



# EMC Test Report

Product Name: Wireless Module

Model Number: MG323

Report No: SYBHZ(R)E012052010EB-1

FCC ID: QISMG323

Reliability Laboratory of Huawei Technologies Co., Ltd.

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## Notice 1

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2. The laboratory has obtained the accreditation of THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION (A2LA), and Accreditation Council Certificate Number: 2174.01.
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.
4. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-1.
5. The laboratory also has been listed by the VCCI to perform EMC measurements. The accreditation number is R2364, C2583, and T256.
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8. The test report is invalid if there is any evidence of erasure and/or falsification.
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10. Normally, the test report is only responsible for the samples that have undergone the test.
11. 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	<i>Not Applicable!</i>
	4	
	5	
	6	
	7	



REPORT ON	Wireless Module
	M/N: MG323
REGULATION	FCC CFR47 Part 15: Subpart B; FCC CFR47 Part 22:Subpart H; FCC CFR47 Part 24: Subpart E;
START OF TEST	May.20, 2010
END OF TEST	May.30, 2010
Final Judgement:	Pass

Approver

2010-05-31

Date

张兴海

Name



Signature

Operator

2010-05-31

Date

廖小平

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: Wireless Module  
MANUFACTURERS MODEL NUMBER: MG323

### 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&24.238	Radiated Spurious Emission	PASS



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### 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

<b>EUT Classification: Wireless Module</b>				
<b>Test Items</b>	<b>Test Configuration &amp; Test Mode</b>	<b>Required Performance Criteria</b>	<b>Result</b>	<b>Site</b>
<u>Radiated Emissions</u> Enclosure Port	TC1 (TM3~TM4)	N/A	Pass	Site1
<u>Conducted Emissions</u>	TC1 (TM1~TM4)	N/A	Pass	Site1
<u>Radiated Spurious Emissions</u> Enclosure Port	TC1 (TM1~TM2)	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

MG323 GSM/GPRS 850/900/1800/1900 Quad band M2M Module is subscriber equipment in the GSM/GPRS system. The GSM/GPRS frequency bands include GSM850, EGSM900, DCS1800 and PCS1900.

MG323 implement such functions as RF signal receiving / transmitting, GPRS/GSM protocol processing, data service etc. Externally they provide 50pin B2B interface.

But only Band II, Band V, GSM850 and DCS1900 test data included in this report.

#### 3.1.1 Main Equipment Technical Data

Description:	Wireless Module
Models:	MG323
Input Rated Voltage:	3.8V
Rated Consumption Power:	2W
Maximum Emission Power:	Max 33dBm
Dimensions:	35 mm × 32.5 mm × 3.05 mm
Weight:	5.8g

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

#### 3.2 Sub-Assembly Identity

Table 4 Sub-Assembly Identity

Board			
Model Name	Qty.	Serial Number	Description
MG323	1	L82AA11041900068	Main Board
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
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	2010-03-12

### 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 7 Configuration table

Test configuration	Test mode
TC1	TM1~TM4

TC1: EUT was powered by a demo board, which is connected to the notebook by USB port.

#### 4.3.2 Test Mode

There were 16 test Modes. TM1 to TM16 were shown below:

- TM1: operate in traffic mode GPRS 1900;
- TM2: operate in traffic mode GPRS 850;
- TM3: operate in idle mode GPRS 1900;
- TM4: operate in idle mode GPRS 850;

### 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 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 661 for PCS1900, 190 to GSM850.

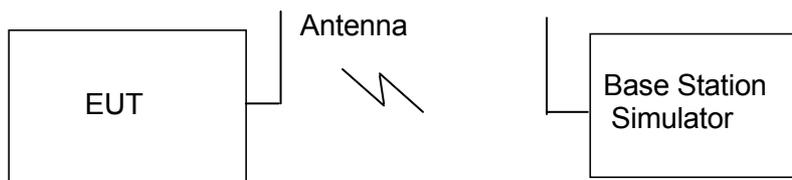


Figure 1.: TC1 (TM1-TM4)

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.

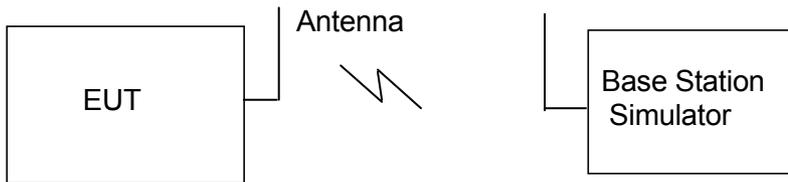


Figure 2. TC1 (TM3-TM4)

## 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 (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 ESU26 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:

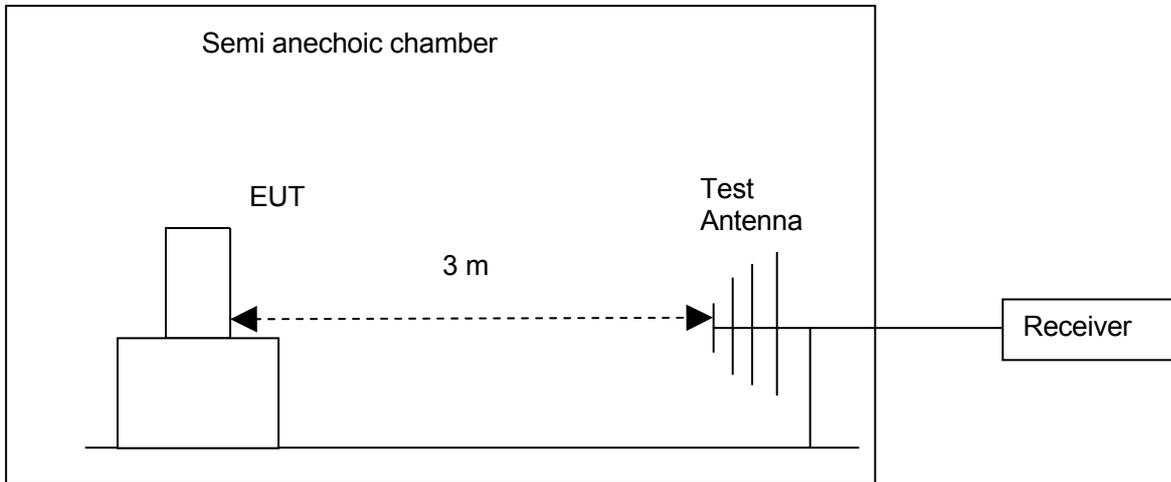


Figure 3. Test set-up

#### 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( $\mu\text{V}/\text{m}$ )	Unit( $\text{dB}\mu\text{V}/\text{m}$ )

30-88	100	40
88-216	150	43.5
216-960	200	46
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: 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.

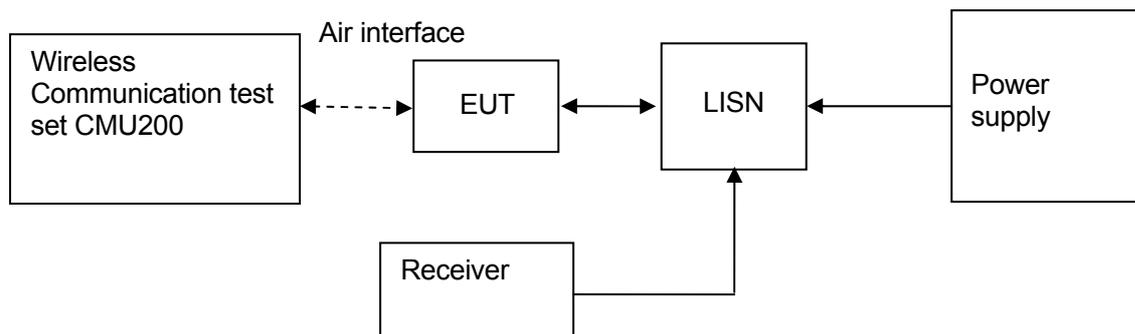


Figure 4. Test Set-up

### 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 dB $\mu$ V	56~46 dB $\mu$ V
0.5MHz~5MHz	56 dB $\mu$ V	46 dB $\mu$ V
5MHz~30MHz	60 dB $\mu$ V	50 dB $\mu$ V

## 5.3 Radiated Spurious Emissions

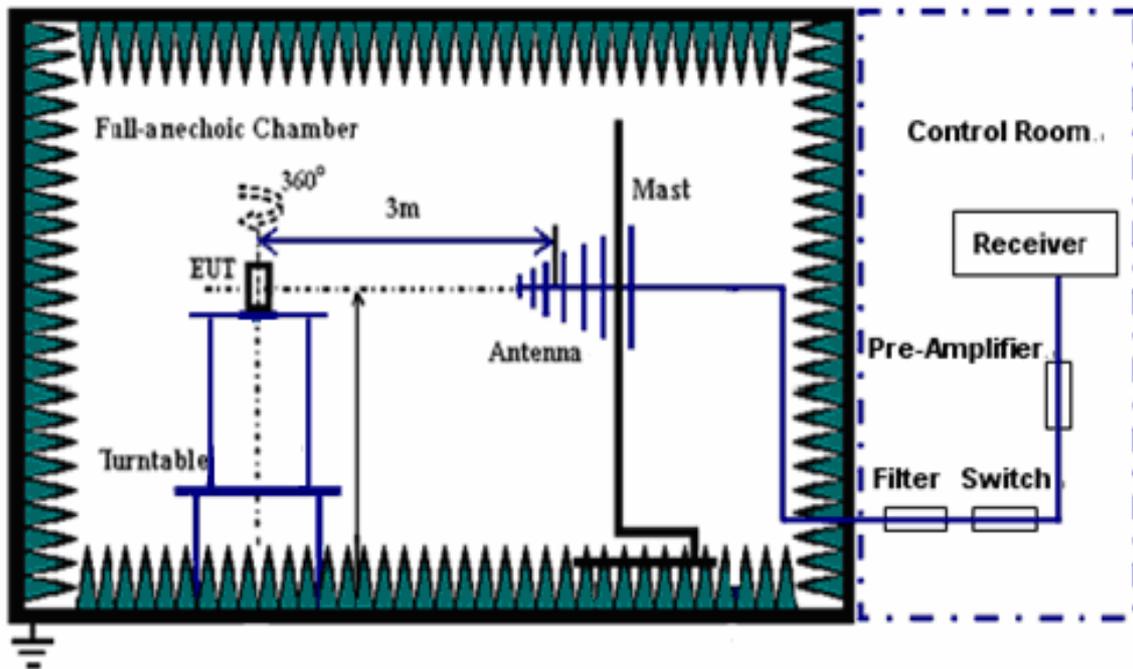
### 5.3.1 Test Procedure

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:

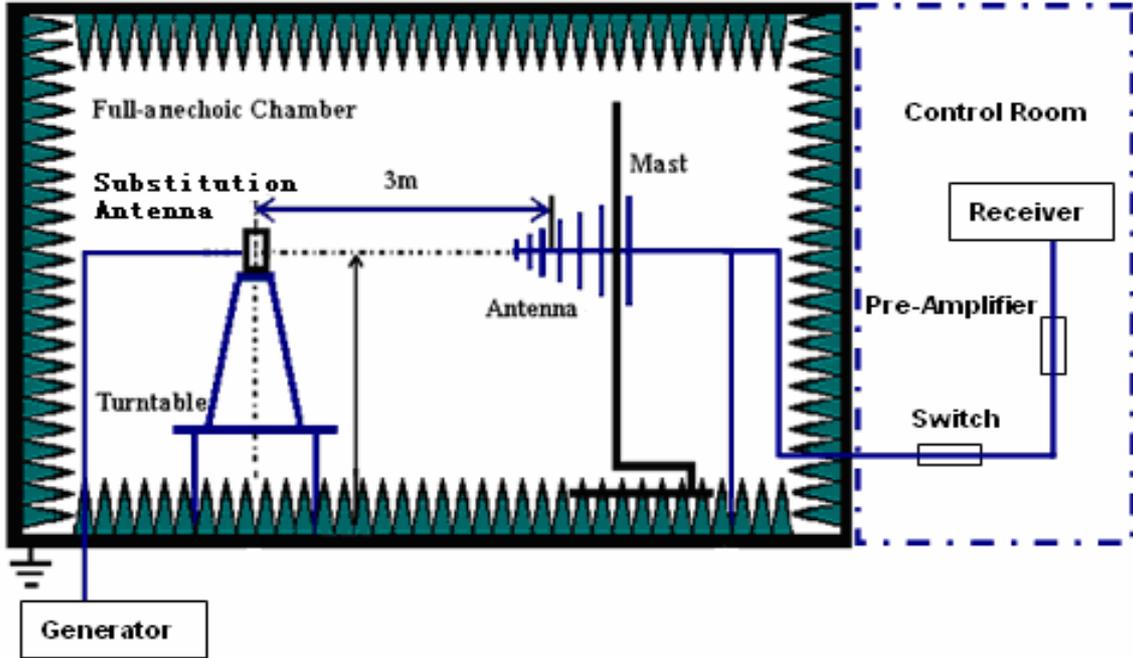
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect 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 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
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 150 kHz: 1 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
30MHz~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: For get the E.R.P. (Efficient Radiated Power) in substitution method, the following formula should take to calculate it,

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

NOTE: SGP- Signal Generator Level

### 5.3.2 Test Results

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

## 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	Jul.07, 2009	12
	Broadband Antenna	VULB9163	SCHWARZBECK	Jun.24, 2009	12
	Horn Antenna	HF906	R&S	Jun.06.2009	12
CE	EMI Test receiver	ESU26	R&S	Jul.22, 2009	12
	Artificial Mains Network	ENV216	R&S	Aug.12, 2009	12
RSE	EMI Test receiver	ESIB26	R&S	April.22, 2010	12
	Horn Antenna	3117	ETS-LINDGREN	Sep.11.2009	12
	Broadband Antenna	CBL6112B (2747)	SCHAFFNER	Nov.30, 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:

Table 14 System Measurement Uncertainty

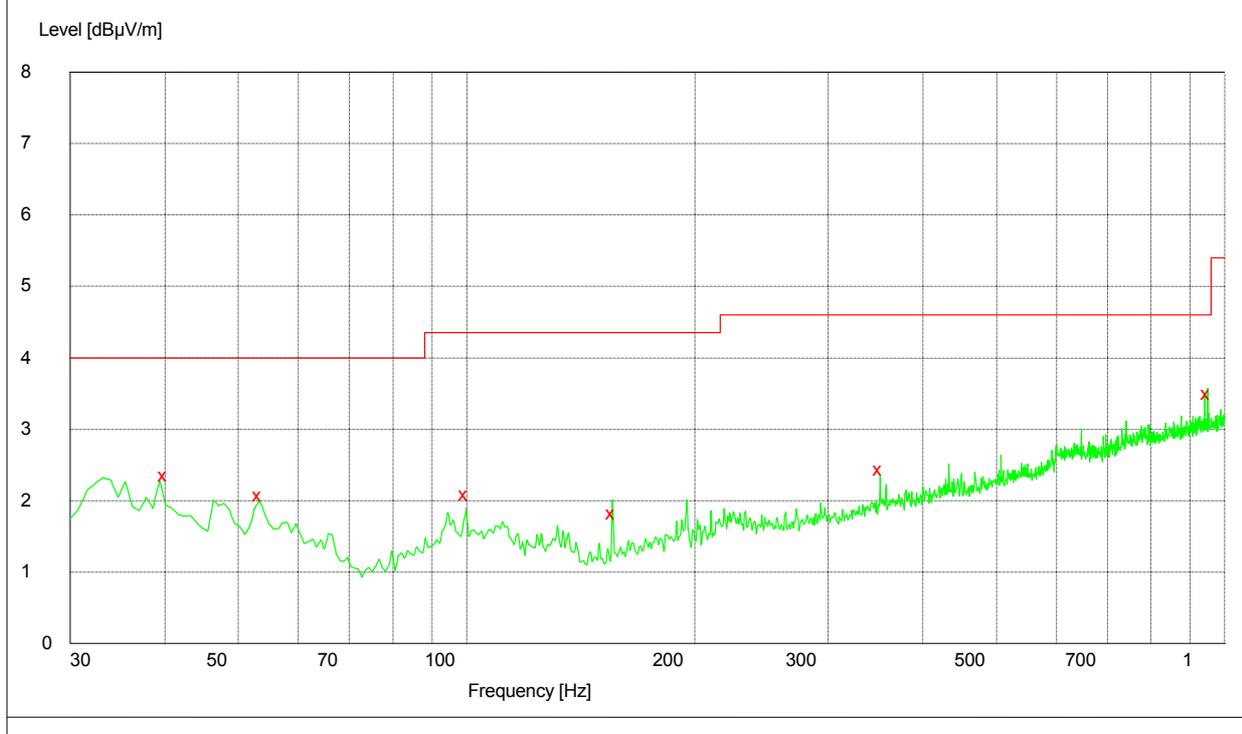
Items		Extended Uncertainty
RE	Field strength (dB $\mu$ V/m)	U=4.1dB; k=2(30MHz-1GHz)
RE	Field strength (dB $\mu$ V/m)	U=4.1dB; k=2(1GHz-18GHz)
RSE	ERP (dBm)	U=2.2dB; k=2
CE	Disturbance Voltage(dB $\mu$ V)	U=3.4dB; k=2

## 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.

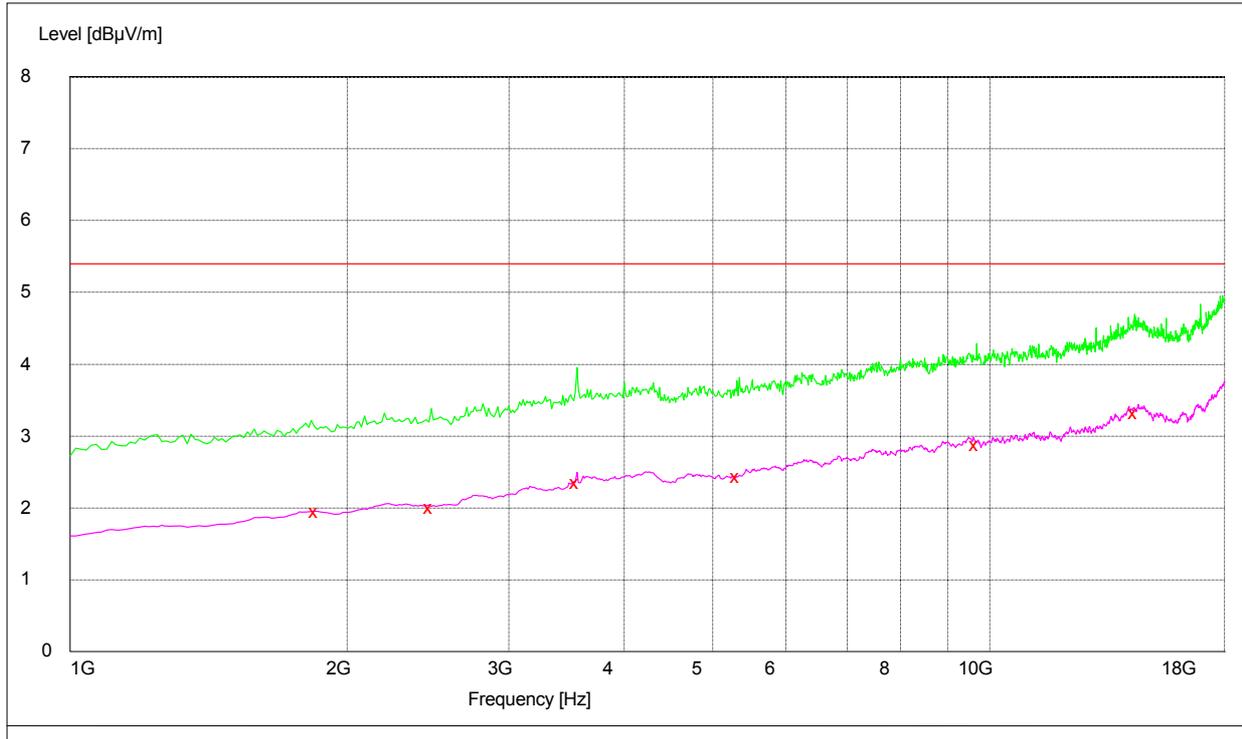
#### 30MHz-1GHz



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
40.020000	23.40	13.1	40.0	16.6	105.0	112.00	VERTICAL
53.340000	20.60	12.7	40.0	19.4	164.0	152.00	VERTICAL
99.960000	20.70	13.1	40.0	19.3	100.0	91.00	HORIZONTAL
156.000000	18.10	9.4	40.0	21.9	100.0	131.00	VERTICAL
351.060000	24.20	17.1	47.0	22.8	124.0	63.00	HORIZONTAL
950.280000	34.90	26.5	47.0	12.1	100.0	255.00	VERTICAL

### 1GHz-18GHz



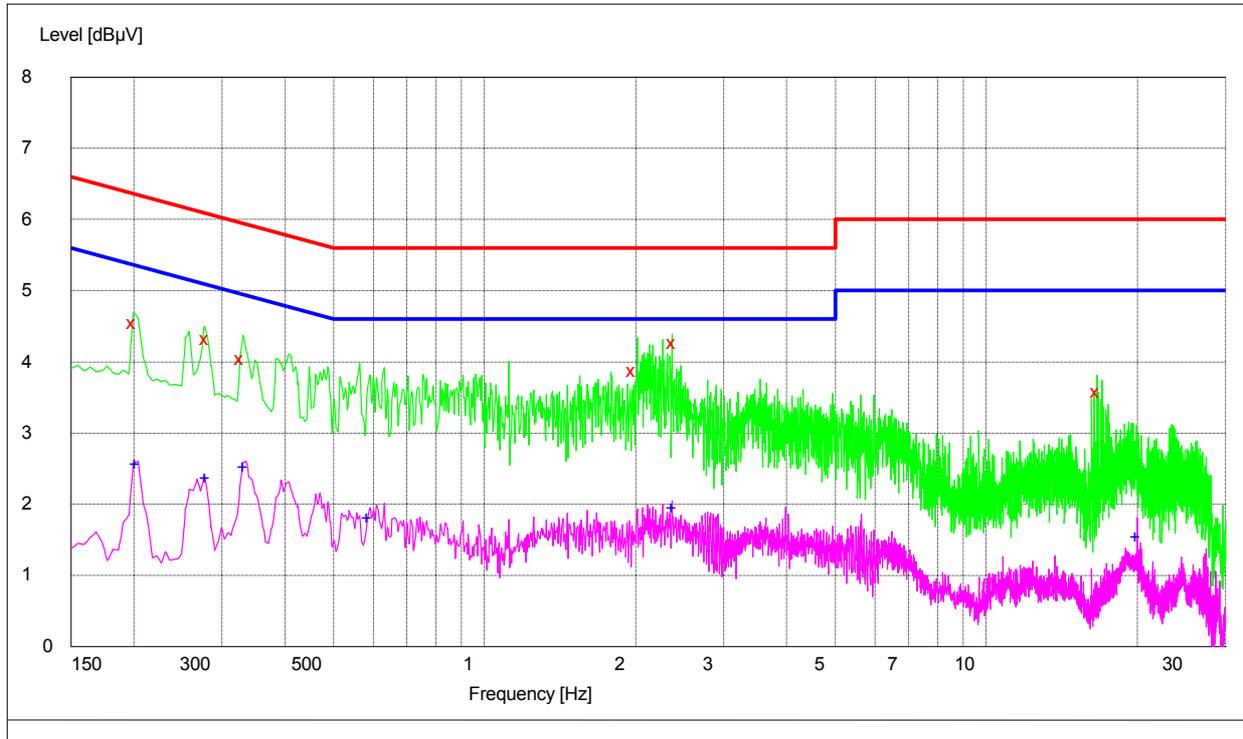
### MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
1850.000000	19.30	-13.3	54.0	34.7	100.0	0.00	VERTICAL
2468.500000	20.00	-11.3	54.0	34.0	100.0	195.00	VERTICAL
3555.000000	23.40	-7.2	54.0	30.6	167.0	358.00	VERTICAL
5318.000000	24.20	-2.6	54.0	29.8	165.0	359.00	VERTICAL
9672.000000	28.70	5.2	54.0	25.3	134.0	49.00	VERTICAL
14401.000000	33.20	12.1	54.0	20.8	169.0	50.00	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
0.200000	45.40	10.0	62	16.6	N	FLO
0.280000	43.20	10.0	60	16.8	N	FLO
0.328000	40.40	10.0	59	18.6	N	FLO
1.982000	38.60	10.1	56	17.4	N	FLO
2.390000	42.50	10.1	56	13.5	N	FLO
16.666000	35.70	10.3	60	24.3	N	FLO

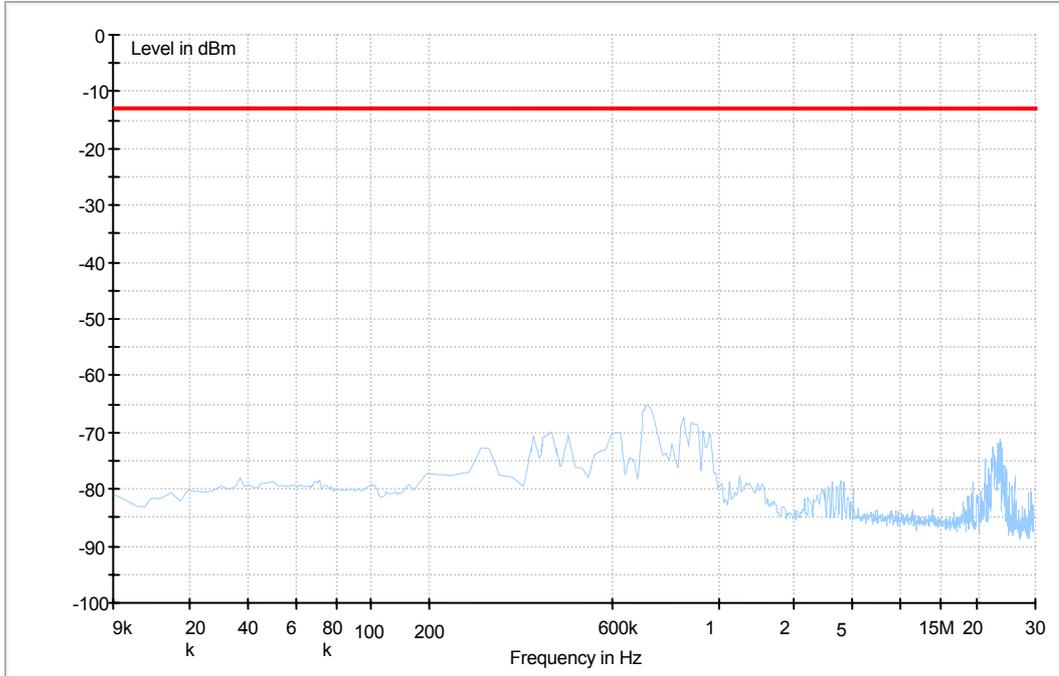
#### MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.203000	25.50	10.0	52	26.5	L1	FLO
0.280000	23.50	10.0	50	26.5	N	FLO
0.333000	25.00	10.0	49	24	N	FLO
0.588000	17.90	10.1	46	28.1	N	FLO
2.378000	19.40	10.1	46	26.6	N	FLO
19.998000	15.20	10.4	50	34.8	N	FLO

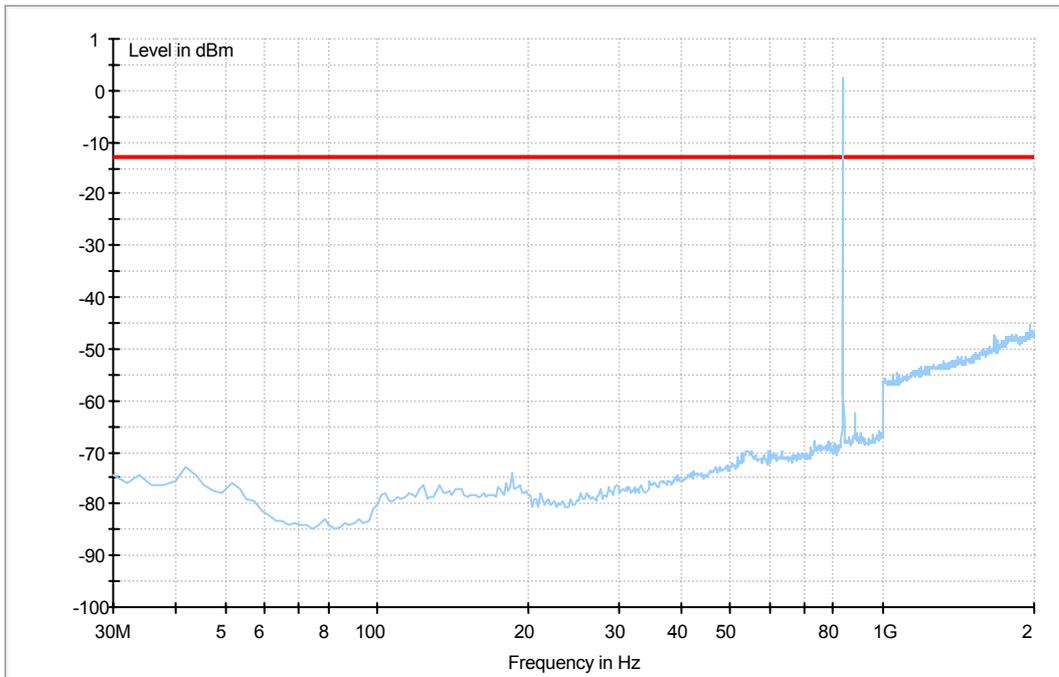
### 8.3 Radiated Spurious Emission

#### 8.3.1 For GPRS 850

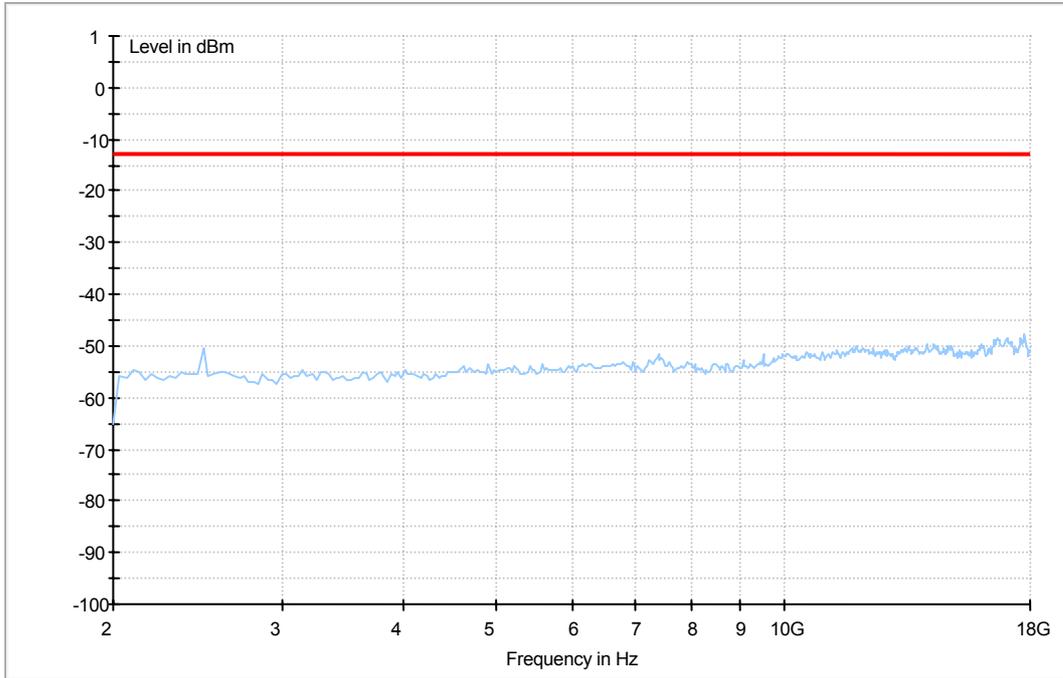
Traffic Mode (9kHz-30MHz)



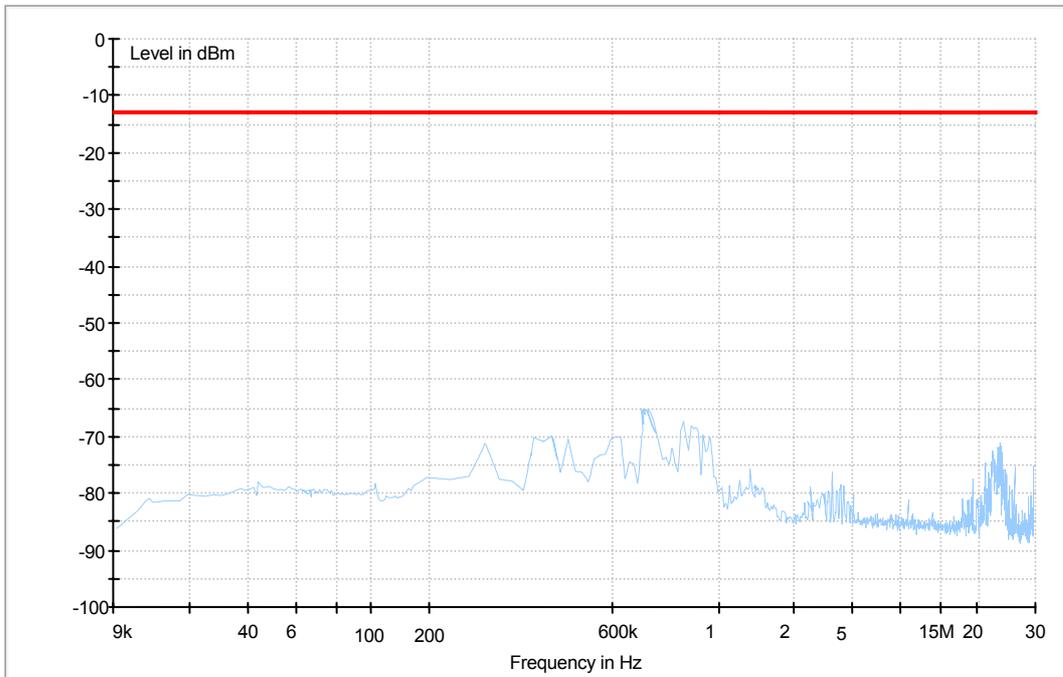
Traffic Mode (30MHz-2GHz)



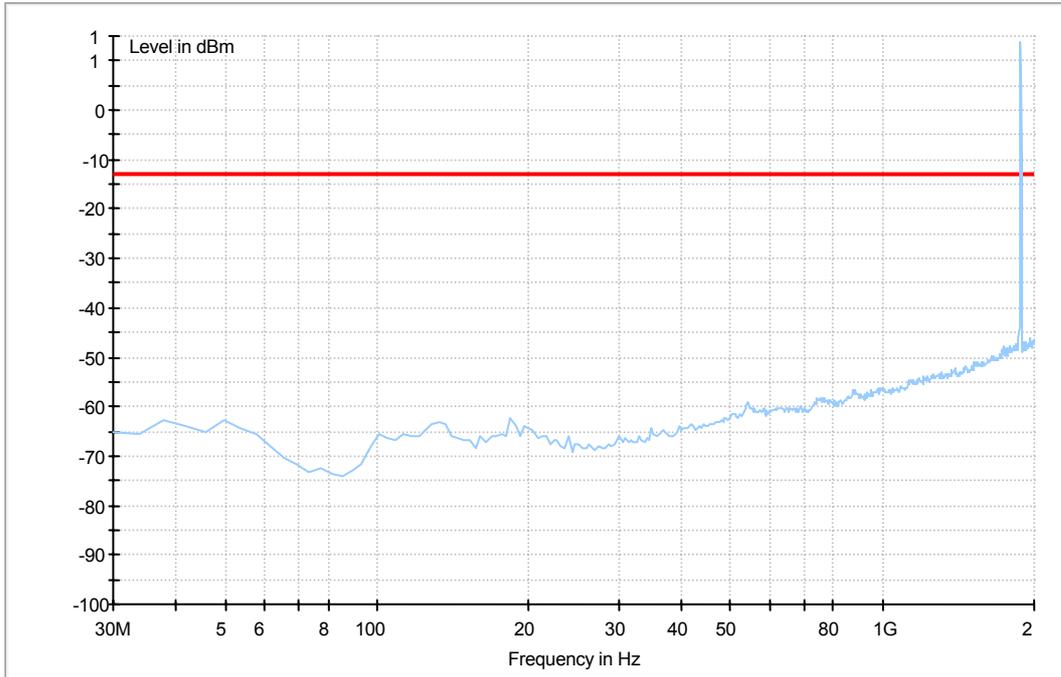
### Traffic Mode (2GHz-18GHz)



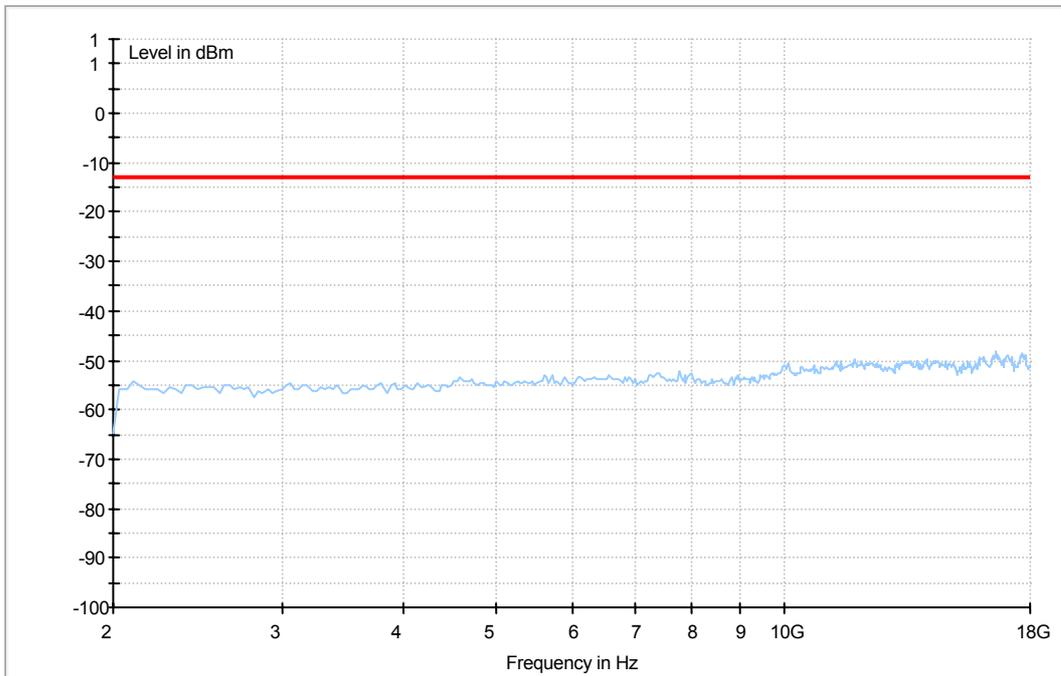
### 8.3.2 For GPRS 1900 Traffic Mode (9kHz-30MHz)



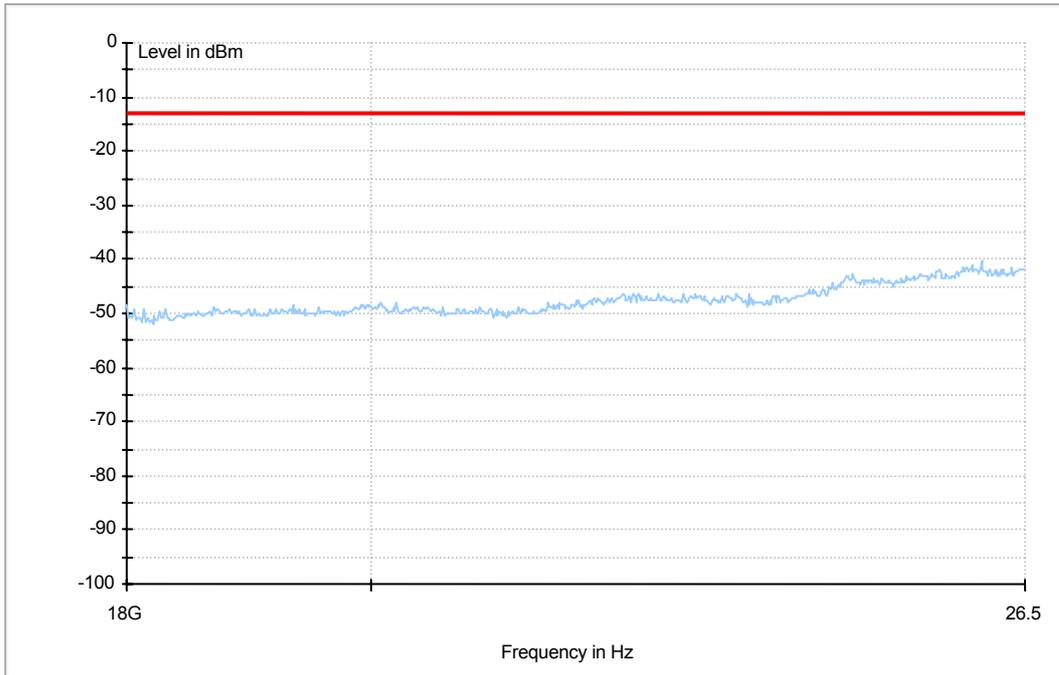
### Traffic Mode (30MHz-2GHz)



### Traffic Mode (2GHz-18GHz)



Traffic Mode (18GHz-26.5GHz)



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**END**