Test Lab
Cert 2951.01

FCC TEST REPORT

(PART 27)

Product:	Mobile Broadband Internet Device
Model Name:	K88
FCC ID:	SRQ-K88
Applicant:	ZTE Corporation
Address:	ZTE Plaza, #55 Keji Road South, Hi-Tech, Industrial Park, Nanshan District
Manufacturer:	ZTE Corporation
Address:	ZTE Plaza, #55 Keji Road South, Hi-Tech, Industrial Park, Nanshan District
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Report No.:	RF160418W001-7
Received Date:	Apr. 18, 2016
Test Date:	Apr. 19, 2016 ~ May 02, 2016
Issued Date:	May 03, 2016

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF160418W001-7	Original release	May 03, 2016

1 CERTIFICATION

PRODUCT:	Mobile Broadband Internet Device
BRAND NAME:	ZTE
MODEL NAME:	K88
APPLICANT:	ZTE Corporation
TESTED:	Apr. 19, 2016 ~ May 02, 2016
TEST SAMPLE:	Identical Prototype
STANDARDS:	**FCC Part 27, Subpart C**
	ANSI /TIA/EIA-603-D

The above equipment has been tested by **Bureau Veritas Shenzhen Co., Ltd. Dongguan 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:** May 03, 2016

(Amyee Qian / Engineer)

APPROVED BY : _____ , **DATE:** May 03, 2016

(William Chung / Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 27 & Part 2			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**REMARK**
2.1046 27.50(a)(3)	Equivalent Isotropically Radiated Power	PASS	Meet the requirement of limit.
2.1055 27.54	Frequency Stability	PASS	Meet the requirement of limit.
2.1049	Occupied Bandwidth	PASS	Meet the requirement of limit.
--	Peak to average ratio	PASS	Meet the requirement of limit.
2.1051 27.53(a)(4)	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 27.53(a)(4)	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 27.53(a)(4)	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -3.08dB at 6930.00MHz.

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	UNCERTAINTY
Conducted emissions	150 kHz ~ 30 MHz	2.44 dB
Radiated emissions	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~1000 MHz	2.0224 dB
	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 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	FSV40	101094	Apr. 05,16	Apr. 04,17
Bilog Antenna 1	Teseq	CBL 6111D	30643	Jun. 25,15	Jun. 24,16
Bilog Antenna 2	Teseq	CBL 6111D	27089	Jun. 25,15	Jun. 24,16
Horn Antenna	ETS-Lindgren	3117	00062558	May 30,14	May 09,17
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170147	Jan. 21,14	Jan. 20,17
Amplifier	Burgeon	BPA-530	100220	Apr. 05,16	Apr. 04,17
Pre-Amplifier	HP	8449B	3008A00409	Apr. 25,15	Apr. 22,17
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 11,15	Nov. 10,16
GPS Generator+ Antenna	TOJOIN	GNSS-5000A	E1-010119	Aug. 08, 14	Aug. 07, 16
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
Power Meter	Anritsu	ML2495A	1139001	Feb.19,16	Feb. 18,17
Power Sensor	Anritsu	MA2411B	1126068	Feb.19,16	Feb. 18,17
Power Sensor	Keysight	U2021XA	MY55060016	May 27,15	May 27,17
Power Sensor	Keysight	U2021XA	MY55060018	May 27,15	May 25,17
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 12, 15	Oct.11, 16
Humid & Temp Programmable Tester	Haida	HD-2257	110807201	Sep.07,15	Sep. 06,16
Oscilloscope	Agilent	DSO9254A	MY51260160	Nov. 09,15	Nov. 08,16
Signal Analyzer	Rohde & Schwarz	FSV7	102331	Nov. 09,15	Nov. 08,16
Signal Generator	Agilent	N5183A	MY50140980	Apr. 22, 15	Apr. 19, 17
ESG Vector Signal Generator	Agilent	E4438C	MY49072505	Sep. 01,15	Aug. 31,16
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	Oct. 12, 15	Oct.11, 16

NOTE:
1. The calibration interval of the above test instruments is 12 months or 24 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in Dongguan 966 Chamber.
3. The horn antenna are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 502831.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Mobile Broadband Internet Device	
MODEL NAME	K88	
POWER SUPPLY	5.0Vdc (adapter or host equipment) 3.8Vdc (Li-ion, battery)	
MODULATION TECHNOLOGY	**LTE Band 30**	QPSK, 16QAM
FREQUENCY RANGE	**LTE Band 30** **Channel Bandwidth: 5MHz**	2307.5 ~ 2312.5 MHz
	LTE Band 30 **Channel Bandwidth: 10MHz**	2310 MHz
EMISSION DESIGNATOR	**LTE Band 30** **Channel Bandwidth: 5MHz**	QPSK: 4M47G7D
		16QAM: 4M46W7D
	LTE Band 30 **Channel Bandwidth: 10MHz**	QPSK: 8M92G7D
		16QAM: 8M91W7D
MAX. EIRP POWER	**LTE Band 30** **Channel Bandwidth: 5MHz**	160mW
	LTE Band 30 **Channel Bandwidth: 10MHz**	123mW
ANTENNA TYPE	PIFA antenna with -0.34dBi gain	
HW VERSION	u91B	
SW VERSION	K88V1.0.0B05	
I/O PORTS	Refer to user's manual	
DATA CABLE	USB cable: shielded, detachable, 1.0m	

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. The EUT was powered by the following adapter:

ADAPTER	
BRAND:	Salcomp
MODEL:	STC-A521A-Z
INPUT:	AC 100-240V, 400mA
OUTPUT:	DC 5V, 2100mA

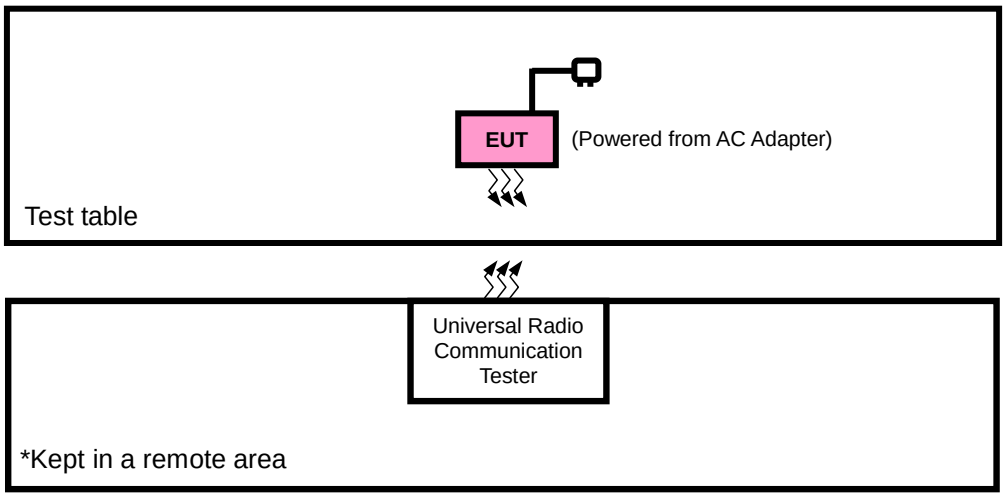
3. The EUT matched the following USB cable:

USB CABLE	
BRAND:	ZTE
MODEL:	USB-TC20-W-100-M
SIGNAL LINE:	1.0 METER

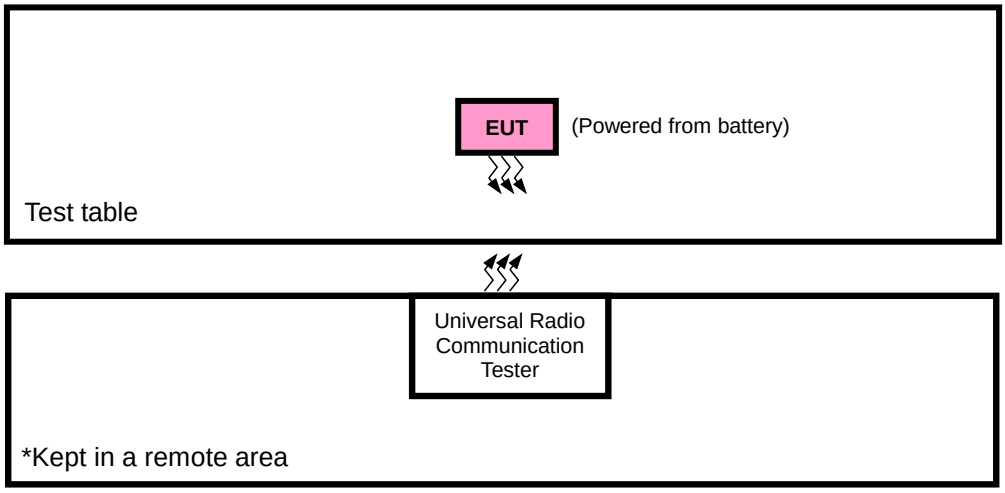
4. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

3.2 CONFIGURATION OF SYSTEM UNDER TEST

FOR RADIATION EMISSION TEST



FOR E.I.R.P TEST



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

3.4 TEST ITEM AND TEST CONFIGURATION

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 Y-plane for EIRP and X-axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	DESCRIPTION
A	**EUT + Adapter + USB Cable with LTE link**
B	EUT + Battery + USB Cable with **LTE link**

LTE BAND 30

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
B	EIRP	27685 to 27735	27685, 27710, 27735	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		27710	27710	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
B	Frequency Stability	27685 to 27735	27710	5 MHz	QPSK	1 RB / 0 RB Offset
		27710	27710	10 MHz	QPSK	1 RB / 0 RB Offset
B	Occupied Bandwidth	27685 to 27735	27685, 27710, 27735	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		27710	27710	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
B	PEAK TO AVERAGE RATIO	27685 to 27735	27685, 27710, 27735	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		27710	27710	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
B	Band Edge	27685 to 27735	27685, 27710, 27735	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		27710	27710	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
B	Conducted Emission	27685 to 27735	27710	5 MHz	QPSK	1 RB / 0 RB Offset
		27710	27710	10 MHz	QPSK	1 RB / 0 RB Offset
A	Radiated Emission	27685 to 27735	27710	5 MHz	QPSK	1 RB / 0 RB Offset

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

TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
EIRP	24deg. C, 60%RH	3.8Vdc from Battery	Alex Chen
FREQUENCY STABILITY	24deg. C, 61%RH	3.8Vdc from Battery	Yuqiang Yin
OCCUPIED BANDWIDTH	24deg. C, 61%RH	3.8Vdc from Battery	Yuqiang Yin
PEAK TO AVERAGE RATIO	24deg. C, 61%RH	3.8Vdc from Battery	Yuqiang Yin
BAND EDGE	24deg. C, 61%RH	3.8Vdc from Battery	Yuqiang Yin
CONDCUDETED EMISSION	24deg. C, 61%RH	3.8Vdc from Battery	Yuqiang Yin
RADIATED EMISSION	24deg. C, 60%RH	5Vdc from adapter	Alex Chen

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 Publication 971168 D02

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

Mobile and portable stations. (i) For mobile and portable stations transmitting in the 2305-2315 MHz band orthe 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz ofauthorized bandwidth, except that or mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operatingband the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth butmay exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stationsusing time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted totransmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.

4.1.2 TEST PROCEDURES

EIRP MEASUREMENT:

a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10MHz for LTE mode.
b. 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.
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.

CONDUCTED POWER MEASUREMENT:

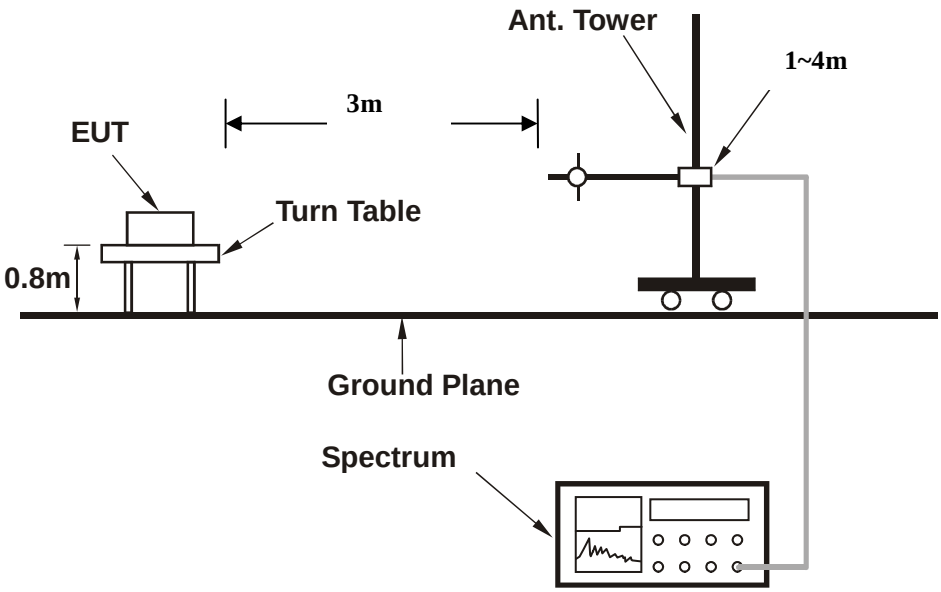
a. The EUT was set up for the maximum power with LTE link data modulation and link

up with simulator.

b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

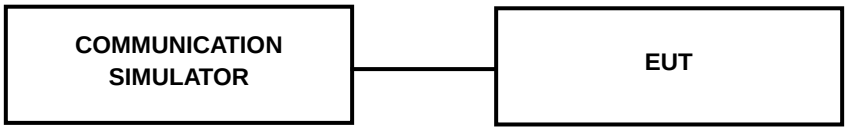
4.1.3 TEST SETUP

EIRP 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)

Band/BW	Modulation	RB Size	RB Offset	Low CH 27685	Mid CH 27710	High CH 27735	MPR
				2307.5 MHz	2310.0 MHz	2312.5 MHz	
30 / 5	QPSK	1	0	14.82	14.58	15.16	0
		1	12	14.85	15.15	15.10	0
		1	24	14.81	14.67	14.78	0
		12	0	14.90	14.85	14.97	1
		12	6	14.94	14.90	14.93	1
		12	13	14.84	14.99	14.94	1
		25	0	14.88	14.93	14.98	1
	16QAM	1	0	14.55	14.26	14.84	1
		1	12	14.32	15.02	14.98	1
		1	24	14.18	14.73	14.80	1
		12	0	14.74	14.74	14.87	2
		12	6	14.82	14.89	15.06	2
		12	13	14.83	14.86	15.09	2
		25	0	14.82	14.94	15.00	2

Band/BW	Modulation	RB Size	RB Offset	Mid CH 27710	MPR
				2310.0 MHz	
30 / 10	QPSK	1	0	**14.57**	0
		1	24	14.51	0
		1	49	14.46	0
		25	0	14.56	1
		25	12	14.55	1
		25	25	14.51	1
		50	0	14.55	1
	16QAM	1	0	14.38	1
		1	24	14.35	1
		1	49	14.23	1
		25	0	14.47	2
		25	12	14.46	2
		25	25	14.43	2
		50	0	14.41	2

EIRP

LTE BAND 30

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
27685	2307.5	-24.89	45.13	18.09	64.42	H
27710	2310.0	-25.27	45.17	17.75	59.57	H
27735	2312.5	-25.68	45.22	17.39	54.83	H
27685	2307.5	-22.43	46.21	21.63	145.55	V
27710	2310.0	-22.79	46.28	21.34	136.14	V
27735	2312.5	-22.13	46.33	22.05	**160.32**	V

NOTE: EIRP (dBm) = LVL (dBm) + Correction Factor (dB)

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
27685	2307.5	-26.87	45.13	16.11	40.83	H
27710	2310.0	-26.14	45.17	16.88	48.75	H
27735	2312.5	-25.88	45.22	17.19	52.36	H
27685	2307.5	-23.21	46.21	20.85	121.62	V
27710	2310.0	-23.66	46.28	20.47	111.43	V
27735	2312.5	-23.98	46.33	20.20	104.71	V

NOTE: EIRP (dBm) = LVL (dBm) + Correction Factor (dB)-2.15dB.

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
27710	2310.0	-25.72	45.17	17.30	53.70	H
27710	2310.0	-23.24	46.28	20.89	**122.74**	V

NOTE: EIRP (dBm) = LVL (dBm) + Correction Factor (dB)

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
27710	2310.0	-26.79	45.17	16.23	41.98	H
27710	2310.0	-24.31	46.28	19.82	95.94	V

NOTE: EIRP (dBm) = LVL (dBm) + Correction Factor (dB)

4.2 FREQUENCY STABILITY MEASUREMENT

4.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

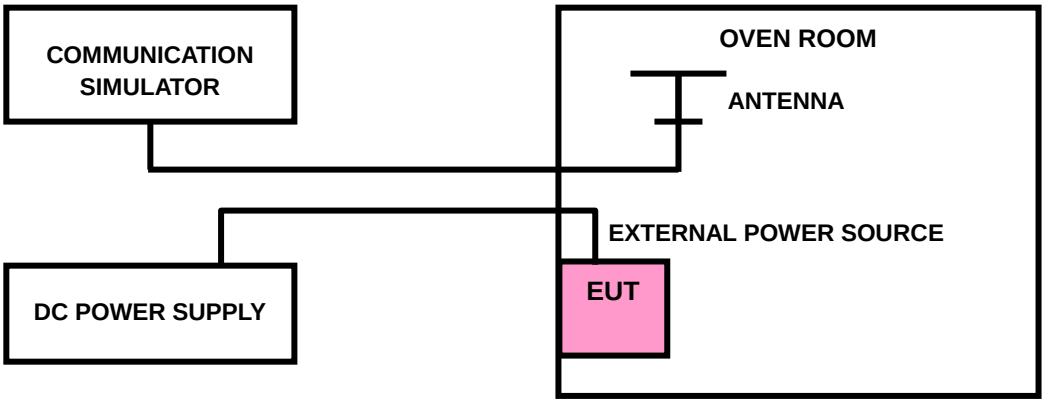
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	LTE BAND 30		
	5MHz	10MHz	
3.6	0.0026	0.0046	2.5
3.8	-0.0039	-0.0046	2.5
4.35	-0.0038	-0.0051	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.6Vdc to 4.35Vdc.

FREQUENCY ERROR vs. TEMPERATURE

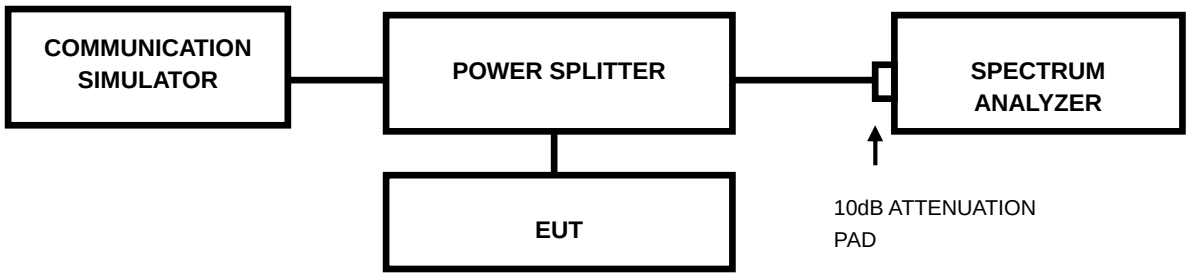
TEMP. (℃)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	LTE BAND 30		
	5MHz	10MHz	
-30	0.0153	0.0125	2.5
-20	0.0130	0.0111	2.5
-10	0.0115	0.0131	2.5
0	0.0110	0.0149	2.5
+10	0.0105	0.0080	2.5
+20	0.0110	0.0021	2.5
+30	-0.0061	0.0043	2.5
+40	-0.0040	0.0071	2.5
+50	0.0015	-0.0037	2.5
+60	0.0042	-0.0080	2.5

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

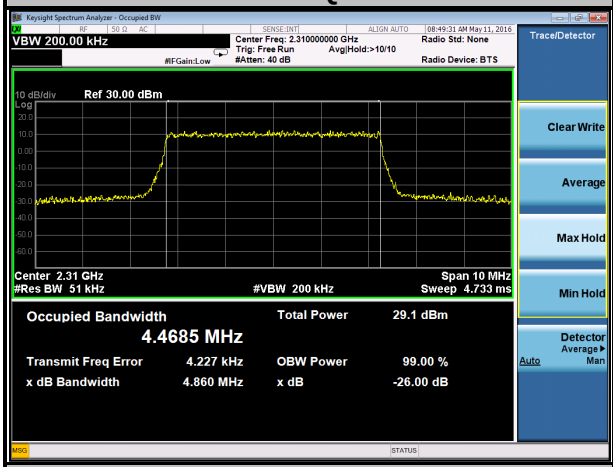
a. The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
b. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.3.4 TEST RESULTS

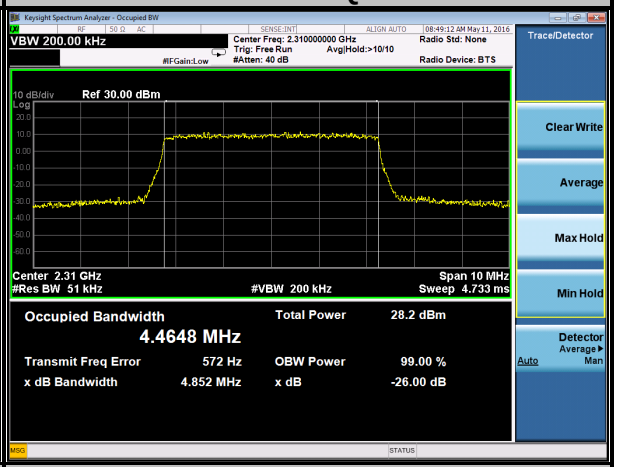
LTE BAND 30							
CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)		CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	
		QPSK	16QAM			QPSK	16QAM
27685	2307.5	4.47	4.46	27710	2310.0	8.92	8.91
27710	2310.0	4.47	4.46				
27735	2312.5	4.47	4.46				

SPECTRUM PLOT OF WORST VALUE

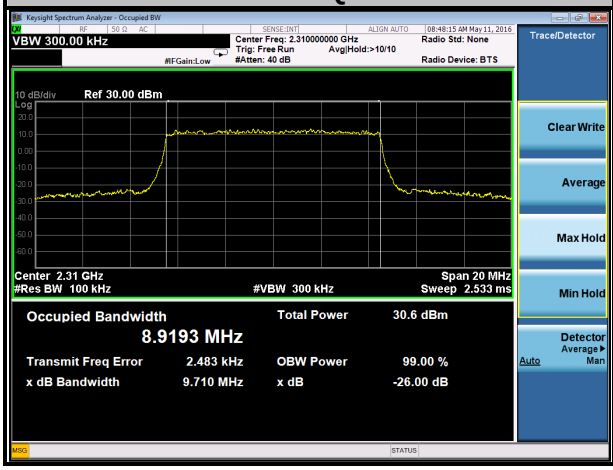
5MHz / QPSK



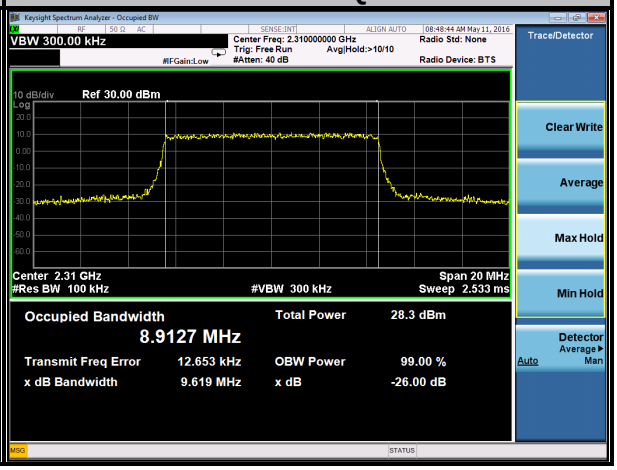
5MHz / 16QAM



10MHz / QPSK



10MHz / 16QAM

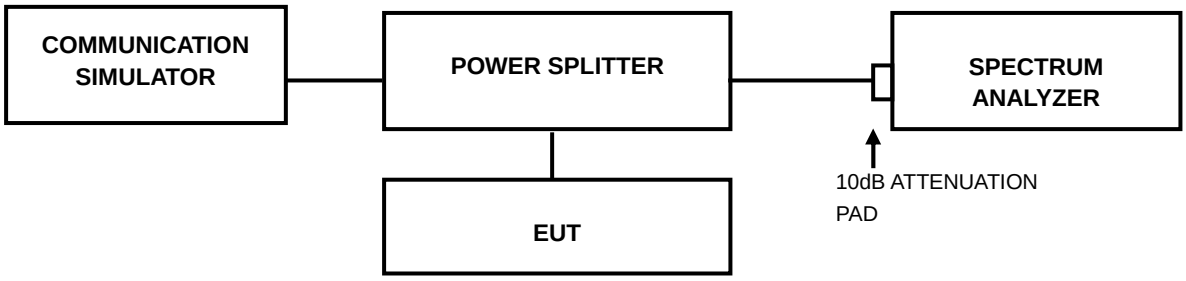


4.4 PEAK TO AVERAGE RATIO

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 ≥ 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%.

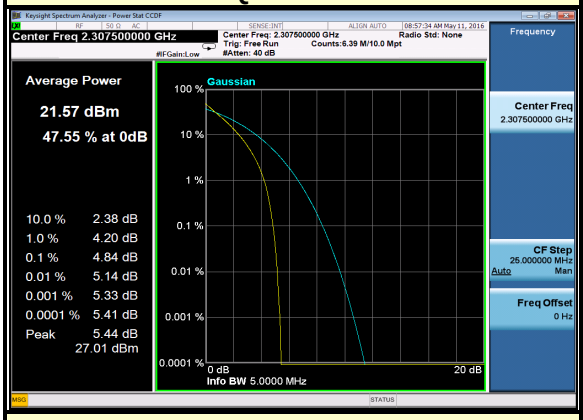
4.4.4 TEST RESULTS

LTE BAND 30

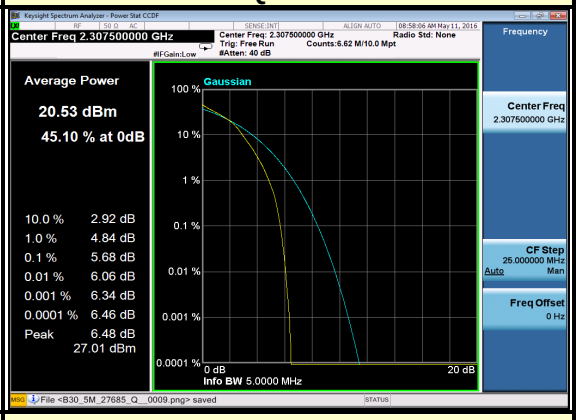
CHANNEL BANDWIDTH: 5MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM
27685	2307.5	4.84	5.68
27710	2310	4.78	5.55
27735	2312.5	4.72	5.48

SPECTRUM PLOT OF WORST VALUE

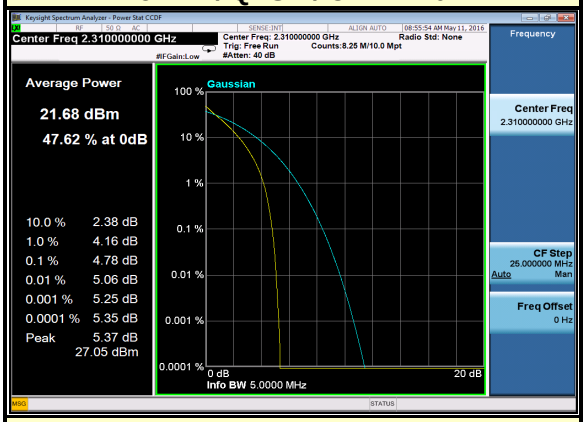
5MHz / QPSK / CH 27685



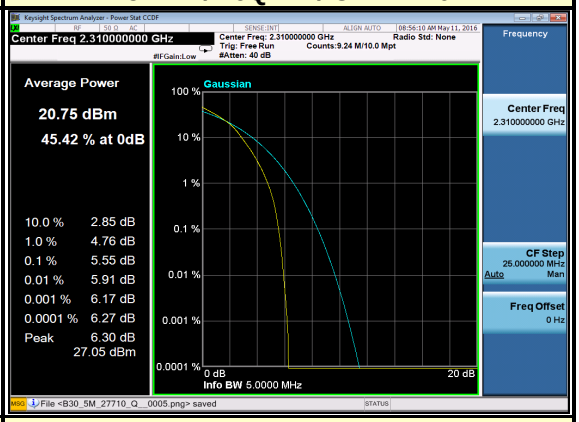
5MHz / 16QAM / CH 27685



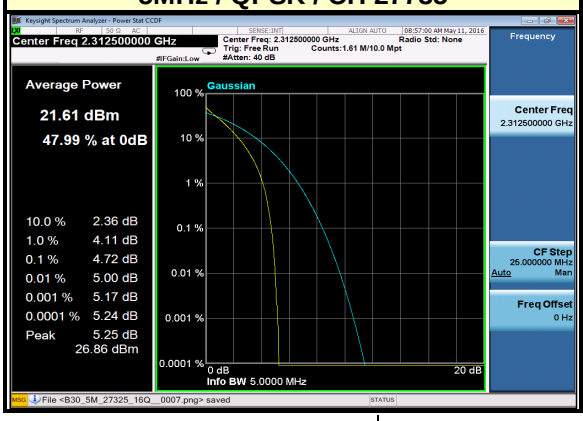
5MHz / QPSK / CH 27710



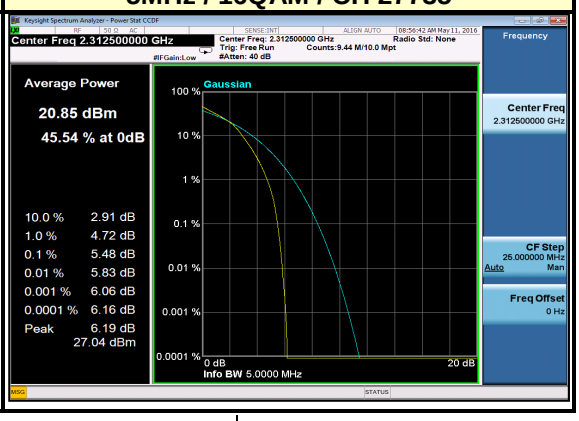
5MHz / 16QAM / CH 27710



5MHz / QPSK / CH 27735



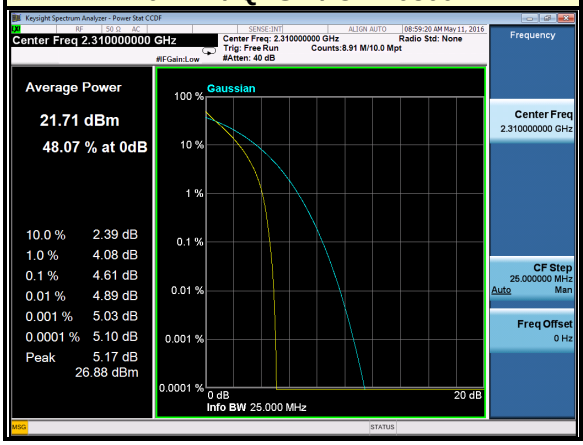
5MHz / 16QAM / CH 27735



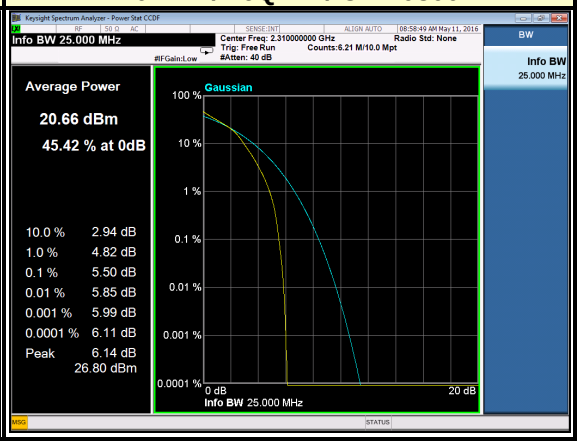
CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM
27710	2310	4.61	5.50

SPECTRUM PLOT OF WORST VALUE

10MHz / QPSK / CH 20800



10MHz / 16QAM / CH 20800



4.5 BAND EDGE MEASUREMENT

4.5.1 LIMITS OF BAND EDGE MEASUREMENT

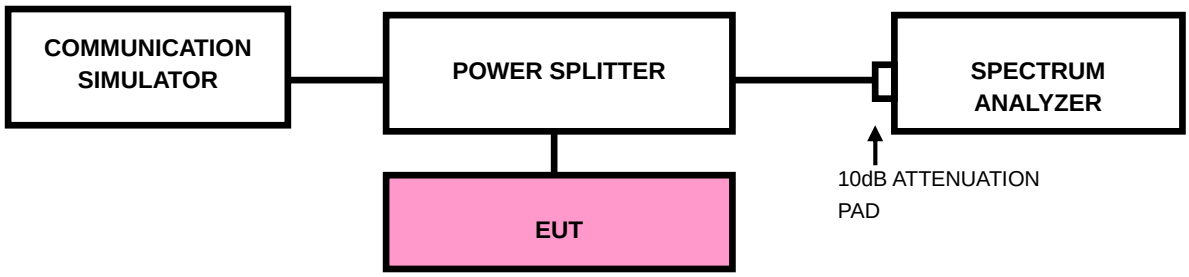
According to FCC 27.53(m) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:

(i) By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and onall frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not lessthan 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHzand on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz;

(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequenciesbetween 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and70 + 10 log (P) dB below 2288 MHz;

(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

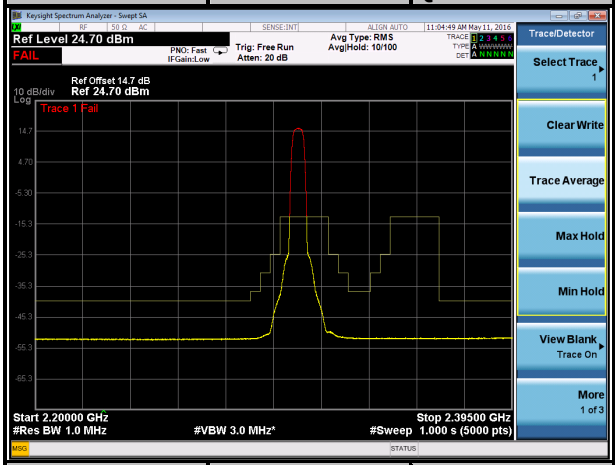
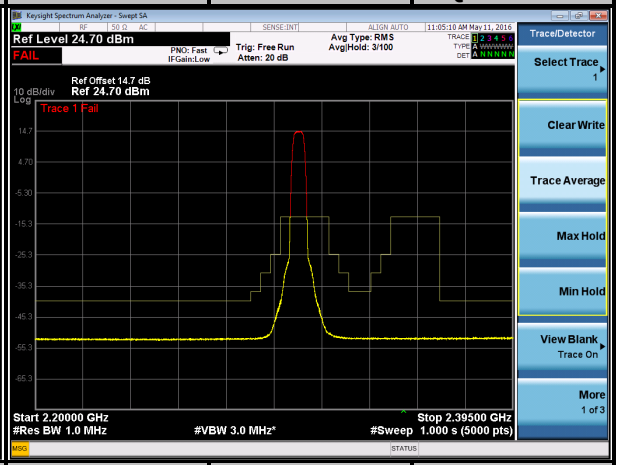
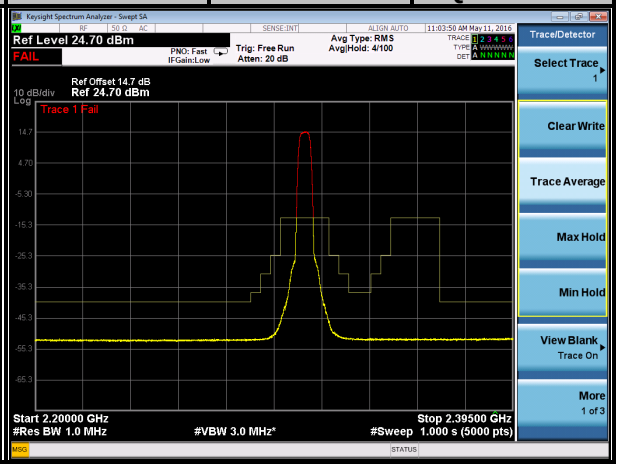
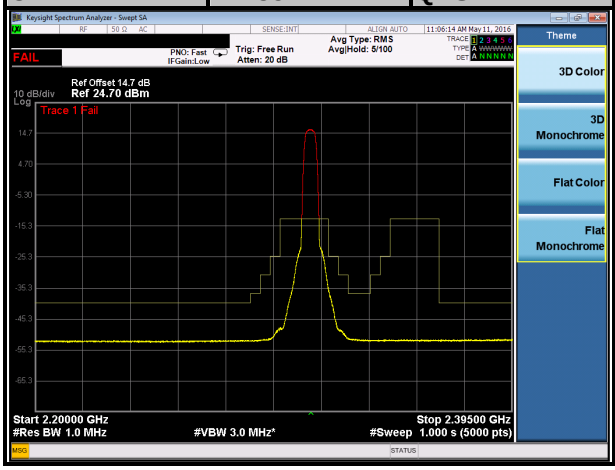
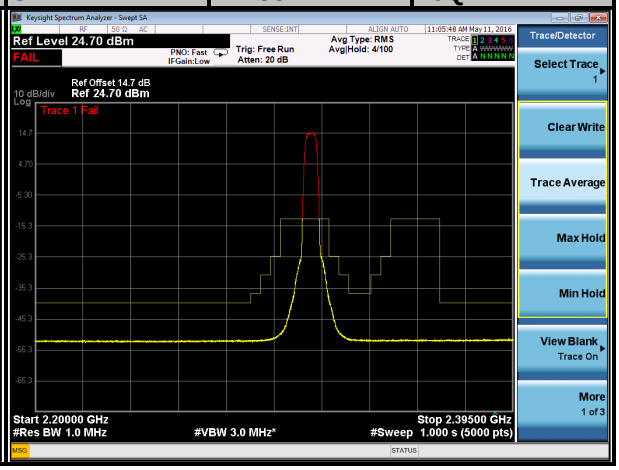
4.5.2 TEST SETUP



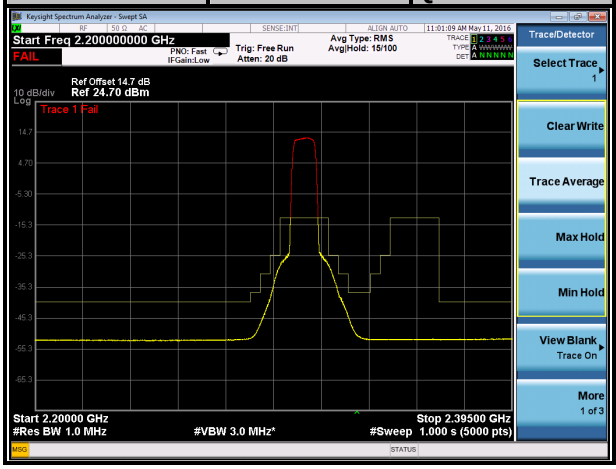
4.5.3 TEST PROCEDURES

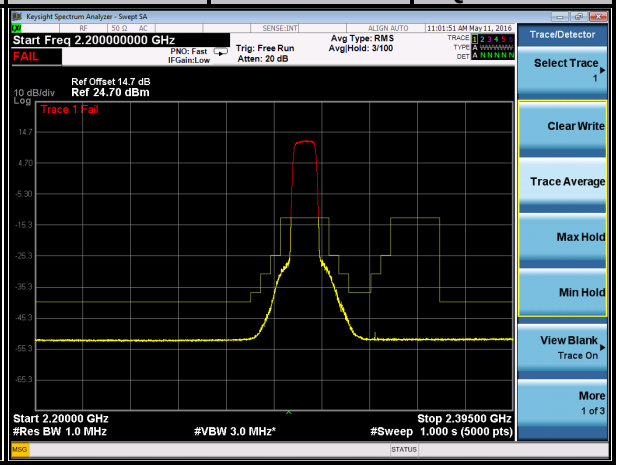
a. The EUT was set up for the maximum peak power with LTE link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range.).
b. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
c. Measuring frequency range is from 2200 MHz to 2395 MHz for LTE Band 30. 10 dB attenuation pad is connectedwith spectrum. RBW=1MHz and VBW=3MHz are used for conducted emission measurement.
d. Record the max trace plot into the test report.

4.5.4 TEST RESULTS

LTE BAND 30					
Channel Bandwidth: 5MHz					
CHANNEL	27685	QPSK	CHANNEL	27685	16QAM
					
CHANNEL	27710	QPSK	CHANNEL	27710	16QAM
					
CHANNEL	27735	QPSK	CHANNEL	27735	16QAM
					

LTE BAND 30					
Channel Bandwidth: 10MHz					
CHANNEL	27710	QPSK	CHANNEL	27710	16QAM





4.6 CONDUCTED SPURIOUS EMISSIONS

4.6.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

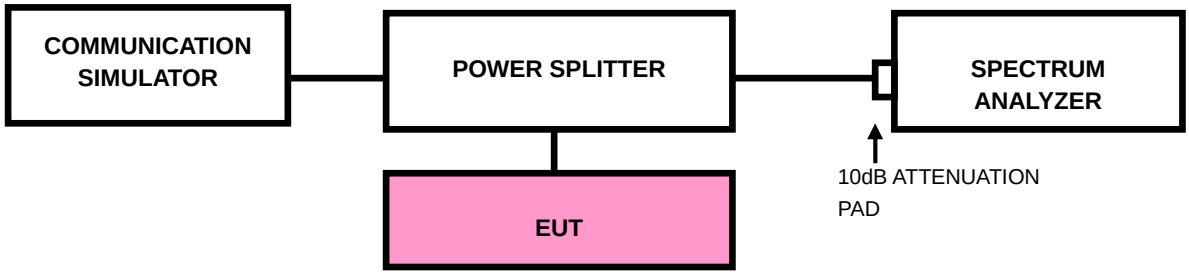
The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 70 +10 log10(P) dB. The limit of emission is equal to -40dBm.

4.6.2 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.

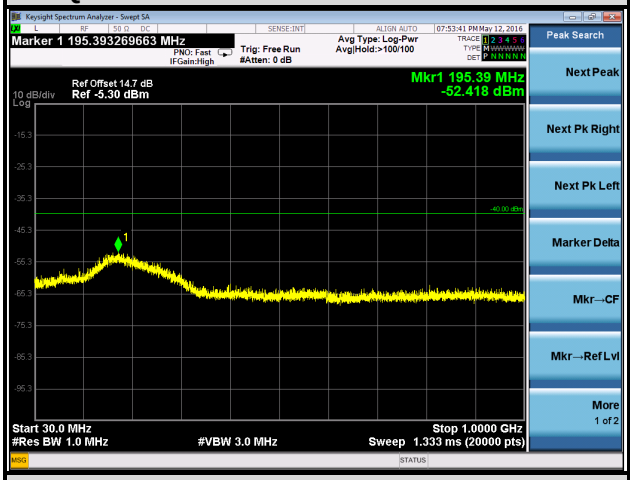
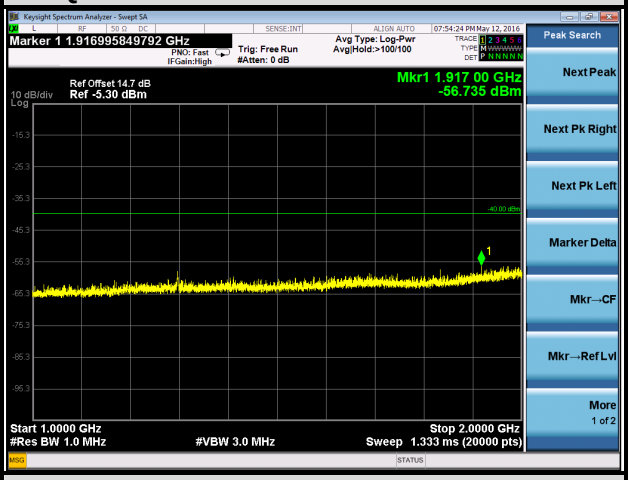
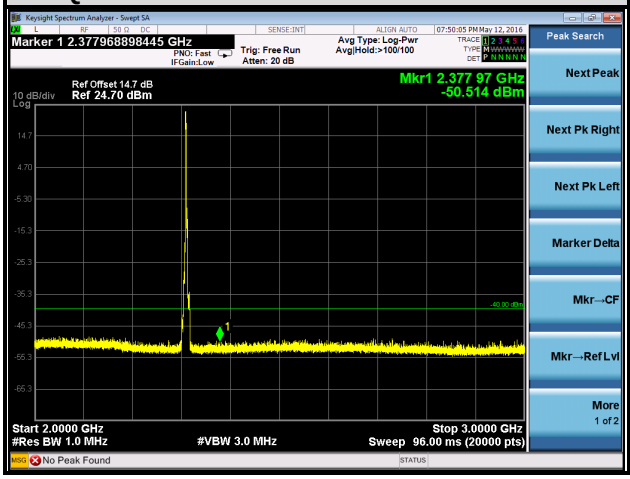
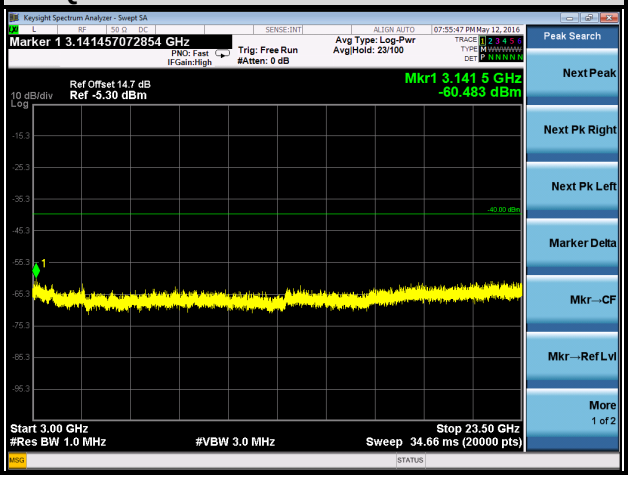
b. Measuring frequency range is from 30MHz to 23.5GHz for LTE Band 30. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz are used for conducted emission measurement.

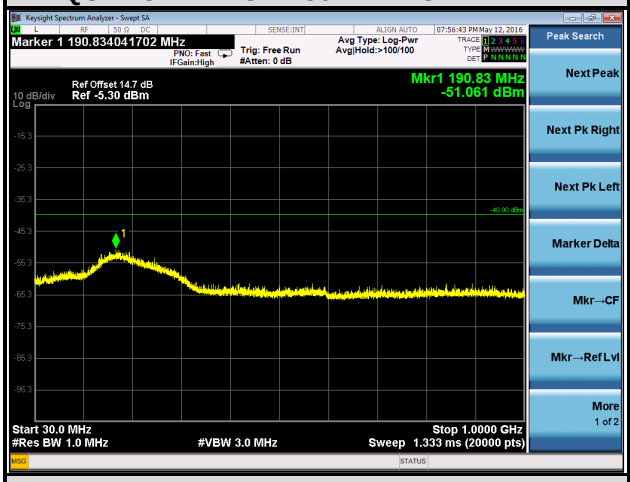
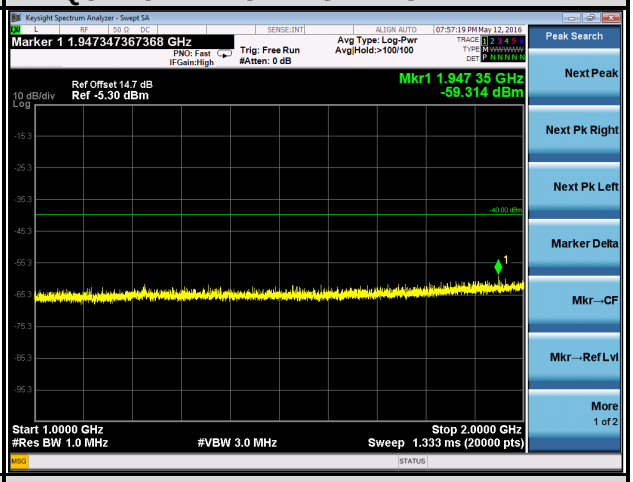
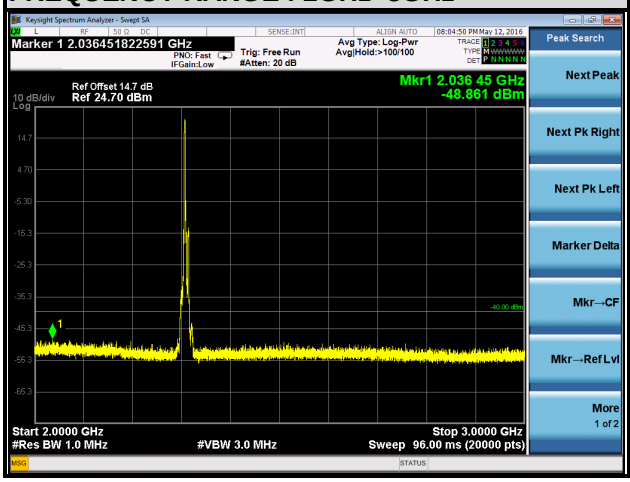
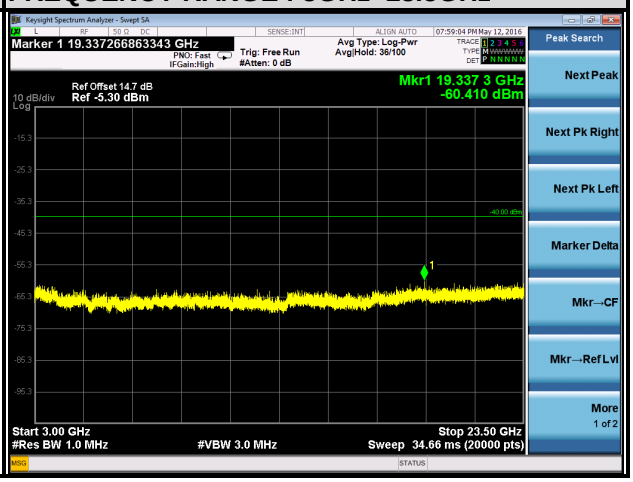
4.6.3 TEST SETUP



4.6.4 TEST RESULTS

LTE BAND 30

CHANNEL 27710	CHANNEL 27710
5MHz	5MHz
FREQUENCY RANGE : 30MHz~1GHz	FREQUENCY RANGE : 1GHz~2GHz
	
FREQUENCY RANGE : 2GHz~3GHz	FREQUENCY RANGE : 3GHz~23.5GHz
	

CHANNEL 27710	CHANNEL 27710
10MHz	10MHz
FREQUENCY RANGE : 30MHz~1GHz	FREQUENCY RANGE : 1GHz~2GHz
	
FREQUENCY RANGE : 2GHz~3GHz	FREQUENCY RANGE : 3GHz~23.5GHz
	

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 70 +10 log10(P) dB. The limit of emission is equal to -40dBm.

4.7.2 TEST PROCEDURES

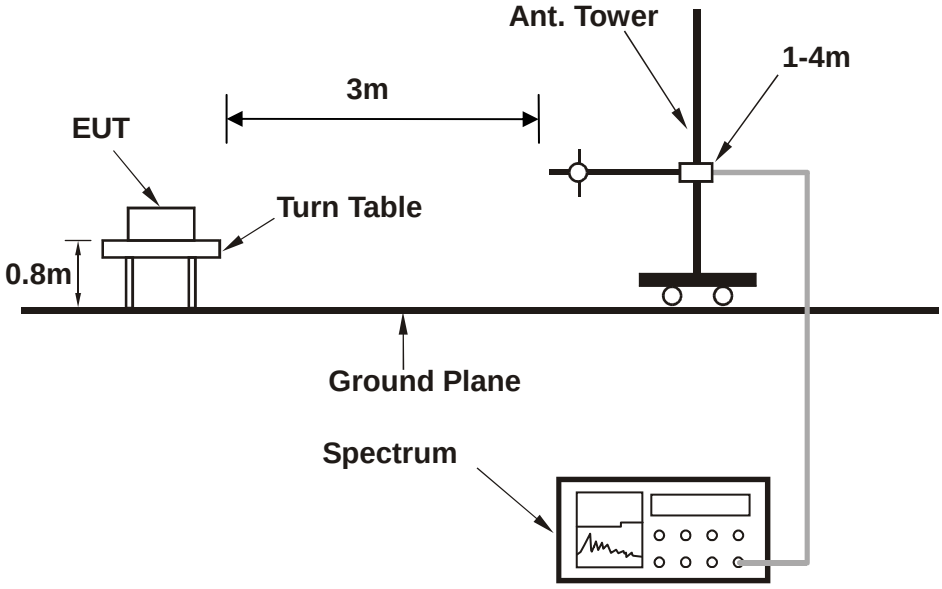
a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 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 = 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 - 2.15dBi.

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



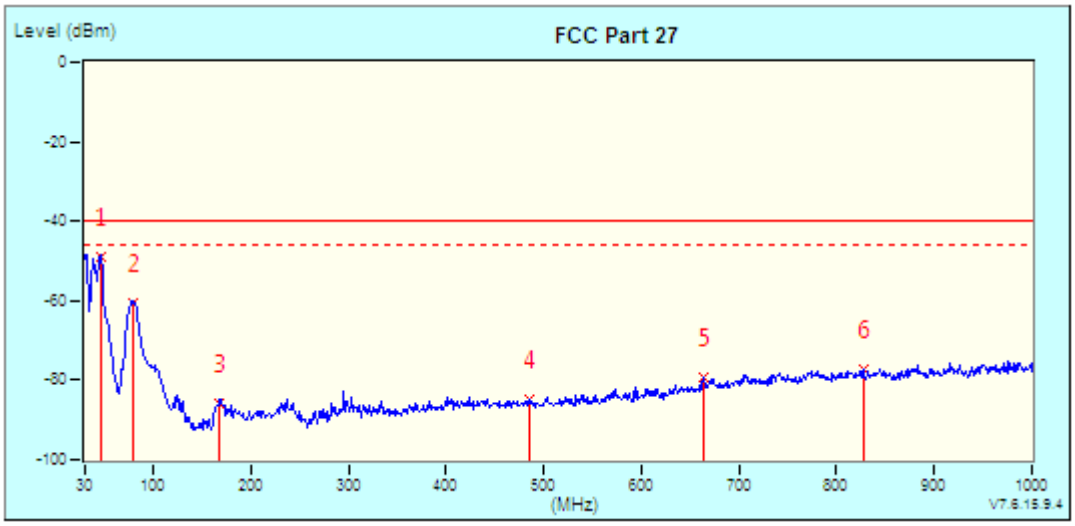
For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.7.5 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

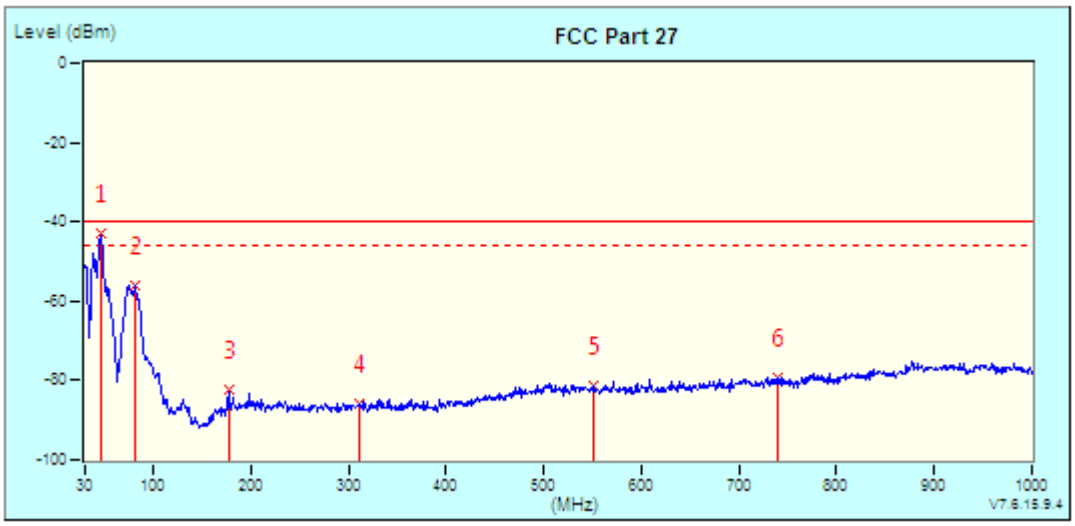
LTE Band 30:

MODE	TX channel 27710	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	**INPUT POWER**	DC 5V from adapter
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			



	No.	Frequency MHz	Factor dB	Reading dBm	Emission dBm	Limit dBm	Margin dB	Tower / Table cm	deg
*	1	46.49	6.34	-55.30	-48.96	-40.00	-8.96	--	--
	2	79.47	-7.89	-52.96	-60.85	-40.00	-20.85	--	--
	3	167.74	-18.20	-67.72	-85.92	-40.00	-45.92	--	--
	4	484.93	-10.39	-74.22	-84.61	-40.00	-44.61	--	--
	5	664.38	-6.55	-72.81	-79.36	-40.00	-39.36	--	--
	6	827.34	-3.90	-73.15	-77.05	-40.00	-37.05	--	--

MODE	TX channel 27710	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

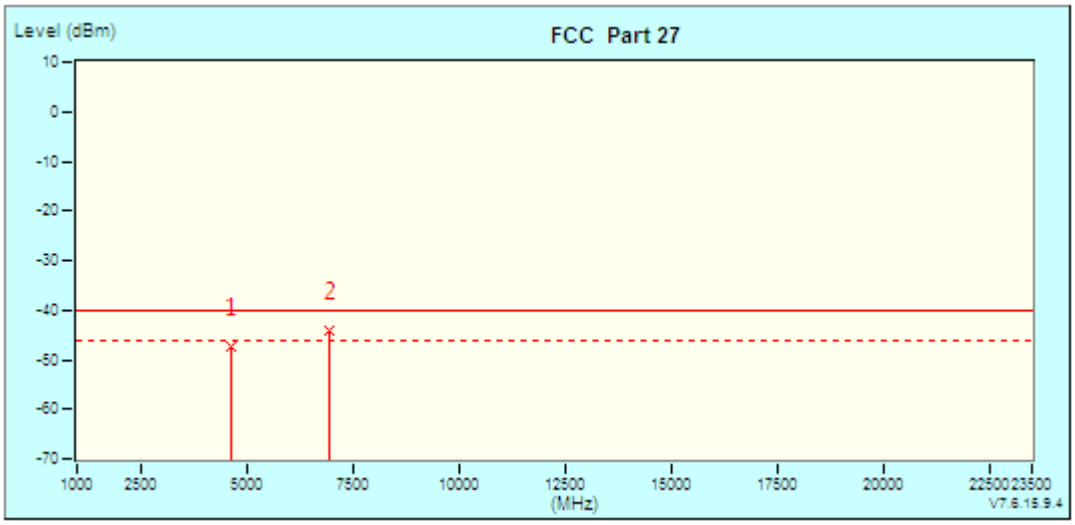


	No.	Frequency MHz	Factor dB	Reading dBm	Emission dBm	Limit dBm	Margin dB	Tower / Table cm	deg
*	1	46.49	-3.64	-39.48	-43.12	-40.00	-3.12	--	--
	2	80.44	-10.26	-45.72	-55.98	-40.00	-15.98	--	--
	3	177.44	-13.44	-68.68	-82.12	-40.00	-42.12	--	--
	4	310.33	-11.26	-74.43	-85.69	-40.00	-45.69	--	--
	5	551.86	-7.29	-74.08	-81.37	-40.00	-41.37	--	--
	6	739.07	-5.85	-73.25	-79.10	-40.00	-39.10	--	--

ABOVE 1GHz

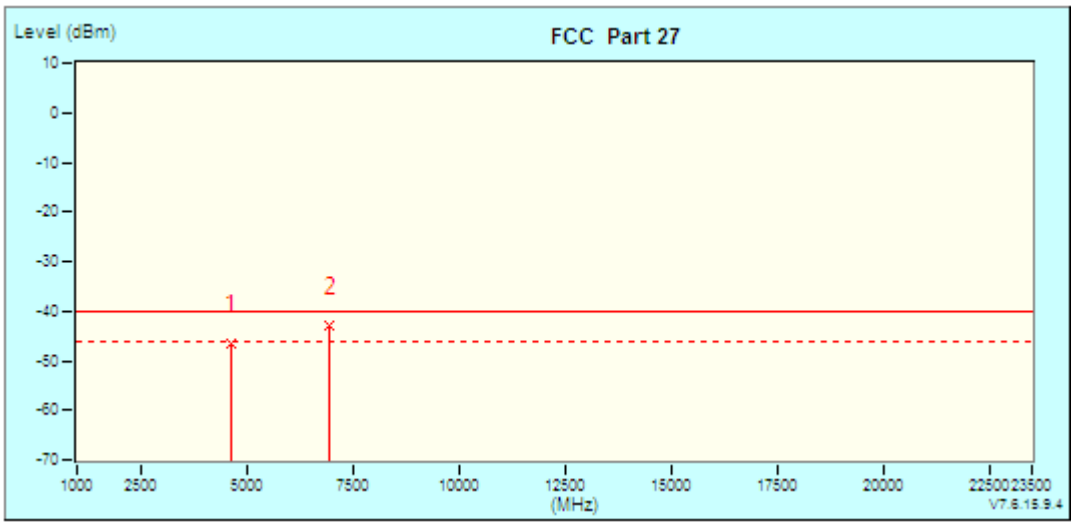
LTE Band 30
CHANNEL BANDWIDTH: 5MHz / QPSK

MODE	TX channel 27710	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	**INPUT POWER**	DC 5V from adapter
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			



	No.	Frequency MHz	Factor dB	Reading dBm	Emission dBm	Limit dBm	Margin dB	Tower / Table cm	deg
	1	4620.00 (PK)	6.78	-54.13	-47.35	-40.00	-7.35	200	360
*	2	6930.00 (PK)	11.56	-55.51	-43.95	-40.00	-3.95	200	360

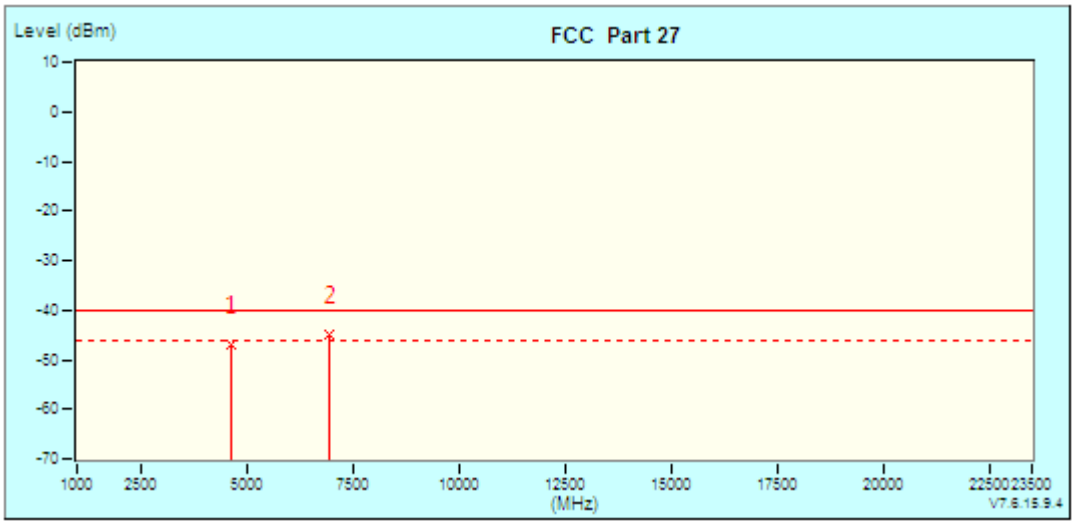
MODE	TX channel 27710	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			



	No.	Frequency MHz	Factor dB	Reading dBm	Emission dBm	Limit dBm	Margin dB	Tower / Table cm	deg
	1	4620.00 (PK)	6.68	-53.16	-46.48	-40.00	-6.48	--	--
*	2	6930.00 (PK)	11.47	-54.55	-43.08	-40.00	-3.08	--	--

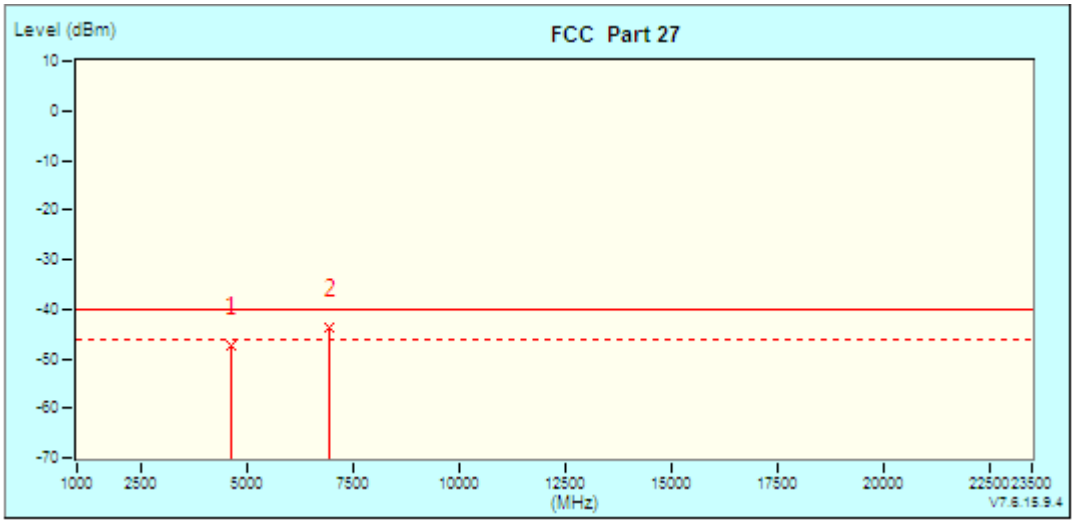
CHANNEL BANDWIDTH: 10MHz / QPSK

MODE	TX channel 27710	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			



	No.	Frequency MHz	Factor dB	Reading dBm	Emission dBm	Limit dBm	Margin dB	Tower / Table cm	deg
	1	4620.00 (PK)	6.78	-53.73	-46.95	-40.00	-6.95	--	--
*	2	6930.00 (PK)	11.56	-56.43	-44.87	-40.00	-4.87	--	--

MODE	TX channel 27710	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Alex Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			



	No.	Frequency MHz	Factor dB	Reading dBm	Emission dBm	Limit dBm	Margin dB	Tower / Table cm	deg
	1	4620.00 (PK)	6.68	-54.03	-47.35	-40.00	-7.35	--	--
*	2	6930.00 (PK)	11.47	-55.14	-43.67	-40.00	-3.67	--	--

5 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch, were founded in 2002 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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Web Site: www.adt.com.tw

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

6 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

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