



# RF TEST REPORT

**Applicant** Huawei Technologies Co., Ltd.  
**FCC ID** QISLYO-L02  
**Product** Smart Phone  
**Model** HUAWEI LYO-L02  
**Report No.** RHA1606-0039RF03  
**Issue Date** June 16, 2016

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2015)/ FCC CFR47 Part 27C (2015)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

*Changxu Wan*

Performed by: Changxu Wan

*Lingling Kang*

Reviewed by: Lingling Kang

*Kai Xu*

Approved by: Kai Xu



中国认可  
国际互认  
检测  
TESTING  
CNAS L2264

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## Table of Contents

1	Test Laboratory.....	4
1.1	Notes of the Test Report.....	4
1.2	Test facility.....	4
1.3	Testing Location.....	5
2	General Description of Equipment under Test.....	6
2.1	Applied Standards.....	8
3	Test Configuration.....	9
4	Test Information.....	10
4.1	RF Power Output.....	10
4.2	Effective Isotropic Radiated Power.....	13
4.3	Occupied Bandwidth.....	17
4.4	Band Edge Compliance.....	23
4.5	Peak-to-Average Power Ratio (PAPR).....	31
4.6	Frequency Stability.....	33
4.7	Spurious Emissions at Antenna Terminals.....	36
4.8	Radiates Spurious Emission.....	44
5	Main Test Equipment.....	52



## Summary of Measurement Results

Number	Test Case	Clause in FCC rules	Verdict
1	RF power output	2.1046	PASS
2	Effective Isotropic Radiated power	27.50(h)(2)	PASS
3	Occupied Bandwidth	2.1049	PASS
4	Band Edge Compliance	27.53(m)	PASS
5	Peak-to-Average Power Ratio	27.50(a)/KDB971168 D01(5.7)	PASS
6	Frequency Stability	2.1055 / 27.54	PASS
7	Spurious Emissions at Antenna Terminals	2.1051 / 27.53(m)	PASS
8	Radiates Spurious Emission	2.1053 /27.53(m)	PASS

Date of Testing: June 8, 2016~ June 14, 2016

Note: PASS: The EUT complies with the essential requirements in the standard.  
FAIL: The EUT does not comply with the essential requirements in the standard.



# 1 Test Laboratory

## 1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of TA technology (shanghai) co., Ltd. The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above. This report must not be used by the client to claim product certification, approval, or endorsement by CNAS or any government agencies.

## 1.2 Test facility

### **CNAS (accreditation number:L2264)**

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

### **FCC (recognition number is 428261)**

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

### **IC (recognition number is 8510A)**

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

### **A2LA (Certificate Number: 3857.01)**

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.



### 1.3 Testing Location

Company: TA Technology (Shanghai) Co., Ltd.  
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## 2 General Description of Equipment under Test

### Client Information

<b>Applicant</b>	Huawei Technologies Co., Ltd.
<b>Applicant address</b>	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129 P.R.China
<b>Manufacturer</b>	Huawei Technologies Co., Ltd.
<b>Manufacturer address</b>	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129 P.R.China

### General information

Model:	HUAWEI LYO-L02		
Product IMEI:	869325021672861		
Hardware Version:	Ver.A		
Software Version:	LYO-L02C000B009		
Power Supply:	Battery/AC adapter		
Antenna Type:	Internal Antenna		
Test Mode(s):	LTE Band 7;		
Maximum E.I.R.P.	LTE Band 7: 21.27dBm		
Rated Power Supply Voltage:	3.8V		
Extreme Voltage:	Minimum: 3.6V    Maximum: 4.3V		
Extreme Temperature:	Lowest: -10°C    Highest: +55°C		
Operating Frequency Range(s)	Mode	Tx (MHz)	Rx (MHz)
	LTE Band 7	2500 ~ 2570	2620 ~ 2690
<b>EUT Accessory</b>			
Battery 1	Manufacturer: Sunwoda electronic Co., Ltd Model: HB4342A1RBC Power Rating: DC 3.8V, 2200mAh, Li-ion		
Battery 2	Manufacturer: Scud (Fujian) Electronics Co., Ltd Model: HB4342A1RBC Power Rating: DC 3.8V, 2200mAh, Li-ion		
Adapter 1	Manufacturer: Huizhou BYD Electronic CO.,LTD Model: HW-050100B01		
Adapter 2	Manufacturer: Huizhou BYD Electronic CO.,LTD Model: HW-050100E01		
Adapter 3	Manufacturer: SHENZHEN HUNTKEY ELECTRIC CO., LTD Model: HW-050100B01		
Adapter 4	Manufacturer: SHENZHEN HUNTKEY ELECTRIC CO., LTD Model: HW-050100E01		



Adapter 5	Manufacturer: Dongguan Phitek Electronics Co.,Ltd Model: HW-050100B01
Adapter 6	Manufacturer: Dongguan Phitek Electronics Co.,Ltd Model: HW-050100E01
Note: 1. The information of the EUT is declared by the manufacturer. Please refer to the specifications or user manual for details.	



## 2.1 Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

### Test standards

FCC CFR47 Part 2 (2015)

FCC CFR47 Part 27C (2015)

ANSI/TIA-603-D(2010)

KDB 971168 D01 Power Meas License Digital Systems v02r02

### 3 Test Configuration

There is more than one Battery and adapter, each one should be applied throughout the compliance test respectively, and however, only the worst case (Battery 2/Adapter 3) will be recorded in this report.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes. EUT stand-up position (Z axis), lie-down position (X, Y axis). Receiver antenna polarization (horizontal and vertical), the worst emission was found in position (Z axis, vertical polarization) and the worst case was recorded.

All mode and data rates and positions and RB size and modulations were investigated.

Subsequently, only the worst case emissions are reported.

The following testing in LTE is set based on the maximum RF Output Power.

The following testing in different Bandwidth is set to detail in the following table:

Test modes are chosen to be reported as the worst case configuration below for LTE Band 7:

Test items	Bandwidth (MHz)				Modulation		RB			Test Channel		
	5	10	15	20	QPSK	16QAM	1	50%	100%	L	M	H
RF power output	O	O	O	O	O	O	O	O	O	O	O	O
Effective Isotropic Radiated power	O	O	O	O	O	O	-	-	O	O	O	O
Occupied Bandwidth	O	O	O	O	O	O	-	-	O	O	O	O
Band Edge Compliance	O	O	O	O	O	O	O	-	O	O	-	O
Peak-to-Average Power Ratio	O	O	O	O	O	O	-	-	O	O	O	O
Frequency Stability	O	O	O	O	O	O	-	-	O	-	O	-
Spurious Emissions at Antenna Terminals	O	O	O	O	O	-	O	-	-	O	O	O
Radiates Spurious Emission	O	O	O	O	O	-	O	-	-	O	O	O
Note	1. The mark "O" means that this configuration is chosen for testing. 2. The mark "-" means that this configuration is not testing.											

## 4 Test Information

### 4.1 RF Power Output

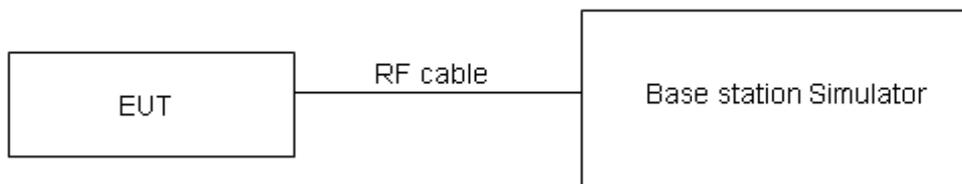
#### Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

#### Methods of Measurement

During the process of the testing, The EUT is controlled by the Base Station Simulator to ensure max power transmission and proper modulation.

#### Test Setup



The loss between RF output port of the EUT and the input port of the tester has been taken into consideration.

#### Limits

No specific RF power output requirements in part 2.1046.

#### Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 2$ ,  $U=0.4$  dB.



Test Results

LTE FDD Band 7				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				20775/2502.5	21100/2535	21425/2567.5
5MHz	QPSK	1	0	22.45	22.54	22.24
		1	13	22.34	22.38	22.30
		1	24	22.32	22.42	22.35
		12	0	21.57	21.56	21.34
		12	6	21.58	21.58	21.42
		12	13	21.62	21.45	21.44
		25	0	21.53	21.53	21.44
	16QAM	1	0	21.54	21.61	21.71
		1	13	21.59	21.55	21.58
		1	24	21.59	21.73	21.49
		12	0	20.58	20.63	20.35
		12	6	20.51	20.68	20.30
		12	13	20.51	20.50	20.34
		25	0	20.53	20.47	20.25
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				20800/2505	21100/2535	21400/2565
10MHz	QPSK	1	0	22.47	22.55	22.27
		1	25	22.37	22.43	22.34
		1	49	22.34	22.46	22.38
		25	0	21.60	21.61	21.38
		25	13	21.61	21.63	21.46
		25	25	21.64	21.49	21.49
		50	0	21.61	21.55	21.48
	16QAM	1	0	21.56	21.64	21.73
		1	25	21.62	21.59	21.61
		1	49	21.62	21.75	21.52
		25	0	20.61	20.68	20.39
		25	13	20.53	20.72	20.33
		25	25	20.54	20.55	20.38
		50	0	20.56	20.52	20.29
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				20825/2507.5	21100/2535	21375/2562.5
15MHz	QPSK	1	0	22.46	22.51	22.25
		1	38	22.35	22.42	22.31
		1	74	22.31	22.41	22.34
		36	0	21.58	21.57	21.35
		36	18	21.58	21.58	21.42
		36	39	21.61	21.46	21.45
		75	0	21.59	21.51	21.43



	16QAM	1	0	21.51	21.62	21.71
		1	38	21.60	21.56	21.59
		1	74	21.59	21.71	21.49
		36	0	20.58	20.66	20.36
		36	18	20.50	20.67	20.29
		36	39	20.52	20.51	20.35
		75	0	20.53	20.47	20.25
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				20850/2510	21100/2535	21350/2560
20MHz	QPSK	1	0	22.43	22.47	22.22
		1	50	22.34	22.38	22.29
		1	99	22.29	22.40	22.31
		50	0	21.55	21.52	21.31
		50	25	21.56	21.54	21.39
		50	50	21.58	21.41	21.41
		100	0	21.56	21.46	21.39
	16QAM	1	0	21.49	21.58	21.66
		1	50	21.56	21.54	21.55
		1	99	21.57	21.68	21.47
		50	0	20.55	20.62	20.33
		50	25	20.47	20.65	20.26
		50	50	20.49	20.46	20.31
		100	0	20.51	20.43	20.22

## 4.2 Effective Isotropic Radiated Power

### Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

### Methods of Measurement

The measurement procedures in TIA- 603-D are used.

1. The EUT was placed on a turntable with 1.5 meter height in a fully anechoic chamber.
2. The EUT was set at 3 meters from the receiving antenna, which was mounted on the antennatower.
- 3.UMTS operating modes: Set RBW= 100 KHz, VBW= 300 KHz, RMS detector over frame, and use channel power option with bandwidth=5MHz, per section 4.0 of KDB 971168 D01.
4. The table was rotated 360 degrees to determine the position of the highest radiated power.
5. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
6. Taking the record of maximum ERP/EIRP.
7. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
8. The conducted power at the terminal of the dipole antenna is measured.
9. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.

$$10. ERP/EIRP = P_s + E_t - E_s + G_s = P_s + R_t - R_s + G_s$$

$P_s$  (dBm) : Input power to substitution antenna.

$G_s$  (dBi or dBd) : Substitution antenna Gain.

$$E_t = R_t + AF$$

$$E_s = R_s + AF$$

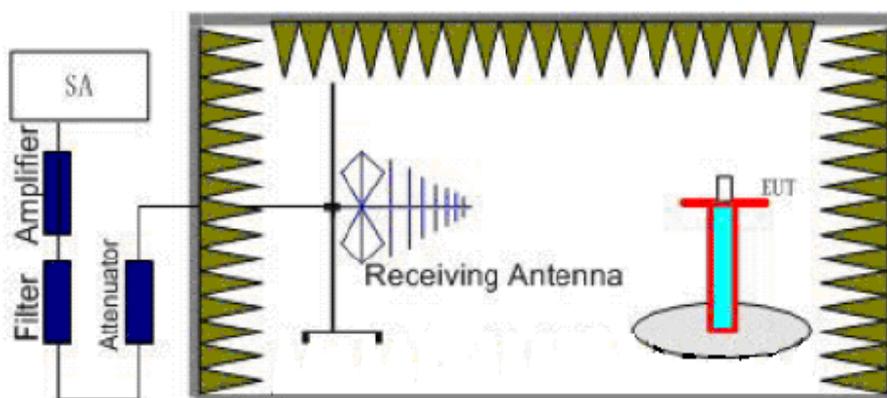
AF (dB/m) : Receive antenna factor

$R_t$  : The highest received signal in spectrum analyzer for EUT.

$R_s$  : The highest received signal in spectrum analyzer for substitution antenna.

$$EIRP = E.R.P + 2.15$$

### Test Setup



**Limits**

Rule Part 27.50(h)(2) specifies that " Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power."

Part 27.50(h)(2) Limit (EIRP)	$\leq 2 \text{ W}$ (33 dBm)
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**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 2, U = 1.19 \text{ dB}$

**Test Results**

LTE Band 7								
Bandwidth	Frequency (MHz)	Ant Pot (H/V)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	Conclusion
5MHz (QPSK)	2502.5	H	-43.41	-61.57	0.00	1.81	19.97	Pass
	2535	H	-41.95	-61.07	0.00	1.80	20.92	Pass
	2567.5	H	-42.62	-61.74	0.00	1.83	20.95	Pass
	2502.5	V	-41.51	-60.97	0.00	1.81	21.27	Pass
	2535	V	-42.00	-60.95	0.00	1.80	20.75	Pass
	2567.5	V	-42.51	-61.48	0.00	1.83	20.80	Pass
5MHz (16QAM)	2502.5	H	-43.51	-61.57	0.00	1.81	19.87	Pass
	2535	H	-43.18	-61.07	0.00	1.80	19.69	Pass
	2567.5	H	-43.79	-61.74	0.00	1.83	19.78	Pass
	2502.5	V	-42.60	-60.97	0.00	1.81	20.18	Pass
	2535	V	-42.63	-60.95	0.00	1.80	20.12	Pass
	2567.5	V	-43.20	-61.48	0.00	1.83	20.11	Pass
10MHz (QPSK)	2505	H	-44.18	-61.60	0.00	1.82	19.24	Pass
	2535	H	-42.85	-61.07	0.00	1.80	20.02	Pass
	2565	H	-42.86	-61.61	0.00	1.81	20.56	Pass
	2505	V	-42.60	-61.09	0.00	1.82	20.31	Pass
	2535	V	-42.82	-60.95	0.00	1.80	19.93	Pass
	2565	V	-43.35	-61.43	0.00	1.81	19.89	Pass
10MHz (16QAM)	2505	H	-44.63	-61.60	0.00	1.82	18.79	Pass
	2535	H	-43.29	-61.07	0.00	1.80	19.58	Pass
	2565	H	-43.79	-61.61	0.00	1.81	19.63	Pass
	2505	V	-43.70	-61.09	0.00	1.82	19.21	Pass
	2535	V	-43.63	-60.95	0.00	1.80	19.12	Pass
	2565	V	-43.90	-61.43	0.00	1.81	19.34	Pass
15MHz (QPSK)	2507.5	H	-46.20	-61.58	0.00	1.78	17.16	Pass
	2535	H	-47.19	-61.07	0.00	1.80	15.68	Pass
	2562.5	H	-44.01	-61.44	0.00	1.82	19.25	Pass
	2507.5	V	-44.31	-61.13	0.00	1.78	18.60	Pass
	2535	V	-47.00	-60.95	0.00	1.80	15.75	Pass
	2562.5	V	-44.56	-61.37	0.00	1.82	18.63	Pass
15MHz (16QAM)	2507.5	H	-46.71	-61.58	0.00	1.78	16.65	Pass
	2535	H	-47.73	-61.07	0.00	1.80	15.14	Pass
	2562.5	H	-44.54	-61.44	0.00	1.82	18.72	Pass
	2507.5	V	-45.22	-61.13	0.00	1.78	17.69	Pass
	2535	V	-47.63	-60.95	0.00	1.80	15.12	Pass
	2562.5	V	-45.32	-61.37	0.00	1.82	17.87	Pass
20MHz	2510	H	-47.56	-61.58	0.00	1.77	15.79	Pass



<b>(QPSK)</b>	2535	H	-46.62	-61.07	0.00	1.80	16.25	Pass
	2560	H	-46.91	-61.34	0.00	1.82	16.25	Pass
	2510	V	-46.01	-61.12	0.00	1.77	16.88	Pass
	2535	V	-46.48	-60.95	0.00	1.80	16.27	Pass
	2560	V	-46.71	-60.68	0.00	1.82	15.79	Pass
<b>20MHz (16QAM)</b>	2510	H	-48.68	-61.58	0.00	1.77	14.67	Pass
	2535	H	-47.69	-61.07	0.00	1.80	15.18	Pass
	2560	H	-47.87	-61.34	0.00	1.82	15.29	Pass
	2510	V	-47.02	-61.12	0.00	1.77	15.87	Pass
	2535	V	-47.51	-60.95	0.00	1.80	15.24	Pass
	2560	V	-47.61	-60.68	0.00	1.82	14.89	Pass

Note: 1. EIRP= E.R.P+2.15

### 4.3 Occupied Bandwidth

#### Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

#### Method of Measurement

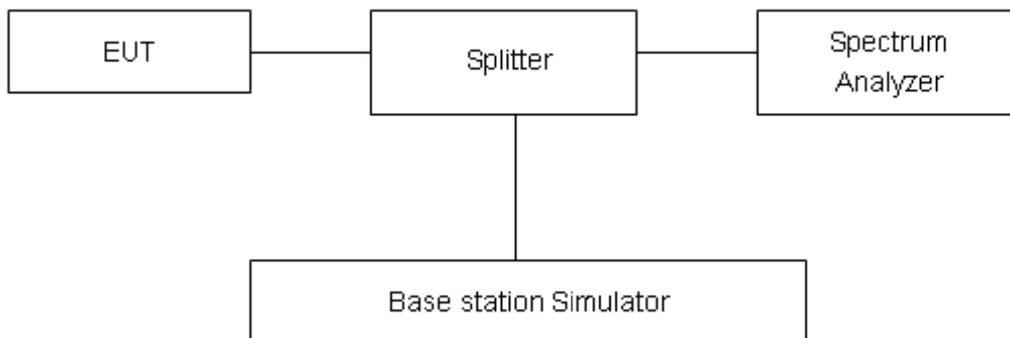
The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer.

RBW is set to 100 kHz, VBW is set to 300 kHz for LTE Band 7 (5MHz),

RBW is set to 300 kHz, VBW is set to 1MHz for LTE Band 7 (10MHz/15MHz/20MHz),

99% power and -26dBc occupied bandwidths are recorded. Spectrum analyzer plots are included on the following pages.

#### Test Setup



#### Limits

No specific occupied bandwidth requirements in part 2.1049.

#### Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 2, U=624\text{Hz}$ .



## Test Result

LTE Band 7						
RB	Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
100 %	QPSK	5	20775	2502.5	4.53	5.050
			21100	2535	4.52	5.136
			21425	2567.5	4.53	5.066
		10	20800	2505	9.05	10.09
			21100	2535	9.04	10.09
			21400	2565	9.03	10.22
		15	20825	2507.5	13.51	14.79
			21100	2535	13.56	15.01
			21375	2562.5	13.52	14.90
		20	20850	2510	17.95	19.47
			21100	2535	17.95	19.48
			21350	2560	17.95	19.49
	16QAM	5	20775	2502.5	4.54	5.042
			21100	2535	4.53	5.061
			21425	2567.5	4.53	5.070
		10	20800	2505	9.03	10.03
			21100	2535	9.09	10.06
			21400	2565	9.05	10.17
		15	20825	2507.5	13.47	14.85
			21100	2535	13.51	14.85
			21375	2562.5	13.51	14.81
		20	20850	2510	17.97	19.30
			21100	2535	17.92	19.43
			21350	2560	17.95	19.58



LTE Band 7QPSK 5MHz CH-Low



LTE Band 7QPSK 10MHz CH-Low



LTE Band 7QPSK 5MHz CH-Middle



LTE Band 7QPSK 10MHz CH-Middle



LTE Band 7QPSK 5MHz CH-High



LTE Band 7QPSK 10MHz CH-High





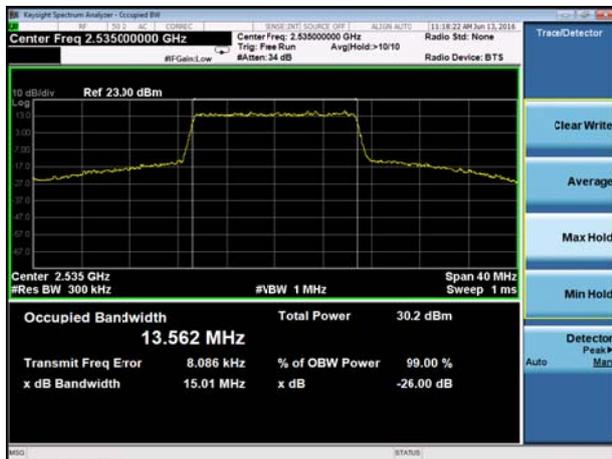
### LTE Band 7QPSK 15MHz CH-Low



### LTE Band 7QPSK 20MHz CH-Low



### LTE Band 7QPSK 15MHz CH-Middle



### LTE Band 7QPSK 20MHz CH-Middle



### LTE Band 7QPSK 15MHz CH-High

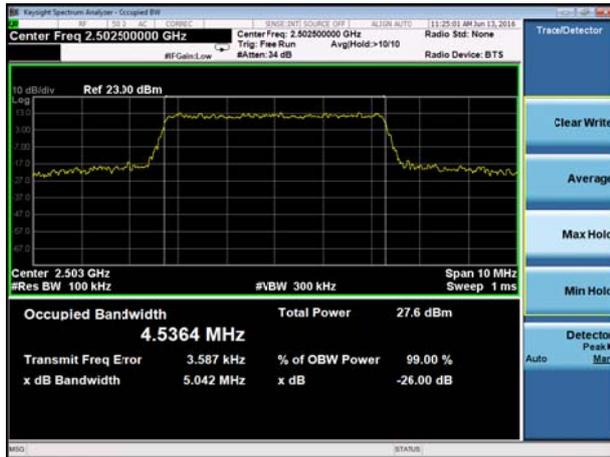


### LTE Band 7QPSK 20MHz CH-High





### LTE Band 7 16QAM 5MHz CH-Low



### LTE Band 7 16QAM 10MHz CH-Low



### LTE Band 7 16QAM 5MHz CH-Middle



### LTE Band 7 16QAM 10MHz CH-Middle



### LTE Band 7 16QAM 5MHz CH-High



### LTE Band 7 16QAM 10MHz CH-High





LTE Band 7 16QAM 15MHz CH-Low



LTE Band 7 16QAM 20MHz CH-Low



LTE Band 7 16QAM 15MHz CH-Middle



LTE Band 7 16QAM 20MHz CH-Middle



LTE Band 7 16QAM 15MHz CH-High



LTE Band 7 16QAM 20MHz CH-High



### 4.4 Band Edge Compliance

#### Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

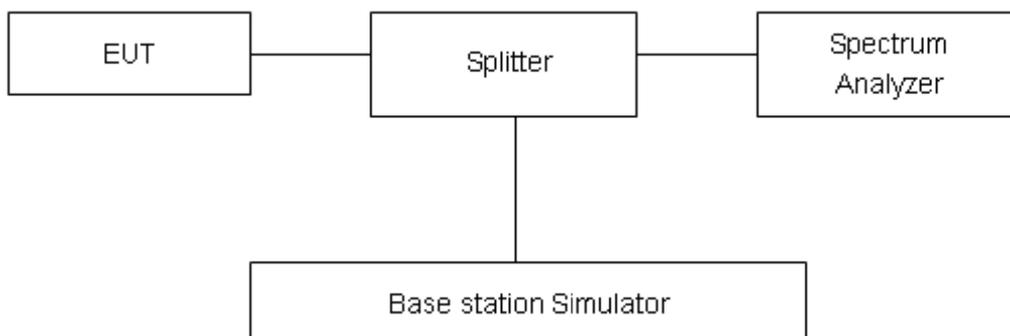
#### Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The band edge of the lowest and highest channels were measured.

The testing follows KDB 971168 v02r02 Section 6.0

- 1.The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The band edges of low and high channels for the highest RF powers were measured.
3. RBW is set to 51 kHz, VBW is set to 160 kHz for LTE Band 7 (5MHz),  
RBW is set to 100 kHz, VBW is set to 300kHz for LTE Band 7 (10MHz),  
RBW is set to 150 kHz, VBW is set to 510kHz for LTE Band 7 (15MHz),  
RBW is set to 200 kHz, VBW is set to 620k Hz for LTE Band 7 (20MHz).
4. Set spectrum analyzer with RMS detector.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. Checked that all the results comply with the emission limit line.

#### Test Setup





## Limits

Part 27.53(m)(4) / specifies that “ For BRS and EBS stations.

For mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log (P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(4) of this section. In addition, the attenuation factor shall not be less that  $43 + 10 \log (P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log (P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Example:

The limit line is derived from  $43 + 10\log(P)$ dB below the transmitter power P(Watts)

$$= P(W) - [43 + 10\log(P)] \text{ (dB)}$$

$$= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)} = -13\text{dBm}.$$

## Measurement Uncertainty

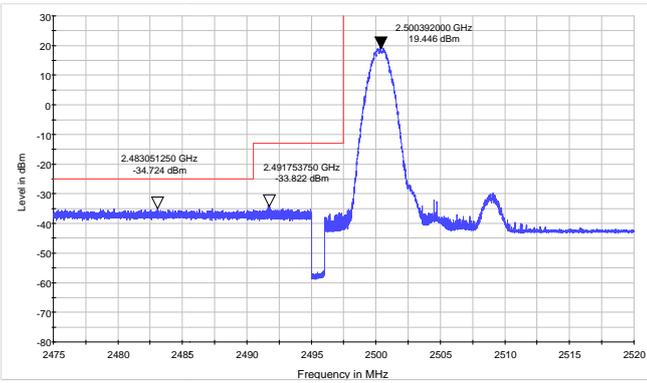
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 1.96$ ,  $U=0.684\text{dB}$ .



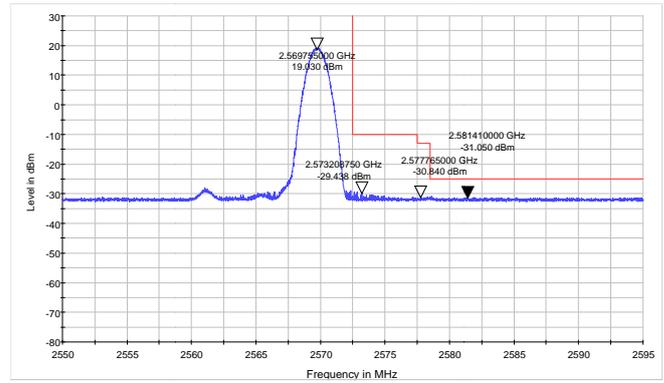
### Test Result

All the test traces in the plots shows the test results clearly.

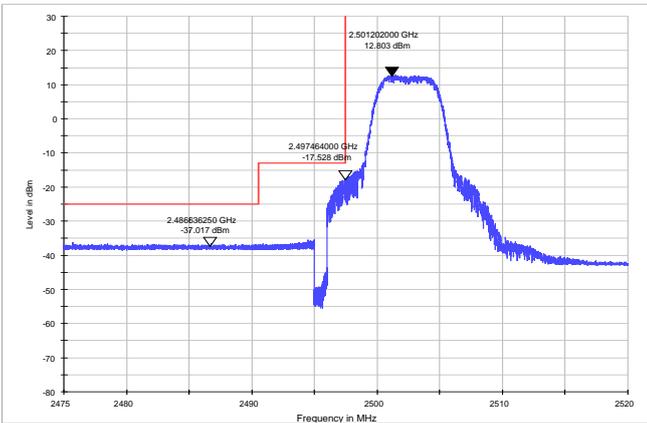
LTE Band 7 QPSK Bandwidth = 5MHz CH-LOW, RB 1



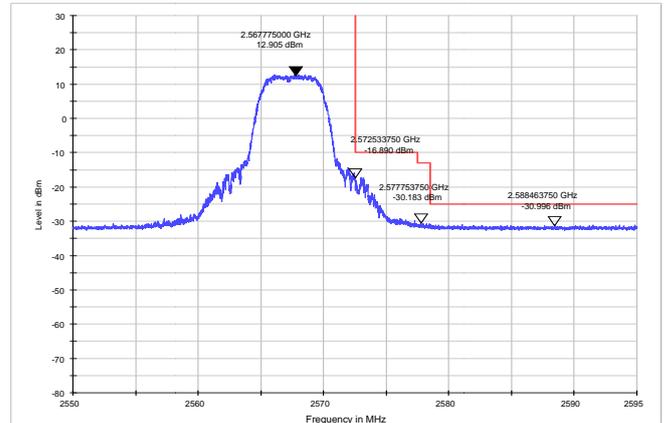
LTE Band 7 QPSK Bandwidth = 5MHz CH-HIGH, RB 1



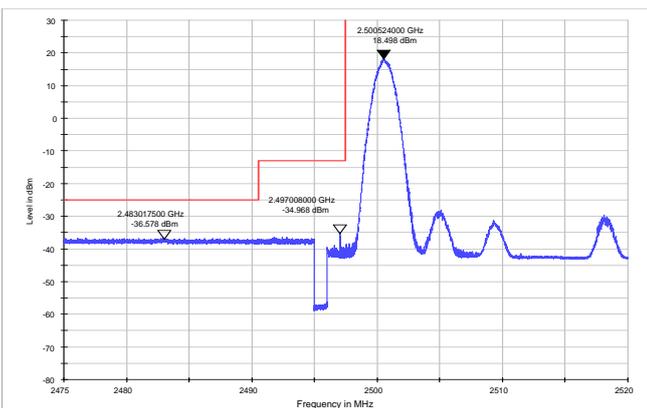
LTE Band 7 QPSK Bandwidth = 5MHz CH-LOW, RB 25



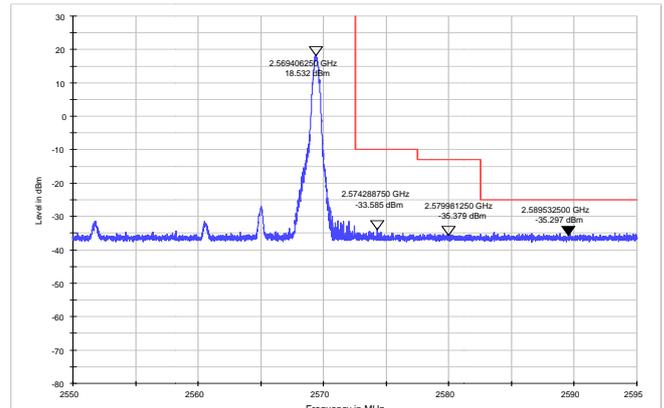
LTE Band 7 QPSK Bandwidth = 5MHz CH-HIGH, RB 25



LTE Band 7 QPSK Bandwidth = 10MHz CH-LOW, RB 1

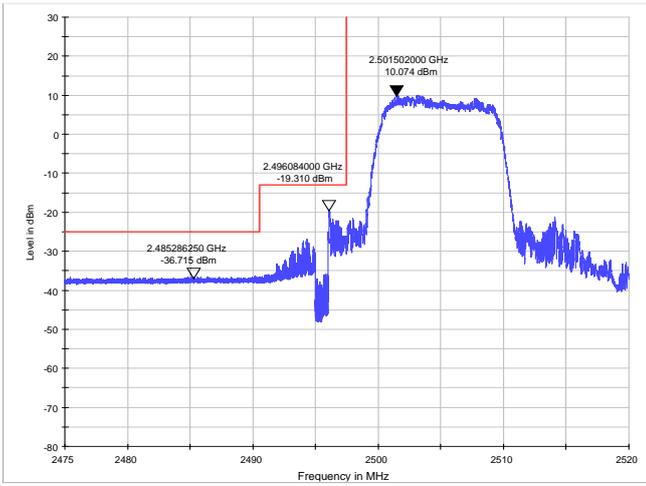


LTE Band 7 QPSK Bandwidth = 10MHz CH-HIGH, RB 1

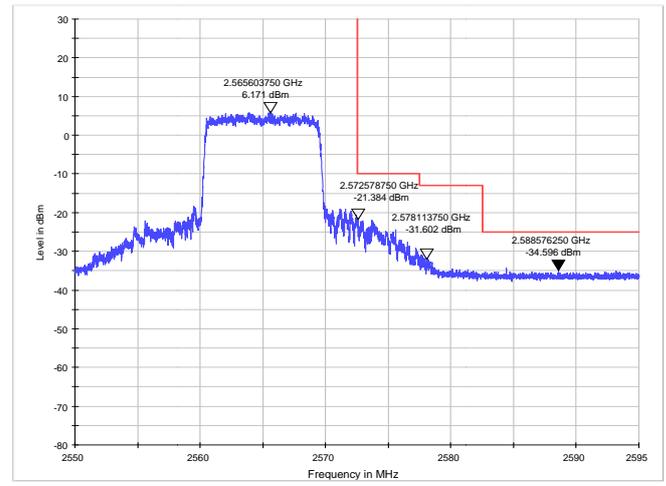




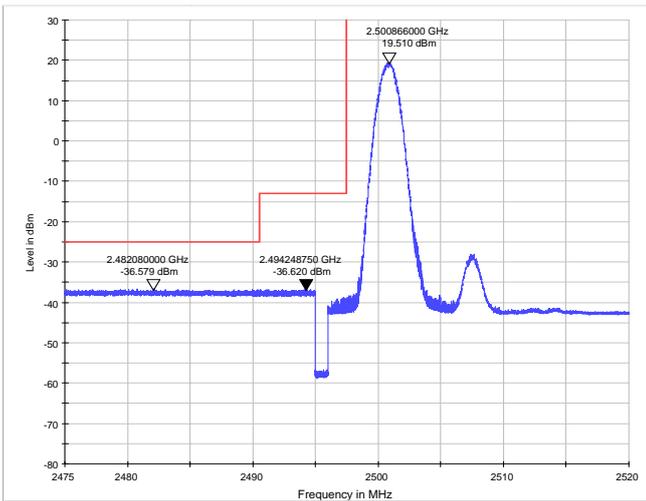
LTE Band 7 QPSK Bandwidth = 10MHz CH-LOW, RB 50



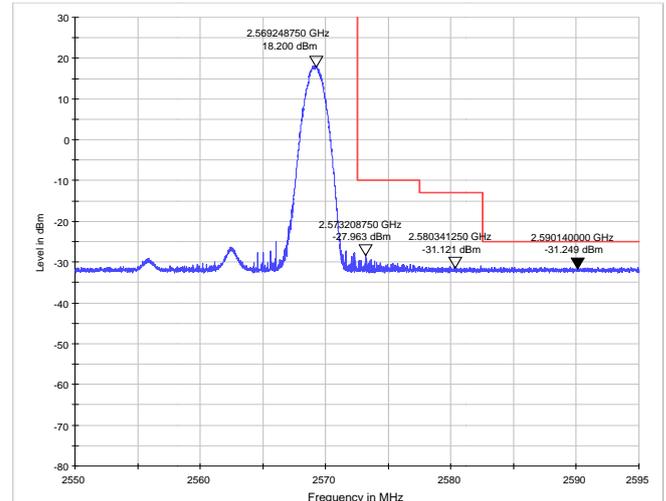
LTE Band 7 QPSK Bandwidth = 10MHz CH-HIGH, RB 50



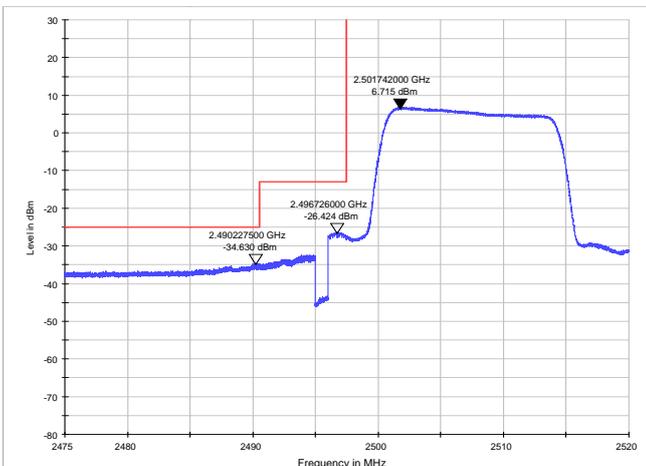
LTE Band 7 QPSK Bandwidth = 15MHz CH-LOW, RB 1



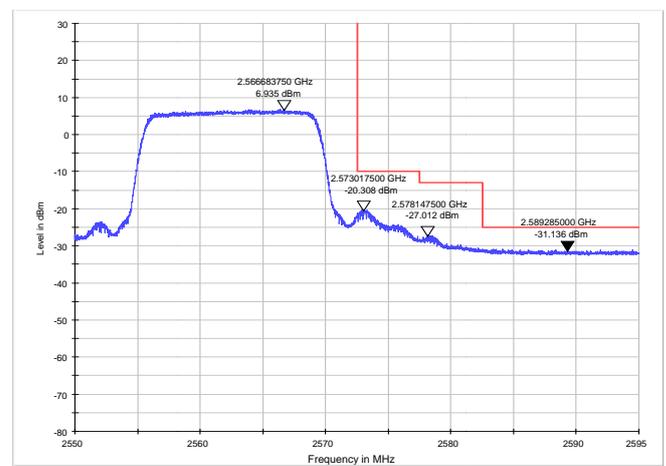
LTE Band 7 QPSK Bandwidth = 15MHz CH-HIGH, RB 1



LTE Band 7 QPSK Bandwidth = 15MHz CH-LOW, RB 75

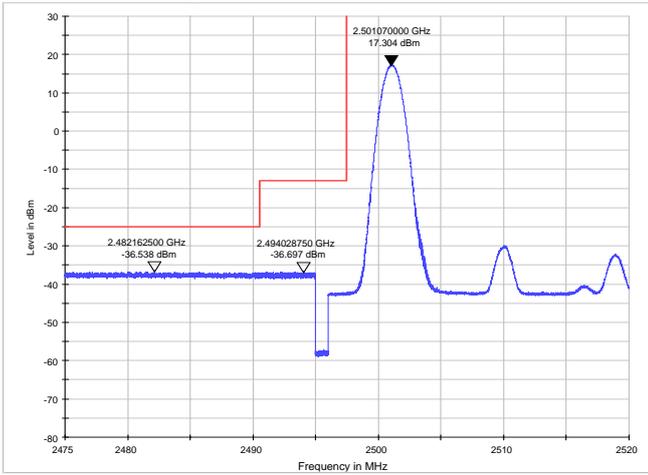


LTE Band 7 QPSK Bandwidth = 15MHz CH-HIGH, RB 75

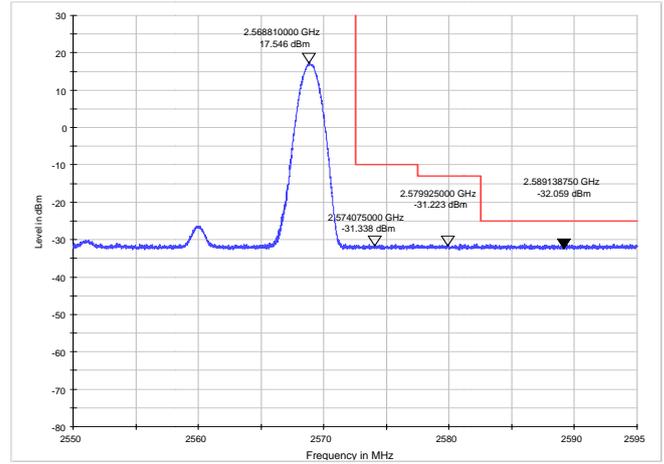




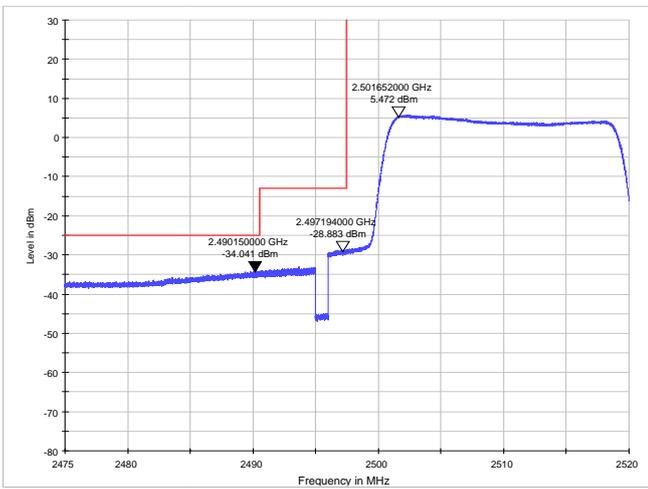
LTE Band 7 QPSK Bandwidth = 20MHz CH-LOW, RB 1



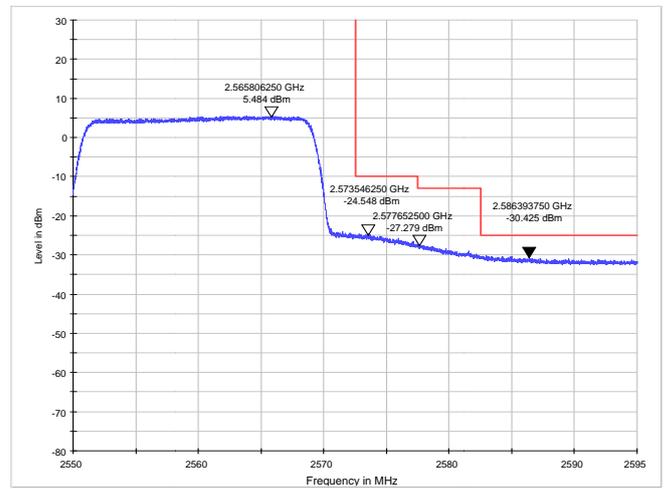
LTE Band 7 QPSK Bandwidth = 20MHz CH-HIGH, RB 1



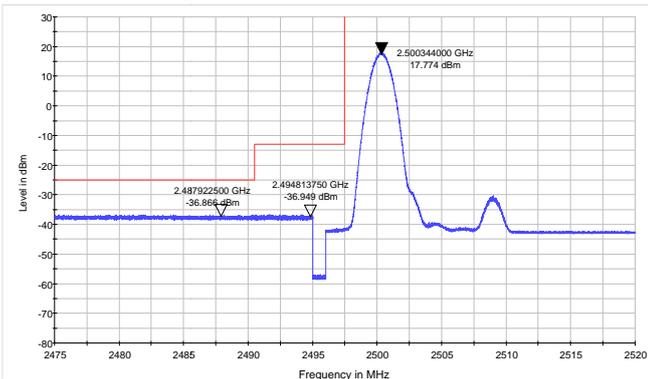
LTE Band 7 QPSK Bandwidth = 20MHz CH-LOW, RB 100



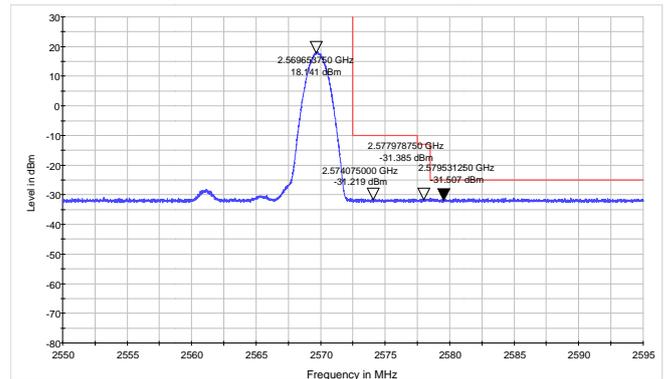
LTE Band 7 QPSK Bandwidth = 20MHz CH-HIGH, RB 100



LTE Band 7 16QAM Bandwidth = 5MHz CH-LOW, RB 1

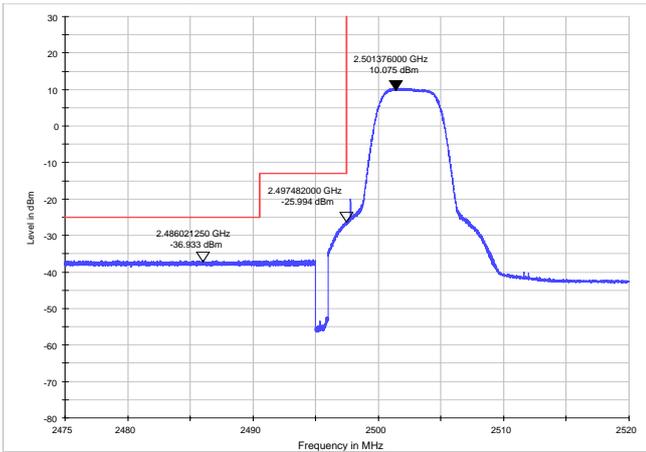


LTE Band 7 16QAM Bandwidth = 5MHz CH-HIGH, RB 1

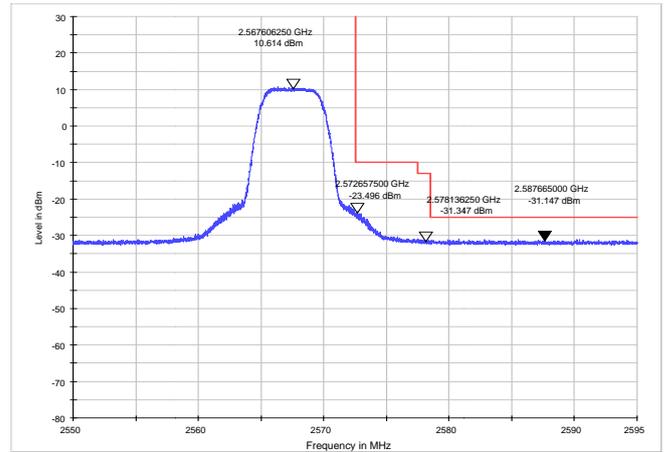




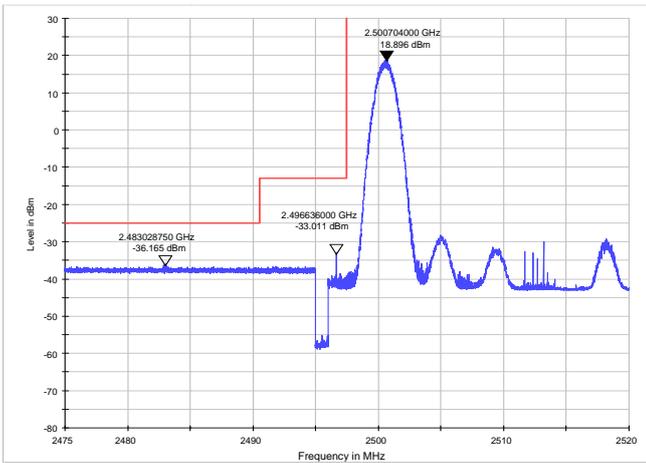
LTE Band 7 16QAM Bandwidth = 5MHz CH-LOW, RB 25



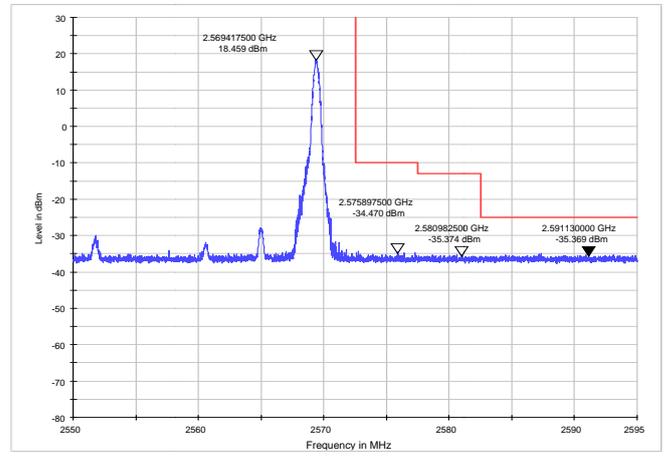
LTE Band 7 16QAM Bandwidth = 5MHz CH-HIGH, RB 25



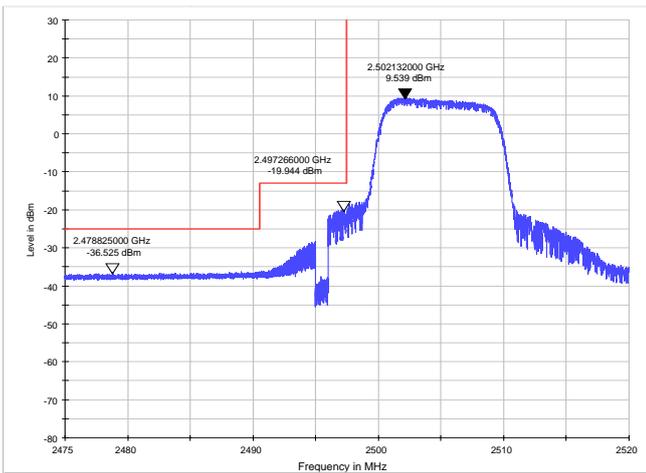
LTE Band 7 16QAM Bandwidth=10MHz CH-LOW, RB 1



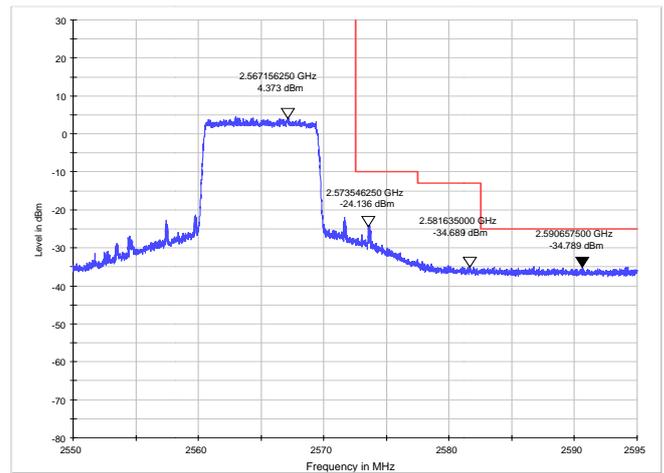
LTE Band 7 16QAM Bandwidth = 10MHz CH-HIGH, RB 1



LTE Band 7 16QAM Bandwidth = 10MHz CH-LOW, RB 50

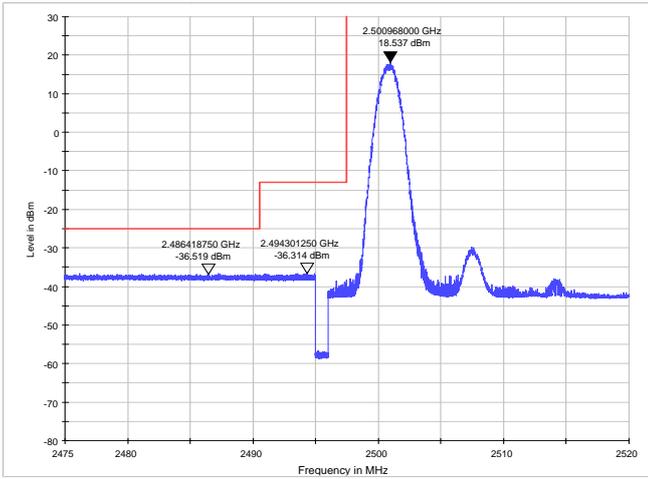


LTE Band 7 16QAM Bandwidth = 10MHz CH-HIGH, RB 50

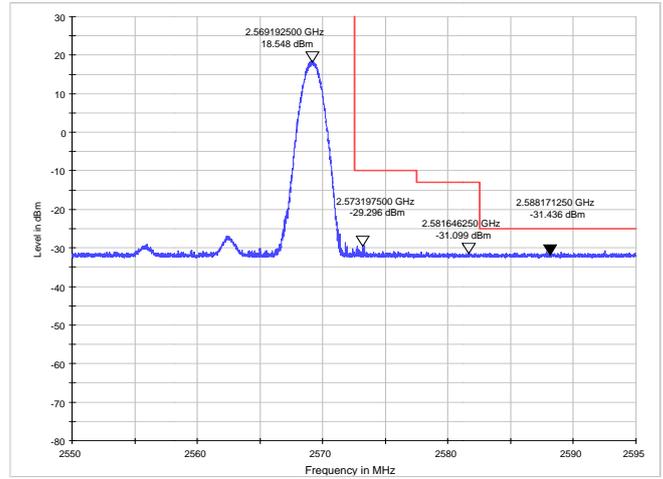




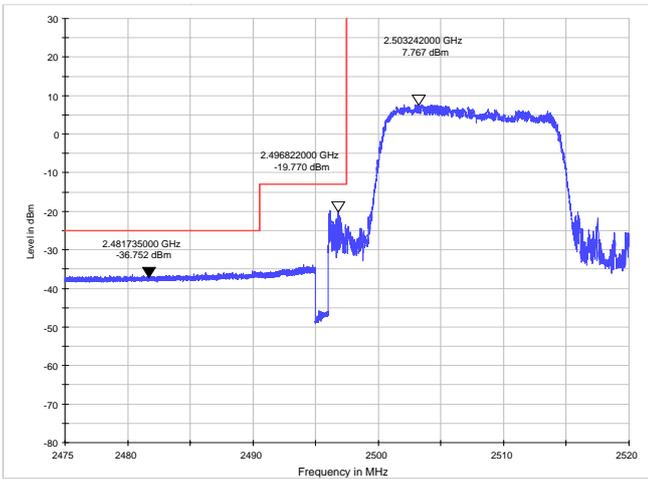
LTE Band 7 16QAM Bandwidth = 15MHz CH-LOW, RB 1



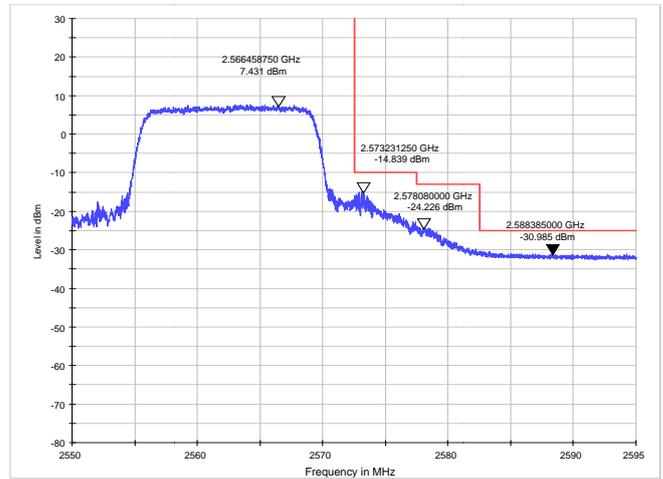
LTE Band 7 16QAM Bandwidth = 15MHz CH-HIGH, RB 1



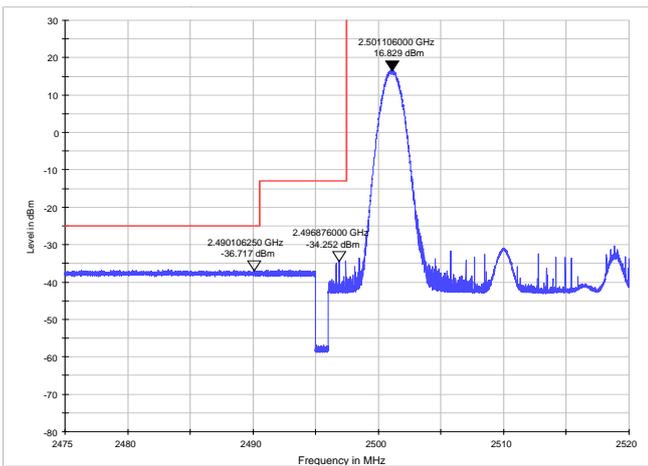
LTE Band 7 16QAM Bandwidth = 15MHz CH-LOW, RB 75



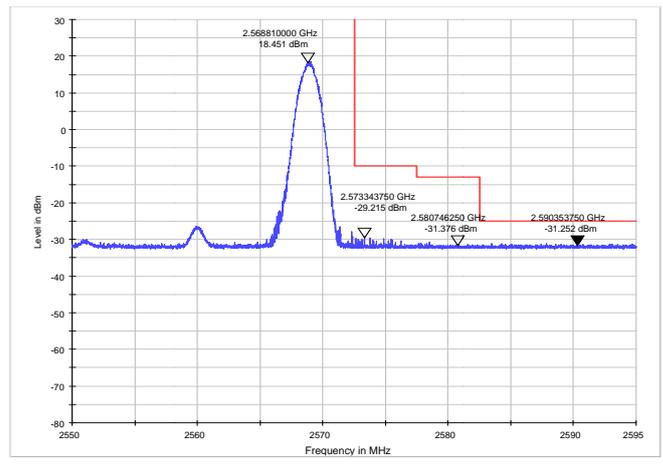
LTE Band 7 16QAM Bandwidth = 15MHz CH-HIGH, RB 75



LTE Band 7 16QAM Bandwidth = 20MHz CH-LOW, RB 1

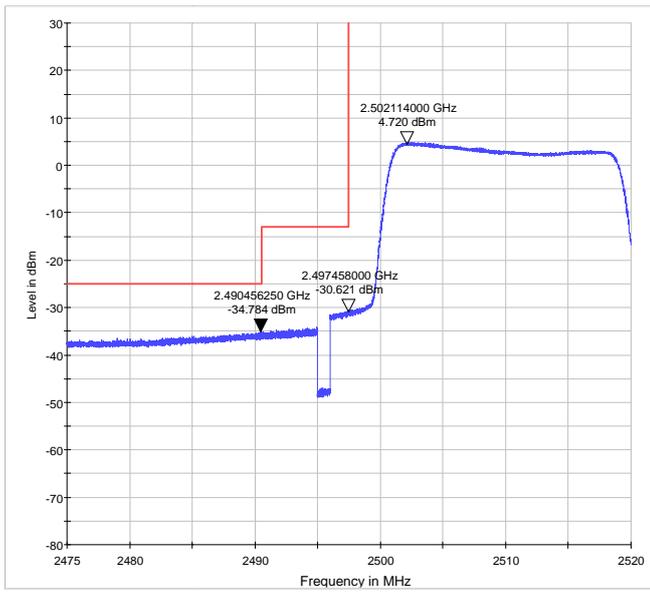


LTE Band 7 16QAM Bandwidth = 20MHz CH-HIGH, RB 1

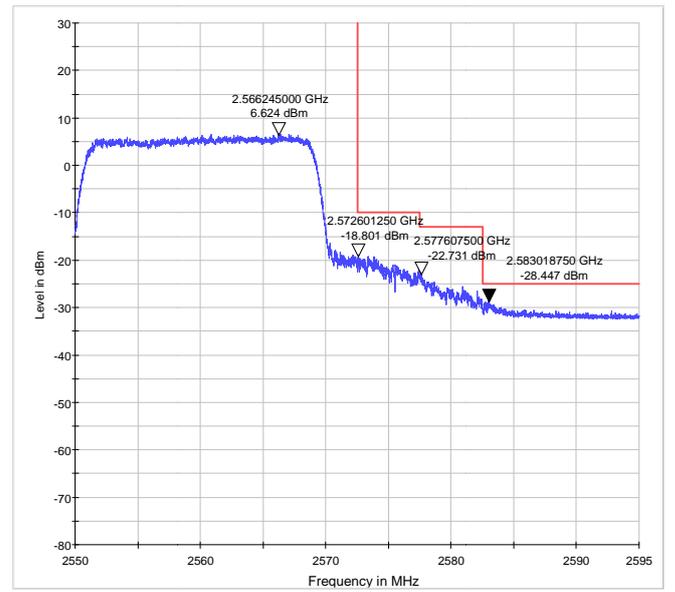




LTE Band 7 16QAM Bandwidth = 20MHz CH-LOW, RB 100



LTE Band 7 16QAM Bandwidth = 20MHz CH-HIGH, RB 100



### 4.5 Peak-to-Average Power Ratio (PAPR)

#### Ambient condition

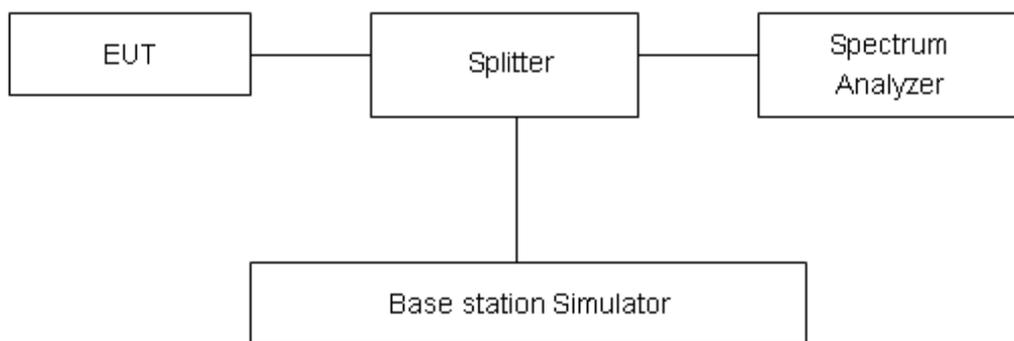
Temperature	Relative humidity
21°C ~25°C	40%~60%

#### Methods of Measurement

Measure the total peak power and record as PPk. And measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

$$PAPR (dB) = PPk (dBm) - PAvg (dBm).$$

#### Test Setup



#### Limits

Equipment employed must be authorized in accordance with the provisions of 24.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. 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.in Part27.50(d).

#### Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for thenormal distribution is with the coverage factor k = 2, U= 0.4 dB.



## Test Results

LTE Band 7							
Modulation	Bandwidth ((MHz))	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Conclusion
QPSK	5	20775	2502.5	26.84	21.53	5.31	PASS
		21100	2535	26.85	21.53	5.32	PASS
		21425	2567.5	26.58	21.44	5.14	PASS
	10	20800	2505	28.37	21.61	6.76	PASS
		21100	2535	28.28	21.55	6.73	PASS
		21400	2565	28.18	21.48	6.70	PASS
	15	20825	2507.5	28.32	21.59	6.73	PASS
		21100	2535	28.17	21.51	6.66	PASS
		21375	2562.5	28.17	21.43	6.74	PASS
	20	20850	2510	28.75	21.56	7.19	PASS
		21100	2535	28.65	21.46	7.19	PASS
		21350	2560	28.41	21.39	7.02	PASS
16QAM	5	20775	2502.5	26.31	20.53	5.78	PASS
		21100	2535	26.43	20.47	5.96	PASS
		21425	2567.5	25.97	20.25	5.72	PASS
	10	20800	2505	27.98	20.56	7.42	PASS
		21100	2535	27.86	20.52	7.34	PASS
		21400	2565	27.60	20.29	7.31	PASS
	15	20825	2507.5	27.93	20.53	7.40	PASS
		21100	2535	27.72	20.47	7.25	PASS
		21375	2562.5	27.69	20.25	7.44	PASS
	20	20850	2510	28.24	20.51	7.73	PASS
		21100	2535	27.93	20.43	7.50	PASS
		21350	2560	27.77	20.22	7.55	PASS

## 4.6 Frequency Stability

### Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

### Method of Measurement

#### 1. Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -30°C to +50°C in 10°C step size.

(1)With all power removed, the temperature was decreased to -10°C and permitted to stabilize for three hours.

(2)Measure the carrier frequency with the test equipment in a “call mode”. These measurements should be made within 1 minute of powering up the mobile station, to prevent significant self warming.

(3) Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

#### 2. Frequency Stability (Voltage Variation)

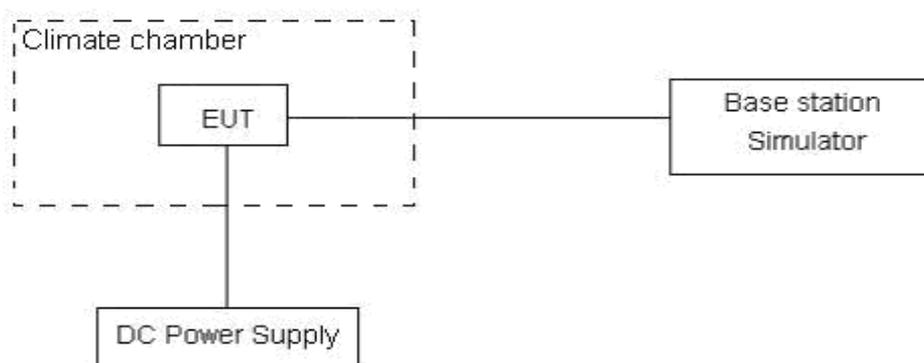
The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery-operating end point which shall be specified by the manufacturer.

This transceiver is specified to operate with an input voltage of between 3.6 V and 4.35 V, with a nominal voltage of 3.8V.

### Test setup



### Limits

No specific frequency stability requirements in part 27.54

### Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor  $k = 3, U=0.01\text{ppm}$ .



## Test Result

Bandwidth	Test status	LTE Band 7 Channel 21100 Test Results (ppm)		
		QPSK	16QAM	Conclusion
5MHz	-10°C/3.8 V	0.00305	0.00206	PASS
	0°C/3.8 V	0.00163	0.00185	PASS
	10°C/3.8 V	0.00116	0.00216	PASS
	20°C/3.8 V	0.00100	0.00140	PASS
	30°C/3.8 V	0.00158	0.00281	PASS
	40°C/3.8 V	0.00132	0.00094	PASS
	50°C/3.8 V	0.00245	0.00054	PASS
	55°C/3.8 V	0.00111	0.00113	PASS
	20°C/3.6 V	0.00100	0.00121	PASS
	20°C/4.3 V	0.00083	0.00260	PASS
10MHz	-10°C/3.8 V	0.00125	0.00210	PASS
	0°C/3.8 V	0.00118	0.00366	PASS
	10°C/3.8 V	0.00120	0.00237	PASS
	20°C/3.8 V	0.00204	0.00307	PASS
	30°C/3.8 V	0.00218	0.00216	PASS
	40°C/3.8 V	0.00093	0.00122	PASS
	50°C/3.8 V	0.00115	0.00159	PASS
	55°C/3.8 V	0.00155	0.00162	PASS
	20°C/3.6 V	0.00198	0.00214	PASS
	20°C/4.3 V	0.00234	0.00089	PASS
15MHz	-10°C/3.8 V	0.00171	0.00215	PASS
	0°C/3.8 V	0.00130	0.00279	PASS
	10°C/3.8 V	0.00202	0.00216	PASS
	20°C/3.8 V	0.00236	0.00362	PASS
	30°C/3.8 V	0.00152	0.00172	PASS
	40°C/3.8 V	0.00312	0.00265	PASS
	50°C/3.8 V	0.00317	0.00353	PASS
	55°C/3.8 V	0.00166	0.00160	PASS
	20°C/3.6 V	0.00288	0.00236	PASS
	20°C/4.3 V	0.00277	0.00228	PASS
20MHz	-10°C/3.8 V	0.00140	0.00235	PASS
	0°C/3.8 V	0.00151	0.00256	PASS
	10°C/3.8 V	0.00132	0.00171	PASS
	20°C/3.8 V	0.00179	0.00188	PASS
	30°C/3.8 V	0.00302	0.00237	PASS
	40°C/3.8 V	0.00292	0.00233	PASS



	50°C/3.8 V	0.00264	0.00206	PASS
	55°C/3.8 V	0.00220	0.00302	PASS
	20°C/3.6 V	0.00175	0.00191	PASS
	20°C/4.3 V	0.00234	0.00323	PASS

### 4.7 Spurious Emissions at Antenna Terminals

#### Ambient condition

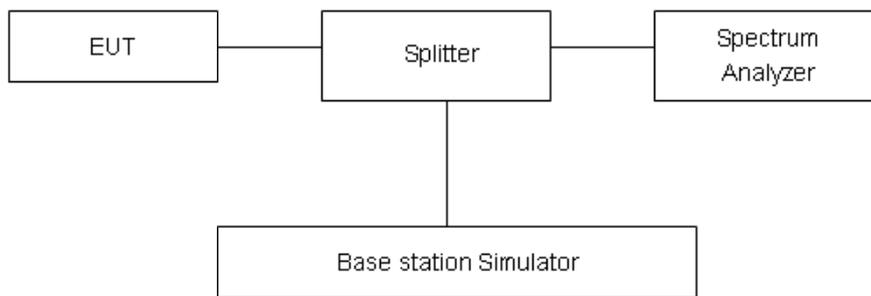
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

#### Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to the 10th harmonic of the carrier. The peak detector is used. RBW and VBW are set to 100 kHz for the carrier frequency, or RBW and VBW are set to 1MHz (other frequency), Sweep is set to ATUO.

Of those disturbances below (limit – 20 dB), the mark is not required for the EUT.

#### Test setup



#### Limits

Rule Part 27.53(m) 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(4) of this section.

Limit	-25 dBm
-------	---------

#### Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor  $k = 1.96$ .

Frequency	Uncertainty
100kHz-2GHz	0.684 dB
2GHz-12.75GHz	1.407 dB

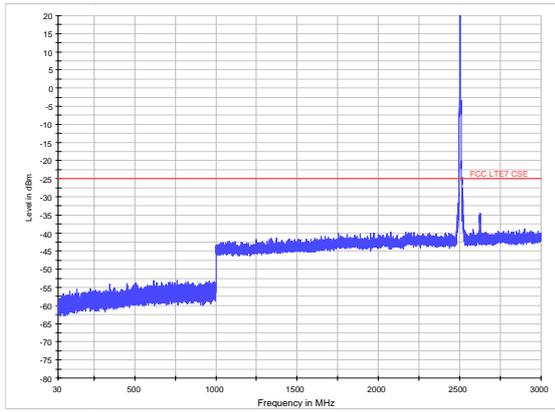
**Test Result: PASS**

If disturbances were found more than 20dB below limit line, the mark is not required for the EUT.  
The signal beyond the limit is carrier in the following plots.

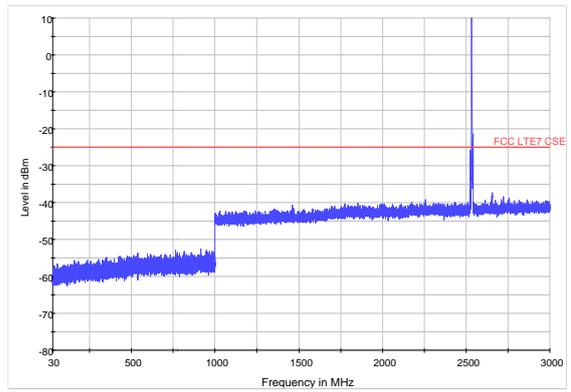
<b>Test Data File Name</b>	<b>Frequency (MHz)</b>	<b>Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>
LTE B7_5M_CHMID_RB1_3-18GHz	5065.9	-34.32	-25	9.32
LTE B7_5M_CHHIGH_RB1_3-18GHz	5130.0	-33.63	-25	8.63
LTE B7_10M_CHLOW_RB1_3-18GHz	5010.4	-44.36	-25	19.36
LTE B7_10M_CHHIGH_RB1_3-18GHz	5121.4	-34.42	-25	9.42
LTE B7_15M_CHLOW_RB1_3-18GHz	5002.1	-41.84	-25	16.84
LTE B7_15M_CHMID_RB1_3-18GHz	5056.9	-38.35	-25	13.35
LTE B7_15M_CHHIGH_RB1_3-18GHz	5111.6	-35.71	-25	10.71
LTE B7_20M_CHLOW_RB1_3-18GHz	5020.5	-39.65	-25	14.7
LTE B7_20M_CHMID_RB1_3-18GHz	5070.0	-44.77	-25	19.77
LTE B7_20M_CHHIGH_RB1_3-18GHz	5120.3	-34.17	-25	9.17



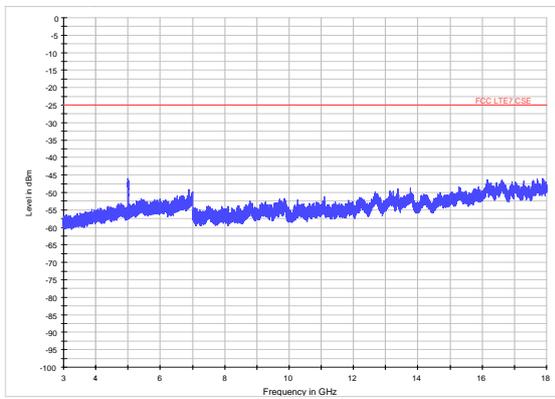
LTE Band 7 5MHz CH-Low 30MHz~3GHz



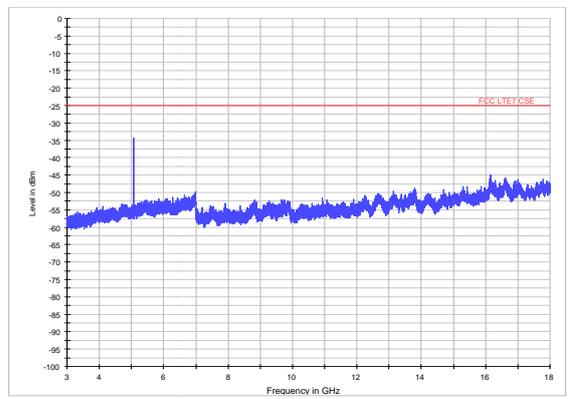
LTE Band 7 5MHz CH-Middle 30MHz~3GHz



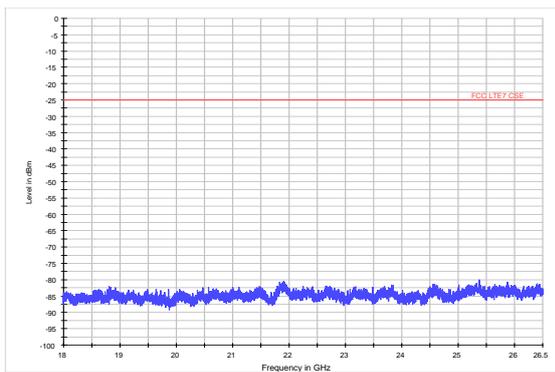
LTE Band 7 5MHz CH-Low 3GHz~18GHz



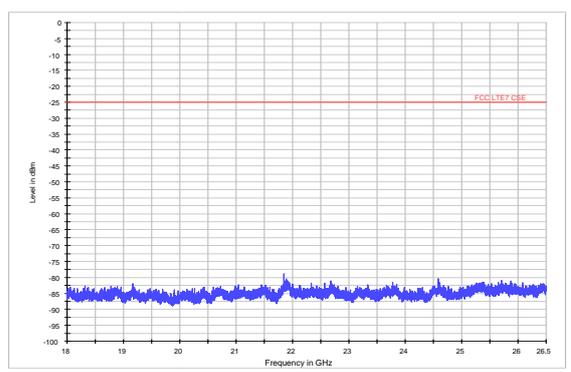
LTE Band 7 5MHz CH-Middle 3GHz~18GHz



LTE Band 7 5MHz CH-Low 18GHz~26.5GHz

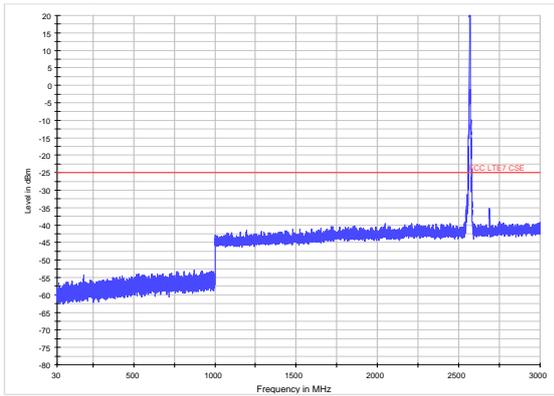


LTE Band 7 5MHz CH-Middle 18GHz~26.5GHz

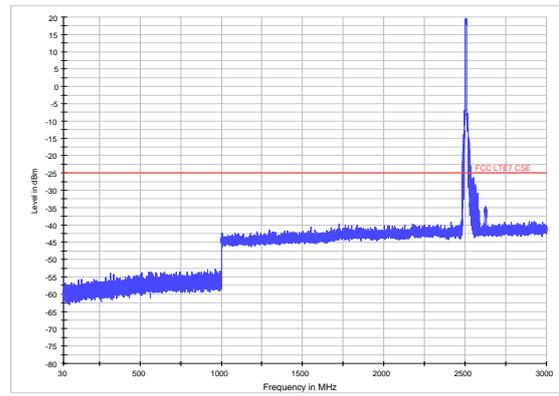




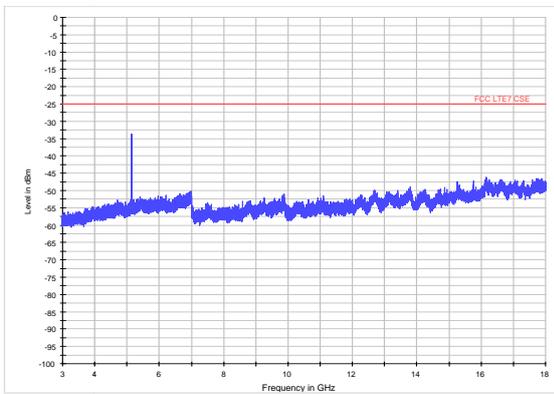
LTE Band 7 5MHz CH-High 30MHz~3GHz



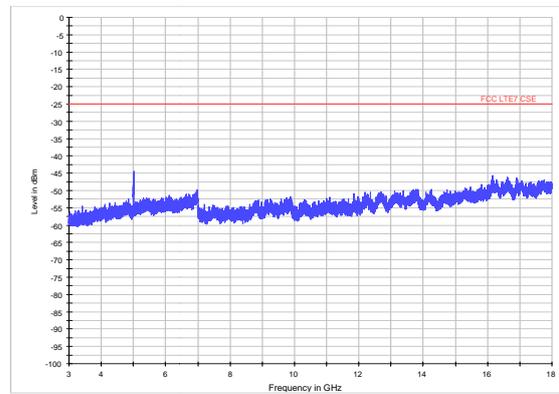
LTE Band 7 10MHz CH-Low 30MHz~3GHz



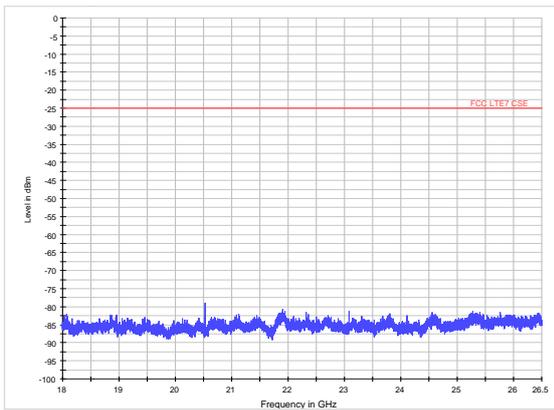
LTE Band 7 5MHz CH-High 3GHz~18GHz



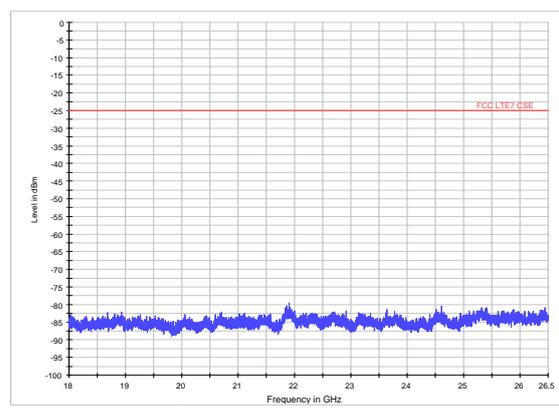
LTE Band 7 10MHz CH-Low 3GHz~18GHz



LTE Band 7 5MHz CH-High 18GHz~26.5GHz

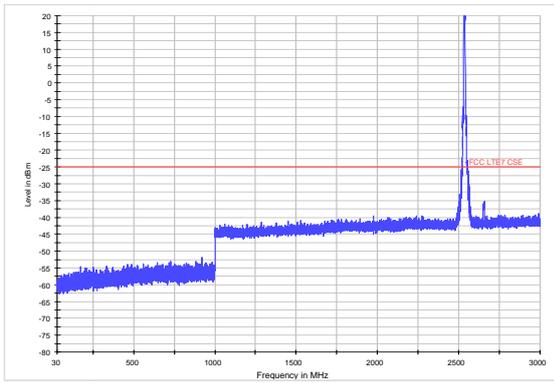


LTE Band 7 10MHz CH-Low 18GHz~26.5GHz

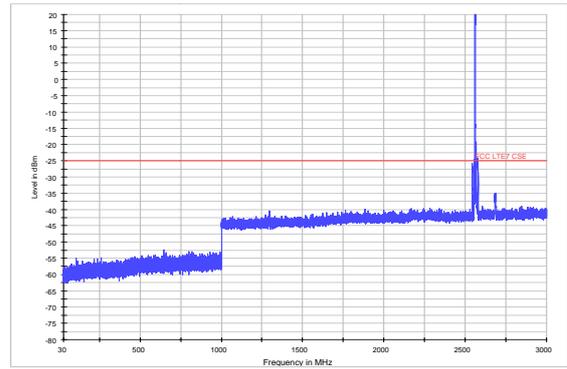




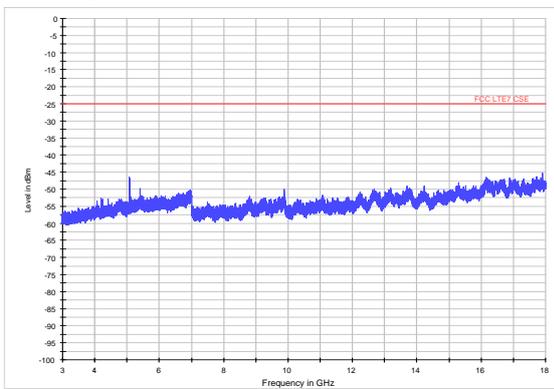
LTE Band 7 10MHz CH-Middle 30MHz~3GHz



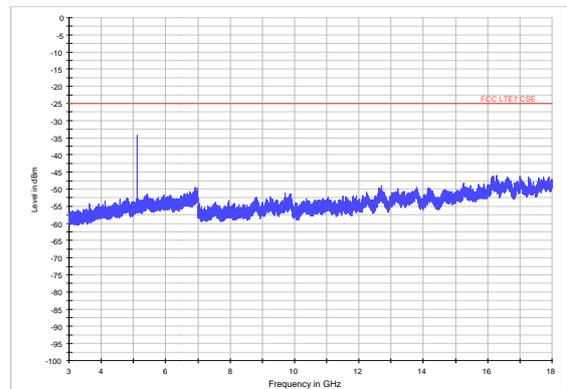
LTE Band 7 10MHz CH-High 30MHz~3GHz



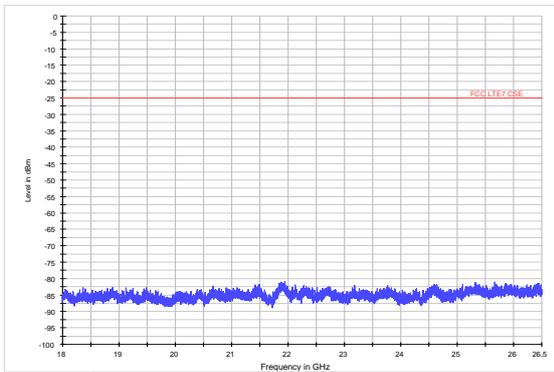
LTE Band 7 10MHz CH-Middle 3GHz~18GHz



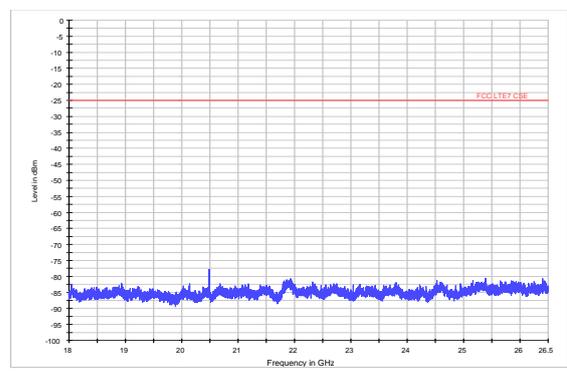
LTE Band 7 10MHz CH-High 3GHz~18GHz



LTE Band 7 10MHz CH-Middle 18GHz~26.5GHz

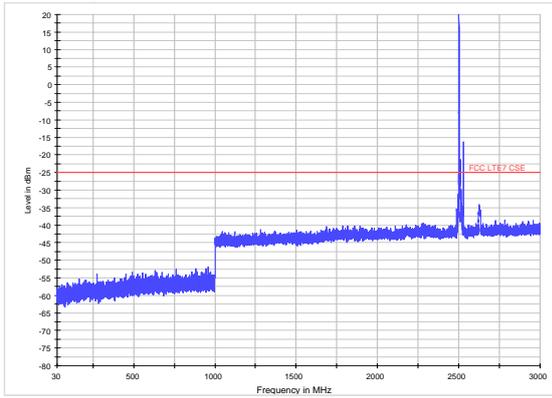


LTE Band 7 10MHz CH-High 18GHz~26.5GHz

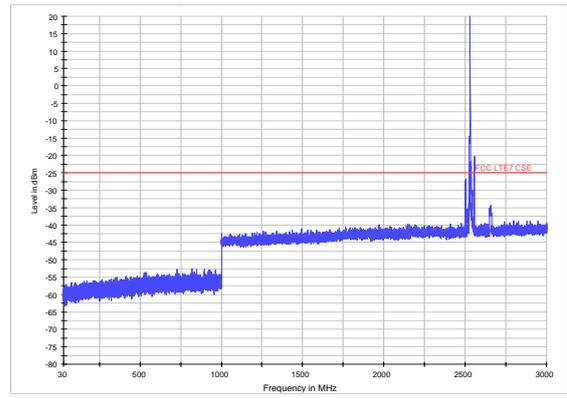




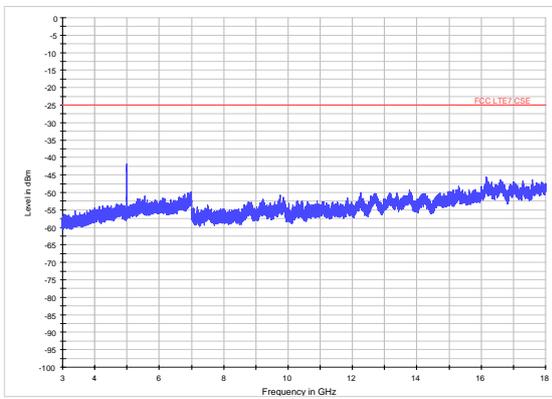
LTE Band 7 15MHz CH-Low 30MHz~3GHz



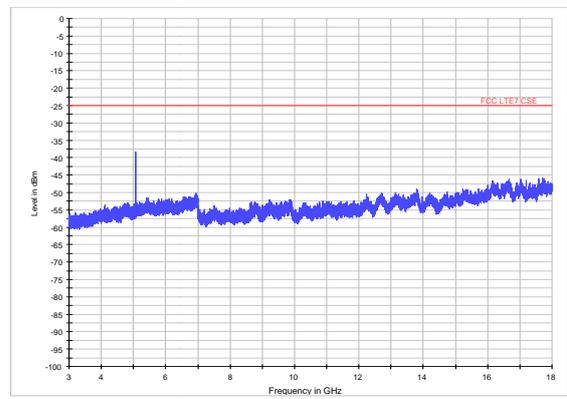
LTE Band 7 15MHz CH-Middle 30MHz~3GHz



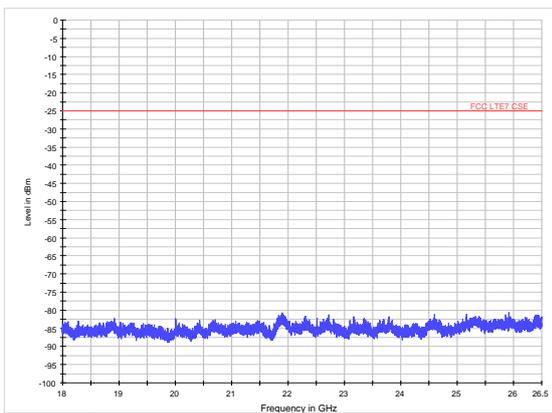
LTE Band 7 15MHz CH-Low 3GHz~18GHz



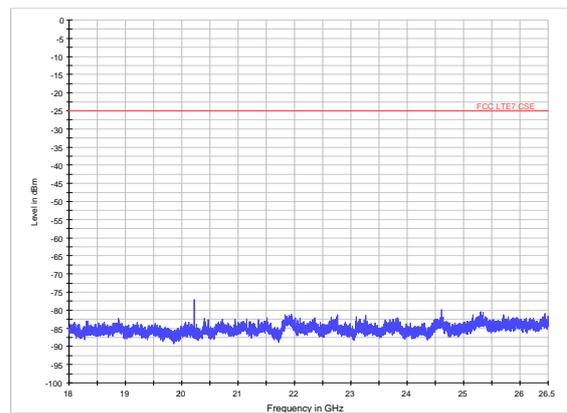
LTE Band 7 15MHz CH-Middle 3GHz~18GHz



LTE Band 7 15MHz CH-Low 18GHz~26.5GHz

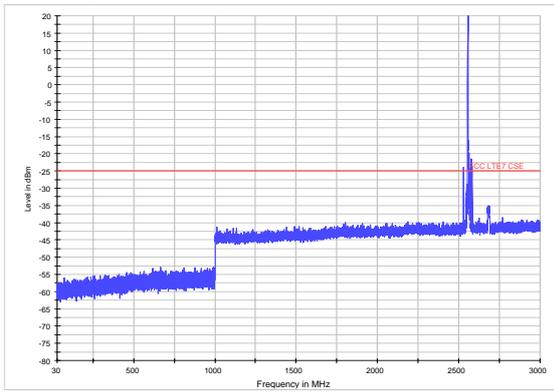


LTE Band 7 15MHz CH-Middle 18GHz~26.5GHz

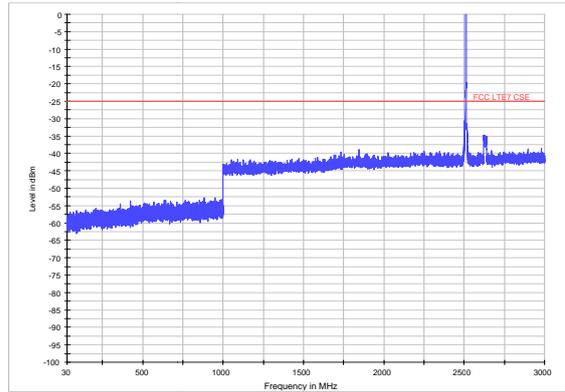




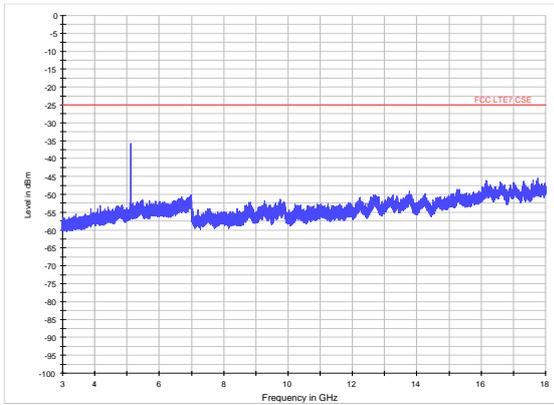
LTE Band 7 15MHz CH-High 30MHz~3GHz



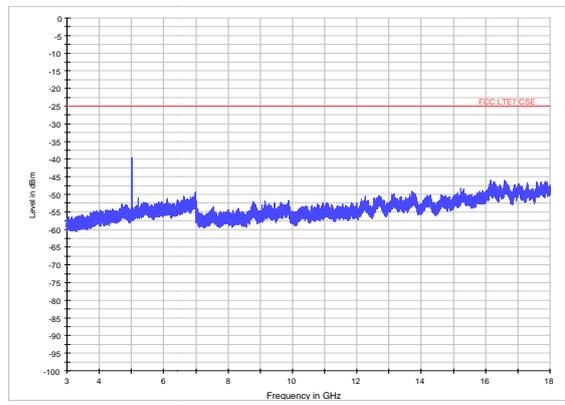
LTE Band 7 20MHz CH-Low 30MHz~3GHz



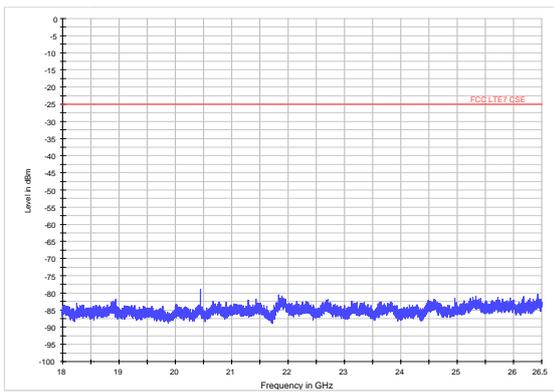
LTE Band 7 15MHz CH-High 3GHz~18GHz



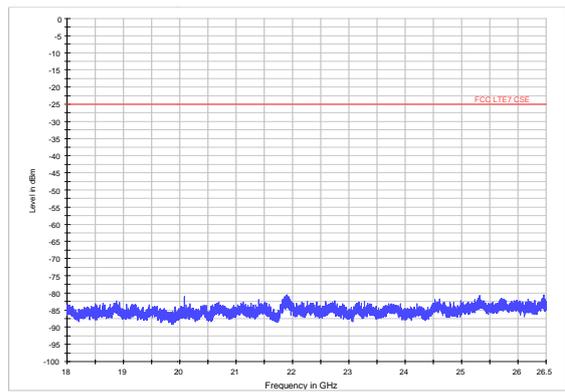
LTE Band 7 20MHz CH-Low 3GHz~18GHz



LTE Band 7 15MHz CH-High 18GHz~26.5GHz

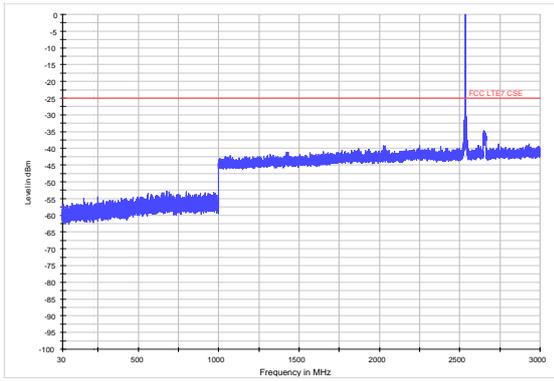


LTE Band 7 20MHz CH-Low 18GHz~26.5GHz

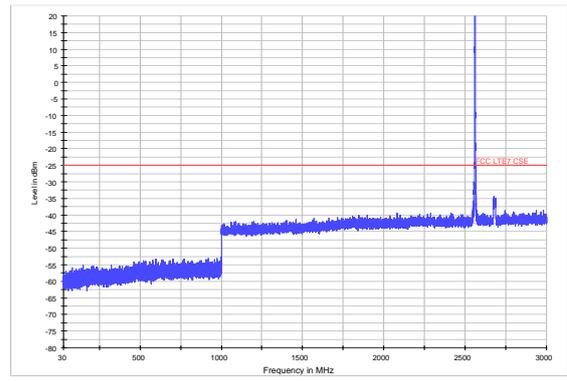




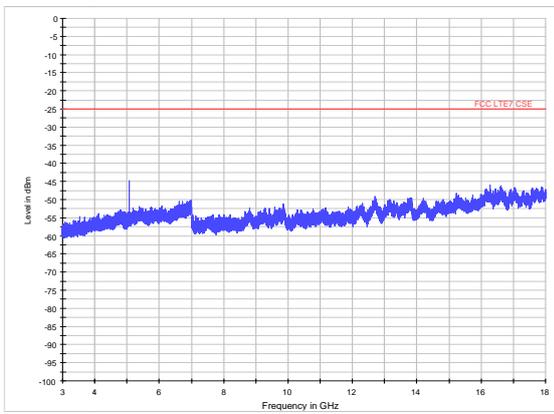
LTE Band 7 20MHz CH-Middle 30MHz~3GHz



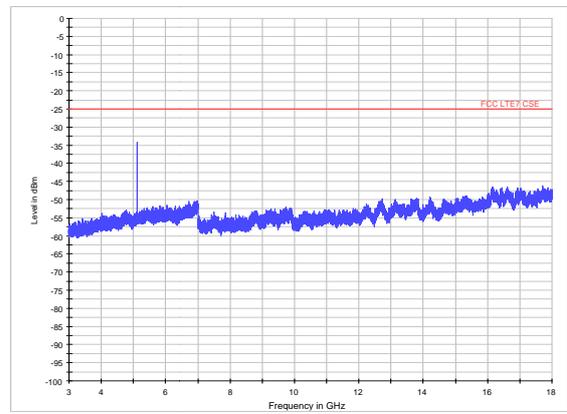
LTE Band 7 20MHz CH-High 30MHz~3GHz



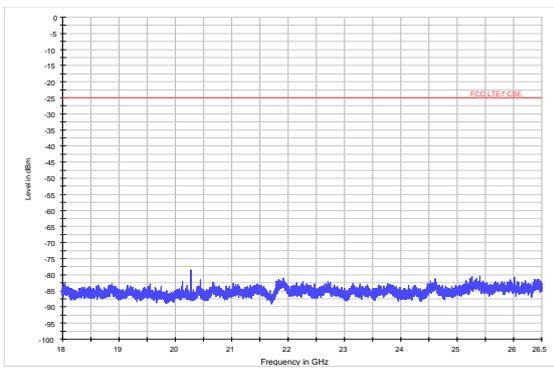
LTE Band 7 20MHz CH-Middle 3GHz~18GHz



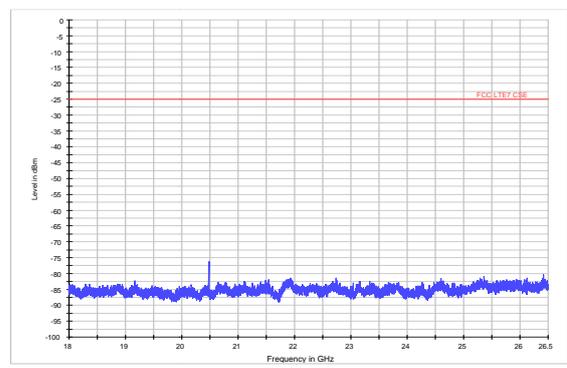
LTE Band 7 20MHz CH-High 3GHz~18GHz



LTE Band 7 20MHz CH-Middle 18GHz~26.5GHz



LTE Band 7 20MHz CH-High 18GHz~26.5GHz



## 4.8 Radiates Spurious Emission

### Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

### Method of Measurement

The measurements procedures in TIA -603-D are used.

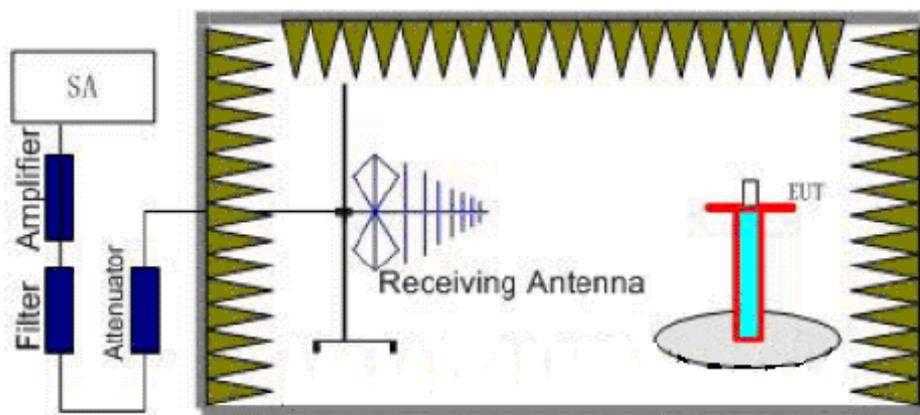
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment.

The emissions less than 20 dB below the permissible value are reported.

The procedure of Radiates Spurious Emission is as follows:

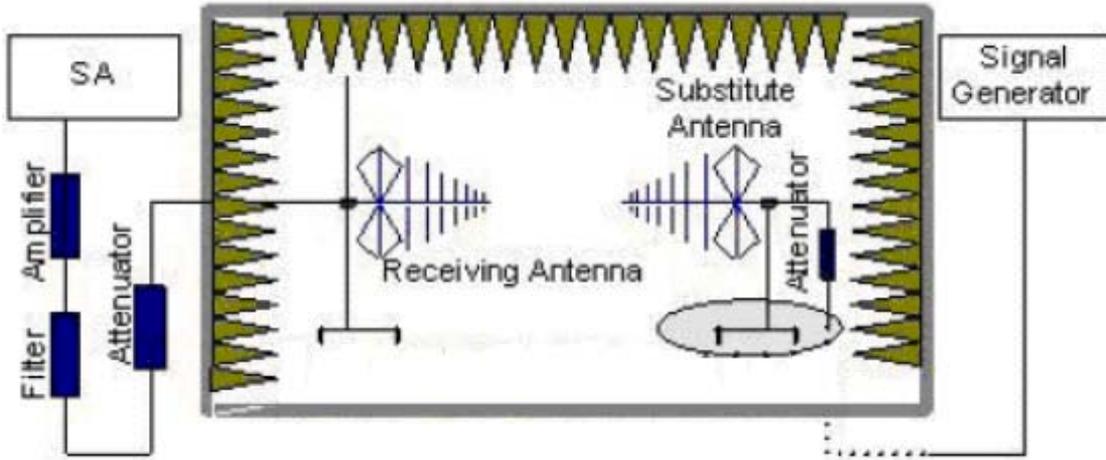
Step 1:

The measurement is carried out in the semi-anechoic chamber. EUT was placed on a 1.5 meters high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. A peak detector is used while RBW and VBW are both set to 1MHz. During the measurement, the highest emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna moved up and down over a range from 1 to 4 meters in both horizontally and vertically polarized orientations. The test setup refers to figure below.



Step 2:

A dipole antenna shall be substituted in place of the EUT. The antenna will be driven by a signal generator with a adjustable S.G. applied through a Tx cable. Adjust the level of the signal generator output until the value of the receiver reach the previously recorded analyzer power level (LVL). Then The E.R.P. /E.I.R.P. of the EUT can be calculated through the level of the signal generator, Tx cable loss and the gain of the substitution antenna. The test setup refers to figure below.



$$E.R.P \text{ (peak power)} = S.G. - Tx \text{ Cable loss} + \text{Substitution antenna gain} - 2.15.$$

$$EIRP = E.R.P + 2.15$$

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). Receiver antenna polarization (horizontal and vertical), The worst emission was found in position (Z axis, vertical polarization) and the worst case was recorded.

**Limits**

LTE -4/12 Rule Part 27.53(h) specifies that “the power of any emission outside a licensee’s frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10(P) dB.”

LTE -41 Rule Part 27.53(m) 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(4) of this section.

LTE -4/12 Limit	-13 dBm
LTE -41 Limit	-25 dBm

**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = \pm 1.96$ ,  $U = \pm 3.55$  dB.

**Test Result**

LTE Band 7 QPSK 5MHz CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	5000.6	-12.63	-31.7	-63.01	Vertical	-43.94	-25	18.94	180
3	7500.8	-12.96	-29.2	-61.40	Vertical	-45.16	-25	20.16	225
4	10001.3	-12.96	-24.9	-59.40	Vertical	-47.46	-25	22.46	180
5	12512.50	-16.87	-24.2	-59.63	Vertical	-52.30	-25	27.30	135
6	15015	-16.22	-22.5	-58.38	Vertical	-52.10	-25	27.10	90
7	17517.50	-8.35	-20.5	-57.45	Vertical	-45.30	-25	20.30	45
8	20020	-67.26	-50.7	-65.74	Vertical	-82.30	-25	57.30	180
9	22522.50	-69.65	-52.2	-65.95	Vertical	-83.40	-25	58.40	45
10	25025	-75.14	-51.3	-65.56	Vertical	-89.40	-25	64.40	0

- Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.  
 2. The worst emission was found in the antenna is vertical position.

LTE Band 7 QPSK 5MHz CH-Middle,

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	5065.9	-11.24	-31.2	-63.07	Vertical	-43.11	-25	18.11	0
3	7598.6	-15.21	-29.0	-61.25	Vertical	-47.46	-25	22.46	0
4	10140.0	-10.85	-24.3	-59.45	Vertical	-46	-25	21.00	90
5	12675.0	-17.34	-24.5	-59.66	Vertical	-52.50	-25	27.50	135
6	15210.0	-16.14	-22.3	-58.36	Vertical	-52.20	-25	27.20	90
7	17745.0	-9.32	-21.7	-58.08	Vertical	-45.70	-25	20.70	45
8	20280.0	-68.24	-51.5	-66.16	Vertical	-82.90	-25	57.90	180
9	22815.0	-69.55	-51.2	-65.25	Vertical	-83.60	-25	58.60	45
10	25350.0	-75.25	-51.3	-65.85	Vertical	-89.80	-25	64.80	180

- Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.  
 2. The worst emission was found in the antenna is vertical position.



LTE Band 7 QPSK 5MHz CH-High,

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	5130.4	-6.41	-31.2	-63.25	Vertical	-38.46	-25	13.46	180
3	7696.1	-14.79	-28.5	-60.98	Vertical	-47.27	-25	22.27	45
4	10230	-14.93	-27.5	-59.57	Vertical	-47	-25	22.00	0
5	12787.50	-18.12	-24.7	-59.68	Vertical	-53.10	-25	28.10	135
6	15345	-18.04	-23.4	-58.06	Vertical	-52.70	-25	27.70	90
7	17902.50	-7.70	-19.2	-57.80	Vertical	-46.30	-25	21.30	45
8	20460	-68.72	-51.1	-65.58	Vertical	-83.20	-25	58.20	180
9	23017.50	-69.55	-51.5	-65.65	Vertical	-83.70	-25	58.70	45
10	25575	-76.24	-50.9	-65.66	Vertical	-91	-25	66.00	180

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is vertical position.

LTE Band 7 QPSK 10MHz CH-Low,

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	5001.4	-12.14	-31.7	-63.01	Vertical	-43.45	-25	18.45	225
3	7501.9	-7.97	-29.2	-61.40	Vertical	-40.17	-25	15.17	225
4	10002.2	-12.21	-24.9	-59.40	Vertical	-46.71	-25	21.71	225
5	12525	-11.87	-24.2	-59.63	Vertical	-47.30	-25	22.30	135
6	15030	-12.62	-22.5	-58.38	Vertical	-48.50	-25	23.50	90
7	17535	-5.35	-20.5	-57.45	Vertical	-42.30	-25	17.30	45
8	20040	-66.26	-50.7	-65.74	Vertical	-81.30	-25	56.30	180
9	22545	-68.35	-52.2	-65.95	Vertical	-82.10	-25	57.10	45
10	25050	-66.24	-51.3	-65.56	Vertical	-80.50	-25	55.50	270

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is vertical position.

LTE Band 7 QPSK 10MHz CH-Middle,

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	5061.0	-7.03	-31.2	-63.07	Vertical	-38.90	-25	13.90	0
3	7591.5	-14.91	-29.0	-61.25	Vertical	-47.16	-25	22.16	0
4	10140.0	-22.15	-24.3	-59.45	Vertical	-57.30	-25	32.30	180
5	12675.0	-12.14	-24.5	-59.66	Vertical	-47.30	-25	22.30	135
6	15210.0	-13.34	-22.3	-58.36	Vertical	-49.40	-25	24.40	90
7	17745.0	-6.32	-21.7	-58.08	Vertical	-42.70	-25	17.70	45
8	20280.0	-67.04	-51.5	-66.16	Vertical	-81.70	-25	56.70	180
9	22815.0	-68.75	-51.2	-65.25	Vertical	-82.80	-25	57.80	45
10	25350.0	-66.65	-51.3	-65.85	Vertical	-81.20	-25	56.20	45

- Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.  
 2. The worst emission was found in the antenna is vertical position.

LTE Band 7 QPSK 10MHz CH-High,

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	5121.4	-5.60	-31.2	-63.25	Vertical	-37.65	-25	12.65	180
3	7681.5	-9.90	-28.5	-60.98	Vertical	-42.38	-25	17.38	180
4	10240	-25.33	-27.5	-59.57	Vertical	-57.40	-25	32.40	90
5	12800	-12.92	-24.7	-59.68	Vertical	-47.90	-25	22.90	135
6	15360	-14.94	-23.4	-58.06	Vertical	-49.60	-25	24.60	90
7	17920	-5	-19.2	-57.80	Vertical	-43.60	-25	18.60	45
8	20480	-68.22	-51.1	-65.58	Vertical	-82.70	-25	57.70	180
9	23040	-69.65	-51.5	-65.65	Vertical	-83.80	-25	58.80	45
10	25600	-66.34	-50.9	-65.66	Vertical	-81.10	-25	56.10	45

- Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.  
 2. The worst emission was found in the antenna is vertical position.

LTE Band 7 QPSK 15MHz CH-Low,

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	5001.8	-13.24	-31.7	-63.01	Vertical	-44.55	-25	19.55	225
3	7502.3	-7.20	-29.2	-61.40	Vertical	-39.40	-25	14.40	225
4	10030	-21.60	-24.9	-59.40	Vertical	-56.10	-25	31.10	90
5	12537.50	-11.07	-24.2	-59.63	Vertical	-46.50	-25	21.50	135
6	15045	-12.22	-22.5	-58.38	Vertical	-48.10	-25	23.10	90
7	17552.50	-6.25	-20.5	-57.45	Vertical	-43.20	-25	18.20	45
8	20060	-65.66	-50.7	-65.74	Vertical	-80.70	-25	55.70	180
9	22567.50	-68.05	-52.2	-65.95	Vertical	-81.80	-25	56.80	45
10	25075	-66.64	-51.3	-65.56	Vertical	-80.90	-25	55.90	45

- Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.  
 2. The worst emission was found in the antenna is vertical position.

LTE Band 7 QPSK 15MHz CH-Middle,

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	5056.9	-7.70	-31.2	-63.07	Vertical	-39.57	-25	14.57	180
3	7585.1	-11.04	-29.0	-61.25	Vertical	-43.29	-25	18.29	180
4	10140	-21.05	-24.3	-59.45	Vertical	-56.20	-25	31.20	90
5	12675	-11.84	-24.5	-59.66	Vertical	-47	-25	22	135
6	15210	-12.94	-22.3	-58.36	Vertical	-49	-25	24	90
7	17745	-7.52	-21.7	-58.08	Vertical	-43.90	-25	18.90	45
8	20280	-66.64	-51.5	-66.16	Vertical	-81.30	-25	56.30	180
9	22815	-67.85	-51.2	-65.25	Vertical	-81.90	-25	56.90	45
10	25350	-66.95	-51.3	-65.85	Vertical	-81.50	-25	56.50	45

- Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.  
 2. The worst emission was found in the antenna is vertical position.

LTE Band 7 QPSK 15MHz CH-High,

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	5112.0	-7.10	-31.2	-63.25	Vertical	-39.15	-25	14.15	0
3	7667.6	-6.46	-28.5	-60.98	Vertical	-38.94	-25	13.94	180
4	10250	-24.53	-27.5	-59.57	Vertical	-56.60	-25	31.60	270
5	12812.50	-12.62	-24.7	-59.68	Vertical	-47.60	-25	22.60	135
6	15375	-14.64	-23.4	-58.06	Vertical	-49.30	-25	24.30	90
7	17937.50	-5.50	-19.2	-57.80	Vertical	-44.10	-25	19.10	45
8	20500	-67.32	-51.1	-65.58	Vertical	-81.80	-25	56.80	180
9	23062.50	-69.15	-51.5	-65.65	Vertical	-83.30	-25	58.30	45
10	25625	-67.04	-50.9	-65.66	Vertical	-81.80	-25	56.80	0

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is vertical position.

LTE Band 7 QPSK 20MHz CH-Low,

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	5002.1	-12.43	-31.7	-63.01	Vertical	-43.74	-25	18.74	180
3	7503.4	-7.10	-29.2	-61.40	Vertical	-39.30	-25	14.30	180
4	10004.5	-12.63	-24.9	-59.40	Vertical	-47.13	-25	22.13	180
5	12550	-11.67	-24.2	-59.63	Vertical	-47.10	-25	22.10	135
6	15060	-11.72	-22.5	-58.38	Vertical	-47.60	-25	22.60	90
7	17570	-5.35	-20.5	-57.45	Vertical	-42.30	-25	17.30	45
8	20080	-66.06	-50.7	-65.74	Vertical	-81.10	-25	56.10	180
9	22590	-66.95	-52.2	-65.95	Vertical	-80.70	-25	55.70	0
10	25100	-67.04	-51.3	-65.56	Vertical	-81.30	-25	56.30	0

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is vertical position.

LTE Band 7 QPSK 20MHz CH-Middle,

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	5052.0	-11.81	-31.2	-63.07	Vertical	18.68	-25	18.68	180
3	7578.0	-6.56	-29.0	-61.25	Vertical	13.81	-25	13.81	180
4	10140.0	-22.05	-24.3	-59.45	Vertical	32.20	-25	32.20	90
5	12675.0	-12.84	-24.5	-59.66	Vertical	23	-25	23	135
6	15210.0	-11.84	-22.3	-58.36	Vertical	22.90	-25	22.90	90
7	17745.0	-6.02	-21.7	-58.08	Vertical	17.40	-25	17.40	45
8	20280.0	-67.14	-51.5	-66.16	Vertical	56.80	-25	56.80	180
9	22815.0	-66.95	-51.2	-65.25	Vertical	56	-25	56	45
10	25350.0	-67.75	-51.3	-65.85	Vertical	57.30	-25	57.30	0

- Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.  
 2. The worst emission was found in the antenna is vertical position.

LTE Band 7 QPSK 20MHz CH-High,

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	5102.3	-9.71	-31.2	-63.25	Vertical	-41.76	-25	16.76	0
3	7653.4	-5.48	-28.5	-60.98	Vertical	-37.96	-25	12.96	180
4	10240	-25.43	-27.5	-59.57	Vertical	-57.50	-25	32.50	270
5	12800	-12.32	-24.7	-59.68	Vertical	-47.30	-25	22.30	135
6	15360	-14.24	-23.4	-58.06	Vertical	-48.90	-25	23.90	90
7	17920	-4.40	-19.2	-57.80	Vertical	-43	-25	18	45
8	20480	-67.62	-51.1	-65.58	Vertical	-82.10	-25	57.10	180
9	23040	-67.35	-51.5	-65.65	Vertical	-81.50	-25	56.50	45
10	25600	-67.94	-50.9	-65.66	Vertical	-82.70	-25	57.70	0

- Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.  
 2. The worst emission was found in the antenna is vertical position.

## 5 Main Test Equipment

Name of Equipment	Type/ Model	Manufacturer	Serial Number	Last Cal.	Cal. Due Date
Base Station Simulator	CMW500	R&S	113645	2016-05-21	2017-05-20
Power Splitter	SHX-GF2-2-13	Hua Xiang	10120101	NA	NA
Universal Radio Communication Tester	E5515C	Agilent	MY48367192	2015-12-17	2016-12-16
Spectrum Analyzer	N9010A	Agilent	MY47191109	2016-05-21	2017-05-20
Spectrum Analyzer	FSP13	R&S	100679	2015-12-17	2016-12-16
Signal Analyzer	FSV30	R&S	100815	2015-12-17	2016-12-16
EMI Test Receiver	ESCI	R&S	100948	2016-05-21	2017-05-20
Trilog Antenna	VUBL 9163	SCHWARZBECK	9163-201	2013-11-25	2016-11-24
Trilog Antenna	VUBL 9163	SCHWARZBECK	9163-391	2014-12-06	2017-12-05
Horn Antenna	HF907	R&S	100126	2015-07-01	2018-06-30
Horn Antenna	HF907	R&S	100125	2014-12-06	2017-12-05
Horn Antenna	3160-09	ETS-Lindgren	00102643	2014-12-06	2017-12-05
Horn Antenna	3160-09	ETS-Lindgren	00102644	2014-12-06	2017-12-05
Climatic Chamber	PT-30B	Re Ce	20101891	2015-07-18	2016-07-17
RF Cable	SMA 15cm	Agilent	0001	2016-05-07	2016-08-06