



EMC Test Report

Product Name: CDMA Mobile Phone

Model Number: M328

Report No: SYBH (R) 012032008EB-1

Reliability Laboratory of Huawei Technologies Co., Ltd.

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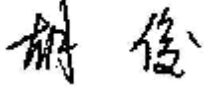
Modification Information:

Table 1 Modification Information

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



REPORT ON	EMC Test of CDMA Mobile Phone
	M/N: M328
REGULATION	FCC CFR47 Part 15: Subpart B; FCC CFR47 Part 22 Subpart H; FCC CFR47 Part 24: Subpart E; FCC CFR47 Part 27: Subpart C;
START OF TEST	Mar.26, 2008
END OF TEST	Apr.6, 2008
Final Judgement:	Pass

Approver	<u>2008-04-8</u>	<u>张兴海</u>	 Signature
	Date	Name	
Reviewer	<u>2008-04-8</u>	<u>余 辉</u>	 Signature
	Date	Name	
Operator	<u>2008-04-7</u>	<u>胡 俊</u>	 Signature
	Date	Name	

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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 Mobile Phone
MANUFACTURERS MODEL NUMBER M328

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	22.917/24.238/27.53	Spurious Emission at Antenna Terminals	PASS

1.3 Test Site

Site 1:

EMC LABORATORY OF RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD

Site 2:

EMC LABORATORY OF AUDIX LABORATORY

Site 3:

EMC LABORATORY OF HUATONGWEI INTERNATIONAL INSPECTION 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,TM4,T M6	N/A	Pass	Site1
<u>Conducted Emissions</u>	TC1/TM1,TM3,T M5	N/A	Pass	Site1
<u>Radiated Spurious Emissions</u> Enclosure Port 30MHz – 18GHz	TC1/TM1,TM5	N/A	Pass	Site1
<u>Radiated Spurious Emissions</u> Enclosure Port 30MHz – 26.5GHz	TC1/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

Huawei CDMA Mobile Phone M328 is subscriber equipment in the CDMA system. The frequency band is US Cellular, PCS,AWS. The Mobile Phone implements such functions as RF signal receiving / Transmitting, CDMA protocol processing, voice and SMS service etc. The Mobile Phone uses QSC6030 single chipset and Zero-IF technologies.

3.1.1 Main Equipment Technical Data

Description:	CDMA 1X Digital Mobile Phone
Model:	M328
Input Rated Voltage:	--- 3.7V
Rated Power:	2W
Dimensions:	45.6 mm (L) × 89 mm (W) × 19mm (H)
Weight:	<110g (with battery)

Table 3 Sub-Assembly Identity

Mode		Frequency	
		Transmitt Frequency (MHz)	Receive Frequency (MHz)
CDMA	CDMA 2000 Celluar	824-849	869-894
	CDMA 2000 PCS	1850-1910	1930-1990
	CDMA 2000 AWS	1710-1755	2110-2155

3.2 Sub-Assembly Identity

Table 4 Sub-Assembly Identity

Board				
Model Name	Qt y.	Hardware Version	Serial	Description
HC2C3328 M	1	VER.C	020GXT2082000217	Main board of Mobile Phone
Accessory				
Name	Qt y.	Manufacture	Serials number	Description
Adapter	1	TECH-POWER INTERNATI ONAL CO.,LTD	TPI791902005	voltage nominal: ~120V Input voltage: ~100-240V ;50/60Hz Output voltage: --- +5.0V, 0.65A Rate power: 4W
Rechargeable Li-ion	1	FMT Electronics Co.,Ltd.	FMT821305432Y	Battery Model: HB4A2H Rated capacity: 900mAh 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

Table 5 Cable Used during Test

Port	Length	Quantity	Type of Cable
AC Power Port	3m	1	Unshielded

4.2 Associated Equipment Used during Test

Table 6 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Cal Date	Cal Interval (month)
Radio Communication Tester	CMU200	R&S	3604091212	2007-10-12	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

TC1	TM1~TM6
-----	---------

4.3.2 Test Mode

There were two test Modes. TM1 to TM6 were shown in the diagrams below:

TM1: operate in traffic mode CDMA 800;

TM2: operate in idle mode CDMA 800;

TM1: operate in traffic mode PCS 1900;

TM2: operate in idle mode PCS1900;

TM1: operate in traffic mode AWS 1700;

TM2: operate in idle mode AWS 1700;

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;

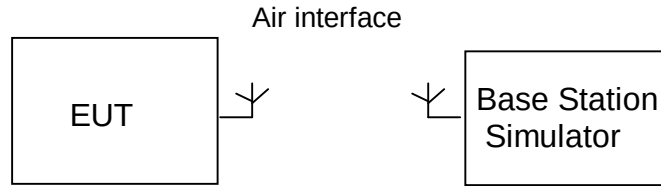


Figure 1. : Test Configuration TC1

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, PCS, AWS, 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.

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.

Measurement bandwidth: 30 MHz – 1000 MHz: 120 k Hz

Test set up figure:

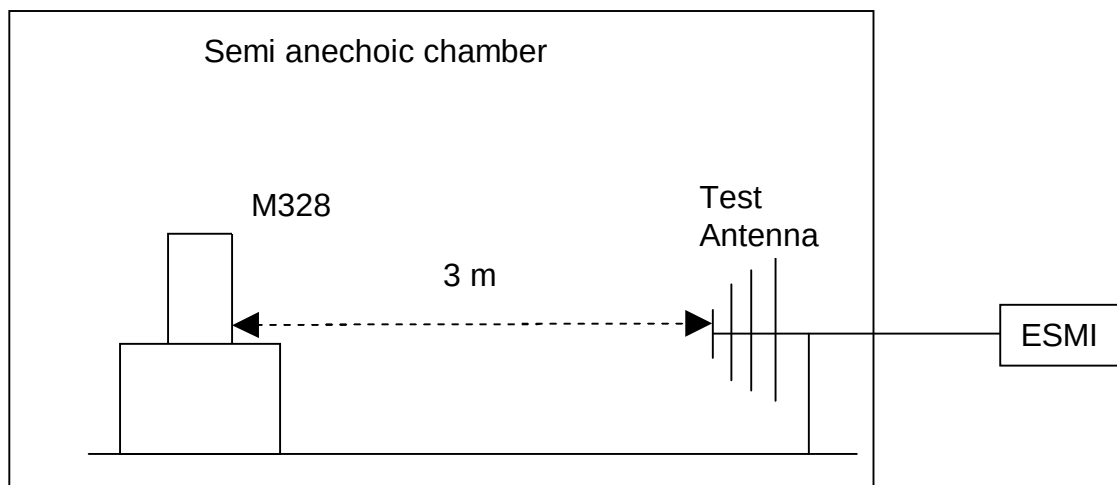


Figure 2. Test set up

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.

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.

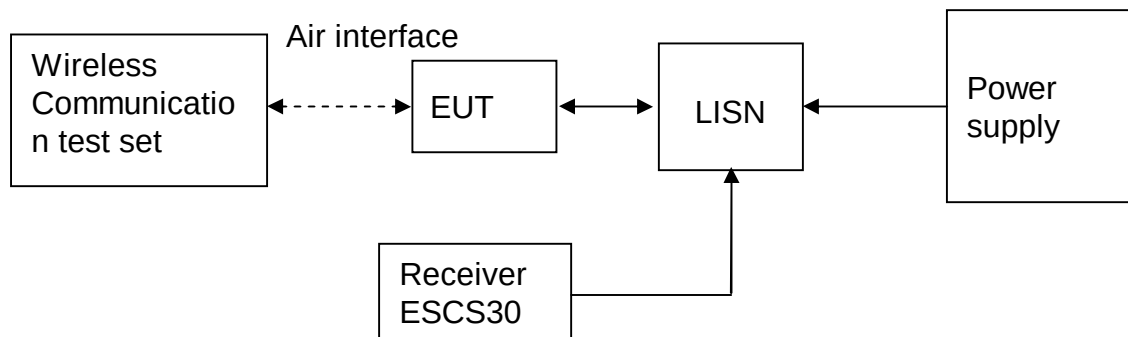


Figure 3. Test Set-up

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.

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

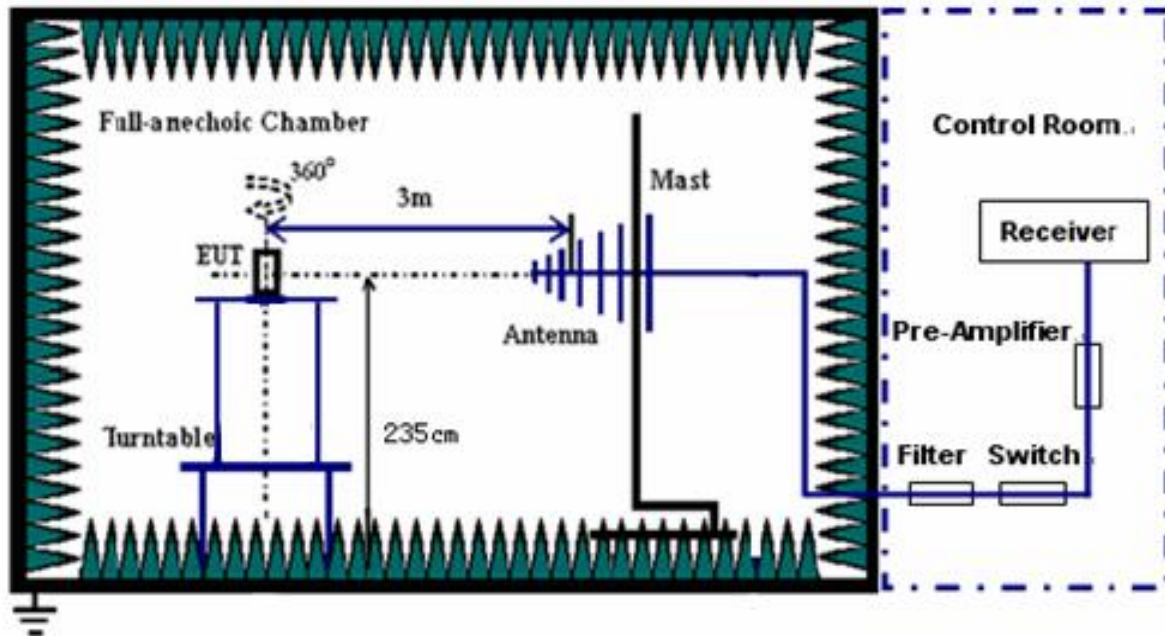
5.3.1 Test Procedure

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:

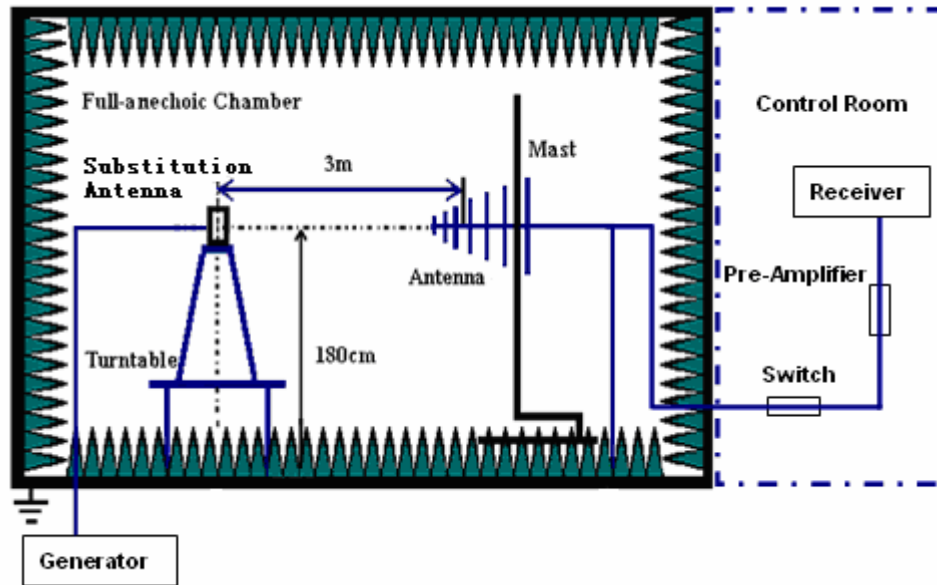
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect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



Test should be performed in normal voltage condition.

According to part 22.917, 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;

Table 10 Radiated Spurious Emissions Limits

Frequency band	Minimum requirement (E.R.P) traffic mode
9KHz~18GHz	-13dBm

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

24.238(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 9KHz up to 26.5GHz: 1MHz;

Table 11 Radiated Spurious Emissions Limits

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

According to part 27.53, 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 27.53, the defined measurement bandwidth as following:

27.53(g) 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 9KHz up to 18GHz: 1MHz;

Table 12 Radiated Spurious Emissions Limits

Frequency band	Minimum requirement (E.R.P) traffic mode
9KHz~18GHz	-13dBm

5.3.2 Test Results

The EUT has met the requirements of FCC Part22/Part24/Part27 requirement.

The test data see section 8.5 of this report.

6 Main Test Instruments

Table 13 Main Test Equipments

Test item	Test Instrument	Model	Manufacturer	Cal-Date	Cal Interval (month)
RE	EMI Test receiver	ESMI	R&S	April.22, 2007	12
	Broadband Antenna	CBL 6112B (2536)	SCHAFFNER	Jun.08, 2007	12
CE	EMI Test receiver	ESCS30	R&S	May.29, 2007	12
	Artificial Mains Network	ENV4200	R&S	May.21, 2007	12
RSE	EMI Test receiver	ESIB26	R&S	May.30.2007	12
	Broadband Antenna	CBL6112B (2747)	SCHAFFNER	Oct.17.2007	12
	Horn Antenna	3117	ETS-Lindgren	May.21.2007	12
Software Information					
Test Item	Software Name	Manufacturer		Version	
RE/CE	ES-K1	R&S		1.7.1	
RSE	EMC32	R&S		V5.0	

7 System Measurement Uncertainty

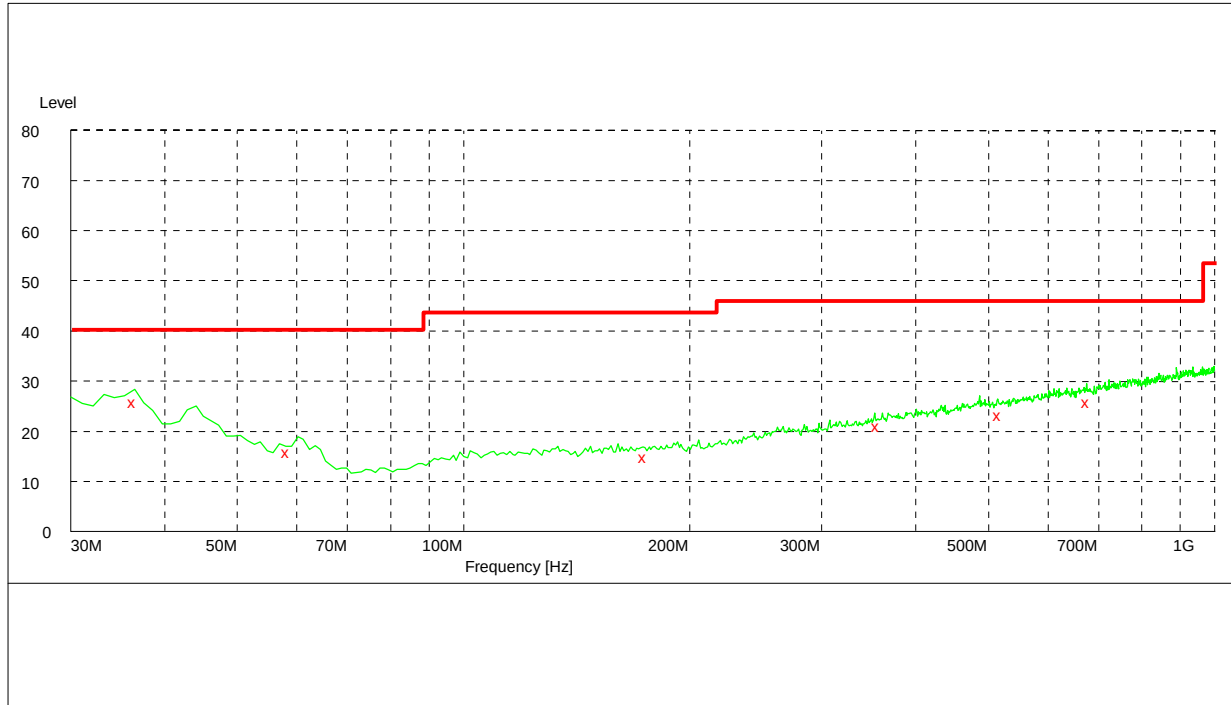
For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

Table 14 System Measurement Uncertainty

Items		Extended Uncertainty
RE	Field strength (dB μ V/m)	U=4.3dB; k=2(30MHz-1GHz)
		U=3.6dB; k=2(1GHz-18GHz)
RSE	ERP (dBm)	U= 2.2dB; k= 2
CE	Disturbance Voltage (dB μ V)	U=3.6dB; k=2

8 Graph and Data of Emission Test

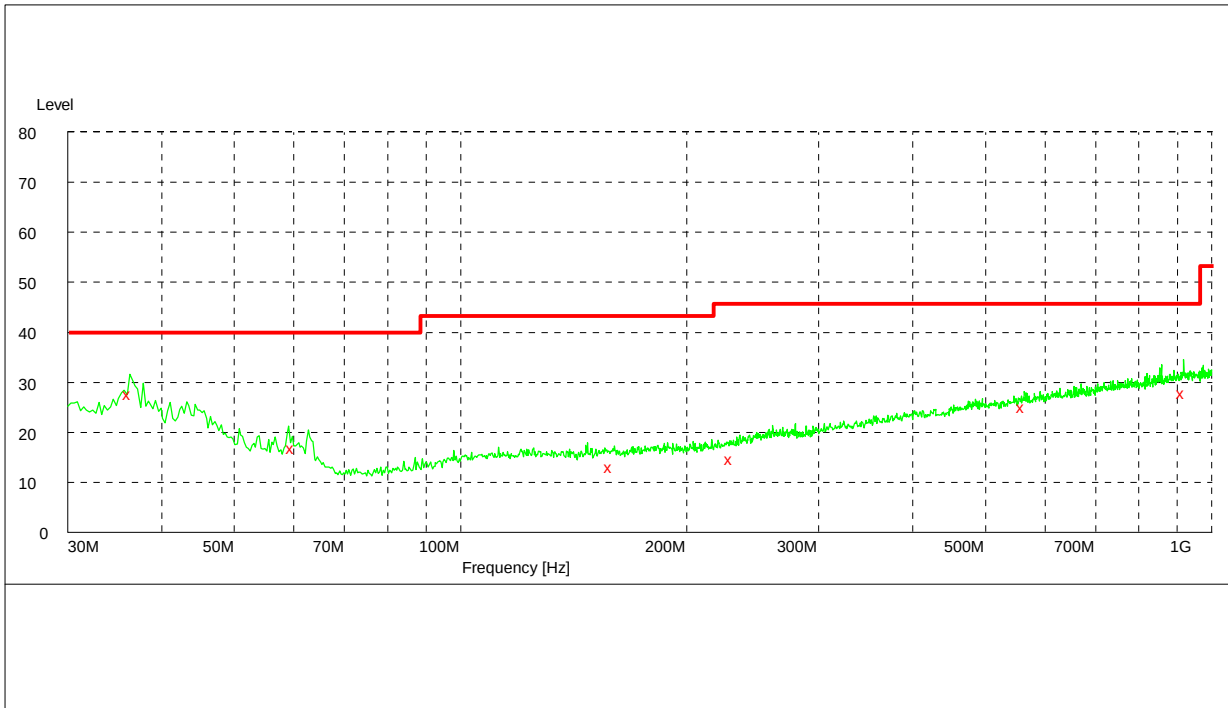
8.1.1 Radiated Disturbance for CDMA800



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
36.560000	26.00	-20.0	40.0	14.0	107.0	30.00	VERTICAL
58.500000	16.10	-26.8	40.0	23.9	100.0	0.00	VERTICAL
175.140000	15.10	-17.4	43.5	28.4	107.0	157.00	VERTICAL
356.880000	21.20	-17.2	46.0	24.8	141.0	62.00	VERTICAL
518.820000	23.40	-14.4	46.0	22.6	391.0	134.00	VERTICAL
679.800000	26.00	-10.5	46.0	20.0	262.0	117.00	VERTICAL

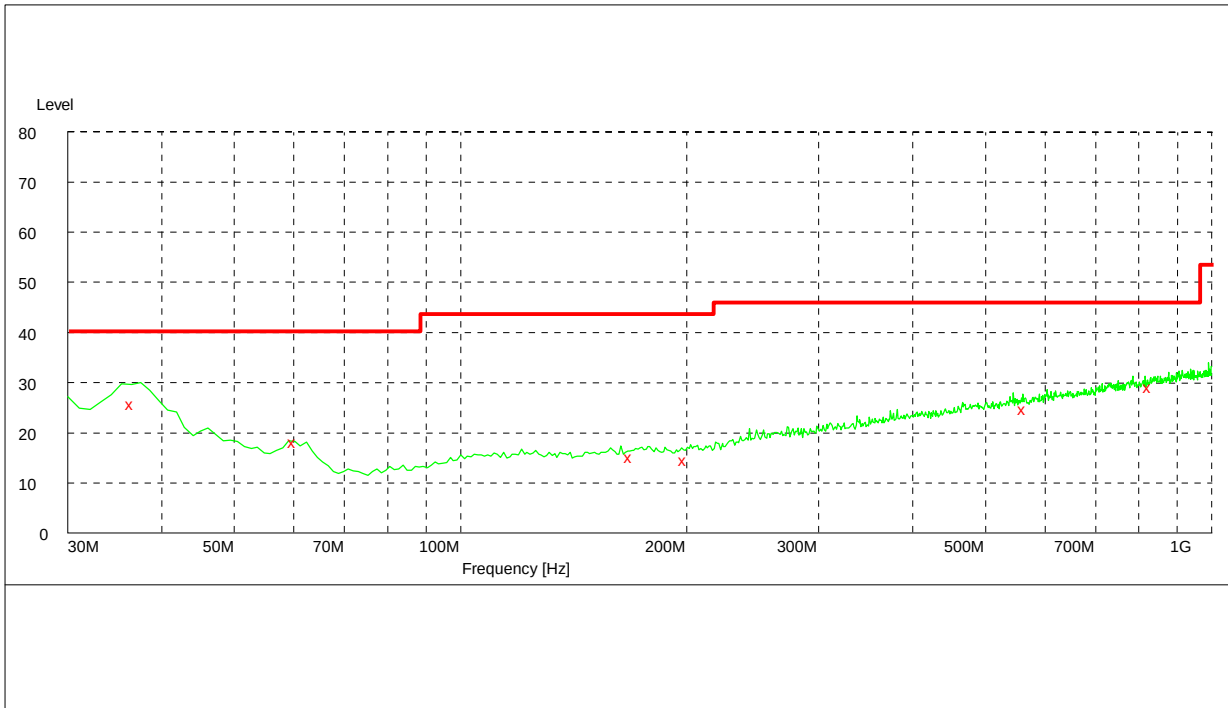
8.1.2 Radiated Disturbance for PCS1900



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
36.320000	27.80	-14.5	40.0	12.2	100.0	214.00	VERTICAL
59.000000	19.30	-18.8	40.0	20.7	231.0	77.00	HORIZONTAL
158.880000	14.20	-14.6	43.5	29.3	100.0	257.00	HORIZONTAL
229.380000	16.50	-12.5	46.0	29.5	196.0	109.00	HORIZONTAL
562.000000	25.20	-9.2	46.0	20.8	206.0	77.00	VERTICAL
917.520000	28.10	-5.7	46.0	17.9	114.0	0.00	VERTICAL

8.1.3 Radiated Disturbance for AWS1700

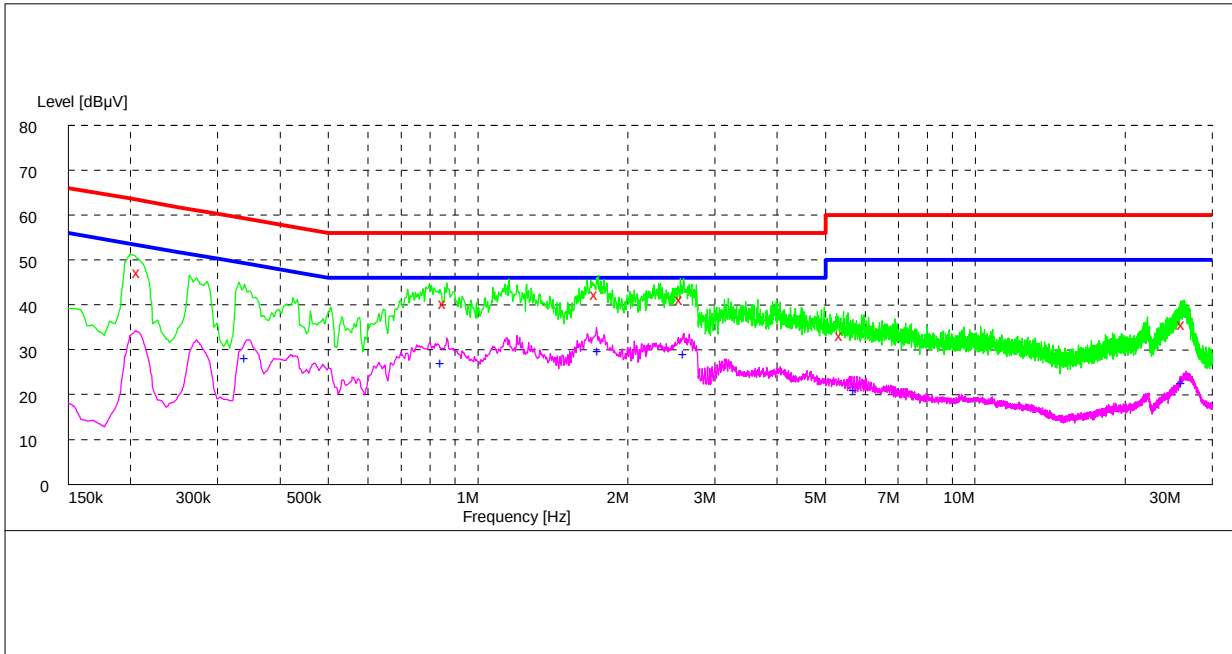


MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
36.620000	25.90	-11.6	40.0	14.1	100.0	260.00	VERTICAL
60.260000	18.40	-17.5	40.0	21.6	100.0	319.00	VERTICAL
168.960000	15.30	-14.4	43.5	28.2	145.0	7.00	HORIZONTAL
199.680000	14.60	-14.1	43.5	28.9	152.0	329.00	VERTICAL
562.520000	25.40	-4.3	46.0	20.6	134.0	40.00	HORIZONTAL
827.500000	29.00	-4.3	46.0	17.0	100.0	354.00	VERTICAL

8.2 Conducted Disturbance

8.2.1 AC Port Test Data for CDMA800



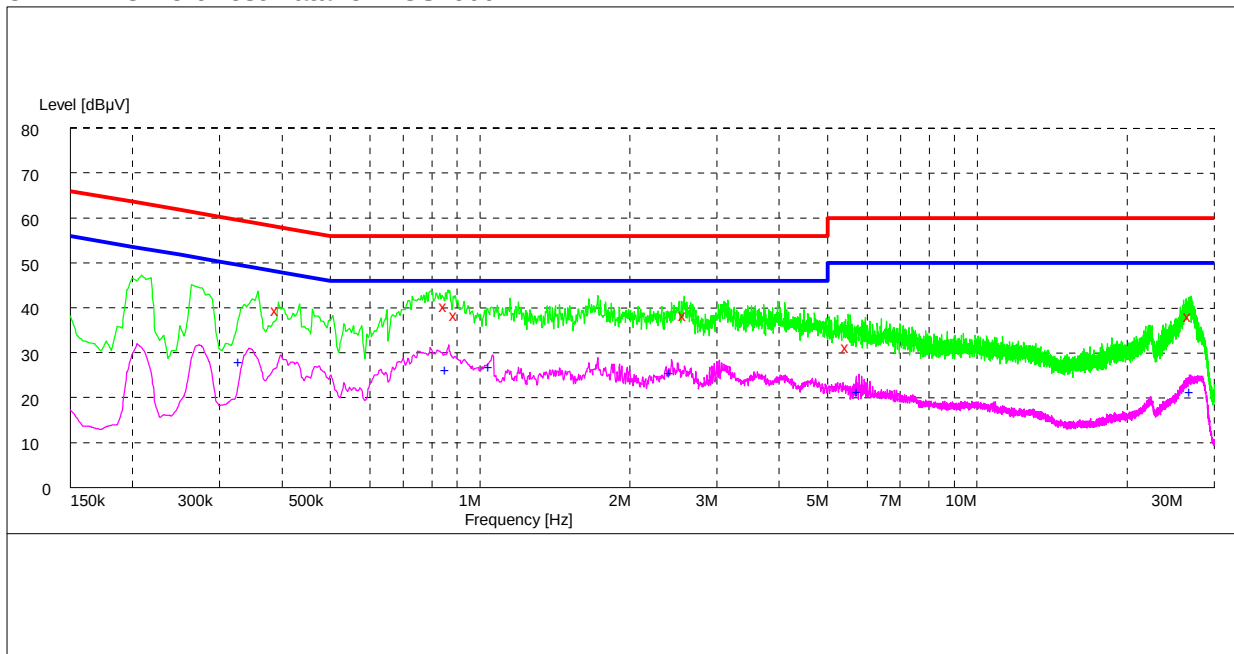
MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.208500	47.70	10.1	63	15.3	L3	FLO
0.861000	40.90	10.0	56	15.1	N	FLO
1.738500	42.70	10.0	56	13.3	N	FLO
2.575500	41.60	10.1	56	14.4	N	FLO
5.424000	33.60	10.1	60	26.4	N	FLO
26.389500	36.00	10.4	60	24.0	N	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.343500	28.40	10.1	49	20.6	N	FLO
0.852000	27.40	10.0	46	18.6	N	FLO
1.761000	30.10	10.0	46	15.9	N	FLO
2.611500	29.30	10.1	46	16.7	N	FLO
5.748000	21.40	10.1	50	28.6	L3	FLO
26.331000	23.00	10.4	50	27.0	N	FLO

8.2.2 AC Port Test Data for PCS1900



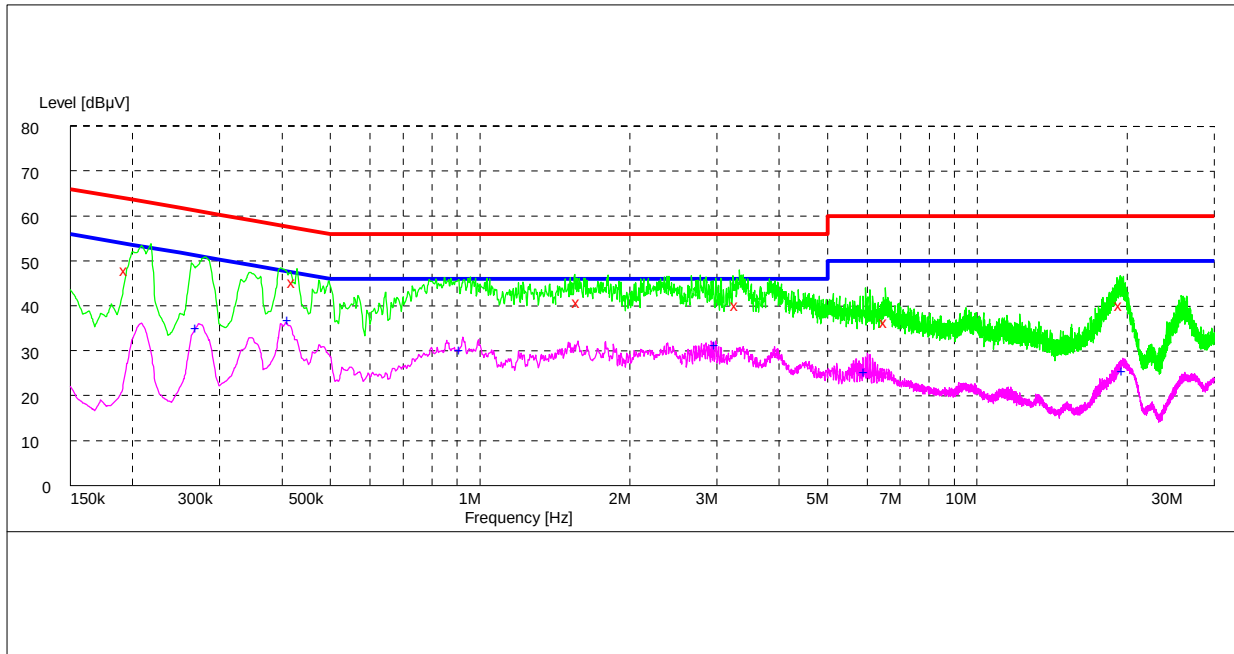
MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.393000	39.90	10.0	58	18.1	L3	FLO
0.856500	40.80	10.0	56	15.2	N	FLO
0.897000	38.90	10.0	56	17.1	N	FLO
2.593500	38.80	10.1	56	17.2	N	FLO
5.514000	31.80	10.1	60	28.2	N	FLO
26.952000	38.40	10.5	60	21.6	N	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.330000	28.30	10.1	49	20.7	N	FLO
0.861000	26.60	10.0	46	19.4	N	FLO
1.054500	27.20	10.0	46	18.8	N	FLO
2.431500	25.90	10.1	46	20.1	L3	FLO
5.784000	21.60	10.1	50	28.4	L3	FLO
27.042000	21.60	10.5	50	28.4	N	FLO

8.2.3 AC Port Test Data for AWS1700



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.195000	48.40	10.1	64	15.6	N	FLO
0.424500	45.80	10.0	57	11.2	L3	FLO
1.585500	41.40	10.0	56	14.6	L3	FLO
3.304500	40.60	10.1	56	15.4	N	FLO
6.580500	36.90	10.2	60	23.1	N	FLO
19.495500	40.60	10.3	60	19.4	N	FLO

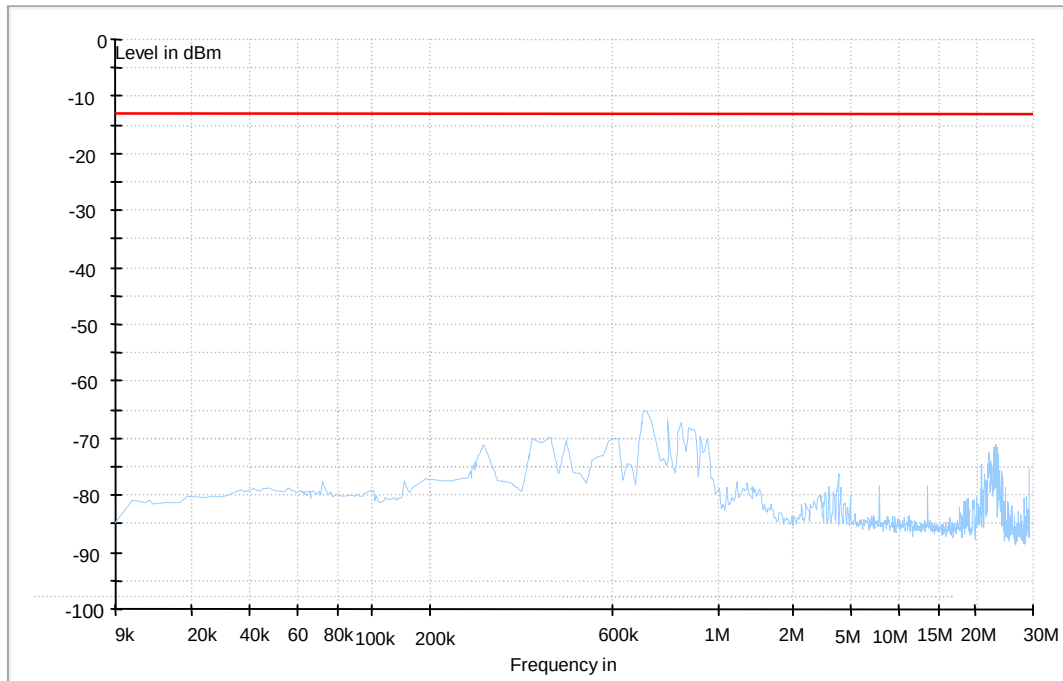
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.271500	35.50	10.0	51	15.5	L3	FLO
0.415500	37.20	10.0	48	10.8	L3	FLO
0.919500	30.50	10.0	46	15.5	L3	FLO
2.994000	31.70	10.0	46	14.3	N	FLO
5.982000	25.70	10.2	50	24.3	N	FLO
19.774500	25.80	10.3	50	24.2	N	FLO

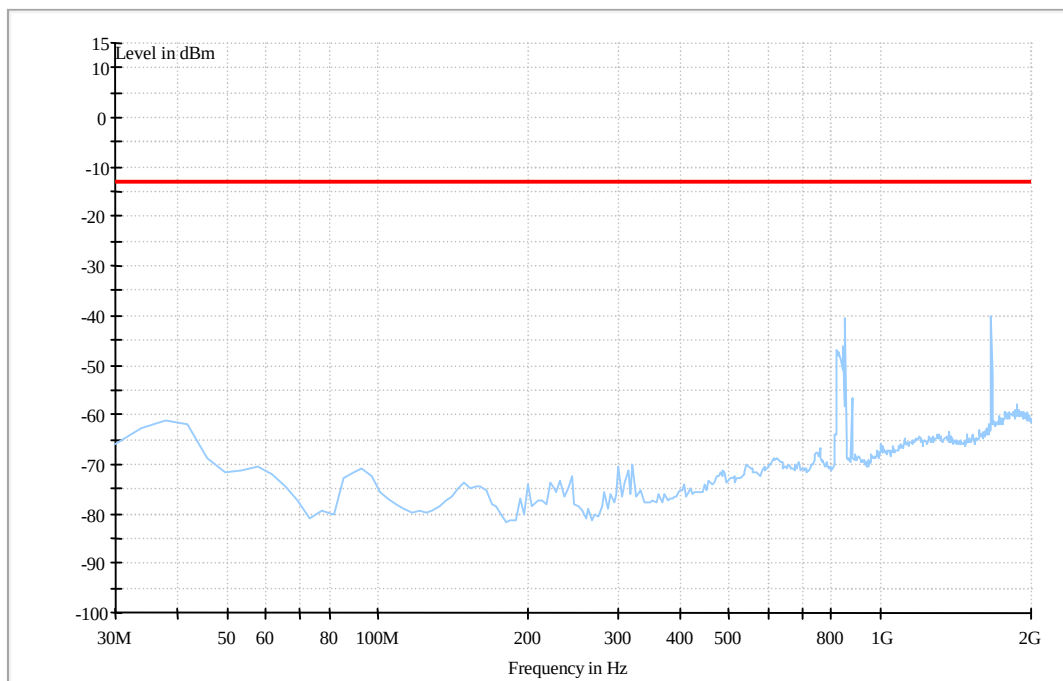
8.3 Radiated Spurious Emission

8.3.1 For CDMA800

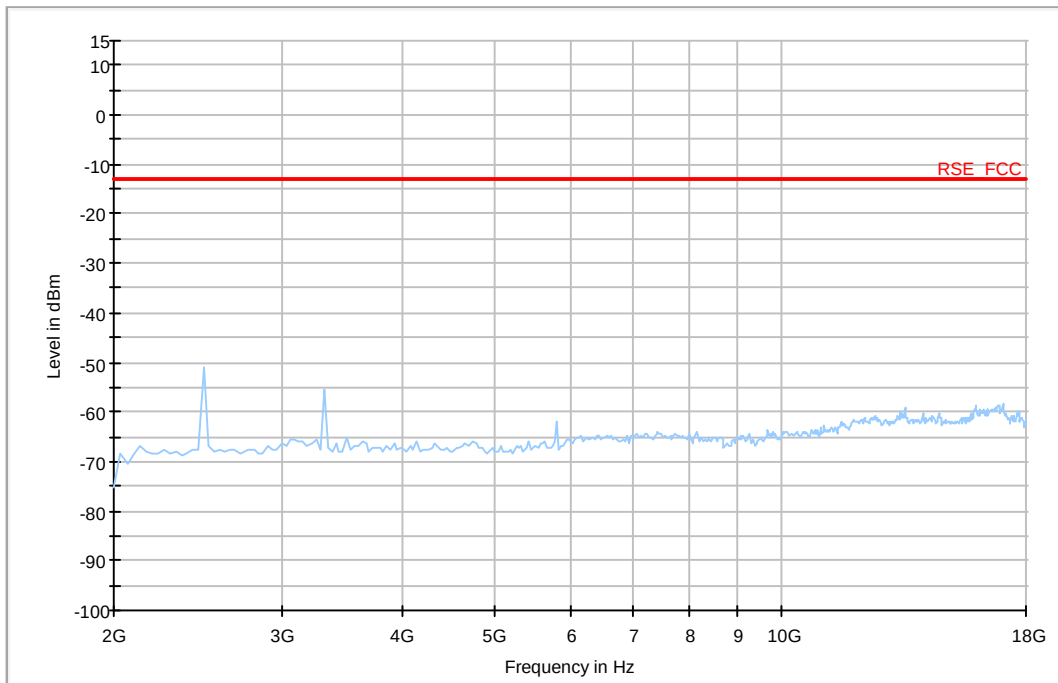
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)

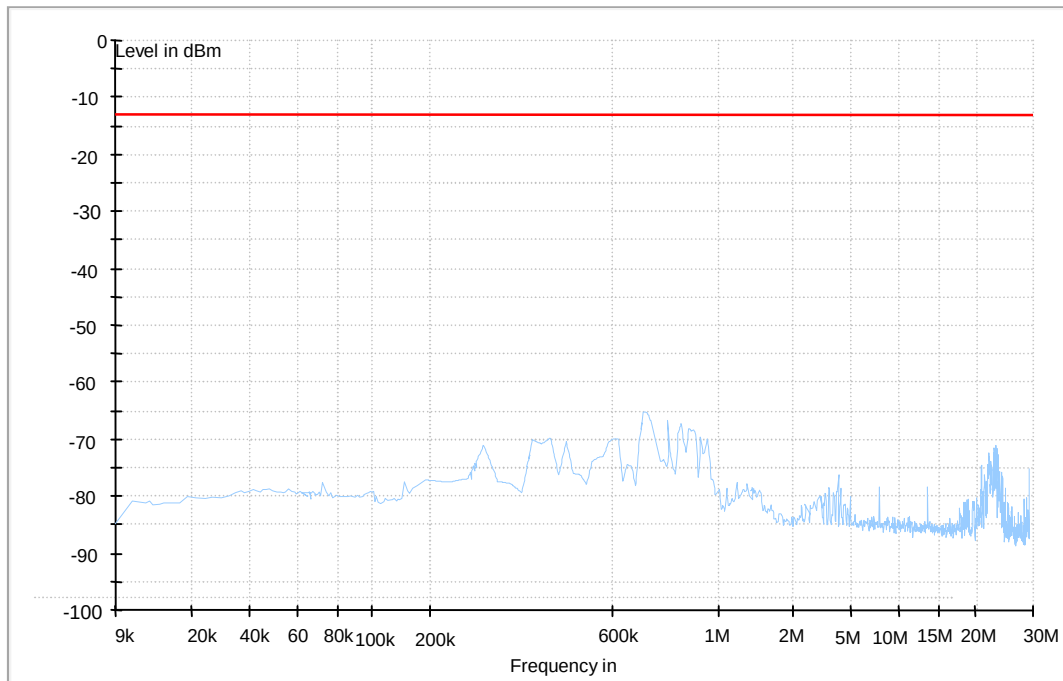


Traffic Mode (2GHz-18GHz)

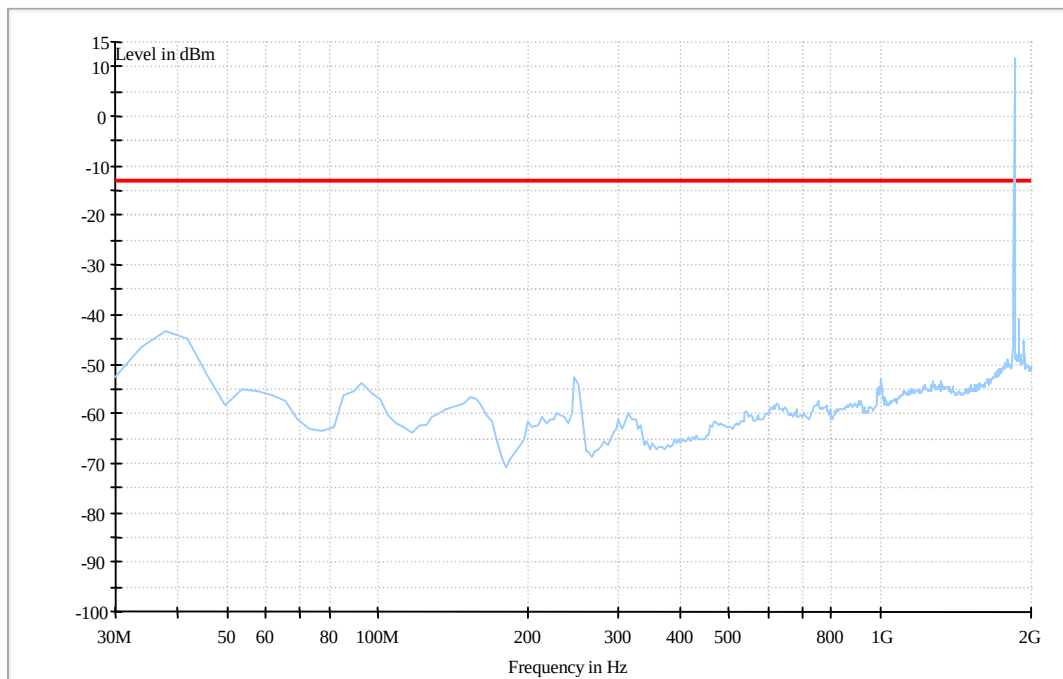


8.3.2 For PCS1900

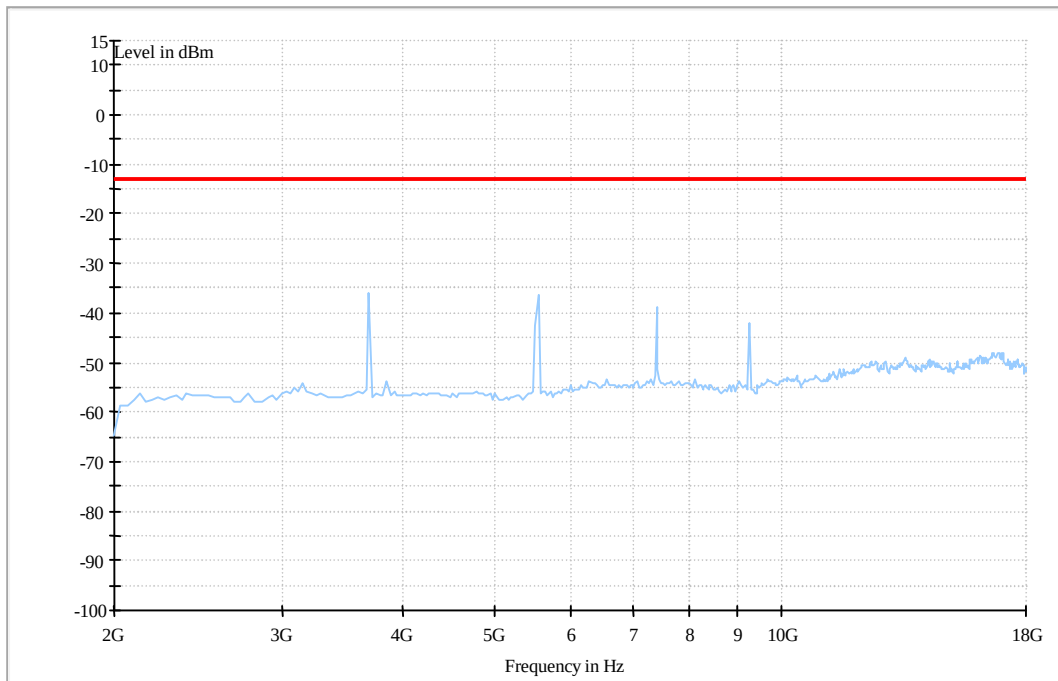
Traffic Mode (9kHz-30MHz)



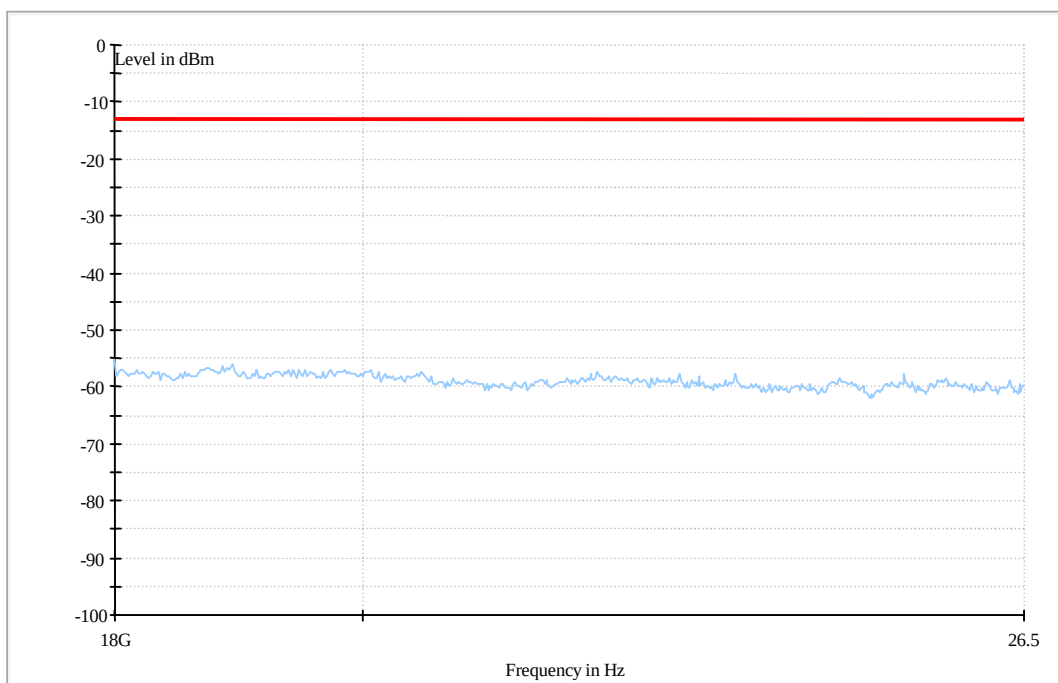
Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)

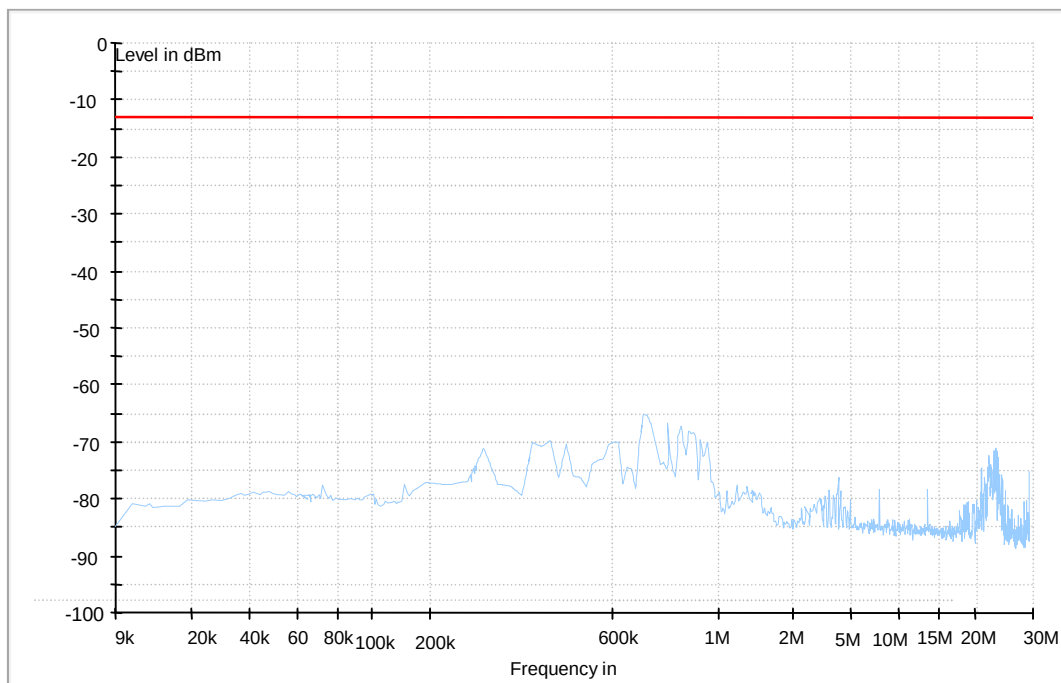


Traffic Mode (18GHz-26.5GHz)

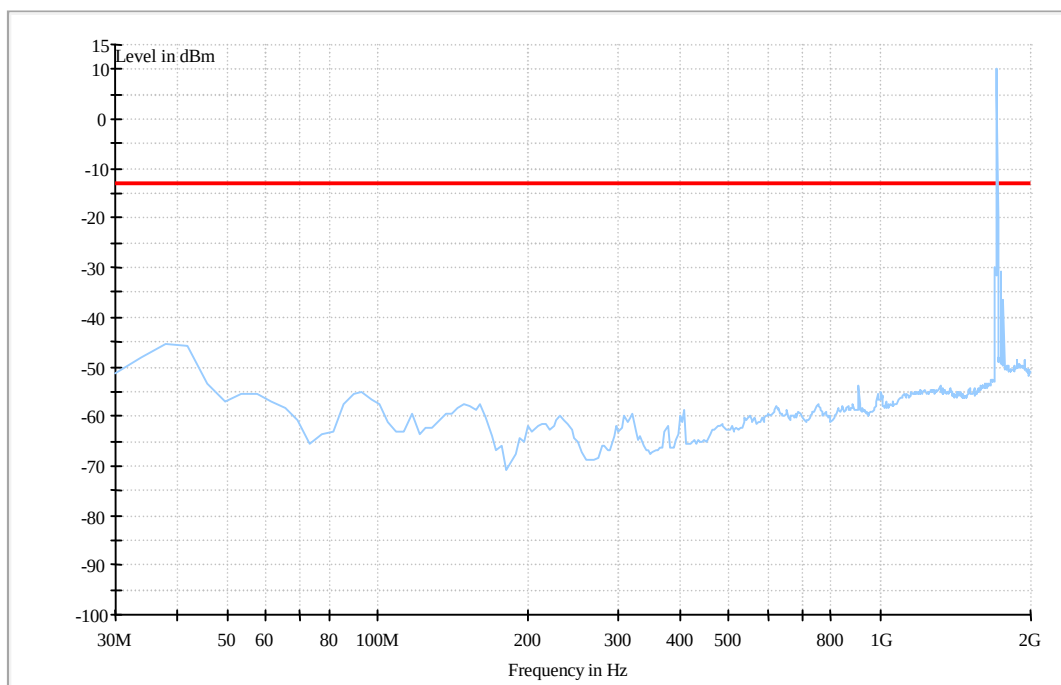


8.3.3 For AWS1700

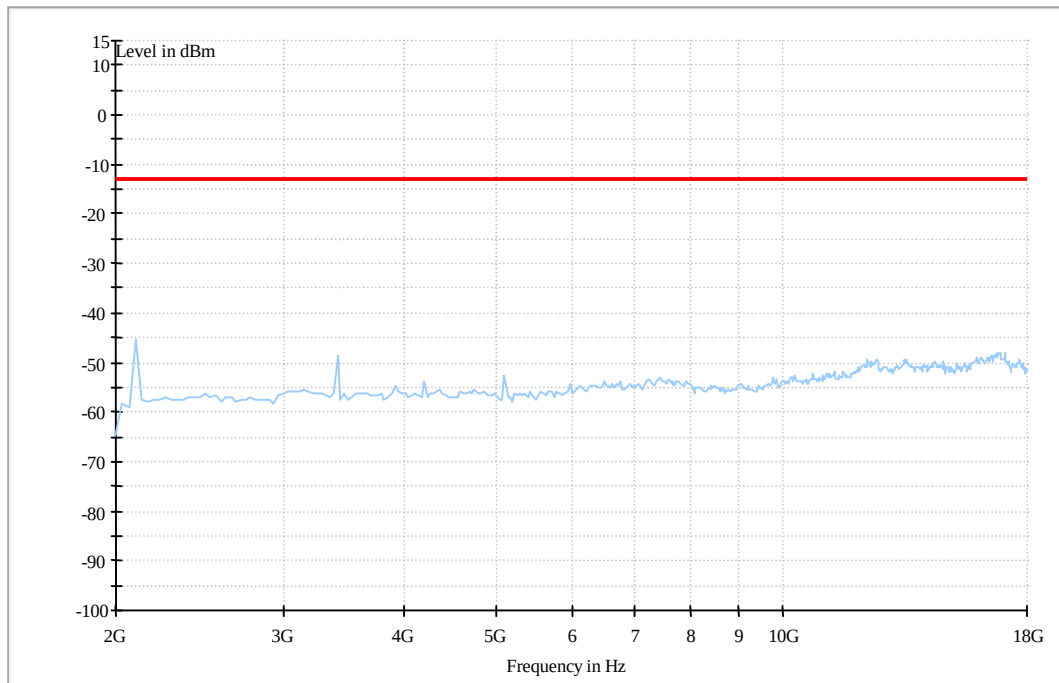
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)



END