TEST REPORT

APPLICANT	:	Shenzhen Chainway Information Technology Co.,Ltd.
PRODUCT NAME	:	Fixed Android UHF Reader
MODEL NAME	:	URA8
BRAND NAME	:	CHAINWAY
FCC ID	:	2AC6AURA8
STANDARD(S)	:	47 CFR Part 22 Subpart H 47 CFR Part 24 Subpart E 47 CFR Part 27 Subpart L
RECEIPT DATE	:	2019-12-09
TEST DATE	:	2019-12-10 to 2019-12-29
ISSUE DATE	:	2020-01-13

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Change History		
Version	**Date**	**Reason for change**
1.0	2020-01-13	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Shenzhen Chainway Information Technology Co.,Ltd.
Applicant Address:	9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen
Manufacturer:	Shenzhen Chainway Information Technology Co.,Ltd.
ManufacturerAddress:	9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen

1.2. Equipment Under Test (EUT) Description

Product Name:	Fixed Android UHF Reader	
Hardware Version:	V12	
Software Version:	A8_20191010	
Modulation Type:	GPRS/GPRS Mode with GMSK Modulation WCDMA Mode with QPSK Modulation	
Operating Frequency Range:	**GPRS 850MHz:** Tx: 824.20 - 848.80MHz Rx: 869.20 - 893.80MHz **GPRS 1900MHz:** Tx: 1850.20 - 1909.80MHz Rx: 1930.20 - 1989.80MHz **WCDMA Band V** Tx: 826.4 - 846.6MHz Rx: 871.4 - 891.6MHz **WCDMA Band II** Tx: 1852.4 - 1907.6MHz Rx: 1932.4 - 1987.6MHz	
Antenna Type:	Fixed External	
Antenna Gain:	GPRS 850:	0.73 dBi
	GPRS1900:	1.20 dBi
	WCDMA Band V:	0.73 dBi
	WCDMA Band II:	1.20 dBi

Accessory Information:	AC Adapter 1	
	Brand Name:	FULLPOWER
	Model No.:	CGSW65-120-5000II
	Serial No.:	100-240V～50/60Hz 1.5A
	Rated Input:	12V⎓5.0A
	Rated Output:	FULLPOWER

Note 1: The transmitter (Tx) frequency arrangement of the Cellular 850MHz band used by the EUT can be represented with the formula F(n)=824.2+0.2*(n-128), 128<=n<=251; the lowest, middle, highest channel numbers (ARFCHs) used and tested in this report are separately 128 (824.2MHz), 190(836.6MHz) and 251 (848.8MHz).

Note 2: The transmitter (Tx) frequency arrangement of the PCS 1900MHz band used by the EUT can be represented with the formula F(n)=1850.2+0.2*(n-512), 512<=n<=810; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 512 (1850.2MHz), 661 (1880.0MHz) and 810 (1909.8MHz).

Note 3: 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 4: 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 5: 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 6: 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:
GPRS mode for GPRS 850;
GPRS mode for GPRS 1900;
WCDMA mode for WCDMA band V;
WCDMA mode for WCDMA band II;

Note 7: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. Maximum ERP/EIRP and Emission Designator

System	Maximum ERP/EIRP（W）	Emission Designator
GPRS850	2.056	245KGXW
GPRS1900	1.312	248KGXW
WCDMA Band V	0.159	4M18F9W
WCDMA Band II	0.144	4M18F9W

1.4. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part 22, Part 24 and Part 27 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
4	47 CFR Part 27(10-1-12 Edition)	Miscellaneous Wireless 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	Dec 14, 2019	Gao Mingzhou	PASS	No deviation
2	24.232(d), 27.50(d)	Peak -Average Ratio	Dec 12, 2019	Gao Mingzhou	PASS	No deviation
3	2.1049	99% Occupied Bandwidth	Dec 12, 2019	Gao Mingzhou	PASS	No deviation
4	2.1055,22.355, 24.235, 27.54	Frequency Stability	Dec 14 - 19, 2019	Gao Mingzhou	PASS	No deviation
5	2.1051,22.917(a),24.238(a), 27.53(h)	Conducted Out of Band Emissions	Dec 12, 2019	Gao Mingzhou	PASS	No deviation
6	2.1051,22.917(a),24.238(a), 27.53(h)	Band Edge	Dec 12, 2019	Gao Mingzhou	PASS	No deviation
7	22.913(a), 24.232(a)	Transmitter Radiated Power (EIPR/ERP)	Dec 12, 2019	Gao Jianrou	PASS	No deviation
8	2.1051,22.917(a),24.238(a), 27.53(h)	Radiated Out of Band Emissions	Dec 28, 2019	Gao Jianrou	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&27L Requirements

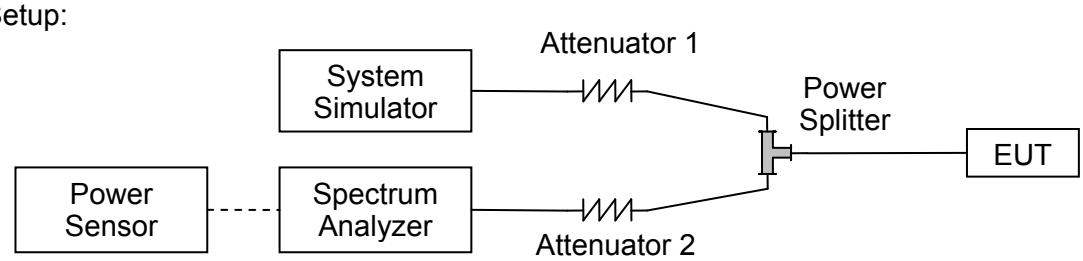
2.1. Conducted RF Output Power

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 EUTis 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

GPRS850	Average Power (dBm)		
TX Channel	**128**	**190**	**251**
Frequency (MHz)	**824.2**	**836.6**	**848.8**
GPRS 1 Tx slot	32.99	33.13	33.02
GPRS 2 Tx slot	32.74	32.90	32.78
GPRS 3 Tx slots	32.46	32.53	32.37
GPRS 4 Tx slots	32.07	32.20	32.11

GPRS1900	Average Power (dBm)		
TX Channel	**512**	**661**	**810**
Frequency (MHz)	**1850.2**	**1880**	**1909.8**
GPRS 1 Tx slot	31.18	31.03	30.88
GPRS 2 Tx slot	31.08	30.91	30.77
GPRS 3 Tx slots	30.98	30.79	30.63
GPRS 4 Tx slots	30.74	30.69	30.48

WCDMA Band V	Average Power (dBm)		
TX Channel	**4132**	**4182**	**4233**
Frequency (MHz)	**826.4**	**836.4**	**846.6**
RMC 12.2Kbps	22.02	21.97	21.98
HSDPA Subtest-1	21.33	21.36	21.46
HSDPA Subtest-2	21.31	21.32	21.37
HSDPA Subtest-3	20.78	20.79	20.89
HSDPA Subtest-4	20.82	20.72	20.83
HSUPA Subtest-1	19.35	19.43	19.44
HSUPA Subtest-2	19.35	19.43	19.35
HSUPA Subtest-3	20.27	20.34	20.41
HSUPA Subtest-4	18.83	18.91	19.00
HSUPA Subtest-5	20.26	20.32	20.32
HSPA+ (16QAM) Subtest-1	19.45	19.48	19.49

WCDMA Band II	Average Power (dBm)		
TX Channel	**9262**	**9400**	**9538**
Frequency (MHz)	**1852.4**	**1880.0**	**1907.6**
RMC 12.2Kbps	21.56	21.59	21.47
HSDPA Subtest-1	21.48	21.54	21.40
HSDPA Subtest-2	21.16	21.10	21.12
HSDPA Subtest-3	20.93	21.01	20.87
HSDPA Subtest-4	20.94	21.01	20.87
HSUPA Subtest-1	19.51	19.54	19.45
HSUPA Subtest-2	19.49	19.52	19.39
HSUPA Subtest-3	20.52	20.52	20.43
HSUPA Subtest-4	19.03	19.04	18.95
HSUPA Subtest-5	20.42	20.48	20.42
HSPA+ (16QAM) Subtest-1	19.40	19.41	19.42

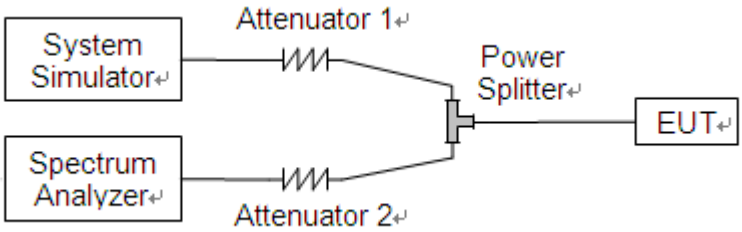
2.2. Peak to Average Ratio

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 EUTis 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 GPRS/EDGE 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

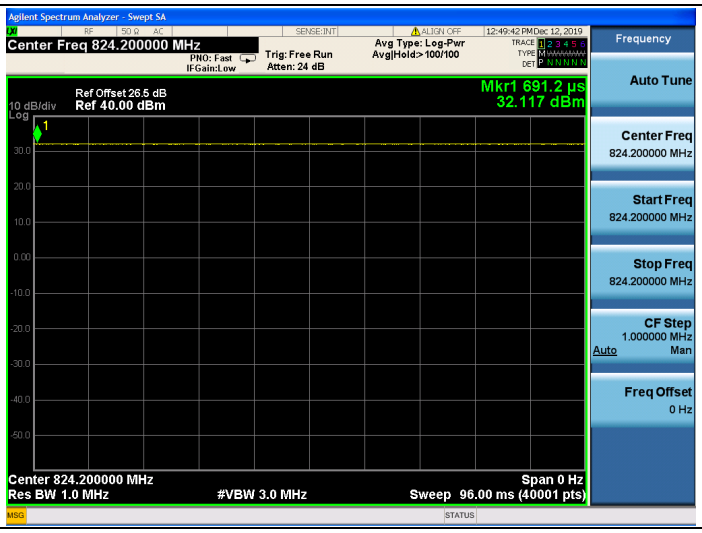
The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

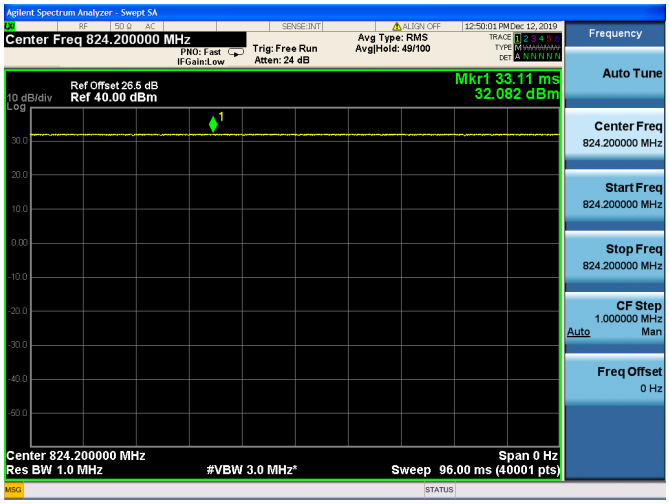
A. Test Verdict:

Band	Channel	Frequency (MHz)	Peak to Average ratio dB	Limit dB	Verdict
GPRS850 MHz	128	824.2	0.035	13	PASS
	190	836.6	0.013		PASS
	251	848.8	0.007		PASS
GPRS 1900MHz	512	1850.2	0.020		PASS
	661	1880.0	0.430		PASS
	810	1909.8	0.006		PASS

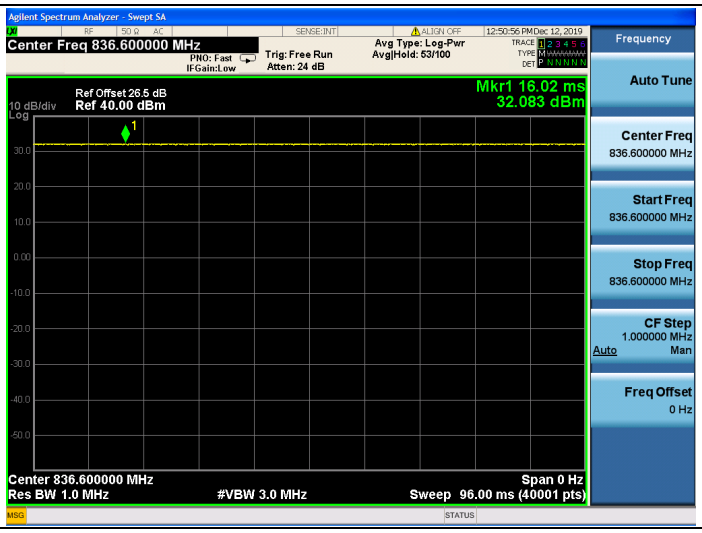
Band	Channel	Frequency (MHz)	Peak to Average ratio dB	Limit dB	Verdict
WCDMA Band V	4132	826.4	3.69	13	PASS
	4182	836.4	4.08		PASS
	4233	846.6	3.77		PASS
WCDMA Band II	9262	1852.4	4.07		PASS
	9400	1880.0	3.96		PASS
	9538	1907.6	4.64		PASS

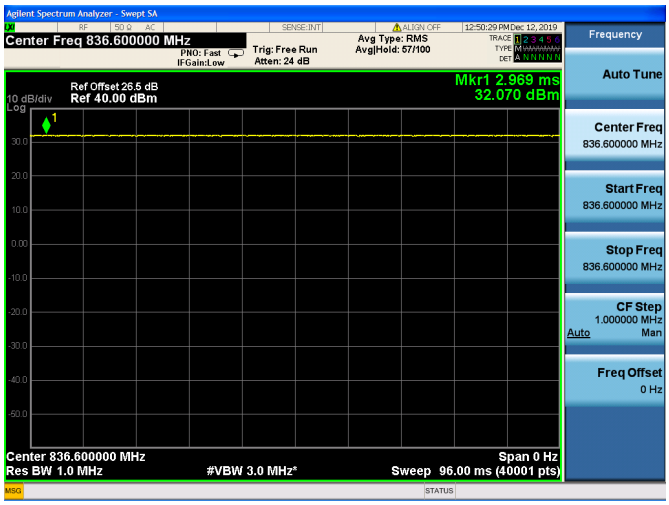
GPRS 850MHz CH128 824.2MHz



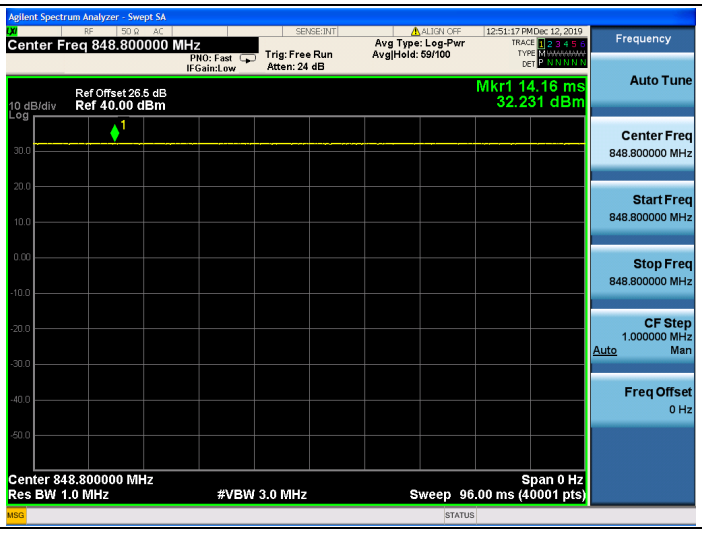


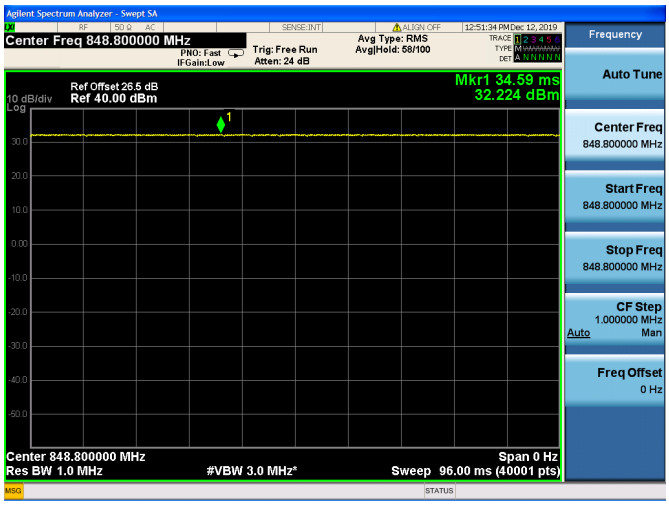
GPRS 850MHz CH190 836.6MHz



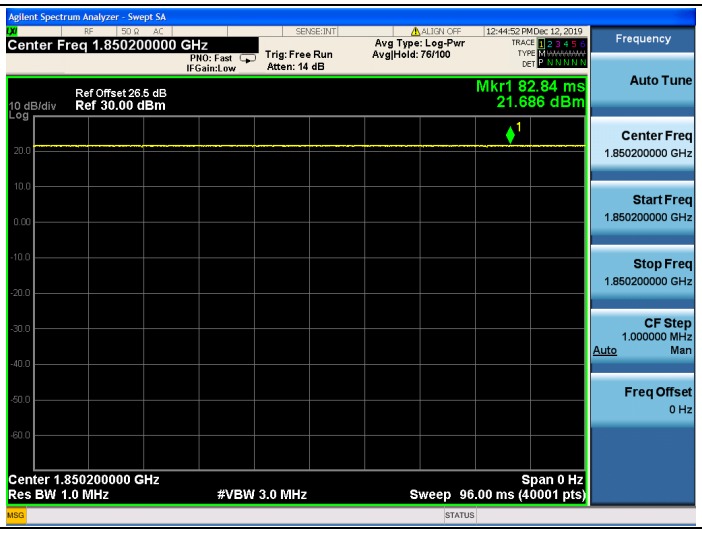


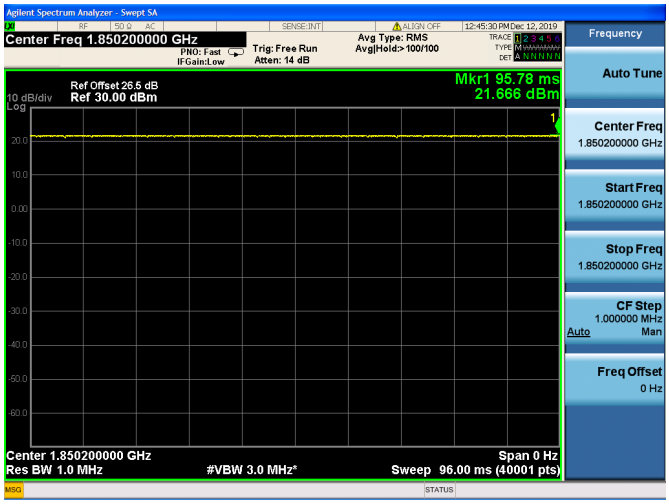
GPRS 850MHz CH251 848.8MHz



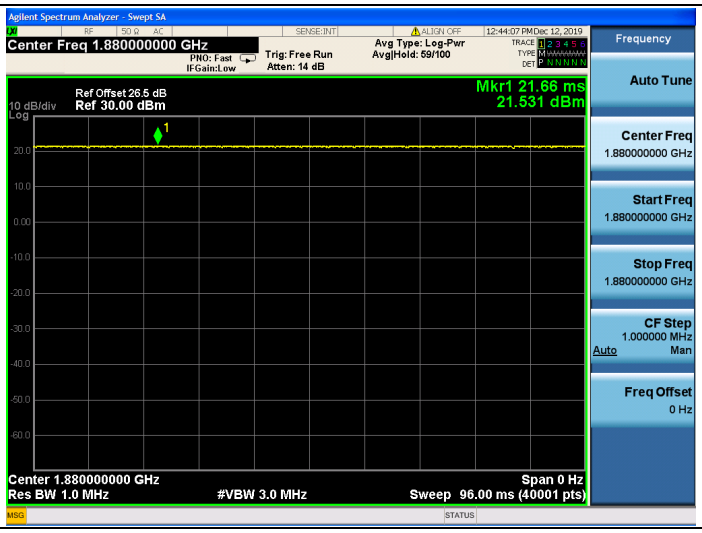


GPRS 1900MHz CH512 1850.2MHz

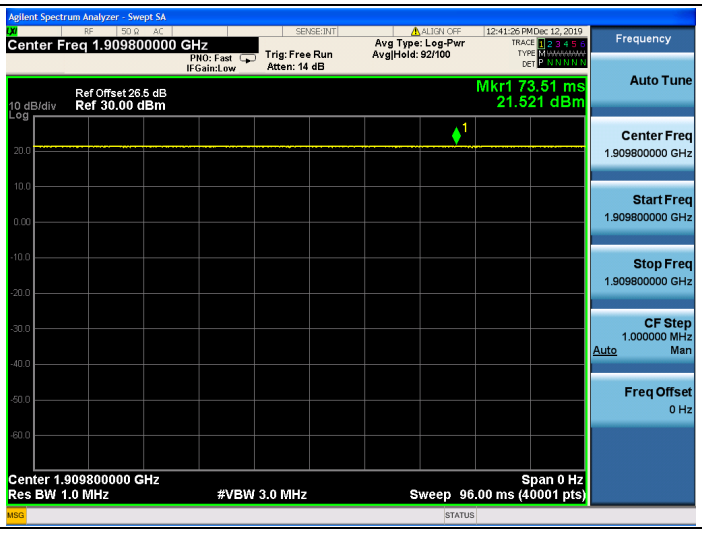


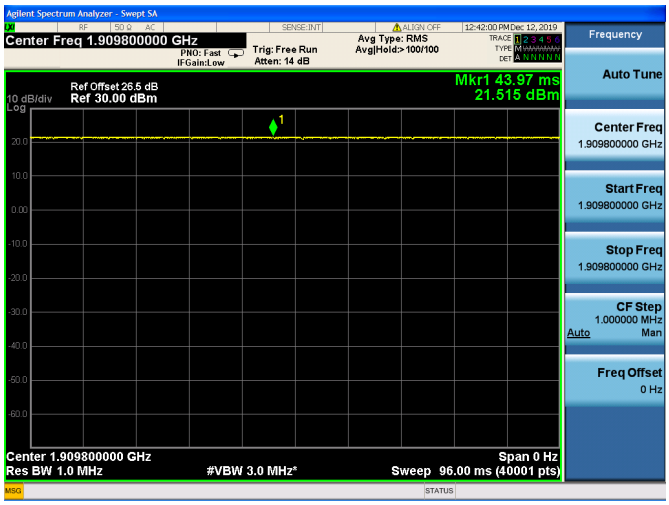


GPRS 1900MHz CH661 1880.0MHz

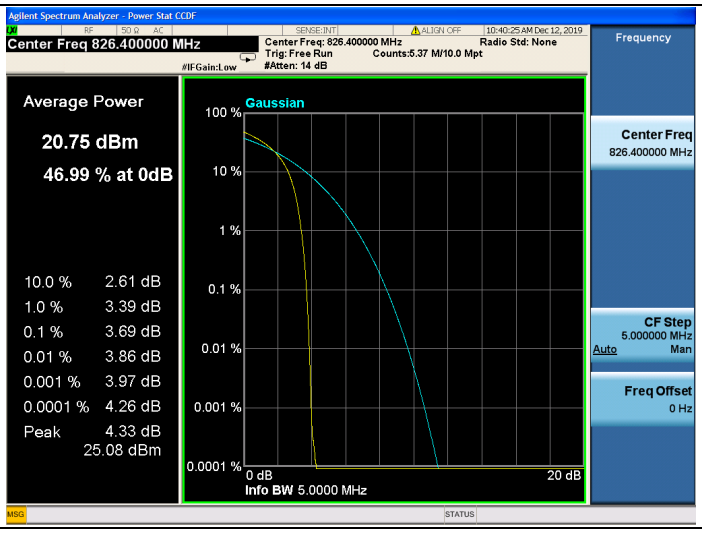


GPRS 1900MHz CH810 1909.8MHz

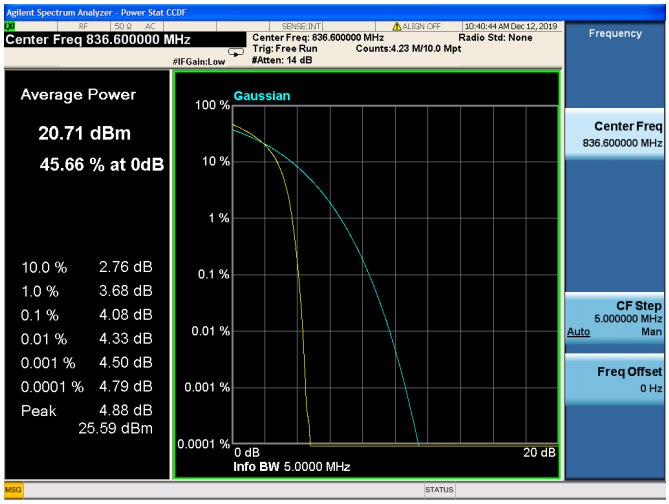




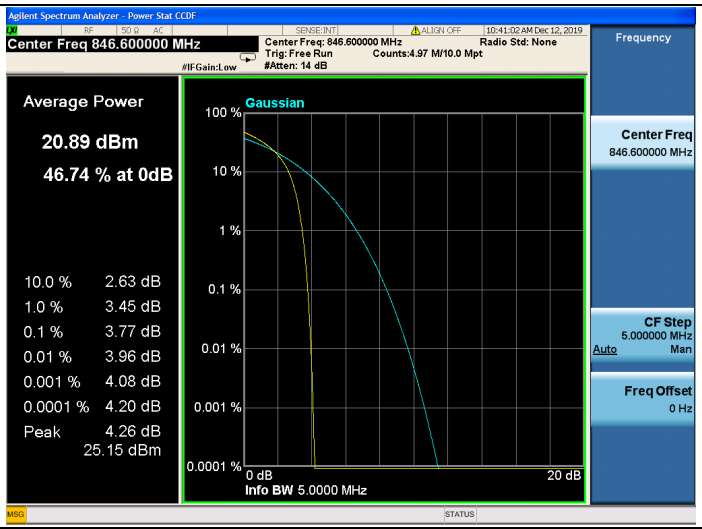
WCDMA Band V CH4132 826.4MHz



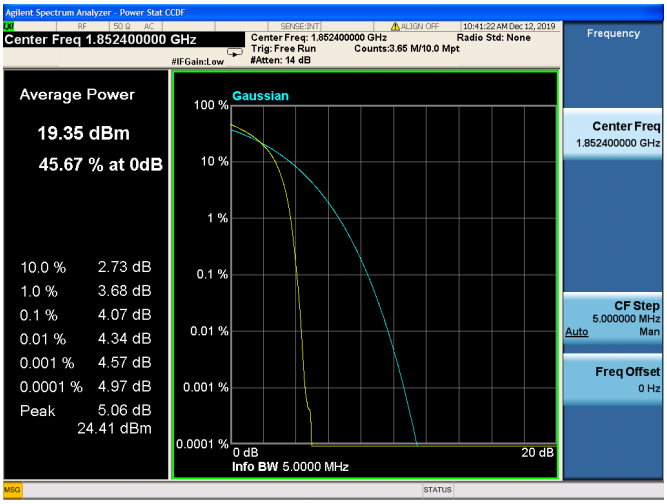
WCDMA Band V CH4183 836.4MHz



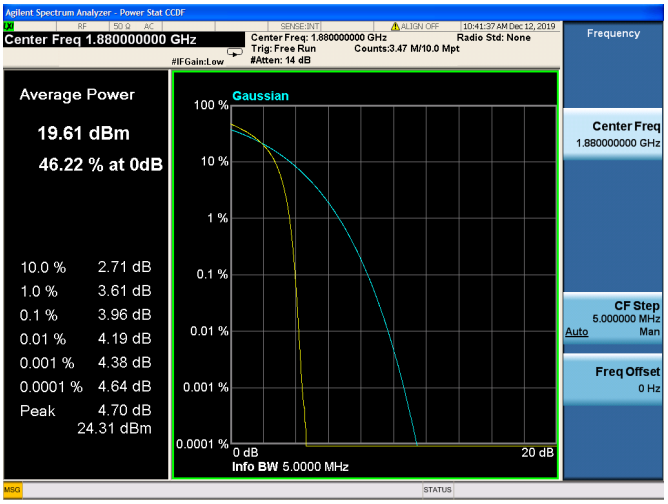
WCDMA Band V CH4233 846.6MHz



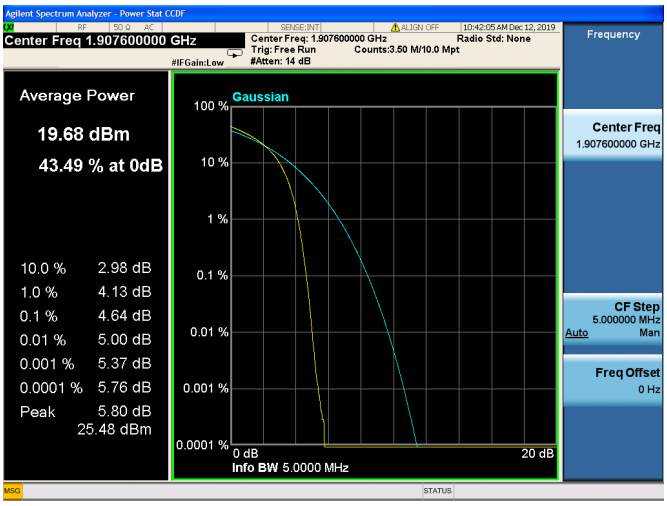
WCDMA Band II CH9262 1852.4MHz



WCDMA Band II CH9400 1880.0MHz



WCDMA Band II CH9538 1907.6MHz



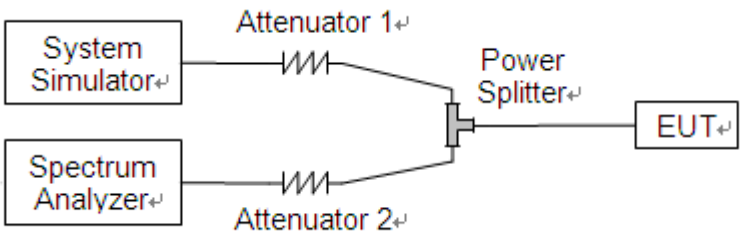
2.3. 99% Occupied Bandwidth

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 EUTis 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.

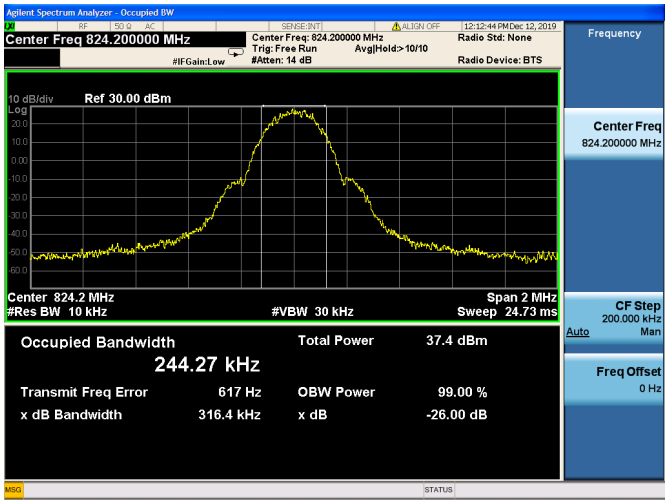
GPRS Test Verdict:

Band	Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26dB Bandwidth (kHz)
GPRS 850MHz	128	824.2	244.27	316.4
	190	836.6	241.82	302.6
	251	848.8	245.24	309.6
GPRS 1900MHz	512	1850.2	246.36	320.0
	661	1880.0	247.75	310.5
	810	1909.8	246.68	313.8

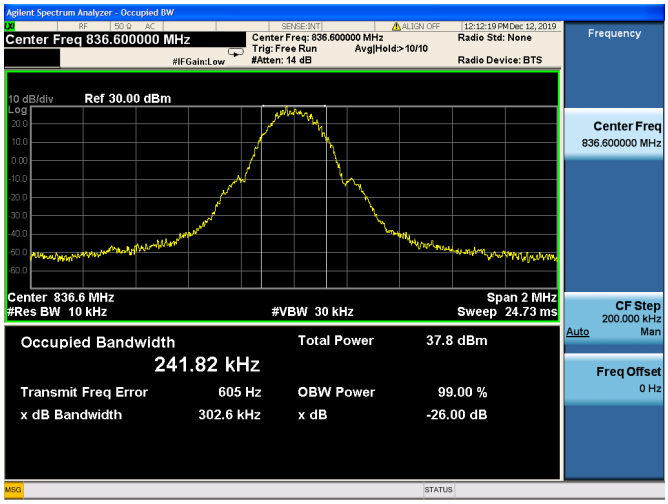
WCDMA Test Verdict:

Band	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)
WCDMA Band V	4132	826.4	4.176	4.744
	4183	836.4	4.161	4.697
	4233	846.6	4.156	4.752
WCDMA Band II	9262	1852.4	4.172	4.751
	9400	1880.0	4.161	4.732
	9538	1907.6	4.177	4.750

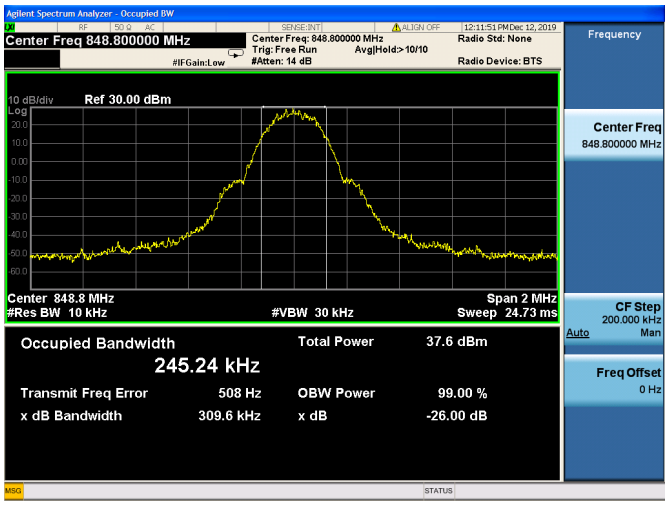
GPRS 850MHz CH128 824.2MHz



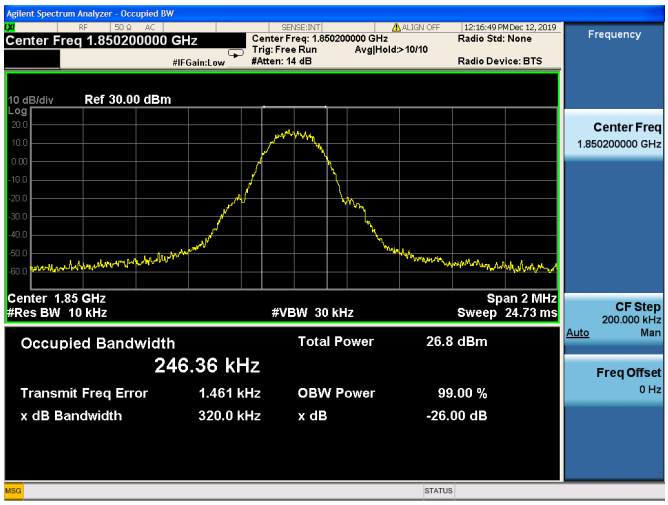
GPRS 850MHz CH190 836.6MHz



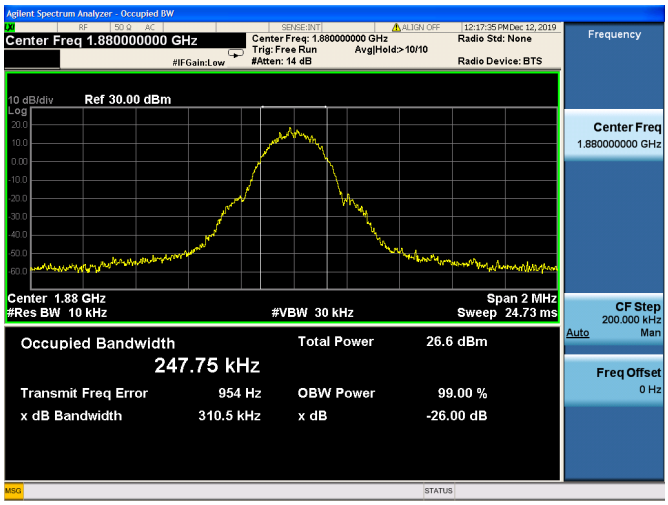
GPRS 850MHz CH251 848.8MHz



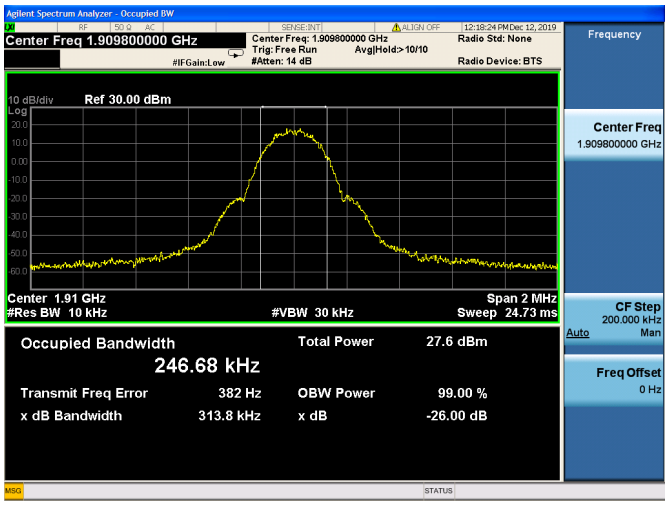
GPRS 1900MHz CH512 1850.2MHz



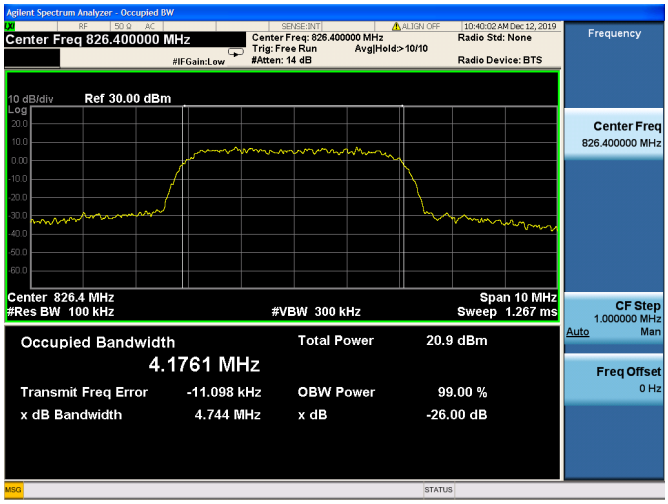
GPRS 1900MHz CH661 1880.0MHz



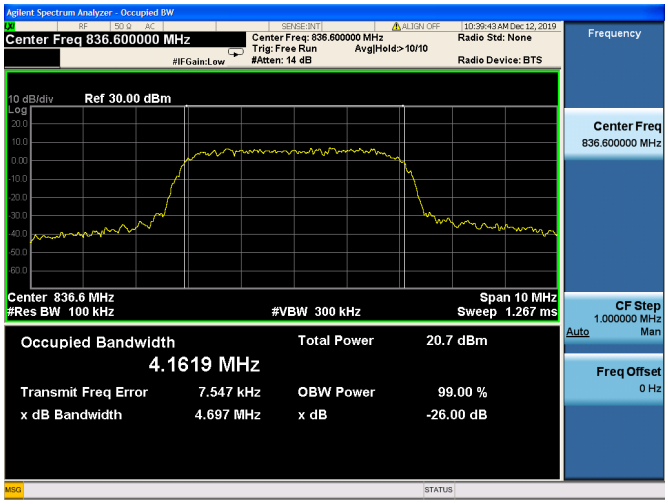
GPRS 1900MHz CH810 1909.8MHz



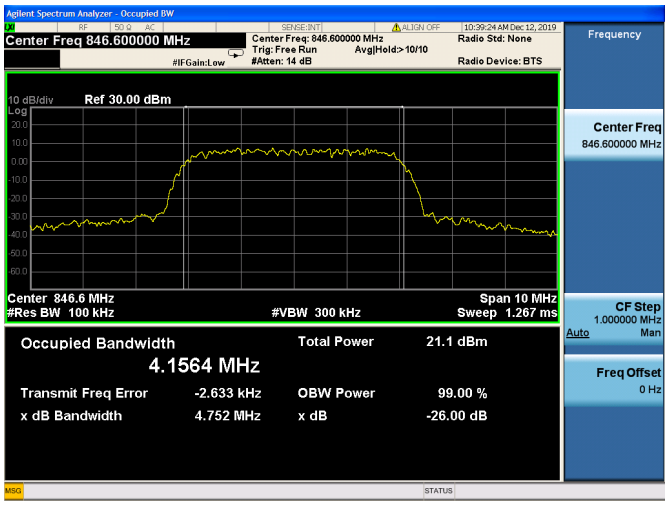
WCDMA Band V CH4132 826.4MHz



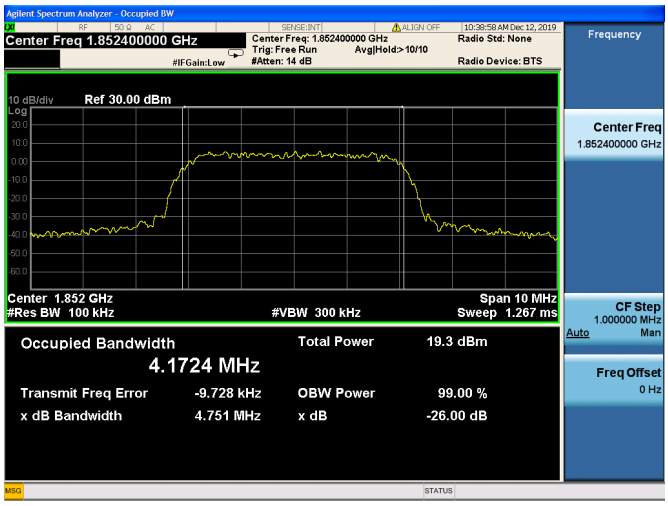
WCDMA Band V CH4183 836.4MHz



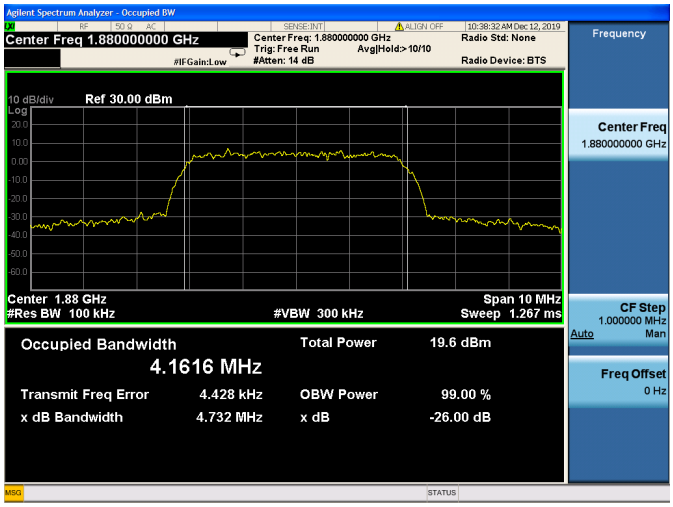
WCDMA Band V CH4233 846.6MHz



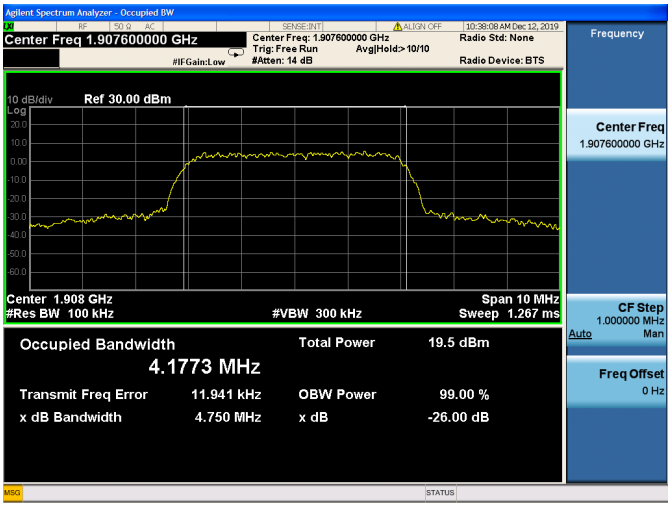
WCDMA Band II CH9262 1852.4MHz



WCDMA Band II CH9400 1880.0MHz



WCDMA Band II CH9538 1907.6MHz



2.4. Frequency Stability

2.4.1. Requirement

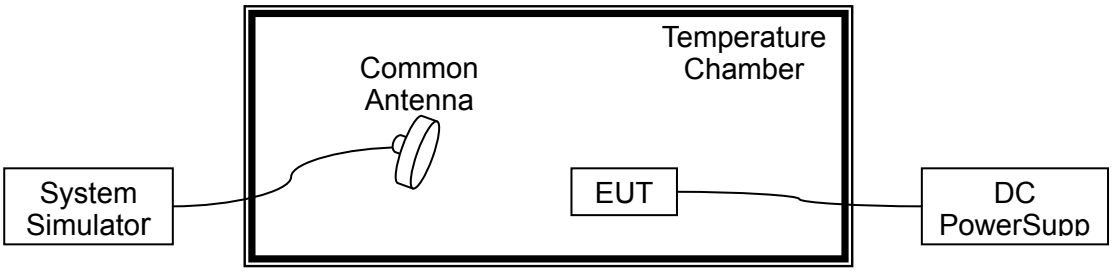
According to FCC section 22.355, 24.235 and 27.54 the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

(a) The temperature is varied from -10°C to +55°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

A. Test Verdict:

GPRS 850MHz, Channel 190, Frequency 836.6MHz Limit =±2.5ppm					
Voltage(%)	**Power(V DC)**	**Temp(°C)**	**Fre. Dev. (Hz)**	**Deviation (ppm)**	**Result**
100	12	+20(Ref)	-36	-0.043	PASS
100		-25	88	0.071	
100		-10	-59	-0.071	
100		0	62	0.074	
100		+10	-16	-0.019	
100		+20	49	0.059	
100		+30	-83	-0.099	
100		+40	52	0.062	
100		+50	12	0.014	
100		+55	24	0.029	
100		+65	-25	-0.030	
115	24	+20	-16	-0.019	
85	10	+20	9	0.011	

GPRS 1900MHz, Channel 661, Frequency 1880.0MHz Limit =Within Authorized Band					
Voltage(%)	**Power(V DC)**	**Temp(°C)**	**Fre. Dev. (Hz)**	**Deviation (ppm)**	**Result**
100	12	+20(Ref)	-42	-0.022	PASS
100		-25	-49	-0.021	
100		-10	54	0.029	
100		0	-32	-0.017	
100		+10	-54	-0.029	
100		+20	38	0.020	
100		+30	-58	-0.031	
100		+40	41	0.022	
100		+50	59	0.031	
100		+55	81	0.043	
100		+65	79	0.042	
115	24	+20	39	0.021	
85	10	+20	87	0.046	

WCDMA Band V, Channel 4182, Frequency 836.4MHz Limit =±2.5ppm					
Voltage(%)	**Power(V DC)**	**Temp(°C)**	**Fre. Dev. (Hz)**	**Deviation (ppm)**	**Result**
100	12	+20(Ref)	31	0.037	PASS
100		-25	-66	-0.089	
100		-10	-77	-0.092	
100		0	-53	-0.063	
100		+10	-75	-0.090	
100		+20	-59	-0.071	
100		+30	54	0.065	
100		+40	25	0.030	
100		+50	26	0.031	
100		+55	82	0.098	
100		+65	79	0.097	
115	24	+20	21	0.025	
85	10	+20	-58	-0.069	

WCDMA Band II, Channel 9400, Frequency 1880.0MHz Limit =Within Authorized Band					
Voltage(%)	**Power(V DC)**	**Temp(°C)**	**Fre. Dev. (Hz)**	**Deviation (ppm)**	**Result**
100	12	+20(Ref)	42	0.022	PASS
100		-25	-29	-0.02	
100		-10	-38	-0.02	
100		0	-88	-0.047	
100		+10	-35	-0.019	
100		+20	-19	-0.01	
100		+30	42	0.022	
100		+40	84	0.045	
100		+50	-14	-0.007	
100		+55	64	0.034	
100		+65	63	0.033	
115	24	+20	24	0.013	
85	10	+20	-1	-0.001	

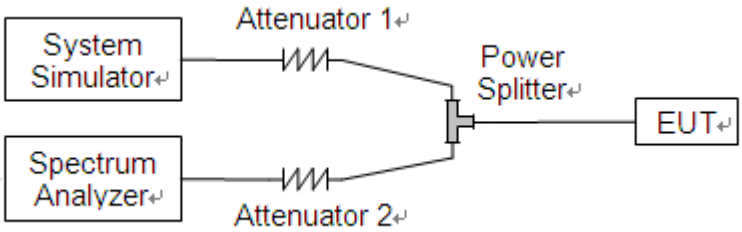
2.5. Conducted Out of Band Emissions

2.5.1. Requirement

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

2.5.2. Test Description

Test Setup:

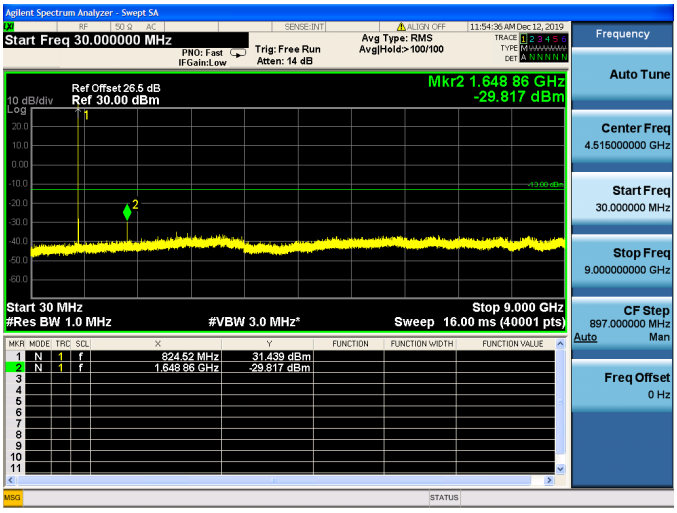


The EUTis coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum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

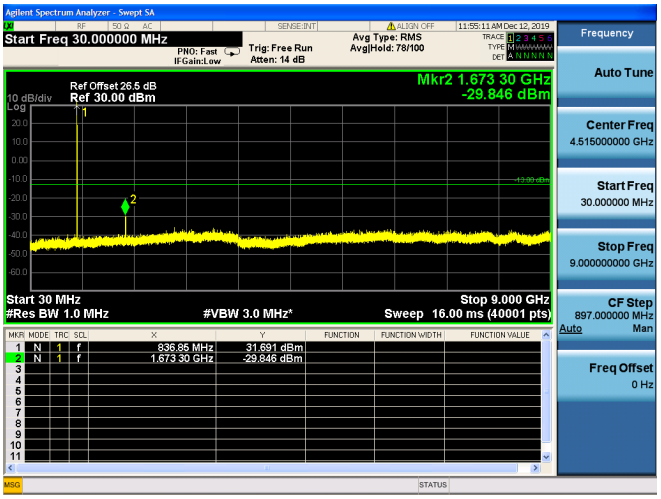
2.5.3. Test Result

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.

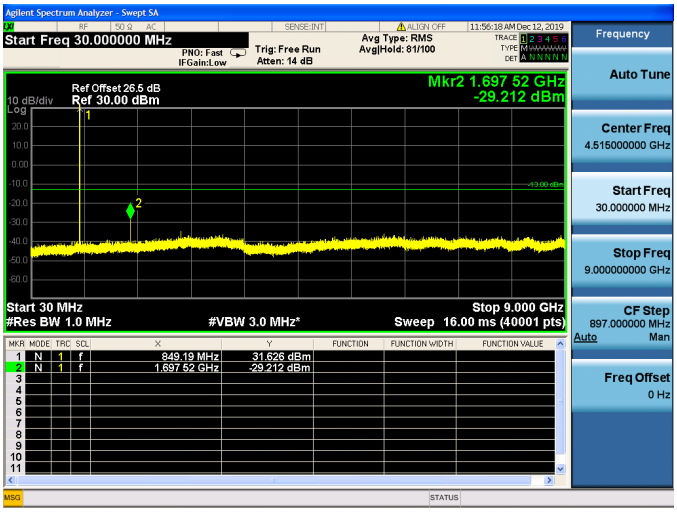
GPRS 850MHz CH128 824.2MHz



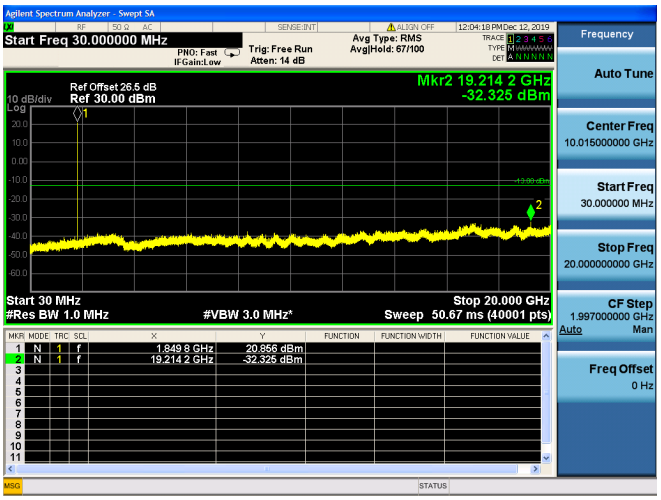
GPRS 850MHz CH190 836.6MHz



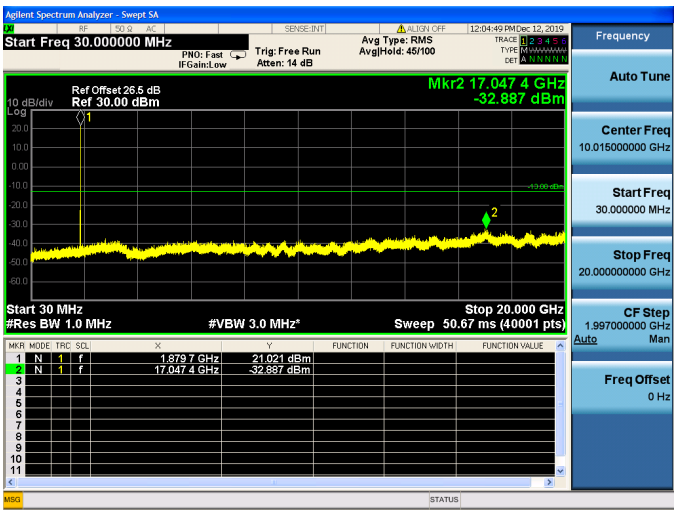
GPRS 850MHz CH251 848.8MHz



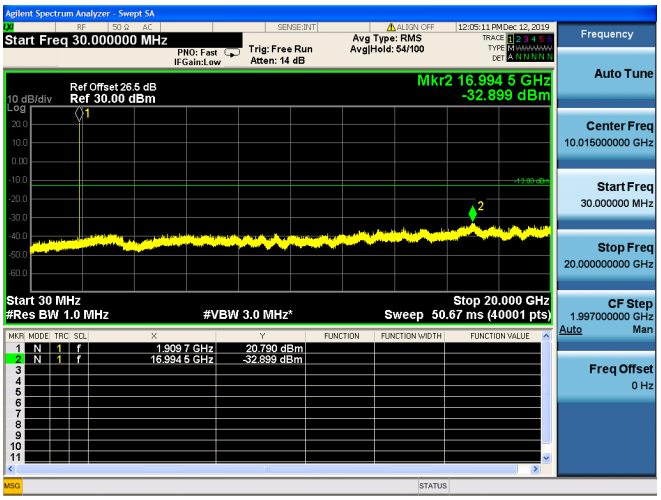
GPRS 1900MHz CH521 1850.2MHz



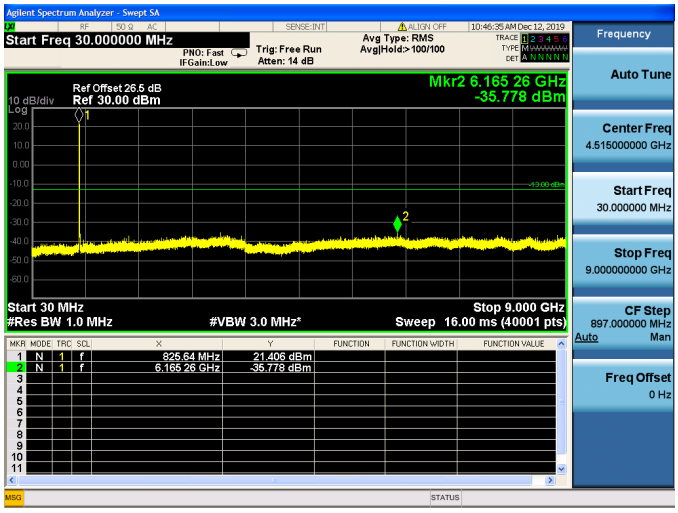
GPRS 1900MHz CH661 1880.0MHz



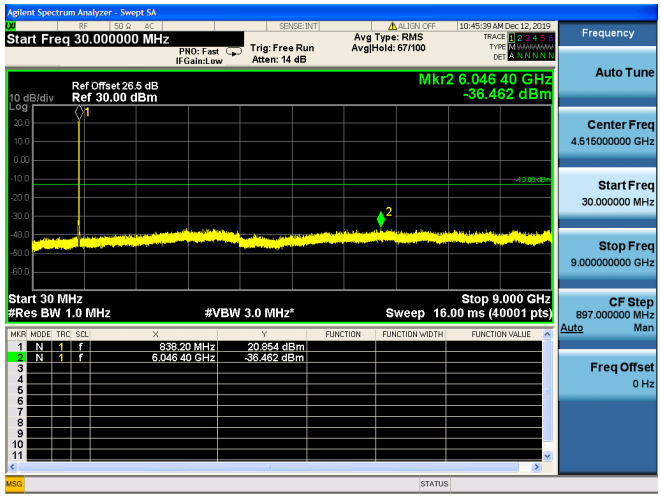
GPRS 1900MHz CH810 1909.8MHz



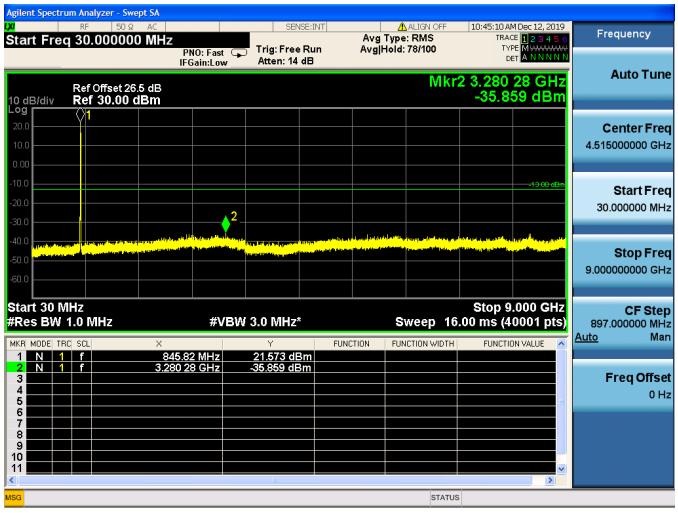
WCDMA Band V CH4132 826.4MHz



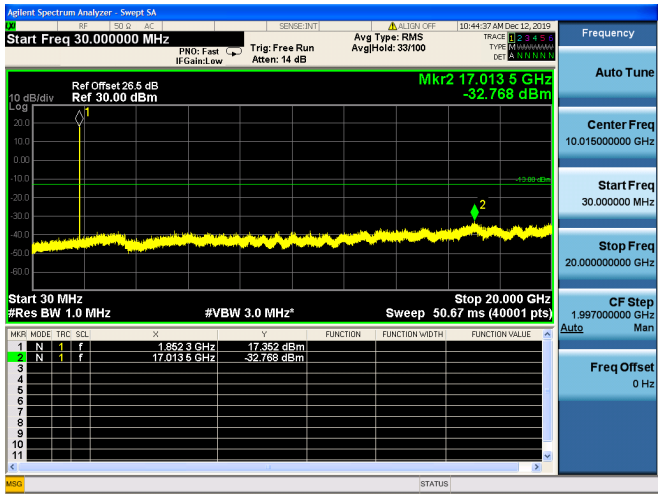
WCDMA Band V CH4183 836.4MHz



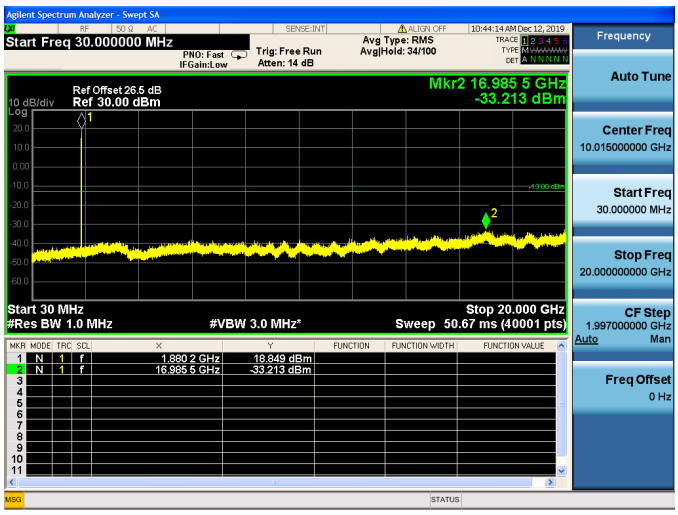
WCDMA Band V CH4233 846.6MHz



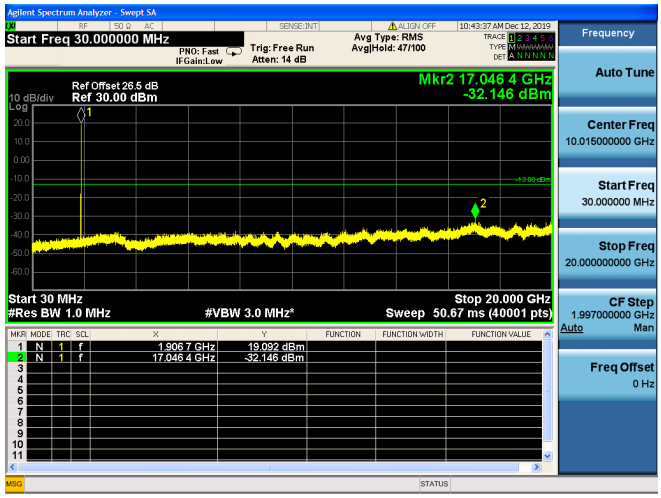
WCDMA Band II CH9262 1852.4MHz



WCDMA Band II CH9400 1880.0MHz



WCDMA Band II CH9538 1907.6MHz



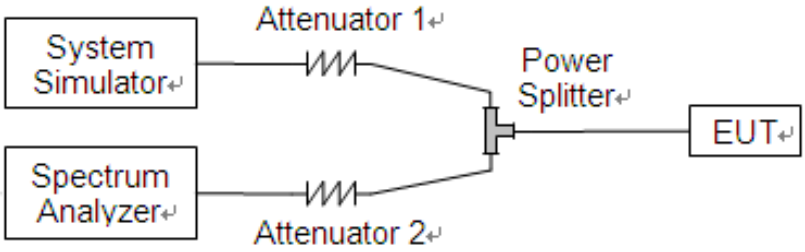
2.6. Band Edge

2.6.1. Requirement

According to FCC section 22.917(b), 24.238(b) and 27.53(h) 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

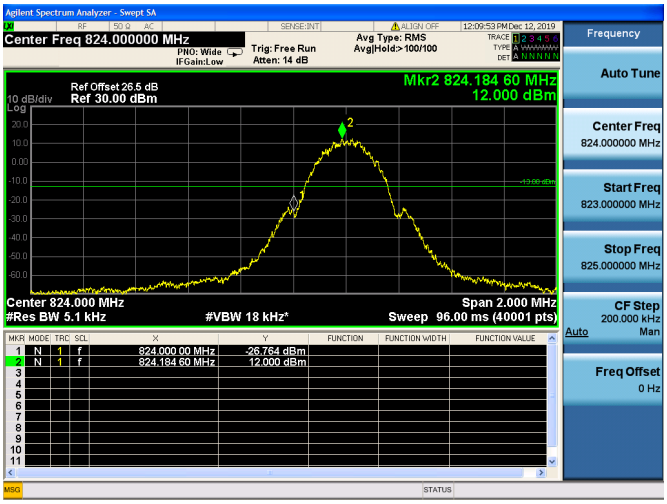
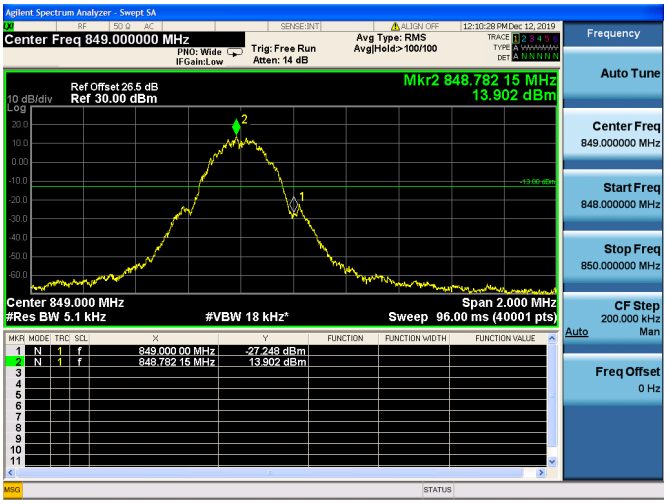
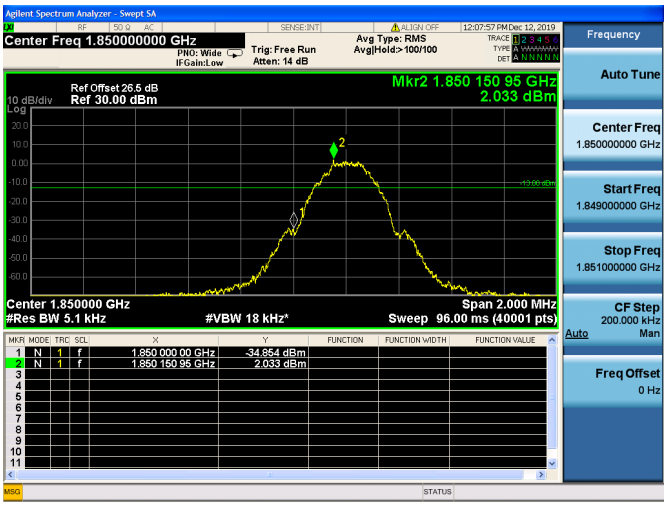
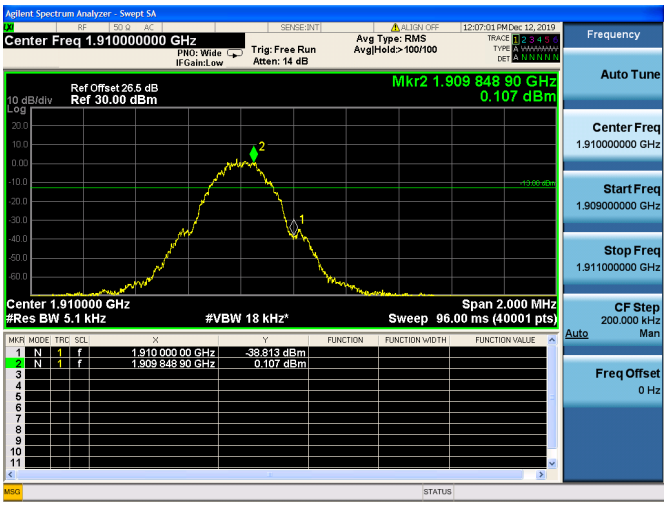
Test Setup:



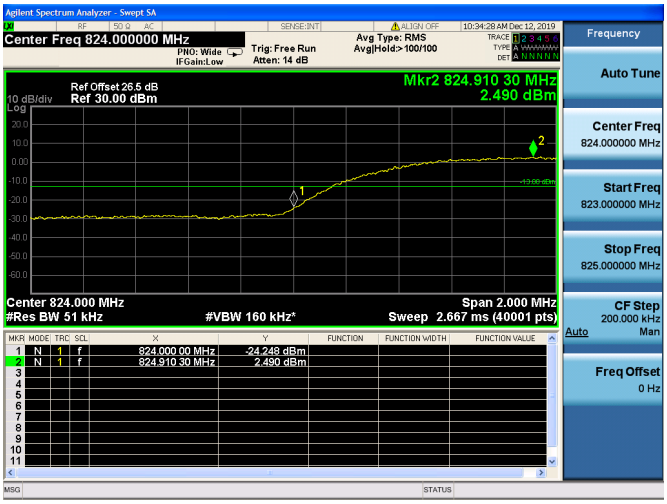
The EUTis coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum 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

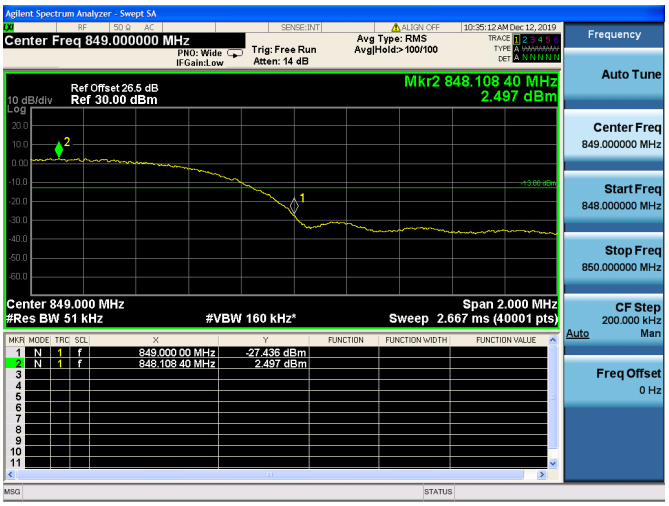
The lowest and highest channels are tested to verify the band edge emissions.

GPRS 850MHz CH128 824.2MHz	GPRS 850MHz CH251 848.8MHz
	
GPRS 1900MHz CH521 1850.2MHz	**GPRS 1900MHz CH810 1909.8MHz**
	

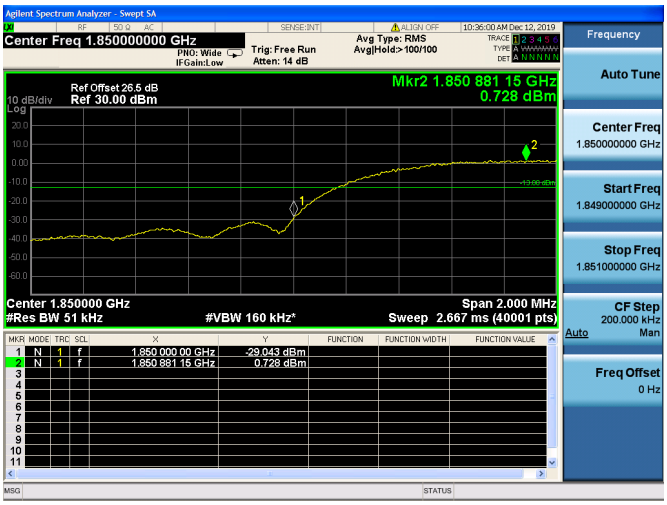
WCDMA Band V CH4132 826.4MHz



WCDMA Band V CH4233 846.6MHz



WCDMA Band II CH9262 1852.4MHz



WCDMA Band II CH9538 1907.6MHz

2.7. Transmitter Radiated Power (EIRP/ERP)

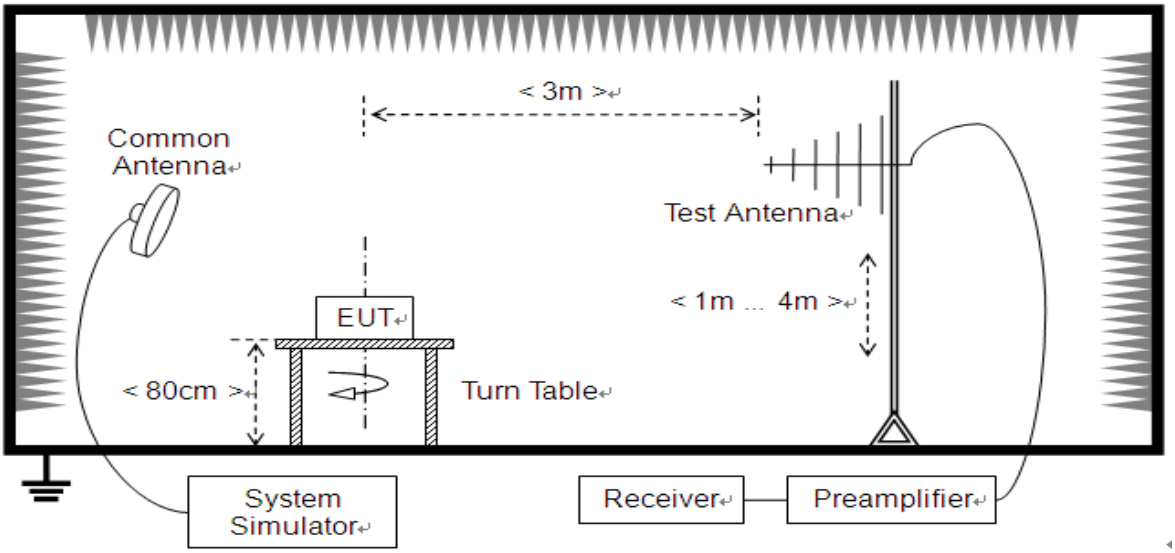
2.7.1. Requirement

According to FCC section 22.913, the Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7Watts.
According to FCC section 24.232, the broadband PCS mobile station is limited to 2 Watts e.i.r.p. peak power.
According to FCC section 27.50, mobile, and portable (hand-held) stations is limited to 1 Watts e.i.r.p. peak power.

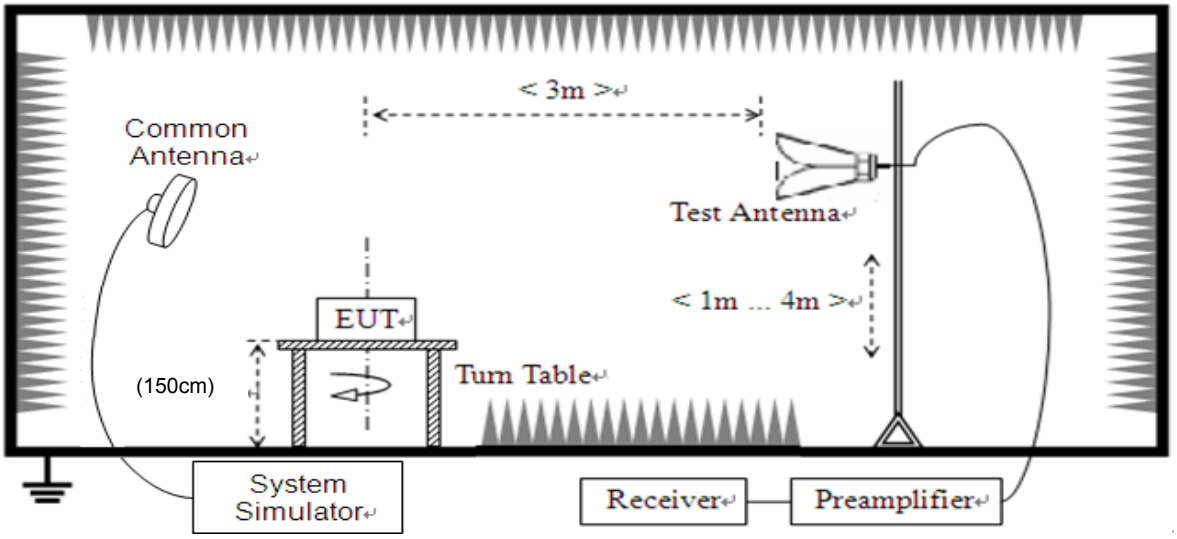
2.7.2. Test Description

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. GPRS850MHz band Power Control Level (PCL) = 5/19 and Power Class = 4, GPRS1900MHz 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}.

GPRS Test verdict:

Band	Channel	Frequency (MHz)	PCL	Measured ERP		Limit		Verdict
				dBm	W	dBm	W	
GPRS 850MHz	128	824.20	5	32.99	1.991	38.5	7	PASS
	190	836.60	5	33.13	2.056			PASS
	251	848.80	5	33.02	2.004			PASS
Band	Channel	Frequency (MHz)	PCL	Measured EIRP		Limit		Verdict
				dBm	W	dBm	W	
GPRS 1900MHz	512	1850.2	0	31.18	1.312	33	2	PASS
	661	1880.0	0	31.03	1.268			PASS
	810	1909.8	0	30.88	1.225			PASS

Note 1: For the GPRS model, all the slots were tested and just the worst data were recorded in this report.

Note 2: Both horizontal and vertical polarizations of the test antenna are evaluatedrespectively, only the worst data (horizontal) were recorded in this report.

WCDMA Test verdict:

Band	Channel	Frequency (MHz)	Measured ERP		Limit		Verdict
			dBm	W	dBm	W	
WCDMA Band V	4132	826.4	22.02	0.159	38.5	7	PASS
	4182	836.4	21.97	0.157			PASS
	4233	846.6	21.98	0.158			PASS

Note: Both horizontal and vertical polarizations of the test antenna are evaluatedrespectively, 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	21.56	0.143	33	2	PASS
	9400	1880.0	21.59	0.144			PASS
	9538	1907.6	21.47	0.140			PASS

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

2.8. Radiated Out of Band Emissions

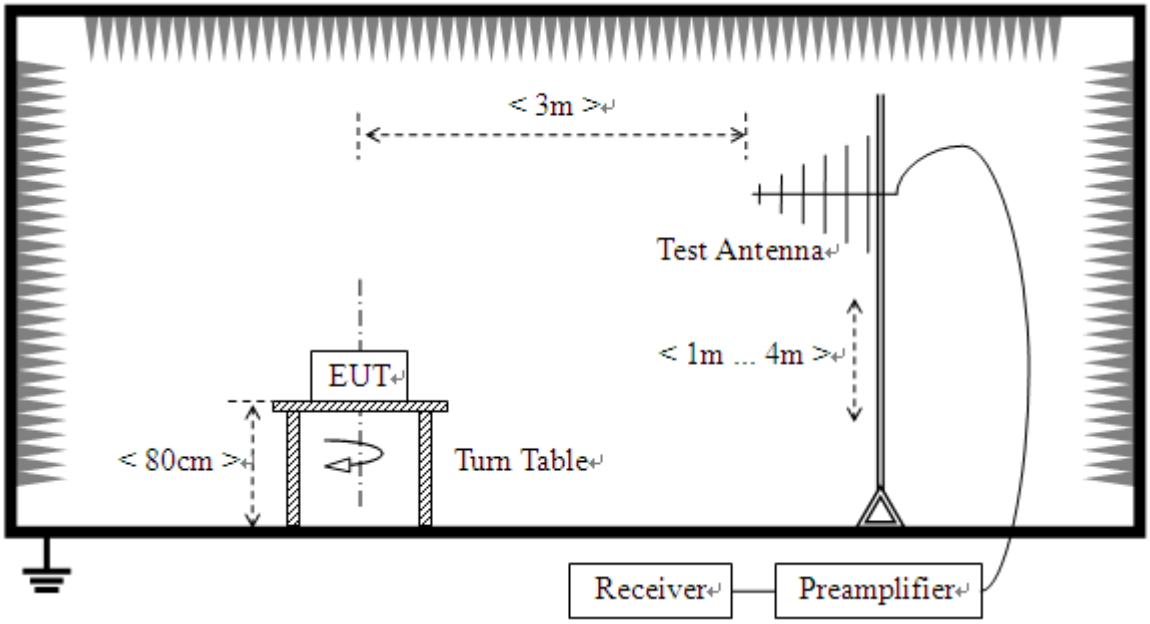
2.8.1. Requirement

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.

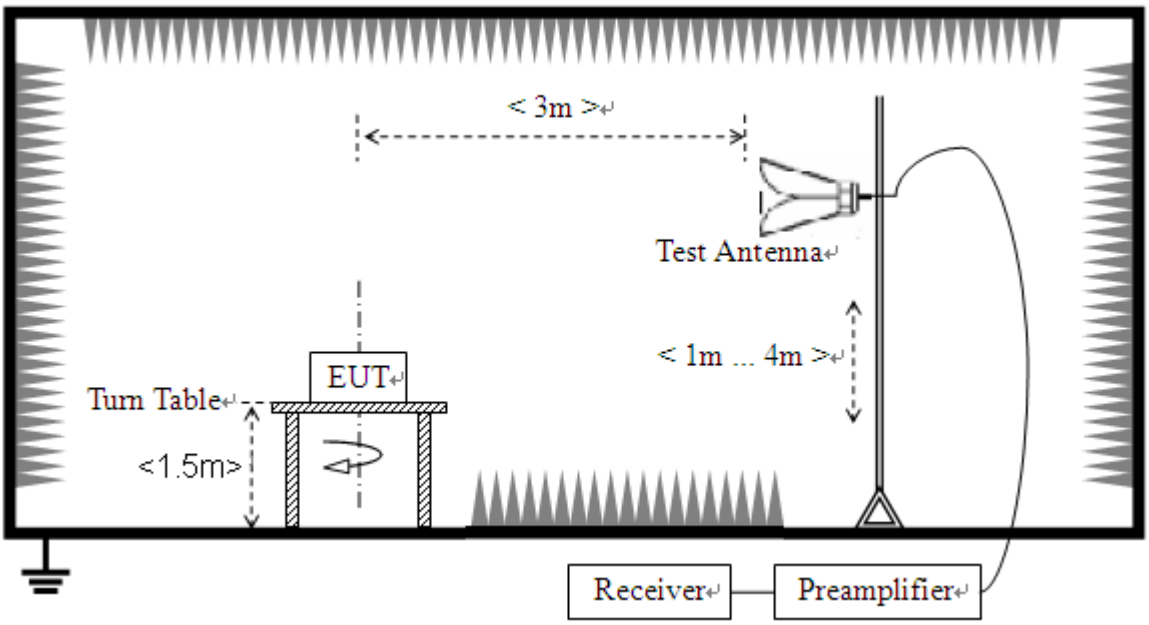
2.8.2. Test Description

Test Setup:

1) Below1GHz



2) Above 1GHz



The EUTis 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. GPRS850MHz band Power Control Level (PCL) = 5/19 and Power Class = 4, GPRS1900MHz 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 3GHz), 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.

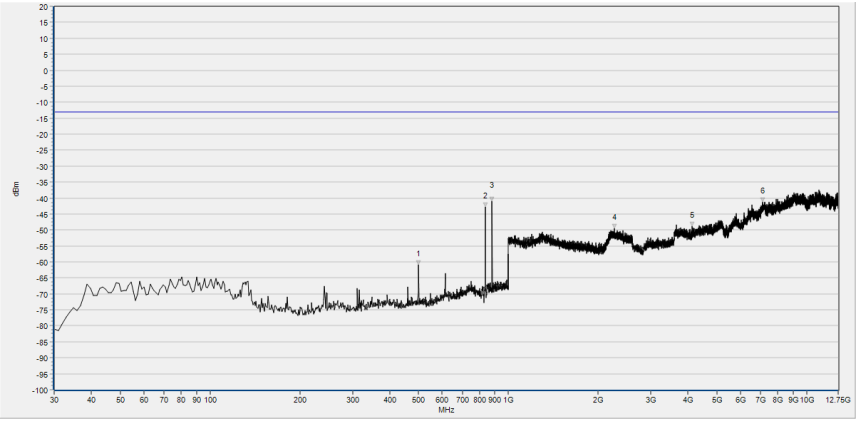
2.8.3. Test Result

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		
GPRS 850MHz	128	824.2	< -25	< -25	-13	PASS
	190	836.6	< -25	< -25		PASS
	251	848.8	< -25	< -25		PASS
GPRS 1900MHz	512	1850.2	< -25	< -25	-13	PASS
	661	1880.0	< -25	< -25		PASS
	810	1909.8	< -25	< -25		PASS
	810	1909.8	< -25	< -25		PASS
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

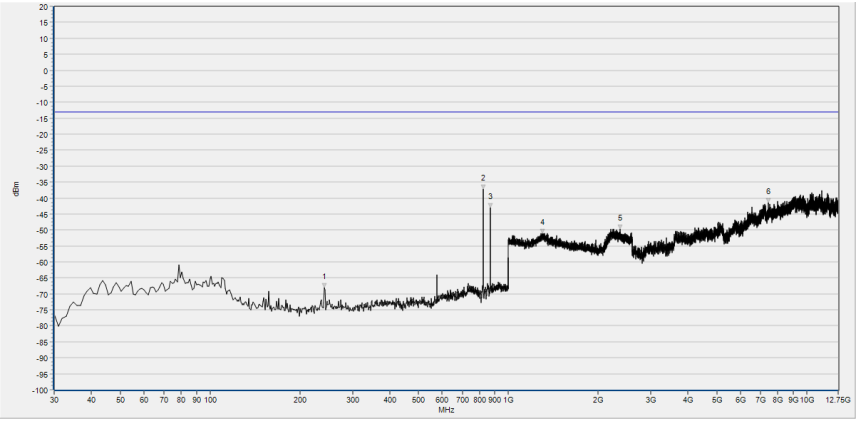
Note 1: All test mode and condition mentioned were considered and evaluated respectively by performing full test, only the worst data were recorded and reported.

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.



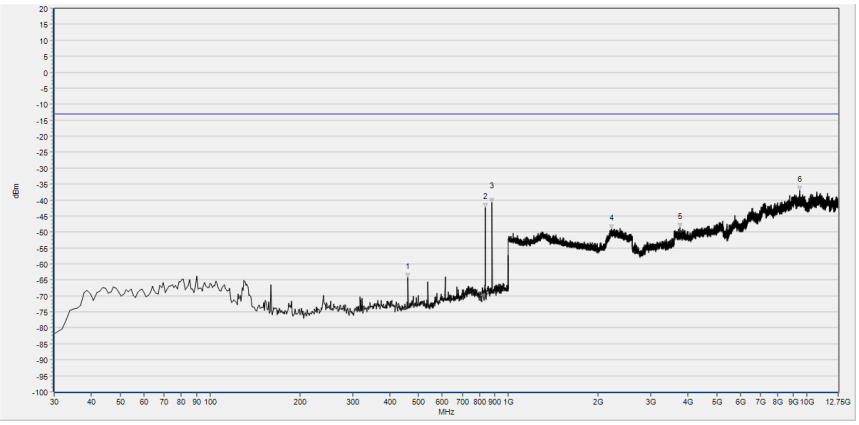
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	499.480	-60.98	-13.00	Horizontal	PASS
2	836.070	-42.68	-13.00	Horizontal	NA
3	881.660	-41.00	-13.00	Horizontal	NA
4	2261.945	-49.53	-13.00	Horizontal	PASS
5	4120.931	-48.73	-13.00	Horizontal	PASS
6	7112.957	-41.31	-13.00	Horizontal	PASS

(GPRS 850MHz, Channel = 128, Horizontal)



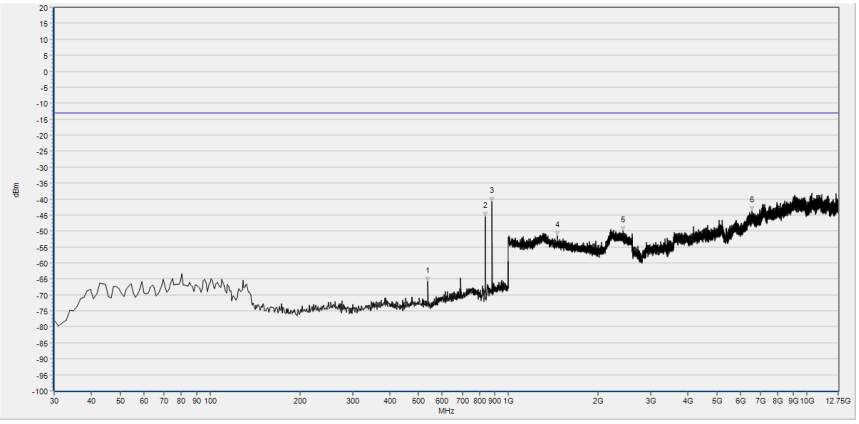
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	241.460	-68.12	-13.00	Vertical	PASS
2	824.430	-37.28	-13.00	Vertical	NA
3	869.050	-42.95	-13.00	Vertical	NA
4	1297.719	-51.05	-13.00	Vertical	PASS
5	2364.386	-49.61	-13.00	Vertical	PASS
6	7448.891	-41.37	-13.00	Vertical	PASS

(GPRS 850MHz, Channel = 128, Vertical)



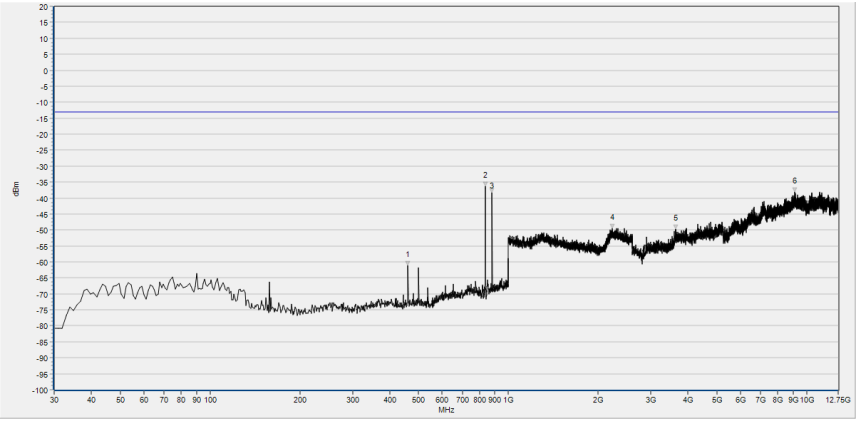
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	460.680	-64.27	-13.00	Horizontal	PASS
2	837.040	-42.45	-13.00	Horizontal	NA
3	881.660	-40.76	-13.00	Horizontal	NA
4	2216.487	-49.09	-13.00	Horizontal	PASS
5	3755.465	-48.53	-13.00	Horizontal	PASS
6	9481.106	-36.92	-13.00	Horizontal	PASS

(GPRS850MHz, Channel = 190, Horizontal)



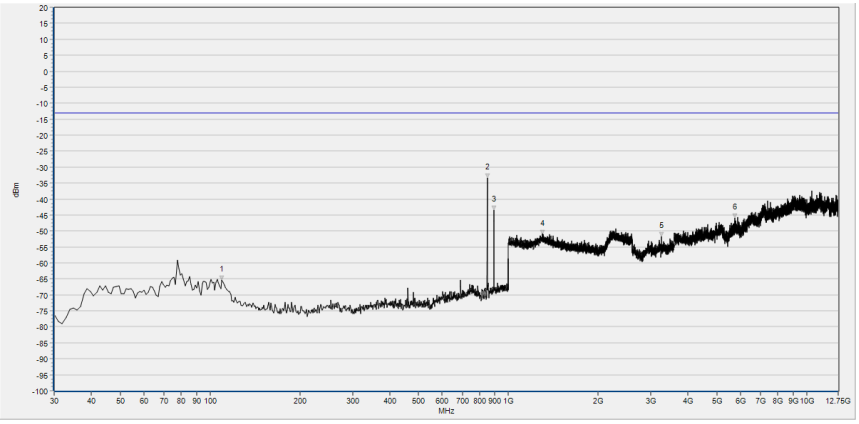
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	537.310	-65.73	-13.00	Vertical	PASS
2	837.040	-45.53	-13.00	Vertical	NA
3	881.660	-40.88	-13.00	Vertical	NA
4	1461.625	-51.57	-13.00	Vertical	PASS
5	2426.491	-50.01	-13.00	Vertical	PASS
6	6553.682	-43.66	-13.00	Vertical	PASS

(GPRS 850MHz, Channel = 190, Vertical)



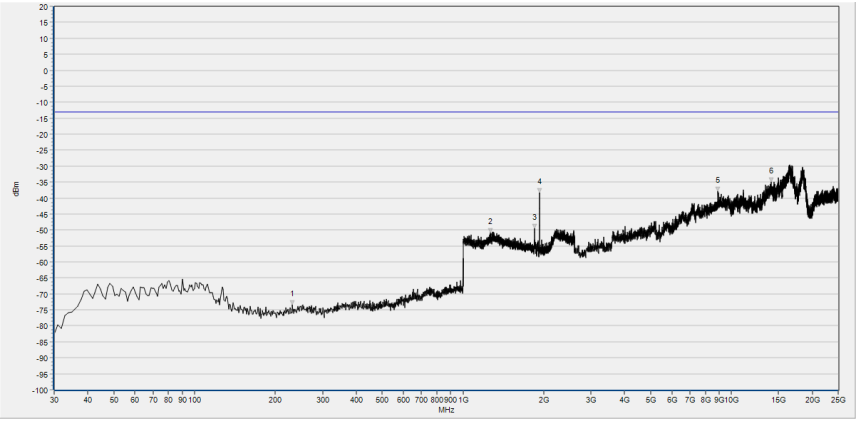
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	460.680	-61.21	-13.00	Horizontal	PASS
2	837.040	-36.38	-13.00	Horizontal	NA
3	881.660	-38.39	-13.00	Horizontal	NA
4	2227.371	-49.55	-13.00	Horizontal	PASS
5	3629.951	-49.72	-13.00	Horizontal	PASS
6	9113.793	-38.12	-13.00	Horizontal	PASS

(GPRS 850MHz, Channel = 251,Horizontal)



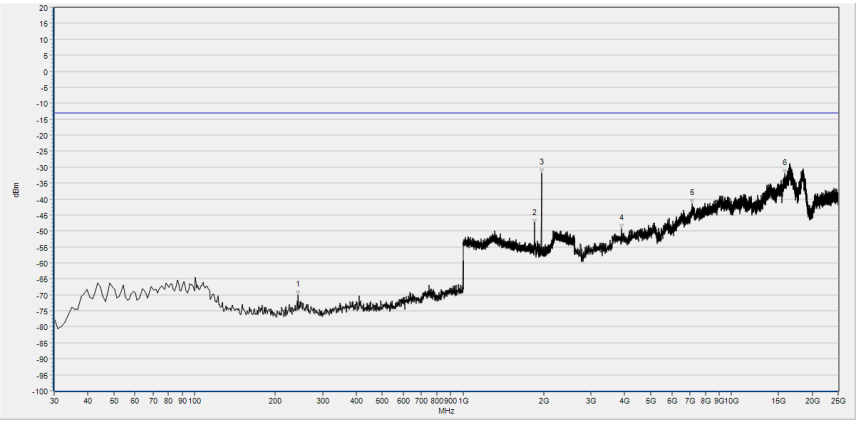
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	109.540	-65.28	-13.00	Vertical	PASS
2	848.680	-33.37	-13.00	Vertical	NA
3	894.270	-43.45	-13.00	Vertical	NA
4	1297.079	-51.08	-13.00	Vertical	PASS
5	3258.947	-51.71	-13.00	Vertical	PASS
6	5737.843	-45.93	-13.00	Vertical	PASS

(GPRS 850MHz, Channel = 251, Vertical)



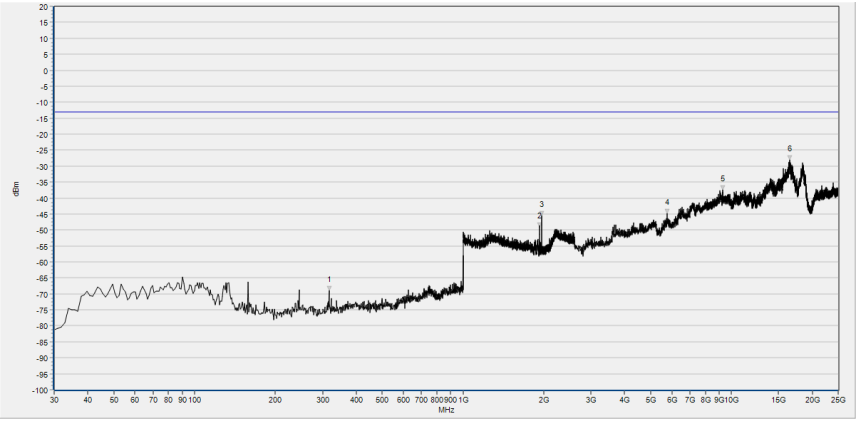
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	231.760	-73.38	-13.00	Horizontal	PASS
2	1266.347	-50.89	-13.00	Horizontal	PASS
3	1850.260	-49.54	-13.00	Horizontal	NA
4	1930.292	-38.24	-13.00	Horizontal	NA
5	8922.022	-37.89	-13.00	Horizontal	PASS
6	14091.253	-35.02	-13.00	Horizontal	PASS

(GPRS 1900MHz, Channel = 512, Horizontal)



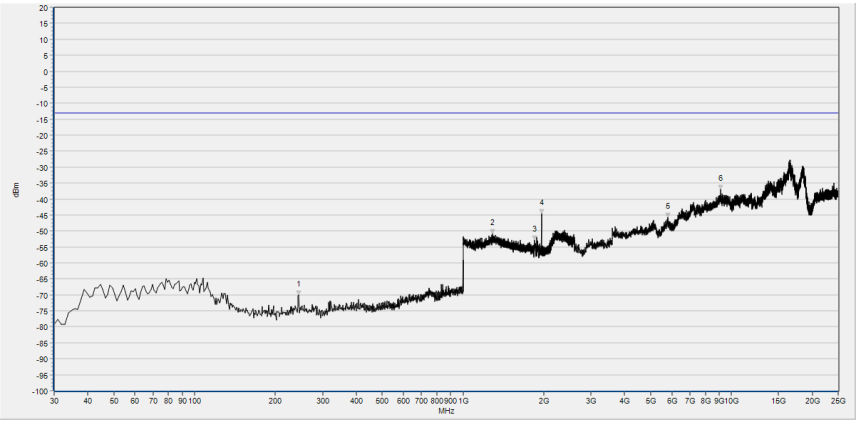
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	243.400	-70.14	-13.00	Vertical	PASS
2	1849.620	-47.65	-13.00	Vertical	NA
3	1959.744	-31.91	-13.00	Vertical	NA
4	3895.363	-49.28	-13.00	Vertical	PASS
5	7158.211	-41.36	-13.00	Vertical	PASS
6	15850.991	-32.09	-13.00	Vertical	PASS

(GPRS 1900MHz, Channel = 512, Vertical)



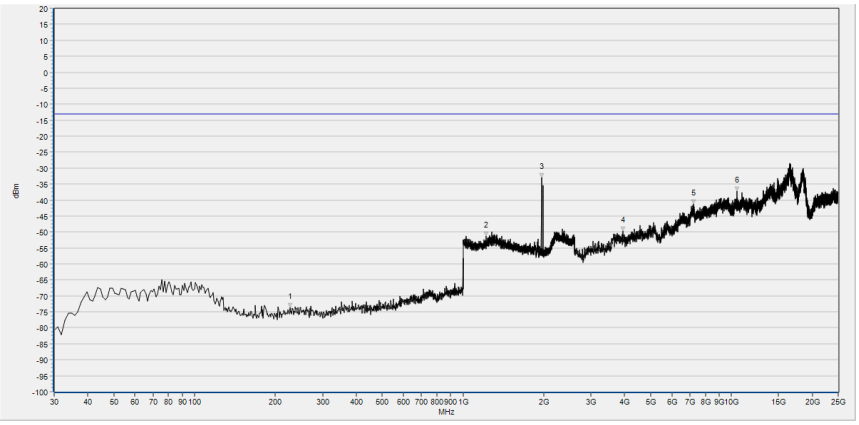
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	317.120	-68.93	-13.00	Horizontal	PASS
2	1929.652	-48.96	-13.00	Horizontal	NA
3	1967.427	-45.58	-13.00	Horizontal	NA
4	5761.011	-44.88	-13.00	Horizontal	PASS
5	9300.855	-37.54	-13.00	Horizontal	PASS
6	16535.334	-28.08	-13.00	Horizontal	PASS

(GPRS 1900MHz, Channel = 661, Horizontal)



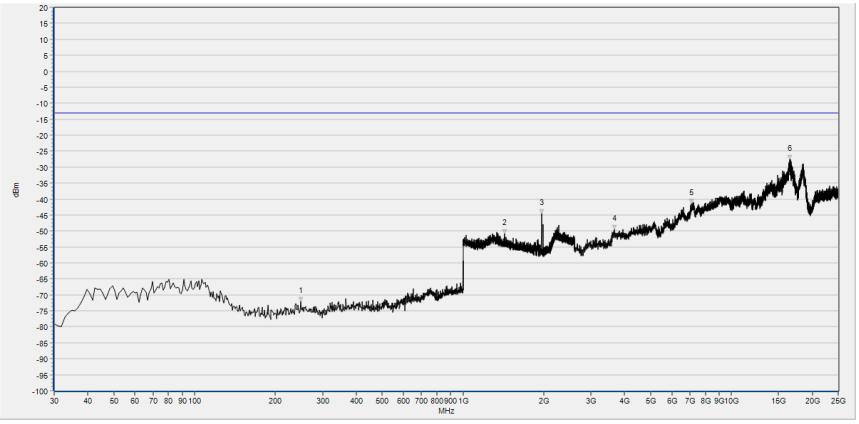
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	244.370	-70.08	-13.00	Vertical	PASS
2	1286.835	-50.94	-13.00	Vertical	PASS
3	1845.138	-52.80	-13.00	Vertical	NA
4	1959.744	-44.64	-13.00	Vertical	NA
5	5789.525	-45.61	-13.00	Vertical	PASS
6	9105.328	-36.97	-13.00	Vertical	PASS

(GPRS 1900MHz, Channel = 661, Vertical)



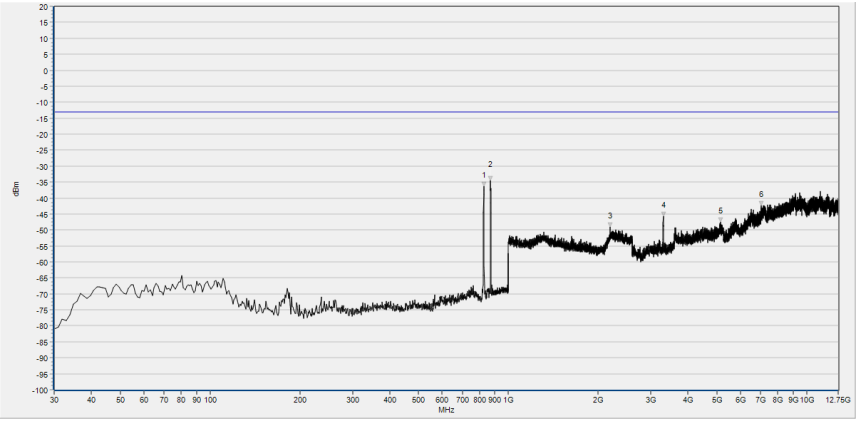
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	226.910	-73.70	-13.00	Horizontal	PASS
2	1220.248	-51.23	-13.00	Horizontal	PASS
3	1959.744	-32.95	-13.00	Horizontal	NA
4	3952.391	-49.81	-13.00	Horizontal	PASS
5	7235.606	-41.13	-13.00	Horizontal	PASS
6	10506.601	-37.31	-13.00	Horizontal	PASS

(GPRS 1900MHz, Channel = 810, Horizontal)



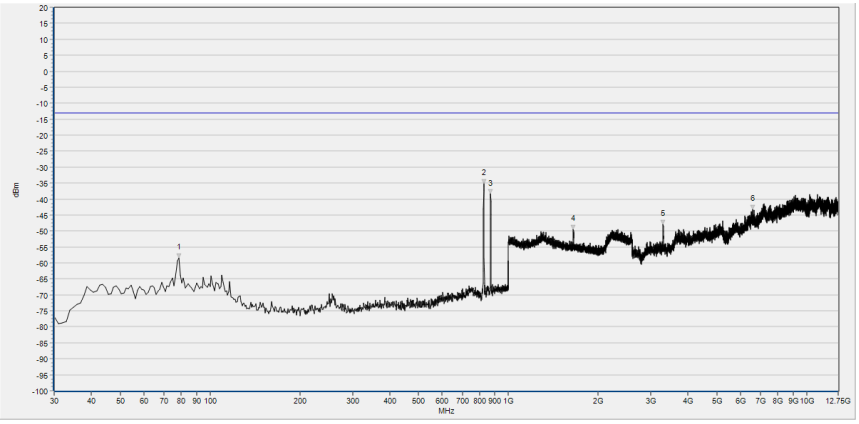
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	248.250	-72.12	-13.00	Vertical	PASS
2	1428.331	-50.85	-13.00	Vertical	PASS
3	1959.744	-44.49	-13.00	Vertical	NA
4	3663.175	-49.59	-13.00	Vertical	PASS
5	7076.741	-41.37	-13.00	Vertical	PASS
6	16490.526	-27.68	-13.00	Vertical	PASS

(GPRS 1900MHz, Channel = 810, Vertical)



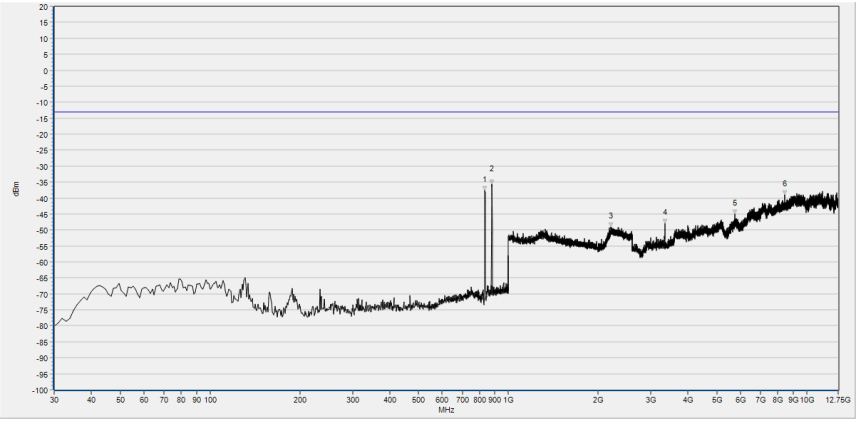
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	827.340	-36.42	-13.00	Horizontal	NA
2	870.020	-34.43	-13.00	Horizontal	NA
3	2194.718	-49.09	-13.00	Horizontal	PASS
4	3303.246	-45.71	-13.00	Horizontal	PASS
5	5147.190	-47.57	-13.00	Horizontal	PASS
6	7044.663	-42.27	-13.00	Horizontal	PASS

(WCDMA Band V, Channel = 4132, Horizontal)



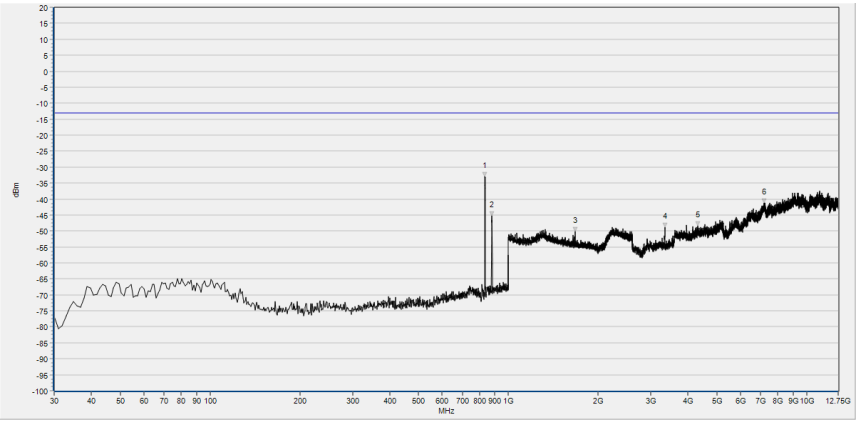
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	78.500	-58.33	-13.00	Vertical	PASS
2	827.340	-35.15	-13.00	Vertical	NA
3	871.960	-38.38	-13.00	Vertical	NA
4	1651.140	-49.50	-13.00	Vertical	PASS
5	3299.554	-48.01	-13.00	Vertical	PASS
6	6601.673	-43.33	-13.00	Vertical	PASS

(WCDMA Band V, Channel = 4132, Vertical)



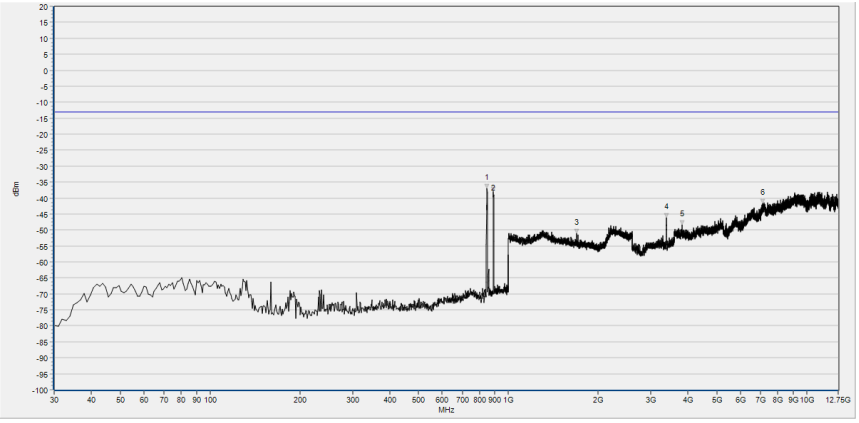
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	834.130	-37.75	-13.00	Horizontal	NA
2	878.750	-35.62	-13.00	Horizontal	NA
3	2204.322	-49.15	-13.00	Horizontal	PASS
4	3345.699	-47.90	-13.00	Horizontal	PASS
5	5745.226	-44.94	-13.00	Horizontal	PASS
6	8438.234	-39.01	-13.00	Horizontal	PASS

(WCDMA Band V, Channel = 4183, Horizontal)



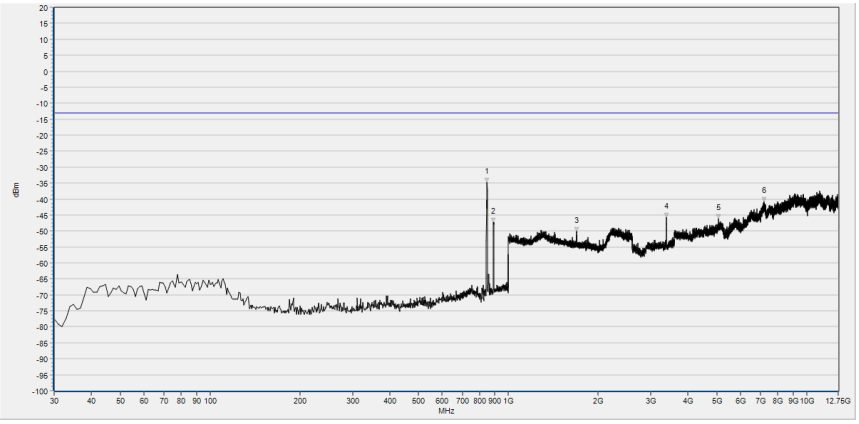
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	834.130	-33.01	-13.00	Vertical	NA
2	878.750	-45.34	-13.00	Vertical	NA
3	1670.988	-50.22	-13.00	Vertical	PASS
4	3342.008	-48.82	-13.00	Vertical	PASS
5	4318.431	-48.33	-13.00	Vertical	PASS
6	7181.251	-41.27	-13.00	Vertical	PASS

(WCDMA Band V, Channel = 4183, Vertical)



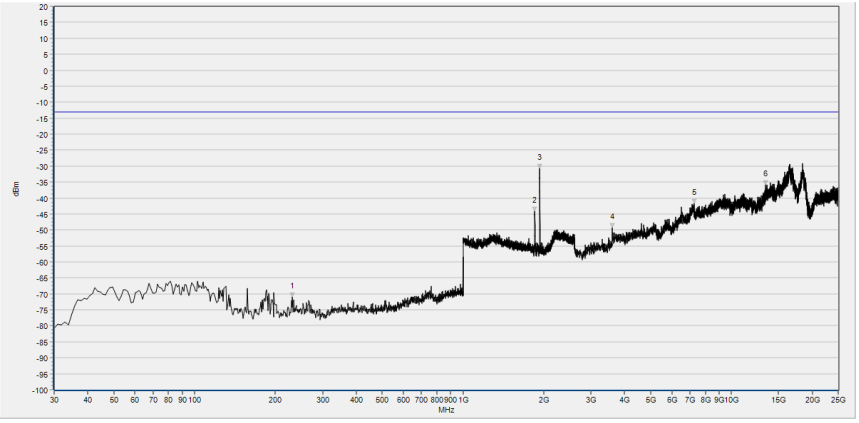
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	847.710	-37.09	-13.00	Horizontal	NA
2	890.390	-37.98	-13.00	Horizontal	NA
3	1690.196	-51.09	-13.00	Horizontal	PASS
4	3380.769	-46.24	-13.00	Horizontal	PASS
5	3829.296	-48.45	-13.00	Horizontal	PASS
6	7100.036	-41.78	-13.00	Horizontal	PASS

(WCDMA Band V, Channel = 4233, Horizontal)



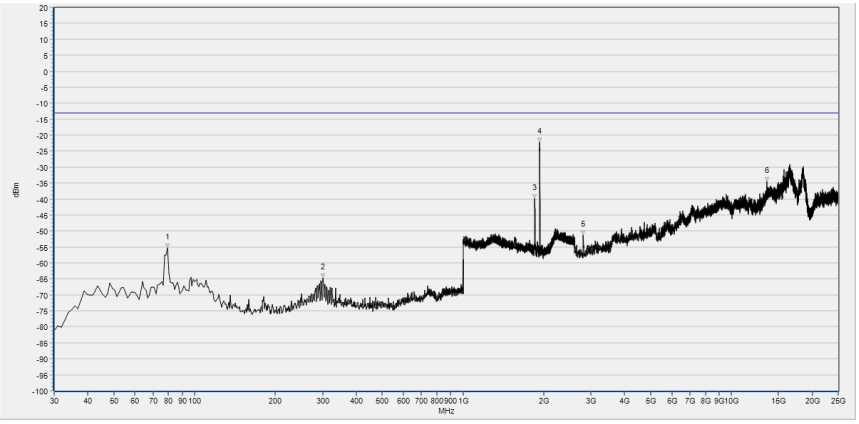
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	847.710	-34.79	-13.00	Vertical	NA
2	891.360	-47.17	-13.00	Vertical	NA
3	1690.196	-50.09	-13.00	Vertical	PASS
4	3380.769	-45.78	-13.00	Vertical	PASS
5	5071.513	-46.03	-13.00	Vertical	PASS
6	7175.714	-40.88	-13.00	Vertical	PASS

(WCDMA Band V, Channel = 4233, Vertical)



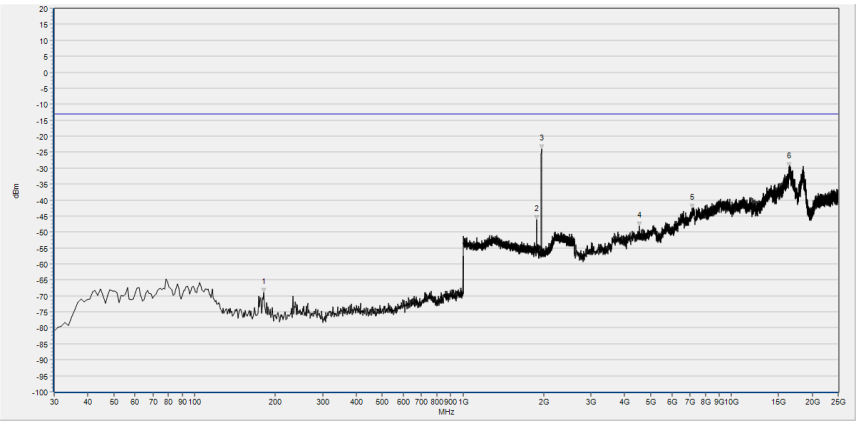
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	231.760	-70.90	-13.00	Horizontal	PASS
2	1850.900	-44.24	-13.00	Horizontal	NA
3	1933.493	-30.78	-13.00	Horizontal	NA
4	3606.147	-49.35	-13.00	Horizontal	PASS
5	7255.974	-41.71	-13.00	Horizontal	PASS
6	13410.984	-35.80	-13.00	Horizontal	PASS

(WCDMA Band II, Channel = 9262, Horizontal)



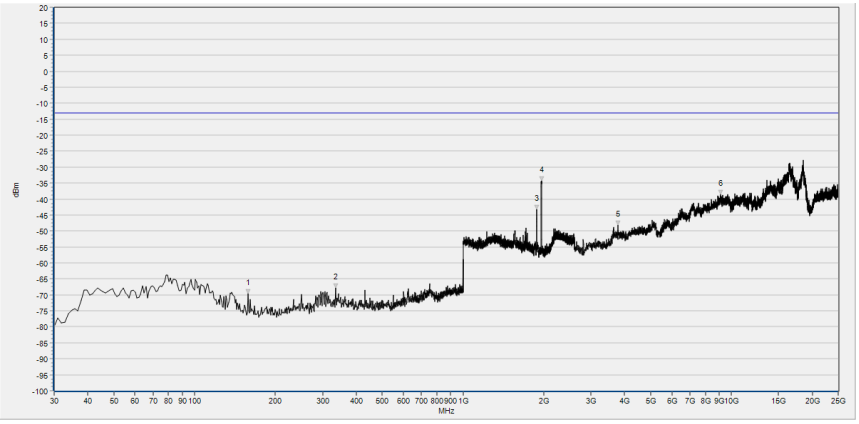
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	79.470	-55.28	-13.00	Vertical	PASS
2	301.600	-64.77	-13.00	Vertical	PASS
3	1850.900	-39.84	-13.00	Vertical	NA
4	1932.853	-22.30	-13.00	Vertical	NA
5	2807.747	-51.32	-13.00	Vertical	PASS
6	13586.143	-34.49	-13.00	Vertical	PASS

(WCDMA Band II, Channel = 9262, Vertical)



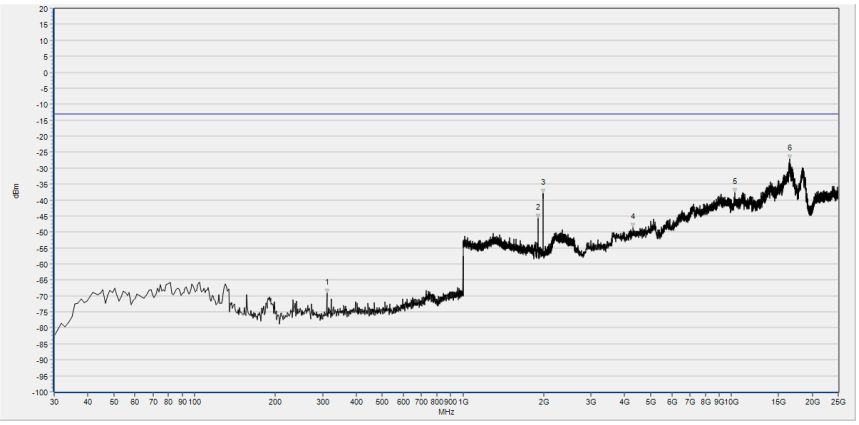
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	181.320	-68.98	-13.00	Horizontal	PASS
2	1878.431	-46.18	-13.00	Horizontal	NA
3	1959.744	-24.03	-13.00	Horizontal	NA
4	4543.044	-48.24	-13.00	Horizontal	PASS
5	7145.990	-42.58	-13.00	Horizontal	PASS
6	16392.762	-29.59	-13.00	Horizontal	PASS

(WCDMA Band II, Channel = 9400, Horizontal)



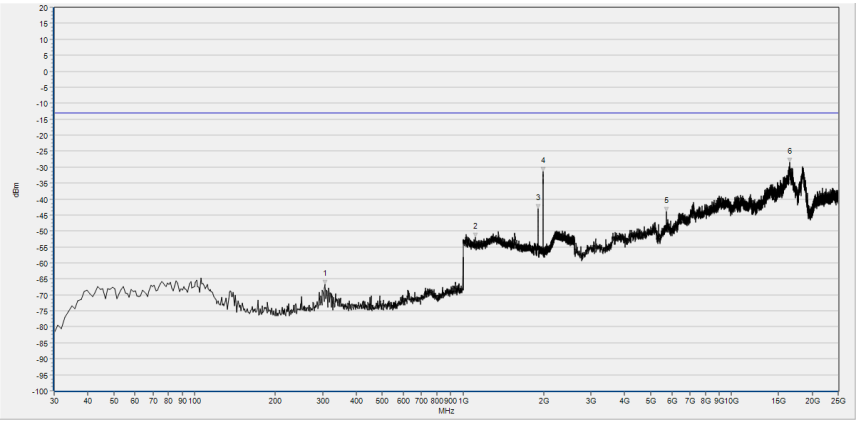
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	158.040	-69.53	-13.00	Vertical	PASS
2	335.550	-67.88	-13.00	Vertical	PASS
3	1878.431	-43.24	-13.00	Vertical	NA
4	1959.104	-34.27	-13.00	Vertical	NA
5	3785.379	-48.22	-13.00	Vertical	PASS
6	9129.769	-38.63	-13.00	Vertical	PASS

(WCDMA Band II, Channel = 9400, Vertical)



Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	311.300	-69.17	-13.00	Horizontal	PASS
2	1909.164	-45.74	-13.00	Horizontal	NA
3	1985.994	-37.91	-13.00	Horizontal	NA
4	4306.783	-48.53	-13.00	Horizontal	PASS
5	10278.487	-37.71	-13.00	Horizontal	PASS
6	16531.260	-27.13	-13.00	Horizontal	PASS

(WCDMA Band II, Channel = 9538, Horizontal)



Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	305.480	-66.68	-13.00	Vertical	PASS
2	1114.606	-51.86	-13.00	Vertical	PASS
3	1908.523	-43.06	-13.00	Vertical	NA
4	1987.915	-31.47	-13.00	Vertical	NA
5	5720.276	-43.90	-13.00	Vertical	PASS
6	16494.599	-28.47	-13.00	Vertical	PASS

(WCDMA Band II, Channel = 9538, 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 C63.10-2013and 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	2019.04.17	2020.04.16
Attenuator 1	(N/A.)	10dB	Resnet	2019.04.17	2020.04.16
Attenuator 2	(N/A.)	3dB	Resnet	2019.04.17	2020.04.16
MXA Signal Analzyer	MY51511149	N9010A	Agilent	2019.07.29	2020.07.28
Wireless synthesizer	MY48364176	8960 -E5515C	Agilent	2019.04.17	2020.04.16
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	2019.04.17	2020.04.16
Computer	T430i	Think Pad	Lenovo	N/A	N/A

4.2 Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal.Due
System Simulator	152038	CMW500	R&S	2019.08.04	2020.08.03
Receiver	MY54130016	N9038A	Agilent	2019.05.18	2020.05.17
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2019.03.03	2020.03.02
Test Antenna - Horn	9170C-531	BBHA9170	Schwarzbeck	2019.08.06	2020.08.05
Test Antenna - Horn	01774	BBHA 9120D	Schwarzbeck	2019.08.02	2020.08.01
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	MA02	TS-PR18	Rohde& Schwarz	2019.05.08	2020.05.07
18-26.5GHz pre-Amplifier	MA03	TS-PR18	Rohde& Schwarz	2019.05.08	2020.05.07
Notch Filter	N/A	WRCG-GPR S850	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCG-GPR S1900	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	2017.11.19	2020.11.18

END OF REPORT