



EMC Test Report

Product Name: CDMA 1X Digital Mobile Phone

Model Number: HUAWEI C5610

Report No: SYBHZ (R) E012042010EB-1

FCC ID: QISC5610

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Modification Information:

Modification Information

Modification Information	1	
	2	
	3	<i>Not Applicable!</i>
	4	
	5	
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REPORT ON EMC Test of CDMA 1X Digital Mobile Phone
M/N:HUAWEI C5610
REGULATION FCC CFR47 Part 15: Subpart B;
FCC CFR47 Part 22: Subpart H;:
START OF TEST Mar. 31, 2010
END OF TEST Apr. 02, 2010
Final Judgement: Pass

Approver

2010-04-13
Date

张兴海
Name

Signature



Operator

2010-04-12
Date

温剑锋
Name

温剑锋
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 CDMA 1X Digital Mobile Phone
MANUFACTURERS MODEL NUMBER HUAWEI C5610

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	Spurious Emission at Antenna Terminals	PASS



1.3 Test Site

Site 1:

EMC LABORATORY OF 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.

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 (TM3~TM4)	N/A	Pass	Site1
<u>Conducted Emissions</u>	TC1 (TM1~TM4)	N/A	Pass	Site1
<u>Radiated Spurious Emissions</u> Enclosure Port 30MHz – 18GHz	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

Huawei CDMA Mobile Phone C5610 is subscriber equipment in the CDMA system. The frequency band is US Cellular. The Mobile Phone implements such functions as RF signal receiving / Transmitting, CDMA protocol processing, voice and SMS service etc. The Mobile Phone uses QSC1110 single chipset and Zero-IF technologies.

3.1.1 Main Equipment Technical Data

Description: CDMA 1X Digital Mobile Phone
 Model: HUAWEI C5610
 Input Rated Voltage:  3.7V
 Rated Power: 2W
 Dimensions: 108.8 mm (L)× 47 mm(W) ×10.8mm(H)
 Weight: <77g (with battery)

Mode	Band Class	Frequency	
		Transmitt Frequency (MHz)	Receive Frequency (MHz)
CDMA	Band Class 0	824-849	869-894
Bluetooth		2400-2483.5	2400-2483.5

3.2 Sub-Assembly Identity

Sub-Assembly Identity

Board				
Model Name	Qty.	Hardware Version	Serial	Description
HC1C7300M	1	VER.B	020RJA2069000209	Main board of Mobile Phone
Accessory				
Name	Qty.	Manufacturer	Serials number	Description
Adapter	1	SHENZHEN HUNTKEY POWER TECHNOLOGY CO., LTD	HKA7C531256	Adapter Model: HS-050040E5 voltage nominal: ~120V Input voltage: ~100-240V ;50/60Hz Output voltage:  +5.0V, 0.4A Rate power: 2W
Adapter	1	SHENZHEN HUNTKEY POWER TECHNOLOGY CO., LTD	HKA7C355425	Adapter Model: HS-050040U5 voltage nominal: ~120V Input voltage: ~100-240V ;50/60Hz Output voltage:  +5.0V, 0.4A Rate power: 2W
Rechargeable Li-ion	1	Harbin Coslight Power Co.,Ltd.	Gag9807xc3212502	Battery Model: HB6A2L Rated capacity: 1000mAh 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

Port	Length	Quantity	Type of Cable
AC Power Port	1.5m	1	Unshielded
USB	0.85m	1	shielded
Earphone	1.25m	1	Unshielded

4.2 Associated Equipment Used during Test

Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Cal Date	Cal Interval (month)
Radio Communication Tester	CMU200	R&S	3607033573	2010-03-12	12
Notebook	D810	DELL	3105083303	NA	NA

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~TM4
---------	---------

4.3.2 Test Mode

There were two test Modes. TM1 and TM4 were shown in the diagrams below:

TM1: operate in traffic mode CDMA 800;

TM2: operate in traffic mode Bluetooth;

TM3: operate in idle mode CDMA 800;

TM4: operate in idle mode Bluetooth;

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;

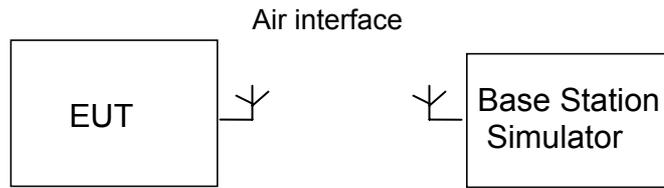


Figure 1. : Test Configuration

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.

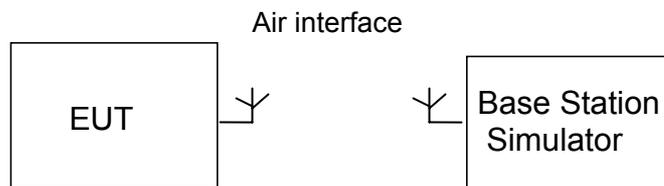


Figure 2. : Test Configuration

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:

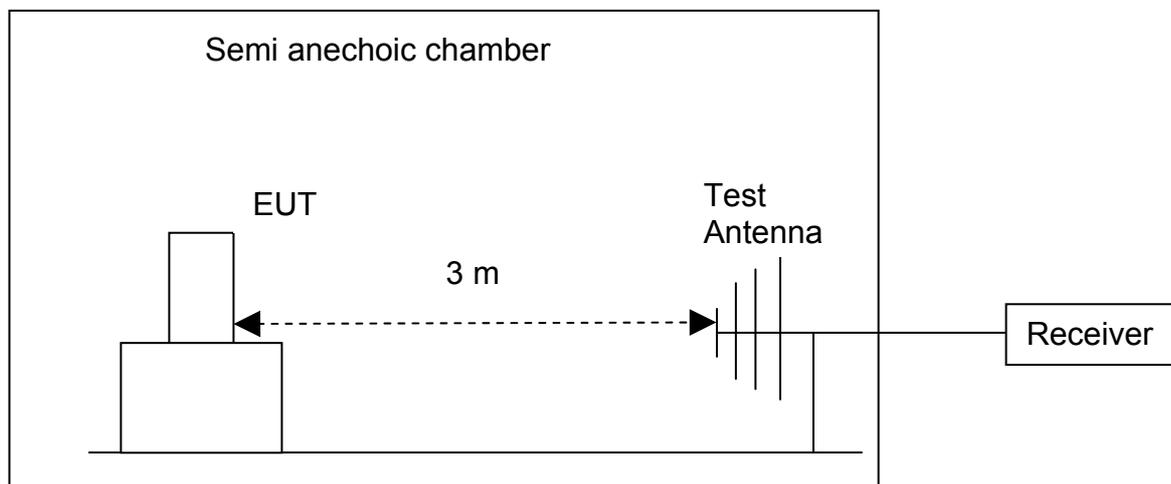


Figure 3. Test set up

5.1.2 Test Results

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

The test data is shown in section 8.1 of the report.

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.

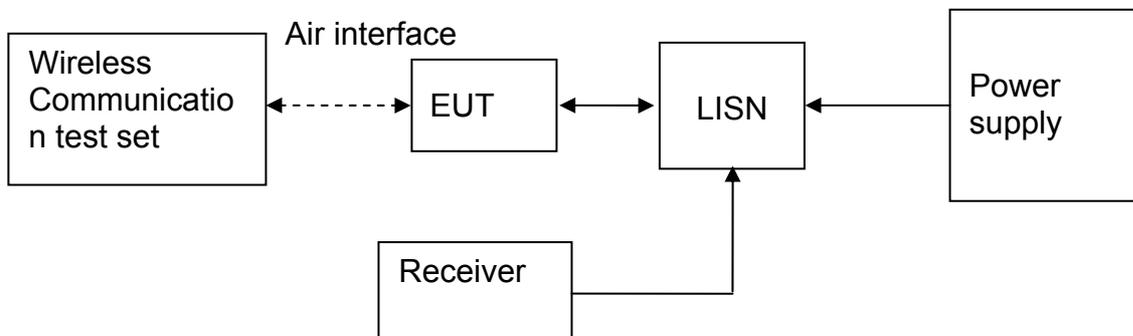


Figure 4. Test Set-up

5.2.2 Test Results

The EUT has met requirements for Conducted disturbance of signal lines. The test data is shown in section 8.2 of the report.

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

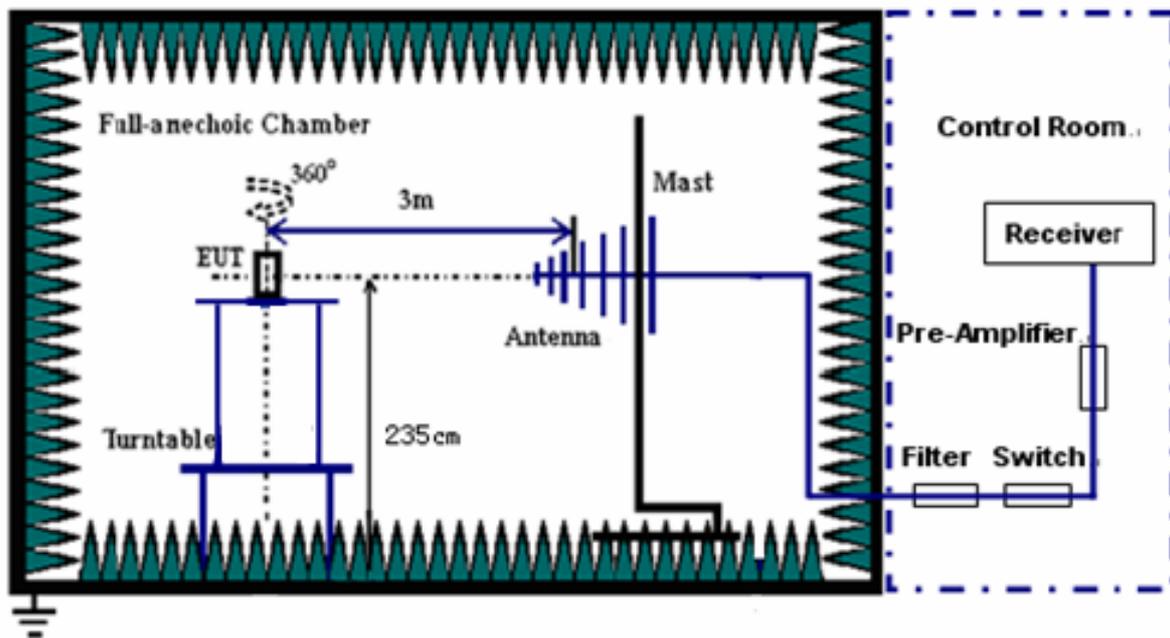
5.3.1 Test Procedure

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:

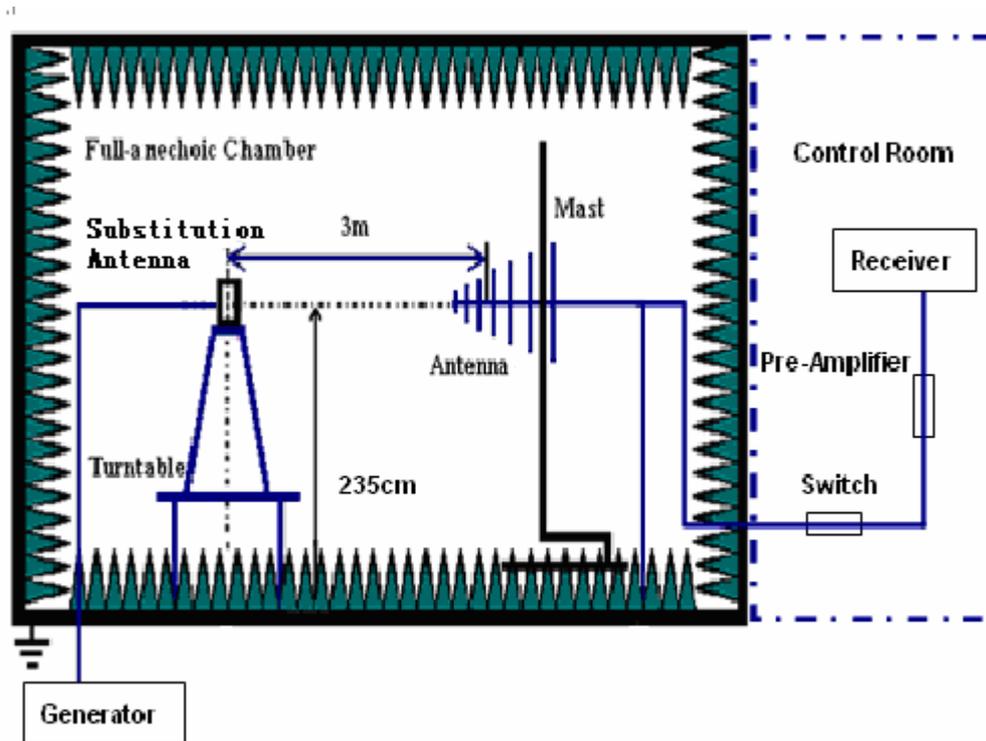
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, ERP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect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



Test should be performed in normal voltage condition.

The received power shall be measured for frequencies within 30MHz~18GHz for CDMA,, shown below, are applicable for frequencies in the spurious domain.

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 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 requirement.

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	Jul.07, 2009	12
	Broadband Antenna	VULB 9163	SCHWARZBECK	Jun.24, 2009	12
	Horn Antenna	HF906	R&S	Jun.19.2009	12
	LISN	ENV216	R&S	Aug.12.2009	12
RSE	EMI Test receiver	ESIB26	R&S	April.22, 2009	12
	Horn Antenna	3117	ETS-Lindgren	Sep.11.2009	12
	Broadband Antenna	CBL6112B	SCHAFFNER	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:

System Measurement Uncertainty

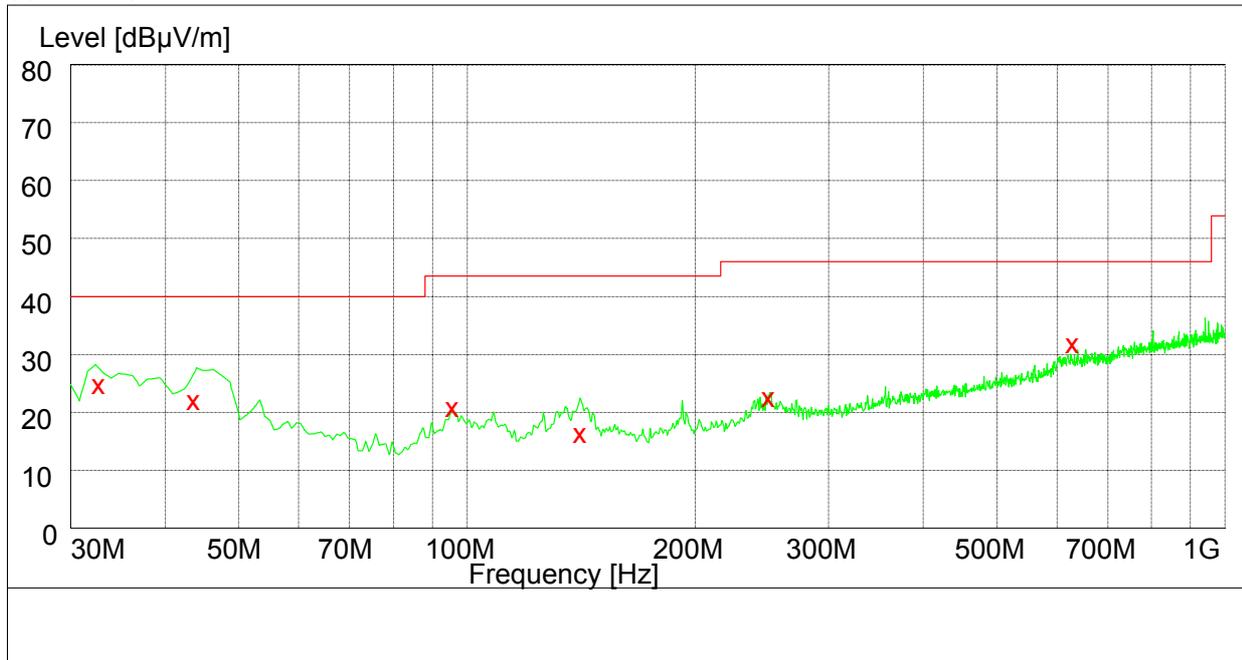
Items		Extended Uncertainty
RE	Field strength (dB μ V/m)	U=4.2dB; k=2(30MHz-1GHz) U=4.92dB; k=2(1GHz-18GHz)
RSE	ERP (dBm)	U=2.2dB; k=2
CE	Disturbance Voltage (dB μ V)	U=3.2dB; k=2

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.

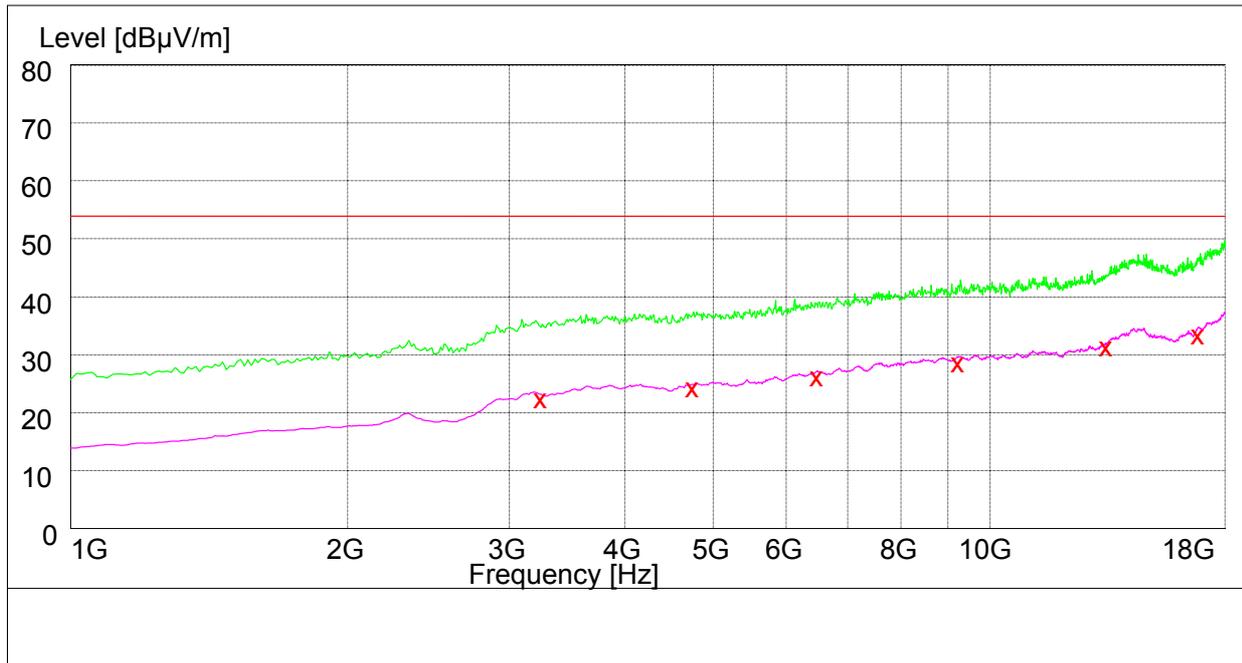
30MHz-1GHz



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
32.700000	25.70	11.7	40.0	14.3	100.0	124.00	VERTICAL
43.620000	22.80	13.1	40.0	17.2	101.0	336.00	VERTICAL
95.820000	21.40	12.8	43.5	22.1	100.0	148.00	VERTICAL
141.120000	17.50	8.7	43.5	26.0	100.0	310.00	VERTICAL
250.320000	23.00	14.2	46.0	23.0	130.0	224.00	HORIZONTAL
630.780000	31.90	22.8	46.0	14.1	263.0	321.00	HORIZONTAL

1GHz-18GHz



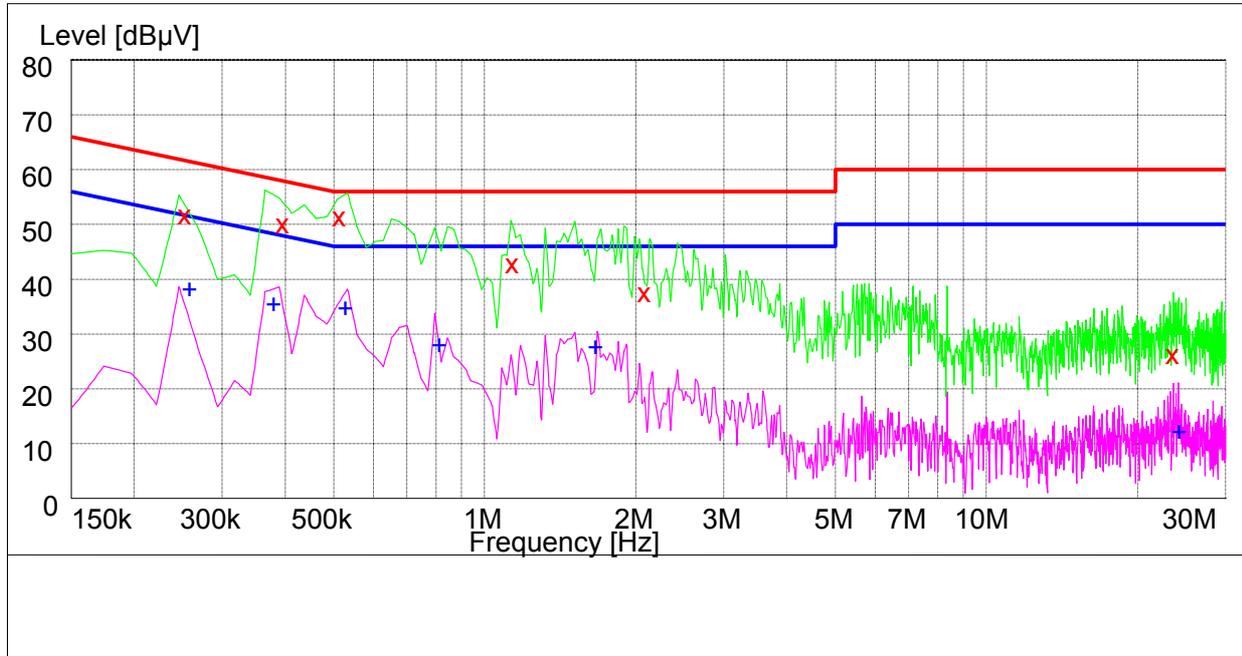
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
3248.000000	22.80	-8.2	54.0	31.2	118.0	15.00	VERTICAL
4750.500000	24.40	-4.2	54.0	29.6	121.0	35.00	HORIZONTAL
6488.500000	26.70	-1.0	54.0	27.3	187.0	360.00	VERTICAL
9238.000000	29.10	4.5	54.0	24.9	165.0	169.00	HORIZONTAL
13376.000000	31.10	9.7	54.0	22.9	100.0	288.00	HORIZONTAL
16844.500000	34.00	12.8	54.0	20.0	200.0	234.00	HORIZONTAL

8.2 Conducted Disturbance

8.2.1 AC Port Test Data

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	Transd dB	Limit dBµV	Margin dB	Line	PE
0.253500	52.20	10.0	62	9.8	N	FLO
0.397500	50.50	10.0	58	7.5	N	FLO
0.514500	51.80	10.1	56	4.2	N	FLO
1.140000	43.20	10.1	56	12.8	N	FLO
2.089500	37.90	10.1	56	18.1	N	FLO
23.631000	26.60	10.4	60	33.4	N	FLO

MEASUREMENT RESULT: AV Detector

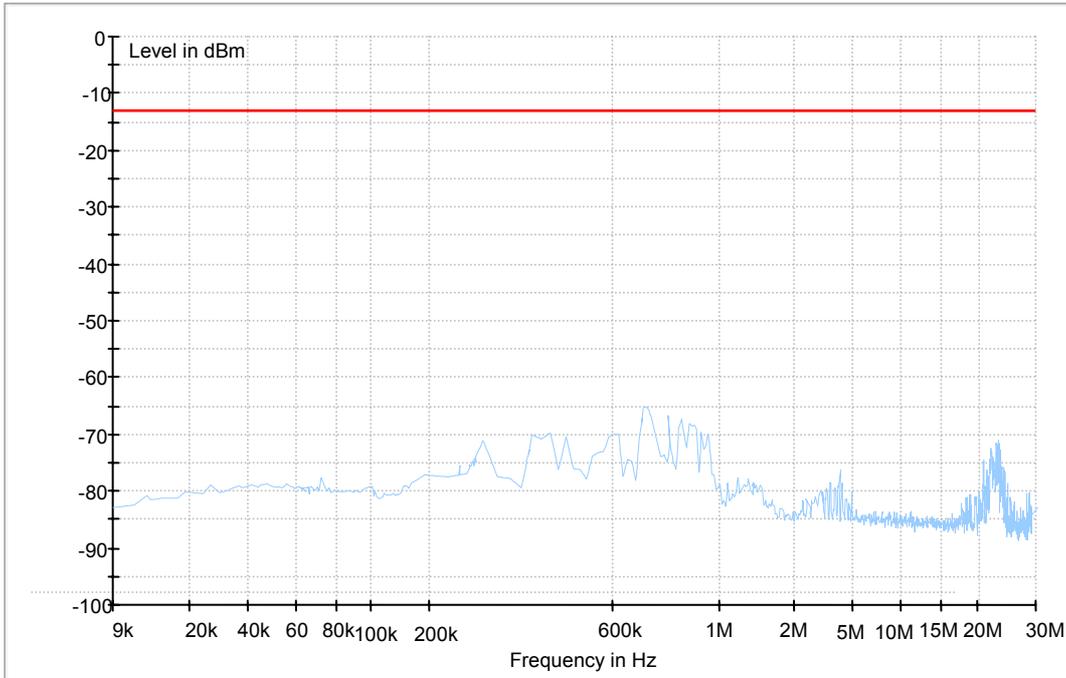
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.258000	38.50	10.0	52	13.0	N	FLO
0.379500	35.70	10.0	48	12.6	N	FLO
0.528000	35.00	10.1	46	11.0	N	FLO
0.811500	28.20	10.1	46	17.8	N	FLO
1.662000	27.90	10.1	46	18.1	N	FLO
24.211500	12.50	10.4	50	37.5	N	FLO

8.3 Radiated Spurious Emission

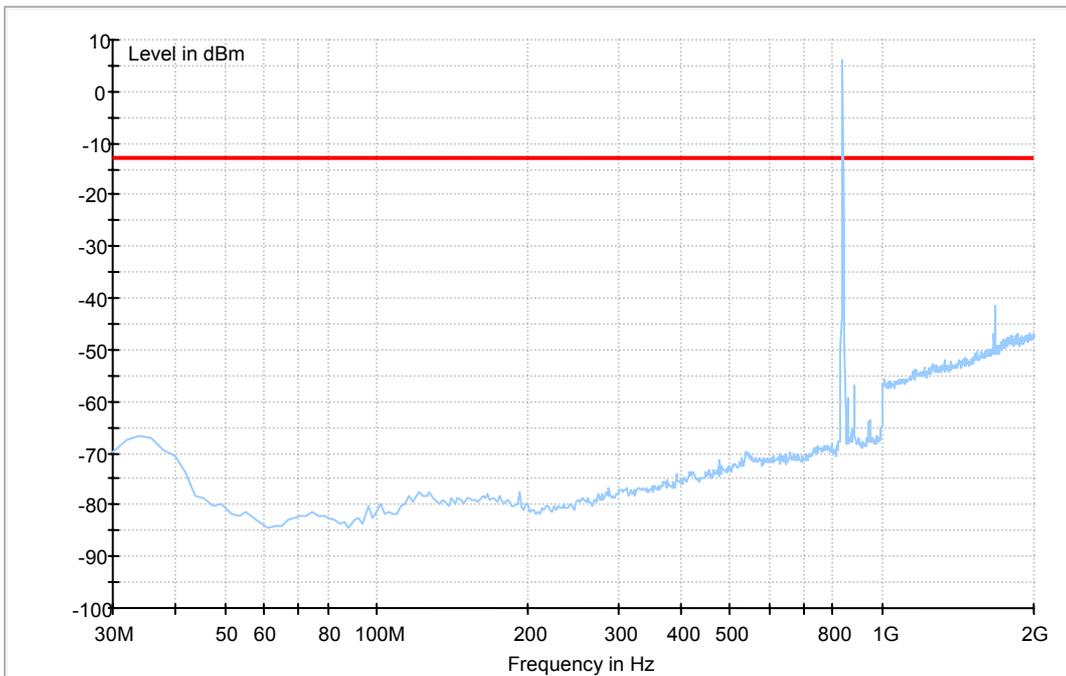
This test results are the maximum level of radiated spurious emissions in vertical and horizontal polarity.

For CDMA800

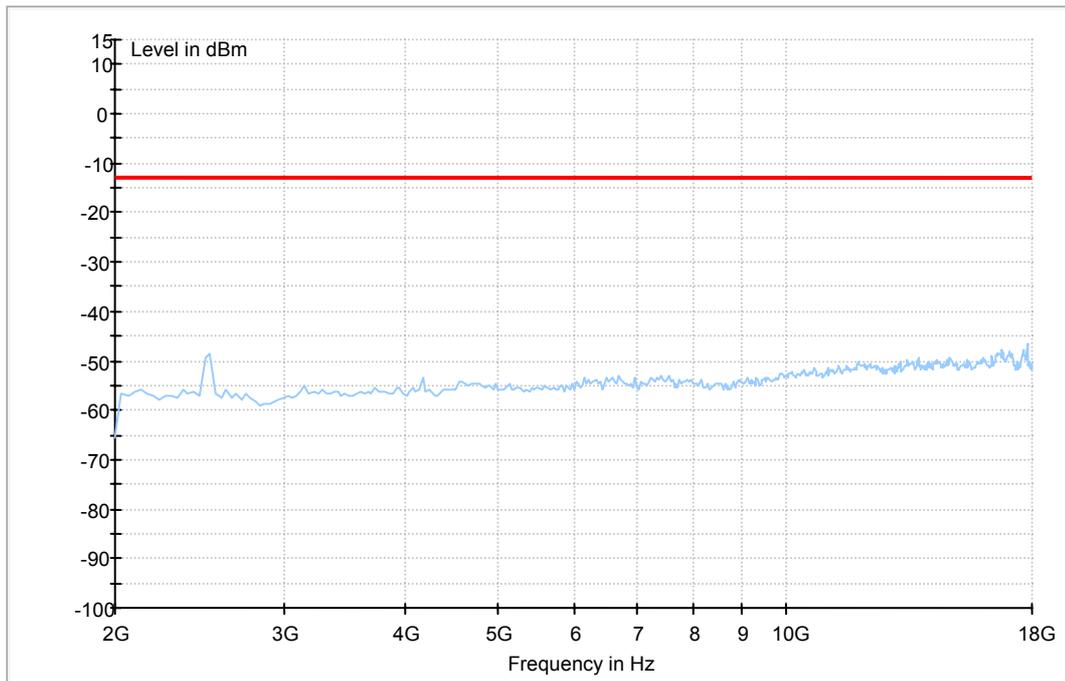
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)



END