FCC
EMC Test Report

Product Name: HSPA USB Stick

Model Number: E173u-81

Report No: SYBH(Z-EMC)037042011-2

FCC ID: QISE173U-81

Reliability Laboratory of Huawei Technologies Co., Ltd.

Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China

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Notice 1

1. The laboratory has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L0310.
2. The laboratory has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements. The site recognition number is 97456.
3. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-2.
4. The test report is invalid if not marked with "exclusive stamp for the test report".
5. The test report is invalid if not marked with the stamps or the signatures of the persons responsible for performing, revising and approving the test report.
6. The test report is invalid if there is any evidence of erasure and/or falsification.
7. If there is any dissidence for the test report, please file objection to the test centre within 15 days from the date of receiving the test report.
8. Normally, the test report is only responsible for the samples that have undergone the test.
9. Context of the test report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of the laboratory.

Notice 2

Modification Information:

Table 1 Modification Information

Modification Information	1	
	2	
	3	Not Applicable!
	4	
	5	
	6	
	7	

Product Name	**HSPA USB Stick**
	M/N: E173u-81
REGULATION	**FCC CFR47 Part 15:Subpart B;**
	FCC CFR47 Part 22:Subpart H; **FCC CFR47 Part 24:Subpart E;**
START OF TEST	**Apr.21, 2011**
END OF TEST	**Apr.24, 2011**
Final Judgement:	**Pass**

Approved By	**2011-04-26**	**Liuchunlin**	Liu Chunlin
	Date	**Name**	**Signature**
Reviewed By	**2011-04-26**	**Dailinjun**	Dailinjun
	Date	**Name**	**Signature**
Operator	**2011-04-26**	**Liaoxiaoping**	LiaoXiaoPing
	Date	**Name**	**Signature**

REPORT BODY CONTENT

1 Status

1.1 Product Information

CLIENT:	Huawei Technologies Co, Ltd.
ADDRESS:	Bantian Longgang District Shenzhen, P.R. China
MANUFACTURING DESCRIPTION	HSPA USB Stick
MANUFACTURERS MODEL NUMBER	E173u-81

1.2 Test Site

Site 1:
RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD

1.3 Test environment condition

Ambient temperature	20~25℃
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 Module				
Test Items	**Test Configuration &Test Mode**	**Required Performance Criteria**	**Result**	**Site**
Radiated Emissions Enclosure Port	TC1 (TM8~TM14)	N/A	Pass	Site1
Conducted Emissions	TC1 (TM1~TM14)	N/A	Pass	Site1
Radiated Spurious Emissions Enclosure Port	TC1 (TM1~TM7)	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

E173u-81 HSPA/WCDMA/EDGE/GPRS/GSM dual mode 7 bands USB Stick is subscriber equipment in the UMTS/GSM system. E173u-81 implements such functions as RF signal receiving/transmitting, HSPA/WCDMA and EDGE/GPRS/GSM protocol processing, data service etc. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface and Micro SD card interface. E173u-81 has an internal antenna as default.

3.1.1 Main Equipment Technical Data

Description:	HSPA USB Stick
Models:	E173u-81
Input Rated Voltage:	⎓ 5V
Rated Consumption Power:	Max 2.5 W
Maximum Emission Power:	Max 33dBm
Dimensions:	84（length）× 27（width）× 11.8（height）(mm3)
Weight:	30g

Table 3 Sub-Assembly Identity

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

3.2 Sub-Assembly Identity

Table 4 Sub-Assembly Identity

Board			
Model Name	**Qty.**	**Serial Number**	**Description**
E173u-81	1	T5Z4CA10B1600056	Main Board

4 System Configuration during EMC Test

The Equipment under Test (EUT) was functioning correctly during all tests. The EUT was installed within the test site and was configured to simulate a typical user installation.

4.1 Cables Used during Test

Table 5 Cable Used during Test

Port	Connector	Type of Cable
N/A	N/A	N/A

4.2 Associated Equipment Used during Test

Table 6 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Cal Date
Radio Communication Tester	CMU200	R&S	112347	2011-03-17
Notebook	T61	ThinkPad	3108052581	NA
Notebook	T43	IBM	3106093834	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).

Table 7 Configuration table

Test configuration	Test mode
TC1	TM1~TM14

TC1: EUT was powered by the USB port of the notebook directly.

4.3.2 Test Mode

There were 14 test Modes. TM1 to TM 14 were shown below:

TM1: operate in traffic mode GPRS 850;
TM2: operate in traffic mode EGPRS 850;
TM3: operate in traffic mode GPRS 1900;
TM4: operate in traffic mode EGPRS 1900;
TM5: operate in traffic mode WCDMA BAND Ⅱ;
TM6: operate in traffic mode HSDPA BAND Ⅱ;
TM7: operate in traffic mode HSUPA BAND Ⅱ;
TM8: operate in idle mode GPRS 850;
TM9: operate in idle mode EGPRS 850;
TM10: operate in idle mode GPRS 1900;
TM11: operate in idle mode EGPRS 1900;
TM12: operate in idle mode WCDMA BAND Ⅱ;
TM13: operate in idle mode HSDPA BAND Ⅱ;
TM14: operate in idle mode HSUPA BAND Ⅱ;

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 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 GSM850 and PCS1900, the following conditions shall also be met:
- The EUT shall be commanded to operate at maximum transmit power;
- The downlink RXQUAL shall be monitored.

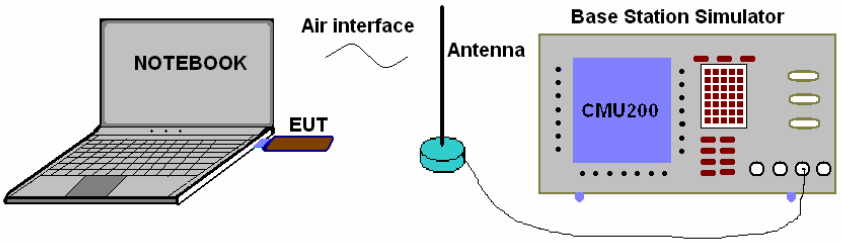


Figure 1.: TC1 (TM1-TM7)

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 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.

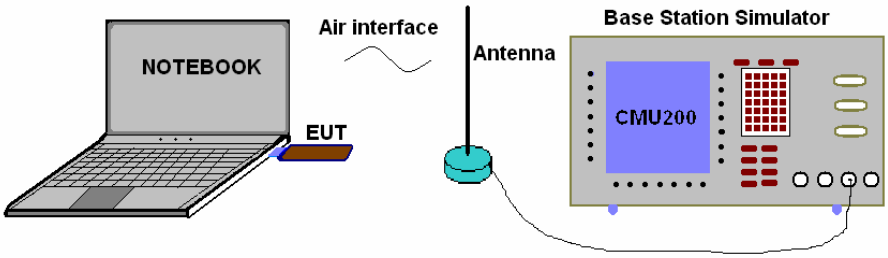


Figure 2. TC1 (TM8-TM14)

5 Electromagnetic Interference (EMI)

5.1 Radiated Disturbance 30MHz to18000MHz

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 (2009). 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 Test Receiver and control software ES-K1.

A preliminary scan and a final scan of the emissions were made from 30 MHz to 18GHz by using test script of software; the emissions were measured using a Quasi-Peak Detector (30MHz~1GHz) and AV detector (1GHz ~18GHz). The maximal emission value was acquired by adjusting the antenna height, polarisation and turntable azimuth in accordance with the software setup. Normally, the height range of antenna was 1m to 4m, the azimuth range of turntable was 0°to 360°, The receive antenna has two polarizations V and H.

Huawei Mobile Station was communicated with the BTS simulator through Air interface. The Mobile Station operated on the typical channel and the Mobile Station worked in idle mode, transmitter was not work in this test.

EUT was configured in idle mode and the test performed at worst emission state.

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

Measurement bandwidth: 1GHz – 18GHz: 1MHz

Test set up figure:

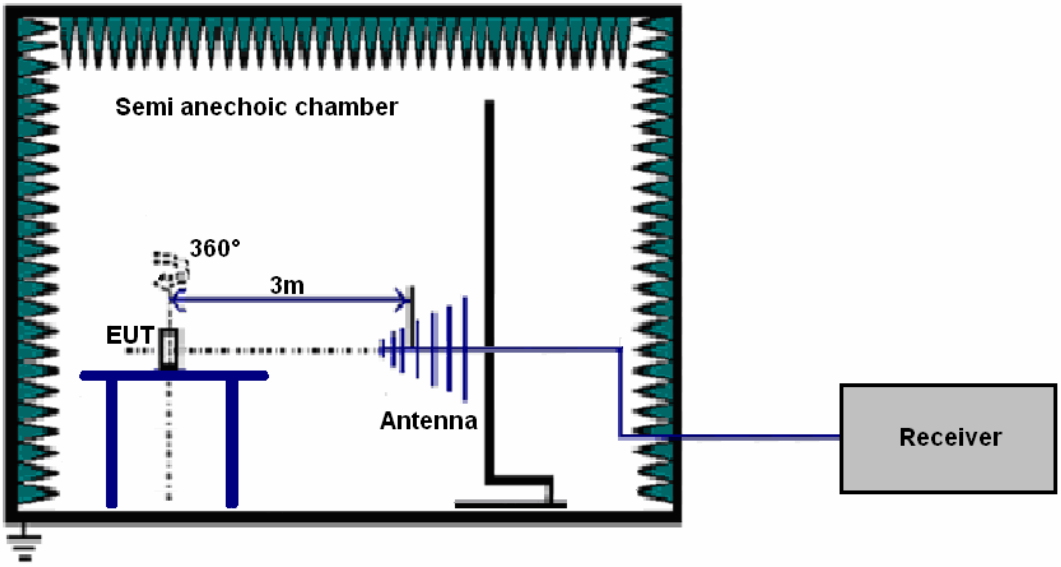


Figure 3.Test set-up

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(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 150kz to 30 MHz: 9 kHz;

Test Set-up figure:

The Mobile Station was setup in the screened chamber and operated under nominal conditions.

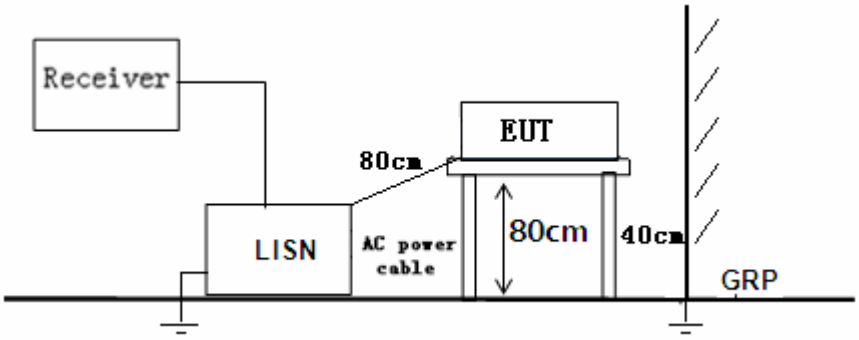


Figure 4. Test Set-up

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

5.3 Radiated Spurious Emissions

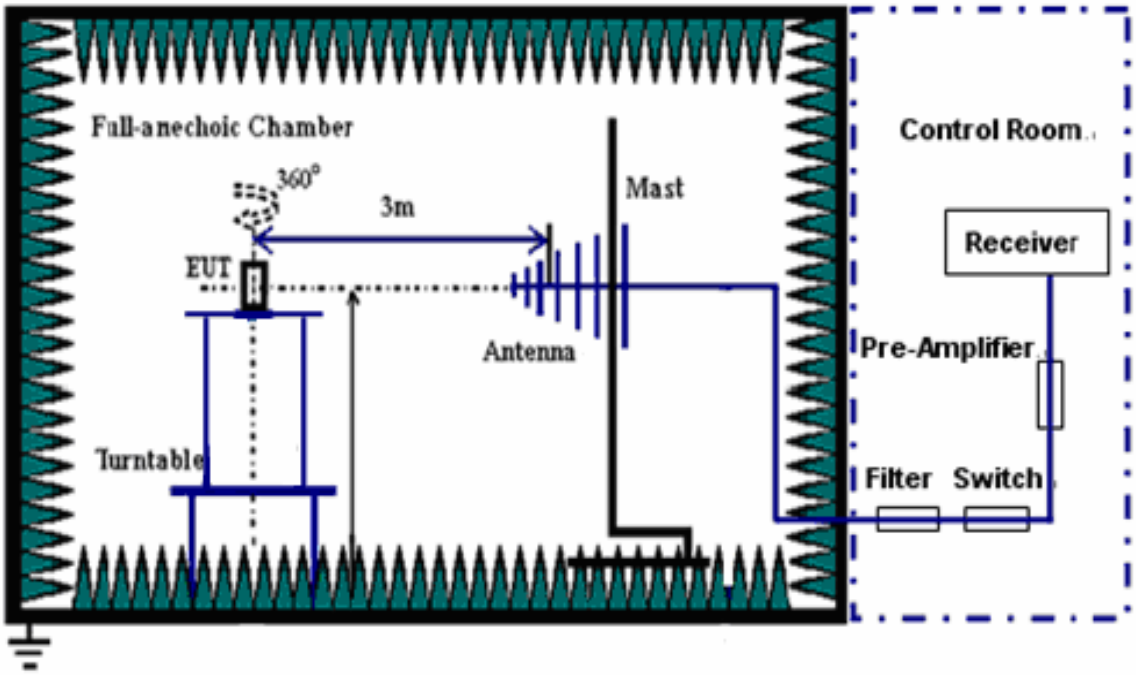
5.3.1 Test Procedure

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:

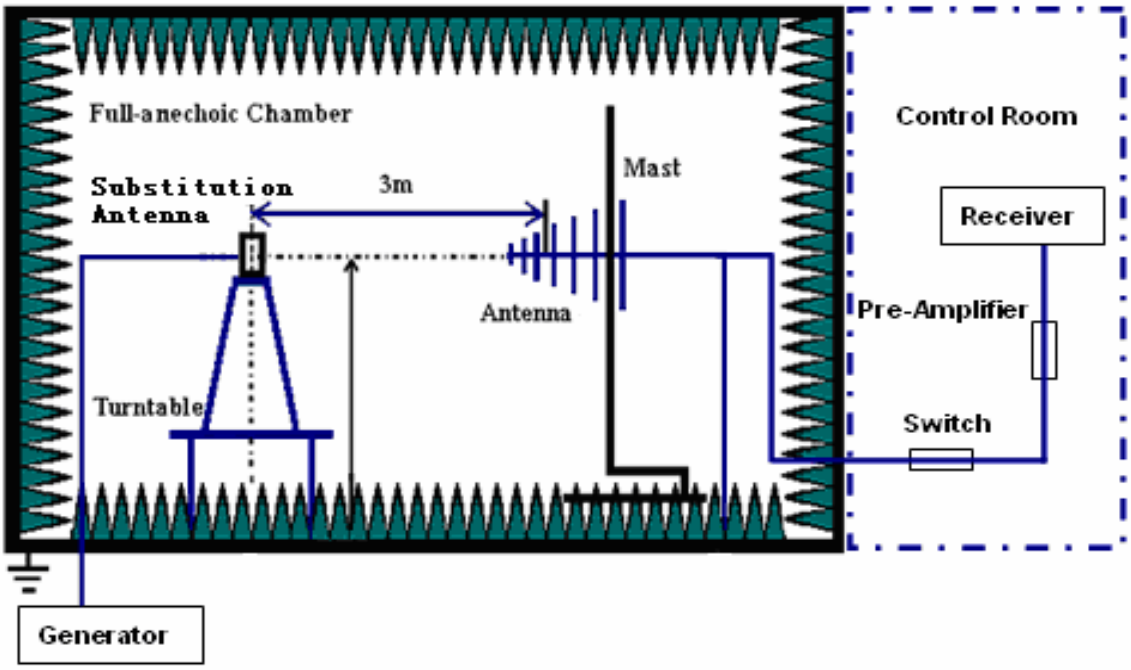
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect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



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: 10 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
9KHz~18GHz	-13dBm

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

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

Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 10 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
9KHz~26.5GHz	-13dBm

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

Calculation Sample:

Table 12 Substitution Results

Freq. [MHz]	Measurement Value [dBm]	Substitution Antenna Type	Gain [dBd]	Cable Loss [dB]	Signal Generator Level [dBm]	Substitution Level [dBm]	FCC limit [dBm]	Result

Note: Forget the E.R.P. (Efficient Radiated Power) in substitution method, the following formula should take to calculate it,

E.R.P. [dBm] = SGP [dBm] - Cable Loss [dB] + Gain [dBd]
NOTE: SGP- Signal Generator Level

5.3.2 Test Results

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

6 Main Test Instruments

Table 13 Main Test Equipments

Test item	Test Instrument	Model	Manufacturer	Cal-Date	Cal Interval (month)
RE	EMI Test receiver	ESU26	R&S	Jun.25, 2010	12
	Broadband Antenna	VULB9163	SCHWARZBECK	May.15, 2010	12
	Horn Antenna	HF906	R&S	May.15, 2010	12
CE	EMI Test receiver	ESU26	R&S	Jun.25, 2010	12
	Artificial Mains Network	ENV216	R&S	Jun.25, 2010	12
RSE	EMI Test receiver	ESIB26	R&S	May.05,2010	12
	Horn Antenna	3117	ETS-Lindgren	Oct.25.2010	12
	Broadband Antenna	CBL6112B	SCHAFFNER	Oct.28.2010	12
	Horn Antenna	3160	ETS-Lindgren	Sep.29.2010	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:

Table 14 System Measurement Uncertainty

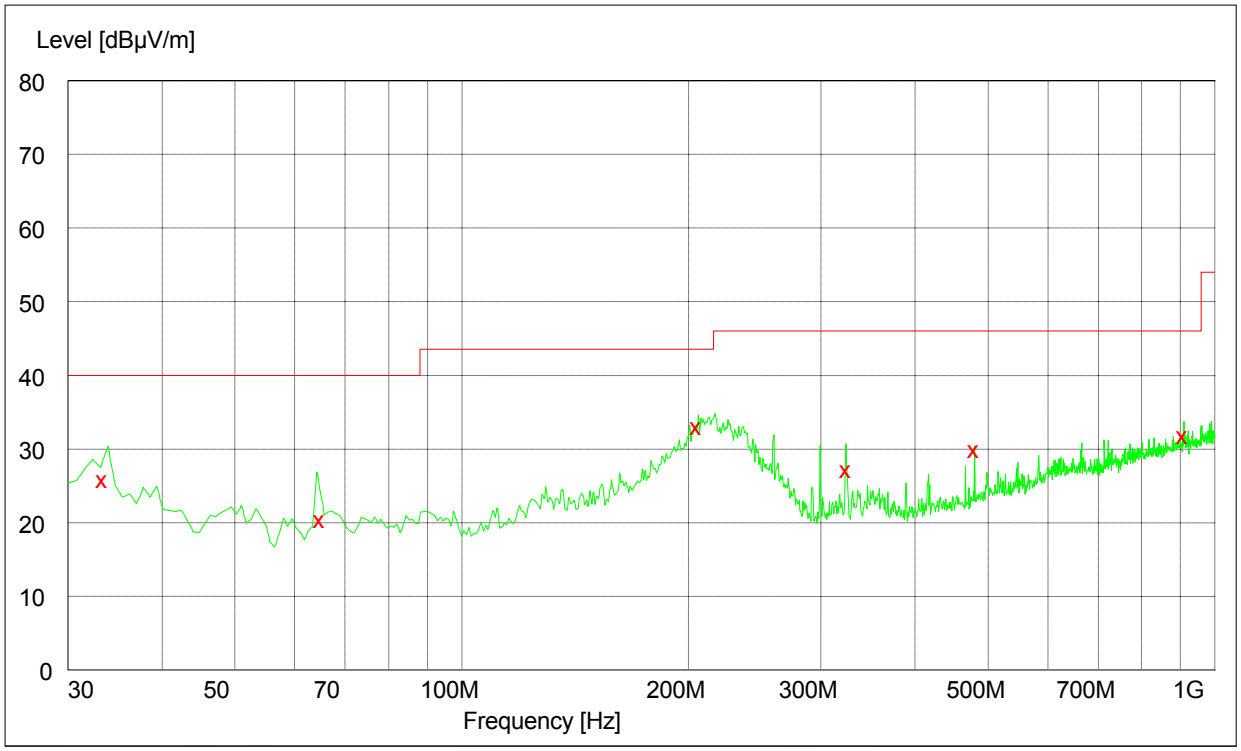
Items		Extended Uncertainty
RE	Field strength (dBμV/m)	U=4.1dB; k=2(30MHz-1GHz)
RE	Field strength (dBμV/m)	U=4.1dB; k=2(1GHz-18GHz)
RSE	ERP (dBm)	U=2.2dB; k=2
CE	Disturbance Voltage(dBμV)	U=3.4dB; k=2

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.

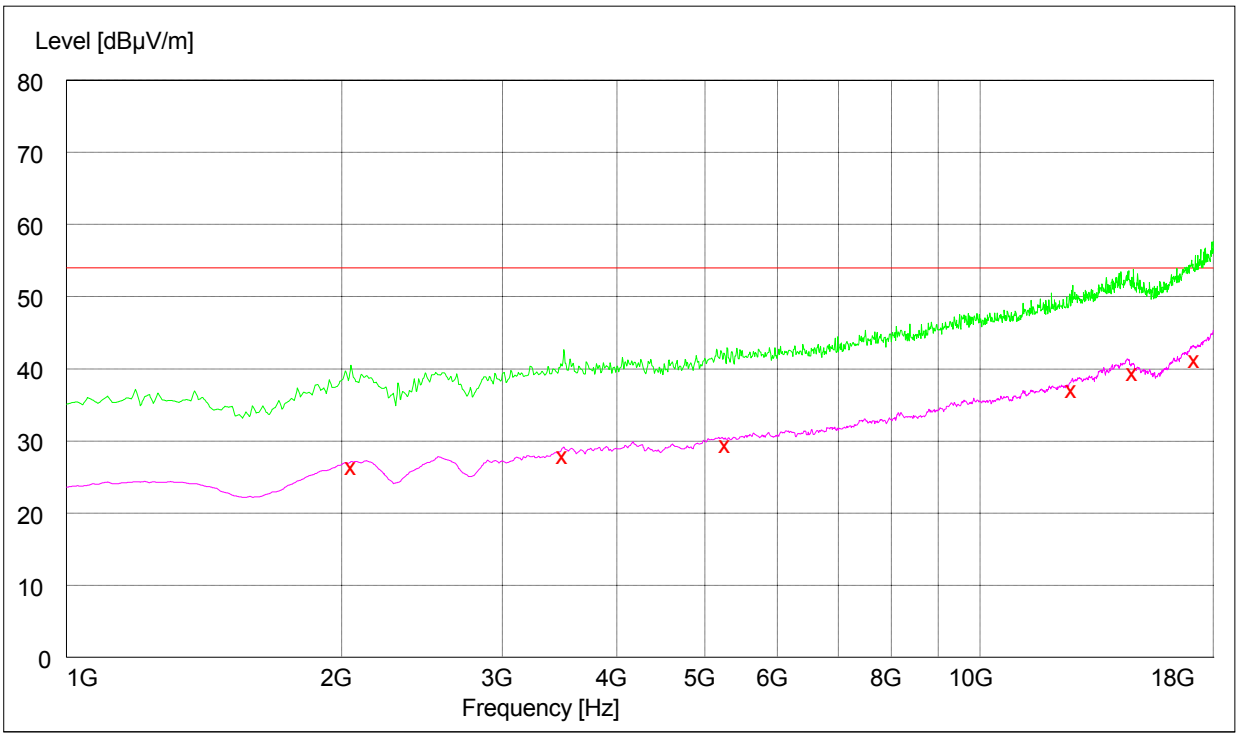
30MHz-1GHz



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
33.420000	26.00	11.7	40.0	14.0	107.0	79.00	VERTICAL
64.860000	20.60	10.5	40.0	19.4	100.0	38.00	VERTICAL
205.560000	33.20	12.3	43.5	10.3	143.0	85.00	HORIZONTAL
324.360000	27.40	16.2	46.0	18.6	100.0	249.00	HORIZONTAL
480.000000	30.10	19.6	46.0	15.9	100.0	360.00	VERTICAL
909.300000	32.00	26.2	46.0	14.0	100.0	0.00	HORIZONTAL

1GHz-18GHz



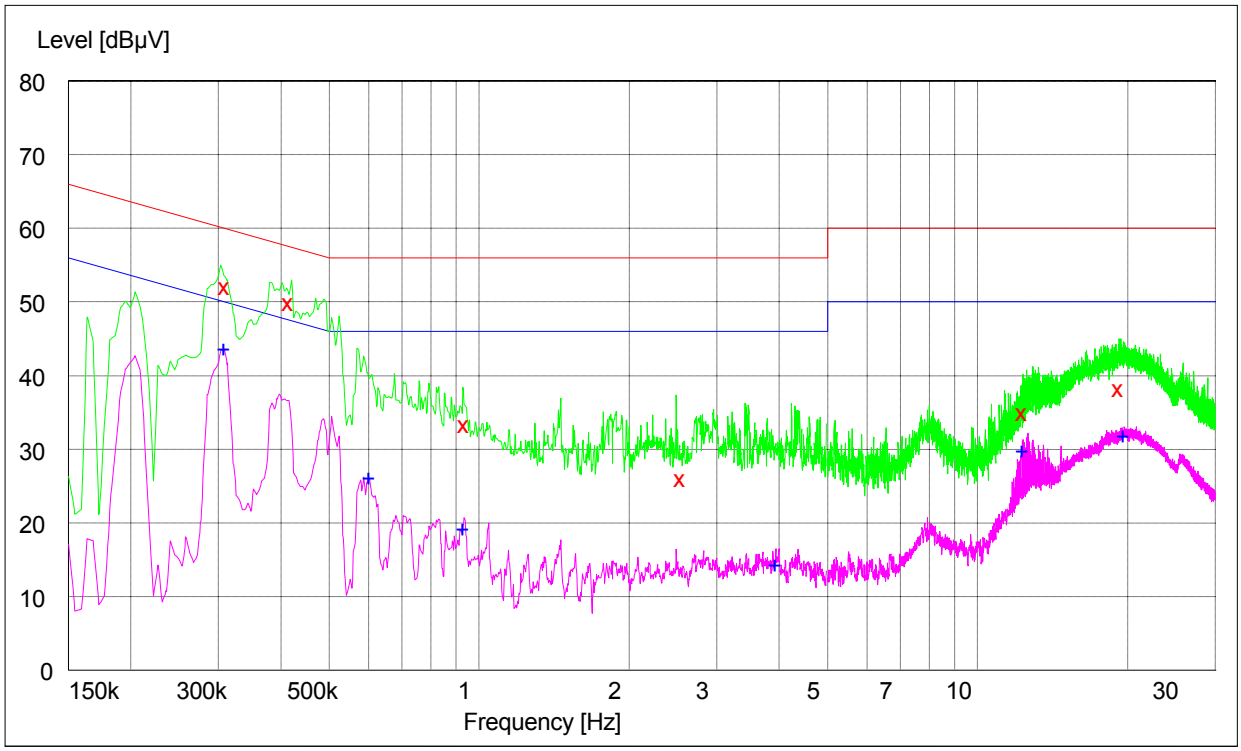
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
2054.500000	26.70	-1.0	54.0	27.3	107.0	190.00	VERTICAL
3498.500000	28.30	3.7	54.0	25.7	119.0	80.00	VERTICAL
5279.000000	29.80	7.9	54.0	24.2	100.0	328.00	VERTICAL
12620.500000	37.40	19.5	54.0	16.6	143.0	316.00	VERTICAL
14721.500000	39.70	21.8	54.0	14.3	119.0	41.00	VERTICAL
17201.500000	41.50	25.0	54.0	12.5	139.0	3.00	VERTICAL

8.2 Conducted Disturbance

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

8.2.1 AC Power Port Test Data



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.310000	52.30	10.0	60	7.7	L1	FLO
0.416000	50.10	10.0	58	7.9	L1	FLO
0.936000	33.60	10.1	56	22.4	L1	FLO
2.544000	26.20	10.1	56	29.8	L1	FLO
12.348000	35.30	10.3	60	24.7	N	FLO
19.244000	38.50	10.3	60	21.5	N	FLO

MEASUREMENT RESULT: AV Detector

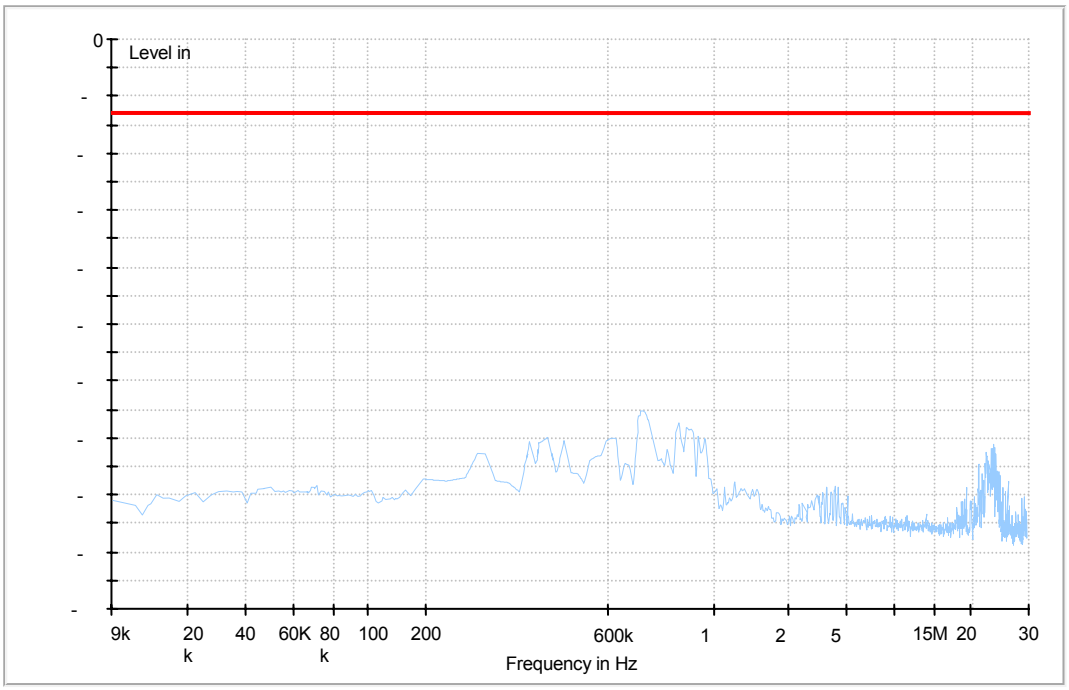
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.308000	43.70	10.0	50	6.3	L1	FLO
0.600000	26.10	10.0	46	19.9	L1	FLO
0.930000	19.30	10.1	46	26.7	L1	FLO
3.938000	14.40	10.2	46	31.6	N	FLO
12.348000	29.90	10.3	50	20.1	N	FLO
19.674000	32.00	10.3	50	18	N	FLO

8.3 Radiated Spurious Emission

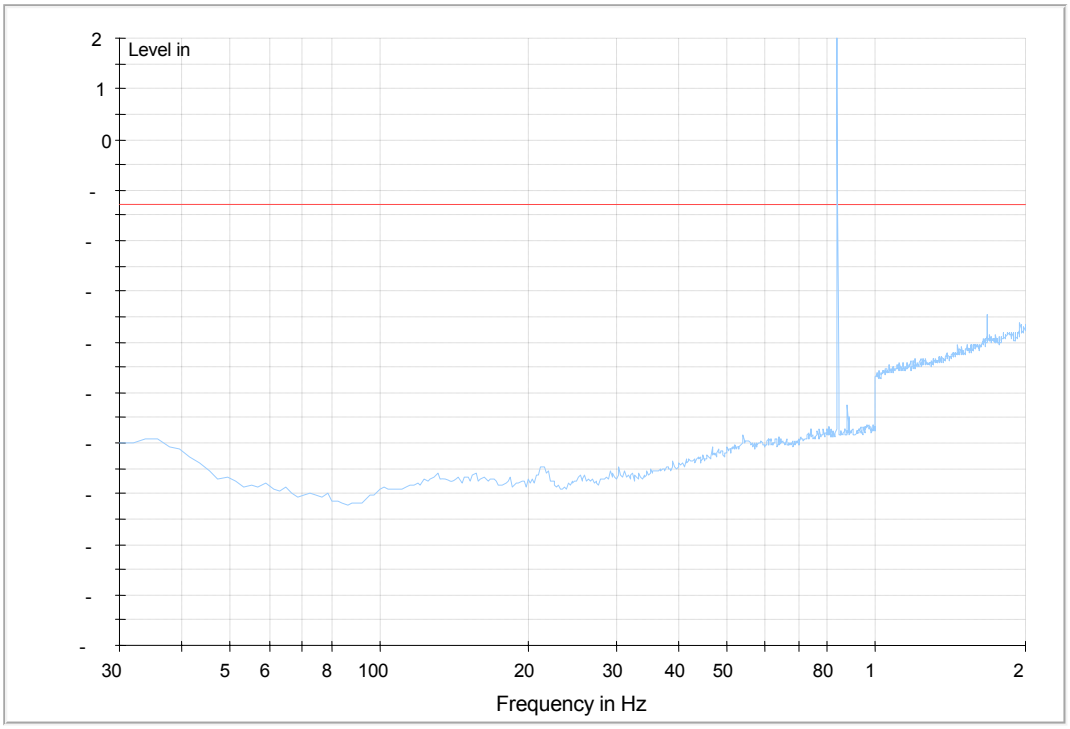
This test results are the maximum level of radiated spurious emissions in vertical and horizontal polarity. The peak exceeds the limit line is carrier frequency.

8.3.1 For GPRS 850

Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)


Level in
2
1
0
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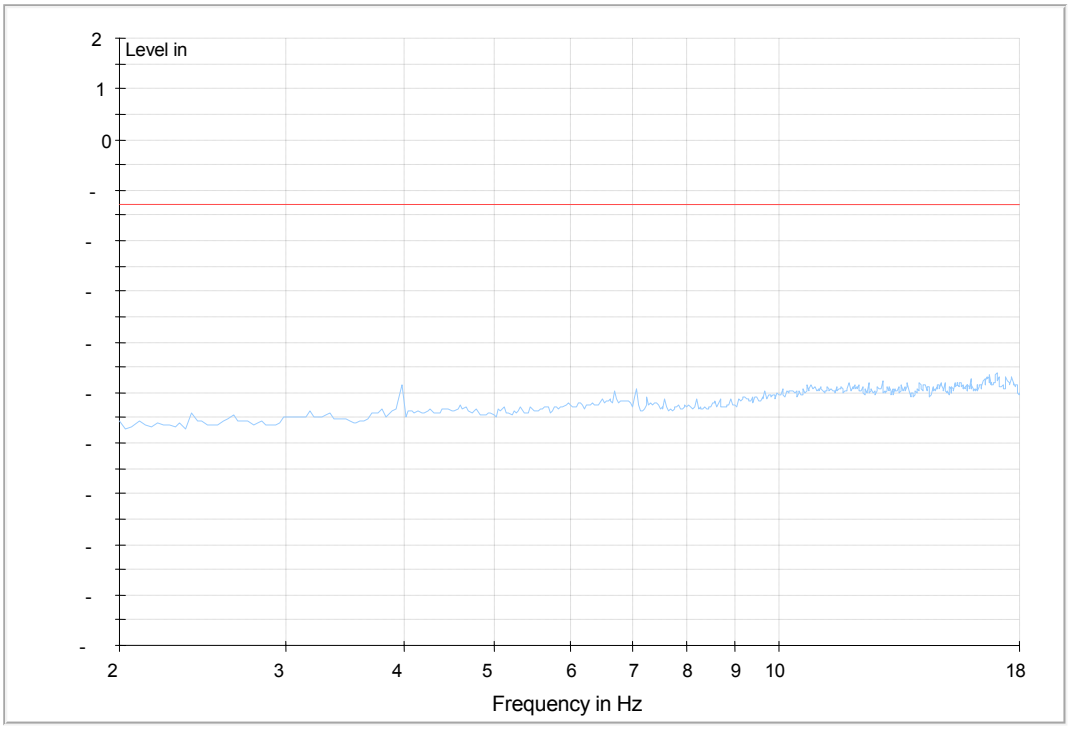
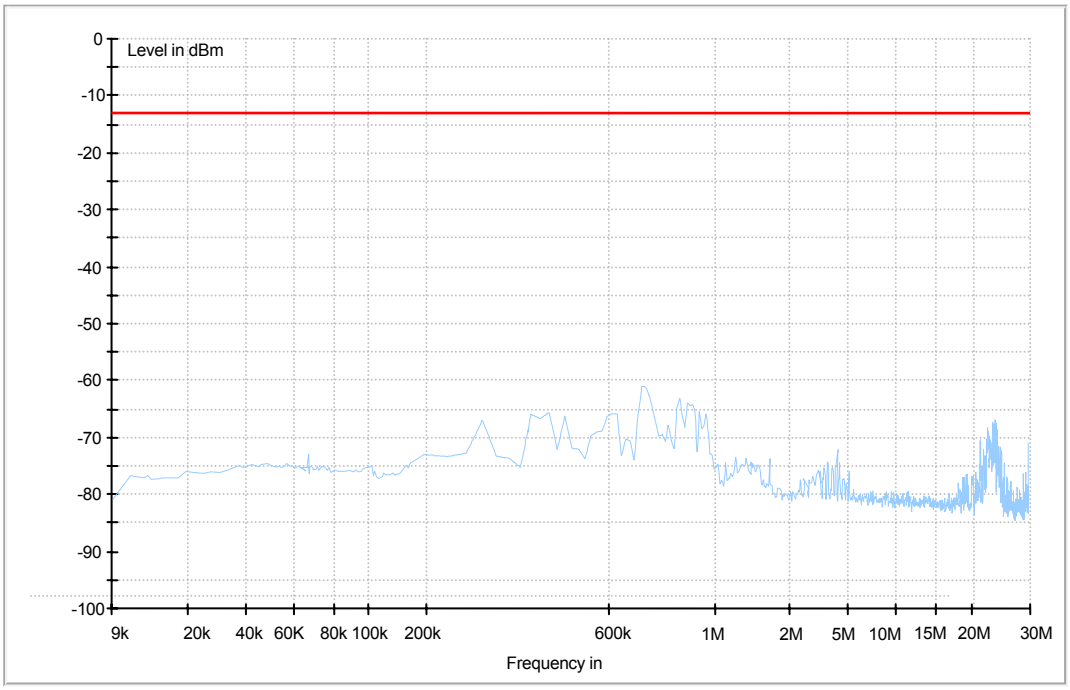
-
-
-
-
-
-
-
-
30
5
6
8
100
20
30
40
50
80
1
2
Frequency in Hz

Traffic Mode (2GHz-18GHz)

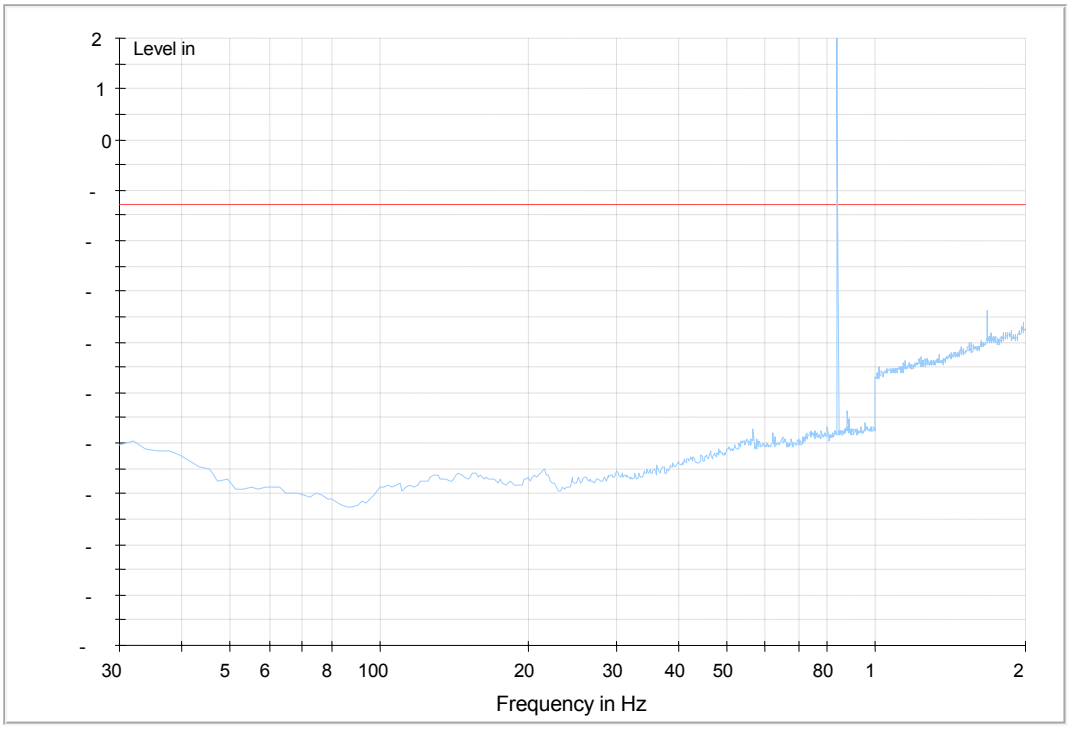


8.3.2 For EGPRS 850

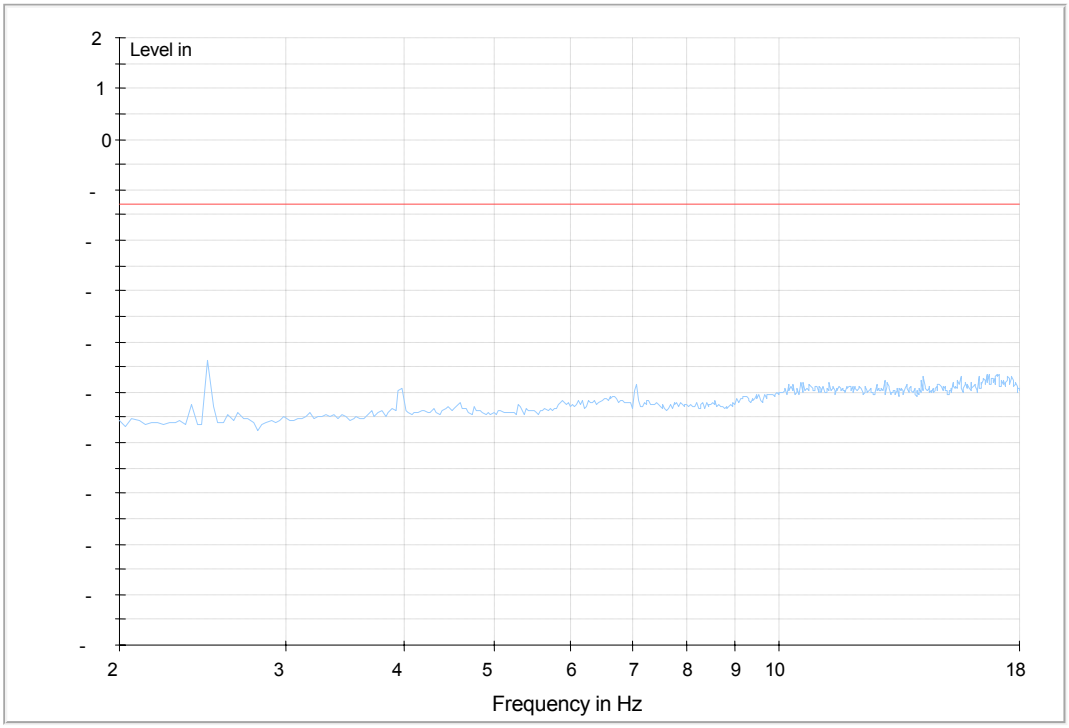
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)

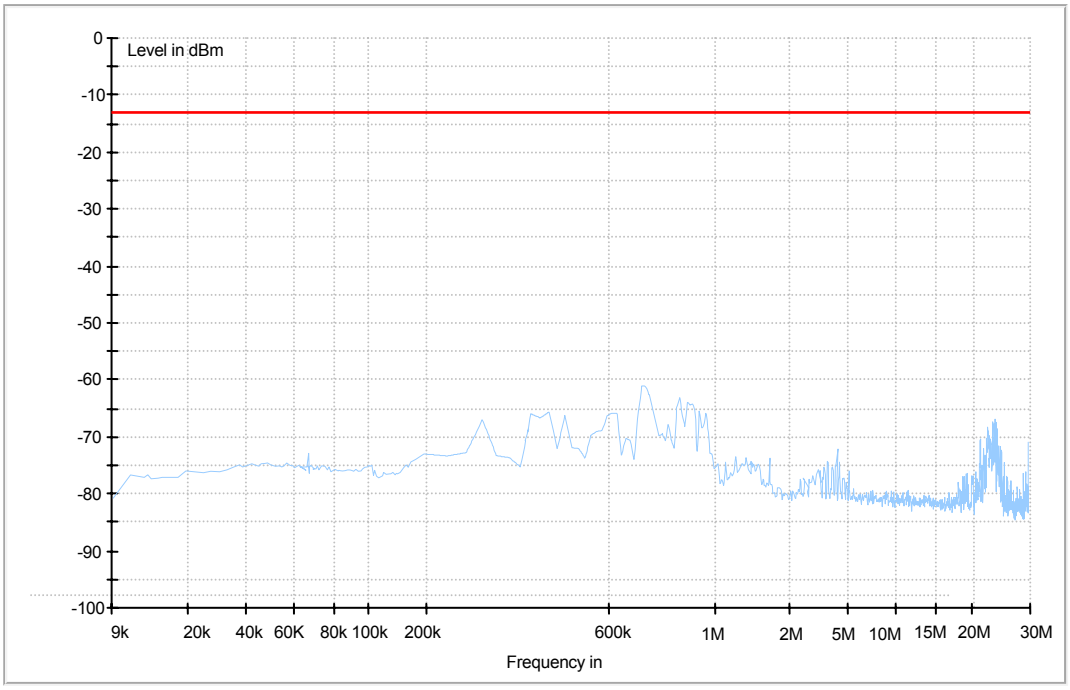


Traffic Mode (2GHz-18GHz)

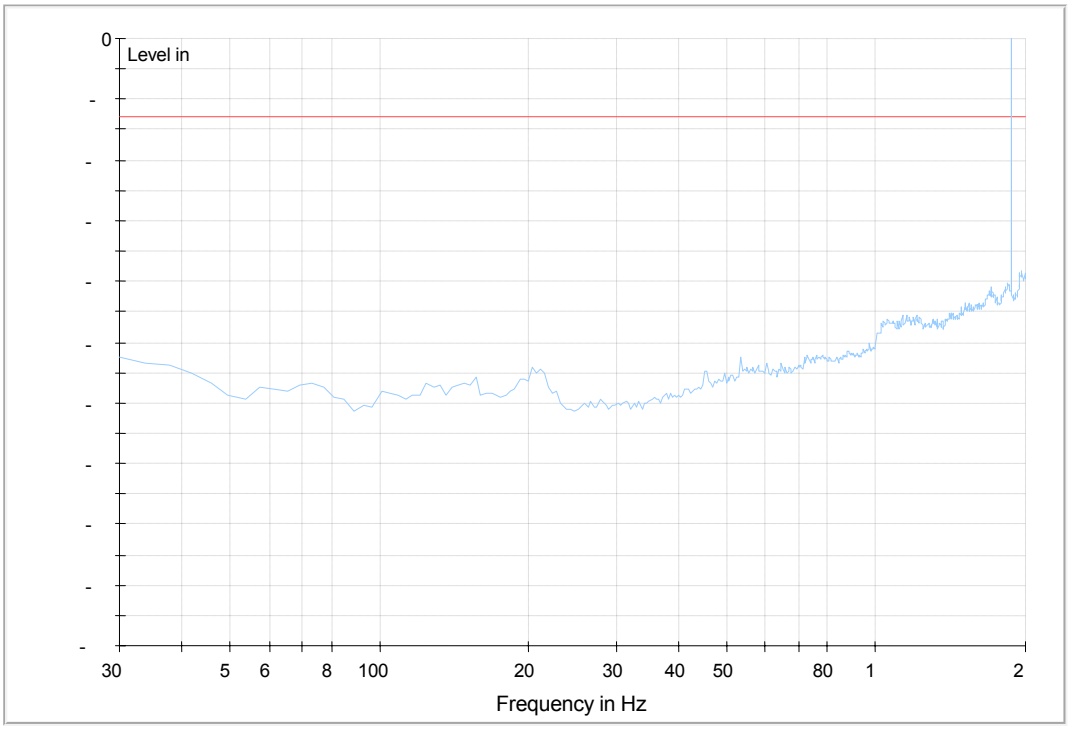


8.3.3 For GPRS 1900

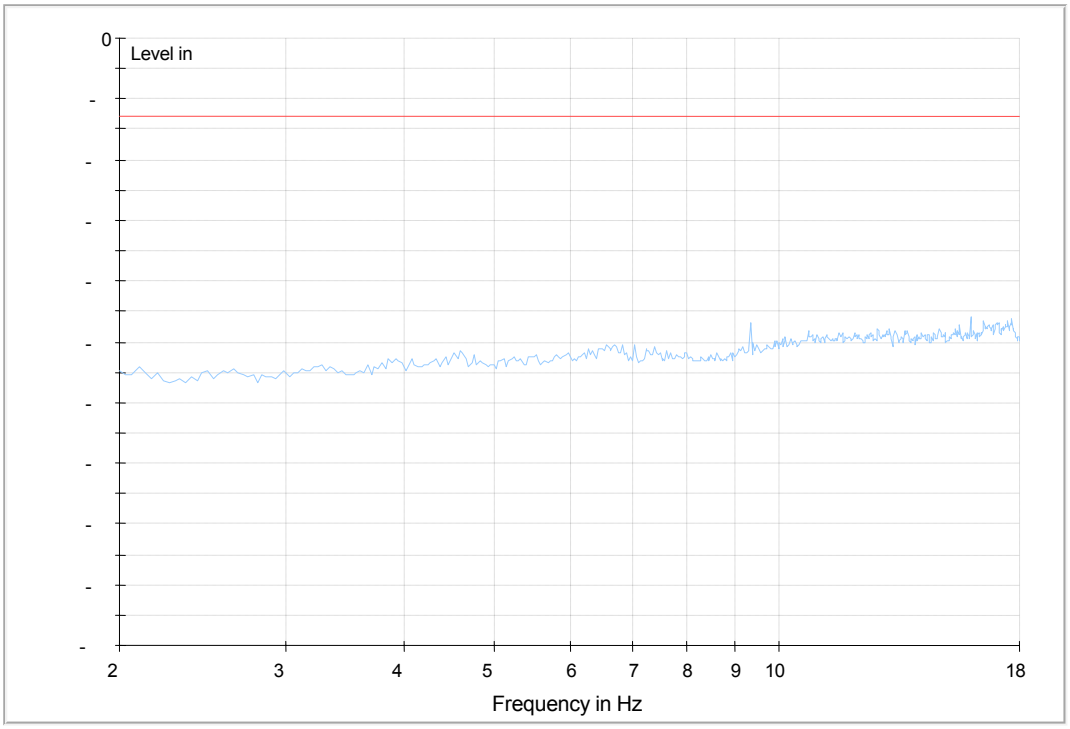
Traffic Mode (9kHz-30MHz)



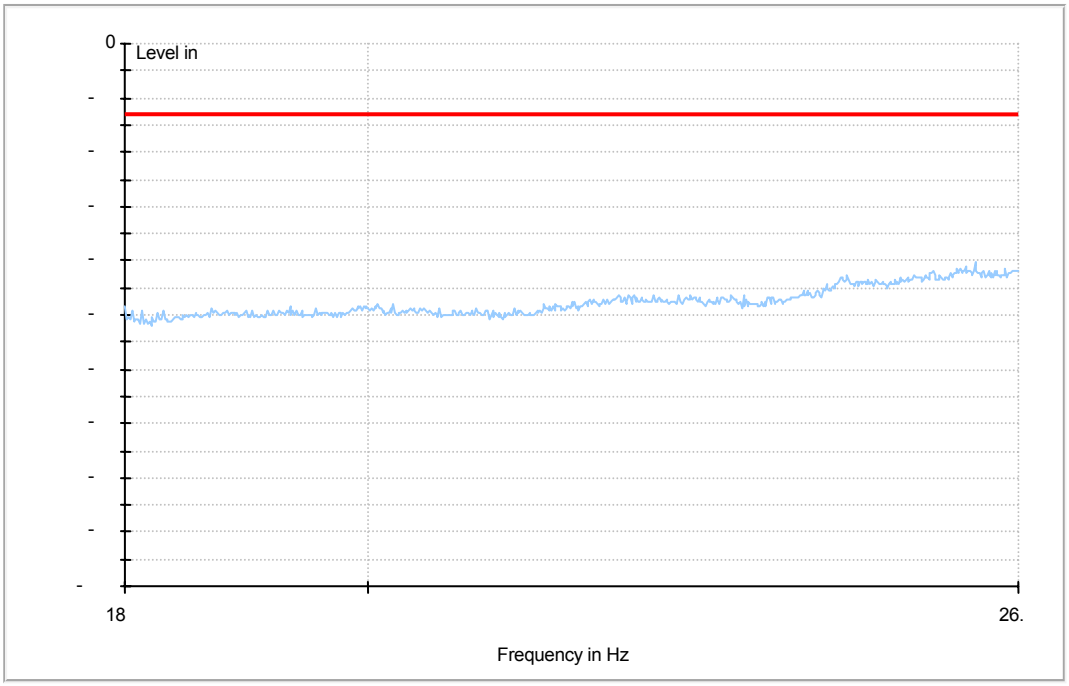
Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)

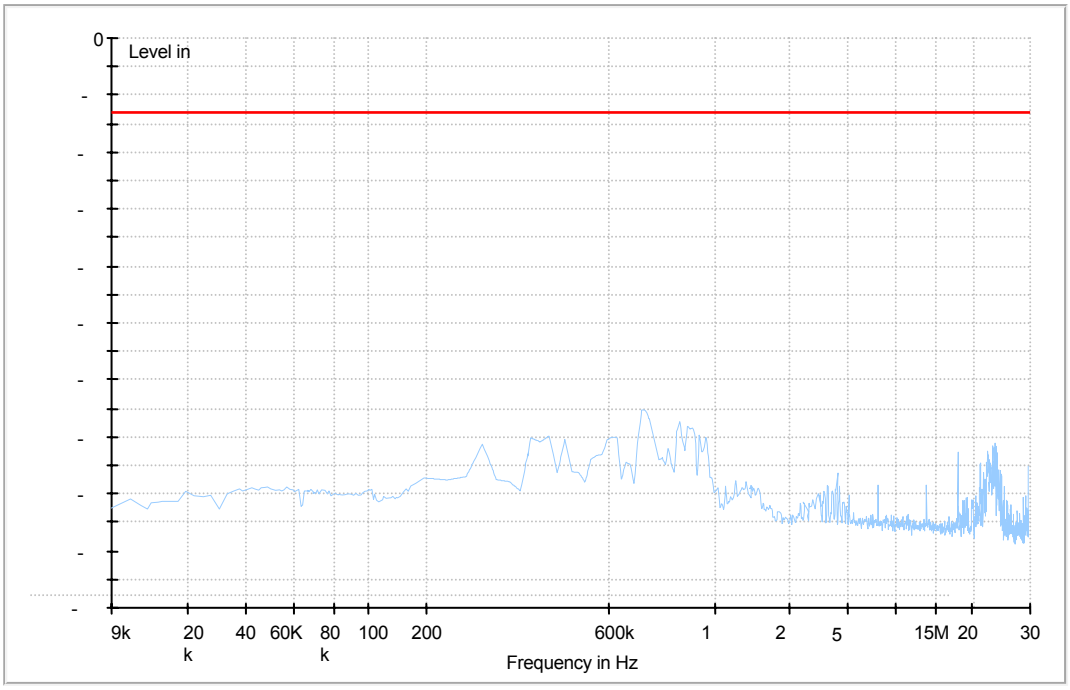


Traffic Mode (18GHz-26.5GHz)

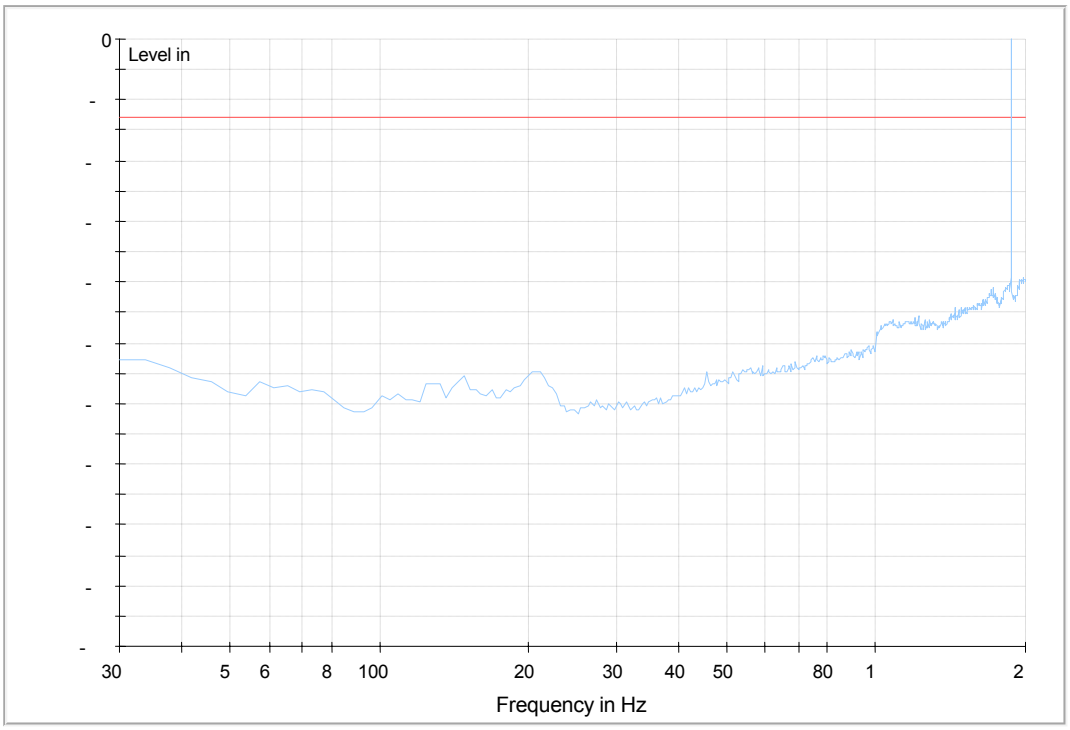


8.3.4 For EGPRS 1900

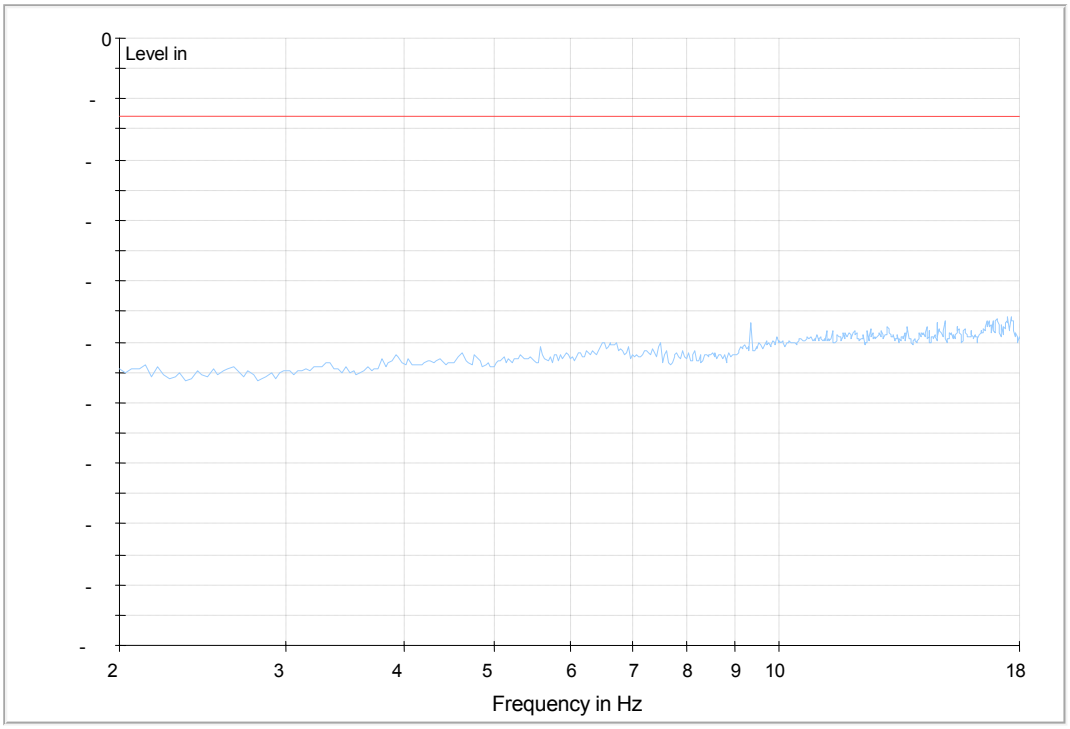
Traffic Mode (9kHz-30MHz)



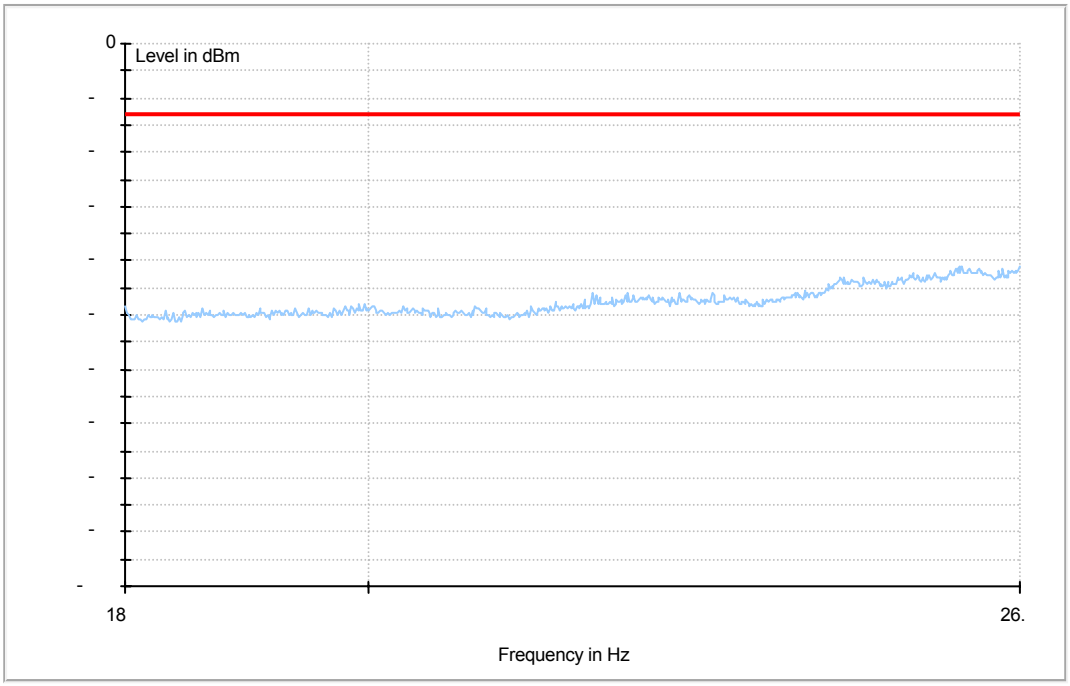
Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)

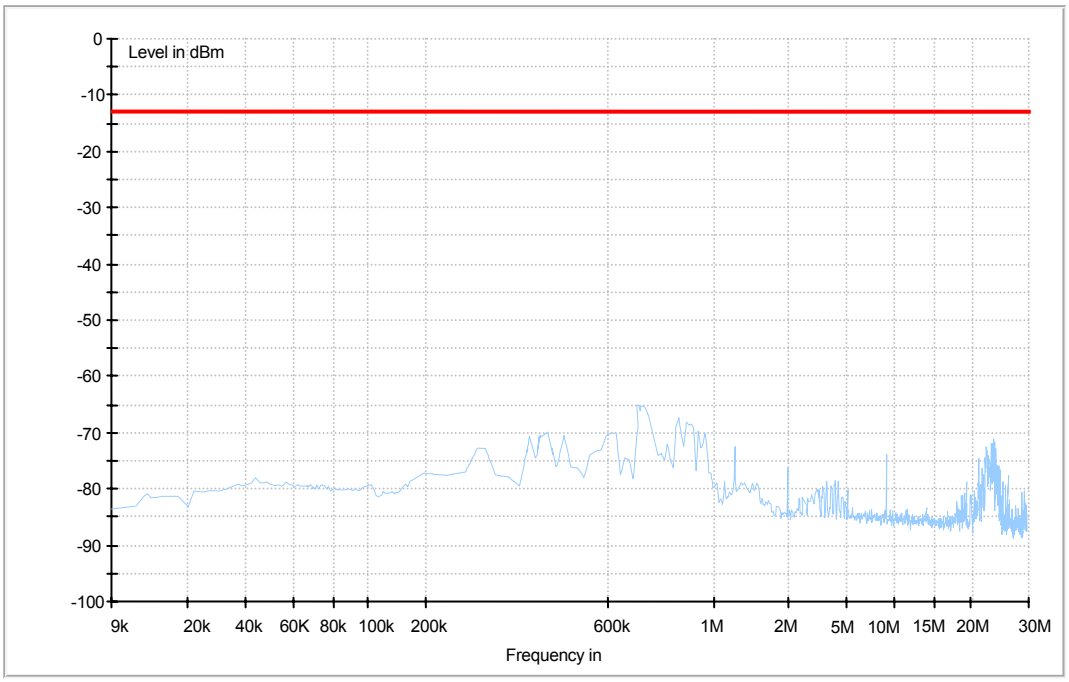


Traffic Mode (18GHz-26.5GHz)

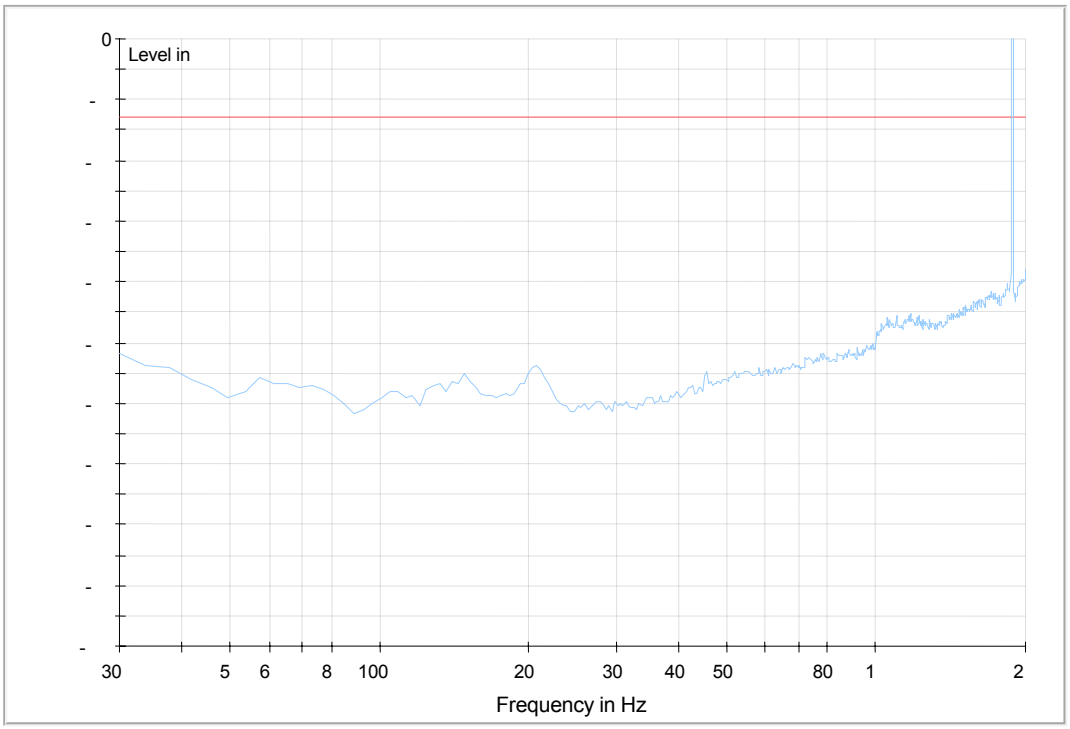


8.3.5 For WCDMA BAND Ⅱ

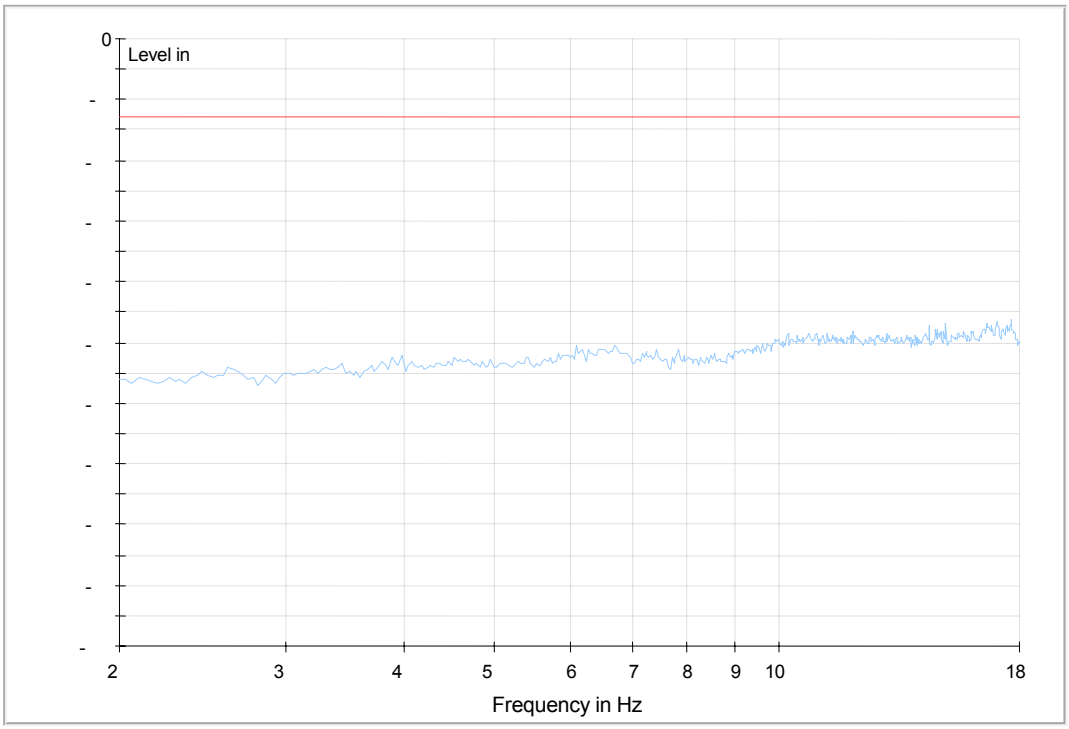
Traffic Mode (9kHz-30MHz)



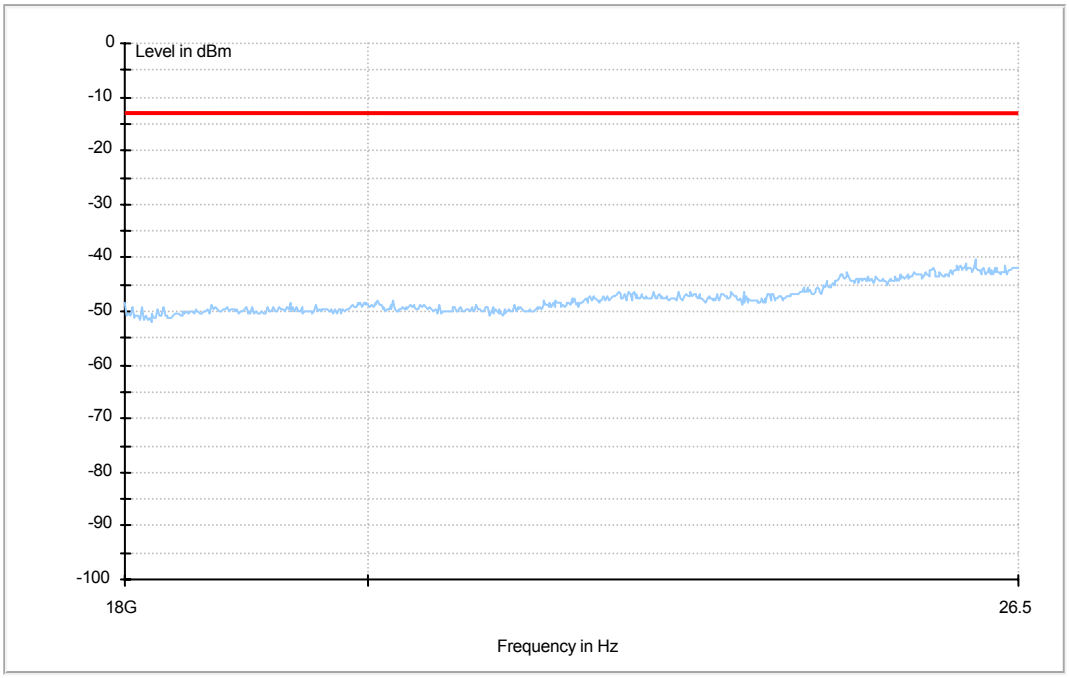
Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)

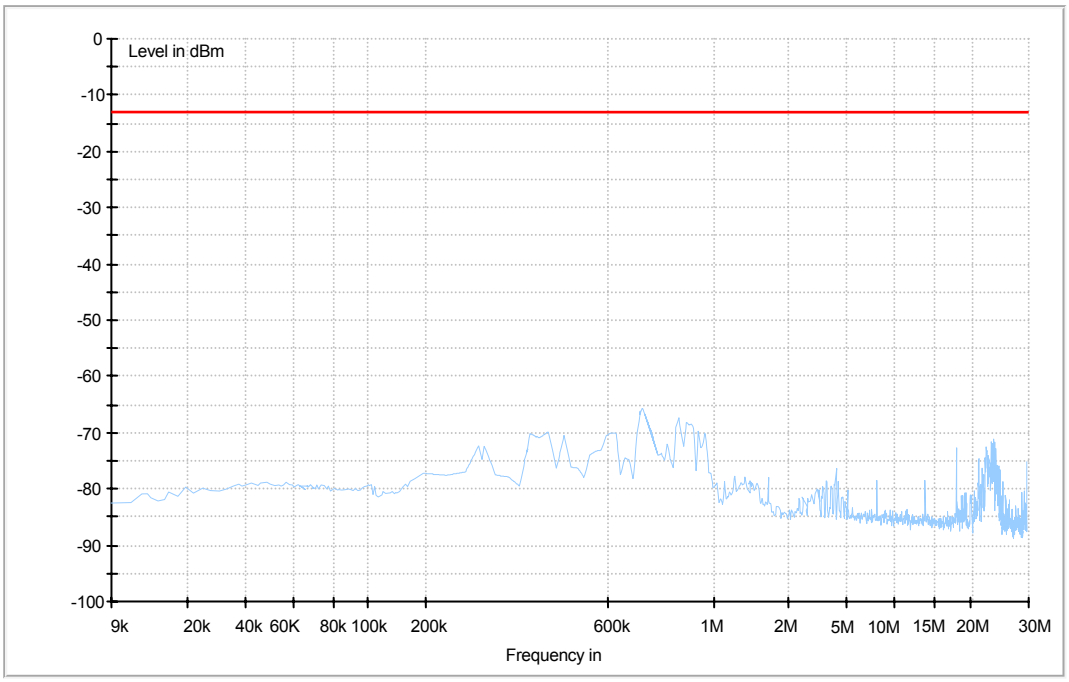


Traffic Mode (18GHz-26.5GHz)

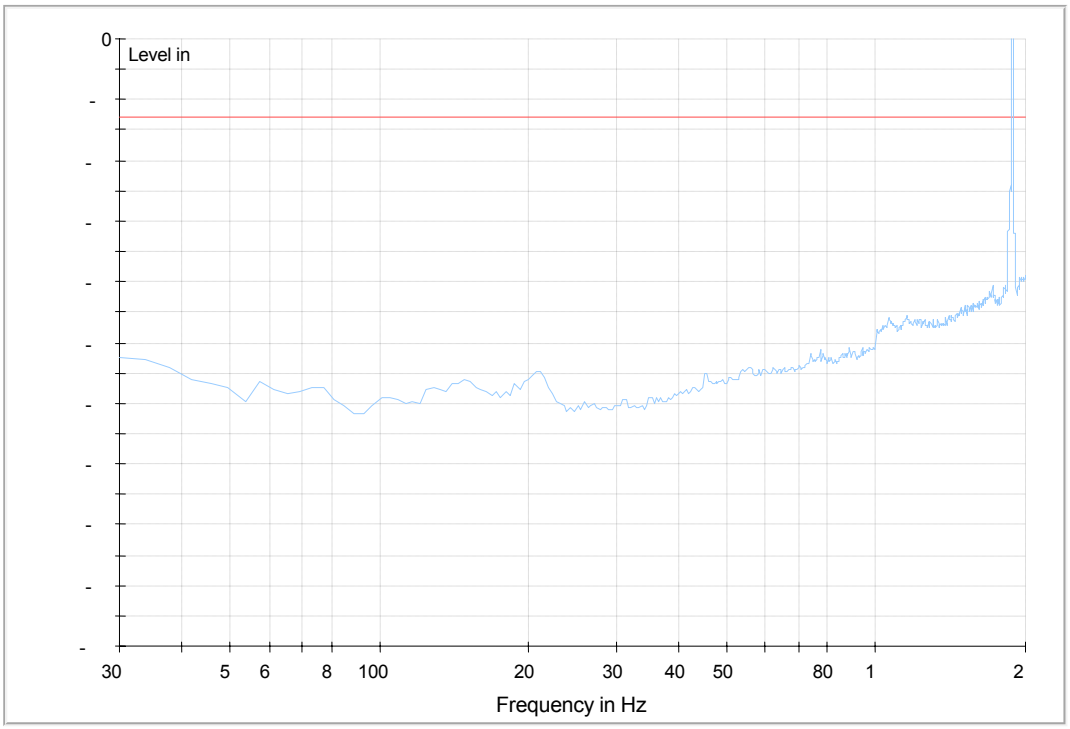


8.3.6 For HSDPA BAND Ⅱ

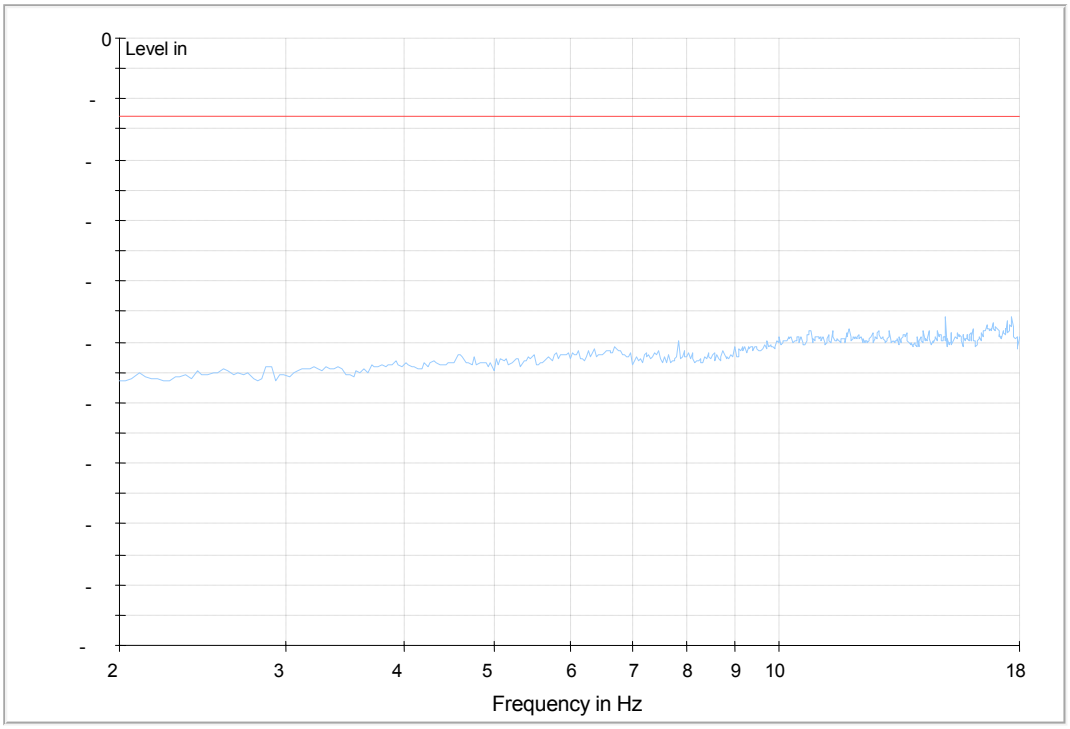
Traffic Mode (9kHz-30MHz)



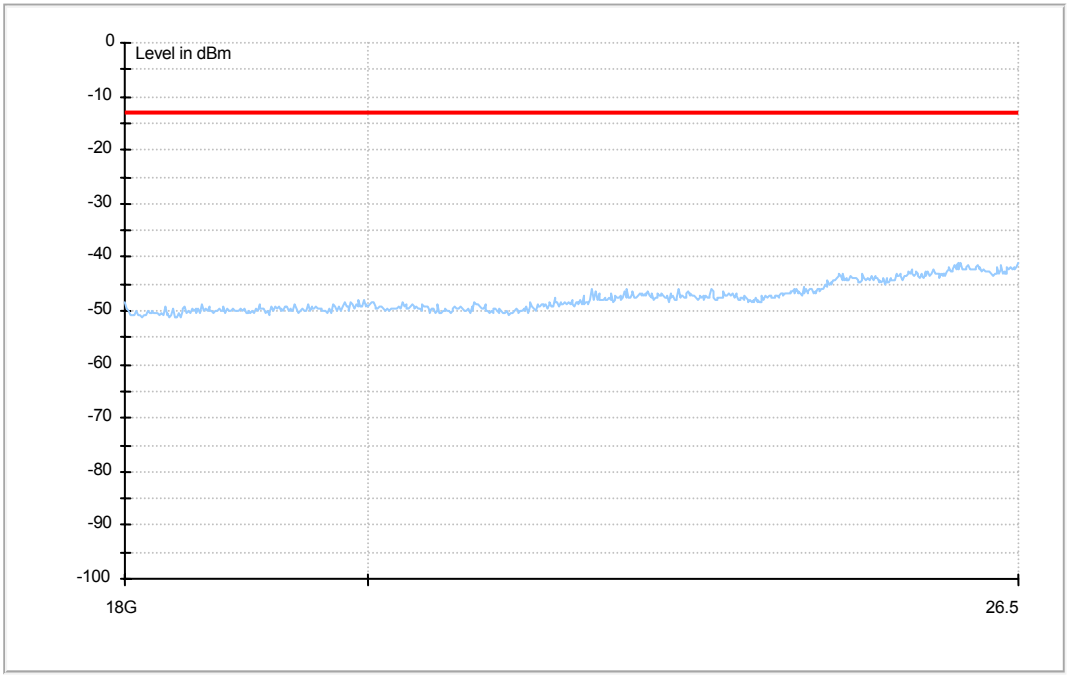
Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)

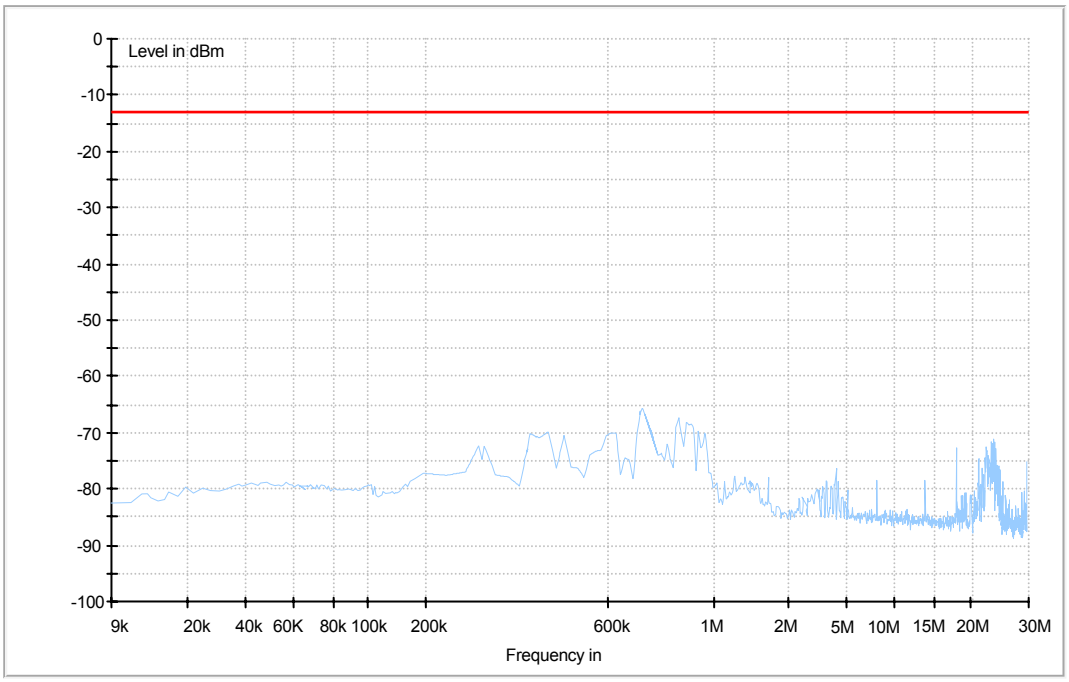


Traffic Mode (18GHz-26.5GHz)

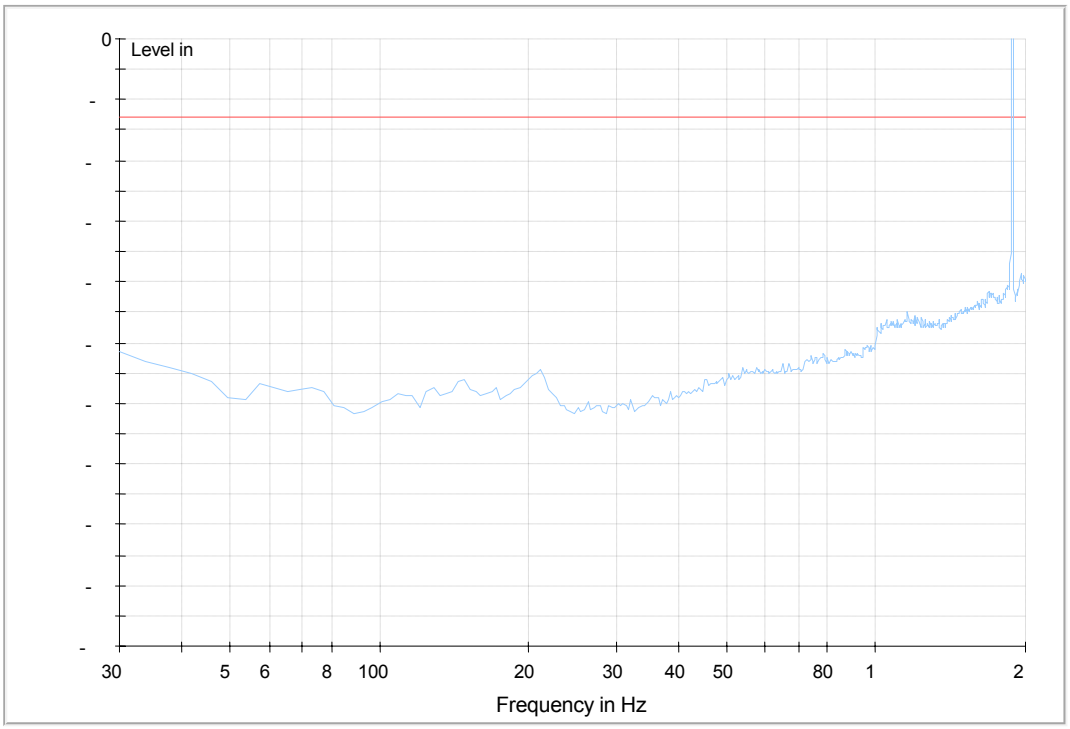


8.3.7 For HSUPA BAND Ⅱ

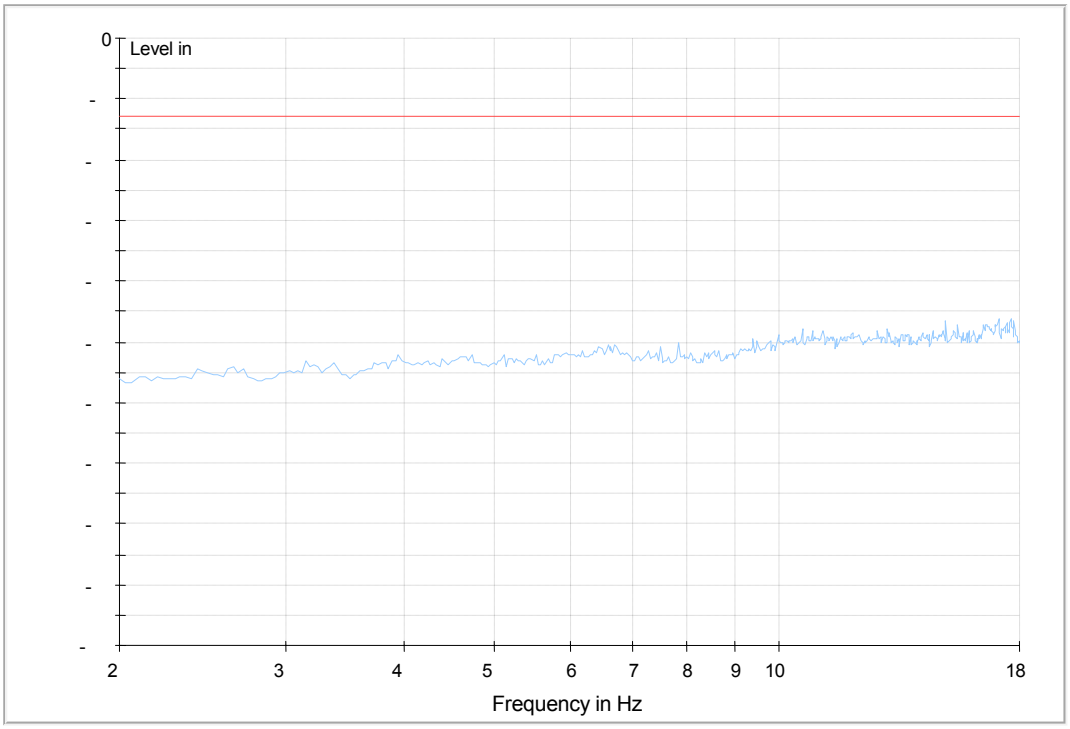
Traffic Mode (9kHz-30MHz)



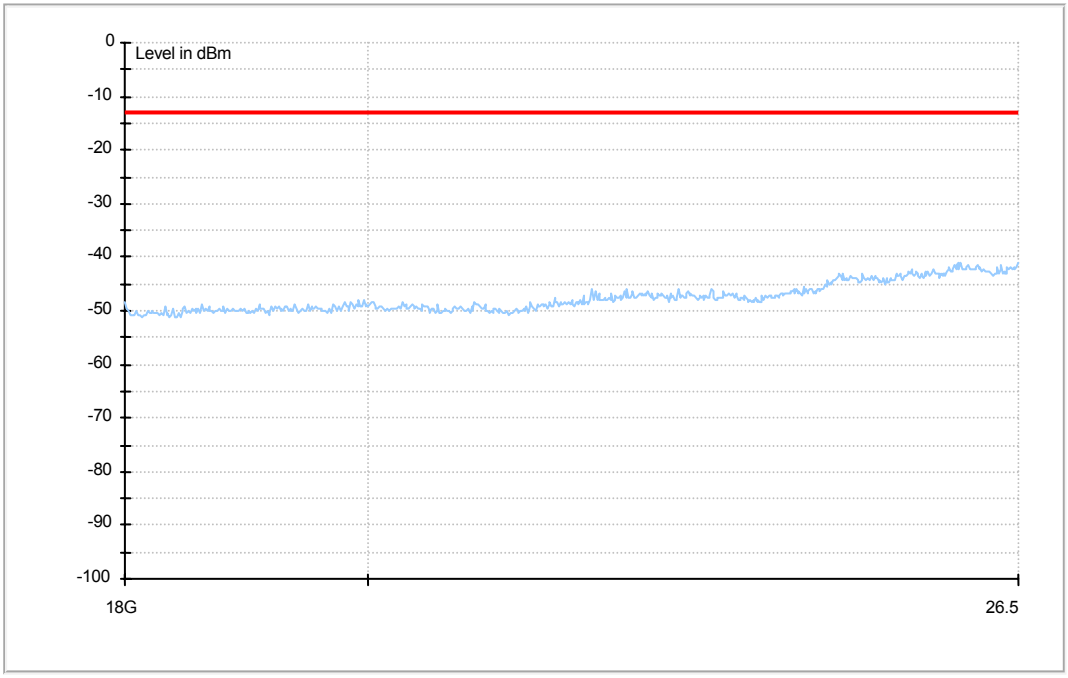
Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)



Traffic Mode (18GHz-26.5GHz)



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