



EMC Test Report

Product Name: 1200Mbps Wireless Router

Product Model: WS5200

Report Number: SYBH(Z-EMC)20180202009001-2

FCC ID: QISWS5200

Reliability Laboratory of Huawei Technologies Co., Ltd.

(Global Compliance and Testing Center of Huawei Technologies Co., Ltd)

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District,
Shenzhen, 518129, P.R.C

Tel: +86 755 28780808 Fax: +86 755 89652518

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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 by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 6369A-1.
4. The laboratory (Reliability Lab of Huawei Technologies Co., Ltd) is also named “Global Compliance and Testing Center of Huawei Technologies Co., Ltd” , the both names have coexisted since 2009.
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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: 2018-03-15
Start Date of Test: 2018-03-15
End Date of Test: 2018-03-25

Test Result: Pass

**Approved By
(Lab Manager)**

2018-03-27
Date

Roger Zhang
Name

Roger Zhang

Signature

**Operator
(Test Engineer)**

2018-03-25
Date

FengJinhua
Name

Feng Jinhua

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 | 1200Mbps Wireless Router |
| Model Number | WS5200 |
| Input voltage | AC:100~240 V 0.5A DC: 12V 1A |
| TX Frequency | WIFI 2.4G 2400MHz to 2483.5MHz WIFI 5G 5150MHz to 5250MHz WIFI 5G 5725MHz to 5850MHz |
| RX Frequency | WIFI 2.4G 2400MHz to 2483.5MHz WIFI 5G 5150MHz to 5250MHz WIFI 5G 5725MHz to 5850MHz |
| S/N | 3SG7S18118000024 |
| HW Version | AMEWS5200M |
| SW Version | 8.0.0.1 |
| EUT Accessory | |
| Adapter | Manufacture: Huawei Technologies Co.,Ltd. Model: HW-120100U01 Input voltage: 100-240V ~50/60Hz, 0.5 A Output voltage:  12 V 1 A Rated Power: 12 W S/N: U96601HAK00011 A966E4HBN00051 |

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



1.2 Test Site Information

| | |
|---------------------|---|
| Test 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 2017, 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 | Mode1 Mode2 | CLASS B | Pass | Site1 |
| <u>Conducted Emissions</u> <input checked="" type="checkbox"/> DC Power Port <input checked="" type="checkbox"/> AC Power Port <input type="checkbox"/> Telecommunication Ports | Mode1 Mode2 | CLASS B | Pass | Site1 |
| Note: 1, Measurement taken is within the uncertainty of test system. 2, <input checked="" type="checkbox"/> The item has been tested; <input type="checkbox"/> The item has not been tested. | | | | |

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

The EUT was configured, installed, arranged and operated in a manner consistent with typical application. The following mode(s) were applied during the compliance test.

| Test Mode | |
|-----------|--|
| Mode 1: | EUT with Adapter+ LAN/WAN+ Wireless Service Idle Mode |
| Mode 2: | EUT with Adapter+ LAN/WAN+ Wireless Service Traffic Mode |

Remark:

- 1) If there is one kind of accessories with different models, each one should be applied throughout the compliance test respectively, however, only the worst case will be recorded in this report.
- 2) If EUT has more than one typical operation, only the worst test mode will be recorded in this report.

Traffic Mode:

When the EUT state is switched on and with Radio Resource Control (RRC) connection established.

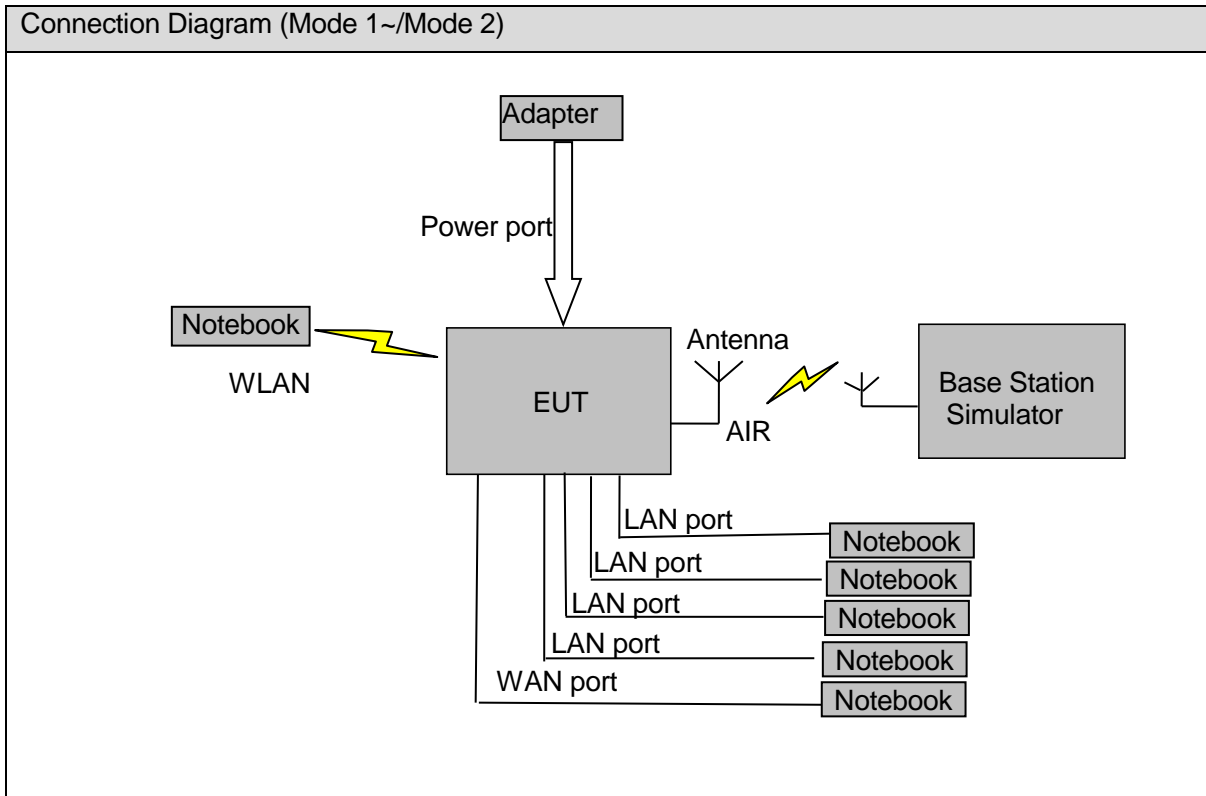
Idle Mode:

When the EUT state is switched on but without Radio Resource Control (RRC) connection.

Worst Case:

- 1) Radiated Emission
Mode 2: Adapter (Model: HW-120100U01, SN: U96601HAK00011) + LAN/WAN+ Wireless Service idle .This result is the worst case.
- 2) Conducted Emission
Mode 2: Adapter (Model: HW-120100U01, SN: A966E4HBN00051) + LAN/WAN+ Wireless Service Traffic. This result is the worst case.

3.2 Test System Configuration



3.3 Cables Used during Test

| Cable | Quantity | Length | Type of Cable |
|-----------|----------|--------|---------------|
| AC Power | 1 | <3m | unshielded |
| Lan Cable | 5 | <3m | unshielded |

3.4 Associated Equipment Used during Test

| Name | Model | Manufacturer | S/N | Calibrated Deadline | Cal interval |
|----------|-------|--------------|------------|---------------------|--------------|
| Notebook | X230 | Lenovo | A130911985 | N/A | Notebook |
| Notebook | X230 | Lenovo | A131113804 | N/A | Notebook |
| Notebook | X230 | Lenovo | A130911972 | N/A | Notebook |
| Notebook | X230 | Lenovo | A131111954 | N/A | Notebook |
| Notebook | X230 | Lenovo | A121210260 | N/A | Notebook |

4 Electromagnetic Interference (EMI)

4.1 Radiated Disturbance 30MHz to 40GHz

4.1.1 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4-2014. The test distance was 3m. The set-up and test methods were according to ANSI C63.4-2014.

A preliminary scan and a final scan of the emissions were made from 30 MHz to 40 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 40000 MHz: 1MHz;

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

4.1.2 Test setup

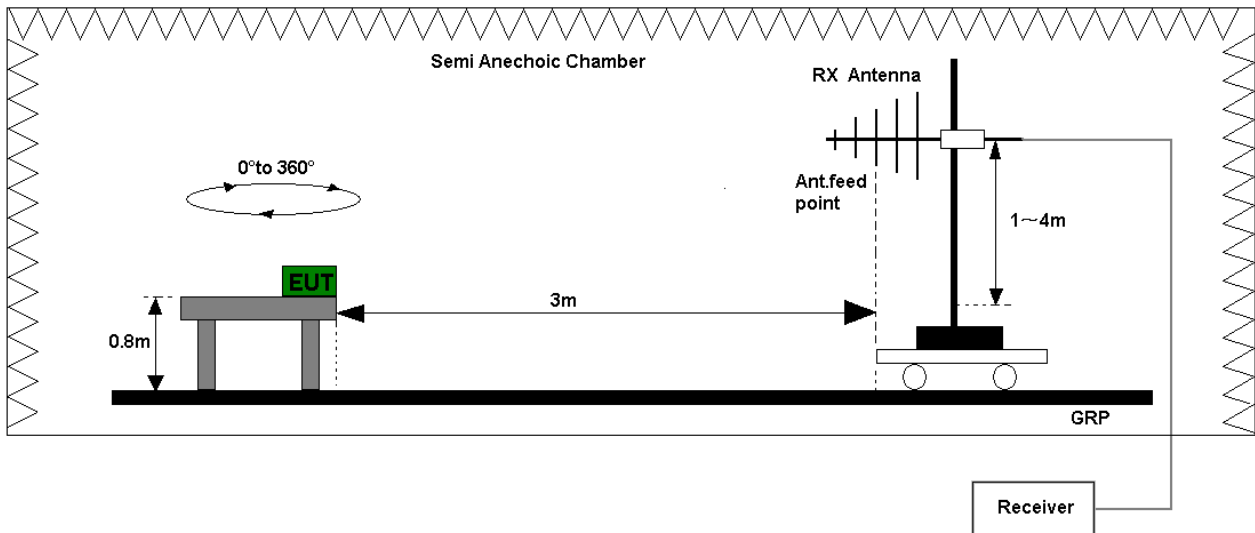


Figure 1. Test set-up of radiated disturbance(30MHz-1GHz)

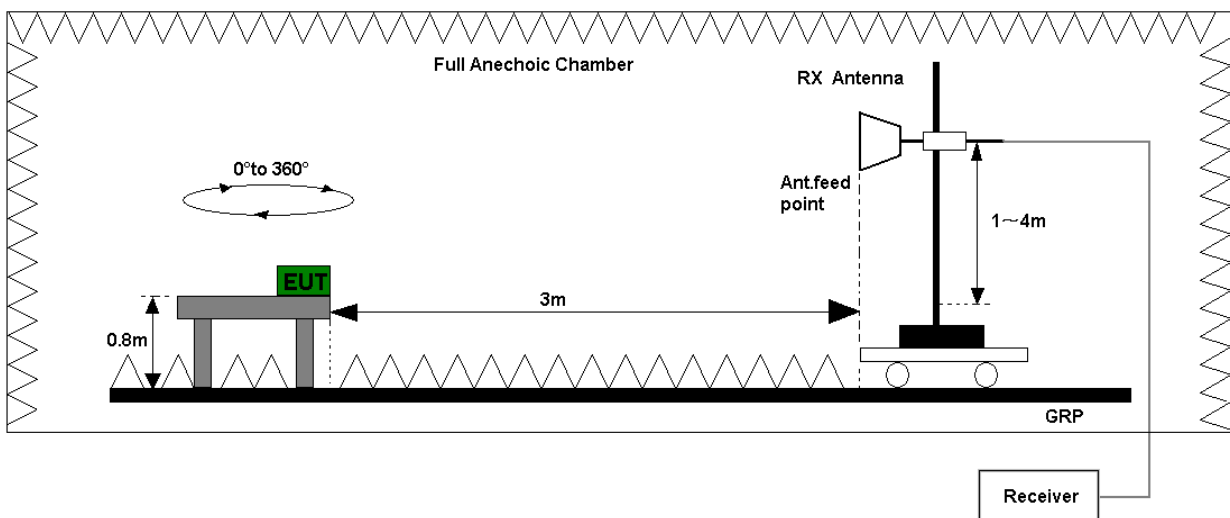


Figure 2. Test set-up of radiated disturbance(above 1GHz)

4.1.3 Test Results

The EUT has met the requirements for Radiated Emission of enclosure port.
Refer to the section 7 of this report for test data.

| Test Limits (Class B) | | | | |
|-----------------------------|------------------|------|--------------------|----|
| 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 C63.4-2014. 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

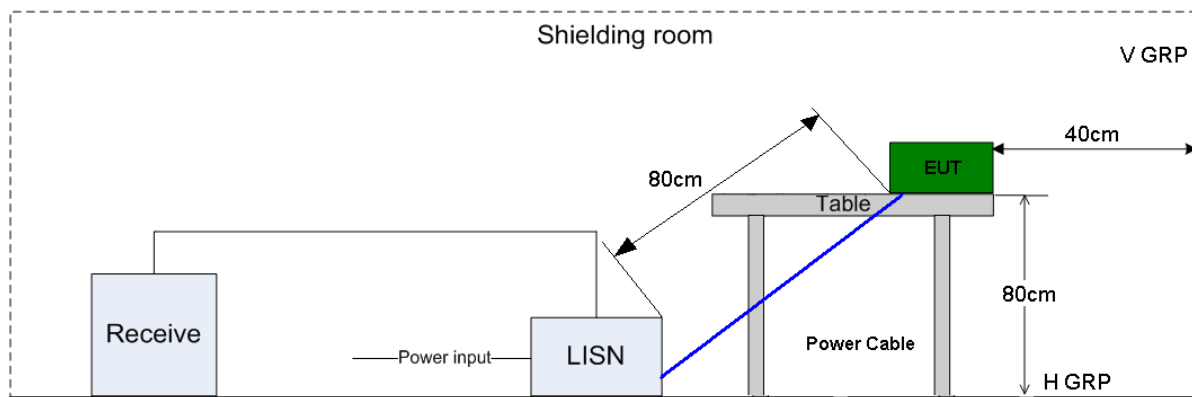


Figure 3. Test Set-up of conducted disturbance

4.2.3 Test Results

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

Refer to the section 7 of this report for test data.

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

5 Main Test Instruments

| Main Test Equipments | | | | | | |
|----------------------|----------------------------|--------------|----------|--------------|---------------------|--------------|
| Test item | Test Instrument | Model | S/N | Manufacturer | Calibrated Deadline | Cal interval |
| RE | EMI Test receiver | ESU26 | 100150 | R&S | Jan. 19, 2019 | 12 |
| | Spectrum Analyzer | FSU43 | 100048 | R&S | Jan. 29, 2019 | 12 |
| | Broadband Antenna | VULB 9163 | 9163-491 | SCHWARZBECK | Mar. 28, 2019 | 24 |
| | Horn antenna (18 to 26.5G) | 3160-09 | 5140299 | ETS | Jul. 20, 2019 | 24 |
| | Horn antenna (26.5 to 40G) | 3160-10 | LM5947 | ETS | Jul. 19, 2019 | 24 |
| | Amplifier | SCU26 | 10021 | R&S | May. 16, 2018 | 12 |
| | Amplifier | SCU40 | 10016 | R&S | May. 16, 2018 | 12 |
| | Horn Antenna | HF906 | 100683 | R&S | May.15, 2018 | 24 |
| CE | EMI Test receiver | ESCI | 101163 | R&S | May. 15, 2018 | 12 |
| | Artificial Mains Network | ENV4200 | 100134 | R&S | May. 15, 2018 | 12 |
| | Artificial Mains Network | ENV216 | 100382 | R&S | May.29, 2018 | 12 |
| Software Information | | | | | | |
| Test Item | Software Name | Manufacturer | | Version | | |
| RE | EMC32 | R&S | | V9.25.0 | | |
| CE | EMC32 | R&S | | V9.25.0 | | |

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 |
| RE(18 GHz-26.5GHz) | Field strength (dB μ V/m) | U=4.82 dB; k=2 |
| RE (26.5 GHz- 40GHz) | Field strength (dB μ V/m) | U=5.22 dB; k=2 |
| CE | Disturbance Voltage (dB μ V) | U=2.5dB; k=2 |

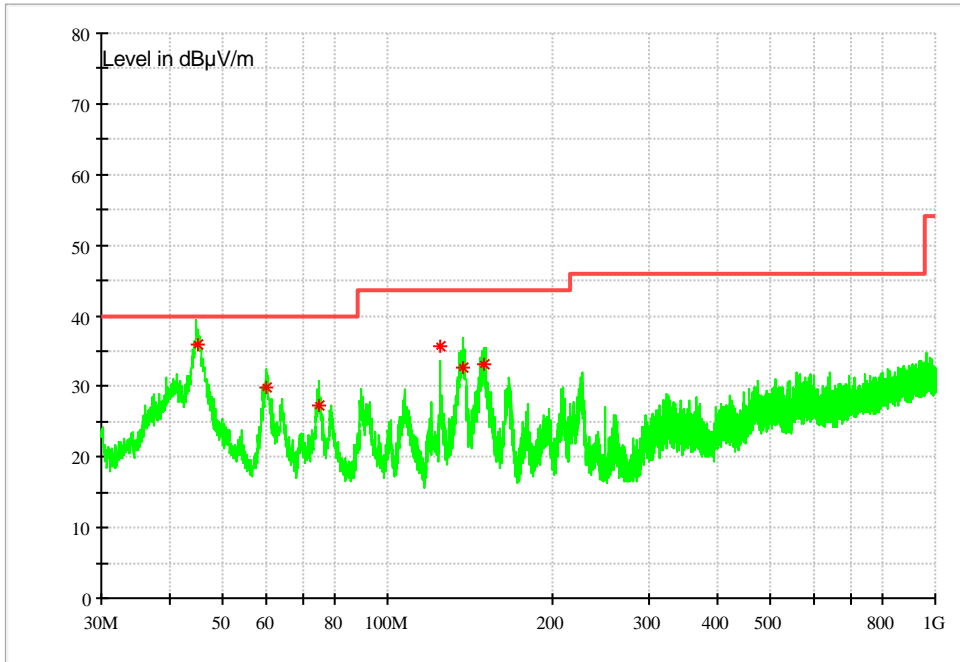
7 Test Data and Graph

Only the worst test results were shown

7.1 Radiated Disturbance

7.1.1 30MHz~1GHz

Test Mode: Mode1



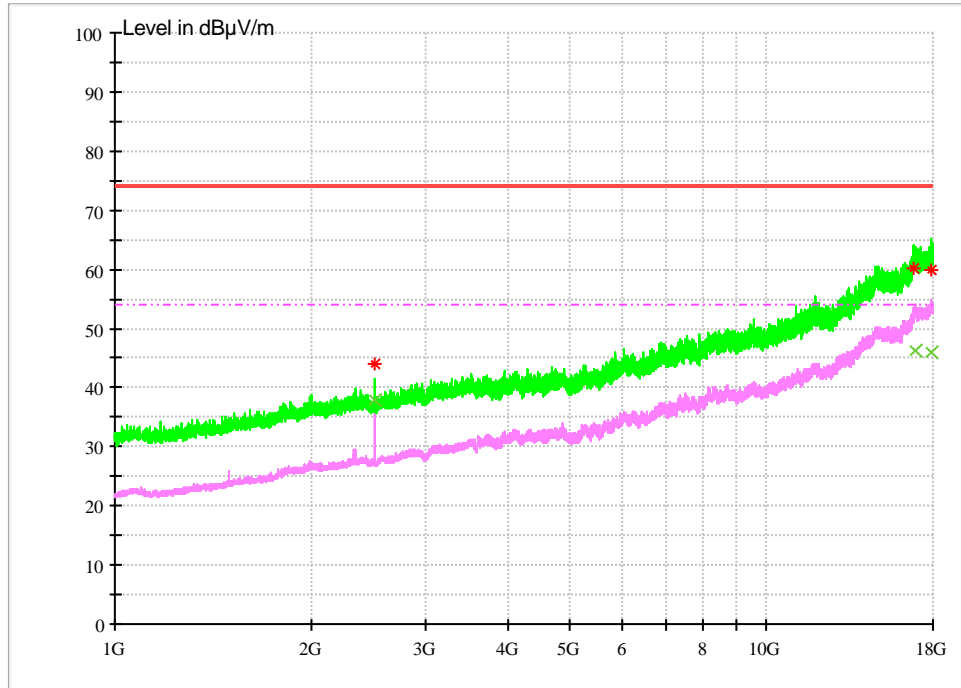
MEASUREMENT RESULT: QP Detector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarisation |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 45.093700 | 35.88 | 16.5 | 40.00 | 4.12 | 101.0 | 71.0 | V |
| 60.130700 | 29.90 | 12.1 | 40.00 | 10.10 | 101.0 | 46.0 | V |
| 74.697700 | 27.37 | 7.8 | 40.00 | 12.63 | 101.0 | 65.0 | V |
| 124.988940 | 35.69 | 14.0 | 43.50 | 7.81 | 102.0 | 92.0 | V |
| 137.338680 | 32.68 | 13.6 | 43.50 | 10.82 | 100.0 | 179.0 | V |
| 149.678780 | 33.15 | 12.5 | 43.50 | 10.35 | 100.0 | 192.0 | V |

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.

7.1.2 1GHz~18GHz
Test Mode: Mode1



MEASUREMENT RESULT: PK Detector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarisation |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 2500.014 | 44.09 | -7.6 | 74 | 29.91 | 100 | 159 | V |
| 16861.366 | 60.13 | 20.9 | 74 | 13.87 | 200 | 228 | V |
| 17934.965 | 59.8 | 21.5 | 74 | 14.2 | 154 | 286 | V |

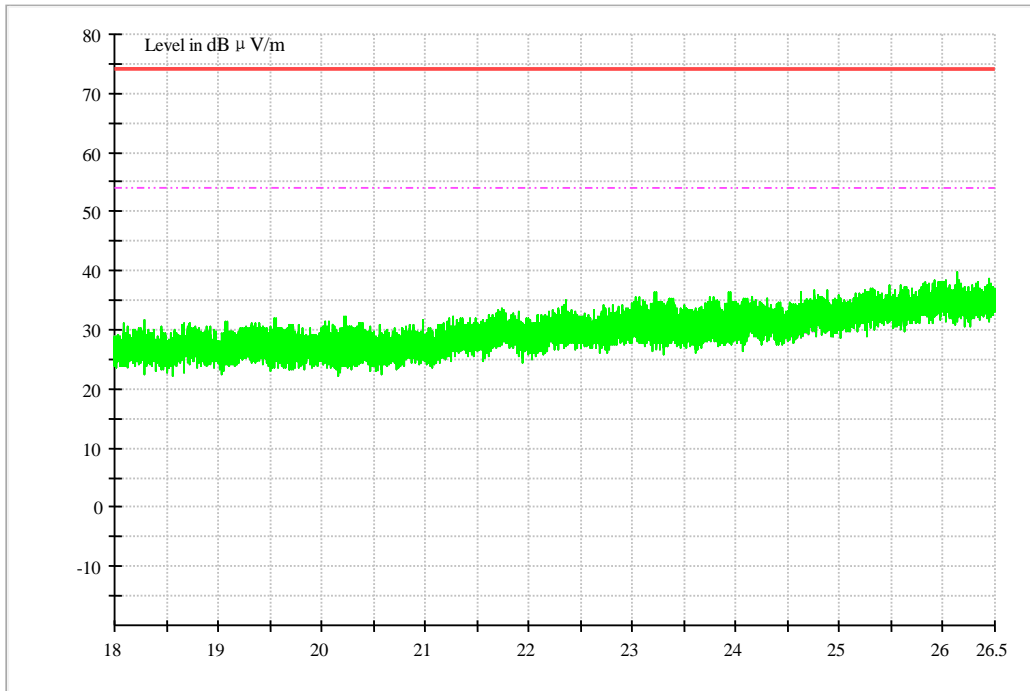
MEASUREMENT RESULT: AV Detector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarisation |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 2500.012 | 37.88 | -7.6 | 54 | 16.12 | 100 | 163 | V |
| 16874.618 | 46.26 | 21 | 54 | 7.74 | 100 | 193 | V |
| 17885.16 | 46.1 | 21.6 | 54 | 7.9 | 100 | 137 | V |

Note:

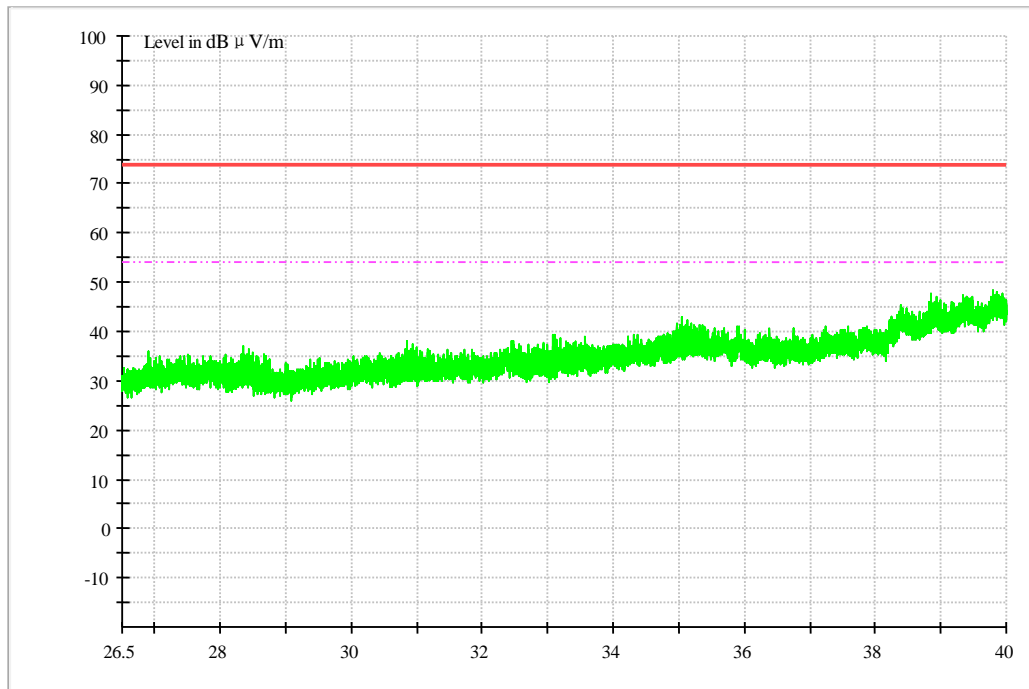
Level = Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)
The reading level is calculated by software which is not shown in the sheet.

7.1.3 18GHz~26.5GHz
Test Mode: Mode1



NOTE 1: The data was measured by Peak detector.
NOTE 2: No peak found in the Test Range of "18 GHz to 26.5GHz"

7.1.4 26.5GHz~40GHz
Test Mode: Mode1

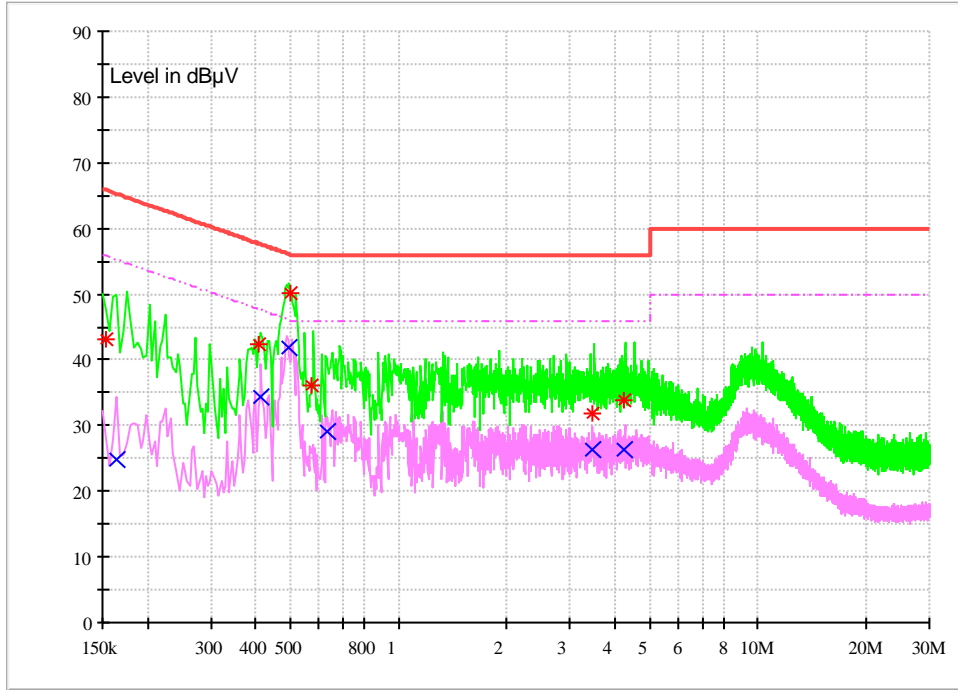


NOTE 1: The data was measured by Peak detector.
NOTE 2: No peak found in the Test Range of "26.5 GHz to 40GHz"

7.2 Conducted Disturbance

7.2.1 AC Port Test Data

Test Mode: Mode2



MEASUREMENT RESULT: QP Detector

| Frequency MHz | Level dBµV | Line | Transd dB | Margin dB | Limit dBµV | PE |
|---------------|------------|------|-----------|-----------|------------|-----|
| 0.153048 | 43.1 | L1 | 9.7 | 22.73 | 65.83 | FLO |
| 0.408959 | 42.35 | L1 | 9.7 | 15.32 | 57.67 | FLO |
| 0.500955 | 50.14 | L1 | 9.7 | 5.86 | 56 | FLO |
| 0.570548 | 36.09 | L1 | 9.7 | 19.91 | 56 | FLO |
| 3.47668 | 31.78 | N | 9.8 | 24.22 | 56 | FLO |
| 4.253623 | 33.76 | L1 | 9.8 | 22.24 | 56 | FLO |

MEASUREMENT RESULT: AV Detector

| Frequency MHz | Level dBµV | Line | Transd dB | Margin dB | Limit dBµV | PE |
|---------------|------------|------|-----------|-----------|------------|-----|
| 0.164553 | 24.91 | N | 9.7 | 30.32 | 55.23 | FLO |
| 0.413474 | 34.42 | L1 | 9.7 | 13.16 | 47.58 | FLO |
| 0.494714 | 41.94 | L1 | 9.7 | 4.15 | 46.09 | FLO |
| 0.630594 | 29.01 | L1 | 9.7 | 16.99 | 46 | FLO |
| 3.473944 | 26.28 | L1 | 9.8 | 19.72 | 46 | FLO |
| 4.23585 | 26.34 | L1 | 9.8 | 19.66 | 46 | FLO |

-----END-----