



Report on EMC Test of WCDMA/GPRS/GSM/EDGE Mobile Phone With Bluetooth M/N: U1215

Report No: SYBH (R)038102007EB-1



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 EMC Test of WCDMA/GPRS/GSM/EDGE Mobile
Phone With Bluetooth
M/N: U1215

REGULATION FCC CFR47 Part 15: Subpart B;

START OF TEST Oct.25, 2007

END OF TEST Nov.05, 2007

Final Judgement: Pass

Approver

2007-11-08
Date

张兴海
Name

Signature



Reviewer

2007-11-08
Date

余辉
Name

Signature

余辉

Operator

2007-11-08
Date

张飞
Name

Signature

张 飞

REPORT BODY CONTENT

1	Status	6
1.1	Product Information.....	6
1.2	Applied Standard	6
1.3	Test Site	7
1.4	Test environment condition.....	7
2	Summary of Results	8
3	Equipment Specification	9
3.1	General Description	9
3.2	Technical Data	9
3.3	Sub-Assembly Identity	10
4	System Configuration during EMC Test	11
4.1	Cables Used during Test	11
4.2	Associated Equipment Used during Test	11
4.3	Test Configurations and Test Mode.....	11
4.4	Test conditions and test connections.....	11
5	Electromagnetic Interference (EMI).....	14
5.1	Radiated Disturbance 30MHz to 1000MHz	14
5.2	Conducted Disturbance 0.15 MHz to 30MHz	15
5.3	Radiated Spurious Emissions.....	16
6	Main Test Instruments	18
7	System Measurement Uncertainty.....	19
8	Graph and Data of Emission Test.....	20
8.1	Radiated Disturbance	20
8.2	Conducted Disturbance	21
8.3	Radiated Spurious Emission.....	22
9	Photographs of Test Set-ups	33
9.1	Radiated Emissions	33
9.2	Conducted Emissions	35



1 Status

1.1 Product Information

CLIENT: Huawei Technologies Co., Ltd.
 ADDRESS: Bantian Longgang District Shenzhen, P.R. China
 MANUFACTURING DESCRIPTION HUAWEI WCDMA/GPRS/GSM/EDGE Mobile
 Phone With Bluetooth
 MANUFACTURERS MODEL NUMBER U1215

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
<u>Radiated Emissions</u> Enclosure Port	TC1 (TM7~TM12)	N/A	Pass	Site1
<u>Conducted Emissions</u>	TC1 (TM7~TM12)	N/A	Pass	Site1
<u>Radiated Spurious Emissions</u> Enclosure Port 30MHz – 12.75GHz	TC1 (TM1~TM6)	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 WCDMA/GPRS/GSM/EDGE Mobile Phone With Bluetooth – U1215 is subscriber equipment in the WCDMA/GSM system. The WCDMA frequency band is Band II and Band V. The GSM frequency band includes GSM850 and DCS1800 and PCS1900. Only GSM 850 PCS1900 WCDMA Band II and Band V test datas are included in this report. U1215 implements such functions as RF signal receiving/sending, WCDMA and 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:	:	WCDMA/GPRS/GSM/EDGE Mobile Phone With Bluetooth
Models:	:	U1215
Input Rated Voltage	:	⎓ 3.7V
Extreme Voltage	:	⎓ 3.6V and ⎓ 4.2V
Rated Power	:	Normal 3W ,Max 8 W
Dimensions	:	105 (depth) ×45.5 (width) ×15.7 (height) (mm3)
Weight	:	<90g
S/N	:	UQ1AA107A1500184

	Mode	Work Frequency	
		Transmitt Frequency (MHz)	Receive Frequency (MHz)
GSM	GSM850	824-849	869-894
	PCS1900	1850-1910	1930-1990
WCDMA	Band II	824-849	869-894
	Band V	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
HD2U121M	1	VER.A	UQ1AA107A1500184	Main board of Mobile Phone
Accessory				
Name	Qty	Manufacture	Serials number	Description
Adapter	1	TECH-POWER INTERNATIONAL CO.,LTD	TP16B2500263	voltage nominal: ~120V Input voltage: ~100-240V ;50/60Hz Output voltage: --- +5.3V, 0.65A Rate power: 4W
Rechargeable Li-ion	1	FMT Electronics Co.,Ltd.	FMT752148832Y	Battery Model: HBU83S Rated capacity: 800mAh 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~TM12
-----	----------

4.3.2 Test Mode

There were twelve test Modes. TM1 and TM12 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 traffic mode WCDMA for band II;
- TM6: operate in traffic mode WCDMA for band V;
- TM7: operate in idle GSM 850;
- TM8: operate in idle mode EGPRS 850;
- TM9: operate in idle mode GSM 1900;
- TM10: operate in idle mode EGPRS 1900;
- TM11: operate in idle mode WCDMA for band II;
- TM12: operate in idle mode WCDMA for band V;

The U1215 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:

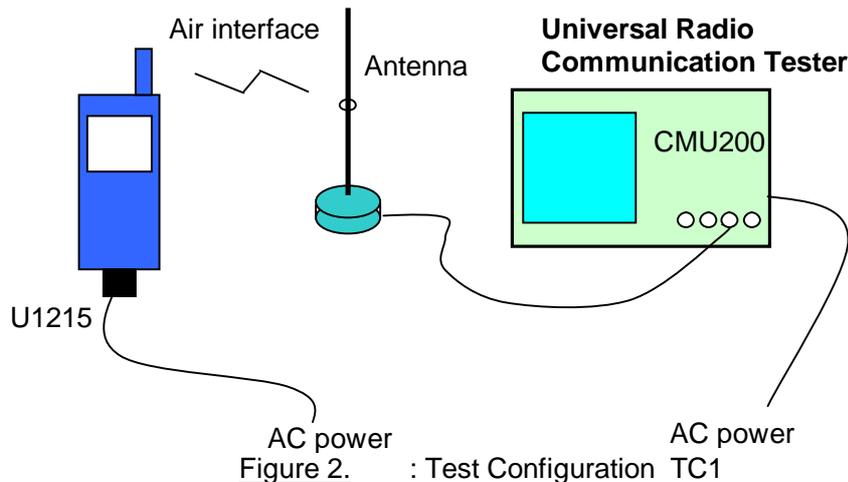
Logical Test Interface for details regarding generic call set-up procedure and BER, BLER test loop scenarios:

- 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 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 to 192 for GSM850, to 4182 for WCDMA 850, to 661 for PCS1900, and to 9400 for WCDMA1900.



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:

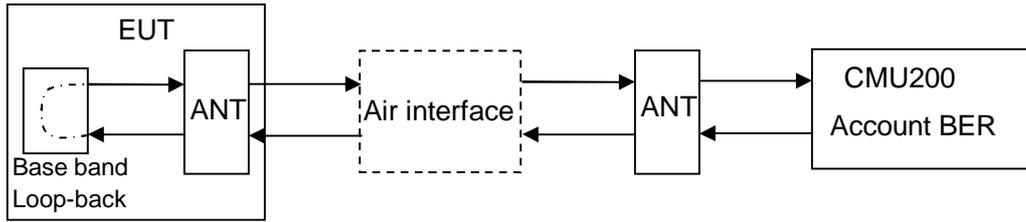
- UE shall be camped on a cell;
- UE shall perform Location Registration (LR) before the test, but not during the test;
- UE's neighbour cell list shall be empty;
- Paging repetition period and DRX cycle shall be set to minimum (shortest possible time interval).

For 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:

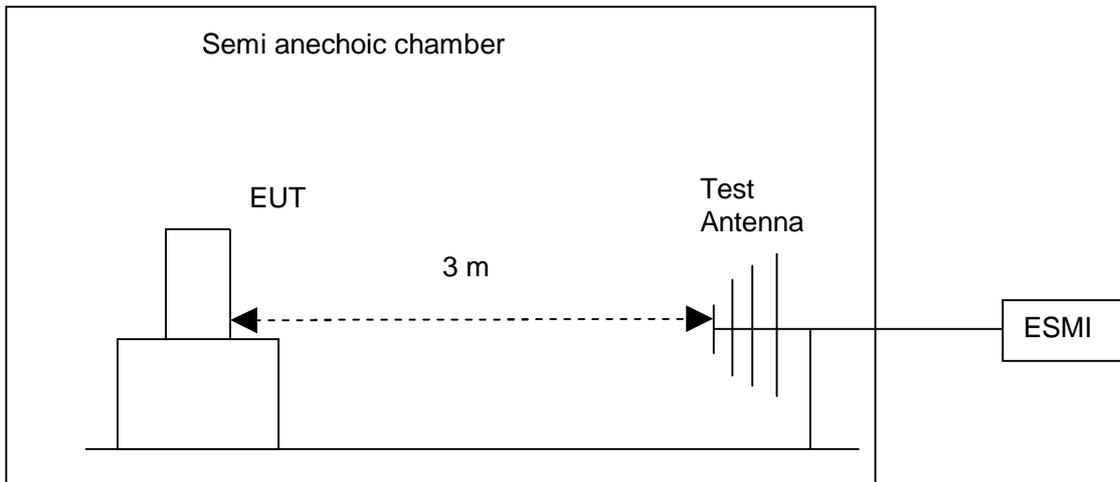


Figure 4. Test set up

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($\mu\text{V}/\text{m}$)	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.

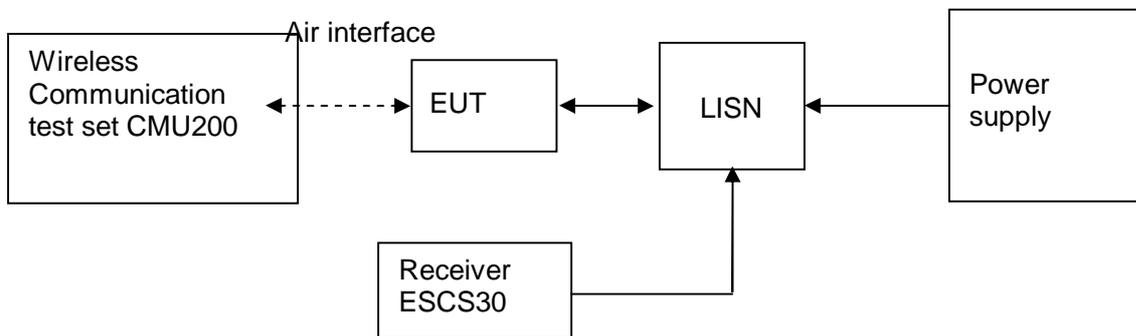


Figure 5. Test Set-up

5.2.2 Test Results

The EUT has met requirements for Conducted disturbance of 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 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

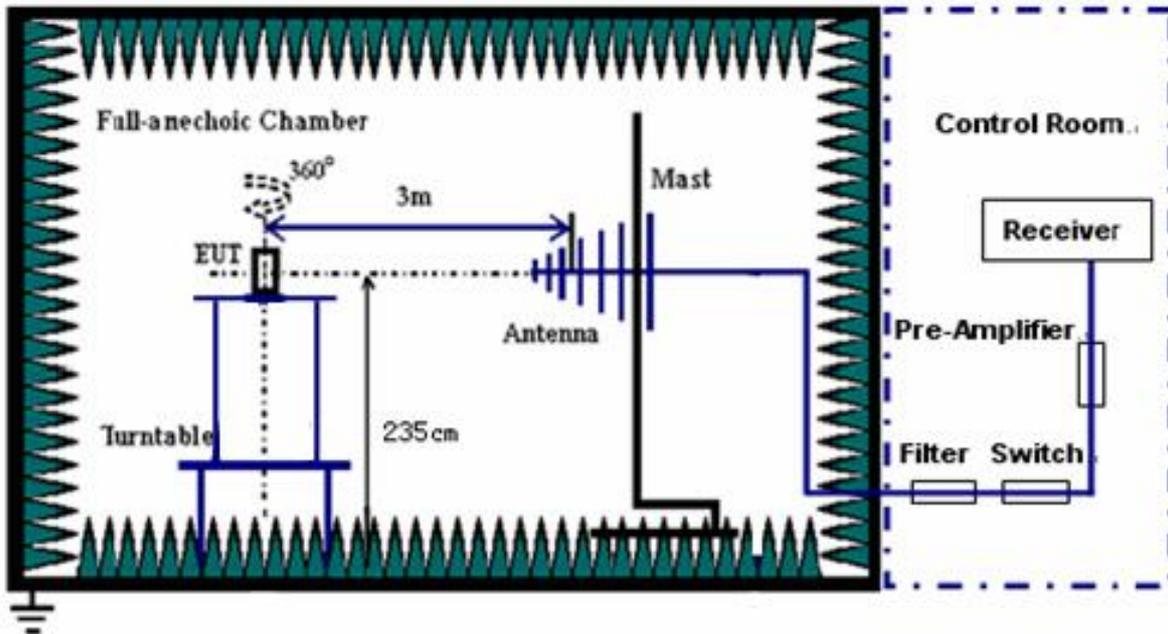
5.3.1 Test Procedure

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:

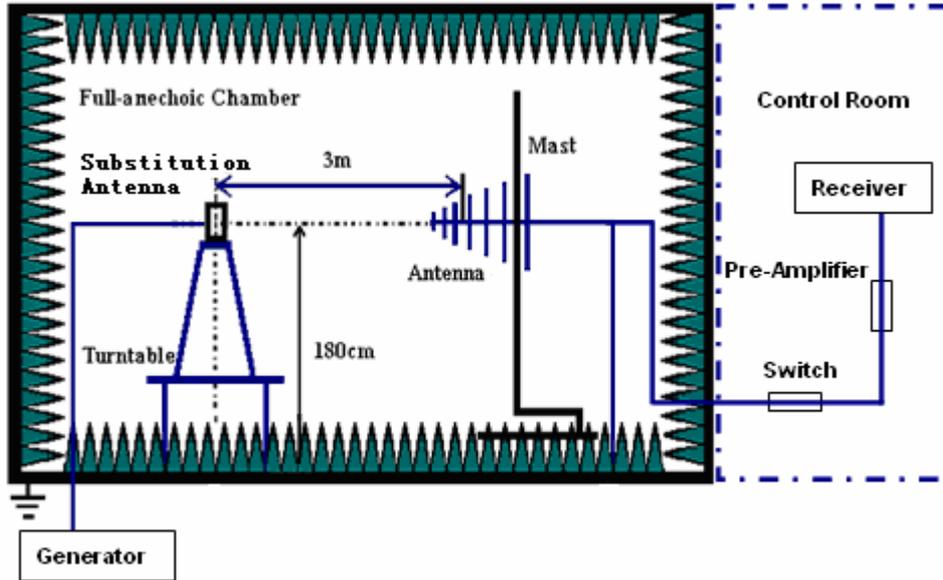
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect 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 1 GHz: 100 kHz;
 Measurement bandwidth (RBW) for 1GHz up to 18 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 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:

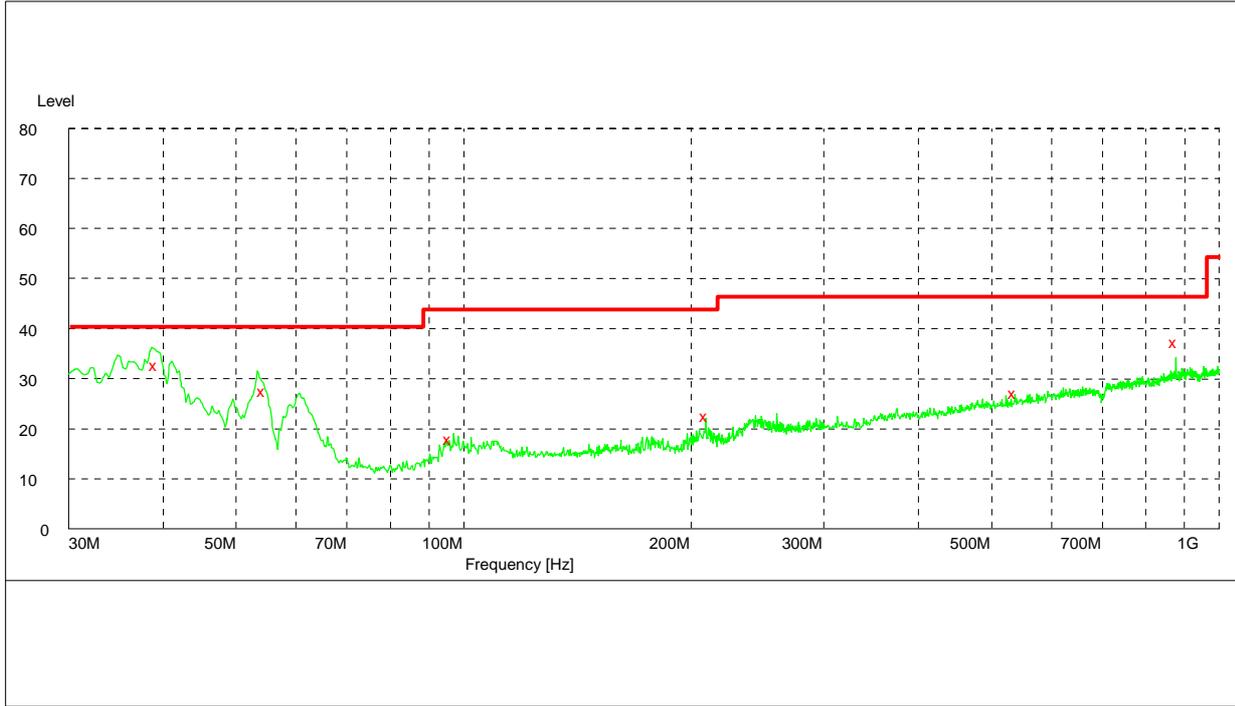
Table 11 System Measurement Uncertainty

	Items	Extended Uncertainty
RE	Field strength (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 of TC1

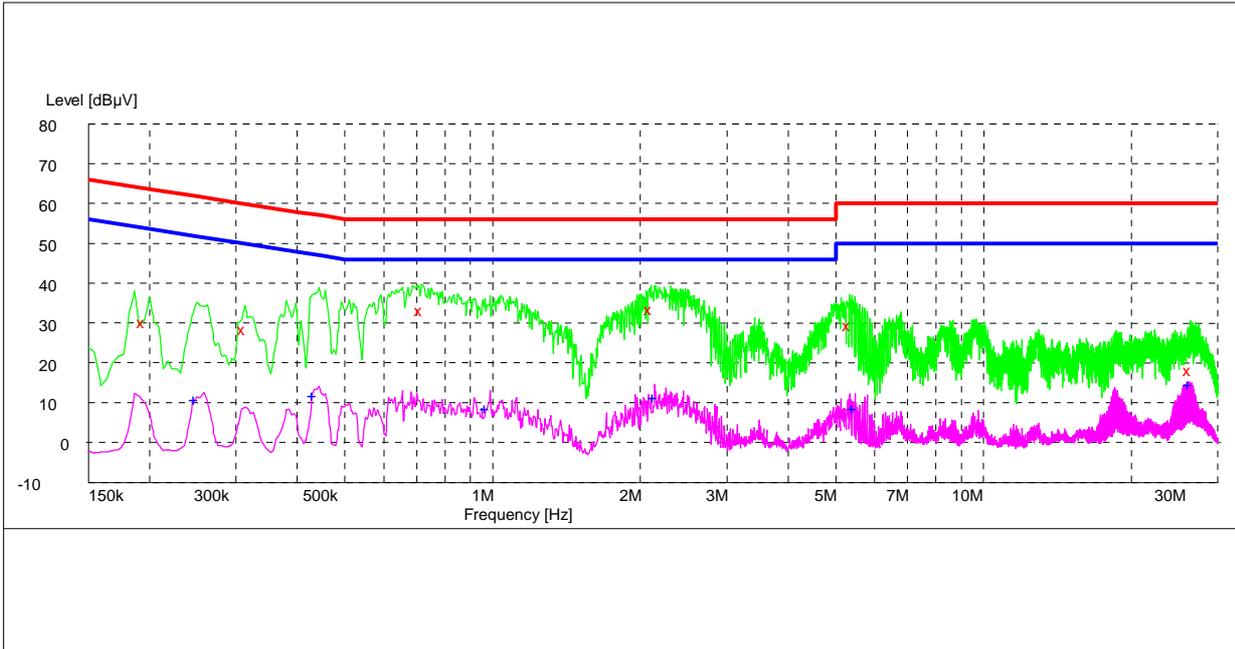


MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
39.180000	32.10	-11.0	40	7.9	112.0	79.00	VERTICAL
54.480000	28.10	-17.2	40	11.9	112.0	58.00	VERTICAL
96.180000	19.20	-15.9	43.5	24.3	312.0	32.00	HORIZONTAL
210.240000	21.10	-13.3	43.5	22.4	119.0	78.00	HORIZONTAL
537.360000	18.60	-4.8	46	27.4	286.0	244.00	VERTICAL
876.000000	37.50	0.6	46	8.5	129.0	243.00	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
0.195000	30.50	10.1	64	33.3	N	FLO
0.312000	28.80	10.1	60	31.1	L3	FLO
0.717000	33.70	10.0	56	22.3	L3	FLO
2.103000	34.00	10.1	56	22.0	L3	FLO
5.325000	29.90	10.1	60	30.1	L3	FLO
26.362500	18.70	10.4	60	41.3	L3	FLO

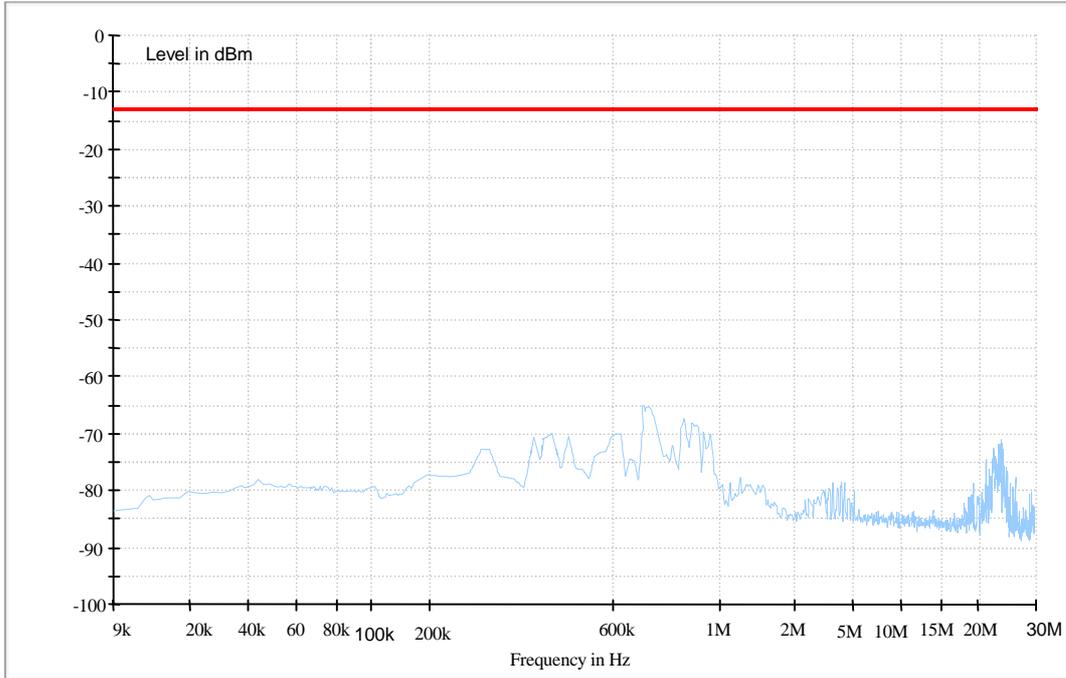
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.249000	11.50	10.0	52	40.3	N	FLO
0.433500	12.30	9.9	47	34.9	L3	FLO
0.973500	9.20	10.0	46	36.8	L3	FLO
2.143500	11.80	10.1	46	34.2	L3	FLO
5.464500	9.30	10.1	50	40.7	L3	FLO
26.313000	15.20	10.4	50	34.8	N	FLO

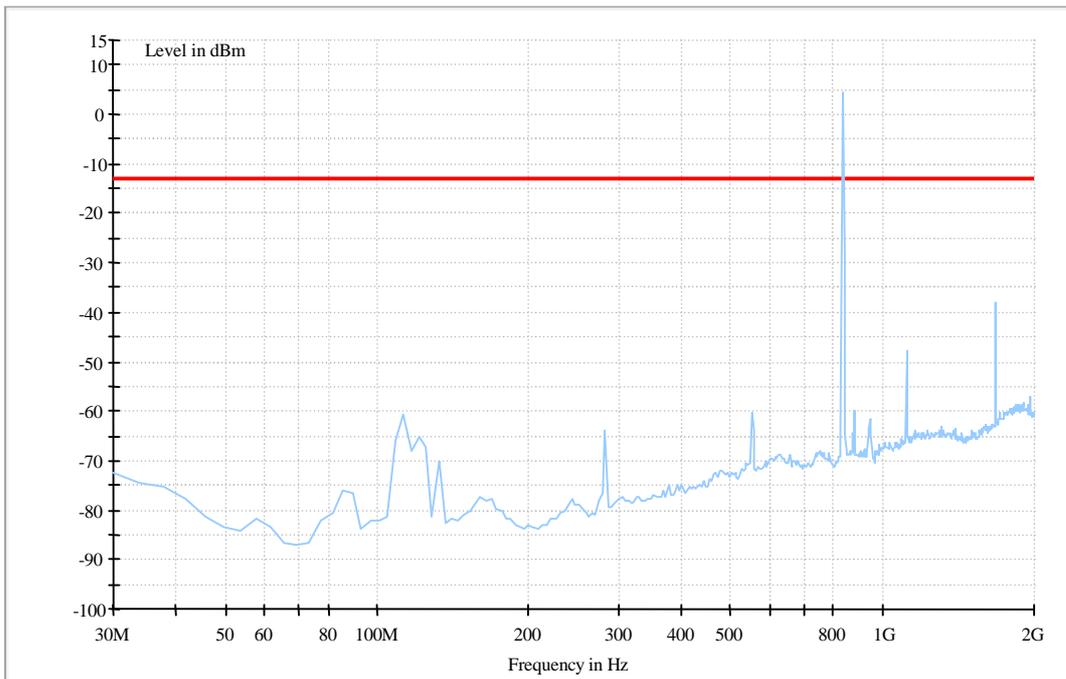
8.3 Radiated Spurious Emission

8.3.1 For GSM 850(Traffic Mode)

Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)

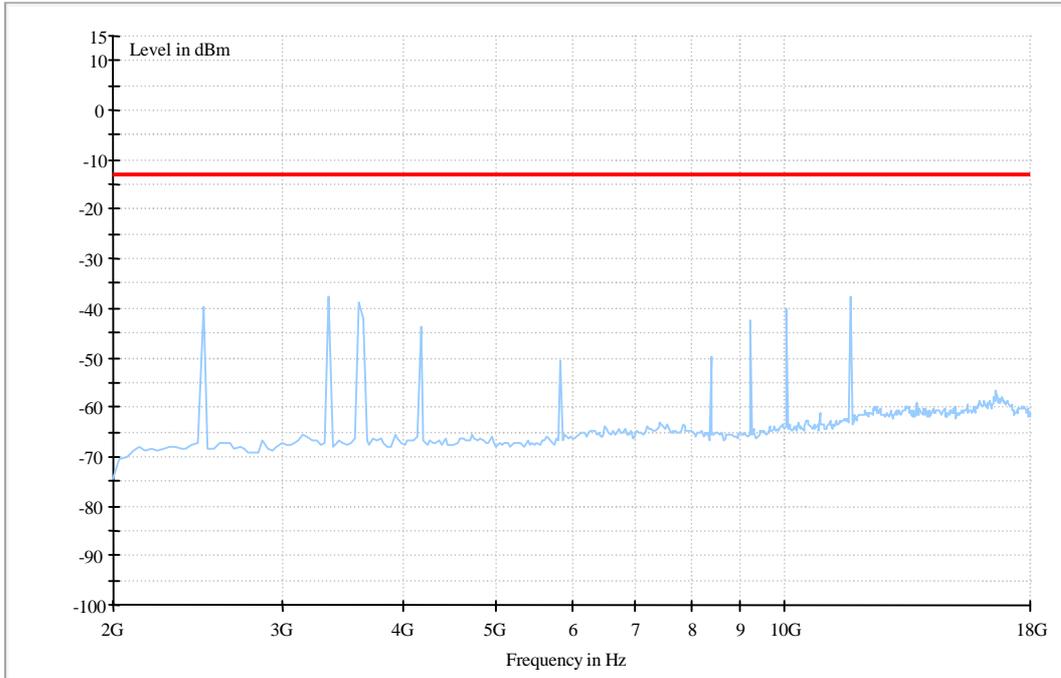
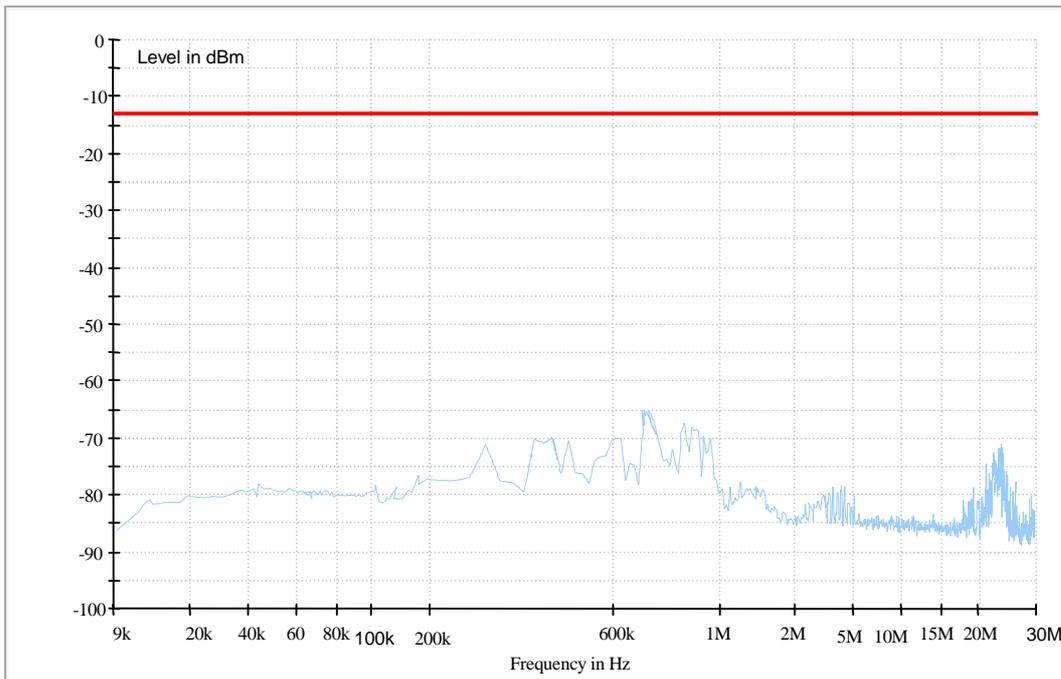
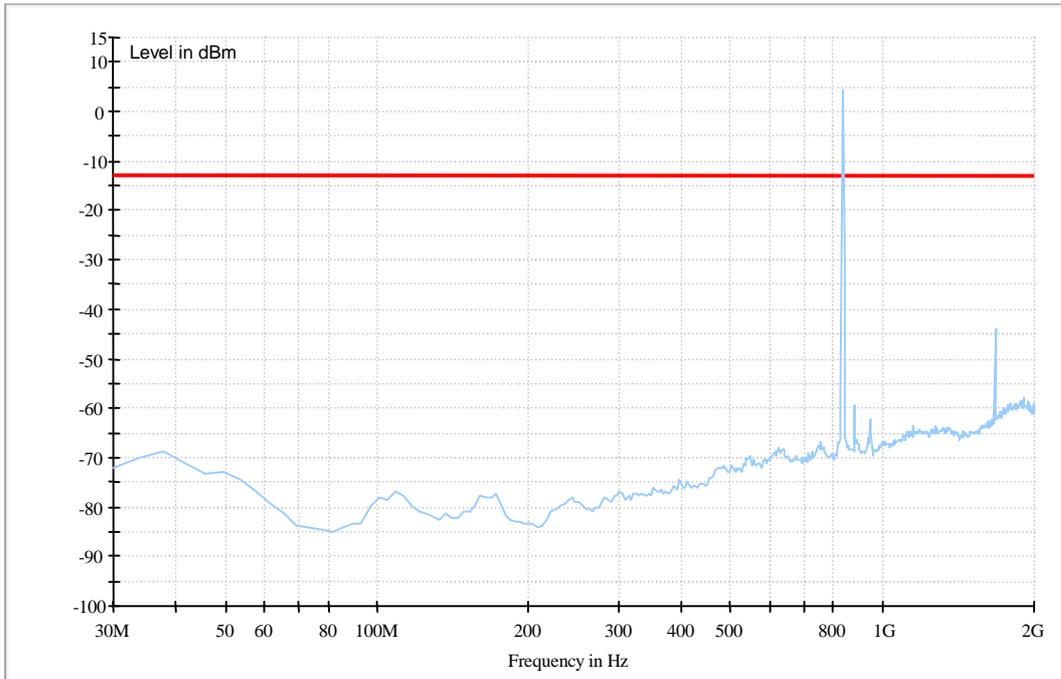


Figure 6. Radiated Spurious Emission

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



Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)

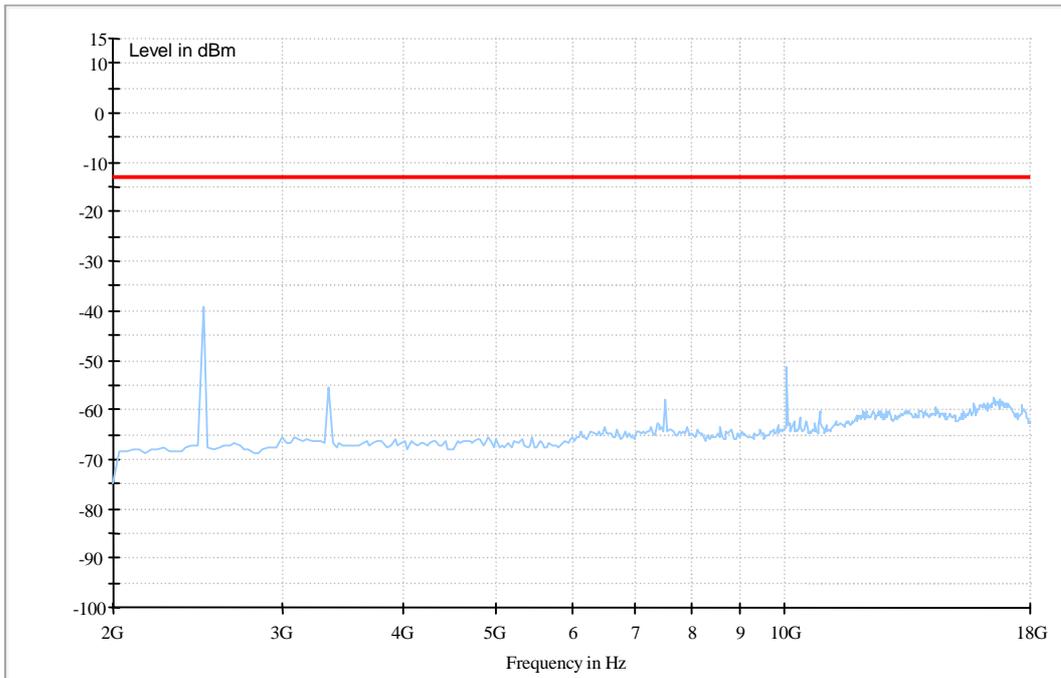
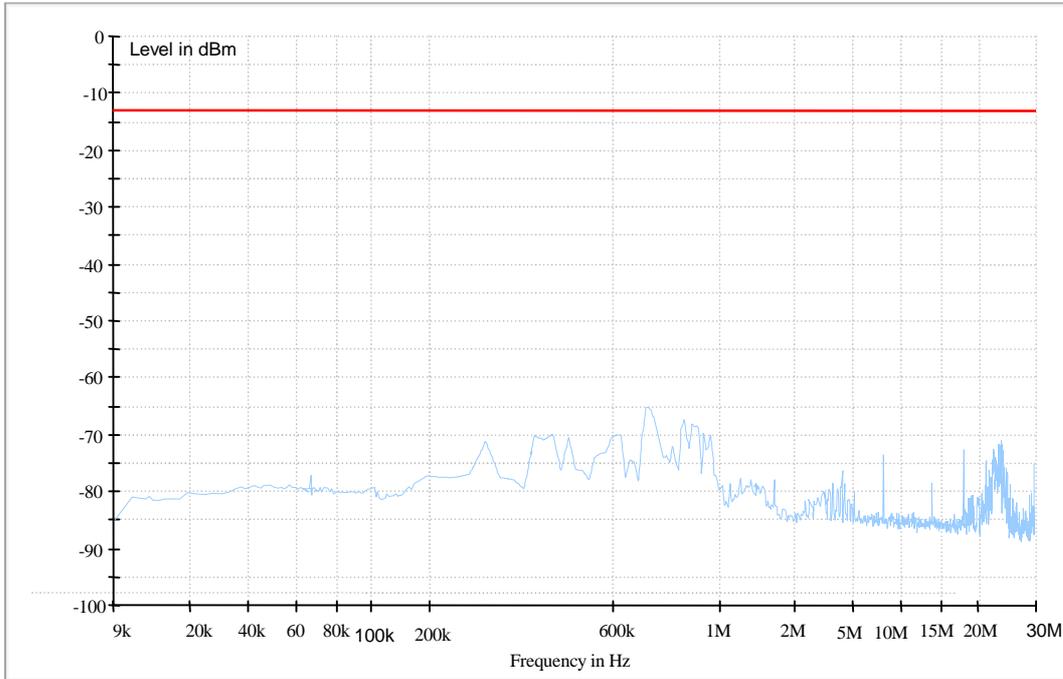


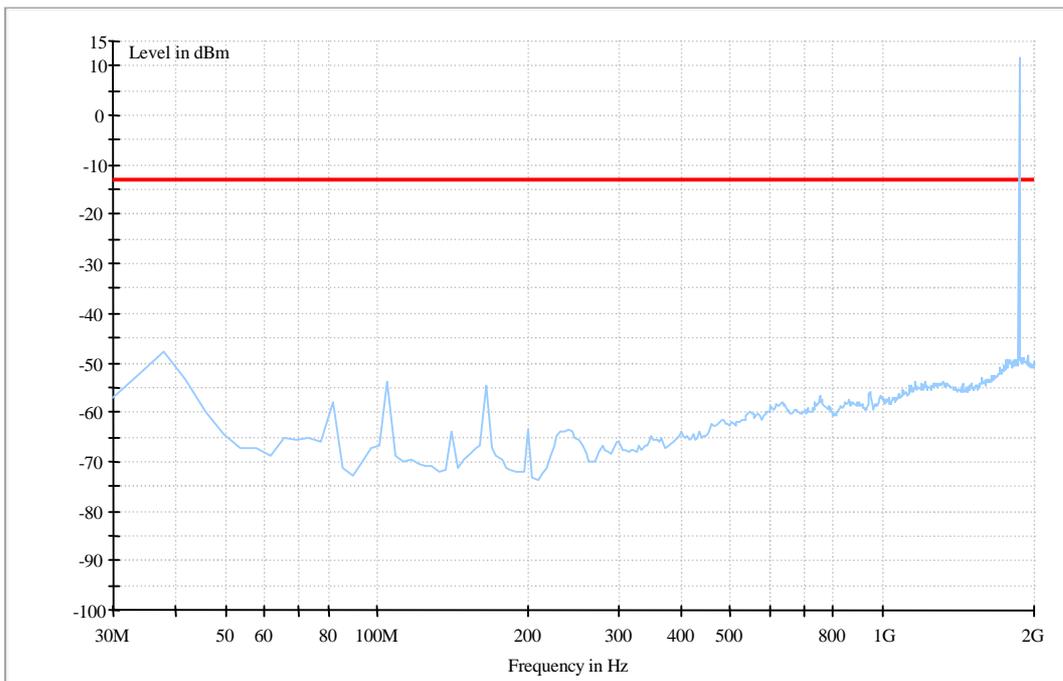
Figure 7. Radiated Spurious Emission

8.3.3 For PCS1900

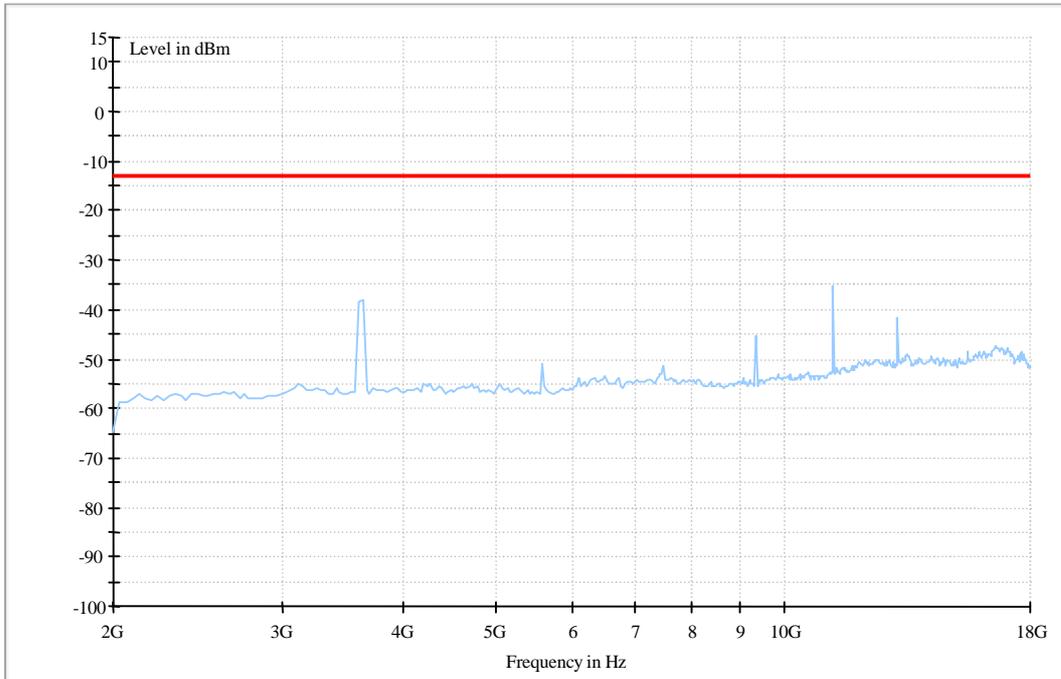
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)



Traffic Mode (18GHz-26GHz)

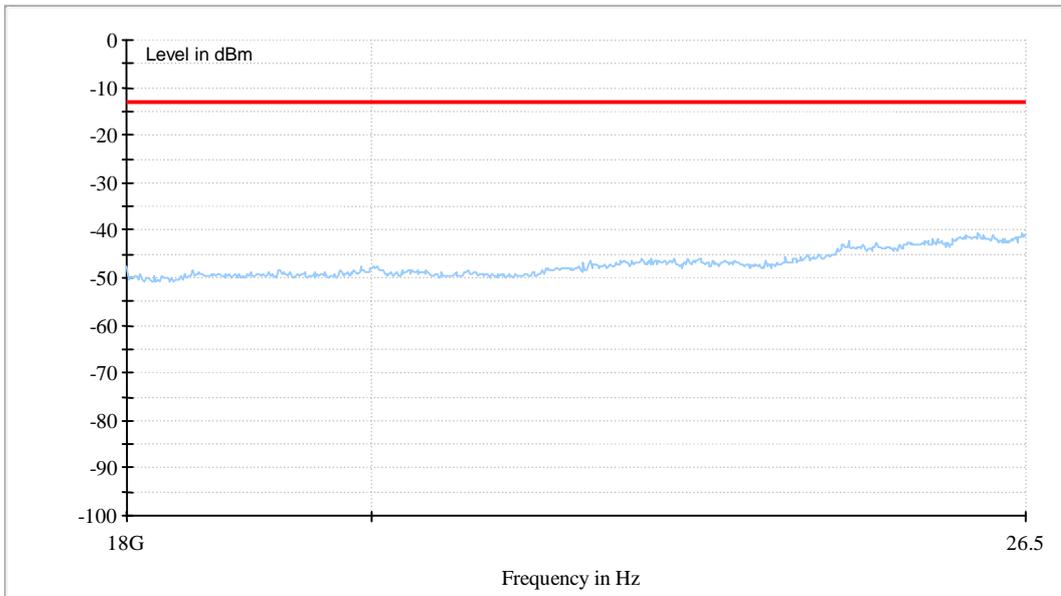
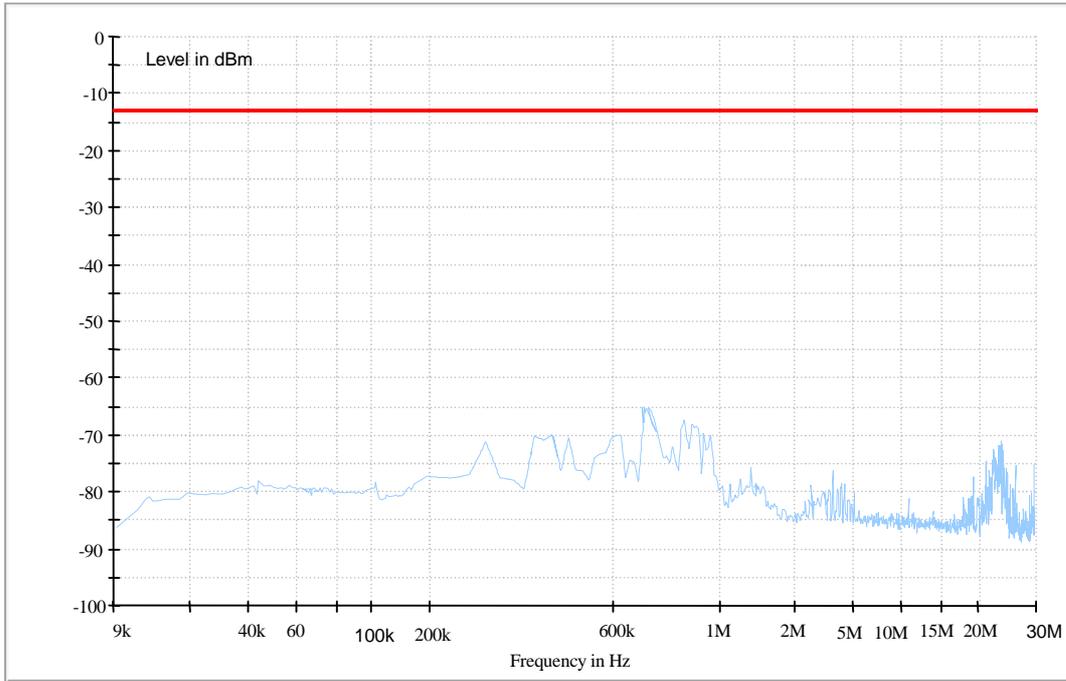
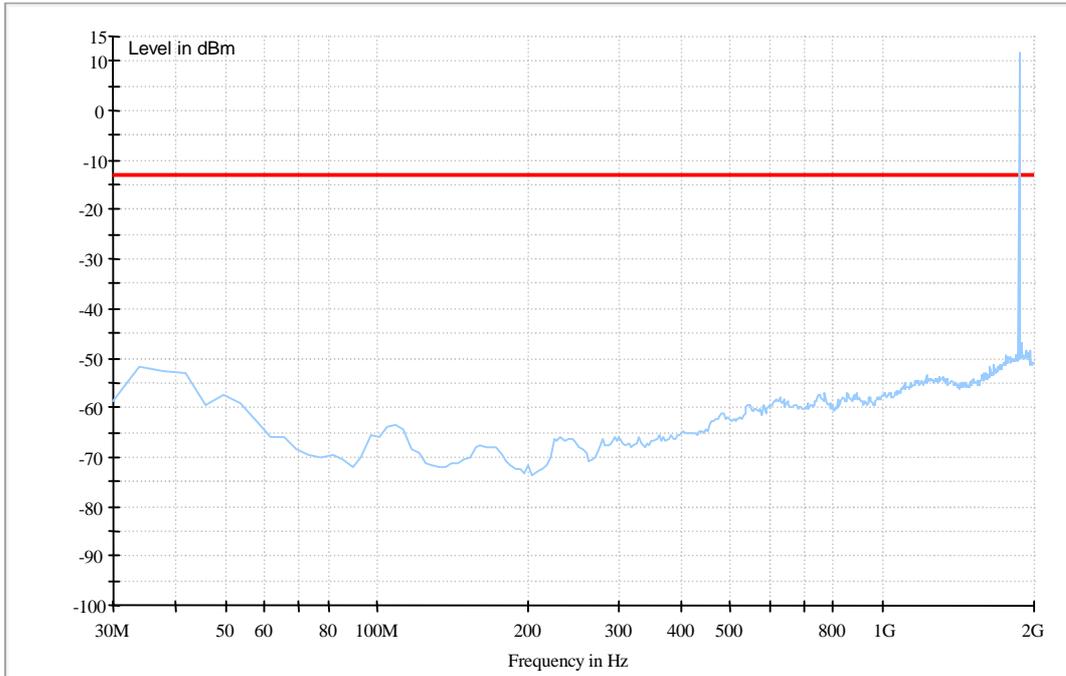


Figure 8. Radiated Spurious Emission

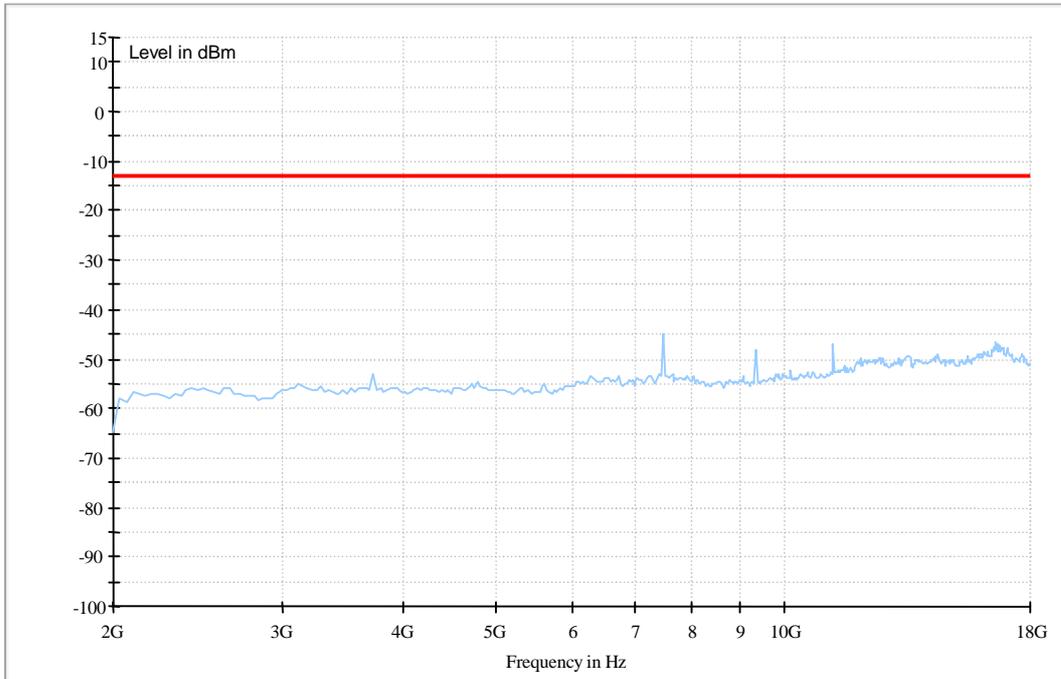
8.3.4 For EGPRS1900 Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)



Traffic Mode (18GHz-26GHz)

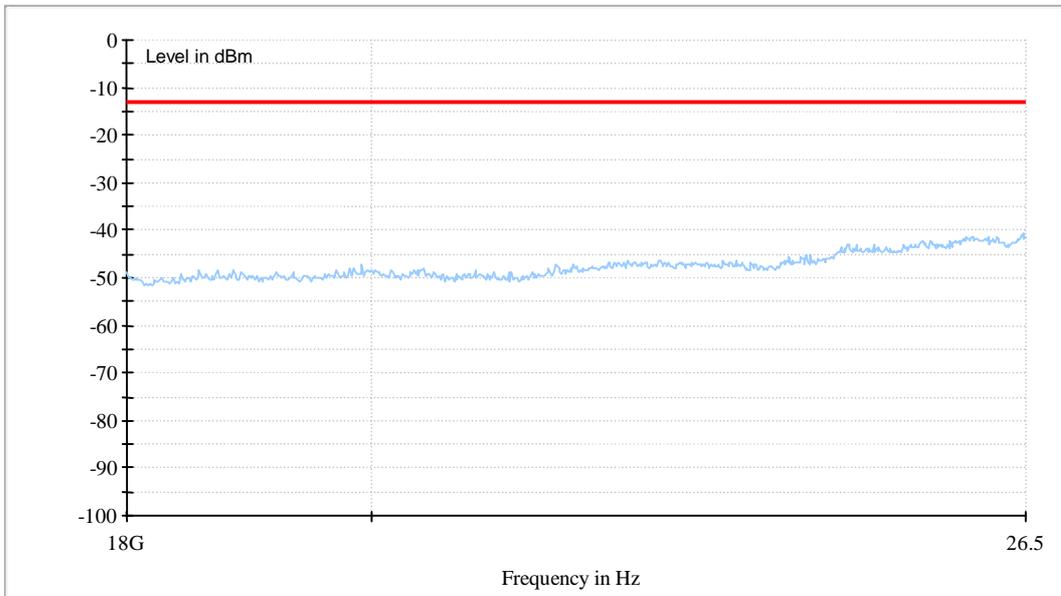
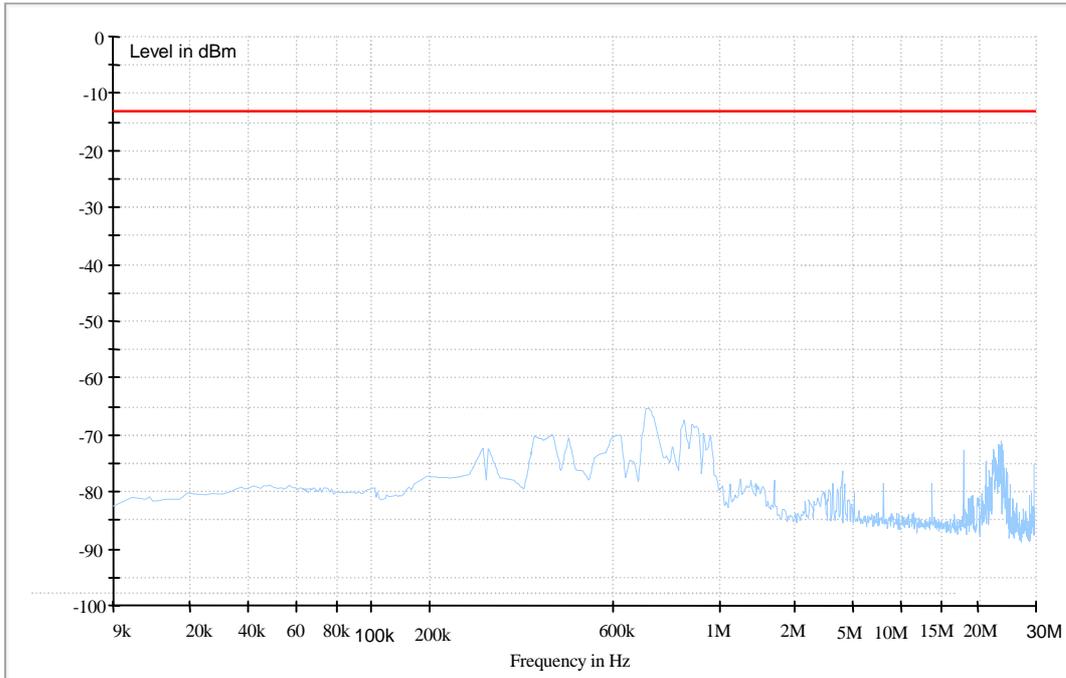
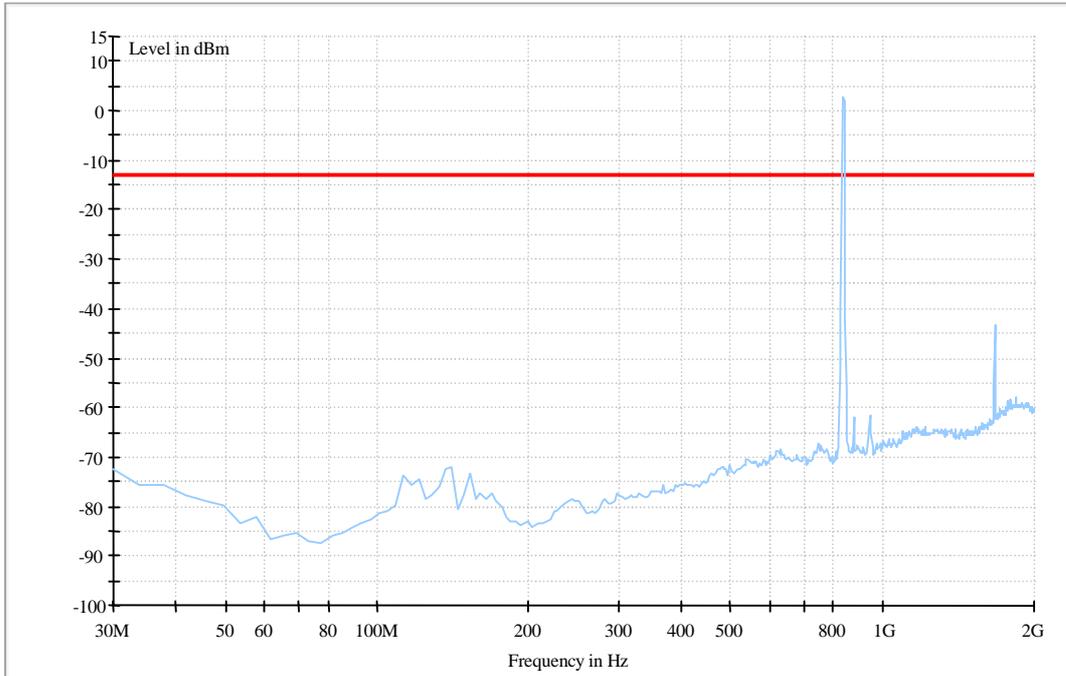


Figure 9. Radiated Spurious Emission

8.3.5 For WCDMA Band II Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)

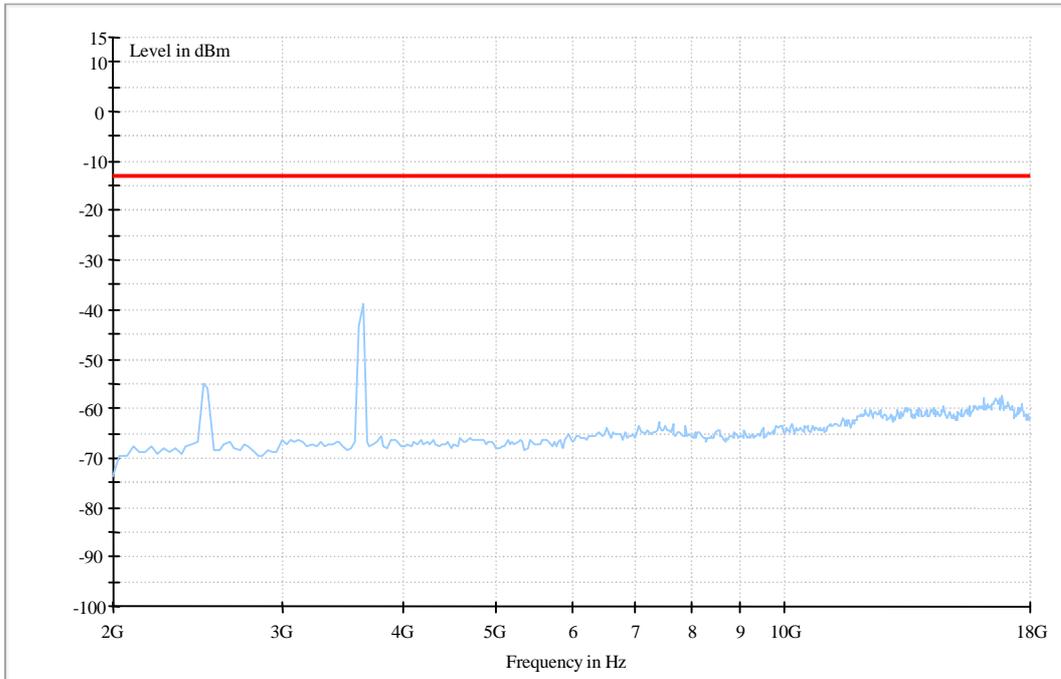
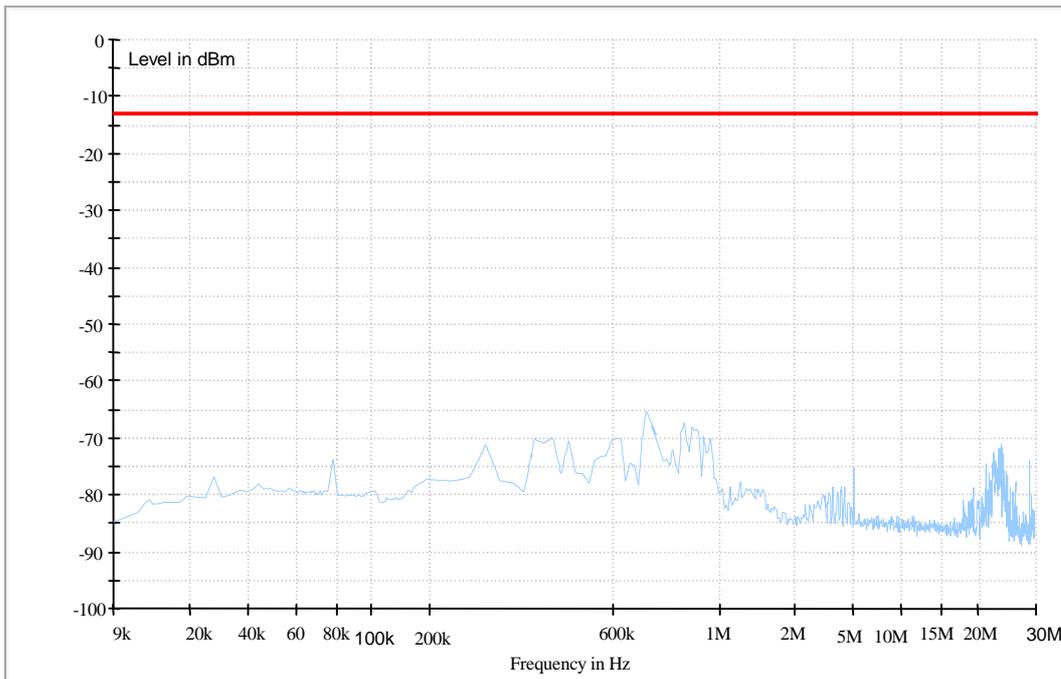
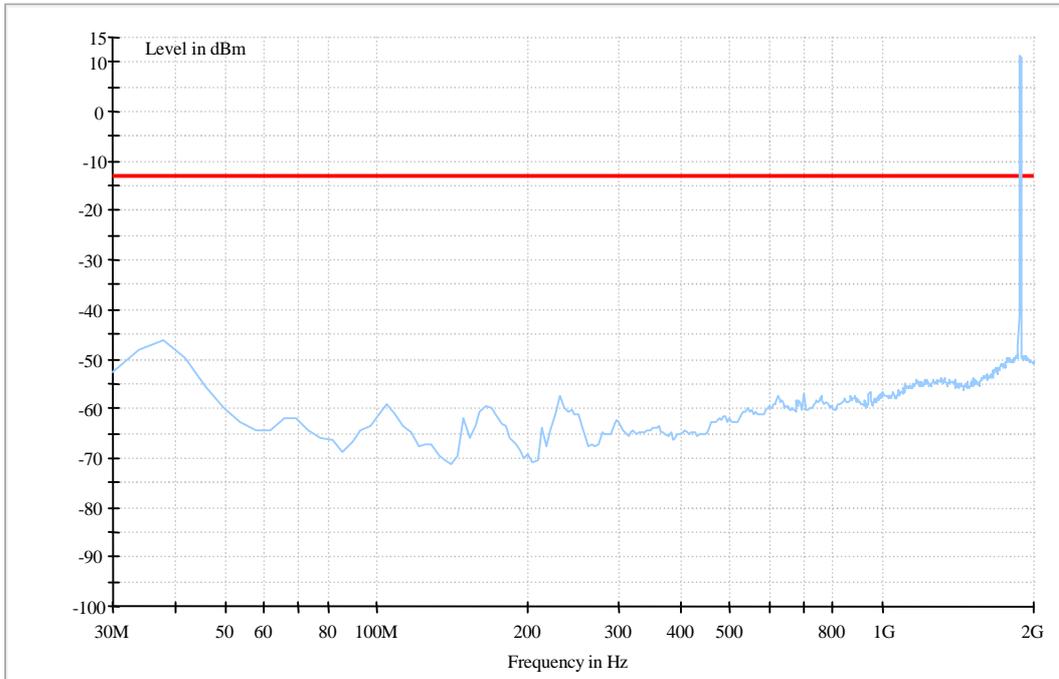


Figure 10. Radiated Spurious Emission

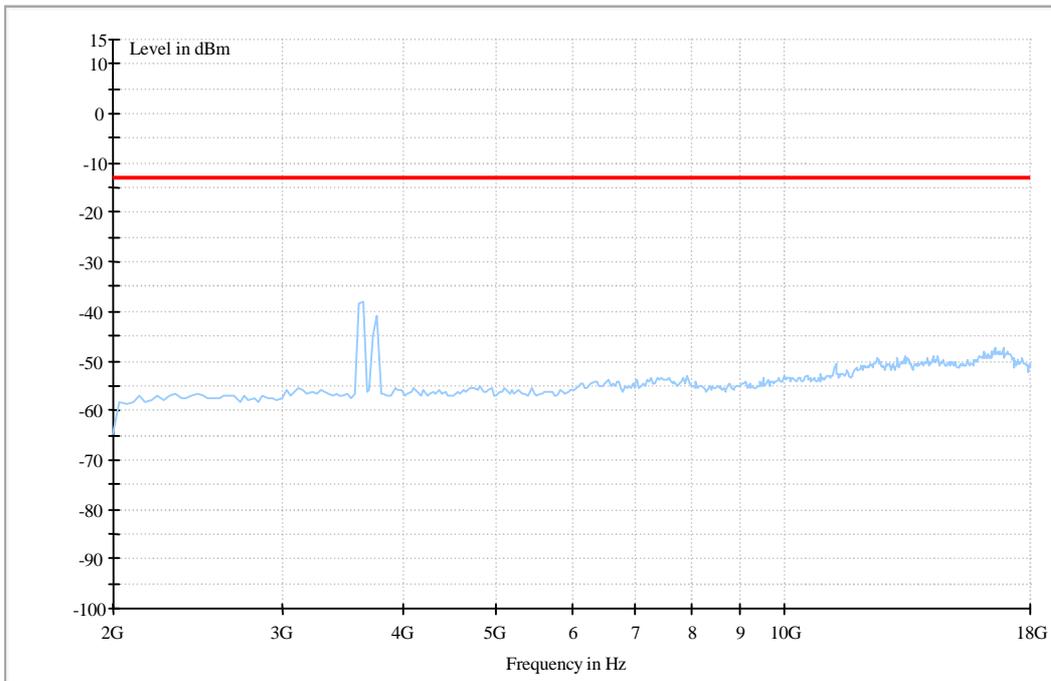
8.3.6 For WCDMA Band V
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)



Traffic Mode (18GHz-26GHz)

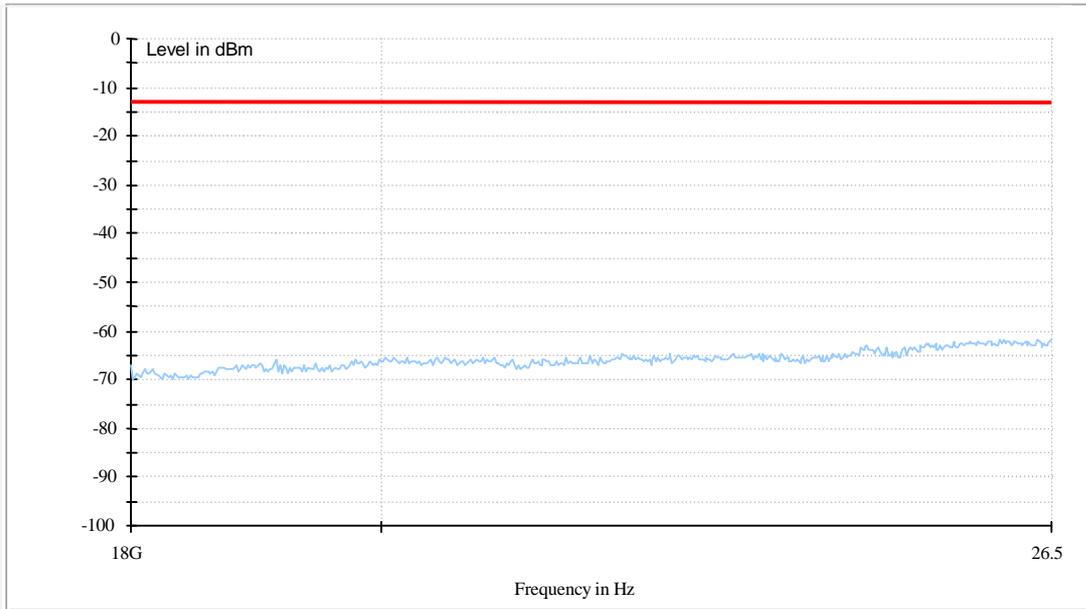
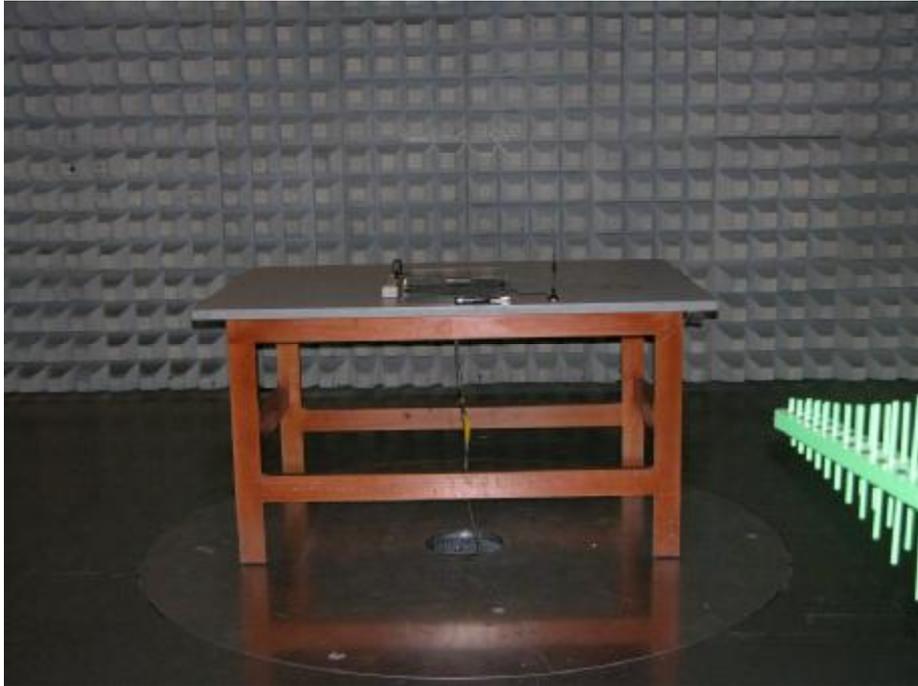


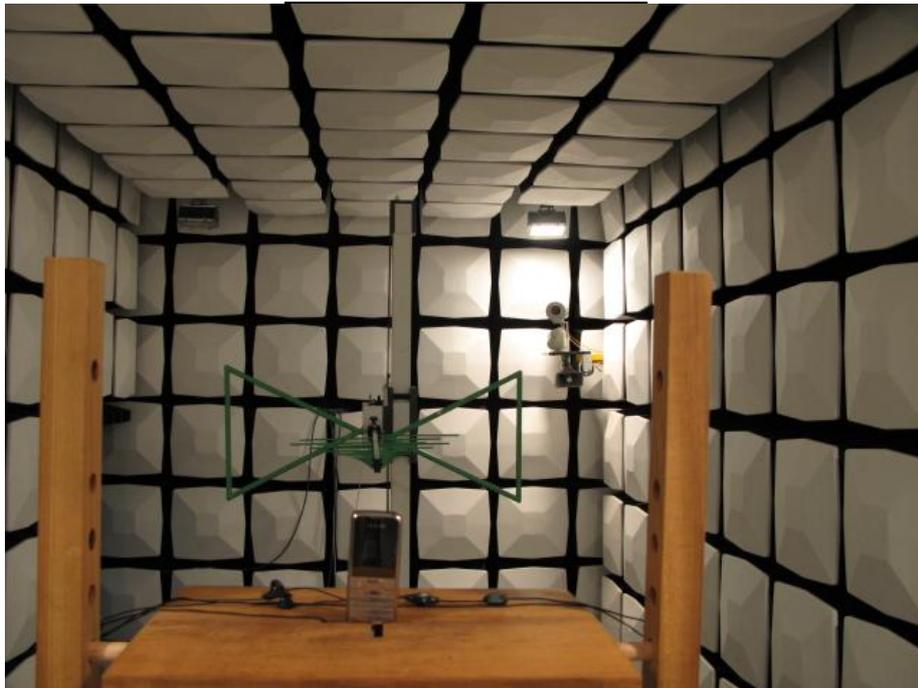
Figure 11. Radiated Spurious Emission

9 Photographs of Test Set-ups

9.1 Radiated Emissions



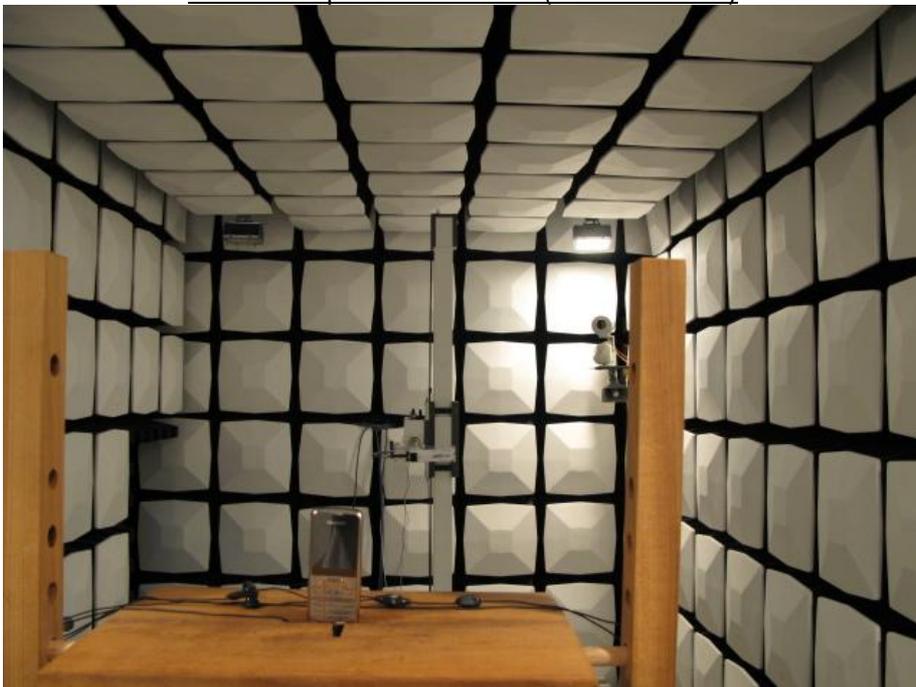
Radiated Disturbance of TC1



Radiated Spurious Emission(30MHz~2000MHz)



Radiated Spurious Emission(2GHz~18GHz)



Radiated Spurious Emission(18GHz~26GHz)

9.2 Conducted Emissions



Conducted Emissions of AC Power Port

END