



EMC Test Report

Product Name:
WCDMA/GPRS/GSM Mobile Phone with Bluetooth

Model Number: HUAWEI U3100-5/U3100-5

Report No: SYBHZ(R)E011022010EB-1

Reliability Laboratory of Huawei Technologies Co., Ltd.

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4. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-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 **EMC TEST OF WCDMA/GPRS/GSM Mobile Phone**
with Bluetooth

REGULATION **M/N: HUAWEI U3100-5/U3100-5**
FCC CFR47 Part 15: Subpart B;
FCC CFR47 Part 22: Subpart H;
FCC CFR47 Part 24: Subpart E;

START OF TEST **Jan.14, 2010**

END OF TEST **Jan.24, 2010**

Final Judgement: **Pass**

Approver

2010-02-10
Date

张兴海
Name

Signature



2010-02-10
Date

徐广义
Name

Signature

徐广义

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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 WCDMA/GPRS/GSM Mobile Phone with Bluetooth
MANUFACTURERS MODEL NUMBER HUAWEI U3100-5/U3100-5

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	Radiated Spurious Emission	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.

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/TC2 (TM1-TM6)	N/A	Pass	Site1
<u>Conducted Emissions</u>	TC1 (TM1-TM12)	N/A	Pass	Site1
<u>Radiated Spurious Emissions</u> Enclosure Port	TC1 (TM7-TM12)	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

WCDMA/GPRS/GSM Mobile Phone with Bluetooth-HUAWEI U3100-5/U3100-5 is subscriber equipment in the WCDMA/GSM system. The WCDMA frequency band is Band II and Band V, they can be used in this report. The GSM/GPRS frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, but only GSM850 and PCS1900MHz band test data included in this report. The Mobile Phone implements such functions as RF signal receiving/Transmitting, WCDMA and GSM/GPRS protocol processing, voice, video and MMS service etc. Externally it provides micro SD card interface, earphone port(to provide voice service) and USIM card interface .It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

3.1.1 Main Equipment Technical Data

Description:	WCDMA/GPRS/GSM Mobile Phone with Bluetooth
Models:	HUAWEI U3100-5/U3100-5
Input Rated Voltage	3.7V
Extreme Voltage	3.6V and 4.2V
Rated Power	Normal 3W ,Max 8 W
Dimensions	106mm (L)×46mm (W)×13.3mm (H)
Weight	<80g(with battery)

Table 3 Sub-Assembly Identity

Mode		Work Frequency	
		Transmitt Frequency(MHz)	Receive Frequency (MHz)
GSM	PCS1900	1850-1910	1930-1990
	GSM850	824-849	869-894
WCDMA	WCDMA850	824 - 849	869 - 894
	WCDMA1900	1850-1910	1930-1990

3.2 Sub-Assembly Identity

Table 4 Sub-Assembly Identity

Board				
Model Name	Qt y.	Hardware Version	Serial	Description
HD1U310M	1	Ver.A	S02AA11020200013	Main board of Mobile Phone
Accessory				
Name	Qt y.	Manufacture	Serials number	Description
Adapter	1	Huawei Technologies Co., Ltd.	HKA991896379	Adapter Model: HS-050040E5 voltage nominal: ~120V Input Voltage : ~100-240V 50/60Hz 0.2A Output Voltage: == 5.0V 400 mA Rated Power: 2W
Adapter	1	Huawei Technologies Co., Ltd.	BYA951515956	Adapter Model: HS-050040E7 voltage nominal: ~120V Input Voltage : ~100-240V 50/60Hz 0.2A Output Voltage: == 5.0V 400 mA

				Rated Power: 2W
Adapter	1	Huawei Technologies Co., Ltd.	HKA9B1451072	Adapter Model: HS-050040U6 voltage nominal: ~120V Input Voltage : ~100-240V 50/60Hz 0.2A Output Voltage: === 5.0V 400 mA Rated Power: 2W
Rechargeable Li-ion	1	Huawei Technologies Co., Ltd.	GAG9B13XC4614301	Battery Model: HB5A2 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

Table 5 Cable Used during Test

Port	Length	Quantity	Type of Cable
AC Power Port	1.5m	1	Unshielded
USB	0.85m	1	Unshielded
Earphone	1.10m	1	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	3608105673	2009-10-10
Notebook	D600	DELL	3106044320	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.

Table 7 Configuration table

TC1/TC2	TM1~TM12
---------	----------

4.3.2 Test Mode

There were 12 test Modes. TM1 to TM12 were shown in the diagrams below:

TM1: operate in idle GSM850;

TM2: operate in idle GPRS850;

TM3: operate in idle GSM1900;

TM4: operate in idle GPRS1900;

TM5: operate in idle WCDMA 850;

TM6: operate in idle WCDMA 1900;

TM7: operate in traffic GSM850;

TM8: operate in traffic GPRS850;

TM9: operate in traffic GSM1900;

TM10: operate in traffic GPRS1900;

TM11: operate in traffic WCDMA 850;

TM12: operate in traffic WCDMA 1900;

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 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. (WCDMA see 3GPP TS 34.121, GSM see ETSI TS 151.010).

For WCDMA, the following conditions shall also be met:

Logical Test Interface for details regarding generic call set-up procedure and BER, BLER test loop scenarios:

set and send continuously up power control commands to the UE;

The DTX shall be disabled;

Inner Loop Power Control shall be enabled;

transmitting and/or receiving (UL/DL) bit rate for reference test channel shall be 12.2 kbit / s.

The EUT shall be commanded to operate at maximum transmit power;

For EGSM and DCS, the following conditions shall also be met:

The EUT shall be commanded to operate at maximum transmit power;

The downlink RXQUAL shall be monitored.

Assign channel frequency to an appropriate channel number.

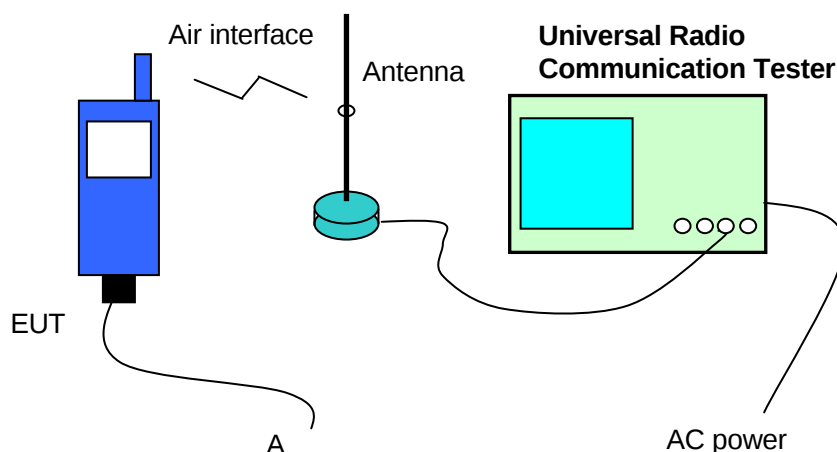


Figure 1. : Test Configuration

Idle Mode:

The EUT is required to be in the idle mode.

For WCDMA, 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;

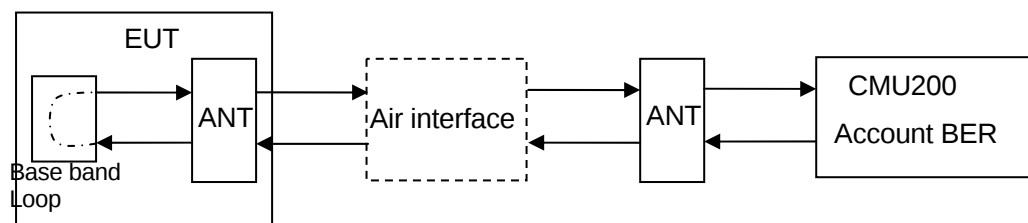
UE's neighbour cell list shall be empty;

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

For GSM850 and PCS1900, 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.

Please refer to following figure:



ANT: Antenna
BER: Bit Error Rate

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:

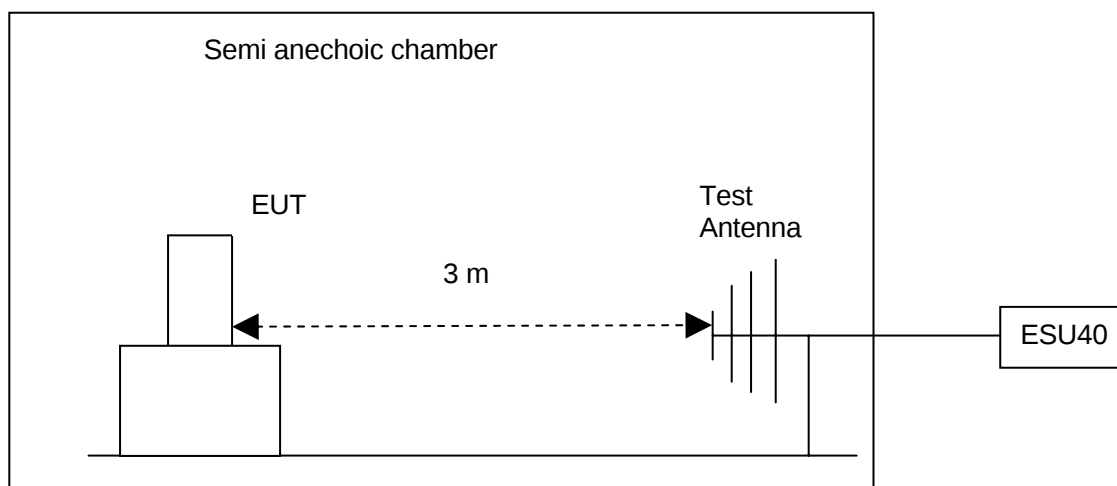


Figure 3. Test set-up

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.

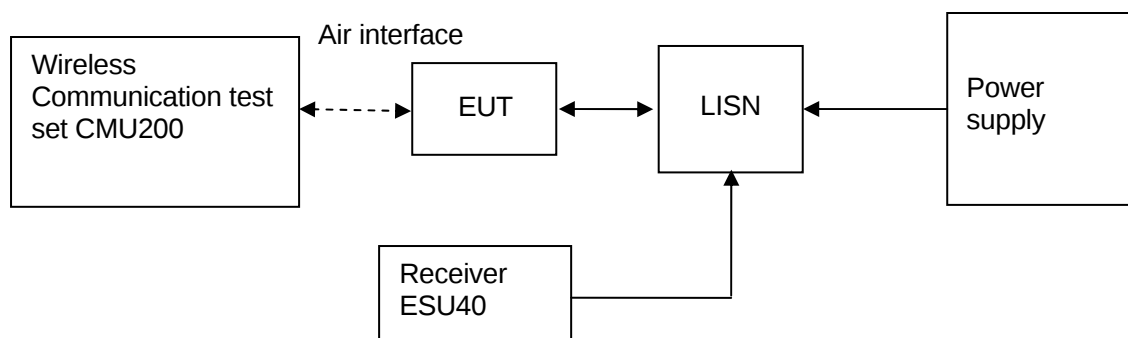


Figure 4. Test Set-up

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 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

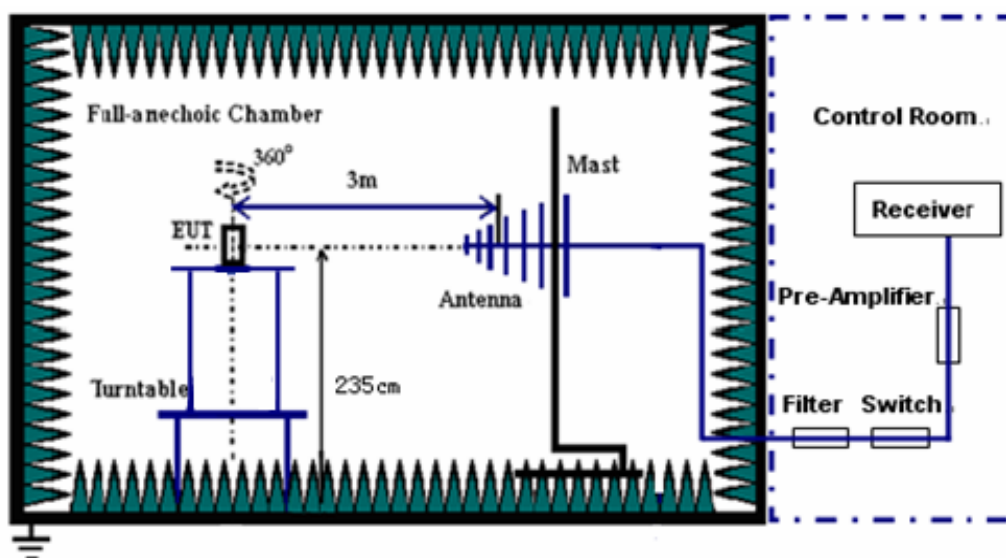
5.3.1 Test Procedure

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:

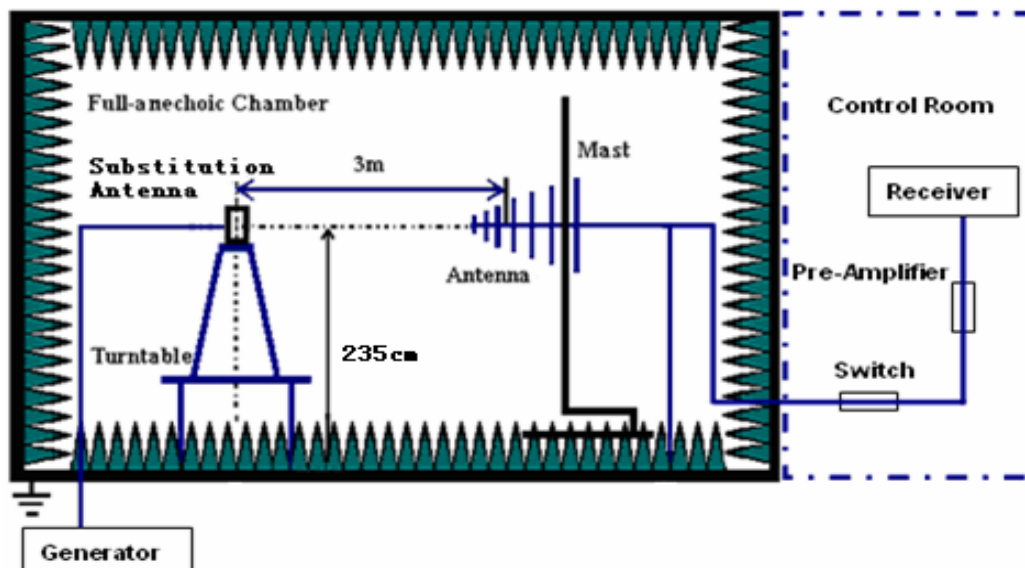
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect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

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;

Table 11 Radiated Spurious Emissions Limits

Frequency band	Minimum requirement (E.R.P) traffic mode
30MHz~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]	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 Part22/24 requirement.

6 Main Test Instruments

Table 13 Main Test Equipments

Test item	Test Instrument	Model	Manufacturer	Cal-Date	Cal Interval (month)
RE	EMI Test receiver	ESU40	R&S	April.22, 2009	12
	Broadband Antenna	CBL 6112B	SCHAFFNER	Jun.08, 2009	12
	Horn Antenna	HF906	R&S	Jan.24, 2009	12
CE	EMI Test receiver	ESU40	R&S	April.22, 2009	12
	Artificial Mains Network	ENV4200	R&S	May.12, 2009	12
RSE	EMI Test receiver	ESIB26	R&S	April.22, 2009	12
	Horn Antenna	3117	EMCO	Sep.11.2009	12
	Broadband Antenna	CBL 6112B	SCHAFFNER	Feb.24.2009	12
	Horn Antenna	3160	EMCO	Jun.19.2009	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 14 System Measurement Uncertainty

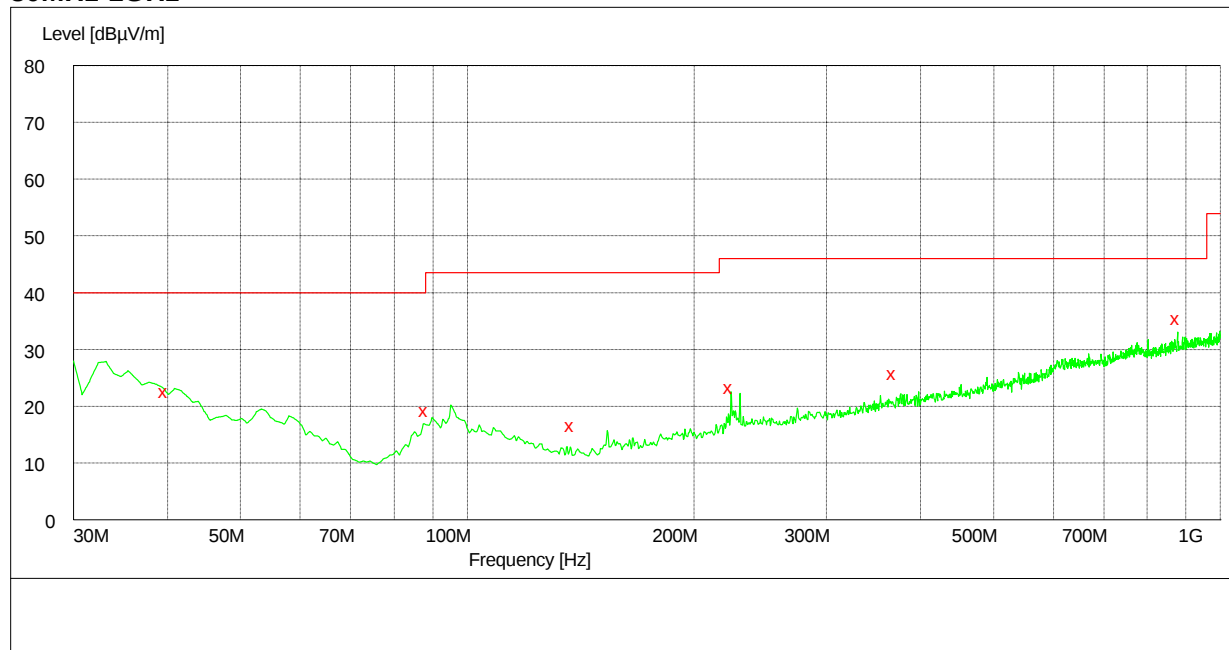
Items		Extended Uncertainty
RE	Field strength (dB μ V/m)	U=4.2dB; k=2(30MHz-1GHz)
RE	Field strength (dB μ V/m)	U=3.6dB; k=2(1GHz-18GHz)
RSE	ERP (dBm)	U=2.2dB ; k=2
CE	Disturbance Voltage (dB μ V)	U=3.3dB; k=2

8 Graph and Data of Emission Test

8.1 Radiated Disturbance

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

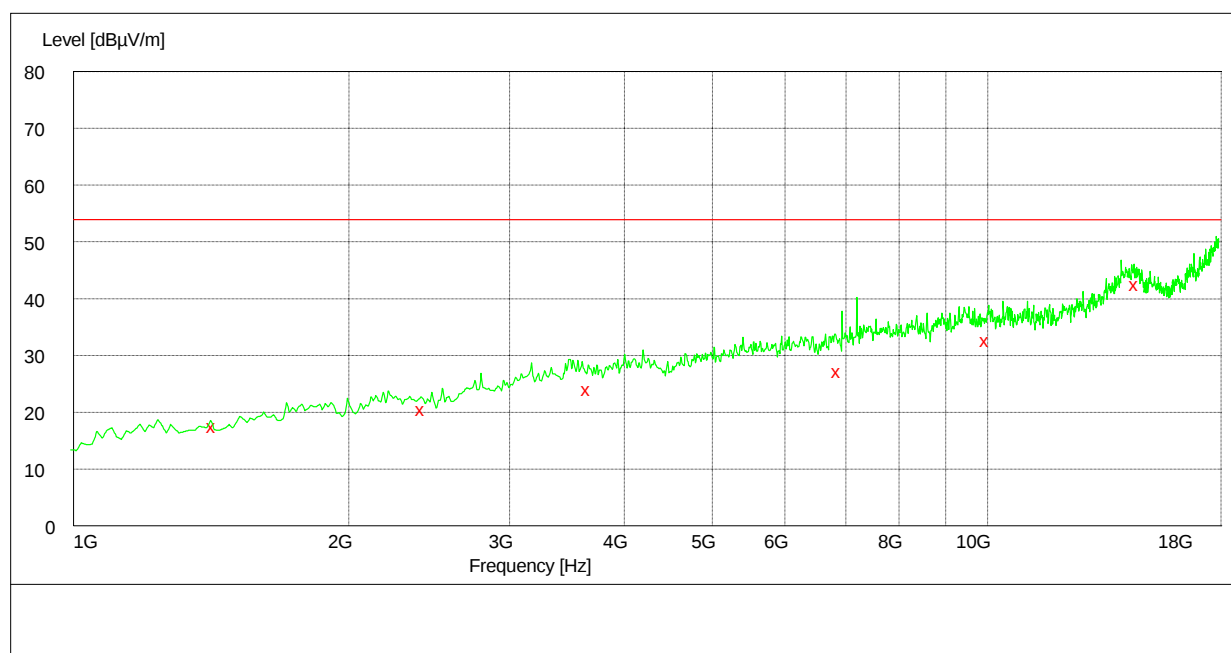
30MHz-1GHz



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
39.780000	22.80	13.0	40.0	17.2	100.0	285.00	HORIZONTAL
88.260000	19.60	11.2	43.5	23.9	221.0	352.00	VERTICAL
137.760000	16.90	8.8	43.5	26.6	284.0	54.00	HORIZONTAL
223.980000	23.50	13.2	46.0	22.5	122.0	227.00	VERTICAL
368.460000	26.00	17.4	46.0	20.0	167.0	74.00	VERTICAL
878.100000	35.80	26.0	46.0	10.2	110.0	33.00	HORIZONTAL

1GHz-18GHz



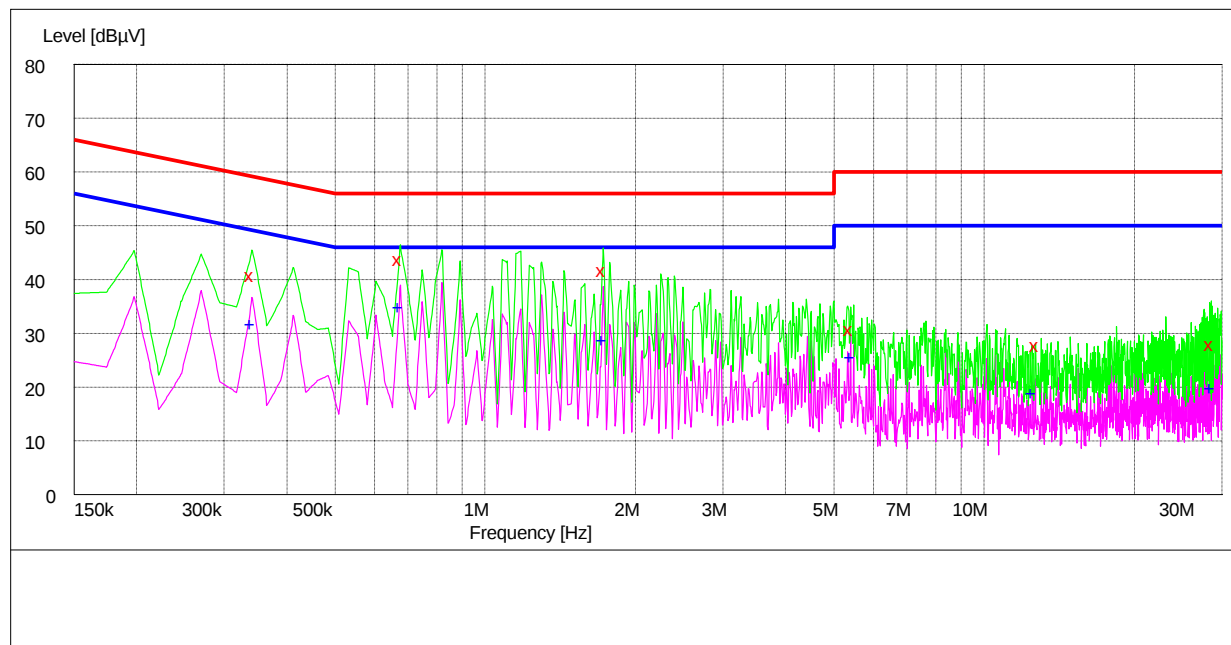
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
1425.000000	17.80	-15.5	53.9	36.1	252.0	342.00	VERTICAL
2411.500000	20.80	-11.5	53.9	33.1	154.0	104.00	VERTICAL
3656.000000	24.20	-6.8	53.9	29.7	166.0	264.00	VERTICAL
6866.500000	27.50	-0.1	53.9	26.4	182.0	134.00	VERTICAL
9985.500000	31.10	5.1	53.9	22.8	200.0	30.00	VERTICAL
14923.500000	40.70	10.8	53.9	13.2	100.0	0.00	VERTICAL

8.2 Conducted Disturbance

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

AC Power Port Test Data



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.341040	41.20	10.0	59	17.8	L1	FLO
0.675360	43.70	10.1	56	12.3	L1	FLO
1.726080	42.00	10.1	56	14	L1	FLO
5.403600	31.10	10.2	60	28.9	L1	FLO
12.782520	27.60	10.3	60	32.4	L1	FLO
28.591080	28.30	10.4	60	31.7	L1	FLO

MEASUREMENT RESULT: AV Detector

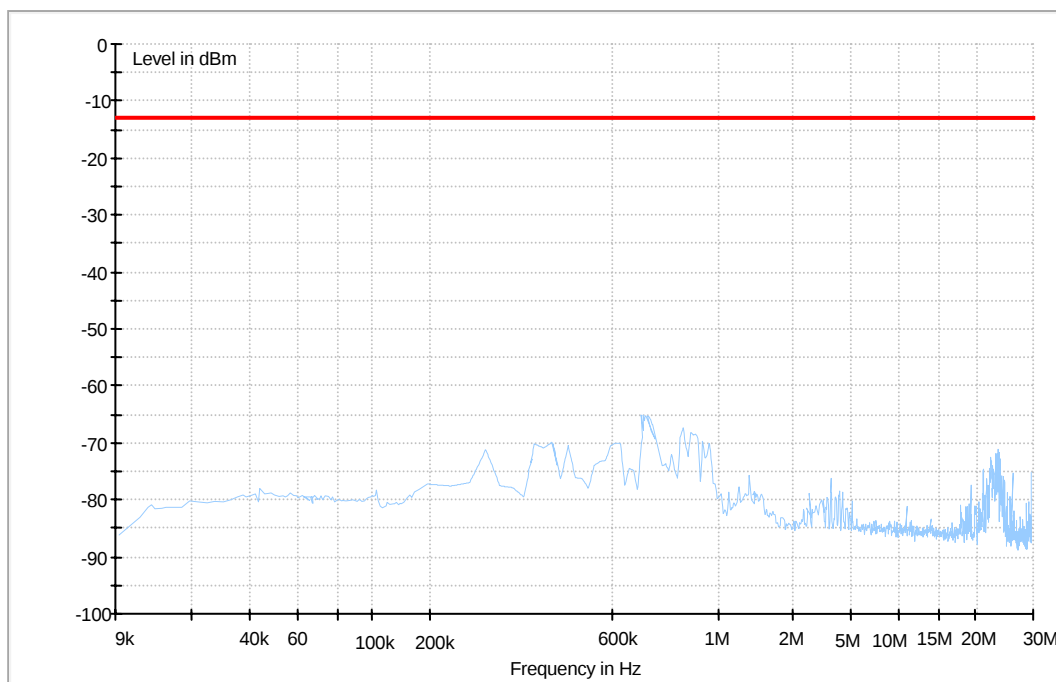
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.341040	31.90	10.0	49	17.1	L1	FLO
0.675360	34.30	10.1	46	11.7	L1	FLO
1.726080	29.10	10.1	46	16.9	L1	FLO
5.403600	26.10	10.2	60	33.9	L1	FLO
12.782520	19.60	10.3	60	40.4	L1	FLO
28.591080	20.80	10.4	50	29.2	L1	FLO

8.3 Radiated Spurious Emission

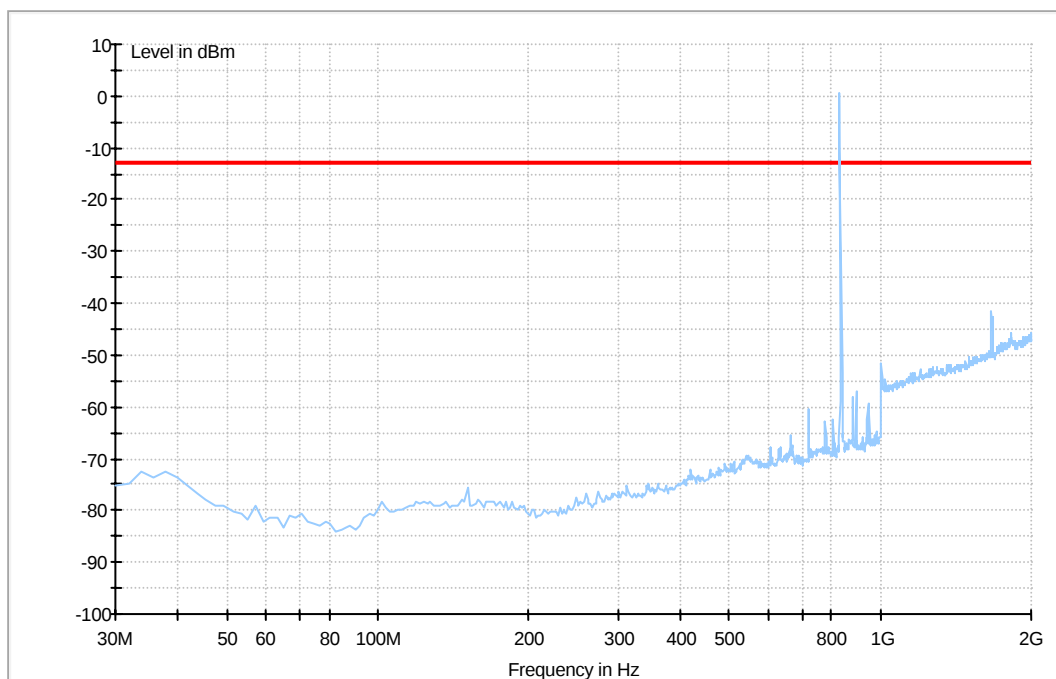
This test results are the maximum level of radiated spurious emissions in vertical and horizontal polarity.

8.3.1 For GSM 850

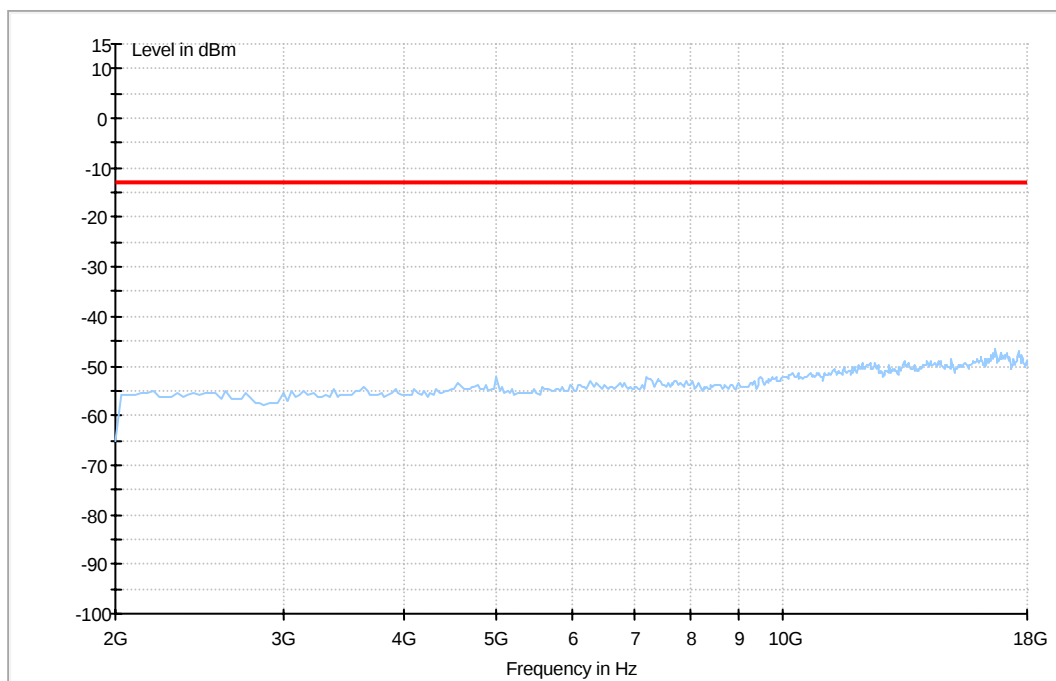
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)

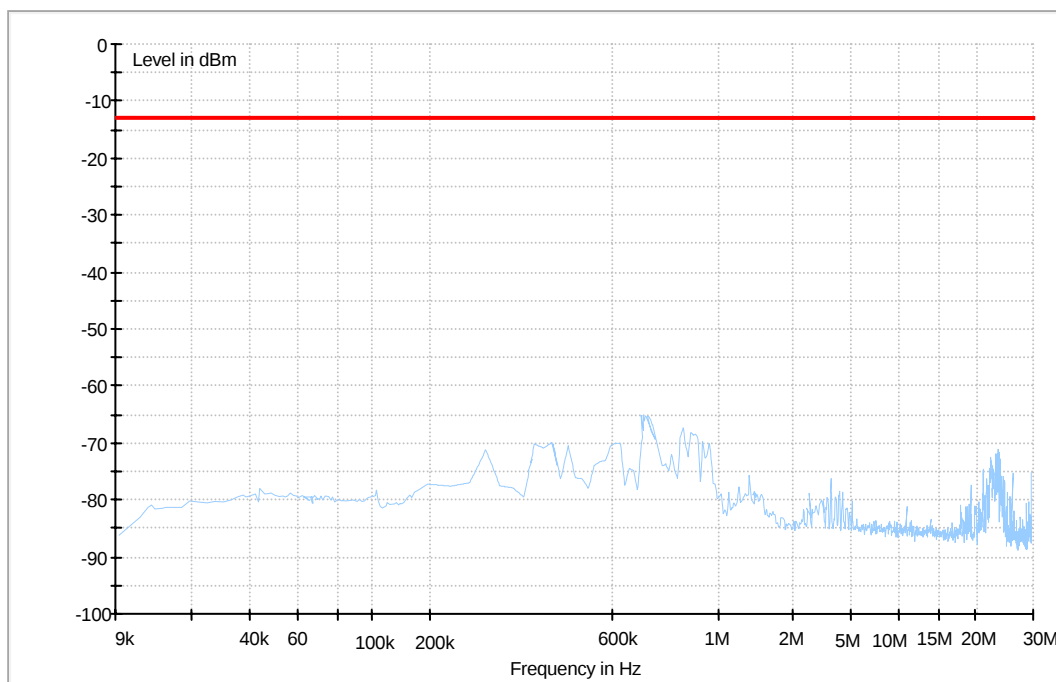


Traffic Mode (2GHz-18GHz)

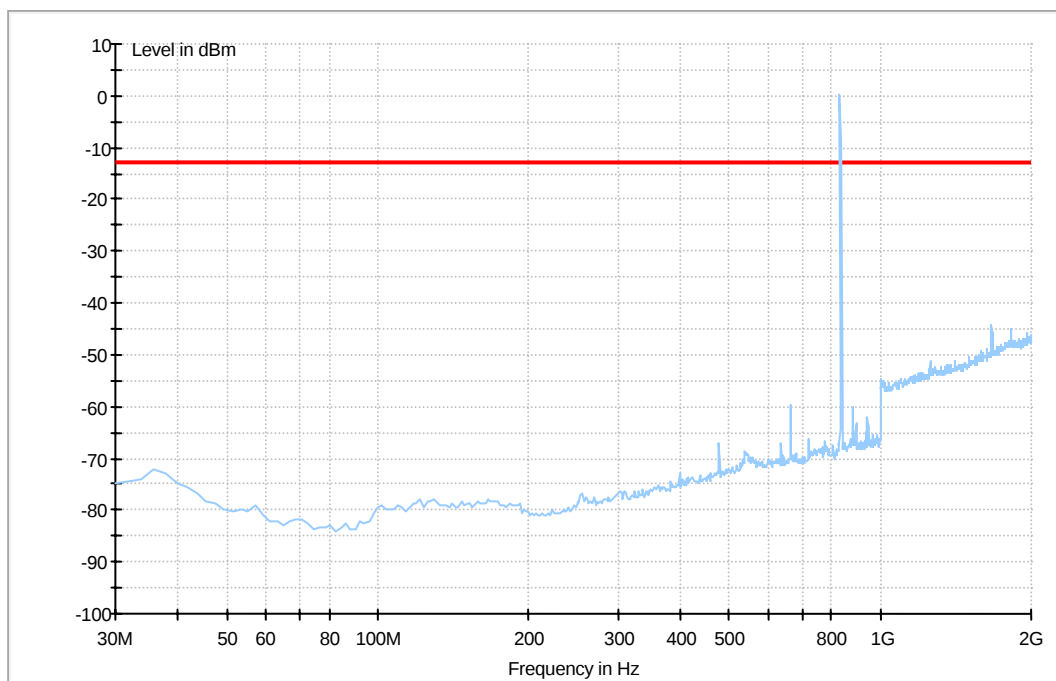


8.3.2 For GPRS 850

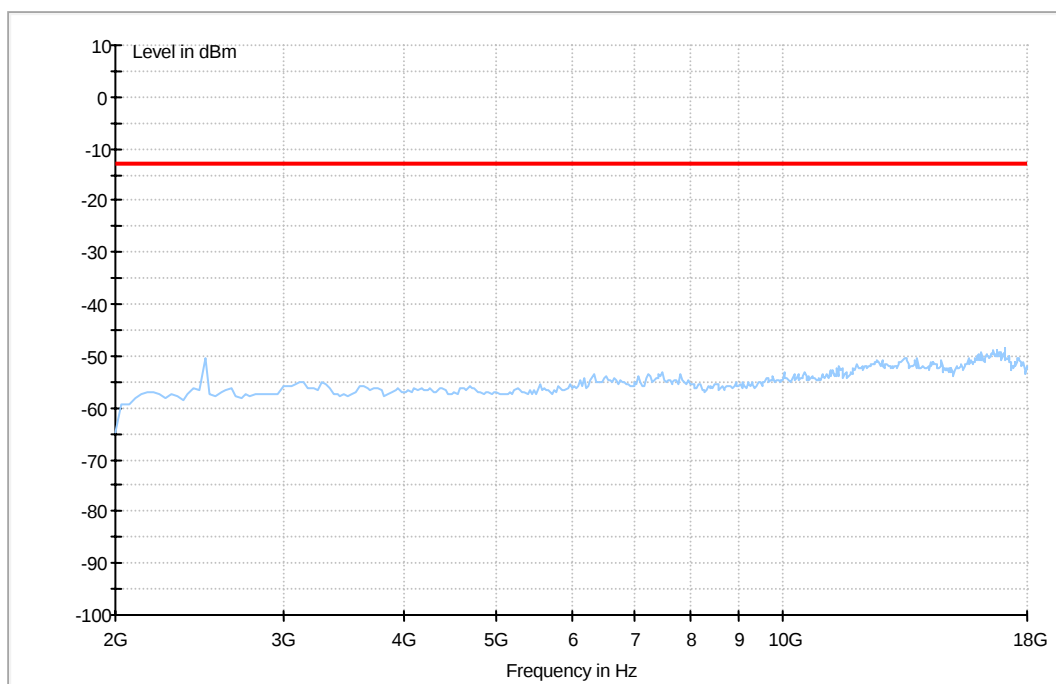
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)

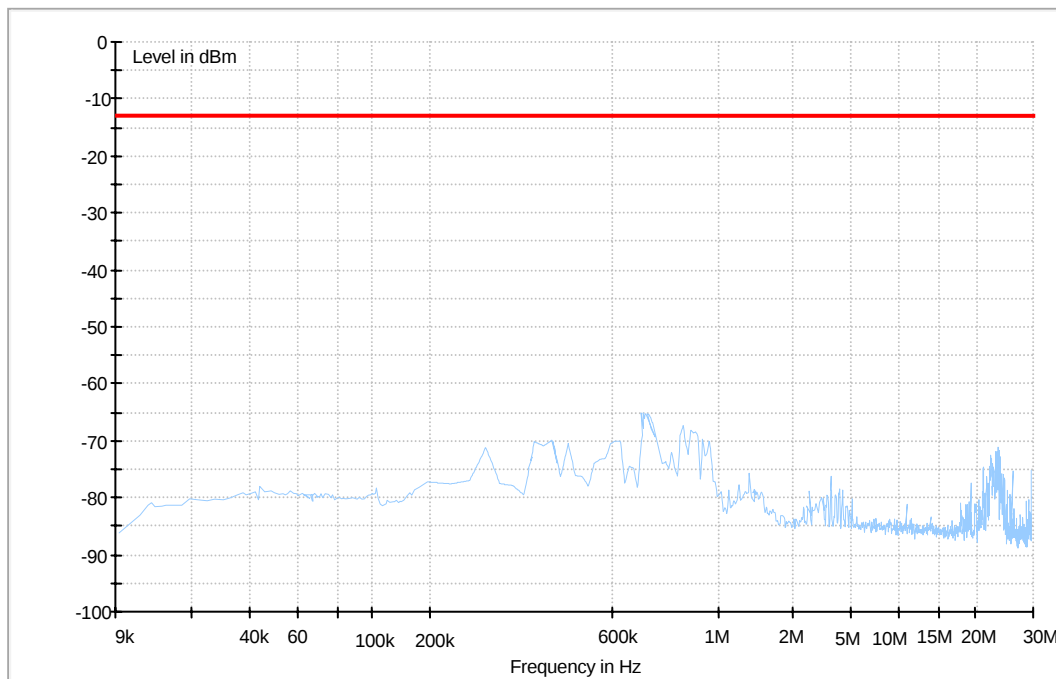


Traffic Mode (2GHz-18GHz)

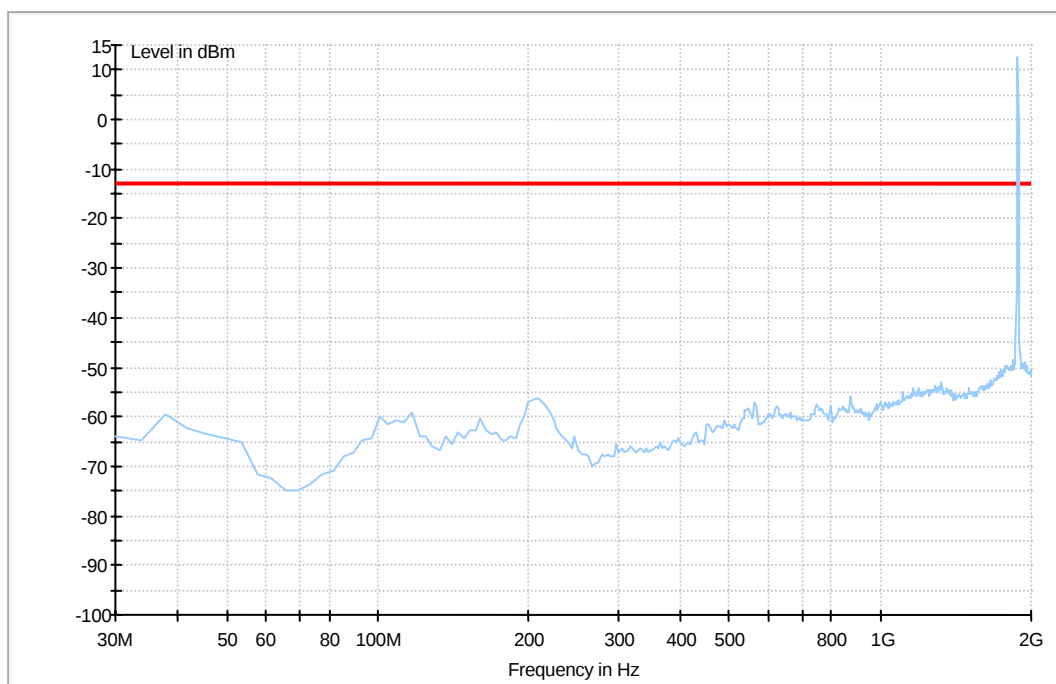


8.3.3 For PCS 1900

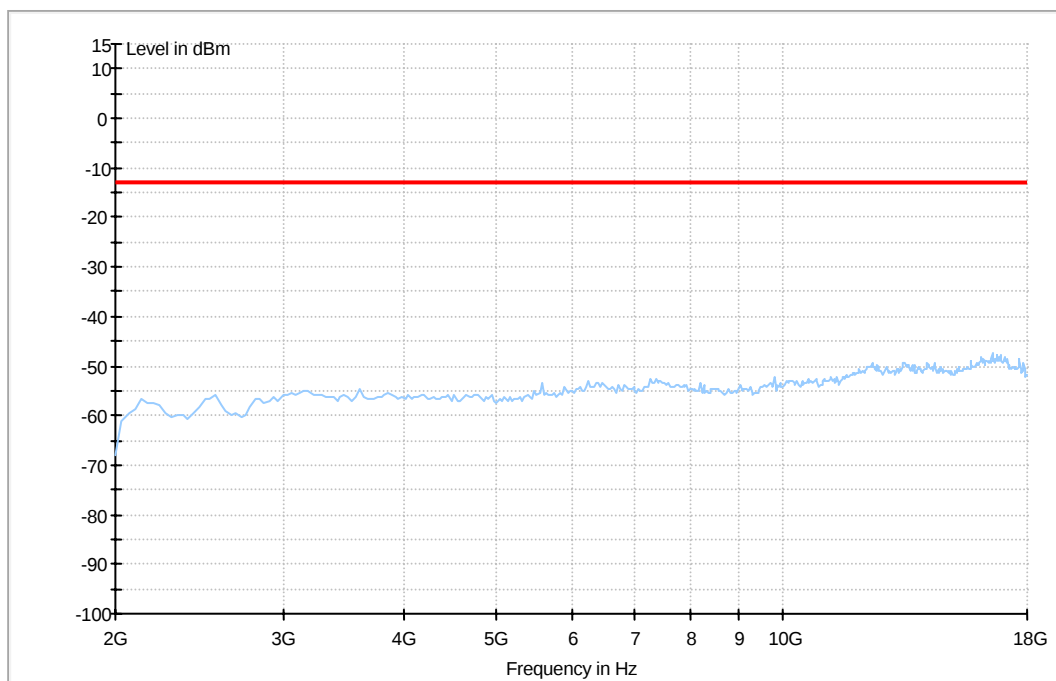
Traffic Mode (9kHz-30MHz)



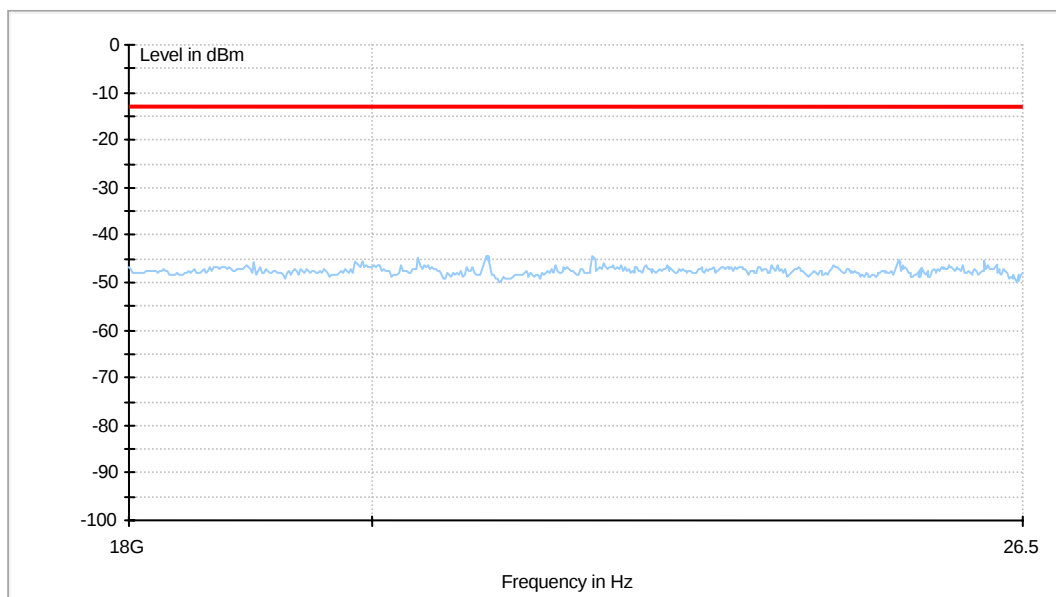
Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)

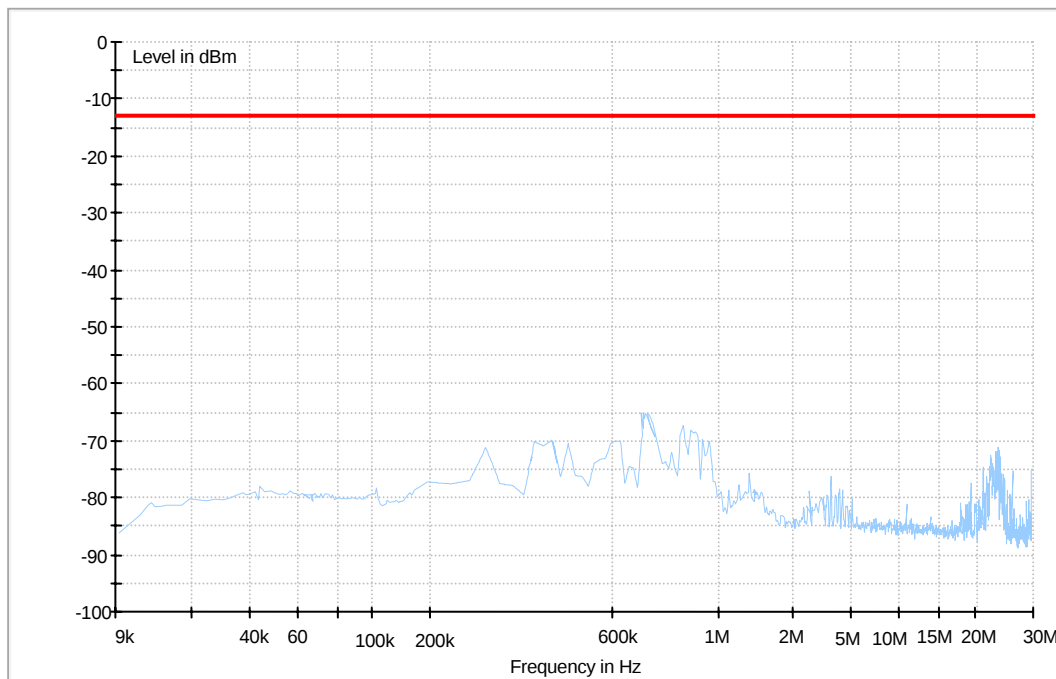


Traffic Mode (18GHz-26.5GHz)

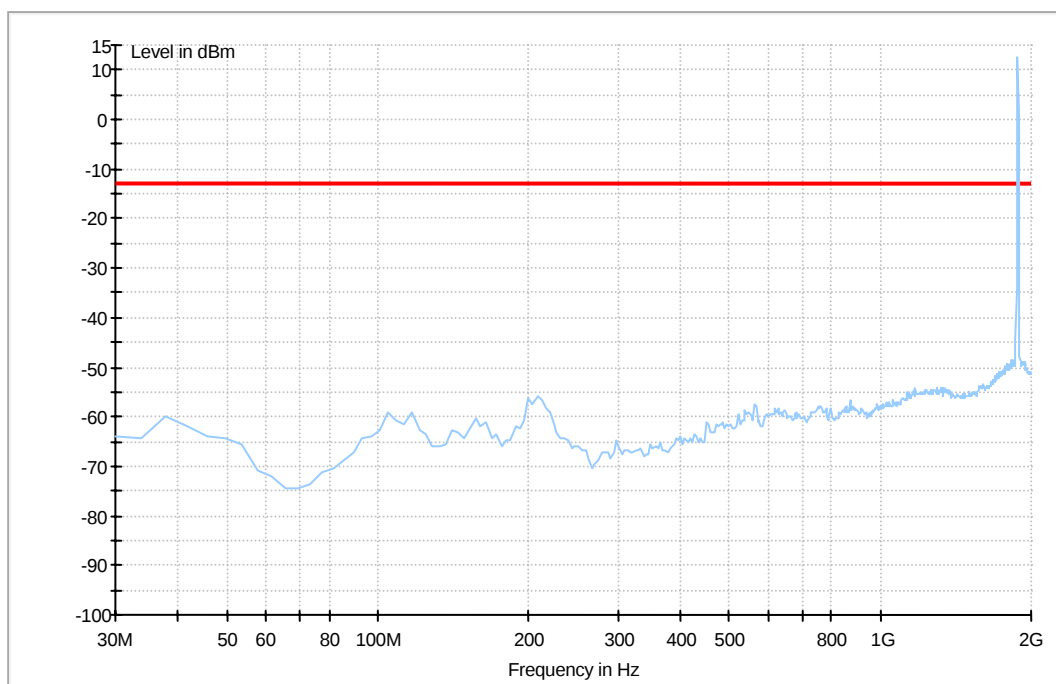


8.3.4 For GPRS 1900

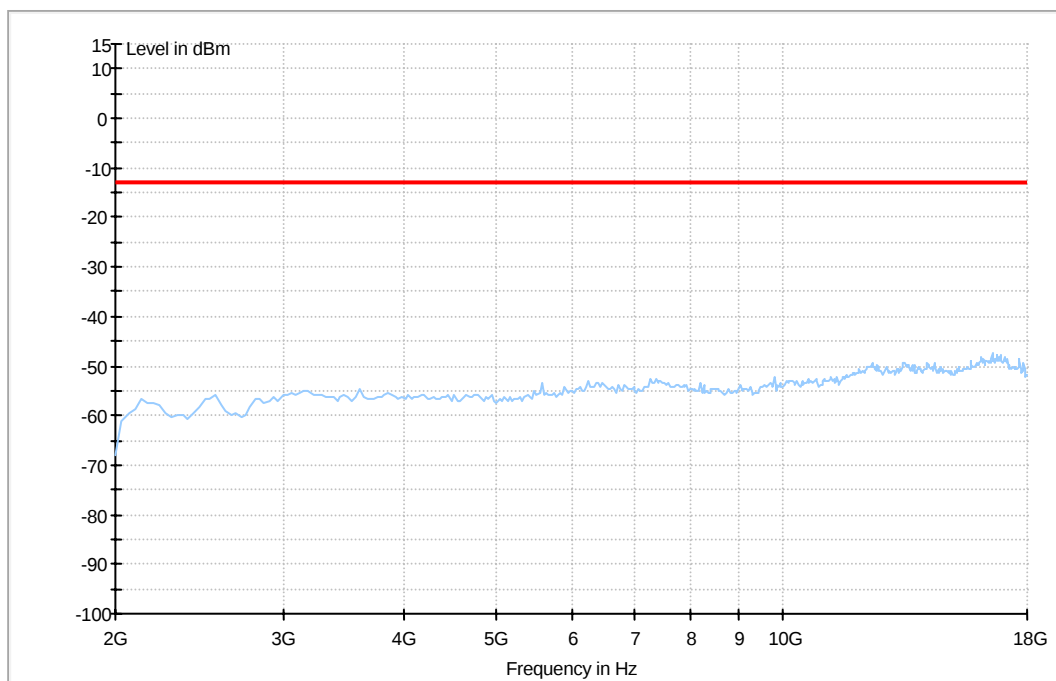
Traffic Mode (9kHz-30MHz)



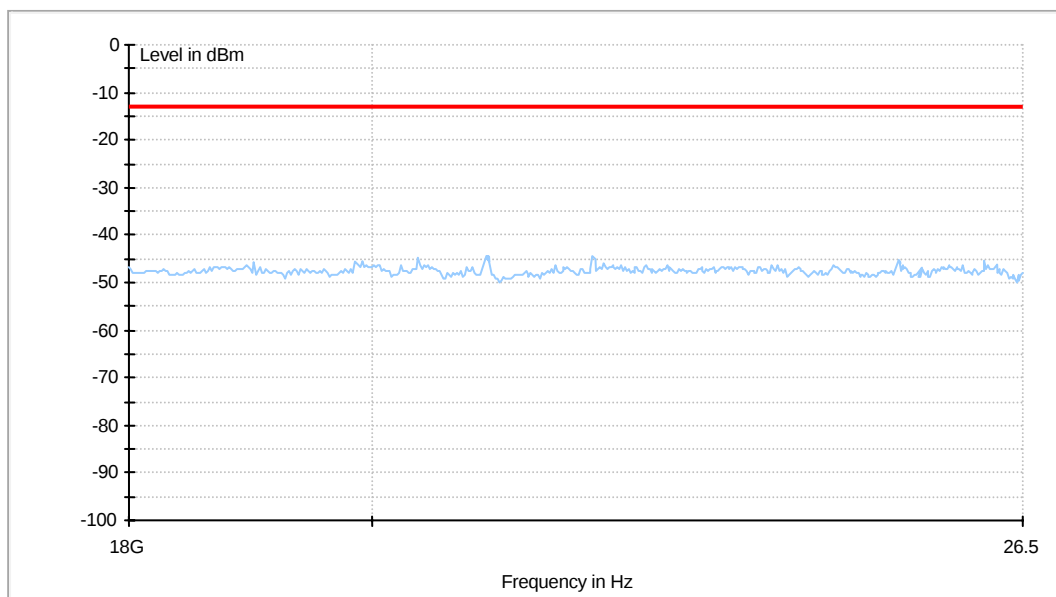
Traffic Mode (30MHz-2GHz)



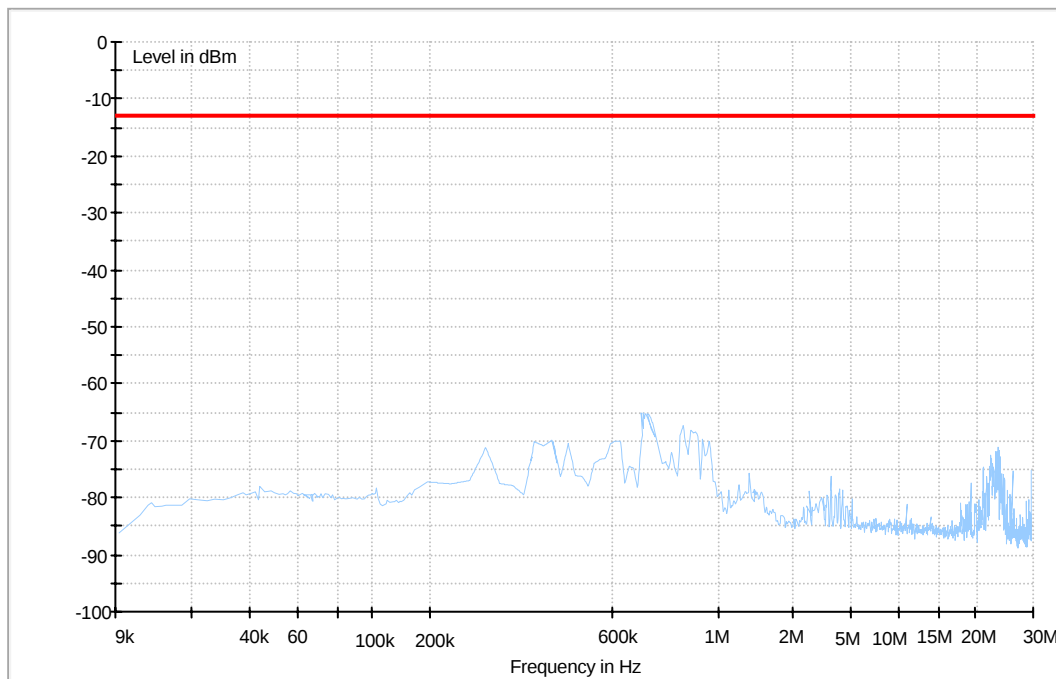
Traffic Mode (2GHz-18GHz)



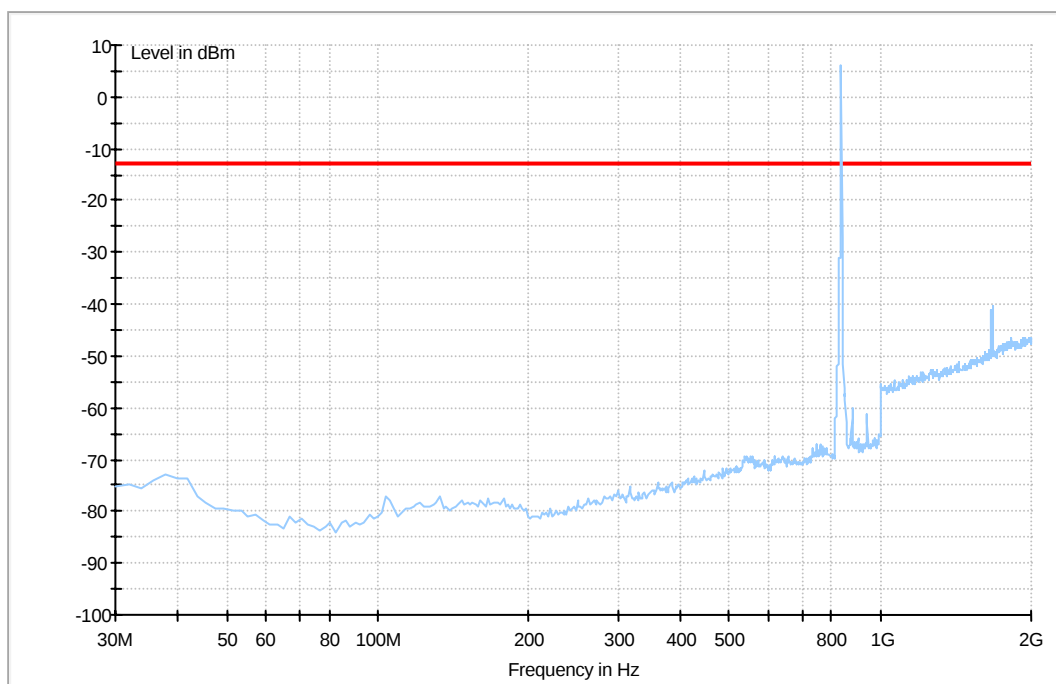
Traffic Mode (18GHz-26.5GHz)



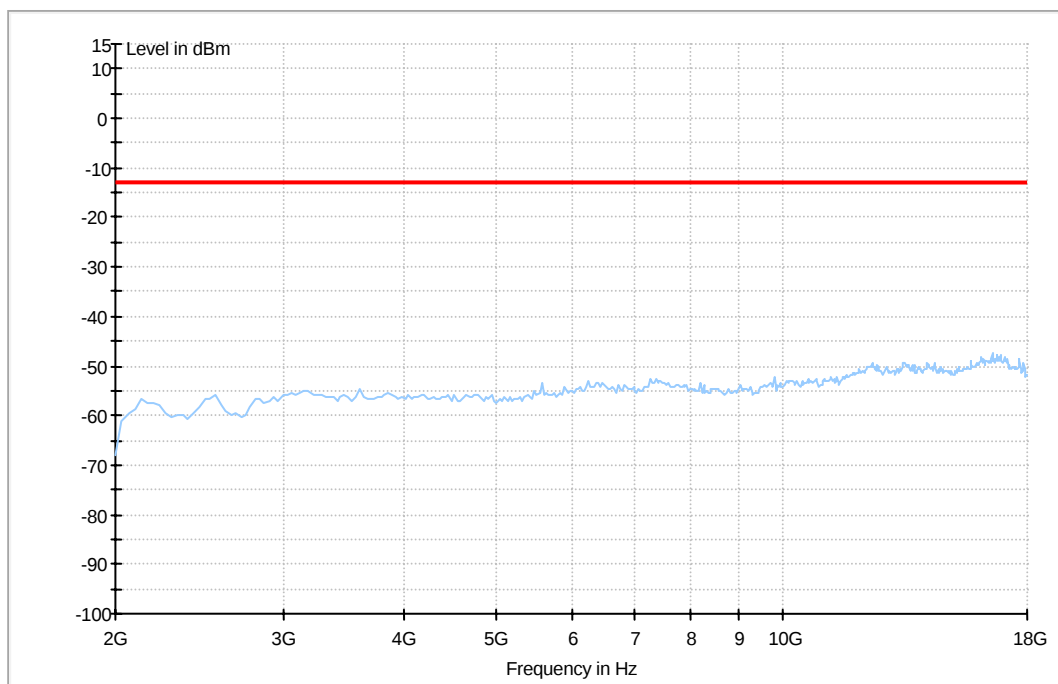
8.3.5 For WCDMA 850 Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)



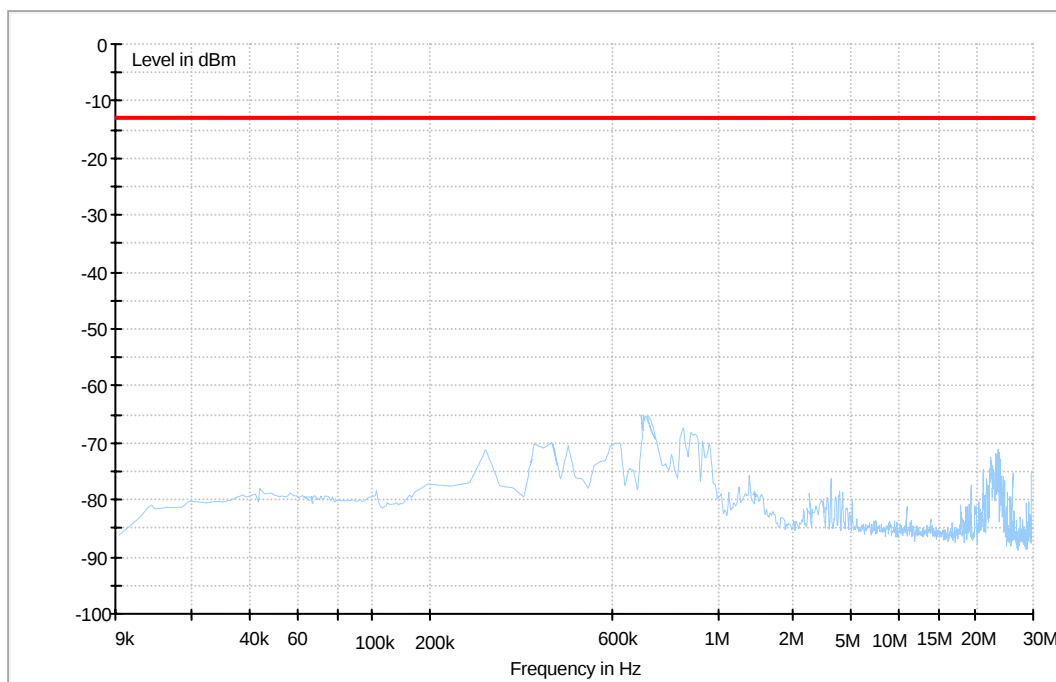
Traffic Mode (2GHz-18GHz)



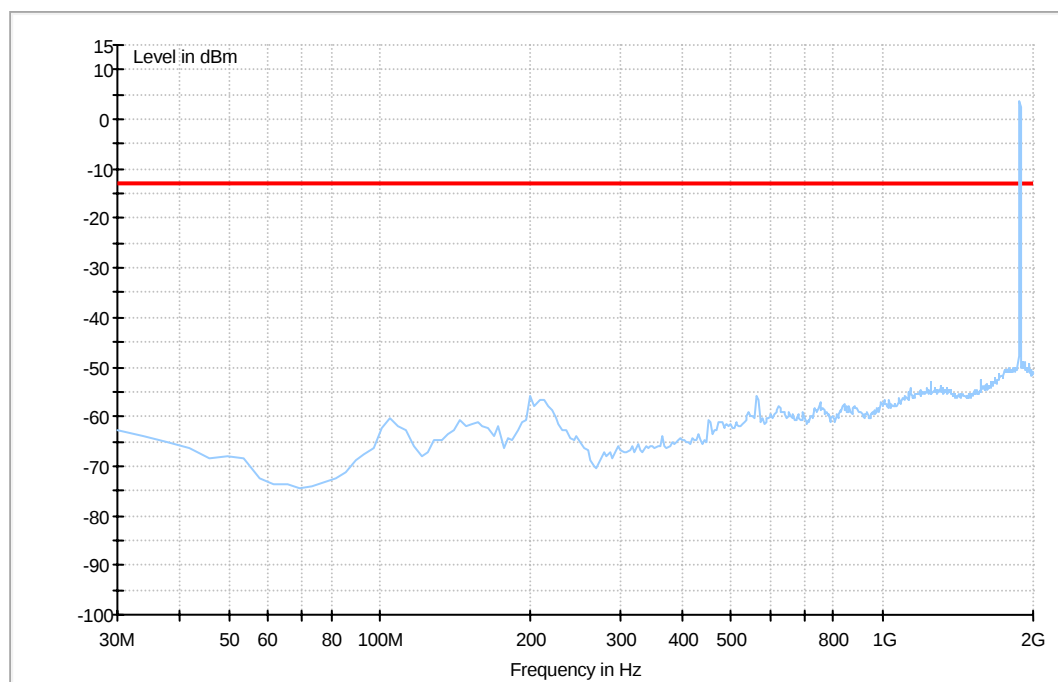
8.3.6

For WCDMA 1900

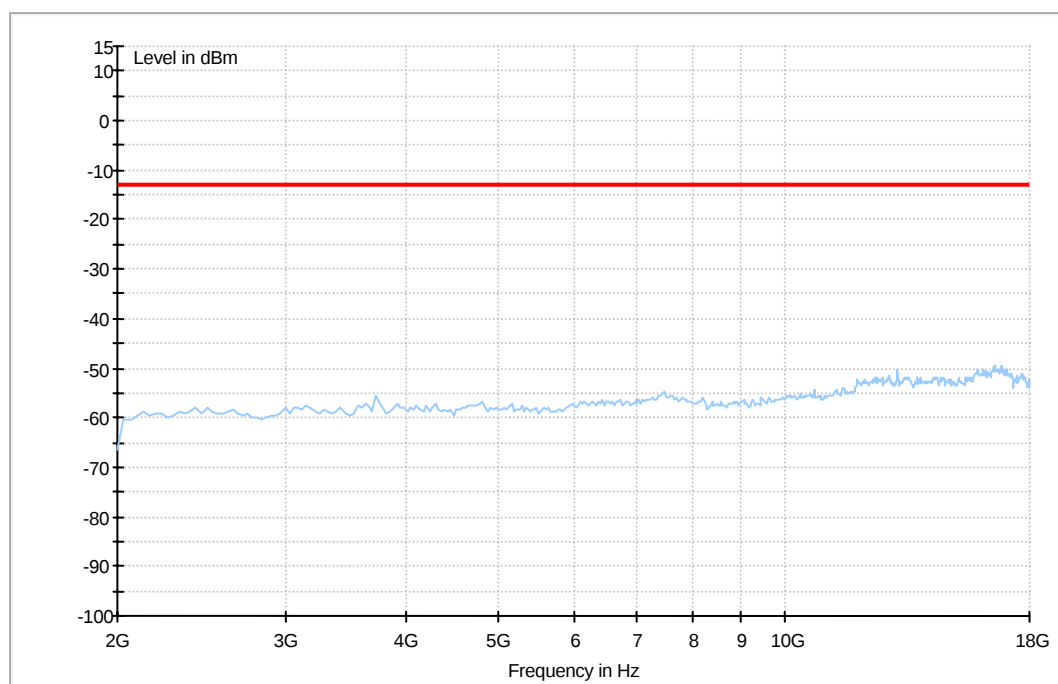
Traffic Mode (9kHz-30MHz)



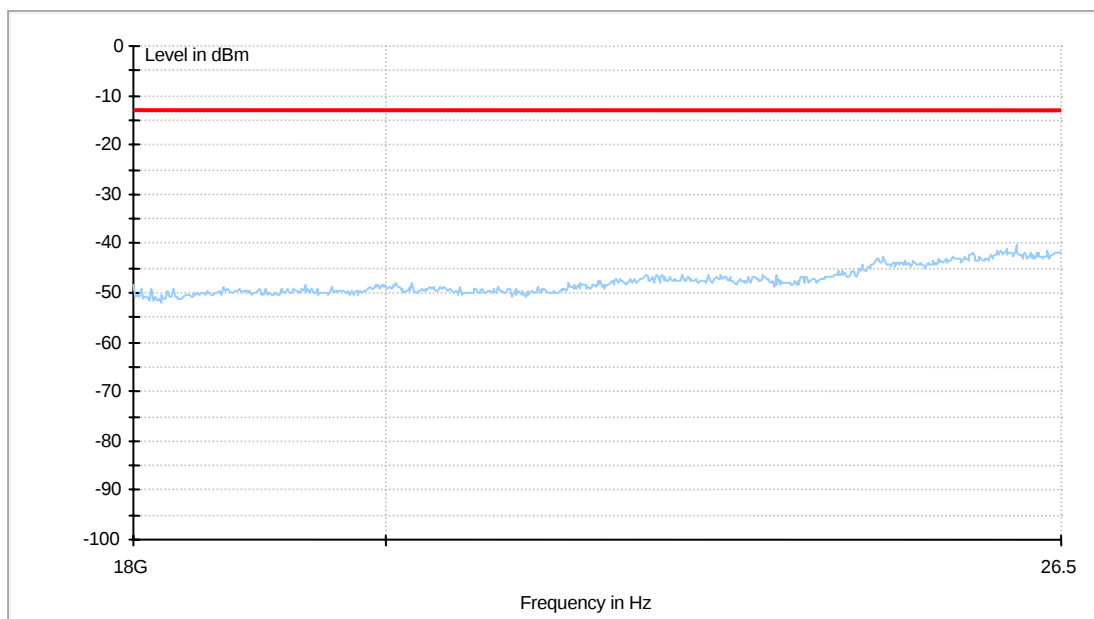
Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)



Traffic Mode (18GHz-26.5GHz)



END