Test Report

FCC ID: 2AR73-H1

Date of issue: Jun. 02, 2019

Report Number:	MTi181217E099
Sample Description:	Wind IoT
Model(s):	H1
Applicant:	Wind Mobility Technology (Beijing) Co., Ltd.
Address:	11603,13th floor, Building 1, No. 2, Nanzhugan Hutong, Dongcheng District, Beijing
Date of Test:	Dec. 05, 2018 to Jun. 02, 2019

Shenzhen Microtest Co., Ltd.
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Address: No.102A & 302A, East Block, Hengfang Industrial Park, Xingye Road, Xixiang, Bao'an District, Shenzhen, Guangdong, China

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Test Result Certification

Applicant's name:	Wind Mobility Technology (Beijing) Co., Ltd.
Address:	11603,13th floor, Building 1, No. 2, Nanzhugan Hutong, Dongcheng District, Beijing
Manufacture's Name:	Shenzhen Qudong Intelligent Technology Co., Ltd.
Address:	C426, Kechuang Park, No. 131, Yu'an Second Road, Bao'an District, Shenzhen, China
Product name:	Wind IoT
Trademark:	N/A
Model name:	H1
Standards:	FCC Part 22 Subpart H FCC Part 24 Subpart E FCC Part 27
Test Procedure:	FCC Part 2 ANSI/TIA-603-E-2016 ANSI C63.26:2015 KDB 971168 D01 Power Meas License Digital Systems v03r01

This device described above has been tested by Shenzhen Microtest Co., Ltd. and the test results show that the equipment under test (EUT) compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

Tested by: Demi Mu — Jun. 02, 2019

Reviewed by: Blue Zheng — Jun. 02, 2019

Approved by: Smith Chen — Jun. 02, 2019

1 General description

1.1 Feature of equipment under test (EUT)

Product name:	Wind IoT
Trade name	N/A
Model name:	H1
Serial model:	N/A
Difference in series models:	N/A
Frequency range:	WCDMA Band II: TX1852.4MHz~1907.6MHz RX1932.4MHz~1987.6MHz; WCDMA Band IV: TX1710-1755 MHz RX2110-2155 MHz WCDMA Band V: TX826.4MHz~846.6MHz RX871.4MHz~891.6MHz;
Modulation type:	QPSK for WCDMA bands;
Power class:	Multi-Class12 Only 4 timeslots are used for GPRS
SIM card:	The Wind IoT has One SIM Card socket
Antenna Type	Integral Antenna
Antenna gain:	WCDMA Band II:4.5dBi WCDMA Band IV: 4.5dBi WCDMA Band V: 4.5dBi
Hardware version	WB-CZ-H1_V1.2
Software version	VER.09.1825
Power supply:	DC 36V from DC power supply
Battery:	N/A
Adapter information:	N/A

1.2 Test frequency channel

Frequency Band	Frequency	Channel	Frequency(MHz)
WCDMA Band II	Low	9262	1852.4
	Middle	9400	1880
	High	9538	1907.6
WCDMA Band IV	Low	1312	1712.4
	Middle	1450	1740.0
	High	1513	1752.6
WCDMA Band V	Low	4132	826.4
	Middle	4183	836.6
	High	4233	846.6

1.3 EUT operation mode

During testing, RF test program provided by the manufacture to control the Tx operation followed the test requirement. The EUT is configured to transmit continuously (duty cycle > 98 %) at the maximum power control level.

1.4 Test conditions

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

- Temperature: 20ºC~30ºC
- Humidity: 30%~70%
- Atmospheric pressure: 98kPa~101kPa

1.5 Testing site

Test Site	Shenzhen Microtest Co., Ltd.
Test Site Location	No.102A & 302A, East Block, Hengfang Industrial Park, Xingye Road, Xixiang, Bao'an District, Shenzhen, Guangdong, China
FCC Registration No.:	448573

1.6 Ancillary equipment list

Equipment	Model	S/N	Manufacturer	Certificate type
DC power supply	QJ3020E	015170	QJE	/

1.7 Measurement uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %, U=2xUc(y)

RF frequency	1 x 10-7
RF power, conducted	± 1 dB
Conducted emission(150kHz~30MHz)	± 2.5 dB
Radiated emission(30MHz~1GHz)	± 4.2 dB
Radiated emission (above 1GHz)	± 4.3 dB
Temperature	±1 degree
Humidity	± 5 %

2 Summary of Test Result

Item	FCC Part No.	Description of Test	Result
1	2.1046, 22.913(a); 24.232(c) 27.50(d) (4)	Maximum output power	Pass
2	2.1046, 22.913(a); 24.232(c) 27.50(d)(5)	Peak to average power radio(PAPR)	Pass
3	2.1046, 22.913(a); 24.232(c) 27.50(d)(4)	Transmitter Radiated Power (EIRP/ERP)	Pass
4	2.1049; 22.917(b); 24.238(b) 27.53(h)	Occupied Bandwidth	Pass
5	2.1051; 22.917(a); 24.238(a) 27.53(h)	Conducted spurious emissions	Pass
6	2.1051; 22.917(b); 24.238(b) 27.53(h)	Spurious emissions at band edge	Pass
7	2.1053; 22.917(a); 24.238(a) 27.53(h)	Radiated spurious emissions	Pass
8	2.1055; 22.355; 24.235 27.54	Frequency Stability	Pass

3 Test facilities and accreditations

3.1 Test laboratory

Test Laboratory	Shenzhen Microtest Co., Ltd
Location	No.102A & 302A, East Block, Hengfang Industrial Park, Xingye Road, Xixiang, Bao'an District, Shenzhen, Guangdong, China
FCC Registration No.:	448573

3.2 Environmental conditions

Temperature:	20ºC~30ºC
Humidity	30%~70%
Atmospheric pressure	98kPa~101kPa

3.3 Measurement uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %, U=2xUc(y)

RF frequency	1 x 10-7
RF power, conducted	± 1 dB
Conducted emission(150kHz~30MHz)	± 2.5 dB
Radiated emission(30MHz~1GHz)	± 4.2 dB
Radiated emission (above 1GHz)	± 4.3 dB
Temperature	±1 degree
Humidity	± 5 %

3.4 Test software

Software Name	Manufacturer	Model	Version
RF Test System	Farad	LZ-RF	Lz_Rf 3A3

4 List of test equipment

Equipment No.	Equipment Name	Manufacturer	Model	Serial No.	Calibration date	Due date
MTI-E001	Spectrum Analyzer	Agilent	E4407B	MY41441082	2018/09/18	2019/09/17
MTI-E002	CMU 200 universal radio communication tester	Rohde&schwarz	CMU 200	114587	2018/09/18	2019/09/17
MTI-E004	EMI Test Receiver	Rohde&schwarz	ESPI	1000314	2018/09/18	2019/09/17
MTI-E006	Broadband antenna	schwarabeck	VULB9163	872	2018/09/18	2019/09/17
MTI-E007	Horn antenna	schwarabeck	BBHA9120D	1201	2018/09/18	2019/09/17
MTI-E014	amplifier	America	8447D	3113A06150	2018/09/18	2019/09/17
MTI-E015	Conduction Immunity Signal Generator	Schloder	CDG6000	126A1343/2015	2018/09/18	2019/09/17
MTI-E016	Coupled decoupling network	Schloder	CDA M2/M3	A2210332/2015	2018/09/18	2019/09/17
MTI-E032	Comprehensive test instrument	Rohde&schwarz	CMW500	124192	2018/09/18	2019/09/17
MTI-E034	amplifier	Agilent	8449B	3008A02400	2018/09/18	2019/09/17
MTI-E040	Spectrum analyzer	Agilent	N9020A	MY49100060	2018/09/18	2019/09/17
MTI-E041	Signal generator	Agilent	N5182A	MY49060455	2018/09/18	2019/09/17
MTI-E042	Analog signal generator	Agilent	E4421B	GB40051240	2018/09/18	2019/09/17
MTI-E043	Power probe	Dare Instruments	RPR3006W	16I00054SNO16	2018/09/18	2019/09/17
MTI-E047	10dB attenuator	Mini-Circuits	UNAT-10+	15542	2018/09/18	2019/09/17
MTI-E049	spectrum analyzer	Rohde&schwarz	FSP-38	100019	2018/09/18	2019/09/17
MTI-E050	PSG Signal generator	Agilent	E8257D	MY46520873	2018/09/18	2019/09/17
MTI-E051	Active Loop Antenna 9kHz - 30MHz	Schwarzbeek	FMZB 1519 B	00044	2018/09/18	2019/09/17
MTI-E052	18-40GHz amplifier	Chengdu step Micro Technology	ZLNA-18-40G-21	1608001	2018/09/18	2019/09/17
MTI-E053	15-40G Antenna	Schwarzbeek	BBHA9170	BBHA9170582	2018/09/18	2019/09/17
MTI-B046	DC power supply	QJE	QJ3020E	015170	2018/09/18	2019/09/17
MTI-E020	Thermometer	/	HTC-1	/	2018/09/18	2019/09/17

Note: the calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

5 Test Result

5.1.1 Maximum output power and EIRP & ERP

5.1.2 Limit

For FCC 22.913: The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

For FCC 24.234: Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

For 27.50 (d)(4) The following power and antenna height requirements apply to stations transmitting in the 1710–1755 MHz and 2110–2155 MHz bands: Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

5.1.3 Test method

For Conducted output power:

1.Use a universal radio communication tester, the output power of EUT was measured at the antenna terminal. The path loss was calibrated and entered as an offset into the test equipment.

2. The EUT was configured to transmit on maximum power by the radio communication tester.

3. Measured the peak and average powers.

For EIRP & ERP:

1.In many cases, the RF output power limits for licensed digital transmission devices is specified in terms of effective radiated power (ERP) or equivalent isotropic radiated power (EIRP). Typically, ERP is specified when the operating frequency is less than or equal to 1 GHz and EIRP is specified when the operating frequency is greater than 1 GHz. Both are determined by adding the transmit antenna gain to the conducted RF output power with the primary difference between the two being that when determining the ERP, the transmit antenna gain is referenced to a dipole antenna (i.e., dBd) whereas when determining the EIRP, the transmit antenna gain is referenced to an isotropic antenna (dBi).

2.The relevant equation for determining the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

$ERP/EIRP = P_{Meas} + GT - LC$

where:

ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as P_{Meas}, typically dBW or dBm);

PMeas = measured transmitter output power or PSD, in dBm or dBW;

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

dBd (ERP)=dBi (EIRP) -2.15 dB

LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

5.1.4 Test setup

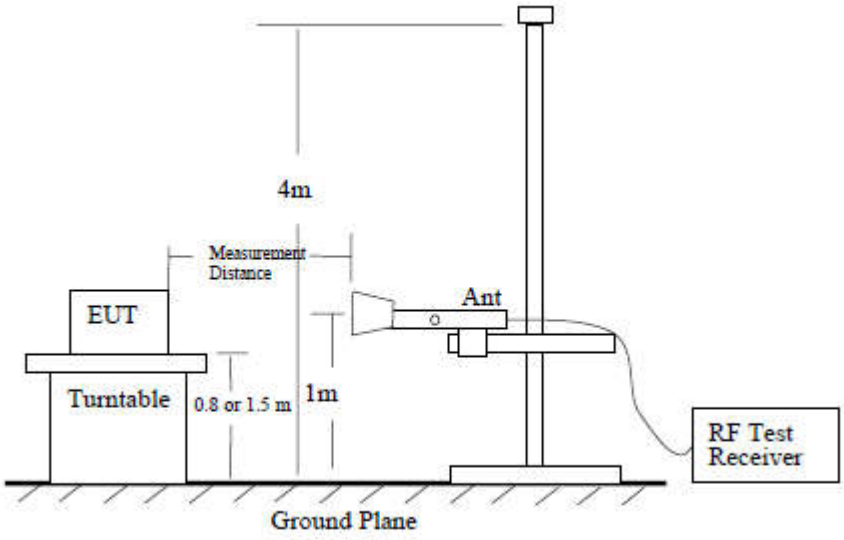


Figure 6—Test site-up for radiated ERP and/or EIRP measurements

5.1.5 Test Result

For Conducted output power:

Output Power for WCDMA BAND II

Mode	Frequency(MHz)	Maximum Average Output Power
HSDPA Subtest 1	1852.4	25.41
	1880	25.45
	1907.6	25.53
HSDPA Subtest 2	1852.4	25.22
	1880	25.13
	1907.6	25.21
HSDPA Subtest 3	1852.4	25.32
	1880	25.34
	1907.6	25.23
HSDPA Subtest 4	1852.4	25.31
	1880	25.41
	1907.6	25.18
HSUPA Subtest 1	1852.4	22.92
	1880	23.53
	1907.6	24.12
HSUPA Subtest 2	1852.4	23.33
	1880	23.57
	1907.6	24.11
HSUPA Subtest 3	1852.4	23.41
	1880	23.62
	1907.6	24.29
HSUPA Subtest 4	1852.4	23.35
	1880	23.48
	1907.6	24.15
HSUPA Subtest 5	1852.4	24.48
	1880	23.32
	1907.6	23.22

Output Power for WCDMA BAND IV

Mode	Frequency(MHz)	Maximum Average Output Power
HSDPA Subtest 1	1712.4	23.35
	1732.6	23.45
	1752.6	23.36
HSDPA Subtest 2	1712.4	23.32
	1732.6	23.41
	1752.6	23.34
HSDPA Subtest 3	1712.4	23.32
	1732.6	23.54
	1752.6	23.33
HSDPA Subtest 4	1712.4	23.31
	1732.6	23.61
	1752.6	23.17
HSUPA Subtest 1	1712.4	23.29
	1732.6	22.53
	1752.6	22.37
HSUPA Subtest 2	1712.4	23.33
	1732.6	23.17
	1752.6	23.12
HSUPA Subtest 3	1712.4	22.41
	1732.6	22.22
	1752.6	23.19
HSUPA Subtest 4	1712.4	22.35
	1732.6	22.48
	1752.6	23.15
HSUPA Subtest 5	1712.4	22.36
	1732.6	23.32
	1752.6	23.12

Output Power for WCDMA BAND V

Mode	Frequency(MHz)	Maximum Average Output Power
HSDPA Subtest 1	826.4	24.64
	836.6	24.27
	846.6	24.65
HSDPA Subtest 2	826.4	24.52
	836.6	24.64
	846.6	24.35
HSDPA Subtest 3	826.4	24.55
	836.6	23.92
	846.6	23.36
HSDPA Subtest 4	826.4	23.54
	836.6	23.92
	846.6	24.27
HSUPA Subtest 1	826.4	23.72
	836.6	24.27
	846.6	23.74
HSUPA Subtest 2	826.4	23.62
	836.6	24.07
	846.6	24.64
HSUPA Subtest 3	826.4	23.73
	836.6	24.24
	846.6	23.63
HSUPA Subtest 4	826.4	23.62
	836.6	24.17
	846.6	23.57
HSUPA Subtest 5	826.4	23.74
	836.6	24.15
	846.6	24.52

For EIRP & ERP:

For WCDMA BAND II

Frequency	Polarization	SG Level	Pcl	Ga Antenna Gain	EIRP	EIRP
(MHz)		(dBm)	(dB)	(dB)	(dBm)	(W)
1852.4	H	22.58	0.47	1.59	24.71	0.2958
1880	H	22.31	0.47	1.72	24.56	0.2858
1907.6	H	21.84	0.46	1.84	25.22	0.3327
1852.4	V	22.23	0.47	1.59	25.35	0.3428
1880	V	22.36	0.47	1.72	25.61	0.3639
1907.6	V	21.92	0.46	1.84	25.35	0.3428

For WCDMA BAND IV

Frequency	Polarization	SG Level	Pcl	Ga Antenna Gain	EIRP	EIRP
(MHz)		(dBm)	(dB)	(dB)	(dBm)	(W)
1712.4	H	22.82	0.39	1	23.43	0.2203
1740	H	22.76	0.35	1.1	23.51	0.2244
1752.6	H	22.64	0.32	1.2	23.52	0.2249
1712.4	V	22.65	0.39	1	23.26	0.2118
1740	V	22.51	0.35	1.1	23.26	0.2118
1752.6	V	22.18	0.32	1.2	23.06	0.2023

For WCDMA BAND V

Radiated Power (ERP) for UMTS band V							
Frequency	Polarization	SG Level	Pcl	Ga	Correction	(ERP)	ERP
(MHz)		(dBm)	(dB)	(dB)	(dBi)	(dBm)	(W)
826.4	H	25.82	0.39	1	2.15	24.28	0.2679
836.6	H	25.36	0.35	1.1	2.15	23.96	0.2489
846.6	H	25.74	0.32	1.2	2.15	24.47	0.2799
826.4	V	26.15	0.39	1	2.15	24.61	0.2891
836.6	V	26.12	0.35	1.1	2.15	24.72	0.2965
846.6	V	26.08	0.32	1.2	2.15	24.81	0.3027

5.2 Peak to average power ratio(PAPR)

5.2.1 Limit

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

5.2.2 Test method

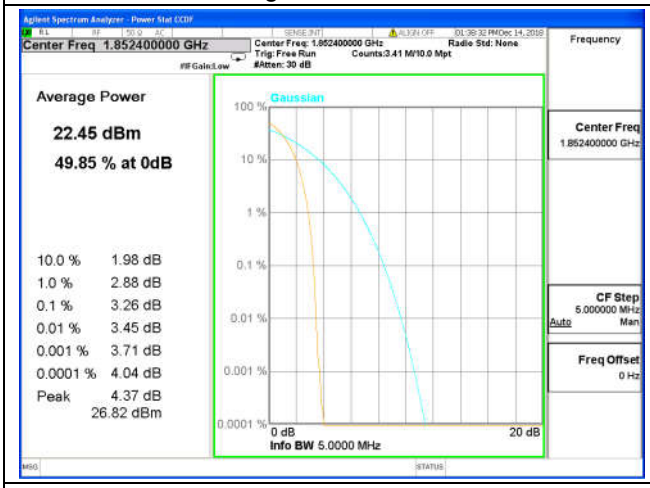
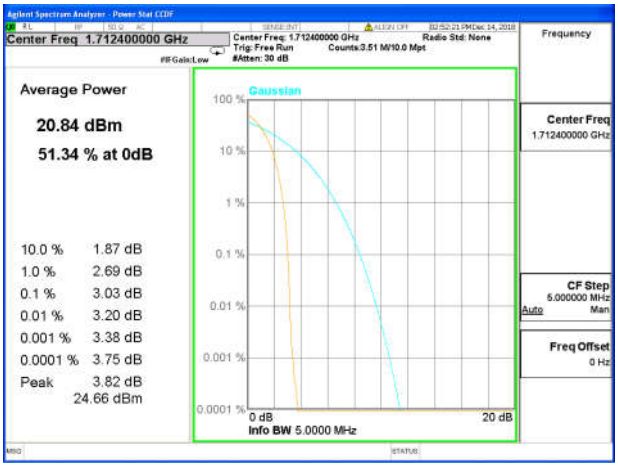
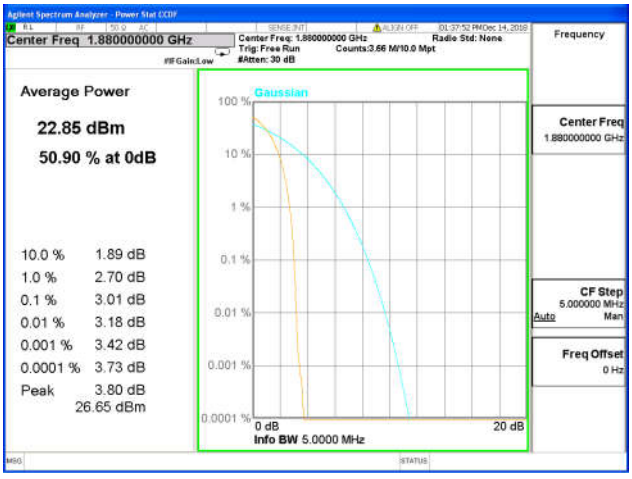
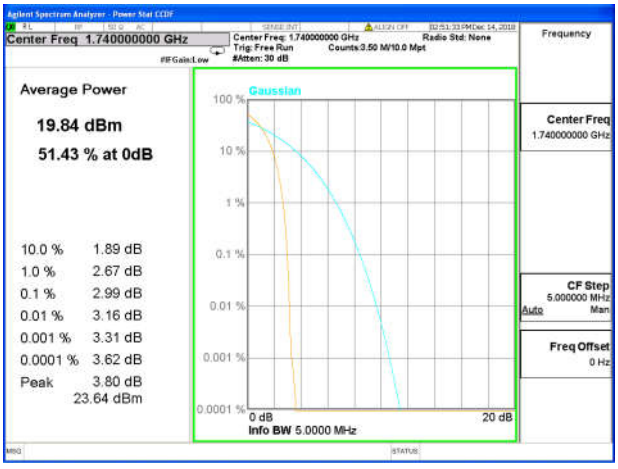
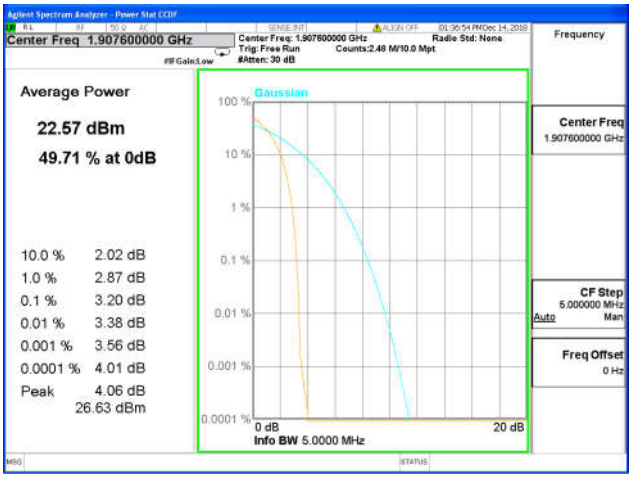
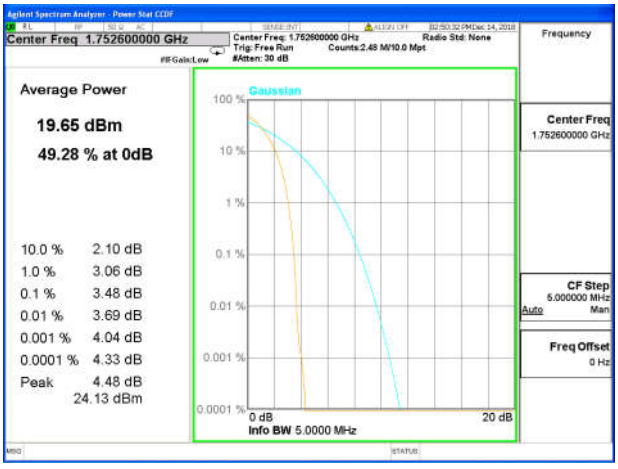
The EUT was connected to Spectrum Analyzer and Base Station via power divider.
The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
Set the number of counts to a value that stabilizes the measured CCDF curve.
Set the measurement interval to 1 ms.
Record the maximum PAPR level associated with a probability of 0.1%.
a) Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
b) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
c) Set the number of counts to a value that stabilizes the measured CCDF curve;
d) 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.
e) Record the maximum PAPR level associated with a probability of 0.1%.

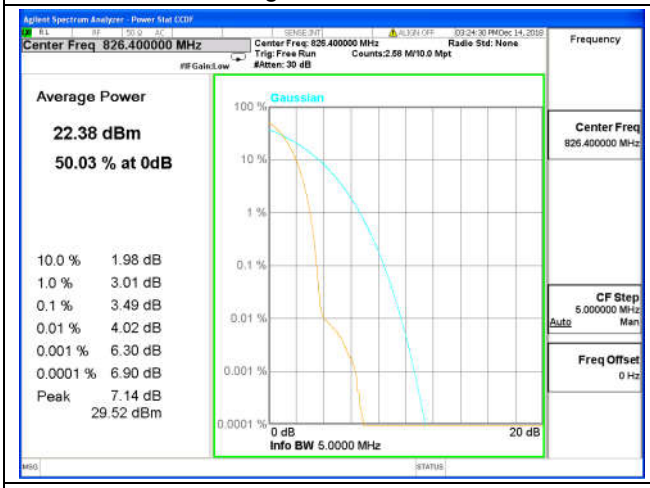
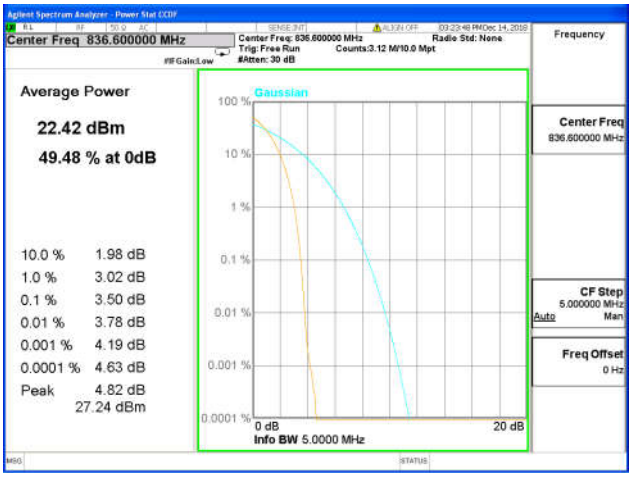
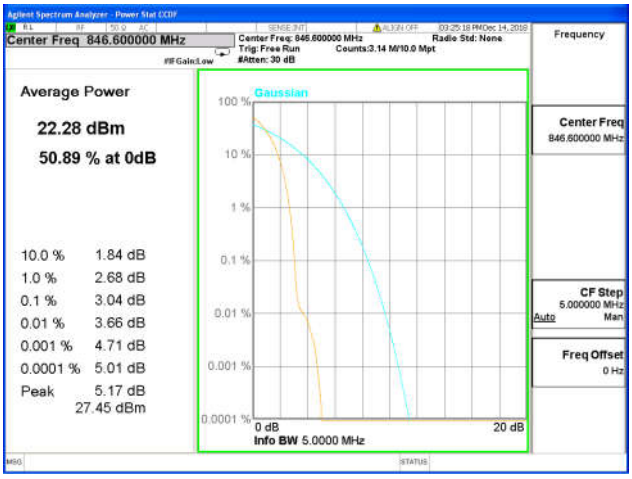
5.2.3 Test Result

Cellular Band						
Modes	WCDMA BAND II			WCDMA BAND IV		
Channel	9262 (Low)	9400 (Mid)	9538 (High)	1312 (Low)	1450 (Mid)	1513 (High)
Frequency(MHz)	1852.4	1880	1907.6	1712.4	1740.0	1752.6
Peak-to-Average Ratio (dB)	3.26	3.01	3.20	3.03	2.99	3.48

Cellular Band						
Modes	WCDMA BAND V					
Channel	4132 (Low)	4183 (Mid)	4233 (High)			
Frequency(MHz)	826.4	836.6	846.6			
Peak-to-Average Ratio (dB)	3.49	3.50	3.04			

Test plot

(WCDMA BAND II)	(WCDMA BAND IV)
Peak-to-Average Ratio on channel 9262	Peak-to-Average Ratio on channel 1312
	
Peak-to-Average Ratio on channel 9400	Peak-to-Average Ratio on channel 1450
	
Peak-to-Average Ratio on channel 9538	Peak-to-Average Ratio on channel 1513
	

Test plot	
(WCDMA BAND V)	
Peak-to-Average Ratio on channel 4132	
	
Peak-to-Average Ratio on channel 4183	
	
Peak-to-Average Ratio on channel 4233	
	

Note: all modes of EUT have been tested; only the data of worst case mode is reported. Worst mode is HSDPA

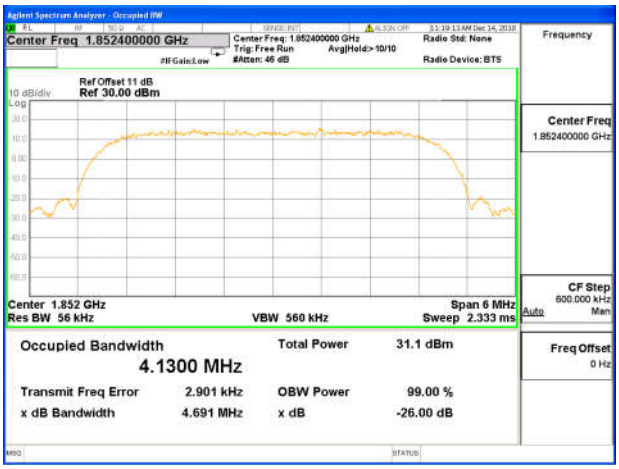
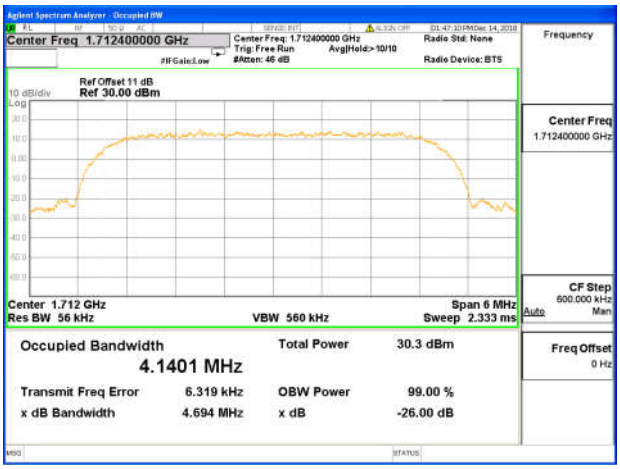
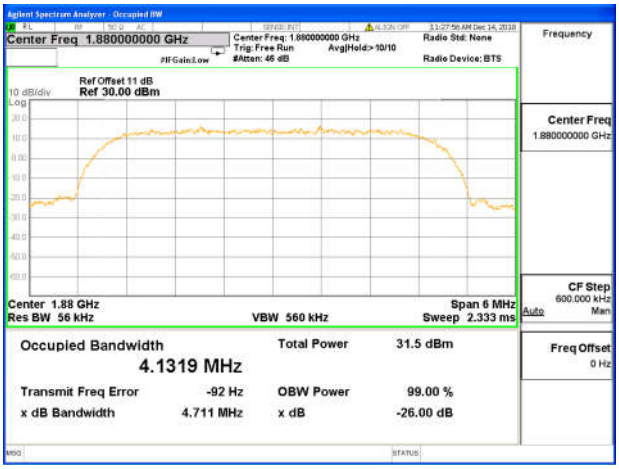
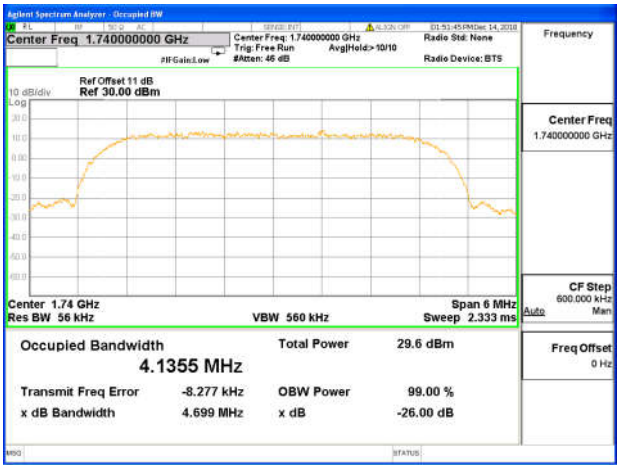
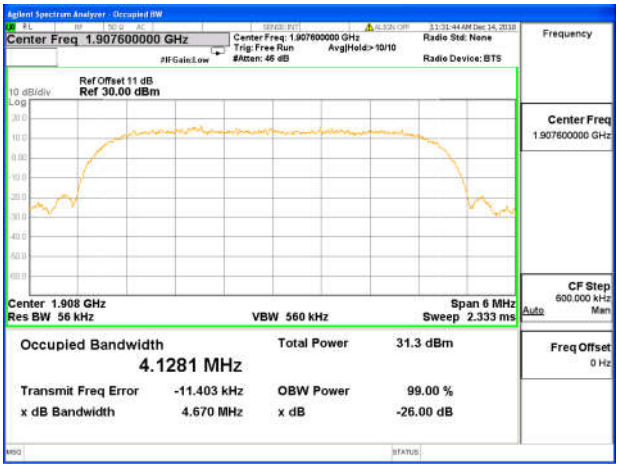
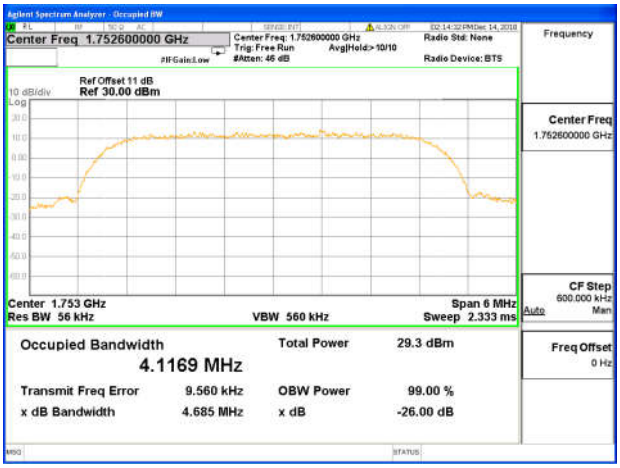
5.3 Occupied bandwidth

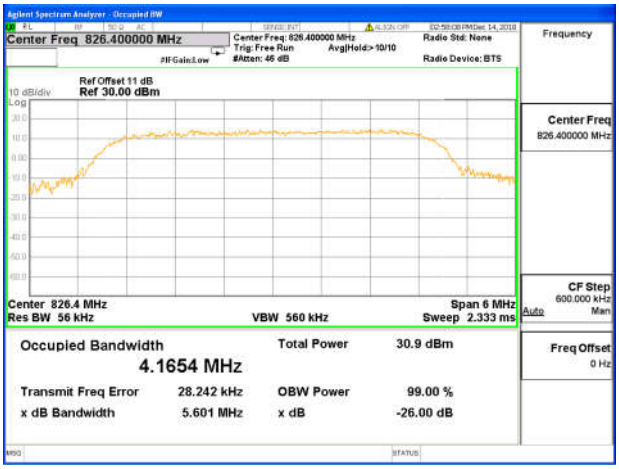
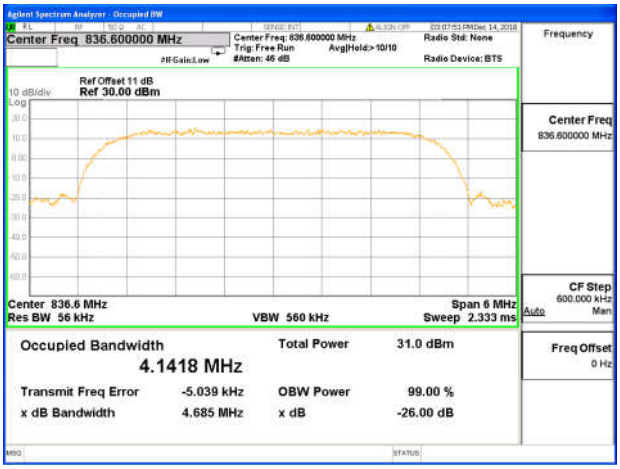
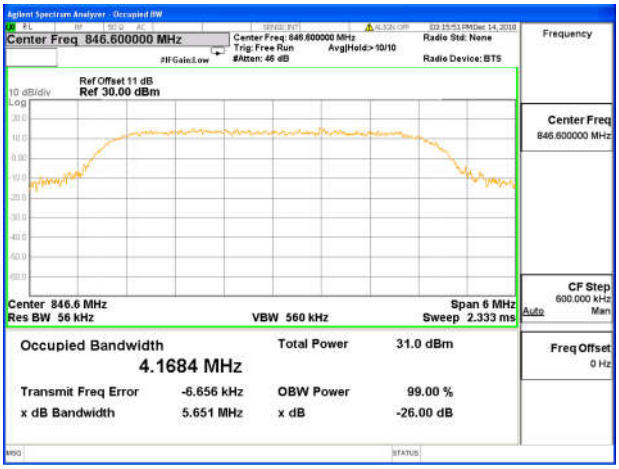
5.3.1 Test method

1. The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.
2. The resolution bandwidth of the Spectrum Analyzer is set to at least 1% of the occupied bandwidth.
3. The low, middle and the high channels are selected to perform tests respectively.
4. Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; search peak; make a line whose value is 26dB lower than the peak; mark two points which the line intersected the waveform at; finally record the delta of the two points as the occupied bandwidth and the plot.
5. Set the Spectrum Analyzer Occupied bandwidth function to measure the 99% occupied bandwidth.

5.3.2 **Test result**

Channel	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
WCDMA Band II			
9262	1852.4	4.691	4.1300
9400	1880	4.711	4.1319
9538	1907.6	4.670	4.1281
WCDMA Band VI			
1312	1712.4	4.694	4.1401
1450	1740.0	4.699	4.1355
1513	1752.6	4.685	4.1169
WCDMA Band V			
4132	826.4	5.601	4.1654
4183	836.4	4.685	4.1418
4233	846.6	5.651	4.1684

WCDMA Band II – 1852.4MHz	WCDMA Band IV –1712.4MHz
	
WCDMA Band II - 1880MHz	**WCDMA Band IV –1740.0MHz**
	
WCDMA Band II – 1907.6MHz	**WCDMA Band IV –1752.6MHz**
	

WCDMA Band V – 826.4MHz	WCDMA Band V –836.6MHz
	
WCDMA Band V –846.6MHz	
	

Note: all modes of EUT have been tested; only the data of worst case mode is reported. Worst mode is HSDPA

5.4 Conducted spurious emissions

5.4.1 Limits

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+10log (P) dB

5.4.2 Test method

1, The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.

2, Spectrum Setting:

Frequency bellow 1 GHz: RBW=100 kHz, VBW=300 kHz.

Frequency above 1 GHz: RBW=1 MHz, VBW=3 MHz.

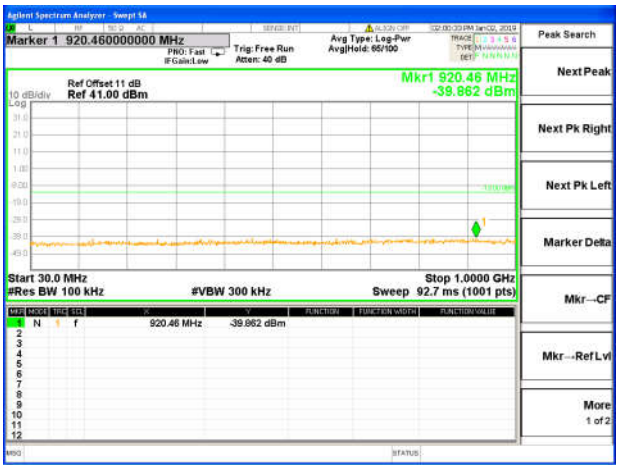
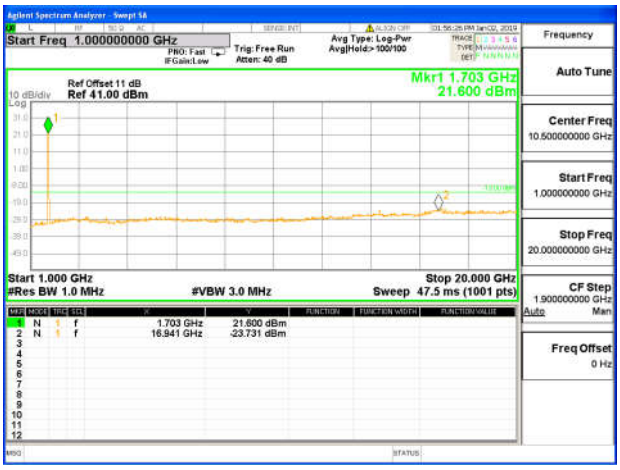
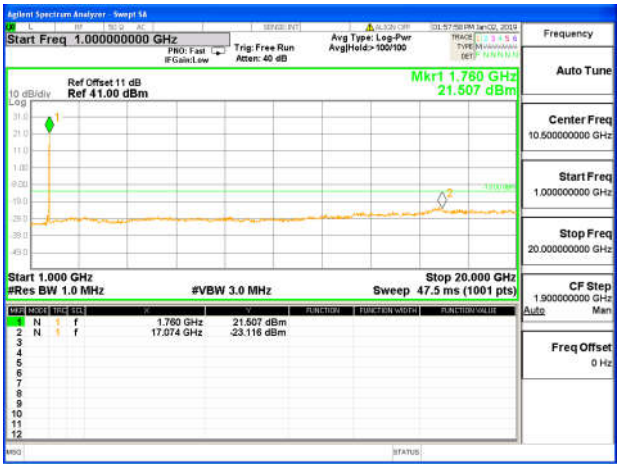
3, The low, middle and high channels of each band and mode's spurious emissions for 30 MHz to 10th Harmonic were measured by Spectrum analyzer.

5.4.3 Test result

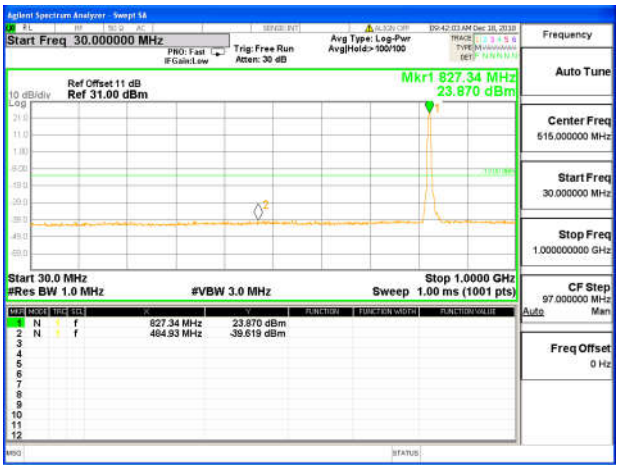
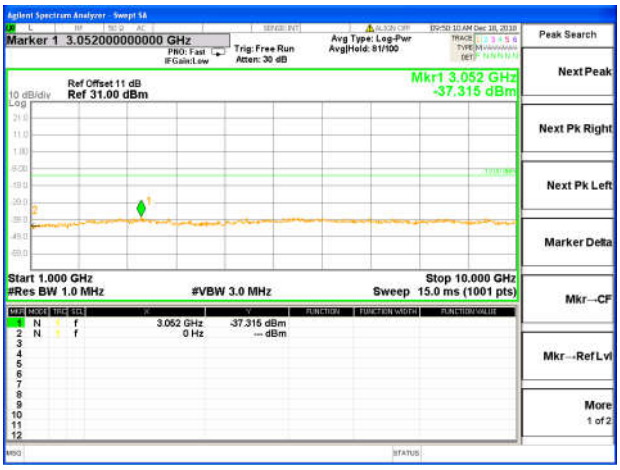
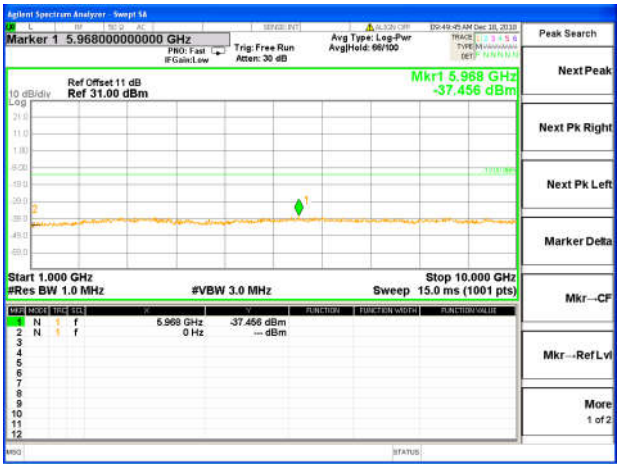
WCDMA Band II

Low Channel – 30MHz-1GHz	Low Channel –1GHz - 20GHz
	
Middle Channel– 30MHz-1GHz	**Middle Channel–1GHz - 20GHz**
	
High Channel– 30MHz-1GHz	**High Channel–1GHz - 20GHz**
	

WCDMA Band IV

Low Channel – 30MHz-1GHz	Low Channel –1GHz - 20GHz
	
Middle Channel–30MHz-1GHz	Middle Channel–1GHz - 20GHz
	
High Channel–30MHz-1GHz	High Channel–1GHz - 20GHz
	

WCDMA Band V

Low Channel – 30MHz-1GHz	Low Channel –1GHz - 10GHz
	
Middle Channel–30MHz-1GHz	Middle Channel–1GHz - 10GHz
	
High Channel–30MHz-1GHz	High Channel–1GHz - 10GHz
	

Note: all modes of EUT have been tested; only the data of worst case mode is reported. Worst mode is HSDPA

5.5 Band edge

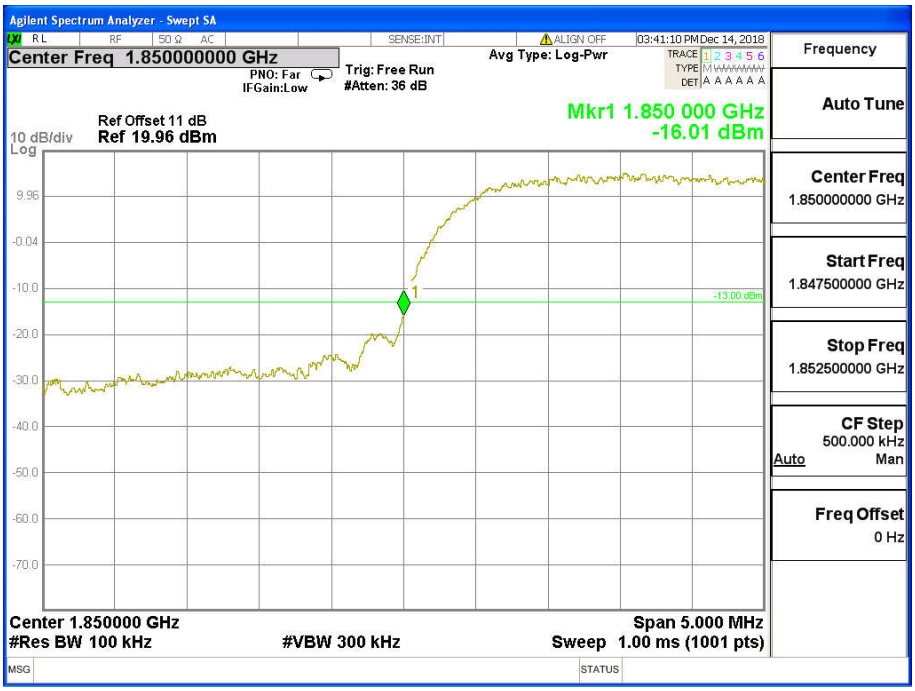
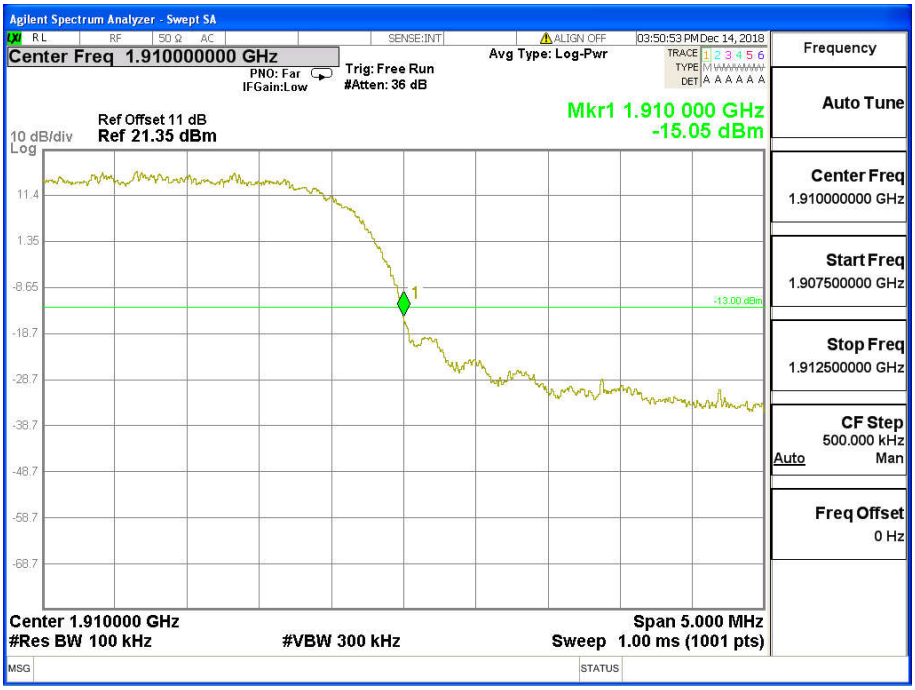
5.5.1 Limits

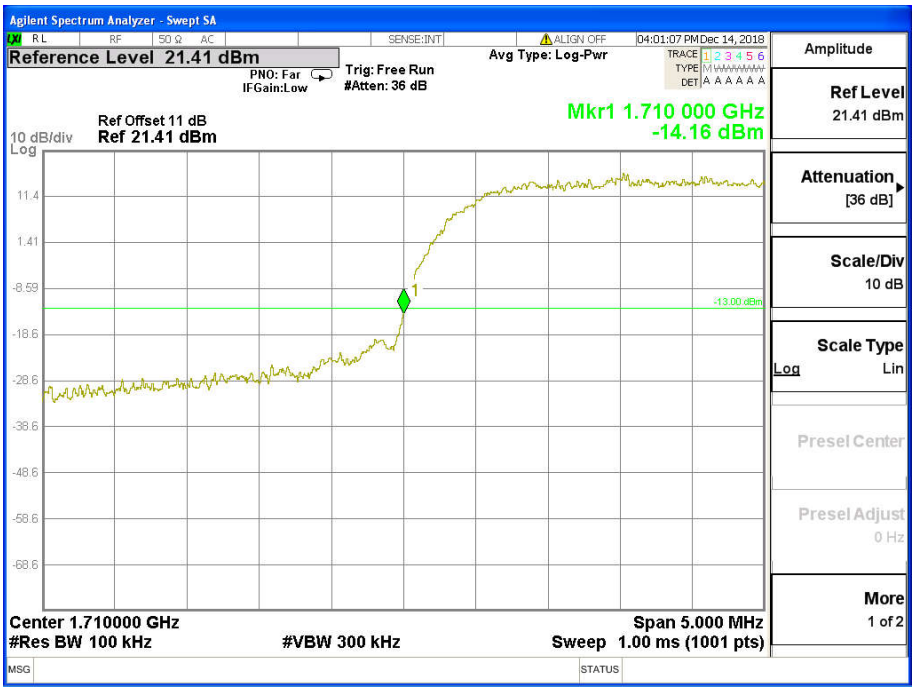
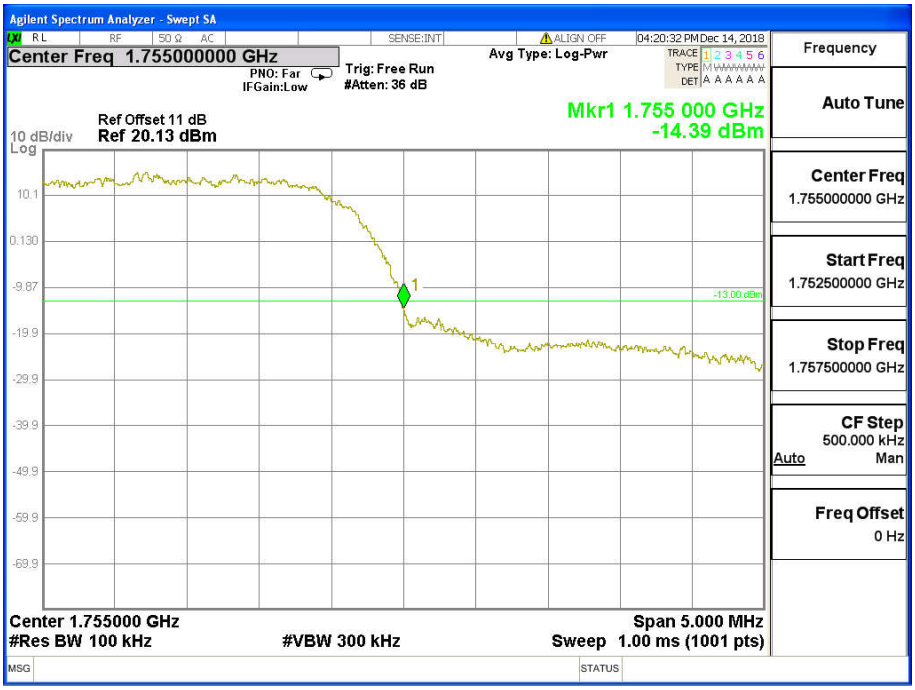
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10log (P) dB, for all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm

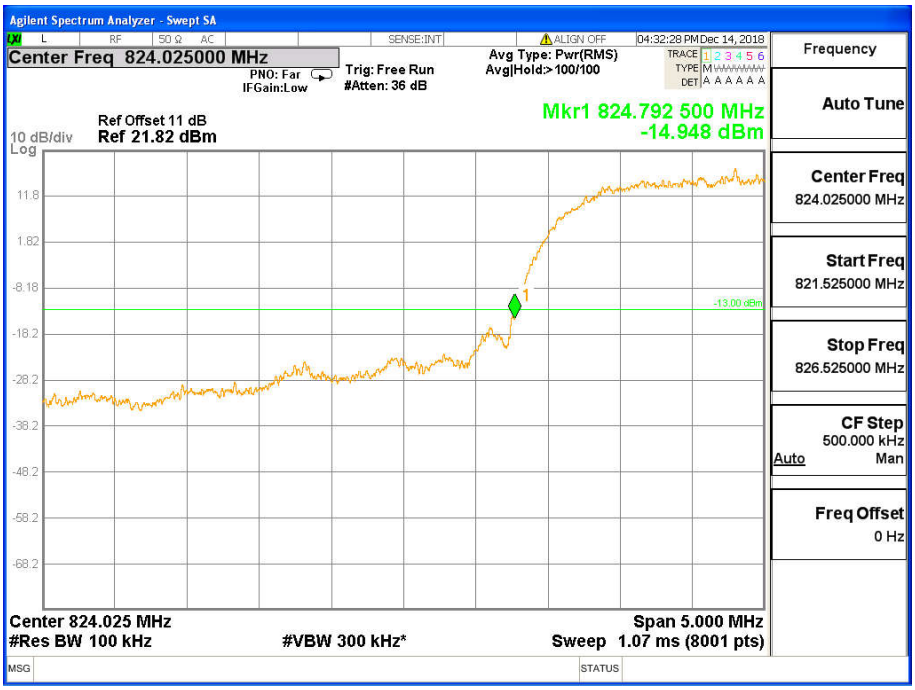
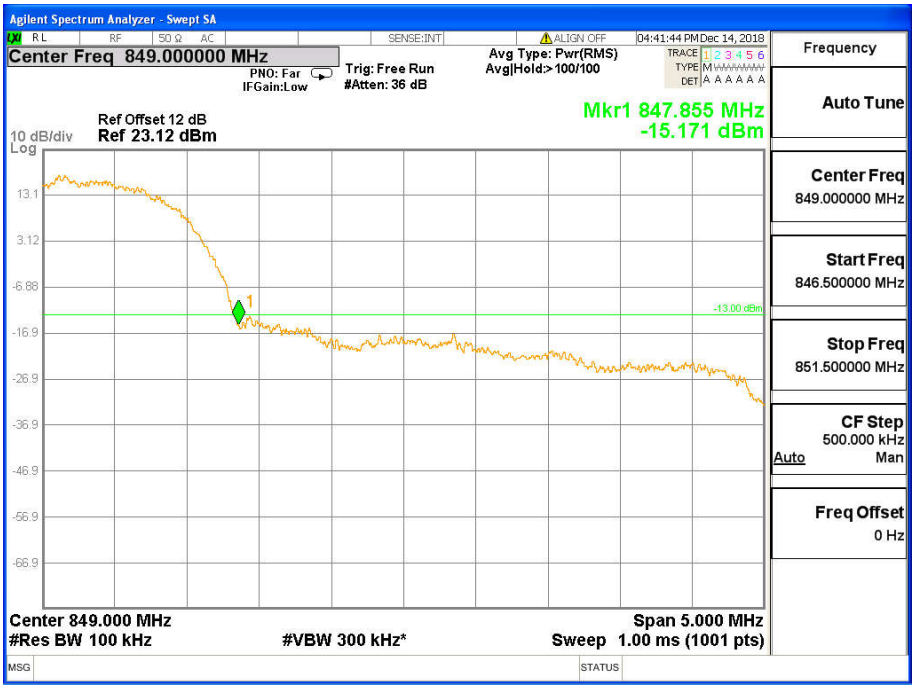
5.5.2 Test method

The testing follows FCC KDB 971168 v03r01 Section 6.0.
The EUT was connected to Spectrum Analyzer and Base Station via power divider.
The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.
The path loss was compensated to the results for each measurement.
The band edges of low and high channels for the highest RF powers were measured.
The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)
= P(W) - [43 + 10log(P)] (dB)
= [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
= -13dBm.

5.5.3 Test result

WCDMA Band II – Left band

WCDMA Band II – Right band


WCDMA Band IV – Left band

WCDMA Band IV– Right band


WCDMA Band V – Left band

WCDMA Band V – Right band


Note: all modes of EUT have been tested; only the data of worst case mode is reported. Worst mode is HSDPA

5.6 Radiated spurious emission

5.6.1 Limit

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+10log (P) dB

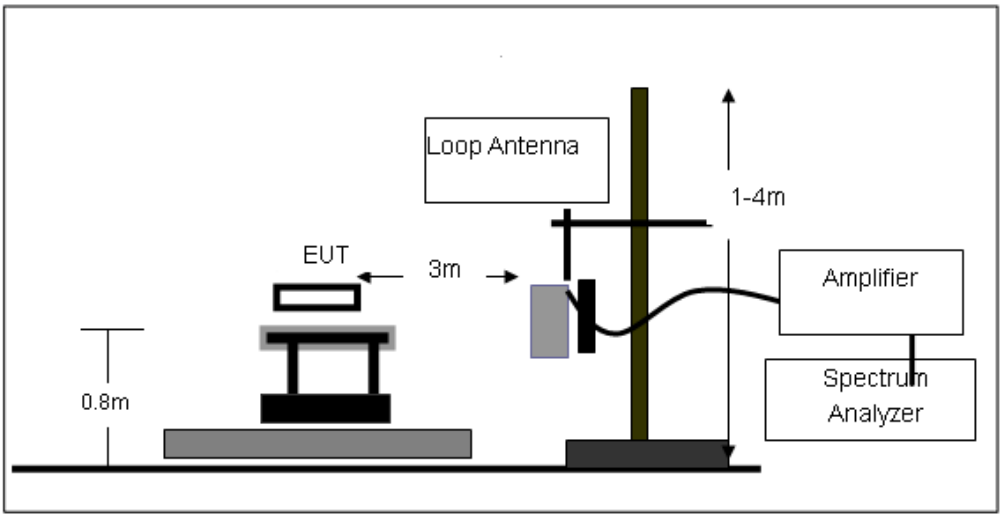
5.6.2 Test method

1. The test system setup as show in the block diagram above.
2. The EUT was placed on an non-conductive rotating platform in an anechoic chamber. The radiated spurious emissions from 30MHz to 10th harmonious of fundamental frequency were measured at 3 m with a test antenna and a spectrum analyzer with RBW=1 MHz, VBW=1 MHz, peak detector settings.
3. During the measurement, the EUT was enforced in maximum power and linked with a base station. All the spurious emissions at 3m were measured by rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
4. When found the maximum level of emissions from the EUT. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

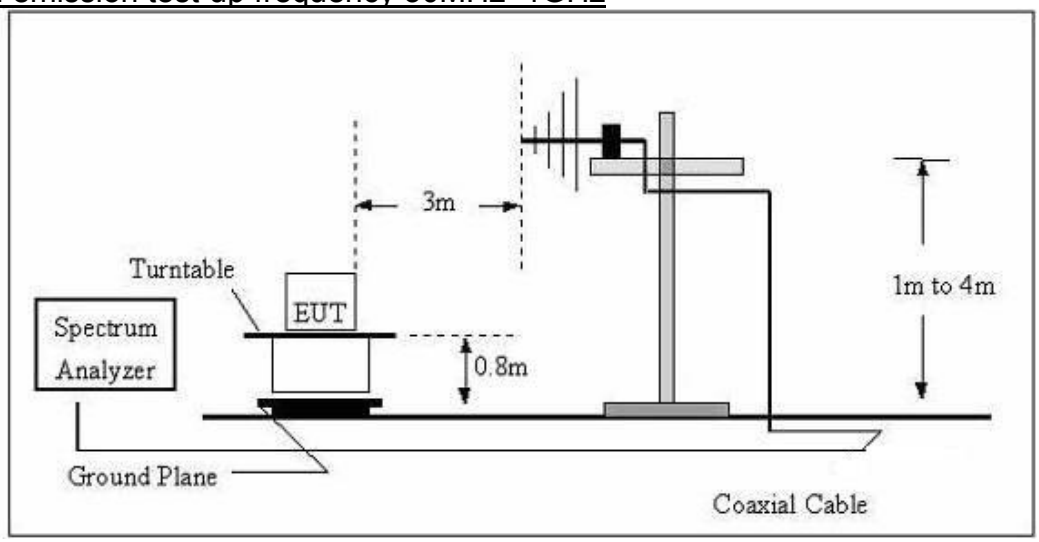
Spurious emissions in dB=10 log(TX power in Watts/0.001)-the absolute level
Spurious attenuation limit in dB=43+10 log(power out in Watts).

5.6.3 Test setup

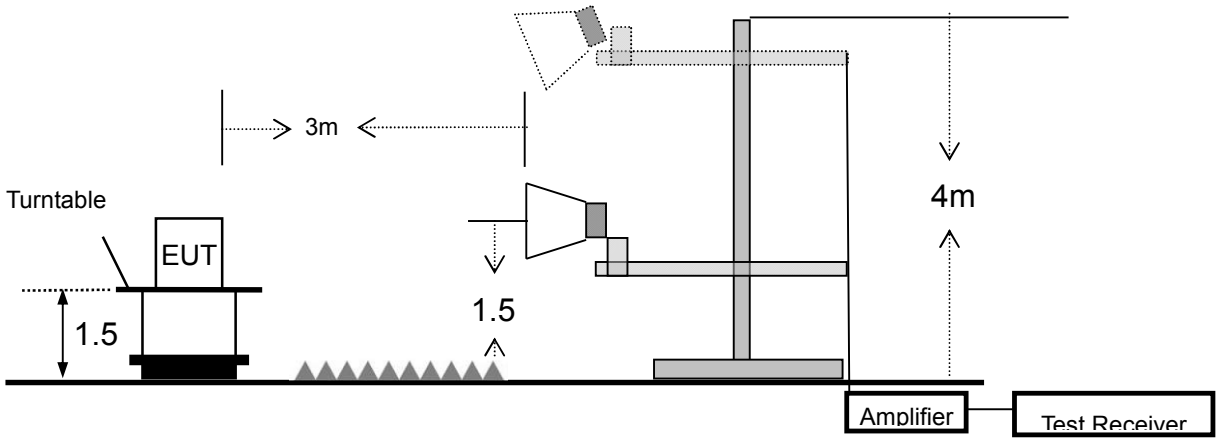
Radiated emission test-up frequency below 30MHz



Radiated emission test-up frequency 30MHz~1GHz



Radiated emission test-up frequency above 1GHz



5.6.4 Test Result

Note: All the configuration was tested and only the worse case was reported

For WCDMA (30MHz – 20GHz)

WCDMA Band II _ Low Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)		(dB)	(dBm)	(dBm)	(dB)	
3704.8	-44.54	5.26	3	9.88	-39.92	-13	-26.92	H
5557.2	-49.01	6.11	3	11.36	-43.76	-13	-30.76	H
3704.8	-49.35	5.26	3	9.88	-44.73	-13	-31.73	V
5557.2	-55.70	6.11	3	11.36	-50.45	-13	-37.45	V
WCDMA Band II _ Middle Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)		(dB)	(dBm)	(dBm)	(dB)	
3760	-38.96	5.32	3	10.03	-34.25	-13	-21.25	H
5640	-48.07	6.19	3	11.41	-42.85	-13	-29.85	H
3760	-46.67	5.32	3	10.03	-41.96	-13	-28.96	V
5640	-53.90	6.19	3	11.41	-48.68	-13	-35.68	V
WCDMA Band II _ High Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)		(dB)	(dBm)	(dBm)	(dB)	
3815.2	-48.53	5.36	3	9.62	-44.27	-13	-31.27	H
5722.8	-53.80	6.24	3	11.46	-48.58	-13	-35.58	H
3815.2	-53.19	5.36	3	9.62	-48.93	-13	-35.93	V
5722.8	-56.70	6.24	3	11.46	-51.48	-13	-38.48	V

WCDMA Band IV _ Low Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)		(dB)	(dBm)	(dBm)	(dB)	
1946.4	-45.71	3.86	3	8.56	-41.01	-13	-28.01	H
3424.8	-47.76	4.29	3	6.98	-45.07	-13	-32.07	H
1946.4	-42.76	3.86	3	8.56	-38.06	-13	-25.06	V
3424.8	-41.71	4.29	3	6.98	-39.02	-13	-26.02	V
WCDMA Band IV _ Middle Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)		(dB)	(dBm)	(dBm)	(dB)	
1982.4	-42.77	3.9	3	8.58	-38.09	-13	-25.09	H
3480	-44.96	4.32	3	6.8	-42.48	-13	-29.48	H
1982.4	-38.79	3.9	3	8.58	-34.11	-13	-21.11	V
3480	-42.10	4.32	3	6.8	-39.62	-13	-26.62	V
WCDMA Band IV _ High Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)		(dB)	(dBm)	(dBm)	(dB)	
2015.2	-47.50	3.91	3	9.06	-42.35	-13	-29.35	H
3505.2	-47.62	4.32	3	6.65	-45.29	-13	-32.29	H
2015.2	-43.74	3.91	3	9.06	-38.59	-13	-25.59	V
3505.2	-43.77	4.32	3	6.65	-41.44	-13	-28.44	V

WCDMA Band V _ Low Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)		(dB)	(dBm)	(dBm)	(dB)	
1652.8	-46.01	3.86	3	8.56	-41.31	-13	-28.31	H
2479.2	-47.39	4.29	3	6.98	-44.70	-13	-31.70	H
1652.8	-41.80	3.86	3	8.56	-37.10	-13	-24.10	V
2479.2	-41.66	4.29	3	6.98	-38.97	-13	-25.97	V
WCDMA Band V _ Middle Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)		(dB)	(dBm)	(dBm)	(dB)	
1672.8	-43.70	3.9	3	8.58	-39.02	-13	-26.02	H
2509.2	-44.36	4.32	3	6.8	-41.88	-13	-28.88	H
1672.8	-38.39	3.9	3	8.58	-33.71	-13	-20.71	V
2509.2	-42.17	4.32	3	6.8	-39.69	-13	-26.69	V
WCDMA Band V _ High Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)		(dB)	(dBm)	(dBm)	(dB)	
1693.2	-47.30	3.91	3	9.06	-42.15	-13	-29.15	H
2539.8	-48.40	4.32	3	6.65	-46.07	-13	-33.07	H
1693.2	-43.23	3.91	3	9.06	-38.08	-13	-25.08	V
2539.8	-43.89	4.32	3	6.65	-41.56	-13	-28.56	V

5.7 Frequency stability

5.7.1 Limit

For FCC part 22.355: the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances 2.5ppm for mobile ≤ 3W condition.

For FCC part 24.235: The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

For FCC Part 27.

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d) (2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 32.4VDC and 41.4VDC, with a nominal voltage of 36VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance from -5.4% to 10.8%. For the purposes of measuring frequency stability these voltage limits are to be used.

5.7.2 Test method

Test Procedures for Temperature Variation:

1, The EUT was set up in the thermal chamber and connected with the base station.
2, With power off, the temperature was decreased to -30℃ and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
3, With power off, the temperature was raised in 10℃ set up to 50℃ and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
4, measure the carrier frequency error.

Test Procedures for Voltage Variation:

1, The EUT was placed in a temperature chamber at 25±5℃ and connected with the base station.
2, Reduce the primary supply voltage to the battery operating end point.
3, measure the carrier frequency error.

5.7.3 Test Result

Band	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
WCDMA Band II	32.4	12	0.0064
	36	19	0.0101
	41.4	24	0.0128

Band	Temperature (℃)	Frequency Error (Hz)	Frequency Error (ppm)
WCDMA Band II	-30	37	0.0197
	-20	15	0.0080
	-10	34	0.0181
	0	29	0.0154
	10	30	0.0160
	20	36	0.0191
	30	22	0.0117
	40	28	0.0149
	50	21	0.0112

Band	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
WCDMA Band IV	32.4	17	0.0203
	36	20	0.0239
	41.4	21	0.0251

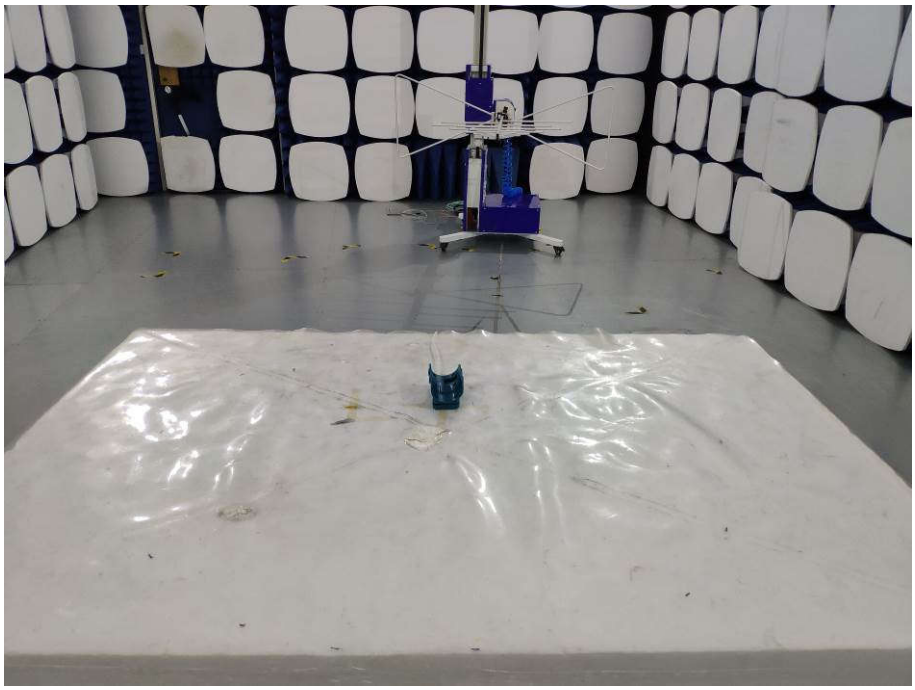
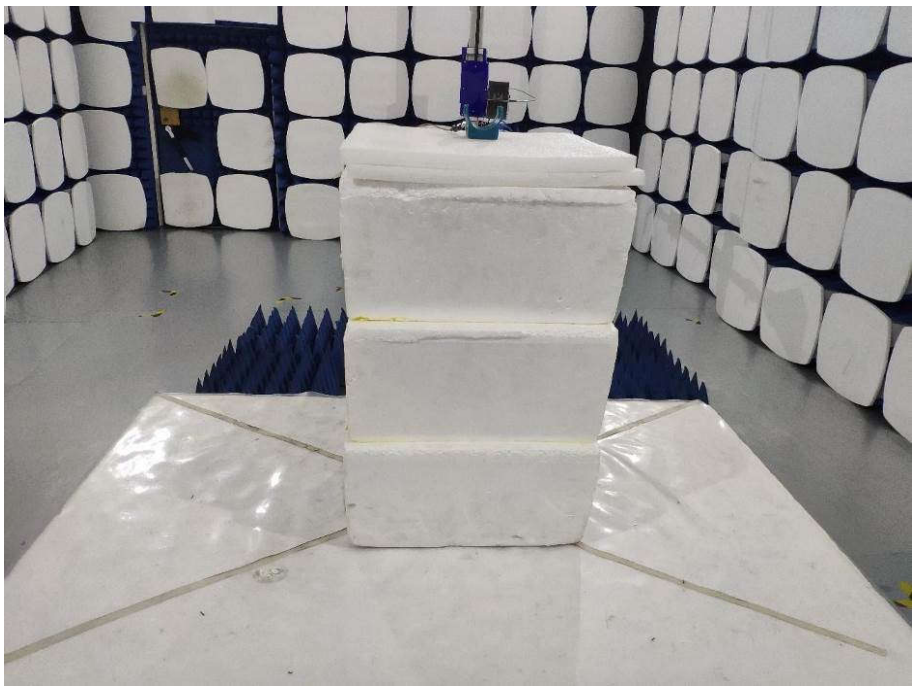
Band	Temperature (℃)	Frequency Error (Hz)	Frequency Error (ppm)
WCDMA Band IV	-30	16	0.0191
	-20	19	0.0227
	-10	14	0.0167
	0	19	0.0227
	10	25	0.0299
	20	19	0.0227
	30	15	0.0179
	40	16	0.0191
	50	13	0.0155

Band	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
WCDMA Band V	32.4	24	0.0287
	36	19	0.0227
	41.4	12	0.0143

Band	Temperature (℃)	Frequency Error (Hz)	Frequency Error (ppm)
WCDMA Band V	-30	33	0.0395
	-20	27	0.0323
	-10	31	0.0371
	0	25	0.0299
	10	21	0.0251
	20	18	0.0215
	30	14	0.0167
	40	19	0.0227
	50	24	0.0287

Note:
1. Normal Voltage = 36V; Battery End Point (BEP) = 32.4V; Maximum Voltage =41.4V
2. All modes of EUT have been tested; only the data of worst case mode is reported.

Photographs of the Test Setup

Radiated emission



Photographs of the EUT

See the APPENDIX 1: EUT PHOTO in the report No.: MTi181217E098-1.

----END OF REPORT----