

FCC eCFR 47 PART 22H, 24E, 27L CERTIFICATION TEST REPORT FCC ID: 2AX5VHBHYBNA1

Product: Security control panel

Trade Mark: AJAX

Model No.: HHG3.4G.F-000-NA

Family Model: N/A

Report No.: S24091204602003

Issue Date: Oct. 21, 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
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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 .. : HHG3.4G.F-000-NA
Family Model..... : N/A
Test Sample Number : S240912046001
Date of Test..... : Sept. 14, 2024 ~ Oct. 21, 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	HHG3.4G.F-000-NA
Family Model	N/A
Model Difference	N/A
FCC ID:	2AX5VHBHYBNA1
Frequency Bands:	U.S. Bands: ☒ LTE FDD Band 2,4,12
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 12 Uplink: 699MHz-716MHz, Downlink: 729MHz-746MHz;
Type of Modulation:	QPSK/16QAM/64QAM(Only Downlink)
Power Class	Class 3
Antenna:	Planar Inverted F- Antenna antenna
Antenna gain:	-1.5 dBi
Adapter	N/A
Battery	N/A
Power Rating	AC 110-240V, 50/60 Hz, 0.1A
Extreme Vol. Limits:	AC 110V to AC 240V (Nominal AC 120V/60Hz) (Note 1)
HW Version	HBF.002.MBR.001v4
FW Version	NA
SW Version	2.xx

** Note1: The High Voltage 240V and Low Voltage 110V 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: 2AX5VHBHYBNA1** 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% ($U = 2U_c(y)$)	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 2/4/12

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	HHG3.4G.F-000-NA	FCC ID: 2AX5VHBHYBNA1	EUT

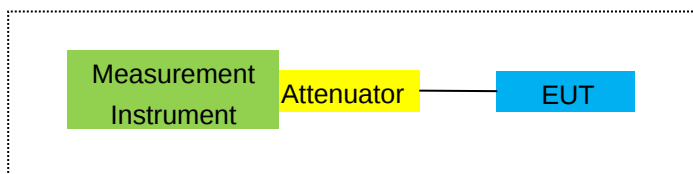
*Note: All the accessories have been used during the test.
the following "EUT" in setup diagram means EUT system.*

2.4 TEST SETUP

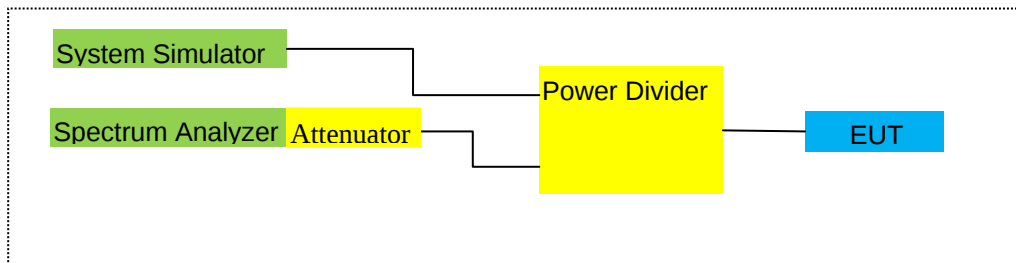
For Radiated Test Cases



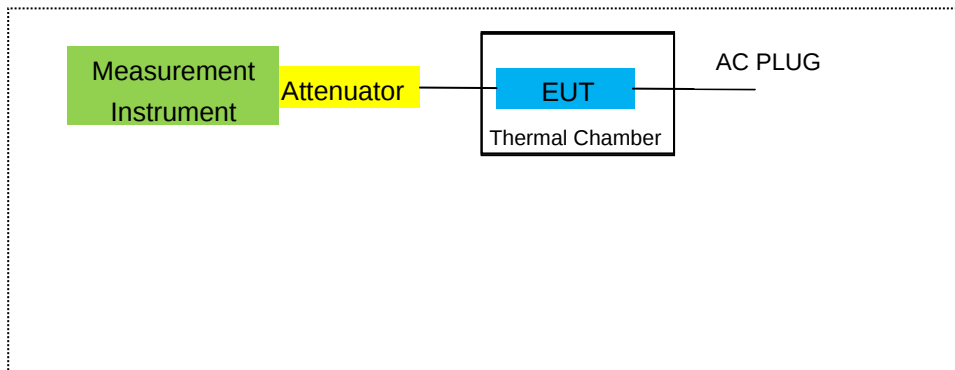
For Conducted Output Power



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	2024.04.25	2025.04.24	1 year
2	Test Receiver	R&S	ESPI	101318	2024.04.26	2025.04.25	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2024.05.12	2025.05.11	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2024.04.26	2027.04.25	3 year
5	Broadband Horn Antenna	SCHWARZBEC K	BBHA 9120 D	2816	2024.05.18	2027.05.17	3 year
6	Broadband Horn Antenna	SCHWARZBEC K	BBHA 9120 D	2817	2024.05.12	2027.05.11	3 year
7	Amplifier	EM	EM-30180	060538	2024.04.26	2025.04.25	1 year
8	Loop Antenna	ARA	PLA-1030/B	1029	2024.03.12	2025.03.11	1 year
9	Power Meter	R&S	NRVS	100696	2024.04.26	2025.04.25	1 year
10	Power Sensor	R&S	URV5-Z4	0395.1619.05	2024.04.26	2025.04.25	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	2024.04.26	2025.04.25	1 year
15	LISN	R&S	ENV216	101313	2024.04.25	2025.04.24	1 year
16	LISN	EMCO	3816/2	00042990	2024.04.25	2025.04.24	1 year
17	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2024.03.12	2025.03.11	1 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 Tester	R&S	CMU200	A0304247	2024.03.12	2025.03.11	1 year
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	20170402923	2024.04.25	2027.04.24	3 year
27	Log-Periodic Antenna	SCHWARZBEC K	VULB 9162	584	2024.04.25	2025.04.24	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

Band 2/4/12

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 2/4/12

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 2/4/12

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 2/4/12

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 (dBi)	Max. EIRP	Max. EIRP Average (mW)	Polarization Of Max. ERP	
						Average (dBm)			
1.4MHz Band QPSK	1/#Mid	1850.7	-4.26	3.76	28.24	20.22	105.196	Horizontal	Pass
		1880	-3.45	3.91	28.22	20.86	121.899	Horizontal	Pass
		1909.3	-3.15	3.93	28.20	21.12	129.420	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	1851.5	-4.41	3.77	28.23	20.05	101.158	Horizontal	Pass
		1880	-3.84	3.91	28.24	20.49	111.944	Horizontal	Pass
		1908.5	-3.16	3.94	28.25	21.15	130.317	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	1852.5	-4.42	3.77	28.31	20.12	102.802	Horizontal	Pass
		1880	-3.95	3.91	28.22	20.36	108.643	Horizontal	Pass
		1907.5	-3.29	3.94	28.20	20.97	125.026	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	1855	-4.26	3.79	28.33	20.28	106.660	Horizontal	Pass
		1880	-3.74	3.95	28.22	20.53	112.980	Horizontal	Pass
		1905	-2.83	3.97	28.19	21.39	137.721	Horizontal	Pass
15.0MHz Band QPSK	1/#Mid	1857.5	-4.45	3.79	28.34	20.10	102.329	Horizontal	Pass
		1880	-3.68	3.95	28.22	20.59	114.551	Horizontal	Pass
		1902.5	-2.87	3.97	28.18	21.34	136.144	Horizontal	Pass
20.0MHz Band QPSK	1/#Mid	1860	-4.04	3.81	28.35	20.50	112.202	Horizontal	Pass
		1880	-3.41	3.96	28.22	20.85	121.619	Horizontal	Pass
		1900	-3.05	4.00	28.16	21.11	129.122	Horizontal	Pass
1.4MHz Band QPSK	1/#Mid	1850.7	-5.71	3.76	28.24	18.77	75.336	Vertical	Pass
		1880	-5.12	3.91	28.22	19.19	82.985	Vertical	Pass
		1909.3	-4.23	3.93	28.20	20.04	100.925	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	1851.5	-5.45	3.77	28.23	19.01	79.616	Vertical	Pass
		1880	-4.51	3.91	28.24	19.82	95.940	Vertical	Pass
		1908.5	-5.07	3.94	28.25	19.24	83.946	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	1852.5	-4.84	3.77	28.31	19.70	93.325	Vertical	Pass
		1880	-4.54	3.91	28.22	19.77	94.842	Vertical	Pass
		1907.5	-5.22	3.94	28.20	19.04	80.168	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	1855	-4.97	3.79	28.33	19.57	90.573	Vertical	Pass
		1880	-4.83	3.95	28.22	19.44	87.902	Vertical	Pass
		1905	-5.14	3.97	28.19	19.08	80.910	Vertical	Pass
15.0MHz Band QPSK	1/#Mid	1857.5	-5.79	3.79	28.34	18.76	75.162	Vertical	Pass
		1880	-5.52	3.95	28.22	18.75	74.989	Vertical	Pass
		1902.5	-4.39	3.97	28.18	19.82	95.940	Vertical	Pass

20.0MHz	1/#Mid	1860	-5.77	3.81	28.35	18.77	75.336	Vertical	Pass
Band		1880	-5.18	3.96	28.22	19.08	80.910	Vertical	Pass
QPSK		1900	-3.82	4.00	28.16	20.34	108.143	Vertical	Pass

Radiated Power (EIRP) for Band 2									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dBi)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band 16 QAM	1/#Mid	1850.7	-4.97	3.76	28.24	19.51	89.331	Horizontal	Pass
		1880	-4.65	3.91	28.22	19.66	92.470	Horizontal	Pass
		1909.3	-4.26	3.93	28.20	20.01	100.231	Horizontal	Pass
3.0MHz Band 16 QAM	1/#Mid	1851.5	-5.47	3.77	28.23	18.99	79.250	Horizontal	Pass
		1880	-4.84	3.91	28.24	19.49	88.920	Horizontal	Pass
		1908.5	-4.23	3.94	28.25	20.08	101.859	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	1852.5	-5.44	3.77	28.31	19.10	81.283	Horizontal	Pass
		1880	-5.04	3.91	28.22	19.27	84.528	Horizontal	Pass
		1907.5	-4.40	3.94	28.20	19.86	96.828	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	1855	-5.51	3.79	28.33	19.03	79.983	Horizontal	Pass
		1880	-4.85	3.95	28.22	19.42	87.498	Horizontal	Pass
		1905	-4.14	3.97	28.19	20.08	101.859	Horizontal	Pass
15.0MHz Band 16 QAM	1/#Mid	1857.5	-5.62	3.79	28.34	18.93	78.163	Horizontal	Pass
		1880	-4.85	3.95	28.22	19.42	87.498	Horizontal	Pass
		1902.5	-4.13	3.97	28.18	20.08	101.859	Horizontal	Pass
20.0MHz Band 16 QAM	1/#Mid	1860	-5.03	3.81	28.35	19.51	89.331	Horizontal	Pass
		1880	-4.50	3.96	28.22	19.76	94.624	Horizontal	Pass
		1900	-3.96	4.00	28.16	20.20	104.713	Horizontal	Pass
1.4MHz Band 16 QAM	1/#Mid	1850.7	-5.32	3.76	28.24	19.16	82.414	Vertical	Pass
		1880	-5.39	3.91	28.22	18.92	77.983	Vertical	Pass
		1909.3	-5.67	3.93	28.20	18.60	72.444	Vertical	Pass
3.0MHz Band 16 QAM	1/#Mid	1851.5	-5.15	3.77	28.23	19.31	85.310	Vertical	Pass
		1880	-5.12	3.91	28.24	19.21	83.368	Vertical	Pass
		1908.5	-4.85	3.94	28.25	19.46	88.308	Vertical	Pass
5.0MHz Band 16 QAM	1/#Mid	1852.5	-5.42	3.77	28.31	19.12	81.658	Vertical	Pass
		1880	-5.39	3.91	28.22	18.92	77.983	Vertical	Pass
		1907.5	-5.69	3.94	28.20	18.57	71.945	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	1855	-5.38	3.79	28.33	19.16	82.414	Vertical	Pass
		1880	-5.51	3.95	28.22	18.76	75.162	Vertical	Pass
		1905	-5.25	3.97	28.19	18.97	78.886	Vertical	Pass
15.0MHz Band 16 QAM	1/#Mid	1857.5	-5.26	3.79	28.34	19.29	84.918	Vertical	Pass
		1880	-5.29	3.95	28.22	18.98	79.068	Vertical	Pass
		1902.5	-5.42	3.97	28.18	18.79	75.683	Vertical	Pass

20.0MHz Band 16 QAM	1/#Mid	1860	-5.87	3.81	28.35	18.67	73.621	Vertical	Pass
		1880	-5.27	3.96	28.22	18.99	79.250	Vertical	Pass
		1900	-4.94	4.00	28.16	19.22	83.560	Vertical	Pass

Note:

SG Level= Signal generator output

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

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 (dBi)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	1/#Mid	1710.7	-4.42	3.12	27.58	20.04	100.925	Horizontal	Pass
		1732.5	-4.16	3.27	27.61	20.18	104.232	Horizontal	Pass
		1754.3	-4.06	3.29	27.63	20.28	106.660	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	1711.5	-4.28	3.13	27.61	20.20	104.713	Horizontal	Pass
		1732.5	-4.08	3.27	27.61	20.26	106.170	Horizontal	Pass
		1753.5	-4.27	3.30	27.62	20.05	101.158	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	1712.5	-4.29	3.13	27.63	20.21	104.954	Horizontal	Pass
		1732.5	-4.40	3.27	27.61	19.94	98.628	Horizontal	Pass
		1752.5	-4.28	3.30	27.60	20.02	100.462	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	1715	-4.12	3.15	27.64	20.37	108.893	Horizontal	Pass
		1732.5	-4.32	3.31	27.61	19.98	99.541	Horizontal	Pass
		1750	-3.79	3.33	27.59	20.47	111.429	Horizontal	Pass
15.0MHz Band QPSK	1/#Mid	1717.5	-4.12	3.15	27.65	20.38	109.144	Horizontal	Pass
		1732.5	-4.12	3.31	27.61	20.18	104.232	Horizontal	Pass
		1747.5	-3.61	3.33	27.57	20.63	115.611	Horizontal	Pass
20.0MHz Band QPSK	1/#Mid	1720	-3.51	3.17	27.66	20.98	125.314	Horizontal	Pass
		1732.5	-4.05	3.32	27.61	20.24	105.682	Horizontal	Pass
		1745	-3.57	3.36	27.56	20.63	115.611	Horizontal	Pass
1.4MHz Band QPSK	1/#Mid	1710.7	-5.25	3.12	27.58	19.21	83.368	Vertical	Pass
		1732.5	-5.52	3.27	27.61	18.82	76.208	Vertical	Pass
		1754.3	-5.39	3.29	27.63	18.95	78.524	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	1711.5	-5.79	3.13	27.61	18.69	73.961	Vertical	Pass
		1732.5	-4.90	3.27	27.61	19.44	87.902	Vertical	Pass
		1753.5	-4.89	3.30	27.62	19.43	87.700	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	1712.5	-5.80	3.13	27.63	18.70	74.131	Vertical	Pass
		1732.5	-5.12	3.27	27.61	19.22	83.560	Vertical	Pass
		1752.5	-5.13	3.30	27.60	19.17	82.604	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	1715	-5.48	3.15	27.64	19.01	79.616	Vertical	Pass
		1732.5	-5.66	3.31	27.61	18.64	73.114	Vertical	Pass
		1750	-5.48	3.33	27.59	18.78	75.509	Vertical	Pass
15.0MHz Band QPSK	1/#Mid	1717.5	-5.72	3.15	27.65	18.78	75.509	Vertical	Pass
		1732.5	-5.18	3.31	27.61	19.12	81.658	Vertical	Pass
		1747.5	-4.94	3.33	27.57	19.30	85.114	Vertical	Pass

20.0MHz	1/#Mid	1720	-5.52	3.17	27.66	18.97	78.886	Vertical	Pass
Band		1732.5	-5.73	3.32	27.61	18.56	71.779	Vertical	Pass
QPSK		1745	-5.07	3.36	27.56	19.13	81.846	Vertical	Pass

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dBi)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band 16 QAM	1/#Mid	1710.7	-5.24	3.12	27.58	19.22	83.560	Horizontal	Pass
		1732.5	-5.23	3.27	27.61	19.11	81.470	Horizontal	Pass
		1754.3	-4.93	3.29	27.63	19.41	87.297	Horizontal	Pass
3.0MHz Band 16 QAM	1/#Mid	1711.5	-5.42	3.13	27.61	19.06	80.538	Horizontal	Pass
		1732.5	-5.26	3.27	27.61	19.08	80.910	Horizontal	Pass
		1753.5	-5.34	3.30	27.62	18.98	79.068	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	1712.5	-5.61	3.13	27.63	18.89	77.446	Horizontal	Pass
		1732.5	-5.37	3.27	27.61	18.97	78.886	Horizontal	Pass
		1752.5	-5.46	3.30	27.60	18.84	76.560	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	1715	-5.46	3.15	27.64	19.03	79.983	Horizontal	Pass
		1732.5	-5.22	3.31	27.61	19.08	80.910	Horizontal	Pass
		1750	-5.25	3.33	27.59	19.01	79.616	Horizontal	Pass
15.0MHz Band 16 QAM	1/#Mid	1717.5	-5.31	3.15	27.65	19.19	82.985	Horizontal	Pass
		1732.5	-5.07	3.31	27.61	19.23	83.753	Horizontal	Pass
		1747.5	-4.76	3.33	27.57	19.48	88.716	Horizontal	Pass
20.0MHz Band 16 QAM	1/#Mid	1720	-5.76	3.17	27.66	18.73	74.645	Horizontal	Pass
		1732.5	-5.28	3.32	27.61	19.01	79.616	Horizontal	Pass
		1745	-4.91	3.36	27.56	19.29	84.918	Horizontal	Pass
1.4MHz Band 16 QAM	1/#Mid	1710.7	-6.62	3.12	27.58	17.84	60.814	Vertical	Pass
		1732.5	-5.98	3.27	27.61	18.36	68.549	Vertical	Pass
		1754.3	-6.69	3.29	27.63	17.65	58.210	Vertical	Pass
3.0MHz Band 16 QAM	1/#Mid	1711.5	-6.23	3.13	27.61	18.25	66.834	Vertical	Pass
		1732.5	-6.53	3.27	27.61	17.81	60.395	Vertical	Pass
		1753.5	-6.53	3.30	27.62	17.79	60.117	Vertical	Pass
5.0MHz Band 16 QAM	1/#Mid	1712.5	-6.53	3.13	27.63	17.97	62.661	Vertical	Pass
		1732.5	-6.35	3.27	27.61	17.99	62.951	Vertical	Pass
		1752.5	-6.65	3.30	27.60	17.65	58.210	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	1715	-6.22	3.15	27.64	18.27	67.143	Vertical	Pass
		1732.5	-6.35	3.31	27.61	17.95	62.373	Vertical	Pass
		1750	-6.56	3.33	27.59	17.70	58.884	Vertical	Pass
15.0MHz Band 16 QAM	1/#Mid	1717.5	-6.17	3.15	27.65	18.33	68.077	Vertical	Pass
		1732.5	-6.76	3.31	27.61	17.54	56.754	Vertical	Pass
		1747.5	-5.95	3.33	27.57	18.29	67.453	Vertical	Pass
20.0MHz	1/#Mid	1720	-6.71	3.17	27.66	17.78	59.979	Vertical	Pass

Band 16 QAM		1732.5	-6.08	3.32	27.61	18.21	66.222	Vertical	Pass
		1745	-6.48	3.36	27.56	17.72	59.156	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 12

Radiated Power (ERP) for Band 12										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Factor (dB)	Correction (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	1/#Mid	699.7	6.91	1.91	19.21	2.15	22.06	160.694	Horizontal	Pass
		707.5	6.65	1.91	19.26	2.15	21.85	153.109	Horizontal	Pass
		715.3	6.7	1.93	19.34	2.15	21.96	157.036	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	700.5	6.66	1.91	19.21	2.15	21.81	151.705	Horizontal	Pass
		707.5	6.69	1.91	19.26	2.15	21.89	154.525	Horizontal	Pass
		714.5	6.4	1.93	19.34	2.15	21.66	146.555	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	701.5	6.58	1.91	19.23	2.15	21.75	149.624	Horizontal	Pass
		707.5	6.64	1.91	19.26	2.15	21.84	152.757	Horizontal	Pass
		713.5	6.18	1.92	19.33	2.15	21.44	139.316	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	704	6.75	1.91	19.25	2.15	21.94	156.315	Horizontal	Pass
		707.5	7	1.91	19.26	2.15	22.20	165.959	Horizontal	Pass
		711	7.01	1.92	19.32	2.15	22.26	168.267	Horizontal	Pass
1.4MHz Band QPSK	1/#Mid	699.7	4.81	1.91	19.21	2.15	19.96	99.083	Vertical	Pass
		707.5	4.63	1.91	19.26	2.15	19.83	96.161	Vertical	Pass
		715.3	4.67	1.93	19.34	2.15	19.93	98.401	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	700.5	4.83	1.91	19.21	2.15	19.98	99.541	Vertical	Pass
		707.5	5.19	1.91	19.26	2.15	20.39	109.396	Vertical	Pass
		714.5	5.03	1.93	19.34	2.15	20.29	106.905	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	701.5	4.59	1.91	19.23	2.15	19.76	94.624	Vertical	Pass
		707.5	5.05	1.91	19.26	2.15	20.25	105.925	Vertical	Pass
		713.5	4.97	1.92	19.33	2.15	20.23	105.439	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	704	4.38	1.91	19.25	2.15	19.57	90.573	Vertical	Pass
		707.5	5.12	1.91	19.26	2.15	20.32	107.647	Vertical	Pass
		711	4.36	1.92	19.32	2.15	19.61	91.411	Vertical	Pass

Radiated Power (ERP) for Band 12										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level	Cable Loss	Antenna Factor	Correction	Max. EIRP	Max. EIRP	Polarization Of Max. ERP	
			(dBm)	(dBm)	(dB)	(dB)	Average (dBm)	Average (mW)		
1.4MHz Band 16 QAM	1/#Mid	699.7	5.81	1.91	19.21	2.15	20.96	124.738	Horizontal	Pass
		707.5	5.6	1.91	19.26	2.15	20.80	120.226	Horizontal	Pass
		715.3	5.47	1.93	19.34	2.15	20.73	118.304	Horizontal	Pass
3.0MHz Band 16 QAM	1/#Mid	700.5	5.66	1.91	19.21	2.15	20.81	120.504	Horizontal	Pass
		707.5	5.23	1.91	19.26	2.15	20.43	110.408	Horizontal	Pass
		714.5	5.15	1.93	19.34	2.15	20.41	109.901	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	701.5	5.37	1.91	19.23	2.15	20.54	113.240	Horizontal	Pass
		707.5	5.26	1.91	19.26	2.15	20.46	111.173	Horizontal	Pass
		713.5	5.09	1.92	19.33	2.15	20.35	108.393	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	704	5.07	1.91	19.25	2.15	20.26	106.170	Horizontal	Pass
		707.5	5.68	1.91	19.26	2.15	20.88	122.462	Horizontal	Pass
		711	5.59	1.92	19.32	2.15	20.84	121.339	Horizontal	Pass
1.4MHz Band 16 QAM	1/#Mid	699.7	4.52	1.91	19.21	2.15	19.67	92.683	Vertical	Pass
		707.5	4.43	1.91	19.26	2.15	19.63	91.833	Vertical	Pass
		715.3	4.66	1.93	19.34	2.15	19.92	98.175	Vertical	Pass
3.0MHz Band 16 QAM	1/#Mid	700.5	5.33	1.91	19.21	2.15	20.48	111.686	Vertical	Pass
		707.5	4.74	1.91	19.26	2.15	19.94	98.628	Vertical	Pass
		714.5	4.55	1.93	19.34	2.15	19.81	95.719	Vertical	Pass
5.0MHz Band 16 QAM	1/#Mid	701.5	5.12	1.91	19.23	2.15	20.29	106.905	Vertical	Pass
		707.5	4.9	1.91	19.26	2.15	20.10	102.329	Vertical	Pass
		713.5	5.2	1.92	19.33	2.15	20.46	111.173	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	704	5.15	1.91	19.25	2.15	20.34	108.143	Vertical	Pass
		707.5	4.3	1.91	19.26	2.15	19.50	89.125	Vertical	Pass
		711	5.19	1.92	19.32	2.15	20.44	110.662	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)

ERP(dBm)=EIRP-2.15

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 $43 + 10 \log_{10}(p)$, 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 2/4/12

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	-51.41	4.04	33.51	-21.94	-13	-8.94	Horizontal
3701.4	-52.32	4.04	33.51	-22.85	-13	-9.85	Vertical
5552.1	-44.87	5.24	35.84	-14.27	-13	-1.27	Vertical
5552.1	-52.21	5.24	35.84	-21.61	-13	-8.61	Horizontal
18507	-58.28	5.24	41.18	-22.34	-13	-9.34	Vertical
18507	-57.40	5.24	41.18	-21.46	-13	-8.46	Horizontal
211.7	-35.12	1.43	16.02	-20.53	-13	-7.53	Vertical
263.8	-41.93	1.30	17.99	-25.24	-13	-12.24	Horizontal
Test Results for Mid Channel 1880MHz							
3760.0	-50.72	4.04	33.56	-21.20	-13	-8.20	Horizontal
3760.0	-50.64	4.04	33.56	-21.12	-13	-8.12	Vertical
5640.0	-50.48	5.24	35.91	-19.81	-13	-6.81	Vertical
5640.0	-50.04	5.24	35.91	-19.37	-13	-6.37	Horizontal
18800	-53.97	5.24	41.25	-17.96	-13	-4.96	Vertical
18800	-53.11	5.24	41.25	-17.10	-13	-4.10	Horizontal
175.5	-44.71	1.62	16.97	-29.36	-13	-16.36	Vertical
426.3	-38.36	1.74	15.98	-24.13	-13	-11.13	Horizontal
Test Results for High Channel 1909.3MHz							
3818.6	-53.46	4.04	34.00	-23.50	-13	-10.50	Horizontal
3818.6	-49.28	4.04	34.00	-19.32	-13	-6.32	Vertical
5727.9	-48.63	5.24	36.04	-17.83	-13	-4.83	Vertical
5727.9	-52.16	5.24	36.04	-21.36	-13	-8.36	Horizontal
19093	-52.41	5.24	41.52	-16.13	-13	-3.13	Vertical
19093	-58.46	5.24	41.52	-22.18	-13	-9.18	Horizontal
205.7	-44.21	1.42	17.29	-28.34	-13	-15.34	Vertical
314.9	-34.78	1.50	17.90	-18.37	-13	-5.37	Horizontal

QPSK EIRP POWER FOR LTE BAND 2 (20.0MHZ BANDWIDTH)

Test Results for Low Channel 1860MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3720.0	-51.68	4.07	33.54	-22.21	-13	-9.21	Horizontal
3720.0	-50.16	4.07	33.54	-20.69	-13	-7.69	Vertical
5580.0	-50.06	5.28	35.86	-19.48	-13	-6.48	Vertical
5580.0	-49.60	5.28	35.86	-19.02	-13	-6.02	Horizontal
18600	-54.56	5.24	41.21	-18.59	-13	-5.59	Vertical
18600	-57.64	5.24	41.21	-21.67	-13	-8.67	Horizontal
212.1	-37.76	1.58	16.89	-22.44	-13	-9.44	Vertical
315.2	-43.45	1.76	17.26	-27.95	-13	-14.95	Horizontal
Test Results for Mid Channel 1880MHz							
3760.0	-52.15	4.04	33.56	-22.63	-13	-9.63	Horizontal
3760.0	-44.33	4.04	33.56	-14.81	-13	-1.81	Vertical
5640.0	-44.90	5.24	35.91	-14.23	-13	-1.23	Vertical
5640.0	-52.44	5.24	35.91	-21.77	-13	-8.77	Horizontal
18800	-52.69	5.24	41.25	-16.68	-13	-3.68	Vertical
18800	-55.43	5.24	41.25	-19.42	-13	-6.42	Horizontal
192.3	-35.79	1.46	16.27	-20.98	-13	-7.98	Vertical
456.2	-34.89	1.59	15.15	-21.33	-13	-8.33	Horizontal
Test Results for High Channel 1900MHz							
3800.0	-53.84	4.04	34.00	-23.88	-13	-10.88	Horizontal
3800.0	-47.88	4.04	34.00	-17.92	-13	-4.92	Vertical
5700.0	-49.92	5.24	36.04	-19.12	-13	-6.12	Vertical
5700.0	-53.87	5.24	36.04	-23.07	-13	-10.07	Horizontal
19000	-58.87	5.24	41.49	-22.62	-13	-9.62	Vertical
19000	-53.97	5.24	41.49	-17.72	-13	-4.72	Horizontal
209.6	-43.35	1.36	17.39	-27.31	-13	-14.31	Vertical
256.6	-44.43	1.66	15.39	-30.70	-13	-17.70	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	-44.01	4.02	29.80	-18.23	-13	-5.23	Horizontal
3421.4	-45.31	4.02	29.80	-19.53	-13	-6.53	Vertical
5132.1	-49.76	5.24	35.84	-19.16	-13	-6.16	Vertical
5132.1	-51.00	5.24	35.84	-20.40	-13	-7.40	Horizontal
196.9	-40.52	1.68	16.04	-26.16	-13	-13.16	Vertical
434.7	-42.30	1.78	17.74	-26.34	-13	-13.34	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-51.80	4.03	30.00	-25.83	-13	-12.83	Horizontal
3465.0	-52.11	4.03	30.00	-26.14	-13	-13.14	Vertical
5197.5	-47.87	5.25	35.86	-17.26	-13	-4.26	Vertical
5197.5	-49.53	5.25	35.86	-18.92	-13	-5.92	Horizontal
184.1	-37.79	1.72	17.69	-21.82	-13	-8.82	Vertical
247.8	-42.83	1.62	16.02	-28.42	-13	-15.42	Horizontal
Test Results for High Channel 1754.3MHz							
3508.6	-46.00	4.05	30.01	-20.04	-13	-7.04	Horizontal
3508.6	-51.57	4.05	30.01	-25.61	-13	-12.61	Vertical
5262.9	-46.06	5.26	35.86	-15.46	-13	-2.46	Vertical
5262.9	-53.70	5.26	35.86	-23.10	-13	-10.10	Horizontal
202.8	-40.98	1.80	16.69	-26.09	-13	-13.09	Vertical
421.0	-43.01	1.75	16.66	-28.11	-13	-15.11	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
3440.0	-51.47	4.02	29.80	-25.69	-13	-12.69	Horizontal
3440.0	-46.13	4.02	29.80	-20.35	-13	-7.35	Vertical
5160.0	-52.87	5.24	35.84	-22.27	-13	-9.27	Vertical
5160.0	-50.26	5.24	35.84	-19.66	-13	-6.66	Horizontal
182.2	-41.59	1.57	17.26	-25.90	-13	-12.90	Vertical
340.4	-36.18	1.78	16.35	-21.61	-13	-8.61	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-45.69	4.03	30.00	-19.72	-13	-6.72	Horizontal
3465.0	-45.91	4.03	30.00	-19.94	-13	-6.94	Vertical
5197.5	-52.89	5.25	35.86	-22.28	-13	-9.28	Vertical
5197.5	-51.92	5.25	35.86	-21.31	-13	-8.31	Horizontal
207.5	-42.98	1.44	17.95	-26.47	-13	-13.47	Vertical
429.4	-43.43	1.65	16.09	-28.99	-13	-15.99	Horizontal
Test Results for High Channel 1745MHz							
3490.0	-48.92	2.91	27.68	-24.15	-13	-11.15	Horizontal
3490.0	-48.07	2.91	27.68	-23.30	-13	-10.30	Vertical
5235.0	-44.66	5.26	35.86	-14.06	-13	-1.06	Vertical
5235.0	-49.13	5.26	35.86	-18.53	-13	-5.53	Horizontal
184.9	-44.28	1.61	16.85	-29.04	-13	-16.04	Vertical
234.2	-43.73	1.61	15.19	-30.15	-13	-17.15	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 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 Factor(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1399.4	-51.00	2.60	27.20	-26.40	-13	-13.40	Horizontal
1399.4	-46.21	2.60	27.20	-21.61	-13	-8.61	Vertical
2099.1	-46.37	2.85	27.54	-21.68	-13	-8.68	Vertical
2099.1	-50.60	2.85	27.54	-25.91	-13	-12.91	Horizontal
178.5	-35.15	1.49	17.78	-18.86	-13	-5.86	Vertical
380.3	-44.77	1.36	17.33	-28.80	-13	-15.80	Horizontal
Test Results For Mid Channel 707.5MHz							
1415.0	-44.40	2.61	27.28	-19.73	-13	-6.73	Horizontal
1415.0	-53.33	2.61	27.28	-28.66	-13	-15.66	Vertical
2122.5	-48.99	2.87	27.59	-24.27	-13	-11.27	Vertical
2122.5	-50.06	2.87	27.59	-25.34	-13	-12.34	Horizontal
182.9	-37.71	1.73	15.74	-23.70	-13	-10.70	Vertical
353.2	-35.21	1.62	15.79	-21.04	-13	-8.04	Horizontal
Test Results for High Channel 715.3MHz							
1430.6	-51.79	2.63	27.28	-27.14	-13	-14.14	Horizontal
1430.6	-48.24	2.63	27.28	-23.59	-13	-10.59	Vertical
2145.9	-53.91	2.88	27.60	-29.19	-13	-16.19	Vertical
2145.9	-53.10	2.88	27.60	-28.38	-13	-15.38	Horizontal
192.2	-41.21	1.61	18.00	-24.82	-13	-11.82	Vertical
458.1	-42.74	1.45	15.49	-28.71	-13	-15.71	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 Factor(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1408.0	-50.66	2.61	27.26	-26.01	-13	-13.01	Horizontal
1408.0	-46.71	2.61	27.26	-22.06	-13	-9.06	Vertical
2112.0	-48.92	2.87	27.58	-24.21	-13	-11.21	Vertical
2112.0	-50.53	2.87	27.58	-25.82	-13	-12.82	Horizontal
193.3	-35.56	1.31	16.97	-19.90	-13	-6.90	Vertical
372.2	-44.38	1.65	16.70	-29.33	-13	-16.33	Horizontal
Test Results for Mid Channel 707.5MHz							
1415.0	-53.28	2.61	27.28	-28.61	-13	-15.61	Horizontal
1415.0	-44.39	2.61	27.28	-19.72	-13	-6.72	Vertical
2122.5	-50.81	2.87	27.59	-26.09	-13	-13.09	Vertical
2122.5	-52.01	2.87	27.59	-27.29	-13	-14.29	Horizontal
187.9	-37.03	1.72	17.99	-20.76	-13	-7.76	Vertical
467.8	-43.58	1.73	17.94	-27.37	-13	-14.37	Horizontal
Test Results for High Channel 711MHz							
1422.0	-51.04	2.62	27.28	-26.38	-13	-13.38	Horizontal
1422.0	-44.28	2.62	27.28	-19.62	-13	-6.62	Vertical
2133.0	-48.44	2.87	27.60	-23.71	-13	-10.71	Vertical
2133.0	-51.23	2.87	27.60	-26.50	-13	-13.50	Horizontal
185.7	-36.40	1.58	15.93	-22.05	-13	-9.05	Vertical
246.3	-42.19	1.36	15.59	-27.96	-13	-14.96	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.

4G and SRD can be transmitted simultaneously which is the worst data recorded in the report.

10. FREQUENCY STABILITY

RULE PART(S)

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

LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations.

§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

Temp. = -30° to $+50^{\circ}\text{C}$

Voltage = low voltage, AC 110V, Normal, AC 120V/60Hz and High voltage, AC 240V.

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 2/4/12

RESULTS

See the following pages.

10.1 LTE BAND 2

Band 2 QPSK, (20MHz BANDWIDTH RB size 100 RB Offset 0)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
110	1880	12.5	0.006652	2.5
120	1880	13.9	0.007389	2.5
240	1880	12.9	0.006837	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1880	13.1	0.006951	2.5
Extreme (50C)	1880	11.4	0.006064	2.5
Extreme (40C)	1880	13.6	0.007259	2.5
Extreme (30C)	1880	13.6	0.007215	2.5
Extreme (10C)	1880	13.7	0.007274	2.5
Extreme (0C)	1880	12.1	0.006436	2.5
Extreme (-10C)	1880	13.1	0.006968	2.5
Extreme (-20C)	1880	14.5	0.007739	2.5
Extreme (-30C)	1880	15.0	0.007993	2.5

Band 2 16QAM, (20MHz BANDWIDTH RB size 100 RB Offset 0)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
110	1880	9.3	0.004961	2.5
120	1880	9.0	0.004764	2.5
240	1880	7.8	0.004140	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1880	9.3	0.004972	2.5
Extreme (50C)	1880	9.1	0.004857	2.5
Extreme (40C)	1880	8.5	0.004496295	2.5
Extreme (30C)	1880	8.8	0.004687861	2.5
Extreme (10C)	1880	8.8	0.00469478	2.5
Extreme (0C)	1880	8.1	0.004292116	2.5
Extreme (-10C)	1880	8.9	0.004739482	2.5
Extreme (-20C)	1880	8.7	0.004634056	2.5
Extreme (-30C)	1880	8.5	0.004522369	2.5

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

10.2 LTE BAND 4

Band 4 QPSK, (20MHz BANDWIDTH RB size 100 RB Offset 0)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
110	1732.5	9.3	0.005346	2.5
120	1732.5	9.0	0.005170	2.5
240	1732.5	7.9	0.004575	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1732.5	8.4	0.004864	2.5
Extreme (50C)	1732.5	8.6	0.004963	2.5
Extreme (40C)	1732.5	7.7	0.004426	2.5
Extreme (30C)	1732.5	5.9	0.003400	2.5
Extreme (10C)	1732.5	7.3	0.004229	2.5
Extreme (0C)	1732.5	9.8	0.005669	2.5
Extreme (-10C)	1732.5	8.3	0.004798	2.5
Extreme (-20C)	1732.5	6.6	0.003789	2.5
Extreme (-30C)	1732.5	8.4	0.004837	2.5

Band 4 16QAM, (20MHz BANDWIDTH RB size 100 RB Offset 0)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
110	1732.5	9.8	0.005642	2.5
120	1732.5	9.0	0.005220	2.5
240	1732.5	8.1	0.004682	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1732.5	9.3	0.005369	2.5
Extreme (50C)	1732.5	9.3	0.005345	2.5
Extreme (40C)	1732.5	7.9	0.004531	2.5
Extreme (30C)	1732.5	9.2	0.005295	2.5
Extreme (10C)	1732.5	8.7	0.004999	2.5
Extreme (0C)	1732.5	8.5	0.004883	2.5
Extreme (-10C)	1732.5	8.9	0.005128	2.5
Extreme (-20C)	1732.5	9.1	0.005236	2.5
Extreme (-30C)	1732.5	7.9	0.004557	2.5

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

10.3 LTE BAND 12

Band 12 QPSK, (10MHz BANDWIDTH RB size 50 RB Offset 0

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
110	707.5	8.8	0.012390	2.5
120	707.5	9.8	0.013884	2.5
240	707.5	8.4	0.011866	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	707.5	8.9	0.012583	2.5
Extreme (50C)	707.5	7.8	0.011082	2.5
Extreme (40C)	707.5	7.1	0.010105	2.5
Extreme (30C)	707.5	8.3	0.011782	2.5
Extreme (10C)	707.5	7.7	0.010892	2.5
Extreme (0C)	707.5	9.5	0.013401	2.5
Extreme (-10C)	707.5	8.3	0.011672	2.5
Extreme (-20C)	707.5	8.4	0.011912	2.5
Extreme (-30C)	707.5	8.2	0.011533	2.5

Band 12 16QAM, (10MHz BANDWIDTH RB size 50 RB Offset 0)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
110	707.5	7.3	0.010279	2.5
120	707.5	8.3	0.011708	2.5
240	707.5	7.0	0.009848	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	707.5	6.5	0.009175	2.5
Extreme (50C)	707.5	5.5	0.007765	2.5
Extreme (40C)	707.5	6.4	0.009110	2.5
Extreme (30C)	707.5	-7.7	-0.010912	2.5
Extreme (10C)	707.5	-8.2	-0.011590	2.5
Extreme (0C)	707.5	2.9	0.004100	2.5
Extreme (-10C)	707.5	-5.2	-0.007292	2.5
Extreme (-20C)	707.5	-8.7	-0.012302	2.5
Extreme (-30C)	707.5	-10.2	-0.014350	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.

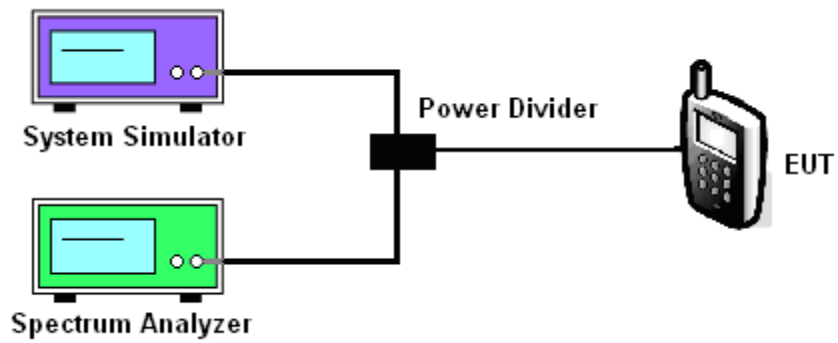
11.2 Measuring Instruments

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 2/4/12

Test data reference attachment.

-----END OF REPORT-----