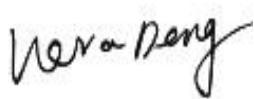


**FCC PART 27 TEST REPORT****FCC Part 27**

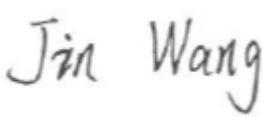
<b>Report Reference No.</b>	<b>LCS200810036AEG</b>
<b>FCC ID.</b>	<b>2AJTU-NAVISTATION</b>
<b>Date of Issue.</b>	<b>September 22, 2020</b>
<b>Testing Laboratory Name</b>	<b>Shenzhen LCS Compliance Testing Laboratory Ltd.</b>
Address	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
<b>Applicant's name</b>	<b>South Surveying &amp; Mapping Technology Co., Ltd.</b>
Address	No.39, Sicheng Road, Tianhe District, Guangzhou, China
<b>Test specification</b>	<b>FCC CFR Title 47 Part 2, Part 27</b>
Standard	<b>TIA-603-E: 2016</b> <b>KDB 971168 D01</b>
Test Report Form No.	<b>LCSEMC-1.0</b>
TRF Originator	<b>Shenzhen LCS Compliance Testing Laboratory Ltd.</b>
Master TRF	<b>Dated 2011-03</b>
<b>Shenzhen LCS Compliance Testing Laboratory Ltd. All rights reserved.</b>	
This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen LCS Compliance Testing Laboratory Ltd. is acknowledged as copyright owner and source of the material. Shenzhen LCS Compliance Testing Laboratory Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.	
<b>Test item description</b>	<b>Total station</b>
Trade Mark	<b>SOUTH, KOLIDA, SANDING, RUIDE, TIANYU</b>
Test Model	<b>NAVI STATION</b>
Modulation Type	<b>QPSK, 16QAM</b>
Rating	<b>DC 7.4V by Rechargeable Li-polymer Battery (3100mAh)</b>
Hardware version	<b>CT_MB_REV.B 8400170FAB0</b>
Software version	<b>1.00.200410.CT5002</b>
Result	<b>PASS</b>

Compiled by:



Vera Deng/ Administrators

Supervised by:



Jin Wang / Technique principal

Approved by:



Gavin Liang/ Manager

## TEST REPORT

Test Report No. :	<b>LCS200810036AEG</b>	September 22, 2020
		Date of issue

Equipment under Test : Total station

Test Model : NAVI STATION

Applicant : **South Surveying & Mapping Technology Co., Ltd.**

Address : No.39, Sicheng Road, Tianhe District, Guangzhou, China

Manufacturer : **Guangzhou South Satellite Navigation Instrument Co., Ltd.**

Address : Area A Layer 6, Area A Layer 5, Area A Layer 4, No.39, Sicheng Road, Tianhe District, Guangzhou, China

Factory : **Guangzhou South Satellite Navigation Instrument Co., Ltd.**

Address : Area A Layer 6, Area A Layer 5, Area A Layer 4, No.39, Sicheng Road, Tianhe District, Guangzhou, China

<b>Test Result:</b>	<b>PASS</b>
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

## Revision History

Revision	Issue Date	Revisions	Revised By
000	September 22, 2020	Initial Issue	Gavin Liang

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## 1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Part 27\(10-1-16 Edition\)](#): MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

[TIA-603-E March 2016](#): Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

[47 CFR FCC Part 15 Subpart B](#): Unintentional Radiators

[FCC Part 2](#): FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

[ANSI C63.4:2014](#): Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

[FCC KDB971168D01](#) Power Meas License Digital Systems

## 2 SUMMARY

### 2.1 General Remarks

Date of receipt of test sample	:	August 10, 2020
Testing commenced on	:	August 10, 2020 ~ September 21, 2020
Testing concluded on	:	September 22, 2020

### 2.2 Product Description

The **South Surveying & Mapping Technology Co., Ltd.**'s Model: Total station or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

EUT : Total station

Test Model : NAVI STATION

ARC 10, RNS, N1, NTS-552R8, NTS-552R15, NTS-552R20, NTS-562R8, NTS-562R15, NTS-562R20, NTS-572R8, NTS-572R15, NTS-572R20, NTS-582R8, NTS-582R15, NTS-582R20, KTS-552R8, KTS-552R15, KTS-552R20, KTS-562R8, KTS-562R15, KTS-562R20, KTS-572R8, KTS-572R15, KTS-572R20, KTS-582R8, KTS-582R15, KTS-582R20, STS-552R8, STS-552R15, STS-552R20, STS-562R8, STS-562R15, STS-562R20, STS-572R8, STS-572R15, STS-572R20, STS-582R8, STS-582R15, STS-582R20, RTS-552R8, RTS-552R15, RTS-552R20, RTS-562R8, RTS-562R15, RTS-562R20, RTS-572R8, RTS-572R15, RTS-572R20, RTS-582R8, RTS-582R15, RTS-582R20, CTS-552R8, CTS-552R15, CTS-552R20, CTS-562R8, CTS-562R15, CTS-562R20, CTS-572R8, CTS-572R15, CTS-572R20, CTS-582R8, CTS-582R15, CTS-582R20

Additional Model No. : PCB board, structure and internal of these model(s) are the same, So no additional models were tested.

Model Declaration : DC 7.4V by Rechargeable Li-polymer Battery (3100mAh)

Power Supply : CT\_MB\_REV.B 8400170FAB0

Hardware Version : 1.00.200410.CT5002

#### Bluetooth

Frequency Range : 2402MHz-2480MHz

Bluetooth Version : V5.0

Bluetooth Channel Number : 79 channels for Bluetooth V5.0 (BT Classics)

: 40 channels for Bluetooth V5.0 (BT LE)

Bluetooth Channel Spacing : 1MHz for Bluetooth V5.0 (BT Classics)

: 2MHz for Bluetooth V5.0 (BT LE)

Bluetooth Modulation Type : GFSK, π/4-DQPSK, 8-DPSK for Bluetooth V5.0 (BT Classics)

: GFSK for Bluetooth V5.0 (BT LE)

#### 2.4G WLAN

Frequency Range : 2412 – 2462 MHz

Channel Number : 11 Channels for 20MHz bandwidth (2412~2462MHz)

: 9 Channels for 40MHz bandwidth (2422~2452MHz)

Channel Spacing : 5MHz

IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)

Modulation Type : IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK)

IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)

#### WIFI(5.2G Band)

Frequency Range	: 5180MHz-5240MHz
Channel Number	: 4 channels for 20MHz bandwidth(5180MHz-5240MHz) 2 channels for 40MHz bandwidth(5190MHz~5230MHz) 1 channels for 80MHz bandwidth(5210MHz)
Modulation Type	: IEEE 802.11a/n/ac: OFDM(64QAM, 16QAM, QPSK, BPSK)
WiFi(5.8G Band)	
Frequency Range	: 5745MHz-5825MHz
Channel Number	: 5 channels for 20MHz bandwidth(5745MHz-5825MHz) 2 channels for 40MHz bandwidth(5755MHz~5795MHz) 1 channels for 80MHz bandwidth(5775MHz)
Modulation Type	: IEEE 802.11a/n/ac: OFDM(64QAM, 16QAM, QPSK, BPSK)
Antenna Description	: PIFA Antenna,3.0dBi(Max.) for BT and WIFI.
GSM	:
GSM/EDGE/GPRS Operation Frequency Band	: GSM850/PCS1900/GPRS850/GPRS1900/EDGE850/EDGE1900
GSM/EDGE/GPRS	Supported GSM/GPRS/EDGE
GSM Release Version	: R99
GSM/EDGE/GPRS Power Class	: GSM850:Power Class 5/ PCS1900:Power Class 0
GPRS/EDGE Multislot Class	: GPRS/EDGE: Multi-slot Class 12
GPRS operation mode	: Class B
Modulation Type	: GMSK for GSM/GPRS, 8-PSK for EDGE
Antenna Gain	: PIFA Antenna,3.0dBi(Max.) For GSM 850; 3.0dBi(Max.) For PCS 1900
WCDMA	:
UMTS Operation Frequency Band	: UMTS FDD Band I/ II/ V/ VIII
WCDMA Release Version	: R8
DC-HSUPA Release Version	: Not Supported
Modulation Type	: BPSK for UMTS
Antenna Gain	: PIFA Antenna,3.0dBi (max.) For WCDMA Band II; 3.0dBi (max.) For WCDMA Band V;
LTE	:
LTE Operation Frequency Band	: LTE Band 7 , 41
LTE Release Version	: Release 9
LTE/UMTS Power Class	: Class 3
Modulation Type	: QPSK, 16QAM for LTE
Antenna Gain	: PIFA Antenna, : 3.0dBi (max.) for LTE Band 7; 3.0dBi (max.) for LTE Band 41;
GPS function	: Support and only RX
FM function	: Support and only RX
PMR(410.125~469.625MHz)	: Support and only RX
Extreme temp. Tolerance	: -15°C to +55° C
Extreme vol. Limits	: 6.29VDC to 8.51VDC (nominal: 7.40VDC)

## 2.3 Equipment under Test

### Power supply system utilised

Power supply voltage	:	<input type="radio"/>	120V/ 60 Hz	<input type="radio"/>	115V/60Hz
		<input type="radio"/>	5 V DC	<input type="radio"/>	24 V DC
		<input checked="" type="radio"/>	Other (specified in blank below)		

DC 7.40V

## 2.4 Short description of the Equipment under Test (EUT)

### 2.4.1 General Description

EUT is subscriber equipment in the WCDMA/GSM/LTE system. The GPRS/EDGE frequency band includes GSM850, GSM900, DCS1800 and PCS1900. The HSPA/UMTS frequency band is Band II/V. LTE frequency band is band 7, band 41. The LTE frequency band 7, band 41 test data included in this report. The EUT implements such functions as RF signal receiving/transmitting, HSPA/UMTS/LTE and GPRS/EDGE protocol processing, video MMS service and etc. Externally it provides SIM card interface.

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

## 2.5 Internal Identification of AE used during the test

AE ID*	Description
AE1	Rechargeable Li-Polymer Battery
AE2	Power Adapter

AE2

Model: LC-10

INPUT: AC 85-265V, 50-60Hz

OUTPUT: DC 8.4V, 1.2Ma

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

\* The product is shipped with one of two adapters, both adapters were tested, but only the worst recorded.

## 2.6 Normal Accessory setting

Fully charged battery was used during the test.

## 2.7 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- supplied by the manufacturer
- supplied by the lab

<input type="radio"/>	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
<input type="radio"/>	Multimeter	Manufacturer :	/
		Model No. :	/

## 2.8 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2AJTU-NAVISTATION** filing to comply with FCC Part 22, Part 24 and Part 27 Rules

## 2.9 Modifications

No modifications were implemented to meet testing criteria.

## 2.10 General Test Conditions/Configurations

### 2.10.1 Test Environment

EnvironmentParameter	SelectedValuesDuringTests	
Relative Humidity	Ambient	
Temperature	TN	Ambient
Voltage	VL	6.29V
	VN	7.40V
	VH	8.51V

NOTE: VL=lower extreme testvoltage VN=nominal voltage

VH=upper extreme testvoltage TN=normal temperature

### 3 TEST ENVIRONMENT

#### 3.1 Address of the test laboratory

##### Shenzhen LCS Compliance Testing Laboratory Ltd

101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

The sites are constructed in conformance with the requirements of ANSI C63.4 (2014) and CISPR Publication 22.

#### 3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.

#### 3.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

#### 3.4 Test Description

##### 3.4.1 LTE Band 7 (2500-2570MHz paired with 2620-2690MHz)

Test Item	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) Radiated Output Power	§2.1046, §27.50(h)	FCC: EIRP ≤ 2W.	Pass
Peak-Average Ratio	§2.1046, §27.50(a)	Limit≤13dB	Pass
Modulation Characteristics	§2.1047	Digital modulation	N/A
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Pass
Band Edges Compliance	§2.1051, §27.53(m)	More details specified in §27.53(m)(4)	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(m)	More details specified in §27.53(m)(4)	Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(m)	More details specified in §27.53(m)(4)	Pass
Frequency Stability	§2.1055, §27.54	≤ ±2.5ppm.	Pass

NOTE 1: For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested".

## 3.4.2 BRS/EBS Band (2496-2690MHz paired with 2496-2690MHz)&lt;LTE Band 41&gt;

Test Item	FCC RuleNo.	Requirements	Verdict
Effective(Isotropic)Radiate dPowerOutputData	§2.1046, §27.50(h)(2)	EIRP $\leq$ 2W;	Pass
Peak-AverageRatio	§2.1046, §27.50(d)(5)	Limit $\leq$ 13dB	Pass
ModulationCharacteristics	§2.1047	Digitalmodulation	N/A
Bandwidth	§2.1049	OBW: Nolimit. EBW: Nolimit.	Pass
BandEdgesCompliance	§2.1051, §27.53(m)(4)	$\leq$ -13dBm/1%*EBW,in 1 MHzbandsimmediately outsideandadjacent to Thefrequency block.	Pass
SpuriousEmissionatAntennaTerminals	§2.1051, §27.53(m) (4)	$\leq$ -13dBm/1MHz, from 9kHz to 10 <sup>th</sup> harmonicsbut outsideauthorized Operatingfrequency ranges.	Pass
Frequency Stability	§2.1055, §27.54	Withinauthorizedbands of operation/frequency block.	Pass
Radiatedspurious emission	§2.1053, §27.53(m) (4)	$\leq$ -25dBm/1MHz.	Pass

NOTE 1: For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested"

### 3.5 Equipments Used during the Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power Meter	R&S	NRVS	100444	2020-06-22	2021-06-21
2	Power Sensor	R&S	NRV-Z81	100458	2020-06-22	2021-06-21
3	Power Sensor	R&S	NRV-Z32	10057	2020-06-22	2021-06-21
4	LTE Test Software	Tonscend	JS1120-1	N/A	N/A	N/A
5	RF Control Unit	Tonscend	JS0806	158060009	2020-06-22	2021-06-21
6	MXA Signal Analyzer	Agilent	N9020A	MY51250905	2019-11-12	2020-11-21
7	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2020-06-22	2021-06-21
8	DC Power Supply	Agilent	E3642A	N/A	2019-11-14	2020-11-13
9	EMI Test Software	EZ	EZ-EMC	N/A	N/A	N/A
10	3m Full Anechoic Chamber	MRDIANZI	FAC-3M	MR009	2019-09-27	2020-09-26
11	Positioning Controller	MF	MF7082	MF78020803	2020-06-22	2021-06-21
12	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2018-07-26	2021-07-25
13	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-07-26	2021-07-25
14	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2018-07-02	2021-07-01
15	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2017-09-21	2020-09-20
16	Broadband Preamplifier	SCHWARZBECK	BBV9745	9719-025	2020-06-22	2021-06-21
17	EMI Test Receiver	R&S	ESR 7	101181	2020-06-22	2021-06-21
18	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2019-11-14	2020-11-13
19	Broadband Preamplifier	/	BP-01M18G	P190501	2020-06-22	2021-06-21
20	RF Cable-R03m	Jye Bao	RG142	CB021	2020-06-22	2021-06-21
21	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2020-06-22	2021-06-21
22	6dB Attenuator	/	100W/6dB	1172040	2020-06-22	2021-06-21
23	3dB Attenuator	/	2N-3dB	/	2020-06-22	2021-06-21
24	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2019-10-09	2020-10-08

Note: All equipment is calibrated through CHINA CEPREI LABORATORY and GUANGZHOU LISAI CALIBRATION AND TEST CO., LTD.

### 3.6 Measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to ETSI TR 100 028 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics" and is documented in the Shenzhen LCS Compliance Testing Laboratory Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen LCS Compliance Testing Laboratory Ltd. is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	3.10 dB	(1)
Radiated Emission	1~18GHz	3.80 dB	(1)
Radiated Emission	18~40GHz	3.90 dB	(1)
Conducted Disturbance	0.15~30MHz	1.63 dB	(1)
Conducted Power	9KHz~18GHz	0.61 dB	(1)
Spurious RF Conducted Emission	9KHz~40GHz	1.22 dB	(1)
Band Edge Compliance of RF Emission	9KHz~40GHz	1.22 dB	(1)
Occupied Bandwidth	9KHz~40GHz	-	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=1.96$ .

## 4 TEST CONDITIONS AND RESULTS

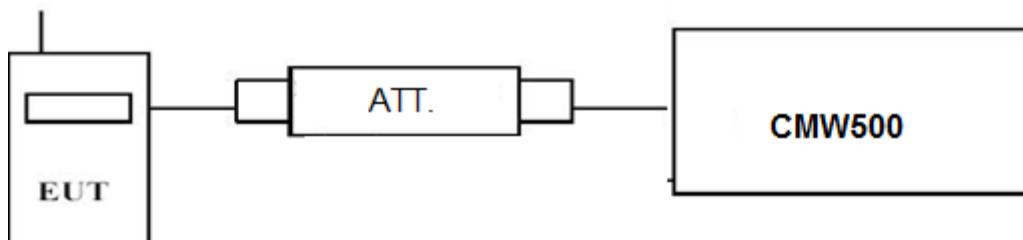
### 4.1 Output Power

#### TEST APPLICABLE

During the process of testing, the EUT was controlled via R&S Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation. This result contains output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

#### 4.1.1. Conducted Output Power

#### TEST CONFIGURATION



#### TEST PROCEDURE

##### **Conducted Power Measurement:**

- a) Place the EUT on a bench and set it in transmitting mode.
- b) Connect a low loss RF cable from the antenna port to a CMW500 by an Att.
- c) EUT Communicate with CMW500 then selects a channel for testing.
- d) Add a correction factor to the display CMW500, and then test.

#### TEST RESULTS

##### *Remark:*

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 7, LTE TDD Band 41; recorded worst case for each Channel Bandwidth of LTE FDD Band 7, LTE TDD Band 41.
2. For E-UTRA Band 7, please refer to Appendix E: Section E.1
3. For E-UTRA Band 41, please refer to Appendix F: Section F.1

#### 4.1.2. Radiated Output Power

##### LIMIT

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

Per Part 27.50(d) (4) specifies, Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755MHz band are limited to 1W EIRP. Fixed stations operating in this band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in this band must employ a means for limiting power to the minimum necessary for successful communications.

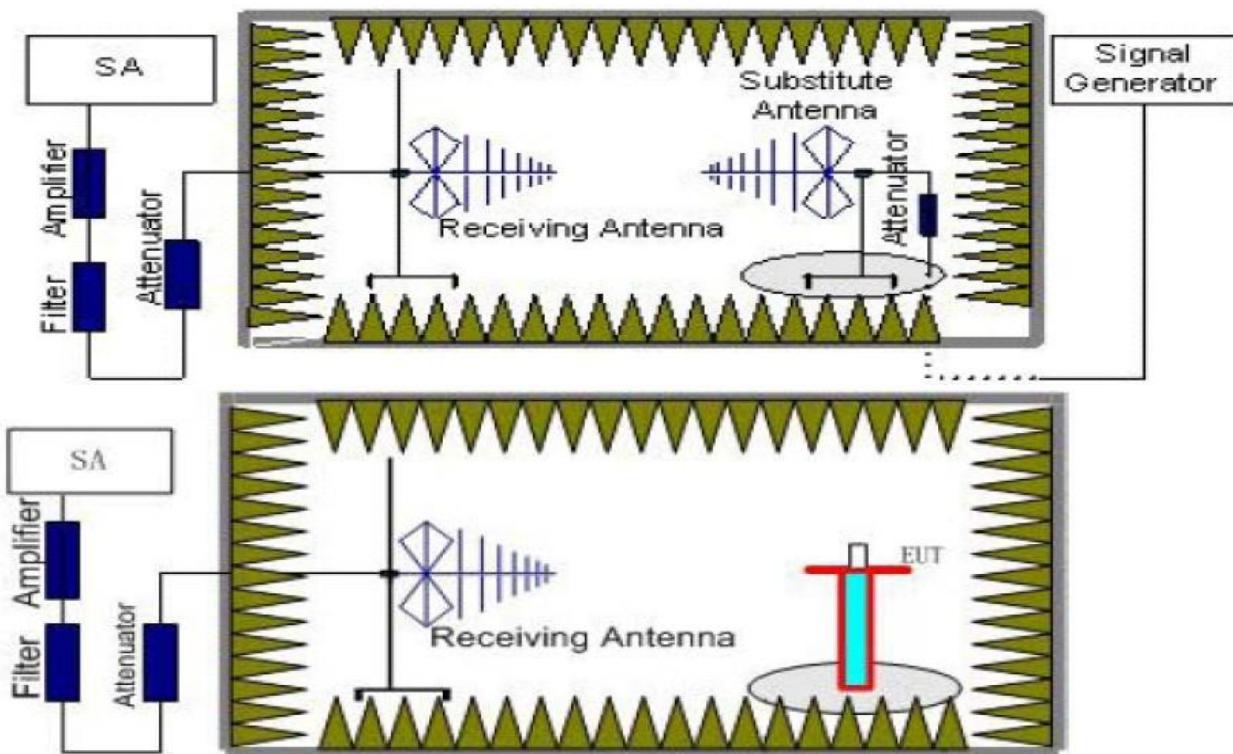
Per Part 27.50 (c) (10) the following power and antenna height requirements apply to stations transmitting in the 698–746 MHz band, the portable stations (hand-held devices) are limited to 3 watts ERP.

Per Part 27.50(b) (10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

Per Part 27.50(a) (3) specifies, *Mobile and portable stations*. (i) For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, *except that* for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.

Per Part 27.50(h) (2) specifies, The following power limits shall apply in the BRS and EBS: *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 CONFIGURATION



## TEST PROCEDURE

1. EUT was placed on a 1.50 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 1.50m. 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. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, And the maximum value of the receiver should be recorded as ( $P_r$ ).
4. The EUT shall be replaced by a substitution antenna. 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.
5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss ( $P_{cl}$ ), the Substitution Antenna Gain ( $G_a$ ) and the Amplifier Gain ( $P_{Ag}$ ) should be recorded after test.  
The measurement results are obtained as described below:  
$$\text{Power(EIRP)} = P_{Mea} + P_{Ag} - P_{cl} + G_a$$
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole,  $ERP = EIRP - 2.15\text{dBi}$ .

## TEST RESULTS

### Radiated Measurement:

Remark:

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 7, LTE TDD Band 41; recorded worst case for each Channel Bandwidth of LTE FDD Band 7, LTE TDD Band 41.
2.  $EIRP = P_{Mea}(\text{dBm}) - P_{cl}(\text{dB}) + P_{Ag}(\text{dB}) + G_a(\text{dBi})$
3.  $ERP = EIRP - 2.15\text{dBi}$  as EIRP by subtracting the gain of the dipole.
4. Margin = Emission Level - Limit
5. We test the H direction and V direction recorded worst case

### LTE FDD Band 7\_Channel Bandwidth 5MHz\_QPSK

Frequency (MHz)	$P_{Mea}$ (dBm)	$P_{cl}$ (dB)	$G_a$ Antenna Gain(dB)	$P_{Ag}$ (dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2502.5	-18.21	4.32	6.80	36.14	20.41	33.01	-12.60	V
2535.0	-18.51	4.32	6.61	36.17	19.95	33.01	-13.06	V
2567.5	-18.59	4.33	6.57	36.22	19.87	33.01	-13.14	V

## LTE FDD Band 7\_Channel Bandwidth 10MHz\_QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2505.0	-18.93	4.32	6.80	36.14	19.69	33.01	-13.32	V
2535.0	-18.52	4.32	6.61	36.17	19.94	33.01	-13.07	V
2565.0	-18.77	4.33	6.57	36.22	19.69	33.01	-13.32	V

## LTE FDD Band 7\_Channel Bandwidth 15MHz\_QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2507.5	-18.38	4.32	6.80	36.14	20.24	33.01	-12.77	V
2535.0	-18.69	4.32	6.61	36.17	19.77	33.01	-13.24	V
2562.5	-18.70	4.33	6.57	36.22	19.76	33.01	-13.25	V

## LTE FDD Band 7\_Channel Bandwidth 20MHz\_QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2510.0	-18.59	4.32	6.80	36.14	20.03	33.01	-12.98	V
2535.0	-18.83	4.32	6.61	36.17	19.63	33.01	-13.38	V
2560.0	-18.71	4.33	6.57	36.22	19.75	33.01	-13.26	V

## LTE FDD Band 7\_Channel Bandwidth 5MHz\_16QAM

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2502.5	-19.15	4.32	6.80	36.14	19.47	33.01	-13.54	V
2535.0	-19.88	4.32	6.61	36.17	18.58	33.01	-14.43	V
2567.5	-18.91	4.33	6.57	36.22	19.55	33.01	-13.46	V

## LTE FDD Band 7\_Channel Bandwidth 10MHz\_16QAM

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2505.0	-19.13	4.32	6.80	36.14	19.49	33.01	-13.52	V
2535.0	-19.65	4.32	6.61	36.17	18.81	33.01	-14.20	V
2565.0	-19.74	4.33	6.57	36.22	18.72	33.01	-14.29	V

## LTE FDD Band 7\_Channel Bandwidth 15MHz\_16QAM

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2507.5	-19.55	4.32	6.80	36.14	19.07	33.01	-13.94	V
2535.0	-19.67	4.32	6.61	36.17	18.79	33.01	-14.22	V
2562.5	-18.98	4.33	6.57	36.22	19.48	33.01	-13.53	V

## LTE FDD Band 7\_Channel Bandwidth 20MHz\_16QAM

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2510.0	-19.60	4.32	6.80	36.14	19.02	33.01	-13.99	V
2535.0	-19.80	4.32	6.61	36.17	18.66	33.01	-14.35	V
2560.0	-19.28	4.33	6.57	36.22	19.18	33.01	-13.83	V

## LTE TDD Band 41\_Channel Bandwidth 5MHz\_QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2498.50	-18.43	4.32	6.8	36.13	20.18	33.01	-12.83	V
2593.00	-18.30	4.36	6.55	36.26	20.15	33.01	-12.86	V
2687.50	-18.29	4.51	6.37	36.54	20.11	33.01	-12.90	V

## LTE TDD Band 41\_Channel Bandwidth 10MHz\_QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2501.00	-18.68	4.32	6.8	36.13	19.93	33.01	-13.08	V
2593.00	-18.45	4.36	6.55	36.26	20.00	33.01	-13.01	V
2685.00	-18.21	4.51	6.37	36.54	20.19	33.01	-12.82	V

## LTE TDD Band 41\_Channel Bandwidth 15MHz\_QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2503.50	-18.26	4.32	6.8	36.13	20.35	33.01	-12.66	V
2593.00	-18.20	4.36	6.55	36.26	20.25	33.01	-12.76	V
2682.50	-18.77	4.51	6.37	36.54	19.63	33.01	-13.38	V

## LTE TDD Band 41\_Channel Bandwidth 20MHz\_QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2506.00	-18.36	4.32	6.8	36.13	20.25	33.01	-12.76	V
2593.00	-18.14	4.36	6.55	36.26	20.31	33.01	-12.70	V
2680.00	-18.40	4.51	6.37	36.54	20.00	33.01	-13.01	V

## LTE TDD Band 41\_Channel Bandwidth 5MHz\_16QAM

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2498.50	-19.74	4.32	6.8	36.13	18.87	33.01	-14.14	V
2593.00	-19.11	4.36	6.55	36.26	19.34	33.01	-13.67	V
2687.50	-19.80	4.51	6.37	36.54	18.60	33.01	-14.41	V

## LTE TDD Band 41\_Channel Bandwidth 10MHz\_16QAM

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2501.00	-19.71	4.32	6.8	36.13	18.90	33.01	-14.11	V
2593.00	-19.88	4.36	6.55	36.26	18.57	33.01	-14.44	V
2685.00	-19.47	4.51	6.37	36.54	18.93	33.01	-14.08	V

## LTE TDD Band 41\_Channel Bandwidth 15MHz\_16QAM

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2503.50	-19.73	4.32	6.8	36.13	18.88	33.01	-14.13	V
2593.00	-19.49	4.36	6.55	36.26	18.96	33.01	-14.05	V
2682.50	-18.97	4.51	6.37	36.54	19.43	33.01	-13.58	V

## LTE TDD Band 41\_Channel Bandwidth 20MHz\_16QAM

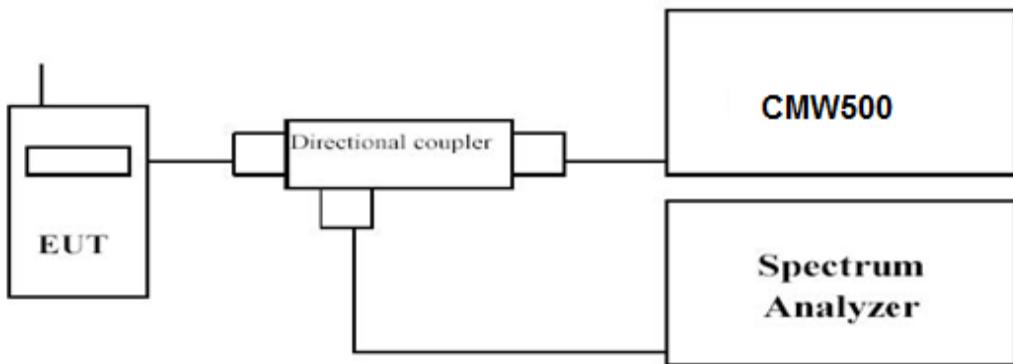
Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2506.00	-18.97	4.32	6.8	36.13	19.64	33.01	-13.37	V
2593.00	-19.63	4.36	6.55	36.26	18.82	33.01	-14.19	V
2680.00	-18.94	4.51	6.37	36.54	19.46	33.01	-13.55	V

## 4.2 Peak-to-Average Ratio (PAR)

### LIMIT

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13 dB.

### TEST CONFIGURATION



### TEST PROCEDURE

1. Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
2. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
3. Set the number of counts to a value that stabilizes the measured CCDF curve;
4. Set the measurement interval as follows:
  - 1). for continuous transmissions, set to 1 ms,
  - 2). for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
5. Record the maximum PAPR level associated with a probability of 0.1%.

### TEST RESULTS

#### *Remark:*

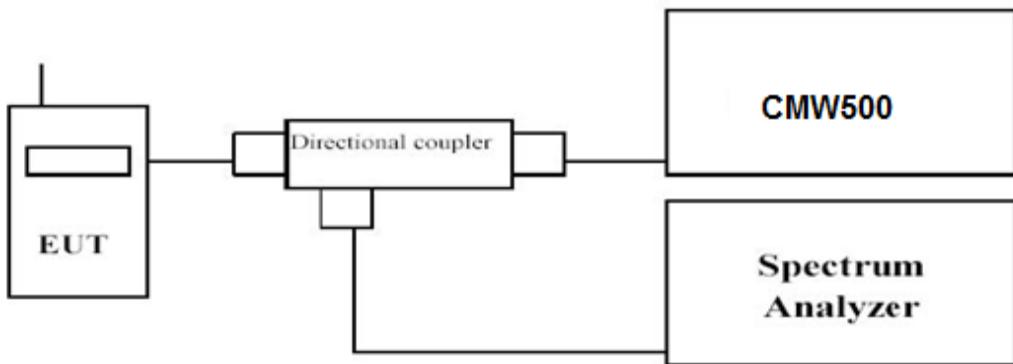
1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 7, LTE TDD Band 41; recorded worst case for each Channel Bandwidth of LTE FDD Band 7, LTE TDD Band 41 .
2. For E-UTRA Band 7, please refer to Appendix E: Section E.2
3. For E-UTRA Band 41, please refer to Appendix F: Section F.2

### 4.3 Occupied Bandwidth and Emission Bandwidth

#### LIMIT

N/A

#### TEST CONFIGURATION



#### 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 low, middle and high channel in each band. The -26dBc Emission bandwidth was also measured and recorded. Set RBW was set to about 1% of emission BW,  $VBW \geq 3$  times RBW.

-26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

#### TEST RESULTS

*Remark:*

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 7, LTE TDD Band 41; recorded worst case for each Channel Bandwidth of LTE FDD Band 7, LTE TDD Band 41.
2. For E-UTRA Band 7, please refer to Appendix E: Section E.3
3. For E-UTRA Band 41, please refer to Appendix F: Section F.3

## 4.4 Band Edge compliance

### LIMIT

For LTE FDD Band 7: Per FCC §27.53 (m)(4): For mobile digital stations, the attenuation factor shall be not less than:

- $40 + 10 \log P$  dB ( $-10$  dBm,  $100$  nW) on all frequencies between the channel edge and  $5$  MHz from the channel edge,
- $43 + 10 \log P$  dB ( $-13$  dBm,  $50$  nW) on all frequencies between  $5$  MHz and  $X$  MHz from the channel edge, and
- $55 + 10 \log P$  dB ( $-25$  dBm,  $3$  nW) on all frequencies more than  $X$  MHz from the channel edge, where  $X$  is the greater of  $6$  MHz or the actual emission bandwidth ( $26$  dB). [§ 27.53(m)(4)]

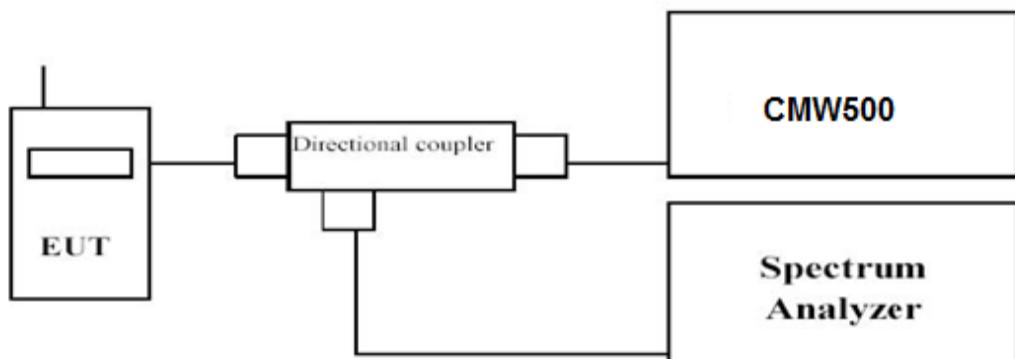
In addition, the attenuation factor (fixed limit) shall not be less than:

- $43 + 10 \log P$  dB on all frequencies between  $2490.5$  MHz and  $2496$  MHz, and
- $55 + 10 \log P$  dB at or below  $2490.5$  MHz. [§ 27.53(m)(4)]

For LTE TDD Band 41: Per §27.53(m)(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of  $1$  megahertz 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; for mobile digital stations, in the  $1$  megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the  $1$  megahertz band is  $2495$ - $2496$  MHz, in which case a resolution bandwidth of at least one percent 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.  $1$  megahertz or  $1$  percent of emission bandwidth, as specified; or  $1$  megahertz or  $2$  percent for mobile digital stations, except in the band  $2495$ - $2496$  MHz). 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. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

(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 CONFIGURATION



## **TEST PROCEDURE**

1. The transmitter output port was connected to base station.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement.
3. Set EUT at maximum power through base station.
4. Select lowest and highest channels for each band and different modulation.
5. Measure Band edge using RMS (Average) detector by spectrum

## **TEST RESULTS**

### *Remark:*

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 7, LTE TDD Band 41; recorded worst case for each Channel Bandwidth of LTE FDD Band 7, LTE TDD Band 41
2. For E-UTRA Band 7, please refer to Appendix E: Section E.4
3. For E-UTRA Band 41, please refer to Appendix F: Section F.4

## 4.5 Spurious Emission on Antenna Port

### LIMIT

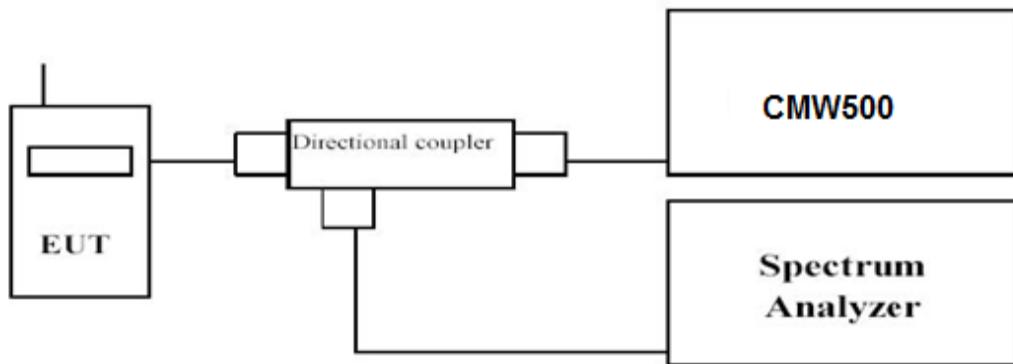
- $40 + 10 \log P$  dB ( $-10$  dBm,  $100$  nW) on all frequencies between the channel edge and  $5$  MHz from the channel edge,
- $43 + 10 \log P$  dB ( $-13$  dBm,  $50$  nW) on all frequencies between  $5$  MHz and  $X$  MHz from the channel edge, and
- $55 + 10 \log P$  dB ( $-25$  dBm,  $3$  nW) on all frequencies more than  $X$  MHz from the channel edge, where  $X$  is the greater of  $6$  MHz or the actual emission bandwidth ( $26$  dB). [§ 27.53(m)(4)]

In addition, the attenuation factor (fixed limit) 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. [§ 27.53(m)(4)]

*For LTE TDD Band 41:* Per §27.53(m)(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz 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; for mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent 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 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 MHz). 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. With respect to television operations, measurements must be made of these separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

(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 CONFIGURATION****TEST PROCEDURE**

The EUT was setup according to TIA-603-E

- Place the EUT on a bench and set it in transmitting mode.
- Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW500 by a Directional Couple.
- EUT Communicate with CMW500, then select a channel for testing.
- Add a correction factor to the display of spectrum, and then test.
- The resolution bandwidth of the spectrum analyzer was set sufficient scans were taken to show the out of band Emission if any up to 10<sup>th</sup> harmonic.
- Please refer to following tables for test antenna conducted emissions.

Working Frequency	Sub range (GHz)	RBW	VBW	Sweep time (s)
LTE FDD Band 7	0.000009~0.000015	1KHz	3KHz	Auto
	0.000015~0.03	10KHz	30KHz	Auto
	0.03~26	1 MHz	3 MHz	Auto
LTE FDD Band 41	0.000009~0.000015	1KHz	3KHz	Auto
	0.000015~0.03	10KHz	30KHz	Auto
	0.03~26	1 MHz	3 MHz	Auto

**TEST RESULTS**

Remark:

- We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 7, LTE TDD Band 41; recorded worst case for each Channel Bandwidth of LTE FDD Band 7, LTE TDD Band 41.
- For E-UTRA Band 7, please refer to Appendix E: Section E.5
- For E-UTRA Band 41, please refer to Appendix F: Section F.5

## 4.6 Radiated Spurious Emission

### LIMIT

For LTE FDD Band 7: Per FCC §27.53 (m)(4): For mobile digital stations, the attenuation factor shall be not less than:

- 40+10logP dB (-10 dBm, 100 nW) on all frequencies between the channel edge and 5 MHz from the channel edge,
- 43+10logP dB (-13 dBm, 50 nW) on all frequencies between 5 MHz and X MHz from the channel edge, and
- 55+10logP dB (-25 dBm, 3 nW) on all frequencies more than X MHz from the channel edge, where X is the greater of 6 MHz or the actual emission bandwidth (26 dB). [§ 27.53(m)(4)]

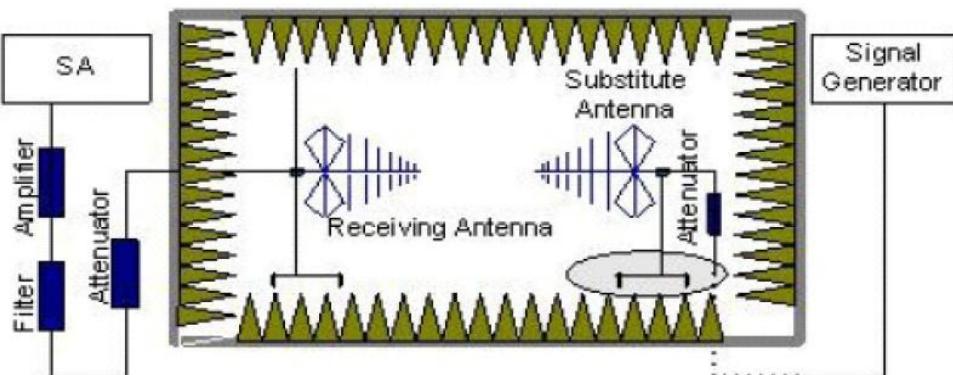
In addition, the attenuation factor (fixed limit) shall not be less than:

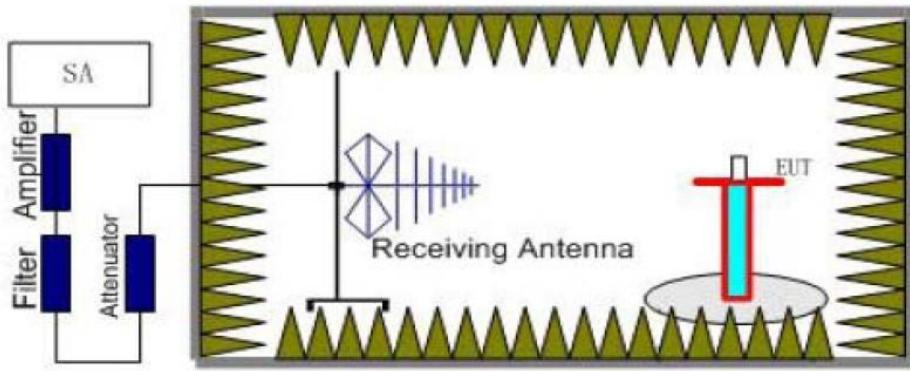
- 43+10logP dB on all frequencies between 2490.5 MHz and 2496 MHz, and
- 55+10logP dB at or below 2490.5 MHz. [§ 27.53(m)(4)]

For LTE TDD Band 41: Per §27.53(m)(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz 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; for mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent 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 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 MHz). 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. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

(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 CONFIGURATION





## TEST PROCEDURE

1. EUT was placed on a 1.50 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 1.50m. 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. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, And the maximum value of the receiver should be recorded as ( $P_r$ ).
4. The EUT shall be replaced by a substitution antenna. 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.
5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss ( $P_{cl}$ ), the Substitution Antenna Gain ( $G_a$ ) and the Amplifier Gain ( $P_{Ag}$ ) should be recorded after test.  
The measurement results are obtained as described below:  

$$\text{Power(EIRP)} = P_{Mea} + P_{Ag} - P_{cl} + G_a$$
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole,  $\text{ERP} = \text{EIRP} - 2.15\text{dBi}$ .
8. In order to make sure test results more clearly, we set frequency range and sweep time for difference frequency range as follows table:

Working Frequency	Subrange (GHz)	RBW	VBW	Sweep time (s)
LTE FDD Band 7	0.00009~0.15	1KHz	3KHz	30
	0.00015~0.03	10KHz	30KHz	10
	0.03~1	100KHz	300KHz	10
	1~2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~11	1 MHz	3 MHz	3
	11~14	1 MHz	3 MHz	3
	14~18	1 MHz	3 MHz	3
	18~20	1 MHz	3 MHz	2
	20~26	1 MHz	3 MHz	2

Working Frequency	Subrange (GHz)	RBW	VBW	Sweep time (s)
LTE FDD Band 41	0.00009~0.15	1KHz	3KHz	30
	0.00015~0.03	10KHz	30KHz	10
	0.03~1	100KHz	300KHz	10
	1~2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~11	1 MHz	3 MHz	3
	11~14	1 MHz	3 MHz	3
	14~18	1 MHz	3 MHz	3
	18~20	1 MHz	3 MHz	2
	20~26.5	1 MHz	3 MHz	2

### TEST LIMITS

According to 27.53(h) 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.

Frequency	Channel	Frequency Range	Verdict
LTE FDD Band 7	Low	9KHz -26GHz	PASS
	Middle	9KHz -26GHz	PASS
	High	9KHz -26GHz	PASS
LTE FDD Band 41	Low	9 KHz – 8 GHz	PASS
	Middle	9 KHz – 8 GHz	PASS
	High	9 KHz – 8 GHz	PASS

**TEST RESULTS****Remark:**

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 7, LTE TDD Band 41; recorded worst case for each Channel Bandwidth of LTE FDD Band 7, LTE TDD Band 41.
2.  $EIRP = P_{\text{Mea}}(\text{dBm}) - P_{\text{cl}}(\text{dB}) + G_a(\text{dBi})$
3. We were not recorded other points as values lower than limits.
4. Margin = EIRP - Limit

**LTE FDD Band 7\_Channel Bandwidth 5MHz\_QPSK\_Low Channel**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5005.0	-40.94	5.88	3.00	10.77	-36.05	-25.00	-11.05	H
7507.5	-45.76	7.12	3.00	12.26	-40.62	-25.00	-15.62	H
5005.0	-35.94	5.88	3.00	10.77	-31.05	-25.00	-6.05	V
7507.5	-39.14	7.12	3.00	12.26	-34.00	-25.00	-9.00	V

**LTE FDD Band 7\_Channel Bandwidth 5MHz\_QPSK\_Middle Channel**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5070.0	-41.45	5.90	3.00	10.81	-36.54	-25.00	-11.54	H
7605.0	-46.60	7.19	3.00	12.32	-41.47	-25.00	-16.47	H
5070.0	-33.09	5.90	3.00	10.81	-28.18	-25.00	-3.18	V
7605.0	-39.86	7.19	3.00	12.32	-34.73	-25.00	-9.73	V

**LTE FDD Band 7\_Channel Bandwidth 5MHz\_QPSK\_High Channel**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5135.0	-38.39	5.94	3.00	10.86	-33.47	-25.00	-8.47	H
7702.5	-47.76	7.25	3.00	12.98	-42.03	-25.00	-17.03	H
5135.0	-34.20	5.94	3.00	10.86	-29.28	-25.00	-4.28	V
7702.5	-39.71	7.25	3.00	12.98	-33.98	-25.00	-8.98	V

**LTE FDD Band 7\_Channel Bandwidth 10MHz\_QPSK\_Low Channel**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5010.0	-40.55	5.88	3.00	10.77	-35.66	-25.00	-10.66	H
7515.0	-47.49	7.12	3.00	12.26	-42.35	-25.00	-17.35	H
5010.0	-35.65	5.88	3.00	10.77	-30.76	-25.00	-5.76	V
7515.0	-36.80	7.12	3.00	12.26	-31.66	-25.00	-6.66	V

**LTE FDD Band 7\_Channel Bandwidth 10MHz\_QPSK\_Middle Channel**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5070.0	-40.43	5.90	3.00	10.81	-35.52	-25.00	-10.52	H
7605.0	-44.36	7.19	3.00	12.32	-39.23	-25.00	-14.23	H
5070.0	-34.05	5.90	3.00	10.81	-29.14	-25.00	-4.14	V
7605.0	-36.58	7.19	3.00	12.32	-31.45	-25.00	-6.45	V

## LTE FDD Band 7\_Channel Bandwidth 10MHz\_QPSK\_High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5130.0	-38.26	5.94	3.00	10.86	-33.34	-25.00	-8.34	H
7695.0	-47.77	7.25	3.00	12.98	-42.04	-25.00	-17.04	H
5130.0	-34.90	5.94	3.00	10.86	-29.98	-25.00	-4.98	V
7695.0	-39.29	7.25	3.00	12.98	-33.56	-25.00	-8.56	V

## LTE FDD Band 7\_Channel Bandwidth 15MHz\_QPSK\_Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5015.0	-41.99	5.88	3.00	10.77	-37.10	-25.00	-12.10	H
7522.5	-44.72	7.12	3.00	12.26	-39.58	-25.00	-14.58	H
5015.0	-34.93	5.88	3.00	10.77	-30.04	-25.00	-5.04	V
7522.5	-36.32	7.12	3.00	12.26	-31.18	-25.00	-6.18	V

## LTE FDD Band 7\_Channel Bandwidth 15MHz\_QPSK\_Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5070.0	-38.61	5.90	3.00	10.81	-33.70	-25.00	-8.70	H
7605.0	-45.38	7.19	3.00	12.32	-40.25	-25.00	-15.25	H
5070.0	-35.93	5.90	3.00	10.81	-31.02	-25.00	-6.02	V
7605.0	-36.61	7.19	3.00	12.32	-31.48	-25.00	-6.48	V

## LTE FDD Band 7\_Channel Bandwidth 15MHz\_QPSK\_High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5125.0	-38.89	5.94	3.00	10.86	-33.97	-25.00	-8.97	H
7687.5	-46.69	7.25	3.00	12.98	-40.96	-25.00	-15.96	H
5125.0	-35.83	5.94	3.00	10.86	-30.91	-25.00	-5.91	V
7687.5	-39.12	7.25	3.00	12.98	-33.39	-25.00	-8.39	V

## LTE FDD Band 7\_Channel Bandwidth 20MHz\_QPSK\_Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5020.0	-39.32	5.88	3.00	10.77	-34.43	-25.00	-9.43	H
7530.0	-46.51	7.12	3.00	12.26	-41.37	-25.00	-16.37	H
5020.0	-33.41	5.88	3.00	10.77	-28.52	-25.00	-3.52	V
7530.0	-37.86	7.12	3.00	12.26	-32.72	-25.00	-7.72	V

## LTE FDD Band 7\_Channel Bandwidth 20MHz\_QPSK\_Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5070.0	-40.07	5.90	3.00	10.81	-35.16	-25.00	-10.16	H
7605.0	-46.76	7.19	3.00	12.32	-41.63	-25.00	-16.63	H
5070.0	-36.07	5.90	3.00	10.81	-31.16	-25.00	-6.16	V
7605.0	-37.57	7.19	3.00	12.32	-32.44	-25.00	-7.44	V

## LTE FDD 7\_Channel Bandwidth 20MHz\_QPSK\_High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5120.0	-41.44	5.94	3.00	10.86	-36.52	-25.00	-11.52	H
7680.0	-46.58	7.25	3.00	12.98	-40.85	-25.00	-15.85	H
5120.0	-36.69	5.94	3.00	10.86	-31.77	-25.00	-6.77	V
7680.0	-37.04	7.25	3.00	12.98	-31.31	-25.00	-6.31	V

## LTE FDD Band 7\_Channel Bandwidth 5MHz\_16QAM\_Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5005.0	-42.68	5.88	3.00	10.77	-37.79	-25.00	-12.79	H
7507.5	-47.56	7.12	3.00	12.26	-42.42	-25.00	-17.42	H
5005.0	-38.08	5.88	3.00	10.77	-33.19	-25.00	-8.19	V
7507.5	-42.56	7.12	3.00	12.26	-37.42	-25.00	-12.42	V

## LTE FDD Band 7\_Channel Bandwidth 5MHz\_16QAM\_Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5070.0	-44.11	5.90	3.00	10.81	-39.20	-25.00	-14.20	H
7605.0	-46.68	7.19	3.00	12.32	-41.55	-25.00	-16.55	H
5070.0	-37.75	5.90	3.00	10.81	-32.84	-25.00	-7.84	V
7605.0	-39.33	7.19	3.00	12.32	-34.20	-25.00	-9.20	V

## LTE FDD Band 7\_Channel Bandwidth 5MHz\_16QAM\_High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5135.0	-41.58	5.94	3.00	10.86	-36.66	-25.00	-11.66	H
7702.5	-47.54	7.25	3.00	12.98	-41.81	-25.00	-16.81	H
5135.0	-38.81	5.94	3.00	10.86	-33.89	-25.00	-8.89	V
7702.5	-40.77	7.25	3.00	12.98	-35.04	-25.00	-10.04	V

## LTE FDD Band 7\_Channel Bandwidth 10MHz\_16QAM\_Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5010.0	-41.52	5.88	3.00	10.77	-36.63	-25.00	-11.63	H
7515.0	-46.89	7.12	3.00	12.26	-41.75	-25.00	-16.75	H
5010.0	-36.84	5.88	3.00	10.77	-31.95	-25.00	-6.95	V
7515.0	-39.44	7.12	3.00	12.26	-34.30	-25.00	-9.30	V

## LTE FDD Band 7\_Channel Bandwidth 10MHz\_16QAM\_Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5070.0	-42.05	5.90	3.00	10.81	-37.14	-25.00	-12.14	H
7605.0	-46.49	7.19	3.00	12.32	-41.36	-25.00	-16.36	H
5070.0	-37.69	5.90	3.00	10.81	-32.78	-25.00	-7.78	V
7605.0	-42.93	7.19	3.00	12.32	-37.80	-25.00	-12.80	V

## LTE FDD Band 7\_Channel Bandwidth 10MHz\_16QAM\_High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5130.0	-44.53	5.94	3.00	10.86	-39.61	-25.00	-14.61	H
7695.0	-47.84	7.25	3.00	12.98	-42.11	-25.00	-17.11	H
5130.0	-38.61	5.94	3.00	10.86	-33.69	-25.00	-8.69	V
7695.0	-42.69	7.25	3.00	12.98	-36.96	-25.00	-11.96	V

## LTE FDD Band 7\_Channel Bandwidth 15MHz\_16QAM\_Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5015.0	-41.15	5.88	3.00	10.77	-36.26	-25.00	-11.26	H
7522.5	-49.24	7.12	3.00	12.26	-44.10	-25.00	-19.10	H
5015.0	-38.65	5.88	3.00	10.77	-33.76	-25.00	-8.76	V
7522.5	-40.62	7.12	3.00	12.26	-35.48	-25.00	-10.48	V

## LTE FDD Band 7\_Channel Bandwidth 15MHz\_16QAM\_Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5070.0	-43.99	5.90	3.00	10.81	-39.08	-25.00	-14.08	H
7605.0	-46.30	7.19	3.00	12.32	-41.17	-25.00	-16.17	H
5070.0	-38.67	5.90	3.00	10.81	-33.76	-25.00	-8.76	V
7605.0	-42.62	7.19	3.00	12.32	-37.49	-25.00	-12.49	V

## LTE FDD Band 7\_Channel Bandwidth 15MHz\_16QAM\_High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5125.0	-41.00	5.94	3.00	10.86	-36.08	-25.00	-11.08	H
7687.5	-46.81	7.25	3.00	12.98	-41.08	-25.00	-16.08	H
5125.0	-39.91	5.94	3.00	10.86	-34.99	-25.00	-9.99	V
7687.5	-41.88	7.25	3.00	12.98	-36.15	-25.00	-11.15	V

## LTE FDD Band 7\_Channel Bandwidth 20MHz\_16QAM\_Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5020.0	-42.32	5.88	3.00	10.77	-37.43	-25.00	-12.43	H
7530.0	-47.69	7.12	3.00	12.26	-42.55	-25.00	-17.55	H
5020.0	-36.50	5.88	3.00	10.77	-31.61	-25.00	-6.61	V
7530.0	-41.04	7.12	3.00	12.26	-35.90	-25.00	-10.90	V

## LTE FDD Band 7\_Channel Bandwidth 20MHz\_16QAM\_Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5070.0	-44.13	5.90	3.00	10.81	-39.22	-25.00	-14.22	H
7605.0	-49.83	7.19	3.00	12.32	-44.70	-25.00	-19.70	H
5070.0	-39.55	5.90	3.00	10.81	-34.64	-25.00	-9.64	V
7605.0	-39.86	7.19	3.00	12.32	-34.73	-25.00	-9.73	V

## LTE FDD Band 7\_Channel Bandwidth 20MHz\_16QAM\_High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5120.0	-41.69	5.94	3.00	10.86	-36.77	-25.00	-11.77	H
7680.0	-49.05	7.25	3.00	12.98	-43.32	-25.00	-18.32	H
5120.0	-39.99	5.94	3.00	10.86	-35.07	-25.00	-10.07	V
7680.0	-39.04	7.25	3.00	12.98	-33.31	-25.00	-8.31	V

## LTE TDD Band 41\_Channel Bandwidth 5MHz\_QPSK\_Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
4997.00	-39.84	7.15	3.00	9.88	-37.11	-25.00	-12.11	H
7495.50	-45.11	8.36	3.00	11.36	-42.11	-25.00	-17.11	H
4997.00	-34.28	7.15	3.00	9.88	-31.55	-25.00	-6.55	V
7495.50	-36.32	8.36	3.00	11.36	-33.32	-25.00	-8.32	V

## LTE TDD Band 41\_Channel Bandwidth 5MHz\_QPSK\_Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5186.00	-40.29	7.26	3.00	10.03	-37.52	-25.00	-12.52	H
7779.00	-44.26	8.48	3.00	11.41	-41.33	-25.00	-16.33	H
5186.00	-33.13	7.26	3.00	10.03	-30.36	-25.00	-5.36	V
7779.00	-37.45	8.48	3.00	11.41	-34.52	-25.00	-9.52	V

## LTE TDD Band 41\_Channel Bandwidth 5MHz\_QPSK\_High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5375.00	-38.96	7.17	3.00	9.62	-36.51	-25.00	-11.51	H
8062.50	-44.29	8.39	3.00	11.46	-41.22	-25.00	-16.22	H
5375.00	-36.18	7.17	3.00	9.62	-33.73	-25.00	-8.73	V
8062.50	-37.37	8.39	3.00	11.46	-34.30	-25.00	-9.30	V

## LTE TDD Band 41\_Channel Bandwidth 10MHz\_QPSK\_Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
4982.00	-39.10	7.15	3.00	9.88	-36.37	-25.00	-11.37	H
7473.00	-45.23	8.36	3.00	11.36	-42.23	-25.00	-17.23	H
4982.00	-36.60	7.15	3.00	9.88	-33.87	-25.00	-8.87	V
7473.00	-36.93	8.36	3.00	11.36	-33.93	-25.00	-8.93	V

## LTE TDD Band 41\_Channel Bandwidth 10MHz\_QPSK\_Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5186.00	-39.29	7.26	3.00	10.03	-36.52	-25.00	-11.52	H
7779.00	-47.51	8.48	3.00	11.41	-44.58	-25.00	-19.58	H
5186.00	-34.58	7.26	3.00	10.03	-31.81	-25.00	-6.81	V
7779.00	-36.09	8.48	3.00	11.41	-33.16	-25.00	-8.16	V

## LTE TDD Band 41\_Channel Bandwidth 10MHz\_QPSK\_High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5370.00	-40.06	7.17	3.00	9.62	-37.61	-25.00	-12.61	H
8055.00	-45.45	8.39	3.00	11.46	-42.38	-25.00	-17.38	H
5370.00	-36.67	7.17	3.00	9.62	-34.22	-25.00	-9.22	V
8055.00	-39.67	8.39	3.00	11.46	-36.60	-25.00	-11.60	V

## LTE TDD Band 41\_Channel Bandwidth 15MHz\_QPSK\_Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5007.00	-40.84	7.15	3.00	9.88	-38.11	-25.00	-13.11	H
7510.50	-44.46	8.36	3.00	11.36	-41.46	-25.00	-16.46	H
5007.00	-35.84	7.15	3.00	9.88	-33.11	-25.00	-8.11	V
7510.50	-36.87	8.36	3.00	11.36	-33.87	-25.00	-8.87	V

## LTE TDD Band 41\_Channel Bandwidth 15MHz\_QPSK\_Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5186.00	-38.53	7.26	3.00	10.03	-35.76	-25.00	-10.76	H
7779.00	-44.76	8.48	3.00	11.41	-41.83	-25.00	-16.83	H
5186.00	-34.25	7.26	3.00	10.03	-31.48	-25.00	-6.48	V
7779.00	-38.21	8.48	3.00	11.41	-35.28	-25.00	-10.28	V

## LTE TDD Band 41\_Channel Bandwidth 15MHz\_QPSK\_High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5365.00	-38.95	7.17	3.00	9.62	-36.50	-25.00	-11.50	H
8047.00	-47.38	8.39	3.00	11.46	-44.31	-25.00	-19.31	H
5365.00	-35.52	7.17	3.00	9.62	-33.07	-25.00	-8.07	V
8047.00	-39.15	8.39	3.00	11.46	-36.08	-25.00	-11.08	V

## LTE TDD Band 41\_Channel Bandwidth 20MHz\_QPSK\_Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5012.00	-38.37	7.15	3.00	9.88	-35.64	-25.00	-10.64	H
7518.00	-46.63	8.36	3.00	11.36	-43.63	-25.00	-18.63	H
5012.00	-34.57	7.15	3.00	9.88	-31.84	-25.00	-6.84	V
7518.00	-38.66	8.36	3.00	11.36	-35.66	-25.00	-10.66	V

## LTE TDD Band 41\_Channel Bandwidth 20MHz\_QPSK\_Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5186.00	-39.69	7.26	3.00	10.03	-36.92	-25.00	-11.92	H
7779.00	-44.63	8.48	3.00	11.41	-41.70	-25.00	-16.70	H
5186.00	-35.46	7.26	3.00	10.03	-32.69	-25.00	-7.69	V
7779.00	-38.96	8.48	3.00	11.41	-36.03	-25.00	-11.03	V

## LTE TDD Band 41\_Channel Bandwidth 20MHz\_QPSK\_High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5360.00	-41.48	7.17	3.00	9.62	-39.03	-25.00	-14.03	H
8040.00	-45.71	8.39	3.00	11.46	-42.64	-25.00	-17.64	H
5360.00	-33.48	7.17	3.00	9.62	-31.03	-25.00	-6.03	V
8040.00	-38.06	8.39	3.00	11.46	-34.99	-25.00	-9.99	V

## LTE TDD Band 41\_Channel Bandwidth 5MHz\_16QAM\_Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
4997.00	-42.68	7.15	3.00	9.88	-39.95	-25.00	-14.95	H
7495.50	-49.48	8.36	3.00	11.36	-46.48	-25.00	-21.48	H
4997.00	-37.05	7.15	3.00	9.88	-34.32	-25.00	-9.32	V
7495.50	-39.49	8.36	3.00	11.36	-36.49	-25.00	-11.49	V

## LTE TDD Band 41\_Channel Bandwidth 5MHz\_16QAM\_Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5186.00	-41.81	7.26	3.00	10.03	-39.04	-25.00	-14.04	H
7779.00	-46.60	8.48	3.00	11.41	-43.67	-25.00	-18.67	H
5186.00	-39.37	7.26	3.00	10.03	-36.60	-25.00	-11.60	V
7779.00	-42.70	8.48	3.00	11.41	-39.77	-25.00	-14.77	V

## LTE TDD Band 41\_Channel Bandwidth 5MHz\_16QAM\_High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5375.00	-41.38	7.17	3.00	9.62	-38.93	-25.00	-13.93	H
8062.50	-47.51	8.39	3.00	11.46	-44.44	-25.00	-19.44	H
5375.00	-38.77	7.17	3.00	9.62	-36.32	-25.00	-11.32	V
8062.50	-42.07	8.39	3.00	11.46	-39.00	-25.00	-14.00	V

## LTE TDD Band 41\_Channel Bandwidth 10MHz\_16QAM\_Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
4982.00	-44.02	7.15	3.00	9.88	-41.29	-25.00	-16.29	H
7473.00	-48.85	8.36	3.00	11.36	-45.85	-25.00	-20.85	H
4982.00	-38.63	7.15	3.00	9.88	-35.90	-25.00	-10.90	V
7473.00	-42.03	8.36	3.00	11.36	-39.03	-25.00	-14.03	V

## LTE TDD Band 41\_Channel Bandwidth 10MHz\_16QAM\_Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5186.00	-44.07	7.26	3.00	10.03	-41.30	-25.00	-16.30	H
7779.00	-48.95	8.48	3.00	11.41	-46.02	-25.00	-21.02	H
5186.00	-37.33	7.26	3.00	10.03	-34.56	-25.00	-9.56	V
7779.00	-39.97	8.48	3.00	11.41	-37.04	-25.00	-12.04	V

## LTE TDD Band 41\_Channel Bandwidth 10MHz\_16QAM\_High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5370.00	-42.79	7.17	3.00	9.62	-40.34	-25.00	-15.34	H
8055.00	-46.44	8.39	3.00	11.46	-43.37	-25.00	-18.37	H
5370.00	-38.92	7.17	3.00	9.62	-36.47	-25.00	-11.47	V
8055.00	-40.00	8.39	3.00	11.46	-36.93	-25.00	-11.93	V

## LTE TDD Band 41\_Channel Bandwidth 15MHz\_16QAM\_Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5007.00	-44.90	7.15	3.00	9.88	-42.17	-25.00	-17.17	H
7510.50	-46.07	8.36	3.00	11.36	-43.07	-25.00	-18.07	H
5007.00	-36.25	7.15	3.00	9.88	-33.52	-25.00	-8.52	V
7510.50	-42.29	8.36	3.00	11.36	-39.29	-25.00	-14.29	V

## LTE TDD Band 41\_Channel Bandwidth 15MHz\_16QAM\_Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5186.00	-44.46	7.26	3.00	10.03	-41.69	-25.00	-16.69	H
7779.00	-49.23	8.48	3.00	11.41	-46.30	-25.00	-21.30	H
5186.00	-36.26	7.26	3.00	10.03	-33.49	-25.00	-8.49	V
7779.00	-42.74	8.48	3.00	11.41	-39.81	-25.00	-14.81	V

## LTE TDD Band 41\_Channel Bandwidth 15MHz\_16QAM\_High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5365.00	-44.87	7.17	3.00	9.62	-42.42	-25.00	-17.42	H
8047.00	-49.77	8.39	3.00	11.46	-46.70	-25.00	-21.70	H
5365.00	-38.17	7.17	3.00	9.62	-35.72	-25.00	-10.72	V
8047.00	-40.05	8.39	3.00	11.46	-36.98	-25.00	-11.98	V

## LTE TDD Band 41\_Channel Bandwidth 20MHz\_16QAM\_Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5012.00	-42.78	7.15	3.00	9.88	-40.05	-25.00	-15.05	H
7518.00	-46.41	8.36	3.00	11.36	-43.41	-25.00	-18.41	H
5012.00	-38.50	7.15	3.00	9.88	-35.77	-25.00	-10.77	V
7518.00	-39.93	8.36	3.00	11.36	-36.93	-25.00	-11.93	V

## LTE TDD Band 41\_Channel Bandwidth 20MHz\_16QAM\_Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5186.00	-41.65	7.26	3.00	10.03	-38.88	-25.00	-13.88	H
7779.00	-46.86	8.48	3.00	11.41	-43.93	-25.00	-18.93	H
5186.00	-36.67	7.26	3.00	10.03	-33.90	-25.00	-8.90	V
7779.00	-39.20	8.48	3.00	11.41	-36.27	-25.00	-11.27	V

## LTE TDD Band 41\_Channel Bandwidth 20MHz\_16QAM\_High Channel

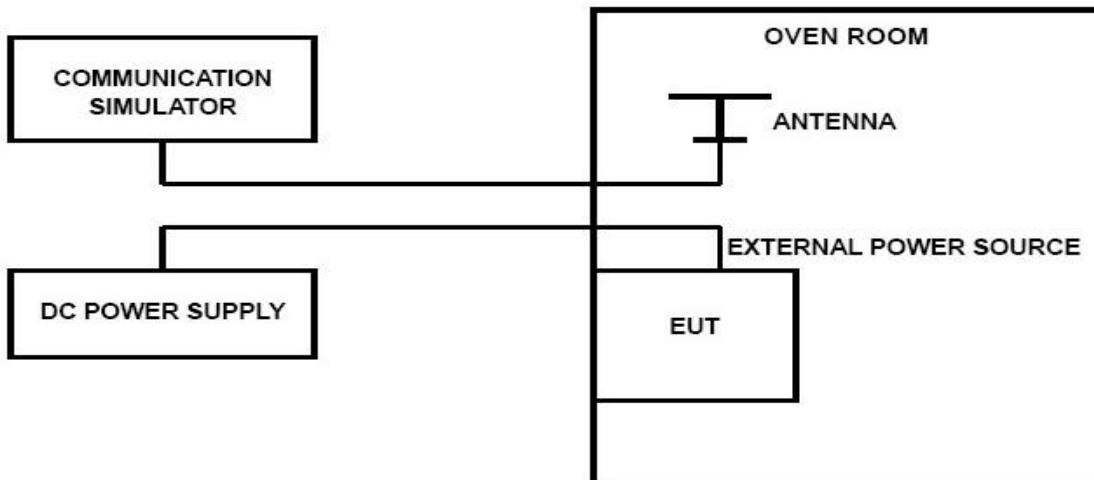
Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5360.00	-44.19	7.17	3.00	9.62	-41.74	-25.00	-16.74	H
8040.00	-47.08	8.39	3.00	11.46	-44.01	-25.00	-19.01	H
5360.00	-37.10	7.17	3.00	9.62	-34.65	-25.00	-9.65	V
8040.00	-40.31	8.39	3.00	11.46	-37.24	-25.00	-12.24	V

## 4.7 Frequency Stability under Temperature & Voltage Variations

### LIMIT

According to FCC §2.1055 and §27.54 requirement, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation and should not exceed 2.5ppm.

### TEST CONFIGURATION



### TEST PROCEDURE

The EUT was setup according to TIA-603-E

#### **Frequency Stability Under Temperature Variations:**

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30°C.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 7, LTE TDD Band 41; measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1 Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50°C.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 °C increments from +50°C to -30°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

#### **Frequency Stability Under Voltage Variations:**

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation ( $\pm 15\%$ ) and endpoint, record the maximum frequency change.

**TEST RESULTS****Remark:**

We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 7, LTE TDD Band 41; recorded worst case for each Channel Bandwidth of LTE FDD Band 7, LTE TDD Band 41.

*LTE Band 7, QPSK, 5MHz bandwidth (worst case of all bandwidths and modulation type)*

LTE FDD Band 7					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
6.29V	25	-58	-0.023	±2.50	PASS
7.40V	25	-22	-0.009	±2.50	PASS
8.51V	25	-13	-0.005	±2.50	PASS
7.40V	-30	42	0.016	±2.50	PASS
7.40V	-15	-33	-0.013	±2.50	PASS
7.40V	-10	-4	-0.002	±2.50	PASS
7.40V	0	69	0.027	±2.50	PASS
7.40V	10	-48	-0.019	±2.50	PASS
7.40V	20	-32	-0.012	±2.50	PASS
7.40V	30	-64	-0.025	±2.50	PASS
7.40V	40	14	0.006	±2.50	PASS
7.40V	50	39	0.016	±2.50	PASS

*LTE Band 7, 16QAM, 5MHz bandwidth (worst case of all bandwidths and modulation type)*

LTE FDD Band 7					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
6.29V	25	23	0.009	±2.50	PASS
7.40V	25	4	0.001	±2.50	PASS
8.51V	25	0	0.000	±2.50	PASS
7.40V	-30	-62	-0.025	±2.50	PASS
7.40V	-15	55	0.022	±2.50	PASS
7.40V	-10	48	0.019	±2.50	PASS
7.40V	0	18	0.007	±2.50	PASS
7.40V	10	26	0.010	±2.50	PASS
7.40V	20	-17	-0.007	±2.50	PASS
7.40V	30	69	0.027	±2.50	PASS
7.40V	40	17	0.007	±2.50	PASS
7.40V	50	-55	-0.022	±2.50	PASS

*LTE Band 41, 5MHz bandwidth, QPSK (worst case of all bandwidths)*

LTE TDD Band 41					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
6.29V	25	-52	-0.020	±2.50	PASS
7.40V	25	-65	-0.025	±2.50	PASS
8.51V	25	-15	-0.006	±2.50	PASS
7.40V	-30	20	0.008	±2.50	PASS
7.40V	-15	37	0.014	±2.50	PASS
7.40V	-10	26	0.010	±2.50	PASS
7.40V	0	-42	-0.016	±2.50	PASS
7.40V	10	-15	-0.006	±2.50	PASS
7.40V	20	-9	-0.003	±2.50	PASS
7.40V	30	-65	-0.025	±2.50	PASS
7.40V	40	25	0.010	±2.50	PASS
7.40V	50	-42	-0.016	±2.50	PASS

LTE Band 41, 5MHz bandwidth, 16QAM (worst case of all bandwidths)

LTE TDD Band 41					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
6.29V	25	37	0.014	±2.50	PASS
7.40V	25	31	0.012	±2.50	PASS
8.51V	25	-24	-0.009	±2.50	PASS
7.40V	-30	19	0.007	±2.50	PASS
7.40V	-15	-18	-0.007	±2.50	PASS
7.40V	-10	15	0.006	±2.50	PASS
7.40V	0	62	0.024	±2.50	PASS
7.40V	10	-1	-0.001	±2.50	PASS
7.40V	20	-65	-0.025	±2.50	PASS
7.40V	30	-39	-0.015	±2.50	PASS
7.40V	40	15	0.006	±2.50	PASS
7.40V	50	-19	-0.008	±2.50	PASS

## **5 Test Setup Photos of the EUT**

Please refer to separated files for Test Setup Photos of the EUT.

## **6 External Photos of the EUT**

Please refer to separated files for External Photos of the EUT.

## **7 Internal Photos of the EUT**

Please refer to separated files for Internal Photos of the EUT.

\*\*\*\*\*End of Report\*\*\*\*\*