



Report on EMC Test of HUAWEI
EDGE/GPRS/GSM USB STICK



Report on EMC Test of HUAWEI EDGE/GPRS/GSM USB STICK M/N: HUAWEI EG162

Report No: SYBH(R)68082007EB-3



Reliability Laboratory of Huawei Technologies Co., Ltd.

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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 HUAWEI EDGE/GPRS/GSM USB STICK
M/N: HUAWEI EG162
REGULATION FCC CFR47 Part 15: Subpart B;
START OF TEST Sep.20, 2007
END OF TEST Oct. 05, 2007
Final Judgement: Pass

Approver

2007-10-09

Date

张兴海

Name

Signature



Reviewer

2007-10-09

Date

余辉

Name

Signature



Operator

2007-10-09

Date

张飞

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 HUAWEI EDGE/GPRS/GSM USB STICK
MANUFACTURERS MODEL NUMBER HUAWEI EG162

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	Radiated Spurious Emission	PASS

1.3 Test Site

Site 1:
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 : Radio Equipment				
Test Items	Test Configuration & Test Mode	Required Performance Criteria	Result	Site
<u>Radiated Emissions</u> Enclosure Port	TC1 (TM5~TM8)	N/A	Pass	Site1
<u>Conducted Emissions</u>	TC1 (TM1~TM8)	N/A	Pass	Site1
<u>Radiated Spurious Emissions</u> Enclosure Port 30MHz ~26.5GHz	TC1 (TM1~TM8)	N/A	Pass	Site1
Note: 1, Measurement taken is within the measurement uncertainty of measurement system. 2, TC = Test configuration 3, NT=no test. Because of not containing devices susceptible to magnetic fields, the EUT has been exempt from immunity test of power frequency magnetic field.				

3 Equipment Specification

3.1 General Description

HUAWEI EG162 EDGE/GPRS/GSM DUALMODE 4BAND USB STICK is subscriber equipment in the GSM system. The GSM/GPRS/EDGE frequency band includes 850M, EGSM900, DCS1800 and PCS1900, but only 850MHz & 1900MHz bands test data included in this report. For GSM850,the TX frequency is 824MHz-849MHz and RX frequency is 869MHz-894MHz;For PCS 1900,the TX frequency is 1850MHz-1910MHz and the RX frequency is 1930MHz-1990MHz. EG162 implements such functions as RF signal receiving/transmitting, EDGE/GPRS/GSM protocol processing, data service etc. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface and antenna interface.

3.2 Technical Data

3.2.1 Main Equipment Technical Data

Description:	HUAWEI EG162 EDGE/GPRS/GSM USB STICK
Model:	HUAWEI EG162
Input Rated Voltage:	5V
Rated Power:	3W
Dimensions:	81.5mm (depth) ×23.2 mm(width) ×10mm(height)
Weight:	24g
S/N:	EM01AA1791300036

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



Figure 1.

EUT Appearance

3.3 Sub-Assembly Identity

Table 4 Sub-Assembly Identity

Board			
Model Name	Qty.	Serial Number	Description
HUAWEI EG162	1	EF1AA10731600098	Main board of data card
Accessory			
Name	Qty.	Serials number	Description

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
USB	USB	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	3604091211	2006-10-12
Notebook	T43	IBM	3106093834	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).

Table 7 Configuration table

Test configuration	Test mode
TC1	TM1~TM8

TC1: EUT was powered by USB port connected to the notebook.

4.3.2 Test Mode

There was 8 test Modes. TM1 to TM8 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 idle mode GPRS 850;
 TM6: operate in idle mode EGPRS 850;
 TM7: operate in idle mode GPRS 1900;
 TM8: operate in idle mode EGPRS 1900;

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 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.

Assign channel frequency to an appropriate channel number. Here, set the ARFCN channel number to 190 for GSM850, 661 for PCS1900.

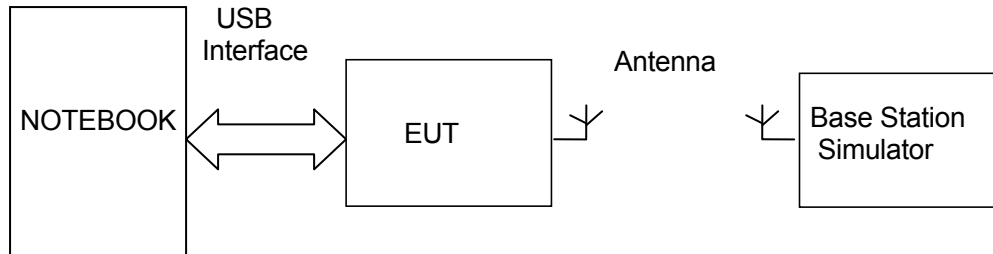


Figure 2.: Test Configuration 1 (TM1-TM4)

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 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.

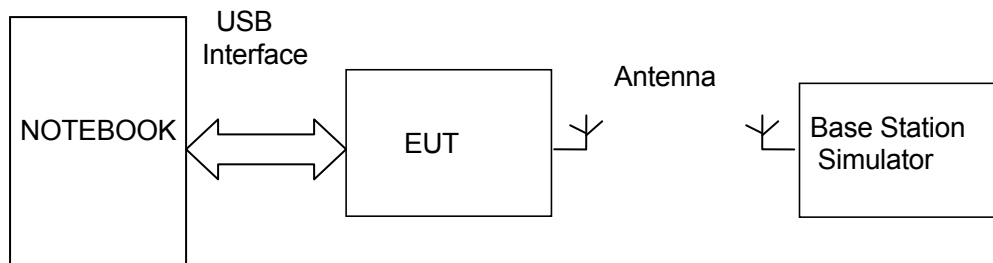


Figure 3. Test Configuration 1 (TM5-TM8)

5 Electromagnetic Interference (EMI)

5.1 Radiated Disturbance 30MHz to 1000MHz

5.1.1 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2003). The test distance was 3m. The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4. The Radiated Disturbance measurements were made using a Rohde and Schwarz ESMI Test Receiver and control software ES-K1.

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

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

EUT was configured to idle mode according to TC1 and the test performed at worst emission state.

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

Test set up figure:

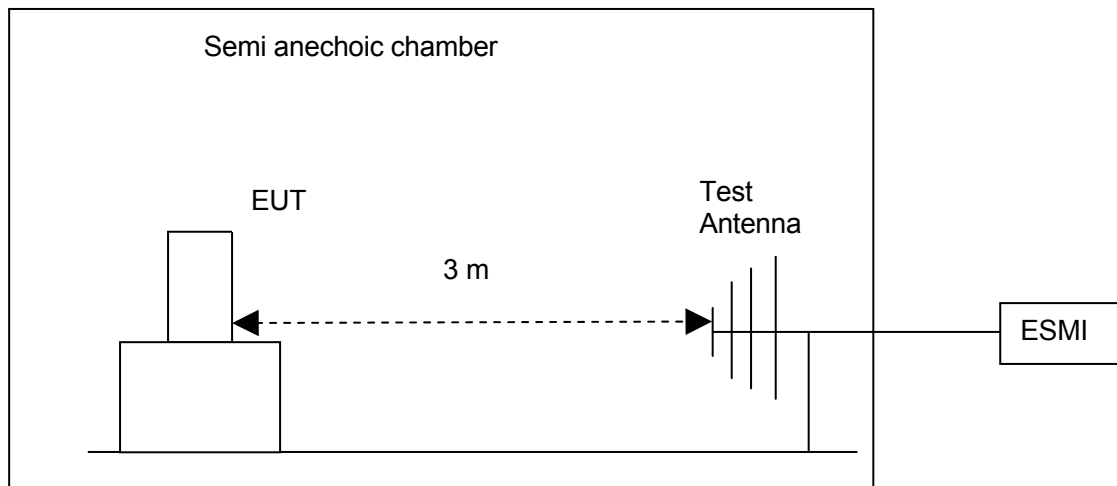


Figure 4. Test set up

5.1.2 Test Results

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

The test data is shown in section 8.1 of the report.

Table 8 Test Limits

Frequency of Emission (MHz)	Radiated Limit	
	Unit($\mu\text{V}/\text{m}$)	Unit($\text{dB}\mu\text{V}/\text{m}$)
30-88	100	40
88-216	150	43.5
216-960	200	46
960-1000	500	54



5.2 Conducted Disturbance 0.15 MHz to 30MHz

5.2.1 Test Procedure

The Table-top EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4: 2003.

Conducted Disturbance at AC Port measurements were undertaken on the L and N Lines. The emissions were measured using a Quasi-Peak Detector and Average Detector.

Huawei Mobile Station was communicated with the BTS simulator through Air interface, the BTS simulator controls the Mobile Station to transmitter the maximum power which defined in specification of product. The Mobile Station operated on the typical channel.

Measurement bandwidth (RBW) for 150kHz to 30 MHz: 9 kHz;

Test Set-up figure:

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

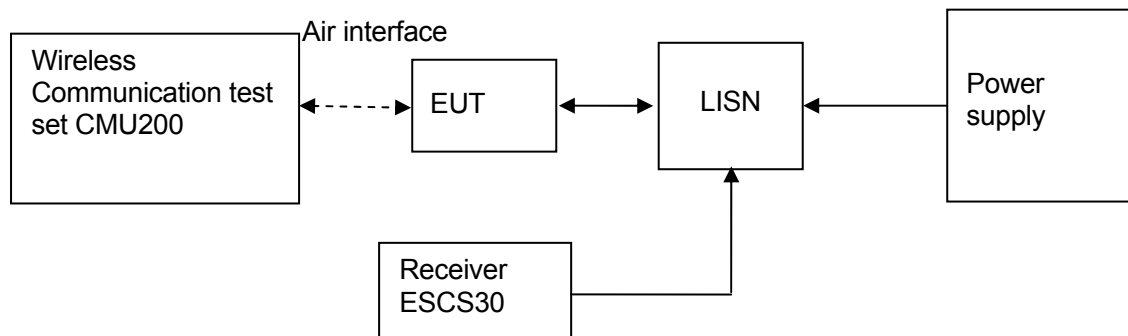


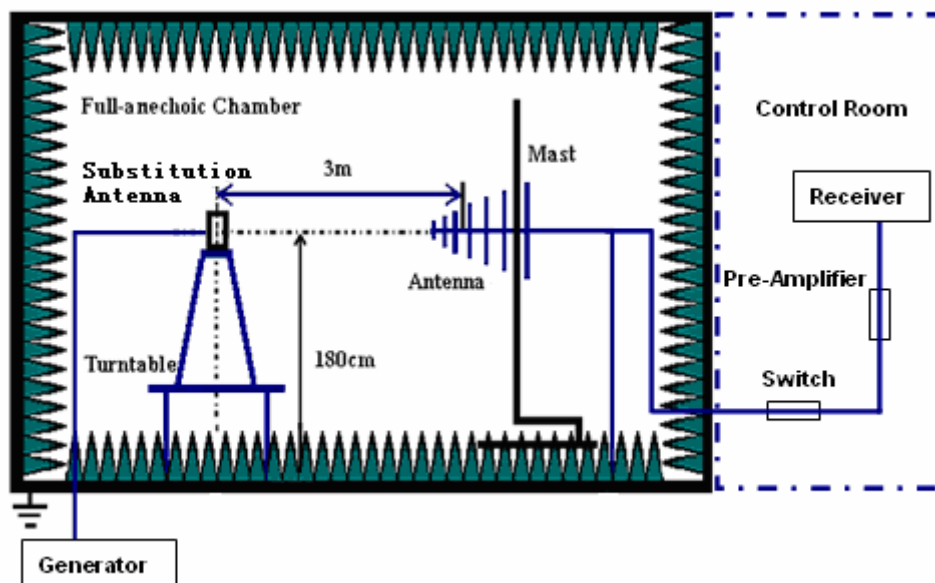
Figure 5. Test Set-up

5.2.2 Test Results

The EUT has met requirements for Conducted disturbance of power lines. The test data is shown in section 8.2 of the report.

Table 9 Test Limit of DC&AC Power Port

Frequency range	150kHz~ 30MHz	
Classification	Class B	
Limit(Class B)	Voltage limits	
	QP	AV
0.15MHz~0.5MHz	66~56 dB μ V	56~46 dB μ V
0.5MHz~5MHz	56 dB μ V	46 dB μ V
5MHz~30MHz	60 dB μ V	50 dB μ V



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 1GHz: 100 kHz;
Measurement bandwidth (RBW) for 1GHz up to 12.75GHz: 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 26.5GHz: 1 MHz;

Table 11 Radiated Spurious Emissions Limits

Frequency band	Minimum requirement (E.R.P) traffic mode
30MHz~26.5GHz	-13dBm

5.3.2 Test Results

The EUT has met the requirements of TS151010-1's requirement.

The test data see section 8.3 of this report.

6 Main Test Instruments

Table 12 Main Test Equipments

Test item	Test Instrument	Model	Manufacturer	Cal-Date	Cal Interval (month)
RE	EMI Test receiver	ESMI	R&S	April.23, 2007	12
	Broadband Antenna	CBL 6112B (2941)	SCHAFFNER	Feb.26, 2007	12
CE	EMI Test receiver	ESCS30	R&S	May.29, 2007	12
	Artificial Mains Network	ENV4200	R&S	May.21, 2007	12
RSE	EMI Test receiver	ESIB26	R&S	May.30.2007	12
	Horn Antenna	3117	EMCO	May.20.2007	12
	Broadband Antenna	CBL6112B /2941	SCHAFFNER	Feb.16.2007	12
	Horn Antenna	3160	EMCO	May.20.2007	12
Software Information					
Test Item	Software Name	Manufacturer		Version	
RE/CE	ES-K1	R&S		1.7.1	
RSE	EMC32	R&S		V5.0	

7 System Measurement Uncertainty

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

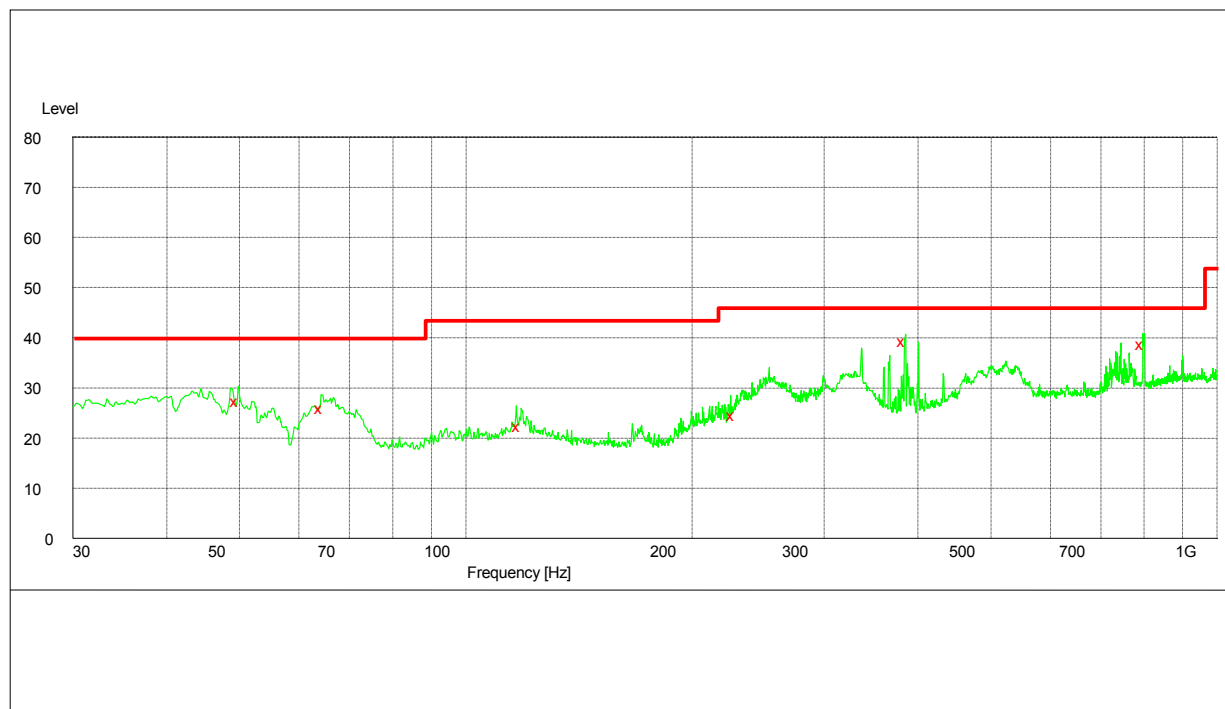
Table 13 System Measurement Uncertainty

Items		Extended Uncertainty
RE	Field strength (dB μ V/m)	U=4.6dB; k=2(30MHz-1GHz)
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

8.1.1 Radiated Disturbance

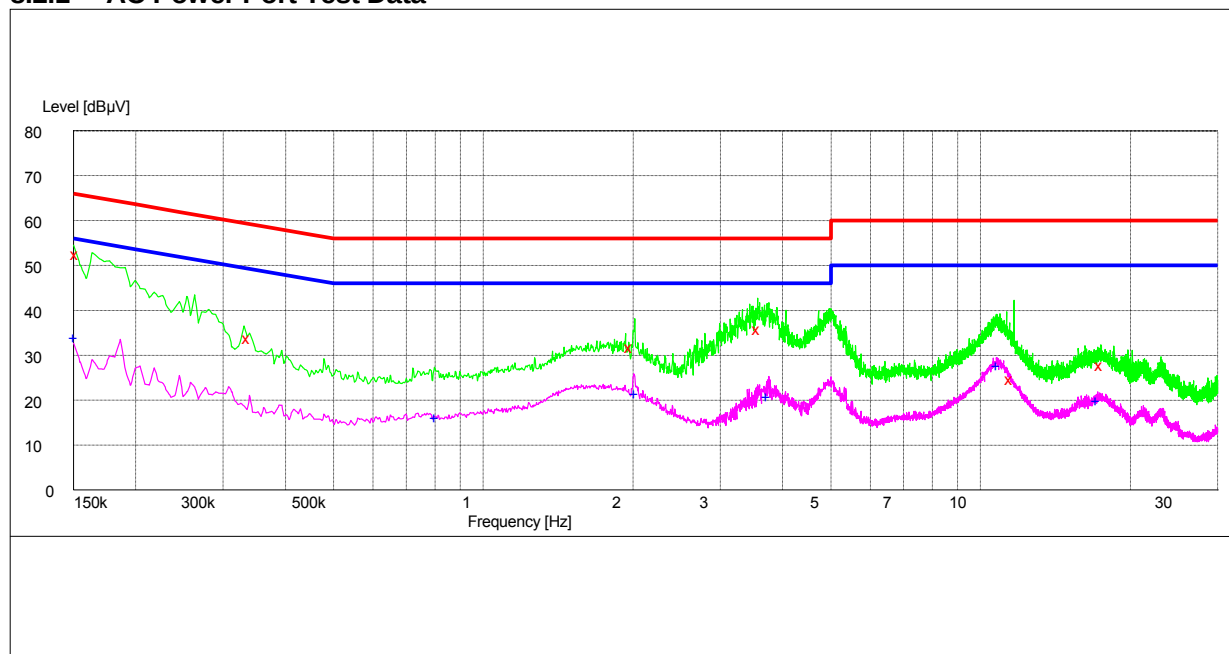


MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
49.680000	27.70	-14.0	40.0	12.3	107.0	72.00	VERTICAL
64.260000	26.00	-16.7	40.0	14.0	178.0	105.00	VERTICAL
117.840000	22.40	-9.6	43.5	21.1	248.0	358.00	HORIZONTAL
227.400000	25.50	-10.5	46.0	20.5	151.0	64.00	HORIZONTAL
384.000000	39.50	-5.1	46.0	6.5	100.0	180.00	HORIZONTAL
796.560000	38.90	0.2	46.0	7.1	223.0	205.00	VERTICAL

8.2 Conducted Disturbance

8.2.1 AC Power Port Test Data



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	52.80	11.0	66	13.2	QP	N	FLO
0.339000	34.60	10.2	59	24.4	QP	L3	FLO
1.990500	32.10	10.1	56	23.9	QP	L3	FLO
3.592500	36.10	10.0	56	19.9	QP	L3	FLO
11.602500	25.00	11.6	60	35.0	QP	N	FLO
17.587500	28.10	12.0	60	31.9	QP	L3	FLO

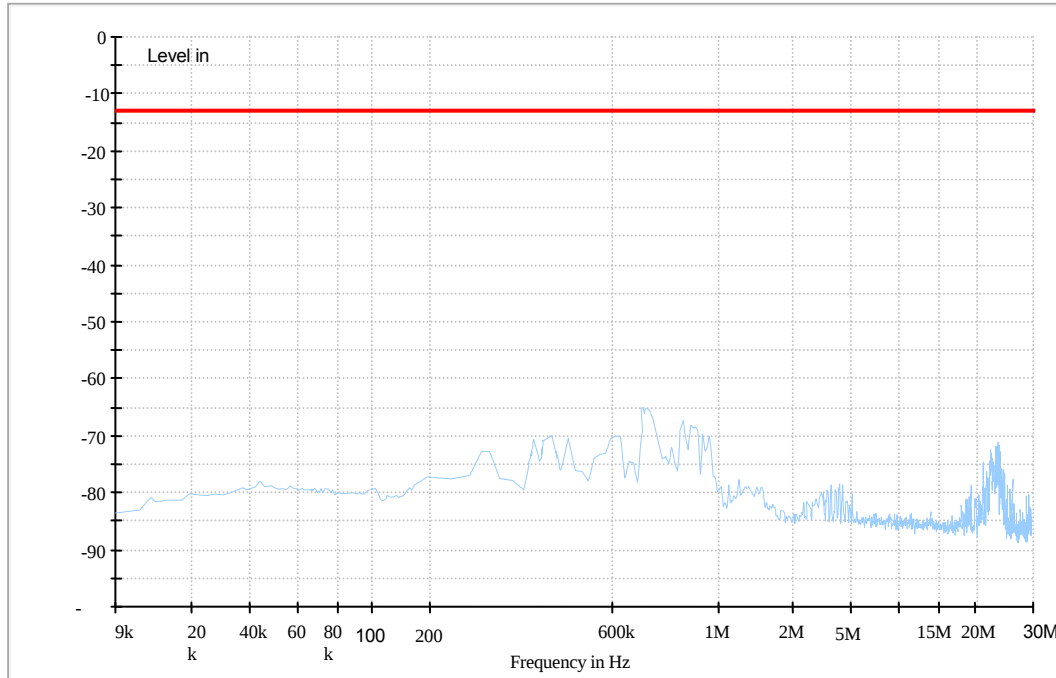
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	34.20	11.0	56	21.8	AV	L3	FLO
0.807000	16.20	9.9	46	29.8	AV	N	FLO
2.035500	21.70	10.1	46	24.3	AV	L3	FLO
3.759000	21.10	10.1	46	24.9	AV	N	FLO
10.900500	27.90	11.6	50	22.1	AV	L3	FLO
17.281500	20.10	12.0	50	29.9	AV	L3	FLO

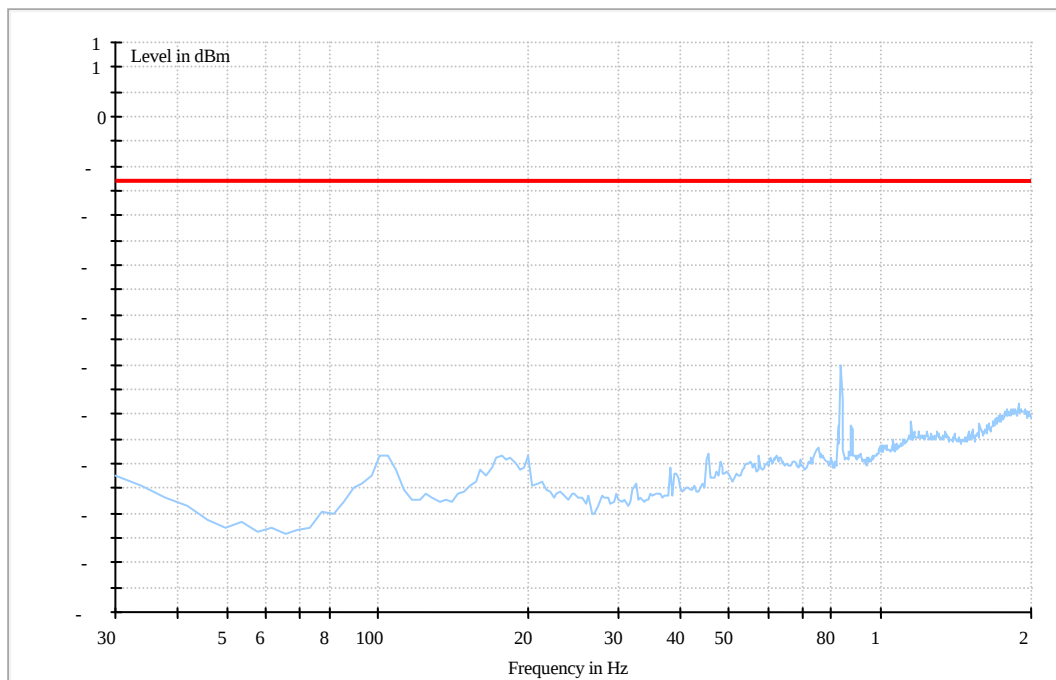
8.3 Radiated Spurious Emission

8.3.1 For GPRS 850

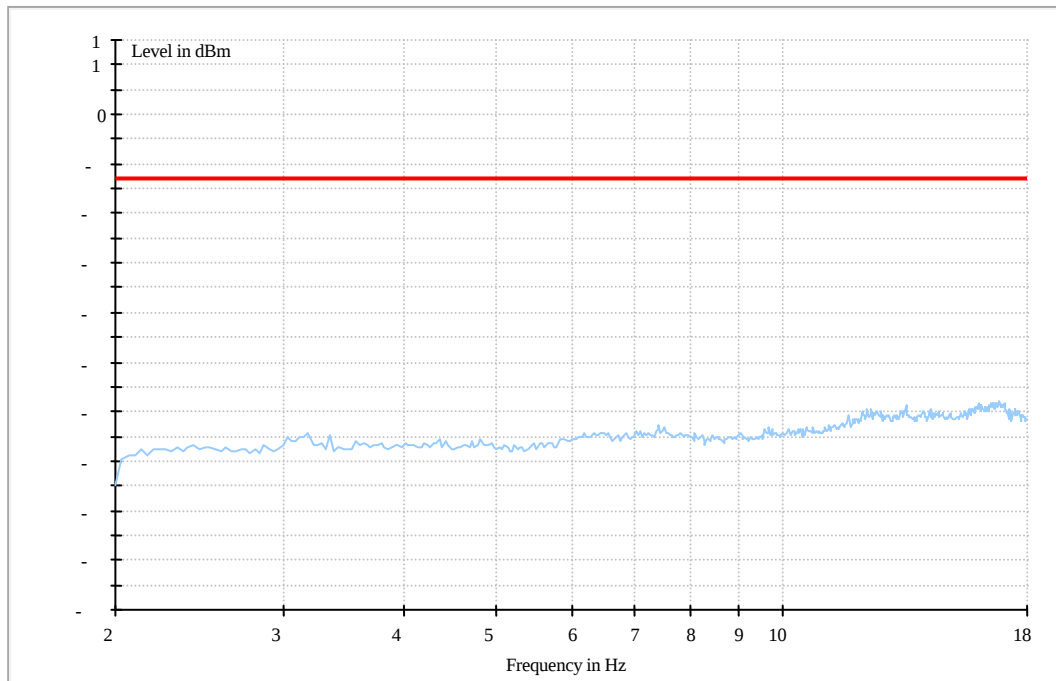
Traffic Mode (9kHz-30MHz)



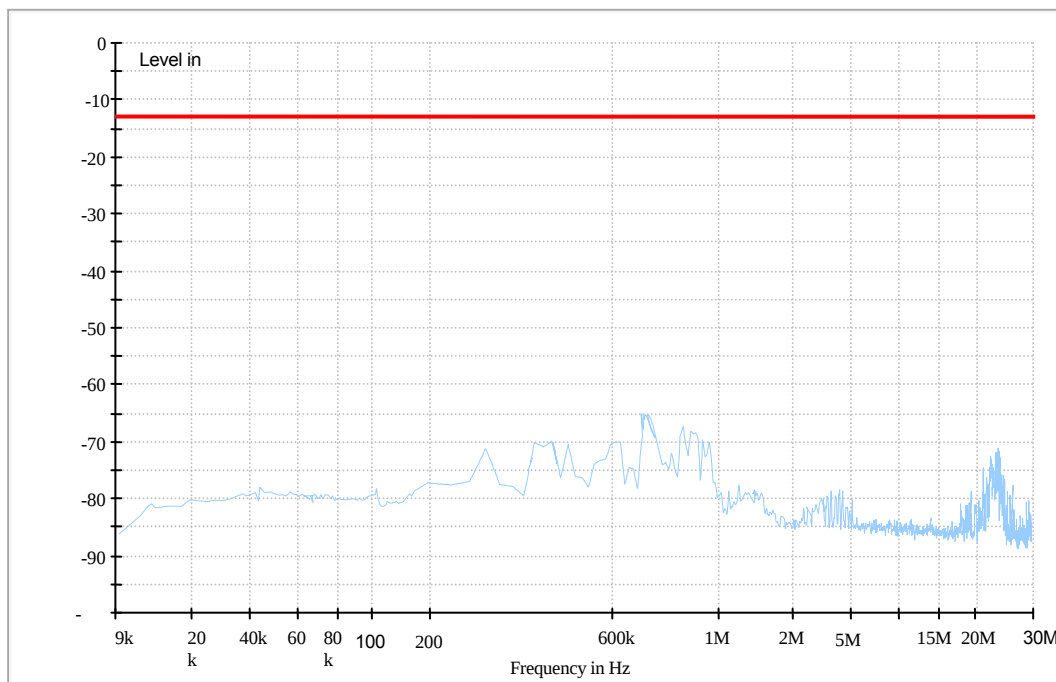
Traffic Mode (30MHz-2GHz)



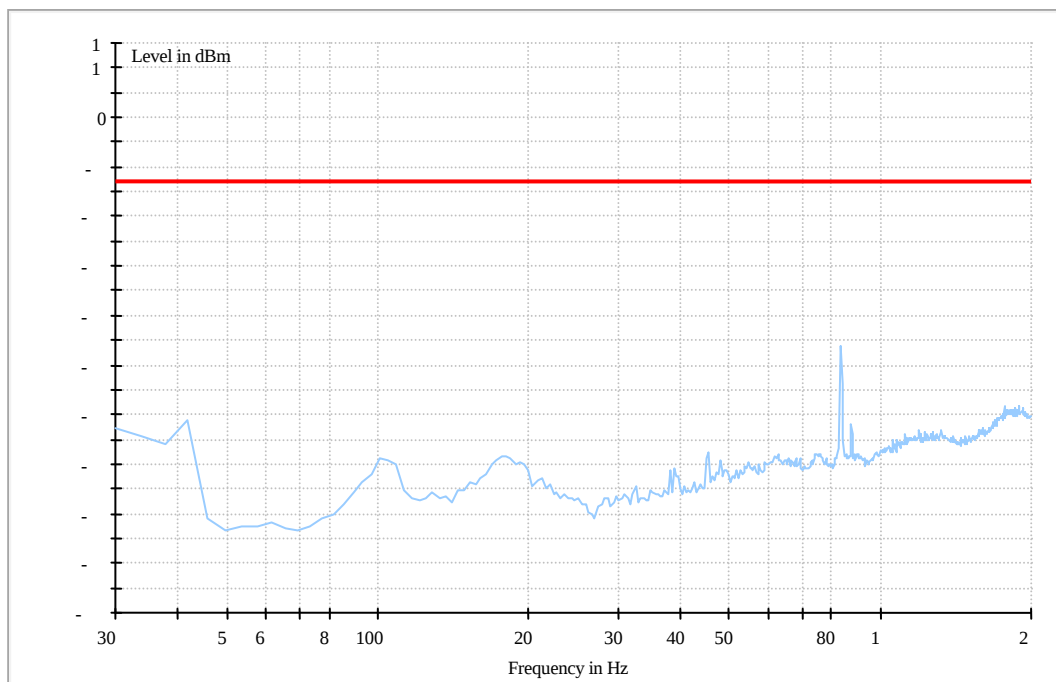
Traffic Mode (2GHz-18GHz)



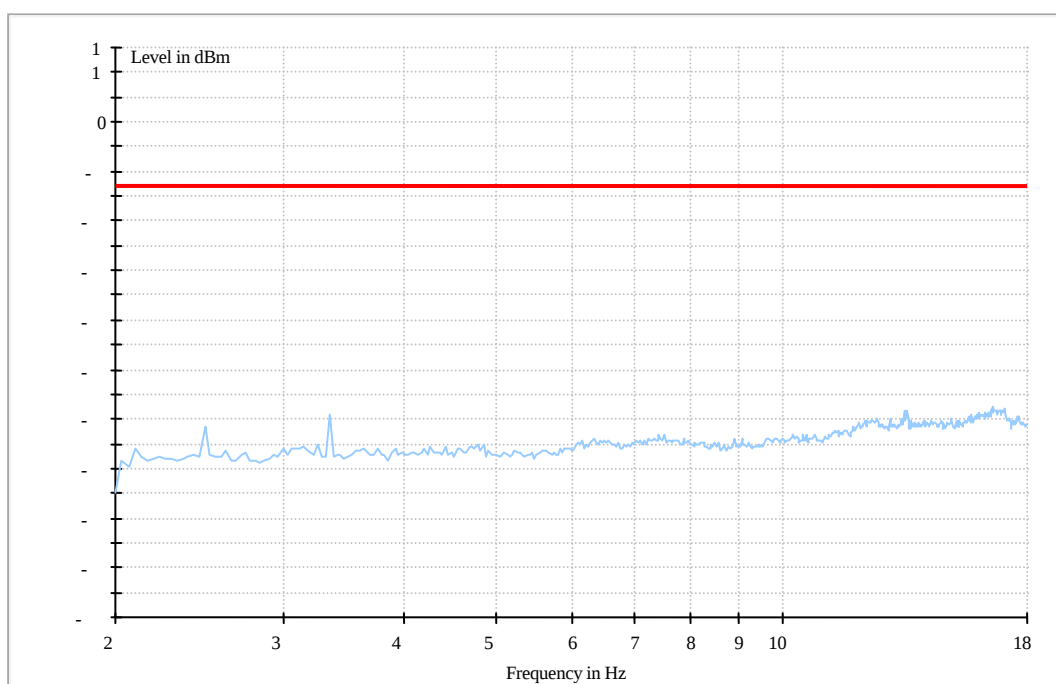
8.3.2 For EGPRS 850 Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)

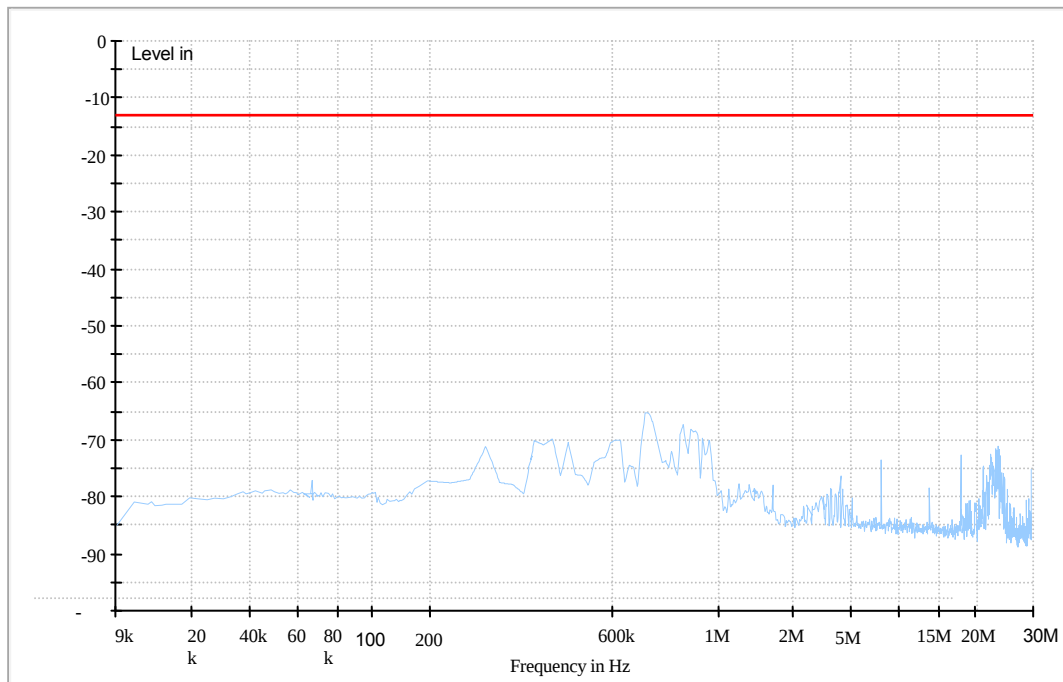


Traffic Mode (2GHz-18GHz)

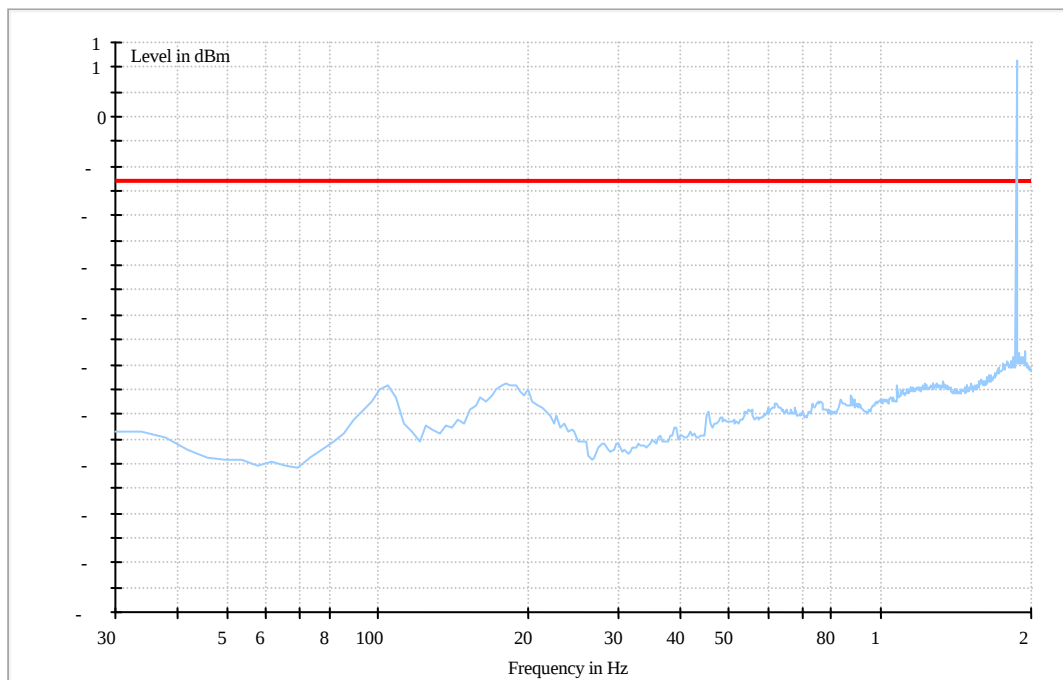


8.3.3 For GPRS 1900

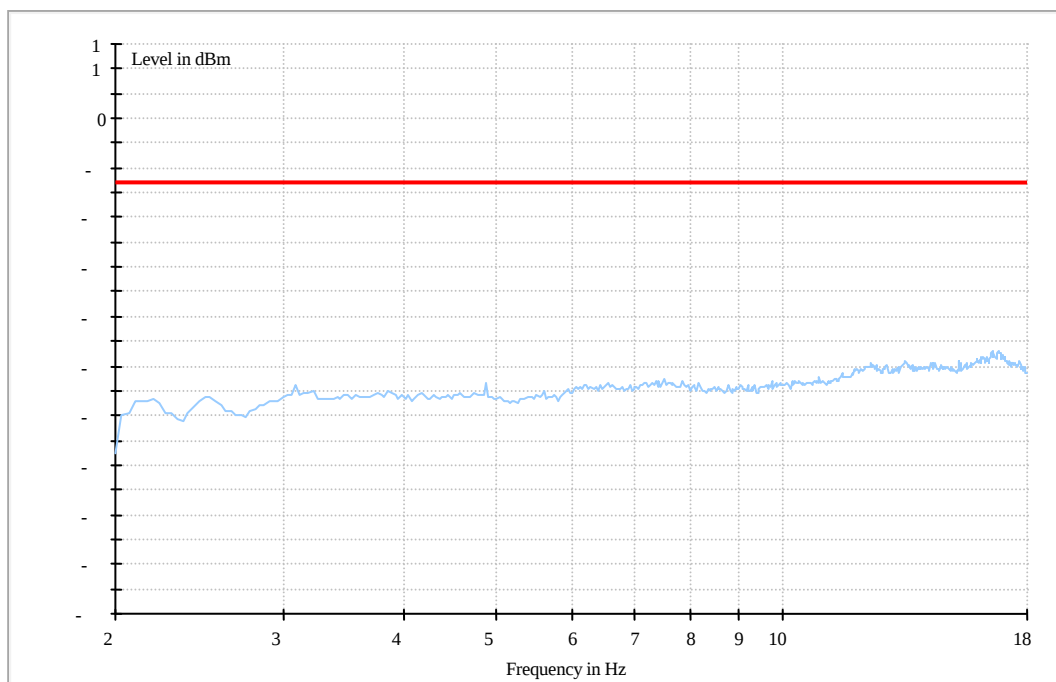
Traffic Mode (9kHz-30MHz)



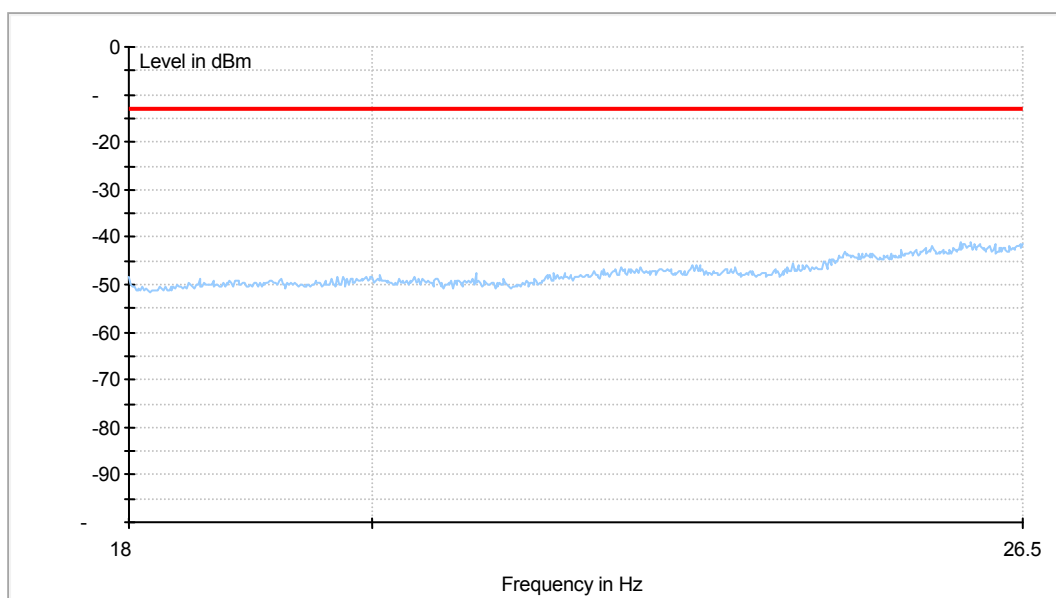
Traffic Mode (30MHz-2GHz)



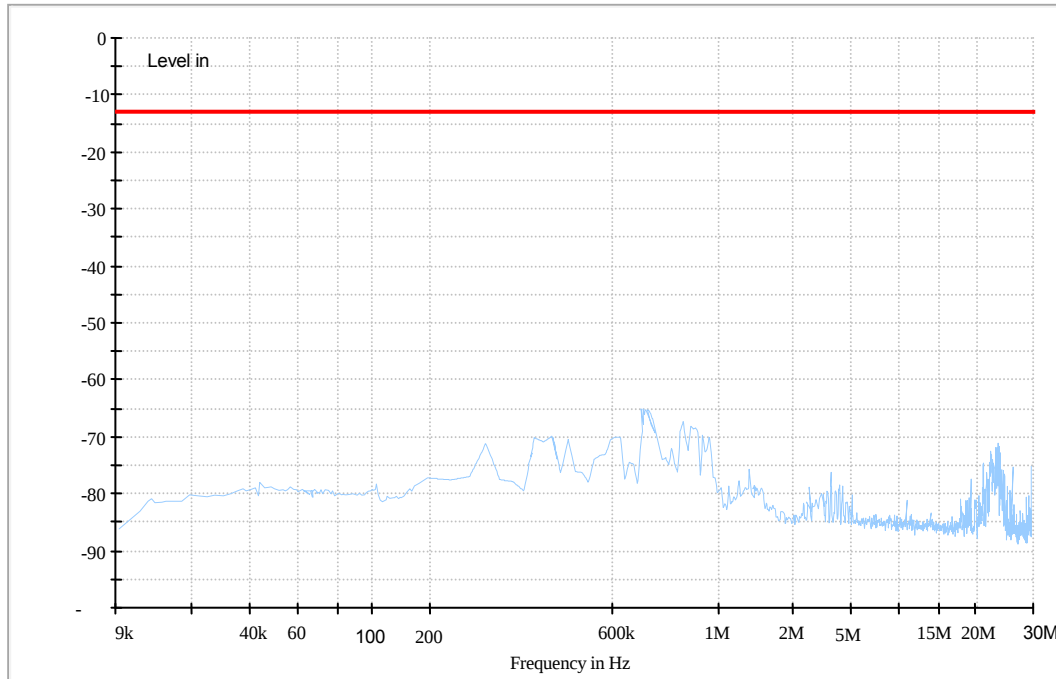
Traffic Mode (2GHz-18GHz)



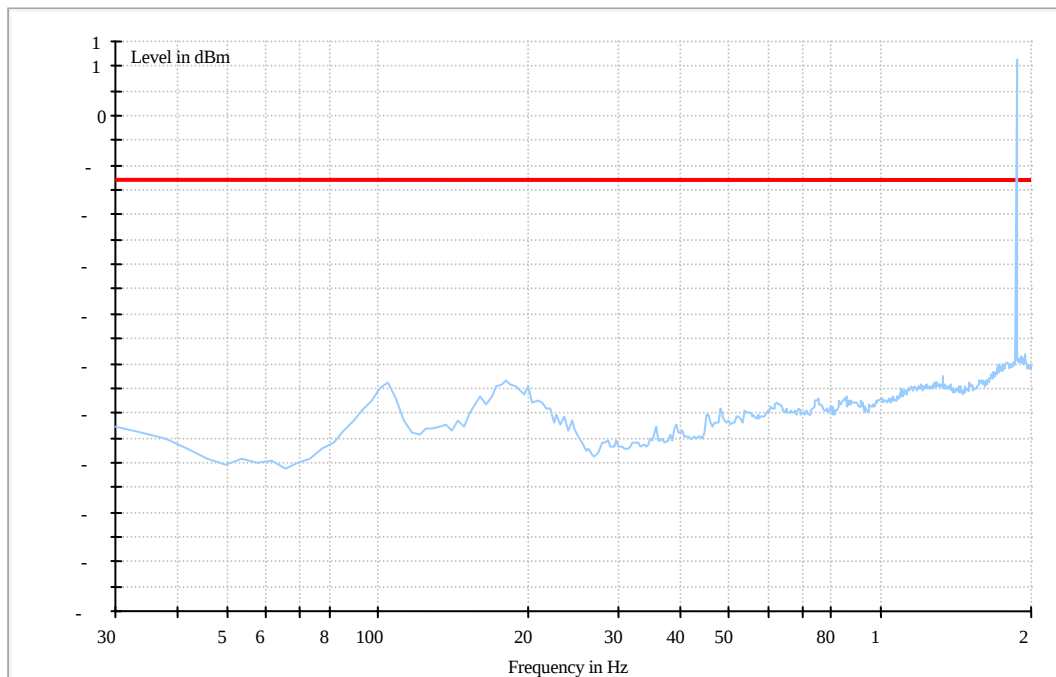
Traffic Mode (18GHz-26.5GHz)



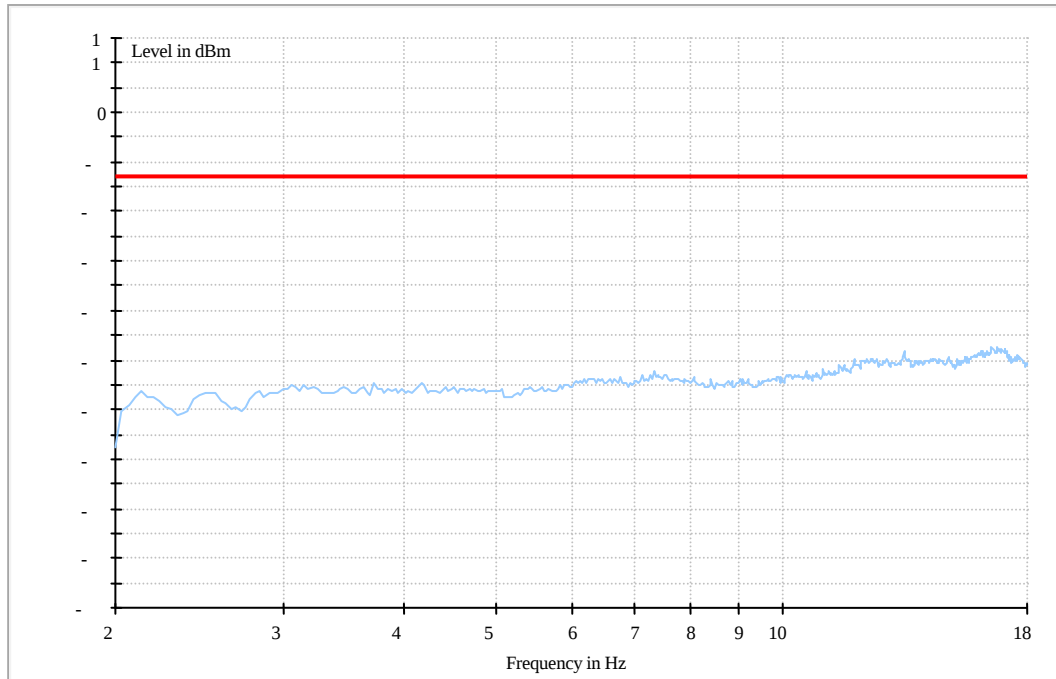
8.3.4 For EGPRS 1900 Traffic Mode (9kHz-30MHz)



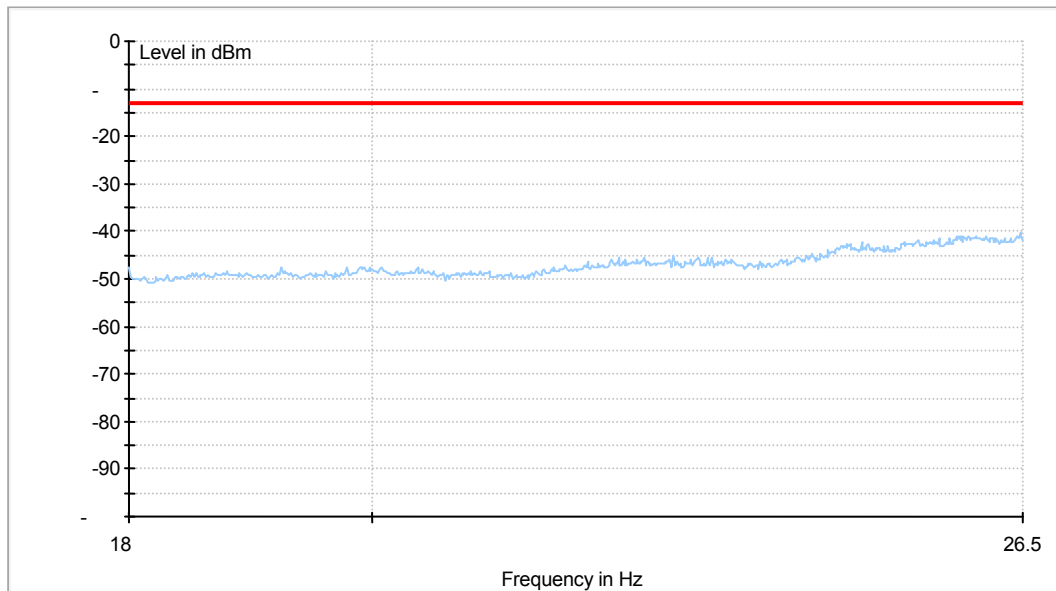
Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)



Traffic Mode (18GHz-26.5GHz)



9 Photographs of Test Set-ups

9.1 Radiated Emissions



Radiated Disturbance Emission

9.2 Radiated Spurious Emissions



Radiated Spurious Emission 30M~2GHz



Radiated Spurious Emission 2G~18GHz



Radiated Spurious Emission 18G~26.5GHz

9.3 Conducted Emissions



Conducted Emissions of AC Power Port

END