FCC Test Report

(PART 27)

Report No.:	RF161117C09-3
FCC ID:	XHG-R872
Test Model:	R872
Received Date:	Nov. 17, 2016
Test Date:	Jan. 06, 2017 ~ Jan. 18, 2017
Issued Date:	Jan. 24, 2017
Applicant:	Franklin Technology Inc.
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Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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Test Location:	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

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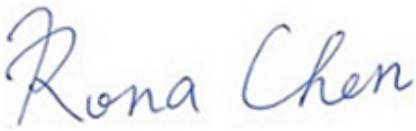
Release Control Record

Issue No.	Description	Date Issued
RF161117C09-3	Original Release	Jan. 24, 2017

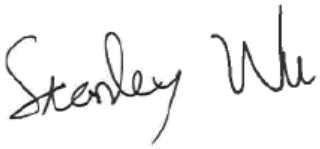
1 Certificate of Conformity

Product:	Mobile Hotspot
Brand:	Franklin
Test Model:	R872
Sample Status:	Production Unit
Applicant:	Franklin Technology Inc.
Test Date:	Jan. 06, 2017 ~ Jan. 18, 2017
Standards:	FCC Part 27, Subpart C, L

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 :  , **Date:** Jan. 24, 2017

Rona Chen / Specialist

Approved by :  , **Date:** Jan. 24, 2017

Stanley Wu / Assistant Manager

2 Summary of Test Results

Applied Standard: FCC Part 27 & Part 2 (LTE 13)			
FCC Clause	**Test Item**	**Result**	**Remarks**
2.1046 27.50(b)(10)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049 27.53(g)	Occupied Bandwidth	Pass	Meet the requirement of limit.
27.50(d)(5)	Peak to Average Ratio	Pass	Meet the requirement of limit.
27.53(g)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 27.53(g)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53(g)(f)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -7.35 dB at 1564.00 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	2.93 dB
	200 MHz ~1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Test Site and Instruments

Description & Manaufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Jan. 21, 2016	Jan. 20, 2017
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 16, 2016	Dec. 15, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 13, 2016	Dec. 12, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 26, 2016	Dec. 27, 2017
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Dec. 12, 2016	Dec. 13, 2017
Double Ridge Guide Horn Antenna EMCO	3115	5619	Dec. 26, 2016	Dec. 27, 2017
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 12, 2016	Dec. 13, 2017
Fixed Attenuator Mini-Circuits	BW-N10W5+	NA	Jul. 08, 2016	Jul. 07, 2017
MXG Vector signal generator Agilent	N5182B	MY53050430	Oct. 19, 2016	Oct. 18, 2017
Preamplifier EMCI	EMC 012645	980115	Oct. 21, 2016	Oct. 20, 2017
Preamplifier EMCI	EMC 184045	980116	Oct. 21, 2016	Oct. 20, 2017
Preamplifier EMCI	EMC 330H	980112	Oct. 21, 2016	Oct. 20, 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 HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 21, 2016	Oct. 20, 2017
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 21, 2016	Oct. 20, 2017
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 21, 2016	Oct. 20, 2017
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA
Fixed Attenuator Mini-Circuits	BW-N10W5+	NA	Jul. 08, 2016	Jul. 07, 2017
Radio Communication Analyzer	MT8820C	6201300640	Aug. 10, 2015	Aug. 09, 2017
Communications Tester-Wireless	8960 Series 10	MY53201073	Jul. 03, 2015	Jul. 02, 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 HwaYa Chamber 10.
3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The FCC Site Registration No. is 690701.
5. The IC Site Registration No. is IC7450F-10.

3 General Information

3.1 General Description of EUT

Product	Mobile Hotspot	
Brand	Franklin	
Test Model	R872	
Status of EUT	Production Unit	
Power Supply Rating	5.0 Vdc (adapter or host equipment) 3.8 Vdc (Li-ion battery)	
Modulation Type	LTE	QPSK, 16QAM
Frequency Range	LTE Band 13 (Channel Bandwidth: 5 MHz)	779.5 ~ 784.5 MHz
	LTE Band 13 (Channel Bandwidth: 10 MHz)	782.0 MHz
Emission Designator	LTE Band 13 (Channel Bandwidth: 5 MHz)	4M49W7D
	LTE Band 13 (Channel Bandwidth: 10 MHz)	8M96W7D
Max. ERP Power	LTE Band 13 (Channel Bandwidth: 5 MHz)	76.91mW
	LTE Band 13 (Channel Bandwidth: 10 MHz)	77.98mW
Antenna Type	Fixed Internal Antenna	
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

Note:

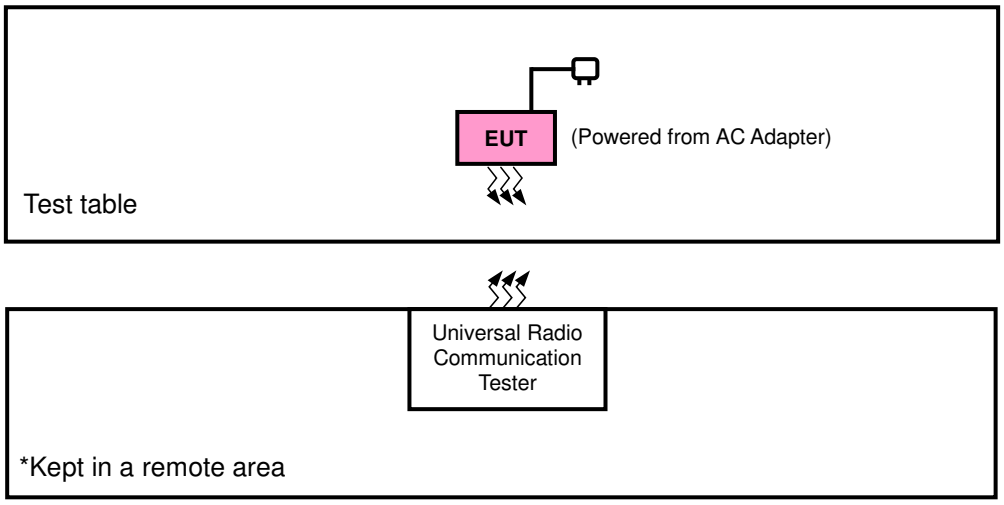
1. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	Franklin Wireless	FWCR900TVL	I/P: 100-240 Vac, 0.3 A O/P: 5 Vdc, 1 A 1.5 m cable non-shielded cable w/o core
Battery	Franklin Wireless	R871	3.8 Vdc, 2450 mAh

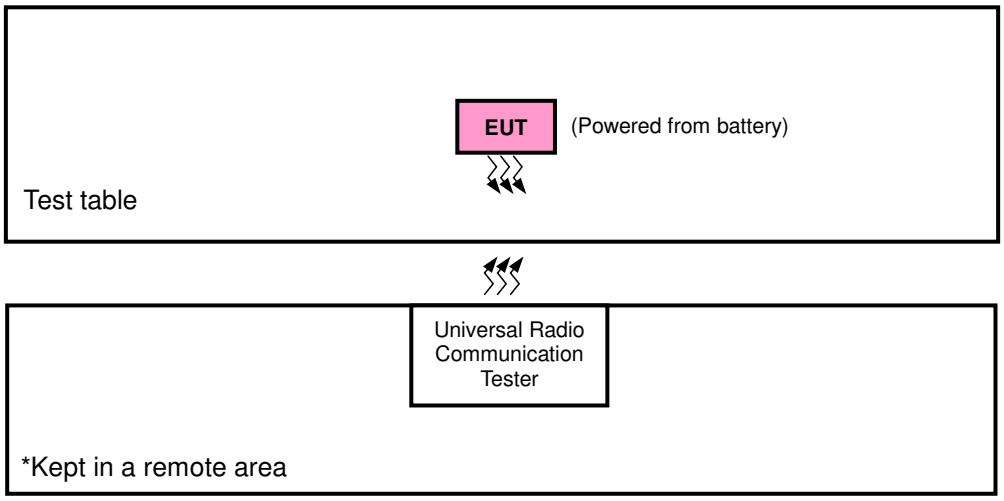
2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test

<Radiated Emission Test>



<E.R.P. / 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	ERP / EIRP	Radiated Emission
LTE Band 13	Y-plane	X-axis

LTE Band 13

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	ERP	23205 to 23255	23205, 23230, 23255	5 MHz	QPSK	1 RB / 12 RB Offset
					16QAM	1 RB / 24 RB Offset
		23230	23230	10 MHz	QPSK	1 RB / 49 RB Offset
					16QAM	1 RB / 24 RB Offset
-	Frequency Stability	23205 to 23255	23205, 23255	5 MHz	QPSK	1 RB / 12 RB Offset
		23230	23230	10 MHz	QPSK	1 RB / 49 RB Offset
-	Occupied Bandwidth	23205 to 23255	23205, 23230, 23255	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		23230	23230	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
-	Peak to Average Ratio	23205 to 23255	23205, 23230, 23255	5 MHz	QPSK, 16QAM	1 RB / 12 RB Offset
		23230	23230	10 MHz	QPSK, 16QAM	1 RB / 49 RB Offset
-	Band Edge	23205 to 23255	23205	5 MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
			23255	5 MHz	QPSK	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		23230	23230	10 MHz	QPSK	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
			23230	10 MHz	QPSK	1 RB / 49 RB Offset
						50 RB / 0 RB Offset
-	Conducted Emission	23205 to 23255	23205, 23230, 23255	5 MHz	QPSK	1 RB / 12 RB Offset
		23230	23230	10 MHz	QPSK	1 RB / 49 RB Offset
-	Radiated Emission	23230	23230	10 MHz	QPSK	1 RB / 0 RB Offset
						50 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
ERP / EIRP	25 deg. C, 65 % RH	3.8 Vdc	Getaz Yang
Frequency Stability	25 deg. C, 65 % RH	3.8 Vdc	Carlos Chen
Occupied Bandwidth	25 deg. C, 65 % RH	3.8 Vdc	Carlos Chen
Band Edge	25 deg. C, 65 % RH	3.8 Vdc	Carlos Chen
Peak to Average Ratio	25 deg. C, 65 % RH	3.8 Vdc	Carlos Chen
Condcudeted Emission	25 deg. C, 65 % RH	3.8 Vdc	Carlos Chen
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Getaz Yang

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 27
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

Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

Portable stations (hand-held devices) operating in the 776-787 MHz band are limited to 3 watts ERP

4.1.2 Test Procedures

EIRP / ERP Measurement:

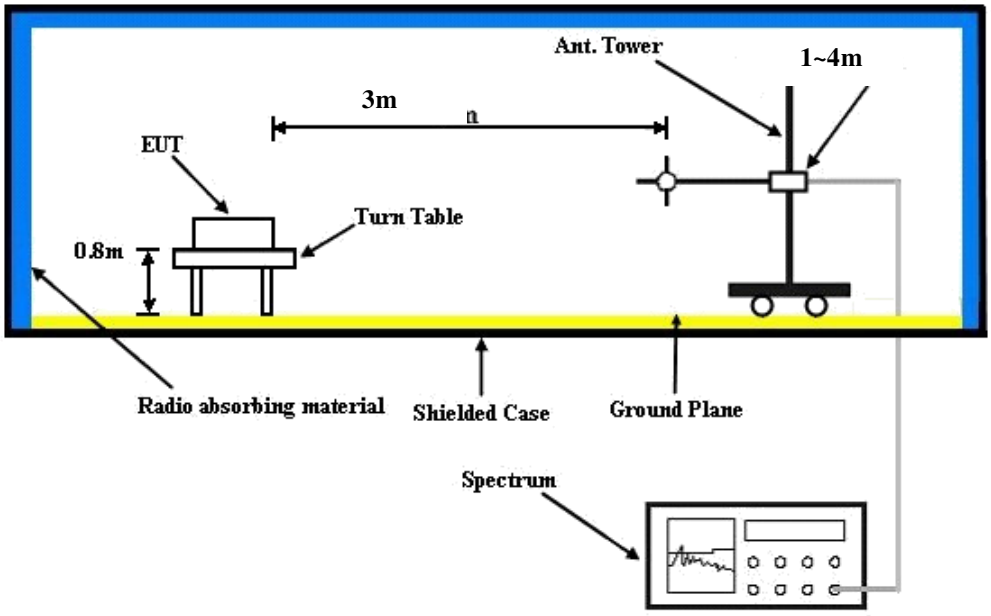
a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 5 MHz for WCDMA and 10 MHz for LTE mode.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m 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:

a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
b. 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 23205	Mid Ch 23230	High Ch 23255		Low Ch 23205	Mid Ch 23230	High Ch 23255	
			779.5 MHz	782.0 MHz	784.5 MHz		779.5 MHz	782.0 MHz	784.5 MHz	
13 / 5M	1	0	22.60	22.37	22.68	0	21.20	21.22	21.21	1
	1	12	22.96	22.69	22.98	0	21.31	21.30	21.37	1
	1	24	22.89	22.61	22.77	0	21.28	21.27	21.46	1
	12	0	21.54	21.44	21.45	1	20.55	20.56	20.41	2
	12	6	21.62	21.59	21.62	1	20.48	20.59	20.65	2
	12	13	21.60	21.38	21.59	1	20.49	20.50	20.55	2
	25	0	21.53	21.50	21.53	1	20.58	20.60	20.65	2

Band / BW	RB Size	RB Offset	QPSK	3GPP MPR (dB)	16QAM	3GPP MPR (dB)
			Mid Ch 23230		Mid Ch 23230	
			782.0 MHz		782.0 MHz	
13 / 10M	1	0	22.44	0	21.08	1
	1	24	22.48	0	21.26	1
	1	49	22.52	0	21.2	1
	25	0	21.46	1	20.39	2
	25	12	21.41	1	20.54	2
	25	25	21.52	1	20.63	2
	50	0	21.39	1	20.55	2

ERP Power (dBm)

LTE Band 13							
Channel Bandwidth: 5 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (mW)**	**Polarization (H/V)**
Y	23205	779.5	-11.36	32.24	18.73	74.64	H
	23230	782.0	-11.16	32.17	18.86	76.91	
	23255	784.5	-11.18	32.11	18.78	75.51	
	23205	779.5	-17.25	32.43	13.03	20.09	V
	23230	782.0	-17.18	32.42	13.09	20.37	
	23255	784.5	-17.25	32.46	13.06	20.23	
Channel Bandwidth: 5 MHz / 16QAM							
Y	23205	779.5	-11.99	32.24	18.10	64.57	H
	23230	782.0	-11.89	32.17	18.13	65.01	
	23255	784.5	-11.88	32.11	18.08	64.27	
	23205	779.5	-18.49	32.43	11.79	15.10	V
	23230	782.0	-18.43	32.42	11.84	15.28	
	23255	784.5	-18.55	32.46	11.76	15.00	

LTE Band 13							
Channel Bandwidth: 10 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (mW)**	**Polarization (H/V)**
Y	23230	782.0	-11.10	32.17	18.92	77.98	H
	23230	782.0	-17.14	32.42	13.13	20.56	V
Channel Bandwidth: 10 MHz / 16QAM							
Y	23230	782.0	-11.79	32.17	18.23	66.53	H
	23230	782.0	-18.29	32.42	11.98	15.78	V

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stabiliity Measurement

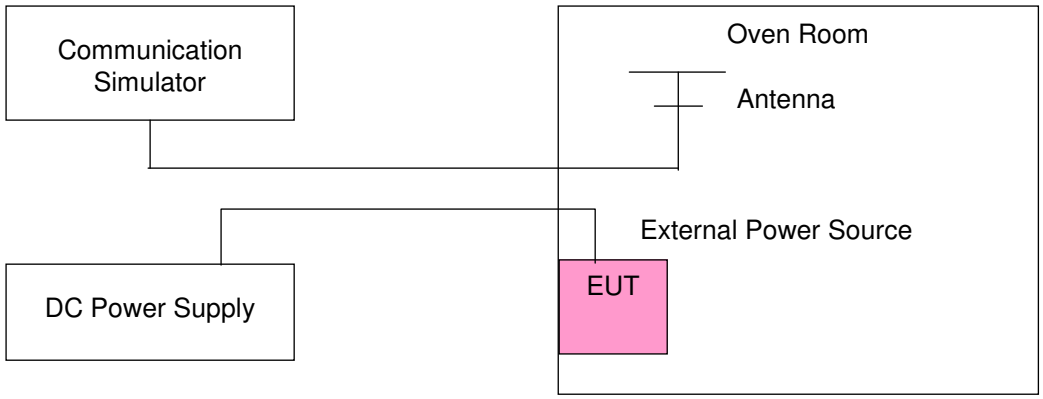
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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)	LTE Band 13				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	779.500001	0.001	784.500001	0.002	2.5
3.5	779.500002	0.002	784.500002	0.002	2.5
4.35	779.500001	0.002	784.500002	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.5 Vdc to 4.35 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 13				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	779.500002	0.003	784.500003	0.003	2.5
-20	779.500002	0.002	784.500002	0.002	2.5
-10	779.500003	0.004	784.500003	0.004	2.5
0	779.500004	0.004	784.500003	0.004	2.5
10	779.500002	0.002	784.500003	0.003	2.5
20	779.499999	-0.002	784.499999	-0.002	2.5
30	779.499998	-0.003	784.499999	-0.002	2.5
40	779.499997	-0.004	784.499998	-0.003	2.5
50	779.499998	-0.002	784.499997	-0.004	2.5
55	779.499997	-0.004	784.499997	-0.004	2.5

Note:

1. The applicant declared that the normal operating temperature of the EUT is from -30˚C to 55˚C.
2. The EUT would shut down automatically as below -30˚C.

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 13		Limit (ppm)
	Channel Bandwidth: 10 MHz		
	Frequency (MHz)	Frequency Error (ppm)	
3.8	782.000002	0.003	2.5
3.5	782.000003	0.004	2.5
4.35	782.000004	0.005	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.5 Vdc to 4.35 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 13		Limit (ppm)
	Channel Bandwidth: 10 MHz		
	Frequency (MHz)	Frequency Error (ppm)	
-30	782.000003	0.004	2.5
-20	782.000001	0.001	2.5
-10	782.000004	0.005	2.5
0	782.000002	0.003	2.5
10	782.000002	0.003	2.5
20	781.999999	-0.001	2.5
30	781.999998	-0.003	2.5
40	781.999998	-0.003	2.5
50	781.999999	-0.002	2.5
55	781.999998	-0.003	2.5

Note:

1. The applicant declared that the normal operating temperature of the EUT is from -30°C to 55°C.
2. The EUT would shut down automatically as below -30°C.

4.3 Occupied Bandwidth Measurement

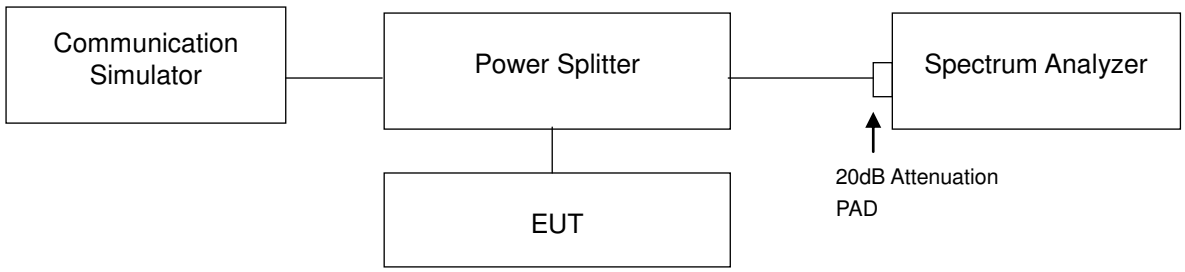
4.3.1 Limits of Occupied Bandwidth Measurement

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

4.3.2 Test Procedure

a. The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
b. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.3.3 Test Setup

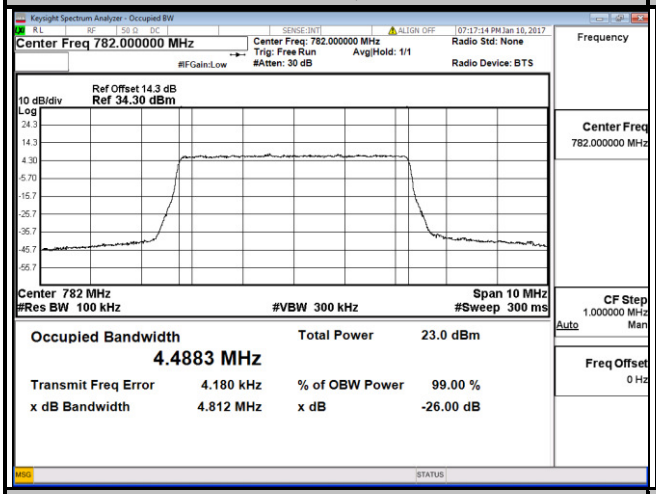


4.3.4 Test Result

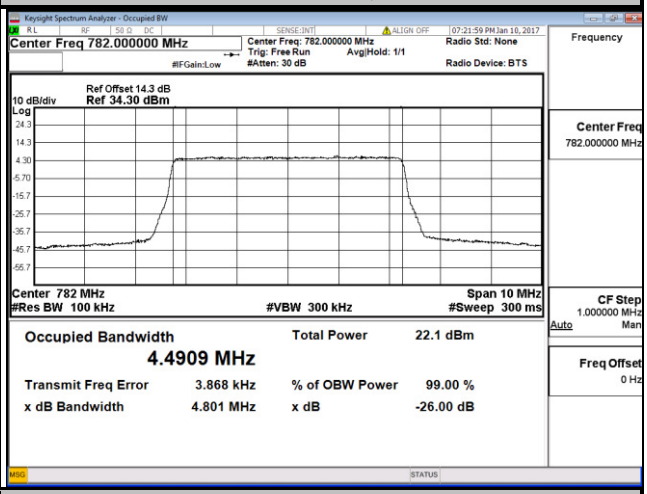
LTE Band 13							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
23205	779.5	4.4881	4.4900	23230	782.0	8.9536	8.9578
23230	782.0	4.4883	4.4909				
23255	784.5	4.4848	4.4891				

Spectrum Plot of Worst Value

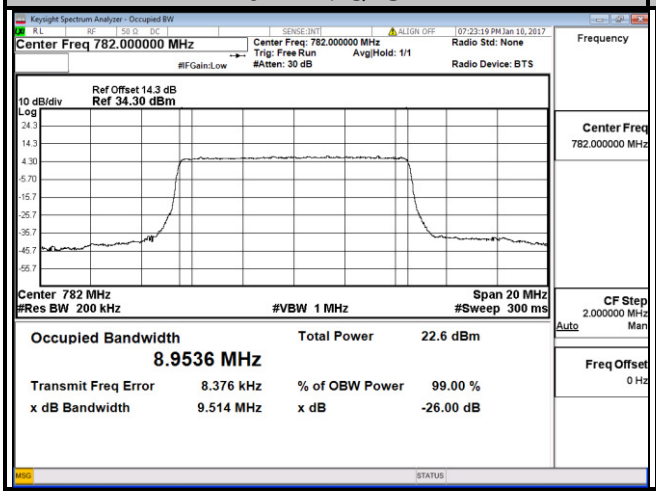
5 MHz / QPSK



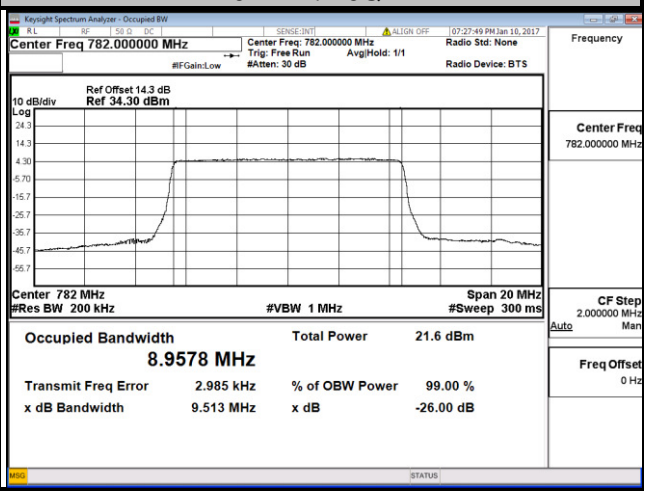
5 MHz / 16QAM



10 MHz / QPSK



10 MHz / 16QAM



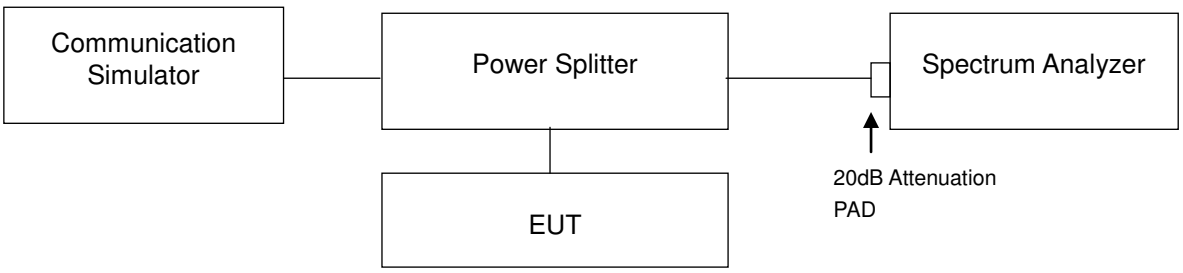
4.4 Band Edge Measurement

4.4.1 Limits of Band Edge Measurement

For operations in the 776-787 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater.
However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

For operations in the 1710–1755 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10(P) dB.

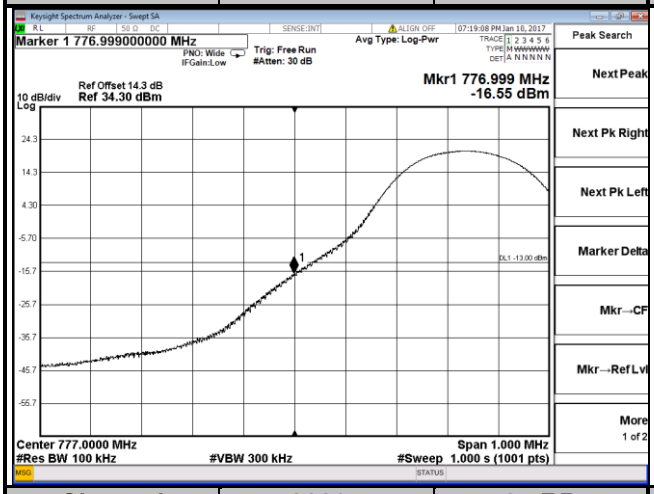
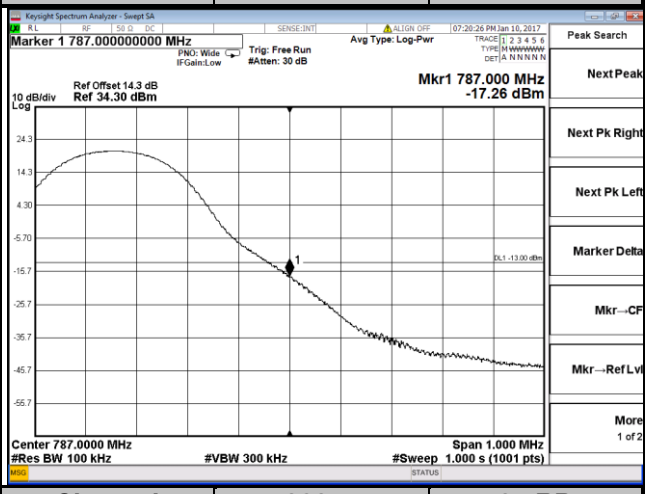
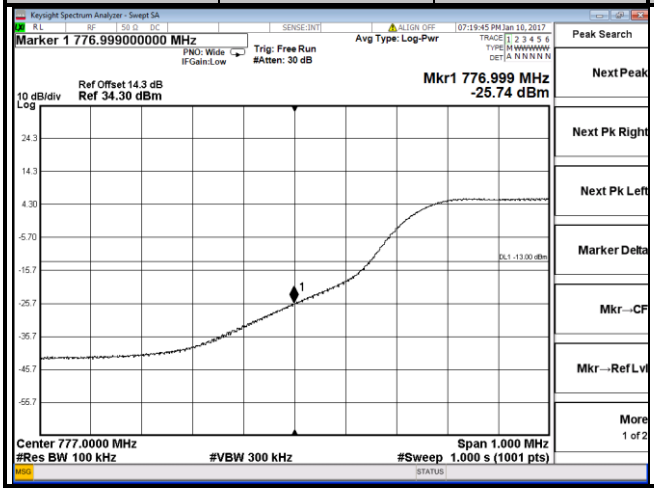
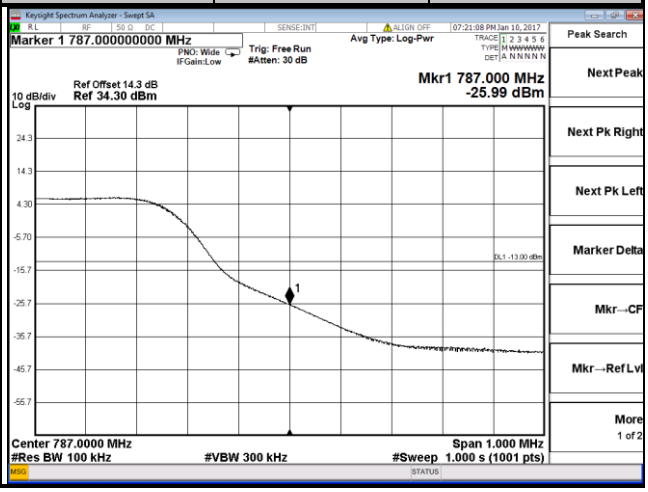
4.4.2 Test Setup

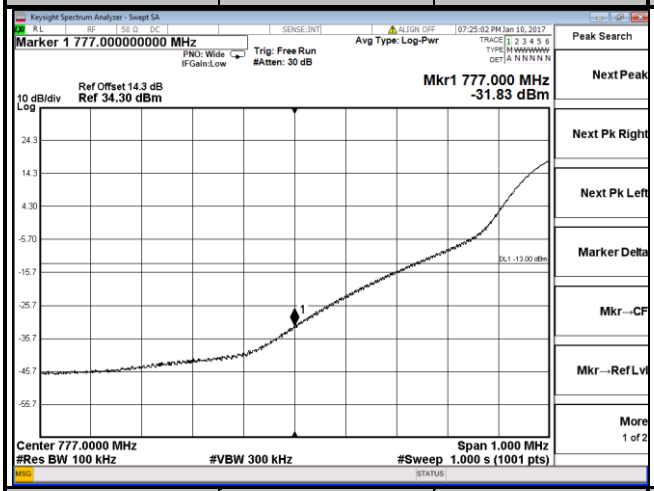
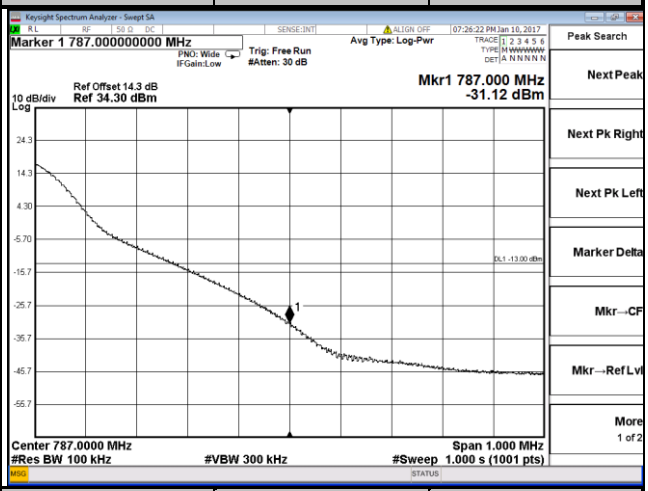
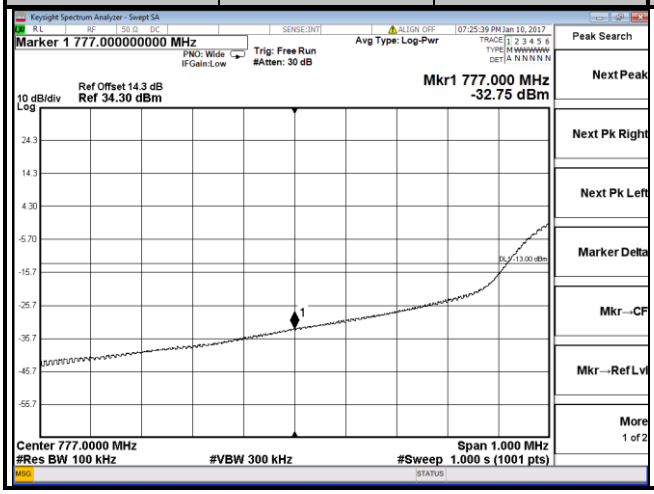
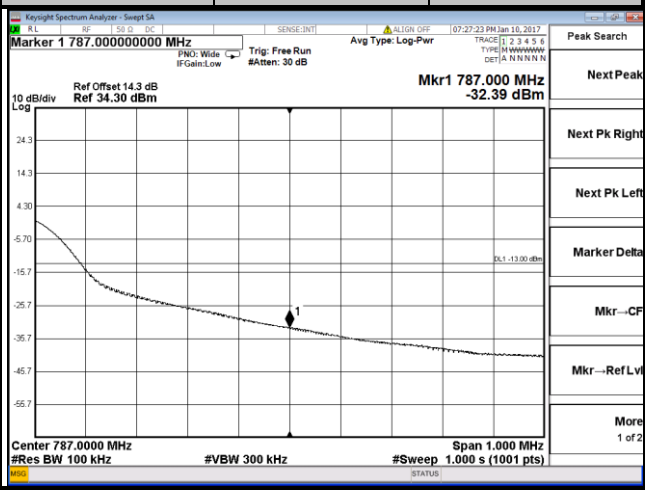


4.4.3 Test Procedures

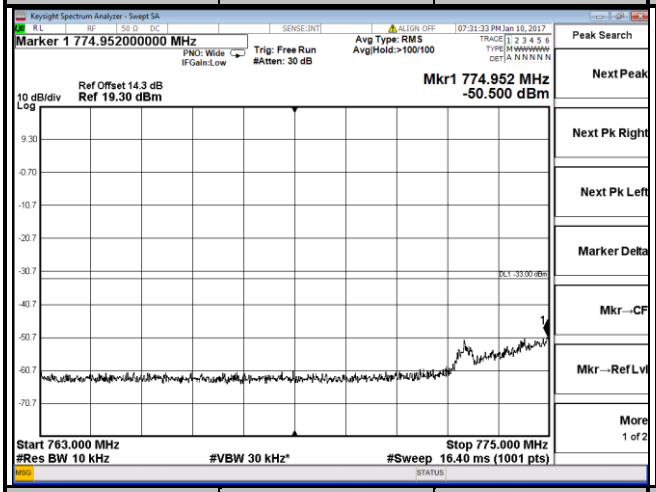
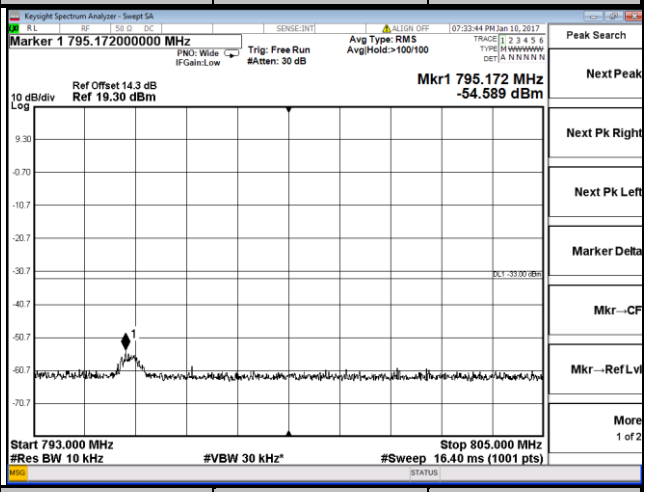
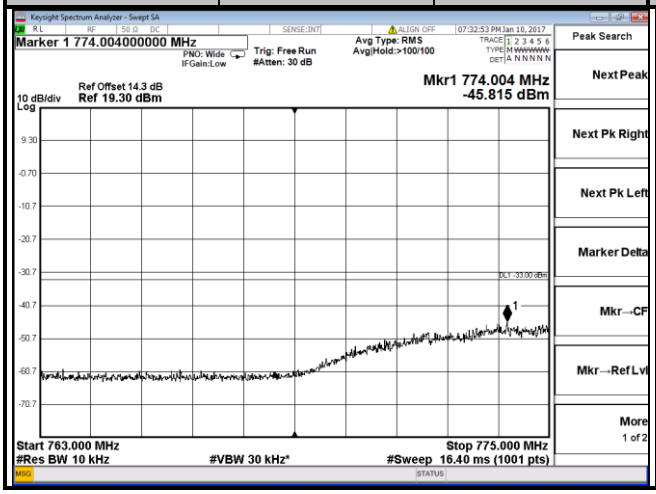
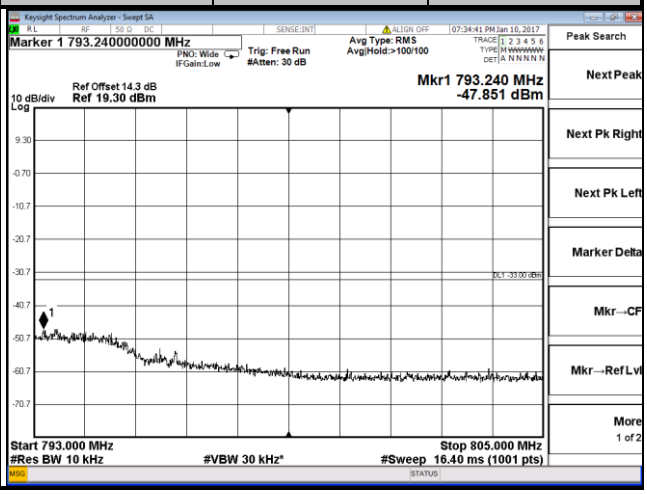
a. All measurements were done at low and high operational frequency range.
b. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (LTE Bandwidth 5 MHz/10 MHz).
c. Record the max trace plot into the test report.

4.4.4 Test Results

LTE Band 13					
Channel Bandwidth: 5 MHz					
Channel	23205	1 RB	Channel	23255	1 RB
					
Channel	23205	25 RB	Channel	23255	25 RB
					

LTE Band 13					
Channel Bandwidth: 10 MHz					
Channel	23230	1 RB	Channel	23230	1 RB
					
Channel	23230	50 RB	Channel	23230	50 RB
					

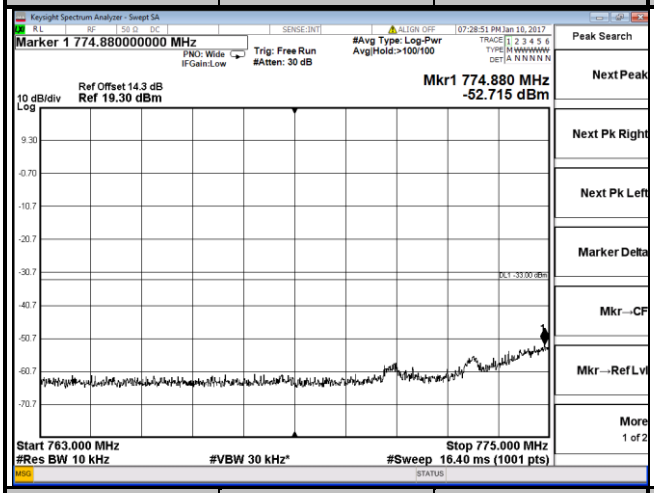
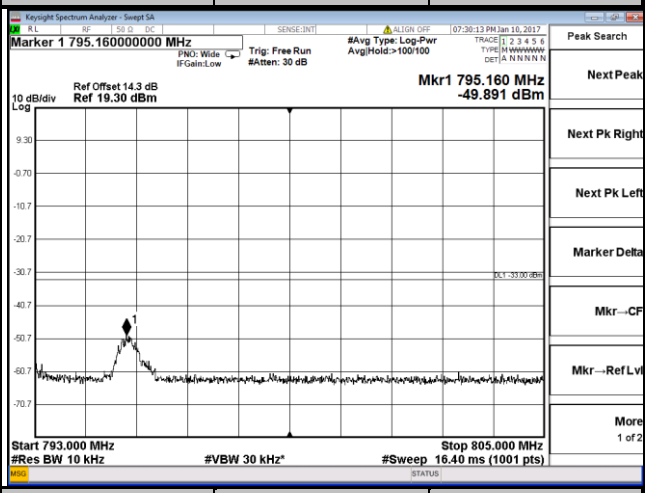
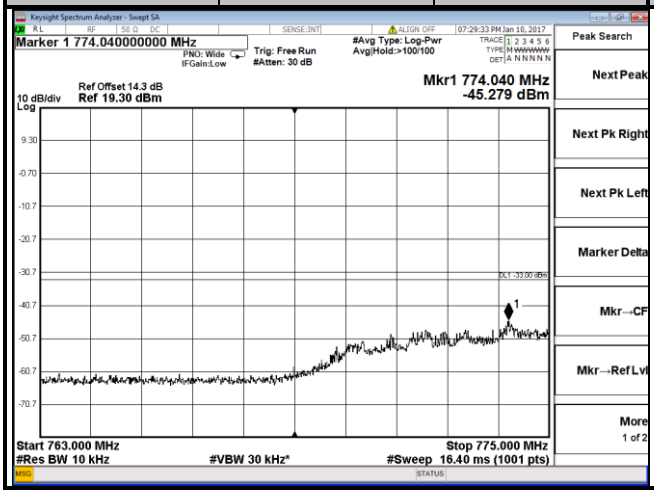
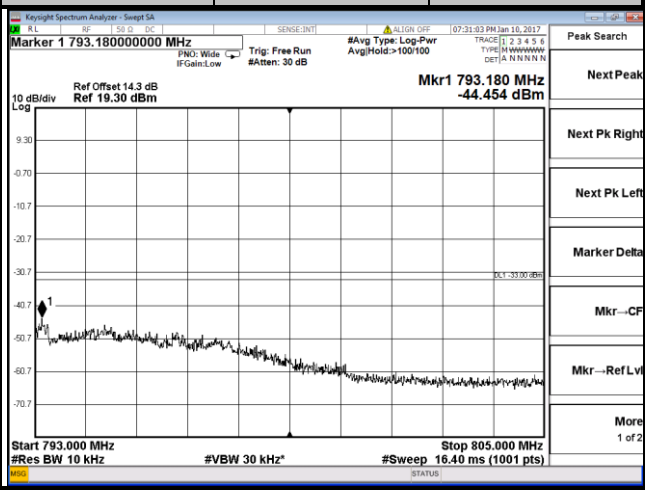
Emission Mask

LTE Band 13					
Channel Bandwidth: 5 MHz					
Channel	23205	1 RB	Channel	23255	1 RB
					
Channel	23205	25 RB	Channel	23255	25 RB
					

For the 763 - 775 MHz and 793 - 805 MHz band ,the FCC limit is 65+10log(P[watt]) in a 6.25 kHz bandwidth . Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment , a bandwidth of 10 kHz was used instead to show compliance. By using a 10 kHz bandwidth on the spectrum analyzer.

10log(10kHz/6.25kHz) = 2.04 dB

Limit line = -35 dBm + 2.04 dB =-32.96 dBm

LTE Band 13					
Channel Bandwidth: 10 MHz					
Channel	23230	1 RB	Channel	23230	1 RB
					
Channel	23230	50 RB	Channel	23230	50 RB
					

For the 763 - 775 MHz and 793 - 805 MHz band ,the FCC limit is 65+10log(P[watt]) in a 6.25 kHz bandwidth . Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment , a bandwidth of 10 kHz was used instead to show compliance. By using a 10 kHz bandwidth on the spectrum analyzer.

10log(10kHz/6.25kHz) = 2.04 dB

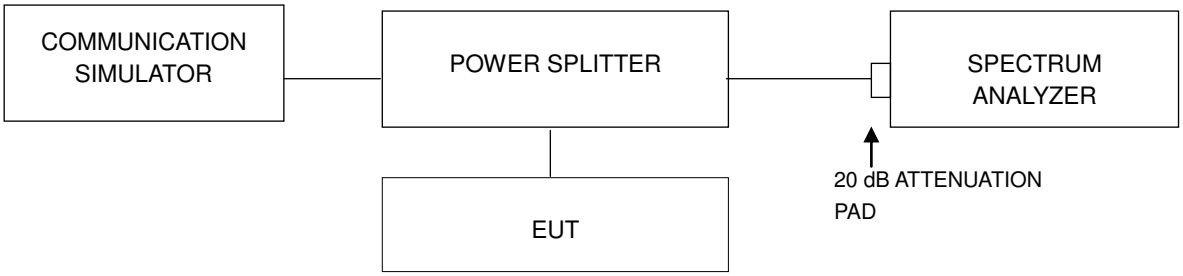
Limit line = -35 dBm + 2.04 dB =-32.96 dBm

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

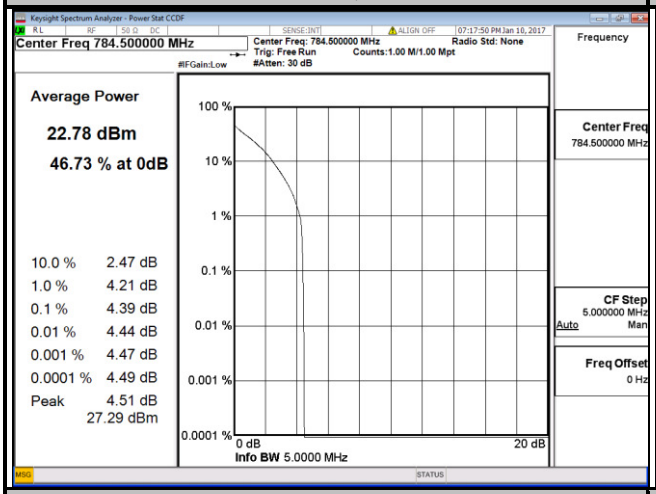
1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

4.5.4 Test Results

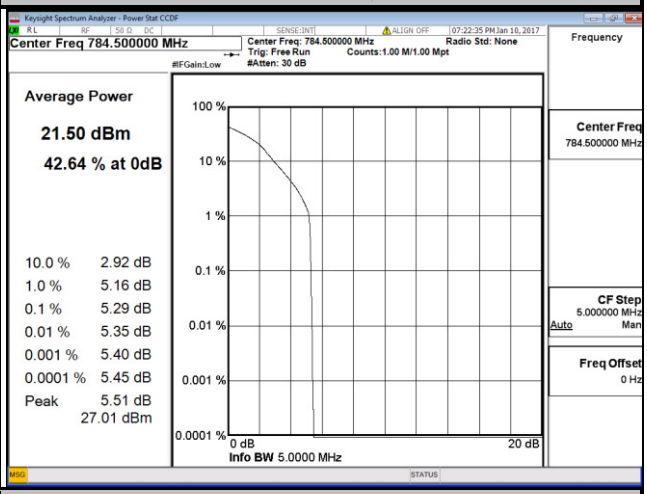
LTE Band 13							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
23205	779.5	4.18	5.08	23230	782.0	4.19	5.10
23230	782.0	4.37	5.26				
23255	784.5	4.39	5.29				

Spectrum Plot of Worst Value

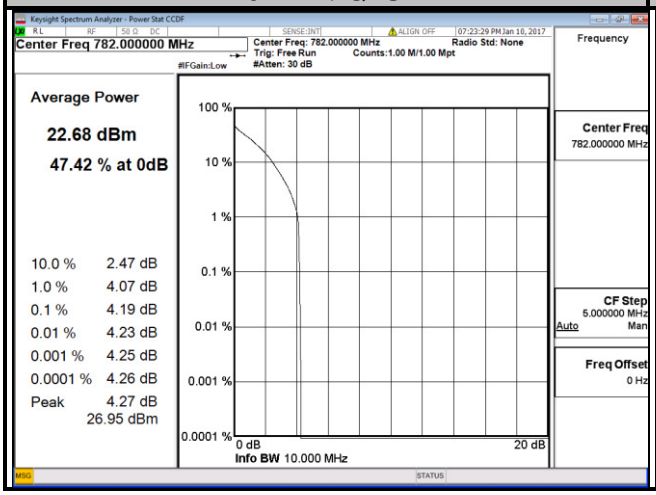
5 MHz / QPSK



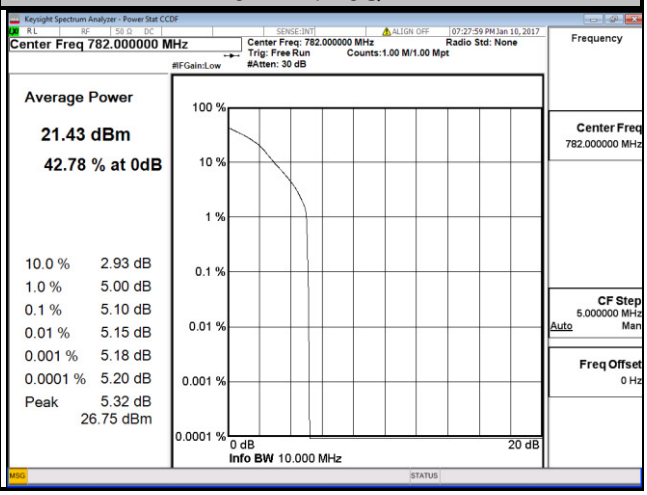
5 MHz / 16QAM



10 MHz / QPSK



10 MHz / 16QAM

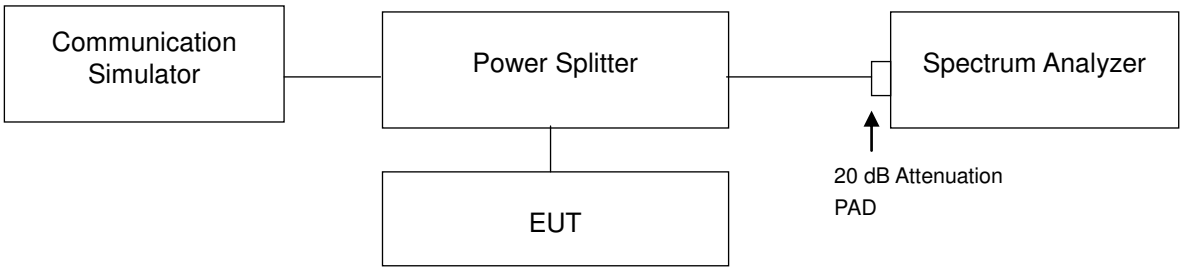


4.6 Conducted Spurious Emissions

4.6.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 +10 log10(P) dB. The limit of emission is 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 30 MHz to 8 GHz. 10 dB attenuation pad is connected with spectrum. RBW=1 MHz and VBW=3 MHz are used for conducted emission measurement.

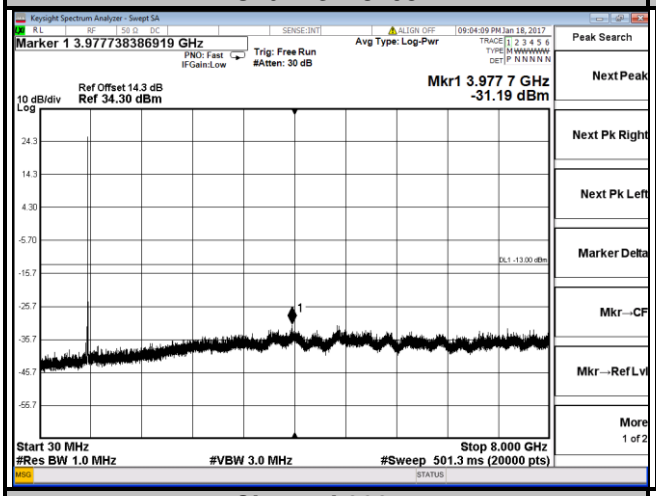
4.6.4 Test Results

Frequency Range: 30 MHz ~ 8 GHz

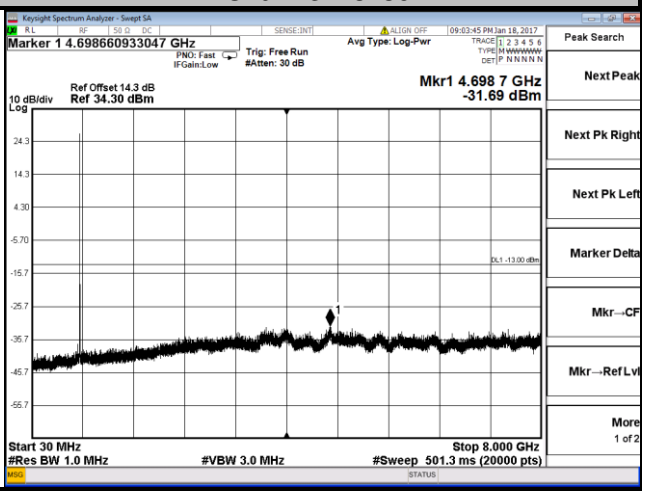
LTE Band 13

Channel Bandwidth: 5 MHz

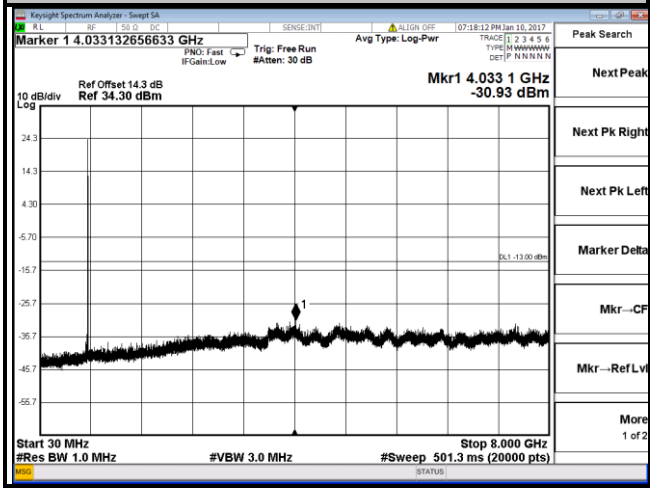
Channel 23205



Channel 23230



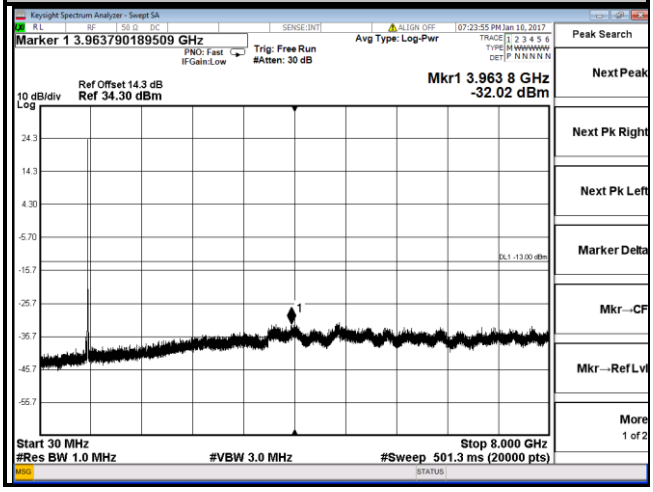
Channel 23255



LTE Band 13

Channel Bandwidth: 10 MHz

Channel 23230



4.7 Radiated Emission Measurement

4.7.1 Limits of Radiated Emission Measurement

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 +10 log10(P) dB. The limit of emission 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.

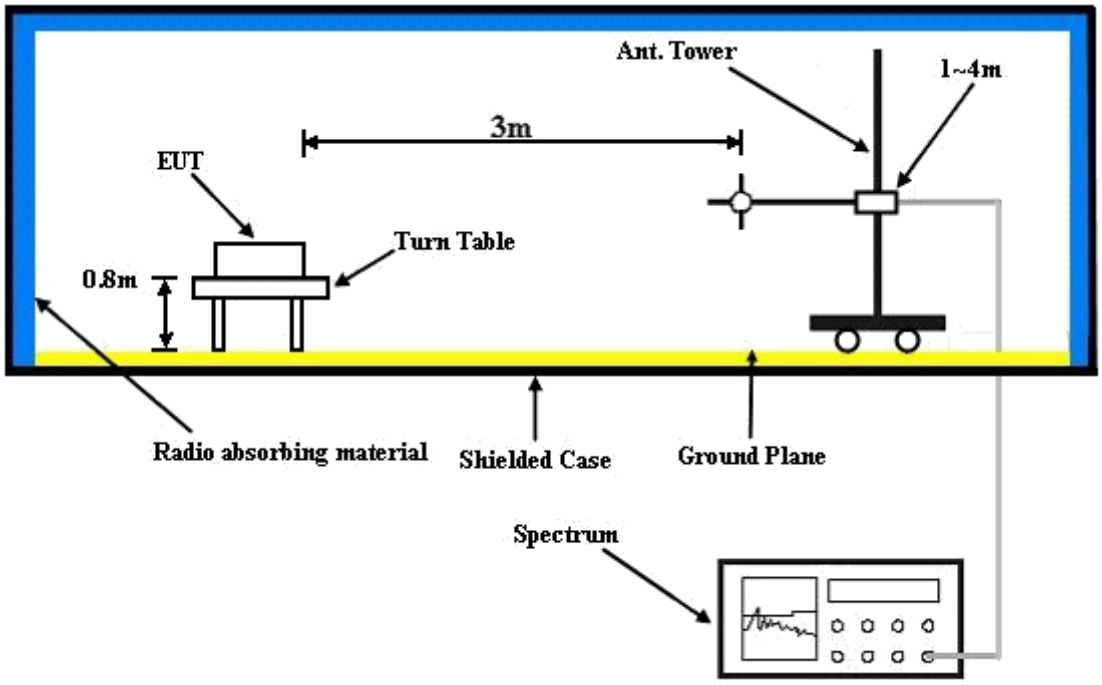
d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15 dBi.

Note: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 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 13

Channel Bandwidth: 10 MHz / QPSK

1RB, 0RB Offset

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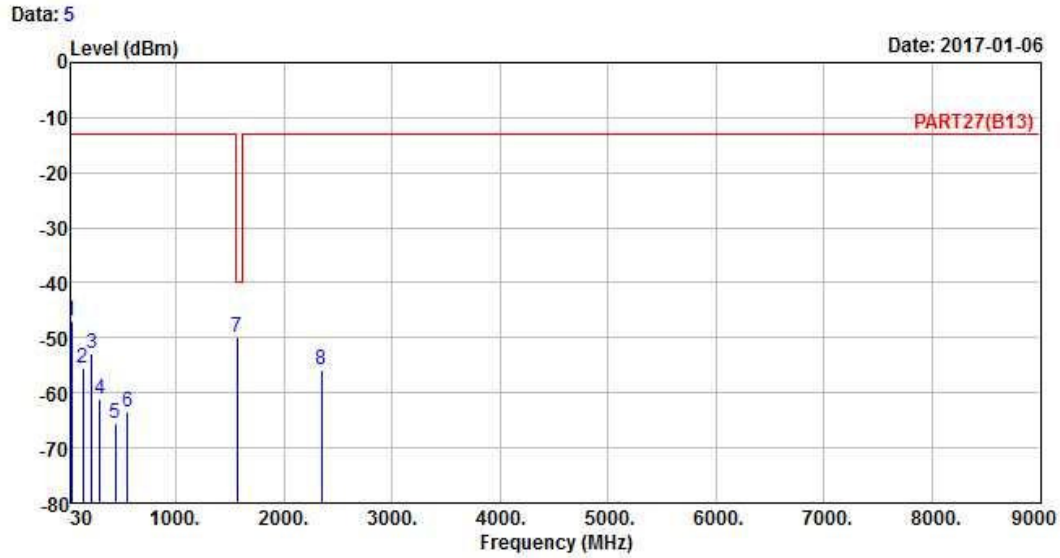
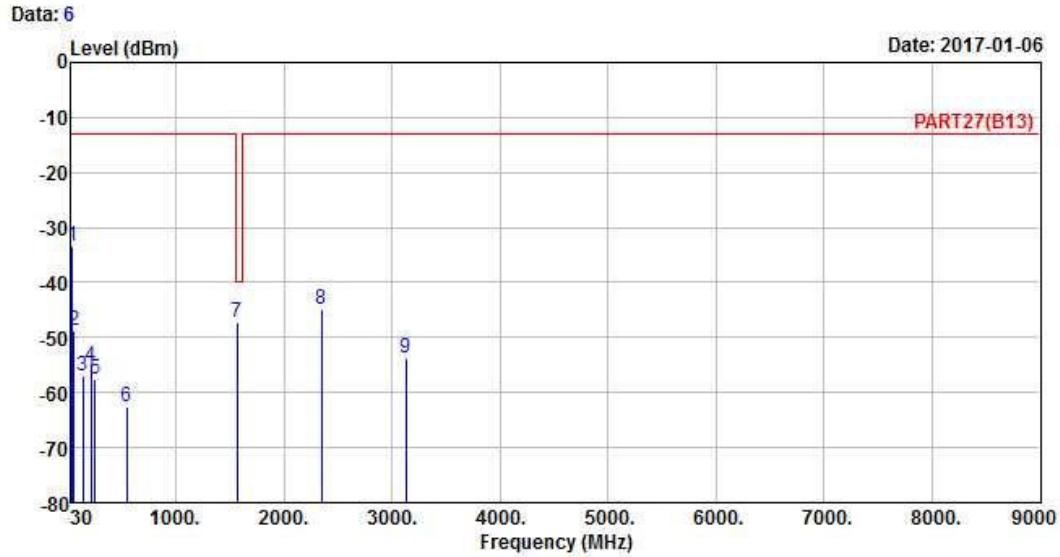


Site : 966 Chamber 5
Condition: PART27(B13) HORIZONTAL
Remak : LTE Band 13 QPSK_10M Link
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	32.91	-46.85	-45.76	-13.00	-33.85	-1.09	Peak
2	135.73	-55.57	-46.90	-13.00	-42.57	-8.67	Peak
3	218.18	-52.71	-45.43	-13.00	-39.71	-7.28	Peak
4	293.84	-61.16	-54.27	-13.00	-48.16	-6.89	Peak
5	435.46	-65.56	-59.90	-13.00	-52.56	-5.66	Peak
6	551.86	-63.48	-60.71	-13.00	-50.48	-2.77	Peak
7 pp	1564.00	-49.99	-34.97	-40.00	-9.99	-15.02	Peak
8	2346.00	-55.91	-45.47	-13.00	-42.91	-10.44	Peak



Site : 966 Chamber 5
Condition: PART27(B13) VERTICAL
Remak : LTE Band 13 QPSK_10M Link
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	39.70	-33.40	-34.04	-13.00	-20.40	0.64	Peak
2	58.13	-48.78	-41.65	-13.00	-35.78	-7.13	Peak
3	136.70	-56.84	-48.18	-13.00	-43.84	-8.66	Peak
4	216.24	-55.24	-47.88	-13.00	-42.24	-7.36	Peak
5	248.25	-57.50	-51.43	-13.00	-44.50	-6.07	Peak
6	545.07	-62.56	-59.54	-13.00	-49.56	-3.02	Peak
7 pp	1564.00	-47.35	-32.33	-40.00	-7.35	-15.02	Peak
8	2346.00	-44.78	-34.34	-13.00	-31.78	-10.44	Peak
9	3128.00	-53.67	-44.64	-13.00	-40.67	-9.03	Peak

50RB, 0RB Offset

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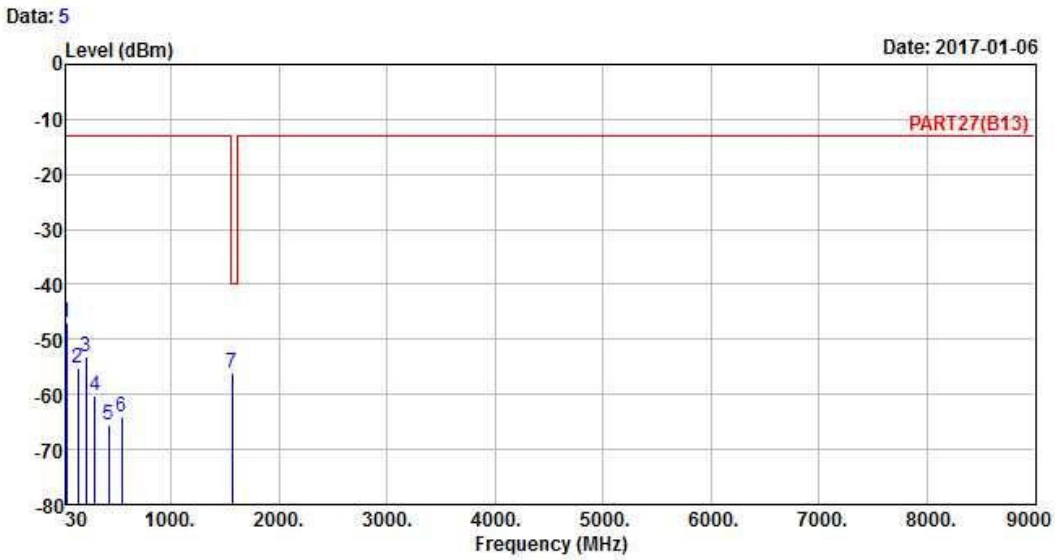
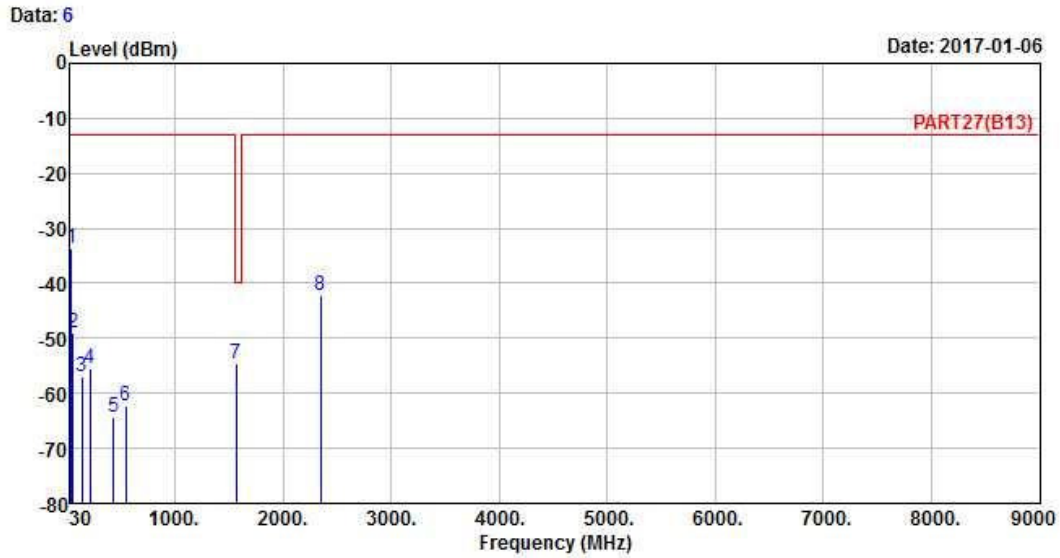


Site : 966 Chamber 5
Condition: PART27(B13) HORIZONTAL
Remak : LTE Band 13 QPSK_10M Link
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	32.91	-46.95	-45.86	-13.00	-33.95	-1.09	Peak
2	136.70	-55.35	-46.69	-13.00	-42.35	-8.66	Peak
3	214.30	-53.23	-45.79	-13.00	-40.23	-7.44	Peak
4	293.84	-60.11	-53.22	-13.00	-47.11	-6.89	Peak
5	421.88	-65.41	-59.64	-13.00	-52.41	-5.77	Peak
6	546.04	-63.97	-60.98	-13.00	-50.97	-2.99	Peak
7 pp	1564.00	-56.16	-41.14	-40.00	-16.16	-15.02	Peak



Site : 966 Chamber 5
Condition: PART27(B13) VERTICAL
Remak : LTE Band 13 QPSK_10M Link
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	39.70	-33.65	-34.29	-13.00	-20.65	0.64	Peak
2	58.13	-49.15	-42.02	-13.00	-36.15	-7.13	Peak
3	136.70	-56.84	-48.18	-13.00	-43.84	-8.66	Peak
4	214.30	-55.48	-48.04	-13.00	-42.48	-7.44	Peak
5	430.61	-64.48	-58.78	-13.00	-51.48	-5.70	Peak
6	545.07	-62.25	-59.23	-13.00	-49.25	-3.02	Peak
7 pp	1564.00	-54.52	-39.50	-40.00	-14.52	-15.02	Peak
8	2346.00	-42.32	-31.88	-13.00	-29.32	-10.44	Peak

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

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