

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

FCC ID: 2AT6G-TR1907Q

Product: 4G Smart Phone

Trade Mark: TERACUBE

Model Number: TR1907Q

Family Model: N/A

Report No.: STR190819001006E

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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	TERACUBE
Model Name	TR1907Q
Family Model	N/A
Model Difference	N/A
FCC ID:	2AT6G-TR1907Q
Frequency Bands:	U.S. Bands: ☒ LTE FDD Band 2,4,5,7,12,17
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 5 Uplink: 824MHz-849MHz, Downlink: 869MHz-894MHz; LTE FDD Band 7 Uplink: 2500MHz-2570MHz, Downlink: 2620MHz-2690MHz; LTE FDD Band 12 Uplink: 699MHz-716MHz, Downlink: 729MHz-746MHz; LTE FDD Band 17 Uplink: 704MHz-716MHz, Downlink: 734MHz-746MHz
Type of Modulation:	QPSK/16QAM
Antenna:	PIFA Antenna
Antenna gain:	B2: 1.41dBi; B4: 1.37dBi; B5: 0.45dBi; B7: 1.56dBi; B12: 0.11dBi; B17: 0.25dBi
Power Supply:	DC 3.85V from Battery or DC 5V from USB port
Battery parameter:	3.85V, 3450mAh
Adapter:	Model: TPA-46050200UU Input: 100-240V~50-60Hz 0.3A Output: 5V---2A
Extreme Vol. Limits:	DC 3.4V to DC 4.4V (Normal DC 3.85V) _{Note}
HW Version	V7101P_MB_V1.0
SW Version	Teracube_S1_05
** Note: The High Voltage DC 4.4V 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: 2AT6G-TR1907Q** 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% ($U = 2U_c(y)$)	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 5, Band 7, Band 12, 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

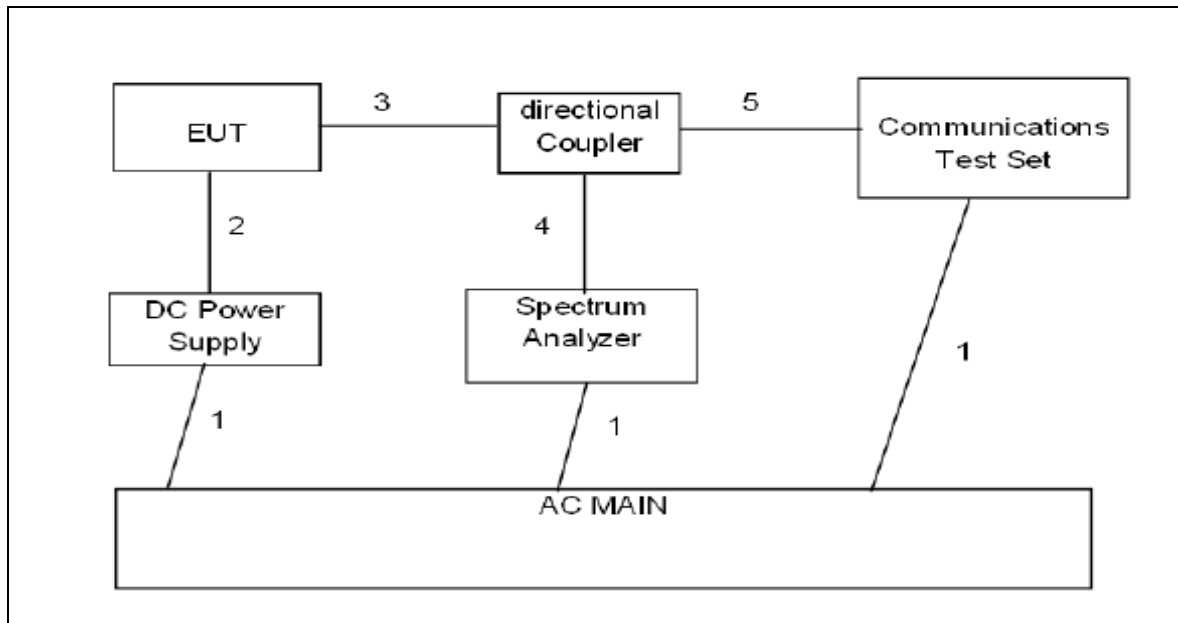
Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Note
1	4G Smart Phone	TR1907Q	FCC ID: 2AT6G-TR1907Q	EUT

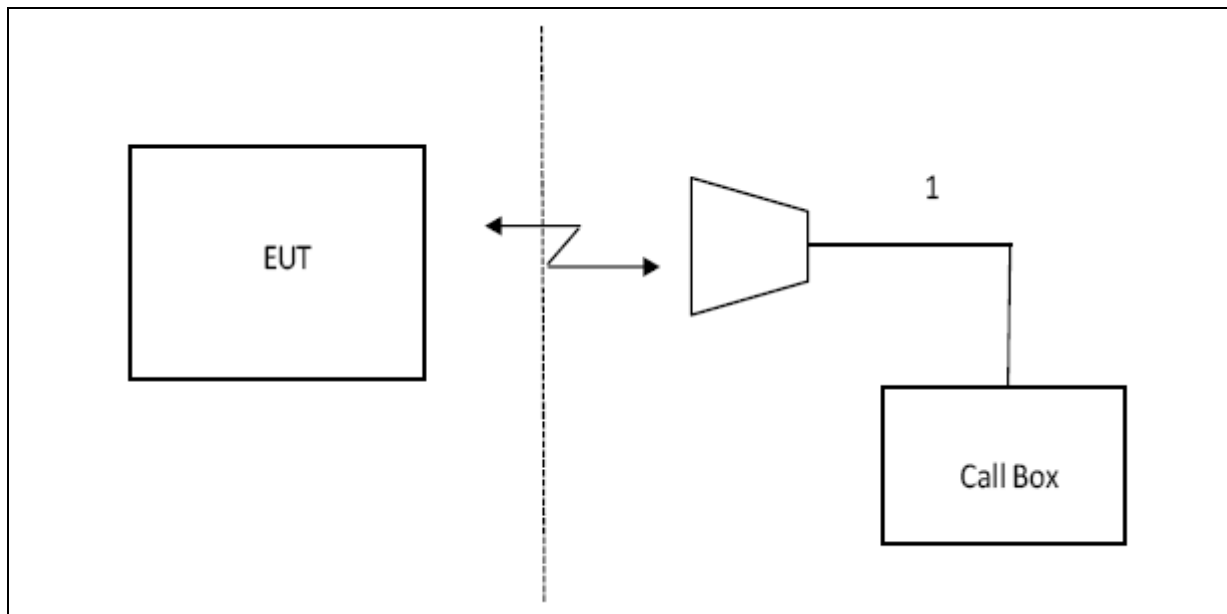
*Note: All the accessories have been used during the test.
the following "EUT" in setup diagram means EUT system.*

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	2019.10.07
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 5
LTE Band 7
LTE Band 12
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.

Set display line at -13 dBm

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

MODES TESTED

LTE Band 2
LTE Band 4
LTE Band 5
LTE Band 7
LTE Band 12
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 display line at -13 dBm

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 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 5
LTE Band 7
LTE Band 12
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 BW QPSK	#Mid /1	1850.7	-4.33	3.76	28.24	20.15	103.514	Vertical	Pass
		1880	-3.87	3.91	28.22	20.44	110.662	Vertical	Pass
		1909.3	-3.90	3.93	28.20	20.37	108.893	Vertical	Pass
1.4MHz BW 16 QAM	#Mid /1	1850.7	-5.15	3.76	28.24	19.33	85.704	Vertical	Pass
		1880	-5.03	3.91	28.22	19.28	84.723	Vertical	Pass
		1909.3	-4.96	3.93	28.20	19.31	85.310	Vertical	Pass
3.0MHz BW QPSK	#Mid /1	1851.5	-4.23	3.77	28.23	20.23	105.439	Vertical	Pass
		1880	-4.06	3.91	28.24	20.27	106.414	Vertical	Pass
		1908.5	-4.02	3.94	28.25	20.29	106.905	Vertical	Pass
3.0MHz BW 16 QAM	#Mid /1	1851.5	-4.91	3.77	28.23	19.55	90.157	Vertical	Pass
		1880	-5.07	3.91	28.24	19.26	84.333	Vertical	Pass
		1908.5	-4.88	3.94	28.25	19.43	87.700	Vertical	Pass
5.0MHz BW QPSK	#Mid /1	1852.5	-4.20	3.77	28.31	20.34	108.143	Vertical	Pass
		1880	-4.10	3.91	28.22	20.21	104.954	Vertical	Pass
		1907.5	-4.08	3.94	28.20	20.18	104.232	Vertical	Pass
5.0MHz BW 16 QAM	#Mid /1	1852.5	-5.01	3.77	28.31	19.53	89.743	Vertical	Pass
		1880	-5.06	3.91	28.22	19.25	84.140	Vertical	Pass
		1907.5	-4.85	3.94	28.20	19.41	87.297	Vertical	Pass
10.0MHz BW QPSK	#Mid /1	1855	-4.25	3.79	28.33	20.29	106.905	Vertical	Pass
		1880	-4.00	3.95	28.22	20.27	106.414	Vertical	Pass
		1905	-3.90	3.97	28.19	20.32	107.647	Vertical	Pass
10.0MHz BW 16 QAM	#Mid /1	1855	-5.19	3.79	28.33	19.35	86.099	Vertical	Pass
		1880	-4.93	3.95	28.22	19.34	85.901	Vertical	Pass
		1905	-4.76	3.97	28.19	19.46	88.308	Vertical	Pass
15.0MHz BW QPSK	#Mid /1	1857.5	-4.36	3.79	28.34	20.19	104.472	Vertical	Pass
		1880	-4.01	3.95	28.22	20.26	106.170	Vertical	Pass
		1902.5	-3.98	3.97	28.18	20.23	105.439	Vertical	Pass
15.0MHz BW 16 QAM	#Mid /1	1857.5	-5.40	3.79	28.34	19.15	82.224	Vertical	Pass
		1880	-5.03	3.95	28.22	19.24	83.946	Vertical	Pass
		1902.5	-4.88	3.97	28.18	19.33	85.704	Vertical	Pass

20.0MHz BW QPSK	#Mid /1	1860	-4.02	3.81	28.35	20.52	112.720	Vertical	Pass
		1880	-3.73	3.96	28.22	20.53	112.980	Vertical	Pass
		1900	-3.77	4.00	28.16	20.39	109.396	Vertical	Pass
20.0MHz BW 16 QAM	#Mid /1	1860	-5.22	3.81	28.35	19.32	85.507	Vertical	Pass
		1880	-4.95	3.96	28.22	19.31	85.310	Vertical	Pass
		1900	-4.94	4.00	28.16	19.22	83.560	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 BW QPSK	#Mid /1	1850.7	-4.80	3.76	28.24	19.68	92.897	Horizontal	Pass
		1880	-4.56	3.91	28.22	19.75	94.406	Horizontal	Pass
		1909.3	-4.72	3.93	28.20	19.55	90.157	Horizontal	Pass
1.4MHz BW 16 QAM	#Mid /1	1850.7	-5.47	3.76	28.24	19.01	79.616	Horizontal	Pass
		1880	-5.33	3.91	28.22	18.98	79.068	Horizontal	Pass
		1909.3	-5.40	3.93	28.20	18.87	77.090	Horizontal	Pass
3.0MHz BW QPSK	#Mid /1	1851.5	-4.72	3.77	28.23	19.74	94.189	Horizontal	Pass
		1880	-4.48	3.91	28.24	19.85	96.605	Horizontal	Pass
		1908.5	-4.38	3.94	28.25	19.93	98.401	Horizontal	Pass
3.0MHz BW 16 QAM	#Mid /1	1851.5	-5.58	3.77	28.23	18.88	77.268	Horizontal	Pass
		1880	-5.31	3.91	28.24	19.02	79.799	Horizontal	Pass
		1908.5	-5.66	3.94	28.25	18.65	73.282	Horizontal	Pass
5.0MHz BW QPSK	#Mid /1	1852.5	-4.86	3.77	28.31	19.68	92.897	Horizontal	Pass
		1880	-4.45	3.91	28.22	19.86	96.828	Horizontal	Pass
		1907.5	-4.49	3.94	28.20	19.77	94.842	Horizontal	Pass
5.0MHz BW 16 QAM	#Mid /1	1852.5	-5.53	3.77	28.31	19.01	79.616	Horizontal	Pass
		1880	-5.36	3.91	28.22	18.95	78.524	Horizontal	Pass
		1907.5	-5.34	3.94	28.20	18.92	77.983	Horizontal	Pass
10.0MHz z BW QPSK	#Mid /1	1855	-4.67	3.79	28.33	19.87	97.051	Horizontal	Pass
		1880	-4.53	3.95	28.22	19.74	94.189	Horizontal	Pass
		1905	-4.59	3.97	28.19	19.63	91.833	Horizontal	Pass
10.0MHz z BW 16 QAM	#Mid /1	1855	-5.68	3.79	28.33	18.86	76.913	Horizontal	Pass
		1880	-5.38	3.95	28.22	18.89	77.446	Horizontal	Pass
		1905	-5.25	3.97	28.19	18.97	78.886	Horizontal	Pass
15.0MHz z BW QPSK	#Mid /1	1857.5	-4.69	3.79	28.34	19.86	96.828	Horizontal	Pass
		1880	-4.30	3.95	28.22	19.96	99.083	Horizontal	Pass
		1902.5	-4.35	3.97	28.18	19.86	96.828	Horizontal	Pass
15.0MHz z BW 16 QAM	#Mid /1	1857.5	-5.60	3.79	28.34	18.95	78.524	Horizontal	Pass
		1880	-5.39	3.95	28.22	18.88	77.268	Horizontal	Pass
		1902.5	-5.30	3.97	28.18	18.91	77.804	Horizontal	Pass
20.0MHz z BW	#Mid /1	1860	-4.75	3.81	28.35	19.79	95.280	Horizontal	Pass
		1880	-4.30	3.96	28.22	19.97	99.312	Horizontal	Pass

QPSK		1900	-4.24	4.00	28.16	19.92	98.175	Horizontal	Pass
20.0MHz z BW 16 QAM	#Mid /1	1860	-5.59	3.81	28.35	18.95	78.524	Horizontal	Pass
		1880	-5.35	3.96	28.22	18.91	77.804	Horizontal	Pass
		1900	-4.20	4.00	28.16	19.96	99.083	Horizontal	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	#Mid/1	1710.7	-3.83	3.12	27.58	20.63	115.611	Vertical	Pass
		1732.5	-3.79	3.27	27.61	20.55	113.501	Vertical	Pass
		1754.3	-3.73	3.29	27.63	20.61	115.080	Vertical	Pass
3.0MHz Band QPSK	#Mid/1	1711.5	-4.42	3.12	27.58	20.04	100.925	Vertical	Pass
		1732.5	-4.23	3.27	27.61	20.11	102.565	Vertical	Pass
		1753.5	-4.25	3.29	27.63	20.09	102.094	Vertical	Pass
5.0MHz Band QPSK	#Mid/1	1712.5	-3.89	3.13	27.61	20.59	114.551	Vertical	Pass
		1732.5	-3.63	3.27	27.61	20.71	117.761	Vertical	Pass
		1752.5	-3.64	3.30	27.62	20.68	116.950	Vertical	Pass
10.0MHz Band QPSK	#Mid/1	1715	-4.43	3.13	27.61	20.05	101.158	Vertical	Pass
		1732.5	-4.25	3.27	27.61	20.09	102.094	Vertical	Pass
		1750	-4.21	3.30	27.62	20.11	102.565	Vertical	Pass
15.0MHz Band QPSK	#Mid/1	1717.5	-3.89	3.13	27.63	20.61	115.080	Vertical	Pass
		1732.5	-3.75	3.27	27.61	20.59	114.551	Vertical	Pass
		1747.5	-3.63	3.30	27.60	20.67	116.681	Vertical	Pass
20.0MHz Band QPSK	#Mid/1	1720	-4.39	3.13	27.63	20.11	102.565	Vertical	Pass
		1732.5	-4.26	3.27	27.61	20.08	101.859	Vertical	Pass
		1745	-4.17	3.30	27.60	20.13	103.039	Vertical	Pass
1.4MHz Band 16 QAM	#Mid/1	1710.7	-3.46	3.36	27.56	20.74	118.577	Vertical	Pass
		1732.5	-3.51	3.31	27.61	20.79	119.950	Vertical	Pass
		1754.3	-3.57	3.33	27.59	20.69	117.220	Vertical	Pass
3.0MHz Band 16 QAM	#Mid/1	1711.5	-4.40	3.15	27.64	20.09	102.094	Vertical	Pass
		1732.5	-4.25	3.31	27.61	20.05	101.158	Vertical	Pass
		1753.5	-4.15	3.33	27.59	20.11	102.565	Vertical	Pass
5.0MHz Band 16 QAM	#Mid/1	1712.5	-3.93	3.15	27.65	20.57	114.025	Vertical	Pass
		1732.5	-3.62	3.31	27.61	20.68	116.950	Vertical	Pass
		1752.5	-3.81	3.33	27.57	20.43	110.408	Vertical	Pass
10.0MHz Band 16 QAM	#Mid/1	1715	-4.52	3.15	27.65	19.98	99.541	Vertical	Pass
		1732.5	-4.26	3.31	27.61	20.04	100.925	Vertical	Pass
		1750	-4.17	3.33	27.57	20.07	101.625	Vertical	Pass

15.0MH z Band 16 QAM	#Mid/ 1	1717.5	-3.81	3.17	27.66	20.68	116.950	Vertical	Pass
		1732.5	-3.62	3.32	27.61	20.67	116.681	Vertical	Pass
		1747.5	-4.27	3.36	27.56	19.93	98.401	Vertical	Pass
20.0MH z Band 16 QAM	#Mid/ 1	1720	-4.37	3.17	27.66	20.12	102.802	Vertical	Pass
		1732.5	-4.31	3.32	27.61	19.98	99.541	Vertical	Pass
		1745	-3.64	3.15	27.64	20.85	121.619	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	#Mid/1	1710.7	-4.25	3.12	27.58	20.21	104.954	Horizontal	Pass
		1732.5	-4.15	3.27	27.61	20.19	104.472	Horizontal	Pass
		1754.3	-4.01	3.29	27.63	20.33	107.895	Horizontal	Pass
3.0MHz Band 16 QAM	#Mid/1	1711.5	-4.89	3.12	27.58	19.57	90.573	Horizontal	Pass
		1732.5	-4.88	3.27	27.61	19.46	88.308	Horizontal	Pass
		1753.5	-4.79	3.29	27.63	19.55	90.157	Horizontal	Pass
5.0MHz Band 16 QAM	#Mid/1	1712.5	-4.22	3.13	27.61	20.26	106.170	Horizontal	Pass
		1732.5	-4.11	3.27	27.61	20.23	105.439	Horizontal	Pass
		1752.5	-4.13	3.30	27.62	20.19	104.472	Horizontal	Pass
10.0MHz Band 16 QAM	#Mid/1	1715	-4.87	3.13	27.61	19.61	91.411	Horizontal	Pass
		1732.5	-4.76	3.27	27.61	19.58	90.782	Horizontal	Pass
		1750	-4.80	3.30	27.62	19.52	89.536	Horizontal	Pass
15.0MHz Band 16 QAM	#Mid/1	1717.5	-4.16	3.13	27.63	20.34	108.143	Horizontal	Pass
		1732.5	-4.05	3.27	27.61	20.29	106.905	Horizontal	Pass
		1747.5	-4.02	3.30	27.60	20.28	106.660	Horizontal	Pass
20.0MHz Band 16 QAM	#Mid/1	1720	-4.94	3.13	27.63	19.56	90.365	Horizontal	Pass
		1732.5	-4.80	3.27	27.61	19.54	89.950	Horizontal	Pass
		1745	-4.78	3.30	27.60	19.52	89.536	Horizontal	Pass
1.4MHz Band QPSK	#Mid/1	1710.7	-5.04	3.17	27.66	19.45	88.105	Horizontal	Pass
		1732.5	-3.98	3.31	27.61	20.32	107.647	Horizontal	Pass
		1754.3	-3.97	3.33	27.59	20.29	106.905	Horizontal	Pass
3.0MHz Band QPSK	#Mid/1	1711.5	-4.91	3.15	27.64	19.58	90.782	Horizontal	Pass
		1732.5	-4.66	3.31	27.61	19.64	92.045	Horizontal	Pass
		1753.5	-4.84	3.33	27.59	19.42	87.498	Horizontal	Pass
5.0MHz Band QPSK	#Mid/1	1712.5	-4.29	3.15	27.65	20.21	104.954	Horizontal	Pass
		1732.5	-4.12	3.31	27.61	20.18	104.232	Horizontal	Pass
		1752.5	-4.11	3.33	27.57	20.13	103.039	Horizontal	Pass
10.0MHz Band QPSK	#Mid/1	1715	-4.83	3.15	27.65	19.67	92.683	Horizontal	Pass
		1732.5	-4.67	3.31	27.61	19.63	91.833	Horizontal	Pass
		1750	-4.80	3.33	27.57	19.44	87.902	Horizontal	Pass
15.0MHz Band	#Mid/1	1717.5	-4.18	3.17	27.66	20.31	107.399	Horizontal	Pass
		1732.5	-4.07	3.32	27.61	20.22	105.196	Horizontal	Pass

QPSK		1747.5	-3.96	3.36	27.56	20.24	105.682	Horizontal	Pass
20.0MHz Band QPSK	#Mid/ 1	1720	-4.05	3.15	27.64	20.44	110.662	Horizontal	Pass
		1732.5	-4.80	3.32	27.61	19.49	88.920	Horizontal	Pass
		1745	-4.69	3.36	27.56	19.51	89.331	Horizontal	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 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	
1.4MHz BW QPSK	#Mid /1	824.7	4.76	2.01	19.68	2.15	20.28	106.660	Vertical	Pass
		836.5	4.76	2.01	19.77	2.15	20.37	108.893	Vertical	Pass
		848.3	4.67	2.02	19.82	2.15	20.32	107.647	Vertical	Pass
1.4MHz BW 16 QAM	#Mid /1	824.7	4.18	2.01	19.68	2.15	19.7	93.325	Vertical	Pass
		836.5	3.98	2.01	19.77	2.15	19.59	90.991	Vertical	Pass
		848.3	3.97	2.02	19.82	2.15	19.62	91.622	Vertical	Pass
3.0MHz BW QPSK	#Mid /1	825.5	4.88	2.01	19.70	2.15	20.42	110.154	Vertical	Pass
		836.5	4.78	2.01	19.77	2.15	20.39	109.396	Vertical	Pass
		847.5	4.65	2.02	19.78	2.15	20.26	106.170	Vertical	Pass
3.0MHz BW 16 QAM	#Mid /1	825.5	4.26	2.01	19.70	2.15	19.8	95.499	Vertical	Pass
		836.5	4.11	2.01	19.77	2.15	19.72	93.756	Vertical	Pass
		847.5	4.10	2.02	19.81	2.15	19.74	94.189	Vertical	Pass
5.0MHz BW QPSK	#Mid /1	826.5	4.65	2.01	19.71	2.15	20.2	104.713	Vertical	Pass
		836.5	4.61	2.01	19.77	2.15	20.22	105.196	Vertical	Pass
		846.5	4.57	2.02	19.79	2.15	20.19	104.472	Vertical	Pass
5.0MHz BW 16 QAM	#Mid /1	826.5	4.32	2.01	19.71	2.15	19.87	97.051	Vertical	Pass
		836.5	4.20	2.01	19.77	2.15	19.81	95.719	Vertical	Pass
		846.5	4.24	2.02	19.79	2.15	19.86	96.828	Vertical	Pass
10.0MHz BW QPSK	#Mid /1	829	4.71	2.01	19.73	2.15	20.28	106.660	Vertical	Pass
		836.5	4.61	2.01	19.77	2.15	20.22	105.196	Vertical	Pass
		844	4.80	2.02	19.81	2.15	20.44	110.662	Vertical	Pass
10.0MHz BW 16 QAM	#Mid /1	829	4.41	2.01	19.73	2.15	19.98	99.541	Vertical	Pass
		836.5	4.25	2.01	19.77	2.15	19.86	96.828	Vertical	Pass
		844	4.21	2.02	19.78	2.15	19.82	95.940	Vertical	Pass

Note:

SG Level= Signal generator output

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

Radiated Power (ERP) for Band 5										
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	
1.4MHz BW QPSK	#Mid /1	824.7	4.46	2.01	19.68	2.15	19.98	99.541	Horizontal	Pass
		836.5	4.49	2.01	19.77	2.15	20.1	102.329	Horizontal	Pass
		848.3	4.34	2.02	19.82	2.15	19.99	99.770	Horizontal	Pass
1.4MHz BW 16 QAM	#Mid /1	824.7	3.79	2.01	19.68	2.15	19.31	85.310	Horizontal	Pass
		836.5	3.74	2.01	19.77	2.15	19.35	86.099	Horizontal	Pass
		848.3	3.67	2.02	19.82	2.15	19.32	85.507	Horizontal	Pass
3.0MHz BW QPSK	#Mid /1	825.5	4.47	2.01	19.70	2.15	20.01	100.231	Horizontal	Pass
		836.5	4.43	2.01	19.77	2.15	20.04	100.925	Horizontal	Pass
		847.5	4.38	2.02	19.81	2.15	20.02	100.462	Horizontal	Pass
3.0MHz BW 16 QAM	#Mid /1	825.5	3.83	2.01	19.70	2.15	19.37	86.497	Horizontal	Pass
		836.5	3.70	2.01	19.77	2.15	19.31	85.310	Horizontal	Pass
		847.5	3.72	2.02	19.81	2.15	19.36	86.298	Horizontal	Pass
5.0MHz BW QPSK	#Mid /1	826.5	4.37	2.01	19.71	2.15	19.92	98.175	Horizontal	Pass
		836.5	4.43	2.01	19.77	2.15	20.04	100.925	Horizontal	Pass
		846.5	4.35	2.02	19.79	2.15	19.97	99.312	Horizontal	Pass
5.0MHz BW 16 QAM	#Mid /1	826.5	3.74	2.01	19.71	2.15	19.29	84.918	Horizontal	Pass
		836.5	3.66	2.01	19.77	2.15	19.27	84.528	Horizontal	Pass
		846.5	3.71	2.02	19.79	2.15	19.33	85.704	Horizontal	Pass
10.0MHz BW QPSK	#Mid /1	829	4.48	2.01	19.73	2.15	20.05	101.158	Horizontal	Pass
		836.5	4.42	2.01	19.77	2.15	20.03	100.693	Horizontal	Pass
		844	4.39	2.02	19.78	2.15	20	100.000	Horizontal	Pass
10.0MHz BW 16 QAM	#Mid /1	829	3.69	2.01	19.73	2.15	19.26	84.333	Horizontal	Pass
		836.5	3.78	2.01	19.77	2.15	19.39	86.896	Horizontal	Pass
		844	3.73	2.02	19.78	2.15	19.34	85.901	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 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 BW QPSK	#Mid /1	2502.5	-3.88	4.54	27.75	19.33	85.704	Vertical	Pass
		2535	-4.02	4.69	27.72	19.01	79.616	Vertical	Pass
		2567.5	-3.75	4.71	27.71	19.25	84.140	Vertical	Pass
5.0MHz BW 16 QAM	#Mid /1	2502.5	-4.41	4.54	27.75	18.8	75.858	Vertical	Pass
		2535	-4.44	4.69	27.72	18.59	72.277	Vertical	Pass
		2567.5	-4.33	4.71	27.71	18.67	73.621	Vertical	Pass
10.0MHz z BW QPSK	#Mid /1	2505	-3.62	4.72	27.69	19.35	86.099	Vertical	Pass
		2535	-3.69	4.69	27.72	19.34	85.901	Vertical	Pass
		2565	-3.70	4.72	27.70	19.28	84.723	Vertical	Pass
10.0MHz z BW 16 QAM	#Mid /1	2505	-4.58	4.55	27.76	18.63	72.946	Vertical	Pass
		2535	-4.35	4.69	27.72	18.68	73.790	Vertical	Pass
		2565	-4.43	4.72	27.70	18.55	71.614	Vertical	Pass
15.0MHz z BW QPSK	#Mid /1	2507.5	-3.96	4.55	27.77	19.26	84.333	Vertical	Pass
		2535	-3.72	4.69	27.72	19.31	85.310	Vertical	Pass
		2562.5	-3.70	4.73	27.72	19.29	84.918	Vertical	Pass
15.0MHz z BW 16 QAM	#Mid /1	2507.5	-4.49	4.55	27.77	18.73	74.645	Vertical	Pass
		2535	-4.37	4.69	27.72	18.66	73.451	Vertical	Pass
		2562.5	-4.27	4.72	27.69	18.7	74.131	Vertical	Pass
20.0MHz z Band QPSK	100/0	2510	-3.88	4.57	27.78	19.33	85.704	Vertical	Pass
		2535	-3.53	4.73	27.72	19.46	88.308	Vertical	Pass
		2560	-3.58	4.75	27.68	19.35	86.099	Vertical	Pass
20.0MHz z Band 16 QAM	100/0	2510	-4.50	4.57	27.78	18.71	74.302	Vertical	Pass
		2535	-4.16	4.73	27.72	18.83	76.384	Vertical	Pass
		2560	-4.17	4.75	27.68	18.76	75.162	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 BW QPSK	#Mid /1	2502.5	-4.15	4.54	27.75	19.06	80.538	Horizontal	Pass
		2535	-4.02	4.69	27.72	19.01	79.616	Horizontal	Pass
		2567.5	-3.97	4.71	27.71	19.03	79.983	Horizontal	Pass
5.0MHz BW 16 QAM	#Mid /1	2502.5	-4.65	4.54	27.75	18.56	71.779	Horizontal	Pass
		2535	-4.56	4.69	27.72	18.47	70.307	Horizontal	Pass
		2567.5	-4.66	4.71	27.71	18.34	68.234	Horizontal	Pass
10.0MHz BW QPSK	#Mid /1	2505	-4.28	4.55	27.76	18.93	78.163	Horizontal	Pass
		2535	-3.97	4.69	27.72	19.06	80.538	Horizontal	Pass
		2565	-3.97	4.72	27.70	19.01	79.616	Horizontal	Pass
10.0MHz BW 16 QAM	#Mid /1	2505	-4.85	4.55	27.76	18.36	68.549	Horizontal	Pass
		2535	-4.65	4.69	27.72	18.38	68.865	Horizontal	Pass
		2565	-4.58	4.72	27.70	18.4	69.183	Horizontal	Pass
15.0MHz BW QPSK	#Mid /1	2507.5	-4.16	4.55	27.77	19.06	80.538	Horizontal	Pass
		2535	-3.95	4.69	27.72	19.08	80.910	Horizontal	Pass
		2562.5	-3.84	4.72	27.69	19.13	81.846	Horizontal	Pass
15.0MHz BW 16 QAM	#Mid /1	2507.5	-5.11	4.55	27.77	18.11	64.714	Horizontal	Pass
		2535	-4.95	4.69	27.72	18.08	64.269	Horizontal	Pass
		2562.5	-4.88	4.72	27.69	18.09	64.417	Horizontal	Pass
20.0MHz BW QPSK	#Mid /1	2510	-4.11	4.57	27.78	19.1	81.283	Horizontal	Pass
		2535	-3.98	4.73	27.72	19.01	79.616	Horizontal	Pass
		2560	-3.89	4.75	27.68	19.04	80.168	Horizontal	Pass
20.0MHz BW 16 QAM	#Mid /1	2510	-5.05	4.57	27.78	18.16	65.464	Horizontal	Pass
		2535	-4.93	4.73	27.72	18.06	63.973	Horizontal	Pass
		2560	-4.82	4.75	27.68	18.11	64.714	Horizontal	Pass

Note:

SG Level= Signal generator output

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

8.6 LTE BAND 12

Radiated Power (ERP) for Band 12										
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	
1.4MHz Band QPSK	#Mid /1	699.7	5.89	1.91	19.21	2.15	21.04	127.057	Vertical	Pass
		707.5	5.91	1.91	19.26	2.15	21.11	129.122	Vertical	Pass
		715.3	5.88	1.93	19.34	2.15	21.14	130.017	Vertical	Pass
3.0MHz Band QPSK	#Mid /1	700.5	5.41	1.91	19.21	2.15	20.56	113.763	Vertical	Pass
		707.5	5.34	1.91	19.26	2.15	20.54	113.240	Vertical	Pass
		714.5	5.17	1.93	19.34	2.15	20.43	110.408	Vertical	Pass
5.0MHz Band QPSK	#Mid /1	701.5	5.98	1.91	19.21	2.15	21.13	129.718	Vertical	Pass
		707.5	5.78	1.91	19.26	2.15	20.98	125.314	Vertical	Pass
		713.5	5.78	1.93	19.34	2.15	21.04	127.057	Vertical	Pass
10.0MHz Band QPSK	#Mid /1	704	5.31	1.91	19.21	2.15	20.46	111.173	Vertical	Pass
		707.5	5.27	1.91	19.26	2.15	20.47	111.429	Vertical	Pass
		711	5.25	1.93	19.34	2.15	20.51	112.460	Vertical	Pass
1.4MHz Band QPSK	#Mid /1	699.7	5.84	1.91	19.23	2.15	21.01	126.183	Vertical	Pass
		707.5	5.83	1.91	19.26	2.15	21.03	126.765	Vertical	Pass
		715.3	5.79	1.92	19.33	2.15	21.05	127.350	Vertical	Pass
3.0MHz Band QPSK	#Mid /1	700.5	5.34	1.91	19.23	2.15	20.51	112.460	Vertical	Pass
		707.5	5.29	1.91	19.26	2.15	20.49	111.944	Vertical	Pass
		714.5	5.27	1.92	19.33	2.15	20.53	112.980	Vertical	Pass
5.0MHz Band QPSK	#Mid /1	701.5	5.88	1.91	19.25	2.15	21.07	127.938	Vertical	Pass
		707.5	5.91	1.91	19.26	2.15	21.11	129.122	Vertical	Pass
		713.5	5.81	1.92	19.32	2.15	21.06	127.644	Vertical	Pass
10.0MHz Band QPSK	#Mid /1	704	5.88	1.91	19.25	2.15	21.07	127.938	Vertical	Pass
		707.5	5.96	1.91	19.26	2.15	21.16	130.617	Vertical	Pass
		711	5.81	1.92	19.32	2.15	21.06	127.644	Vertical	Pass

Radiated Power (EIRP) for Band 12										
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	
1.4MHz Band 16 QAM	#Mid /1	699.7	5.59	1.91	19.21	2.15	20.74	118.577	Horizontal	Pass
		707.5	5.45	1.91	19.26	2.15	20.65	116.145	Horizontal	Pass
		715.3	5.45	1.93	19.34	2.15	20.71	117.761	Horizontal	Pass
3.0MHz Band 16 QAM	#Mid /1	700.5	5.00	1.91	19.21	2.15	20.15	103.514	Horizontal	Pass
		707.5	4.99	1.91	19.26	2.15	20.19	104.472	Horizontal	Pass
		714.5	4.95	1.93	19.34	2.15	20.21	104.954	Horizontal	Pass
5.0MHz Band 16 QAM	#Mid /1	701.5	5.62	1.91	19.21	2.15	20.77	119.399	Horizontal	Pass
		707.5	5.63	1.91	19.26	2.15	20.83	121.060	Horizontal	Pass
		713.5	5.53	1.93	19.34	2.15	20.79	119.950	Horizontal	Pass
10.0MHz Band 16 QAM	#Mid /1	704	5.07	1.91	19.21	2.15	20.22	105.196	Horizontal	Pass
		707.5	4.99	1.91	19.26	2.15	20.19	104.472	Horizontal	Pass
		711	4.94	1.93	19.34	2.15	20.20	104.713	Horizontal	Pass
1.4MHz Band 16 QAM	#Mid /1	699.7	5.46	1.91	19.23	2.15	20.63	115.611	Horizontal	Pass
		707.5	5.47	1.91	19.26	2.15	20.67	116.681	Horizontal	Pass
		715.3	5.45	1.92	19.33	2.15	20.71	117.761	Horizontal	Pass
3.0MHz Band 16 QAM	#Mid /1	700.5	4.95	1.91	19.23	2.15	20.12	102.802	Horizontal	Pass
		707.5	4.95	1.91	19.26	2.15	20.15	103.514	Horizontal	Pass
		714.5	4.95	1.92	19.33	2.15	20.21	104.954	Horizontal	Pass
5.0MHz Band 16 QAM	#Mid /1	701.5	5.37	1.91	19.25	2.15	20.56	113.763	Horizontal	Pass
		707.5	5.54	1.91	19.26	2.15	20.74	118.577	Horizontal	Pass
		713.5	5.44	1.92	19.32	2.15	20.69	117.220	Horizontal	Pass
10.0MHz Band 16 QAM	#Mid /1	704	5.69	1.91	19.25	2.15	20.88	122.462	Horizontal	Pass
		707.5	5.09	1.91	19.26	2.15	20.29	106.905	Horizontal	Pass
		711	5.12	1.92	19.32	2.15	20.37	108.893	Horizontal	Pass

Note:

SG Level= Signal generator output

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

8.7 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	#Mid /1	706.5	6.14	1.91	19.23	2.15	21.31	135.207	Vertical	Pass
		710	6.09	1.91	19.26	2.15	21.29	134.586	Vertical	Pass
		713.5	6.07	1.92	19.33	2.15	21.33	135.831	Vertical	Pass
5.0MHz Band 16 QAM	#Mid /1	706.5	5.61	1.91	19.23	2.15	20.78	119.674	Vertical	Pass
		710	5.54	1.91	19.26	2.15	20.74	118.577	Vertical	Pass
		713.5	5.43	1.92	19.33	2.15	20.69	117.220	Vertical	Pass
10.0MHz Band QPSK	#Mid /1	709	6.08	1.91	19.25	2.15	21.27	133.968	Vertical	Pass
		710	6.15	1.91	19.26	2.15	21.35	136.458	Vertical	Pass
		711	5.94	1.92	19.32	2.15	21.19	131.522	Vertical	Pass
10.0MHz Band 16 QAM	#Mid /1	709	5.66	1.91	19.25	2.15	20.85	121.619	Vertical	Pass
		710	5.59	1.91	19.26	2.15	20.79	119.950	Vertical	Pass
		711	5.51	1.92	19.32	2.15	20.76	119.124	Vertical	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 QPSK	#Mid /1	706.5	5.61	1.91	19.23	2.15	20.78	119.674	Horizontal	Pass
		710	5.54	1.91	19.26	2.15	20.74	118.577	Horizontal	Pass
		713.5	5.50	1.92	19.33	2.15	20.76	119.124	Horizontal	Pass
5.0MHz Band 16 QAM	#Mid /1	706.5	5.08	1.91	19.23	2.15	20.25	105.925	Horizontal	Pass
		710	5.11	1.91	19.26	2.15	20.31	107.399	Horizontal	Pass
		713.5	5.03	1.92	19.33	2.15	20.29	106.905	Horizontal	Pass
10.0MHz Band QPSK	#Mid /1	709	5.55	1.91	19.25	2.15	20.74	118.577	Horizontal	Pass
		710	5.49	1.91	19.26	2.15	20.69	117.220	Horizontal	Pass
		711	5.49	1.92	19.32	2.15	20.74	118.577	Horizontal	Pass
10.0MHz Band 16 QAM	#Mid /1	709	5.13	1.91	19.25	2.15	20.32	107.647	Horizontal	Pass
		710	5.08	1.91	19.26	2.15	20.28	106.660	Horizontal	Pass
		711	5.04	1.92	19.32	2.15	20.29	106.905	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 5
LTE Band 7
LTE Band 12
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	-54.17	4.04	33.51	-24.70	-13	-11.70	Horizontal
3701.4	-56.92	4.04	33.51	-27.45	-13	-14.45	Vertical
5552.1	-58.32	5.24	35.84	-27.72	-13	-14.72	Vertical
5552.1	-55.18	5.24	35.84	-24.58	-13	-11.58	Horizontal
Test Results for Mid Channel 1880MHz							
3760	-57.84	4.04	33.56	-28.32	-13	-15.32	Horizontal
3760	-56.92	4.04	33.56	-27.40	-13	-14.40	Vertical
5640	-57.41	5.24	35.91	-26.74	-13	-13.74	Vertical
5640	-56.69	5.24	35.91	-26.02	-13	-13.02	Horizontal
Test Results for High Channel 1909.3MHz							
3818.6	-55.22	4.04	34.00	-25.26	-13	-12.26	Horizontal
3818.6	-57.36	4.04	34.00	-27.40	-13	-14.40	Vertical
5727.9	-59.41	5.24	36.04	-28.61	-13	-15.61	Vertical
5727.9	-57.85	5.24	36.04	-27.05	-13	-14.05	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	-58.63	4.07	33.54	-29.16	-13	-16.16	Horizontal
3720	-54.44	4.07	33.54	-24.97	-13	-11.97	Vertical
5580	-57.19	5.28	35.86	-26.61	-13	-13.61	Vertical
5580	-58.92	5.28	35.86	-28.34	-13	-15.34	Horizontal
Test Results for Mid Channel 1880MHz							
3760	-56.32	4.04	33.56	-26.80	-13	-13.80	Horizontal
3760	-55.58	4.04	33.56	-26.06	-13	-13.06	Vertical
5640	-59.96	5.24	35.91	-29.29	-13	-16.29	Vertical
5640	-57.13	5.24	35.91	-26.46	-13	-13.46	Horizontal
Test Results for High Channel 1900MHz							
3800	-57.49	4.04	34.00	-27.53	-13	-14.53	Horizontal
3800	-57.18	4.04	34.00	-27.22	-13	-14.22	Vertical
5700	-56.82	5.24	36.04	-26.02	-13	-13.02	Vertical
5700	-56.93	5.24	36.04	-26.13	-13	-13.13	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.

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	-57.94	4.02	29.80	-32.16	-13	-19.16	Horizontal
3421.4	-56.62	4.02	29.80	-30.84	-13	-17.84	Vertical
5132.1	-58.41	5.24	35.84	-27.81	-13	-14.81	Vertical
5132.1	-59.96	5.24	35.84	-29.36	-13	-16.36	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465	-57.44	4.03	30.00	-31.47	-13	-18.47	Horizontal
3465	-56.28	4.03	30.00	-30.31	-13	-17.31	Vertical
5197.5	-58.63	5.25	35.86	-28.02	-13	-15.02	Vertical
5197.5	-57.46	5.25	35.86	-26.85	-13	-13.85	Horizontal
Test Results for High Channel 1754.3MHz							
3508.6	-53.92	4.05	30.01	-27.96	-13	-14.96	Horizontal
3508.6	-51.41	4.05	30.01	-25.45	-13	-12.45	Vertical
5262.9	-56.22	5.26	35.86	-25.62	-13	-12.62	Vertical
5262.9	-57.64	5.26	35.86	-27.04	-13	-14.04	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	-56.32	4.02	29.80	-30.54	-13	-17.54	Horizontal
3440	-57.41	4.02	29.80	-31.63	-13	-18.63	Vertical
5160	-53.62	5.24	35.84	-23.02	-13	-10.02	Vertical
5160	-58.97	5.24	35.84	-28.37	-13	-15.37	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465	-56.41	4.03	30.00	-30.44	-13	-17.44	Horizontal
3465	-55.28	4.03	30.00	-29.31	-13	-16.31	Vertical
5197.5	-56.63	5.25	35.86	-26.02	-13	-13.02	Vertical
5197.5	-57.48	5.25	35.86	-26.87	-13	-13.87	Horizontal
Test Results for High Channel 1745MHz							
2490	-55.64	2.91	27.68	-30.87	-13	-17.87	Horizontal
3490	-56.98	2.91	27.68	-32.21	-13	-19.21	Vertical
5235	-56.43	5.26	35.86	-25.83	-13	-12.83	Vertical
5235	-57.85	5.26	35.86	-27.25	-13	-14.25	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.

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	-55.16	2.78	27.50	-30.44	-13	-17.44	Horizontal
1649.4	-54.84	2.78	27.50	-30.12	-13	-17.12	Vertical
2474.1	-53.62	2.90	27.80	-28.72	-13	-15.72	Vertical
2474.1	-54.47	2.90	27.80	-29.57	-13	-16.57	Horizontal
Test Results For Mid Channel 836.5MHz							
1673	-52.98	2.78	27.48	-28.28	-13	-15.28	Horizontal
1673	-55.18	2.78	27.48	-30.48	-13	-17.48	Vertical
2509.5	-56.92	2.91	27.70	-32.13	-13	-19.13	Vertical
2509.5	-55.14	2.91	27.70	-30.35	-13	-17.35	Horizontal
Test Results for High Channel 848.3MHz							
1696.6	-55.57	2.78	27.43	-30.92	-13	-17.92	Horizontal
1696.6	-53.82	2.78	27.43	-29.17	-13	-16.17	Vertical
2544.9	-53.64	2.92	27.74	-28.82	-13	-15.82	Vertical
2544.9	-56.25	2.92	27.74	-31.43	-13	-18.43	Horizontal

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

Test Results for Low Channel 829MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1658	-53.41	2.78	27.50	-28.69	-13	-15.69	Horizontal
1658	-53.26	2.78	27.50	-28.54	-13	-15.54	Vertical
2487	-54.81	2.90	27.80	-29.91	-13	-16.91	Vertical
2487	-53.12	2.90	27.80	-28.22	-13	-15.22	Horizontal
Test Results For Mid Channel 836.5MHz							
1673	-53.65	2.78	27.48	-28.95	-13	-15.95	Horizontal
1673	-52.18	2.78	27.48	-27.48	-13	-14.48	Vertical
2509.5	-56.69	2.91	27.70	-31.90	-13	-18.90	Vertical
2509.5	-54.41	2.91	27.70	-29.62	-13	-16.62	Horizontal
Test Results for High Channel 844MHz							
1688	-55.28	2.78	27.43	-30.63	-13	-17.63	Horizontal
1688	-53.82	2.78	27.43	-29.17	-13	-16.17	Vertical
2532	-52.12	2.92	27.74	-27.30	-13	-14.30	Vertical
2532	-53.62	2.92	27.74	-28.80	-13	-15.80	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.

9.4 LTE BAND 7

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

Test Results for Low Channel 2502.5MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
5005	-56.85	5.23	35.81	-26.27	-13	-13.27	Horizontal
5005	-56.93	5.23	35.81	-26.35	-13	-13.35	Vertical
7507.5	-55.82	5.67	36.85	-24.64	-13	-11.64	Vertical
7507.5	-56.41	5.67	36.85	-25.23	-13	-12.23	Horizontal
Test Results for Mid Channel 2535MHz							
5070	-55.82	5.23	35.82	-25.23	-13	-12.23	Horizontal
5070	-57.91	5.23	35.82	-27.32	-13	-14.32	Vertical
7605	-56.96	5.67	36.85	-25.78	-13	-12.78	Vertical
7605	-56.36	5.67	36.85	-25.18	-13	-12.18	Horizontal
Test Results for High Channel 2567.5MHz							
5135	-56.94	5.24	35.83	-26.35	-13	-13.35	Horizontal
5135	-56.47	5.24	35.83	-25.88	-13	-12.88	Vertical
7702.5	-55.85	5.68	36.87	-24.66	-13	-11.66	Vertical
7702.5	-57.19	5.68	36.87	-26.00	-13	-13.00	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	-56.94	5.23	35.82	-26.35	-13	-13.35	Horizontal
5020	-57.18	5.23	35.82	-26.59	-13	-13.59	Vertical
7530	-56.63	5.67	36.86	-25.44	-13	-12.44	Vertical
7530	-55.52	5.67	36.86	-24.33	-13	-11.33	Horizontal
Test Results for Mid Channel 2535MHz							
5070	-56.92	5.23	35.82	-26.33	-13	-13.33	Horizontal
5070	-55.57	5.23	35.82	-24.98	-13	-11.98	Vertical
7605	-56.96	5.67	36.85	-25.78	-13	-12.78	Vertical
7605	-59.97	5.67	36.85	-28.79	-13	-15.79	Horizontal
Test Results for High Channel 2560MHz							
5120	-55.64	5.24	35.83	-25.05	-13	-12.05	Horizontal
5120	-56.43	5.24	35.83	-25.84	-13	-12.84	Vertical
7680	-59.98	5.7	36.88	-28.80	-13	-15.80	Vertical
7680	-57.81	5.7	36.88	-26.63	-13	-13.63	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.

9.5 LTE BAND 12

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

Test Results for Low Channel 699.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1399.4	-53.64	2.60	27.20	-29.04	-13	-16.04	Horizontal
1399.4	-51.15	2.60	27.20	-26.55	-13	-13.55	Vertical
2099.1	-54.17	2.85	27.54	-29.48	-13	-16.48	Vertical
2099.1	-55.29	2.85	27.54	-30.60	-13	-17.60	Horizontal
Test Results For Mid Channel 707.5MHz							
1415	-52.62	2.61	27.28	-27.95	-13	-14.95	Horizontal
1415	-53.91	2.61	27.28	-29.24	-13	-16.24	Vertical
2122.5	-51.64	2.87	27.59	-26.92	-13	-13.92	Vertical
2122.5	-54.48	2.87	27.59	-29.76	-13	-16.76	Horizontal
Test Results for High Channel 715.3MHz							
1430.6	-52.62	2.63	27.28	-27.97	-13	-14.97	Horizontal
1430.6	-52.22	2.63	27.28	-27.57	-13	-14.57	Vertical
2145.9	-53.63	2.88	27.60	-28.91	-13	-15.91	Vertical
2145.9	-53.81	2.88	27.60	-29.09	-13	-16.09	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	-53.64	2.61	27.26	-28.99	-13	-15.99	Horizontal
1408	-53.18	2.61	27.26	-28.53	-13	-15.53	Vertical
2112	-56.94	2.87	27.58	-32.23	-13	-19.23	Vertical
2112	-54.48	2.87	27.58	-29.77	-13	-16.77	Horizontal
Test Results for Mid Channel 707.5MHz							
1415	-52.25	2.61	27.28	-27.58	-13	-14.58	Horizontal
1415	-51.14	2.61	27.28	-26.47	-13	-13.47	Vertical
2122.5	-54.63	2.87	27.59	-29.91	-13	-16.91	Vertical
2122.5	-52.98	2.87	27.59	-28.26	-13	-15.26	Horizontal
Test Results for High Channel 711MHz							
1422	-55.67	2.62	27.28	-31.01	-13	-18.01	Horizontal
1422	-53.64	2.62	27.28	-28.98	-13	-15.98	Vertical
2133	-55.58	2.87	27.60	-30.85	-13	-17.85	Vertical
2133	-55.62	2.87	27.60	-30.89	-13	-17.89	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.

9.6 LTE BAND 17

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

Test Results for Low Channel 706.5MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1413	-53.62	2.61	27.28	-28.95	-13	-15.95	Horizontal
1413	-54.19	2.61	27.28	-29.52	-13	-16.52	Vertical
2119.5	-54.46	2.87	27.59	-29.74	-13	-16.74	Vertical
2119.5	-53.85	2.87	27.59	-29.13	-13	-16.13	Horizontal
Test Results For Mid Channel 710MHz							
1420	-51.62	2.62	27.30	-26.94	-13	-13.94	Horizontal
1420	-55.29	2.62	27.30	-30.61	-13	-17.61	Vertical
2130	-52.36	2.87	27.62	-27.61	-13	-14.61	Vertical
2130	-53.52	2.87	27.62	-28.77	-13	-15.77	Horizontal
Test Results for High Channel 713.5MHz							
1427	-55.16	2.66	27.28	-30.54	-13	-17.54	Horizontal
1427	-51.24	2.66	27.28	-26.62	-13	-13.62	Vertical
2140.5	-54.98	2.88	27.60	-30.26	-13	-17.26	Vertical
2140.5	-53.26	2.88	27.60	-28.54	-13	-15.54	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	-53.64	2.62	27.30	-28.96	-13	-15.96	Horizontal
1418	-52.94	2.62	27.30	-28.26	-13	-15.26	Vertical
2127	-52.68	2.87	27.62	-27.93	-13	-14.93	Vertical
2127	-55.64	2.87	27.62	-30.89	-13	-17.89	Horizontal
Test Results for Mid Channel 710MHz							
1420	-52.18	2.62	27.30	-27.50	-13	-14.50	Horizontal
1420	-53.64	2.62	27.30	-28.96	-13	-15.96	Vertical
2130	-55.59	2.87	27.62	-30.84	-13	-17.84	Vertical
2130	-53.11	2.87	27.62	-28.36	-13	-15.36	Horizontal
Test Results for High Channel 711MHz							
1422	-52.98	2.62	27.30	-28.30	-13	-15.30	Horizontal
1422	-53.27	2.62	27.30	-28.59	-13	-15.59	Vertical
2133	-51.62	2.87	27.62	-26.87	-13	-13.87	Vertical
2133	-53.29	2.87	27.62	-28.54	-13	-15.54	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.

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 3.6V, Normal, DC 3.7V and High voltage, DC DC 4.3V.

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 5
LTE Band 7
LTE Band 12
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	-9.02	-0.004798	2.5
3.85	1880	-6.66	-0.003543	2.5
4.4	1880	-8.97	-0.004771	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	-9.4	-0.005000	2.5
Extreme (50C)	1880	-9.68	-0.005149	2.5
Extreme (40C)	1880	-10.41	-0.005537	2.5
Extreme (30C)	1880	-8.25	-0.004388	2.5
Extreme (10C)	1880	-5.6	-0.002979	2.5
Extreme (0C)	1880	-6.9	-0.003670	2.5
Extreme (-10C)	1880	-6.97	-0.003707	2.5
Extreme (-20C)	1880	-7.62	-0.004053	2.5
Extreme (-30C)	1880	-8.23	-0.004378	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	-11.2	-0.005957	2.5
3.85	1880	-8.52	-0.004532	2.5
4.4	1880	-7.63	-0.004059	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	-9.47	-0.005037	2.5
Extreme (50C)	1880	-8.63	-0.004590	2.5
Extreme (40C)	1880	-8.2	-0.004362	2.5
Extreme (30C)	1880	-9.1	-0.004840	2.5
Extreme (10C)	1880	-9.63	-0.005122	2.5
Extreme (0C)	1880	-10.21	-0.005431	2.5
Extreme (-10C)	1880	-9.35	-0.004973	2.5
Extreme (-20C)	1880	-5.74	-0.003053	2.5
Extreme (-30C)	1880	-6.02	-0.003202	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	-11.74	-0.006776	2.5
3.85	1732.5	-9.11	-0.005258	2.5
4.4	1732.5	-10.4	-0.006003	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	-11.25	-0.006494	2.5
Extreme (50C)	1732.5	-9.6	-0.005541	2.5
Extreme (40C)	1732.5	-9.96	-0.005749	2.5
Extreme (30C)	1732.5	-10.58	-0.006107	2.5
Extreme (10C)	1732.5	-8.57	-0.004947	2.5
Extreme (0C)	1732.5	-6.73	-0.003885	2.5
Extreme (-10C)	1732.5	-7.44	-0.004294	2.5
Extreme (-20C)	1732.5	-8.96	-0.005172	2.5
Extreme (-30C)	1732.5	-9.1	-0.005253	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	-11.14	-0.006430	2.5
3.85	1732.5	-10.3	-0.005945	2.5
4.4	1732.5	-8.96	-0.005172	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	-10.4	-0.006003	2.5
Extreme (50C)	1732.5	-8.95	-0.005166	2.5
Extreme (40C)	1732.5	-6.35	-0.003665	2.5
Extreme (30C)	1732.5	-8.95	-0.005166	2.5
Extreme (10C)	1732.5	-7.42	-0.004283	2.5
Extreme (0C)	1732.5	-9.02	-0.005206	2.5
Extreme (-10C)	1732.5	-10.41	-0.006009	2.5
Extreme (-20C)	1732.5	-11.5	-0.006638	2.5
Extreme (-30C)	1732.5	-13.6	-0.007850	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

QPSK, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 5 QPSK, (CH 20525 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
3.4	836.5	-4.4	-0.005260	2.5
3.85	836.5	-2.57	-0.003072	2.5
4.4	836.5	-5.2	-0.006216	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 5 QPSK, (CH 20525 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	836.5	-4.6	-0.005499	2.5
Extreme (50C)	836.5	-5.8	-0.006934	2.5
Extreme (40C)	836.5	-3.4	-0.004065	2.5
Extreme (30C)	836.5	-2.64	-0.003156	2.5
Extreme (10C)	836.5	-3.29	-0.003933	2.5
Extreme (0C)	836.5	-5.17	-0.006181	2.5
Extreme (-10C)	836.5	-5.8	-0.006934	2.5
Extreme (-20C)	836.5	-2.9	-0.003467	2.5
Extreme (-30C)	836.5	-3.61	-0.004316	2.5

16QAM, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 5 16QAM, (CH 20525 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
3.4	836.5	-4.1	-0.004901	2.5
3.85	836.5	-4.5	-0.005380	2.5
4.4	836.5	-5.8	-0.006934	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 5 16QAM, (CH 20525 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	836.5	-10.63	-0.012708	2.5
Extreme (50C)	836.5	-11.24	-0.013437	2.5
Extreme (40C)	836.5	-10.8	-0.012911	2.5
Extreme (30C)	836.5	-2.6	-0.003108	2.5
Extreme (10C)	836.5	-3.4	-0.004065	2.5
Extreme (0C)	836.5	-6.26	-0.007484	2.5
Extreme (-10C)	836.5	-2.97	-0.003551	2.5
Extreme (-20C)	836.5	-4.21	-0.005033	2.5
Extreme (-30C)	836.5	-5.74	-0.006862	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

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	-17.65	-0.006963	2.5
3.85	2535	-13.14	-0.005183	2.5
4.4	2535	-15.64	-0.006170	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	-16.6	-0.006548	2.5
Extreme (50C)	2535	-17.4	-0.006864	2.5
Extreme (40C)	2535	-18.52	-0.007306	2.5
Extreme (30C)	2535	-15.23	-0.006008	2.5
Extreme (10C)	2535	-13.62	-0.005373	2.5
Extreme (0C)	2535	-9.52	-0.003755	2.5
Extreme (-10C)	2535	-10.47	-0.004130	2.5
Extreme (-20C)	2535	-13.28	-0.005239	2.5
Extreme (-30C)	2535	-14.06	-0.005546	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	-15.5	-0.006114	2.5
3.85	2535	-17.4	-0.006864	2.5
4.4	2535	-13.6	-0.005365	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	-19.5	-0.007692	2.5
Extreme (50C)	2535	-20.1	-0.007929	2.5
Extreme (40C)	2535	-15.8	-0.006233	2.5
Extreme (30C)	2535	-16.3	-0.006430	2.5
Extreme (10C)	2535	-17.4	-0.006864	2.5
Extreme (0C)	2535	-15.2	-0.005996	2.5
Extreme (-10C)	2535	-13.6	-0.005365	2.5
Extreme (-20C)	2535	-12.5	-0.004931	2.5
Extreme (-30C)	2535	-13.8	-0.005444	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

QPSK, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 12 QPSK, (CH 23095 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
3.4	707.5	-4.1	-0.005795	2.5
3.85	707.5	-4.92	-0.006954	2.5
4.4	707.5	-4.29	-0.006064	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 12 QPSK, (CH 23095 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	707.5	-3.64	-0.005145	2.5
Extreme (50C)	707.5	-4.7	-0.006643	2.5
Extreme (40C)	707.5	-4.26	-0.006021	2.5
Extreme (30C)	707.5	-3.91	-0.005527	2.5
Extreme (10C)	707.5	-5.21	-0.007364	2.5
Extreme (0C)	707.5	-4.47	-0.006318	2.5
Extreme (-10C)	707.5	-4.81	-0.006799	2.5
Extreme (-20C)	707.5	-4.2	-0.005936	2.5
Extreme (-30C)	707.5	-3.6	-0.005088	2.5

16QAM, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 12 16QAM, (CH 23095 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
3.4	707.5	-5.4	-0.007633	2.5
3.85	707.5	-4.1	-0.005795	2.5
4.4	707.5	-3.69	-0.005216	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 12 QPSK, (CH 23095 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	707.5	-5.47	-0.007731	2.5
Extreme (50C)	707.5	-1.85	-0.002615	2.5
Extreme (40C)	707.5	-2.6	-0.003675	2.5
Extreme (30C)	707.5	-3.8	-0.005371	2.5
Extreme (10C)	707.5	-4.19	-0.005922	2.5
Extreme (0C)	707.5	-6.32	-0.008933	2.5
Extreme (-10C)	707.5	-6.42	-0.009074	2.5
Extreme (-20C)	707.5	-5.1	-0.007208	2.5
Extreme (-30C)	707.5	-6.3	-0.008905	2.5

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

10.6 LTE BAND 17

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	-8.64	-0.012169	2.5
3.85	710.0	-6.73	-0.009479	2.5
4.4	710.0	-8.63	-0.012155	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	-7.41	-0.010437	2.5
Extreme (50C)	710.0	-6.8	-0.009577	2.5
Extreme (40C)	710.0	-7.36	-0.010366	2.5
Extreme (30C)	710.0	-8.02	-0.011296	2.5
Extreme (10C)	710.0	-8.3	-0.011690	2.5
Extreme (0C)	710.0	-6.41	-0.009028	2.5
Extreme (-10C)	710.0	-7.95	-0.011197	2.5
Extreme (-20C)	710.0	-8.9	-0.012535	2.5
Extreme (-30C)	710.0	-9.7	-0.013662	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	-7.91	-0.011141	2.5
3.85	710.0	-7.14	-0.010056	2.5
4.4	710.0	-8.6	-0.012113	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	-8.6	-0.012113	2.5
Extreme (50C)	710.0	-9.3	-0.013099	2.5
Extreme (40C)	710.0	-10.02	-0.014113	2.5
Extreme (30C)	710.0	-11.5	-0.016197	2.5
Extreme (10C)	710.0	-7.5	-0.010563	2.5
Extreme (0C)	710.0	-6.3	-0.008873	2.5
Extreme (-10C)	710.0	-6.39	-0.009000	2.5
Extreme (-20C)	710.0	-7.42	-0.010451	2.5
Extreme (-30C)	710.0	-7.59	-0.010690	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.

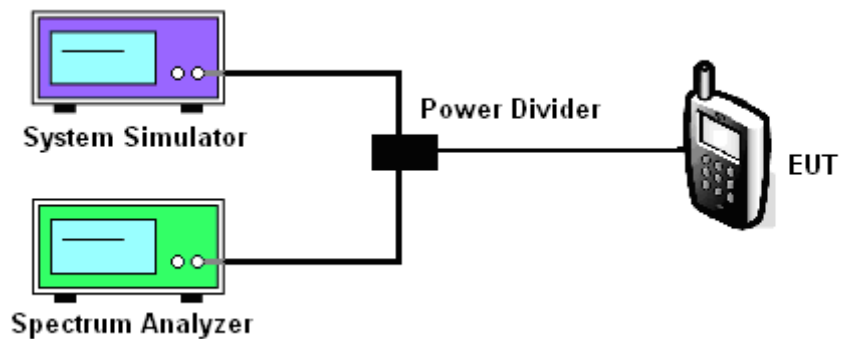
11.2 Measuring Instruments

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 5
 LTE Band 7
 LTE Band 12
 LTE Band 17

Test data reference attachment.

----END OF REPORT----