FCC PART 22/24/27 TEST REPORT

FCC Part 27

Report Reference No.....:	**LCS180507021AEB**
FCC ID.....:	**UU3-GW300**
Date of Issue. .....:	**June 01, 2018**
Testing Laboratory Name .....:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address .....:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Applicant's name.....:	**Shenzhen Friendcom Technology Development Co., Ltd.**
Address .....:	6/F,17 Building,Guangqian Industrial Park,Longzhu Road,Xili Town, Nanshan,Shenzhen,China
Test specification .....**:**	
Standard .....:	**FCC CFR Title 47 Part 2, Part 27** **ANSI C63.26:2015** **KDB 971168 D01**
Test Report Form No.....:	LCSEMC-1.0
TRF Originator.....:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF.....:	Dated 2011-03

Test item description .....:	Industrial LoRaWAN Gateway
Trade Mark .....:	Friendcom®
Model/Type reference.....:	GW300
Listed Models .....:	/
Modulation Type .....:	QPSK, 16QAM
Rating .....:	DC 48V (POE), 0.6A
Hardware version .....:	V4
Software version.....:	V0.0.7
Result.....:	**PASS**

Compiled by:	**Supervised by:**	**Approved by:**
Peter Xiao	Dick Su	Gavin Liang
Peter Xiao / Administrators	Dick Su / Technique principal	Gavin Liang/ Manager

TEST REPORT

Test Report No. :	**LCS180507021AEB**	June 01, 2018 Date of issue

Equipment under Test	:	Industrial LoRaWAN Gateway
Model /Type	:	GW300
Applicant	:	**Shenzhen Friendcom Technology Development Co., Ltd.**
Address	:	6/F,17 Building,Guangqian Industrial Park,Longzhu Road,Xili Town, Nanshan,Shenzhen,China
Manufacturer	:	**Shenzhen Friendcom Technology Development Co., Ltd.**
Address	:	6/F,17 Building,Guangqian Industrial Park,Longzhu Road,Xili Town, Nanshan,Shenzhen,China
Factory	:	**Shenzhen Friendcom Technology Development Co., Ltd.**
Address	:	6/F,17 Building,Guangqian Industrial Park,Longzhu Road,Xili Town, Nanshan,Shenzhen,China

Test Result:	**PASS**

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.

Revison History

Revision	Issue Date	Revisions	Revised By
000	June 01, 2018	Initial Issue	Gavin Liang

Contents

1 TEST STANDARDS

The tests were performed according to following standards:
FCC Part 27:MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
47 CFR FCC Part 15 Subpart B: Unintentional Radiators
FCC Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS
ANSI C63.26:2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services.
KDB 971168 D01 Power Meas License Digital Systems v03 : Measurement Guidance For Certification of Licensed Digital Transmitters

2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	May 07, 2018
Testing commenced on	:	May 14, 2018
Testing concluded on	:	May 30, 2018

2.2 Product Description

The **Shenzhen Friendcom Technology Development Co., Ltd.**'s Model: GW300 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	:	Industrial LoRaWAN Gateway
Model Number	:	/
Model Declaration	:	/
Test Model	:	GW300
Hardware version	:	V4
Software version	:	V0.0.7
Power Supply	:	DC 51V (POE), 0.6A
LoraWAN		
Channel frequency		902.5-927.5MHz
Channel number	:	10 Channel
LTE		
LTE Operation Frequency Band		LTE FDD band 4
LTE Release Version		R8
LTE Power Class		Class 3
Modulation Technology	:	LoRa(CSS) for 902.5-927.5MHz QPSK,16QAM for LTE
Antenna Type and Gain	:	5.0dBi (max.) For LTE FDD Band 4; (External Antenna) 2.0 dBi (max.) For 902.5-927.5MHz(External Antenna)
Extreme temp. Tolerance	:	-10°C to +50°C
GPS function	:	Support and only RX
NFC Function	:	Not Supported
Extreme vol. Limits	:	40.8VDC to 55.2VDC (nominal: 48.0VDC)

2.3 Equipment under Test

Power supply system utilised

Power supply voltage	:	○	120V/ 60 Hz	○	115V/60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC 48.0V Adapter from AC 120V/60Hz

2.4 Short description of the Equipment under Test (EUT)

2.4.1 GeneralDescription

GW300 is subscribere quipmentin the LTE system. LTE frequency band is band 4; Internal it provides micro SD 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	Charger

AE1
Model: PoE30G-AT
INPUT: AC100-240V 50/60Hz 0.8A
OUTPUT: DC 51.0V 30W

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

2.6 Normal Accessory setting

N/A

2.7 EUT configuration

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

● - supplied by the manufacturer

○ - supplied by the lab

○	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
○	Multimeter	Manufacturer :	/
		Model No. :	/

2.8 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID:UU3-GW300** filing to comply with FCC 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	108V
	VN	120V
	VH	132V

NOTE:
VL=lower extreme testvoltage
VN=nominalvoltage
VH=upperextreme testvoltage
TN=normaltemperature

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen LCS Compliance Testing Laboratory Ltd

1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
The sites are constructed in conformance with the requirements of ANSI C63.26:2015 and CISPR Publication 22.

3.2 Test Facility

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

FCC Registration Number. is 254912.
Industry Canada Registration Number. is 9642A-1.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001
NVLAP Registration Code is 600167-0

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 AWS Band (1710-1755MHz pairedwith 2110-2155MHz)

Test Item	FCC Rule No.	Requirements	Verdict
Effective(Isotropic)RadiatedPowerOutputData	§2.1046, §27.50(d)	EIRP ≤ 1W;	PASS
Peak-AverageRatio	§2.1046, §27.50(d)	Limit≤13dB	PASS
ModulationCharacteristics	§2.1047	Digitalmodulation	N/A
Bandwidth	§2.1049	OBW: Nolimit. EBW: Nolimit.	PASS
BandEdgesCompliance	§2.1051, §27.53(h)	≤ -13dBm/1%*EBW,in1 MHz bands immediately outside and adjacent to the frequency block.	PASS
SpuriousEmissionatAntennaTerminals	§2.1051, §27.53(h)	≤ -13dBm/1MHz, from 9 KHz to 10th harmonics but outside authorized operating frequency ranges.	PASS
Frequency Stability	§2.1055, §27.54	Within authorized bands of operation/frequency block.	PASS
Radiatedspurious emission	§2.1053, §27.53(h)	≤ -13dBm/1MHz.	PASS
NOTE 1: For the verdict, the “N/A” denotes “not applicable”, the “N/T” de notes “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	2017-06-17	2018-06-16
2	Power Sensor	R&S	NRV-Z81	100458	2017-06-17	2018-06-16
3	Power Sensor	R&S	NRV-Z32	10057	2017-06-17	2018-06-16
4	X-series USB Peak and Average Power Sensor Aglient	Agilent	U2021XA	MY54080022	2017-10-26	2018-10-25
5	4 CH. Simultaneous Sampling 14 Bits 2MS/s	Agilent	U2531A	MY54080016	2017-10-26	2018-10-25
6	Test Software	Ascentest	AT890-SW	20160630	N/A	N/A
7	RF Control Unit	Ascentest	AT890-RFB	N/A	2017-06-17	2018-06-16
8	ESA-E SERIES SPECTRUM ANALYZER	Agilent	E4407B	MY41440754	2017-11-17	2018-11-16
9	MXA Signal Analyzer	Agilent	N9020A	MY49100040	2017-06-17	2018-06-16
10	SPECTRUM ANALYZER	R&S	FSP	100503	2017-06-17	2018-06-16
11	MXG Vector Signal Generator	Agilent	N5182A	MY47071151	2017-11-17	2018-11-16
12	ESG VECTOR SIGNAL GENERATOR	Agilent	E4438C	MY42081396	2017-11-17	2018-11-16
13	PSG Analog Signal Generator	Agilent	E8257D	MY4520521	2017-11-17	2018-11-16
14	Universal Radio Communication Tester	R&S	CMU 200	105788	2017-06-17	2018-06-16
15	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2017-06-17	2018-06-16
16	RF Control Unit	Tonscend	JS0806-1	N/A	2017-06-17	2018-06-16
17	DC Power Supply	Agilent	E3642A	N/A	2017-11-17	2018-11-16
18	LTE Test Software	Tonscend	JS1120-1	N/A	N/A	N/A
19	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2017-10-11	2018-10-10
20	DC Source	CHROMA	62012P-80-60	34782951	2017-10-11	2018-10-10
21	RF Filter	Micro-Tronics	BRC50718	S/N-017	2017-06-17	2018-06-16
22	RF Filter	Micro-Tronics	BRC50719	S/N-011	2017-06-17	2018-06-16
23	RF Filter	Micro-Tronics	BRC50720	S/N-011	2017-06-17	2018-06-16
24	RF Filter	Micro-Tronics	BRC50721	S/N-013	2017-06-17	2018-06-16
25	RF Filter	Micro-Tronics	BRM50702	S/N-195	2017-06-17	2018-06-16
26	Splitter/Combiner	Micro-Tronics	PS2-15	CB11-20	2017-06-17	2018-06-16
27	Splitter/Combiner	Micro-Tronics	CB11-20	N/A	2017-06-17	2018-06-16
28	Attenuator	Micro-Tronics	PAS-8-10	S/N23466	2017-06-17	2018-06-16
29	Exposure Level Tester	Narda	ELT-400	N-0713	2018-04-03	2019-04-02
30	B-Field Probe	Narda	ELT-400	M-1154	2018-04-11	2019-04-10
31	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2017-06-17	2018-06-16
32	Positioning Controller	MF	MF-7082	/	2017-06-17	2018-06-16
33	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
34	EMI Test Receiver	R&S	ESR 7	101181	2017-06-17	2018-06-16
35	AMPLIFIER	QuieTek	QTK-A2525G	CHM10809065	2017-11-17	2018-11-16
36	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2017-06-23	2018-06-22
37	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-05-02	2019-05-01
38	Horn Antenna	EMCO	3115	6741	2017-06-23	2018-06-22
39	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2017-09-21	2018-09-20
40	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2017-09-21	2018-09-20
41	RF Cable-R03m	Jye Bao	RG142	CB021	2017-06-17	2018-06-16
42	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2017-06-17	2018-06-16
Note: All equipment is calibrated through 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 compatibilityand Radio spectrum Matters (ERM);Uncertainties in the measurementof 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)
Occuiped 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

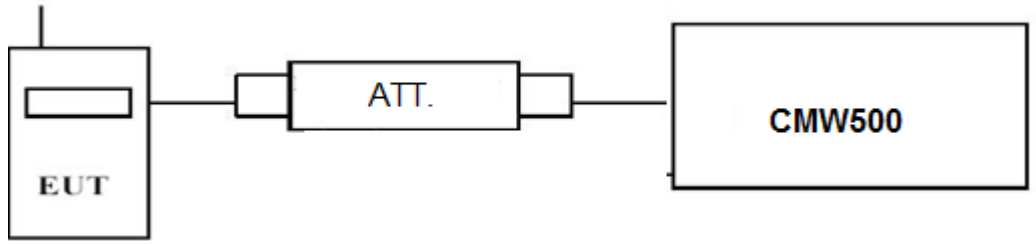
4.1 Output Power

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:

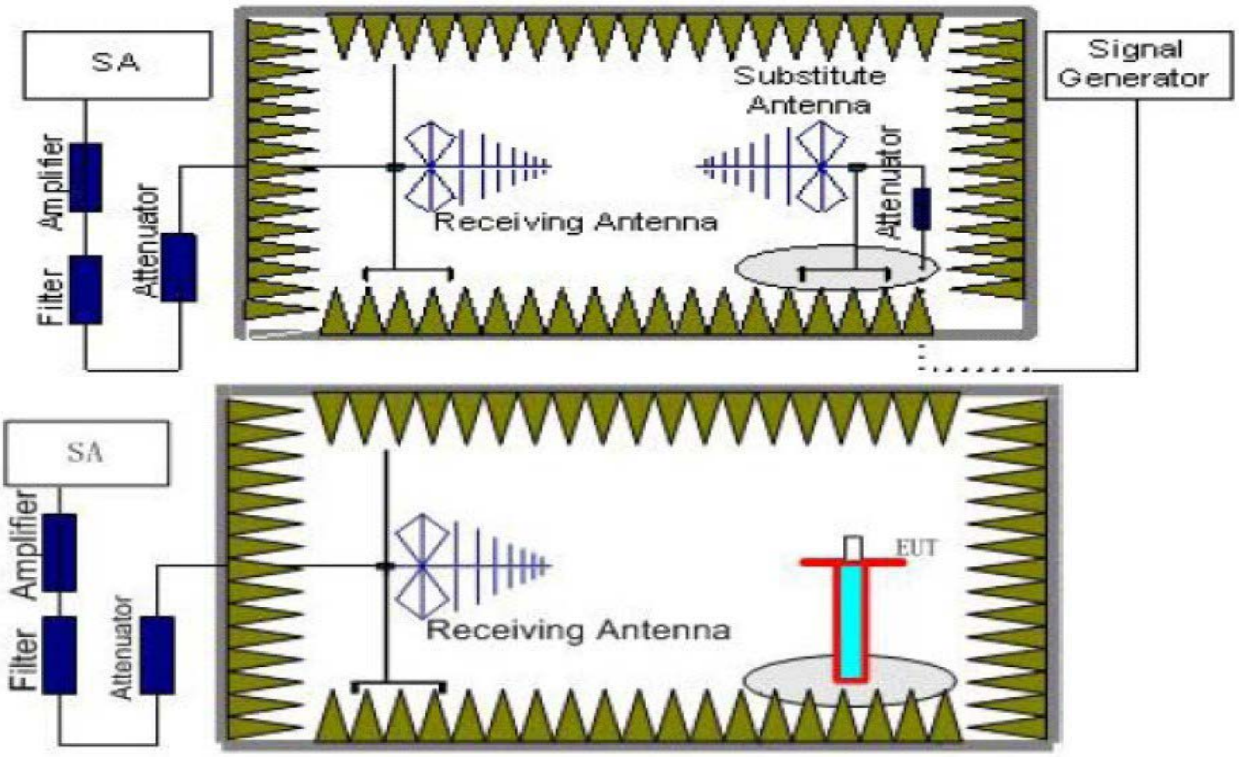
1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE LTE FDD Band 4;*
2. *For E-UTRA Band 4, please refer to Appendix A: Section A.1*

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.

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:
   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-2.15dBi.

TEST RESULTS

Radiated Measurement:

Remark:
1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE LTE FDD Band 4; recorded worst case for each Channel Bandwidth of LTE,LTE FDD Band 4.*
2. *EIRP=P_{Mea}(dBm)-P_{cl}(dB)+P_{Ag}(dB)+G_a(dBi)*
3. *ERP = EIRP – 2.15dBi 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 4_Channel Bandwidth 1.4MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1710.70	-16.47	3.93	9.05	34.96	23.61	30.00	-6.39	V
1732.50	-15.42	3.93	8.89	35.01	**24.55**	30.00	-5.45	V
1754.30	-15.77	3.94	8.76	35.08	24.13	30.00	-5.87	V

LTE FDD Band 4_Channel Bandwidth 3MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1711.50	-16.20	3.93	9.05	34.96	23.88	30.00	-6.12	V
1732.50	-15.81	3.93	8.89	35.01	24.16	30.00	-5.84	V
1753.50	-15.86	3.94	8.76	35.08	24.04	30.00	-5.96	V

LTE FDD Band 4_Channel Bandwidth 5MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1712.50	-16.71	3.93	9.05	34.96	23.37	30.00	-6.63	V
1732.50	-15.97	3.93	8.89	35.01	24.00	30.00	-6.00	V
1752.50	-16.01	3.94	8.76	35.08	23.89	30.00	-6.11	V

LTE FDD Band 4_Channel Bandwidth 10MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1715.00	-16.66	3.93	9.05	34.96	23.42	30.00	-6.58	V
1732.50	-16.09	3.93	8.89	35.01	23.88	30.00	-6.12	V
1750.00	-16.19	3.94	8.76	35.08	23.71	30.00	-6.29	V

LTE FDD Band 4_Channel Bandwidth 15MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1717.50	-16.75	3.93	9.05	34.96	23.33	30.00	-6.67	V
1732.50	-16.28	3.93	8.89	35.01	23.86	30.00	-6.31	V
1747.50	-16.38	3.94	8.76	35.08	23.62	30.00	-6.48	V

LTE FDD Band 4_Channel Bandwidth 20MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1720.00	-16.77	3.93	9.05	34.96	23.31	30.00	-6.69	V
1732.50	-16.15	3.93	8.89	35.01	**23.82**	30.00	-6.18	V
1745.00	-16.31	3.94	8.76	35.08	23.59	30.00	-6.41	V

LTE FDD Band 4_Channel Bandwidth 1.4MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1710.70	-17.06	3.93	9.05	34.96	23.02	30.00	-6.98	V
1732.50	-16.34	3.93	8.89	35.01	**23.63**	30.00	-6.37	V
1754.30	-16.64	3.94	8.76	35.08	23.26	30.00	-6.74	V

LTE FDD Band 4_Channel Bandwidth 3MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	Burst Avergae EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1711.50	-17.24	3.93	9.05	34.96	22.84	30.00	-7.16	V
1732.50	-16.46	3.93	8.89	35.01	23.51	30.00	-6.49	V
1753.50	-16.73	3.94	8.76	35.08	23.17	30.00	-6.83	V

LTE FDD Band 4_Channel Bandwidth 5MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1712.50	-17.29	3.93	9.05	34.96	22.79	30.00	-7.21	V
1732.50	-16.53	3.93	8.89	35.01	23.44	30.00	-6.56	V
1752.50	-16.80	3.94	8.76	35.08	23.10	30.00	-6.90	V

LTE FDD Band 4_Channel Bandwidth 10MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	Burst Avergae EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1715.00	-17.42	3.93	9.05	34.96	22.66	30.00	-7.34	V
1732.50	-16.65	3.93	8.89	35.01	23.32	30.00	-6.68	V
1750.00	-16.89	3.94	8.76	35.08	23.01	30.00	-6.99	V

LTE FDD Band 4_Channel Bandwidth 15MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1717.50	-17.51	3.93	9.05	34.96	22.57	30.00	-7.43	V
1732.50	-16.76	3.93	8.89	35.01	23.21	30.00	-6.79	V
1747.50	-16.96	3.94	8.76	35.08	22.94	30.00	-7.06	V

LTE FDD Band 4_Channel Bandwidth 20MHz_16QAM

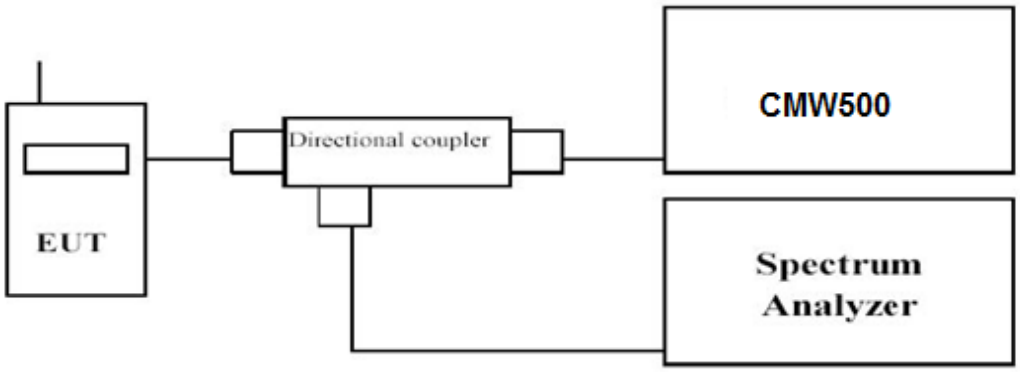
Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	Burst Avergae EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1720.00	-17.66	3.93	9.05	34.96	22.42	30.00	-7.58	V
1732.50	-16.81	3.93	8.89	35.01	**23.16**	30.00	-6.84	V
1745.00	-17.07	3.94	8.76	35.08	22.83	30.00	-7.17	V

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 ≥ 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:

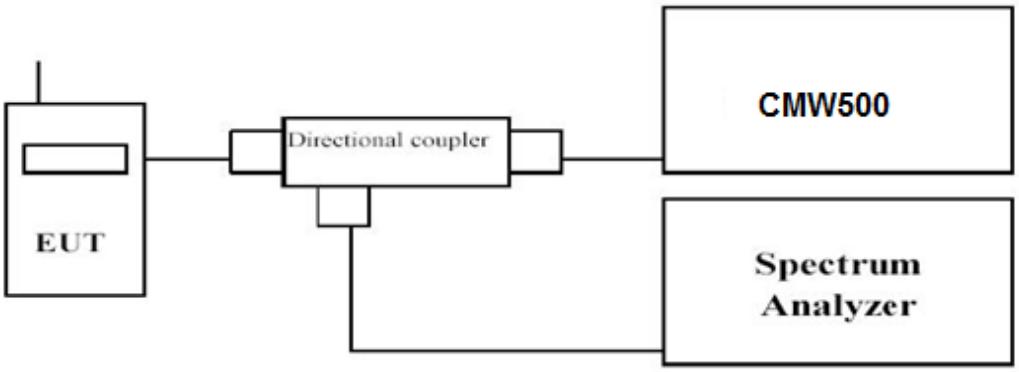
1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE LTE FDD Band 4;*
2. *For E-UTRA Band 4, please refer to Appendix A: Section A.2*

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≥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

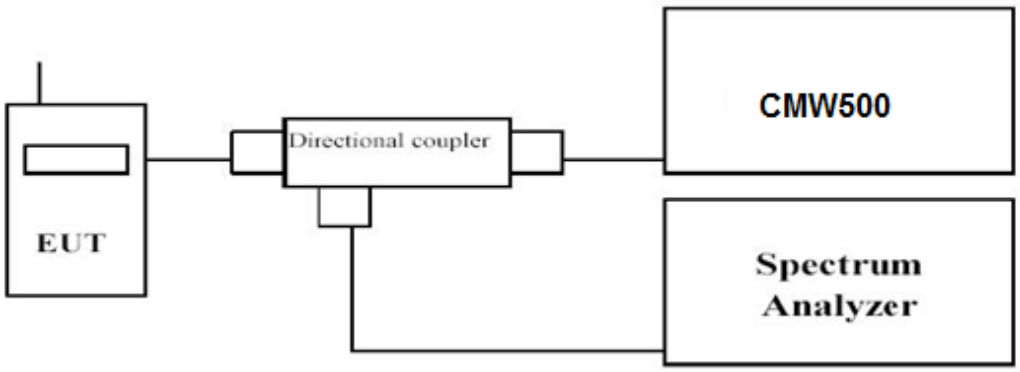
Remark:
1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE LTE FDD Band 4;*
2. *For E-UTRA Band 4, please refer to Appendix A: Section A.3*

4.4 Band Edge compliance

LIMIT

For LTE FDD Band 4: Per §27.53(h): For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10(P) dB.

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 lowestand highest channels for each band and different modulation.
5. Measure Band edge using RMS (Average) detector by spectrum

TEST RESULTS

Remark:

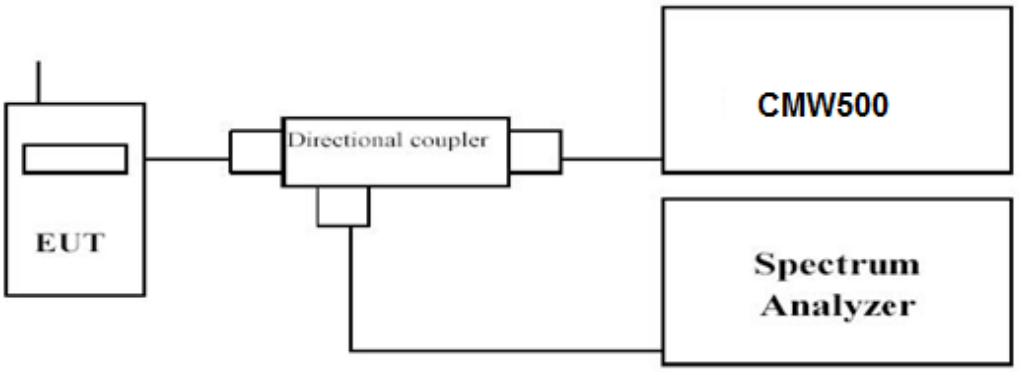
1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE LTE FDD Band 4;*
2. *For E-UTRA Band 4, please refer to Appendix A: Section A.4*

4.5 Spurious Emssion on Antenna Port

LIMIT

For LTE FDD Band 4: Per §27.53(h): For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10(P) dB.

TEST CONFIGURATION



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

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 spectrum analyzer and CMW500 by a Directional Couple.
c. EUT Communicate with CMW500, then select a channel for testing.
d. Add a correction factor to the display of spectrum, and then test.
e. The resolution bandwidth of the spectrum analyzer was setsufficient scans were taken to show the out of band Emission if any up to10^{th} harmonic.
f. Please refer to following tables for test antenna conducted emissions.

Working Frequency	Sub range (GHz)	RBW	VBW	Sweep time (s)
LTE FDD Band 4	0.000009~0.000015	1KHz	3KHz	Auto
	0.000015~0.03	10KHz	30KHz	Auto
	0.03~26	1 MHz	3 MHz	Auto

TEST RESULTS

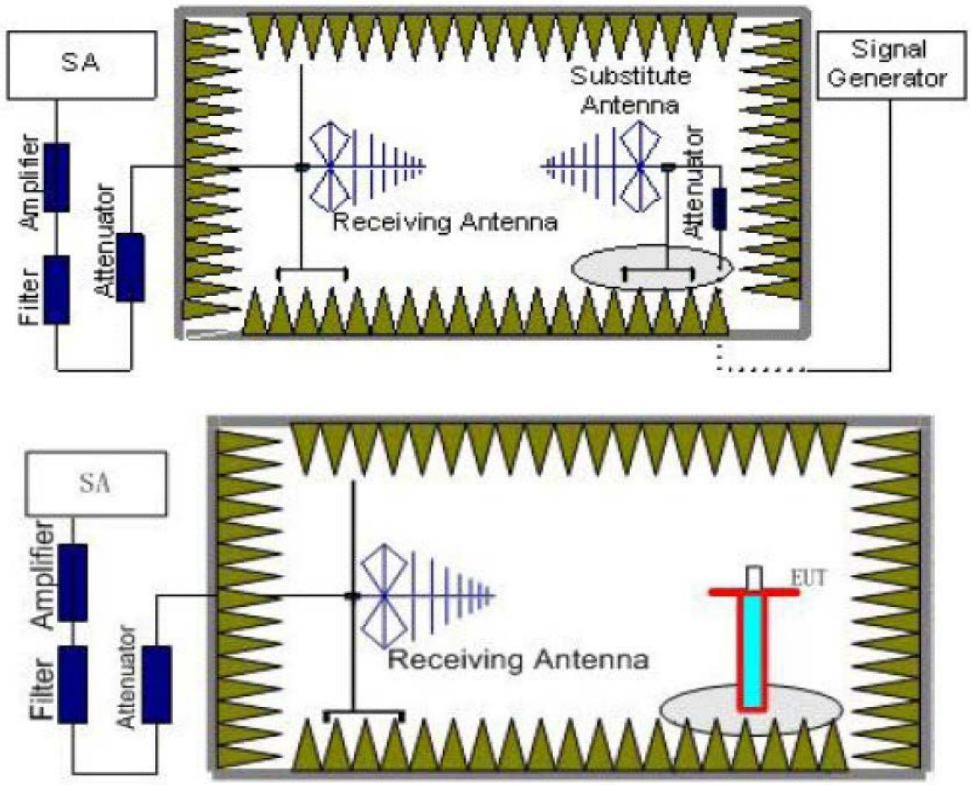
Remark:
1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE LTE FDD Band 4;*
2. *For E-UTRA Band 4, please refer to Appendix A: Section A.5*

4.6 Radiated Spurious Emssion

LIMIT

For LTE FDD Band 4: Per §27.53(h): For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10(P) dB.

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:
   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 -2.15dBi.
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 4	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

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 4	Low	9 KHz – 18 GHz	PASS
	Middle	9 KHz – 18 GHz	PASS
	High	9 KHz – 18 GHz	PASS

TEST RESULTS

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

LTE FDD Band 4_Channel Bandwidth 1.4MHz_QPSK_ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3421.40	-43.10	4.62	3.00	9.81	-37.91	-13.00	-24.91	H
5132.10	-48.43	5.94	3.00	10.86	-43.51	-13.00	-30.51	H
3421.40	-34.50	4.62	3.00	9.81	-29.31	-13.00	-16.31	V
5132.10	-40.60	5.94	3.00	10.86	-35.68	-13.00	-22.68	V

LTE FDD Band 4_Channel Bandwidth 1.4MHz_QPSK_ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.00	-41.98	4.63	3.00	9.84	-36.77	-13.00	-23.77	H
5197.50	-47.68	5.94	3.00	10.86	-42.76	-13.00	-29.76	H
3465.00	-35.46	4.63	3.00	9.84	-30.25	-13.00	-17.25	V
5197.50	-41.41	5.94	3.00	10.86	-36.49	-13.00	-23.49	V

LTE FDD Band 4_Channel Bandwidth 1.4MHz_QPSK_ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3508.60	-41.11	4.65	3.00	9.90	-35.86	-13.00	-22.86	H
5262.90	-45.23	5.95	3.00	10.91	-40.27	-13.00	-27.27	H
3508.60	-33.44	4.65	3.00	9.90	-28.19	-13.00	-15.19	V
5262.90	-40.27	5.95	3.00	10.91	-35.31	-13.00	-22.31	V

LTE FDD Band 4_Channel Bandwidth 3MHz_QPSK_ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3423.00	-41.74	4.62	3.00	9.81	-36.55	-13.00	-23.55	H
5134.50	-48.70	5.94	3.00	10.86	-43.78	-13.00	-30.78	H
3423.00	-33.92	4.62	3.00	9.81	-28.73	-13.00	-15.73	V
5134.50	-40.22	5.94	3.00	10.86	-35.30	-13.00	-22.30	V

LTE FDD Band 4_Channel Bandwidth 3MHz_QPSK_ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.00	-43.24	4.63	3.00	9.84	-38.03	-13.00	-25.03	H
5197.50	-46.07	5.94	3.00	10.86	-41.15	-13.00	-28.15	H
3465.00	-33.46	4.63	3.00	9.84	-28.25	-13.00	-15.25	V
5197.50	-41.26	5.94	3.00	10.86	-36.34	-13.00	-23.34	V

LTE FDD Band 4_Channel Bandwidth 3MHz_QPSK_ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3507.00	-40.82	4.65	3.00	9.9	-35.57	-13.00	-22.57	H
5260.50	-48.78	5.95	3.00	10.91	-43.82	-13.00	-30.82	H
3507.00	-35.08	4.65	3.00	9.9	-29.83	-13.00	-16.83	V
5260.50	-38.50	5.95	3.00	10.91	-33.54	-13.00	-20.54	V

LTE FDD Band 4_Channel Bandwidth 5MHz_QPSK_ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3425.00	-43.20	4.62	3.00	9.81	-38.01	-13.00	-25.01	H
5137.50	-45.22	5.94	3.00	10.86	-40.30	-13.00	-27.30	H
3425.00	-35.17	4.62	3.00	9.81	-29.98	-13.00	-16.98	V
5137.50	-38.80	5.94	3.00	10.86	-33.88	-13.00	-20.88	V

LTE FDD Band 4_Channel Bandwidth 5MHz_QPSK_ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.00	-40.76	4.63	3.00	9.84	-35.55	-13.00	-22.55	H
5197.50	-47.81	5.94	3.00	10.86	-42.89	-13.00	-29.89	H
3465.00	-35.25	4.63	3.00	9.84	-30.04	-13.00	-17.04	V
5197.50	-41.87	5.94	3.00	10.86	-36.95	-13.00	-23.95	V

LTE FDD Band 4_Channel Bandwidth 5MHz_QPSK_ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3505.00	-41.25	4.65	3.00	9.90	-36.00	-13.00	-23.00	H
5257.50	-46.42	5.95	3.00	10.91	-41.46	-13.00	-28.46	H
3505.00	-36.08	4.65	3.00	9.90	-30.83	-13.00	-17.83	V
5257.50	-39.89	5.95	3.00	10.91	-34.93	-13.00	-21.93	V

LTE FDD Band 4_Channel Bandwidth 10MHz_QPSK_ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3430.00	-40.54	4.62	3.00	9.81	-35.35	-13.00	-22.35	H
5145.00	-45.74	5.94	3.00	10.86	-40.82	-13.00	-27.82	H
3430.00	-35.35	4.62	3.00	9.81	-30.16	-13.00	-17.16	V
5145.00	-39.30	5.94	3.00	10.86	-34.38	-13.00	-21.38	V

LTE FDD Band 4_Channel Bandwidth 10MHz_QPSK_ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.00	-43.53	4.63	3.00	9.84	-38.32	-13.00	-25.32	H
5197.50	-47.15	5.94	3.00	10.86	-42.23	-13.00	-29.23	H
3465.00	-33.48	4.63	3.00	9.84	-28.27	-13.00	-15.27	V
5197.50	-39.09	5.94	3.00	10.86	-34.17	-13.00	-21.17	V

LTE FDD Band 4_Channel Bandwidth 10MHz_QPSK_ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3500.00	-42.94	4.65	3.00	9.90	-37.69	-13.00	-24.69	H
5250.00	-45.16	5.95	3.00	10.91	-40.20	-13.00	-27.20	H
3500.00	-36.41	4.65	3.00	9.90	-31.16	-13.00	-18.16	V
5250.00	-38.49	5.95	3.00	10.91	-33.53	-13.00	-20.53	V

LTE FDD Band 4_Channel Bandwidth 15MHz_QPSK_ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3435.00	-40.67	4.62	3.00	9.81	-35.48	-13.00	-22.48	H
5152.50	-47.26	5.94	3.00	10.86	-42.34	-13.00	-29.34	H
3435.00	-36.42	4.62	3.00	9.81	-31.23	-13.00	-18.23	V
5152.50	-38.02	5.94	3.00	10.86	-33.10	-13.00	-20.10	V

LTE FDD Band 4_Channel Bandwidth 15MHz_QPSK_ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.00	-40.26	4.63	3.00	9.84	-35.05	-13.00	-22.05	H
5197.50	-46.28	5.94	3.00	10.86	-41.36	-13.00	-28.36	H
3465.00	-36.84	4.63	3.00	9.84	-31.63	-13.00	-18.63	V
5197.50	-40.25	5.94	3.00	10.86	-35.33	-13.00	-22.33	V

LTE FDD Band 4_Channel Bandwidth 15MHz_QPSK_ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3495.00	-40.84	4.65	3.00	9.90	-35.59	-13.00	-22.59	H
5242.50	-46.71	5.95	3.00	10.91	-41.75	-13.00	-28.75	H
3495.00	-34.35	4.65	3.00	9.90	-29.10	-13.00	-16.10	V
5242.50	-41.50	5.95	3.00	10.91	-36.54	-13.00	-23.54	V

LTE FDD Band 4_Channel Bandwidth 20MHz_QPSK_ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3440.00	-40.04	4.62	3.00	9.81	-34.85	-13.00	-21.85	H
5160.00	-48.15	5.94	3.00	10.86	-43.23	-13.00	-30.23	H
3440.00	-33.56	4.62	3.00	9.81	-28.37	-13.00	-15.37	V
5160.00	-38.64	5.94	3.00	10.86	-33.72	-13.00	-20.72	V

LTE FDD Band 4_Channel Bandwidth 20MHz_QPSK_ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.00	-43.43	4.63	3.00	9.84	-38.22	-13.00	-25.22	H
5197.50	-46.69	5.94	3.00	10.86	-41.77	-13.00	-28.77	H
3465.00	-34.44	4.63	3.00	9.84	-29.23	-13.00	-16.23	V
5197.50	-40.68	5.94	3.00	10.86	-35.76	-13.00	-22.76	V

LTE FDD Band 4_Channel Bandwidth 20MHz_QPSK_ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3490.00	-40.95	4.65	3.00	9.90	-35.70	-13.00	-22.70	H
5235.00	-46.37	5.95	3.00	10.91	-41.41	-13.00	-28.41	H
3490.00	-36.50	4.65	3.00	9.90	-31.25	-13.00	-18.25	V
5235.00	-38.72	5.95	3.00	10.91	-33.76	-13.00	-20.76	V

LTE FDD Band 4_Channel Bandwidth 1.4MHz_16QAM _ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3421.40	-44.45	4.62	3.00	9.81	-39.26	-13.00	-26.26	H
5132.10	-51.77	5.94	3.00	10.86	-46.85	-13.00	-33.85	H
3421.40	-39.38	4.62	3.00	9.81	-34.19	-13.00	-21.19	V
5132.10	-44.24	5.94	3.00	10.86	-39.32	-13.00	-26.32	V

LTE FDD Band 4_Channel Bandwidth 1.4MHz_16QAM _ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.00	-45.46	4.63	3.00	9.84	-40.25	-13.00	-27.25	H
5197.50	-49.13	5.94	3.00	10.86	-44.21	-13.00	-31.21	H
3465.00	-37.25	4.63	3.00	9.84	-32.04	-13.00	-19.04	V
5197.50	-44.63	5.94	3.00	10.86	-39.71	-13.00	-26.71	V

LTE FDD Band 4_Channel Bandwidth 1.4MHz_16QAM _ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3508.60	-44.01	4.65	3.00	9.90	-38.76	-13.00	-25.76	H
5262.90	-48.38	5.95	3.00	10.91	-43.42	-13.00	-30.42	H
3508.60	-37.44	4.65	3.00	9.90	-32.19	-13.00	-19.19	V
5262.90	-41.31	5.95	3.00	10.91	-36.35	-13.00	-23.35	V

LTE FDD Band 4_Channel Bandwidth 3MHz_16QAM _ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3423.00	-43.20	4.62	3.00	9.81	-38.01	-13.00	-25.01	H
5134.50	-49.97	5.94	3.00	10.86	-45.05	-13.00	-32.05	H
3423.00	-37.51	4.62	3.00	9.81	-32.32	-13.00	-19.32	V
5134.50	-41.73	5.94	3.00	10.86	-36.81	-13.00	-23.81	V

LTE FDD Band 4_Channel Bandwidth 3MHz_16QAM _ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.00	-44.54	4.63	3.00	9.84	-39.33	-13.00	-26.33	H
5197.50	-50.56	5.94	3.00	10.86	-45.64	-13.00	-32.64	H
3465.00	-36.88	4.63	3.00	9.84	-31.67	-13.00	-18.67	V
5197.50	-44.77	5.94	3.00	10.86	-39.85	-13.00	-26.85	V

LTE FDD Band 4_Channel Bandwidth 3MHz_16QAM _ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3507.00	-43.12	4.65	3.00	9.90	-37.87	-13.00	-24.87	H
5260.50	-50.25	5.95	3.00	10.91	-45.29	-13.00	-32.29	H
3507.00	-37.14	4.65	3.00	9.90	-31.89	-13.00	-18.89	V
5260.50	-44.13	5.95	3.00	10.91	-39.17	-13.00	-26.17	V

LTE FDD Band 4_Channel Bandwidth 5MHz_16QAM _ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3425.00	-44.96	4.62	3.00	9.81	-39.77	-13.00	-26.77	H
5137.50	-48.67	5.94	3.00	10.86	-43.75	-13.00	-30.75	H
3425.00	-38.11	4.62	3.00	9.81	-32.92	-13.00	-19.92	V
5137.50	-44.10	5.94	3.00	10.86	-39.18	-13.00	-26.18	V

LTE FDD Band 4_Channel Bandwidth 5MHz_16QAM _ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.00	-45.54	4.63	3.00	9.84	-40.33	-13.00	-27.33	H
5197.50	-50.59	5.94	3.00	10.86	-45.67	-13.00	-32.67	H
3465.00	-38.10	4.63	3.00	9.84	-32.89	-13.00	-19.89	V
5197.50	-41.77	5.94	3.00	10.86	-36.85	-13.00	-23.85	V

LTE FDD Band 4_Channel Bandwidth 5MHz_16QAM _ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3505.00	-44.39	4.65	3.00	9.9	-39.14	-13.00	-26.14	H
5257.50	-48.09	5.95	3.00	10.91	-43.13	-13.00	-30.13	H
3505.00	-37.59	4.65	3.00	9.9	-32.34	-13.00	-19.34	V
5257.50	-41.74	5.95	3.00	10.91	-36.78	-13.00	-23.78	V

LTE FDD Band 4_Channel Bandwidth 10MHz_16QAM _ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3430.00	-44.34	4.62	3.00	9.81	-39.15	-13.00	-26.15	H
5145.00	-48.32	5.94	3.00	10.86	-43.40	-13.00	-30.40	H
3430.00	-38.68	4.62	3.00	9.81	-33.49	-13.00	-20.49	V
5145.00	-44.11	5.94	3.00	10.86	-39.19	-13.00	-26.19	V

LTE FDD Band 4_Channel Bandwidth 10MHz_16QAM _ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.00	-45.37	4.63	3.00	9.84	-40.16	-13.00	-27.16	H
5197.50	-48.79	5.94	3.00	10.86	-43.87	-13.00	-30.87	H
3465.00	-39.81	4.63	3.00	9.84	-34.60	-13.00	-21.60	V
5197.50	-44.69	5.94	3.00	10.86	-39.77	-13.00	-26.77	V

LTE FDD Band 4_Channel Bandwidth 10MHz_16QAM _ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3500.00	-45.69	4.65	3.00	9.90	-40.44	-13.00	-27.44	H
5250.00	-49.46	5.95	3.00	10.91	-44.50	-13.00	-31.50	H
3500.00	-36.32	4.65	3.00	9.90	-31.07	-13.00	-18.07	V
5250.00	-41.99	5.95	3.00	10.91	-37.03	-13.00	-24.03	V

LTE FDD Band 4_Channel Bandwidth 15MHz_16QAM _ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3435.00	-44.13	4.62	3.00	9.81	-38.94	-13.00	-25.94	H
5152.50	-48.19	5.94	3.00	10.86	-43.27	-13.00	-30.27	H
3435.00	-36.17	4.62	3.00	9.81	-30.98	-13.00	-17.98	V
5152.50	-42.23	5.94	3.00	10.86	-37.31	-13.00	-24.31	V

LTE FDD Band 4_Channel Bandwidth 15MHz_16QAM _ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.00	-46.83	4.63	3.00	9.84	-41.62	-13.00	-28.62	H
5197.50	-50.08	5.94	3.00	10.86	-45.16	-13.00	-32.16	H
3465.00	-39.23	4.63	3.00	9.84	-34.02	-13.00	-21.02	V
5197.50	-41.39	5.94	3.00	10.86	-36.47	-13.00	-23.47	V

LTE FDD Band 4_Channel Bandwidth 15MHz_16QAM _ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3495.00	-45.79	4.65	3.00	9.90	-40.54	-13.00	-27.54	H
5242.50	-48.01	5.95	3.00	10.91	-43.05	-13.00	-30.05	H
3495.00	-39.88	4.65	3.00	9.90	-34.63	-13.00	-21.63	V
5242.50	-42.46	5.95	3.00	10.91	-37.50	-13.00	-24.50	V

LTE FDD Band 4_Channel Bandwidth 20MHz_16QAM _ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3440.00	-45.28	4.62	3.00	9.81	-40.09	-13.00	-27.09	H
5160.00	-49.34	5.94	3.00	10.86	-44.42	-13.00	-31.42	H
3440.00	-37.17	4.62	3.00	9.81	-31.98	-13.00	-18.98	V
5160.00	-42.33	5.94	3.00	10.86	-37.41	-13.00	-24.41	V

LTE FDD Band 4_Channel Bandwidth 20MHz_16QAM _ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.00	-44.40	4.63	3.00	9.84	-39.19	-13.00	-26.19	H
5197.50	-48.97	5.94	3.00	10.86	-44.05	-13.00	-31.05	H
3465.00	-37.14	4.63	3.00	9.84	-31.93	-13.00	-18.93	V
5197.50	-42.64	5.94	3.00	10.86	-37.72	-13.00	-24.72	V

LTE FDD Band 4_Channel Bandwidth 20MHz_16QAM _ High Channel

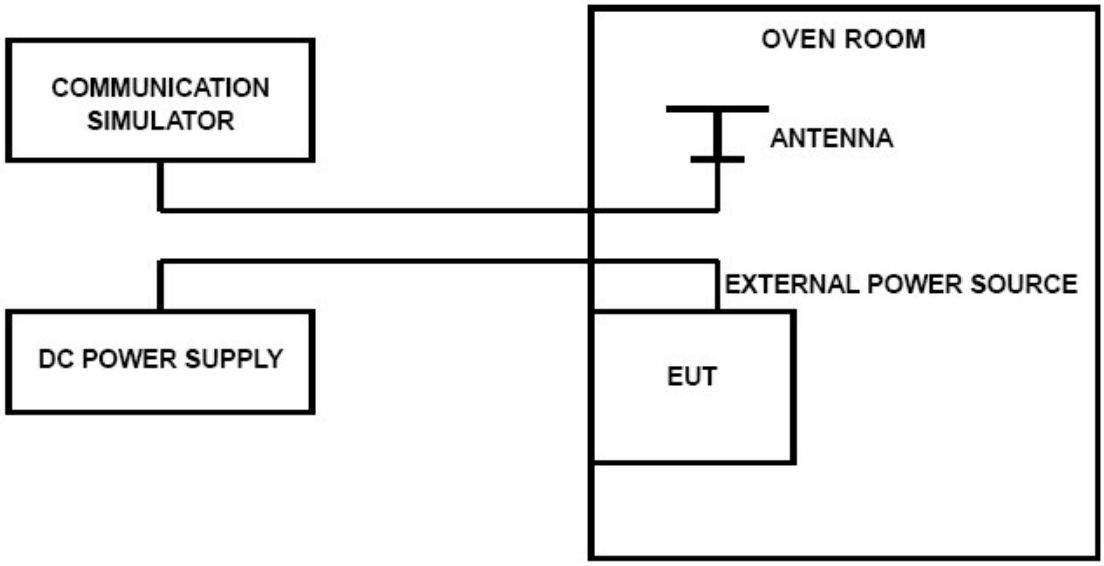
Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3490.00	-43.07	4.65	3.00	9.90	-37.82	-13.00	-24.82	H
5235.00	-51.91	5.95	3.00	10.91	-46.95	-13.00	-33.95	H
3490.00	-37.35	4.65	3.00	9.90	-32.10	-13.00	-19.10	V
5235.00	-43.29	5.95	3.00	10.91	-38.33	-13.00	-25.33	V

4.7 Frequency Stability under Temperature & Voltage Variations

LIMIT

According to FCC §2.1055, §22.355, §24.235 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 EIA/TIA 603D

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℃.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE band 2 and LTE band 4, 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℃ increments from -10℃ to +50℃. 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 0.1Volt 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℃.
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 ℃ increments from +50℃ to -30℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

Frequency Stability Under Voltage Variations:
Set chamber temperature to 20℃. 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 (±15%) and endpoint, record the maximum frequency change.

TEST RESULTS

Remark:
1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE LTE FDD Band 4;

LTE Band 4, 1.4MHz bandwidth, QPSK (worst case of all bandwidths)

LTE FDD Band 4					
AC Power	Temperature (℃)	Frequency error (Hz)	Frequency error (ppm)	Limit (ppm)	Verdict
108	20	93	0.053	2.50	PASS
120	20	11	0.006	2.50	PASS
132	20	30	0.017	2.50	PASS
120	-10	11	0.006	2.50	PASS
120	-20	43	0.025	2.50	PASS
120	-10	78	0.045	2.50	PASS
120	0	35	0.020	2.50	PASS
120	10	40	0.023	2.50	PASS
120	20	30	0.017	2.50	PASS
120	30	60	0.034	2.50	PASS
120	40	3	0.002	2.50	PASS
120	50	16	0.009	2.50	PASS

LTE Band 4, 1.4MHz bandwidth, 16QAM (worst case of all bandwidths)

LTE FDD Band 4					
AC Power	Temperature (℃)	Frequency error (Hz)	Frequency error (ppm)	Limit (ppm)	Verdict
108	20	40	0.023	2.50	PASS
120	20	41	0.023	2.50	PASS
132	20	56	0.032	2.50	PASS
120	-10	89	0.051	2.50	PASS
120	-20	55	0.031	2.50	PASS
120	-10	32	0.018	2.50	PASS
120	0	93	0.053	2.50	PASS
120	10	24	0.014	2.50	PASS
120	20	69	0.039	2.50	PASS
120	30	26	0.015	2.50	PASS
120	40	12	0.007	2.50	PASS
120	50	50	0.029	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*************************