

# FCC Test Report

## (PART 27)

**Report No.:** RF160724W003-3

**FCC ID:** ZMOL816AM

**Test Model:** L816-AM

**Received Date:** Jul. 24, 2016

**Test Date:** Jul. 25, 2016 ~ Aug. 11, 2016

**Issued Date:** Aug. 12, 2016

**Applicant:** Fibocom Wireless Inc.

**Address:** 5/F, Tower A, Technology Building II, 1057 Nanhai Blvd,  
Nanshan, Shenzhen, China

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd.,  
Taoyuan Branch

**Lab Address:** No. 47-2, 14th Ling, Chia Cau Vil., Lin Kou Dist., New Taipei  
City, Taiwan (R.O.C.)

**Test Location:** No. 19, Hwa Ya 2nd Rd., Wen Hwa Tsuen, Kwei Shan Hsiang,  
Taoyuan Hsien 333, Taiwan, R.O.C.

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## RELEASE CONTROL RECORD

Issue No.	Description	Date Issued
RF160724W003-3	Original release	Aug. 12, 2016

## 1 Certificate of Conformity

**Product:** LTE module

**Brand:** Fibocom

**Test Model:** L816-AM

**Sample Status:** Identical Prototype

**Applicant:** Fibocom Wireless Inc.

**Test Date:** Jul. 25, 2016 ~ Aug. 11, 2016

**Standards:** FCC Part 27, Subpart C, L  
FCC Part 2

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:**

Aug. 12, 2016

Yuqiang Yin / Engineer

**Approved by :**



**Date:**

Aug. 12, 2016

William Chung / Manager

## 2 Summary of Test Results

Applied Standard: FCC Part 27 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50(d)(4)	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(h)	Occupied Bandwidth	PASS	Meet the requirement of limit.
27.50(d)(5)	Peak to average ratio	PASS	Meet the requirement of limit.
27.53(h)	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 27.53(h)	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 27.53(h)	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -13.80dB at 6928.00MHz.

### 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	Expanded Uncertainty (k=2) ( $\pm$ )
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	2.93 dB
	200MHz ~ 1000MHz	2.95 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 2.2 Test Site And Instruments

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR7	101494	Apr. 05,16	Apr. 04,17
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV7	102331	Nov. 09,15	Nov. 08,16
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Apr. 05,16	Apr. 04,17
Bilog Antenna 1	Teseq	CBL 6111D	30643	Jul. 14, 16	Jul. 13, 17
Bilog Antenna 2	Teseq	CBL 6111D	27089	Jul. 14, 16	Jul. 13, 17
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062558	May 18,16	May 17,17
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062557	May 18,16	May 17,17
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	Mar. 12,16	Mar. 11,18
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A	N/A
10dB Attenuator	JFW/USA	50HF-010-SM A	1505	Jul. 27, 16	Jul. 26, 17
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170147	Mar. 12,16	Mar. 11,17
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170242	Mar. 12,16	Mar. 11,17
Amplifier	Burgeon	BPA-530	100220	Apr. 05,16	Apr. 04,17
Amplifier (9kHz-1GHz)	SONOMA	310D	186955	Mar. 04,16	Mar. 03, 17
Pre-Amplifier(1-18G)	HP	8449B	3008A00409	Apr. 25,16	Apr. 24,17
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 20,15	Nov. 19,16
Humid & Temp Programmable Tester	Haida	HD-2257	110807201	Sep.05,16	Sep. 04,17
Signal Generator	Agilent	N5183A	MY50140980	Nov. 09,15	Nov. 08,16

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.

3. The test was performed in HwaYa Chamber 4.

4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

5. The FCC Site Registration No. is 460141.

6. The IC Site Registration No. is IC7450F-4.

### 3 General Information

#### 3.1 General Description of EUT

<b>PRODUCT</b>	LTE module	
<b>BRAND</b>	Fibocom	
<b>MODEL NAME</b>	L816-AM	
<b>POWER SUPPLY</b>	3.8Vdc (host equipment)	
<b>MODULATION TECHNOLOGY</b>	LTE	QPSK, 16QAM
<b>FREQUENCY RANGE</b>	LTE Band 4 Channel Bandwidth: 1.4MHz	1710.7MHz ~ 1754.3MHz
	LTE Band 4 Channel Bandwidth: 3MHz	1711.5MHz ~ 1753.5MHz
	LTE Band 4 Channel Bandwidth: 5MHz	1712.5MHz ~ 1752.5MHz
	LTE Band 4 Channel Bandwidth: 10MHz	1715.0MHz ~ 1750.0MHz
	LTE Band 4 Channel Bandwidth: 15MHz	1717.5MHz ~ 1747.5MHz
	LTE Band 4 Channel Bandwidth: 20MHz	1720.0MHz ~ 1745.0MHz
	LTE Band 12 Channel Bandwidth: 1.4MHz	699.7MHz ~ 715.3MHz
	LTE Band 12 Channel Bandwidth: 3MHz	700.5MHz ~ 714.5MHz
	LTE Band 12 Channel Bandwidth: 5MHz	701.5MHz ~ 713.5MHz
	LTE Band 12 Channel Bandwidth: 10MHz	704.0MHz ~ 711.0MHz
<b>EMISSION DESIGNATOR</b>	LTE Band 4 Channel Bandwidth: 1.4MHz	QPSK: 1M09G7D 16QAM: 1M09W7D
	LTE Band 4 Channel Bandwidth: 3MHz	QPSK: 2M69G7D 16QAM: 2M68W7D
	LTE Band 4 Channel Bandwidth: 5MHz	QPSK: 4M47G7D 16QAM: 4M46W7D
	LTE Band 4 Channel Bandwidth: 10MHz	QPSK: 8M93G7D 16QAM: 8M95W7D
	LTE Band 4 Channel Bandwidth: 15MHz	QPSK: 13M4G7D 16QAM: 13M4W7D
	LTE Band 4 Channel Bandwidth: 20MHz	QPSK: 17M9G7D 16QAM: 17M9W7D
	LTE Band 12 Channel Bandwidth: 1.4MHz	QPSK: 1M09G7D 16QAM: 1M09W7D
	LTE Band 12 Channel Bandwidth: 3MHz	QPSK: 2M69G7D 16QAM: 2M68W7D
	LTE Band 12 Channel Bandwidth: 5MHz	QPSK: 4M47G7D 16QAM: 4M46W7D
	LTE Band 12 Channel Bandwidth: 10MHz	QPSK: 8M94G7D 16QAM: 8M94W7D

<b>MAX. ERP/EIRP POWER</b>	<b>LTE Band 4 Channel Bandwidth: 1.4MHz</b>	274mW
	<b>LTE Band 4 Channel Bandwidth: 3MHz</b>	270mW
	<b>LTE Band 4 Channel Bandwidth: 5MHz</b>	273mW
	<b>LTE Band 4 Channel Bandwidth: 10MHz</b>	277mW
	<b>LTE Band 4 Channel Bandwidth: 15MHz</b>	272mW
	<b>LTE Band 4 Channel Bandwidth: 20MHz</b>	245mW
	<b>LTE Band 12 Channel Bandwidth: 1.4MHz</b>	307mW
	<b>LTE Band 12 Channel Bandwidth: 3MHz</b>	311mW
	<b>LTE Band 12 Channel Bandwidth: 5MHz</b>	306mW
	<b>LTE Band 12 Channel Bandwidth: 10MHz</b>	276mW
<b>ANTENNA TYPE</b>	<b>LTE Band 4</b>	External Antenna with 5dBi
	<b>LTE Band 12</b>	External Antenna with 3dBi
<b>HW VERSION</b>	V1.0.0	
<b>SW VERSION</b>	L816_V1A.0D.01.01	
<b>ACCESSORY DEVICE</b>	Refer to note as below	
<b>DATA CABLE</b>	N/A	

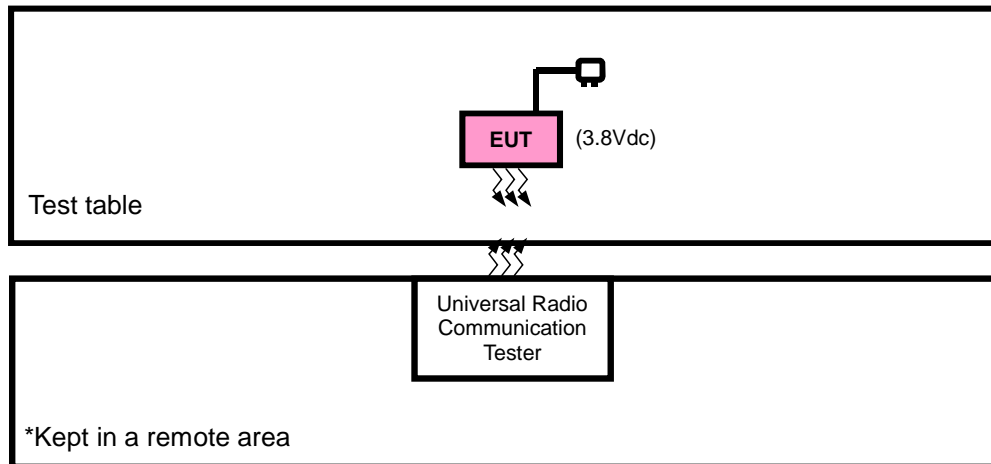
**Note:**

1. 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.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

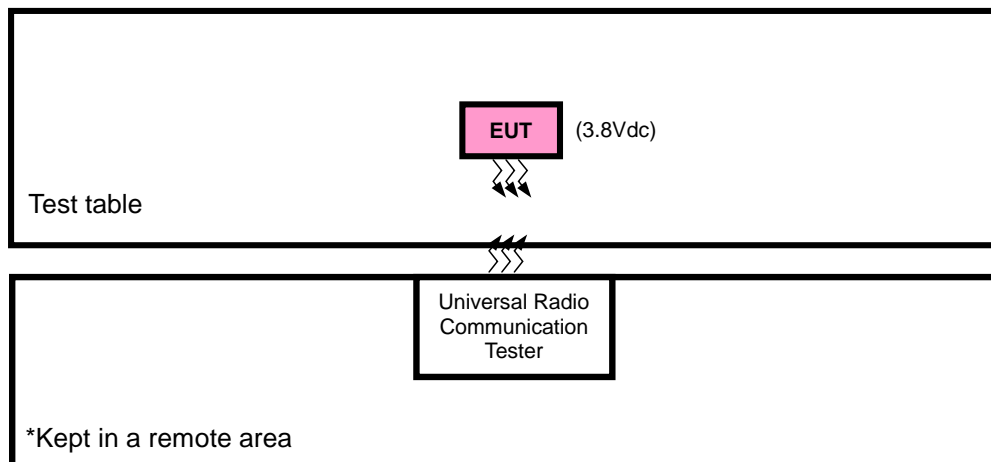


### 3.2 Configuration of System Under Test

#### FOR RADIATION EMISSION TEST



#### FOR 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. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	DC source	LONG WEI	PS-6403D	010934269	N/A
2	PC	HP	A6608CN	3CR83825X3	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	DC Line: Unshielded, Detachable 1.0m
2	AC Line: Unshielded, Detachable 1.5m

#### NOTE:

1. All power cords of the above support units are non shielded (1.8m).

### 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 on X-plane. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	DESCRIPTION
-	EUT with LTE link

# LTE BAND 4

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
-	EIRP	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	FREQUENCY STABILITY	19957 to 20393	20175	1.4MHz	QPSK	1 RB / 0 RB Offset
		19965 to 20385	20175	3MHz	QPSK	1 RB / 0 RB Offset
		19975 to 20375	20175	5MHz	QPSK	1 RB / 0 RB Offset
		20000 to 20350	20175	10MHz	QPSK	1 RB / 0 RB Offset
		20025 to 20325	20175	15MHz	QPSK	1 RB / 0 RB Offset
		20050 to 20300	20175	20MHz	QPSK	1 RB / 0 RB Offset
-	OCCUPIED BANDWIDTH	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	6 RB / 0 RB Offset
		19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	15 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	50 RB / 0 RB Offset
		20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	100 RB / 0 RB Offset
-	PEAK TO AVERAGE RATIO	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	BAND EDGE	19957 to 20393	19957	1.4MHz	QPSK	1 RB / 0 RB Offset
						6 RB / 0 RB Offset
		19965 to 20385	19965	3MHz	QPSK	1 RB / 0 RB Offset
						15 RB / 0 RB Offset
		19975 to 20375	19975	5MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
		20000 to 20350	20000	10MHz	QPSK	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
		20025 to 20325	20025	15MHz	QPSK	1 RB / 0 RB Offset
						75 RB / 0 RB Offset
		20050 to 20300	20050	20MHz	QPSK	1 RB / 0 RB Offset
						100 RB / 0 RB Offset

			20300	20MHz	QPSK	1 RB / 99 RB Offset
						100 RB / 0 RB Offset
-	CONDCUDED EMISSION	19957 to 20393	20175	1.4MHz	QPSK	1 RB / 0 RB Offset
		19965 to 20385	20175	3MHz	QPSK	1 RB / 0 RB Offset
		19975 to 20375	20175	5MHz	QPSK	1 RB / 0 RB Offset
		20000 to 20350	20175	10MHz	QPSK	1 RB / 0 RB Offset
		20025 to 20325	20175	15MHz	QPSK	1 RB / 0 RB Offset
		20050 to 20300	20175	20MHz	QPSK	1 RB / 0 RB Offset
-	RADIATED EMISSION	19957 to 20393	20175	1.4MHz	QPSK	1 RB / 0 RB Offset
		19965 to 20385	20175	3MHz	QPSK	1 RB / 0 RB Offset
		19975 to 20375	20175	5MHz	QPSK	1 RB / 0 RB Offset
		20000 to 20350	20175	10MHz	QPSK	1 RB / 0 RB Offset
		20025 to 20325	20175	15MHz	QPSK	1 RB / 0 RB Offset
		20050 to 20300	20175	20MHz	QPSK	1 RB / 0 RB Offset

## LTE BAND 12

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
-	ERP	23017 to 23173	23017, 23095 , 23173	1.4MHz	QPSK,16QAM	1 RB / 0 RB Offset
		23025 to 23165	23025, 23095 ,23165	3MHz	QPSK,16QAM	1 RB / 0 RB Offset
		23035 to 23155	23035, 23095 ,23155	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
		23060 to 23130	23060, 23095 ,23130	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
-	FREQUENCY STABILITY	23017 to 23173	23095	1.4MHz	QPSK	1 RB / 0 RB Offset
		23025 to 23165	23095	3MHz	QPSK	1 RB / 0 RB Offset
		23035 to 23155	23095	5MHz	QPSK	1 RB / 0 RB Offset
		23060 to 23130	23095	10MHz	QPSK	1 RB / 0 RB Offset
-	OCCUPIED BANDWIDTH	23017 to 23173	23017, 23095 , 23173	1.4MHz	QPSK,16QAM	6 RB / 0 RB Offset
		23025 to 23165	23025, 23095 ,23165	3MHz	QPSK,16QAM	15 RB / 0 RB Offset
		23035 to 23155	23035, 23095 ,23155	5MHz	QPSK,16QAM	25 RB / 0 RB Offset
		23060 to 23130	23060, 23095 ,23130	10MHz	QPSK,16QAM	50 RB / 0 RB Offset
-	PEAK TO AVERAGE RATIO	23017 to 23173	23017, 23095 , 23173	1.4MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23025 to 23165	23025, 23095 ,23165	3MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23035 to 23155	23035, 23095 ,23155	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23060 to 23130	23060, 23095 ,23130	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	BAND EDGE	23017 to 23173	23017	1.4MHz	QPSK	1 RB / 0 RB Offset
						6 RB / 0 RB Offset
		23017 to 23173	23173	1.4MHz	QPSK	1 RB / 5 RB Offset
						6 RB / 0 RB Offset
		23025 to 23165	23025	3MHz	QPSK	1 RB / 0 RB Offset
						15 RB / 0 RB Offset
		23025 to 23165	23165	3MHz	QPSK	1 RB / 14 RB Offset
						15 RB / 0 RB Offset
		23035 to 23155	23035	5MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
		23035 to 23155	23155	5MHz	QPSK	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
-	CONDCUDED EMISSION	23017 to 23173	23095	1.4MHz	QPSK	1 RB / 0 RB Offset
		23025 to 23165	23095	3MHz	QPSK	1 RB / 0 RB Offset
		23035 to 23155	23095	5MHz	QPSK	1 RB / 0 RB Offset
-	RADIATED EMISSION	23017 to 23173	23095	1.4MHz	QPSK	1 RB / 0 RB Offset
		23025 to 23165	23095	3MHz	QPSK	1 RB / 0 RB Offset
		23035 to 23155	23095	5MHz	QPSK	1 RB / 0 RB Offset
-		23060 to 23130	23095	10MHz	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
ERP	21deg. C, 71%RH 22deg. C, 71%RH	3.8Vdc	Yuqiang Yin
Frequency Stability	24deg. C, 64%RH	3.8Vdc	Yuqiang Yin
Occupied Bandwidth	24deg. C, 64%RH	3.8Vdc	Yuqiang Yin
Band Edge	24deg. C, 64%RH	3.8Vdc	Yuqiang Yin
Conducuted Emission	24deg. C, 64%RH	3.8Vdc	Yuqiang Yin
Radiated Emission	21deg. C, 71%RH	3.8Vdc	Alex Chen

### **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**

**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 bands are limited to 1 watt EIRP.

Portable stations (hand-held devices) operating in the 699-716 MHz bands are limited to 3 watts ERP.

#### 4.1.2 Test Procedures

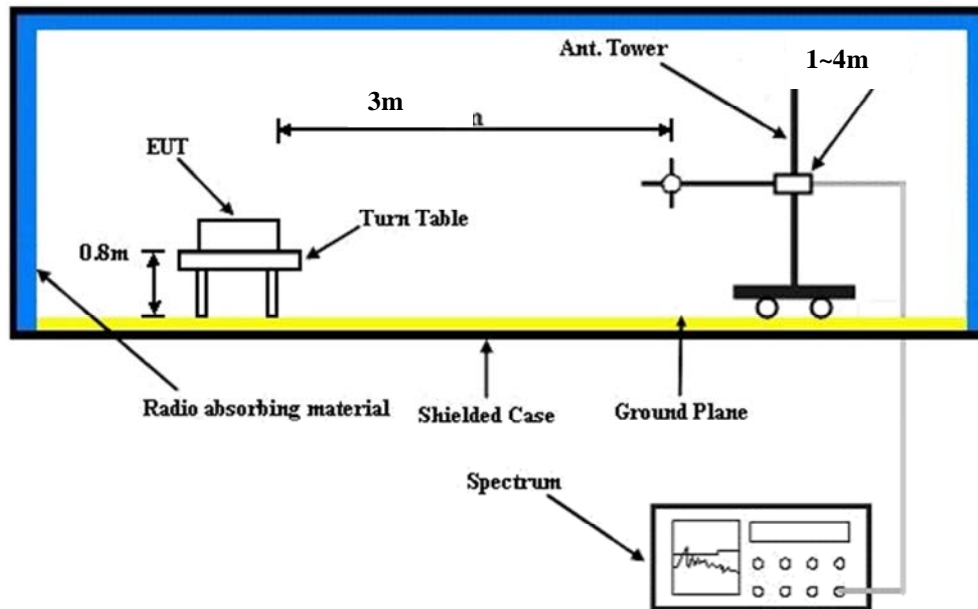
EIRP / ERP Measurement:

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10MHz for LTE mode.
- b. E.I.R.P power measurement. In the semi-anechoic chamber, EUT placed on the 0.8m 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 a. Record the power level of S.G
- d.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$
- e.  $E.R.P = E.I.R.P - 2.15 \text{ dB}$

Conducted Power Measurement:

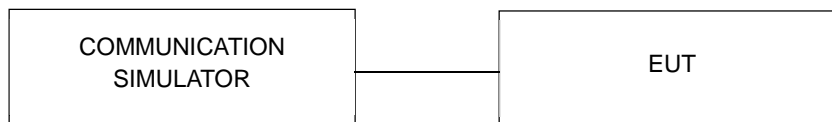
- a. The EUT was set up for the maximum power with WCDMA & LTE link data modulation and link up with simulator.
- b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

#### 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:



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



#### 4.1.4 Test Results

##### AVERAGE CONDUCTED OUTPUT POWER (dBm)

LTE Band 4							
BW	Modulation	RB Size	RB Offset	Low CH 19957	Mid CH 20175	High CH 20393	MPR
				Frequency 1710.7 MHz	Frequency 1732.5 MHz	Frequency 1754.3 MHz	
1.4MHz	QPSK	1	0	23.05	23.30	23.07	0
		1	2	22.91	23.12	22.94	0
		1	5	22.81	23.01	22.75	0
		3	0	23.03	23.28	23.05	0
		3	1	22.89	23.10	22.92	0
		3	3	22.79	22.99	22.73	0
		6	0	21.85	22.10	21.87	1
	16QAM	1	0	22.16	22.23	22.05	1
		1	2	21.88	22.08	21.82	1
		1	5	21.77	22.02	21.79	1
		3	0	22.15	22.22	22.04	1
		3	1	21.87	22.07	21.81	1
		3	3	21.76	22.01	21.78	1
		6	0	21.07	21.14	20.96	2
LTE Band 4							
BW	Modulation	RB Size	RB Offset	Low CH 19965	Mid CH 20175	High CH 20385	MPR
				Frequency 1711.5 MHz	Frequency 1732.5 MHz	Frequency 1753.5 MHz	
3 MHz	QPSK	1	0	23.06	23.31	23.08	0
		1	7	22.92	23.13	22.95	0
		1	14	22.82	23.02	22.76	0
		8	0	21.94	22.19	21.96	1
		8	3	21.90	22.11	21.93	1
		8	7	21.83	22.03	21.77	1
		15	0	21.86	22.11	21.88	1
	16QAM	1	0	22.17	22.24	22.06	1
		1	7	21.89	22.09	21.83	1
		1	14	21.78	22.03	21.80	1
		8	0	21.17	21.24	21.06	2
		8	3	20.86	21.06	20.80	2
		8	7	20.80	21.05	20.82	2
		15	0	21.08	21.15	20.97	2

LTE Band 4							
BW	Modulation	RB Size	RB Offset	Low CH 19975	Mid CH 20175	High CH 20375	MPR
				Frequency 1712.5 MHz	Frequency 1732.5 MHz	Frequency 1752.5 MHz	
5 MHz	QPSK	1	0	23.09	23.34	23.11	0
		1	12	22.95	23.16	22.98	0
		1	24	22.85	23.05	22.79	0
		12	0	21.97	22.22	21.99	1
		12	6	21.93	22.14	21.96	1
		12	13	21.86	22.06	21.80	1
		25	0	21.89	22.14	21.91	1
	16QAM	1	0	22.20	22.27	22.09	1
		1	12	21.92	22.12	21.86	1
		1	24	21.81	22.06	21.83	1
		12	0	21.20	21.27	21.09	2
		12	6	20.89	21.09	20.83	2
		12	13	20.83	21.08	20.85	2
		25	0	21.11	21.18	21.00	2
LTE Band 4							
BW	Modulation	RB Size	RB Offset	Low CH 20000	Mid CH 20175	High CH 20350	MPR
				Frequency 1715 MHz	Frequency 1732.5 MHz	Frequency 1750 MHz	
10 MHz	QPSK	1	0	23.13	23.38	23.15	0
		1	24	22.99	23.20	23.02	0
		1	49	22.89	23.09	22.83	0
		25	0	22.01	22.26	22.03	1
		25	12	21.97	22.18	22.00	1
		25	25	21.90	22.10	21.84	1
		50	0	21.93	22.18	21.95	1
	16QAM	1	0	22.24	22.31	22.13	1
		1	24	21.96	22.16	21.90	1
		1	49	21.85	22.10	21.87	1
		25	0	21.24	21.31	21.13	2
		25	12	20.93	21.13	20.87	2
		25	25	20.87	21.12	20.89	2
		50	0	21.15	21.22	21.04	2

LTE Band 4							
BW	Modulation	RB Size	RB Offset	Low CH 20025	Mid CH 20175	High CH 20325	MPR
				Frequency 1717.5 MHz	Frequency 1732.5 MHz	Frequency 1747.5 MHz	
15 MHz	QPSK	1	0	23.19	23.44	23.21	0
		1	37	23.05	23.26	23.08	0
		1	74	22.95	23.15	22.89	0
		36	0	22.07	22.32	22.09	1
		36	19	22.03	22.24	22.06	1
		36	39	21.96	22.16	21.90	1
		75	0	21.99	22.24	22.01	1
	16QAM	1	0	22.30	22.37	22.19	1
		1	37	22.02	22.22	21.96	1
		1	74	21.91	22.16	21.93	1
		36	0	21.30	21.37	21.19	2
		36	19	20.99	21.19	20.93	2
		36	39	20.93	21.18	20.95	2
		75	0	21.21	21.28	21.10	2
LTE Band 4							
BW	Modulation	RB Size	RB Offset	Low CH 20050	Mid CH 20175	High CH 20300	MPR
				Frequency 1720 MHz	Frequency 1732.5 MHz	Frequency 1745 MHz	
20MHz	QPSK	1	0	23.22	23.47	23.24	0
		1	50	23.08	23.29	23.11	0
		1	99	22.98	23.18	22.92	0
		50	0	22.10	22.35	22.12	1
		50	25	22.06	22.27	22.09	1
		50	50	21.99	22.19	21.93	1
		100	0	22.02	22.27	22.04	1
	16QAM	1	0	22.33	22.40	22.22	1
		1	50	22.05	22.25	21.99	1
		1	99	21.94	22.19	21.96	1
		50	0	21.33	21.40	21.22	2
		50	25	21.02	21.22	20.96	2
		50	50	20.96	21.21	20.98	2
		100	0	21.24	21.31	21.13	2

LTE Band 12							
BW	Modulation	RB Size	RB Offset	Low CH 23017	Mid CH 23095	High CH 23173	MPR
				Frequency 699.7 MHz	Frequency 707.5 MHz	Frequency 715.3 MHz	
1.4 MHz	QPSK	1	0	23.36	23.32	23.10	0
		1	2	23.24	23.25	23.18	0
		1	5	23.05	23.07	23.10	0
		3	0	23.34	23.30	23.08	0
		3	1	23.22	23.23	23.16	0
		3	3	23.03	23.05	23.08	0
		6	0	22.31	22.27	22.05	1
	16QAM	1	0	22.42	22.41	22.34	1
		1	2	22.35	22.37	22.40	1
		1	5	22.25	22.21	21.99	1
		3	0	22.41	22.40	22.33	1
		3	1	22.34	22.36	22.39	1
		3	3	22.24	22.20	21.98	1
		6	0	21.30	21.29	21.22	2
LTE Band 12							
BW	Modulation	RB Size	RB Offset	Low CH 23025	Mid CH 23095	High CH 23165	MPR
				Frequency 700.5 MHz	Frequency 707.5 MHz	Frequency 714.5 MHz	
3 MHz	QPSK	1	0	23.40	23.36	23.14	0
		1	7	23.28	23.29	23.22	0
		1	14	23.09	23.11	23.14	0
		8	0	22.43	22.39	22.17	1
		8	3	22.30	22.31	22.24	1
		8	7	22.25	22.27	22.30	1
		15	0	22.35	22.31	22.09	1
	16QAM	1	0	22.46	22.45	22.38	1
		1	7	22.39	22.41	22.44	1
		1	14	22.29	22.25	22.03	1
		8	0	21.38	21.37	21.30	2
		8	3	21.29	21.31	21.34	2
		8	7	21.33	21.29	21.07	2
		15	0	21.34	21.33	21.26	2

LTE Band 12							
BW	Modulation	RB Size	RB Offset	Low CH 23035	Mid CH 23095	High CH 23155	MPR
				Frequency 701.5 MHz	Frequency 707.5 MHz	Frequency 713.5 MHz	
5 MHz	QPSK	1	0	23.46	23.42	23.20	0
		1	12	23.34	23.35	23.28	0
		1	24	23.15	23.17	23.20	0
		12	0	22.49	22.45	22.23	1
		12	6	22.36	22.37	22.30	1
		12	13	22.31	22.33	22.36	1
		25	0	22.41	22.37	22.15	1
	16QAM	1	0	22.52	22.51	22.44	1
		1	12	22.45	22.47	22.50	1
		1	24	22.35	22.31	22.09	1
		12	0	21.44	21.43	21.36	2
		12	6	21.35	21.37	21.40	2
		12	13	21.39	21.35	21.13	2
		25	0	21.40	21.39	21.32	2
LTE Band 12							
BW	Modulation	RB Size	RB Offset	Low CH 23060	Mid CH 23095	High CH 23130	MPR
				Frequency 704 MHz	Frequency 707.5 MHz	Frequency 711 MHz	
10 MHz	QPSK	1	0	23.49	23.45	23.23	0
		1	24	23.37	23.38	23.31	0
		1	49	23.18	23.20	23.23	0
		25	0	22.52	22.48	22.26	1
		25	12	22.39	22.40	22.33	1
		25	25	22.34	22.36	22.39	1
		50	0	22.44	22.40	22.18	1
	16QAM	1	0	22.55	22.54	22.47	1
		1	24	22.48	22.50	22.53	1
		1	49	22.38	22.34	22.12	1
		25	0	21.47	21.46	21.39	2
		25	12	21.38	21.40	21.43	2
		25	25	21.42	21.38	21.16	2
		50	0	21.43	21.42	21.35	2

## EIRP

### LTE BAND 4

#### CHANNEL BANDWIDTH: 1.4MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
19957	1710.7	-18.25	41.29	23.04	201.56	H	1
20175	1732.5	-19.13	41.36	22.23	167.11	H	1
20393	1754.3	-18.95	42.74	23.79	239.22	H	1
19957	1710.7	-20.01	44.25	24.24	265.16	V	1
20175	1732.5	-19.83	44.20	24.37	<b>273.53</b>	V	1
20393	1754.3	-20.28	44.09	23.81	240.16	V	1

#### CHANNEL BANDWIDTH: 1.4MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
19957	1710.7	-19.12	41.29	22.17	164.97	H	1
20175	1732.5	-20.06	41.36	21.30	134.90	H	1
20393	1754.3	-19.91	42.74	22.83	191.78	H	1
19957	1710.7	-20.88	44.25	23.37	217.02	V	1
20175	1732.5	-20.76	44.20	23.44	220.80	V	1
20393	1754.3	-21.24	44.09	22.85	192.53	V	1

### LTE BAND 4

#### CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
19965	1711.5	-18.23	41.27	23.04	201.23	H	1
20175	1732.5	-19.19	41.36	22.17	164.82	H	1
20385	1753.5	-18.90	42.76	23.86	243.05	H	1
19965	1711.5	-19.99	44.26	24.27	267.42	V	1
20175	1732.5	-19.89	44.20	24.31	<b>269.77</b>	V	1
20385	1753.5	-20.23	44.23	24.00	251.30	V	1

### CHANNEL BANDWIDTH: 3MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
19965	1711.5	-19.30	41.27	21.97	157.29	H	1
20175	1732.5	-20.08	41.36	21.28	134.28	H	1
20385	1753.5	-19.89	42.76	22.87	193.51	H	1
19965	1711.5	-21.06	44.26	23.20	209.03	V	1
20175	1732.5	-20.78	44.20	23.42	219.79	V	1
20385	1753.5	-21.22	44.23	23.01	200.08	V	1

### LTE BAND 4

#### CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
19975	1712.5	-18.29	41.39	23.10	204.13	H	1
20175	1732.5	-19.14	41.36	22.22	166.72	H	1
20375	1752.5	-18.85	42.63	23.78	238.73	H	1
19975	1712.5	-20.05	44.17	24.12	257.99	V	1
20175	1732.5	-19.84	44.20	24.36	<b>272.90</b>	V	1
20375	1752.5	-20.18	44.35	24.17	260.92	V	1

#### CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
19975	1712.5	-19.12	41.39	22.27	168.62	H	1
20175	1732.5	-20.16	41.36	21.20	131.83	H	1
20375	1752.5	-19.95	42.63	22.68	185.31	H	1
19975	1712.5	-20.88	44.17	23.29	213.11	V	1
20175	1732.5	-20.86	44.20	23.34	215.77	V	1
20375	1752.5	-21.28	44.35	23.07	202.53	V	1

#### LTE BAND 4

##### CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
20000	1715.0	-18.10	41.49	23.39	218.07	H	1
20175	1732.5	-19.08	41.36	22.28	169.04	H	1
20350	1750.0	-18.72	42.28	23.56	227.14	H	1
20000	1715.0	-19.86	44.06	24.20	263.21	V	1
20175	1732.5	-19.78	44.20	24.42	<b>276.69</b>	V	1
20350	1750.0	-20.05	44.43	24.38	274.16	V	1

##### CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
20000	1715.0	-19.25	41.49	22.24	167.34	H	1
20175	1732.5	-20.18	41.36	21.18	131.22	H	1
20350	1750.0	-19.88	42.28	22.40	173.90	H	1
20000	1715.0	-21.01	44.06	23.05	201.98	V	1
20175	1732.5	-20.88	44.20	23.32	214.78	V	1
20350	1750.0	-21.21	44.43	23.22	209.89	V	1

#### LTE BAND 4

##### CHANNEL BANDWIDTH: 15MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
20025	1717.5	-18.11	41.34	23.23	210.28	H	1
20175	1732.5	-19.15	41.36	22.21	166.34	H	1
20325	1747.5	-18.79	42.09	23.30	213.60	H	1
20025	1717.5	-19.87	44.04	24.17	261.46	V	1
20175	1732.5	-19.85	44.20	24.35	<b>272.27</b>	V	1
20325	1747.5	-20.12	44.22	24.10	256.74	V	1



### CHANNEL BANDWIDTH: 15MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
20025	1717.5	-18.97	41.34	22.37	172.50	H	1
20175	1732.5	-20.02	41.36	21.34	136.14	H	1
20325	1747.5	-19.64	42.09	22.45	175.63	H	1
20025	1717.5	-20.73	44.04	23.31	214.49	V	1
20175	1732.5	-20.72	44.20	23.48	222.84	V	1
20325	1747.5	-20.97	44.22	23.25	211.11	V	1

### LTE BAND 4

### CHANNEL BANDWIDTH: 20MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
20050	1720.0	-18.69	41.28	22.59	181.59	H	1
20175	1732.5	-19.60	41.36	21.76	150.00	H	1
20300	1745.0	-19.37	41.96	22.59	181.43	H	1
20050	1720.0	-20.45	44.14	23.69	233.61	V	1
20175	1732.5	-20.30	44.20	23.90	<b>245.24</b>	V	1
20300	1745.0	-20.70	43.88	23.18	208.07	V	1

### CHANNEL BANDWIDTH: 20MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
20050	1720.0	-19.62	41.28	21.66	146.59	H	1
20175	1732.5	-20.67	41.36	20.69	117.25	H	1
20300	1745.0	-20.20	41.96	21.76	149.86	H	1
20050	1720.0	-21.38	44.14	22.76	188.58	V	1
20175	1732.5	-21.37	44.20	22.83	191.69	V	1
20300	1745.0	-21.53	43.88	22.35	171.87	V	1

**REMARKS:** 1. EIRP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB).

2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss

## LTE BAND 12

### CHANNEL BANDWIDTH: 1.4MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23017	699.7	-10.93	32.77	19.69	93.11	H	3
23095	707.5	-9.94	33.23	21.14	130.02	H	3
23173	715.3	-10.68	33.14	20.31	107.35	H	3
23017	699.7	-6.52	32.42	23.75	236.92	V	3
23095	707.5	-5.58	32.60	24.87	<b>306.90</b>	V	3
23173	715.3	-5.49	32.19	24.55	284.84	V	3

### CHANNEL BANDWIDTH: 1.4MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23017	699.7	-11.76	32.77	18.86	76.91	H	3
23095	707.5	-10.96	33.23	20.12	102.80	H	3
23173	715.3	-11.78	33.14	19.21	83.33	H	3
23017	699.7	-7.35	32.42	22.92	195.70	V	3
23095	707.5	-6.60	32.60	23.85	242.66	V	3
23173	715.3	-6.59	32.19	23.45	221.11	V	3

## LTE BAND 12

### CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23025	700.5	-10.74	32.63	19.74	94.21	H	3
23095	707.5	-9.88	33.23	21.20	131.83	H	3
23165	714.5	-10.55	33.21	20.51	112.33	H	3
23025	700.5	-6.33	32.33	23.85	242.49	V	3
23095	707.5	-5.52	32.60	24.93	<b>311.17</b>	V	3
23165	714.5	-5.36	32.30	24.79	301.37	V	3

### CHANNEL BANDWIDTH: 3MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23025	700.5	-11.89	32.63	18.59	72.29	H	3
23095	707.5	-10.98	33.23	20.10	102.33	H	3
23165	714.5	-11.71	33.21	19.35	86.00	H	3
23025	700.5	-7.48	32.33	22.70	186.08	V	3
23095	707.5	-6.62	32.60	23.83	241.55	V	3
23165	714.5	-6.52	32.30	23.63	230.73	V	3

### LTE BAND 12

### CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23035	701.5	-10.75	32.53	19.63	91.73	H	3
23095	707.5	-9.95	33.23	21.13	129.66	H	3
23155	713.5	-10.62	33.29	20.52	112.64	H	3
23035	701.5	-6.34	32.25	23.76	237.90	V	3
23095	707.5	-5.59	32.60	24.86	<b>306.20</b>	V	3
23155	713.5	-5.43	32.39	24.81	302.41	V	3

### CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23035	701.5	-11.61	32.53	18.77	75.25	H	3
23095	707.5	-10.82	33.23	20.26	106.12	H	3
23155	713.5	-11.47	33.29	19.67	92.62	H	3
23035	701.5	-7.20	32.25	22.90	195.16	V	3
23095	707.5	-6.46	32.60	23.99	250.61	V	3
23155	713.5	-6.28	32.39	23.96	248.66	V	3

## LTE BAND 12

### CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23060	704.0	-11.33	32.68	19.20	83.23	H	3
23095	707.5	-10.40	33.23	20.68	116.95	H	3
23130	711.0	-11.20	33.39	20.04	100.86	H	3
23060	704.0	-6.92	32.37	23.30	213.70	V	3
23095	707.5	-6.04	32.60	24.41	<b>276.06</b>	V	3
23130	711.0	-6.01	32.56	24.40	275.11	V	3

### CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23060	704.0	-12.26	32.68	18.27	67.19	H	3
23095	707.5	-11.47	33.23	19.61	91.41	H	3
23130	711.0	-12.03	33.39	19.21	83.31	H	3
23060	704.0	-7.85	32.37	22.37	172.50	V	3
23095	707.5	-7.11	32.60	23.34	215.77	V	3
23130	711.0	-6.84	32.56	23.57	227.25	V	3

**REMARKS:** 1. ERP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB) -2.15(dB).  
2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss

## 4.2 Frequency Stability Measurement

### 4.2.1 Limits of Frequency Stability Measurement

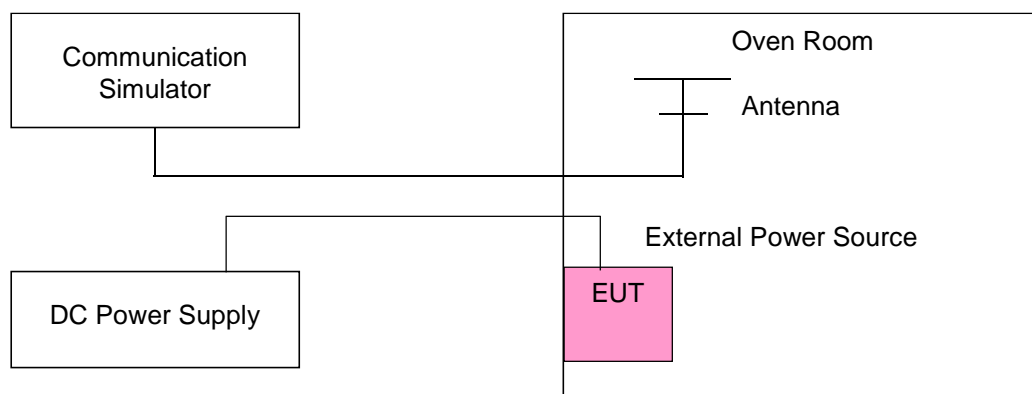
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

### 4.2.2 Test Procedure

- 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.
- 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.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the  $\pm 0.5^{\circ}\text{C}$  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

	FREQUENCY ERROR (PPM)						
VOLTAGE (Volts)	LTE Band 4						LIMIT (ppm)
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz	
3.8	0.0016	0.0015	0.0015	0.0017	0.0020	0.0015	2.5
3.3	-0.0017	-0.0016	-0.0019	-0.0021	-0.0023	-0.0019	2.5
4.5	-0.0014	-0.0014	-0.0017	-0.0019	-0.0023	-0.0017	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.5Vdc.

##### FREQUENCY ERROR vs. TEMPERATURE.

	Frequency Error (PPM)						
TEMP. (°C)	LTE Band 4						LIMIT (ppm)
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz	
-30	-0.0061	-0.0061	-0.0065	-0.0064	-0.0063	-0.0066	2.5
-20	-0.0054	-0.0054	-0.0058	-0.0056	-0.0056	-0.0058	2.5
-10	-0.0047	-0.0047	-0.0051	-0.0049	-0.0048	-0.0051	2.5
0	-0.0039	-0.0039	-0.0043	-0.0042	-0.0041	-0.0042	2.5
10	-0.0032	-0.0032	-0.0035	-0.0035	-0.0033	-0.0035	2.5
20	-0.0025	-0.0025	-0.0028	-0.0028	-0.0025	-0.0028	2.5
30	-0.0018	-0.0019	-0.0021	-0.0019	-0.0018	-0.0020	2.5
40	-0.0012	-0.0011	-0.0014	-0.0012	-0.0011	-0.0012	2.5
50	-0.0004	-0.0004	-0.0006	-0.0005	-0.0004	-0.0005	2.5
60	0.0004	0.0002	0.0001	0.0002	0.0005	0.0002	2.5

# FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)				LIMIT (ppm)	
	LTE Band 12					
	1.4MHz	3MHz	5MHz	10MHz		
3.8	0.0041	0.0043	0.0038	0.0030	2.5	
3.3	-0.0046	-0.0050	-0.0047	-0.0040	2.5	
4.5	-0.0041	-0.0046	-0.0040	-0.0035	2.5	

**NOTE:** The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.5Vdc.

# FREQUENCY ERROR vs. TEMPERATURE.

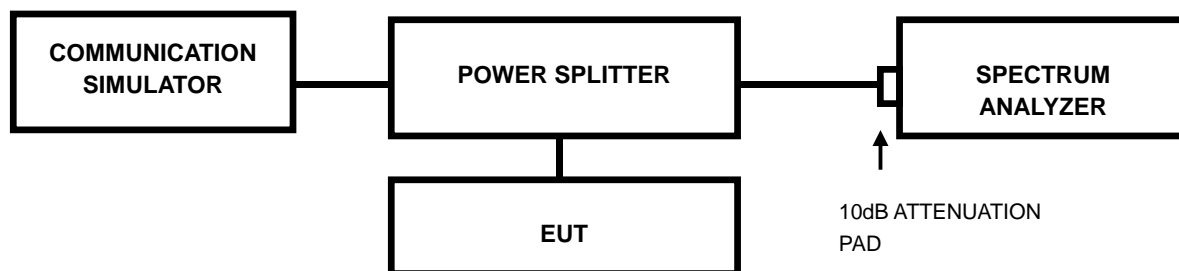
TEMP. (°C)	FREQUENCY ERROR (ppm)				LIMIT (ppm)	
	LTE Band 12					
	1.4MHz	3MHz	5MHz	10MHz		
-30	-0.0153	-0.0151	-0.0159	-0.0154	2.5	
-20	-0.0137	-0.0135	-0.0142	-0.0133	2.5	
-10	-0.0118	-0.0118	-0.0124	-0.0114	2.5	
0	-0.0100	-0.0100	-0.0103	-0.0097	2.5	
10	-0.0083	-0.0086	-0.0086	-0.0075	2.5	
20	-0.0066	-0.0068	-0.0069	-0.0057	2.5	
30	-0.0048	-0.0050	-0.0050	-0.0041	2.5	
40	-0.0031	-0.0030	-0.0033	-0.0021	2.5	
50	-0.0013	-0.0009	-0.0016	-0.0003	2.5	
60	0.0005	0.0009	0.0005	0.0013	2.5	

### 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 Setup



#### 4.3.3 Test Procedures

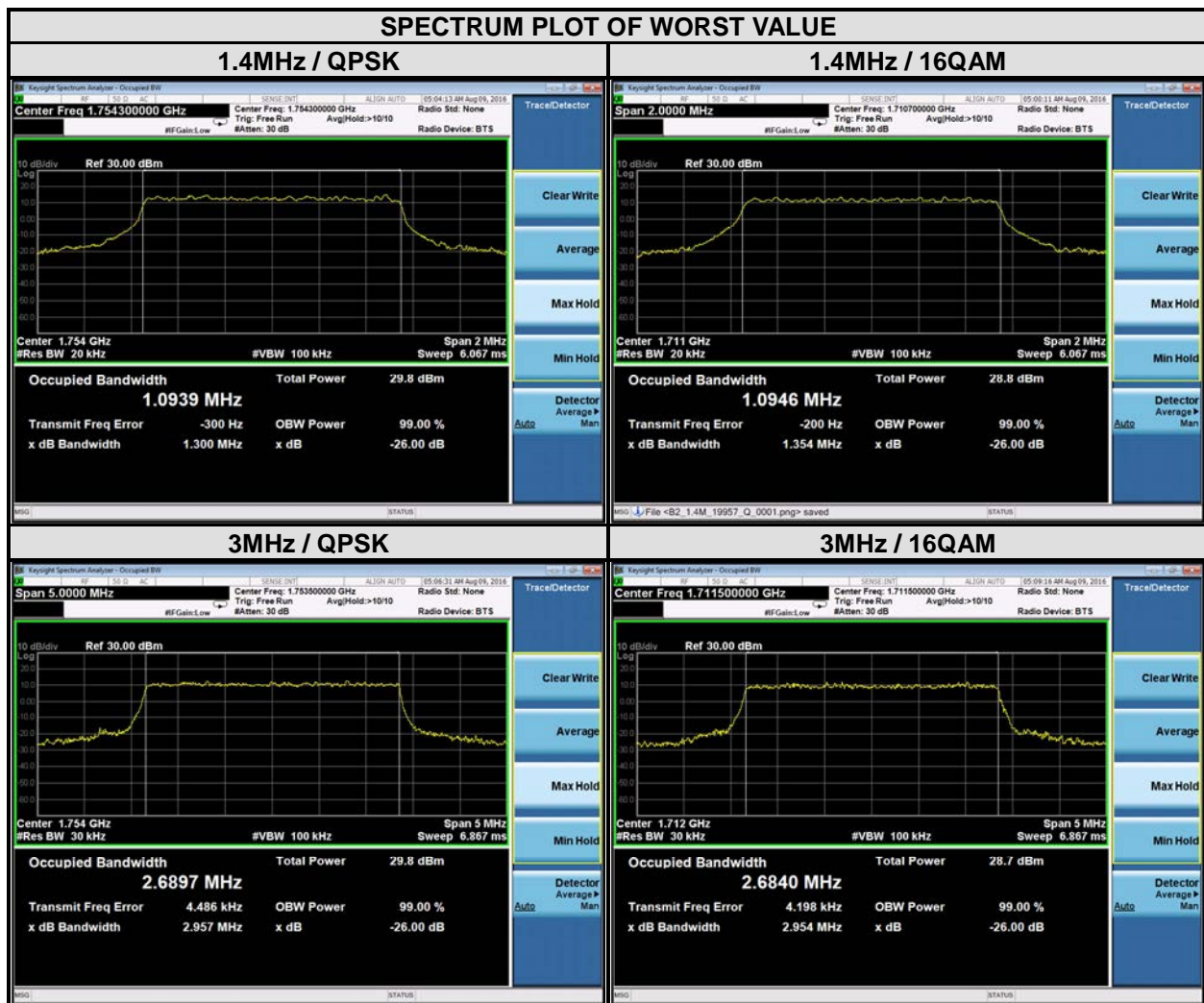
- The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.



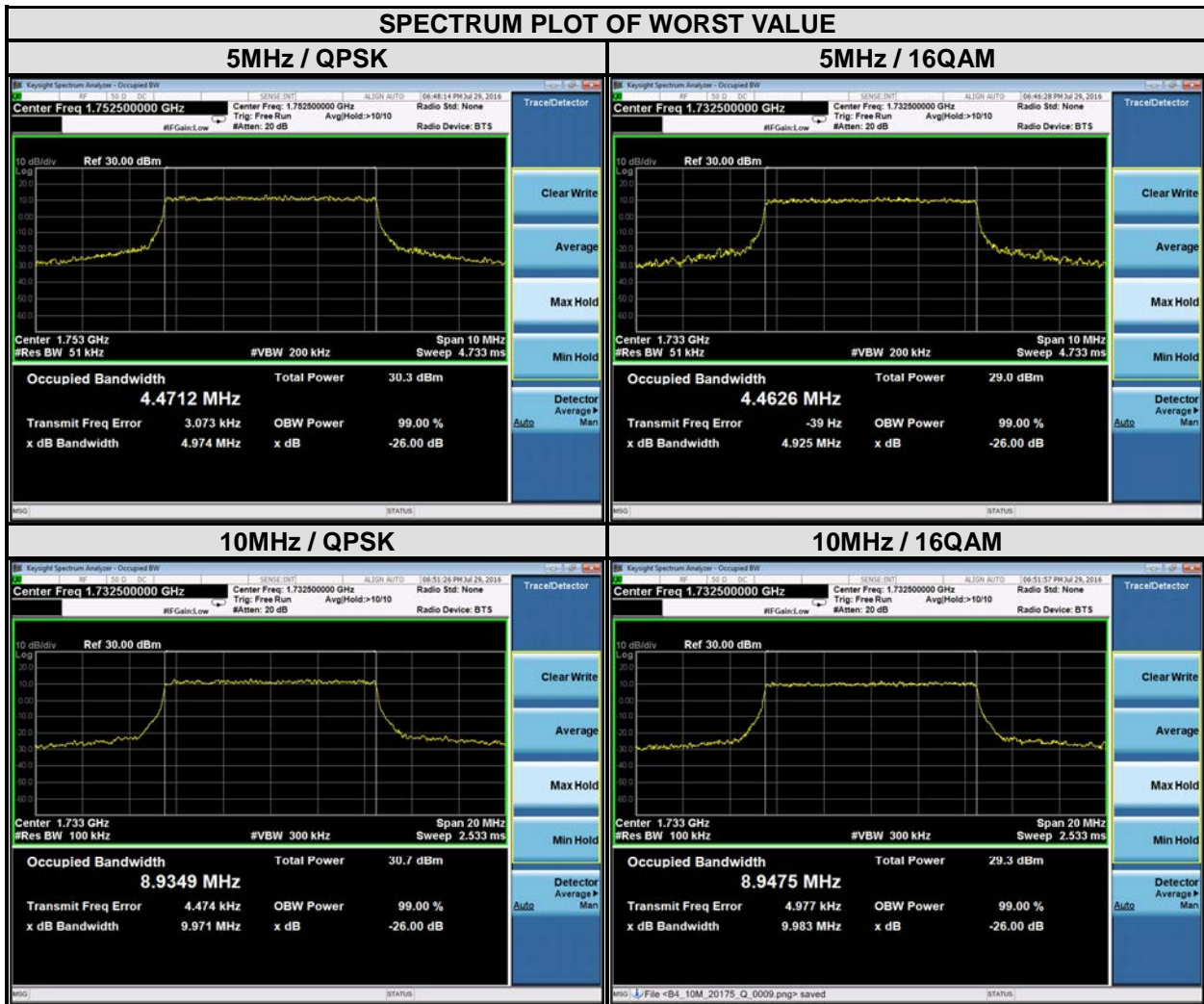
#### 4.3.4 Test Result

##### LTE BAND 4

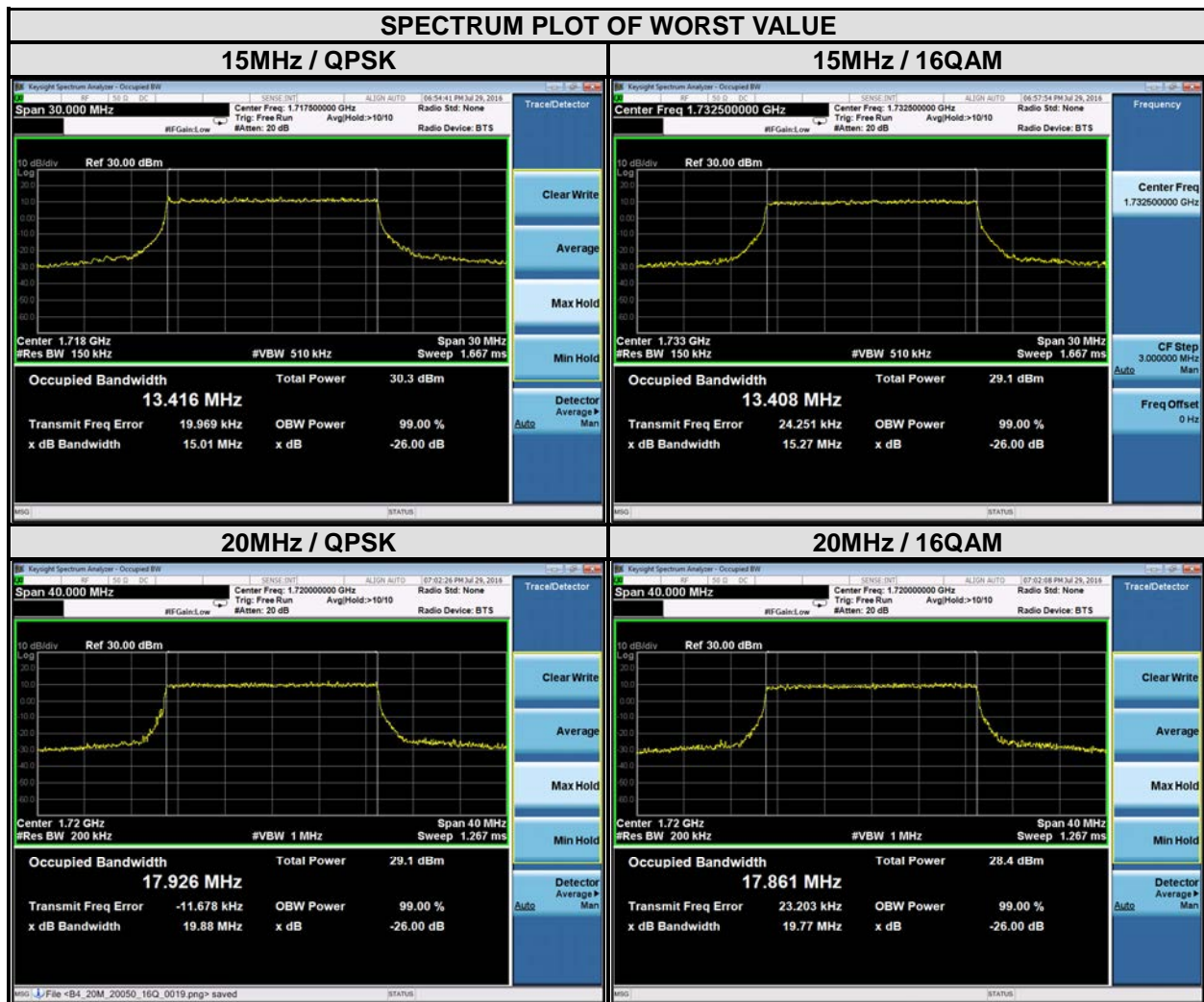
CHANNEL BANDWIDTH: 1.4MHz				CHANNEL BANDWIDTH: 3MHz			
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)		CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
19957	1710.7	1.09	1.09	19965	1711.5	2.68	2.68
20175	1732.5	1.09	1.09	20175	1732.5	2.68	2.68
20393	1754.3	1.09	1.09	20385	1753.5	2.69	2.68



CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)		CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
19975	1712.5	4.47	4.46	20000	1715	8.93	8.91
20175	1732.5	4.47	4.46	20175	1732.5	8.93	8.95
20375	1752.5	4.47	4.46	20350	1750	8.93	8.94

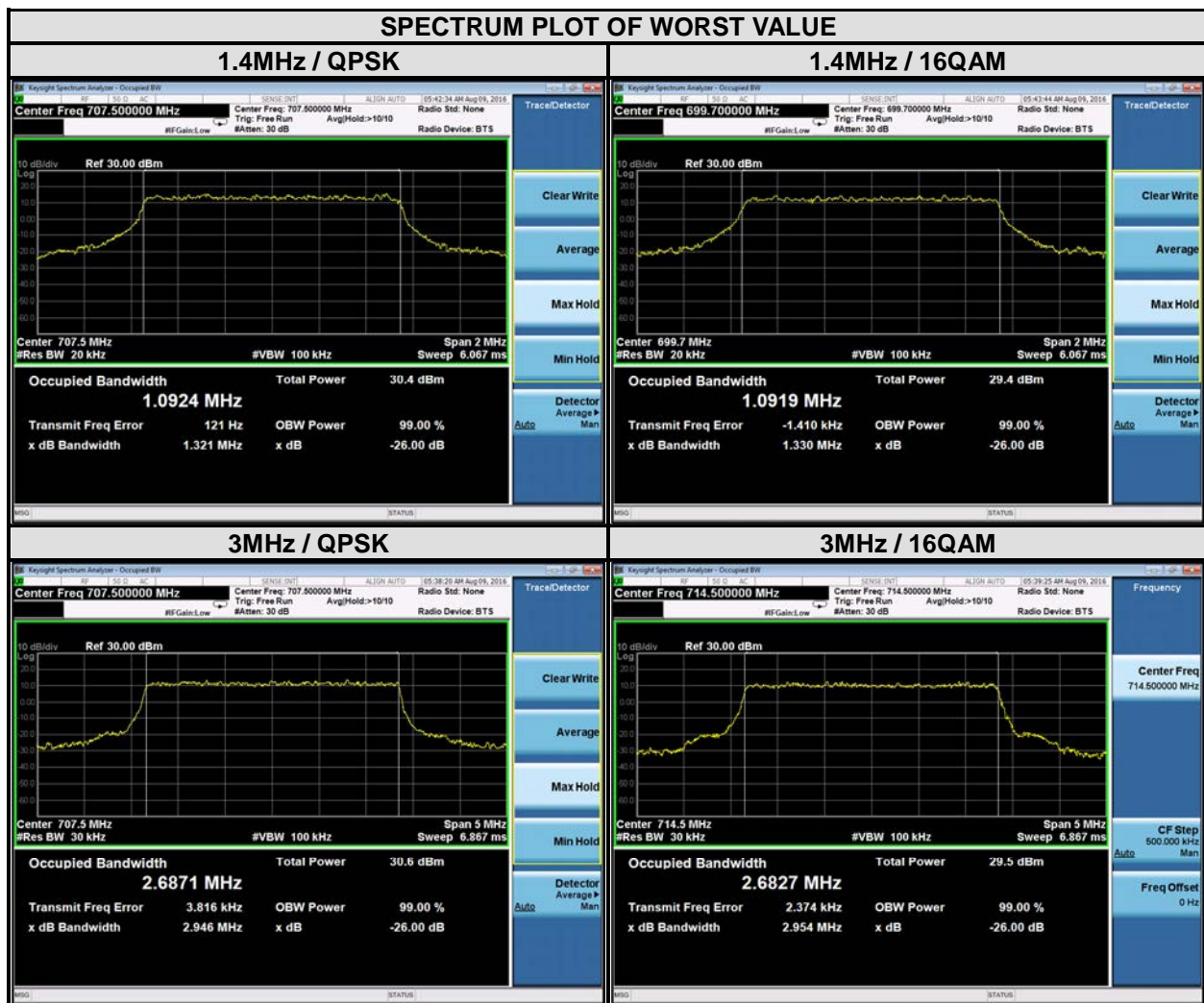


CHANNEL BANDWIDTH: 15MHz				CHANNEL BANDWIDTH: 20MHz			
CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)		CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	
		QPSK	16QAM			QPSK	16QAM
20025	1717.5	13.42	13.40	20050	1720	17.93	17.86
20175	1732.5	13.42	13.41	20175	1732.5	17.86	17.85
20325	1747.5	13.41	13.40	20300	1745	17.91	17.84



# LTE BAND 12

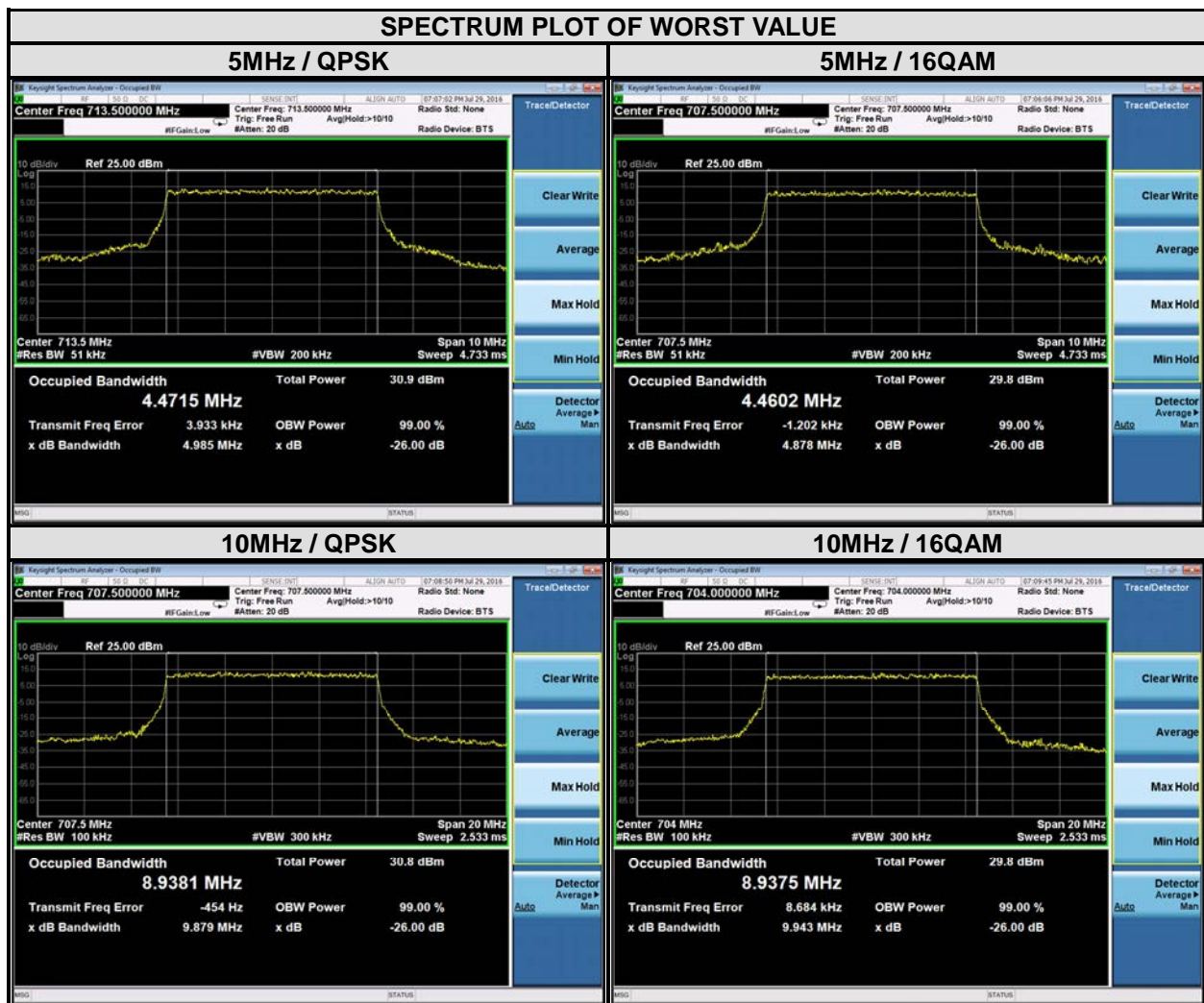
CHANNEL BANDWIDTH: 1.4MHz				CHANNEL BANDWIDTH: 3MHz			
CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)		CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	
		QPSK	16QAM			QPSK	16QAM
23017	699.7	1.09	1.09	23025	700.5	2.68	2.68
23095	707.5	1.09	1.09	23095	707.5	2.69	2.68
23173	715.3	1.08	1.09	23165	714.5	2.68	2.68





# LTE BAND 12

CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)		CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
23035	701.5	4.47	4.46	23060	704	8.92	8.94
23095	707.5	4.47	4.46	23095	707.5	8.94	8.93
23155	713.5	4.47	4.46	23130	711	8.94	8.91

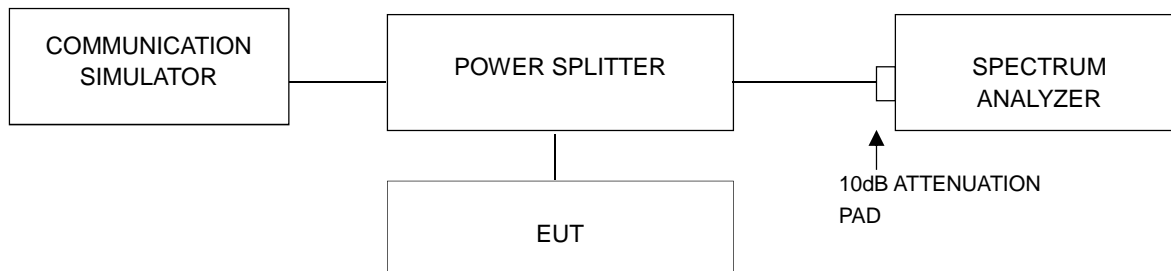


## 4.4 Peak To Average Ratio

### 4.4.1 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

### 4.4.2 Test Setup



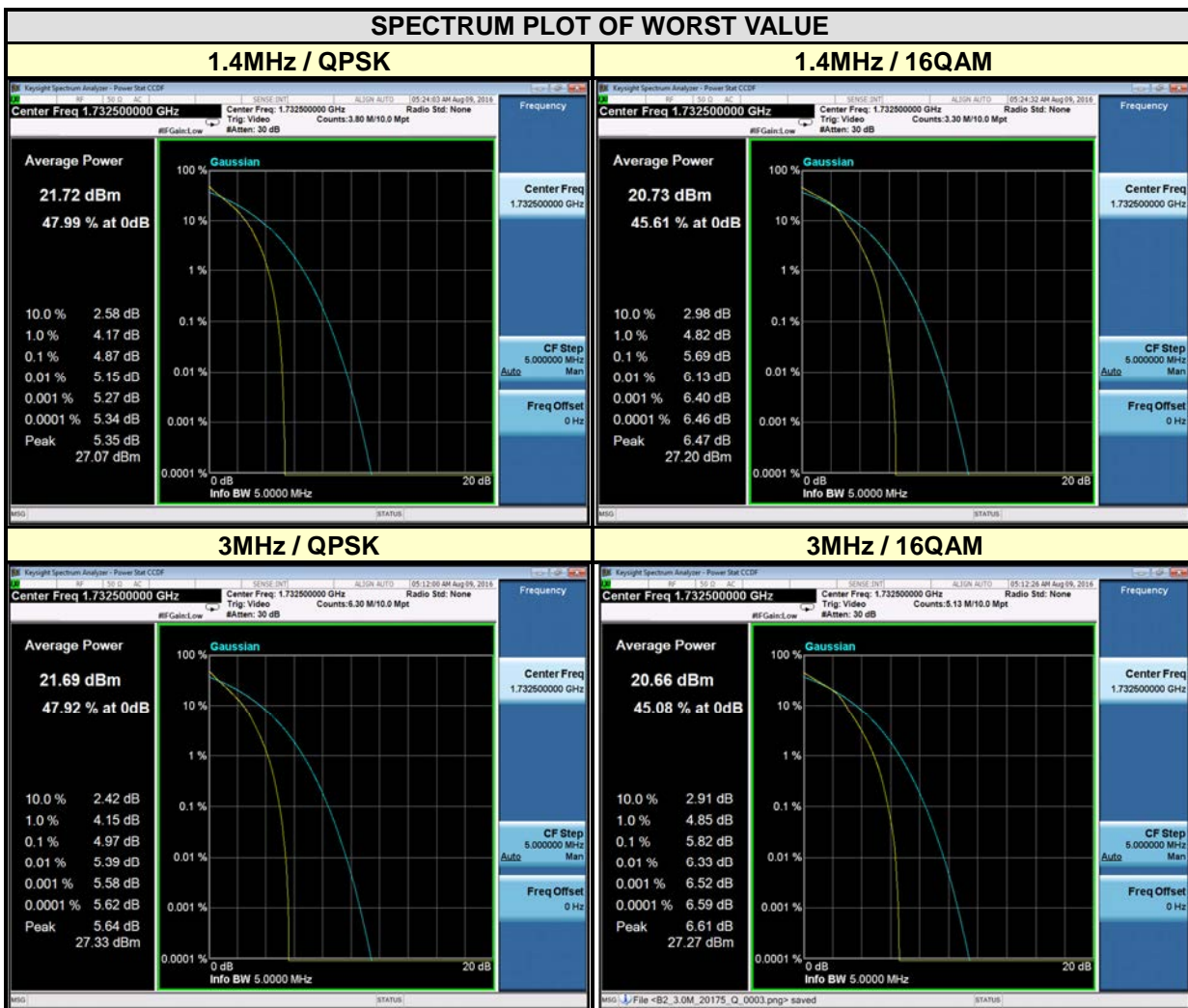
### 4.4.3 Test Procedures

1. Set resolution/measurement bandwidth  $\geq$  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%.

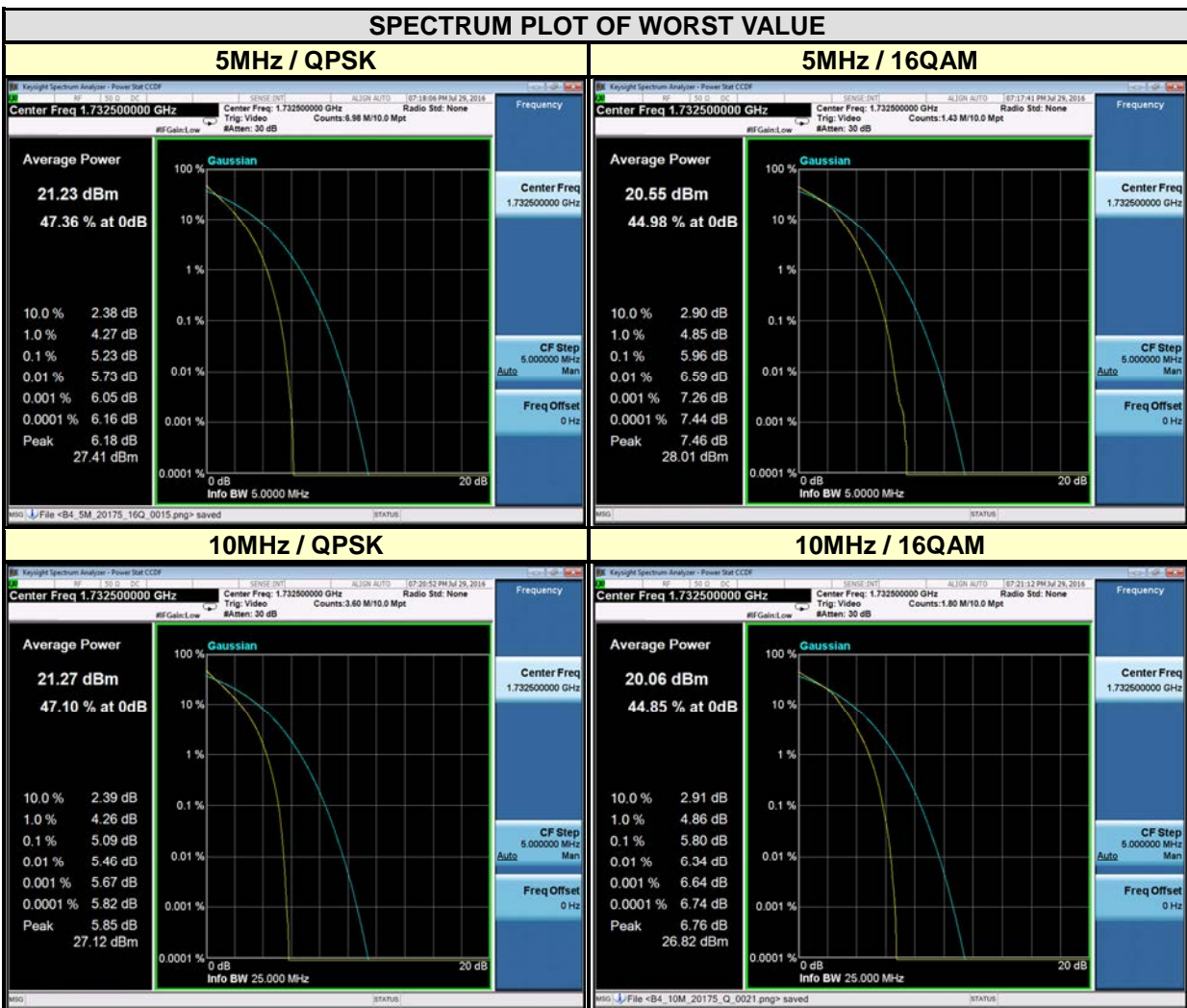
#### 4.4.4 Test Results

##### LTE BAND 4

CHANNEL BANDWIDTH: 1.4MHz				CHANNEL BANDWIDTH: 3MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
19957	1710.7	4.63	5.41	19965	1711.5	4.76	5.59
20175	1732.5	4.87	5.69	20175	1732.5	4.97	5.82
20393	1754.3	4.78	5.65	20385	1753.5	4.90	5.73

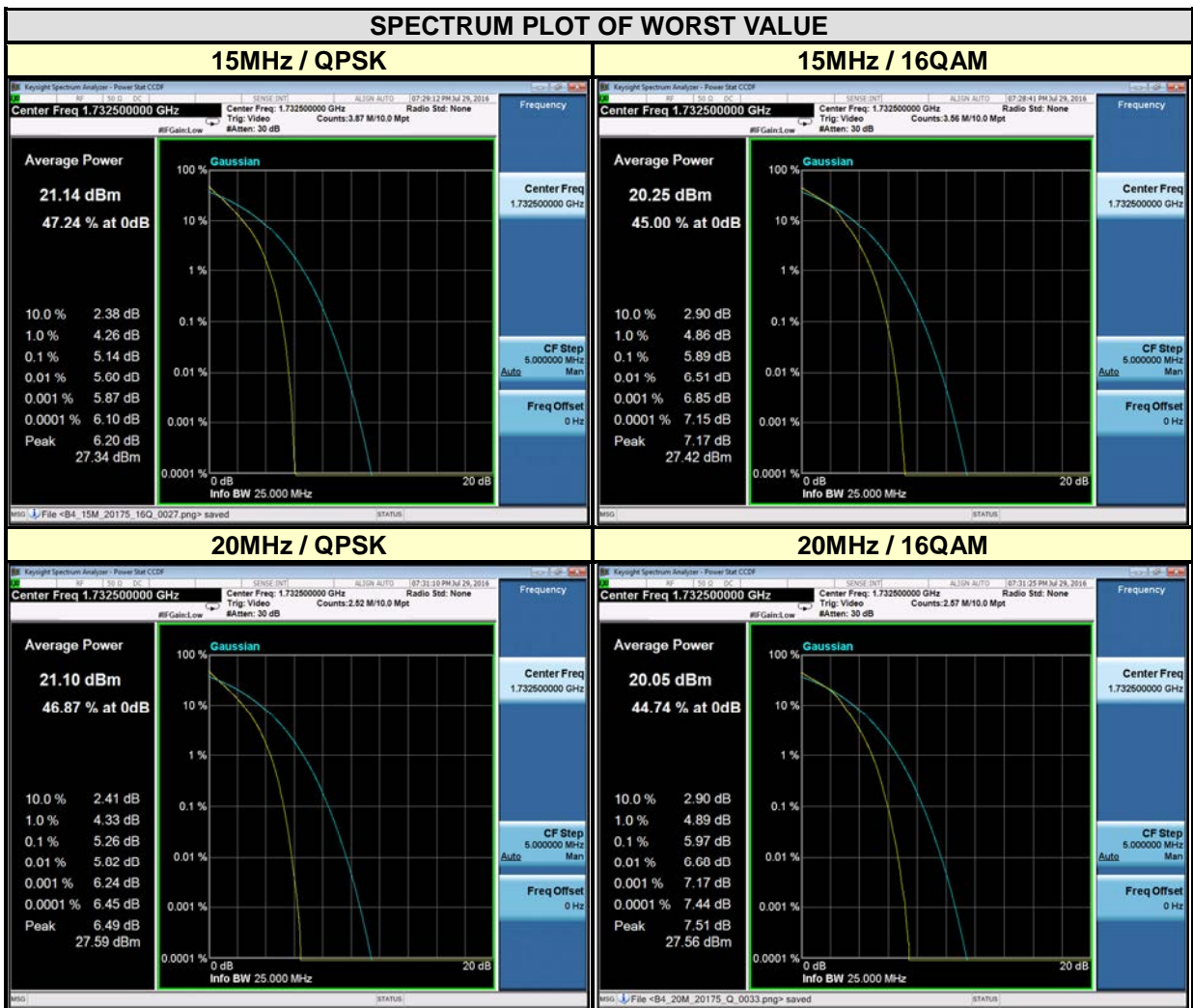


CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
19975	1712.5	5.09	5.79	20000	1715	4.93	5.69
20175	1732.5	5.23	5.96	20175	1732.5	5.09	5.80
20375	1752.5	5.19	5.91	20350	1750	4.92	5.67





CHANNEL BANDWIDTH: 15MHz				CHANNEL BANDWIDTH: 20MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
20025	1717.5	5.04	5.80	20050	1720	5.22	5.96
20175	1732.5	5.14	5.89	20175	1732.5	5.26	5.97
20325	1747.5	5.04	5.76	20300	1745	5.21	5.95

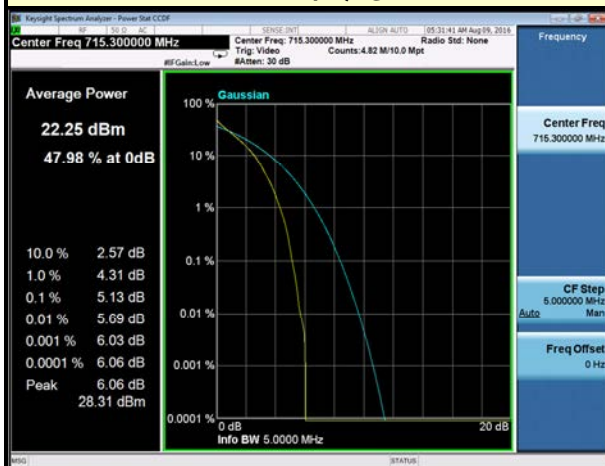


## LTE BAND 12

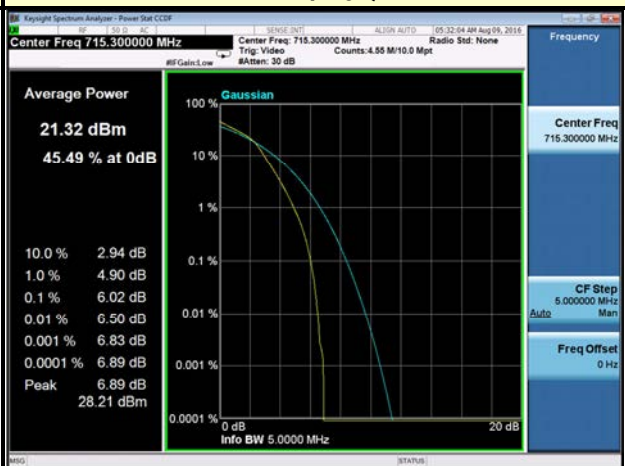
CHANNEL BANDWIDTH: 1.4MHz				CHANNEL BANDWIDTH: 3MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
23017	699.7	4.52	5.35	23025	700.5	4.83	5.66
23095	707.5	4.80	5.61	23095	707.5	4.93	5.74
23173	715.3	5.13	6.02	23165	714.5	5.35	6.16

## SPECTRUM PLOT OF WORST VALUE

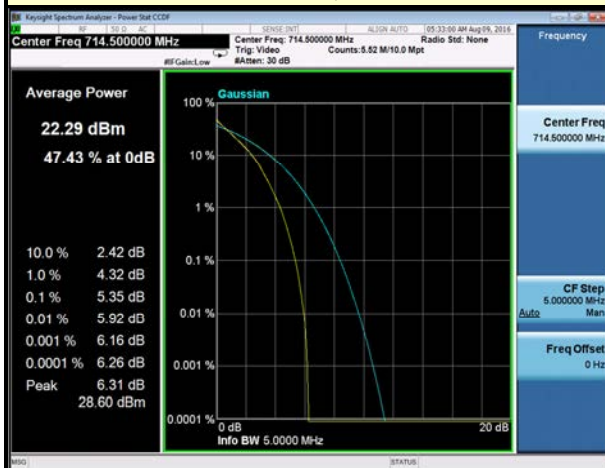
### 1.4MHz / QPSK



### 1.4MHz / 16QAM



### 3MHz / QPSK



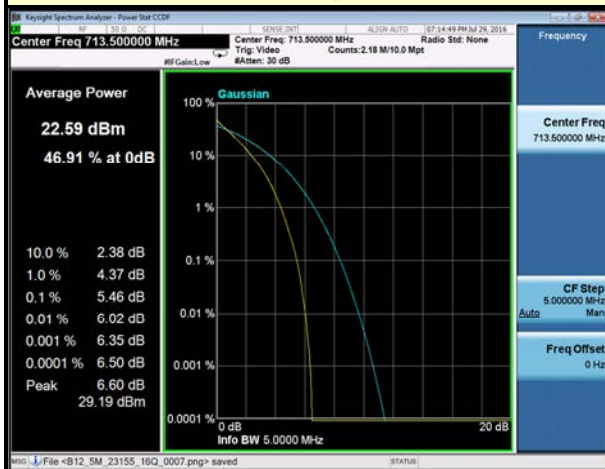
### 3MHz / 16QAM



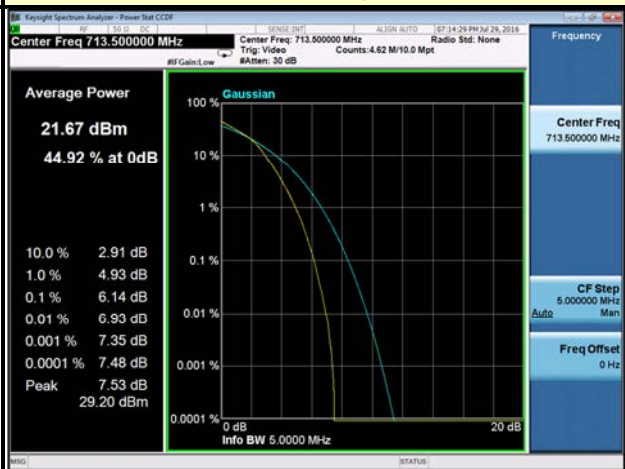
CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
23035	701.5	5.15	5.89	23060	704	5.51	6.17
23095	707.5	5.22	5.94	23095	707.5	5.17	5.88
23155	713.5	5.46	6.14	23130	711	5.18	5.92

### SPECTRUM PLOT OF WORST VALUE

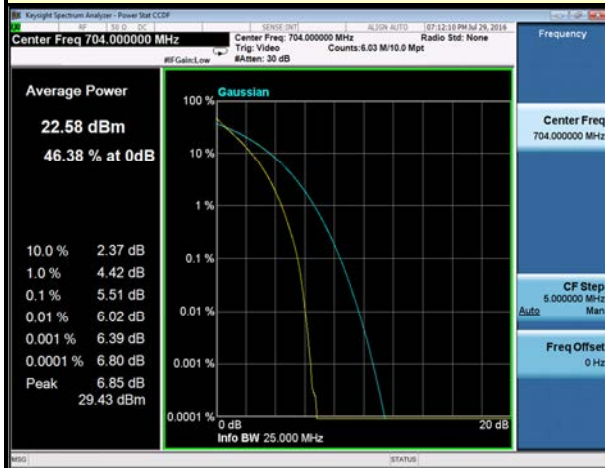
#### 5MHz / QPSK



#### 5MHz / 16QAM



#### 10MHz / QPSK



#### 10MHz / 16QAM



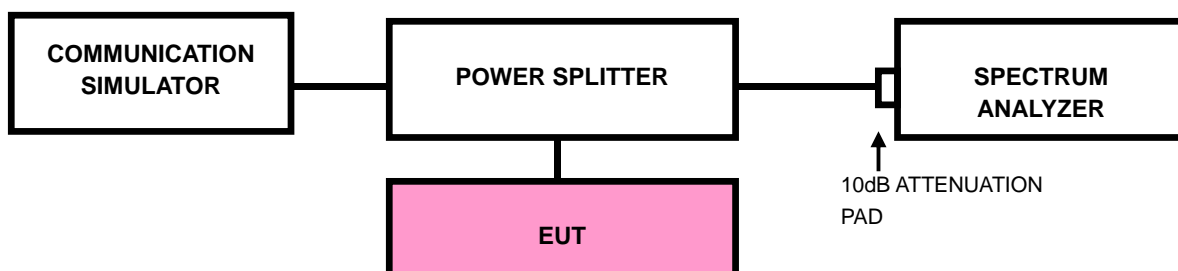
## 4.5 Band Edge Measurement

### 4.5.1 Limits of Band Edge Measurement

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.

### 4.5.2 Test Setup



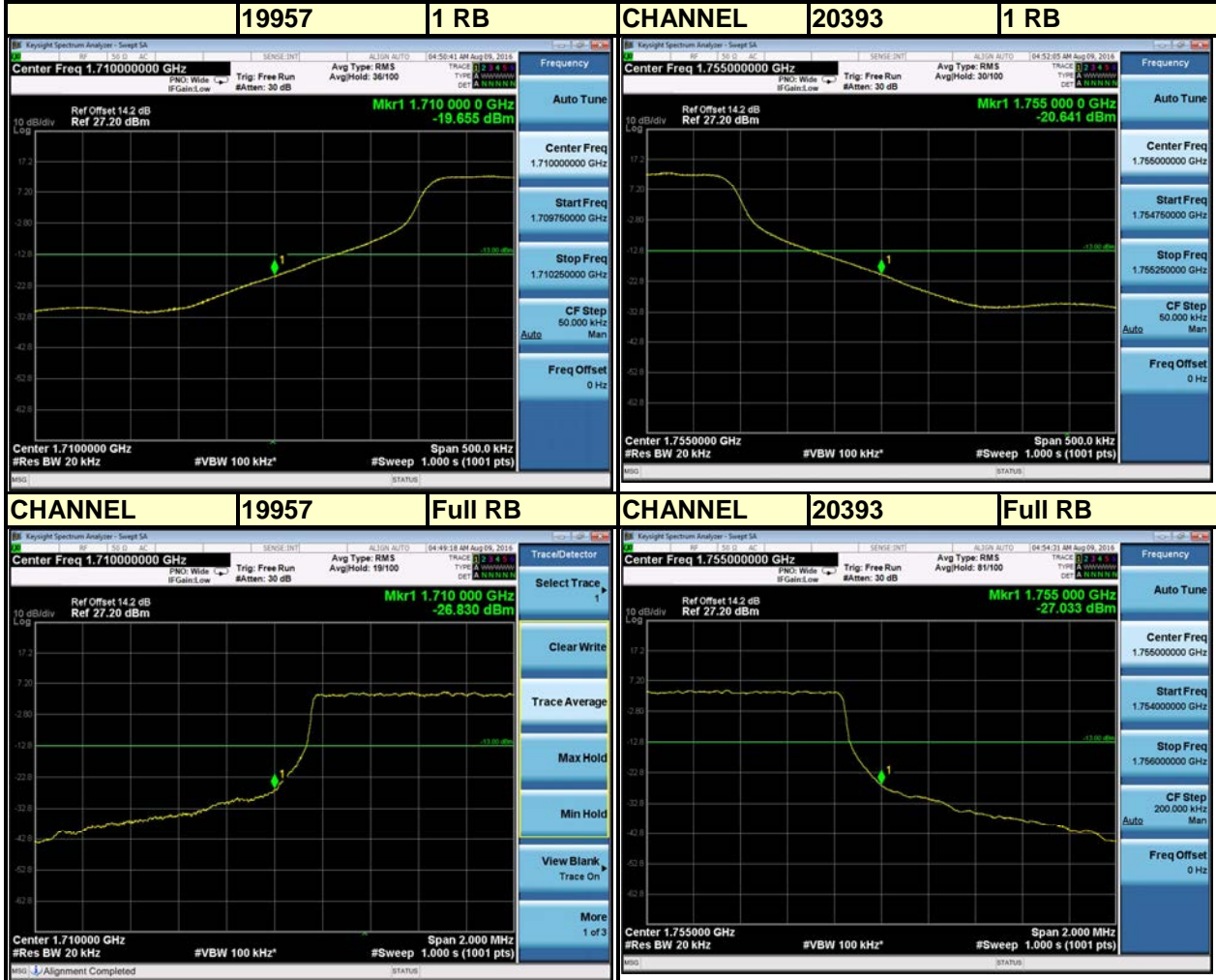
### 4.5.3 Test Procedures

- The EUT was set up for the maximum peak power with LTE link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range.).
- The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RB of the spectrum is 20kHz and VB of the spectrum is 100 kHz. (LTE bandwidth 1.4MHz)
- The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RB of the spectrum is 30kHz and VB of the spectrum is 100kHz. (LTE bandwidth 3MHz)
- The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RB of the spectrum is 50kHz and VB of the spectrum is 200kHz. (LTE bandwidth 5MHz)
- The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz. (LTE bandwidth 10MHz)
- The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RB of the spectrum is 200kHz and VB of the spectrum is 1MHz. (LTE bandwidth 15MHz)
- The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RB of the spectrum is 200kHz and VB of the spectrum is 1MHz. (LTE bandwidth 20MHz)
- Record the max trace plot into the test report.

## 4.5.4 Test Results

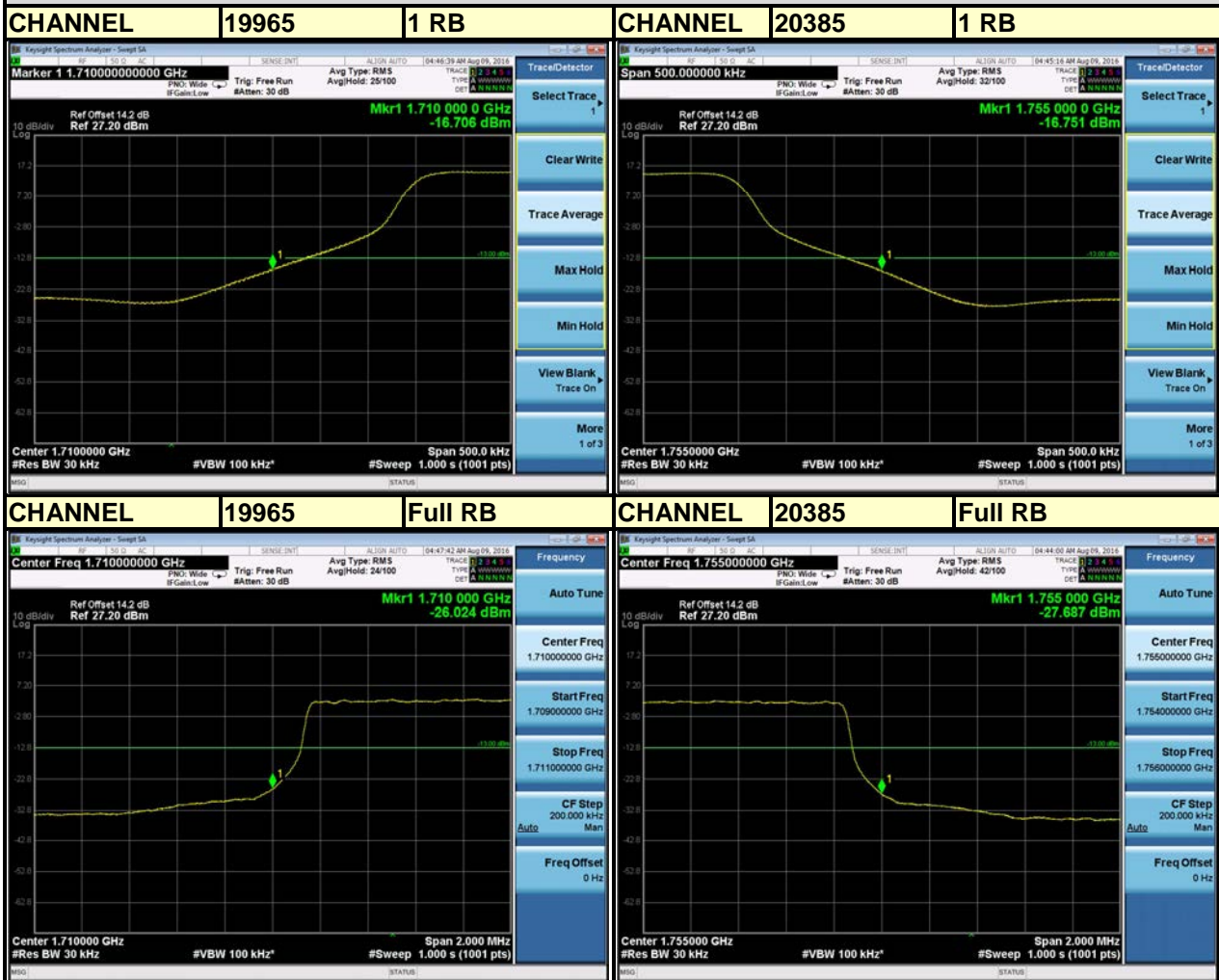
### LTE BAND 4

#### Channel Bandwidth: 1.4MHz



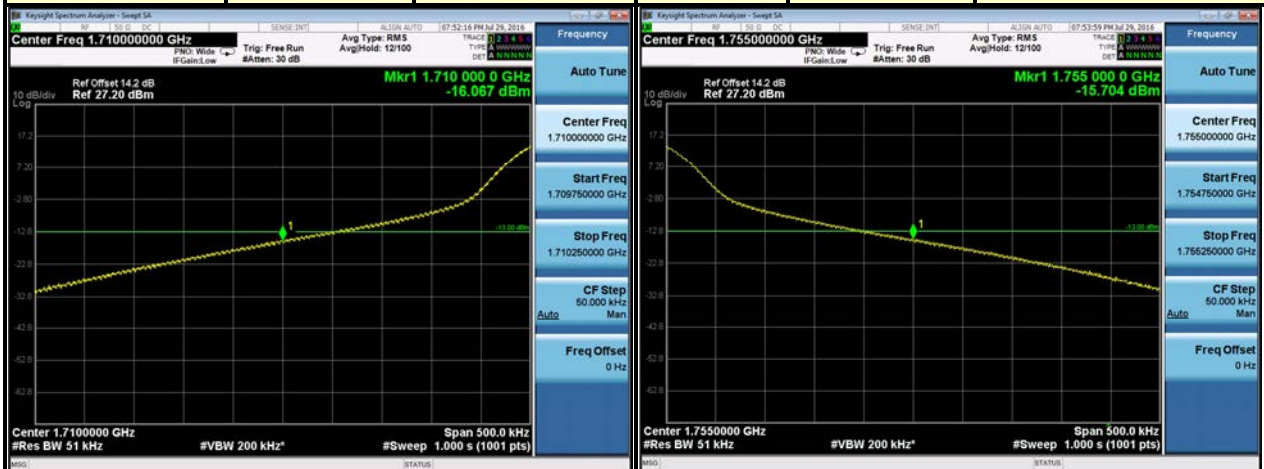


# Channel Bandwidth: 3MHz

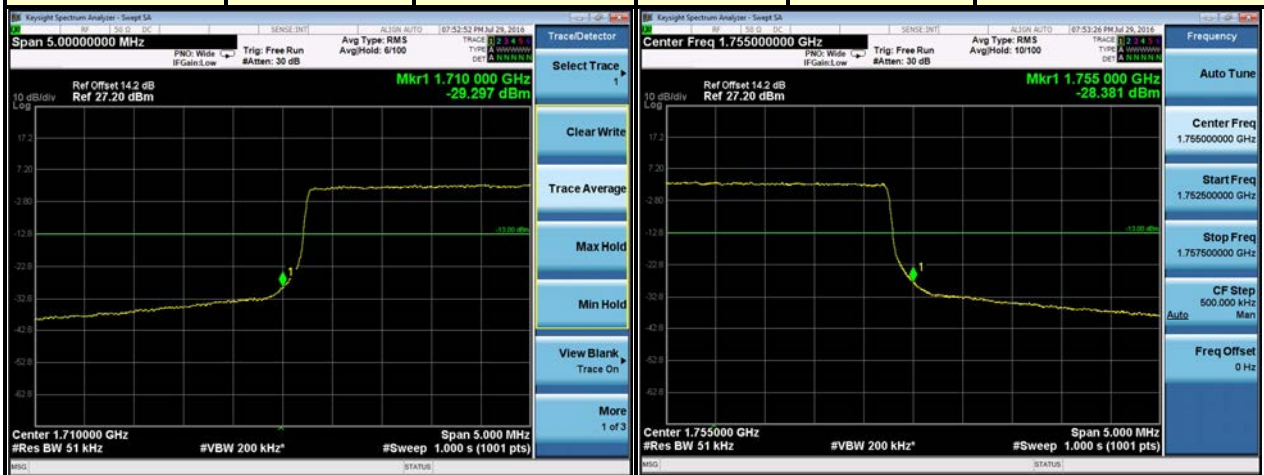


# Channel Bandwidth: 5MHz

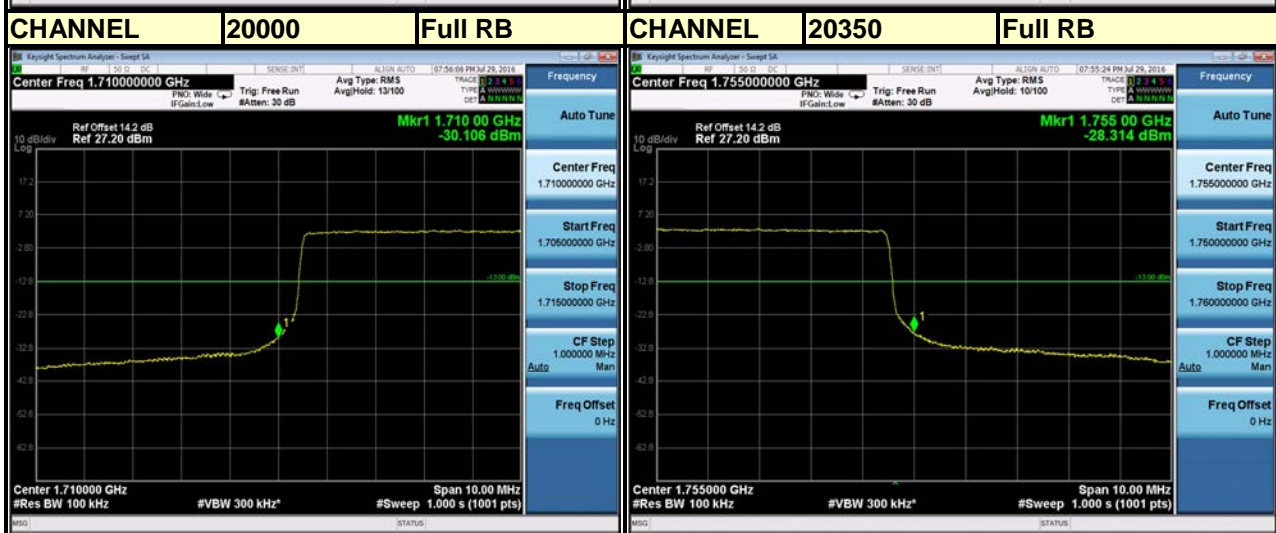
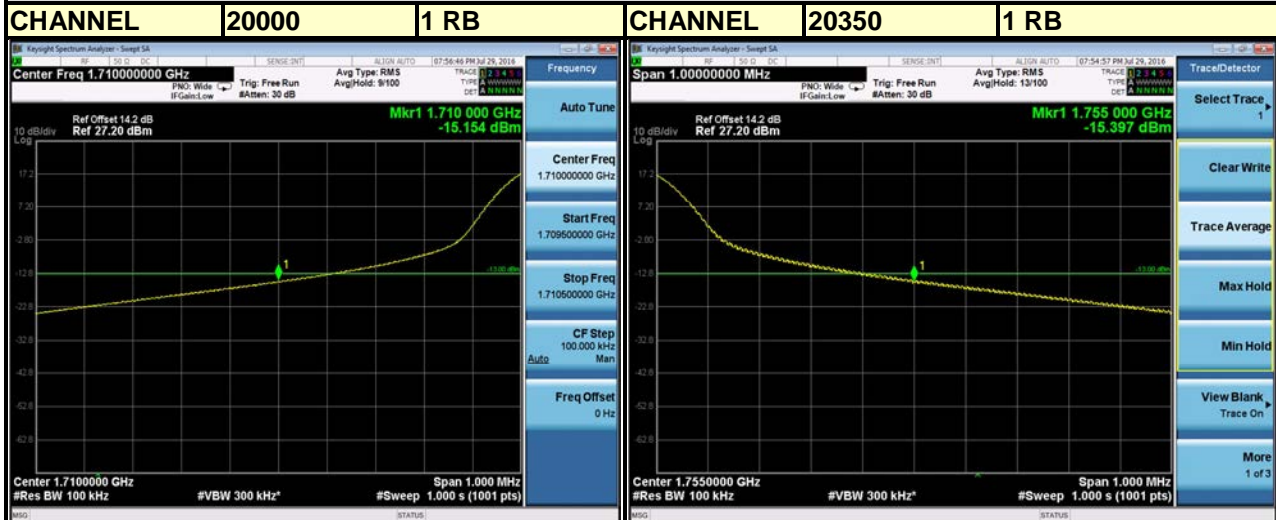
CHANNEL	19975	1 RB	CHANNEL	20375	1 RB
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CHANNEL	19975	Full RB	CHANNEL	20375	Full RB
---------	-------	---------	---------	-------	---------

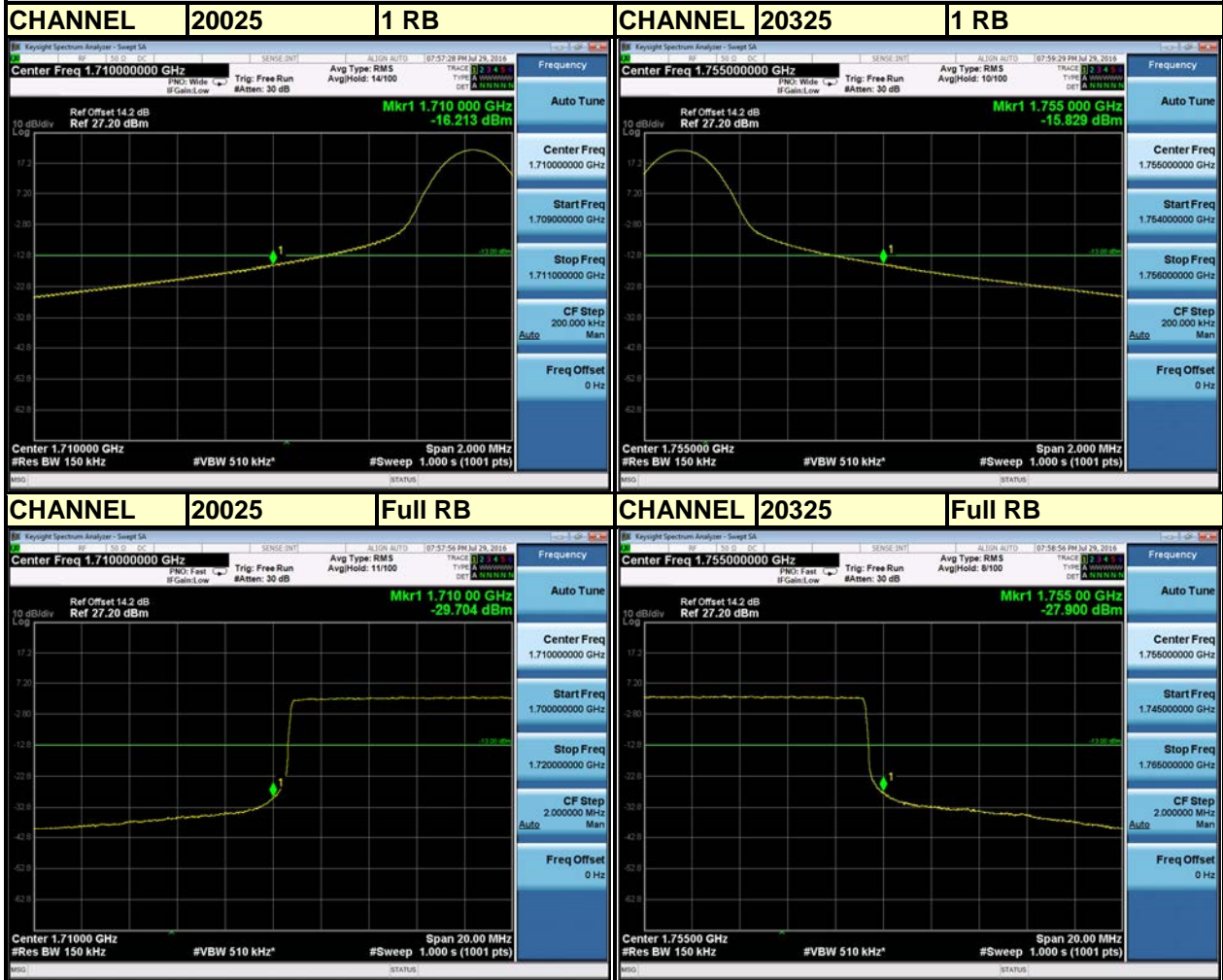


# Channel Bandwidth: 10MHz

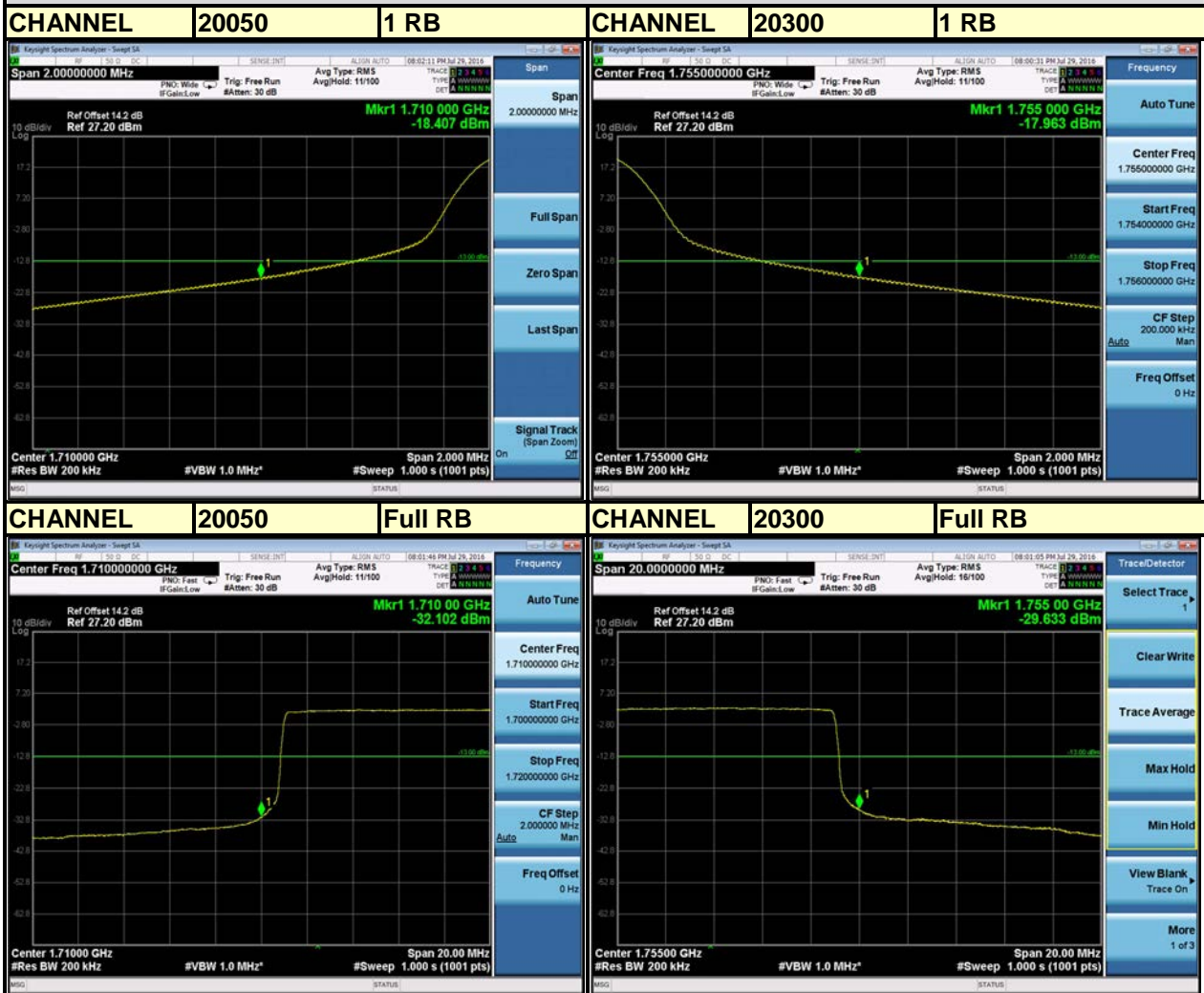




# Channel Bandwidth: 15MHz

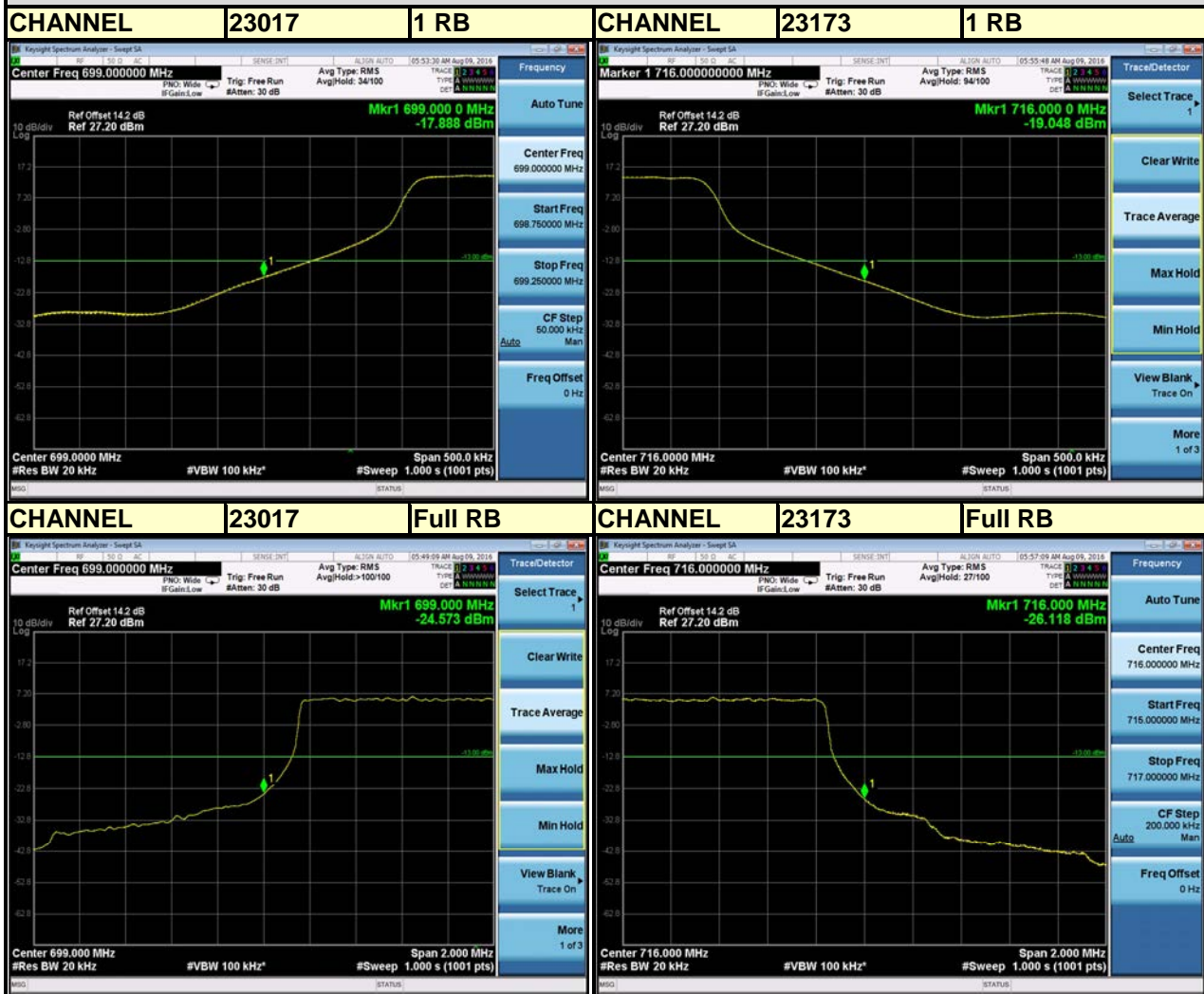


# Channel Bandwidth: 20MHz

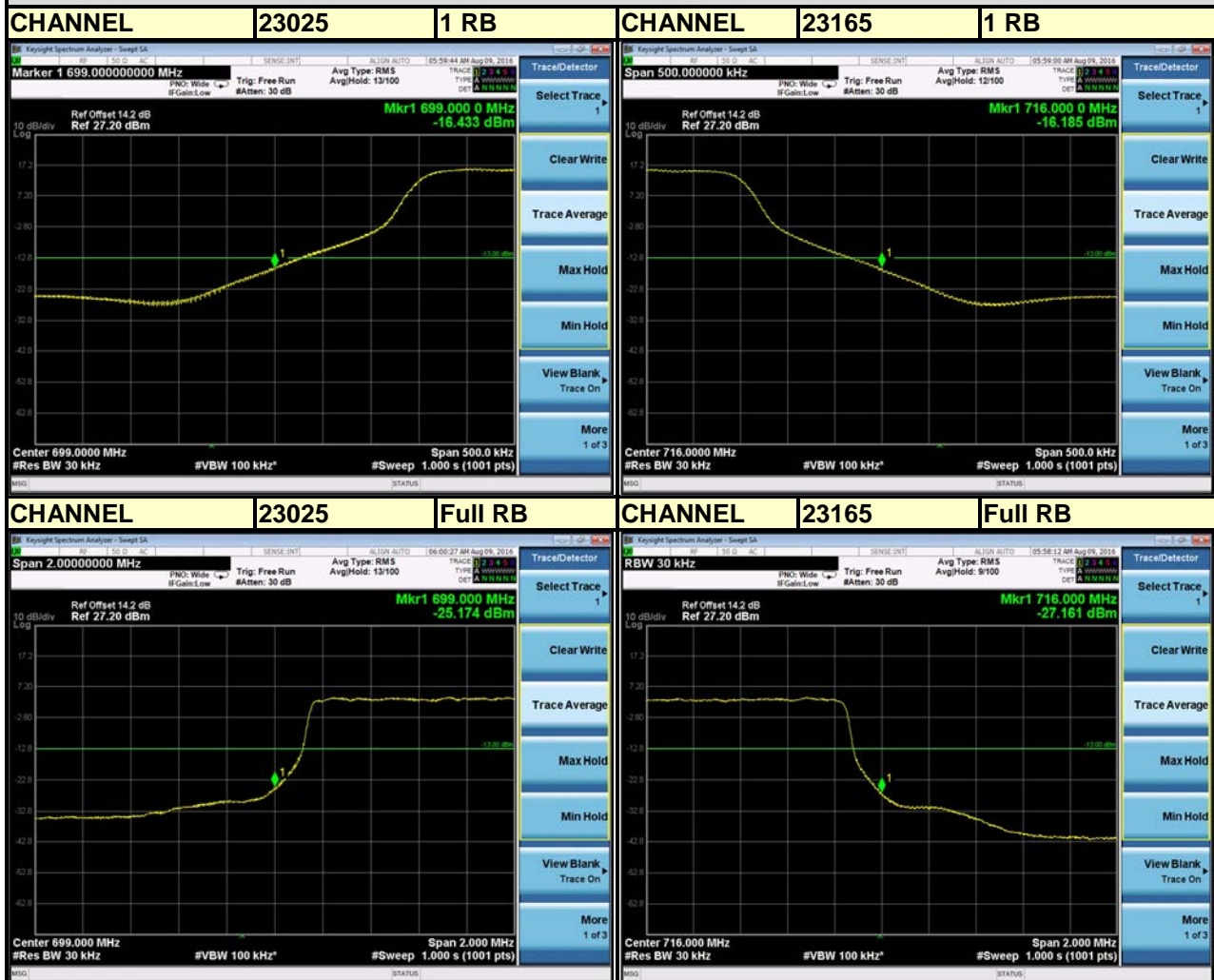


# LTE BAND 12

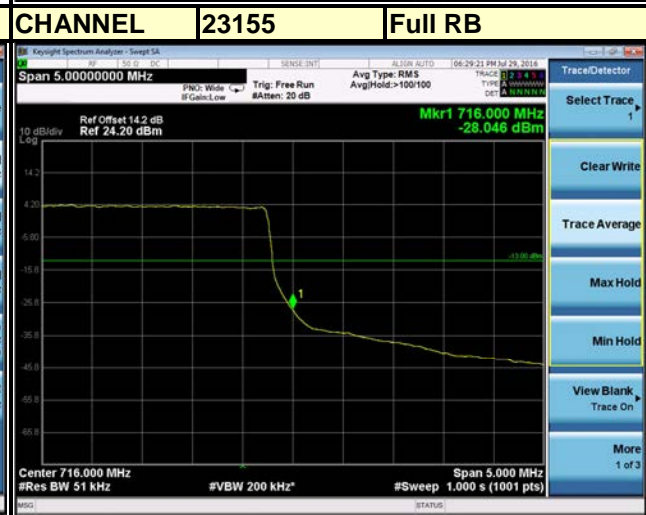
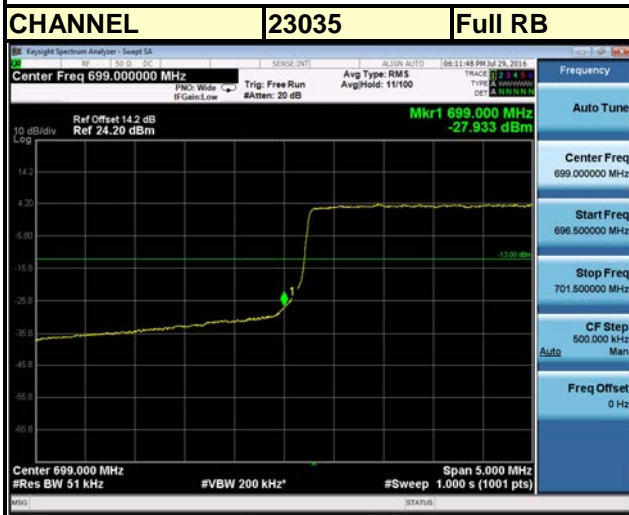
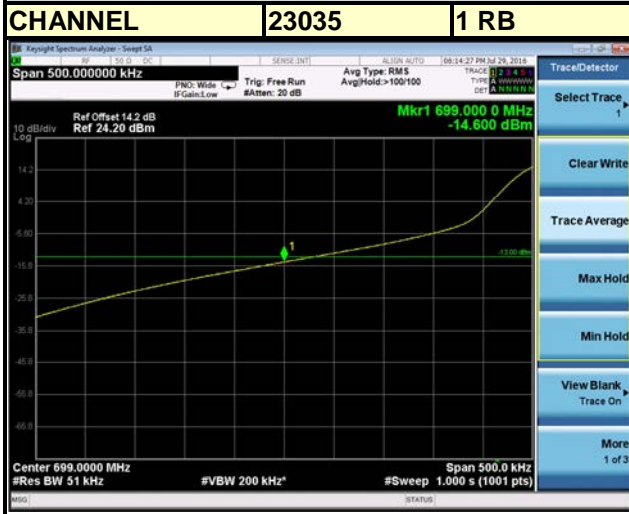
## Channel Bandwidth: 1.4MHz



# Channel Bandwidth: 3MHz

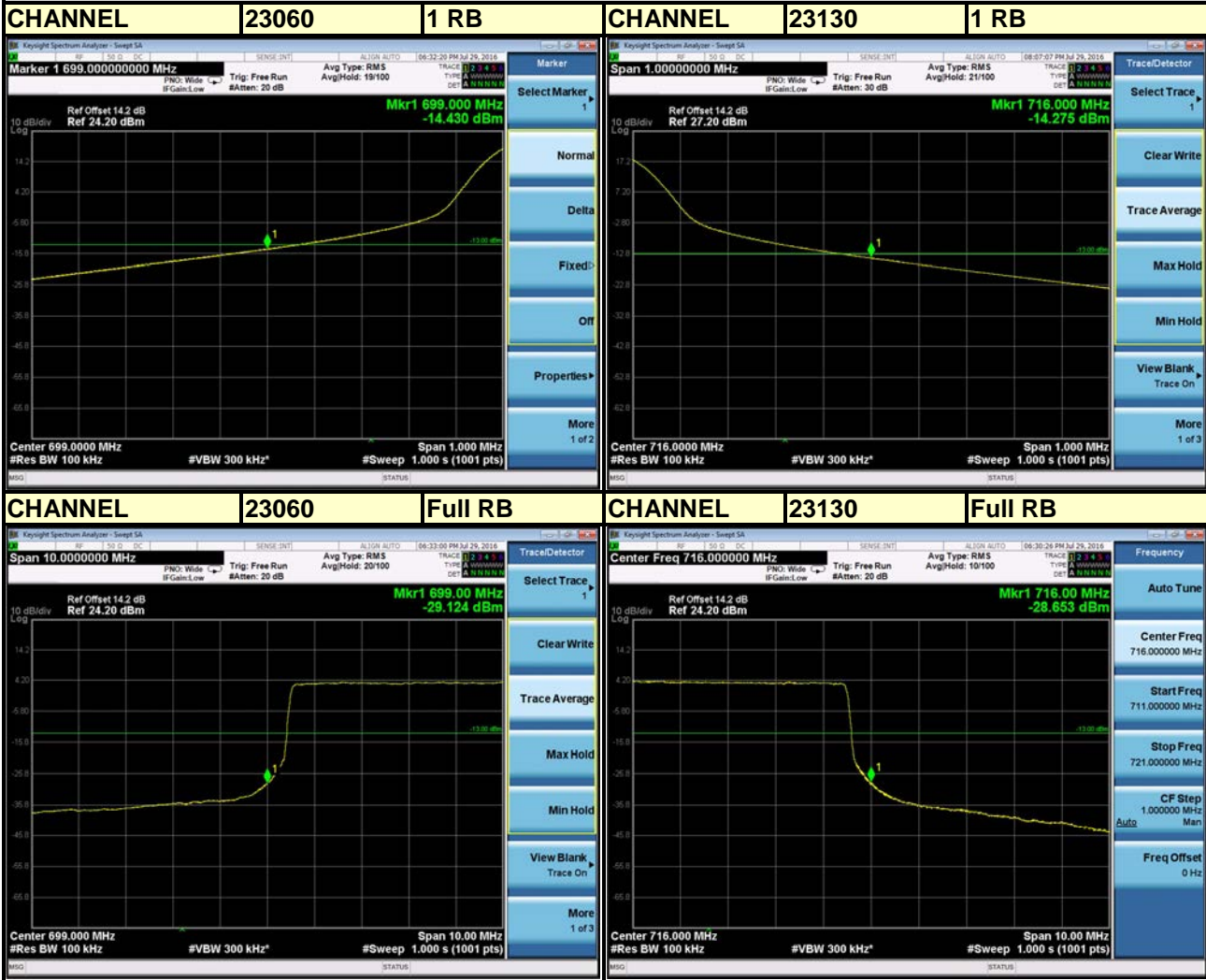


# Channel Bandwidth: 5MHz





# Channel Bandwidth: 10MHz



## 4.6 Conducted Spurious Emissions

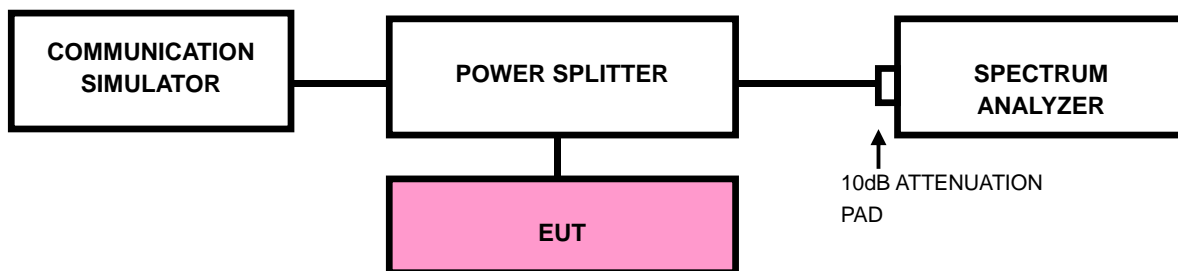
### 4.6.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log_{10}(P)$  dB. The limit of emission is equal to -13dBm.

### 4.6.2 Test Procedure

- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 30MHz to 19.1GHz for LTE Band 4, 30 MHz to 9GHz for LTE Band 12. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz are used for conducted emission measurement.

### 4.6.3 Test Setup



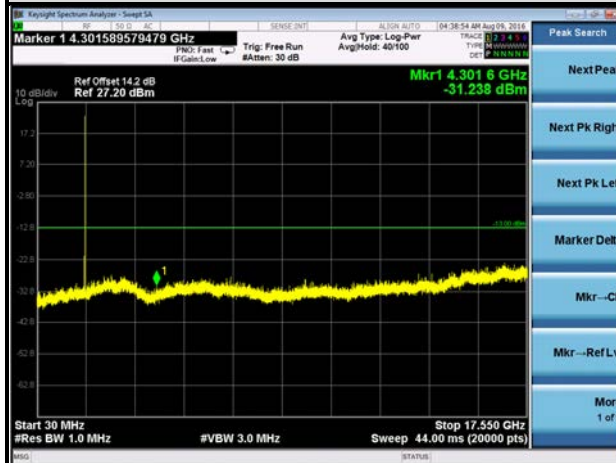
## 4.6.4 Test Results

### LTE BAND 4

#### CHANNEL 20175

#### 1.4MHz / QPSK

#### FREQUENCY RANGE : 30MHz~19.1GHz



#### CHANNEL 20175

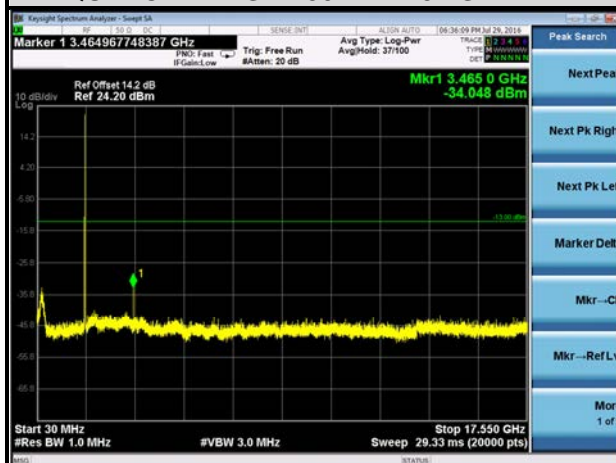
#### 3MHz / QPSK

#### FREQUENCY RANGE : 30MHz~19.1GHz



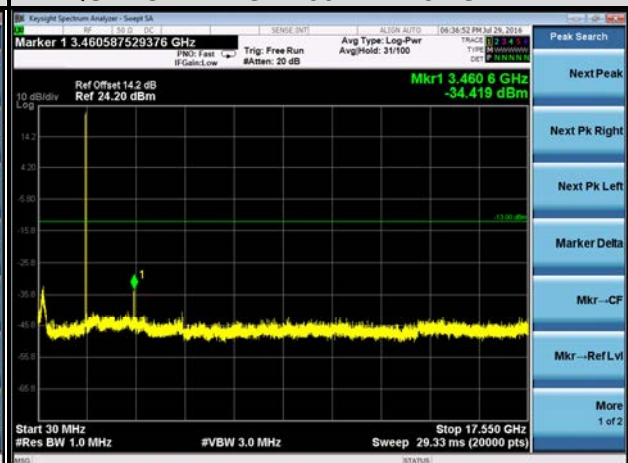
#### 5MHz / QPSK

#### FREQUENCY RANGE : 30MHz~19.1GHz



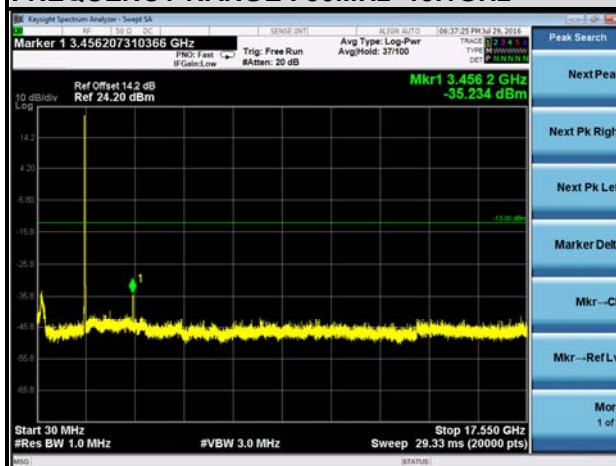
#### 10MHz / QPSK

#### FREQUENCY RANGE : 30MHz~19.1GHz



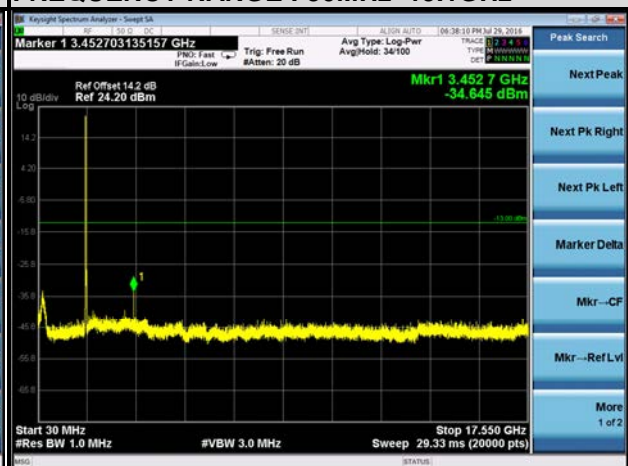
#### 15MHz / QPSK

#### FREQUENCY RANGE : 30MHz~19.1GHz



#### 20MHz / QPSK

#### FREQUENCY RANGE : 30MHz~19.1GHz



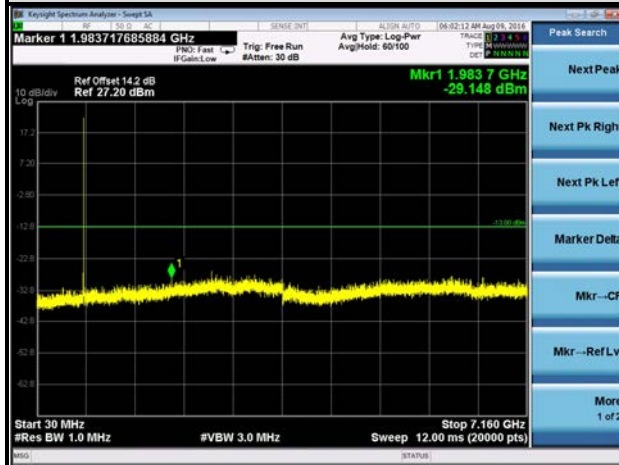


## LTE BAND 12

### CHANNEL 23095

#### 1.4MHz / QPSK

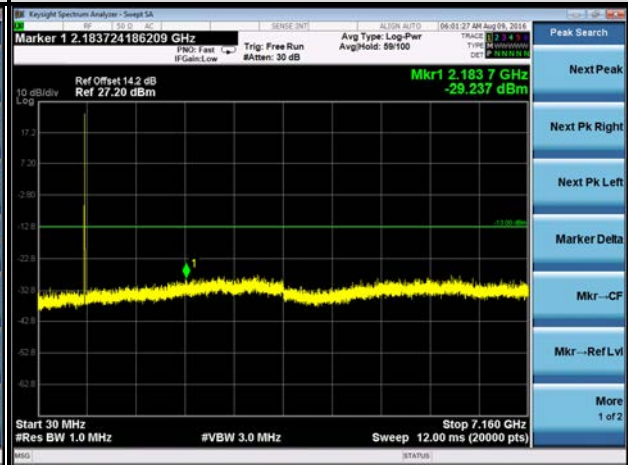
FREQUENCY RANGE : 30MHz~9GHz



### CHANNEL 23095

#### 3MHz / QPSK

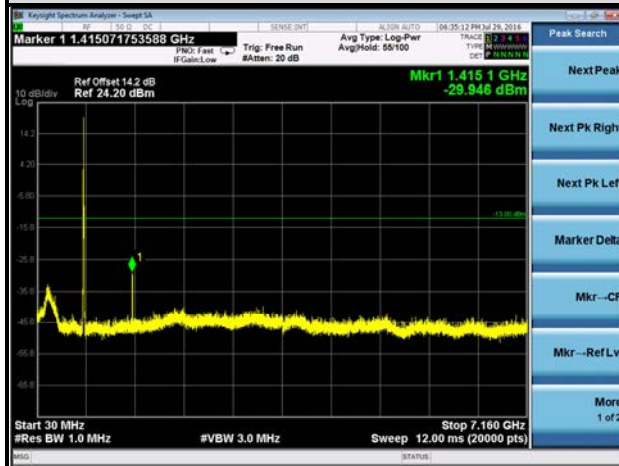
FREQUENCY RANGE : 30MHz~9GHz



### CHANNEL 23095

#### 5MHz / QPSK

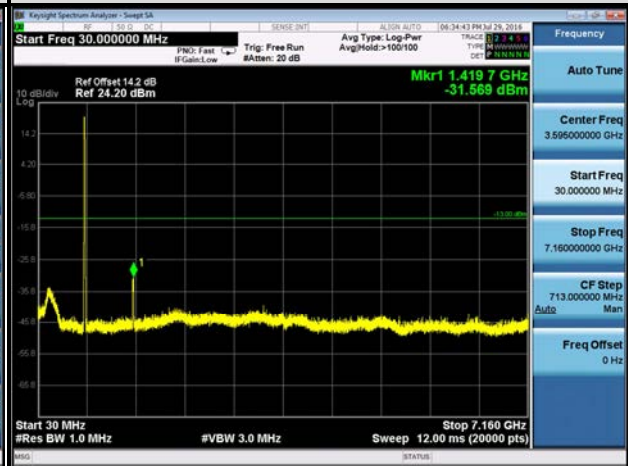
FREQUENCY RANGE : 30MHz~9GHz



### CHANNEL 23095

#### 10MHz / QPSK

FREQUENCY RANGE : 30MHz~9GHz



## 4.7 Radiated Emission Measurement

### 4.7.1 Limits of Radiated Emission Measurement

In the FCC 27.53(m) (4), On any frequency outside a licensee's frequency block, The power of any emission shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB. The emission limit equal to -13dBm.

### 4.7.2 Test Procedure

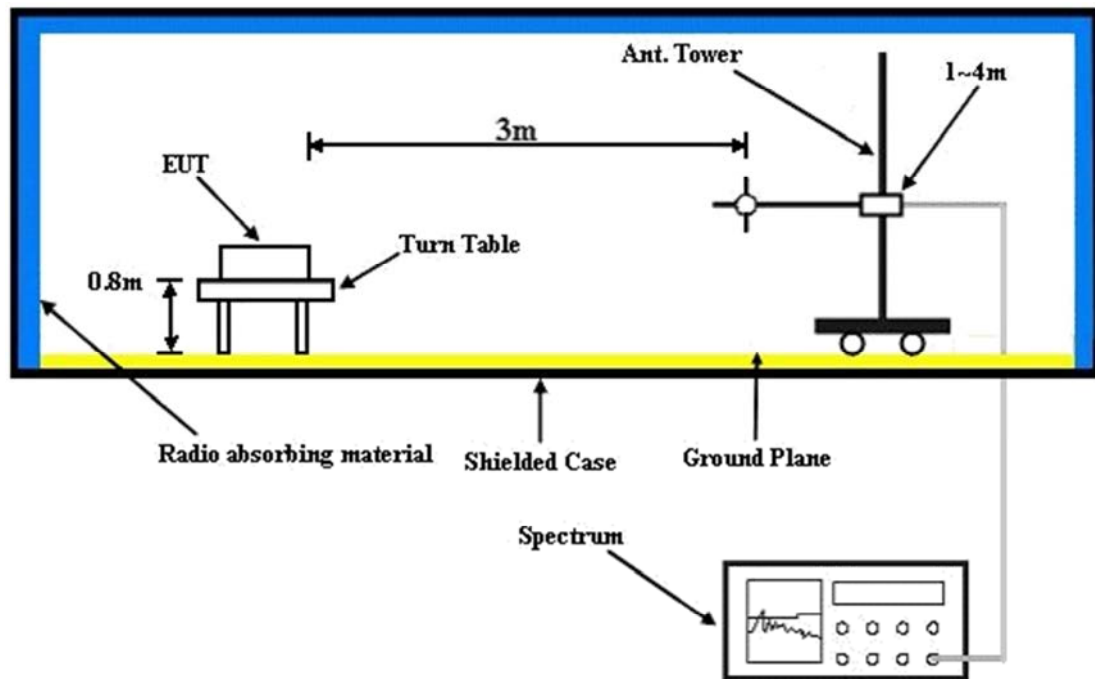
- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- 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.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole,  $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15\text{dBi}.$

**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).

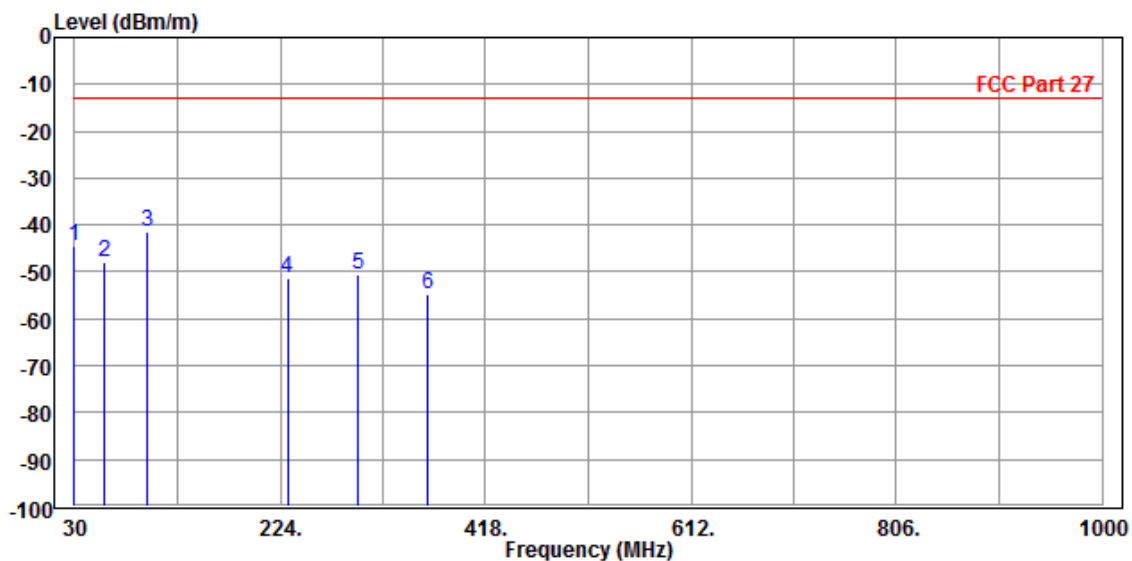
#### 4.7.5 Test Results

#### BELOW 1GHz WORST-CASE DATA

##### LTE Band 4:

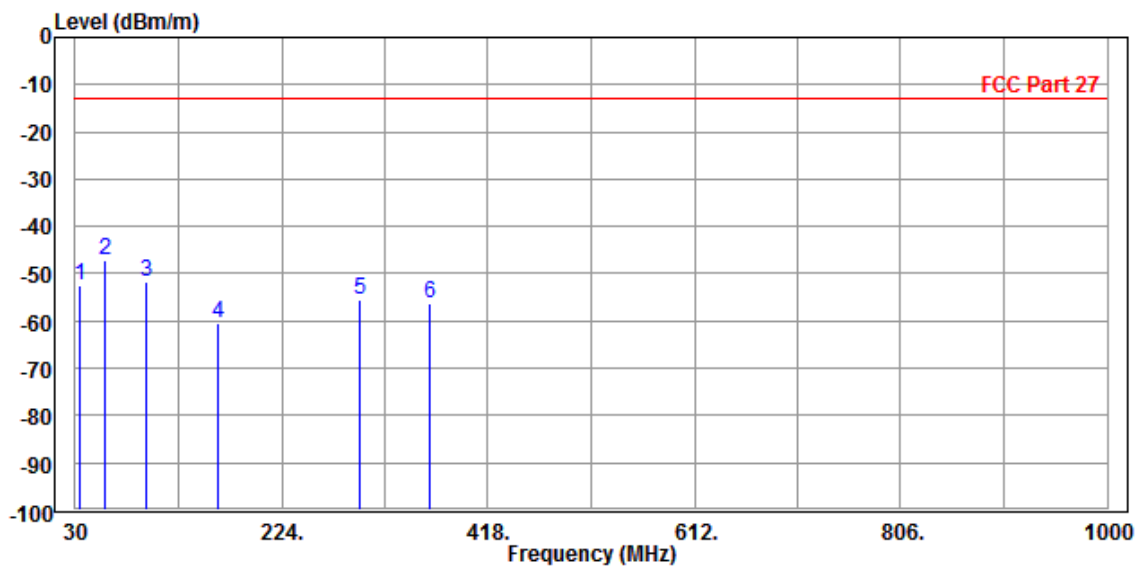
MODE	TX channel 20175	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	30.000	-44.68	-64.02	-13.00	-31.68	19.34	Peak	Horizontal
2	57.160	-47.95	-43.70	-13.00	-34.95	-4.25	Peak	Horizontal
3 PP	97.900	-41.26	-30.55	-13.00	-28.26	-10.71	Peak	Horizontal
4	230.790	-51.30	-34.65	-13.00	-38.30	-16.65	Peak	Horizontal
5	296.750	-50.63	-36.66	-13.00	-37.63	-13.97	Peak	Horizontal
6	362.710	-54.74	-43.03	-13.00	-41.74	-11.71	Peak	Horizontal



MODE	TX channel 20175	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	33.880	-52.49	-52.66	-13.00	-39.49	0.17	Peak	Vertical
2 PP	58.130	-47.22	-36.28	-13.00	-34.22	-10.94	Peak	Vertical
3	96.930	-51.52	-40.89	-13.00	-38.52	-10.63	Peak	Vertical
4	164.830	-60.54	-45.78	-13.00	-47.54	-14.76	Peak	Vertical
5	296.750	-55.43	-44.12	-13.00	-42.43	-11.31	Peak	Vertical
6	362.710	-56.36	-45.29	-13.00	-43.36	-11.07	Peak	Vertical



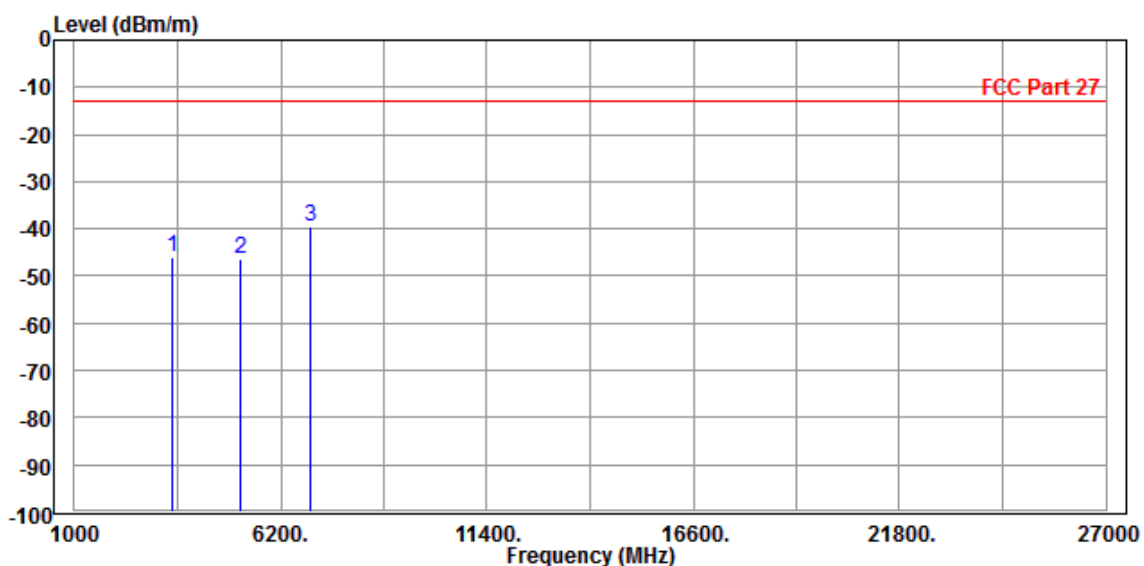
ABOVE 1GHz

LTE BAND 4

CHANNEL BANDWIDTH: 1.4MHz / QPSK

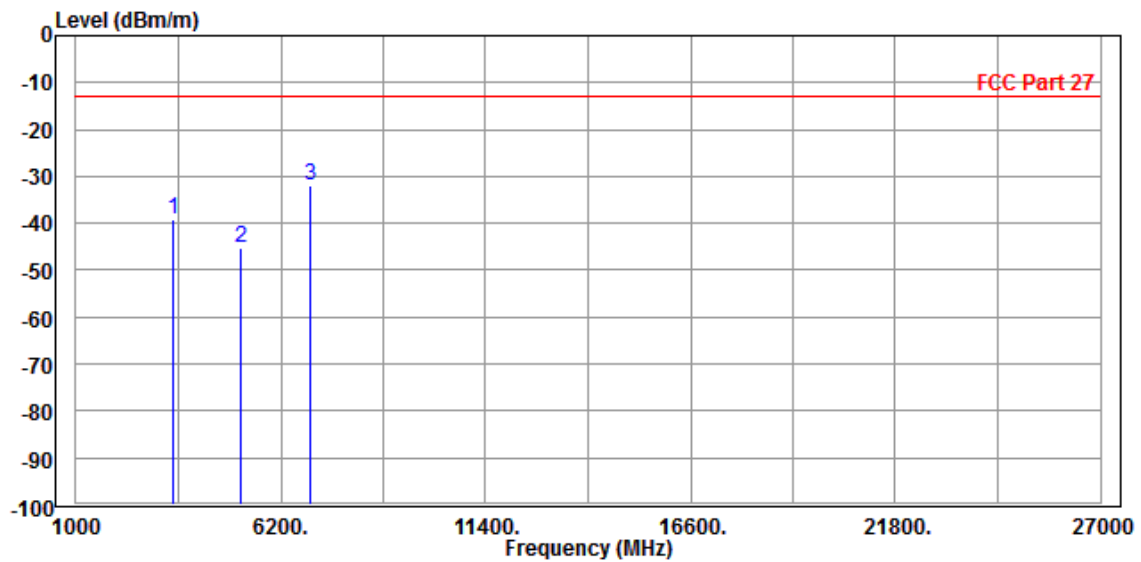
MODE	TX channel 20175	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3465.000	-45.84	-47.87	-13.00	-32.84	2.03	Peak	Horizontal
2	5197.500	-46.31	-54.92	-13.00	-33.31	8.61	Peak	Horizontal
3 PP	6928.000	-39.72	-51.27	-13.00	-26.72	11.55	Peak	Horizontal



MODE	TX channel 20175	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

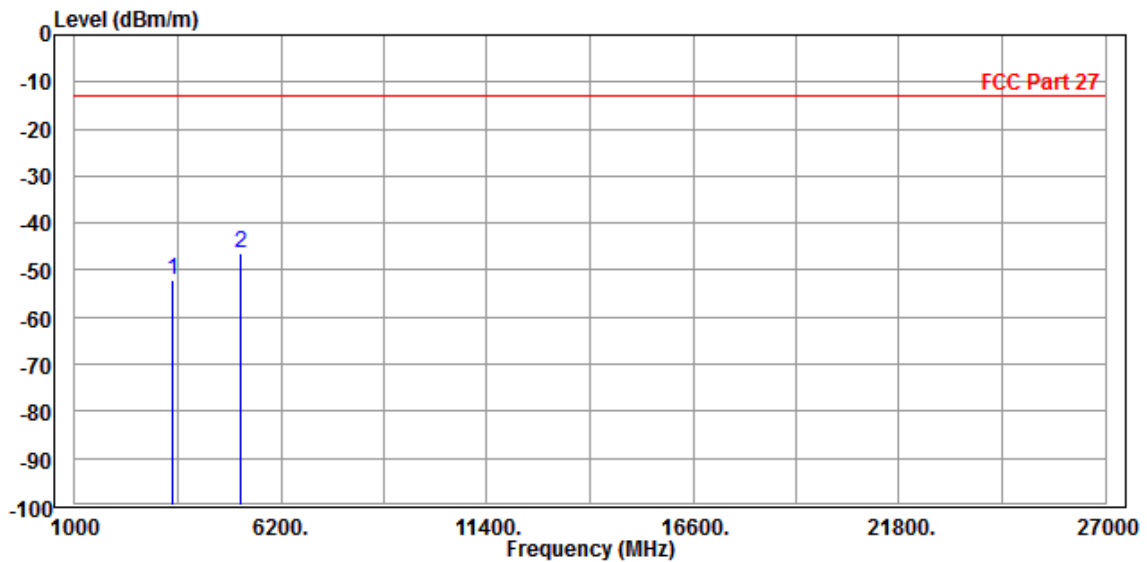
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3465.000	-39.04	-41.57	-13.00	-26.04	2.53	Peak	Vertical
2	5197.500	-45.36	-53.34	-13.00	-32.36	7.98	Peak	Vertical
3 PP	6928.000	-31.76	-43.22	-13.00	-18.76	11.46	Peak	Vertical



# CHANNEL BANDWIDTH: 3MHz / QPSK

MODE	TX channel 20175	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

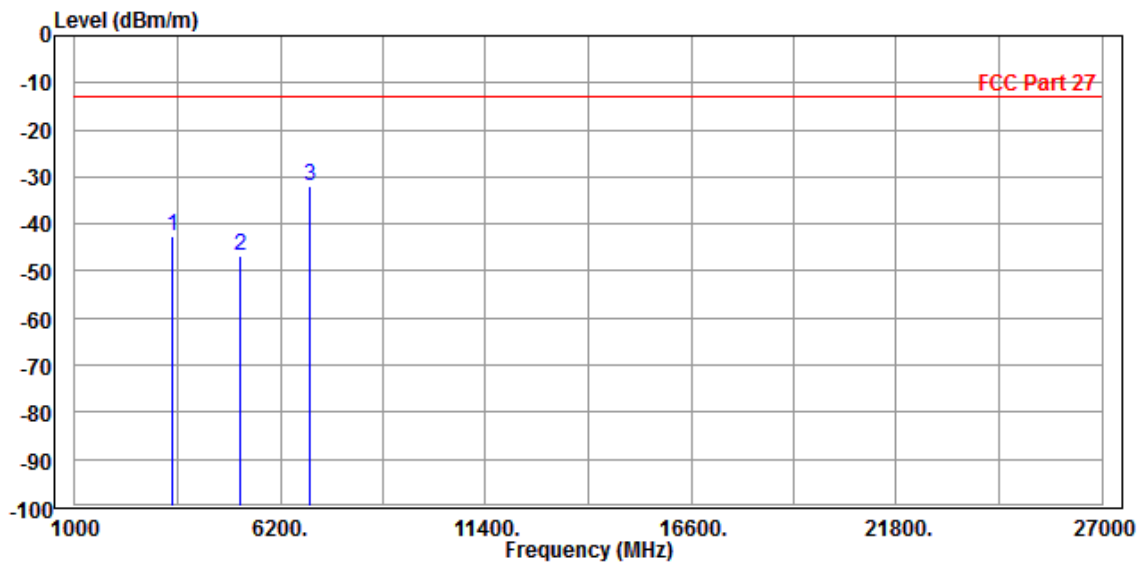
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3465.000	-51.97	-54.00	-13.00	-38.97	2.03	Peak	Horizontal
2 PP	5197.500	-46.31	-54.92	-13.00	-33.31	8.61	Peak	Horizontal





MODE	TX channel 20175	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

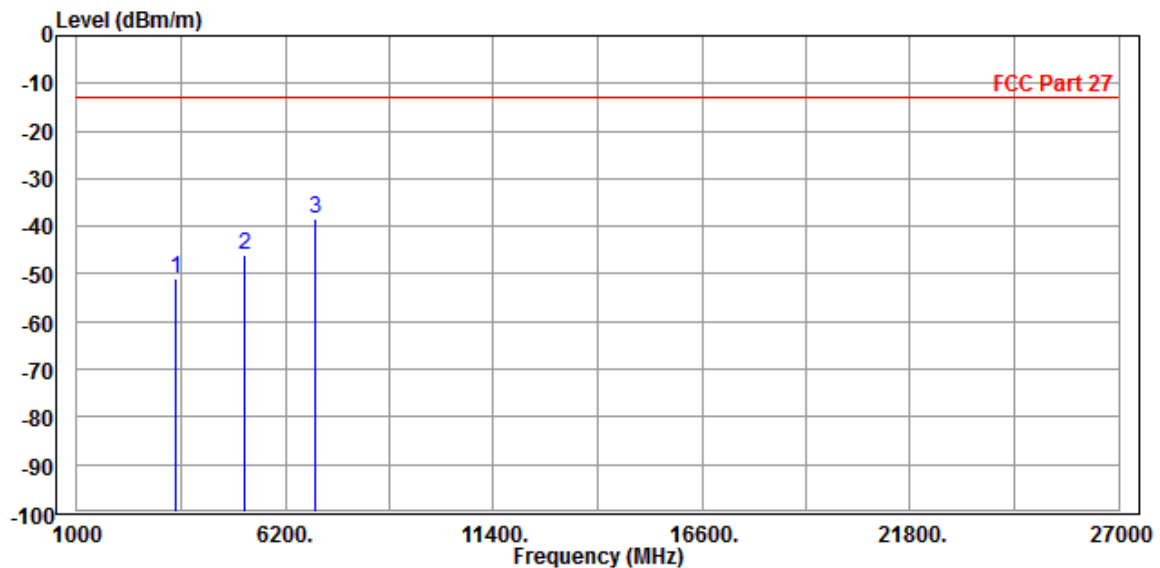
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3465.000	-42.77	-45.30	-13.00	-29.77	2.53	Peak	Vertical
2	5197.500	-46.89	-54.87	-13.00	-33.89	7.98	Peak	Vertical
3 PP	6928.000	-31.79	-43.25	-13.00	-18.79	11.46	Peak	Vertical



# CHANNEL BANDWIDTH: 5MHz / QPSK

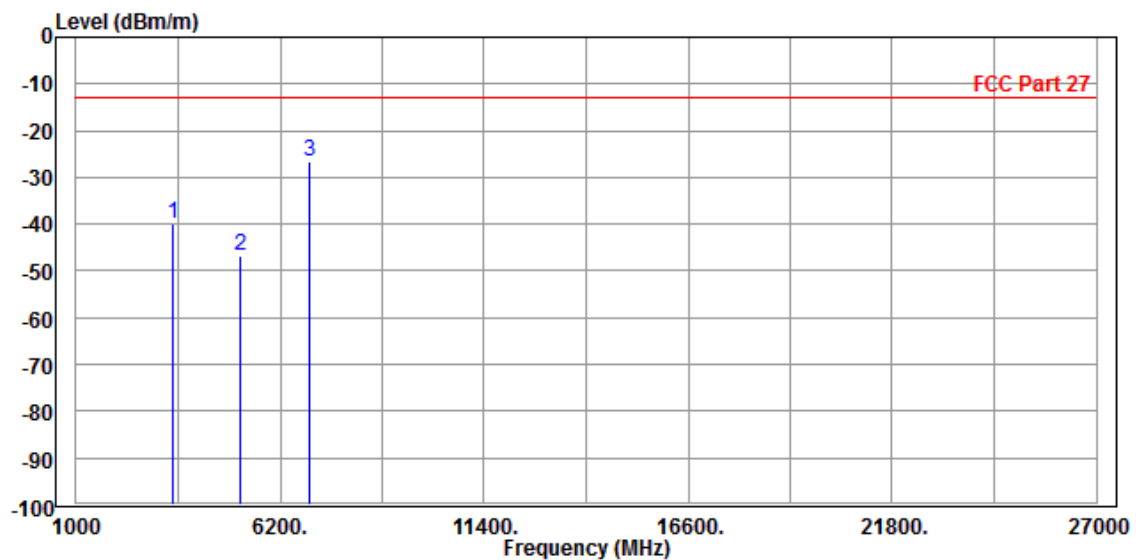
MODE	TX channel 20175	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3465.000	-50.91	-52.94	-13.00	-37.91	2.03	Peak	Horizontal
2	5197.500	-46.11	-54.72	-13.00	-33.11	8.61	Peak	Horizontal
3 PP	6928.000	-38.32	-49.87	-13.00	-25.32	11.55	Peak	Horizontal



MODE	TX channel 20175	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

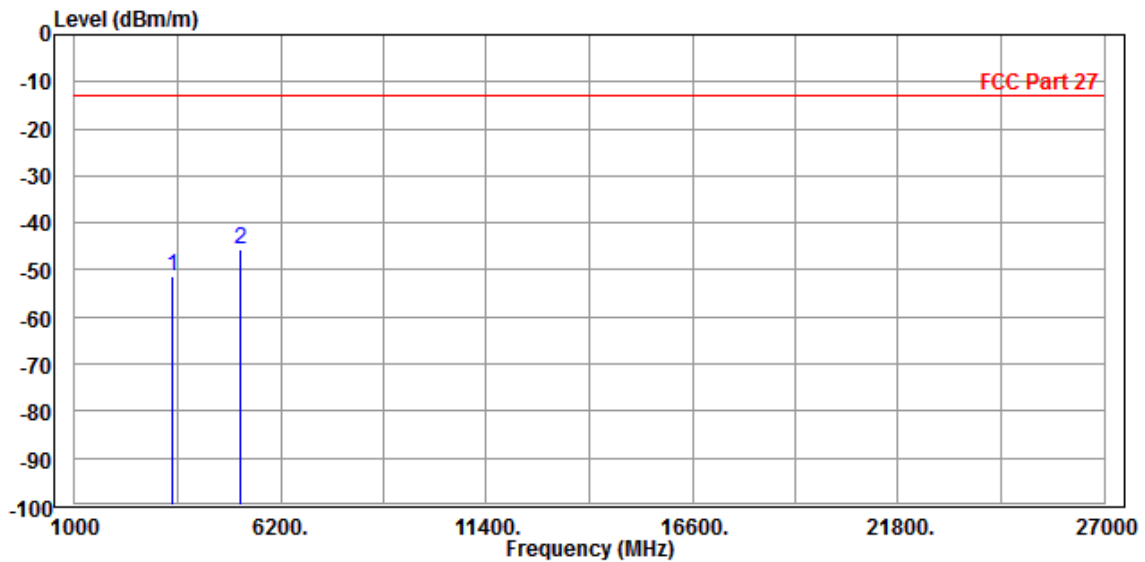
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3465.000	-40.01	-42.54	-13.00	-27.01	2.53	Peak	Vertical
2	5197.500	-46.69	-54.67	-13.00	-33.69	7.98	Peak	Vertical
3 PP	6928.000	-26.80	-38.26	-13.00	-13.80	11.46	Peak	Vertical



# CHANNEL BANDWIDTH: 10MHz / QPSK

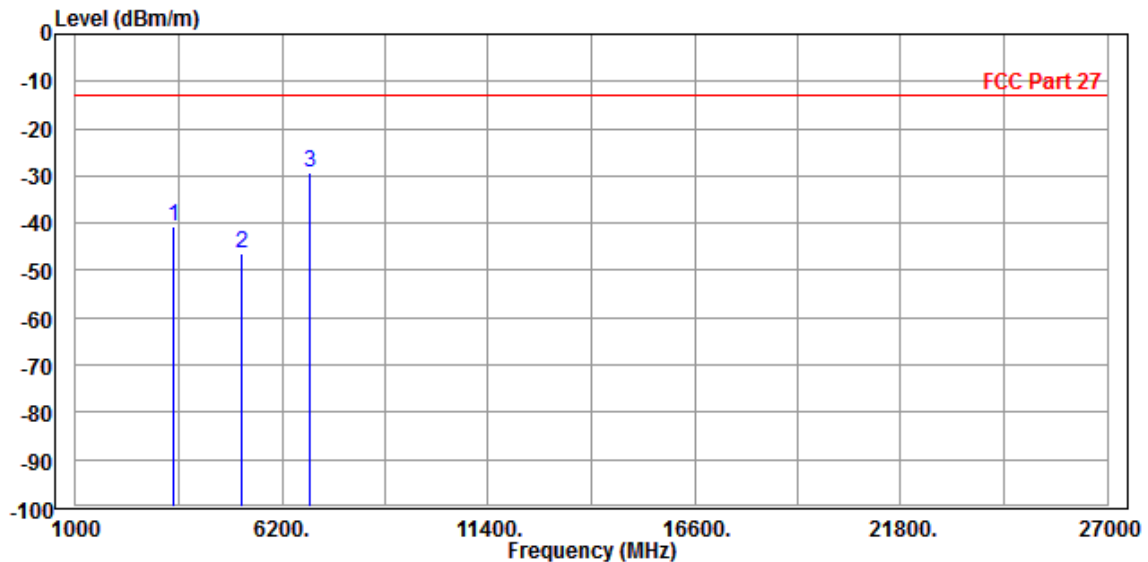
MODE	TX channel 20175	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3456.000	-51.24	-53.23	-13.00	-38.24	1.99	Peak	Horizontal
2 PP	5197.500	-45.79	-54.40	-13.00	-32.79	8.61	Peak	Horizontal



MODE	TX channel 20175	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

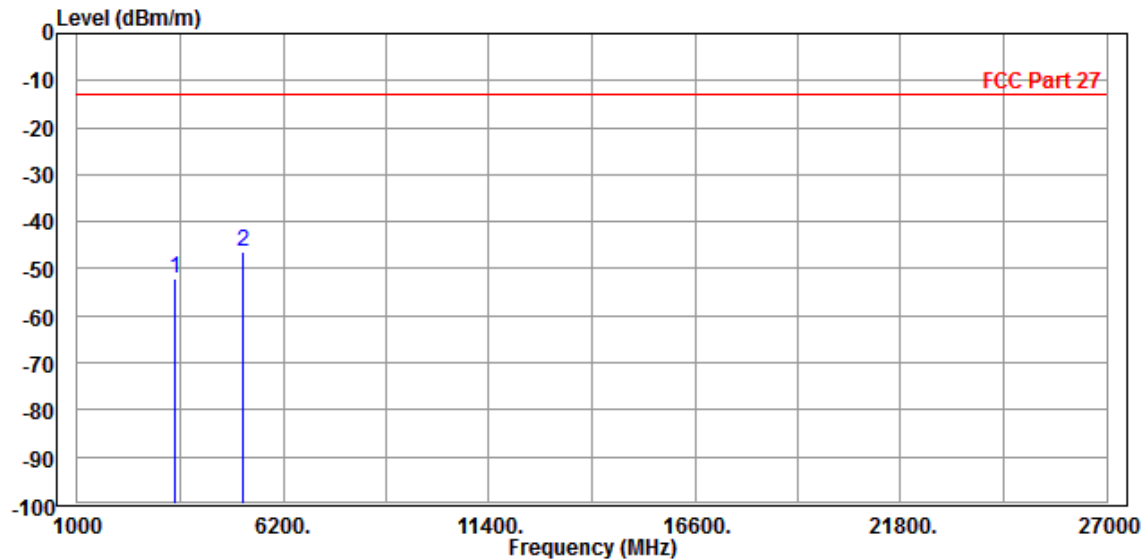
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3456.000	-40.75	-43.26	-13.00	-27.75	2.51	Peak	Vertical
2	5197.500	-46.36	-54.34	-13.00	-33.36	7.98	Peak	Vertical
3 PP	6902.000	-29.41	-40.82	-13.00	-16.41	11.41	Peak	Vertical



# CHANNEL BANDWIDTH: 15MHz / QPSK

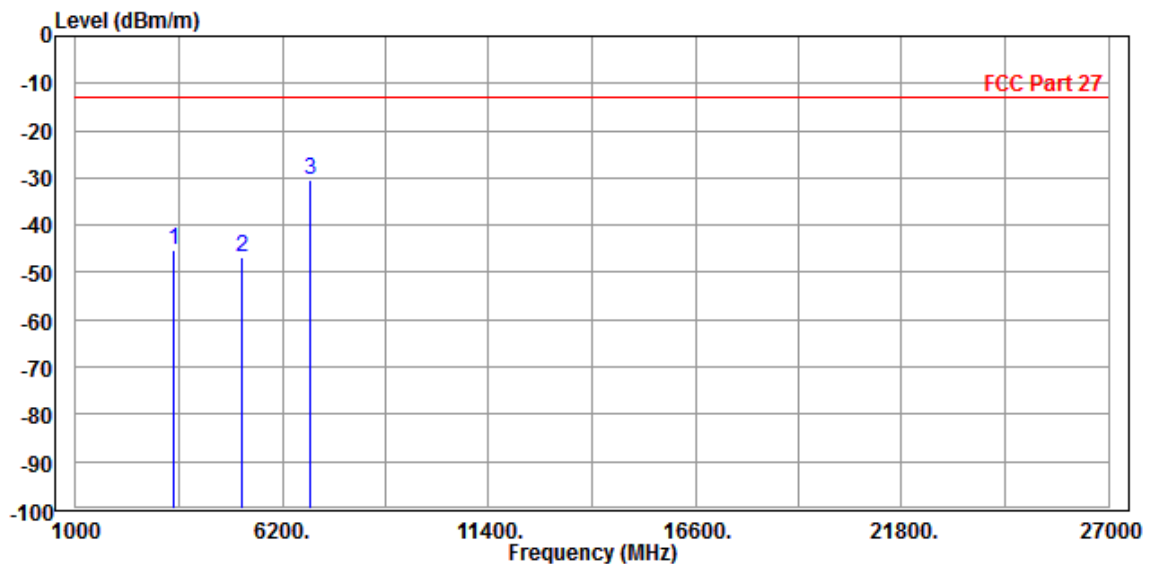
MODE	TX channel 20175	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3456.000	-52.01	-54.00	-13.00	-39.01	1.99	Peak	Horizontal
2 PP	5197.500	-46.45	-55.06	-13.00	-33.45	8.61	Peak	Horizontal



MODE	TX channel 20175	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

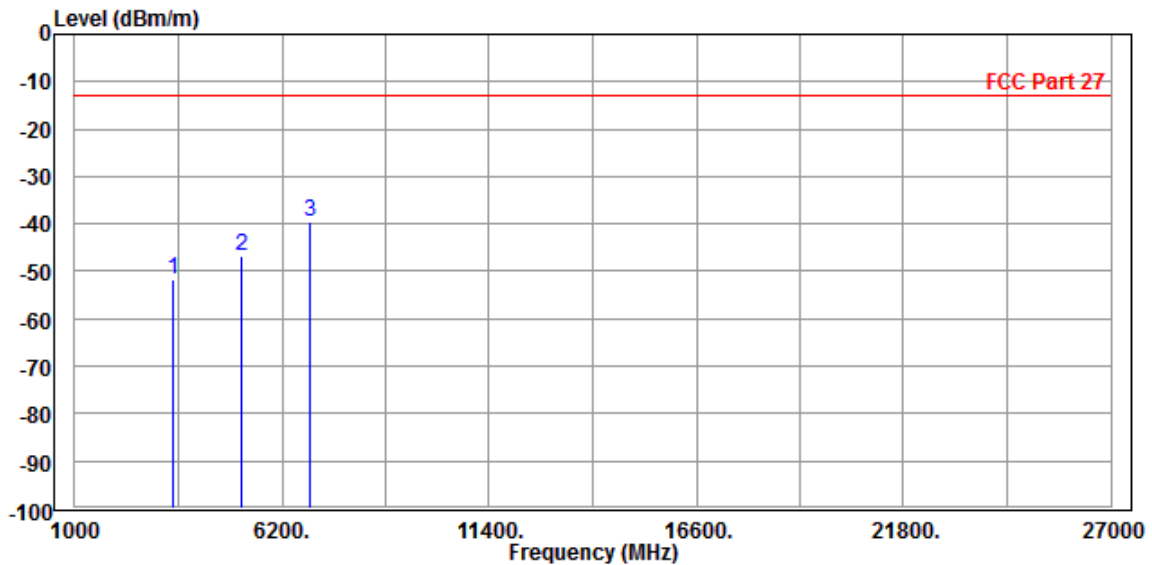
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3456.000	-45.31	-47.82	-13.00	-32.31	2.51	Peak	Vertical
2	5197.500	-46.58	-54.56	-13.00	-33.58	7.98	Peak	Vertical
3 PP	6902.000	-30.27	-41.68	-13.00	-17.27	11.41	Peak	Vertical



# CHANNEL BANDWIDTH: 20MHz / QPSK

MODE	TX channel 20175	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

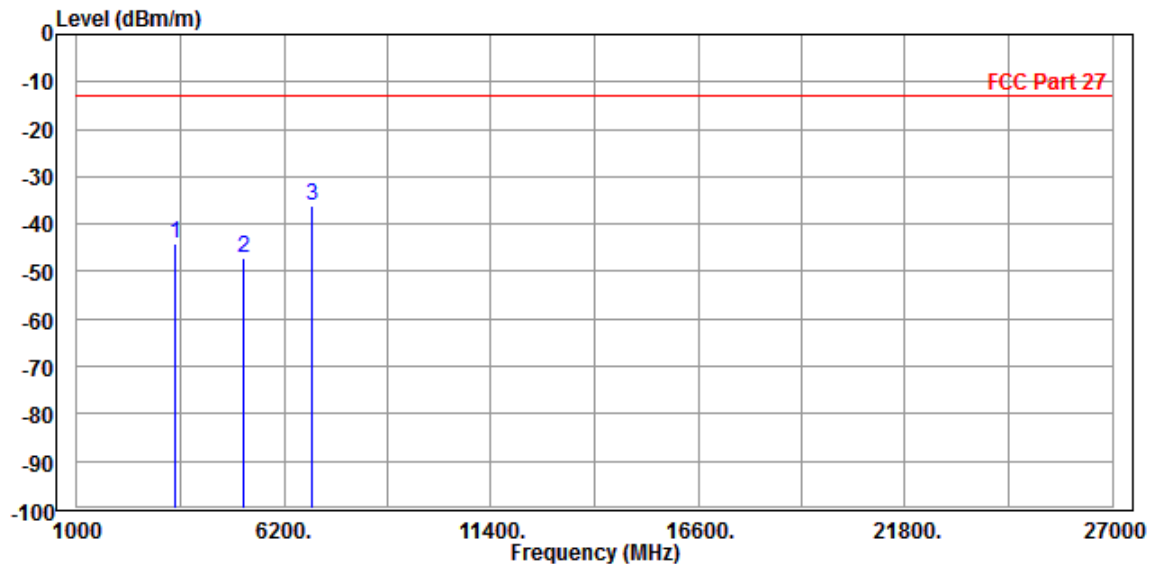
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3456.000	-51.67	-53.66	-13.00	-38.67	1.99	Peak	Horizontal
2	5197.500	-46.85	-55.46	-13.00	-33.85	8.61	Peak	Horizontal
3 PP	6902.000	-39.66	-51.15	-13.00	-26.66	11.49	Peak	Horizontal





MODE	TX channel 20175	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3456.000	-44.21	-46.72	-13.00	-31.21	2.51	Peak	Vertical
2	5197.500	-47.15	-55.13	-13.00	-34.15	7.98	Peak	Vertical
3 PP	6902.000	-35.99	-47.40	-13.00	-22.99	11.41	Peak	Vertical

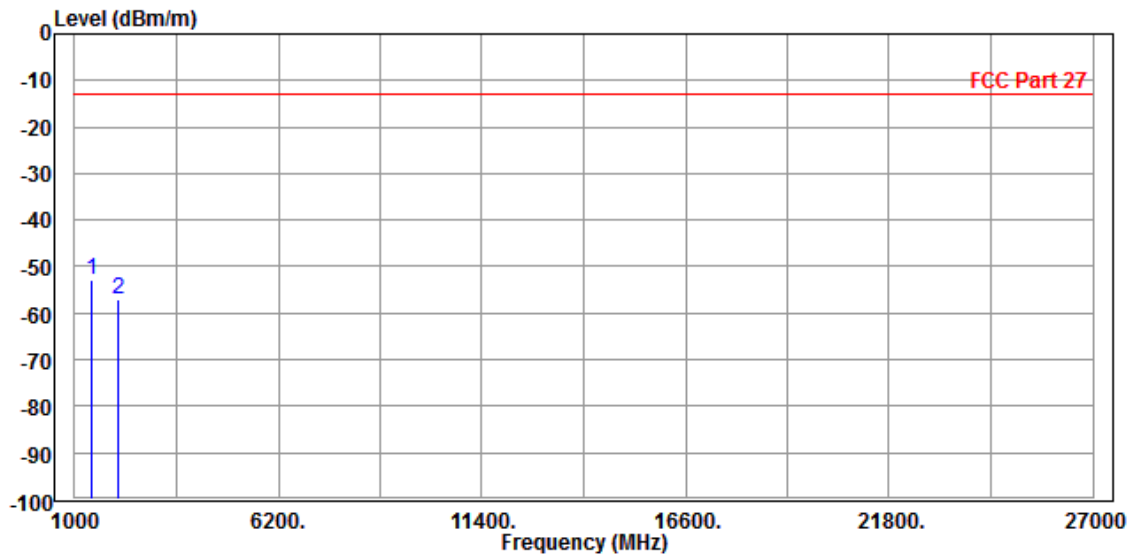


# LTE BAND 12

CHANNEL BANDWIDTH: 1.4MHz / QPSK

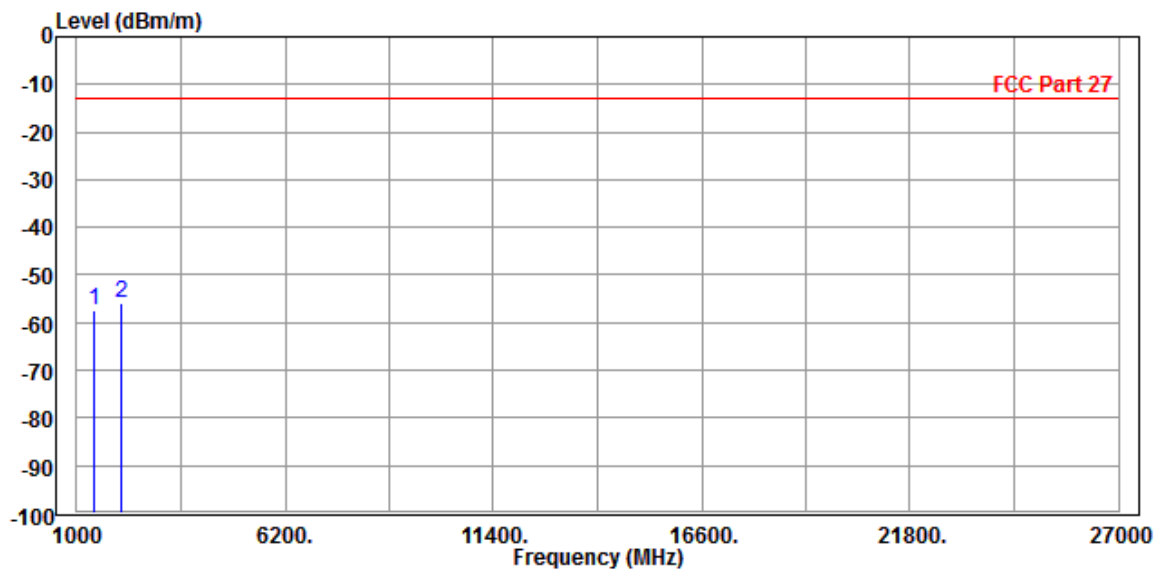
MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1416.000	-52.71	-45.99	-13.00	-39.71	-6.72	Peak	Horizontal
2	2122.500	-56.95	-55.02	-13.00	-43.95	-1.93	Peak	Horizontal



MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

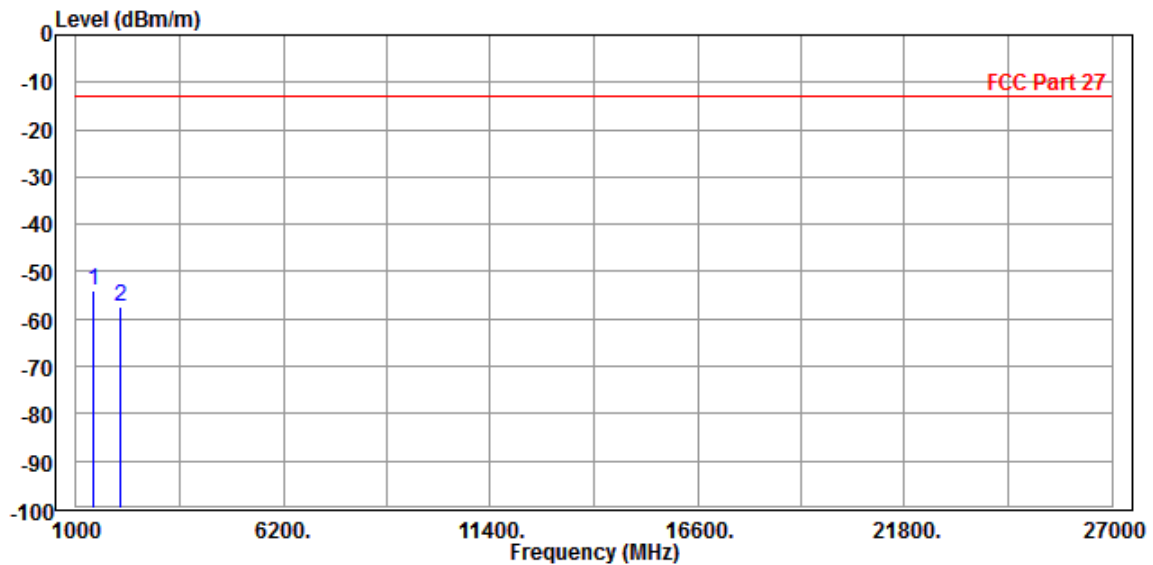
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1416.000	-57.31	-51.87	-13.00	-44.31	-5.44	Peak	Vertical
2 PP	2122.500	-55.90	-55.66	-13.00	-42.90	-0.24	Peak	Vertical



# CHANNEL BANDWIDTH: 3MHz / QPSK

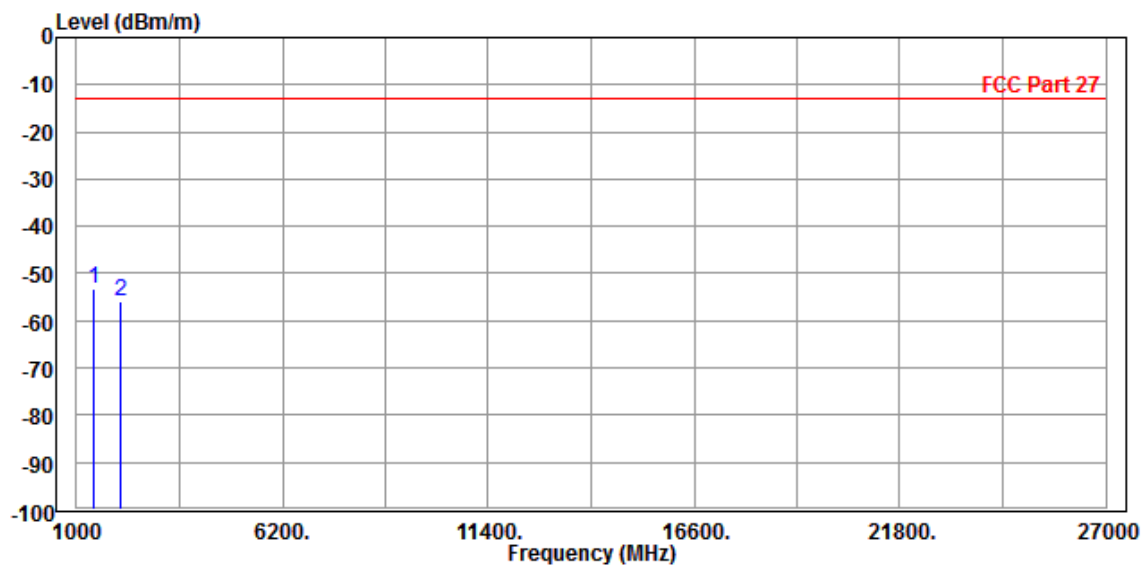
MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

			Read	Limit	Over			
	Freq	Level	Level	Line	Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP 1416.000	-54.12	-47.40	-13.00	-41.12	-6.72	Peak	Horizontal
2	2122.500	-57.56	-55.63	-13.00	-44.56	-1.93	Peak	Horizontal



MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

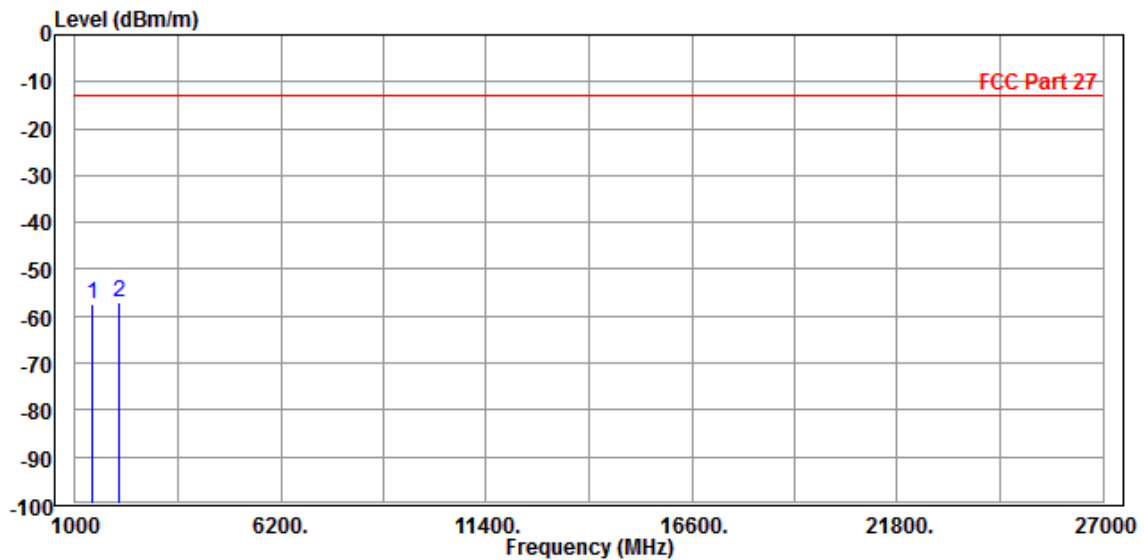
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1416.000	-53.20	-47.76	-13.00	-40.20	-5.44	Peak	Vertical
2		2122.500	-55.79	-55.55	-13.00	-42.79	-0.24	Peak	Vertical



# CHANNEL BANDWIDTH: 5MHz / QPSK

MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1416.000	-57.44	-50.72	-13.00	-44.44	-6.72	Peak	Horizontal
2 PP	2122.500	-57.08	-55.15	-13.00	-44.08	-1.93	Peak	Horizontal

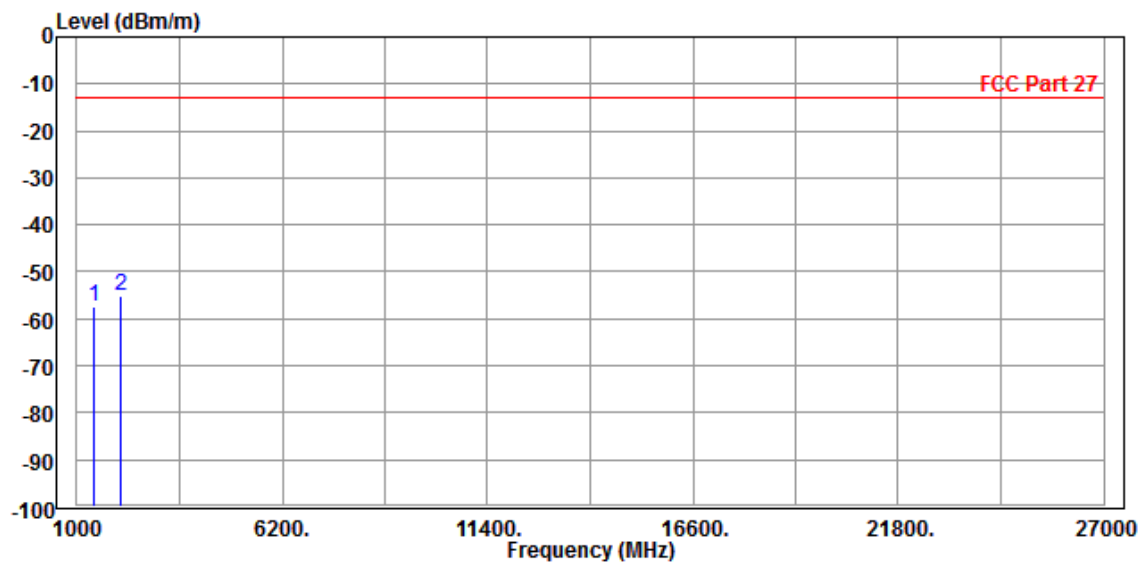




A D T

MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

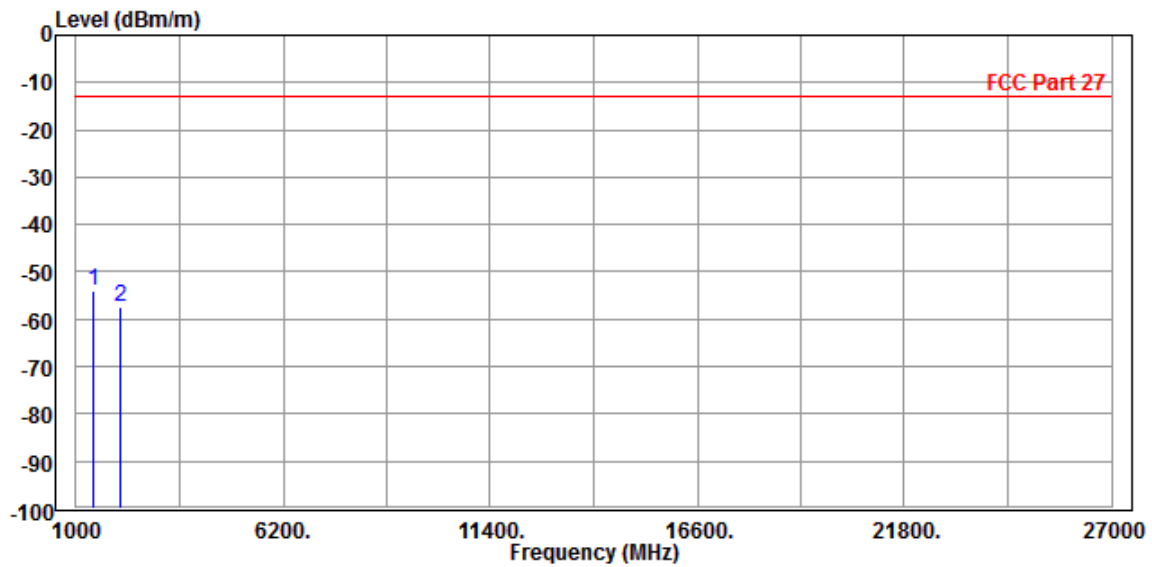
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1416.000	-57.57	-52.13	-13.00	-44.57	-5.44	Peak	Vertical
2 PP	2122.500	-54.95	-54.71	-13.00	-41.95	-0.24	Peak	Vertical



# CHANNEL BANDWIDTH: 10MHz / QPSK

MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

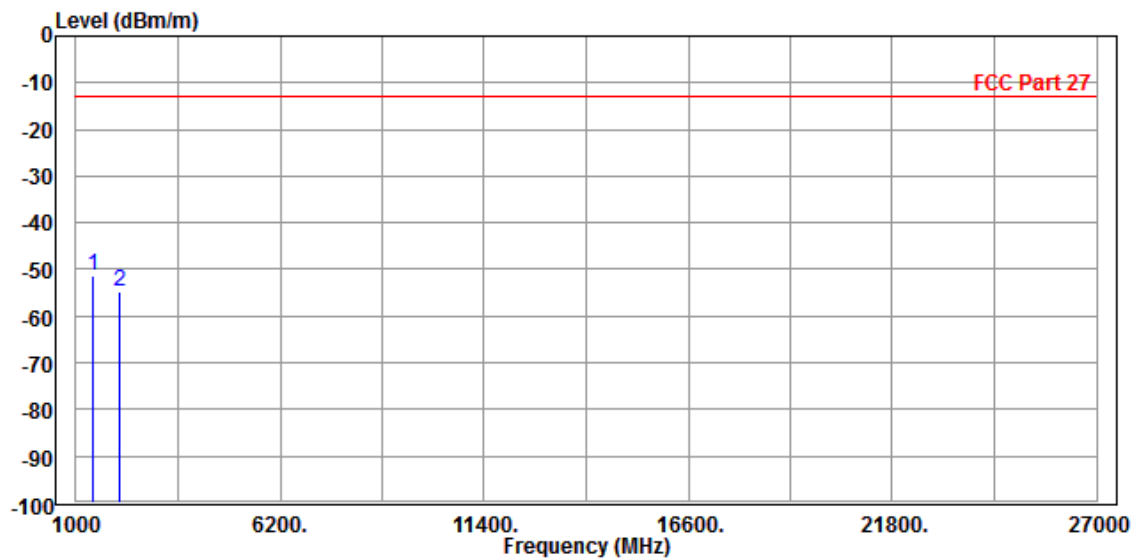
			Read	Limit	Over			
	Freq	Level	Level	Line	Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1416.000	-54.16	-47.44	-13.00	-41.16	-6.72	Peak	Horizontal
2	2122.500	-57.35	-55.42	-13.00	-44.35	-1.93	Peak	Horizontal





MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	3.8Vdc
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1416.000	-51.48	-46.04	-13.00	-38.48	-5.44	Peak	Vertical
2		2122.500	-54.92	-54.68	-13.00	-41.92	-0.24	Peak	Vertical



## 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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