Report on EMC Test of GSM/GPRS/EDGE Mobile Phone With Bluetooth M/N: T7200

Report No: SYBH(R) 013102007EB-1

Reliability Laboratory of Huawei Technologies Co., Ltd.

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Notice 1

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3. 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.
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Notice 2

Modification Information:

Table 1 Modification Information

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

REPORT ON	**EMC Test of GSM /GPRS/EDGE Mobile Phone With Bluetooth M/N: T7200**
REGULATION	**FCC CFR47 Part 15: Subpart B;**
START OF TEST	**Oct.10, 2007**
END OF TEST	**Oct.20, 2007**
Final Judgement:	**Pass**

Approver	**2007-10-27**	张兴海	
	Date	**Name**	**Signature**
Reviewer	**2007-10-27**	余 辉	
	Date	**Name**	**Signature**
Operator	**2007-10-27**	张飞	
	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	HUAWEI GSM/GPRS/EDGE Mobile Phone With Bluetooth
MANUFACTURERS MODEL NUMBER	T7200

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:
EMC LABORATORY OF RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD

1.4 Test environment condition

Ambient temperature	20~25°C
Relative humidity	40%~52%
Atmospheric pressure	101kPa

2 Summary of Results

Table *2* below shows a brief summary of the results obtained.

Table 2 Summary of results

EUT Classification： Wireless Terminal				
Test Items	**Test Configuration &Test Mode**	**Required Performance Criteria**	**Result**	**Site**
Radiated Emissions Enclosure Port	TC1 (TM5~TM8)	N/A	Pass	Site1
Conducted Emissions	TC1 (TM1~TM4)	N/A	Pass	Site1
Radiated Spurious Emissions Enclosure Port 9KHz – 26.5GHz	TC1 (TM1~TM4)	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 GSM/GPRS/EDGE Mobile Phone with Bluetooth–T7200 is subscriber equipment in the GSM system. The GSM frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900. Only GSM 850 and PCS1900 bands' test datas are shown in this report. T7200 implements such functions as RF signal receiving/sending, GSM/GPRS/EGPRS protocol processing, voice and data service etc. Externally it provides Micro SD card interface, earphone port(to provide voice service) and USIM card interface.

3.2 Technical Data

3.2.1 Main Equipment Technical Data

Description:	:	GSM/GPRS/EDGE Mobile Phone with Bluetooth
Models:		T7200
Input Rated Voltage	:	⎓ 3.7V
Extreme Voltage	:	⎓ 3.6V and ⎓ 4.2V
Rated Power	:	Normal 3W ,Max 8 W
Dimensions	:	98 mm (L) × 48 mm (W) × 16.5mm (H)
Weight	:	＜105 g (with battery)
IMEI	:	357960010001570

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

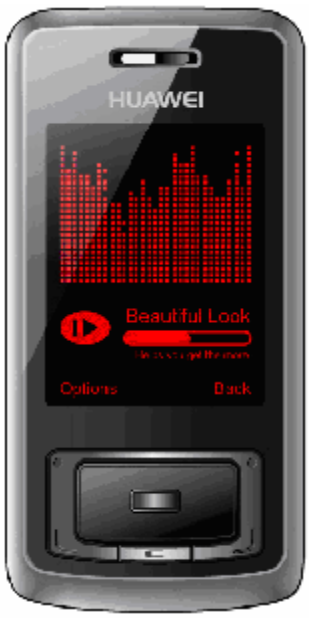


Figure 1. EUT Appearance

3.3 Sub-Assembly Identity

Table 3 Sub-Assembly Identity

Board				
Model Name	Qty.	Hardware Version	Serials number	Description
HD1U810E	1	VER.A	UQ1CA10791900204	Main board of Mobile Phone
Accessory				
Name	Qty.	Manufacture	Serials number	Description
Adapter	1	TECH-POWER INTERNATIONAL CO.,LTD	TP1752903536	voltage nominal: ~120V Input voltage: ~100-240V ;50/60Hz Output voltage: ⎓ +5.0V，0.65A Rate power: 4W
Rechargeable Li-ion	1	FMT Electronics Co.,Ltd.	FMT80501066Y	Battery Model: HBU86 Rated capacity: 850mAh Nominal Voltage: ⎓ +3.7V Charging Voltage: ⎓ +4.2V

4 System Configuration during EMC Test

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

4.1 Cables Used during Test

Table 4 Cable Used during Test

Port	Length	Quantity	Type of Cable
AC Power Port	3m	1	Unshielded
USB	0.85m	1	shielded
Earphone	1.25m	1	Unshielded

4.2 Associated Equipment Used during Test

Table 5 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Cal Date	Cal Interval (month)
Radio Communication Tester	CMU200	R&S	108522	2007.03.22	12

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 6 Configuration table

TC1	TM1~TM8

4.3.2 Test Mode

There were twelve test Modes. TM1 and TM8 were shown in the diagrams below:
TM1: operate in traffic GSM 850;
TM2: operate in traffic mode EGPRS 850;
TM3: operate in traffic mode GSM 1900;
TM4: operate in traffic mode EGPRS 1900;
TM5: operate in idle GSM 850;
TM6: operate in idle mode EGPRS 850;
TM7: operate in idle mode GSM 1900;
TM8: operate in idle mode EGPRS 1900;
The T7200 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 Cellular 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. Set the ARFCN channel number to192 for GSM850, to 661 forPCS1900.

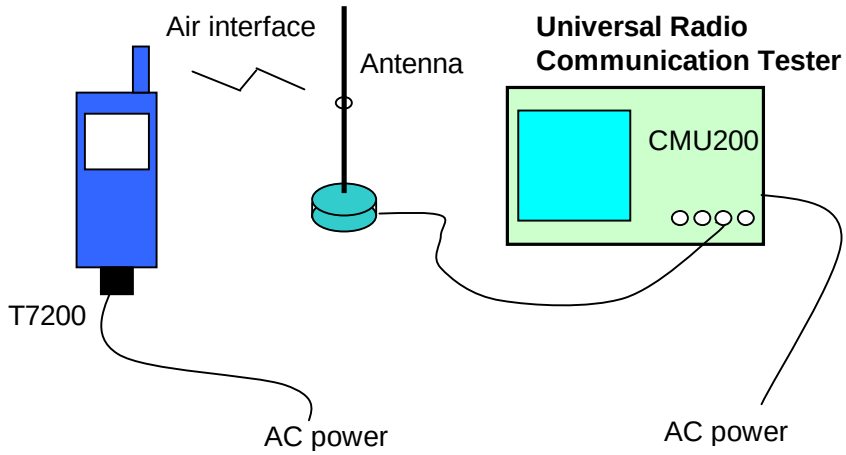
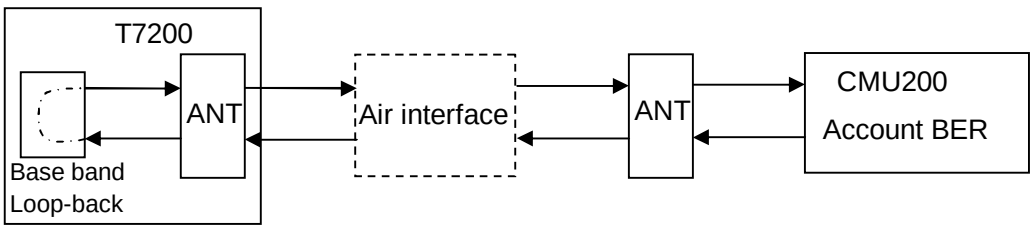


Figure 2. : Test Configuration TC1

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 Cellular and PCS, 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 3. : Test Configuration TC1

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:

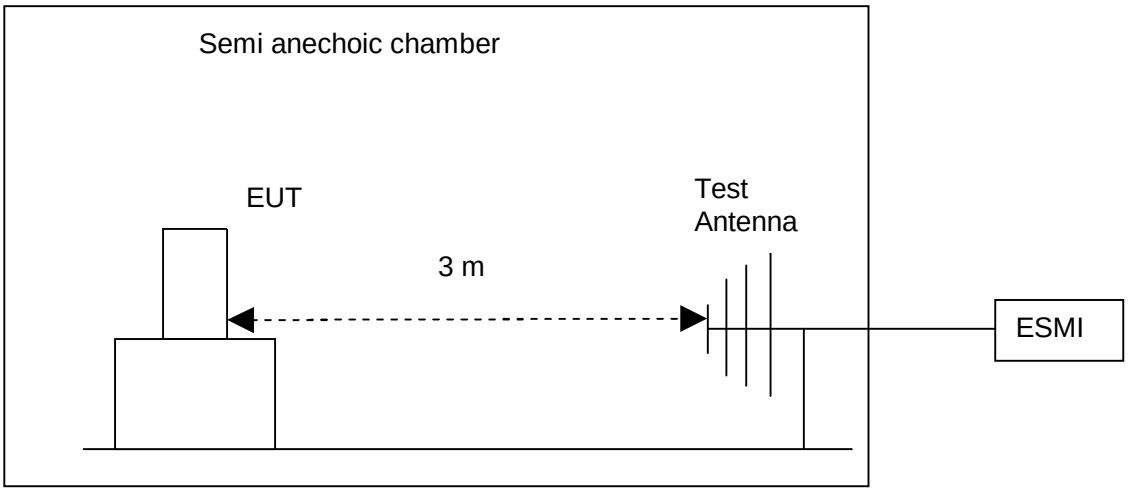


Figure 4. Test set up

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 7 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
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 150kz to 30 MHz: 9 kHz;

Test Set-up figure:

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

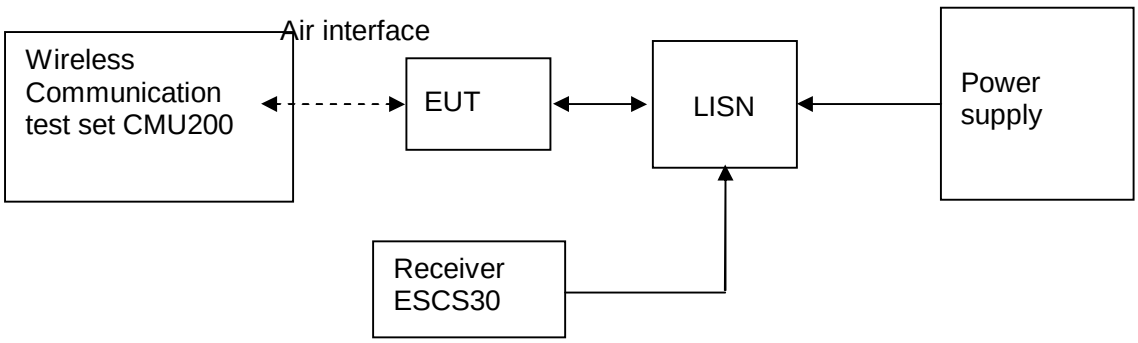


Figure 5. Test Set-up

5.2.2 Test Results

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

Table 8 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

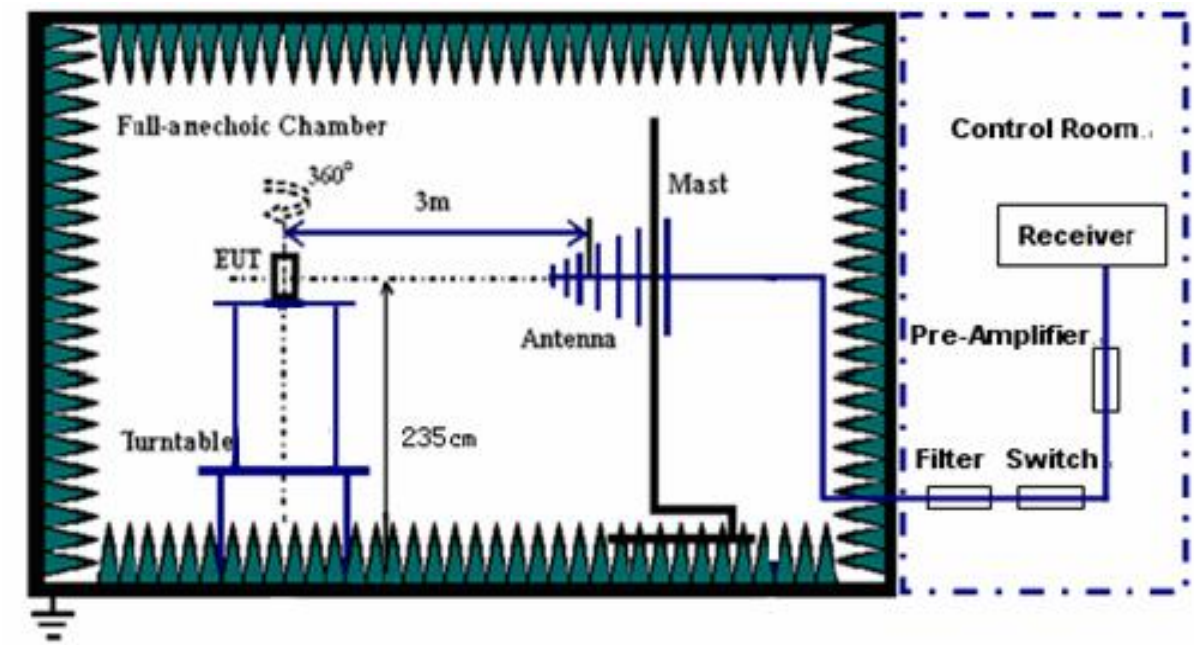
5.3.1 Test Procedure

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:

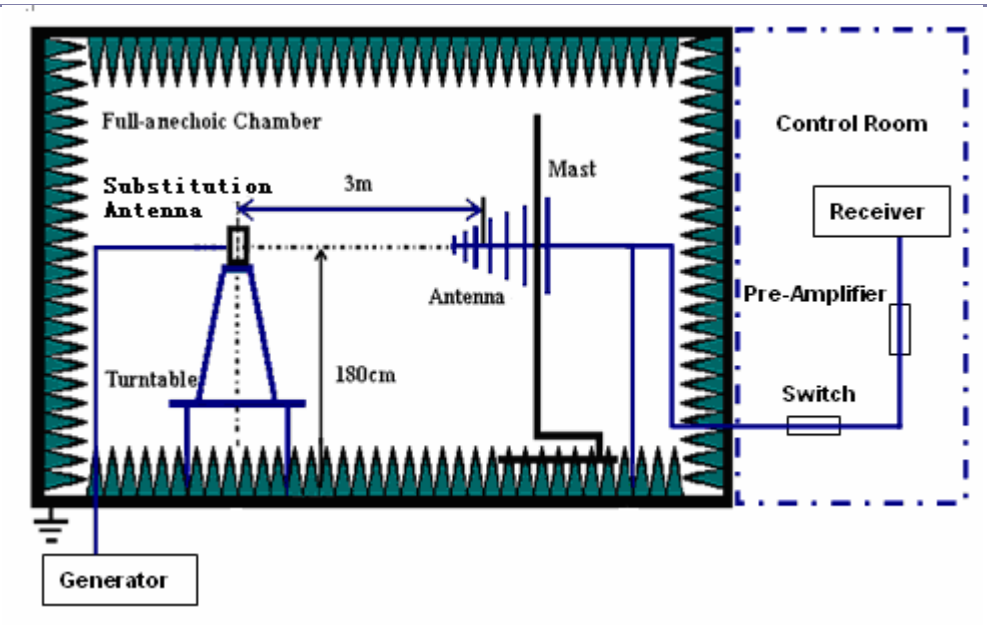
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect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

Test the Radiated maximum output power by the 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 1 GHz: 100 kHz;
Measurement bandwidth (RBW) for 1GHz up to 12.75 GHz: 1MHz;

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 30 MHz: 100 kHz;
Measurement bandwidth (RBW) for 30 MHz up to 26 GHz: 1 MHz;

Table 9 Radiated Spurious Emissions Limits

Frequency band	**Minimum requirement (E.R.P) traffic mode**
30MHz~26GHz	-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 10 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（2536）	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 11 System Measurement Uncertainty

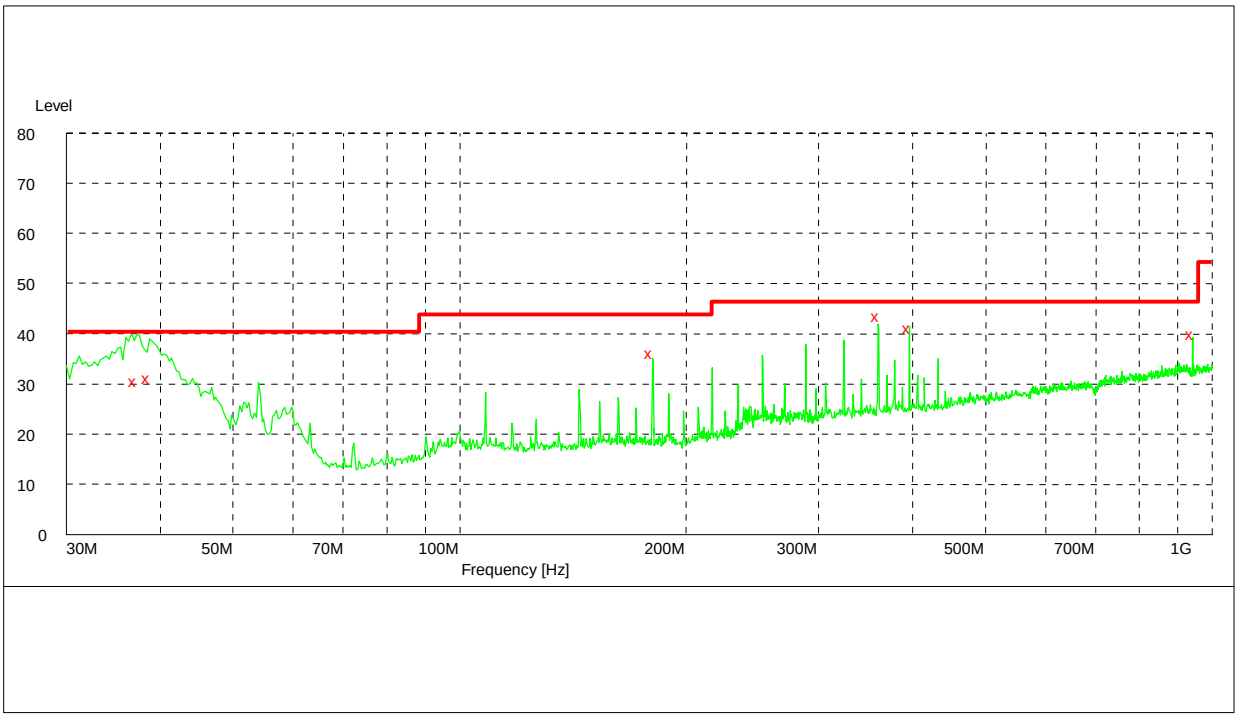
Items		Extended Uncertainty
RE	Field strength （dBμV/m）	U=4.6dB; k=2(30MHz-1GHz)
RSE	ERP (dBm)	U＝2.2dB；k＝2
CE	Disturbance Voltage（dBμV）	U=3.3dB; k=2

8 Graph and Data of Emission Test

8.1 Radiated Disturbance

8.1.1 Radiated Disturbance of TC1

This test was carried out in many test modes which were shown in table2. Here only the worst test result was shown.

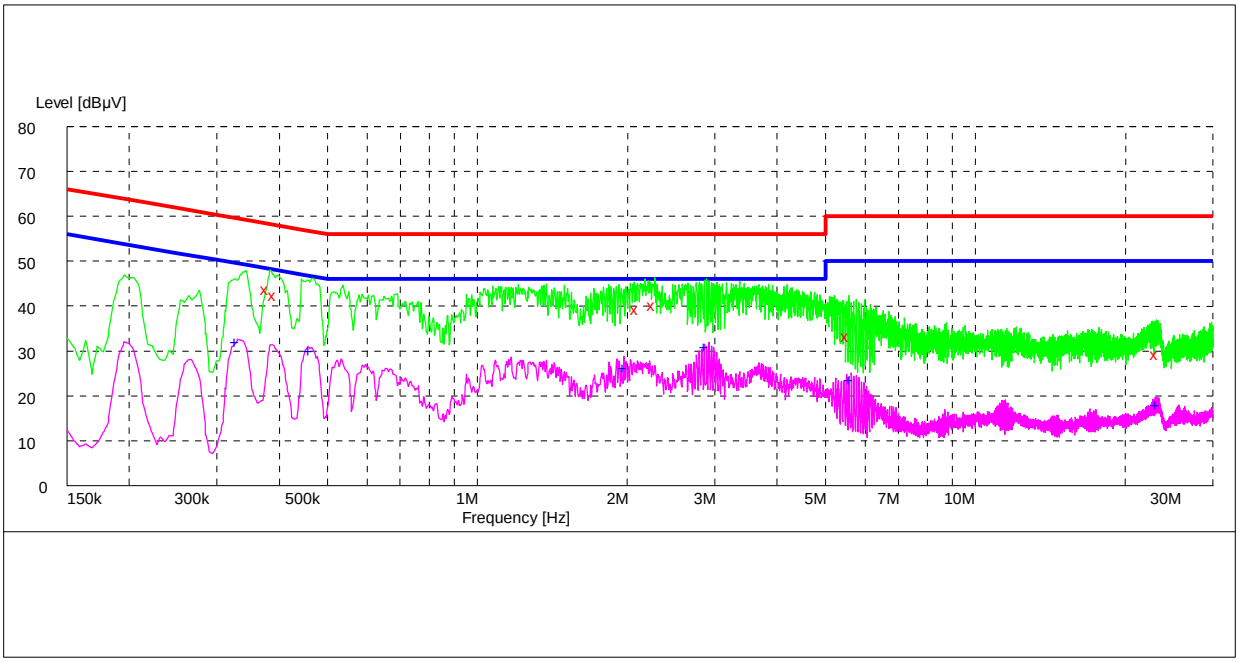


MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
37.080000	30.80	-7.5	40.0	9.2	100.0	360.00	VERTICAL
38.700000	31.50	-8.5	40.0	8.5	100.0	340.00	VERTICAL
180.000000	36.40	-11.8	43.5	7.1	188.0	151.00	HORIZONTAL
360.000000	43.80	-5.8	46.0	2.2	100.0	139.00	HORIZONTAL
396.444444	41.40	-5.2	46.0	4.6	100.0	142.00	HORIZONTAL
941.400000	40.20	1.2	46.0	5.8	100.0	125.00	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	Line	PE
0.379500	44.20	10.1	58	14.1	L3	FLO
0.393000	42.90	10.1	58	15.1	L3	FLO
2.098500	39.70	10.1	56	16.3	L3	FLO
2.269500	40.70	10.1	56	15.3	L3	FLO
5.563500	33.80	10.2	60	26.2	L3	FLO
23.217000	29.80	15.5	60	30.2	L3	FLO

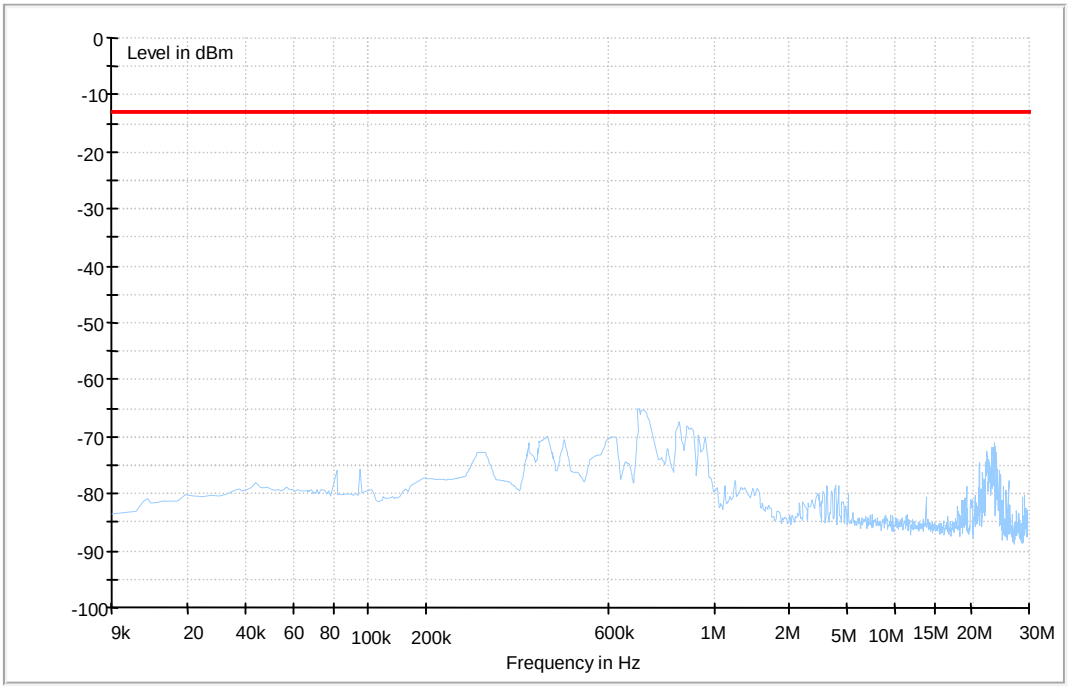
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.330000	32.30	10.2	49	17.1	L3	FLO
0.465000	30.40	10.0	47	16.2	L3	FLO
1.986000	26.70	10.1	46	19.3	L3	FLO
2.886000	31.30	10.1	46	14.7	L3	FLO
5.635500	24.00	10.2	50	26.0	L3	FLO
23.275500	18.40	15.5	50	31.6	L3	FLO

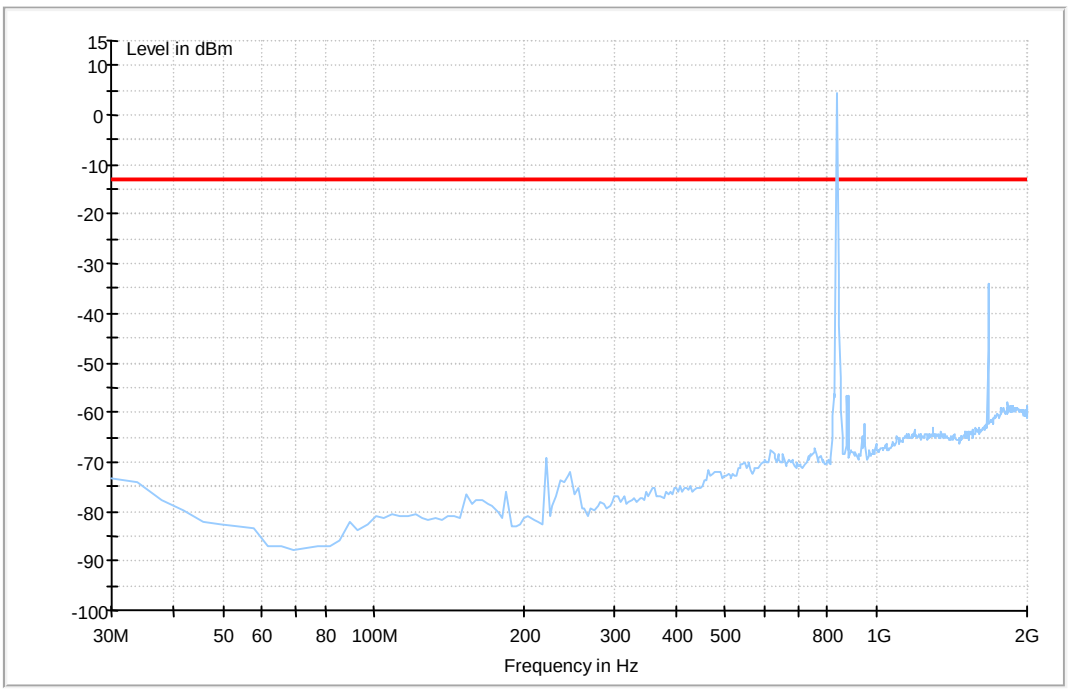
8.3 Radiated Spurious Emission

8.3.1 For GSM 850(Traffic Mode)

Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz) 7

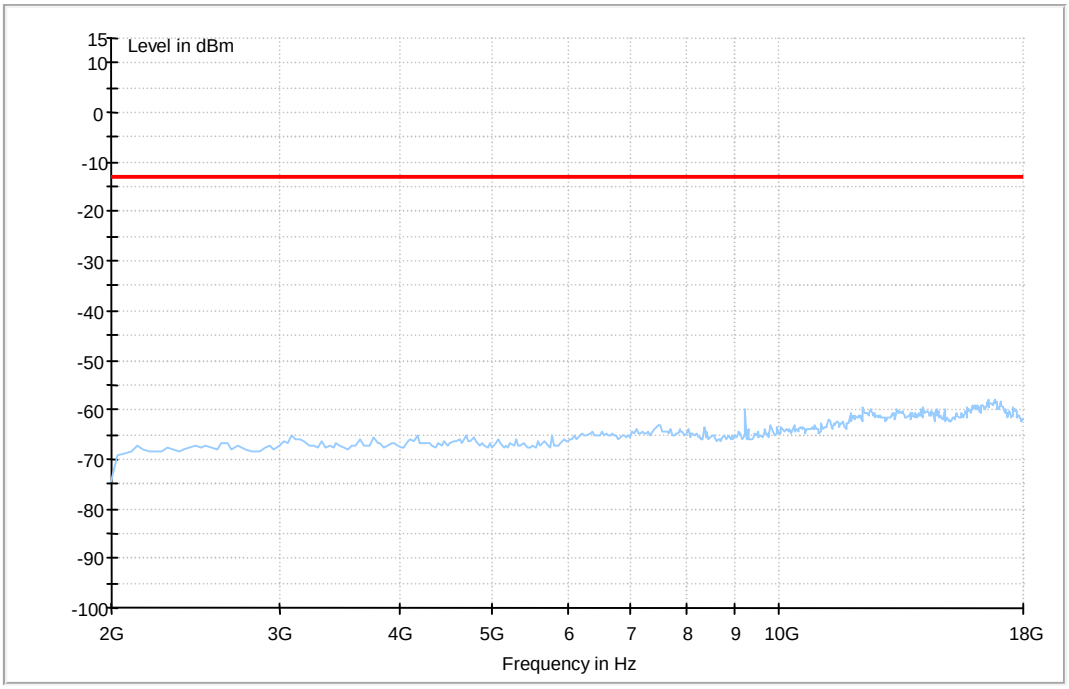
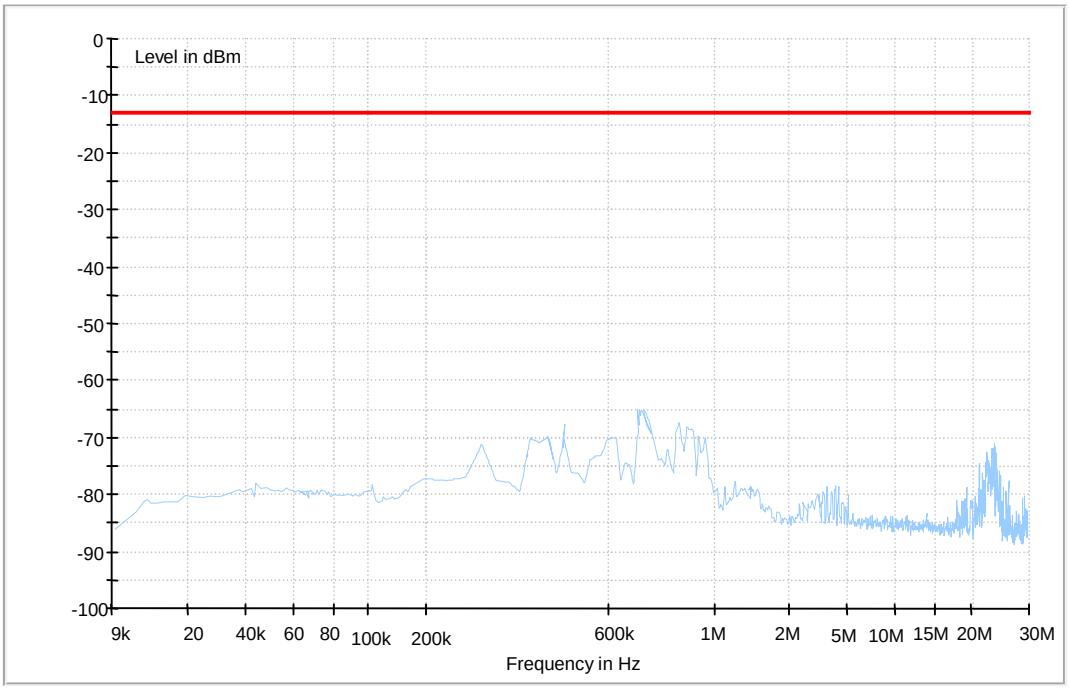


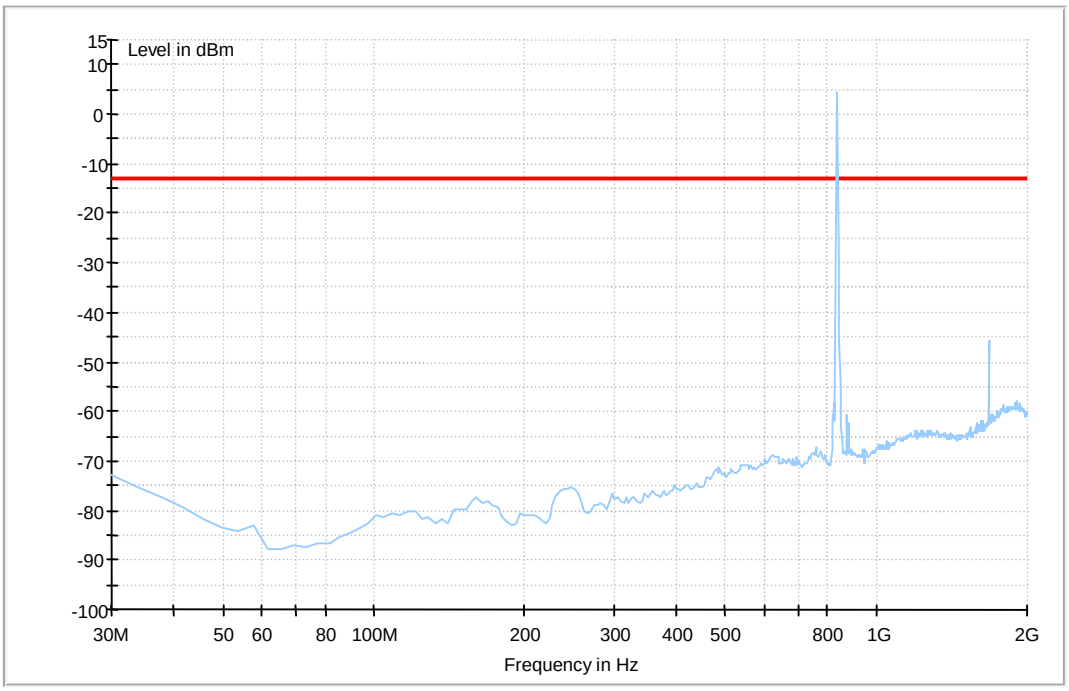
Figure 6. Radiated Spurious Emission

8.3.2 For EGPRS 850

Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)

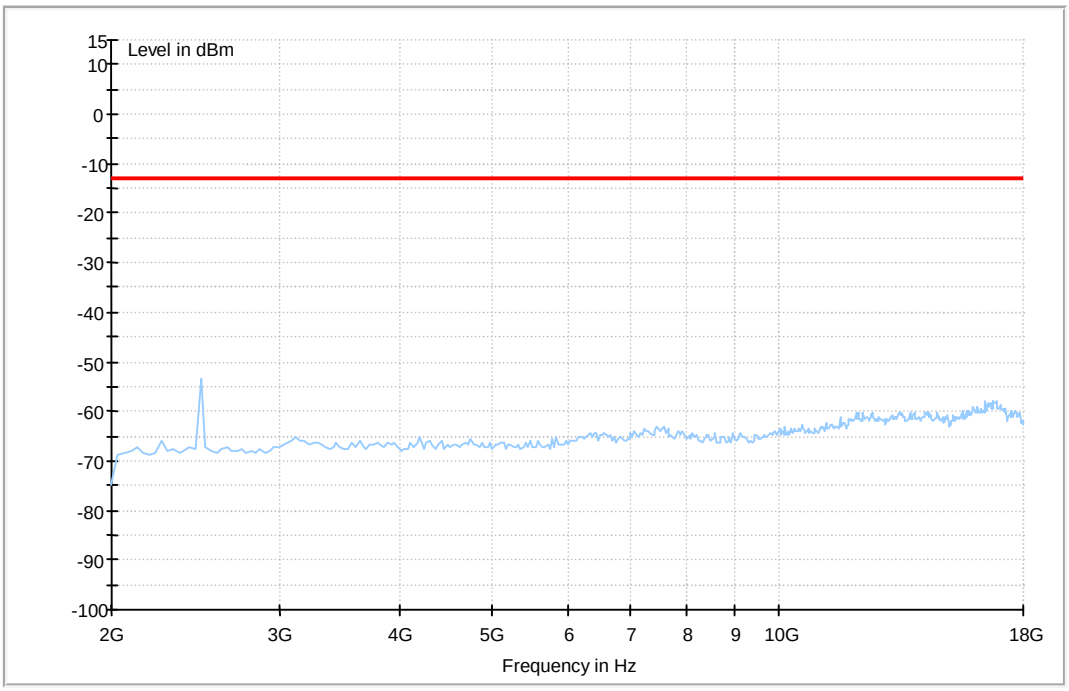
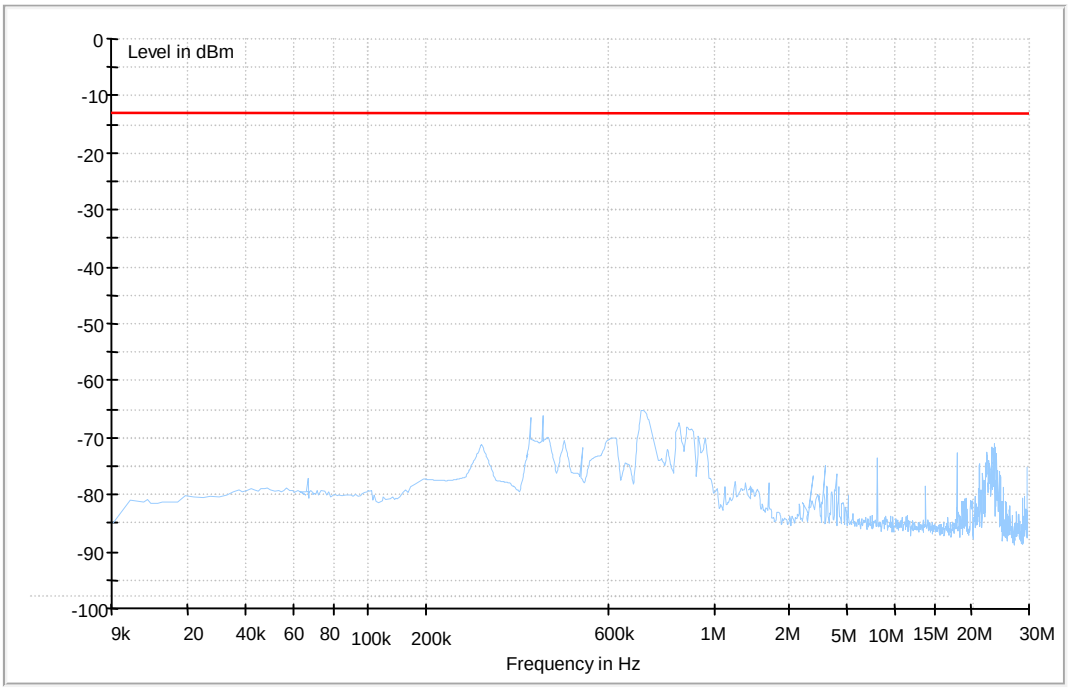


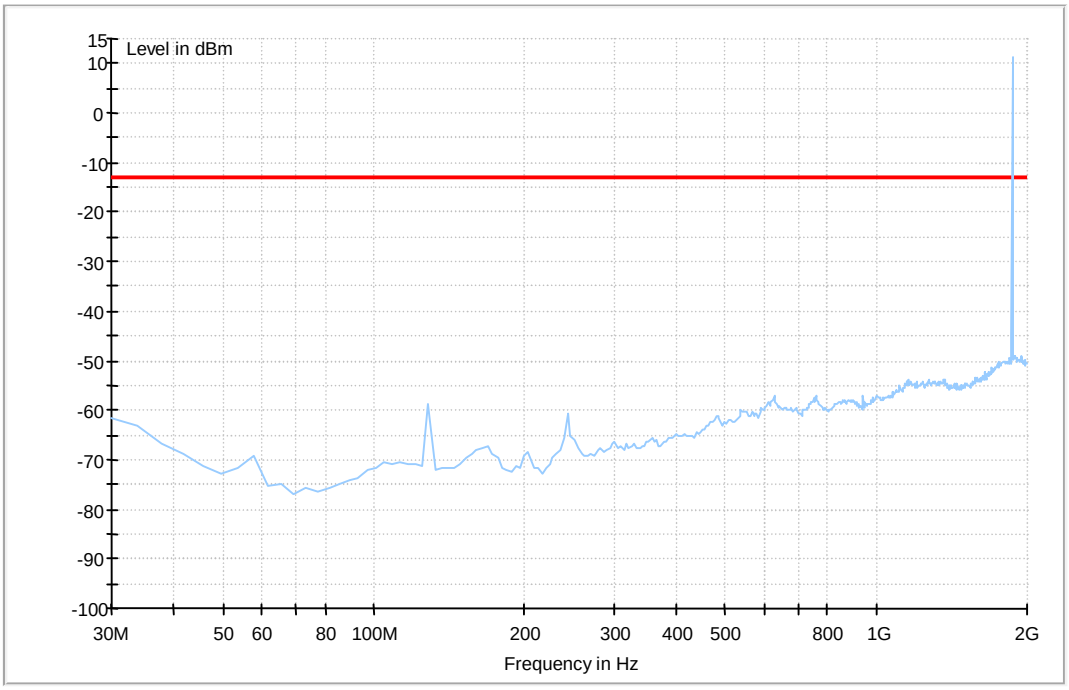
Figure 7. Radiated Spurious Emission

8.3.3 For PCS1900

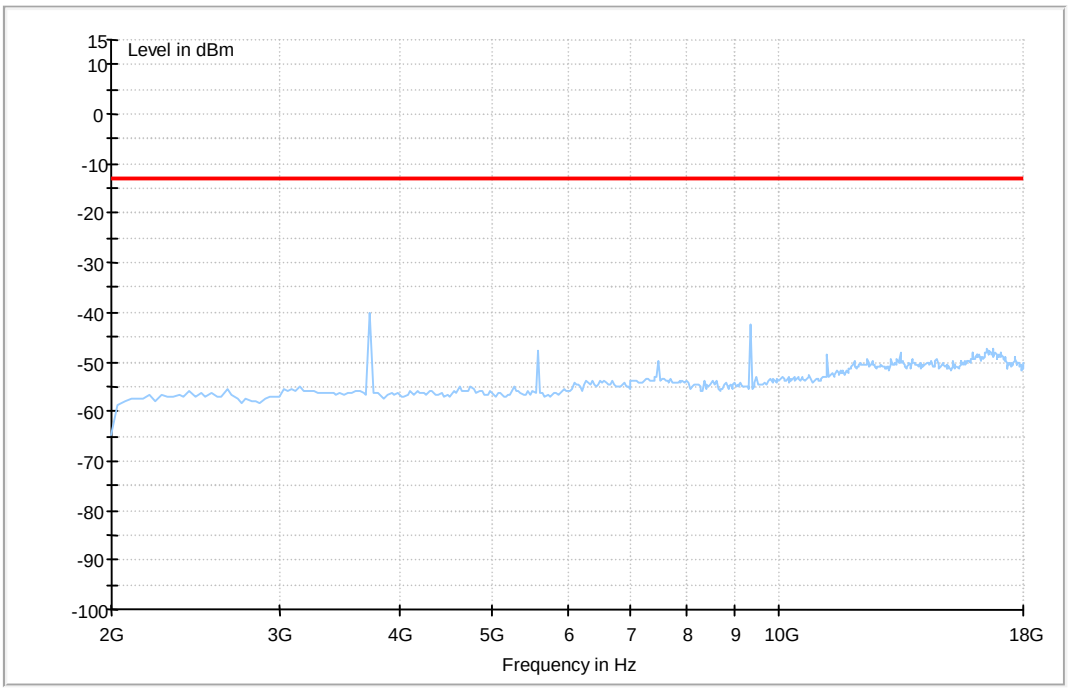
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)



Traffic Mode (18GHz-26GHz)

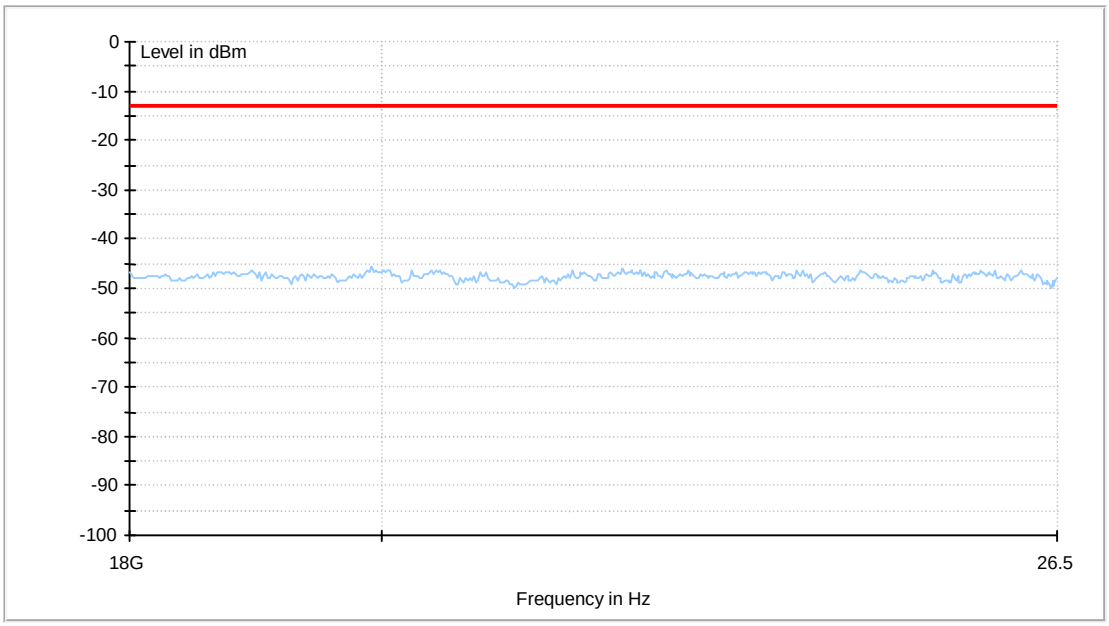
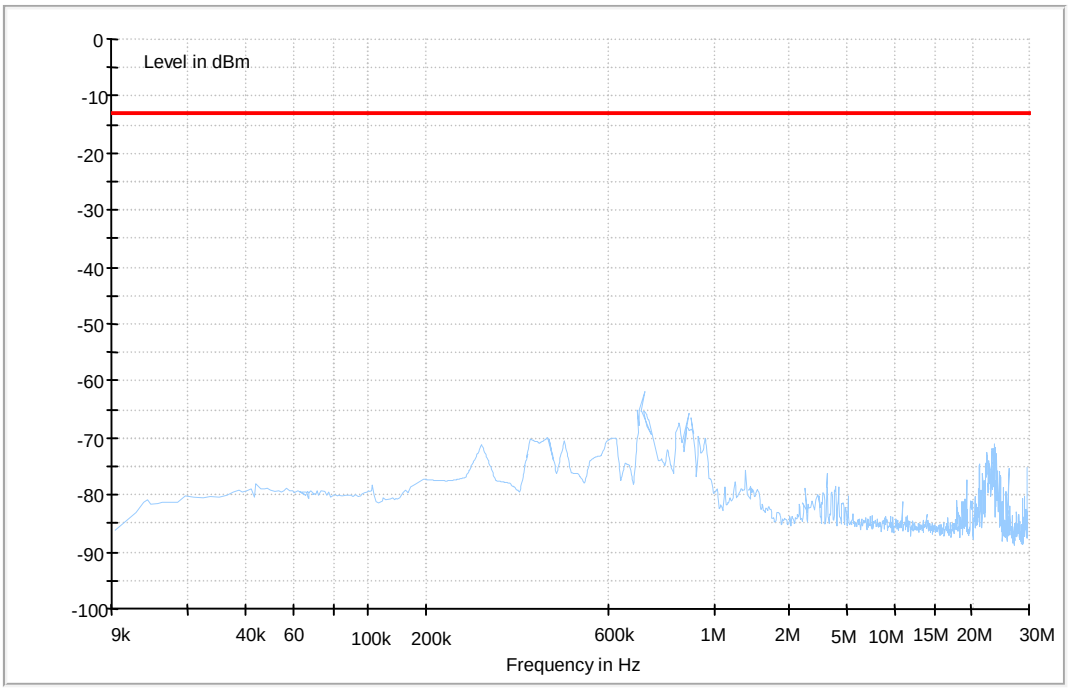


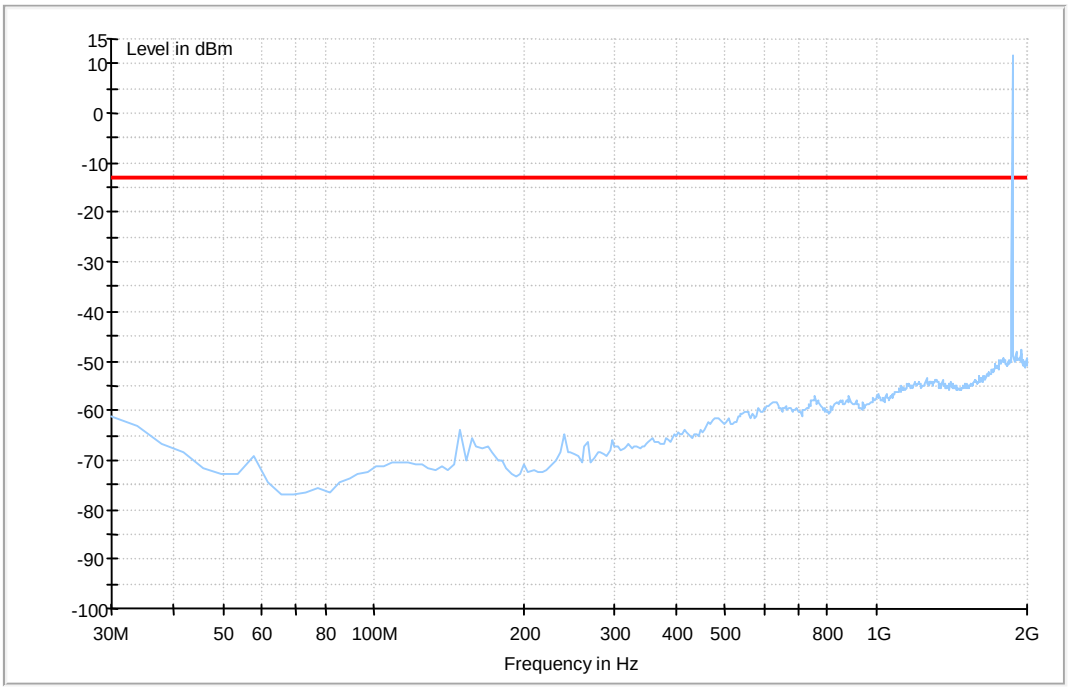
Figure 8. Radiated Spurious Emission

8.3.4 For EGPRS1900

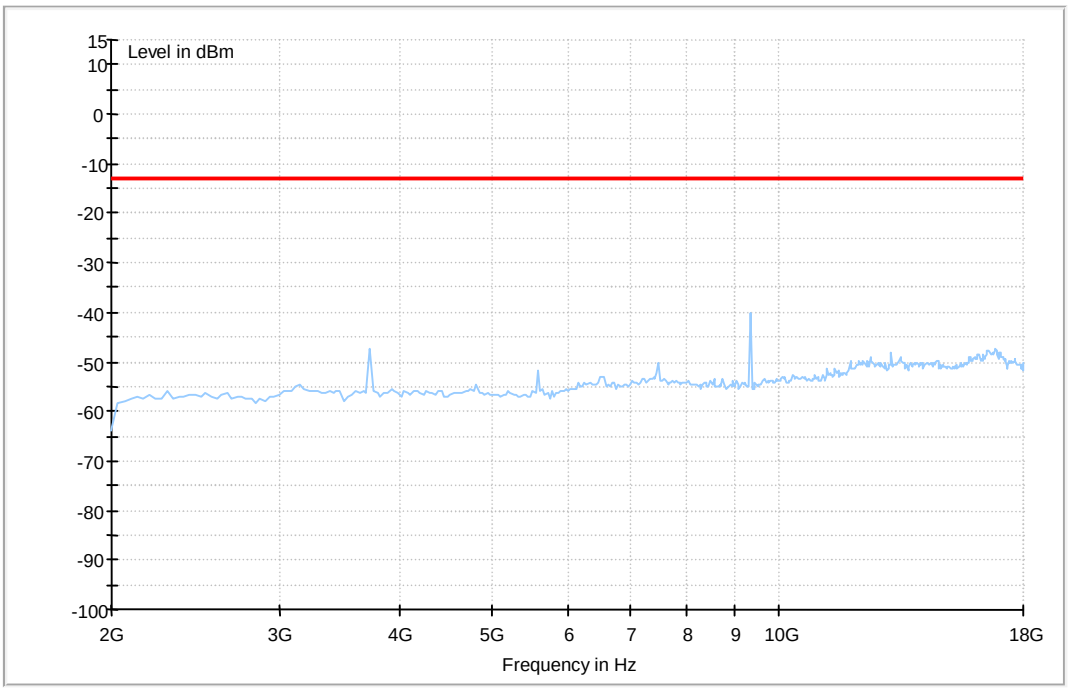
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)



Traffic Mode (18GHz-26GHz)

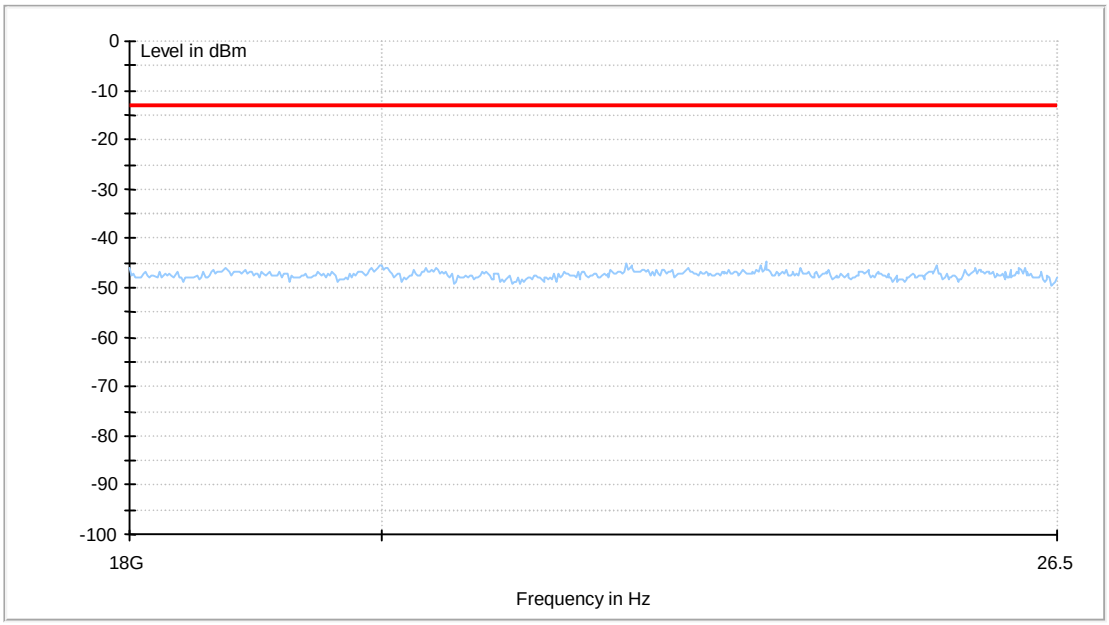


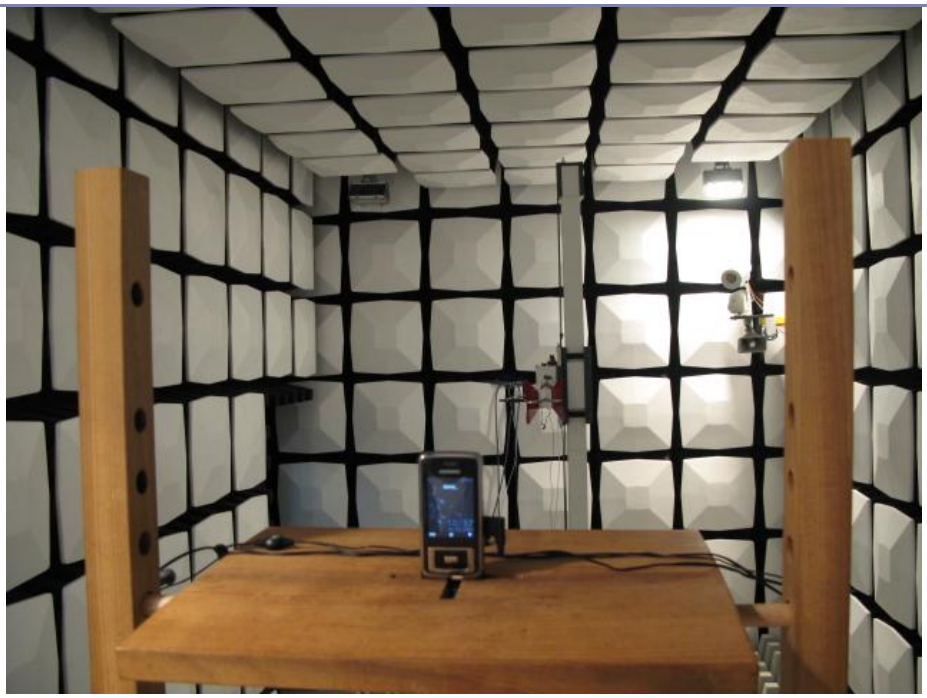
Figure 9. Radiated Spurious Emission

9 Photographs of Test Set-ups

9.1 Radiated Emissions

Radiated Disturbance of TC1

Radiated Spurious Emission(30MHz~2000MHz)



Radiated Spurious Emission(2GHz~18GHz)

Radiated Spurious Emission(18GHz~26.5GHz)

9.2 Conducted Emissions

Conducted Emissions of AC Power Port

END