



FCC EMC Test Report

Product Name: 3G/4G Dual Mode Wireless Router

Model Number: EC5072,PCDH5072HS

Report No: SYBH(Z-EMC)006032011-2
FCC ID: QISEC5072

Reliability Laboratory of Huawei Technologies Co., Ltd.

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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-1.
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.
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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:

Modification Information

Modification Information	1	
	2	
	3	<i>Not Applicable!</i>
	4	
	5	
	6	
	7	



REPORT ON	3G/4G Dual Mode Wireless Router
	M/N: EC5072,PCDH5072HS
REGULATION	FCC CFR47 Part 15: Subpart B;
	FCC CFR47 Part 22: Subpart H;
	FCC CFR47 Part 24: Subpart E;
	FCC CFR47 Part 27: Subpart C&M;
START OF TEST	Mar.03,2011
END OF TEST	Mar.09,2011
Final Judgement:	Pass

Approved By

2011-03-16
Date

Liuchunlin
Name

Signature

Reviewed By

2011-03-16
Date

Dailinjun
Name

Signature

Operator

2011-03-15
Date

daniel
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	3G/4G Dual Mode Wireless Router
MANUFACTURERS MODEL NUMBER	EC5072,PCDH5072HS

1.2 Test Site

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

1.3 Test environment condition

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



2 Summary of Results

Table below shows a brief summary of the results obtained.

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 (TM6-TM10)	N/A	Pass	Site1
<u>Conducted Emissions</u>	TC1 (TM1-TM5)	N/A	Pass	Site1
<u>Radiated Spurious Emissions</u> Enclosure Port	TC1 (TM1-TM5)	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

EC5072 is a WiMAX/EVDO dual mode and WiFi Wireless mobile Router; it can be used as a WiFi Access Point based on standard of IEEE802.11b/g/n, max to 5 WiFi stations can be associating with EC5072 simultaneously. It also can be used as a USB modem by connecting with PC via USB cable. It supports 3G CDMA and 4G WiMAX wireless internet accessing function and GPS function. About 3G CDMA wireless mode, it supports CDMA2000 1x and 1xEV-DO Rev.0/Rev.A, operating in Band Class 0(800MHz) and Band Class 1(1900M), and the 4G WiMAX supports IEEE802.16e, operating in frequency of 2.5GHz. The WiFi frequency is 2.4GHz.

EC5072 supports 1Tx2Rx for 3G CDMA and 4G WiMAX, but there are also two antenna for 4G WiMAX to realize TxD(TX Switching Diversity), WiFi only supports 1Tx1Rx, the GPS is only used for receiver.

3.1.1 Main Equipment Technical Data

Description:	3G/4G Dual Mode Wireless Router
Models:	EC5072,PCDH5072HS
Input Rated Voltage:	3.7V
Rated Consumption Power:	Max 5W
Rated Power:	23.5dBm for 4G WiMAX 24.5dBm for 3G CDMA 14dBm for WiFi 11b, 12dBm for WiFi 11g/n
Dimensions:	109 (length) × 60 (width) × 16.8 (height) (mm3)
Weight:	< 125g(with battery)

Sub-Assembly Identity

Mode		Work Frequency	
		Transmitt Frequency (MHz)	Receive Frequency (MHz)
CDMA	EVDO 800M	824-849	869- 894
	CDMA 800M	824-849	869- 894
	EVDO 1900M	1850-1910	1930-1990
	CDMA 1900M	1850-1910	1930-1990
WiMAX	802.16e	2496-2690	2496-2690
WiFi	802.11b/g/n	2400-2472	2400-2472
GPS	GPS	NA	1575.42



Sub-Assembly Identity

Board				
Model Name	Qty.		Serial	Description
EC5072, PCDH5072HS	1		NA	Main board
	1		NA	Slave board
Accessory				
Name	Qty.	Manufacture	Serials number	Description
Adapter	1	Huawei Technologies Co., Ltd.	HKAB11265713	Adapter Model: HW-050100U1W Input Voltage: 100-240V ~50/60Hz, 0.2A Output Voltage: === 5.0V 1.0A
Rechargeable Li-ion Battery	1	Huawei Technologies Co., Ltd.	YACB217HI0801542	Battery Model: BTR5072B Rated capacity: 2200mAh 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

Cable Used during Test

Cable	Quantity	Type of Cable
USB	1	shielded

4.2 Associated Equipment Used during Test

Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Cal Date
Radio Communication Tester	CMU200	R&S	3607111817	2010-7-23
Mobile WiMAX Test Set(Base Station simulator)	E6651A	Agilent	MY48150125	2010-8-10
Notebook	T61	IBM	3108052508	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).

TC1:EUT powered with an adapter and connected to the test system (Base Station Simulator).

Configuration table

TC1	TM1~TM10
-----	----------

4.3.2 Test Mode

There were 10 test Modes. TM1 to TM10 were shown in the diagrams below:

TM1	operate in traffic mode CDMA800;
TM2	operate in traffic mode EVDO800;
TM3	operate in traffic mode CDMA1900;
TM4	operate in traffic mode EVDO1900;
TM5	operate in traffic mode WIMAX
TM6	operate in idle mode CDMA800;
TM7	operate in idle mode EVDO800;
TM8	operate in idle mode CDMA1900;
TM9	operate in idle mode EVDO1900;
TM10	operate in idle WIMAX

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 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 CDMA/WIWAX, the following conditions shall also be met:

- The EUT shall be commanded to operate at maximum transmit power;

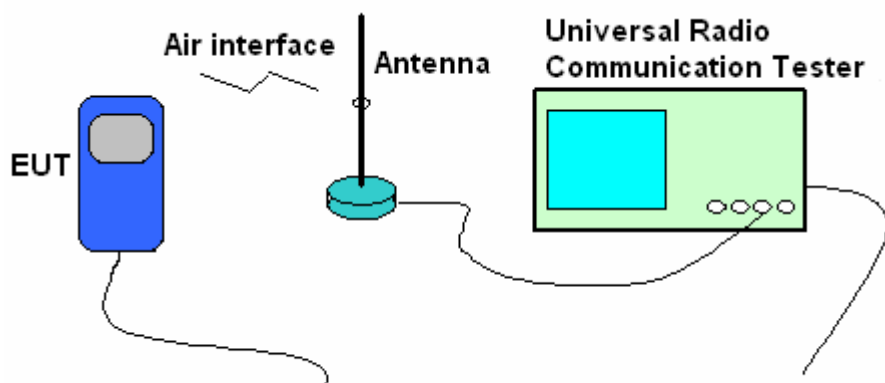


Figure 1.: Test Configuration

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 CDMA/WIWAX, 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;

For Cellular, 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.

5 Electromagnetic Interference (EMI)

5.1 Radiated Disturbance 30MHz to 18GHz

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. The test distance was 3m. The set-up and test methods were according to ANSI C63.4.

A preliminary scan and a final scan of the emissions were made from 30 MHz to 18 GHz by using test script of software; the emissions were measured using Quasi-Peak Detector (30MHz~1GHz) and AV detector (above 1GHz). 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.

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:

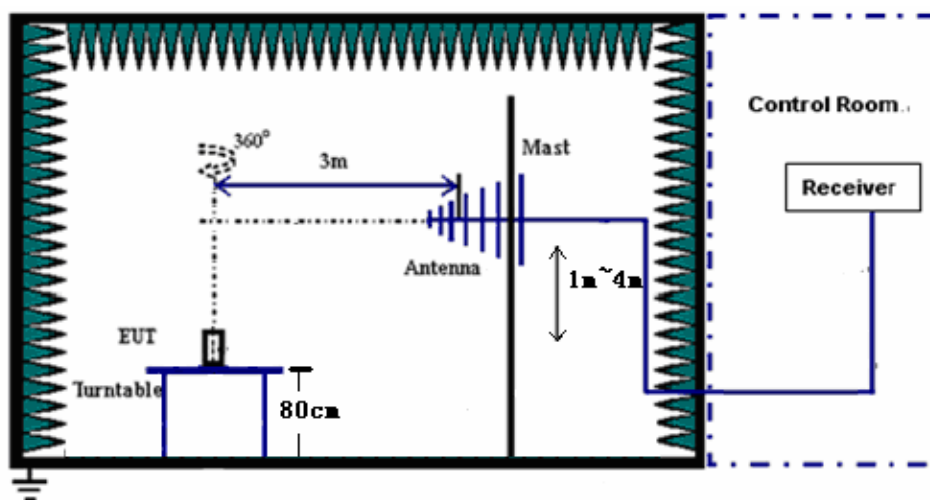


Figure 2. Test set-up

5.1.2 Test Results

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

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.

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.

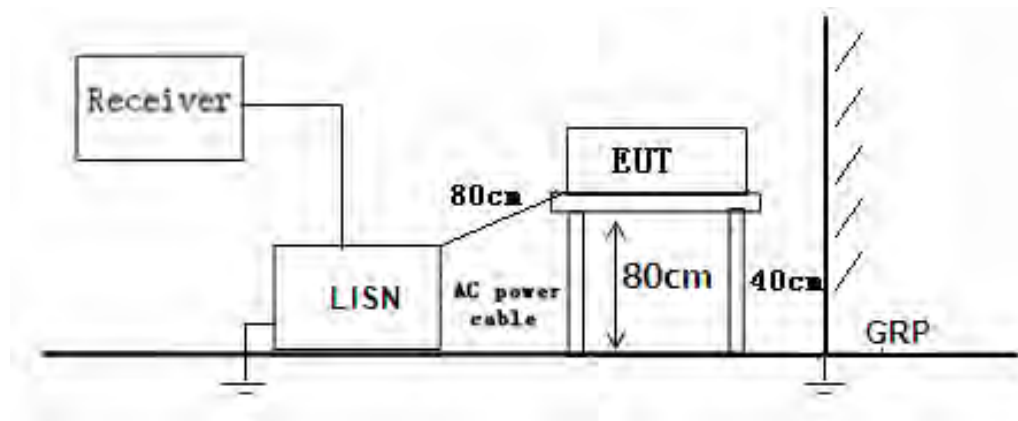


Figure 3. Test Set-up

5.2.2 Test Results

The EUT has met requirements for Conducted disturbance of power lines.

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

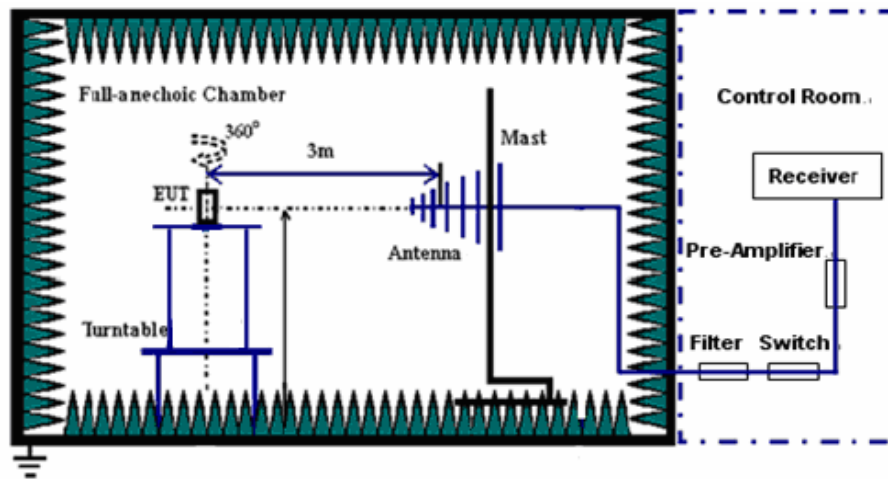
5.3.1 Test Procedure

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:

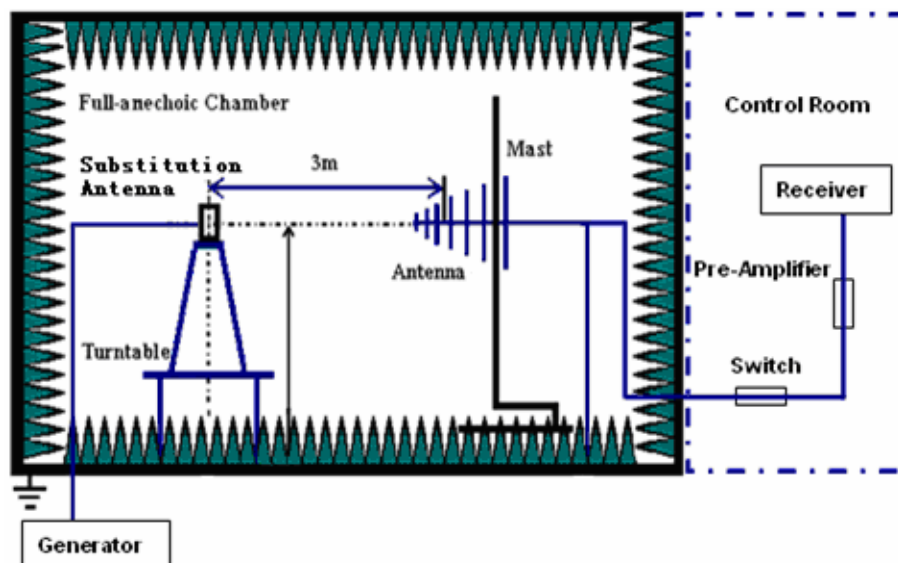
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect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

Test the Radiated maximum output power by the 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.





Test should be performed in normal voltage condition.

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 30MHz up to 1 GHz: 100 kHz;
Measurement bandwidth (RBW) for 1GHz up to 18GHz: 1MHz;

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 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 30MHz up to 26.5GHz: 1MHz;

Radiated Spurious Emissions Limits

Frequency band	Minimum requirement (E.R.P) traffic mode
9KHz~26.5GHz	-13dBm

According to part 27.53(m), the defined measurement bandwidth as following:

27.53(m) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1MHz 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 30MHz up to 26.5GHz: 1MHz;

Radiated Spurious Emissions Limits

Frequency band	Minimum requirement (E.R.P) traffic mode
9KHz~26.5GHz	-25dBm



Substitution Results

Freq. [MHz]	Measure ment 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 Part22/24/27.



6 Main Test Instruments

Main Test Equipments

Test item	Test Instrument	Model	Manufacturer	Cal-Date	Cal Interval (month)
RE&CE	EMI Test receiver	ESU26	R&S	Jun.25, 2010	12
	Broadband Antenna	VULB 9163	SCHWARZBECK	May.15, 2010	12
	Horn Antenna	HF906	R&S	May.15, 2010	12
	LISN	ENV216	R&S	Jun.25.2010	12
RSE (CDMA Test)	EMI Test receiver	ESIB26	R&S	Apr.22,2010	12
	Horn Antenna	3117	EMCO	Oct.25.2010	12
	Broadband Antenna	CBL6112B	SCHAFFNER	Oct.28.2010	12
	Horn Antenna	3160	ETS-Lindgren	Sep.29.2010	12
RSE (WIMAX Test)	EMI Test receiver	FSU43	R&S	Jun.24, 2010	12
	Broadband Antenna	VULB 9163	SCHAFFNER	Sep.21, 2010	12
	Horn Antenna	HF906	R&S	Jun.29, 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 (CDMA Test)	EMC32	R&S		V8.40.10	
RSE (WIMAX Test)	EMC32	R&S		V8.10.10	



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:

System Measurement Uncertainty

Items		Extended Uncertainty
RE	Field strength (dB μ V/m)	U=4.1dB; k=2(30MHz-1GHz)
RE	Field strength (dB μ V/m)	U=4.1dB; k=2(1GHz-18GHz)
RSE (CDMA Test)	ERP (dBm)	U=2.2dB; k=2
RSE (WIMAX Test)	ERP (dBm)	U=2.8dB; k=2
CE	Disturbance Voltage (dB μ V)	U=3.4dB; k=2

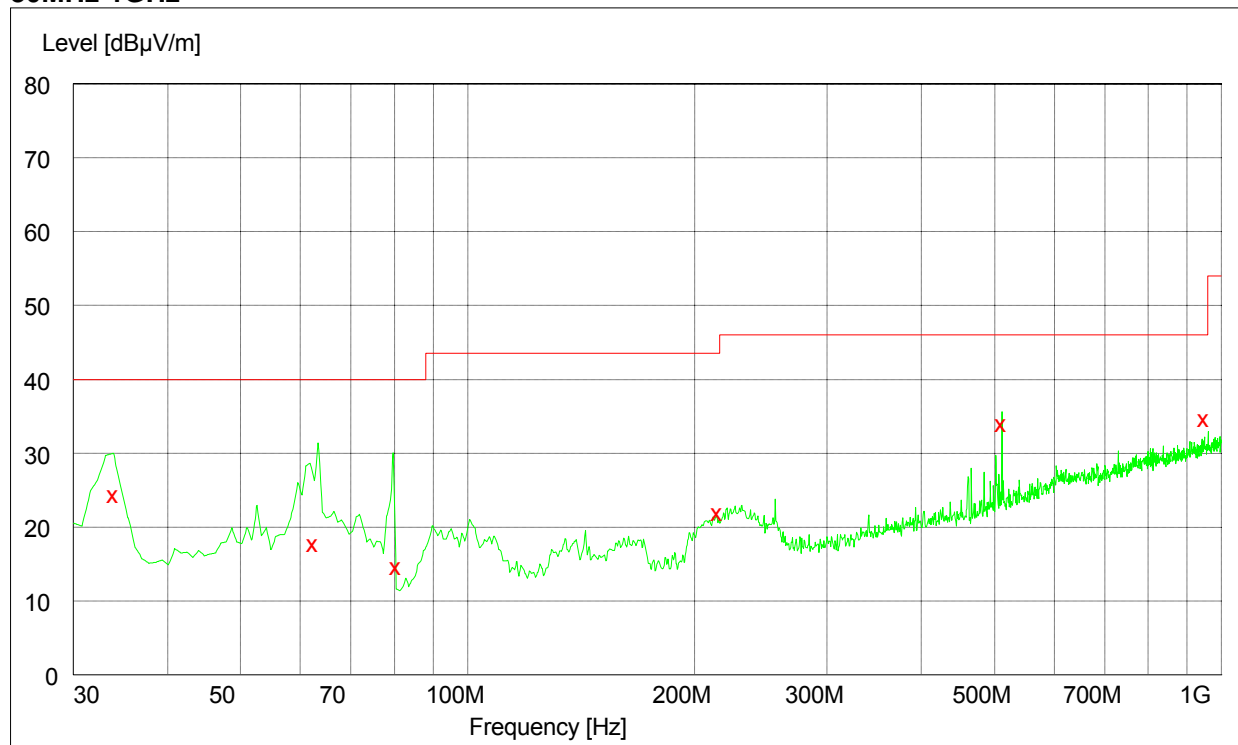


8 Graph and Data of Emission Test

8.1 Radiated Disturbance

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

30MHz-1GHz

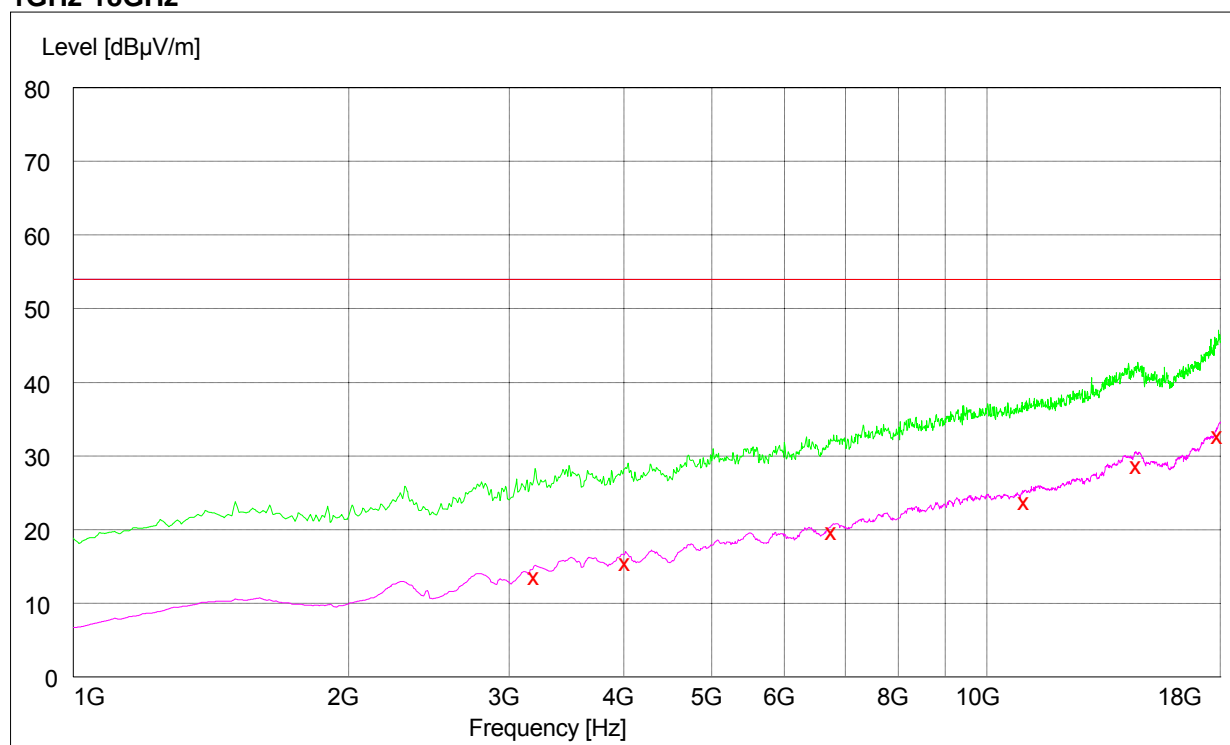


MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
34.000000	24.70	11.7	40.0	15.3	103.0	194.00	VERTICAL
62.468000	18.00	11.4	40.0	22.0	197.0	316.00	VERTICAL
80.564000	14.90	8.5	40.0	25.1	197.0	99.00	HORIZONTAL
214.752000	22.10	12.7	43.5	21.4	100.0	343.00	VERTICAL
512.016000	34.30	20.5	46.0	11.7	200.0	358.00	VERTICAL
950.212000	34.90	26.6	46.0	11.1	189.0	101.00	HORIZONTAL



1GHz-18GHz

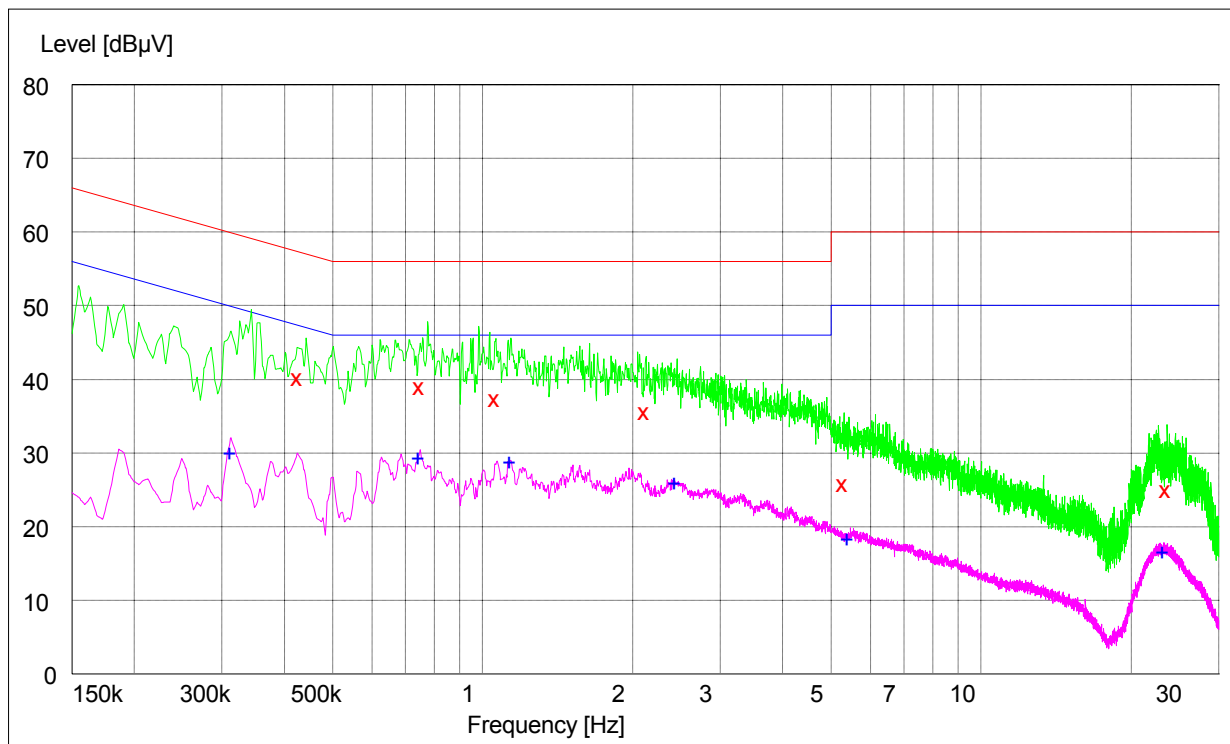


MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
3199.200000	13.80	-8.3	54.0	40.2	200.0	191.00	VERTICAL
4024.700000	15.70	-5.7	54.0	38.3	193.0	4.00	HORIZONTAL
6776.000000	19.90	-0.5	54.0	34.1	136.0	0.00	HORIZONTAL
11011.600000	24.10	6.7	54.0	29.9	124.0	177.00	HORIZONTAL
14596.500000	29.00	12.1	54.0	25.0	155.0	138.00	VERTICAL
17917.900000	33.00	16.8	54.0	21.0	170.0	104.00	VERTICAL

8.2 Conducted Disturbance

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



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.426000	40.50	10.0	57	16.5	N	FLO
0.750000	39.30	10.1	56	16.7	N	FLO
1.060000	37.70	10.1	56	18.3	N	FLO
2.116000	35.90	10.1	56	20.1	N	FLO
5.294000	26.00	10.2	60	34.0	L1	FLO
23.580000	25.20	10.4	60	34.8	N	FLO

MEASUREMENT RESULT: AV Detector

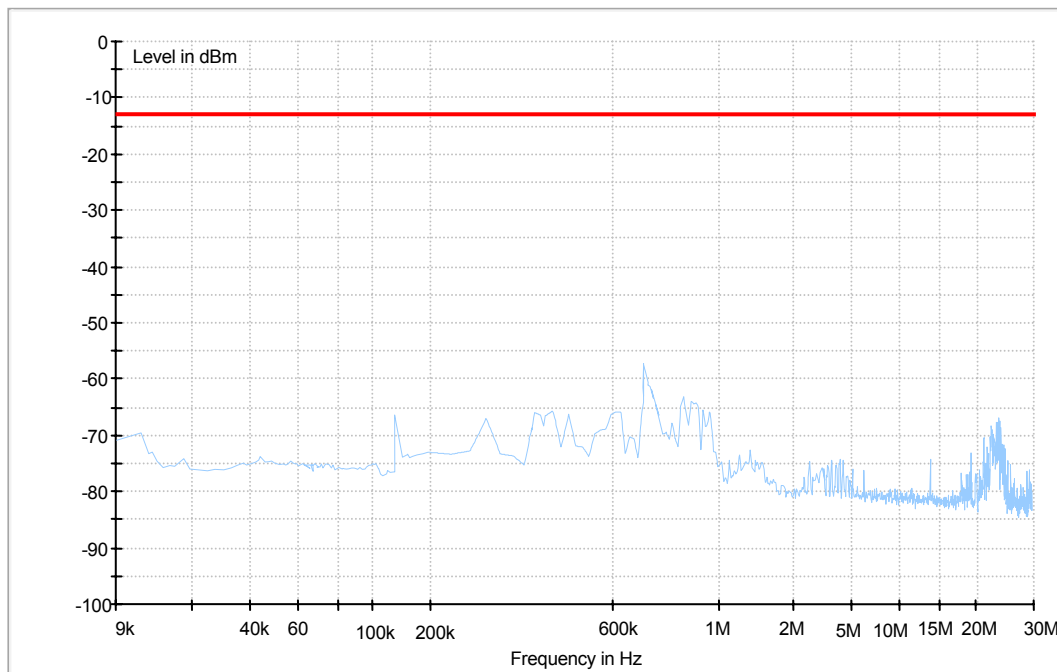
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.312000	30.20	10.0	50	19.8	N	FLO
0.746000	29.50	10.1	46	16.5	N	FLO
1.134000	28.90	10.1	46	17.1	N	FLO
2.436000	26.10	10.1	46	19.9	N	FLO
5.412000	18.50	10.2	50	31.5	L1	FLO
23.206000	16.70	10.4	50	33.3	N	FLO

8.3 Radiated Spurious Emission

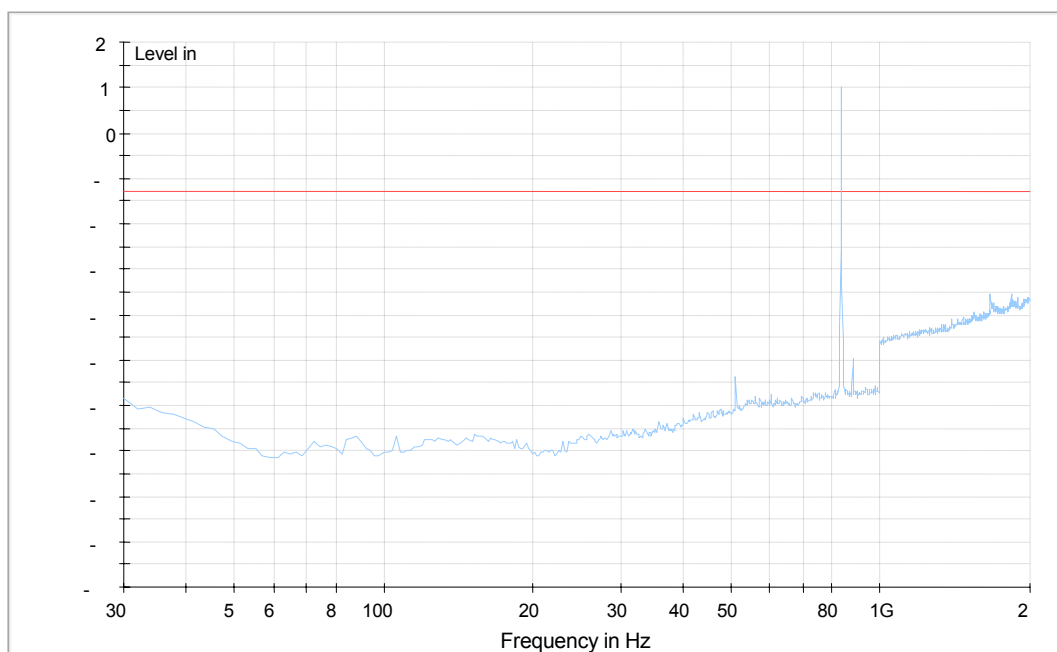
This test results are the maximum level of radiated spurious emissions in vertical and horizontal polarity. The highest peak exceeds the limit line is carrier frequency

8.3.1 For CDMA 800

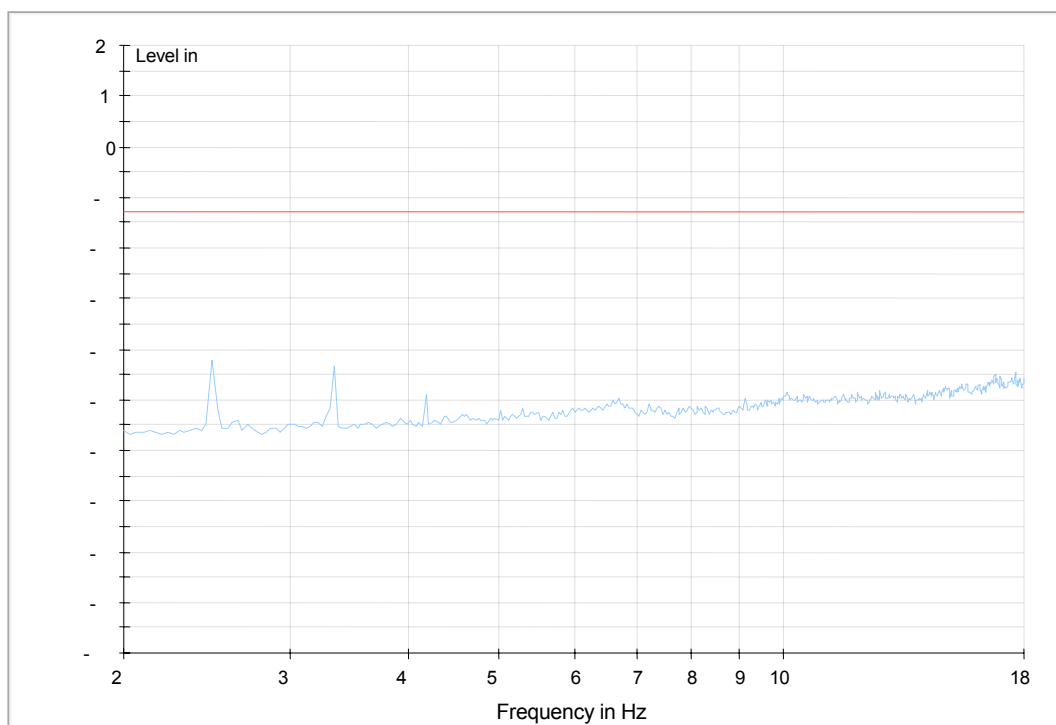
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)

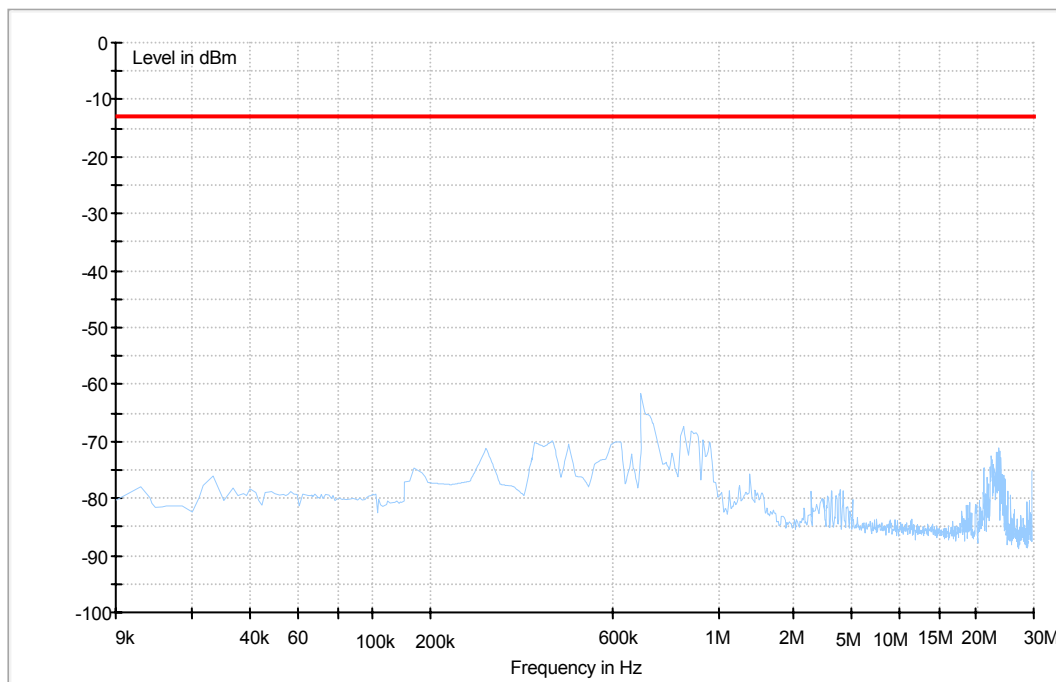


Traffic Mode (2GHz-18GHz)



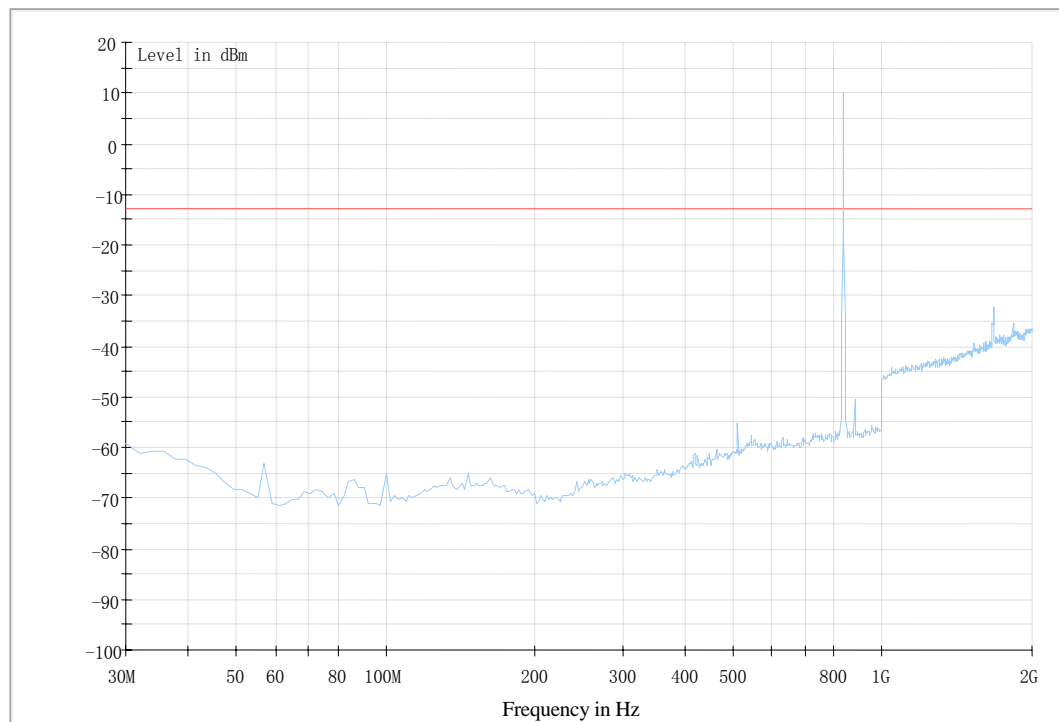
8.3.2 For EVDO 800

Traffic Mode (9kHz-30MHz)

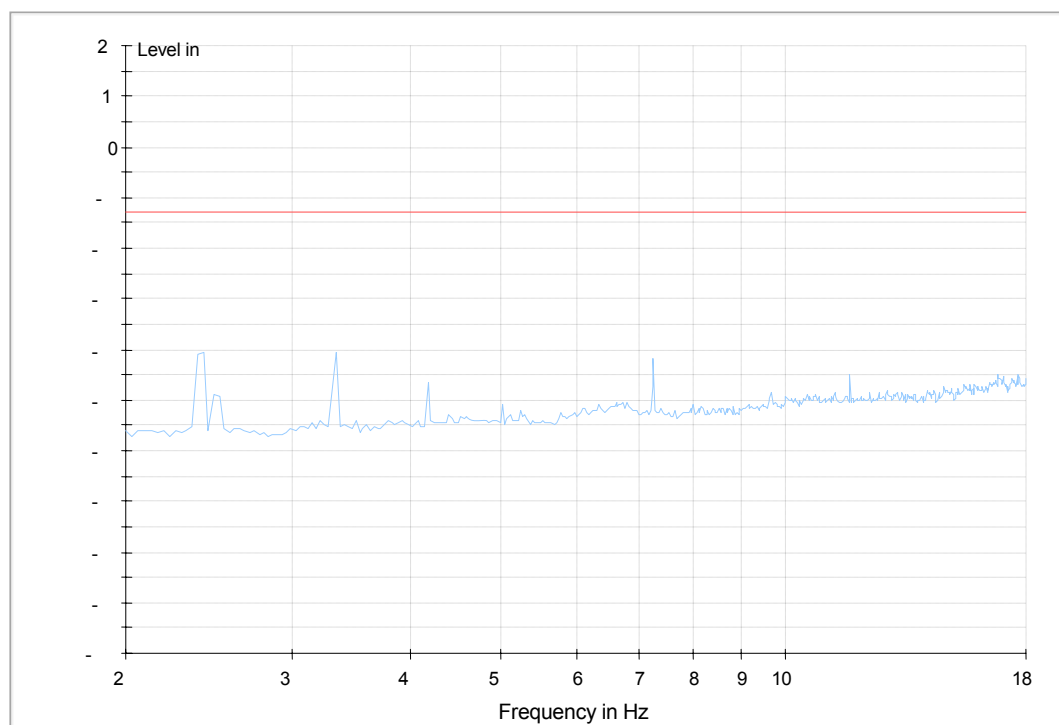




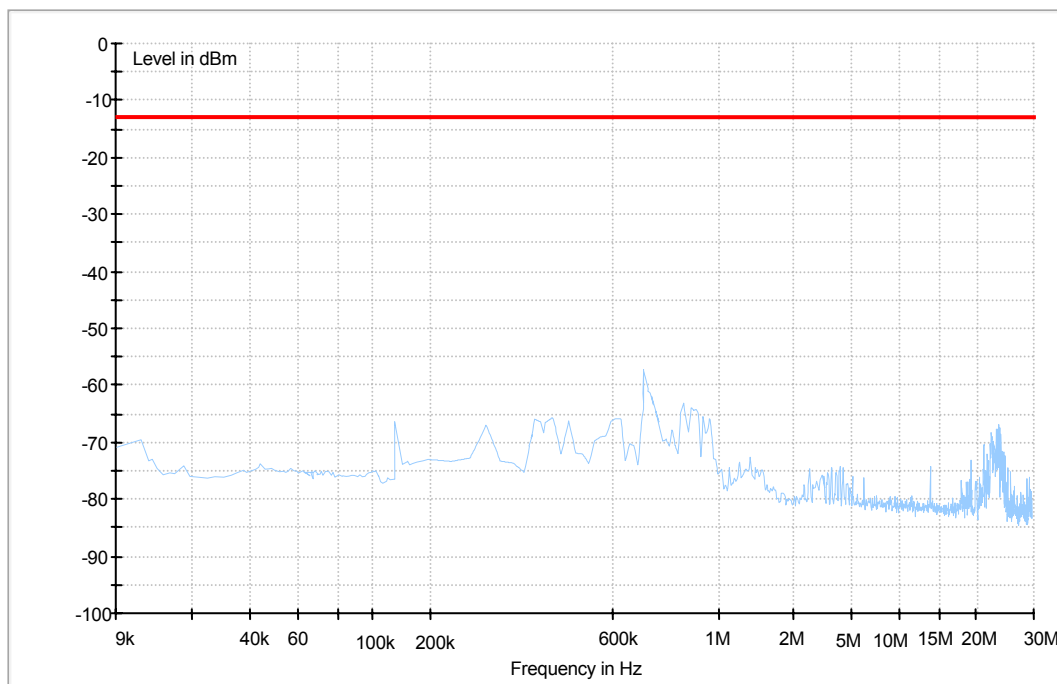
Traffic Mode (30MHz-2GHz)



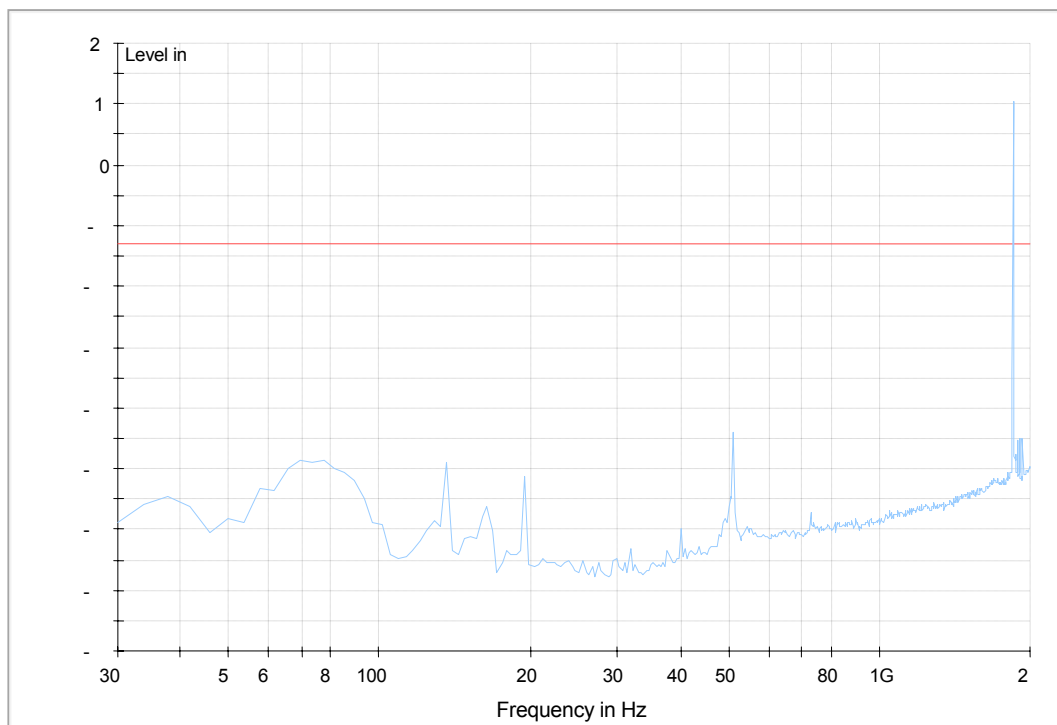
Traffic Mode (2GHz-18GHz)



8.3.3 For CDMA 1900 Traffic Mode (9kHz-30MHz)

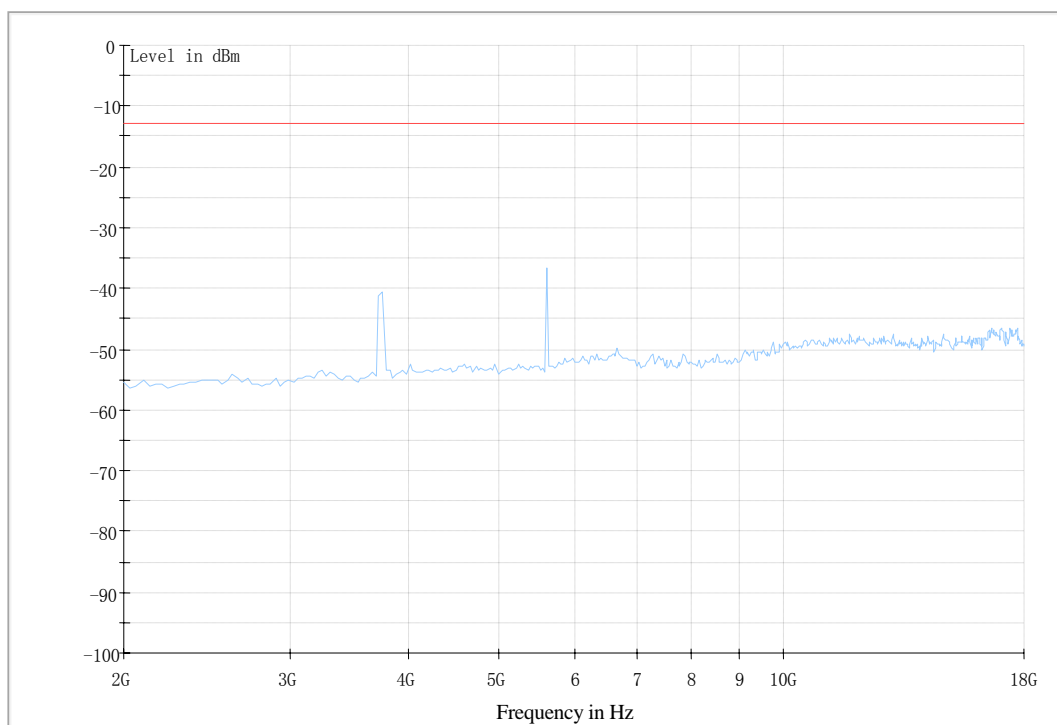


Traffic Mode (30MHz-2GHz)

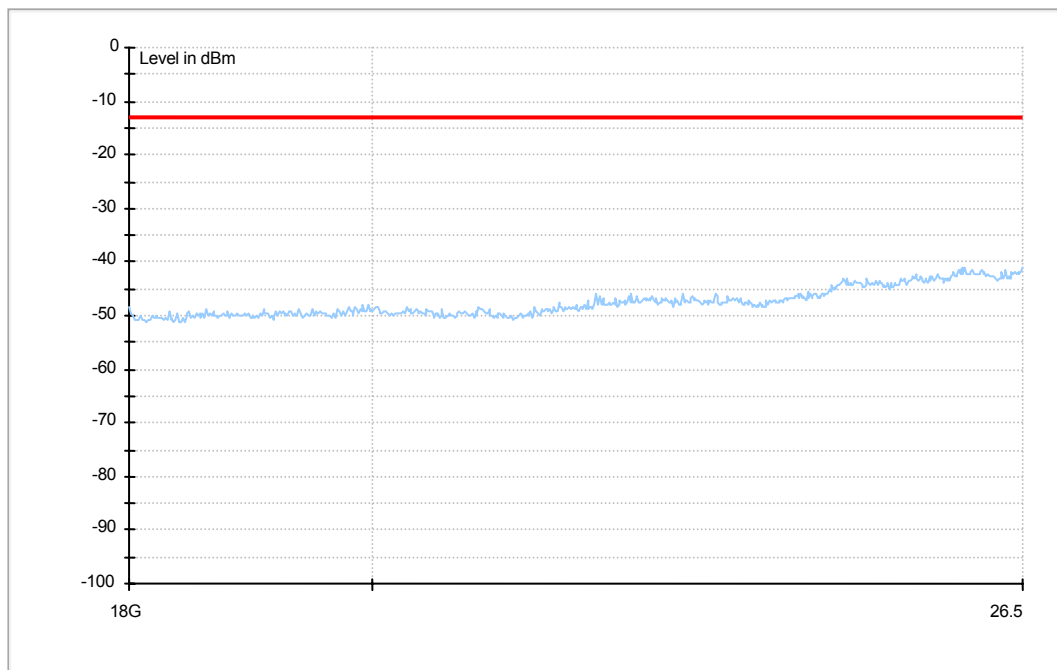




Traffic Mode (2GHz-18GHz)

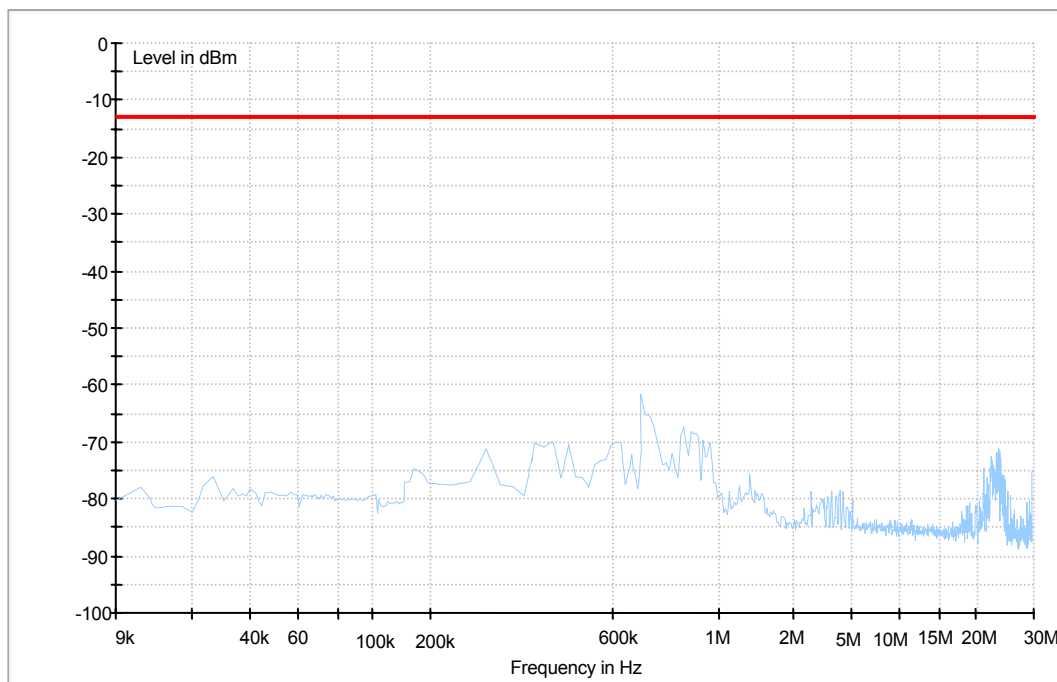


Traffic Mode (18GHz-26.5GHz)

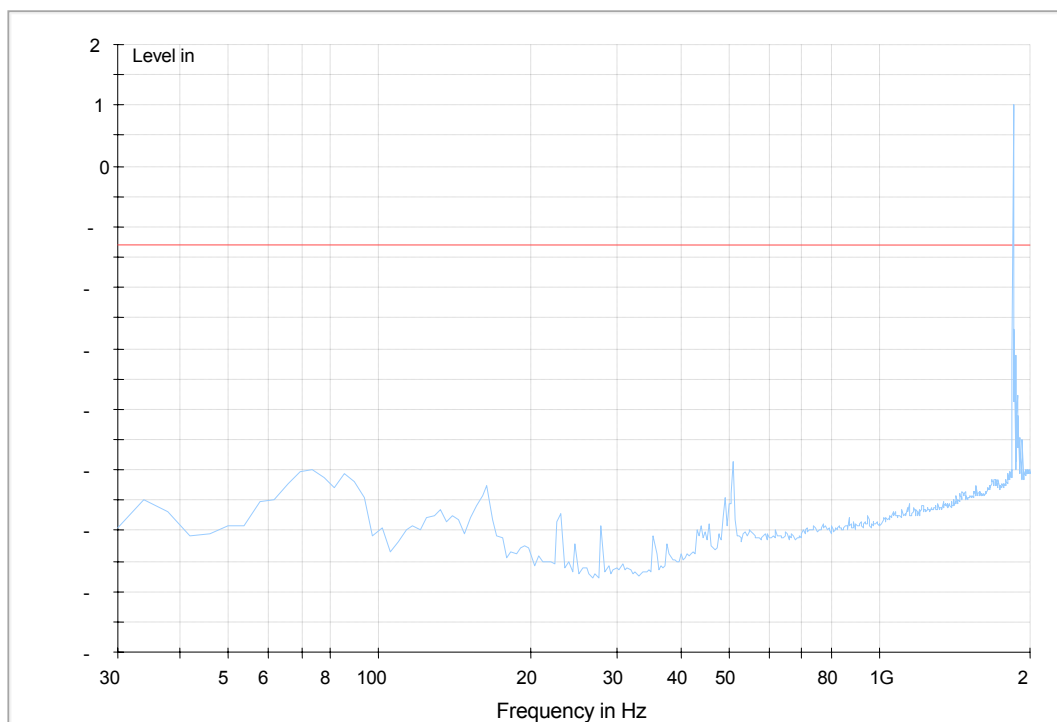


8.3.4 For EVDO 1900

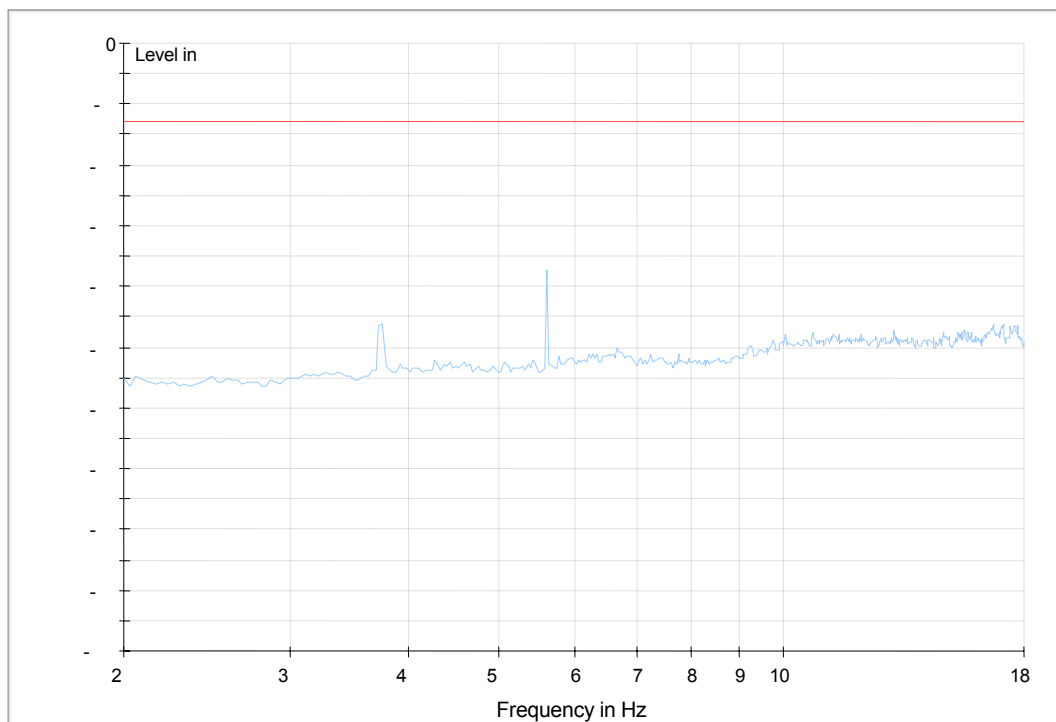
Traffic Mode (9kHz-30MHz)



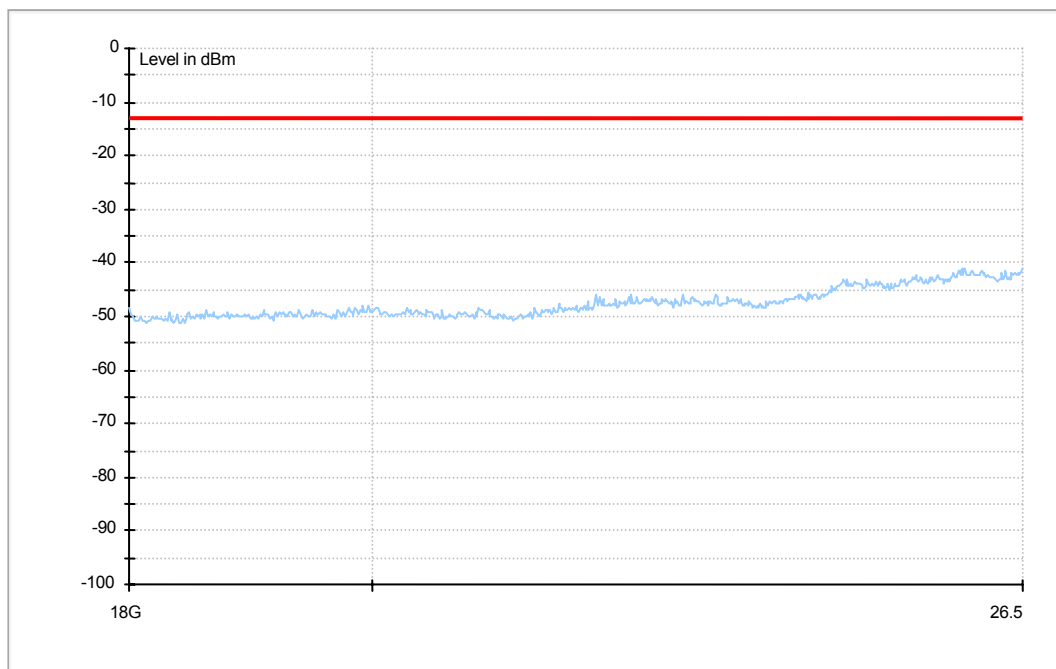
Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)

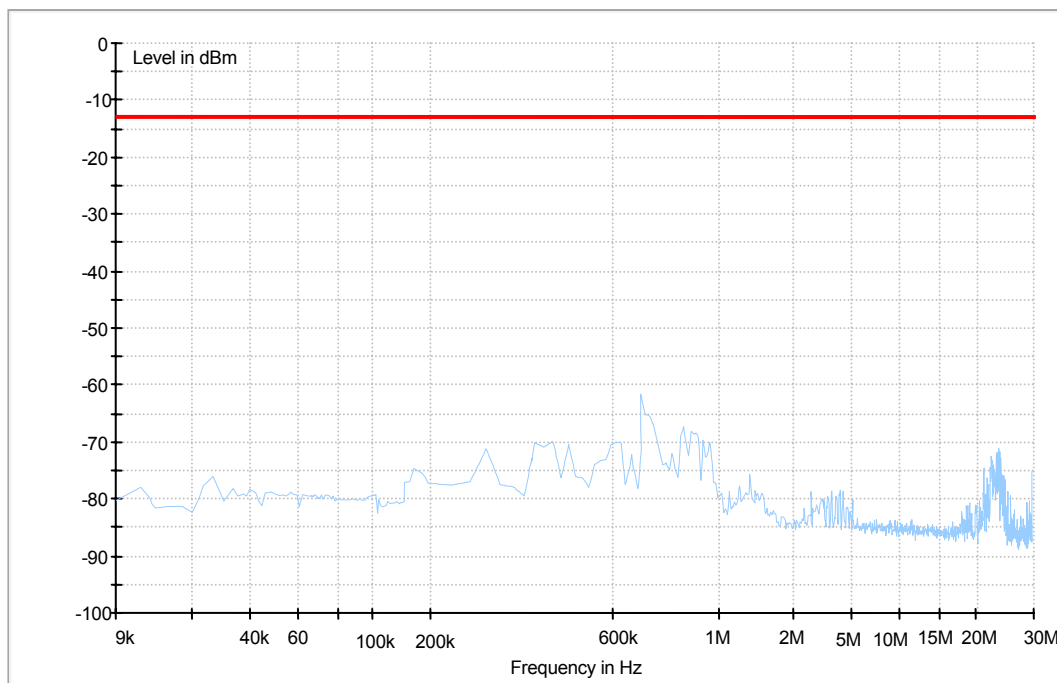


Traffic Mode (18GHz-26.5GHz)

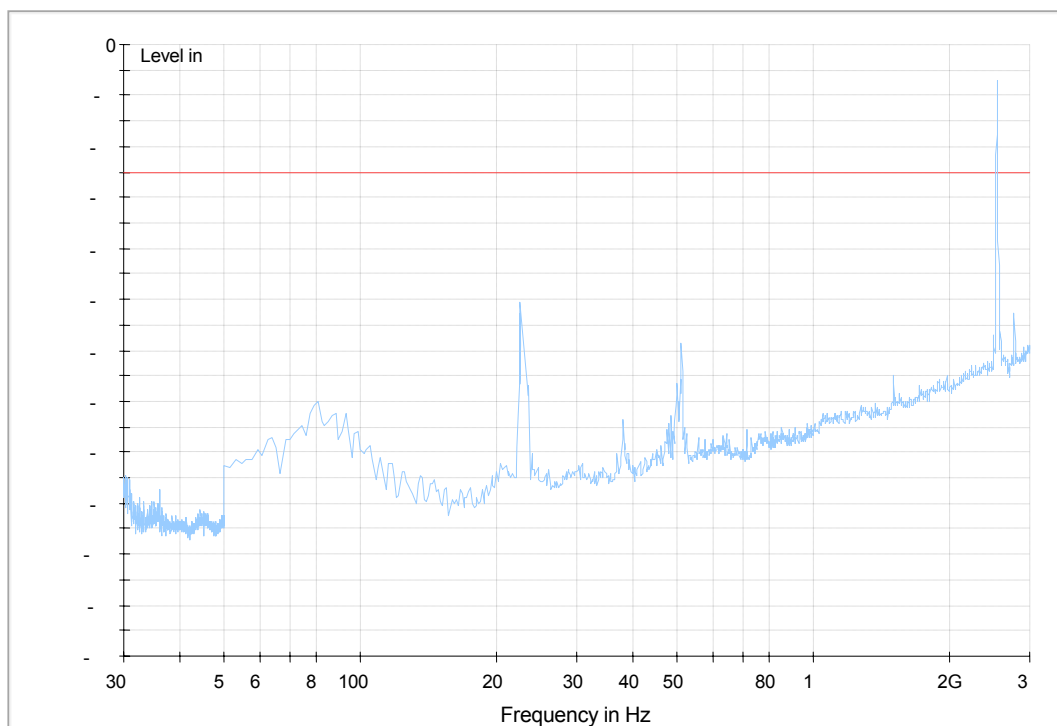


8.3.5 For WIMAX 2.5G

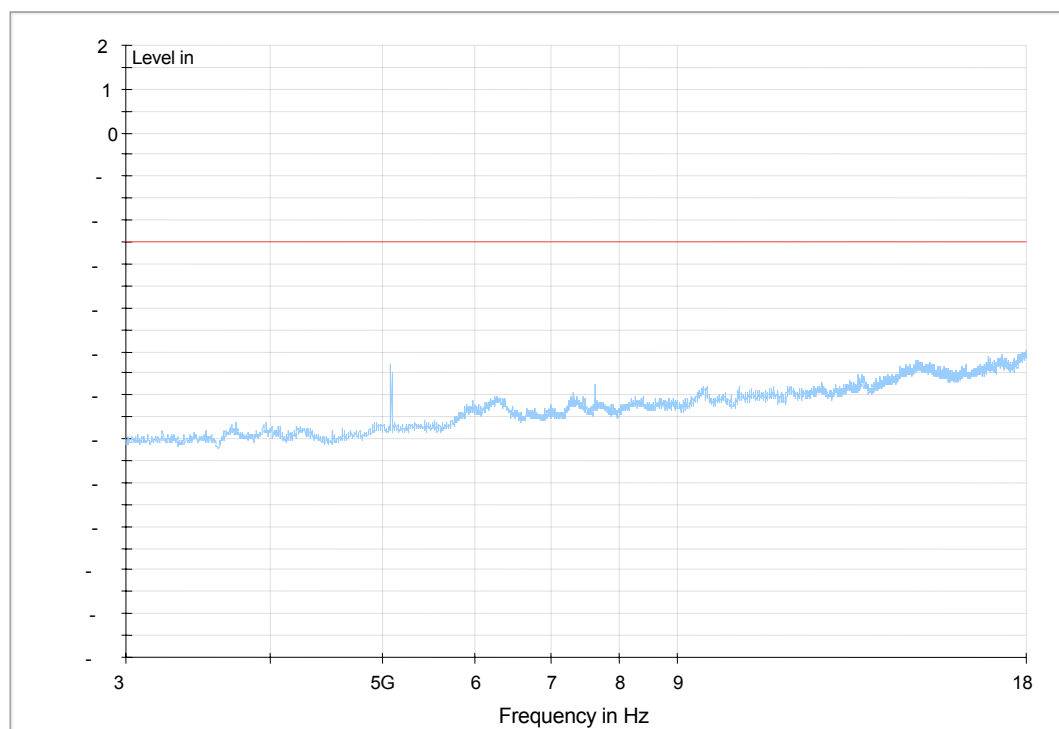
Traffic Mode (9kHz-30MHz)



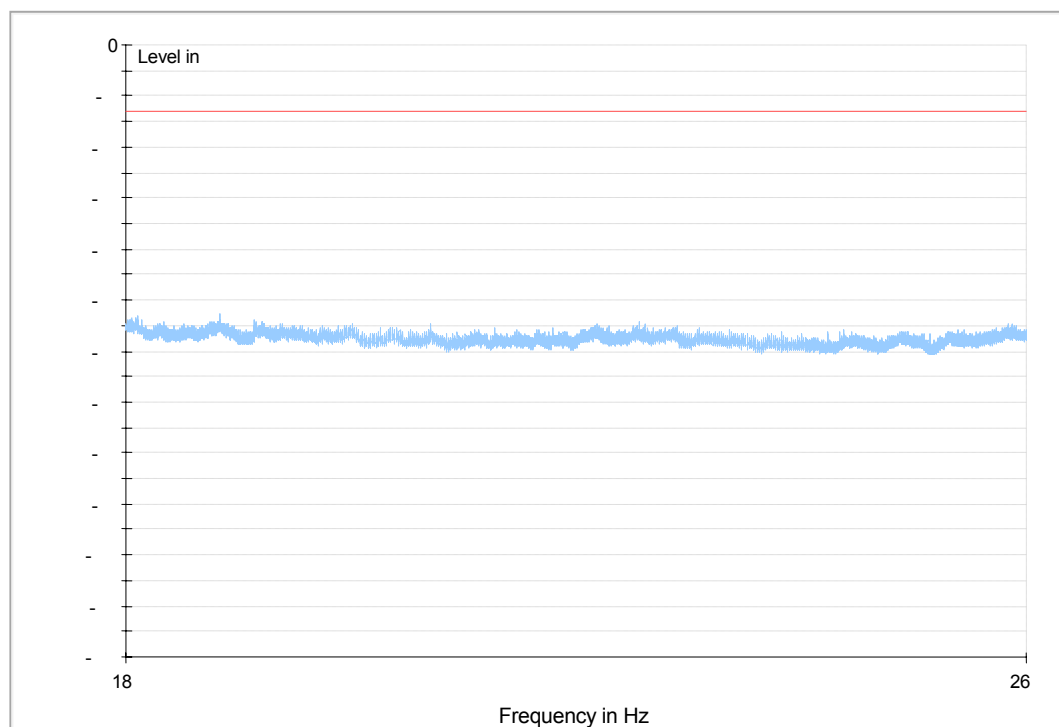
Traffic Mode (30MHz-3GHz)



Traffic Mode (3GHz-18GHz)



Traffic Mode (18GHz-26.5GHz)



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