



EMC Test Report

Product Name: EVDO Rev.A Rotatable USB Stick

Model Number: HUAWEI EC167

Report No: SYBHZ(R)E050102009EB-1

Reliability Laboratory of Huawei Technologies Co., Ltd.

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Notice 1

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Notice 2

Modification Information:

Table 1 Modification Information

Modification Information	1	
	2	
	3	<i>Not Applicable!</i>
	4	
	5	
	6	
	7	

REPORT ON	EVDO Rev.A Rotatable USB Stick
	M/N: EC167
REGULATION	FCC CFR47 Part 15: Subpart B; FCC CFR47 Part 22: Subpart H;
START OF TEST	Nov.15, 2009
END OF TEST	Nov.25, 2009
Final Judgement:	Pass

Approver

2009-12-02
Date

张兴海
Name

Signature



Operator

2009-12-01
Date

张飞
Name

Signature



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1 Status

1.1 Product Information

CLIENT: Huawei Technologies Co., Ltd.
ADDRESS: Bantian Longgang District Shenzhen, P.R. China
MANUFACTURING DESCRIPTION EVDO Rev.A Rotatable USB Stick
MANUFACTURERS MODEL NUMBER HUAWEI EC167

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°C
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
<u>Radiated Emissions</u> Enclosure Port	TC1 (TM5~TM8)	N/A	Pass	Site1
<u>Conducted Emissions</u>	TC1 (TM1~TM8)	N/A	Pass	Site1
<u>Radiated Spurious Emissions</u> Enclosure Port	TC1 (TM1~TM4)	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

HUAWEI EC167 EVDO Rev.A Rotatable USB Stick is subscriber equipment in the CDMA2000 system. The Cellular-CDMA frequency is band class 0. HUAWEI EC167 implement such functions as RF signal receiving/transmitting, Cellular-CDMA protocol processing, data service etc. Externally they provide USB interface (to connect to the notebook etc.), Micro SD card interface and UIM interface.

3.1.1 Main Equipment Technical Data

Name	EVDO Rev.A Rotatable USB Stick
Model	HUAWEI EC167
Input Rated Voltage	5V
Rated Power	2.5 W
Dimensions	80.1(length)× 26.4(width)× 10.2(height)(mm ³)
Weight	20g
Hardware	CE1EC167M

Table 3 Sub-Assembly Identity

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

3.2 Sub-Assembly Identity

Table 4 Sub-Assembly Identity

Board			
Model Name	Qty.	Serial Number	Description
CE1EC167M	1	BH2AA109A1600145	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

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	3608105673	2009-10-10
Notebook	X6130	HP	3105094252	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~TM4

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

4.3.2 Test Mode

There were 4 test Modes. TM1 to TM4 were shown below:

TM1: operate in traffic mode CDMA800;

TM2: operate in traffic mode 1xEV-DO Rev. A 800;

TM3: operate in idle mode CDMA800;

TM4: operate in idle mode 1xEV-DO Rev. A 800;

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:

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.

and the following conditions shall be met:

The EUT shall be commanded to operate at maximum transmit power 24dBm; Assign channel frequency to an appropriate channel number, For MC706 the channel numbers is set to 283 (Transmit frequency 833.49MHz) here.

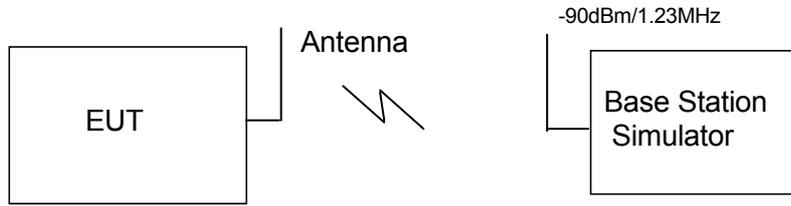


Figure 1. Test Configuration

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)

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.

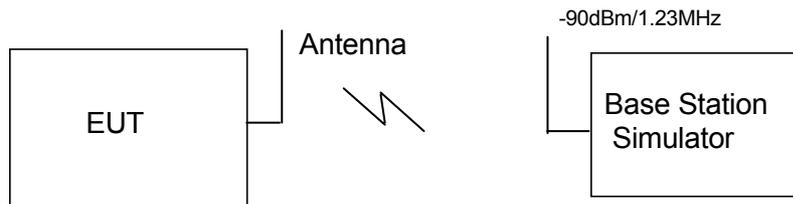


Figure 2. Test Configuration

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 63.4 and CAN/CSA-CEI/IEC CISPR 22

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:

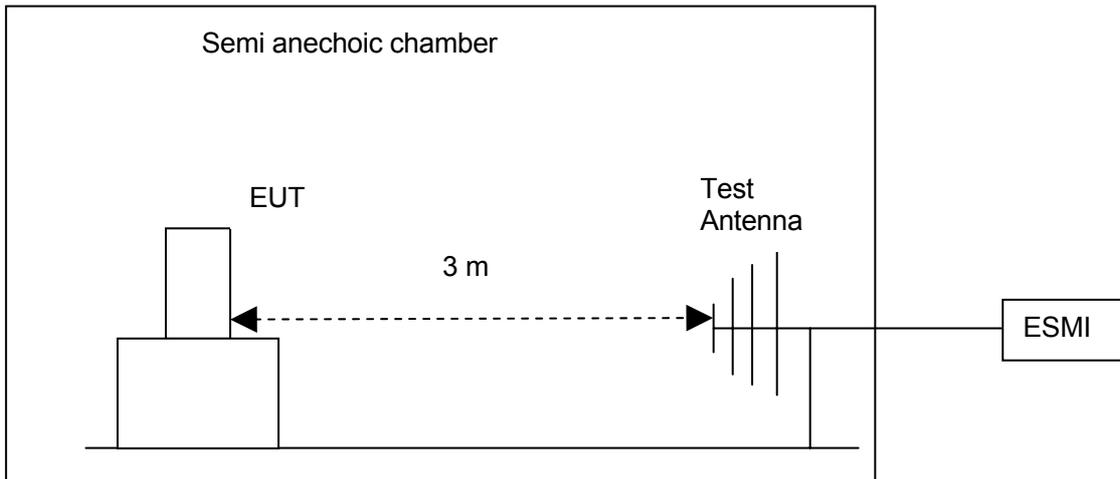


Figure 3. Test set-up

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($\mu\text{V}/\text{m}$)	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: 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 150kHz to 30 MHz: 9 kHz;

Test Set-up figure:

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

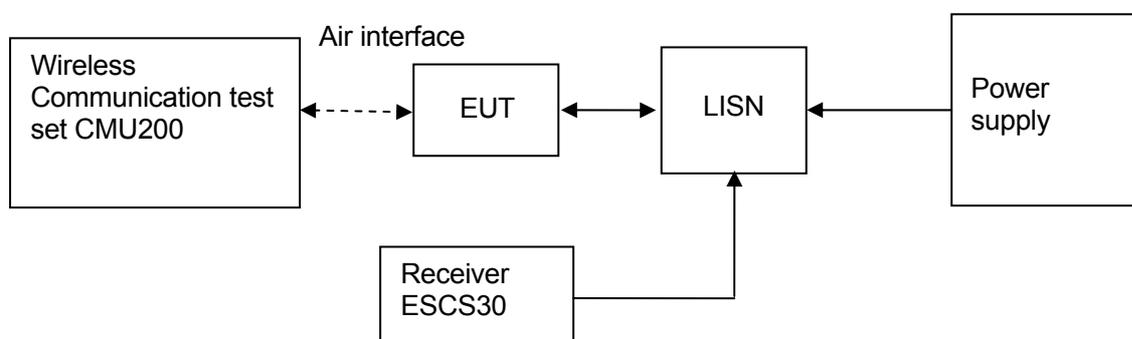


Figure 4. Test Set-up

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

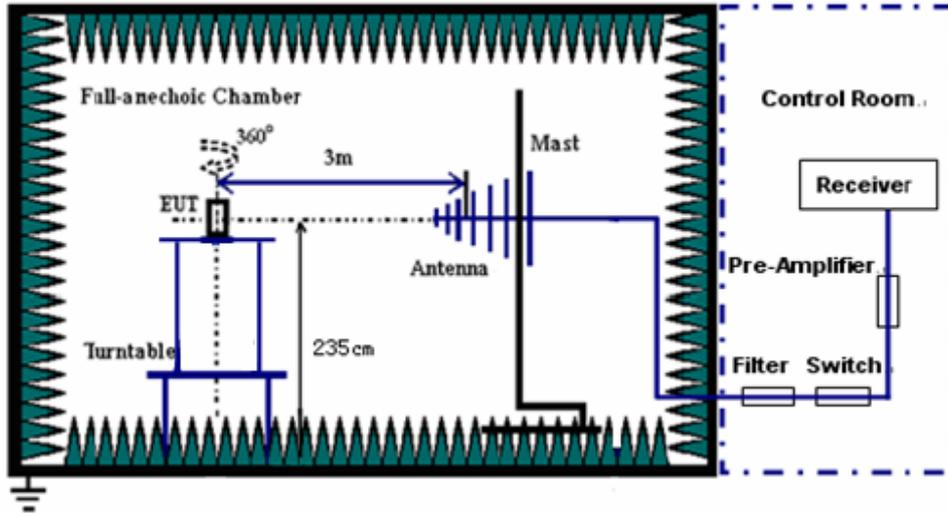
5.3.1 Test Procedure

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:

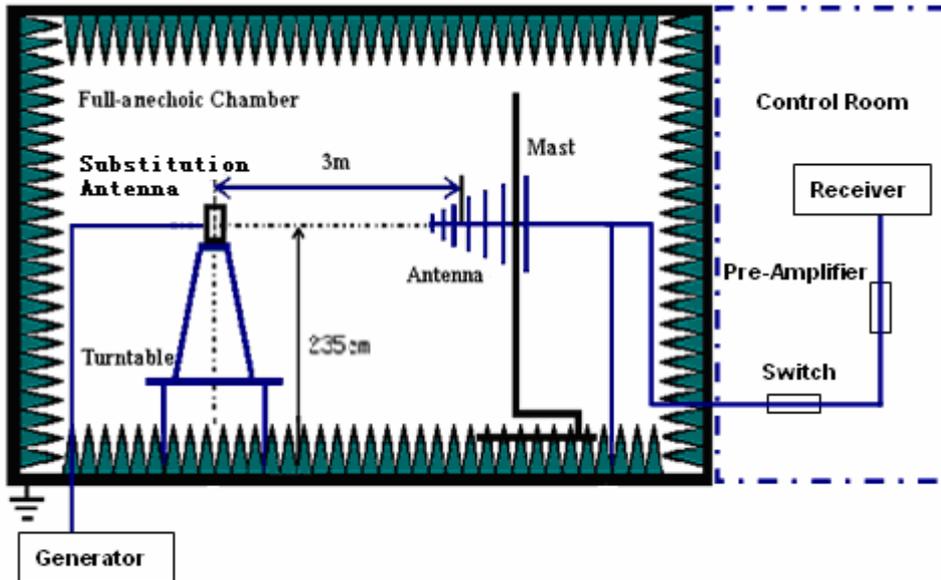
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect 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 Part22 requirement.

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.21.2009	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:

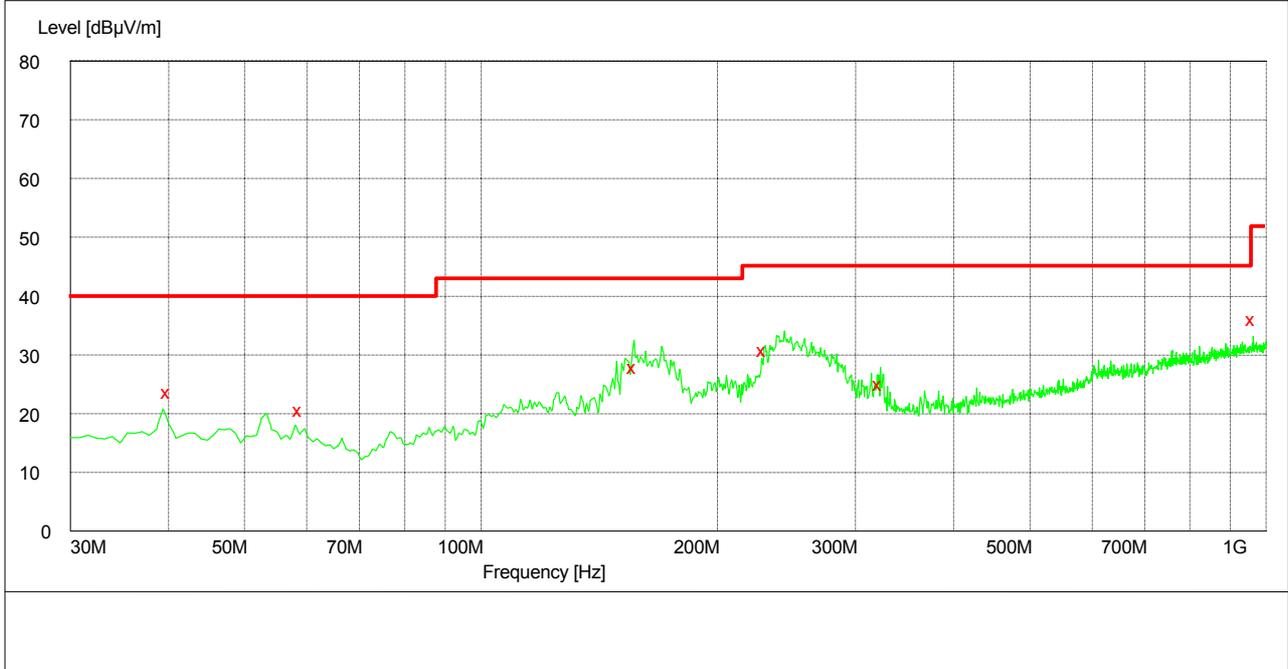
Table 12 System Measurement Uncertainty

	Items	Extended Uncertainty
RE	Field strength (dB μ V/m)	U=4.6dB; k=2(30MHz-1GHz)
RE	Field strength (dB μ V/m)	U=3.64dB; k=2(1GHz-18GHz)
RSE	ERP (dBm)	U=2.2dB; k=2
CE	Disturbance Voltage(dB μ V)	U=3.3dB; k=2

8 Graph and Data of Emission Test

8.1 Radiated Disturbance

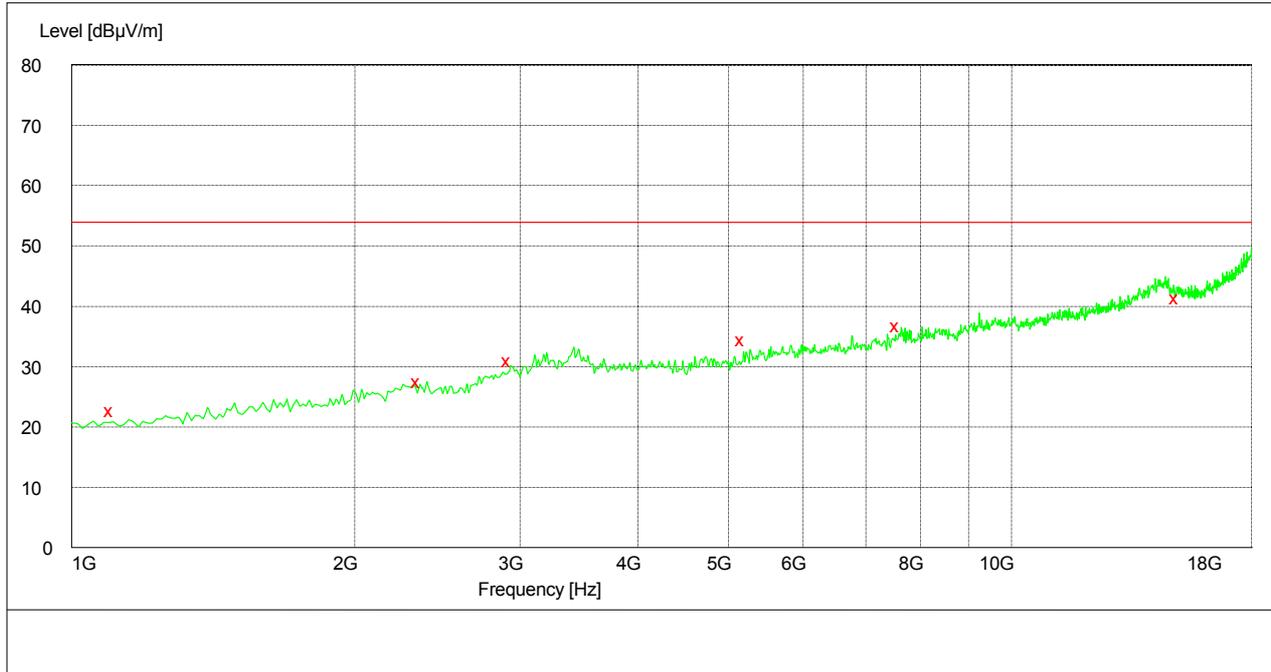
This test was carried out in all the test modes, but only the worst test result was shown.



MEASUREMENT RESULT: QP Detector

Frequency (MHz)	Level (dBµV/m)	Transd (dB)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
40.020000	23.80	13.1	40.0	16.2	254.0	235.00	HORIZONTAL
58.800000	20.70	12.4	40.0	19.3	175.0	204.00	HORIZONTAL
156.780000	28.00	9.4	43.5	15.5	209.0	19.00	HORIZONTAL
229.620000	31.00	13.5	46.0	15	133.0	331.00	HORIZONTAL
322.380000	25.20	16.1	46.0	20.8	100.0	147.00	HORIZONTAL
963.900000	36.20	26.7	46.0	9.8	100.0	232.00	HORIZONTAL

1GHz-18GHz



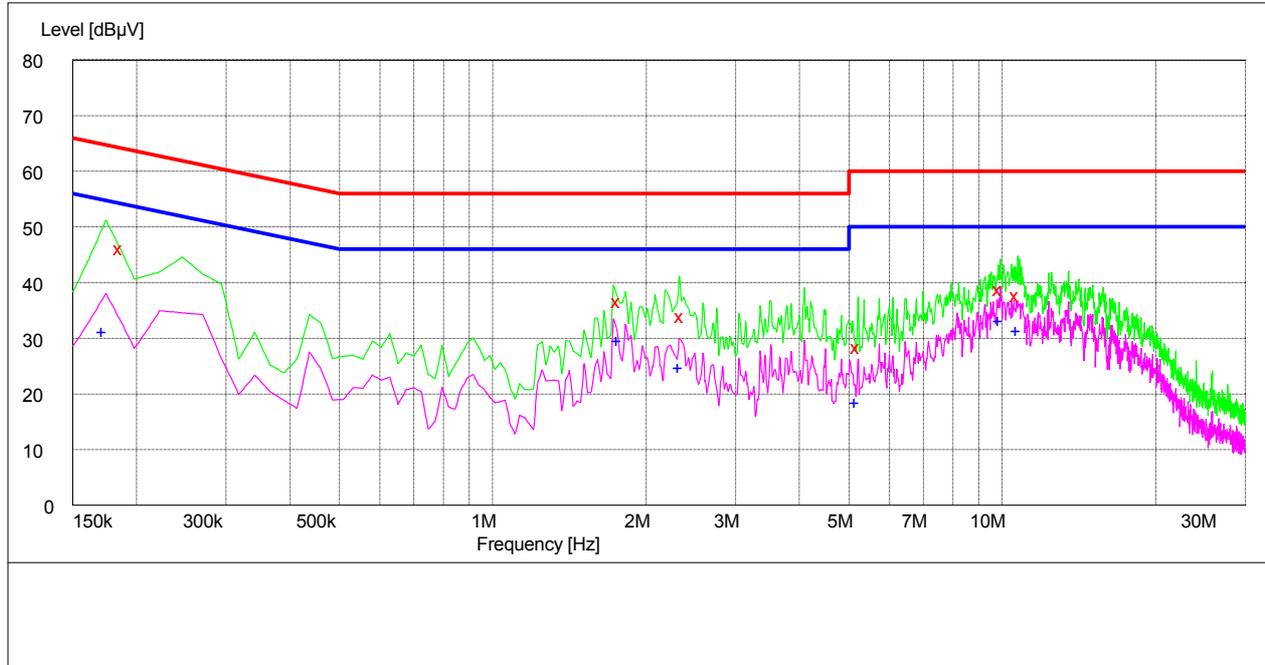
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
1108.500000	21.90	-15.9	54.0	32.1	129.0	90.00	HORIZONTAL
2379.000000	28.80	-10.0	54.0	25.2	150.0	273.00	HORIZONTAL
2909.500000	30.50	-7.6	54.0	23.5	148.0	13.00	HORIZONTAL
5061.500000	33.00	-1.4	54.0	21	148.0	170.00	HORIZONTAL
7510.000000	37.40	4.1	54.0	16.6	139.0	224.00	VERTICAL
15995.500000	40.20	17.3	54.0	13.8	100.0	110.00	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
0.186000	46.40	10.1	64	17.6	L1	FLO
1.765500	36.90	10.1	56	19.1	L1	FLO
2.355000	34.20	10.1	56	21.8	N	FLO
5.212500	28.60	10.2	60	31.4	L1	FLO
9.906000	39.00	10.3	60	21.0	L1	FLO
10.716000	38.00	10.3	60	22.0	N	FLO

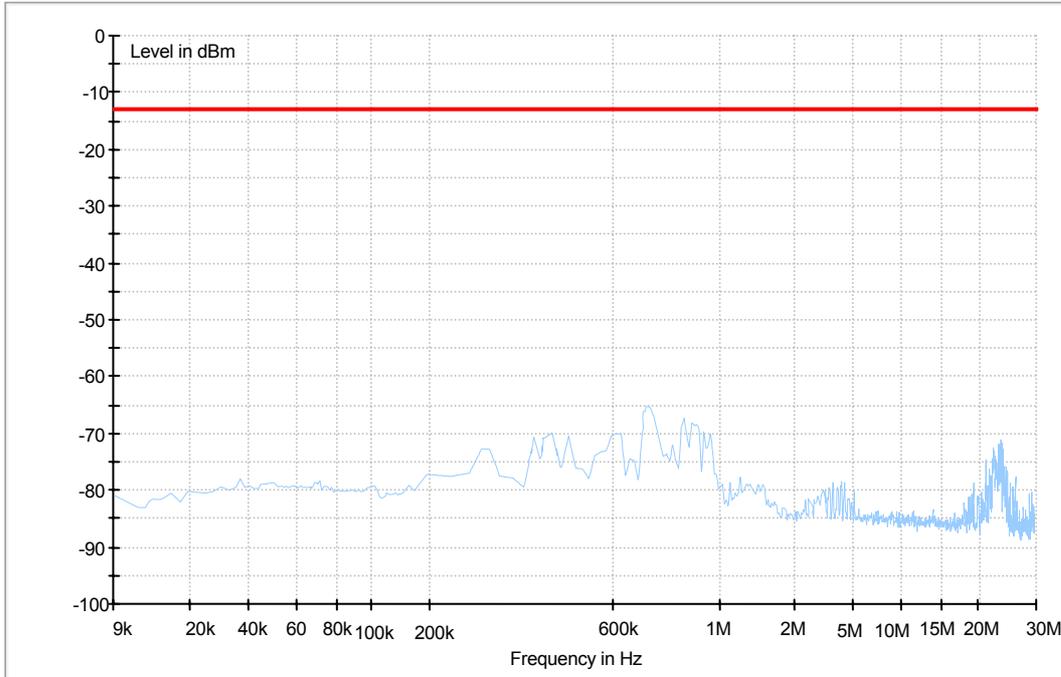
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.172500	31.30	10.1	55	23.7	L1	FLO
1.765500	29.80	10.1	46	16.2	N	FLO
2.332500	24.90	10.1	46	21.1	N	FLO
5.172000	18.60	10.2	50	31.4	L1	FLO
9.910500	33.30	10.3	50	16.7	L1	FLO
10.747500	31.50	10.3	50	18.5	L1	FLO

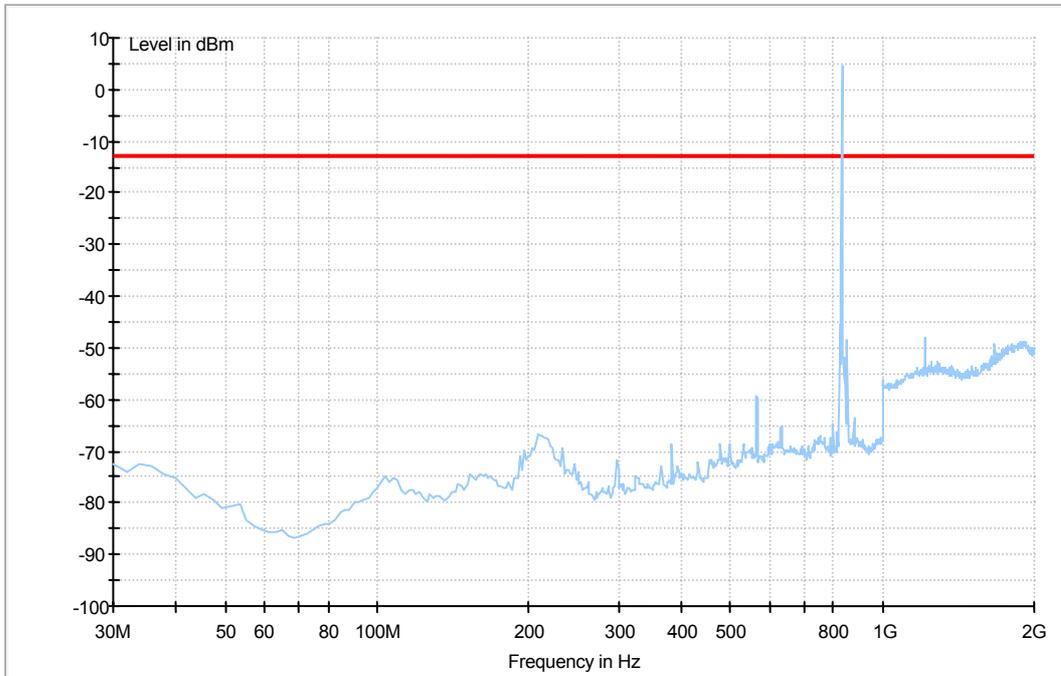
8.3 Radiated Spurious Emission

8.3.1 For CDMA800

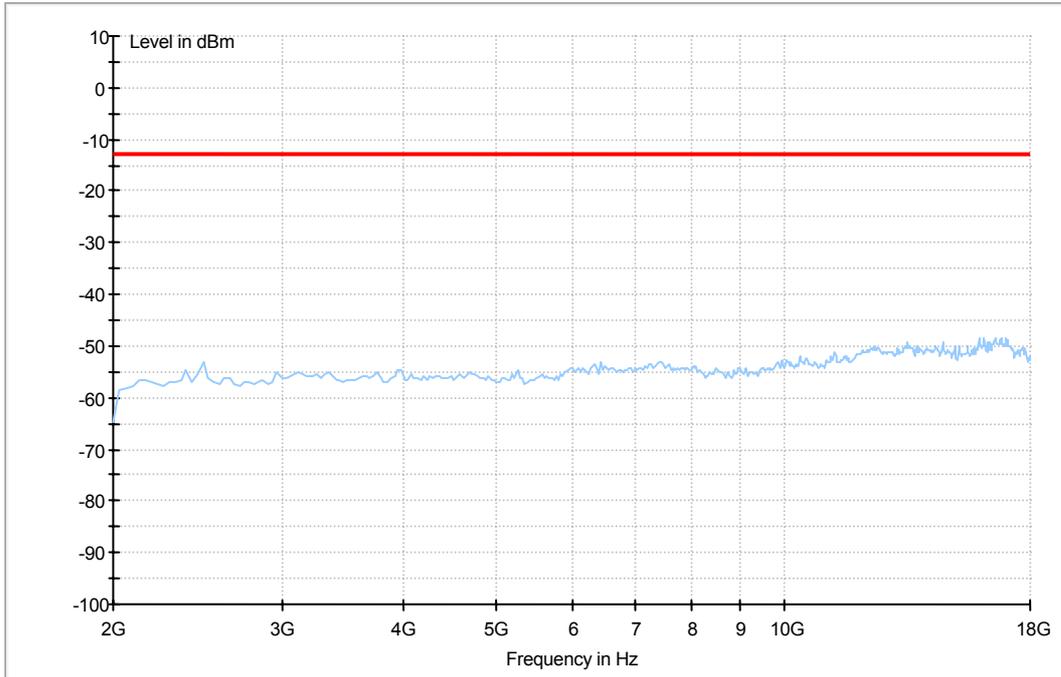
Traffic Mode (9kHz-30MHz)



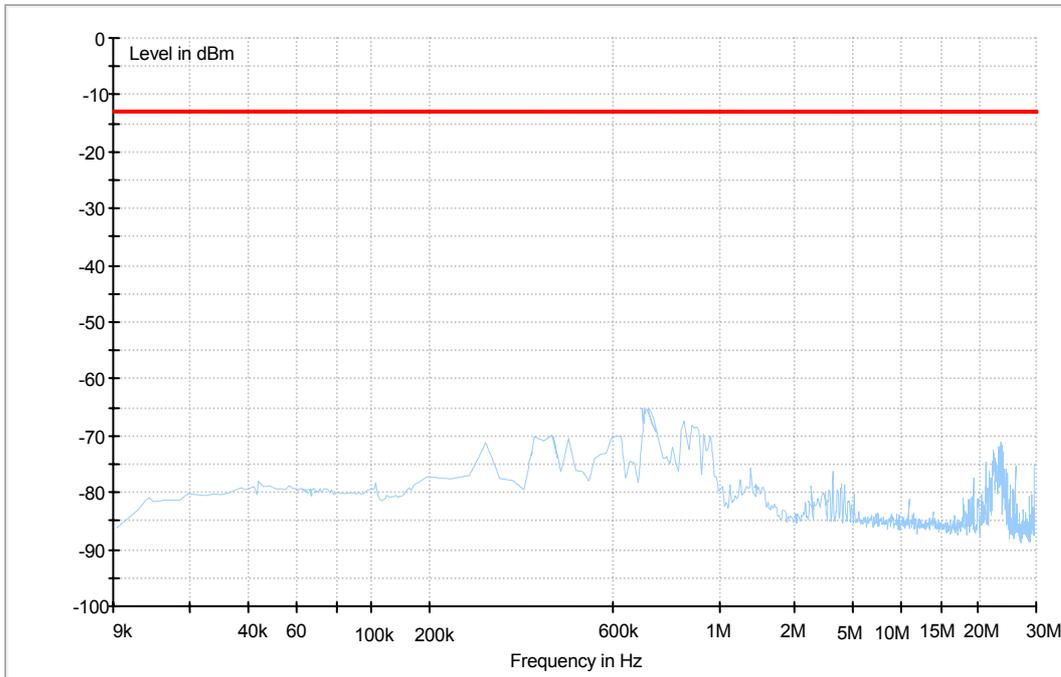
Traffic Mode (30MHz-2GHz)



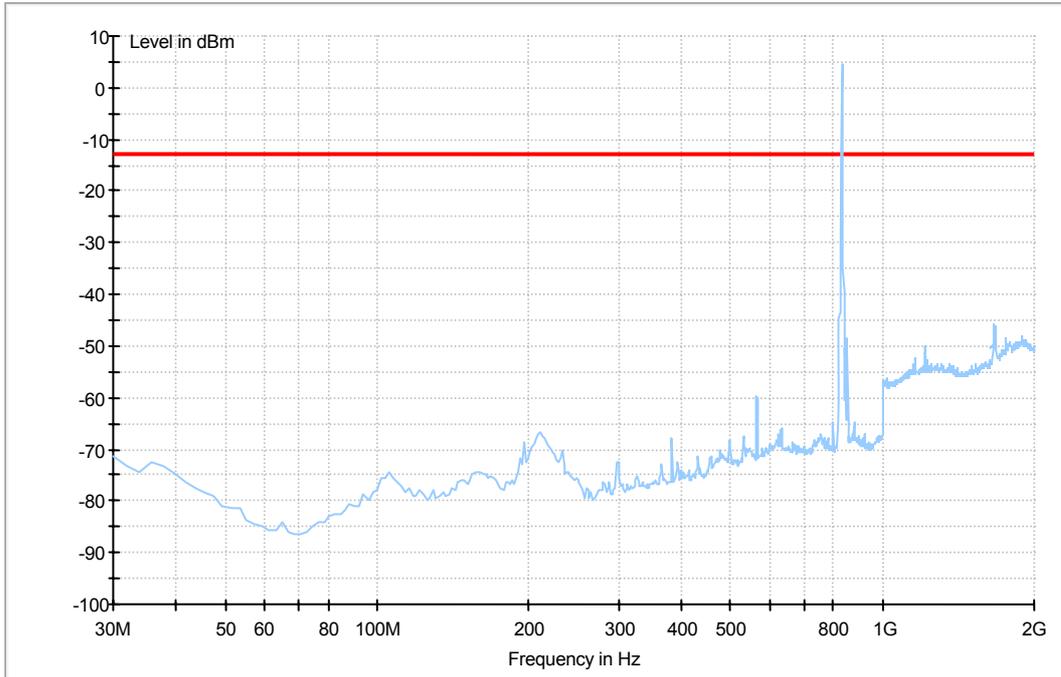
Traffic Mode (2GHz-18GHz)



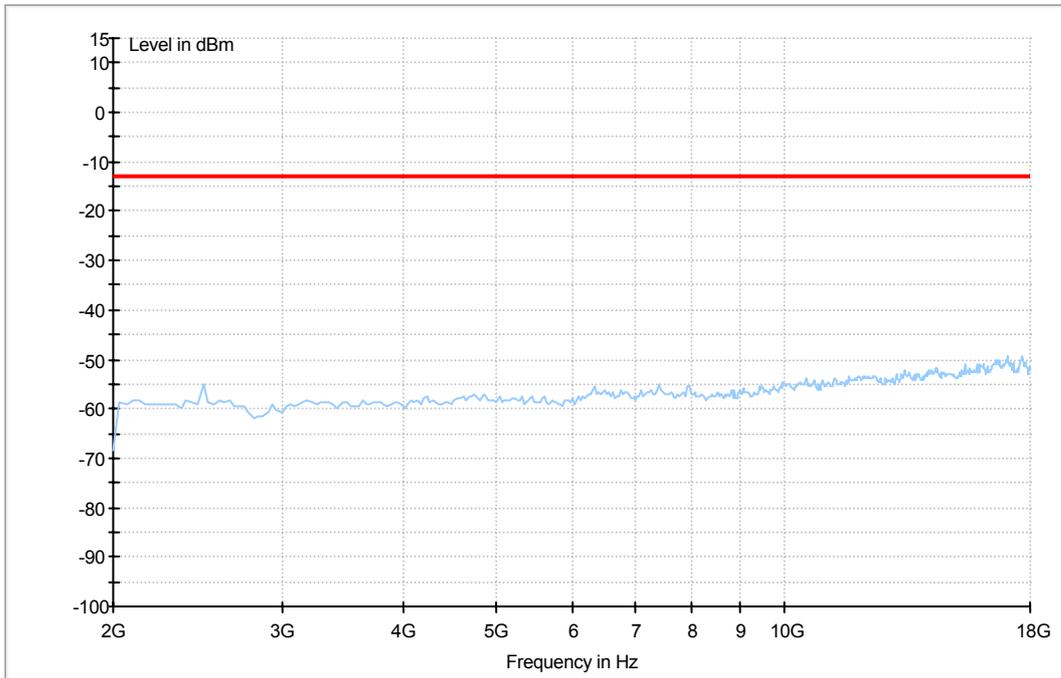
8.3.2 For EV-DO Rev. A 800
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)



END