

FCC CFR47 PART 27

CERTIFICATION TEST REPORT

FCC ID: 2ABFV-QTP2019

Product: Touch Smart QUICKTAB PLUS

Trade Mark: Touch Smart

Model Number: Touch Smart QUICKTAB PLUS

Family Model: N/A

Report No.: STR191029001007E

Prepared for

PC Smart S.A.

Carrera 116 no.15-25, Bogota, Colombia

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name: PC Smart S.A.
Address: Carrera 116 no.15-25, Bogota, Colombia

Manufacturer's Name: PC Smart S.A.
Address: Carrera 116 no.15-25, Bogota, Colombia

Product name: Touch Smart QUICKTAB PLUS
Model and/or type reference: Touch Smart QUICKTAB PLUS
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

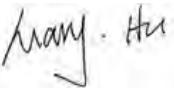
Date (s) of performance of tests: 15 Aug. 2019 ~ 03 Sep. 2019

Date of Issue: 31 Oct. 2019

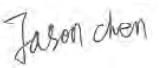
Test Result: **Pass**

Note: All test data of this report are based on the original test report

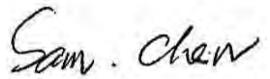
STR190814001007E, dated by 2019-09-04.

Testing Engineer : 

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Authorized Signatory : 

(Sam Chen)

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Revision History

1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	Touch Smart QUICKTAB PLUS
Trade Mark	Touch Smart
Model Name	Touch Smart QUICKTAB PLUS
Family Model	N/A
Model Difference	N/A
FCC ID:	2ABFV-QTP2019
Frequency Bands:	U.S. Bands: <input checked="" type="checkbox"/> LTE FDD Band 4, 7
Frequency Range:	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 4: 0.89dBi, Band 7: 0.66dBi
Power Supply:	3.8V/4050mAh from Battery or DC 5V from USB Port.
Adapter:	Model: GLY-G19UA-050150-540A-HQFY Input: 100-240V~50/60Hz 0.3A Output: 5V---1500mA
Extreme Vol. Limits:	DC 3.20V to DC 4.35V (Nominal DC 3.8V) (Note 1)
HW Version	FD625BP_MB_V2.0
SW Version	QUICKTAB PLUS_TS19_PA19H02

** Note1: The High Voltage DC 4.35V and Low Voltage 3.20V 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: **2ABFV-QTP2019** 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 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.

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

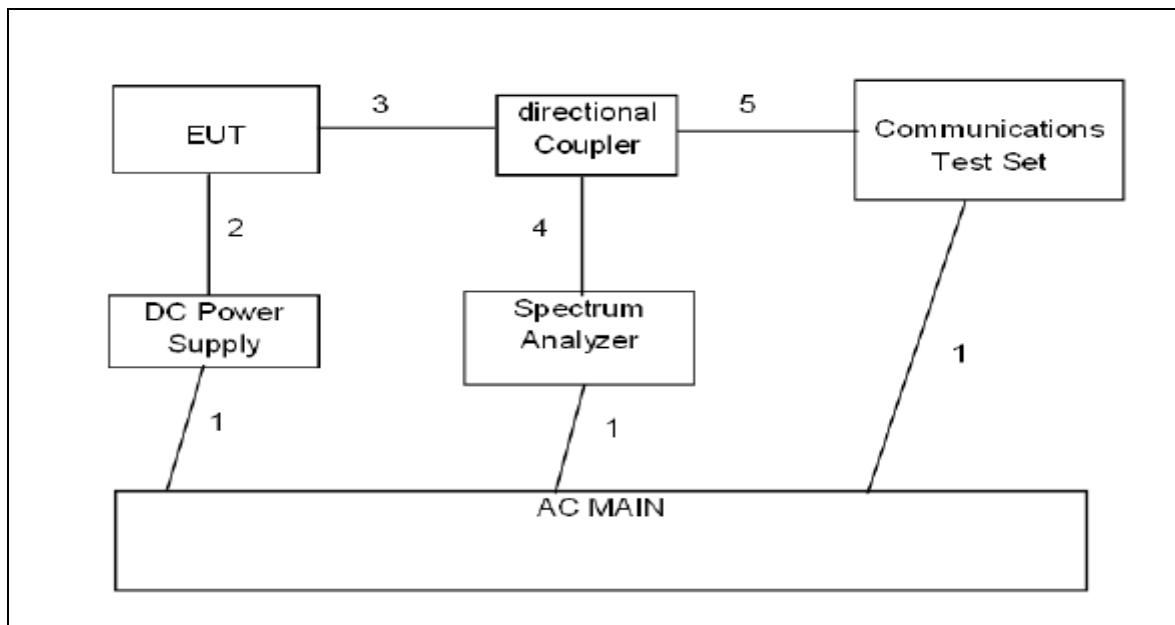
Item	Equipment	Model No.	ID or Specification	Note
1	Touch Smart QUICKTAB PLUS	Touch Smart QUICKTAB PLUS	FCC ID: 2ABFV-QTP2019	EUT

Note: All the accessories have been used during the test.

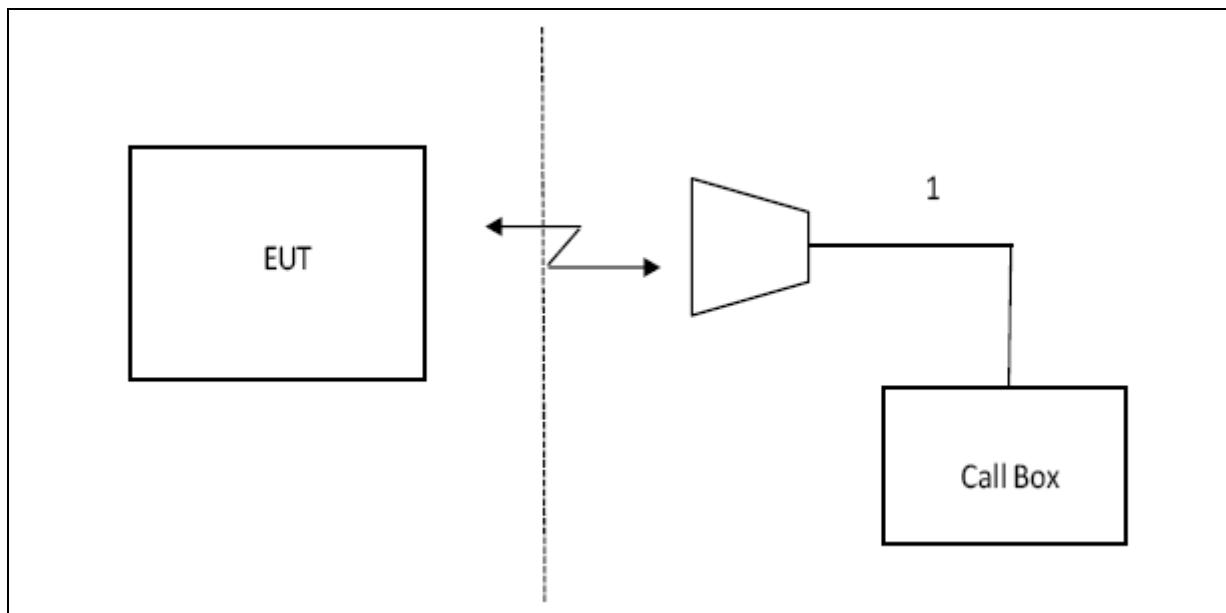
the following "EUT" in setup diagram means EUT system.

2.4 TEST SETUP

CONDUCTED SETUP DIAGRAM FOR TESTS



RADIATED SETUP DIAGRAM FOR TESTS



3. TEST AND MEASUREMENT EQUIPMENT

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

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	NEXT CAL. DATE
SPECTRUM ANALYZER	AGILENT	N9020A	MY49100060	2019.10.07
TEST RECEIVER	R&S	ESCI	101318	2020.05.12
COMMUNICATION TESTER	R&S	CMU200	117858	2020.05.12
COMMUNICATION TESTER	R&S	CMW500	148500	2020.05.12
TEST RECEIVER	R&S	FCKL1528	A0304230	2020.05.12
LISN	SCHWARZBECK	NSLK8127	A0304233	2020.05.12
CLIMATE CHAMBER	ALBATROSS	--	--	2020.05.12
Loop Antenna	Daze	ZN30900N	SEL0097	2020.05.12
Biological Antenna	A.H. Systems Inc.	SAS-521-4	N/A	2020.05.12
Horn Antenna	EM	EM-AH-10180	2011071402	2020.05.12
DC Power Source	N/A	PS-6005D	20170402923	2020.05.12

4. OUTPUT POWER

4.1 OUTPUT POWER MEASUREMENT

LTE Measurement Procedure:

All LTE bands conducted power peak and average are obtained from the CMW500 telecommunication test set. The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

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

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

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

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

Test data reference attachment.

5. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

LIMITS

For reporting purposes only

TEST PROCEDURE

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

MODES TESTED

LTE Band 4

LTE Band 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, and §90.691

FCC: §22.359

LIMITS

FCC: §22.359, §24.238,

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.

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 (704, 716, 824, 849, 1710 and 1755, 1850 and 1910MHz)

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

Set display line at -13 dBm

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

MODES TESTED

LTE Band 4

LTE Band 7

RESULTS

Test data reference attachment.

7. OUT OF BAND EMISSIONS

RULE PART(S)

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

LIMITS

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.

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 at -13 dBm

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

MODES TESTED

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.

8. RADIATED MEASUREMENT

8.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232 and §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

LTE Band 4

LTE Band 7

RESULTS

Pass

8.2 LTE BAND 4

Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	1/0	1710.7	-0.82	3.12	27.58	23.64	231.206	Vertical	Pass
		1732.5	-0.66	3.27	27.61	23.68	233.346	Vertical	Pass
		1754.3	-0.71	3.29	27.63	23.63	230.675	Vertical	Pass
1.4MHz Band 16 QAM	1/0	1710.7	-1.85	3.12	27.58	22.61	182.390	Vertical	Pass
		1732.5	-1.86	3.27	27.61	22.48	177.011	Vertical	Pass
		1754.3	-1.78	3.29	27.63	22.56	180.302	Vertical	Pass
3.0MHz Band QPSK	1/0	1711.5	-0.80	3.13	27.61	23.68	233.346	Vertical	Pass
		1732.5	-0.69	3.27	27.61	23.65	231.739	Vertical	Pass
		1753.5	-0.63	3.30	27.62	23.69	233.884	Vertical	Pass
3.0MHz Band 16 QAM	1/0	1711.5	-2.04	3.13	27.61	22.44	175.388	Vertical	Pass
		1732.5	-2.11	3.27	27.61	22.23	167.109	Vertical	Pass
		1753.5	-1.97	3.30	27.62	22.35	171.791	Vertical	Pass
5.0MHz Band QPSK	1/0	1712.5	-0.72	3.13	27.63	23.78	238.781	Vertical	Pass
		1732.5	-0.65	3.27	27.61	23.69	233.884	Vertical	Pass
		1752.5	-0.66	3.30	27.60	23.64	231.206	Vertical	Pass
5.0MHz Band 16 QAM	1/0	1712.5	-2.19	3.13	27.63	22.31	170.216	Vertical	Pass
		1732.5	-1.90	3.27	27.61	22.44	175.388	Vertical	Pass
		1752.5	-1.84	3.30	27.60	22.46	176.198	Vertical	Pass
10.0MHz Band QPSK	1/0	1715	-0.88	3.15	27.64	23.61	229.615	Vertical	Pass
		1732.5	-0.97	3.31	27.61	23.33	215.278	Vertical	Pass
		1750	-0.74	3.33	27.59	23.52	224.905	Vertical	Pass
10.0MHz Band 16 QAM	1/0	1715	-1.98	3.15	27.64	22.51	178.238	Vertical	Pass
		1732.5	-1.92	3.31	27.61	22.38	172.982	Vertical	Pass
		1750	-1.90	3.33	27.59	22.36	172.187	Vertical	Pass
15.0MHz Band QPSK	1/0	1717.5	-0.79	3.15	27.65	23.71	234.963	Vertical	Pass
		1732.5	-1.35	3.31	27.61	22.95	197.242	Vertical	Pass
		1747.5	-0.36	3.33	27.57	23.88	244.343	Vertical	Pass
15.0MHz Band 16 QAM	1/0	1717.5	-2.02	3.15	27.65	22.48	177.011	Vertical	Pass
		1732.5	-2.07	3.31	27.61	22.23	167.109	Vertical	Pass
		1747.5	-1.88	3.33	27.57	22.36	172.187	Vertical	Pass

20.0MH	1/0	1720	-0.69	3.17	27.66	23.80	239.883	Vertical	Pass
z Band		1732.5	-0.57	3.32	27.61	23.72	235.505	Vertical	Pass
QPSK		1745	0.44	3.36	27.56	24.64	291.072	Vertical	Pass
20.0MH	1/0	1720	-1.01	3.17	27.66	23.48	222.844	Vertical	Pass
z Band		1732.5	-0.94	3.32	27.61	23.35	216.272	Vertical	Pass
16 QAM		1745	-0.71	3.36	27.56	23.49	223.357	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 QPSK	1/0	1710.7	-1.54	3.12	27.58	22.92	195.884	Horizontal	Pass
		1732.5	-1.46	3.27	27.61	22.88	194.089	Horizontal	Pass
		1754.3	-1.65	3.29	27.63	22.69	185.780	Horizontal	Pass
1.4MHz Band 16 QAM	1/0	1710.7	-2.61	3.12	27.58	21.85	153.109	Horizontal	Pass
		1732.5	-2.59	3.27	27.61	21.75	149.624	Horizontal	Pass
		1754.3	-2.77	3.29	27.63	21.57	143.549	Horizontal	Pass
3.0MHz Band QPSK	1/0	1711.5	-1.46	3.13	27.61	23.02	200.447	Horizontal	Pass
		1732.5	-1.34	3.27	27.61	23.00	199.526	Horizontal	Pass
		1753.5	-1.54	3.30	27.62	22.78	189.671	Horizontal	Pass
3.0MHz Band 16 QAM	1/0	1711.5	-2.89	3.13	27.61	21.59	144.212	Horizontal	Pass
		1732.5	-2.87	3.27	27.61	21.47	140.281	Horizontal	Pass
		1753.5	-2.59	3.30	27.62	21.73	148.936	Horizontal	Pass
5.0MHz Band QPSK	1/0	1712.5	-1.45	3.13	27.63	23.05	201.837	Horizontal	Pass
		1732.5	-1.46	3.27	27.61	22.88	194.089	Horizontal	Pass
		1752.5	-1.50	3.30	27.60	22.80	190.546	Horizontal	Pass
5.0MHz Band 16 QAM	1/0	1712.5	-2.96	3.13	27.63	21.54	142.561	Horizontal	Pass
		1732.5	-2.69	3.27	27.61	21.65	146.218	Horizontal	Pass
		1752.5	-2.62	3.30	27.60	21.68	147.231	Horizontal	Pass
10.0MHz Band QPSK	1/0	1715	-1.52	3.15	27.64	22.97	198.153	Horizontal	Pass
		1732.5	-1.47	3.31	27.61	22.83	191.867	Horizontal	Pass
		1750	-1.38	3.33	27.59	22.88	194.089	Horizontal	Pass
10.0MHz Band 16 QAM	1/0	1715	-2.74	3.15	27.64	21.75	149.624	Horizontal	Pass
		1732.5	-2.53	3.31	27.61	21.77	150.314	Horizontal	Pass
		1750	-2.60	3.33	27.59	21.66	146.555	Horizontal	Pass
15.0MHz Band QPSK	1/0	1717.5	-1.68	3.15	27.65	22.82	191.426	Horizontal	Pass
		1732.5	-1.51	3.31	27.61	22.79	190.108	Horizontal	Pass
		1747.5	-1.39	3.33	27.57	22.85	192.752	Horizontal	Pass
15.0MHz Band 16 QAM	1/0	1717.5	-2.56	3.15	27.65	21.94	156.315	Horizontal	Pass
		1732.5	-2.73	3.31	27.61	21.57	143.549	Horizontal	Pass
		1747.5	-2.46	3.33	27.57	21.78	150.661	Horizontal	Pass
20.0MHz Band	1/0	1720	-1.40	3.17	27.66	23.09	203.704	Horizontal	Pass
		1732.5	-1.66	3.32	27.61	22.63	183.231	Horizontal	Pass

QPSK		1745	-1.24	3.36	27.56	22.96	197.697	Horizontal	Pass
20.0MH z Band 16 QAM	1/0	1720	-2.69	3.17	27.66	21.80	151.356	Horizontal	Pass
		1732.5	-2.64	3.32	27.61	21.65	146.218	Horizontal	Pass
		1745	-2.48	3.36	27.56	21.72	148.594	Horizontal	Pass

Note:

SG Level= Signal generator output

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

8.3 LTE BAND 7

Radiated Power (EIRP) for Band 7								
Mode	RB/ RB SIZE	Frequency	Result					
			SG Level (dBm)	Cabl e Loss (dBm)	Antenn a Gain (dB)	Max. EIRP Averag e (dBm)	Max. EIRP Averag e (mW)	Polarizati on Of Max. ERP
5.0MHz Band QPSK	1/0	2502.5	0.95	4.54	27.75	24.16	260.615	Vertical
		2535	1.19	4.69	27.72	24.22	264.241	Vertical
		2567.5	1.20	4.71	27.71	24.20	263.027	Vertical
5.0MHz Band 16 QAM	1/0	2502.5	-0.19	4.54	27.75	23.02	200.447	Vertical
		2535	0.11	4.69	27.72	23.14	206.063	Vertical
		2567.5	0.19	4.71	27.71	23.19	208.449	Vertical
10.0MHz z Band QPSK	1/0	2505	0.91	4.55	27.76	24.12	258.226	Vertical
		2535	1.06	4.69	27.72	24.09	256.448	Vertical
		2565	1.00	4.72	27.70	23.98	250.035	Vertical
10.0MHz z Band 16 QAM	1/0	2505	-0.26	4.55	27.76	22.95	197.242	Vertical
		2535	-0.06	4.69	27.72	22.97	198.153	Vertical
		2565	0.06	4.72	27.70	23.04	201.372	Vertical
15.0MHz z Band QPSK	1/0	2507.5	0.90	4.55	27.77	24.12	258.226	Vertical
		2535	1.07	4.69	27.72	24.10	257.040	Vertical
		2562.5	1.25	4.72	27.69	24.22	264.241	Vertical
15.0MHz z Band 16 QAM	1/0	2507.5	-0.14	4.55	27.77	23.08	203.236	Vertical
		2535	-0.14	4.69	27.72	22.89	194.536	Vertical
		2562.5	-0.07	4.72	27.69	22.90	194.984	Vertical
20.0MHz z Band QPSK	1/0	2510	0.71	4.57	27.78	23.92	246.604	Vertical
		2535	0.98	4.73	27.72	23.97	249.459	Vertical
		2560	1.30	4.75	27.68	24.23	264.850	Vertical
20.0MHz z Band 16 QAM	1/0	2510	-0.34	4.57	27.78	22.87	193.642	Vertical
		2535	0.00	4.73	27.72	22.99	199.067	Vertical
		2560	0.30	4.75	27.68	23.23	210.378	Vertical

Note:

SG Level= Signal generator output

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

Radiated Power (EIRP) for Band 7									
Mode	RB/ RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cabl e Loss (dBm)	Antenn a Gain (dB)	Max. EIRP Averag e (dBm)	Max. EIRP Averag e (mW)	Polarizati on Of Max. ERP	
5.0MHz Band QPSK	1/0	2502.5	0.57	4.54	27.75	23.78	238.781	Horizontal	Pass
		2535	0.83	4.69	27.72	23.86	243.220	Horizontal	Pass
		2567.5	0.88	4.71	27.71	23.88	244.343	Horizontal	Pass
5.0MHz Band 16 QAM	1/0	2502.5	-0.43	4.54	27.75	22.78	189.671	Horizontal	Pass
		2535	-0.36	4.69	27.72	22.67	184.927	Horizontal	Pass
		2567.5	-0.38	4.71	27.71	22.62	182.810	Horizontal	Pass
10.0MH z Band QPSK	1/0	2505	0.48	4.55	27.76	23.69	233.884	Horizontal	Pass
		2535	0.59	4.69	27.72	23.62	230.144	Horizontal	Pass
		2565	0.62	4.72	27.70	23.60	229.087	Horizontal	Pass
10.0MH z Band 16 QAM	1/0	2505	-0.58	4.55	27.76	22.63	183.231	Horizontal	Pass
		2535	-0.57	4.69	27.72	22.46	176.198	Horizontal	Pass
		2565	-0.40	4.72	27.70	22.58	181.134	Horizontal	Pass
15.0MH z Band QPSK	1/0	2507.5	0.42	4.55	27.77	23.64	231.206	Horizontal	Pass
		2535	0.74	4.69	27.72	23.77	238.232	Horizontal	Pass
		2562.5	0.78	4.72	27.69	23.75	237.137	Horizontal	Pass
15.0MH z Band 16 QAM	1/0	2507.5	-0.70	4.55	27.77	22.52	178.649	Horizontal	Pass
		2535	-0.55	4.69	27.72	22.48	177.011	Horizontal	Pass
		2562.5	-0.47	4.72	27.69	22.50	177.828	Horizontal	Pass
20.0MH z Band QPSK	1/0	2510	0.59	4.57	27.78	23.80	239.883	Horizontal	Pass
		2535	0.83	4.73	27.72	23.82	240.991	Horizontal	Pass
		2560	0.80	4.75	27.68	23.73	236.048	Horizontal	Pass
20.0MH z Band 16 QAM	1/0	2510	-0.54	4.57	27.78	22.67	184.927	Horizontal	Pass
		2535	-0.43	4.73	27.72	22.56	180.302	Horizontal	Pass
		2560	-0.25	4.75	27.68	22.68	185.353	Horizontal	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: §2.1053, §22.917, §24.238 and §27.53

LIMIT

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

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

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

TEST PROCEDURE

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

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

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

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

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

MODES TESTED

LTE Band 4

LTE Band 7

RESULTS

PASS

Below 1G:**QPSK EIRP POWER FOR LTE BAND 7 (20MHZ 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
38.23	-62.70	1.79	19.20	-45.29	-13.00	-32.29	Horizontal
217.48	-63.63	1.82	19.31	-46.14	-13.00	-33.14	Vertical
114.11	-63.31	1.82	19.22	-45.91	-13.00	-32.91	Vertical
218.36	-62.66	1.81	19.24	-45.23	-13.00	-32.23	Horizontal
Test Results for Mid Channel 2535MHz							
35.26	-64.94	1.79	18.11	-48.62	-13.00	-35.62	Horizontal
98.58	-62.95	1.91	19.20	-45.66	-13.00	-32.66	Vertical
417.81	-71.72	1.91	19.34	-54.29	-13.00	-41.29	Vertical
538.53	-73.77	1.91	19.21	-56.47	-13.00	-43.47	Horizontal
Test Results for High Channel 2560MHz							
95.88	-62.30	1.91	19.20	-45.01	-13.00	-32.01	Horizontal
221.79	-73.42	1.92	19.33	-56.01	-13.00	-43.01	Vertical
382.89	-75.39	1.91	19.22	-58.08	-13.00	-45.08	Vertical
580.17	-75.39	1.91	19.21	-58.09	-13.00	-45.09	Horizontal

Note:

1. Pre-test tests all modes, only the worst mode data is recorded in the report
2. All other emissions more than 20dB below the limit

9.1 LTE BAND 4

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

Test Results for Low Channel 1710.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3421.4	-53.81	4.02	29.80	-28.03	-13	-15.03	Horizontal
3421.4	-52.94	4.02	29.80	-27.16	-13	-14.16	Vertical
5132.1	-53.77	5.24	35.84	-23.17	-13	-10.17	Vertical
5132.1	-54.90	5.24	35.84	-24.30	-13	-11.30	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-55.91	4.03	30.00	-29.94	-13	-16.94	Horizontal
3465.0	-51.64	4.03	30.00	-25.67	-13	-12.67	Vertical
5197.5	-53.79	5.25	35.86	-23.18	-13	-10.18	Vertical
5197.5	-53.27	5.25	35.86	-22.66	-13	-9.66	Horizontal
Test Results for High Channel 1754.3MHz							
3508.6	-53.80	4.05	30.01	-27.84	-13	-14.84	Horizontal
3508.6	-57.16	4.05	30.01	-31.20	-13	-18.20	Vertical
5262.9	-55.94	5.26	35.86	-25.34	-13	-12.34	Vertical
5262.9	-53.47	5.26	35.86	-22.87	-13	-9.87	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	-52.10	4.02	29.80	-26.32	-13	-13.32	Horizontal
3440.0	-52.15	4.02	29.80	-26.37	-13	-13.37	Vertical
5160.0	-58.39	5.24	35.84	-27.79	-13	-14.79	Vertical
5160.0	-56.25	5.24	35.84	-25.65	-13	-12.65	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-50.65	4.03	30.00	-24.68	-13	-11.68	Horizontal
3465.0	-53.52	4.03	30.00	-27.55	-13	-14.55	Vertical
5197.5	-55.03	5.25	35.86	-24.42	-13	-11.42	Vertical
5197.5	-52.90	5.25	35.86	-22.29	-13	-9.29	Horizontal
Test Results for High Channel 1745MHz							
2490.0	-50.73	2.91	27.68	-25.96	-13	-12.96	Horizontal
3490.0	-52.05	2.91	27.68	-27.28	-13	-14.28	Vertical
5235.0	-52.82	5.26	35.86	-22.22	-13	-9.22	Vertical
5235.0	-53.99	5.26	35.86	-23.39	-13	-10.39	Horizontal

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

Over Limit= : PMea(dBm)-Limit(dBm)

We test both H direction and V direction, recorded worst case direction.

9.2 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	-60.02	5.23	35.81	-29.44	-25	-4.44	Horizontal
5005.0	-57.51	5.23	35.81	-26.93	-25	-1.93	Vertical
7507.5	-60.86	5.67	36.85	-29.68	-25	-4.68	Vertical
7507.5	-60.32	5.67	36.85	-29.14	-25	-4.14	Horizontal
Test Results for Mid Channel 2535MHz							
5070.0	-60.14	5.23	35.82	-29.55	-25	-4.55	Horizontal
5070.0	-60.89	5.23	35.82	-30.30	-25	-5.30	Vertical
7605.0	-61.92	5.67	36.85	-30.74	-25	-5.74	Vertical
7605.0	-63.22	5.67	36.85	-32.04	-25	-7.04	Horizontal
Test Results for High Channel 2567.5MHz							
5135.0	-69.89	5.24	35.83	-39.30	-25	-14.30	Horizontal
5135.0	-67.21	5.24	35.83	-36.62	-25	-11.62	Vertical
7702.5	-68.07	5.68	36.87	-36.88	-25	-11.88	Vertical
7702.5	-71.73	5.68	36.87	-40.54	-25	-15.54	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	-63.51	5.23	35.82	-32.92	-25	-7.92	Horizontal
5020	-62.66	5.23	35.82	-32.07	-25	-7.07	Vertical
7530	-62.63	5.67	36.86	-31.44	-25	-6.44	Vertical
7530	-58.87	5.67	36.86	-27.68	-25	-2.68	Horizontal
Test Results for Mid Channel 2535MHz							
5070	-60.24	5.23	35.82	-29.65	-25	-4.65	Horizontal
5070	-60.89	5.23	35.82	-30.30	-25	-5.30	Vertical
7605	-61.13	5.67	36.85	-29.95	-25	-4.95	Vertical
7605	-60.32	5.67	36.85	-29.14	-25	-4.14	Horizontal
Test Results for High Channel 2560MHz							
5120	-63.38	5.24	35.83	-32.79	-25	-7.79	Horizontal
5120	-60.81	5.24	35.83	-30.22	-25	-5.22	Vertical
7680	-64.92	5.7	36.88	-33.74	-25	-8.74	Vertical
7680	-63.36	5.7	36.88	-32.18	-25	-7.18	Horizontal

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

Over Limit= : PMea(dBm)-Limit(dBm)

We test both H direction and V direction, recorded worst case direction.

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°C to $+50^{\circ}\text{C}$

Voltage = low voltage, DC 3.2V, Normal, DC 3.8V and High voltage, DC 4.35V.

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 4

LTE Band 7

RESULTS

See the following pages.

10.1 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	7.8	0.004502	2.5
3.8	1732.5	1.9	0.001097	2.5
4.4	1732.5	3.6	0.002078	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	10	0.005772	2.5
Extreme (50C)	1732.5	2.7	0.001558	2.5
Extreme (40C)	1732.5	3.8	0.002193	2.5
Extreme (30C)	1732.5	3	0.001732	2.5
Extreme (10C)	1732.5	5.6	0.003232	2.5
Extreme (0C)	1732.5	7.9	0.004560	2.5
Extreme (-10C)	1732.5	5.6	0.003232	2.5
Extreme (-20C)	1732.5	6.8	0.003925	2.5
Extreme (-30C)	1732.5	1.3	0.000750	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	4.1	0.002367	2.5
3.8	1732.5	3.5	0.002020	2.5
4.4	1732.5	1.9	0.001097	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	7.7	0.004444	2.5
Extreme (50C)	1732.5	6.1	0.003521	2.5
Extreme (40C)	1732.5	4.5	0.002597	2.5
Extreme (30C)	1732.5	2	0.001154	2.5
Extreme (10C)	1732.5	6.2	0.003579	2.5
Extreme (0C)	1732.5	5	0.002886	2.5
Extreme (-10C)	1732.5	5.2	0.003001	2.5
Extreme (-20C)	1732.5	4.6	0.002655	2.5
Extreme (-30C)	1732.5	4.7	0.002713	2.5

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

10.2 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	5.5	0.002170	2.5
3.8	2535	3.4	0.001341	2.5
4.4	2535	6	0.002367	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	3.2	0.001262	2.5
Extreme (50C)	2535	4.8	0.001893	2.5
Extreme (40C)	2535	8	0.003156	2.5
Extreme (30C)	2535	9	0.003550	2.5
Extreme (10C)	2535	5.6	0.002209	2.5
Extreme (0C)	2535	3	0.001183	2.5
Extreme (-10C)	2535	7.2	0.002840	2.5
Extreme (-20C)	2535	9.1	0.003590	2.5
Extreme (-30C)	2535	5.4	0.002130	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	7	0.002761	2.5
3.8	2535	1	0.000394	2.5
4.4	2535	3.6	0.001420	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	3.1	0.001223	2.5
Extreme (50C)	2535	3.7	0.001460	2.5
Extreme (40C)	2535	4.5	0.001775	2.5
Extreme (30C)	2535	4.8	0.001893	2.5
Extreme (10C)	2535	8.2	0.003235	2.5
Extreme (0C)	2535	5.5	0.002170	2.5
Extreme (-10C)	2535	5.6	0.002209	2.5
Extreme (-20C)	2535	0.8	0.000316	2.5
Extreme (-30C)	2535	3.2	0.001262	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.

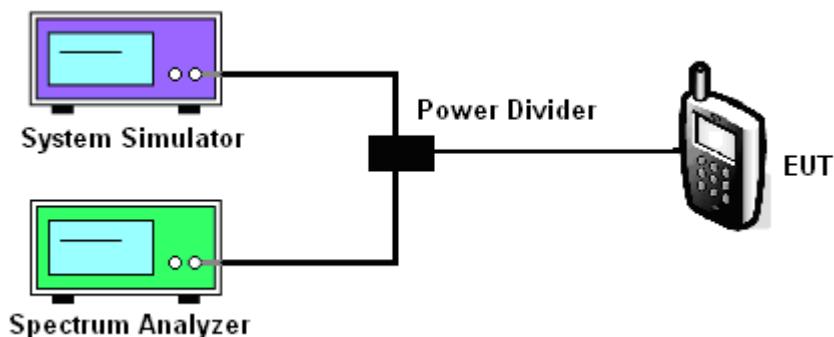
11.2 Measuring Instruments

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 4

LTE Band 7

Test data reference attachment.

----END OF REPORT----