



# EMC Test Report

**Product Name: LTE USB Stick**

**Model Number: MS2372h-607**

**FCC ID: QISMS2372H-607**

**Report No: SYBH(Z-EMC)048092017-2**

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

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## Notice

1. The laboratory has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L0310.
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 as “Global Compliance and Testing Center of Huawei Technologies Co., Ltd”, the both names have coexisted since 2009.
5. The laboratory has been recognized by the US Federal Communications Commission (FCC) to perform compliance testing subject to the Commission's Declaration Of Conformity (DOC) and Certification rules. The Designation Number is CN1173, and the Test Firm Registration Number is 294140.”
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9. Normally, the test report is only responsible for the samples that have undergone the test.
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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:** Sep.25,2017  
**Start Date of Test:** Sep.25,2017  
**End Date of Test:** Sep.30,2017  
**Test Result:** Pass

|                                |                   |                    |                           |
|--------------------------------|-------------------|--------------------|---------------------------|
| Approved By<br>(Lab Manager)   | <u>2017-09-30</u> | <u>Roger Zhang</u> | <u><i>Roger Zhang</i></u> |
|                                | Date              | Name               | Signature                 |
| Prepared by<br>(Test Engineer) | <u>2017-09-30</u> | <u>Luo Wei</u>     | <u><i>Luo Wei</i></u>     |
|                                | Date              | Name               | Signature                 |



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## 1 General Information

### 1.1 EUT Description

| EUT Description     |                                                                                             |
|---------------------|---------------------------------------------------------------------------------------------|
| Product Name        | LTE USB Stick                                                                               |
| Model Number        | MS2372h-607                                                                                 |
| Serials Number      | 2NU0117907000016                                                                            |
| Input Rated Voltage | --- 5V                                                                                      |
| TX Frequency        | GSM 850: 824MHz to 849MHz<br>GSM 1900: 1850MHz to 1910MHz<br>LTE BAND 7: 2500MHz to 2570MHz |
| RX Frequency        | GSM 850: 869MHz to 894MHz<br>GSM 1900: 1930MHz to 1990MHz<br>LTE BAND 7: 2620MHz to 2690MHz |
| HW Version          | CL1MS2372HM01 VER.B                                                                         |
| SW Version          | 21.328.01.07.00                                                                             |

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:          | 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 15:2016, Subpart B

## 2 Summary of Results

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

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

| Test Mode |                                       |
|-----------|---------------------------------------|
| Mode 1:   | EUT with PC+ USB Cable+ Idle Mode     |
| Mode 2:   | EUT with PC+ USB Cable + Traffic Mode |

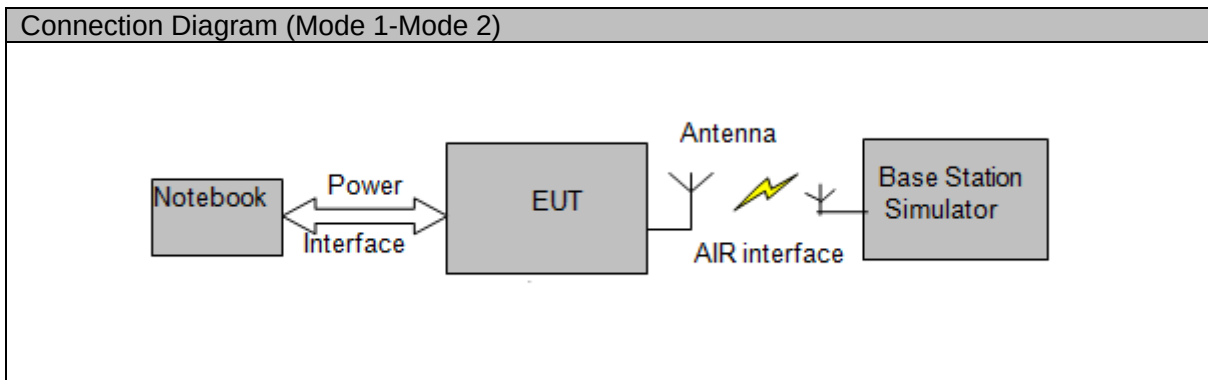
Traffic Mode:

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.

#### 3.2 Test System Configuration





### 3.3 Cables Used during Test

| Cable     | Quantity | Length | Type of Cable |
|-----------|----------|--------|---------------|
| USB cable | 1        | 1m     | shielded      |

### 3.4 Associated Equipment Used during Test

| Name                          | Model   | Manufacturer | S/N         | Calibrated<br>Deadline |
|-------------------------------|---------|--------------|-------------|------------------------|
| Radio Communication<br>Tester | CMU200  | R&S          | 3607033573  | 2018-02-<br>28         |
| Radio Communication<br>Tester | MT8820C | Anritsu      | A110518805  | 2018-05-<br>15         |
| Notebook                      | X230    | ThinkPad     | 31090403579 | /                      |

## 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 C63.4-2014. The test distance is 3m. The set-up and test methods are according to ANSI C63.4-2014.

A preliminary scan and a final scan of the emissions are made from 30 MHz to 18 GHz by using test script of software; The emissions are measured using Quasi-Peak Detector (30MHz~1GHz) and AV/PK detector (above 1GHz). The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth in accordance with the software setup. Normally, the height range of antenna is 1m to 4m. The azimuth range of turntable is 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 is configured in idle mode and the test performed at worst emission state.

#### 4.1.2 Test setup

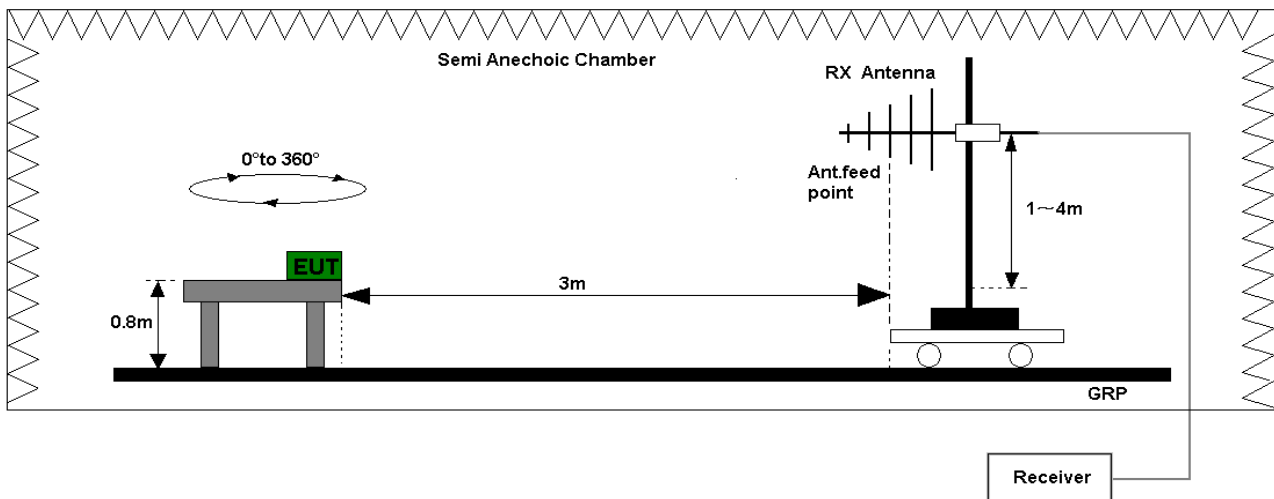


Figure 1. Test set-up of radiated disturbance(30MHz-1GHz )

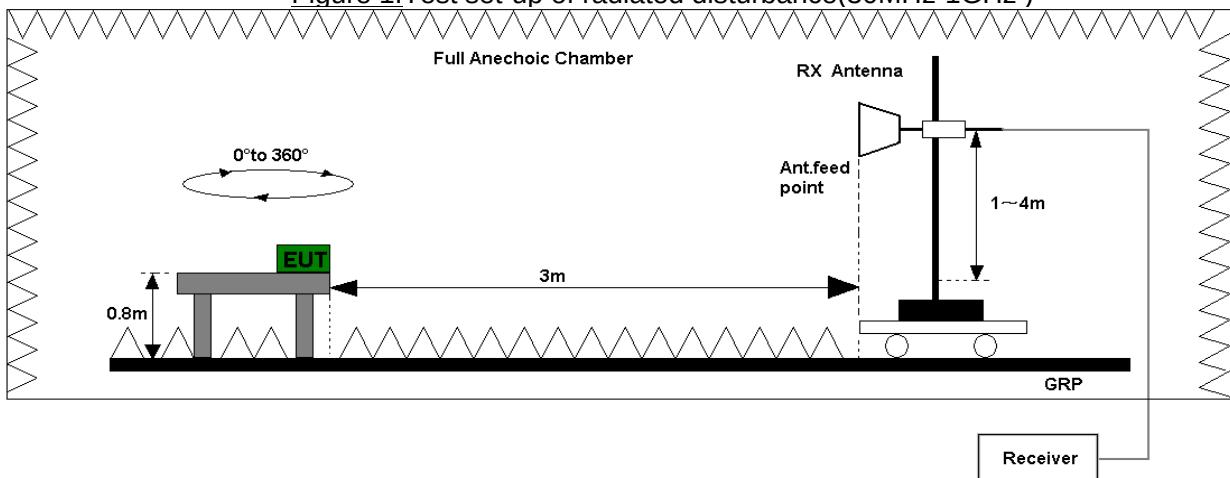


Figure 2. Test set-up of radiated disturbance(above 1GHz)

#### 4.1.3 Test Results

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

| Test Limits (Class B)          |                  |      |                    |    |
|--------------------------------|------------------|------|--------------------|----|
| Frequency of Emission<br>(MHz) | Radiated Limit   |      |                    |    |
|                                | Unit( $\mu$ V/m) |      | Unit(dB $\mu$ 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 is placed upon a non-metallic table 0.8 m above the horizontal metal reference ground plane. EUT is connected to LISN and LISN is connected to reference Ground Plane. EUT is 80cm away from LISN. The set-up and test methods are according to ANSI C63.4-2014.

Conducted Disturbance at AC Port measurements are undertaken on the L and N Lines. The emissions are measured using a Quasi-Peak Detector and Average Detector.

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

### 4.2.2 Test Setup

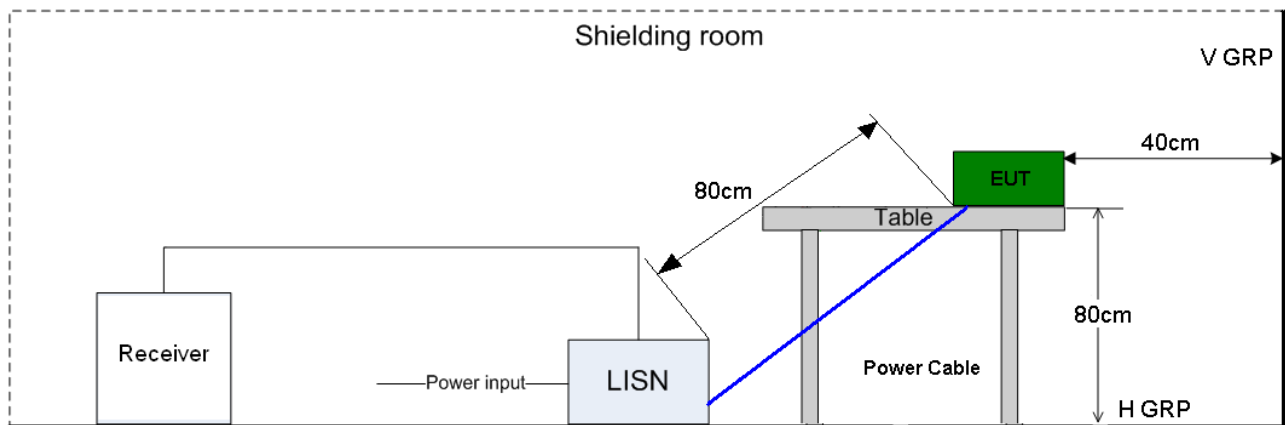


Figure 3. Test Set-up of conducted disturbance

### 4.2.3 Test Results

The EUT has met requirements for Conducted disturbance.

Refer to the section 7.2 of this report for test data.

| Test Limit of AC Power Port |                  |                  |
|-----------------------------|------------------|------------------|
| Frequency range             | 150kHz ~ 30MHz   |                  |
| Frequency                   | 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 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          | Feb. 20, 2018       | 12                   |
|                      | Broadband Antenna        | VULB 9163 | 9163-491     | SCHWARZBECK  | Mar. 28, 2019       | 24                   |
|                      | Horn Antenna             | HF906     | 100683       | R&S          | Mar. 28, 2019       | 24                   |
| CE                   | EMI Test receiver        | ESU26     | 101163       | R&S          | Feb. 20, 2018       | 12                   |
|                      | Artificial Mains Network | ENV216    | 100382       | R&S          | May. 15, 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 are:

| System Measurement Uncertainty |                                  |                      |
|--------------------------------|----------------------------------|----------------------|
| Items                          |                                  | Extended Uncertainty |
| RE(30MHz-1GHz)                 | Field strength (dB $\mu$ V/m)    | U=4.1dB; k=2         |
| RE(1GHz-18GHz)                 | Field strength (dB $\mu$ V/m)    | U=5.0dB; k=2         |
| CE                             | Disturbance Voltage (dB $\mu$ V) | U=2.5dB; k=2         |

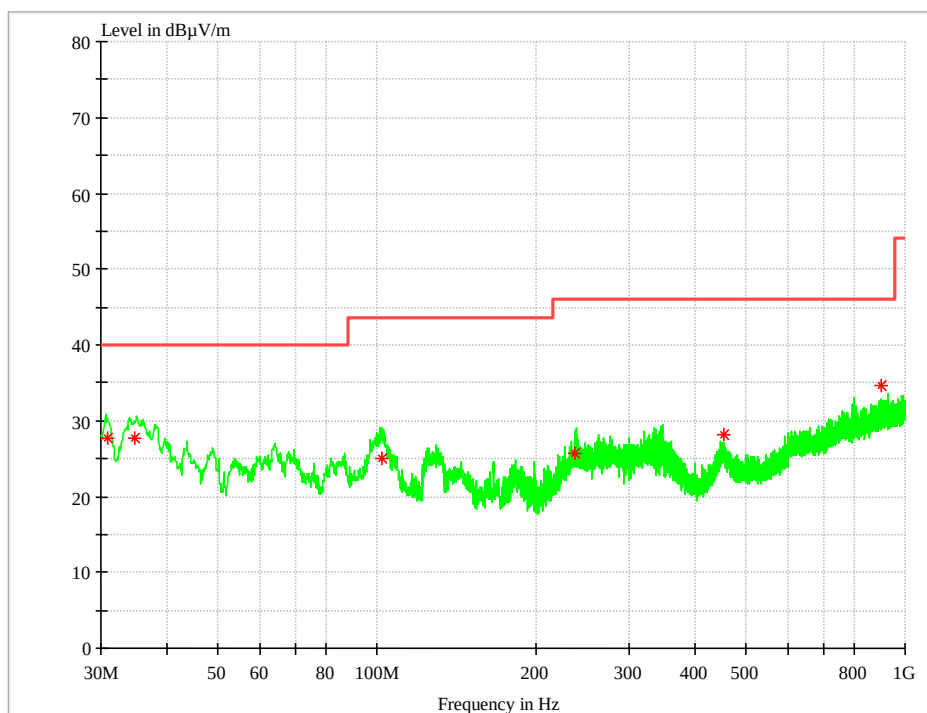
## 7 Test Data and Graph

Only the worst test result is shown in this report.

### 7.1 Radiated Disturbance

#### 7.1.1 30MHz~1GHz

Mode 1:



#### MEASUREMENT RESULT: QP Detector

| Frequency MHz | Level dBμV/m | Transd dB | Limit dBμV/m | Margin dB | Height cm | Azimuth deg | Polarisation |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 30.896950     | 27.62        | 14.7      | 40.00        | 12.38     | 100.0     | 197.0       | VERTICAL     |
| 34.663200     | 27.76        | 15.2      | 40.00        | 12.24     | 100.0     | 18.0        | VERTICAL     |
| 101.936650    | 25.09        | 13.8      | 43.50        | 18.41     | 143.0     | 350.0       | VERTICAL     |
| 237.584400    | 25.63        | 14.3      | 46.00        | 20.37     | 129.0     | 264.0       | HORIZONTAL   |
| 453.604800    | 28.20        | 19.0      | 46.00        | 17.80     | 107.0     | 208.0       | VERTICAL     |
| 899.754650    | 34.73        | 26.1      | 46.00        | 11.27     | 200.0     | 197.0       | HORIZONTAL   |

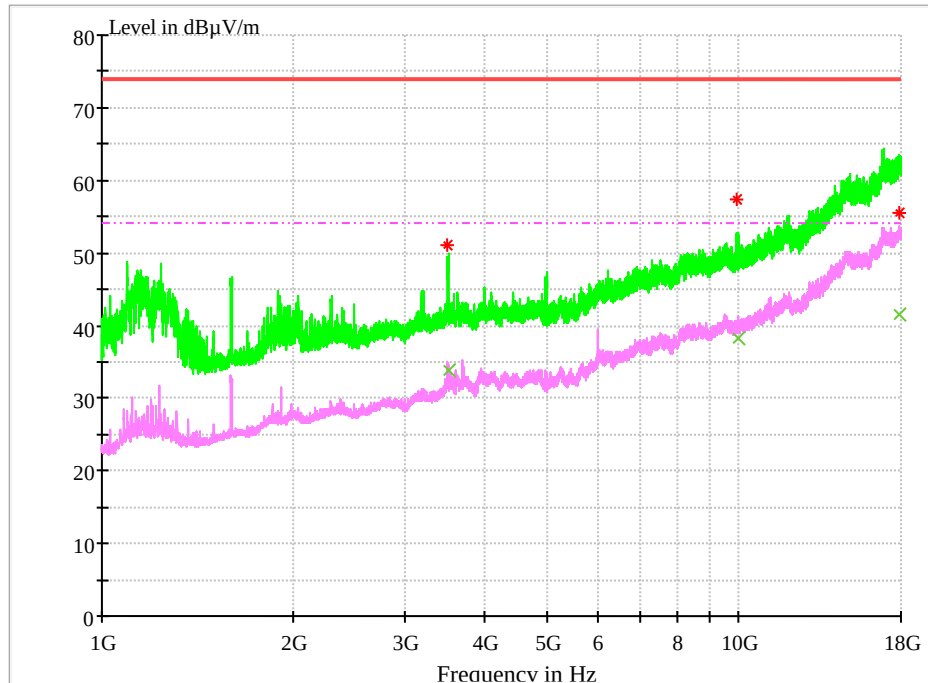
Note:

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.

## 7.1.2 1GHz~18GHz

Mode 1:



### MEASUREMENT RESULT: PK Detector

| Frequency MHz | Level dBμV/m | Transd dB | Limit dBμV/m | Margin dB | Height cm | Azimuth deg | Polarisation |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 3492.238667   | 51.13        | -3.5      | 74           | 22.87     | 100       | 316         | VERTICAL     |
| 9964.602667   | 57.3         | 7.4       | 74           | 16.7      | 140       | 12          | VERTICAL     |
| 17922.54667   | 55.43        | 21.6      | 74           | 18.57     | 256       | 63          | HORIZONTAL   |

### MEASUREMENT RESULT: AV Detector

| Frequency MHz | Level dBμV/m | Transd dB | Limit dBμV/m | Margin dB | Height cm | Azimuth deg | Polarisation |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 3499.236      | 33.9         | -3.5      | 54           | 20.1      | 100       | 316         | VERTICAL     |
| 9977.314      | 38.21        | 7.4       | 54           | 15.79     | 143       | 7           | VERTICAL     |
| 17870.98867   | 41.63        | 21.5      | 54           | 12.37     | 160       | 354         | HORIZONTAL   |

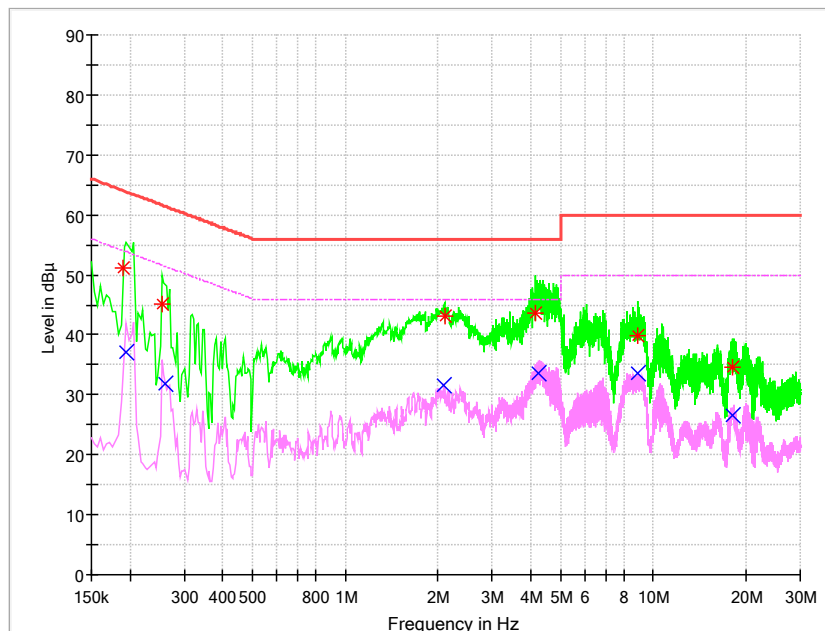
Note:

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

### 7.2.1 AC Port Test Data

Mode 2:



#### MEASUREMENT RESULT: QP Detector

| Frequency MHz | Level dBμV | Line | Transd dB | Margin dB | Limit dBμV | PE  |
|---------------|------------|------|-----------|-----------|------------|-----|
| 0.190489      | 51.14      | N    | 9.7       | 12.87     | 64.02      | FLO |
| 0.253845      | 45.17      | L1   | 9.7       | 16.46     | 61.63      | FLO |
| 2.098522      | 43.1       | N    | 9.7       | 12.9      | 56         | FLO |
| 4.129714      | 43.52      | N    | 9.8       | 12.48     | 56         | FLO |
| 8.889401      | 39.92      | L1   | 9.9       | 20.08     | 60         | FLO |
| 18.121226     | 34.5       | L1   | 10.1      | 25.5      | 60         | FLO |

#### MEASUREMENT RESULT: AV Detector

| Frequency MHz | Level dBμV | Line | Transd dB | Margin dB | Limit dBμV | PE  |
|---------------|------------|------|-----------|-----------|------------|-----|
| 0.194539      | 37.06      | L1   | 9.7       | 16.78     | 53.84      | FLO |
| 0.259515      | 31.77      | L1   | 9.7       | 19.68     | 51.45      | FLO |
| 2.095601      | 31.6       | N    | 9.7       | 14.4      | 46         | FLO |
| 4.259456      | 33.68      | N    | 9.8       | 12.32     | 46         | FLO |
| 8.890166      | 33.58      | L1   | 9.9       | 16.42     | 50         | FLO |
| 18.171019     | 26.54      | L1   | 10.1      | 23.46     | 50         | 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-----