



EMC Test Report

Product Name: HUAWEI CDMA Express Data Card

Model Number: EC821

Report No: SYBH(R)008052008EB-1

Reliability Laboratory of Huawei Technologies Co., Ltd.

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Modification Information:

Table 1 Modification Information

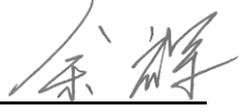
Modification Information	1	
	2	
	3	<i>Not Applicable!</i>
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REPORT ON HUAWEI CDMA Express Data Card
M/N: EC821

REGULATION FCC CFR47 Part 15: Subpart B;

START OF TEST May.05, 2008
END OF TEST May.20, 2008

Final Judgement: Pass

Approver	<u>2008-06-15</u>	张兴海	
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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 HUAWEI CDMA Express Data Card
MANUFACTURERS MODEL NUMBER EC821

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 terminal				
Test Items	Test Configuration & Test Mode	Required Performance Criteria	Result	Site
<u>Radiated Emissions</u> Enclosure Port	TC1 (TM2)	N/A	Pass	Site1
<u>Conducted Emissions</u>	TC1 (TM1~TM2)	N/A	Pass	Site1
<u>Radiated Spurious Emissions</u> Enclosure Port	TC1 (TM1)	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

EC821 CDMA Express Data Card is subscriber equipment in the CDMA 1x system. The CDMA frequency is Band Class 0. EC821 implements such functions as RF signal receiving/transmitting, CDMA 1x protocol processing, data service etc. Externally it provides Express interface (to connect to the notebook etc.), UIM card interface.

3.1.1 Main Equipment Technical Data

Name	CDMA Express Data Card
Model	EC821
Input Rated Voltage	3.3V
Rated Power	2.5 W
Dimensions	75 (depth) × 34(width) × 5 (height) (mm ³)
Weight	19g

Table 3 Sub-Assembly Identity

Mode		Work Frequency	
		Transmitt Frequency (MHz)	Receive Frequency (MHz)
CDMA	CDMA800	824-849	869-894

3.2 Sub-Assembly Identity

Table 4 Sub-Assembly Identity

Board			
Model Name	Qty.	Serial Number	Description
EC821	1	DN2AA10851300009	Main board of data card
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
Express	Express	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	108522	2007-10-10
Notebook	D640m	DELL	3106094190	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~TM2

TC1: EUT was powered by express port of the notebook.

4.3.2 Test Mode

There was 2 test Modes. TM1 to TM2 were shown below:

TM1: operate in traffic mode CDMA 800;
 TM2: operate in idle mode CDMA 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:

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.(CDMA see 3GPP2 C.S0011-B).

For CDMA, the following conditions shall also be met:

- Logical Test Interface for details regarding generic call set-up procedure
- set and send continuously up power control commands to the UE;
- The EUT shall be commanded to operate at maximum transmit power;

Assign channel frequency to an appropriate channel number. Set the ARFCN channel number to 283 (833.49MHz) for CDMA.

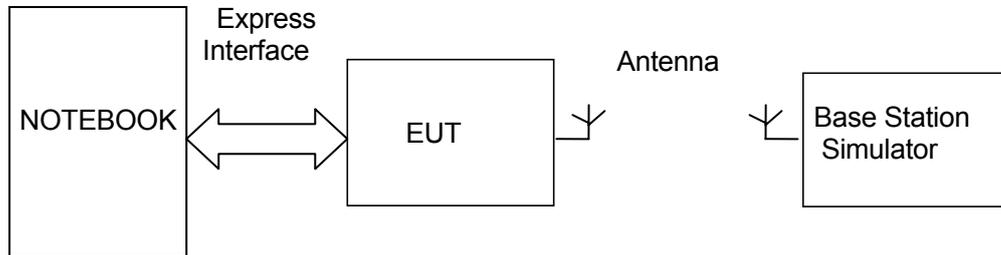


Figure 1.: TC1 (TM1)

Idle Mode:

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;
- Paging repetition period and DRX cycle shall be set to minimum (shortest possible time interval).

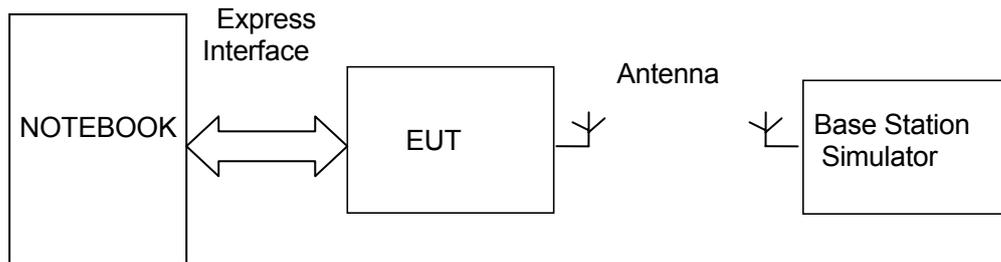


Figure 2. TC1 (TM2)

5 Electromagnetic Interference (EMI)

5.1 Radiated Disturbance 30MHz to 1000MHz

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 1GHz 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

Test set up figure:

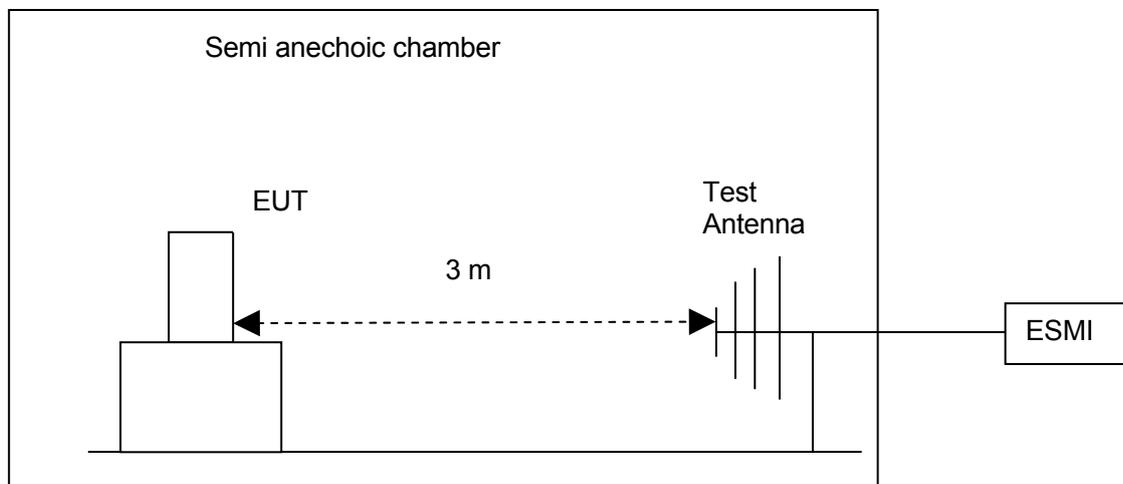


Figure 3. Test set-up

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

960-1000	500	54
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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.

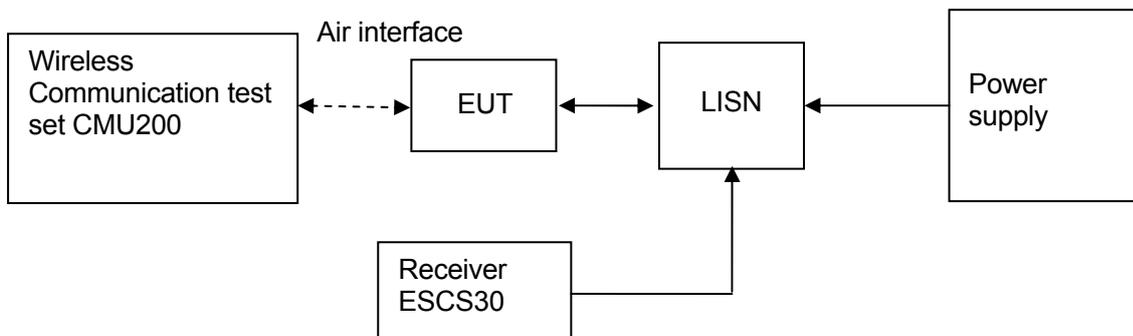


Figure 4. Test Set-up

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 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

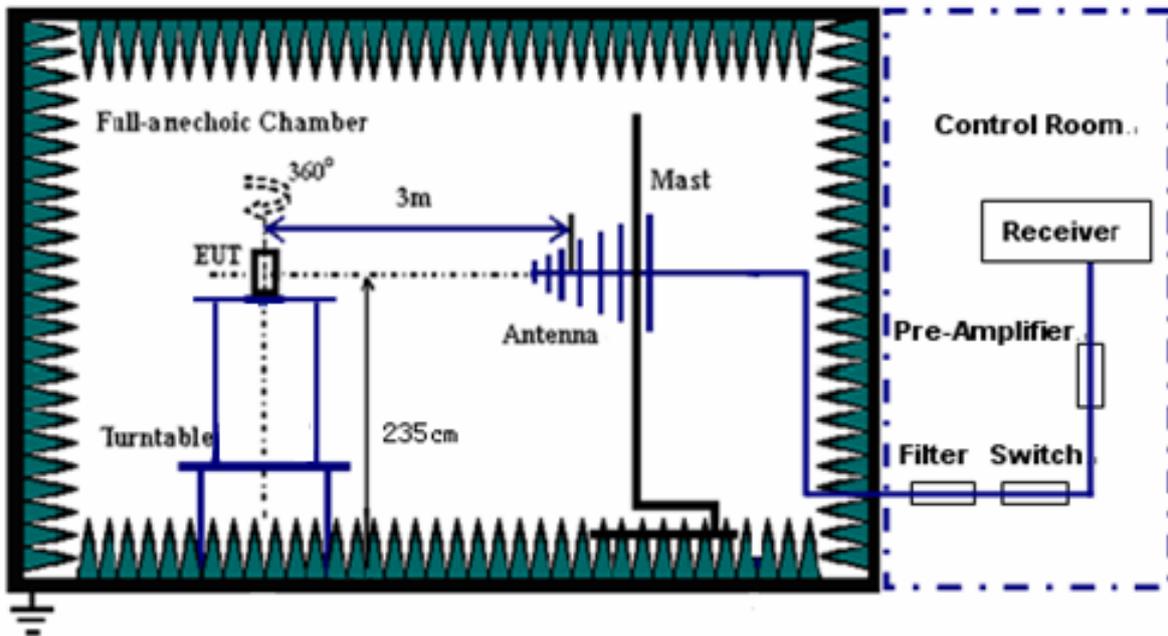
5.3.1 Test Procedure

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:

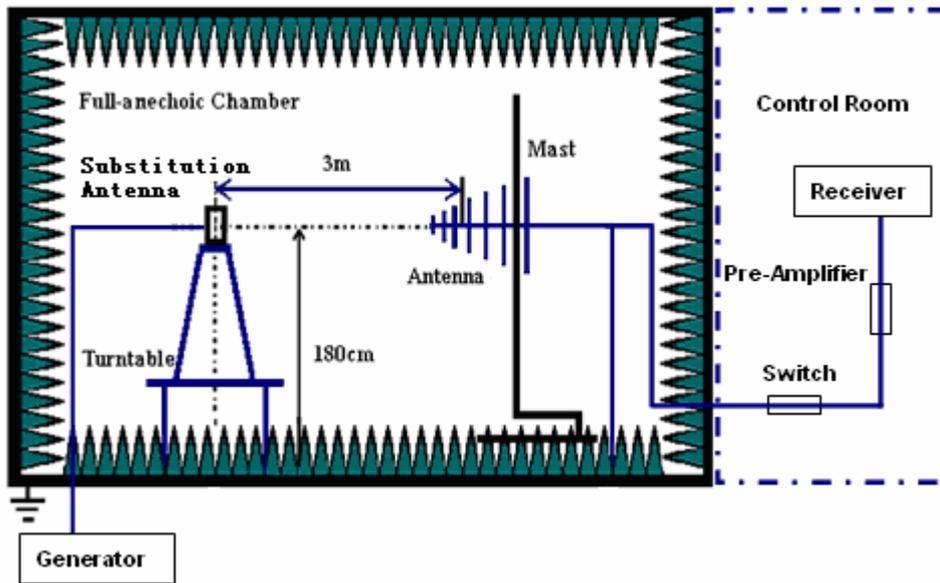
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect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

Test the Radiated maximum output power by the 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 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 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, 2008	12
	Broadband Antenna	CBL 6112B (2747)	SCHAFFNER	Oct.17, 2007	12
CE	EMI Test receiver	ESCS30	R&S	April.22, 2008	12
	Artificial Mains Network	ENV4200	R&S	May.12, 2008	12
RSE	EMI Test receiver	ESIB26	R&S	May.30.2007	12
	Horn Antenna	3117	EMCO	July.16.2007	12
	Broadband Antenna	CBL 6112B (2536)	SCHAFFNER	Jun.08.2007	12
	Horn Antenna	3160	EMCO	Aug.03.2007	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:

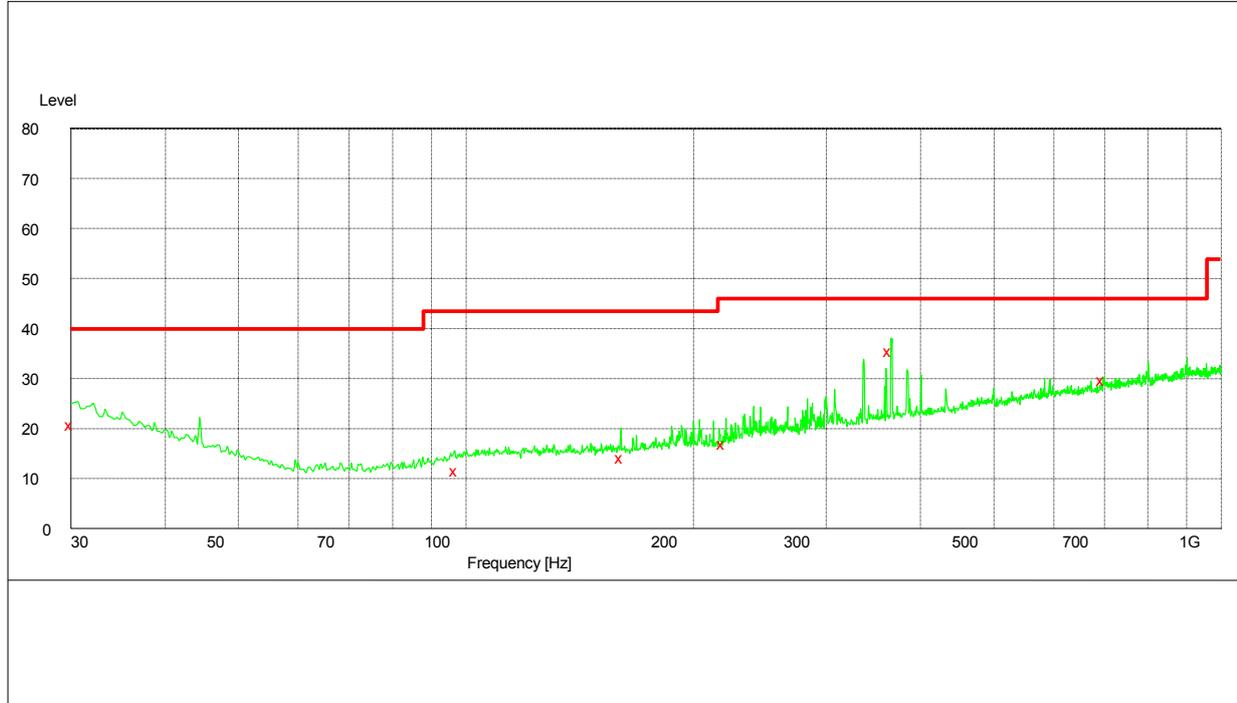
Table 12 System Measurement Uncertainty

	Items	Extended Uncertainty
RE	Field strength (dB μ V/m)	U=4.6dB; k=2(30MHz-1GHz)
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, Here only the worst test result was shown.



MEASUREMENT RESULT: QP Detector

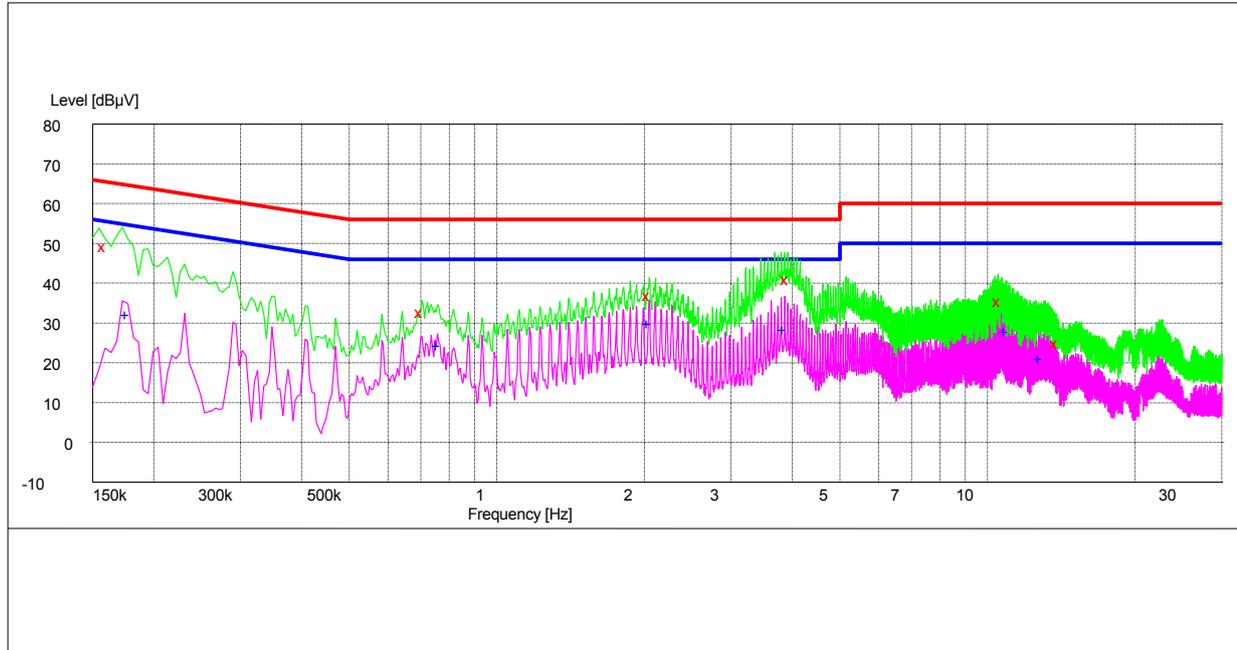
Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
30.12	20.9	-6	40	19.1	137	360	VERTICAL
97.2	11.6	-16.2	43.5	31.9	106	0	HORIZONTAL
161.16	14.3	-14.7	43.5	29.2	147	13	HORIZONTAL
219.84	17	-13.2	46	29.0	100	344	HORIZONTAL
365.22	35.6	-8	46	10.4	100	247	HORIZONTAL
699.96	29.8	-2.6	46	16.2	200	46	VERTICAL

- REMARKS: 1. Level (dBuV/m) = Receiver Value(dBμV/m) + Transd(dB)
 2. Transd (dB) = Path loss(cable loss+ preamplifier) + Antenna factor
 3. Margin = Limit (dBμV) – Level (dBμV).

8.2 Conducted Disturbance

This test was carried out in all the test modes, Here 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
0.159000	49.00	10.0	66	17.0	L3	FLO
0.703500	33.10	10.0	56	22.9	N	FLO
2.044500	37.40	10.1	56	18.6	L3	FLO
3.916500	41.30	10.1	56	14.7	N	FLO
10.581000	35.80	10.1	60	24.2	L3	FLO
13.857000	25.30	10.1	60	34.7	L3	FLO

MEASUREMENT RESULT: AV Detector

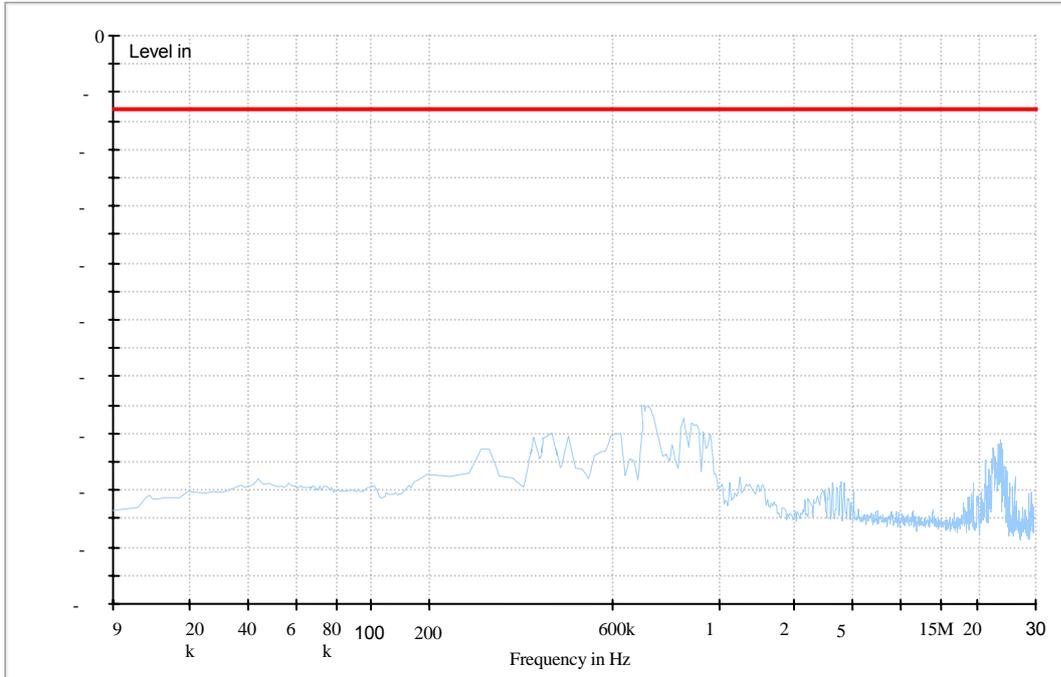
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.177000	32.40	10.1	55	22.6	L3	FLO
0.762000	24.50	10.0	46	21.5	L3	FLO
2.044500	30.00	10.1	46	16.0	L3	FLO
3.858000	28.60	10.1	46	17.4	N	FLO
10.936500	28.10	10.2	50	21.9	L3	FLO
12.808500	21.20	10.1	50	28.8	L3	FLO

- REMARKS: 1. Margin = Limit (dBµV) – Level (dBµV).
 2. Level = Receiver Value (dBµV) + Transd(dB).
 3. Transd = Insertion loss + cable Loss.

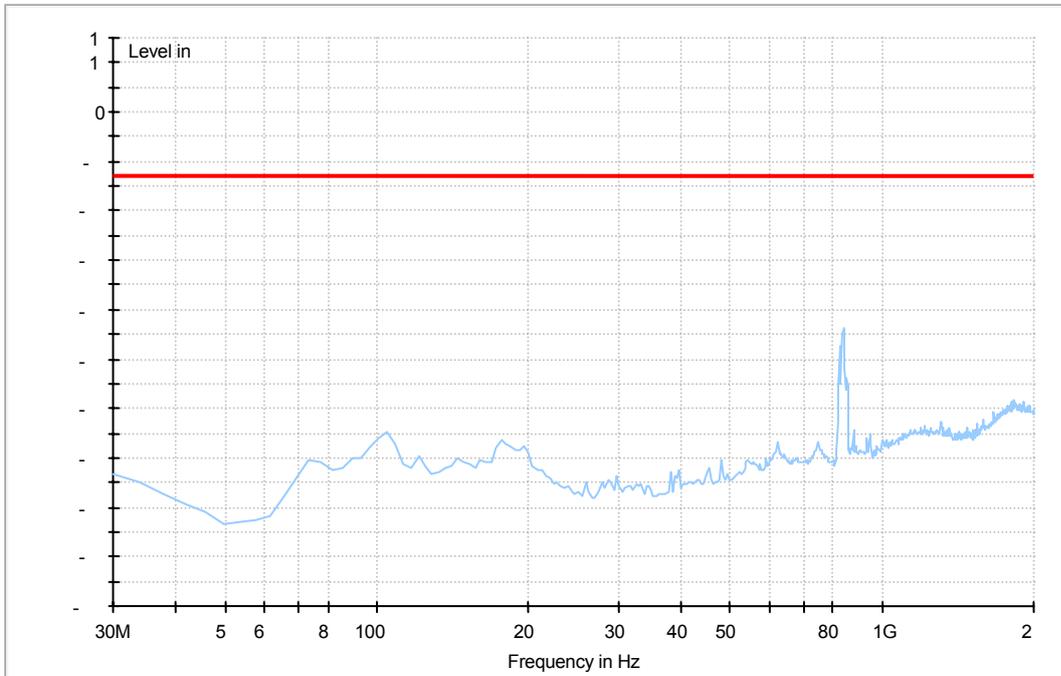
8.3 Radiated Spurious Emission

8.3.1 For CDMA 800

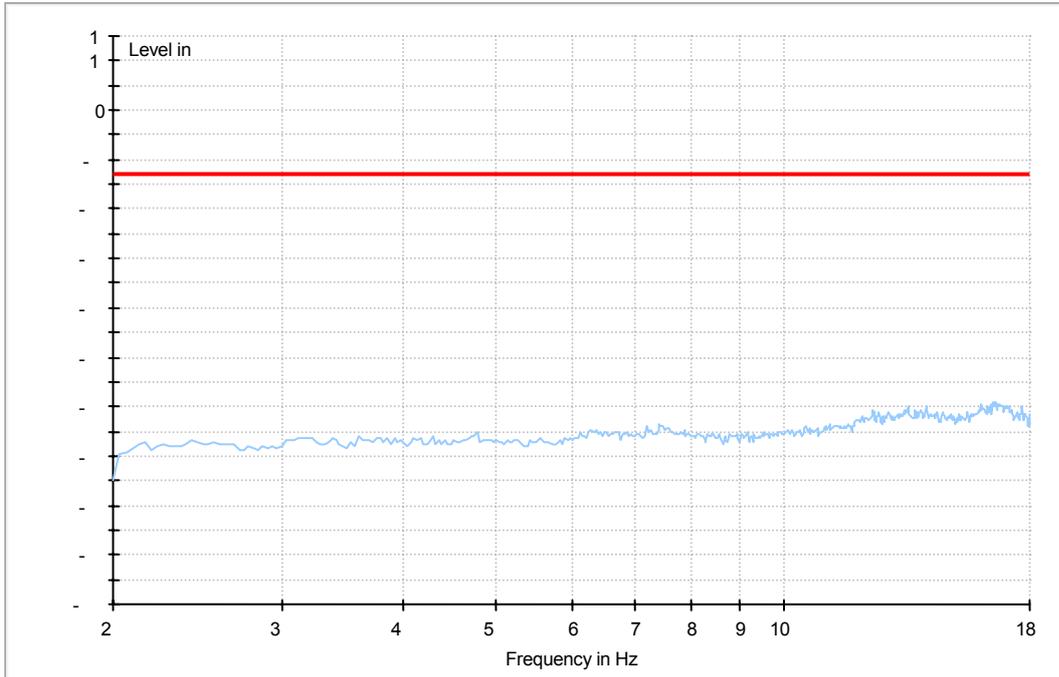
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)



END