TEST REPORT

APPLICANT	:	Reliance Communications LLC
PRODUCT NAME	:	Orbic Speed X
MODEL NAME	:	RC400LX
BRAND NAME	:	Orbic, Kajeet
FCC ID	:	2ABGH-RC400LX
STANDARD(S)	:	47 CFR Part 22 Subpart H 47 CFR Part 24 Subpart E
RECEIPT DATE	:	2020-04-17
TEST DATE	:	2020-04-17 to 2020-07-14
ISSUE DATE	:	2020-07-20

Edited by: Zhou Xiaolong

Zhou Xiaolong (Rapporteur)

Approved by: Peng Huarui

Peng Huarui (Supervisor)

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MORLAB

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Change History		
Issue	**Date**	**Reason for change**
1.0	2020-07-15	First edition
2.0	2020-07-20	Change section 1.3 Maximum ERP/EIRP and, Emission Designator information

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Reliance Communications LLC
Applicant Address:	91 Colin Drive, Unit 1, HOLBROOK, New York 11741, United States
Manufacturer:	Unimaxcomm
Manufacturer Address:	Room 602, Floor 6th, Building B, Software Park T3,Hi-Tech Park South, Nanshan District, Shenzhen, P.R. China

1.2. Equipment Under Test (EUT) Description

Product Name:	Orbic Speed X	
Hardware Version:	V1.1	
Software Version:	ORB400LX_V1.0.2_BVZNAKJ	
Modulation Type:	WCDMA Mode with QPSK Modulation HSDPA Mode with QPSK Modulation HSUPA Mode with QPSK Modulation HSPA+ Mode with QPSK Modulation DC-HSDPA Mode with QPSK Modulation	
Operating Frequency Range:	**WCDMA Band V** Tx: 824MHz - 849MHz Rx: 869MHz - 894MHz **WCDMA Band II** Tx: 1850MHz - 1910MHz Rx: 1930MHz - 1990MHz **WCDMA Band IV** Tx: 1710 MHz -1755 MHz Rx: 2110 MHz -2155 MHz	
Antenna Type:	Fixed Internal	
Antenna Gain:	WCDMA Band V:	1.00 dBi
	WCDMA Band II:	1.50 dBi
	WCDMA Band IV:	1.50 dBi

Accessory Information:	Battery	
	Brand Name:	Orbic
	Model No.:	BTE-3003
	Capacity:	3000 mAh
	Rated Voltage:	3.7 V
	Charge Limit:	4.2 V
	AC Adapter	
	Brand Name:	Orbic
	Model No.:	TPA-5950100UU
	Rated Input:	100-240V ～ 50/60Hz 0.2A
	Rated Output:	5V⎓1.0A

Note 1: The transmitter (Tx) frequency arrangement of the WCDMA Band V used by the EUT can be represented with the formula F(n)=826.4+0.2*(n-4132), 4132<=n<=4233; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 4132 (826.4MHz), 4182(836.4MHz) and 4233 (846.6MHz).

Note 2: The transmitter (Tx) frequency arrangement of the WCDMA Band II used by the EUT can be represented with the formula F(n)=1852.4+0.2*(n-9262), 9262<=n<=9538; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 9262 (1852.4MHz), 9400 (1880MHz) and 9538 (1907.6MHz).

Note 3: The transmitter (Tx) frequency arrangement of the WCDMA 1700MHz band used by the EUT can be represented with the formula F(n)=1712.4+0.2*(n-1312), 1312<=n<=1513; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 1312 (1712.4MHz), 1413 (1732.6MHz) and 1513 (1752.6MHz).

Note 4: All modes and data rates were considered and evaluated respectively by performing full test. Test modes are chosen to be reported as the worst case below:
WCDMA mode for WCDMA band V;
WCDMA mode for WCDMA band II;
WCDMA mode for WCDMA band IV.

Note 5: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

Note 6: This test report is updated from the original report (Report No.: SZ20040157W01, Model: RC400L). According to the previous similarity, only modify the product name, model, software and hardware version; Add a brand; Add 3G/4G RF front end components (added UMTS Band 4 and LTE Band 7/12/14/17/25/26/30/41/71); Disable LTE Band 13 (Remove LTE Band 13 components); Disable WiFi MIMO function and change to SISO (Remove one WiFi connector and related components), the WiFi chip and circuit are the same as before. We evaluated and tested the above changes.

1.3. Maximum ERP/EIRP and Emission Designator

System	Maximum ERP/EIRP（W）	Emission Designator
WCDMA Band V	0.120	4M14F9W
WCDMA Band II	0.213	4M14F9W
WCDMA Band IV	0.219	4M14F9W

1.4. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part 22 and Part 24 for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 2 (10-1-12 Edition)	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 22 (10-1-12 Edition)	Public Mobile Services
3	47 CFR Part 24 (10-1-12 Edition)	Personal Communications Services

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Test Date	Test Engineer	Result	Method determination/ Remark
1	2.1046	Conducted RF Output Power	Jul 1 to 10, 2020	Chen Hao	PASS	No deviation
2	24.232(d)	Peak -Average Ratio	Jul 10 ,2020	Zhou Xiaolong	PASS	No deviation
3	2.1049	99% Occupied Bandwidth	Jul 10 ,2020	Zhou Xiaolong	PASS	No deviation
4	2.1055, 22.355, 24.235,	Frequency Stability	Jul 1 to 10 2020	Zhou Xiaolong	PASS	No deviation
5	2.1051, 22.917(a), 24.238(a),	Conducted Out of Band Emissions	Jul 10,2020	Zhou Xiaolong	PASS	No deviation
6	2.1051, 22.917(a), 24.238(a),	Band Edge	Jul 10,2020	Zhou Xiaolong	PASS	No deviation
7	22.913(a), 24.232(a)	Transmitter Radiated Power (EIPR/ERP)	Jul 1 to 10, 2020	Li Zihao	PASS	No deviation
8	2.1051, 22.917(a), 24.238(a)	Radiated Out of Band Emissions	Jul 1 to 10, 2020	PengXuewei	PASS	No deviation

Note 1: The tests were performed according to the method of measurements prescribed in KDB971168 D01 v03 and ANSI/TIA-603-E-2016.

Note 2: The path loss during the RF test is calibrated to correct the results by the offset setting in the test equipments. The ref offset 26.5dB contains two parts that cable loss 16.5dB and Attenuator 10dB.

1.5. Environmental Conditions

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

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106

2. 47 CFR Part 2, Part 22H & 24E Requirements

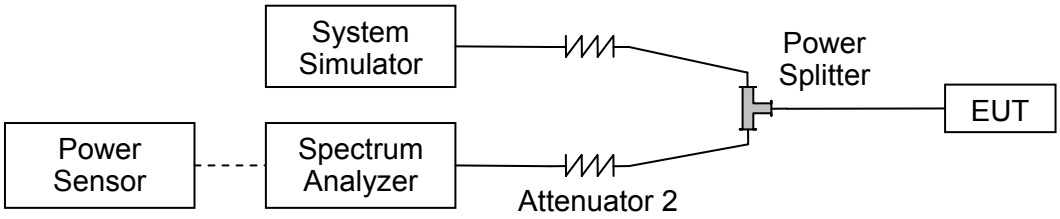
2.1. Conducted RF Output Power

2.1.1. Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

2.1.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.

2.1.3. Test Results

WCDMA Band V	Average Power (dBm)		
TX Channel	**4132**	**4182**	**4233**
Frequency (MHz)	**826.4**	**836.4**	**846.6**
AMR 12.2Kbps	21.63	21.65	21.54
RMC 12.2Kbps	21.62	21.64	21.52
HSDPA Subtest-1	20.27	20.09	20.21
HSDPA Subtest-2	20.26	20.07	20.20
HSDPA Subtest-3	20.23	20.05	20.19
HSDPA Subtest-4	20.19	20.01	20.15
HSUPA Subtest-1	20.32	20.12	20.33
HSUPA Subtest-2	20.30	20.09	20.28
HSUPA Subtest-3	20.28	20.07	20.26
HSUPA Subtest-4	20.27	20.06	20.23
HSUPA Subtest-5	20.23	20.03	20.20
HSPA+	20.24	20.05	20.23
DC-HSDPA Subtest-1	21.53	21.52	21.37
DC-HSDPA Subtest-2	21.46	21.53	21.46
DC-HSDPA Subtest-3	20.95	21.02	21.50
DC-HSDPA Subtest-4	20.90	20.98	20.92

WCDMA Band II	Average Power (dBm)		
TX Channel	**9262**	**9400**	**9538**
Frequency (MHz)	**1852.4**	**1880.0**	**1907.6**
AMR 12.2Kbps	21.71	21.79	21.74
RMC 12.2Kbps	21.69	21.78	21.73
HSDPA Subtest-1	20.45	20.54	20.41
HSDPA Subtest-2	20.43	20.51	20.40
HSDPA Subtest-3	20.42	20.50	20.37
HSDPA Subtest-4	20.40	20.48	20.35
HSUPA Subtest-1	20.50	20.60	20.51
HSUPA Subtest-2	20.48	20.57	20.49
HSUPA Subtest-3	20.47	20.55	20.44
HSUPA Subtest-4	20.44	20.52	20.41
HSUPA Subtest-5	20.40	20.49	20.37
HSPA+	20.41	20.50	20.41
DC-HSDPA Subtest-1	21.67	21.77	21.74

DC-HSDPA Subtest-2	21.68	21.74	21.78
DC-HSDPA Subtest-3	21.20	21.26	21.22
DC-HSDPA Subtest-4	21.12	21.30	21.23

WCDMA Band IV	**Average Power (dBm)**		
TX Channel	**1312**	**1413**	**1513**
Frequency (MHz)	**1712.4**	**1732.6**	**1752.6**
AMR 12.2Kbps	21.91	21.95	21.93
RMC 12.2Kbps	21.71	21.90	21.87
HSDPA Subtest-1	21.66	21.69	21.63
HSDPA Subtest-2	21.39	21.41	21.40
HSDPA Subtest-3	21.27	21.25	21.31
HSDPA Subtest-4	21.09	21.10	21.11
HSUPA Subtest-1	21.15	21.13	21.18
HSUPA Subtest-2	20.93	20.94	20.95
HSUPA Subtest-3	20.75	20.76	20.87
HSUPA Subtest-4	20.67	20.66	20.73
HSUPA Subtest-5	20.63	20.59	20.65
HSPA+	20.39	20.35	20.38
DC-HSDPA Subtest-1	19.77	19.79	19.77
DC-HSDPA Subtest-2	19.74	19.81	19.78
DC-HSDPA Subtest-3	19.34	19.33	19.36
DC-HSDPA Subtest-4	19.29	19.31	19.37

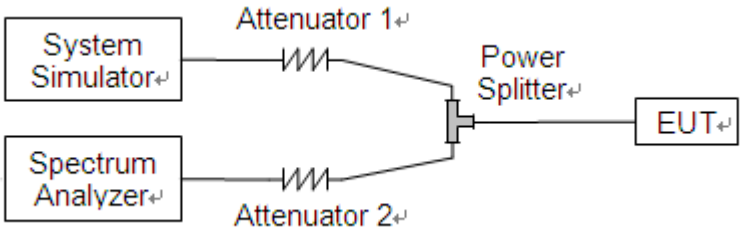
2.2. Peak to Average Ratio

2.2.1. Requirement

According to FCC 24.232(d) the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

2.2.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.

2.2.3. Test procedure

1 .For GSM/GPRS operating mode:

a. Set RBW=1MHz, VBW=3MHz, peak detector in spectrum analyzer.
b. Set EUT in maximum output power, and triggered the bust signal.
c. Measured respectively the peak level and mean level, and the deviation was recorded as Peak to Average ratio.

2. For UMTS operating mode:

a. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1%.

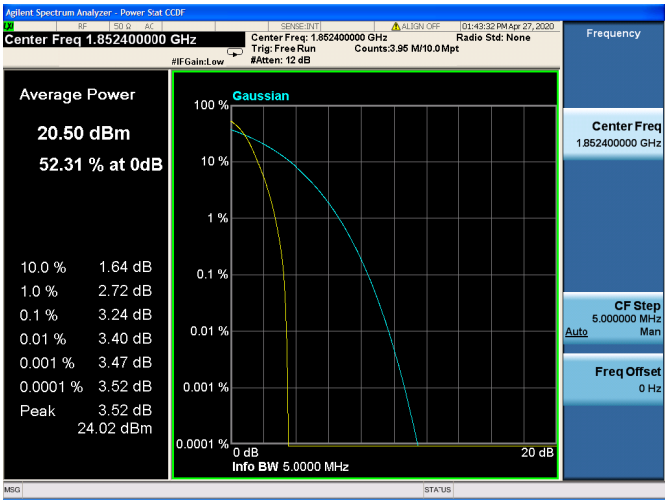
2.2.4. Test Result

The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

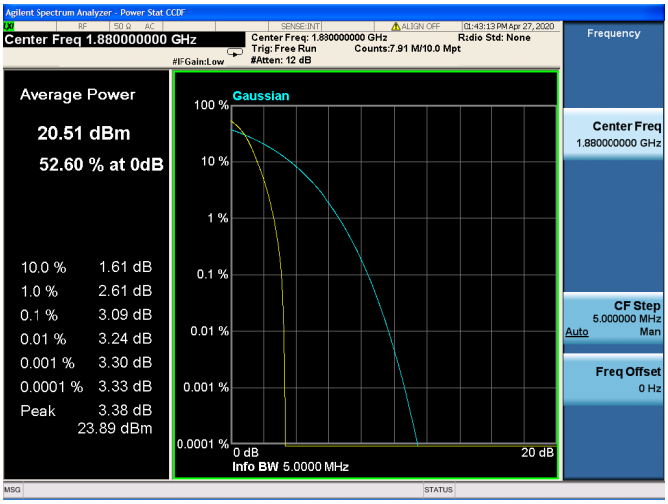
A. Test Verdict:

Band	Channel	Frequency (MHz)	Peak to Average ratio dB	Limit dB	Verdict
WCDMA Band II	9262	1852.4	3.24	13	PASS
	9400	1880.0	3.09		PASS
	9538	1907.6	3.09		PASS
WCDMA Band IV	1312	1712.4	3.23		PASS
	1413	1732.6	8.50		PASS
	1513	1752.6	8.49		PASS

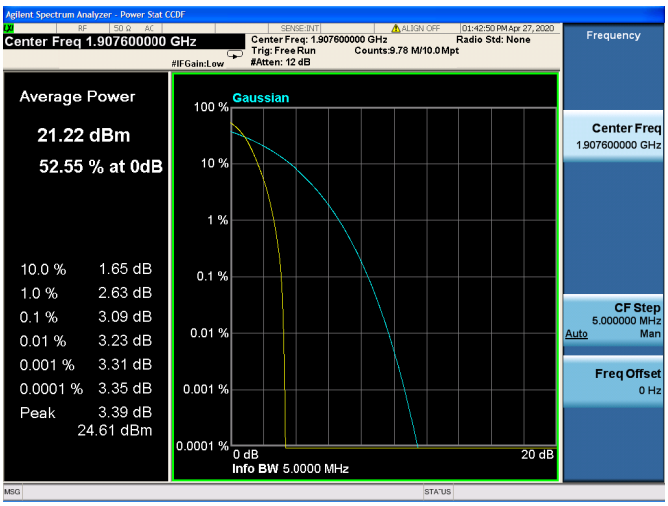
WCDMA Band II CH9262 1852.4MHz



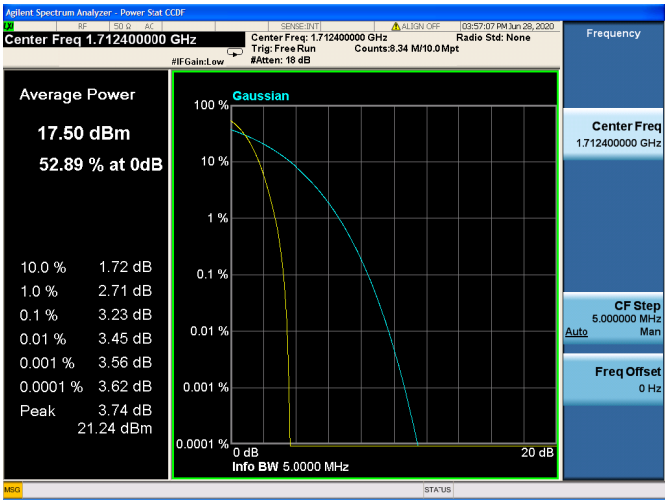
WCDMA Band II CH9400 1880.0MHz



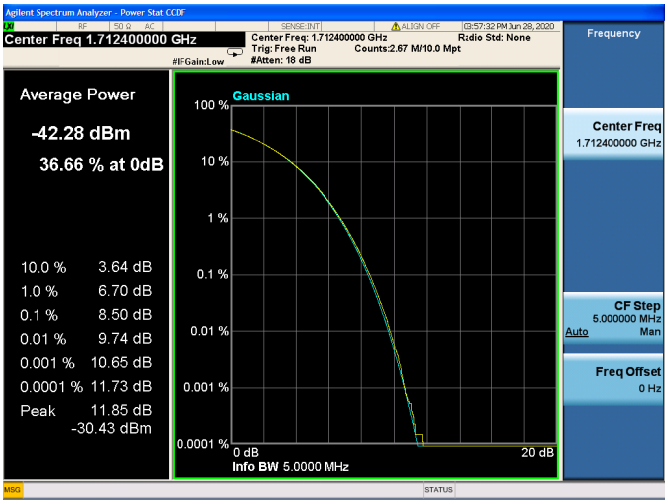
WCDMA Band II CH9538 1907.6MHz



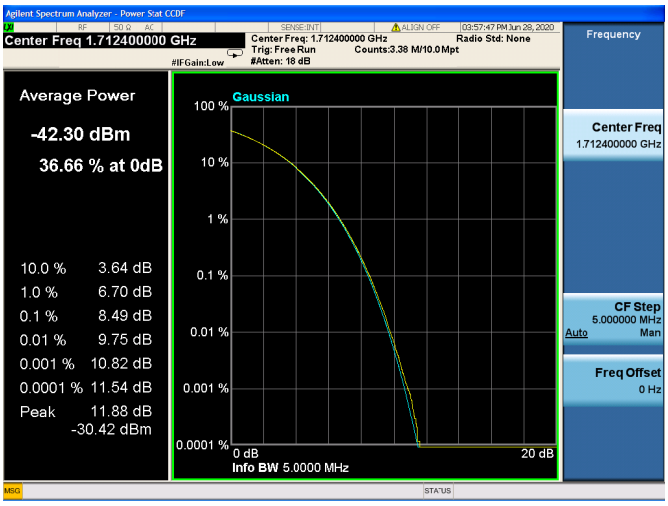
WCDMA Band IV CH1312 1712.4MHz



WCDMA Band IV CH1413 1732.6MHz



WCDMA Band IV CH1513 1752.6MHz



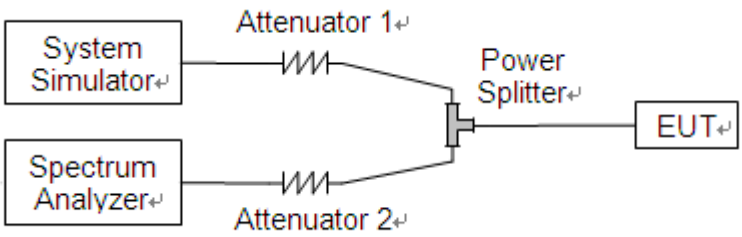
2.3. 99% Occupied Bandwidth

2.3.1. Requirement

According to FCC section 2.1049, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission. Occupied bandwidth is also known as the 99% emission bandwidth.

2.3.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.

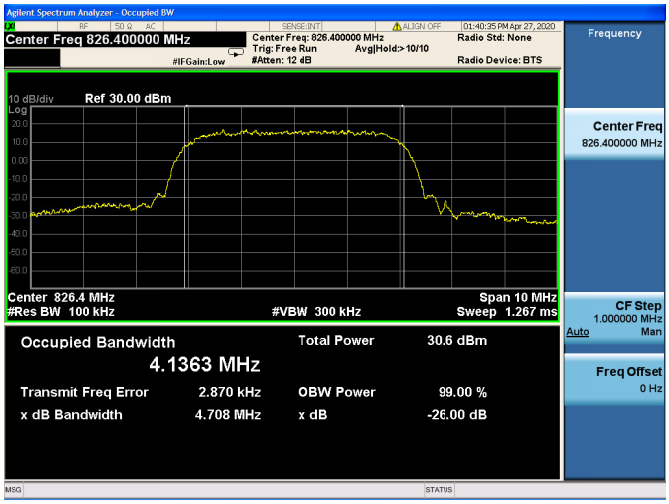
2.3.3. Test Result

The lowest, middle and highest channels are selected to perform testing to record the 99% occupied bandwidth.

WCDMA Test Verdict:

Band	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)
WCDMA Band V	4132	826.4	4.136	4.708
	4183	836.4	4.128	4.703
	4233	846.6	4.119	4.682
WCDMA Band II	9262	1852.4	4.131	4.701
	9400	1880.0	4.143	4.697
	9538	1907.6	4.129	4.695
WCDMA Band IV	1312	1712.4	4.121	4.686
	1413	1732.6	4.134	4.712
	1513	1752.6	4.139	4.690

WCDMA Band V CH4132 826.4MHz

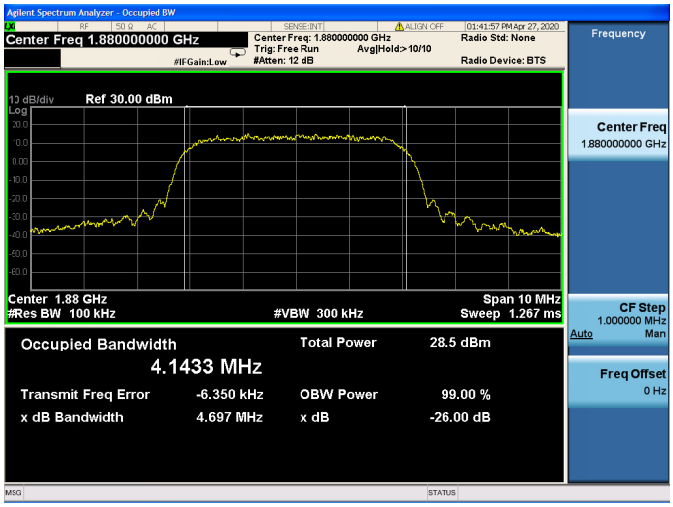


WCDMA Band V CH4183 836.4MHz

WCDMA Band V CH4233 846.6MHz

WCDMA Band II CH9262 1852.4MHz

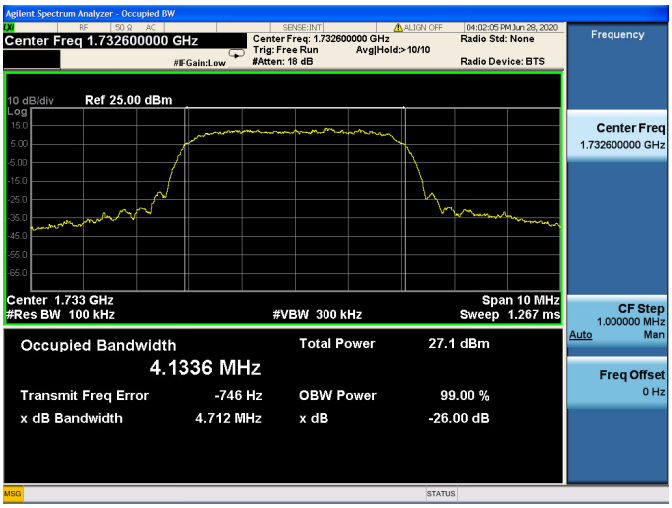
WCDMA Band II CH9400 1880.0MHz



WCDMA Band II CH9538 1907.6MHz

WCDMA Band IV CH1312 1712.4MHz

WCDMA Band IV CH1413 1732.6MHz



WCDMA Band IV CH1513 1752.6MHz

2.4. Frequency Stability

2.4.1. Requirement

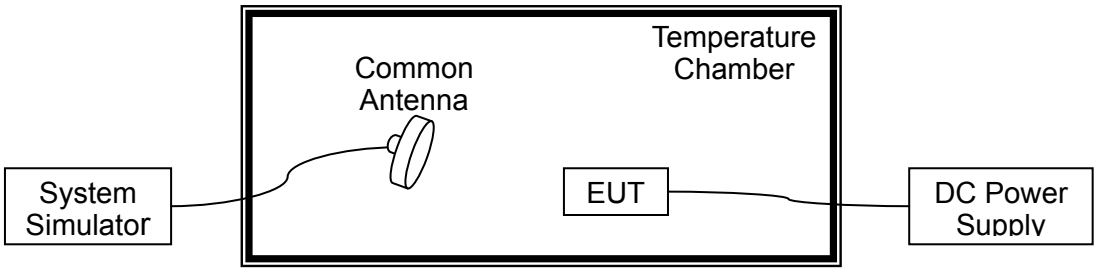
According to FCC section 22.355 and 24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

(a) The temperature is varied from -10°C to +45°C at intervals of not more than 10°C.

(b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

2.4.2. Test Description

Test Setup:



The EUT, which is powered by the DC Power Supply directly, is located in the Temperature Chamber. The EUT is commanded by the System Simulator (SS) to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS via a Common Antenna.

2.4.3. Test Result

The nominal, highest and lowest extreme voltages are separately 3.7VDC, 4.0VDC and 3.5VDC, which are specified by the applicant; the normal temperature here used is 20°C.

A. Test Verdict:

WCDMA Band V, Channel 4183, Frequency 836.4MHz Limit =±2.5ppm					
Voltage (%)	**Power (VDC)**	**Temp (°C)**	**Fre. Dev. (Hz)**	**Deviation (ppm)**	**Result**
100	3.7	+20(Ref)	31	0.037	PASS
100		-10	-28	-0.034	
100		0	-35	-0.042	
100		+10	32	0.038	
100		+20	16	0.019	
100		+30	26	0.031	
100		+40	47	0.056	
100		+45	43	0.023	
115	4.0	+20	-65	-0.078	
85	3.5	+20	-35	-0.042	

WCDMA Band II, Channel 9400, Frequency 1880.0MHz Limit =Within Authorized Band					
Voltage (%)	**Power (VDC)**	**Temp (°C)**	**Fre. Dev. (Hz)**	**Deviation (ppm)**	**Result**
100	3.7	+20(Ref)	25	0.013	PASS
100		-10	-85	-0.045	
100		0	-37	-0.020	
100		+10	-26	-0.014	
100		+20	86	0.046	
100		+30	83	0.044	
100		+40	52	0.028	
100		+45	47	0.056	
115	4.0	+20	43	0.023	
85	3.5	+20	-86	-0.046	

WCDMA Band IV, Channel 1413, Frequency 1732.6MHz Limit =Within Authorized Band					
Voltage (%)	**Power (VDC)**	**Temp (°C)**	**Fre. Dev. (Hz)**	**Deviation (ppm)**	**Result**
100	3.7	+20(Ref)	27	0.012	PASS
100		-10	-84	-0.047	
100		0	-36	-0.021	
100		+10	-25	-0.016	
100		+20	88	0.042	
100		+30	81	0.045	
100		+40	55	0.026	
100		+45	46	0.054	
115	4.0	+20	44	0.021	
85	3.5	+20	-85	-0.045	

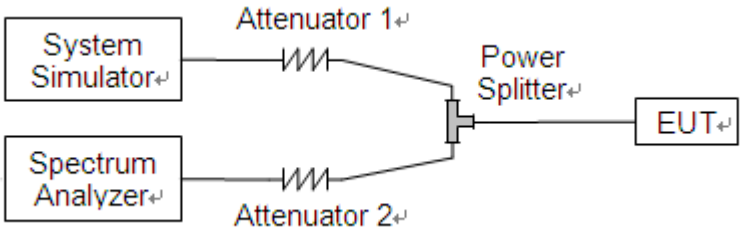
2.5. Conducted Out of Band Emissions

2.5.1. Requirement

According to FCC section 22.917(a) and 24.238(a), 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. This calculated to be -13dBm.

2.5.2. Test Description

Test Setup:

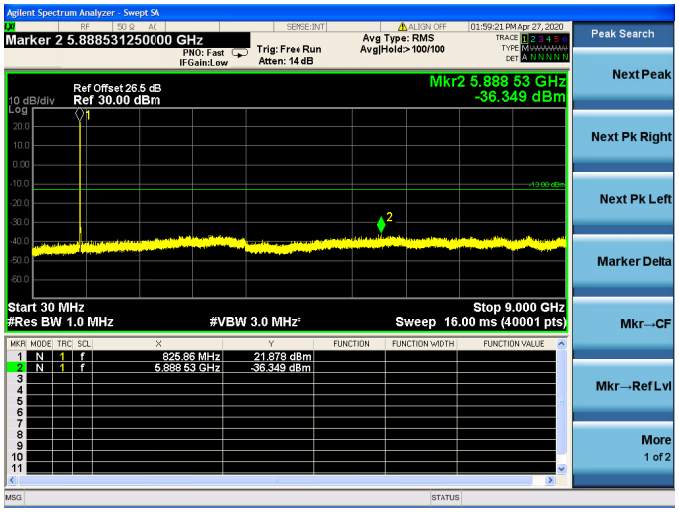


The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.

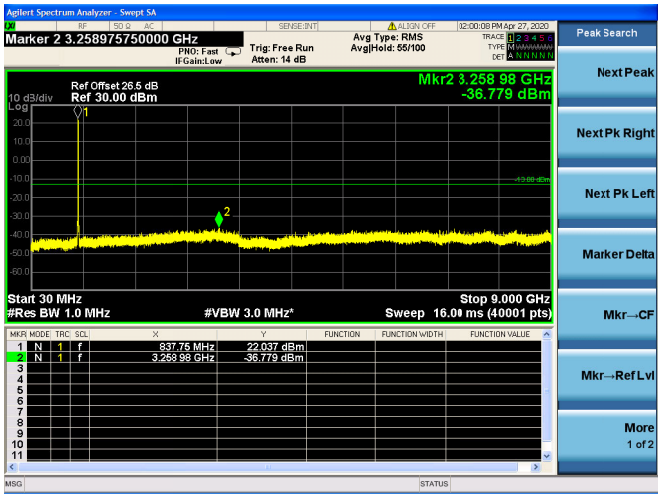
2.5.3. Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.

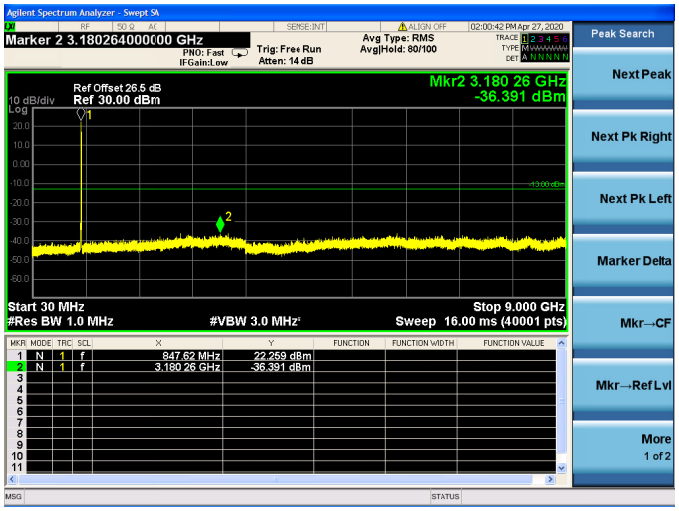
WCDMA Band V CH4132 826.4MHz



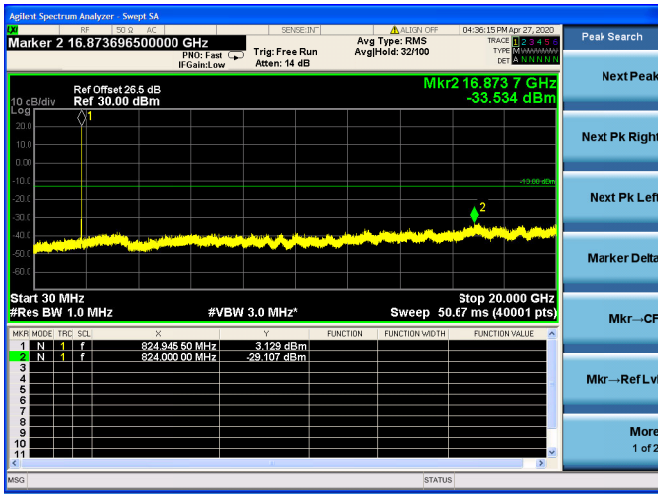
WCDMA Band V CH4183 836.4MHz



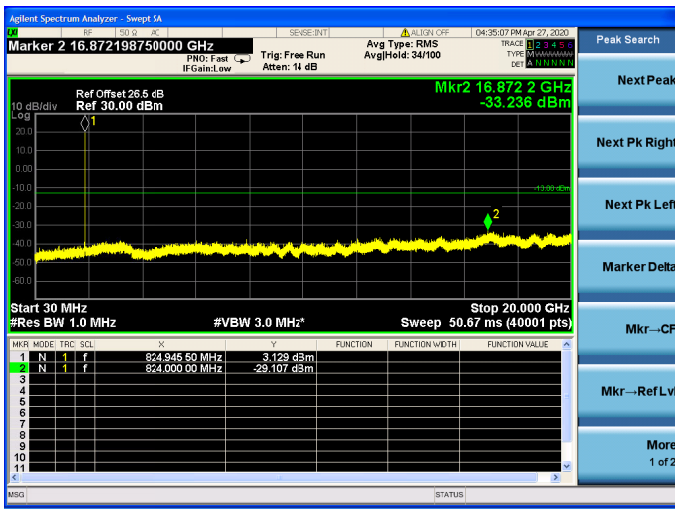
WCDMA Band V CH4233 846.6MHz



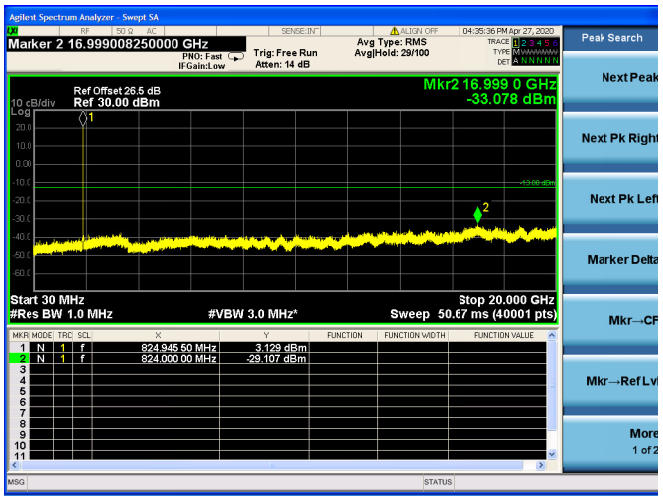
WCDMA Band II CH9262 1852.4MHz



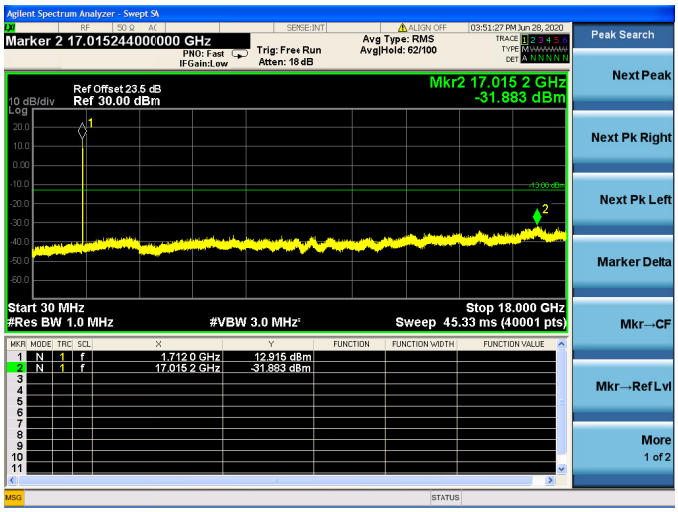
WCDMA Band II CH9400 1880.0MHz



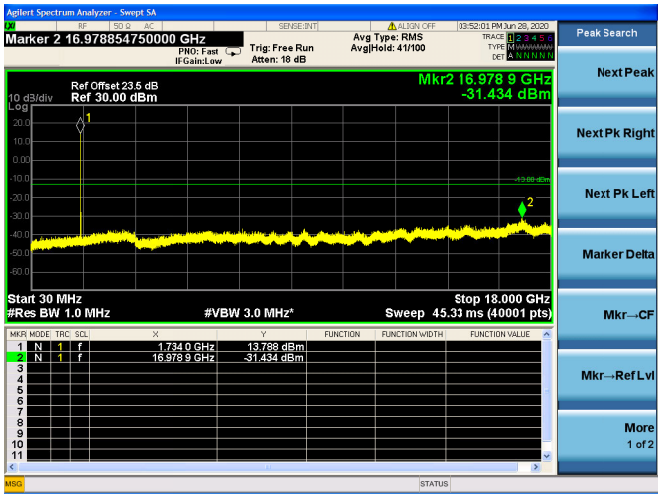
WCDMA Band II CH9538 1907.6MHz



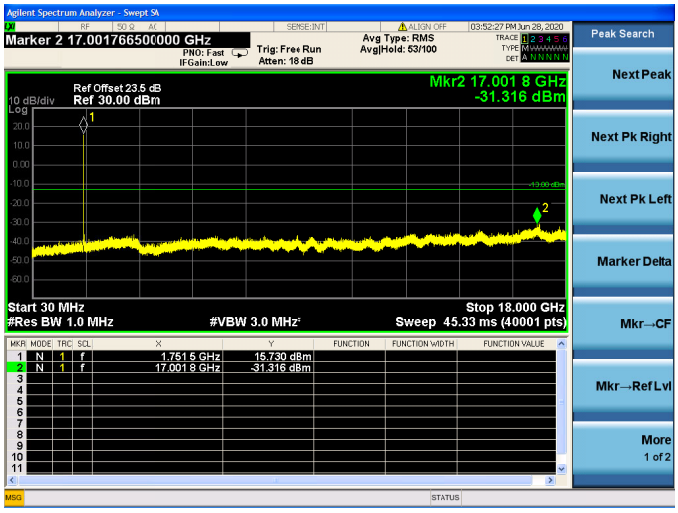
WCDMA Band IV CH1312 1712.4MHz



WCDMA Band IV CH1413 1732.6MHz



WCDMA Band IV CH1513 1752.6MHz



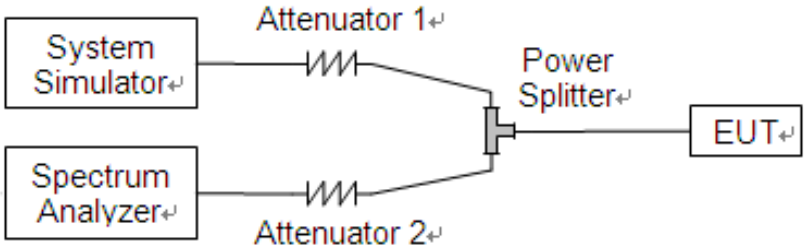
2.6. Band Edge

2.6.1. Requirement

According to FCC section 22.917(b) and 24.238(b), in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth (—26dB emission bandwidth) of the fundamental emission of the transmitter may be employed.

2.6.2. Test Description

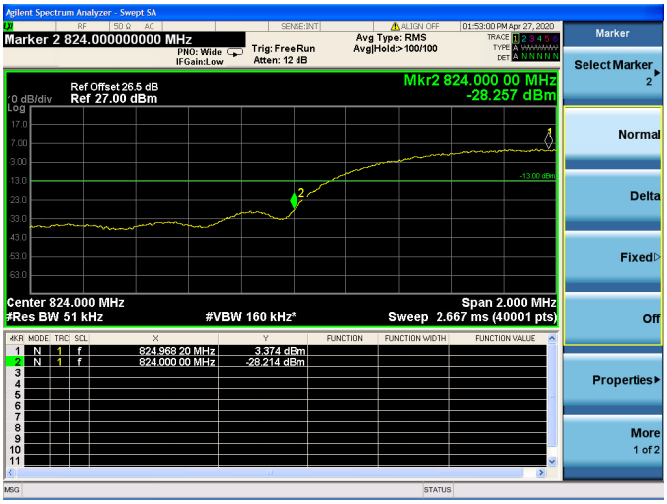
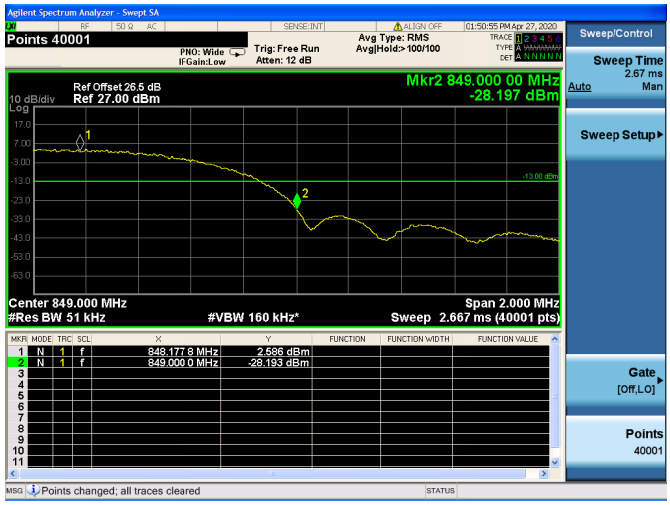
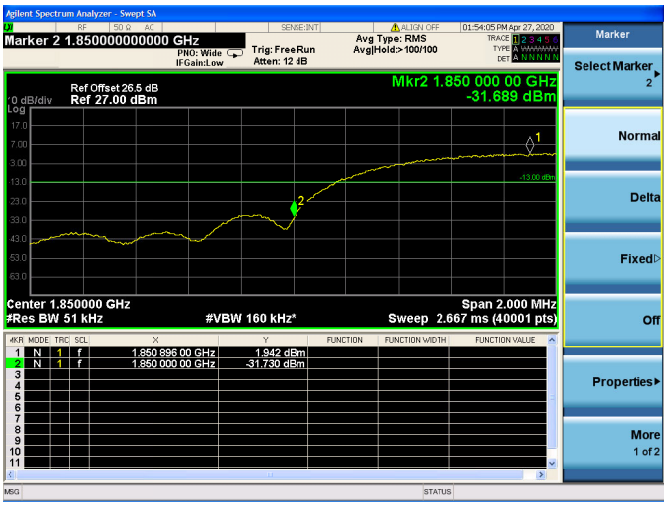
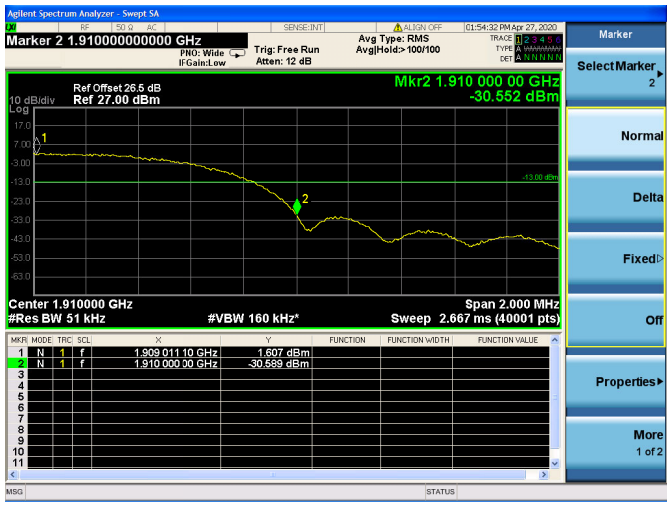
Test Setup:

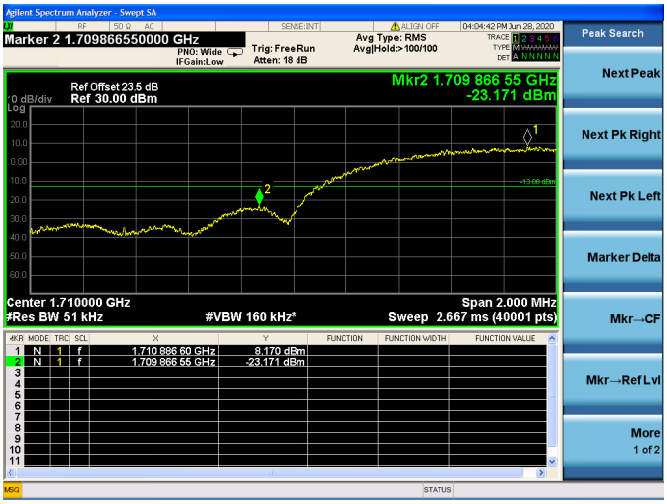
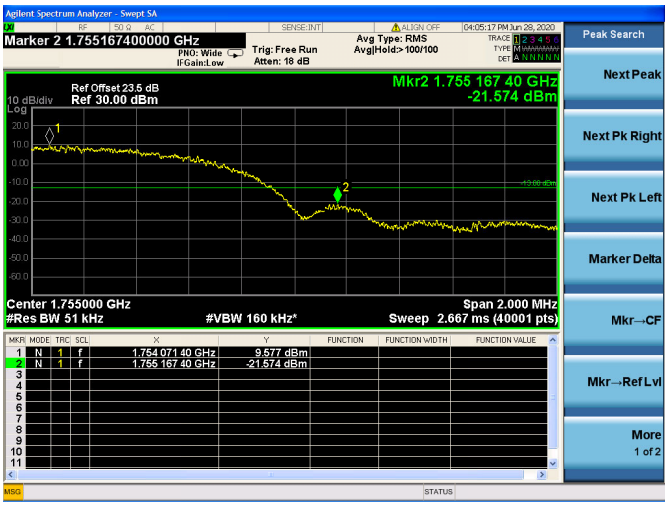


The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.

2.6.3. Test Result

The lowest and highest channels are tested to verify the band edge emissions.

WCDMA Band V CH4132 826.4MHz	WCDMA Band V CH4233 846.6MHz
	
WCDMA Band II CH9262 1852.4MHz	**WCDMA Band II CH9538 1907.6MHz**
	

WCDMA Band IV CH1312 1712.4MHz	WCDMA Band IV CH1513 1752.6MHz
	

2.7. Transmitter Radiated Power (EIRP/ERP)

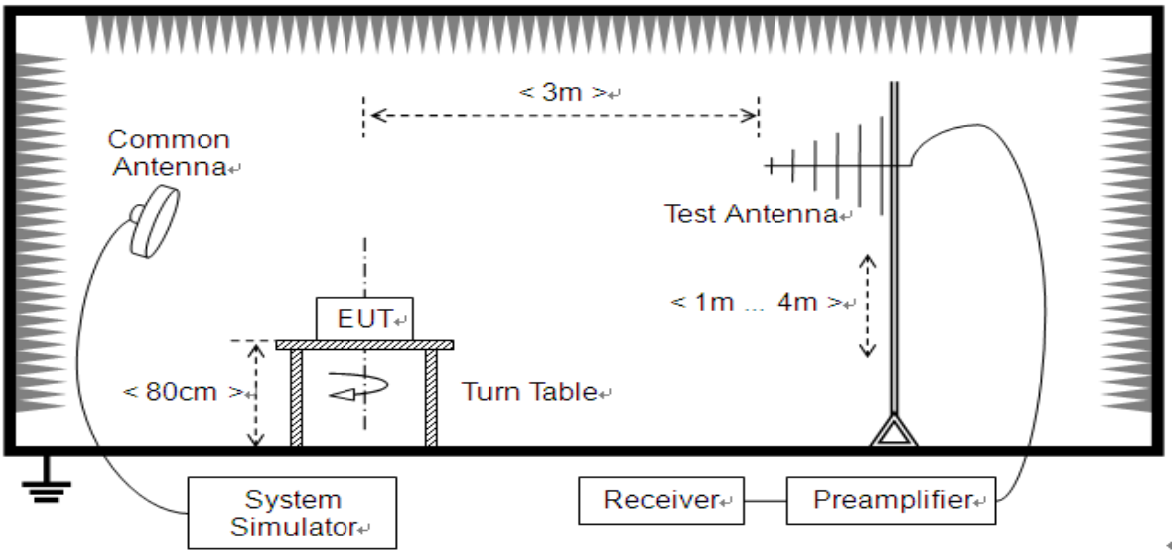
2.7.1. Requirement

According to FCC section 22.913, the Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.
According to FCC section 24.232, the broadband PCS mobile station is limited to 2 Watts e.i.r.p. peak power.

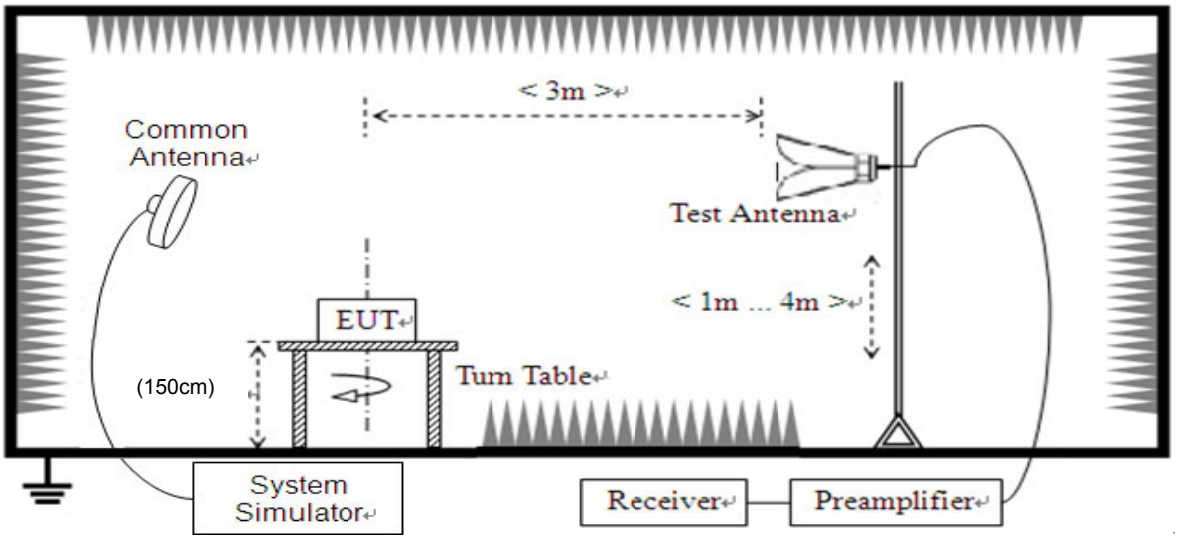
2.7.2. Test Description

Test Setup:

1) Below1GHz



2) Above 1GHz



The EUT is located in a 3m Full-Anechoic Chamber; the cable loss, air loss and so on of the site as factors are pre-calibrated using the "Substitution" method, and calculated to correct the reading.

A call is established between the EUT and the SS via a Common Antenna. The EUT is commanded by the SS to operate at the maximum and minimum output power (i.e. GSM850MHz band Power Control Level (PCL) = 5/19 and Power Class = 4, GSM1900MHz band Power Control Level (PCL) = 0/15 and Power Class = 1), and only the test result of the maximum output power was recorded. Please refer to section 2.1.3 of this report.

- Step size (dB): 3dB

The Test Antenna is a Bi-Log one (used for 30MHz to 1GHz) or a Horn one (used for above 3GHz), it's located at the same height as the EUT. The Filters consists of Notch Filters and High Pass Filter.

2.7.3. Test Result

The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. The lowest, middle and highest channels are tested.

The substitution corrections are obtained as described below:

$A_{SUBST} = P_{SUBST_TX} - P_{SUBST_RX} - L_{SUBST_CABLES} + G_{SUBST_TX_ANT}$

$A_{TOT} = L_{CABLES} + A_{SUBST}$

Where A_{SUBST} is the final substitution correction including receive antenna gain.

P_{SUBST_TX} is signal generator level,

P_{SUBST_RX} is receiver level,

L_{SUBST_CABLES} is cable losses including TX cable,

$G_{SUBST_TX_ANT}$ is substitution antenna gain.

A_{TOT} is total correction factor including cable loss and substitution correction

During the test, the data of A_{TOT} was added in the Test Spectrum Analyze, so Spectrum Analyze reading is the final values which contain the data of A_{TOT}.

WCDMA Test verdict:

Band	Channel	Frequency (MHz)	Measured ERP		Limit		Verdict
			dBm	W	dBm	W	
WCDMA Band V	4132	826.4	20.69	0.117	38.5	7	PASS
	4182	836.4	20.78	0.120			PASS
	4233	846.6	20.73	0.118			PASS
HSDPA Band V	4132	826.4	19.45	0.088	38.5	7	PASS
	4182	836.4	19.54	0.090			PASS
	4233	846.6	19.41	0.087			PASS
HSUPA Band V	4132	826.4	19.50	0.089	38.5	7	PASS
	4182	836.4	19.60	0.091			PASS
	4233	846.6	19.51	0.089			PASS
HSPA+ Band V	4132	826.4	19.41	0.087	38.5	7	PASS
	4182	836.4	19.50	0.089			PASS
	4233	846.6	19.41	0.087			PASS
DC-HSDPA Band V	4132	826.4	20.38	0.109	38.5	7	PASS
	4182	836.4	20.38	0.109			PASS
	4233	846.6	20.31	0.107			PASS

Note: Both horizontal and vertical polarizations of the test antenna are evaluated respectively, only the worst data (horizontal) were recorded in this report.

Band	Channel	Frequency (MHz)	Measured EIRP		Limit		Verdict
			dBm	W	dBm	W	
WCDMA Band II	9262	1852.4	23.12	0.205	33	2	PASS
	9400	1880.0	23.14	0.206			PASS
	9538	1907.6	23.02	0.200			PASS
HSDPA Band II	9262	1852.4	21.77	0.150	33	2	PASS
	9400	1880.0	21.59	0.144			PASS
	9538	1907.6	21.71	0.148			PASS
HSUPA Band II	9262	1852.4	21.82	0.152	33	2	PASS
	9400	1880.0	21.62	0.145			PASS
	9538	1907.6	21.83	0.152			PASS
HSPA+ Band II	9262	1852.4	21.74	0.149	33	2	PASS
	9400	1880.0	21.55	0.143			PASS
	9538	1907.6	21.73	0.149			PASS
DC-HSDPA Band II	9262	1852.4	23.18	0.208	33	2	PASS
	9400	1880.0	23.27	0.212			PASS
	9538	1907.6	23.28	0.213			PASS

Note: Both horizontal and vertical polarizations of the test antenna are evaluated respectively, only the worst data (horizontal) were recorded in this report.

Band	Channel	Frequency (MHz)	Measured EIRP		Limit		Verdict
			dBm	W	dBm	W	
WCDMA Band IV	1312	1712.4	23.21	0.209	33	2	PASS
	1413	1732.6	23.40	0.219			PASS
	1513	1752.6	23.37	0.217			PASS
HSDPA Band IV	1312	1712.4	23.16	0.207	33	2	PASS
	1413	1732.6	23.19	0.208			PASS
	1513	1752.6	23.13	0.206			PASS
HSUPA Band IV	1312	1712.4	22.65	0.184	33	2	PASS
	1413	1732.6	22.63	0.183			PASS
	1513	1752.6	22.68	0.185			PASS
HSPA+ Band IV	1312	1712.4	21.89	0.155	33	2	PASS
	1413	1732.6	21.85	0.153			PASS
	1513	1752.6	21.88	0.154			PASS
DC-HSDPA Band IV	1312	1712.4	21.27	0.134	33	2	PASS
	1413	1732.6	21.31	0.135			PASS
	1513	1752.6	21.28	0.134			PASS

Note: Both horizontal and vertical polarizations of the test antenna are evaluated respectively, only the worst data (horizontal) were recorded in this report.

2.8. Radiated Out of Band Emissions

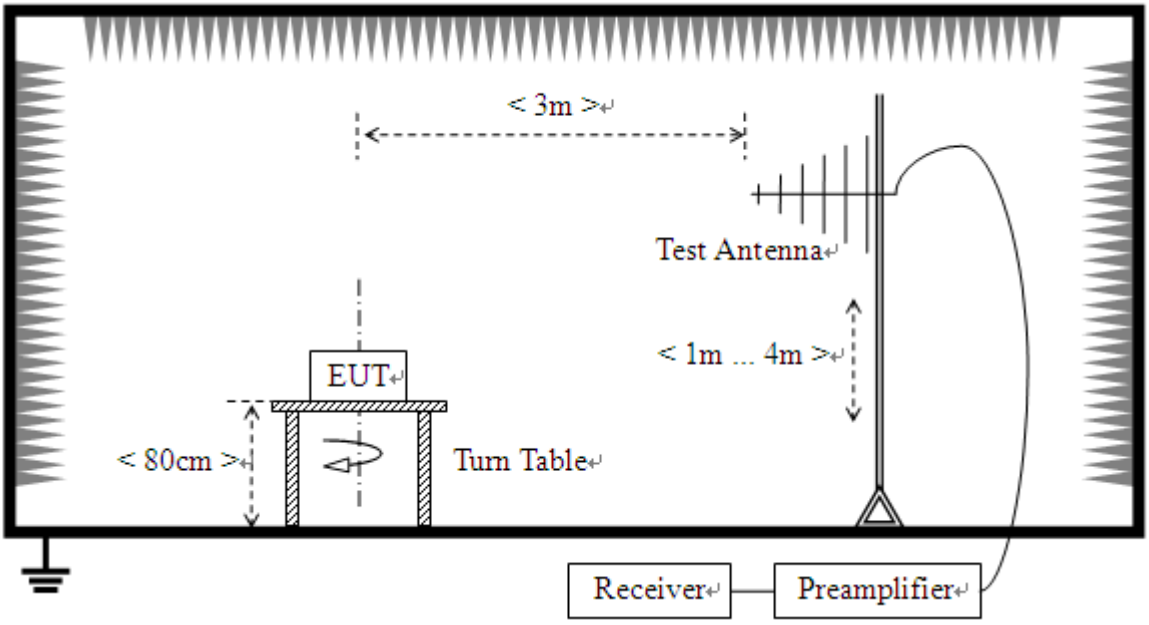
2.8.1. Requirement

According to FCC section 2.1051, 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. This calculated to be -13dBm.

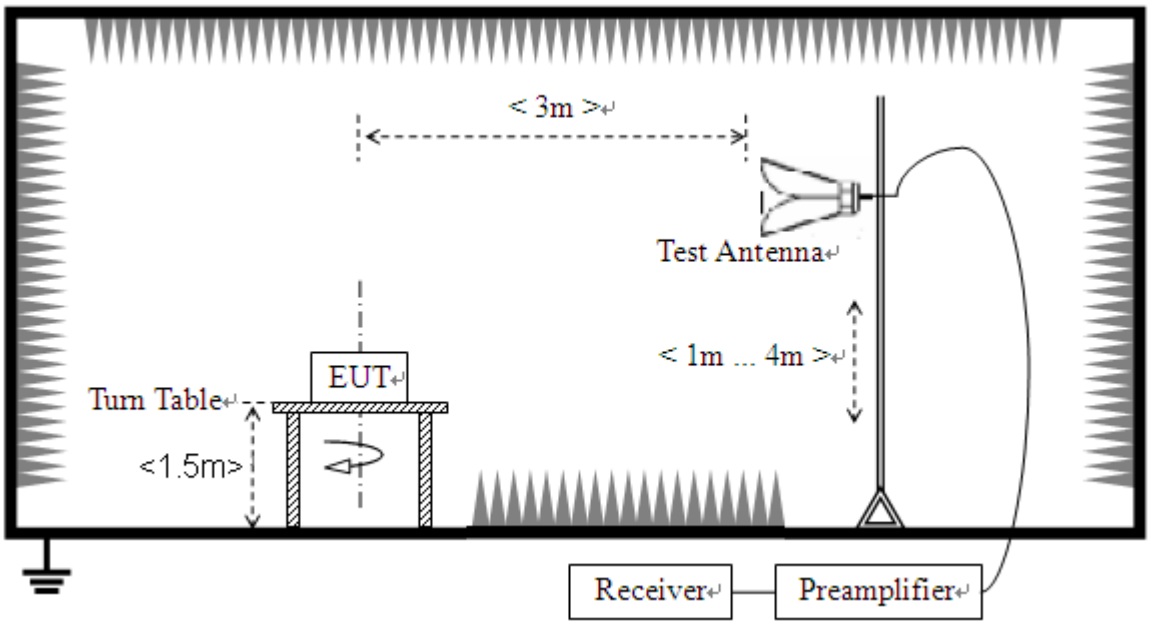
2.8.2. Test Description

Test Setup:

1) Below1GHz



2) Above 1GHz



The EUT is located in a 3m Full-Anechoic Chamber, the cable loss, air loss and so on of the site as factors are pre-calibrated using the "Substitution" method, and calculated to correct the reading.

A call is established between the EUT and the SS via a Common Antenna. The EUT is commanded by the SS to operate at the maximum and minimum output power (i.e. GSM850MHz band Power Control Level (PCL) = 5/19 and Power Class = 4, GSM1900MHz band Power Control Level (PCL) = 0/15 and Power Class = 1), and only the test result of the maximum output power was recorded. Please refer to section 2.1.3 of this report.

- Step size (dB): 3dB

The Test Antenna is a Bi-Log one (used for 30MHz to 1GHz) and a Horn one (used for above 3 GHz), it's located at the same height as the EUT. The Filters consists of Notch Filters and High Pass Filter.

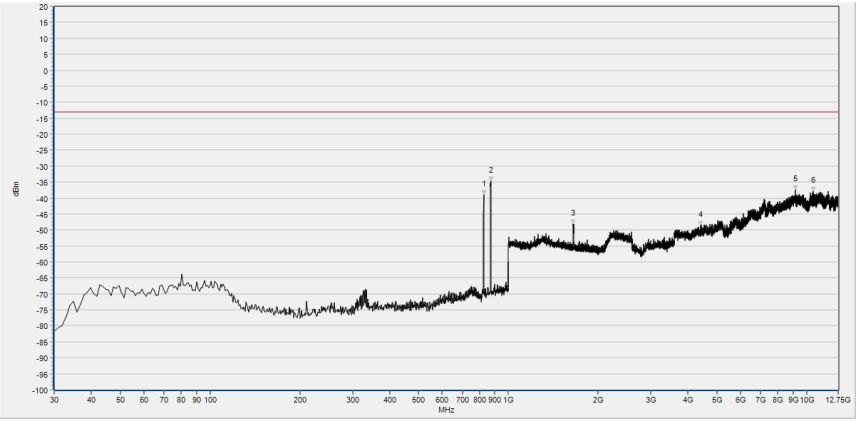
Note: when doing measurements above 1GHz, the EUT has been within the 3dB cone width of the horn antenna during horizontal antenna.

2.8.3. Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. The lowest, middle and highest channels are tested to verify the out of band emissions. The power of the EUT transmitting frequency should be ignored.

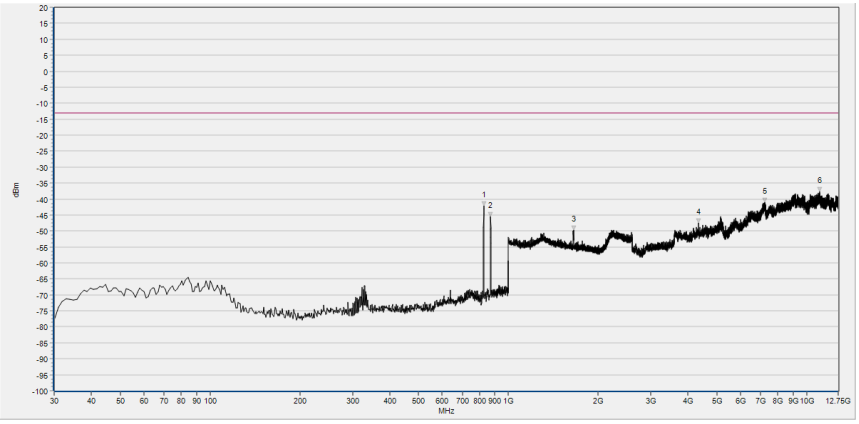
Band	Channel	Frequency (MHz)	Measured Max. Spurious Emission (dBm)		Limit (dBm)	Verdict
			Test Antenna Horizontal	Test Antenna Vertical		
WCDMA Band V	4132	826.4	< -25	< -25	-13	PASS
	4183	836.4	< -25	< -25		PASS
	4233	846.6	< -25	< -25		PASS
WCDMA Band II	9262	1852.4	< -25	< -25	-13	PASS
	9400	1880.0	< -25	< -25		PASS
	9538	1907.6	< -25	< -25		PASS
WCDMA Band IV	1312	1712.4	< -25	< -25	-13	PASS
	1413	1732.6	< -25	< -25		PASS
	1513	1752.6	< -25	< -25		PASS

Note 1: All test mode and condition mentioned were considered and evaluated respectively by performing full test, only the worst data were recorded and reported.
Note 2: All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.



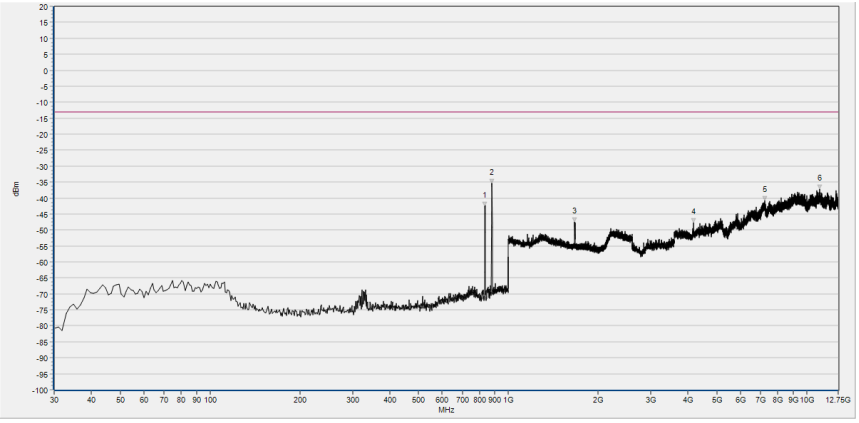
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	826.370	-39.01	-13.00	Horizontal	NA
2	872.930	-34.73	-13.00	Horizontal	NA
3	1650.500	-48.19	-13.00	Horizontal	PASS
4	4412.566	-48.68	-13.00	Horizontal	PASS
5	9150.709	-37.38	-13.00	Horizontal	PASS
6	10509.211	-37.77	-13.00	Horizontal	PASS

(WCDMA Band V, Channel = 4132, Horizontal)



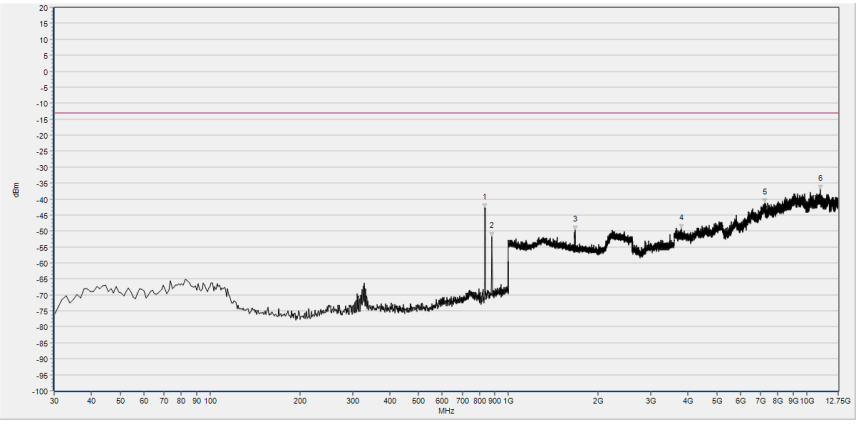
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	827.340	-42.11	-13.00	Vertical	NA
2	871.960	-45.56	-13.00	Vertical	NA
3	1654.982	-49.81	-13.00	Vertical	PASS
4	4329.505	-47.39	-13.00	Vertical	PASS
5	7216.321	-41.07	-13.00	Vertical	PASS
6	11048.181	-37.68	-13.00	Vertical	PASS

(WCDMA Band V, Channel = 4132, Vertical)



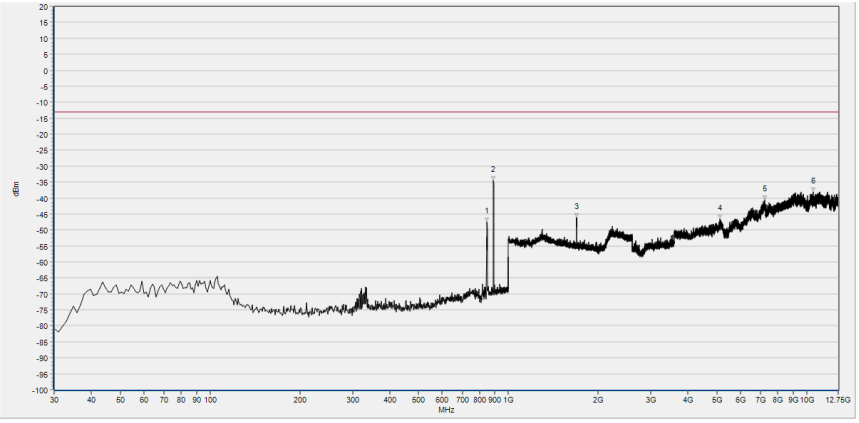
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	834.130	-42.57	-13.00	Horizontal	NA
2	878.750	-35.34	-13.00	Horizontal	NA
3	1667.787	-47.48	-13.00	Horizontal	PASS
4	4174.459	-47.74	-13.00	Horizontal	PASS
5	7236.625	-40.81	-13.00	Horizontal	PASS
6	11070.331	-37.29	-13.00	Horizontal	PASS

(WCDMA Band V, Channel = 4183, Horizontal)



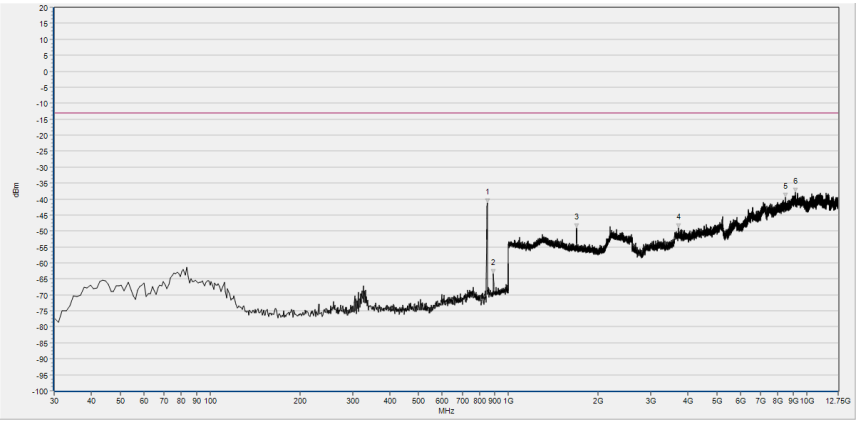
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	834.130	-42.78	-13.00	Vertical	NA
2	879.720	-51.69	-13.00	Vertical	NA
3	1672.269	-49.76	-13.00	Vertical	PASS
4	3801.609	-49.33	-13.00	Vertical	PASS
5	7234.779	-41.18	-13.00	Vertical	PASS
6	11090.635	-37.03	-13.00	Vertical	PASS

(WCDMA Band V, Channel = 4183, Vertical)



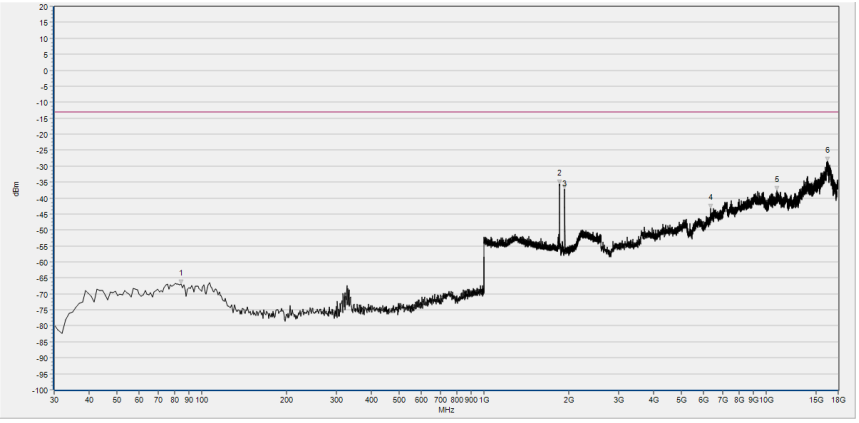
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	847.710	-47.47	-13.00	Horizontal	NA
2	890.390	-34.50	-13.00	Horizontal	NA
3	1690.836	-46.20	-13.00	Horizontal	PASS
4	5112.120	-46.58	-13.00	Horizontal	PASS
5	7229.242	-40.55	-13.00	Horizontal	PASS
6	10536.898	-38.08	-13.00	Horizontal	PASS

(WCDMA Band V, Channel = 4233, Horizontal)



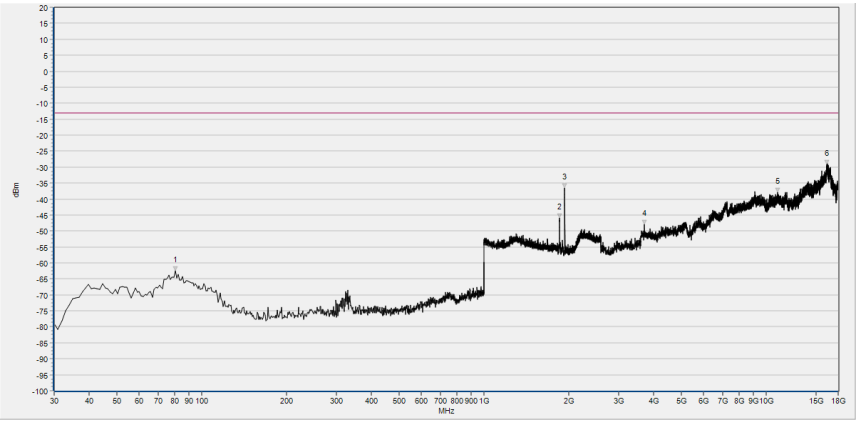
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	848.680	-41.18	-13.00	Vertical	NA
2	890.390	-63.46	-13.00	Vertical	NA
3	1695.318	-49.15	-13.00	Vertical	PASS
4	3724.086	-49.02	-13.00	Vertical	PASS
5	8493.608	-39.44	-13.00	Vertical	PASS
6	9141.480	-37.98	-13.00	Vertical	PASS

(WCDMA Band V, Channel = 4233, Vertical)



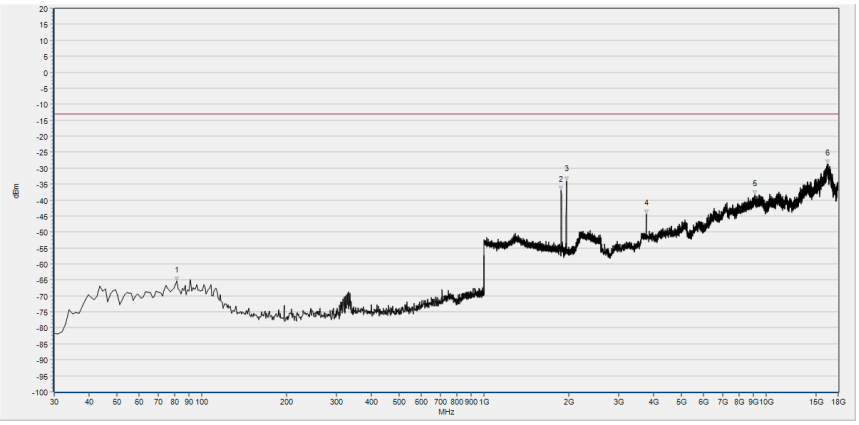
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	84.320	-66.84	-13.00	Horizontal	PASS
2	1850.900	-35.60	-13.00	Horizontal	NA
3	1932.853	-37.30	-13.00	Horizontal	NA
4	6366.685	-43.33	-13.00	Horizontal	PASS
5	10906.310	-37.73	-13.00	Horizontal	PASS
6	16532.533	-28.58	-13.00	Horizontal	PASS

(WCDMA Band II, Channel = 9262, Horizontal)



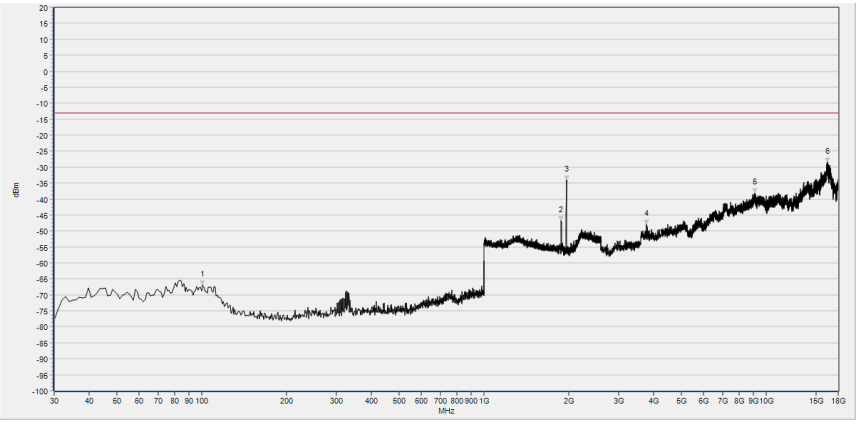
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	80.440	-62.50	-13.00	Vertical	PASS
2	1851.541	-46.02	-13.00	Vertical	NA
3	1932.853	-36.52	-13.00	Vertical	NA
4	3706.201	-47.87	-13.00	Vertical	PASS
5	10965.121	-37.82	-13.00	Vertical	PASS
6	16414.912	-29.20	-13.00	Vertical	PASS

(WCDMA Band II, Channel = 9262, Vertical)



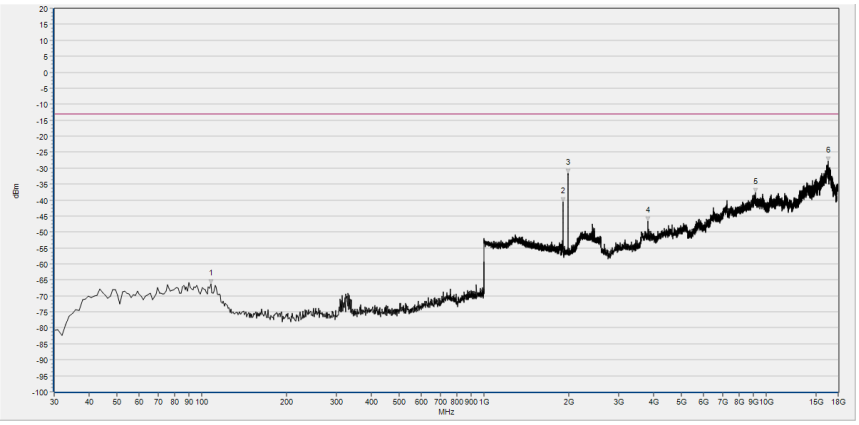
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	81.410	-65.46	-13.00	Horizontal	PASS
2	1879.072	-36.97	-13.00	Horizontal	NA
3	1960.384	-34.09	-13.00	Horizontal	NA
4	3756.610	-44.26	-13.00	Horizontal	PASS
5	9102.782	-38.39	-13.00	Horizontal	PASS
6	16532.533	-28.61	-13.00	Horizontal	PASS

(WCDMA Band II, Channel = 9400, Horizontal)



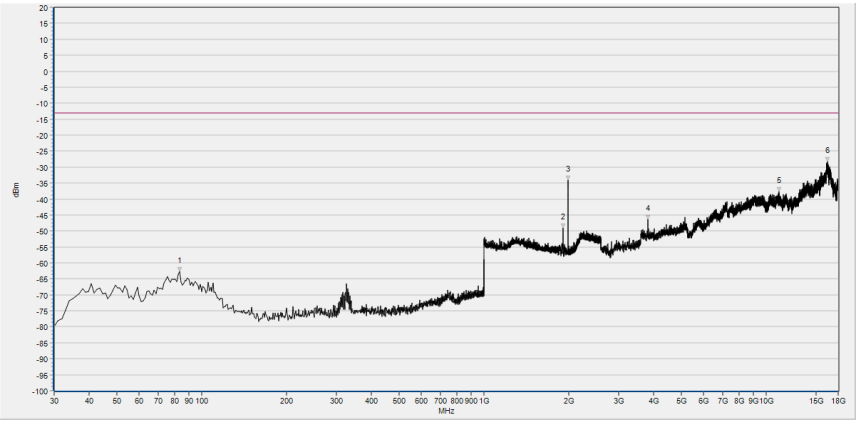
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	100.810	-66.94	-13.00	Vertical	PASS
2	1879.072	-46.88	-13.00	Vertical	NA
3	1959.744	-34.07	-13.00	Vertical	NA
4	3759.411	-48.01	-13.00	Vertical	PASS
5	9094.381	-38.08	-13.00	Vertical	PASS
6	16532.533	-28.42	-13.00	Vertical	PASS

(WCDMA Band II, Channel = 9400, Vertical)



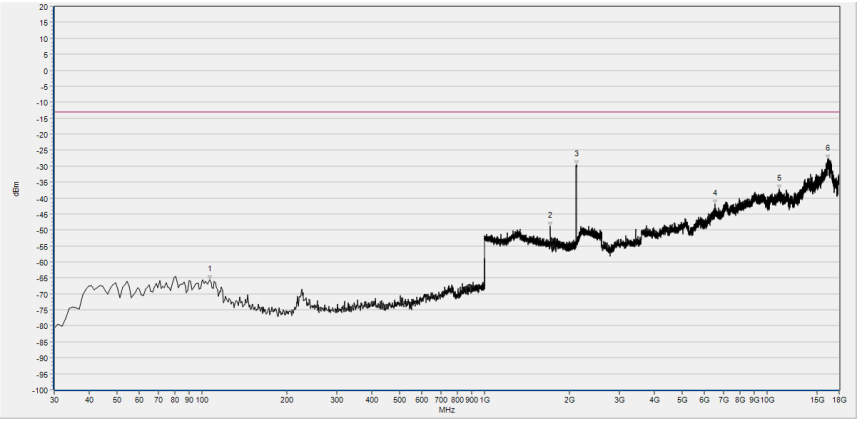
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	107.600	-66.25	-13.00	Horizontal	PASS
2	1908.523	-40.66	-13.00	Horizontal	NA
3	1985.994	-31.68	-13.00	Horizontal	NA
4	3815.421	-46.69	-13.00	Horizontal	PASS
5	9153.191	-37.55	-13.00	Horizontal	PASS
6	16552.137	-27.74	-13.00	Horizontal	PASS

(WCDMA Band II, Channel = 9538, Horizontal)



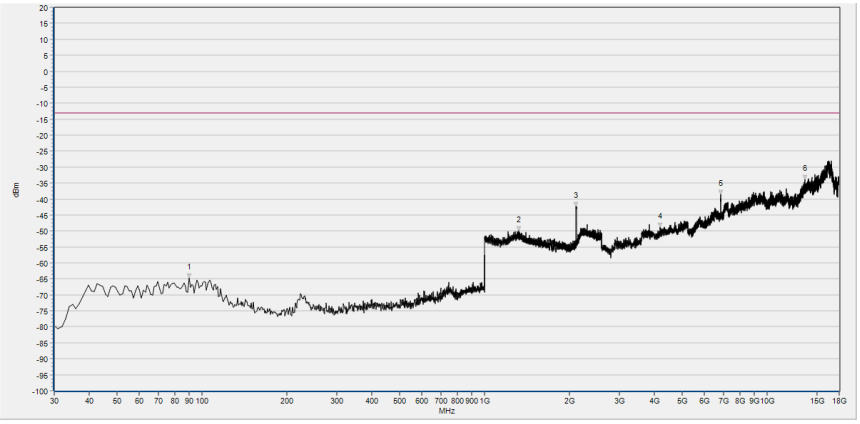
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	83.350	-62.69	-13.00	Vertical	PASS
2	1908.523	-48.98	-13.00	Vertical	NA
3	1987.275	-34.16	-13.00	Vertical	NA
4	3812.620	-46.30	-13.00	Vertical	PASS
5	11077.141	-37.66	-13.00	Vertical	PASS
6	16538.134	-28.24	-13.00	Vertical	PASS

(WCDMA Band II, Channel = 9538, Vertical)



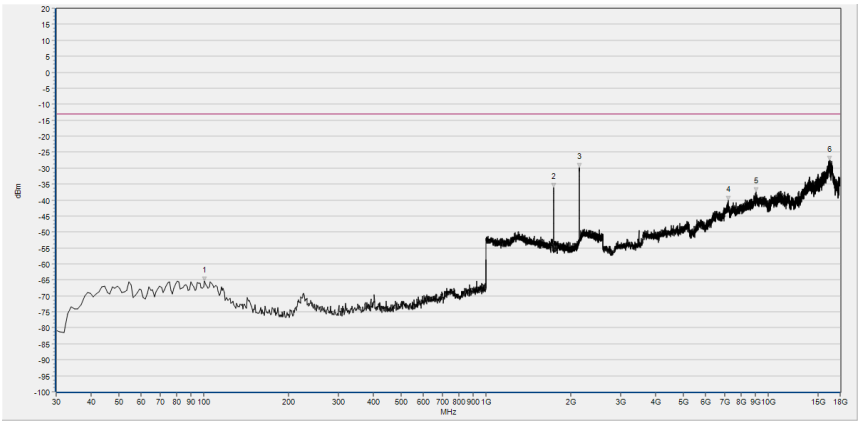
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	106.630	-65.58	-13.00	Horizontal	PASS
2	1711.325	-48.74	-13.00	Horizontal	NA
3	2112.765	-29.63	-13.00	Horizontal	NA
4	6540.316	-41.99	-13.00	Horizontal	PASS
5	11065.939	-37.23	-13.00	Horizontal	PASS
6	16409.311	-27.92	-13.00	Horizontal	PASS

(WCDMA Band IV, Channel = 1312, Horizontal)



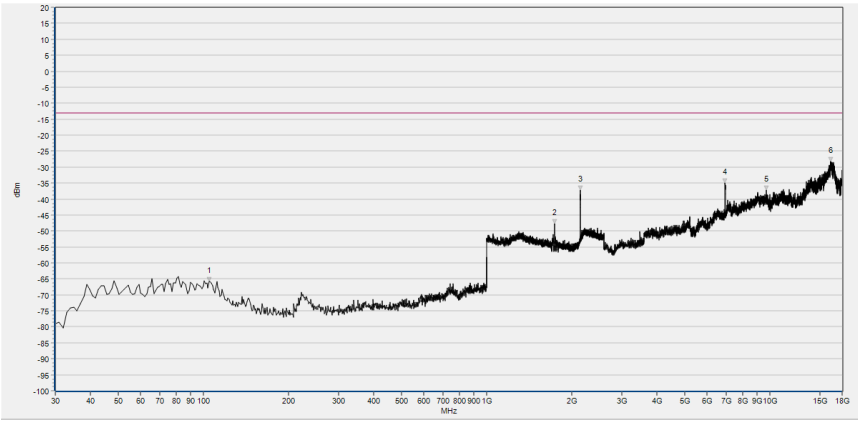
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	90.140	-64.63	-13.00	Vertical	PASS
2	1322.689	-50.00	-13.00	Vertical	PASS
3	2111.485	-42.34	-13.00	Vertical	NA
4	4187.889	-48.76	-13.00	Vertical	PASS
5	6845.572	-38.55	-13.00	Vertical	PASS
6	13594.799	-33.96	-13.00	Vertical	PASS

(WCDMA Band IV, Channel = 1312, Vertical)



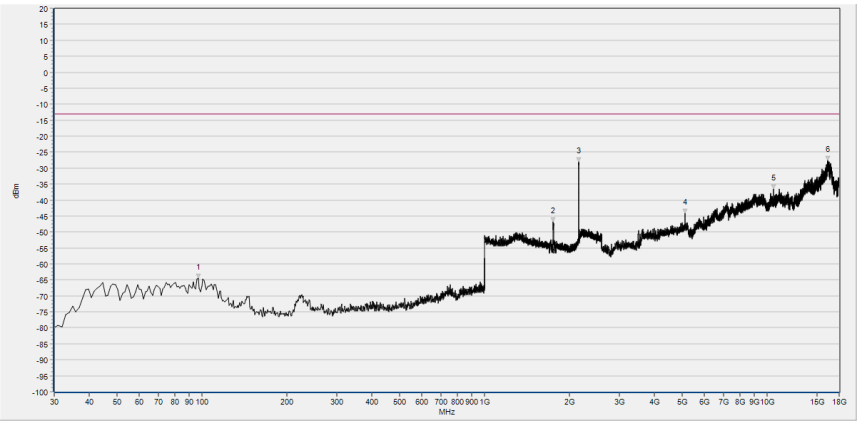
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	100.810	-65.27	-13.00	Horizontal	PASS
2	1738.856	-36.13	-13.00	Horizontal	NA
3	2138.375	-29.88	-13.00	Horizontal	NA
4	7215.239	-40.06	-13.00	Horizontal	PASS
5	9066.376	-37.46	-13.00	Horizontal	PASS
6	16529.733	-27.64	-13.00	Horizontal	PASS

(WCDMA Band IV, Channel = 1413, Horizontal)



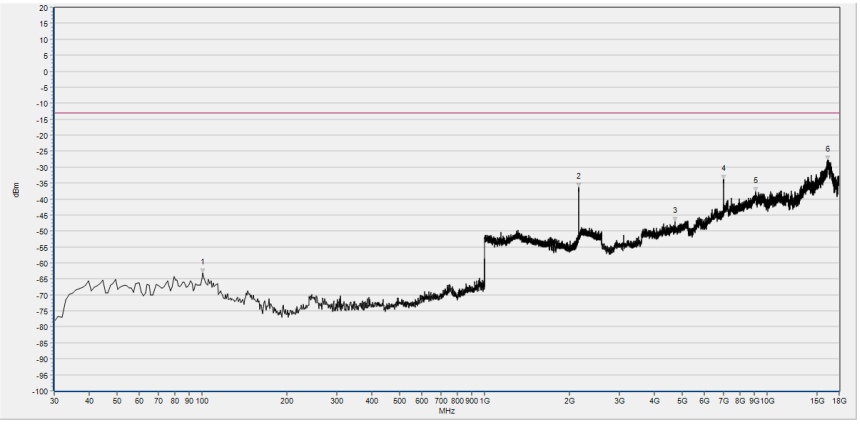
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	104.690	-65.79	-13.00	Vertical	PASS
2	1738.215	-47.72	-13.00	Vertical	NA
3	2140.936	-37.24	-13.00	Vertical	NA
4	6954.792	-34.99	-13.00	Vertical	PASS
5	9716.094	-37.28	-13.00	Vertical	PASS
6	16389.707	-28.30	-13.00	Vertical	PASS

(WCDMA Band IV, Channel = 1413, Vertical)



Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	96.930	-64.43	-13.00	Horizontal	PASS
2	1751.020	-46.80	-13.00	Horizontal	NA
3	2153.741	-28.00	-13.00	Horizontal	NA
4	5137.261	-44.06	-13.00	Horizontal	PASS
5	10525.441	-36.53	-13.00	Horizontal	PASS
6	16398.109	-27.64	-13.00	Horizontal	PASS

(WCDMA Band IV, Channel = 1513, Horizontal)



Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	100.810	-63.03	-13.00	Vertical	PASS
2	2151.180	-36.28	-13.00	Vertical	NA
3	4719.985	-47.03	-13.00	Vertical	PASS
4	7005.201	-33.83	-13.00	Vertical	PASS
5	9139.189	-37.70	-13.00	Vertical	PASS
6	16378.505	-27.89	-13.00	Vertical	PASS

(WCDMA Band IV, Channel = 1513, Vertical)

Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test items	Uncertainty
Output Power	±2.22dB
Bandwidth	±5%
Conducted Spurious Emission	±2.77 dB
Radiated Emission	±2.95dB

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Laboratory Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.

4. Test Equipments Utilized

4.1 Conducted Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Power Splitter	NW521	1506A	Weinschel	2020.04.15	2021.04.14
Attenuator 1	(N/A.)	10dB	Resnet	2020.04.15	2021.04.14
Attenuator 2	(N/A.)	3dB	Resnet	2020.04.15	2021.04.14
EXA Signal Analzyer	MY51511149	N9020A	Agilent	2019.07.29	2020.07.28
USB Power Sensor	MY54210011	U2021XA	Agilent	2020.04.15	2021.04.14
System Simulator	6200995016	MT8820C	Anritsu	2020.01.13	2021.01.12
RF cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
Coaxial cable	CB02	RF02	Morlab	N/A	N/A
SMA connector	CN01	RF03	HUBER-SUHNER	N/A	N/A
Temperature Chamber	(N/A)	HUT705P	CHONGQING HANBA EXPERIMENTAL EQUIPMENT CO.,LTD	2020.03.25	2021.03.24

4.2 Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
System Simulator	152038	CMW500	R&S	2020.01.13	2021.01.12
Receiver	MY54130016	N9038A	Agilent	2019.07.29	2020.07.28
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2019.05.24	2022.05.23
Test Antenna - Horn	9170C-531	BBHA9170	Schwarzbeck	2019.07.26	2022.07.25
Test Antenna - Horn	01774	BBHA 9120D	Schwarzbeck	2019.05.24	2022.05.23
Coaxial cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial cable(N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
1-18GHz pre-Amplifier	S020180L3203	N/A	Dongsheng	2019.07.29	2020.07.28
18-26.5GHz pre-Amplifier	S10M100L3802	N/A	Dongsheng	2019.07.29	2020.07.28
Notch Filter	N/A	WRCG-GSM 850	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCG-GSM 1900	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV-W Band V	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV-W Band II	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV-W Band IV	Wainwright	2019.12.01	2020.11.30
Anechoic Chamber	N/A	9m*6m*6m	CRT	2019.07.13	2022.07.12

END OF REPORT