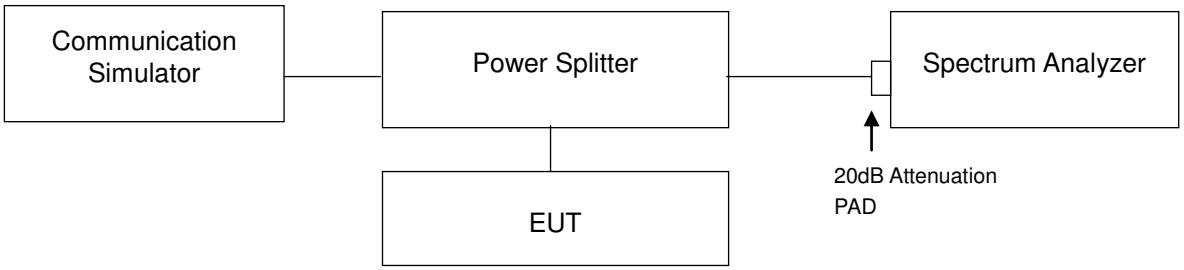


4.6 Conducted Spurious Emissions

4.6.1 Limits of Conducted Spurious Emissions Measurement

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. The emission limit equal to –13 dBm.

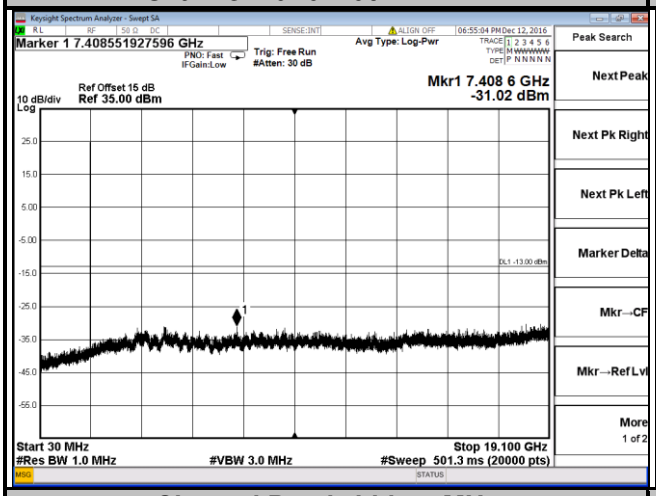
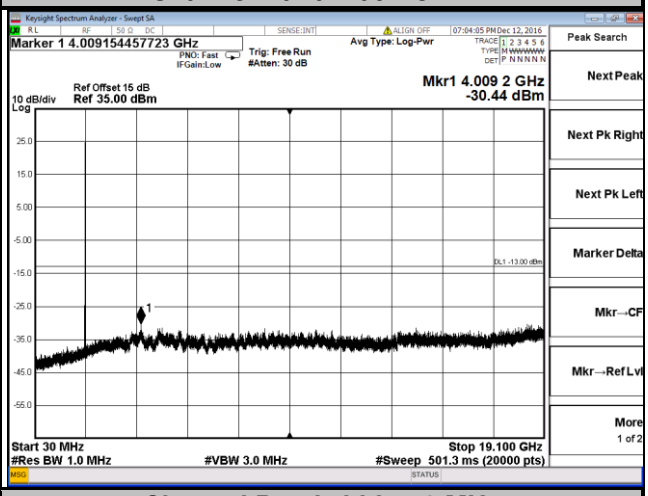
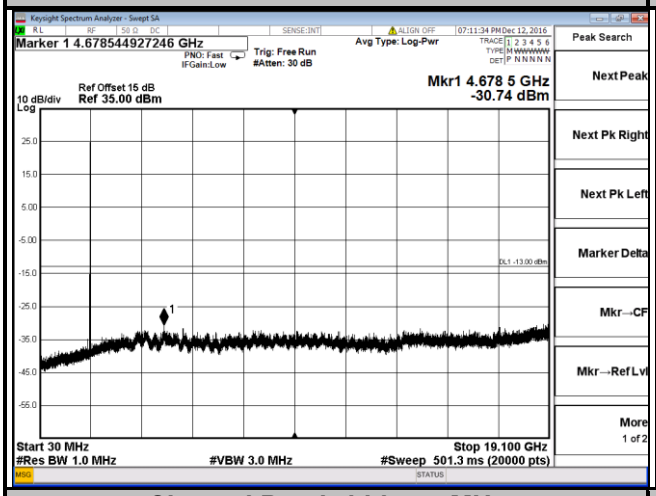
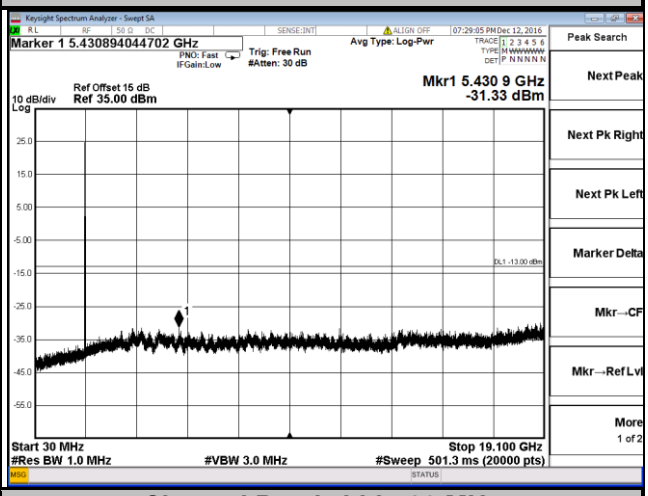
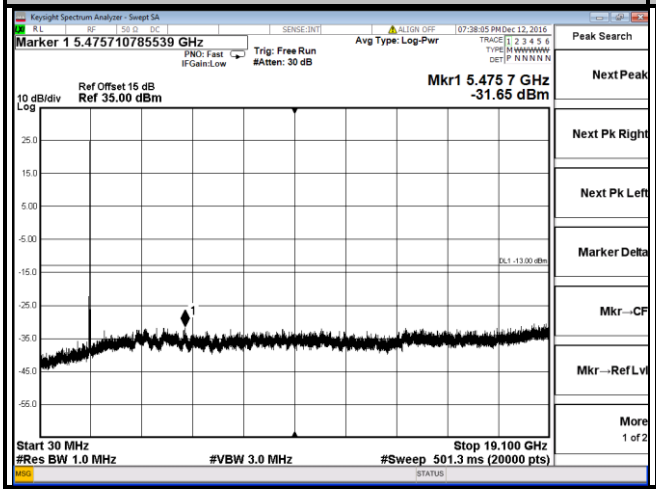
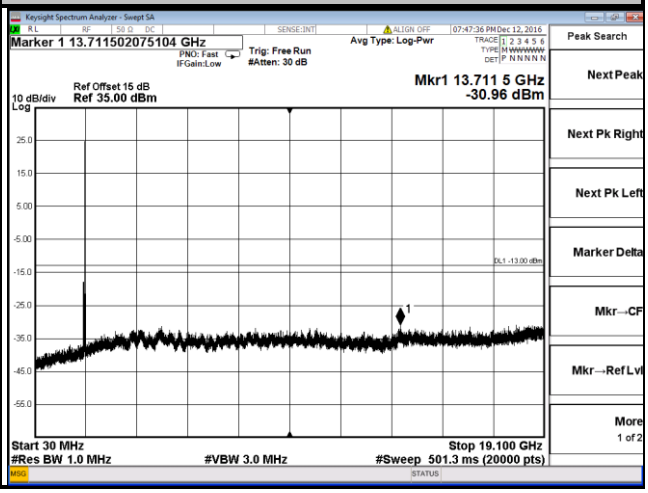
4.6.2 Test Setup



4.6.3 Test Procedure

a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
b. Measuring frequency range is from 9 kHz to 9 GHz. 20 dB attenuation pad is connected with spectrum. RBW=1 MHz and VBW=3 MHz is used for conducted emission measurement.

4.6.4 Test Results

LTE Band 2	
Channel 18900	
Channel Bandwidth: 1.4 MHz	Channel Bandwidth: 3 MHz
	
Channel Bandwidth: 5 MHz	Channel Bandwidth: 10 MHz
	
Channel Bandwidth: 15 MHz	Channel Bandwidth: 20 MHz
	

4.7 Radiated Emission Measurement

4.7.1 Limits of Radiated Emission Measurement

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. The emission limit is equal to –13 dBm.

4.7.2 Test Procedure

a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step a. Record the power level of S.G.

c. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.

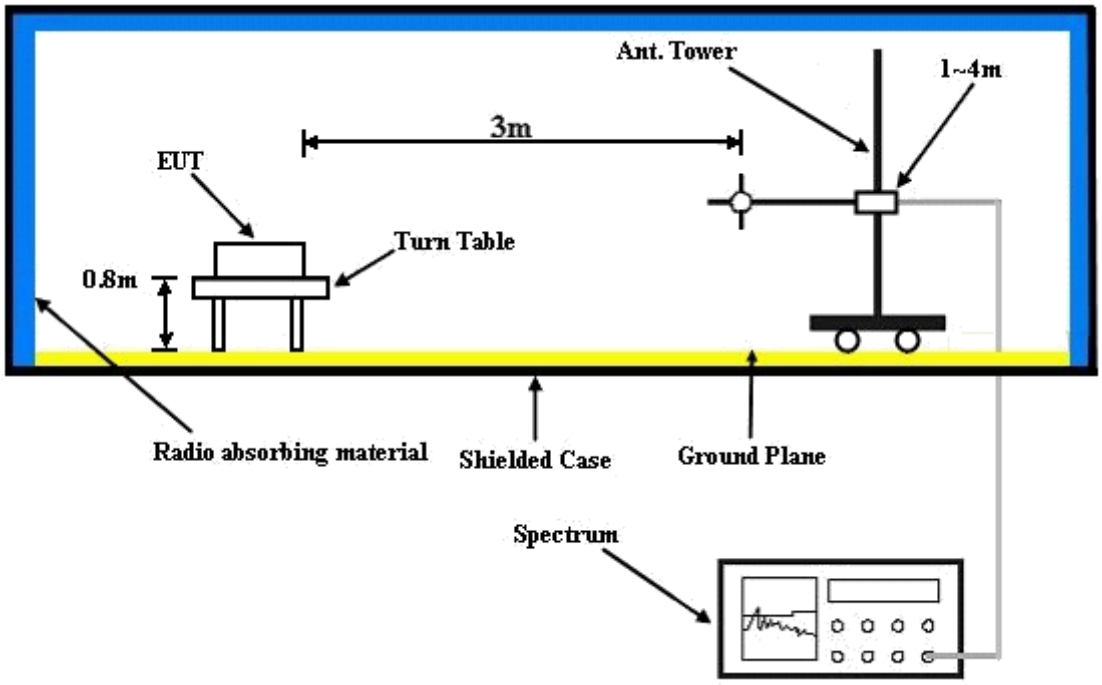
d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15 dBi.

NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.

4.7.3 Deviation from Test Standard

No deviation.

4.7.4 Test Setup

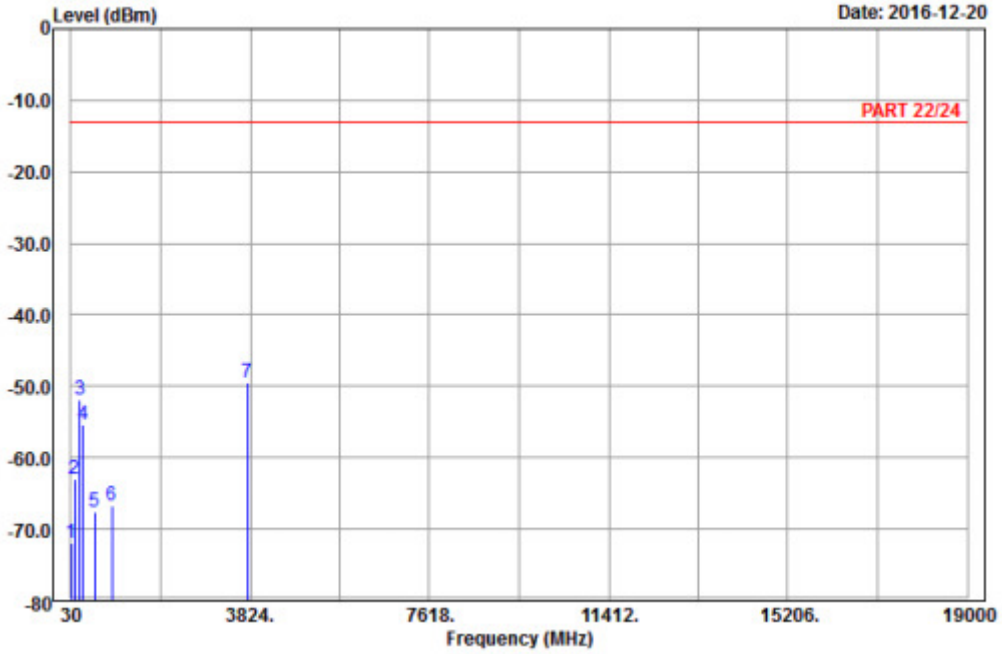


For the actual test configuration, please refer to the attached file (Test Setup Photo).

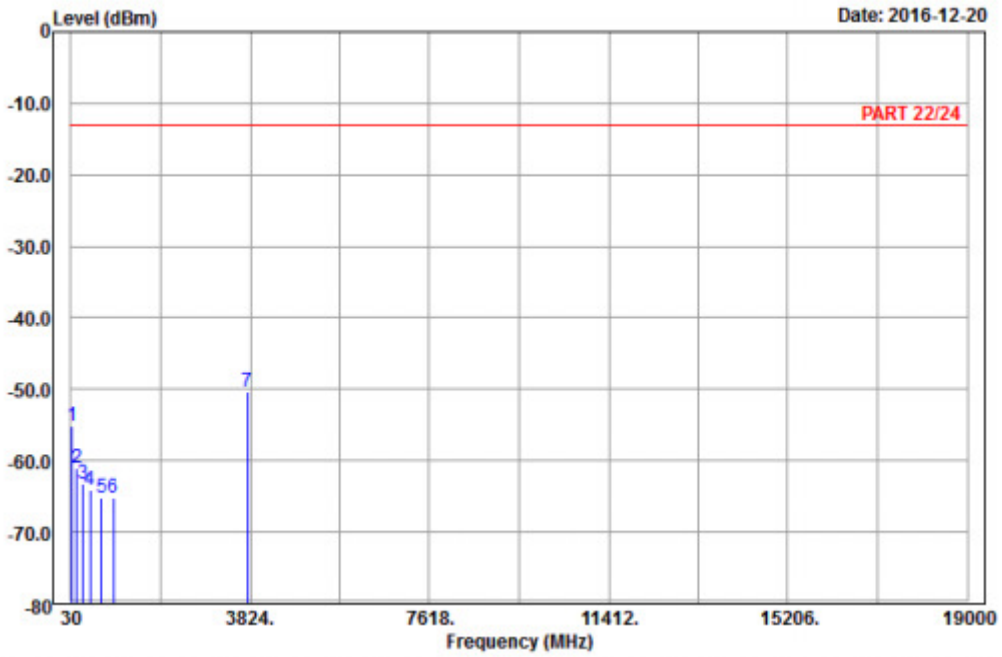
4.7.5 Test Results

LTE Band 2

Channel Bandwidth: 20 MHz / QPSK



Frequency (MHz)	ERP(dBm)	Limit(dBm)	Over Limit (dB)	SPA. Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
42.15	-69.71	-13	-56.71	-60.87	-57.22	0.48	-12.01	H	Pass
105.33	-60.89	-13	-47.89	-53.62	-51.51	0.91	-8.47	H	Pass
213.87	-49.63	-13	-36.63	-45.79	-49.62	1.23	1.22	H	Pass
282.99	-53.26	-13	-40.26	-49.60	-58.43	1.32	6.49	H	Pass
534.5	-65.48	-13	-52.48	-64.83	-69.94	1.63	6.09	H	Pass
902.7	-64.57	-13	-51.57	-69.74	-68.56	2.02	6.01	H	Pass
3760	-49.56	-13	-36.56	-65.70	-52.44	5.72	8.60	H	Pass



Frequency (MHz)	ERP(dBm)	Limit(dBm)	Over Limit (dB)	SPA. Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
50.25	-52.99	-13	-39.99	-41.09	-40.45	0.49	-12.05	V	Pass
160.68	-58.79	-13	-45.79	-53.37	-59.42	0.96	1.59	V	Pass
286.23	-61.01	-13	-48.01	-57.33	-60.53	1.14	0.66	V	Pass
426.7	-61.85	-13	-48.85	-60.66	-67.65	1.48	7.28	V	Pass
684.3	-63.00	-13	-50.00	-64.85	-67.58	1.81	6.39	V	Pass
926.5	-62.96	-13	-49.96	-69.17	-66.78	2.19	6.01	V	Pass
3760	-50.38	-13	-37.38	-66.52	-53.26	5.72	8.60	V	Pass

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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