

FCC CFR47 PART 24E, 27 CERTIFICATION TEST REPORT FCC ID: 2AU5L-M5502B

Product: 4G Smart Phone

Trade Mark: CloudMosa

Model Number: Puffin OS Phone Founder's Edition M5502B

Family Model: N/A

Report No.: STR191022002006E

Prepared for

CloudMosa, Inc.

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Prepared by

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TEST RESULT CERTIFICATION

Applicant's name: CloudMosa, Inc.

Address: 20863 Stevens Creek Blvd. Suite 560, Cupertino, CA 95014

Manufacturer's Name: VPLUS COMMUNICATION INTELLIGENT CO.,LTD.

Address: 4/F,Building G ,Huachuangda Central Business Building,Junction of Xinghua 1st Road and Ban'an Avenue, Bao'an District,Shenzhen, China

Product name.....: 4G Smart Phone

Model and/or type reference ...: Puffin OS Phone Founder's Edition M5502B

Family Model.....: N/A

Standards.....: FCC CFR 47 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.

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Date of Test

Date (s) of performance of tests Oct. 26, 2019 ~ Nov. 13, 2019

Date of Issue Nov. 14, 2019

Test Result..... **Pass**

Testing Engineer :



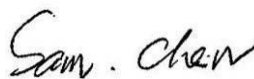
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(Jason Chen)

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(Sam Chen)

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1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	4G Smart Phone
Trade Mark	CloudMosa
Model Name	Puffin OS Phone Founder's Edition M5502B
Family Model	N/A
Model Difference	N/A
FCC ID:	2AU5L-M5502B
Frequency Bands:	U.S. Bands: ☒ LTE FDD Band 2,4, 7, 17
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 7 Uplink: 2500MHz-2570MHz, Downlink: 2620MHz-2690MHz; LTE FDD Band 17 Uplink: 704MHz-716MHz, Downlink: 734MHz-746MHz
Type of Modulation:	QPSK/16QAM
Antenna:	PIFA Antenna
Antenna gain:	B2: 0.68dBi; B4: 0.52dBi; B7: 0.55dBi; B17: 0.23dBi
Power Supply:	DC 3.8V from Battery or DC 5V from USB port
Battery parameter:	3.8V, 2600mAh
Adapter:	Model: HJ-0501000E1-US Input: 100-240V~50/60Hz 0.2A Output: 5V---1000mA
Extreme Vol. Limits:	DC 3.4V to DC 4.35V (Normal DC 3.8V) _{Note}
HW Version	E62A-MB-V1.0
SW Version	E62_M5502B_V02
** Note: The High Voltage DC 4.35V 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: 2AU5L-M5502B** filing to comply with the FCC Part 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 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, Band 4, Band 7, Band 17.

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

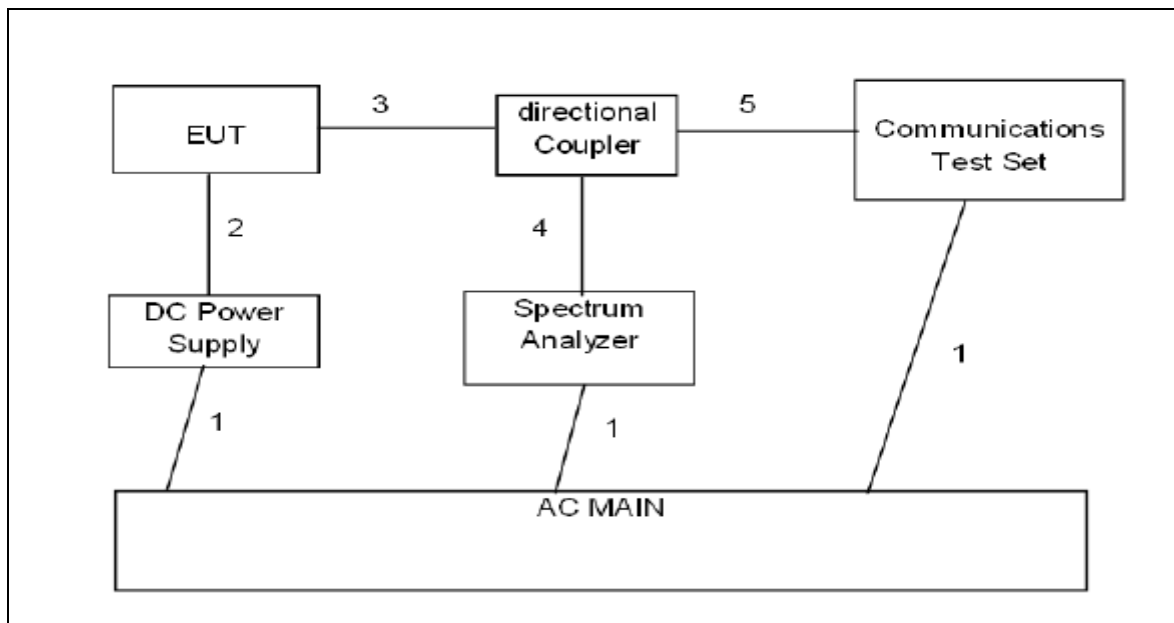
Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Note
1	4G Smart Phone	Puffin OS Phone Founder's Edition M5502B	FCC ID: 2AU5L-M5502B	EUT

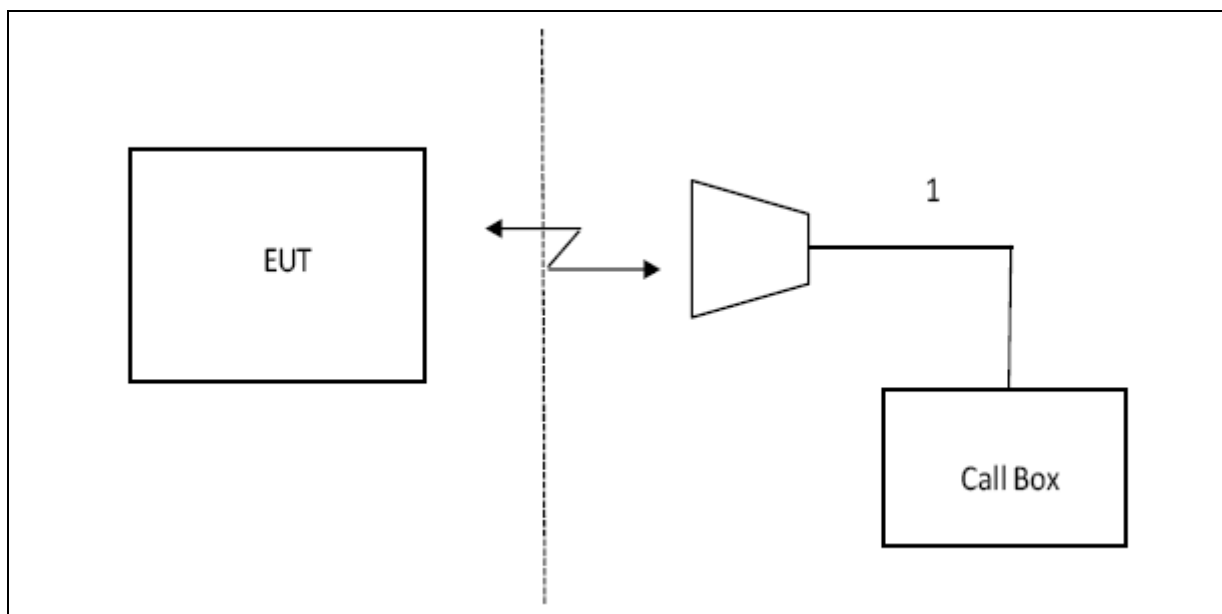
*Note: All the accessories have been used during the test.
the following "EUT" in setup diagram means EUT system.*

2.4 TEST SETUP

CONDUCTED SETUP DIAGRAM FOR TESTS



RADIATED SETUP DIAGRAM FOR TESTS



3.TEST AND MEASUREMENT EQUIPMENT

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

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	NEXT CAL. DATE
SPECTRUM ANALYZER	AGILENT	N9020A	MY49100060	2020.08.27
TEST RECEIVER	R&S	ESCI	101318	2020.05.12
COMMUNICATION TESTER	R&S	CMU200	117858	2020.05.12
COMMUNICATION TESTER	R&S	CMW500	148500	2020.05.12
TEST RECEIVER	R&S	FCKL1528	A0304230	2020.05.12
LISN	SCHWARZBECK	NSLK8127	A0304233	2020.05.12
CLIMATE CHAMBER	ALBATROSS	--	--	2020.05.12
Loop Antenna	Daze	ZN30900N	SEL0097	2020.05.12
Biological Antenna	A.H. Systems Inc.	SAS-521-4	N/A	2020.05.12
Horn Antenna	EM	EM-AH-10180	2011071402	2020.05.12
Horn ant	SCHWARZBECK	BBHA 9170	9170-181	2019.12.10
DC Power Source	N/A	PS-6005D	20170402923	2020.05.12

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 Band 2
LTE Band 4
LTE Band 7
LTE Band 17

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: §22.359, §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 than $43 + 10 \log (P)$ 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.

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.

MODES TESTED

LTE Band 2
 LTE Band 4
 LTE Band 7
 LTE Band 17

RESULTS

Test data reference attachment.

7. OUT OF BAND EMISSIONS

RULE PART(S)

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

LIMITS

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.

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

LTE Band 2
LTE Band 4
LTE Band 7
LTE Band 17

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 and §27.50

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.

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 7

LTE Band 17

RESULTS

Pass

8.2 LTE BAND 2

Radiated Power (EIRP) for Band 2									
Mode	RB Posi tion / RB SIZE	Frequency	Result						Conclusio n
			SG Level (dBm)	Cable Loss (dBm)	Antenn a Gain (dB)	Max. EIRP Avera ge (dBm)	Max. EIRP	Polarizati on Of Max. ERP	
							Average		
							(mW)		
1.4MHz Band QPSK	1/Mi d	1850.7	-4.12	3.76	28.24	20.36	108.696	Horizontal	Pass
		1880	-3.86	3.91	28.22	20.45	110.902	Horizontal	Pass
		1909.3	-3.87	3.93	28.20	20.40	109.625	Horizontal	Pass
3.0MHz Band QPSK	1/Mi d	1851.5	-4.12	3.77	28.23	20.34	108.135	Horizontal	Pass
		1880	-3.99	3.91	28.24	20.34	108.261	Horizontal	Pass
		1908.5	-3.91	3.94	28.25	20.40	109.660	Horizontal	Pass
5.0MHz Band QPSK	1/Mi d	1852.5	-4.26	3.77	28.31	20.28	106.750	Horizontal	Pass
		1880	-3.97	3.91	28.22	20.34	108.260	Horizontal	Pass
		1907.5	-4.07	3.94	28.20	20.19	104.421	Horizontal	Pass
10.0MHz Band QPSK	1/Mi d	1855	-4.23	3.79	28.33	20.31	107.360	Horizontal	Pass
		1880	-3.86	3.95	28.22	20.41	109.797	Horizontal	Pass
		1905	-3.76	3.97	28.19	20.46	111.133	Horizontal	Pass
15.0MHz Band QPSK	1/Mi d	1857.5	-3.98	3.79	28.34	20.57	114.134	Horizontal	Pass
		1880	-3.70	3.95	28.22	20.57	113.996	Horizontal	Pass
		1902.5	-3.61	3.97	28.18	20.60	114.723	Horizontal	Pass
20.0MHz Band QPSK	1/Mi d	1860	-4.18	3.81	28.35	20.36	108.618	Horizontal	Pass
		1880	-3.95	3.96	28.22	20.31	107.277	Horizontal	Pass
		1900	-3.65	4.00	28.16	20.51	112.544	Horizontal	Pass
1.4MHz Band QPSK	1/Mi d	1850.7	-4.16	3.76	28.24	20.32	107.739	Vertical	Pass
		1880	-3.96	3.91	28.22	20.35	108.383	Vertical	Pass
		1909.3	-3.97	3.93	28.20	20.30	107.264	Vertical	Pass
3.0MHz Band QPSK	1/Mi d	1851.5	-3.98	3.77	28.23	20.48	111.698	Vertical	Pass
		1880	-3.83	3.91	28.24	20.50	112.144	Vertical	Pass
		1908.5	-3.76	3.94	28.25	20.55	113.593	Vertical	Pass
5.0MHz Band QPSK	1/Mi d	1852.5	-4.18	3.77	28.31	20.36	108.626	Vertical	Pass
		1880	-3.88	3.91	28.22	20.43	110.521	Vertical	Pass
		1907.5	-4.05	3.94	28.20	20.21	104.999	Vertical	Pass
10.0MHz Band QPSK	1/Mi d	1855	-4.12	3.79	28.33	20.42	110.264	Vertical	Pass
		1880	-3.91	3.95	28.22	20.36	108.658	Vertical	Pass
		1905	-3.94	3.97	28.19	20.28	106.610	Vertical	Pass

15.0MHz Band QPSK	1/Mi d	1857.5	-4.09	3.79	28.34	20.46	111.300	Vertical	Pass
		1880	-3.84	3.95	28.22	20.43	110.293	Vertical	Pass
		1902.5	-3.56	3.97	28.18	20.65	116.101	Vertical	Pass
20.0MHz Band QPSK	1/Mi d	1860	-4.10	3.81	28.35	20.44	110.719	Vertical	Pass
		1880	-4.00	3.96	28.22	20.26	106.063	Vertical	Pass
		1900	-3.48	4.00	28.16	20.68	117.078	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 Position / 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	-4.54	3.76	28.24	19.94	98.517	Horizontal	Pass
		1880	-4.31	3.91	28.22	20.00	100.055	Horizontal	Pass
		1909.3	-4.25	3.93	28.20	20.02	100.499	Horizontal	Pass
3.0MHz Band 16 QAM	1/Mid	1851.5	-4.54	3.77	28.23	19.92	98.237	Horizontal	Pass
		1880	-4.50	3.91	28.24	19.83	96.267	Horizontal	Pass
		1908.5	-4.35	3.94	28.25	19.96	99.037	Horizontal	Pass
5.0MHz Band 16 QAM	1/Mid	1852.5	-4.63	3.77	28.31	19.91	97.843	Horizontal	Pass
		1880	-4.23	3.91	28.22	20.08	101.752	Horizontal	Pass
		1907.5	-4.35	3.94	28.20	19.91	98.041	Horizontal	Pass
10.0MHz Band 16 QAM	1/Mid	1855	-4.57	3.79	28.33	19.97	99.281	Horizontal	Pass
		1880	-4.25	3.95	28.22	20.02	100.559	Horizontal	Pass
		1905	-4.30	3.97	28.19	19.92	98.103	Horizontal	Pass
15.0MHz Band 16 QAM	1/Mid	1857.5	-4.63	3.79	28.34	19.92	98.255	Horizontal	Pass
		1880	-4.36	3.95	28.22	19.91	97.978	Horizontal	Pass
		1902.5	-4.27	3.97	28.18	19.94	98.702	Horizontal	Pass
20.0MHz Band 16 QAM	1/Mid	1860	-4.59	3.81	28.35	19.95	98.921	Horizontal	Pass
		1880	-4.22	3.96	28.22	20.04	100.906	Horizontal	Pass
		1900	-4.33	4.00	28.16	19.83	96.173	Horizontal	Pass
1.4MHz Band 16 QAM	1/Mid	1850.7	-4.48	3.76	28.24	20.00	99.903	Vertical	Pass
		1880	-4.41	3.91	28.22	19.90	97.758	Vertical	Pass
		1909.3	-4.20	3.93	28.20	20.07	101.579	Vertical	Pass
3.0MHz Band 16 QAM	1/Mid	1851.5	-4.56	3.77	28.23	19.90	97.798	Vertical	Pass
		1880	-4.49	3.91	28.24	19.84	96.488	Vertical	Pass
		1908.5	-4.33	3.94	28.25	19.98	99.625	Vertical	Pass
5.0MHz Band 16 QAM	1/Mid	1852.5	-4.58	3.77	28.31	19.96	99.161	Vertical	Pass
		1880	-4.43	3.91	28.22	19.88	97.349	Vertical	Pass
		1907.5	-4.22	3.94	28.20	20.04	101.024	Vertical	Pass
10.0MHz Band 16 QAM	1/Mid	1855	-4.74	3.79	28.33	19.80	95.432	Vertical	Pass
		1880	-4.43	3.95	28.22	19.84	96.405	Vertical	Pass
		1905	-4.52	3.97	28.19	19.70	93.226	Vertical	Pass
15.0MHz Band	1/Mid	1857.5	-4.75	3.79	28.34	19.80	95.442	Vertical	Pass
		1880	-4.40	3.95	28.22	19.87	97.128	Vertical	Pass

16 QAM		1902.5	-4.35	3.97	28.18	19.86	96.916	Vertical	Pass
20.0MHz Band	1/Mid	1860	-4.54	3.81	28.35	20.00	99.945	Vertical	Pass
		1880	-4.17	3.96	28.22	20.09	102.192	Vertical	Pass
16 QAM		1900	-4.21	4.00	28.16	19.95	98.958	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 Position / 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	1710.7	-2.89	3.12	27.58	21.57	143.613	Horizontal	Pass
		1732.5	-2.98	3.27	27.61	21.36	136.877	Horizontal	Pass
		1754.3	-2.62	3.29	27.63	21.72	148.758	Horizontal	Pass
3.0MHz Band QPSK	1/Mid	1711.5	-3.01	3.13	27.61	21.47	140.315	Horizontal	Pass
		1732.5	-2.78	3.27	27.61	21.56	143.347	Horizontal	Pass
		1753.5	-2.70	3.30	27.62	21.62	145.125	Horizontal	Pass
5.0MHz Band QPSK	1/Mid	1712.5	-2.68	3.13	27.63	21.82	152.068	Horizontal	Pass
		1732.5	-2.38	3.27	27.61	21.96	156.883	Horizontal	Pass
		1752.5	-2.44	3.30	27.60	21.86	153.316	Horizontal	Pass
10.0MHz Band QPSK	1/Mid	1715	-2.72	3.15	27.64	21.77	150.352	Horizontal	Pass
		1732.5	-2.71	3.31	27.61	21.59	144.171	Horizontal	Pass
		1750	-2.61	3.33	27.59	21.65	146.380	Horizontal	Pass
15.0MHz Band QPSK	1/Mid	1717.5	-3.03	3.15	27.65	21.47	140.253	Horizontal	Pass
		1732.5	-2.61	3.31	27.61	21.69	147.571	Horizontal	Pass
		1747.5	-2.63	3.33	27.57	21.61	144.873	Horizontal	Pass
20.0MHz Band QPSK	1/Mid	1720	-2.85	3.17	27.66	21.64	145.732	Horizontal	Pass
		1732.5	-2.62	3.32	27.61	21.67	146.833	Horizontal	Pass
		1745	-2.73	3.36	27.56	21.47	140.162	Horizontal	Pass
1.4MHz Band QPSK	1/Mid	1710.7	-2.84	3.12	27.58	21.62	145.154	Vertical	Pass
		1732.5	-2.78	3.27	27.61	21.56	143.130	Vertical	Pass
		1754.3	-2.76	3.29	27.63	21.58	143.847	Vertical	Pass
3.0MHz Band QPSK	1/Mid	1711.5	-2.82	3.13	27.61	21.66	146.515	Vertical	Pass
		1732.5	-2.64	3.27	27.61	21.70	147.936	Vertical	Pass
		1753.5	-2.80	3.30	27.62	21.52	142.016	Vertical	Pass
5.0MHz Band QPSK	1/Mid	1712.5	-2.56	3.13	27.63	21.94	156.374	Vertical	Pass
		1732.5	-2.47	3.27	27.61	21.87	153.671	Vertical	Pass
		1752.5	-2.39	3.30	27.60	21.91	155.107	Vertical	Pass
10.0MHz Band QPSK	1/Mid	1715	-2.83	3.15	27.64	21.66	146.418	Vertical	Pass
		1732.5	-2.68	3.31	27.61	21.62	145.296	Vertical	Pass
		1750	-2.61	3.33	27.59	21.65	146.293	Vertical	Pass

15.0MHz z Band QPSK	1/Mid	1717.5	-2.96	3.15	27.65	21.54	142.500	Vertical	Pass
		1732.5	-2.56	3.31	27.61	21.74	149.382	Vertical	Pass
		1747.5	-2.50	3.33	27.57	21.74	149.146	Vertical	Pass
20.0MHz z Band QPSK	1/Mid	1720	-2.47	3.17	27.66	22.02	159.093	Vertical	Pass
		1732.5	-2.65	3.32	27.61	21.64	145.782	Vertical	Pass
		1745	-2.62	3.36	27.56	21.58	144.014	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 Position / 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	1710.7	-2.88	3.12	27.58	21.58	143.873	Horizontal	Pass
		1732.5	-2.75	3.27	27.61	21.59	144.092	Horizontal	Pass
		1754.3	-2.87	3.29	27.63	21.47	140.428	Horizontal	Pass
3.0MHz Band 16 QAM	1/Mid	1711.5	-3.67	3.13	27.61	20.81	120.617	Horizontal	Pass
		1732.5	-3.53	3.27	27.61	20.81	120.568	Horizontal	Pass
		1753.5	-3.44	3.30	27.62	20.88	122.330	Horizontal	Pass
5.0MHz Band 16 QAM	1/Mid	1712.5	-3.81	3.13	27.63	20.69	117.278	Horizontal	Pass
		1732.5	-3.68	3.27	27.61	20.66	116.324	Horizontal	Pass
		1752.5	-2.69	3.30	27.60	21.61	144.831	Horizontal	Pass
10.0MHz Band 16 QAM	1/Mid	1715	-3.04	3.15	27.64	21.45	139.656	Horizontal	Pass
		1732.5	-2.74	3.31	27.61	21.56	143.144	Horizontal	Pass
		1750	-2.95	3.33	27.59	21.31	135.143	Horizontal	Pass
15.0MHz Band 16 QAM	1/Mid	1717.5	-2.88	3.15	27.65	21.62	145.072	Horizontal	Pass
		1732.5	-2.71	3.31	27.61	21.59	144.160	Horizontal	Pass
		1747.5	-2.61	3.33	27.57	21.63	145.403	Horizontal	Pass
20.0MHz Band 16 QAM	1/Mid	1720	-3.13	3.17	27.66	21.36	136.911	Horizontal	Pass
		1732.5	-2.91	3.32	27.61	21.38	137.362	Horizontal	Pass
		1745	-2.74	3.36	27.56	21.46	140.048	Horizontal	Pass
1.4MHz Band 16 QAM	1/Mid	1710.7	-2.93	3.12	27.58	21.53	142.386	Vertical	Pass
		1732.5	-2.80	3.27	27.61	21.54	142.446	Vertical	Pass
		1754.3	-2.81	3.29	27.63	21.53	142.188	Vertical	Pass
3.0MHz Band 16 QAM	1/Mid	1711.5	-3.52	3.13	27.61	20.96	124.626	Vertical	Pass
		1732.5	-3.47	3.27	27.61	20.87	122.228	Vertical	Pass
		1753.5	-3.40	3.30	27.62	20.92	123.646	Vertical	Pass
5.0MHz Band 16 QAM	1/Mid	1712.5	-3.73	3.13	27.63	20.77	119.433	Vertical	Pass
		1732.5	-3.51	3.27	27.61	20.83	121.169	Vertical	Pass
		1752.5	-3.63	3.30	27.60	20.67	116.791	Vertical	Pass
10.0MHz Band 16 QAM	1/Mid	1715	-2.92	3.15	27.64	21.57	143.476	Vertical	Pass
		1732.5	-2.71	3.31	27.61	21.59	144.133	Vertical	Pass
		1750	-2.90	3.33	27.59	21.36	136.685	Vertical	Pass
15.0MHz Band	1/Mid	1717.5	-3.07	3.15	27.65	21.43	138.991	Vertical	Pass
		1732.5	-2.92	3.31	27.61	21.38	137.459	Vertical	Pass

16 QAM		1747.5	-2.93	3.33	27.57	21.31	135.250	Vertical	Pass
20.0MHz Band	1/MHz	1720	-2.99	3.17	27.66	21.50	141.407	Vertical	Pass
		1732.5	-2.83	3.32	27.61	21.46	140.013	Vertical	Pass
16 QAM		1745	-2.53	3.36	27.56	21.67	147.002	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 7

Radiated Power (EIRP) for Band 7									
Mode	RB Position / 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	-2.72	4.54	27.75	20.49	111.97	Vertical	Pass
		2535	-2.39	4.69	27.72	20.64	115.98	Vertical	Pass
		2567.5	-2.37	4.71	27.71	20.63	115.60	Vertical	Pass
5.0MHz Band 16 QAM	1/Mid	2502.5	-3.60	4.54	27.75	19.61	91.33	Vertical	Pass
		2535	-2.75	4.69	27.72	20.28	106.66	Vertical	Pass
		2567.5	-3.41	4.71	27.71	19.59	91.02	Vertical	Pass
10.0MHz Band QPSK	1/Mid	2505	-2.55	4.55	27.76	20.66	116.39	Vertical	Pass
		2535	-2.45	4.69	27.72	20.58	114.23	Vertical	Pass
		2565	-2.54	4.72	27.70	20.44	110.63	Vertical	Pass
10.0MHz Band 16 QAM	1/Mid	2505	-3.78	4.55	27.76	19.43	87.63	Vertical	Pass
		2535	-3.32	4.69	27.72	19.71	93.59	Vertical	Pass
		2565	-3.54	4.72	27.70	19.44	87.90	Vertical	Pass
15.0MHz Band QPSK	1/Mid	2507.5	-2.90	4.55	27.77	20.32	107.55	Vertical	Pass
		2535	-2.36	4.69	27.72	20.67	116.69	Vertical	Pass
		2562.5	-2.91	4.72	27.69	20.06	101.38	Vertical	Pass
15.0MHz Band 16 QAM	1/Mid	2507.5	-3.47	4.55	27.77	19.75	94.36	Vertical	Pass
		2535	-3.94	4.69	27.72	19.09	81.16	Vertical	Pass
		2562.5	-3.14	4.72	27.69	19.83	96.18	Vertical	Pass
20.0MHz Band QPSK	1/Mid	2510	-2.85	4.57	27.78	20.36	108.76	Vertical	Pass
		2535	-2.52	4.73	27.72	20.47	111.55	Vertical	Pass
		2560	-2.31	4.75	27.68	20.62	115.34	Vertical	Pass
20.0MHz Band 16 QAM	1/Mid	2510	-3.03	4.57	27.78	20.18	104.23	Vertical	Pass
		2535	-2.14	4.73	27.72	20.85	121.62	Vertical	Pass
		2560	-2.47	4.75	27.68	20.46	111.17	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 7									
Mode	RB Position / 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	-2.28	4.54	27.75	20.93	123.880	Horizontal	Pass
		2535	-2.16	4.69	27.72	20.87	122.180	Horizontal	Pass
		2567.5	-2.25	4.71	27.71	20.75	118.850	Horizontal	Pass
5.0MHz Band 16 QAM	1/Mid	2502.5	-3.42	4.54	27.75	19.79	95.280	Horizontal	Pass
		2535	-3.23	4.69	27.72	19.80	95.499	Horizontal	Pass
		2567.5	-3.19	4.71	27.71	19.81	95.719	Horizontal	Pass
10.0MHz Band QPSK	1/Mid	2505	-2.27	4.55	27.76	20.94	124.165	Horizontal	Pass
		2535	-1.96	4.69	27.72	21.07	127.938	Horizontal	Pass
		2565	-2.09	4.72	27.70	20.89	122.744	Horizontal	Pass
10.0MHz Band 16 QAM	1/Mid	2505	-3.20	4.55	27.76	20.01	100.231	Horizontal	Pass
		2535	-2.98	4.69	27.72	20.05	101.158	Horizontal	Pass
		2565	-3.07	4.72	27.70	19.91	97.949	Horizontal	Pass
15.0MHz Band QPSK	1/Mid	2507.5	-2.10	4.55	27.77	20.56	113.763	Horizontal	Pass
		2535	-1.99	4.69	27.72	21.04	127.057	Horizontal	Pass
		2562.5	-2.17	4.72	27.69	20.80	120.226	Horizontal	Pass
15.0MHz Band 16 QAM	1/Mid	2507.5	-3.31	4.55	27.77	19.91	97.949	Horizontal	Pass
		2535	-3.18	4.69	27.72	19.85	96.605	Horizontal	Pass
		2562.5	-3.21	4.72	27.69	19.76	94.624	Horizontal	Pass
20.0MHz Band QPSK	1/Mid	2510	-2.54	4.57	27.78	20.67	116.681	Horizontal	Pass
		2535	-2.43	4.73	27.72	21.12	129.420	Horizontal	Pass
		2560	-2.21	4.75	27.68	20.72	118.032	Horizontal	Pass
20.0MHz Band 16 QAM	1/Mid	2510	-2.04	4.57	27.78	21.17	130.918	Horizontal	Pass
		2535	-3.25	4.73	27.72	19.74	94.189	Horizontal	Pass
		2560	-3.37	4.75	27.68	19.56	90.365	Horizontal	Pass

Note:

SG Level= Signal generator output

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

8.5 LTE BAND 17

Radiated Power (ERP) for Band 17										
Mode	RB Position / 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	706.5	6.18	1.91	19.23	2.15	21.35	136.328	Vertical	Pass
		710	6.07	1.91	19.26	2.15	21.27	134.044	Vertical	Pass
		713.5	6.09	1.92	19.33	2.15	21.35	136.363	Vertical	Pass
10.0MHz Band QPSK	1/Mid	709	6.31	1.91	19.25	2.15	21.50	141.226	Vertical	Pass
		710	6.35	1.91	19.26	2.15	21.55	142.764	Vertical	Pass
		711	6.07	1.92	19.32	2.15	21.32	135.591	Vertical	Pass
5.0MHz Band QPSK	1/Mid	706.5	6.29	1.91	19.23	2.15	21.46	139.940	Horizontal	Pass
		710	6.13	1.91	19.26	2.15	21.33	135.749	Horizontal	Pass
		713.5	6.14	1.92	19.33	2.15	21.40	137.889	Horizontal	Pass
10.0MHz Band QPSK	1/Mid	709	6.27	1.91	19.25	2.15	21.46	139.938	Horizontal	Pass
		710	6.38	1.91	19.26	2.15	21.58	143.787	Horizontal	Pass
		711	6.02	1.92	19.32	2.15	21.27	133.876	Horizontal	Pass

Radiated Power (ERP) for Band 17										
Mode	RB Position / 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 16 QAM	1/Mid	706.5	6.08	1.91	19.23	2.15	21.25	133.273	Vertical	Pass
		710	6.05	1.91	19.26	2.15	21.25	133.433	Vertical	Pass
		713.5	5.99	1.92	19.33	2.15	21.25	133.211	Vertical	Pass
10.0MHz Band 16 QAM	1/Mid	709	5.97	1.91	19.25	2.15	21.16	130.726	Vertical	Pass
		710	5.87	1.91	19.26	2.15	21.07	127.903	Vertical	Pass
		711	5.90	1.92	19.32	2.15	21.15	130.300	Vertical	Pass
5.0MHz Band 16 QAM	1/Mid	706.5	5.98	1.91	19.23	2.15	21.15	130.236	Horizontal	Pass
		710	6.05	1.91	19.26	2.15	21.25	133.405	Horizontal	Pass
		713.5	6.00	1.92	19.33	2.15	21.26	133.605	Horizontal	Pass
10.0MHz Band 16 QAM	1/Mid	709	5.95	1.91	19.25	2.15	21.14	130.064	Horizontal	Pass
		710	6.16	1.91	19.26	2.15	21.36	136.859	Horizontal	Pass
		711	5.83	1.92	19.32	2.15	21.08	128.292	Horizontal	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: §2.1053, §22.917, §24.238 and §27.53

LIMIT

§22.917 (e) and §24.238 (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 $43 + 10 \log_{10}(p)$, dB; and
- b. for mobile subscriber equipment, the attenuation shall not be less than $43 + 10 \log_{10}(p)$, dB at the channel edges and $55 + 10 \log_{10}(p)$ 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
LTE Band 4
LTE Band 7
LTE Band 17

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	-57.46	4.04	33.51	-27.99	-13	-14.99	Horizontal
3701.4	-58.19	4.04	33.51	-28.72	-13	-15.72	Vertical
5552.1	-55.83	5.24	35.84	-25.23	-13	-12.23	Vertical
5552.1	-56.16	5.24	35.84	-25.56	-13	-12.56	Horizontal
Test Results for Mid Channel 1880MHz							
3760	-59.46	4.04	33.56	-29.94	-13	-16.94	Horizontal
3760	-57.76	4.04	33.56	-28.24	-13	-15.24	Vertical
5640	-58.89	5.24	35.91	-28.22	-13	-15.22	Vertical
5640	-58.13	5.24	35.91	-27.46	-13	-14.46	Horizontal
Test Results for High Channel 1909.3MHz							
3818.6	-59.59	4.04	34.00	-29.63	-13	-16.63	Horizontal
3818.6	-58.77	4.04	34.00	-28.81	-13	-15.81	Vertical
5727.9	-58.29	5.24	36.04	-27.49	-13	-14.49	Vertical
5727.9	-58.85	5.24	36.04	-28.05	-13	-15.05	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	-57.21	4.07	33.54	-27.74	-13	-14.74	Horizontal
3720	-57.10	4.07	33.54	-27.63	-13	-14.63	Vertical
5580	-58.80	5.28	35.86	-28.22	-13	-15.22	Vertical
5580	-59.85	5.28	35.86	-29.27	-13	-16.27	Horizontal
Test Results for Mid Channel 1880MHz							
3760	-58.13	4.04	33.56	-28.61	-13	-15.61	Horizontal
3760	-58.56	4.04	33.56	-29.04	-13	-16.04	Vertical
5640	-59.76	5.24	35.91	-29.09	-13	-16.09	Vertical
5640	-58.46	5.24	35.91	-27.79	-13	-14.79	Horizontal
Test Results for High Channel 1900MHz							
3800	-58.56	4.04	34.00	-28.60	-13	-15.60	Horizontal
3800	-58.13	4.04	34.00	-28.17	-13	-15.17	Vertical
5700	-58.56	5.24	36.04	-27.76	-13	-14.76	Vertical
5700	-59.77	5.24	36.04	-28.97	-13	-15.97	Horizontal

Note: P_{Mea}(dBm)= Power(dBm)+ AR_{pl} (dBm)

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

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

QPSK mode is the worst case, just worst case data reported on the report.

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	-54.79	4.02	29.80	-29.01	-13	-16.01	Horizontal
3421.4	-55.46	4.02	29.80	-29.68	-13	-16.68	Vertical
5132.1	-58.56	5.24	35.84	-27.96	-13	-14.96	Vertical
5132.1	-59.88	5.24	35.84	-29.28	-13	-16.28	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465	-52.50	4.03	30.00	-26.53	-13	-13.53	Horizontal
3465	-53.22	4.03	30.00	-27.25	-13	-14.25	Vertical
5197.5	-57.56	5.25	35.86	-26.95	-13	-13.95	Vertical
5197.5	-57.85	5.25	35.86	-27.24	-13	-14.24	Horizontal
Test Results for High Channel 1754.3MHz							
3508.6	-55.56	4.05	30.01	-29.60	-13	-16.60	Horizontal
3508.6	-57.32	4.05	30.01	-31.36	-13	-18.36	Vertical
5262.9	-57.67	5.26	35.86	-27.07	-13	-14.07	Vertical
5262.9	-57.08	5.26	35.86	-26.48	-13	-13.48	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	-57.46	4.02	29.80	-31.68	-13	-18.68	Horizontal
3440	-55.80	4.02	29.80	-30.02	-13	-17.02	Vertical
5160	-58.55	5.24	35.84	-27.95	-13	-14.95	Vertical
5160	-59.76	5.24	35.84	-29.16	-13	-16.16	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465	-54.77	4.03	30.00	-28.80	-13	-15.80	Horizontal
3465	-55.99	4.03	30.00	-30.02	-13	-17.02	Vertical
5197.5	-58.10	5.25	35.86	-27.49	-13	-14.49	Vertical
5197.5	-58.59	5.25	35.86	-27.98	-13	-14.98	Horizontal
Test Results for High Channel 1745MHz							
3490	-54.77	2.91	27.68	-30.00	-13	-17.00	Horizontal
3490	-58.13	2.91	27.68	-33.36	-13	-20.36	Vertical
5235	-58.77	5.26	35.86	-28.17	-13	-15.17	Vertical
5235	-59.46	5.26	35.86	-28.86	-13	-15.86	Horizontal

Note: P_{Mea}(dBm)= Power(dBm)+ AR_{pl} (dBm)

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

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

QPSK mode is the worst case, just worst case data reported on the report.

9.3 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 Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
5005	-82.26	5.23	35.81	-51.68	-25.00	-26.68	Horizontal
5005	-81.55	5.23	35.81	-50.97	-25.00	-25.97	Vertical
7507.5	-80.56	5.67	36.85	-49.38	-25.00	-24.38	Vertical
7507.5	-80.15	5.67	36.85	-48.97	-25.00	-23.97	Horizontal
Test Results for Mid Channel 2535MHz							
5070	-78.95	5.23	35.82	-48.36	-25.00	-23.36	Horizontal
5070	-80.04	5.23	35.82	-49.45	-25.00	-24.45	Vertical
7605	-80.59	5.67	36.85	-49.41	-25.00	-24.41	Vertical
7605	-81.07	5.67	36.85	-49.89	-25.00	-24.89	Horizontal
Test Results for High Channel 2567.5MHz							
5135	-85.46	5.24	35.83	-54.87	-25.00	-29.87	Horizontal
5135	-83.02	5.24	35.83	-52.43	-25.00	-27.43	Vertical
7702.5	-83.85	5.68	36.87	-52.66	-25.00	-27.66	Vertical
7702.5	-84.19	5.68	36.87	-53.00	-25.00	-28.00	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 Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
5020	-79.92	5.23	35.82	-49.33	-25.00	-24.33	Horizontal
5020	-79.35	5.23	35.82	-48.76	-25.00	-23.76	Vertical
7530	-80.31	5.67	36.86	-49.12	-25.00	-24.12	Vertical
7530	-80.34	5.67	36.86	-49.15	-25.00	-24.15	Horizontal
Test Results for Mid Channel 2535MHz							
5070	-81.79	5.23	35.82	-51.20	-25.00	-26.20	Horizontal
5070	-81.12	5.23	35.82	-50.53	-25.00	-25.53	Vertical
7605	-80.92	5.67	36.85	-49.74	-25.00	-24.74	Vertical
7605	-82.46	5.67	36.85	-51.28	-25.00	-26.28	Horizontal
Test Results for High Channel 2560MHz							
5120	-81.94	5.24	35.83	-51.35	-25.00	-26.35	Horizontal
5120	-81.89	5.24	35.83	-51.30	-25.00	-26.30	Vertical
7680	-82.21	5.70	36.88	-51.03	-25.00	-26.03	Vertical
7680	-81.61	5.70	36.88	-50.43	-25.00	-25.43	Horizontal

Note: P_{Mea}(dBm)= Power(dBm)+ AR_{pl} (dBm)

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

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

QPSK mode is the worst case, just worst case data reported on the report.

9.4 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 Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1413	-53.55	2.61	27.28	-28.88	-13	-15.88	Horizontal
1413	-54.46	2.61	27.28	-29.79	-13	-16.79	Vertical
2119.5	-53.91	2.87	27.59	-29.19	-13	-16.19	Vertical
2119.5	-53.57	2.87	27.59	-28.85	-13	-15.85	Horizontal
Test Results For Mid Channel 710MHz							
1420	-53.02	2.62	27.30	-28.34	-13	-15.34	Horizontal
1420	-54.88	2.62	27.30	-30.20	-13	-17.20	Vertical
2130	-55.60	2.87	27.62	-30.85	-13	-17.85	Vertical
2130	-58.25	2.87	27.62	-33.50	-13	-20.50	Horizontal
Test Results for High Channel 713.5MHz							
1427	-55.18	2.66	27.28	-30.56	-13	-17.56	Horizontal
1427	-56.63	2.66	27.28	-32.01	-13	-19.01	Vertical
2140.5	-53.75	2.88	27.60	-29.03	-13	-16.03	Vertical
2140.5	-52.45	2.88	27.60	-27.73	-13	-14.73	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 Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1418	-56.08	2.62	27.30	-31.40	-13	-18.40	Horizontal
1418	-53.94	2.62	27.30	-29.26	-13	-16.26	Vertical
2127	-55.11	2.87	27.62	-30.36	-13	-17.36	Vertical
2127	-58.20	2.87	27.62	-33.45	-13	-20.45	Horizontal
Test Results for Mid Channel 710MHz							
1420	-55.64	2.62	27.30	-30.96	-13	-17.96	Horizontal
1420	-53.15	2.62	27.30	-28.47	-13	-15.47	Vertical
2130	-57.51	2.87	27.62	-32.76	-13	-19.76	Vertical
2130	-53.09	2.87	27.62	-28.34	-13	-15.34	Horizontal
Test Results for High Channel 711MHz							
1422	-54.13	2.62	27.30	-29.45	-13	-16.45	Horizontal
1422	-54.74	2.62	27.30	-30.06	-13	-17.06	Vertical
2133	-53.69	2.87	27.62	-28.94	-13	-15.94	Vertical
2133	-56.64	2.87	27.62	-31.89	-13	-18.89	Horizontal

Note: P_{Mea}(dBm)= Power(dBm)+ AR_{pl} (dBm)

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

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

QPSK mode is the worst case, just worst case data reported on the report.

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 $+50^{\circ}\text{C}$

Voltage = low voltage, DC 3.4V, Normal, DC 3.8V and High voltage, DC DC 4.35V.

Frequency Stability vs Temperature:

The EUT is placed inside a temperature chamber. The temperature is set to -30°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
LTE Band 4
LTE Band 7
LTE Band 17

RESULTS

See the following pages.

10.1 LTE BAND 2

QPSK, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 2 QPSK, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.4	1880	-18	-0.009574	2.5
3.8	1880	-18.1	-0.009628	2.5
4.35	1880	-17.6	-0.009362	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 2 QPSK, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1880	-8.2	-0.004362	2.5
Extreme (50C)	1880	-6.1	-0.003245	2.5
Extreme (40C)	1880	-6.2	-0.003298	2.5
Extreme (30C)	1880	-8.3	-0.004415	2.5
Extreme (10C)	1880	-8.8	-0.004681	2.5
Extreme (0C)	1880	-8.7	-0.004628	2.5
Extreme (-10C)	1880	-10.4	-0.005532	2.5
Extreme (-20C)	1880	-9.6	-0.005106	2.5
Extreme (-30C)	1880	-10.3	-0.005479	2.5

16QAM, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 2 16QAM, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.4	1880	-14.1	-0.007500	2.5
3.8	1880	-10.5	-0.005585	2.5
4.35	1880	-13.7	-0.007287	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 2 16QAM, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1880	-14.4	-0.007660	2.5
Extreme (50C)	1880	-15.6	-0.008298	2.5
Extreme (40C)	1880	-15.2	-0.008085	2.5
Extreme (30C)	1880	-13.7	-0.007287	2.5
Extreme (10C)	1880	-14.3	-0.007606	2.5
Extreme (0C)	1880	-13.2	-0.007021	2.5
Extreme (-10C)	1880	-12.6	-0.006702	2.5
Extreme (-20C)	1880	-12.4	-0.006596	2.5
Extreme (-30C)	1880	-11.7	-0.006223	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

QPSK, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 4 QPSK, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.4	1732.5	-10	-0.005772	2.5
3.8	1732.5	-10	-0.005772	2.5
4.35	1732.5	-10.1	-0.005830	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 4 QPSK, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1732.5	-6.9	-0.003983	2.5
Extreme (50C)	1732.5	-8.6	-0.004964	2.5
Extreme (40C)	1732.5	-8.3	-0.004791	2.5
Extreme (30C)	1732.5	-8.3	-0.004791	2.5
Extreme (10C)	1732.5	-6.6	-0.003810	2.5
Extreme (0C)	1732.5	-5.8	-0.003348	2.5
Extreme (-10C)	1732.5	-6.1	-0.003521	2.5
Extreme (-20C)	1732.5	-10.3	-0.005945	2.5
Extreme (-30C)	1732.5	-8.7	-0.005022	2.5

16QAM, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 4 16QAM, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.4	1732.5	-7.7	-0.004444	2.5
3.8	1732.5	-8.4	-0.004848	2.5
4.35	1732.5	-8.2	-0.004733	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 4 16QAM, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1732.5	-18.1	-0.010447	2.5
Extreme (50C)	1732.5	-15.1	-0.008716	2.5
Extreme (40C)	1732.5	-15.6	-0.009004	2.5
Extreme (30C)	1732.5	-16.9	-0.009755	2.5
Extreme (10C)	1732.5	-17.5	-0.010101	2.5
Extreme (0C)	1732.5	-17.2	-0.009928	2.5
Extreme (-10C)	1732.5	-15.4	-0.008889	2.5
Extreme (-20C)	1732.5	-17	-0.009812	2.5
Extreme (-30C)	1732.5	-16.9	-0.009755	2.5

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

10.3 LTE BAND 7

QPSK, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 7 QPSK, (CH 21100 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.4	2535	-17.1	-0.006746	2.5
3.8	2535	-17.5	-0.006903	2.5
4.35	2535	-17.9	-0.007061	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 7 QPSK, (CH 21100 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	2535	-27.6	-0.010888	2.5
Extreme (50C)	2535	-30.4	-0.011992	2.5
Extreme (40C)	2535	-32.5	-0.012821	2.5
Extreme (30C)	2535	-27.5	-0.010848	2.5
Extreme (10C)	2535	-27.1	-0.010690	2.5
Extreme (0C)	2535	-26.2	-0.010335	2.5
Extreme (-10C)	2535	-29.4	-0.011598	2.5
Extreme (-20C)	2535	-27.9	-0.011006	2.5
Extreme (-30C)	2535	-31	-0.012229	2.5

16QAM, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 7 16QAM, (CH 21100 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.4	2535	-19	-0.007495	2.5
3.8	2535	-19.4	-0.007653	2.5
4.35	2535	-19.4	-0.007653	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 7 16QAM, (CH 21100 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	2535	-18.7	-0.007377	2.5
Extreme (50C)	2535	-20.2	-0.007968	2.5
Extreme (40C)	2535	-21.7	-0.008560	2.5
Extreme (30C)	2535	-18.8	-0.007416	2.5
Extreme (10C)	2535	-18.9	-0.007456	2.5
Extreme (0C)	2535	-19.6	-0.007732	2.5
Extreme (-10C)	2535	-20.4	-0.008047	2.5
Extreme (-20C)	2535	-20	-0.007890	2.5
Extreme (-30C)	2535	-20.7	-0.008166	2.5

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

10.4 LTE BAND 17

QPSK, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 17 QPSK, (CH 23790 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
3.4	710.0	-2.6	-0.003662	2.5
3.8	710.0	-2	-0.002817	2.5
4.35	710.0	-1.8	-0.002535	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 17 QPSK, (CH 23790 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	710.0	-2.1	-0.002958	2.5
Extreme (50C)	710.0	-2.6	-0.003662	2.5
Extreme (40C)	710.0	-2.1	-0.002958	2.5
Extreme (30C)	710.0	-2.9	-0.004085	2.5
Extreme (10C)	710.0	-2.8	-0.003944	2.5
Extreme (0C)	710.0	-2.9	-0.004085	2.5
Extreme (-10C)	710.0	-2	-0.002817	2.5
Extreme (-20C)	710.0	-2.5	-0.003521	2.5
Extreme (-30C)	710.0	-2.4	-0.003380	2.5

16QAM, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 17 16QAM, (CH 23790 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
3.4	710.0	-13.7	-0.019296	2.5
3.8	710.0	-14	-0.019718	2.5
4.35	710.0	-13.5	-0.019014	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 17 QPSK, (CH 23790 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	710.0	-13.5	-0.019014	2.5
Extreme (50C)	710.0	-14.6	-0.020563	2.5
Extreme (40C)	710.0	-14.1	-0.019859	2.5
Extreme (30C)	710.0	-13.6	-0.019155	2.5
Extreme (10C)	710.0	-13.7	-0.019296	2.5
Extreme (0C)	710.0	-14.1	-0.019859	2.5
Extreme (-10C)	710.0	-14.4	-0.020282	2.5
Extreme (-20C)	710.0	-13.9	-0.019577	2.5
Extreme (-30C)	710.0	-14.3	-0.020141	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.

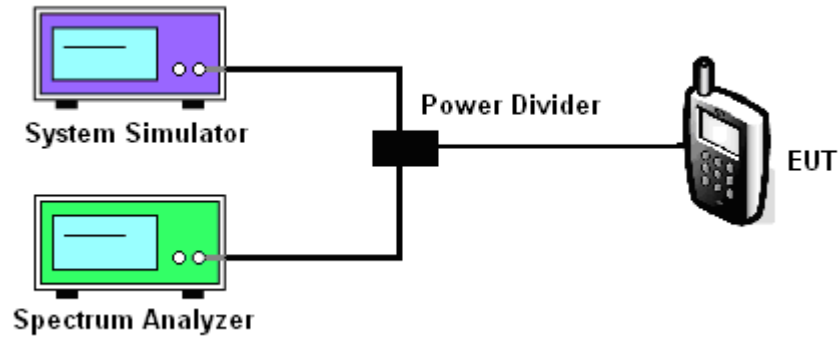
11.2 Measuring Instruments

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 GSM/EGPRS operating modes:
 - a. Set the RBW = 1MHz, VBW = 1MHz, Peak detector in spectrum analyzer.
 - b. Set EUT in maximum power output, and triggered the burst signal.
 - c. Measured respectively the Peak level and Mean level, and the deviation was recorded as Peak to Average Ratio.
4. For UMTS 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
 LTE Band 4
 LTE Band 7
 LTE Band 17

Test data reference attachment.

----END OF REPORT----