

# RED-EMC Test Report

**Client Name** : EcoFlow Inc.

**Client Address** : Plant A202, Founder Technology Industrial  
Park, Shiyan Sub-district, Bao'an District  
Shenzhen, Guangdong 518000 China

**Product Name** : Portable Power Station

**Report Date** : Oct. 14, 2022

**Shenzhen Anbotek Compliance Laboratory Limited**



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## TEST REPORT

Applicant : EcoFlow Inc.  
Manufacturer : EcoFlow Inc.  
Product Name : Portable Power Station  
Model No. : EFR600  
Trade Mark :  **ECOFLOW**  
Rating(s) : Please refer to page 7

**Test Standard(s) : ETSI EN 301 489-1 V2.2.3 (2019-11)**  
**ETSI EN 301 489-17 V3.2.4 (2020-09)**  
**EN 55032: 2015+A11: 2020; EN 55035: 2017+A11: 2020**  
**EN IEC 61000-3-2: 2019; EN 61000-3-3: 2013+A1:2019**

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the ETSI EN 301 489-1 V2.2.3 (2019-11), ETSI EN 301 489-17 V3.2.4 (2020-09), EN 55032: 2015+A11: 2020, EN 55035: 2017+A11: 2020, EN IEC 61000-3-2: 2019 and EN 61000-3-3: 2013+A1:2019 requirements. All measurements contained in this report were conducted with the test standards listed above.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Receipt

Aug. 11, 2022

Date of Test

Aug. 11~22, 2022

Prepared By



(Nianxiu Chen)

Approved &amp; Authorized Signer



(Kingkong Jin)



## Revision History

| Report Version | Description     | Issued Date   |
|----------------|-----------------|---------------|
| R00            | Original Issue. | Oct. 14, 2022 |
|                |                 |               |
|                |                 |               |




## 1. General Information

### 1.1. Client Information

|              |   |   |
|--------------|---|---|
| Applicant    | : | EcoFlow Inc.  |
| Address      | : | Plant A202, Founder Technology Industrial Park, Shiyan Sub-district, Bao'an District Shenzhen, Guangdong 518000 China |
| Manufacturer | : | EcoFlow Inc.  |
| Address      | : | Plant A202, Founder Technology Industrial Park, Shiyan Sub-district, Bao'an District Shenzhen, Guangdong 518000 China |

### 1.2. Description of Device (EUT)

|   |   |   |
|---|---|---|
| Product Name  | : | Portable Power Station  |
| Model No.   | : | EFR600  |
| Trade Mark  | : |  <b>ECOFLOW</b>  |
| Test Power Supply   | : | AC 230V, 50Hz/ DC 11-30V  |
| Test Sample No.   | : | 1-2-1(Normal Sample)  |
| Adapter   | : | N/A   |
| <b>WiFi</b>   |   |   |
| Operation Band  | : | <input checked="" type="checkbox"/> 2.4GHz band <input type="checkbox"/> 5GHz band  |
| Operation Mode  | : | <input type="checkbox"/> a <input checked="" type="checkbox"/> b <input checked="" type="checkbox"/> g <input checked="" type="checkbox"/> n(HT20)    |
|   | : | <input checked="" type="checkbox"/> n(HT40) <input type="checkbox"/> ac(VHT20) <input type="checkbox"/> ac(VHT40) <input type="checkbox"/> ac(VHT80)  |
|   | : | <input type="checkbox"/> ac(VHT160) <input type="checkbox"/> ax(HEW20) <input type="checkbox"/> ax(HEW40) <input type="checkbox"/> ax(HEW80)          |
|   | : | <input type="checkbox"/> ax(HEW160)   |
| Modulation Type   | : | <input type="checkbox"/> 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)   |
|   | : | <input checked="" type="checkbox"/> 802.11b: DSSS (CCK, DQPSK, DBPSK)   |
|   | : | <input checked="" type="checkbox"/> 802.11g: OFDM (BPSK, QPSK, 16QAM, 64QAM)  |
|   | : | <input checked="" type="checkbox"/> 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM)  |
|   | : | <input type="checkbox"/> 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)  |
|   | : | <input type="checkbox"/> 802.11ax: OFDMA(BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)   |
| <b>Bluetooth</b>  |   |   |
| Operation Mode  | : | <input type="checkbox"/> BT BDR <input type="checkbox"/> BT EDR <input checked="" type="checkbox"/> BLE 1M <input checked="" type="checkbox"/> BLE 2M |
| Modulation Type   | : | <input checked="" type="checkbox"/> GFSK <input type="checkbox"/> $\pi/4$ -DQPSK <input type="checkbox"/> 8-DPSK                                      |
| <b>Remark:</b> 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. 2)The rated voltage of the product is DC 11-30V, only DC 12V is selected for testing. |   |   |





### 1.3. Auxiliary Equipment Used During Test

| Description | Rating(s)                                 |
|-------------|---|
| Cement load | 5Ω load*3<br>1000W ac load*1<br>2Ω load*1 |

### 1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned bellow was evaluated respectively.

| Test Mode | Description  | Test Standards                     |
|-----------|--|------------------------------------|
| Mode 1    | AC charging+discharging full load<br>(AC output+USB output+type-c output+car charge)               | EN55032 or EN55035<br>EN 301489-17 |
| Mode 2    | PV charging+discharging full load<br>(AC output+USB output+type-c output+car charge)               | EN55032 or EN55035<br>EN 301489-17 |
| Mode 3    | AC discharging+ discharging full load<br>(AC output+USB output+type-c output+car charge+DC output) | EN55032 or EN55035<br>EN 301489-17 |

Rating(s):

|   |   |
|---|---|
| <b>Portable Power Station/station électronique portable</b> |   |
| <b>Model/Modèle:</b>  | EFR600                                  |
| <b>Capacity/Capacité:</b>                                   | 256Wh (20Ah 12.8V $\overline{=}$ )      |
| <b>Discharge Temperature/Température d'utilisation:</b>     | -10 to 45°C (14 to 113°F)               |
| <b>Charge Temperature/Température de recharge:</b>          | 0 to 45°C (32 to 113°F)                 |
| <b>AC Input/entrée:</b>                                     | 200-240V~ 50Hz/60Hz 8A Max              |
| <b>Solar/Solaire/DC Input/entrée:</b>                       | 11-30V $\overline{=}$ 8A 110W Max       |
| <b>Total Output/sortie totale:</b>                          | 484W                                    |
| <b>DC Output/sortie:</b>                                    | 12.6V $\overline{=}$ 8A 100W Max        |
| <b>AC Output/sortie(x1):</b>                                | 230V~1.3A (total) 50Hz/60Hz 300W        |
| <b>AC Output/sortie/(Bypass/Dérivation)(x1):</b>            | 200-240V~ 600W (total) 50Hz/60Hz        |
| <b>USB-A Output/sortie(x2):</b>                             | 5V $\overline{=}$ 2.4A 12W Max per port |
| <b>USB-C Input/Output/entrée/sortie(x1):</b>                | 5/9/12/15/20V $\overline{=}$ 3A 60W Max |



## 1.5. Test Equipment List

## Conducted Emission Measurement

| Item | Equipment   | Manufacturer            | Model No. | Serial No.   | Last Cal.     | Cal. Interval |
|------|---|-------------------------|-----------|--------------|---------------|---------------|
| 1.   | L.I.S.N.<br>Artificial Mains<br>Network           | Rohde & Schwarz         | ENV216    | 100055       | Oct. 22, 2021 | 1 Year        |
| 2.   | Three Phase<br>V-type Artificial<br>Power Network | CYBERTEK                | EM5040DT  | E215040DT001 | Jul 05, 2022  | 1 Year        |
| 3.   | EMI Test Receiver                                 | Rohde & Schwarz         | ESCI      | 100627       | Oct. 22, 2021 | 1 Year        |
| 4.   | RF Switching Unit                                 | Compliance<br>Direction | RSU-M2    | 38303        | Oct. 22, 2021 | 1 Year        |
| 5.   | Software Name<br>EZ-EMC                           | Ferrari Technology      | ANB-03A   | N/A          | N/A           | N/A           |

## Radiated Emission Measurement

| Item | Equipment                     | Manufacturer               | Model No.  | Serial No.    | Last Cal.     | Cal. Interval |
|------|-------------------------------|----------------------------|------------|---------------|---------------|---------------|
| 1.   | EMI Test Receiver             | Rohde & Schwarz            | ESR26      | 101481        | Oct. 22, 2021 | 1 Year        |
| 2.   | Bilog Broadband<br>Antenna    | Schwarzbeck                | VULB9163   | VULB 9163-289 | Oct. 22, 2021 | 2 Year        |
| 3.   | Pre-amplifier                 | SONOMA                     | 310N       | 186860        | Oct. 22, 2021 | 1 Year        |
| 4.   | Software Name<br>EZ-EMC       | Ferrari Technology         | ANB-03A    | N/A           | N/A           | N/A           |
| 5.   | Preamplifier                  | SKET Electronic            | BK1G18G30D | KD17503       | Oct. 22, 2021 | 1 Year        |
| 6.   | Double Ridged<br>Horn Antenna | Instruments<br>corporation | GTH-0118   | 351600        | Oct. 22, 2021 | 2 Year        |

## Harmonic and Flicker Measurement

| Item | Equipment                        | Manufacturer | Model No.          | Serial No. | Last Cal.     | Cal. Interval |
|------|----------------------------------|--------------|--------------------|------------|---------------|---------------|
| 1.   | Programmable AC<br>Power source  | IVYTECH      | APS-5005A          | 632734     | Oct. 22, 2021 | 1 Year        |
| 2.   | Harmonic and<br>Flicker Analyzer | EMC-PARTNER  | HMONICS<br>1000-1P | 164        | Oct. 22, 2021 | 1 Year        |
| 3.   | Harmonics-1000                   | N/A          | Ed.3.0+4.0         | N.A        | N/A           | N/A           |

## Electrostatic Discharge Measurement

| Item | Equipment      | Manufacturer | Model No.  | Serial No. | Last Cal.     | Cal. Interval |
|------|----------------|--------------|------------|------------|---------------|---------------|
| 1.   | ESD Simulators | emtest       | ESD NX30.1 | 11936      | Mar. 25, 2022 | 1 Year        |





## R/S Immunity Measurement

| Item | Equipment            | Manufacturer            | Model No.         | Serial No. | Last Cal.     | Cal. Interval |
|------|----------------------|-------------------------|-------------------|------------|---------------|---------------|
| 1.   | Signal Generator     | Agilent                 | N5182A            | MY48180656 | Oct. 22, 2021 | 1 Year        |
| 2.   | Amplifier            | Micotoop                | MPA-80-1000-250   | MPA1903096 | Oct. 22, 2021 | 1 Year        |
| 3.   | Amplifier            | Micotoop                | MPA-1000-6000-100 | MPA1903122 | Oct. 22, 2021 | 1 Year        |
| 4.   | Log-Periodic Antenna | Schwarzbeck             | VULP9118E         | 00992      | N/A           | N/A           |
| 5.   | Horn Antenna         | Instruments corporation | GTH-0118          | 351600     | Oct. 22, 2021 | 2 Year        |
| 6.   | Power Sensor         | Agilent                 | E9301A            | MY41498906 | Oct. 22, 2021 | 1 Year        |
| 7.   | Power Sensor         | Agilent                 | E9301A            | MY41498088 | Oct. 22, 2021 | 1 Year        |
| 8.   | Power Meter          | Agilent                 | E4419B            | GB40202909 | Oct. 22, 2021 | 1 Year        |
| 9.   | Electric field Probe | Narda                   | EP 601            | 811ZX10351 | Oct. 22, 2021 | 1 Year        |
| 10.  | RS Test software     | EMtrace                 | EM 3              | V1.1.7     | N/A           | N/A           |

## Surge Measurement

| Item | Equipment                    | Manufacturer | Model No. | Serial No. | Last Cal.     | Cal. Interval |
|------|------------------------------|--------------|-----------|------------|---------------|---------------|
| 1.   | Surge Generator              | TESEQ        | NSG 3060  | 1480       | Oct. 22, 2021 | 1 Year        |
| 2.   | CDN                          | TESEQ        | CDN 3061  | 1408       | Oct. 22, 2021 | 1 Year        |
| 3.   | Telecom port surge generator | PMI          | TW101     | 190411     | May 13, 2022  | 1 Year        |

## Electrical Fast Transient/Burst Immunity Measurement

| Item | Equipment       | Manufacturer | Model No. | Serial No. | Last Cal.     | Cal. Interval |
|------|-----------------|--------------|-----------|------------|---------------|---------------|
| 1.   | Surge Generator | TESEQ        | NSG 3060  | 1480       | Oct. 22, 2021 | 1 Year        |
| 2.   | CDN             | TESEQ        | CDN 3061  | 1408       | Oct. 22, 2021 | 1 Year        |
| 3.   | EFT-Clamp       | PRIMA        | EFT-Clamp | /          | Oct. 22, 2021 | 1 Year        |

## Injected Currents Susceptibility Measurement

| Item | Equipment                          | Manufacturer | Model No.    | Serial No.    | Last Cal.     | Cal. Interval |
|------|------------------------------------|--------------|--------------|---------------|---------------|---------------|
| 1.   | C/S Conducted Immunity Test System | FRANKONIA    | CIT-10       | 126A1196/2012 | Oct. 22, 2021 | 1 Year        |
| 2.   | CDN                                | FRANKONIA    | CDN - M2+ M3 | A2210178/2012 | Oct. 22, 2021 | 1 Year        |
| 3.   | 6dB Attenuator                     | FRANKONIA    | DAM 26W      | 1172202       | Oct. 22, 2021 | 1 Year        |
| 4.   | CIT-10                             | FRANKONIA    | Version1.1.7 | N/A           | N/A           | N/A           |
| 5.   | EM-Clamp                           | FRANKONIA    | EMCL-20      | 18101728-0103 | May 17, 2022  | 1 Year        |



## Voltage Dips and Interruptions Measurement

| Item | Equipment           | Manufacturer | Model No.  | Serial No. | Last Cal.     | Cal. Interval |
|------|---------------------|--------------|------------|------------|---------------|---------------|
| 1.   | CYCLE SAG Simulator | PRIMA        | DRP61011AG | PR12046234 | Oct. 22, 2021 | 1 Year        |

## Power frequency Magnetic Field Immunity Measurement

| Item | Equipment                                | Manufacturer | Model No.   | Serial No. | Last Cal.     | Cal. Interval |
|------|--|--------------|-------------|------------|---------------|---------------|
| 1.   | Power Frequency Magnetic Field Generator | EVERFINE     | EMS61000-8K | 906002     | Oct. 22, 2021 | 1 Year        |

## 1.6. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

**FCC-Registration No.: 184111**

Shenzhen Anbotek Compliance Laboratory Limited, 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 our files. Registration No. 184111.

**ISED-Registration No.: 8058A**

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A.

**Test Location**

Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102

## 1.7. Measurement Uncertainty

|                        |   |                          |
|------------------------|---|--------------------------|
| Radiation Uncertainty  | : | Ur = 3.9 dB (Horizontal) |
|                        |   | Ur = 3.8 dB (Vertical)   |
| Conduction Uncertainty | : | Uc = 3.4 dB              |

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.





## 2. Summary of Test Results

| EMC Emission  |  |                        |         |
|---|--|------------------------|---------|
| Test Items  | Standard                                     | Basic Standard         | Results |
| Conducted Emission<br>(Power Line)                                  | ETSI EN 301 489-1 V2.2.3 Clause<br>8.3 & 8.4 | EN 55032               | PASS    |
| Conducted Emission<br>(Wired network ports)                         | ETSI EN 301 489-1 V2.2.3 Clause<br>8.7       | EN 55032               | N/A     |
| Radiated Emission   | ETSI EN 301 489-1 V2.2.3 Clause<br>8.2       | EN 55032               | PASS    |
| Harmonic Current Emission   | ETSI EN 301 489-1 V2.2.3 Clause<br>8.5       | EN IEC 61000-3-2       | PASS    |
| Voltage Fluctuations&Flicker  | ETSI EN 301 489-1 V2.2.3 Clause<br>8.6       | EN 61000-3-3           | PASS    |
| EMC Immunity  |  |                        |         |
| Test Items  | Standard                                     | Basic Standard         | Results |
| Electrostatic Discharge   | ETSI EN 301 489-1 V2.2.3 Clause<br>9.3       | EN 61000-4-2           | PASS    |
| RF Electromagnetic Field  | ETSI EN 301 489-1 V2.2.3 Clause<br>9.2       | EN 61000-4-3           | PASS    |
| Fast transients, common<br>mode                                     | ETSI EN 301 489-1 V2.2.3 Clause<br>9.4       | EN 61000-4-4           | PASS    |
| Surges  | ETSI EN 301 489-1 V2.2.3 Clause<br>9.8       | EN 61000-4-5           | PASS    |
| Radio frequency, common<br>mode                                     | ETSI EN 301 489-1 V2.2.3 Clause<br>9.5       | EN 61000-4-6           | PASS    |
| Volt. Interruptions Volt. Dips                                      | ETSI EN 301 489-1 V2.2.3 Clause<br>9.7       | EN 61000-4-11          | PASS    |
| Power frequency Magnetic<br>Field Immunity                          | EN 55035                                     | IEC 61000-4-8:<br>2009 | PASS    |
| Transients and surges in the<br>vehicular environment               | ETSI EN 301 489-1 V2.2.3 Clause<br>9.6       | ISO 7637-2             | N/A     |
| Note: (1) "N/A" denotes test is not applicable in this Test Report. |  |                        |         |



### 3. Emission Test

#### 3.1. Power Line Conducted Emission Test

##### 3.1.1. Test Standard and Limit

|                |                                    |
|----------------|------------------------------------|
| Test Standard  | ETSI EN 301 489-1 Clause 8.3 & 8.4 |
| Basic Standard | EN 55032                           |

☒ Limits for conducted emission at the AC mains power ports of Class A equipment

| Frequency (MHz) | Limits (dB $\mu$ V) |               |
|-----------------|---------------------|---------------|
|                 | Quasi-peak Level    | Average Level |
| 0.15 ~ 0.50     | 79.0                | 66.0          |
| 0.50 ~ 30.00    | 73.0                | 60.0          |

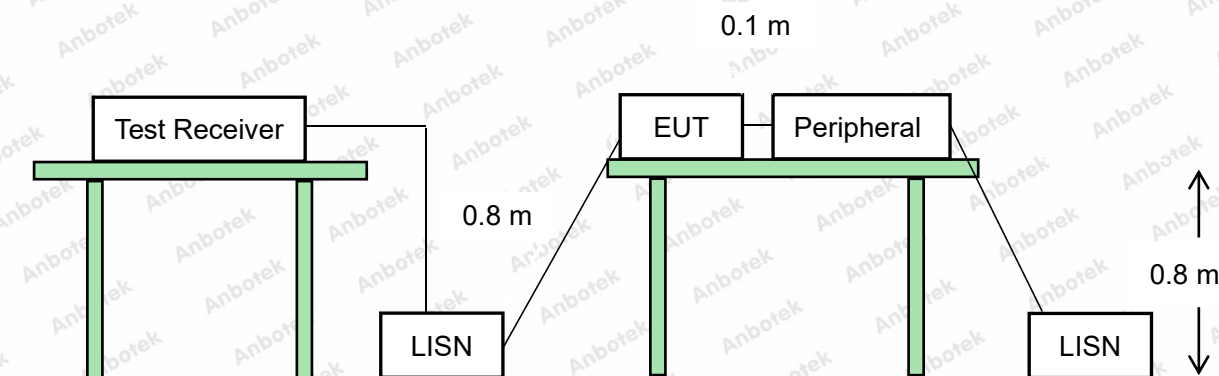
Remark: The lower limit shall apply at the transition frequencies.

☐ Limits for conducted emission at the AC mains power ports of Class B equipment

| Frequency (MHz) | Limits (dB $\mu$ V) |               |
|-----------------|---------------------|---------------|
|                 | Quasi-peak Level    | Average Level |
| 0.15 ~ 0.50     | 66.0 ~ 56.0 *       | 56.0 ~ 46.0 * |
| 0.50 ~ 5.00     | 56.0                | 46.0          |
| 5.00 ~ 30.00    | 60.0                | 50.0          |

Remark:  
(1) The lower limit shall apply at the transition frequencies.  
(2) The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

##### 3.1.2. Test Setup





### 3.1.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ETSI EN 301 489-1 & EN55032 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

### 3.1.4. Test Data

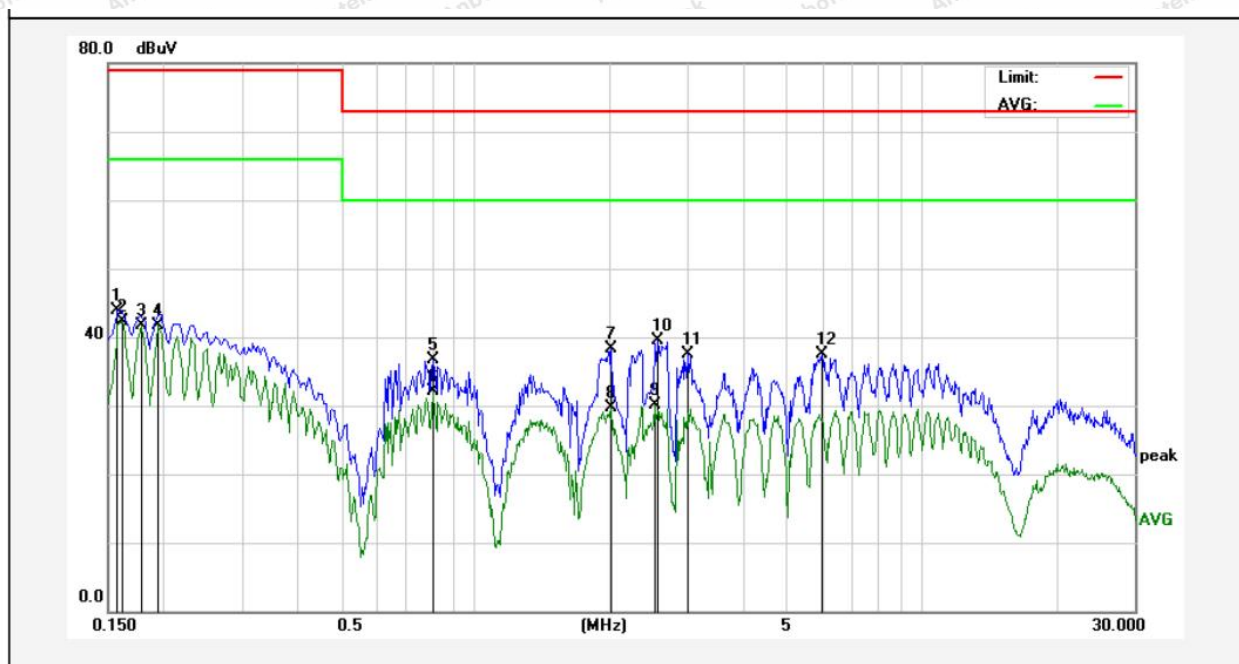
#### PASS

Only the worst case data was showed in the report, please to see the following pages.



**Conducted Emission Test Data**

Test Site: 1# Shielded Room  
Operating Condition: Mode 1  
Test Specification: AC 230V, 50Hz  
Comment: Live Line  
Temp.(°C)/Hum.(%RH): 22.8°C/48%RH



| No. | Freq.<br>(MHz) | Reading<br>(dBuV) | Factor<br>(dB) | Result<br>(dBuV) | Limit<br>(dBuV) | Over Limit<br>(dB) | Detector | Remark |
|-----|----------------|-------------------|----------------|------------------|-----------------|--------------------|----------|--------|
| 1   | 0.1580         | 34.13             | 9.70           | 43.83            | 79.00           | -35.17             | QP       |        |
| 2   | 0.1620         | 32.64             | 9.70           | 42.34            | 66.00           | -23.66             | AVG      |        |
| 3   | 0.1780         | 32.07             | 9.71           | 41.78            | 66.00           | -24.22             | AVG      |        |
| 4   | 0.1940         | 32.09             | 9.71           | 41.80            | 66.00           | -24.20             | AVG      |        |
| 5   | 0.8020         | 26.87             | 9.75           | 36.62            | 73.00           | -36.38             | QP       |        |
| 6   | 0.8020         | 22.37             | 9.75           | 32.12            | 60.00           | -27.88             | AVG      |        |
| 7   | 2.0220         | 28.49             | 9.72           | 38.21            | 73.00           | -34.79             | QP       |        |
| 8   | 2.0220         | 20.06             | 9.72           | 29.78            | 60.00           | -30.22             | AVG      |        |
| 9   | 2.5140         | 20.30             | 9.73           | 30.03            | 60.00           | -29.97             | AVG      |        |
| 10  | 2.5540         | 29.69             | 9.73           | 39.42            | 73.00           | -33.58             | QP       |        |
| 11  | 2.9860         | 27.75             | 9.73           | 37.48            | 73.00           | -35.52             | QP       |        |
| 12  | 5.9699         | 27.80             | 9.76           | 37.56            | 73.00           | -35.44             | QP       |        |

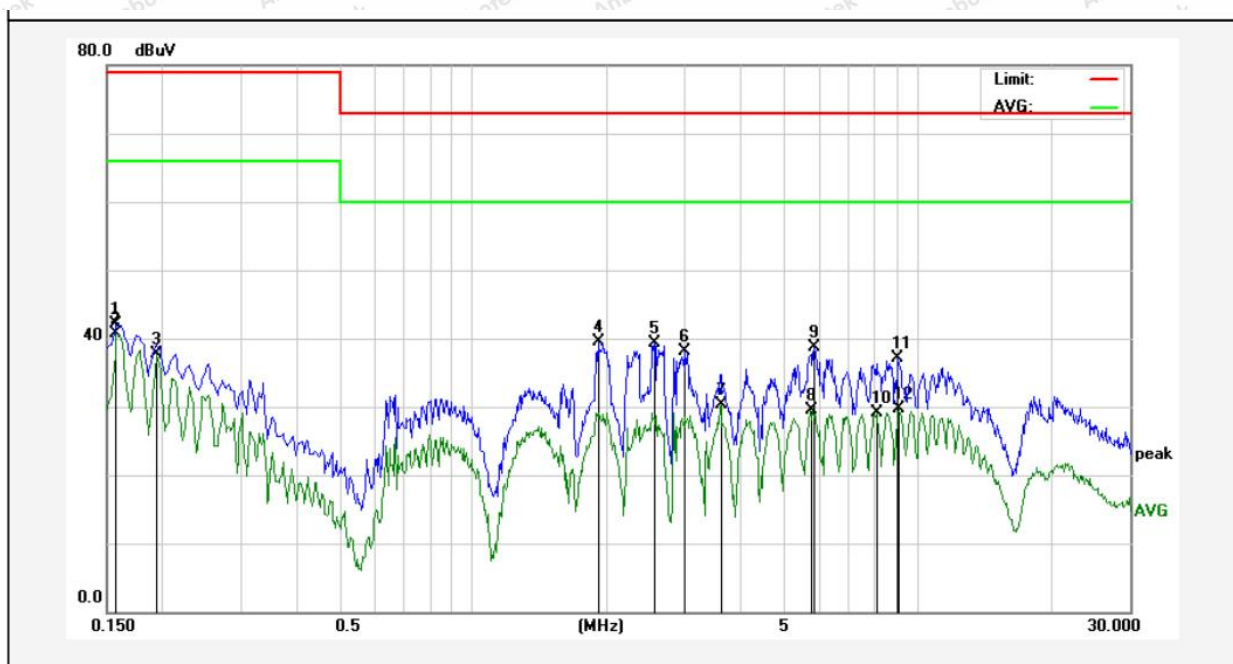
Note: Result = Reading + Factor      Over Limit = Result - Limit





**Conducted Emission Test Data**

Test Site: 1# Shielded Room  
 Operating Condition: Mode 1  
 Test Specification: AC 230V, 50Hz  
 Comment: Neutral Line  
 Temp.(°C)/Hum.(%RH): 22.8°C/48%RH



| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit (dBuV) | Over Limit (dB) | Detector | Remark |
|-----|-------------|----------------|-------------|---------------|--------------|-----------------|----------|--------|
| 1   | 0.1580      | 32.33          | 9.70        | 42.03         | 79.00        | -36.97          | QP       |        |
| 2   | 0.1580      | 30.96          | 9.70        | 40.66         | 66.00        | -25.34          | AVG      |        |
| 3   | 0.1940      | 28.09          | 9.71        | 37.80         | 66.00        | -28.20          | AVG      |        |
| 4   | 1.9180      | 29.71          | 9.72        | 39.43         | 73.00        | -33.57          | QP       |        |
| 5   | 2.5660      | 29.48          | 9.73        | 39.21         | 73.00        | -33.79          | QP       |        |
| 6   | 2.9980      | 28.30          | 9.73        | 38.03         | 73.00        | -34.97          | QP       |        |
| 7   | 3.6060      | 20.54          | 9.74        | 30.28         | 60.00        | -29.72          | AVG      |        |
| 8   | 5.7420      | 19.77          | 9.75        | 29.52         | 60.00        | -30.48          | AVG      |        |
| 9   | 5.8578      | 28.91          | 9.76        | 38.67         | 73.00        | -34.33          | QP       |        |
| 10  | 8.0740      | 19.34          | 9.81        | 29.15         | 60.00        | -30.85          | AVG      |        |
| 11  | 9.0499      | 27.27          | 9.82        | 37.09         | 73.00        | -35.91          | QP       |        |
| 12  | 9.1059      | 19.84          | 9.82        | 29.66         | 60.00        | -30.34          | AVG      |        |

Note: Result = Reading + Factor    Over Limit = Result - Limit



## 3.2. Wired Network Ports Conducted Emission Test

### 3.2.1. Test Standard and Limit

|                |                              |
|----------------|------------------------------|
| Test Standard  | ETSI EN 301 489-1 Clause 8.7 |
| Basic Standard | EN 55032                     |

☐ Limits for asymmetric mode conducted emissions of Class A equipment

| Frequency (MHz) | Limits (dB $\mu$ V) |               |
|-----------------|---------------------|---------------|
|                 | Quasi-peak Level    | Average Level |
| 0.15 ~ 0.50     | 97.0 ~ 87.0 *       | 87.0 ~ 74.0 * |
| 0.50 ~ 30.00    | 87.0                | 74.0          |

Remark:

The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

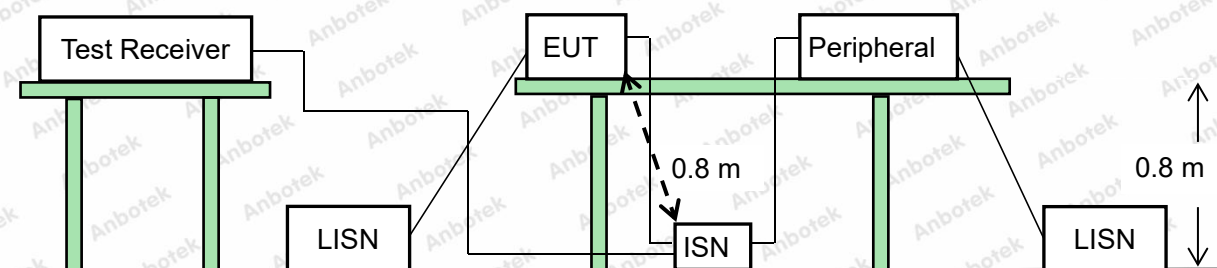
☐ Limits for asymmetric mode conducted emissions of Class B equipment

| Frequency (MHz) | Limits (dB $\mu$ V) |               |
|-----------------|---------------------|---------------|
|                 | Quasi-peak Level    | Average Level |
| 0.15 ~ 0.50     | 84.0 ~ 74.0 *       | 74.0 ~ 44.0 * |
| 0.50 ~ 30.00    | 74.0                | 64.0          |

Remark:

The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

### 3.2.2. Test Setup





### 3.2.3. Test Procedure

The EUT is put on the plane 0.8 m high above the ground by insulating support and connected to the wired network ports through Impedance Stabilization Network(ISN). and it is investigated to find out the maximum conducted emission according to the EN55032 regulations during conducted emission measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

### 3.2.4. Test Results

Not applicable.



### 3.3. Radiated Emission Test

#### 3.3.1. Test Standard and Limit

|                |                              |
|----------------|------------------------------|
| Test Standard  | ETSI EN 301 489-1 Clause 8.2 |
| Basic Standard | EN 55032                     |

☒ **Limit for radiated emissions at frequencies up to 1 GHz for class A equipment**

| Frequency<br>(MHz)   | Distance<br>(Meters) | Limit<br>(dB $\mu$ V/m) |
|--|----------------------|-------------------------|
| 30 ~ 230   | 3                    | 50                      |
| 230 ~ 1000   | 3                    | 57                      |
| Remark: The lower limit shall apply at the transition frequencies. |                      |                         |

☒ **Limit for radiated emissions at frequencies above 1 GHz for class A equipment**

| Frequency<br>(MHz)   | Distance<br>(Meters) | Limit<br>(dB $\mu$ V/m) |         |
|--|----------------------|-------------------------|---------|
|  |                      | Peak                    | Average |
| 1000 MHz -3000 MHz   | 3                    | 76                      | 56      |
| 3000 MHz -6000 MHz   | 3                    | 80                      | 60      |
| Remark: The lower limit shall apply at the transition frequencies. |                      |                         |         |

☐ **Limit for radiated emissions at frequencies up to 1 GHz for class B equipment**

| Frequency<br>(MHz)   | Distance<br>(Meters) | Limit<br>(dB $\mu$ V/m) |
|--|----------------------|-------------------------|
| 30 ~ 230   | 3                    | 40                      |
| 230 ~ 1000   | 3                    | 47                      |
| Remark: The lower limit shall apply at the transition frequencies. |                      |                         |





☐ Limit for radiated emissions at frequencies up to 1 GHz for class B equipment

| Frequency<br>(MHz) | Distance<br>(Meters) | Limit<br>(dB $\mu$ V/m) |         |
|--------------------|----------------------|-------------------------|---------|
|                    |                      | Peak                    | Average |
| 1000 MHz -3000 MHz | 1000 MHz -3000 MHz   | 70                      | 50      |
| 3000 MHz -6000 MHz | 3000 MHz -6000 MHz   | 74                      | 54      |

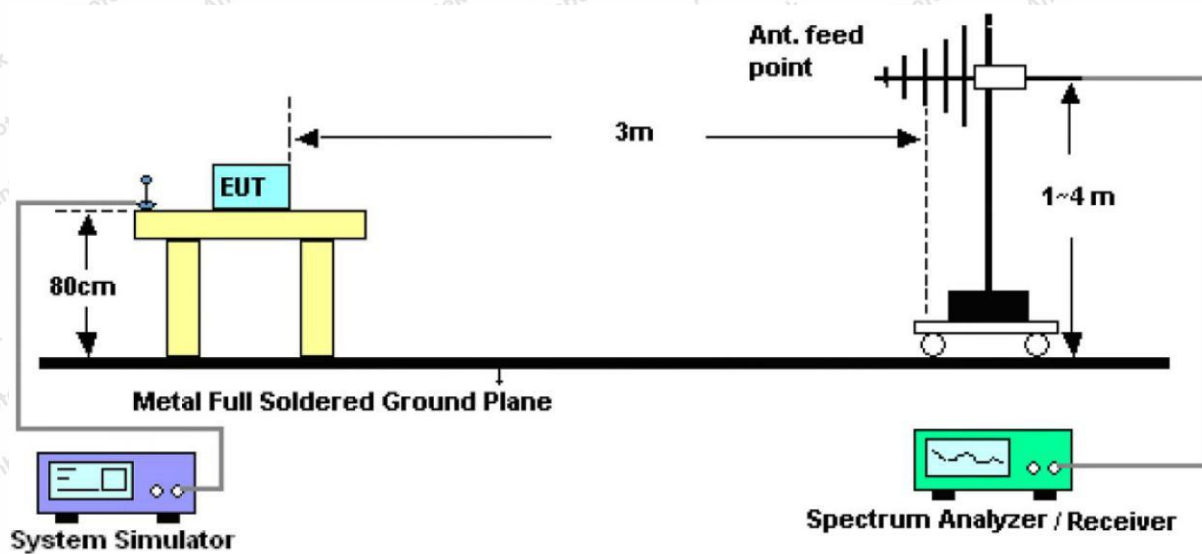
Remark: The lower limit shall apply at the transition frequencies.

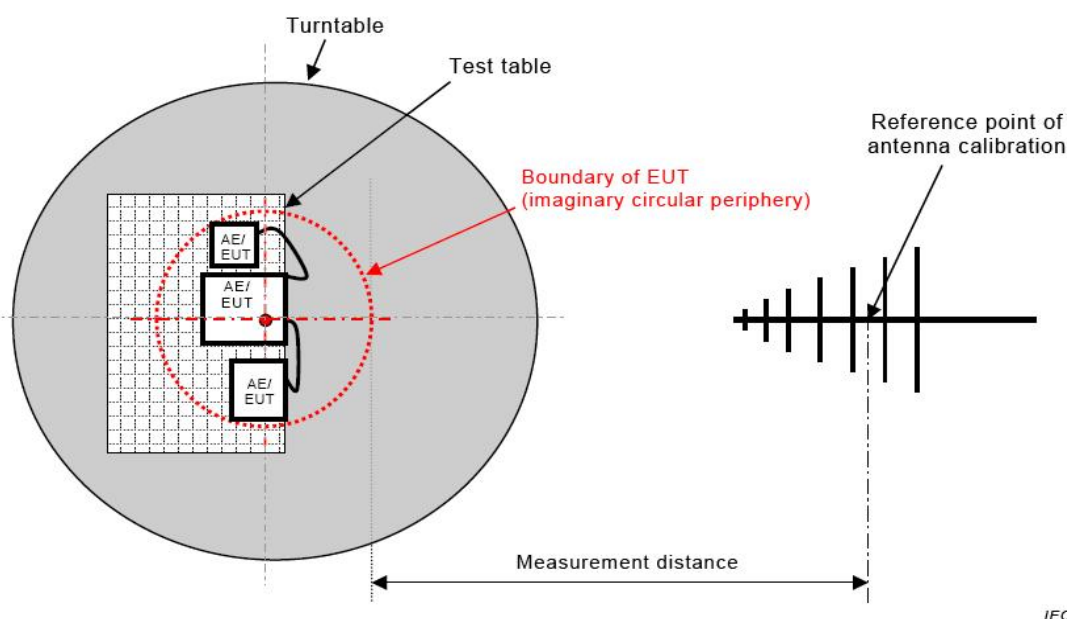
☐ Radiated emission test limit for FM receivers

| Frequency<br>(MHz) | Distance<br>(Meters) | Limit (dB $\mu$ V/m) |           |
|--------------------|----------------------|----------------------|-----------|
|                    |                      | Fundamental          | Harmonics |
| 30MHz~230MHz       | 3                    | 60                   | 52        |
| 230MHz~300MHz      | 3                    | 60                   | 52        |
| 300MHz~1000MHz     | 3                    | 60                   | 56        |

Remark: The lower limit shall apply at the transition frequency.

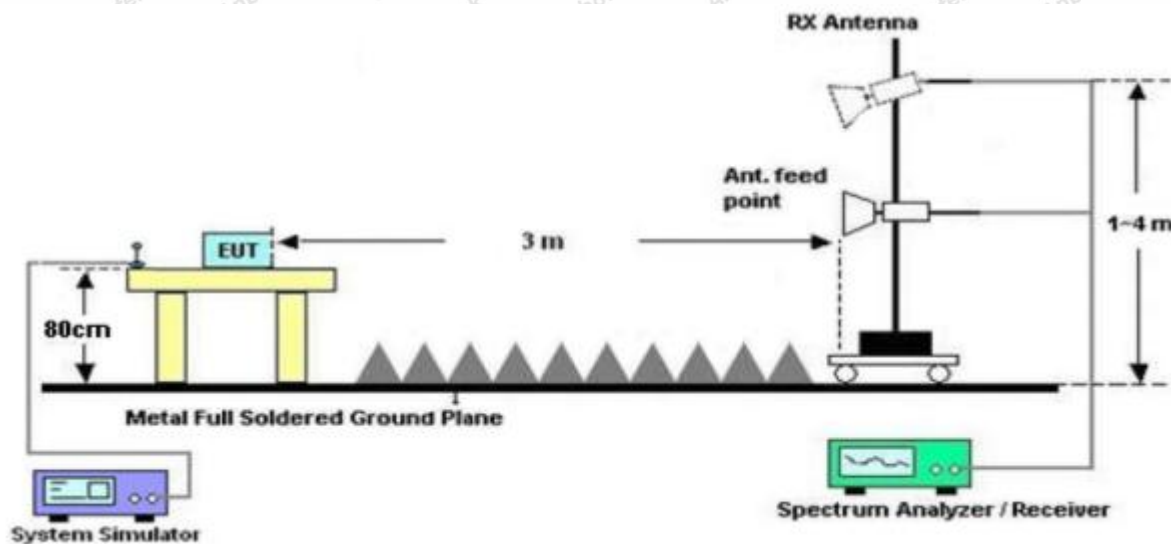
## 3.3.2. Test Setup





**Figure C.1 – Measurement distance**

30MHz to 1GHz



Above 1 GHz





### 3.3.3. Test Procedure

- 1) The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- 2) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- 3) The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4) The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- 5) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.

The test receiver/spectrum was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.

**Note:**

The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak/ Average detection at frequency above 1GHz.

### 3.3.4. Test Data

#### PASS

Only the worst case data was showed in the report, please to see the following pages.

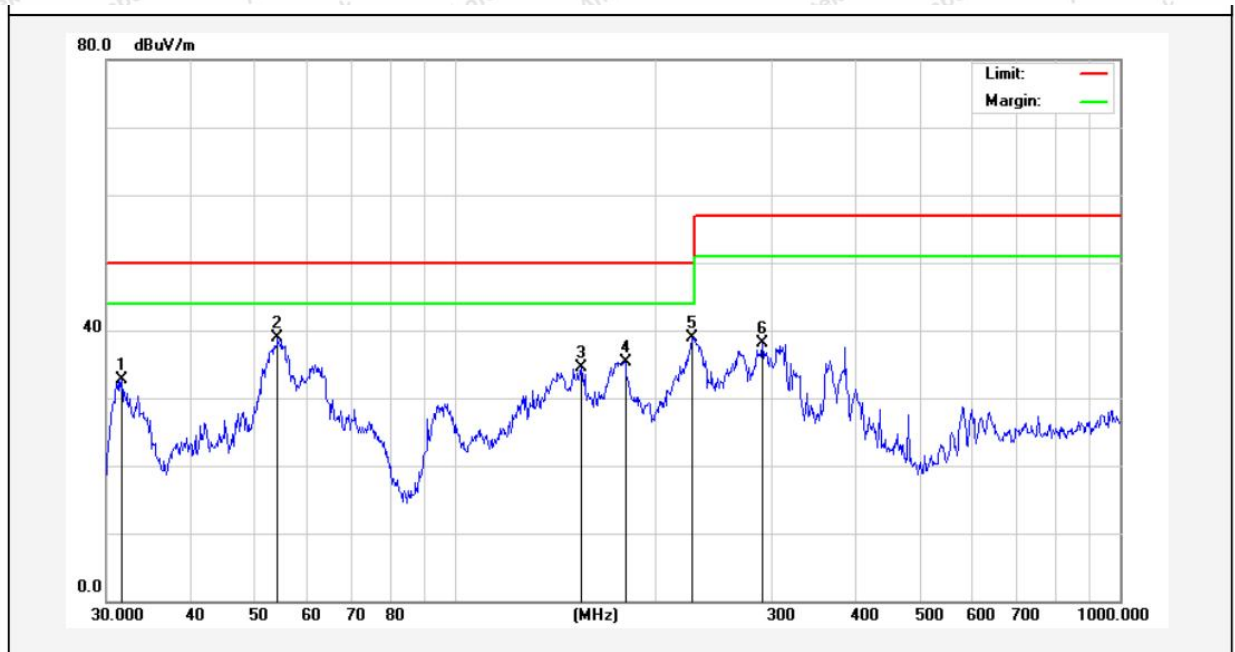


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**Test Results (30~1000MHz)**

Test Mode: Mode 1  
Power Source: AC 230V, 50Hz  
Polarization: Horizontal  
Temp.(°C)/Hum.(%RH): 24.2°C/50%RH



| No. | Freq.<br>(MHz) | Reading<br>(dBuV) | Factor<br>(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Over Limit<br>(dB) | Detector | Height<br>(cm) | degree<br>(deg) | Remark |
|-----|----------------|-------------------|------------------|--------------------|-------------------|--------------------|----------|----------------|-----------------|--------|
| 1   | 31.6202        | 52.36             | -19.67           | 32.69              | 50.00             | -17.31             | QP       |                |                 |        |
| 2   | 54.2610        | 56.16             | -17.35           | 38.81              | 50.00             | -11.19             | QP       |                |                 |        |
| 3   | 155.3644       | 57.90             | -23.48           | 34.42              | 50.00             | -15.58             | QP       |                |                 |        |
| 4   | 180.6488       | 58.49             | -23.15           | 35.34              | 50.00             | -14.66             | QP       |                |                 |        |
| 5   | 227.6906       | 60.81             | -21.87           | 38.94              | 50.00             | -11.06             | QP       |                |                 |        |
| 6   | 290.0172       | 56.15             | -18.02           | 38.13              | 57.00             | -18.87             | QP       |                |                 |        |

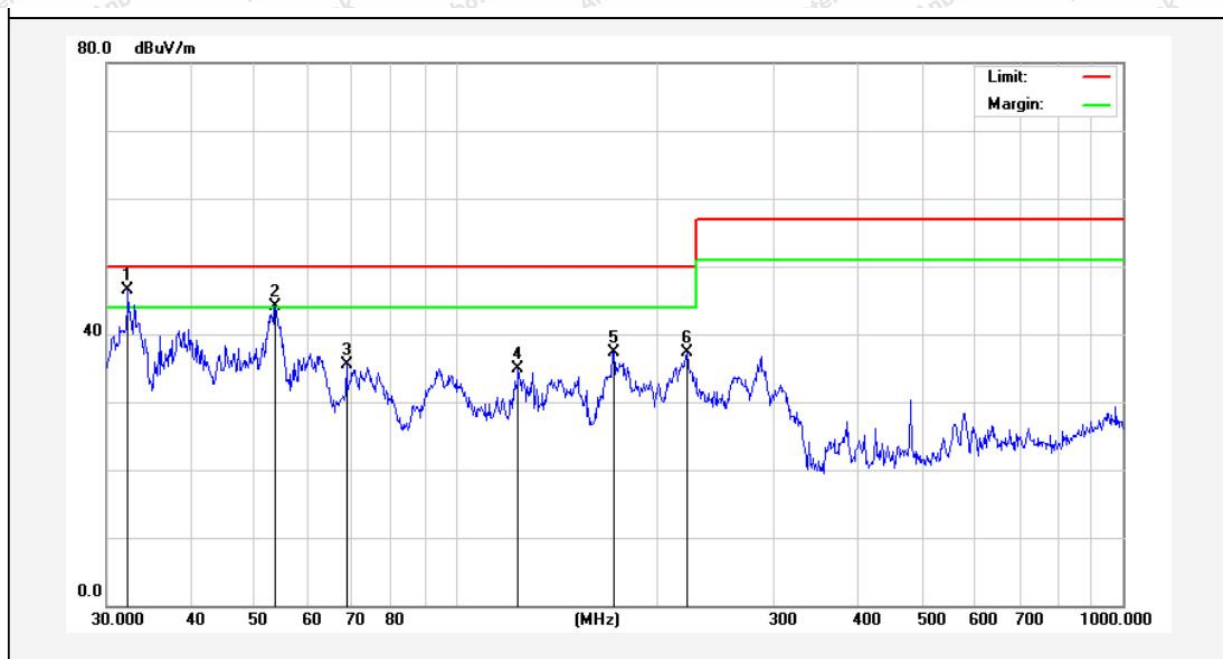
Note: Result = Reading + Factor      Over Limit = Result - Limit





## Test Results (30~1000MHz)

Test Mode: Mode 1  
Power Source: AC 230V, 50Hz  
Polarization: Vertical  
Temp.(°C)/Hum.(%RH): 24.2°C/50%RH



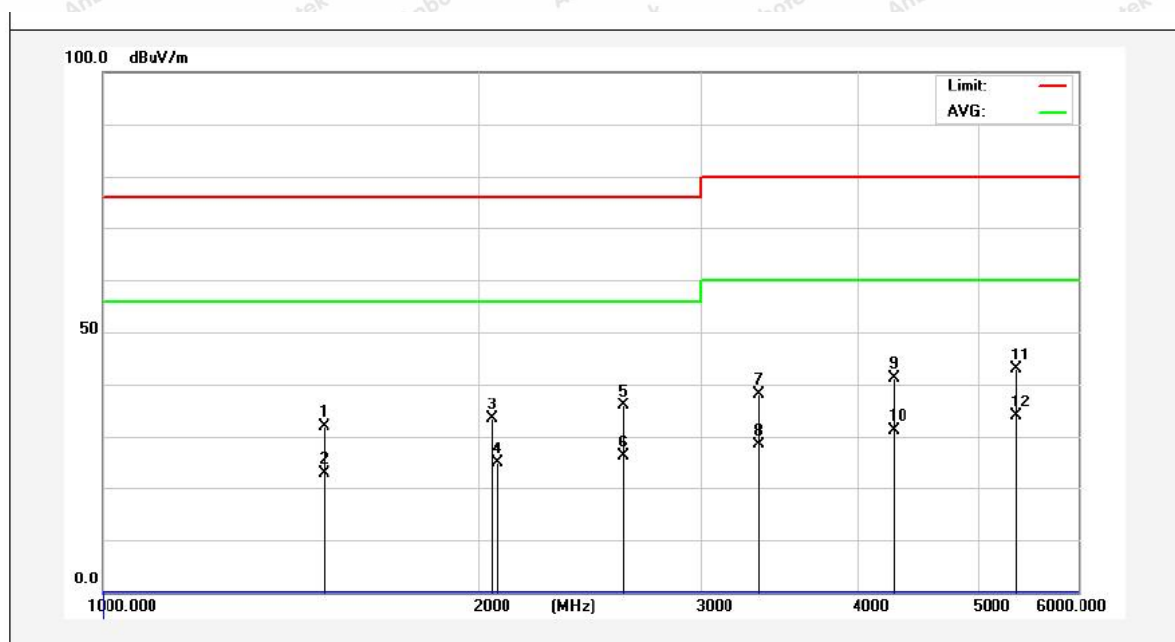
| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Height (cm) | degree (deg) | Remark |
|-----|-------------|----------------|---------------|-----------------|----------------|-----------------|----------|-------------|--------------|--------|
| 1   | 32.2925     | 64.13          | -17.58        | 46.55           | 50.00          | -3.45           | QP       |             |              |        |
| 2   | 53.6932     | 61.24          | -17.15        | 44.09           | 50.00          | -5.91           | QP       |             |              |        |
| 3   | 68.6310     | 55.39          | -19.79        | 35.60           | 50.00          | -14.40          | QP       |             |              |        |
| 4   | 124.1330    | 55.54          | -20.57        | 34.97           | 50.00          | -15.03          | QP       |             |              |        |
| 5   | 172.5988    | 58.38          | -20.99        | 37.39           | 50.00          | -12.61          | QP       |             |              |        |
| 6   | 222.1698    | 56.16          | -18.90        | 37.26           | 50.00          | -12.74          | QP       |             |              |        |

Note: Result = Reading + Factor    Over Limit = Result - Limit



## Test Results (1GHz~6GHz)

Test Mode: Mode 1  
Power Source: AC 230V, 50Hz  
Polarization: Horizontal  
Temp.(°C)/Hum.(%RH): 24.3°C/56%RH



| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Height (cm) | degree (deg) | Remark |
|-----|-------------|----------------|---------------|-----------------|----------------|-----------------|----------|-------------|--------------|--------|
| 1   | 1504.591    | 58.73          | -26.87        | 31.86           | 76.00          | -44.14          | peak     |             |              |        |
| 2   | 1504.591    | 49.69          | -26.87        | 22.82           | 56.00          | -33.18          | AVG      |             |              |        |
| 3   | 2047.672    | 58.59          | -25.21        | 33.38           | 76.00          | -42.62          | peak     |             |              |        |
| 4   | 2062.401    | 50.12          | -25.17        | 24.95           | 56.00          | -31.05          | AVG      |             |              |        |
| 5   | 2598.691    | 59.81          | -23.81        | 36.00           | 76.00          | -40.00          | peak     |             |              |        |
| 6   | 2598.691    | 49.97          | -23.81        | 26.16           | 56.00          | -29.84          | AVG      |             |              |        |
| 7   | 3333.632    | 59.74          | -21.63        | 38.11           | 80.00          | -41.89          | peak     |             |              |        |
| 8   | 3333.632    | 50.12          | -21.63        | 28.49           | 60.00          | -31.51          | AVG      |             |              |        |
| 9   | 4284.092    | 60.11          | -18.94        | 41.17           | 80.00          | -38.83          | peak     |             |              |        |
| 10  | 4284.092    | 49.99          | -18.94        | 31.05           | 60.00          | -28.95          | AVG      |             |              |        |
| 11  | 5340.371    | 59.19          | -16.27        | 42.92           | 80.00          | -37.08          | peak     |             |              |        |
| 12  | 5359.542    | 50.12          | -16.26        | 33.86           | 60.00          | -26.14          | AVG      |             |              |        |

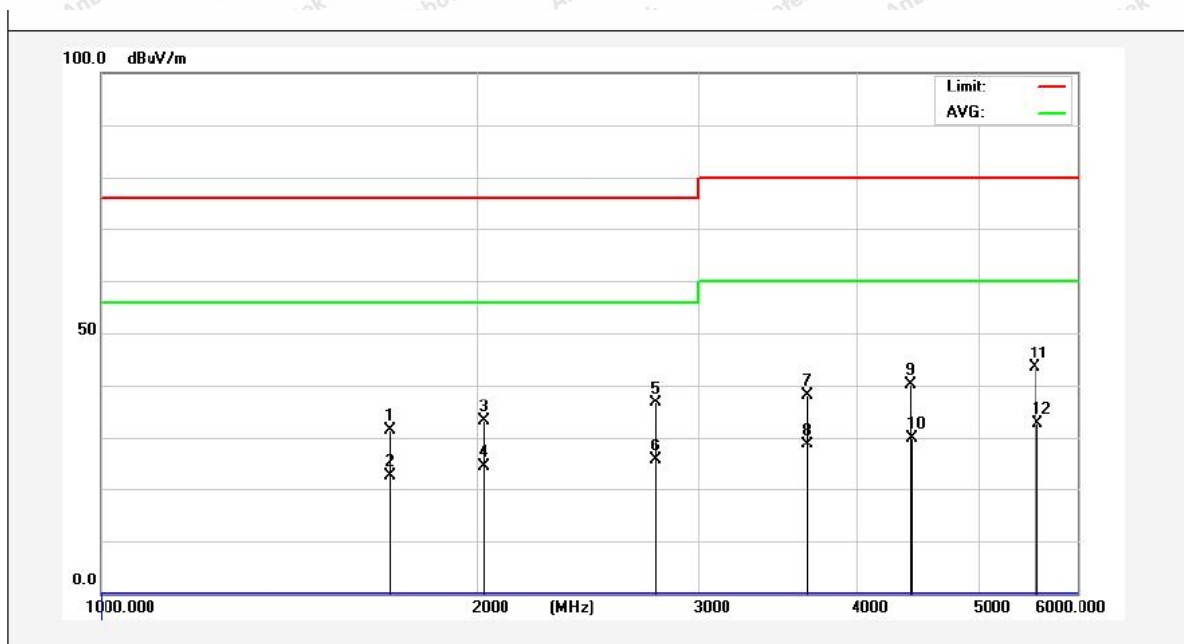
Note: Result = Reading + Factor      Over Limit = Result - Limit





## Test Results (1GHz~6GHz)

Test Mode: Mode 1  
 Power Source: AC 230V, 50Hz  
 Polarization: Vertical  
 Temp.(°C)/Hum.(%RH): 24.3°C/56%RH



| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Height (cm) | degree (deg) | Remark |
|-----|-------------|----------------|---------------|-----------------|----------------|-----------------|----------|-------------|--------------|--------|
| 1   | 1696.503    | 58.10          | -26.64        | 31.46           | 76.00          | -44.54          | peak     |             |              |        |
| 2   | 1696.503    | 49.23          | -26.64        | 22.59           | 56.00          | -33.41          | AVG      |             |              |        |
| 3   | 2014.917    | 58.58          | -25.33        | 33.25           | 76.00          | -42.75          | peak     |             |              |        |
| 4   | 2014.917    | 49.78          | -25.33        | 24.45           | 56.00          | -31.55          | AVG      |             |              |        |
| 5   | 2771.839    | 60.23          | -23.54        | 36.69           | 76.00          | -39.31          | peak     |             |              |        |
| 6   | 2771.839    | 49.12          | -23.54        | 25.58           | 56.00          | -30.42          | AVG      |             |              |        |
| 7   | 3646.072    | 59.43          | -21.40        | 38.03           | 80.00          | -41.97          | peak     |             |              |        |
| 8   | 3646.072    | 50.12          | -21.40        | 28.72           | 60.00          | -31.28          | AVG      |             |              |        |
| 9   | 4432.448    | 58.41          | -18.35        | 40.06           | 80.00          | -39.94          | peak     |             |              |        |
| 10  | 4440.397    | 48.16          | -18.34        | 29.82           | 60.00          | -30.18          | AVG      |             |              |        |
| 11  | 5545.141    | 59.41          | -16.15        | 43.26           | 80.00          | -36.74          | peak     |             |              |        |
| 12  | 5565.048    | 48.89          | -16.22        | 32.67           | 60.00          | -27.33          | AVG      |             |              |        |

Note: Result = Reading + Factor      Over Limit = Result - Limit

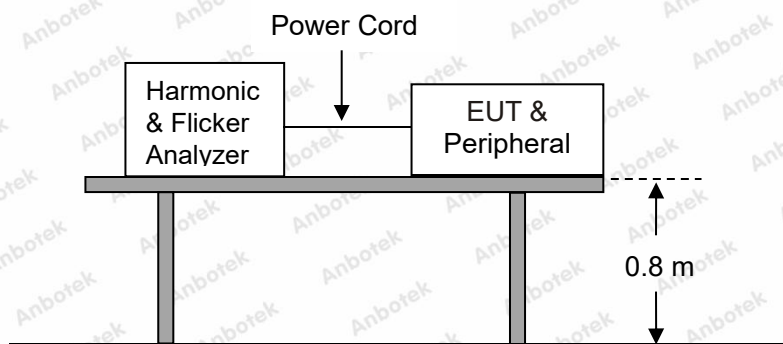


## 3.4. Harmonic Current Emissions

### 3.4.1. Test Standard and Limit

|                |  |
|----------------|--|
| Test Standard  | ETSI EN 301 489-1 Clause 8.5                                 |
| Basic Standard | EN IEC 61000-3-2   |
| Test Limit     | Please to refer to the clause 7 of standard EN IEC 61000-3-2 |

### 3.4.2. Test Setup



### 3.4.3. Test Procedure

- 1) The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions.
- 2) The classification of EUT is according to section 5 of EN IEC 61000-3-2. The EUT is classified as follows:  
Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.  
Class B: Portable tools; Arc welding equipment which is not professional equipment.  
Class C: Lighting equipment.  
Class D: Equipment having a specified power less than or equal to 600W of the following types:  
Personal computers and personal computer monitors and television.
- 3) The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

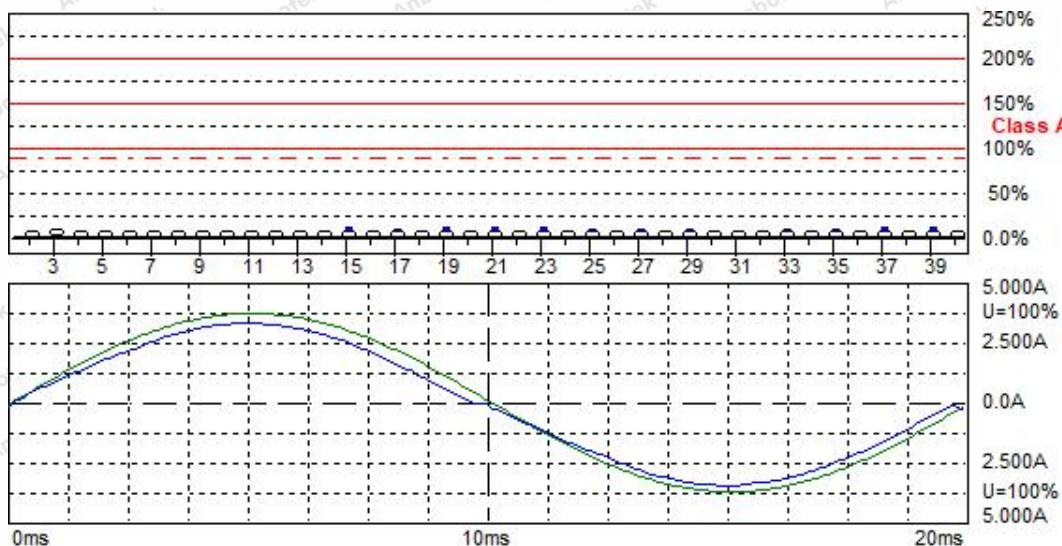




## 3.4.4. Test Data

## Pass

|            |                  |                      |               |
|------------|------------------|----------------------|---------------|
| Standard:  | EN IEC 61000-3-2 | Temp.(°C)/Hum.(%RH): | 24.3°C/50%RH  |
| Test Mode: | Mode 1           | Power Source:        | AC 230V, 50Hz |



Harmonic Emission - IEC 61000-3-2, EN 61000-3-2, (EN60555-2)

Urms = 229.7 V P = 530.6 W THC = 0.107 A Range: 5 A  
 Irms = 2.317 A pf = 0.997 H1max = A V-nom: 230 V

Test aborted, Result: PASSED

HAR-1000 EMC-Partner

Full Bar : Actual Values

Empty Bar : Maximum Values

Blue : Current , Green : Voltage , Red : Failed

Urms = 229.7V Freq = 50.013 Range: 5 A  
 Irms = 2.317A Ipk = 3.474A cf = 1.499  
 P = 530.6W S = 532.2VA pf = 0.997  
 THDi = 4.60 % THDu = 0.10 % Class A

Test - Time : 3min ( 100 %)

Test aborted, Result: PASSED

| Order | Freq.<br>[Hz] | Iavg<br>[A] | Iavg%L<br>[%] | Irms<br>[A] | Irms%<br>[%] | Irms%L<br>[%] | Imax<br>[A] | Imax%L<br>[%] | Limit<br>[A] | Status |
|-------|---------------|-------------|---------------|-------------|--------------|---------------|-------------|---------------|--------------|--------|
| 1     | 50            | 2.1375      |               | 2.3099      | 99.697       |               | 2.3093      |               |              |        |
| 2     | 100           | 0.0000      | 0.0000        | 0.0079      | 0.3425       | 0.7347        | 0.0082      | 0.7629        | 1.0800       |        |
| 3     | 150           | 0.0962      | 4.1824        | 0.0970      | 4.1886       | 4.2194        | 0.0970      | 4.2194        | 2.3000       |        |





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|    |      |        |        |        |        |        |        |        |        |
|----|------|--------|--------|--------|--------|--------|--------|--------|--------|
| 4  | 200  | 0.0000 | 0.0000 | 0.0021 | 0.0922 | 0.4968 | 0.0024 | 0.5678 | 0.4300 |
| 5  | 250  | 0.0186 | 1.6291 | 0.0186 | 0.8035 | 1.6330 | 0.0186 | 1.6330 | 1.1400 |
| 6  | 300  | 0.0000 | 0.0000 | 0.0034 | 0.1449 | 1.1190 | 0.0037 | 1.2207 | 0.3000 |
| 7  | 350  | 0.0178 | 2.3072 | 0.0180 | 0.7771 | 2.3384 | 0.0180 | 2.3384 | 0.7700 |
| 8  | 400  | 0.0000 | 0.0000 | 0.0018 | 0.0790 | 0.7961 | 0.0021 | 0.9288 | 0.2300 |
| 9  | 450  | 0.0020 | 0.4905 | 0.0137 | 0.5927 | 3.4332 | 0.0137 | 3.4332 | 0.4000 |
| 10 | 500  | 0.0000 | 0.0000 | 0.0031 | 0.1317 | 1.6586 | 0.0031 | 1.6586 | 0.1840 |
| 11 | 550  | 0.0000 | 0.0000 | 0.0110 | 0.4742 | 3.3292 | 0.0113 | 3.4217 | 0.3300 |
| 12 | 600  | 0.0000 | 0.0000 | 0.0018 | 0.0790 | 1.1942 | 0.0018 | 1.1942 | 0.1533 |
| 13 | 650  | 0.0000 | 0.0000 | 0.0098 | 0.4215 | 4.6503 | 0.0098 | 4.6503 | 0.2100 |
| 14 | 700  | 0.0000 | 0.0000 | 0.0037 | 0.1581 | 2.7864 | 0.0037 | 2.7864 | 0.1314 |
| 15 | 750  | 0.0000 | 0.0000 | 0.0122 | 0.5269 | 8.1380 | 0.0122 | 8.1380 | 0.1500 |
| 16 | 800  | 0.0000 | 0.0000 | 0.0024 | 0.1054 | 2.1230 | 0.0024 | 2.1230 | 0.1150 |
| 17 | 850  | 0.0000 | 0.0000 | 0.0092 | 0.3952 | 6.9173 | 0.0095 | 7.1479 | 0.1324 |
| 18 | 900  | 0.0000 | 0.0000 | 0.0034 | 0.1449 | 3.2840 | 0.0034 | 3.2840 | 0.1022 |
| 19 | 950  | 0.0000 | 0.0000 | 0.0095 | 0.4083 | 7.9888 | 0.0095 | 7.9888 | 0.1184 |
| 20 | 1000 | 0.0000 | 0.0000 | 0.0021 | 0.0922 | 2.3220 | 0.0024 | 2.6537 | 0.0920 |
| 21 | 1050 | 0.0000 | 0.0000 | 0.0089 | 0.3820 | 8.2601 | 0.0089 | 8.2601 | 0.1071 |
| 22 | 1100 | 0.0000 | 0.0000 | 0.0031 | 0.1317 | 3.6488 | 0.0031 | 3.6488 | 0.0836 |
| 23 | 1150 | 0.0000 | 0.0000 | 0.0076 | 0.3293 | 7.7989 | 0.0076 | 7.7989 | 0.0978 |
| 24 | 1200 | 0.0000 | 0.0000 | 0.0024 | 0.1054 | 3.1844 | 0.0024 | 3.1844 | 0.0767 |
| 25 | 1250 | 0.0000 | 0.0000 | 0.0061 | 0.2634 | 6.7817 | 0.0061 | 6.7817 | 0.0900 |
| 26 | 1300 | 0.0000 | 0.0000 | 0.0027 | 0.1185 | 3.8810 | 0.0027 | 3.8810 | 0.0708 |
| 27 | 1350 | 0.0000 | 0.0000 | 0.0061 | 0.2634 | 7.3242 | 0.0061 | 7.3242 | 0.0833 |
| 28 | 1400 | 0.0000 | 0.0000 | 0.0027 | 0.1185 | 4.1796 | 0.0027 | 4.1796 | 0.0657 |
| 29 | 1450 | 0.0000 | 0.0000 | 0.0052 | 0.2239 | 6.6867 | 0.0052 | 6.6867 | 0.0776 |
| 30 | 1500 | 0.0000 | 0.0000 | 0.0024 | 0.1054 | 3.9806 | 0.0024 | 3.9806 | 0.0613 |
| 31 | 1550 | 0.0000 | 0.0000 | 0.0040 | 0.1712 | 5.4660 | 0.0040 | 5.4660 | 0.0726 |
| 32 | 1600 | 0.0000 | 0.0000 | 0.0024 | 0.1054 | 4.2459 | 0.0021 | 3.7152 | 0.0575 |
| 33 | 1650 | 0.0000 | 0.0000 | 0.0046 | 0.1976 | 6.7139 | 0.0046 | 6.7139 | 0.0682 |
| 34 | 1700 | 0.0000 | 0.0000 | 0.0021 | 0.0922 | 3.9474 | 0.0021 | 3.9474 | 0.0541 |
| 35 | 1750 | 0.0000 | 0.0000 | 0.0037 | 0.1581 | 5.6966 | 0.0040 | 6.1713 | 0.0643 |
| 36 | 1800 | 0.0000 | 0.0000 | 0.0021 | 0.0922 | 4.1796 | 0.0024 | 4.7767 | 0.0511 |
| 37 | 1850 | 0.0000 | 0.0000 | 0.0055 | 0.2371 | 9.0332 | 0.0058 | 9.5350 | 0.0608 |
| 38 | 1900 | 0.0000 | 0.0000 | 0.0021 | 0.0922 | 4.4118 | 0.0021 | 4.4118 | 0.0484 |
| 39 | 1950 | 0.0000 | 0.0000 | 0.0049 | 0.2107 | 8.4635 | 0.0049 | 8.4635 | 0.0577 |
| 40 | 2000 | 0.0000 | 0.0000 | 0.0018 | 0.0790 | 3.9806 | 0.0021 | 4.6440 | 0.0460 |



**Calculation of Individual Harmonic Limits****Fixed Limits for Class A:**

| Order | Limits in Ampere |        |        |        |
|-------|------------------|--------|--------|--------|
|       | 90%              | 100%   | 150%   | 200%   |
| 2     | 0.9720           | 1.0800 | 1.6200 | 2.1600 |
| 3     | 2.0701           | 2.3001 | 3.4502 | 4.6002 |
| 4     | 0.3870           | 0.4300 | 0.6450 | 0.8600 |
| 5     | 1.0261           | 1.1401 | 1.7102 | 2.2803 |
| 6     | 0.2700           | 0.3000 | 0.4500 | 0.6000 |
| 7     | 0.6930           | 0.7700 | 1.1549 | 1.5399 |
| 8     | 0.2071           | 0.2301 | 0.3452 | 0.4602 |
| 9     | 0.3601           | 0.4001 | 0.6001 | 0.8002 |
| 10    | 0.1656           | 0.1840 | 0.2760 | 0.3680 |
| 11    | 0.2969           | 0.3299 | 0.4948 | 0.6598 |
| 12    | 0.1379           | 0.1532 | 0.2298 | 0.3064 |
| 13    | 0.1890           | 0.2100 | 0.3149 | 0.4199 |
| 14    | 0.1184           | 0.1315 | 0.1973 | 0.2631 |
| 15    | 0.1351           | 0.1501 | 0.2252 | 0.3003 |
| 16    | 0.1035           | 0.1151 | 0.1726 | 0.2301 |
| 17    | 0.1192           | 0.1324 | 0.1987 | 0.2649 |
| 18    | 0.0920           | 0.1022 | 0.1534 | 0.2045 |
| 19    | 0.1066           | 0.1184 | 0.1776 | 0.2368 |
| 20    | 0.0827           | 0.0919 | 0.1378 | 0.1837 |
| 21 *  | 0.0964           | 0.1071 | 0.1607 | 0.2142 |
| 22    | 0.0753           | 0.0836 | 0.1254 | 0.1672 |
| 23 *  | 0.0882           | 0.0980 | 0.1469 | 0.1959 |
| 24    | 0.0689           | 0.0766 | 0.1149 | 0.1532 |
| 25 *  | 0.0810           | 0.0900 | 0.1350 | 0.1801 |
| 26    | 0.0637           | 0.0708 | 0.1062 | 0.1416 |
| 27 *  | 0.0750           | 0.0833 | 0.1250 | 0.1666 |
| 28    | 0.0591           | 0.0656 | 0.0984 | 0.1312 |
| 29 *  | 0.0698           | 0.0775 | 0.1163 | 0.1550 |
| 30    | 0.0552           | 0.0613 | 0.0920 | 0.1227 |
| 31 *  | 0.0654           | 0.0726 | 0.1089 | 0.1453 |
| 32    | 0.0516           | 0.0574 | 0.0861 | 0.1147 |
| 33 *  | 0.0612           | 0.0681 | 0.1021 | 0.1361 |
| 34    | 0.0486           | 0.0540 | 0.0810 | 0.1080 |



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|      |        |        |        |        |
|------|--------|--------|--------|--------|
| 35 * | 0.0580 | 0.0644 | 0.0966 | 0.1288 |
| 36   | 0.0459 | 0.0510 | 0.0764 | 0.1019 |
| 37 * | 0.0547 | 0.0607 | 0.0911 | 0.1215 |
| 38   | 0.0437 | 0.0485 | 0.0728 | 0.0970 |
| 39 * | 0.0519 | 0.0577 | 0.0865 | 0.1154 |
| 40   | 0.0415 | 0.0461 | 0.0691 | 0.0922 |





### 3.5. Voltage Fluctuations and Flicker

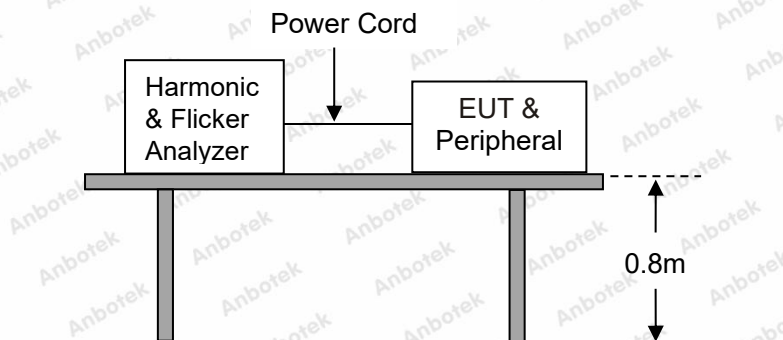
#### 3.5.1. Test Standard and Limit

|                |                              |
|----------------|------------------------------|
| Test Standard  | ETSI EN 301 489-1 Clause 8.6 |
| Basic Standard | EN 61000-3-3                 |

Voltage Fluctuation and Flicker Test Limit

| Test Items | Limits                    |
|------------|---------------------------|
| Pst        | 1.0                       |
| Plt        | 0.65                      |
| dc         | 3.3%                      |
| dmax       | 4.0%                      |
| dt         | Not exceed 3.3% for 500ms |

#### 3.5.2. Test Setup



#### 3.5.3. Test Procedure

- 1) Tests was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in Clause 5.0/6.0 of IEC555-3 and/or Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.
- 2) All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

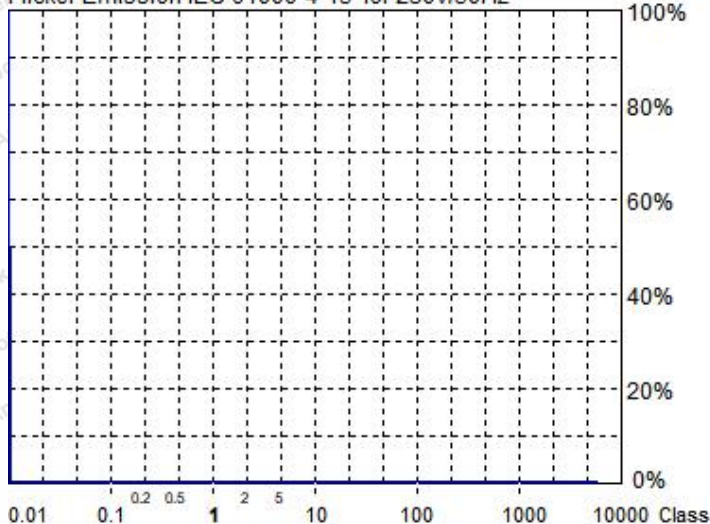


## 3.5.4. Test Data

## Pass

|            |              |                      |               |
|------------|--------------|----------------------|---------------|
| Standard:  | EN 61000-3-3 | Temp.(°C)/Hum.(%RH): | 24.3°C /55%RH |
| Test Mode: | Mode 1       | Power Source:        | AC 230V, 50Hz |

Flicker Emission IEC 61000-4-15 for 230V/50Hz



Actual Flicker (Fli): 0.00

Short-term Flicker (Pst): 0.07

Limit (Pst): 1.00

Long-term Flicker (Plt): 0.00

Limit (Plt): 0.65

Maximum Relative  
Volt. Change (dmax): 0.00%

Limit (dmax): 4.00%

Relative Steady-state  
Voltage Change (dc): 0.01%

Limit (dc): 3.30%

Tmax 3.00% (dt): 0.00ms

Limit (dt&gt;Lim): 200ms

Flicker Emission - IEC 61000-3-3, EN 61000-3-3

Urms = 228.7 V P = 526.9 W  
Irms = 2.310 A pf = 0.997

Range: 10 A  
V-nom: 230 V

Test aborted, Result: PASSED

HAR-1000 EMC-Partner

Full Bar : Actual Values

Empty Bar : Maximum Values

Circles : Average Values

Blue : Current, Green : Voltage, Red : Failed

Urms = 228.7V Freq = 50.000 Range: 10 A  
Irms = 2.310A Ipk = 3.496A cf = 1.514  
P = 526.9W S = 528.3VA pf = 0.997

Test - Time : 10 x 1min = 10min ( 100 %)

LIN (Line Impedance Network) : L: 0.24ohm +j0.15ohm N: 0.16ohm +j0.10ohm

Limits : Plt : 0.65 Pst : 1.00  
dmax : 4.00 % dc : 3.30 %  
dtLim: 3.00 % dt>Lim: 200ms

Test aborted, Result: PASSED

|   |       |       |        |
|---|-------|-------|--------|
|   | dmax  | dc    | dt>Lim |
|   | [%]   | [%]   | [ms]   |
| 1 | 0.000 | 0.000 | 0.000  |





## 4. Immunity Test

### General Performance Criteria

#### Performance criteria for For EN 55035:

##### Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

##### Performance criterion B

During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.

After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

##### Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.

Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.





## Performance criteria for ETSI EN 301 489-17:

Table 2: Performance criteria

| Criteria | During test  | After test<br>(i.e. as a result of the application of the test)   |
|----------|--|---|
| A        | Shall operate as intended.<br>(See note).<br>Shall be no loss of function.<br>Shall be no unintentional transmissions. | Shall operate as intended.<br>Shall be no degradation of performance.<br>Shall be no loss of function.<br>Shall be no loss of critical stored data. |
| B        | May be loss of function.   | Functions shall be self-recoverable.<br>Shall operate as intended after recovering.<br>Shall be no loss of critical stored data.                    |
| C        | May be loss of function.   | Functions shall be recoverable by the operator.<br>Shall operate as intended after recovering.<br>Shall be no loss of critical stored data.         |

NOTE: Operate as intended during the test allows a level of degradation in accordance with clause 6.2.2.

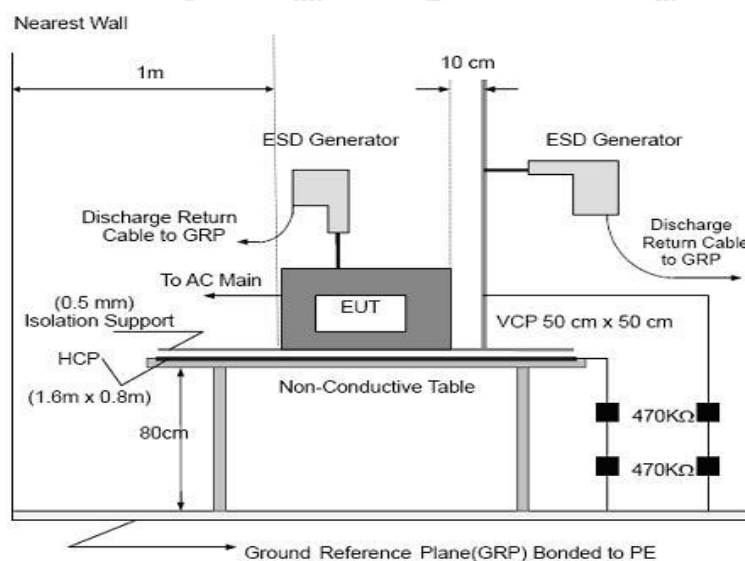


## 4.1. Electrostatic Discharge Test

### 4.1.1. Test Standard and Specification

|                        |   |
|------------------------|---|
| Test Standard          | ETSI EN 301 489-1 Clause 9.3/ EN 55035 Clause 4.2.1   |
| Basic Standard         | EN 61000-4-2  |
| Discharge Impedance:   | 330 ohm / 150 pF  |
| Performance Criterion: | B (for EN 301489-17)<br>B (for EN 55035)  |
| Discharge Voltage:     | Air Discharge: 2kV/4kV/8kV<br>Contact Discharge: 2kV/4kV (Direct/Indirect)                    |
| Polarity:              | Positive & Negative   |
| Number of Discharge:   | Air Discharge: min. 20 times at each test point<br>Contact Discharge: min. 200 times in total |
| Discharge Mode:        | Single Discharge  |
| Discharge Period:      | 1 second minimum  |

### 4.1.2. Test Setup



#### TABLE-TOP EQUIPMENT:

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940kohm total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC / EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.





**FLOOR-STANDING EQUIPMENT:**

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

**4.1.3. Test Procedure**

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

- 1) Contact discharge was applied to conductive surfaces and coupling planes of the EUT.

During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second.

**Vertical Coupling Plane (VCP):**

The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

**Horizontal Coupling Plane (HCP):**

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

- 2) Air discharges at insulation surfaces of the EUT.

It was at least ten single discharges with positive and negative at the same selected point.

**4.1.4. Test Data**

Pass

Please refer to the following page.





| Electrostatic Discharge Test Results |                             |             |                   |         |
|--------------------------------------|-----------------------------|-------------|-------------------|---------|
| Test Mode:                           | Please refers to clause 1.4 |             |                   |         |
| Temp.(°C)/Hum.(%RH):                 | Tem.: 23.4°C Hum.: 49%      |             |                   |         |
| Test mode for EN 301489-17 standard  |                             |             |                   |         |
| Test Voltage                         | Coupling                    | Observation | Perform. Criteria | Results |
| ±2KV, ±4kV                           | Contact Discharge           | A           | B                 | PASS    |
| ±2KV, ±4kV, ±8kV                     | Air Discharge               | A           | B                 | PASS    |
| ±2KV, ±4kV                           | Indirect Discharge HCP      | A           | B                 | PASS    |
| ±2KV, ±4kV                           | Indirect Discharge VCP      | A           | B                 | PASS    |
| Test mode for EN 55035 standard      |                             |             |                   |         |
| Test Voltage                         | Coupling                    | Observation | Perform. Criteria | Results |
| ±2KV, ±4kV                           | Contact Discharge           | A           | B                 | PASS    |
| ±2KV, ±4kV, ±8kV                     | Air Discharge               | A           | B                 | PASS    |
| ±2KV, ±4kV                           | Indirect Discharge HCP      | A           | B                 | PASS    |
| ±2KV, ±4kV                           | Indirect Discharge VCP      | A           | B                 | PASS    |

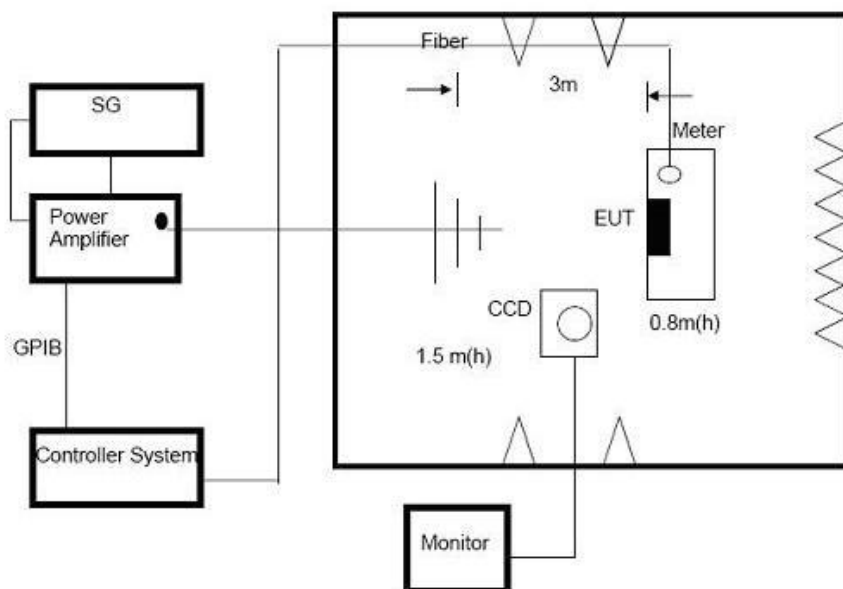


## 4.2. Radiated, RF Electromagnetic Fields Test

### 4.2.1. Test Standard and Specification

|  |  |  |   |
|--|--|--|---|
| Test Standard  | ETSI EN 301 489-1 Clause 9.2/ EN 55035 Clause 5      |  |   |
| Basic Standard   | EN 61000-4-3   |  |   |
| Required Performance   | A (for EN 301489-17)<br>A (for EN 55035)             |  |   |
| Frequency Range<br>(for EN 301 489-1)  | 80MHz to 6000MHz                                     |  |   |
| Frequency Range<br>(for EN 55035)  | <input checked="" type="checkbox"/> 80MHz to 1000MHz | <input checked="" type="checkbox"/> Spot frequencies | <input checked="" type="checkbox"/> Additional spot frequencies |
| Field Strength   | 3 V/m  |  |   |
| Modulation   | 1kHz Sine Wave, 80%, AM Modulation                   |  |   |
| Frequency Step   | 1 % of preceding frequency value                     |  |   |
| Polarity of Antenna  | Horizontal and Vertical                              |  |   |
| Test Distance  | 3 m  |  |   |
| Antenna Height   | 1.5 m  |  |   |
| Dwell Time   | at least 0.5s  |  |   |
| Spot frequencies: 1800 MHz, 2600 MHz, 3500 MHz and 5000 MHz;<br>Additional spot frequencies: 80 MHz, 120 MHz, 160 MHz, 230 MHz, 434 MHz, 460 MHz, 600 MHz,<br>863 MHz and 900 MHz. |  |  |   |

### 4.2.2. Test Setup



#### 4.2.3. Test Procedure

The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber. The testing distance from antenna to the EUT was 3 meters.

- 1) The field strength level was 3V/m
- 2) The frequency range is swept from 80 MHz to 6000 MHz with the signal 80%amplitude modulated with a 1kHz sine wave.
- 3) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond, but shall in no case be less than 0.5s.
- 4) The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

#### 4.2.4. Test Data

Pass

Please refer to the following page.





## Radiated, RF Electromagnetic Fields Test Results

|                                     |                   |  |         |             |                   |         |
|-------------------------------------|-------------------|--|---------|-------------|-------------------|---------|
| Test Mode:                          |                   | Please refers to clause 1.4                |         |             |                   |         |
| Temp.(°C)/Hum.(%RH):                |                   | Tem.: 24.0℃ Hum.: 51%                      |         |             |                   |         |
| Test mode for EN 301489-17 standard |                   |  |         |             |                   |         |
| Frequency Range (MHz)               | RF Field Position | R.F. Field Strength                        | Azimuth | Observation | Perform. Criteria | Results |
| 80~6000                             | H / V             | 3 V/m (rms)<br>AM Modulated<br>1000Hz, 80% | Front   | A           | A                 | PASS    |
|                                     |                   |  | Rear    | A           | A                 | PASS    |
|                                     |                   |  | Left    | A           | A                 | PASS    |
|                                     |                   |  | Right   | A           | A                 | PASS    |
| Test mode for EN 55035 standard     |                   |  |         |             |                   |         |
| Frequency Range (MHz)               | RF Field Position | R.F. Field Strength                        | Azimuth | Observation | Perform. Criteria | Results |
| 80~1000                             | H / V             | 3 V/m (rms)<br>AM Modulated<br>1000Hz, 80% | Front   | A           | A                 | PASS    |
|                                     |                   |  | Rear    | A           | A                 | PASS    |
|                                     |                   |  | Left    | A           | A                 | PASS    |
|                                     |                   |  | Right   | A           | A                 | PASS    |
| Spot frequencies                    | H / V             | 3 V/m (rms)<br>AM Modulated<br>1000Hz, 80% | Front   | A           | A                 | PASS    |
|                                     |                   |  | Rear    | A           | A                 | PASS    |
|                                     |                   |  | Left    | A           | A                 | PASS    |
|                                     |                   |  | Right   | A           | A                 | PASS    |
| Additional spot frequencies         | H / V             | 3 V/m (rms)<br>AM Modulated<br>1000Hz, 80% | Front   | A           | A                 | PASS    |
|                                     |                   |  | Rear    | A           | A                 | PASS    |
|                                     |                   |  | Left    | A           | A                 | PASS    |
|                                     |                   |  | Right   | A           | A                 | PASS    |



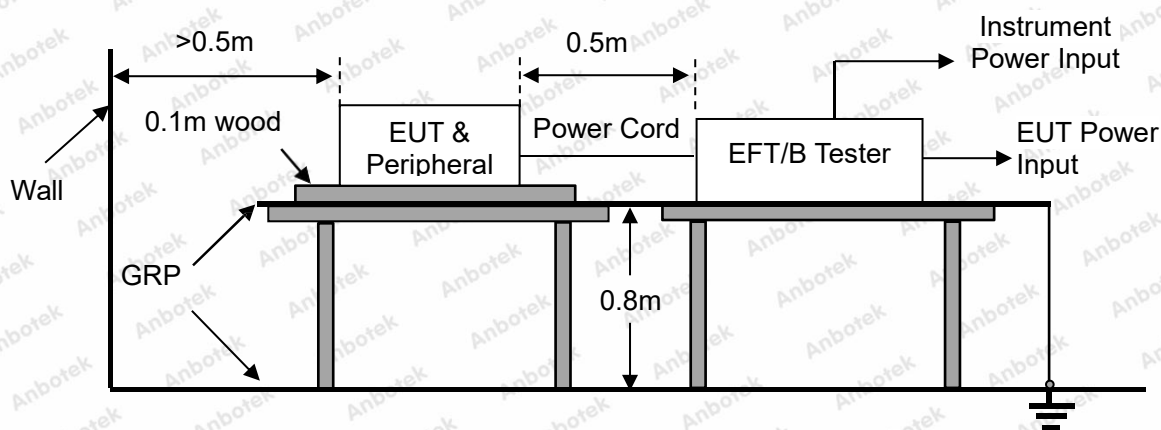
### 4.3. Fast Transients, Common Mode Test

#### 4.3.1. Test Standard and Specification

|                      |   |
|----------------------|---|
| Test Standard        | ETSI EN 301 489-1 Clause 9.4/ EN 55035 Clause 4.2.4   |
| Basic Standard       | EN 61000-4-4  |
| Required Performance | B (for EN 301489-17)<br>B (for EN 55035)  |
| Test Voltage:        | <input checked="" type="checkbox"/> 1 kV, AC mains power ports<br><input type="checkbox"/> 0.5 kV, DC network power ports<br><input type="checkbox"/> 0.5 kV, Analogue/digital data ports |
| Polarity:            | Positive & Negative   |
| Impulse Frequency:   | 5 kHz   |
| Impulse Wave shape : | Tr/Th 5/50 ns   |
| Burst Duration:      | 15 ms for 5KHz Repetition Frequency<br>0.75 ms for 100KHz Repetition Frequency  |
| Burst Period:        | 300 ms  |
| Test Duration        | 1 min   |

#### 4.3.2. Test Setup

AC mains power ports and DC network power ports:



### 4.3.3. Test Procedure

The table-top EUT is placed on a table that is 0.8 m height, a ground reference plane is placed on the table, and uses 0.1 m insulation between the EUT and ground reference plane. The floor-standing EUT is placed on a ground reference plane and insulated from it by an insulating support with a thickness of 0.1 m. This reference ground plane shall project beyond the EUT by at least 0.1 m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5 m.

All cables to the EUT shall be placed on the insulation support 0.1 m above the ground reference plane. Cables not subject to electrical fast transients shall be routed as far as possible from the cable under test to minimize the coupling between the cables.

### 4.3.4. Test Data

Pass

Please refer to the following page.

| Fast Transients, Common Mode Test Results        |        |                             |          |             |           |         |
|--|--------|-----------------------------|----------|-------------|-----------|---------|
| Test Mode:                                       |        | Please refers to clause 1.4 |          |             |           |         |
| Temp.(℃ )/Hum.(%RH):                             |        | Tem.: 23.4℃ Hum.: 49%       |          |             |           |         |
| Test mode for EN 301489-17 and EN 55035 standard |        |                             |          |             |           |         |
| Coupling Line                                    |        | Test Voltage                | Polarity | Observation | Criterion | Results |
| AC Line  | L      | 1KV                         | ±        | A           | B         | PASS    |
|  | N      | 1KV                         | ±        | A           | B         | PASS    |
|  | L+N    | 1KV                         | ±        | A           | B         | PASS    |
|  | PE     | 1KV                         | ±        | A           | B         | PASS    |
|  | L+PE   | 1KV                         | ±        | A           | B         | PASS    |
|  | N+PE   | 1KV                         | ±        | A           | B         | PASS    |
|  | L+N+PE | 1KV                         | ±        | A           | B         | PASS    |



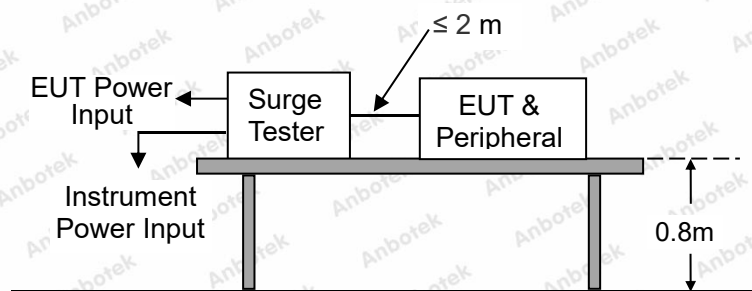


## 4.4. Surges Test

### 4.4.1. Test Standard and Specification

|                        |                           |   |
|------------------------|---------------------------|---|
| Test Standard          |                           | ETSI EN 301 489-1 V2.2.3 Clause 9.8/ EN 55035 Clause 4.2.5  |
| Basic Standard         |                           | EN 61000-4-5  |
| Required Performance   |                           | B (for EN 301489-17)<br>B (for EN 55035)  |
| Wave-Shape:            |                           | Combination Wave<br>1.2/50 us Open Circuit Voltage<br>8 /20 us Short Circuit Current                            |
| Test level             | AC power port:            | <input checked="" type="checkbox"/> 1kV, Line to Line<br><input checked="" type="checkbox"/> 2kV, Line to Earth |
|                        | DC network power port:    | <input type="checkbox"/> 0.5kV, Line to Reference ground  |
|                        | Coaxial or shielded port: | <input type="checkbox"/> 0.5kV, Shield to ground  |
| Generator Source:      |                           | 2 ohm between networks  |
| Impedance:             |                           | 12 ohm between network and ground   |
| Polarity:              |                           | Positive/Negative   |
| Phase Angle:           |                           | 0°/90°/180°/270° (for EN 301489-1)<br>90°, 270° (EN 55035)  |
| Pulse Repetition Rate: |                           | 1 time / min. (maximum)   |
| Number of Tests:       |                           | 5 positive and 5 negative at selected points  |

### 4.4.2. Test Setup



### 4.4.3. Test Procedure

Table-top EUT is placed on a table of 0.8 m heights above a metal ground reference plane. Floor standing EUT is placed on a ground reference plane and insulated from it by an insulating support with a thickness of 0.1 m. The length of the power cord between the EUT and the coupling/decoupling network is not more than 2 m, and the length of the interconnection line between the EUT and the coupling/decoupling network is not more than 2 m. The tests were done at repetition rate 1 per minute.



**4.4.4. Test Data**

Pass

Please refer to the following page.

| Surges Test Results                        |      |                             |                     |              |             |           |         |
|--|------|-----------------------------|---------------------|--------------|-------------|-----------|---------|
| Test Mode:                                 |      | Please refers to clause 1.4 |                     |              |             |           |         |
| Temp.(°C)/Hum.(%RH):                       |      | Tem.: 23.4°C Hum.: 49%      |                     |              |             |           |         |
| Test mode for EN 301489-17 standard        |      |                             |                     |              |             |           |         |
| Coupling Line                              |      | Phase                       |                     | Test Voltage | Observation | Criterion | Results |
| AC Line                                    | L-N  | +                           | 0°, 90°, 180°, 270° | 1KV          | A           | B         | PASS    |
|  |      | -                           | 0°, 90°, 180°, 270° | 1KV          | A           | B         | PASS    |
|  | L-PE | +                           | 0°, 90°, 180°, 270° | 2KV          | A           | B         | PASS    |
|  |      | -                           | 0°, 90°, 180°, 270° | 2KV          | A           | B         | PASS    |
|  | N-PE | +                           | 0°, 90°, 180°, 270° | 2KV          | A           | B         | PASS    |
|  |      | -                           | 0°, 90°, 180°, 270° | 2KV          | A           | B         | PASS    |
| Test mode for AC port of EN 55035 standard |      |                             |                     |              |             |           |         |
| Coupling Line                              |      | Phase                       |                     | Test Voltage | Observation | Criterion | Results |
| AC Line                                    | L-N  | +                           | 90°                 | 1KV          | A           | B         | PASS    |
|  |      | -                           | 270°                | 1KV          | A           | B         | PASS    |
|  | L-PE | +                           | 90°                 | 2KV          | A           | B         | PASS    |
|  |      | -                           | 270°                | 2KV          | A           | B         | PASS    |
|  | N-PE | -                           | 90°                 | 2KV          | A           | B         | PASS    |
|  |      | +                           | 270°                | 2KV          | A           | B         | PASS    |





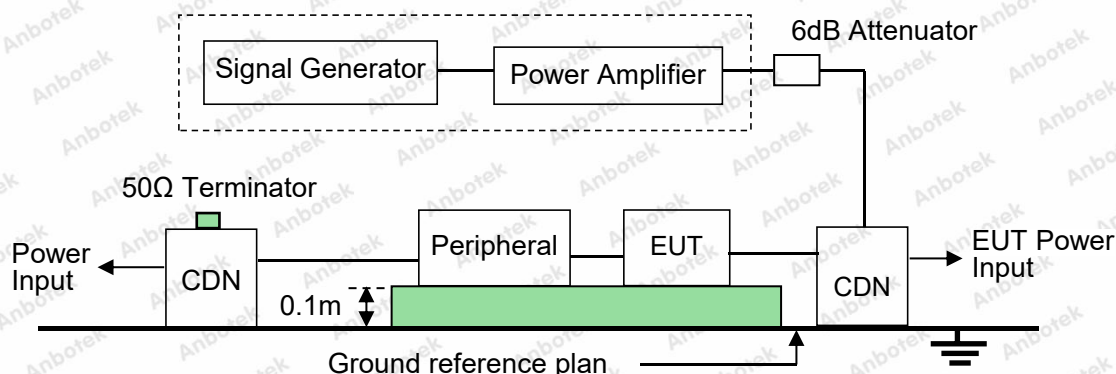
## 4.5. Radio Frequency, Common Mode Test

### 4.5.1. Test Standard and Specification

|                      |   |
|----------------------|---|
| Test Standard        | ETSI EN 301 489-1 Clause 9.5/ EN 55035 Clause 5   |
| Basic Standard       | EN 61000-4-6  |
| Required Performance | A (for EN 301489-17)<br>A (for EN 55035)  |
| Frequency Range:     | 0.15 MHz - 80 MHz (for EN 301489-1)<br>0.15MHz~10MHz, 10MHz~30MHz, 30MHz~80MHz (for EN 55035) |
| Field Strength:      | 3 Vr.m.s. (for EN 301489-1)<br>3 Vr.m.s./3V~1Vr.m.s./1Vr.m.s. (for EN 55035)                  |
| Modulation:          | 1kHz Sine Wave, 80%, AM Modulation  |
| Frequency Step:      | 1 % of fundamental  |
| Dwell Time:          | at least 3 seconds  |

### 4.5.2. Test Setup

CDN injection:



### 4.5.3. Test Procedure

- (1) The EUT and peripheral are placed on an insulating support of 0.1 m height above a ground reference plan. The distance between EUT and CDN is 0.1 m to 0.3 m. All cables exiting the EUT are supported at a height of at least 30 mm above the ground reference plan.
- (2) The frequency range is swept from 150 kHz to 80MHz, with the signal 80% amplitude modulated with a 1 kHz sine wave. The rate of sweep did not exceed  $1.5 \times 10^{-3}$  decade/s. The frequency range is swept incrementally. The step size was 1% of fundamental from 0.15MHz to 80MHz.
- (3) The dwell time at each frequency isn't less than the time necessary for the EUT to be able to respond.



#### 4.5.4. Test Data

Pass

Please refer to the following page.

| Radio Frequency, Common Mode Test Results  |             |                             |             |                   |         |
|--|-------------|-----------------------------|-------------|-------------------|---------|
| Test Mode:                                 |             | Please refers to clause 1.4 |             |                   |         |
| Temp.(°C)/Hum.(%RH):                       |             | Tem.: 23.5°C Hum.: 48%      |             |                   |         |
| Test mode for EN 301489-17 standard        |             |                             |             |                   |         |
| Test Frequency (MHz)                       | Voltage (V) | Injected Position           | Observation | Perform. Criteria | Results |
| 0.15 – 80                                  | 3           | AC Mains                    | A           | A                 | PASS    |
| Test mode for AC port of EN 55035 standard |             |                             |             |                   |         |
| Test Frequency (MHz)                       | Voltage (V) | Injected Position           | Observation | Perform. Criteria | Results |
| 0.15 ~ 10                                  | 3V          | AC Mains                    | A           | A                 | PASS    |
| 10 ~ 30                                    | 3V to 1V    | AC Mains                    | A           | A                 | PASS    |
| 30 ~ 80                                    | 1V          | AC Mains                    | A           | A                 | PASS    |



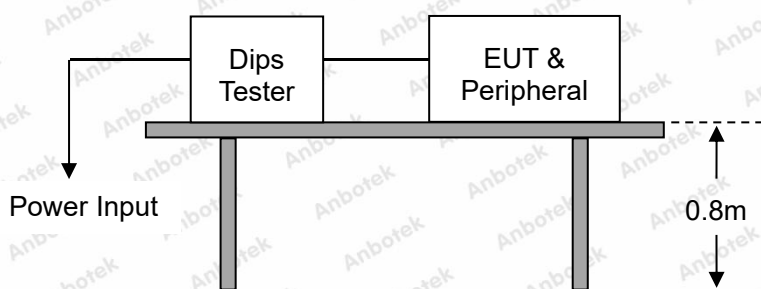


## 4.6. Voltage Dips and Interruptions Test

### 4.6.1. Test Standard and Specification

|                         |  |
|-------------------------|--|
| Test Standard           | ETSI EN 301 489-1 Clause 9.7/ EN 55035 Clause 4.2.6                            |
| Basic Standard          | EN 61000-4-11  |
| Voltage Dips:           | 0% reduction, 0.5 Cycle<br>0% reduction, 1.0 Cycle<br>70% reduction, 25 Cycles |
| Voltage Interruptions:  | 0% reduction, 250 Cycles   |
| Interval between Event: | Minimum 10 seconds   |
| Phase Angle:            | 0°/180°  |
| Test Cycle:             | 3 times  |

### 4.6.2. Test Setup



### 4.6.3. Test Procedure

1. The EUT was placed on a ground reference plane (GRP) insulated by an insulating support 0.1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.
2. The test was performed with the EUT connected to the test generator with the shortest power supply cable as specified by the EUT manufacturer.
3. The EUT was tested for each selected combination of test level and duration with a sequence of three dips/interruptions with intervals of 10 s minimum. Each representative mode of operation was tested.
4. For EUT with more than one power cord, each power cord was tested individually.

### 4.6.4. Test Data

Pass

Please refer to the following page.



**Voltage Dips and Interruptions Test Results**

Test Mode: Please refers to clause 1.4

Temp.(°C)/Hum.(%RH): Tem.: 23.4°C Hum.: 49%

**Test mode for EN 301489-17 standard**

| Test Level<br>% UT | Voltage Dips &<br>Short<br>Interruptions % UT | Duration<br>(in periods) | Observation | Criterion | Results |
|--------------------|---|--------------------------|-------------|-----------|---------|
| 0                  | 100   | 0.5P                     | A           | B         | PASS    |
| 0                  | 100   | 1P                       | A           | B         | PASS    |
| 70                 | 30  | 25P                      | A           | B         | PASS    |
| 0                  | 100   | 250P                     | B           | C         | PASS    |

**Test mode for EN 55035 standard**

| Test Level<br>% UT | Voltage Dips &<br>Short<br>Interruptions % UT | Duration<br>(in periods) | Observation | Criterion | Results |
|--------------------|---|--------------------------|-------------|-----------|---------|
| 0                  | 100   | 0.5P                     | A           | B         | PASS    |
| 70                 | 30  | 25P                      | A           | C         | PASS    |
| 0                  | 100   | 250P                     | B           | C         | PASS    |

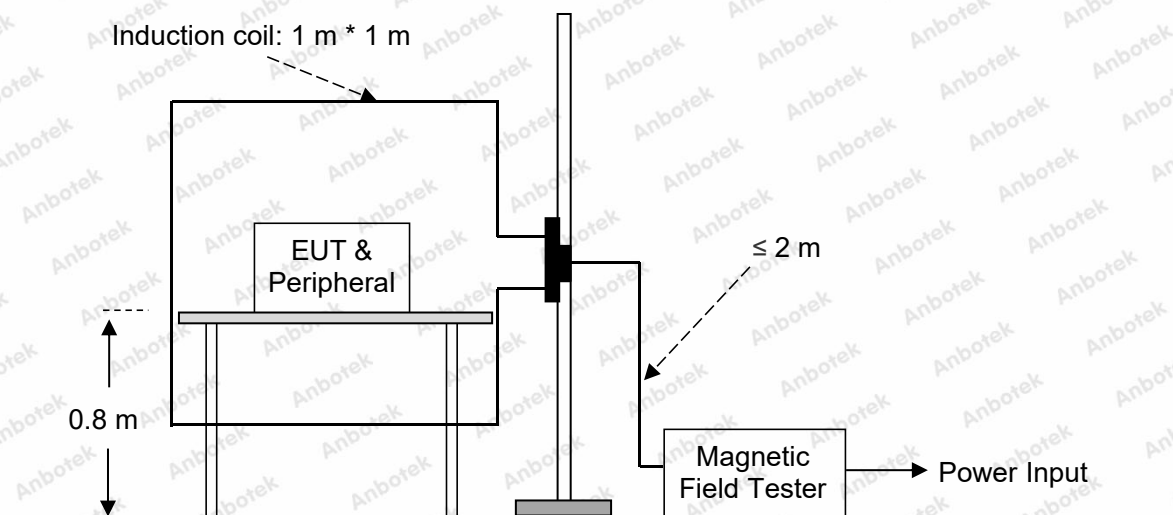


## 4.7. Power Frequency Magnetic Field Immunity Test

### 4.7.1 Test Specification

|                      |                     |
|----------------------|---------------------|
| Test Standard:       | EN 55035            |
| Basic Standard       | IEC 61000-4-8: 2009 |
| Performance criteria | A                   |
| Test level           | 1A/m                |

### 4.7.2 Test Setup



### 4.7.3 Test Procedure

Table-top EUT is placed on a table that is 0.8 m height. Floor standing EUT is placed on a ground reference plane and insulated from it by an insulating support with a thickness of 0.1 m.

The EUT is placed in the middle of an induction coil. The proximity method is used when the EUT does not fit into the standard inductive coil

### 4.7.4 Test Results

**PASS**

Please refer to the following page.





| Magnetic Field Immunity Test Results |                  |                             |             |           |         |
|--------------------------------------|------------------|-----------------------------|-------------|-----------|---------|
| Test Mode:                           |                  | Please refers to clause 1.4 |             |           |         |
| Temp.(°C)/Hum.(%RH):                 |                  | Tem.: 23.7℃ Hum.: 54%       |             |           |         |
| Test mode for EN 55035 standard      |                  |                             |             |           |         |
| Test Level (A/M)                     | Testing Duration | Coil Orientation            | Observation | Criterion | Results |
| 1                                    | 5 minutes        | X                           | A           | A         | PASS    |
| 1                                    | 5 minutes        | Y                           | A           | A         | PASS    |
| 1                                    | 5 minutes        | Z                           | A           | A         | PASS    |
| Note: N/A                            |                  |                             |             |           |         |



## **APPENDIX I -- TEST SETUP PHOTOGRAPH**

Please refer to separated files Appendix I -- Test Setup Photograph\_EMC

## **APPENDIX II -- EXTERNAL PHOTOGRAPH**

Please refer to separated files Appendix II -- External Photograph

## **APPENDIX III -- INTERNAL PHOTOGRAPH**

Please refer to separated files Appendix III -- Internal Photograph

----- End of Report -----

