

## TEST REPORT

**Applicant:** Shenzhen Growatt Power Technology Co., Ltd.

**Address of Applicant:** 1001,10/F. Building A, Sino-German(Europe) Industrial Park, Hangcheng Ave, Xixiang, Bao' an District, Shenzhen

**Manufacturer:** Shenzhen Growatt Power Technology Co., Ltd.

**Address of Manufacturer:** 1001,10/F. Building A, Sino-German(Europe) Industrial Park, Hangcheng Ave, Xixiang, Bao' an District, Shenzhen

**Equipment Under Test (EUT)**

Product Name: Portable Power Station

Model No.: VITA 550

Trade Mark: 

FCC ID: 2A9PQ-VITA550

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C

**Date of sample receipt:** November 25, 2022

**Date of Test:** November 30~December 8, 2022

**Date of report issued:** December 8, 2022

**Test Result :** PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Robinson Luo

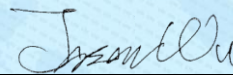
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

## 2 Version

| Version No. | Date             | Description |
|-------------|------------------|-------------|
| 00          | December 8, 2022 | Original    |
|             |                  |             |
|             |                  |             |
|             |                  |             |
|             |                  |             |

Prepared By:

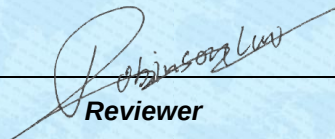


Date:

December 8, 2022

Project Engineer

Check By:



Reviewer

Date:

December 8, 2022

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## 4 Test Summary

| Test Item                        | Section in CFR 47 | Result |
|----------------------------------|-------------------|--------|
| Antenna requirement              | 15.203            | Pass   |
| AC Power Line Conducted Emission | 15.207            | Pass   |
| Spurious Emission                | 15.209(a)(f)      | Pass   |
| 20dB Bandwidth                   | 15.215            | Pass   |

Pass: The EUT complies with the essential requirements in the standard.

### 4.1 Measurement Uncertainty

| Test Item                                                                                             | Frequency Range | Measurement Uncertainty | Notes |
|-------------------------------------------------------------------------------------------------------|-----------------|-------------------------|-------|
| Radiated Emission                                                                                     | 9kHz-30MHz      | 3.1dB                   | (1)   |
| Radiated Emission                                                                                     | 30MHz-200MHz    | 3.8039dB                | (1)   |
| Radiated Emission                                                                                     | 200MHz-1GHz     | 3.9679dB                | (1)   |
| Radiated Emission                                                                                     | 1GHz-18GHz      | 4.29dB                  | (1)   |
| Radiated Emission                                                                                     | 18GHz-40GHz     | 3.30dB                  | (1)   |
| AC Power Line Conducted Emission                                                                      | 0.15MHz ~ 30MHz | 3.44dB                  | (1)   |
| Occupied Bandwidth                                                                                    | /               | 3%                      | (1)   |
| Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%. |                 |                         |       |

## 5 General Information

### 5.1 General Description of EUT

|                      |                                                                                                                                                                                   |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name:        | Portable Power Station                                                                                                                                                            |
| Model No.:           | VITA 550                                                                                                                                                                          |
| Test Model No.:      | VITA 550                                                                                                                                                                          |
| Serial No.:          | HMM0268822460004                                                                                                                                                                  |
| Hardware version:    | G0008_VITA 550_BMS V04                                                                                                                                                            |
| Software version:    | V1.1.28                                                                                                                                                                           |
| Test sample(s) ID:   | GTSL202212000253-1                                                                                                                                                                |
| Sample(s) Status     | Engineer sample                                                                                                                                                                   |
| Operation Frequency: | 110.5kHz~205kHz                                                                                                                                                                   |
| Modulation type:     | ASK                                                                                                                                                                               |
| Antenna Type:        | Inductive loop coil Antenna                                                                                                                                                       |
| Antenna gain:        | 0dBi (Max)                                                                                                                                                                        |
| Power supply:        | Input: AC Input: 120V~, 6A, 60Hz<br>DC Input: 12-24V  10A Max<br>Battery Capacity: 22.4V/537.6Wh |
| WPT Output Power:    | 15W Max                                                                                                                                                                           |

#### Operation Frequency each of channel

| Test channel | Frequency (MHz) |
|--------------|-----------------|
| 00           | 0.149MHz        |

## 5.2 Test mode

|                        |                                           |
|------------------------|-------------------------------------------|
| Wireless charging mode | Keep the EUT in wireless charging status. |
|------------------------|-------------------------------------------|

## 5.3 Description of Support Units

| Manufacturer | Description           | Model | S/N |
|--------------|-----------------------|-------|-----|
| EESON        | Wireless charger load | 2S    | N/A |

## 5.4 Test Facility

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"> <li>• <b>FCC—Registration No.: 381383</b><br/>Designation Number: CN5029<br/>Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files.</li> <li>• <b>IC —Registration No.: 9079A</b><br/>CAB identifier: CN0091<br/>The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing</li> <li>• <b>NVLAP (LAB CODE:600179-0)</b><br/>Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).</li> </ul> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 5.5 Test Location

|                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| All tests were performed at:                                                                                                                                                                                                                         |
| <p>Global United Technology Services Co., Ltd.<br/>No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102<br/>Tel: 0755-27798480<br/>Fax: 0755-27798960</p> |

## 5.6 Other Information Requested by the Customer

|       |
|-------|
| None. |
|-------|

## 6 Test Instruments list

| Radiated Emission: |                                     |                                |                             |               |                     |                         |
|--------------------|-------------------------------------|--------------------------------|-----------------------------|---------------|---------------------|-------------------------|
| Item               | Test Equipment                      | Manufacturer                   | Model No.                   | Inventory No. | Cal.Date (mm-dd-yy) | Cal.Due date (mm-dd-yy) |
| 1                  | 3m Semi- Anechoic Chamber           | ZhongYu Electron               | 9.2(L)*6.2(W)* 6.4(H)       | GTS250        | July 02, 2020       | July 01, 2025           |
| 2                  | Control Room                        | ZhongYu Electron               | 6.2(L)*2.5(W)* 2.4(H)       | GTS251        | N/A                 | N/A                     |
| 3                  | EMI Test Receiver                   | Rohde & Schwarz                | ESU26                       | GTS203        | April 22, 2022      | April 21, 2023          |
| 4                  | BiConiLog Antenna                   | SCHWARZBECK<br>MESS-ELEKTRONIK | VULB9168                    | GTS640        | March 21, 2022      | March 20, 2023          |
| 5                  | Double -ridged waveguide horn       | SCHWARZBECK<br>MESS-ELEKTRONIK | BBHA 9120 D                 | GTS208        | June 12, 2022       | June 11, 2023           |
| 6                  | Horn Antenna                        | ETS-LINDGREN                   | 3160                        | GTS217        | June 23, 2022       | June 22, 2023           |
| 7                  | EMI Test Software                   | AUDIX                          | E3                          | N/A           | N/A                 | N/A                     |
| 8                  | Coaxial Cable                       | GTS                            | N/A                         | GTS213        | April 22, 2022      | April 21, 2023          |
| 9                  | Coaxial Cable                       | GTS                            | N/A                         | GTS211        | April 22, 2022      | April 21, 2023          |
| 10                 | Coaxial cable                       | GTS                            | N/A                         | GTS210        | April 22, 2022      | April 21, 2023          |
| 11                 | Coaxial Cable                       | GTS                            | N/A                         | GTS212        | April 22, 2022      | April 21, 2023          |
| 12                 | Amplifier(100kHz-3GHz)              | HP                             | 8347A                       | GTS204        | April 22, 2022      | April 21, 2023          |
| 13                 | Amplifier (18-26GHz)                | Rohde & Schwarz                | AFS33-18002<br>650-30-8P-44 | GTS218        | June 23, 2022       | June 22, 2023           |
| 14                 | Band filter                         | Amindeon                       | 82346                       | GTS219        | June 23, 2022       | June 22, 2023           |
| 15                 | Power Meter                         | Anritsu                        | ML2495A                     | GTS540        | June 23, 2022       | June 22, 2023           |
| 16                 | Power Sensor                        | Anritsu                        | MA2411B                     | GTS541        | June 23, 2022       | June 22, 2023           |
| 17                 | Wideband Radio Communication Tester | Rohde & Schwarz                | CMW500                      | GTS575        | April 22, 2022      | April 21, 2023          |
| 18                 | Splitter                            | Agilent                        | 11636B                      | GTS237        | June 23, 2022       | June 22, 2023           |
| 19                 | Loop Antenna                        | ZHINAN                         | ZN30900A                    | GTS534        | Nov. 29, 2022       | Nov. 28, 2023           |
| 20                 | Broadband Preamplifier              | SCHWARZBECK                    | BBV9718                     | GTS535        | April 22, 2022      | April 21, 2023          |
| 21                 | Breitband hornantenna               | SCHWARZBECK                    | BBHA 9170                   | GTS579        | Oct. 16, 2022       | Oct. 15, 2023           |
| 22                 | Amplifier                           | TDK                            | PA-02-02                    | GTS574        | Oct. 16, 2022       | Oct. 15, 2023           |
| 23                 | Amplifier                           | TDK                            | PA-02-03                    | GTS576        | Oct. 16, 2022       | Oct. 15, 2023           |
| 24                 | PSA Series Spectrum Analyzer        | Rohde & Schwarz                | FSP                         | GTS578        | June 23, 2022       | June 22, 2023           |
| 25                 | Amplifier(1GHz-26.5GHz)             | HP                             | 8449B                       | GTS601        | April 22, 2022      | April 21, 2023          |

| Conducted Emission |                           |                         |                      |               |                     |                         |
|--------------------|---------------------------|-------------------------|----------------------|---------------|---------------------|-------------------------|
| Item               | Test Equipment            | Manufacturer            | Model No.            | Inventory No. | Cal.Date (mm-dd-yy) | Cal.Due date (mm-dd-yy) |
| 1                  | Shielding Room            | ZhongYu Electron        | 7.3(L)x3.1(W)x2.9(H) | GTS252        | May 14, 2022        | May 13, 2025            |
| 2                  | EMI Test Receiver         | R&S                     | ESCI 7               | GTS552        | April 24, 2022      | April 23, 2023          |
| 3                  | Coaxial Switch            | ANRITSU CORP            | MP59B                | GTS225        | June 23, 2022       | June 22, 2023           |
| 4                  | ENV216 2-L-V-NETZNACHB.DE | ROHDE&SCHWARZ           | ENV216               | GTS226        | April 22, 2022      | April 21, 2023          |
| 5                  | Coaxial Cable             | GTS                     | N/A                  | GTS227        | N/A                 | N/A                     |
| 6                  | EMI Test Software         | AUDIX                   | E3                   | N/A           | N/A                 | N/A                     |
| 7                  | Thermo meter              | JINCHUANG               | GSP-8A               | GTS639        | April 28, 2022      | April 27, 2023          |
| 8                  | Absorbing clamp           | Elektronik-Feinmechanik | MDS21                | GTS229        | April 15, 2022      | April 14, 2023          |
| 9                  | ISN                       | SCHWARZBECK             | NTFM 8158            | GTS565        | April 22, 2022      | April 21, 2023          |
| 10                 | High voltage probe        | SCHWARZBECK             | TK9420               | GTS537        | April 22, 2022      | April 21, 2023          |

| RF Conducted Test: |                                                |              |                  |            |                     |                         |
|--------------------|------------------------------------------------|--------------|------------------|------------|---------------------|-------------------------|
| Item               | Test Equipment                                 | Manufacturer | Model No.        | Serial No. | Cal.Date (mm-dd-yy) | Cal.Due date (mm-dd-yy) |
| 1                  | MXA Signal Analyzer                            | Agilent      | N9020A           | GTS566     | April 22, 2022      | April 21, 2023          |
| 2                  | EMI Test Receiver                              | R&S          | ESCI 7           | GTS552     | April 22, 2022      | April 21, 2023          |
| 3                  | Spectrum Analyzer                              | Agilent      | E4440A           | GTS536     | April 22, 2022      | April 21, 2023          |
| 4                  | MXG vector Signal Generator                    | Agilent      | N5182A           | GTS567     | April 22, 2022      | April 21, 2023          |
| 5                  | ESG Analog Signal Generator                    | Agilent      | E4428C           | GTS568     | April 22, 2022      | April 21, 2023          |
| 6                  | USB RF Power Sensor                            | DARE         | RPR3006W         | GTS569     | April 22, 2022      | April 21, 2023          |
| 7                  | RF Switch Box                                  | Shongyi      | RFSW3003328      | GTS571     | April 22, 2022      | April 21, 2023          |
| 8                  | Programmable Constant Temp & Humi Test Chamber | WEWON        | WHTH-150L-40-880 | GTS572     | April 22, 2022      | April 21, 2023          |

| General used equipment: |                                 |              |           |               |                     |                         |
|-------------------------|---------------------------------|--------------|-----------|---------------|---------------------|-------------------------|
| Item                    | Test Equipment                  | Manufacturer | Model No. | Inventory No. | Cal.Date (mm-dd-yy) | Cal.Due date (mm-dd-yy) |
| 1                       | Humidity/ Temperature Indicator | KTJ          | TA328     | GTS243        | April 25, 2022      | April 24, 2023          |
| 2                       | Barometer                       | KUMAO        | SF132     | GTS647        | July 26, 2022       | July 25, 2023           |

## 7 Test results and Measurement Data

### 7.1 Antenna requirement:

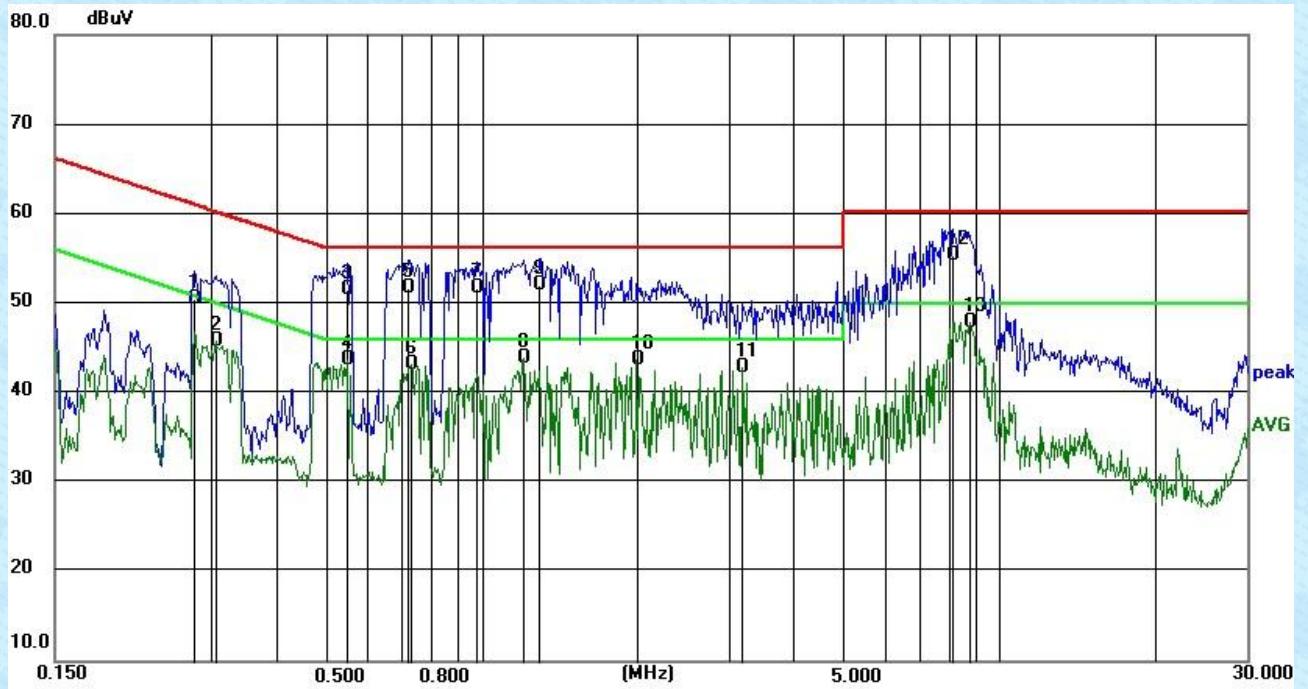
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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| <b>Standard requirement:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                     | FCC Part15 C Section 15.203 |
| <b>15.203 requirement:</b><br>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. |                             |
| <b>EUT Antenna:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                             |
| The antenna is Inductive loop coil Antenna, the best case gain of the antenna is 0dBi, reference to the appendix II for details.                                                                                                                                                                                                                                                                                                                                                 |                             |

## 7.2 Conducted Emissions

|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |              |     |           |          |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------|-----|-----------|----------|
| Test Requirement:                                | FCC Part15 C Section 15.207                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |              |     |           |          |
| Test Method:                                     | ANSI C63.10:2013                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |              |     |           |          |
| Test Frequency Range:                            | 150KHz to 30MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |              |     |           |          |
| Class / Severity:                                | Class B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |              |     |           |          |
| Receiver setup:                                  | RBW=9KHz, VBW=30KHz, Sweep time=auto                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |              |     |           |          |
| Limit:                                           | Frequency range (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       | Limit (dBuV) |     |           |          |
|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       | Quasi-peak   |     | Average   |          |
|                                                  | 0.15-0.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       | 66 to 56*    |     | 56 to 46* |          |
|                                                  | 0.5-5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       | 56           |     | 46        |          |
|                                                  | 5-30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       | 60           |     | 50        |          |
| * Decreases with the logarithm of the frequency. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |              |     |           |          |
| Test setup:                                      | <div><p style="text-align: center;"><b>Reference Plane</b></p><p style="text-align: center;">Test table/Insulation plane</p><p><i>Remark:<br/>E.U.T: Equipment Under Test<br/>LISN: Line Impedance Stabilization Network<br/>Test table height=0.8m</i></p></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |              |     |           |          |
| Test procedure:                                  | <div><div>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</div><div>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</div><div>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.</div></div> |       |              |     |           |          |
| Test Instruments:                                | Refer to section 6.0 for details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |              |     |           |          |
| Test mode:                                       | Refer to section 5.2 for details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |              |     |           |          |
| Test environment:                                | Temp.:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 25 °C | Humid.:      | 52% | Press.:   | 1012mbar |
| Test voltage:                                    | AC 120V, 60Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |              |     |           |          |
| Test results:                                    | Pass                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |              |     |           |          |

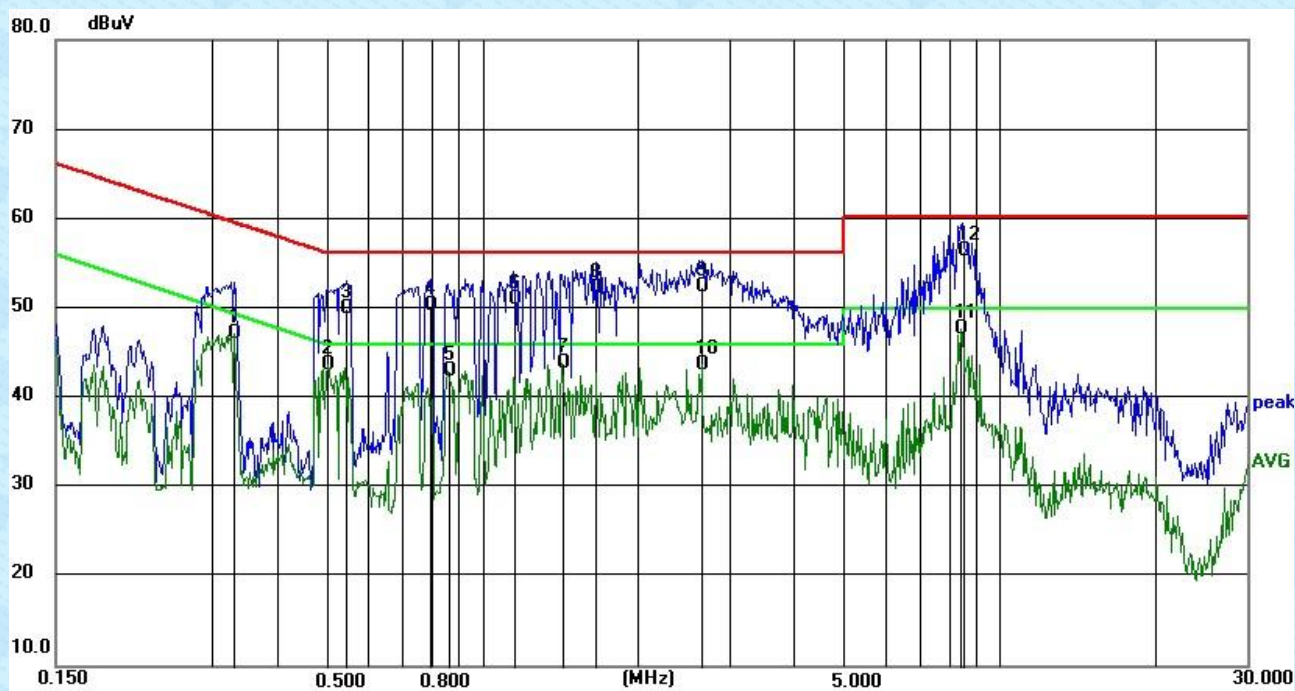
**Measurement data:**

**Line:**



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|-----|-----------------|----------------|-------------|--------------|--------------|-------------|--------|
| 1   | 0.2787          | 40.53          | 10.02       | 50.55        | 60.85        | 10.30       | QP     |
| 2   | 0.3065          | 35.74          | 10.02       | 45.76        | 50.06        | 4.30        | AVG    |
| 3   | 0.5522          | 41.46          | 10.03       | 51.49        | 56.00        | 4.51        | QP     |
| 4   | 0.5522          | 33.66          | 10.05       | 43.71        | 46.00        | 2.29        | AVG    |
| 5   | 0.7235          | 41.73          | 10.06       | 51.79        | 56.00        | 4.21        | QP     |
| 6   | 0.731           | 32.96          | 10.14       | 43.10        | 46.00        | 2.90        | AVG    |
| 7   | 0.9787          | 41.48          | 10.15       | 51.63        | 56.00        | 4.37        | QP     |
| 8   | 1.2033          | 33.67          | 10.19       | 43.86        | 46.00        | 2.14        | AVG    |
| 9   | 1.296           | 41.67          | 10.36       | 52.03        | 56.00        | 3.97        | QP     |
| 10  | 1.9904          | 33.14          | 10.58       | 43.72        | 46.00        | 2.28        | AVG    |
| 11  | 3.19            | 32.24          | 10.66       | 42.90        | 46.00        | 3.10        | AVG    |
| 12  | 8.1051          | 44.49          | 10.85       | 55.34        | 60.00        | 4.66        | QP     |
| 13  | 8.7757          | 36.82          | 11.02       | 47.84        | 50.00        | 2.16        | AVG    |

## Neutral:



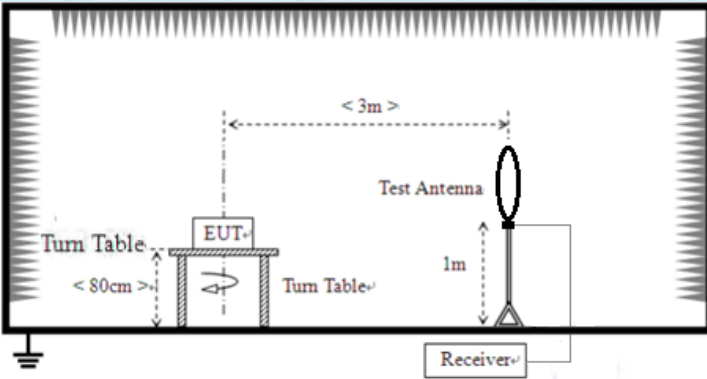
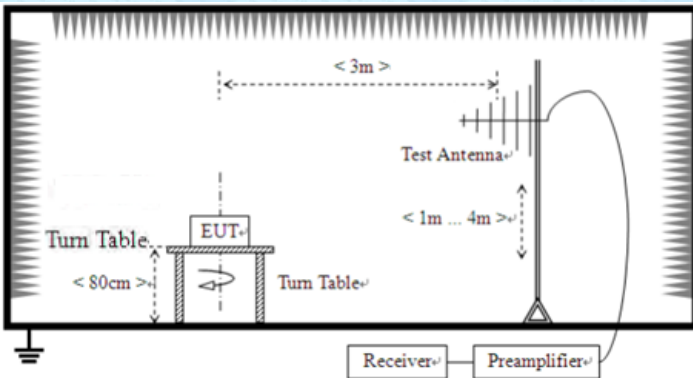
| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Factor<br>(dB) | Level<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|----------------|-----------------|-----------------|----------------|--------|
| 1   | 0.332              | 37.21             | 10.02          | 47.23           | 49.40           | 2.17           | AVG    |
| 2   | 0.5045             | 33.63             | 10.03          | 43.66           | 46.00           | 2.34           | AVG    |
| 3   | 0.5463             | 40.00             | 10.03          | 50.03           | 56.00           | 5.97           | QP     |
| 4   | 0.796              | 40.27             | 10.06          | 50.33           | 56.00           | 5.67           | QP     |
| 5   | 0.8571             | 32.81             | 10.14          | 42.95           | 46.00           | 3.05           | AVG    |
| 6   | 1.1472             | 40.95             | 10.14          | 51.09           | 56.00           | 4.91           | QP     |
| 7   | 1.4256             | 33.71             | 10.15          | 43.86           | 46.00           | 2.14           | AVG    |
| 8   | 1.6536             | 42.05             | 10.19          | 52.24           | 56.00           | 3.76           | QP     |
| 9   | 2.65               | 42.09             | 10.36          | 52.45           | 56.00           | 3.55           | QP     |
| 10  | 2.65               | 33.13             | 10.58          | 43.71           | 46.00           | 2.29           | AVG    |
| 11  | 8.4115             | 37.00             | 10.66          | 47.66           | 50.00           | 2.34           | AVG    |
| 12  | 8.456              | 45.57             | 10.90          | 56.47           | 60.00           | 3.53           | QP     |

## Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss

## 7.3 Spurious Emission

|                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |                         |                  |                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------------|------------------|------------------|
| Test Requirement:                                                                                                                                                                                                                                                                                    | FCC Part15 C Section 15.209                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |                         |                  |                  |
| Test Method:                                                                                                                                                                                                                                                                                         | ANSI C63.10:2013                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |                         |                  |                  |
| Test Frequency Range:                                                                                                                                                                                                                                                                                | 9kHz to 1GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                         |                  |                  |
| Test site:                                                                                                                                                                                                                                                                                           | Measurement Distance: 3m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                         |                  |                  |
| Receiver setup:                                                                                                                                                                                                                                                                                      | Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Detector           | RBW                     | VBW              | Remark           |
|                                                                                                                                                                                                                                                                                                      | 9kHz- 30MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Quasi-peak         | 10kHz                   | 30kHz            | Quasi-peak Value |
|                                                                                                                                                                                                                                                                                                      | 30MHz-1GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Quasi-peak         | 120kHz                  | 300kHz           | Quasi-peak Value |
|                                                                                                                                                                                                                                                                                                      | Above 1GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Peak               | 1MHz                    | 3MHz             | Peak Value       |
|                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | AV                 | 1MHz                    | 10Hz             | Average Value    |
| Remark: For the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission test in these three bands are based on measurements employing an average detector.                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |                         |                  |                  |
| Limit:<br>(Spurious Emissions)                                                                                                                                                                                                                                                                       | <b>Limits for frequency below 30MHz</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                    |                         |                  |                  |
|                                                                                                                                                                                                                                                                                                      | Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Limit (uV/m)       | Measurement Distance(m) | Remark           |                  |
|                                                                                                                                                                                                                                                                                                      | 0.009-0.490                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2400/F(kHz)        | 300                     | Quasi-peak Value |                  |
|                                                                                                                                                                                                                                                                                                      | 0.490-1.705                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 24000/F(kHz)       | 30                      | Quasi-peak Value |                  |
|                                                                                                                                                                                                                                                                                                      | 1.705-30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 30                 | 30                      | Quasi-peak Value |                  |
|                                                                                                                                                                                                                                                                                                      | <b>Limits for frequency Above 30MHz</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                    |                         |                  |                  |
|                                                                                                                                                                                                                                                                                                      | Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Limit (dBuV/m @3m) | Remark                  |                  |                  |
|                                                                                                                                                                                                                                                                                                      | 30MHz-88MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 40.00              | Quasi-peak Value        |                  |                  |
|                                                                                                                                                                                                                                                                                                      | 88MHz-216MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 43.50              | Quasi-peak Value        |                  |                  |
|                                                                                                                                                                                                                                                                                                      | 216MHz-960MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 46.00              | Quasi-peak Value        |                  |                  |
| 960MHz-1GHz                                                                                                                                                                                                                                                                                          | 54.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Quasi-peak Value   |                         |                  |                  |
| Above 1GHz                                                                                                                                                                                                                                                                                           | 54.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Average Value      |                         |                  |                  |
|                                                                                                                                                                                                                                                                                                      | 74.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Peak Value         |                         |                  |                  |
| Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |                         |                  |                  |
| Test Procedure:                                                                                                                                                                                                                                                                                      | <div>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</div> <div>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</div> <div>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</div> <div>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</div> <div>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</div> <div>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or</div> |                    |                         |                  |                  |

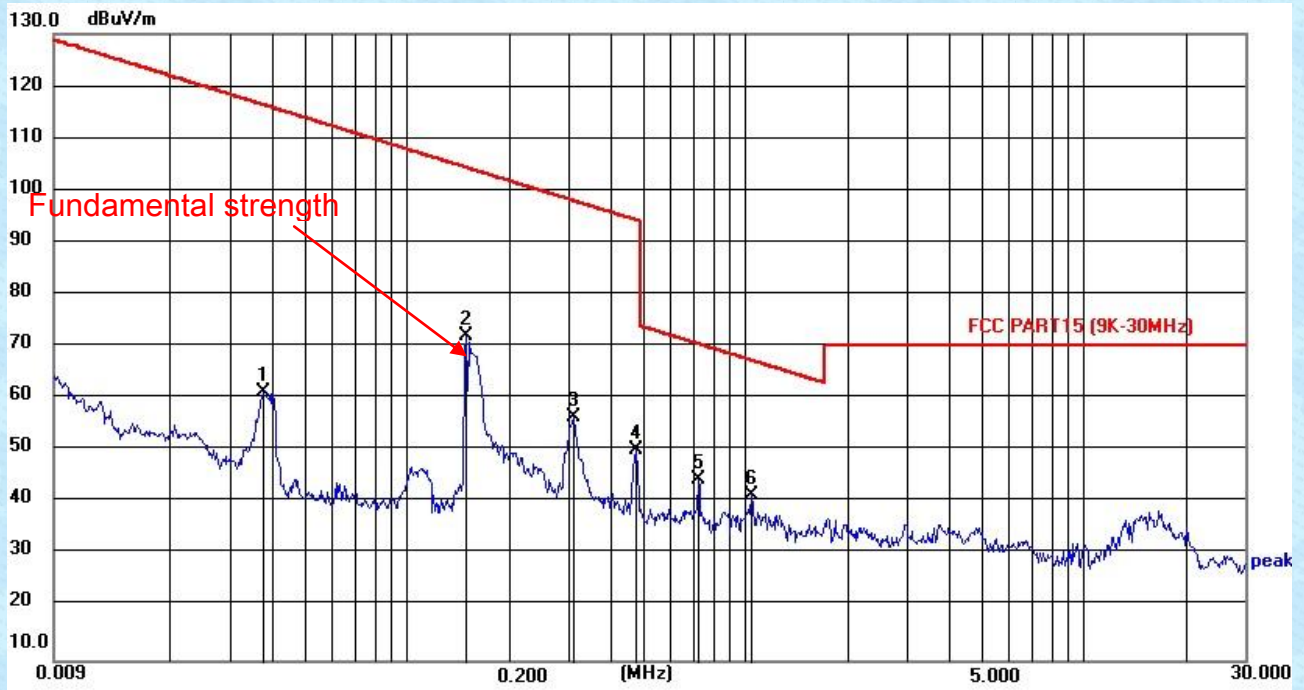
|                   |                                                                                                                                                                                                                                                                         |       |         |     |         |          |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------|-----|---------|----------|
|                   | <p>average method as specified and then reported in a data sheet.</p> <p>7. The radiation measurements are performed in X, Y, Z axis positioning. And found the Y axis positioning which it is worse case, only the test worst case mode is recorded in the report.</p> |       |         |     |         |          |
| Test setup:       | <p>Below 30MHz</p>  <p>30MHz ~ 1000MHz</p>                                                         |       |         |     |         |          |
| Test Instruments: | Refer to section 6.0 for details                                                                                                                                                                                                                                        |       |         |     |         |          |
| Test mode:        | Refer to section 5.2 for details                                                                                                                                                                                                                                        |       |         |     |         |          |
| Test environment: | Temp.:                                                                                                                                                                                                                                                                  | 25 °C | Humid.: | 52% | Press.: | 1012mbar |
| Test voltage:     | AC 120V, 60Hz                                                                                                                                                                                                                                                           |       |         |     |         |          |
| Test results:     | Pass                                                                                                                                                                                                                                                                    |       |         |     |         |          |

## Measurement data:

Note: Limit dBuV/m @3m = Limit dBuV/m @300m+ 80

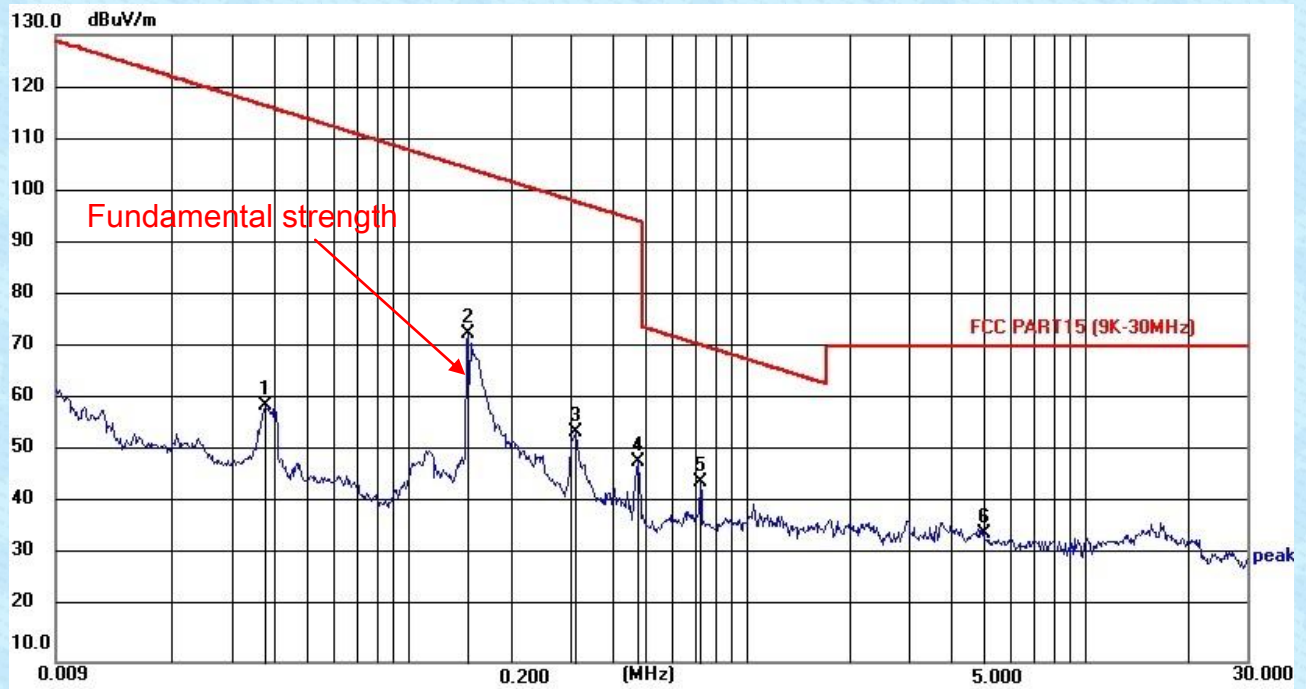
Limit dBuV/m @3m = Limit dBuV/m @30m + 40

9 kHz~30 MHz (X Axis)



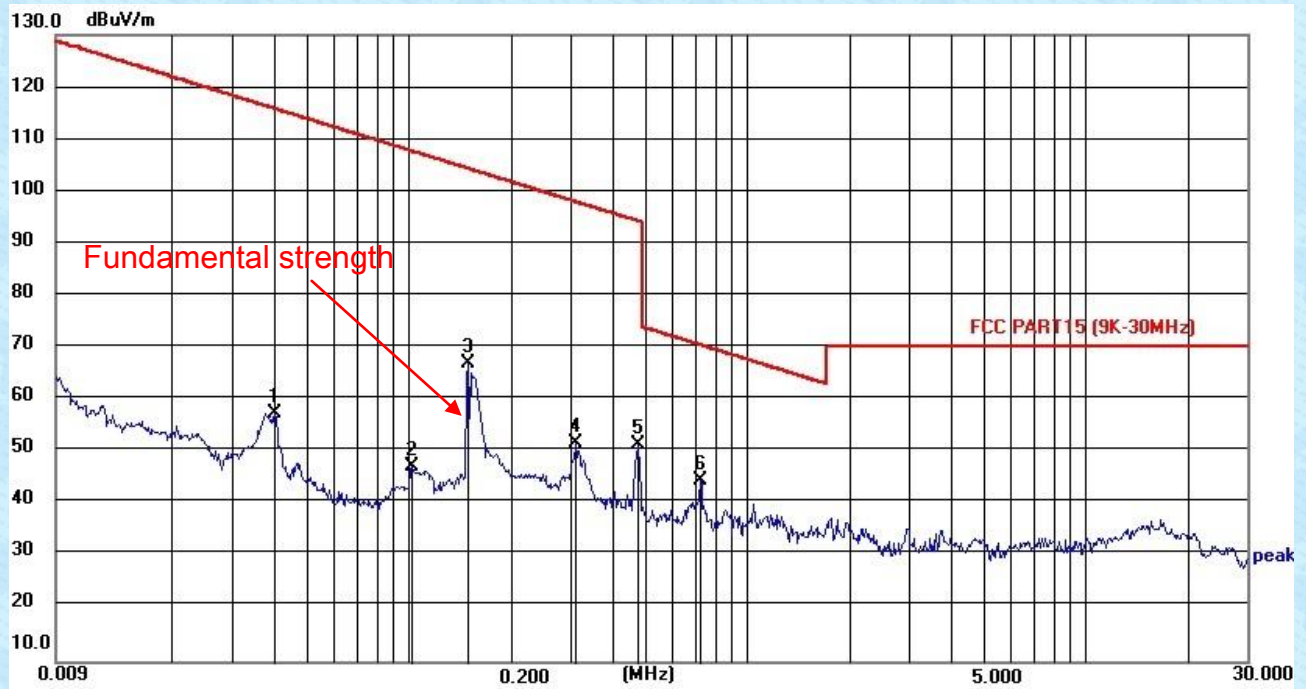
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Azimuth (deg) | Remark |
|-----|-----------------|----------------|-------------|----------------|----------------|-------------|-------------|---------------|--------|
| 1   | 0.0376          | 41.52          | 20.00       | 61.52          | 116.15         | 54.63       | 100         | 53            | AVG    |
| 2   | 0.1489          | 52.29          | 20.00       | 72.29          | 104.15         | 31.86       | 100         | 126           | AVG    |
| 3   | 0.3083          | 36.66          | 20.01       | 56.67          | 97.81          | 41.14       | 100         | 113           | AVG    |
| 4   | 0.4750          | 30.49          | 20.01       | 50.50          | 94.07          | 43.57       | 100         | 215           | AVG    |
| 5   | 0.7243          | 24.90          | 20.02       | 44.92          | 70.40          | 25.48       | 100         | 187           | QP     |
| 6   | 1.0434          | 21.91          | 20.03       | 41.94          | 67.23          | 25.29       | 100         | 164           | QP     |

## 9 kHz~30 MHz (Y Axis)



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Factor<br>(dB) | Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Azimuth<br>(deg) | Remark |
|-----|--------------------|-------------------|----------------|-------------------|-------------------|----------------|----------------|------------------|--------|
| 1   | 0.0372             | 39.01             | 20.00          | 59.01             | 116.15            | 57.13          | 100            | 142              | AVG    |
| 2   | 0.1484             | 52.75             | 20.00          | 72.75             | 104.15            | 31.36          | 100            | 155              | AVG    |
| 3   | 0.3081             | 34.13             | 20.01          | 54.14             | 97.81             | 43.64          | 100            | 194              | AVG    |
| 4   | 0.4755             | 28.44             | 20.01          | 48.45             | 94.07             | 45.57          | 100            | 257              | AVG    |
| 5   | 0.7243             | 24.34             | 20.02          | 44.36             | 70.40             | 25.98          | 100            | 312              | QP     |
| 6   | 4.9950             | 14.35             | 20.15          | 34.50             | 70.00             | 35.45          | 100            | 29               | QP     |

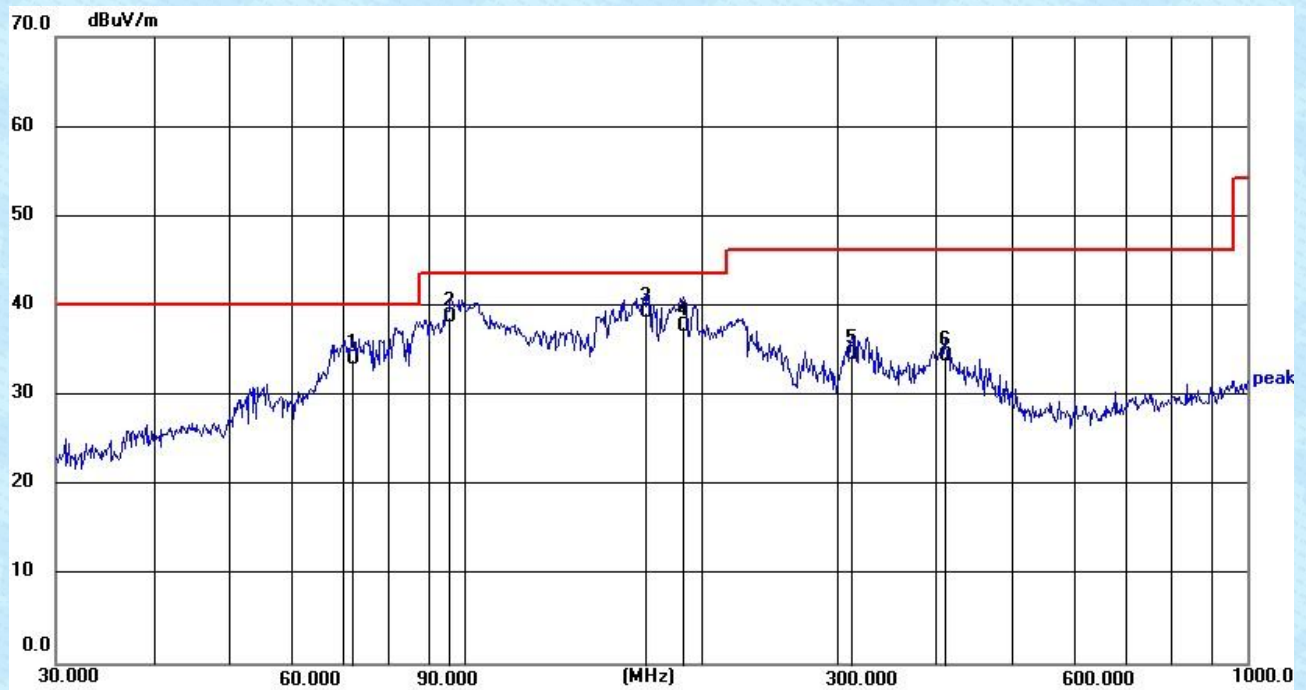
## 9 kHz~30 MHz (Z Axis)



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Factor<br>(dB) | Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Azimuth<br>(deg) | Remark |
|-----|--------------------|-------------------|----------------|-------------------|-------------------|----------------|----------------|------------------|--------|
| 1   | 0.0401             | 37.76             | 20.00          | 57.76             | 115.56            | 57.80          | 100            | 219              | AVG    |
| 2   | 0.1013             | 27.48             | 20.00          | 47.48             | 107.47            | 59.99          | 100            | 76               | AVG    |
| 3   | 0.1486             | 47.29             | 20.00          | 67.29             | 104.15            | 36.86          | 100            | 153              | AVG    |
| 4   | 0.3112             | 31.92             | 20.01          | 51.93             | 97.74             | 45.81          | 100            | 169              | AVG    |
| 5   | 0.4750             | 31.49             | 20.01          | 51.50             | 94.07             | 42.57          | 100            | 207              | AVG    |
| 6   | 0.7244             | 24.90             | 20.02          | 44.92             | 70.40             | 25.48          | 100            | 331              | QP     |

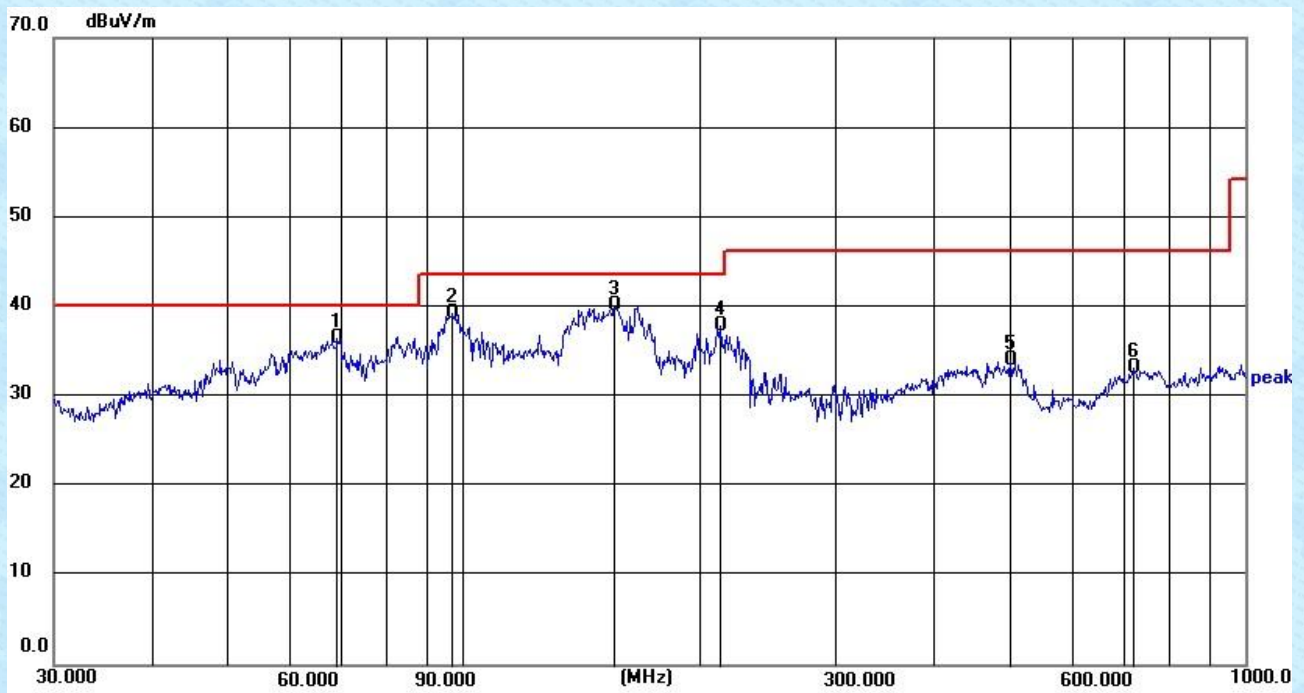
## 30MHz~1GHz

Horizontal



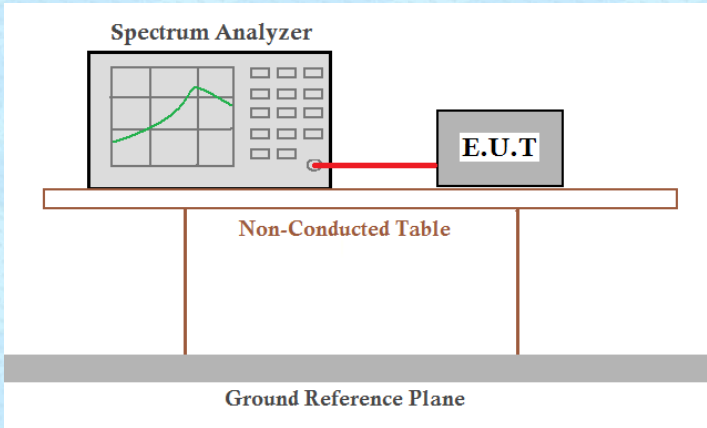
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Azimuth (deg) | Remark |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|-------------|---------------|--------|
| 1   | 71.8319         | 22.15          | 11.89         | 34.04          | 40.00          | 5.96        | 108         | 312           | QP     |
| 2   | 95.7622         | 27.13          | 11.58         | 38.71          | 43.50          | 4.79        | 133         | 105           | QP     |
| 3   | 170.1947        | 24.32          | 15.00         | 39.32          | 43.50          | 4.18        | 157         | 114           | QP     |
| 4   | 190.4050        | 25.42          | 12.32         | 37.74          | 43.50          | 5.76        | 105         | 53            | QP     |
| 5   | 312.1792        | 19.54          | 15.08         | 34.62          | 46.00          | 11.38       | 214         | 186           | QP     |
| 6   | 411.8240        | 17.33          | 17.08         | 34.41          | 46.00          | 11.59       | 122         | 204           | QP     |

## Vertical

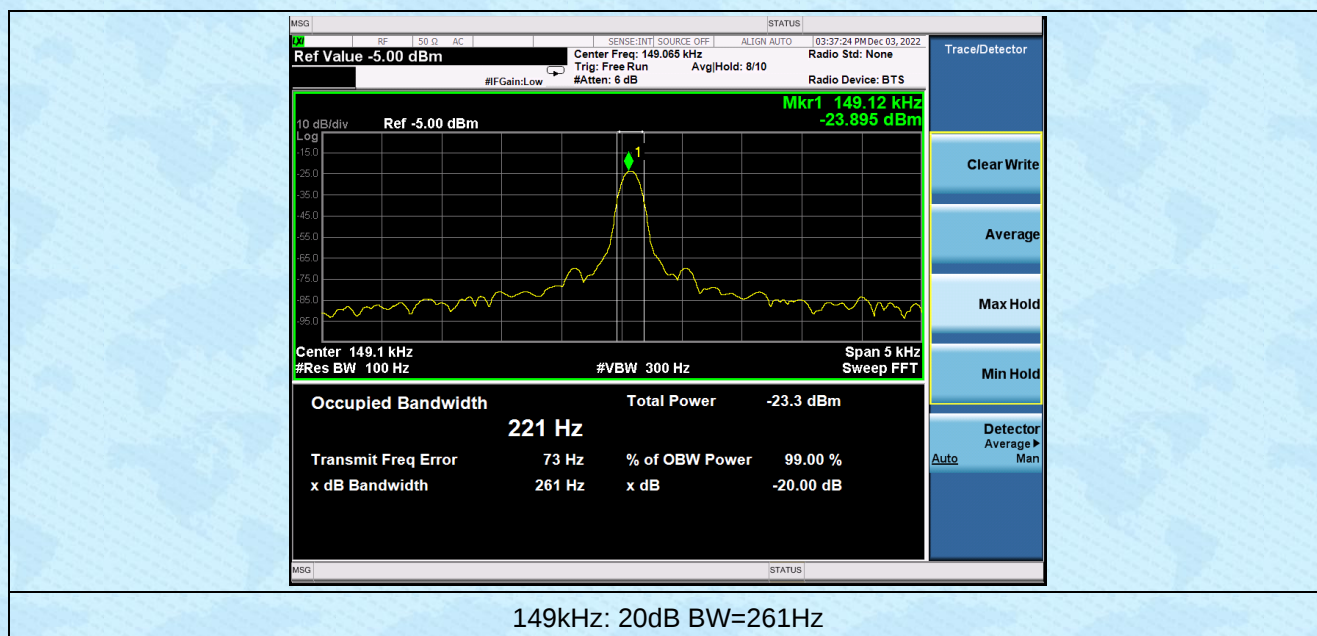


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Azimuth (deg) | Remark |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|-------------|---------------|--------|
| 1   | 69.1140         | 24.18          | 12.30         | 36.48          | 40.00          | 3.52        | 153         | 24            | QP     |
| 2   | 97.1148         | 27.59          | 11.70         | 39.29          | 43.50          | 4.21        | 142         | 322           | QP     |
| 3   | 155.9100        | 24.22          | 15.99         | 40.21          | 43.50          | 3.29        | 117         | 158           | QP     |
| 4   | 213.7632        | 25.59          | 12.30         | 37.89          | 43.50          | 5.61        | 105         | 42            | QP     |
| 5   | 501.1788        | 15.33          | 18.64         | 33.97          | 46.00          | 12.03       | 137         | 147           | QP     |
| 6   | 721.7258        | 11.04          | 22.19         | 33.23          | 46.00          | 12.77       | 186         | 306           | QP     |

## 7.4 20dB Occupy Bandwidth

|                   |                                                                                    |
|-------------------|------------------------------------------------------------------------------------|
| Test Requirement: | FCC Part15 C Section 15.215                                                        |
| Test Method:      | ANSI C63.10:2013                                                                   |
| Test setup:       |  |
| Test Instruments: | Refer to section 6.0 for details                                                   |
| Test mode:        | Refer to section 5.2 for details                                                   |
| Test results:     | Pass                                                                               |

## Measurement Data



## 8 Test Setup Photo

Reference to the **appendix I** for details.

## 9 EUT Constructional Details

Reference to the **appendix II** for details.

-----End-----