

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

FCC ID: 2AV3BSP4702

Product: 4G Tablet

Trade Mark: ADVANCE

Model No.: SP4702

Family Model: N/A

Report No.: STR230406001005E

Issue Date: Apr 25, 2023

Prepared for

TECHNOSOURCE HK LIMITED

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Prepared by

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TEST RESULT CERTIFICATION

Applicant's name : TECHNOSOURCE HK LIMITED

Address..... : 2F, Building B, Sulandscape Industrial park, Shiyan Town, Bao'an District, Shenzhen China

Manufacturer's Name..... : TECHNOSOURCE HK LIMITED

Address..... : 2F, Building B, Sulandscape Industrial park, Shiyan Town, Bao'an District, Shenzhen China

Product name..... : 4G Tablet

Model and/or type reference .. : SP4702

Trade Mark..... : ADVANCE

Family Model..... : N/A

Test Sample Number..... T230406001R003

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..... Apr 07, 2023 ~ Apr 25, 2023

Date of Issue Apr 25, 2023

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

Testing Engineer :



(Allen Liu)

Authorized Signatory :



(Alex Li)

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1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	4G Tablet
Trade Mark	ADVANCE
Model Name	SP4702
Family Model	N/A
Model Difference	N/A
FCC ID:	2AV3BSP4702
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	SIM 1 and SIM 2 is a chipset unit and tested as a single chipset. The SIM 1 is chosen for test.
Antenna:	PIFA Antenna
Antenna gain:	Band 2:3.81dBi; Band 4:2.94dBi; Band 7:0.23dBi;
Adapter	MODEL: JYX-70 INPUT: 110-220V~50-60Hz 0.4A OUTPUT: 5VDC---2.0A
Battery	DC 3.8V, 5000mAh
Power supply	DC 3.8V from battery or DC 5V from Adapter.
Extreme Vol. Limits:	DC 3.4V to DC 4.2V (Nominal DC 3.8V) (Note 1)
HW Version	S863T-9863A-V1.0
SW Version	ADVANCE_SP4702
** Note1: The High Voltage DC 4.2V and Low Voltage 3.4V was declared by manufacturer, The EUT couldn't be operate normally with higher or lower voltage.	

1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AV3BSP4702** filing to comply with the FCC Part 22H&24E&27.

1.3 TEST METHODOLOGY

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

1.4 TEST FACILITY

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

ShenZhen NTEK Testing Technology Co., Ltd.

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

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

FCC Registration No.:463705

IC Registration No.:9270A-1,

CNAS Registration No.:L5516

MEASUREMENT UNCERTAINTY

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

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

1.5 SPECIAL ACCESSORIES

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

1.6 WORST-CASE CONFIGURATION AND MODE

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

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

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.

2. SYSTEM TEST CONFIGURATION

2.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT EXERCISE

The Transmitter was operated in the maximum output power mode through Communication Tester. The TX frequency was fixed which was for the purpose of the measurements.

2.3 CONFIGURATION OF EUT SYSTEM

Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Note
1	4G Tablet	SP4702	FCC ID: 2AV3BSP4702	EUT

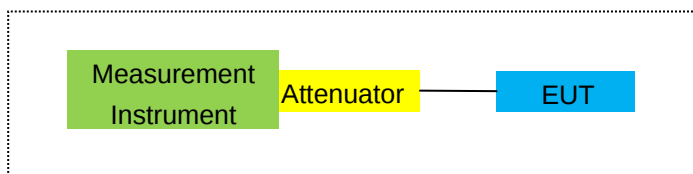
*Note: All the accessories have been used during the test.
the following "EUT" in setup diagram means EUT system.*

2.4 TEST SETUP

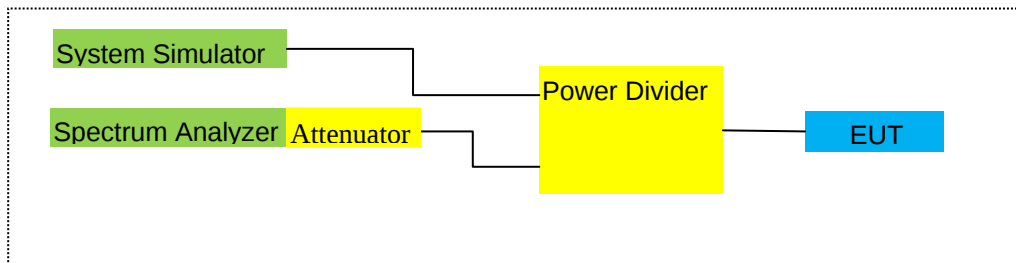
For Radiated Test Cases



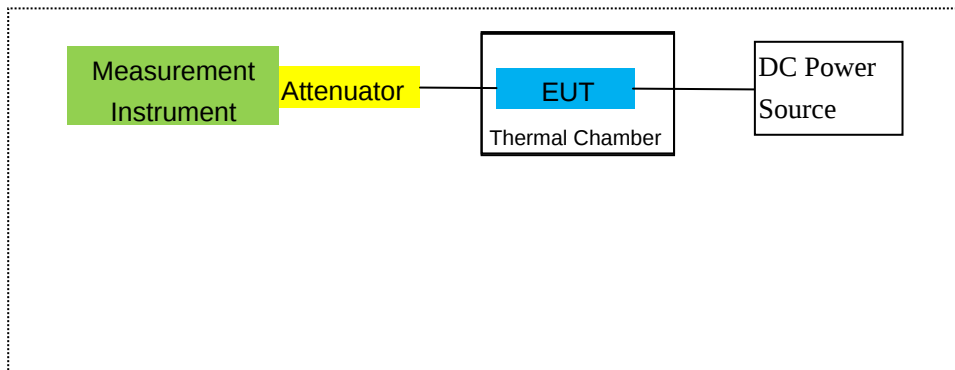
For Conducted Output Power



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	2022.06.17	2023.06.16	1 year
2	Test Receiver	R&S	ESPI	101318	2023.03.27	2024.03.26	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2023.03.27	2024.03.26	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2020.05.11	2023.05.10	3 year
5	Horn Antenna	EM	EM-AH-10180	2011071402	2023.03.27	2024.03.26	1 year
6	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2022.06.17	2023.06.16	1 year
7	Amplifier	EM	EM-30180	060538	2022.06.17	2023.06.16	1 year
8	Loop Antenna	ARA	PLA-1030/B	1029	2023.03.27	2024.03.26	1 year
9	Power Meter	R&S	NRVS	100696	2022.06.17	2023.06.16	1 year
10	Power Sensor	R&S	URV5-Z4	0395.1619.05	2023.03.27	2024.03.26	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	2024.03.26	1 year
15	LISN	R&S	ENV216	101313	2023.03.27	2024.03.26	1 year
16	LISN	EMCO	3816/2	00042990	2023.03.27	2024.03.26	1 year
17	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2023.03.27	2024.03.26	1 year
18	Passive Voltage Probe	R&S	ESH2-Z3	100196	2023.03.27	2024.03.26	1 year
19	Test Cable	N/A	C01	N/A	2020.05.11	2023.05.10	3 year
20	Test Cable	N/A	C02	N/A	2020.05.11	2023.05.10	3 year
21	Test Cable	N/A	C03	N/A	2020.05.11	2023.05.10	3 year
22	Attenuator	MCE	24-10-34	BN9258	2023.03.27	2024.03.26	1 year
23	Spectrum Analyzer	agilent	e4440a	us44300399	2023.03.27	2024.03.26	1 year
24	test receiver	R&S	ESCI	a0304218	2023.03.27	2024.03.26	1 year
25	Communication Tester	R&S	CMU200	A0304247	2022.06.16	2023.06.15	1 year

26	Thermal Chamber	Ten Billion	TTC-B3C	TBN-960502	2023.03.27	2024.03.26	1 year
27	DC Power Source	N/A	PS-6005D	20170402923	2020.05.11	2023.05.10	3 year
28	MXG Vector Signal Generator	Agilent	N5182A	MY47070317	2022.06.16	2023.06.15	1 year
29	Communication Tester	R&S	CMW500	148500	2022.06.16	2023.06.15	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 2/4/7

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 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 2/4/7

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

TEST PROCEDURE

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

For each out of band emissions measurement:

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

MODES TESTED

- ☐ 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 (dB)	Max. EIRP Average (dBm)	Max.	Polarization Of Max. ERP	
							EIRP		
							Average		
						(mW)			
1.4MHz	1/#Mid	1850.7	-2.67	3.76	28.24	21.81	151.705	Horizontal	Pass
Band		1880	-2.48	3.91	28.22	21.83	152.405	Horizontal	Pass
QPSK		1909.3	-2.39	3.93	28.20	21.88	154.170	Horizontal	Pass
3.0MHz	1/#Mid	1851.5	-2.73	3.77	28.23	21.73	148.936	Horizontal	Pass
Band		1880	-2.58	3.91	28.24	21.75	149.624	Horizontal	Pass
QPSK		1908.5	-2.45	3.94	28.25	21.86	153.462	Horizontal	Pass
5.0MHz	1/#Mid	1852.5	-2.62	3.77	28.31	21.92	155.597	Horizontal	Pass
Band		1880	-2.24	3.91	28.22	22.07	161.065	Horizontal	Pass
QPSK		1907.5	-2.17	3.94	28.20	22.09	161.808	Horizontal	Pass
10.0MHz	1/#Mid	1855	-2.48	3.79	28.33	22.06	160.694	Horizontal	Pass
Band		1880	-2.18	3.95	28.22	22.09	161.808	Horizontal	Pass
QPSK		1905	-2.07	3.97	28.19	22.15	164.059	Horizontal	Pass
15.0MHz	1/#Mid	1857.5	-2.44	3.79	28.34	22.11	162.555	Horizontal	Pass
Band		1880	-2.23	3.95	28.22	22.04	159.956	Horizontal	Pass
QPSK		1902.5	-2.09	3.97	28.18	22.12	162.930	Horizontal	Pass
20.0MHz	1/#Mid	1860	-2.43	3.81	28.35	22.11	162.555	Horizontal	Pass
Band		1880	-2.10	3.96	28.22	22.16	164.437	Horizontal	Pass
QPSK		1900	-2.04	4.00	28.16	22.12	162.930	Horizontal	Pass
1.4MHz	1/#Mid	1850.7	-3.12	3.76	28.24	21.36	136.773	Vertical	Pass
Band		1880	-3.78	3.91	28.22	20.53	112.980	Vertical	Pass
QPSK		1909.3	-2.78	3.93	28.20	21.49	140.929	Vertical	Pass
3.0MHz	1/#Mid	1851.5	-3.18	3.77	28.23	21.28	134.276	Vertical	Pass
Band		1880	-2.90	3.91	28.24	21.43	138.995	Vertical	Pass
QPSK		1908.5	-2.97	3.94	28.25	21.34	136.144	Vertical	Pass
5.0MHz	1/#Mid	1852.5	-3.34	3.77	28.31	21.20	131.826	Vertical	Pass
Band		1880	-2.85	3.91	28.22	21.46	139.959	Vertical	Pass
QPSK		1907.5	-3.04	3.94	28.20	21.22	132.434	Vertical	Pass
10.0MHz	1/#Mid	1855	-3.42	3.79	28.33	21.12	129.420	Vertical	Pass
Band		1880	-3.47	3.95	28.22	20.80	120.226	Vertical	Pass
QPSK		1905	-2.96	3.97	28.19	21.26	133.660	Vertical	Pass

15.0MHz		1857.5	-3.21	3.79	28.34	21.34	136.144	Vertical	Pass
Band	1/#Mid	1880	-3.25	3.95	28.22	21.02	126.474	Vertical	Pass
QPSK		1902.5	-3.09	3.97	28.18	21.12	129.420	Vertical	Pass
20.0MHz		1860	-3.69	3.81	28.35	20.85	121.619	Vertical	Pass
Band	1/#Mid	1880	-3.00	3.96	28.22	21.26	133.660	Vertical	Pass
QPSK		1900	-3.47	4.00	28.16	20.69	117.220	Vertical	Pass

Radiated Power (EIRP) for Band 2									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Factor (dB)	Max. EIRP Average (dBm)	Max. EIRP	Polarization Of Max. ERP	
							Average		
							(mW)		
1.4MHz	1/#Mid	1850.7	-3.79	3.76	28.24	20.69	117.220	Horizontal	Pass
Band 16		1880	-3.26	3.91	28.22	21.05	127.350	Horizontal	Pass
QAM		1909.3	-3.19	3.93	28.20	21.08	128.233	Horizontal	Pass
3.0MHz	1/#Mid	1851.5	-3.29	3.77	28.23	21.17	130.918	Horizontal	Pass
Band 16		1880	-3.37	3.91	28.24	20.96	124.738	Horizontal	Pass
QAM		1908.5	-3.58	3.94	28.25	20.73	118.304	Horizontal	Pass
5.0MHz	1/#Mid	1852.5	-3.23	3.77	28.31	21.31	135.207	Horizontal	Pass
Band 16		1880	-3.14	3.91	28.22	21.17	130.918	Horizontal	Pass
QAM		1907.5	-2.82	3.94	28.20	21.44	139.316	Horizontal	Pass
10.0MHz	1/#Mid	1855	-3.28	3.79	28.33	21.26	133.660	Horizontal	Pass
Band 16		1880	-3.27	3.95	28.22	21.00	125.893	Horizontal	Pass
QAM		1905	-2.74	3.97	28.19	21.48	140.605	Horizontal	Pass
15.0MHz	1/#Mid	1857.5	-3.26	3.79	28.34	21.29	134.586	Horizontal	Pass
Band 16		1880	-3.05	3.95	28.22	21.22	132.434	Horizontal	Pass
QAM		1902.5	-3.01	3.97	28.18	21.20	131.826	Horizontal	Pass
20.0MHz	1/#Mid	1860	-3.15	3.81	28.35	21.39	137.721	Horizontal	Pass
Band 16		1880	-2.85	3.96	28.22	21.41	138.357	Horizontal	Pass
QAM		1900	-2.67	4.00	28.16	21.49	140.929	Horizontal	Pass
1.4MHz	1/#Mid	1850.7	-4.80	3.76	28.24	19.68	92.897	Vertical	Pass
Band 16		1880	-3.98	3.91	28.22	20.33	107.895	Vertical	Pass
QAM		1909.3	-4.55	3.93	28.20	19.72	93.756	Vertical	Pass
3.0MHz	1/#Mid	1851.5	-4.58	3.77	28.23	19.88	97.275	Vertical	Pass
Band 16		1880	-4.02	3.91	28.24	20.31	107.399	Vertical	Pass
QAM		1908.5	-4.08	3.94	28.25	20.23	105.439	Vertical	Pass
5.0MHz	1/#Mid	1852.5	-4.47	3.77	28.31	20.07	101.625	Vertical	Pass
Band 16		1880	-3.87	3.91	28.22	20.44	110.662	Vertical	Pass
QAM		1907.5	-4.12	3.94	28.20	20.14	103.276	Vertical	Pass
10.0MHz	1/#Mid	1855	-4.81	3.79	28.33	19.73	93.972	Vertical	Pass
Band 16		1880	-3.88	3.95	28.22	20.39	109.396	Vertical	Pass
QAM		1905	-4.09	3.97	28.19	20.13	103.039	Vertical	Pass
15.0MHz	1/#Mid	1857.5	-4.34	3.79	28.34	20.21	104.954	Vertical	Pass
Band 16		1880	-4.14	3.95	28.22	20.13	103.039	Vertical	Pass
QAM		1902.5	-4.61	3.97	28.18	19.60	91.201	Vertical	Pass

20.0MHz	1/#Mid	1860	-4.31	3.81	28.35	20.23	105.439	Vertical	Pass
Band 16		1880	-4.29	3.96	28.22	19.97	99.312	Vertical	Pass
QAM		1900	-4.05	4.00	28.16	20.11	102.565	Vertical	Pass

Note:

SG Level= Signal generator output

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

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

8.3 LTE BAND 4

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG	Cable	Antenna	Max.	Max.	Polarization Of	
			Level	Loss	Factor	EIRP	EIRP	Max. ERP	
			(dBm)	(dBm)	(dB)	Average	Average		
						(dBm)	(mW)		
1.4MHz	1/#Mid	1710.7	-2.58	3.12	27.58	21.88	154.170	Horizontal	Pass
Band		1732.5	-2.57	3.27	27.61	21.77	150.314	Horizontal	Pass
QPSK		1754.3	-2.55	3.29	27.63	21.79	151.008	Horizontal	Pass
3.0MHz	1/#Mid	1711.5	-2.75	3.13	27.61	21.73	148.936	Horizontal	Pass
Band		1732.5	-2.67	3.27	27.61	21.67	146.893	Horizontal	Pass
QPSK		1753.5	-2.59	3.30	27.62	21.73	148.936	Horizontal	Pass
5.0MHz	1/#Mid	1712.5	-2.52	3.13	27.63	21.98	157.761	Horizontal	Pass
Band		1732.5	-2.42	3.27	27.61	21.92	155.597	Horizontal	Pass
QPSK		1752.5	-2.30	3.30	27.60	22.00	158.489	Horizontal	Pass
10.0MHz	1/#Mid	1715	-2.46	3.15	27.64	22.03	159.588	Horizontal	Pass
Band		1732.5	-2.23	3.31	27.61	22.07	161.065	Horizontal	Pass
QPSK		1750	-2.25	3.33	27.59	22.01	158.855	Horizontal	Pass
15.0MHz	1/#Mid	1717.5	-2.47	3.15	27.65	22.03	159.588	Horizontal	Pass
Band		1732.5	-2.31	3.31	27.61	21.99	158.125	Horizontal	Pass
QPSK		1747.5	-2.25	3.33	27.57	21.99	158.125	Horizontal	Pass
20.0MHz	1/#Mid	1720	-2.41	3.17	27.66	22.08	161.436	Horizontal	Pass
Band		1732.5	-2.24	3.32	27.61	22.05	160.325	Horizontal	Pass
QPSK		1745	-2.18	3.36	27.56	22.02	159.221	Horizontal	Pass
1.4MHz	1/#Mid	1710.7	-2.94	3.12	27.58	21.52	141.906	Vertical	Pass
Band		1732.5	-3.20	3.27	27.61	21.14	130.017	Vertical	Pass
QPSK		1754.3	-3.12	3.29	27.63	21.22	132.434	Vertical	Pass
3.0MHz	1/#Mid	1711.5	-3.19	3.13	27.61	21.29	134.586	Vertical	Pass
Band		1732.5	-3.33	3.27	27.61	21.01	126.183	Vertical	Pass
QPSK		1753.5	-3.58	3.30	27.62	20.74	118.577	Vertical	Pass
5.0MHz	1/#Mid	1712.5	-3.66	3.13	27.63	20.84	121.339	Vertical	Pass
Band		1732.5	-2.92	3.27	27.61	21.42	138.676	Vertical	Pass
QPSK		1752.5	-3.33	3.30	27.60	20.97	125.026	Vertical	Pass
10.0MHz	1/#Mid	1715	-3.77	3.15	27.64	20.72	118.032	Vertical	Pass
Band		1732.5	-3.46	3.31	27.61	20.84	121.339	Vertical	Pass
QPSK		1750	-2.78	3.33	27.59	21.48	140.605	Vertical	Pass

15.0MHz		1717.5	-3.97	3.15	27.65	20.53	112.980	Vertical	Pass
Band	1/#Mid	1732.5	-3.70	3.31	27.61	20.60	114.815	Vertical	Pass
QPSK		1747.5	-3.66	3.33	27.57	20.58	114.288	Vertical	Pass
20.0MHz		1720	-3.76	3.17	27.66	20.73	118.304	Vertical	Pass
Band	1/#Mid	1732.5	-2.79	3.32	27.61	21.50	141.254	Vertical	Pass
QPSK		1745	-3.62	3.36	27.56	20.58	114.288	Vertical	Pass

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level	Cable Loss	Antenna Factor	Max. EIRP	Max. EIRP	Polarization	
			(dBm)	(dBm)	(dB)	Average	Average	Of Max. ERP	
						(dBm)	(mW)		
1.4MHz	1/#Mid	1710.7	-3.39	3.12	27.58	21.07	127.938	Horizontal	Pass
Band 16		1732.5	-3.24	3.27	27.61	21.10	128.825	Horizontal	Pass
QAM		1754.3	-3.24	3.29	27.63	21.10	128.825	Horizontal	Pass
3.0MHz	1/#Mid	1711.5	-3.33	3.13	27.61	21.15	130.317	Horizontal	Pass
Band 16		1732.5	-3.46	3.27	27.61	20.88	122.462	Horizontal	Pass
QAM		1753.5	-3.68	3.30	27.62	20.64	115.878	Horizontal	Pass
5.0MHz	1/#Mid	1712.5	-3.16	3.13	27.63	21.34	136.144	Horizontal	Pass
Band 16		1732.5	-3.12	3.27	27.61	21.22	132.434	Horizontal	Pass
QAM		1752.5	-2.81	3.30	27.60	21.49	140.929	Horizontal	Pass
10.0MHz	1/#Mid	1715	-3.23	3.15	27.64	21.26	133.660	Horizontal	Pass
Band 16		1732.5	-3.42	3.31	27.61	20.88	122.462	Horizontal	Pass
QAM		1750	-2.80	3.33	27.59	21.46	139.959	Horizontal	Pass
15.0MHz	1/#Mid	1717.5	-3.03	3.15	27.65	21.47	140.281	Horizontal	Pass
Band 16		1732.5	-3.09	3.31	27.61	21.21	132.130	Horizontal	Pass
QAM		1747.5	-3.11	3.33	27.57	21.13	129.718	Horizontal	Pass
20.0MHz	1/#Mid	1720	-2.98	3.17	27.66	21.51	141.579	Horizontal	Pass
Band 16		1732.5	-2.99	3.32	27.61	21.30	134.896	Horizontal	Pass
QAM		1745	-2.80	3.36	27.56	21.40	138.038	Horizontal	Pass
1.4MHz	1/#Mid	1710.7	-4.25	3.12	27.58	20.21	104.954	Vertical	Pass
Band 16		1732.5	-4.73	3.27	27.61	19.61	91.411	Vertical	Pass
QAM		1754.3	-4.01	3.29	27.63	20.33	107.895	Vertical	Pass
3.0MHz	1/#Mid	1711.5	-4.37	3.13	27.61	20.11	102.565	Vertical	Pass
Band 16		1732.5	-4.55	3.27	27.61	19.79	95.280	Vertical	Pass
QAM		1753.5	-4.62	3.30	27.62	19.70	93.325	Vertical	Pass
5.0MHz	1/#Mid	1712.5	-4.20	3.13	27.63	20.30	107.152	Vertical	Pass
Band 16		1732.5	-4.26	3.27	27.61	20.08	101.859	Vertical	Pass
QAM		1752.5	-4.53	3.30	27.60	19.77	94.842	Vertical	Pass
10.0MHz	1/#Mid	1715	-3.98	3.15	27.64	20.51	112.460	Vertical	Pass
Band 16		1732.5	-4.38	3.31	27.61	19.92	98.175	Vertical	Pass
QAM		1750	-4.04	3.33	27.59	20.22	105.196	Vertical	Pass
15.0MHz	1/#Mid	1717.5	-4.29	3.15	27.65	20.21	104.954	Vertical	Pass
Band 16		1732.5	-3.89	3.31	27.61	20.41	109.901	Vertical	Pass

QAM		1747.5	-3.98	3.33	27.57	20.26	106.170	Vertical	Pass
20.0MHz	1/#Mid	1720	-4.38	3.17	27.66	20.11	102.565	Vertical	Pass
Band 16		1732.5	-4.41	3.32	27.61	19.88	97.275	Vertical	Pass
QAM		1745	-4.11	3.36	27.56	20.09	102.094	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	Cable	Antenna	Max.	Max.	Polarization Of	
			Level	Loss	Factor	EIRP	EIRP	Max. ERP	
			(dBm)	(dBm)	(dB)	Average	Average		
5.0MHz Band QPSK	1/#Mid	2502.5	-1.22	4.54	27.75	21.99	158.125	Horizontal	Pass
		2535	-1.05	4.69	27.72	21.98	157.761	Horizontal	Pass
		2567.5	-0.98	4.71	27.71	22.02	159.221	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	2505	-1.15	4.55	27.76	22.06	160.694	Horizontal	Pass
		2535	-0.96	4.69	27.72	22.07	161.065	Horizontal	Pass
		2565	-0.88	4.72	27.70	22.10	162.181	Horizontal	Pass
15.0MHz Band QPSK	1/#Mid	2507.5	-1.16	4.55	27.77	22.06	160.694	Horizontal	Pass
		2535	-1.02	4.69	27.72	22.01	158.855	Horizontal	Pass
		2562.5	-0.92	4.72	27.69	22.05	160.325	Horizontal	Pass
20.0MHz Band QPSK	1/#Mid	2510	-1.10	4.57	27.78	22.11	162.555	Horizontal	Pass
		2535	-0.92	4.73	27.72	22.07	161.065	Horizontal	Pass
		2560	-0.88	4.75	27.68	22.05	160.325	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	2502.5	-2.30	4.54	27.75	20.91	123.310	Vertical	Pass
		2535	-2.39	4.69	27.72	20.64	115.878	Vertical	Pass
		2567.5	-2.77	4.71	27.71	20.23	105.439	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	2505	-2.96	4.55	27.76	20.25	105.925	Vertical	Pass
		2535	-2.69	4.69	27.72	20.34	108.143	Vertical	Pass
		2565	-2.31	4.72	27.70	20.67	116.681	Vertical	Pass
15.0MHz Band QPSK	1/#Mid	2507.5	-2.56	4.55	27.77	20.66	116.413	Vertical	Pass
		2535	-1.92	4.69	27.72	21.11	129.122	Vertical	Pass
		2562.5	-2.62	4.72	27.69	20.35	108.393	Vertical	Pass
20.0MHz Band QPSK	1/#Mid	2510	-2.28	4.57	27.78	20.93	123.880	Vertical	Pass
		2535	-2.61	4.73	27.72	20.38	109.144	Vertical	Pass
		2560	-2.70	4.75	27.68	20.23	105.439	Vertical	Pass

Radiated Power (EIRP) for Band 7									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level	Cable	Antenna	Max. EIRP	Max. EIRP	Polarization	
			(dBm)	Loss	Factor	Average	Average	Of Max. ERP	
				(dBm)	(dB)	(dBm)	(mW)		
5.0MHz Band 16 QAM	1/#Mid	2502.5	-1.91	4.54	27.75	21.30	134.896	Horizontal	Pass
		2535	-1.60	4.69	27.72	21.43	138.995	Horizontal	Pass
		2567.5	-1.68	4.71	27.71	21.32	135.519	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	2505	-1.80	4.55	27.76	21.41	138.357	Horizontal	Pass
		2535	-1.81	4.69	27.72	21.22	132.434	Horizontal	Pass
		2565	-2.08	4.72	27.70	20.90	123.027	Horizontal	Pass
15.0MHz Band 16 QAM	1/#Mid	2507.5	-1.98	4.55	27.77	21.24	133.045	Horizontal	Pass
		2535	-1.95	4.69	27.72	21.08	128.233	Horizontal	Pass
		2562.5	-1.56	4.72	27.69	21.41	138.357	Horizontal	Pass
20.0MHz Band 16 QAM	1/#Mid	2510	-1.86	4.57	27.78	21.35	136.458	Horizontal	Pass
		2535	-1.53	4.73	27.72	21.46	139.959	Horizontal	Pass
		2560	-1.63	4.75	27.68	21.30	134.896	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	2502.5	-3.48	4.54	27.75	19.73	93.972	Vertical	Pass
		2535	-2.74	4.69	27.72	20.29	106.905	Vertical	Pass
		2567.5	-3.73	4.71	27.71	19.27	84.528	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	2505	-3.08	4.55	27.76	20.13	103.039	Vertical	Pass
		2535	-2.14	4.69	27.72	20.89	122.744	Vertical	Pass
		2565	-2.29	4.72	27.70	20.69	117.220	Vertical	Pass
15.0MHz Band 16 QAM	1/#Mid	2507.5	-2.75	4.55	27.77	20.47	111.429	Vertical	Pass
		2535	-2.78	4.69	27.72	20.25	105.925	Vertical	Pass
		2562.5	-2.74	4.72	27.69	20.23	105.439	Vertical	Pass
20.0MHz Band 16 QAM	1/#Mid	2510	-2.27	4.57	27.78	20.94	124.165	Vertical	Pass
		2535	-3.60	4.73	27.72	19.39	86.896	Vertical	Pass
		2560	-3.27	4.75	27.68	19.66	92.470	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 $43 + 10 \log_{10}(P)$ 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

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 Factor(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3701.4	-51.82	4.04	33.51	-22.35	-13	-9.35	Horizontal
3701.4	-48.16	4.04	33.51	-18.69	-13	-5.69	Vertical
5552.1	-50.20	5.24	35.84	-19.60	-13	-6.60	Vertical
5552.1	-50.74	5.24	35.84	-20.14	-13	-7.14	Horizontal
210.5	-43.28	1.43	16.02	-28.69	-13	-15.69	Vertical
268.7	-39.56	1.30	17.99	-22.87	-13	-9.87	Horizontal
Test Results for Mid Channel 1880MHz							
3760.0	-52.98	4.04	33.56	-23.46	-13	-10.46	Horizontal
3760.0	-50.12	4.04	33.56	-20.60	-13	-7.60	Vertical
5640.0	-50.22	5.24	35.91	-19.55	-13	-6.55	Vertical
5640.0	-53.60	5.24	35.91	-22.93	-13	-9.93	Horizontal
183.3	-38.85	1.62	16.97	-23.50	-13	-10.50	Vertical
364.3	-37.76	1.74	15.98	-23.53	-13	-10.53	Horizontal
Test Results for High Channel 1909.3MHz							
3818.6	-53.36	4.04	34.00	-23.40	-13	-10.40	Horizontal
3818.6	-52.77	4.04	34.00	-22.81	-13	-9.81	Vertical
5727.9	-50.37	5.24	36.04	-19.57	-13	-6.57	Vertical
5727.9	-51.62	5.24	36.04	-20.82	-13	-7.82	Horizontal
204.8	-44.54	1.42	17.29	-28.67	-13	-15.67	Vertical
446.5	-41.99	1.50	17.90	-25.58	-13	-12.58	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 Factor(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3720.0	-50.45	4.07	33.54	-20.98	-13	-7.98	Horizontal
3720.0	-53.90	4.07	33.54	-24.43	-13	-11.43	Vertical
5580.0	-49.57	5.28	35.86	-18.99	-13	-5.99	Vertical
5580.0	-49.86	5.28	35.86	-19.28	-13	-6.28	Horizontal
203.6	-39.30	1.58	16.89	-23.98	-13	-10.98	Vertical
440.6	-40.57	1.76	17.26	-25.07	-13	-12.07	Horizontal
Test Results for Mid Channel 1880MHz							
3760.0	-48.24	4.04	33.56	-18.72	-13	-5.72	Horizontal
3760.0	-46.92	4.04	33.56	-17.40	-13	-4.40	Vertical
5640.0	-53.06	5.24	35.91	-22.39	-13	-9.39	Vertical
5640.0	-49.57	5.24	35.91	-18.90	-13	-5.90	Horizontal
210.9	-39.15	1.46	16.27	-24.34	-13	-11.34	Vertical
272.0	-36.17	1.59	15.15	-22.61	-13	-9.61	Horizontal
Test Results for High Channel 1900MHz							
3800.0	-52.58	4.04	34.00	-22.62	-13	-9.62	Horizontal
3800.0	-50.16	4.04	34.00	-20.20	-13	-7.20	Vertical
5700.0	-50.67	5.24	36.04	-19.87	-13	-6.87	Vertical
5700.0	-52.05	5.24	36.04	-21.25	-13	-8.25	Horizontal
203.8	-35.13	1.36	17.39	-19.09	-13	-6.09	Vertical
356.2	-40.65	1.66	15.39	-26.92	-13	-13.92	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 Factor(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3421.4	-48.07	4.02	29.80	-22.29	-13	-9.29	Horizontal
3421.4	-48.77	4.02	29.80	-22.99	-13	-9.99	Vertical
5132.1	-48.18	5.24	35.84	-17.58	-13	-4.58	Vertical
5132.1	-51.66	5.24	35.84	-21.06	-13	-8.06	Horizontal
176.1	-39.40	1.68	16.04	-25.04	-13	-12.04	Vertical
457.1	-34.12	1.78	17.74	-18.16	-13	-5.16	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-45.72	4.03	30.00	-19.75	-13	-6.75	Horizontal
3465.0	-46.58	4.03	30.00	-20.61	-13	-7.61	Vertical
5197.5	-48.65	5.25	35.86	-18.04	-13	-5.04	Vertical
5197.5	-50.09	5.25	35.86	-19.48	-13	-6.48	Horizontal
194.3	-42.35	1.72	17.69	-26.38	-13	-13.38	Vertical
369.9	-37.38	1.62	16.02	-22.97	-13	-9.97	Horizontal
Test Results for High Channel 1754.3MHz							
3508.6	-52.15	4.05	30.01	-26.19	-13	-13.19	Horizontal
3508.6	-46.55	4.05	30.01	-20.59	-13	-7.59	Vertical
5262.9	-49.42	5.26	35.86	-18.82	-13	-5.82	Vertical
5262.9	-52.30	5.26	35.86	-21.70	-13	-8.70	Horizontal
207.2	-36.18	1.80	16.69	-21.29	-13	-8.29	Vertical
273.4	-44.34	1.75	16.66	-29.44	-13	-16.44	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 Factor(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3440.0	-52.73	4.02	29.80	-26.95	-13	-13.95	Horizontal
3440.0	-53.63	4.02	29.80	-27.85	-13	-14.85	Vertical
5160.0	-51.36	5.24	35.84	-20.76	-13	-7.76	Vertical
5160.0	-50.84	5.24	35.84	-20.24	-13	-7.24	Horizontal
185.9	-39.25	1.57	17.26	-23.56	-13	-10.56	Vertical
334.4	-42.33	1.78	16.35	-27.76	-13	-14.76	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-53.97	4.03	30.00	-28.00	-13	-15.00	Horizontal
3465.0	-45.07	4.03	30.00	-19.10	-13	-6.10	Vertical
5197.5	-49.61	5.25	35.86	-19.00	-13	-6.00	Vertical
5197.5	-50.01	5.25	35.86	-19.40	-13	-6.40	Horizontal
181.0	-38.33	1.44	17.95	-21.82	-13	-8.82	Vertical
457.0	-41.47	1.65	16.09	-27.03	-13	-14.03	Horizontal
Test Results for High Channel 1745MHz							
3490.0	-47.30	2.91	27.68	-22.53	-13	-9.53	Horizontal
3490.0	-53.22	2.91	27.68	-28.45	-13	-15.45	Vertical
5235.0	-53.41	5.26	35.86	-22.81	-13	-9.81	Vertical
5235.0	-52.90	5.26	35.86	-22.30	-13	-9.30	Horizontal
211.6	-38.12	1.61	16.85	-22.88	-13	-9.88	Vertical
434.8	-35.69	1.61	15.19	-22.11	-13	-9.11	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 7

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

Test Results for Low Channel 2502.5MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Factor(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
5005.0	-60.79	5.23	35.81	-30.21	-25	-5.21	Horizontal
5005.0	-60.29	5.23	35.81	-29.71	-25	-4.71	Vertical
7507.5	-64.48	5.67	36.85	-33.30	-25	-8.30	Vertical
7507.5	-62.52	5.67	36.85	-31.34	-25	-6.34	Horizontal
210.0	-49.52	1.73	17.97	-33.28	-25	-8.28	Vertical
405.1	-49.17	1.38	15.11	-35.44	-25	-10.44	Horizontal
Test Results for Mid Channel 2535MHz							
5070.0	-60.00	5.23	35.82	-29.41	-25	-4.41	Horizontal
5070.0	-61.80	5.23	35.82	-31.21	-25	-6.21	Vertical
7605.0	-64.69	5.67	36.85	-33.51	-25	-8.51	Vertical
7605.0	-61.70	5.67	36.85	-30.52	-25	-5.52	Horizontal
203.9	-46.62	1.77	16.17	-32.21	-25	-7.21	Vertical
245.4	-48.02	1.63	15.21	-34.44	-25	-9.44	Horizontal
Test Results for High Channel 2567.5MHz							
5135.0	-64.53	5.24	35.83	-33.94	-25	-8.94	Horizontal
5135.0	-61.93	5.24	35.83	-31.34	-25	-6.34	Vertical
7702.5	-63.50	5.68	36.87	-32.31	-25	-7.31	Vertical
7702.5	-61.35	5.68	36.87	-30.16	-25	-5.16	Horizontal
193.2	-52.06	1.58	17.56	-36.08	-25	-11.08	Vertical
372.1	-54.20	1.45	16.58	-39.07	-25	-14.07	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
5020.0	-64.25	5.23	35.82	-33.66	-25	-8.66	Horizontal
5020.0	-64.51	5.23	35.82	-33.92	-25	-8.92	Vertical
7530.0	-64.81	5.67	36.86	-33.62	-25	-8.62	Vertical
7530.0	-62.08	5.67	36.86	-30.89	-25	-5.89	Horizontal
196.6	-52.42	1.63	15.76	-38.29	-25	-13.29	Vertical
273.6	-48.10	1.71	15.44	-34.37	-25	-9.37	Horizontal
Test Results for Mid Channel 2535MHz							
5070.0	-63.27	5.23	35.82	-32.68	-25	-7.68	Horizontal
5070.0	-62.62	5.23	35.82	-32.03	-25	-7.03	Vertical
7605.0	-63.29	5.67	36.85	-32.11	-25	-7.11	Vertical
7605.0	-62.08	5.67	36.85	-30.90	-25	-5.90	Horizontal
201.9	-44.32	1.79	16.84	-29.26	-25	-4.26	Vertical
461.2	-54.25	1.71	17.64	-38.32	-25	-13.32	Horizontal
Test Results for High Channel 2560MHz							
5120.0	-63.50	5.24	35.83	-32.91	-25	-7.91	Horizontal
5120.0	-62.67	5.24	35.83	-32.08	-25	-7.08	Vertical
7680.0	-64.39	5.70	36.88	-33.21	-25	-8.21	Vertical
7680.0	-62.47	5.70	36.88	-31.29	-25	-6.29	Horizontal
184.4	-48.00	1.79	16.84	-32.94	-25	-7.94	Vertical
424.2	-46.02	1.71	17.64	-30.09	-25	-5.09	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 $+50^{\circ}\text{C}$
- ☐ Voltage = low voltage, DC 3.4V, Normal, DC 3.8V and High voltage, DC 4.2V.

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 2/4/7

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]
3.40	1880	12.8	0.006826	2.5
3.8	1880	13.3	0.007086	2.5
4.20	1880	13.1	0.006961	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1880	13.1	0.006988	2.5
Extreme (50C)	1880	11.2	0.005973	2.5
Extreme (40C)	1880	13.7	0.007291	2.5
Extreme (30C)	1880	13.6	0.007254	2.5
Extreme (10C)	1880	14.1	0.007523	2.5
Extreme (0C)	1880	11.8	0.006301	2.5
Extreme (-10C)	1880	12.7	0.006731	2.5
Extreme (-20C)	1880	14.5	0.007693	2.5
Extreme (-30C)	1880	15.0	0.007998	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]
3.40	1880	9.9	0.005287	2.5
3.8	1880	8.8	0.004669	2.5
4.20	1880	8.0	0.004276	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1880	10.1	0.005350	2.5
Extreme (50C)	1880	8.4	0.004495	2.5
Extreme (40C)	1880	7.8	0.004156	2.5
Extreme (30C)	1880	9.2	0.004876	2.5
Extreme (10C)	1880	8.8	0.004692	2.5
Extreme (0C)	1880	8.5	0.004494	2.5
Extreme (-10C)	1880	8.6	0.004600	2.5
Extreme (-20C)	1880	8.9	0.004730	2.5
Extreme (-30C)	1880	7.7	0.004095	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]
3.40	1732.5	8.4	0.004823	2.5
3.8	1732.5	8.9	0.005161	2.5
4.20	1732.5	8.1	0.004678	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1732.5	8.0	0.004589	2.5
Extreme (50C)	1732.5	8.7	0.004996	2.5
Extreme (40C)	1732.5	7.6	0.004360	2.5
Extreme (30C)	1732.5	5.8	0.003373	2.5
Extreme (10C)	1732.5	7.2	0.004179	2.5
Extreme (0C)	1732.5	9.8	0.005633	2.5
Extreme (-10C)	1732.5	8.2	0.004739	2.5
Extreme (-20C)	1732.5	6.8	0.003928	2.5
Extreme (-30C)	1732.5	8.4	0.004872	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]
3.40	1732.5	9.8	0.005637	2.5
3.8	1732.5	9.4	0.005402	2.5
4.20	1732.5	7.9	0.004589	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	1732.5	9.4	0.005445	2.5
Extreme (50C)	1732.5	9.1	0.005236	2.5
Extreme (40C)	1732.5	8.5	0.004915	2.5
Extreme (30C)	1732.5	8.7	0.005014	2.5
Extreme (10C)	1732.5	8.9	0.005158	2.5
Extreme (0C)	1732.5	8.3	0.004812	2.5
Extreme (-10C)	1732.5	8.6	0.004938	2.5
Extreme (-20C)	1732.5	8.7	0.005048	2.5
Extreme (-30C)	1732.5	7.7	0.004436	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]
3.40	2535	9.8	0.003874	2.5
3.8	2535	9.2	0.003643	2.5
4.20	2535	8.2	0.003252	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2535	9.9	0.003904	2.5
Extreme (50C)	2535	8.4	0.003316	2.5
Extreme (40C)	2535	8.1	0.003207	2.5
Extreme (30C)	2535	8.9	0.003508	2.5
Extreme (10C)	2535	8.0	0.003153	2.5
Extreme (0C)	2535	8.0	0.003171	2.5
Extreme (-10C)	2535	9.3	0.003665	2.5
Extreme (-20C)	2535	9.1	0.003577	2.5
Extreme (-30C)	2535	8.9	0.003509	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]
3.40	2535	6.9	0.002739	2.5
3.8	2535	6.3	0.002481	2.5
4.20	2535	5.8	0.002273	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
Normal (25C)	2535	7.1	0.002809	2.5
Extreme (50C)	2535	6.0	0.002352	2.5
Extreme (40C)	2535	5.2	0.002037	2.5
Extreme (30C)	2535	7.0	0.002780	2.5
Extreme (10C)	2535	5.6	0.002221	2.5
Extreme (0C)	2535	4.8	0.001901	2.5
Extreme (-10C)	2535	5.4	0.002147	2.5
Extreme (-20C)	2535	5.4	0.002142	2.5
Extreme (-30C)	2535	5.7	0.002237	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.

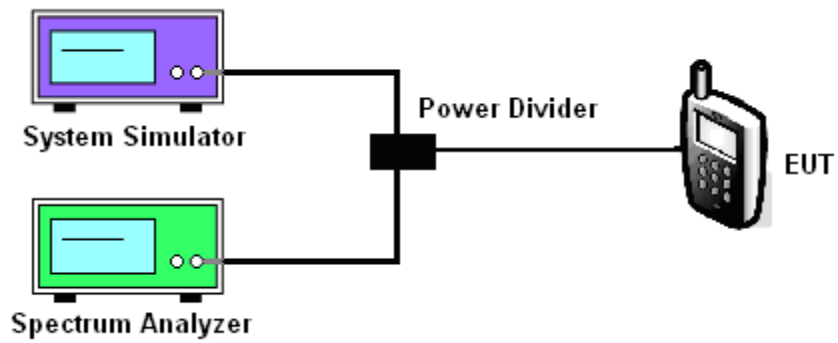
11.2 Measuring Instruments

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-----