REPORT No.: SZ18090036W07

TEST REPORT

APPLICANT	:	Panasonic India Private Limited
PRODUCT NAME	:	Smartphone
MODEL NAME	:	Panasonic ELUGA Ray 600
BRAND NAME	:	Panasonic
FCC ID	:	2APTIS60ER6
STANDARD(S)	:	47 CFR Part 22, Subpart H
TEST DATE	:	2018-09-06 to 2018-09-13
ISSUE DATE	:	2018-10-23

Tested by: Gao Mingzhou (Test Engineer)

Approved by: Peng Huarui (Supervisor)

MORLAB

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DIRECTORY

Change History		
Issue	**Date**	**Reason for change**
1.0	2018-10-23	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Panasonic India Private Limited
Applicant Address:	12th Floor Ambience Tower, Ambience Island, NH-8, Gurgaon-122002, Haryana, India
Manufacturer:	Shenzhen Tinno Mobile Technology Corp.
Manufacturer Address:	4/F.,H-3 Building,OCT Eastern Industrial Park. NO.1 XiangShan East Road.,Nan Shan District,Shenzhen,P.R.China.

1.2. Equipment Under Test (EUT) Description

Product Name:	Smartphone	
Serial No:	(N/A, marked #1 by test site)	
Hardware Version:	V1.0	
Software Version:	EB-90S60ER6v1015	
Modulation Type:	QPSK, 16QAM	
Operation Band:	Band 5	
Frequency Range:	LTE Band 5	Tx: 824MHz -849MHz
		Rx: 869MHz -894MHz
	LTE Band 5	1.4MHz, 3 MHz, 5 MHz, 10MHz
Emission Designator:	1M08G7D (LTE Band 5, QPSK, BW 1.4MHz) 1M07W7D (LTE Band 5, 16QAM, BW 1.4MHz) 2M68G7D (LTE Band 5, QPSK, BW 3MHz) 2M67W7D (LTE Band 5, 16QAM, BW 3MHz) 4M51G7D (LTE Band 5, QPSK, BW 5MHz) 4M48W7D (LTE Band 5, 16QAM, BW 5MHz) 8M93G7D (LTE Band 5, QPSK, BW 10MHz) 8M93W7D (LTE Band 5, 16QAM, BW 10MHz)	
Antenna Type:	PIFA Antenna	
Antenna Gain:	-1.5 dBi	
Operating voltage:	Normal(NV):	3.8V
	Lowest(LV):	3.45V
	Highest(HV):	4.35V

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

1.3. Test Standards and Results

The objective of the report is to perform testing according to Part 2 and Part 22 for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 22	Public Mobile Services

Test detailed items/section required by FCC rules and results are as below:

Section	Description	Test Date	Test Engineer	Result
2.1046	Transmitter Conducted Output Power	Sep 07, 2018	Gao Mingzhou	PASS
2.1049	Occupied Bandwidth	Sep 07, 2018	Gao Mingzhou	PASS
22.355	Frequency Stability	Sep 07, 2018	Gao Mingzhou	PASS
24.232(d)	Peak to Average Radio	Sep 07, 2018	Gao Mingzhou	PASS
2.1051, 22.917(a)	Conducted Spurious Emissions	Sep 07, 2018	Gao Mingzhou	PASS
2.1051, 22.917(a)	Band Edge	Sep 07, 2018	Gao Mingzhou	PASS
22.913(a)(2)	Equivalent Isotropic Radiated Power	Sep 12, 2018	Peng Xuewei	PASS
2.1051, 22.917(a)	Radiated Spurious Emissions	Sep 12, 2018	Peng Xuewei	PASS
Note: The tests were performed according to the method of measurements prescribed in KDB971168 D01 v03 (Oct 27, 2017) and ANSI/TIA-603-E-2016.				

1.4. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106

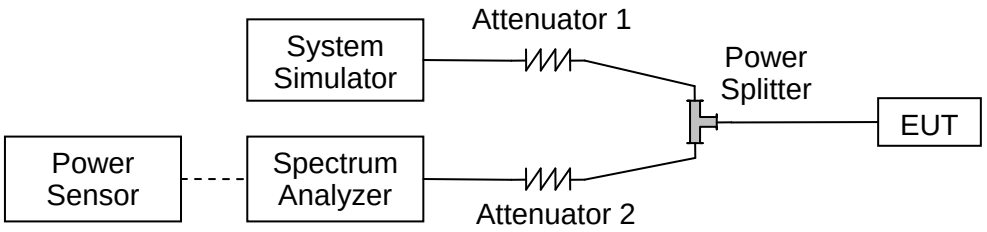
2. 47 CFR Part 2, Part 22H Requirements

2.1. Transmitter Conducted Output Power

2.1.1. Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

2.1.2. Test Description



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

2.1.3. Test procedure

KDB 971168 D01v03 Section 5.2 and ANSI/TIA-603-E-2016.

2.1.4. Result

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.
Channel				20450	20525	20600
Frequency (MHz)				829	836.5	844
10	QPSK	1	0	23.36	23.6	23.26
10	QPSK	1	25	23.25	23.21	23.28
10	QPSK	1	49	23.18	23.14	23.24
10	QPSK	25	0	22.26	22.42	22.4
10	QPSK	25	12	22.25	22.32	22.22
10	QPSK	25	25	22.39	22.24	22.34
10	QPSK	50	0	22.33	22.2	22.37
10	16QAM	1	0	22.41	22.61	22.18
10	16QAM	1	25	22.35	22.43	22.6
10	16QAM	1	49	22.32	22.51	22.28
10	16QAM	25	0	21.33	21.28	21.27
10	16QAM	25	12	21.31	21.38	21.34
10	16QAM	25	25	21.48	21.42	21.29
10	16QAM	50	0	21.36	21.29	21.37
Channel				20425	20525	20625
Frequency (MHz)				826.5	836.5	846.5
5	QPSK	1	0	23.01	23.1	23.11
5	QPSK	1	12	23.21	23.26	23.38
5	QPSK	1	24	23.19	23.06	23.21
5	QPSK	12	0	22.19	22.14	22.15
5	QPSK	12	7	22.25	22.23	22.28
5	QPSK	12	13	22.15	22.23	22.22
5	QPSK	25	0	22.27	22.13	22.19
5	16QAM	1	0	22.23	22.18	22.03
5	16QAM	1	12	22.61	22.48	22.3
5	16QAM	1	24	22.15	22.12	22.57
5	16QAM	12	0	21.17	21.27	21.19
5	16QAM	12	7	21.26	21.3	21.28
5	16QAM	12	13	21.23	21.16	21.26
5	16QAM	25	0	21.32	21.32	21.11

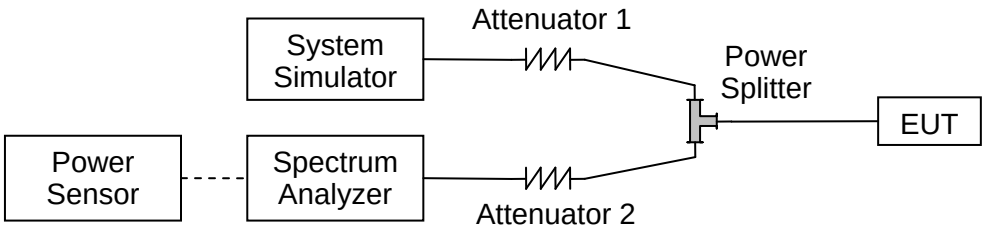
Channel				20415	20525	20635
Frequency (MHz)				825.5	836.5	847.5
3	QPSK	1	0	23.19	23.2	23.18
3	QPSK	1	8	23.06	23.1	23.18
3	QPSK	1	14	23.11	23.14	23.14
3	QPSK	8	0	22.15	22.13	22.30
3	QPSK	8	4	22.32	22.19	22.17
3	QPSK	8	7	22.25	22.29	22.50
3	QPSK	15	0	22.25	22.27	22.19
3	16QAM	1	0	22.3	22.41	22.28
3	16QAM	1	8	22.39	22.45	22.20
3	16QAM	1	14	22.25	22.42	22.23
3	16QAM	8	0	21.23	21.24	21.16
3	16QAM	8	4	21.36	21.32	21.50
3	16QAM	8	7	21.17	21.24	21.29
3	16QAM	15	0	21.23	21.32	21.35
Channel				20407	20525	20643
Frequency (MHz)				824.7	836.5	848.3
1.4	QPSK	1	0	23.07	23.15	23.04
1.4	QPSK	1	3	23.39	23.2	23.24
1.4	QPSK	1	5	23.19	23.18	23.06
1.4	QPSK	3	0	23.23	23.23	23.18
1.4	QPSK	3	1	23.32	23.26	23.18
1.4	QPSK	3	3	23.17	23.19	23.22
1.4	QPSK	6	0	22.32	22.38	22.32
1.4	16QAM	1	0	22.43	22.31	22.29
1.4	16QAM	1	3	22.52	22.47	22.27
1.4	16QAM	1	5	22.38	22.38	22.51
1.4	16QAM	3	0	22.18	22.19	22.17
1.4	16QAM	3	1	22.24	22.3	22.31
1.4	16QAM	3	3	22.16	22.24	22.19
1.4	16QAM	6	0	21.43	21.4	21.25

2.2. Occupied Bandwidth

2.2.1. Requirement

According to FCC section 2.1049, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.Occupied bandwidth is also known as the 99% emission bandwidth.

2.2.2. Test Description



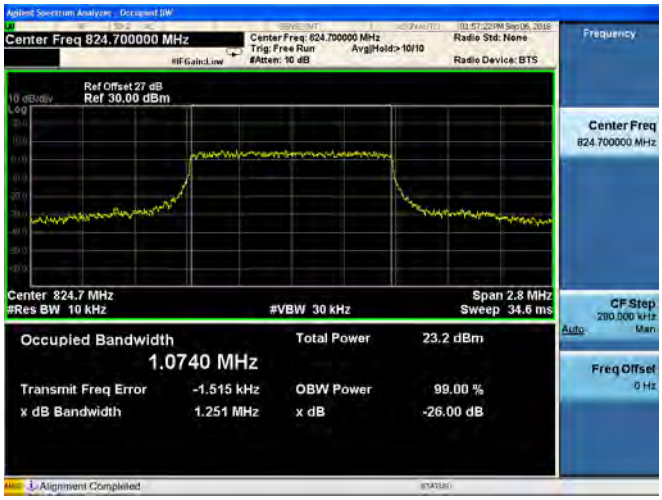
The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

2.2.3. Test procedure

KDB 971168 D01v03 Section 4.1 and ANSI/TIA-603-E-2016.

2.2.4. Test Result

LTE Band 5, BW: 1.4MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
20407	824.7	1.0740	1.251	1.0746	1.227
20525	836.5	1.0751	1.249	1.0738	1.250
20643	848.3	1.0739	1.207	1.0744	1.215
LTE Band 5, BW: 3MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
20415	825.5	2.6663	2.793	2.6708	2.801
20525	836.5	2.6761	2.814	2.6664	2.807
20635	847.5	2.6689	2.806	2.6749	2.794
LTE Band 5, BW: 5MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
20425	826.5	4.4962	4.801	4.4808	4.852
20525	836.5	4.4952	4.812	4.4736	4.809
20625	846.5	4.5115	4.959	4.4772	4.816
LTE Band 5, BW: 10MHz					
Channel	Frequency (MHz)	QPSK		16QAM	
		99% Bandwidth (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
20450	829.0	8.9259	9.321	8.9308	9.254
20525	836.5	8.9160	9.323	8.9138	9.331
20600	844.0	8.9299	9.333	8.9241	9.364

LTE Band 5 99%&26dB Bandwidth	
1.4MHz/QPSK/Low CH	**1.4MHz/16QAM/Low CH**
	
1.4MHz/QPSK/Mid CH	**1.4MHz/16QAM/Mid CH**
	

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

3MHz/QPSK/Low CH	3MHz/16QAM/Low CH
	
3MHz/QPSK/Mid CH	**3MHz/16QAM/Mid CH**
	
3MHz/QPSK/High CH	**3MHz/16QAM/High CH**
	

5MHz/QPSK/Low CH	5MHz/16QAM/Low CH
	
5MHz/QPSK/Mid CH	**5MHz/16QAM/Mid CH**
	
5MHz/QPSK/High CH	**5MHz/16QAM/High CH**
	

10MHz/QPSK/Low CH	10MHz/16QAM/Low CH
	
10MHz/QPSK/Mid CH	**10MHz/16QAM/Mid CH**
	
10MHz/QPSK/High CH	**10MHz/16QAM/High CH**
	

2.3. Frequency Stability

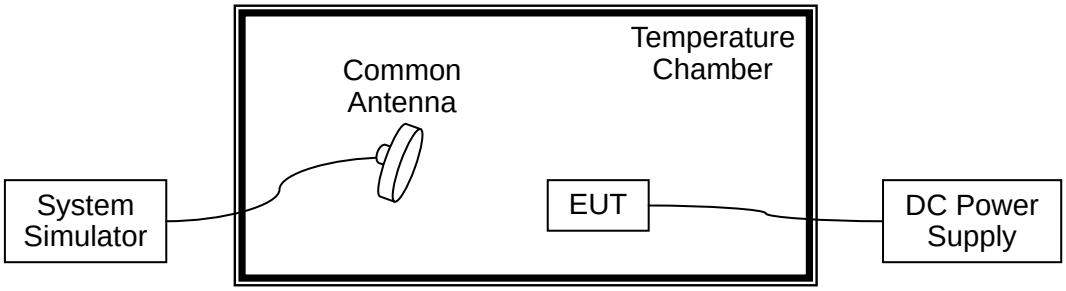
2.3.1. Requirement

According to FCC section 2.1055& 22.355, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

(a) The temperature is varied from -30°C to +50°C at intervals of not more than 10°C.

(b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

2.3.2. Test Description



The EUT which is powered by the DC Power Supply directly, is located in the Temperature Chamber. The EUT is commanded by the System Simulator (SS) to operate at the maximum output power. A call is established between the EUT and the SS via a Common Antenna.

2.3.3. Test procedure

KDB 971168 D01v03 Section 9.0 and ANSI/TIA-603-E-2016.

2.3.4. Test Result

The nominal, highest and lowest extreme voltages are separately 3.8VDC, 4.35VDC and 3.45VDC, which are specified by the applicant.

The testing was performed using one RB and Bandwidth setting for each band.

LTE Band 5 – QPSK - Channel 20525 – Frequency 836.5MHz Limit: ±2.5ppm					
Voltage (%)	**Power (VDC)**	**Temp (°C)**	**Fre. Dev. (Hz)**	**Deviation (ppm)**	**Result**
100	3.8V	+20(Ref)	11	0.013	PASS
100		-30	12	0.014	
100		-20	-64	-0.077	
100		-10	-22	-0.026	
100		0	-47	-0.056	
100		+10	-64	-0.077	
100		+20	34	0.041	
100		+30	39	0.047	
100		+40	27	0.032	
100		+50	48	0.057	
115	4.35V	+20	35	0.042	
85	3.45V	+20	-76	-0.091	

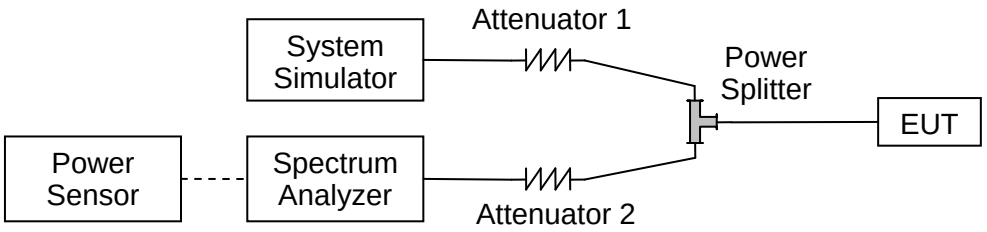
2.4. Peak to Average Radio

2.4.1. Requirement

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

2.4.2. Test Description

A. Test Set:



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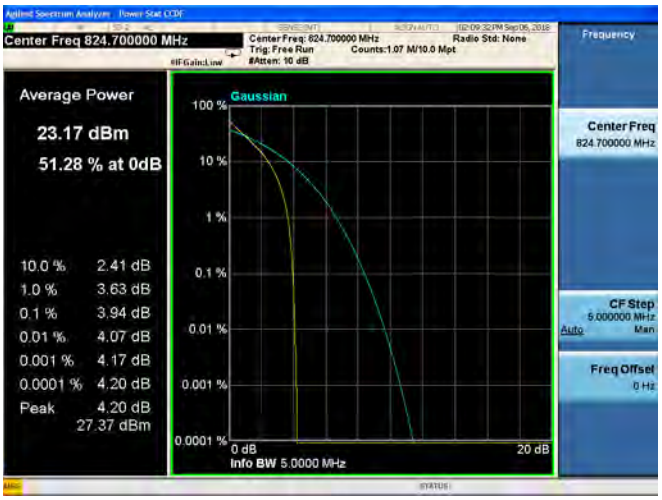
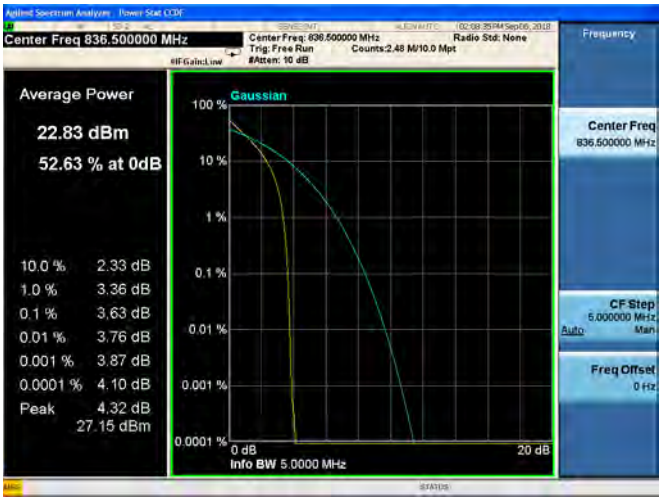
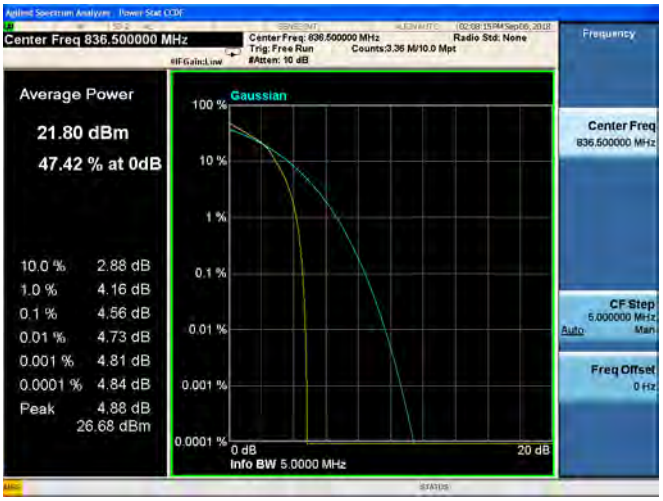
2.4.3. Test procedure

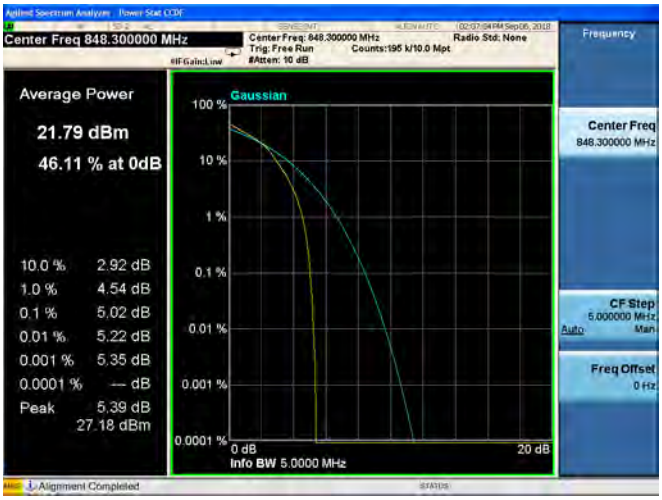
KDB 971168 D01v03 Section 5.7 and ANSI/TIA-603-E-2016.

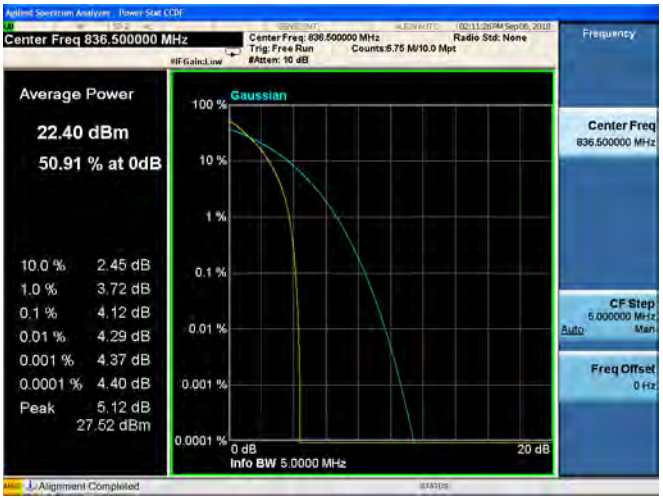
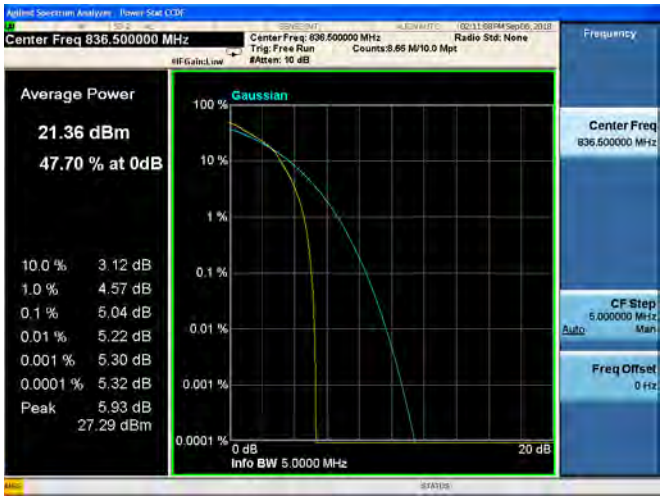
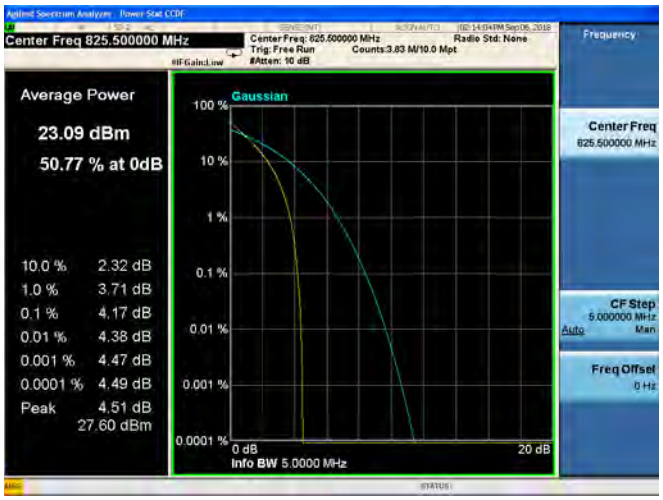
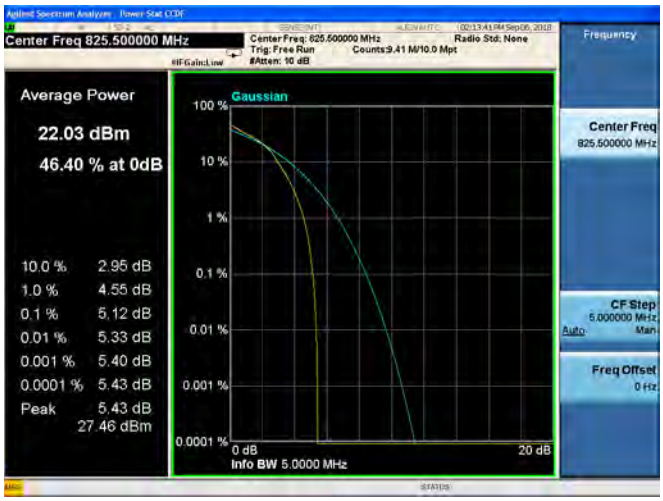
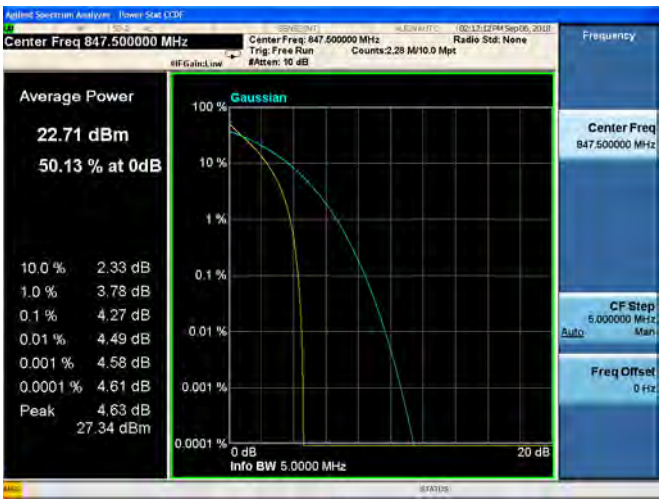
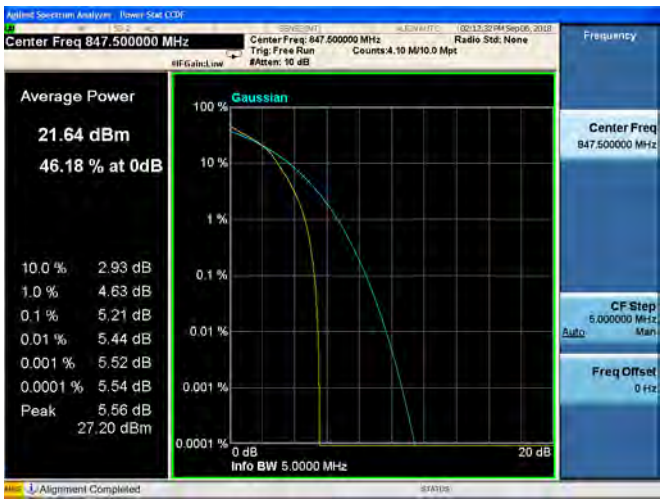
2.4.4. Test Result

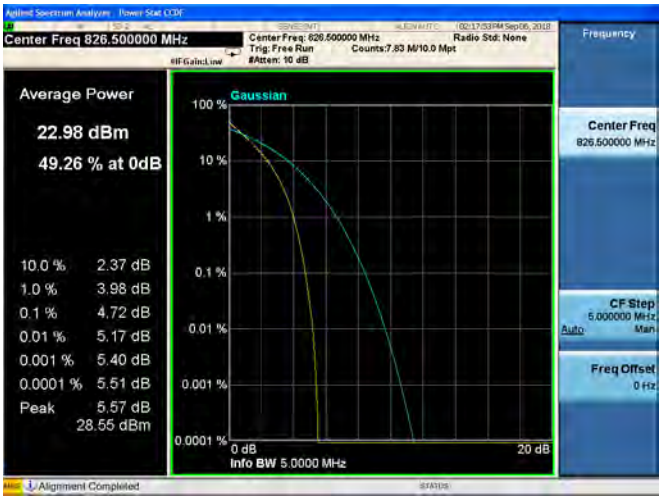
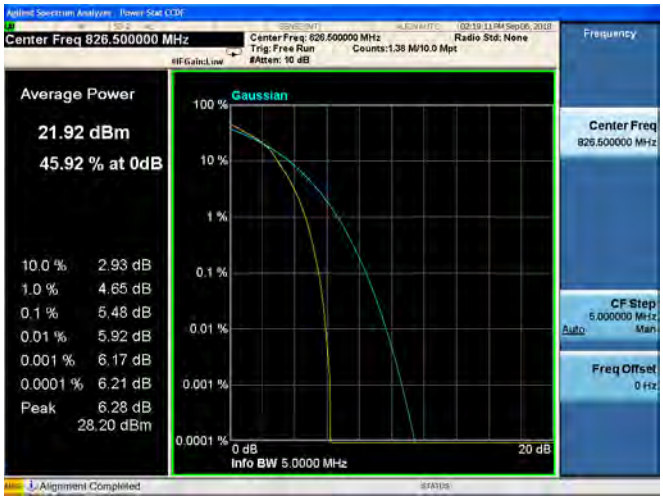
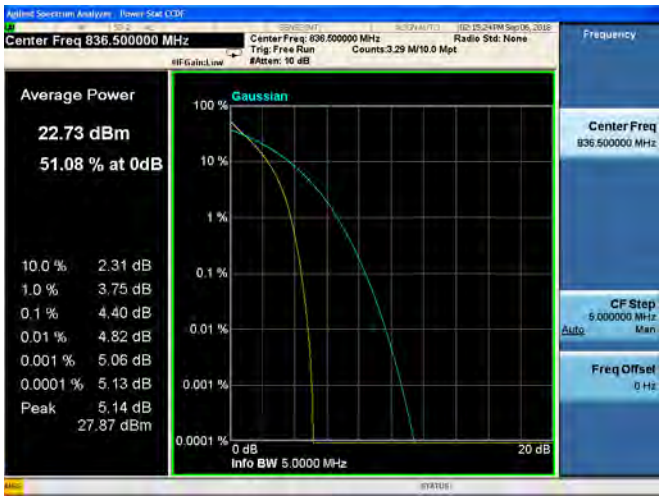
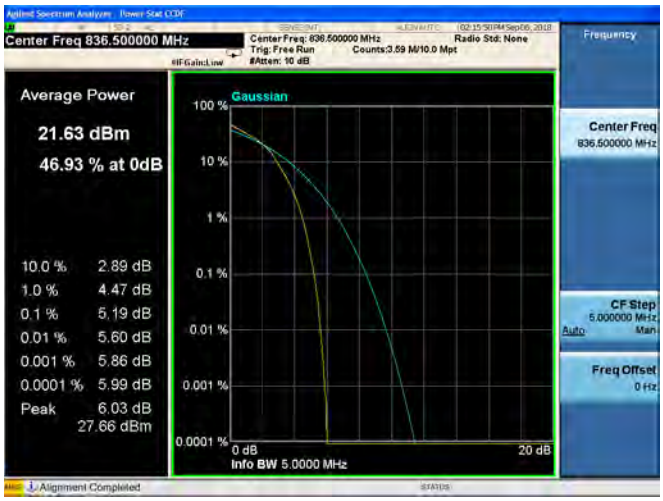
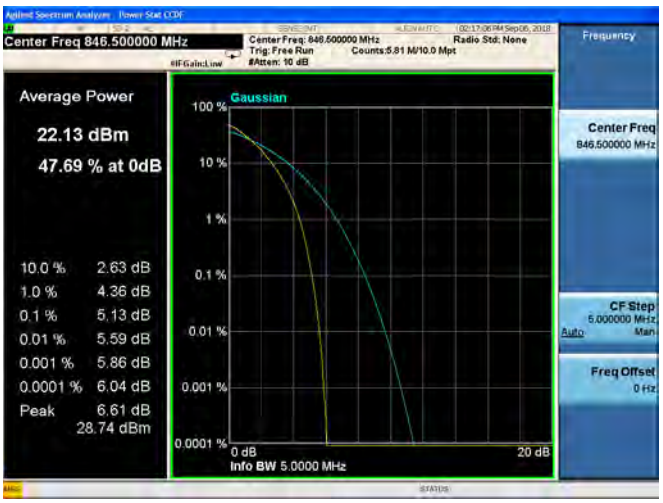
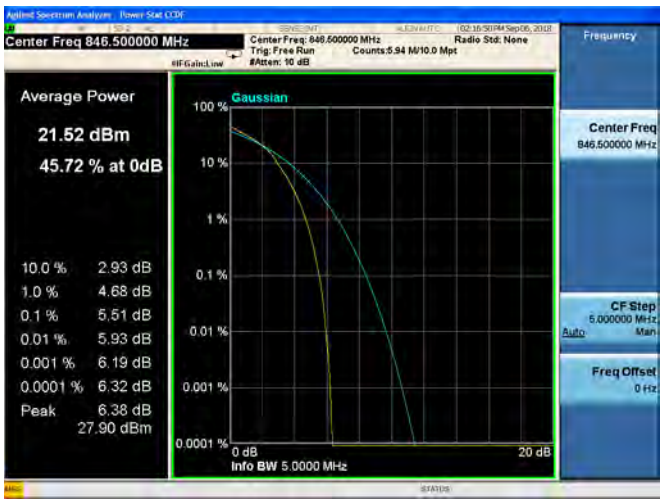
Record the maximum PAPR level associated with a probability of 0.1%.

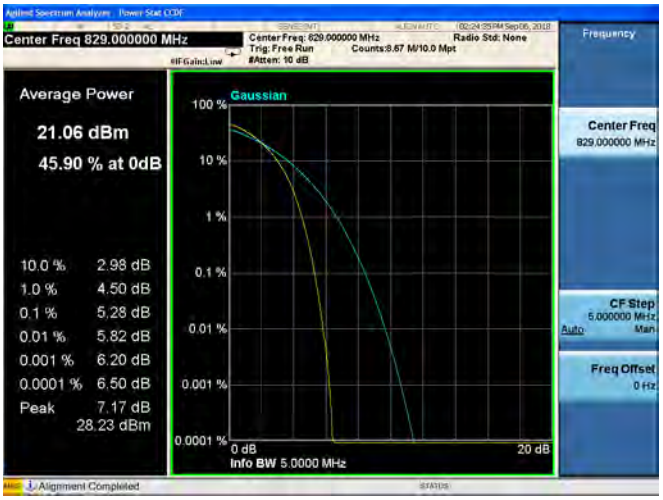
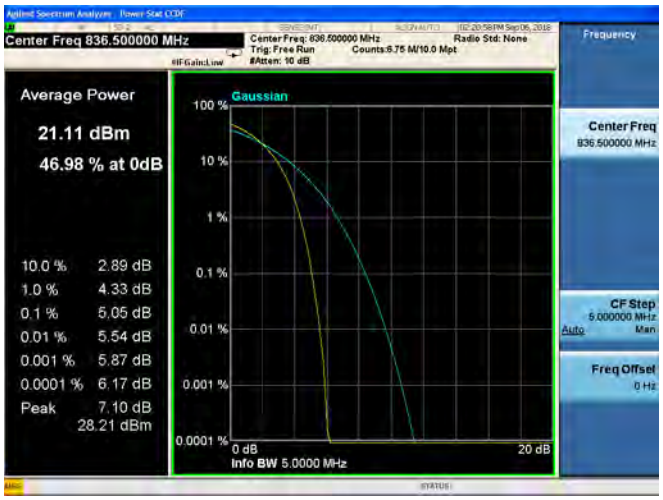
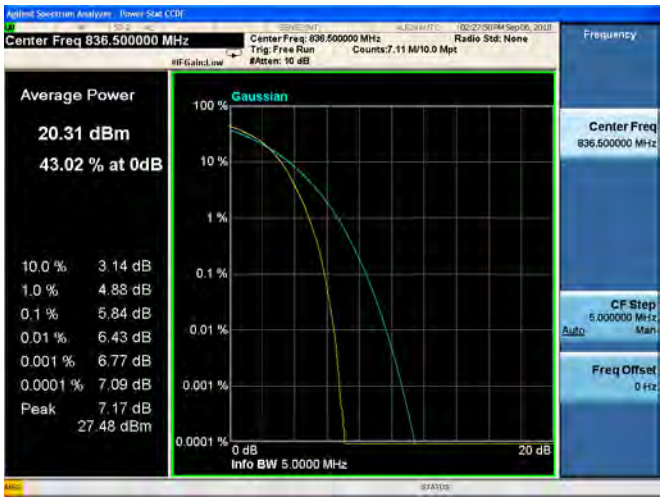
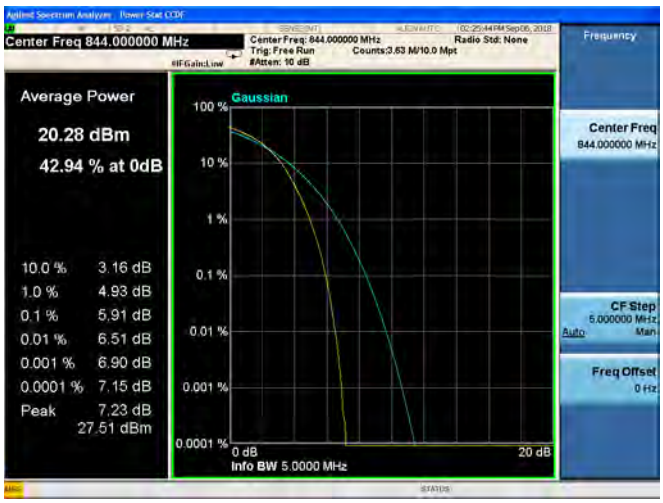
LTE Band 5, BW: 1.4MHz			
Channel	Frequency (MHz)	Peak to Average Radio(dB)	
		QPSK	16QAM
20407	824.7	3.94	4.85
20525	836.5	3.63	4.56
20643	848.3	4.11	5.02
LTE Band 5, BW: 3MHz			
Channel	Frequency (MHz)	Peak to Average Radio(dB)	
		QPSK	16QAM
20415	825.5	4.17	5.12
20525	836.5	4.12	5.04
20635	847.5	4.27	5.21
LTE Band 5, BW: 5MHz			
Channel	Frequency (MHz)	Peak to Average Radio(dB)	
		QPSK	16QAM
20425	826.5	4.72	5.48
20525	836.5	4.40	5.19
20625	846.5	5.13	5.51
LTE Band 5, BW: 10MHz			
Channel	Frequency (MHz)	Peak to Average Radio(dB)	
		QPSK	16QAM
20450	829.0	5.28	5.93
20525	836.5	5.05	5.84
20600	844.0	4.74	5.91

LTE Band 5 Peak to Average Radio	
1.4MHz/QPSK/Low CH	**1.4MHz/16QAM/Low CH**
	
1.4MHz/QPSK/Mid CH	**1.4MHz/16QAM/Mid CH**
	

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

3MHz/QPSK/Low CH	3MHz/16QAM/Low CH
	
3MHz/QPSK/Mid CH	**3MHz/16QAM/Mid CH**
	
3MHz/QPSK/High CH	**3MHz/16QAM/High CH**
	

5MHz/QPSK/Low CH	5MHz/16QAM/Low CH
	
5MHz/QPSK/Mid CH	**5MHz/16QAM/Mid CH**
	
5MHz/QPSK/High CH	**5MHz/16QAM/High CH**
	

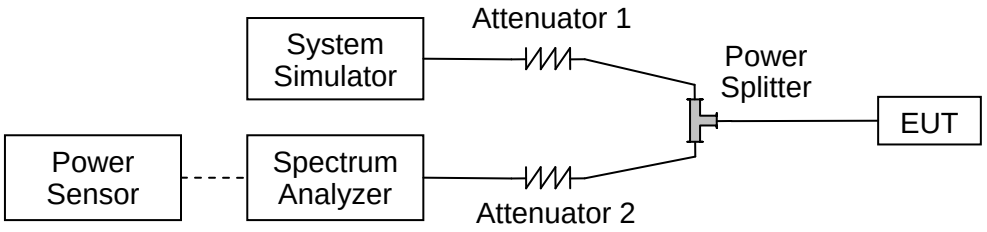
10MHz/QPSK/Low CH	10MHz/16QAM/Low CH
	
10MHz/QPSK/Mid CH	**10MHz/16QAM/Mid CH**
	
10MHz/QPSK/High CH	**10MHz/16QAM/High CH**
	

2.5. Conducted Spurious Emissions

2.5.1. Requirement

According to FCC section 2.1051, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10*log(P)dB. This calculated to be -13dBm.

2.5.2. Test Description

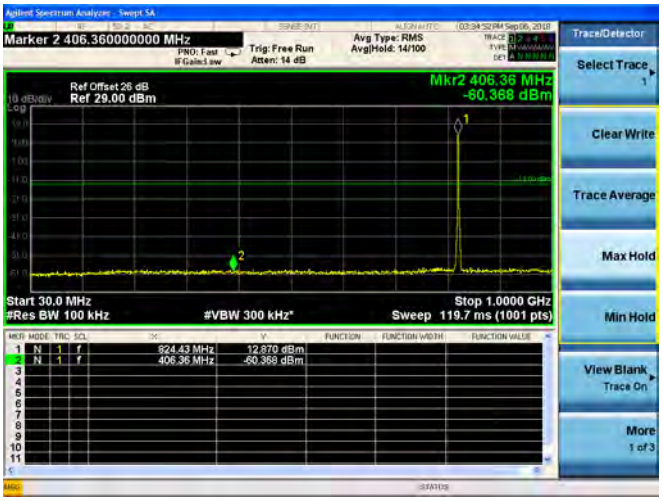
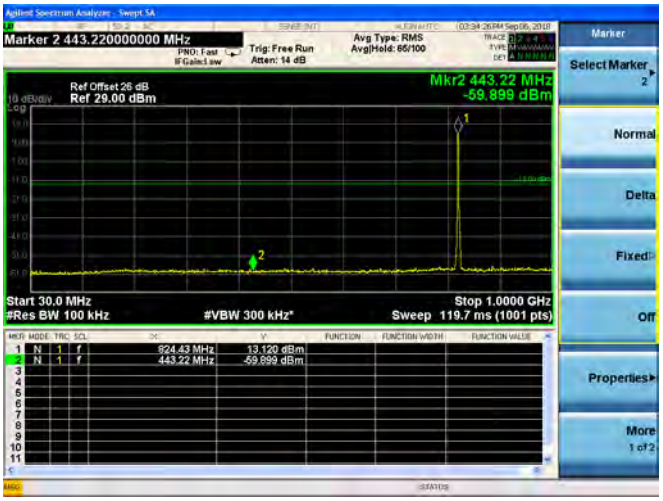


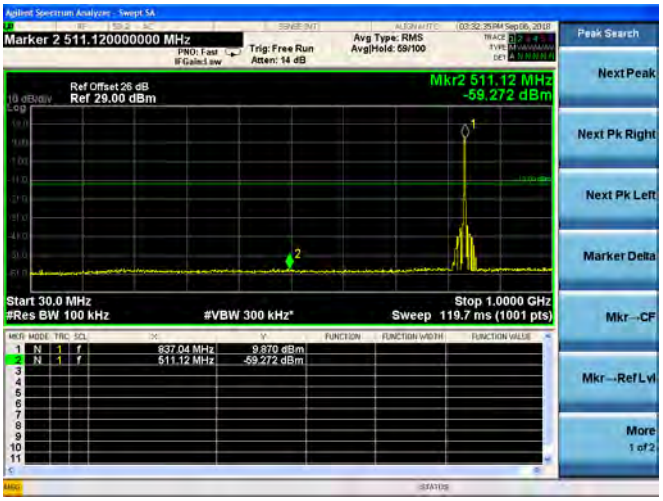
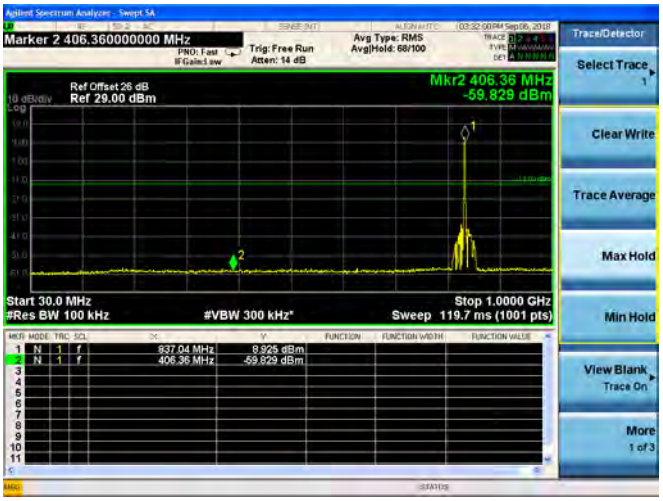
The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

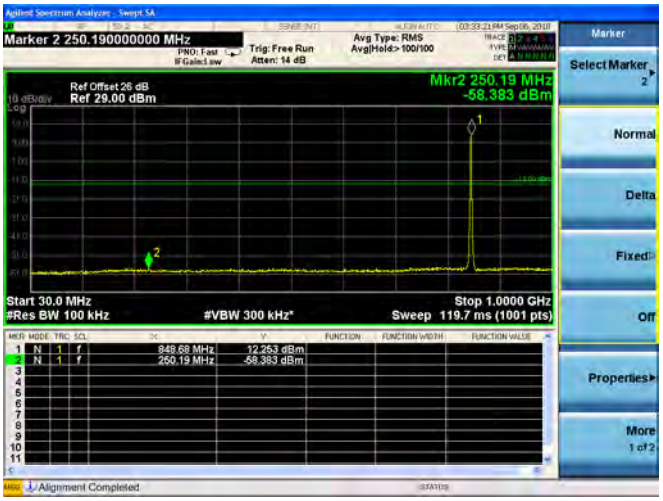
2.5.3. Test procedure

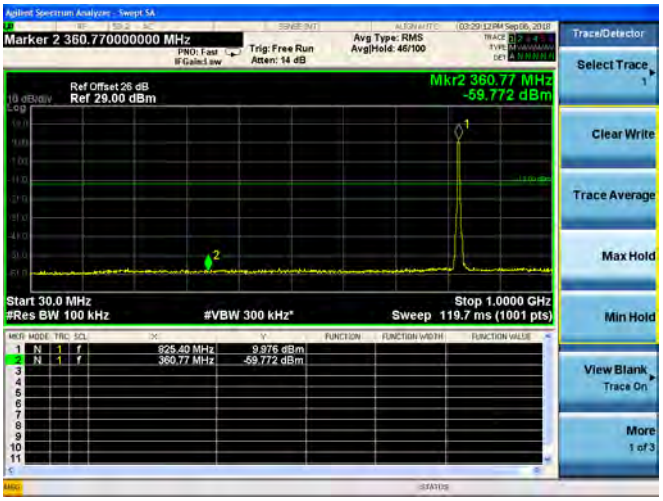
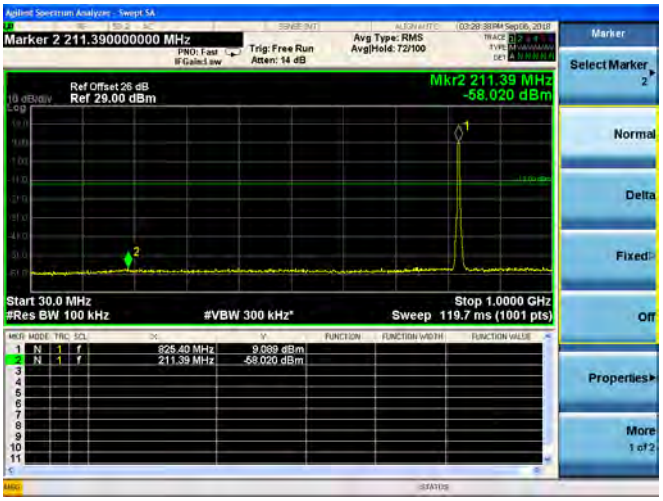
KDB 971168 D01v03 Section 6.0 and ANSI/TIA-603-E-2016.

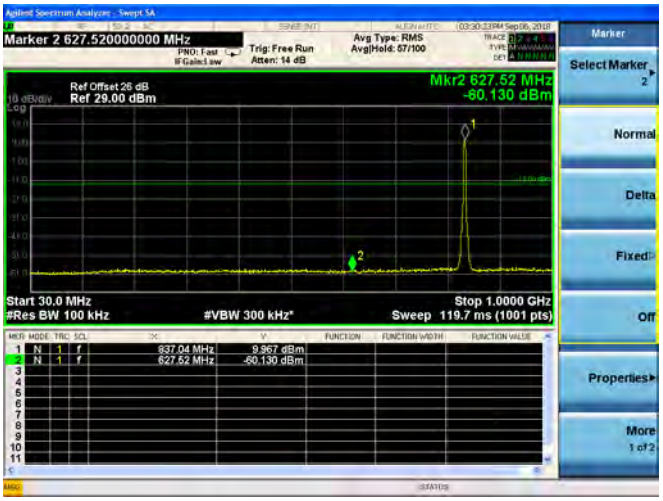
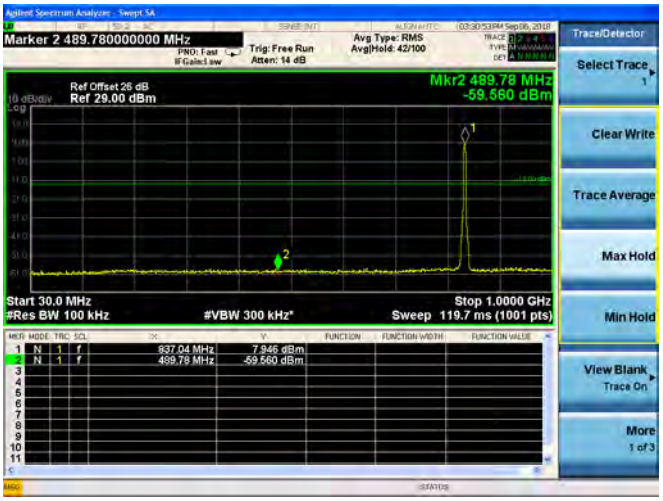
2.5.4. Test Result

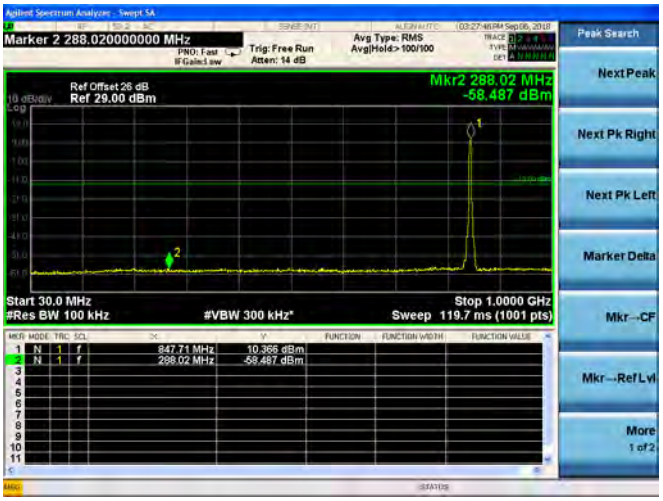
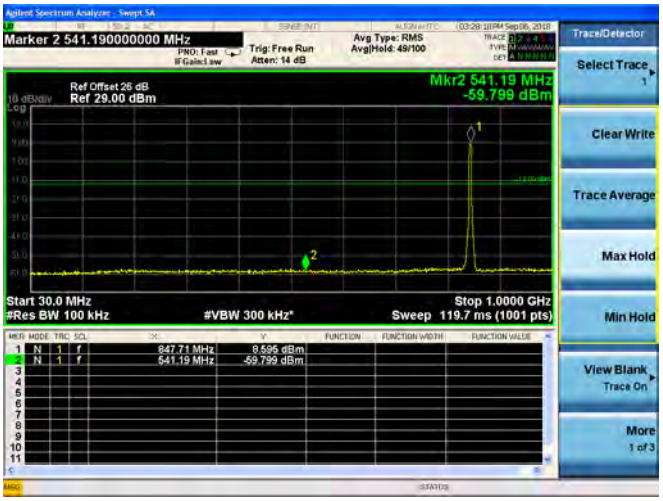
LTE Band 5 1.4MHz BW Low Channel	
QPSK	
	
16QAM	
	

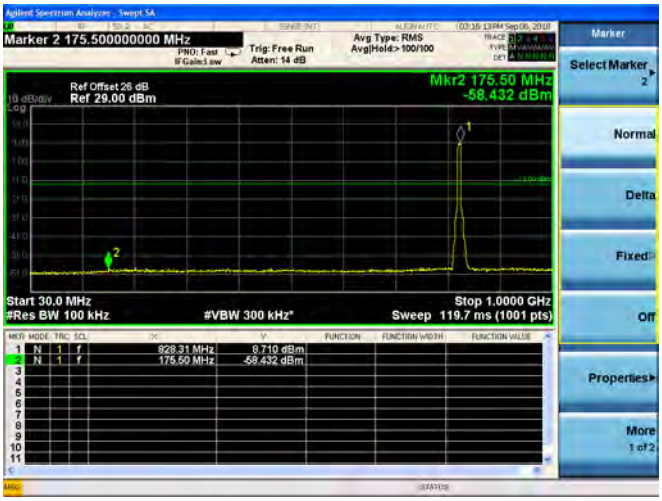
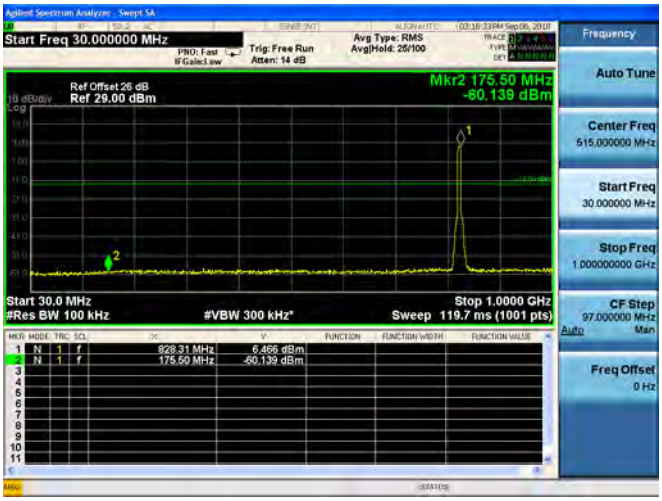
LTE Band 5 1.4MHz BW Mid Channel	
QPSK	
	
16QAM	
	

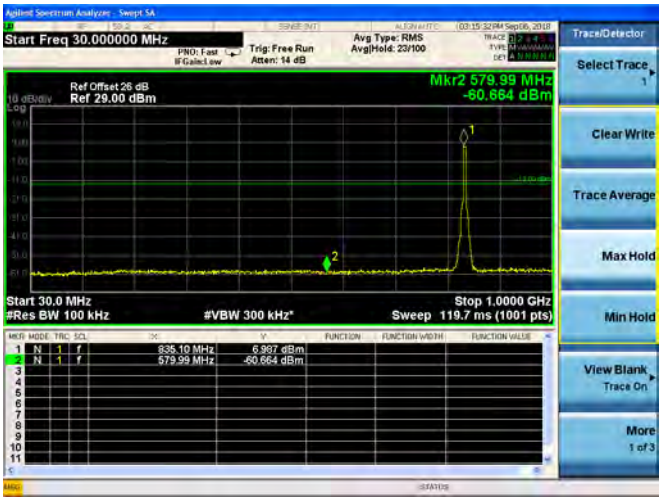
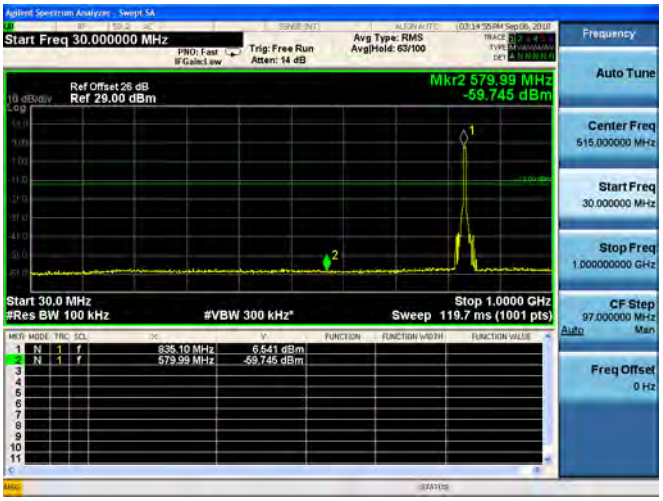
LTE Band 12 1.4MHz BW High Channel	
QPSK	
	
16QAM	
	

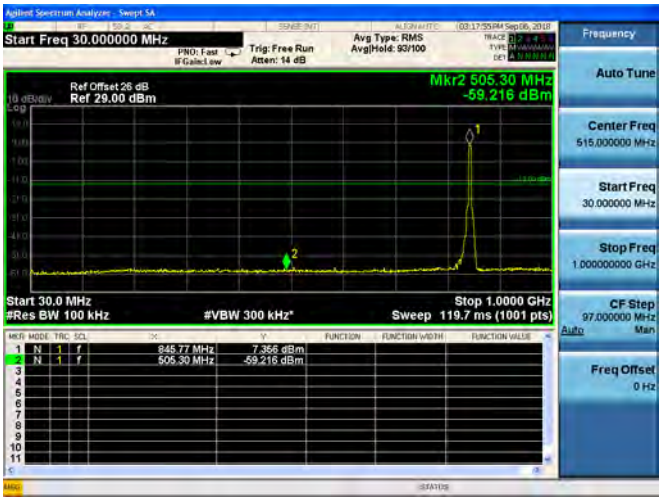
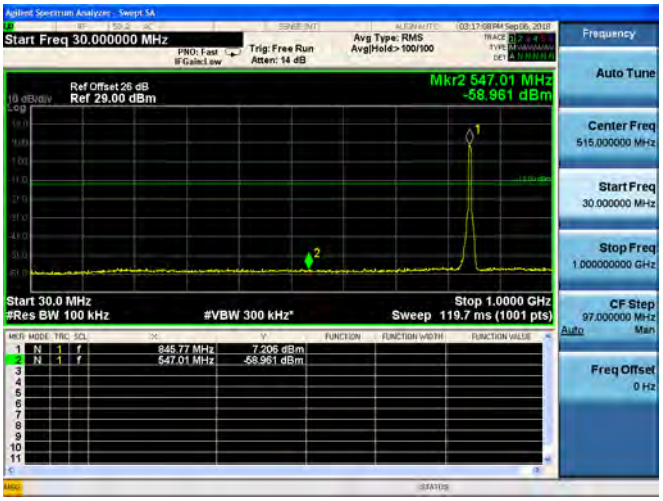
LTE Band 5 3MHz BW Low Channel	
QPSK	
	
16QAM	
	

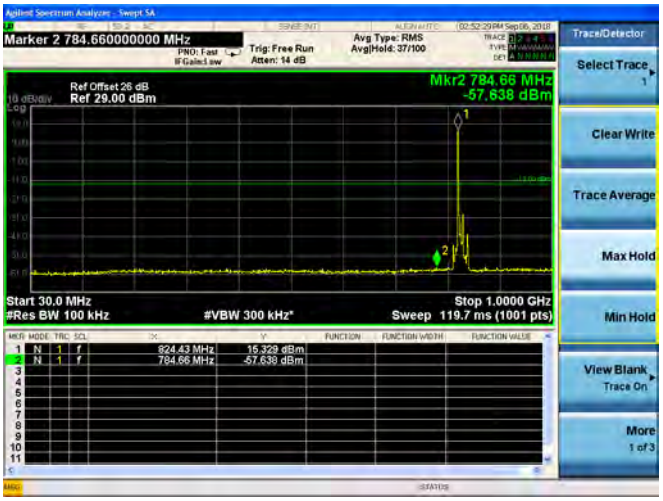
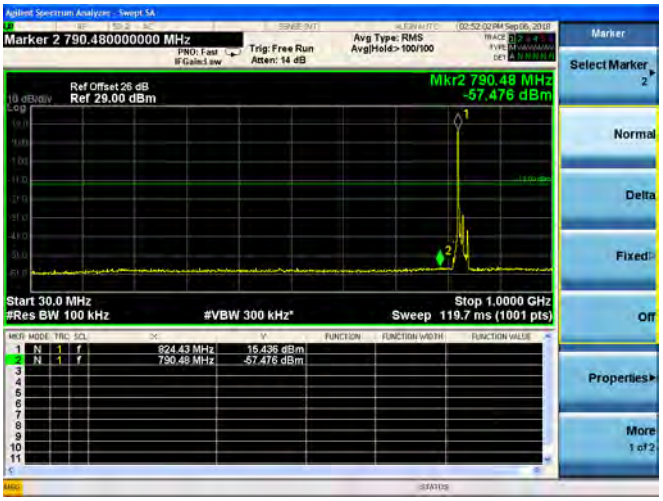
LTE Band 5 3MHz BW Mid Channel	
QPSK	
	
16QAM	
	

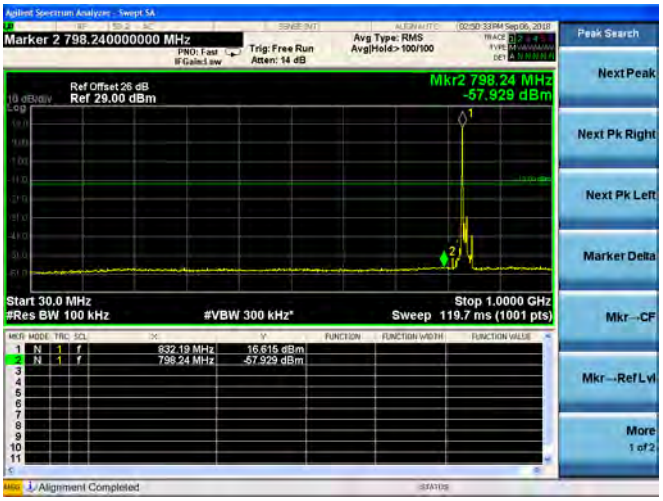
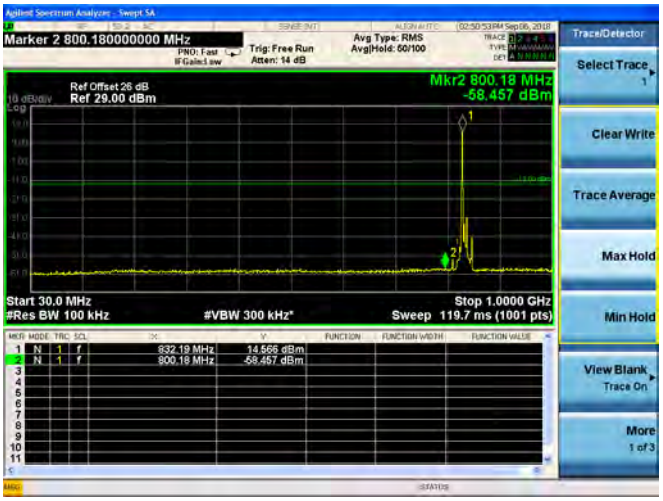
LTE Band 5 3MHz BW High Channel	
QPSK	
	
16QAM	
	

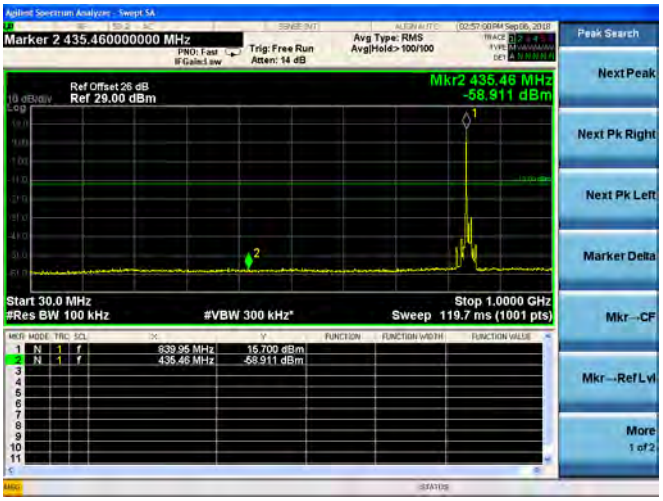
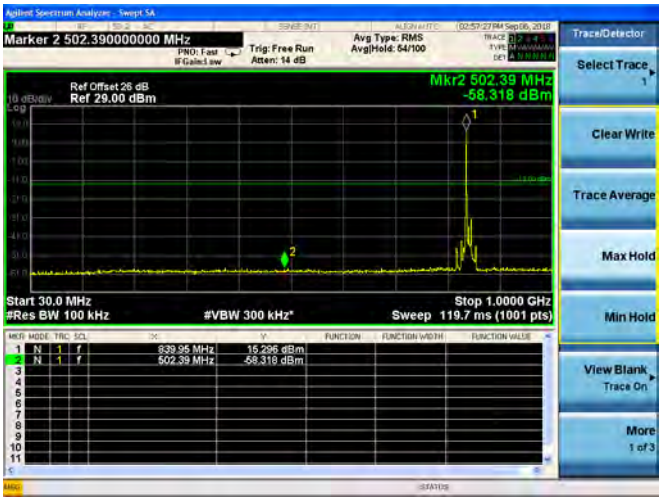
LTE Band 5 5MHz BW Low Channel	
QPSK	
	
16QAM	
	

LTE Band 5 5MHz BW Mid Channel	
QPSK	
	
16QAM	
	

LTE Band 5 5MHz BW High Channel	
QPSK	
	
16QAM	
	

LTE Band 5 10MHz BW Low Channel	
QPSK	
	
16QAM	
	

LTE Band 5 10MHz BW Mid Channel	
QPSK	
	
16QAM	
	

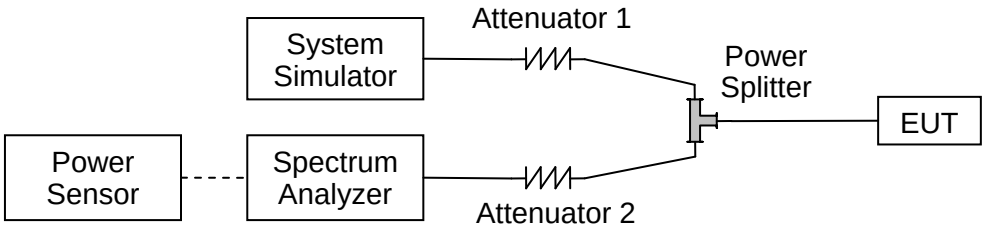
LTE Band 5 10MHz BW High Channel	
QPSK	
	
16QAM	
	

2.6. Band Edge

2.6.1. Requirement

According to FCC section 22.917(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

2.6.2. Test Description



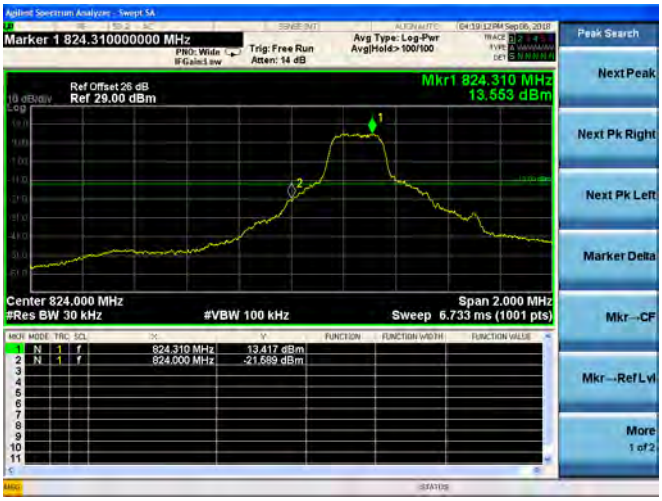
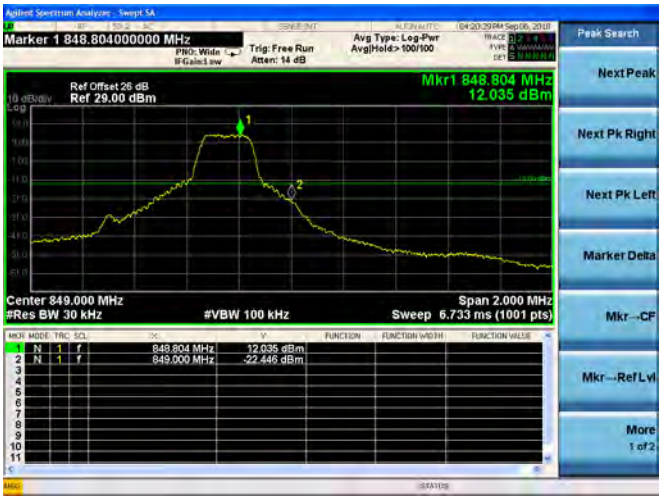
The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

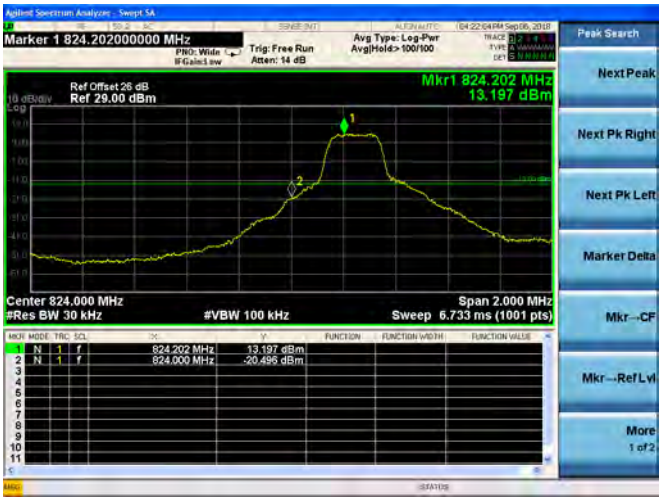
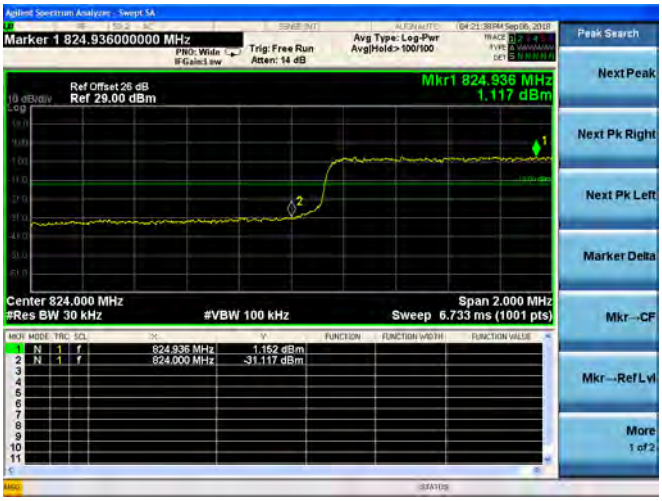
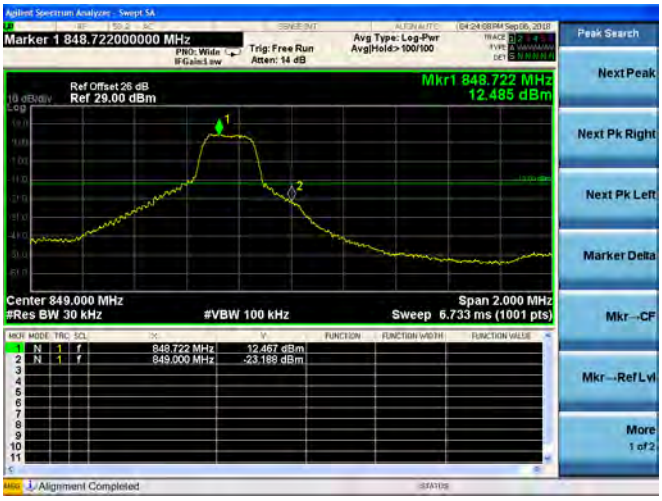
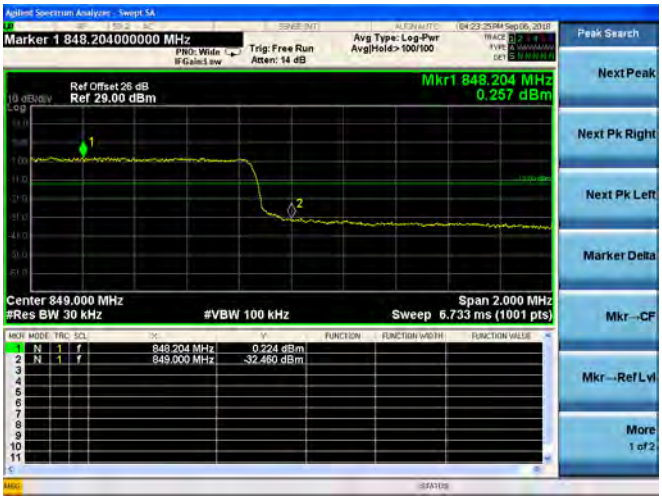
2.6.3. Test procedure

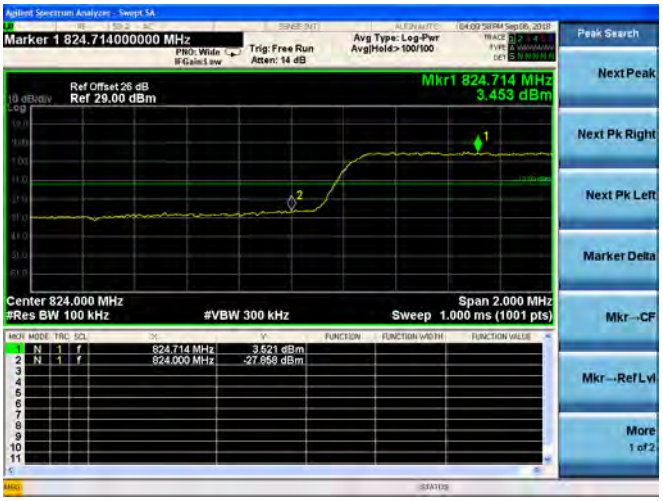
KDB 971168 D01v03 Section 6.0 and ANSI/TIA-603-E-2016.

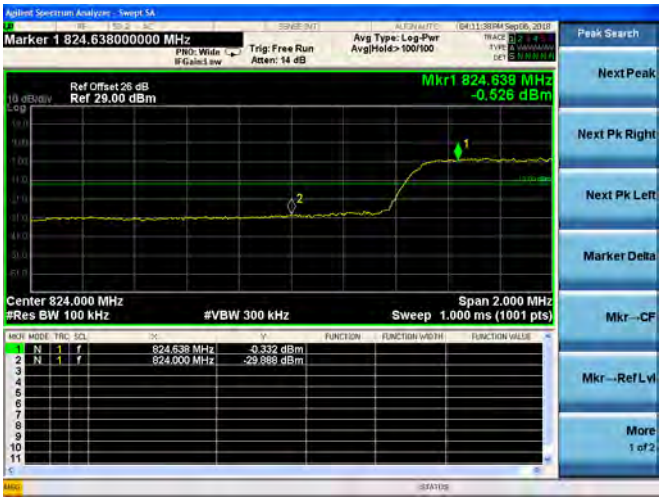
2.6.4. Test Result

The center frequency of spectrum is the band edge frequency and span is 2MHz, Record the max trace into the test report.

LTE Band 5							
Channel Bandwidth: 1.4MHz							
Channel	20407	RB Size 1	RB Offset 0	Channel	20407	RB Size 6	RB Offset 0
							
Channel Bandwidth: 1.4MHz							
Channel	20643	RB Size 1	RB Offset 5	Channel	20643	RB Size 6	RB Offset 0
							

LTE Band 5							
Channel Bandwidth: 3MHz							
Channel	20415	RB Size 1	RB Offset 0	Channel	20415	RB Size 15	RB Offset 0
							
Channel Bandwidth: 3MHz							
Channel	20635	RB Size 1	RB Offset 14	Channel	20635	RB Size 15	RB Offset 0
							

LTE Band 5							
Channel Bandwidth: 5MHz							
Channel	20425	RB Size 1	RB Offset 0	Channel	20425	RB Size 25	RB Offset 0
								
Channel Bandwidth: 5MHz							
Channel	20625	RB Size 1	RB Offset 24	Channel	20625	RB Size 25	RB Offset 0
								

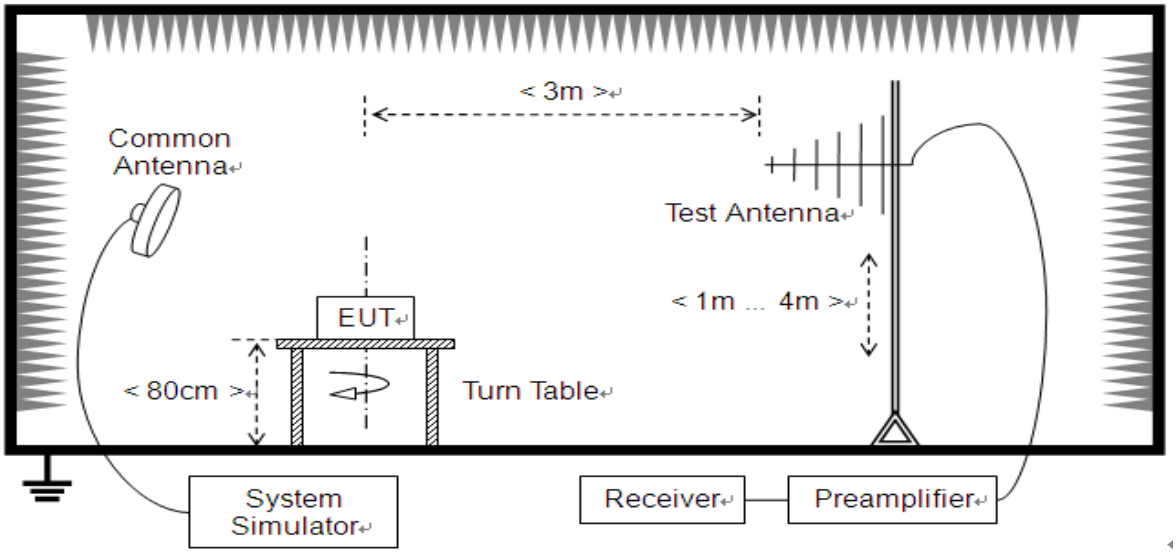
LTE Band 5							
Channel Bandwidth: 10MHz							
Channel	20450	RB Size 1	RB Offset 0	Channel	20600	RB Size 50	RB Offset 0
								
Channel Bandwidth: 10MHz							
Channel	23130	RB Size 1	RB Offset 49	Channel	23130	RB Size 50	RB Offset 0
								

2.7. Transmitter Radiated Power (EIRP/ERP)

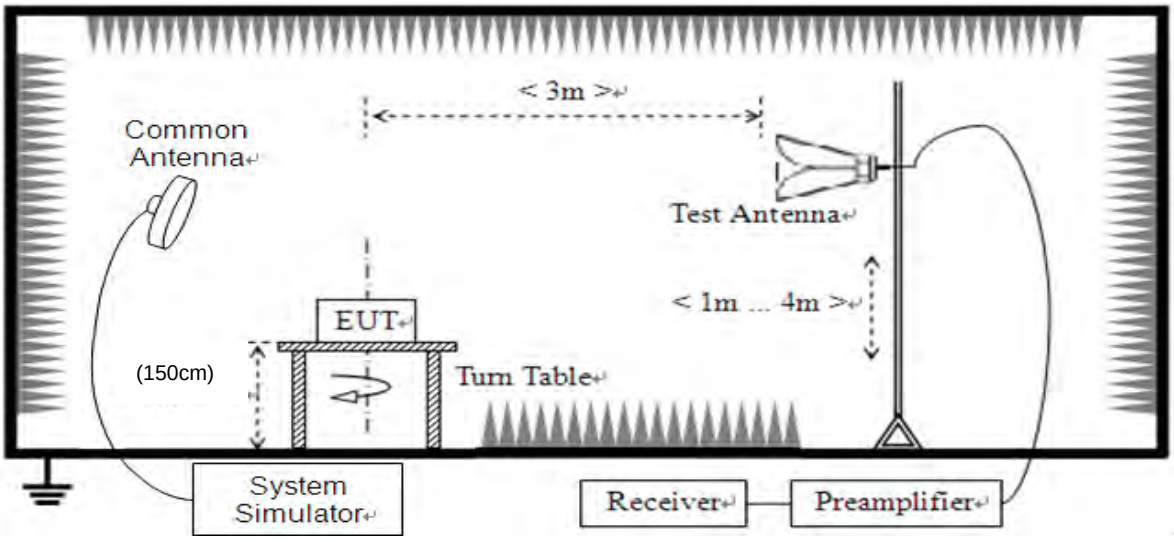
2.7.1. Requirement

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

2.7.2. Test Description



(For the test frequency from 30MHz to1GHz)



(For the test frequency above 1GHz)

The EUT is located in a 3m Full-Anechoic Chamber, the cable loss, air loss and so on of the site as factors are pre-calibrated using the "Substitution" method, and calculated to correct the reading.
A call is established between the EUT and the SS via a Common Antenna. The EUT is commanded by the SS to operate at the maximum and minimum output power, and only the test result of the maximum output power was recorded.
In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground and the Turn Table is actuated to turn from 0° to 360°to determine the maximum value of the radiated power. The emission levels at both horizontal and vertical polarizations should be tested. The Filters consists of Notch Filters and High Pass Filter.

2.7.3. Test procedure

KDB 971168 D01v03 Section 51&5.2 and ANSI/TIA-603-E-2016.

2.7.4. Test Result

The EUT was verified under all configurations (RB size and offset) and the worst case radiated power reported for each modulation/channel bandwidth.

The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. The lowest, middle and highest channels are tested.

The substitution corrections are obtained as described below:

$A_{SUBST} = P_{SUBST\_TX} - P_{SUBST\_RX} - L_{SUBST\_CABLES} + G_{SUBST\_TX\_ANT}$

$A_{TOT} = L_{CABLES} + A_{SUBST}$

Where A_{SUBST} is the final substitution correction including receive antenna gain.

P_{SUBST_TX} is signal generator level,

P_{SUBST_RX} is receiver level,

L_{SUBST_CABLES} is cable losses including TX cable,

$G_{SUBST\_TX\_ANT}$ is substitution antenna gain.

A_{TOT} is total correction factor including cable loss and substitution correction

During the test, the data of A_{TOT} was added in the Test Spectrum Analyze, so Spectrum Analyze reading is the final values which contain the data of A_{TOT}.

Note: Both horizontal and vertical polarizations of the test antenna are evaluated respectively, only the worst data (horizontal) were recorded in this report.

Band	Band Width	Channel	Freq.(MHz)	Modulation	RB Configuration		EIRP (dBm)
					RB Size	RB Offset	
LTE Band 5	10MHz	20450	829	QPSK	1	0	23.56
					50	0	23.14
				16-QAM	1	0	22.59
					50	0	22.21
		20525	836.5	QPSK	1	0	23.67
					50	0	22.74
				16-QAM	1	0	23.12
					50	0	21.64
		20600	844	QPSK	1	0	23.51
					50	0	22.70
				16-QAM	1	0	22.57
					50	0	21.54
Band	Band Width	Channel	Freq.(MHz)	Modulation	RB Configuration		EIRP (dBm)
					RB Size	RB Offset	
LTE Band 5	5MHz	20425	826.5	QPSK	1	0	23.69
					25	0	23.27
				16-QAM	1	0	22.97
					25	0	22.80
		20525	836.5	QPSK	1	0	23.53
					25	0	23.22
				16-QAM	1	0	22.71
					25	0	22.26
		20625	846.5	QPSK	1	0	23.50
					25	0	23.14
				16-QAM	1	0	22.59
					25	0	22.24

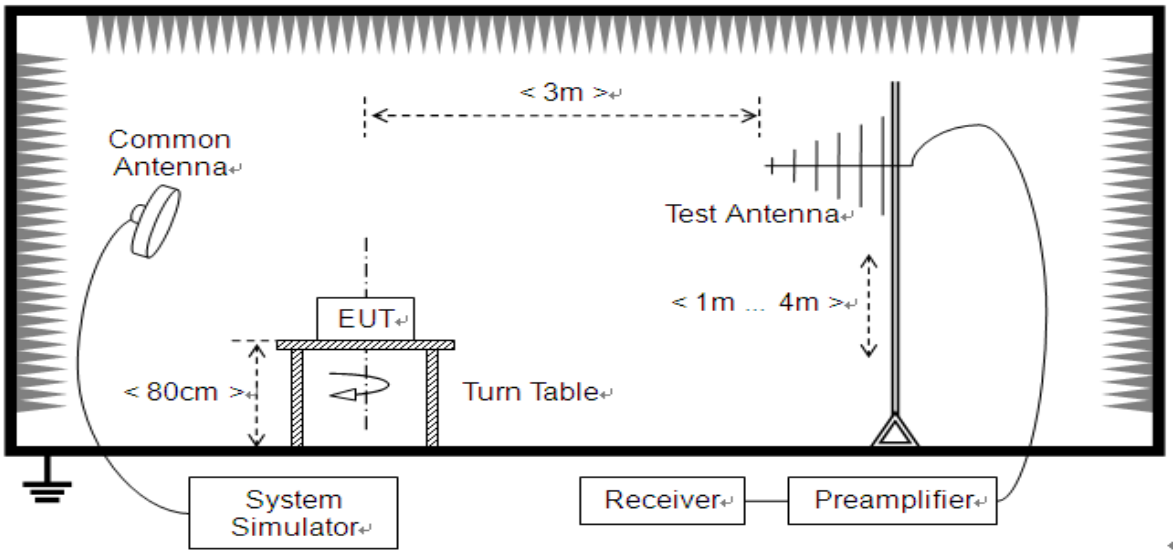
Band	Band Width	Channel	Freq.(MHz)	Modulation	RB Configuration		EIRP
					RB Size	RB Offset	(dBm)
LTE Band 5	3MHz	20415	825.5	QPSK	1	0	23.47
					15	0	23.08
				16-QAM	1	0	23.11
					15	0	22.51
		20525	836.5	QPSK	1	0	23.43
					15	0	23.23
				16-QAM	1	0	23.04
					15	0	22.28
		20635	847.5	QPSK	1	0	23.16
					15	0	22.57
				16-QAM	1	0	22.40
					15	0	21.23
Band	Band Width	Channel	Freq.(MHz)	Modulation	RB Configuration		EIRP
					RB Size	RB Offset	(dBm)
LTE Band 5	1.4MHz	20407	824.7	QPSK	1	0	23.59
					6	0	22.66
				16-QAM	1	0	22.90
					6	0	22.02
		20525	836.5	QPSK	1	0	22.88
					6	0	22.81
				16-QAM	1	0	22.73
					6	0	22.29
		20643	848.3	QPSK	1	0	23.48
					6	0	23.71
				16-QAM	1	0	22.26
					6	0	21.40

2.8. Radiated Spurious Emissions

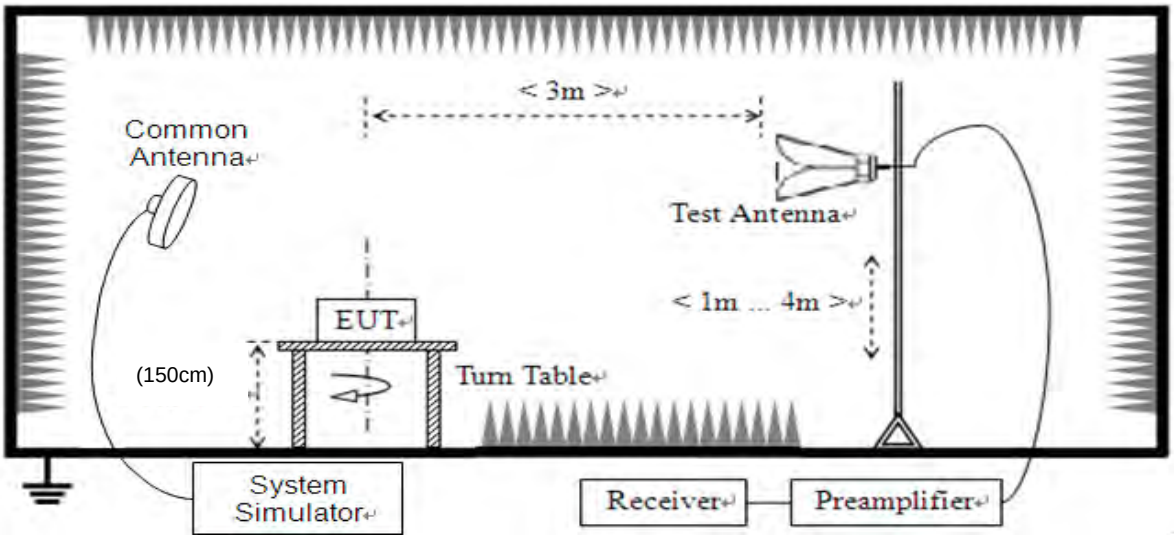
2.8.1. Requirement

According to FCC section 2.1051, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10*log(P)dB. This calculated to be -13dBm.

2.8.2. Test Description



(For the test frequency from 30MHz to1GHz)



(For the test frequency above 1GHz)

The EUT is located in a 3m Full-Anechoic Chamber, the cable loss, air loss and so on of the site as factors are pre-calibrated using the "Substitution" method, and calculated to correct the reading.
A call is established between the EUT and the SS via a Common Antenna. The EUT is commanded by the SS to operate at the maximum and minimum output power, and only the test result of the maximum output power was recorded.
In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground and the Turn Table is actuated to turn from 0° to 360°to determine the maximum value of the radiated power. The emission levels at both horizontal and vertical polarizations should be tested. The Filters consists of Notch Filters and High Pass Filter.

Note: when doing measurements above 1GHz, the EUT has been within the 3dB cone width of the horn antenna during horizontal antenna.

2.8.3. Test procedure

KDB 971168 D01v03 Section 5.8 and ANSI/TIA-603-E-2016.

2.8.4. Test Result

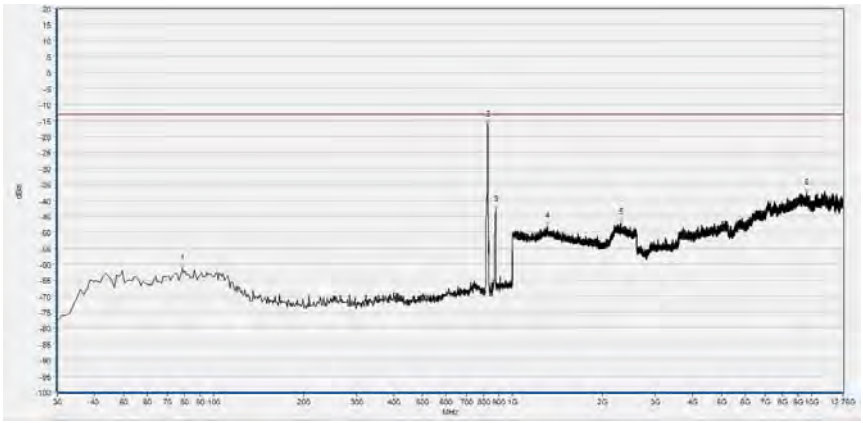
The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. Test Antenna height is varied from 1m to 4m above the ground, and the Turn Table is actuated to turn from 0° to 360°, both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

Note1: The power of the EUT transmitting frequency should be ignored.

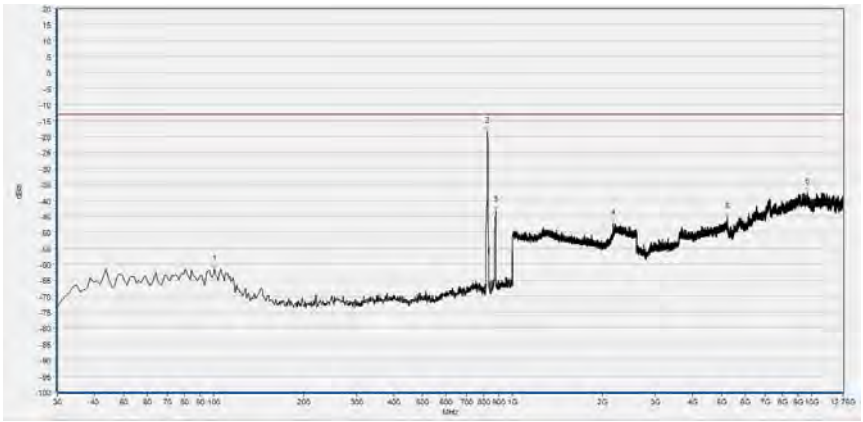
Note2: All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Note3: All bandwidth and test channel were considered and evaluated respectively by performing full test for each band, only the worst cases were recorded in this test report.

LTE Band 5 10MHz BW, Low Channel, QPSK

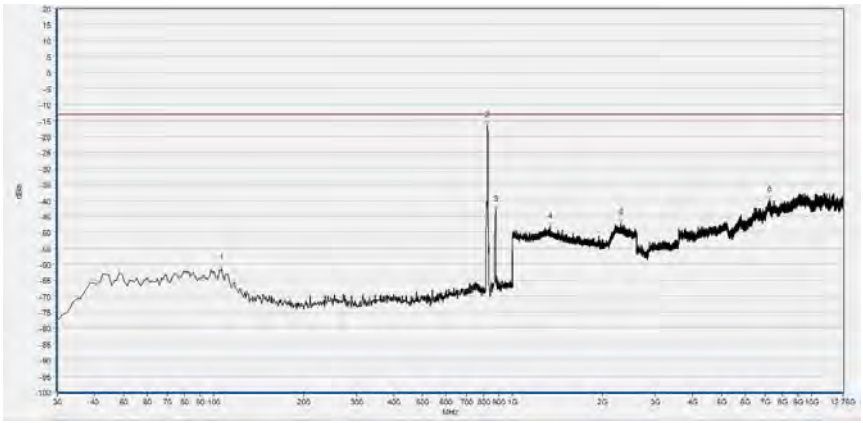


No.	Fre. (MHz)	Peak	Limit(PK)	Antenna	Verdict
1	78.500	-61.43	-13.00	Horizontal	PASS
2	826.370	-16.37	-13.00	Horizontal	N/A
3	877.780	-43.09	-13.00	Horizontal	N/A
4	1304.762	-48.13	-13.00	Horizontal	PASS
5	2304.842	-47.08	-13.00	Horizontal	PASS
6	9610.311	-37.71	-13.00	Horizontal	PASS

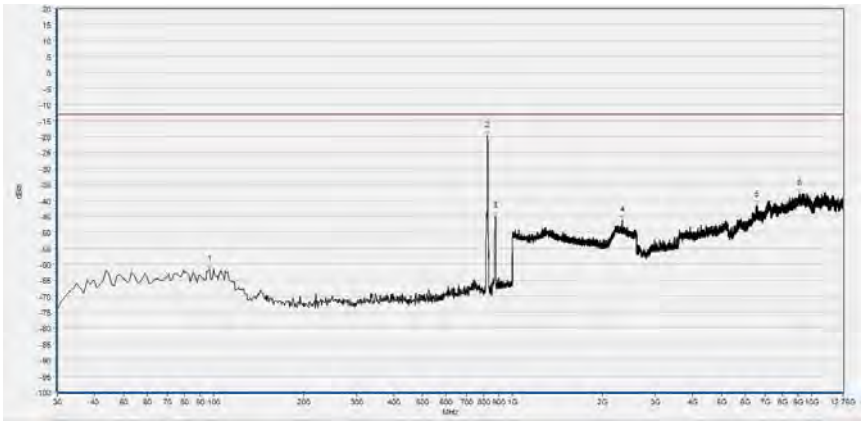


No.	Fre. (MHz)	Peak	Limit(PK)	Antenna	Verdict
1	100.810	-61.67	-13.00	Vertical	PASS
2	824.430	-18.51	-13.00	Vertical	N/A
3	878.750	-43.16	-13.00	Vertical	N/A
4	2164.626	-47.18	-13.00	Vertical	PASS
5	5222.868	-45.20	-13.00	Vertical	PASS
6	9702.600	-37.53	-13.00	Vertical	PASS

LTE Band 5 10MHz BW, Low Channel, 16QAM

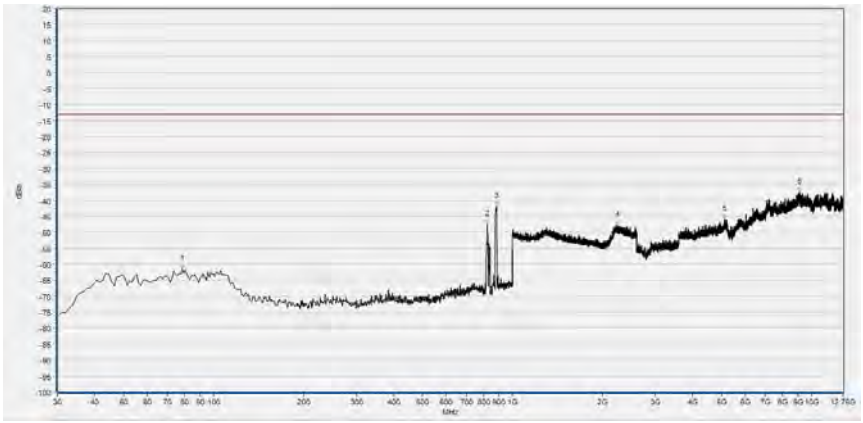


No.	Fre. (MHz)	Peak	Limit(PK)	Antenna	Verdict
1	106.630	-61.28	-13.00	Horizontal	PASS
2	824.430	-16.64	-13.00	Horizontal	N/A
3	877.780	-43.12	-13.00	Horizontal	N/A
4	1336.134	-48.41	-13.00	Horizontal	PASS
5	2301.641	-47.28	-13.00	Horizontal	PASS
6	7245.854	-39.81	-13.00	Horizontal	PASS

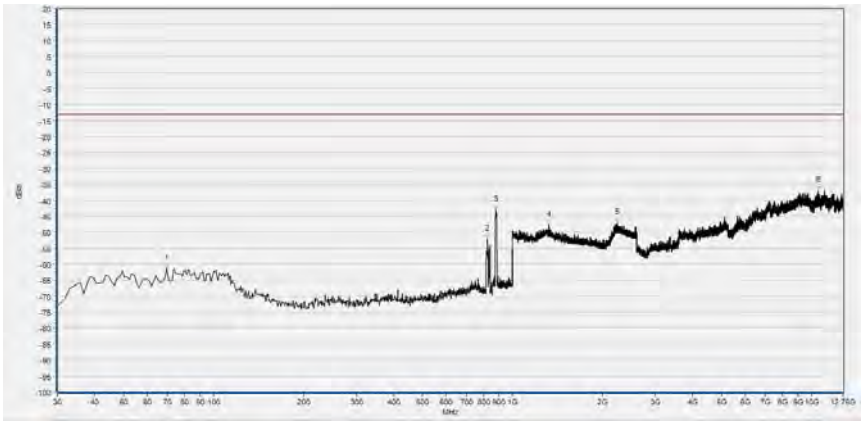


No.	Fre. (MHz)	Peak	Limit(PK)	Antenna	Verdict
1	96.930	-61.57	-13.00	Vertical	PASS
2	825.400	-19.88	-13.00	Vertical	N/A
3	876.810	-45.09	-13.00	Vertical	N/A
4	2329.172	-46.10	-13.00	Vertical	PASS
5	6551.837	-41.40	-13.00	Vertical	PASS
6	9126.714	-37.96	-13.00	Vertical	PASS

LTE Band 5 10MHz BW, Mid Channel, QPSK

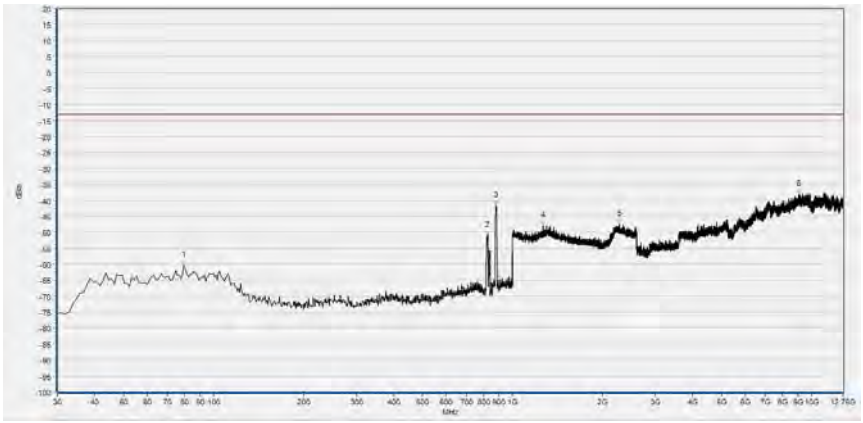


No.	Fre. (MHz)	Peak	Limit(PK)	Antenna	Verdict
1	78.500	-61.61	-13.00	Horizontal	PASS
2	823.460	-47.47	-13.00	Horizontal	N/A
3	883.600	-41.86	-13.00	Horizontal	N/A
4	2238.896	-47.69	-13.00	Horizontal	PASS
5	5119.504	-45.91	-13.00	Horizontal	PASS
6	9113.793	-37.32	-13.00	Horizontal	PASS

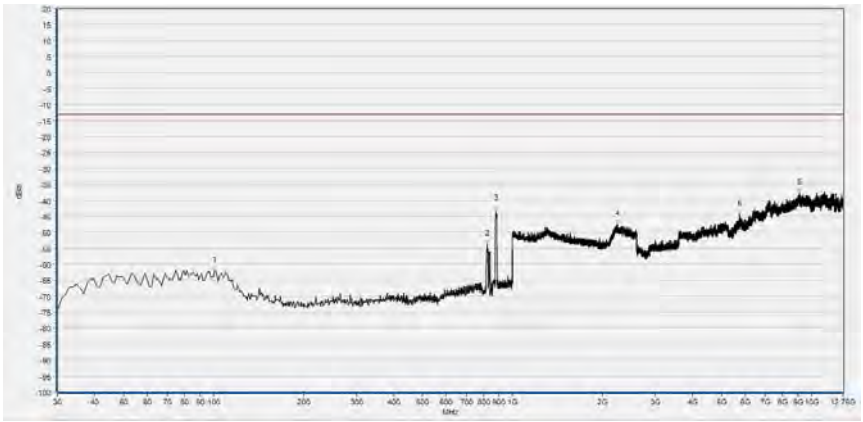


No.	Fre. (MHz)	Peak	Limit(PK)	Antenna	Verdict
1	69.770	-61.43	-13.00	Vertical	PASS
2	824.430	-52.22	-13.00	Vertical	N/A
3	879.720	-43.04	-13.00	Vertical	N/A
4	1320.768	-47.77	-13.00	Vertical	PASS
5	2240.816	-47.06	-13.00	Vertical	PASS
6	10518.440	-36.98	-13.00	Vertical	PASS

LTE Band 5 10MHz BW, Mid Channel, 16QAM

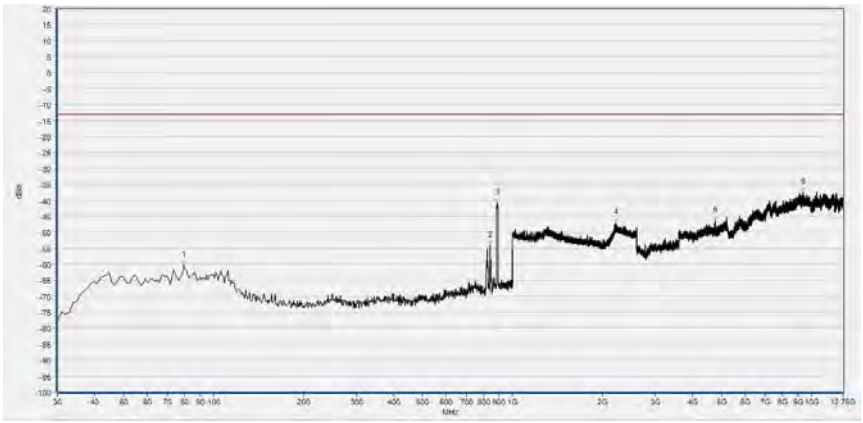


No.	Fre. (MHz)	Peak	Limit(PK)	Antenna	Verdict
1	79.470	-60.45	-13.00	Horizontal	PASS
2	824.430	-51.00	-13.00	Horizontal	N/A
3	879.720	-41.70	-13.00	Horizontal	N/A
4	1266.987	-47.90	-13.00	Horizontal	PASS
5	2283.073	-47.47	-13.00	Horizontal	PASS
6	9063.957	-38.08	-13.00	Horizontal	PASS

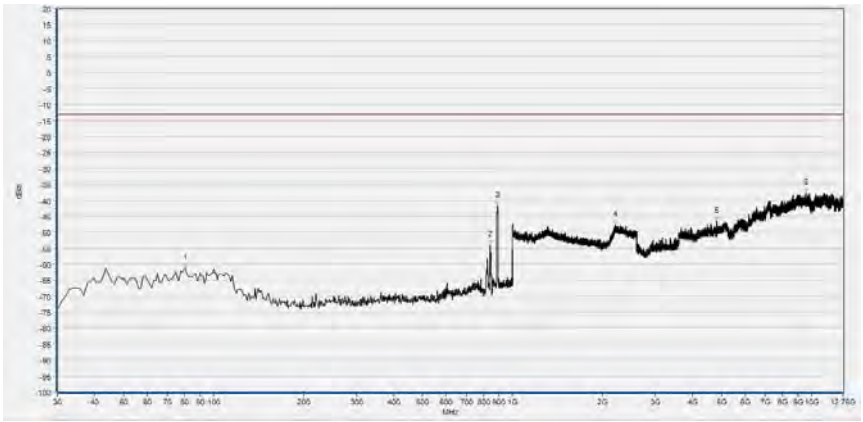


No.	Fre. (MHz)	Peak	Limit(PK)	Antenna	Verdict
1	100.810	-62.05	-13.00	Vertical	PASS
2	821.520	-53.84	-13.00	Vertical	N/A
3	878.750	-43.79	-13.00	Vertical	N/A
4	2236.975	-47.53	-13.00	Vertical	PASS
5	5748.918	-44.30	-13.00	Vertical	PASS
6	9113.793	-37.72	-13.00	Vertical	PASS

LTE Band 5 10MHz BW, High Channel, QPSK

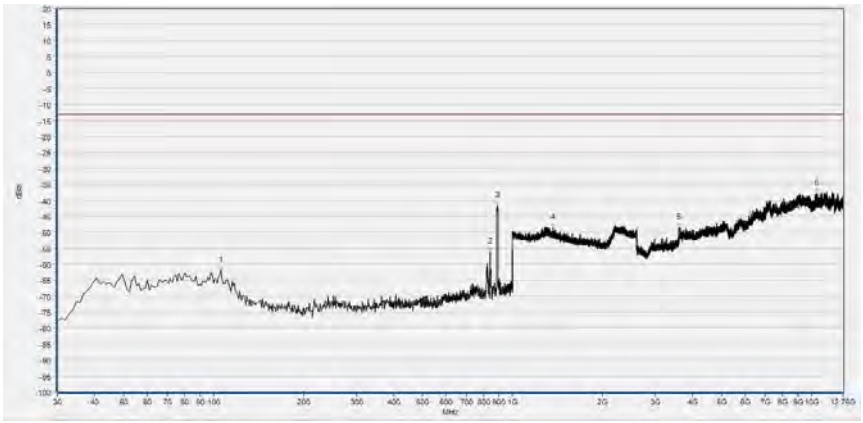


No.	Fre. (MHz)	Peak	Limit(PK)	Antenna	Verdict
1	79.470	-60.37	-13.00	Horizontal	PASS
2	839.950	-54.17	-13.00	Horizontal	N/A
3	890.390	-40.87	-13.00	Horizontal	N/A
4	2221.609	-47.09	-13.00	Horizontal	PASS
5	4752.191	-46.26	-13.00	Horizontal	PASS
6	9394.354	-37.45	-13.00	Horizontal	PASS

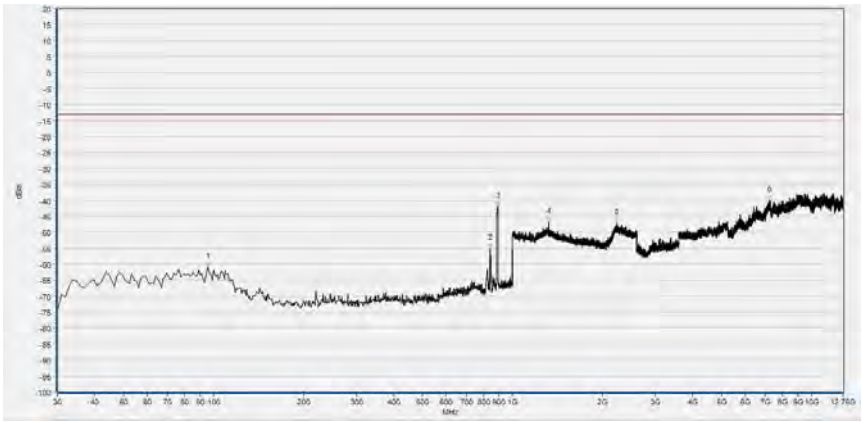


No.	Fre. (MHz)	Peak	Limit(PK)	Antenna	Verdict
1	80.440	-61.23	-13.00	Vertical	PASS
2	839.950	-54.02	-13.00	Vertical	N/A
3	891.360	-41.78	-13.00	Vertical	N/A
4	2201.120	-47.71	-13.00	Vertical	PASS
5	4802.028	-46.66	-13.00	Vertical	PASS
6	9554.937	-37.73	-13.00	Vertical	PASS

LTE Band 5 10MHz BW, High Channel, 16QAM



No.	Fre. (MHz)	Peak	Limit(PK)	Antenna	Verdict
1	105.660	-62.12	-13.00	Horizontal	PASS
2	839.950	-56.24	-13.00	Horizontal	N/A
3	889.420	-41.60	-13.00	Horizontal	N/A
4	1366.867	-48.65	-13.00	Horizontal	PASS
5	3604.110	-48.49	-13.00	Horizontal	PASS
6	10380.005	-37.80	-13.00	Horizontal	PASS



No.	Fre. (MHz)	Peak	Limit(PK)	Antenna	Verdict
1	95.960	-60.95	-13.00	Vertical	PASS
2	839.950	-55.00	-13.00	Vertical	N/A
3	892.330	-41.98	-13.00	Vertical	N/A
4	1323.970	-46.88	-13.00	Vertical	PASS
5	2226.090	-47.31	-13.00	Vertical	PASS
6	7251.391	-39.85	-13.00	Vertical	PASS

Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test items	Uncertainty
Output Power	±2.22 dB
Bandwidth	±5%
Conducted Spurious Emission	±2.77 dB
Band Edge	±2.77 dB
Equivalent Isotropic Radiated Power	±2.22 dB
Radiated Spurious Emissions	±6 dB

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

Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Department:	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Responsible Test Lab Manager:	Mr. Su Feng
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.

4. Test Equipments Utilized

4.1 Conducted Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Power Splitter	NW521	1506A	Weinschel	2018.04.17	2019.04.16
Attenuator 1	(N/A.)	10dB	Resnet	2018.04.17	2019.04.16
Attenuator 2	(N/A.)	3dB	Resnet	2018.04.17	2019.04.16
EXA Signal Analzyer	MY53470836	N9010A	Agilent	2017.12.03	2018.12.02
USB Power Sensor	MY54210011	U2021XA	Agilent	2018.04.17	2019.04.16
System Simulator	152038	CMW500	R&S	2018.05.08	2019.05.07
RF cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
Coaxial cable	CB02	RF02	Morlab	N/A	N/A
SMA connector	CN01	RF03	HUBER-SUHNER	N/A	N/A
Temperature Chamber	(N/A)	HUT705P	CHONGQING HANBA EXPERIMENTAL EQUIPMENT CO.,LTD	2018.04.17	2019.04.16

4.2Auxiliary Test Equipment

Equipment Name	Model No.	Brand Name	Manufacturer	Cal.Date	Cal. Due
Computer	T430i	Think Pad	Lenovo	N/A	N/A

4.3 Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
System Simulator	152038	CMW500	R&S	2018.08.04	2019.08.03
Receiver	MY54130016	N9038A	Agilent	2018.05.18	2019.05.17
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2018.03.03	2019.03.02
Test Antenna - Horn	9170C-531	BBHA9170	Schwarzbeck	2018.08.06	2019.08.05
Test Antenna - Horn	01774	BBHA 9120D	Schwarzbeck	2018.08.02	2019.08.01
Coaxial cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial cable (N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
1-18GHz pre-Amplifier	MA02	TS-PR18	Rohde& Schwarz	2018.05.08	2019.05.07
18-26.5GHz pre-Amplifier	MA03	TS-PR18	Rohde& Schwarz	2018.05.08	2019.05.07
Anechoic Chamber	N/A	9m*6m*6m	CRT	2017.11.19	2020.11.18

END OF REPORT