



EMC Test Report

Product Name:
HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth

Model Number:
UM840

Report No: SYBHZ(R)E055072010EB-1
FCC ID: QISUM840

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Modification Information

Modification Information	1	
	2	
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	4	
	5	
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REPORT ON	EMC TEST OF HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth
	M/N: UM840
REGULATION	FCC CFR47 Part 15: Subpart B;
	FCC CFR47 Part 22: Subpart H;
	FCC CFR47 Part 24: Subpart E;
START OF TEST	Jul.29, 2010
END OF TEST	Aug.06, 2010
Final Judgement:	Pass

Approver

2010-08-13
Date

张兴海
Name

Signature



Operator

2010-08-13
Date

温剑锋
Name

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	HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth
MANUFACTURERS MODEL NUMBER	UM840

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 (TM13-TM24)	N/A	Pass	Site1
<u>Conducted Emissions</u>	TC1 (TM1-TM24)	N/A	Pass	Site1
<u>Radiated Spurious Emissions</u> Enclosure Port	TC1 (TM1-TM10)	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 HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth-UM840 is subscriber equipment in the WCDMA/GSM system. The HSDPA frequency bands are Band II and Band V. The GSM/GPRS/EDGE frequency bands include GSM850 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, HSDPA 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:	HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth
Models:	UM840
Input Rated Voltage	3.7V
Extreme Voltage	3.6V and 4.2V
Dimensions	111.5mm (L)×58mm (W)× 12.8mm (H)
Weight	<110g (with battery)

Sub-Assembly Identity

Mode		Work Frequency	
		Transmitt Frequency (MHz)	Receive Frequency (MHz)
GSM	GSM850	824 - 849	869 - 894
	PCS1900	1850-1910	1930-1990
WCDMA	WCDMA850	824 - 849	869 - 894
	WCDMA1900	1850-1910	1930-1990
Bluetooth		2400-2483.5	
WIFI		2400-2483.5	

3.2 Sub-Assembly Identity

Sub-Assembly Identity

Board				
Model Name	Qty.	Serial	Description	
UM840	1	3M2AA11071500176	Main board of Mobile Phone	
Accessory				
Name	Qty.	Manufacture	Serials number	Description
Adapter	1	Huawei Technologies Co., Ltd.	HKAA51556776	Adapter Model: HW-050100U1W Input Voltage : ~100-240V 50/60Hz 0.2A Output Voltage: $\overline{\text{---}}$ 5.0V 1A Rated Power: 2W
Rechargeable Li-ion	1	Huawei Technologies Co., Ltd.	YACA501HI1824574	Battery Model: HB5A2H Rated capacity: 1150mAh Nominal Voltage: $\overline{\text{---}}$ +3.7V Charging Voltage: $\overline{\text{---}}$ +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
AC Power Adapter	1	Unshielded
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	3608105673	2009-10-10
Notebook	T43	LENOVO	H3106010123	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~TM24
---------	----------

4.3.2 Test Mode

There were 24 test Modes. TM1 to TM24 were shown in the diagrams below:

TM1	operate in traffic mode GSM850;
TM2	operate in traffic mode GSM1900;
TM3	operate in traffic mode WCDMA 850;
TM4	operate in traffic mode WCDMA 1900;
TM5	operate in traffic mode GPRS850;
TM6	operate in traffic mode GPRS 1900;
TM7	operate in traffic mode HSDPA 850;
TM8	operate in traffic mode HSDPA 1900;
TM9	operate in traffic mode EDGE850;
TM10	operate in traffic mode EDGE1900;
TM11	operate in traffic mode Bluetooth;
TM12	operate in traffic mode WIFI;
TM13	operate in idle mode GSM850;
TM14	operate in idle mode GSM1900;
TM15	operate in idle mode WCDMA 850;

TM16	operate in idle mode WCDMA 1900;
TM17	operate in idle mode GPRS850;
TM18	operate in idle mode GPRS 1900;
TM19	operate in idle mode HSDPA 850;
TM20	operate in idle mode HSDPA 1900;
TM21	operate in idle mode EDGE850;
TM22	operate in idle mode EDGE1900;
TM23	operate in idle mode Bluetooth;
TM24	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. (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.

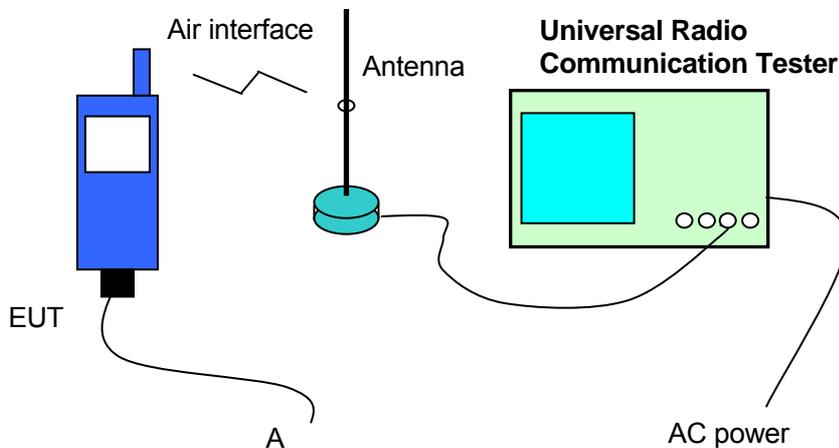


Figure 1.: Test Configuration

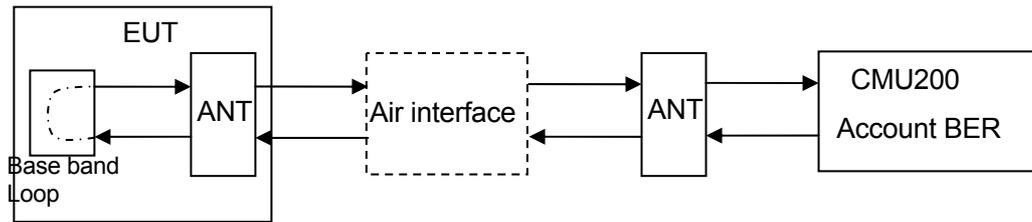
Idle Mode:

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 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:

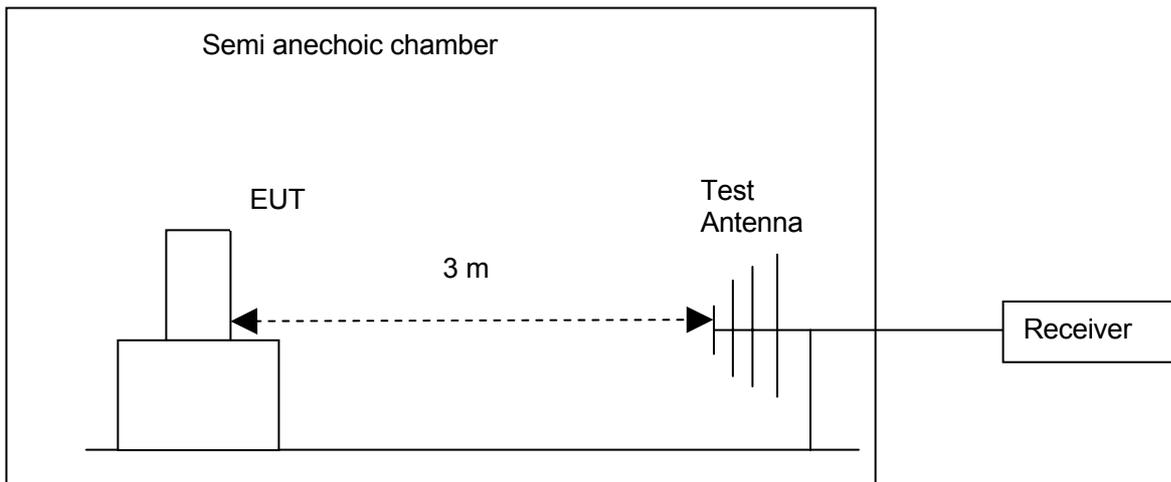


Figure 3. Test set-up

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.

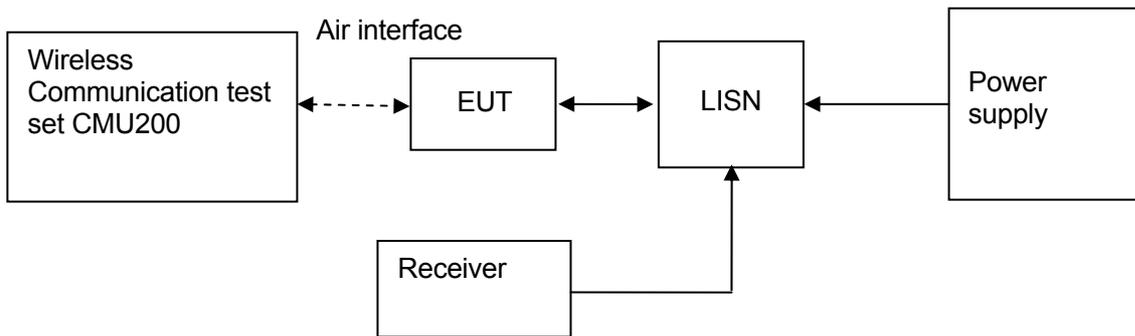


Figure 4. Test Set-up

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 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

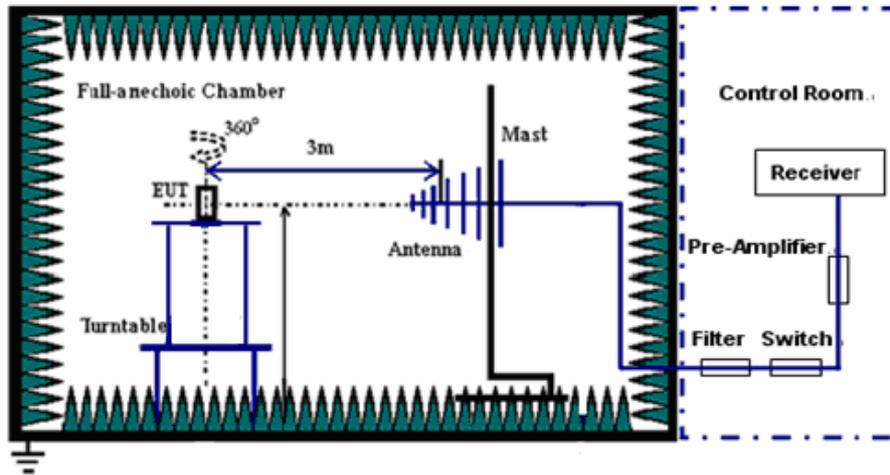
5.3.1 Test Procedure

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:

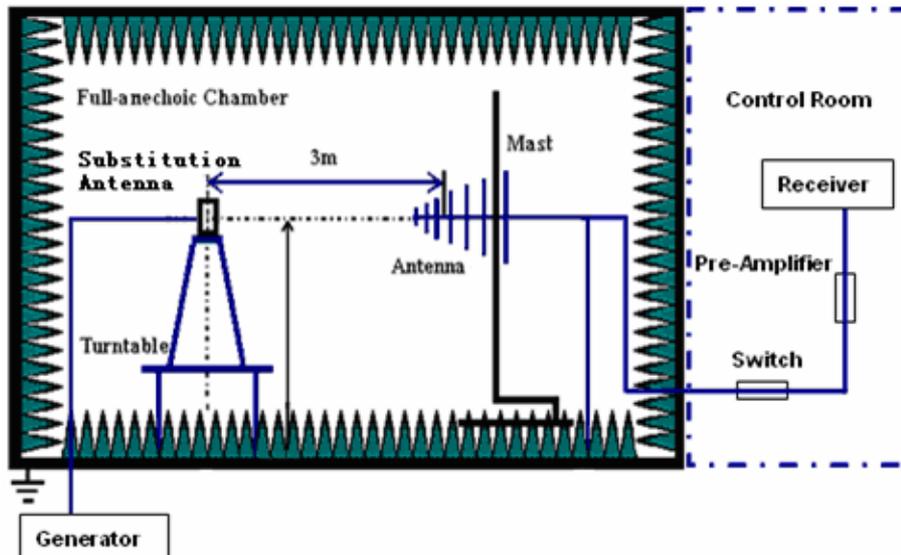
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect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

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 9 kHz up to 150 kHz: 1 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,

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

NOTE: SGP- Signal Generator Level

5.3.2 Test Results

The EUT has met the requirements of FCC Part22/24 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	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	April.22, 2010	12
	Broadband Antenna	CBL6112B	SCHAFFNER	Sep.21.2009	12
	Horn Antenna	3117	ETS-Lindgren	Sep.11.2009	12
	Horn Antenna	3160	ETS-Lindgren	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

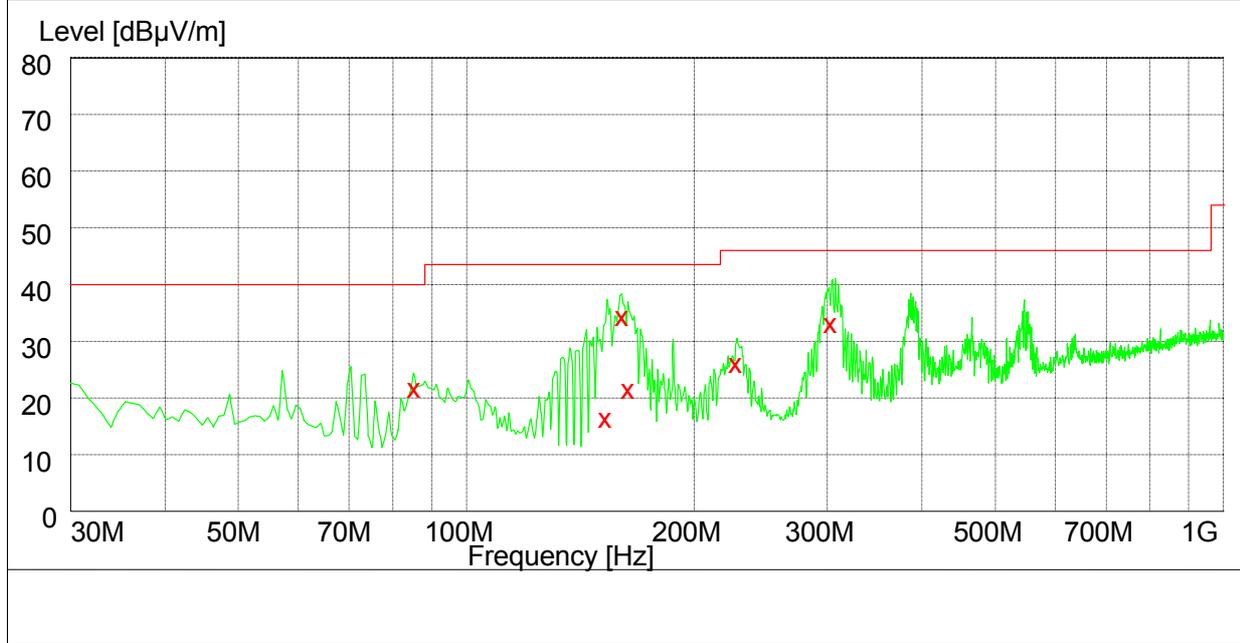
Items		Extended Uncertainty
RE	Field strength (dB μ V/m)	U=4.1dB; k=2(30MHz-1GHz)
RE	Field strength (dB μ V/m)	U=4.1dB; k=2(1GHz-18GHz)
RSE	ERP (dBm)	U=2.2dB; k=2
CE	Disturbance Voltage (dB μ V)	U=3.4dB; k=2

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.

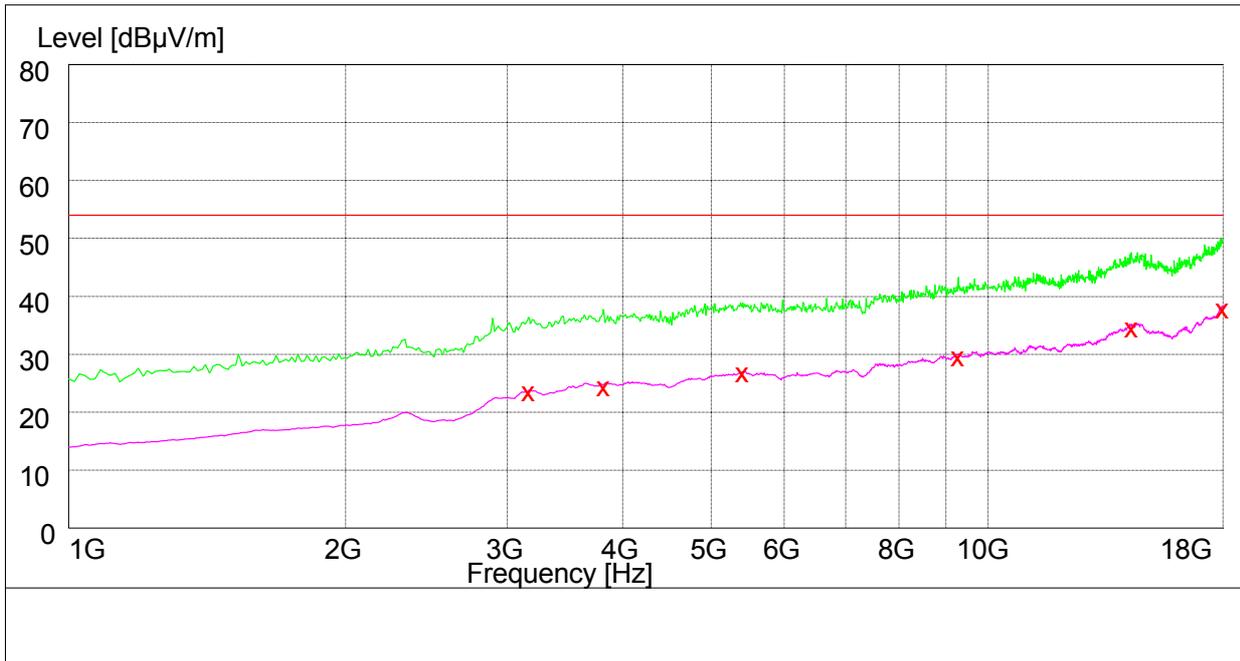
30MHz-1GHz



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
85.380000	21.60	10.3	40.0	18.4	133.0	101.00	VERTICAL
152.940000	16.30	9.1	43.5	27.2	100.0	0.00	VERTICAL
160.680000	34.40	9.6	43.5	9.1	100.0	360.00	VERTICAL
163.860000	21.30	9.8	43.5	22.2	101.0	133.00	VERTICAL
227.460000	25.90	13.4	46.0	20.1	186.0	270.00	HORIZONTAL
303.060000	32.90	15.6	46.0	13.1	206.0	284.00	HORIZONTAL

1GHz-18GHz



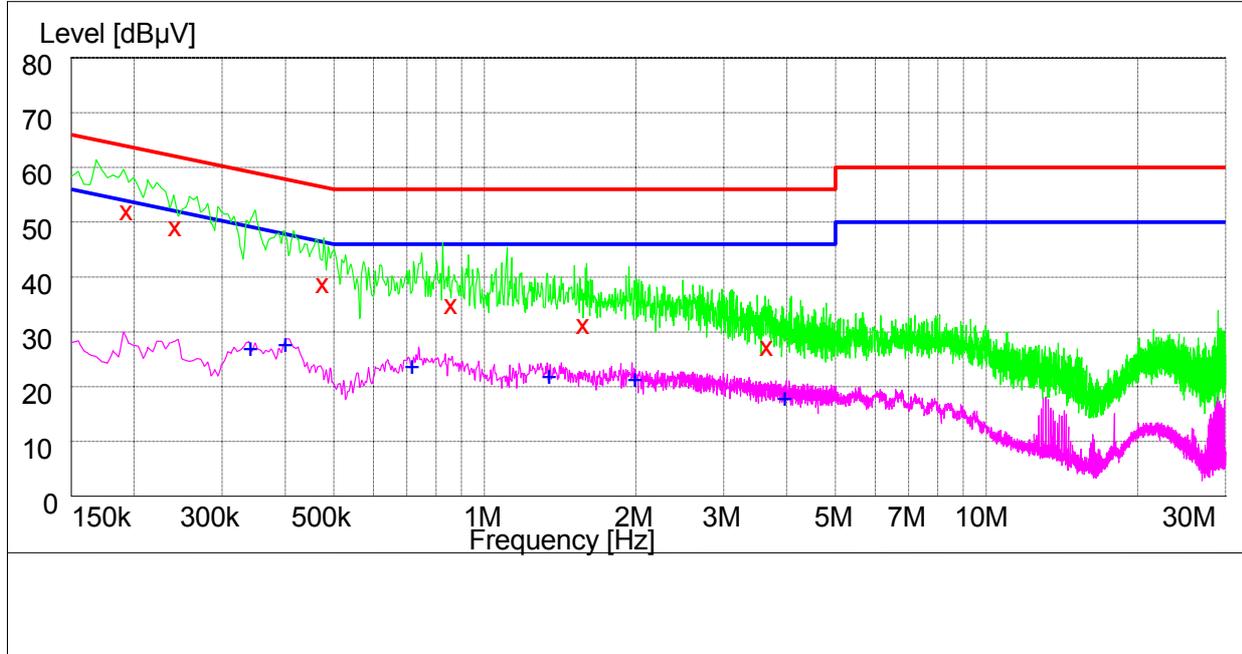
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
3165.500000	23.30	-8.4	54.0	30.7	121.0	245.00	HORIZONTAL
3821.500000	24.20	-6.3	54.0	29.8	132.0	359.00	HORIZONTAL
5405.000000	26.60	-2.5	54.0	27.4	200.0	126.00	VERTICAL
9282.500000	29.40	4.6	54.0	24.6	179.0	16.00	HORIZONTAL
14329.500000	34.40	11.8	54.0	19.6	200.0	323.00	HORIZONTAL
17988.000000	37.60	17.2	54.0	16.4	122.0	197.00	HORIZONTAL

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
0.194000	51.90	10.1	64	12.1	N	FLO
0.242000	49.00	10.0	62	13.0	N	FLO
0.476000	38.70	10.1	56	17.3	N	FLO
0.860000	34.80	10.1	56	21.2	N	FLO
1.576000	31.30	10.1	56	24.7	N	FLO
3.654000	27.30	10.2	56	28.7	N	FLO

MEASUREMENT RESULT: AV Detector

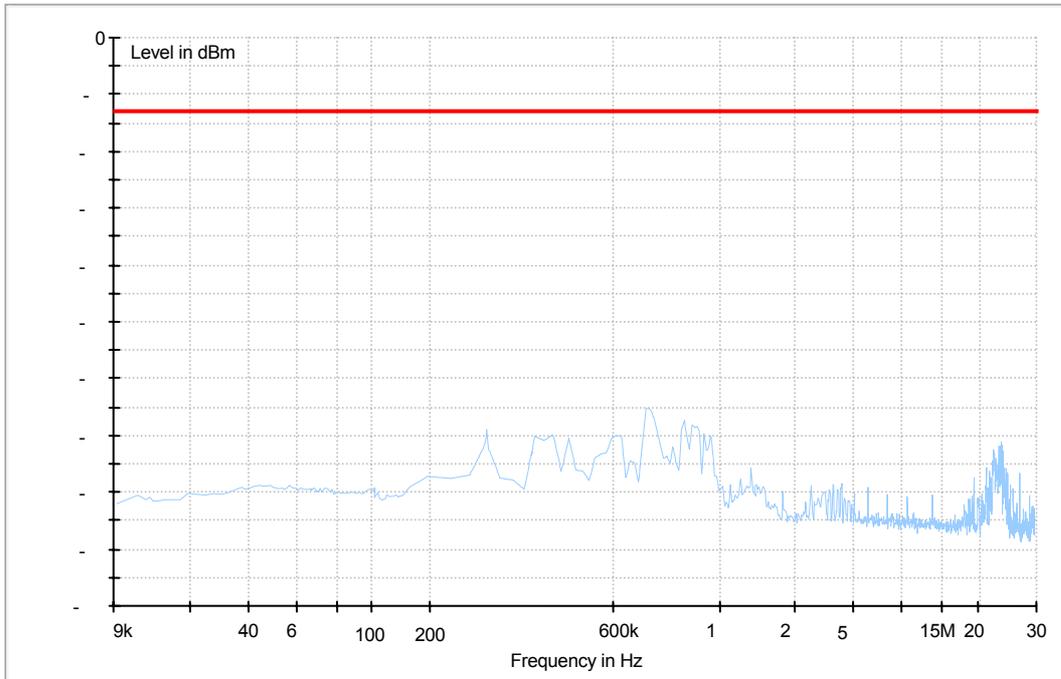
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.342000	26.70	10.0	49	22.3	N	FLO
0.400000	27.40	10.0	48	20.6	N	FLO
0.716000	23.50	10.1	46	22.5	N	FLO
1.344000	21.60	10.1	46	24.4	N	FLO
1.998000	21.10	10.1	46	24.9	N	FLO
3.964000	17.60	10.2	46	28.4	N	FLO

8.3 Radiated Spurious Emission

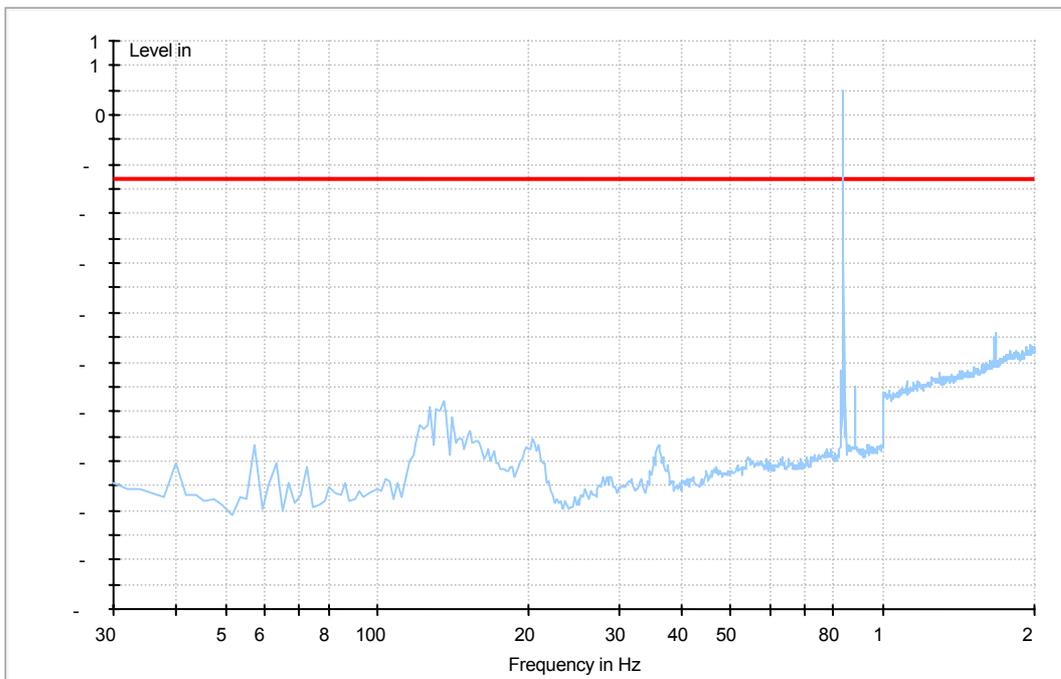
This test results are the maximum level of radiated spurious emissions in vertical and horizontal polarity.

8.3.1 For GSM 850

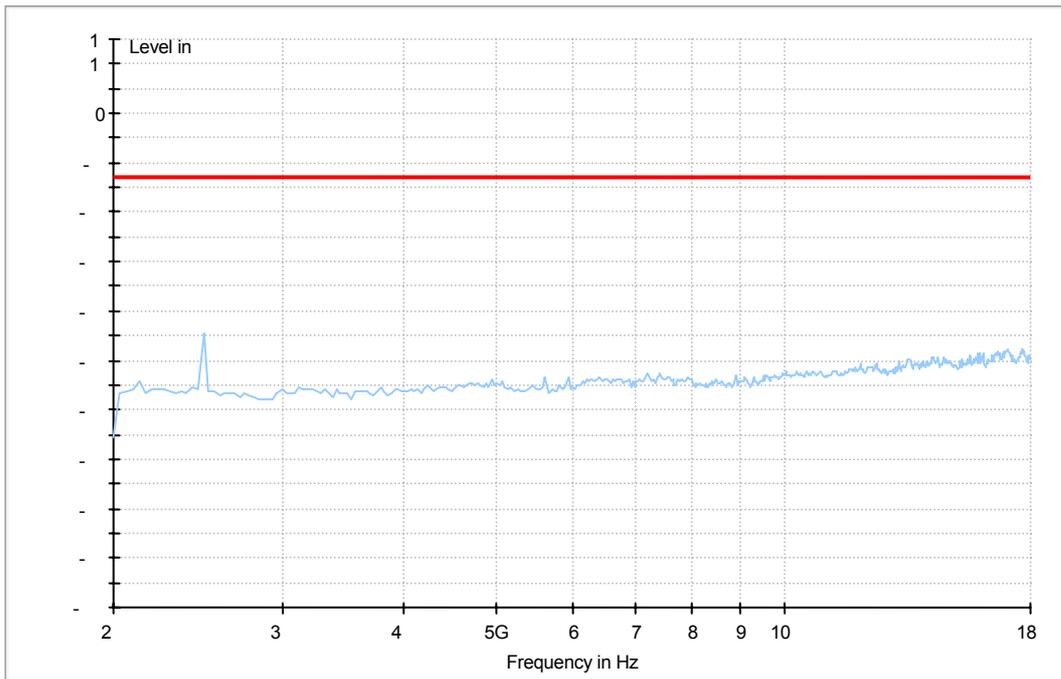
Traffic Mode (9kHz-30MHz)



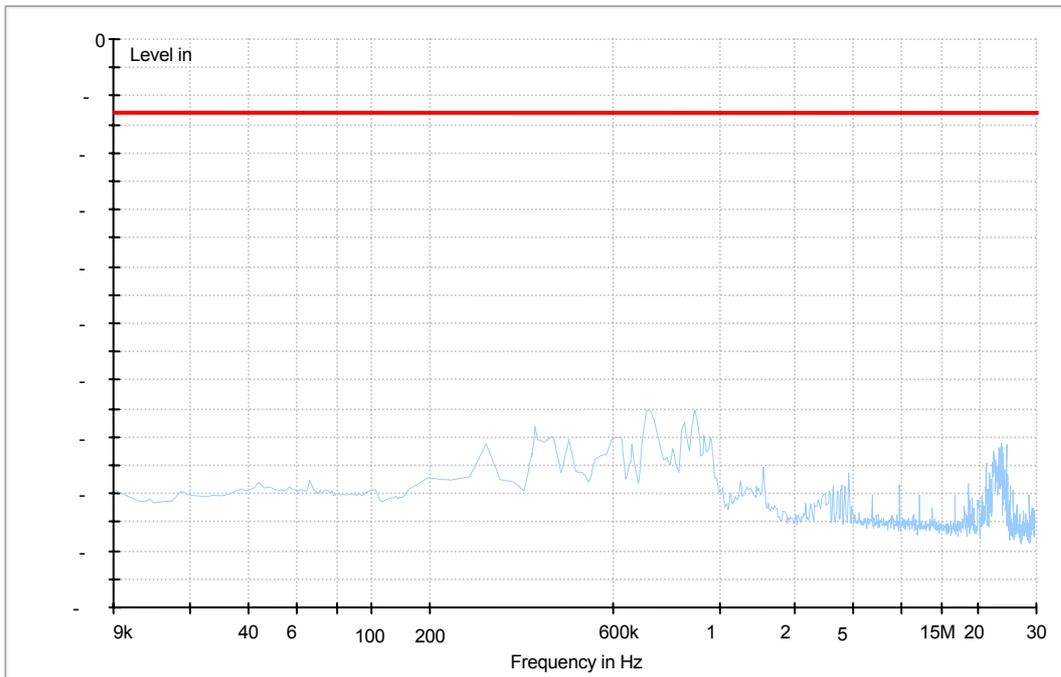
Traffic Mode (30MHz-2GHz)



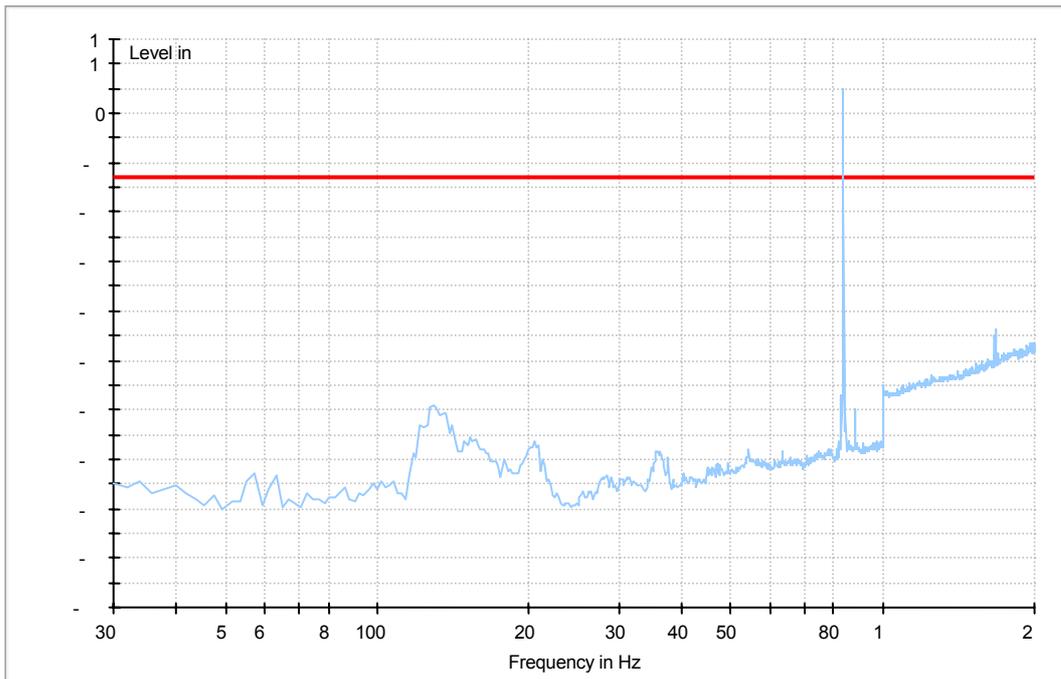
Traffic Mode (2GHz-18GHz)



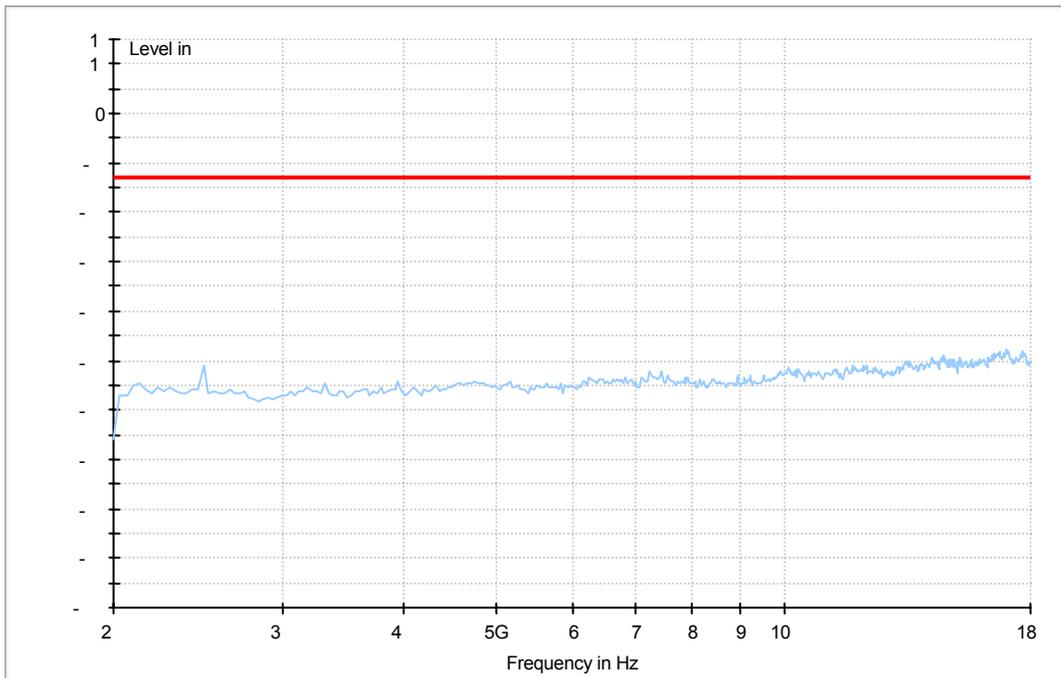
8.3.2 For GPRS 850
Traffic Mode (9kHz-30MHz)



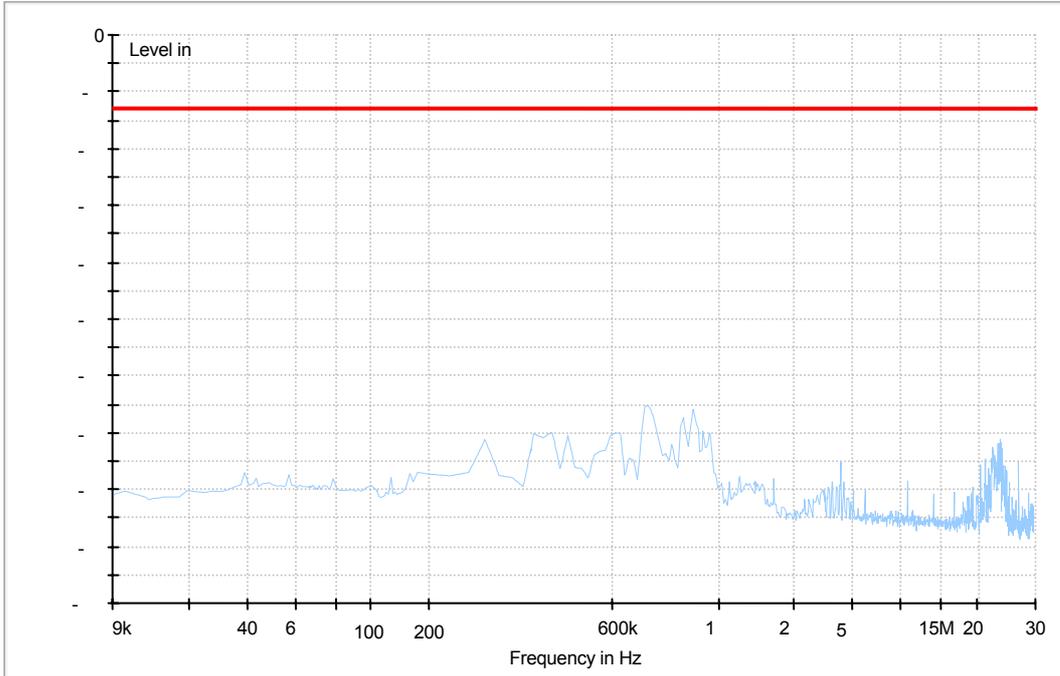
Traffic Mode (30MHz-2GHz)



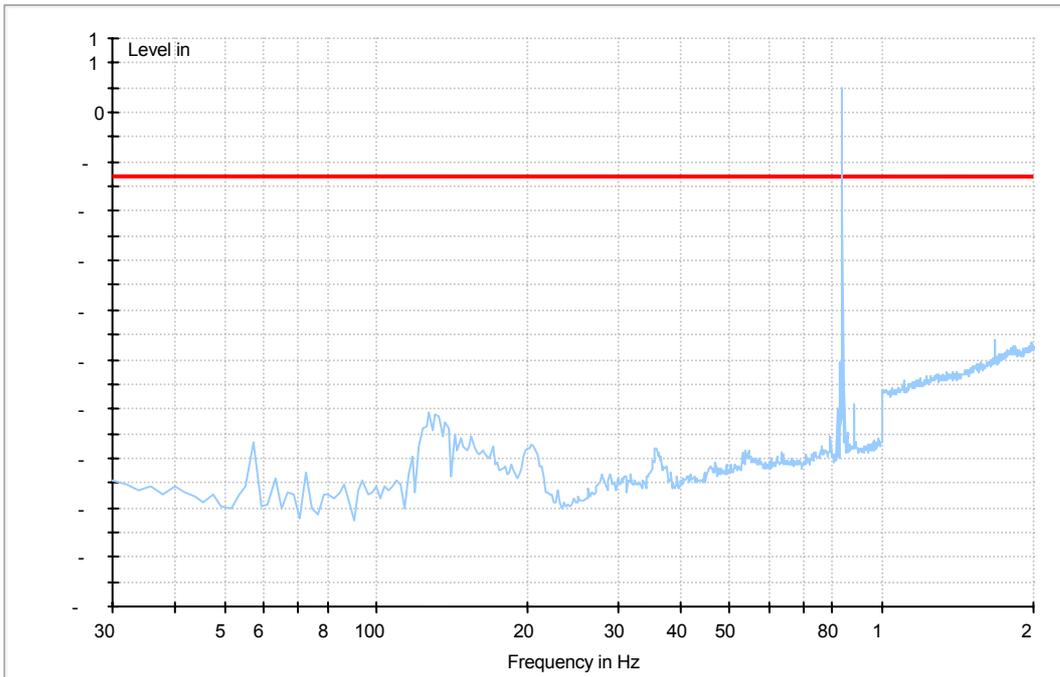
Traffic Mode (2GHz-18GHz)



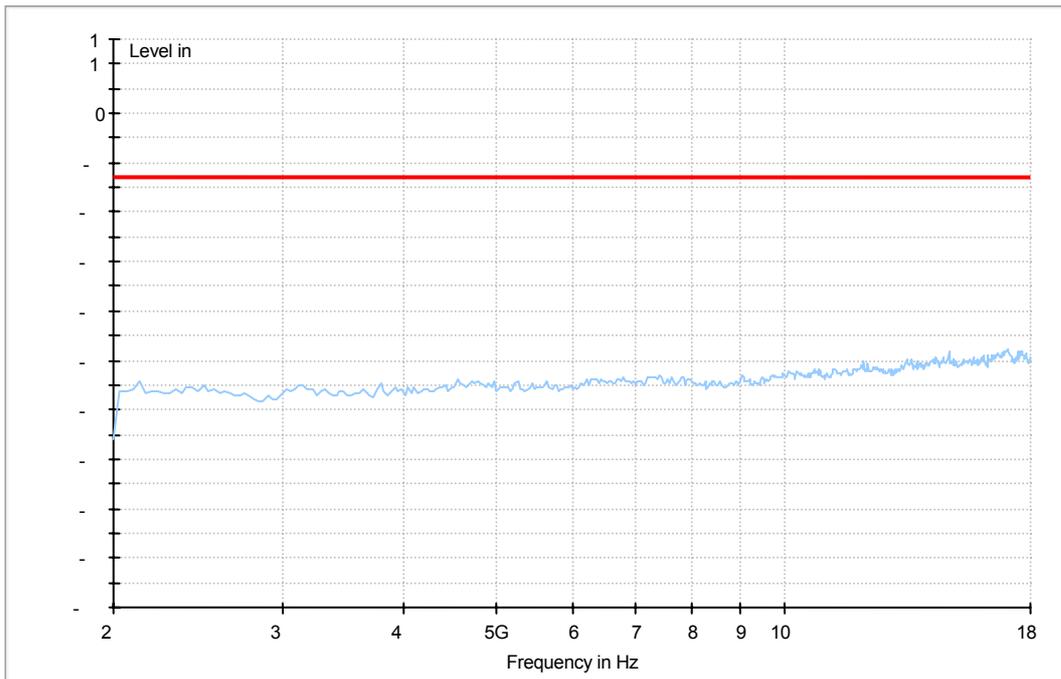
8.3.3 For EDGE 850 Traffic Mode (9kHz-30MHz)



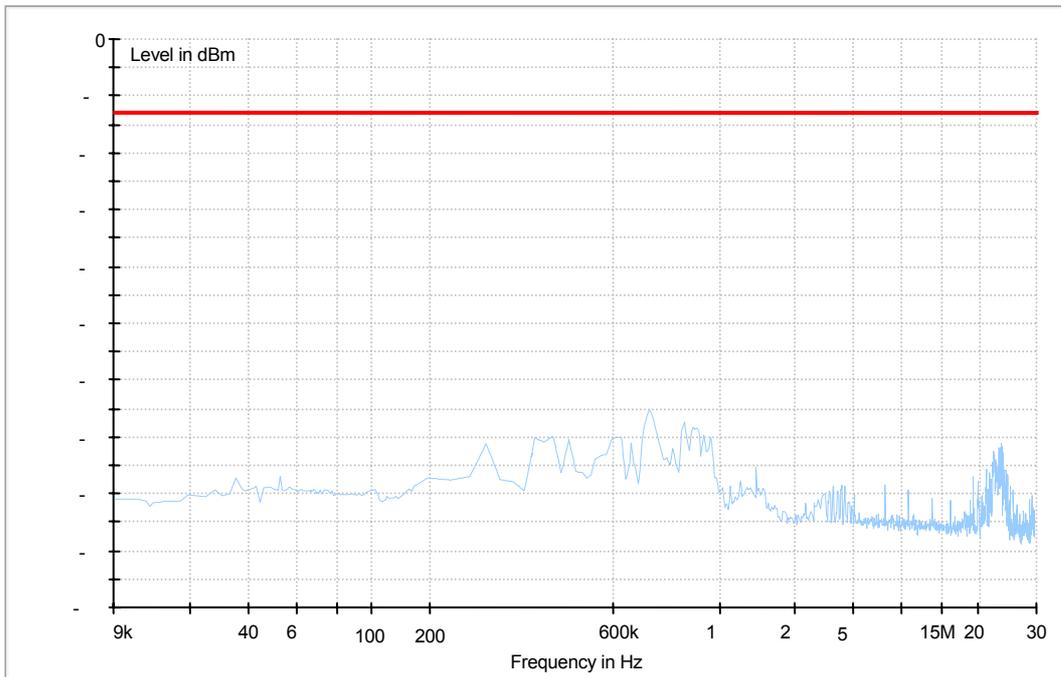
Traffic Mode (30MHz-2GHz)



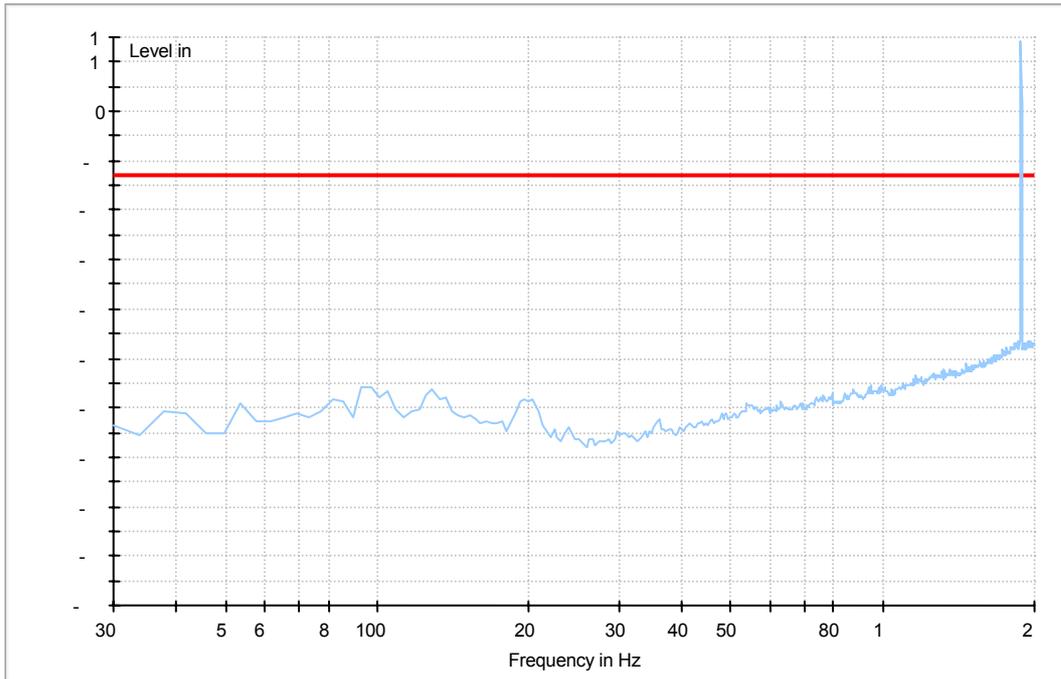
Traffic Mode (2GHz-18GHz)



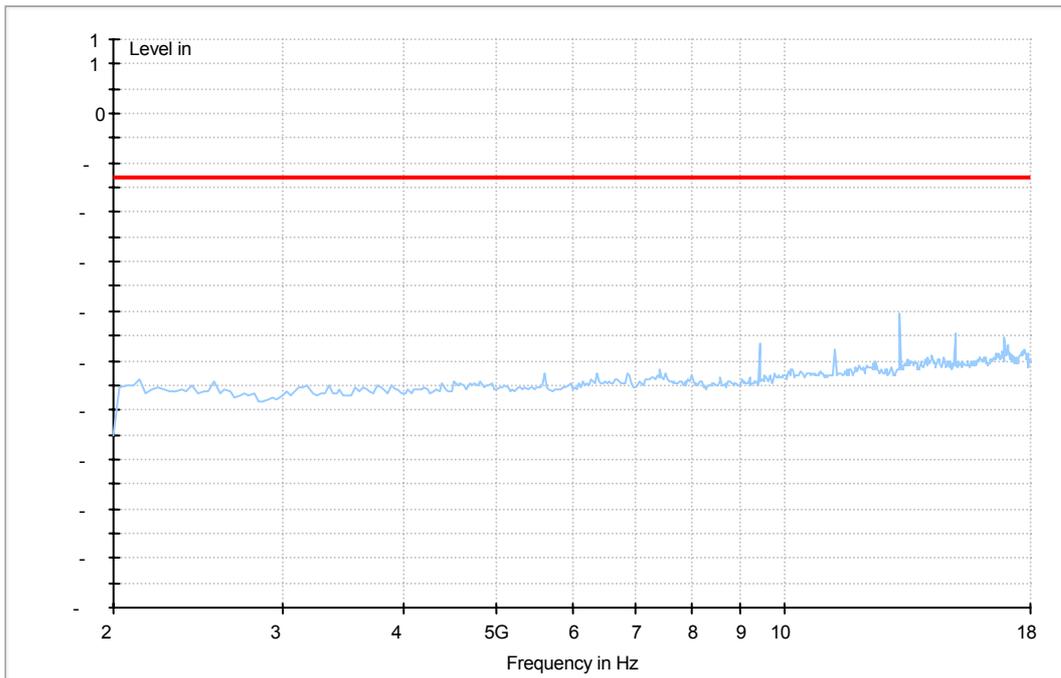
8.3.4 For GSM 1900
Traffic Mode (9kHz-30MHz)



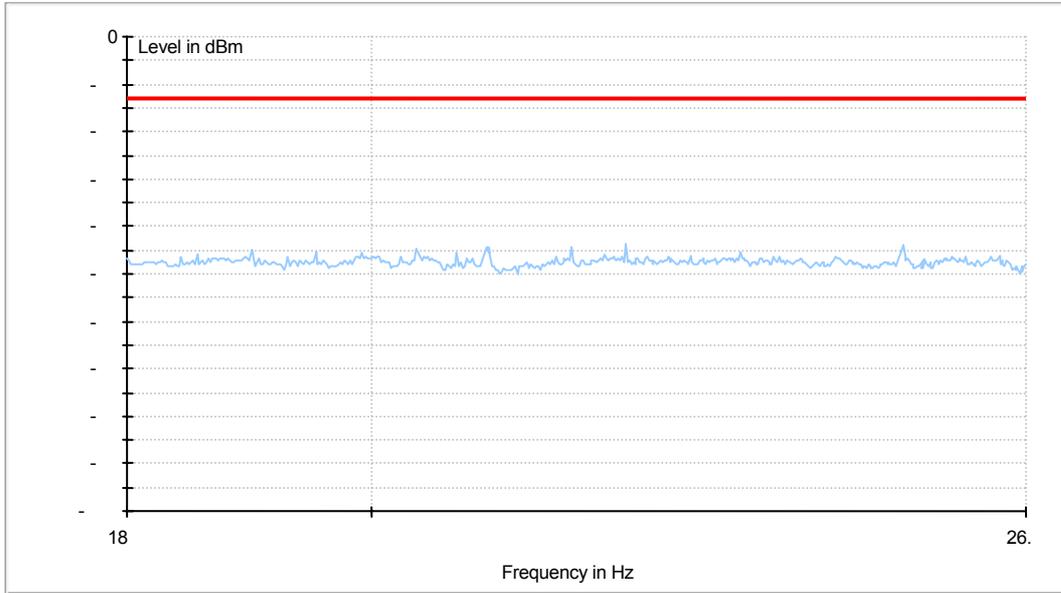
Traffic Mode (30MHz-2GHz)



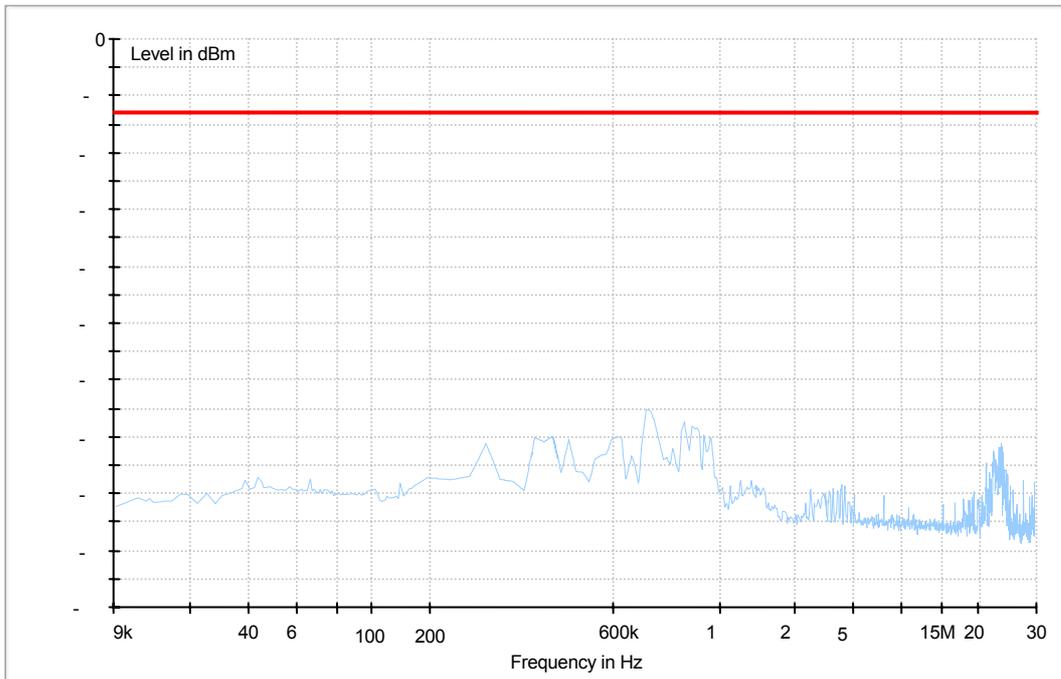
Traffic Mode (2GHz-18GHz)



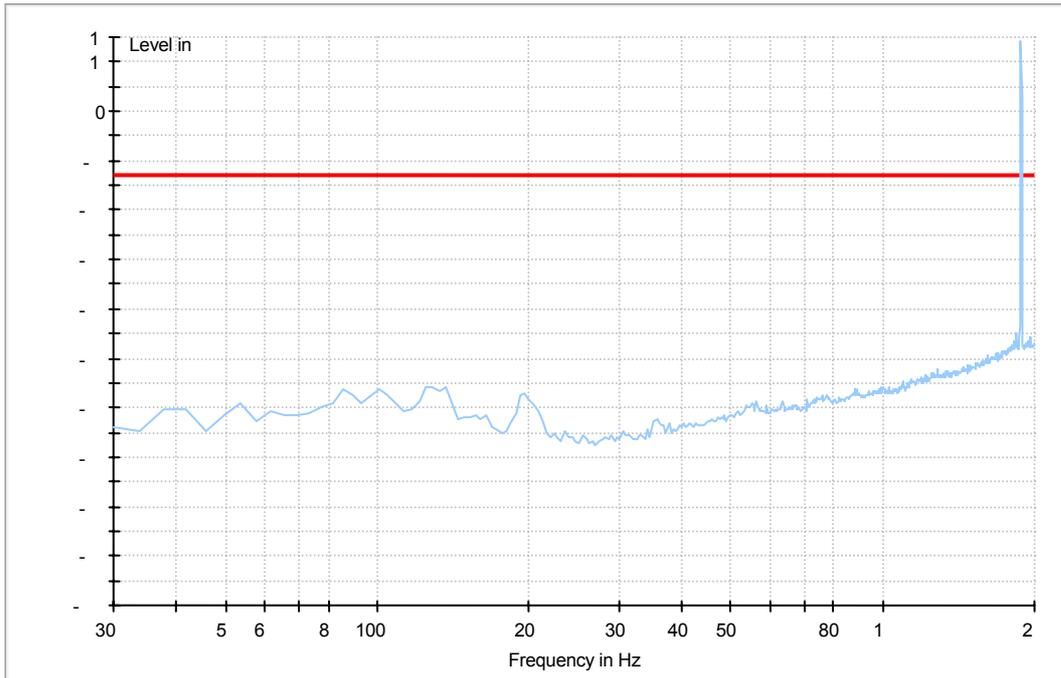
Traffic Mode (18GHz-26.5GHz)



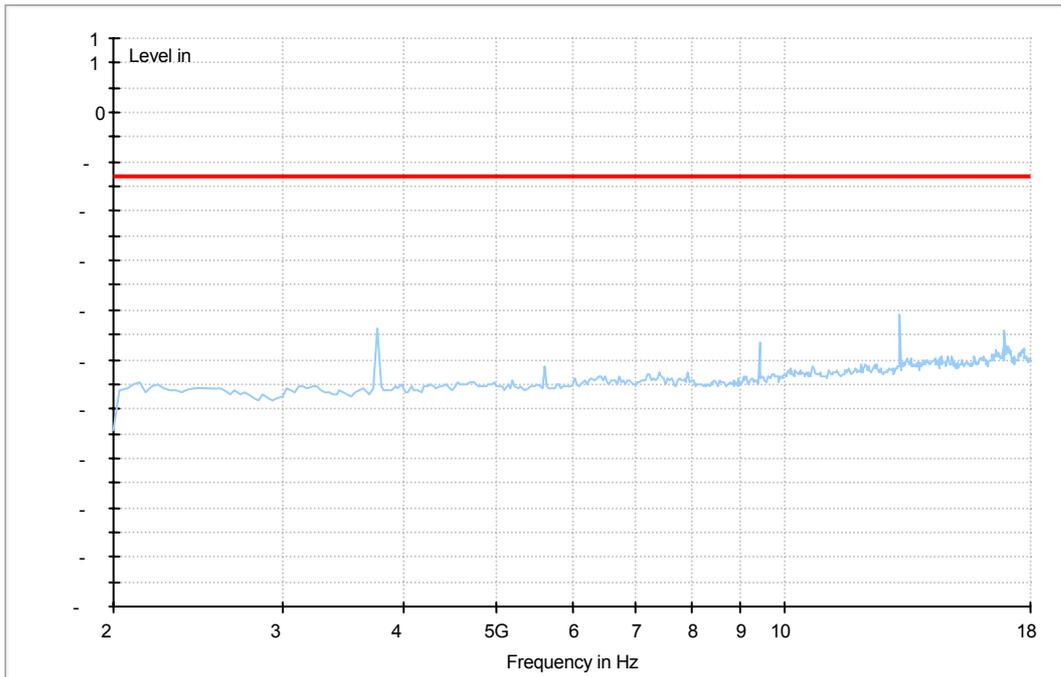
8.3.5 For GPRS 1900 Traffic Mode (9kHz-30MHz)



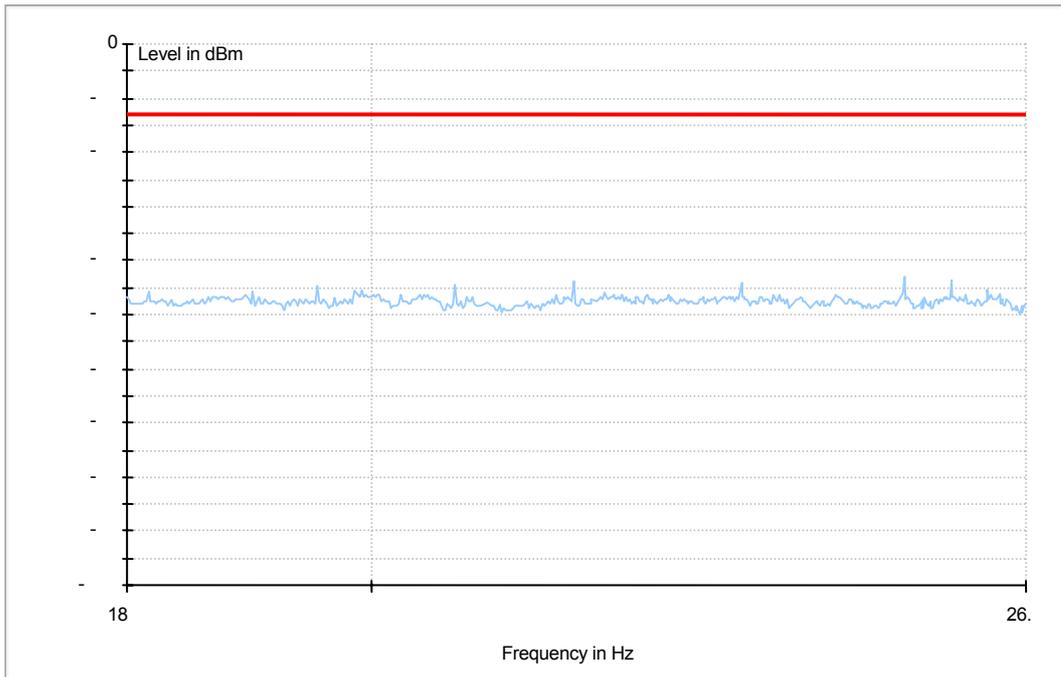
Traffic Mode (30MHz-2GHz)



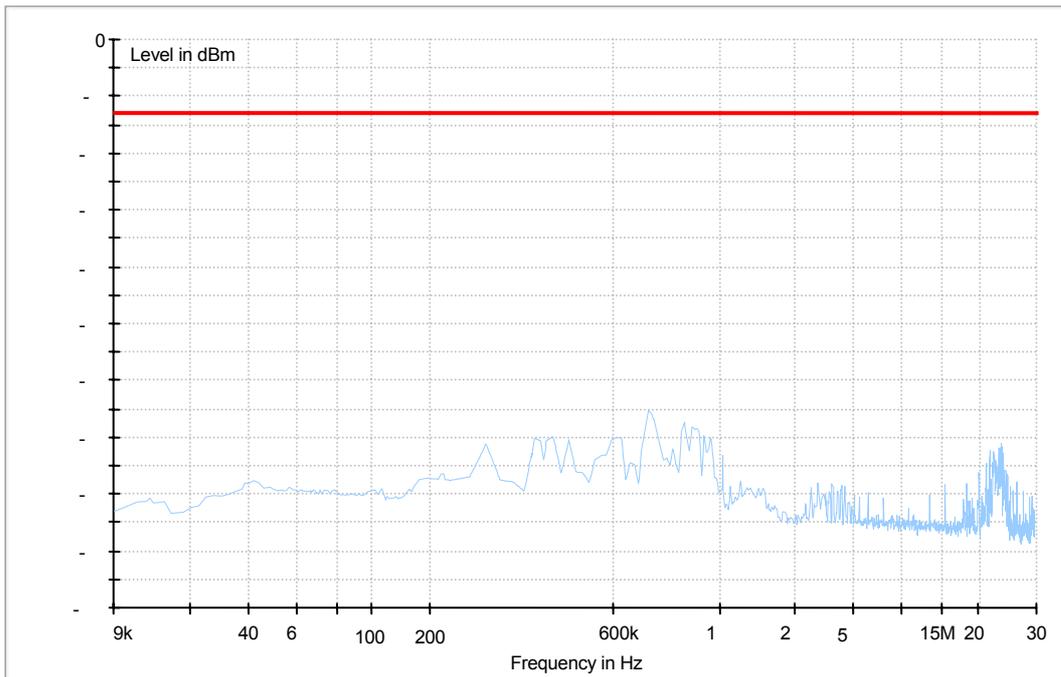
Traffic Mode (2GHz-18GHz)



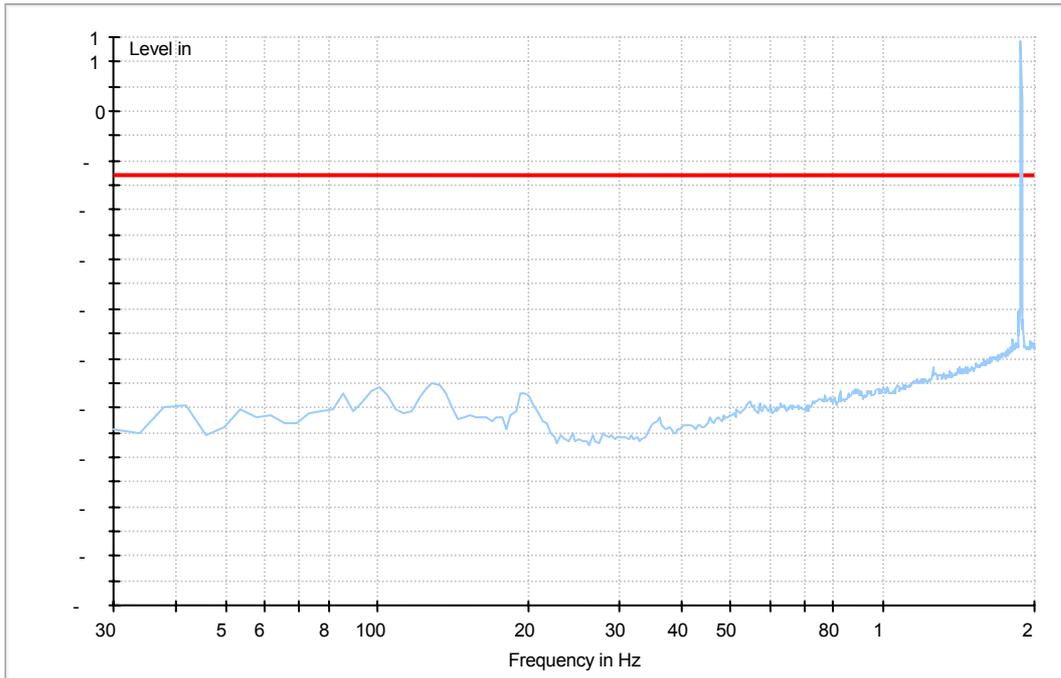
Traffic Mode (18GHz-26.5GHz)



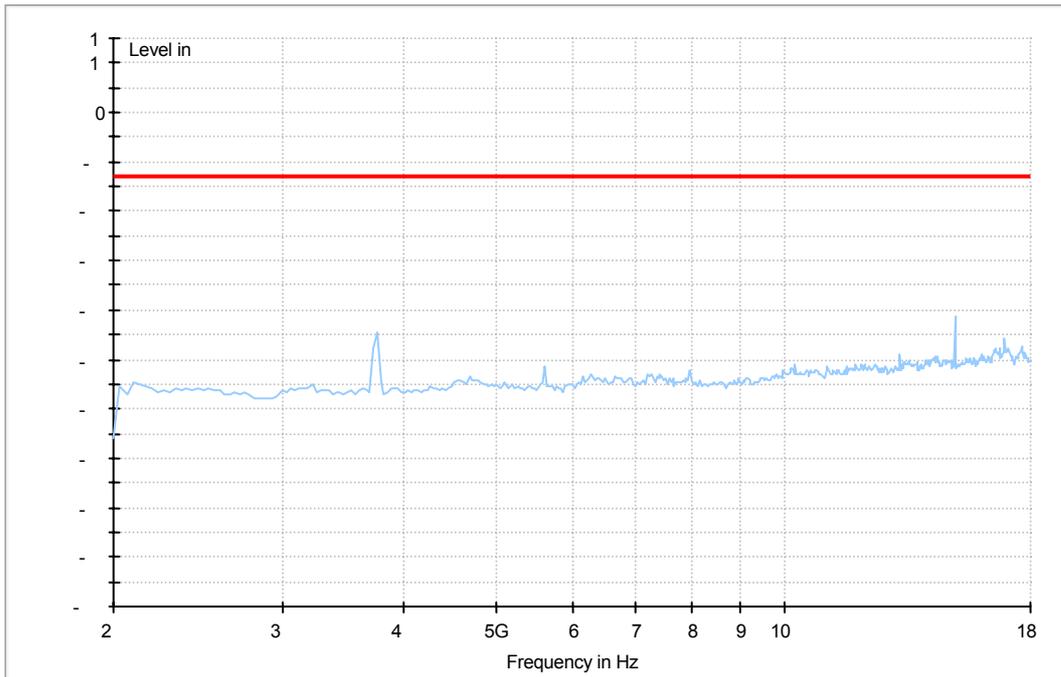
8.3.6 For EDGE 1900 Traffic Mode (9kHz-30MHz)



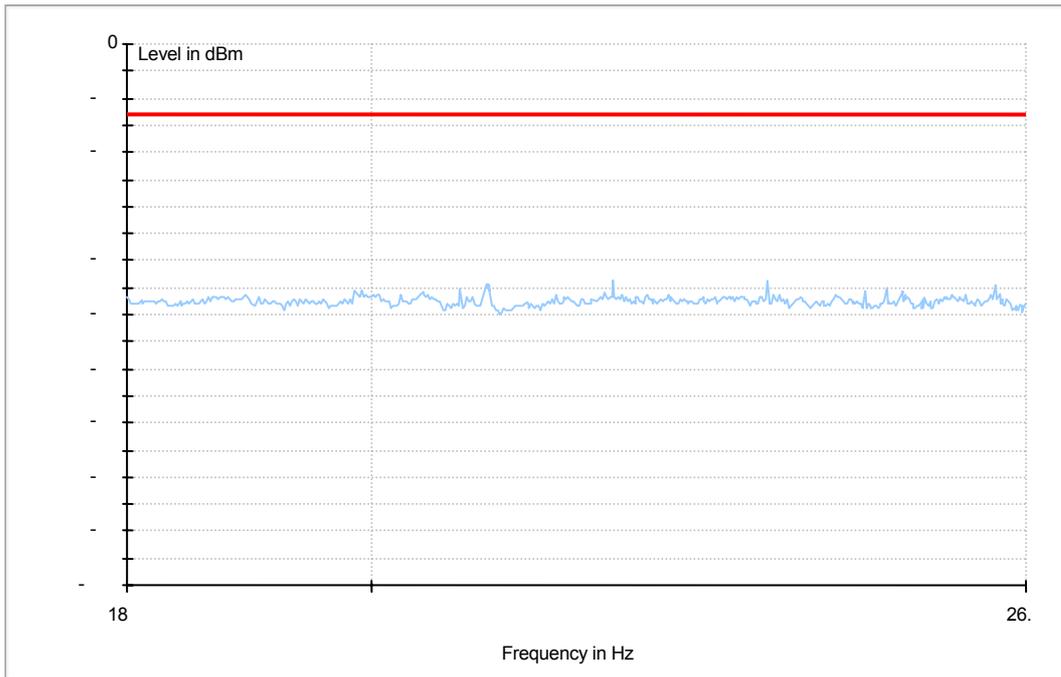
Traffic Mode (30MHz-2GHz)



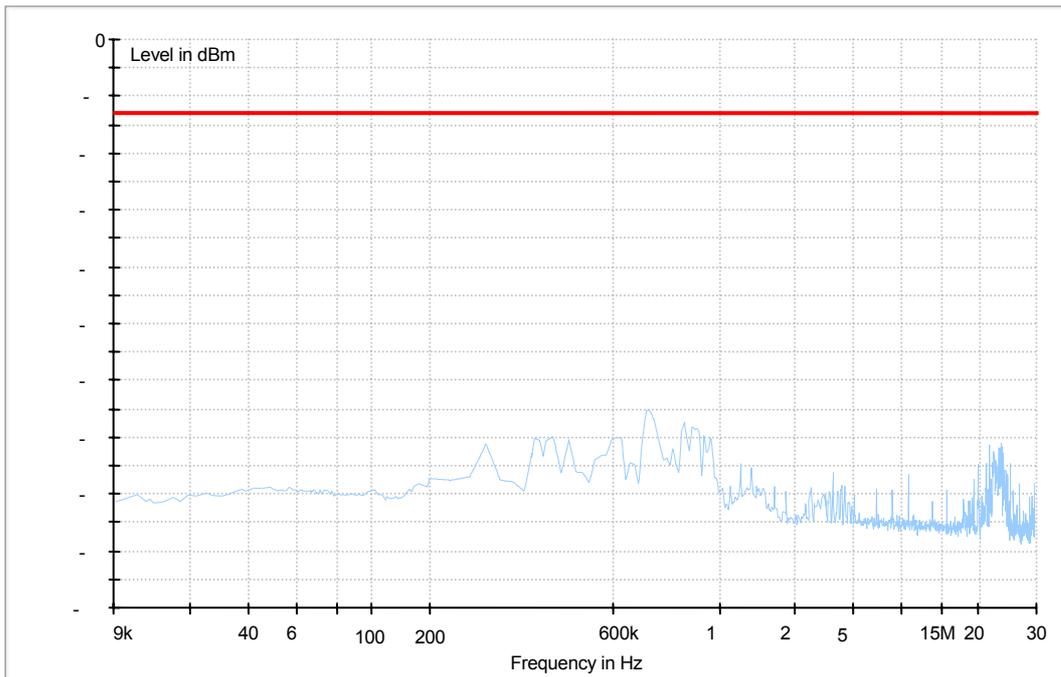
Traffic Mode (2GHz-18GHz)



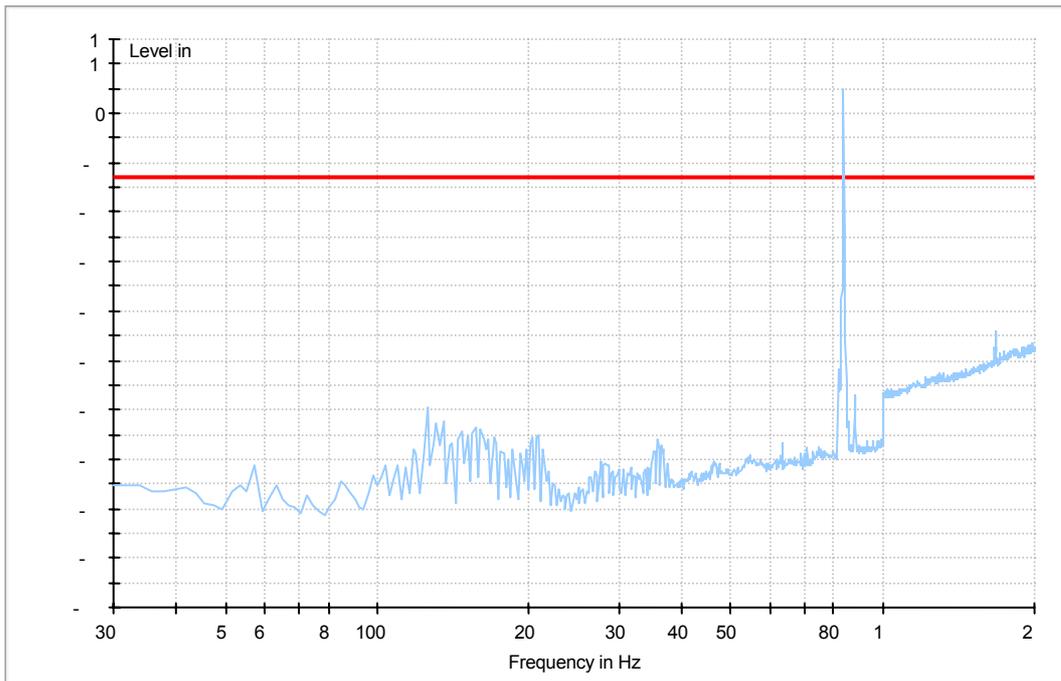
Traffic Mode (18GHz-26.5GHz)



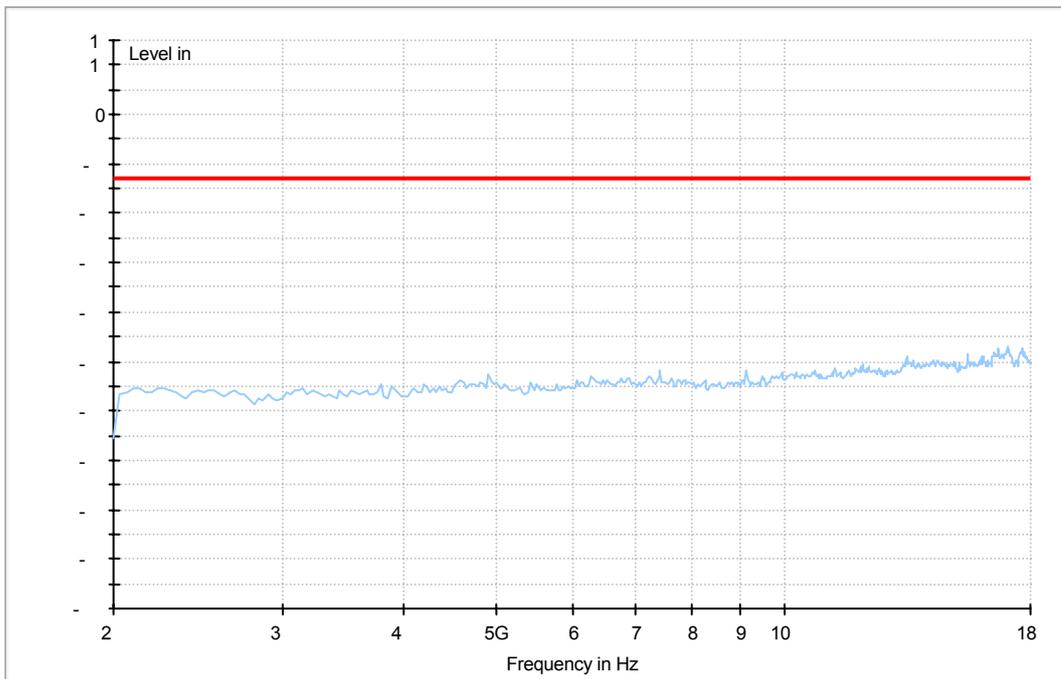
8.3.7 For WCDMA 850
Traffic Mode (9kHz-30MHz)



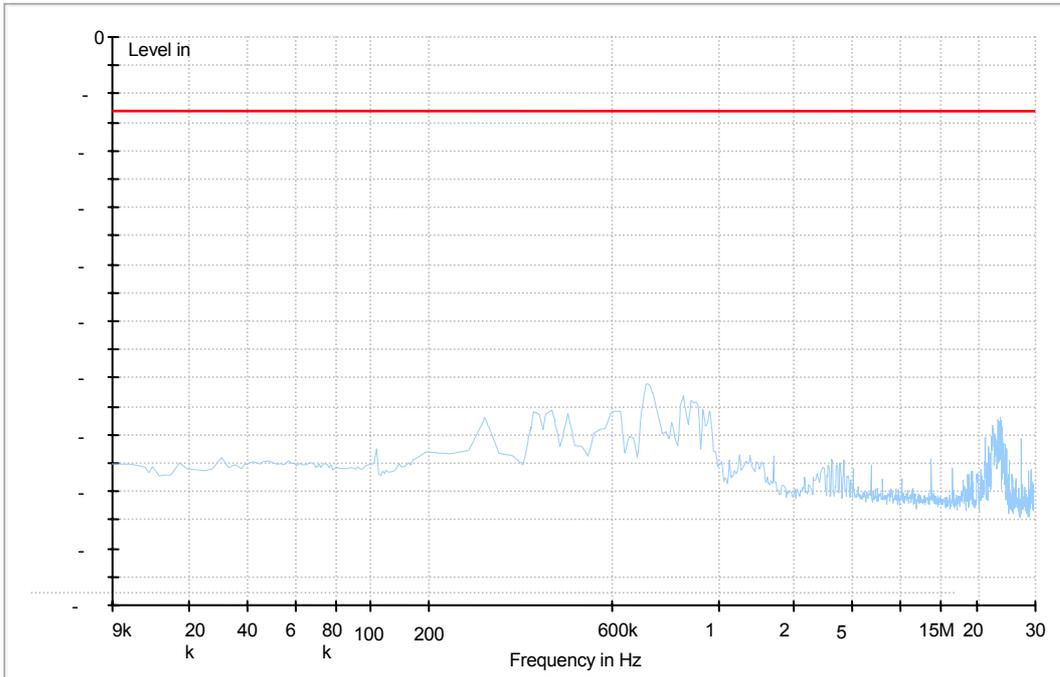
Traffic Mode (30MHz-2GHz)



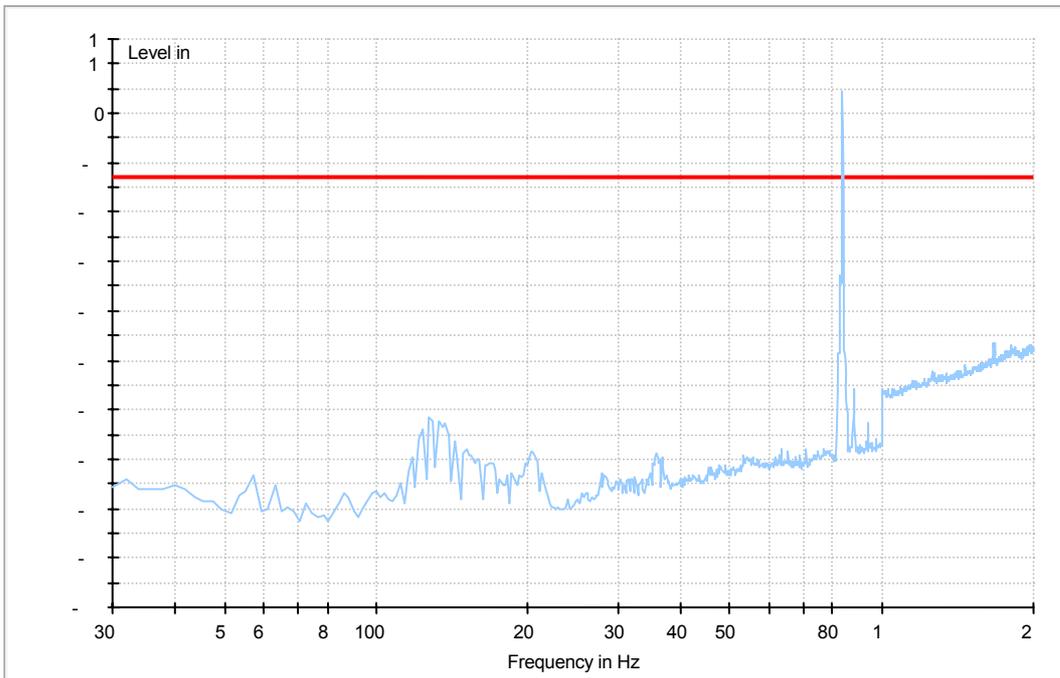
Traffic Mode (2GHz-18GHz)



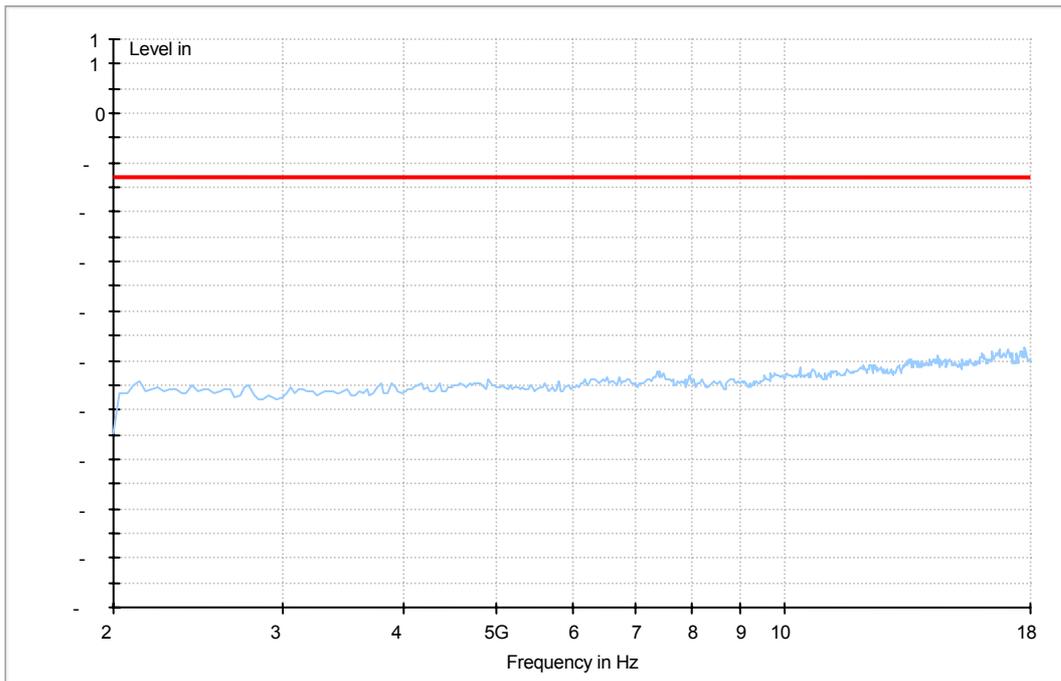
8.3.8 For HSDPA 850 Traffic Mode (9kHz-30MHz)



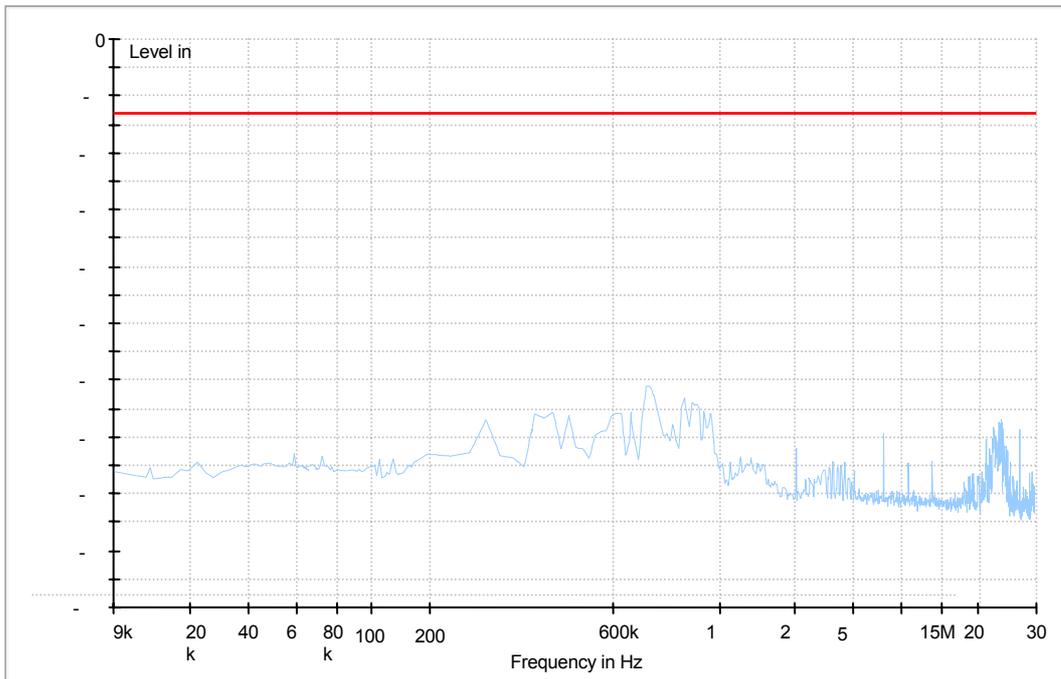
Traffic Mode (30MHz-2GHz)



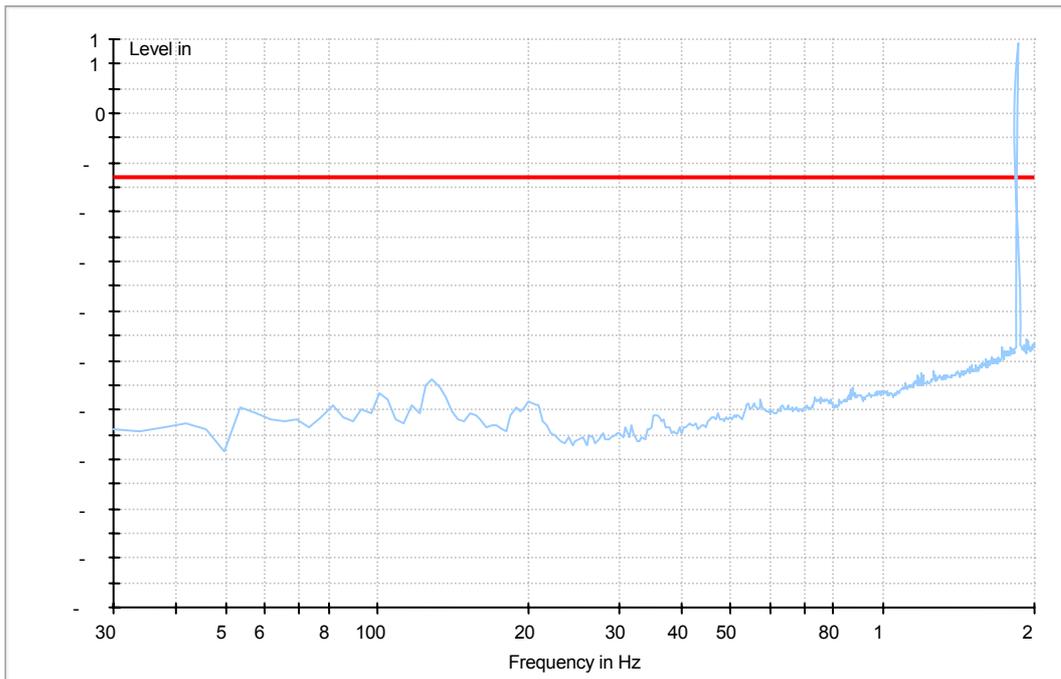
Traffic Mode (2GHz-18GHz)



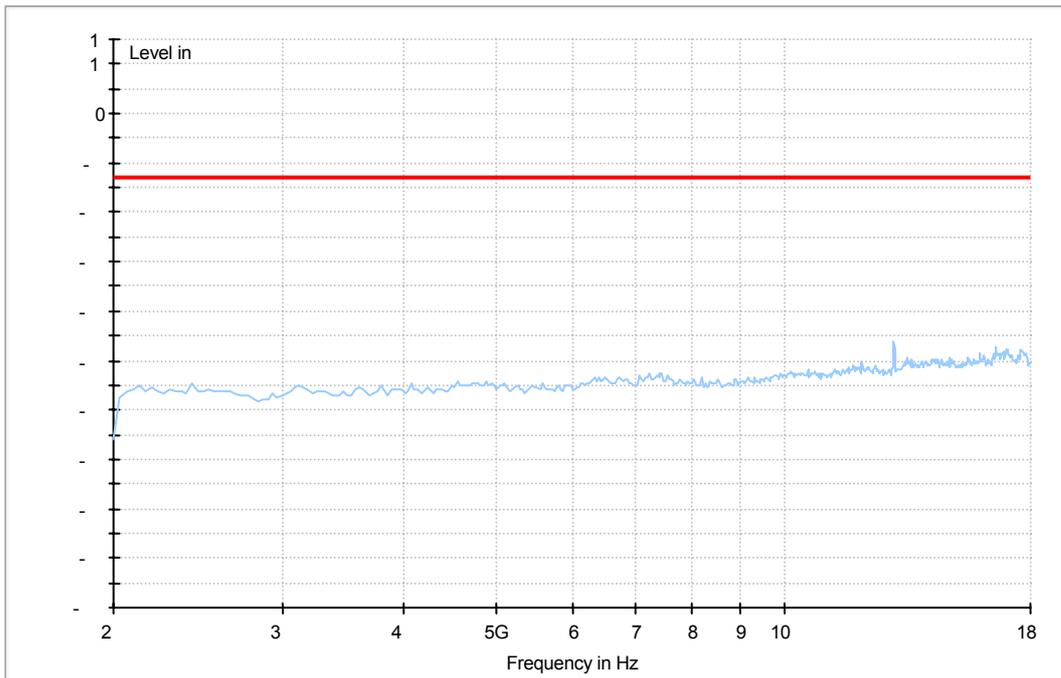
8.3.9 For WCDMA 1900
Traffic Mode (9kHz-30MHz)



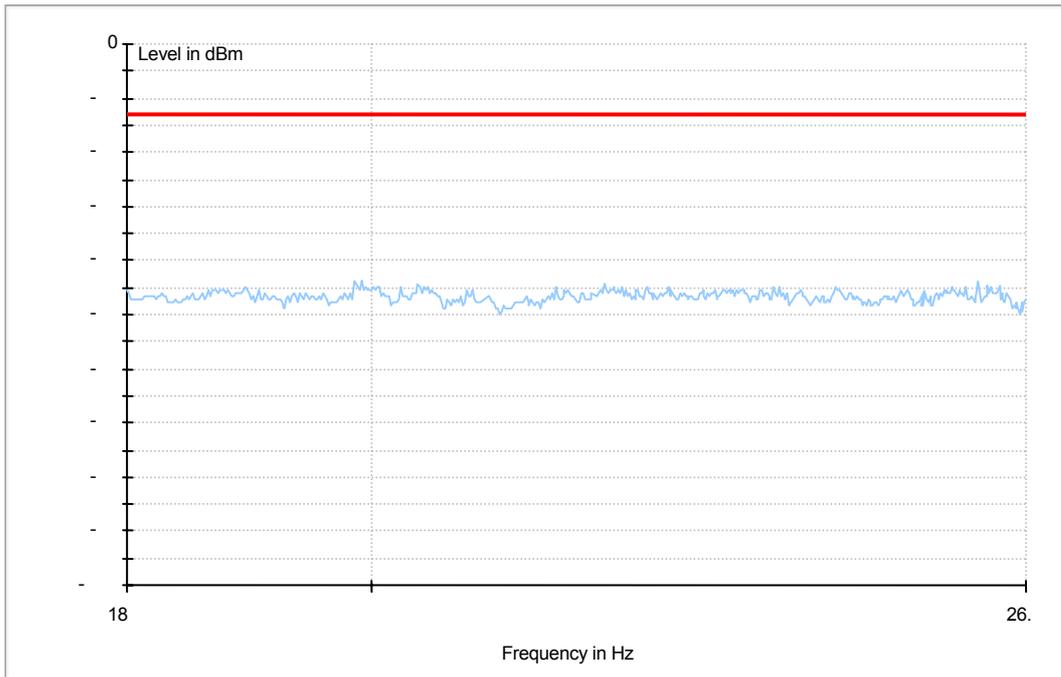
Traffic Mode (30MHz-2GHz)



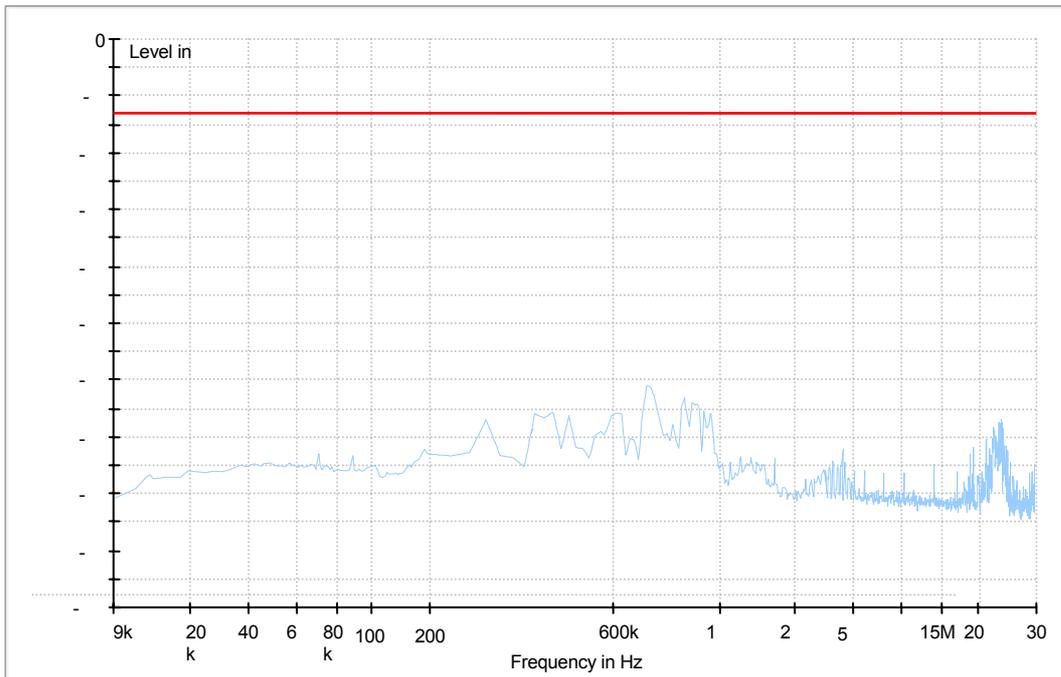
Traffic Mode (2GHz-18GHz)



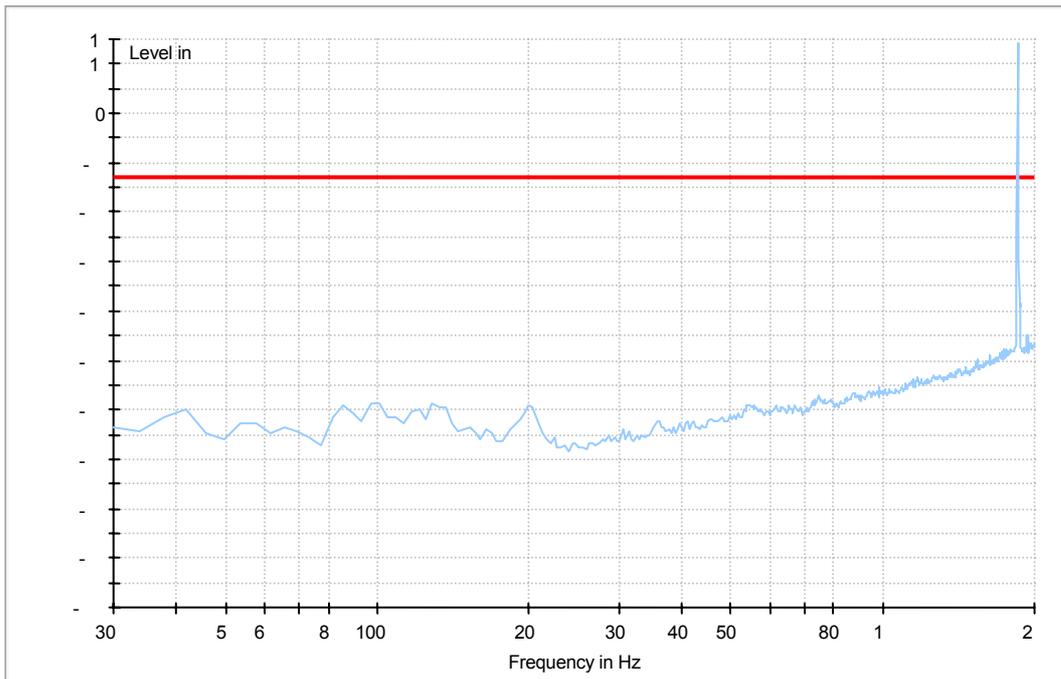
Traffic Mode (18GHz-26.5GHz)



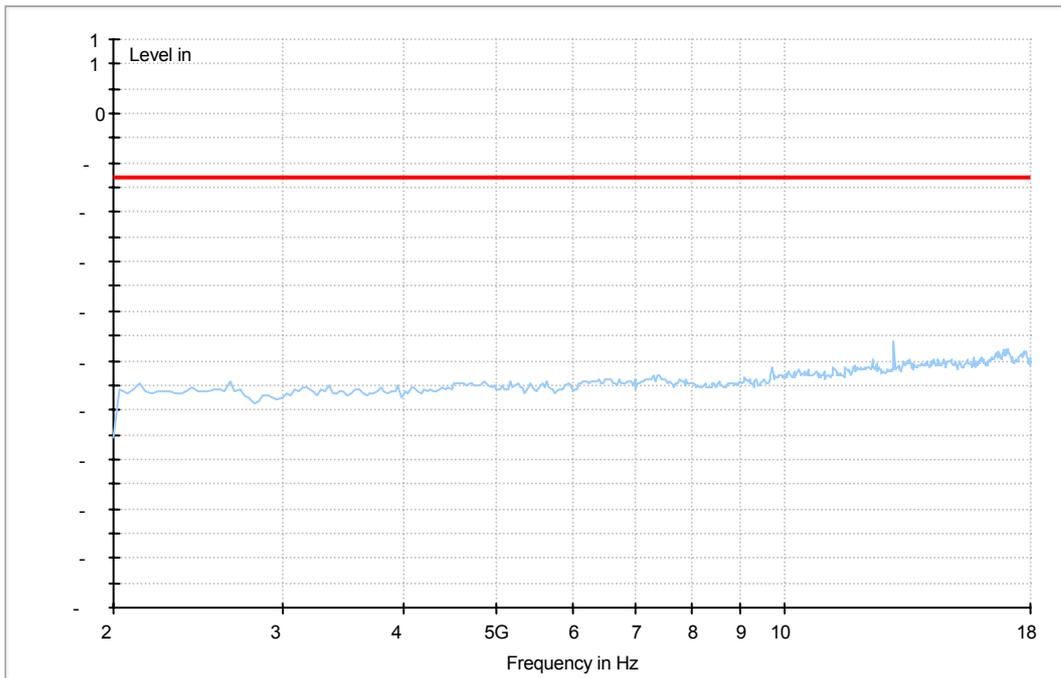
8.3.10 For HSDPA 1900
Traffic Mode (9kHz-30MHz)



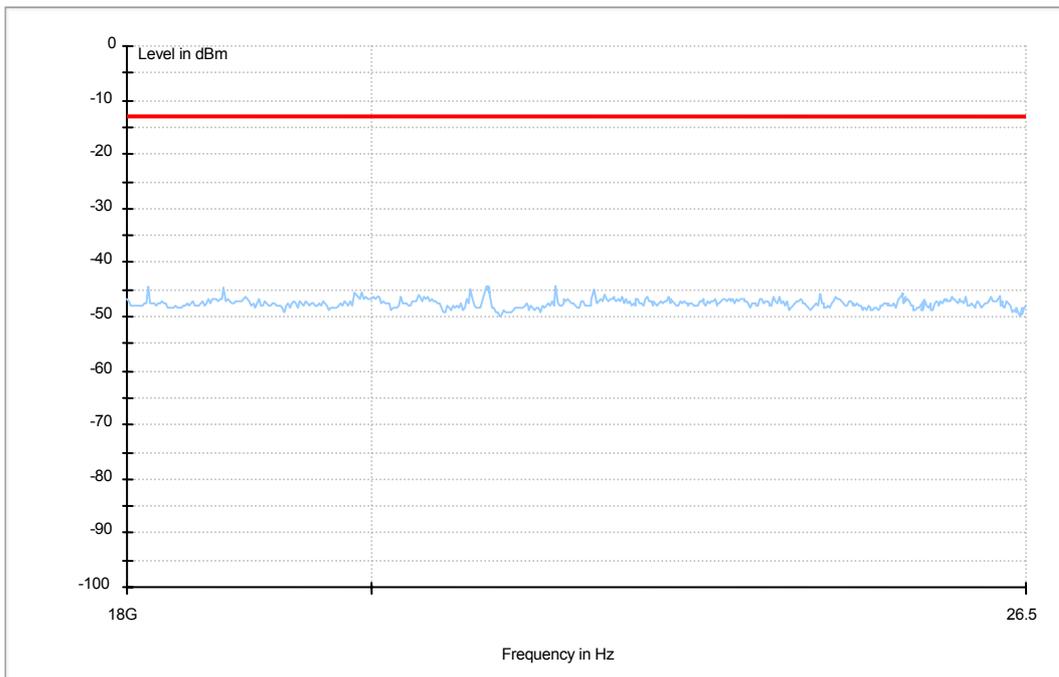
Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)



Traffic Mode (18GHz-26.5GHz)



END