



Portion

TEST REPORT

No. I16D00113-RFA-01

For

Client : Shanghai Simcom Ltd.

Production : LTE-FDD/HSPA MODULE

Model Name : SIM7500A

FCC ID: UDV-201606

Hardware Version: V1.02

Software Version: SIM7500A_V1.0

Issued date: 2016-07-20

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of ECIT Shanghai.

Test Laboratory:

ECIT Shanghai, East China Institute of Telecommunications

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Revision Version

Report Number	Revision	Date	Memo
I16D00113-RFA-01	00	2016-07-20	Initial creation of test report

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1. Test Laboratory

1.1. Testing Location

Company Name:	ECIT Shanghai, East China Institute of Telecommunications
Address:	7-8F, G Area, No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China
Postal Code:	200001
Telephone:	(+86)-021-63843300
Fax:	(+86)-021-63843301
FCC Registration NO.:	489729

1.2. Testing Environment

Normal Temperature:	15-35°C
Extreme Temperature:	-30/+50°C
Relative Humidity:	20-75%

1.3. Project data

Project Leader:	Wang Yaqiong
Testing Start Date:	2016-06-03
Testing End Date:	2016-06-17

1.4. Signature



Wang Changqing
(Prepared this test report)



Liu Jianquan
(Reviewed this test report)



Zheng Zhongbin
Director of the laboratory
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: Shanghai Simcom Ltd.
Address: SIM Technology Building.,No.633, Jinzhong Rd,Changning District,
Shanghai, P.R.China
Telephone: 021-32523134
Email:: yongsheng.li@sim.com

2.2. Manufacturer Information

Company Name: Shenyang Simcom Technology Ltd.
Address: No.37, Shenbei Rd, Shenbei New Aear, Shenyang,P.R.China
Telephone: 024-88922251
Email:: qin.pan@sim.com

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

EUT Description	LTE-FDD/HSPA MODULE
Model name	SIM7500A
FCC ID	UDV-201606
WCDMA Frequency Band	WCDMA Band 850/1900
LTE Frequency Band	LTE Band2/4/17
Extreme Temperature	-30/+50℃
Nominal Voltage	4.0V
Extreme High Voltage	4.2V
Extreme Low Voltage	3.4V

Note: Photographs of EUT are shown in ANNEX A of this test report.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
N06	861475030000931	V1.02	SIM7500A_V1.0	2016-06-02

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN
AE1	RF cable	---
AE2	Dummy Battery	---

*AE ID: is used to identify the test sample in the lab internally.

3.4. Statements

The product name SIM7500A, supporting WCDMA/HSPA+/LTE manufactured by Shenyang Simcom Technology Ltd. is a new product for testing. And please note that Only the radiated measurement results are in this report.

ECIT has verified that the compliance of the tested device specified in section 5 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 5 of this test report.

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	2015
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	2015
ANSI-TIA-603-D	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2010
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014

5. SUMMARY OF TEST RESULTS

LTE Band2

Item	Test items	FCC rules	result
1	Output Power	24.232(c)	Pass
2	Conducted Spurious mission	2.1057/24.238	Pass

LTE Band4

Item	Test items	FCC rules	result
1	Output Power	27.50(d)(4)	Pass
2	Conducted Spurious mission	2.1057/27.53(h)	Pass

LTE Band17

Item	Test items	FCC rules	result
1	Output Power	27.50(c)(10)	Pass
2	Conducted Spurious mission	2.1057/27.53(g)	Pass

Note: Only the radlated measurement results are in this report.

6. Test Equipments Utilized

Radiated emission test system

The test equipments and ancillaries used are as follows.

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Date	Cal. interval
1	Universal Radio Communication tester	CMW500	104178	R&S	2016-05-12	1
2	Test Receiver	ESU40	100307	R&S	2016-05-12	1
3	Trilog Antenna	VULB9163	VULB9163-515	Schwarzbeck	2014-11-05	3
4	Double Ridged Guide Antenna	ETS-3117	00135885	ETS	2014-05-06	3
5	2-Line V-Network	ENV216	101380	R&S	2016-05-12	1

7. Test Environment

Shielding Room1 (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Ground system resistance	< 0.5
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

Control room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. =30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 k
Ground system resistance	< 0.5

Fully-anechoic chamber1 (6.8 meters×3.08 meters×3.53 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 k
Ground system resistance	< 0.5
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

Fully-anechoic chamber2 (Tapered Section: 8.75 meters×3.66 meters×3.66 meters, Rectangular Section: 7.32 meters×3.97 meters×3.66 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 k
Ground system resistance	< 0.5
Uniformity of field strength	Between 0 and 6 dB, from 30MHz to 40000MHz

ANNEX A. RADIATED MEASUREMENT RESULTS

A.1. LTE EIRP

A.1.1. Description

This is the test for the maximum radiated power from the EUT.

Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage." Rule Part 27.50(d) specifies "Fixed, mobile, and portable (handheld) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP".

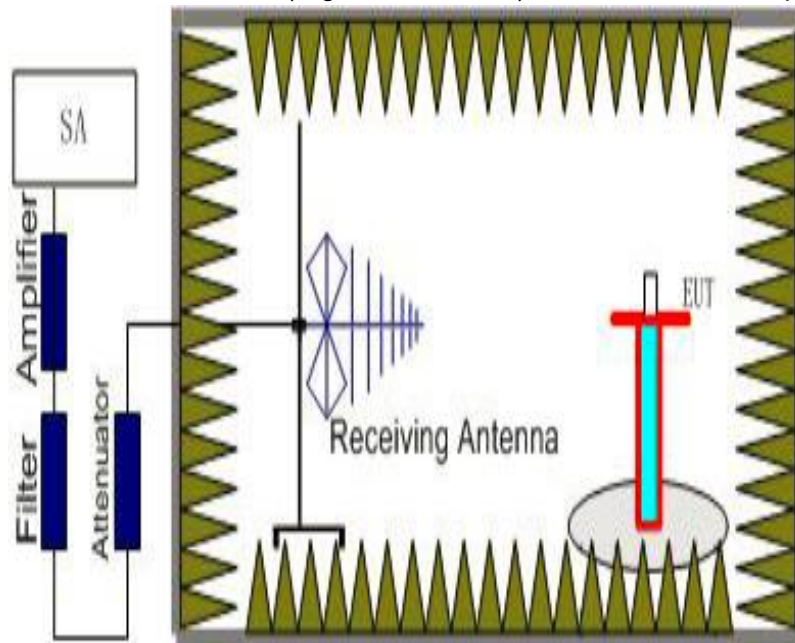
Rule Part 27.50(h)(2) specifies "Mobile stations are limited to 2.0 watts EIRP.".

Rule Part 27.50(c)(10) specifies "Portable stations (hand-held devices) are limited to 3 watts ERP".

A.1.2. Method of Measurement

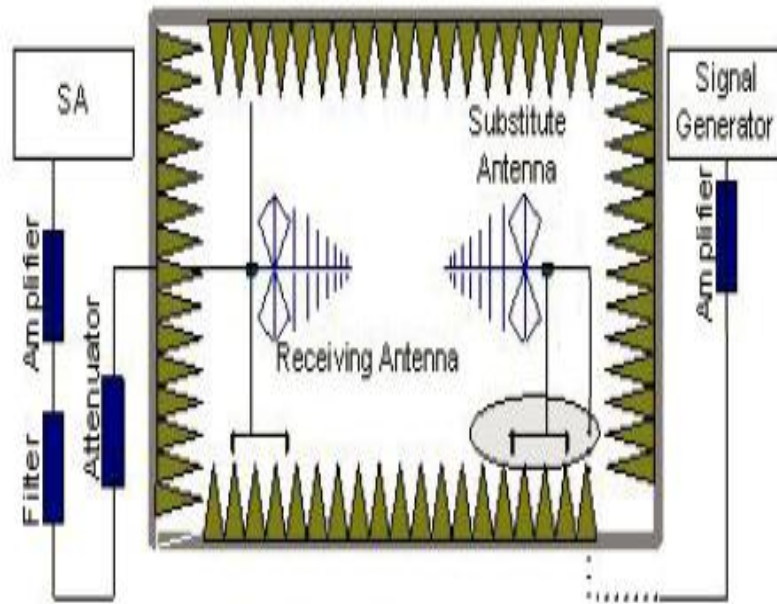
The measurements procedures in TIA-603D-2010 are used.

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).

3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitute Antenna. The cable loss (P_{cl}), the Substitute Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.

The measurement results are obtained as described below:

$$\text{Power(EIRP)} = P_{Mea} + P_{Ag} - P_{cl} + G_a$$

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dBi}$.

A.1.3 LTE Band 2- EIRP 24. 232(b)

A.1.3.1 Limit

	Burst Peak EIRP (dBm)
LTE Band 2	$\leq 33\text{dBm (2W)}$

A.1.3.2 Measurement result

LTE Band 2_1.4MHz_QPSK

Frequency(MHz)	$P_{Mea}(\text{dBm})$	$P_{cl}(\text{dB})$	$P_{Ag}(\text{dB})$	G_a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1850.70	-14.17	2.92	36.00	4.6	23.51	H
1880.00	-14.6	2.85	35.62	4.6	22.77	H

1909.30	-15.83	2.87	36.33	4.6	22.23	H
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LTE Band 2_3MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{ci} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1851.50	-14.7	2.87	36.00	4.6	23.03	H
1880.00	-14.07	2.85	35.62	4.6	23.30	H
1908.50	-15.69	2.89	35.90	4.6	21.92	H

LTE Band 2_5MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{ci} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1852.50	-14.74	2.87	36.00	4.6	22.99	H
1880.00	-14.96	2.85	35.62	4.6	22.41	H
1907.50	-15.21	2.84	35.90	4.6	22.45	H

LTE Band 2_10MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{ci} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1855.00	-13.25	4.6	36.00	4.6	22.75	H
1880.00	-13.21	4.6	35.62	4.6	22.41	H
1905.00	-14.89	4.7	35.93	4.6	20.94	H

LTE Band 2_15MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{ci} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1857.50	-13.56	4.6	36.00	4.6	22.44	H
1880.00	-12.85	4.6	35.62	4.6	22.77	H
1902.50	-13.59	4.7	36.20	4.6	22.51	H

LTE Band 2_20 MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{ci} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1860.00	-13.44	4.6	36.00	4.6	22.56	H
1880.00	-13.79	4.6	35.62	4.6	21.83	H
1900.00	-14.98	4.7	36.40	4.6	21.32	H

LTE Band 2_1.4MHz_16QAM

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1850.70	-12.89	4.6	36.00	4.6	23.11	H
1880.00	-12.57	4.6	35.62	4.6	23.05	H
1909.30	-13.94	4.7	36.33	4.6	22.29	H

LTE Band 2_3MHz_16QAM

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1851.50	-13.26	4.6	36.00	4.6	22.74	H
1880.00	-12.71	4.6	35.62	4.6	22.91	H
1908.50	-13.73	4.7	35.90	4.6	22.07	H

LTE Band 2_5MHz_16QAM

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1852.50	-13.86	4.6	36.00	4.6	22.14	H
1880.00	-12.49	4.6	35.62	4.6	23.13	H
1907.50	-14.03	4.7	35.90	4.6	21.77	H

LTE Band 2_10MHz_16QAM

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1855.00	-13.81	4.6	36.00	4.6	22.19	H
1880.00	-12.67	4.6	35.62	4.6	22.95	H
1905.00	-13.72	4.7	35.93	4.6	22.11	H

LTE Band 2_15MHz_16QAM

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1857.50	-14.07	4.6	36.00	4.6	21.93	H
1880.00	-14.03	4.6	35.62	4.6	21.59	H
1902.50	-14.03	4.7	36.20	4.6	22.07	H

LTE Band 2_20 MHz_16QAM

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1860.00	-15.73	4.6	36.00	4.6	20.27	H
1880.00	-13.32	4.6	35.62	4.6	22.30	H
1900.00	-16.1	4.7	36.40	4.6	20.20	H

Peak EIRP(dBm) = P_{Mea}(-15.73dBm) + G_a (4.6 dBi) + P_{Ag} (36.00dB) - P_{cl} (4.6 dB) = 20.27dBm

LTE Band 4- EIRP 27.50(d)

Limits: ≤30dBm (1W)

LTE Band 4_1.4MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1710.70	-13.63	4.4	36.25	4.7	22.92	H
1732.50	-14.42	4.4	36.13	4.7	22.01	H
1754.30	-13.76	4.5	36.44	4.7	22.88	H

LTE Band 4_3MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1711.50	-13.85	4.4	36.25	4.7	22.70	H
1732.50	-14.81	4.4	36.13	4.7	21.62	H
1753.50	-13.82	4.5	36.52	4.7	22.90	H

LTE Band 4_5MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1712.50	-14.18	4.4	36.25	4.7	22.37	H
1732.50	-14.71	4.4	36.13	4.7	21.72	H
1752.50	-12.37	4.5	35.86	4.7	23.69	H

LTE Band 4_10MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1715.00	-14.55	4.4	36.25	4.7	22.00	H
1732.50	-13.38	4.4	36.13	4.7	23.05	H
1750.50	-14.31	4.5	36.42	4.7	22.31	H

LTE Band 4_15MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1717.50	-14.16	4.4	36.25	4.7	22.39	H
1732.50	-15.2	4.4	36.13	4.7	21.23	H
1747.50	-14	4.5	36.46	4.7	22.66	H

LTE Band 4_20MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1720.00	-14.29	4.4	36.25	4.7	22.26	H
1732.50	-13.45	4.4	36.13	4.7	22.98	H
1745.00	-13.03	4.5	35.75	4.7	22.92	H

LTE Band 4_1.4MHz_16QAM

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1710.70	-13.65	4.4	36.25	4.7	22.90	H
1732.50	-13.48	4.4	36.13	4.7	22.95	H
1754.30	-13.63	4.5	36.44	4.7	23.01	H

LTE Band 4_3MHz_16QAM

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1711.50	-13.82	4.4	36.25	4.7	22.73	H
1732.50	-14.05	4.4	36.13	4.7	22.38	H
1753.50	-14.34	4.5	36.52	4.7	22.38	H

LTE Band 4_5MHz_16QAM

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1712.50	-14.72	4.4	36.25	4.7	21.83	H
1732.50	-14.09	4.4	36.13	4.7	22.34	H
1752.50	-13.38	4.5	35.86	4.7	22.68	H

LTE Band 4_10MHz_16QAM

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1715.00	-14.43	4.4	36.25	4.7	22.12	H
1732.50	-13.65	4.4	36.13	4.7	22.78	H
1750.50	-13.9	4.5	36.52	4.7	22.82	H

LTE Band 4_15MHz_16QAM

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1717.50	-14.47	4.4	36.25	4.7	22.08	H
1732.50	-13.52	4.4	36.13	4.7	22.91	H
1747.50	-13.82	4.5	36.46	4.7	22.84	H

LTE Band 4_20MHz_16QAM

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBi)	EIRP(dBm)	Polarization
1720.00	-14.94	4.4	36.25	4.7	21.61	H
1732.50	-13.73	4.4	36.13	4.7	22.70	H
1745.00	-12.63	4.5	35.75	4.7	23.32	H

Peak EIRP(dBm) = P_{Mea}(-14.94dBm) + G_a (4.7 dBi) + P_{Ag} (36.25dB) - P_{cl} (4.4 dB) = 21.61dBm

LTE Band 17 - ERP 27.50(c)(10)
Limits: ≤34.77dBm (3W)

LTE Band 17_5MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBd)	EIRP(dBm)	Polarization
706.50	-13.77	2.80	37.06	-1.11	19.38	H
710.00	-13.4	2.80	37.06	-1.11	19.75	H
713.50	-12.86	2.80	37.06	-1.11	20.29	H

LTE Band 17_10MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBd)	EIRP(dBm)	Polarization
709.00	-12.9	2.80	37.06	-1.11	20.25	H
710.00	-13.33	2.80	37.06	-1.11	19.82	H
711.00	-13.61	2.80	37.06	-1.11	19.54	H

LTE Band 17_5MHz_16QAM

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBd)	EIRP(dBm)	Polarization
706.50	-14.21	2.80	37.06	-1.11	18.94	H
710.00	-14.17	2.80	37.06	-1.11	18.98	H
713.50	-13.88	2.80	37.06	-1.11	19.27	H

LTE Band 17_10MHz_16QAM

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dBd)	EIRP(dBm)	Polarization
709.00	-14.15	2.80	37.06	-1.11	19.00	H
710.00	-14.73	2.80	37.06	-1.11	18.42	H
711.00	-14.39	2.80	37.06	-1.11	18.76	H

$$\text{Peak ERP(dBm)} = P_{\text{Mea}}(-14.15\text{dBm}) + G_a(-1.11\text{ dBd}) + P_{\text{Ag}}(37.06\text{dB}) - P_{\text{cl}}(2.80\text{dB}) = 19.00\text{dBm}$$
ANALYZER SETTINGS:

RBW = VBW = 8MHz for occupied bandwidths equal to or less than 5MHz. RBW = VBW = 20MHz for occupied bandwidths equal to or greater than 10MHz.

A.2 EMISSION LIMIT

Reference

FCC: CFR 2.1051, 24.238(a), 27.53(h) , 27.53(m), 27.53(g).

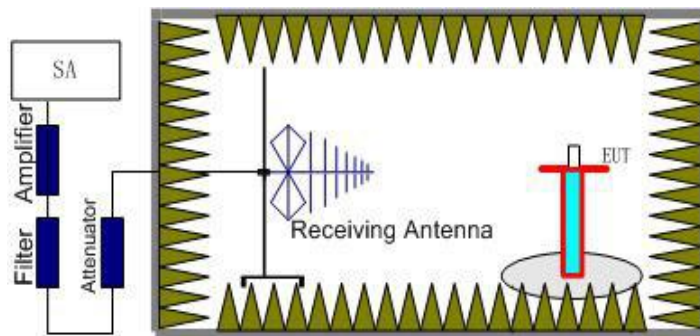
A.2.1 Measurement Method

The measurements procedures in TIA-603D-2010 are used. This measurement is carried out in fully-anechoic chamber FAC-3.

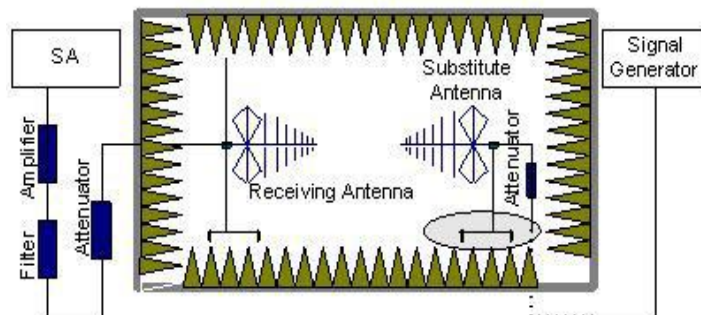
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz as outlined in Part 24.238(a), Part 27.53(h) and Part 27.53(g). The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Bands 2, 4 and 12.

The procedure of radiated spurious emissions is as follows:

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the

reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.

An amplifier should be connected in for the test.

The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier. The measurement results are obtained as described below:

$$\text{Power (EIRP)} = P_{Mea} + P_{pl} + G_a$$

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit: dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15dB$.

A.2.2. Measurement Limit

Part 24.238(a), Part 27.53(h) and Part 27.53(g) all specify that 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. The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

A.2.3. Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Bands 2, 4, 17. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the LTE Bands 2, 4, 17 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

LTE Band 2, 1.4MHz, QPSK, Channel 18607

Frequency(MHz)	P_{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
3700.000000	-46.45	6.6	7.9	-45.15	-13.00	32.15	H
5550.800000	-43.32	8.2	9.8	-41.72	-13.00	28.72	H
7401.200000	-47.67	9.7	11.6	-45.77	-13.00	32.77	H
9251.200000	-46.84	10.6	12.7	-44.74	-13.00	31.74	H
11757.400000	-42.37	12.3	12.4	-42.27	-13.00	29.27	V
15900.000000	-33.18	15.0	13.1	-35.08	-13.00	22.08	V

LTE Band 2, 1.4MHz, QPSK, Channel 18900

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
3759.200000	-43.43	6.6	7.9	-42.13	-13.00	29.13	V
5638.400000	-43.22	8.3	9.8	-41.72	-13.00	28.72	H
7518.000000	-46.22	9.7	11.6	-44.32	-13.00	31.32	H
9397.600000	-46.87	10.7	12.7	-44.87	-13.00	31.87	H
12783.600000	-40.35	12.6	12.8	-40.15	-13.00	27.15	H
15921.000000	-34.26	15.0	13.8	-35.46	-13.00	22.46	V

LTE Band 2, 1.4MHz, QPSK, Channel 19193

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
3817.600000	-41.53	6.7	8.0	-40.23	-13.00	27.23	V
5726.800000	-39.98	8.5	10.2	-38.28	-13.00	25.28	H
7635.200000	-45.91	9.7	11.7	-43.91	-13.00	30.91	H
11623.000000	-42.67	12.2	12.5	-42.37	-13.00	29.37	V
13812.600000	-39.06	13.8	13.9	-38.96	-13.00	25.96	V
15839.800000	-33.57	14.9	13.2	-35.27	-13.00	22.27	H

LTE Band 2, 1.4MHz, 16QAM, Channel 18607

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
3700.400000	-46.54	6.6	7.9	-45.24	-13.00	32.24	H
5550.800000	-42.6	8.2	9.8	-41.00	-13.00	28.00	H
7400.400000	-48.04	9.7	11.6	-46.14	-13.00	33.14	H
9251.200000	-46.09	10.6	12.7	-43.99	-13.00	30.99	H
13850.400000	-39.13	13.6	13.9	-38.83	-13.00	25.83	H
17158.600000	-31.34	16.0	13.0	-34.34	-13.00	21.34	V

LTE Band 2, 1.4MHz, 16QAM, Channel 18900

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
3759.200000	-44.3	6.6	7.9	-43.00	-13.00	30.00	V
5638.800000	-42.61	8.3	10.0	-40.91	-13.00	27.91	H
7518.000000	-45.97	9.7	11.6	-44.07	-13.00	31.07	H
9397.200000	-46.84	10.7	12.7	-44.84	-13.00	31.84	H
12467.200000	-40.74	12.6	12.7	-40.64	-13.00	27.64	H
16513.200000	-33.32	14.6	13.0	-34.92	-13.00	21.92	H

LTE Band 2, 1.4MHz, 16QAM, Channel 19193

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
3817.200000	-41.35	6.7	7.9	-40.15	-13.00	24.59	V
5726.400000	-41.16	8.5	10.2	-39.46	-13.00	28.64	H
7635.200000	-45.45	9.7	11.7	-43.45	-13.00	26.58	H
11728.000000	-41.81	12.4	12.4	-41.81	-13.00	28.21	V
13360.400000	-36.28	16.7	13.5	-39.48	-13.00	37.08	H
16798.800000	-31.26	15.8	13.0	-34.06	-13.00	32.61	V

LTE Band 4, 1.4MHz QPSK, Channel 19957

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
3420.400000	-49.45	6.3	7.8	-47.95	-13.00	34.95	H
5130.800000	-48.64	7.9	9.6	-46.94	-13.00	33.94	V
8551.200000	-41.24	10.3	12.6	-38.94	-13.00	25.94	H
10260.800000	-44.95	11.4	12.4	-43.95	-13.00	30.95	V
13231.600000	-39.97	13.0	13.4	-39.57	-13.00	26.57	V
17185.200000	-31.19	16.0	13.0	-34.19	-13.00	21.19	V

LTE Band 4, 1.4MHz, QPSK, Channel 20175

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
3464.000000	-49.4	6.4	7.8	-48.00	-13.00	35.00	H
5196.000000	-45.19	8.0	9.6	-43.59	-13.00	30.59	V
8660.000000	-43.27	10.3	12.6	-40.97	-13.00	27.97	V
13223.200000	-40.06	13.0	13.4	-39.66	-13.00	26.66	V
14834.600000	-36.98	14.3	13.7	-37.58	-13.00	24.58	V
16261.200000	-32.79	14.8	13.2	-34.39	-13.00	21.39	V

LTE Band 4, 1.4MHz, QPSK, Channel 20393

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
3507.600000	-47.31	6.4	7.8	-45.91	-13.00	32.91	V
5261.600000	-39.09	8.0	9.4	-37.69	-13.00	24.69	V
7015.200000	-50.65	9.3	11.1	-48.85	-13.00	35.85	H
8769.200000	-43.76	10.4	12.7	-41.46	-13.00	28.46	V
10908.000000	-44.27	11.8	12.6	-43.47	-13.00	30.47	V
14824.800000	-37.19	14.3	13.7	-37.79	-13.00	24.79	V

LTE Band 4, 1.4MHz, 16QAM, Channel 19957

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
3420.000000	-48.54	6.3	7.0	-47.84	-13.00	34.84	H
5130.800000	-47.19	7.9	9.5	-45.59	-13.00	32.59	V
8551.200000	-40.8	10.3	12.6	-38.50	-13.00	25.50	H
13406.600000	-38.43	13.7	13.7	-38.43	-13.00	25.43	H
15936.400000	-33.71	15.0	13.1	-35.61	-13.00	22.61	V
17232.800000	-30.81	16.0	12.9	-33.91	-13.00	20.91	V

LTE Band 4, 1.4MHz, 16QAM, Channel 20175

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
3464.000000	-48.51	6.4	7.8	-47.11	-13.00	34.11	H
5196.400000	-44.61	8.0	9.4	-43.21	-13.00	30.21	V
6928.400000	-49.66	9.3	11.1	-47.86	-13.00	34.86	H
8660.000000	-43.31	10.3	12.6	-41.01	-13.00	28.01	H
11648.200000	-42.17	12.2	12.5	-41.87	-13.00	28.87	V
16542.600000	-34.38	14.2	13.0	-35.58	-13.00	22.58	V

LTE Band 4, 1.4MHz, 16QAM, Channel 20393

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
3507.600000	-47.18	6.4	7.8	-45.78	-13.00	32.78	V
5261.600000	-39.57	8.0	9.4	-38.17	-13.00	25.17	V
7014.800000	-49.94	9.3	11.1	-48.14	-13.00	35.14	H
8769.600000	-43.37	10.4	12.7	-41.07	-13.00	28.07	V
12755.600000	-41.49	12.6	12.8	-41.29	-13.00	28.29	H
17589.800000	-31.79	15.5	13.0	-34.29	-13.00	21.29	V

LTE Band 17, 5MHz QPSK, Channel 19957

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
1408.769231	-46.58	4.0	5.3	-45.28	-13.00	32.28	H
1931.115385	-47.14	4.7	4.5	-47.34	-13.00	34.34	V
2463.076923	-42.16	5.3	5.6	-41.86	-13.00	28.86	H
2886.923077	-39.5	5.8	6.4	-38.90	-13.00	25.90	V
3522.000000	-52.93	6.4	7.8	-51.53	-13.00	38.53	H
4522.000000	-51.64	7.3	8.7	-50.24	-13.00	37.24	H

LTE Band 17, 5MHz, QPSK, Channel 20175

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
1415.692308	-45.01	4.0	5.3	-43.71	-13.00	30.71	H
1615.423077	-50.48	4.3	4.5	-50.28	-13.00	37.28	H
2304.230769	-43.74	5.1	5.6	-43.24	-13.00	30.24	H
2630.384615	-40.99	5.5	5.9	-40.59	-13.00	27.59	H
5026.800000	-52.3	7.8	9.6	-50.50	-13.00	37.50	H
8315.800000	-50.29	10.1	12.5	-47.89	-13.00	34.89	H

LTE Band 17, 5MHz, QPSK, Channel 20393

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
1422.269231	-47.68	4.0	5.3	-46.38	-13.00	33.38	H
2093.076923	-44.67	4.9	4.5	-45.07	-13.00	32.07	H
2593.461539	-40.84	5.5	5.6	-40.74	-13.00	27.74	H
2781.923077	-39.91	5.7	6.1	-39.51	-13.00	26.51	V
2950.384615	-38.41	5.8	6.7	-37.51	-13.00	24.51	V
3556.800000	-50.7	6.4	7.8	-49.30	-13.00	36.30	H

LTE Band 17, 5MHz, 16QAM, Channel 19957

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
1408.423077	-46.89	4.0	5.3	-45.59	-13.00	32.59	H
2275.000000	-43.53	5.1	5.1	-43.53	-13.00	30.53	H
2593.076923	-40.49	5.5	5.6	-40.39	-13.00	27.39	V
2713.461538	-40.32	5.6	6.1	-39.82	-13.00	26.82	V
2985.769231	-39.33	5.8	6.7	-38.43	-13.00	25.43	V
3570.800000	-53.43	6.4	7.8	-52.03	-13.00	39.03	H

LTE Band 17, 5MHz, 16QAM, Channel 20175

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
1415.346154	-51.31	4.0	5.3	-50.01	-13.00	37.01	H
2228.076923	-44.23	5.0	5.1	-44.13	-13.00	31.13	H
2483.076923	-42.06	5.4	5.6	-41.86	-13.00	28.86	H
2716.153846	-40.55	5.6	6.1	-40.05	-13.00	27.05	V
2953.461538	-38.86	5.8	6.7	-37.96	-13.00	24.96	V
3222.400000	-52.28	6.1	6.9	-51.48	-13.00	38.48	V

LTE Band 17, 5MHz, 16QAM, Channel 20393

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Margin(dB)	Polarization
1422.615385	-47.42	4.0	5.3	-46.12	-13.00	33.12	H
2284.230769	-43.16	5.0	5.1	-43.06	-13.00	30.06	H
2559.230769	-40.58	5.4	5.6	-40.38	-13.00	27.38	V
2822.307692	-39.65	5.7	6.1	-39.25	-13.00	26.25	H
2962.692308	-39.32	5.8	6.7	-38.42	-13.00	25.42	V
3556.800000	-51.64	6.4	7.8	-50.24	-13.00	37.24	V

ANNEX B. Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

*******End The Report*******