

FCC CFR47 PART 22H, 24E, 27, 90S CERTIFICATION TEST REPORT FCC ID: 2AXTFMAS1227

Product: Automation Rugged Windows Mobile Tablet
PC

Trade Mark: MACTRON GROUP

Model Number: MAS1227

Family Model: N/A

Report No.: S21102603702006

Prepared for

MACTRON GROUP CO.,LTD.

2F, No. 86, Xinhua 1st Rd., Neihu Dist, Taipei City , Taiwan (R.O.C.)

Prepared by

Shenzhen NTEK Testing Technology Co., Ltd.

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

Tel. 400-800-6106, 0755-2320 0050, 0755-2320 0090

Website: <http://www.ntek.org.cn>

TABLE OF CONTENTS

1. GENERAL INFORMATION.....	6
1. GENERAL INFORMATION.....	6
1.1 PRODUCT DESCRIPTION	6
1.2 RELATED SUBMITTAL(S) / GRANT (S)	8
1.3 TEST METHODOLOGY.....	8
1.4 TEST FACILITY.....	8
MEASUREMENT UNCERTAINTY	8
1.5 SPECIAL ACCESSORIES.....	8
1.6 WORST-CASE CONFIGURATION AND MODE.....	8
2. SYSTEM TEST CONFIGURATION	9
2.1 EUT CONFIGURATION.....	9
2.2 EUT EXERCISE	9
2.3 CONFIGURATION OF EUT SYSTEM.....	9
2.4 TEST SETUP	10
3.TEST AND MEASUREMENT EQUIPMENT	11
4. OUTPUT POWER.....	13
4.1 OUTPUT POWER MEASUREMENT	13
6. BANDEDGE AND EMISSION MASK.....	16
7. OUT OF BAND EMISSIONS	18
7.1 MEASUREMENT METHOD	18
8. RADIATED MEASUREMENT	19
8.1. RADIATED POWER (ERP & EIRP).....	19
8.2 LTE BAND 2.....	20

8.3 LTE BAND 4.....	24
8.4 LTE BAND 5.....	28
8.5 LTE BAND 12	30
8.6 LTE BAND 13	32
8.7 LTE BAND 14	34
8.8 LTE BAND 66	36
8.9 LTE BAND 71	40
9. SPURIOUS RADIATION EMISSION	42
9.1 LTE BAND 2.....	44
9.2 LTE BAND 4.....	46
9.3 LTE BAND 5.....	48
9.4 LTE BAND 12	50
9.5 LTE BAND 13	52
9.6 LTE BAND 14	54
9.7 LTE BAND 66	56
9.8 LTE BAND 71	58
10. FREQUENCY STABILITY	60
10.1 LTE BAND 2	61
10.2 LTE BAND 4	63
10.3 LTE BAND 5	65
10.4 LTE BAND 12	67
10.5 LTE BAND 13	69
10.6 LTE BAND 14	71
10.7 LTE BAND 66	73
10.8 LTE BAND 71	75
11. PEAK-TO-AVERAGE RATIO.....	77
11.1 Description of the PAR Measurement.....	77
11.2 Measuring Instruments	77

11.3 Test Procedures..... 77

11.4 Test Setup..... 78

1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	Automation Rugged Windows Mobile Tablet PC
Trade Mark	MACTRON GROUP
Model Name	MAS1227
Family Model	N/A
Model Difference	N/A
FCC ID:	2AXTFMAS1227
Frequency Bands:	U.S. Bands: ☒ LTE FDD Band 2,4,5, 12,13, 14, 66, 71
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 12 Uplink: 699MHz-716MHz, Downlink: 729MHz-746MHz; LTE FDD Band 13 Uplink: 777MHz-787MHz, Downlink: 746MHz-756MHz; LTE FDD Band 14 Uplink: 788MHz-798MHz, Downlink: 758MHz-768MHz; LTE FDD Band 66 Uplink: 1710MHz-1780MHz, Downlink: 2110MHz-2200MHz; LTE FDD Band 71 Uplink: 663MHz-698MHz, Downlink: 617MHz-652MHz;
Type of Modulation:	QPSK/16QAM
SIM Card	SIM 1 and SIM 2 is a chipset unit and tested as a single chipset. The SIM 1 is chosen for test.
Antenna:	FPC Antenna
Antenna gain:	1dBi;
Power Supply:	DC 7.4V, 6300mAh from battery or DC 12V from Adapter.
Adapter:	Model: FJ-SW20171204000 Input: 100-240V~50/60Hz 1.5A Max Output: 12.0V---4.0A 48.0W
Extreme Vol. Limits:	DC 6.29V to DC 8.51V (Nominal DC 7.40V) (Note 1)
HW Version	MTG MAS1227 MB PCB
SW Version	Windows 10

Firmware version	EC25AFFDR07A08M4G
** Note1: The High Voltage DC 8.51V and Low Voltage 6.29V 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: 2AXTFMAS1227** filing to comply with the FCC Part 22H&24E&27&90S.

1.3 TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI/TIA-603-E-2016, FCC CFR 47 Part 2, Part 22, Part 24, Part 27, Part 90S, 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 12, Band 13, Band 14, Band 66, Band 71.

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	Automation Rugged Windows Mobile Tablet PC	MAS1227	FCC ID: 2AXTFMAS1227	EUT

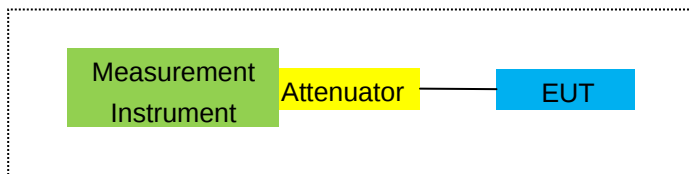
*Note: All the accessories have been used during the test.
the following "EUT" in setup diagram means EUT system.*

2.4 TEST SETUP

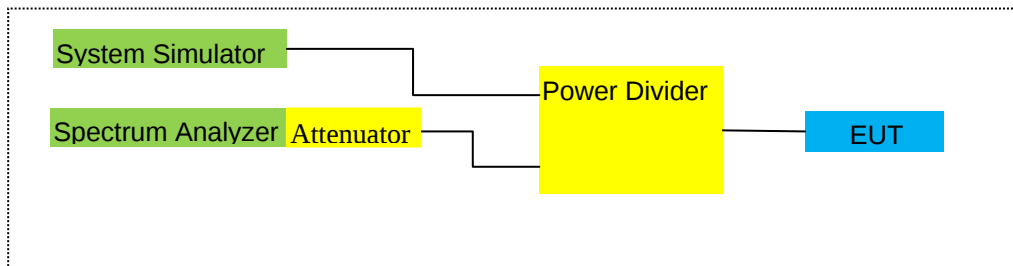
For Radiated Test Cases



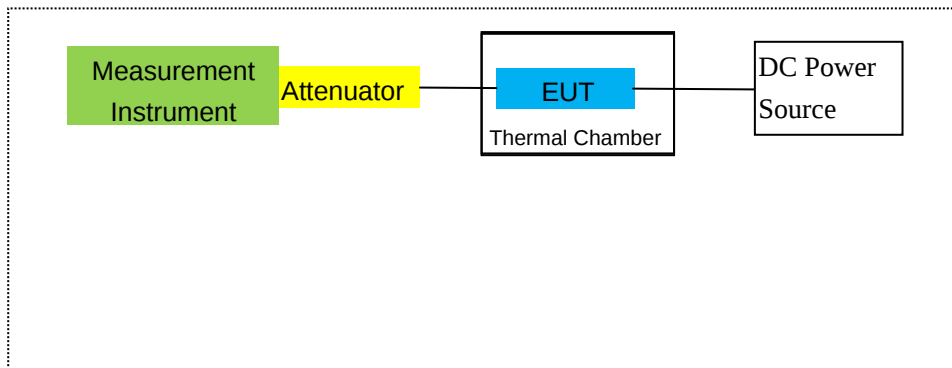
For Conducted Output Power



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



For Frequency Stability



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

3.TEST AND MEASUREMENT EQUIPMENT

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

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	MXA Signal Analyzer	Agilent	N9020A	MY49100060	2021.07.01	2022.06.30	1 year
2	Test Receiver	R&S	ESPI	101318	2021.04.27	2022.04.26	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2021.03.29	2022.03.28	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2020.05.11	2023.05.10	3 year
5	Horn Antenna	EM	EM-AH-10180	2011071402	2021.03.29	2022.03.28	1 year
6	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2020.11.20	2021.11.19	1 year
7	Amplifier	EM	EM-30180	060538	2021.07.01	2022.06.30	1 year
8	Loop Antenna	ARA	PLA-1030/B	1029	2021.04.27	2022.04.26	1 year
9	Power Meter	R&S	NRVS	100696	2021.07.01	2022.06.30	1 year
10	Power Sensor	R&S	URV5-Z4	0395.1619.05	2021.04.27	2022.04.26	1 year
11	Test Cable	N/A	R-01	N/A	2019.08.06	2022.08.05	3 year
12	Test Cable	N/A	R-02	N/A	2019.08.06	2022.08.05	3 year
13	Test Cable	N/A	R-03	N/A	2019.06.28	2022.06.27	3 year
14	Test Receiver	R&S	ESCI	101160	2021.04.27	2022.04.26	1 year
15	LISN	R&S	ENV216	101313	2021.04.27	2022.04.26	1 year
16	LISN	EMCO	3816/2	00042990	2021.04.27	2022.04.26	1 year
17	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2021.04.27	2022.04.26	1 year
18	Passive Voltage Probe	R&S	ESH2-Z3	100196	2021.04.27	2022.04.26	1 year
19	Test Cable	N/A	C01	N/A	2020.05.11	2023.05.10	3 year
20	Test Cable	N/A	C02	N/A	2020.05.11	2023.05.10	3 year
21	Test Cable	N/A	C03	N/A	2020.05.11	2023.05.10	3 year
22	Attenuator	MCE	24-10-34	BN9258	2021.07.01	2022.06.30	1 year
23	Spectrum Analyzer	agilent	e4440a	us44300399	2021.04.27	2022.04.26	1 year
24	test receiver	R&S	ESCI	a0304218	2021.04.27	2022.04.26	1 year
25	Communication Tester	R&S	CMU200	A0304247	2021.07.01	2022.06.30	1 year
26	Thermal Chamber	Ten Billion	TTC-B3C	TBN-960502	2021.04.27	2022.04.26	1 year

27	DC Power Source	N/A	PS-6005D	2017040292 3	2020.05.11	2023.05.10	3 year
28	PSG Analog Signal Generator	Agilent	E8257D	MY51110112	2021.07.01	2022.06.30	1 year
29	Communication Tester	R&S	CMW500	148500	2021.07.01	2022.06.30	1 year

Note: Each piece of equipment is scheduled for calibration once a year except the Test Cable& DC Power Source which is scheduled for calibration every 3 years.

4. OUTPUT POWER

4.1 OUTPUT POWER MEASUREMENT

LTE Measurement Procedure:

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

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

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

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

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".³

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

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

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

Test data reference attachment.

5. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

LIMITS

For reporting purposes only

TEST PROCEDURE

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

MODES TESTED

- ☐ LTE Band 2
- LTE Band 4
- LTE Band 5
- LTE Band 12
- LTE Band 13
- LTE Band 14
- LTE Band 66
- LTE Band 71

RESULTS

PASS

Test data reference attachment.

6. BANDEDGE AND EMISSION MASK

RULE PART(S)

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

FCC: §22.359

LIMITS

FCC: §22.917, §24.238, §27.53

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

(m)(4) For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less 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.

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

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

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

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

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

TEST PROCEDURE

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

For each band edge measurement:

Set the spectrum analyzer span to include the block edge frequency

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

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

MODES TESTED

- ☐ LTE Band 2
- LTE Band 4
- LTE Band 5
- LTE Band 12
- LTE Band 13
- LTE Band 14
- LTE Band 66
- LTE Band 71

RESULTS

Test data reference attachment.

7. OUT OF BAND EMISSIONS

RULE PART(S)

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

LIMITS

1. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.
2. The Band 7/41 emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $55 + 10 \log (P)$ dB.

TEST PROCEDURE

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

For each out of band emissions measurement:

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

MODES TESTED

- ☐ LTE Band 2/4/5/12/13/14/66/71
- ☐

7.1 MEASUREMENT METHOD

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

Test data reference attachment.

8. RADIATED MEASUREMENT

8.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

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

LIMITS:

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

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

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

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

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

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

TEST PROCEDURE

ANSI/TIA-603-E Clause 2.2.17

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

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

MODES TESTED

- ☐ LTE Band 2/4/5/12/13/14/66/71

RESULTS

Pass

8.2 LTE BAND 2

Radiated Power (EIRP) for Band 2									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP	Polarization Of Max. ERP	
							Average		
							(mW)		
1.4MHz Band QPSK	1/#Mid	1850.7	-3.22	3.76	28.24	21.26	133.660	Horizontal	Pass
		1880	-3.03	3.91	28.22	21.28	134.276	Horizontal	Pass
		1909.3	-2.94	3.93	28.20	21.33	135.831	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	1851.5	-3.28	3.77	28.23	21.18	131.220	Horizontal	Pass
		1880	-3.13	3.91	28.24	21.20	131.826	Horizontal	Pass
		1908.5	-3.00	3.94	28.25	21.31	135.207	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	1852.5	-3.17	3.77	28.31	21.37	137.088	Horizontal	Pass
		1880	-2.79	3.91	28.22	21.52	141.906	Horizontal	Pass
		1907.5	-2.72	3.94	28.20	21.54	142.561	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	1855	-3.03	3.79	28.33	21.51	141.579	Horizontal	Pass
		1880	-2.73	3.95	28.22	21.54	142.561	Horizontal	Pass
		1905	-2.62	3.97	28.19	21.60	144.544	Horizontal	Pass
15.0MHz Band QPSK	1/#Mid	1857.5	-2.99	3.79	28.34	21.56	143.219	Horizontal	Pass
		1880	-2.78	3.95	28.22	21.49	140.929	Horizontal	Pass
		1902.5	-2.64	3.97	28.18	21.57	143.549	Horizontal	Pass
20.0MHz Band QPSK	1/#Mid	1860	-2.98	3.81	28.35	21.56	143.219	Horizontal	Pass
		1880	-2.65	3.96	28.22	21.61	144.877	Horizontal	Pass
		1900	-2.59	4.00	28.16	21.57	143.549	Horizontal	Pass
1.4MHz Band QPSK	1/#Mid	1850.7	-4.10	3.76	28.24	20.38	109.144	Vertical	Pass
		1880	-3.42	3.91	28.22	20.89	122.744	Vertical	Pass
		1909.3	-3.57	3.93	28.20	20.70	117.490	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	1851.5	-4.22	3.77	28.23	20.24	105.682	Vertical	Pass
		1880	-3.39	3.91	28.24	20.94	124.165	Vertical	Pass
		1908.5	-3.68	3.94	28.25	20.63	115.611	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	1852.5	-4.15	3.77	28.31	20.39	109.396	Vertical	Pass
		1880	-3.71	3.91	28.22	20.60	114.815	Vertical	Pass
		1907.5	-3.84	3.94	28.20	20.42	110.154	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	1855	-4.10	3.79	28.33	20.44	110.662	Vertical	Pass
		1880	-3.96	3.95	28.22	20.31	107.399	Vertical	Pass
		1905	-3.91	3.97	28.19	20.31	107.399	Vertical	Pass

15.0MHz	1/#Mid	1857.5	-3.66	3.79	28.34	20.89	122.744	Vertical	Pass
Band		1880	-3.75	3.95	28.22	20.52	112.720	Vertical	Pass
QPSK		1902.5	-3.28	3.97	28.18	20.93	123.880	Vertical	Pass
20.0MHz	1/#Mid	1860	-4.55	3.81	28.35	19.99	99.770	Vertical	Pass
Band		1880	-3.63	3.96	28.22	20.63	115.611	Vertical	Pass
QPSK		1900	-4.05	4.00	28.16	20.11	102.565	Vertical	Pass

Note:

SG Level= Signal generator output

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

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

Radiated Power (EIRP) for Band 2									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP	Polarization Of Max. ERP	
							Average		
							(mW)		
1.4MHz Band 16 QAM	1/#Mid	1850.7	-4.34	3.76	28.24	20.14	103.276	Horizontal	Pass
1880		-3.81	3.91	28.22	20.50	112.202	Horizontal	Pass	
1909.3		-3.74	3.93	28.20	20.53	112.980	Horizontal	Pass	
3.0MHz Band 16 QAM	1/#Mid	1851.5	-3.84	3.77	28.23	20.62	115.345	Horizontal	Pass
1880		-3.92	3.91	28.24	20.41	109.901	Horizontal	Pass	
1908.5		-4.13	3.94	28.25	20.18	104.232	Horizontal	Pass	
5.0MHz Band 16 QAM	1/#Mid	1852.5	-3.78	3.77	28.31	20.76	119.124	Horizontal	Pass
1880		-3.69	3.91	28.22	20.62	115.345	Horizontal	Pass	
1907.5		-3.37	3.94	28.20	20.89	122.744	Horizontal	Pass	
10.0MHz Band 16 QAM	1/#Mid	1855	-3.83	3.79	28.33	20.71	117.761	Horizontal	Pass
1880		-3.82	3.95	28.22	20.45	110.917	Horizontal	Pass	
1905		-3.29	3.97	28.19	20.93	123.880	Horizontal	Pass	
15.0MHz Band 16 QAM	1/#Mid	1857.5	-3.81	3.79	28.34	20.74	118.577	Horizontal	Pass
1880		-3.60	3.95	28.22	20.67	116.681	Horizontal	Pass	
1902.5		-3.56	3.97	28.18	20.65	116.145	Horizontal	Pass	
20.0MHz Band 16 QAM	1/#Mid	1860	-3.70	3.81	28.35	20.84	121.339	Horizontal	Pass
1880		-3.40	3.96	28.22	20.86	121.899	Horizontal	Pass	
1900		-3.22	4.00	28.16	20.94	124.165	Horizontal	Pass	
1.4MHz Band 16 QAM	1/#Mid	1850.7	-5.25	3.76	28.24	19.23	83.753	Vertical	Pass
1880		-4.90	3.91	28.22	19.41	87.297	Vertical	Pass	
1909.3		-5.02	3.93	28.20	19.25	84.140	Vertical	Pass	
3.0MHz Band 16 QAM	1/#Mid	1851.5	-4.66	3.77	28.23	19.80	95.499	Vertical	Pass
1880		-4.89	3.91	28.24	19.44	87.902	Vertical	Pass	
1908.5		-5.06	3.94	28.25	19.25	84.140	Vertical	Pass	
5.0MHz Band 16 QAM	1/#Mid	1852.5	-5.09	3.77	28.31	19.45	88.105	Vertical	Pass
1880		-5.15	3.91	28.22	19.16	82.414	Vertical	Pass	
1907.5		-4.67	3.94	28.20	19.59	90.991	Vertical	Pass	
10.0MHz Band 16 QAM	1/#Mid	1855	-5.19	3.79	28.33	19.35	86.099	Vertical	Pass
1880		-4.83	3.95	28.22	19.44	87.902	Vertical	Pass	
1905		-4.73	3.97	28.19	19.49	88.920	Vertical	Pass	
15.0MHz Band 16 QAM	1/#Mid	1857.5	-4.92	3.79	28.34	19.63	91.833	Vertical	Pass
1880		-4.31	3.95	28.22	19.96	99.083	Vertical	Pass	
1902.5		-4.74	3.97	28.18	19.47	88.512	Vertical	Pass	

20.0MHz		1860	-5.09	3.81	28.35	19.45	88.105	Vertical	Pass
Band 16	1/#Mid	1880	-4.73	3.96	28.22	19.53	89.743	Vertical	Pass
QAM		1900	-4.59	4.00	28.16	19.57	90.573	Vertical	Pass

Note:

SG Level= Signal generator output

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

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

8.3 LTE BAND 4

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG	Cable	Antenna	Max.	Max.	Polarization	
			Level	Loss	Gain	EIRP	EIRP	Of Max. ERP	
			(dBm)	(dBm)	(dB)	Average	Average		
						(dBm)	(mW)		
1.4MHz Band QPSK	1/#Mid	1710.7	-2.11	3.12	27.58	22.35	171.791	Horizontal	Pass
		1732.5	-2.10	3.27	27.61	22.24	167.494	Horizontal	Pass
		1754.3	-2.08	3.29	27.63	22.26	168.267	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	1711.5	-2.28	3.13	27.61	22.20	165.959	Horizontal	Pass
		1732.5	-2.20	3.27	27.61	22.14	163.682	Horizontal	Pass
		1753.5	-2.12	3.30	27.62	22.20	165.959	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	1712.5	-2.05	3.13	27.63	22.45	175.792	Horizontal	Pass
		1732.5	-1.95	3.27	27.61	22.39	173.380	Horizontal	Pass
		1752.5	-1.83	3.30	27.60	22.47	176.604	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	1715	-1.99	3.15	27.64	22.50	177.828	Horizontal	Pass
		1732.5	-1.76	3.31	27.61	22.54	179.473	Horizontal	Pass
		1750	-1.78	3.33	27.59	22.48	177.011	Horizontal	Pass
15.0MHz Band QPSK	1/#Mid	1717.5	-2.00	3.15	27.65	22.50	177.828	Horizontal	Pass
		1732.5	-1.84	3.31	27.61	22.46	176.198	Horizontal	Pass
		1747.5	-1.78	3.33	27.57	22.46	176.198	Horizontal	Pass
20.0MHz Band QPSK	1/#Mid	1720	-1.94	3.17	27.66	22.55	179.887	Horizontal	Pass
		1732.5	-1.77	3.32	27.61	22.52	178.649	Horizontal	Pass
		1745	-1.71	3.36	27.56	22.49	177.419	Horizontal	Pass
1.4MHz Band QPSK	1/#Mid	1710.7	-3.30	3.12	27.58	21.16	130.617	Vertical	Pass
		1732.5	-2.60	3.27	27.61	21.74	149.279	Vertical	Pass
		1754.3	-2.44	3.29	27.63	21.90	154.882	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	1711.5	-3.23	3.13	27.61	21.25	133.352	Vertical	Pass
		1732.5	-3.00	3.27	27.61	21.34	136.144	Vertical	Pass
		1753.5	-2.73	3.30	27.62	21.59	144.212	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	1712.5	-3.02	3.13	27.63	21.48	140.605	Vertical	Pass
		1732.5	-2.35	3.27	27.61	21.99	158.125	Vertical	Pass
		1752.5	-2.85	3.30	27.60	21.45	139.637	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	1715	-2.52	3.15	27.64	21.97	157.398	Vertical	Pass
		1732.5	-3.16	3.31	27.61	21.14	130.017	Vertical	Pass
		1750	-3.07	3.33	27.59	21.19	131.522	Vertical	Pass
15.0MHz	1/#Mid	1717.5	-3.12	3.15	27.65	21.38	137.404	Vertical	Pass

Band		1732.5	-2.68	3.31	27.61	21.62	145.211	Vertical	Pass
QPSK		1747.5	-3.06	3.33	27.57	21.18	131.220	Vertical	Pass
20.0MHz	1/#Mid	1720	-2.94	3.17	27.66	21.55	142.889	Vertical	Pass
Band		1732.5	-2.44	3.32	27.61	21.85	153.109	Vertical	Pass
QPSK		1745	-2.97	3.36	27.56	21.23	132.739	Vertical	Pass

Note:

SG Level= Signal generator output

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

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

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level	Cable	Antenna	Max. EIRP	Max.	Polarization	
			(dBm)	Loss	Gain	Average	EIRP	Of Max.	
				(dBm)	(dB)	(dBm)	Average	ERP	
1.4MHz	1/#Mid	1710.7	-2.92	3.12	27.58	21.54	142.561	Horizontal	Pass
Band 16		1732.5	-2.77	3.27	27.61	21.57	143.549	Horizontal	Pass
QAM		1754.3	-2.77	3.29	27.63	21.57	143.549	Horizontal	Pass
3.0MHz	1/#Mid	1711.5	-2.86	3.13	27.61	21.62	145.211	Horizontal	Pass
Band 16		1732.5	-2.99	3.27	27.61	21.35	136.458	Horizontal	Pass
QAM		1753.5	-3.21	3.30	27.62	21.11	129.122	Horizontal	Pass
5.0MHz	1/#Mid	1712.5	-2.69	3.13	27.63	21.81	151.705	Horizontal	Pass
Band 16		1732.5	-2.65	3.27	27.61	21.69	147.571	Horizontal	Pass
QAM		1752.5	-2.34	3.30	27.60	21.96	157.036	Horizontal	Pass
10.0MHz	1/#Mid	1715	-2.76	3.15	27.64	21.73	148.936	Horizontal	Pass
Band 16		1732.5	-2.95	3.31	27.61	21.35	136.458	Horizontal	Pass
QAM		1750	-2.33	3.33	27.59	21.93	155.955	Horizontal	Pass
15.0MHz	1/#Mid	1717.5	-2.56	3.15	27.65	21.94	156.315	Horizontal	Pass
Band 16		1732.5	-2.62	3.31	27.61	21.68	147.231	Horizontal	Pass
QAM		1747.5	-2.64	3.33	27.57	21.60	144.544	Horizontal	Pass
20.0MHz	1/#Mid	1720	-2.51	3.17	27.66	21.98	157.761	Horizontal	Pass
Band 16		1732.5	-2.52	3.32	27.61	21.77	150.314	Horizontal	Pass
QAM		1745	-2.33	3.36	27.56	21.87	153.815	Horizontal	Pass
1.4MHz	1/#Mid	1710.7	-3.97	3.12	27.58	20.49	111.944	Vertical	Pass
Band 16		1732.5	-4.04	3.27	27.61	20.30	107.152	Vertical	Pass
QAM		1754.3	-3.58	3.29	27.63	20.76	119.124	Vertical	Pass
3.0MHz	1/#Mid	1711.5	-3.70	3.13	27.61	20.78	119.674	Vertical	Pass
Band 16		1732.5	-3.99	3.27	27.61	20.35	108.393	Vertical	Pass
QAM		1753.5	-3.96	3.30	27.62	20.36	108.643	Vertical	Pass
5.0MHz	1/#Mid	1712.5	-3.81	3.13	27.63	20.69	117.220	Vertical	Pass
Band 16		1732.5	-3.85	3.27	27.61	20.49	111.944	Vertical	Pass
QAM		1752.5	-3.32	3.30	27.60	20.98	125.314	Vertical	Pass
10.0MHz	1/#Mid	1715	-4.42	3.15	27.64	20.07	101.625	Vertical	Pass
Band 16		1732.5	-3.86	3.31	27.61	20.44	110.662	Vertical	Pass
QAM		1750	-3.48	3.33	27.59	20.78	119.674	Vertical	Pass
15.0MHz	1/#Mid	1717.5	-3.90	3.15	27.65	20.60	114.815	Vertical	Pass
Band 16		1732.5	-3.45	3.31	27.61	20.85	121.619	Vertical	Pass

QAM		1747.5	-3.80	3.33	27.57	20.44	110.662	Vertical	Pass
20.0MHz	1/#Mid	1720	-3.70	3.17	27.66	20.79	119.950	Vertical	Pass
Band 16		1732.5	-3.83	3.32	27.61	20.46	111.173	Vertical	Pass
QAM		1745	-3.99	3.36	27.56	20.21	104.954	Vertical	Pass

Note:

SG Level= Signal generator output

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

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

8.4 LTE BAND 5

Radiated Power (ERP) for Band 5										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level	Cable Loss	Antenna Gain	Correction	Max. EIRP	Max. EIRP	Polarization Of Max. ERP	
			(dBm)	(dBm)	(dB)		Average	Average		
							(dBm)	(mW)		
1.4MHz Band QPSK	3/#Mid	824.7	6.99	2.01	19.68	2.15	22.51	178.238	Horizontal	Pass
		836.5	6.87	2.01	19.77	2.15	22.48	177.011	Horizontal	Pass
		848.3	6.67	2.02	19.82	2.15	22.32	170.608	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	825.5	6.76	2.01	19.70	2.15	22.30	169.824	Horizontal	Pass
		836.5	6.66	2.01	19.77	2.15	22.27	168.655	Horizontal	Pass
		847.5	6.53	2.02	19.81	2.15	22.17	164.816	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	826.5	7.04	2.01	19.71	2.15	22.59	181.552	Horizontal	Pass
		836.5	6.92	2.01	19.77	2.15	22.53	179.061	Horizontal	Pass
		846.5	6.76	2.02	19.79	2.15	22.38	172.982	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	829	7.06	2.01	19.73	2.15	22.63	183.231	Horizontal	Pass
		836.5	7.01	2.01	19.77	2.15	22.62	182.810	Horizontal	Pass
		844	6.91	2.02	19.78	2.15	22.52	178.649	Horizontal	Pass
1.4MHz Band QPSK	1/#Mid	824.7	6.19	2.01	19.68	2.15	21.71	148.252	Vertical	Pass
		836.5	5.70	2.01	19.77	2.15	21.31	135.207	Vertical	Pass
		848.3	5.67	2.02	19.82	2.15	21.32	135.519	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	825.5	5.40	2.01	19.70	2.15	20.94	124.165	Vertical	Pass
		836.5	5.83	2.01	19.77	2.15	21.44	139.316	Vertical	Pass
		847.5	5.49	2.02	19.81	2.15	21.13	129.718	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	826.5	5.50	2.01	19.71	2.15	21.05	127.350	Vertical	Pass
		836.5	5.36	2.01	19.77	2.15	20.97	125.026	Vertical	Pass
		846.5	6.10	2.02	19.79	2.15	21.72	148.594	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	829	5.43	2.01	19.73	2.15	21.00	125.893	Vertical	Pass
		836.5	5.99	2.01	19.77	2.15	21.60	144.544	Vertical	Pass
		844	5.39	2.02	19.78	2.15	21.00	125.893	Vertical	Pass

Note:

SG Level= Signal generator output

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

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

Radiated Power (ERP) for Band 5										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level	Cable Loss	Antenna Gain	Correction	Max. EIRP	Max. EIRP	Polarization	
			(dBm)	(dBm)	(dB)	(dB)	Average	Average	Of Max. ERP	
							(dBm)	(mW)		
1.4MHz	3/#Mid	824.7	6.14	2.01	19.68	2.15	21.66	146.555	Horizontal	Pass
Band 16		836.5	6.07	2.01	19.77	2.15	21.68	147.231	Horizontal	Pass
QAM		848.3	5.91	2.02	19.82	2.15	21.56	143.219	Horizontal	Pass
3.0MHz	1/#Mid	825.5	6.22	2.01	19.70	2.15	21.76	149.968	Horizontal	Pass
Band 16		836.5	5.93	2.01	19.77	2.15	21.54	142.561	Horizontal	Pass
QAM		847.5	5.41	2.02	19.81	2.15	21.05	127.350	Horizontal	Pass
5.0MHz	1/#Mid	826.5	6.54	2.01	19.71	2.15	22.09	161.808	Horizontal	Pass
Band 16		836.5	6.31	2.01	19.77	2.15	21.92	155.597	Horizontal	Pass
QAM		846.5	6.06	2.02	19.79	2.15	21.68	147.231	Horizontal	Pass
10.0MHz	1/#Mid	829	6.54	2.01	19.73	2.15	22.11	162.555	Horizontal	Pass
Band 16		836.5	6.26	2.01	19.77	2.15	21.87	153.815	Horizontal	Pass
QAM		844	5.80	2.02	19.78	2.15	21.41	138.357	Horizontal	Pass
1.4MHz	1/#Mid	824.7	5.35	2.01	19.68	2.15	20.87	122.180	Vertical	Pass
Band 16		836.5	5.51	2.01	19.77	2.15	21.12	129.420	Vertical	Pass
QAM		848.3	4.91	2.02	19.82	2.15	20.56	113.763	Vertical	Pass
3.0MHz	1/#Mid	825.5	4.95	2.01	19.70	2.15	20.49	111.944	Vertical	Pass
Band 16		836.5	4.27	2.01	19.77	2.15	19.88	97.275	Vertical	Pass
QAM		847.5	4.50	2.02	19.81	2.15	20.14	103.276	Vertical	Pass
5.0MHz	1/#Mid	826.5	5.51	2.01	19.71	2.15	21.06	127.644	Vertical	Pass
Band 16		836.5	4.34	2.01	19.77	2.15	19.95	98.855	Vertical	Pass
QAM		846.5	5.31	2.02	19.79	2.15	20.93	123.880	Vertical	Pass
10.0MHz	1/#Mid	829	5.08	2.01	19.73	2.15	20.65	116.145	Vertical	Pass
Band 16		836.5	4.59	2.01	19.77	2.15	20.20	104.713	Vertical	Pass
QAM		844	4.29	2.02	19.78	2.15	19.90	97.724	Vertical	Pass

Note:

SG Level= Signal generator output

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

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

8.5 LTE BAND 12

Radiated Power (ERP) for Band 12										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level	Cable Loss	Antenna Gain	Correction	Max. EIRP	Max. EIRP	Polarization Of Max. ERP	
			(dBm)	(dBm)	(dB)		Average	Average		
							(dBm)	(mW)		
1.4MHz Band QPSK	1/#Mid	699.7	7.78	1.91	19.21	2.15	22.93	196.336	Vertical	Pass
		707.5	7.70	1.91	19.26	2.15	22.90	194.984	Vertical	Pass
		715.3	7.48	1.93	19.34	2.15	22.74	187.932	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	700.5	7.57	1.91	19.21	2.15	22.72	187.068	Vertical	Pass
		707.5	7.49	1.91	19.26	2.15	22.69	185.780	Vertical	Pass
		714.5	7.33	1.93	19.34	2.15	22.59	181.552	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	701.5	7.84	1.91	19.23	2.15	23.01	199.986	Vertical	Pass
		707.5	7.75	1.91	19.26	2.15	22.95	197.242	Vertical	Pass
		713.5	7.54	1.92	19.33	2.15	22.80	190.546	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	704	7.86	1.91	19.25	2.15	23.05	201.837	Vertical	Pass
		707.5	7.84	1.91	19.26	2.15	23.04	201.372	Vertical	Pass
		711	7.69	1.92	19.32	2.15	22.94	196.789	Vertical	Pass
1.4MHz Band QPSK	1/#Mid	699.7	6.67	1.91	19.21	2.15	21.82	152.055	Horizontal	Pass
		707.5	6.58	1.91	19.26	2.15	21.78	150.661	Horizontal	Pass
		715.3	6.63	1.93	19.34	2.15	21.89	154.525	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	700.5	6.72	1.91	19.21	2.15	21.87	153.815	Horizontal	Pass
		707.5	6.25	1.91	19.26	2.15	21.45	139.637	Horizontal	Pass
		714.5	6.69	1.93	19.34	2.15	21.95	156.675	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	701.5	6.31	1.91	19.23	2.15	21.48	140.605	Horizontal	Pass
		707.5	6.47	1.91	19.26	2.15	21.67	146.893	Horizontal	Pass
		713.5	6.19	1.92	19.33	2.15	21.45	139.637	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	704	6.73	1.91	19.25	2.15	21.92	155.597	Horizontal	Pass
		707.5	6.32	1.91	19.26	2.15	21.52	141.906	Horizontal	Pass
		711	6.25	1.92	19.32	2.15	21.50	141.254	Horizontal	Pass

Radiated Power (ERP) for Band 12										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level	Cable Loss	Antenna Gain	Correction	Max. EIRP	Max. EIRP	Polarization	
			(dBm)	(dBm)	(dB)		Average	Average	Of Max. ERP	
							(dBm)	(mW)		
1.4MHz	1/#Mid	699.7	7.78	1.91	19.21	2.15	23.06	202.302	Vertical	Pass
Band 16		707.5	7.70	1.91	19.26	2.15	23.03	200.909	Vertical	Pass
QAM		715.3	7.48	1.93	19.34	2.15	22.87	193.642	Vertical	Pass
3.0MHz	1/#Mid	700.5	7.57	1.91	19.21	2.15	22.85	192.752	Vertical	Pass
Band 16		707.5	7.49	1.91	19.26	2.15	22.82	191.426	Vertical	Pass
QAM		714.5	7.33	1.93	19.34	2.15	22.72	187.068	Vertical	Pass
5.0MHz	1/#Mid	701.5	7.84	1.91	19.23	2.15	23.14	206.063	Vertical	Pass
Band 16		707.5	7.75	1.91	19.26	2.15	23.08	203.236	Vertical	Pass
QAM		713.5	7.54	1.92	19.33	2.15	22.93	196.336	Vertical	Pass
10.0MHz	1/#Mid	704	7.86	1.91	19.25	2.15	23.18	207.970	Vertical	Pass
Band 16		707.5	7.84	1.91	19.26	2.15	23.17	207.491	Vertical	Pass
QAM		711	7.69	1.92	19.32	2.15	23.07	202.768	Vertical	Pass
1.4MHz	1/#Mid	699.7	6.79	1.91	19.21	2.15	22.34	171.396	Horizontal	Pass
Band 16		707.5	6.95	1.91	19.26	2.15	21.96	157.036	Horizontal	Pass
QAM		715.3	6.61	1.93	19.34	2.15	21.65	146.218	Horizontal	Pass
3.0MHz	1/#Mid	700.5	6.47	1.91	19.21	2.15	21.35	136.458	Horizontal	Pass
Band 16		707.5	6.18	1.91	19.26	2.15	21.51	141.579	Horizontal	Pass
QAM		714.5	6.60	1.93	19.34	2.15	21.42	138.676	Horizontal	Pass
5.0MHz	1/#Mid	701.5	6.08	1.91	19.23	2.15	22.25	167.880	Horizontal	Pass
Band 16		707.5	6.29	1.91	19.26	2.15	21.75	149.624	Horizontal	Pass
QAM		713.5	6.31	1.92	19.33	2.15	22.16	164.437	Horizontal	Pass
10.0MHz	1/#Mid	704	6.42	1.91	19.25	2.15	22.09	161.808	Horizontal	Pass
Band 16		707.5	6.83	1.91	19.26	2.15	22.20	165.959	Horizontal	Pass
QAM		711	6.32	1.92	19.32	2.15	21.66	146.555	Horizontal	Pass

Note:

SG Level= Signal generator output

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

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

8.6 LTE BAND 13

Radiated Power (ERP) for Band 13										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level	Cable Loss	Antenna Gain	Correction	Max. EIRP	Max. EIRP	Polarization	
			(dBm)	(dBm)	(dB)		Average	Average	Of Max. ERP	
							(dBm)	(mW)		
5.0MHz Band QPSK	1/#Mid	748.5	7.00	1.91	19.23	2.15	22.17	164.816	Vertical	Pass
		782	6.86	1.91	19.26	2.15	22.06	160.694	Vertical	Pass
		784.5	6.76	1.92	19.33	2.15	22.02	159.221	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	782	7.01	1.91	19.25	2.15	22.20	165.959	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	748.5	5.68	1.91	19.23	2.15	20.85	121.619	Horizontal	Pass
		782	5.26	1.91	19.26	2.15	20.46	111.173	Horizontal	Pass
		784.5	5.63	1.92	19.33	2.15	20.89	122.744	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	782	5.28	1.91	19.25	2.15	20.47	111.429	Horizontal	Pass

Radiated Power (ERP) for Band 13										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level	Cable Loss (dBm)	Antenna Gain (dB)	Correction (dB)	Max. EIRP	Max. EIRP	Polarization	
			(dBm)				Average	Average	Of Max. ERP	
							(dBm)	(mW)		
5.0MHz	1/#Mid	748.5	5.17	1.91	19.23	2.15	20.34	108.143	Vertical	Pass
Band 16		782	5.39	1.91	19.26	2.15	20.59	114.551	Vertical	Pass
QAM		784.5	5.20	1.92	19.33	2.15	20.46	111.173	Vertical	Pass
10.0MHz	1/#Mid	782	5.89	1.91	19.25	2.15	21.08	128.233	Vertical	Pass
Band 16										
QAM										
5.0MHz	1/#Mid	748.5	5.32	1.91	19.23	2.15	20.49	111.944	Horizontal	Pass
Band 16		782	5.10	1.91	19.26	2.15	20.30	107.152	Horizontal	Pass
QAM		784.5	4.80	1.92	19.33	2.15	20.06	101.391	Horizontal	Pass
10.0MHz	1/#Mid	782	5.57	1.91	19.25	2.15	20.76	119.124	Horizontal	Pass
Band 16										
QAM										

Note:

SG Level= Signal generator output

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

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

8.7 LTE BAND 14

Radiated Power (ERP) for Band 14										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level	Cable Loss (dBm)	Antenna Gain (dB)	Correction	Max. EIRP	Max. EIRP	Polarization Of Max. ERP	
			(dBm)				Average	Average		
							(dB)	(dBm)		
5.0MHz Band QPSK	1/##Mid	790.5	7.00	1.91	19.23	2.15	22.12	162.930	Vertical	Pass
		793	6.86	1.91	19.26	2.15	22.01	158.855	Vertical	Pass
		795.5	6.76	1.92	19.33	2.15	21.97	157.398	Vertical	Pass
10.0MHz Band QPSK	1/##Mid	793	7.01	1.91	19.25	2.15	22.15	164.059	Vertical	Pass
5.0MHz Band QPSK	1/##Mid	790.5	6.64	1.91	19.23	2.15	21.03	126.765	Horizontal	Pass
		793	4.88	1.91	19.26	2.15	21.75	149.624	Horizontal	Pass
		795.5	5.95	1.92	19.33	2.15	20.66	116.413	Horizontal	Pass
10.0MHz Band QPSK	1/##Mid	793	5.54	1.91	19.25	2.15	21.66	146.555	Horizontal	Pass

Radiated Power (ERP) for Band 14										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level	Cable Loss (dBm)	Antenna Gain (dB)	Correction	Max. EIRP	Max. EIRP	Polarization Of Max. ERP	
			(dBm)				Average	Average		
							(dB)	(dBm)		
5.0MHz	1/#Mid	790.5	5.17	1.91	19.23	2.15	21.46	139.959	Vertical	Pass
Band 16		793	5.39	1.91	19.26	2.15	21.41	138.357	Vertical	Pass
QAM		795.5	5.20	1.92	19.33	2.15	21.27	133.968	Vertical	Pass
10.0MHz	1/#Mid	793	5.89	1.91	19.25	2.15	22.08	161.436	Vertical	Pass
Band 16										
QAM										
5.0MHz	1/#Mid	790.5	5.62	1.91	19.23	2.15	20.79	119.950	Horizontal	Pass
Band 16		793	4.86	1.91	19.26	2.15	20.15	103.514	Horizontal	Pass
QAM		795.5	5.71	1.92	19.33	2.15	20.43	110.408	Horizontal	Pass
10.0MHz	1/#Mid	793	5.39	1.91	19.25	2.15	20.84	121.339	Horizontal	Pass
Band 16										
QAM										

Note:

SG Level= Signal generator output

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

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

8.8 LTE BAND 66

Radiated Power (EIRP) for Band 66									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP	Max. EIRP	Polarization Of Max. ERP	
						Average (dBm)	Average		
							(mW)		
1.4MHz	1/#Mid	1710.7	-2.01	3.76	28.24	22.47	176.604	Horizontal	Pass
Band		1745	-1.87	3.91	28.22	22.44	175.388	Horizontal	Pass
QPSK		1779.3	-1.74	3.93	28.2	22.53	179.061	Horizontal	Pass
3.0MHz	1/#Mid	1711.5	-2.07	3.77	28.23	22.39	173.380	Horizontal	Pass
Band		1745	-1.98	3.91	28.24	22.35	171.791	Horizontal	Pass
QPSK		1778.5	-2.00	3.94	28.25	22.31	170.216	Horizontal	Pass
5.0MHz	1/#Mid	1712.5	-1.97	3.77	28.31	22.57	180.717	Horizontal	Pass
Band		1745	-1.65	3.91	28.22	22.66	184.502	Horizontal	Pass
QPSK		1777.5	-1.71	3.94	28.2	22.55	179.887	Horizontal	Pass
10.0MHz	1/#Mid	1715	-1.86	3.79	28.33	22.68	185.353	Horizontal	Pass
Band		1745	-1.59	3.95	28.22	22.68	185.353	Horizontal	Pass
QPSK		1775	-1.60	3.97	28.19	22.62	182.810	Horizontal	Pass
15.0MHz	1/#Mid	1717.5	-1.88	3.79	28.34	22.67	184.927	Horizontal	Pass
Band		1745	-1.69	3.95	28.22	22.58	181.134	Horizontal	Pass
QPSK		1772.5	-1.64	3.97	28.18	22.57	180.717	Horizontal	Pass
20.0MHz	1/#Mid	1720	-1.85	3.81	28.35	22.69	185.780	Horizontal	Pass
Band		1745	-1.59	3.96	28.22	22.67	184.927	Horizontal	Pass
QPSK		1770	-1.61	4	28.16	22.55	179.887	Horizontal	Pass
1.4MHz	1/#Mid	1710.7	-3.01	3.76	28.24	21.47	140.281	Vertical	Pass
Band		1745	-2.81	3.91	28.22	21.50	141.254	Vertical	Pass
QPSK		1779.3	-2.51	3.93	28.2	21.76	149.968	Vertical	Pass
3.0MHz	1/#Mid	1711.5	-3.26	3.77	28.23	21.20	131.826	Vertical	Pass
Band		1745	-2.53	3.91	28.24	21.80	151.356	Vertical	Pass
QPSK		1778.5	-3.24	3.94	28.25	21.07	127.938	Vertical	Pass
5.0MHz	1/#Mid	1712.5	-2.69	3.77	28.31	21.85	153.109	Vertical	Pass
Band		1745	-3.29	3.91	28.22	21.02	126.474	Vertical	Pass
QPSK		1777.5	-2.91	3.94	28.2	21.35	136.458	Vertical	Pass
10.0MHz	1/#Mid	1715	-3.42	3.79	28.34	21.13	129.718	Vertical	Pass
Band		1745	-2.79	3.95	28.22	21.48	140.605	Vertical	Pass

QPSK		1775	-2.57	3.97	28.18	21.64	145.881	Vertical	Pass
15.0MHz	1/#Mid	1717.5	-2.59	3.81	28.35	21.95	156.675	Vertical	Pass
Band		1745	-2.44	3.96	28.22	21.82	152.055	Vertical	Pass
QPSK		1772.5	-2.39	4	28.16	21.77	150.314	Vertical	Pass
20.0MHz	1/#Mid	1720	-2.87	3.79	28.34	21.68	147.231	Vertical	Pass
Band		1745	-3.08	3.95	28.22	21.19	131.522	Vertical	Pass
QPSK		1770	-2.28	3.97	28.18	21.93	155.955	Vertical	Pass

Radiated Power (EIRP) for Band 66									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss	Antenna Gain	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band 16 QAM	1/#Mid	1710.7	-2.84	3.76	28.24	21.64	145.881	Horizontal	Pass
		1745	-2.45	3.91	28.22	21.86	153.462	Horizontal	Pass
		1779.3	-2.63	3.93	28.2	21.64	145.881	Horizontal	Pass
3.0MHz Band 16 QAM	1/#Mid	1711.5	-3.23	3.77	28.23	21.23	132.739	Horizontal	Pass
		1745	-2.48	3.91	28.24	21.85	153.109	Horizontal	Pass
		1778.5	-2.77	3.94	28.25	21.54	142.561	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	1712.5	-2.65	3.77	28.31	21.89	154.525	Horizontal	Pass
		1745	-2.71	3.91	28.22	21.60	144.544	Horizontal	Pass
		1777.5	-2.38	3.94	28.2	21.88	154.170	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	1715	-2.70	3.79	28.33	21.84	152.757	Horizontal	Pass
		1745	-2.36	3.95	28.22	21.91	155.239	Horizontal	Pass
		1775	-2.68	3.97	28.19	21.54	142.561	Horizontal	Pass
15.0MHz Band 16 QAM	1/#Mid	1717.5	-2.69	3.79	28.34	21.86	153.462	Horizontal	Pass
		1745	-2.51	3.95	28.22	21.76	149.968	Horizontal	Pass
		1772.5	-2.30	3.97	28.18	21.91	155.239	Horizontal	Pass
20.0MHz Band 16 QAM	1/#Mid	1720	-2.52	3.81	28.35	22.02	159.221	Horizontal	Pass
		1745	-2.30	3.96	28.22	21.96	157.036	Horizontal	Pass
		1770	-2.24	4	28.16	21.92	155.597	Horizontal	Pass
1.4MHz Band 16 QAM	1/#Mid	1710.7	-3.53	3.76	28.24	20.95	124.451	Vertical	Pass
		1745	-3.77	3.91	28.22	20.54	113.240	Vertical	Pass
		1779.3	-3.22	3.93	28.2	21.05	127.350	Vertical	Pass
3.0MHz Band 16 QAM	1/#Mid	1711.5	-3.05	3.77	28.23	21.41	138.357	Vertical	Pass
		1745	-3.84	3.91	28.24	20.49	111.944	Vertical	Pass
		1778.5	-3.78	3.94	28.25	20.53	112.980	Vertical	Pass
5.0MHz Band 16 QAM	1/#Mid	1712.5	-3.25	3.77	28.31	21.29	134.586	Vertical	Pass
		1745	-4.26	3.91	28.22	20.05	101.158	Vertical	Pass
		1777.5	-3.61	3.94	28.2	20.65	116.145	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	1715	-4.11	3.79	28.34	20.44	110.662	Vertical	Pass
		1745	-2.89	3.95	28.22	21.38	137.404	Vertical	Pass
		1775	-4.03	3.97	28.18	20.18	104.232	Vertical	Pass
15.0MHz Band 16	1/#Mid	1717.5	-3.26	3.81	28.35	21.28	134.276	Vertical	Pass
		1745	-3.23	3.96	28.22	21.03	126.765	Vertical	Pass

QAM		1772.5	-2.22	4	28.16	21.94	156.315	Vertical	Pass
20.0MHz	1/#Mid	1720	-3.33	3.79	28.34	21.22	132.434	Vertical	Pass
Band 16		1745	-3.57	3.95	28.22	20.70	117.490	Vertical	Pass
QAM		1770	-3.64	3.97	28.18	20.57	114.025	Vertical	Pass

Note:

SG Level= Signal generator output

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

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

8.9 LTE BAND 71

Radiated Power (ERP) for Band 71										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level	Cable Loss (dBm)	Antenna Gain (dB)	Correction (dB)	Max. EIRP	Max. EIRP	Polarization Of Max. ERP	
			(dBm)				Average	Average		
							(dBm)	(mW)		
5.0MHz Band QPSK	25/0	665.5	7.54	2.01	19.68	2.15	23.06	202.30	Horizontal	Pass
		680.5	7.42	2.01	19.77	2.15	23.03	200.91	Horizontal	Pass
		695.5	7.22	2.02	19.82	2.15	22.87	193.64	Horizontal	Pass
10.0MHz Band QPSK	50/0	668	7.31	2.01	19.70	2.15	22.85	192.75	Horizontal	Pass
		680.5	7.21	2.01	19.77	2.15	22.82	191.43	Horizontal	Pass
		693	7.08	2.02	19.81	2.15	22.72	187.07	Horizontal	Pass
15.0MHz Band QPSK	75/0	670.5	7.59	2.01	19.71	2.15	23.14	206.06	Horizontal	Pass
		680.5	7.47	2.01	19.77	2.15	23.08	203.24	Horizontal	Pass
		690.5	7.31	2.02	19.79	2.15	22.93	196.34	Horizontal	Pass
20.0MHz Band QPSK	100/0	673	7.61	2.01	19.73	2.15	23.18	207.97	Horizontal	Pass
		683	7.56	2.01	19.77	2.15	23.17	207.49	Horizontal	Pass
		688	7.46	2.02	19.78	2.15	23.07	202.77	Horizontal	Pass
5.0MHz Band QPSK	25/0	665.5	6.65	2.01	19.68	2.15	22.17	164.82	Vertical	Pass
		680.5	6.23	2.01	19.77	2.15	21.84	152.76	Vertical	Pass
		695.5	6.40	2.02	19.82	2.15	22.05	160.32	Vertical	Pass
15.0MHz Band QPSK	50/0	668	6.15	2.01	19.70	2.15	21.69	147.57	Vertical	Pass
		680.5	6.15	2.01	19.77	2.15	21.76	149.97	Vertical	Pass
		693	6.59	2.02	19.81	2.15	22.23	167.11	Vertical	Pass
15.0MHz Band QPSK	75/0	670.5	5.92	2.01	19.71	2.15	21.47	140.28	Vertical	Pass
		680.5	6.48	2.01	19.77	2.15	22.09	161.81	Vertical	Pass
		690.5	6.26	2.02	19.79	2.15	21.88	154.17	Vertical	Pass
20MHz Band QPSK	100/0	673	6.72	2.01	19.73	2.15	22.29	169.43	Vertical	Pass
		683	5.93	2.01	19.77	2.15	21.54	142.56	Vertical	Pass
		688	5.88	2.02	19.78	2.15	21.49	140.93	Vertical	Pass

Radiated Power (ERP) for Band 71										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level	Cable Loss	Antenna Gain	Correction	Max. EIRP	Max. EIRP	Polarization	
			(dBm)	(dBm)	(dB)	(dB)	Average	Average	Of Max. ERP	
							(dBm)	(mW)		
5.0MHz Band 16 QAM	25/0	665.5	7.54	2.01	19.68	2.15	23.19	208.45	Horizontal	Pass
		680.5	7.42	2.01	19.77	2.15	23.16	207.01	Horizontal	Pass
		695.5	7.22	2.02	19.82	2.15	23.00	199.53	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	668	7.31	2.01	19.70	2.15	22.98	198.61	Horizontal	Pass
		680.5	7.21	2.01	19.77	2.15	22.95	197.24	Horizontal	Pass
		693	7.08	2.02	19.81	2.15	22.85	192.75	Horizontal	Pass
15.0MHz Band 16 QAM	75/0	670.5	7.59	2.01	19.71	2.15	23.27	212.32	Horizontal	Pass
		680.5	7.47	2.01	19.77	2.15	23.21	209.41	Horizontal	Pass
		690.5	7.31	2.02	19.79	2.15	23.06	202.30	Horizontal	Pass
20.0MHz Band 16 QAM	100/0	673	7.61	2.01	19.73	2.15	23.31	214.29	Horizontal	Pass
		683	7.56	2.01	19.77	2.15	23.30	213.80	Horizontal	Pass
		688	7.46	2.02	19.78	2.15	23.20	208.93	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	665.5	6.33	2.01	19.68	2.15	21.55	142.89	Vertical	Pass
		680.5	6.09	2.01	19.77	2.15	21.54	142.56	Vertical	Pass
		695.5	5.78	2.02	19.82	2.15	21.53	142.23	Vertical	Pass
10.0MHz Band 16 QAM	50/0	668	6.62	2.01	19.70	2.15	21.55	142.89	Vertical	Pass
		680.5	6.20	2.01	19.77	2.15	21.93	155.96	Vertical	Pass
		693	6.13	2.02	19.81	2.15	21.92	155.60	Vertical	Pass
15.0MHz Band 16 QAM	75/0	670.5	5.85	2.01	19.71	2.15	22.09	161.81	Vertical	Pass
		680.5	5.89	2.01	19.77	2.15	21.80	151.36	Vertical	Pass
		690.5	6.33	2.02	19.79	2.15	21.56	143.22	Vertical	Pass
20.0MHz Band 16 QAM	100/0	673	6.49	2.01	19.73	2.15	21.85	153.11	Vertical	Pass
		683	6.12	2.01	19.77	2.15	22.18	165.20	Vertical	Pass
		688	6.42	2.02	19.78	2.15	22.01	158.85	Vertical	Pass

Note:

SG Level= Signal generator output

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

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

9. SPURIOUS RADIATION EMISSION

RULE PART(S)

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

LIMIT

§22.917 (e) and §24.238 and §90.691 (a): Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

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

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

TEST PROCEDURE

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

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

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

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

- a. for base station and subscriber equipment, other than mobile subscriber equipment, the attenuation shall not be less than $43 + 10 \log_{10}(p)$, 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 12
- LTE Band 13
- LTE Band 14
- LTE Band 66
- LTE Band 71

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	-50.80	4.04	33.51	-21.33	-13	-8.33	Horizontal
3701.4	-51.89	4.04	33.51	-22.42	-13	-9.42	Vertical
5552.1	-55.36	5.24	35.84	-24.76	-13	-11.76	Vertical
5552.1	-65.75	5.24	35.84	-35.15	-13	-22.15	Horizontal
Test Results for Mid Channel 1880MHz							
3760	-52.41	4.04	33.56	-22.89	-13	-9.89	Horizontal
3760	-53.73	4.04	33.56	-24.21	-13	-11.21	Vertical
5640	-52.65	5.24	35.91	-21.98	-13	-8.98	Vertical
5640	-54.59	5.24	35.91	-23.92	-13	-10.92	Horizontal
Test Results for High Channel 1909.3MHz							
3818.6	-52.45	4.04	34.00	-22.49	-13	-9.49	Horizontal
3818.6	-53.96	4.04	34.00	-24.00	-13	-11.00	Vertical
5727.9	-57.35	5.24	36.04	-26.55	-13	-13.55	Vertical
5727.9	-55.49	5.24	36.04	-24.69	-13	-11.69	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	-55.45	4.07	33.54	-25.98	-13	-12.98	Horizontal
3720	-50.08	4.07	33.54	-20.61	-13	-7.61	Vertical
5580	-57.43	5.28	35.86	-26.85	-13	-13.85	Vertical
5580	-59.69	5.28	35.86	-29.11	-13	-16.11	Horizontal
Test Results for Mid Channel 1880MHz							
3760	-55.25	4.04	33.56	-25.73	-13	-12.73	Horizontal
3760	-51.62	4.04	33.56	-22.10	-13	-9.10	Vertical
5640	-55.75	5.24	35.91	-25.08	-13	-12.08	Vertical
5640	-57.45	5.24	35.91	-26.78	-13	-13.78	Horizontal
Test Results for High Channel 1900MHz							
3800	-53.56	4.04	34.00	-23.60	-13	-10.60	Horizontal
3800	-55.75	4.04	34.00	-25.79	-13	-12.79	Vertical
5700	-56.19	5.24	36.04	-25.39	-13	-12.39	Vertical
5700	-55.99	5.24	36.04	-25.19	-13	-12.19	Horizontal

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

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

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

9.2 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	-57.97	4.02	29.80	-32.19	-13	-19.19	Horizontal
3421.4	-56.28	4.02	29.80	-30.50	-13	-17.50	Vertical
5132.1	-59.63	5.24	35.84	-29.03	-13	-16.03	Vertical
5132.1	-62.33	5.24	35.84	-31.73	-13	-18.73	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465	-49.57	4.03	30.00	-23.60	-13	-10.60	Horizontal
3465	-53.38	4.03	30.00	-27.41	-13	-14.41	Vertical
5197.5	-56.91	5.25	35.86	-26.30	-13	-13.30	Vertical
5197.5	-55.36	5.25	35.86	-24.75	-13	-11.75	Horizontal
Test Results for High Channel 1754.3MHz							
3508.6	-49.97	4.05	30.01	-24.01	-13	-11.01	Horizontal
3508.6	-57.16	4.05	30.01	-31.20	-13	-18.20	Vertical
5262.9	-56.50	5.26	35.86	-25.90	-13	-12.90	Vertical
5262.9	-54.51	5.26	35.86	-23.91	-13	-10.91	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	-54.89	4.02	29.80	-29.11	-13	-16.11	Horizontal
3440	-57.39	4.02	29.80	-31.61	-13	-18.61	Vertical
5160	-59.11	5.24	35.84	-28.51	-13	-15.51	Vertical
5160	-61.00	5.24	35.84	-30.40	-13	-17.40	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465	-49.56	4.03	30.00	-23.59	-13	-10.59	Horizontal
3465	-52.95	4.03	30.00	-26.98	-13	-13.98	Vertical
5197.5	-59.45	5.25	35.86	-28.84	-13	-15.84	Vertical
5197.5	-57.35	5.25	35.86	-26.74	-13	-13.74	Horizontal
Test Results for High Channel 1745MHz							
2490	-52.89	2.91	27.68	-28.12	-13	-15.12	Horizontal
3490	-54.50	2.91	27.68	-29.73	-13	-16.73	Vertical
5235	-57.29	5.26	35.86	-26.69	-13	-13.69	Vertical
5235	-56.40	5.26	35.86	-25.80	-13	-12.80	Horizontal

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

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

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

9.3 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	-49.67	2.78	27.50	-24.95	-13	-11.95	Horizontal
1649.4	-54.92	2.78	27.50	-30.20	-13	-17.20	Vertical
2474.1	-53.20	2.90	27.80	-28.30	-13	-15.30	Vertical
2474.1	-52.11	2.90	27.80	-27.21	-13	-14.21	Horizontal
Test Results For Mid Channel 836.5MHz							
1673	-51.07	2.78	27.48	-26.37	-13	-13.37	Horizontal
1673	-48.67	2.78	27.48	-23.97	-13	-10.97	Vertical
2509.5	-51.11	2.91	27.70	-26.32	-13	-13.32	Vertical
2509.5	-49.89	2.91	27.70	-25.10	-13	-12.10	Horizontal
Test Results for High Channel 848.3MHz							
1696.6	-51.56	2.78	27.43	-26.91	-13	-13.91	Horizontal
1696.6	-51.65	2.78	27.43	-27.00	-13	-14.00	Vertical
2544.9	-49.63	2.92	27.74	-24.81	-13	-11.81	Vertical
2544.9	-50.60	2.92	27.74	-25.78	-13	-12.78	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	-51.39	2.78	27.50	-26.67	-13	-13.67	Horizontal
1658	-49.17	2.78	27.50	-24.45	-13	-11.45	Vertical
2487	-54.17	2.90	27.80	-29.27	-13	-16.27	Vertical
2487	-51.92	2.90	27.80	-27.02	-13	-14.02	Horizontal
Test Results for Mid Channel 836.5MHz							
1673	-50.74	2.78	27.48	-26.04	-13	-13.04	Horizontal
1673	-50.64	2.78	27.48	-25.94	-13	-12.94	Vertical
2509.5	-55.27	2.91	27.70	-30.48	-13	-17.48	Vertical
2509.5	-51.33	2.91	27.70	-26.54	-13	-13.54	Horizontal
Test Results for High Channel 844MHz							
1688	-53.88	2.78	27.43	-29.23	-13	-16.23	Horizontal
1688	-48.11	2.78	27.43	-23.46	-13	-10.46	Vertical
2532	-48.40	2.92	27.74	-23.58	-13	-10.58	Vertical
2532	-50.14	2.92	27.74	-25.32	-13	-12.32	Horizontal

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

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

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

9.4 LTE BAND 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	-48.18	2.60	27.2	-23.58	-13	-10.58	Horizontal
1399.4	-48.91	2.60	27.2	-24.31	-13	-11.31	Vertical
2099.1	-48.78	2.85	27.54	-24.09	-13	-11.09	Vertical
2099.1	-48.53	2.85	27.54	-23.84	-13	-10.84	Horizontal
Test Results For Mid Channel 707.5MHz							
1415	-50.36	2.61	27.28	-25.69	-13	-12.69	Horizontal
1415	-48.84	2.61	27.28	-24.17	-13	-11.17	Vertical
2122.5	-46.73	2.87	27.59	-22.01	-13	-9.01	Vertical
2122.5	-52.50	2.87	27.59	-27.78	-13	-14.78	Horizontal
Test Results for High Channel 715.3MHz							
1430.6	-49.68	2.63	27.28	-25.03	-13	-12.03	Horizontal
1430.6	-54.85	2.63	27.28	-30.20	-13	-17.20	Vertical
2145.9	-52.35	2.88	27.60	-27.63	-13	-14.63	Vertical
2145.9	-50.34	2.88	27.60	-25.62	-13	-12.62	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	-47.37	2.61	27.26	-22.72	-13	-9.72	Horizontal
1408	-52.36	2.61	27.26	-27.71	-13	-14.71	Vertical
2112	-50.98	2.87	27.58	-26.27	-13	-13.27	Vertical
2112	-51.87	2.87	27.58	-27.16	-13	-14.16	Horizontal
Test Results for Mid Channel 707.5MHz							
1415	-50.77	2.61	27.28	-26.10	-13	-13.10	Horizontal
1415	-54.07	2.61	27.28	-29.40	-13	-16.40	Vertical
2122.5	-52.37	2.87	27.59	-27.65	-13	-14.65	Vertical
2122.5	-50.67	2.87	27.59	-25.95	-13	-12.95	Horizontal
Test Results for High Channel 711MHz							
1422	-53.31	2.62	27.28	-28.65	-13	-15.65	Horizontal
1422	-48.35	2.62	27.28	-23.69	-13	-10.69	Vertical
2133	-52.62	2.87	27.60	-27.89	-13	-14.89	Vertical
2133	-51.78	2.87	27.60	-27.05	-13	-14.05	Horizontal

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

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

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

9.5 LTE BAND 13

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

Test Results for Low Channel 779.5MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1559	-70.15	2.61	27.28	-45.48	-40	-5.48	Horizontal
1559	-69.54	2.61	27.28	-44.87	-40	-4.87	Vertical
2338.5	-50.03	2.87	27.59	-25.31	-13	-12.31	Vertical
2338.5	-48.11	2.87	27.59	-23.39	-13	-10.39	Horizontal
Test Results For Mid Channel 782MHz							
1564	-67.88	2.62	27.30	-43.20	-40	-3.20	Horizontal
1564	-69.69	2.62	27.30	-45.01	-40	-5.01	Vertical
2346	-51.67	2.87	27.62	-26.92	-13	-13.92	Vertical
2346	-53.53	2.87	27.62	-28.78	-13	-15.78	Horizontal
Test Results for High Channel 784.5MHz							
1569	-70.58	2.66	27.28	-45.96	-40	-5.96	Horizontal
1569	-71.69	2.66	27.28	-47.07	-40	-7.07	Vertical
2353.5	-49.47	2.88	27.60	-24.75	-13	-11.75	Vertical
2353.5	-47.98	2.88	27.60	-23.26	-13	-10.26	Horizontal

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

Test Results for Channel 782MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1564	-72.36	2.62	27.30	-47.68	-40	-7.68	Horizontal
1564	-68.77	2.62	27.30	-44.09	-40	-4.09	Vertical
2346	-50.66	2.87	27.62	-25.91	-13	-12.91	Vertical
2346	-53.97	2.87	27.62	-29.22	-13	-16.22	Horizontal

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

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

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

9.6 LTE BAND 14

QPSK EIRP POWER FOR LTE BAND 14 (5MHZ BANDWIDTH)

Test Results for Low Channel 790.5MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1581	-72.02	2.61	27.28	-47.35	-40	-7.35	Horizontal
1581	-67.32	2.61	27.28	-42.65	-40	-2.65	Vertical
2371.5	-49.18	2.87	27.59	-24.46	-13	-11.46	Vertical
2371.5	-47.26	2.87	27.59	-22.54	-13	-9.54	Horizontal
Test Results For Mid Channel 793MHz							
1586	-70.41	2.62	27.30	-45.73	-40	-5.73	Horizontal
1586	-69.58	2.62	27.30	-44.90	-40	-4.90	Vertical
2379	-50.82	2.87	27.62	-26.07	-13	-13.07	Vertical
2379	-52.68	2.87	27.62	-27.93	-13	-14.93	Horizontal
Test Results for High Channel 795MHz							
1590	-68.89	2.66	27.28	-44.27	-40	-4.27	Horizontal
1590	-67.47	2.66	27.28	-42.85	-40	-2.85	Vertical
2385	-48.62	2.88	27.60	-23.90	-13	-10.90	Vertical
2385	-47.13	2.88	27.60	-22.41	-13	-9.41	Horizontal

QPSK EIRP POWER FOR LTE BAND 14 (10MHZ BANDWIDTH)

Test Results for Channel 793MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1586	-73.05	2.62	27.30	-48.37	-40	-8.37	Horizontal
1586	-70.11	2.62	27.30	-45.43	-40	-5.43	Vertical
2379	-49.81	2.87	27.62	-25.06	-13	-12.06	Vertical
2379	-53.12	2.87	27.62	-28.37	-13	-15.37	Horizontal

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

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

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

9.7 LTE BAND 66

QPSK EIRP POWER FOR LTE BAND 66 (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	-56.67	2.61	27.28	-32.00	-13	-19.00	Horizontal
3421.4	-60.69	2.61	27.28	-36.02	-13	-23.02	Vertical
5132.1	-63.32	2.87	27.59	-38.60	-13	-25.60	Vertical
5132.1	-51.52	2.87	27.59	-26.80	-13	-13.80	Horizontal
Test Results for Mid Channel 1745MHz							
3490	-53.92	2.62	27.3	-29.24	-13	-16.24	Horizontal
3490	-63.92	2.62	27.3	-39.24	-13	-26.24	Vertical
5337.9	-61.90	2.87	27.62	-37.15	-13	-24.15	Vertical
5337.9	-59.23	2.87	27.62	-34.48	-13	-21.48	Horizontal
Test Results for High Channel 1779.3MHz							
3558.6	-60.87	2.66	27.28	-36.25	-13	-23.25	Horizontal
3558.6	-55.15	2.66	27.28	-30.53	-13	-17.53	Vertical
5337.9	-57.31	2.88	27.6	-32.59	-13	-19.59	Vertical
5337.9	-61.30	2.88	27.6	-36.58	-13	-23.58	Horizontal

QPSK EIRP POWER FOR LTE BAND 66 (20MHZ 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	-52.80	2.62	27.3	-28.12	-13	-15.12	Horizontal
3440	-58.67	2.62	27.3	-33.99	-13	-20.99	Vertical
5160	-61.35	2.87	27.62	-36.60	-13	-23.60	Vertical
5160	-58.08	2.87	27.62	-33.33	-13	-20.33	Horizontal
Test Results for Mid Channel 1745MHz							
3490	-58.02	2.62	27.3	-33.34	-13	-20.34	Horizontal
3490	-56.11	2.62	27.3	-31.43	-13	-18.43	Vertical
5337.9	-61.97	2.87	27.62	-37.22	-13	-24.22	Vertical
5337.9	-58.55	2.87	27.62	-33.80	-13	-20.80	Horizontal
Test Results for High Channel 1770MHz							
3540	-58.43	2.62	27.3	-33.75	-13	-20.75	Horizontal
3540	-56.75	2.62	27.3	-32.07	-13	-19.07	Vertical
5310	-55.57	2.87	27.62	-30.82	-13	-17.82	Vertical
5310	-53.00	2.87	27.62	-28.25	-13	-15.25	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.

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

9.8 LTE BAND 71

QPSK EIRP POWER FOR LTE BAND 71 (5MHZ BANDWIDTH)

Test Results for Low Channel 665.5MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1331	-53.31	2.61	27.28	-28.64	-13	-15.64	Horizontal
1331	-50.79	2.61	27.28	-26.12	-13	-13.12	Vertical
1996.5	-51.53	2.87	27.59	-26.81	-13	-13.81	Vertical
1996.5	-52.91	2.87	27.59	-28.19	-13	-15.19	Horizontal
Test Results for Mid Channel 680.5MHz							
1361	-52.25	2.62	27.30	-27.57	-13	-14.57	Horizontal
1361	-50.07	2.62	27.30	-25.39	-13	-12.39	Vertical
2041.5	-52.59	2.87	27.62	-27.84	-13	-14.84	Vertical
2041.5	-51.29	2.87	27.62	-26.54	-13	-13.54	Horizontal
Test Results for High Channel 695.5MHz							
1391	-49.12	2.66	27.28	-24.50	-13	-11.50	Horizontal
1391	-50.54	2.66	27.28	-25.92	-13	-12.92	Vertical
2086.5	-51.93	2.88	27.60	-27.21	-13	-14.21	Vertical
2086.5	-54.12	2.88	27.60	-29.40	-13	-16.40	Horizontal

QPSK EIRP POWER FOR LTE BAND 71 (20MHZ BANDWIDTH)

Test Results for Low Channel 673MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1346	-53.95	2.62	27.30	-29.27	-13	-16.27	Horizontal
1346	-50.90	2.62	27.30	-26.22	-13	-13.22	Vertical
2019	-52.40	2.87	27.62	-27.65	-13	-14.65	Vertical
2019	-53.42	2.87	27.62	-28.67	-13	-15.67	Horizontal
Test Results for Mid Channel 683MHz							
1366	-51.96	2.62	27.30	-27.28	-13	-14.28	Horizontal
1366	-50.31	2.62	27.30	-25.63	-13	-12.63	Vertical
2049	-53.16	2.87	27.62	-28.41	-13	-15.41	Vertical
2049	-51.52	2.87	27.62	-26.77	-13	-13.77	Horizontal
Test Results for High Channel 688MHz							
1376	-49.53	2.62	27.30	-24.85	-13	-11.85	Horizontal
1376	-50.24	2.62	27.30	-25.56	-13	-12.56	Vertical
2064	-52.70	2.87	27.62	-27.95	-13	-14.95	Vertical
2064	-54.56	2.87	27.62	-29.81	-13	-16.81	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.

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

10. FREQUENCY STABILITY

RULE PART(S)

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

LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of ± 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 6.29V, Normal, DC 7.40V and High voltage, DC 8.51V.

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 12
- LTE Band 13
- LTE Band 14
- LTE Band 66
- LTE Band 71

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)				
6.29	1880	8.9	0.00473	2.5
7.40	1880	6.5	0.00346	2.5
8.51	1880	5.3	0.00282	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	6.7	0.00356	2.5
Extreme (50C)	1880	6.9	0.00367	2.5
Extreme (40C)	1880	8.3	0.00441	2.5
Extreme (30C)	1880	9.1	0.00484	2.5
Extreme (10C)	1880	8.9	0.00473	2.5
Extreme (0C)	1880	6.4	0.00340	2.5
Extreme (-10C)	1880	8	0.00426	2.5
Extreme (-20C)	1880	8.5	0.00455	2.5
Extreme (-30C)	1880	5.6	0.00298	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)				
6.29	1880	7.4	0.00394	2.5
7.40	1880	6	0.00319	2.5
8.51	1880	6.6	0.00351	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	7.9	0.00420	2.5
Extreme (50C)	1880	7.2	0.00383	2.5
Extreme (40C)	1880	5	0.00266	2.5
Extreme (30C)	1880	7.2	0.00383	2.5
Extreme (10C)	1880	6.5	0.00346	2.5
Extreme (0C)	1880	4.7	0.00250	2.5
Extreme (-10C)	1880	9.4	0.00500	2.5
Extreme (-20C)	1880	6.1	0.00327	2.5
Extreme (-30C)	1880	6.5	0.00346	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)				
6.29	1732.5	6	0.00346	2.5
7.40	1732.5	5.4	0.00312	2.5
8.51	1732.5	6.5	0.00375	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	5.3	0.00306	2.5
Extreme (50C)	1732.5	9.9	0.00571	2.5
Extreme (40C)	1732.5	6.1	0.00352	2.5
Extreme (30C)	1732.5	6.6	0.00381	2.5
Extreme (10C)	1732.5	6.7	0.00387	2.5
Extreme (0C)	1732.5	9.8	0.00566	2.5
Extreme (-10C)	1732.5	5.9	0.00341	2.5
Extreme (-20C)	1732.5	6.1	0.00352	2.5
Extreme (-30C)	1732.5	6.6	0.00381	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)				
6.29	1732.5	5.7	0.00329	2.5
7.40	1732.5	7	0.00404	2.5
8.51	1732.5	5.7	0.00329	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	5.1	0.00294	2.5
Extreme (50C)	1732.5	5.1	0.00294	2.5
Extreme (40C)	1732.5	3.5	0.00202	2.5
Extreme (30C)	1732.5	-6.4	-0.00369	2.5
Extreme (10C)	1732.5	-3.1	-0.00179	2.5
Extreme (0C)	1732.5	4.3	0.00248	2.5
Extreme (-10C)	1732.5	6.3	0.00364	2.5
Extreme (-20C)	1732.5	6.1	0.00352	2.5
Extreme (-30C)	1732.5	6.6	0.00381	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)				
6.29	836.5	6.4	0.00765	2.5
7.40	836.5	8.2	0.00980	2.5
8.51	836.5	4.4	0.00526	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	6.7	0.00801	2.5
Extreme (50C)	836.5	8.2	0.00980	2.5
Extreme (40C)	836.5	9.9	0.01184	2.5
Extreme (30C)	836.5	5.5	0.00658	2.5
Extreme (10C)	836.5	6.1	0.00729	2.5
Extreme (0C)	836.5	4.7	0.00562	2.5
Extreme (-10C)	836.5	3.6	0.00430	2.5
Extreme (-20C)	836.5	6.1	0.00729	2.5
Extreme (-30C)	836.5	6.6	0.00789	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)				
6.29	836.5	8.3	0.00992	2.5
7.40	836.5	6	0.00717	2.5
8.51	836.5	7.8	0.00932	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	6.5	0.00777	2.5
Extreme (50C)	836.5	5.4	0.00646	2.5
Extreme (40C)	836.5	3.9	0.00466	2.5
Extreme (30C)	836.5	2.1	0.00251	2.5
Extreme (10C)	836.5	6.9	0.00825	2.5
Extreme (0C)	836.5	2.5	0.00299	2.5
Extreme (-10C)	836.5	9.4	0.01124	2.5
Extreme (-20C)	836.5	6.1	0.00729	2.5
Extreme (-30C)	836.5	6.6	0.00789	2.5

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

10.4 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)				
6.29	707.5	12.7	0.01795	2.5
7.40	707.5	13.4	0.01894	2.5
8.51	707.5	13.4	0.01894	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	-6.8	-0.00961	2.5
Extreme (50C)	707.5	-3.6	-0.00509	2.5
Extreme (40C)	707.5	5.9	0.00834	2.5
Extreme (30C)	707.5	-3.5	-0.00495	2.5
Extreme (10C)	707.5	6.8	0.00961	2.5
Extreme (0C)	707.5	4.5	0.00636	2.5
Extreme (-10C)	707.5	9.4	0.01329	2.5
Extreme (-20C)	707.5	6.1	0.00862	2.5
Extreme (-30C)	707.5	6.6	0.00933	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)				
6.29	707.5	9.1	0.01286	2.5
7.40	707.5	5.1	0.00721	2.5
8.51	707.5	4.1	0.00580	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	5.4	0.00763	2.5
Extreme (50C)	707.5	9	0.01272	2.5
Extreme (40C)	707.5	6.8	0.00961	2.5
Extreme (30C)	707.5	7.2	0.01018	2.5
Extreme (10C)	707.5	6.8	0.00961	2.5
Extreme (0C)	707.5	5.1	0.00721	2.5
Extreme (-10C)	707.5	6.8	0.00961	2.5
Extreme (-20C)	707.5	5.1	0.00721	2.5
Extreme (-30C)	707.5	4.1	0.00580	2.5

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

10.5 LTE BAND 13

QPSK, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 13 QPSK, (CH 23230 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
6.29	782.0	6.6	0.00844	2.5
7.40	782.0	6.4	0.00818	2.5
8.51	782.0	4.8	0.00614	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 13 QPSK, (CH 23230 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	782.0	4.5	0.00575	2.5
Extreme (50C)	782.0	9.7	0.01240	2.5
Extreme (40C)	782.0	7.3	0.00934	2.5
Extreme (30C)	782.0	6	0.00767	2.5
Extreme (10C)	782.0	6.5	0.00831	2.5
Extreme (0C)	782.0	4.7	0.00601	2.5
Extreme (-10C)	782.0	9.4	0.01202	2.5
Extreme (-20C)	782.0	6.1	0.00780	2.5
Extreme (-30C)	782.0	6.6	0.00844	2.5

16QAM, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 13 16QAM, (CH 23230 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
6.29	782.0	6.3	0.00806	2.5
7.40	782.0	9.7	0.01240	2.5
8.51	782.0	6.7	0.00857	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 13 QPSK, (CH 23230 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	782.0	7.2	0.00921	2.5
Extreme (50C)	782.0	7.2	0.00921	2.5
Extreme (40C)	782.0	5.5	0.00703	2.5
Extreme (30C)	782.0	6.6	0.00844	2.5
Extreme (10C)	782.0	6.5	0.00831	2.5
Extreme (0C)	782.0	4.8	0.00614	2.5
Extreme (-10C)	782.0	9.5	0.01215	2.5
Extreme (-20C)	782.0	6.1	0.00780	2.5
Extreme (-30C)	782.0	6.6	0.00844	2.5

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

10.6 LTE BAND 14

QPSK, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 14 QPSK, (CH 23330 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
6.29	793	6.3	0.00791	2.5
7.40	793	4.8	0.00611	2.5
8.51	793	8.0	0.01006	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 14 QPSK, (CH 23330 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	793	4.5	0.00564	2.5
Extreme (50C)	793	6.5	0.00817	2.5
Extreme (40C)	793	6.0	0.00752	2.5
Extreme (30C)	793	6.5	0.00823	2.5
Extreme (10C)	793	4.5	0.00573	2.5
Extreme (0C)	793	7.7	0.00972	2.5
Extreme (-10C)	793	5.9	0.00741	2.5
Extreme (-20C)	793	5.5	0.00688	2.5
Extreme (-30C)	793	5.7	0.00715	2.5

16QAM, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 14 16QAM, (CH 23330 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
6.29	793	5.9	0.00748	2.5
7.40	793	4.9	0.00620	2.5
8.51	793	3.7	0.00465	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 14 QPSK, (CH 23330 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	793	5.2	0.00655	2.5
Extreme (50C)	793	4.8	0.00611	2.5
Extreme (40C)	793	3.0	0.00383	2.5
Extreme (30C)	793	3.9	0.00496	2.5
Extreme (10C)	793	6.2	0.00779	2.5
Extreme (0C)	793	4.8	0.00600	2.5
Extreme (-10C)	793	9.1	0.01148	2.5
Extreme (-20C)	793	6.3	0.00801	2.5
Extreme (-30C)	793	6.1	0.00771	2.5

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

10.7 LTE BAND 66

QPSK, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 66 QPSK, (CH 132322 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
6.29	1745	12.7	0.00728	2.5
7.40	1745	13.4	0.00768	2.5
8.51	1745	13	0.00745	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 66 QPSK, (CH 132322 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1745	7.7	0.00441	2.5
Extreme (50C)	1745	5.2	0.00298	2.5
Extreme (40C)	1745	5.1	0.00292	2.5
Extreme (30C)	1745	5	0.00287	2.5
Extreme (10C)	1745	6.6	0.00378	2.5
Extreme (0C)	1745	4.8	0.00275	2.5
Extreme (-10C)	1745	9.8	0.00562	2.5
Extreme (-20C)	1745	6.1	0.00350	2.5
Extreme (-30C)	1745	6.6	0.00378	2.5

16QAM, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 66 16QAM, (CH 132322 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
6.29	1745	12.3	0.00705	2.5
7.40	1745	14.2	0.00814	2.5
8.51	1745	13.5	0.00774	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 66 16QAM, (CH 132322 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1745	7.7	0.00441	2.5
Extreme (50C)	1745	4.7	0.00269	2.5
Extreme (40C)	1745	5.9	0.00338	2.5
Extreme (30C)	1745	5.2	0.00298	2.5
Extreme (10C)	1745	6.3	0.00361	2.5
Extreme (0C)	1745	4.7	0.00269	2.5
Extreme (-10C)	1745	9.4	0.00539	2.5
Extreme (-20C)	1745	6.1	0.00350	2.5
Extreme (-30C)	1745	6.6	0.00378	2.5

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

10.8 LTE BAND 71

QPSK, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 71 QPSK, (CH 133322 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
6.29	683	8.6	0.01259	2.5
7.40	683	13.4	0.01962	2.5
8.51	683	13	0.01903	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 71 QPSK, (CH 133322 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	683	7.7	0.01127	2.5
Extreme (50C)	683	5.2	0.00761	2.5
Extreme (40C)	683	5.1	0.00747	2.5
Extreme (30C)	683	5	0.00732	2.5
Extreme (10C)	683	6.6	0.00966	2.5
Extreme (0C)	683	4.8	0.00703	2.5
Extreme (-10C)	683	9.8	0.01435	2.5
Extreme (-20C)	683	7.2	0.01054	2.5
Extreme (-30C)	683	7.3	0.01069	2.5

16QAM, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 71 16QAM, (CH 133322 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
6.29	683	12.3	0.01801	2.5
7.40	683	14.2	0.02079	2.5
8.51	683	11.2	0.01640	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 71 16QAM, (CH 133322 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	683	7.7	0.01127	2.5
Extreme (50C)	683	4.7	0.00688	2.5
Extreme (40C)	683	5.9	0.00864	2.5
Extreme (30C)	683	5.2	0.00761	2.5
Extreme (10C)	683	5.2	0.00761	2.5
Extreme (0C)	683	6.3	0.00922	2.5
Extreme (-10C)	683	9.4	0.01376	2.5
Extreme (-20C)	683	8.2	0.01201	2.5
Extreme (-30C)	683	8.4	0.01230	2.5

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

11. Peak-to-Average Ratio

11.1 Description of the PAR Measurement

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

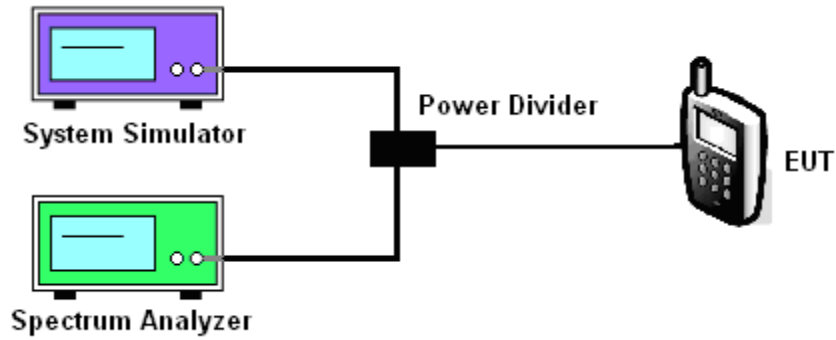
11.2 Measuring Instruments

See list of measuring instruments of this test report.

11.3 Test Procedures

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

11.4 Test Setup



MODES TESTED

- ☐ LTE Band 2
- LTE Band 4
- LTE Band 5
- LTE Band 12
- LTE Band 13
- LTE Band 14
- LTE Band 66
- LTE Band 71

Test data reference attachment.

----END OF REPORT----