

FCC PART 22/24/27 TEST REPORT**FCC Part 22H/Part 24E/Part 27****Client Information:**

Applicant: Wuhan Tianyu Information Industry Co., Ltd.
Applicant add.: HUST Industry Park, East-Lake Development Zone, Wuhan 430223, Hubei, China
Manufacturer: Wuhan Tianyu Information Industry Co., Ltd.
Manufacturer add.: HUST Industry Park, East-Lake Development Zone, Wuhan 430223, Hubei, China

Product Information:

Product Name: POS Terminal

Model No.: TP50

Brand Name: 

FCC ID: 2ALKI-TP50

Applicable standards: FCC CFR Title 47 Part 2, Part 22H, Part 24E, Part 27
TIA-603-E: 2016
KDB971168 D01 Power Meas License Digital Systems
v03r01

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Date of Receipt: Apr. 03, 2022

Date of Test: Apr. 04~Apr. 21, 2022

Date of Issue: Apr. 21, 2022

Test Result: Pass

This device described above has been tested by Dongguan Yaxu (AiT) Technology Limited and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Reviewed by:



Simba Huang

Approved by:



Seal.chen

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1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Part 22H](#): Cellular Radiotelephone Service

[FCC Part 24E](#): Broadband PCS

[FCC Part 27](#): 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 KDB971168 D01](#) Power Meas License Digital Systems v03r01

2 SUMMARY

2.1 Product Description

EUT	: POS Terminal
Test Model	: TP50
Additional Model No.	: /
Model Declaration	: /
Test sample(s) ID:	22040103-2
Power Supply	: Input: DC 5V, 2A DC 3.7V by Rechargeable Li-ion Battery, 2600mAh
Hardware Version	: /
Software Version	: /
SIM Card:	: SIM 1 and SIM 2 is a chipset unit and tested as single chipset, SIM 1 is used to tested.
LTE	:
Support Band	: ☒ E-UTRA Band 2(U.S.-Band) ☒ E-UTRA Band 4(U.S.-Band) ☒ E-UTRA Band 5(U.S.-Band) ☒ E-UTRA Band 12(U.S.-Band) ☒ E-UTRA Band 13(U.S.-Band)
LTE Release Version	: R13
Type Of Modulation	: QPSK/16QAM
Antenna Description	: Internal Antenna 0.8dBi (max.) For E-UTRA Band 2 0.8dBi (max.) For E-UTRA Band 4 0.5dBi (max.) For E-UTRA Band 5 0.5dBi (max.) For E-UTRA Band 12 0.5dBi (max.) For E-UTRA Band 13
Power Class	: Class 3
Extreme vol. Limits	: 3.3VDC to 4.2VDC (nominal: 3.7VDC)

2.2 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): 3.7V		

2.3 Internal Identification of AE used during the test

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

2.4 Normal Accessory setting

Fully charged battery was used during the test.

2.5 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. :	/

2.6 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2ALKI-TP50 filing to comply with FCC Part 22, Part 24 and Part 27 Rules

2.7 Modifications

No modifications were implemented to meet testing criteria.

2.8 General Test Conditions/Configurations

2.10.1 Test Environment

EnvironmentParameter	SelectedValuesDuringTests	
Relative Humidity	Ambient	
Temperature	TN	Ambient
Voltage	VL	DC 3.3V
	VN	DC 3.7V
	VH	DC 4.2V

NOTE:VL=lower extreme testvoltageVN=nominalvoltage
VH=upperextreme testvoltageTN=normaltemperature

3 TEST ENVIRONMENT

3.1 Test Facility

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

CNAS- Registration No: L6177

Dongguan Yaxu (AiT) technology Limited is accredited to ISO/IEC 17025:2017 general Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the competence of testing and calibration laboratories) on Aug.04, 2020

FCC-Registration No.: 703111 Designation Number: CN1313

Dongguan Yaxu (AiT) technology Limited has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC —Registration No.: 6819A CAB identifier: CN0122

The 3m Semi-anechoic chamber of DongguanYaxu (AiT) technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 6819A

A2LA-Lab Cert. No.: 6317.01

Dongguan Yaxu (AiT) technology Limited has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

3.2 Environmental conditions

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

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

3.3 Test Description

Band 2 (1850-1910MHz pairedwith 1930-1990MHz)

Test Item	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) Radiated Output Power	§2.1046, §24.232	EIRP $\leq$ 2W	PASS
Peak-Average Ratio	§2.1046, §24.232	FCC:Limit $\leq$ 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, §24.238	$\leq$ -13dBm/1%*EBW, In 1MHz bands immediately outside and adjacent to the frequency block.	PASS
Spurious Emission at Antenna Terminals	§2.1051, §24.238	$\leq$ -13dBm/1MHz, from 9kHz to10 th harmonics but outside authorized Operating frequency ranges.	PASS
Field Strength of Spurious Radiation	§2.1053, §24.238	$\leq$ -13dBm/1MHz.	PASS
Frequency Stability	§2.1055,	FCC: within authorized frequency	PASS



	§24.235	block.	
NOTE 1:For the verdict, the“N/A”denotes“not applicable”,the“N/T”de notes “not tested”.			

Band 4 (1710-1755MHz pairedwith 2110-2155MHz)

Test Item	FCC RuleNo.	Requirements	Verdict
Effective(Isotropic)RadiatedPowerOutputData	§2.1046, §27.50(d)	EIRP $\leq$ 1W;	PASS
Peak-AverageRatio	§2.1046, §27.50(d)	Limit $\leq$ 13dB	Pass
ModulationCharacteristics	§2.1047	Digitalmodulation	N/A
Bandwidth	§2.1049	OBW: Nolimit. EBW: Nolimit.	PASS
BandEdgesCompliance	§2.1051, §27.53(h)	$\leq$ -13dBm/1%*EBW,in1 MHz bands immediately outside and adjacent to the frequency block.	PASS
SpuriousEmissionatAntennaTerminals	§2.1051, §27.53(h)	$\leq$ -13dBm/1MHz, from 9kHz to 10 th 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)	$\leq$ -13dBm/1MHz.	PASS
NOTE 1: For the verdict, the "N/A" denotes "not applicable", the "N/T" de notes "not tested"			

Band 5 (824-849MHz pairedwith 869-894MHz)

Test Item	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) Radiated Output Power	§2.1046, §22.913	FCC: ERP $\leq$ 7W.	Pass
Modulation Characteristics	§2.1047	Digital modulation	N/A
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Pass
Band Edges Compliance	§2.1051, §22.917	$\leq$ -13dBm/1%*EBW, In1MHzbandsimmediatelyoutsideandadjacentto Thefrequency block.	Pass
Spurious Emissionat AntennaTerminals	§2.1051, §22.917	FCC: $\leq$ -13dBm/100kHz, from 9kHz to 10th harmonics but outside authorized operating frequency ranges.	Pass
Field Strength of Spurious Radiation	§2.1053, §22.917	FCC: $\leq$ -13dBm/100kHz.	Pass
Frequency Stability	§2.1055, §22.355	$\leq \pm 2.5$ ppm.	Pass
NOTE 1:For the verdict, the"N/A"denotes"not applicable",the"N/T"de notes "not tested".			

Band 12 (699-716MHz paired with 729-746MHz)

Test Item	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) RadiatedPower OutputData	§2.1046, §27.50(c)	ERP ≤ 3W;	PASS
Peak-Average Ratio	§2.1046, §27.50(c)	Limit≤13dB	PASS
Modulation Characteristics	§2.1047	Digitalmodulation	N/A
Bandwidth	§2.1049	OBW: Nolimit. EBW: Nolimit.	PASS
BandEdges Compliance	§2.1051, §27.53(g)	≤ -13dBm/1%*EBW,in1 MHz bands immediately outside and adjacent to The frequency block.	PASS
Spurious Emission at Antenna Terminals	§2.1051, §27.53(g)	≤ -13dBm/100KHz, from 9kHz to10th 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(g)	≤ -13dBm/100KHz.	PASS
NOTE 1:For the verdict, the“N/A”denotes“not applicable”,the“N/T”de notes “not tested”.			

Band 13 (777-787MHz paired with 746-756MHz)

Test Item	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) RadiatedPower OutputData	§2.1046, §27.50(b)	ERP ≤ 3W;	PASS
Peak-Average Ratio	§2.1046, §27.50(b)	Limit≤13dB	PASS
Modulation Characteristics	§2.1047	Digitalmodulation	N/A
Bandwidth	§2.1049	OBW: Nolimit. EBW: Nolimit.	PASS
BandEdges Compliance	§2.1051, §27.53(c)	≤ -13dBm/1%*EBW,in1 MHz bands immediately outside and adjacent to The frequency block.	PASS
Spurious Emission at Antenna Terminals	§2.1051, §27.53(c)	≤ -13dBm/100KHz, from 9kHz to10th 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(c)	≤ -13dBm/100KHz.	PASS
NOTE 1:For the verdict, the“N/A”denotes“not applicable”,the“N/T”de notes “not tested”.			

3.4 Equipments Used during the Test

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Spectrum Analyzer	R&S	FSV40	101470	2021.08.30	2022.08.29
2	EMI Measuring Receiver	R&S	ESR	101160	2021.08.30	2022.08.29
3	Low Noise Pre Amplifier	HP	HP8447E	AiT-F01319	2021.08.30	2022.08.29
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2021.08.30	2022.08.29
5	Passive Loop	ETS	6512	00165355	2020.09.05	2022.09.04
6	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2021.08.28	2022.08.27
7	Broadband Horn Antenna	SCHWARZBECK	BBHA9120D	452	2021.08.28	2022.08.27
8	SHF-EHF Horn Antenna 15-40GHz	SCHWARZBECK	BBHA9170	BBHA9170367d	2020.11.24	2023.11.23
9	EMI Test Receiver	R&S	ESCI	100124	2021.08.30	2022.08.29
10	LISN	Kyoritsu	KNW-242	8-837-4	2021.08.30	2022.08.29
11	LISN	R&S	ESH3-Z2	0357.8810.54-101161-S2	2021.08.30	2022.08.29
12	Pro.Temp&Humi.chamber	MENTEK	MHP-150-1C	MAA08112501	2021.08.30	2022.08.29
13	RF Automatic Test system	MW	MW100-RFCB	21033016	2021.08.30	2022.08.29
14	Wideband Radio communication tester	R&S	CMW500	1201.0002K50	2021.08.30	2022.08.29
15	Signal Analyzer	Agilent	N9020A	9011796	2021.08.30	2022.08.29
16	DC power supply	ZHAOXIN	RXN-305D-2	28070002559	N/A	N/A
17	temporary antenna connector(Note)	NTS	R001	N/A	N/A	N/A
Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.						

3.5 Measurement uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power, conducted	$\pm 0.16\text{dB}$
3	Spurious emissions, conducted	$\pm 0.21\text{dB}$
4	All emissions, radiated (<1G)	$\pm 4.68\text{dB}$
5	All emissions, radiated (>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$

4 TEST CONDITIONS AND RESULTS

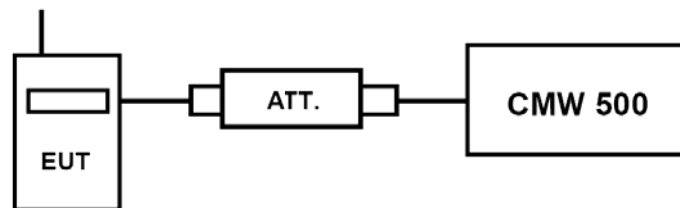
4.1 Output Power

TEST APPLICABLE

During the process of testing, the EUT was controlled via R&S Digital Radio Communication tester (CMW 500) 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:

- Place the EUT on a bench and set it in transmitting mode.
- Connect a low loss RF cable from the antenna port to a CMW 500 by an Att.
- EUT Communicate with CMW 500 then selects a channel for testing.
- Add a correction factor to the display CMW 500, and then test.

TEST RESULTS

Remark:

- We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 12, LTE FDD Band 13; recorded worst case for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 12, LTE FDD Band 13.
- For E-UTRA Band 2, please refer to Appendix B: Section B.1
- For E-UTRA Band 4, please refer to Appendix C: Section C.1
- For E-UTRA Band 5, please refer to Appendix D: Section D.1
- For E-UTRA Band 12, please refer to Appendix E: Section E.1
- For E-UTRA Band 13, 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 §22.913(2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in §22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

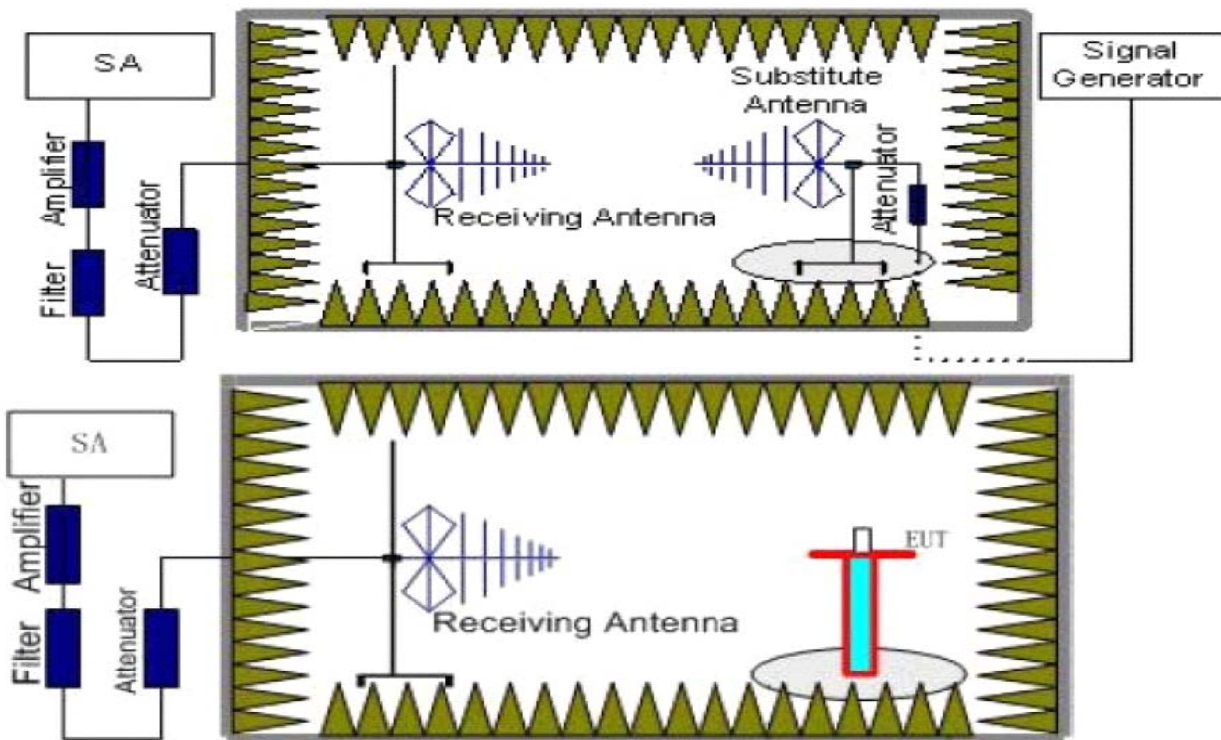
Rule Part 24.232(c) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(e) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

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) specifies, Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

Per Part 27.50(h) (2) specifies 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, a 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, $\text{ERP} = \text{EIRP} - 2.15\text{dBi}$.

TEST RESULTS

Radiated Measurement:

Remark:

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 12, LTE FDD Band 13; recorded worst case for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 12, LTE FDD Band 13.
2. $\text{EIRP} = P_{Mea}(\text{dBm}) - P_{cl}(\text{dB}) + P_{Ag}(\text{dB}) + G_a(\text{dBi})$
3. $\text{ERP} = \text{EIRP} - 2.15\text{dBi}$ as EIRP by subtracting the gain of the dipole.
4. $\text{Margin} = \text{Emission Level} - \text{Limit}$
5. We tested the worst-case records for H and V directions, and only the worst-case records for V direction were recorded in the report.

LTE FDD Band 2 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
1850.7	-19.11	4.03	8.38	35.51	20.75	33.01	-12.26	V
1880.0	-19.51	4.08	8.33	35.56	20.30	33.01	-12.71	V
1909.3	-19.02	4.14	8.26	35.63	20.73	33.01	-12.28	V

LTE FDD Band 2 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
1851.5	-20.06	4.03	8.38	35.51	19.80	33.01	-13.21	V
1880.0	-19.67	4.08	8.33	35.56	20.14	33.01	-12.87	V
1908.5	-20.20	4.14	8.26	35.63	19.55	33.01	-13.46	V

LTE FDD Band 2 Channel Bandwidth 5MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1852.5	-20.59	4.03	8.38	35.51	19.27	33.01	-13.74	V
1880.0	-20.10	4.08	8.33	35.56	19.71	33.01	-13.30	V
1907.5	-20.88	4.14	8.26	35.63	18.87	33.01	-14.14	V

LTE FDD Band 2 Channel Bandwidth 10MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1855.0	-21.08	4.03	8.38	35.51	18.78	33.01	-14.23	V
1880.0	-20.59	4.08	8.33	35.56	19.22	33.01	-13.79	V
1905.0	-21.32	4.14	8.26	35.63	18.43	33.01	-14.58	V

LTE FDD Band 2 Channel Bandwidth 15MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1857.5	-21.46	4.03	8.38	35.51	18.40	33.01	-14.61	V
1880.0	-21.94	4.08	8.33	35.56	17.87	33.01	-15.14	V
1902.5	-21.87	4.14	8.26	35.63	17.88	33.01	-15.13	V

LTE FDD Band 2 Channel Bandwidth 20MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1860.0	-21.58	4.03	8.38	35.51	18.28	33.01	-14.73	V
1880.0	-22.05	4.08	8.33	35.56	17.76	33.01	-15.25	V
1900.0	-22.04	4.14	8.26	35.63	17.71	33.01	-15.30	V

LTE FDD Band 2 Channel Bandwidth 1.4MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1850.7	-20.00	4.03	8.38	35.51	19.86	33.01	-13.15	V
1880.0	-20.10	4.08	8.33	35.56	19.71	33.01	-13.30	V
1909.3	-19.60	4.14	8.26	35.63	20.15	33.01	-12.86	V

LTE FDD Band 2 Channel Bandwidth 3MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1851.5	-20.91	4.03	8.38	35.51	18.95	33.01	-14.06	V
1880.0	-20.65	4.08	8.33	35.56	19.16	33.01	-13.85	V
1908.5	-20.13	4.14	8.26	35.63	19.62	33.01	-13.39	V

LTE FDD Band 2 Channel Bandwidth 5MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1852.5	-21.08	4.03	8.38	35.51	18.78	33.01	-14.23	V
1880.0	-21.16	4.08	8.33	35.56	18.65	33.01	-14.36	V
1907.5	-21.48	4.14	8.26	35.63	18.27	33.01	-14.74	V

LTE FDD Band 2 Channel Bandwidth 10MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1855.0	-21.50	4.03	8.38	35.51	18.36	33.01	-14.65	V
1880.0	-21.75	4.08	8.33	35.56	18.06	33.01	-14.95	V
1905.0	-21.67	4.14	8.26	35.63	18.08	33.01	-14.93	V

LTE FDD Band 2 Channel Bandwidth 15MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1857.5	-22.47	4.03	8.38	35.51	17.39	33.01	-15.62	V
1880.0	-22.37	4.08	8.33	35.56	17.44	33.01	-15.57	V
1902.5	-22.21	4.14	8.26	35.63	17.54	33.01	-15.47	V

LTE FDD Band 2 Channel Bandwidth 20MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1860.0	-22.18	4.03	8.38	35.51	17.68	33.01	-15.33	V
1880.0	-22.69	4.08	8.33	35.56	17.12	33.01	-15.89	V
1900.0	-22.42	4.14	8.26	35.63	17.33	33.01	-15.68	V

LTE FDD Band 4 Channel Bandwidth 1.4MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1710.7	-18.66	3.93	9.05	34.96	21.42	30.00	-8.58	V
1732.5	-18.82	3.93	8.89	35.01	21.15	30.00	-8.85	V
1754.3	-19.27	3.94	8.76	35.08	20.63	30.00	-9.37	V

LTE FDD Band 4 Channel Bandwidth 3MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1711.5	-19.07	3.93	9.05	34.96	21.01	30.00	-8.99	V
1732.5	-19.15	3.93	8.89	35.01	20.82	30.00	-9.18	V
1753.5	-19.49	3.94	8.76	35.08	20.41	30.00	-9.59	V

LTE FDD Band 4_Channel Bandwidth 5MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1712.5	-19.06	3.93	9.05	34.96	21.02	30.00	-8.98	V
1732.5	-18.68	3.93	8.89	35.01	21.29	30.00	-8.71	V
1752.5	-19.01	3.94	8.76	35.08	20.89	30.00	-9.11	V

LTE FDD Band 4_Channel Bandwidth 10MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1715.0	-19.83	3.93	9.05	34.96	20.25	30.00	-9.75	V
1732.5	-19.62	3.93	8.89	35.01	20.35	30.00	-9.65	V
1750.0	-19.51	3.94	8.76	35.08	20.39	30.00	-9.61	V

LTE FDD Band 4_Channel Bandwidth 15MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1717.5	-18.67	3.93	9.05	34.96	21.41	30.00	-8.59	V
1732.5	-19.33	3.93	8.89	35.01	20.64	30.00	-9.36	V
1747.5	-19.22	3.94	8.76	35.08	20.68	30.00	-9.32	V

LTE FDD Band 4_Channel Bandwidth 20MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1720.0	-19.24	3.93	9.05	34.96	20.84	30.00	-9.16	V
1732.5	-19.66	3.93	8.89	35.01	20.31	30.00	-9.69	V
1745.0	-19.70	3.94	8.76	35.08	20.20	30.00	-9.80	V

LTE FDD Band 4_Channel Bandwidth 1.4MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1710.7	-19.87	3.93	9.05	34.96	20.21	30.00	-9.79	V
1732.5	-19.47	3.93	8.89	35.01	20.50	30.00	-9.50	V
1754.3	-19.87	3.94	8.76	35.08	20.03	30.00	-9.97	V

LTE FDD Band 4_Channel Bandwidth 3MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1711.5	-18.66	3.93	9.05	34.96	21.42	30.00	-8.58	V
1732.5	-18.77	3.93	8.89	35.01	21.20	30.00	-8.80	V
1753.5	-19.40	3.94	8.76	35.08	20.50	30.00	-9.50	V

LTE FDD Band 4_Channel Bandwidth 5MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1712.5	-19.81	3.93	9.05	34.96	20.27	30.00	-9.73	V
1732.5	-19.58	3.93	8.89	35.01	20.39	30.00	-9.61	V
1752.5	-18.92	3.94	8.76	35.08	20.98	30.00	-9.02	V

LTE FDD Band 4_Channel Bandwidth 10MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1715.0	-19.04	3.93	9.05	34.96	21.04	30.00	-8.96	V
1732.5	-18.74	3.93	8.89	35.01	21.23	30.00	-8.77	V
1750.0	-18.93	3.94	8.76	35.08	20.97	30.00	-9.03	V

LTE FDD Band 4_Channel Bandwidth 15MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1717.5	-19.25	3.93	9.05	34.96	20.83	30.00	-9.17	V
1732.5	-19.58	3.93	8.89	35.01	20.39	30.00	-9.61	V
1747.5	-18.91	3.94	8.76	35.08	20.99	30.00	-9.01	V

LTE FDD Band 4_Channel Bandwidth 20MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1720.0	-19.05	3.93	9.05	34.96	21.03	30.00	-8.97	V
1732.5	-19.03	3.93	8.89	35.01	20.94	30.00	-9.06	V
1745.0	-18.81	3.94	8.76	35.08	21.09	30.00	-8.91	V

LTE FDD Band 5_Channel Bandwidth 1.4MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	Correction (dB)	P _{Aq} (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
824.70	-16.48	3.45	8.45	2.15	33.79	20.16	38.45	-18.29	V
836.50	-16.40	3.49	8.45	2.15	33.85	20.26	38.45	-18.19	V
848.30	-15.88	3.55	8.36	2.15	33.88	20.66	38.45	-17.79	V

LTE FDD Band 5_Channel Bandwidth 3MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	Correction (dB)	P _{Aq} (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
825.50	-16.40	3.45	8.45	2.15	33.79	20.24	38.45	-18.21	V
836.50	-16.22	3.49	8.45	2.15	33.85	20.44	38.45	-18.01	V
847.50	-16.25	3.55	8.36	2.15	33.88	20.29	38.45	-18.16	V

LTE FDD Band 5_Channel Bandwidth 5MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	Correction (dB)	P _{Aq} (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
826.50	-16.21	3.45	8.45	2.15	33.79	20.43	38.45	-18.02	V
836.50	-16.19	3.49	8.45	2.15	33.85	20.47	38.45	-17.98	V

846.50	-16.24	3.55	8.36	2.15	33.88	20.30	38.45	-18.15	V
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LTE FDD Band 5 Channel Bandwidth 10MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	Correction (dB)	P _{Aq} (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
829.00	-16.01	3.45	8.45	2.15	33.79	20.63	38.45	-17.82	V
836.50	-15.89	3.49	8.45	2.15	33.85	20.77	38.45	-17.68	V
844.00	-16.14	3.55	8.36	2.15	33.88	20.40	38.45	-18.05	V

LTE FDD Band 5 Channel Bandwidth 1.4MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	Correction (dB)	P _{Aq} (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
824.70	-17.06	3.45	8.45	2.15	33.79	19.58	38.45	-18.87	V
836.50	-16.52	3.49	8.45	2.15	33.85	20.14	38.45	-18.31	V
848.30	-17.27	3.55	8.36	2.15	33.88	19.27	38.45	-19.18	V

LTE FDD Band 5 Channel Bandwidth 3MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	Correction (dB)	P _{Aq} (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
825.50	-17.31	3.45	8.45	2.15	33.79	19.33	38.45	-19.12	V
836.50	-16.58	3.49	8.45	2.15	33.85	20.08	38.45	-18.37	V
847.50	-16.58	3.55	8.36	2.15	33.88	19.96	38.45	-18.49	V

LTE FDD Band 5 Channel Bandwidth 5MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	Correction (dB)	P _{Aq} (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
826.50	-16.57	3.45	8.45	2.15	33.79	20.07	38.45	-18.38	V
836.50	-16.51	3.49	8.45	2.15	33.85	20.15	38.45	-18.30	V
846.50	-17.16	3.55	8.36	2.15	33.88	19.38	38.45	-19.07	V

LTE FDD Band 5 Channel Bandwidth 10MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	Correction (dB)	P _{Aq} (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
829.00	-16.74	3.45	8.45	2.15	33.79	19.90	38.45	-18.55	V
836.50	-17.09	3.49	8.45	2.15	33.85	19.57	38.45	-18.88	V
844.00	-16.59	3.55	8.36	2.15	33.88	19.95	38.45	-18.50	V

LTE FDD Band 12 Channel Bandwidth 1.4MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain (dB)	P _{Aq} (dB)	Correction (dB)	Burst Average ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
699.70	-14.24	3.01	8.29	33.52	2.15	22.41	34.77	-12.36	V
707.50	-14.77	3.02	8.29	33.52	2.15	21.87	34.77	-12.90	V
715.30	-14.50	3.06	8.29	33.52	2.15	22.10	34.77	-12.67	V

LTE FDD Band 12 Channel Bandwidth 3MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain (dB)	P _{Aq} (dB)	Correction (dB)	Burst Average ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
700.50	-14.69	3.01	8.29	33.52	2.15	21.96	34.77	-12.81	V
707.50	-14.99	3.02	8.29	33.52	2.15	21.65	34.77	-13.12	V

714.50	-14.88	3.06	8.29	33.52	2.15	21.72	34.77	-13.05	V
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LTE FDD Band 12 Channel Bandwidth 5MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain (dB)	P _{Aq} (dB)	Correction (dB)	Burst Avergae ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
701.50	-15.76	3.01	8.29	33.52	2.15	20.89	34.77	-13.88	V
707.50	-15.68	3.02	8.29	33.52	2.15	20.96	34.77	-13.81	V
713.50	-15.62	3.06	8.29	33.52	2.15	20.98	34.77	-13.79	V

LTE FDD Band 12 Channel Bandwidth 10MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain (dB)	P _{Aq} (dB)	Correction (dB)	Burst Avergae ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
704.00	-15.99	3.01	8.29	33.52	2.15	20.66	34.77	-14.11	V
707.50	-15.81	3.02	8.29	33.52	2.15	20.83	34.77	-13.94	V
711.00	-15.97	3.06	8.29	33.52	2.15	20.63	34.77	-14.14	V

LTE FDD Band 12 Channel Bandwidth 1.4MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain (dB)	P _{Aq} (dB)	Correction (dB)	Burst Avergae ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
699.70	-15.28	3.01	8.29	33.52	2.15	21.37	34.77	-13.40	V
707.50	-14.63	3.02	8.29	33.52	2.15	22.01	34.77	-12.76	V
715.30	-14.58	3.06	8.29	33.52	2.15	22.02	34.77	-12.75	V

LTE FDD Band 12 Channel Bandwidth 3MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain (dB)	P _{Aq} (dB)	Correction (dB)	Burst Avergae ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
700.50	-15.10	3.01	8.29	33.52	2.15	21.55	34.77	-13.22	V
707.50	-15.11	3.02	8.29	33.52	2.15	21.53	34.77	-13.24	V
714.50	-15.72	3.06	8.29	33.52	2.15	20.88	34.77	-13.89	V

LTE FDD Band 12 Channel Bandwidth 5MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain (dB)	P _{Aq} (dB)	Correction (dB)	Burst Avergae ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
701.50	-15.70	3.01	8.29	33.52	2.15	20.95	34.77	-13.82	V
707.50	-16.21	3.02	8.29	33.52	2.15	20.43	34.77	-14.34	V
713.50	-15.60	3.06	8.29	33.52	2.15	21.00	34.77	-13.77	V

LTE FDD Band 12 Channel Bandwidth 10MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain (dB)	P _{Aq} (dB)	Correction (dB)	Burst Avergae ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
704.00	-16.60	3.01	8.29	33.52	2.15	20.05	34.77	-14.72	V
707.50	-16.16	3.02	8.29	33.52	2.15	20.48	34.77	-14.29	V
711.00	-16.59	3.06	8.29	33.52	2.15	20.01	34.77	-14.76	V

LTE FDD Band 13_Channel Bandwidth 5MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
779.5	-17.78	3.21	9.61	33.89	2.15	20.36	34.77	-14.41	V
782.0	-18.36	3.23	9.52	34.74	2.15	20.52	34.77	-14.25	V
784.5	-17.64	3.25	9.43	34.85	2.15	21.24	34.77	-13.53	V

LTE FDD Band 13_Channel Bandwidth 10MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
782.0	-17.26	3.23	9.52	34.74	2.15	21.62	34.77	-13.15	V

LTE FDD Band 13_Channel Bandwidth 5MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
779.5	-18.79	3.21	9.61	33.89	2.15	19.35	34.77	-15.42	V
782.0	-19.22	3.23	9.52	34.74	2.15	19.66	34.77	-15.11	V
784.5	-18.93	3.25	9.43	34.85	2.15	19.95	34.77	-14.82	V

LTE FDD Band 13_Channel Bandwidth 10MHz_16QAM

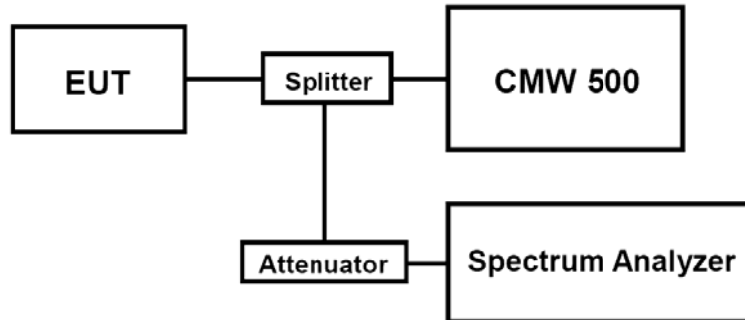
Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
782.0	-18.12	3.23	9.52	34.74	2.15	20.76	34.77	-14.01	V

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:

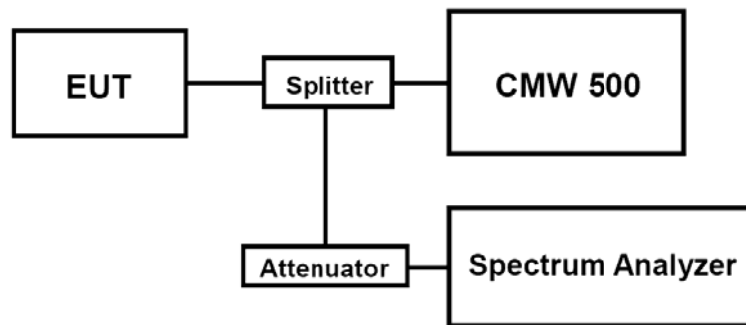
1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 12, LTE FDD Band 13; recorded worst case for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 12, LTE FDD Band 13.
2. For E-UTRA Band 2, please refer to Appendix B: Section B.2
3. For E-UTRA Band 4, please refer to Appendix C: Section C.2
4. For E-UTRA Band 5, please refer to Appendix D: Section D.2
5. For E-UTRA Band 12, please refer to Appendix E: Section E.2
6. For E-UTRA Band 13, 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 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 12, LTE FDD Band 13; recorded worst case for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 12, LTE FDD Band 13.
2. For E-UTRA Band 2, please refer to Appendix B: Section B.3
3. For E-UTRA Band 4, please refer to Appendix C: Section C.3
4. For E-UTRA Band 5, please refer to Appendix D: Section D.3
5. For E-UTRA Band 12, please refer to Appendix E: Section E.3
6. For E-UTRA Band 13, please refer to Appendix F: Section F.3

4.4 Band Edge compliance

LIMIT

For LTE FDD Band 2: Per FCC §24.238 the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10\log(P)$ dB.

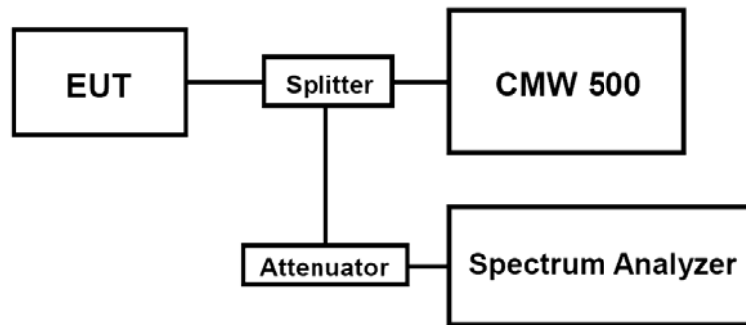
For LTE FDD Band 4: Per §27.53(h): For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB.

For LTE FDD Band 5: Per FCC §22.917 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.

For LTE FDD Band 12: Per §27.53 (g): For operations in the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB.

For LTE FDD Band 13: Per §27.53 (c): For operations in the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following: On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;

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 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 12, LTE FDD Band 13;; recorded worst case for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 12, LTE FDD Band 13.
2. For E-UTRA Band 2, please refer to Appendix B: Section B.4
3. For E-UTRA Band 4, please refer to Appendix C: Section C.4
4. For E-UTRA Band 5, please refer to Appendix D: Section D.4
5. For E-UTRA Band 12, please refer to Appendix E: Section E.4
6. For E-UTRA Band 13, please refer to Appendix F: Section F.4

1.1 Spurious Emssion on Antenna Port

LIMIT

For LTE FDD Band 2: Per FCC §24.238 the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10\log(P)$ dB.

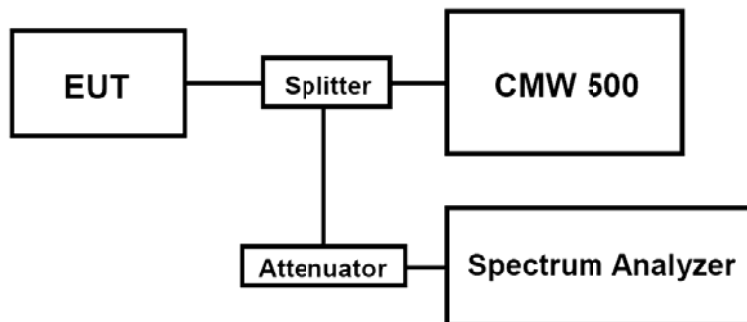
For LTE FDD Band 4: Per §27.53(h): For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB.

For LTE FDD Band 5: Per FCC §22.917 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.

For LTE FDD Band 12: Per §27.53 (g): For operations in the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB.

For LTE FDD Band 13: Per §27.53 (c): For operations in the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following: On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;

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 CMW 500 by a Directional Couple.
- EUT Communicate with CMW 500, 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 10th harmonic.
- Please refer to following tables for test antenna conducted emissions.

Working Frequency	Sub range (GHz)	RBW	VBW	Sweep time (s)
LTE FDD Band 2	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 4	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 5	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 12	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 13	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 FDD Band 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 12, LTE FDD Band 13; recorded worst case for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 12, LTE FDD Band 13.
2. For E-UTRA Band 2, please refer to Appendix B: Section B.5
3. For E-UTRA Band 4, please refer to Appendix C: Section C.5
4. For E-UTRA Band 5, please refer to Appendix D: Section D.5
5. For E-UTRA Band 12, please refer to Appendix E: Section E.5
6. For E-UTRA Band 13, please refer to Appendix F: Section F.5

4.5 Radiated Spurious Emission

LIMIT

For LTE FDD Band 2: Per FCC §24.238 the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10\log(P)$ dB.

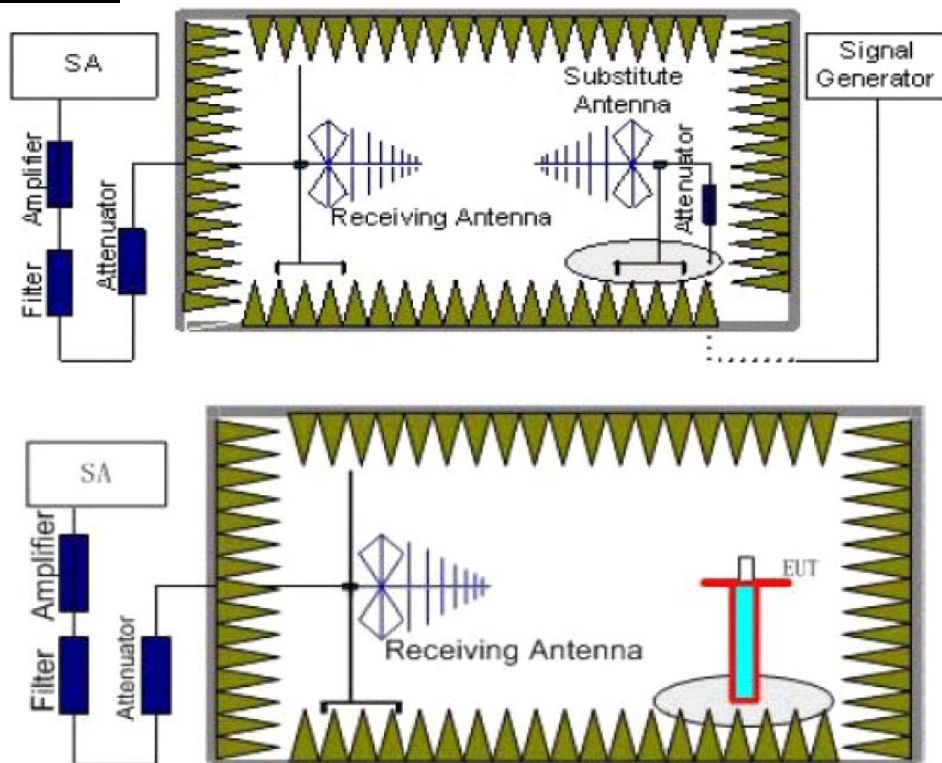
For LTE FDD Band 4: Per §27.53(h): For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10\log(P)$ dB.

For LTE FDD Band 5: Per FCC §22.917 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.

For LTE FDD Band 12: Per §27.53 (g): For operations in the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10\log(P)$ dB.

For LTE FDD Band 13: Per §27.53 (c): For operations in the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following: On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10\log(P)$ dB; On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $65 + 10\log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;

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 2	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
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
LTE FDD Band 5	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
	8~9	1 MHz	3 MHz	3
LTE FDD Band 12	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
LTE FDD Band 13	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

Frequency	Channel	Frequency Range	Verdict
LTE FDD Band 2	Low	9KHz -20GHz	PASS
	Middle	9KHz -20GHz	PASS
	High	9KHz -20GHz	PASS
LTE FDD Band 4	Low	9KHz -18GHz	PASS
	Middle	9KHz -18GHz	PASS
	High	9KHz -18GHz	PASS
LTE FDD Band 5	Low	9KHz -9GHz	PASS
	Middle	9KHz -9GHz	PASS
	High	9KHz -9GHz	PASS
LTE FDD Band 12	Low	9KHz -8GHz	PASS
	Middle	9KHz -8GHz	PASS
	High	9KHz -8GHz	PASS
LTE FDD Band 13	Low	9KHz -8GHz	PASS
	Middle	9KHz -8GHz	PASS
	High	9KHz -8GHz	PASS

TEST RESULTS

Remark:

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 12, LTE FDD Band 13.; recorded worst case for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 12, LTE FDD Band 13.

3. We were not recorded other points as values lower than limits.

4. $Power(EIRP) = P_{Mea} + P_{Ag} - P_{Cl} + G_a$

5. $Margin = EIRP - Limit$

LTE FDD Band 2_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
3715.0	-37.58	5.26	3.00	9.88	-32.96	-13.00	-19.96	H
5572.5	-45.91	6.11	3.00	11.36	-40.66	-13.00	-27.66	H
3715.0	-31.83	5.26	3.00	9.88	-27.21	-13.00	-14.21	V
5572.5	-35.06	6.11	3.00	11.36	-29.81	-13.00	-16.81	V

LTE FDD Band 2_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
3720.0	-40.21	5.32	3.00	10.03	-35.50	-13.00	-22.50	H
5580.0	-43.66	6.19	3.00	11.41	-38.44	-13.00	-25.44	H
3720.0	-30.18	5.32	3.00	10.03	-25.47	-13.00	-12.47	V
5580.0	-33.54	6.19	3.00	11.41	-28.32	-13.00	-15.32	V

LTE FDD Band 2_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
3800.0	-39.09	5.36	3.00	9.62	-34.83	-13.00	-21.83	H
5700.0	-45.74	6.24	3.00	11.46	-40.52	-13.00	-27.52	H
3800.0	-28.50	5.36	3.00	9.62	-24.24	-13.00	-11.24	V
5700.0	-34.68	6.24	3.00	11.46	-29.46	-13.00	-16.46	V

LTE FDD Band 2_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
3715.0	-40.70	5.26	3.00	9.88	-36.08	-13.00	-23.08	H
5572.5	-49.47	6.11	3.00	11.36	-44.22	-13.00	-31.22	H
3715.0	-34.60	5.26	3.00	9.88	-29.98	-13.00	-16.98	V
5572.5	-40.43	6.11	3.00	11.36	-35.18	-13.00	-22.18	V

LTE FDD Band 2_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
3720.0	-42.36	5.32	3.00	10.03	-37.65	-13.00	-24.65	H
5580.0	-46.47	6.19	3.00	11.41	-41.25	-13.00	-28.25	H
3720.0	-34.84	5.32	3.00	10.03	-30.13	-13.00	-17.13	V
5580.0	-38.94	6.19	3.00	11.41	-33.72	-13.00	-20.72	V

LTE FDD Band 2_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
3800.0	-41.61	5.36	3.00	9.62	-37.35	-13.00	-24.35	H
5700.0	-46.02	6.24	3.00	11.46	-40.80	-13.00	-27.80	H
3800.0	-31.37	5.36	3.00	9.62	-27.11	-13.00	-14.11	V
5700.0	-38.55	6.24	3.00	11.46	-33.33	-13.00	-20.33	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
3440.0	-40.35	4.62	3.00	9.81	-35.16	-13.00	-22.16	H
5160.0	-45.97	5.94	3.00	10.86	-41.05	-13.00	-28.05	H
3440.0	-34.69	4.62	3.00	9.81	-29.50	-13.00	-16.50	V
5160.0	-40.99	5.94	3.00	10.86	-36.07	-13.00	-23.07	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
3465.0	-40.89	4.63	3.00	9.84	-35.68	-13.00	-22.68	H
5197.5	-46.29	5.94	3.00	10.86	-41.37	-13.00	-28.37	H
3465.0	-34.60	4.63	3.00	9.84	-29.39	-13.00	-16.39	V
5197.5	-39.78	5.94	3.00	10.86	-34.86	-13.00	-21.86	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
3490.0	-43.08	4.65	3.00	9.90	-37.83	-13.00	-24.83	H
5235.0	-45.94	5.95	3.00	10.91	-40.98	-13.00	-27.98	H
3490.0	-36.76	4.65	3.00	9.90	-31.51	-13.00	-18.51	V
5235.0	-38.57	5.95	3.00	10.91	-33.61	-13.00	-20.61	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
3440.0	-44.08	4.62	3.00	9.81	-38.89	-13.00	-25.89	H
5160.0	-51.62	5.94	3.00	10.86	-46.70	-13.00	-33.70	H
3440.0	-36.99	4.62	3.00	9.81	-31.80	-13.00	-18.80	V
5160.0	-42.83	5.94	3.00	10.86	-37.91	-13.00	-24.91	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
3465.0	-43.39	4.63	3.00	9.84	-38.18	-13.00	-25.18	H
5197.5	-50.89	5.94	3.00	10.86	-45.97	-13.00	-32.97	H
3465.0	-39.81	4.63	3.00	9.84	-34.60	-13.00	-21.60	V
5197.5	-41.49	5.94	3.00	10.86	-36.57	-13.00	-23.57	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
3490.0	-43.41	4.65	3.00	9.90	-38.16	-13.00	-25.16	H
5235.0	-51.66	5.95	3.00	10.91	-46.70	-13.00	-33.70	H
3490.0	-39.32	4.65	3.00	9.90	-34.07	-13.00	-21.07	V
5235.0	-44.94	5.95	3.00	10.91	-39.98	-13.00	-26.98	V

LTE FDD Band 5_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
1658.00	-41.15	3.86	3.00	8.56	-36.45	-13.00	-23.45	H
2487.00	-47.05	4.29	3.00	6.98	-44.36	-13.00	-31.36	H
1658.00	-35.03	3.86	3.00	8.56	-30.33	-13.00	-17.33	V
2487.00	-36.50	4.29	3.00	6.98	-33.81	-13.00	-20.81	V

LTE FDD Band 5_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
1673.00	-38.41	3.90	3.00	8.58	-33.73	-13.00	-20.73	H
2509.50	-44.96	4.32	3.00	6.80	-42.48	-13.00	-29.48	H
1673.00	-35.74	3.90	3.00	8.58	-31.06	-13.00	-18.06	V
2509.50	-39.72	4.32	3.00	6.80	-37.24	-13.00	-24.24	V

LTE FDD Band 5_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
1688.00	-41.94	3.91	3.00	9.06	-36.79	-13.00	-23.79	H
2532.00	-44.11	4.32	3.00	6.65	-41.78	-13.00	-28.78	H
1688.00	-35.02	3.91	3.00	9.06	-29.87	-13.00	-16.87	V
2532.00	-39.17	4.32	3.00	6.65	-36.84	-13.00	-23.84	V

LTE FDD Band 5_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
1658.00	-43.55	3.86	3.00	8.56	-38.85	-13.00	-25.85	H
2487.00	-49.70	4.29	3.00	6.98	-47.01	-13.00	-34.01	H
1658.00	-39.87	3.86	3.00	8.56	-35.17	-13.00	-22.17	V
2487.00	-39.01	4.29	3.00	6.98	-36.32	-13.00	-23.32	V

LTE FDD Band 5_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
1673.00	-44.72	3.90	3.00	8.58	-40.04	-13.00	-27.04	H
2509.50	-49.27	4.32	3.00	6.80	-46.79	-13.00	-33.79	H
1673.00	-37.43	3.90	3.00	8.58	-32.75	-13.00	-19.75	V
2509.50	-39.20	4.32	3.00	6.80	-36.72	-13.00	-23.72	V

LTE FDD Band 5_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
1688.00	-42.58	3.91	3.00	9.06	-37.43	-13.00	-24.43	H
2532.00	-47.56	4.32	3.00	6.65	-45.23	-13.00	-32.23	H
1688.00	-39.46	3.91	3.00	9.06	-34.31	-13.00	-21.31	V
2532.00	-42.77	4.32	3.00	6.65	-40.44	-13.00	-27.44	V

LTE FDD Band 12_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
1408.00	-39.73	3.71	3.00	9.02	-34.42	-13.00	-21.42	H
2112.00	-45.53	4.22	3.00	8.64	-41.11	-13.00	-28.11	H
1408.00	-35.04	3.71	3.00	9.02	-29.73	-13.00	-16.73	V
2112.00	-36.80	4.22	3.00	8.64	-32.38	-13.00	-19.38	V

LTE FDD Band 12_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
1415.00	-41.98	3.72	3.00	9.04	-36.66	-13.00	-23.66	H
2122.50	-46.43	4.23	3.00	8.60	-42.06	-13.00	-29.06	H
1415.00	-35.18	3.72	3.00	9.04	-29.86	-13.00	-16.86	V
2122.50	-36.81	4.23	3.00	8.60	-32.44	-13.00	-19.44	V

LTE FDD Band 12_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
1422.00	-39.25	4.78	3.00	8.91	-35.12	-13.00	-22.12	H
2133.00	-47.37	4.25	3.00	8.26	-43.36	-13.00	-30.36	H
1422.00	-36.40	4.78	3.00	8.91	-32.27	-13.00	-19.27	V
2133.00	-38.00	4.25	3.00	8.26	-33.99	-13.00	-20.99	V

LTE FDD Band 12_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
1408.00	-41.36	3.71	3.00	9.02	-36.05	-13.00	-23.05	H
2112.00	-46.05	4.22	3.00	8.64	-41.63	-13.00	-28.63	H
1408.00	-35.22	3.71	3.00	9.02	-29.91	-13.00	-16.91	V
2112.00	-37.22	4.22	3.00	8.64	-32.80	-13.00	-19.80	V

LTE FDD Band 12_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
1415.00	-39.86	3.72	3.00	9.04	-34.54	-13.00	-21.54	H
2122.50	-45.42	4.23	3.00	8.60	-41.05	-13.00	-28.05	H
1415.00	-33.27	3.72	3.00	9.04	-27.95	-13.00	-14.95	V
2122.50	-39.72	4.23	3.00	8.60	-35.35	-13.00	-22.35	V

LTE FDD Band 12_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
1422.00	-39.98	4.78	3.00	8.91	-35.85	-13.00	-22.85	H
2133.00	-45.29	4.25	3.00	8.26	-41.28	-13.00	-28.28	H
1422.00	-34.61	4.78	3.00	8.91	-30.48	-13.00	-17.48	V
2133.00	-39.50	4.25	3.00	8.26	-35.49	-13.00	-22.49	V

LTE FDD Band 13_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
1564.0	-60.09	4.99	3.00	11.12	-53.96	-40.00	-13.96	H
2346.0	-47.92	5.85	3.00	12.02	-41.75	-13.00	-28.75	H
1564.0	-60.08	4.99	3.00	11.12	-53.95	-40.00	-13.95	V
2346.0	-39.29	5.85	3.00	12.02	-33.12	-13.00	-20.12	V

LTE FDD Band 13_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
1564.0	-58.42	4.99	3.00	11.12	-52.29	-40.00	-12.29	H
2346.0	-45.49	5.85	3.00	12.02	-39.32	-13.00	-26.32	H
1564.0	-59.96	4.99	3.00	11.12	-53.83	-40.00	-13.83	V
2346.0	-39.19	5.85	3.00	12.02	-33.02	-13.00	-20.02	V

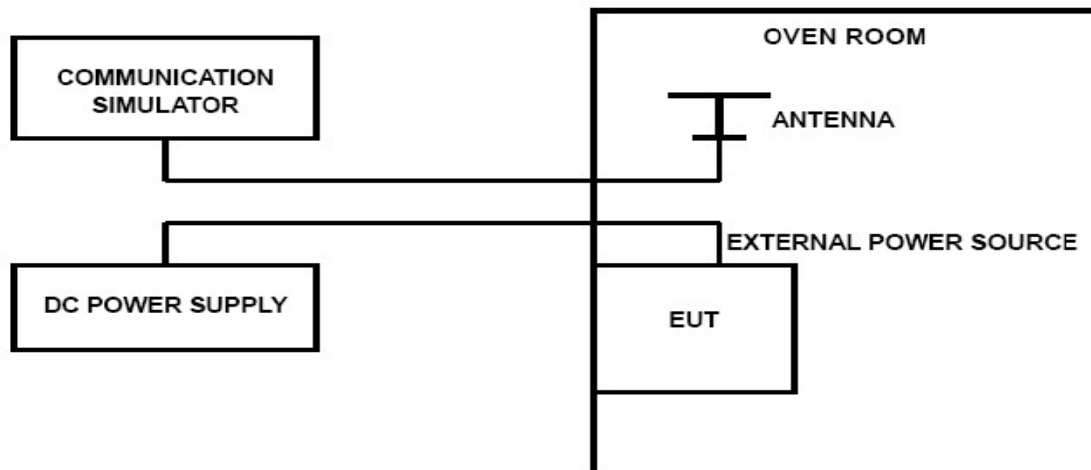
Notes: All channel bandwidth were tested,the report recorded the worst data.

4.6 Frequency Stability under Temperature & Voltage Variations

LIMIT

According to FCC §2.1055, §22.355, §24.235, §27.54 and §90.213 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 CMW 500 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 CMW 500 and in a simulated call on middle channel for LTE band 2, LTE band 4, LTE band 5, LTE band 7, LTE band 12, LTE Band 17, LTE band 38, LTE 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 0.1Volt 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°C.
7. With the EUT, powered via nominal voltage, connected to the CMW 500 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 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 12, LTE FDD Band 13; recorded worst case for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 5, LTE FDD Band 12, LTE FDD Band 13.

LTE Band 2, QPSK, 1.4MHz bandwidth (worst case of all bandwidths)

LTE FDD Band 2					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
3.3	20	19	0.010	± 2.50	PASS
3.7	20	-5	-0.003	± 2.50	PASS
4.2	20	-2	-0.001	± 2.50	PASS
3.7	-30	12	0.006	± 2.50	PASS
3.7	-20	-1	-0.001	± 2.50	PASS
3.7	-10	-5	-0.003	± 2.50	PASS
3.7	0	12	0.006	± 2.50	PASS
3.7	10	-11	-0.006	± 2.50	PASS
3.7	20	3	0.002	± 2.50	PASS
3.7	30	-18	-0.010	± 2.50	PASS
3.7	40	12	0.006	± 2.50	PASS
3.7	50	-10	-0.005	± 2.50	PASS

LTE Band 2, 16QAM, 1.4MHz bandwidth (worst case of all bandwidths)

LTE FDD Band 2					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
3.3	20	-1	-0.001	± 2.50	PASS
3.7	20	-24	-0.014	± 2.50	PASS
4.2	20	-48	-0.027	± 2.50	PASS
3.7	-30	4	0.002	± 2.50	PASS
3.7	-20	42	0.024	± 2.50	PASS
3.7	-10	-24	-0.014	± 2.50	PASS
3.7	0	-1	-0.001	± 2.50	PASS
3.7	10	-14	-0.008	± 2.50	PASS
3.7	20	45	0.026	± 2.50	PASS
3.7	30	31	0.018	± 2.50	PASS
3.7	40	1	0.001	± 2.50	PASS
3.7	50	-31	-0.018	± 2.50	PASS

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

LTE FDD Band 4					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
3.3	20	28	0.016	±2.50	PASS
3.7	20	1	0.001	±2.50	PASS
4.2	20	29	0.017	±2.50	PASS
3.7	-30	46	0.026	±2.50	PASS
3.7	-20	15	0.009	±2.50	PASS
3.7	-10	-6	-0.003	±2.50	PASS
3.7	0	28	0.016	±2.50	PASS
3.7	10	-26	-0.015	±2.50	PASS
3.7	20	-30	-0.017	±2.50	PASS
3.7	30	-9	-0.005	±2.50	PASS
3.7	40	14	0.008	±2.50	PASS
3.7	50	-27	-0.015	±2.50	PASS

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

LTE FDD Band 4					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
3.3	20	29	0.035	±2.50	PASS
3.7	20	20	0.024	±2.50	PASS
4.2	20	-8	-0.010	±2.50	PASS
3.7	-30	3	0.004	±2.50	PASS
3.7	-20	-8	-0.010	±2.50	PASS
3.7	-10	-32	-0.039	±2.50	PASS
3.7	0	-38	-0.046	±2.50	PASS
3.7	10	23	0.028	±2.50	PASS
3.7	20	30	0.036	±2.50	PASS
3.7	30	-3	-0.004	±2.50	PASS
3.7	40	-48	-0.058	±2.50	PASS
3.7	50	15	0.018	±2.50	PASS

LTE Band 5, QPSK, 1.4MHz bandwidth(worst case of all bandwidths)

LTE FDD Band 5					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
3.3	20	11	0.013	±2.50	PASS
3.7	20	2	0.002	±2.50	PASS
4.2	20	-45	-0.055	±2.50	PASS
3.7	-30	15	0.018	±2.50	PASS
3.7	-20	-14	-0.017	±2.50	PASS
3.7	-10	12	0.015	±2.50	PASS
3.7	0	-35	-0.042	±2.50	PASS
3.7	10	50	0.061	±2.50	PASS
3.7	20	29	0.035	±2.50	PASS
3.7	30	22	0.027	±2.50	PASS
3.7	40	42	0.051	±2.50	PASS
3.7	50	0	0.000	±2.50	PASS

LTE Band 5, 16QAM, 1.4MHz bandwidth(worst case of all bandwidths)

LTE FDD Band 5					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
3.3	20	3	0.004	±2.50	PASS
3.7	20	-24	-0.029	±2.50	PASS
4.2	20	47	0.057	±2.50	PASS
3.7	-30	-28	-0.034	±2.50	PASS
3.7	-20	-37	-0.045	±2.50	PASS
3.7	-10	33	0.040	±2.50	PASS
3.7	0	29	0.035	±2.50	PASS
3.7	10	-47	-0.057	±2.50	PASS
3.7	20	-46	-0.056	±2.50	PASS
3.7	30	10	0.012	±2.50	PASS
3.7	40	11	0.013	±2.50	PASS
3.7	50	9	0.011	±2.50	PASS

LTE Band 12, QPSK, 1.4MHz bandwidth (worst case of all bandwidths and modulation type)

LTE FDD Band 12					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
3.3	20	46	0.065	±2.50	PASS
3.7	20	44	0.062	±2.50	PASS
4.2	20	-43	-0.061	±2.50	PASS
3.7	-30	-29	-0.041	±2.50	PASS
3.7	-20	31	0.044	±2.50	PASS
3.7	-10	34	0.048	±2.50	PASS
3.7	0	43	0.061	±2.50	PASS
3.7	10	-21	-0.030	±2.50	PASS
3.7	20	-2	-0.003	±2.50	PASS
3.7	30	3	0.004	±2.50	PASS
3.7	40	-43	-0.061	±2.50	PASS
3.7	50	36	0.051	±2.50	PASS

LTE Band 12, 16QAM, 1.4MHz bandwidth (worst case of all bandwidths and modulation type)

LTE FDD Band 12					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
3.3	20	39	0.055	±2.50	PASS
3.7	20	35	0.049	±2.50	PASS
4.2	20	10	0.014	±2.50	PASS
3.7	-30	34	0.048	±2.50	PASS
3.7	-20	-28	-0.040	±2.50	PASS
3.7	-10	19	0.027	±2.50	PASS
3.7	0	20	0.028	±2.50	PASS
3.7	10	7	0.010	±2.50	PASS
3.7	20	-30	-0.042	±2.50	PASS
3.7	30	-9	-0.013	±2.50	PASS
3.7	40	-11	-0.016	±2.50	PASS
3.7	50	17	0.024	±2.50	PASS

LTE Band 13, 5MHz bandwidth, QPSK (worst case of all bandwidths)

LTE FDD Band 13					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
3.3	20	-49	-0.063	2.50	PASS
3.7	20	33	0.042	2.50	PASS
4.2	20	-9	-0.012	2.50	PASS
3.7	-30	-23	-0.029	2.50	PASS
3.7	-20	31	0.040	2.50	PASS
3.7	-10	25	0.032	2.50	PASS
3.7	0	50	0.064	2.50	PASS
3.7	10	-30	-0.038	2.50	PASS
3.7	20	38	0.049	2.50	PASS
3.7	30	47	0.060	2.50	PASS
3.7	40	-11	-0.014	2.50	PASS
3.7	50	-31	-0.040	2.50	PASS

LTE Band 13, 5MHz bandwidth, 16QAM (worst case of all bandwidths)

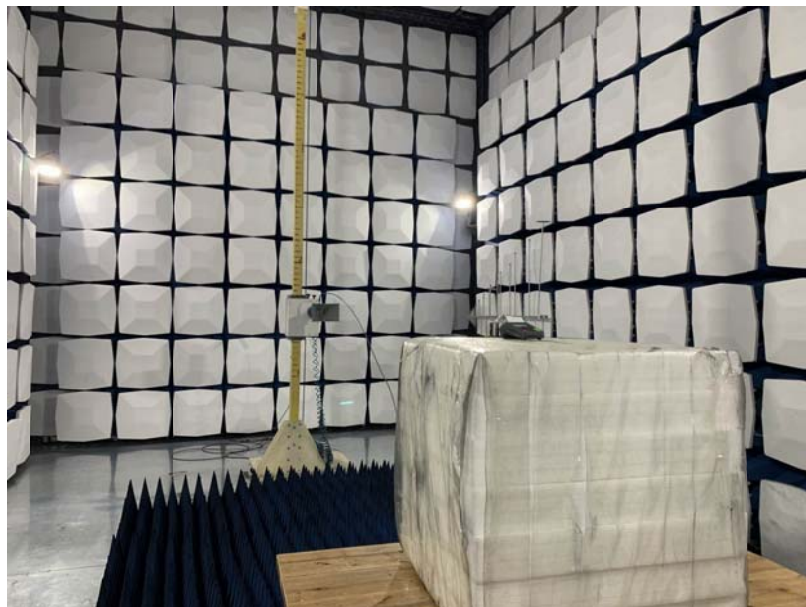
LTE FDD Band 13					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
3.3	20	-33	-0.042	2.50	PASS
3.7	20	30	0.038	2.50	PASS
4.2	20	-21	-0.027	2.50	PASS
3.7	-30	-50	-0.064	2.50	PASS
3.7	-20	30	0.038	2.50	PASS
3.7	-10	24	0.031	2.50	PASS
3.7	0	17	0.022	2.50	PASS
3.7	10	-41	-0.052	2.50	PASS
3.7	20	11	0.014	2.50	PASS
3.7	30	41	0.052	2.50	PASS
3.7	40	48	0.061	2.50	PASS
3.7	50	-47	-0.060	2.50	PASS

5 Test Setup Photos of the EUT

Spurious Emission Test Setup (below 1GHz)



Spurious Emission Test Setup (above 1GHz)



6 External Photos of the EUT

Pleaserefer to separated files for External Photos of the EUT.

7 Internal Photos of the EUT

Pleaserefer to separated files for Internal Photos of the EUT.

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