FCC CFR47 PART 22H, 24E, 27
CERTIFICATION TEST REPORT
FCC ID: 2BBNN-SSW-160

Product:	Smart watch
Trade Mark:	esenses
Model No.:	SSW 160
Family Model:	N/A
Report No.:	S24030606902003
Issue Date:	Mar 27 , 2024

Prepared for

BEDIGITAL S.A.

Parque Industrial Santa Lucia Km 3.3 Via Funza Siberia
Bodega 13A, Bogota, Colombia

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name	:	BEDIGITAL S.A.
Address	:	Parque Industrial Santa Lucia Km 3.3 Via Funza Siberia Bodega 13A, Bogota, Colombia
Manufacturer's Name	:	H HK LAGENIO TECHNOLOGY CO., LIMITED
Address	:	FLAT 6 11/F CHEUNG HING BLDG540-544 NATHAN ROAD YAU MA TEIKL
Product name	:	Smart watch
Model and/or type reference	:	SSW 160
Trade Mark	:	esenses
Family Model	:	N/A
Test Sample Number		S240306069002
Standards	:	FCC CFR 47 Part 22H, Part 24E, Part 27
Test procedure	:	ANSI C63.26:2015 ANSI/TIA-603-E-2016

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

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Date of Test .....

Date (s) of performance of tests ..... Mar. 06, 2024 ~ Mar 27 , 2024

Date of Issue ..... Mar 27 , 2024

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

Prepared By	:	Mary Hu (Project Engineer)	Reviewed By	:	Aaron Cheng (Supervisor)
Approved By	:	Alex Li (Manager)			

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1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	Smart watch
Trade Mark	esenses
Model Name	SSW 160
Family Model	N/A
Model Difference	N/A
FCC ID:	2BBNN-SSW-160
Frequency Bands:	U.S. Bands: ☒LTE FDD Band 2, 4, 7
Frequency Range:	LTE FDD Band 2 Uplink: 1850MHz-1910MHz, Downlink: 1930MHz-1990MHz; LTE FDD Band 4 Uplink: 1710MHz-1755MHz, Downlink: 2110MHz-2155MHz; LTE-FDD Band 7 Uplink: 2500MHz-2570MHz, Downlink: 2620MHz-2690MHz;
Type of Modulation:	QPSK/16QAM/64QAM(Only Downlink)
Power Class	Class 3
SIM Card:	One SIM card
Antenna:	PIFA Antenna
Antenna gain:	Band 2: -5.3 dBi, Band 4: -5.0dBi, Band 7: -5.2dBi
Adapter	N/A
Battery	DC 3.8V,720mAh, 2.736Wh
Power supply	DC 3.8V from battery or DC 5V from magnetic charging port
Extreme Vol. Limits:	DC 3.23V to DC 4.37V (Nominal DC 3.8V)（Note 1）
HW Version	LW01-MB-V2.0
FW Version	N/A
SW Version	S16W_G_Q90_WC
** Note1: The High Voltage DC 4.37V and Low Voltage 3.23V 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: 2BBNN-SSW-160** filing to comply with the FCC Part 22H&24E&27

1.3 TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI/TIA-603-E-2016, FCC CFR 47 Part 2, Part 22, Part 24, Part 27, ANSI C63.26:2015.

1.4 TEST FACILITY

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

ShenZhen NTEK Testing Technology Co., Ltd.

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

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

FCC Registration No.:463705

IC Registration No.:9270A-1,

CNAS Registration No.:L5516

MEASUREMENT UNCERTAINTY

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

No.	Item	Uncertainty
1	Measuring Uncertainty for a Level of Confidence of 95% (U = 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 2/4/7

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.

1.7 SUMMARY OF TEST RESULTS

FCC Part22, Subpart H/ FCC Part24, Subpart E, FCC Part27, Subpart L, KDB 971168 D01 Power Meas License Digital Systems v03r01			
FCC Rule	**Test Item**	**Verdict**	**Remark**
2.1046	Conducted Output Power	PASS	
22.913(d) 24.232(d) 27.50(d)(5) KDB 971168 D01 Clause 5.7	Peak-to-Average Ratio	PASS	
2.1049 22.917(b) 24.238(b) KDB 971168 D01 Clause 4.2	Occupied Bandwidth	PASS	
2.1051 22.917(a) 24.238(a) 27.53(g), (h), (m) KDB 971168 D01 Clause 6	Band Edge	PASS	
22.913(a)(2) 27.50(b)(10), (c)(10) KDB 971168 D01 Clause 5.6	Effective Radiated Power	PASS	
24.232(c) 27.50(h)(2), (d)(4) KDB 971168 D01 Clause 5.6	Equivalent Isotropic Radiated Power	PASS	
2.1053 22.917(a) 24.238(a) 27.53(g), (h), (m) KDB 971168 D01 Clause 7	Field Strength of Spurious Radiation	PASS	
2.1055 22.355 24.235 27.54 KDB 971168 D01 Clause 9	Frequency Stability for Temperature & Voltage	PASS	

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

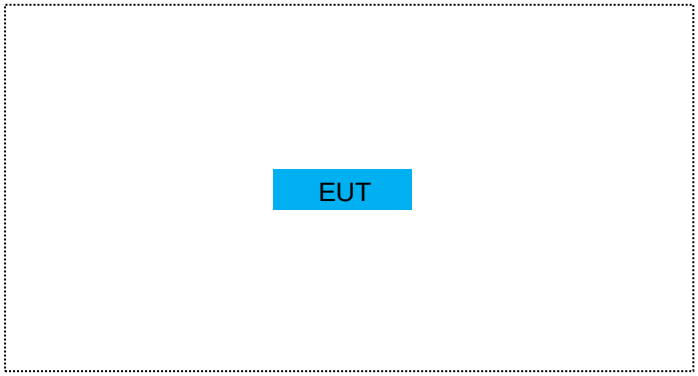
Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Note
1	Smart watch	SSW 160	FCC ID: 2BBNN-SSW-160	EUT

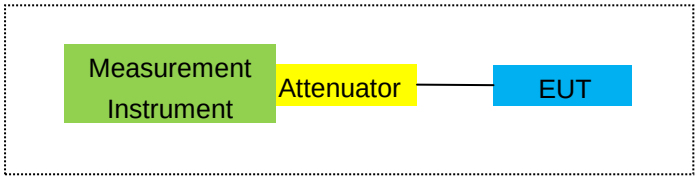
Note: All the accessories have been used during the test.
the following "EUT" in setup diagram means EUT system.

2.4 TEST SETUP

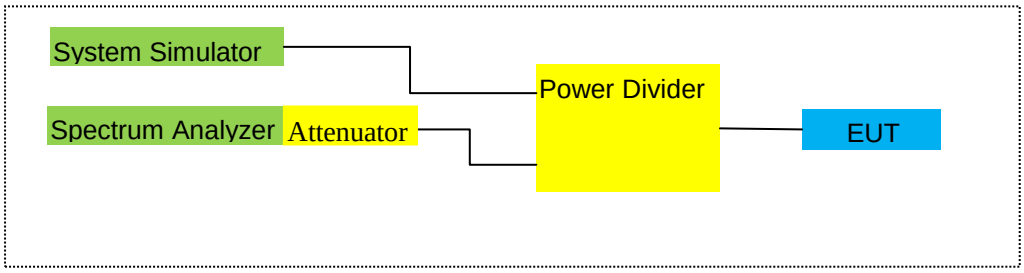
For Radiated Test Cases



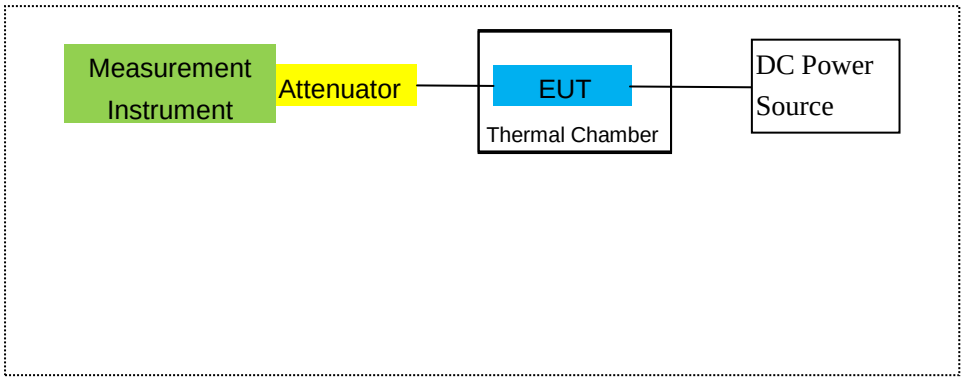
For Conducted Output Power



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	2024.05.28	1 year
2	Test Receiver	R&S	ESPI	101318	2023.03.27 2024.03.12	2024.03.26 2025.03.11	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2023.03.16 2024.03.11	2024.03.15 2025.03.10	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2023.05.06	2026.05.05	3 year
5	Horn Antenna	EM	EM-AH-10180	2011071402	2022.03.31	2025.03.30	3 year
6	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2022.03.31	2025.03.30	3 year
7	Amplifier	EM	EM-30180	060538	2023.05.29	2024.05.28	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	2024.05.28	1 year
10	Power Sensor	R&S	URV5-Z4	0395.1619.05	2023.05.29	2024.05.28	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	2023.03.27 2024.03.12	2024.03.26 2025.03.11	1 year
15	LISN	R&S	ENV216	101313	2023.03.27 2024.03.12	2024.03.26 2025.03.11	1 year
16	LISN	EMCO	3816/2	00042990	2023.03.27 2024.03.12	2024.03.26 2025.03.11	1 year
17	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2023.05.06	2026.05.05	1 year
18	Passive Voltage Probe	R&S	ESH2-Z3	100196	2023.03.27 2024.03.12	2024.03.26 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	2023.03.27 2024.03.12	2024.03.26 2025.03.11	1 year

23	test receiver	R&S	ESCI	a0304218	2023.03.27 2024.03.12	2024.03.26 2025.03.11	1 year
24	Communication Tester	R&S	CMU200	A0304247	2023.05.29	2024.05.28	1 year
25	Thermal Chamber	Ten Billion	TTC-B3C	TBN-960502	2023.03.27 2024.03.12	2024.03.26 2025.03.11	1 year
26	DC Power Source	N/A	PS-6005D	20170402923	2023.05.06	2026.05.05	3 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 2/4/7

RESULTS

PASS

Test data reference attachment.

6. BANDEDGE AND EMISSION MASK

RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238, §27.53,
FCC: §22.359

LIMITS

FCC: §22.917, §24.238, §27.53
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

(m)(4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 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 2/4/7

RESULTS

Test data reference attachment.

7. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §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 2/4/7

□

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.

TEST PROCEDURE

ANSI/TIA-603-E Clause 2.2.17
KDB 971168 v02r01 RF power output using broadband peak and average power meter method.
KDB 971168 D01 Power Meas License Digital Systems v02r01, “Measurement Guidance for Certification of Licensed Digital Transmitters”

MODES TESTED

- Band 2/4/7

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 Factor (dBi)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	6/0	1850.7	13.07	3.76	8.90	18.21	66.222	Horizontal	Pass
		1880	14.61	3.91	8.90	19.60	91.268	Horizontal	Pass
		1909.3	12.76	3.93	8.90	17.73	59.322	Horizontal	Pass
3.0MHz Band QPSK	15/0	1851.5	10.80	3.77	8.90	15.93	39.217	Horizontal	Pass
		1880	14.13	3.91	8.90	19.12	81.658	Horizontal	Pass
		1908.5	13.27	3.94	8.90	18.23	66.527	Horizontal	Pass
5.0MHz Band QPSK	25/0	1852.5	12.34	3.77	8.90	17.47	55.840	Horizontal	Pass
		1880	14.66	3.91	8.90	19.65	92.257	Horizontal	Pass
		1907.5	14.40	3.94	8.90	19.36	86.298	Horizontal	Pass
10.0MHz Band QPSK	50/0	1855	14.59	3.79	8.90	19.70	93.243	Horizontal	Pass
		1880	14.49	3.95	8.90	19.44	87.959	Horizontal	Pass
		1905	13.67	3.97	8.90	18.60	72.363	Horizontal	Pass
15.0MHz Band QPSK	75/0	1857.5	14.20	3.79	8.90	19.31	85.371	Horizontal	Pass
		1880	12.92	3.95	8.90	17.87	61.203	Horizontal	Pass
		1902.5	11.42	3.97	8.90	16.35	43.152	Horizontal	Pass
20.0MHz Band QPSK	100/0	1860	14.27	3.81	8.90	19.36	86.298	Horizontal	Pass
		1880	14.11	3.96	8.90	19.05	80.330	Horizontal	Pass
		1900	13.05	4.00	8.90	17.95	62.317	Horizontal	Pass
1.4MHz Band QPSK	6/0	1850.7	13.96	3.76	8.90	19.10	81.247	Vertical	Pass
		1880	11.48	3.91	8.90	16.47	44.311	Vertical	Pass
		1909.3	11.23	3.93	8.90	16.20	41.642	Vertical	Pass
3.0MHz Band QPSK	15/0	1851.5	14.15	3.77	8.90	19.28	84.791	Vertical	Pass
		1880	13.37	3.91	8.90	18.36	68.627	Vertical	Pass
		1908.5	13.06	3.94	8.90	18.02	63.342	Vertical	Pass
5.0MHz Band QPSK	25/0	1852.5	12.34	3.77	8.90	17.47	55.817	Vertical	Pass
		1880	14.33	3.91	8.90	19.32	85.507	Vertical	Pass
		1907.5	14.63	3.94	8.90	19.59	91.005	Vertical	Pass
10.0MHz Band QPSK	50/0	1855	14.26	3.79	8.90	19.37	86.414	Vertical	Pass
		1880	12.88	3.95	8.90	17.83	60.727	Vertical	Pass
		1905	11.54	3.97	8.90	16.47	44.381	Vertical	Pass

15.0MHz Band QPSK	75/0	1857.5	14.21	3.79	8.90	19.32	85.507	Vertical	Pass
		1880	11.82	3.95	8.90	16.77	47.582	Vertical	Pass
		1902.5	12.68	3.97	8.90	17.61	57.706	Vertical	Pass
20.0MHz Band QPSK	100/0	1860	13.26	3.81	8.90	18.35	68.391	Vertical	Pass
		1880	14.83	3.96	8.90	19.77	94.842	Vertical	Pass
		1900	13.83	4.00	8.90	18.73	74.575	Vertical	Pass

Radiated Power (EIRP) for Band 2									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Factor (dBi)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band 16 QAM	6/0	1850.7	14.60	3.76	8.90	18.03	63.479	Horizontal	Pass
		1880	15.75	3.91	8.90	18.24	66.681	Horizontal	Pass
		1909.3	15.45	3.93	8.90	18.11	64.714	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	1851.5	15.29	3.77	8.90	16.24	42.108	Horizontal	Pass
		1880	14.95	3.91	8.90	18.35	68.391	Horizontal	Pass
		1908.5	14.55	3.94	8.90	18.21	66.222	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	1852.5	15.14	3.77	8.90	17.89	61.454	Horizontal	Pass
		1880	15.50	3.91	8.90	18.21	66.222	Horizontal	Pass
		1907.5	14.00	3.94	8.90	18.96	78.623	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	1855	15.35	3.79	8.90	18.24	66.681	Horizontal	Pass
		1880	14.05	3.95	8.90	18.44	69.864	Horizontal	Pass
		1905	15.36	3.97	8.90	17.99	63.005	Horizontal	Pass
15.0MHz Band 16 QAM	75/0	1857.5	13.68	3.79	8.90	18.21	66.222	Horizontal	Pass
		1880	15.77	3.95	8.90	18.33	68.077	Horizontal	Pass
		1902.5	15.65	3.97	8.90	18.03	63.533	Horizontal	Pass
20.0MHz Band 16 QAM	100/0	1860	13.84	3.81	8.90	16.18	41.484	Horizontal	Pass
		1880	16.17	3.96	8.90	18.32	67.920	Horizontal	Pass
		1900	14.55	4.00	8.90	17.23	52.888	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	1850.7	14.61	3.76	8.90	18.23	66.527	Vertical	Pass
		1880	15.84	3.91	8.90	16.97	49.719	Vertical	Pass
		1909.3	15.13	3.93	8.90	18.12	64.913	Vertical	Pass
3.0MHz Band 16 QAM	15/0	1851.5	13.77	3.77	8.90	18.22	66.374	Vertical	Pass
		1880	14.83	3.91	8.90	18.63	72.946	Vertical	Pass
		1908.5	14.56	3.94	8.90	18.35	68.391	Vertical	Pass
5.0MHz	25/0	1852.5	13.76	3.77	8.90	18.36	68.549	Vertical	Pass

Band 16 QAM		1880	15.05	3.91	8.90	18.41	69.285	Vertical	Pass
		1907.5	15.69	3.94	8.90	17.67	58.418	Vertical	Pass
10.0MHz Band 16 QAM	50/0	1855	13.98	3.79	8.90	17.92	61.976	Vertical	Pass
		1880	15.57	3.95	8.90	18.52	71.121	Vertical	Pass
		1905	15.12	3.97	8.90	17.80	60.263	Vertical	Pass
15.0MHz Band 16 QAM	75/0	1857.5	13.85	3.79	8.90	17.48	56.029	Vertical	Pass
		1880	14.87	3.95	8.90	18.25	66.834	Vertical	Pass
		1902.5	13.66	3.97	8.90	17.64	58.048	Vertical	Pass
20.0MHz Band 16 QAM	100/0	1860	14.29	3.81	8.90	18.23	66.527	Vertical	Pass
		1880	14.90	3.96	8.90	18.96	78.705	Vertical	Pass
		1900	13.78	4.00	8.90	16.28	42.429	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					Polarization Of Max. ERP	Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Factor (dBi)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)		
1.4MHz Band QPSK	6/0	1710.7	13.11	3.12	8.90	18.89	77.534	Horizontal	Pass
		1732.5	12.83	3.27	8.90	18.46	70.079	Horizontal	Pass
		1754.3	12.16	3.29	8.90	17.77	59.801	Horizontal	Pass
3.0MHz Band QPSK	15/0	1711.5	13.35	3.13	8.90	19.12	81.658	Horizontal	Pass
		1732.5	13.30	3.27	8.90	18.93	78.074	Horizontal	Pass
		1753.5	13.64	3.30	8.90	19.24	83.974	Horizontal	Pass
5.0MHz Band QPSK	25/0	1712.5	13.25	3.13	8.90	19.02	79.799	Horizontal	Pass
		1732.5	12.60	3.27	8.90	18.23	66.527	Horizontal	Pass
		1752.5	13.43	3.30	8.90	19.03	79.983	Horizontal	Pass
10.0MHz Band QPSK	50/0	1715	13.36	3.15	8.90	19.11	81.470	Horizontal	Pass
		1732.5	13.75	3.31	8.90	19.34	85.884	Horizontal	Pass
		1750	13.76	3.33	8.90	19.33	85.704	Horizontal	Pass
15.0MHz Band QPSK	75/0	1717.5	13.56	3.15	8.90	19.31	85.403	Horizontal	Pass
		1732.5	13.28	3.31	8.90	18.87	77.004	Horizontal	Pass
		1747.5	13.51	3.33	8.90	19.08	80.929	Horizontal	Pass
20.0MHz Band QPSK	100/0	1720	12.17	3.17	8.90	17.90	61.643	Horizontal	Pass
		1732.5	13.65	3.32	8.90	19.23	83.753	Horizontal	Pass
		1745	13.67	3.36	8.90	19.21	83.368	Horizontal	Pass
1.4MHz Band QPSK	6/0	1710.7	13.47	3.12	8.90	19.25	84.140	Vertical	Pass
		1732.5	13.49	3.27	8.90	19.12	81.658	Vertical	Pass
		1754.3	12.46	3.29	8.90	18.07	64.158	Vertical	Pass
3.0MHz Band QPSK	15/0	1711.5	12.91	3.13	8.90	18.68	73.787	Vertical	Pass
		1732.5	12.69	3.27	8.90	18.32	67.945	Vertical	Pass
		1753.5	12.73	3.30	8.90	18.33	68.077	Vertical	Pass
5.0MHz Band QPSK	25/0	1712.5	13.24	3.13	8.90	19.01	79.616	Vertical	Pass
		1732.5	13.69	3.27	8.90	19.32	85.507	Vertical	Pass
		1752.5	12.65	3.30	8.90	18.25	66.875	Vertical	Pass
10.0MHz Band QPSK	50/0	1715	10.83	3.15	8.90	16.58	45.495	Vertical	Pass
		1732.5	13.53	3.31	8.90	19.12	81.658	Vertical	Pass
		1750	13.54	3.33	8.90	19.11	81.470	Vertical	Pass

15.0MHz Band QPSK	75/0	1717.5	13.26	3.15	8.90	19.01	79.616	Vertical	Pass
		1732.5	13.43	3.31	8.90	19.02	79.765	Vertical	Pass
		1747.5	12.71	3.33	8.90	18.28	67.226	Vertical	Pass
20.0MHz Band QPSK	100/0	1720	13.49	3.17	8.90	19.22	83.560	Vertical	Pass
		1732.5	13.95	3.32	8.90	19.53	89.743	Vertical	Pass
		1745	12.25	3.36	8.90	17.79	60.059	Vertical	Pass

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Factor (dBi)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band 16 QAM	6/0	1710.7	12.37	3.12	8.90	18.15	65.277	Horizontal	Pass
		1732.5	12.63	3.27	8.90	18.26	66.988	Horizontal	Pass
		1754.3	12.48	3.29	8.90	18.09	64.376	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	1711.5	11.93	3.13	8.90	17.70	58.946	Horizontal	Pass
		1732.5	12.70	3.27	8.90	18.33	68.077	Horizontal	Pass
		1753.5	12.98	3.30	8.90	18.58	72.116	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	1712.5	10.69	3.13	8.90	16.46	44.211	Horizontal	Pass
		1732.5	10.51	3.27	8.90	16.14	41.073	Horizontal	Pass
		1752.5	12.61	3.30	8.90	18.21	66.288	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	1715	12.79	3.15	8.90	18.54	71.450	Horizontal	Pass
		1732.5	12.09	3.31	8.90	17.68	58.585	Horizontal	Pass
		1750	12.09	3.33	8.90	17.66	58.310	Horizontal	Pass
15.0MHz Band 16 QAM	75/0	1717.5	12.38	3.15	8.90	18.13	65.013	Horizontal	Pass
		1732.5	12.53	3.31	8.90	18.12	64.863	Horizontal	Pass
		1747.5	12.65	3.33	8.90	18.22	66.374	Horizontal	Pass
20.0MHz Band 16 QAM	100/0	1720	12.20	3.17	8.90	17.93	62.050	Horizontal	Pass
		1732.5	12.54	3.32	8.90	18.12	64.863	Horizontal	Pass
		1745	12.78	3.36	8.90	18.32	67.846	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	1710.7	12.34	3.12	8.90	18.12	64.863	Vertical	Pass
		1732.5	13.11	3.27	8.90	18.74	74.760	Vertical	Pass
		1754.3	12.61	3.29	8.90	18.22	66.374	Vertical	Pass
3.0MHz Band 16 QAM	15/0	1711.5	12.25	3.13	8.90	18.02	63.387	Vertical	Pass
		1732.5	12.13	3.27	8.90	17.76	59.756	Vertical	Pass
		1753.5	12.64	3.30	8.90	18.24	66.681	Vertical	Pass
5.0MHz	25/0	1712.5	12.55	3.13	8.90	18.32	67.920	Vertical	Pass

Band 16 QAM		1732.5	12.61	3.27	8.90	18.24	66.681	Vertical	Pass
		1752.5	11.89	3.30	8.90	17.49	56.058	Vertical	Pass
10.0MHz Band 16 QAM	50/0	1715	12.51	3.15	8.90	18.26	67.028	Vertical	Pass
		1732.5	13.04	3.31	8.90	18.63	72.946	Vertical	Pass
		1750	12.66	3.33	8.90	18.23	66.527	Vertical	Pass
15.0MHz Band 16 QAM	75/0	1717.5	11.27	3.15	8.90	17.02	50.364	Vertical	Pass
		1732.5	12.08	3.31	8.90	17.67	58.497	Vertical	Pass
		1747.5	12.66	3.33	8.90	18.23	66.527	Vertical	Pass
20.0MHz Band 16 QAM	100/0	1720	13.05	3.17	8.90	18.78	75.476	Vertical	Pass
		1732.5	12.78	3.32	8.90	18.36	68.549	Vertical	Pass
		1745	12.98	3.36	8.90	18.52	71.121	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 7

Radiated Power (EIRP) for Band 7									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Factor (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
5.0MHz Band QPSK	25/0	2502.5	15.29	4.54	9.00	19.75	94.492	Horizontal	Pass
		2535	14.94	4.69	9.00	19.25	84.131	Horizontal	Pass
		2567.5	12.04	4.71	9.00	16.33	42.915	Horizontal	Pass
10.0MHz Band QPSK	50/0	2505	12.11	4.55	9.00	16.56	45.326	Horizontal	Pass
		2535	15.01	4.69	9.00	19.32	85.557	Horizontal	Pass
		2565	14.01	4.72	9.00	18.29	67.383	Horizontal	Pass
15.0MHz Band QPSK	75/0	2507.5	15.39	4.55	9.00	19.84	96.492	Horizontal	Pass
		2535	14.40	4.69	9.00	18.71	74.285	Horizontal	Pass
		2562.5	13.91	4.72	9.00	18.19	65.842	Horizontal	Pass
20.0MHz Band QPSK	100/0	2510	13.69	4.57	9.00	18.12	64.813	Horizontal	Pass
		2535	15.65	4.73	9.00	19.92	98.093	Horizontal	Pass
		2560	14.81	4.75	9.00	19.06	80.480	Horizontal	Pass
5.0MHz Band QPSK	25/0	2502.5	14.72	4.54	9.00	19.18	82.792	Vertical	Pass
		2535	15.47	4.69	9.00	19.78	95.018	Vertical	Pass
		2567.5	14.07	4.71	9.00	18.36	68.549	Vertical	Pass
10.0MHz Band QPSK	50/0	2505	14.10	4.55	9.00	18.55	71.543	Vertical	Pass
		2535	15.07	4.69	9.00	19.38	86.598	Vertical	Pass
		2565	15.14	4.72	9.00	19.42	87.438	Vertical	Pass
15.0MHz Band QPSK	75/0	2507.5	14.26	4.55	9.00	18.71	74.316	Vertical	Pass
		2535	15.81	4.69	9.00	20.12	102.877	Vertical	Pass
		2562.5	15.24	4.72	9.00	19.52	89.606	Vertical	Pass
20.0MHz Band QPSK	100/0	2510	15.22	4.57	9.00	19.65	92.321	Vertical	Pass
		2535	14.99	4.73	9.00	19.26	84.305	Vertical	Pass
		2560	16.39	4.75	9.00	20.64	115.913	Vertical	Pass

Radiated Power (EIRP) for Band 7									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Factor (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
5.0MHz Band 16 QAM	25/0	2502.5	14.31	4.54	9.00	18.77	75.395	Horizontal	Pass
		2535	15.43	4.69	9.00	19.74	94.087	Horizontal	Pass
		2567.5	15.24	4.71	9.00	19.53	89.681	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	2505	14.78	4.55	9.00	19.23	83.748	Horizontal	Pass
		2535	15.03	4.69	9.00	19.34	85.895	Horizontal	Pass
		2565	15.32	4.72	9.00	19.60	91.126	Horizontal	Pass
15.0MHz Band 16 QAM	75/0	2507.5	15.16	4.55	9.00	19.61	91.435	Horizontal	Pass
		2535	15.08	4.69	9.00	19.39	86.994	Horizontal	Pass
		2562.5	14.32	4.72	9.00	18.60	72.367	Horizontal	Pass
20.0MHz Band 16 QAM	100/0	2510	15.11	4.57	9.00	19.54	90.053	Horizontal	Pass
		2535	13.28	4.73	9.00	17.55	56.919	Horizontal	Pass
		2560	14.87	4.75	9.00	19.12	81.742	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	2502.5	14.80	4.54	9.00	19.26	84.291	Vertical	Pass
		2535	15.25	4.69	9.00	19.56	90.309	Vertical	Pass
		2567.5	15.38	4.71	9.00	19.67	92.653	Vertical	Pass
10.0MHz Band 16 QAM	50/0	2505	14.40	4.55	9.00	18.85	76.804	Vertical	Pass
		2535	15.11	4.69	9.00	19.42	87.444	Vertical	Pass
		2565	15.41	4.72	9.00	19.69	93.118	Vertical	Pass
15.0MHz Band 16 QAM	75/0	2507.5	15.01	4.55	9.00	19.46	88.260	Vertical	Pass
		2535	15.18	4.69	9.00	19.49	88.994	Vertical	Pass
		2562.5	13.55	4.72	9.00	17.83	60.644	Vertical	Pass
20.0MHz Band 16 QAM	100/0	2510	15.39	4.57	9.00	19.82	96.008	Vertical	Pass
		2535	14.89	4.73	9.00	19.16	82.346	Vertical	Pass
		2560	15.09	4.75	9.00	19.34	85.854	Vertical	Pass

Note:

SG Level= Signal generator output

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

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 log10(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 Log10 (p), dB; and
b. for mobile subscriber equipment, the attenuation shall not be less than 43 + 10 Log10 (p), dB at the channel edges and 55 + 10 Log10 (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 2/4/7

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	-48.77	4.04	33.51	-19.30	-13	-6.30	Horizontal
3701.4	-48.24	4.04	33.51	-18.77	-13	-5.77	Vertical
5552.1	-52.79	5.24	35.84	-22.19	-13	-9.19	Vertical
5552.1	-63.31	5.24	35.84	-32.71	-13	-19.71	Horizontal
Test Results for Mid Channel 1880MHz							
3760	-48.44	4.04	33.56	-18.92	-13	-5.92	Horizontal
3760	-49.64	4.04	33.56	-20.12	-13	-7.12	Vertical
5640	-49.48	5.24	35.91	-18.81	-13	-5.81	Vertical
5640	-52.28	5.24	35.91	-21.61	-13	-8.61	Horizontal
Test Results for High Channel 1909.3MHz							
3818.6	-49.35	4.04	34.00	-19.39	-13	-6.39	Horizontal
3818.6	-52.59	4.04	34.00	-22.63	-13	-9.63	Vertical
5727.9	-54.55	5.24	36.04	-23.75	-13	-10.75	Vertical
5727.9	-54.31	5.24	36.04	-23.51	-13	-10.51	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	-52.41	4.07	33.54	-22.94	-13	-9.94	Horizontal
3720	-47.39	4.07	33.54	-17.92	-13	-4.92	Vertical
5580	-53.43	5.28	35.86	-22.85	-13	-9.85	Vertical
5580	-55.91	5.28	35.86	-25.33	-13	-12.33	Horizontal
Test Results for Mid Channel 1880MHz							
3760	-51.46	4.04	33.56	-21.94	-13	-8.94	Horizontal
3760	-47.88	4.04	33.56	-18.36	-13	-5.36	Vertical
5640	-51.36	5.24	35.91	-20.69	-13	-7.69	Vertical
5640	-53.07	5.24	35.91	-22.40	-13	-9.40	Horizontal
Test Results for High Channel 1900MHz							
3800	-48.78	4.04	34.00	-18.82	-13	-5.82	Horizontal
3800	-50.75	4.04	34.00	-20.79	-13	-7.79	Vertical
5700	-52.89	5.24	36.04	-22.09	-13	-9.09	Vertical
5700	-52.80	5.24	36.04	-22.00	-13	-9.00	Horizontal

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(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	-53.15	4.02	29.80	-27.37	-13	-14.37	Horizontal
3421.4	-52.31	4.02	29.80	-26.53	-13	-13.53	Vertical
5132.1	-55.91	5.24	35.84	-25.31	-13	-12.31	Vertical
5132.1	-57.47	5.24	35.84	-26.87	-13	-13.87	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465	-45.40	4.03	30.00	-19.43	-13	-6.43	Horizontal
3465	-51.77	4.03	30.00	-25.80	-13	-12.80	Vertical
5197.5	-52.19	5.25	35.86	-21.58	-13	-8.58	Vertical
5197.5	-52.37	5.25	35.86	-21.76	-13	-8.76	Horizontal
Test Results for High Channel 1754.3MHz							
3508.6	-46.77	4.05	30.01	-20.81	-13	-7.81	Horizontal
3508.6	-54.85	4.05	30.01	-28.89	-13	-15.89	Vertical
5262.9	-52.07	5.26	35.86	-21.47	-13	-8.47	Vertical
5262.9	-51.36	5.26	35.86	-20.76	-13	-7.76	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	-50.52	4.02	29.80	-24.74	-13	-11.74	Horizontal
3440	-52.52	4.02	29.80	-26.74	-13	-13.74	Vertical
5160	-54.26	5.24	35.84	-23.66	-13	-10.66	Vertical
5160	-57.10	5.24	35.84	-26.50	-13	-13.50	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465	-45.48	4.03	30.00	-19.51	-13	-6.51	Horizontal
3465	-47.42	4.03	30.00	-21.45	-13	-8.45	Vertical
5197.5	-54.88	5.25	35.86	-24.27	-13	-11.27	Vertical
5197.5	-52.65	5.25	35.86	-22.04	-13	-9.04	Horizontal
Test Results for High Channel 1745MHz							
2490	-47.93	2.91	27.68	-23.16	-13	-10.16	Horizontal
3490	-51.02	2.91	27.68	-26.25	-13	-13.25	Vertical
5235	-54.27	5.26	35.86	-23.67	-13	-10.67	Vertical
5235	-53.45	5.26	35.86	-22.85	-13	-9.85	Horizontal

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(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 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	-64.83	5.23	35.81	-34.25	-25	-9.25	Horizontal
5005	-62.96	5.23	35.81	-32.38	-25	-7.38	Vertical
7507.5	-67.87	5.67	36.85	-36.69	-25	-11.69	Vertical
7507.5	-63.85	5.67	36.85	-32.67	-25	-7.67	Horizontal
Test Results for Mid Channel 2535MHz							
5070	-61.52	5.23	35.82	-30.93	-25	-5.93	Horizontal
5070	-64.28	5.23	35.82	-33.69	-25	-8.69	Vertical
7605	-65.64	5.67	36.85	-34.46	-25	-9.46	Vertical
7605	-65.30	5.67	36.85	-34.12	-25	-9.12	Horizontal
Test Results for High Channel 2567.5MHz							
5135	-65.86	5.24	35.83	-35.27	-25	-10.27	Horizontal
5135	-62.96	5.24	35.83	-32.37	-25	-7.37	Vertical
7702.5	-64.70	5.68	36.87	-33.51	-25	-8.51	Vertical
7702.5	-67.49	5.68	36.87	-36.30	-25	-11.30	Horizontal

QPSK EIRP POWER FOR LTE BAND 7 (20.0MHZ BANDWIDTH)

Test Results for Low Channel 2510MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Factor(dB)	Absolute Level(dBm)	Limit （dBm）	Margin(dBm)	Polarity
5020	-64.64	5.23	35.82	-34.05	-25	-9.05	Horizontal
5020	-61.86	5.23	35.82	-31.27	-25	-6.27	Vertical
7530	-64.99	5.67	36.86	-33.80	-25	-8.80	Vertical
7530	-60.67	5.67	36.86	-29.48	-25	-4.48	Horizontal
Test Results for Mid Channel 2535MHz							
5070	-61.82	5.23	35.82	-31.23	-25	-6.23	Horizontal
5070	-62.73	5.23	35.82	-32.14	-25	-7.14	Vertical
7605	-63.45	5.67	36.85	-32.27	-25	-7.27	Vertical
7605	-65.80	5.67	36.85	-34.62	-25	-9.62	Horizontal
Test Results for High Channel 2560MHz							
5120	-60.24	5.24	35.83	-29.65	-25	-4.65	Horizontal
5120	-65.29	5.24	35.83	-34.70	-25	-9.70	Vertical
7680	-64.49	5.70	36.88	-33.31	-25	-8.31	Vertical
7680	-65.94	5.70	36.88	-34.76	-25	-9.76	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.

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°C
- Voltage =low voltage, DC 323V, Normal, DC 3.8V and High voltage, DC 4.37V.

Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to -30ºC 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 +50ºC is reached.

Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

MODES TESTED

LTE Band 2/4/7

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]
3.23	1880	8	0.00426	2.5
3.8	1880	5	0.00266	2.5
4.37	1880	25	0.01330	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1880	0	0.00000	2.5
Extreme (50C)	1880	13	0.00691	2.5
Extreme (40C)	1880	6	0.00319	2.5
Extreme (30C)	1880	3	0.00160	2.5
Extreme (10C)	1880	6	0.00319	2.5
Extreme (0C)	1880	19	0.01011	2.5
Extreme (-10C)	1880	12	0.00638	2.5
Extreme (-20C)	1880	22	0.01170	2.5
Extreme (-30C)	1880	17	0.00904	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]
3.23	1880	6	0.00319	2.5
3.8	1880	8	0.00426	2.5
4.37	1880	0	0.00000	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1880	13	0.00691	2.5
Extreme (50C)	1880	10	0.00532	2.5
Extreme (40C)	1880	21	0.01117	2.5
Extreme (30C)	1880	5	0.00266	2.5
Extreme (10C)	1880	20	0.01064	2.5
Extreme (0C)	1880	0	0.00000	2.5
Extreme (-10C)	1880	4	0.00213	2.5
Extreme (-20C)	1880	15	0.00798	2.5
Extreme (-30C)	1880	15	0.00798	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]
3.23	1732.5	20	0.01154	2.5
3.8	1732.5	24	0.01385	2.5
4.37	1732.5	5	0.00289	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1732.5	9	0.00519	2.5
Extreme (50C)	1732.5	21	0.01212	2.5
Extreme (40C)	1732.5	3	0.00173	2.5
Extreme (30C)	1732.5	1	0.00058	2.5
Extreme (10C)	1732.5	11	0.00635	2.5
Extreme (0C)	1732.5	3	0.00173	2.5
Extreme (-10C)	1732.5	13	0.00750	2.5
Extreme (-20C)	1732.5	8	0.00462	2.5
Extreme (-30C)	1732.5	13	0.00750	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]
3.23	1732.5	13	0.00750	2.5
3.8	1732.5	14	0.00808	2.5
4.37	1732.5	17	0.00981	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1732.5	13	0.00750	2.5
Extreme (50C)	1732.5	3	0.00173	2.5
Extreme (40C)	1732.5	4	0.00231	2.5
Extreme (30C)	1732.5	2	0.00115	2.5
Extreme (10C)	1732.5	15	0.00866	2.5
Extreme (0C)	1732.5	8	0.00462	2.5
Extreme (-10C)	1732.5	10	0.00577	2.5
Extreme (-20C)	1732.5	6	0.00346	2.5
Extreme (-30C)	1732.5	5	0.00289	2.5

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

10.3 LTE BAND 7

Band 7 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]
3.23	2535	1	0.00039	2.5
3.8	2535	16	0.00631	2.5
4.37	2535	14	0.00552	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2535	13	0.00513	2.5
Extreme (50C)	2535	10	0.00394	2.5
Extreme (40C)	2535	8	0.00316	2.5
Extreme (30C)	2535	9	0.00355	2.5
Extreme (10C)	2535	10	0.00394	2.5
Extreme (0C)	2535	10	0.00394	2.5
Extreme (-10C)	2535	3	0.00118	2.5
Extreme (-20C)	2535	22	0.00868	2.5
Extreme (-30C)	2535	21	0.00828	2.5

Band 7 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]
3.23	2535	10	0.00394	2.5
3.8	2535	12	0.00473	2.5
4.37	2535	19	0.00750	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2535	0	0.00000	2.5
Extreme (50C)	2535	20	0.00789	2.5
Extreme (40C)	2535	21	0.00828	2.5
Extreme (30C)	2535	14	0.00552	2.5
Extreme (10C)	2535	23	0.00907	2.5
Extreme (0C)	2535	23	0.00907	2.5
Extreme (-10C)	2535	23	0.00907	2.5
Extreme (-20C)	2535	3	0.00118	2.5
Extreme (-30C)	2535	21	0.00828	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.

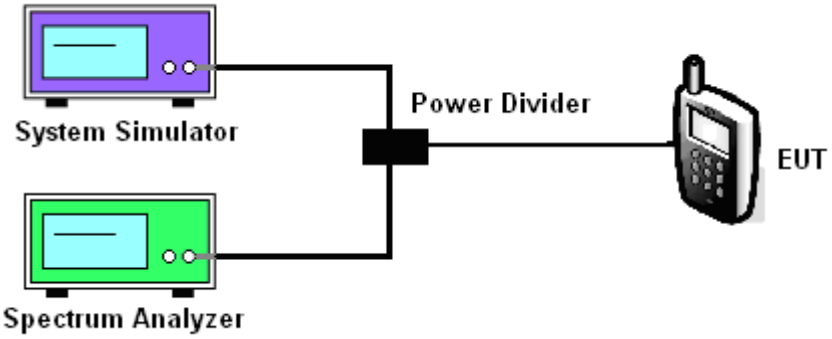
11.2 Measuring Instruments

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 2/4/7

Test data reference attachment.

----END OF REPORT----