Shenzhen CTL Testing Technology Co., Ltd.
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TEST REPORT

FCC Part 22 Subpart H

Report Reference No. ..... :	**CTL2501142011-WF05**	
Compiled by: (position+printed name+signature)	Happy Guo (File administrator)	
Tested by: (position+printed name+signature)	Yapeng Jin (Test Engineer)	
Approved by: (position+printed name+signature)	Ivan Xie (Manager)	

Product Name..... :	All Netcom Android module
Model/Type reference ..... :	M201
List Model(s)..... :	M201-QVCT-2G16G
Trade Mark..... :	N/A
FCC ID..... :	**2BOIX-M201**
Applicant's name ..... :	**Shanghai Mijia Electronics Technology Co., Ltd.**
Address of applicant ..... :	Room 307, 3rd Floor, Building 2, No. 359 Yinxi Road, Jiuting Town, Songjiang District, Shanghai, China
Test Firm ..... :	**Shenzhen CTL Testing Technology Co., Ltd.**
Address of Test Firm ..... :	Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055
Test specification..... :	
Standard ..... :	**FCC CFR Title 47 Part 2, Part 22H** **ANSI/TIA-603-E-2016** **KDB 971168 D01**
TRF Originator ..... :	Shenzhen CTL Testing Technology Co., Ltd.
Master TRF ..... :	Dated 2011-01
Date of receipt of test item..... :	Jan. 23, 2025
Date of Test Date..... :	Jan. 23, 2025-Mar. 20, 2025
Data of Issue..... :	Mar. 21, 2025
Result..... :	Pass

TEST REPORT

Test Report No. :	CTL2501142011-WF05	Mar. 21, 2025 Date of issue

Equipment under Test	:	All Netcom Android module
Sample No	:	CTL2501142011
Model /Type	:	M201
Listed Models	:	M201-QVCT-2G16G
Applicant	:	**Shanghai Mijia Electronics Technology Co., Ltd.**
Address	:	Room 307, 3rd Floor, Building 2, No. 359 Yinxi Road, Jiuting Town, Songjiang District, Shanghai, China
Manufacturer	:	**Shenzhen Guoguan Electronics co., Ltd**
Address	:	4 / F, building E, Xinxiong Industrial Zone, No. 157, Gushu 1st Road, Xixiang street, Bao'an District, Shenzhen, China

Test result	Pass *

*In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

** Modified History **

Revisions	Description	Issued Data	Report No.	Remark
Version 1.0	Initial Test Report Release	2025-03-21	CTL2501142011-WF05	Tracy Qi

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1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:

FCC Part 22: PRIVATE LAND MOBILE RADIO SERVICES.

ANSI/TIA-603-E-2016: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

FCC Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS

KDB 971168 D01:v03r01 MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

ANSI C63.10-2013 Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

1.2. Test Description

Test Item	Section in CFR 47	Result
Effective (Isotropic) Radiated Power Output Data	§2.1046 §22.913	Pass
Peak-to-Average Ratio	§22.913（d）	Pass
Modulation Characteristics	§2.1047	Pass
Bandwidth	§2.1049 §22.917	Pass
Band Edges Compliance	§ 2.1051 §22.917	Pass
Spurious Emission at Antenna Terminals	§2.1051 §22.917	Pass
Field Strength of Spurious Radiation	§2.1053 § 22.917	Pass
Frequency stability	§2.1055 §22.355	Pass

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.
Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.3.2 Laboratory accreditation

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

CNAS-Lab Code: L7497

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 4343.01

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC Registration No.: 9618B

CAB identifier: CN0041

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9618B.

FCC-Registration No.: 399832

Designation No.: CN1216

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory 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. Registration 399832.

1.4. Statement of the 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 CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., 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 CTL laboratory is reported:

Test	Measurement Uncertainty	Notes
Transmitter power Radiated	±2.20 dB	(1)
Occupied Bandwidth	±0.02ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)

Conducted Disturbance0.15~30MHz	±2.96dB	(1)
20dB Emission Bandwidth	±1.9%	(1)
Carrier Frequency Separation	±1.9%	(1)
Maximum Power Spectral Density Level	±0.98 dB	(1)
Number of Hopping Channel	±1.9%	(1)
Time of Occupancy	±0.11%	(1)
Max Peak Conducted Output Power	±0.98 dB	(1)
Band-edge Spurious Emission	±1.21dB	(1)
Conducted RF Spurious Emission	9kHz-7GHz:±1.09dB 7GHz-26.5GHz: ±3.27dB	(1)

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

1.5. EUT configuration

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

- ● - supplied by the manufacturer
- ○ - supplied by the lab

○	Notebook Computer	Manufacturer :	Huawei Technologies Co Ltd
		Model No. :	KPL-W00
○	HUAWEI Super Charge	Manufacturer :	Huawei Technologies Co Ltd.
		Model No. :	HW-200200CP1
○	Air Switch	Manufacturer :	Chint Group Corp.
		Model No. :	NXB-63C32

2. GENERAL INFORMATION

2.1. Environmental conditions

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

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2. General Description of EUT

Product Name:	All Netcom Android module		
Model/Type reference:	M201		
Power supply:	DC12V DC power supply		
Test Mode(S)			
Mode:	Band GSM850, WCDMA Band V, LTE Band 5		
Modulation Type:	GMSK for GSM/GPRS; 8-PSK for EDGE; (WCDMA)QPSK; (LTE)QPSK 16QAM		
Operating Frequency Range(S)	Band	Tx(MHz)	Rx(MHz)
	GSM850	824~849	869~894
	WCDMA Band V	824~849	869~894
	LTE Band 5	824~849	869~894
Release Version:	Release 9		
Category:	Cat 4		
Antenna type:	PIFA Antenna		
Antenna gain:	GSM850: 3.00dBi WCDMA Band V: 3.00dBi LTE Band 5: 3.00dBi		

Note: For more details, refer to the user's manual of the EUT.

2.3. Description of Test Modes

The EUT has been tested under typical operating condition. The CMW500 used to control the EUT staying in continuous transmitting and receiving mode for testing. Regards to the frequency band operation: the lowest、middle and highest frequency of channel were selected to perform the test, then shown on this report.

2.4. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2023/02/13	2026/02/12
Bilog Antenna	Sunol Sciences Corp.	JB1	A061714	2023/02/13	2026/02/12
EMI Test Receiver	R&S	ESCI	103710	2024/04/30	2025/04/29
Spectrum Analyzer	Agilent	N9020A	US46220290	2024/05/02	2025/05/01
Spectrum Analyzer	Keysight	N9020A	MY53420874	2024/05/02	2025/05/01
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2024/12/21	2027/12/20
Horn Antenna	Ocean Microwave	OBH100400	26999002	2024/12/21	2027/12/20
Active Loop Antenna	BEIJING DA ZE TECHNOLOGY CO., LTD	ZN30900A	N/A	2024/04/30	2025/04/29
Amplifier	Agilent	8349B	3008A02306	2024/04/30	2025/04/29
Amplifier	Agilent	8447D	2944A10176	2024/04/30	2025/04/29
Temperature/Humidity Meter	Jiyu	MC501	02	2024/05/04	2025/05/03
Wideband Radio Communication Tester	R&S	CMW500	1201.0002K50-107930-CD	2024/05/01	2025/04/30
Climate Chamber	Jingbang	TLHW-64B	N/A	2024/05/04	2025/05/03
SIGNAL GENERATOR	Wiltron	68347B	657OO1	2024/05/01	2025/04/30
Power Sensor	Agilent	U2021XA	MY5365004	2024/05/04	2025/05/03
Power Meter	Agilent	E4419B	GB43317877	2023/08/02	2024/08/01

2.5. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended to comply with of the Part 22 Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

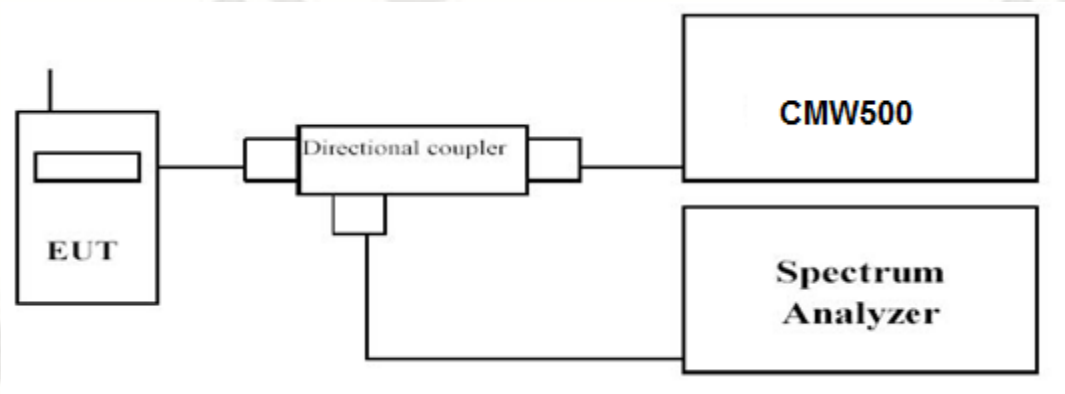
3.1. Output Power

LIMIT

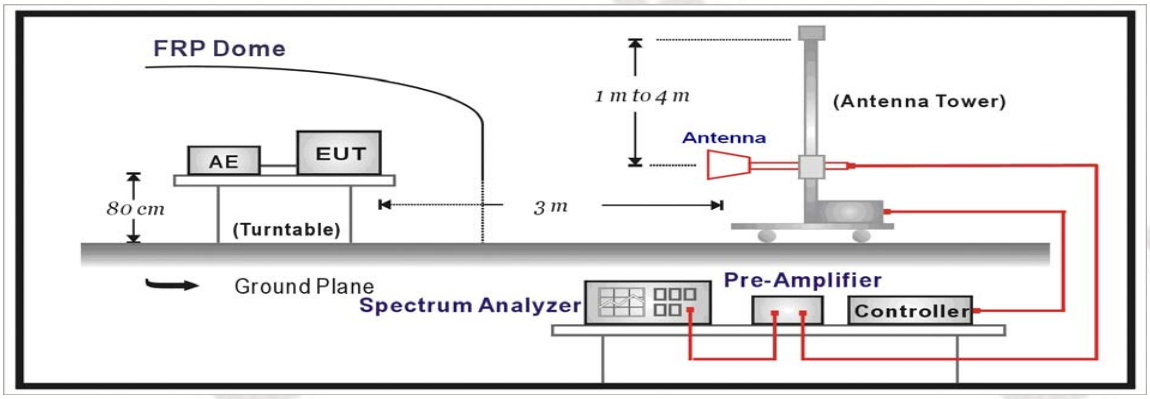
According to § 22.913(a) specifies ” The EIRP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.”

TEST CONFIGURATION

Conducted Power Measurement



Radiated Power Measurement:



TEST PROCEDURE

The EUT was setup according to ANSI/TIA-603-E-2016

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 spectrum analyzer and CMW500 by a Directional Couple.
c) EUT Communicate with CMW500 then selects a channel for testing.
d) Add a correction factor to the display of spectrum, and then test.

Radiated Power Measurement:

a) The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
b) The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to thefrequency of the transmitter
c) The output of the test antenna shall be connected to the measuring receiver.

d) The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.
e) The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
f) The transmitter shall then be rotated through 360°in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
g) The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
h) The maximum signal level detected by the measuring receiver shall be noted.
i) The transmitter shall be replaced by a substitution antenna.
j) The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
k) The substitution antenna shall be connected to a calibrated signal generator.
l) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
m) The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
n) The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
o) The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
p) The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
q) Test site anechoic chamber refer to ANSI C63.4.

TEST RESULTS

Conducted Measurement:

1. please refer to Appendix for 2G_ GSM850: Section 1
2. please refer to Appendix for 3G_WCDMA_band_5: Section 1
3. please refer to Appendix for 4G_LTE_band_5: Section 1

Radiated Measurement:

Remark:

1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of Band GSM850, WCDMA Band V, LTE FDD Band 5; recorded worst case for each Channel Bandwidth of Band GSM850, WCDMA Band V, FDD LTE Band 5.*
2. *EIRP=PMea(dBm)-Pcl(dB)+PAg(dB)+Ga(dBi)*
3. *ERP = EIRP – 2.15dBi as EIRP by subtracting the gain of the dipole.*

GPRS 850

Channel	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Correction (dB)	P_{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
128	-12.04	3.45	8.45	2.15	33.79	24.60	38.45	-13.85
190	-12.15	3.49	8.45	2.15	33.85	24.51	38.45	-13.94
251	-11.82	3.55	8.36	2.15	33.88	24.72	38.45	-13.73

EDGE850

Channel	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Correction (dB)	P_{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
128	-11.90	3.45	8.45	2.15	33.79	24.74	38.45	-13.71
190	-11.98	3.49	8.45	2.15	33.85	24.68	38.45	-13.77
251	-12.15	3.55	8.36	2.15	33.88	24.39	38.45	-14.06

WCDMA Band V

Frquency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Correction (dB)	P_{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
826.4	-16.21	3.45	8.45	2.15	33.79	20.43	38.45	-18.02
836.6	-16.08	3.49	8.45	2.15	33.85	20.58	38.45	-17.87
846.6	-16.69	3.55	8.36	2.15	33.88	19.85	38.45	-18.60

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_{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
824.7	-16.15	3.45	8.45	2.15	33.79	20.49	38.45	-17.96
836.5	-17.57	3.49	8.45	2.15	33.85	19.09	38.45	-19.36
848.3	-16.36	3.55	8.36	2.15	33.88	20.18	38.45	-18.27

LTE FDD Band 5_Channel Bandwidth 3MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Correction (dB)	P_{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
825.5	-17.22	3.45	8.45	2.15	33.79	19.42	38.45	-19.03
836.5	-16.01	3.49	8.45	2.15	33.85	20.65	38.45	-17.80
847.5	-16.30	3.55	8.36	2.15	33.88	20.24	38.45	-18.21

LTE FDD Band 5_Channel Bandwidth 5MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Correction (dB)	P_{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
826.5	-17.86	3.45	8.45	2.15	33.79	18.78	38.45	-19.67
836.5	-16.63	3.49	8.45	2.15	33.85	20.03	38.45	-18.42
846.5	-17.18	3.55	8.36	2.15	33.88	19.36	38.45	-19.09

LTE FDD Band 5_Channel Bandwidth 10MHz_QPSK

Frequency (MHz)	PMea (dBm)	Pcl (dB)	Ga Antenna Gain(dB)	Correction (dB)	PAg (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
829.0	-16.61	3.45	8.45	2.15	33.79	20.03	38.45	-18.42
836.5	-17.66	3.49	8.45	2.15	33.85	19.00	38.45	-19.45
844.0	-17.26	3.55	8.36	2.15	33.88	19.28	38.45	-19.17

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_{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
824.7	-18.31	3.45	8.45	2.15	33.79	18.33	38.45	-20.12
836.5	-18.26	3.49	8.45	2.15	33.85	18.40	38.45	-20.05
848.3	-18.47	3.55	8.36	2.15	33.88	18.07	38.45	-20.38

LTE FDD Band 5_Channel Bandwidth 3MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Correction (dB)	P_{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
825.5	-17.59	3.45	8.45	2.15	33.79	19.05	38.45	-19.40
836.5	-18.57	3.49	8.45	2.15	33.85	18.09	38.45	-20.36
847.5	-18.63	3.55	8.36	2.15	33.88	17.91	38.45	-20.54

LTE FDD Band 5_Channel Bandwidth 5MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Correction (dB)	P_{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
826.5	-18.57	3.45	8.45	2.15	33.79	18.07	38.45	-20.38
836.5	-18.86	3.49	8.45	2.15	33.85	17.80	38.45	-20.65
846.5	-17.89	3.55	8.36	2.15	33.88	18.65	38.45	-19.80

LTE FDD Band 5_Channel Bandwidth 10MHz_16QAM

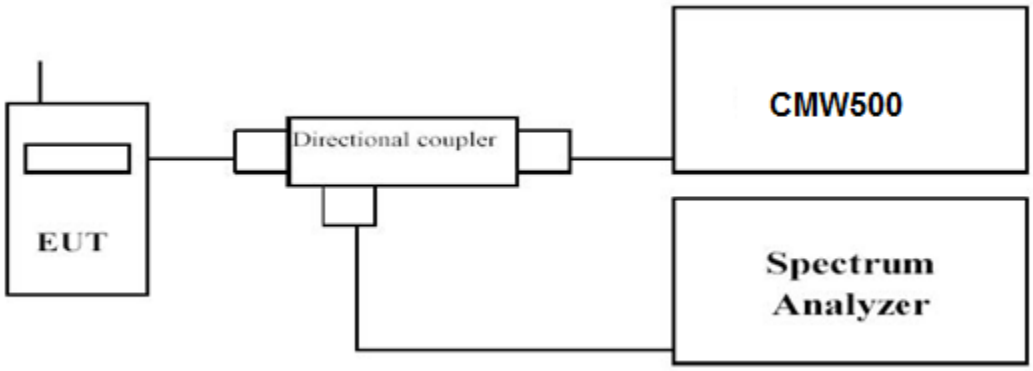
Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Correction (dB)	P_{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
829.0	-18.61	3.45	8.45	2.15	33.79	18.03	38.45	-20.42
836.5	-18.33	3.49	8.45	2.15	33.85	18.33	38.45	-20.12
844.0	-17.68	3.55	8.36	2.15	33.88	18.86	38.45	-19.59

3.2. 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

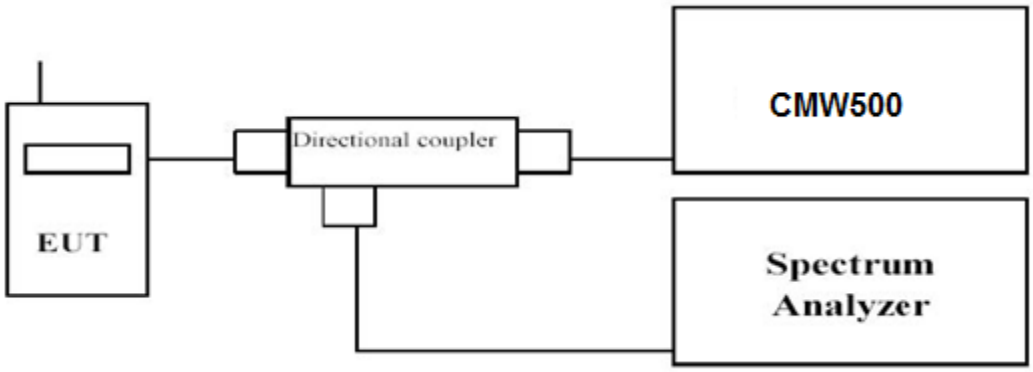
1. please refer to Appendix for 3G_WCDMA_band_5: Section 4
2. please refer to Appendix for 4G_LTE_band_5: Section 4

3.3. 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

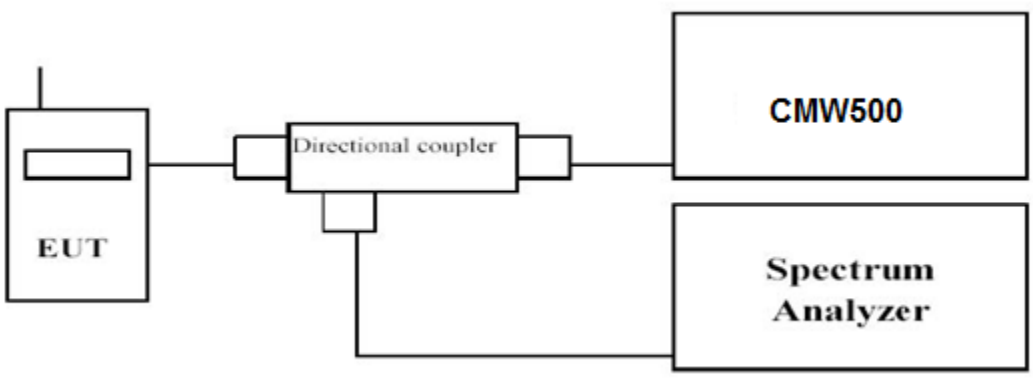
1. please refer to Appendix for 2G_ GSM850: Section 4
2. please refer to Appendix for 3G_WCDMA_band_5: Section 3
3. please refer to Appendix for 4G_LTE_band_5: Section 3

3.4. Band Edge compliance

LIMIT

According to Part §22.917 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.

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

1. please refer to Appendix for 2G_ GSM850: Section 5
2. please refer to Appendix for 3G_WCDMA_band_5: Section 5
3. please refer to Appendix for 4G_LTE_band_5: Section 5

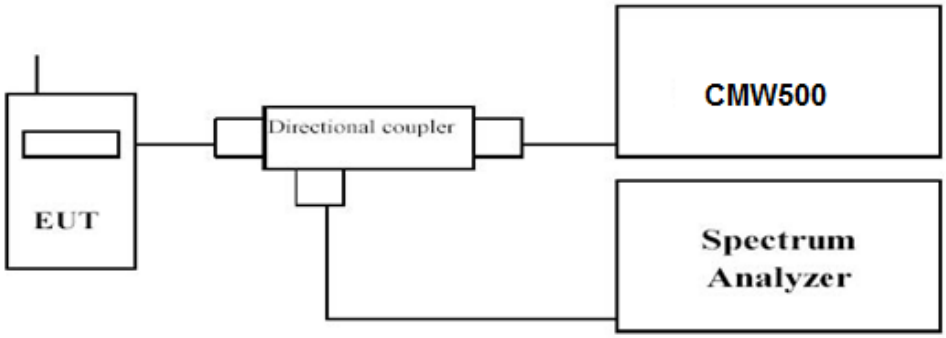
3.5. Spurious Emission

LIMIT

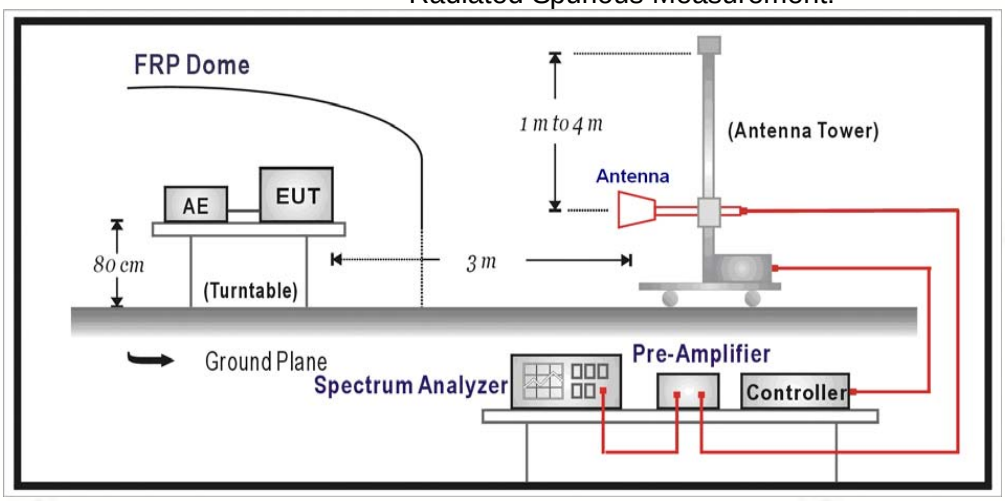
According to Part §22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.
The specification that emissions shall be attenuated below the transmitter power (P) by 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.

TEST CONFIGURATION

Conducted Spurious Measurement:



Radiated Spurious Measurement:



TEST PROCEDURE

The EUT was setup according to ANSI/TIA-603-E-2016

Conducted Spurious 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 spectrum analyzer and CMW500 by a Directional Couple.
c. EUT Communicate with CMW500 then selects 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 set sufficient scans were taken to show the out of band Emission if any up to10th harmonic.

Radiated Spurious Measurement:

a. The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
b. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter
c. The output of the test antenna shall be connected to the measuring receiver.
d. The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.
e. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
f. The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
g. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
h. The maximum signal level detected by the measuring receiver shall be noted.
i. The transmitter shall be replaced by a substitution antenna.
j. The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
k. The substitution antenna shall be connected to a calibrated signal generator.
l. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
m. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
n. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
o. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
p. The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
q. The resolution bandwidth of the spectrum analyzer was set at 100 kHz for Part 22 and 1MHz for Part 24. The frequency range was checked up to 10th harmonic.
r. Test site anechoic chamber refer to ANSI C63.

TEST RESULTS

1. please refer to Appendix for 2G_ GSM850: Section 5
2. please refer to Appendix for 3G_WCDMA_band_5: Section 5
3. please refer to Appendix for 4G_LTE_band_5: Section 5

Radiated Measurement:

Remark:
1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of Band GSM850, WCDMA Band V, LTE FDD Band 5; recorded worst case for each Channel Bandwidth of Band GSM850, WCDMA Band V, LTE FDD Band 5 QPSK*
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 = Limit - EIRP

GPRS850

Channel	Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
128	1648.40	-45.55	3.86	3.00	8.56	-40.85	-13.00	-27.85	H
	2472.60	-46.40	4.29	3.00	6.98	-43.71	-13.00	-30.71	H
	1648.40	-42.22	3.86	3.00	8.56	-37.52	-13.00	-24.52	V
	2472.60	-43.98	4.29	3.00	6.98	-41.29	-13.00	-28.29	V
190	1673.20	-43.76	3.90	3.00	8.58	-39.08	-13.00	-26.08	H
	2509.80	-48.68	4.32	3.00	6.80	-46.20	-13.00	-33.20	H
	1673.20	-39.40	3.90	3.00	8.58	-34.72	-13.00	-21.72	V
	2509.80	-45.01	4.32	3.00	6.80	-42.53	-13.00	-29.53	V
251	1697.60	-48.64	3.91	3.00	9.06	-43.49	-13.00	-30.49	H
	2546.40	-51.56	4.32	3.00	6.65	-49.23	-13.00	-36.23	H
	1697.60	-45.45	3.91	3.00	9.06	-40.30	-13.00	-27.30	V
	2546.40	-46.97	4.32	3.00	6.65	-44.64	-13.00	-31.64	V

WCDMA Band V _ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1652.8	-47.98	3.86	3.00	8.56	-43.28	-13.00	-30.28	H
2479.2	-48.98	4.29	3.00	6.98	-46.29	-13.00	-33.29	H
1652.8	-44.17	3.86	3.00	8.56	-39.47	-13.00	-26.47	V
2479.2	-44.49	4.29	3.00	6.98	-41.80	-13.00	-28.80	V

WCDMA Band V _ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1672.8	-49.19	3.90	3.00	8.58	-44.51	-13.00	-31.51	H
2509.2	-51.36	4.32	3.00	6.80	-48.88	-13.00	-35.88	H
1672.8	-45.04	3.90	3.00	8.58	-40.36	-13.00	-27.36	V
2509.2	-45.05	4.32	3.00	6.80	-42.57	-13.00	-29.57	V

WCDMA Band V _ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1693.2	-52.36	3.91	3.00	9.06	-47.21	-13.00	-34.21	H
2539.8	-54.87	4.32	3.00	6.65	-52.54	-13.00	-39.54	H
1693.2	-49.55	3.91	3.00	9.06	-44.40	-13.00	-31.40	V
2539.8	-51.41	4.32	3.00	6.65	-49.08	-13.00	-36.08	V

LTE FDD Band 5_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
1649.4	-40.02	3.86	3.00	8.56	-35.32	-13.00	-22.32	H
2474.1	-48.10	4.29	3.00	6.98	-45.41	-13.00	-32.41	H
1649.4	-41.71	3.86	3.00	8.56	-37.01	-13.00	-24.01	V
2474.1	-51.92	4.29	3.00	6.98	-49.23	-13.00	-36.23	V

LTE FDD Band 5_Channel Bandwidth 1.4MHz_QPSK_ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-40.03	3.90	3.00	8.58	-35.35	-13.00	-22.35	H
2509.5	-50.69	4.32	3.00	6.80	-48.21	-13.00	-35.21	H
1673.0	-43.37	3.90	3.00	8.58	-38.69	-13.00	-25.69	V
2509.5	-54.52	4.32	3.00	6.80	-52.04	-13.00	-39.04	V

LTE FDD Band 5_Channel Bandwidth 1.4MHz_QPSK_ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1696.6	-44.29	3.91	3.00	9.06	-39.14	-13.00	-26.14	H
2544.9	-53.52	4.32	3.00	6.65	-51.19	-13.00	-38.19	H
1696.6	-42.22	3.91	3.00	9.06	-37.07	-13.00	-24.07	V
2544.9	-49.74	4.32	3.00	6.65	-47.41	-13.00	-34.41	V

LTE FDD Band 5_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
1651.0	-42.34	3.86	3.00	8.56	-37.64	-13.00	-24.64	H
2476.5	-50.74	4.29	3.00	6.98	-48.05	-13.00	-35.05	H
1651.0	-40.18	3.86	3.00	8.56	-35.48	-13.00	-22.48	V
2476.5	-52.41	4.29	3.00	6.98	-49.72	-13.00	-36.72	V

LTE FDD Band 5_Channel Bandwidth 3MHz_QPSK_ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-43.45	3.90	3.00	8.58	-38.77	-13.00	-25.77	H
2509.5	-47.26	4.32	3.00	6.80	-44.78	-13.00	-31.78	H
1673.0	-41.44	3.90	3.00	8.58	-36.76	-13.00	-23.76	V
2509.5	-50.76	4.32	3.00	6.80	-48.28	-13.00	-35.28	V

LTE FDD Band 5_Channel Bandwidth 3MHz_QPSK_ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1695.0	-41.22	3.91	3.00	9.06	-36.07	-13.00	-23.07	H
2542.5	-49.81	4.32	3.00	6.65	-47.48	-13.00	-34.48	H
1695.0	-45.95	3.91	3.00	9.06	-40.80	-13.00	-27.80	V
2542.5	-46.36	4.32	3.00	6.65	-44.03	-13.00	-31.03	V

LTE FDD Band 5_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
1653.0	-40.64	3.86	3.00	8.56	-35.94	-13.00	-22.94	H
2479.5	-47.10	4.29	3.00	6.98	-44.41	-13.00	-31.41	H
1653.0	-40.97	3.86	3.00	8.56	-36.27	-13.00	-23.27	V
2479.5	-54.95	4.29	3.00	6.98	-52.26	-13.00	-39.26	V

LTE FDD Band 5_Channel Bandwidth 5MHz_QPSK_ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-45.03	3.90	3.00	8.58	-40.35	-13.00	-27.35	H
2509.5	-52.46	4.32	3.00	6.80	-49.98	-13.00	-36.98	H
1673.0	-45.46	3.90	3.00	8.58	-40.78	-13.00	-27.78	V
2509.5	-51.53	4.32	3.00	6.80	-49.05	-13.00	-36.05	V

LTE FDD Band 5_Channel Bandwidth 5MHz_QPSK_ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1693.0	-42.22	3.91	3.00	9.06	-37.07	-13.00	-24.07	H
2539.5	-49.89	4.32	3.00	6.65	-47.56	-13.00	-34.56	H
1693.0	-40.26	3.91	3.00	9.06	-35.11	-13.00	-22.11	V
2539.5	-47.13	4.32	3.00	6.65	-44.80	-13.00	-31.80	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
1658.0	-40.37	3.86	3.00	8.56	-35.67	-13.00	-22.67	H
2487.0	-48.33	4.29	3.00	6.98	-45.64	-13.00	-32.64	H
1658.0	-40.65	3.86	3.00	8.56	-35.95	-13.00	-22.95	V
2487.0	-47.89	4.29	3.00	6.98	-45.20	-13.00	-32.20	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)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-43.78	3.90	3.00	8.58	-39.10	-13.00	-26.10	H
2509.5	-55.13	4.32	3.00	6.80	-52.65	-13.00	-39.65	H
1673.0	-41.78	3.90	3.00	8.58	-37.10	-13.00	-24.10	V
2509.5	-46.95	4.32	3.00	6.80	-44.47	-13.00	-31.47	V

LTE FDD Band 5_Channel Bandwidth 10MHz_QPSK_ High Channel

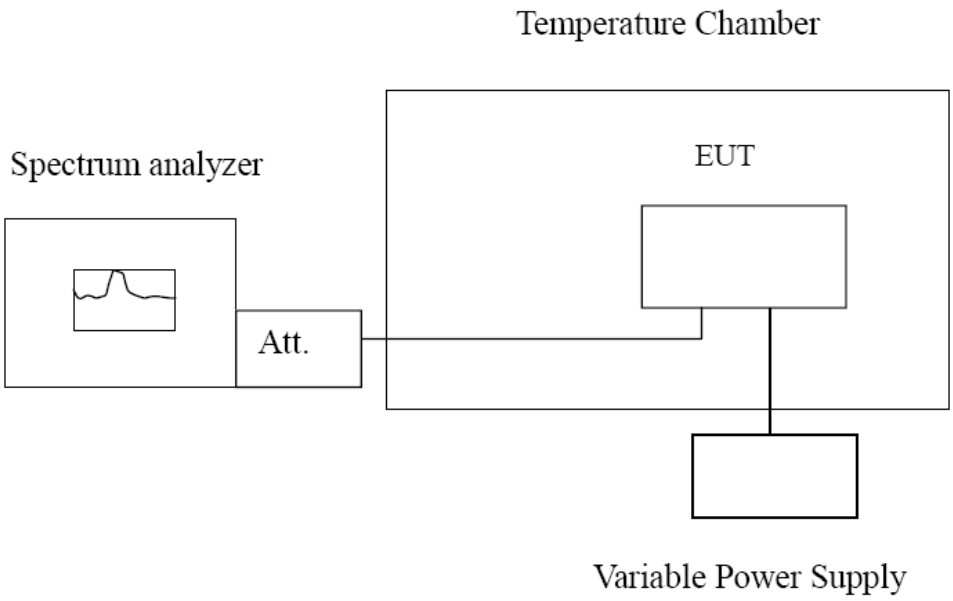
Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Distance	G_a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1688.0	-42.36	3.91	3.00	9.06	-37.21	-13.00	-24.21	H
2532.0	-51.14	4.32	3.00	6.65	-48.81	-13.00	-35.81	H
1688.0	-43.51	3.91	3.00	9.06	-38.36	-13.00	-25.36	V
2532.0	-48.64	4.32	3.00	6.65	-46.31	-13.00	-33.31	V

3.6. Frequency Stability under Temperature & Voltage Variations

LIMIT

According to §22.917, §2.1055 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 ANSI/TIA-603-E-2016

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 5, 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 -30℃ 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.

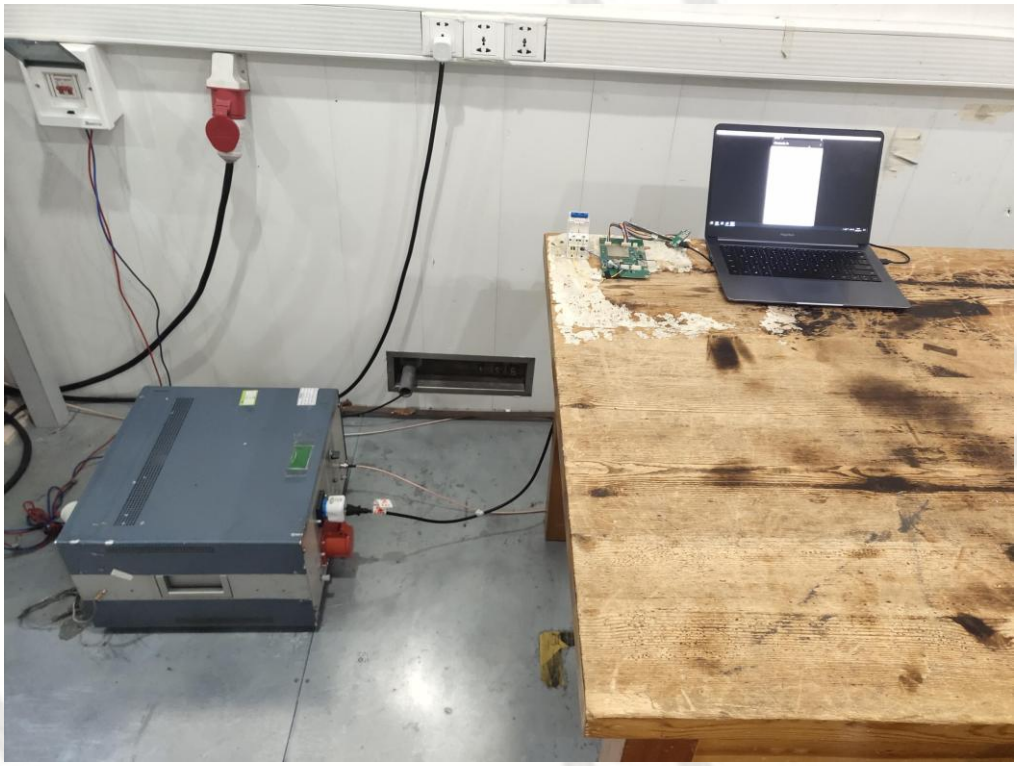
Frequency Stability under Voltage Variations:

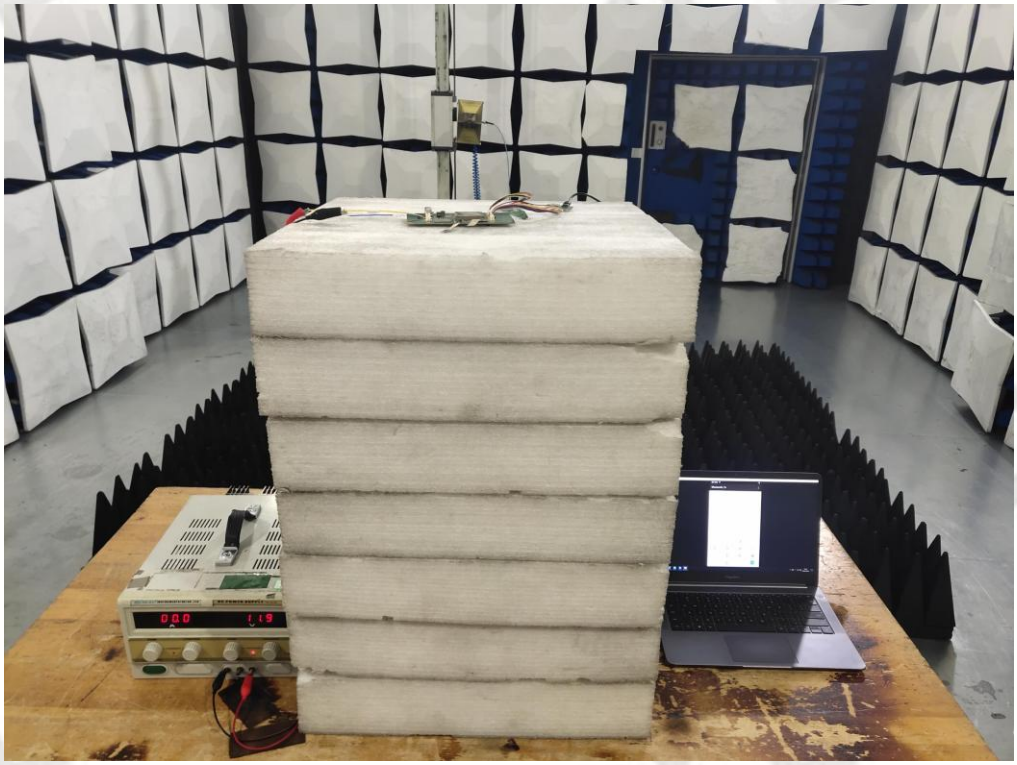
Set chamber temperature to 20℃. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.
Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

TEST RESULTS

1. please refer to Appendix for 2G_ GSM850: Section 2
2. please refer to Appendix for 3G_WCDMA_band_5: Section 2
3. please refer to Appendix for 4G_LTE_band_5: Section 2

4. Test Setup Photos of the EUT





5. External and Internal Photos of the EUT

Reference to the test report No.CTL2501142011-WF01.

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