



FCC EMC Test Report

Product Name: CDMA2000 1x Module

Model Number: MC323

Report No: SYBH (Z-EMC)038102010-2

FCC ID: QISMC323

IC ID:6369A-MC323

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Notice 1

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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.
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6. 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.
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8. Normally, the test report is only responsible for the samples that have undergone the test.
9. 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	<i>Not Applicable!</i>
	4	
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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	CDMA2000 1x Module
MANUFACTURERS MODEL NUMBER	MC323

1.2 Test Site

Site 1:
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 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 (TM3-TM4)	N/A	Pass	Site1
<u>Conducted Emissions</u>	TC1 (TM1-TM2)	N/A	Pass	Site1
<u>Radiated Spurious Emissions</u> Enclosure Port	TC1 (TM1-TM2)	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**

MC323 CDMA 1x Wireless Module is subscriber equipment in the CDMA system. MC323 implement such functions as RF signal receiving/transmitting, CDMA 1x protocol processing, data service etc. Externally it provides a 50-pin Board to Board connector interface.

3.1.1 **Main Equipment Technical Data**

Name	CDMA2000 1x Module
Model	MC323
Input Rated Voltage	3.8V
Rated Power	Max2.5w
Maximum Emission Power:	Max 30dBm
Dimensions	35 mm × 32.5 mm × 3.05 mm
Weight	6.0g

Table 3 Sub-Assembly Identity

Mode	Work Frequency	
	Transmitt Frequency (MHz)	Receive Frequency (MHz)
CDMA 2000 1X 800M	824 MHz - 849MHz	869 MHz - 894MHz
CDMA2000 1X 1900M	1850 MHz - 1910MHz	1930 MHz -1990MHz

3.2 **Sub-Assembly Identity**

Table 4 Sub-Assembly Identity

Board			
Model Name	Qty.	Serial Number	Description
MC323	1	2NA2B110A1100125	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
USB	USB	Unshielded

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	112347	2010-03-12

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.

4.3.2 Test Mode

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

- TM1: operate in traffic mode CDMA800 1x;
- TM2: operate in traffic mode CDMA1900 1x;
- TM3 operate in idle mode CDMA800 1x;
- TM4: operate in idle mode CDMA1900 1x;

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 CDMA800, to 575 (1878.75MHz) for CDMA1900.

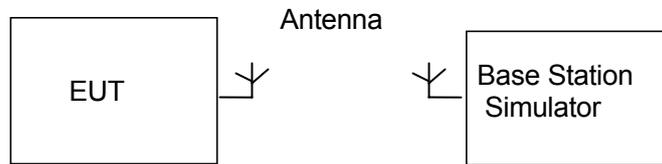


Figure 1.: TC1 (TM1)

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).

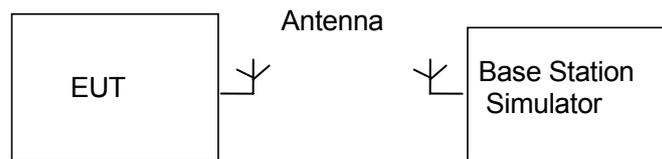


Figure 2. TC1 (TM3)

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:

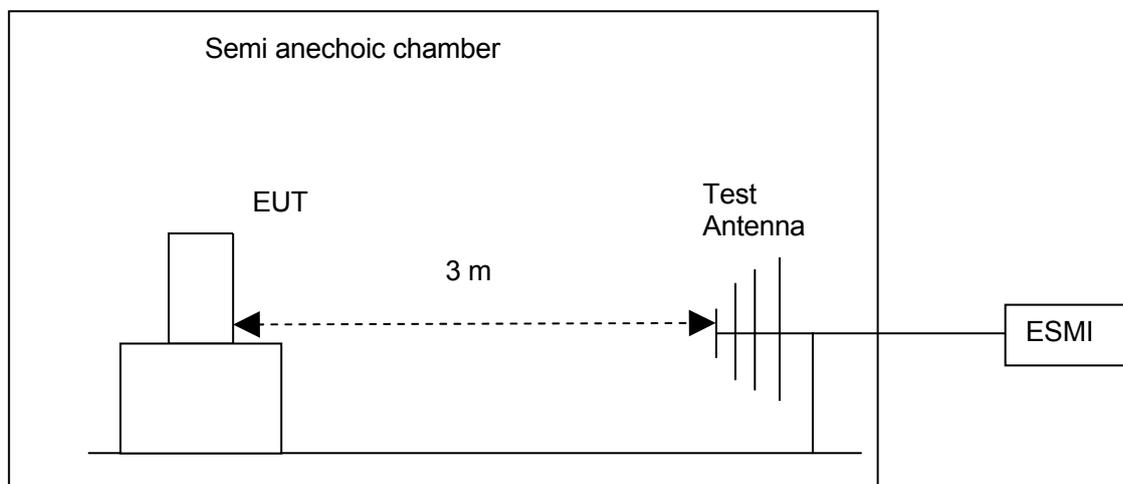


Figure 3. Test set-up

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

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.

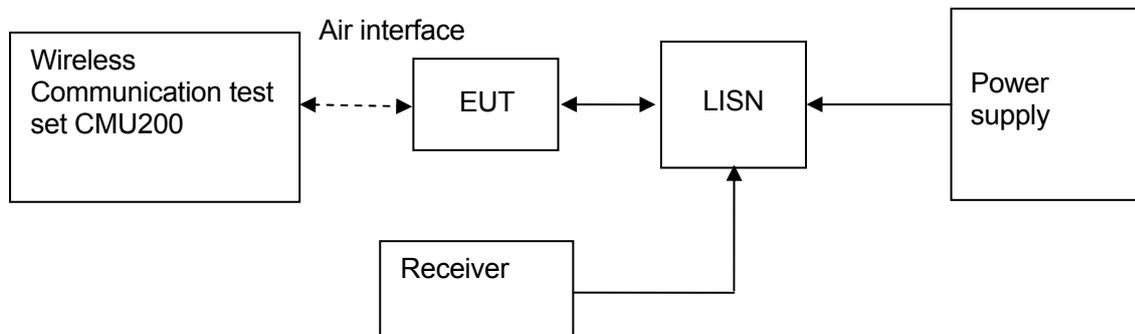


Figure 4. Test Set-up

5.2.2 Test Results

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

Table 9 Test Limit of 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

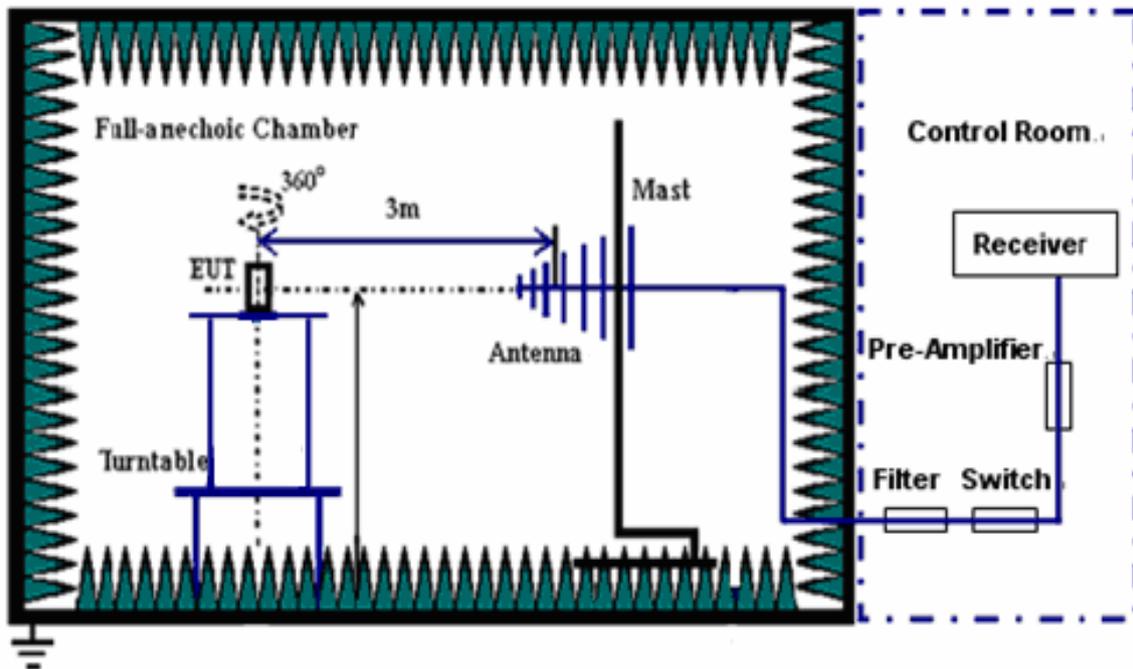
5.3.1 Test Procedure

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:

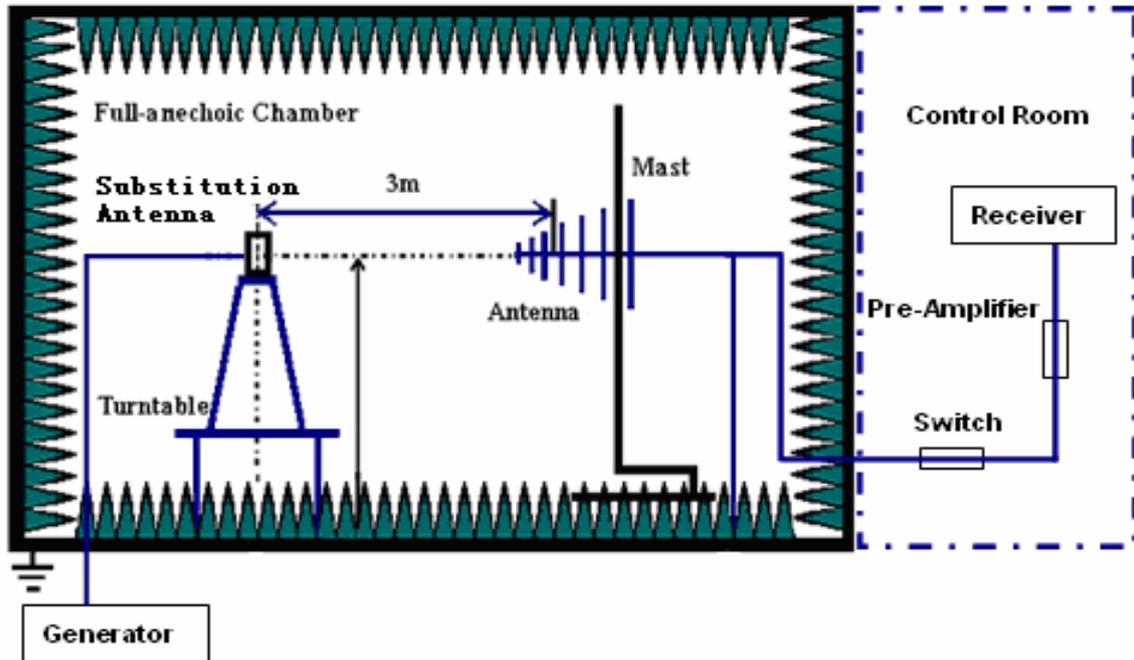
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements. Connect the EUT to the BTS simulator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



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;

According to RSS-132, the defined measurement bandwidth as following:

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 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
9KHz~18GHz	-13dBm

According to part 24.238, the defined measurement bandwidth as following:

24.238 (b) Measurement procedure: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz 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 26.5 GHz: 1 MHz;

According to RSS-133, the defined measurement bandwidth as following:

RSS-133 Measurement procedure: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.

- Measurement bandwidth (RBW) for 30 MHz up to 26.5 GHz: 1 MHz;



Table 11 Radiated Spurious Emissions Limits

Frequency band	Minimum requirement (E.R.P) traffic mode
9KHz~26.5GHz	-13dBm

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

Calculation Sample:

Table 12 Substitution Results

Freq. [MHz]	Measurement 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,

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

NOTE: SGP- Signal Generator Level

5.3.2 Test Results

The EUT has met the requirements of FCC Part22/Part24/RSS-132/133requirement.

6 Receiver Spurious Emission (Radiated)

6.1.1 Test Procedure

The EUT was connected to the Spectrum Analyzer or equivalent via one RF RX diversity connector, and other RF connectors were connected to match loads. The EUT was controlled to transmit maximum power and to be operated in the normal receive mode by Console Computer. Measure and record the Receiver Out-band Spurious Emissions of the EUT by the Spectrum Analyzer or equivalent.

According to IC RSS-Gen clause 4.10, the search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tuneable or local oscillator frequency, whichever is the higher, without exceeding 40 GHz.

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:

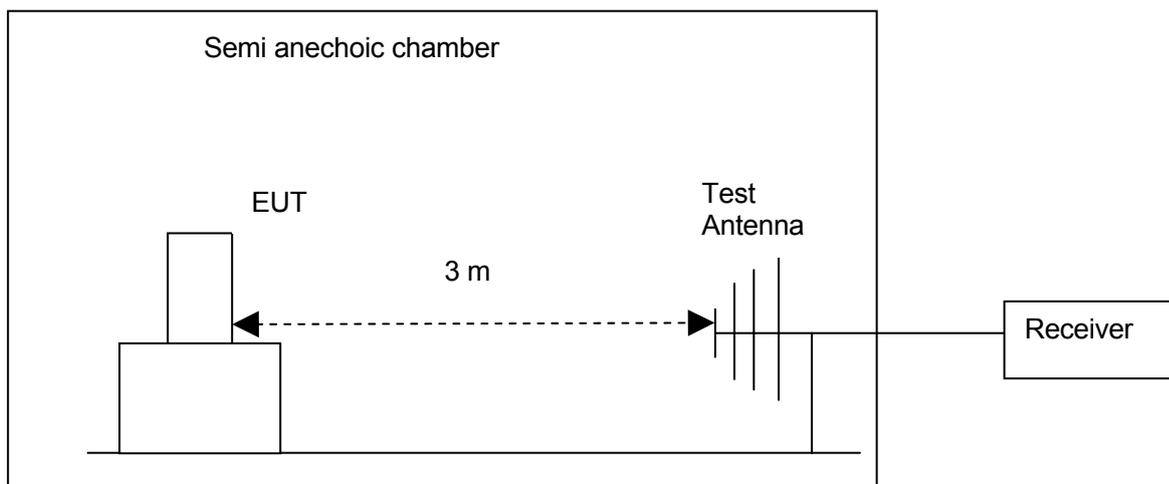


Figure 5. Test set-up

6.1.2 Test Results

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

Table 13 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



7 Main Test Instruments

Table 14 Main Test Equipments

Test item	Test Instrument	Model	Manufacturer	Cal-Date	Cal Interval (month)
RE	EMI Test receiver	ESU26	R&S	Jun.25, 2010	12
	Broadband Antenna	VULB9163	SCHWARZBECK	May.15, 2010	12
	Horn Antenna	HF906	R&S	May.15, 2010	12
CE	EMI Test receiver	ESU26	R&S	Jun.25, 2010	12
	Artificial Mains Network	ENV216	R&S	Jun.25, 2010	12
RSE	EMI Test receiver	ESIB26	R&S	April.22, 2010	12
	Horn Antenna	3117	EMCO	Oct.28.2009	12
	Broadband Antenna	CBL6112B	SCHAFFNER	Nov.30, 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	



8 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 15 System Measurement Uncertainty

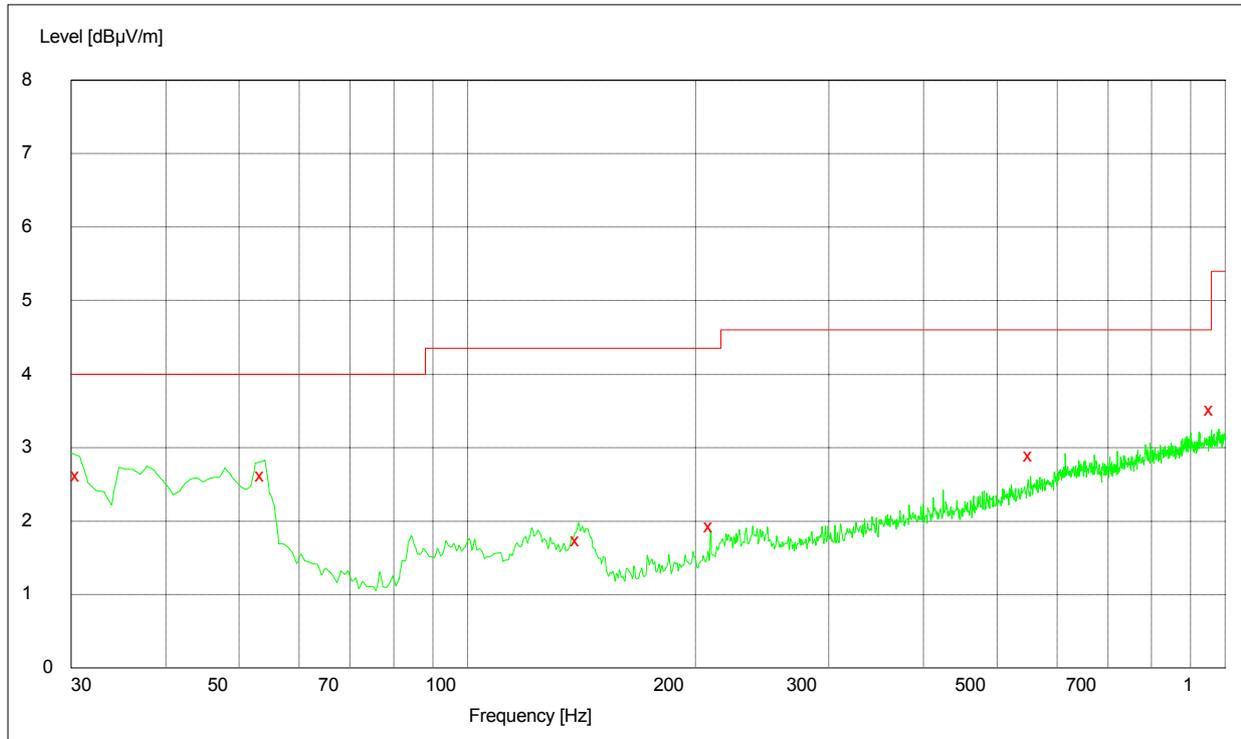
Items		Extended Uncertainty
RE	Field strength (dB μ V/m)	U=4.1dB; k=2(30MHz-1GHz)
RE	Field strength (dB μ V/m)	U=4.1dB; k=2(1GHz-18GHz)
RSE	ERP (dBm)	U=2.2dB; k=2
CE	Disturbance Voltage(dB μ V)	U=3.4dB; k=2

9 Graph and Data of Emission Test

9.1 Radiated Disturbance

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

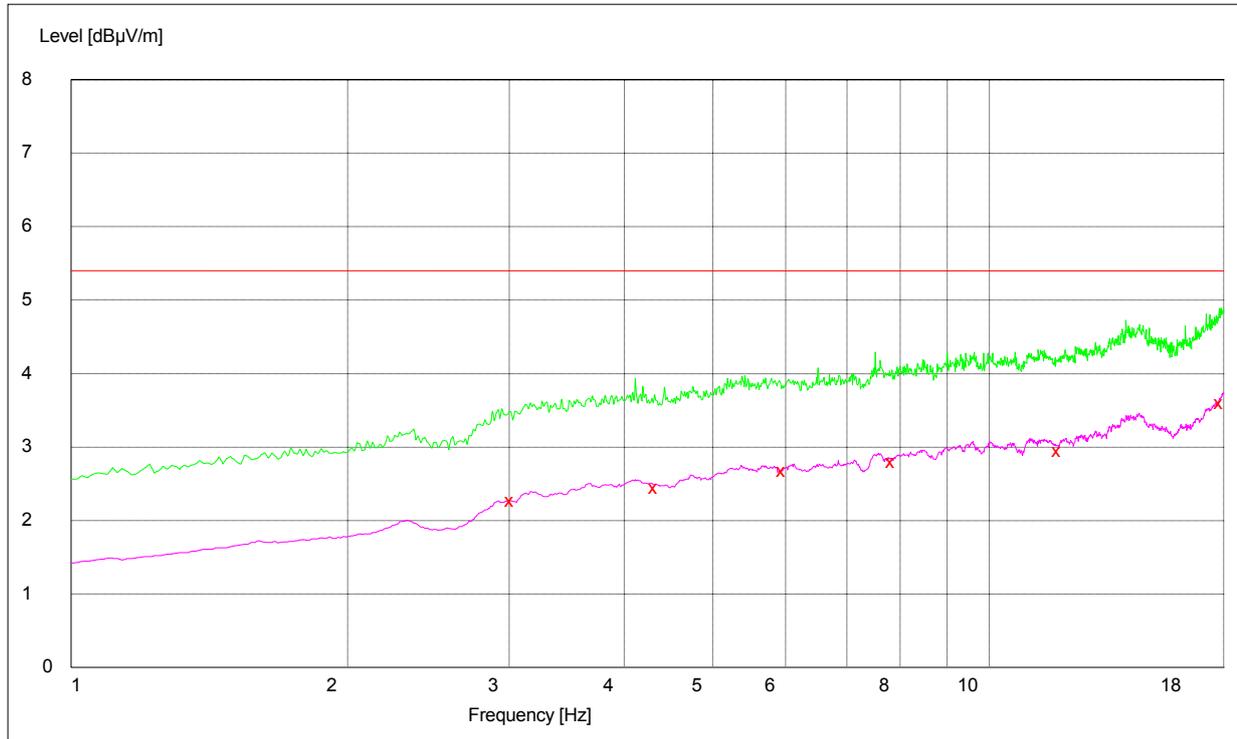
30MHz-1GHz



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
30.600000	26.10	11.7	40.0	13.9	100.0	88.00	VERTICAL
53.640000	26.10	12.7	40.0	13.9	100.0	324.00	VERTICAL
139.860000	17.30	8.7	43.5	26.2	112.0	124.00	VERTICAL
209.760000	19.20	12.5	43.5	24.3	206.0	342.00	HORIZONTAL
553.260000	28.80	21.5	46.0	17.2	140.0	103.00	VERTICAL
959.520000	35.10	26.8	46.0	10.9	218.0	184.00	VERTICAL

1GHz-18GHz



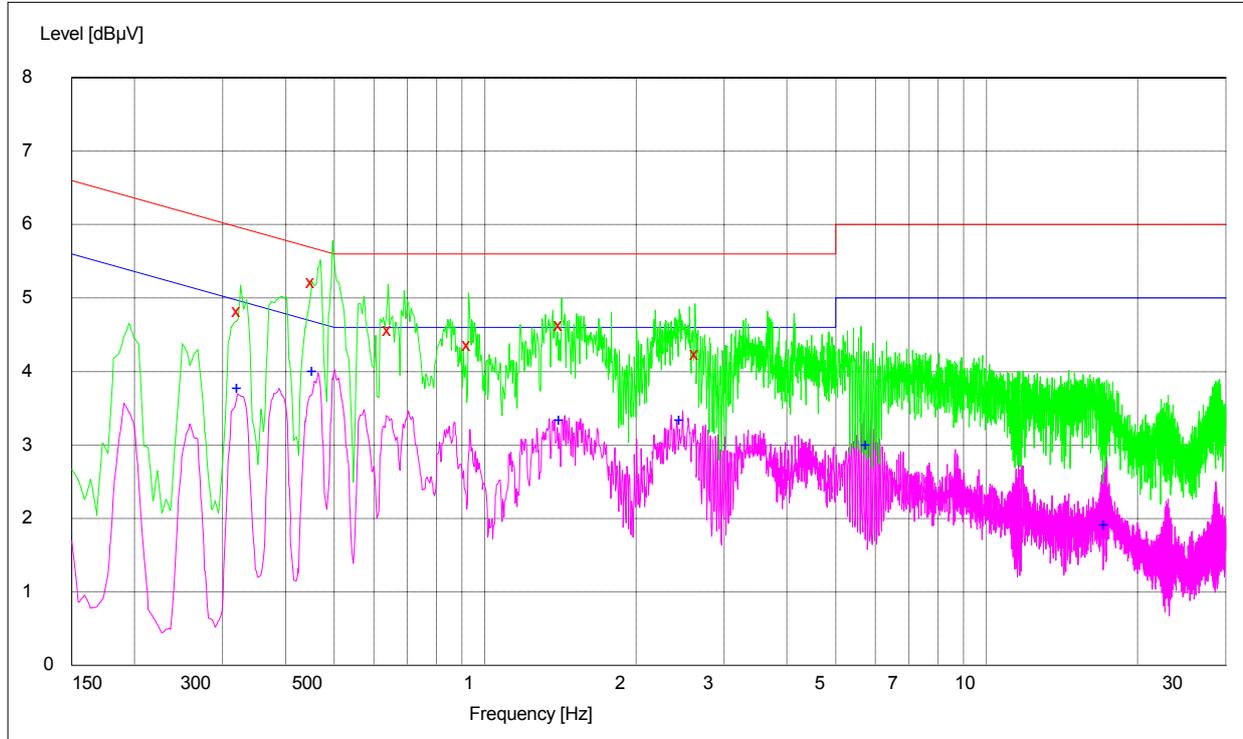
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
3023.000000	22.60	-9.1	54.0	31.4	100.0	268.00	VERTICAL
4333.500000	24.30	-5.4	54.0	29.7	100.0	5.00	VERTICAL
5971.000000	26.70	-1.6	54.0	27.3	100.0	7.00	HORIZONTAL
7858.500000	27.90	1.8	54.0	26.1	100.0	309.00	HORIZONTAL
11910.000000	29.40	6.9	54.0	24.6	100.0	320.00	HORIZONTAL
17879.000000	35.90	16.5	54.0	18.1	100.0	313.00	VERTICAL

9.2 Conducted Disturbance

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

9.2.1 AC Power Port Test Data



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.324000	48.10	10.0	60	11.9	N	FLO
0.454000	52.00	10.1	57	5.0	N	FLO
0.646000	45.50	10.1	56	10.5	N	FLO
0.930000	43.50	10.1	56	12.5	N	FLO
1.418000	46.20	10.1	56	9.8	N	FLO
2.644000	42.30	10.2	56	13.7	N	FLO

MEASUREMENT RESULT: AV Detector

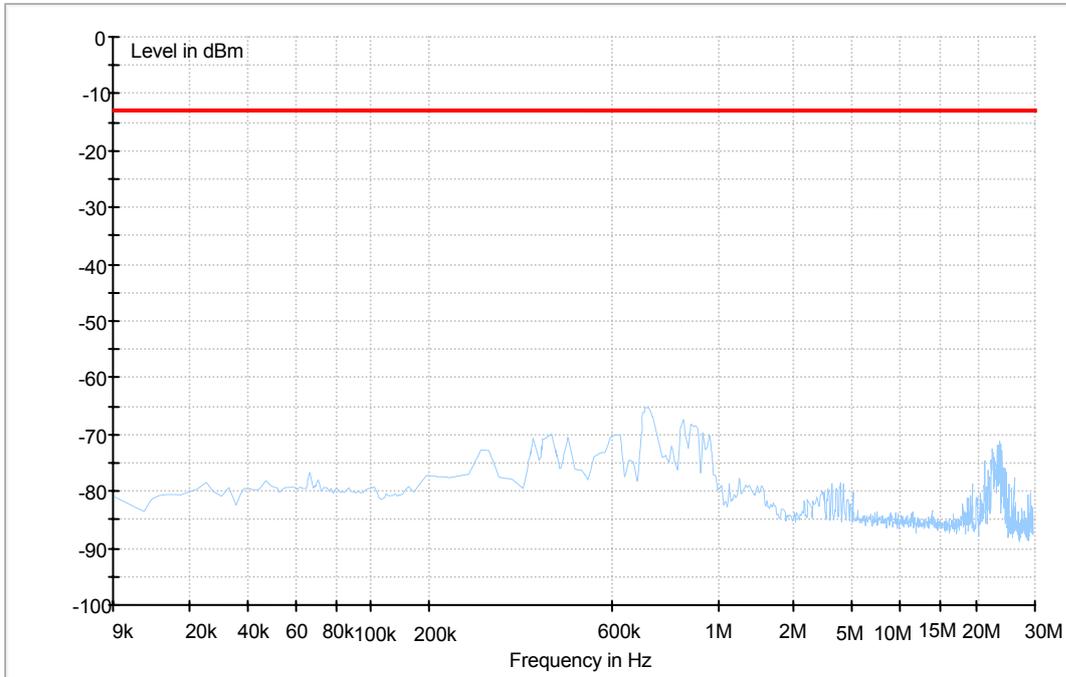
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.324000	37.50	10.0	50	12.5	N	FLO
0.456000	39.80	10.1	47	7.2	N	FLO
1.418000	33.20	10.1	46	12.8	N	FLO
2.466000	33.10	10.1	46	12.9	N	FLO
5.798000	29.70	10.2	50	20.3	N	FLO
17.332000	18.90	10.3	50	31.1	L1	FLO

9.3 Radiated Spurious Emission

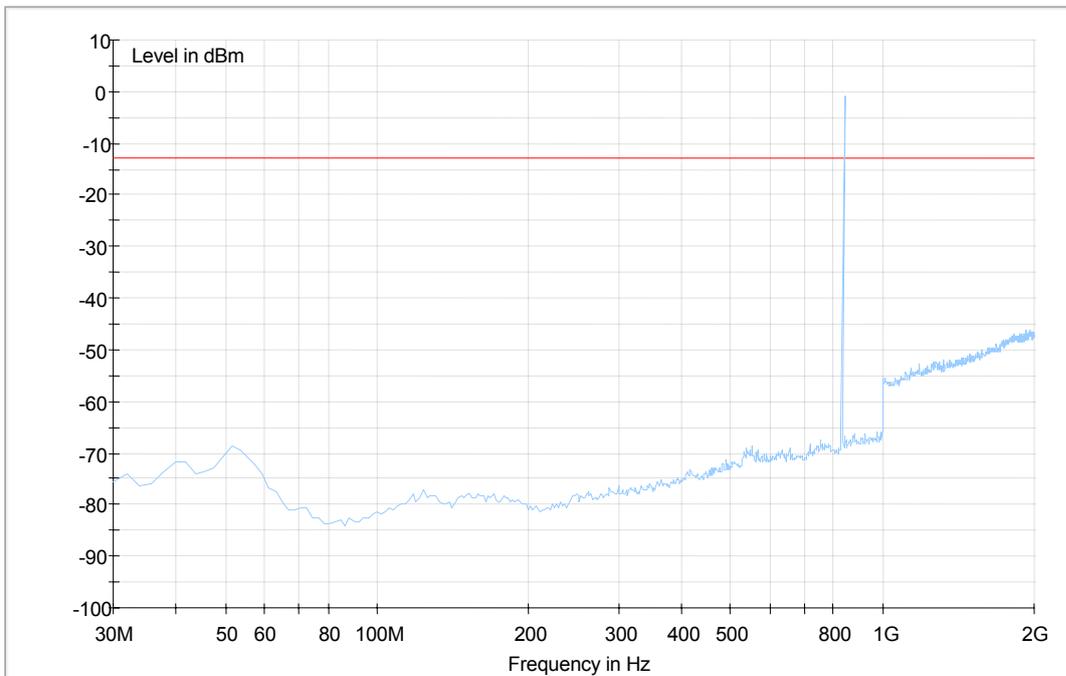
This test results are the maximum level of radiated spurious emissions in vertical and horizontal polarity. The peak exceeds the limit line is carrier frequency.

9.3.1 For CDMA 800

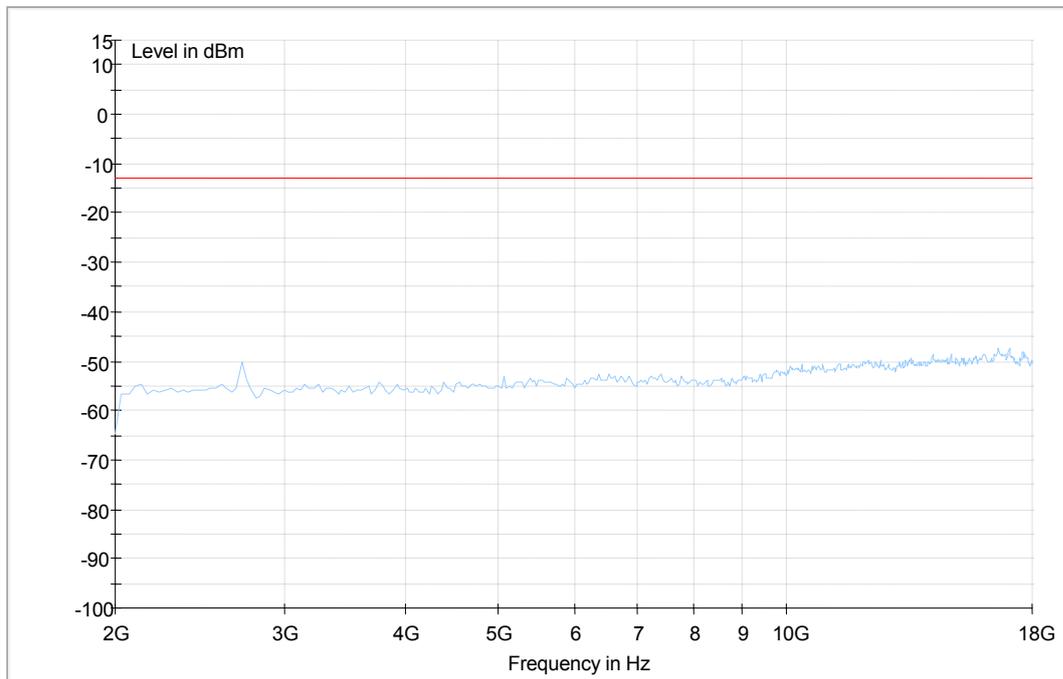
Traffic Mode (9kHz-30MHz)



transmitter Mode (30MHz-2GHz)

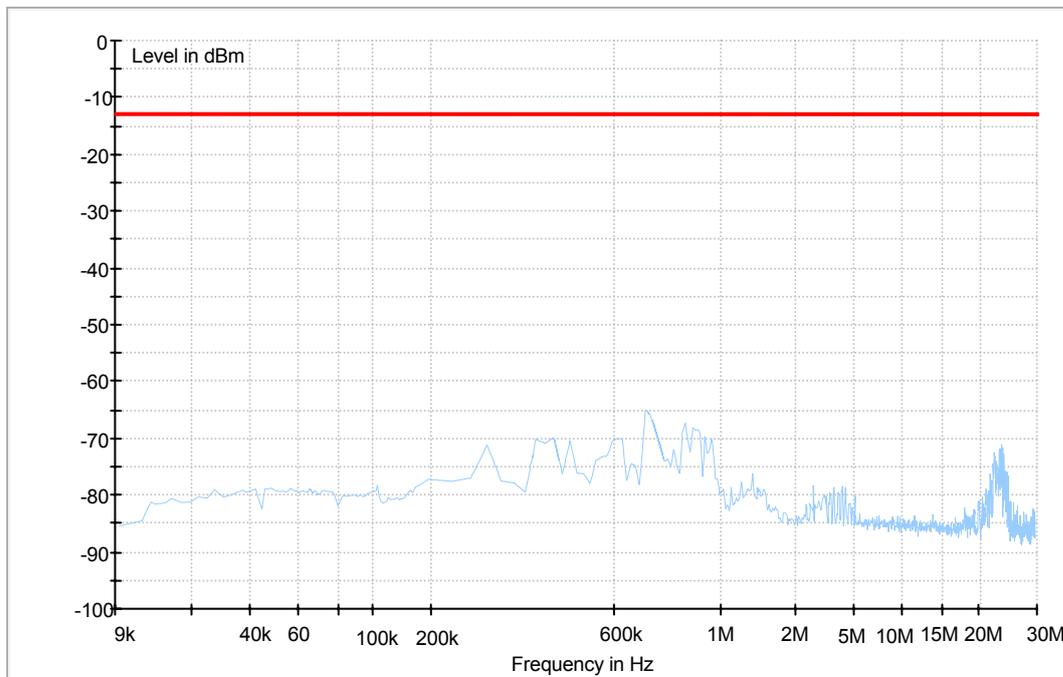


transmitter Mode (2GHz-18GHz)

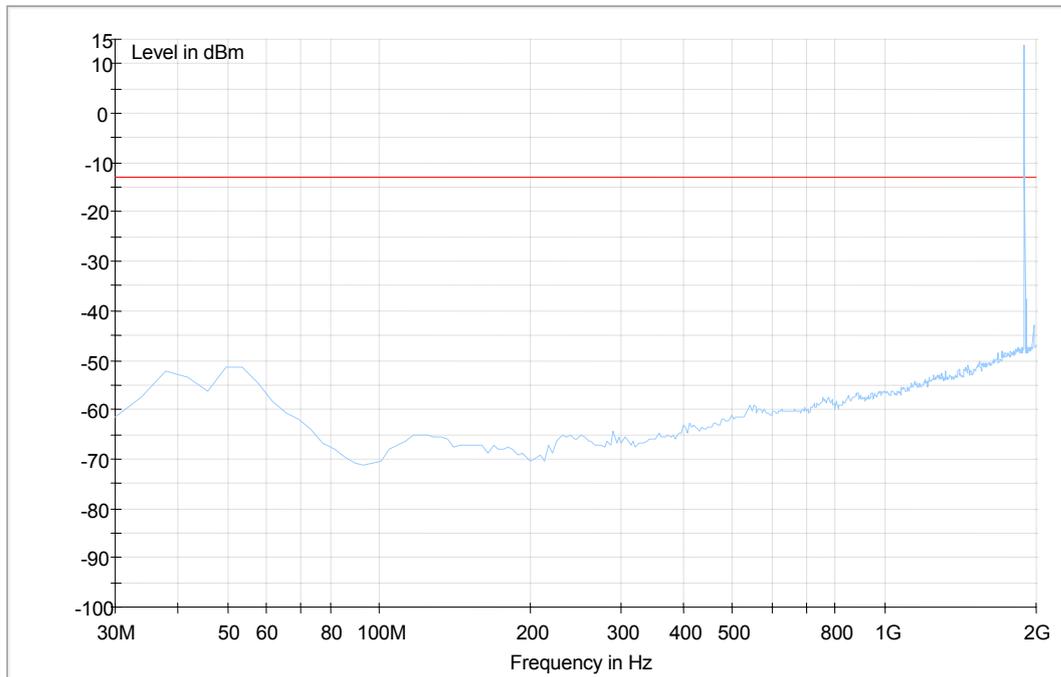


9.3.2 For CDMA 1900

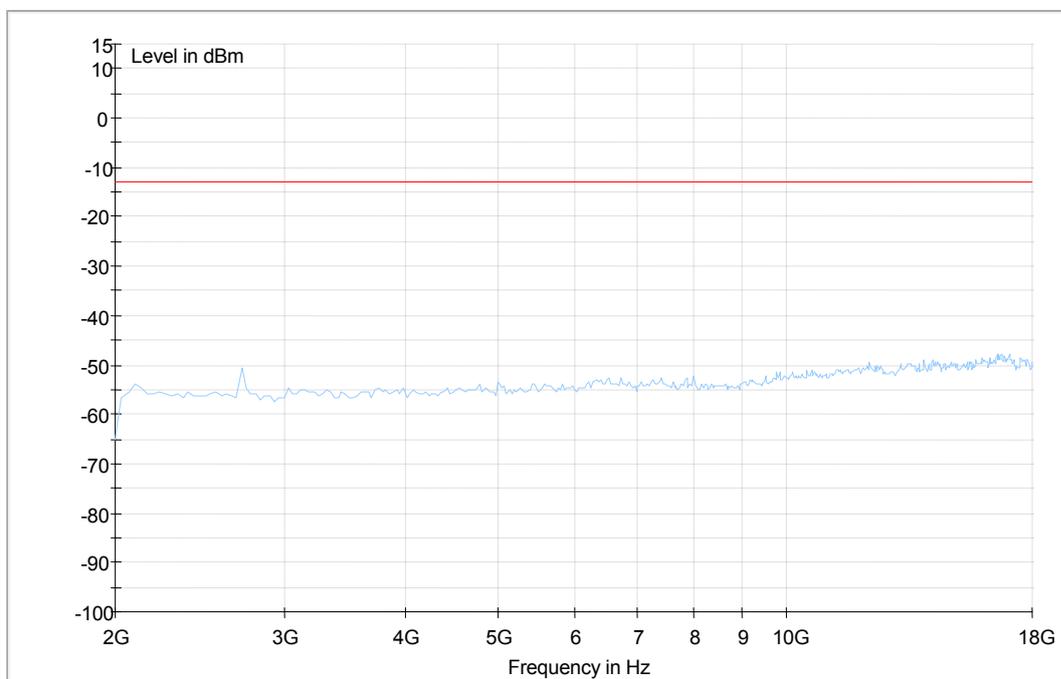
Traffic Mode (9kHz-30MHz)



Transmitter Mode (30MHz-2GHz)

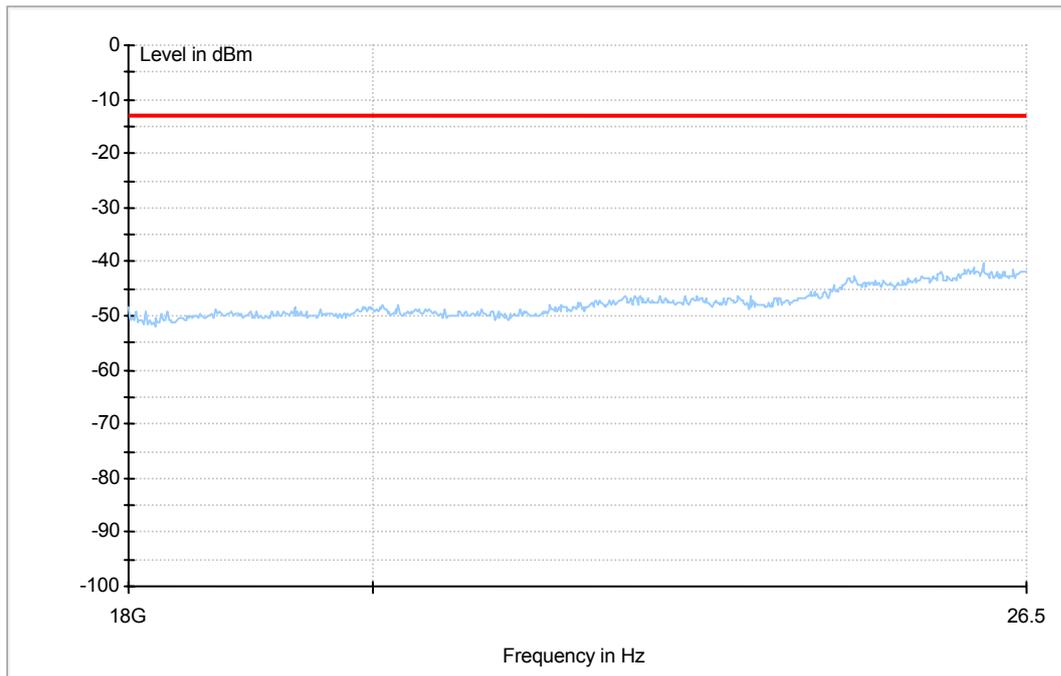


Transmitter Mode (2GHz-18GHz)





Traffic Mode (18GHz-26.5GHz)

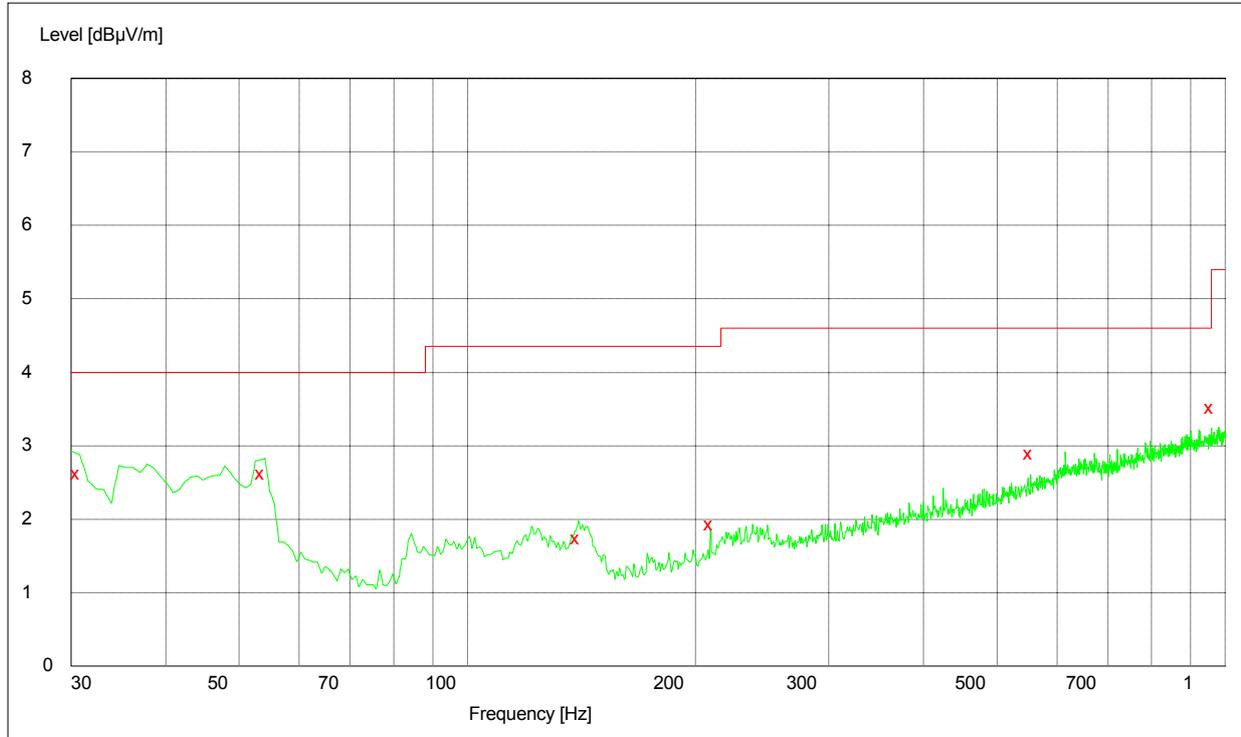


9.4 Receiver Spurious Emission Radiated

9.4.1 For CDMA 800

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

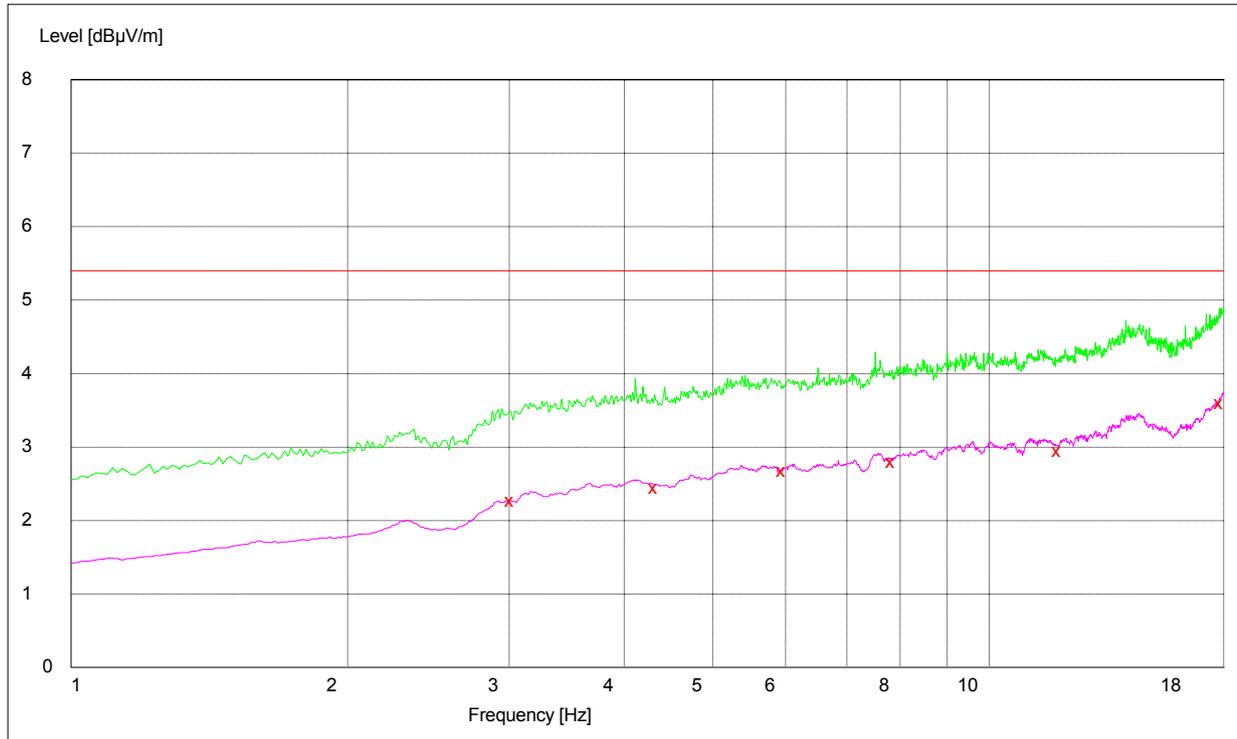
30MHz-1GHz



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
30.600000	26.10	11.7	40.0	13.9	100.0	88.00	VERTICAL
53.640000	26.10	12.7	40.0	13.9	100.0	324.00	VERTICAL
139.860000	17.30	8.7	43.5	26.2	112.0	124.00	VERTICAL
209.760000	19.20	12.5	43.5	24.3	206.0	342.00	HORIZONTAL
553.260000	28.80	21.5	46.0	17.2	140.0	103.00	VERTICAL
959.520000	35.10	26.8	46.0	10.9	218.0	184.00	VERTICAL

1GHz-18GHz



MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
3023.000000	22.60	-9.1	54.0	31.4	100.0	268.00	VERTICAL
4333.500000	24.30	-5.4	54.0	29.7	100.0	5.00	VERTICAL
5971.000000	26.70	-1.6	54.0	27.3	100.0	7.00	HORIZONTAL
7858.500000	27.90	1.8	54.0	26.1	100.0	309.00	HORIZONTAL
11910.000000	29.40	6.9	54.0	24.6	100.0	320.00	HORIZONTAL
17879.000000	35.90	16.5	54.0	18.1	100.0	313.00	VERTICAL

END