

## EMC Test Report

Applicant : Cermate Technologirs Inc.

Product Type : Human machine interface

Trade Name : Cermate

Model Number : IT407-22ST,NT407-22ST,MT407-22ST,KT407-22ST,RT407-22ST,PT407-22ST  
FT407-22ST,GT407-22ST,HT407-22ST,OT407-22ST,VT407-22ST,PT2070-22ST  
NT2070-22ST,MT2070-22ST,KT2070-22ST,RT2070-22ST,FT2070-22ST,GT2070-22ST  
HT2070-22ST,OT2070-22ST,VT2070-22ST,IT2070-22ST,IPT2070-22ST,xPT2070-22ST  
GPT2070-22ST,xIT407-22ST,GIT407-22ST

Applicable Standard : FCC 47 CFR PART 15 SUBPART B  
ANSI C63.4: 2014

Received Date : Jan. 21, 2021

Test Period : Jan. 29 ~ Mar. 10, 2021

Issued Date : Apr. 01, 2021

### Issued by

A Test Lab Techno Corp.  
No. 140-1, Changan Street, Bade District,  
Taoyuan City 33465, Taiwan (R.O.C.)  
Tel : +886-3-2710188 / Fax : +886-3-2710190



Taiwan Accreditation Foundation accreditation number: 1330  
Test Firm MRA designation number: TW1062  
Certified Scope: 9 kHz ~ 40 GHz

#### Note:

- 1.The test results are valid only for samples provided by customers and under the test conditions described in this report.
- 2.This report shall not be reproduced except in full, without the written approval of A Test Lab Technology Corporation.
- 3.The relevant information is provided by customers in this test report. According to the correctness, appropriateness or completeness of the information provided by the customer, if there is any doubt or error in the information which affects the validity of the test results, the laboratory does not take the responsibility.



### **Revision History**

| Rev. | Issued Date   | Revisions     | Revised By  |
|------|---------------|---------------|-------------|
| 00   | Apr. 01, 2021 | Initial Issue | Yutsen Chou |
|      |               |               |             |
|      |               |               |             |
|      |               |               |             |

## Verification of Compliance

Applicant : Cermate Technologirs Inc.

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HT2070-22ST,OT2070-22ST,VT2070-22ST,IT2070-22ST,IPT2070-22ST,xPT2070-22ST  
GPT2070-22ST,xIT407-22ST,GIT407-22ST

EUT Rated Voltage : DC 24 V, 0.8 A

Test Voltage : 120 Vac / 60 Hz ; 240 Vac / 60 Hz

Applicable Standard : FCC 47 CFR PART 15 SUBPART B  
ANSI C63.4: 2014

Test Result : Complied

Performing Lab. : A Test Lab Techno Corp.  
No. 140-1, Changan Street, Bade District,  
Taoyuan City 33465, Taiwan (R.O.C.)  
Tel : +886-3-2710188 / Fax : +886-3-2710190  
Taiwan Accreditation Foundation accreditation number: 1330  
<http://www.atl-lab.com.tw/e-index.htm>



The above equipment has been tested by A Test Lab Techno Corp., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved By

: Terry Liao

(Manager)

(Terry Liao)

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## 1 General Information

### 1.1. Summary of Test Result

| Emission                                   |                    |         |                    |
|--|--------------------|---------|--------------------|
| Standard                                   | Item               | Verdict | Remark             |
| FCC 47 CFR PART 15 SUBPART B<br>ANSI C63.4 | Conducted Emission | PASS    | Meet Class A limit |
| FCC 47 CFR PART 15 SUBPART B<br>ANSI C63.4 | Radiated Emission  | PASS    | Meet Class A limit |

Decision Rule

☒ Uncertainty is not included.

☐ Uncertainty is included.

### 1.2. Testing Location

Site Name: A Test Lab Techno Corp.

<http://www.atl-lab.com.tw/e-index.htm>

Site Address: No. 140-1, Changan Street, Bade District, Taoyuan City 33465, Taiwan (R.O.C.)

Tel : +886-3-2710188

Fax : +886-3-2710190

### 1.3. Measurement Uncertainty

| Test Item          |               | Frequency Range  | Uncertainty (dB) |
|--------------------|---------------|------------------|------------------|
| Conducted Emission | AC Power Port | 9 kHz ~ 150 kHz  | ± 2.7            |
|                    |               | 150 kHz ~ 30 MHz | ± 2.7            |

| Test Item   | Test Site | Frequency Range       |            | Uncertainty (dB) |
|---|-----------|-----------------------|------------|------------------|
| Radiated Emission   | TE06      | 30 MHz ~ 1000 MHz     | Horizontal | ± 4.4            |
|   |           |                       | Vertical   | ± 4.5            |
|   | TE01      | 1000 MHz ~ 6000 MHz   |            | ± 5.2            |
|   |           | 6000 MHz ~ 18000 MHz  |            | ± 5.5            |
|   |           | 18000 MHz ~ 26500 MHz |            | ± 4.8            |
|   |           | 26500 MHz ~ 40000 MHz |            | ± 5.4            |
|   | TE09      | 1000 MHz ~ 6000 MHz   |            | ± 5.0            |
|   |           | 6000 MHz ~ 18000 MHz  |            | ± 5.3            |
|   |           | 18000 MHz ~ 26500 MHz |            | ± 4.5            |
|   |           | 26500 MHz ~ 40000 MHz |            | ± 5.4            |
| Note: The Vertical and Horizontal measurement uncertainty of 1 GHz to 40 GHz is evaluated and choose which polarity is worst value. |           |                       |            |                  |

### 1.4. Test Site Environment

| Test Item          | Items                      | Required (IEC 60068-1) | Actual   |
|--------------------|----------------------------|------------------------|----------|
| Conducted Emission | Temperature (°C)           | 15-35                  | 15-30    |
|                    | Humidity (%RH)             | 25-75                  | 45-75    |
|                    | Barometric pressure (mbar) | 860-1060               | 990-1005 |
| Radiated Emission  | Temperature (°C)           | 15-35                  | 15-30    |
|                    | Humidity (%RH)             | 25-75                  | 45-75    |
|                    | Barometric pressure (mbar) | 860-1060               | 990-1005 |

## 2 EUT Description

|   |   |
|---|---|
| Applicant                                 | Cermate Technologirs Inc.<br>7F-1, No.168, Lien Cheng Rd., Chung-Ho District, New Taipei City, Taiwan 235   |
| Manufacturer                              | Cermate Technologirs Inc.<br>7F-1, No.168, Lien Cheng Rd., Chung-Ho District, New Taipei City, Taiwan 235   |
| Product Type                              | Human machine interface   |
| Trade Name                                | Cermate   |
| Model Number                              | IT407-22ST,NT407-22ST,MT407-22ST,KT407-22ST,RT407-22ST,PT407-22ST<br>FT407-22ST,GT407-22ST,HT407-22ST,OT407-22ST,VT407-22ST,PT2070-22ST<br>NT2070-22ST,MT2070-22ST,KT2070-22ST,RT2070-22ST,FT2070-22ST,GT2070-22ST<br>HT2070-22ST,OT2070-22ST,VT2070-22ST,IT2070-22ST,IPT2070-22ST,xPT2070-22ST<br>GPT2070-22ST,xIT407-22ST,GIT407-22ST |
| Difference description<br>of model number | Difference is due to selling region.  |
| I/O Ports                                 | Refer to User Manual  |
| Highest Operating<br>Frequency            | 300 MHz   |

### 3 Test Methodology

#### 3.1. Decision of Test Mode

##### 3.1.1. The following test mode(s) were scanned during the preliminary test:

| Pre-Test Mode  |
|--|
| Mode 1: Normal Operation Mode (120 V / 60 Hz)<br>Mode 2: Normal Operation Mode (240 V / 60 Hz) |

##### 3.1.2. After the preliminary scan, the following test mode was final mode and found to produce the highest emission level.

| Final Test Mode |                    |             |                 |
|-----------------|--------------------|-------------|-----------------|
| Emission        | Conducted Emission |             | Mode 1 / Mode 2 |
|                 | Radiated Emission  | Below 1 GHz | Mode 1 / Mode 2 |
|                 |                    | Above 1 GHz | Mode 1 / Mode 2 |

The above highest emission mode of the configuration of the EUT and cable was chosen for all final test items.

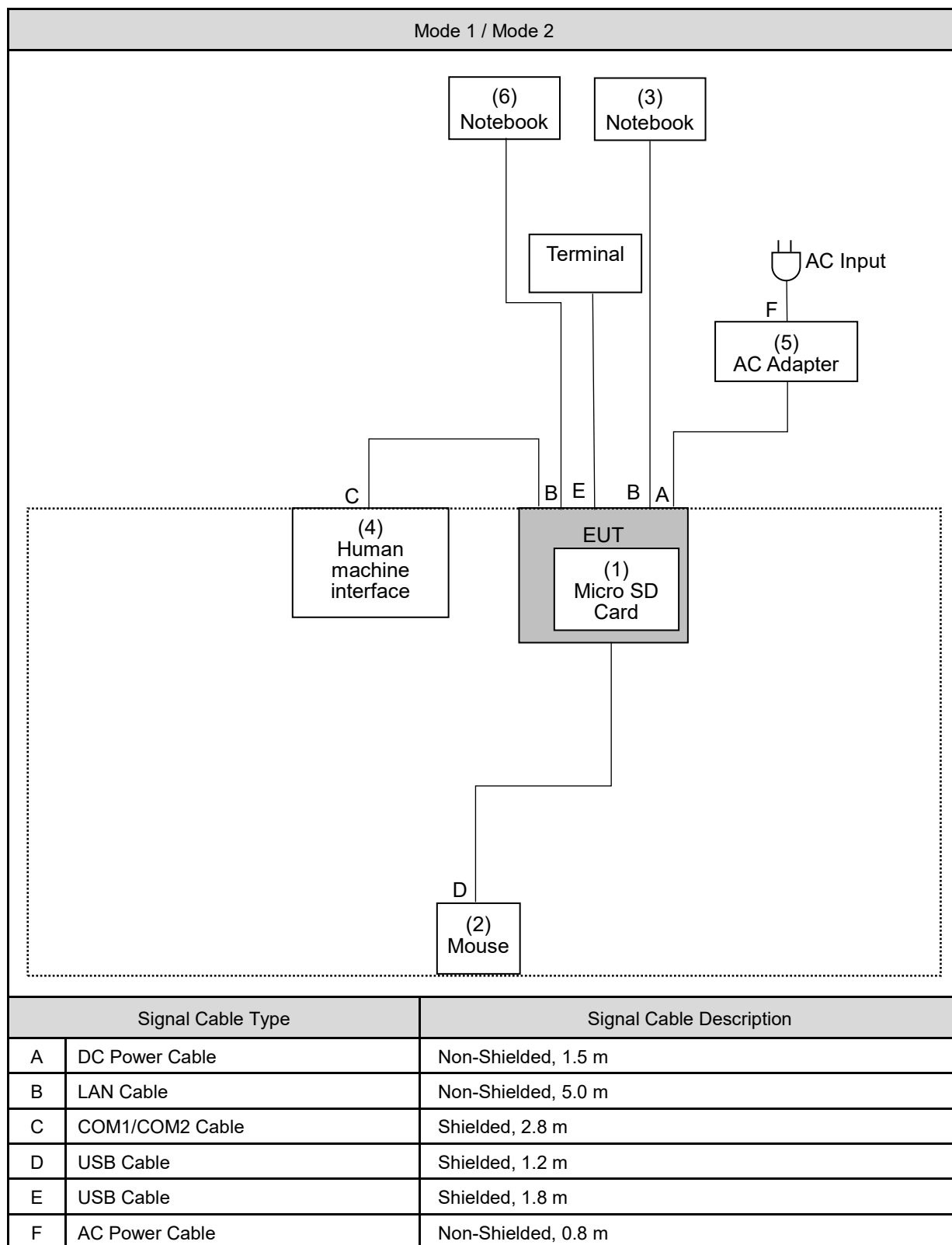
#### 3.2. EUT Test Step

|   |
|---|
| 1. Setup the EUT and simulators as shown on 3.3.  |
| 2. Turn on the power of all equipment.  |
| 3. Data will be communicated between EUT and Notebook, that is connected to LAN Port of EUT and Notebook. |
| 4. Connected Human machine interface and transfer data(Read/Write)  |
| 5. Start to test till get the worst reading.  |

| Measurement Software |                                 |          |         |
|----------------------|---------------------------------|----------|---------|
| No.                  | Description                     | Software | Version |
| 1                    | Conducted Emission              | EZ EMC   | 1.1.4.3 |
| 2                    | Radiated Emission _ Below 1 GHz | EZ EMC   | 1.1.4.2 |
| 3                    | Radiated Emission _ Above 1 GHz | EZ EMC   | 1.1.4.4 |



### 3.3. Configuration of Test System Details



| Devices Description |                         |              |                 |                          |                     |
|---------------------|-------------------------|--------------|-----------------|--------------------------|---------------------|
| Product             |                         | Manufacturer | Model Number    | Serial Number            | Power Cord          |
| (1)                 | Micro SD Card           | SanDisk      | 16GB            | N/A                      | N/A                 |
| (2)                 | Mouse                   | DELL         | MOCZL           | CN-049 TWY-73826-63N015S | Power by EUT        |
| (3)                 | Notebook                | DELL         | LATITUDE E5440  | 25627158361              | Non-Shielded, 1.8 m |
| (4)                 | Human machine interface | Cermate      | IT407-22ST-F4B4 | 07127GXC000005           | Non-Shielded, 1.5 m |
| (5)                 | AC Adapter              | MEAN WELL    | SE-100-24       | N/A                      | Non-Shielded, 1.5 m |
| (6)                 | Notebook                | DELL         | LATITUDE E5440  | 6699565657               | Non-Shielded, 1.8 m |

### 3.4. Test Instruments

Test Period : Jan. 29 ~ Feb. 23, 2021

Testing Engineer : Shenglung Wen

| Conducted Emission test site |              |                |                      |            |             |
|------------------------------|--------------|----------------|----------------------|------------|-------------|
| Equipment                    | Manufacturer | Model Number   | Serial Number        | Cal. Date  | Cal. Period |
| Test Receiver                | R&S          | ESCI           | 100367               | 05/25/2020 | 1 year      |
| LISN                         | R&S          | ENV216         | 101040               | 03/23/2020 | 1 year      |
| LISN                         | R&S          | ENV216         | 101041               | 04/06/2020 | 1 year      |
| Cable                        | Woken        | 00100D1380194M | TE-02-03<br>(CB-098) | 05/26/2020 | 1 year      |
| Test Site                    | ATL          | TE02           | TE02                 | N.C.R.     | -----       |

Test Period : Feb. 25 ~ Mar. 10, 2021

Testing Engineer : Andy Liu, Jacky Wu

| Radiated Emission - 10 Meter Chamber |                                |                 |               |            |             |
|--------------------------------------|--------------------------------|-----------------|---------------|------------|-------------|
| Equipment                            | Manufacturer                   | Model Number    | Serial Number | Cal. Date  | Cal. Period |
| Amplifier                            | EMCI                           | EMC9135         | 980298        | 11/02/2020 | 1 year      |
| Amplifier                            | EMCI                           | EMC9135         | 980299        | 11/30/2020 | 1 year      |
| Test Receiver                        | R&S                            | ESCI            | 100722        | 10/28/2020 | 1 year      |
| Test Receiver                        | R&S                            | ESCI            | 101000        | 11/27/2020 | 1 year      |
| Broadband Antenna                    | SCHWARZBECK<br>MESS-ELEKTRONIK | VULB 9168       | 670           | 11/11/2020 | 1 year      |
| Broadband Antenna                    | SCHWARZBECK<br>MESS-ELEKTRONIK | VULB 9168       | 671           | 11/26/2020 | 1 year      |
| RF Cable                             | EMC                            | EMC102-N-N-6000 | TE06-H-1      | 02/15/2021 | 1 year      |
| RF Cable                             | EMC                            | EMC102-N-N-7000 | TE06-H-2      | 02/15/2021 | 1 year      |
| RF Cable                             | EMC                            | EMC102-N-N-3000 | TE06-H-3      | 02/15/2021 | 1 year      |
| RF Cable                             | EMC                            | EMC102-N-N-1000 | TE06-H-4      | 02/15/2021 | 1 year      |
| RF Cable                             | EMC                            | EMC102-N-N-7000 | TE06-V-2      | 02/15/2021 | 1 year      |
| RF Cable                             | EMC                            | EMC102-N-N-3000 | TE06-V-3      | 02/15/2021 | 1 year      |
| RF Cable                             | EMC                            | EMC102-N-N-1000 | TE06-V-4      | 02/15/2021 | 1 year      |
| RF Cable                             | EMC                            | EMC104-N-N-6000 | TE06-V-5      | 02/15/2021 | 1 year      |
| Test Site                            | ATL                            | TE06            | TE06          | 10/18/2020 | 1 year      |

Note: N.C.R. = No Calibration Request.



Test Period : Feb. 24, 2021

Testing Engineer : Terry Wu

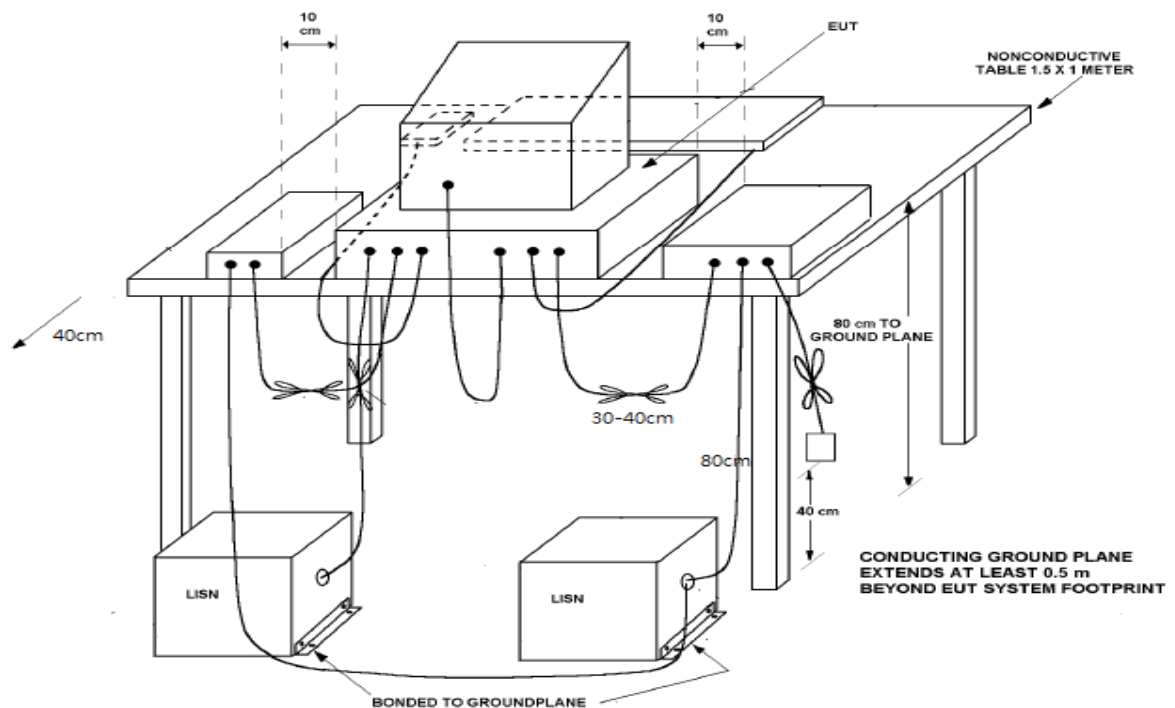
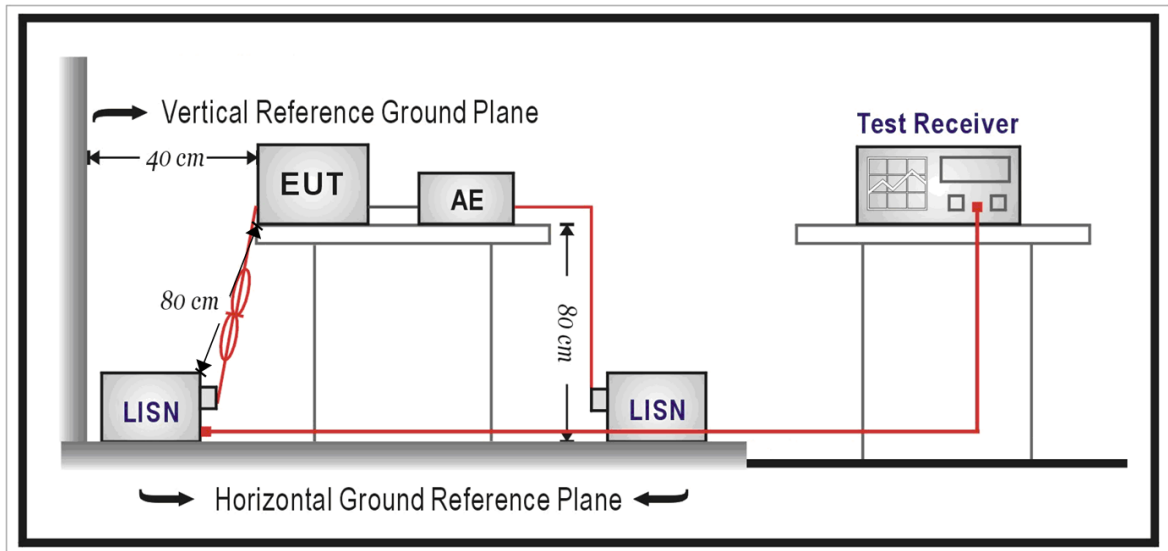
| Radiated Emission - 3 Meter Chamber   |                                |                    |               |            |             |
|---------------------------------------|--------------------------------|--------------------|---------------|------------|-------------|
| Equipment                             | Manufacturer                   | Model Number       | Serial Number | Cal. Date  | Cal. Period |
| Spectrum Analyzer                     | Agilent                        | E4445A             | MY46181986    | 05/30/2020 | 1 year      |
| Amplifier (1-26.5 GHz)                | Agilent                        | 8449B              | 3008A02456    | 03/25/2020 | 1 year      |
| Double Ridged Horn Antenna (1-18 GHz) | ETS                            | 3117               | 00152321      | 09/23/2020 | 1 year      |
| Microwave Cable                       | EMCI                           | EMC104-SM-SM-1500  | 140303        | 02/17/2021 | 1 year      |
| Microwave Cable                       | EMCI                           | EMC104-SM-SM-13000 | 150503        | 02/17/2021 | 1 year      |
| Spectrum Analyzer                     | Keysight                       | N9010A             | MY52221312    | 01/18/2021 | 1 year      |
| Horn Antenna (18-40 GHz)              | SCHWARZBECK<br>MESS-ELEKTRONIK | 9170               | 9170-320      | 08/18/2020 | 1 year      |
| Amplifier (26.5-40 GHz)               | EMCI                           | EMC2654045         | 980028        | 08/24/2020 | 1 year      |
| Test Site(VSWR)                       | ATL                            | TE09               | TE09          | 04/11/2020 | 1 year      |

Note: N.C.R. = No Calibration Request.

## 4 Measurement Procedure

### 4.1. Conducted Emission

#### ■ Test Setup



## ■ Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a  $50\ \Omega$  //  $50\ \mu\text{H}$  coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a  $50\ \Omega$  //  $50\ \mu\text{H}$  coupling impedance with  $50\ \Omega$  termination.

Tabletop device shall be placed on a non-conducting platform, of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The wall of screened room shall be located 40cm to the rear of the EUT. Other surfaces of tabletop or floor standing EUT shall be at least 80cm from any other ground conducting surface including one or more LISNs. For floor-standing device shall be placed under the EUT with a 12 mm insulating material.

Conducted emissions were investigated over the frequency range from 0.15 MHz to 30 MHz using a resolution bandwidth of 9 kHz. The equipment under test (EUT) shall be meet the limits in section 4.1.1, as applicable, including the average limit and the quasi-peak limit when using respectively, an average detector and quasi-peak detector measured in accordance with the methods described of related standard. When all of peak value were complied with quasi-peak and average limit from 150 kHz to 30 MHz then quasi-peak and average measurement was unnecessary.

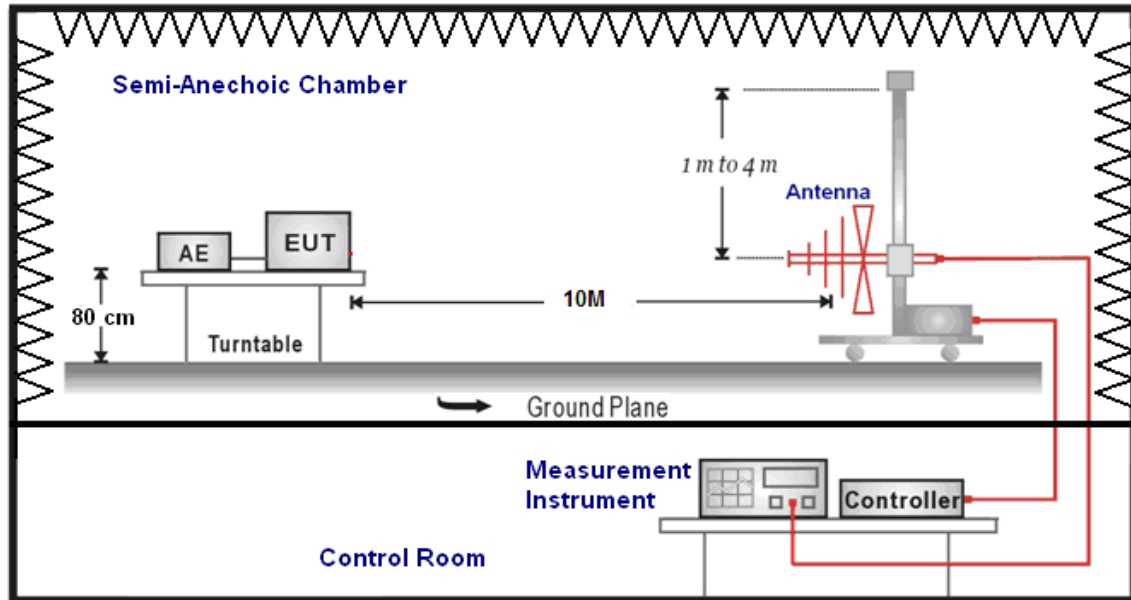
The AMN shall be placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane for AMNs mounted on top of the ground reference plane. This distance is between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment shall be at least 0,8 m from the AMN. If the mains power cable is longer than 1m then the cable shall be folded back and forth at the centre of the lead to form a bundle no longer than 0.4 m. All of interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long. All of EUT and AE shall be separate place more than 0.1 m. All  $50\ \Omega$  ports of the LISN shall be resistively terminated into  $50\ \Omega$  loads when not connected to the measuring instrument.

If the reading of the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 s at each measurement frequency; the higher reading shall be recorded with the exception of any brief isolated high reading which shall be ignored.

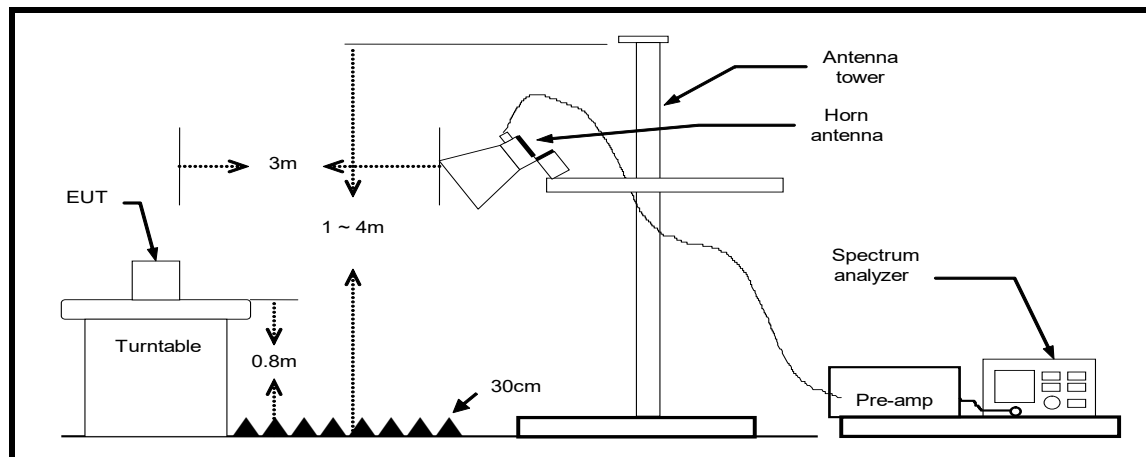
## 4.2. Radiated Emission

### ■ Test Setup

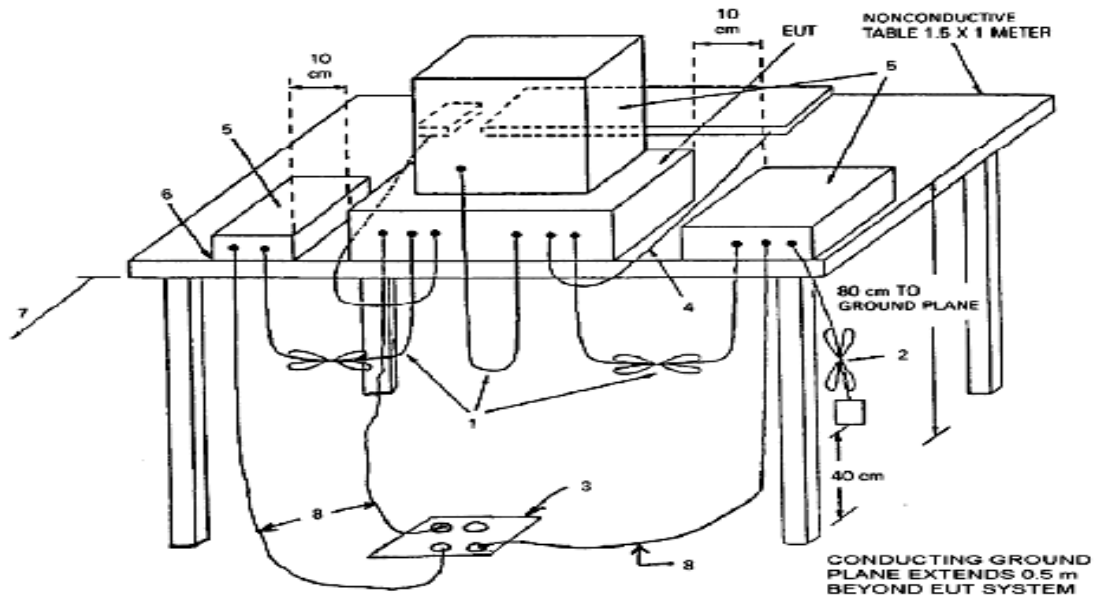
Below 1 GHz



Above 1 GHz



Test arrangement for radiated emissions of tabletop equipment.





## ■ Test Procedure

### Below 1 GHz

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. When the EUT is floor-standing equipment, it is placed on the ground plane which has a 12 mm non-conductive covering to insulate the EUT from the ground plane.

The turn table is 0.8 m height and 2.0 m wide x 1.0 m deep size. It can rotate 360 degrees to determine the position of the maximum emission level. The spacing between the each equipment was 10 cm. The mains cables are dropped to floor and are round to receptacle. Interconnecting cables of table top equipment that hang closer than 0.4 m to the ground plane are folded back and forth forming a bundle 0.3 m to 0.4 m long, hanging approximately in the middle between ground plane and table. The EUT was positioned such that the distance from antenna to the EUT was 10 meters and the receive antenna was moved from 1 m to 4 m to investigate maximum highest emission at least 6 points over the frequency range from 30 MHz to 1 GHz using a resolution bandwidth of 120 kHz and measured by the quasi-peak detector.

According to this standard paragraph 15.109, as an alternative to the radiated emission limits, digital devices may be shown to comply with the standards contained in Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, "Information Technology Equipment - Radio Disturbance Characteristics - Limits and Methods of Measurement".

### Above 1 GHz

The Setup is same as Below 1 GHz placement. The turn table is 0.8 m height and 1.8 m wide x 1.0 m deep size. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meter for above 1 GHz, the highest frequency performed according to internal source frequency of the EUT, the specification was below:

| Highest frequency generated or used in the device or on which the device operates or tunes (MHz) | Upper frequency of measurement range (MHz)                          |
|--|---|
| Below 1.705  | 30  |
| 1.705 - 108  | 1000  |
| 108 - 500  | 2000  |
| 500 - 1000   | 5000  |
| Above 1000   | 5th harmonic of the highest frequency or 40 GHz, whichever is lower |

Absorber shall be spread between floor of a turn table and a receive antenna shown in 4.2.3. The antenna used boresight antenna master from 1 meter and 4 meters to find out the maximum emission level and find the highest emission at least 6 points. Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated on radiated measurement.

Radiated emissions were applied to above 1 GHz using a resolution bandwidth of 1 MHz and measured by the peak and average detector which antenna to the EUT distance was 3 meters. If the EUT was meet both limits and measurement with the average detector receiver is unnecessary.

## 5 Test Results

### 5.1. Conducted Emission

#### ■ Limit

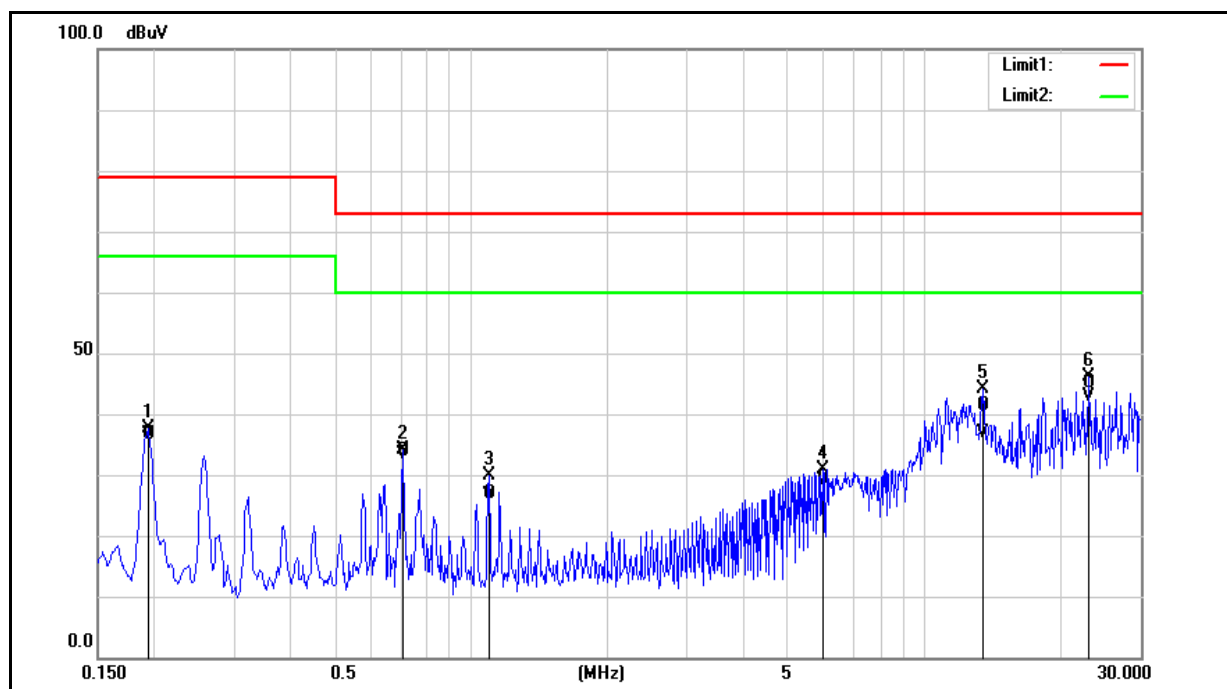
| Frequency (MHz) | Class A (dBuV) |         | Class B (dBuV) |         |
|-----------------|----------------|---------|----------------|---------|
|                 | Quasi-peak     | Average | Quasi-peak     | Average |
| 0.15 - 0.5      | 79             | 66      | 66 - 56        | 56 - 46 |
| 0.50 - 5.0      | 73             | 60      | 56             | 46      |
| 5.0 - 30.0      | 73             | 60      | 60             | 50      |

Note: (1) The lower limit shall apply at the transition frequencies.

(2) The limit decreases in line with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

## ■ Test Result

|                |              |             |                  |
|----------------|--------------|-------------|------------------|
| Test Standard: | FCC Part 15B | Power Line: | L1               |
| Test Mode:     | Mode 1       | Test Power: | AC 120 V / 60 Hz |
| Description:   |              |             |                  |

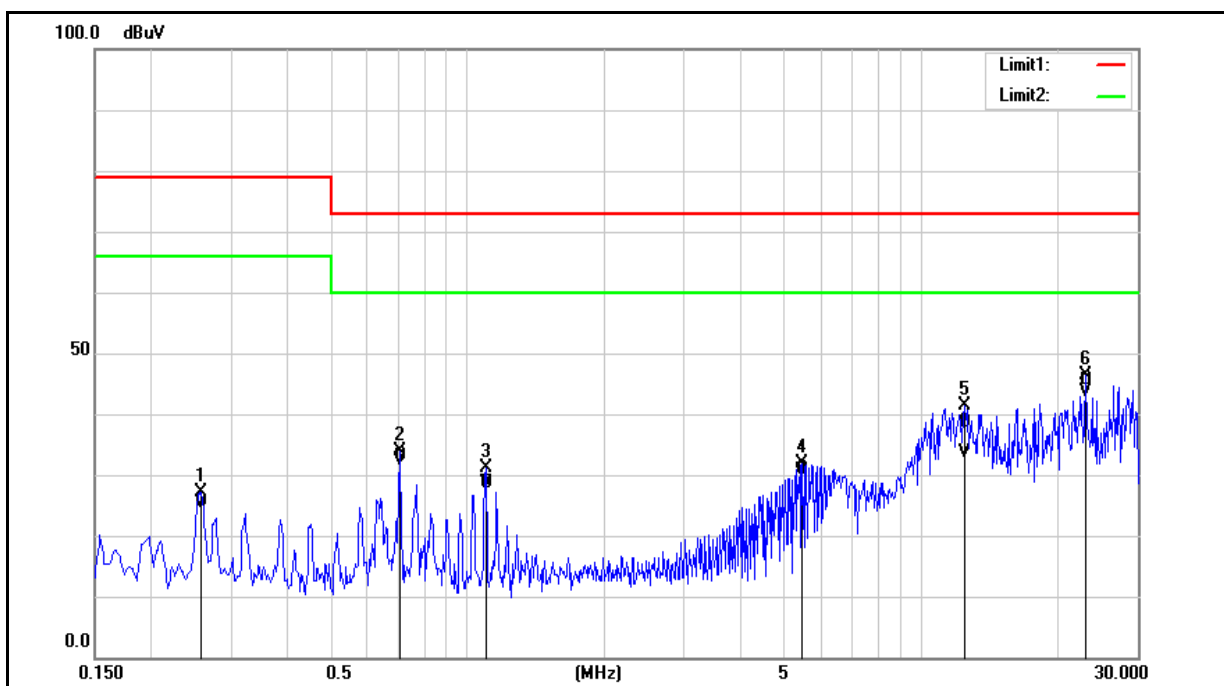


| No. | Frequency (MHz) | QP reading (dBuV) | AVG reading (dBuV) | Correction factor (dB) | QP result (dBuV) | AVG result (dBuV) | QP limit (dBuV) | AVG limit (dBuV) | QP margin (dB) | AVG margin (dB) | Remark |
|-----|-----------------|-------------------|--------------------|------------------------|------------------|-------------------|-----------------|------------------|----------------|-----------------|--------|
| 1   | 0.1940          | 27.03             | 27.00              | 9.70                   | 36.73            | 36.70             | 79.00           | 66.00            | -42.27         | -29.30          | Pass   |
| 2   | 0.7060          | 24.28             | 23.66              | 9.70                   | 33.98            | 33.36             | 73.00           | 60.00            | -39.02         | -26.64          | Pass   |
| 3   | 1.0940          | 17.26             | 16.85              | 9.71                   | 26.97            | 26.56             | 73.00           | 60.00            | -46.03         | -33.44          | Pass   |
| 4   | 5.9740          | 19.51             | 19.31              | 9.83                   | 29.34            | 29.14             | 73.00           | 60.00            | -43.66         | -30.86          | Pass   |
| 5   | 13.4820         | 31.47             | 26.82              | 9.95                   | 41.42            | 36.77             | 73.00           | 60.00            | -31.58         | -23.23          | Pass   |
| 6   | 23.1300         | 35.16             | 32.92              | 10.05                  | 45.21            | 42.97             | 73.00           | 60.00            | -27.79         | -17.03          | Pass   |

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

|                |              |             |                  |
|----------------|--------------|-------------|------------------|
| Test Standard: | FCC Part 15B | Power Line: | N                |
| Test Mode:     | Mode 1       | Test Power: | AC 120 V / 60 Hz |
| Description:   |              |             |                  |

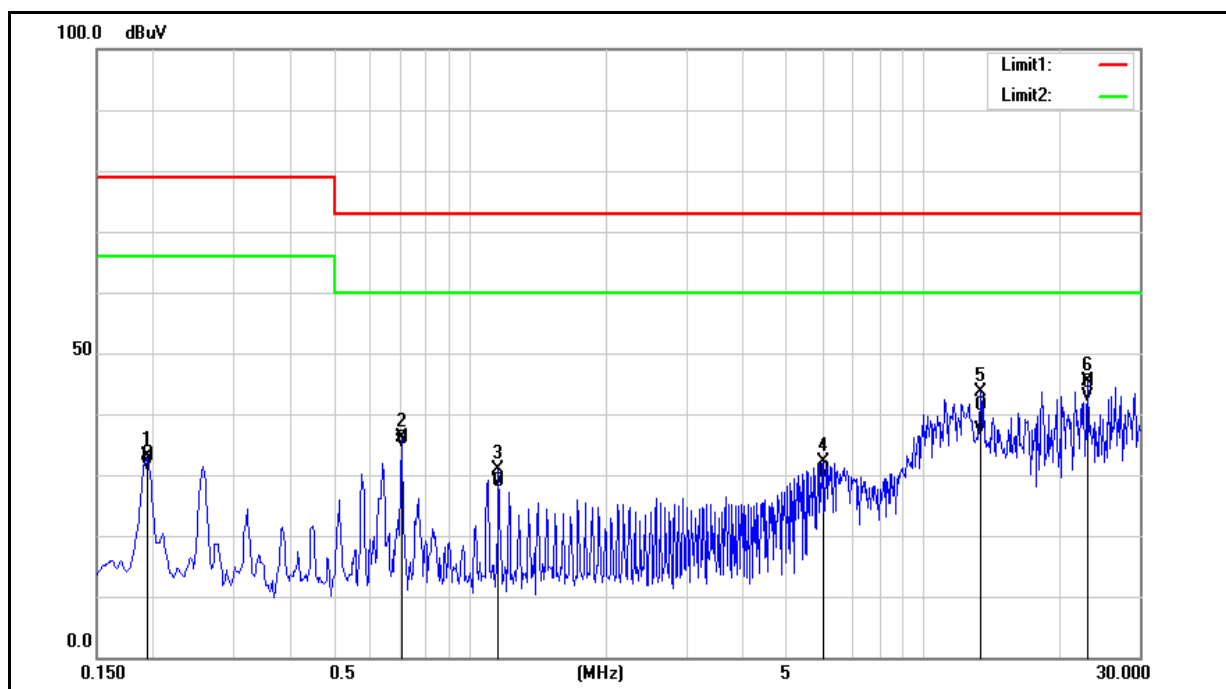


| No. | Frequency (MHz) | QP reading (dBuV) | AVG reading (dBuV) | Correction factor (dB) | QP result (dBuV) | AVG result (dBuV) | QP limit (dBuV) | AVG limit (dBuV) | QP margin (dB) | AVG margin (dB) | Remark |
|-----|-----------------|-------------------|--------------------|------------------------|------------------|-------------------|-----------------|------------------|----------------|-----------------|--------|
| 1   | 0.2580          | 15.84             | 15.63              | 9.69                   | 25.53            | 25.32             | 79.00           | 66.00            | -53.47         | -40.68          | Pass   |
| 2   | 0.7060          | 23.37             | 22.72              | 9.69                   | 33.06            | 32.41             | 73.00           | 60.00            | -39.94         | -27.59          | Pass   |
| 3   | 1.0940          | 18.99             | 18.94              | 9.70                   | 28.69            | 28.64             | 73.00           | 60.00            | -44.31         | -31.36          | Pass   |
| 4   | 5.4580          | 20.98             | 20.89              | 9.81                   | 30.79            | 30.70             | 73.00           | 60.00            | -42.21         | -29.30          | Pass   |
| 5   | 12.5140         | 28.73             | 23.61              | 9.94                   | 38.67            | 33.55             | 73.00           | 60.00            | -34.33         | -26.45          | Pass   |
| 6   | 23.1300         | 35.46             | 33.50              | 10.10                  | 45.56            | 43.60             | 73.00           | 60.00            | -27.44         | -16.40          | Pass   |

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

|                |              |             |                  |
|----------------|--------------|-------------|------------------|
| Test Standard: | FCC Part 15B | Power Line: | L1               |
| Test Mode:     | Mode 2       | Test Power: | AC 240 V / 60 Hz |
| Description:   |              |             |                  |

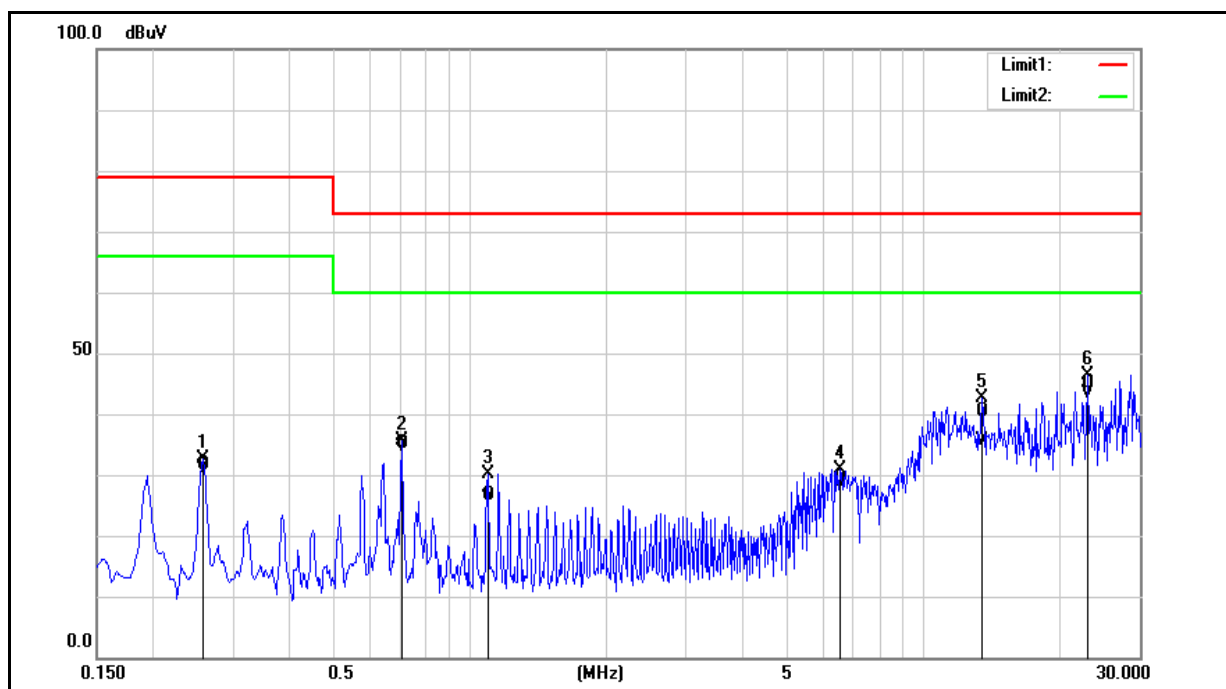


| No. | Frequency<br>(MHz) | QP<br>reading<br>(dBuV) | AVG<br>reading<br>(dBuV) | Correction<br>factor<br>(dB) | QP<br>result<br>(dBuV) | AVG<br>result<br>(dBuV) | QP<br>limit<br>(dBuV) | AVG<br>limit<br>(dBuV) | QP<br>margin<br>(dB) | AVG<br>margin<br>(dB) | Remark |
|-----|--------------------|-------------------------|--------------------------|------------------------------|------------------------|-------------------------|-----------------------|------------------------|----------------------|-----------------------|--------|
| 1   | 0.1940             | 23.68                   | 22.04                    | 9.70                         | 33.38                  | 31.74                   | 79.00                 | 66.00                  | -45.62               | -34.26                | Pass   |
| 2   | 0.7060             | 26.18                   | 25.71                    | 9.70                         | 35.88                  | 35.41                   | 73.00                 | 60.00                  | -37.12               | -24.59                | Pass   |
| 3   | 1.1580             | 19.24                   | 19.16                    | 9.72                         | 28.96                  | 28.88                   | 73.00                 | 60.00                  | -44.04               | -31.12                | Pass   |
| 4   | 6.0380             | 21.03                   | 20.13                    | 9.83                         | 30.86                  | 29.96                   | 73.00                 | 60.00                  | -42.14               | -30.04                | Pass   |
| 5   | 13.3580            | 31.55                   | 27.49                    | 9.95                         | 41.50                  | 37.44                   | 73.00                 | 60.00                  | -31.50               | -22.56                | Pass   |
| 6   | 23.1300            | 34.96                   | 32.90                    | 10.05                        | 45.01                  | 42.95                   | 73.00                 | 60.00                  | -27.99               | -17.05                | Pass   |

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

|                |              |             |                  |
|----------------|--------------|-------------|------------------|
| Test Standard: | FCC Part 15B | Power Line: | N                |
| Test Mode:     | Mode 2       | Test Power: | AC 240 V / 60 Hz |
| Description:   |              |             |                  |



| No. | Frequency<br>(MHz) | QP<br>reading<br>(dBuV) | AVG<br>reading<br>(dBuV) | Correction<br>factor<br>(dB) | QP<br>result<br>(dBuV) | AVG<br>result<br>(dBuV) | QP<br>limit<br>(dBuV) | AVG<br>limit<br>(dBuV) | QP<br>margin<br>(dB) | AVG<br>margin<br>(dB) | Remark |
|-----|--------------------|-------------------------|--------------------------|------------------------------|------------------------|-------------------------|-----------------------|------------------------|----------------------|-----------------------|--------|
| 1   | 0.2580             | 21.85                   | 21.48                    | 9.69                         | 31.54                  | 31.17                   | 79.00                 | 66.00                  | -47.46               | -34.83                | Pass   |
| 2   | 0.7060             | 25.42                   | 24.91                    | 9.69                         | 35.11                  | 34.60                   | 73.00                 | 60.00                  | -37.89               | -25.40                | Pass   |
| 3   | 1.0940             | 17.03                   | 16.47                    | 9.70                         | 26.73                  | 26.17                   | 73.00                 | 60.00                  | -46.27               | -33.83                | Pass   |
| 4   | 6.5500             | 19.42                   | 18.53                    | 9.84                         | 29.26                  | 28.37                   | 73.00                 | 60.00                  | -43.74               | -31.63                | Pass   |
| 5   | 13.4780            | 30.45                   | 25.57                    | 9.95                         | 40.40                  | 35.52                   | 73.00                 | 60.00                  | -32.60               | -24.48                | Pass   |
| 6   | 23.1300            | 35.13                   | 33.29                    | 10.10                        | 45.23                  | 43.39                   | 73.00                 | 60.00                  | -27.77               | -16.61                | Pass   |

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

## 5.2. Radiated Emission

### ■ Limit

Under 1 GHz test shall not exceed following value

| FCC 47 CFR PART 15 SUBPART B |              |        |              |        |
|------------------------------|--------------|--------|--------------|--------|
| Frequency range (MHz)        | Class A      |        | Class B      |        |
|                              | Distance (m) | dBuV/m | Distance (m) | dBuV/m |
| 30 to 88                     | 10           | 39     | 3            | 40     |
| 88 to 216                    | 10           | 43.5   | 3            | 43.5   |
| 216 to 960                   | 10           | 46.4   | 3            | 46     |
| Above 960                    | 10           | 49.5   | 3            | 54     |

| CISPR 22              |              |        |              |        |
|-----------------------|--------------|--------|--------------|--------|
| Frequency range (MHz) | Class A      |        | Class B      |        |
|                       | Distance (m) | dBuV/m | Distance (m) | dBuV/m |
| 30 to 230             | 10           | 40     | 10           | 30     |
| 230 to 1000           | 10           | 47     | 10           | 37     |

Above 1 GHz test shall not exceed following value

| Frequency (MHz) | dBuV/m (Distance 3 m) |      |         |      |
|-----------------|-----------------------|------|---------|------|
|                 | Class A               |      | Class B |      |
|                 | Average               | Peak | Average | Peak |
| 1000 ~ 40000    | 60                    | 80   | 54      | 74   |

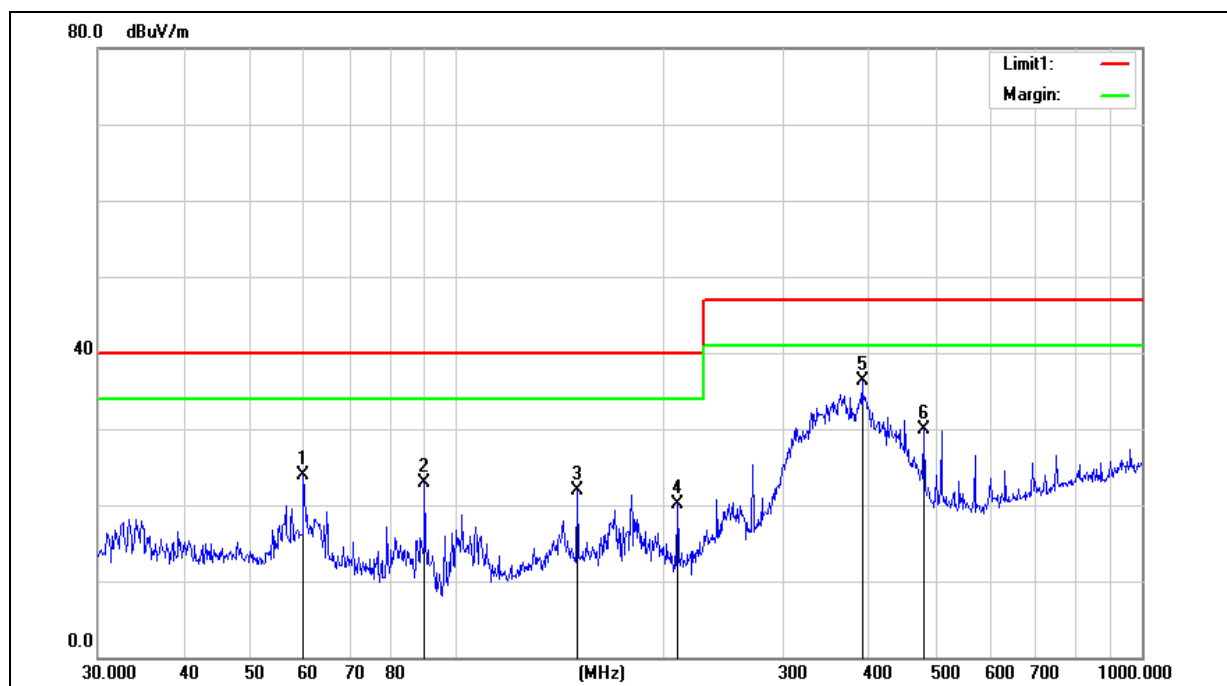
- Remark:
1. The tighter limit shall apply at the edge between two frequency bands.
  2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
  3. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
  4. Peak detector limit is corresponding to 20 dB above the maximum permitted average limit.

According to FCC Part 15.33 (b), for an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

| Highest frequency generated or used in the device or in which the device operated or tunes (MHz) | Upper frequency of measurement range (MHz)                          |
|--|---|
| Below 1.705  | 30  |
| 1.705-108  | 1000  |
| 108-500  | 2000  |
| 500-1000   | 5000  |
| Above 1000   | 5th harmonic of the highest frequency or 40 GHz, whichever is lower |

## ■ Test Result

|                    |              |                |                  |
|--------------------|--------------|----------------|------------------|
| Test Standard:     | FCC Part 15B | Test Distance: | 10 m             |
| Test Mode:         | Mode 1       | Test Power:    | AC 120 V / 60 Hz |
| Measurement Range: | 30 MHz~1 GHz | Ant.Polar.:    | Horizontal       |



| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (°) | Remark |
|-----|-----------------|----------------|-----------------------|-----------------|----------------|-------------|-------------|------------|--------|
| 1   | 59.8588         | 42.00          | -18.10                | 23.90           | 40.00          | -16.10      | 300         | 360        | QP     |
| 2   | 89.9047         | 46.06          | -23.16                | 22.90           | 40.00          | -17.10      | 400         | 275        | QP     |
| 3   | 150.0108        | 38.73          | -16.83                | 21.90           | 40.00          | -18.10      | 400         | 254        | QP     |
| 4   | 210.0482        | 39.96          | -19.76                | 20.20           | 40.00          | -19.80      | 400         | 318        | QP     |
| 5   | 390.7226        | 50.18          | -13.88                | 36.30           | 47.00          | -10.70      | 200         | 134        | QP     |
| 6   | 480.5276        | 41.86          | -11.86                | 30.00           | 47.00          | -17.00      | 160         | 360        | QP     |

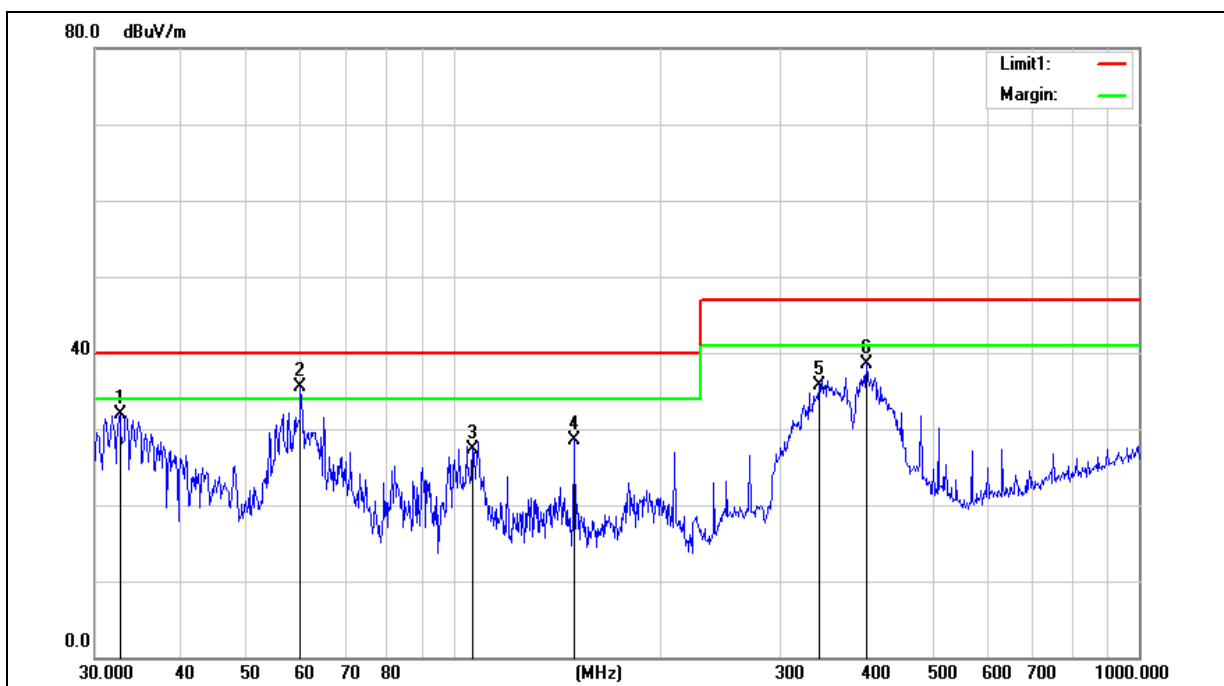
Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

Example: 23.90 = -18.10 + 42.00

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



|                    |              |                |                  |
|--------------------|--------------|----------------|------------------|
| Test Standard:     | FCC Part 15B | Test Distance: | 10 m             |
| Test Mode:         | Mode 1       | Test Power:    | AC 120 V / 60 Hz |
| Measurement Range: | 30 MHz~1 GHz | Ant.Polar.:    | Vertical         |



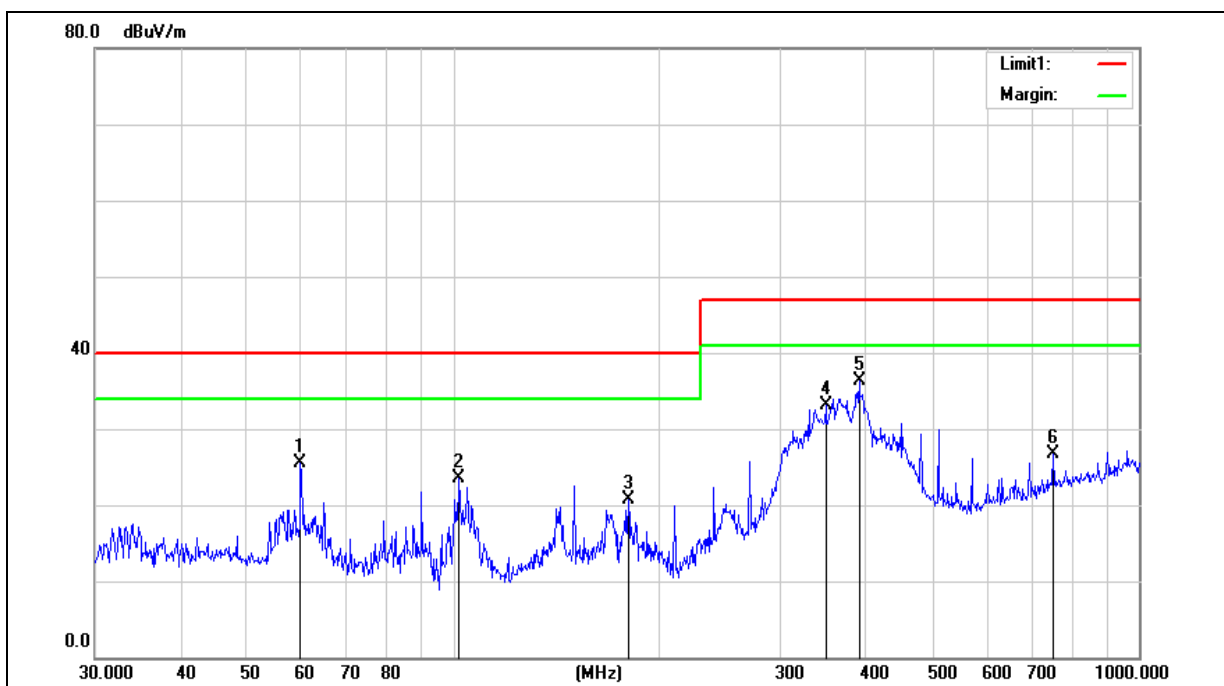
| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (°) | Remark |
|-----|-----------------|----------------|-----------------------|-----------------|----------------|-------------|-------------|------------|--------|
| 1   | 32.6340         | 50.23          | -18.33                | 31.90           | 40.00          | -8.10       | 199         | 144        | QP     |
| 2   | 59.8588         | 52.54          | -16.94                | 35.60           | 40.00          | -4.40       | 300         | 360        | QP     |
| 3   | 106.7587        | 46.99          | -19.59                | 27.40           | 40.00          | -12.60      | 199         | 275        | QP     |
| 4   | 150.0108        | 44.19          | -15.59                | 28.60           | 40.00          | -11.40      | 100         | 243        | QP     |
| 5   | 341.9786        | 49.13          | -13.43                | 35.70           | 47.00          | -11.30      | 100         | 112        | QP     |
| 6   | 400.4320        | 50.40          | -11.80                | 38.60           | 47.00          | -8.40       | 100         | 148        | QP     |

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

Example: 31.90 = -18.33 + 50.23

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

|                    |              |                |                  |
|--------------------|--------------|----------------|------------------|
| Test Standard:     | FCC Part 15B | Test Distance: | 10 m             |
| Test Mode:         | Mode 2       | Test Power:    | AC 240 V / 60 Hz |
| Measurement Range: | 30 MHz~1 GHz | Ant.Polar.:    | Horizontal       |

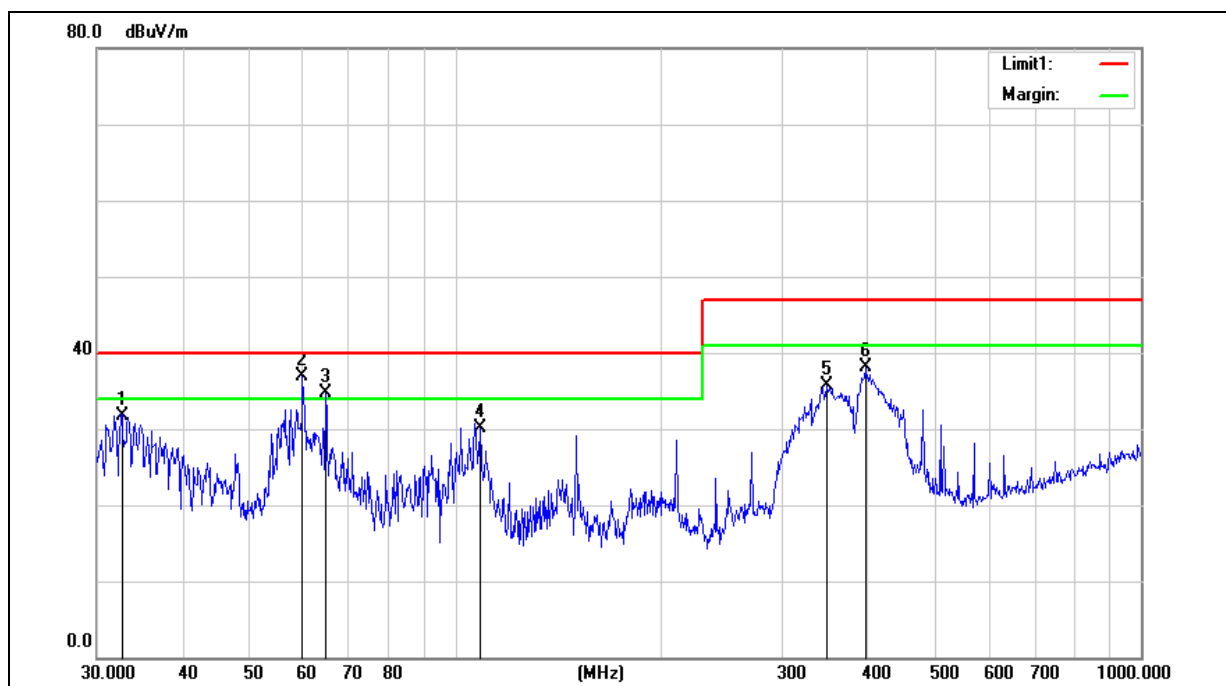


| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (°) | Remark |
|-----|-----------------|----------------|-----------------------|-----------------|----------------|-------------|-------------|------------|--------|
| 1   | 59.8588         | 43.60          | -18.10                | 25.50           | 40.00          | -14.50      | 200         | 359        | QP     |
| 2   | 102.0014        | 44.92          | -21.42                | 23.50           | 40.00          | -16.50      | 400         | 69         | QP     |
| 3   | 180.0165        | 38.75          | -18.05                | 20.70           | 40.00          | -19.30      | 400         | 241        | QP     |
| 4   | 349.2500        | 48.07          | -14.97                | 33.10           | 47.00          | -13.90      | 300         | 61         | QP     |
| 5   | 390.7226        | 50.18          | -13.88                | 36.30           | 47.00          | -10.70      | 300         | 118        | QP     |
| 6   | 750.1083        | 33.93          | -7.23                 | 26.70           | 47.00          | -20.30      | 400         | 194        | QP     |

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

|                    |              |                |                  |
|--------------------|--------------|----------------|------------------|
| Test Standard:     | FCC Part 15B | Test Distance: | 10 m             |
| Test Mode:         | Mode 2       | Test Power:    | AC 240 V / 60 Hz |
| Measurement Range: | 30 MHz~1 GHz | Ant.Polar.:    | Vertical         |

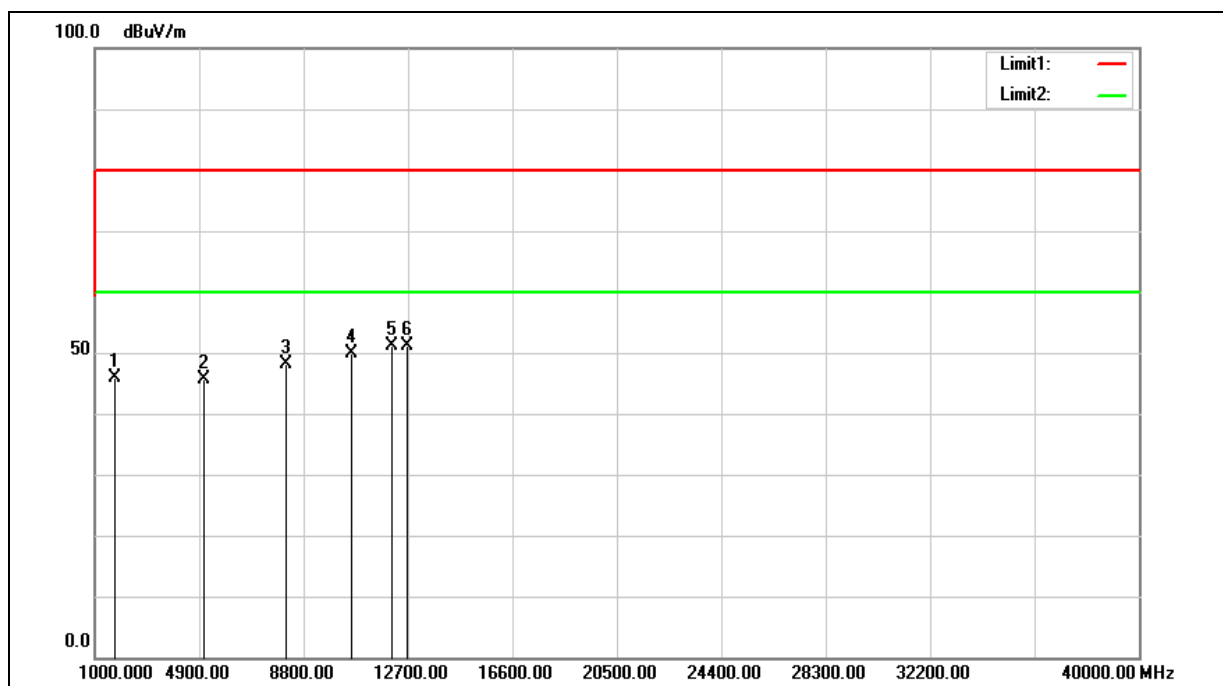


| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (°) | Remark |
|-----|-----------------|----------------|-----------------------|-----------------|----------------|-------------|-------------|------------|--------|
| 1   | 32.5198         | 50.10          | -18.30                | 31.80           | 40.00          | -8.20       | 100         | 23         | QP     |
| 2   | 59.8588         | 53.84          | -16.94                | 36.90           | 40.00          | -3.10       | 399         | 340        | QP     |
| 3   | 64.6594         | 52.14          | -17.44                | 34.70           | 40.00          | -5.30       | 299         | 62         | QP     |
| 4   | 108.6470        | 49.54          | -19.44                | 30.10           | 40.00          | -9.90       | 199         | 272        | QP     |
| 5   | 348.0274        | 49.13          | -13.43                | 35.70           | 47.00          | -11.30      | 100         | 112        | QP     |
| 6   | 396.2415        | 50.06          | -11.96                | 38.10           | 47.00          | -8.90       | 100         | 141        | QP     |

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

|                    |              |                |                  |
|--------------------|--------------|----------------|------------------|
| Test Standard:     | FCC Part 15B | Test Distance: | 3 m              |
| Test Mode:         | Mode 1       | Test Power:    | AC 120 V / 60 Hz |
| Measurement Range: | 1 GHz~40 GHz | Ant.Polar.:    | Horizontal       |



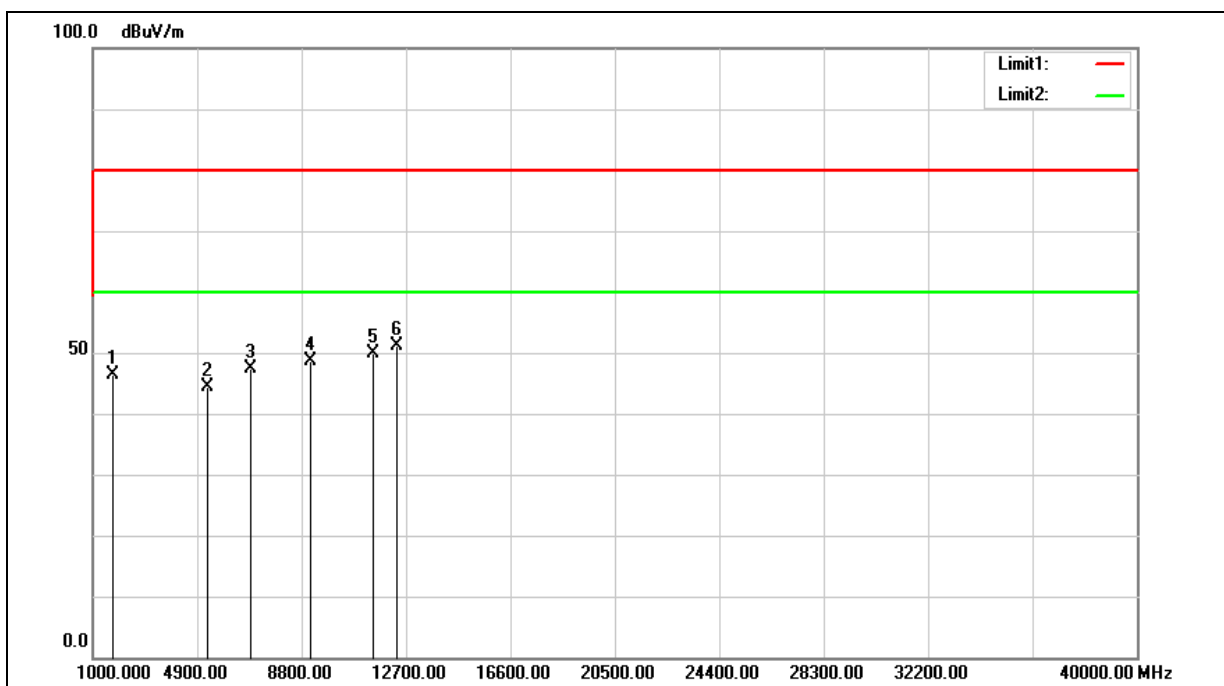
| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (°) | Remark |
|-----|-----------------|----------------|-----------------------|-----------------|----------------|-------------|-------------|------------|--------|
| 1   | 1708.000        | 48.39          | -2.42                 | 45.97           | 80.00          | -34.03      | 200         | 201        | peak   |
| 2   | 5020.000        | 38.79          | 6.83                  | 45.62           | 80.00          | -34.38      | 200         | 360        | peak   |
| 3   | 8128.000        | 38.32          | 9.90                  | 48.22           | 80.00          | -31.78      | 200         | 337        | peak   |
| 4   | 10576.000       | 36.27          | 13.65                 | 49.92           | 80.00          | -30.08      | 200         | 337        | peak   |
| 5   | 12064.000       | 35.67          | 15.43                 | 51.10           | 80.00          | -28.90      | 200         | 291        | peak   |
| 6   | 12628.000       | 34.83          | 16.42                 | 51.25           | 80.00          | -28.75      | 200         | 327        | peak   |

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

Example: 45.97 = -2.42 + 48.39

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

|                    |              |                |                  |
|--------------------|--------------|----------------|------------------|
| Test Standard:     | FCC Part 15B | Test Distance: | 3 m              |
| Test Mode:         | Mode 1       | Test Power:    | AC 120 V / 60 Hz |
| Measurement Range: | 1 GHz~40 GHz | Ant.Polar.:    | Vertical         |



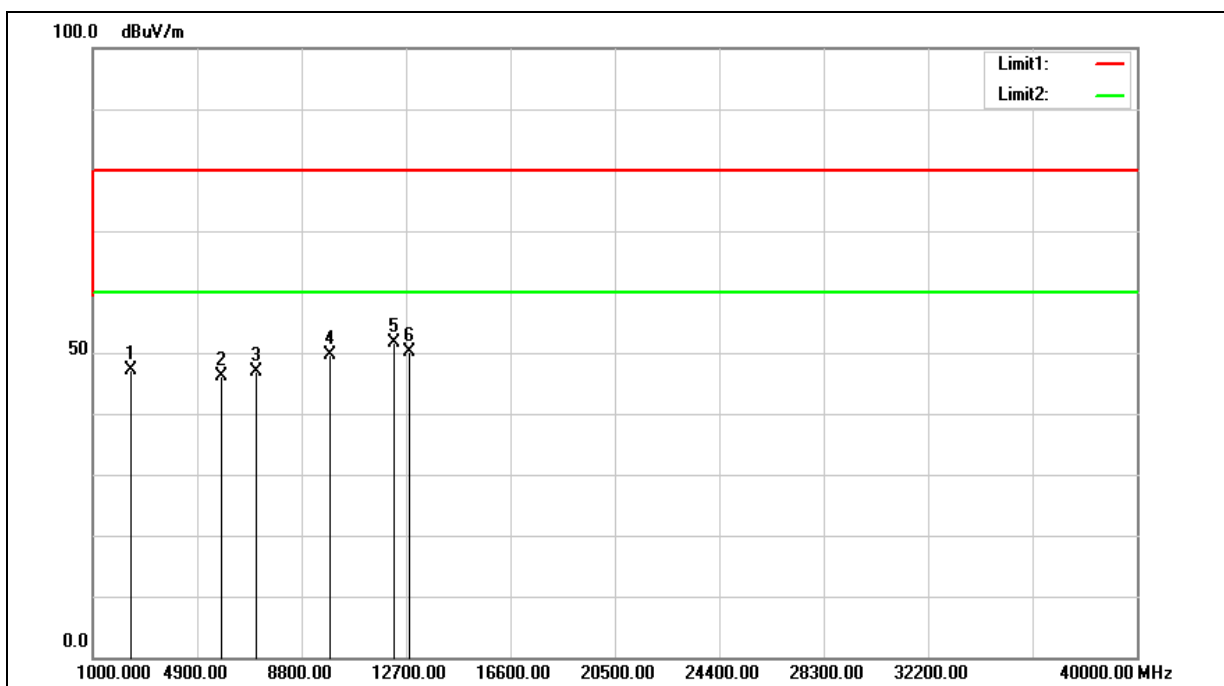
| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (°) | Remark |
|-----|-----------------|----------------|-----------------------|-----------------|----------------|-------------|-------------|------------|--------|
| 1   | 1720.000        | 47.97          | -1.52                 | 46.45           | 80.00          | -33.55      | 100         | 250        | peak   |
| 2   | 5284.000        | 37.61          | 6.89                  | 44.50           | 80.00          | -35.50      | 100         | 205        | peak   |
| 3   | 6880.000        | 38.23          | 9.10                  | 47.33           | 80.00          | -32.67      | 200         | 14         | peak   |
| 4   | 9124.000        | 37.85          | 10.69                 | 48.54           | 80.00          | -31.46      | 200         | 349        | peak   |
| 5   | 11488.000       | 35.57          | 14.32                 | 49.89           | 80.00          | -30.11      | 100         | 304        | peak   |
| 6   | 12316.000       | 35.36          | 15.70                 | 51.06           | 80.00          | -28.94      | 100         | 0          | peak   |

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

Example: 46.45 = -1.52 + 47.97

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

|                    |              |                |                  |
|--------------------|--------------|----------------|------------------|
| Test Standard:     | FCC Part 15B | Test Distance: | 3 m              |
| Test Mode:         | Mode 2       | Test Power:    | AC 240 V / 60 Hz |
| Measurement Range: | 1 GHz~40 GHz | Ant.Polar.:    | Horizontal       |

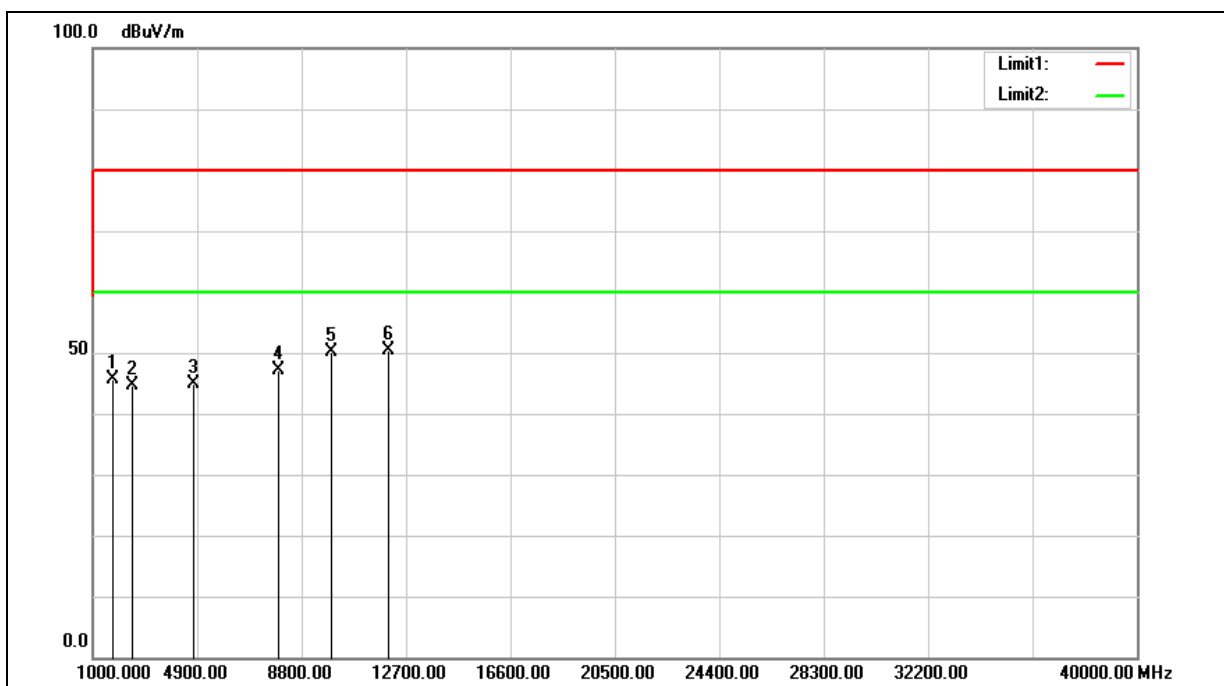


| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (°) | Remark |
|-----|-----------------|----------------|-----------------------|-----------------|----------------|-------------|-------------|------------|--------|
| 1   | 2416.000        | 45.71          | 1.54                  | 47.25           | 80.00          | -32.75      | 101         | 0          | peak   |
| 2   | 5776.000        | 38.45          | 7.77                  | 46.22           | 80.00          | -33.78      | 100         | 232        | peak   |
| 3   | 7108.000        | 37.63          | 9.29                  | 46.92           | 80.00          | -33.08      | 200         | 322        | peak   |
| 4   | 9832.000        | 37.74          | 11.91                 | 49.65           | 80.00          | -30.35      | 100         | 0          | peak   |
| 5   | 12220.000       | 35.88          | 15.68                 | 51.56           | 80.00          | -28.44      | 100         | 360        | peak   |
| 6   | 12784.000       | 33.47          | 16.76                 | 50.23           | 80.00          | -29.77      | 100         | 354        | peak   |

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

|                    |              |                |                  |
|--------------------|--------------|----------------|------------------|
| Test Standard:     | FCC Part 15B | Test Distance: | 3 m              |
| Test Mode:         | Mode 2       | Test Power:    | AC 240 V / 60 Hz |
| Measurement Range: | 1 GHz~40 GHz | Ant.Polar.:    | Vertical         |



| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (°) | Remark |
|-----|-----------------|----------------|-----------------------|-----------------|----------------|-------------|-------------|------------|--------|
| 1   | 1708.000        | 47.33          | -1.62                 | 45.71           | 80.00          | -34.29      | 100         | 164        | peak   |
| 2   | 2464.000        | 42.46          | 2.28                  | 44.74           | 80.00          | -35.26      | 200         | 330        | peak   |
| 3   | 4708.000        | 38.76          | 6.07                  | 44.83           | 80.00          | -35.17      | 100         | 0          | peak   |
| 4   | 7924.000        | 37.34          | 9.81                  | 47.15           | 80.00          | -32.85      | 100         | 327        | peak   |
| 5   | 9868.000        | 38.28          | 11.87                 | 50.15           | 80.00          | -29.85      | 200         | 344        | peak   |
| 6   | 12004.000       | 35.30          | 15.12                 | 50.42           | 80.00          | -29.58      | 200         | 78         | peak   |

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

--- END ---