



EMC Test Report

**Product Name: HUAWEI IDEOS X3;
HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with
Bluetooth; IDEOS X3**

Model Number: HUAWEI U8510-1/U8510-1/U8510

Report No: SYBH(Z-EMC)096032011-2

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Notice 1

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3. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-2.
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Notice 2

Modification Information:

Modification Information

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

REPORT ON	HUAWEI IDEOS X3; HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth; IDEOS X3
	HUAWEI U8510-1/U8510-1/U8510
REGULATION	FCC CFR47 Part 15: Subpart B;
	FCC CFR47 Part 22: Subpart H;
	FCC CFR47 Part 24: Subpart E;
START OF TEST	Apr.15,2011
END OF TEST	Apr.26,2011
Final Judgement:	Pass

Approved By

2011-04-26
Date

Liuchunlin
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Reviewed By

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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 IDEOS X3; HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth; IDEOS X3
MANUFACTURERS MODEL NUMBER	HUAWEI U8510-1/U8510-1/U8510

1.2 Test Site

Site 1:

EMC LABORATORY OF 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 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 (TM9-TM16)	N/A	Pass	Site1
<u>Conducted Emissions</u>	TC1 (TM1-TM16)	N/A	Pass	Site1
<u>Radiated Spurious Emissions</u> Enclosure Port	TC1 (TM1-TM6)	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 U8510-1/U8510-1/U8510 is subscriber equipment in the WCDMA/GSM system. The HSDPA/UMTS frequency band is Band I and Band VIII. The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, but only GSM850 and PCS1900 bands test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSDPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video, MMS service, GPS and WIFI 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:	HUAWEI IDEOS X3; HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth; IDEOS X3
Models:	HUAWEI U8510-1/U8510-1/U8510
Input Rated Voltage	3.7V
Extreme Voltage	3.6V and 4.2V
Rated Power	Normal 3W ,Max 8 W
Dimensions	110mm(L)×56.5mm(W)×11.2mm(H)
Weight	<110g (with battery)

Sub-Assembly Identity

Mode		Work Frequency	
		Transmitt Frequency (MHz)	Receive Frequency (MHz)
GSM	GSM 850	824 - 849	869 - 894
	PCS1900	1850-1910	1930-1990
Bluetooth		2400-2483.5	
Wi-Fi		2400-2483.5	

Sub-Assembly Identity

Sub Assembly Inventory				
Board				
Model Name	Qty.	Serial	Description	
HD2U851M	1	F2E2A11130100005	Main board of Mobile Phone	
Accessory				
Name	Qty.	Manufacture	Serials number	Description
Adapter	1	Huawei Technologies Co., Ltd.	HKAAB2405455	Adapter Model: HW-050100E1W Input Voltage : ~100-240V 50/60Hz 0.2A Output Voltage: 5.0V  1A Rated Power: 5W
Adapter	1	Huawei Technologies Co., Ltd.	HKAA82699534	Adapter Model: HW-050100B1W Input Voltage : ~100-240V 50/60Hz 0.2A Output Voltage: 5.0V  1A Rated Power: 5W
Adapter	1	Huawei Technologies Co., Ltd.	HKAB11265698	Adapter Model: HW-050100U1W Input Voltage : ~100-240V 50/60Hz 0.2A Output Voltage: 5.0V  1A



				Rated Power: 5W
Rechargeable Li-ion	1	Huawei Technologies Co., Ltd.	LACA923HI3900470	Battery Model: HB4J1H Rated capacity: 1200mAh 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

Cable	Quantity	Type of Cable
USB	1	shielded
Earphone	1	Unshielded

4.2 Associated Equipment Used during Test

Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Cal Date
Radio Communication Tester	CMU200	R&S	3607111817	2010-7-23
Notebook	T61	IBM	3108052508	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).

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~TM16
---------	----------

4.3.2 Test Mode

There were 16 test Modes. TM1 to TM16 were shown in the diagrams below:

TM1	operate in traffic mode GSM850;
TM2	operate in traffic mode GSM1900;
TM3	operate in traffic mode GPRS850;
TM4	operate in traffic mode GPRS 1900;
TM5	operate in traffic mode EDGE850;
TM6	operate in traffic mode EDGE1900;
TM7	operate in traffic mode Bluetooth;
TM8	operate in traffic mode WIFI;
TM9	operate in idle mode GSM850;
TM10	operate in idle mode GSM1900;
TM11	operate in idle mode GPRS850;
TM12	operate in idle mode GPRS 1900;
TM13	operate in idle mode EDGE850;
TM14	operate in idle mode EDGE1900;
TM15	operate in idle mode Bluetooth;
TM16	operate in idle mode WIFI;

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. (GSM see ETSI TS 151.010).

For EGSM and PCS, 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.

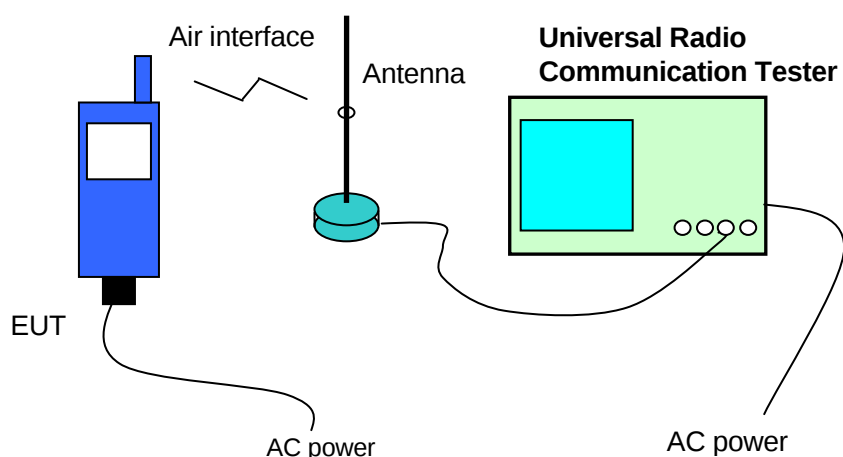


Figure 1.: Test Configuration

Idle Mode:

The EUT is required to be in the idle mode.

For 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.

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 C63.4 .

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:

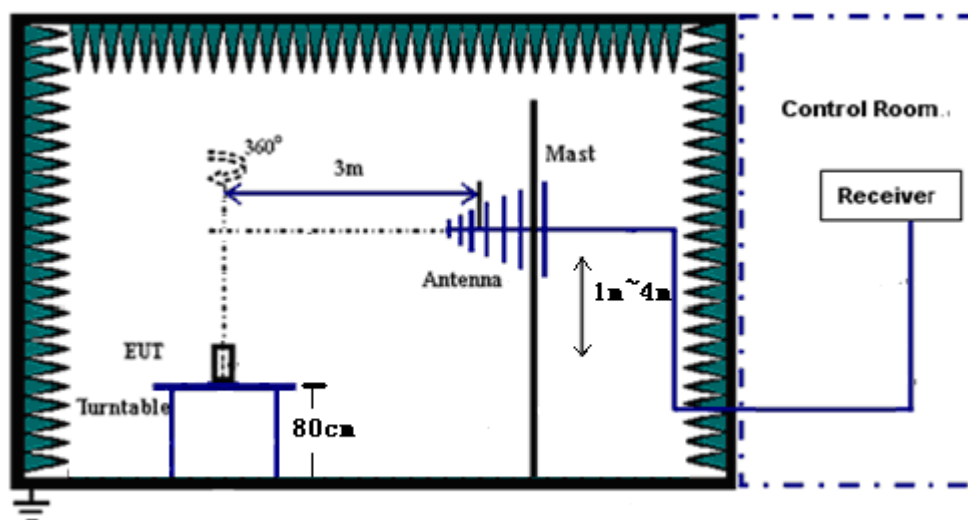


Figure 2. Test set-up

5.1.2 Test Results

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

Test Limits

Frequency of Emission (MHz)	Radiated Limit	
	Unit(μV/m)	Unit(dBμV/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.

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.

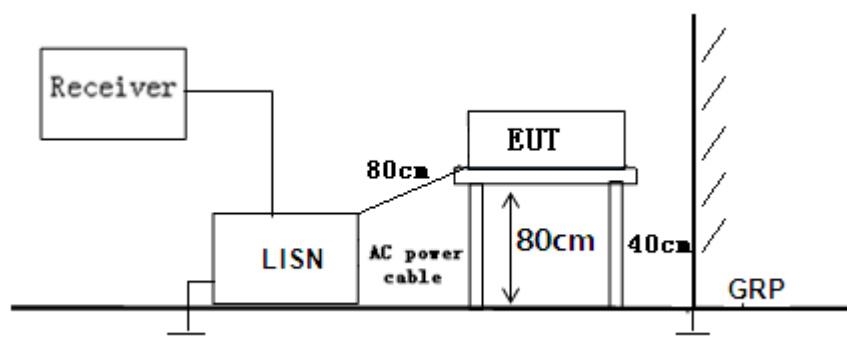


Figure 3. Test Set-up

5.2.2 Test Results

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

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 dBμV	56~46 dBμV
0.5MHz~5MHz	56 dBμV	46 dBμV
5MHz~30MHz	60 dBμV	50 dBμV

5.3 Radiated Spurious Emissions

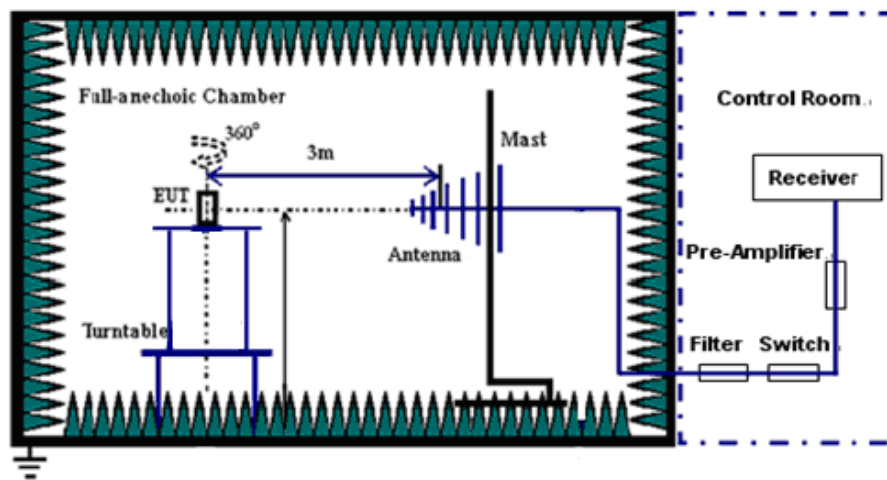
5.3.1 Test Procedure

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:

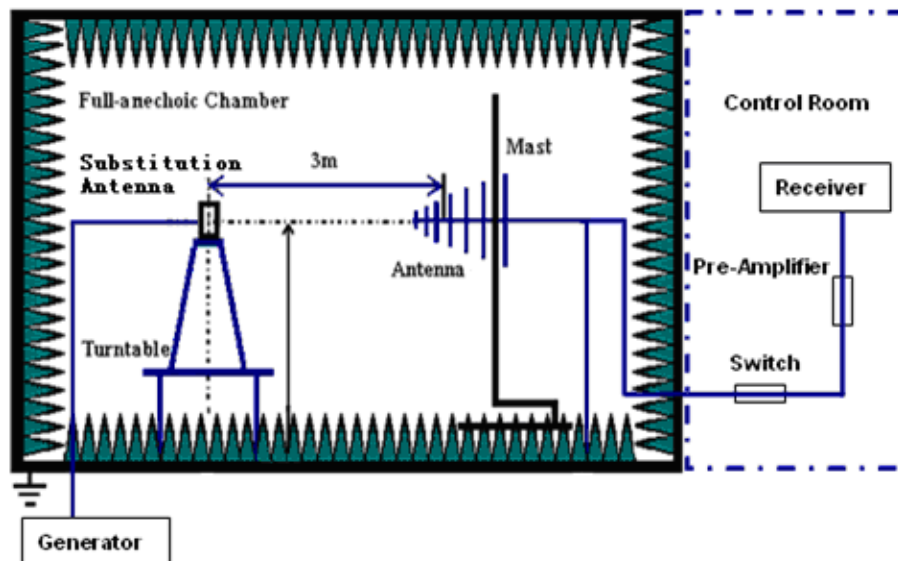
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect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

Test the Radiated maximum output power by the 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.



Test should be performed in normal voltage condition.

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: 10 kHz;
Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz;
Measurement bandwidth (RBW) for 30MHz 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

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 9 kHz up to 150 kHz: 10 kHz;
Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz;
Measurement bandwidth (RBW) for 30MHz up to 26.5GHz: 1MHz;

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:

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.

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	Jun.25, 2010	12
	Broadband Antenna	VULB 9163	SCHWARZBECK	May.15, 2010	12
	Horn Antenna	HF906	R&S	May.15, 2010	12
	LISN	ENV216	R&S	Jun.25.2010	12
RSE	EMI Test receiver	ESIB26	R&S	May.05, 2010	12
	Horn Antenna	3117	ETS-Lindgren	Dec.13.2010	12
	Broadband Antenna	CBL 6112B	SCHAFFNER	Dec.11.2010	12
	Horn Antenna	3160	ETS-Lindgren	Dec.23.2010	12
Software Information					
Test Item	Software Name	Manufacturer		Version	
RE/CE	ES-K1	R&S		1.7.1	
RSE	EMC32	R&S		V8.40.10	

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

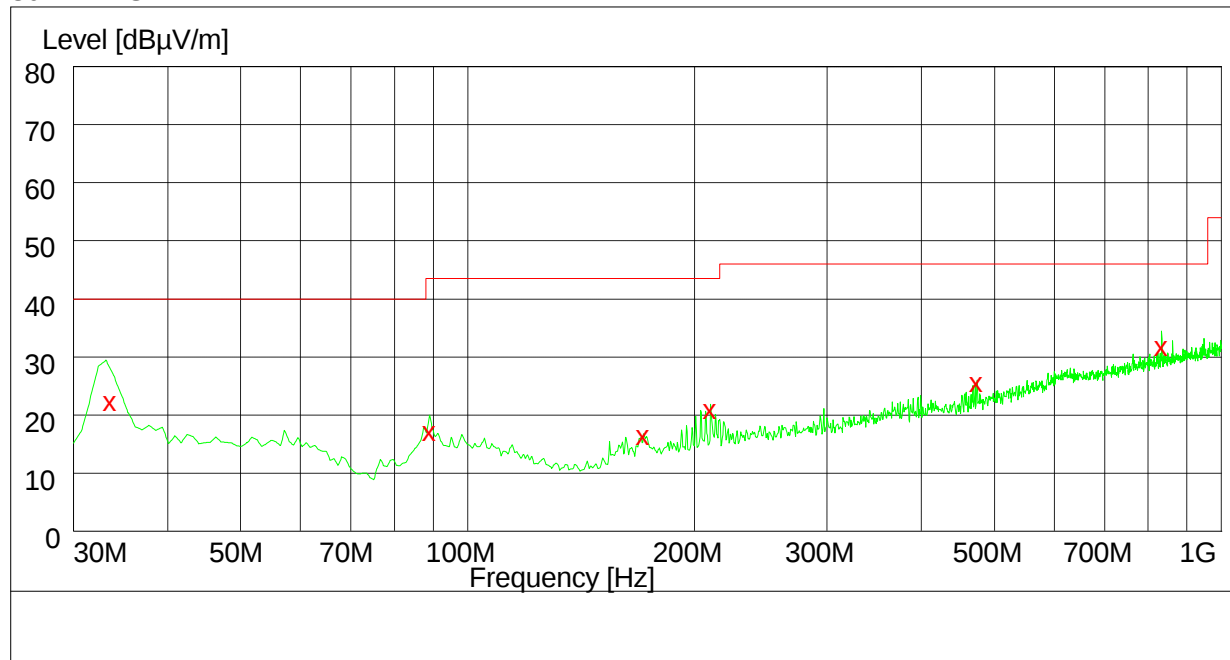
Items		Extended Uncertainty
RE	Field strength (dB μ V/m)	U=4.1dB; k=2(30MHz-1GHz)
RE	Field strength (dB μ V/m)	U=4.1dB; k=2(1GHz-18GHz)
RSE	ERP (dBm)	U=2.2dB; k=2
CE	Disturbance Voltage (dB μ V)	U=3.4dB; k=2

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.

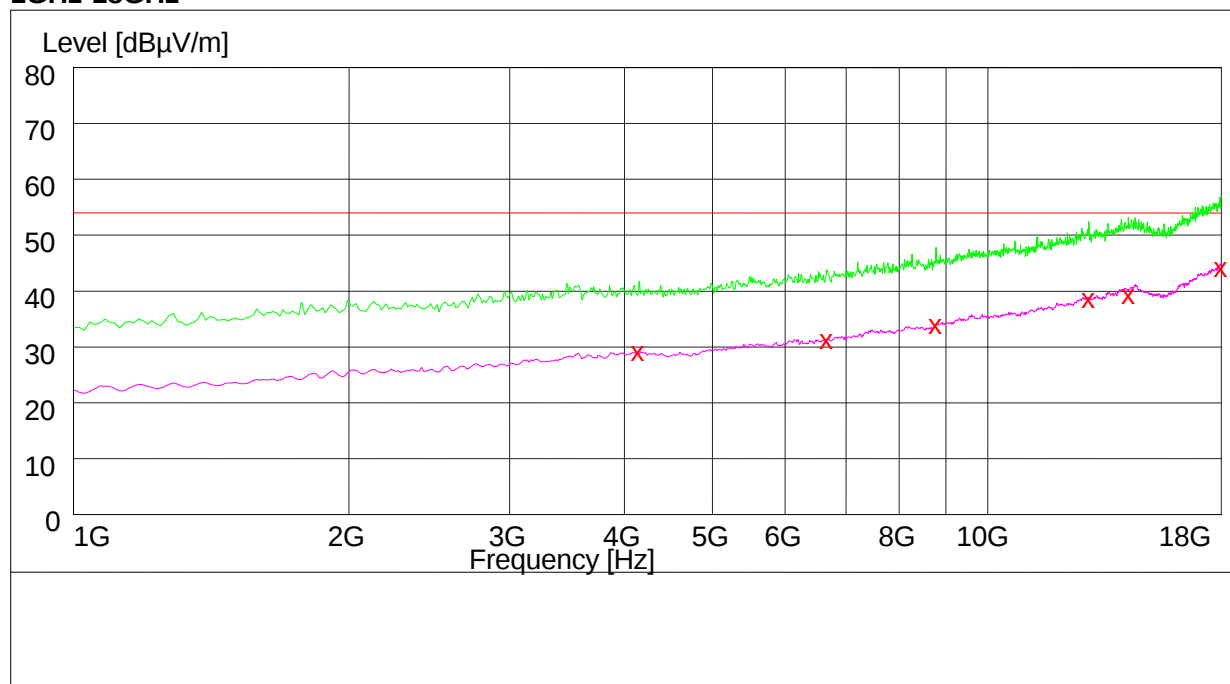
30MHz-1GHz



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
33.584000	23.60	11.7	40.0	16.4	100.0	166.00	VERTICAL
88.024000	18.20	11.1	43.5	25.3	149.0	142.00	VERTICAL
170.992000	17.70	10.1	43.5	25.8	100.0	183.00	VERTICAL
210.032000	22.20	12.5	43.5	21.3	121.0	109.00	HORIZONTAL
473.748000	26.90	19.4	46.0	19.1	100.0	237.00	HORIZONTAL
832.980000	33.00	25.3	46.0	13.0	150.0	274.00	HORIZONTAL

1GHz-18GHz

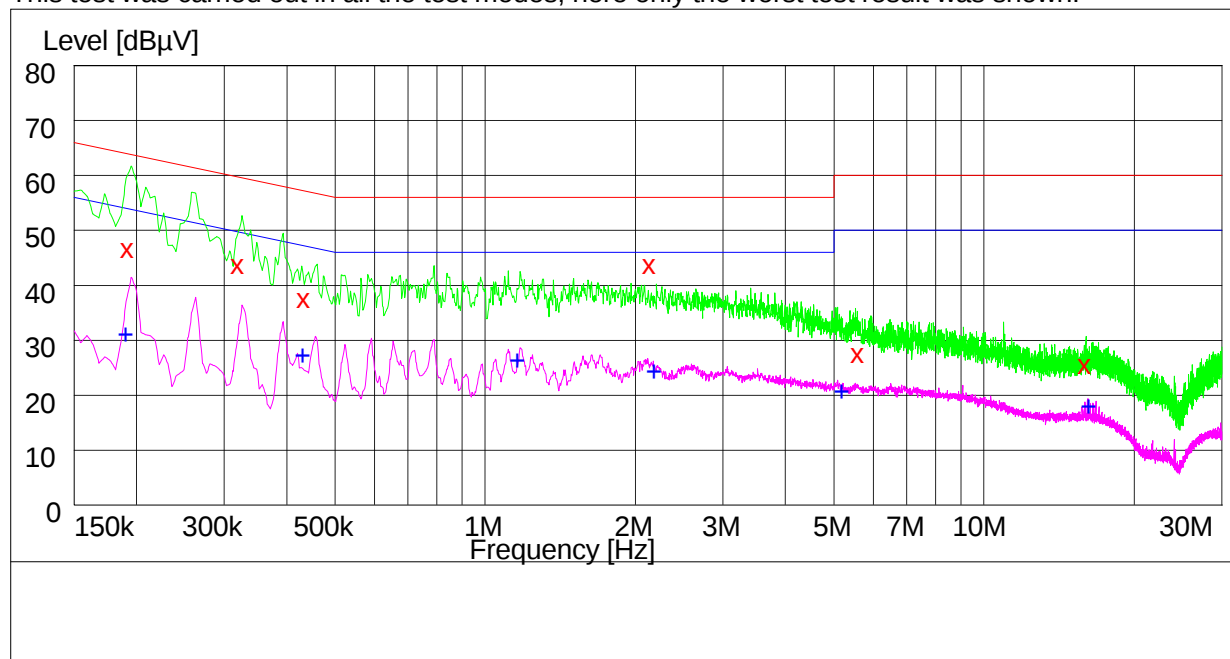


MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV/ m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
4148.000000	28.40	5.8	54.0	25.6	140.0	263.00	VERTICAL
6665.500000	30.70	9.7	54.0	23.3	121.0	108.00	VERTICAL
8776.000000	33.40	13.7	54.0	20.6	152.0	334.00	HORIZONTAL
12897.500000	37.60	19.6	54.0	16.4	110.0	220.00	HORIZONTAL
14253.500000	39.40	21.7	54.0	14.6	101.0	52.00	VERTICAL
17992.500000	43.80	27.7	54.0	10.2	141.0	310.00	VERTICAL

8.2 Conducted 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	Transd dB	Limit dBμV	Margin dB	Line	PE
0.192000	46.40	10.1	64	17.6	N	FLO
0.320000	43.90	10.0	60	16.1	N	FLO
0.434000	39.00	10.1	57	18.0	N	FLO
2.116000	44.90	10.1	56	11.1	L1	FLO
5.588000	28.90	10.2	60	31.1	N	FLO
15.936000	25.60	10.3	60	34.4	L1	FLO

MEASUREMENT RESULT: AV Detector

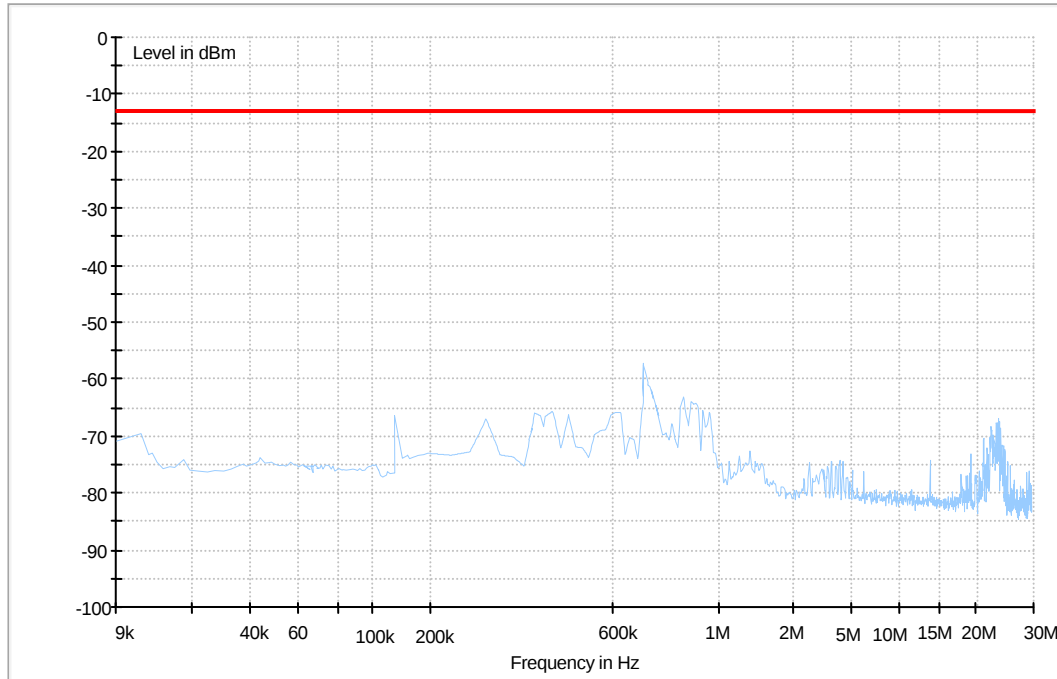
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.190000	30.40	10.1	54	23.6	N	FLO
0.430000	28.50	10.0	47	18.5	N	FLO
1.158000	27.70	10.1	46	18.3	N	FLO
2.182000	25.70	10.1	46	20.3	N	FLO
5.176000	20.70	10.2	50	29.3	N	FLO
16.152000	19.30	10.3	50	30.7	L1	FLO

8.3 Radiated Spurious Emission

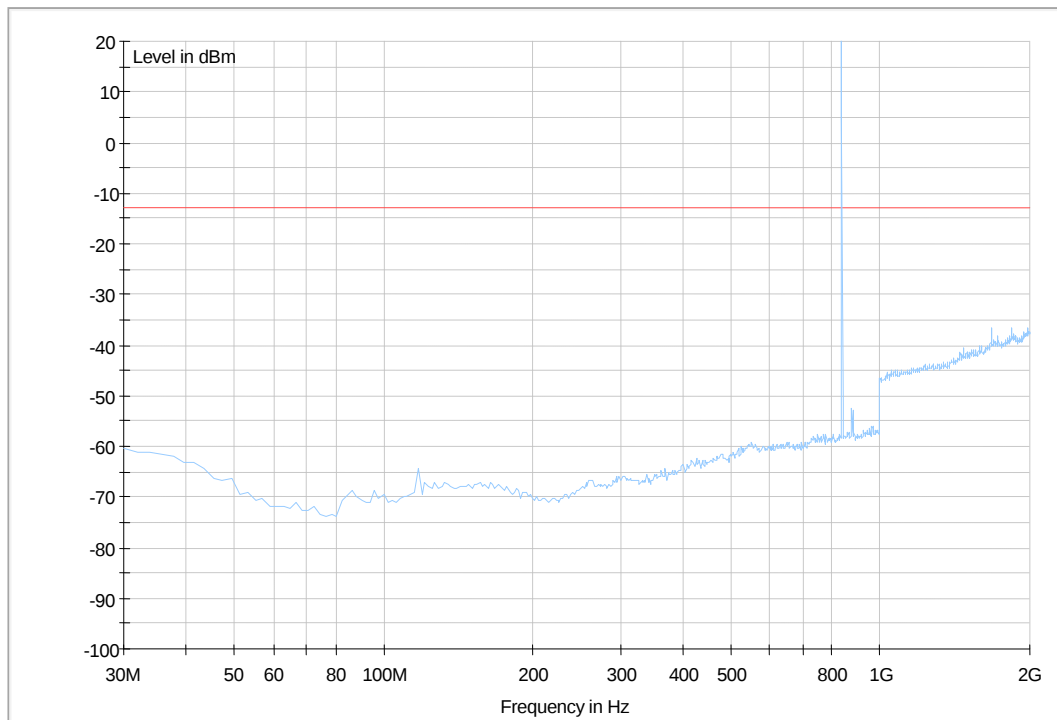
This test results are the maximum level of radiated spurious emissions in vertical and horizontal polarity. The highest peak exceeds the limit line is carrier frequency

8.3.1 For GSM 850

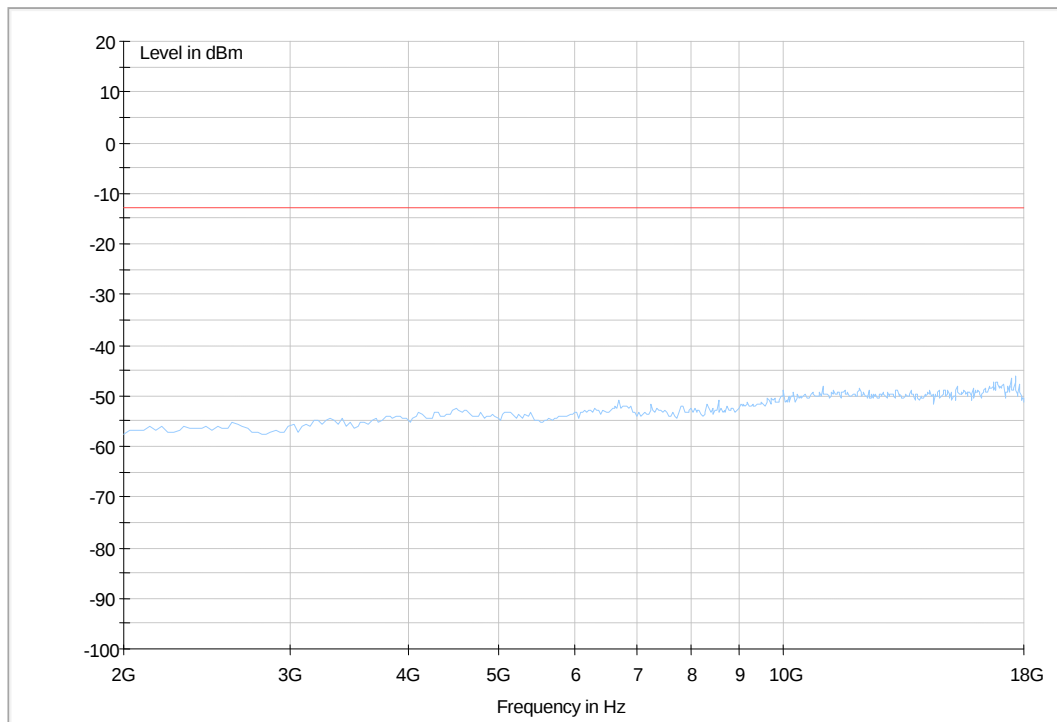
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)

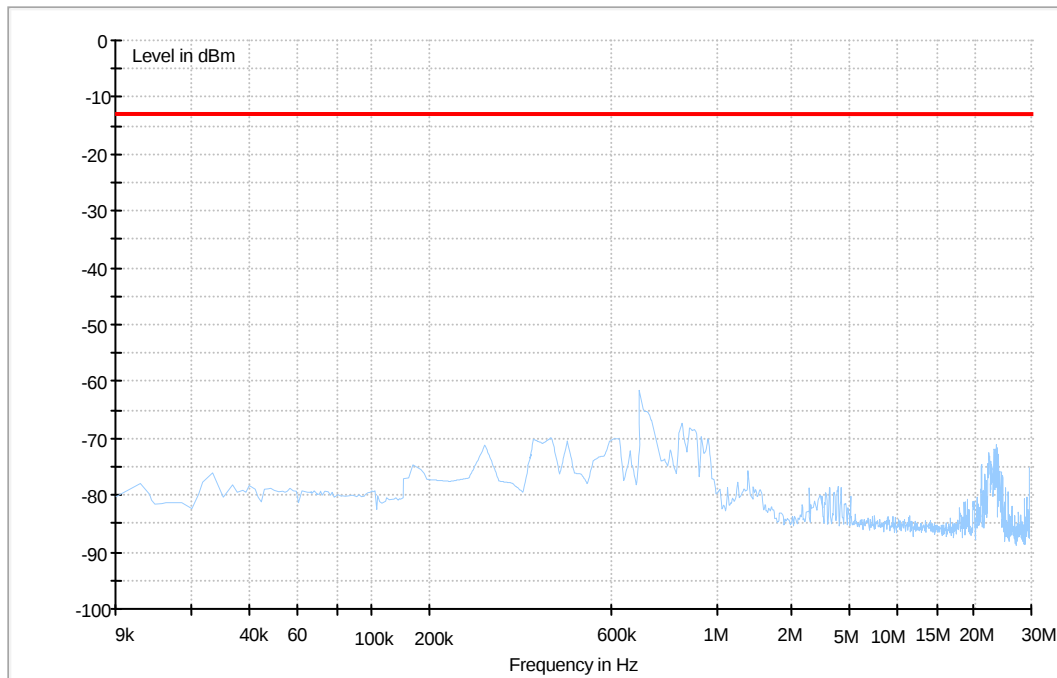


Traffic Mode (2GHz-18GHz)

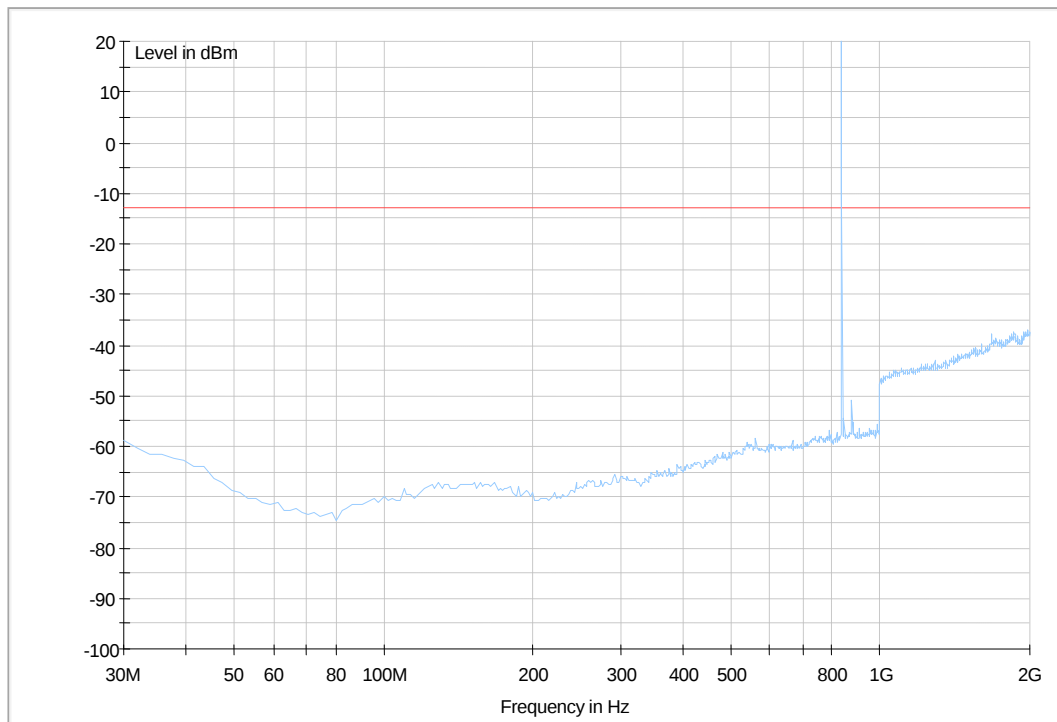


8.3.2 For GPRS 850

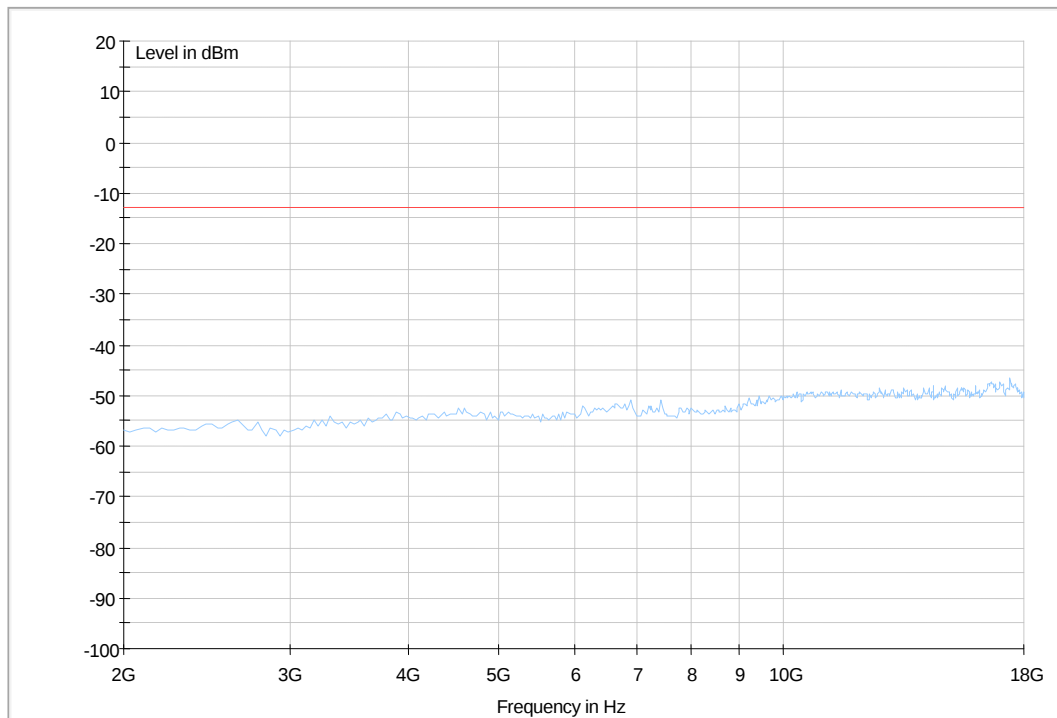
Traffic Mode (9kHz-30MHz)



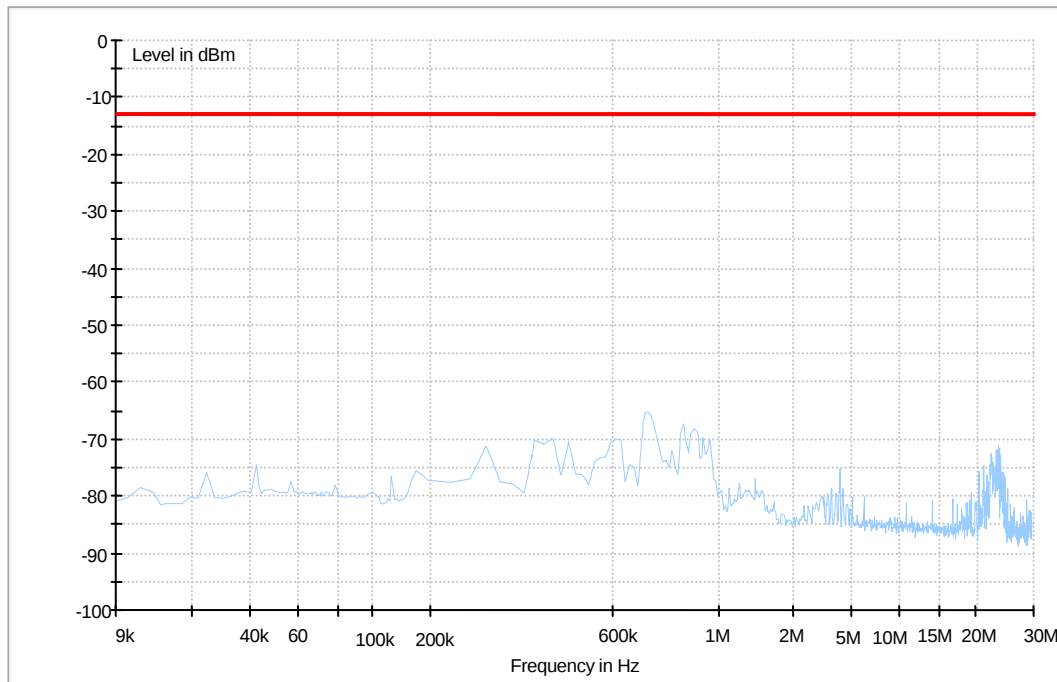
Traffic Mode (30MHz-2GHz)



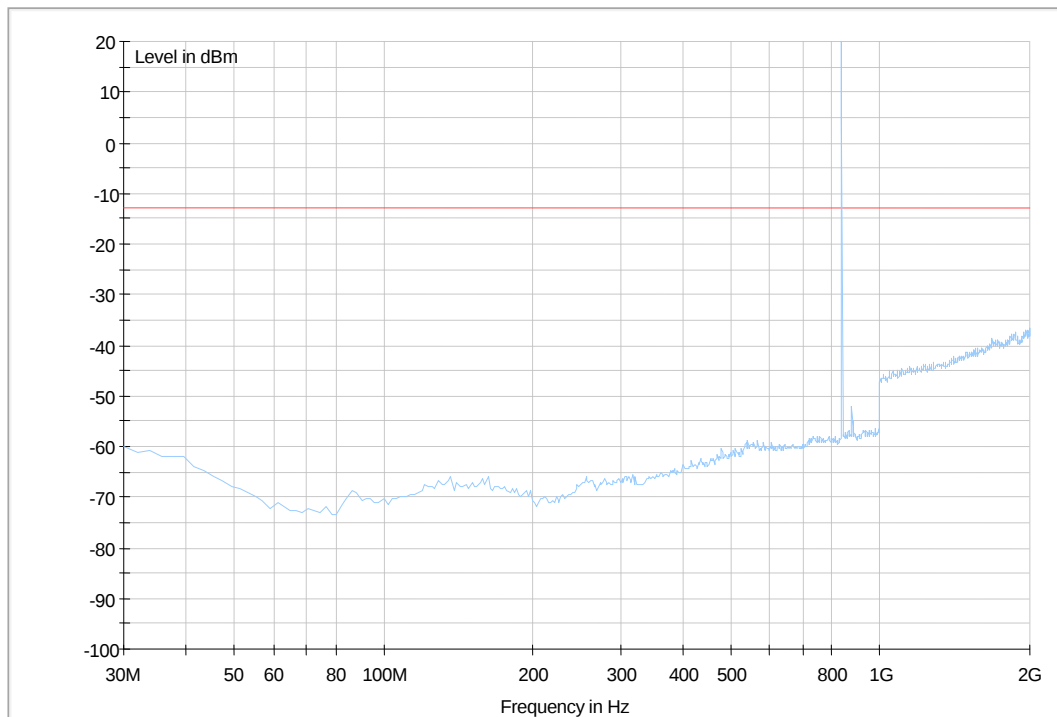
Traffic Mode (2GHz-18GHz)



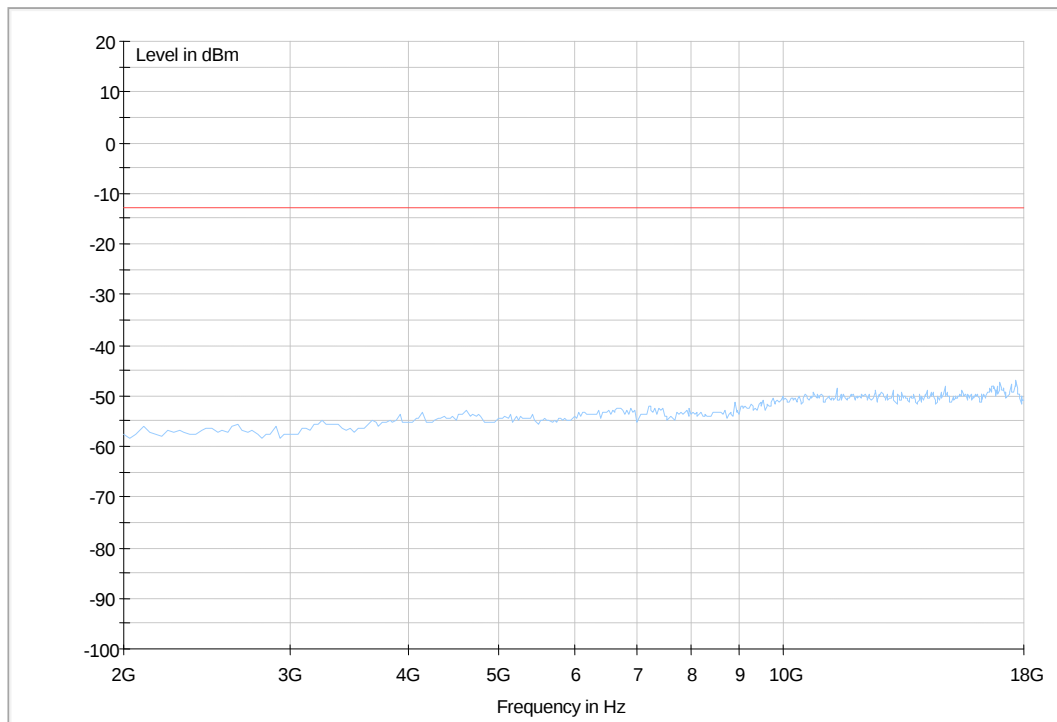
8.3.3 For EDGE 850 Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)

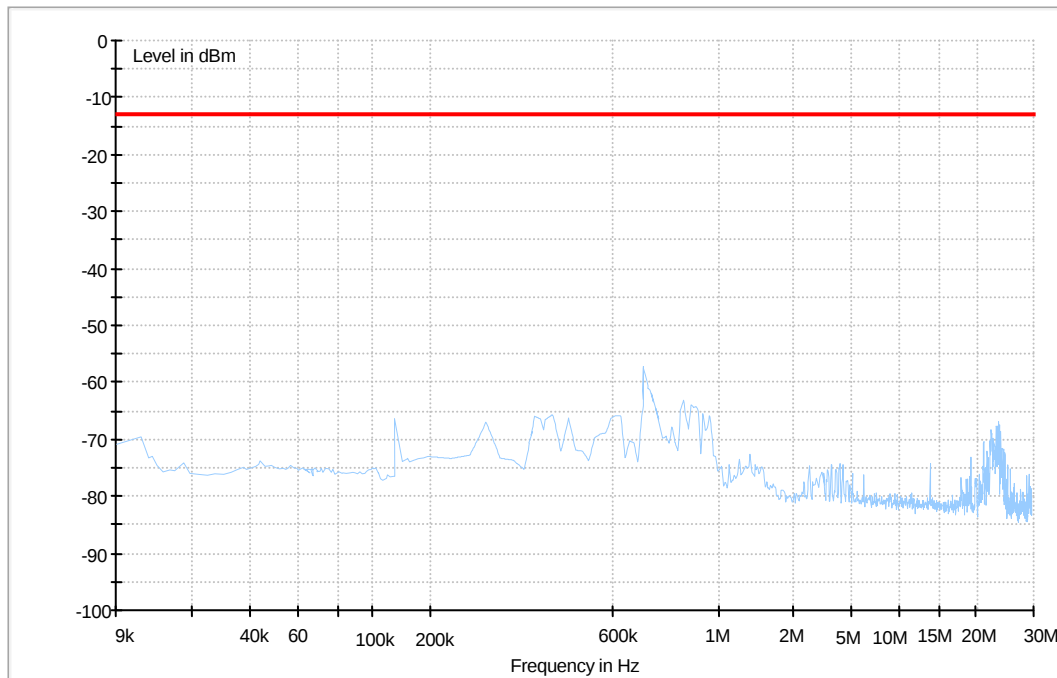


Traffic Mode (2GHz-18GHz)

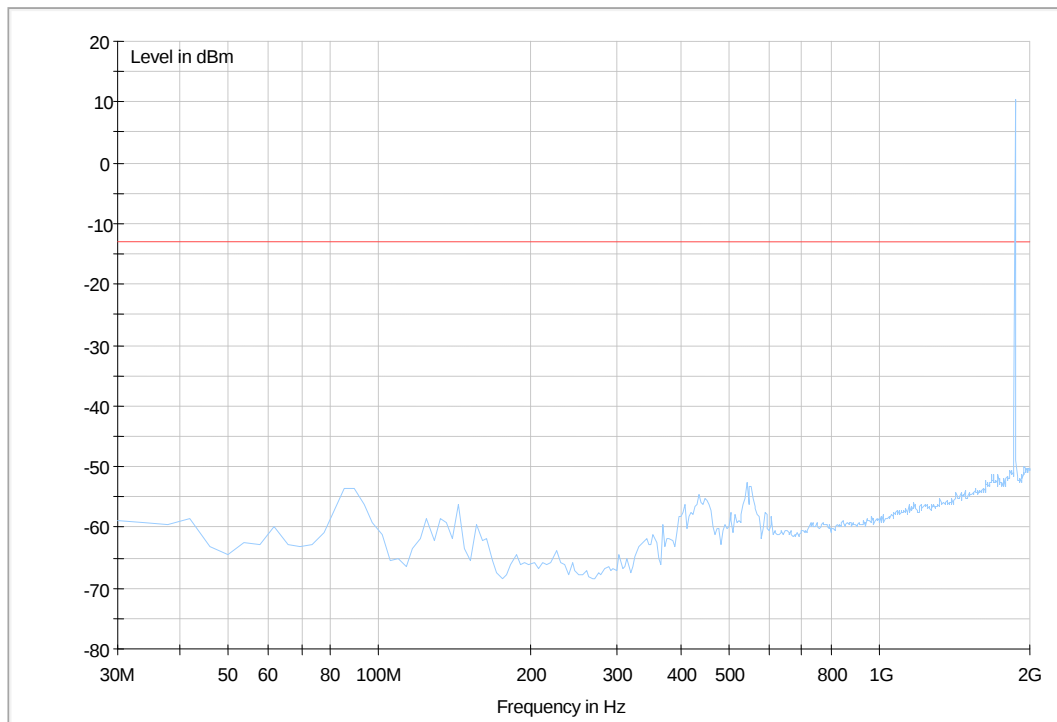


8.3.4 For GSM 1900

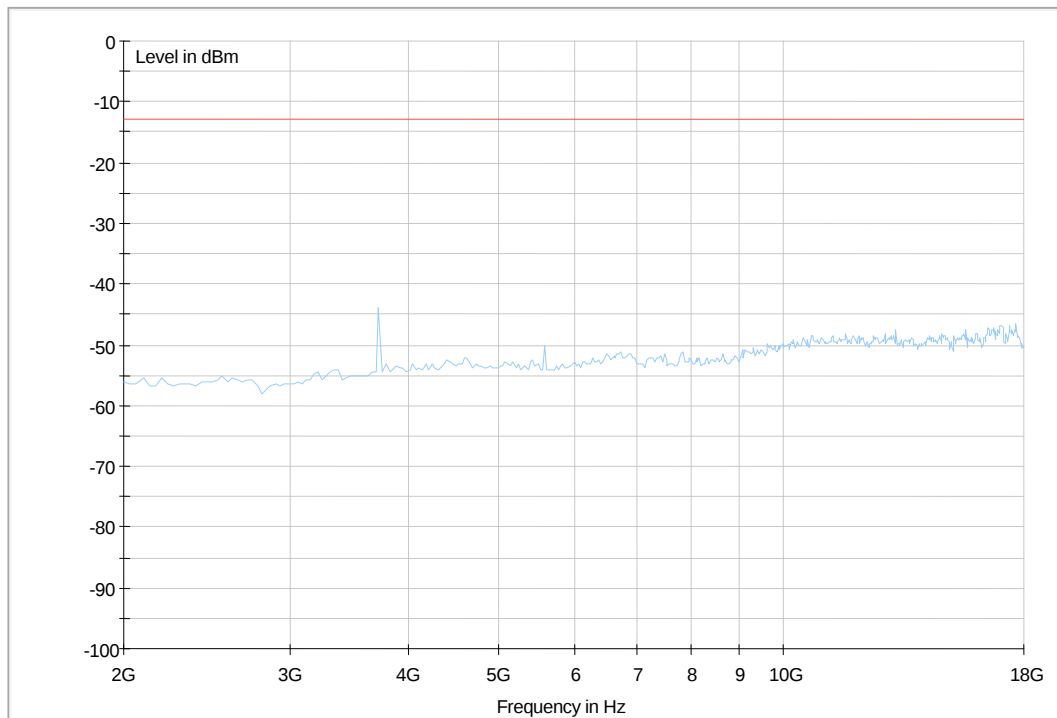
Traffic Mode (9kHz-30MHz)



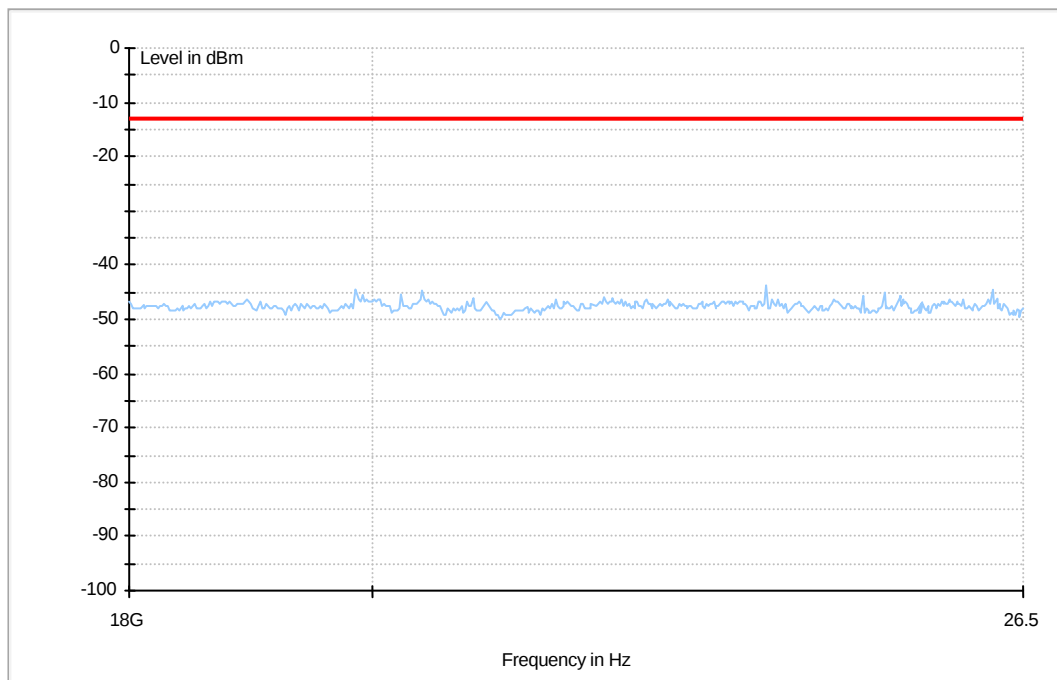
Traffic Mode (30MHz-2GHz)



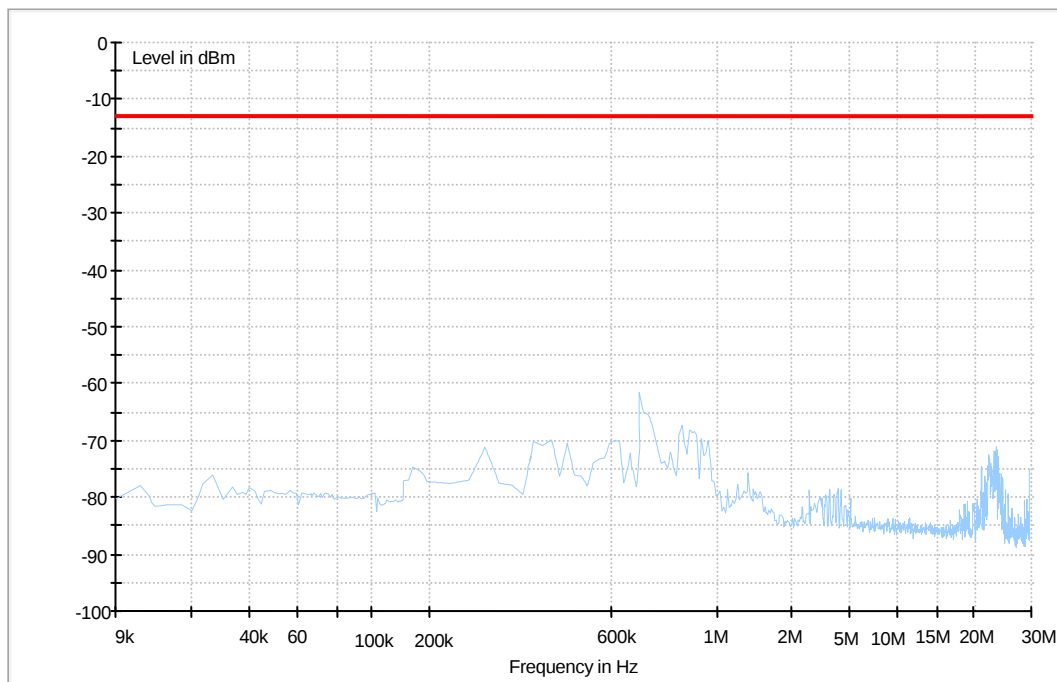
Traffic Mode (2GHz-18GHz)



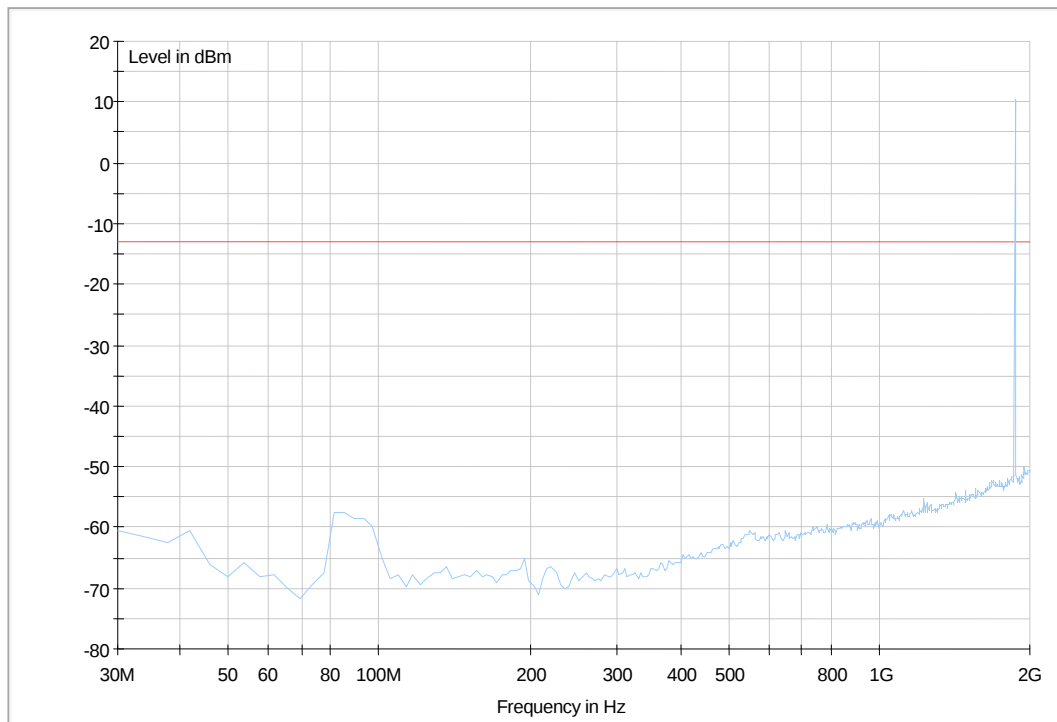
Traffic Mode (18GHz-26.5GHz)



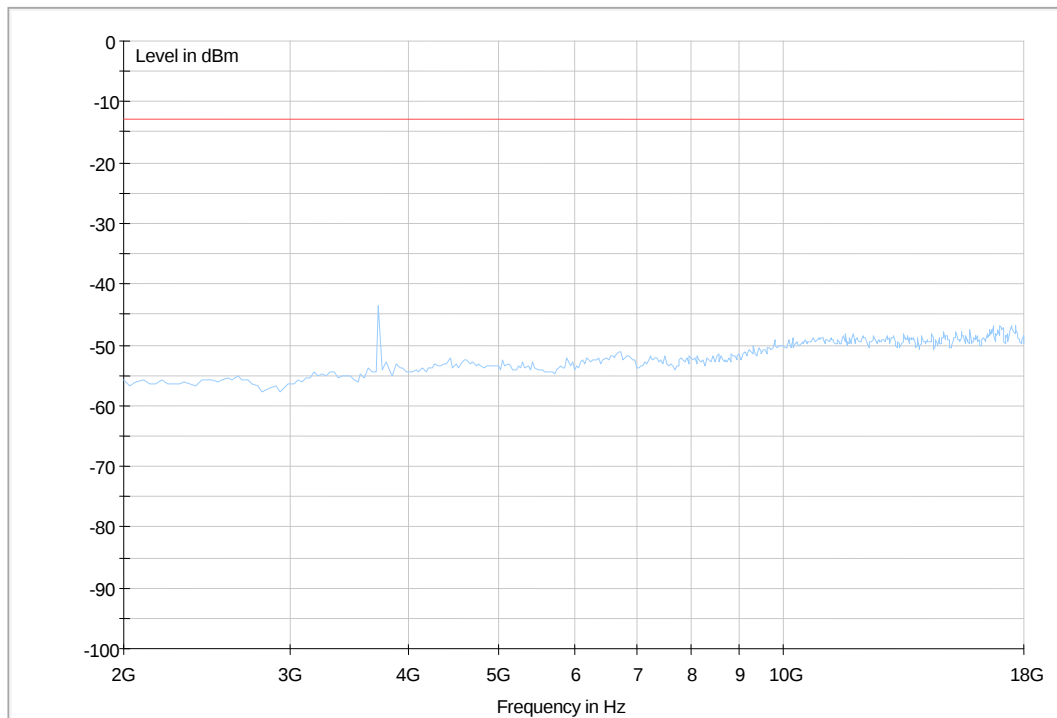
8.3.5 For GPRS 1900 Traffic Mode (9kHz-30MHz)



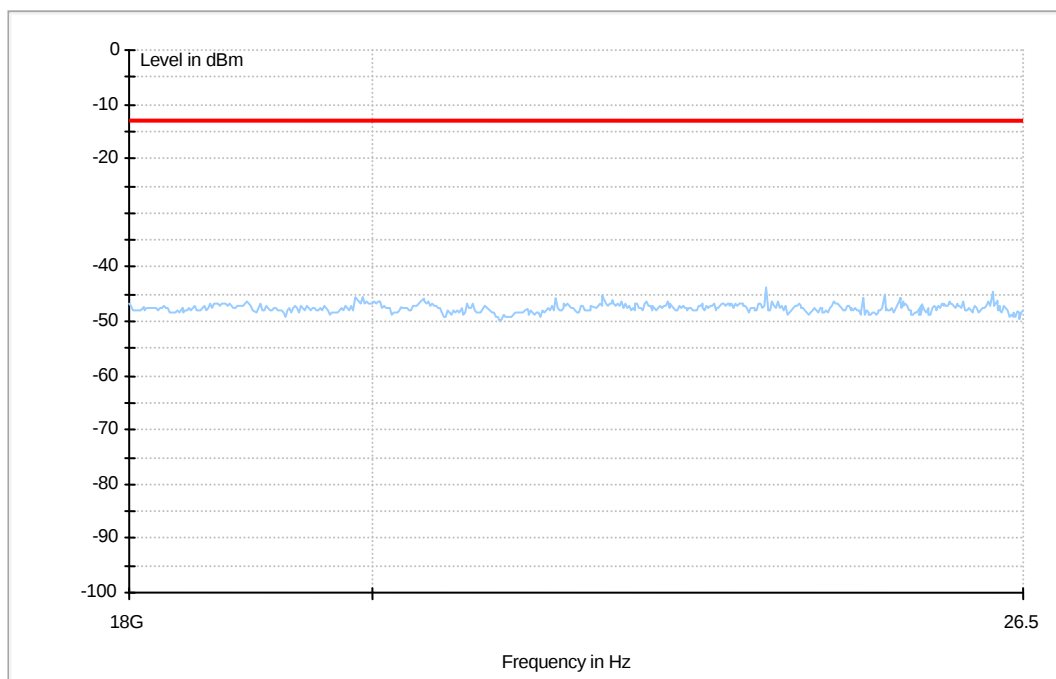
Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)

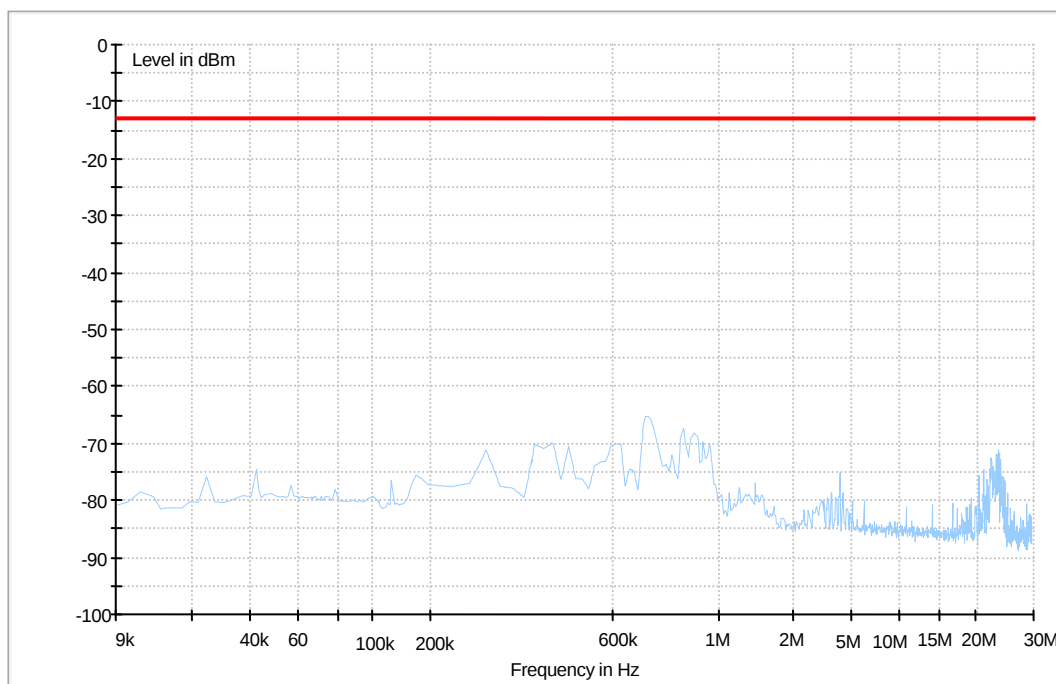


Traffic Mode (18GHz-26.5GHz)

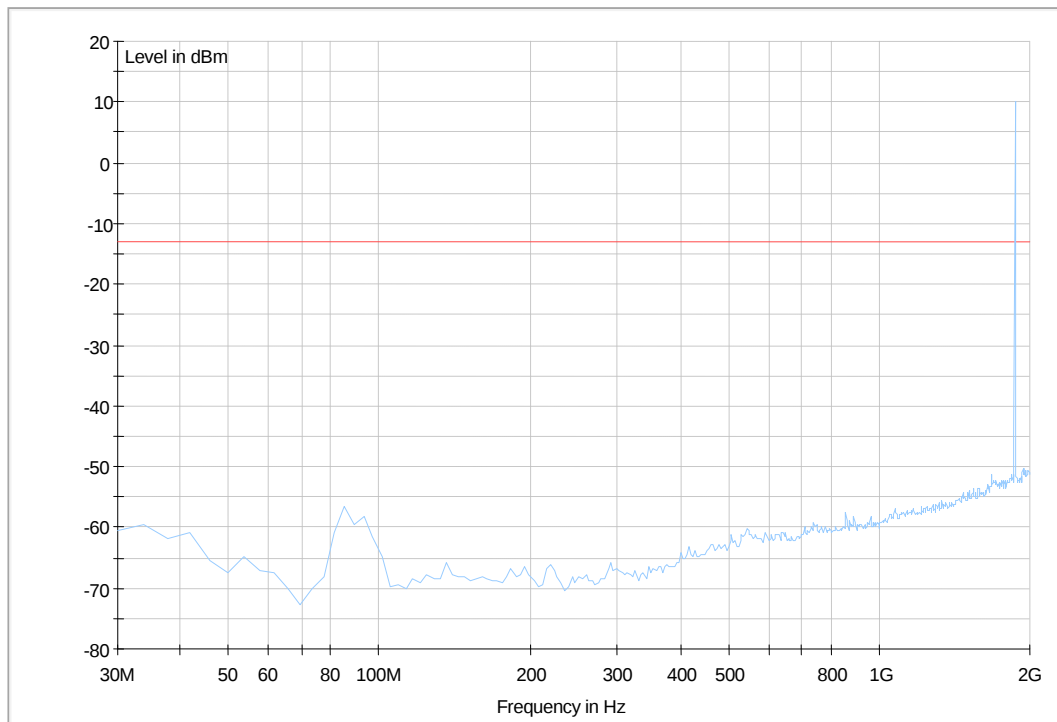


8.3.6 For EDGE 1900

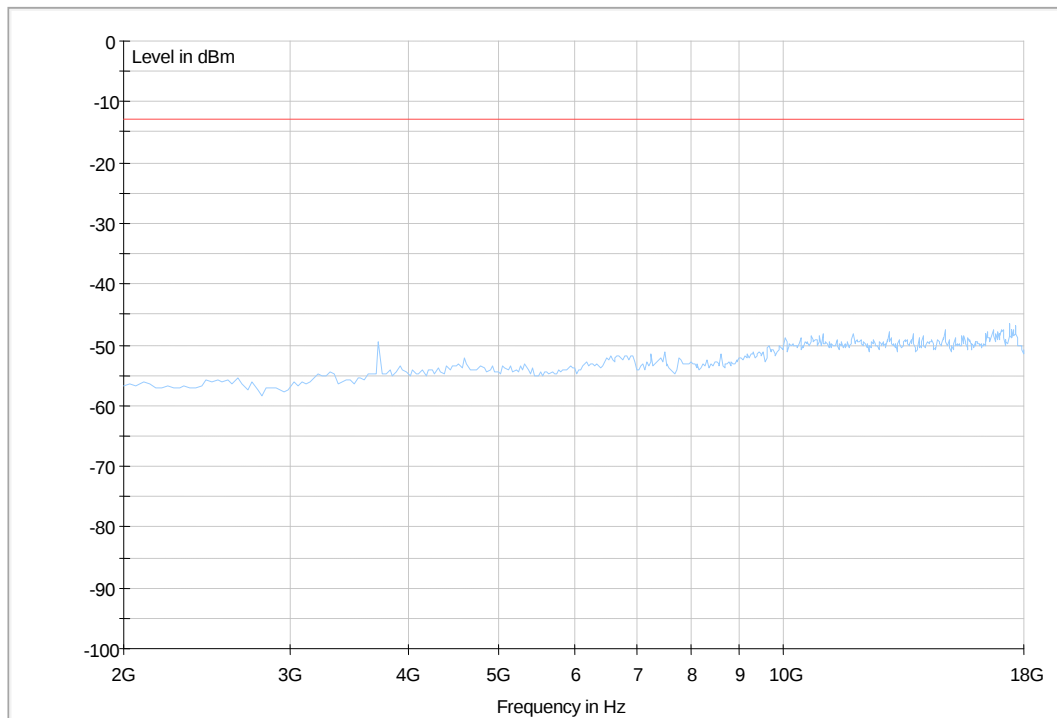
Traffic Mode (9kHz-30MHz)



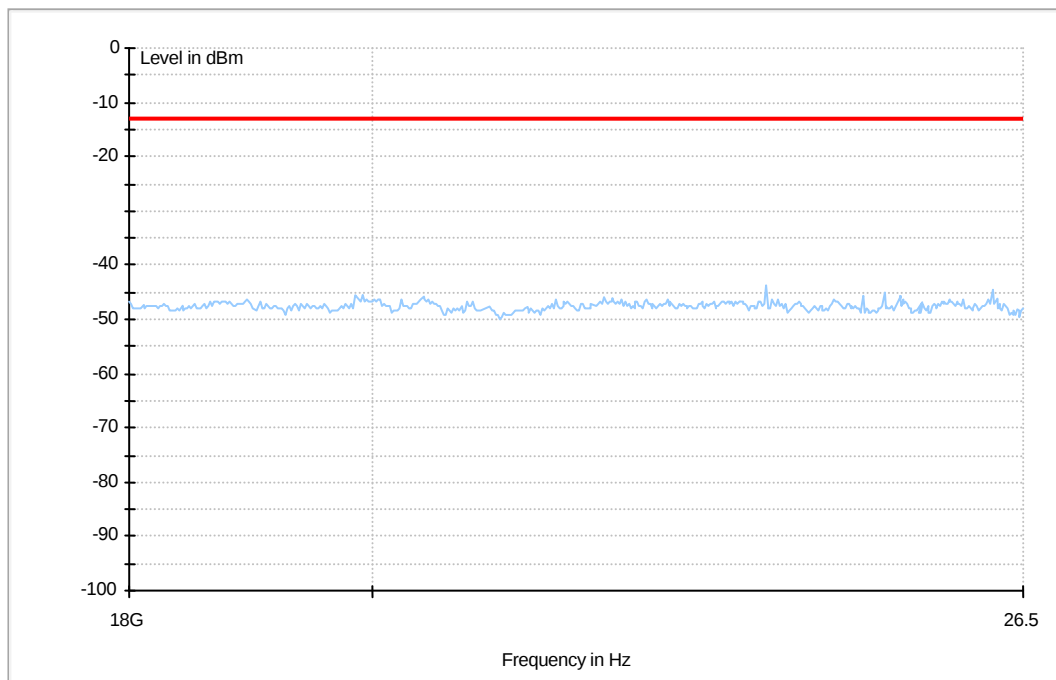
Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)



Traffic Mode (18GHz-26.5GHz)



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