

FCC eCFR 47 PART 22H, 24E, 27L CERTIFICATION TEST REPORT FCC ID: 2AX5VHUB2PLNA2

Product: Security control panel

Trade Mark: AJAX

Model No.: HP2J0002NA

Family Model: N/A

Report No.: S24030403702004

Issue Date: Jun 06, 2024

Prepared for

AJAX SYSTEMS CYPRUS HOLDINGS LTD

Ifigeneias, 17, Strovolos, 2007, Nicosia, Cyprus

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name : AJAX SYSTEMS CYPRUS HOLDINGS LTD
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Manufacturer's Name..... : "AJAX SYSTEMS MANUFACTURING" LIMITED LIABILITY COMPANY
Address..... : Sklyarenka, 5, Kyiv, 04073, Ukraine
Factory (1)..... : "AJAX SYSTEMS MANUFACTURING" LIMITED LIABILITY COMPANY
Address..... : Sklyarenka, 5, Kyiv, 04073, Ukraine
Factory (2)..... : "AJAX TURKEY ELEKTRONİK TİCARET" ANONİM ŞİRKETİ
Address..... : Aydınlı Sb Mah. 4.Sk. Desbaş 6 Blok No: 4 İc Kapi No: Z01 Tuzla / Istanbul
Product name..... : Security control panel
Model and/or type reference .. : HP2J0002NA
Family Model..... : N/A
Test Sample Number : S240304037003
Date of Test..... : Mar 13, 2024 ~ Jun 06, 2024
Standards..... : FCC eCFR 47 Part 22H, Part 24E, Part 27L
Test procedure ANSI C63.26:2015

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

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1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	Security control panel
Trade Mark	
Model Name	HP2J0002NA
Family Model	N/A
Model Difference	N/A
FCC ID:	2AX5VHUB2PLNA2
Frequency Bands:	U.S. Bands: <input checked="" type="checkbox"/> LTE FDD Band 2,4,5,7 LTE TDD Band 40
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 TDD Band 40 Uplink& Downlink: 2300MHz-2400MHz,
Type of Modulation:	QPSK/16QAM/64QAM(Only Downlink)
Power Class	Class 3
Antenna:	Flexible Multiband antenna
Antenna gain:	3 dBi
Adapter	N/A
Battery	DC 3.7V, 3000mAh
Power Rating	DC 3.7V from battery or or AC 110-240V, 50/60 Hz
Extreme Vol. Limits:	DC 3.15V to DC 4.26V (Nominal DC 3.7V) (Note 1)
HW Version	HB3.001.MBR.001v9 HB2.001.PWB.001v4 HB2.002.ANT.002v3 HB2.002.ANT.001v3 HB2.002.ANT.002v4
FW Version	N/A
SW Version	N/A
** Note1: The High Voltage DC 4.26V and Low Voltage 3.15V 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: 2AX5VHUB2PLNA2** filing to comply with the FCC Part 22H&24E&27L.

1.3 TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, Part 22H, Part 24E, Part 27L,ANSI C63.26:2015.

1.4 TEST FACILITY

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

ShenZhen NTEK Testing Technology Co., Ltd.

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

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

FCC Registration No.:463705

IC Registration No.:9270A-1,

CNAS Registration No.:L5516

MEASUREMENT UNCERTAINTY

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

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

1.5 SPECIAL ACCESSORIES

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

1.6 WORST-CASE CONFIGURATION AND MODE

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

The device has LTE Bands of: Band 2/4/5/7/40

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

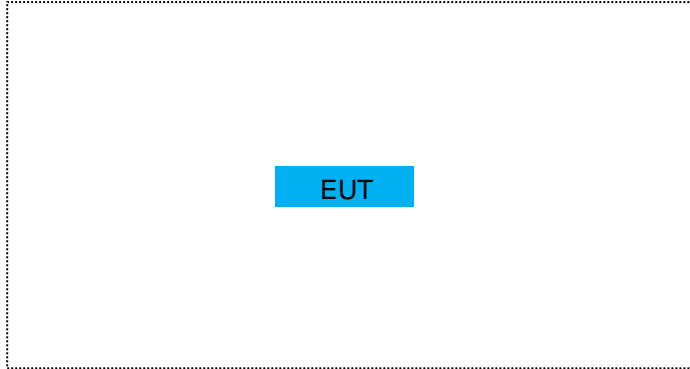
Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Note
1	Security control panel	HP2J0002NA	FCC ID: 2AX5VHUB2PLNA2	EUT

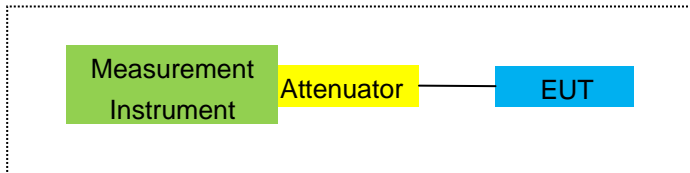
*Note: All the accessories have been used during the test.
the following “EUT” in setup diagram means EUT system.*

2.4 TEST SETUP

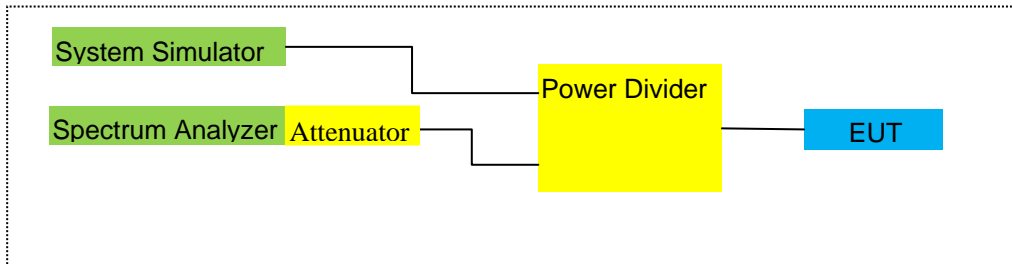
For Radiated Test Cases



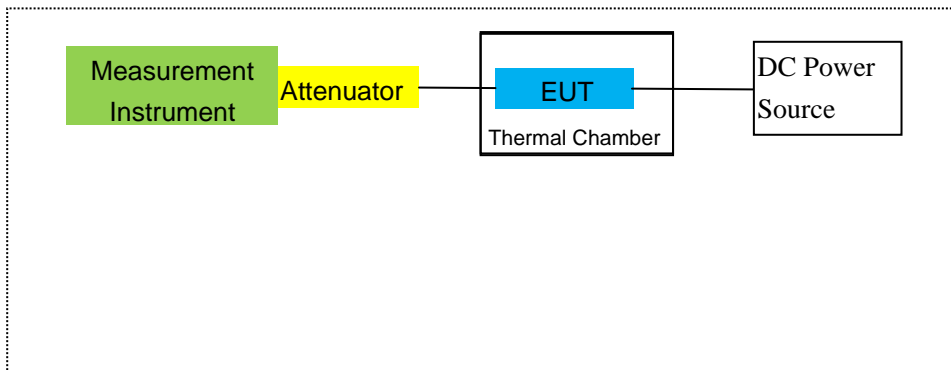
For Conducted Output Power



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



For Frequency Stability



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

3. TEST AND MEASUREMENT EQUIPMENT

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

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	MXA Signal Analyzer	Agilent	N9020A	MY49100060	2023.05.29 2024.04.26	2024.05.28 2025.04.25	1 year
2	Test Receiver	R&S	ESPI	101318	2024.03.12	2025.03.11	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2024.03.11	2025.03.10	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2023.05.06	2026.05.05	3 year
5	Broadband Horn Antenna	SCHWARZBECK	BBHA 9120 D	2816	2023.01.12	2026.01.11	3 year
6	Broadband Horn Antenna	SCHWARZBECK	BBHA 9120 D	2817	2023.01.12	2026.01.11	3 year
7	Amplifier	EM	EM-30180	060538	2023.05.29 2024.04.25	2024.05.28 2025.04.24	1 year
8	Loop Antenna	ARA	PLA-1030/B	1029	2023.11.03	2026.11.02	3 year
9	Power Meter	R&S	NRVS	100696	2023.05.29 2024.04.25	2024.05.28 2025.04.24	1 year
10	Power Sensor	R&S	URV5-Z4	0395.1619.05	2023.05.29 2024.04.25	2024.05.28 2025.04.24	1 year
11	Test Cable	N/A	R-01	N/A	2022.06.17	2025.06.16	3 year
12	Test Cable	N/A	R-02	N/A	2022.06.17	2025.06.16	3 year
13	Test Cable	N/A	R-03	N/A	2022.06.17	2025.06.16	3 year
14	Test Receiver	R&S	ESCI	101160	2024.03.12	2025.03.11	1 year
15	LISN	R&S	ENV216	101313	2024.03.12	2025.03.11	1 year
16	LISN	EMCO	3816/2	00042990	2024.03.12	2025.03.11	1 year
17	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2023.05.06	2026.05.05	3 year
18	Passive Voltage Probe	R&S	ESH2-Z3	100196	2024.03.12	2025.03.11	1 year
19	Test Cable	N/A	C01	N/A	2023.05.06	2026.05.05	3 year
20	Test Cable	N/A	C02	N/A	2023.05.06	2026.05.05	3 year
21	Test Cable	N/A	C03	N/A	2023.05.06	2026.05.05	3 year
22	Spectrum Analyzer	agilent	e4440a	us44300399	2024.03.12	2025.03.11	1 year
23	test receiver	R&S	ESCI	a0304218	2024.03.12	2025.03.11	1 year
24	Communication	R&S	CMU200	A0304247	2023.05.29	2024.05.28	1 year

	Tester				2024.04.26	2025.04.25	
25	Thermal Chamber	Ten Billion	TTC-B3C	TBN-960502	2024.03.12	2025.03.11	1 year
26	DC Power Source	N/A	PS-6005D	2017040292 3	2023.05.06	2026.05.05	3 year
27	Log-Periodic Antenna	SCHWARZBE CK	VULB 9162	584	2023.12.29	2024.12.28	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	13	10	Table 6.2.4-2	Table 6.2.4-2
	6.6.3.3.2				
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 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

Band 2/4/5/7/40

RESULTS

PASS

Test data reference attachment.

6. BANDEDGE AND EMISSION MASK

RULE PART(S)

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

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;

TEST PROCEDURE

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

For each band edge measurement:

Set the spectrum analyzer span to include the block edge frequency

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

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

MODES TESTED

Band 2/4/5/7/40

RESULTS

Test data reference attachment.

7. OUT OF BAND EMISSIONS

RULE PART(S)

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

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

TEST PROCEDURE

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

For each out of band emissions measurement:

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

MODES TESTED

Band 2/4/5/7/40

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

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.

24.232(c) The maximum output power of the transmitter for mobile and portable stations are limited to 2 watts EIRP.

TEST PROCEDURE

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

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

MODES TESTED

Band 2/4/5/7/40

RESULTS

Pass

8.2 LTE BAND 2

Radiated Power (EIRP) for Band 2									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	1/#Mid	1850.7	1.38	3.76	28.24	25.86	385.478	Horizontal	Pass
		1880	1.63	3.91	28.22	25.94	392.645	Horizontal	Pass
		1909.3	1.51	3.93	28.20	25.78	378.443	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	1851.5	1.31	3.77	28.23	25.77	377.572	Horizontal	Pass
		1880	0.89	3.91	28.24	25.22	332.660	Horizontal	Pass
		1908.5	0.94	3.94	28.25	25.25	334.965	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	1852.5	1.26	3.77	28.31	25.80	380.189	Horizontal	Pass
		1880	1.12	3.91	28.22	25.43	349.140	Horizontal	Pass
		1907.5	1.01	3.94	28.20	25.27	336.512	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	1855	1.61	3.79	28.33	26.15	412.098	Horizontal	Pass
		1880	1.17	3.95	28.22	25.44	349.945	Horizontal	Pass
		1905	0.91	3.97	28.19	25.13	325.837	Horizontal	Pass
1.4MHz Band QPSK	1/#Mid	1850.7	1.49	3.76	28.24	25.97	395.367	Vertical	Pass
		1880	1.14	3.91	28.22	25.45	350.752	Vertical	Pass
		1909.3	0.75	3.93	28.20	25.02	317.687	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	1851.5	0.55	3.77	28.23	25.01	316.957	Vertical	Pass
		1880	1.48	3.91	28.24	25.81	381.066	Vertical	Pass
		1908.5	1.07	3.94	28.25	25.38	345.144	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	1852.5	0.68	3.77	28.31	25.22	332.660	Vertical	Pass
		1880	1.56	3.91	28.22	25.87	386.367	Vertical	Pass
		1907.5	1.04	3.94	28.20	25.30	338.844	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	1855	0.97	3.79	28.33	25.51	355.631	Vertical	Pass
		1880	1.47	3.95	28.22	25.74	374.973	Vertical	Pass
		1905	1.50	3.97	28.19	25.72	373.250	Vertical	Pass

Radiated Power (EIRP) for Band 2									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band 16 QAM	1/#Mid	1850.7	1.29	3.76	28.24	25.77	377.572	Horizontal	Pass
		1880	1.40	3.91	28.22	25.71	372.392	Horizontal	Pass
		1909.3	1.69	3.93	28.20	25.96	394.457	Horizontal	Pass
3.0MHz Band 16 QAM	1/#Mid	1851.5	0.94	3.77	28.23	25.40	346.737	Horizontal	Pass
		1880	0.90	3.91	28.24	25.23	333.426	Horizontal	Pass
		1908.5	1.11	3.94	28.25	25.42	348.337	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	1852.5	1.08	3.77	28.31	25.62	364.754	Horizontal	Pass
		1880	0.78	3.91	28.22	25.09	322.849	Horizontal	Pass
		1907.5	0.83	3.94	28.20	25.09	322.849	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	1855	1.18	3.79	28.33	25.72	373.250	Horizontal	Pass
		1880	0.98	3.95	28.22	25.25	334.965	Horizontal	Pass
		1905	1.73	3.97	28.19	25.95	393.550	Horizontal	Pass
1.4MHz Band 16 QAM	1/#Mid	1850.7	-0.39	3.76	28.24	24.09	256.448	Vertical	Pass
		1880	0.17	3.91	28.22	24.48	280.543	Vertical	Pass
		1909.3	0.11	3.93	28.20	24.38	274.157	Vertical	Pass
3.0MHz Band 16 QAM	1/#Mid	1851.5	0.10	3.77	28.23	24.56	285.759	Vertical	Pass
		1880	0.44	3.91	28.24	24.77	299.916	Vertical	Pass
		1908.5	0.48	3.94	28.25	24.79	301.301	Vertical	Pass
5.0MHz Band 16 QAM	1/#Mid	1852.5	0.12	3.77	28.31	24.66	292.415	Vertical	Pass
		1880	-0.21	3.91	28.22	24.10	257.040	Vertical	Pass
		1907.5	0.60	3.94	28.20	24.86	306.196	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	1855	-0.48	3.79	28.33	24.06	254.683	Vertical	Pass
		1880	0.41	3.95	28.22	24.68	293.765	Vertical	Pass
		1905	0.60	3.97	28.19	24.82	303.389	Vertical	Pass

Note:

SG Level= Signal generator output

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

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

8.3 LTE BAND 4

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	1/#Mid	1710.7	1.68	3.12	27.58	26.14	411.150	Horizontal	Pass
		1732.5	2.00	3.27	27.61	26.34	430.527	Horizontal	Pass
		1754.3	1.98	3.29	27.63	26.32	428.549	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	1711.5	1.76	3.13	27.61	26.24	420.727	Horizontal	Pass
		1732.5	1.76	3.27	27.61	26.10	407.380	Horizontal	Pass
		1753.5	1.99	3.30	27.62	26.31	427.563	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	1712.5	1.77	3.13	27.63	26.27	423.643	Horizontal	Pass
		1732.5	1.66	3.27	27.61	26.00	398.107	Horizontal	Pass
		1752.5	1.71	3.30	27.60	26.01	399.025	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	1715	1.76	3.15	27.64	26.25	421.697	Horizontal	Pass
		1732.5	1.73	3.31	27.61	26.03	400.867	Horizontal	Pass
		1750	1.78	3.33	27.59	26.04	401.791	Horizontal	Pass
1.4MHz Band QPSK	1/#Mid	1710.7	1.39	3.12	27.58	25.85	384.592	Vertical	Pass
		1732.5	1.62	3.27	27.61	25.96	394.457	Vertical	Pass
		1754.3	1.31	3.29	27.63	25.65	367.282	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	1711.5	1.24	3.13	27.61	25.72	373.250	Vertical	Pass
		1732.5	1.14	3.27	27.61	25.48	353.183	Vertical	Pass
		1753.5	1.55	3.30	27.62	25.87	386.367	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	1712.5	0.52	3.13	27.63	25.02	317.687	Vertical	Pass
		1732.5	0.74	3.27	27.61	25.08	322.107	Vertical	Pass
		1752.5	1.69	3.30	27.60	25.99	397.192	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	1715	1.49	3.15	27.64	25.98	396.278	Vertical	Pass
		1732.5	1.11	3.31	27.61	25.41	347.536	Vertical	Pass
		1750	0.92	3.33	27.59	25.18	329.610	Vertical	Pass

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band 16 QAM	1/#Mid	1710.7	0.88	3.12	27.58	25.34	341.979	Horizontal	Pass
		1732.5	1.07	3.27	27.61	25.41	347.536	Horizontal	Pass
		1754.3	0.48	3.29	27.63	24.82	303.389	Horizontal	Pass
3.0MHz Band 16 QAM	1/#Mid	1711.5	1.16	3.13	27.61	25.64	366.438	Horizontal	Pass
		1732.5	0.97	3.27	27.61	25.31	339.625	Horizontal	Pass
		1753.5	0.69	3.30	27.62	25.01	316.957	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	1712.5	0.55	3.13	27.63	25.05	319.890	Horizontal	Pass
		1732.5	0.81	3.27	27.61	25.15	327.341	Horizontal	Pass
		1752.5	0.22	3.30	27.60	24.52	283.139	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	1715	1.37	3.15	27.64	25.86	385.478	Horizontal	Pass
		1732.5	0.40	3.31	27.61	24.70	295.121	Horizontal	Pass
		1750	0.77	3.33	27.59	25.03	318.420	Horizontal	Pass
1.4MHz Band 16 QAM	1/#Mid	1710.7	0.48	3.12	27.58	24.94	311.889	Vertical	Pass
		1732.5	0.32	3.27	27.61	24.66	292.415	Vertical	Pass
		1754.3	-0.23	3.29	27.63	24.11	257.632	Vertical	Pass
3.0MHz Band 16 QAM	1/#Mid	1711.5	-0.40	3.13	27.61	24.08	255.859	Vertical	Pass
		1732.5	0.47	3.27	27.61	24.81	302.691	Vertical	Pass
		1753.5	0.51	3.30	27.62	24.83	304.089	Vertical	Pass
5.0MHz Band 16 QAM	1/#Mid	1712.5	0.22	3.13	27.63	24.72	296.483	Vertical	Pass
		1732.5	0.60	3.27	27.61	24.94	311.889	Vertical	Pass
		1752.5	0.40	3.30	27.60	24.70	295.121	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	1715	-0.43	3.15	27.64	24.06	254.683	Vertical	Pass
		1732.5	0.38	3.31	27.61	24.68	293.765	Vertical	Pass
		1750	0.67	3.33	27.59	24.93	311.172	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 (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Correction (dB)	Max. ERP Average (dBm)	Max. ERP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	1/#Mid	824.7	10.74	2.01	19.68	2.15	26.26	422.669	Horizontal	Pass
		836.5	10.79	2.01	19.77	2.15	26.40	436.516	Horizontal	Pass
		848.3	10.75	2.02	19.82	2.15	26.40	436.516	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	825.5	10.91	2.01	19.70	2.15	26.45	441.570	Horizontal	Pass
		836.5	10.53	2.01	19.77	2.15	26.14	411.150	Horizontal	Pass
		847.5	10.62	2.02	19.81	2.15	26.26	422.669	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	826.5	11.08	2.01	19.71	2.15	26.63	460.257	Horizontal	Pass
		836.5	10.75	2.01	19.77	2.15	26.36	432.514	Horizontal	Pass
		846.5	10.72	2.02	19.79	2.15	26.34	430.527	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	829	11.06	2.01	19.73	2.15	26.63	460.257	Horizontal	Pass
		836.5	10.49	2.01	19.77	2.15	26.10	407.380	Horizontal	Pass
		844	10.71	2.02	19.78	2.15	26.32	428.549	Horizontal	Pass
1.4MHz Band QPSK	1/#Mid	824.7	10.40	2.01	19.68	2.15	25.92	390.841	Vertical	Pass
		836.5	9.92	2.01	19.77	2.15	25.53	357.273	Vertical	Pass
		848.3	9.44	2.02	19.82	2.15	25.09	322.849	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	825.5	10.26	2.01	19.70	2.15	25.80	380.189	Vertical	Pass
		836.5	9.79	2.01	19.77	2.15	25.40	346.737	Vertical	Pass
		847.5	9.99	2.02	19.81	2.15	25.63	365.595	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	826.5	9.68	2.01	19.71	2.15	25.23	333.426	Vertical	Pass
		836.5	9.64	2.01	19.77	2.15	25.25	334.965	Vertical	Pass
		846.5	9.49	2.02	19.79	2.15	25.11	324.340	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	829	9.51	2.01	19.73	2.15	25.08	322.107	Vertical	Pass
		836.5	10.34	2.01	19.77	2.15	25.95	393.550	Vertical	Pass
		844	10.34	2.02	19.78	2.15	25.95	393.550	Vertical	Pass

Radiated Power (ERP) for Band 5										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Correction (dB)	Max. ERP Average (dBm)	Max. ERP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band 16 QAM	1/#Mid	824.7	9.84	2.01	19.68	2.15	25.36	343.558	Horizontal	Pass
		836.5	10.18	2.01	19.77	2.15	25.79	379.315	Horizontal	Pass
		848.3	9.13	2.02	19.82	2.15	24.78	300.608	Horizontal	Pass
3.0MHz Band 16 QAM	1/#Mid	825.5	10.43	2.01	19.70	2.15	25.97	395.367	Horizontal	Pass
		836.5	9.52	2.01	19.77	2.15	25.13	325.837	Horizontal	Pass
		847.5	9.51	2.02	19.81	2.15	25.15	327.341	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	826.5	9.86	2.01	19.71	2.15	25.41	347.536	Horizontal	Pass
		836.5	9.05	2.01	19.77	2.15	24.66	292.415	Horizontal	Pass
		846.5	9.59	2.02	19.79	2.15	25.21	331.894	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	829	10.92	2.01	19.73	2.15	26.49	445.656	Horizontal	Pass
		836.5	9.29	2.01	19.77	2.15	24.90	309.030	Horizontal	Pass
		844	9.74	2.02	19.78	2.15	25.35	342.768	Horizontal	Pass
1.4MHz Band 16 QAM	1/#Mid	824.7	8.96	2.01	19.68	2.15	24.48	280.543	Vertical	Pass
		836.5	8.80	2.01	19.77	2.15	24.41	276.058	Vertical	Pass
		848.3	8.35	2.02	19.82	2.15	24.00	251.189	Vertical	Pass
3.0MHz Band 16 QAM	1/#Mid	825.5	9.08	2.01	19.70	2.15	24.62	289.734	Vertical	Pass
		836.5	9.16	2.01	19.77	2.15	24.77	299.916	Vertical	Pass
		847.5	9.73	2.02	19.81	2.15	25.37	344.350	Vertical	Pass
5.0MHz Band 16 QAM	1/#Mid	826.5	9.07	2.01	19.71	2.15	24.62	289.734	Vertical	Pass
		836.5	10.06	2.01	19.77	2.15	25.67	368.978	Vertical	Pass
		846.5	8.41	2.02	19.79	2.15	24.03	252.930	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	829	9.14	2.01	19.73	2.15	24.71	295.801	Vertical	Pass
		836.5	8.68	2.01	19.77	2.15	24.29	268.534	Vertical	Pass
		844	9.33	2.02	19.78	2.15	24.94	311.889	Vertical	Pass

Note:

SG Level= Signal generator output

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

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

8.5 LTE BAND 7

Radiated Power (EIRP) for Band 7									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
5.0MHz Band QPSK	1/#Mid	2502.5	3.14	4.54	27.75	26.35	431.519	Horizontal	Pass
		2535	3.19	4.69	27.72	26.22	418.794	Horizontal	Pass
		2567.5	3.27	4.71	27.71	26.27	423.643	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	2505	3.36	4.55	27.76	26.57	453.942	Horizontal	Pass
		2535	3.05	4.69	27.72	26.08	405.509	Horizontal	Pass
		2565	3.27	4.72	27.70	26.25	421.697	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	2502.5	2.44	4.54	27.75	25.65	367.282	Vertical	Pass
		2535	2.53	4.69	27.72	25.56	359.749	Vertical	Pass
		2567.5	2.19	4.71	27.71	25.19	330.370	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	2505	2.74	4.55	27.76	25.95	393.550	Vertical	Pass
		2535	2.29	4.69	27.72	25.32	340.408	Vertical	Pass
		2565	2.84	4.72	27.70	25.82	381.944	Vertical	Pass

Radiated Power (EIRP) for Band 7									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level	Cable Loss	Antenna Gain	Max. EIRP	Max. EIRP	Polarization Of Max. ERP	
			(dBm)	(dBm)	(dB)	Average	Average		
						(dBm)	(mW)		
5.0MHz Band 16 QAM	1/#Mid	2502.5	2.12	4.54	27.75	25.33	341.193	Horizontal	Pass
		2535	2.35	4.69	27.72	25.38	345.144	Horizontal	Pass
		2567.5	2.19	4.71	27.71	25.19	330.370	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	2505	1.80	4.55	27.76	25.01	316.957	Horizontal	Pass
		2535	2.71	4.69	27.72	25.74	374.973	Horizontal	Pass
		2565	1.83	4.72	27.70	24.81	302.691	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	2502.5	1.75	4.54	27.75	24.96	313.329	Vertical	Pass
		2535	1.02	4.69	27.72	24.05	254.097	Vertical	Pass
		2567.5	2.47	4.71	27.71	25.47	352.371	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	2505	1.70	4.55	27.76	24.91	309.742	Vertical	Pass
		2535	1.86	4.69	27.72	24.89	308.319	Vertical	Pass
		2565	1.38	4.72	27.70	24.36	272.898	Vertical	Pass

Note:

SG Level= Signal generator output

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

8.9 LTE BAND 40

Radiated Power (EIRP) for Band 40A (2305-2315MHz)									
Mode	RB/RB SIZE	Frequency	Result					Polarization Of Max. ERP	Conclusion
			SG Level	Cable Loss	Antenna Gain	Max. EIRP	Max. EIRP		
			(dBm)	(dBm)	(dB)	Average (dBm)	Average (mW)		
5.0MHz Band QPSK	25/0	2307.5	21.37	4.95	9.00	25.42	348.34	Horizontal	Pass
		2310	21.39	5.02	9.00	25.37	344.35	Horizontal	Pass
		2312.5	21.79	4.97	9.00	25.82	381.94	Horizontal	Pass
10.0MHz Band QPSK	50/0	2310	21.41	5	9.00	25.41	347.54	Horizontal	Pass
5.0MHz Band QPSK	25/0	2307.5	20.38	4.95	9.00	24.43	277.11	Vertical	Pass
		2310	20.90	5.02	9.00	24.88	307.61	Vertical	Pass
		2312.5	20.15	4.97	9.00	24.18	261.98	Vertical	Pass
10.0MHz Band QPSK	50/0	2310	20.45	4.75	9.00	24.70	294.81	Vertical	Pass

Radiated Power (EIRP) for Band 40 A(2305-2315MHz)									
Mode	RB/RB SIZE	Frequency	Result					Polarization Of Max. ERP	Conclusion
			SG Level	Cable Loss	Antenna Gain	Max. EIRP	Max. EIRP		
			(dBm)	(dBm)	(dB)	Average	Average		
					(dBm)	(mW)			
5.0MHz Band 16QAM	25/0	2307.5	19.79	4.95	9.00	23.84	242.10	Horizontal	Pass
		2310	20.01	5.02	9.00	23.99	250.61	Horizontal	Pass
		2312.5	20.07	4.97	9.00	24.1	257.04	Horizontal	Pass
10.0MHz Band 16QAM	50/0	2310	20.85	5	9.00	24.85	305.49	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	2307.5	18.87	4.95	9.00	22.92	195.88	Vertical	Pass
		2310	19.15	5.02	9.00	23.13	205.59	Vertical	Pass
		2312.5	18.32	4.97	9.00	22.35	171.79	Vertical	Pass
10.0MHz Band 16QAM	50/0	2310	19.17	4.75	9.00	23.42	219.79	Vertical	Pass

Radiated Power (EIRP) for Band 40B(2350-2360MHz)									
Mode	RB/RB SIZE	Frequency	Result					Polarization Of Max. ERP	Conclusion
			SG Level	Cable Loss	Antenna Gain	Max. EIRP	Max. EIRP		
			(dBm)	(dBm)	(dB)	Average (dBm)	Average (mW)		
5.0MHz Band QPSK	25/0	2352.5	21.43	4.92	9.00	25.51	355.63	Horizontal	Pass
		2355	21.09	4.95	9.00	25.14	326.59	Horizontal	Pass
		2357.5	21.17	4.81	9.00	25.36	343.56	Horizontal	Pass
10.0MHz Band QPSK	50/0	2355	21.20	4.86	9.00	25.34	341.98	Horizontal	Pass
5.0MHz Band QPSK	25/0	2352.5	20.22	4.92	9.00	24.3	269.15	Vertical	Pass
		2355	20.67	4.95	9.00	24.72	296.48	Vertical	Pass
		2357.5	21.03	4.81	9.00	25.22	332.66	Vertical	Pass
10.0MHz Band QPSK	50/0	2355	20.97	4.86	9.00	25.11	324.34	Vertical	Pass

Radiated Power (EIRP) for Band 40(2350-2360MHz)									
Mode	RB/RB SIZE	Frequency	Result					Polarization Of Max. ERP	Conclusion
			SG Level	Cable Loss	Antenna Gain	Max. EIRP	Max. EIRP		
			(dBm)	(dBm)	(dB)	Average (dBm)	Average (mW)		
5.0MHz Band 16 QAM	25/0	2352.5	20.05	4.92	9.00	24.13	258.82	Vertical	Pass
		2355	19.99	4.95	9.00	24.04	253.51	Vertical	Pass
		2357.5	19.67	4.81	9.00	23.86	243.22	Vertical	Pass
10.0MHz Band 16 QAM	50/0	2355	20.67	4.86	9.00	24.81	302.69	Vertical	Pass
5.0MHz Band 16 QAM	25/0	2352.5	19.48	4.92	9.00	23.56	226.99	Horizontal	Pass
		2355	19.12	4.95	9.00	23.17	207.49	Horizontal	Pass
		2357.5	19.03	4.81	9.00	23.22	209.89	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	2355	19.96	4.86	9.00	24.1	257.04	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)

9. SPURIOUS RADIATION EMISSION

RULE PART(S)

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

LIMIT

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

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

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

TEST PROCEDURE

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

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

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

MHz or 1% of the occupied bandwidth as applicable.

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

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

MODES TESTED

LTE Band 2/4/5/7/40

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	-52.11	4.04	33.51	-22.64	-13	-9.64	Horizontal
3701.4	-50.76	4.04	33.51	-21.29	-13	-8.29	Vertical
5552.1	-51.35	5.24	35.84	-20.75	-13	-7.75	Vertical
5552.1	-53.23	5.24	35.84	-22.63	-13	-9.63	Horizontal
183.8	-39.08	1.43	16.02	-24.49	-13	-11.49	Vertical
323.6	-41.38	1.30	17.99	-24.69	-13	-11.69	Horizontal
Test Results for Mid Channel 1880MHz							
3760.0	-49.74	4.04	33.56	-20.22	-13	-7.22	Horizontal
3760.0	-51.84	4.04	33.56	-22.32	-13	-9.32	Vertical
5640.0	-51.91	5.24	35.91	-21.24	-13	-8.24	Vertical
5640.0	-49.63	5.24	35.91	-18.96	-13	-5.96	Horizontal
182.9	-40.56	1.62	16.97	-25.21	-13	-12.21	Vertical
264.9	-40.35	1.74	15.98	-26.12	-13	-13.12	Horizontal
Test Results for High Channel 1909.3MHz							
3818.6	-46.39	4.04	34.00	-16.43	-13	-3.43	Horizontal
3818.6	-44.30	4.04	34.00	-14.34	-13	-1.34	Vertical
5727.9	-53.14	5.24	36.04	-22.34	-13	-9.34	Vertical
5727.9	-50.20	5.24	36.04	-19.40	-13	-6.40	Horizontal
177.7	-41.66	1.42	17.29	-25.79	-13	-12.79	Vertical
232.4	-34.87	1.50	17.90	-18.46	-13	-5.46	Horizontal

QPSK EIRP POWER FOR LTE BAND 2 (10.0MHZ BANDWIDTH)

Test Results for Low Channel 1855MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3710.0	-51.44	4.07	33.54	-21.97	-13	-8.97	Horizontal
3710.0	-49.79	4.07	33.54	-20.32	-13	-7.32	Vertical
5565.0	-44.31	5.28	35.86	-13.73	-13	-0.73	Vertical
5565.0	-52.32	5.28	35.86	-21.74	-13	-8.74	Horizontal
212.1	-38.36	1.58	16.89	-23.04	-13	-10.04	Vertical
352.6	-39.15	1.76	17.26	-23.65	-13	-10.65	Horizontal
Test Results for Mid Channel 1880MHz							
3760.0	-51.93	4.04	33.56	-22.41	-13	-9.41	Horizontal
3760.0	-52.27	4.04	33.56	-22.75	-13	-9.75	Vertical
5640.0	-51.14	5.24	35.91	-20.47	-13	-7.47	Vertical
5640.0	-49.91	5.24	35.91	-19.24	-13	-6.24	Horizontal
179.2	-40.61	1.46	16.27	-25.80	-13	-12.80	Vertical
262.3	-36.00	1.59	15.15	-22.44	-13	-9.44	Horizontal
Test Results for High Channel 1905MHz							
3810	-53.21	4.04	34.00	-23.25	-13	-10.25	Horizontal
3810	-44.19	4.04	34.00	-14.23	-13	-1.23	Vertical
5715	-46.81	5.24	36.04	-16.01	-13	-3.01	Vertical
5715	-49.58	5.24	36.04	-18.78	-13	-5.78	Horizontal
177.9	-42.93	1.36	17.39	-26.89	-13	-13.89	Vertical
312.8	-34.05	1.66	15.39	-20.32	-13	-7.32	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.

9.2 LTE BAND 4

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

Test Results for Low Channel 1710.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3421.4	-48.50	4.02	29.80	-22.72	-13	-9.72	Horizontal
3421.4	-44.78	4.02	29.80	-19.00	-13	-6.00	Vertical
5132.1	-53.58	5.24	35.84	-22.98	-13	-9.98	Vertical
5132.1	-52.87	5.24	35.84	-22.27	-13	-9.27	Horizontal
190.0	-40.44	1.68	16.04	-26.08	-13	-13.08	Vertical
298.6	-35.74	1.78	17.74	-19.78	-13	-6.78	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-51.23	4.03	30.00	-25.26	-13	-12.26	Horizontal
3465.0	-51.06	4.03	30.00	-25.09	-13	-12.09	Vertical
5197.5	-49.39	5.25	35.86	-18.78	-13	-5.78	Vertical
5197.5	-49.37	5.25	35.86	-18.76	-13	-5.76	Horizontal
188.5	-41.81	1.72	17.69	-25.84	-13	-12.84	Vertical
365.8	-41.83	1.62	16.02	-27.42	-13	-14.42	Horizontal
Test Results for High Channel 1754.3MHz							
3508.6	-50.19	4.05	30.01	-24.23	-13	-11.23	Horizontal
3508.6	-44.11	4.05	30.01	-18.15	-13	-5.15	Vertical
5262.9	-50.64	5.26	35.86	-20.04	-13	-7.04	Vertical
5262.9	-49.89	5.26	35.86	-19.29	-13	-6.29	Horizontal
204.7	-43.41	1.80	16.69	-28.52	-13	-15.52	Vertical
453.9	-38.68	1.75	16.66	-23.78	-13	-10.78	Horizontal

QPSK EIRP POWER FOR LTE BAND 4 (10.0MHZ BANDWIDTH)

Test Results for Low Channel 1715MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3430	-51.52	4.02	29.80	-25.74	-13	-12.74	Horizontal
3430	-48.07	4.02	29.80	-22.29	-13	-9.29	Vertical
5145	-47.94	5.24	35.84	-17.34	-13	-4.34	Vertical
5145	-53.42	5.24	35.84	-22.82	-13	-9.82	Horizontal
197.4	-36.80	1.57	17.26	-21.11	-13	-8.11	Vertical
285.3	-35.62	1.78	16.35	-21.05	-13	-8.05	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-48.57	4.03	30.00	-22.60	-13	-9.60	Horizontal
3465.0	-51.84	4.03	30.00	-25.87	-13	-12.87	Vertical
5197.5	-52.13	5.25	35.86	-21.52	-13	-8.52	Vertical
5197.5	-53.11	5.25	35.86	-22.50	-13	-9.50	Horizontal
209.1	-37.73	1.44	17.95	-21.22	-13	-8.22	Vertical
356.2	-35.37	1.65	16.09	-20.93	-13	-7.93	Horizontal
Test Results for High Channel 1750MHz							
3500	-47.25	2.91	27.68	-22.48	-13	-9.48	Horizontal
3500	-47.52	2.91	27.68	-22.75	-13	-9.75	Vertical
5250	-46.28	5.26	35.86	-15.68	-13	-2.68	Vertical
5250	-50.71	5.26	35.86	-20.11	-13	-7.11	Horizontal
175.7	-41.71	1.61	16.85	-26.47	-13	-13.47	Vertical
354.1	-39.77	1.61	15.19	-26.19	-13	-13.19	Horizontal

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

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

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

9.3 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	-46.67	2.78	27.50	-21.95	-13	-8.95	Horizontal
1649.4	-49.30	2.78	27.50	-24.58	-13	-11.58	Vertical
2474.1	-50.86	2.90	27.80	-25.96	-13	-12.96	Vertical
2474.1	-52.66	2.90	27.80	-27.76	-13	-14.76	Horizontal
207.6	-37.75	1.76	17.59	-21.92	-13	-8.92	Vertical
282.0	-44.74	1.63	15.87	-30.50	-13	-17.50	Horizontal
Test Results For Mid Channel 836.5MHz							
1673.0	-52.69	2.80	27.48	-28.01	-13	-15.01	Horizontal
1673.0	-45.50	2.80	27.48	-20.82	-13	-7.82	Vertical
2509.5	-44.71	2.91	27.70	-19.92	-13	-6.92	Vertical
2509.5	-49.21	2.91	27.70	-24.42	-13	-11.42	Horizontal
175.2	-44.68	1.61	15.68	-30.61	-13	-17.61	Vertical
453.5	-41.69	1.59	17.52	-25.77	-13	-12.77	Horizontal
Test Results for High Channel 848.3MHz							
1696.6	-44.78	2.82	27.43	-20.17	-13	-7.17	Horizontal
1696.6	-46.63	2.82	27.43	-22.02	-13	-9.02	Vertical
2544.9	-52.52	2.92	27.74	-27.70	-13	-14.70	Vertical
2544.9	-51.54	2.92	27.74	-26.72	-13	-13.72	Horizontal
204.1	-34.12	1.69	16.67	-19.13	-13	-6.13	Vertical
466.5	-34.99	1.70	17.18	-19.51	-13	-6.51	Horizontal

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

Test Results for Low Channel 829MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1658.0	-49.91	2.78	27.50	-25.19	-13	-12.19	Horizontal
1658.0	-51.39	2.78	27.50	-26.67	-13	-13.67	Vertical
2487.0	-49.79	2.90	27.80	-24.89	-13	-11.89	Vertical
2487.0	-53.37	2.90	27.80	-28.47	-13	-15.47	Horizontal
207.3	-38.39	1.71	15.57	-24.53	-13	-11.53	Vertical
377.9	-40.03	1.34	16.40	-24.97	-13	-11.97	Horizontal
Test Results for Mid Channel 836.5MHz							
1673.0	-53.83	2.80	27.48	-29.15	-13	-16.15	Horizontal
1673.0	-47.67	2.80	27.48	-22.99	-13	-9.99	Vertical
2509.5	-47.29	2.91	27.70	-22.50	-13	-9.50	Vertical
2509.5	-51.49	2.91	27.70	-26.70	-13	-13.70	Horizontal
202.9	-38.32	1.44	17.04	-22.72	-13	-9.72	Vertical
458.9	-36.72	1.76	17.62	-20.86	-13	-7.86	Horizontal
Test Results for High Channel 844MHz							
1688.0	-48.21	2.82	27.43	-23.60	-13	-10.60	Horizontal
1688.0	-51.28	2.82	27.43	-26.67	-13	-13.67	Vertical
2532.0	-47.47	2.92	27.74	-22.65	-13	-9.65	Vertical
2532.0	-53.92	2.92	27.74	-29.10	-13	-16.10	Horizontal
180.1	-35.74	1.74	17.70	-19.78	-13	-6.78	Vertical
347.8	-36.73	1.41	17.46	-20.67	-13	-7.67	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 7

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

Test Results for Low Channel 2502.5MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Factor(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
5005.0	-62.91	5.23	35.81	-32.33	-25	-7.33	Horizontal
5005.0	-63.65	5.23	35.81	-33.07	-25	-8.07	Vertical
7507.5	-62.04	5.67	36.85	-30.86	-25	-5.86	Vertical
7507.5	-60.01	5.67	36.85	-28.83	-25	-3.83	Horizontal
178.8	-53.88	1.73	17.97	-37.64	-25	-12.64	Vertical
262.5	-48.51	1.38	15.11	-34.78	-25	-9.78	Horizontal
Test Results for Mid Channel 2535MHz							
5070.0	-64.66	5.23	35.82	-34.07	-25	-9.07	Horizontal
5070.0	-61.89	5.23	35.82	-31.30	-25	-6.30	Vertical
7605.0	-63.68	5.67	36.85	-32.50	-25	-7.50	Vertical
7605.0	-61.19	5.67	36.85	-30.01	-25	-5.01	Horizontal
194.3	-52.68	1.77	16.17	-38.27	-25	-13.27	Vertical
265.7	-45.97	1.63	15.21	-32.39	-25	-7.39	Horizontal
Test Results for High Channel 2567.5MHz							
5135.0	-61.66	5.24	35.83	-31.07	-25	-6.07	Horizontal
5135.0	-60.58	5.24	35.83	-29.99	-25	-4.99	Vertical
7702.5	-64.75	5.68	36.87	-33.56	-25	-8.56	Vertical
7702.5	-60.04	5.68	36.87	-28.85	-25	-3.85	Horizontal
180.5	-48.07	1.58	17.56	-32.09	-25	-7.09	Vertical
458.7	-45.28	1.45	16.58	-30.15	-25	-5.15	Horizontal

QPSK EIRP POWER FOR LTE BAND 7 (10.0MHZ BANDWIDTH)

Test Results for Low Channel 2505MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Factor(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
5010.0	-60.86	5.23	35.82	-30.27	-25	-5.27	Horizontal
5010.0	-59.84	5.23	35.82	-29.25	-25	-4.25	Vertical
7515	-60.29	5.67	36.86	-29.10	-25	-4.10	Vertical
7515	-61.23	5.67	36.86	-30.04	-25	-5.04	Horizontal
177.8	-48.11	1.63	15.76	-33.98	-25	-8.98	Vertical
466.7	-46.54	1.71	15.44	-32.81	-25	-7.81	Horizontal
Test Results for Mid Channel 2535MHz							
5070.0	-60.45	5.23	35.82	-29.86	-25	-4.86	Horizontal
5070.0	-62.48	5.23	35.82	-31.89	-25	-6.89	Vertical
7605.0	-61.74	5.67	36.85	-30.56	-25	-5.56	Vertical
7605.0	-60.36	5.67	36.85	-29.18	-25	-4.18	Horizontal
193.5	-50.97	1.79	16.84	-35.91	-25	-10.91	Vertical
245.4	-51.93	1.71	17.64	-36.00	-25	-11.00	Horizontal
Test Results for High Channel 2565MHz							
5130	-64.89	5.24	35.83	-34.30	-25	-9.30	Horizontal
5130	-61.78	5.24	35.83	-31.19	-25	-6.19	Vertical
7695	-63.93	5.70	36.88	-32.75	-25	-7.75	Vertical
7695	-63.07	5.70	36.88	-31.89	-25	-6.89	Horizontal
189.1	-47.72	1.79	16.84	-32.66	-25	-7.66	Vertical
286.3	-46.71	1.71	17.64	-30.78	-25	-5.78	Horizontal

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

. Margin = Spurious Emission Level - Limit

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

9.8 LTE BAND 40

QPSK EIRP POWER FOR LTE BAND 40A(2305-2315MHz) (5.0MHZ BANDWIDTH)

Test Results for Low Channel 2307.5MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
4615	-74.74	4.04	33.51	-45.27	-40	-5.27	Horizontal
4615	-75.95	4.04	33.51	-46.48	-40	-6.48	Vertical
6922.5	-79.38	5.24	35.84	-48.78	-40	-8.78	Vertical
6922.5	-88.39	5.24	35.84	-57.79	-40	-17.79	Horizontal
Test Results for Mid Channel 2310MHz							
4620	-76.65	4.04	33.56	-47.13	-40	-7.13	Horizontal
4620	-75.28	4.04	33.56	-45.76	-40	-5.76	Vertical
6930	-76.84	5.24	35.91	-46.17	-40	-6.17	Vertical
6930	-77.31	5.24	35.91	-46.64	-40	-6.64	Horizontal
Test Results for High Channel 2312.5MHz							
4625	-75.11	4.04	34	-45.15	-40	-5.15	Horizontal
4625	-76.16	4.04	34	-46.20	-40	-6.20	Vertical
6937.5	-80.10	5.24	36.04	-49.30	-40	-9.30	Vertical
6937.5	-78.05	5.24	36.04	-47.25	-40	-7.25	Horizontal

QPSK EIRP POWER FOR LTE BAND 40A (10.0MHZ BANDWIDTH)

Test Results for Low Channel 2310MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
4620	-76.87	4.04	33.56	-47.35	-40	-7.35	Horizontal
4620	-74.62	4.04	33.56	-45.10	-40	-5.10	Vertical
6930	-79.51	5.24	35.91	-48.84	-40	-8.84	Vertical
6930	-80.37	5.24	35.91	-49.70	-40	-9.70	Horizontal

QPSK EIRP POWER FOR LTE BAND 40B(2345-2360MHz) (5.0MHZ BANDWIDTH)

Test Results for Low Channel 2347.5MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
4705	-76.41	4.04	33.51	-46.94	-40	-6.94	Horizontal
4705	-77.95	4.04	33.51	-48.48	-40	-8.48	Vertical
7057.5	-80.93	5.24	35.84	-50.33	-40	-10.33	Vertical
7057.5	-90.66	5.24	35.84	-60.06	-40	-20.06	Horizontal
Test Results for Mid Channel 2352MHz							
4710	-77.01	4.04	33.56	-47.49	-40	-7.49	Horizontal
4710	-78.11	4.04	33.56	-48.59	-40	-8.59	Vertical
7065	-78.08	5.24	35.91	-47.41	-40	-7.41	Vertical
7065	-80.27	5.24	35.91	-49.60	-40	-9.60	Horizontal
Test Results for High Channel 2357MHz							
4715	-75.38	4.04	34	-45.42	-40	-5.42	Horizontal
4715	-79.03	4.04	34	-49.07	-40	-9.07	Vertical
7072.5	-79.65	5.24	36.04	-48.85	-40	-8.85	Vertical
7072.5	-79.47	5.24	36.04	-48.67	-40	-8.67	Horizontal

QPSK EIRP POWER FOR LTE BAND 40B (10.0MHZ BANDWIDTH)

Test Results for Low Channel 2355MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
4710	-81.47	4.04	33.56	-51.95	-40	-11.95	Horizontal
4710	-77.22	4.04	33.56	-47.70	-40	-7.70	Vertical
7065	-81.11	5.24	35.91	-50.44	-40	-10.44	Vertical
7065	-82.35	5.24	35.91	-51.68	-40	-11.68	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

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 3.15V, Normal, DC 3.7V and High voltage, DC 4.26V.

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 2/4/5/7/40

RESULTS

See the following pages.

10.1 LTE BAND 2

Band 2 QPSK, (10MHz BANDWIDTH RB size 100 RB Offset 0)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.15	1880	12.7	0.006754	2.5
3.7	1880	13.7	0.007294	2.5
4.26	1880	13.5	0.007191	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1880	12.9	0.006865	2.5
Extreme (50C)	1880	11.6	0.006150	2.5
Extreme (40C)	1880	13.4	0.007134	2.5
Extreme (30C)	1880	13.9	0.007376	2.5
Extreme (10C)	1880	14.4	0.007643	2.5
Extreme (0C)	1880	12.3	0.006531	2.5
Extreme (-10C)	1880	13.5	0.007173	2.5
Extreme (-20C)	1880	14.1	0.007512	2.5
Extreme (-30C)	1880	14.6	0.007774	2.5

Band 2 16QAM, (10MHz BANDWIDTH RB size 100 RB Offset 0)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.15	1880	10.2	0.005413	2.5
3.7	1880	8.5	0.004533	2.5
4.26	1880	8.0	0.004275	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1880	9.7	0.005169	2.5
Extreme (50C)	1880	8.9	0.004724	2.5
Extreme (40C)	1880	8.0	0.004239298	2.5
Extreme (30C)	1880	8.6	0.004561701	2.5
Extreme (10C)	1880	9.4	0.00498161	2.5
Extreme (0C)	1880	8.6	0.00455716	2.5
Extreme (-10C)	1880	8.9	0.004740562	2.5
Extreme (-20C)	1880	9.0	0.004781094	2.5
Extreme (-30C)	1880	8.5	0.00449723	2.5

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

10.2 LTE BAND 4

Band 4 QPSK, (10MHz BANDWIDTH RB size 100 RB Offset 0)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.15	1732.5	9.1	0.005281	2.5
3.7	1732.5	8.6	0.004939	2.5
4.26	1732.5	8.2	0.004714	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1732.5	8.2	0.004724	2.5
Extreme (50C)	1732.5	9.0	0.005174	2.5
Extreme (40C)	1732.5	7.7	0.004439	2.5
Extreme (30C)	1732.5	6.4	0.003683	2.5
Extreme (10C)	1732.5	6.6	0.003817	2.5
Extreme (0C)	1732.5	9.5	0.005462	2.5
Extreme (-10C)	1732.5	8.9	0.005130	2.5
Extreme (-20C)	1732.5	6.6	0.003803	2.5
Extreme (-30C)	1732.5	8.4	0.004859	2.5

Band 4 16QAM, (10MHz BANDWIDTH RB size 100 RB Offset 0)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.15	1732.5	10.2	0.005863	2.5
3.7	1732.5	9.2	0.005285	2.5
4.26	1732.5	8.0	0.004624	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1732.5	9.7	0.005574	2.5
Extreme (50C)	1732.5	8.7	0.005031	2.5
Extreme (40C)	1732.5	8.5	0.004912	2.5
Extreme (30C)	1732.5	8.5	0.004922	2.5
Extreme (10C)	1732.5	9.3	0.005387	2.5
Extreme (0C)	1732.5	8.3	0.004806	2.5
Extreme (-10C)	1732.5	9.0	0.005201	2.5
Extreme (-20C)	1732.5	8.8	0.005099	2.5
Extreme (-30C)	1732.5	7.7	0.004461	2.5

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

10.3 LTE BAND 5

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

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.15	836.5	5.3	0.006357	2.5
3.7	836.5	6.9	0.008245	2.5
4.26	836.5	4.9	0.005894	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	836.5	5.9	0.007072	2.5
Extreme (50C)	836.5	5.9	0.007038	2.5
Extreme (40C)	836.5	5.7	0.006838	2.5
Extreme (30C)	836.5	6.6	0.007929	2.5
Extreme (10C)	836.5	5.7	0.006865	2.5
Extreme (0C)	836.5	5.5	0.006541	2.5
Extreme (-10C)	836.5	6.0	0.007162	2.5
Extreme (-20C)	836.5	6.4	0.007675	2.5
Extreme (-30C)	836.5	6.5	0.007805	2.5

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

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.15	836.5	6.0	0.007195	2.5
3.7	836.5	7.1	0.008531	2.5
4.26	836.5	4.6	0.005530	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	836.5	6.5	0.007731	2.5
Extreme (50C)	836.5	5.9	0.006999	2.5
Extreme (40C)	836.5	6.0	0.007175	2.5
Extreme (30C)	836.5	6.1	0.007288	2.5
Extreme (10C)	836.5	5.1	0.006076	2.5
Extreme (0C)	836.5	5.6	0.006751	2.5
Extreme (-10C)	836.5	5.5	0.006593	2.5
Extreme (-20C)	836.5	5.7	0.006760	2.5
Extreme (-30C)	836.5	6.4	0.007616	2.5

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

10.4 LTE BAND 7

Band 7 QPSK, (10MHz BANDWIDTH RB size 100 RB Offset 0)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.15	2535	9.6	0.003773	2.5
3.7	2535	8.4	0.003320	2.5
4.26	2535	8.0	0.003167	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2535	9.1	0.003574	2.5
Extreme (50C)	2535	9.0	0.003532	2.5
Extreme (40C)	2535	8.5	0.003363	2.5
Extreme (30C)	2535	8.7	0.003415	2.5
Extreme (10C)	2535	7.8	0.003061	2.5
Extreme (0C)	2535	8.2	0.003252	2.5
Extreme (-10C)	2535	9.3	0.003661	2.5
Extreme (-20C)	2535	9.1	0.003596	2.5
Extreme (-30C)	2535	8.2	0.003218	2.5

Band 7 16QAM, (10MHz BANDWIDTH RB size 100 RB Offset 0)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.15	2535	6.9	0.002722	2.5
3.7	2535	6.9	0.002703	2.5
4.26	2535	5.4	0.002122	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2535	6.9	0.002722	2.5
Extreme (50C)	2535	6.0	0.002378	2.5
Extreme (40C)	2535	5.6	0.002199	2.5
Extreme (30C)	2535	6.9	0.002720	2.5
Extreme (10C)	2535	5.9	0.002319	2.5
Extreme (0C)	2535	5.3	0.002073	2.5
Extreme (-10C)	2535	5.0	0.001957	2.5
Extreme (-20C)	2535	5.8	0.002292	2.5
Extreme (-30C)	2535	5.7	0.002243	2.5

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

10.8 LTE BAND 40

Band 40A (2350-2360MHz)QPSK, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.15	2355	8.5	0.003609	2.5
3.7	2355	7.2	0.003056	2.5
4.26	2355	9.2	0.003908	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2355	9.2	0.003903	2.5
Extreme (50C)	2355	8.3	0.003534	2.5
Extreme (40C)	2355	8.6	0.003641	2.5
Extreme (30C)	2355	7.8	0.003313	2.5
Extreme (10C)	2355	8.2	0.003468	2.5
Extreme (0C)	2355	6.5	0.002766	2.5
Extreme (-10C)	2355	8.5	0.003630	2.5
Extreme (-20C)	2355	8.8	0.003729	2.5
Extreme (-30C)	2355	5.8	0.002484	2.5

Band 40A (2350-2360MHz)16QAM, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.15	2355	8.3	0.003535	2.5
3.7	2355	7.4	0.003130	2.5
4.26	2355	9.3	0.003958	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2355	8.5	0.003616	2.5
Extreme (50C)	2355	8.3	0.003543	2.5
Extreme (40C)	2355	8.4	0.003556	2.5
Extreme (30C)	2355	7.9	0.003334	2.5
Extreme (10C)	2355	8.7	0.003690	2.5
Extreme (0C)	2355	6.8	0.002879	2.5
Extreme (-10C)	2355	8.2	0.003494	2.5
Extreme (-20C)	2355	8.7	0.003687	2.5
Extreme (-30C)	2355	5.4	0.002296	2.5

Band 40B (2305-2315MHz)QPSK, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.15	2310	8.8	0.003811	2.5
3.7	2310	9.3	0.004031	2.5
4.26	2310	8.4	0.003619	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2310	8.4	0.003615	2.5
Extreme (50C)	2310	8.5	0.003679	2.5
Extreme (40C)	2310	8.8	0.003791	2.5
Extreme (30C)	2310	7.7	0.003326	2.5
Extreme (10C)	2310	8.7	0.003752	2.5
Extreme (0C)	2310	6.4	0.002780	2.5
Extreme (-10C)	2310	8.3	0.003601	2.5
Extreme (-20C)	2310	9.0	0.003896	2.5
Extreme (-30C)	2310	5.2	0.002260	2.5

Band 40B (2305-2315MHz)16QAM, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
3.15	2310	9.0	0.003906	2.5
3.7	2310	8.8	0.003802	2.5
4.26	2310	8.8	0.003817	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2310	8.9	0.003848	2.5
Extreme (50C)	2310	8.4	0.003622	2.5
Extreme (40C)	2310	8.5	0.003681	2.5
Extreme (30C)	2310	7.7	0.003328	2.5
Extreme (10C)	2310	8.8	0.003821	2.5
Extreme (0C)	2310	6.2	0.002674	2.5
Extreme (-10C)	2310	8.1	0.003514	2.5
Extreme (-20C)	2310	8.2	0.003567	2.5
Extreme (-30C)	2310	5.5	0.002387	2.5

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

11. Peak-to-Average Ratio

11.1 Description of the PAR Measurement

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

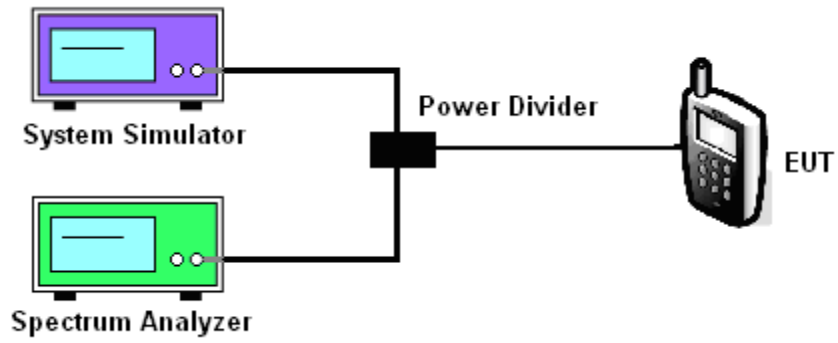
11.2 Measuring Instruments

See list of measuring instruments of this test report.

11.3 Test Procedures

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

11.4 Test Setup



MODES TESTED

LTE Band 2/4/5/7/40

Test data reference attachment.

----END OF REPORT----