



EMC Test Report

Product Name: HSDPA USB Stick

Model Number: E153u-6

Report No: SYBHZ(R)E011052010EB-1

FCC ID: QISE153U-6

Reliability Laboratory of Huawei Technologies Co., Ltd.

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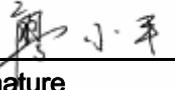
Table 1 Modification Information

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



| | |
|------------------|--|
| REPORT ON | HSPA USB Stick |
| | M/N: E153u-6 |
| REGULATION | FCC CFR47 Part 15: Subpart B; FCC CFR47 Part 22:Subpart H; FCC CFR47 Part 24: Subpart E; |
| START OF TEST | May.6, 2010 |
| END OF TEST | May.14, 2010 |
| Final Judgement: | Pass |

| | | | |
|----------|-------------------|------------|---|
| Approver | <u>2010-05-17</u> | <u>张兴海</u> |  |
| | Date | Name | |

| | | | |
|----------|-------------------|------------|---|
| Operator | <u>2010-05-17</u> | <u>廖小平</u> |  |
| | Date | Name | |

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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 HSPA USB Stick
MANUFACTURERS MODEL NUMBER E153u-6

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 |



1.3 Test Site

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

1.4 Test environment condition

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

2 Summary of Results

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

Table 2 Summary of results

| EUT Classification: Wireless Module | | | | |
|--|--------------------------------|-------------------------------|--------|-------|
| Test Items | Test Configuration & Test Mode | Required Performance Criteria | Result | Site |
| <u>Radiated Emissions</u> Enclosure Port | TC1 (TM9~TM16) | N/A | Pass | Site1 |
| <u>Conducted Emissions</u> | TC1 (TM1~TM16) | N/A | Pass | Site1 |
| <u>Radiated Spurious Emissions</u> Enclosure Port | TC1 (TM1~TM8) | 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

E153u-6 HSDPA/WCDMA/EDGE/GPRS/GSM dual mode 7 bands USB Stick is subscriber equipment in the UMTS/GSM system. E153u-6 implement such functions as RF signal receiving/transmitting, HSDPA/WCDMA and EDGE/GPRS/GSM protocol processing, data service etc. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface and Micro SD card interface. E153u-6 has an internal antenna as default. But only Band II, Band V, GSM850 and DCS1900 test data included in this report.

3.1.1 Main Equipment Technical Data

| | |
|--------------------------|--|
| Description: | HSDPA USB Stick |
| Models: | E153u-6 |
| Input Rated Voltage: | 5V |
| Rated Consumption Power: | Max 2.5 W |
| Maximum Emission Power: | Max 33dBm |
| Dimensions: | 84.2 (length) × 27.2 (width) × 12 (height) (mm3) |
| Weight: | 26g |

Table 3 Sub-Assembly Identity

| Mode | | Work Frequency | |
|-------|---------|---------------------------|-------------------------|
| | | Transmitt Frequency (MHz) | Receive Frequency (MHz) |
| WCDMA | BAND V | 824-849 | 869-894 |
| | BAND II | 1850-1910 | 1930-1990 |
| 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 |
| E153u-6 | 1 | M12AA11041400088 | 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 |
|------|-----------|---------------|
| USB | USB | N/A |

4.2 Associated Equipment Used during Test

Table 6 Associated Equipment Used during Test

| Name | Model | Manufacturer | S/N | Cal Date |
|----------------------------|--------|--------------|------------|------------|
| Radio Communication Tester | CMU200 | R&S | 112347 | 2010-03-12 |
| Notebook | nx6130 | HP | 3105094252 | NA |
| Notebook | T43 | IBM | 3106093834 | N/A |

4.3 Test Configurations and Test Mode

4.3.1 Test Configuration.

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

Table 7 Configuration table

| Test configuration | Test mode |
|--------------------|-----------|
| TC1 | TM1~TM16 |

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 EGPRS 1900;
TM3: operate in traffic mode WCDMA BAND II ;
TM4: operate in traffic mode HSDPA BAND II ;
TM5: operate in traffic mode GPRS 850;
TM6: operate in traffic mode EGPRS 850;
TM7: operate in traffic mode WCDMA BAND V ;
TM8: operate in traffic mode HSDPA BAND V ;
TM9: operate in idle mode GPRS 1900;
TM10: operate in idle mode EGPRS 1900;
TM11: operate in idle mode GPRS 850;
TM12: operate in idle mode EGPRS 850;
TM13: operate in idle mode WCDMA BAND II ;
TM14: operate in idle mode HSDPA BAND II ;
TM15: operate in idle mode WCDMA BAND V ;
TM16: operate in idle mode HSDPA BAND V ;

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 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 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, 4132 to WCDMA 850, 9400 to WCDMA 1900.

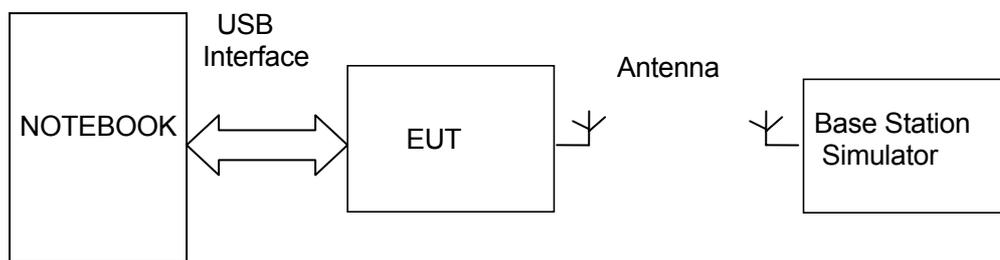


Figure 1.: TC1 (TM1-TM8)

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 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.

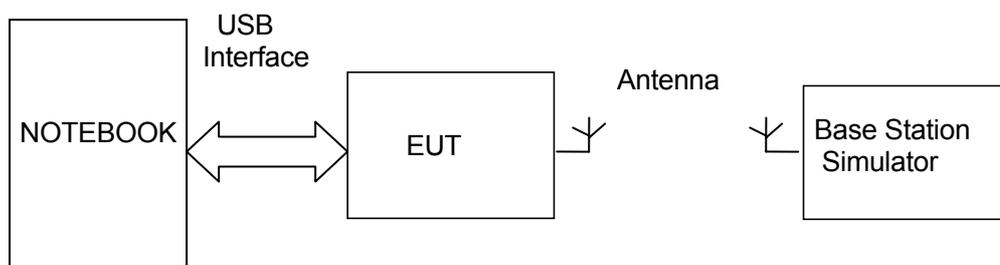


Figure 2. TC1 (TM9-TM16)

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:

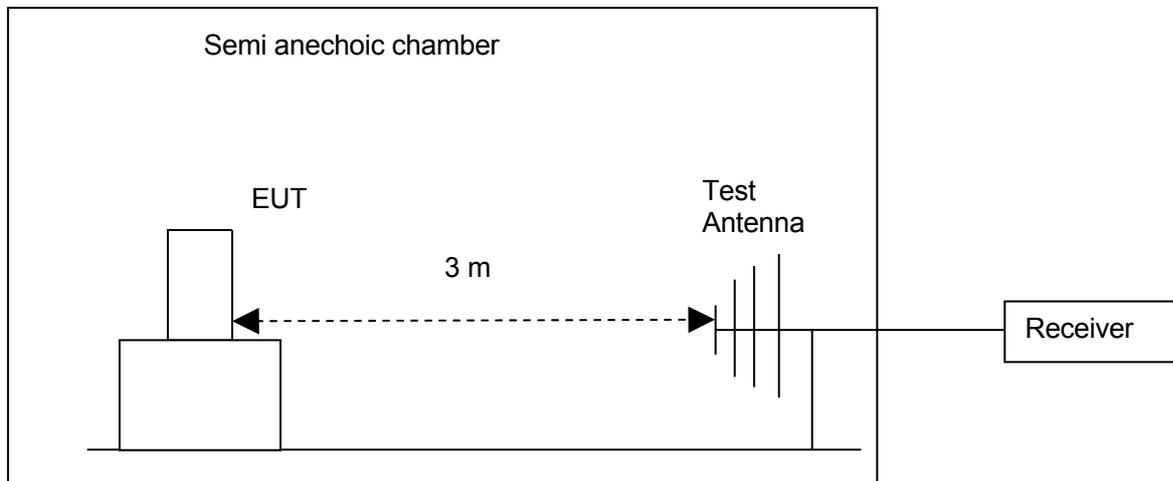


Figure 3. Test set-up

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.

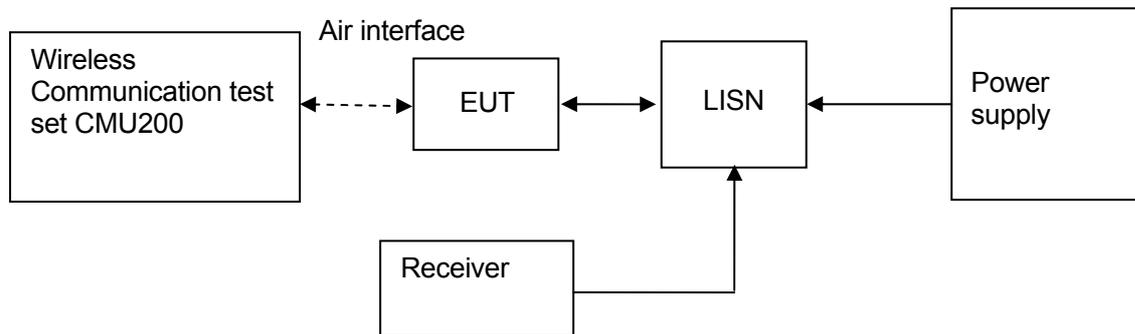


Figure 4. Test Set-up

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 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

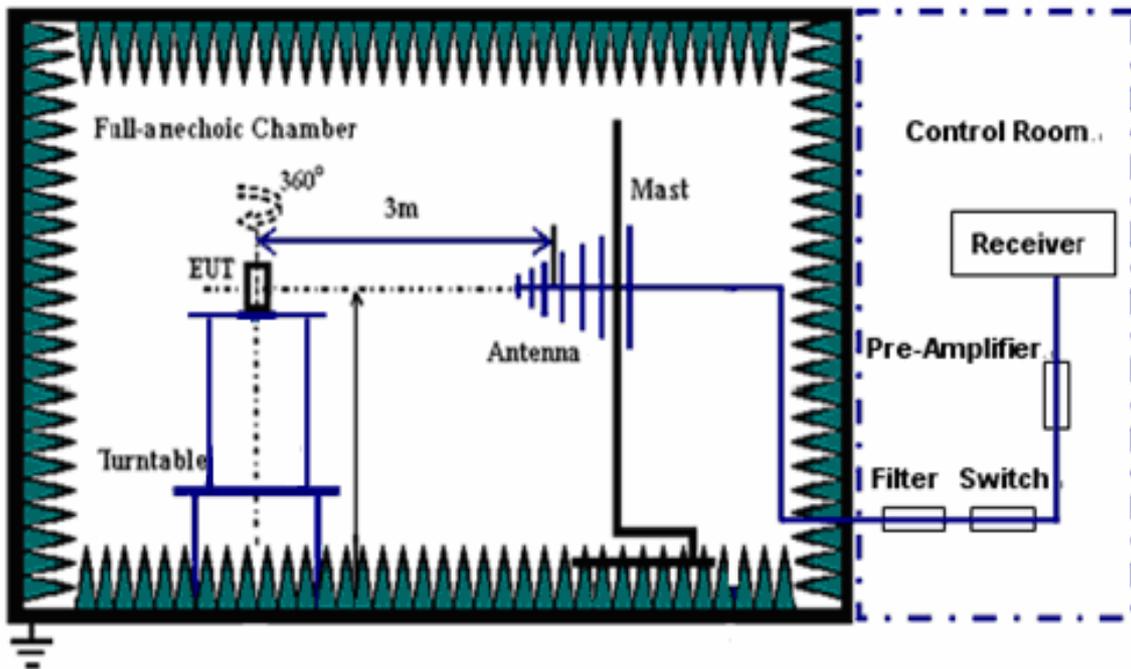
5.3.1 Test Procedure

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:

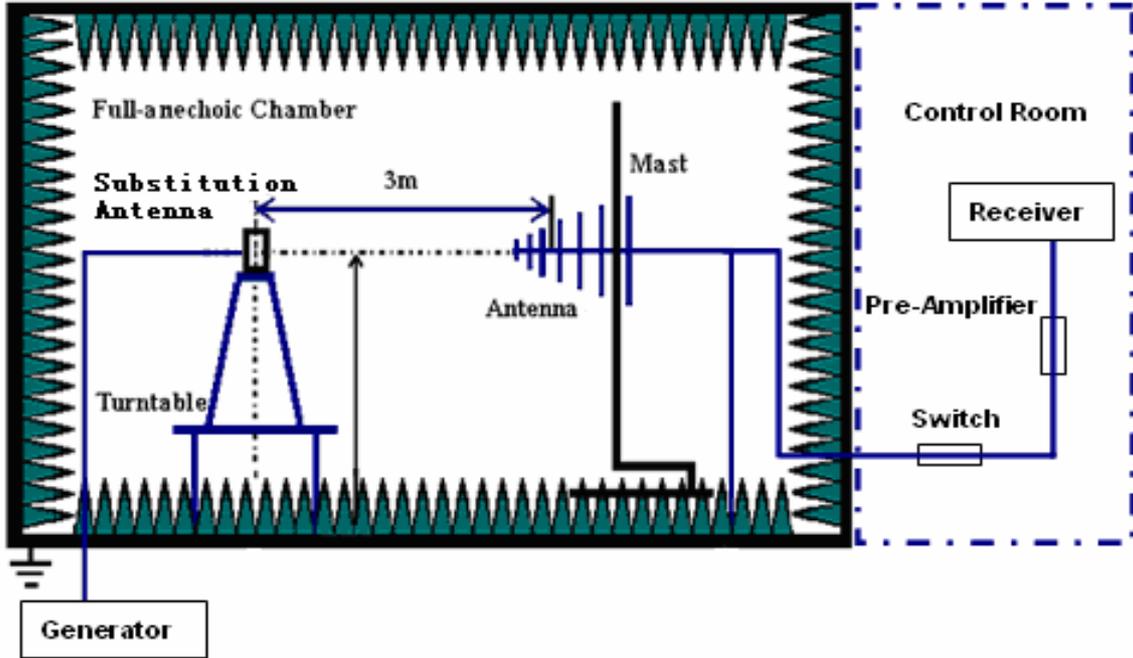
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect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

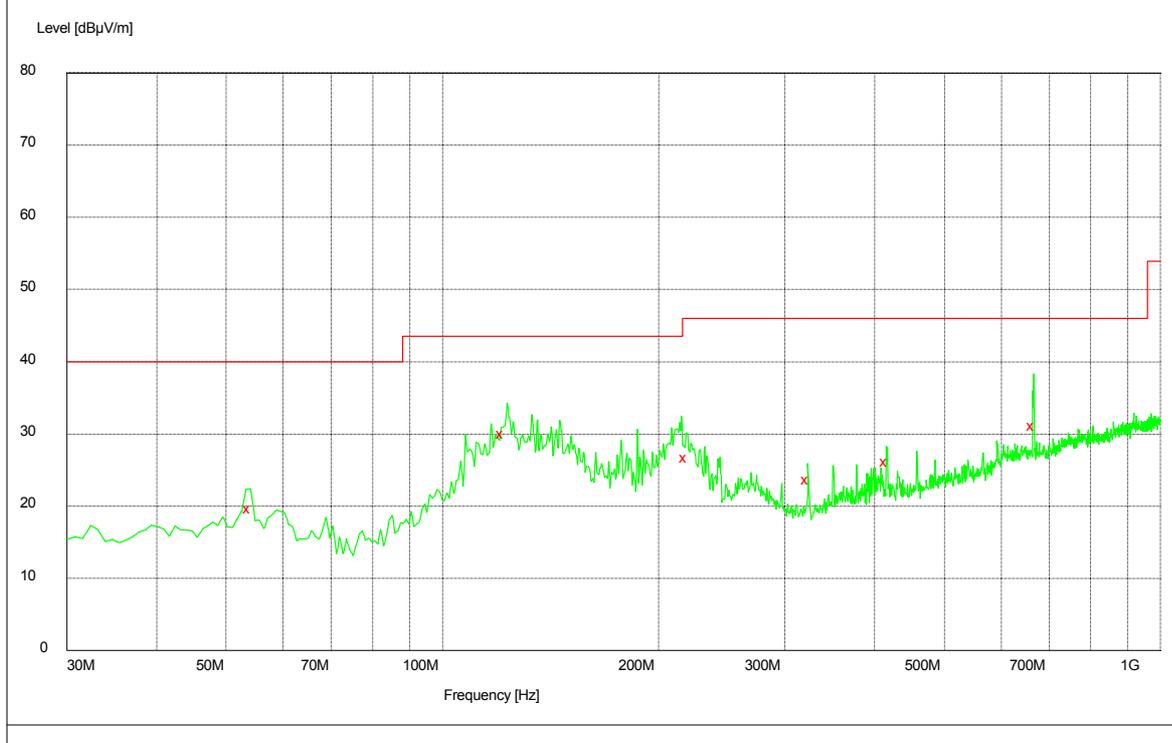
| Items | | Extended Uncertainty |
|-------|---------------------------------|--------------------------|
| RE | Field strength (dB μ V/m) | U=4.1dB; k=2(30MHz-1GHz) |
| RE | Field strength (dB μ V/m) | U=4.1dB; k=2(1GHz-18GHz) |
| RSE | ERP (dBm) | U=2.2dB; k=2 |
| CE | Disturbance Voltage(dB μ V) |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

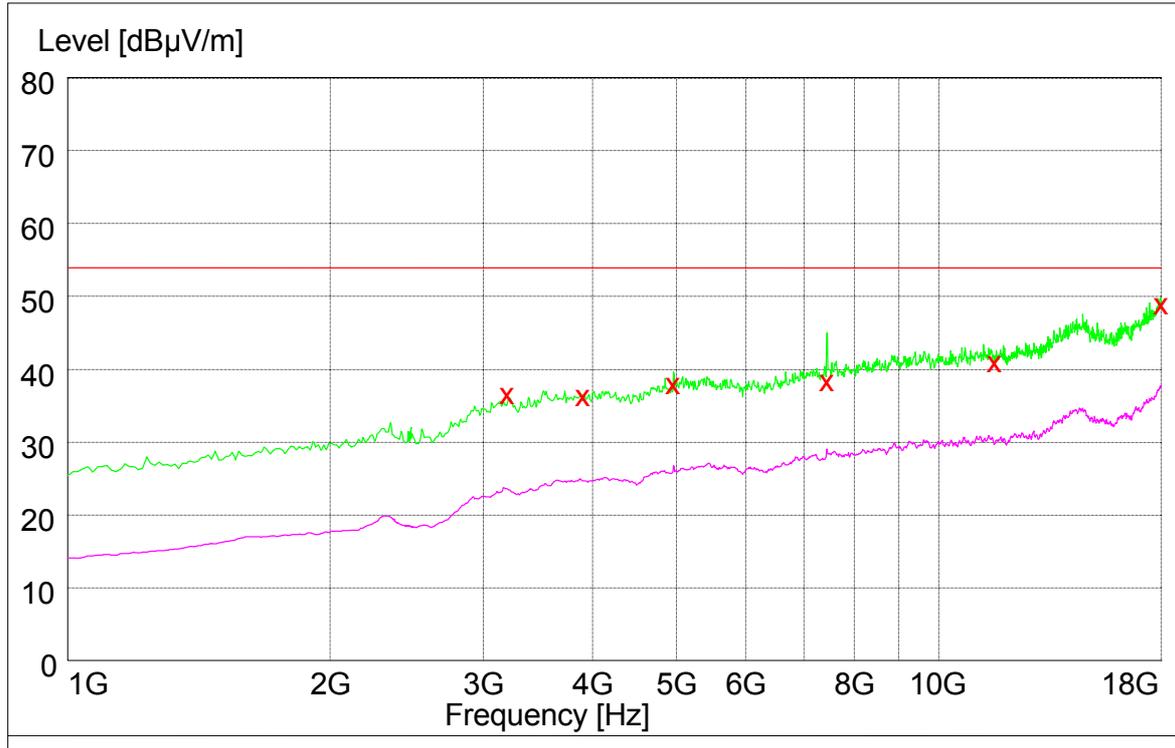
30MHz-1GHz



MEASUREMENT RESULT: QP Detector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarisation |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 53.940000 | 19.20 | 12.7 | 40.0 | 20.8 | 252.0 | 0.00 | VERTICAL |
| 123.120000 | 30.50 | 10.1 | 43.5 | 13.0 | 124.0 | 157.00 | HORIZONTAL |
| 216.300000 | 25.50 | 12.7 | 46.0 | 20.5 | 131.0 | 62.00 | HORIZONTAL |
| 323.400000 | 23.20 | 16.1 | 46.0 | 22.8 | 141.0 | 79.00 | VERTICAL |
| 416.280000 | 25.70 | 18.6 | 46.0 | 20.3 | 143.0 | 13.00 | HORIZONTAL |
| 666.060000 | 30.70 | 23.0 | 46.0 | 15.3 | 208.0 | 0.00 | VERTICAL |

1GHz-18GHz



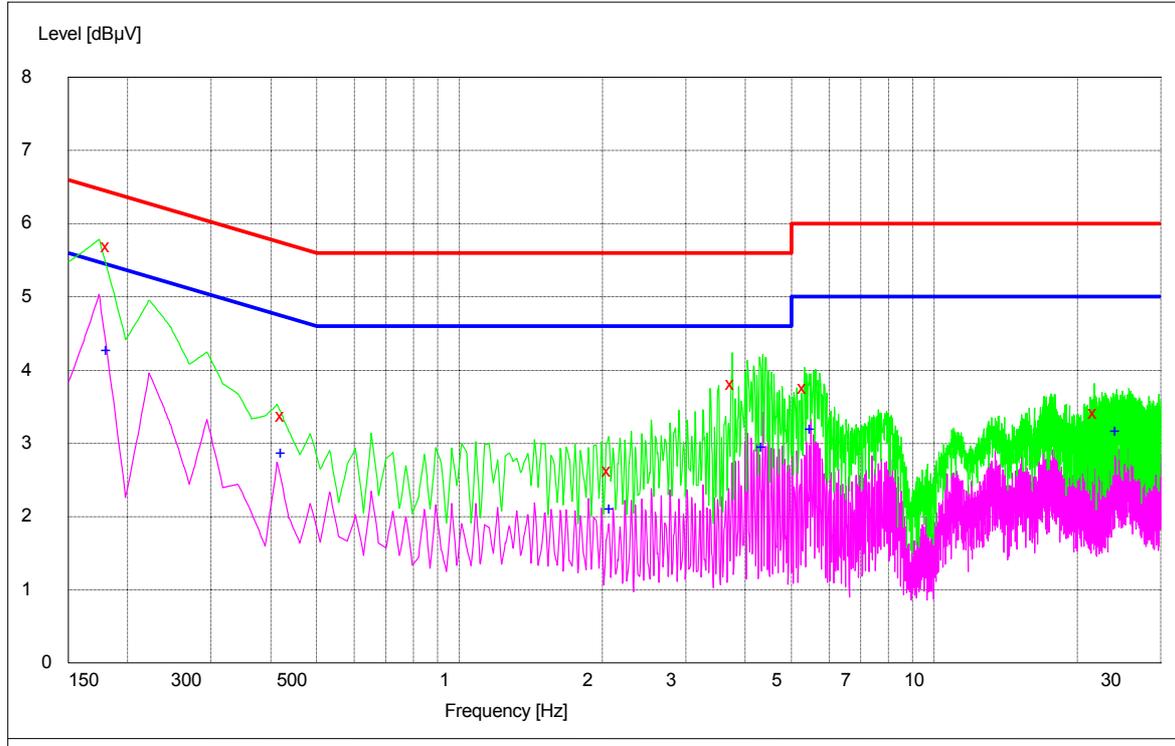
MEASUREMENT RESULT: AV Detector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarisation |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 3193.000000 | 37.40 | -8.3 | 54 | 16.6 | 100.0 | 72.00 | HORIZONTAL |
| 3901.500000 | 37.20 | -6.1 | 54 | 16.8 | 181.0 | 306.00 | VERTICAL |
| 4954.000000 | 38.80 | -3.8 | 54 | 15.2 | 100.0 | 350.00 | HORIZONTAL |
| 7430.000000 | 39.20 | 1.2 | 54 | 14.8 | 180.0 | 224.00 | HORIZONTAL |
| 11575.500000 | 41.80 | 6.8 | 54 | 12.2 | 100.0 | 331.00 | HORIZONTAL |
| 17971.000000 | 49.70 | 17.1 | 54 | 4.3 | 180.0 | 288.00 | 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 |
|---------------|------------|-----------|------------|-----------|------|-----|
| 0.181500 | 56.70 | 10.1 | 64 | 7.3 | L1 | FLO |
| 0.424500 | 33.60 | 10.0 | 57 | 23.4 | N | FLO |
| 2.062500 | 26.10 | 10.1 | 56 | 29.9 | L1 | FLO |
| 3.754500 | 38.00 | 10.2 | 56 | 18 | L1 | FLO |
| 5.329500 | 37.50 | 10.2 | 60 | 22.5 | L1 | FLO |
| 21.804000 | 34.00 | 10.4 | 60 | 26 | N | FLO |

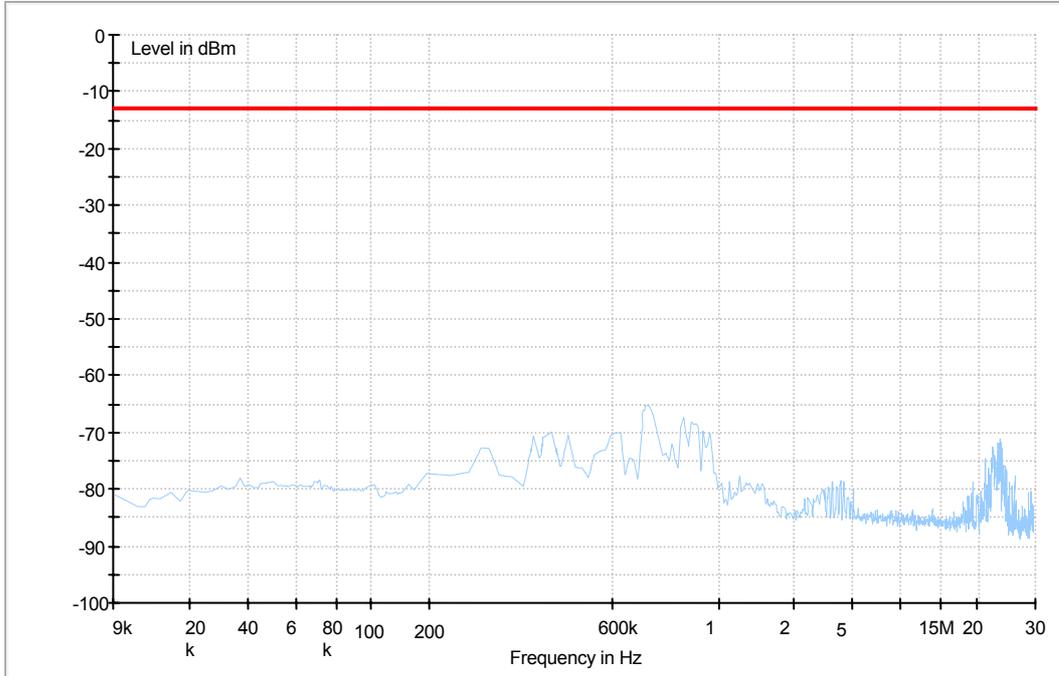
MEASUREMENT RESULT: AV Detector

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Line | PE |
|---------------|------------|-----------|------------|-----------|------|-----|
| 0.181500 | 42.50 | 10.1 | 54 | 11.5 | L1 | FLO |
| 0.424500 | 28.50 | 10.0 | 47 | 18.5 | N | FLO |
| 2.096300 | 21.20 | 10.2 | 46 | 24.8 | L1 | FLO |
| 4.357500 | 29.30 | 10.2 | 46 | 16.7 | L1 | FLO |
| 5.509500 | 31.80 | 10.2 | 50 | 18.2 | L1 | FLO |
| 24.225000 | 31.50 | 10.4 | 50 | 18.5 | L1 | FLO |

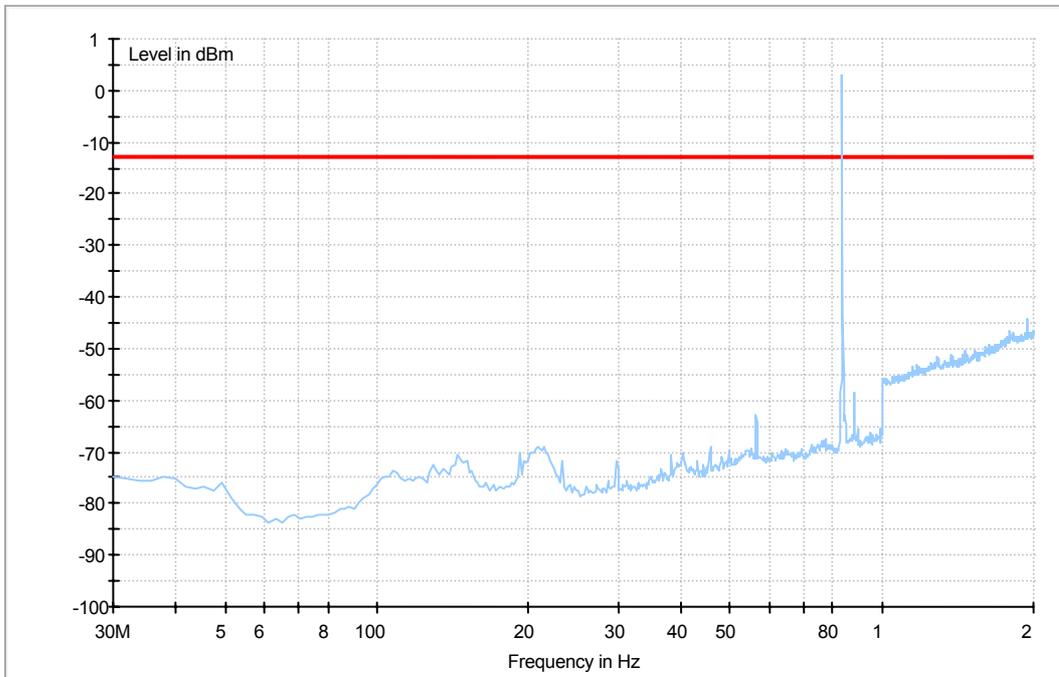
8.3 Radiated Spurious Emission

8.3.1 For GPRS 850

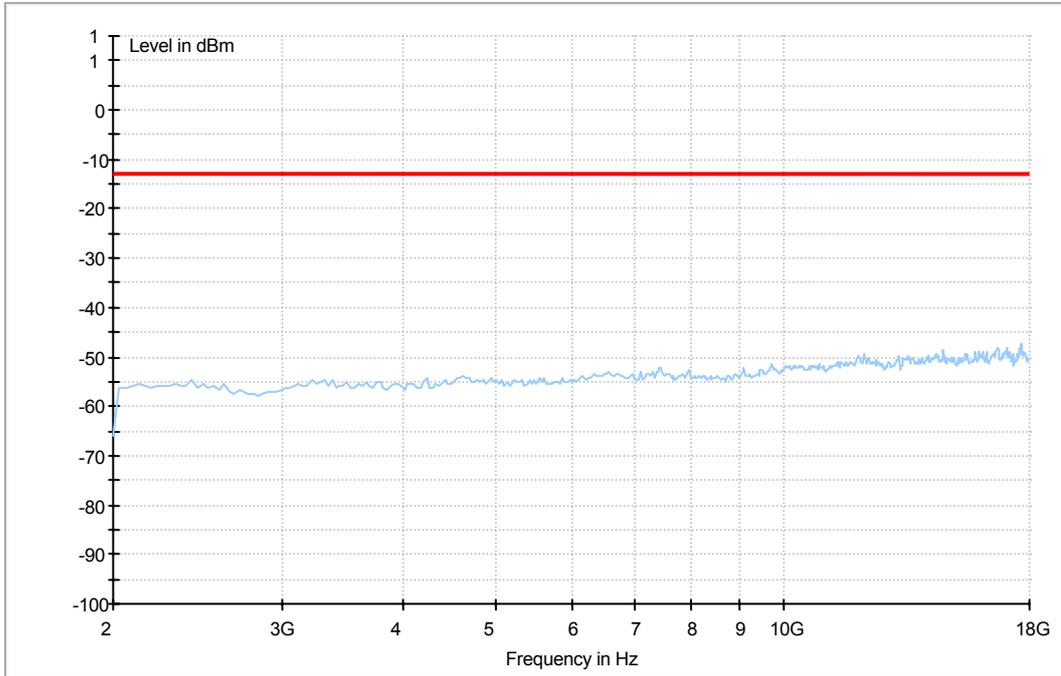
Traffic Mode (9kHz-30MHz)



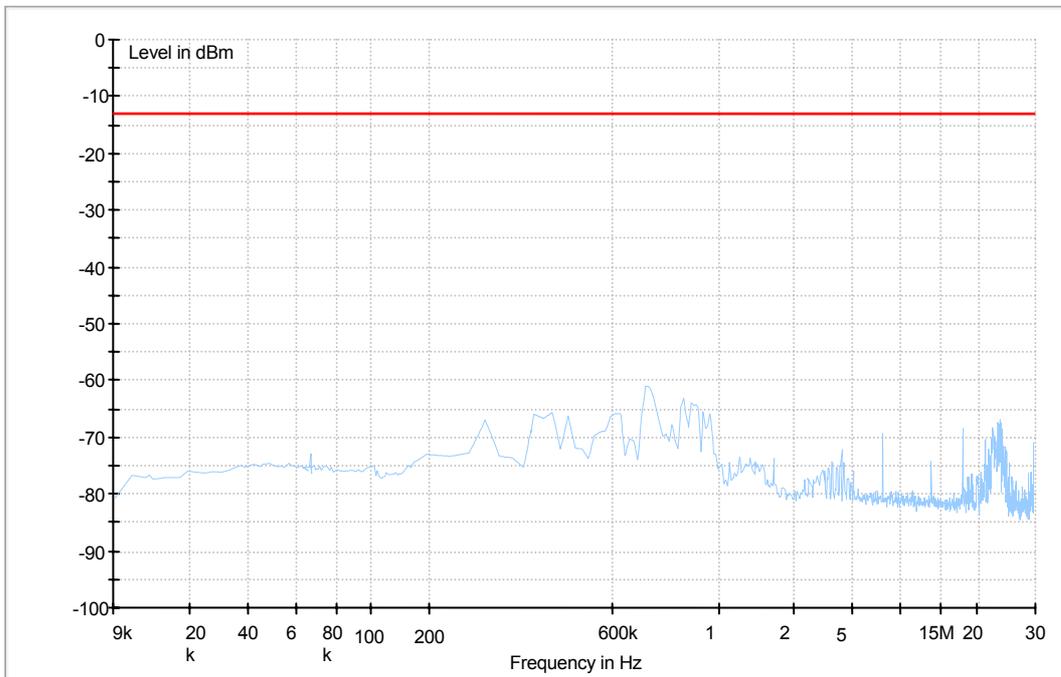
Traffic Mode (30MHz-2GHz)



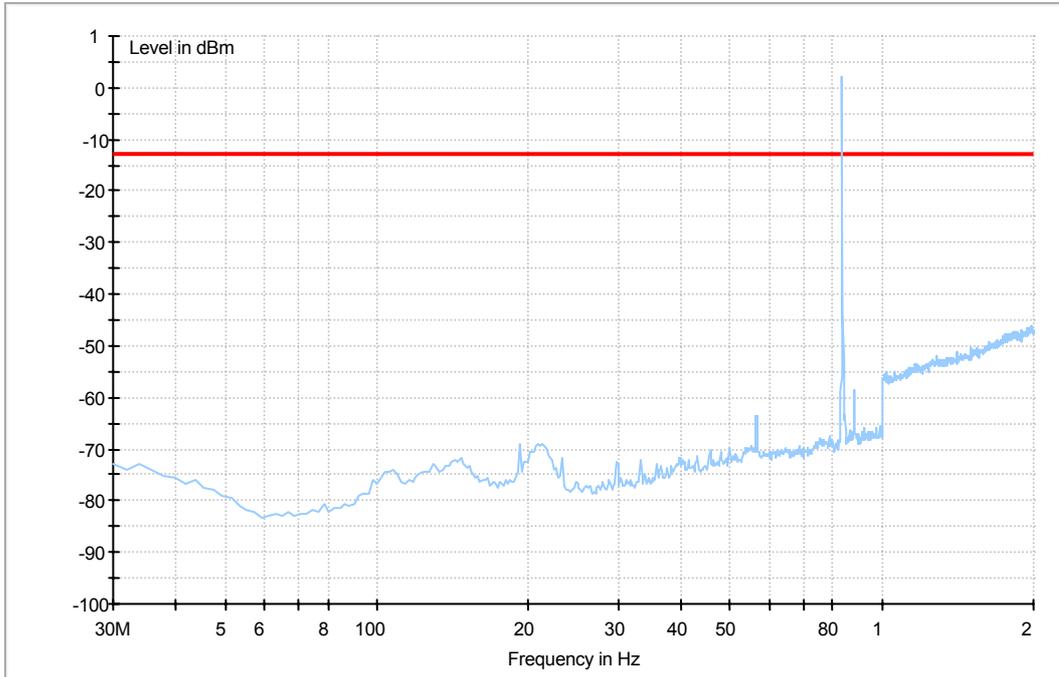
Traffic Mode (2GHz-18GHz)



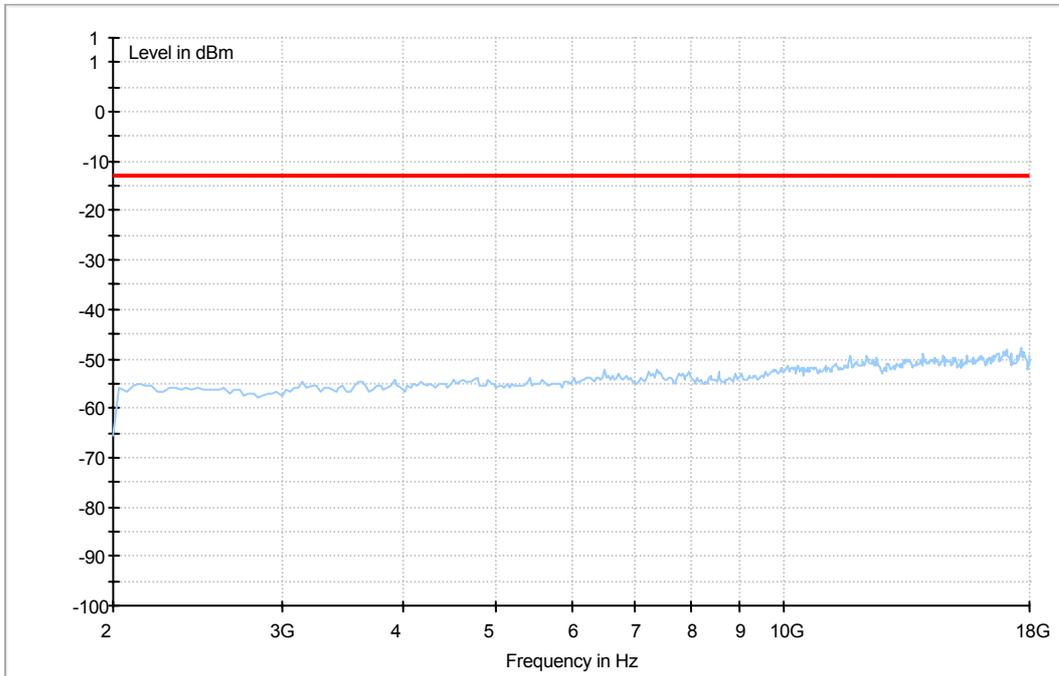
8.3.2 For EGPRS 850 Traffic Mode (9kHz-30MHz)



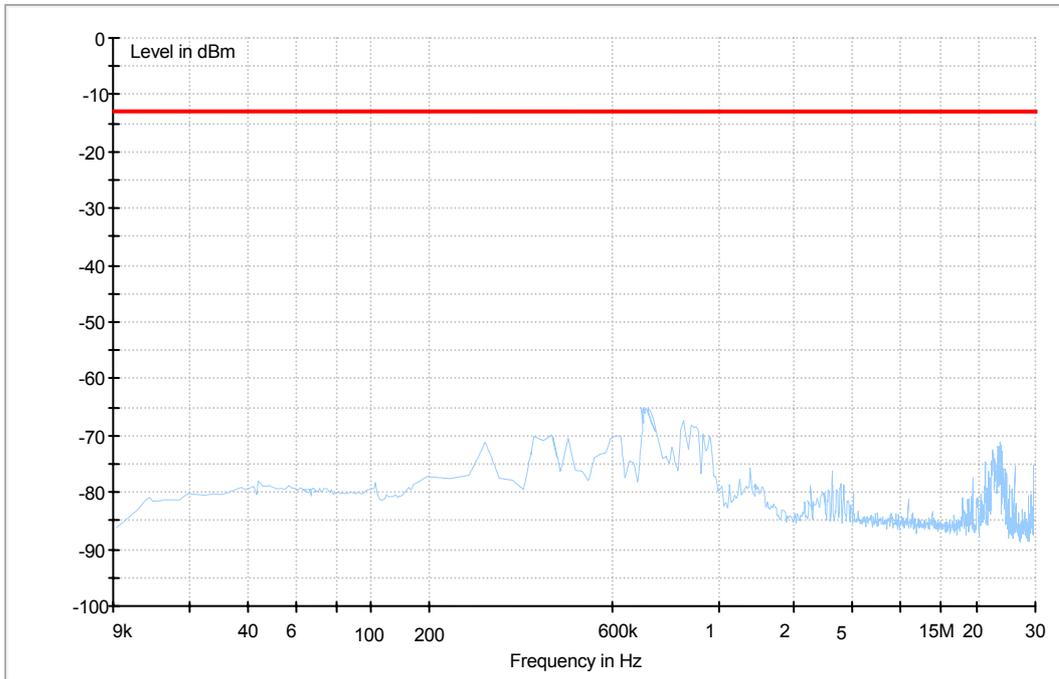
Traffic Mode (30MHz-2GHz)



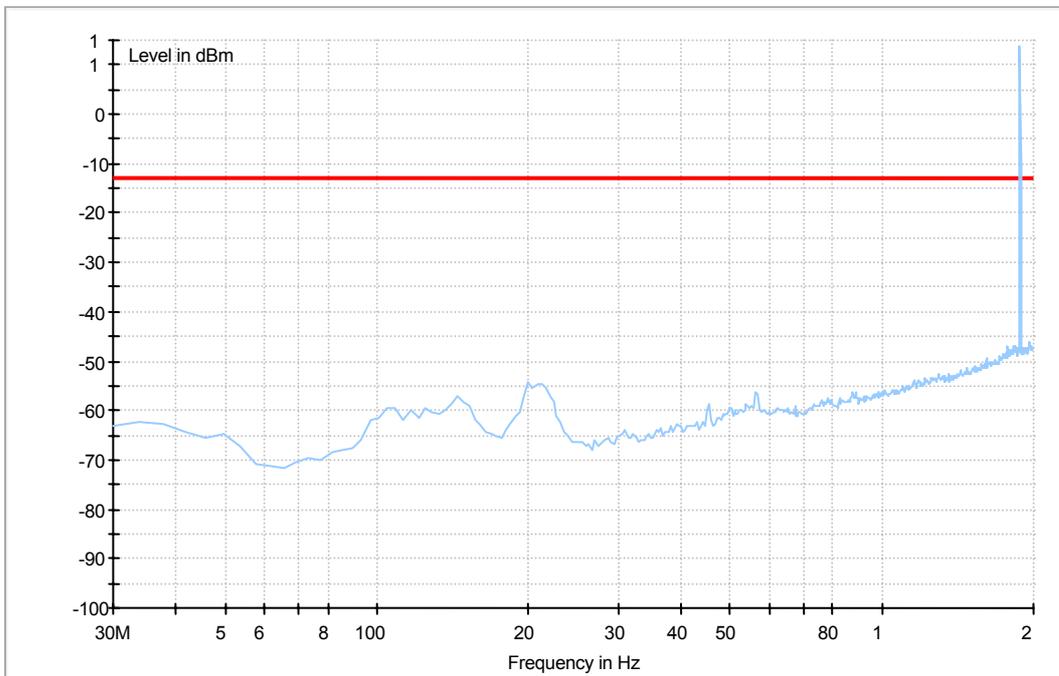
Traffic Mode (2GHz-18GHz)



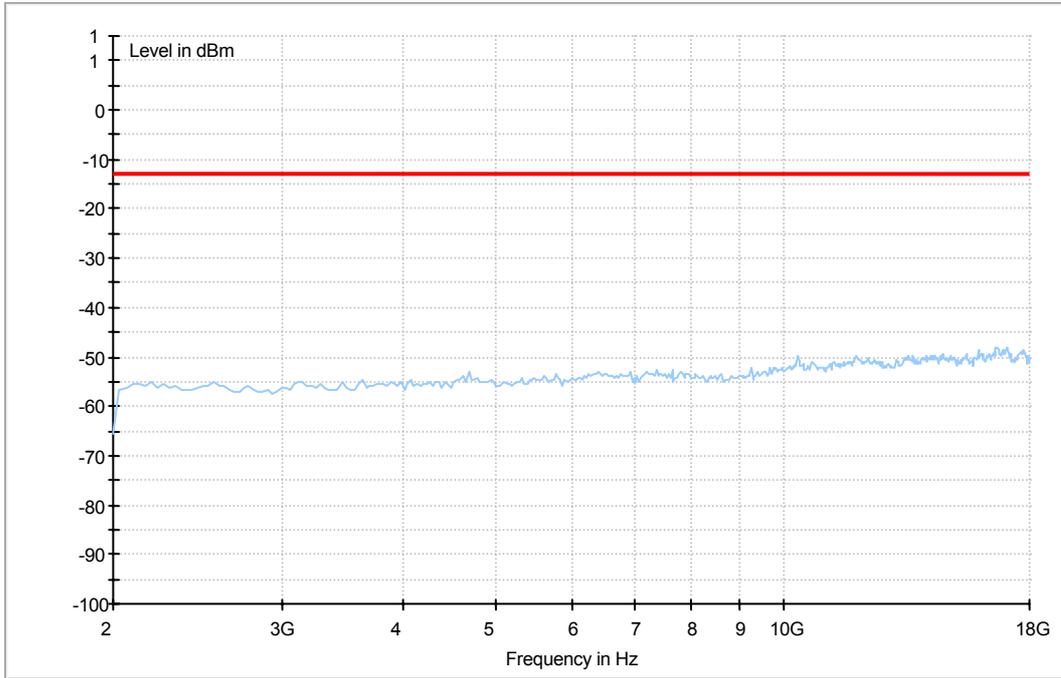
8.3.3 For GPRS 1900 Traffic Mode (9kHz-30MHz)



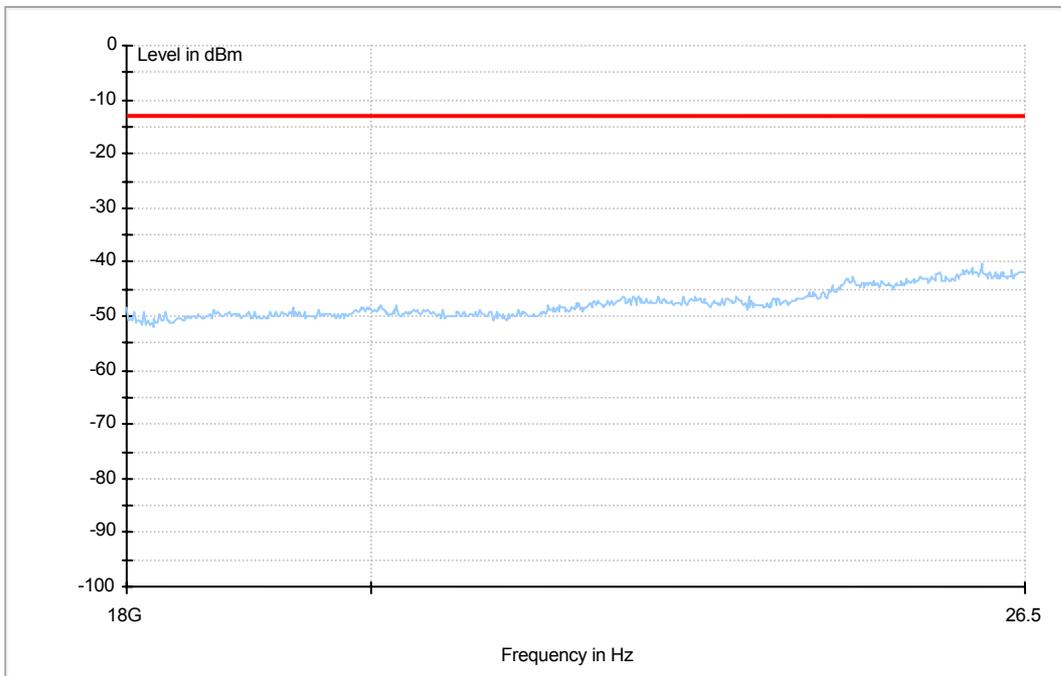
Traffic Mode (30MHz-2GHz)



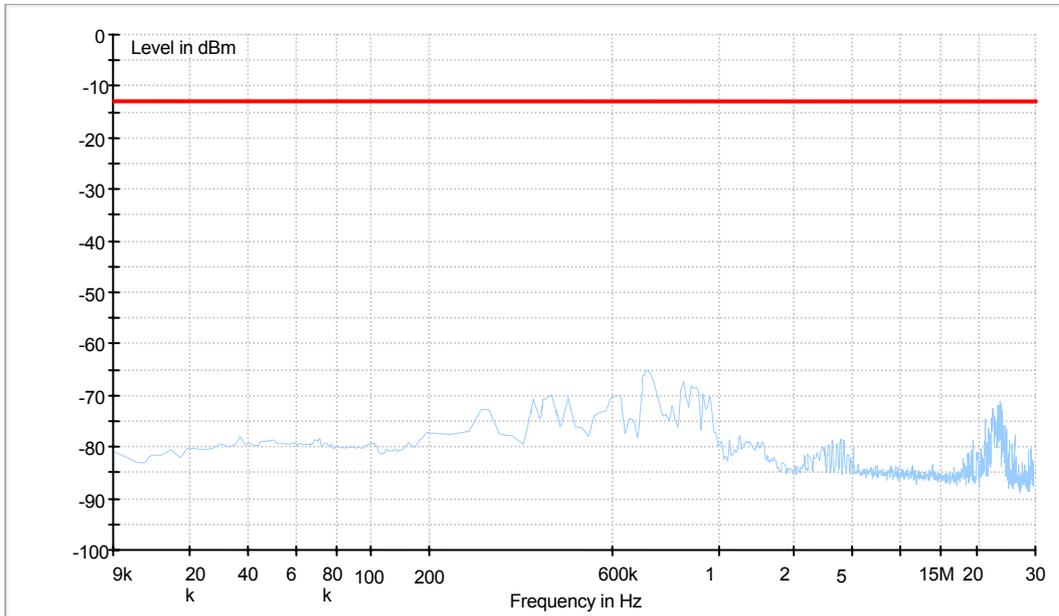
Traffic Mode (2GHz-18GHz)



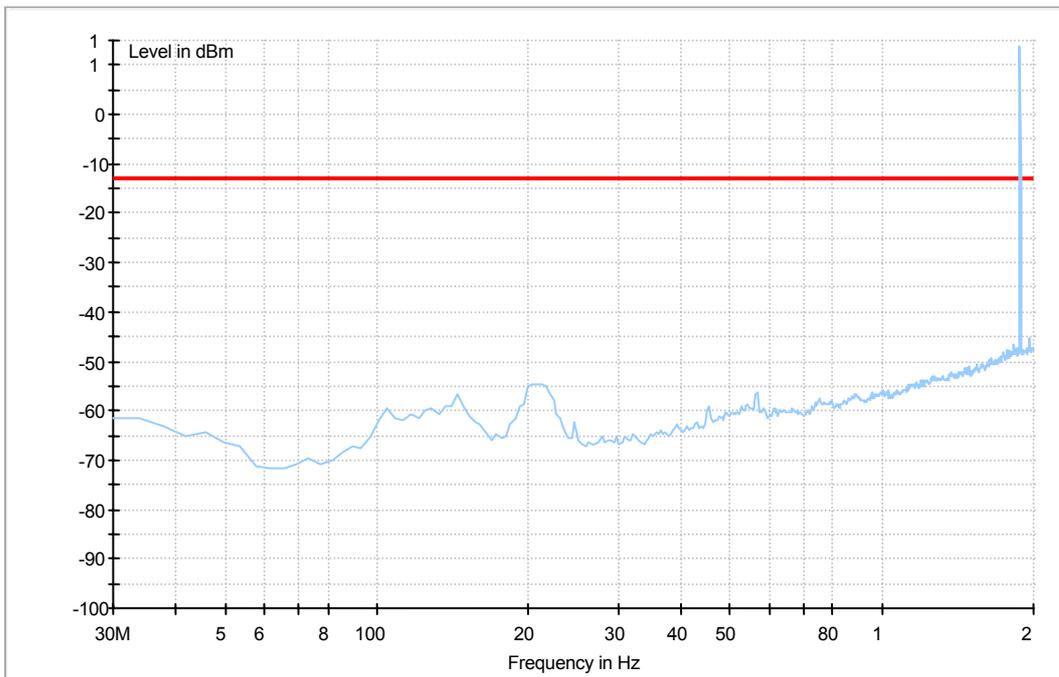
Traffic Mode (18GHz-26.5GHz)



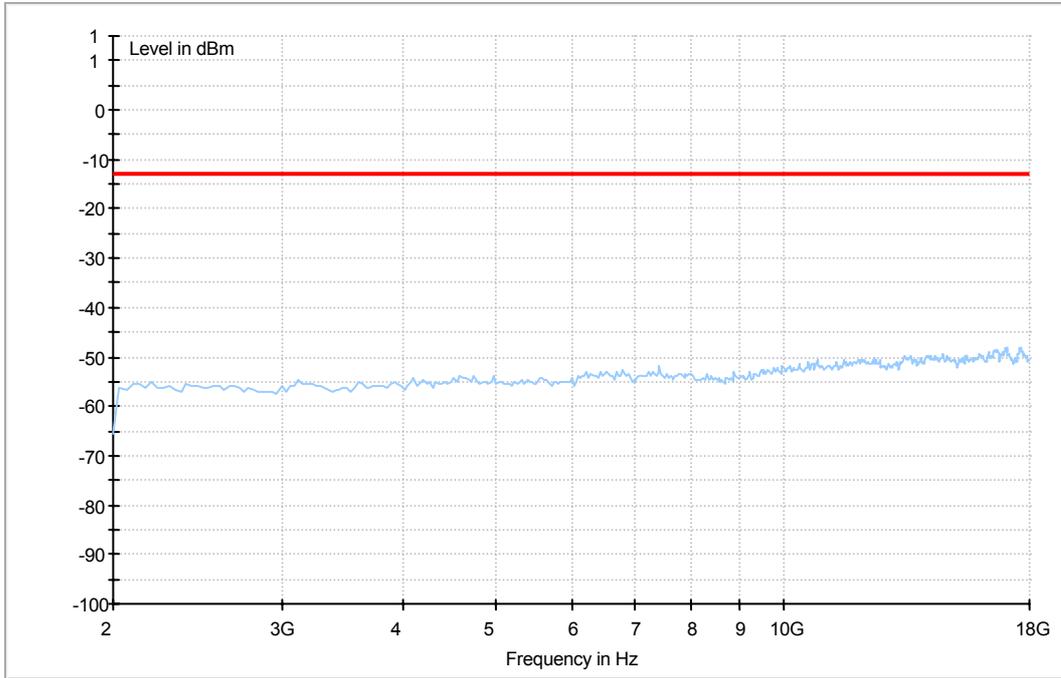
8.3.4 For EGPRS 1900 Traffic Mode (9kHz-30MHz)



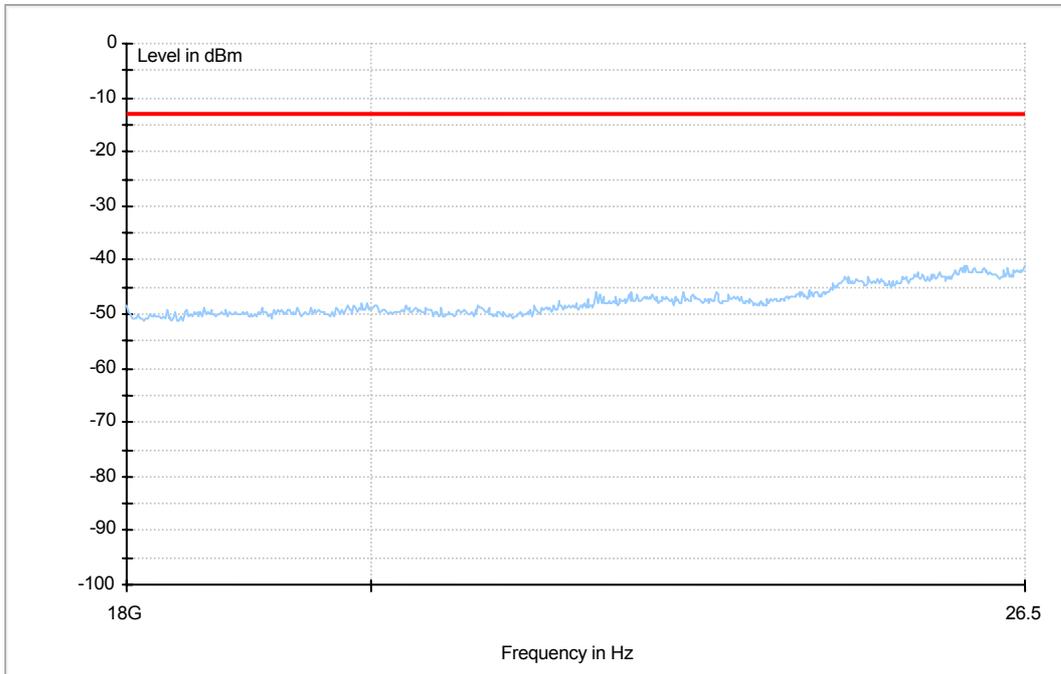
Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)

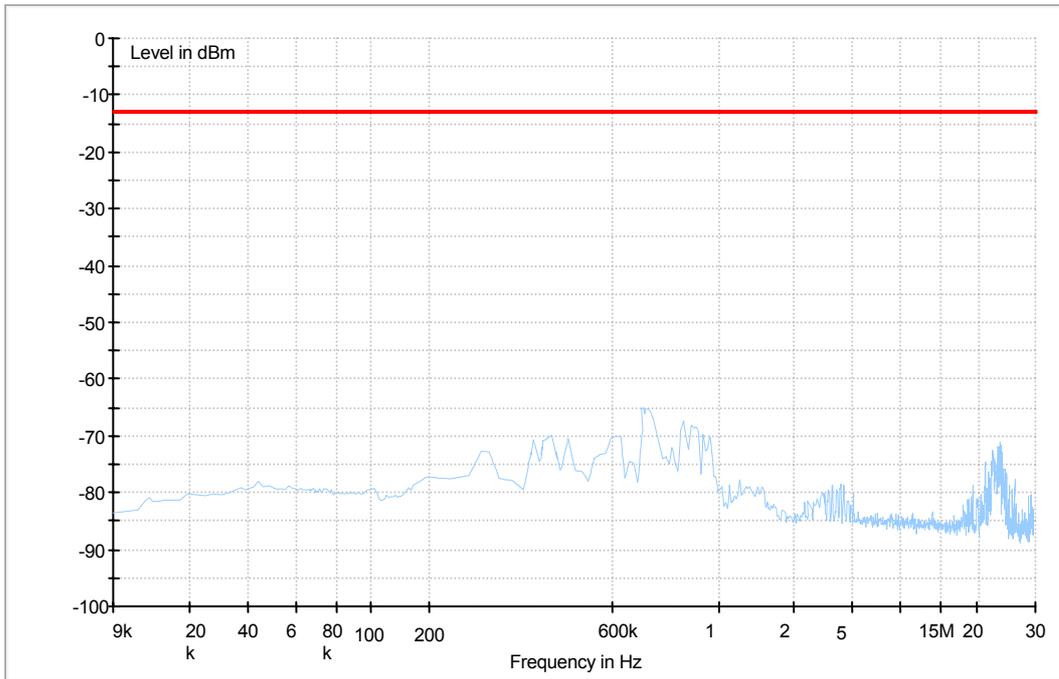


Traffic Mode (18GHz-26.5GHz)

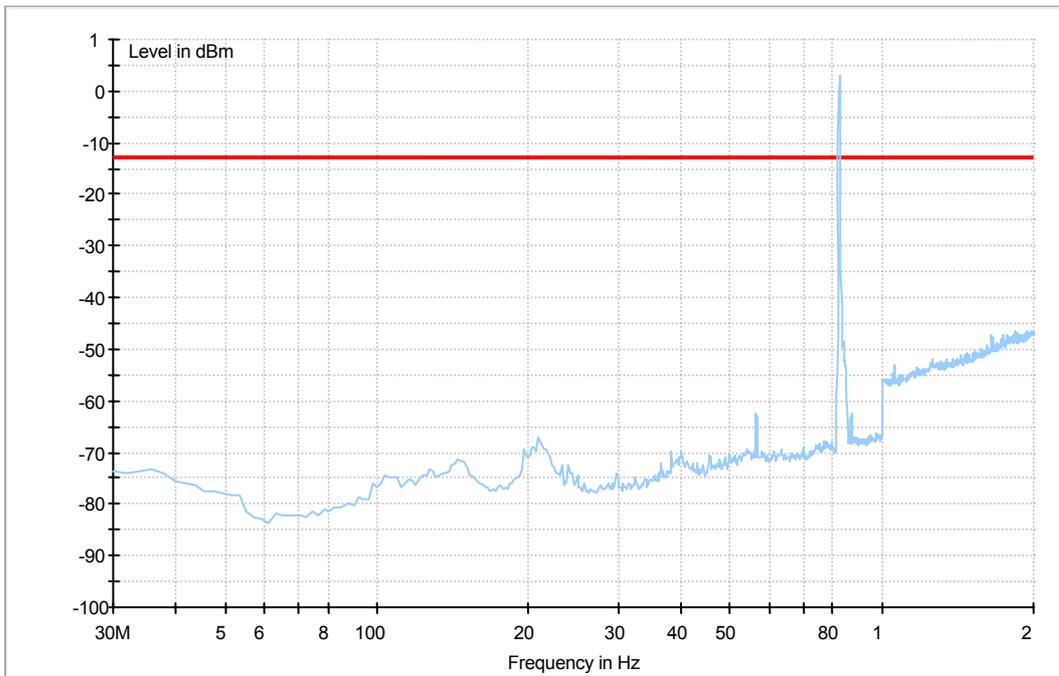


8.3.5 For WCDMA BAND V

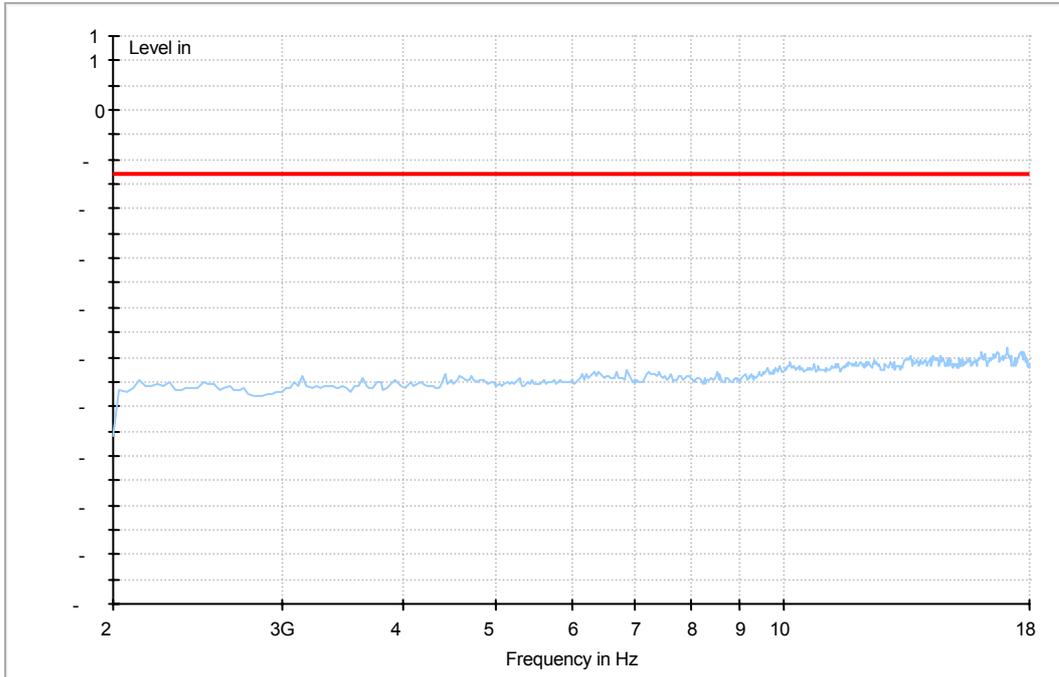
Traffic Mode (9kHz-30MHz)



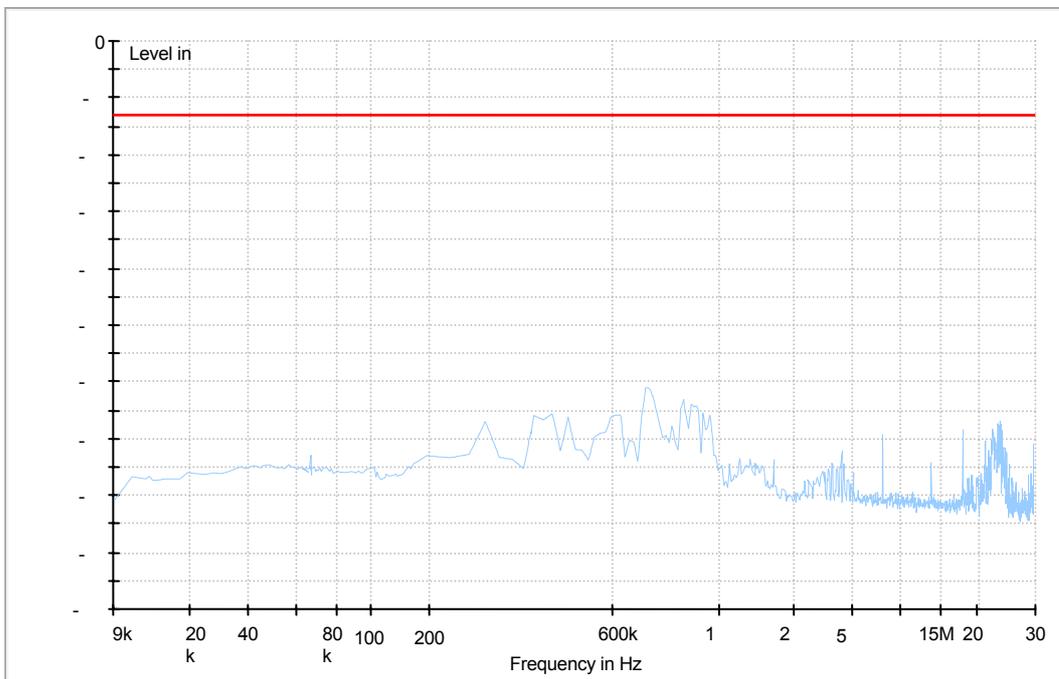
Traffic Mode (30MHz-2GHz)



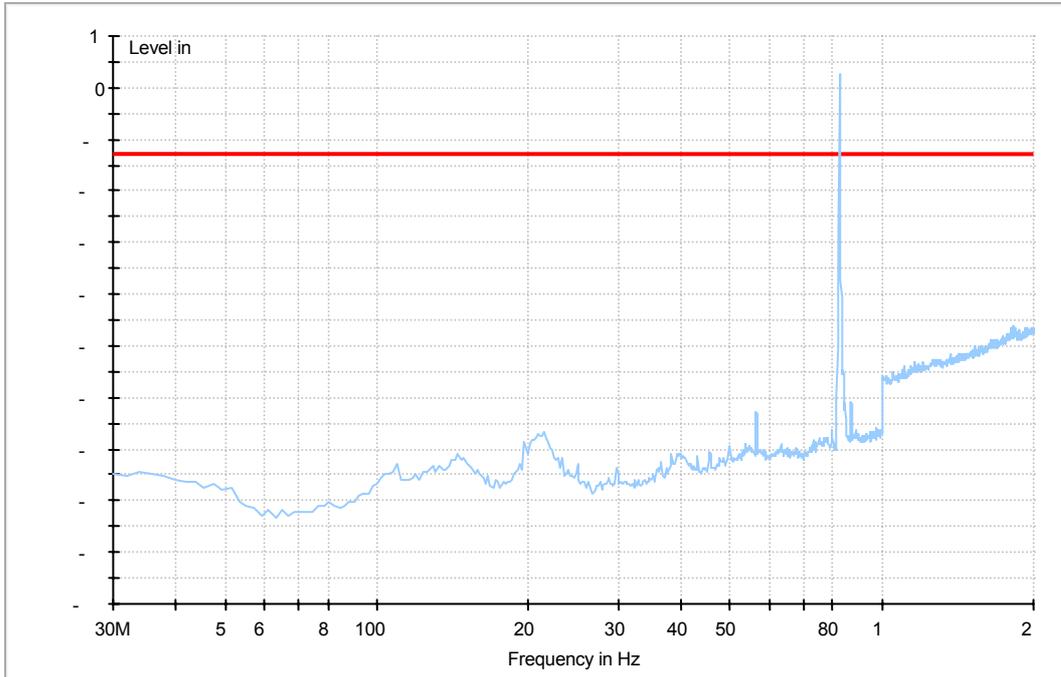
Traffic Mode (2GHz-18GHz)



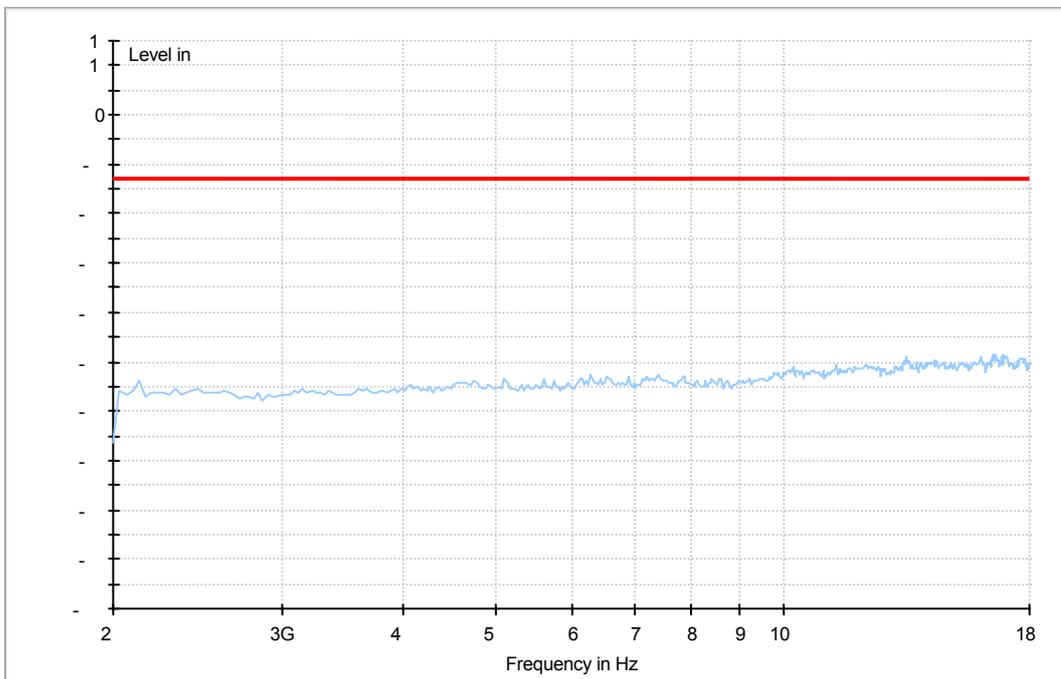
8.3.6 For HSDPA BAND V Traffic Mode (9kHz-30MHz)



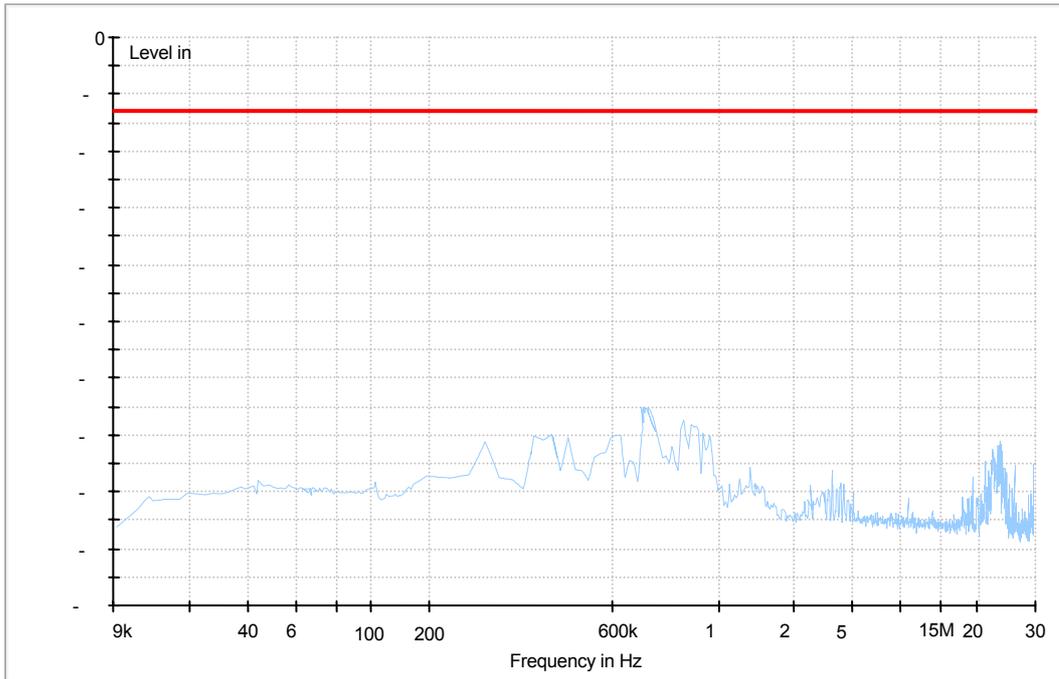
Traffic Mode (30MHz-2GHz)



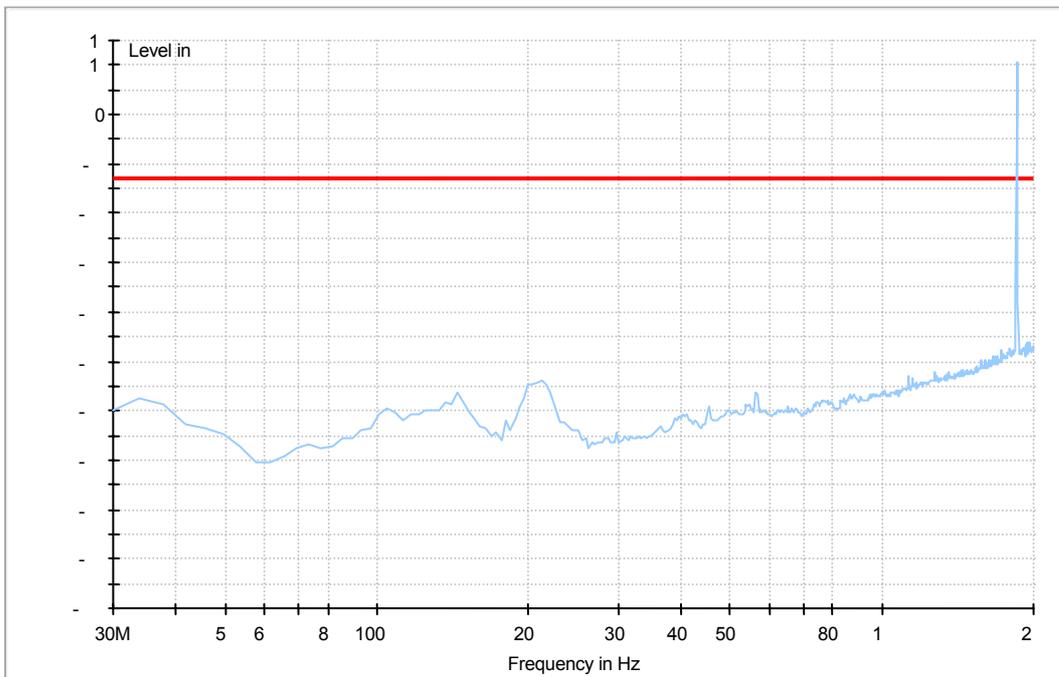
Traffic Mode (2GHz-18GHz)



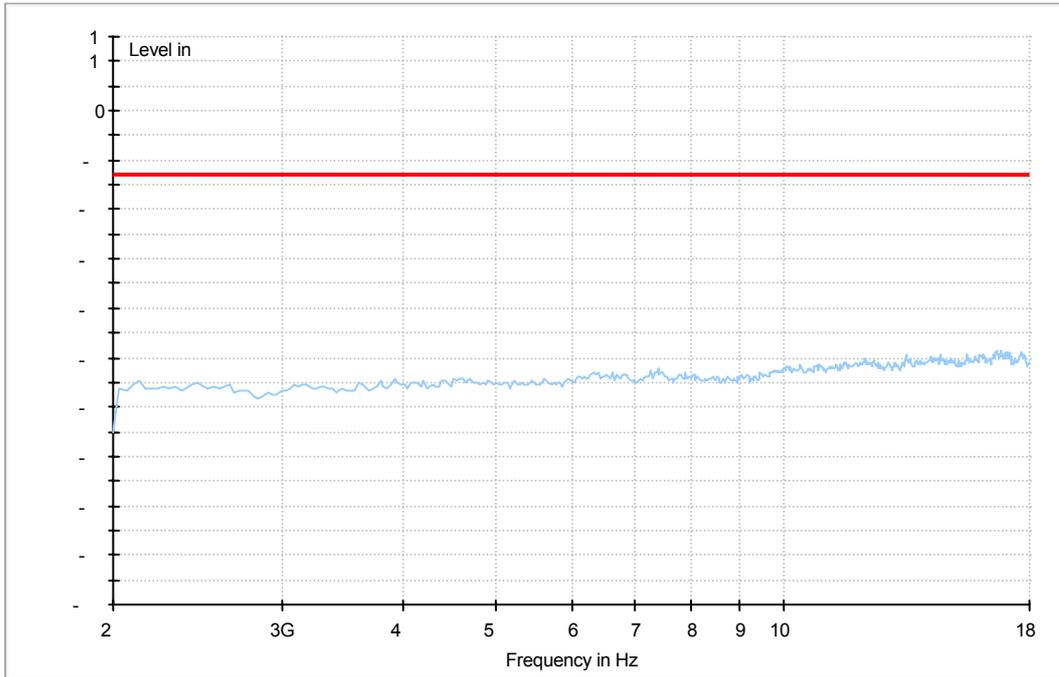
8.3.7 For WCDMA BAND II Traffic Mode (9kHz-30MHz)



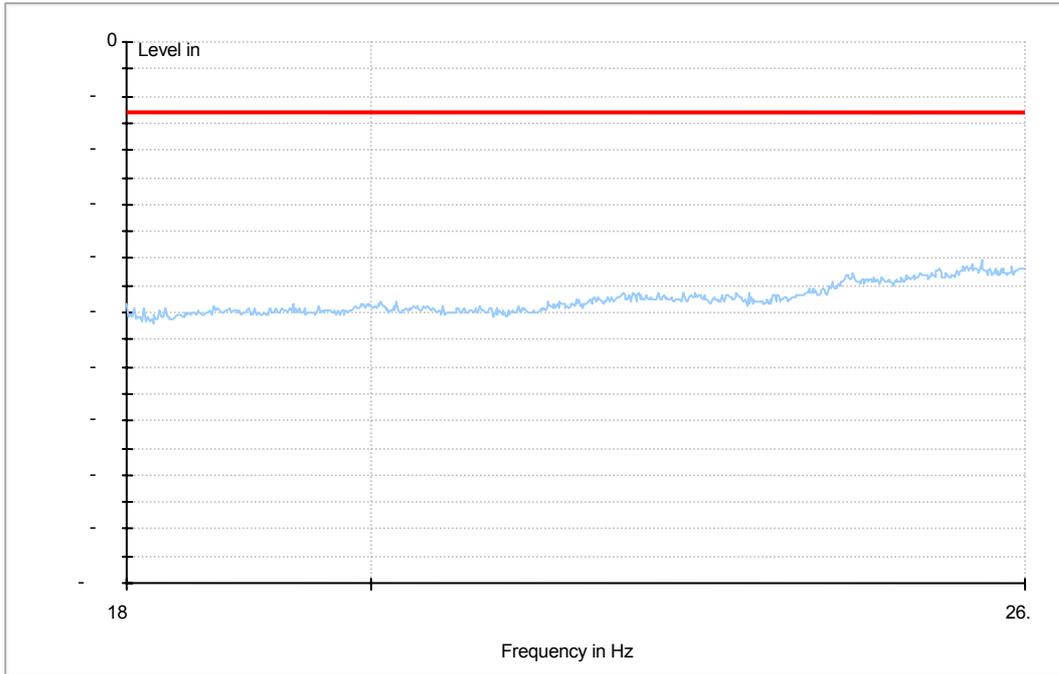
Traffic Mode (30MHz-2GHz)



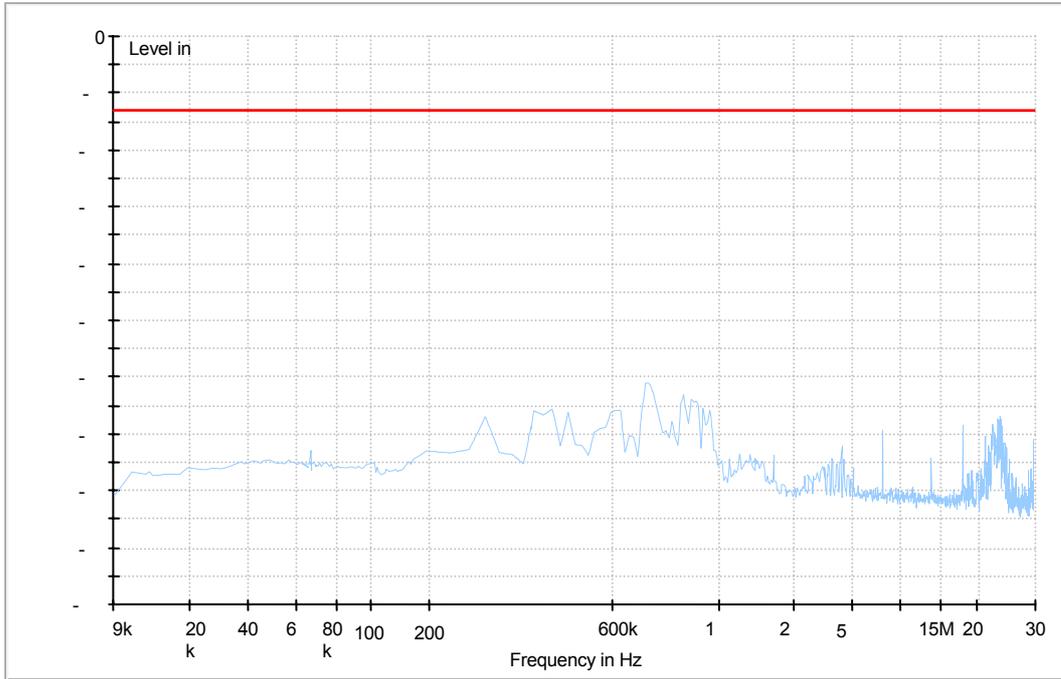
Traffic Mode (2GHz-18GHz)



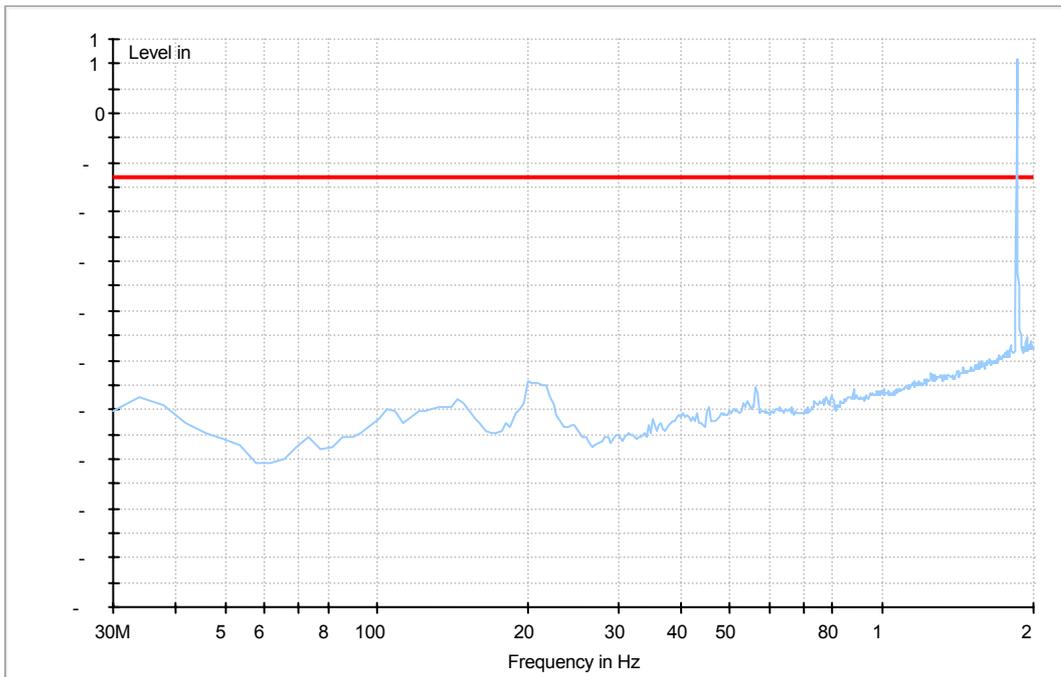
Traffic Mode (18GHz-26.5GHz)



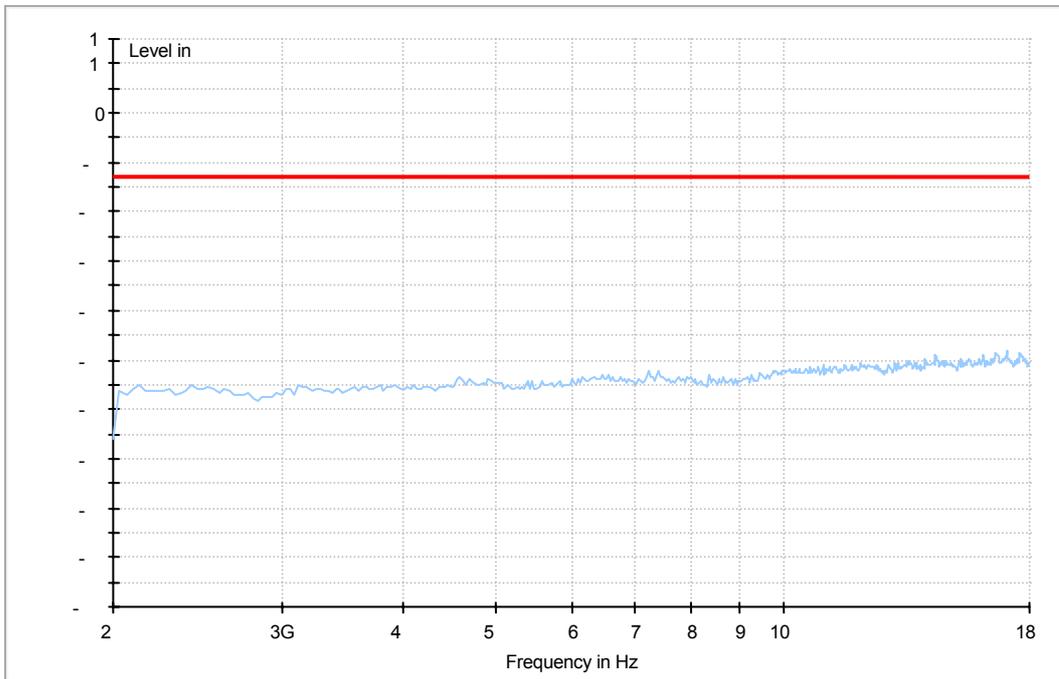
8.3.8 For HSDPA BAND II Traffic Mode (9kHz-30MHz)



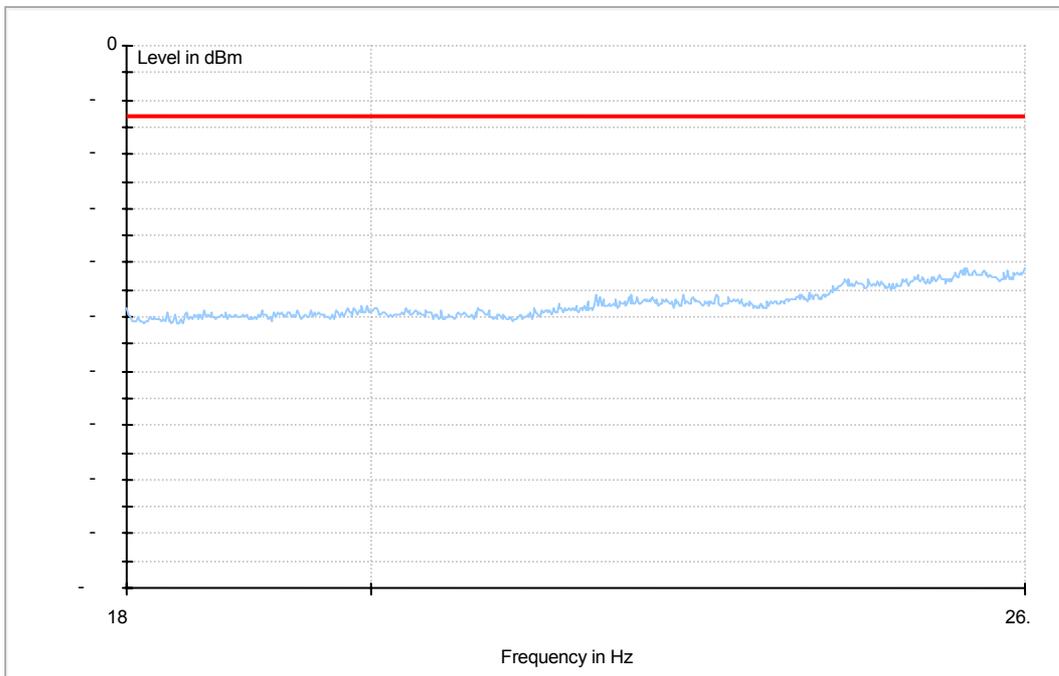
Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-18GHz)



Traffic Mode (18GHz-26.5GHz)





END