

# FCC CFR47 PART 22H, 24E, 27 CERTIFICATION TEST REPORT

## FCC ID: 2AOWK-3117

**Product:** Mobile Phone

**Trade Mark:** ulefone

**Model No.:** GQ3117

**Family Model:** Armor X13, Armor X13 Pro,  
Armor X13 Lite,Armor X13 Plus,  
Armor X13S, Armor X13P,  
Armor X13T, Armor X13E

**Report No.:** S23060903601006

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# 1. GENERAL INFORMATION

## 1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	Mobile Phone
Trade Mark	ulefone
Model Name	GQ3117
Family Model	Armor X13, Armor X13 Pro, Armor X13 Lite,Armor X13 Plus, Armor X13S, Armor X13P, Armor X13T, Armor X13E
Model Difference	All the model are the same circuit and RF module, except the model names.
FCC ID:	2AOWK-3117
Frequency Bands:	U.S. Bands: <input checked="" type="checkbox"/> LTE FDD Band 2,4,5,7,12,17,41
Frequency Range:	LTE FDD Band 2 Uplink: 1850MHz-1910MHz, Downlink: 1930MHz-1990MHz; LTE FDD Band 4 Uplink: 1710MHz-1755MHz, Downlink: 2110MHz-2155MHz; LTE FDD Band 5 Uplink: 824MHz-849MHz, Downlink: 869MHz-894MHz; LTE-FDD Band 7 Uplink: 2500MHz-2570MHz, Downlink: 2620MHz-2690MHz; LTE FDD Band 12 Uplink: 699MHz-716MHz, Downlink: 729MHz-746MHz; LTE FDD Band 17 Uplink: 704MHz-716MHz, Downlink: 734MHz-746MHz; LTE FDD Band 41 Uplink: 2535MHz-2655MHz,
Type of Modulation:	QPSK/16QAM/64QAM(Only Downlink)
Power Class	Class 3
SIM Card:	SIM 1 and SIM 2 is a chipset unit and tested as a single chipset. The SIM 1 is chosen for test.
Antenna:	PIFA Antenna
Antenna gain:	Band 2: 1.5 dBi, Band 4: 1.2 dBi, Band 5: 0.2 dBi, Band 7: 1.2 dBi, Band 12: -0.1 dBi, Band 17: -0.1 dBi, Band 41: 1.5 dBi
Adapter	Model: HJ-0502000W2-US Input: 100-240V~50/60Hz 0.3A Output: 5V---2000mA
Battery	DC 3.85V, 6320mAh, 24.332Wh
Power supply	DC 3.85V from battery or DC 5V from adapter
Extreme Vol. Limits:	DC 3.27V to DC 4.43V (Nominal DC 3.85V) (Note 1)
HW Version	P1_02
SW Version	Armor X13_SH1_EEA_V10
** Note1: The High Voltage DC 4.43V and Low Voltage 3.27V was declared by manufacturer, The EUT couldn't be operate normally with higher or lower voltage.	

**1.2 RELATED SUBMITTAL(S) / GRANT (S)**

This submittal(s) (test report) is intended for **FCC ID: 2AOWK-3117** filing to comply with the FCC Part 22H&24E&27&90S.

**1.3 TEST METHODOLOGY**

The tests documented in this report were performed in accordance with ANSI/TIA-603-E-2016, FCC CFR 47 Part 2, Part 22, Part 24, Part 27, ANSI C63.26:2015.

**1.4 TEST FACILITY**

The test site used to collect the radiated data is located at:

ShenZhen NTEK Testing Technology Co., Ltd.

1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R.China.

The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.26:2015& ANSI C63.4: 2014.

FCC Registration No.:463705

IC Registration No.:9270A-1,

CNAS Registration No.:L5516

**MEASUREMENT UNCERTAINTY**

The reported uncertainty of measurement, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.5dB

**1.5 SPECIAL ACCESSORIES**

The battery and the charger, earphone supplied by the applicant were used as accessories and being tested with EUT intended for FCC grant together.

**1.6 WORST-CASE CONFIGURATION AND MODE**

The worst-case scenario for all measurements is based on the investigation results.

The device has LTE Bands of: Band 2/4/5/7/12/17/41

The RB Size was selected to measure for peak or average ERP and EIRP, which was based on the conducted power verification baseline data.

For the fundamental investigation of radiated emissions, the EUT is investigated for vertical and horizontal antenna orientations and X Y and Z orientations of the EUT alone. After the investigations the worst case was determined to be at X orientation for all LTE bands.

## 2. SYSTEM TEST CONFIGURATION

### 2.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT EXERCISE

The Transmitter was operated in the maximum output power mode through Communication Tester. The TX frequency was fixed which was for the purpose of the measurements.

### 2.3 CONFIGURATION OF EUT SYSTEM

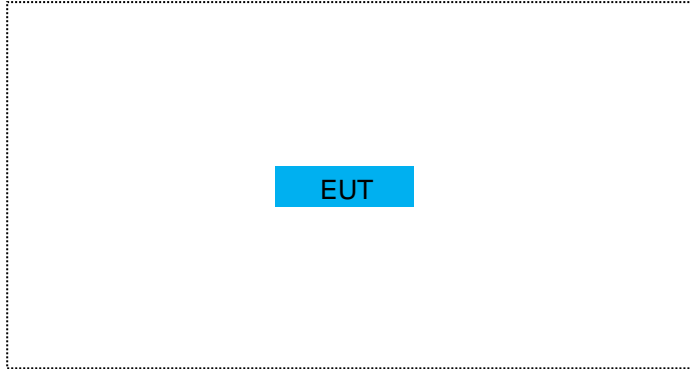
Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Note
1	Mobile Phone	GQ3117	FCC ID: 2AOWK-3117	EUT

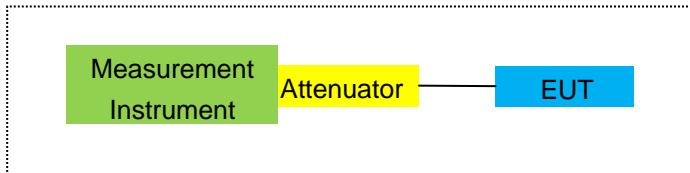
*Note: All the accessories have been used during the test.  
the following "EUT" in setup diagram means EUT system.*

## 2.4 TEST SETUP

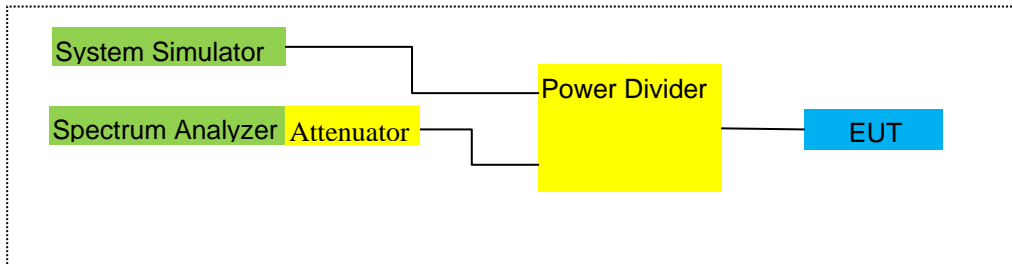
For Radiated Test Cases



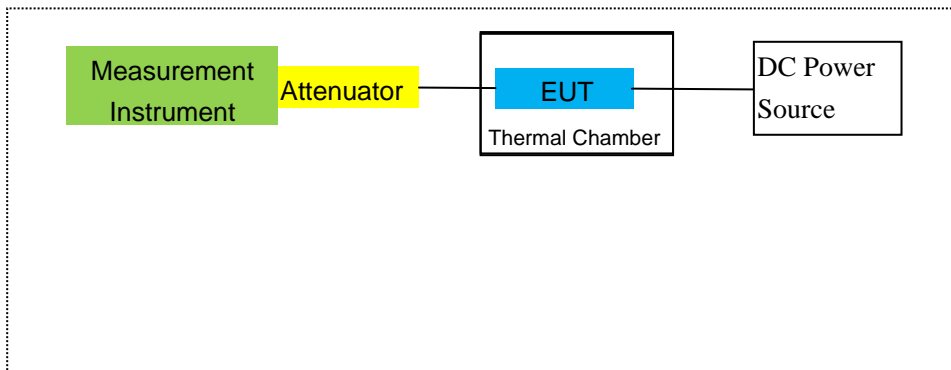
For Conducted Output Power



For Peak-to Average Ratio, Occupied Bandwidth, Conducted Band edge and Conducted Spurious Emission



For Frequency Stability



Note: EUT built-in battery-powered, the battery is fully-charged.



### 3. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	MXA Signal Analyzer	Agilent	N9020A	MY49100060	2023.05.29	2024.05.28	1 year
2	Test Receiver	R&S	ESPI	101318	2023.03.27	2024.03.26	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2023.03.16	2024.03.15	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2023.05.06	2026.05.05	3 year
5	Horn Antenna	EM	EM-AH-10180	2011071402	2022.03.31	2025.03.30	3 year
6	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2022.11.07	2023.11.06	1 year
7	Amplifier	EM	EM-30180	060538	2023.05.29	2024.05.28	1 year
8	Loop Antenna	ARA	PLA-1030/B	1029	2022.11.04	2023.11.05	1 year
9	Power Meter	R&S	NRVS	100696	2023.05.29	2024.05.28	1 year
10	Power Sensor	R&S	URV5-Z4	0395.1619.05	2023.05.29	2024.05.28	1 year
11	Test Cable	N/A	R-01	N/A	2022.06.17	2025.06.16	3 year
12	Test Cable	N/A	R-02	N/A	2022.06.17	2025.06.16	3 year
13	Test Cable	N/A	R-03	N/A	2022.06.17	2025.06.16	3 year
14	Test Receiver	R&S	ESCI	101160	2023.03.27	2024.03.26	1 year
15	LISN	R&S	ENV216	101313	2023.03.27	2024.03.26	1 year
16	LISN	EMCO	3816/2	00042990	2023.03.27	2024.03.26	1 year
17	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2023.03.27	2024.03.26	1 year
18	Passive Voltage Probe	R&S	ESH2-Z3	100196	2023.03.27	2024.03.26	1 year
19	Test Cable	N/A	C01	N/A	2023.05.06	2026.05.05	3 year
20	Test Cable	N/A	C02	N/A	2023.05.06	2026.05.05	3 year
21	Test Cable	N/A	C03	N/A	2023.05.06	2026.05.05	3 year
22	Spectrum Analyzer	agilent	e4440a	us44300399	2023.03.27	2024.03.26	1 year
23	test receiver	R&S	ESCI	a0304218	2023.03.27	2024.03.26	1 year
24	Communication Tester	R&S	CMU200	A0304247	2023.05.29	2024.05.28	1 year
25	Thermal Chamber	Ten Billion	TTC-B3C	TBN-960502	2023.03.27	2024.03.26	1 year

26	DC Power Source	N/A	PS-6005D	2017040292 3	2023.05.06	2026.05.05	3 year
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Note: Each piece of equipment is scheduled for calibration once a year except the Test Cable& DC Power Source which is scheduled for calibration every 3 years.

## 4. OUTPUT POWER

### 4.1 OUTPUT POWER MEASUREMENT

#### LTE Measurement Procedure:

All LTE bands conducted power peak and average are obtained from the CMW500 telecommunication test set. The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3**

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS\_01".3

**Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)**

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks ( $N_{RB}$ )	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4, 10, 23, 25, 35, 36	3	>5	$\leq 1$
			5	>6	$\leq 1$
			10	>6	$\leq 1$
			15	>8	$\leq 1$
			20	>10	$\leq 1$
NS_04	6.6.2.2.2	41	5	>6	$\leq 1$
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	$\geq 50$	$\leq 1$
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3	13	10	Table 6.2.4-2	Table 6.2.4-2
	6.6.3.3.2				
NS_08	6.6.3.3.3	19	10, 15	> 44	$\leq 3$
NS_09	6.6.3.3.4	21	10, 15	> 40	$\leq 1$
				> 55	$\leq 2$
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23 <sup>1</sup>	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

Test data reference attachment.

## 5. OCCUPIED BANDWIDTH

### RULE PART(S)

FCC: §2.1049

### LIMITS

For reporting purposes only

### TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

### MODES TESTED

Band 2/4/5/7/12/17/41

### RESULTS

**PASS**

Test data reference attachment.

## 6. BANDEDGE AND EMISSION MASK

### RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238, §27.53, and §90.691

FCC: §22.359

### LIMITS

FCC: §22.917, §24.238, §27.53

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.

(m)(4) 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)(6) 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. Show citation box.

(c)(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than  $65 + 10 \log (P)$  dB in a 6.25 kHz band segment, for mobile and portable stations;

FCC: §90.691 Emission mask requirements for EA-based systems.

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \log_{10}(f/6.1)$  decibels or  $50 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

**TEST PROCEDURE**

The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each band edge measurement:

Set the spectrum analyzer span to include the block edge frequency

Set a marker to point the corresponding band edge frequency in each test case.

Set resolution bandwidth to at least 1% of emission bandwidth.

**MODES TESTED**

Band 2/4/5/7/12/17/41

**RESULTS**

Test data reference attachment.

## 7. OUT OF BAND EMISSIONS

### RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238, §27.53 and §90.691

### LIMITS

1. 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. The Band 7/41 emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $55 + 10 \log (P)$  dB.

### TEST PROCEDURE

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

For each out of band emissions measurement:

- 
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

### **MODES TESTED**

- Band 2/4/5/7/12/17/41
- 

### 7.1 MEASUREMENT METHOD

The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.

Test data reference attachment.



## 8. RADIATED MEASUREMENT

### 8.1. RADIATED POWER (ERP & EIRP)

#### RULE PART(S)

FCC: §2.1046, §22.913, §24.232, §27.50 and §90.635

#### LIMITS:

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

27.50 (c) (10) the following power and antenna height requirements apply to stations transmitting in the 698–746 MHz band, the portable stations (hand-held devices) are limited to 3 watts ERP.

27.50 (b)(10) Portable stations (hand-held devices) transmitting in the 746–757 MHz, 758–763 MHz, 776–793 MHz, and 805–806 MHz bands are limited to 3 watts ERP.

27.50 (d)(4) The following power and antenna height requirements apply to stations transmitting in the 1710–1755 MHz and 2110–2155 MHz bands: Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

27.50 (h)(2) 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.

90.635(b) The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).

#### TEST PROCEDURE

ANSI/TIA-603-E Clause 2.2.17

KDB 971168 v02r01 RF power output using broadband peak and average power meter method.

KDB 971168 D01 Power Meas License Digital Systems v02r01, "Measurement Guidance for Certification of Licensed Digital Transmitters"

#### MODES TESTED

- Band 2/4/5/7/12/17/41

#### RESULTS

Pass

8.2 LTE BAND 2

Radiated Power (EIRP) for Band 2										
Mode	RB/RB SIZE	Frequency	Result						Polarization Of Max. ERP	Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Factor (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)			
1.4MHz Band QPSK	1/#Mid	1850.7	-0.59	3.76	28.24	23.89	244.906	Horizontal	Pass	
		1880	-0.32	3.91	28.22	23.99	250.611	Horizontal	Pass	
		1909.3	-0.30	3.93	28.20	23.97	249.459	Horizontal	Pass	
3.0MHz Band QPSK	1/#Mid	1851.5	-0.54	3.77	28.23	23.92	246.604	Horizontal	Pass	
		1880	-0.42	3.91	28.24	23.91	246.037	Horizontal	Pass	
		1908.5	-0.41	3.94	28.25	23.90	245.471	Horizontal	Pass	
5.0MHz Band QPSK	1/#Mid	1852.5	-0.71	3.77	28.31	23.83	241.546	Horizontal	Pass	
		1880	-0.35	3.91	28.22	23.96	248.886	Horizontal	Pass	
		1907.5	-0.30	3.94	28.20	23.96	248.886	Horizontal	Pass	
10.0MHz Band QPSK	1/#Mid	1855	-0.66	3.79	28.33	23.88	244.343	Horizontal	Pass	
		1880	-0.31	3.95	28.22	23.96	248.886	Horizontal	Pass	
		1905	-0.35	3.97	28.19	23.87	243.781	Horizontal	Pass	
15.0MHz Band QPSK	1/#Mid	1857.5	-0.70	3.79	28.34	23.85	242.661	Horizontal	Pass	
		1880	-0.41	3.95	28.22	23.86	243.220	Horizontal	Pass	
		1902.5	-0.29	3.97	28.18	23.92	246.604	Horizontal	Pass	
20.0MHz Band QPSK	1/#Mid	1860	-0.55	3.81	28.35	23.99	250.611	Horizontal	Pass	
		1880	-0.44	3.96	28.22	23.82	240.991	Horizontal	Pass	
		1900	-0.20	4.00	28.16	23.96	248.886	Horizontal	Pass	
1.4MHz Band QPSK	1/#Mid	1850.7	-0.50	3.76	28.24	23.98	250.035	Vertical	Pass	
		1880	-0.45	3.91	28.22	23.86	243.220	Vertical	Pass	
		1909.3	-0.39	3.93	28.20	23.88	244.343	Vertical	Pass	
3.0MHz Band QPSK	1/#Mid	1851.5	-0.51	3.77	28.23	23.95	248.313	Vertical	Pass	
		1880	-0.44	3.91	28.24	23.89	244.906	Vertical	Pass	
		1908.5	-0.46	3.94	28.25	23.85	242.661	Vertical	Pass	
5.0MHz Band QPSK	1/#Mid	1852.5	-0.70	3.77	28.31	23.84	242.103	Vertical	Pass	
		1880	-0.42	3.91	28.22	23.89	244.906	Vertical	Pass	
		1907.5	-0.37	3.94	28.20	23.89	244.906	Vertical	Pass	
10.0MHz Band QPSK	1/#Mid	1855	-0.64	3.79	28.33	23.90	245.471	Vertical	Pass	
		1880	-0.27	3.95	28.22	24.00	251.189	Vertical	Pass	
		1905	-0.30	3.97	28.19	23.92	246.604	Vertical	Pass	

15.0MHz Band QPSK	1/#Mid	1857.5	-0.58	3.79	28.34	23.97	249.459	Vertical	Pass
		1880	-0.32	3.95	28.22	23.95	248.313	Vertical	Pass
		1902.5	-0.25	3.97	28.18	23.96	248.886	Vertical	Pass
20.0MHz Band QPSK	1/#Mid	1860	-0.50	3.81	28.35	24.04	253.513	Vertical	Pass
		1880	-0.22	3.96	28.22	24.04	253.513	Vertical	Pass
		1900	-0.11	4.00	28.16	24.05	254.097	Vertical	Pass

Radiated Power (EIRP) for Band 2									
Mode	RB/RB SIZE	Frequency	Result					Polarization Of Max. ERP	Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Factor (dB)	Max. EIRP Average (dBm)	Max. EIRP		
							Average (mW)		
1.4MHz Band 16 QAM	1/#Mid	1850.7	-1.73	3.76	28.24	22.75	188.365	Horizontal	Pass
		1880	-1.52	3.91	28.22	22.79	190.108	Horizontal	Pass
		1909.3	-1.60	3.93	28.20	22.67	184.927	Horizontal	Pass
3.0MHz Band 16 QAM	1/#Mid	1851.5	-1.70	3.77	28.23	22.76	188.799	Horizontal	Pass
		1880	-1.64	3.91	28.24	22.69	185.780	Horizontal	Pass
		1908.5	-1.52	3.94	28.25	22.79	190.108	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	1852.5	-1.75	3.77	28.31	22.79	190.108	Horizontal	Pass
		1880	-1.58	3.91	28.22	22.73	187.499	Horizontal	Pass
		1907.5	-1.57	3.94	28.20	22.69	185.780	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	1855	-1.77	3.79	28.33	22.77	189.234	Horizontal	Pass
		1880	-1.57	3.95	28.22	22.70	186.209	Horizontal	Pass
		1905	-1.42	3.97	28.19	22.80	190.546	Horizontal	Pass
15.0MHz Band 16 QAM	1/#Mid	1857.5	-1.78	3.79	28.34	22.77	189.234	Horizontal	Pass
		1880	-1.58	3.95	28.22	22.69	185.780	Horizontal	Pass
		1902.5	-1.52	3.97	28.18	22.69	185.780	Horizontal	Pass
20.0MHz Band 16 QAM	1/#Mid	1860	-1.91	3.81	28.35	22.63	183.231	Horizontal	Pass
		1880	-1.54	3.96	28.22	22.72	187.068	Horizontal	Pass
		1900	-1.49	4.00	28.16	22.67	184.927	Horizontal	Pass
1.4MHz Band 16 QAM	1/#Mid	1850.7	-1.76	3.76	28.24	22.72	187.068	Vertical	Pass
		1880	-1.52	3.91	28.22	22.79	190.108	Vertical	Pass
		1909.3	-1.53	3.93	28.20	22.74	187.932	Vertical	Pass
3.0MHz Band 16 QAM	1/#Mid	1851.5	-1.74	3.77	28.23	22.72	187.068	Vertical	Pass
		1880	-1.57	3.91	28.24	22.76	188.799	Vertical	Pass
		1908.5	-1.57	3.94	28.25	22.74	187.932	Vertical	Pass
5.0MHz	1/#Mid	1852.5	-1.79	3.77	28.31	22.75	188.365	Vertical	Pass

Band 16		1880	-1.51	3.91	28.22	22.80	190.546	Vertical	Pass
QAM		1907.5	-1.48	3.94	28.20	22.78	189.671	Vertical	Pass
10.0MHz	1/#Mid	1855	-1.76	3.79	28.33	22.78	189.671	Vertical	Pass
Band 16		1880	-1.55	3.95	28.22	22.72	187.068	Vertical	Pass
QAM		1905	-1.52	3.97	28.19	22.70	186.209	Vertical	Pass
15.0MHz	1/#Mid	1857.5	-1.84	3.79	28.34	22.71	186.638	Vertical	Pass
Band 16		1880	-1.59	3.95	28.22	22.68	185.353	Vertical	Pass
QAM		1902.5	-1.45	3.97	28.18	22.76	188.799	Vertical	Pass
20.0MHz	1/#Mid	1860	-1.70	3.81	28.35	22.84	192.309	Vertical	Pass
Band 16		1880	-1.42	3.96	28.22	22.84	192.309	Vertical	Pass
QAM		1900	-1.35	4.00	28.16	22.81	190.985	Vertical	Pass

**Note:**

SG Level= Signal generator output

Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

Factor Gain(dB)=Antenna Gain(dB) + Amplifier Factor (dB)

8.3 LTE BAND 4

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Factor (dB)	Max. EIRP	Max. EIRP	Polarization Of Max. ERP	
						Average (dBm)	Average (mW)		
1.4MHz Band QPSK	1/#Mid	1710.7	-1.98	3.12	27.58	22.48	177.011	Horizontal	Pass
		1732.5	-1.86	3.27	27.61	22.48	177.011	Horizontal	Pass
		1754.3	-1.95	3.29	27.63	22.39	173.380	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	1711.5	-2.13	3.13	27.61	22.35	171.791	Horizontal	Pass
		1732.5	-1.95	3.27	27.61	22.39	173.380	Horizontal	Pass
		1753.5	-1.85	3.30	27.62	22.47	176.604	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	1712.5	-2.08	3.13	27.63	22.42	174.582	Horizontal	Pass
		1732.5	-1.87	3.27	27.61	22.47	176.604	Horizontal	Pass
		1752.5	-1.81	3.30	27.60	22.49	177.419	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	1715	-2.12	3.15	27.64	22.37	172.584	Horizontal	Pass
		1732.5	-1.82	3.31	27.61	22.48	177.011	Horizontal	Pass
		1750	-1.86	3.33	27.59	22.40	173.780	Horizontal	Pass
15.0MHz Band QPSK	1/#Mid	1717.5	-2.13	3.15	27.65	22.37	172.584	Horizontal	Pass
		1732.5	-1.86	3.31	27.61	22.44	175.388	Horizontal	Pass
		1747.5	-1.80	3.33	27.57	22.44	175.388	Horizontal	Pass
20.0MHz Band QPSK	1/#Mid	1720	-2.07	3.17	27.66	22.42	174.582	Horizontal	Pass
		1732.5	-1.95	3.32	27.61	22.34	171.396	Horizontal	Pass
		1745	-1.82	3.36	27.56	22.38	172.982	Horizontal	Pass
1.4MHz Band QPSK	1/#Mid	1710.7	-2.08	3.12	27.58	22.38	172.982	Vertical	Pass
		1732.5	-1.92	3.27	27.61	22.42	174.582	Vertical	Pass
		1754.3	-1.94	3.29	27.63	22.40	173.780	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	1711.5	-2.08	3.13	27.61	22.40	173.780	Vertical	Pass
		1732.5	-1.85	3.27	27.61	22.49	177.419	Vertical	Pass
		1753.5	-1.88	3.30	27.62	22.44	175.388	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	1712.5	-2.07	3.13	27.63	22.43	174.985	Vertical	Pass
		1732.5	-1.94	3.27	27.61	22.40	173.780	Vertical	Pass
		1752.5	-1.97	3.30	27.60	22.33	171.002	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	1715	-2.10	3.15	27.64	22.39	173.380	Vertical	Pass
		1732.5	-1.90	3.31	27.61	22.40	173.780	Vertical	Pass
		1750	-1.79	3.33	27.59	22.47	176.604	Vertical	Pass

15.0MHz Band QPSK	1/#Mid	1717.5	-2.01	3.15	27.65	22.49	177.419	Vertical	Pass
		1732.5	-1.91	3.31	27.61	22.39	173.380	Vertical	Pass
		1747.5	-1.78	3.33	27.57	22.46	176.198	Vertical	Pass
20.0MHz Band QPSK	1/#Mid	1720	-1.97	3.17	27.66	22.52	178.649	Vertical	Pass
		1732.5	-1.75	3.32	27.61	22.54	179.473	Vertical	Pass
		1745	-1.66	3.36	27.56	22.54	179.473	Vertical	Pass

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result					Polarization Of Max. ERP	Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Factor (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)		
1.4MHz Band 16 QAM	1/#Mid	1710.7	-2.99	3.12	27.58	21.47	140.281	Horizontal	Pass
		1732.5	-2.77	3.27	27.61	21.57	143.549	Horizontal	Pass
		1754.3	-2.77	3.29	27.63	21.57	143.549	Horizontal	Pass
3.0MHz Band 16 QAM	1/#Mid	1711.5	-3.02	3.13	27.61	21.46	139.959	Horizontal	Pass
		1732.5	-2.84	3.27	27.61	21.50	141.254	Horizontal	Pass
		1753.5	-2.73	3.30	27.62	21.59	144.212	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	1712.5	-2.92	3.13	27.63	21.58	143.880	Horizontal	Pass
		1732.5	-2.80	3.27	27.61	21.54	142.561	Horizontal	Pass
		1752.5	-2.88	3.30	27.60	21.42	138.676	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	1715	-3.02	3.15	27.64	21.47	140.281	Horizontal	Pass
		1732.5	-2.74	3.31	27.61	21.56	143.219	Horizontal	Pass
		1750	-2.78	3.33	27.59	21.48	140.605	Horizontal	Pass
15.0MHz Band 16 QAM	1/#Mid	1717.5	-2.94	3.15	27.65	21.56	143.219	Horizontal	Pass
		1732.5	-2.76	3.31	27.61	21.54	142.561	Horizontal	Pass
		1747.5	-2.69	3.33	27.57	21.55	142.889	Horizontal	Pass
20.0MHz Band 16 QAM	1/#Mid	1720	-3.04	3.17	27.66	21.45	139.637	Horizontal	Pass
		1732.5	-2.81	3.32	27.61	21.48	140.605	Horizontal	Pass
		1745	-2.68	3.36	27.56	21.52	141.906	Horizontal	Pass
1.4MHz Band 16 QAM	1/#Mid	1710.7	-2.86	3.12	27.58	21.60	144.544	Vertical	Pass
		1732.5	-2.85	3.27	27.61	21.49	140.929	Vertical	Pass
		1754.3	-2.80	3.29	27.63	21.54	142.561	Vertical	Pass
3.0MHz Band 16 QAM	1/#Mid	1711.5	-2.93	3.13	27.61	21.55	142.889	Vertical	Pass
		1732.5	-2.87	3.27	27.61	21.47	140.281	Vertical	Pass
		1753.5	-2.87	3.30	27.62	21.45	139.637	Vertical	Pass
5.0MHz	1/#Mid	1712.5	-3.06	3.13	27.63	21.44	139.316	Vertical	Pass

Band 16		1732.5	-2.89	3.27	27.61	21.45	139.637	Vertical	Pass
QAM		1752.5	-2.86	3.30	27.60	21.44	139.316	Vertical	Pass
10.0MHz	1/#Mid	1715	-2.97	3.15	27.64	21.52	141.906	Vertical	Pass
Band 16		1732.5	-2.78	3.31	27.61	21.52	141.906	Vertical	Pass
QAM		1750	-2.68	3.33	27.59	21.58	143.880	Vertical	Pass
15.0MHz	1/#Mid	1717.5	-2.95	3.15	27.65	21.55	142.889	Vertical	Pass
Band 16		1732.5	-2.73	3.31	27.61	21.57	143.549	Vertical	Pass
QAM		1747.5	-2.66	3.33	27.57	21.58	143.880	Vertical	Pass
20.0MHz	1/#Mid	1720	-2.84	3.17	27.66	21.65	146.218	Vertical	Pass
Band 16		1732.5	-2.64	3.32	27.61	21.65	146.218	Vertical	Pass
QAM		1745	-2.58	3.36	27.56	21.62	145.211	Vertical	Pass

Note:

SG Level= Signal generator output

Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

Factor Gain(dB)=Antenna Gain(dB) + Amplifier Factor (dB)

### 8.4 LTE BAND 5

Radiated Power (ERP) for Band 5											
Mode	RB/RB SIZE	Frequency	Result							Polarization Of Max. ERP	Conclusion
			SG Level	Cable Loss (dBm)	Factor (dB)	Correction (dB)	Max. ERP	Max. ERP			
			(dBm)				Average	Average			
							(dBm)	(mW)			
1.4MHz Band QPSK	1/#Mid	824.7	6.08	2.01	19.68	2.15	21.60	144.544	Horizontal	Pass	
		836.5	5.96	2.01	19.77	2.15	21.57	143.549	Horizontal	Pass	
		848.3	5.98	2.02	19.82	2.15	21.63	145.546	Horizontal	Pass	
3.0MHz Band QPSK	1/#Mid	825.5	6.01	2.01	19.70	2.15	21.55	142.889	Horizontal	Pass	
		836.5	5.98	2.01	19.77	2.15	21.59	144.212	Horizontal	Pass	
		847.5	5.95	2.02	19.81	2.15	21.59	144.212	Horizontal	Pass	
5.0MHz Band QPSK	1/#Mid	826.5	6.08	2.01	19.71	2.15	21.63	145.546	Horizontal	Pass	
		836.5	5.95	2.01	19.77	2.15	21.56	143.219	Horizontal	Pass	
		846.5	5.97	2.02	19.79	2.15	21.59	144.212	Horizontal	Pass	
10.0MHz Band QPSK	1/#Mid	829	5.95	2.01	19.73	2.15	21.52	141.906	Horizontal	Pass	
		836.5	6.08	2.01	19.77	2.15	21.69	147.571	Horizontal	Pass	
		844	5.93	2.02	19.78	2.15	21.54	142.561	Horizontal	Pass	
1.4MHz Band QPSK	1/#Mid	824.7	6.16	2.01	19.68	2.15	21.68	147.231	Vertical	Pass	
		836.5	5.97	2.01	19.77	2.15	21.58	143.880	Vertical	Pass	
		848.3	5.99	2.02	19.82	2.15	21.64	145.881	Vertical	Pass	
3.0MHz Band QPSK	1/#Mid	825.5	6.06	2.01	19.70	2.15	21.60	144.544	Vertical	Pass	
		836.5	6.06	2.01	19.77	2.15	21.67	146.893	Vertical	Pass	
		847.5	6.01	2.02	19.81	2.15	21.65	146.218	Vertical	Pass	
5.0MHz Band QPSK	1/#Mid	826.5	6.08	2.01	19.71	2.15	21.63	145.546	Vertical	Pass	
		836.5	6.07	2.01	19.77	2.15	21.68	147.231	Vertical	Pass	
		846.5	5.94	2.02	19.79	2.15	21.56	143.219	Vertical	Pass	
10.0MHz Band QPSK	1/#Mid	829	6.18	2.01	19.73	2.15	21.75	149.624	Vertical	Pass	
		836.5	6.12	2.01	19.77	2.15	21.73	148.936	Vertical	Pass	
		844	6.11	2.02	19.78	2.15	21.72	148.594	Vertical	Pass	



Radiated Power (ERP) for Band 5											
Mode	RB/RB SIZE	Frequency	Result							Polarization Of Max. ERP	Conclusion
			SG Level	Cable Loss (dBm)	Factor (dB)	Correction (dB)	Max. ERP	Max. ERP			
			(dBm)				Average	Average			
							(dBm)	(mW)			
1.4MHz Band 16 QAM	1/#Mid	824.7	5.28	2.01	19.68	2.15	20.80	120.226	Horizontal	Pass	
		836.5	5.23	2.01	19.77	2.15	20.84	121.339	Horizontal	Pass	
		848.3	5.15	2.02	19.82	2.15	20.80	120.226	Horizontal	Pass	
3.0MHz Band 16 QAM	1/#Mid	825.5	5.26	2.01	19.70	2.15	20.80	120.226	Horizontal	Pass	
		836.5	5.21	2.01	19.77	2.15	20.82	120.781	Horizontal	Pass	
		847.5	5.26	2.02	19.81	2.15	20.90	123.027	Horizontal	Pass	
5.0MHz Band 16 QAM	1/#Mid	826.5	5.26	2.01	19.71	2.15	20.81	120.504	Horizontal	Pass	
		836.5	5.29	2.01	19.77	2.15	20.90	123.027	Horizontal	Pass	
		846.5	5.14	2.02	19.79	2.15	20.76	119.124	Horizontal	Pass	
10.0MHz z Band 16 QAM	1/#Mid	829	5.21	2.01	19.73	2.15	20.78	119.674	Horizontal	Pass	
		836.5	5.18	2.01	19.77	2.15	20.79	119.950	Horizontal	Pass	
		844	5.23	2.02	19.78	2.15	20.84	121.339	Horizontal	Pass	
1.4MHz Band 16 QAM	1/#Mid	824.7	5.29	2.01	19.68	2.15	20.81	120.504	Vertical	Pass	
		836.5	5.28	2.01	19.77	2.15	20.89	122.744	Vertical	Pass	
		848.3	5.24	2.02	19.82	2.15	20.89	122.744	Vertical	Pass	
3.0MHz Band 16 QAM	1/#Mid	825.5	5.21	2.01	19.70	2.15	20.75	118.850	Vertical	Pass	
		836.5	5.28	2.01	19.77	2.15	20.89	122.744	Vertical	Pass	
		847.5	5.19	2.02	19.81	2.15	20.83	121.060	Vertical	Pass	
5.0MHz Band 16 QAM	1/#Mid	826.5	5.25	2.01	19.71	2.15	20.80	120.226	Vertical	Pass	
		836.5	5.14	2.01	19.77	2.15	20.75	118.850	Vertical	Pass	
		846.5	5.26	2.02	19.79	2.15	20.88	122.462	Vertical	Pass	
10.0MHz z Band 16 QAM	1/#Mid	829	5.35	2.01	19.73	2.15	20.92	123.595	Vertical	Pass	
		836.5	5.31	2.01	19.77	2.15	20.92	123.595	Vertical	Pass	
		844	5.34	2.02	19.78	2.15	20.95	124.451	Vertical	Pass	

Note:

SG Level= Signal generator output

Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

Factor Gain(dB)=Antenna Gain(dB) + Amplifier Factor (dB)

8.5 LTE BAND 7

Radiated Power (EIRP) for Band 7									
Mode	RB/RB SIZE	Frequency	Result					Polarization Of Max. ERP	Conclusion
			SG Level	Cable Loss	Antenna Factor	Max. EIRP	Max. EIRP		
			(dBm)	(dBm)	(dB)	Average	Average		
						(dBm)	(mW)		
5.0MHz Band QPSK	1/#Mid	2502.5	0.46	4.54	27.75	23.67	232.809	Horizontal	Pass
		2535	0.59	4.69	27.72	23.62	230.144	Horizontal	Pass
		2567.5	0.61	4.71	27.71	23.61	229.615	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	2505	0.33	4.55	27.76	23.54	225.944	Horizontal	Pass
		2535	0.52	4.69	27.72	23.55	226.464	Horizontal	Pass
		2565	0.64	4.72	27.70	23.62	230.144	Horizontal	Pass
15.0MHz Band QPSK	1/#Mid	2507.5	0.48	4.55	27.77	23.70	234.423	Horizontal	Pass
		2535	0.63	4.69	27.72	23.66	232.274	Horizontal	Pass
		2562.5	0.64	4.72	27.69	23.61	229.615	Horizontal	Pass
20.0MHz Band QPSK	1/#Mid	2510	0.48	4.57	27.78	23.69	233.884	Horizontal	Pass
		2535	0.70	4.73	27.72	23.69	233.884	Horizontal	Pass
		2560	0.70	4.75	27.68	23.63	230.675	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	2502.5	0.35	4.54	27.75	23.56	226.986	Vertical	Pass
		2535	0.65	4.69	27.72	23.68	233.346	Vertical	Pass
		2567.5	0.70	4.71	27.71	23.70	234.423	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	2505	0.45	4.55	27.76	23.66	232.274	Vertical	Pass
		2535	0.56	4.69	27.72	23.59	228.560	Vertical	Pass
		2565	0.59	4.72	27.70	23.57	227.510	Vertical	Pass
15.0MHz Band QPSK	1/#Mid	2507.5	0.46	4.55	27.77	23.68	233.346	Vertical	Pass
		2535	0.51	4.69	27.72	23.54	225.944	Vertical	Pass
		2562.5	0.57	4.72	27.69	23.54	225.944	Vertical	Pass
20.0MHz Band QPSK	1/#Mid	2510	0.54	4.57	27.78	23.75	237.137	Vertical	Pass
		2535	0.73	4.73	27.72	23.72	235.505	Vertical	Pass
		2560	0.77	4.75	27.68	23.70	234.423	Vertical	Pass

Radiated Power (EIRP) for Band 7									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level	Cable Loss	Antenna Factor	Max. EIRP	Max. EIRP	Polarization	
			(dBm)	(dBm)	(dB)	Average	Average	Of Max. ERP	
						(dBm)	(mW)		
5.0MHz Band 16 QAM	1/#Mid	2502.5	-0.71	4.54	27.75	22.50	177.828	Horizontal	Pass
		2535	-0.45	4.69	27.72	22.58	181.134	Horizontal	Pass
		2567.5	-0.44	4.71	27.71	22.56	180.302	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	2505	-0.77	4.55	27.76	22.44	175.388	Horizontal	Pass
		2535	-0.51	4.69	27.72	22.52	178.649	Horizontal	Pass
		2565	-0.40	4.72	27.70	22.58	181.134	Horizontal	Pass
15.0MHz Band 16 QAM	1/#Mid	2507.5	-0.76	4.55	27.77	22.46	176.198	Horizontal	Pass
		2535	-0.55	4.69	27.72	22.48	177.011	Horizontal	Pass
		2562.5	-0.38	4.72	27.69	22.59	181.552	Horizontal	Pass
20.0MHz Band 16 QAM	1/#Mid	2510	-0.62	4.57	27.78	22.59	181.552	Horizontal	Pass
		2535	-0.48	4.73	27.72	22.51	178.238	Horizontal	Pass
		2560	-0.35	4.75	27.68	22.58	181.134	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	2502.5	-0.75	4.54	27.75	22.46	176.198	Vertical	Pass
		2535	-0.48	4.69	27.72	22.55	179.887	Vertical	Pass
		2567.5	-0.54	4.71	27.71	22.46	176.198	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	2505	-0.65	4.55	27.76	22.56	180.302	Vertical	Pass
		2535	-0.52	4.69	27.72	22.51	178.238	Vertical	Pass
		2565	-0.43	4.72	27.70	22.55	179.887	Vertical	Pass
15.0MHz Band 16 QAM	1/#Mid	2507.5	-0.69	4.55	27.77	22.53	179.061	Vertical	Pass
		2535	-0.56	4.69	27.72	22.47	176.604	Vertical	Pass
		2562.5	-0.55	4.72	27.69	22.42	174.582	Vertical	Pass
20.0MHz Band 16 QAM	1/#Mid	2510	-0.58	4.57	27.78	22.63	183.231	Vertical	Pass
		2535	-0.34	4.73	27.72	22.65	184.077	Vertical	Pass
		2560	-0.28	4.75	27.68	22.65	184.077	Vertical	Pass

Note:

SG Level= Signal generator output

Max. EIRP Average (dBm)= Antenna Factor (dB)+ SG Level (dBm)- Cable Loss(dBm)

### 8.6 LTE BAND 12

Radiated Power (ERP) for Band 12											
Mode	RB/RB SIZE	Frequency	Result							Polarization Of Max. ERP	Conclusion
			SG Level	Cable Loss (dBm)	Antenna Gain (dB)	Correction	Max. ERP	Max. ERP			
			(dBm)			(dB)	Average	Average			
						(dBm)	(mW)				
1.4MHz Band QPSK	1/#Mid	699.7	6.00	1.91	19.21	2.15	21.15	130.317	Vertical	Pass	
		707.5	6.07	1.91	19.26	2.15	21.27	133.968	Vertical	Pass	
		715.3	5.91	1.93	19.34	2.15	21.17	130.918	Vertical	Pass	
3.0MHz Band QPSK	1/#Mid	700.5	6.07	1.91	19.21	2.15	21.22	132.434	Vertical	Pass	
		707.5	5.99	1.91	19.26	2.15	21.19	131.522	Vertical	Pass	
		714.5	5.91	1.93	19.34	2.15	21.17	130.918	Vertical	Pass	
5.0MHz Band QPSK	1/#Mid	701.5	6.05	1.91	19.23	2.15	21.22	132.434	Vertical	Pass	
		707.5	6.00	1.91	19.26	2.15	21.20	131.826	Vertical	Pass	
		713.5	5.95	1.92	19.33	2.15	21.21	132.130	Vertical	Pass	
10.0MHz Band QPSK	1/#Mid	704	6.10	1.91	19.25	2.15	21.29	134.586	Vertical	Pass	
		707.5	5.91	1.91	19.26	2.15	21.11	129.122	Vertical	Pass	
		711	5.90	1.92	19.32	2.15	21.15	130.317	Vertical	Pass	
1.4MHz Band QPSK	1/#Mid	699.7	6.01	1.91	19.21	2.15	21.16	130.617	Horizontal	Pass	
		707.5	5.98	1.91	19.26	2.15	21.18	131.220	Horizontal	Pass	
		715.3	5.91	1.93	19.34	2.15	21.17	130.918	Horizontal	Pass	
3.0MHz Band QPSK	1/#Mid	700.5	6.15	1.91	19.21	2.15	21.30	134.896	Horizontal	Pass	
		707.5	5.99	1.91	19.26	2.15	21.19	131.522	Horizontal	Pass	
		714.5	5.96	1.93	19.34	2.15	21.22	132.434	Horizontal	Pass	
5.0MHz Band QPSK	1/#Mid	701.5	6.00	1.91	19.23	2.15	21.17	130.918	Horizontal	Pass	
		707.5	6.10	1.91	19.26	2.15	21.30	134.896	Horizontal	Pass	
		713.5	5.98	1.92	19.33	2.15	21.24	133.045	Horizontal	Pass	
10.0MHz Band QPSK	1/#Mid	704	6.13	1.91	19.25	2.15	21.32	135.519	Horizontal	Pass	
		707.5	6.13	1.91	19.26	2.15	21.33	135.831	Horizontal	Pass	
		711	6.07	1.92	19.32	2.15	21.32	135.519	Horizontal	Pass	

Radiated Power (ERP) for Band 12										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level	Cable Loss (dBm)	Antenna Gain (dB)	Correction	Max. ERP	Max. ERP	Polarization Of Max. ERP	
			(dBm)			(dB)	Average	Average		
							(dBm)	(mW)		
1.4MHz Band 16 QAM	1/#Mid	699.7	5.44	1.91	19.21	2.15	20.59	114.551	Vertical	Pass
		707.5	5.47	1.91	19.26	2.15	20.67	116.681	Vertical	Pass
		715.3	5.39	1.93	19.34	2.15	20.65	116.145	Vertical	Pass
3.0MHz Band 16 QAM	1/#Mid	700.5	5.48	1.91	19.21	2.15	20.63	115.611	Vertical	Pass
		707.5	5.41	1.91	19.26	2.15	20.61	115.080	Vertical	Pass
		714.5	5.41	1.93	19.34	2.15	20.67	116.681	Vertical	Pass
5.0MHz Band 16 QAM	1/#Mid	701.5	5.39	1.91	19.23	2.15	20.56	113.763	Vertical	Pass
		707.5	5.38	1.91	19.26	2.15	20.58	114.288	Vertical	Pass
		713.5	5.26	1.92	19.33	2.15	20.52	112.720	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	704	5.31	1.91	19.25	2.15	20.50	112.202	Vertical	Pass
		707.5	5.39	1.91	19.26	2.15	20.59	114.551	Vertical	Pass
		711	5.28	1.92	19.32	2.15	20.53	112.980	Vertical	Pass
1.4MHz Band 16 QAM	1/#Mid	699.7	5.40	1.91	19.21	2.15	20.55	113.501	Horizontal	Pass
		707.5	5.36	1.91	19.26	2.15	20.56	113.763	Horizontal	Pass
		715.3	5.30	1.93	19.34	2.15	20.56	113.763	Horizontal	Pass
3.0MHz Band 16 QAM	1/#Mid	700.5	5.51	1.91	19.21	2.15	20.66	116.413	Horizontal	Pass
		707.5	5.40	1.91	19.26	2.15	20.60	114.815	Horizontal	Pass
		714.5	5.42	1.93	19.34	2.15	20.68	116.950	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	701.5	5.39	1.91	19.23	2.15	20.56	113.763	Horizontal	Pass
		707.5	5.50	1.91	19.26	2.15	20.70	117.490	Horizontal	Pass
		713.5	5.36	1.92	19.33	2.15	20.62	115.345	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	704	5.55	1.91	19.25	2.15	20.74	118.577	Horizontal	Pass
		707.5	5.54	1.91	19.26	2.15	20.74	118.577	Horizontal	Pass
		711	5.48	1.92	19.32	2.15	20.73	118.304	Horizontal	Pass

**Note:**

SG Level= Signal generator output

Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

Factor Gain(dB)=Antenna Gain(dB) + Amplifier Factor (dB)

### 8.7 LTE BAND 17

Radiated Power (ERP) for Band 17										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level	Cable Loss	Antenna Factor	Correction	Max. ERP	Max. ERP	Polarization Of Max. ERP	
			(dBm)	(dBm)	(dB)		Average	Average		
							(dBm)	(mW)		
5.0MHz Band QPSK	1/#Mid	706.5	6.32	1.91	19.23	2.15	21.49	140.929	Vertical	Pass
		710	6.29	1.91	19.26	2.15	21.49	140.929	Vertical	Pass
		713.5	6.21	1.92	19.33	2.15	21.47	140.281	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	709	6.34	1.91	19.25	2.15	21.53	142.233	Vertical	Pass
		710	6.30	1.91	19.26	2.15	21.50	141.254	Vertical	Pass
		711	6.28	1.92	19.32	2.15	21.53	142.233	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	706.5	6.40	1.91	19.23	2.15	21.57	143.549	Horizontal	Pass
		710	6.32	1.91	19.26	2.15	21.52	141.906	Horizontal	Pass
		713.5	6.22	1.92	19.33	2.15	21.48	140.605	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	709	6.42	1.91	19.25	2.15	21.61	144.877	Horizontal	Pass
		710	6.43	1.91	19.26	2.15	21.63	145.546	Horizontal	Pass
		711	6.36	1.92	19.32	2.15	21.61	144.877	Horizontal	Pass

Radiated Power (ERP) for Band 17											
Mode	RB/RB SIZE	Frequency	Result							Polarization Of Max. ERP	Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Factor (dB)	Correction (dB)	Max. ERP Average (dBm)	Max. ERP Average (mW)			
5.0MHz Band 16 QAM	1/#Mid	706.5	5.73	1.91	19.23	2.15	20.90	123.027	Vertical	Pass	
		710	5.77	1.91	19.26	2.15	20.97	125.026	Vertical	Pass	
		713.5	5.64	1.92	19.33	2.15	20.90	123.027	Vertical	Pass	
10.0MHz Band 16 QAM	1/#Mid	709	5.72	1.91	19.25	2.15	20.91	123.310	Vertical	Pass	
		710	5.71	1.91	19.26	2.15	20.91	123.310	Vertical	Pass	
		711	5.61	1.92	19.32	2.15	20.86	121.899	Vertical	Pass	
5.0MHz Band 16 QAM	1/#Mid	706.5	5.75	1.91	19.23	2.15	20.92	123.595	Horizontal	Pass	
		710	5.73	1.91	19.26	2.15	20.93	123.880	Horizontal	Pass	
		713.5	5.69	1.92	19.33	2.15	20.95	124.451	Horizontal	Pass	
10.0MHz Band 16 QAM	1/#Mid	709	5.83	1.91	19.25	2.15	21.02	126.474	Horizontal	Pass	
		710	5.84	1.91	19.26	2.15	21.04	127.057	Horizontal	Pass	
		711	5.78	1.92	19.32	2.15	21.03	126.765	Horizontal	Pass	

Note:

ERP=EIRP-2.15

SG Level= Signal generator output

Max. EIRP Average (dBm)= Antenna Factor (dB)+ SG Level (dBm)- Cable Loss(dBm)

8.8 LTE BAND 41

Radiated Power (EIRP) for Band 41										
Mode	RB/RB SIZE	Frequency	Result						Polarization Of Max. ERP	Conclusion
			SG Level	Cable Loss (dBm)	Factor (dB)	Max. EIRP	Max. EIRP			
			(dBm)			Average	Average			
						(dBm)	(mW)			
5.0MHz Band QPSK	1/#Mid	2537.5	-0.55	4.54	27.75	22.66	184.502	Horizontal	Pass	
		2595	-0.43	4.69	27.72	22.60	181.970	Horizontal	Pass	
		2652.5	-0.41	4.71	27.71	22.59	181.552	Horizontal	Pass	
10.0MHz Band QPSK	1/#Mid	2540	-0.63	4.55	27.76	22.58	181.134	Horizontal	Pass	
		2595	-0.41	4.69	27.72	22.62	182.810	Horizontal	Pass	
		2650	-0.32	4.72	27.70	22.66	184.502	Horizontal	Pass	
15.0MHz Band QPSK	1/#Mid	2542.5	-0.64	4.55	27.77	22.58	181.134	Horizontal	Pass	
		2595	-0.36	4.69	27.72	22.67	184.927	Horizontal	Pass	
		2647.5	-0.30	4.72	27.69	22.67	184.927	Horizontal	Pass	
20.0MHz Band QPSK	1/#Mid	2545	-0.58	4.57	27.78	22.63	183.231	Horizontal	Pass	
		2595	-0.41	4.73	27.72	22.58	181.134	Horizontal	Pass	
		2645	-0.35	4.75	27.68	22.58	181.134	Horizontal	Pass	
5.0MHz Band QPSK	1/#Mid	2537.5	-0.54	4.54	27.75	22.67	184.927	Vertical	Pass	
		2595	-0.45	4.69	27.72	22.58	181.134	Vertical	Pass	
		2652.5	-0.44	4.71	27.71	22.56	180.302	Vertical	Pass	
10.0MHz Band QPSK	1/#Mid	2540	-0.65	4.55	27.76	22.56	180.302	Vertical	Pass	
		2595	-0.40	4.69	27.72	22.63	183.231	Vertical	Pass	
		2650	-0.32	4.72	27.70	22.66	184.502	Vertical	Pass	
15.0MHz Band QPSK	1/#Mid	2542.5	-0.61	4.55	27.77	22.61	182.390	Vertical	Pass	
		2595	-0.49	4.69	27.72	22.54	179.473	Vertical	Pass	
		2647.5	-0.33	4.72	27.69	22.64	183.654	Vertical	Pass	
20.0MHz Band QPSK	1/#Mid	2545	-0.50	4.57	27.78	22.71	186.638	Vertical	Pass	
		2595	-0.28	4.73	27.72	22.71	186.638	Vertical	Pass	
		2645	-0.20	4.75	27.68	22.73	187.499	Vertical	Pass	



Radiated Power (EIRP) for Band 41										
Mode	RB/RB SIZE	Frequency	Result						Polarization Of Max. ERP	Conclusion
			SG Level	Cable Loss (dBm)	Factor (dB)	Max. EIRP	Max. EIRP			
			(dBm)			Average (dBm)	Average (mW)			
5.0MHz Band 16 QAM	1/#Mid	2537.5	-0.79	4.54	27.75	22.42	174.582	Horizontal	Pass	
		2595	-0.54	4.69	27.72	22.49	177.419	Horizontal	Pass	
		2652.5	-0.55	4.71	27.71	22.45	175.792	Horizontal	Pass	
10.0MHz Band 16 QAM	1/#Mid	2540	-0.85	4.55	27.76	22.36	172.187	Horizontal	Pass	
		2595	-0.61	4.69	27.72	22.42	174.582	Horizontal	Pass	
		2650	-0.60	4.72	27.70	22.38	172.982	Horizontal	Pass	
15.0MHz Band 16 QAM	1/#Mid	2542.5	-0.83	4.55	27.77	22.39	173.380	Horizontal	Pass	
		2595	-0.63	4.69	27.72	22.40	173.780	Horizontal	Pass	
		2647.5	-0.53	4.72	27.69	22.44	175.388	Horizontal	Pass	
20.0MHz Band 16 QAM	1/#Mid	2545	-0.72	4.57	27.78	22.49	177.419	Horizontal	Pass	
		2595	-0.56	4.73	27.72	22.43	174.985	Horizontal	Pass	
		2645	-0.43	4.75	27.68	22.50	177.828	Horizontal	Pass	
5.0MHz Band 16 QAM	1/#Mid	2537.5	-0.73	4.54	27.75	22.48	177.011	Vertical	Pass	
		2595	-0.57	4.69	27.72	22.46	176.198	Vertical	Pass	
		2652.5	-0.65	4.71	27.71	22.35	171.791	Vertical	Pass	
10.0MHz Band 16 QAM	1/#Mid	2540	-0.81	4.55	27.76	22.40	173.780	Vertical	Pass	
		2595	-0.68	4.69	27.72	22.35	171.791	Vertical	Pass	
		2650	-0.50	4.72	27.70	22.48	177.011	Vertical	Pass	
15.0MHz Band 16 QAM	1/#Mid	2542.5	-0.90	4.55	27.77	22.32	170.608	Vertical	Pass	
		2595	-0.57	4.69	27.72	22.46	176.198	Vertical	Pass	
		2647.5	-0.51	4.72	27.69	22.46	176.198	Vertical	Pass	
20.0MHz Band 16 QAM	1/#Mid	2545	-0.70	4.57	27.78	22.51	178.238	Vertical	Pass	
		2595	-0.44	4.73	27.72	22.55	179.887	Vertical	Pass	
		2645	-0.42	4.75	27.68	22.51	178.238	Vertical	Pass	

Note:

SG Level= Signal generator output

Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

Factor Gain(dB)=Antenna Gain(dB) + Amplifier Factor (dB)

## 9. SPURIOUS RADIATION EMISSION

### RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27.53 and §90.691

### LIMIT

§22.917 (e) and §24.238 and §90.691 (a): Out of band emissions. 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.

§27.53 (g) For operations in the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43 + 10 \log (P)$  dB.

§27.53 (h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log_{10}(P)$  dB.

### TEST PROCEDURE

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth ( i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

The unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth in the 1 MHz band immediately outside and adjacent to the channel edge of the equipment. Beyond the 1 MHz band immediately outside the channel edge of the equipment, a resolution bandwidth of 1 MHz shall be employed. A narrower resolution bandwidth is allowed to be used provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz or 1% of the occupied bandwidth as applicable.

The power of any unwanted emissions measured from the channel edge of the equipment shall be attenuated below the transmitter power, P (dBW), as follows:

- a. for base station and subscriber equipment, other than mobile subscriber equipment, the attenuation shall not be less than  $43 + 10 \text{ Log}_{10} (p)$ , dB; and
- b. for mobile subscriber equipment, the attenuation shall not be less than  $43 + 10 \text{ Log}_{10} (p)$ , dB at the channel edges and  $55 + 10 \text{ Log}_{10} (p)$  at 5.5 MHz away and beyond the channel edges where p in (a) and (b) is the transmitter power measured in watts.

**MODES TESTED**

LTE Band 2/4/5/7/12/17/41

**RESULTS**

PASS

**9.1 LTE BAND 2**

**QPSK EIRP POWER FOR LTE BAND 2 (1.4MHZ BANDWIDTH)**

Test Results for Low Channel 1850.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3701.4	-53.43	4.04	33.51	-23.96	-13	-10.96	Horizontal
3701.4	-48.72	4.04	33.51	-19.25	-13	-6.25	Vertical
5552.1	-52.51	5.24	35.84	-21.91	-13	-8.91	Vertical
5552.1	-53.22	5.24	35.84	-22.62	-13	-9.62	Horizontal
189.6	-39.49	1.43	16.02	-24.90	-13	-11.90	Vertical
352.5	-40.92	1.30	17.99	-24.23	-13	-11.23	Horizontal
Test Results for Mid Channel 1880MHz							
3760.0	-52.42	4.04	33.56	-22.90	-13	-9.90	Horizontal
3760.0	-46.02	4.04	33.56	-16.50	-13	-3.50	Vertical
5640.0	-53.78	5.24	35.91	-23.11	-13	-10.11	Vertical
5640.0	-51.40	5.24	35.91	-20.73	-13	-7.73	Horizontal
198.3	-36.80	1.62	16.97	-21.45	-13	-8.45	Vertical
458.8	-36.72	1.74	15.98	-22.49	-13	-9.49	Horizontal
Test Results for High Channel 1909.3MHz							
3818.6	-46.98	4.04	34.00	-17.02	-13	-4.02	Horizontal
3818.6	-46.07	4.04	34.00	-16.11	-13	-3.11	Vertical
5727.9	-45.17	5.24	36.04	-14.37	-13	-1.37	Vertical
5727.9	-53.72	5.24	36.04	-22.92	-13	-9.92	Horizontal
179.8	-39.08	1.42	17.29	-23.21	-13	-10.21	Vertical
364.7	-37.56	1.50	17.90	-21.15	-13	-8.15	Horizontal

**QPSK EIRP POWER FOR LTE BAND 2 (20.0MHZ BANDWIDTH)**

Test Results for Low Channel 1860MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3720.0	-50.79	4.07	33.54	-21.32	-13	-8.32	Horizontal
3720.0	-51.98	4.07	33.54	-22.51	-13	-9.51	Vertical
5580.0	-52.47	5.28	35.86	-21.89	-13	-8.89	Vertical
5580.0	-49.93	5.28	35.86	-19.35	-13	-6.35	Horizontal
212.5	-35.82	1.58	16.89	-20.50	-13	-7.50	Vertical
367.3	-43.78	1.76	17.26	-28.28	-13	-15.28	Horizontal
Test Results for Mid Channel 1880MHz							
3760.0	-49.79	4.04	33.56	-20.27	-13	-7.27	Horizontal
3760.0	-52.70	4.04	33.56	-23.18	-13	-10.18	Vertical
5640.0	-47.50	5.24	35.91	-16.83	-13	-3.83	Vertical
5640.0	-49.62	5.24	35.91	-18.95	-13	-5.95	Horizontal
212.5	-37.56	1.46	16.27	-22.75	-13	-9.75	Vertical
330.5	-39.74	1.59	15.15	-26.18	-13	-13.18	Horizontal
Test Results for High Channel 1900MHz							
3800.0	-53.84	4.04	34.00	-23.88	-13	-10.88	Horizontal
3800.0	-52.60	4.04	34.00	-22.64	-13	-9.64	Vertical
5700.0	-52.27	5.24	36.04	-21.47	-13	-8.47	Vertical
5700.0	-52.56	5.24	36.04	-21.76	-13	-8.76	Horizontal
184.2	-36.98	1.36	17.39	-20.94	-13	-7.94	Vertical
439.9	-37.65	1.66	15.39	-23.92	-13	-10.92	Horizontal

Note: P<sub>Mea</sub>(dBm)= Power(dBm)+ AR<sub>pl</sub> (dBm)

. Over Limit= : P<sub>Mea</sub>(dBm)-Limit(dBm)

. Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

**9.2 LTE BAND 4**

**QPSK EIRP POWER FOR LTE BAND 4 (1.4MHZ BANDWIDTH)**

Test Results for Low Channel 1710.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3421.4	-48.45	4.02	29.80	-22.67	-13	-9.67	Horizontal
3421.4	-53.37	4.02	29.80	-27.59	-13	-14.59	Vertical
5132.1	-48.42	5.24	35.84	-17.82	-13	-4.82	Vertical
5132.1	-53.92	5.24	35.84	-23.32	-13	-10.32	Horizontal
180.6	-38.95	1.68	16.04	-24.59	-13	-11.59	Vertical
312.6	-37.76	1.78	17.74	-21.80	-13	-8.80	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-49.58	4.03	30.00	-23.61	-13	-10.61	Horizontal
3465.0	-51.35	4.03	30.00	-25.38	-13	-12.38	Vertical
5197.5	-53.12	5.25	35.86	-22.51	-13	-9.51	Vertical
5197.5	-52.64	5.25	35.86	-22.03	-13	-9.03	Horizontal
190.9	-44.33	1.72	17.69	-28.36	-13	-15.36	Vertical
312.1	-44.16	1.62	16.02	-29.75	-13	-16.75	Horizontal
Test Results for High Channel 1754.3MHz							
3508.6	-45.41	4.05	30.01	-19.45	-13	-6.45	Horizontal
3508.6	-44.14	4.05	30.01	-18.18	-13	-5.18	Vertical
5262.9	-47.95	5.26	35.86	-17.35	-13	-4.35	Vertical
5262.9	-49.66	5.26	35.86	-19.06	-13	-6.06	Horizontal
207.5	-41.00	1.80	16.69	-26.11	-13	-13.11	Vertical
448.2	-39.86	1.75	16.66	-24.96	-13	-11.96	Horizontal

**QPSK EIRP POWER FOR LTE BAND 4 (20.0MHZ BANDWIDTH)**

Test Results for Low Channel 1720MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3440.0	-45.76	4.02	29.80	-19.98	-13	-6.98	Horizontal
3440.0	-44.31	4.02	29.80	-18.53	-13	-5.53	Vertical
5160.0	-46.79	5.24	35.84	-16.19	-13	-3.19	Vertical
5160.0	-49.70	5.24	35.84	-19.10	-13	-6.10	Horizontal
200.0	-37.84	1.57	17.26	-22.15	-13	-9.15	Vertical
465.9	-34.10	1.78	16.35	-19.53	-13	-6.53	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-53.07	4.03	30.00	-27.10	-13	-14.10	Horizontal
3465.0	-45.56	4.03	30.00	-19.59	-13	-6.59	Vertical
5197.5	-52.11	5.25	35.86	-21.50	-13	-8.50	Vertical
5197.5	-52.87	5.25	35.86	-22.26	-13	-9.26	Horizontal
196.2	-41.64	1.44	17.95	-25.13	-13	-12.13	Vertical
414.5	-40.18	1.65	16.09	-25.74	-13	-12.74	Horizontal
Test Results for High Channel 1745MHz							
3490.0	-50.19	4.05	27.68	-26.56	-13	-13.56	Horizontal
3490.0	-51.42	4.05	27.68	-27.79	-13	-14.79	Vertical
5235.0	-49.51	5.26	35.86	-18.91	-13	-5.91	Vertical
5235.0	-51.75	5.26	35.86	-21.15	-13	-8.15	Horizontal
188.2	-41.92	1.61	16.85	-26.68	-13	-13.68	Vertical
428.5	-34.17	1.61	15.19	-20.59	-13	-7.59	Horizontal

Note: P<sub>Mea</sub>(dBm)= Power(dBm)+ AR<sub>pl</sub> (dBm)

Over Limit= : P<sub>Mea</sub>(dBm)-Limit(dBm)

Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

**9.3 LTE BAND 5**

**QPSK EIRP POWER FOR LTE BAND 5 (1.4MHZ BANDWIDTH)**

Test Results for Low Channel 824.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1649.4	-53.58	2.78	27.50	-28.86	-13	-15.86	Horizontal
1649.4	-51.09	2.78	27.50	-26.37	-13	-13.37	Vertical
2474.1	-51.85	2.90	27.80	-26.95	-13	-13.95	Vertical
2474.1	-49.57	2.90	27.80	-24.67	-13	-11.67	Horizontal
184.8	-42.65	1.76	17.59	-26.82	-13	-13.82	Vertical
461.0	-43.72	1.63	15.87	-29.48	-13	-16.48	Horizontal
Test Results For Mid Channel 836.5MHz							
1673.0	-48.76	2.80	27.48	-24.08	-13	-11.08	Horizontal
1673.0	-50.61	2.80	27.48	-25.93	-13	-12.93	Vertical
2509.5	-47.42	2.91	27.70	-22.63	-13	-9.63	Vertical
2509.5	-52.91	2.91	27.70	-28.12	-13	-15.12	Horizontal
183.4	-35.33	1.61	15.68	-21.26	-13	-8.26	Vertical
369.8	-42.71	1.59	17.52	-26.79	-13	-13.79	Horizontal
Test Results for High Channel 848.3MHz							
1696.6	-46.91	2.82	27.43	-22.30	-13	-9.30	Horizontal
1696.6	-53.08	2.82	27.43	-28.47	-13	-15.47	Vertical
2544.9	-44.38	2.92	27.74	-19.56	-13	-6.56	Vertical
2544.9	-49.47	2.92	27.74	-24.65	-13	-11.65	Horizontal
186.6	-43.53	1.69	16.67	-28.54	-13	-15.54	Vertical
453.7	-37.64	1.70	17.18	-22.16	-13	-9.16	Horizontal



**QPSK EIRP POWER FOR LTE BAND 5 (10MHZ BANDWIDTH)**

Test Results for Low Channel 829MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1658.0	-49.25	2.78	27.50	-24.53	-13	-11.53	Horizontal
1658.0	-51.96	2.78	27.50	-27.24	-13	-14.24	Vertical
2487.0	-52.30	2.90	27.80	-27.40	-13	-14.40	Vertical
2487.0	-49.45	2.90	27.80	-24.55	-13	-11.55	Horizontal
182.2	-37.19	1.71	15.57	-23.33	-13	-10.33	Vertical
403.4	-35.65	1.34	16.40	-20.59	-13	-7.59	Horizontal
Test Results for Mid Channel 836.5MHz							
1673.0	-51.69	2.80	27.48	-27.01	-13	-14.01	Horizontal
1673.0	-46.35	2.80	27.48	-21.67	-13	-8.67	Vertical
2509.5	-48.82	2.91	27.70	-24.03	-13	-11.03	Vertical
2509.5	-49.38	2.91	27.70	-24.59	-13	-11.59	Horizontal
195.5	-42.55	1.44	17.04	-26.95	-13	-13.95	Vertical
268.8	-41.20	1.76	17.62	-25.34	-13	-12.34	Horizontal
Test Results for High Channel 844MHz							
1688.0	-50.74	2.82	27.43	-26.13	-13	-13.13	Horizontal
1688.0	-51.76	2.82	27.43	-27.15	-13	-14.15	Vertical
2532.0	-45.12	2.92	27.74	-20.30	-13	-7.30	Vertical
2532.0	-51.45	2.92	27.74	-26.63	-13	-13.63	Horizontal
211.1	-40.80	1.74	17.70	-24.84	-13	-11.84	Vertical
371.2	-44.57	1.41	17.46	-28.51	-13	-15.51	Horizontal

Note:  $P_{Mea}(dBm) = Power(dBm) + ARpl (dBm)$

. Over Limit = :  $P_{Mea}(dBm) - Limit(dBm)$

. Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

**9.4 LTE BAND 7**

**QPSK EIRP POWER FOR LTE BAND 7 (5.0MHZ BANDWIDTH)**

Test Results for Low Channel 2502.5MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Factor(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
5005.0	-60.88	5.23	35.81	-30.30	-25	-5.30	Horizontal
5005.0	-62.07	5.23	35.81	-31.49	-25	-6.49	Vertical
7507.5	-62.10	5.67	36.85	-30.92	-25	-5.92	Vertical
7507.5	-59.62	5.67	36.85	-28.44	-25	-3.44	Horizontal
211.8	-49.97	1.73	17.97	-33.73	-25	-8.73	Vertical
446.9	-50.94	1.38	15.11	-37.21	-25	-12.21	Horizontal
Test Results for Mid Channel 2535MHz							
5070.0	-59.49	5.23	35.82	-28.90	-25	-3.90	Horizontal
5070.0	-63.61	5.23	35.82	-33.02	-25	-8.02	Vertical
7605.0	-59.20	5.67	36.85	-28.02	-25	-3.02	Vertical
7605.0	-64.15	5.67	36.85	-32.97	-25	-7.97	Horizontal
206.6	-54.37	1.77	16.17	-39.96	-25	-14.96	Vertical
306.2	-47.47	1.63	15.21	-33.89	-25	-8.89	Horizontal
Test Results for High Channel 2567.5MHz							
5135.0	-59.85	5.24	35.83	-29.26	-25	-4.26	Horizontal
5135.0	-61.27	5.24	35.83	-30.68	-25	-5.68	Vertical
7702.5	-61.74	5.68	36.87	-30.55	-25	-5.55	Vertical
7702.5	-64.39	5.68	36.87	-33.20	-25	-8.20	Horizontal
186.9	-49.36	1.58	17.56	-33.38	-25	-8.38	Vertical
401.4	-52.41	1.45	16.58	-37.28	-25	-12.28	Horizontal

**QPSK EIRP POWER FOR LTE BAND 7 (20.0MHZ BANDWIDTH)**

Test Results for Low Channel 2510MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Factor(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
5020.0	-61.13	5.23	35.82	-30.54	-25	-5.54	Horizontal
5020.0	-60.69	5.23	35.82	-30.10	-25	-5.10	Vertical
7530.0	-60.14	5.67	36.86	-28.95	-25	-3.95	Vertical
7530.0	-62.27	5.67	36.86	-31.08	-25	-6.08	Horizontal
206.0	-46.24	1.63	15.76	-32.11	-25	-7.11	Vertical
403.3	-51.98	1.71	15.44	-38.25	-25	-13.25	Horizontal
Test Results for Mid Channel 2535MHz							
5070.0	-62.40	5.23	35.82	-31.81	-25	-6.81	Horizontal
5070.0	-64.99	5.23	35.82	-34.40	-25	-9.40	Vertical
7605.0	-59.22	5.67	36.85	-28.04	-25	-3.04	Vertical
7605.0	-63.60	5.67	36.85	-32.42	-25	-7.42	Horizontal
195.6	-54.14	1.79	16.84	-39.08	-25	-14.08	Vertical
411.4	-51.49	1.71	17.64	-35.56	-25	-10.56	Horizontal
Test Results for High Channel 2560MHz							
5120.0	-59.88	5.24	35.83	-29.29	-25	-4.29	Horizontal
5120.0	-62.34	5.24	35.83	-31.75	-25	-6.75	Vertical
7680.0	-62.80	5.70	36.88	-31.62	-25	-6.62	Vertical
7680.0	-63.92	5.70	36.88	-32.74	-25	-7.74	Horizontal
192.1	-45.44	1.79	16.84	-30.38	-25	-5.38	Vertical
436.3	-45.02	1.71	17.64	-29.09	-25	-4.09	Horizontal

Note: Spurious Emission Level = Spectrum Analyzer Read Value + Cable Loss+ Antenna Factor + 11.74

. Margin = Spurious Emission Level - Limit

. Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

**9.5 LTE BAND 12**

**QPSK EIRP POWER FOR LTE BAND 12 (1.4MHZ BANDWIDTH)**

Test Results for Low Channel 699.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1399.4	-53.26	2.60	27.20	-28.66	-13	-15.66	Horizontal
1399.4	-44.81	2.60	27.20	-20.21	-13	-7.21	Vertical
2099.1	-45.60	2.85	27.54	-20.91	-13	-7.91	Vertical
2099.1	-52.96	2.85	27.54	-28.27	-13	-15.27	Horizontal
186.0	-42.06	1.49	17.78	-25.77	-13	-12.77	Vertical
416.6	-38.60	1.36	17.33	-22.63	-13	-9.63	Horizontal
Test Results For Mid Channel 707.5MHz							
1415.0	-50.64	2.61	27.28	-25.97	-13	-12.97	Horizontal
1415.0	-46.48	2.61	27.28	-21.81	-13	-8.81	Vertical
2122.5	-47.36	2.87	27.59	-22.64	-13	-9.64	Vertical
2122.5	-52.51	2.87	27.59	-27.79	-13	-14.79	Horizontal
175.0	-39.58	1.73	15.74	-25.57	-13	-12.57	Vertical
282.6	-36.69	1.62	15.79	-22.52	-13	-9.52	Horizontal
Test Results for High Channel 715.3MHz							
1430.6	-44.07	2.63	27.28	-19.42	-13	-6.42	Horizontal
1430.6	-51.60	2.63	27.28	-26.95	-13	-13.95	Vertical
2145.9	-46.18	2.88	27.60	-21.46	-13	-8.46	Vertical
2145.9	-51.88	2.88	27.60	-27.16	-13	-14.16	Horizontal
186.6	-34.63	1.61	18.00	-18.24	-13	-5.24	Vertical
305.2	-35.64	1.45	15.49	-21.61	-13	-8.61	Horizontal

**QPSK EIRP POWER FOR LTE BAND 12 (10MHZ BANDWIDTH)**

Test Results for Low Channel 704MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1408.0	-46.08	2.61	27.26	-21.43	-13	-8.43	Horizontal
1408.0	-44.18	2.61	27.26	-19.53	-13	-6.53	Vertical
2112.0	-50.92	2.87	27.58	-26.21	-13	-13.21	Vertical
2112.0	-49.30	2.87	27.58	-24.59	-13	-11.59	Horizontal
195.4	-36.55	1.31	16.97	-20.89	-13	-7.89	Vertical
337.2	-37.53	1.65	16.70	-22.48	-13	-9.48	Horizontal
Test Results for Mid Channel 707.5MHz							
1415.0	-52.02	2.61	27.28	-27.35	-13	-14.35	Horizontal
1415.0	-49.60	2.61	27.28	-24.93	-13	-11.93	Vertical
2122.5	-52.90	2.87	27.59	-28.18	-13	-15.18	Vertical
2122.5	-49.55	2.87	27.59	-24.83	-13	-11.83	Horizontal
210.2	-37.07	1.72	17.99	-20.80	-13	-7.80	Vertical
407.0	-42.05	1.73	17.94	-25.84	-13	-12.84	Horizontal
Test Results for High Channel 711MHz							
1422.0	-46.13	2.62	27.28	-21.47	-13	-8.47	Horizontal
1422.0	-51.04	2.62	27.28	-26.38	-13	-13.38	Vertical
2133.0	-45.80	2.87	27.60	-21.07	-13	-8.07	Vertical
2133.0	-53.04	2.87	27.60	-28.31	-13	-15.31	Horizontal
205.9	-37.22	1.58	15.93	-22.87	-13	-9.87	Vertical
453.6	-41.07	1.36	15.59	-26.84	-13	-13.84	Horizontal

Note: P<sub>Mea</sub>(dBm)= Power(dBm)+ AR<sub>pl</sub> (dBm)

. Over Limit= : P<sub>Mea</sub>(dBm)-Limit(dBm)

. Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

**9.6 LTE BAND 17**

**QPSK EIRP POWER FOR LTE BAND 17 (5MHZ BANDWIDTH)**

Test Results for Low Channel 706.5MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Factor(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1413.0	-46.64	2.61	27.28	-21.97	-13	-8.97	Horizontal
1413.0	-49.61	2.61	27.28	-24.94	-13	-11.94	Vertical
2119.5	-44.50	2.87	27.59	-19.78	-13	-6.78	Vertical
2119.5	-51.44	2.87	27.59	-26.72	-13	-13.72	Horizontal
190.5	-44.88	1.71	16.15	-30.44	-13	-17.44	Vertical
265.4	-44.01	1.41	17.32	-28.10	-13	-15.10	Horizontal
Test Results For Mid Channel 710MHz							
1420.0	-50.93	2.62	27.30	-26.25	-13	-13.25	Horizontal
1420.0	-47.48	2.62	27.30	-22.80	-13	-9.80	Vertical
2130.0	-52.17	2.87	27.62	-27.42	-13	-14.42	Vertical
2130.0	-52.23	2.87	27.62	-27.48	-13	-14.48	Horizontal
178.3	-44.84	1.42	15.25	-31.02	-13	-18.02	Vertical
264.7	-38.47	1.36	17.19	-22.64	-13	-9.64	Horizontal
Test Results for High Channel 713.5MHz							
1427.0	-45.59	2.66	27.28	-20.97	-13	-7.97	Horizontal
1427.0	-53.86	2.66	27.28	-29.24	-13	-16.24	Vertical
2140.5	-44.95	2.88	27.60	-20.23	-13	-7.23	Vertical
2140.5	-53.20	2.88	27.60	-28.48	-13	-15.48	Horizontal
178.5	-34.12	1.32	17.29	-18.15	-13	-5.15	Vertical
264.4	-44.63	1.72	16.89	-29.46	-13	-16.46	Horizontal

**QPSK EIRP POWER FOR LTE BAND 17 (10MHZ BANDWIDTH)**

Test Results for Low Channel 709MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Factor(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1418.0	-52.21	2.62	27.30	-27.53	-13	-14.53	Horizontal
1418.0	-46.14	2.62	27.30	-21.46	-13	-8.46	Vertical
2127.0	-53.30	2.87	27.62	-28.55	-13	-15.55	Vertical
2127.0	-53.67	2.87	27.62	-28.92	-13	-15.92	Horizontal
193.5	-43.91	1.35	16.91	-28.35	-13	-15.35	Vertical
239.6	-37.99	1.62	16.31	-23.30	-13	-10.30	Horizontal
Test Results for Mid Channel 710MHz							
1420.0	-53.99	2.62	27.30	-29.31	-13	-16.31	Horizontal
1420.0	-51.41	2.62	27.30	-26.73	-13	-13.73	Vertical
2130.0	-46.71	2.87	27.62	-21.96	-13	-8.96	Vertical
2130.0	-53.01	2.87	27.62	-28.26	-13	-15.26	Horizontal
197.1	-36.41	1.51	17.14	-20.78	-13	-7.78	Vertical
438.8	-42.29	1.77	16.88	-27.18	-13	-14.18	Horizontal
Test Results for High Channel 711MHz							
1422.0	-53.19	2.62	27.30	-28.51	-13	-15.51	Horizontal
1422.0	-52.45	2.62	27.30	-27.77	-13	-14.77	Vertical
2133.0	-51.01	2.87	27.62	-26.26	-13	-13.26	Vertical
2133.0	-49.26	2.87	27.62	-24.51	-13	-11.51	Horizontal
180.5	-37.80	1.78	15.95	-23.63	-13	-10.63	Vertical
371.1	-38.75	1.34	17.95	-22.15	-13	-9.15	Horizontal

Note: Spurious Emission Level = Spectrum Analyzer Read Value + Cable Loss+ Antenna Factor + 11.74  
 . Margin = Spurious Emission Level - Limit  
 . Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

**9.7 LTE BAND 41**

**QPSK EIRP POWER FOR LTE BAND 41 (5MHZ BANDWIDTH)**

<b>Test Results for Low Channel 2537.5MHz</b>							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
5075	-62.03	5.13	35.81	-31.35	-25	-6.35	Horizontal
5075	-59.93	5.13	35.81	-29.25	-25	-4.25	Vertical
7612.5	-61.88	5.42	36.85	-30.45	-25	-5.45	Vertical
7612.5	-59.87	5.42	36.85	-28.44	-25	-3.44	Horizontal
193.2	-48.05	1.56	17.97	-31.64	-25	-6.64	Vertical
412.5	-54.17	1.33	15.11	-40.39	-25	-15.39	Horizontal
<b>Test Results for Mid Channel 2595MHz</b>							
5190	-61.42	5.16	35.82	-30.76	-25	-5.76	Horizontal
5190	-64.32	5.16	35.82	-33.66	-25	-8.66	Vertical
7785	-63.93	5.53	36.85	-32.61	-25	-7.61	Vertical
7785	-60.72	5.53	36.85	-29.40	-25	-4.40	Horizontal
207.6	-49.64	1.77	16.17	-35.23	-25	-10.23	Vertical
387.2	-54.42	1.63	15.21	-40.84	-25	-15.84	Horizontal
<b>Test Results for High Channel 2652.5MHz</b>							
5305	-61.38	5.23	35.83	-30.78	-25	-5.78	Horizontal
5305	-61.86	5.23	35.83	-31.26	-25	-6.26	Vertical
7957.5	-59.37	5.62	36.87	-28.12	-25	-3.12	Vertical
7957.5	-64.77	5.62	36.87	-33.52	-25	-8.52	Horizontal
209.6	-45.90	1.58	17.56	-29.92	-25	-4.92	Vertical
269.1	-46.13	1.45	16.58	-31.00	-25	-6.00	Horizontal



**QPSK EIRP POWER FOR LTE BAND 41 (20MHZ BANDWIDTH)**

Test Results for Low Channel 2545MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
5090	-63.55	5.23	35.82	-32.96	-25	-7.96	Horizontal
5090	-64.27	5.23	35.82	-33.68	-25	-8.68	Vertical
7635	-63.26	5.67	36.86	-32.07	-25	-7.07	Vertical
7635	-63.11	5.67	36.86	-31.92	-25	-6.92	Horizontal
201.4	-44.56	1.55	15.76	-30.35	-25	-5.35	Vertical
233.9	-46.34	1.62	15.44	-32.52	-25	-7.52	Horizontal
Test Results for Mid Channel 2595MHz							
5190	-61.48	5.16	35.82	-30.82	-25	-5.82	Horizontal
5190	-60.16	5.16	35.82	-29.50	-25	-4.50	Vertical
7785	-63.88	5.53	36.85	-32.56	-25	-7.56	Vertical
7785	-61.15	5.53	36.85	-29.83	-25	-4.83	Horizontal
202.3	-54.55	1.58	16.84	-39.29	-25	-14.29	Vertical
401.1	-51.44	1.61	17.64	-35.41	-25	-10.41	Horizontal
Test Results for High Channel 2645MHz							
5290	-61.66	5.24	35.83	-31.07	-25	-6.07	Horizontal
5290	-60.13	5.24	35.83	-29.54	-25	-4.54	Vertical
7935	-62.15	5.70	36.88	-30.97	-25	-5.97	Vertical
7935	-61.02	5.70	36.88	-29.84	-25	-4.84	Horizontal
184.1	-49.16	1.48	16.84	-33.80	-25	-8.80	Vertical
343.5	-48.24	1.59	17.64	-32.19	-25	-7.19	Horizontal

Note: P<sub>Mea</sub>(dBm)= Power(dBm)+ AR<sub>pl</sub> (dBm)

. Over Limit= : P<sub>Mea</sub>(dBm)-Limit(dBm)

. We test both H direction and V direction, recorded worst case direction.

Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

## 10. FREQUENCY STABILITY

### RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §27.54, §90.213

### LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations.

§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

### TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. =  $-30^{\circ}$  to  $+50^{\circ}\text{C}$
- Voltage = low voltage, DC 3.27V, Normal, DC 3.85V and High voltage, DC 4.43V.

### Frequency Stability vs Temperature:

The EUT is placed inside a temperature chamber. The temperature is set to  $-30^{\circ}\text{C}$  and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until  $+50^{\circ}\text{C}$  is reached.

### Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

### MODES TESTED

LTE Band 2/4/5/7/12/17/41

### RESULTS

See the following pages.

10.1 LTE BAND 2

**Band 2 QPSK, (20MHz BANDWIDTH RB size 100 RB Offset 0)**

**Frequency error vs. Voltage**

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.27	1880	13.1	0.006992	2.5
3.85	1880	14.2	0.007539	2.5
4.43	1880	13.7	0.007299	2.5

**Frequency error vs. Temperature**

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1880	12.3	0.006560	2.5
Extreme (50C)	1880	11.3	0.006028	2.5
Extreme (40C)	1880	13.8	0.007344	2.5
Extreme (30C)	1880	13.2	0.007014	2.5
Extreme (10C)	1880	14.2	0.007551	2.5
Extreme (0C)	1880	11.9	0.006353	2.5
Extreme (-10C)	1880	13.3	0.007068	2.5
Extreme (-20C)	1880	14.5	0.007720	2.5
Extreme (-30C)	1880	15.2	0.008060	2.5

**Band 2 16QAM, (20MHz BANDWIDTH RB size 100 RB Offset 0)**

**Frequency error vs. Voltage**

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.27	1880	9.5	0.005042	2.5
3.85	1880	9.1	0.004842	2.5
4.43	1880	8.2	0.004355	2.5

**Frequency error vs. Temperature**

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1880	9.8	0.005224	2.5
Extreme (50C)	1880	9.1	0.004840	2.5
Extreme (40C)	1880	8.1	0.004313821	2.5
Extreme (30C)	1880	8.8	0.004694577	2.5
Extreme (10C)	1880	8.9	0.00474926	2.5
Extreme (0C)	1880	7.6	0.004044828	2.5
Extreme (-10C)	1880	8.7	0.004611383	2.5
Extreme (-20C)	1880	8.6	0.004564104	2.5
Extreme (-30C)	1880	7.9	0.00419041	2.5

**\*Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

## 10.2 LTE BAND 4

**Band 4 QPSK, (20MHz BANDWIDTH RB size 100 RB Offset 0)**
**Frequency error vs. Voltage**

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.27	1732.5	9.1	0.005270	2.5
3.85	1732.5	9.1	0.005249	2.5
4.43	1732.5	7.9	0.004580	2.5

**Frequency error vs. Temperature**

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1732.5	8.5	0.004930	2.5
Extreme (50C)	1732.5	9.3	0.005387	2.5
Extreme (40C)	1732.5	7.4	0.004271	2.5
Extreme (30C)	1732.5	5.8	0.003332	2.5
Extreme (10C)	1732.5	7.2	0.004156	2.5
Extreme (0C)	1732.5	9.4	0.005416	2.5
Extreme (-10C)	1732.5	8.2	0.004757	2.5
Extreme (-20C)	1732.5	7.3	0.004217	2.5
Extreme (-30C)	1732.5	8.1	0.004665	2.5

**Band 4 16QAM, (20MHz BANDWIDTH RB size 100 RB Offset 0)**

**Frequency error vs. Voltage**

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.27	1732.5	9.9	0.005731	2.5
3.85	1732.5	8.7	0.004994	2.5
4.43	1732.5	8.0	0.004646	2.5

**Frequency error vs. Temperature**

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1732.5	9.2	0.005332	2.5
Extreme (50C)	1732.5	8.6	0.004966	2.5
Extreme (40C)	1732.5	8.6	0.004961	2.5
Extreme (30C)	1732.5	8.7	0.005043	2.5
Extreme (10C)	1732.5	8.8	0.005090	2.5
Extreme (0C)	1732.5	8.6	0.004958	2.5
Extreme (-10C)	1732.5	8.6	0.004958	2.5
Extreme (-20C)	1732.5	9.0	0.005166	2.5
Extreme (-30C)	1732.5	8.1	0.004672	2.5

**\*Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

### 10.3 LTE BAND 5

#### Band 5 QPSK, (10MHz BANDWIDTH RB size 50 RB Offset 0)

##### Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.27	836.5	5.5	0.006527	2.5
3.85	836.5	6.9	0.008303	2.5
4.43	836.5	4.4	0.005225	2.5

##### Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	836.5	5.7	0.006769	2.5
Extreme (50C)	836.5	6.0	0.007193	2.5
Extreme (40C)	836.5	6.0	0.007203	2.5
Extreme (30C)	836.5	6.7	0.007987	2.5
Extreme (10C)	836.5	5.8	0.006877	2.5
Extreme (0C)	836.5	5.0	0.005970	2.5
Extreme (-10C)	836.5	5.8	0.006914	2.5
Extreme (-20C)	836.5	6.0	0.007155	2.5
Extreme (-30C)	836.5	6.6	0.007857	2.5

**Band 5 16QAM, (10MHz BANDWIDTH RB size 50 RB Offset 0)**

**Frequency error vs. Voltage**

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.27	836.5	5.9	0.007041	2.5
3.85	836.5	7.0	0.008342	2.5
4.43	836.5	4.3	0.005146	2.5

**Frequency error vs. Temperature**

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	836.5	5.8	0.006922	2.5
Extreme (50C)	836.5	5.8	0.006896	2.5
Extreme (40C)	836.5	6.3	0.007575	2.5
Extreme (30C)	836.5	6.2	0.007461	2.5
Extreme (10C)	836.5	5.4	0.006451	2.5
Extreme (0C)	836.5	4.8	0.005777	2.5
Extreme (-10C)	836.5	5.1	0.006128	2.5
Extreme (-20C)	836.5	5.7	0.006864	2.5
Extreme (-30C)	836.5	6.3	0.007481	2.5

**\*Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.



10.4 LTE BAND 7

**Band 7 QPSK, (20MHz BANDWIDTH RB size 100 RB Offset 0)**

**Frequency error vs. Voltage**

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.27	2535	10.4	0.004122	2.5
3.85	2535	8.7	0.003423	2.5
4.43	2535	8.7	0.003436	2.5

**Frequency error vs. Temperature**

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2535	9.0	0.003568	2.5
Extreme (50C)	2535	9.0	0.003539	2.5
Extreme (40C)	2535	8.6	0.003409	2.5
Extreme (30C)	2535	9.0	0.003532	2.5
Extreme (10C)	2535	8.2	0.003239	2.5
Extreme (0C)	2535	8.7	0.003443	2.5
Extreme (-10C)	2535	9.9	0.003890	2.5
Extreme (-20C)	2535	9.2	0.003611	2.5
Extreme (-30C)	2535	8.0	0.003166	2.5

**Band 7 16QAM, (20MHz BANDWIDTH RB size 100 RB Offset 0)**

**Frequency error vs. Voltage**

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.27	2535	6.9	0.002722	2.5
3.85	2535	6.3	0.002503	2.5
4.43	2535	5.3	0.002077	2.5

**Frequency error vs. Temperature**

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2535	6.9	0.002722	2.5
Extreme (50C)	2535	5.5	0.002153	2.5
Extreme (40C)	2535	5.4	0.002128	2.5
Extreme (30C)	2535	6.7	0.002656	2.5
Extreme (10C)	2535	5.4	0.002124	2.5
Extreme (0C)	2535	4.8	0.001887	2.5
Extreme (-10C)	2535	5.0	0.001981	2.5
Extreme (-20C)	2535	5.4	0.002137	2.5
Extreme (-30C)	2535	6.0	0.002366	2.5

**\*Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

10.5 LTE BAND 12

**Band 12 QPSK, (10MHz BANDWIDTH RB size 50 RB Offset 0**

**Frequency error vs. Voltage**

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.27	707.5	8.7	0.012261	2.5
3.85	707.5	10.1	0.014337	2.5
4.43	707.5	8.1	0.011502	2.5

**Frequency error vs. Temperature**

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	707.5	8.4	0.011851	2.5
Extreme (50C)	707.5	7.5	0.010534	2.5
Extreme (40C)	707.5	7.5	0.010567	2.5
Extreme (30C)	707.5	7.9	0.011115	2.5
Extreme (10C)	707.5	7.7	0.010849	2.5
Extreme (0C)	707.5	9.2	0.013071	2.5
Extreme (-10C)	707.5	8.0	0.011304	2.5
Extreme (-20C)	707.5	9.0	0.012654	2.5
Extreme (-30C)	707.5	7.8	0.010965	2.5

**Band 12 16QAM, (10MHz BANDWIDTH RB size 50 RB Offset 0)**

**Frequency error vs. Voltage**

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.27	707.5	7.2	0.010243	2.5
3.85	707.5	7.8	0.011070	2.5
4.43	707.5	7.4	0.010422	2.5

**Frequency error vs. Temperature**

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	707.5	9.0	0.012767	2.5
Extreme (50C)	707.5	8.7	0.012337	2.5
Extreme (40C)	707.5	8.7	0.012231	2.5
Extreme (30C)	707.5	7.9	0.011183	2.5
Extreme (10C)	707.5	9.2	0.013027	2.5
Extreme (0C)	707.5	7.3	0.010275	2.5
Extreme (-10C)	707.5	7.3	0.010326	2.5
Extreme (-20C)	707.5	8.8	0.012397	2.5
Extreme (-30C)	707.5	8.5	0.012076	2.5

**\*Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

## 10.6 LTE BAND 17

### Band 17 QPSK, (10MHz BANDWIDTH RB size 50 RB Offset 0)

#### Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.27	710.0	9.8	0.013797	2.5
3.85	710.0	8.8	0.012338	2.5
4.43	710.0	7.7	0.010777	2.5

#### Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	710.0	9.7	0.013651	2.5
Extreme (50C)	710.0	8.7	0.012318	2.5
Extreme (40C)	710.0	8.0	0.011231	2.5
Extreme (30C)	710.0	9.3	0.013074	2.5
Extreme (10C)	710.0	8.4	0.011839	2.5
Extreme (0C)	710.0	8.0	0.011267	2.5
Extreme (-10C)	710.0	8.9	0.012471	2.5
Extreme (-20C)	710.0	9.0	0.012647	2.5
Extreme (-30C)	710.0	7.8	0.010975	2.5

**Band 17 16QAM, (10MHz BANDWIDTH RB size 50 RB Offset 0)**

**Frequency error vs. Voltage**

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.27	710.0	10.3	0.014521	2.5
3.85	710.0	8.8	0.012377	2.5
4.43	710.0	8.1	0.011439	2.5

**Frequency error vs. Temperature**

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	710.0	9.3	0.013123	2.5
Extreme (50C)	710.0	9.1	0.012873	2.5
Extreme (40C)	710.0	8.8	0.012344	2.5
Extreme (30C)	710.0	9.1	0.012839	2.5
Extreme (10C)	710.0	8.4	0.011795	2.5
Extreme (0C)	710.0	8.5	0.011968	2.5
Extreme (-10C)	710.0	9.2	0.013014	2.5
Extreme (-20C)	710.0	9.3	0.013064	2.5
Extreme (-30C)	710.0	8.3	0.011659	2.5

**\*Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

10.7 LTE BAND 41

**Band 41 QPSK, (20MHz BANDWIDTH RB size 100 RB Offset 0)**

**Frequency error vs. Voltage**

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.27	2595	10.3	0.003956	2.5
3.85	2595	9.1	0.003506	2.5
4.43	2595	8.4	0.003245	2.5

**Frequency error vs. Temperature**

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2595	9.9	0.003818	2.5
Extreme (50C)	2595	8.7	0.003360	2.5
Extreme (40C)	2595	8.3	0.003208	2.5
Extreme (30C)	2595	9.2	0.003535	2.5
Extreme (10C)	2595	8.2	0.003153	2.5
Extreme (0C)	2595	8.6	0.003329	2.5
Extreme (-10C)	2595	9.3	0.003599	2.5
Extreme (-20C)	2595	8.5	0.003270	2.5
Extreme (-30C)	2595	8.5	0.003292	2.5

**Band 41 16QAM, (20MHz BANDWIDTH RB size 100 RB Offset 0)**

**Frequency error vs. Voltage**

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.27	2595	6.9	0.002661	2.5
3.85	2595	6.6	0.002558	2.5
4.43	2595	6.0	0.002309	2.5

**Frequency error vs. Temperature**

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2595	6.9	0.002661	2.5
Extreme (50C)	2595	6.1	0.002350	2.5
Extreme (40C)	2595	5.8	0.002256	2.5
Extreme (30C)	2595	6.9	0.002656	2.5
Extreme (10C)	2595	5.7	0.002186	2.5
Extreme (0C)	2595	4.9	0.001892	2.5
Extreme (-10C)	2595	4.9	0.001899	2.5
Extreme (-20C)	2595	5.8	0.002231	2.5
Extreme (-30C)	2595	6.1	0.002342	2.5

**\*Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.



## 11. Peak-to-Average Ratio

### 11.1 Description of the PAR Measurement

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

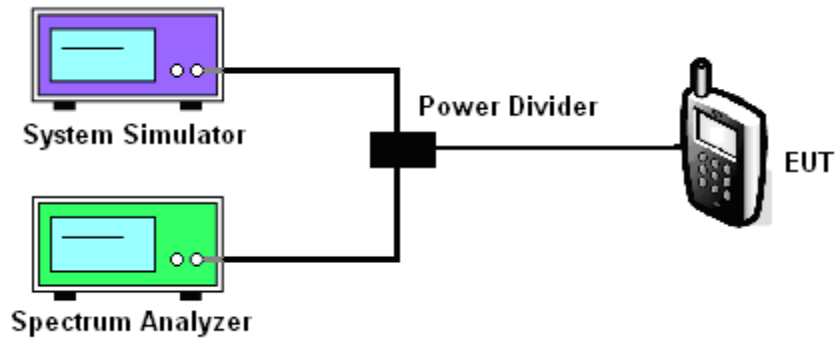
### 11.2 Measuring Instruments

See list of measuring instruments of this test report.

### 11.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. For LTE operating modes:
  - a. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
  - b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.

### 11.4 Test Setup



### MODES TESTED

LTE Band 2/4/5/7/12/17/41

Test data reference attachment.

----END OF REPORT----