FCC CFR47 PART 22H, 24E, 27
CERTIFICATION TEST REPORT
FCC ID: 2AWAG-PINEPHONEPRO

Product： PINEPHONEPRO

Trade Mark： PINE64

Model Number： PINEPHONEPRO

Family Model： N/A

Report No.： S21101902807006

Prepared for

Pine Store Limited

1906, 19/F., Ginza Plaza, 2A Sai Yeung Choi South Street,
Mongkok, Kowloon, Hong Kong.

Prepared by

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
Tel. 400-800-6106, 0755-2320 0050, 0755-2320
0090Website:http://www.ntek.org.cn

TEST RESULT CERTIFICATION

Applicant's name ..... :	Pine Store Limited
Address..... :	1906, 19/F., Ginza Plaza, 2A Sai Yeung Choi South Street, Mongkok, Kowloon, Hong Kong.
Manufacturer's Name..... :	Pine Store Limited
Address..... :	1906, 19/F., Ginza Plaza, 2A Sai Yeung Choi South Street, Mongkok, Kowloon, Hong Kong.
Product name..... :	PINEPHONEPRO
Trademark ..... :	PINE64
Model and/or type reference .. :	PINEPHONEPRO
Family Model：	N/A
Standards..... :	FCC CFR 47 Part 22H, Part 24E, Part 27
Test procedure ..... :	ANSI C63.26:2015 ANSI/TIA-603-E-2016

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of NTEK, this document may be altered or revised by NTEK, personal only, and shall be noted in the revision of the document.

Date of Test	
Date (s) of performance of tests.....	Oct 19. 2021 ~ Nov 26. 2021
Date of Issue.....	Nov 26. 2021
Test Result.....	**Pass**

Testing Engineer : Mukzi Lee

(Mukzi Lee)

Authorized Signatory : Alex

(Alex Li)

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	PINEPHONEPRO
Trade Mark	PINE64
Model Name	PINEPHONEPRO
Family Model	N/A
Model Difference	N/A
FCC ID:	2AWAG-PINEPHONEPRO
Frequency Bands:	U.S. Bands: ☒LTE FDD Band 2, 4, 5, 7, 12,13,41
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 13 Uplink: 777MHz-787MHz, Downlink: 746MHz-756MHz; LTE-TDD Band 41 Uplink&Downlink: 2555MHz-2655MHz,
Type of Modulation:	QPSK/16QAM
Power Class	Class 3
Antenna:	PIFA Antenna
Antenna gain:	Band 2: 2.41dBi; Band 4: 2.14dBi; Band 5: 3.05dBi; Band 7: 2.47dBi; Band 12: 1.87dBi; Band 13: 2.41dBi; Band 41: 2.24dBi
Power Supply:	DC 3.8V from battery or DC 5V from type-c port.
Battery	DC 3.8V, 3000mAh, 11.40Wh
Adapter:	N/A
Extreme Vol. Limits:	DC 3.4V to DC 4.2V (Nominal DC 3.8V) (Note 1)
HW Version	Pinephonepro-V02-0911
SW Version	pinephone_pro_android9_1119.img

** Note1: The High Voltage 4.2V and Low Voltage 3.4V 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: 2AWAG-PINEPHONEPRO** filing to comply with the FCC Part 22H&24E &27.

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
2	Conducted Emission Test	±1.38dB
3	RF power, conducted	±0.16dB
4	Spurious emissions, conducted	±0.21dB
5	All emissions, radiated(<1G)	±4.68dB
6	All emissions, radiated(>1G)	±4.89dB
7	Temperature	±0.5°C
8	Humidity	±2%
9	Frequency error, conducted	±0.19 ppm

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, Band 4, Band 5, Band 7, Band 12, Band 13, Band 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.

1.6 SUMMARY OF TEST RESULTS

FCC Part22, Subpart H/ FCC Part24, Subpart E, FCC Part27, Subpart L, KDB 971168 D01 Power Meas License Digital Systems v03			
FCC Rule	**Test Item**	**Verdict**	**Remark**
2.1046	Conducted Output Power	PASS	
22.913(d) 24.232(d) 27.50(d)(5) KDB 971168 D01 Clause 5.7	Peak-to-Average Ratio	PASS	
2.1049 22.917(b) 24.238(b) KDB 971168 D01 Clause 4.2	Occupied Bandwidth	PASS	
2.1051 22.917(a) 24.238(a) 27.53(c), (g), (h), (m) KDB 971168 D01 Clause 6	Band Edge	PASS	
22.913(a)(2) 27.50 (c)(10) KDB 971168 D01 Clause 5.6	Effective Radiated Power	PASS	

24.232(c) 27.50(h)(2), (d)(4) KDB 971168 D01 Clause 5.6	Equivalent Isotropic Radiated Power	PASS	
2.1053 22.917(a) 24.238(a) 27.53(c)(g)(h)(m) KDB 971168 D01 Clause 7	Field Strength of Spurious Radiation	PASS	
2.1055 22.355 24.235 27.54 KDB 971168 D01 Clause 9	Frequency Stability for Temperature & Voltage	PASS	
2.1051 22.917(a) 24.238(a) 27.53(c)(g)(h)(m) KDB 971168 D01 Clause 6	Conducted Emission	PASS	

Remark:

1. “N/A” denotes test is not applicable in this Test Report.
2. All test items were verified and recorded according to the standards and without any deviation during the test.
3. No modifications are made to the EUT during all test items.

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

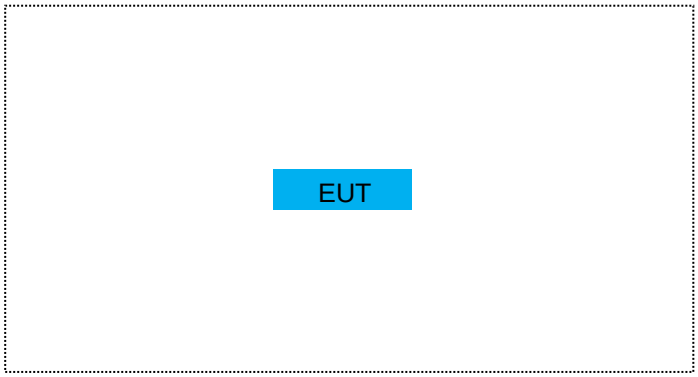
Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Note
1	PINEPHONEPRO	PINEPHONEPRO	FCC ID: 2AWAG-PINEPHONEPRO	EUT

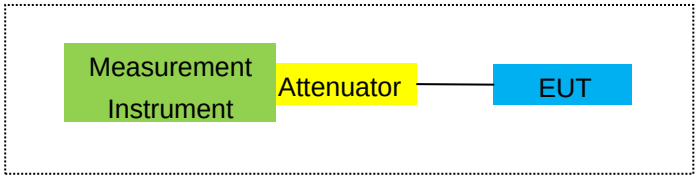
Note: All the accessories have been used during the test.
the following "EUT" in setup diagram means EUT system.

2.4 TEST SETUP

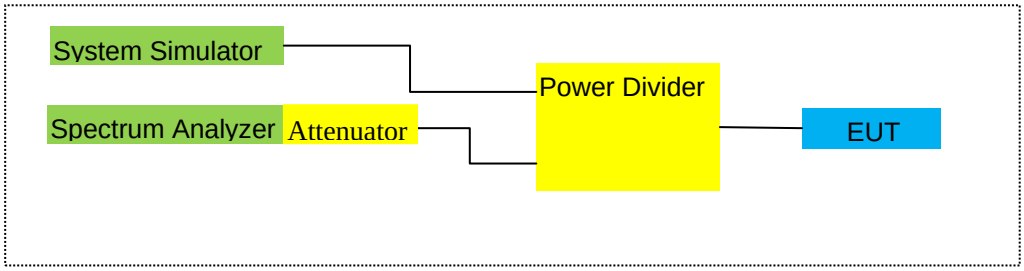
For Radiated Test Cases



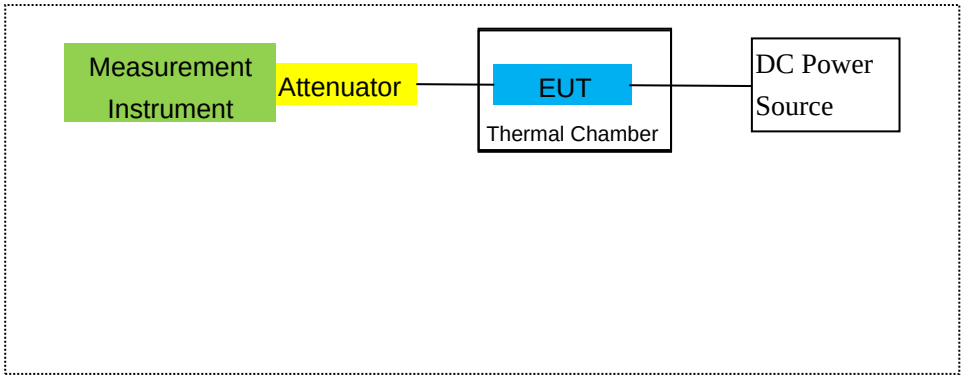
For Conducted Output Power



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	2021.07.01	2022.06.30	1 year
2	Test Receiver	R&S	ESPI	101318	2021.04.27	2022.04.26	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2021.03.29	2022.03.28	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2020.05.11	2023.05.10	3 year
5	Horn Antenna	EM	EM-AH-10180	2011071402	2021.03.29	2022.03.28	1 year
6	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2020.11.20 2021.11.07	2021.11.19 2022.11.06	1 year
7	Amplifier	EM	EM-30180	060538	2021.07.01	2022.06.30	1 year
8	Loop Antenna	ARA	PLA-1030/B	1029	2021.04.27	2022.04.26	1 year
9	Power Meter	R&S	NRVS	100696	2021.07.01	2022.06.30	1 year
10	Power Sensor	R&S	URV5-Z4	0395.1619.05	2021.04.27	2022.04.26	1 year
11	Test Cable	N/A	R-01	N/A	2019.08.06	2022.08.05	3 year
12	Test Cable	N/A	R-02	N/A	2019.08.06	2022.08.05	3 year
13	Test Cable	N/A	R-03	N/A	2019.06.28	2022.06.27	3 year
14	Test Receiver	R&S	ESCI	101160	2021.04.27	2022.04.26	1 year
15	LISN	R&S	ENV216	101313	2021.04.27	2022.04.26	1 year
16	LISN	EMCO	3816/2	00042990	2021.04.27	2022.04.26	1 year
17	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2021.04.27	2022.04.26	1 year
18	Passive Voltage Probe	R&S	ESH2-Z3	100196	2021.04.27	2022.04.26	1 year
19	Test Cable	N/A	C01	N/A	2020.05.11	2023.05.10	3 year
20	Test Cable	N/A	C02	N/A	2020.05.11	2023.05.10	3 year
21	Test Cable	N/A	C03	N/A	2020.05.11	2023.05.10	3 year
22	Attenuator	MCE	24-10-34	BN9258	2021.05.11	2022.05.10	1 year
23	Spectrum Analyzer	agilent	e4440a	us44300399	2021.04.27	2022.04.26	1 year
24	test receiver	R&S	ESCI	a0304218	2021.04.27	2022.04.26	1 year
25	Communication Tester	R&S	CMU200	A0304247	2021.07.01	2022.06.30	1 year
26	Thermal Chamber	Ten Billion	TTC-B3C	TBN-960502	2021.04.27	2022.04.26	1 year

27	DC Power Source	N/A	PS-6005D	20170402923	2020.05.11	2023.05.10	3 year
28	PSG Analog Signal Generator	Agilent	E8257D	MY51110112	2021.07.01	2022.06.30	1 year
29	Communication Tester	R&S	CMW500	148500	2021.07.01	2022.06.30	1 year
30	PSG Analog Signal Generator	Agilent	E8257D	MY51110112	2021.07.01	2022.06.30	1 year

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	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 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 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23[1]	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

- LTE Band2
- LTE Band 4
- LTE Band 5
- LTE Band 7
- LTE Band 12
- LTE Band 13
- LTE Band 41

RESULTS

PASS

Test data reference attachment.

6. BANDEDGE AND EMISSION MASK

RULE PART(S)

FCC: §2.1051,§22.917(a), §24.238(a), §27.53(c)(g)(h)(m)

FCC: §2.1046, §22.913, §24.232

LIMITS

The minimum permissible attenuation level of any spurious emission is 43 + log10(P[Watts]), where P is the transmitter power in Watts.

The minimum permissible attenuation level for Band 7 is as following.

Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

Per 27.53(c.5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c.4) is 65 + 10log10(P) = -35dBm in a 6.25kHz bandwidth.

Per 27.53(m) for operations in the BRS/EBS bands, 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.

TEST PROCEDURE

The transmitter output was connected to a CMW500Test 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 display line

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

MODES TESTED

□ LTE Band 2/4/5/7/12/13/41

RESULTS

Test data reference attachment.

7. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051,§22.917(a), §24.238(a), §27.53(c)(g)(h)(m)

LIMITS

The minimum permissible attenuation level of any spurious emission is 43 + log10(P[Watts]), where P is the transmitter power in Watts.
The minimum permissible attenuation level for Band 7 is as following.
Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.
Per 27.53(c.5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.
For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c.4) is 65 + 10log10(P) = -35dBm in a 6.25kHz bandwidth.
Per 27.53(m) for operations in the BRS/EBS bands, 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.

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

MODES TESTED

LTE Band 2
LTE Band 4
LTE Band 5
LTE Band 7
LTE Band 12
LTE Band 13
LTE Band 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.

Note: For LTE band 2/4/7/41, the frequency range above the 5th harmonic, the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

8. RADIATED MEASUREMENT

8.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913(a)(2), §24.232(c) and §27.50 (h)(2), (c)(10), (d)(4)

LIMITS:

22.913(a) (2)- The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.
24.232 (c) Mobile and portable stations are limited to 2 watts EIRP.
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 in the 2500–2570 MHz and 2620–2690 MHz bands. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

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

- LTE Band 2
- LTE Band 4
- LTE Band 5
- LTE Band 7
- LTE Band 12
- LTE Band 13
- LTE Band 41

RESULTS

Pass

8.2 LTE BAND 2

Radiated Power (EIRP) for Band 2									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	1/#Mid	1850.7	-1.64	3.76	28.24	22.84	192.309	Horizontal	Pass
		1880	-1.50	3.91	28.22	22.81	190.985	Horizontal	Pass
		1909.3	-1.50	3.93	28.20	22.77	189.234	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	1851.5	-1.58	3.77	28.23	22.88	194.089	Horizontal	Pass
		1880	-1.44	3.91	28.24	22.89	194.536	Horizontal	Pass
		1908.5	-1.52	3.94	28.25	22.79	190.108	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	1852.5	-1.65	3.77	28.31	22.89	194.536	Horizontal	Pass
		1880	-1.47	3.91	28.22	22.84	192.309	Horizontal	Pass
		1907.5	-1.50	3.94	28.20	22.76	188.799	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	1855	-1.70	3.79	28.33	22.84	192.309	Horizontal	Pass
		1880	-1.44	3.95	28.22	22.83	191.867	Horizontal	Pass
		1905	-1.37	3.97	28.19	22.85	192.752	Horizontal	Pass
15.0MHz Band QPSK	1/#Mid	1857.5	-1.77	3.79	28.34	22.78	189.671	Horizontal	Pass
		1880	-1.45	3.95	28.22	22.82	191.426	Horizontal	Pass
		1902.5	-1.44	3.97	28.18	22.77	189.234	Horizontal	Pass
20.0MHz Band QPSK	1/#Mid	1860	-1.80	3.81	28.35	22.74	187.932	Horizontal	Pass
		1880	-1.35	3.96	28.22	22.91	195.434	Horizontal	Pass
		1900	-1.35	4.00	28.16	22.81	190.985	Horizontal	Pass
1.4MHz Band QPSK	1/#Mid	1850.7	-1.70	3.76	28.24	22.78	189.671	Vertical	Pass
		1880	-1.42	3.91	28.22	22.89	194.536	Vertical	Pass
		1909.3	-1.40	3.93	28.20	22.87	193.642	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	1851.5	-1.63	3.77	28.23	22.83	191.867	Vertical	Pass
		1880	-1.43	3.91	28.24	22.90	194.984	Vertical	Pass
		1908.5	-1.46	3.94	28.25	22.85	192.752	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	1852.5	-1.79	3.77	28.31	22.75	188.365	Vertical	Pass
		1880	-1.46	3.91	28.22	22.85	192.752	Vertical	Pass
		1907.5	-1.38	3.94	28.20	22.88	194.089	Vertical	Pass
10.0MHz Band	1/#Mid	1855	-1.69	3.79	28.33	22.85	192.752	Vertical	Pass
		1880	-1.50	3.95	28.22	22.77	189.234	Vertical	Pass

QPSK		1905	-1.41	3.97	28.19	22.81	190.985	Vertical	Pass
15.0MHz Band QPSK	1/#Mid	1857.5	-1.75	3.79	28.34	22.80	190.546	Vertical	Pass
		1880	-1.38	3.95	28.22	22.89	194.536	Vertical	Pass
		1902.5	-1.41	3.97	28.18	22.80	190.546	Vertical	Pass
20.0MHz Band QPSK	1/#Mid	1860	-1.60	3.81	28.35	22.94	196.789	Vertical	Pass
		1880	-1.35	3.96	28.22	22.91	195.434	Vertical	Pass
		1900	-1.21	4.00	28.16	22.95	197.242	Vertical	Pass

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

Radiated Power (EIRP) for Band 2									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band 16 QAM	1/#Mid	1850.7	-2.92	3.76	28.24	21.56	143.219	Horizontal	Pass
		1880	-2.69	3.91	28.22	21.62	145.211	Horizontal	Pass
		1909.3	-2.71	3.93	28.20	21.56	143.219	Horizontal	Pass
3.0MHz Band 16 QAM	1/#Mid	1851.5	-2.89	3.77	28.23	21.57	143.549	Horizontal	Pass
		1880	-2.77	3.91	28.24	21.56	143.219	Horizontal	Pass
		1908.5	-2.63	3.94	28.25	21.68	147.231	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	1852.5	-2.89	3.77	28.31	21.65	146.218	Horizontal	Pass
		1880	-2.67	3.91	28.22	21.64	145.881	Horizontal	Pass
		1907.5	-2.59	3.94	28.20	21.67	146.893	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	1855	-2.85	3.79	28.33	21.69	147.571	Horizontal	Pass
		1880	-2.58	3.95	28.22	21.69	147.571	Horizontal	Pass
		1905	-2.52	3.97	28.19	21.70	147.911	Horizontal	Pass
15.0MHz Band 16 QAM	1/#Mid	1857.5	-2.86	3.79	28.34	21.69	147.571	Horizontal	Pass
		1880	-2.72	3.95	28.22	21.55	142.889	Horizontal	Pass
		1902.5	-2.60	3.97	28.18	21.61	144.877	Horizontal	Pass
20.0MHz Band 16 QAM	1/#Mid	1860	-2.97	3.81	28.35	21.57	143.549	Horizontal	Pass
		1880	-2.65	3.96	28.22	21.61	144.877	Horizontal	Pass
		1900	-2.56	4.00	28.16	21.60	144.544	Horizontal	Pass
1.4MHz Band 16 QAM	1/#Mid	1850.7	-2.88	3.76	28.24	21.60	144.544	Vertical	Pass
		1880	-2.72	3.91	28.22	21.59	144.212	Vertical	Pass
		1909.3	-2.67	3.93	28.20	21.60	144.544	Vertical	Pass
3.0MHz Band 16 QAM	1/#Mid	1851.5	-2.86	3.77	28.23	21.60	144.544	Vertical	Pass
		1880	-2.78	3.91	28.24	21.55	142.889	Vertical	Pass
		1908.5	-2.68	3.94	28.25	21.63	145.546	Vertical	Pass
5.0MHz Band 16 QAM	1/#Mid	1852.5	-2.99	3.77	28.31	21.55	142.889	Vertical	Pass
		1880	-2.62	3.91	28.22	21.69	147.571	Vertical	Pass
		1907.5	-2.55	3.94	28.20	21.71	148.252	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	1855	-2.94	3.79	28.33	21.60	144.544	Vertical	Pass
		1880	-2.62	3.95	28.22	21.65	146.218	Vertical	Pass
		1905	-2.58	3.97	28.19	21.64	145.881	Vertical	Pass
15.0MHz Band 16 QAM	1/#Mid	1857.5	-2.90	3.79	28.34	21.65	146.218	Vertical	Pass
		1880	-2.70	3.95	28.22	21.57	143.549	Vertical	Pass
		1902.5	-2.61	3.97	28.18	21.60	144.544	Vertical	Pass

20.0MHz Band 16 QAM	1/#Mid	1860	-2.82	3.81	28.35	21.72	148.594	Vertical	Pass
		1880	-2.54	3.96	28.22	21.72	148.594	Vertical	Pass
		1900	-2.43	4.00	28.16	21.73	148.936	Vertical	Pass

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

8.3 LTE BAND 4

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result					Polarization Of Max. ERP	Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)		
1.4MHz Band QPSK	1/#Mid	1710.7	-1.40	3.12	27.58	23.06	202.302	Horizontal	Pass
		1732.5	-1.30	3.27	27.61	23.04	201.372	Horizontal	Pass
		1754.3	-1.34	3.29	27.63	23.00	199.526	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	1711.5	-1.40	3.13	27.61	23.08	203.236	Horizontal	Pass
		1732.5	-1.24	3.27	27.61	23.10	204.174	Horizontal	Pass
		1753.5	-1.21	3.30	27.62	23.11	204.644	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	1712.5	-1.48	3.13	27.63	23.02	200.447	Horizontal	Pass
		1732.5	-1.22	3.27	27.61	23.12	205.116	Horizontal	Pass
		1752.5	-1.31	3.30	27.60	22.99	199.067	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	1715	-1.35	3.15	27.64	23.14	206.063	Horizontal	Pass
		1732.5	-1.17	3.31	27.61	23.13	205.589	Horizontal	Pass
		1750	-1.19	3.33	27.59	23.07	202.768	Horizontal	Pass
15.0MHz Band QPSK	1/#Mid	1717.5	-1.42	3.15	27.65	23.08	203.236	Horizontal	Pass
		1732.5	-1.25	3.31	27.61	23.05	201.837	Horizontal	Pass
		1747.5	-1.13	3.33	27.57	23.11	204.644	Horizontal	Pass
20.0MHz Band QPSK	1/#Mid	1720	-1.40	3.17	27.66	23.09	203.704	Horizontal	Pass
		1732.5	-1.18	3.32	27.61	23.11	204.644	Horizontal	Pass
		1745	-1.21	3.36	27.56	22.99	199.067	Horizontal	Pass
1.4MHz Band QPSK	1/#Mid	1710.7	-1.44	3.12	27.58	23.02	200.447	Vertical	Pass
		1732.5	-1.28	3.27	27.61	23.06	202.302	Vertical	Pass
		1754.3	-1.32	3.29	27.63	23.02	200.447	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	1711.5	-1.43	3.13	27.61	23.05	201.837	Vertical	Pass
		1732.5	-1.33	3.27	27.61	23.01	199.986	Vertical	Pass
		1753.5	-1.32	3.30	27.62	23.00	199.526	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	1712.5	-1.37	3.13	27.63	23.13	205.589	Vertical	Pass
		1732.5	-1.28	3.27	27.61	23.06	202.302	Vertical	Pass
		1752.5	-1.20	3.30	27.60	23.10	204.174	Vertical	Pass
10.0MHz Band	1/#Mid	1715	-1.50	3.15	27.64	22.99	199.067	Vertical	Pass
		1732.5	-1.26	3.31	27.61	23.04	201.372	Vertical	Pass

QPSK		1750	-1.26	3.33	27.59	23.00	199.526	Vertical	Pass
15.0MHz Band QPSK	1/#Mid	1717.5	-1.46	3.15	27.65	23.04	201.372	Vertical	Pass
		1732.5	-1.23	3.31	27.61	23.07	202.768	Vertical	Pass
		1747.5	-1.13	3.33	27.57	23.11	204.644	Vertical	Pass
20.0MHz Band QPSK	1/#Mid	1720	-1.31	3.17	27.66	23.18	207.970	Vertical	Pass
		1732.5	-1.10	3.32	27.61	23.19	208.449	Vertical	Pass
		1745	-1.06	3.36	27.56	23.14	206.063	Vertical	Pass

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result					Polarization Of Max. ERP	Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)		
1.4MHz Band 16 QAM	1/#Mid	1710.7	-2.18	3.12	27.58	22.28	169.044	Horizontal	Pass
		1732.5	-2.00	3.27	27.61	22.34	171.396	Horizontal	Pass
		1754.3	-2.13	3.29	27.63	22.21	166.341	Horizontal	Pass
3.0MHz Band 16 QAM	1/#Mid	1711.5	-2.16	3.13	27.61	22.32	170.608	Horizontal	Pass
		1732.5	-2.09	3.27	27.61	22.25	167.880	Horizontal	Pass
		1753.5	-2.08	3.30	27.62	22.24	167.494	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	1712.5	-2.27	3.13	27.63	22.23	167.109	Horizontal	Pass
		1732.5	-2.02	3.27	27.61	22.32	170.608	Horizontal	Pass
		1752.5	-2.06	3.30	27.60	22.24	167.494	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	1715	-2.25	3.15	27.64	22.24	167.494	Horizontal	Pass
		1732.5	-1.99	3.31	27.61	22.31	170.216	Horizontal	Pass
		1750	-1.96	3.33	27.59	22.30	169.824	Horizontal	Pass
15.0MHz Band 16 QAM	1/#Mid	1717.5	-2.16	3.15	27.65	22.34	171.396	Horizontal	Pass
		1732.5	-2.04	3.31	27.61	22.26	168.267	Horizontal	Pass
		1747.5	-1.97	3.33	27.57	22.27	168.655	Horizontal	Pass
20.0MHz Band 16 QAM	1/#Mid	1720	-2.28	3.17	27.66	22.21	166.341	Horizontal	Pass
		1732.5	-2.06	3.32	27.61	22.23	167.109	Horizontal	Pass
		1745	-2.00	3.36	27.56	22.20	165.959	Horizontal	Pass
1.4MHz Band 16 QAM	1/#Mid	1710.7	-2.20	3.12	27.58	22.26	168.267	Vertical	Pass
		1732.5	-2.12	3.27	27.61	22.22	166.725	Vertical	Pass
		1754.3	-2.08	3.29	27.63	22.26	168.267	Vertical	Pass
3.0MHz Band 16 QAM	1/#Mid	1711.5	-2.26	3.13	27.61	22.22	166.725	Vertical	Pass
		1732.5	-2.06	3.27	27.61	22.28	169.044	Vertical	Pass
		1753.5	-2.08	3.30	27.62	22.24	167.494	Vertical	Pass
5.0MHz Band 16 QAM	1/#Mid	1712.5	-2.19	3.13	27.63	22.31	170.216	Vertical	Pass
		1732.5	-2.06	3.27	27.61	22.28	169.044	Vertical	Pass
		1752.5	-2.10	3.30	27.60	22.20	165.959	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	1715	-2.21	3.15	27.64	22.28	169.044	Vertical	Pass
		1732.5	-2.05	3.31	27.61	22.25	167.880	Vertical	Pass
		1750	-2.04	3.33	27.59	22.22	166.725	Vertical	Pass
15.0MHz Band 16 QAM	1/#Mid	1717.5	-2.24	3.15	27.65	22.26	168.267	Vertical	Pass
		1732.5	-2.06	3.31	27.61	22.24	167.494	Vertical	Pass
		1747.5	-2.02	3.33	27.57	22.22	166.725	Vertical	Pass

20.0MHz Band 16 QAM	1/#Mid	1720	-2.12	3.17	27.66	22.37	172.584	Vertical	Pass
		1732.5	-1.91	3.32	27.61	22.38	172.982	Vertical	Pass
		1745	-1.82	3.36	27.56	22.38	172.982	Vertical	Pass

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

8.4 LTE BAND 5

Radiated Power (ERP) for Band 5										
Mode	RB/RB SIZE	Frequency	Result						Polarization Of Max. ERP	Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Correction (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)		
1.4MHz Band QPSK	1/#Mid	824.7	3.94	2.01	19.68	2.15	19.46	88.308	Horizontal	Pass
		836.5	3.96	2.01	19.77	2.15	19.57	90.573	Horizontal	Pass
		848.3	3.91	2.02	19.82	2.15	19.56	90.365	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	825.5	4.05	2.01	19.70	2.15	19.59	90.991	Horizontal	Pass
		836.5	3.98	2.01	19.77	2.15	19.59	90.991	Horizontal	Pass
		847.5	3.88	2.02	19.81	2.15	19.52	89.536	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	826.5	4.04	2.01	19.71	2.15	19.59	90.991	Horizontal	Pass
		836.5	3.89	2.01	19.77	2.15	19.50	89.125	Horizontal	Pass
		846.5	3.91	2.02	19.79	2.15	19.53	89.743	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	829	4.02	2.01	19.73	2.15	19.59	90.991	Horizontal	Pass
		836.5	3.92	2.01	19.77	2.15	19.53	89.743	Horizontal	Pass
		844	3.86	2.02	19.78	2.15	19.47	88.512	Horizontal	Pass
1.4MHz Band QPSK	1/#Mid	824.7	4.06	2.01	19.68	2.15	19.58	90.782	Vertical	Pass
		836.5	3.92	2.01	19.77	2.15	19.53	89.743	Vertical	Pass
		848.3	3.85	2.02	19.82	2.15	19.50	89.125	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	825.5	3.99	2.01	19.70	2.15	19.53	89.743	Vertical	Pass
		836.5	3.89	2.01	19.77	2.15	19.50	89.125	Vertical	Pass
		847.5	3.84	2.02	19.81	2.15	19.48	88.716	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	826.5	3.88	2.01	19.71	2.15	19.43	87.700	Vertical	Pass
		836.5	3.88	2.01	19.77	2.15	19.49	88.920	Vertical	Pass
		846.5	3.98	2.02	19.79	2.15	19.60	91.201	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	829	4.04	2.01	19.73	2.15	19.61	91.411	Vertical	Pass
		836.5	4.03	2.01	19.77	2.15	19.64	92.045	Vertical	Pass
		844	4.03	2.02	19.78	2.15	19.64	92.045	Vertical	Pass

Radiated Power (ERP) for Band 5										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Correction (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band 16 QAM	1/#Mid	824.7	7.92	2.01	19.68	2.15	23.44	220.800	Horizontal	Pass
		836.5	7.76	2.01	19.77	2.15	23.37	217.270	Horizontal	Pass
		848.3	7.78	2.02	19.82	2.15	23.43	220.293	Horizontal	Pass
3.0MHz Band 16 QAM	1/#Mid	825.5	7.90	2.01	19.70	2.15	23.44	220.800	Horizontal	Pass
		836.5	7.75	2.01	19.77	2.15	23.36	216.770	Horizontal	Pass
		847.5	7.70	2.02	19.81	2.15	23.34	215.774	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	826.5	7.88	2.01	19.71	2.15	23.43	220.293	Horizontal	Pass
		836.5	7.76	2.01	19.77	2.15	23.37	217.270	Horizontal	Pass
		846.5	7.79	2.02	19.79	2.15	23.41	219.280	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	829	7.70	2.01	19.73	2.15	23.27	212.324	Horizontal	Pass
		836.5	7.67	2.01	19.77	2.15	23.28	212.814	Horizontal	Pass
		844	7.67	2.02	19.78	2.15	23.28	212.814	Horizontal	Pass
1.4MHz Band 16 QAM	1/#Mid	824.7	7.92	2.01	19.68	2.15	23.44	220.800	Vertical	Pass
		836.5	7.77	2.01	19.77	2.15	23.38	217.771	Vertical	Pass
		848.3	7.70	2.02	19.82	2.15	23.35	216.272	Vertical	Pass
3.0MHz Band 16 QAM	1/#Mid	825.5	7.78	2.01	19.70	2.15	23.32	214.783	Vertical	Pass
		836.5	7.79	2.01	19.77	2.15	23.40	218.776	Vertical	Pass
		847.5	7.71	2.02	19.81	2.15	23.35	216.272	Vertical	Pass
5.0MHz Band 16 QAM	1/#Mid	826.5	7.90	2.01	19.71	2.15	23.45	221.309	Vertical	Pass
		836.5	7.76	2.01	19.77	2.15	23.37	217.270	Vertical	Pass
		846.5	7.83	2.02	19.79	2.15	23.45	221.309	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	829	7.94	2.01	19.73	2.15	23.51	224.388	Vertical	Pass
		836.5	7.87	2.01	19.77	2.15	23.48	222.844	Vertical	Pass
		844	7.87	2.02	19.78	2.15	23.48	222.844	Vertical	Pass

Note:
ERP=EIRP-2.15
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

8.5 LTE BAND 7

Radiated Power (EIRP) for Band 7									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
5.0MHz Band QPSK	1/#Mid	2502.5	0.72	4.54	27.75	23.93	247.172	Horizontal	Pass
		2535	0.80	4.69	27.72	23.83	241.546	Horizontal	Pass
		2567.5	0.93	4.71	27.71	23.93	247.172	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	2505	0.64	4.55	27.76	23.85	242.661	Horizontal	Pass
		2535	0.82	4.69	27.72	23.85	242.661	Horizontal	Pass
		2565	0.99	4.72	27.70	23.97	249.459	Horizontal	Pass
15.0MHz Band QPSK	1/#Mid	2507.5	0.66	4.55	27.77	23.88	244.343	Horizontal	Pass
		2535	0.89	4.69	27.72	23.92	246.604	Horizontal	Pass
		2562.5	0.97	4.72	27.69	23.94	247.742	Horizontal	Pass
20.0MHz Band QPSK	1/#Mid	2510	0.75	4.57	27.78	23.96	248.886	Horizontal	Pass
		2535	0.93	4.73	27.72	23.92	246.604	Horizontal	Pass
		2560	0.92	4.75	27.68	23.85	242.661	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	2502.5	0.73	4.54	27.75	23.94	247.742	Vertical	Pass
		2535	0.93	4.69	27.72	23.96	248.886	Vertical	Pass
		2567.5	0.92	4.71	27.71	23.92	246.604	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	2505	0.72	4.55	27.76	23.93	247.172	Vertical	Pass
		2535	0.80	4.69	27.72	23.83	241.546	Vertical	Pass
		2565	0.96	4.72	27.70	23.94	247.742	Vertical	Pass
15.0MHz Band QPSK	1/#Mid	2507.5	0.68	4.55	27.77	23.90	245.471	Vertical	Pass
		2535	0.94	4.69	27.72	23.97	249.459	Vertical	Pass
		2562.5	0.83	4.72	27.69	23.80	239.883	Vertical	Pass
20.0MHz Band QPSK	1/#Mid	2510	0.77	4.57	27.78	23.98	250.035	Vertical	Pass
		2535	0.99	4.73	27.72	23.98	250.035	Vertical	Pass
		2560	1.05	4.75	27.68	23.98	250.035	Vertical	Pass

Radiated Power (EIRP) for Band 7									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
5.0MHz Band 16 QAM	1/#Mid	2502.5	-0.61	4.54	27.75	22.60	181.970	Horizontal	Pass
		2535	-0.45	4.69	27.72	22.58	181.134	Horizontal	Pass
		2567.5	-0.40	4.71	27.71	22.60	181.970	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	2505	-0.65	4.55	27.76	22.56	180.302	Horizontal	Pass
		2535	-0.44	4.69	27.72	22.59	181.552	Horizontal	Pass
		2565	-0.34	4.72	27.70	22.64	183.654	Horizontal	Pass
15.0MHz Band 16 QAM	1/#Mid	2507.5	-0.61	4.55	27.77	22.61	182.390	Horizontal	Pass
		2535	-0.36	4.69	27.72	22.67	184.927	Horizontal	Pass
		2562.5	-0.38	4.72	27.69	22.59	181.552	Horizontal	Pass
20.0MHz Band 16 QAM	1/#Mid	2510	-0.67	4.57	27.78	22.54	179.473	Horizontal	Pass
		2535	-0.36	4.73	27.72	22.63	183.231	Horizontal	Pass
		2560	-0.27	4.75	27.68	22.66	184.502	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	2502.5	-0.64	4.54	27.75	22.57	180.717	Vertical	Pass
		2535	-0.37	4.69	27.72	22.66	184.502	Vertical	Pass
		2567.5	-0.38	4.71	27.71	22.62	182.810	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	2505	-0.61	4.55	27.76	22.60	181.970	Vertical	Pass
		2535	-0.39	4.69	27.72	22.64	183.654	Vertical	Pass
		2565	-0.41	4.72	27.70	22.57	180.717	Vertical	Pass
15.0MHz Band 16 QAM	1/#Mid	2507.5	-0.60	4.55	27.77	22.62	182.810	Vertical	Pass
		2535	-0.47	4.69	27.72	22.56	180.302	Vertical	Pass
		2562.5	-0.39	4.72	27.69	22.58	181.134	Vertical	Pass
20.0MHz Band 16 QAM	1/#Mid	2510	-0.51	4.57	27.78	22.70	186.209	Vertical	Pass
		2535	-0.27	4.73	27.72	22.72	187.068	Vertical	Pass
		2560	-0.21	4.75	27.68	22.72	187.068	Vertical	Pass

Note:

SG Level= Signal generator output

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

8.5 LTE BAND 12

Radiated Power (ERP) for Band 12										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Correction (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	1/#Mid	699.7	7.50	1.91	19.21	2.15	22.65	184.077	Horizontal	Pass
		707.5	7.34	1.91	19.26	2.15	22.54	179.473	Horizontal	Pass
		715.3	7.36	1.93	19.34	2.15	22.62	182.810	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	700.5	7.51	1.91	19.21	2.15	22.66	184.502	Horizontal	Pass
		707.5	7.37	1.91	19.26	2.15	22.57	180.717	Horizontal	Pass
		714.5	7.36	1.93	19.34	2.15	22.62	182.810	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	701.5	7.43	1.91	19.23	2.15	22.60	181.970	Horizontal	Pass
		707.5	7.39	1.91	19.26	2.15	22.59	181.552	Horizontal	Pass
		713.5	7.25	1.92	19.33	2.15	22.51	178.238	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	704	7.35	1.91	19.25	2.15	22.54	179.473	Horizontal	Pass
		707.5	7.45	1.91	19.26	2.15	22.65	184.077	Horizontal	Pass
		711	7.37	1.92	19.32	2.15	22.62	182.810	Horizontal	Pass
1.4MHz Band QPSK	1/#Mid	699.7	7.38	1.91	19.21	2.15	22.53	179.061	Vertical	Pass
		707.5	7.42	1.91	19.26	2.15	22.62	182.810	Vertical	Pass
		715.3	7.35	1.93	19.34	2.15	22.61	182.390	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	700.5	7.52	1.91	19.21	2.15	22.67	184.927	Vertical	Pass
		707.5	7.36	1.91	19.26	2.15	22.56	180.302	Vertical	Pass
		714.5	7.40	1.93	19.34	2.15	22.66	184.502	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	701.5	7.47	1.91	19.23	2.15	22.64	183.654	Vertical	Pass
		707.5	7.44	1.91	19.26	2.15	22.64	183.654	Vertical	Pass
		713.5	7.26	1.92	19.33	2.15	22.52	178.649	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	704	7.49	1.91	19.25	2.15	22.68	185.353	Vertical	Pass
		707.5	7.48	1.91	19.26	2.15	22.68	185.353	Vertical	Pass
		711	7.42	1.92	19.32	2.15	22.67	184.927	Vertical	Pass

Radiated Power (ERP) for Band 12										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Correction (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band 16 QAM	1/#Mid	699.7	1.91	19.21	2.15	22.04	159.956	1.91	Horizontal	Pass
		707.5	1.91	19.26	2.15	22.04	159.956	1.91	Horizontal	Pass
		715.3	1.93	19.34	2.15	21.96	157.036	1.93	Horizontal	Pass
3.0MHz Band 16 QAM	1/#Mid	700.5	1.91	19.21	2.15	21.99	158.125	1.91	Horizontal	Pass
		707.5	1.91	19.26	2.15	21.97	157.398	1.91	Horizontal	Pass
		714.5	1.93	19.34	2.15	22.01	158.855	1.93	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	701.5	1.91	19.23	2.15	21.92	155.597	1.91	Horizontal	Pass
		707.5	1.91	19.26	2.15	21.89	154.525	1.91	Horizontal	Pass
		713.5	1.92	19.33	2.15	21.94	156.315	1.92	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	704	1.91	19.25	2.15	21.89	154.525	1.91	Horizontal	Pass
		707.5	1.91	19.26	2.15	21.97	157.398	1.91	Horizontal	Pass
		711	1.92	19.32	2.15	21.94	156.315	1.92	Horizontal	Pass
1.4MHz Band 16 QAM	1/#Mid	699.7	1.91	19.21	2.15	22.03	159.588	1.91	Vertical	Pass
		707.5	1.91	19.26	2.15	21.92	155.597	1.91	Vertical	Pass
		715.3	1.93	19.34	2.15	21.99	158.125	1.93	Vertical	Pass
3.0MHz Band 16 QAM	1/#Mid	700.5	1.91	19.21	2.15	21.94	156.315	1.91	Vertical	Pass
		707.5	1.91	19.26	2.15	22.01	158.855	1.91	Vertical	Pass
		714.5	1.93	19.34	2.15	22.02	159.221	1.93	Vertical	Pass
5.0MHz Band 16 QAM	1/#Mid	701.5	1.91	19.23	2.15	21.96	157.036	1.91	Vertical	Pass
		707.5	1.91	19.26	2.15	21.91	155.239	1.91	Vertical	Pass
		713.5	1.92	19.33	2.15	22.05	160.325	1.92	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	704	1.91	19.25	2.15	22.10	162.181	1.91	Vertical	Pass
		707.5	1.91	19.26	2.15	22.12	162.930	1.91	Vertical	Pass
		711	1.92	19.32	2.15	22.11	162.555	1.92	Vertical	Pass

Note:
ERP=EIRP-2.15
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

8.6 LTE BAND 13

Radiated Power (ERP) for Band 13										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Correction (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
5.0MHz Band QPSK	1/#Mid	779.5	9.30	1.95	19.23	2.15	24.43	277.332	Vertical	Pass
		782	9.24	1.95	19.26	2.15	24.40	275.423	Vertical	Pass
		784.5	9.16	1.96	19.33	2.15	24.38	274.157	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	782	9.33	1.95	19.25	2.15	24.48	280.543	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	779.5	9.25	1.95	19.23	2.15	24.38	274.157	Horizontal	Pass
		782	9.22	1.95	19.26	2.15	24.38	274.157	Horizontal	Pass
		784.5	9.18	1.96	19.33	2.15	24.40	275.423	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	782	9.39	1.95	19.25	2.15	24.54	284.446	Horizontal	Pass

Radiated Power (ERP) for Band 13										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Correction (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
5.0MHz Band QPSK	1/#Mid	779.5	8.34	1.95	19.23	2.15	23.47	222.331	Vertical	Pass
		782	8.26	1.95	19.26	2.15	23.42	219.786	Vertical	Pass
		784.5	8.23	1.96	19.33	2.15	23.45	221.309	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	782	8.35	1.95	19.25	2.15	23.5	223.872	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	779.5	8.37	1.95	19.23	2.15	23.50	223.872	Horizontal	Pass
		782	8.22	1.95	19.26	2.15	23.38	217.771	Horizontal	Pass
		784.5	8.18	1.96	19.33	2.15	23.40	218.776	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	782	8.39	1.95	19.25	2.15	23.54	225.944	Horizontal	Pass

Note:
ERP=EIRP-2.15
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

8.7 LTE Band 41

Radiated Power (EIRP) for Band 41									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
5.0MHz Band QPSK	25/0	2498.5	0.09	4.54	27.75	23.30	213.796	Horizontal	Pass
		2593	0.26	4.69	27.72	23.29	213.304	Horizontal	Pass
		2687.5	0.30	4.71	27.71	23.30	213.796	Horizontal	Pass
10.0MHz Band QPSK	50/0	2501	0.10	4.55	27.76	23.31	214.289	Horizontal	Pass
		2593	0.23	4.69	27.72	23.26	211.836	Horizontal	Pass
		2685	0.24	4.72	27.70	23.22	209.894	Horizontal	Pass
15.0MHz Band QPSK	75/0	2503.5	0.11	4.55	27.77	23.33	215.278	Horizontal	Pass
		2593	0.29	4.69	27.72	23.32	214.783	Horizontal	Pass
		2682.5	0.22	4.72	27.69	23.19	208.449	Horizontal	Pass
20.0MHz Band QPSK	100/0	2506	0.01	4.57	27.78	23.22	209.894	Horizontal	Pass
		2593	0.27	4.73	27.72	23.26	211.836	Horizontal	Pass
		2680	0.28	4.75	27.68	23.21	209.411	Horizontal	Pass
5.0MHz Band QPSK	25/0	2498.5	0.02	4.54	27.75	23.23	210.378	Vertical	Pass
		2593	0.23	4.69	27.72	23.26	211.836	Vertical	Pass
		2687.5	0.33	4.71	27.71	23.33	215.278	Vertical	Pass
10.0MHz Band QPSK	50/0	2501	0.12	4.55	27.76	23.33	215.278	Vertical	Pass
		2593	0.20	4.69	27.72	23.23	210.378	Vertical	Pass
		2685	0.29	4.72	27.70	23.27	212.324	Vertical	Pass
15.0MHz Band QPSK	75/0	2503.5	-0.02	4.55	27.77	23.20	208.930	Vertical	Pass
		2593	0.13	4.69	27.72	23.16	207.014	Vertical	Pass
		2682.5	0.27	4.72	27.69	23.24	210.863	Vertical	Pass
20.0MHz Band QPSK	100/0	2506	0.15	4.57	27.78	23.36	216.770	Vertical	Pass
		2593	0.35	4.73	27.72	23.34	215.774	Vertical	Pass
		2680	0.42	4.75	27.68	23.35	216.272	Vertical	Pass

Radiated Power (EIRP) for Band 41									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
5.0MHz Band 16 QAM	25/0	2502.5	2498.5	4.54	27.75	22.22	166.725	Horizontal	Pass
		2535	2593	4.69	27.72	22.11	162.555	Horizontal	Pass
		2567.5	2687.5	4.71	27.71	22.23	167.109	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	2505	2501	4.55	27.76	22.08	161.436	Horizontal	Pass
		2535	2593	4.69	27.72	22.16	164.437	Horizontal	Pass
		2565	2685	4.72	27.70	22.24	167.494	Horizontal	Pass
15.0MHz Band 16 QAM	75/0	2507.5	2503.5	4.55	27.77	22.19	165.577	Horizontal	Pass
		2535	2593	4.69	27.72	22.19	165.577	Horizontal	Pass
		2562.5	2682.5	4.72	27.69	22.14	163.682	Horizontal	Pass
20.0MHz Band 16 QAM	100/0	2510	2506	4.57	27.78	22.15	164.059	Horizontal	Pass
		2535	2593	4.73	27.72	22.24	167.494	Horizontal	Pass
		2560	2680	4.75	27.68	22.23	167.109	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	2502.5	2498.5	4.54	27.75	22.15	164.059	Vertical	Pass
		2535	2593	4.69	27.72	22.20	165.959	Vertical	Pass
		2567.5	2687.5	4.71	27.71	22.13	163.305	Vertical	Pass
10.0MHz Band 16 QAM	50/0	2505	2501	4.55	27.76	22.23	167.109	Vertical	Pass
		2535	2593	4.69	27.72	22.13	163.305	Vertical	Pass
		2565	2685	4.72	27.70	22.19	165.577	Vertical	Pass
15.0MHz Band 16 QAM	75/0	2507.5	2503.5	4.55	27.77	22.13	163.305	Vertical	Pass
		2535	2593	4.69	27.72	22.18	165.196	Vertical	Pass
		2562.5	2682.5	4.72	27.69	22.19	165.577	Vertical	Pass
20.0MHz Band 16 QAM	100/0	2510	2506	4.57	27.78	22.27	168.655	Vertical	Pass
		2535	2593	4.73	27.72	22.25	167.880	Vertical	Pass
		2560	2680	4.75	27.68	22.26	168.267	Vertical	Pass

Note:

SG Level= Signal generator output

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

9. SPURIOUS RADIATION EMISSION

RULE PART(S)

FCC: §2.1051,§22.917(a), §24.238(a), §27.53(c)(g)(h)(m)

LIMIT

For Band 7, the minimum permissible attenuation level of any spurious emission is 55 + log10 (P [Watts]).

The minimum permissible attenuation level of any spurious emission is 43 + log10 (P [Watts]), where P is the transmitter power in Watts.

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 Log10 (p), dB; and
b. for mobile subscriber equipment, the attenuation shall not be less than 43 + 10 Log10 (p), dB at the channel edges and 55 + 10 Log10 (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 Band2
- LTE Band 4
- ☐ LTE Band 5
- LTE Band 7
- LTE Band 12
- LTE Band 13
- LTE Band 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	-47.68	4.04	33.51	-18.21	-13	-5.21	Horizontal
3701.4	-46.86	4.04	33.51	-17.39	-13	-4.39	Vertical
5552.1	-53.54	5.24	35.84	-22.94	-13	-9.94	Vertical
5552.1	-51.76	5.24	35.84	-21.16	-13	-8.16	Horizontal
185.6	-40.00	1.43	16.02	-25.41	-13	-12.41	Vertical
413.8	-39.71	1.30	17.99	-23.02	-13	-10.02	Horizontal
Test Results for Mid Channel 1880MHz							
3760.0	-49.40	4.04	33.56	-19.88	-13	-6.88	Horizontal
3760.0	-49.51	4.04	33.56	-19.99	-13	-6.99	Vertical
5640.0	-49.17	5.24	35.91	-18.50	-13	-5.50	Vertical
5640.0	-52.72	5.24	35.91	-22.05	-13	-9.05	Horizontal
191.4	-36.35	1.62	16.97	-21.00	-13	-8.00	Vertical
465.7	-40.39	1.74	15.98	-26.16	-13	-13.16	Horizontal
Test Results for High Channel 1909.3MHz							
3818.6	-51.78	4.04	34.00	-21.82	-13	-8.82	Horizontal
3818.6	-52.89	4.04	34.00	-22.93	-13	-9.93	Vertical
5727.9	-52.48	5.24	36.04	-21.68	-13	-8.68	Vertical
5727.9	-49.84	5.24	36.04	-19.04	-13	-6.04	Horizontal
201.2	-38.40	1.42	17.29	-22.53	-13	-9.53	Vertical
369.2	-38.45	1.50	17.90	-22.04	-13	-9.04	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	-53.24	4.07	33.54	-23.77	-13	-10.77	Horizontal
3720.0	-46.20	4.07	33.54	-16.73	-13	-3.73	Vertical
5580.0	-53.02	5.28	35.86	-22.44	-13	-9.44	Vertical
5580.0	-52.95	5.28	35.86	-22.37	-13	-9.37	Horizontal
179.9	-40.65	1.58	16.89	-25.33	-13	-12.33	Vertical
330.8	-42.68	1.76	17.26	-27.18	-13	-14.18	Horizontal
Test Results for Mid Channel 1880MHz							
3760.0	-44.54	4.04	33.56	-15.02	-13	-2.02	Horizontal
3760.0	-46.86	4.04	33.56	-17.34	-13	-4.34	Vertical
5640.0	-45.18	5.24	35.91	-14.51	-13	-1.51	Vertical
5640.0	-50.92	5.24	35.91	-20.25	-13	-7.25	Horizontal
206.5	-34.89	1.46	16.27	-20.08	-13	-7.08	Vertical
343.9	-43.12	1.59	15.15	-29.56	-13	-16.56	Horizontal
Test Results for High Channel 1900MHz							
3800.0	-46.39	4.04	34.00	-16.43	-13	-3.43	Horizontal
3800.0	-53.13	4.04	34.00	-23.17	-13	-10.17	Vertical
5700.0	-47.54	5.24	36.04	-16.74	-13	-3.74	Vertical
5700.0	-51.59	5.24	36.04	-20.79	-13	-7.79	Horizontal
200.8	-42.49	1.36	17.39	-26.45	-13	-13.45	Vertical
465.3	-40.13	1.66	15.39	-26.40	-13	-13.40	Horizontal

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(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	-49.20	4.02	29.80	-23.42	-13	-10.42	Horizontal
3421.4	-46.18	4.02	29.80	-20.40	-13	-7.40	Vertical
5132.1	-45.57	5.24	35.84	-14.97	-13	-1.97	Vertical
5132.1	-52.02	5.24	35.84	-21.42	-13	-8.42	Horizontal
180.7	-38.60	1.68	16.04	-24.24	-13	-11.24	Vertical
384.0	-34.03	1.78	17.74	-18.07	-13	-5.07	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-48.17	4.03	30.00	-22.20	-13	-9.20	Horizontal
3465.0	-53.50	4.03	30.00	-27.53	-13	-14.53	Vertical
5197.5	-52.55	5.25	35.86	-21.94	-13	-8.94	Vertical
5197.5	-52.17	5.25	35.86	-21.56	-13	-8.56	Horizontal
191.9	-40.18	1.72	17.69	-24.21	-13	-11.21	Vertical
358.0	-43.52	1.62	16.02	-29.11	-13	-16.11	Horizontal
Test Results for High Channel 1754.3MHz							
3508.6	-48.80	4.05	30.01	-22.84	-13	-9.84	Horizontal
3508.6	-50.16	4.05	30.01	-24.20	-13	-11.20	Vertical
5262.9	-49.80	5.26	35.86	-19.20	-13	-6.20	Vertical
5262.9	-50.09	5.26	35.86	-19.49	-13	-6.49	Horizontal
182.8	-36.45	1.80	16.69	-21.56	-13	-8.56	Vertical
248.5	-39.98	1.75	16.66	-25.08	-13	-12.08	Horizontal

QPSK EIRP POWER FOR LTE BAND 4 (20.0MHZ 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
3440.0	-52.93	4.02	29.80	-27.15	-13	-14.15	Horizontal
3440.0	-44.71	4.02	29.80	-18.93	-13	-5.93	Vertical
5160.0	-48.16	5.24	35.84	-17.56	-13	-4.56	Vertical
5160.0	-53.51	5.24	35.84	-22.91	-13	-9.91	Horizontal
208.7	-44.48	1.57	17.26	-28.79	-13	-15.79	Vertical
245.9	-41.89	1.78	16.35	-27.32	-13	-14.32	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-49.80	4.03	30.00	-23.83	-13	-10.83	Horizontal
3465.0	-52.11	4.03	30.00	-26.14	-13	-13.14	Vertical
5197.5	-51.24	5.25	35.86	-20.63	-13	-7.63	Vertical
5197.5	-52.23	5.25	35.86	-21.62	-13	-8.62	Horizontal
197.0	-40.45	1.44	17.95	-23.94	-13	-10.94	Vertical
334.5	-41.61	1.65	16.09	-27.17	-13	-14.17	Horizontal
Test Results for High Channel 1754.3MHz							
3490.0	-53.95	2.91	27.68	-29.18	-13	-16.18	Horizontal
3490.0	-51.83	2.91	27.68	-27.06	-13	-14.06	Vertical
5235.0	-44.38	5.26	35.86	-13.78	-13	-0.78	Vertical
5235.0	-53.55	5.26	35.86	-22.95	-13	-9.95	Horizontal
197.8	-41.00	1.61	16.85	-25.76	-13	-12.76	Vertical
397.9	-44.89	1.61	15.19	-31.31	-13	-18.31	Horizontal

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(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	-53.60	2.78	27.50	-28.88	-13	-15.88	Horizontal
1649.4	-49.78	2.78	27.50	-25.06	-13	-12.06	Vertical
2474.1	-52.28	2.90	27.80	-27.38	-13	-14.38	Vertical
2474.1	-53.30	2.90	27.80	-28.40	-13	-15.40	Horizontal
178.5	-42.87	1.76	17.59	-27.04	-13	-14.04	Vertical
320.0	-43.58	1.63	15.87	-29.34	-13	-16.34	Horizontal
Test Results For Mid Channel 836.5MHz							
1673.0	-52.24	2.80	27.48	-27.56	-13	-14.56	Horizontal
1673.0	-47.60	2.80	27.48	-22.92	-13	-9.92	Vertical
2509.5	-50.42	2.91	27.70	-25.63	-13	-12.63	Vertical
2509.5	-50.57	2.91	27.70	-25.78	-13	-12.78	Horizontal
210.3	-40.99	1.61	15.68	-26.92	-13	-13.92	Vertical
302.9	-35.57	1.59	17.52	-19.65	-13	-6.65	Horizontal
Test Results for High Channel 848.3MHz							
1696.6	-50.69	2.82	27.43	-26.08	-13	-13.08	Horizontal
1696.6	-45.30	2.82	27.43	-20.69	-13	-7.69	Vertical
2544.9	-44.55	2.92	27.74	-19.73	-13	-6.73	Vertical
2544.9	-53.53	2.92	27.74	-28.71	-13	-15.71	Horizontal
207.9	-43.68	1.69	16.67	-28.69	-13	-15.69	Vertical
401.7	-42.53	1.70	17.18	-27.05	-13	-14.05	Horizontal

QPSK EIRP POWER FOR LTE BAND 5 (10MHZ BANDWIDT

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
1658.0	-44.05	2.78	27.50	-19.33	-13	-6.33	Horizontal
1658.0	-46.35	2.78	27.50	-21.63	-13	-8.63	Vertical
2487.0	-45.07	2.90	27.80	-20.17	-13	-7.17	Vertical
2487.0	-52.25	2.90	27.80	-27.35	-13	-14.35	Horizontal
199.3	-38.57	1.71	15.57	-24.71	-13	-11.71	Vertical
276.2	-35.42	1.34	16.40	-20.36	-13	-7.36	Horizontal
Test Results for Mid Channel 836.5MHz							
1673.0	-51.45	2.80	27.48	-26.77	-13	-13.77	Horizontal
1673.0	-47.97	2.80	27.48	-23.29	-13	-10.29	Vertical
2509.5	-52.87	2.91	27.70	-28.08	-13	-15.08	Vertical
2509.5	-52.03	2.91	27.70	-27.24	-13	-14.24	Horizontal
204.5	-44.39	1.44	17.04	-28.79	-13	-15.79	Vertical
325.1	-44.21	1.76	17.62	-28.35	-13	-15.35	Horizontal
Test Results for High Channel 848.3MHz							
1688.0	-46.87	2.82	27.43	-22.26	-13	-9.26	Horizontal
1688.0	-50.14	2.82	27.43	-25.53	-13	-12.53	Vertical
2532.0	-48.66	2.92	27.74	-23.84	-13	-10.84	Vertical
2532.0	-50.55	2.92	27.74	-25.73	-13	-12.73	Horizontal
193.6	-39.84	1.74	17.70	-23.88	-13	-10.88	Vertical
240.8	-43.41	1.41	17.46	-27.35	-13	-14.35	Horizontal

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(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 1710.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit （dBm）	Margin(dBm)	Polarity
5005.0	-61.88	5.23	35.81	-31.30	-25	-6.30	Horizontal
5005.0	-64.85	5.23	35.81	-34.27	-25	-9.27	Vertical
7507.5	-61.80	5.67	36.85	-30.62	-25	-5.62	Vertical
7507.5	-63.92	5.67	36.85	-32.74	-25	-7.74	Horizontal
202.2	-45.50	1.73	17.97	-29.26	-25	-4.26	Vertical
371.2	-51.43	1.38	15.11	-37.70	-25	-12.70	Horizontal
Test Results for Mid Channel1732.5MHz							
5070.0	-64.05	5.23	35.82	-33.46	-25	-8.46	Horizontal
5070.0	-64.18	5.23	35.82	-33.59	-25	-8.59	Vertical
7605.0	-60.14	5.67	36.85	-28.96	-25	-3.96	Vertical
7605.0	-61.35	5.67	36.85	-30.17	-25	-5.17	Horizontal
201.3	-47.59	1.77	16.17	-33.18	-25	-8.18	Vertical
455.3	-52.43	1.63	15.21	-38.85	-25	-13.85	Horizontal
Test Results for High Channel1754.3MHz							
5135.0	-64.35	5.24	35.83	-33.76	-25	-8.76	Horizontal
5135.0	-59.24	5.24	35.83	-28.65	-25	-3.65	Vertical
7702.5	-59.67	5.68	36.87	-28.48	-25	-3.48	Vertical
7702.5	-61.20	5.68	36.87	-30.01	-25	-5.01	Horizontal
207.4	-53.22	1.58	17.56	-37.24	-25	-12.24	Vertical
256.8	-46.43	1.45	16.58	-31.30	-25	-6.30	Horizontal

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

Test Results for Low Channel1710.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit （dBm）	Margin(dBm)	Polarity
5020.0	-61.19	5.23	35.82	-30.60	-25	-5.60	Horizontal
5020.0	-63.45	5.23	35.82	-32.86	-25	-7.86	Vertical
7530.0	-63.34	5.67	36.86	-32.15	-25	-7.15	Vertical
7530.0	-62.10	5.67	36.86	-30.91	-25	-5.91	Horizontal
187.0	-52.60	1.63	15.76	-38.47	-25	-13.47	Vertical
424.6	-45.07	1.71	15.44	-31.34	-25	-6.34	Horizontal
Test Results for Mid Channel 1732.5MHz							
5070.0	-59.86	5.23	35.82	-29.27	-25	-4.27	Horizontal
5070.0	-60.00	5.23	35.82	-29.41	-25	-4.41	Vertical
7605.0	-61.80	5.67	36.85	-30.62	-25	-5.62	Vertical
7605.0	-59.89	5.67	36.85	-28.71	-25	-3.71	Horizontal
209.3	-46.29	1.79	16.84	-31.23	-25	-6.23	Vertical
385.8	-49.84	1.71	17.64	-33.91	-25	-8.91	Horizontal
Test Results for High Channel 1754.3MHz							
5120.0	-64.74	5.24	35.83	-34.15	-25	-9.15	Horizontal
5120.0	-60.16	5.24	35.83	-29.57	-25	-4.57	Vertical
7680.0	-64.98	5.70	36.88	-33.80	-25	-8.80	Vertical
7680.0	-64.11	5.70	36.88	-32.93	-25	-7.93	Horizontal
202.0	-48.84	1.79	16.84	-33.78	-25	-8.78	Vertical
405.9	-48.34	1.71	17.64	-32.41	-25	-7.41	Horizontal

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(dBm)-Limit(dBm)

. 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	-46.86	2.60	27.20	-22.26	-13	-9.26	Horizontal
1399.4	-49.84	2.60	27.20	-25.24	-13	-12.24	Vertical
2099.1	-50.70	2.85	27.54	-26.01	-13	-13.01	Vertical
2099.1	-52.18	2.85	27.54	-27.49	-13	-14.49	Horizontal
208.9	-34.88	1.49	17.78	-18.59	-13	-5.59	Vertical
469.5	-43.17	1.36	17.33	-27.20	-13	-14.20	Horizontal
Test Results For Mid Channel 707.5MHz							
1415.0	-46.70	2.61	27.28	-22.03	-13	-9.03	Horizontal
1415.0	-46.59	2.61	27.28	-21.92	-13	-8.92	Vertical
2122.5	-45.57	2.87	27.59	-20.85	-13	-7.85	Vertical
2122.5	-52.45	2.87	27.59	-27.73	-13	-14.73	Horizontal
185.4	-34.66	1.73	15.74	-20.65	-13	-7.65	Vertical
312.1	-36.32	1.62	15.79	-22.15	-13	-9.15	Horizontal
Test Results for High Channel 715.3MHz							
1430.6	-46.44	2.63	27.28	-21.79	-13	-8.79	Horizontal
1430.6	-51.58	2.63	27.28	-26.93	-13	-13.93	Vertical
2145.9	-48.17	2.88	27.60	-23.45	-13	-10.45	Vertical
2145.9	-51.05	2.88	27.60	-26.33	-13	-13.33	Horizontal
175.3	-42.62	1.61	18.00	-26.23	-13	-13.23	Vertical
248.3	-34.16	1.45	15.49	-20.13	-13	-7.13	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	-51.75	2.61	27.26	-27.10	-13	-14.10	Horizontal
1408.0	-50.91	2.61	27.26	-26.26	-13	-13.26	Vertical
2112.0	-44.27	2.87	27.58	-19.56	-13	-6.56	Vertical
2112.0	-52.63	2.87	27.58	-27.92	-13	-14.92	Horizontal
206.4	-41.62	1.31	16.97	-25.96	-13	-12.96	Vertical
356.2	-43.14	1.65	16.70	-28.09	-13	-15.09	Horizontal
Test Results for Mid Channel 707.5MHz							
1415.0	-49.50	2.61	27.28	-24.83	-13	-11.83	Horizontal
1415.0	-47.79	2.61	27.28	-23.12	-13	-10.12	Vertical
2122.5	-51.19	2.87	27.59	-26.47	-13	-13.47	Vertical
2122.5	-50.58	2.87	27.59	-25.86	-13	-12.86	Horizontal
204.7	-34.08	1.72	17.99	-17.81	-13	-4.81	Vertical
453.2	-35.07	1.73	17.94	-18.86	-13	-5.86	Horizontal
Test Results for High Channel 711MHz							
1422.0	-48.33	2.62	27.28	-23.67	-13	-10.67	Horizontal
1422.0	-47.97	2.62	27.28	-23.31	-13	-10.31	Vertical
2133.0	-53.41	2.87	27.60	-28.68	-13	-15.68	Vertical
2133.0	-51.91	2.87	27.60	-27.18	-13	-14.18	Horizontal
202.4	-40.41	1.58	15.93	-26.06	-13	-13.06	Vertical
249.5	-42.31	1.36	15.59	-28.08	-13	-15.08	Horizontal

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(dBm)-Limit(dBm)

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

9.5 LTE BAND 13

QPSK EIRP POWER FOR LTE BAND 13 (5MHZ BANDWIDTH)

Test Results for Low Channel 779.5MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit （dBm）	Margin(dBm)	Polarity
1559.0	-50.89	2.61	27.28	-26.22	-13	-13.22	Horizontal
1559.0	-48.48	2.61	27.28	-23.81	-13	-10.81	Vertical
2338.5	-47.28	2.87	27.59	-22.56	-13	-9.56	Vertical
2338.5	-52.90	2.87	27.59	-28.18	-13	-15.18	Horizontal
199.7	-41.28	1.71	16.15	-26.84	-13	-13.84	Vertical
463.8	-34.09	1.41	17.32	-18.18	-13	-5.18	Horizontal
Test Results For Mid Channel 782MHz							
1564.0	-44.54	2.62	27.30	-19.86	-13	-6.86	Horizontal
1564.0	-48.13	2.62	27.30	-23.45	-13	-10.45	Vertical
2346.0	-45.86	2.87	27.62	-21.11	-13	-8.11	Vertical
2346.0	-50.89	2.87	27.62	-26.14	-13	-13.14	Horizontal
208.7	-35.64	1.42	15.25	-21.82	-13	-8.82	Vertical
282.6	-35.29	1.36	17.19	-19.46	-13	-6.46	Horizontal
Test Results for High Channel 784.5MHz							
1569.0	-44.29	2.66	27.28	-19.67	-13	-6.67	Horizontal
1569.0	-45.13	2.66	27.28	-20.51	-13	-7.51	Vertical
2353.5	-44.71	2.88	27.60	-19.99	-13	-6.99	Vertical
2353.5	-51.20	2.88	27.60	-26.48	-13	-13.48	Horizontal
209.2	-40.27	1.32	17.29	-24.30	-13	-11.30	Vertical
367.9	-42.05	1.72	16.89	-26.88	-13	-13.88	Horizontal

QPSK EIRP POWER FOR LTE BAND 13 (10MHZ BANDWIDTH)

Test Results for Low Channel 782MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit （dBm）	Margin(dBm)	Polarity
1564.0	-51.44	2.62	27.30	-26.76	-13	-13.76	Horizontal
1564.0	-44.61	2.62	27.30	-19.93	-13	-6.93	Vertical
2346.0	-53.76	2.87	27.62	-29.01	-13	-16.01	Vertical
2346.0	-53.01	2.87	27.62	-28.26	-13	-15.26	Horizontal
193.1	-42.30	1.35	16.91	-26.74	-13	-13.74	Vertical
467.1	-36.87	1.62	16.31	-22.18	-13	-9.18	Horizontal

9.7 LTE BAND 41

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

Test Results for Low Channel 2498.5MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit （dBm）	Margin(dBm)	Polarity
4997.0	-60.75	5.13	35.81	-30.07	-25	-5.07	Horizontal
4997.0	-64.07	5.13	35.81	-33.39	-25	-8.39	Vertical
7495.5	-59.21	5.42	36.85	-27.78	-25	-2.78	Vertical
7495.5	-62.38	5.42	36.85	-30.95	-25	-5.95	Horizontal
208.0	-51.52	1.56	17.97	-35.11	-25	-10.11	Vertical
263.3	-50.08	1.33	15.11	-36.30	-25	-11.30	Horizontal
Test Results For Mid Channel 2593MHz							
5186.0	-63.78	5.16	35.82	-33.12	-25	-8.12	Horizontal
5186.0	-61.47	5.16	35.82	-30.81	-25	-5.81	Vertical
7779.0	-63.20	5.53	36.85	-31.88	-25	-6.88	Vertical
7779.0	-64.89	5.53	36.85	-33.57	-25	-8.57	Horizontal
201.1	-48.36	1.77	16.17	-33.95	-25	-8.95	Vertical
462.4	-53.09	1.63	15.21	-39.51	-25	-14.51	Horizontal
Test Results for High Channel 2687.5MHz							
5375.0	-62.96	5.23	35.83	-32.36	-25	-7.36	Horizontal
5375.0	-63.15	5.23	35.83	-32.55	-25	-7.55	Vertical
8062.5	-59.38	5.62	36.87	-28.13	-25	-3.13	Vertical
8062.5	-63.74	5.62	36.87	-32.49	-25	-7.49	Horizontal
190.2	-44.17	1.58	17.56	-28.19	-25	-3.19	Vertical
394.5	-48.11	1.45	16.58	-32.98	-25	-7.98	Horizontal

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

Test Results for Low Channel 2506MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit （dBm）	Margin(dBm)	Polarity
5012.0	-62.62	5.23	35.82	-32.03	-25	-7.03	Horizontal
5012.0	-63.79	5.23	35.82	-33.20	-25	-8.20	Vertical
7518.0	-62.75	5.67	36.86	-31.56	-25	-6.56	Vertical
7518.0	-64.22	5.67	36.86	-33.03	-25	-8.03	Horizontal
206.7	-53.76	1.55	15.76	-39.55	-25	-14.55	Vertical
376.3	-49.64	1.62	15.44	-35.82	-25	-10.82	Horizontal
Test Results for Mid Channel 2593MHz							
5186.0	-59.43	5.16	35.82	-28.77	-25	-3.77	Horizontal
5186.0	-64.45	5.16	35.82	-33.79	-25	-8.79	Vertical
7779.0	-63.11	5.53	36.85	-31.79	-25	-6.79	Vertical
7779.0	-62.89	5.53	36.85	-31.57	-25	-6.57	Horizontal
177.6	-54.95	1.58	16.84	-39.69	-25	-14.69	Vertical
237.8	-45.00	1.61	17.64	-28.97	-25	-3.97	Horizontal
Test Results for High Channel 2680MHz							
5360.0	-61.05	5.24	35.83	-30.46	-25	-5.46	Horizontal
5360.0	-61.83	5.24	35.83	-31.24	-25	-6.24	Vertical
8040.0	-59.77	5.70	36.88	-28.59	-25	-3.59	Vertical
8040.0	-63.91	5.70	36.88	-32.73	-25	-7.73	Horizontal
202.3	-46.42	1.48	16.84	-31.06	-25	-6.06	Vertical
381.3	-48.47	1.59	17.64	-32.42	-25	-7.42	Horizontal

10. FREQUENCY STABILITY

RULE PART(S)

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

LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of ±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° to +50°C
- Voltage =low voltage, DC 366V, Normal, DC 3.85V and High voltage, DC 4.43V.

Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to -30ºC 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 +50ºC is reached.

Frequency Stability vs Voltage:

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

MODES TESTED

- LTE Band2

LTE Band 4

- LTE Band5

LTE Band 7

LTE Band 12

LTE Band 13

LTE Band 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]
3.4	1880	13.1	0.006985	2.5
3.8	1880	13.9	0.007377	2.5
4.2	1880	13.6	0.007209	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1880	12.5	0.006623	2.5
Extreme (50C)	1880	11.8	0.006300	2.5
Extreme (40C)	1880	13.2	0.007042	2.5
Extreme (30C)	1880	13.5	0.007171	2.5
Extreme (10C)	1880	14.2	0.007567	2.5
Extreme (0C)	1880	11.8	0.006284	2.5
Extreme (-10C)	1880	13.0	0.006931	2.5
Extreme (-20C)	1880	14.3	0.007616	2.5
Extreme (-30C)	1880	14.5	0.007715	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]
3.4	1880	9.7	0.005183	2.5
3.8	1880	8.7	0.004622	2.5
4.2	1880	8.0	0.004261	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1880	9.3	0.004956	2.5
Extreme (50C)	1880	8.6	0.004585	2.5
Extreme (40C)	1880	8.6	0.004556253	2.5
Extreme (30C)	1880	9.0	0.004763785	2.5
Extreme (10C)	1880	9.0	0.00479708	2.5
Extreme (0C)	1880	7.9	0.004214503	2.5
Extreme (-10C)	1880	9.2	0.004905889	2.5
Extreme (-20C)	1880	8.8	0.004702239	2.5
Extreme (-30C)	1880	8.1	0.004330019	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]
3.4	1732.5	9.0	0.005183	2.5
3.8	1732.5	8.6	0.004959	2.5
4.2	1732.5	8.6	0.004968	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1732.5	8.2	0.004707	2.5
Extreme (50C)	1732.5	8.8	0.005089	2.5
Extreme (40C)	1732.5	7.8	0.004484	2.5
Extreme (30C)	1732.5	6.0	0.003452	2.5
Extreme (10C)	1732.5	7.0	0.004026	2.5
Extreme (0C)	1732.5	9.1	0.005271	2.5
Extreme (-10C)	1732.5	8.8	0.005071	2.5
Extreme (-20C)	1732.5	6.6	0.003798	2.5
Extreme (-30C)	1732.5	8.8	0.005096	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]
3.4	1732.5	10.0	0.005778	2.5
3.8	1732.5	8.7	0.005032	2.5
4.2	1732.5	8.0	0.004604	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1732.5	10.1	0.005858	2.5
Extreme (50C)	1732.5	8.7	0.005045	2.5
Extreme (40C)	1732.5	7.7	0.004470	2.5
Extreme (30C)	1732.5	9.1	0.005246	2.5
Extreme (10C)	1732.5	9.3	0.005376	2.5
Extreme (0C)	1732.5	7.8	0.004494	2.5
Extreme (-10C)	1732.5	9.5	0.005470	2.5
Extreme (-20C)	1732.5	8.9	0.005149	2.5
Extreme (-30C)	1732.5	8.5	0.004910	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]
3.4	836.5	5.5	0.006529	2.5
3.8	836.5	6.8	0.008104	2.5
4.2	836.5	5.2	0.006167	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	836.5	6.0	0.007165	2.5
Extreme (50C)	836.5	5.7	0.006830	2.5
Extreme (40C)	836.5	5.9	0.007008	2.5
Extreme (30C)	836.5	6.9	0.008209	2.5
Extreme (10C)	836.5	5.5	0.006614	2.5
Extreme (0C)	836.5	5.7	0.006826	2.5
Extreme (-10C)	836.5	5.1	0.006130	2.5
Extreme (-20C)	836.5	5.8	0.006910	2.5
Extreme (-30C)	836.5	6.3	0.007572	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]
3.4	836.5	6.1	0.007293	2.5
3.8	836.5	6.4	0.007622	2.5
4.2	836.5	5.1	0.006081	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	836.5	5.6	0.006740	2.5
Extreme (50C)	836.5	6.3	0.007518	2.5
Extreme (40C)	836.5	5.7	0.006820	2.5
Extreme (30C)	836.5	6.5	0.007741	2.5
Extreme (10C)	836.5	5.5	0.006526	2.5
Extreme (0C)	836.5	5.2	0.006245	2.5
Extreme (-10C)	836.5	5.9	0.007099	2.5
Extreme (-20C)	836.5	6.1	0.007257	2.5
Extreme (-30C)	836.5	6.5	0.007789	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]
3.4	2535	10.0	0.003955	2.5
3.8	2535	8.6	0.003406	2.5
4.2	2535	8.1	0.003211	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2535	9.0	0.003537	2.5
Extreme (50C)	2535	8.9	0.003503	2.5
Extreme (40C)	2535	8.3	0.003278	2.5
Extreme (30C)	2535	8.6	0.003393	2.5
Extreme (10C)	2535	8.2	0.003250	2.5
Extreme (0C)	2535	8.2	0.003215	2.5
Extreme (-10C)	2535	9.1	0.003572	2.5
Extreme (-20C)	2535	8.8	0.003478	2.5
Extreme (-30C)	2535	8.4	0.003318	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]
3.4	2535	6.9	0.002722	2.5
3.8	2535	6.2	0.002455	2.5
4.2	2535	5.3	0.002086	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	5.3	0.002105	2.5
Extreme (40C)	2535	5.0	0.001981	2.5
Extreme (30C)	2535	6.8	0.002690	2.5
Extreme (10C)	2535	6.2	0.002428	2.5
Extreme (0C)	2535	5.2	0.002049	2.5
Extreme (-10C)	2535	4.8	0.001891	2.5
Extreme (-20C)	2535	5.9	0.002328	2.5
Extreme (-30C)	2535	6.1	0.002416	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]
3.4	707.5	9.1	0.012924	2.5
3.8	707.5	10.2	0.014362	2.5
4.2	707.5	9.0	0.012749	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	707.5	8.4	0.011889	2.5
Extreme (50C)	707.5	7.1	0.009984	2.5
Extreme (40C)	707.5	7.7	0.010832	2.5
Extreme (30C)	707.5	8.5	0.011988	2.5
Extreme (10C)	707.5	7.1	0.009995	2.5
Extreme (0C)	707.5	8.6	0.012128	2.5
Extreme (-10C)	707.5	8.6	0.012144	2.5
Extreme (-20C)	707.5	8.6	0.012137	2.5
Extreme (-30C)	707.5	8.2	0.011642	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]
3.4	707.5	7.5	0.010638	2.5
3.8	707.5	8.8	0.012400	2.5
4.2	707.5	7.2	0.010120	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	707.5	9.3	0.013104	2.5
Extreme (50C)	707.5	8.3	0.011766	2.5
Extreme (40C)	707.5	9.4	0.013223	2.5
Extreme (30C)	707.5	7.8	0.011093	2.5
Extreme (10C)	707.5	8.3	0.011739	2.5
Extreme (0C)	707.5	7.8	0.011048	2.5
Extreme (-10C)	707.5	7.0	0.009871	2.5
Extreme (-20C)	707.5	9.2	0.013061	2.5
Extreme (-30C)	707.5	7.9	0.011231	2.5

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

10.5 LTE BAND 13

Band 13 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]
3.4	782.0	12.7	0.016192	2.5
3.8	782.0	13.7	0.017521	2.5
4.2	782.0	13.0	0.016676	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	782.0	14.3	0.018293	2.5
Extreme (50C)	782.0	13.4	0.017185	2.5
Extreme (40C)	782.0	15.5	0.019822	2.5
Extreme (30C)	782.0	14.6	0.018639	2.5
Extreme (10C)	782.0	13.7	0.017573	2.5
Extreme (0C)	782.0	14.1	0.018054	2.5
Extreme (-10C)	782.0	13.9	0.017837	2.5
Extreme (-20C)	782.0	13.6	0.017424	2.5
Extreme (-30C)	782.0	13.6	0.017444	2.5

Band 13 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]
3.4	782.0	12.9	0.016485	2.5
3.8	782.0	14.0	0.017962	2.5
4.2	782.0	12.9	0.016463	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	782.0	13.1	0.016747	2.5
Extreme (50C)	782.0	11.2	0.014283	2.5
Extreme (40C)	782.0	13.8	0.017594	2.5
Extreme (30C)	782.0	13.4	0.017197	2.5
Extreme (10C)	782.0	14.1	0.018004	2.5
Extreme (0C)	782.0	12.2	0.015655	2.5
Extreme (-10C)	782.0	12.6	0.016067	2.5
Extreme (-20C)	782.0	13.9	0.017721	2.5
Extreme (-30C)	782.0	14.9	0.019103	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]
3.4	2593	10.3	0.003975	2.5
3.8	2593	8.8	0.003411	2.5
4.2	2593	7.9	0.003052	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2593	9.7	0.003747	2.5
Extreme (50C)	2593	8.5	0.003282	2.5
Extreme (40C)	2593	8.1	0.003137	2.5
Extreme (30C)	2593	9.4	0.003620	2.5
Extreme (10C)	2593	7.7	0.002968	2.5
Extreme (0C)	2593	8.6	0.003330	2.5
Extreme (-10C)	2593	9.6	0.003703	2.5
Extreme (-20C)	2593	9.1	0.003510	2.5
Extreme (-30C)	2593	8.4	0.003226	2.5

Band 41 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]
3.4	2593	6.9	0.002661	2.5
3.8	2593	6.0	0.002296	2.5
4.2	2593	5.2	0.002012	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2593	6.9	0.002661	2.5
Extreme (50C)	2593	5.8	0.002245	2.5
Extreme (40C)	2593	5.2	0.002007	2.5
Extreme (30C)	2593	7.2	0.002762	2.5
Extreme (10C)	2593	6.1	0.002343	2.5
Extreme (0C)	2593	5.5	0.002122	2.5
Extreme (-10C)	2593	5.0	0.001914	2.5
Extreme (-20C)	2593	5.9	0.002260	2.5
Extreme (-30C)	2593	5.9	0.002285	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.

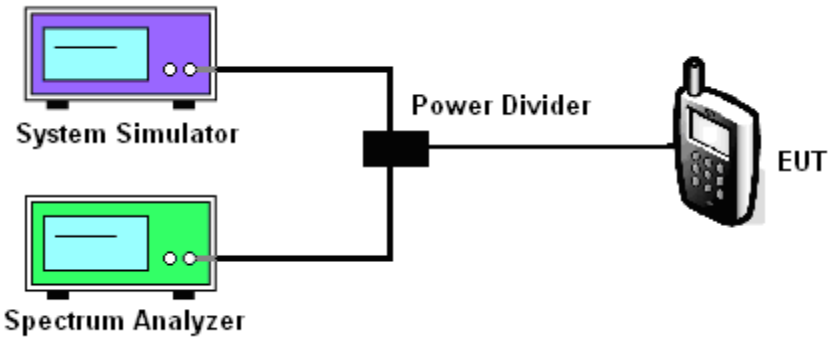
11.2 Measuring Instruments

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 2/4/5/7/12/13/41
-

Test data reference attachment.

----END OF REPORT----