

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

FCC ID: 2AV3BSP5775

Product: Tablet

Trade Mark: ADVANCE

Model Number: SP5775

Family Model: N/A

Report No.: STR200903002006E

Prepared for

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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

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

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

Product name..... : Tablet

Model and/or type reference .. : SP5775

Family Model: : N/A

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..... 03 Sep. 2020 ~ 19 Sep, 2020

Date of Issue 19 Sep, 2020

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

Testing Engineer :



(Allen Liu)

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(Jason Chen)

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:	Tablet
Trade Mark	ADVANCE
Model Name	SP5775
Family Model	N/A
Model Difference	N/A
FCC ID:	2AV3BSP5775
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
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: 0.81dBi, Band 4: 0.45dBi, Band 7: 0.89dBi,
Power Supply:	DC 3.7V/5000mAh from battery or DC 5V from Adapter
Adapter:	Model: BOS050300-01A Input: 100-240V~50/60Hz 0.55A Output: 5.0V --- 3000mA
Extreme Vol. Limits:	DC 3.2V to DC 4.1V (Nominal DC 3.7V) (Note 1)
HW Version	P30-9863A-V1.0
SW Version	ADVANCE_SP5775_20200911_1.0.01
** Note1: The High Voltage 4.1V and Low Voltage 3.2V 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: 2AOWKSP5775** 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, Band 4, Band 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.

1.6 SUMMARY OF TEST RESULTS

FCC Part22, Subpart H/ FCC Part24, Subpart E, FCC Part27, Subpart L, KDB 971168 D01 Power Meas License Digital Systems v03			
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(c), (g), (h) 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(c)(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	

2.1051 22.917(a) 24.238(a) 27.53(c)(g)(h)(m) KDB 971168 D01 Clause 6	Conducted Emission	PASS	
Remark: 1. "N/A" denotes test is not applicable in this Test Report. 2. All test items were verified and recorded according to the standards and without any deviation during the test. 3. No modifications are made to the EUT during all test items.			

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

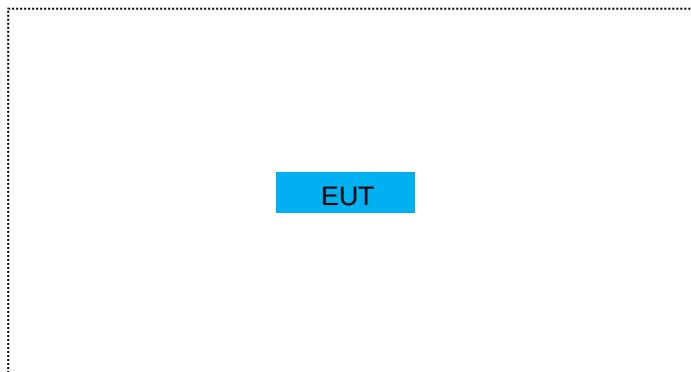
Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Note
1	Tablet	SP5775	FCC ID: 2AV3BSP5775	EUT

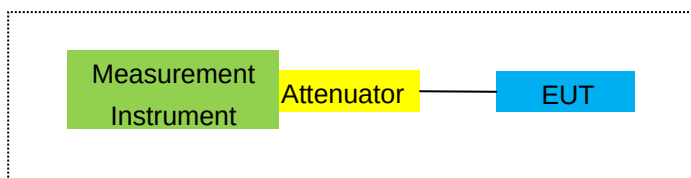
*Note: All the accessories have been used during the test.
the following "EUT" in setup diagram means EUT system.*

2.4 TEST SETUP

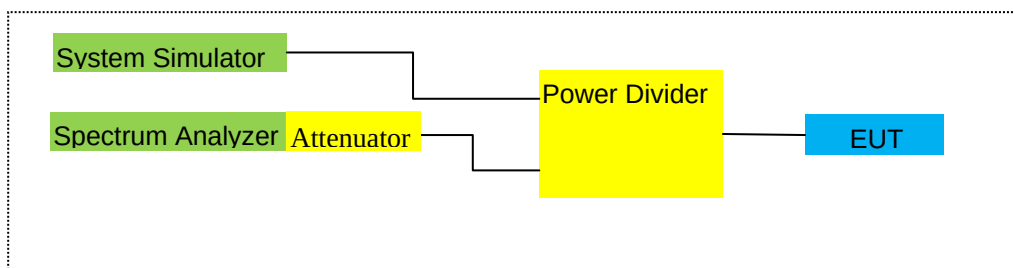
For Radiated Test Cases



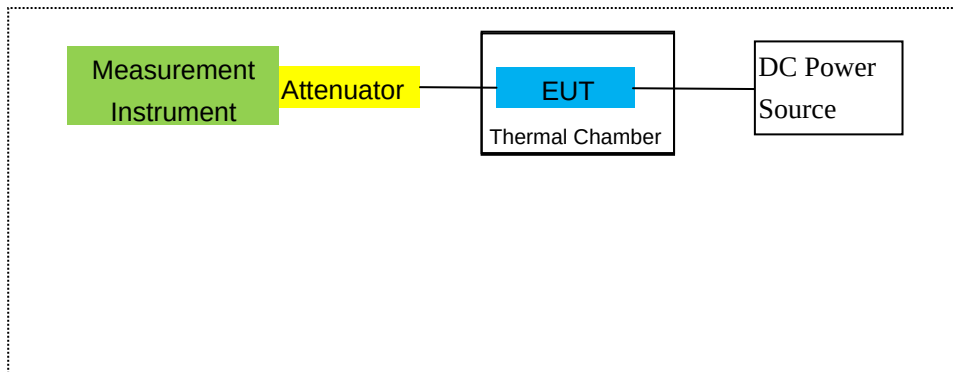
For Conducted Output Power



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	2020.07.13	2021.07.12	1 year
2	Test Receiver	R&S	ESPI	101318	2020.05.11	2021.05.10	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2020.04.11	2021.04.10	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2020.05.11	2023.05.10	1 year
5	Horn Antenna	EM	EM-AH-10180	2011071402	2020.04.11	2021.04.10	1 year
6	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2019.12.10	2020.12.09	1 year
7	Amplifier	EM	EM-30180	060538	2020.07.13	2021.07.12	1 year
8	Loop Antenna	ARA	PLA-1030/B	1029	2020.05.11	2021.05.10	1 year
9	Power Meter	R&S	NRVS	100696	2020.07.13	2021.07.12	1 year
10	Power Sensor	R&S	URV5-Z4	0395.1619.05	2020.05.11	2021.05.10	1 year
11	Test Cable	N/A	R-01	N/A	2019.08.06	2022.08.05	3 year
12	Test Cable	N/A	R-02	N/A	2020.07.13	2023.07.12	3 year
13	Test Cable	N/A	R-03	N/A	2019.06.28	2022.06.27	3 year
14	Test Receiver	R&S	ESCI	101160	2020.05.11	2021.05.10	1 year
15	LISN	R&S	ENV216	101313	2020.05.11	2021.05.10	1 year
16	LISN	EMCO	3816/2	00042990	2020.05.11	2021.05.10	1 year
17	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2020.05.11	2021.05.10	1 year
18	Passive Voltage Probe	R&S	ESH2-Z3	100196	2020.04.11	2023.04.10	3 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	2021.05.10	1 year
22	Attenuator	MCE	24-10-34	BN9258	2020.05.11	2021.05.10	1 year
23	Spectrum Analyzer	agilent	e4440a	us44300399	2020.05.11	2021.05.10	1 year
24	test receiver	R&S	ESCI	a0304218	2020.05.11	2021.05.10	1 year
25	Communication Tester	R&S	CMU200	A0304247	2020.07.13	2021.07.12	1 year
26	Thermal Chamber	Ten Billion	TTC-B3C	TBN-960502	2020.05.11	2021.05.10	1 year

27	DC Power Source	N/A	PS-6005D	2017040292 3	2017.06.06	2020.06.05	3 year
28	PSG Analog Signal Generator	Agilent	E8257D	MY51110112	2020.07.13	2021.07.12	1 year
29	Communication Tester	R&S	CMW500	148500	2020.05.11	2021.05.10	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
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

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

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

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

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

Test data reference attachment.

5. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

LIMITS

For reporting purposes only

TEST PROCEDURE

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

MODES TESTED

- ☐ LTE Band 2
- LTE Band 4
- LTE Band 7

RESULTS

PASS

Test data reference attachment.

6. BANDEDGE AND EMISSION MASK

RULE PART(S)

FCC: §2.1051, §22.917(a), §24.238(a), §27.53(c)(g)(h)(m)

FCC: §2.1046, §22.913, §24.232

LIMITS

The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P[\text{Watts}])$, where P is the transmitter power in Watts.

The minimum permissible attenuation level for Band 7 is as following.

Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

Per 27.53(c.5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c.4) is $65 + 10\log_{10}(P) = -35\text{dBm}$ in a 6.25kHz bandwidth.

Per 27.53(m) for operations in the BRS/EBS bands, 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.

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 display line

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

MODES TESTED

- ☐ LTE Band 2/4/7

RESULTS

Test data reference attachment.

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

7. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.917(a), §24.238(a), §27.53(c)(g)(h)(m)

LIMITS

The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P[\text{Watts}])$, where P is the transmitter power in Watts.

The minimum permissible attenuation level for Band 7 is as following.

Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

Per 27.53(c.5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c.4) is $65 + 10\log_{10}(P) = -35\text{dBm}$ in a 6.25kHz bandwidth.

Per 27.53(m) for operations in the BRS/EBS bands, 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.

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

MODES TESTED

- ☐ LTE Band2
- LTE Band 4
- LTE Band 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.

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

8. RADIATED MEASUREMENT

8.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913(a)(2), §24.232(c) and §27.50 (h)(2), (b)(10), (c)(10), (d)(4)

LIMITS:

22.913(a) (2)- The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.
24.232 (c) Mobile and portable stations are limited to 2 watts EIRP.
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 in the 2500–2570 MHz and 2620–2690 MHz bands. 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

- ☐ LTE Band 2
- LTE Band 4
- LTE Band 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 Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	6/0	1850.7	1.16	3.76	28.24	25.64	366.438	Horizontal	Pass
		1880	1.35	3.91	28.22	25.66	368.129	Horizontal	Pass
		1909.3	1.44	3.93	28.20	25.71	372.392	Horizontal	Pass
3.0MHz Band QPSK	15/0	1851.5	1.10	3.77	28.23	25.56	359.749	Horizontal	Pass
		1880	1.25	3.91	28.24	25.58	361.410	Horizontal	Pass
		1908.5	1.38	3.94	28.25	25.69	370.681	Horizontal	Pass
5.0MHz Band QPSK	25/0	1852.5	1.21	3.77	28.31	25.75	375.837	Horizontal	Pass
		1880	1.59	3.91	28.22	25.90	389.045	Horizontal	Pass
		1907.5	1.66	3.94	28.20	25.92	390.841	Horizontal	Pass
10.0MHz Band QPSK	50/0	1855	1.35	3.79	28.33	25.89	388.150	Horizontal	Pass
		1880	1.65	3.95	28.22	25.92	390.841	Horizontal	Pass
		1905	1.76	3.97	28.19	25.98	396.278	Horizontal	Pass
15.0MHz Band QPSK	75/0	1857.5	1.39	3.79	28.34	25.94	392.645	Horizontal	Pass
		1880	1.60	3.95	28.22	25.87	386.367	Horizontal	Pass
		1902.5	1.74	3.97	28.18	25.95	393.550	Horizontal	Pass
20.0MHz Band QPSK	100/0	1860	1.40	3.81	28.35	25.94	392.645	Horizontal	Pass
		1880	1.73	3.96	28.22	25.99	397.192	Horizontal	Pass
		1900	1.79	4.00	28.16	25.95	393.550	Horizontal	Pass
1.4MHz Band QPSK	6/0	1850.7	0.64	3.76	28.24	25.12	325.087	Vertical	Pass
		1880	0.94	3.91	28.22	25.25	334.965	Vertical	Pass
		1909.3	0.35	3.93	28.20	24.62	289.734	Vertical	Pass
3.0MHz Band QPSK	15/0	1851.5	0.23	3.77	28.23	24.69	294.442	Vertical	Pass
		1880	0.93	3.91	28.24	25.26	335.738	Vertical	Pass
		1908.5	0.20	3.94	28.25	24.51	282.488	Vertical	Pass
5.0MHz Band QPSK	25/0	1852.5	0.34	3.77	28.31	24.88	307.610	Vertical	Pass
		1880	0.96	3.91	28.22	25.27	336.512	Vertical	Pass
		1907.5	0.45	3.94	28.20	24.71	295.801	Vertical	Pass
10.0MHz Band QPSK	50/0	1855	0.49	3.79	28.33	25.03	318.420	Vertical	Pass
		1880	0.21	3.95	28.22	24.48	280.543	Vertical	Pass
		1905	1.08	3.97	28.19	25.30	338.844	Vertical	Pass

15.0MHz Band QPSK	75/0	1857.5	0.58	3.79	28.34	25.13	325.837	Vertical	Pass
		1880	0.67	3.95	28.22	24.94	311.889	Vertical	Pass
		1902.5	1.08	3.97	28.18	25.29	338.065	Vertical	Pass
20.0MHz Band QPSK	100/0	1860	-0.14	3.81	28.35	24.40	275.423	Vertical	Pass
		1880	0.85	3.96	28.22	25.11	324.340	Vertical	Pass
		1900	0.29	4.00	28.16	24.45	278.612	Vertical	Pass

Note:

SG Level= Signal generator output

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

Radiated Power (EIRP) for Band 2									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band 16 QAM	6/0	1850.7	0.04	3.76	28.24	24.52	283.139	Horizontal	Pass
		1880	0.57	3.91	28.22	24.88	307.610	Horizontal	Pass
		1909.3	0.64	3.93	28.20	24.91	309.742	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	1851.5	0.54	3.77	28.23	25.00	316.228	Horizontal	Pass
		1880	0.46	3.91	28.24	24.79	301.301	Horizontal	Pass
		1908.5	0.25	3.94	28.25	24.56	285.759	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	1852.5	0.60	3.77	28.31	25.14	326.588	Horizontal	Pass
		1880	0.69	3.91	28.22	25.00	316.228	Horizontal	Pass
		1907.5	1.01	3.94	28.20	25.27	336.512	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	1855	0.55	3.79	28.33	25.09	322.849	Horizontal	Pass
		1880	0.56	3.95	28.22	24.83	304.089	Horizontal	Pass
		1905	1.09	3.97	28.19	25.31	339.625	Horizontal	Pass
15.0MHz Band 16 QAM	75/0	1857.5	0.57	3.79	28.34	25.12	325.087	Horizontal	Pass
		1880	0.78	3.95	28.22	25.05	319.890	Horizontal	Pass
		1902.5	0.82	3.97	28.18	25.03	318.420	Horizontal	Pass
20.0MHz Band 16 QAM	100/0	1860	0.68	3.81	28.35	25.22	332.660	Horizontal	Pass
		1880	0.98	3.96	28.22	25.24	334.195	Horizontal	Pass
		1900	1.16	4.00	28.16	25.32	340.408	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	1850.7	-0.19	3.76	28.24	24.29	268.534	Vertical	Pass
		1880	-0.86	3.91	28.22	23.45	221.309	Vertical	Pass
		1909.3	-0.24	3.93	28.20	24.03	252.930	Vertical	Pass
3.0MHz Band 16 QAM	15/0	1851.5	-1.07	3.77	28.23	23.39	218.273	Vertical	Pass
		1880	-0.94	3.91	28.24	23.39	218.273	Vertical	Pass
		1908.5	-0.69	3.94	28.25	23.62	230.144	Vertical	Pass
5.0MHz Band 16 QAM	25/0	1852.5	-0.96	3.77	28.31	23.58	228.034	Vertical	Pass
		1880	-0.68	3.91	28.22	23.63	230.675	Vertical	Pass
		1907.5	-0.08	3.94	28.20	24.18	261.818	Vertical	Pass
10.0MHz Band 16 QAM	50/0	1855	-0.50	3.79	28.33	24.04	253.513	Vertical	Pass
		1880	-0.30	3.95	28.22	23.97	249.459	Vertical	Pass
		1905	0.10	3.97	28.19	24.32	270.396	Vertical	Pass
15.0MHz Band 16 QAM	75/0	1857.5	-1.03	3.79	28.34	23.52	224.905	Vertical	Pass
		1880	-0.09	3.95	28.22	24.18	261.818	Vertical	Pass
		1902.5	-0.13	3.97	28.18	24.08	255.859	Vertical	Pass

20.0MHz	100/0	1860	-1.17	3.81	28.35	23.37	217.270	Vertical	Pass
Band 16		1880	-0.22	3.96	28.22	24.04	253.513	Vertical	Pass
QAM		1900	-0.01	4.00	28.16	24.15	260.016	Vertical	Pass

Note:

SG Level= Signal generator output

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

8.3 LTE BAND 4

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	6/0	1710.7	1.13	3.12	27.58	25.59	362.243	Horizontal	Pass
		1732.5	1.14	3.27	27.61	25.48	353.183	Horizontal	Pass
		1754.3	1.16	3.29	27.63	25.50	354.813	Horizontal	Pass
3.0MHz Band QPSK	15/0	1711.5	0.96	3.13	27.61	25.44	349.945	Horizontal	Pass
		1732.5	1.04	3.27	27.61	25.38	345.144	Horizontal	Pass
		1753.5	1.12	3.30	27.62	25.44	349.945	Horizontal	Pass
5.0MHz Band QPSK	25/0	1712.5	1.19	3.13	27.63	25.69	370.681	Horizontal	Pass
		1732.5	1.29	3.27	27.61	25.63	365.595	Horizontal	Pass
		1752.5	1.41	3.30	27.60	25.71	372.392	Horizontal	Pass
10.0MHz Band QPSK	50/0	1715	1.25	3.15	27.64	25.74	374.973	Horizontal	Pass
		1732.5	1.48	3.31	27.61	25.78	378.443	Horizontal	Pass
		1750	1.46	3.33	27.59	25.72	373.250	Horizontal	Pass
15.0MHz Band QPSK	75/0	1717.5	1.24	3.15	27.65	25.74	374.973	Horizontal	Pass
		1732.5	1.40	3.31	27.61	25.70	371.535	Horizontal	Pass
		1747.5	1.46	3.33	27.57	25.70	371.535	Horizontal	Pass
20.0MHz Band QPSK	100/0	1720	1.30	3.17	27.66	25.79	379.315	Horizontal	Pass
		1732.5	1.47	3.32	27.61	25.76	376.704	Horizontal	Pass
		1745	1.53	3.36	27.56	25.73	374.111	Horizontal	Pass
1.4MHz Band QPSK	6/0	1710.7	0.23	3.12	27.58	24.69	294.442	Vertical	Pass
		1732.5	0.56	3.27	27.61	24.90	309.030	Vertical	Pass
		1754.3	0.49	3.29	27.63	24.83	304.089	Vertical	Pass
3.0MHz Band QPSK	15/0	1711.5	-0.05	3.13	27.61	24.43	277.332	Vertical	Pass
		1732.5	-0.01	3.27	27.61	24.33	271.019	Vertical	Pass
		1753.5	0.61	3.30	27.62	24.93	311.172	Vertical	Pass
5.0MHz Band QPSK	25/0	1712.5	0.39	3.13	27.63	24.89	308.319	Vertical	Pass
		1732.5	-0.03	3.27	27.61	24.31	269.774	Vertical	Pass
		1752.5	0.24	3.30	27.60	24.54	284.446	Vertical	Pass
10.0MHz Band QPSK	50/0	1715	0.11	3.15	27.64	24.60	288.403	Vertical	Pass
		1732.5	0.18	3.31	27.61	24.48	280.543	Vertical	Pass
		1750	0.93	3.33	27.59	25.19	330.370	Vertical	Pass

15.0MHz Band QPSK	75/0	1717.5	0.32	3.15	27.65	24.82	303.389	Vertical	Pass
		1732.5	0.56	3.31	27.61	24.86	306.196	Vertical	Pass
		1747.5	0.08	3.33	27.57	24.32	270.396	Vertical	Pass
20.0MHz Band QPSK	100/0	1720	0.74	3.17	27.66	25.23	333.426	Vertical	Pass
		1732.5	0.54	3.32	27.61	24.83	304.089	Vertical	Pass
		1745	0.45	3.36	27.56	24.65	291.743	Vertical	Pass

Note:

SG Level= Signal generator output

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

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band 16 QAM	6/0	1710.7	0.32	3.12	27.58	24.78	300.608	Horizontal	Pass
		1732.5	0.47	3.27	27.61	24.81	302.691	Horizontal	Pass
		1754.3	0.47	3.29	27.63	24.81	302.691	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	1711.5	0.38	3.13	27.61	24.86	306.196	Horizontal	Pass
		1732.5	0.25	3.27	27.61	24.59	287.740	Horizontal	Pass
		1753.5	0.03	3.30	27.62	24.35	272.270	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	1712.5	0.55	3.13	27.63	25.05	319.890	Horizontal	Pass
		1732.5	0.59	3.27	27.61	24.93	311.172	Horizontal	Pass
		1752.5	0.90	3.30	27.60	25.20	331.131	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	1715	0.48	3.15	27.64	24.97	314.051	Horizontal	Pass
		1732.5	0.29	3.31	27.61	24.59	287.740	Horizontal	Pass
		1750	0.91	3.33	27.59	25.17	328.852	Horizontal	Pass
15.0MHz Band 16 QAM	75/0	1717.5	0.68	3.15	27.65	25.18	329.610	Horizontal	Pass
		1732.5	0.62	3.31	27.61	24.92	310.456	Horizontal	Pass
		1747.5	0.60	3.33	27.57	24.84	304.789	Horizontal	Pass
20.0MHz Band 16 QAM	100/0	1720	0.73	3.17	27.66	25.22	332.660	Horizontal	Pass
		1732.5	0.72	3.32	27.61	25.01	316.957	Horizontal	Pass
		1745	0.91	3.36	27.56	25.11	324.340	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	1710.7	-0.39	3.12	27.58	24.07	255.270	Vertical	Pass
		1732.5	-0.80	3.27	27.61	23.54	225.944	Vertical	Pass
		1754.3	-0.82	3.29	27.63	23.52	224.905	Vertical	Pass
3.0MHz Band 16 QAM	15/0	1711.5	-1.19	3.13	27.61	23.29	213.304	Vertical	Pass
		1732.5	-0.95	3.27	27.61	23.39	218.273	Vertical	Pass
		1753.5	-0.18	3.30	27.62	24.14	259.418	Vertical	Pass
5.0MHz Band 16 QAM	25/0	1712.5	-0.45	3.13	27.63	24.05	254.097	Vertical	Pass
		1732.5	-0.35	3.27	27.61	23.99	250.611	Vertical	Pass
		1752.5	-0.24	3.30	27.60	24.06	254.683	Vertical	Pass
10.0MHz Band 16 QAM	50/0	1715	-1.01	3.15	27.64	23.48	222.844	Vertical	Pass
		1732.5	-1.06	3.31	27.61	23.24	210.863	Vertical	Pass
		1750	-0.83	3.33	27.59	23.43	220.293	Vertical	Pass
15.0MHz Band 16 QAM	75/0	1717.5	-1.23	3.15	27.65	23.27	212.324	Vertical	Pass
		1732.5	-0.86	3.31	27.61	23.44	220.800	Vertical	Pass
		1747.5	-0.04	3.33	27.57	24.20	263.027	Vertical	Pass

20.0MHz	100/0	1720	-0.55	3.17	27.66	23.94	247.742	Vertical	Pass
Band 16		1732.5	-0.07	3.32	27.61	24.22	264.241	Vertical	Pass
QAM		1745	-0.08	3.36	27.56	24.12	258.226	Vertical	Pass

Note:

SG Level= Signal generator output

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

8.5 LTE BAND 7

Radiated Power (EIRP) for Band 7									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
5.0MHz Band QPSK	1/#Mid	2502.5	3.53	4.54	27.75	26.74	472.063	Horizontal	Pass
		2535	3.70	4.69	27.72	26.73	470.977	Horizontal	Pass
		2567.5	3.77	4.71	27.71	26.77	475.335	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	2505	3.60	4.55	27.76	26.81	479.733	Horizontal	Pass
		2535	3.79	4.69	27.72	26.82	480.839	Horizontal	Pass
		2565	3.87	4.72	27.70	26.85	484.172	Horizontal	Pass
15.0MHz Band QPSK	1/#Mid	2507.5	3.59	4.55	27.77	26.81	479.733	Horizontal	Pass
		2535	3.73	4.69	27.72	26.76	474.242	Horizontal	Pass
		2562.5	3.83	4.72	27.69	26.80	478.630	Horizontal	Pass
20.0MHz Band QPSK	1/#Mid	2510	3.65	4.57	27.78	26.86	485.289	Horizontal	Pass
		2535	3.83	4.73	27.72	26.82	480.839	Horizontal	Pass
		2560	3.87	4.75	27.68	26.80	478.630	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	2502.5	2.65	4.54	27.75	25.86	385.478	Vertical	Pass
		2535	2.24	4.69	27.72	25.27	336.512	Vertical	Pass
		2567.5	1.98	4.71	27.71	24.98	314.775	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	2505	1.76	4.55	27.76	24.97	314.051	Vertical	Pass
		2535	2.09	4.69	27.72	25.12	325.087	Vertical	Pass
		2565	2.17	4.72	27.70	25.15	327.341	Vertical	Pass
15.0MHz Band QPSK	1/#Mid	2507.5	1.77	4.55	27.77	24.99	315.500	Vertical	Pass
		2535	2.28	4.69	27.72	25.31	339.625	Vertical	Pass
		2562.5	2.93	4.72	27.69	25.90	389.045	Vertical	Pass
20.0MHz Band QPSK	1/#Mid	2510	1.73	4.57	27.78	24.94	311.889	Vertical	Pass
		2535	2.23	4.73	27.72	25.22	332.660	Vertical	Pass
		2560	2.79	4.75	27.68	25.72	373.250	Vertical	Pass

Radiated Power (EIRP) for Band 7									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
5.0MHz Band 16 QAM	1/#Mid	2502.5	0.15	4.54	27.75	23.36	216.86	Horizontal	Pass
		2535	0.36	4.69	27.72	23.39	218.06	Horizontal	Pass
		2567.5	0.45	4.71	27.71	23.45	221.06	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	2505	0.50	4.55	27.76	23.71	234.77	Horizontal	Pass
		2535	0.78	4.69	27.72	23.81	240.37	Horizontal	Pass
		2565	1.16	4.72	27.7	24.14	259.33	Horizontal	Pass
15.0MHz Band 16 QAM	1/#Mid	2507.5	0.64	4.55	27.77	23.86	243.13	Horizontal	Pass
		2535	0.14	4.69	27.72	23.17	207.52	Horizontal	Pass
		2562.5	0.69	4.72	27.69	23.66	232.05	Horizontal	Pass
20.0MHz Band 16 QAM	1/#Mid	2510	0.74	4.57	27.78	23.95	248.42	Horizontal	Pass
		2535	-0.28	4.73	27.72	22.71	186.62	Horizontal	Pass
		2560	0.09	4.75	27.68	23.02	200.22	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	2502.5	0.24	4.54	27.75	23.45	221.45	Vertical	Pass
		2535	-0.46	4.69	27.72	22.57	180.88	Vertical	Pass
		2567.5	0.64	4.71	27.71	23.64	231.39	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	2505	0.94	4.55	27.76	24.15	260.19	Vertical	Pass
		2535	0.97	4.69	27.72	24.00	251.33	Vertical	Pass
		2565	0.56	4.72	27.70	23.54	226.08	Vertical	Pass
15.0MHz Band 16 QAM	1/#Mid	2507.5	1.23	4.55	27.77	24.45	278.43	Vertical	Pass
		2535	1.07	4.69	27.72	24.10	257.33	Vertical	Pass
		2562.5	1.79	4.72	27.69	24.76	299.26	Vertical	Pass
20.0MHz Band 16 QAM	1/#Mid	2510	1.58	4.57	27.78	24.79	301.47	Vertical	Pass
		2535	0.46	4.73	27.72	23.45	221.42	Vertical	Pass
		2560	0.22	4.75	27.68	23.15	206.32	Vertical	Pass

Note:

SG Level= Signal generator output

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

9. SPURIOUS RADIATION EMISSION

RULE PART(S)

FCC: §2.1051, §22.917(a), §24.238(a), §27.53(c)(g)(h)(m)

LIMIT

For Band 7, the minimum permissible attenuation level of any spurious emission is $55 + \log_{10}(P)$ [Watts]).

The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P)$ [Watts]), where P is the transmitter power in Watts.

TEST PROCEDURE

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

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

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

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

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

MODES TESTED

- ☐ LTE Band 2
- LTE Band 4
- LTE Band 7

RESULTS

PASS

9.1 LTE BAND 2

QPSK EIRP POWER FOR LTE BAND 2 (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
3701.4	-45.11	4.04	33.51	-15.64	-13	-2.64	Horizontal
3701.4	-50.43	4.04	33.51	-20.96	-13	-7.96	Vertical
5552.1	-50.13	5.24	35.84	-19.53	-13	-6.53	Vertical
5552.1	-50.32	5.24	35.84	-19.72	-13	-6.72	Horizontal
183.9	-39.66	1.43	16.02	-25.07	-13	-12.07	Vertical
236.3	-40.25	1.30	17.99	-23.56	-13	-10.56	Horizontal
Test Results for Mid Channel 1732.5MHz							
3760.0	-52.17	4.04	33.56	-22.65	-13	-9.65	Horizontal
3760.0	-52.75	4.04	33.56	-23.23	-13	-10.23	Vertical
5640.0	-47.79	5.24	35.91	-17.12	-13	-4.12	Vertical
5640.0	-51.59	5.24	35.91	-20.92	-13	-7.92	Horizontal
212.7	-34.08	1.62	16.97	-18.73	-13	-5.73	Vertical
429.9	-39.10	1.74	15.98	-24.87	-13	-11.87	Horizontal
Test Results for High Channel 1754.3MHz							
3818.6	-51.84	4.04	34.00	-21.88	-13	-8.88	Horizontal
3818.6	-51.16	4.04	34.00	-21.20	-13	-8.20	Vertical
5727.9	-48.89	5.24	36.04	-18.09	-13	-5.09	Vertical
5727.9	-52.52	5.24	36.04	-21.72	-13	-8.72	Horizontal
204.1	-37.45	1.42	17.29	-21.58	-13	-8.58	Vertical
362.5	-38.96	1.50	17.90	-22.55	-13	-9.55	Horizontal

QPSK EIRP POWER FOR LTE BAND 2 (20.0MHZ 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
3720.0	-50.84	4.07	33.54	-21.37	-13	-8.37	Horizontal
3720.0	-47.20	4.07	33.54	-17.73	-13	-4.73	Vertical
5580.0	-44.36	5.28	35.86	-13.78	-13	-0.78	Vertical
5580.0	-52.41	5.28	35.86	-21.83	-13	-8.83	Horizontal
201.2	-39.67	1.58	16.89	-24.35	-13	-11.35	Vertical
466.9	-36.90	1.76	17.26	-21.40	-13	-8.40	Horizontal
Test Results for Mid Channel 1732.5MHz							
3760.0	-45.95	4.04	33.56	-16.43	-13	-3.43	Horizontal
3760.0	-50.05	4.04	33.56	-20.53	-13	-7.53	Vertical
5640.0	-46.04	5.24	35.91	-15.37	-13	-2.37	Vertical
5640.0	-53.05	5.24	35.91	-22.38	-13	-9.38	Horizontal
206.8	-36.12	1.46	16.27	-21.31	-13	-8.31	Vertical
381.4	-41.67	1.59	15.15	-28.11	-13	-15.11	Horizontal
Test Results for High Channel 1754.3MHz							
3800.0	-47.14	4.04	34.00	-17.18	-13	-4.18	Horizontal
3800.0	-47.28	4.04	34.00	-17.32	-13	-4.32	Vertical
5700.0	-52.21	5.24	36.04	-21.41	-13	-8.41	Vertical
5700.0	-49.06	5.24	36.04	-18.26	-13	-5.26	Horizontal
189.0	-34.07	1.36	17.39	-18.03	-13	-5.03	Vertical
360.3	-41.41	1.66	15.39	-27.68	-13	-14.68	Horizontal

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

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

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

9.2 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	-45.44	4.02	29.80	-19.66	-13	-6.66	3421.4
3421.4	-47.67	4.02	29.80	-21.89	-13	-8.89	3421.4
5132.1	-45.84	5.24	35.84	-15.24	-13	-2.24	5132.1
5132.1	-52.83	5.24	35.84	-22.23	-13	-9.23	5132.1
206.6	-40.51	1.68	16.04	-26.15	-13	-13.15	206.6
391.5	-34.38	1.78	17.74	-18.42	-13	-5.42	391.5
Test Results for Mid Channel 1732.5MHz							
3465.0	-52.32	4.03	30.00	-26.35	-13	-13.35	Horizontal
3465.0	-51.26	4.03	30.00	-25.29	-13	-12.29	Vertical
5197.5	-44.24	5.25	35.86	-13.63	-13	-0.63	Vertical
5197.5	-53.60	5.25	35.86	-22.99	-13	-9.99	Horizontal
192.5	-34.81	1.72	17.69	-18.84	-13	-5.84	Vertical
288.3	-40.26	1.62	16.02	-25.85	-13	-12.85	Horizontal
Test Results for High Channel 1754.3MHz							
3508.6	-47.70	4.05	30.01	-21.74	-13	-8.74	Horizontal
3508.6	-46.33	4.05	30.01	-20.37	-13	-7.37	Vertical
5262.9	-48.38	5.26	35.86	-17.78	-13	-4.78	Vertical
5262.9	-50.60	5.26	35.86	-20.00	-13	-7.00	Horizontal
183.8	-34.41	1.80	16.69	-19.52	-13	-6.52	Vertical
314.1	-36.72	1.75	16.66	-21.82	-13	-8.82	Horizontal

QPSK EIRP POWER FOR LTE BAND 4 (20.0MHZ BANDWIDTH)

Test Results for Low Channel 1720MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3440.0	-49.36	4.02	29.80	-23.58	-13	-10.58	Horizontal
3440.0	-49.46	4.02	29.80	-23.68	-13	-10.68	Vertical
5160.0	-50.80	5.24	35.84	-20.20	-13	-7.20	Vertical
5160.0	-49.23	5.24	35.84	-18.63	-13	-5.63	Horizontal
182.1	-38.71	1.57	17.26	-23.02	-13	-10.02	Vertical
280.1	-36.49	1.78	16.35	-21.92	-13	-8.92	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-49.94	4.03	30.00	-23.97	-13	-10.97	Horizontal
3465.0	-50.57	4.03	30.00	-24.60	-13	-11.60	Vertical
5197.5	-52.37	5.25	35.86	-21.76	-13	-8.76	Vertical
5197.5	-51.78	5.25	35.86	-21.17	-13	-8.17	Horizontal
209.3	-39.50	1.44	17.95	-22.99	-13	-9.99	Vertical
366.4	-37.09	1.65	16.09	-22.65	-13	-9.65	Horizontal
Test Results for High Channel 1745MHz							
3490.0	-50.48	2.91	27.68	-25.71	-13	-12.71	Horizontal
3490.0	-47.80	2.91	27.68	-23.03	-13	-10.03	Vertical
5235.0	-44.61	5.26	35.86	-14.01	-13	-1.01	Vertical
5235.0	-51.34	5.26	35.86	-20.74	-13	-7.74	Horizontal
211.4	-34.44	1.61	16.85	-19.20	-13	-6.20	Vertical
372.5	-37.28	1.61	15.19	-23.70	-13	-10.70	Horizontal

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

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

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

9.4 LTE BAND 7

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

Test Results for Low Channel 2502.5MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
5005.0	-64.34	5.23	35.81	-33.76	-25	-8.76	Horizontal
5005.0	-62.80	5.23	35.81	-32.22	-25	-7.22	Vertical
7507.5	-60.03	5.67	36.85	-28.85	-25	-3.85	Vertical
7507.5	-60.02	5.67	36.85	-28.84	-25	-3.84	Horizontal
195.8	-50.20	1.73	17.97	-33.96	-25	-8.96	Vertical
282.9	-47.18	1.38	15.11	-33.45	-25	-8.45	Horizontal
Test Results for Mid Channel 2535MHz							
5070.0	-62.65	5.23	35.82	-32.06	-25	-7.06	Horizontal
5070.0	-62.85	5.23	35.82	-32.26	-25	-7.26	Vertical
7605.0	-63.18	5.67	36.85	-32.00	-25	-7.00	Vertical
7605.0	-59.64	5.67	36.85	-28.46	-25	-3.46	Horizontal
192.5	-50.90	1.77	16.17	-36.49	-25	-11.49	Vertical
296.5	-54.68	1.63	15.21	-41.10	-25	-16.10	Horizontal
Test Results for High Channel 2567.5MHz							
5135.0	-64.25	5.24	35.83	-33.66	-25	-8.66	Horizontal
5135.0	-60.94	5.24	35.83	-30.35	-25	-5.35	Vertical
7702.5	-61.61	5.68	36.87	-30.42	-25	-5.42	Vertical
7702.5	-64.86	5.68	36.87	-33.67	-25	-8.67	Horizontal
186.6	-44.43	1.58	17.56	-28.45	-25	-3.45	Vertical
331.6	-49.87	1.45	16.58	-34.74	-25	-9.74	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 Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
5020.0	-61.27	5.23	35.82	-30.68	-25	-5.68	Horizontal
5020.0	-59.98	5.23	35.82	-29.39	-25	-4.39	Vertical
7530.0	-59.68	5.67	36.86	-28.49	-25	-3.49	Vertical
7530.0	-60.35	5.67	36.86	-29.16	-25	-4.16	Horizontal
199.5	-52.43	1.63	15.76	-38.30	-25	-13.30	Vertical
326.6	-46.79	1.71	15.44	-33.06	-25	-8.06	Horizontal
Test Results for Mid Channel 2535MHz							
5070.0	-62.24	5.23	35.82	-31.65	-25	-6.65	Horizontal
5070.0	-60.84	5.23	35.82	-30.25	-25	-5.25	Vertical
7605.0	-60.46	5.67	36.85	-29.28	-25	-4.28	Vertical
7605.0	-59.12	5.67	36.85	-27.94	-25	-2.94	Horizontal
208.3	-49.14	1.79	16.84	-34.08	-25	-9.08	Vertical
412.9	-50.05	1.71	17.64	-34.12	-25	-9.12	Horizontal
Test Results for High Channel 2560MHz							
5120.0	-61.01	5.24	35.83	-30.42	-25	-5.42	Horizontal
5120.0	-60.66	5.24	35.83	-30.07	-25	-5.07	Vertical
7680.0	-62.81	5.70	36.88	-31.63	-25	-6.63	Vertical
7680.0	-60.76	5.70	36.88	-29.58	-25	-4.58	Horizontal
191.6	-49.61	1.79	16.84	-34.55	-25	-9.55	Vertical
258.5	-45.53	1.71	17.64	-29.60	-25	-4.60	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.

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 3.2V, Normal, DC 3.8V and High voltage, DC 4.4V.

Frequency Stability vs Temperature:

The EUT is placed inside a temperature chamber. The temperature is set to -30°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until $+50^{\circ}\text{C}$ is reached.

Frequency Stability vs Voltage:

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

MODES TESTED

- ☐ LTE Band 2
- LTE Band 4
- LTE Band 7

RESULTS

See the following pages.

10.1 LTE BAND 2

QPSK, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 2 QPSK, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.2	1880	12.8	0.006790	2.5
3.7	1880	14.0	0.007451	2.5
4.1	1880	13.5	0.007196	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 2 QPSK, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1880	12.2	0.006515	2.5
Extreme (50C)	1880	11.8	0.006266	2.5
Extreme (40C)	1880	13.9	0.007411	2.5
Extreme (30C)	1880	13.4	0.007112	2.5
Extreme (10C)	1880	14.1	0.007484	2.5
Extreme (0C)	1880	12.5	0.006660	2.5
Extreme (-10C)	1880	13.0	0.006896	2.5
Extreme (-20C)	1880	14.3	0.007614	2.5
Extreme (-30C)	1880	14.5	0.007700	2.5

16QAM, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 2 16QAM, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.2	1880	10.1	0.005348	2.5
3.7	1880	8.6	0.004590	2.5
4.1	1880	8.4	0.004461	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 2 16QAM, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1880	9.4	0.004978	2.5
Extreme (50C)	1880	8.5	0.004538	2.5
Extreme (40C)	1880	8.3	0.004407	2.5
Extreme (30C)	1880	8.7	0.004640	2.5
Extreme (10C)	1880	9.0	0.004765	2.5
Extreme (0C)	1880	7.6	0.004056	2.5
Extreme (-10C)	1880	9.3	0.004936	2.5
Extreme (-20C)	1880	8.6	0.004555	2.5
Extreme (-30C)	1880	8.5	0.004515	2.5

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

10.2 LTE BAND 4

QPSK, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 4 QPSK, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.2	1732.5	8.9	0.005119	2.5
3.7	1732.5	8.8	0.005067	2.5
4.1	1732.5	8.5	0.004914	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 4 QPSK, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1732.5	8.0	0.004629	2.5
Extreme (50C)	1732.5	9.2	0.005306	2.5
Extreme (40C)	1732.5	7.7	0.004443	2.5
Extreme (30C)	1732.5	6.2	0.003571	2.5
Extreme (10C)	1732.5	7.2	0.004174	2.5
Extreme (0C)	1732.5	9.3	0.005373	2.5
Extreme (-10C)	1732.5	8.9	0.005137	2.5
Extreme (-20C)	1732.5	6.6	0.003784	2.5
Extreme (-30C)	1732.5	8.0	0.004624	2.5

16QAM, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 4 16QAM, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.2	1732.5	9.7	0.005576	2.5
3.7	1732.5	8.6	0.004951	2.5
4.1	1732.5	8.3	0.004815	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 4 16QAM, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1732.5	9.4	0.005425	2.5
Extreme (50C)	1732.5	8.6	0.004948	2.5
Extreme (40C)	1732.5	8.0	0.004595	2.5
Extreme (30C)	1732.5	8.6	0.004990	2.5
Extreme (10C)	1732.5	8.7	0.005032	2.5
Extreme (0C)	1732.5	7.7	0.004438	2.5
Extreme (-10C)	1732.5	8.8	0.005055	2.5
Extreme (-20C)	1732.5	9.3	0.005390	2.5
Extreme (-30C)	1732.5	7.7	0.004460	2.5

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

10.4 LTE BAND 7

QPSK, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 7 QPSK, (CH 21100 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.2	2535	10.5	0.004140	2.5
3.8	2535	8.7	0.003449	2.5
4.4	2535	8.9	0.003511	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 7 QPSK, (CH 21100 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	2535	9.2	0.003643	2.5
Extreme (50C)	2535	8.7	0.003428	2.5
Extreme (40C)	2535	8.6	0.003381	2.5
Extreme (30C)	2535	8.9	0.003519	2.5
Extreme (10C)	2535	8.6	0.003385	2.5
Extreme (0C)	2535	8.8	0.003459	2.5
Extreme (-10C)	2535	9.6	0.003789	2.5
Extreme (-20C)	2535	9.1	0.003605	2.5
Extreme (-30C)	2535	8.3	0.003262	2.5

16QAM, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 7 16QAM, (CH 21100 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.2	2535	6.9	0.002722	2.5
3.8	2535	6.2	0.002461	2.5
4.4	2535	5.8	0.002288	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 7 16QAM, (CH 21100 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	2535	6.9	0.002722	2.5
Extreme (50C)	2535	5.6	0.002209	2.5
Extreme (40C)	2535	5.5	0.002163	2.5
Extreme (30C)	2535	7.2	0.002826	2.5
Extreme (10C)	2535	5.7	0.002234	2.5
Extreme (0C)	2535	5.6	0.002200	2.5
Extreme (-10C)	2535	5.6	0.002190	2.5
Extreme (-20C)	2535	5.6	0.002220	2.5
Extreme (-30C)	2535	6.1	0.002410	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.

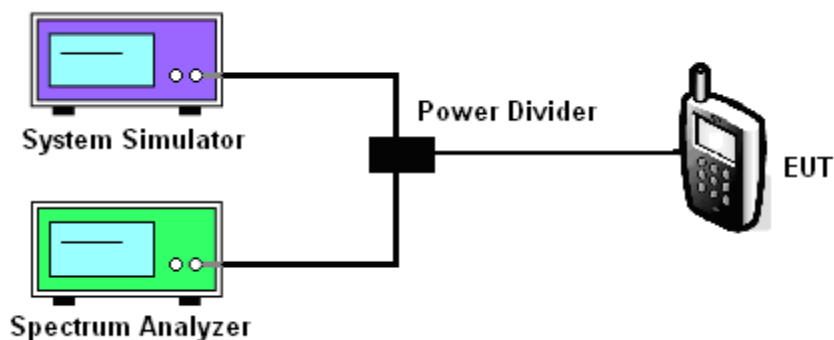
11.2 Measuring Instruments

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 GSM/EGPRS operating modes:
 - a. Set the RBW = 1MHz, VBW = 1MHz, Peak detector in spectrum analyzer.
 - b. Set EUT in maximum power output, and triggered the burst signal.
 - c. Measured respectively the Peak level and Mean level, and the deviation was recorded as Peak to Average Ratio.
4. For UMTS 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----