



EMC Test Report

Product Name: LTE USB Rotator

Model Number: 203HW

Report No: SYBH(Z-EMC)128012013-2

FCC ID: QIS203HW

Reliability Laboratory of Huawei Technologies Co., Ltd.

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2. The laboratory has passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 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.
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Applicant: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

Date of Receipt Test Item: Jan.31, 2013
Start Date of Test: Feb.01, 2013
End Date of Test: Feb.06, 2013

Test Result: Pass

**Approved By
(Lab Manager)**

2013-02-22
Date

Liu Chunlin
Name

Signature

**Operator
(Test Engineer)**

2013-02-22
Date

Zheng Ke
Name

Signature



Modification Record

| No. | Last Report No. | Modification Description |
|-----|-----------------|--------------------------|
| 1 | NA | First report |



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1 General Information

1.1 EUT Description

| EUT Description | |
|-----------------|--|
| Product Name | LTE USB Rotator |
| Model Number | 203HW |
| TX Frequency | GSM 850:824MHz To 849MHz GSM1900:1850MHz To 1910MHz |
| RX Frequency | GSM850:869MHz To 894MHz GSM1900:1930MHz To 1990MHz |
| S/N | 2# |
| HW Version | CH1E3278SM |
| SW Version | 22.260.01.00.00 |
| EUT Accessory | |
| USB Cable | Data Cable USB A Male to Micro Usb, shielded |

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.



1.2 Test Site Information

| | |
|---------------------|---|
| Site 1: | RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD. |
| Test Site Location: | Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C |

1.3 Applied Standards

APPLIED STANDARD

47 CFR FCC Part 15:2011, Subpart B



2 Summary of Results

| Summary of Results | | | | |
|--|------------------|---|--------|-------|
| Test Items | Test Mode | Performance Class & Required Performance Criteria | Result | Site |
| <u>Radiated Emissions</u> Enclosure Port | Mode 2 Mode 4 | CLASS B | Pass | Site1 |
| <u>Conducted Emissions</u> <input checked="" type="checkbox"/> AC Power Port | Mode1~ Mode4 | CLASS B | Pass | Site1 |
| Note: 1, Measurement taken is within the measurement uncertainty of measurement system. | | | | |

During the measurement, the environmental conditions complied with the range listed as below.

| Item | Required |
|----------------------|----------------|
| Ambient temperature | 15°C ~ 35°C |
| Relative humidity | 25% ~ 75% |
| Atmospheric pressure | 86kPa ~ 106kPa |

3 System Configuration during EMC Test

3.1 Test Mode

Huawei has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was in this test report and defined as below:

| Test Mode | |
|-----------|--|
| Mode 1: | USB Copy(EUT with PC)+ Traffic |
| Mode 2: | USB Copy(EUT with PC)+Idle |
| Mode 3: | USB Cable + USB Copy(EUT with PC)+ Traffic |
| Mode 4: | USB Cable + USB Copy(EUT with PC)+Idle |

Remark: If there is more than one Data cable, each one should be applied throughout the compliance test respectively, however, only the worst case will be recorded in this report.

USB Copy:

State of EUT when transferred the data between the EUT and PC

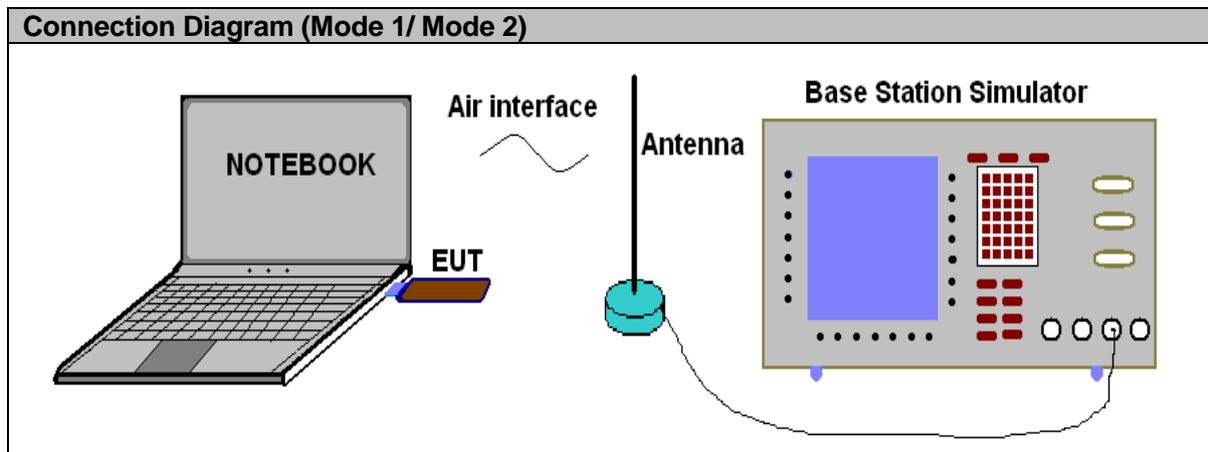
Traffic Mode:

State of EUT when switched on and with Radio Resource Control (RRC) connection established

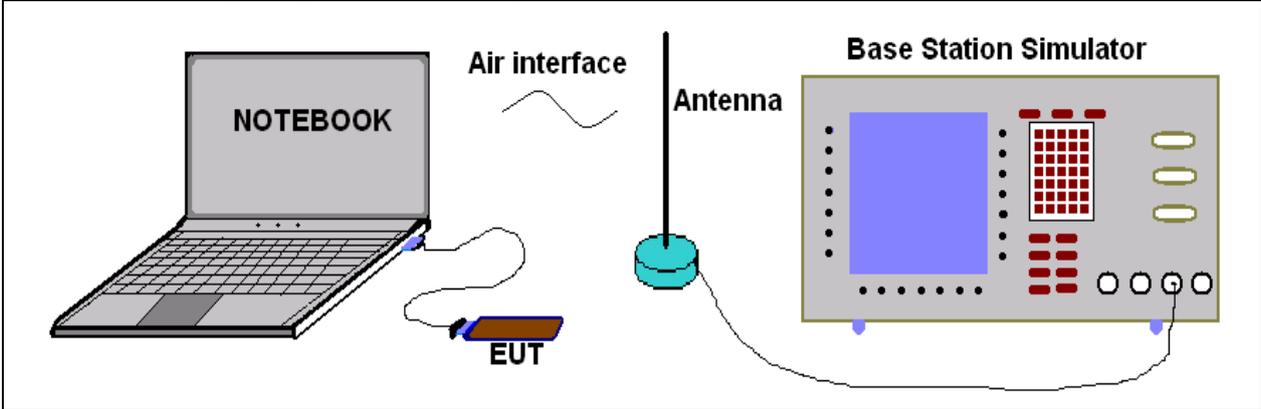
Idle Mode:

State of EUT when switched on but with no Radio Resource Control (RRC) connection

3.2 Test System Configuration



Connection Diagram (Mode 3~Mode 4)





3.3 Cables Used during Test

| Cable | Quantity | Length | Type of Cable |
|-------|----------|--------|---------------|
| USB | 1 | <3m | shielded |

3.4 Associated Equipment Used during Test

| Name | Model | Manufacturer | S/N | Calibrated Deadline | Cal interval (month) |
|----------------------------|--------|--------------|-------------|---------------------|----------------------|
| Radio Communication Tester | CMU200 | R&S | 3607111924 | 2013-06-07 | 12 |
| Notebook | X200 | ThinkPad | 31090403588 | / | / |

4 Electromagnetic Interference (EMI)

4.1 Radiated Disturbance 30MHz to 18GHz

4.1.1 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4-2009. The test distance was 3m. The set-up and test methods were according to ANSI C63.4-2009.

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/PK 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 receiving antenna has two polarizations V and H.

Measurement bandwidth (RBW) for 30MHz to 1000 MHz: 120 kHz;

Measurement bandwidth (RBW) for 1000MHz to 18000 MHz: 1MHz;

EUT was configured in idle mode and the test performed at worst emission state.

4.1.2 Test setup

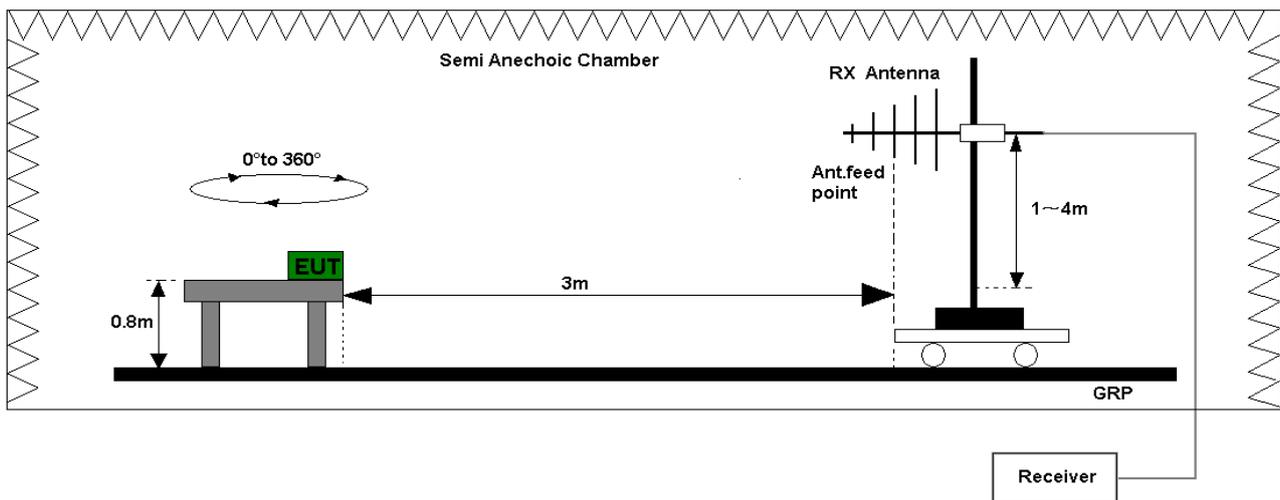


Figure 1. Test set-up of radiated disturbance(30MHz-1GHz)

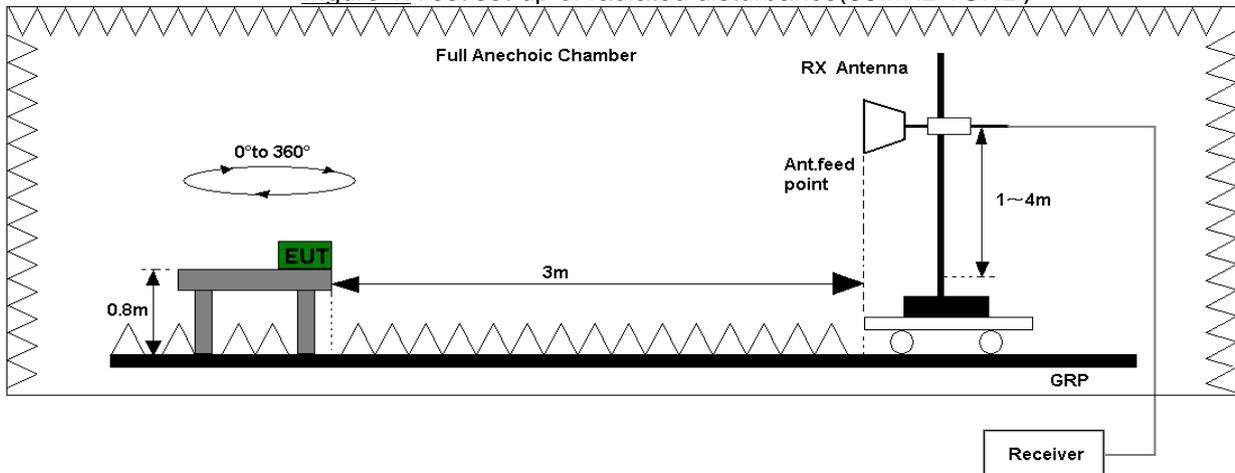


Figure 2. Test set-up of radiated disturbance(above 1GHz)



4.1.3 Test Results

The EUT has met the requirements for Radiated Emission of enclosure port.
The test data see section 7.1 of this report.

| Test Limits | | | | |
|-----------------------------|------------------|------|--------------------|----|
| Frequency of Emission (MHz) | Radiated Limit | | | |
| | Unit(μ V/m) | | Unit(dB μ V/m) | |
| 30-88 | 100 | | 40 | |
| 88-216 | 150 | | 43.5 | |
| 216-960 | 200 | | 46 | |
| Above 960 | 500 | | 54 | |
| Above 1000 | AV | PK | AV | PK |
| | 500 | 5000 | 54 | 74 |

4.2 Conducted Disturbance 0.15 MHz to 30MHz

4.2.1 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 away from LISN. The set-up and test methods were according to ANSI C63.4-2009. 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.

EUT was communicated with the simulator through Air interface, the simulator controls the EUT to transmitter the maximum power which defined in specification of product. The EUT operated on the typical channel.

Measurement bandwidth (RBW) for 150 kHz to 30 MHz: 9 kHz;

The EUT was set in the shielded chamber and operated under nominal conditions.

4.2.2 Test Setup

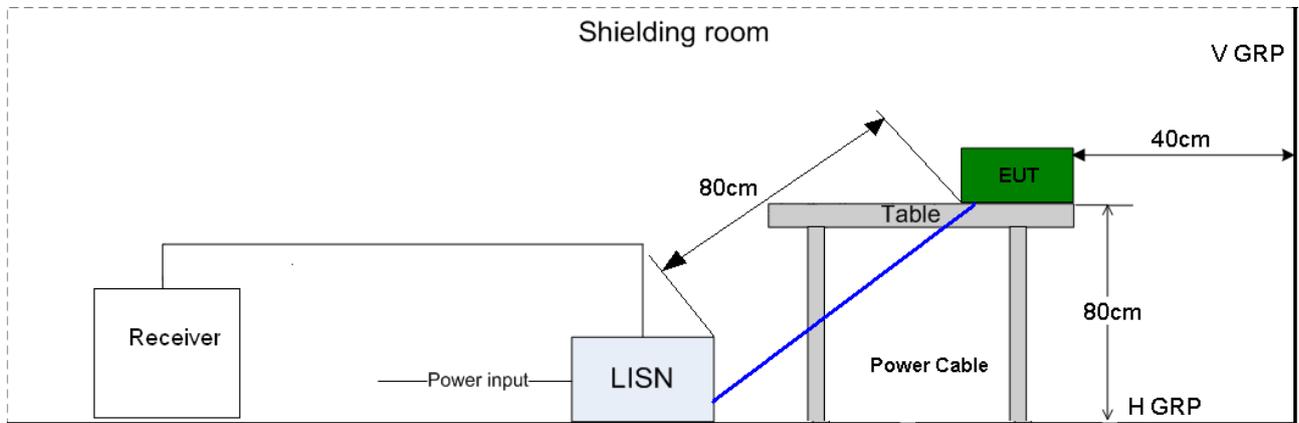


Figure 3. Test Set-up of conducted disturbance

4.2.3 Test Results

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

The test data see section 7.2 of this report.

| Test Limit of AC Power Port | | |
|-----------------------------|-----------------|------------------|
| Frequency range | 150kHz ~ 30MHz | |
| Frequency | Voltage limits | |
| | QP | AV |
| 0.15MHz~0.5MHz | 66-56dB μ V | 56-46 dB μ V |
| 0.5MHz-5MHz | 56dB μ V | 46 dB μ V |
| 5MHz~30MHz | 60dB μ V | 50 dB μ V |



5 Main Test Instruments

| Main Test Equipments | | | | | | |
|----------------------|--------------------------|--------------|----------|--------------|---------------------|----------------------|
| Test item | Test Instrument | Model | S/N | Manufacturer | Calibrated Deadline | Cal interval (month) |
| RE | EMI Test receiver | ESU26 | 100150 | R&S | May.27, 2013 | 12 |
| | Broadband Antenna | VULB 9163 | 9163-941 | SCHWARZ BECK | Jul.07, 2013 | 24 |
| | Horn Antenna | HF906 | 100683 | R&S | May.15, 2013 | 24 |
| CE | EMI Test receiver | ESCI | 101163 | R&S | Mar. 05, 2013 | 12 |
| | Artificial Mains Network | ENV216 | 100382 | R&S | Mar.21, 2013 | 12 |
| Software Information | | | | | | |
| Test Item | Software Name | Manufacturer | | Version | | |
| RE | ES-K1 | R&S | | 1.7.1 | | |
| CE | EMC32 | R&S | | V8.52.0 | | |

6 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(30MHz-1GHz) | Field strength (dB μ V/m) | U=4.1dB; k=2 |
| RE(1GHz-18GHz) | Field strength (dB μ V/m) | U=5.1dB; k=2 |
| CE | Disturbance Voltage (dB μ V) | U=2.6dB; k=2 |

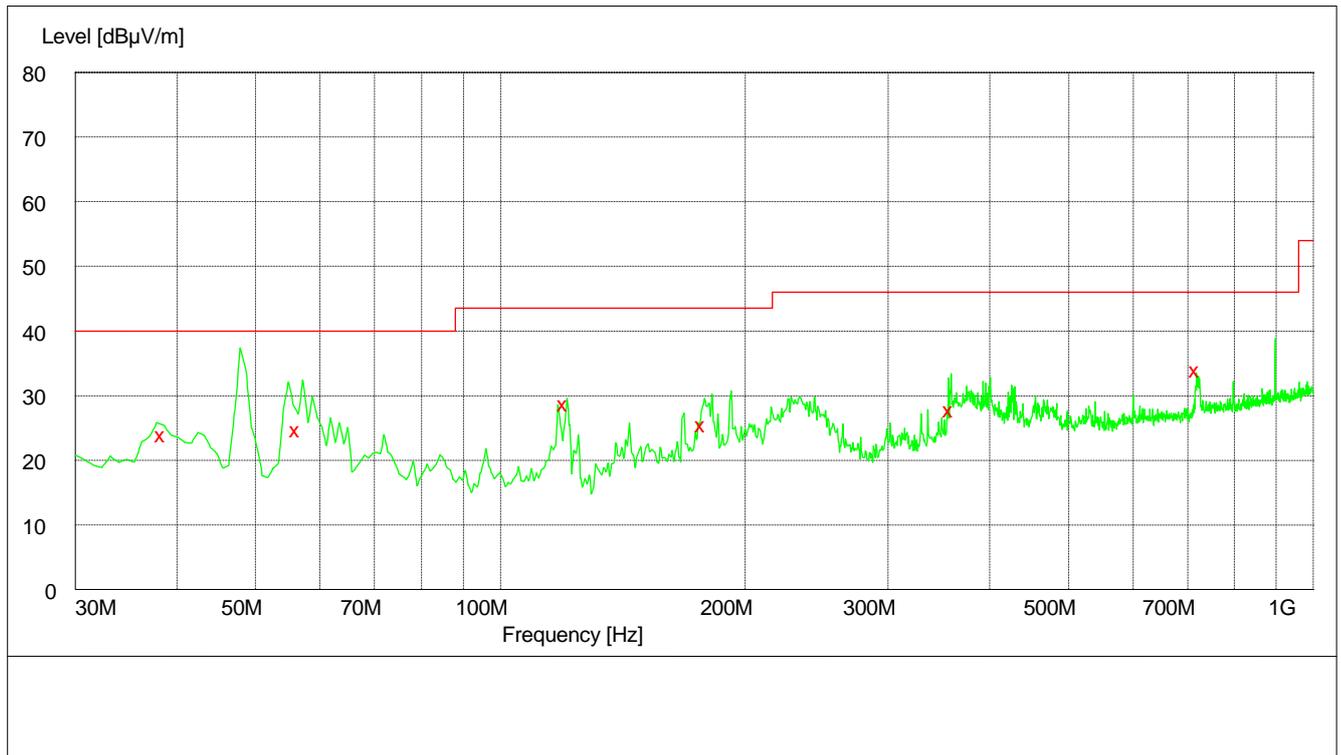


7 Test Data and Graph

Only the worst test result was shown in this report.

7.1 Radiated Disturbance

30MHz~1GHz



MEASUREMENT RESULT: QP Detector

| Frequency MHz | Level dBµV/m | Transducer dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarisation |
|---------------|--------------|---------------|--------------|-----------|-----------|-------------|--------------|
| 38.400000 | 24.20 | 15.3 | 40.0 | 15.8 | 100.0 | 211.00 | VERTICAL |
| 56.280000 | 24.90 | 14.2 | 40.0 | 15.1 | 100.0 | 190.00 | VERTICAL |
| 120.000000 | 28.90 | 11.5 | 43.5 | 14.6 | 200.0 | 97.00 | HORIZONTAL |
| 177.360000 | 25.70 | 11.1 | 43.5 | 17.8 | 132.0 | 218.00 | HORIZONTAL |
| 357.960000 | 28.00 | 16.8 | 46.0 | 18.0 | 100.0 | 266.00 | HORIZONTAL |
| 718.020000 | 34.30 | 22.7 | 46.0 | 11.7 | 123.0 | 132.00 | HORIZONTAL |

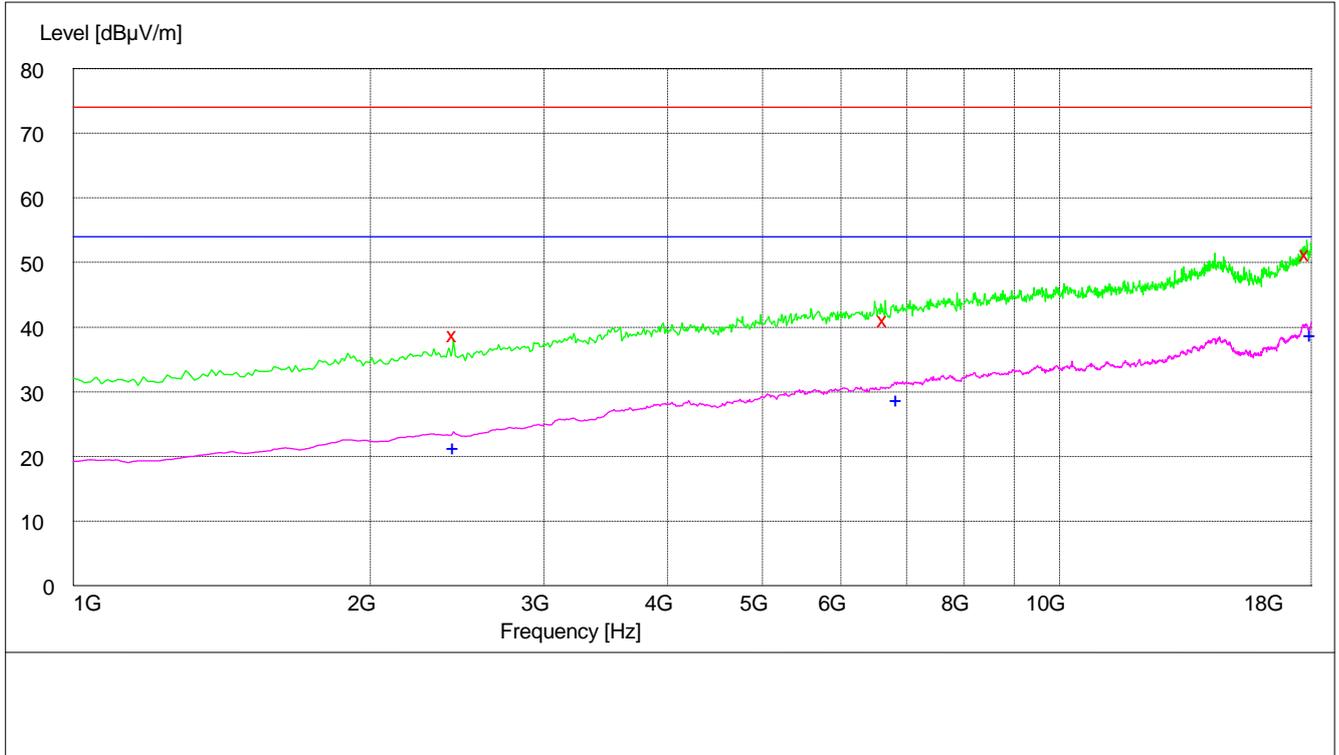
Note:

Level = Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)

The reading level is calculated by software which is not shown in the sheet.



1GHz~18GHz



MEASUREMENT RESULT: PK Detector

| Frequency MHz | Level dBµV/m | Transducer dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarisation |
|---------------|--------------|---------------|--------------|-----------|-----------|-------------|--------------|
| 2434.000000 | 40.80 | -9.2 | 74.0 | 34.6 | 112.0 | 97.00 | VERTICAL |
| 6653.100000 | 41.40 | 1.1 | 74.0 | 32.6 | 106.0 | 45.00 | HORIZONTAL |
| 17805.100000 | 51.50 | 21.5 | 74.0 | 22.5 | 150.0 | 201.00 | VERTICAL |

MEASUREMENT RESULT: AV Detector

| Frequency MHz | Level dBµV/m | Transducer dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarisation |
|---------------|--------------|---------------|--------------|-----------|-----------|-------------|--------------|
| 2433.000000 | 21.60 | -9.3 | 54.0 | 32.4 | 100.0 | 195.00 | VERTICAL |
| 6847.000000 | 29.00 | 1.4 | 54.0 | 25.0 | 100.0 | 359.00 | HORIZONTAL |
| 17992.500000 | 39.00 | 21.1 | 54.0 | 15.0 | 132.0 | 115.00 | HORIZONTAL |

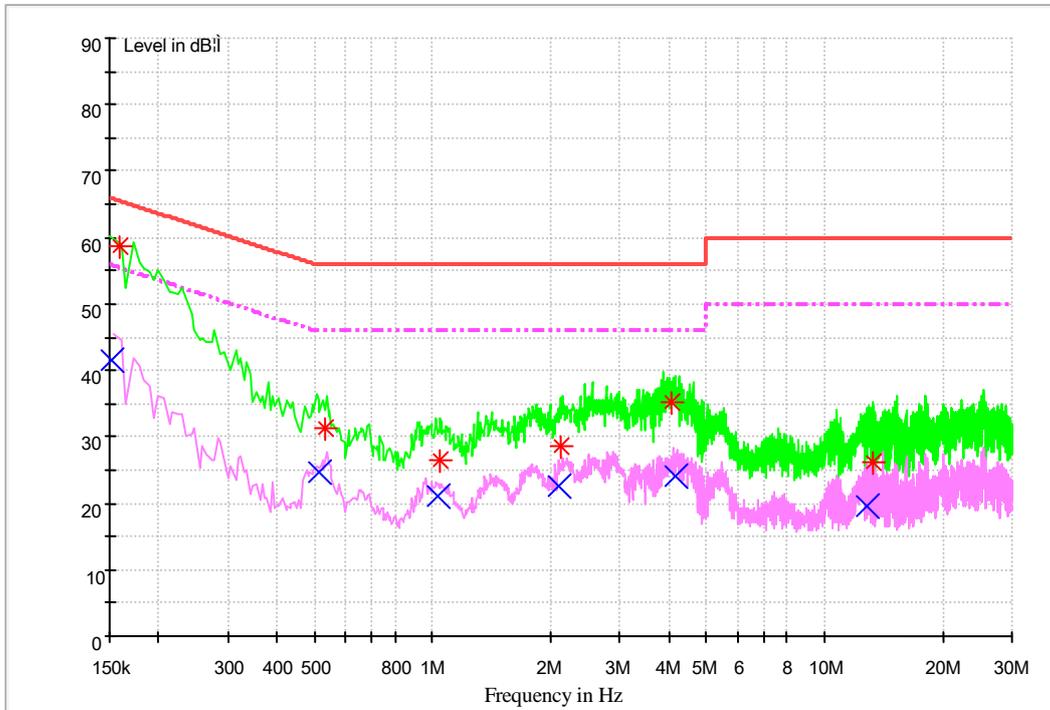
Note:

Level = Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)
The reading level is calculated by software which is not shown in the sheet.



7.2 Conducted Disturbance

AC Port Test Data



MEASUREMENT RESULT: QP Detector

| Frequency MHz | Level dBμV | Line | Transd dB | Margin dB | Limit dBμV | PE |
|---------------|------------|------|-----------|-----------|------------|-----|
| 0.160073 | 58.6 | N | 9.7 | 6.9 | 65.5 | FLO |
| 0.533329 | 31.2 | N | 9.7 | 24.8 | 56.0 | FLO |
| 1.049261 | 26.6 | N | 9.7 | 29.4 | 56.0 | FLO |
| 2.114160 | 28.6 | N | 9.7 | 27.4 | 56.0 | FLO |
| 4.066860 | 35.1 | L1 | 9.8 | 20.9 | 56.0 | FLO |
| 13.253426 | 26.3 | N | 10.0 | 33.7 | 60.0 | FLO |

MEASUREMENT RESULT: AV Detector

| Frequency MHz | Level dBμV | Line | Transd dB | Margin dB | Limit dBμV | PE |
|---------------|------------|------|-----------|-----------|------------|-----|
| 0.152578 | 41.5 | L1 | 9.7 | 14.4 | 55.9 | FLO |
| 0.515212 | 24.8 | L1 | 9.7 | 21.2 | 46.0 | FLO |
| 1.032154 | 21.2 | N | 9.7 | 24.8 | 46.0 | FLO |
| 2.102978 | 22.6 | N | 9.7 | 23.4 | 46.0 | FLO |
| 4.150244 | 24.2 | N | 9.8 | 21.8 | 46.0 | FLO |
| 12.815122 | 19.5 | N | 10.0 | 30.5 | 50.0 | FLO |

Note:

Level= Reading level+ Transd (cable loss + correction factor)



The reading level is calculated by software which is not shown in the sheet.

-----**END**-----