CTC Laboratories, Inc.

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TEST REPORT

Report No. ·····:	**CTC20192260E02**
FCC ID·····:	**2AC88-GLMU19A02**
Applicant·····:	HONGKONG UCLOUDLINK NETWORK TECHNOLOGY LIMITED
Address·····:	Suite 603, 6/F, Laws Commercial Plaza, 788 Cheung Sha Wan Road, Kowloon, Hong Kong, China
Product Name·····:	**4G Wireless Data Terminal**
Trade Mark·····:	GlocalMe
Model/Type reference·····:	GLMU19A02
Listed Model(s) ·····:	N/A
Standard·····:	**FCC CFR47 PART 22H, 24E, 27L AND 90S ISED RSS-132 ISSUE 3, RSS-133 ISSUE 6 AND RSS-139 ISSUE 3**
Date of receipt of test sample…:	**Nov. 25, 2019**
Date of testing……...:	**Nov. 26, 2019 to Dec. 13, 2019**
Date of issue……....:	**Dec. 15, 2019**
Result……:	**PASS**

Compiled by: (Printed name+signature)	Torny Fang	Torny Fang
Supervised by: (Printed name+signature)	Eric Zhang	Eric Zhang
Approved by: (Printed name+signature)	Walter Chen	Walter Chen

Testing Laboratory Name.....	**CTC Laboratories, Inc.**
Address.....	1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

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1. SUMMARY

1.1. Test Standards

FCC Rules Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS
FCC Rules Part 22: PRIVATE LAND MOBILE RADIO SERVICES.
FCC Rules Part 24: PUBLIC MOBILE SERVICES
FCC Rules Part 27: MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
FCC Rules Part 90S: Regulations Governing Licensing and Use of Frequencies in the 806-824, 851-869, 896-901, and 935-940 MHz Bands
TIA/EIA 603 E March 2016: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.
ANSI C63.26: 2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
KDB 971168 D01 Power Meas License Digital Systems v03: MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS
RSS-Gen Issue 5: General Requirements for Compliance of Radio Apparatus.
RSS-132 Issue 3: Cellular Telephone Systems Operating in the Bands 824-849MHz and 869-894MHz.
RSS-133 Issue 6: 2 GHz Personal Communications Services.

1.2. Report version

Revised No.	Date of issue	Description
01	Dec. 15, 2019	Original

1.3. Test Description

Test Item	Section in CFR 47	RSS Rule	Result	Test Engineer
Conducted Output Power	Part 2.1046 Part 22.913(a) Part 24.232(c) Part 27.50	RSS-132(5.4) RSS-133(6.4)	Pass	Young He
Peak-to-Average Ratio	Part 24.232 Part 27.50	RSS-132(5.4) RSS-133(6.4)	Pass	Young He
99% Occupied Bandwidth & 26 dB Bandwidth	Part 2.1049 Part 22.917(b) Part 24.238(b) Part 27.53	RSS-GEN(6.6) RSS-133(6.5)	Pass	Young He
Band Edge	Part 2.1051 Part 22.917 Part 24.238 Part 27.53	RSS-132(5.5) RSS-133(6.5)	Pass	Young He
Conducted Spurious Emissions	Part 2.1051 Part 22.917 Part 24.238 Part 27.53	RSS-132(5.5) RSS-133(6.5)	Pass	Young He
Frequency stability vs temperature	Part 2.1055(a)(1)(b) Part 22.355 Part 24.235 Part 27.54	RSS-GEN(6.11) RSS-132(5.3)	Pass	Young He
Frequency stability vs voltage	Part 2.1055(d)(1)(2) Part 22.355 Part 24.235 Part 27.54	RSS-GEN(6.11) RSS-132(5.3)	Pass	Young He
ERP and EIRP	Part 22.913(a) Part 24.232(b) Part 27.50	RSS-132(5.4) RSS-133(6.4)	Pass	Young He
Radiated Spurious Emissions	Part 2.1053 Part 22.917 Part 24.238 Part 27.53	RSS-132(5.5) RSS-133(6.5)	Pass	Young He

Note: The measurement uncertainty is not included in the test result.
The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, Part 22, Part 24, Part 27, and Part 90, FCC KDB 971168 D01 v03r01/ D02 v02r01, KDB 412172 D01 v01r01, ANSI C63.26:2015, IC RSS-132,RSS-133 and RSS-139.

1.4. Test Facility

Address of the report laboratory

CTC Laboratories, Inc.

Add: 2/F., Building 1 and 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Longhua District, Shenzhen, Guangdong, China

Laboratory accreditation

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

CNAS-Lab Code: L5365

CTC Laboratories, Inc. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation. Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: 4340.01

CTC Laboratories, Inc. 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 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

Industry Canada （Registration No.: 9783A,CAB Identifier:CN0029）

CTC Laboratories, Inc. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9783A on Jan, 2016.

FCC (Registration No.: 951311, Designation Number CN1208)

CTC Laboratories, Inc. 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 951311, Aug 26, 2017.

1.5. 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 General Testing & Inspection 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 General Testing & Inspection laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Frequency stability	25 Hz	(1)
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-12.75 GHz	1.60 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 30~1000MHz	4.24 dB	(1)
Radiated Emission 1~18GHz	5.16 dB	(1)
Radiated Emission 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	---------	(1)
Emission Mask	---------	(1)
Modulation Characteristic	---------	(1)
Transmitter Frequency Behavior	---------	(1)

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

1.6. Environmental conditions

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

Normal Temperature:	20°C-25°C
Relative Humidity:	50 %-55 %
Air Pressure:	101kPa

2. GENERAL INFORMATION

2.1. Client Information

Applicant:	HONGKONG UCLOUDLINK NETWORK TECHNOLOGY LIMITED
Address:	Suite 603, 6/F, Laws Commercial Plaza, 788 Cheung Sha Wan Road, Kowloon, Hong Kong, China
Manufacturer:	HONGKONG UCLOUDLINK NETWORK TECHNOLOGY LIMITED
Address:	Suite 603, 6/F, Laws Commercial Plaza, 788 Cheung Sha Wan Road, Kowloon, Hong Kong, China, China
Factory:	Shenzhen uCloudlink Network Technology Co., Ltd
Address:	3rd Floor, A part of Building 1, Shenzhen Software Industry Base, Nanshan District Xuefu Road, 518057 Shenzhen City, Guangdong, China

2.2. General Description of EUT

Product Name:	4G Wireless Data Terminal
Model/Type reference:	GLMU19A02
Listed Model(s):	N/A
Power supply:	3.8Vdc 3000mAh,11.40Wh from Li-ion Battery
Hardware version:	U3_MAINBOARD_VA
Software version:	U3Q19_TSV3.2.001.001.191204
GSM	
Operation Band:	GPRS/EGPRS850: UL: 824MHz~849MHz, DL: 869MHz~894MHz GPRS/EGPRS1900: UL: 1850MHz~1910, DL: 1930MHz~1990MHz
Supported Type:	GPRS/EGPRS
Modulation Type:	GMSK for GPRS, 8PSK for EGPRS
Antenna Type:	PIFA Antenna
Antenna Gain:	GPRS/EDGE850: 0.3dBi GPRS/EDGE1900: 0.77dBi
CDMA	
Operation Band:	BC0: 824.70 MHz ~ 848.31 MHz BC1: 1851.25 MHz ~ 1908.75 MHz
Modulation Type:	CDMA2000 1xRTT: QPSK CDMA2000 1xEV-DO: QPSK/8PSK
Antenna Type:	PIFA Antenna
Antenna Gain:	BC0: 0.51dBi BC1: 0.77dBi
WCDMA	
Operation Band:	Band II: UL: 1852.4MHz~1907.6MHz, DL: 1932.6MHz~1987.4MHz Band IV: UL: 1712.4MHz~1752.6MHz, DL: 2112.6MHz~2152.4MHz Band V: UL: 826.4MHz~846.6MHz, DL: 871.6MHz~1891.4MHz
Modulation Type:	QPSK for WCDMA/HSUPA/HSDPA
Antenna Type:	PIFA Antenna
Antenna Gain:	WCDMA II: 0.77dBi WCDMA IV: -0.39dBi WCDMA V: 0.3dBi

2.3. Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. The CUM200 used to control the EUT staying in continuous transmitting and receiving mode for testing.

Test Frequency:

GPRS/EDGE850		GPRS/EDGE1900	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
128	824.20	512	1850.20
190	836.60	661	1880.00
251	848.80	810	1909.80

BC0		BC1	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
1013	824.70	25	1851.25
384	836.52	600	1880.00
777	848.31	1175	1908.75

WCDMA Band II		WCDMA Band IV		WCDMA Band V	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
9262	1852.40	1312	1712.40	4132	826.40
9400	1880.00	1413	1732.60	4183	836.60
9538	1907.60	1513	1752.60	4233	846.60

2.4. Measurement Instruments List

Output Power (Radiated) & Radiated Spurious Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	100967	Dec. 28, 2019
2	High pass filter	Compliance Direction systems	BSU-6	34202	Dec. 28, 2019
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Dec. 28, 2019
4	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4181	Dec. 28, 2019
5	Spectrum Analyzer	HP	8563E	02052	Dec. 28, 2019
6	Horn Antenna	Schwarzbeck	BBHA 9120D	648	Dec. 28, 2019
7	Horn Antenna	Schwarzbeck	BBHA 9120D	649	Dec. 28, 2019
8	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Dec. 28, 2019
9	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25842	Dec. 28, 2019
10	Pre-Amplifier	HP	8447D	1937A03050	Dec. 28, 2019
11	Pre-Amplifier	EMCI	EMC051835	980075	Dec. 28, 2019
12	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 28, 2019
13	Signal Generator	Agilent	N5182A	1019356	Dec. 28, 2019
14	UNIVERSAL RADIO COMMUNICATION	Rohde & Schwarz	CMU200	114694	Dec. 28, 2019
15	Antenna Mast	UC	UC3000	N/A	N/A
16	Antenna mast	MATURO	TAM-4.0-P	N/A	N/A
17	Turn Table	UC	UC3000	N/A	N/A
18	Cable Below 1GHz	Schwarzbeck	AK9515E	33155	Dec. 28, 2019
19	Cable Above 1GHz	Hubersuhner	SUCOFLEX102	DA1580	Dec. 28, 2019

Output Power(Conducted) & Occupied Bandwidth & Emission Bandwidth & Band Edge Compliance & Conducted Spurious Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	UNIVERSAL RADIO COMMUNICATION	Rohde & Schwarz	CMU200	114694	Dec. 28, 2019
2	Spectrum Analyzer	Rohde & Schwarz	FSU	100105	Dec. 28, 2019
3	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Jan. 07, 2017
4	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 28, 2019
5	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	Dec. 28, 2019
6	RF Connection Cable	Chengdu E-Microwave	---	---	Dec. 28, 2019
7	Attenuator	Chengdu E-Microwave	EMCAXX-10 RNZ-3	---	Dec. 28, 2019

Frequency Stability					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	UNIVERSAL RADIO COMMUNICATION	Rohde & Schwarz	CMU200	114694	Dec. 28, 2019
2	Spectrum Analyzer	Rohde & Schwarz	FSU	100105	Dec. 28, 2019

3	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Dec. 28, 2019
4	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 28, 2019
5	Climate Chamber	ESPEC	EL-10KA	05107008	Dec. 28, 2019

Note: 1. The Cal. Interval was one year.
2. The cable loss has calculated in test result which connection between each test instruments.

3. TEST ITEM AND RESULTS

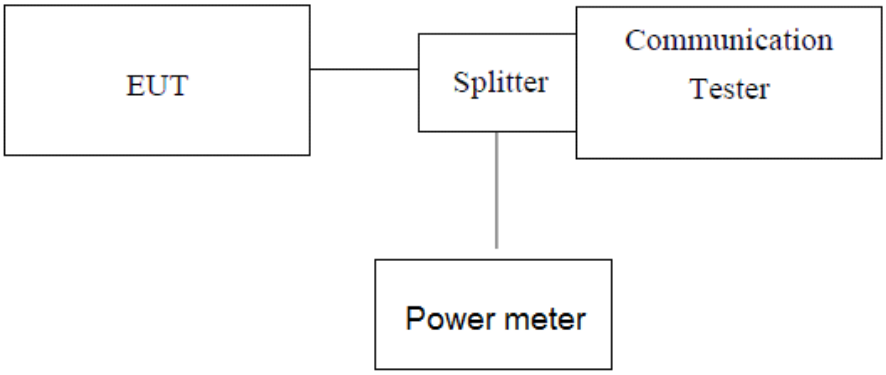
3.1. Conducted Output Power

LIMIT:

FCC: §2.1046, §22.913, §24.232, §27.50 and §90.635

IC: RSS132§5.4; RSS133§6.4 and RSS139§6.5.

TEST CONFIGURATION



Note: Measurement setup for testing on Antenna connector

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, middle, and highest channels for each band and different modulation.
5. Measure the maximum PK burst power and maximum Avg. burst power.

TEST RESULTS

Please see the Appendix for every tested Band.

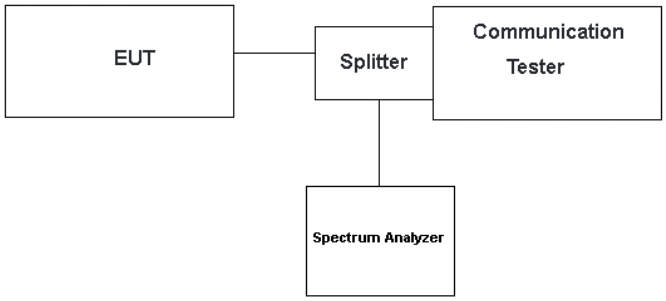
3.2. Peak-to-Average Ratio

LIMIT:

In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

TEST CONFIGURATION

- For Peak-to-Average Ratio



TEST PROCEDURE

- For Peak-to-Average Ratio

1. The testing follows FCC KDB 971168 v02r02 Section 5.7.1.
2. The EUT was connected to spectrum and communication tester via a splitter
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
6. Record the deviation as Peak to Average Ratio.

TEST RESULTS

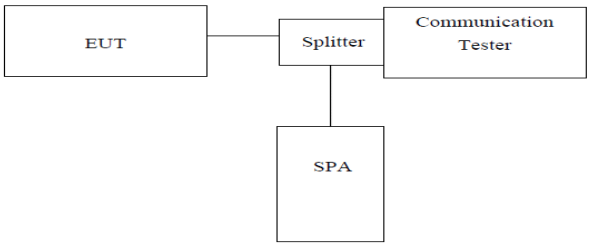
Please see the Appendix for every tested Band.

3.3. Occupy Bandwidth

LIMITS

For reporting purposes only.

TEST CONFIGURATION



Note: Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer
2. RBW was set to about 1% of emission BW, VBW≥3 times RBW.
3. -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

Please see the Appendix for every tested Band.

3.4. OUT OF BAND EMISSIONS

LIMIT

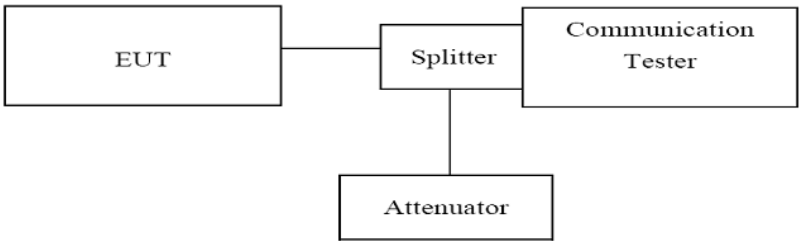
FCC: §22.917, §24.238, §27.53 (h), §90.691

The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

RSS132§5.5, RSS133§6.5, RSS139§6.6

The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

TEST CONFIGURATION



TEST PROCEDURE

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 1MHz; sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.
3. For the out of band: Set the RBW = 1MHz VBW≥3 times RBW, Start=30MHz, Stop= 10th harmonic.

TEST RESULTS

Please see the Appendix for every tested Band.

3.5. Band Edge compliance

LIMIT

FCC: §22.917, §24.238, §27.53 (h)

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.

FCC: §90.691 Emission mask requirements for EA-based systems.

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

RSS132§5.5

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

(i) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1,the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p (watts).

(ii) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least43 +10 log10 p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

RSS133§6.5

Equipment shall comply with the limits in (i) and (ii) below.

(i) In the 1.0 MHz bands immediately outside and adjacent to the equipment’s operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p(watts).

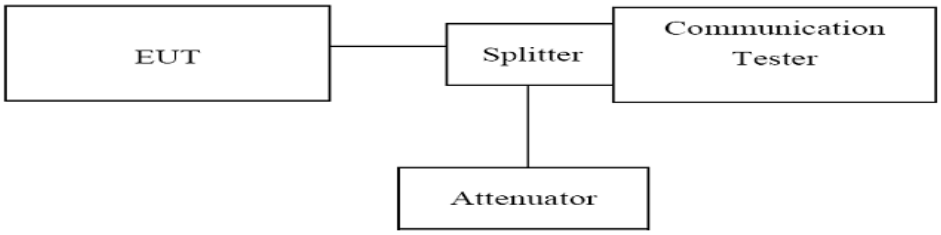
(ii) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

RSS139§6.6

(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment’s smallest operating frequency block,Footnote2 which can contain the equipment’s occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least43 + 10 log10 p (watts) dB.

(ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB.

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to a R&S CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each band edge measurement:

• Set the spectrum analyzer span to include the block edge frequency.

• Set a marker to point the corresponding band edge frequency in each test case.

• Set display line at -13 dBm

• Set resolution bandwidth to at least 1% of emission bandwidth.

TEST RESULTS

Please see the Appendix for every tested Band.

3.6. Radiated Power Measurement

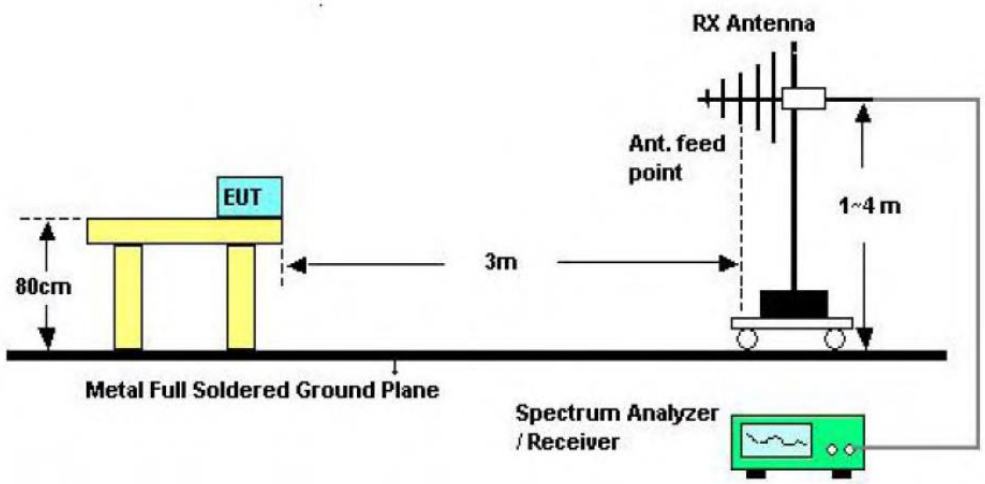
LIMIT

FCC: §2.1046, §22.913, §24.232, §27.50 and §90.635

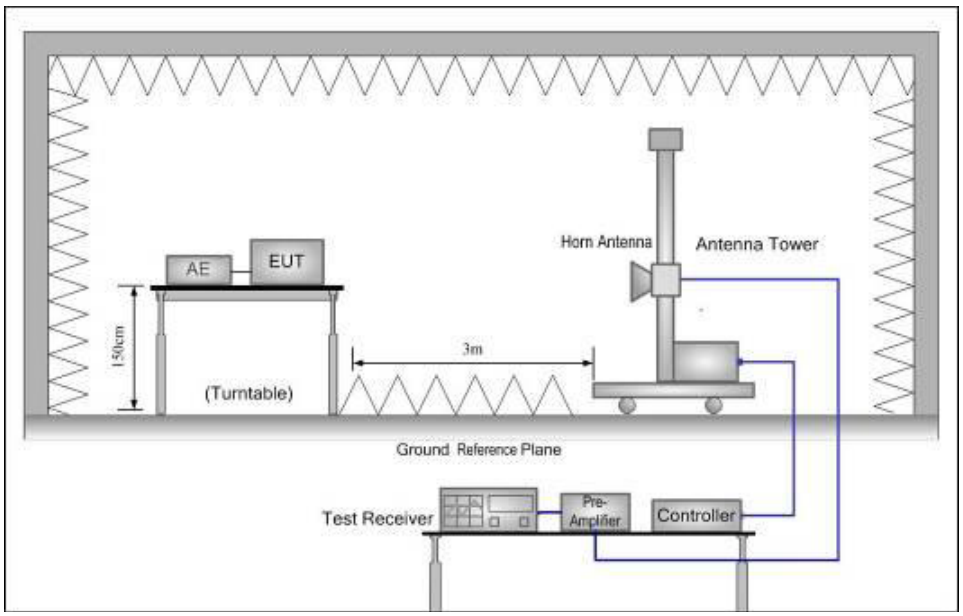
IC: RSS132§5.4; RSS133§6.4 and RSS139§6.5.

TEST CONFIGURATION

For the actual test configuration, please refer to the related Item – EUT Test Photos.



Below 1GHz



Above 1GHz

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 (Pr).
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 (PMea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (Pcl), the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:
   Power(EIRP)=PMea- PAg - Pcl + Ga
   We used N5182A microwave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substitution test; The measurement results are amend as described below:
   Power(EIRP)=PMea- Pcl + Ga
7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
   ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

TEST RESULTS

Remark:
1. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Z axis” position was the worst, and test data recorded in this report.

Measurement Data (worst case) :

Mode	Channel	Antenna Pol.	ERP	Limit (dBm)	Result
GPRS850	128	V	21.84	38.45	Pass
		H	21.32		
	190	V	21.14		
		H	21.00		
	251	V	21.82		
		H	21.75		
EGPRS850	128	V	20.20	38.45	Pass
		H	20.19		
	190	V	21.11		
		H	20.56		
	251	V	20.08		
		H	20.58		

Mode	Channel	Antenna Pol.	ERP	Limit (dBm)	Result
GPRS1900	512	V	21.52	33.00	Pass
		H	21.38		
	661	V	22.94		
		H	21.32		
	810	V	21.30		
		H	21.15		
EGPRS1900	512	V	21.84	33.00	Pass
		H	21.20		
	661	V	21.36		
		H	22.03		
	810	V	22.15		
		H	21.20		

Mode	Channel	Antenna Pol.	ERP	Limit (dBm)	Result
BC0	1013	V	19.84	38.45	Pass
		H	19.32		
	384	V	20.14		
		H	20.00		
	777	V	20.82		
		H	21.75		
BC1	25	V	20.20	33	Pass
		H	21.19		
	600	V	21.11		
		H	20.56		
	1175	V	21.08		
		H	21.58		

Mode	Channel	Antenna Pol.	ERP	Limit (dBm)	Result
WCDMA Band II (QPSK)	9262	V	20.76	33.00	Pass
		H	20.98		
	9400	V	21.72		
		H	19.77		
	9538	V	20.96		
		H	20.67		

Mode	Channel	Antenna Pol.	ERP	Limit (dBm)	Result
WCDMA Band IV (QPSK)	1312	V	20.93	33.00	Pass
		H	19.26		
	1413	V	19.25		
		H	19.45		
	1513	V	19.56		
		H	19.42		

Mode	Channel	Antenna Pol.	ERP	Limit (dBm)	Result
WCDMA Band V (QPSK)	4132	V	19.07	38.45	Pass
		H	19.39		
	4183	V	19.42		
		H	19.06		
	4233	V	19.14		
		H	20.19		

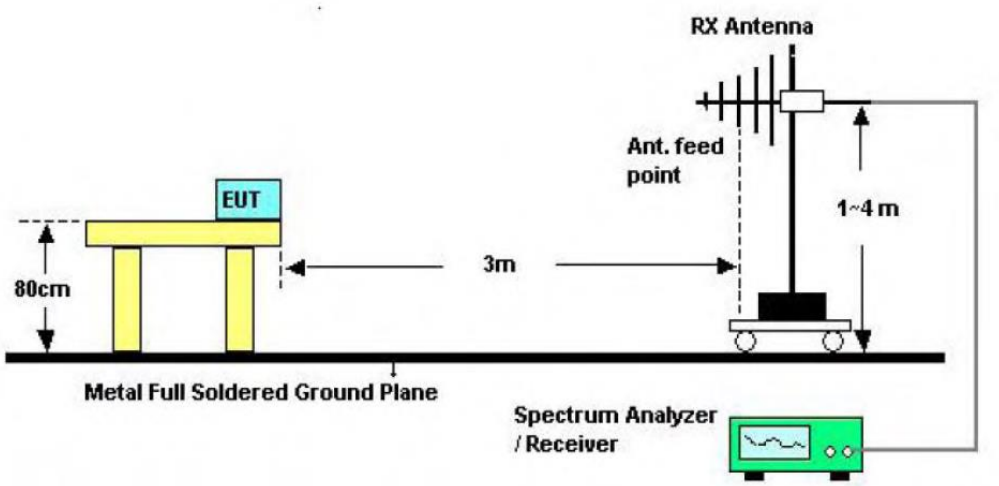
3.7. Radiated Spurious Emission

LIMIT

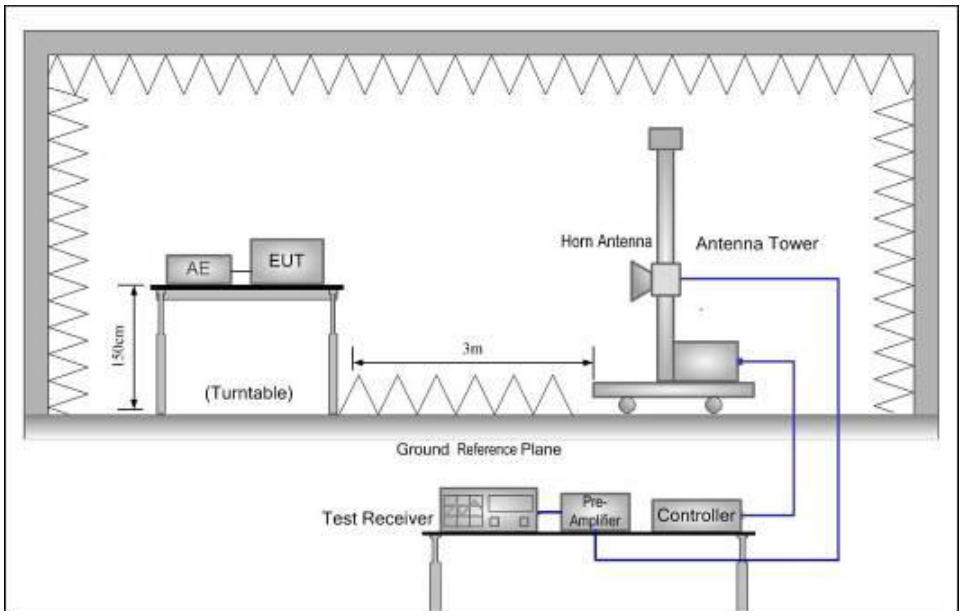
FCC: §22.917(a), §24.238(a), §27.53 (h), §90.691
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.
RSS132§5.5
Mobile and base station equipment shall comply with the limits in (i) and (ii) below.
(i) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p (watts).
(ii) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least43 +10 log10 p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.
RSS133§6.5
Equipment shall comply with the limits in (i) and (ii) below.
(i) In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p(watts).
(ii) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.
RSS139§6.6
(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block,Footnote2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least43 + 10log10 p (watts) dB.
(ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB.

TEST CONFIGURATION

For the actual test configuration, please refer to the related Item – EUT Test Photos.



Below 1GHz



Above 1GHz

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 (Pr).
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 (PMea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:
   Power(EIRP)=PMea- PAg - Pcl + Ga
   We used SMF100A microwave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substitution test; The measurement results are amend as described below:
   Power(EIRP)=PMea- Pcl + Ga
7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
   ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.
8. Test frequency range should extend to 10^{th} harmonic of highest fundamental frequency.

TEST RESULTS

Remark:

1. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Z axis” position was the worst, and test data recorded in this report.

GPRS850					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
128	1648.8	Vertical	-52.23	-13.00	Pass
	2473.2	Vertical	-53.83		
	1648.8	Horizontal	-48.67		
	2473.2	Horizontal	-51.07		
190	1673.2	Vertical	-54.70		
	2509.8	Vertical	-50.07		
	1673.2	Horizontal	-48.00		
	2509.8	Horizontal	-47.44		
251	1697.6	Vertical	-49.52		
	2546.4	Vertical	-46.29		
	1697.6	Horizontal	-53.65		
	2546.4	Horizontal	-54.43		

EGPRS850					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
128	1648.8	Vertical	-43.47	-13.00	Pass
	2473.2	Vertical	-48.07		
	1648.8	Horizontal	-47.88		
	2473.2	Horizontal	-53.53		
190	1673.2	Vertical	-43.67		
	2509.8	Vertical	-49.68		
	1673.2	Horizontal	-47.05		
	2509.8	Horizontal	-54.44		
251	1697.6	Vertical	-44.88		
	2546.4	Vertical	-46.30		
	1697.6	Horizontal	-44.42		
	2546.4	Horizontal	-47.40		

Remark：

1. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

GPRS1900					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
512	3700.4	Vertical	-51.29	-13.00	Pass
	5550.6	Vertical	-55.24		
	3700.4	Horizontal	-50.27		
	5550.6	Horizontal	-53.73		
661	3760	Vertical	-54.14		
	5640	Vertical	-50.59		
	3760	Horizontal	-46.78		
	5640	Horizontal	-51.79		
810	3819.6	Vertical	-48.91		
	5729.4	Vertical	-53.52		
	3819.6	Horizontal	-49.57		
	5729.4	Horizontal	-54.63		

EGPRS1900					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
512	3700.4	Vertical	-52.53	-13.00	Pass
	5550.6	Vertical	-49.37		
	3700.4	Horizontal	-50.34		
	5550.6	Horizontal	-54.52		
661	3760	Vertical	-52.69		
	5640	Vertical	-50.62		
	3760	Horizontal	-50.46		
	5640	Horizontal	-55.74		
810	3819.6	Vertical	-54.14		
	5729.4	Vertical	-48.68		
	3819.6	Horizontal	-50.65		
	5729.4	Horizontal	-54.85		

Remark：

1. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

CDMA BC0 1xRTT					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
1013	1649.4	Vertical	-53.81	-13.00	Pass
	2474.1	Vertical	-50.43		
	1649.4	Horizontal	-52.17		
	2474.1	Horizontal	-49.33		
384	1673.04	Vertical	-50.80		
	2509.56	Vertical	-50.77		
	1673.04	Horizontal	-55.59		
	2509.56	Horizontal	-52.77		
777	1696.62	Vertical	-53.97		
	2544.93	Vertical	-54.44		
	1696.62	Horizontal	-47.15		
	2544.93	Horizontal	-53.20		

CDMA BC0 1xEV-DO					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
1013	1649.4	Vertical	-54.10	-13.00	Pass
	2474.1	Vertical	-51.69		
	1649.4	Horizontal	-50.60		
	2474.1	Horizontal	-53.73		
384	1673.04	Vertical	-51.96		
	2509.56	Vertical	-46.57		
	1673.04	Horizontal	-48.82		
	2509.56	Horizontal	-51.71		
777	1696.62	Vertical	-50.80		
	2544.93	Vertical	-50.91		
	1696.62	Horizontal	-47.60		
	2544.93	Horizontal	-46.63		

Remark：

1. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

CDMA BC1 1xRTT					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
25	3702.5	Vertical	-55.87	-13.00	Pass
	5553.75	Vertical	-52.70		
	3702.5	Horizontal	-51.49		
	5553.75	Horizontal	-53.71		
600	3760	Vertical	-51.87		
	5640	Vertical	-49.35		
	3760	Horizontal	-48.14		
	5640	Horizontal	-50.02		
1175	3817.5	Vertical	-53.37		
	5726.25	Vertical	-47.97		
	3817.5	Horizontal	-52.58		
	5726.25	Horizontal	-53.77		

CDMA BC1 1xEV-DO					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
25	3702.5	Vertical	-55.19	-13.00	Pass
	5553.75	Vertical	-47.92		
	3702.5	Horizontal	-47.17		
	5553.75	Horizontal	-51.17		
600	3760	Vertical	-50.25		
	5640	Vertical	-53.80		
	3760	Horizontal	-46.72		
	5640	Horizontal	-48.39		
1175	3817.5	Vertical	-50.93		
	5726.25	Vertical	-46.18		
	3817.5	Horizontal	-55.82		
	5726.25	Horizontal	-46.02		

Remark：

1. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

WCDMA Band II					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
9262	3705.20	Vertical	-40.40	-13.00	Pass
	5557.80	Vertical	-50.42		
	3705.20	Horizontal	-47.96		
	5557.80	Horizontal	-52.99		
9400	3760.00	Vertical	-43.39		
	5640.00	Vertical	-53.34		
	3760.00	Horizontal	-43.43		
	5640.00	Horizontal	-52.69		
9538	3814.80	Vertical	-41.58		
	5722.20	Vertical	-52.12		
	3814.80	Horizontal	-42.09		
	5722.20	Horizontal	-48.24		

Remark：

1. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

WCDMA Band IV					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
1312	3425.20	Vertical	-43.17	-13.00	Pass
	5137.80	Vertical	-55.74		
	3425.20	Horizontal	-48.70		
	5137.80	Horizontal	-53.65		
1413	3465.20	Vertical	-41.08		
	5197.80	Vertical	-55.07		
	3465.20	Horizontal	-49.61		
	5197.80	Horizontal	-50.32		
1513	3504.80	Vertical	-42.85		
	5257.20	Vertical	-55.29		
	3504.80	Horizontal	-44.46		
	5257.20	Horizontal	-53.58		

Remark：

1. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

WCDMA Band V					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
4132	1653.20	Vertical	-41.69	-13.00	Pass
	2479.80	Vertical	-52.33		
	1653.20	Horizontal	-49.78		
	2479.80	Horizontal	-50.00		
4183	1672.80	Vertical	-44.10		
	2509.20	Vertical	-51.76		
	1672.80	Horizontal	-46.12		
	2509.20	Horizontal	-51.15		
4233	1692.80	Vertical	-38.94		
	2539.20	Vertical	-54.48		
	1692.80	Horizontal	-45.91		
	2539.20	Horizontal	-51.99		

Remark：

1. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

3.8. Frequency stability

LIMIT

FCC §22.355, §90.213

The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

FCC §24.235 & §27.54

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

RSS132§5.3

The carrier frequency shall not depart from the reference frequency in excess of ±2.5 SRSP for mobile stations and±1.5 ppm for base stations.

In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the occupied bandwidth stays within each of the sub-bands (see Section 5.1) when tested to the temperature and supply voltage variations specified in RSS-Gen.

RSS133§6.3

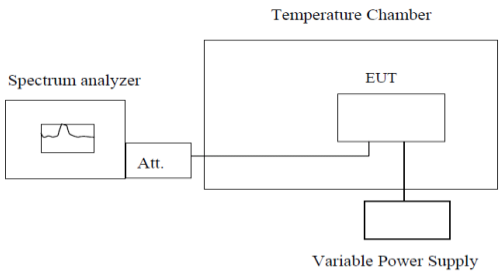
The carrier frequency shall not depart from the reference frequency, in excess of ±2.5 ppm for mobile stations and±1.0 ppm for base stations.

In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the emission bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

RSS139§6.4

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

TEST CONFIGURATION



Note : Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25℃ operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to –30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.
7. Reduce the input voltage to specified extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.

TEST RESULTS

Please see the Appendix for every tested Band.

4. EUT TEST PHOTOS

Reference to the document No.: Test Photo 3

5. PHOTOGRAPHS OF EUT CONSTRUCTIONAL

Reference to the document No.: External photos and Internal photos.

**********THE END**********