



EMC Test Report

Product Name: cdma2000 Digital Mobile Phone

Model Number: HUAWEI C8500/C8500

Report No: SYBH(Z-EMC)008122010-2
FCC ID:QISC8500

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Notice 1

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Notice 2

Modification Information:

Modification Information

Modification Information	1	
	2	
	3	<i>Not Applicable!</i>
	4	
	5	
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REPORT ON	cdma2000 Digital Mobile Phone
	HUAWEI C8500/C8500
REGULATION	FCC CFR47 Part 15: Subpart B;
	FCC CFR47 Part 22: Subpart H;
START OF TEST	Dec.20, 2010
END OF TEST	Jan.05, 2011
Final Judgement:	Pass

Approved By

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DateLiuchunlin
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REPORT BODY CONTENT

1	Status	6
1.1	Product Information	6
1.2	Test Site	6
1.3	Test environment condition	6
2	Summary of Results	7
3	Equipment Specification	8
3.1	General Description	8
3.2	Sub-Assembly Identity	8
4	System Configuration during EMC Test	10
4.1	Cables Used during Test	10
4.2	Associated Equipment Used during Test	10
4.3	Test Configurations and Test Mode	10
4.4	Test conditions and test Connections	11
5	Electromagnetic Interference (EMI)	12
5.1	Radiated Disturbance 30MHz to 18GHz	12
5.2	Conducted Disturbance 0.15 MHz to 30MHz	13
5.3	Radiated Spurious Emissions	14
6	Main Test Instruments	16
7	System Measurement Uncertainty	17
8	Graph and Data of Emission Test	18
8.1	Radiated Disturbance	18
8.2	Conducted Disturbance	20
8.3	Radiated Spurious Emission	21

1 Status

1.1 Product Information

CLIENT:	Huawei Technologies Co., Ltd.
ADDRESS:	Bantian Longgang District Shenzhen, P.R. China
MANUFACTURING DESCRIPTION	cdma2000 Digital Mobile Phone
MANUFACTURERS MODEL NUMBER	HUAWEI C8500/C8500

1.2 Test Site

Site 1:

EMC LABORATORY OF RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD

1.3 Test environment condition

Ambient temperature	20~25°C
Relative humidity	40%~52%
Atmospheric pressure	101kPa

2 Summary of Results

Table below shows a brief summary of the results obtained.

Summary of results

EUT Classification: Wireless Terminal				
Test Items	Test Configuration & Test Mode	Required Performance Criteria	Result	Site
<u>Radiated Emissions</u> Enclosure Port	TC1/TC2 (TM7-TM12)	N/A	Pass	Site1
<u>Conducted Emissions</u>	TC1 (TM1-TM12)	N/A	Pass	Site1
<u>Radiated Spurious Emissions</u> Enclosure Port	TC1 (TM1-TM3)	N/A	Pass	Site1
Note: 1, Measurement taken is within the measurement uncertainty of measurement system. 2, TC = Test configuration				

3 Equipment Specification

3.1 General Description

cdma2000 Digital Mobile Phone — HUAWEI C8500/C8500 is subscriber equipment in the CDMA/EVDO system. The frequency band is US Cellular, This band test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, CDMA2000 1x and 1xEV-DO protocol processing, voice, video, MMS service, GPS, AGPS and WIFI etc. Externally it provides micro SD card interface, earphone port(to provide voice service). and USIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

3.1.1 Main Equipment Technical Data

Description:	cdma2000 Digital Mobile Phone
Models:	HUAWEI C8500/C8500
Input Rated Voltage	3.7V
Extreme Voltage	3.6V and 4.2V
Rated Power	Normal 3W ,Max 8 W
Dimensions	105mm (L)×55.8mm (W)×13.6mm (H)
Weight	<110g (with battery)

Sub-Assembly Identity



Mode		Work Frequency	
		Transmitt Frequency (MHz)	Receive Frequency (MHz)
CDMA2000 1x and 1xEV-DO	CDMA/EVDO800	824-849	869-894
Bluetooth		2400-2483.5	
WIFI		2400-2483.5	
GPS		1575.42	

3.2 Sub-Assembly Identity

Sub-Assembly Identity

Sub Assembly Identity

Board				
Model Name	Qty.	Serial	Description	
HC1C815M	1	3R7NAA1082500441	Main board of Mobile Phone	
Accessory				
Name	Qty.	Manufacture	Serials number	Description
Adapter	1	Huawei Technologies Co., Ltd.	HKAA82473545	Adapter Model: HW-050100U1W Input Voltage : ~100-240V 50/60Hz 0.2A Output Voltage: --- 5.0V 1A Rated Power: 5W
Adapter	1	Huawei Technologies Co., Ltd.	HKAAB2405797	Adapter Model: HW-050100E1W Input Voltage : ~100-240V 50/60Hz 0.2A Output Voltage: --- 5.0V 1.0A

				Rated Power: 5W
Rechargeable Li-ion	1	Huawei Technologies Co., Ltd.	GAGA917XC3900225	Battery Model: HB4J1 Rated capacity: 1050mAh Nominal Voltage:  +3.7V Charging Voltage:  +4.2V

4 System Configuration during EMC Test

The Equipment under Test (EUT) was functioning correctly during all tests. The EUT was installed within the test site and was configured to simulate a typical user installation.

4.1 Cables Used during Test

Cable Used during Test

Cable	Quantity	Type of Cable
USB	1	shielded
Earphone	1	Unshielded

4.2 Associated Equipment Used during Test

Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Cal Date
Radio Communication Tester	CMU200	R&S	3607111817	2010-7-23
Notebook	T61	IBM	3108052508	N/A

4.3 Test Configurations and Test Mode

4.3.1 Test Configuration.

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

TC1:EUT powered with an adapter and connected to the test system (Base Station Simulator).

TC2:EUT connected to the notebook by USB port.

Configuration table

TC1/TC2	TM1~TM12
---------	----------

4.3.2 Test Mode

There were 12 test Modes. TM1 to TM12 were shown in the diagrams below:

TM1	operate in traffic mode CDMA800;
TM2	operate in traffic mode EVDO800.0;
TM3	operate in traffic mode EVDO800.A;
TM4	operate in traffic mode Bluetooth;
TM5	operate in traffic mode WIFI;
TM6	operate in traffic mode GPS;
TM7	operate in idle mode CDMA800;
TM8	operate in idle mode EVDO800.0;
TM9	operate in idle mode EVDO800.A;
TM10	operate in idle mode Bluetooth;
TM11	operate in idle mode WIFI;
TM12	operate in idle mode GPS;

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

4.4 Test conditions and test Connections

4.4.1 Test Conditions

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

4.4.2 Test connections

Traffic Mode:

The EUT is required to be in the traffic mode, a call is set up according to the generic call set up procedure and enter the EUT into loop back test mode.

For CDMA, the following conditions shall also be met:

- The EUT shall be commanded to operate at maximum transmit power;

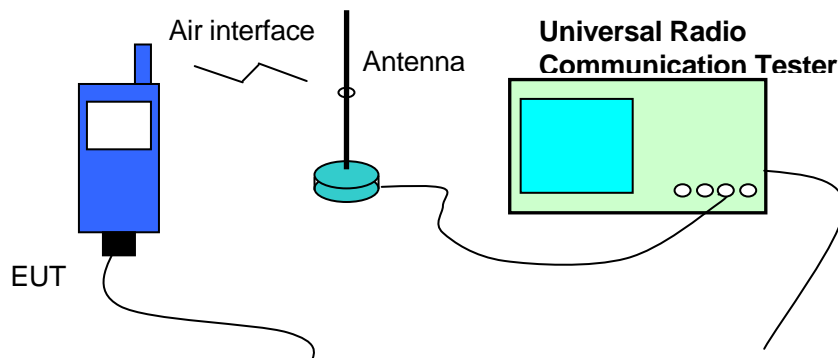


Figure 1.: Test Configuration

Idle Mode:

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

The EUT is required to be in the idle mode.

For CDMA, the following conditions shall be met:

- UE shall be camped on a cell;
- UE shall perform Location Registration (LR) before the test, but not during the test;
- UE's neighbour cell list shall be empty;

For Cellular, the following conditions shall be met:

When the EUT is required to be in the idle mode, the test system shall simulate a Base Station (BS) with Broadcast Control Channel/Common Control Channel (BCCH/CCCH) on one carrier. The EUT shall be synchronized to the BCCH, listening to the CCCH and able to respond to paging messages. Periodic Location Updating shall be disabled.

5 Electromagnetic Interference (EMI)

5.1 Radiated Disturbance 30MHz to 18GHz

5.1.1 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4. The test distance was 3m. The set-up and test methods were according to ANSI C63.4 .

A preliminary scan and a final scan of the emissions were made from 30 MHz to 18 GHz by using test script of software; the emissions were measured using Quasi-Peak Detector (30MHz~1GHz) and AV detector (above 1GHz). The maximal emission value was acquired by adjusting the antenna height, polarisation and turntable azimuth in accordance with the software setup. Normally, the height range of antenna was 1m to 4m, the azimuth range of turntable was 0° to 360°, The receive antenna has two polarizations V and H.

EUT was configured in idle mode and the test performed at worst emission state.

Measurement bandwidth: 30 MHz – 1000 MHz: 120 k Hz

Measurement bandwidth: 1GHz – 18GHz: 1MHz

Test set up figure:

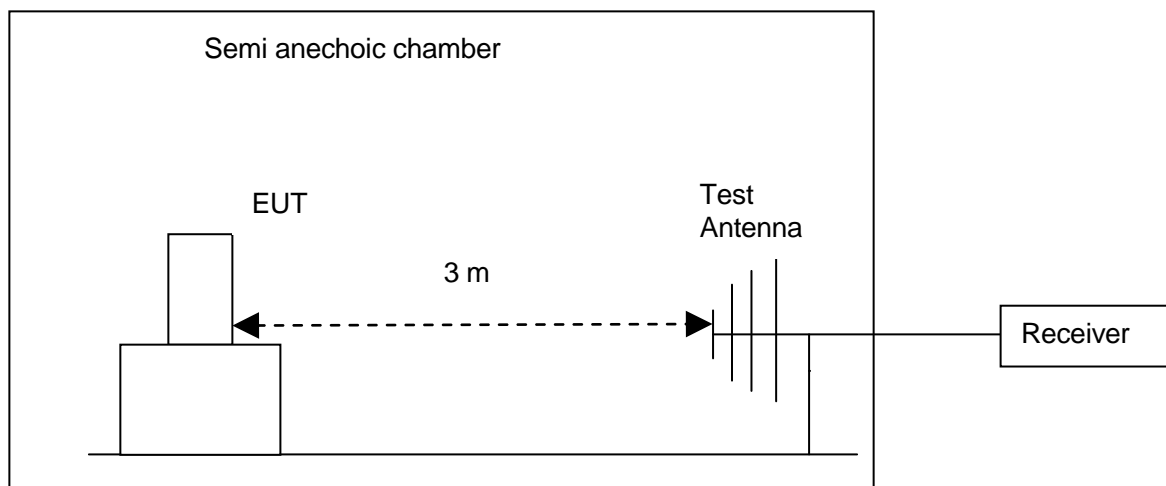


Figure 2. Test set-up

5.1.2 Test Results

The EUT has met the requirements for Radiated Emission of enclosure port.

Test Limits

Frequency of Emission (MHz)	Radiated Limit	
	Unit($\mu\text{V}/\text{m}$)	Unit($\text{dB}\mu\text{V}/\text{m}$)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

5.2 Conducted Disturbance 0.15 MHz to 30MHz

5.2.1 Test Procedure

The Table-top EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4.

Conducted Disturbance at AC Port measurements were undertaken on the L and N Lines. The emissions were measured using a Quasi-Peak Detector and Average Detector.

Huawei Mobile Station was communicated with the BTS simulator through Air interface, the BTS simulator controls the Mobile Station to transmitter the maximum power which defined in specification of product. The Mobile Station operated on the typical channel.

Measurement bandwidth (RBW) for 150kHz to 30 MHz: 9 kHz;

Test Set-up figure:

The Mobile Station was setup in the screened chamber and operated under nominal conditions.

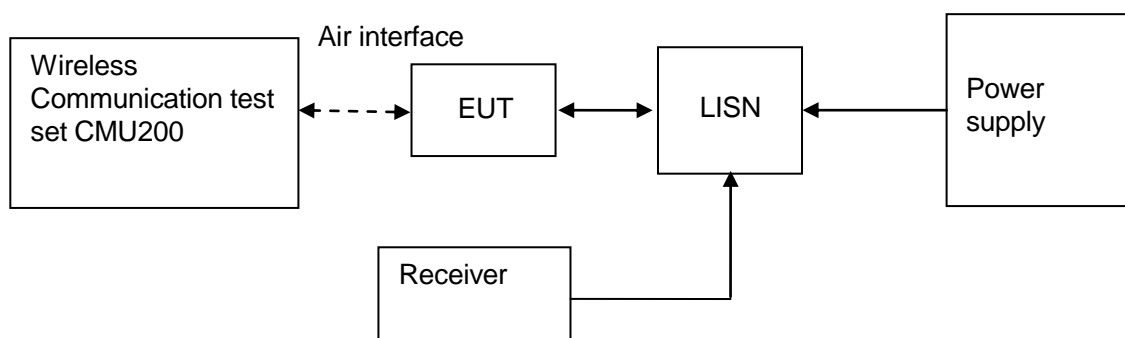


Figure 3. Test Set-up

5.2.2 Test Results

The EUT has met requirements for Conducted disturbance of power lines.

Test Limit of DC&AC Power Port

Frequency range	150kHz~ 30MHz	
Classification	Class B	
Limit(Class B)	Voltage limits	
	QP	AV
0.15MHz~0.5MHz	66~56 dB μ V	56~46 dB μ V
0.5MHz~5MHz	56 dB μ V	46 dB μ V
5MHz~30MHz	60 dB μ V	50 dB μ V

5.3 Radiated Spurious Emissions

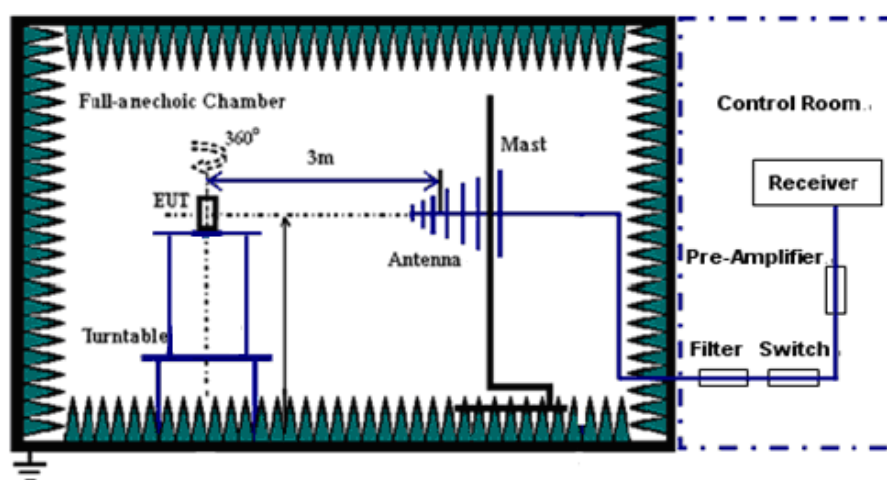
5.3.1 Test Procedure

A test site fulfilling the requirements of ITU-R Recommendation SM329-10 was used. The EUT was placed on a non-conducting support in the anechoic chamber and was operated from a power source via an RF filter to avoid radiation from the power leads.

Step 1:

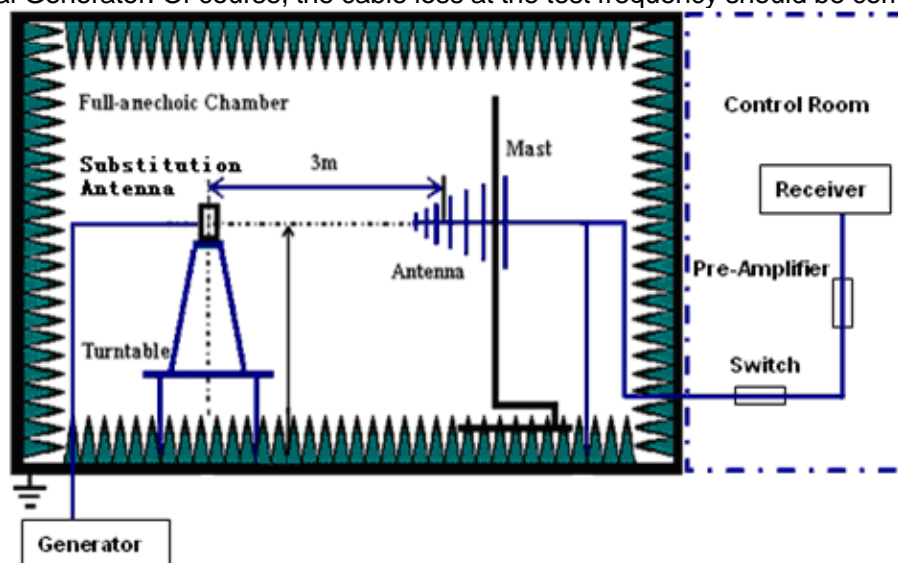
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the EUT to the BTS simulator via the air interface.

Test the Radiated maximum output power by the Test Receiver from test antenna.



Step 2:

Use substitution method to verify the maximum output power. The EUT is substituted by a dipole antenna. The dipole is connected to a signal generator. And then adjust the output level of the signal generator to get the same received power recorded in step1 on Test Receiver, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.



Test should be performed in normal voltage condition.

According to part 22.917, the defined measurement bandwidth as following:

22.917(b) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz;
Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz;
Measurement bandwidth (RBW) for 30MHz up to 1 GHz: 100 kHz;
Measurement bandwidth (RBW) for 1GHz up to 18GHz: 1MHz;

Radiated Spurious Emissions Limits

Frequency band	Minimum requirement (E.R.P) traffic mode
9KHz~18GHz	-13dBm

No peak found in pre- test. All frequency points' margin is bigger than 20dB, so the substitution method isn't used.

Calculation Sample:

Substitution Results

Freq. [MHz]	Measure ment Value [dBm]	Substitution Antenna Type	Gain [dBd]	Cable Loss [dB]	Signal Generator Level [dBm]	Substitution Level [dBm]	FCC limit [dBm]	Result

Note: For get the E.R.P. (Efficient Radiated Power) in substitution method, the following formula should take to calculate it,

$$\text{E.R.P. [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBd]}$$

NOTE: SGP- Signal Generator Level

5.3.2 Test Results

The EUT has met the requirements of FCC Part22.

6 Main Test Instruments

Main Test Equipments

Test item	Test Instrument	Model	Manufacturer	Cal-Date	Cal Interval (month)
RE&CE	EMI Test receiver	ESU26	R&S	Jun.25, 2010	12
	Broadband Antenna	VULB 9163	SCHWARZBECK	May.15, 2010	12
	Horn Antenna	HF906	R&S	May.15, 2010	12
	LISN	ENV216	R&S	Jun.25.2010	12
RSE	EMI Test receiver	FSU43	R&S	Jun.24, 2010	12
	Broadband Antenna	VULB 9163	SCHAFFNER	May.15.2010	12
	Horn Antenna	HF906	R&S	Jun.26, 2010	12
Software Information					
Test Item	Software Name	Manufacturer		Version	
RE/CE	ES-K1	R&S		1.7.1	
RSE	EMC32	R&S		V8.10.10	

7 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

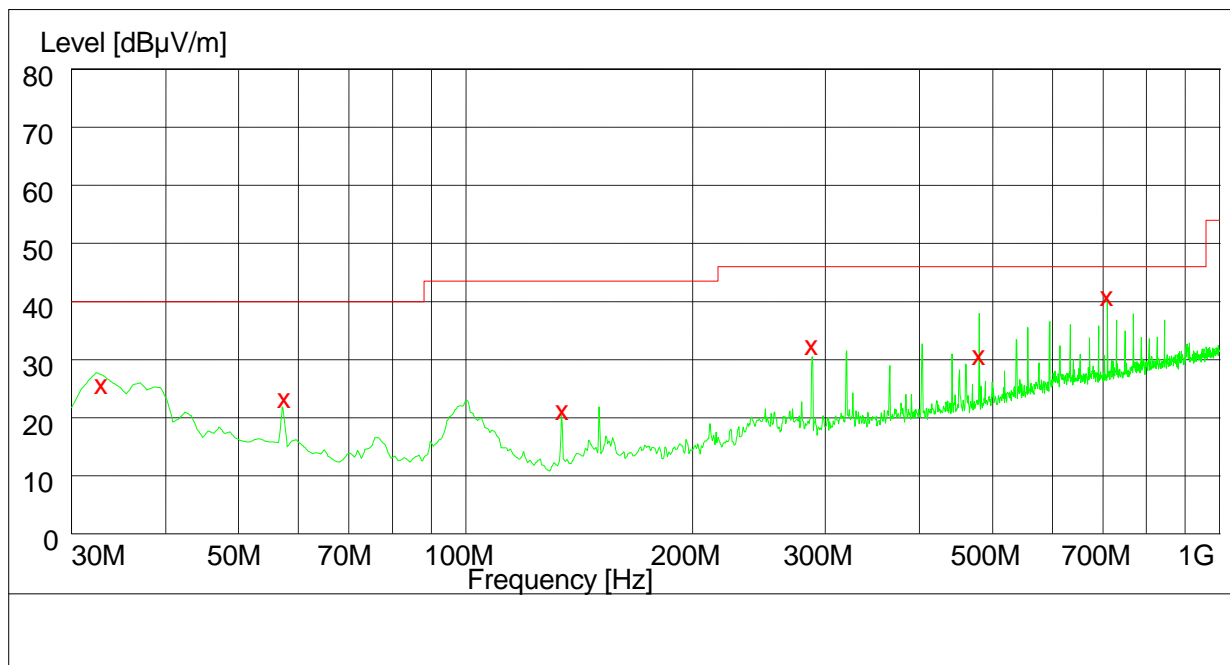
Items		Extended Uncertainty
RE	Field strength (dB μ V/m)	U=4.1dB; k=2(30MHz-1GHz)
RE	Field strength (dB μ V/m)	U=4.1dB; k=2(1GHz-18GHz)
RSE	ERP (dBm)	U=2.8dB; k=2
CE	Disturbance Voltage (dB μ V)	U=3.4dB; k=2

8 Graph and Data of Emission Test

8.1 Radiated Disturbance

This test was carried out in all the test modes, here only the worst test result was shown.

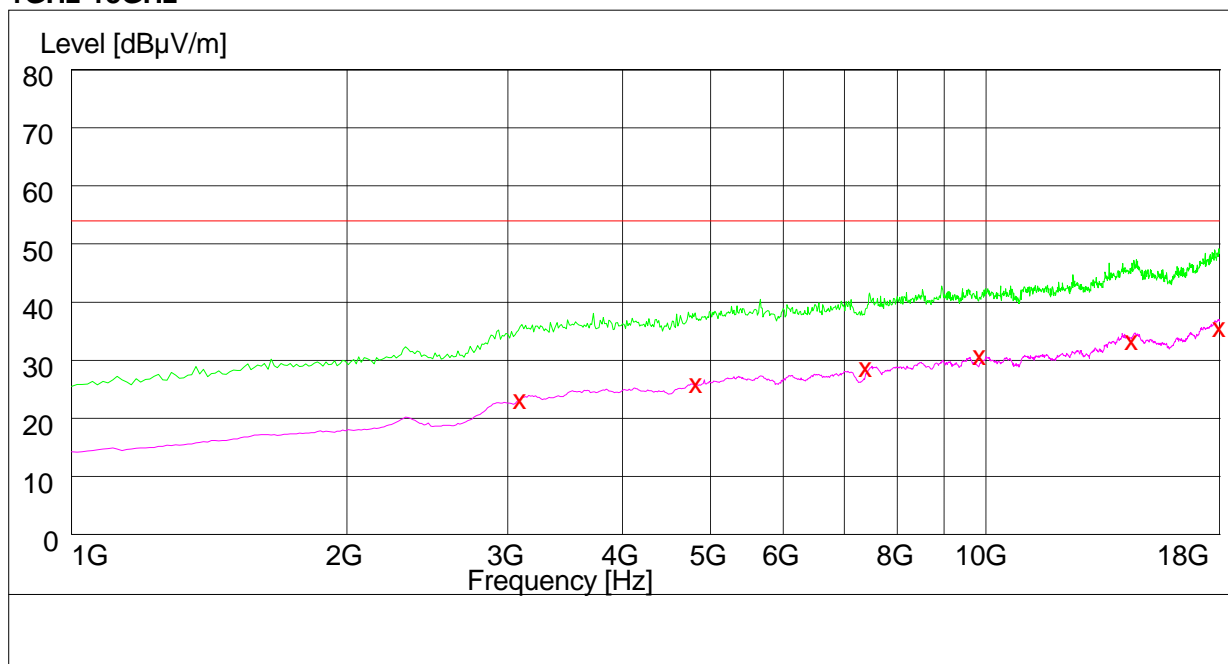
30MHz-1GHz



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
32.928000	25.50	11.7	40.0	14.5	100.0	90.00	VERTICAL
57.580000	23.90	12.4	40.0	16.1	100.0	285.00	VERTICAL
134.404000	21.80	9.0	43.5	21.7	101.0	108.00	VERTICAL
287.988000	33.60	15.2	46.0	12.4	109.0	232.00	HORIZONTAL
480.020000	30.20	19.6	46.0	15.8	121.0	216.00	VERTICAL
710.372000	41.10	23.4	46.0	4.9	100.0	164.00	VERTICAL

1GHz-18GHz



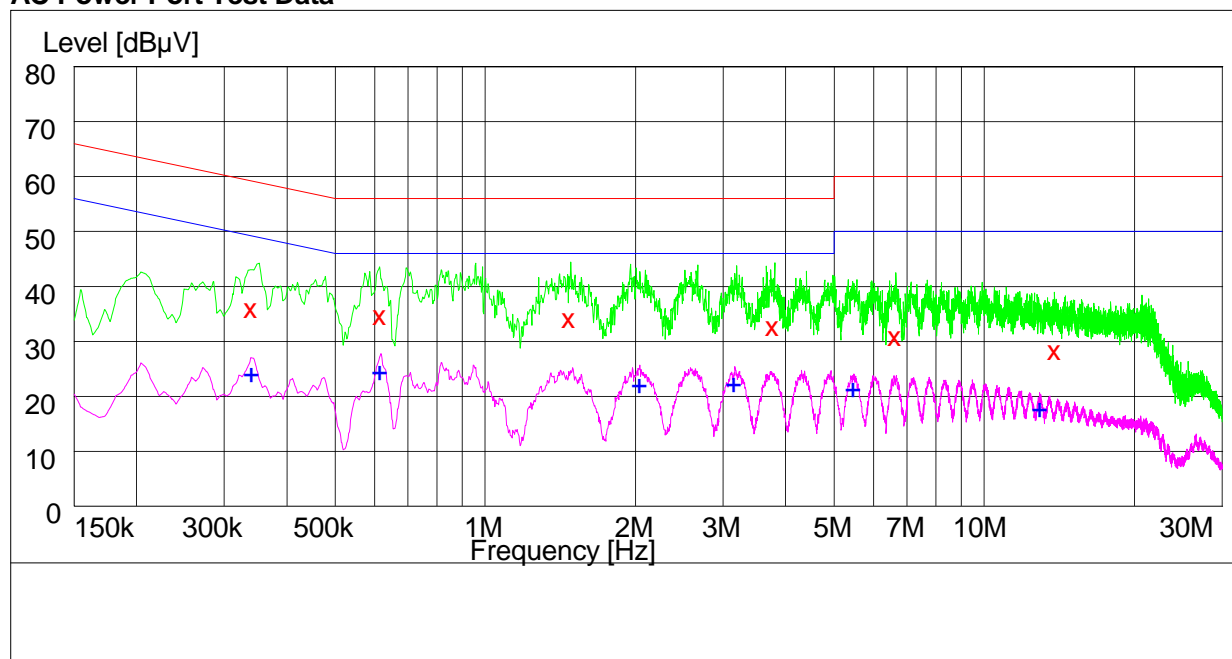
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV/ m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
3092.000000	24.40	-8.8	54.0	29.6	101.0	128.00	HORIZONTAL
4820.900000	27.20	-4.1	54.0	26.8	102.0	111.00	VERTICAL
7388.700000	29.60	1.0	54.0	24.4	181.0	355.00	HORIZONTAL
9844.000000	30.70	5.1	54.0	23.3	171.0	225.00	VERTICAL
14438.000000	34.70	12.2	54.0	19.3	185.0	32.00	HORIZONTAL
17990.500000	36.90	17.3	54.0	17.1	174.0	174.00	HORIZONTAL

8.2 Conducted Disturbance

This test was carried out in all the test modes, here only the worst test result was shown.

AC Power Port Test Data



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.340000	37.40	10.0	59	21.6	N	FLO
0.616000	36.00	10.1	56	20.0	N	FLO
1.472000	35.60	10.1	56	20.4	N	FLO
3.768000	34.10	10.2	56	21.9	N	FLO
6.638000	32.30	10.2	60	27.7	N	FLO
13.834000	29.70	10.3	60	30.3	N	FLO

MEASUREMENT RESULT: AV Detector

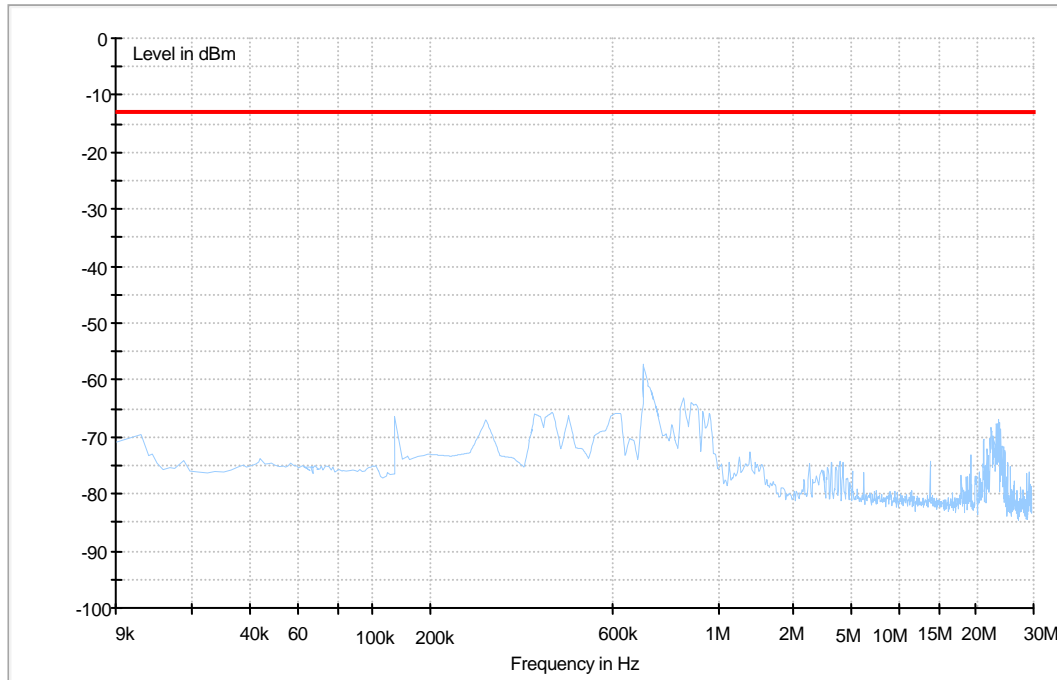
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.340000	25.60	10.0	49	23.4	N	FLO
0.614000	26.00	10.1	46	20.0	N	FLO
2.038000	23.60	10.1	46	22.4	N	FLO
3.150000	23.80	10.2	46	22.2	N	FLO
5.444000	22.70	10.2	50	27.3	N	FLO
12.910000	19.10	10.3	50	30.9	N	FLO

8.3 Radiated Spurious Emission

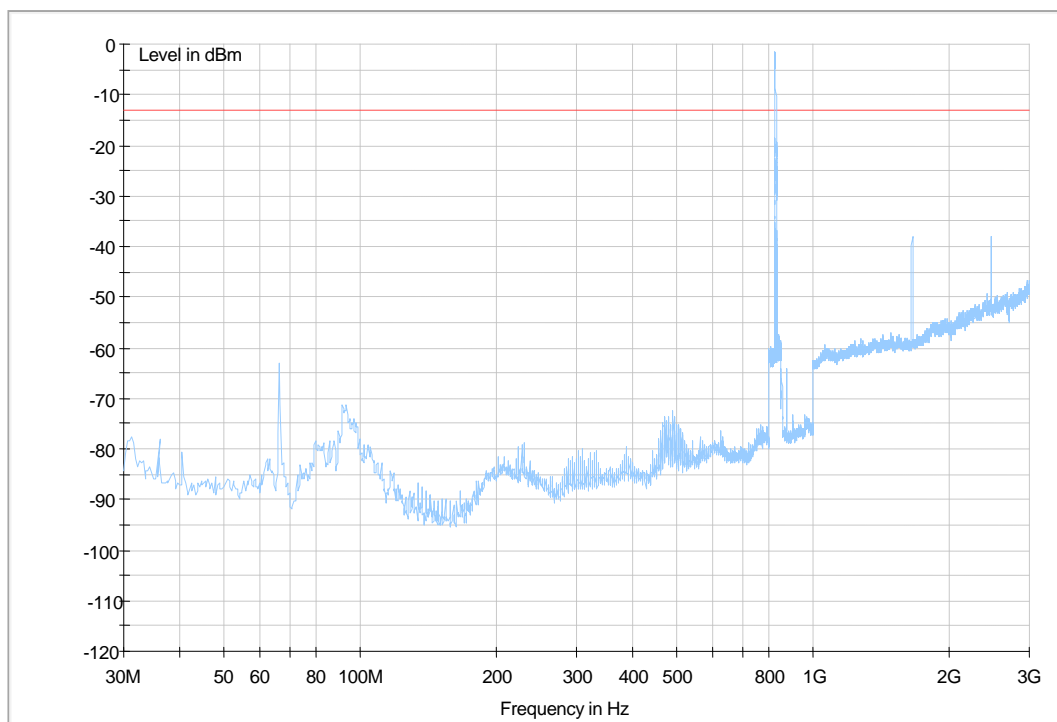
This test results are the maximum level of radiated spurious emissions in vertical and horizontal polarity. The highest peak exceeds the limit line is carrier frequency

8.3.1 For CDMA 800

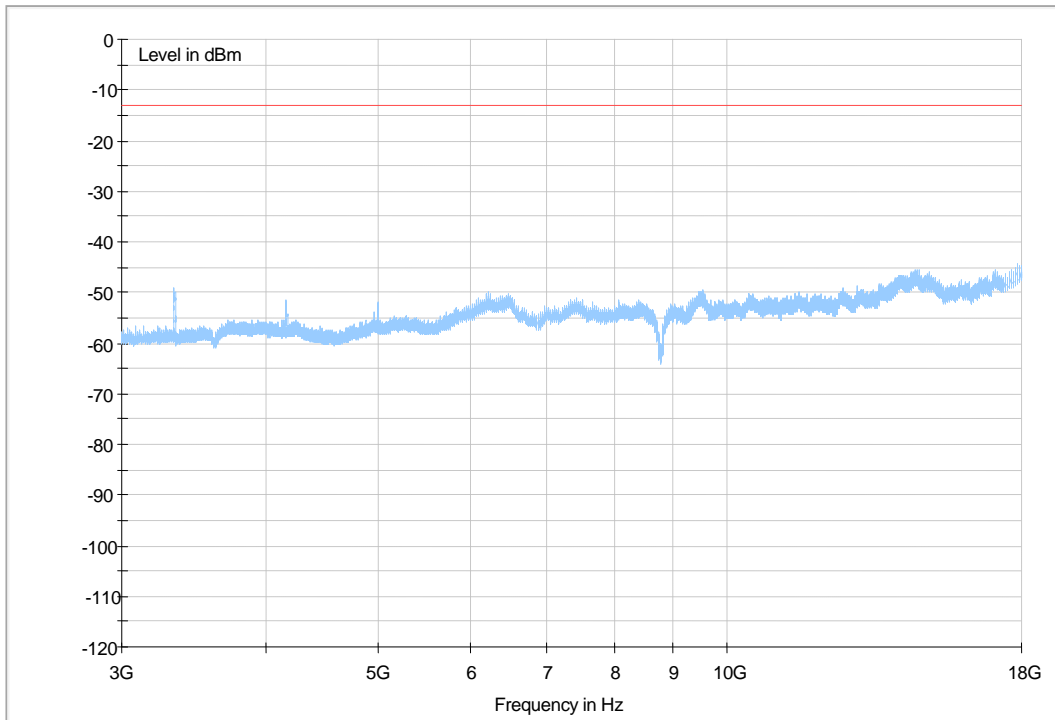
Traffic Mode (9kHz-30MHz)



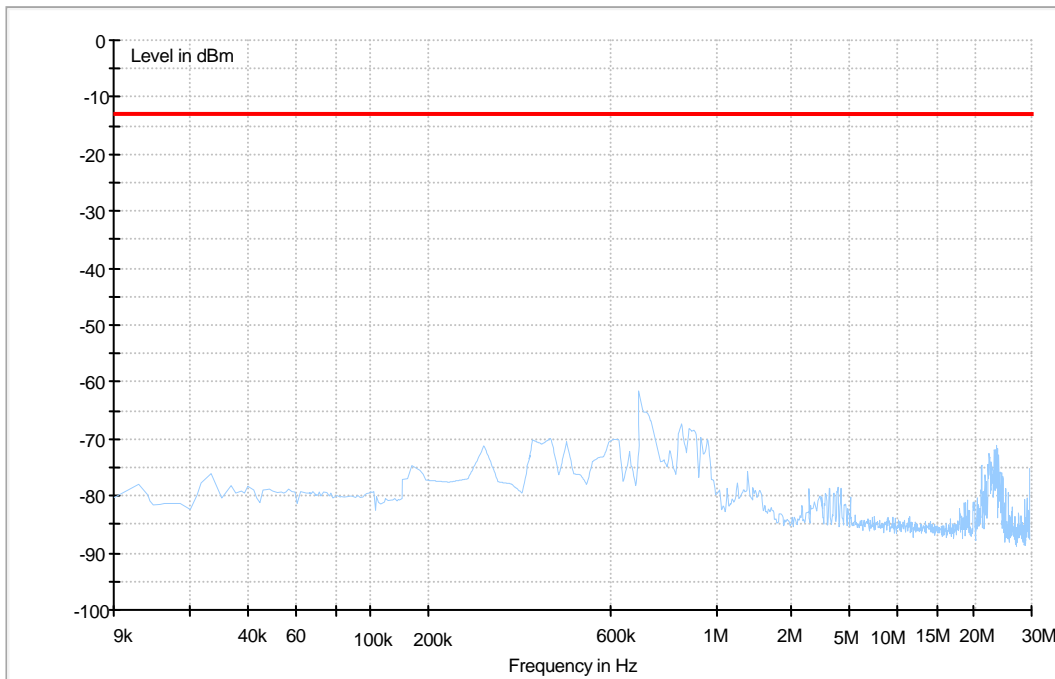
Traffic Mode (30MHz-3GHz)



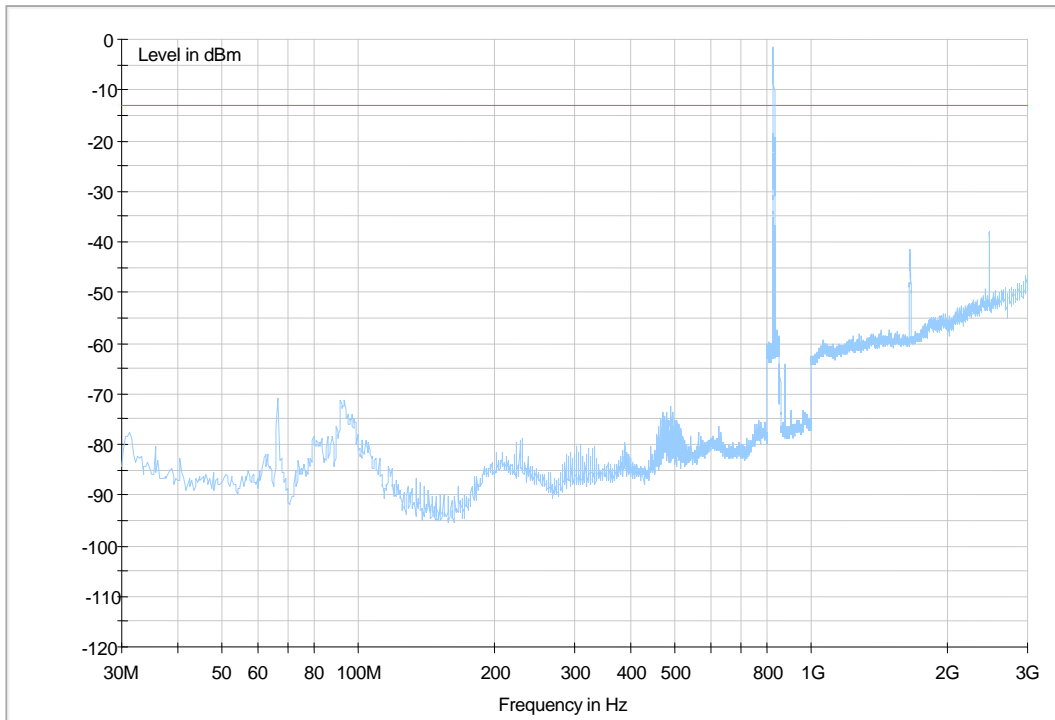
Traffic Mode (3GHz-18GHz)



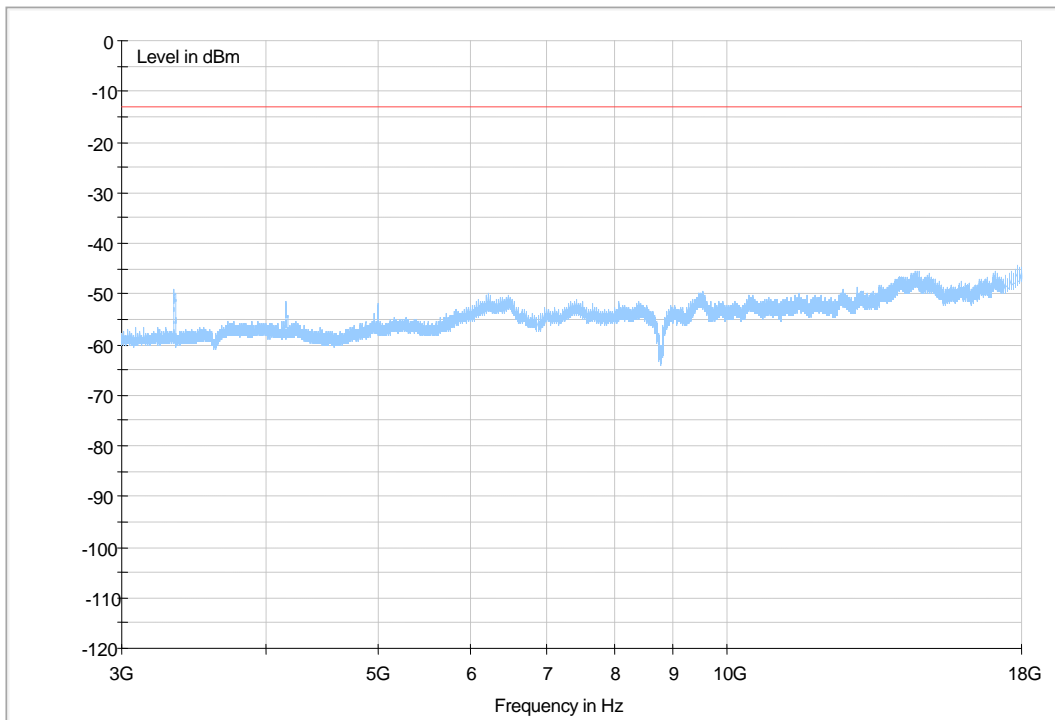
8.3.2 For EVDO 800 R.0 Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-3GHz)

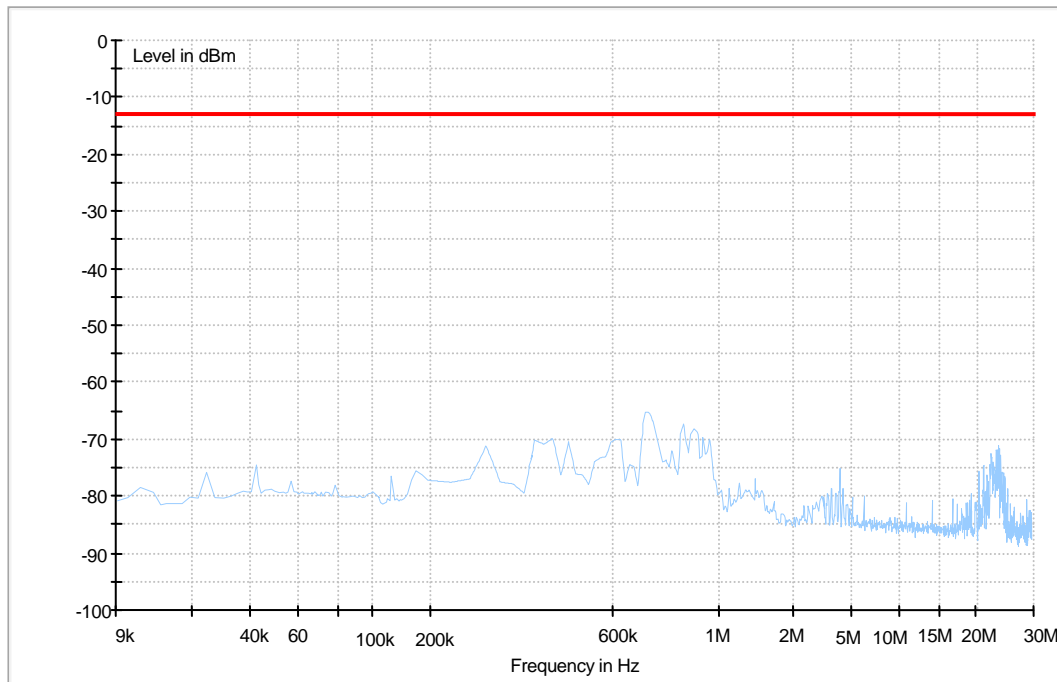


Traffic Mode (3GHz-18GHz)

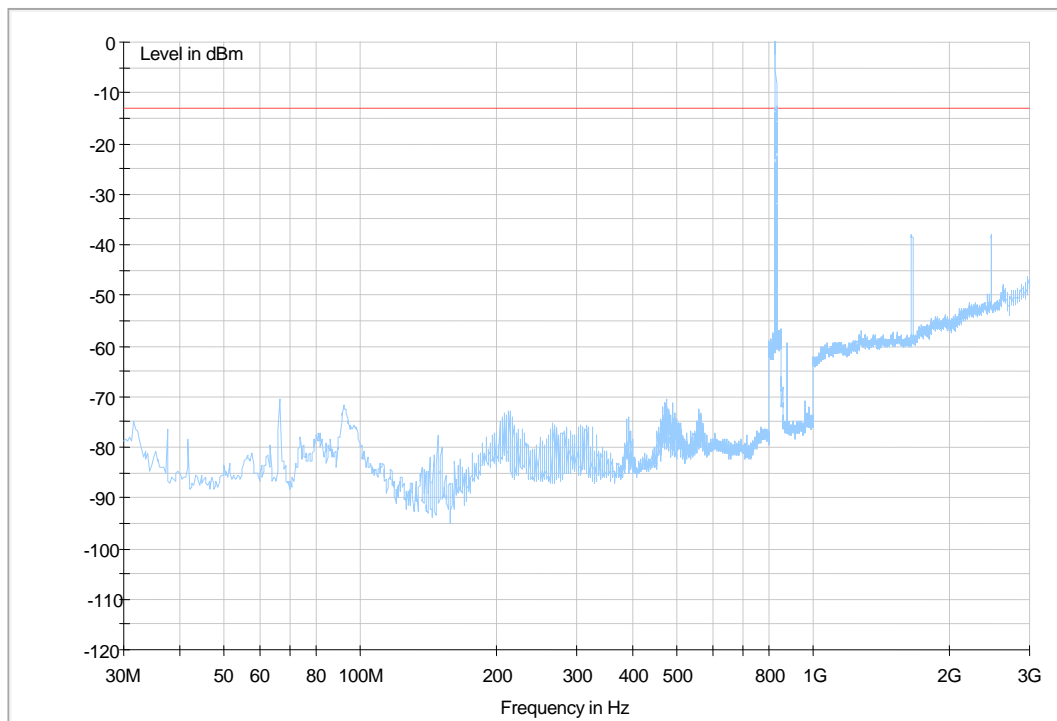


8.3.3 For EVDO 800 R.A

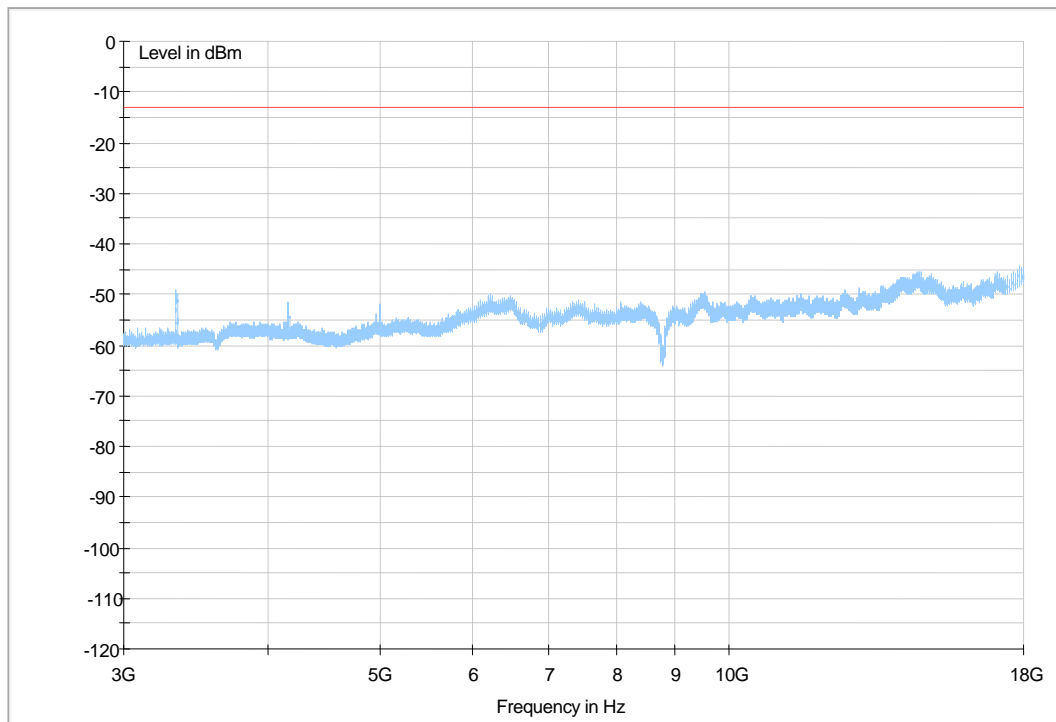
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-3GHz)



Traffic Mode (3GHz-18GHz)



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