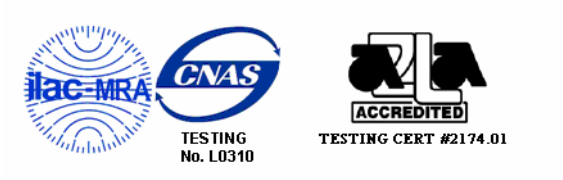


EMC Test Report

Product Name: EVDO Rev.A Module

Model Number: HUAWEI EM660C

Report No: SYBHZ(R)E002112009EB-1

Reliability Laboratory of Huawei Technologies Co., Ltd.

Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China

Tel: +86 755 28780808 Fax: +86 755 89652518

Notice 1

1. The laboratory has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L0310.
2. The laboratory has obtained the accreditation of THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION (A2LA), and Accreditation Council Certificate Number: 2174.01.
3. The laboratory has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements. The site recognition number is 97456.
4. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-1.
5. The laboratory also has been listed by the VCCI to perform EMC measurements. The accreditation number is R2364, C2583, and T256.
6. The test report is invalid if not marked with "exclusive stamp for the test report".
7. The test report is invalid if not marked with the stamps or the signatures of the persons responsible for performing, revising and approving the test report.
8. The test report is invalid if there is any evidence of erasure and/or falsification.
9. If there is any dissidence for the test report, please file objection to the test centre within 15 days from the date of receiving the test report.
10. Normally, the test report is only responsible for the samples that have undergone the test.
11. Context of the test report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of the laboratory.

Notice 2

Modification Information:

Table 1 Modification Information

Modification Information	1	
	2	
	3	Not Applicable!
	4	
	5	
	6	
	7	

REPORT ON	**EVDO Rev.A Module**
	M/N: HUAWEI EM660C
REGULATION	**FCC CFR47 Part 15: Subpart B;**
	FCC CFR47 Part 22: Subpart H;
START OF TEST	**Oct.18, 2009**
END OF TEST	**Oct. 28, 2009**
Final Judgement:	**Pass**

	Date	Name	Signature
Approver	2009-11-13	张兴海	
Operator	2009-11-10	徐广义	徐广义

REPORT BODY CONTENT

1 Status

1.1 Product Information

CLIENT:	Huawei Technologies Co., Ltd.
ADDRESS:	Bantian Longgang District Shenzhen, P.R. China
MANUFACTURING DESCRIPTION	EVDO Rev.A Module
MANUFACTURERS MODEL NUMBER	HUAWEI EM660C

1.2 Applied Standard

FCC Measurement Specification	FCC Limits Part(s)	Description	Result
	15.107	Conducted Emission at Power Port	PASS
	15.109	Radiated Emission of Enclosure in Idle Mode	PASS
2.1051	22.917	Radiated Spurious Emission	PASS

1.3 Test Site

Site 1:
RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD

1.4 Test environment condition

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

2 Summary of Results

Table 2 below shows a brief summary of the results obtained.

Table 2 Summary of results

EUT Classification:Wireless Equipment				
Test Items	**Test Configuration &Test Mode**	**Required Performance Criteria**	**Result**	**Site**
Radiated Emissions Enclosure Port	TC1 (TM4~TM6)	N/A	Pass	Site1
Conducted Emissions	TC1 (TM1~TM3)	N/A	Pass	Site1
Radiated Spurious Emissions 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, NT=no test. Because of not containing devices susceptible to magnetic fields, the EUT has been exempt from immunity test of power frequency magnetic field.				

3 Equipment Specification

3.1 General Description

HUWEI EM660C EVDO Rev.A Module is a subscriber equipment in the CDMA and CDMA2000 1x EVDO Rev.A/Rev.0 system and supports 800 MHz frequency band. By using the QSC6085 chipset and Zero-IF technologies, the Module implements such functions as RF signal reception/transmission, CDMA protocol process, CDMA2000 1xEV-DO Rev.A/Rev.0 protocol processing, high-rate packet data services.

3.1.1 Main Equipment Technical Data

Description:	EVDO Rev.A Module
Models:	HUAWEI EM660C
Input Rated Voltage:	⎓ 3.3V
Rated Consumption Power:	Max 2.5 W
Maximum Emission Power:	Max 30dBm
Dimensions:	56.0(length)× 30.0(width)× 5.0(height)(mm^3)
Weight:	7.2g

Table 3 Sub-Assembly Identity

Mode		Work Frequency	
		Transmitt Frequency(MHz)	Receive Frequency (MHz)
CDMA	Cellular - CDMA	824 to 849	869 to 894

3.2 Sub-Assembly Identity

Table 4 Sub-Assembly Identity

Board			
Model Name	**Qty.**	**Serial Number**	**Description**
CE66TCPU	1	MU4CAA1961100185	Main Board
Accessory			
Name	**Qty.**	**Serials number**	**Description**

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

Table 5 Cable Used during Test

Port	Connector	Type of Cable
PCI-E	PCI-E	N/A

4.2 Associated Equipment Used during Test

Table 6 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Cal Date
Radio Communication Tester	CMU200	R&S	3608082535	2009-08-05
Notebook	HSTNN-I05C	HP	CNU5301HH0	NA
Notebook	T43	IBM	3106093834	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).

Table 7 Configuration table

Test configuration	Test mode
TC1	TM1~TM6

TC1: EUT was powered by a demo board, which is connected to the notebook by USB port.

4.3.2 Test Mode

There were 6 test Modes. TM1 to TM6 were shown below:

TM1: operate in traffic mode CDMA800;
TM2: operate in traffic mode CDMA2000 1x EVDO Rev.A;
TM3: operate in traffic mode CDMA2000 1x EVDO Rev.0;
TM4: operate in idle mode CDMA 800;
TM5: operate in idle mode CDMA2000 1x EVDO Rev.A;
TM6: operate in idle mode CDMA2000 1x EVDO Rev.0;

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.(see clause 1.3 in 3GPP2 C.S0011-A).
and the following conditions shall be met:

The EUT shall be commanded to operate at maximum transmit power 24dBm;
The "variable Data Rate Transmission" shall be disabled;
The Fixed terminal shall be set for maximum data transmission rate.
Assign channel frequency to an appropriate channel number, For MC703 the channel numbers is set to 283 (Transmit frequency 833.49MHz)here.

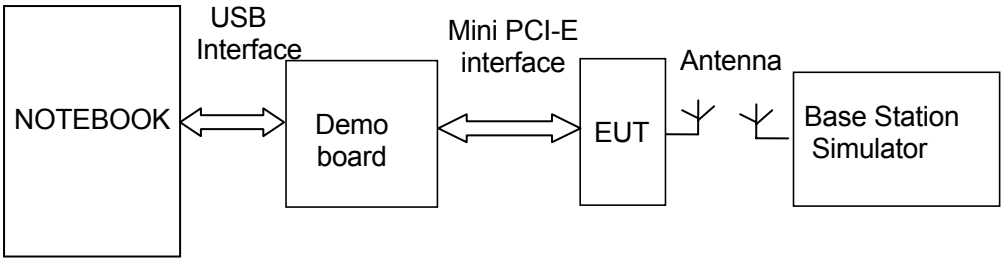


Figure 1.: TC1 (TM1-TM3)

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)
When the EUT is required to be in the idle mode, then the following conditions shall be met:
Enable the receiver for CDMA-only mode;
The test system shall simulate a Base Station with the Paging Channel or the Quick Paging Channel or Forward Common Control Channel/Broadcast Control Channel on one carrier. The Base Station Simulator shall be synchronized and be able to respond to paging messages. The fixed terminal shall not initiate a call (originated call), re-registration, or message transmission.

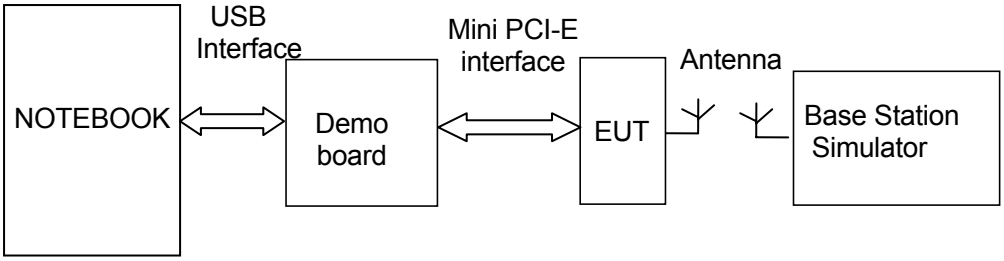


Figure 2. TC1 (TM4-TM6)

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 (2003). The test distance was 3m.The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4.The Radiated Disturbance measurements were made using a Rohde and Schwarz ESMI Test Receiver and control software ES-K1.

A preliminary scan and a final scan of the emissions were made from 30 MHz to 18GHz by using test script of software; the emissions were measured using a Quasi-Peak Detector. 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.

Huawei Mobile Station was communicated with the BTS simulator through Air interface. The Mobile Station operated on the typical channel and the Mobile Station worked in idle mode, transmitter was not work in this test.

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:

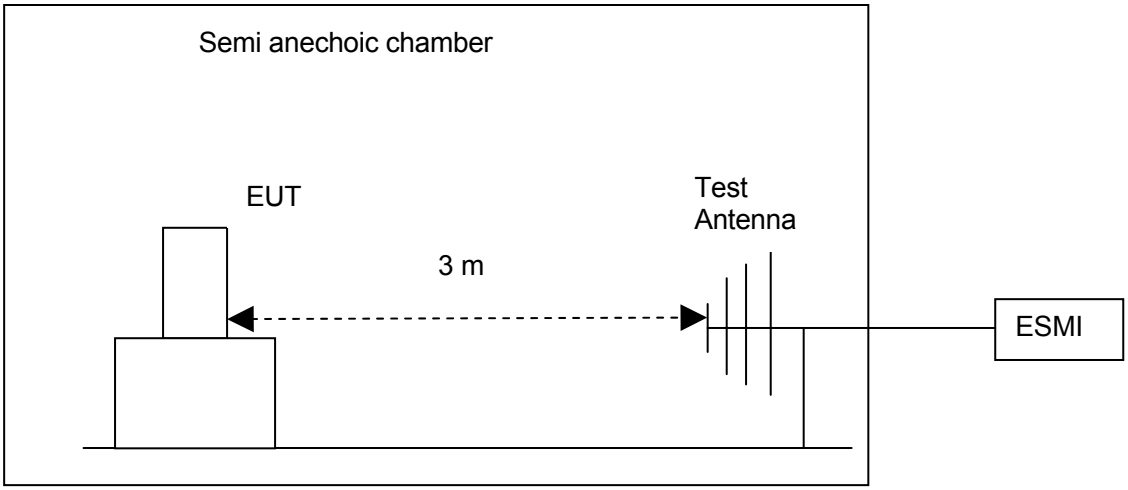


Figure 3. Test set-up

5.1.2 Test Results

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

Table 8 Test Limits

Frequency of Emission (MHz)	Radiated Limit

	Unit(μv/m)	Unit(dBμV/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: 2003.

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 150kz to 30 MHz: 9 kHz;

Test Set-up figure:

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

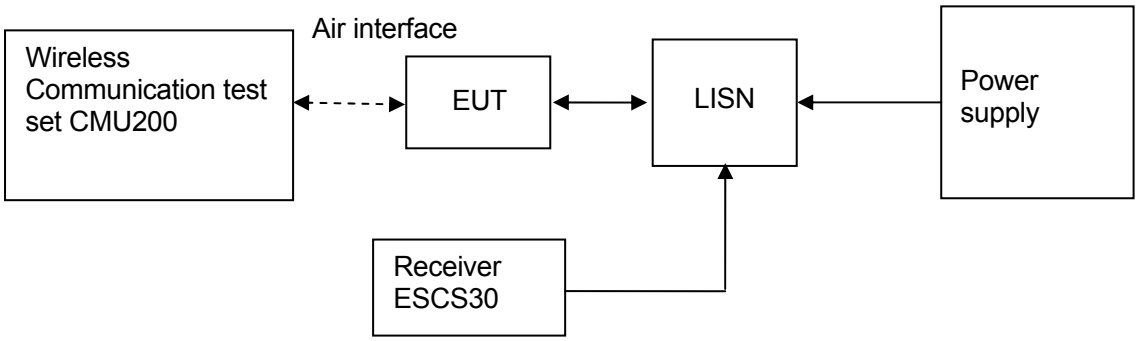


Figure 4. Test Set-up

5.2.2 Test Results

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

Table 9 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 dBμV	56~46 dBμV
0.5MHz~5MHz	56 dBμV	46 dBμV
5MHz~30MHz	60 dBμV	50 dBμV

5.3 Radiated Spurious Emissions

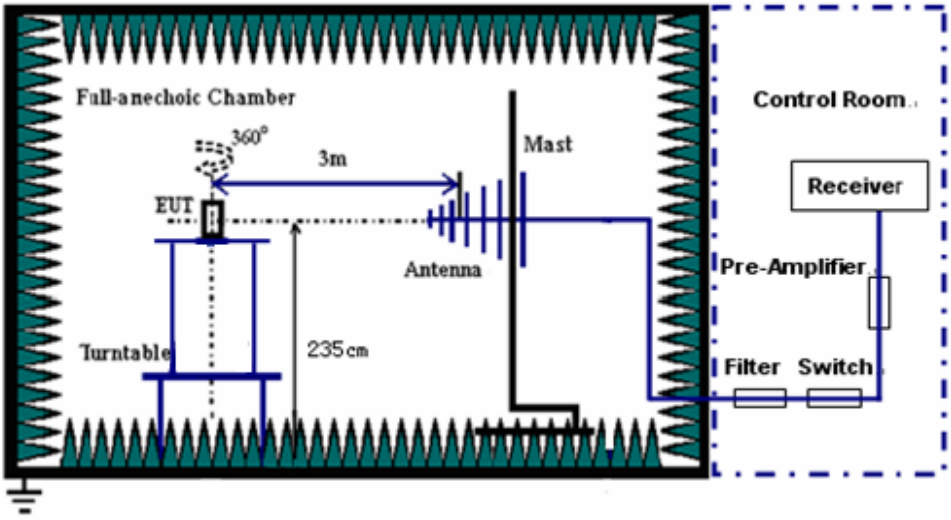
5.3.1 Test Procedure

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:

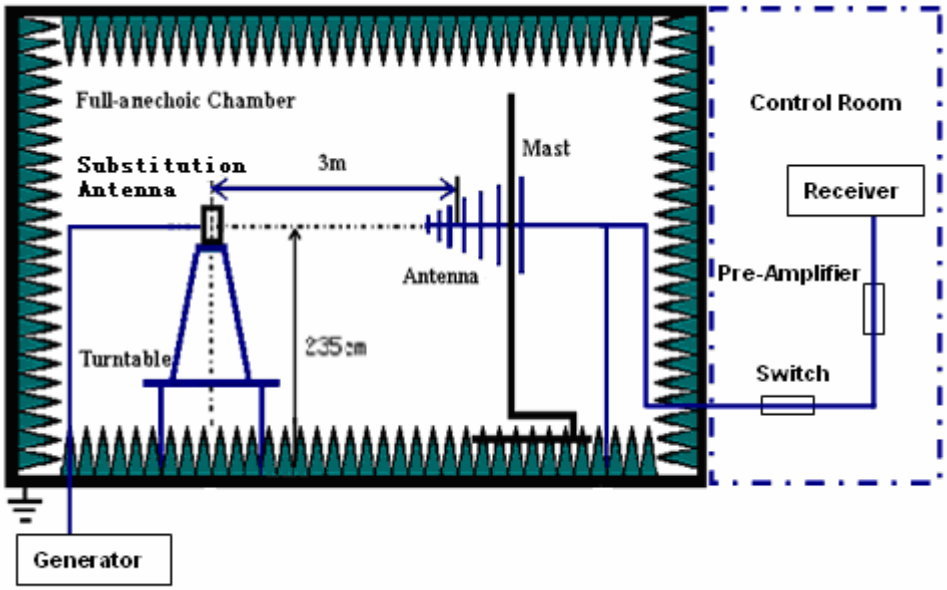
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect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

Test the Radiated maximum output power by the Rohde and Schwarz ESIB26 Test Receiver from test antenna.



Step 2:

Use substitution method to verify the maximum output power. The EUT is substituted by an antenna. The antenna 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 ESIB26 Test Receiver, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.



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

Table 10 Radiated Spurious Emissions Limits

Frequency band	**Minimum requirement (E.R.P) traffic mode**
30MHz~18GHz	-13dBm

5.3.2 Test Results

The EUT has met the requirements of FCC Part22requirement.

6 Main Test Instruments

Table 11 Main Test Equipments

Test item	Test Instrument	Model	Manufacturer	Cal-Date	Cal Interval (month)
RE	EMI Test receiver	ESMI	R&S	April.22, 2009	12
	Broadband Antenna	CBL 6112B (2536)	SCHAFFNER	Jun.08, 2009	12
CE	EMI Test receiver	ESCS30	R&S	April.22, 2009	12
	Artificial Mains Network	ENV4200	R&S	May.12, 2009	12
RSE	EMI Test receiver	ESIB26	R&S	May.30, 2009	12
	Horn Antenna	3117	ETS-LINDGREN	Jul.16, 2009	12
	Broadband Antenna	CBL6112B	SCHAFFNER	Aril.17, 2009	12
	Horn Antenna	3160	ETS-LINDGREN	Sep.27,2009	12

Software Information			
Test Item	Software Name	Manufacturer	Version
RE/CE	ES-K1	R&S	1.7.1
RSE	EMC32	R&S	V5.10.99

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:

Table 12 System Measurement Uncertainty

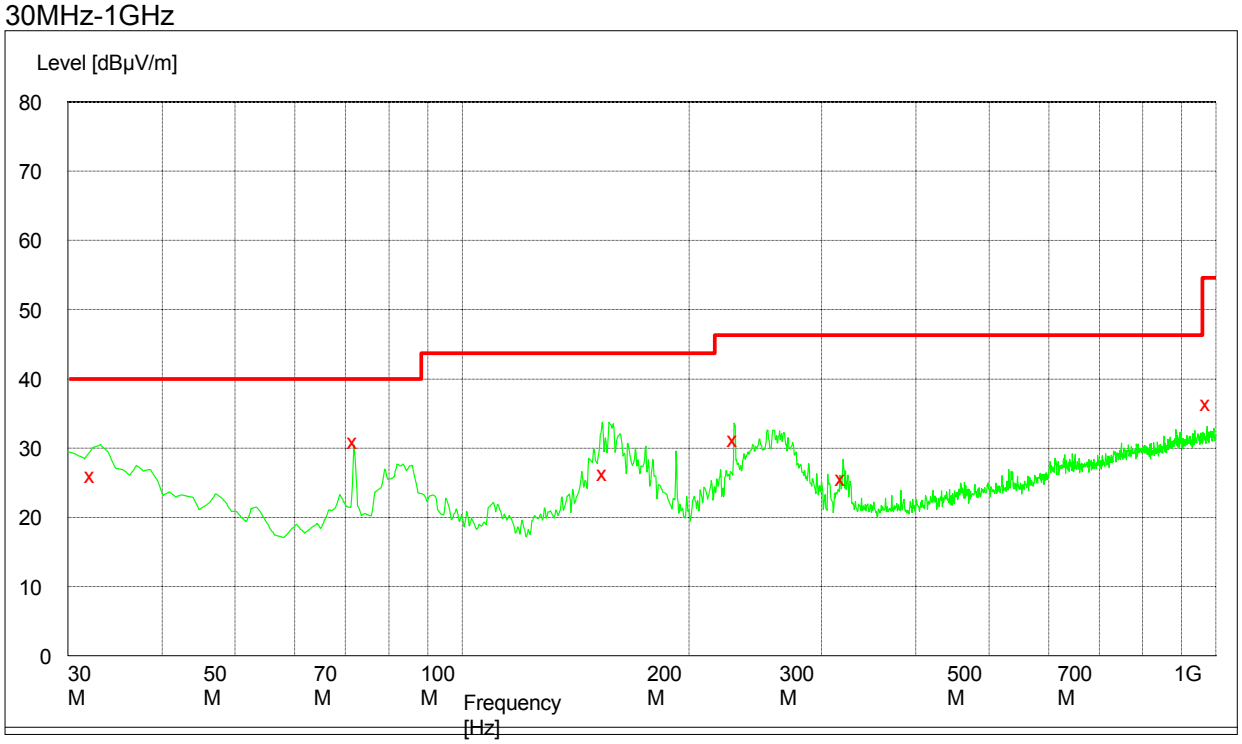
Items		Extended Uncertainty
RE	Field strength (dBμV/m)	U=4.6dB; k=2(30MHz-1GHz)
RSE	ERP (dBm)	U＝2.2dB；k＝2
CE	Disturbance Voltage(dBμV)	U=3.3dB; k=2

8 Graph and Data of Emission Test

8.1 Radiated Disturbance

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

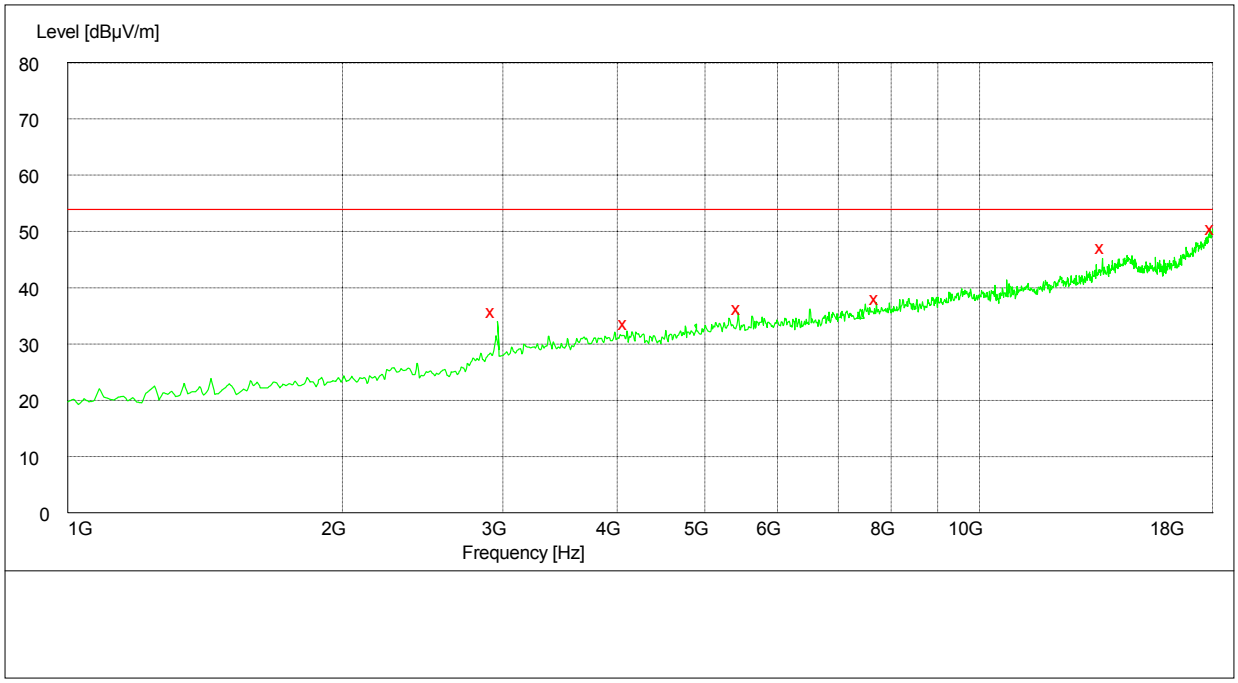
30MHz-1GHz



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
32.280000	26.10	11.7	40.0	13.9	100.0	233.00	VERTICAL
72.000000	31.00	8.1	40.0	9.0	288.0	209.00	HORIZONTAL
154.140000	26.50	9.2	43.5	17.0	167.0	169.00	HORIZONTAL
229.920000	31.30	13.5	46.0	14.7	126.0	176.00	HORIZONTAL
319.440000	25.60	16.0	46.0	20.4	100.0	239.00	HORIZONTAL
974.340000	36.50	26.9	54.0	17.5	269.0	159.00	VERTICAL

1GHz-18GHz

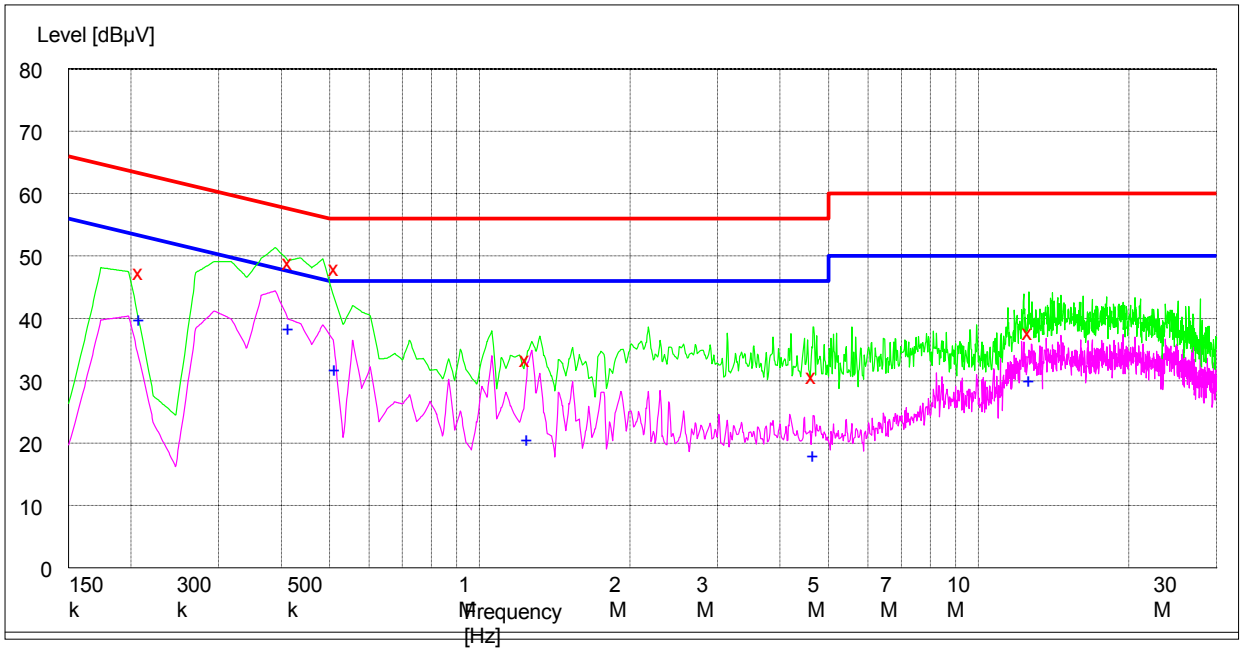


Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
3372.000000	36.00	-7.8	53.9	17.9	100.0	322.00	HORIZONTAL
4883.500000	46.50	-3.9	53.9	7.4	100.0	198.00	VERTICAL
5439.000000	40.10	-2.4	53.9	13.8	100.0	359.00	VERTICAL
7325.500000	47.20	0.7	53.9	6.7	100.0	51.00	HORIZONTAL
13629.50000	47.40	10.2	53.9	6.5	100.0	330.00	HORIZONTAL
17994.00000	52.50	17.3	53.9	1.4	100.0	341.00	HORIZONTAL

8.2 Conducted Disturbance

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

8.2.1 AC Power Port Test Data



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.208500	47.70	10.0	63	15.3	N	FLO
0.415500	49.20	10.0	58	8.8	L1	FLO
0.514500	48.20	10.1	56	7.8	N	FLO
1.243500	33.70	10.1	56	22.3	L1	FLO
4.663500	30.90	10.2	56	25.1	N	FLO
12.673500	38.00	10.3	60	22.0	L1	FLO

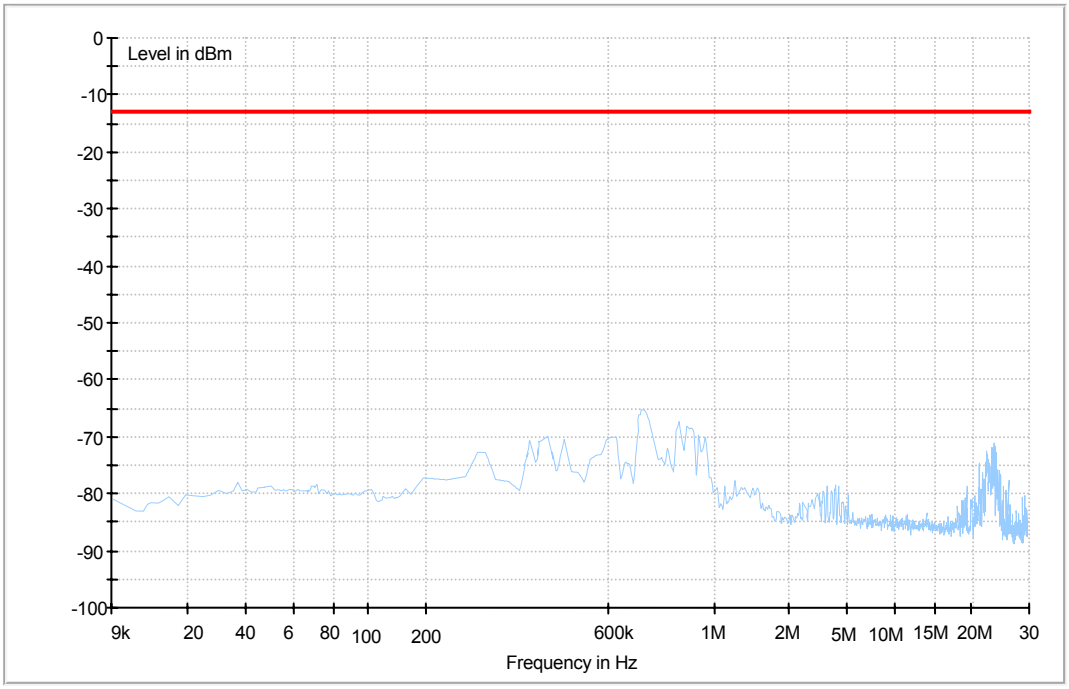
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.208500	39.90	10.0	53	13.1	N	FLO
0.415500	38.40	10.0	48	9.6	L1	FLO
0.514500	31.90	10.1	46	14.1	N	FLO
1.252500	20.70	10.1	46	25.3	L1	FLO
4.690500	18.10	10.2	46	27.9	N	FLO
12.682500	30.20	10.3	50	19.8	L1	FLO

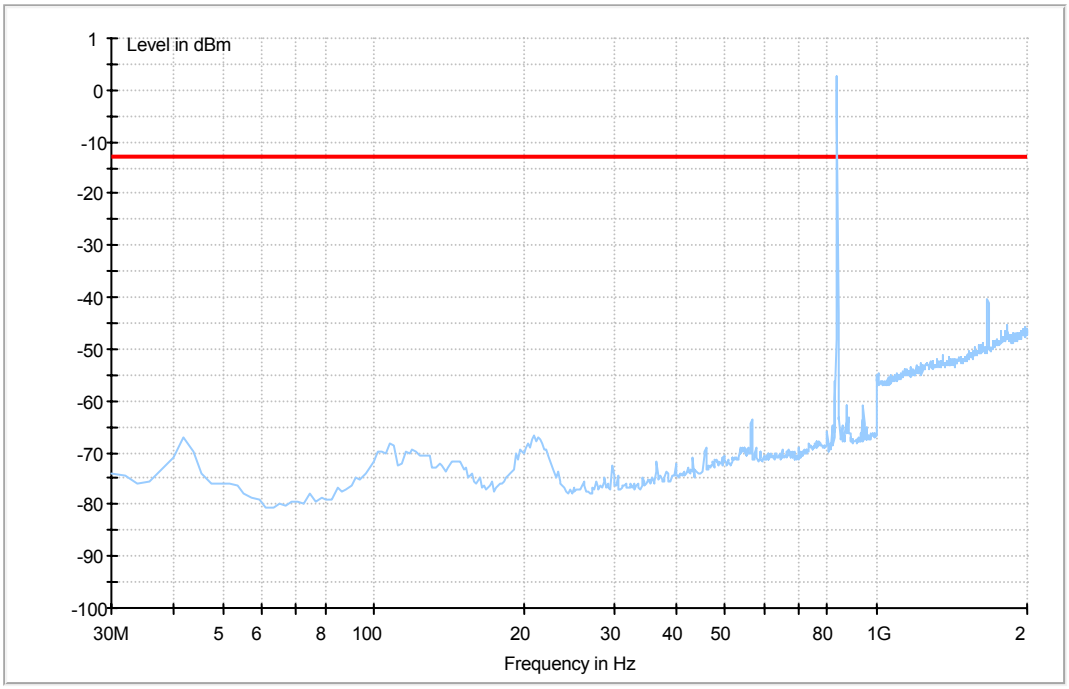
8.3 Radiated Spurious Emission

8.3.1 For CDMA 800

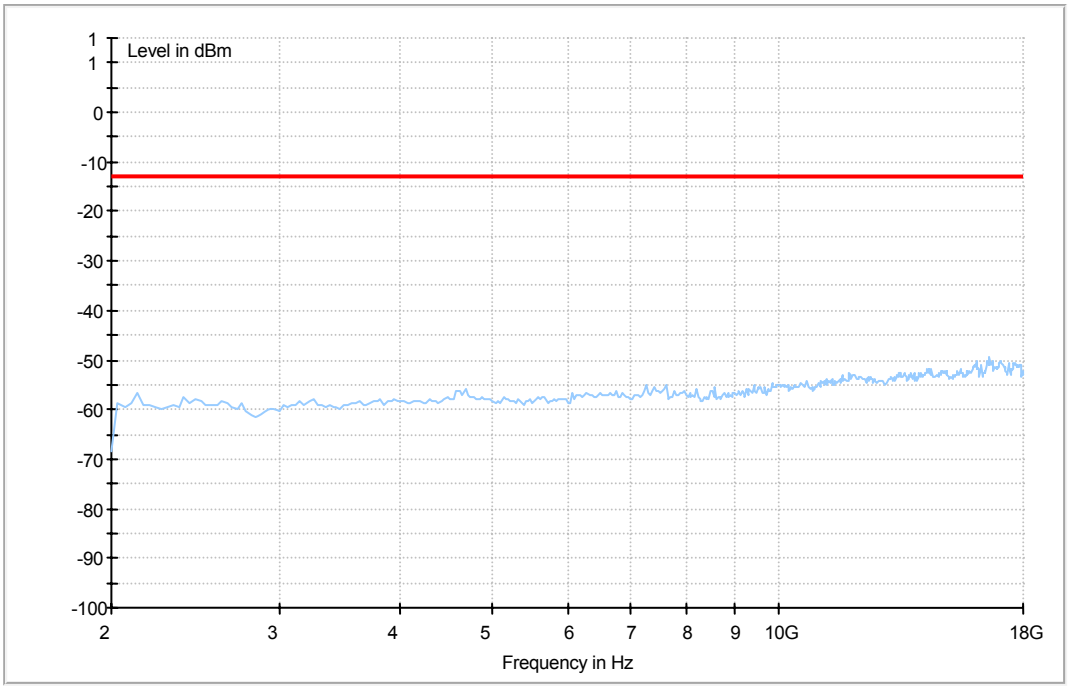
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)

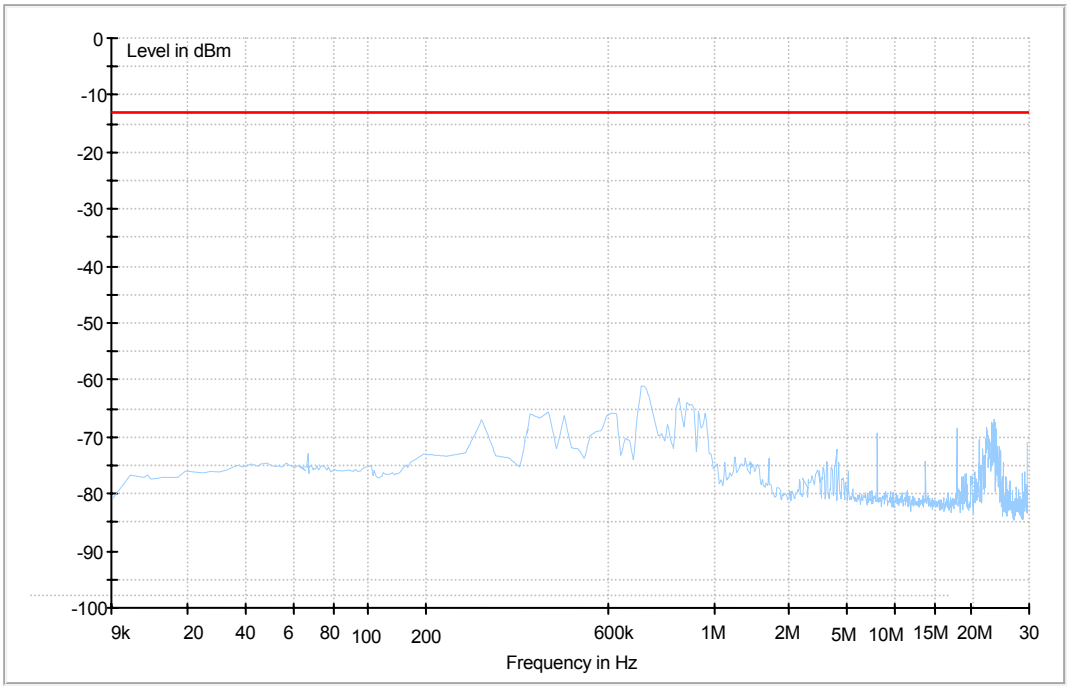


Traffic Mode (2GHz-18GHz)

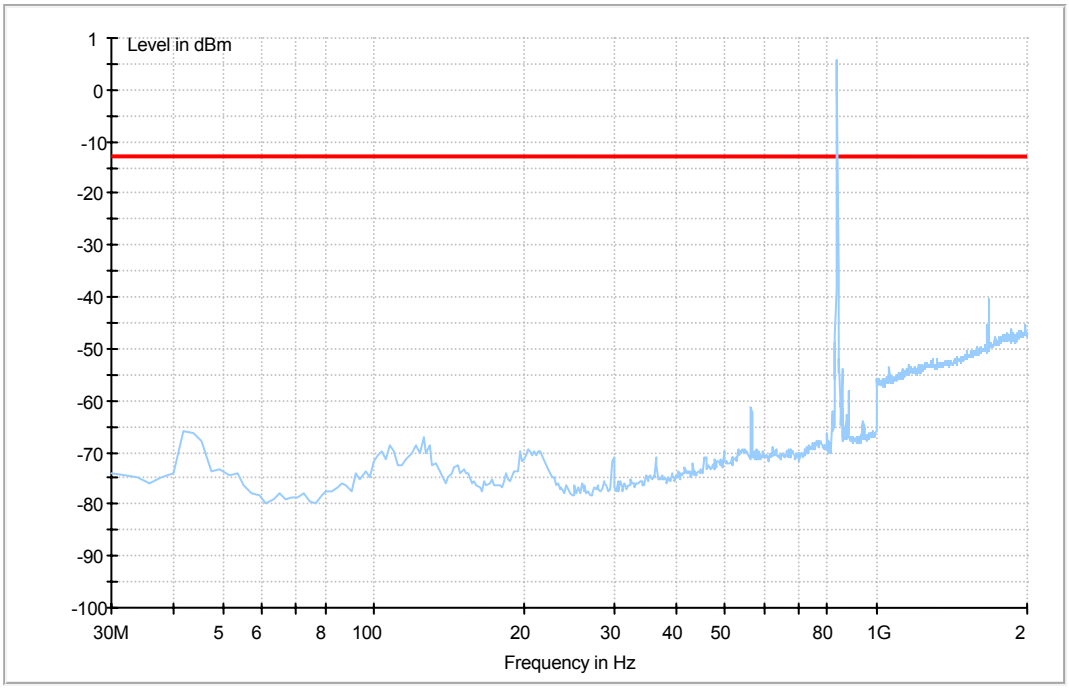


8.3.2 For EVDO Rev. 0 800

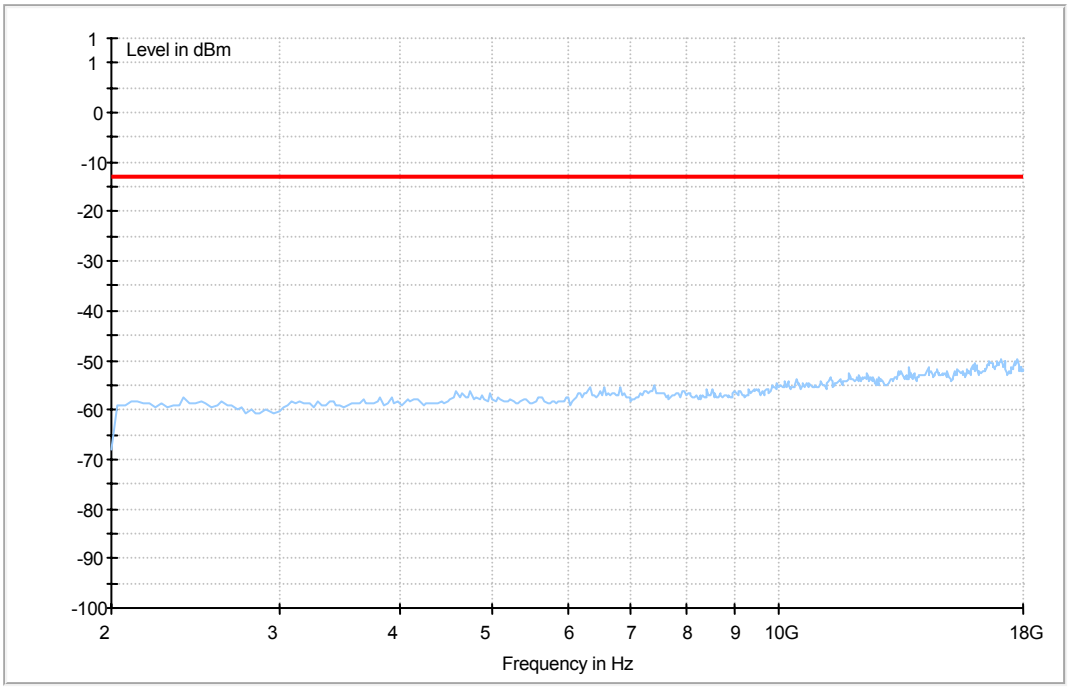
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)

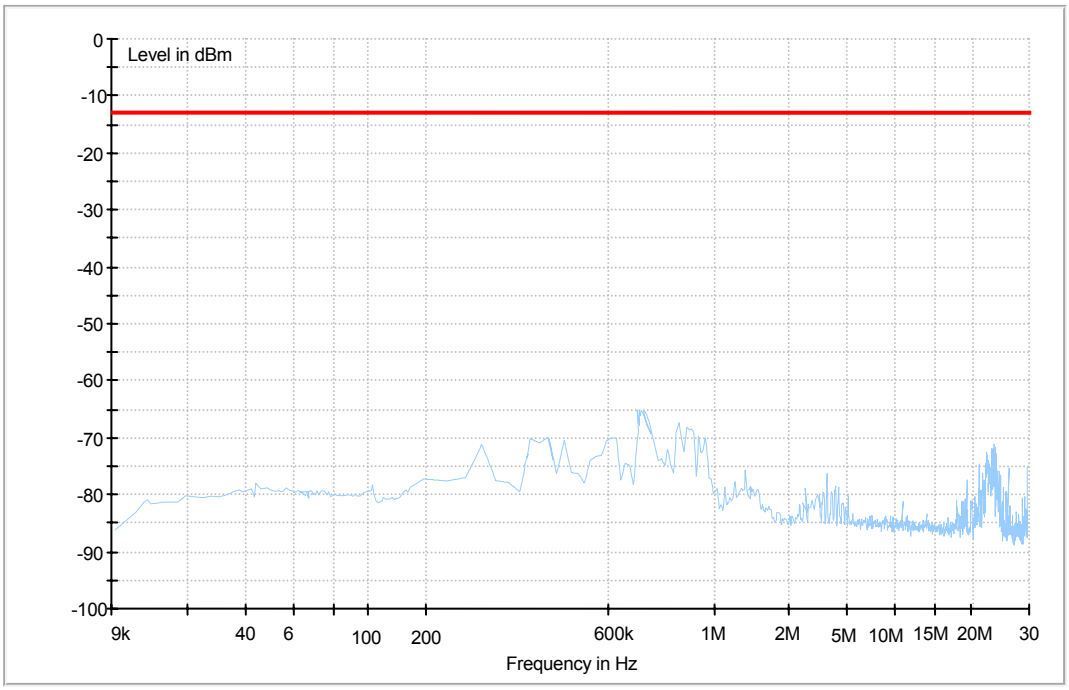


Traffic Mode (2GHz-18GHz)

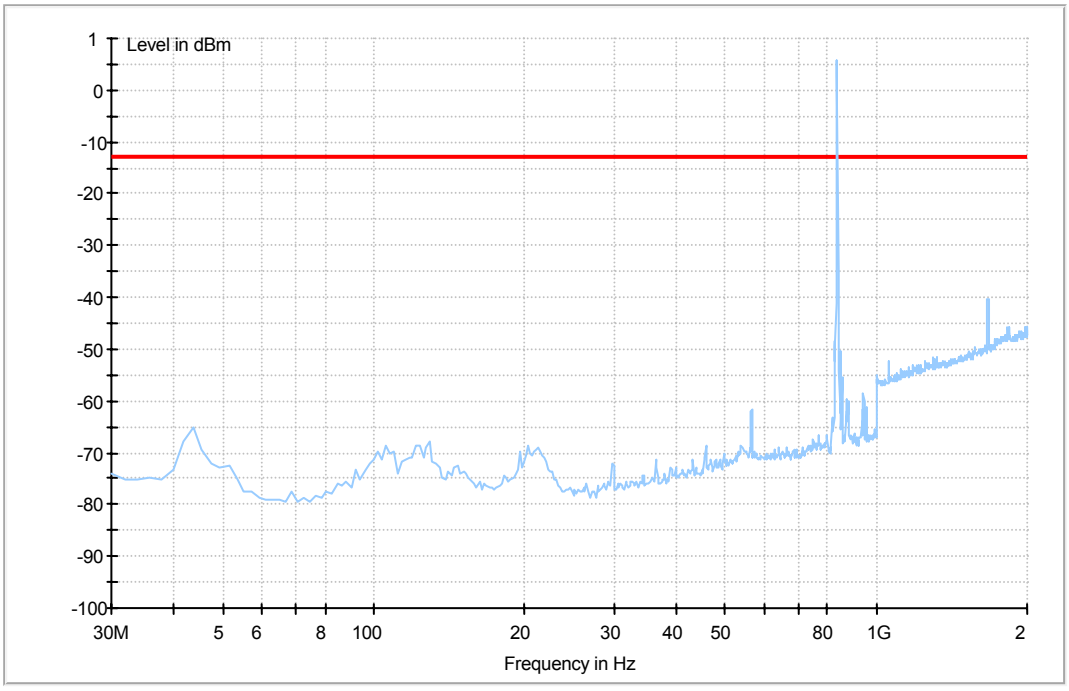


8.3.3 For EV-DO Rev. A 800

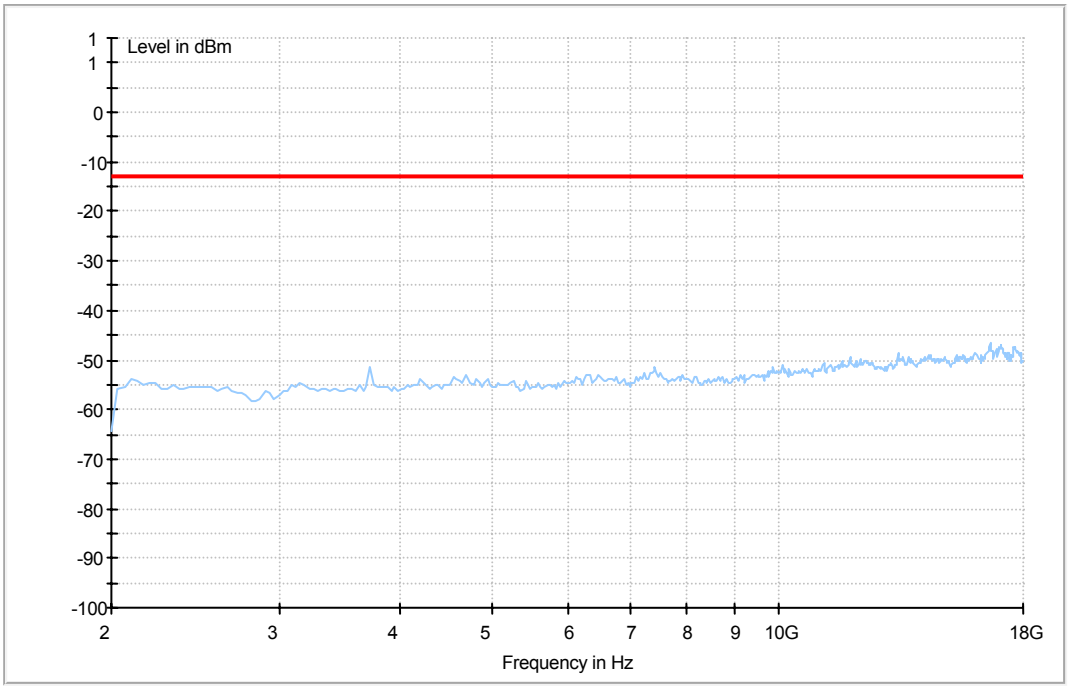
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)



END