# EMC Test Report

Report No.: AGC12440210702EE01

| | | |
|---|---|---|
| **PRODUCT DESIGNATION** | : | WIRELESS MOON SHAPED SPEAKER |
| **BRAND NAME** | : | N/A |
| **MODEL NAME** | : | MO9745 |
| **APPLICANT** | : | Mid Ocean Brands B.V. |
| **DATE OF ISSUE** | : | Jul. 28, 2021 |
| **STANDARD(S)** | : | ETSI EN 301 489-1 V2.2.3 (2019-11)<br>ETSI EN 301 489-17 V3.2.4 (2020-09) |
| **REPORT VERSION** | : | V1.0 |

*A*ttestation of *G*lobal *C*ompliance (Shenzhen) Co., Ltd

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# REPORT REVISE RECORD

| Report Version | Revise Time | Issued Date | Valid Version | Notes |
|---|---|---|---|---|
| V1.0 | / | Jul. 28, 2021 | Valid | Initial release |

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## 1. TEST REPORT CERTIFICATION

| | |
|---|---|
| **Applicant** | Mid Ocean Brands B.V. |
| **Address** | 7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, HongKong. |
| **Manufacturer** | Mid Ocean Brands B.V. |
| **Address** | 7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, HongKong. |
| **Factory** | Mid Ocean Brands B.V. |
| **Address** | 7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, HongKong. |
| **Product Designation** | WIRELESS MOON SHAPED SPEAKER |
| **Brand Name** | N/A |
| **Test Model** | MO9745 |
| **Date of test** | Jul. 22, 2021 to Jul. 28, 2021 |
| **Deviation** | None |
| **Condition of Test Sample** | Normal |
| **Test Result** | Pass |
| **Report Template** | AGCRT-EC-EMC |

We, Attestation of Global Compliance (Shenzhen) Co., Ltd., hereby certify that the submitted samples of the above item, as detailed in chapter 2.1 of this report, has been tested in our facility. The test record, data evaluation and test configuration represented herein are true and accurate accounts of measurements of the sample's EMC characteristics under the conditions herein specified.

Prepared By

Eddy Liu
Project Engineer
Jul. 28, 2021

Reviewed By

Max Zhang
Reviewer
Jul. 28, 2021

Approved By

Forrest Lei
Authorized Officer
Jul. 28, 2021

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# 2. GENERAL INFORMATION

## 2.1. DESCRIPTION OF EUT

The EUT is a short range, lower power, Bluetooth device.

It is designed by way of FHSS modulation achieves the system operating.

Details of technical specification refer to the description in follows:

Transmitter/Receiver (TX/RX)

| | |
|---|---|
| **Operating Frequency** | 2.402 GHz to 2.480GHz |
| **Bluetooth Version** | V5.0 |
| **Modulation** | BR ☒GFSK, EDR ☒π /4-DQPSK, ☐8DPSK<br>BLE ☐GFSK 1Mbps ☐GFSK 2Mbps |
| **Hardware Version** | V1.1 |
| **Software Version** | 5.0 |
| **Antenna designation** | PCB Antenna |
| **Number of channels** | 79 |
| **Antenna Gain** | 2dBi |
| **Power Supply** | DC 3.7V by battery or DC 5V by adapter |

Note: The EUT doesn't support BLE.

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## 2.2. OBJECTIVE

Perform Electro Magnetic Interference (EMI) and Electro Magnetic Susceptibility (EMS) tests for CE Marking.

## 2.3. TEST STANDARDS AND RESULTS

The EUT has been tested according to ETSI EN 301 489-1 V2.2.3 (2019-11) and ETSI EN 301 489-17 V3.2.4 (2020-09).

| | |
|---|---|
| **ETSI EN 301 489-1** | ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility. |
| **ETSI EN 301 489-17** | ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility |

## 2.4. TEST ITEMS AND THE RESULTS

| No. | Basic Standard | Test Type | Result |
|---|---|---|---|
| **EMISSION (EN 301 489-1 §7.1)** | | | |
| 1 | EN 55032 | Radiated emission | PASS |
| 2 | EN 55032 | Conducted emission, AC ports | PASS |
| 3 | EN 55032 | Conducted emission, Telecom ports | N/A |
| 4 | EN 61000-3-2 | Harmonic current emissions | N/A |
| 5 | EN 61000-3-3 | Voltage fluctuations & flicker | PASS |
| **IMMUNITY (EN 301 489-1 §7.2)** | | | |
| 6 | EN 61000-4-2 | Electrostatic discharge immunity | PASS |
| 7 | EN 61000-4-3 | Radiated RF electromagnetic field immunity | PASS |
| 8 | EN 61000-4-4 | Electrical fast transient/burst immunity | PASS |
| 9 | ISO 7637-1, -2 | Transients and surges, DC ports | N/A |
| 10 | EN 61000-4-5 | Surge immunity, AC ports, Telecom ports | PASS |
| 11 | EN 61000-4-6 | Immunity to conducted disturbances induced by RF fields | PASS |
| 12 | EN 61000-4-11 | Voltage dips and short interruptions immunity | PASS |

Note: 1. N/A- Not Applicable.
2. The latest versions of basic standards are applied.

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## 2.5. ENVIRONMENTAL CONDITIONS

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 15-35ºC
- Relative humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

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## 3. TEST MODE DESCRIPTION

| TEST MODE DESCRIPTION | | |
|---|---|---|
| **NO.** | **EMI TEST MODE DESCRIPTION** | **WORST** |
| 1 | Charging mode with adapter | V |
| 2 | BT Link | - |
| **NO.** | **EMS TEST MODE DESCRIPTION** | **WORST** |
| 1 | Charging mode with adapter | V |
| 2 | BT Link | - |

Note: 1. V means EMI worst mode.
2. All modes have been tested and only the worst mode test data recorded in the test report.
3. The BT function of EUT didn't work when charging.

**I/O Port Information (☒Applicable ☐Not Applicable)**

| I/O Port of EUT | | | |
|---|---|---|---|
| **I/O Port Type** | **Number** | **Cable Description** | **Tested With** |
| DC IN | 1 | 0.9m | 1 |

Note: All the above "--" means that EUT has no cable.

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## 4. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI.

- Uncertainty of Radiated Emission, Uc = ±3.1dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±4.0 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB

## 5. SUPPORT EQUIPMENT

| Device Type | Manufacturer | Model Name | Data Cable |
|---|---|---|---|
| Mobile phone | TCL | J326T | -- |
| Adapter | Zhongli | ZL-PCB0100020502000 | -- |

Note: 1.“-- “means no any support device during testing.
2. All the cables were provided by AGC Lab.

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## 6. IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

| | |
|---|---|
| **Site** | Attestation of Global Compliance (Shenzhen) Co., Ltd |
| **Location** | 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China |

### TEST EQUIPMENT OF CONDUCTED EMISSION TEST

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Test Receiver | R&S | ESCI | 10096 | May 15, 2021 | May 14, 2022 |
| LISN | R&S | ESH2-Z5 | 100086 | Jun. 09, 2021 | Jun. 08, 2022 |

### TEST EQUIPMENT OF RADIATED EMISSION TEST

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Test Receiver | R&S | ESCI | 10096 | May 15, 2021 | May 14, 2022 |
| ANTENNA | SCHWARZBECK | VULB9168 | 494 | Sep. 20, 2019 | Sep. 19, 2021 |
| Double-Ridged Waveguide Horn | ETS LINDGREN | 3117 | 00034609 | Apr. 23, 2021 | Apr. 22, 2023 |
| EXA Signal Analyzer | Aglient | N9010A | MY53470504 | Dec. 07, 2020 | Dec.06, 2021 |

### TEST EQUIPMENT OF ESD TEST

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| ESD Simulator | EM Test | NSG 438 | 782 | Jan. 08, 2021 | Jan. 07, 2022 |

### TEST EQUIPMENT OF POWER HARMONICS / VOLTAGE FLUCTUATION / FLICKER TEST

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Signal Conditioning Unit | Schaffner | CCN1000-1 | 72431 | Jul. 15,2020 | Jul. 14,2022 |
| AC Source | Schaffner | NSG 1007 | 56825 | Jul. 15,2020 | Jul. 14,2022 |

### TEST EQUIPMENT OF SURGE/EFT/DIPSTEST

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| EFT Surge Generator | Schaffner | Modula 6150 | 34437 | Jul. 03,2020 | Jul. 02,2022 |

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**TEST EQUIPMENT OF RS IMMUNITY TEST**

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Signal Generator | R&S | E4421B | MY43351603 | Jun. 08, 2020 | Jun. 07, 2022 |
| POWER SENSOR | R&S | URV5-Z4 | 100124 | May 22, 2020 | May 21, 2022 |
| POWER METER | R&S | NRVD | 8323781027 | May 22, 2020 | May 21, 2022 |
| POWER AMPLIFIER | KALMUS | 7100LC | 04-02/17-06-001 | N/A | N/A |
| RF AMPLIFIER | Milmega | AS0104-55_55 | 1004793 | N/A | N/A |
| Double-Ridged Waveguide Horn | ETS LINDGREN | 3117 | 00034609 | Apr. 23, 2021 | Apr. 22, 2023 |
| ANTENNA | SCHWARZBECK | VULB9168 | 494 | Jan. 08,2021 | Jan. 07,2023 |

**TEST EQUIPMENT OF CS IMMUNITY TEST**

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Power Amplifier | AR | 75A250 | 18464 | N/A | N/A |
| CDN | ZHINAN | ZN3751 | 15004 | Sep. 03, 2020 | Sep. 02, 2022 |
| 6dB attenuator | ZHINAN | E-002 | N/A | Sep. 03, 2020 | Sep. 02, 2022 |
| Electromagnetic Injection Clamp | Luthi | EM101 | 35773 | Aug. 25,2020 | Aug. 24,2022 |
| Power Sensor | R&S | URV5-Z4 | 100124 | May 22, 2020 | May 21, 2022 |
| Power Meter | R&S | NRVD | 8323781027 | May 22, 2020 | May 21, 2022 |
| SIGNAL GENERATOR | R&S | E4421B | MY43351603 | Jun. 08, 2020 | Jun. 07, 2022 |

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# 7. RADIATED DISTURBANCE MEASUREMENT

## 7.1. LIMITS OF RADIATED DISTURBANCES

Limits for radiated disturbance 30M to1 GHz at a measurement distance of 3 m

| Frequency range (MHz) | Quasi peak limits(dBuV/m), for Class B ITE, at 3m measurement distance |
|---|---|
| 30 - 230 | 40 |
| 230 - 1000 | 47 |

Limits for radiated disturbance above 1 GHz at a measurement distance of 3 m

| Frequency range (MHz) | Limits (dBuV/m), Class B ITE | |
|---|---|---|
| | Peak | Average |
| 1000-3000MHz | 70 | 50 |
| 3000-6000MHz | 74 | 54 |

Note: 1. The lower limit shall apply at the transition frequency.
2. Additional provisions may be required for cases where interference occurs.

## 7.2. TEST PROCEDURE

(1). The EUT was placed on the top of an insulating table 0.8 meters above the ground at a semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
(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.
(3).The antenna is a broadband antenna, and its height is varied from 1 to 4 meter 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.
(4). For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to the heights from 1 to 4 meters and the ratable table was turned from 0 degrees to 360 degrees to find the maximum reading.

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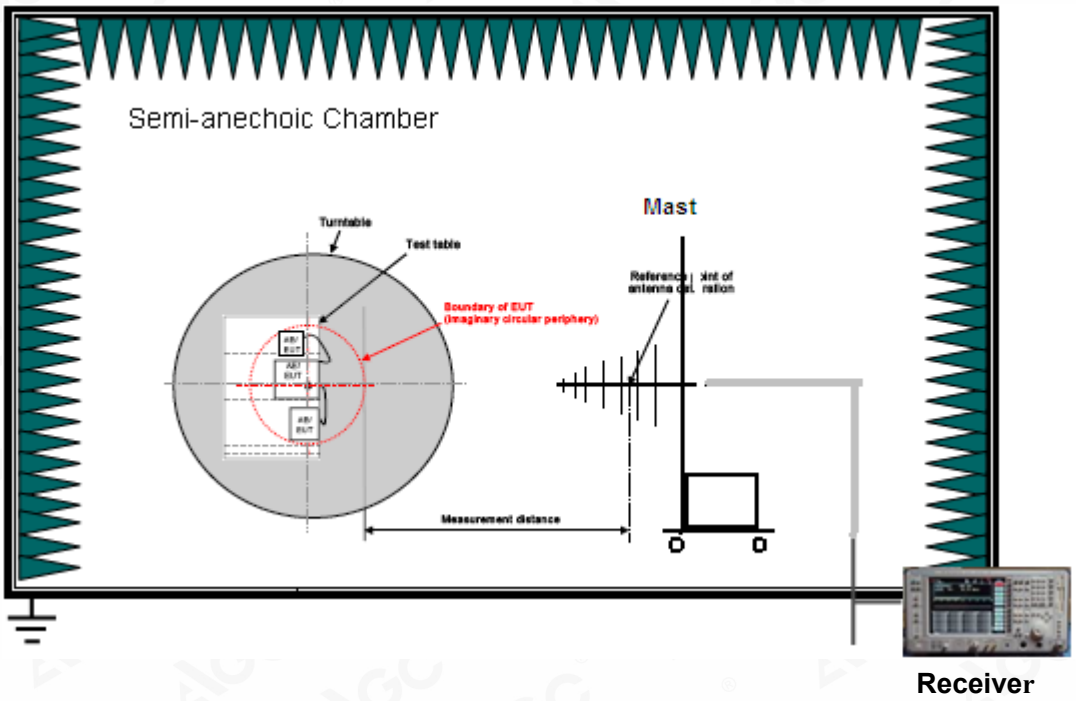
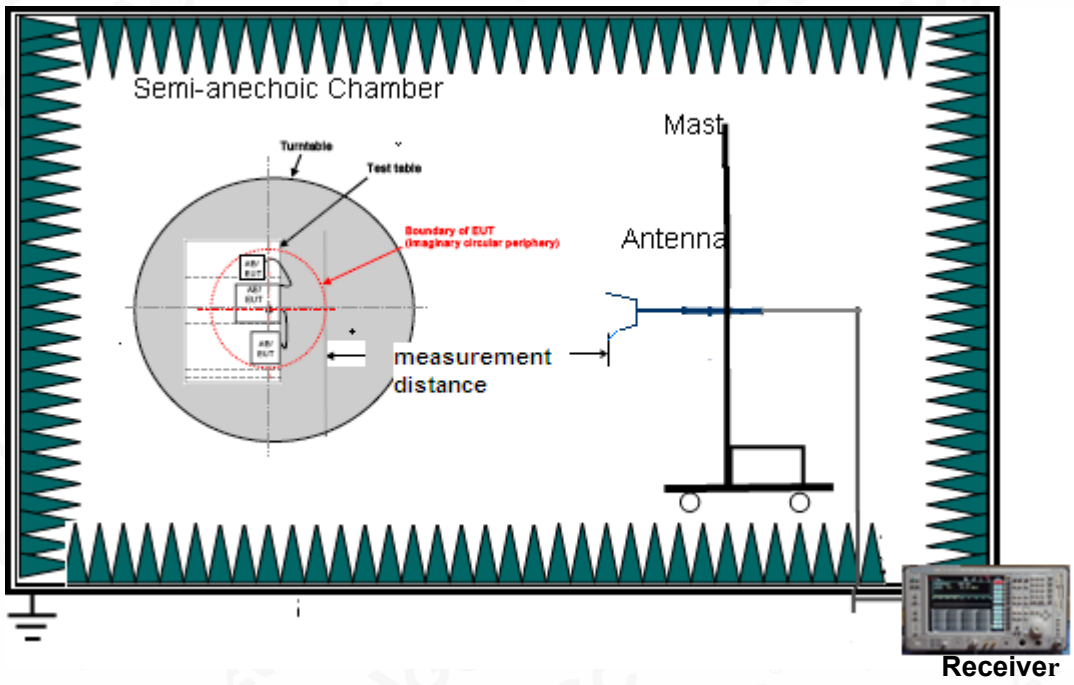
## 7.3. BLOCK DIAGRAM OF TEST SETUP

**Radiated Disturbance below 1 GHz**




**Radiated Disturbance above 1 GHz**




For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

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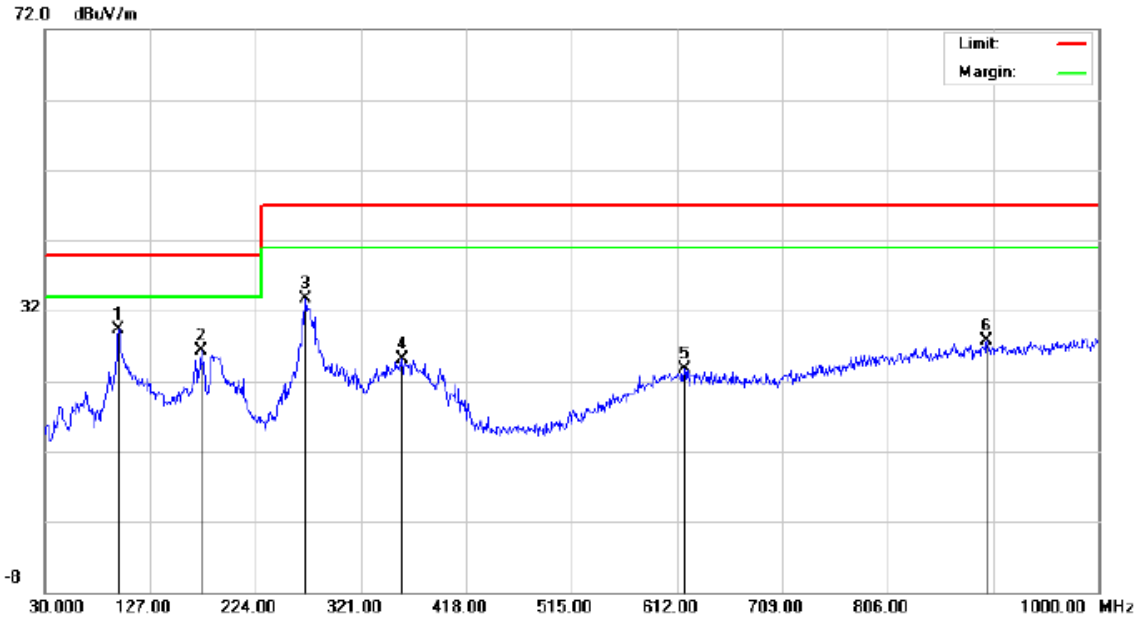
## 7.4. TEST RESULT

The test modes were carried out for all modes.

The worst test mode of the EUT was Mode 1, and its test data was showed as the follow:

RADIATED EMISSION BELOW 1GHz– HORIZONTAL




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | * | 97.9000 | 19.63 | 9.73 | 29.36 | 40.00 | -10.64 | peak |
| 2 | | 173.5600 | 19.21 | 7.00 | 26.21 | 40.00 | -13.79 | peak |
| 3 | | 269.5900 | 24.70 | 9.09 | 33.79 | 47.00 | -13.21 | peak |
| 4 | | 358.8299 | 15.23 | 9.96 | 25.19 | 47.00 | -21.81 | peak |
| 5 | | 618.7900 | 6.96 | 16.80 | 23.76 | 47.00 | -23.24 | peak |
| 6 | | 897.1800 | 7.02 | 20.67 | 27.69 | 47.00 | -19.31 | peak |

**RESULT: PASS**

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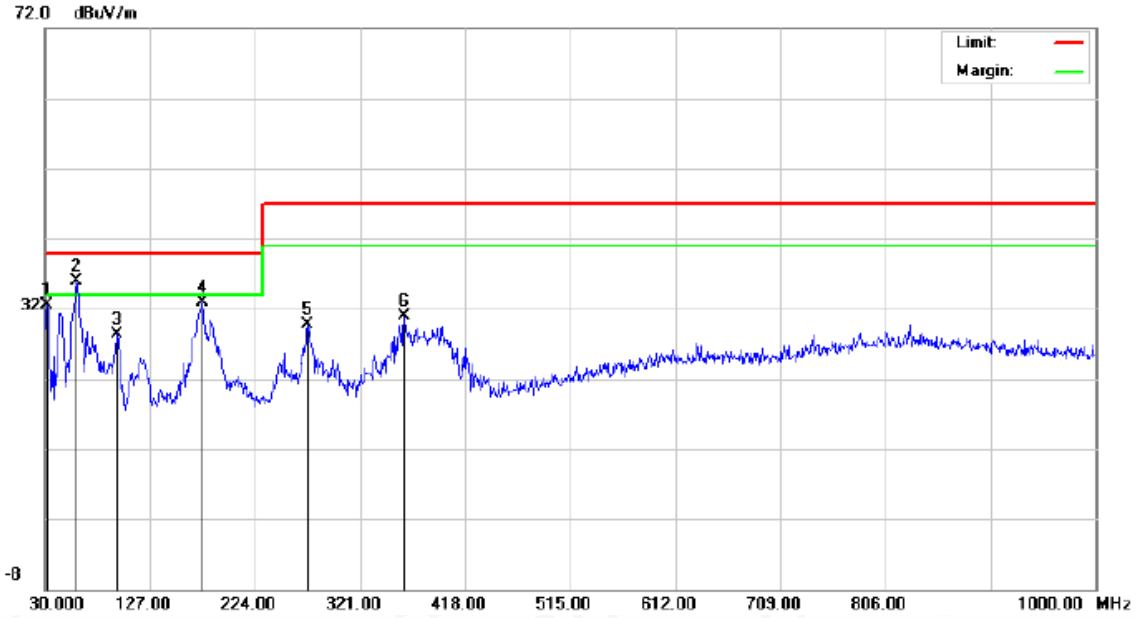
RADIATED EMISSION BELOW 1GHz– VERTICAL




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 31.9400 | 25.36 | 7.23 | 32.59 | 40.00 | -7.41 | peak |
| 2 | * | 59.1000 | 21.63 | 14.28 | 35.91 | 40.00 | -4.09 | peak |
| 3 | | 95.9600 | 19.59 | 8.81 | 28.40 | 40.00 | -11.60 | peak |
| 4 | | 175.5000 | 21.04 | 11.92 | 32.96 | 40.00 | -7.04 | peak |
| 5 | | 272.5000 | 15.41 | 14.33 | 29.74 | 47.00 | -17.26 | peak |
| 6 | | 361.7400 | 16.77 | 14.17 | 30.94 | 47.00 | -16.06 | peak |

**RESULT: PASS**

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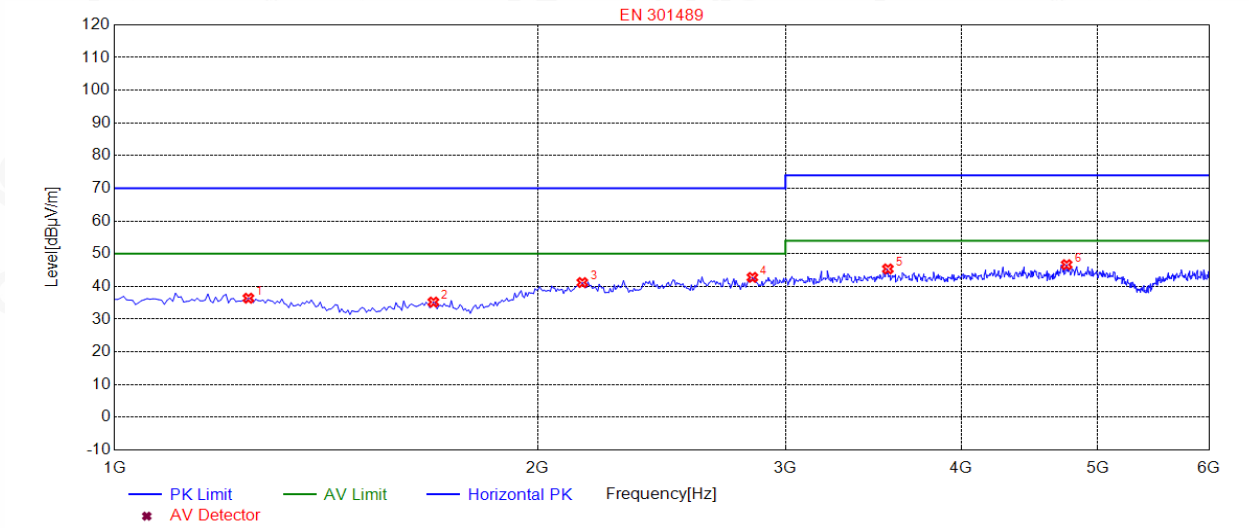
## RADIATED EMISSION ABOVE 1GHz – HORIZONTAL




| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 1245.2452 | 36.42 | -16.88 | 70.00 | 33.58 | 100 | 200 | Horizontal |
| 2 | 1685.6857 | 35.24 | -15.16 | 70.00 | 34.76 | 100 | 90 | Horizontal |
| 3 | 2151.1512 | 41.20 | -11.19 | 70.00 | 28.80 | 100 | 310 | Horizontal |
| 4 | 2841.8418 | 42.79 | -9.45 | 70.00 | 27.21 | 100 | 290 | Horizontal |
| 5 | 3547.5475 | 45.37 | -7.50 | 74.00 | 28.63 | 100 | 210 | Horizontal |
| 6 | 4753.7538 | 46.67 | -4.96 | 74.00 | 27.33 | 100 | 300 | Horizontal |

**RESULT: PASS**

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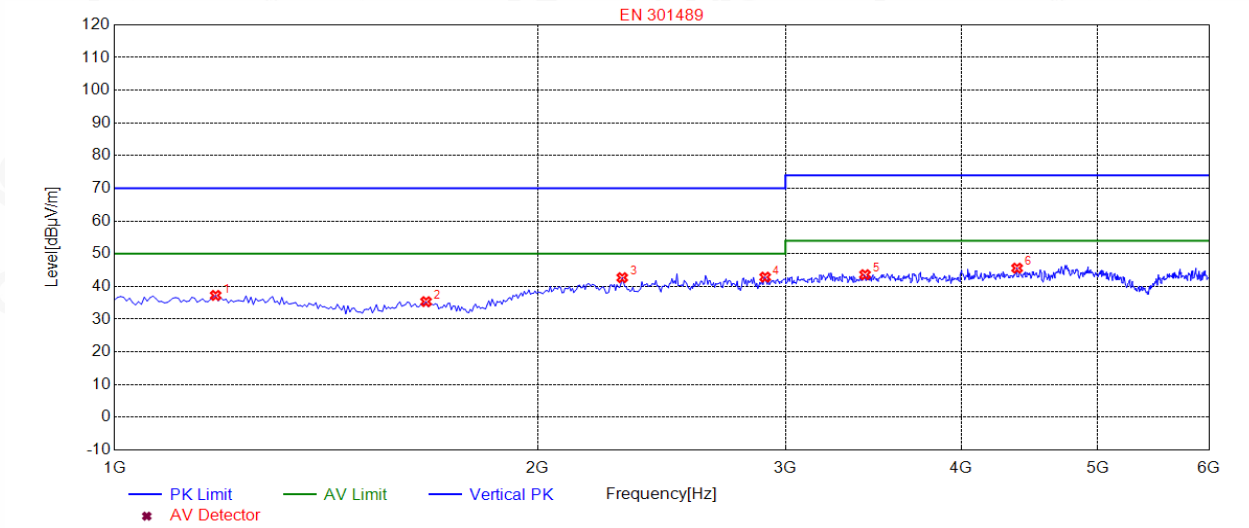
## RADIATED EMISSION ABOVE 1GHz - VERTICAL




| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 1180.1802 | 37.27 | -16.82 | 70.00 | 32.73 | 100 | 320 | Vertical |
| 2 | 1665.6657 | 35.37 | -15.37 | 70.00 | 34.63 | 100 | 160 | Vertical |
| 3 | 2296.2963 | 42.70 | -10.58 | 70.00 | 27.30 | 100 | 290 | Vertical |
| 4 | 2901.9019 | 42.87 | -9.41 | 70.00 | 27.13 | 100 | 220 | Vertical |
| 5 | 3417.4174 | 43.62 | -7.89 | 74.00 | 30.38 | 100 | 220 | Vertical |
| 6 | 4383.3834 | 45.61 | -5.50 | 74.00 | 28.39 | 100 | 180 | Vertical |

**RESULT: PASS**

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# 8. MAINS TERMINAL DISTURBANCE VOLTAGE MEASUREMENT

## 8.1. LIMITS OF MAINS TERMINAL DISTURBANCE VOLTAGE

| Frequency range (MHz) | Limits (dBuV) Class B ITE | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 - 0.50 | 66 to 56 | 56 to 46 |
| 0.50 - 5 | 56 | 46 |
| 5 - 30 | 60 | 50 |

Note: 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.

## 8.2. TEST PROCEDURE

(1) The EUT was placed 0.4 meters from the conducting wall of shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). The LISN provide 50Ω/50μH of coupling impedance for the measuring instrument.
(2) Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
(3)The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 20dB under the prescribed limits are not reported.

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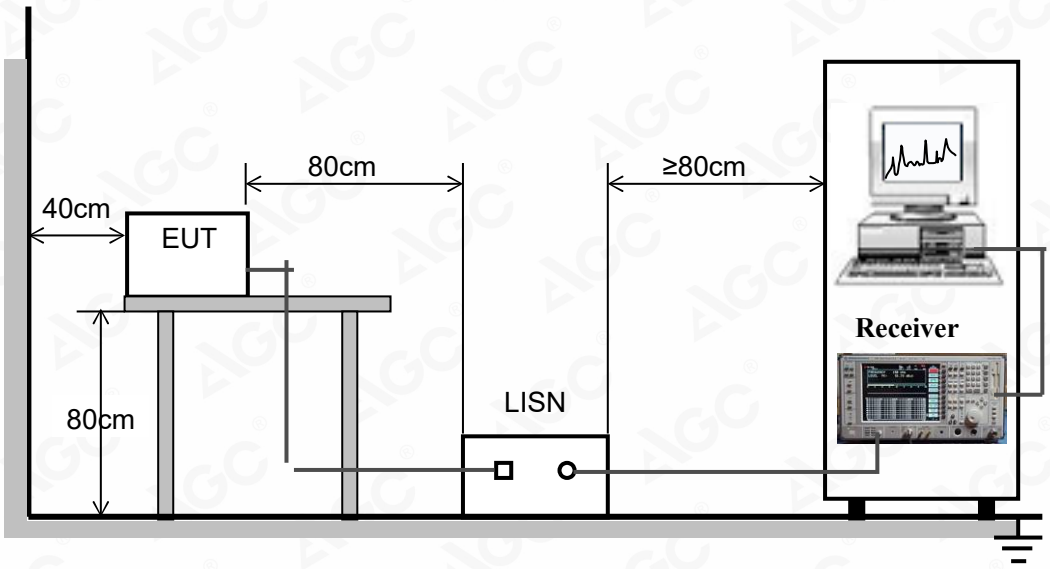
## 8.3. TEST SETUP




For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

## 8.4. TEST RESULT

The test modes were carried out for all modes.

The worst test mode of the EUT was Mode 1, and its test data was showed as the follow:

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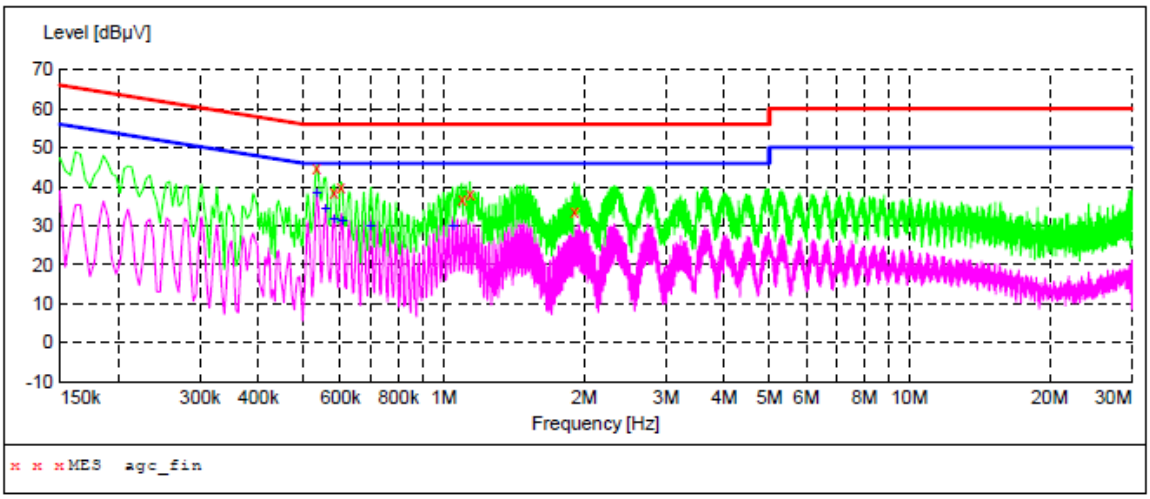
LINE CONCUTED EMISSION TEST-L




***MEASUREMENT RESULT: "agc_fin"***

2021/7/23 10:39

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line |
|---|---|---|---|---|---|---|
| 0.534000 | 44.80 | 5.4 | 56 | 11.2 | QP | L1 |
| 0.582000 | 38.30 | 5.4 | 56 | 17.7 | QP | L1 |
| 0.602000 | 39.90 | 5.4 | 56 | 16.1 | QP | L1 |
| 1.094000 | 36.90 | 5.6 | 56 | 19.1 | QP | L1 |
| 1.138000 | 38.00 | 5.6 | 56 | 18.0 | QP | L1 |
| 1.906000 | 33.70 | 6.4 | 56 | 22.3 | QP | L1 |

***MEASUREMENT RESULT: "agc_fin2"***

2021/7/23 10:39

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line |
|---|---|---|---|---|---|---|
| 0.534000 | 38.40 | 5.4 | 46 | 7.6 | AV | L1 |
| 0.558000 | 34.40 | 5.4 | 46 | 11.6 | AV | L1 |
| 0.582000 | 31.70 | 5.4 | 46 | 14.3 | AV | L1 |
| 0.606000 | 31.60 | 5.4 | 46 | 14.4 | AV | L1 |
| 0.698000 | 30.20 | 5.4 | 46 | 15.8 | AV | L1 |
| 1.046000 | 30.20 | 5.5 | 46 | 15.8 | AV | L1 |

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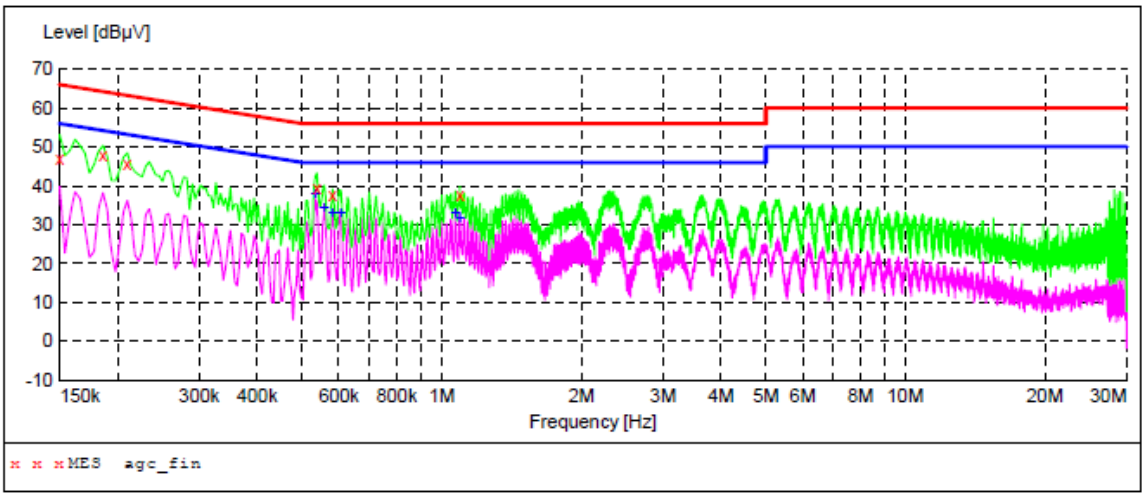
LINE CONCUTED EMISSION TEST-N




***MEASUREMENT RESULT: "agc_fin"***

2021/7/23 10:37

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line |
|---|---|---|---|---|---|---|
| 0.150000 | 46.90 | 6.9 | 66 | 18.1 | QP | N |
| 0.186000 | 47.80 | 6.6 | 64 | 16.4 | QP | N |
| 0.210000 | 45.60 | 6.5 | 63 | 17.6 | QP | N |
| 0.538000 | 39.40 | 5.4 | 56 | 16.6 | QP | N |
| 0.582000 | 37.70 | 5.4 | 56 | 18.3 | QP | N |
| 1.094000 | 37.50 | 5.6 | 56 | 18.5 | QP | N |

***MEASUREMENT RESULT: "agc_fin2"***

2021/7/23 10:36

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line |
|---|---|---|---|---|---|---|
| 0.534000 | 37.90 | 5.4 | 46 | 8.1 | AV | N |
| 0.558000 | 34.50 | 5.4 | 46 | 11.5 | AV | N |
| 0.582000 | 33.20 | 5.4 | 46 | 12.8 | AV | N |
| 0.606000 | 33.30 | 5.4 | 46 | 12.7 | AV | N |
| 1.070000 | 33.00 | 5.5 | 46 | 13.0 | AV | N |
| 1.094000 | 31.90 | 5.6 | 46 | 14.1 | AV | N |

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# 9. HARMONIC CURRENT MEASUREMENT

## 9.1. LIMITS OF HARMONIC CURRENT

| Limits for Class A Equipment | |
|---|---|
| **Harmonics Order n** | **Max. permissible harmonic current (A)** |
| **Odd harmonics** | |
| 3 | 2.30 |
| 5 | 1.14 |
| 7 | 0.77 |
| 9 | 0.40 |
| 11 | 0.33 |
| 13 | 0.21 |
| 15≤n≤39 | 0.15×15/n |
| **Even harmonics** | |
| 2 | 1.08 |
| 4 | 0.43 |
| 6 | 0.30 |
| 8≤n≤40 | 0.23×8/n |

Note: 1. According to section 5 of EN61000-3-2: 2014, the EUT is Class A equipment.
2.The above limits are for all applications having an active input power>75W. No limits apply for equipment with an active input power up to and including 75W.

## 9.2. 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 for each successive harmonic component in turn.
2. 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 necessary for the EUT to be exercised.

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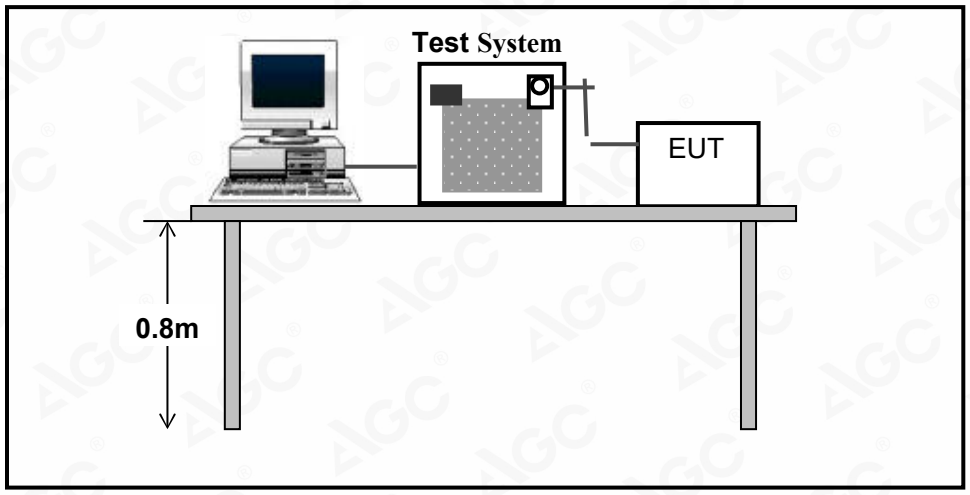
## 9.3. TEST SETUP




For the actual test configuration, please refer to Appendix I：Photographs of the Test Configuration.

## 9.4. TEST RESULT

No applicable for equipment with an active input power up to and including 75W.

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# 10. VOLTAGE FLUCTUATIONS AND FLICK MEASUREMENT

## 10.1. LIMITS OF VOLTAGE FLUCTUATIONS AND FLICK

| Test Item | Limit | Note |
|---|---|---|
| $P_{st}$ | 1.0 | $P_{st}$ means Short-term flicker indicator |
| $P_{lt}$ | 0.65 | $P_{lt}$ means long-term flicker indicator |
| $T_{dt}$ | 0.5 | $T_{dt}$ means maximum time that $d_t$ exceeds 3.3% |
| $d_{max}$(%) | 4% | $d_{max}$ means maximum relative voltage change. |
| $d_c$(%) | 3.3% | $d_c$ means relative steady-state voltage change. |

## 10.2. 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 most unfavorable sequence of voltage changes under normal conditions
2. During the flick measurement, the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

## 10.3. TEST SETUP

Same as 9.3

## 10.4. TEST RESULT

**Test Specification**

| | | | |
|---|---|---|---|
| **Test Frequency** | 50Hz | **Test Voltage** | 230V AC |
| **Waveform** | Sine | **Test Time** | 10 minutes($P_{st}$); 2 hours ($P_{lt}$) |

**Test Result**

| Test Parameter | Measurement Value | Limit | Remarks |
|---|---|---|---|
| $P_{st}$ | 0.156 | 1.0 | Pass |
| $P_{lt}$ | 0.069 | 0.65 | Pass |
| $T_{dt(s)}$ | 0.0 | 0.5 | Pass |
| $d_{max}$(%) | 0.00% | 4% | Pass |
| $d_c$(%) | 0.00% | 3.3% | Pass |

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# 11. IMMUNITY TEST

## 11.1. DESCRIPTION OF PERFORMANCE CRITERIA

The performance criteria are used to take a decision on whether a radio equipment passes or fails immunity tests.

For the purpose of the present document two categories of performance criteria apply:

- Performance criteria for continuous phenomena.
- Performance criteria for transient phenomena.

## 11.2. GENERAL PERFORMANCE CRITERIA

**1. Performance criteria for continuous phenomena**

During the test, the equipment shall:

- continue to operate as intended;
- not unintentionally transmit;
- not unintentionally change its operating state;
- not unintentionally change critical stored data.

**2. Performance criteria for transient phenomena**

For all ports and transient phenomena with the exception described below, the following applies:

- The application of the transient phenomena shall not result in a change of the mode of operation (e.g. unintended transmission) or the loss of critical stored data.
- After application of the transient phenomena, the equipment shall operate as intended.

For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies:

- For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be otherwise restored. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.
- For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

For a 0 % residual voltage dip tests the following performance criteria apply:

- The performance criteria for transient phenomena shall apply.

For a 70 % residual voltage dip and voltage interruption tests, the following performance criteria apply:

- in the case where the equipment is fitted with or connected to a battery back-up, the performance criteria for transient phenomena shall apply;
- in the case where the equipment is powered solely from the AC mains supply (without the use of a parallel battery back-up) volatile user data may have been lost and if applicable the communication link need not to be maintained and lost functions should be recoverable by user or operator;
- no unintentional responses shall occur at the end of the test, when the voltage is restored to nominal;

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• in the event of loss of function(s) or in the event of loss of user stored data, this fact shall be recorded.

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**5. Performance Table**

| EN 301 489-17 Performance criteria | | |
|---|---|---|
| **Criteria** | **During Test** | **After Test (i.e. as a result of the application of the test)** |
| A | Shall operate as intended. (see note). Shall be no loss of function. Shall be no unintentional transmissions. | Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data. |
| B | May be loss of function. | Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data. |
| C | May be loss of function. | Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data. |
| The performance criteria A shall apply for continuous phenomena. The performance criteria B shall apply for transient phenomena, except for voltage dips greater than or equal to 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply. Where the EUT is a transmitter in standby mode or receive mode, unintentional transmission shall not occur during the test. | | |
| Note: Operate as intended during the test allows a level of degradation in accordance with the Minimum performance level. | | |
| **Minimum performance level** | | |
| For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %. For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment. | | |

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# 12. ELECTROSTATIC DISCHARGE IMMUNITY TEST

## 12.1 TEST SPECIFICATION

| | |
|---|---|
| **Basic Standard** | EN 61000-4-2 |
| **Discharge Impedance** | 330Ω / 150 pF |
| **Discharge Voltage** | Air Discharge –8 kV, Contact Discharge – 4 kV |
| **Polarity** | Positive / Negative |
| **Number of Discharge** | Minimum 25 times at each test point |
| **Discharge Mode** | Single discharge |
| **Discharge Period** | 1-second minimum |

## 12.2 TEST PROCEDURE

The test procedure was in accordance with EN 61000-4-2:

a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.

b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

c. The time interval between two successive single discharges was at least 1 second.

d. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.

e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were completed.

g. At least ten single discharges (in the most sensitive polarity) were applied to the Horizontal Coupling Plane at points on each side of the EUT. The ESD generator was positioned vertically at a distance of 0.1 meters from the EUT with the discharge electrode touching the HCP.

h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5m×0.5m) was placed vertically to and 0.1 meters from the EUT.

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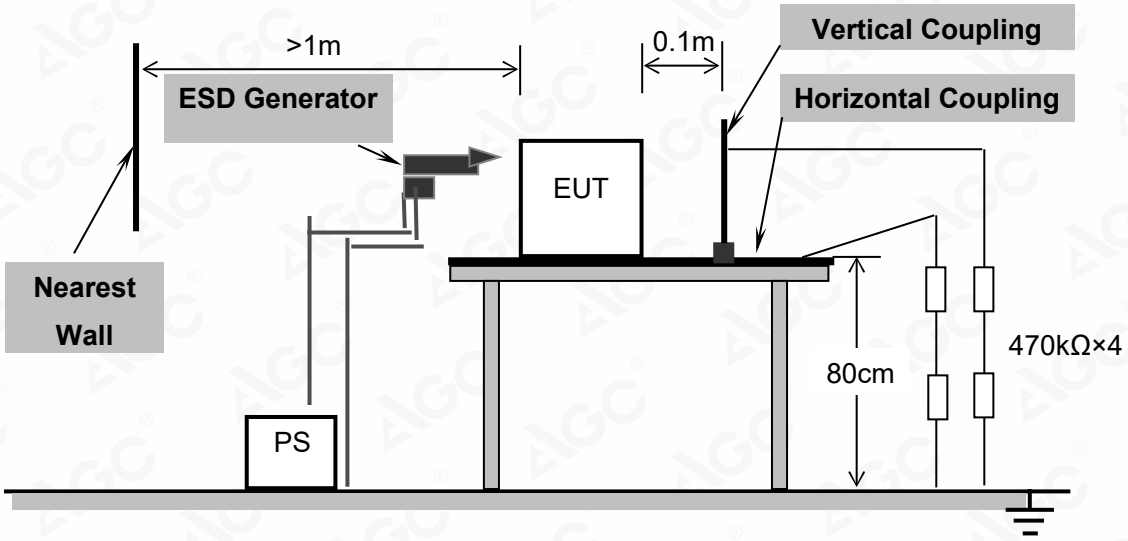
## 12.3 TEST SETUP




For the actual test configuration, please refer to Appendix A：Photographs of the Test Configuration.

## 12.4 TEST RESULT

**DESCRIPTION OF THE ELECTROSTATIC DISCHARGES (ESD)**

| Times of Discharge | Voltage | Coupling | Test Mode | Performance criteria |
|---|---|---|---|---|
| Mini 25 / Point | ±2kV; ±4kV | Contact discharge | Mode 1/2 | A |
| Mini 25 / Point | ±2kV; ±4kV; ±8kV | Air Discharge | Mode 1/2 | A |
| Mini 25 / Point | ±4kV | Indirect Discharge HCP | Mode 1/2 | A |
| Mini 25 / Point | ±4kV | Indirect Discharge VCP | Mode 1/2 | A |
| A: No degradation in the performance of the EUT was observed. | | | | |

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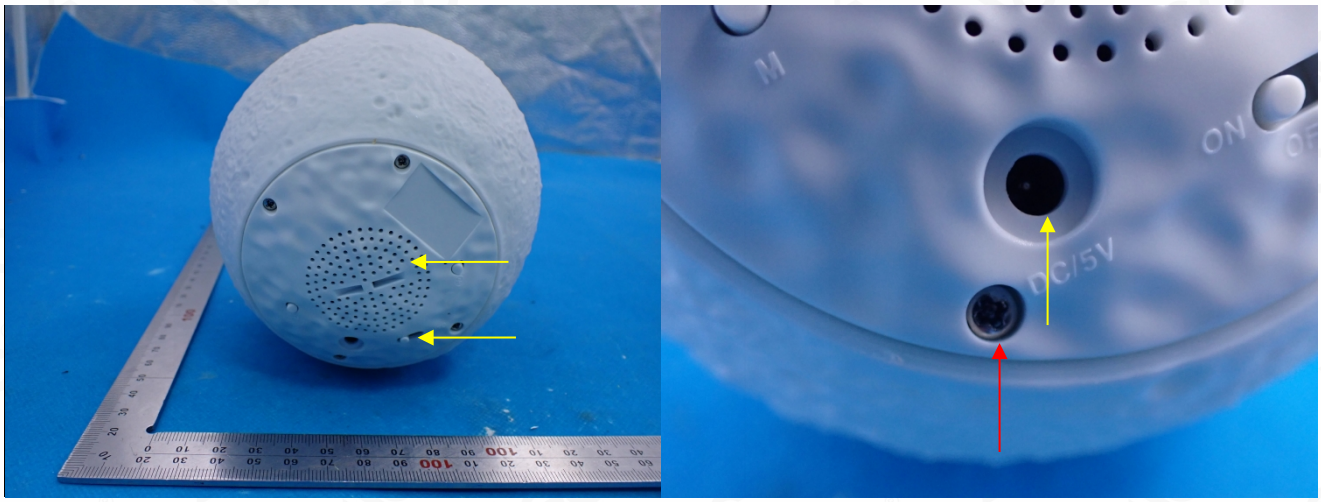
ESD location:

Yellow line: Air discharge

Red line: Contact discharge

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## 12.5 PERFORMANCE

| | |
|---|---|
| ☒**Criteria A:** | The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. |
| ☐**Criteria B:** | The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. |
| ☐**Criteria C:** | Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls. |

☒***PASS*** ☐***FAIL***

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# 13. RADIATED, RADIO FREQUENCY ELECTROMAGNETIC FIELD IMMUNITY TEST

## 13.1. TEST SPECIFICATION

| | |
|---|---|
| **Basic Standard** | EN 61000-4-3 |
| **Frequency Range** | 80 MHz – 6000MHz |
| **Field Strength** | 3V/m |
| **Modulation** | 1 kHz sine wave, 80%, AM modulation |
| **Frequency Step** | 1% of fundamental |
| **Polarity of Antenna** | Horizontal and Vertical |
| **Test Distance** | 3m |
| **Antenna Height** | 1.55m |
| **Dwell Time** | 3 seconds |

## 13.2. TEST PROCEDURE

The test procedure was in accordance with EN 61000-4-3.

a. The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
b. The test signal was 80% amplitude modulated with a 1 kHz sine wave.
c. The frequency range was swept from 80 MHz to 6000MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers. The rate of sweep did not exceed $1.5\times10^{-3}$ decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
d. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
e. The field strength level was 3V/m.
f. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

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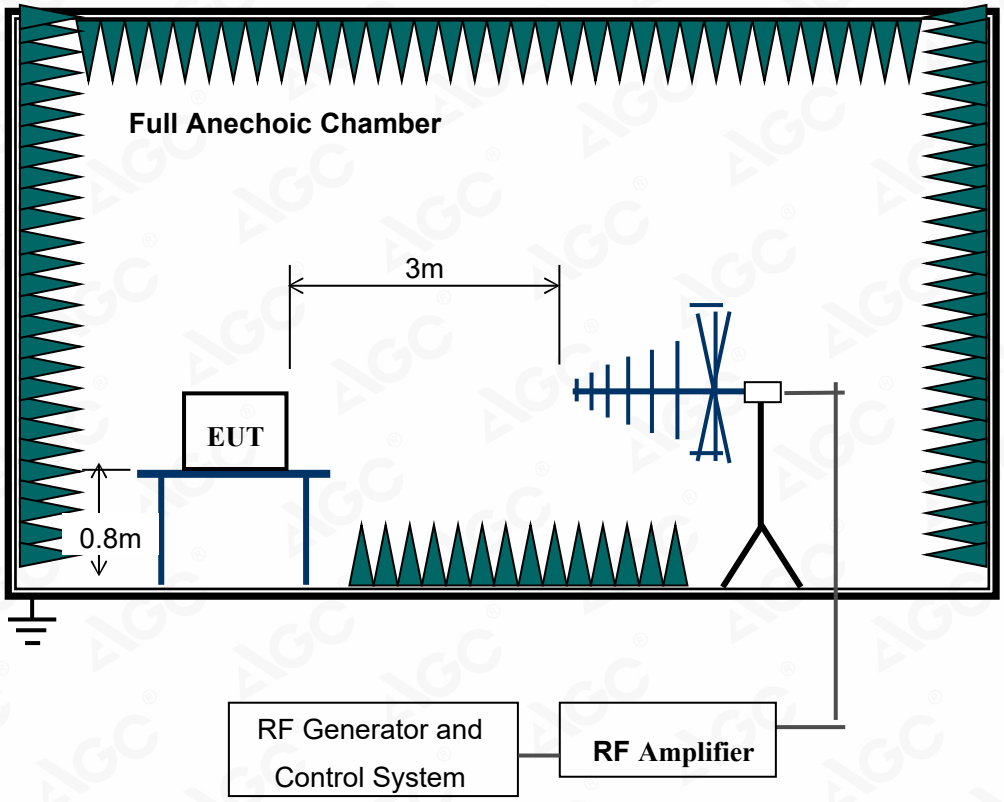
## 13.3. TEST SETUP




For the actual test configuration, please refer to Appendix A：Photographs of the Test Configuration.

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### 13.4. TEST RESULT

| Freq. Range (MHz) | Field | Modulation | Polarity | Position | Test Mode | Performance criteria |
|---|---|---|---|---|---|---|
| 80-6000 | 3V/m | Yes | H | Front | Mode 1/2 | A |
| 80-6000 | 3V/m | Yes | H | Back | Mode 1/2 | A |
| 80-6000 | 3V/m | Yes | H | Left | Mode 1/2 | A |
| 80-6000 | 3V/m | Yes | H | Right | Mode 1/2 | A |
| 80-6000 | 3V/m | Yes | V | Front | Mode 1/2 | A |
| 80-6000 | 3V/m | Yes | V | Back | Mode 1/2 | A |
| 80-6000 | 3V/m | Yes | V | Left | Mode 1/2 | A |
| 80-6000 | 3V/m | Yes | V | Right | Mode 1/2 | A |
| A: No degradation or PER < 10% in the performance of the EUT was observed. | | | | | | |

### 13.5. PERFORMANCE

| | |
|---|---|
| ☒**Criteria A:** | The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. |
| ☐**Criteria B:** | The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. |
| ☐**Criteria C:** | Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls. |

☒***PASS*** ☐***FAIL***

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# 14. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

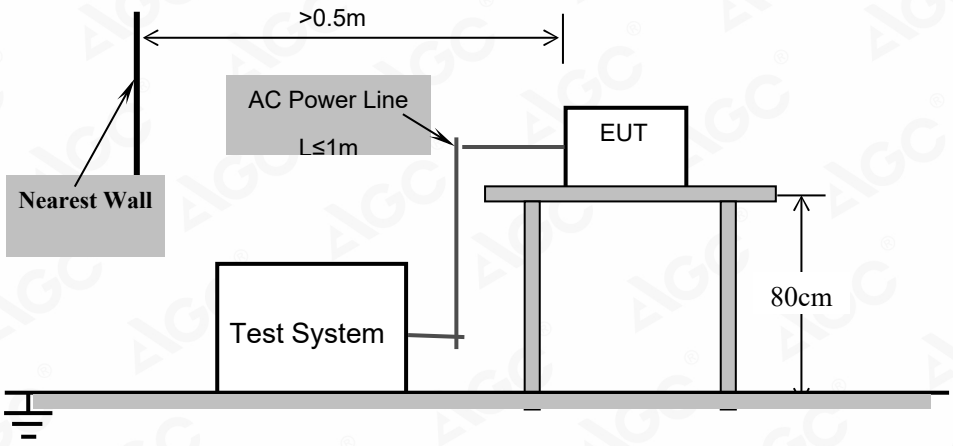
## 14.1. TEST SPECIFICATION

| | |
|---|---|
| **Basic Standard** | EN 61000-4-4 |
| **Test Voltage** | a.c. power port – 1 kV |
| **Polarity** | Positive/Negative |
| **Impulse Frequency** | 5kHz |
| **Impulse wave shape** | 5/50ns |
| **Burst Duration** | 15ms |
| **Burst Period** | 300ms |
| **Test Duration** | Not less than 1 min. |

## 14.2. TEST PROCEDURE

1. The EUT was tested with 1000 volt discharges to the AC power input leads.
2. Both positive and negative polarity discharges were applied.
3. The length of the “hot wire” from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 1 meter.
4. The duration time of each test sequential was 1 minute.
5. The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.

## 14.3. TEST SETUP




For the actual test configuration, please refer to Appendix A：Photographs of the Test Configuration.

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### 14.4. TEST RESULT

| Test Point | Polarity | Test Level (kV) | Test Mode | Performance criteria |
|---|---|---|---|---|
| a.c. port, L | +/- | 1 | Mode 1 | A |
| a.c. port, N | +/- | 1 | Mode 1 | A |
| a.c. port, L-N | +/- | 1 | Mode 1 | A |
| A: No degradation in the performance of the EUT was observed. | | | | |

### 14.5. PERFORMANCE

| | |
|---|---|
| ☒**Criteria A:** | The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. |
| ☐**Criteria B:** | The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. |
| ☐**Criteria C:** | Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls. |

☒***PASS*** ☐***FAIL***

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# 15. SURGE IMMUNITY TEST

## 15.1. TEST SPECIFICATION

| | |
|---|---|
| **Basic Standard** | EN 61000-4-5 |
| **Waveform** | Voltage 1.2/50 μs; Current 8/20 μs |
| **Test Voltage** | a.c. power port, line to line 1.0 kV |
| **Polarity** | Positive/Negative |
| **Phase Angle** | 0°, 90°, 180°, 270° |
| **Repetition Rate** | 60sec |
| **Times** | 5 time/each condition. |

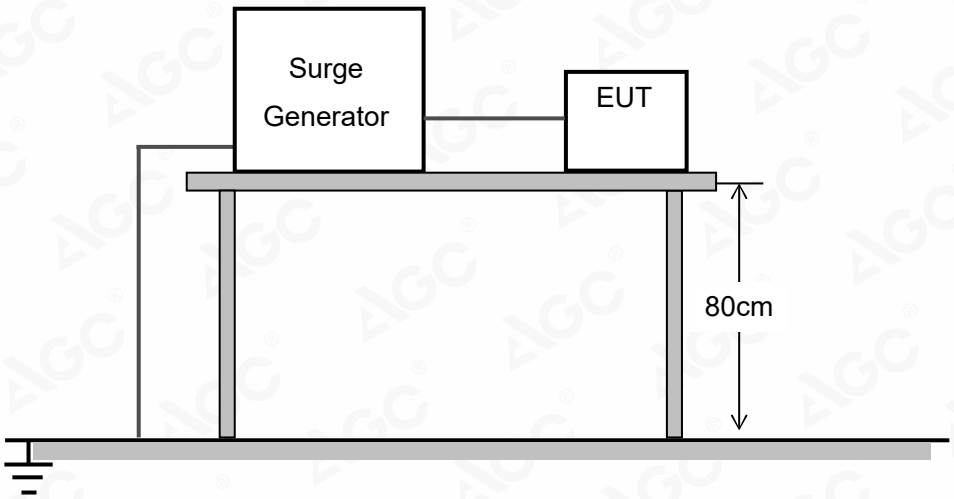
## 15.2. TEST PROCEDURE

a. The EUT and the auxiliary equipment were placed on a table of 0.8m heights above a metal ground reference plane. The size of ground plane is greater than 1m×1m and project beyond the EUT by at least 0.1m on all sides. The ground plane is connected to the protective earth. The length of power cord between the coupling device and the EUT was less than 2 meters (provided by the manufacturer).

b. The EUT was connected to the power mains through a coupling device that directly couples the surge interference signal. The surge noise was applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).

c. The surges were applied line to line and line(s) to earth. All lower levels including the selected test level were tested. The polarity of each surge level included positive and negative test pulses.

## 15.3. TEST SETUP




For the actual test configuration, please refer to Appendix A：Photographs of the Test Configuration.

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### 15.4. TEST RESULT

| Coupling Line | Polarity | Voltage (kV) | Test Mode | Performance criteria |
|---|---|---|---|---|
| a.c. power, L-N | +/- | 1.0 | Mode 1 | A |
| A: No degradation in the performance of the EUT was observed. | | | | |

### 15.5. PERFORMANCE

| | |
|---|---|
| ☒**Criteria A:** | The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. |
| ☐**Criteria B:** | The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. |
| ☐**Criteria C:** | Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls. |

☒***PASS*** ☐***FAIL***

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# 16. IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS

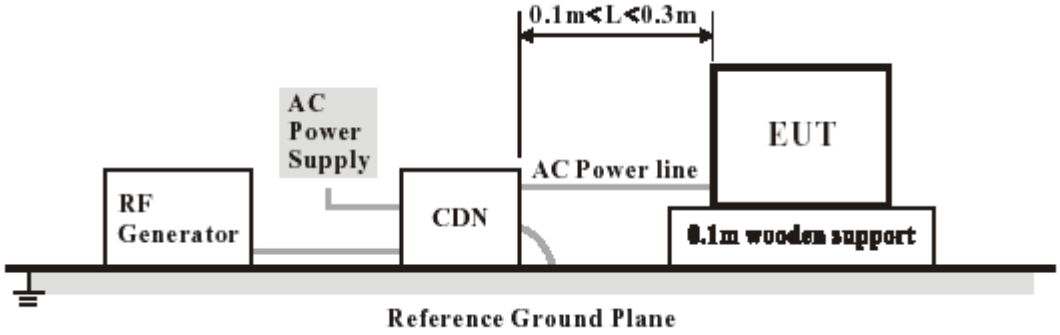
## 16.1. TEST SPECIFICATION

| | |
|---|---|
| **Basic Standard** | EN 61000-4-6 |
| **Frequency Range** | 0.15 MHz – 80 MHz |
| **Field Strength** | 3Vrms |
| **Modulation** | 1 kHz Sine Wave, 80% AM |
| **Frequency Step** | 1% of fundamental |
| **Coupled Cable** | a.c. power line |
| **Coupling Device** | CDN-M2 |

## 16.2. TEST PROCEDURE

1. The EUT shall be tested within its intended operating and climatic conditions.
2. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.
3. The test signal was 80% amplitude modulated with a 1 kHz sine wave
4. The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80% amplitude. The sweep rate shall not exceed 1.5×10-3 decades/s. The step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value where the frequency is swept incrementally.
5. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequencies and harmonics or frequencies of dominant interest, shall be analyzed separately.
6. Attempts should be made to fully exercise the EUT during test, and to fully interrogate all exercise modes selected for susceptibility.

## 16.3. TEST SETUP




For the actual test configuration, please refer to Appendix A：Photographs of the Test Configuration.

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### 16.4. TEST RESULT

| Test Point | Frequency (MHz) | Level (V rms) | Test Mode | Performance criteria |
|---|---|---|---|---|
| a.c. port | 0.15 – 80 | 3 | Mode 1 | A |
| A: No degradation in the performance of the EUT was observed. | | | | |

### 16.5. PERFORMANCE

| | |
|---|---|
| ☒**Criteria A:** | The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. |
| ☐**Criteria B:** | The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. |
| ☐**Criteria C:** | Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls. |

☒***PASS*** ☐***FAIL***

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# 17. VOLTAGE DIPS AND SHORT INTERRUPTIONS IMMUNITY TEST

## 17.1. TEST SPECIFICATION

| | |
|---|---|
| **Basic Standard** | EN 61000-4-11 |
| **Voltage Dips** | 100% reduction, 0.5 Cycle<br>100% reduction, 1.0 Cycle<br>30% reduction, 25 Cycles |
| **Voltage Interruptions** | 100% reduction, 250 Cycles |
| **Voltage Phase Angle** | 0°, 45°, 90°, 135°, 180°, 225°, 270°, 315° |

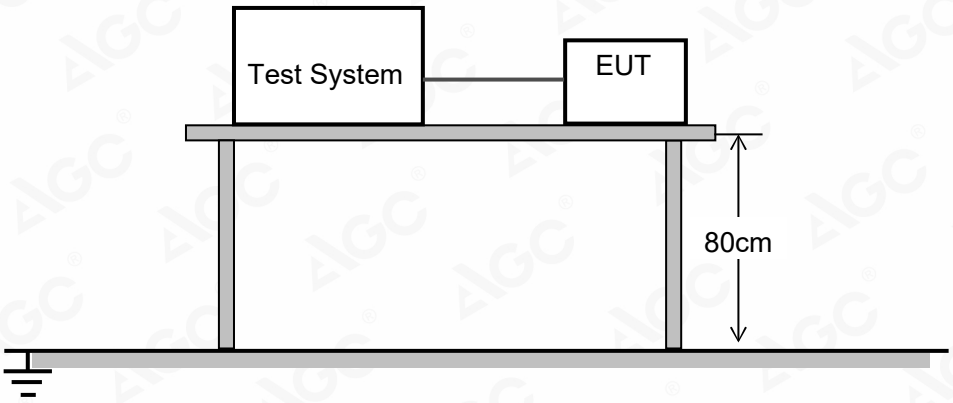
## 17.2. TEST PROCEDURE

a).The power cord was used as supplied by the manufacturer. The EUT was connected to the line output of the Voltage Dips and Interruption Generator.

b).The EUT was tested for (1) 100% voltage dip of supplied voltage with duration of 0.5 cycles, (2)100% voltage dip of supplied voltage and duration 1.0 cycle. (3) 30% voltage dip of supplied voltage and duration 25 cycles. (4) 100% voltage interruption of supplied voltage with duration of 250 Cycles was followed.

c).Voltage reductions occur at 0 degree crossover point of the voltage waveform. The performance of the EUT was checked after the voltage dip or interruption.

## 17.3. TEST SETUP




For the actual test configuration, please refer to Appendix A, Photographs of the Test Configuration.

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### 17.4. TEST RESULT

| Test Mode | Voltage Reduction | Duration (cycle) | Times | Interval (Sec) | Test Mode | Performance criteria |
|---|---|---|---|---|---|---|
| Voltage dips | 100% | 0.5 | 3 | 10 | Mode 1 | B |
| | 100% | 1 | 3 | 10 | Mode 1 | B |
| | 30% | 25 | 3 | 10 | Mode 1 | B |
| Voltage interruptions | 100% | 250 | 3 | 10 | Mode 1 | C |
| A: No degradation in the performance of the EUT was observed.<br>B: Stop charging during the test and self-recoverable after test.<br>C: Lost functions can be recoverable by user or operator. | | | | | | |

### 17.5. PERFORMANCE

| | |
|---|---|
| ☐**Criteria A:** | The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. |
| ☒**Criteria B:** | The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. |
| ☒**Criteria C:** | Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls. |

☒***PASS*** ☐***FAIL***

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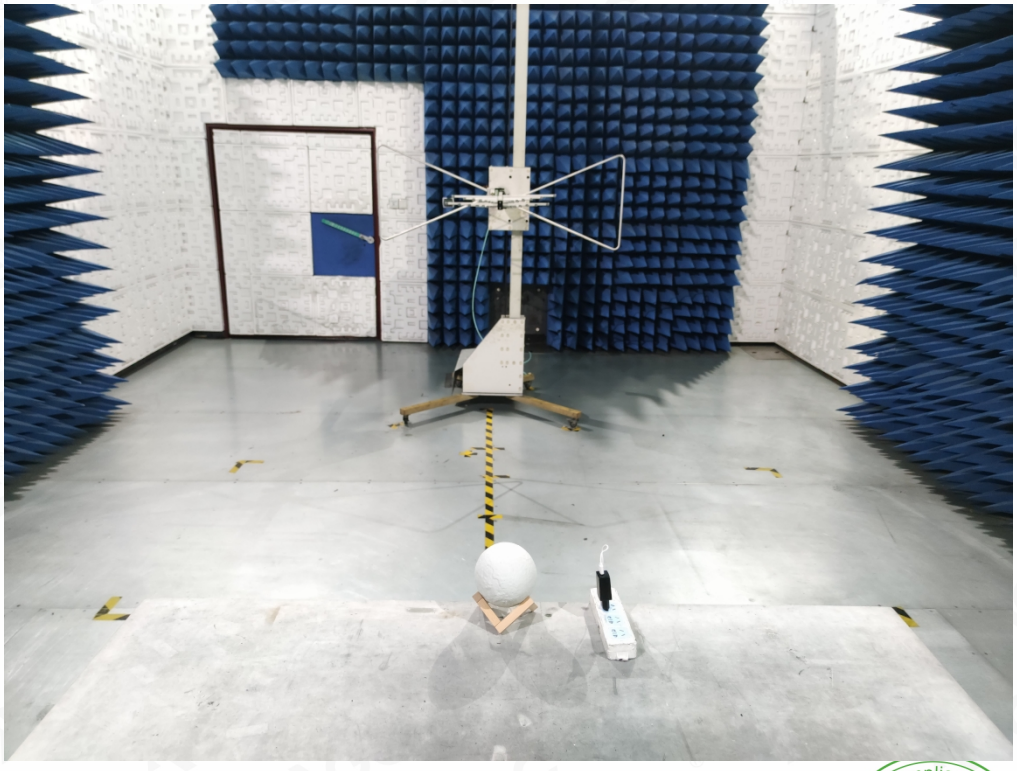
# APPENDIX A: PHOTOGRAPHS OF TEST SETUP

LINE CONDUCTED EMISSION TEST SETUP



RADIATED EMISSION TEST SETUP (BELOW 1GHz)



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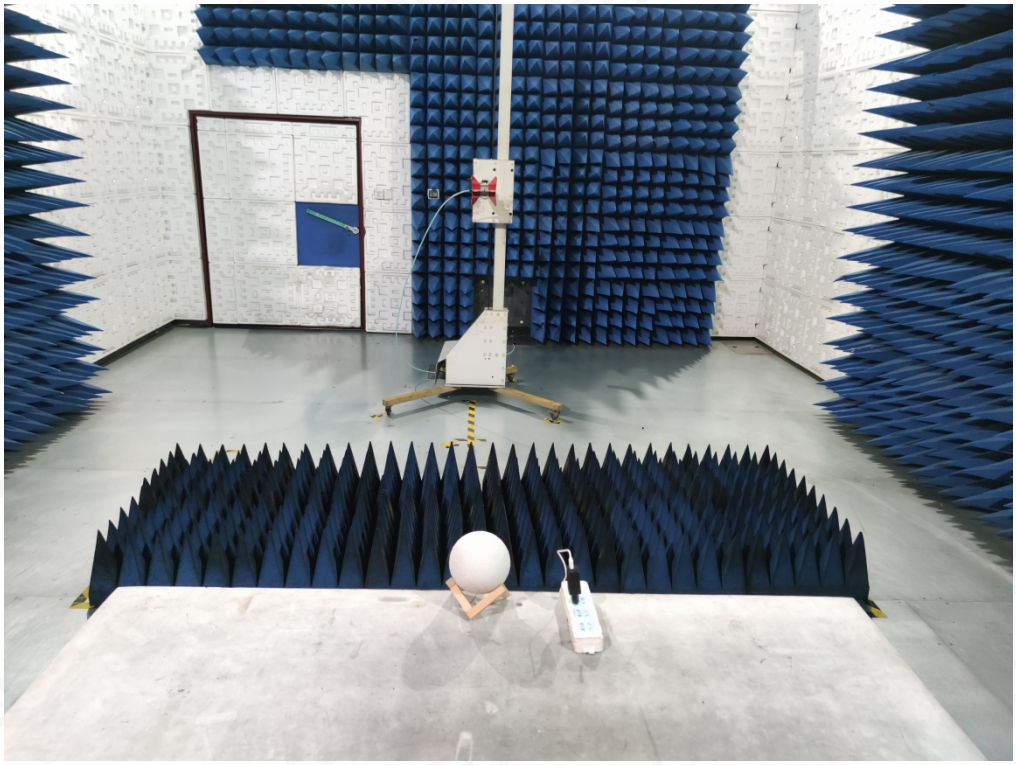
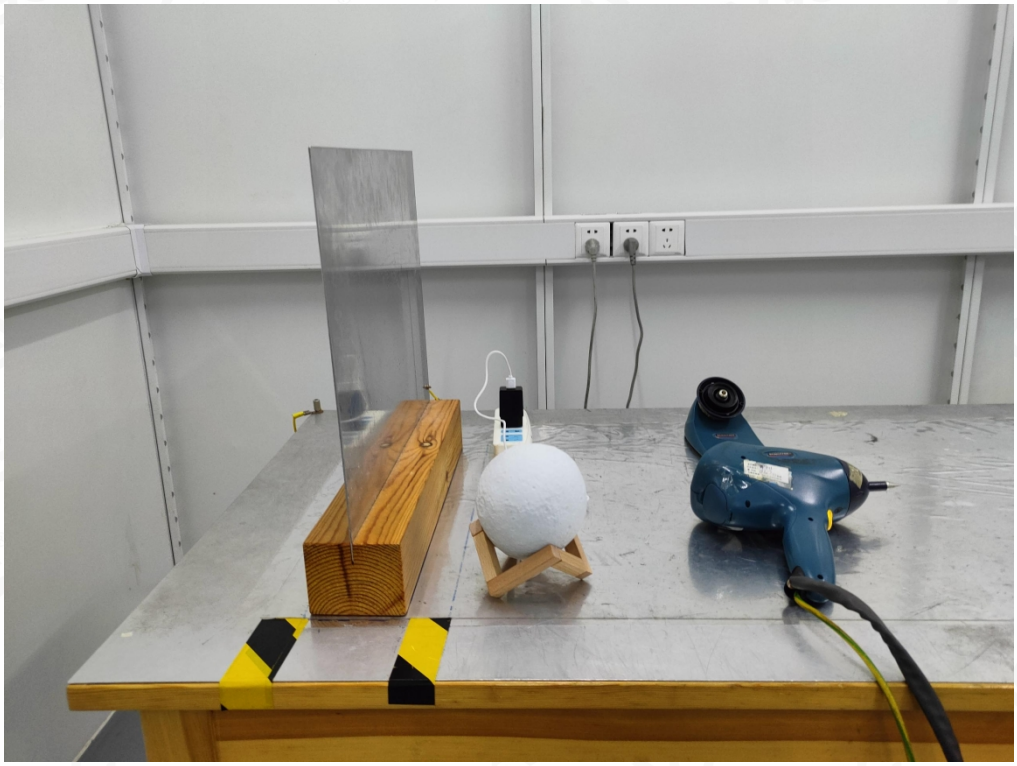
RADIATED EMISSION TEST SETUP (ABOVE 1GHz)



EN 61000-4-2 ESD TEST SETUP



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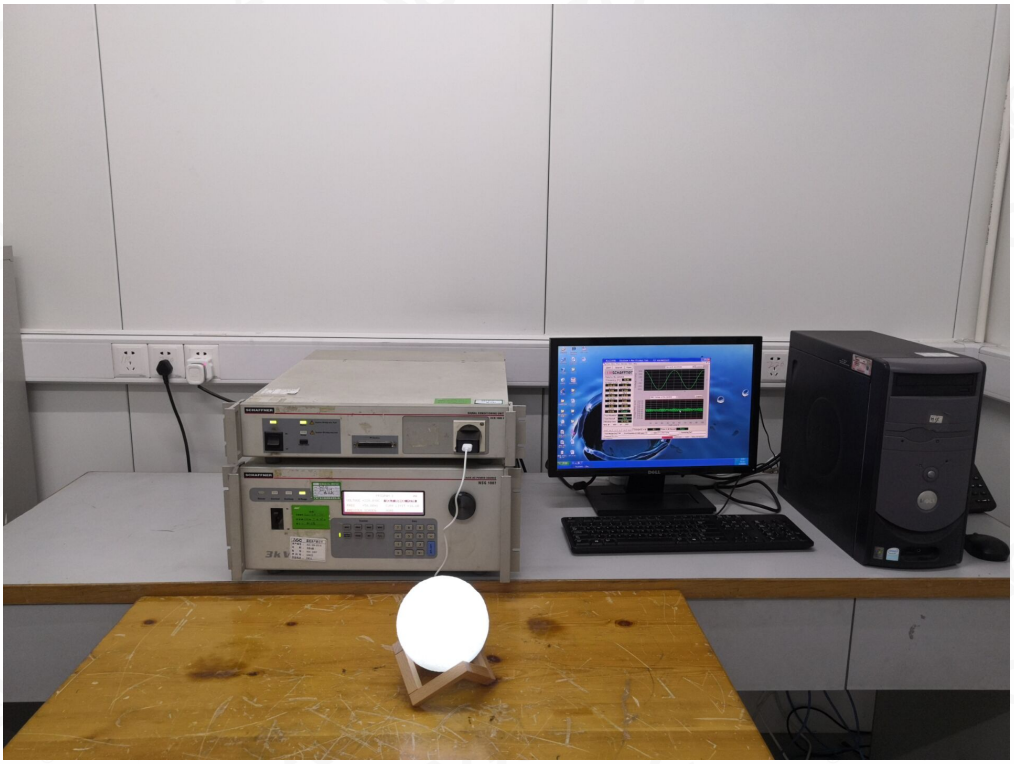
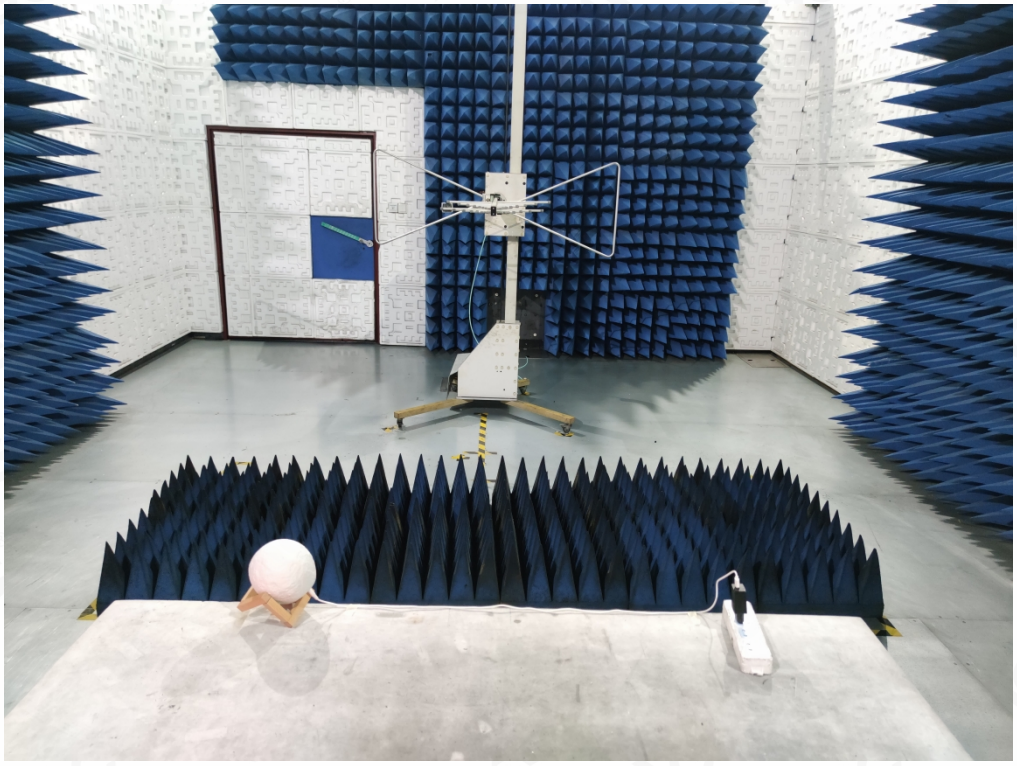
EN61000-3-3 VOLTAGE FLUCTUATION / FLICKER TEST SETUP



EN 61000-4-3 RS TEST SETUP (BELOW 1GHz)



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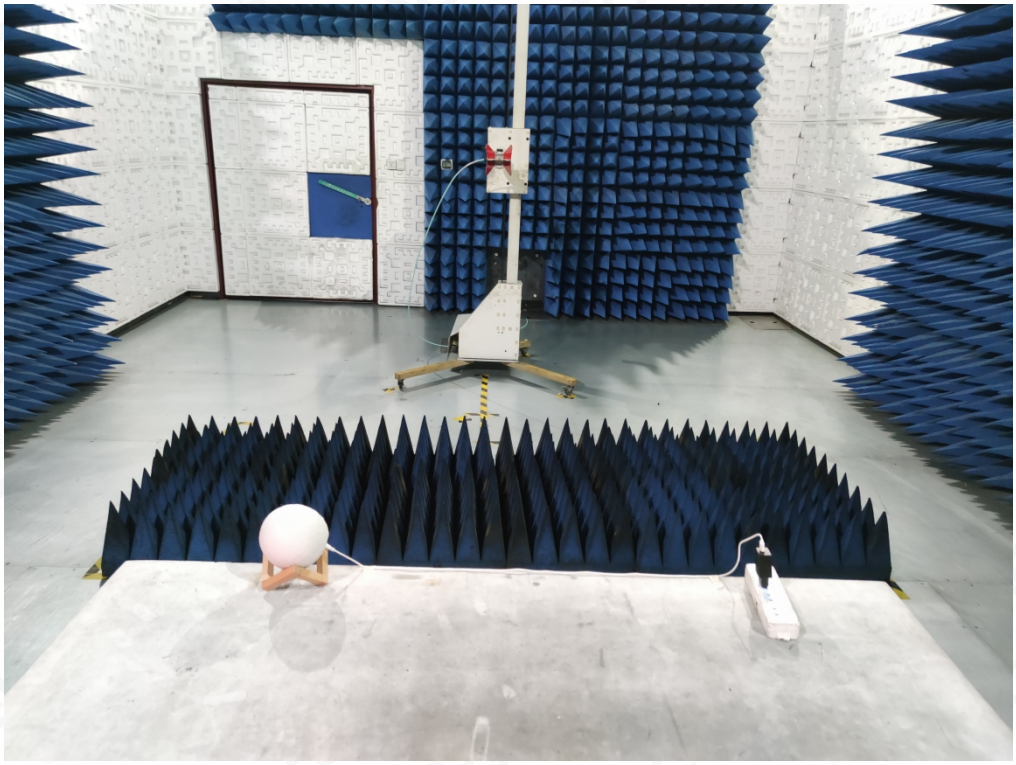
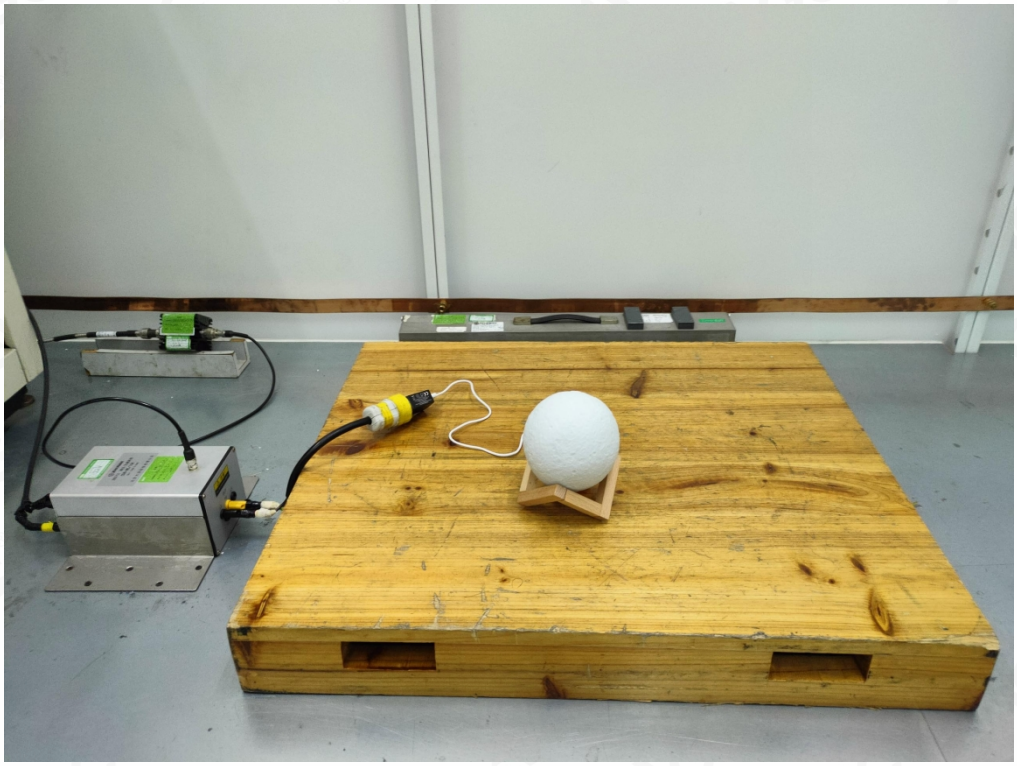
EN 61000-4-3 RS TEST SETUP (ABOVE 1GHz)



EN 61000-4-6 CS IMMUNITY TEST SETUP



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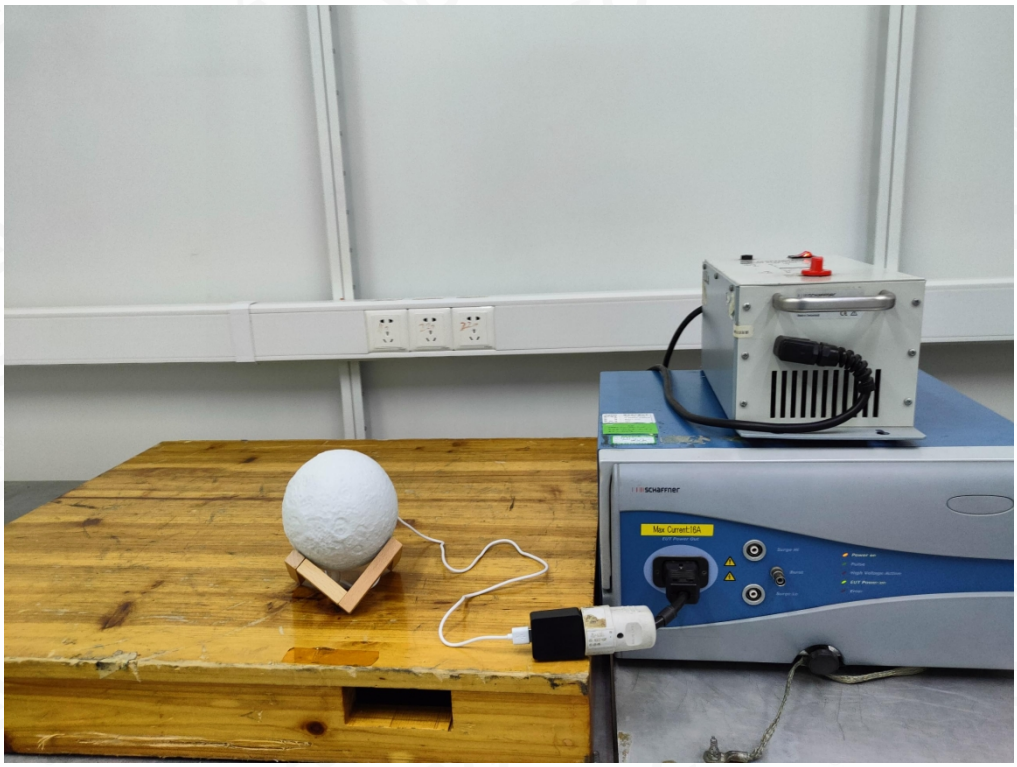
EN 61000-4-4/-5/-11 EFT/SURGE/DIPS TEST SETUP

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## APPENDIX B: PHOTOGRAPHS OF EUT

Refer to the Report No.: AGC12440210702AP01

**----END OF REPORT----**

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Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

3.The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

4. The non-CMA report issued by AGC is only permitted to be used by the client as internal reference use and shall not be used for public demonstration purpose.

5. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

6. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

7. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.

8.Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

9. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.

10. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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# EMC Test Report

Report No.: AGC12440210702EE02

| | | |
|---|---|---|
| **PRODUCT DESIGNATION** | : | WIRELESS MOON SHAPED SPEAKER |
| **BRAND NAME** | : | N/A |
| **MODEL NAME** | : | MO9745 |
| **APPLICANT** | : | Mid Ocean Brands B.V. |
| **DATE OF ISSUE** | : | Jul. 28, 2021 |
| **STANDARD(S)** | : | EN IEC 55015:2019/A11:2020<br>EN IEC 61000-3-2:2019<br>EN 61000-3-3:2013/A1:2019<br>EN 61547:2009 |
| **REPORT VERSION** | : | V1.0 |

*A*ttestation of *G*lobal *C*ompliance (Shenzhen) Co., Ltd

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## REPORT REVISE RECORD

| Report Version | Revise Time | Issued Date | Valid Version | Notes |
|---|---|---|---|---|
| V1.0 | / | Jul. 28, 2021 | Valid | Initial release |

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**APPENDIX B: PHOTOGRAPHS OF EUT.....50**

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## 1 VERIFICATION OF CONFORMITY

| | |
|---|---|
| **Applicant** | Mid Ocean Brands B.V. |
| **Address** | 7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, HongKong. |
| **Manufacturer** | Mid Ocean Brands B.V. |
| **Address** | 7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, HongKong. |
| **Factory** | Mid Ocean Brands B.V. |
| **Address** | 7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, HongKong. |
| **Product Designation** | WIRELESS MOON SHAPED SPEAKER |
| **Brand Name** | N/A |
| **Test Model** | MO9745 |
| **Date of test** | Jul. 22, 2021 to Jul. 28, 2021 |
| **Deviation** | The sample has no any deviation to the method of standard mentioned on page 1 |
| **Condition of Test Sample** | Normal |
| **Test Result** | Pass |

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. for compliance with the requirements set forth in the Technical Standards mentioned above. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment and the level of the immunity endurance of the equipment are within the compliance requirements.

The test results of this report relate only to the tested sample identified in this report.

| | | |
|---|---|---|
| Prepared By | Eddy Liu<br>Project Engineer | Jul. 28, 2021 |
| Reviewed By | Max Zhang<br>Reviewer | Jul. 28, 2021 |
| Approved By | Forrest Lei<br>Authorized Officer | Jul. 28, 2021 |

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## 2 SYSTEM DESCRIPTION

| TEST MODE DESCRIPTION | | |
|---|---|---|
| **NO.** | **TEST MODE DESCRIPTION** | **WORST** |
| 1 | Lighting on with charging | V |
| Note:<br>1. V means EMI worst mode.<br>2. Only worst mode data recorded in the test report. | | |

## 3 MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by ISO.

- Uncertainty of Conducted Emission, Uc = ±3.1dB
- Uncertainty of Radiated Emission, Uc = ±4.0dB

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## 4 PRODUCT INFORMATION

| | |
|---|---|
| **Housing Type** | Plastic and metal |
| **EUT Input Rating** | DC 5V by adapter or DC3.7V by Battery |

**I/O Port Information (☒Applicable ☐Not Applicable)**

| I/O Port of EUT | | | |
|---|---|---|---|
| **I/O Port Type** | **Number** | **Cable Description** | **Tested With** |
| DC IN | 1 | 0.9m | 1 |

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## 5 SUPPORT EQUIPMENT

| Device Type | Manufacturer | Model Name | Serial No. | Data Cable | Power Cable |
|---|---|---|---|---|---|
| Adapter | Zhongli | ZL-PCB0100020502000 | | | |

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## 6 TEST FACILITY

| | |
|---|---|
| **Site** | Attestation of Global Compliance (Shenzhen) Co., Ltd |
| **Location** | 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao 'an District, Shenzhen, Guangdong, China |

## 7 TEST EQUIPMENT LIST

### TEST EQUIPMENT OF CONDUCTED EMISSION TEST

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Test Receiver | R&S | ESPI | 101206 | May 11, 2021 | May 10, 2022 |
| LISN | R&S | ESH2-Z5 | 100086 | Jun. 09, 2021 | Jun. 08, 2022 |
| Test software | FARA | EZ-EMC (Ver.AGC-CON03A1) | N/A | N/A | N/A |

### TEST EQUIPMENT OF RADIATED EMISSION TEST

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Test Receiver | R&S | ESCI | 10096 | Apr. 14, 2021 | Apr. 13, 2022 |
| Antenna | SCHWARZBECK | VULB9168 | 494 | Jan. 08, 2021 | Jan. 07, 2023 |
| Test software | FARA | EZ-EMC (Ver.RA-03A) | N/A | N/A | N/A |

### TEST EQUIPMENT OF RADIATED ELECTROMAGNETIC DISTURBANCE TEST

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Triple Loop Antenna | LAPLACE | RF300 | 9070 | Mar. 23, 2020 | Mar. 22, 2022 |
| Test Receiver | R&S | ESCI | 10096 | May 15, 2020 | May 14, 2022 |

### TEST EQUIPMENT OF POWER HARMONICS / VOLTAGE FLUCTUATION / FLICKER TEST

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Signal Conditioning Unit | Schaffner | CCN1000-1 | 72431 | Jul. 15, 2020 | Jul. 14, 2022 |
| AC Source | Schaffner | NSG1007 | 56825 | Jul. 15, 2020 | Jul. 14, 2022 |

### TEST EQUIPMENT OF SURGE/EFT/DIPS TEST

| Description | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| EFT Surge | Schaffner | Modula 6150 | 34437 | Jul. 19, 2021 | Jul. 18, 2022 |

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| | | | | | |
|---|---|---|---|---|---|
| Generator | | | | | |

**TEST EQUIPMENT OF ESD TEST**

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| ESD Simulator | Schaffner | NSG 438 | 782 | Jan. 08, 2021 | Jan. 07, 2022 |

**TEST EQUIPMENT OF RS IMMUNITY TEST**

| Description | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Signal Generator | R&S | E4421B | MY43351603 | May 11, 2021 | May 10, 2022 |
| Power Sensor | R&S | URV5-Z4 | 100124 | Apr. 26, 2021 | Apr. 25, 2023 |
| Power Meter | R&S | NRVD | 8323781027 | Apr. 26, 2021 | Apr. 25, 2023 |
| Power Amplifier | KALMUS | 7100LC | 04-02/17-06-001 | N/A | N/A |
| Power Amplifier | Milmega | AS0104-55_55 | 1004793 | N/A | N/A |
| Broadband Preamplifier | SCHWARZBECK | VULB9168 | D69250 | Sep. 20, 2019 | Sep. 19, 2021 |

**TEST EQUIPMENT OF CS IMMUNITY TEST**

| Description | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Power Amplifier | AR | 75A250 | 18464 | N/A | N/A |
| CDN | ZHINAN | ZN3751 | 15004 | Sep. 03, 2020 | Sep. 02, 2022 |
| 6dB attenuator | ZHINAN | E-002 | N/A | Sep. 03, 2020 | Sep. 02, 2022 |
| Power Sensor | R&S | URV5-Z4 | 100124 | Apr. 26, 2021 | Apr. 25, 2023 |
| Power Meter | R&S | NRVD | 8323781027 | Apr. 26, 2021 | Apr. 25, 2023 |
| Signal Generator | R&S | E4421B | MY43351603 | May 11, 2021 | May 10, 2022 |

**TEST EQUIPMENT OF PFMF TEST**

| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| PFMF system | HTEC | HPFMF | 161701 | Jul. 19, 2021 | Jul. 18, 2022 |

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## 8 TEST SUMMARY LIST

| Test item | Test Requirement | Test Method | Class/Severity | Result |
|---|---|---|---|---|
| CONDUCTED EMISSION | EN IEC 55015 | EN IEC 55015 | 0.009MHz -30MHz | Pass |
| RADIATED EMISSION | EN IEC 55015 | EN IEC 55015 | 30MHz -1000MHz | Pass |
| RADIATED ELECTROMAGNETIC DISTURBANCE | EN IEC 55015 | EN IEC 55015 | 0.009MHz -30MHz | Pass |
| Harmonic current emission | EN IEC 61000-3-2 | EN IEC 61000-3-2 | Class C | N/A |
| Voltage fluctuations & flicker | EN 61000-3-3 | EN 61000-3-3 | §5 of EN 61000-3-3 | Pass |
| Electrostatic Discharge Immunity | EN 61547 | EN 61000-4-2 | ± 8.0 kV (Air Discharge)<br>± 4.0 kV (Contact Discharge)<br>± 4.0 kV (Indirect Discharge) | Pass |
| Radiated RF Electromagnetic | EN 61547 | EN 61000-4-3 | 3V/m with 80% AM. 1kHz Modulation. | Pass |
| Electrical fast transient/burst Immunity | EN 61547 | EN 61000-4-4 | +/- 1kV for Power Supply Lines | Pass |
| SURGE IMMUNITY | EN 61547 | EN 61000-4-5 | >25W<br>+/-1kV (Line to Line)<br>+/-2kV (Line to Ground)<br><25W<br>+/-0.5kV (Line to Line)<br>+/-1kV (Line to Ground) | Pass |
| Immunity to Conducted Disturbances Induced by RF fields | EN 61547 | EN 61000-4-6 | 3V with 80% AM. 1 kHz Modulation | Pass |
| Power Frequency Magnetic Fields | EN 61547 | EN 61000-4-8 | 50/60 Hz, 3A/m | Pass |
| Voltage dips and short interruptions immunity | EN 61547 | EN 61000-4-11 | PHASE ANGLE 0, 45, 90, 135, 180, 225, 270, 315 degrees | Pass |

**Note:** N/A means not applicable.

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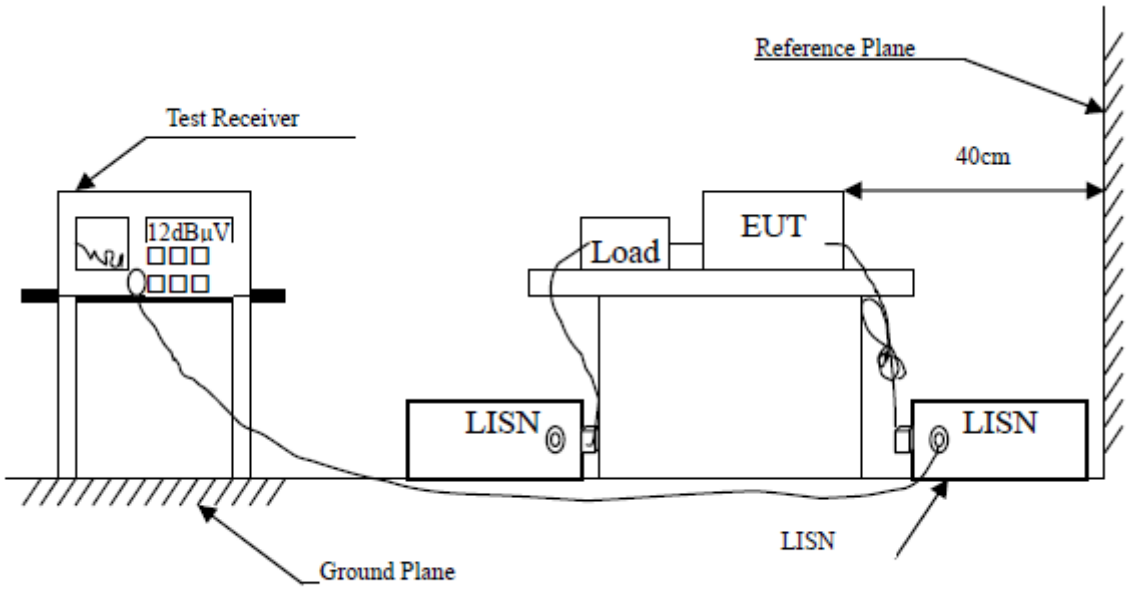
## 9 EN IEC 55015 LINE CONDUCTED EMISSION TEST

### 9.1 LIMITS OF LINE CONDUCTED EMISSION TEST AT MAINS TERMINALS

| Frequency Range | Maximum RF Line Voltage | |
|---|---|---|
| | Q.P.( dBuV) | Average( dBuV) |
| 9 KHz-50 KHz | 110 | -- |
| 50 KHz-150 KHz | 90-80 | -- |
| 150 kHz-500 kHz | 66-56 | 56-46 |
| 500 kHz-5.0 MHz | 56 | 46 |
| 5.0 MHz-30.0 MHz | 60 | 50 |

Note:
1. At the transition frequency, the lower limit applies.
2. The limit decreases linearly with the logarithm of the frequency in the range 50 KHz to 150 KHz and 150 KHz to 0.5 MHz.

### 9.2 BLOCK DIAGRAM OF TEST SETUP

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## 9.3 PROCEDURE OF LINE CONDUCTED EMISSION TEST

(1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per EN55015 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 10cm non-conductive covering to insulate the EUT from the ground plane.

(2) Support equipment, if needed, was placed as per EN55015.

(3) All I/O cables were positioned to simulate typical actual usage as per EN55015.

(4) The EUT received DC 5V power from adapter which received AC 230V 50Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.

(5) All support equipments received power from a second LISN supplying power of AC 230V/50Hz, if any.

(6) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.

(7) Analyzer / Receiver scanned from 9 kHz to 30 MHz for emissions in each of the test modes.

(8) During the above scans, the emissions were maximized by cable manipulation.

(9) The test mode(s) were scanned during the test

(10) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions.

(11) Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.

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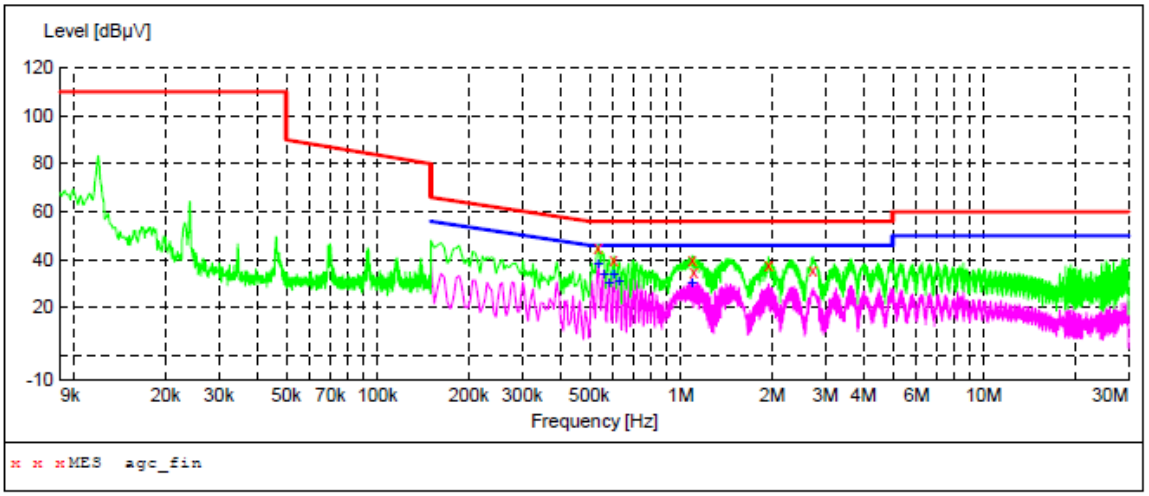
## 9.4 TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST-L




***MEASUREMENT RESULT: "agc_fin"***

2021/7/23 10:45

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line |
|---|---|---|---|---|---|---|
| 0.534000 | 45.20 | 5.4 | 56 | 10.8 | QP | L1 |
| 0.602000 | 40.10 | 5.4 | 56 | 15.9 | QP | L1 |
| 1.090000 | 40.10 | 5.6 | 56 | 15.9 | QP | L1 |
| 1.106000 | 34.80 | 5.6 | 56 | 21.2 | QP | L1 |
| 1.946000 | 37.80 | 6.4 | 56 | 18.2 | QP | L1 |
| 2.730000 | 35.60 | 6.5 | 56 | 20.4 | QP | L1 |

***MEASUREMENT RESULT: "agc_fin2"***

2021/7/23 10:45

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line |
|---|---|---|---|---|---|---|
| 0.534000 | 38.50 | 5.4 | 46 | 7.5 | AV | L1 |
| 0.558000 | 34.00 | 5.4 | 46 | 12.0 | AV | L1 |
| 0.582000 | 30.30 | 5.4 | 46 | 15.7 | AV | L1 |
| 0.602000 | 34.00 | 5.4 | 46 | 12.0 | AV | L1 |
| 0.626000 | 31.00 | 5.4 | 46 | 15.0 | AV | L1 |
| 1.090000 | 30.60 | 5.6 | 46 | 15.4 | AV | L1 |

**RESULT: PASS**

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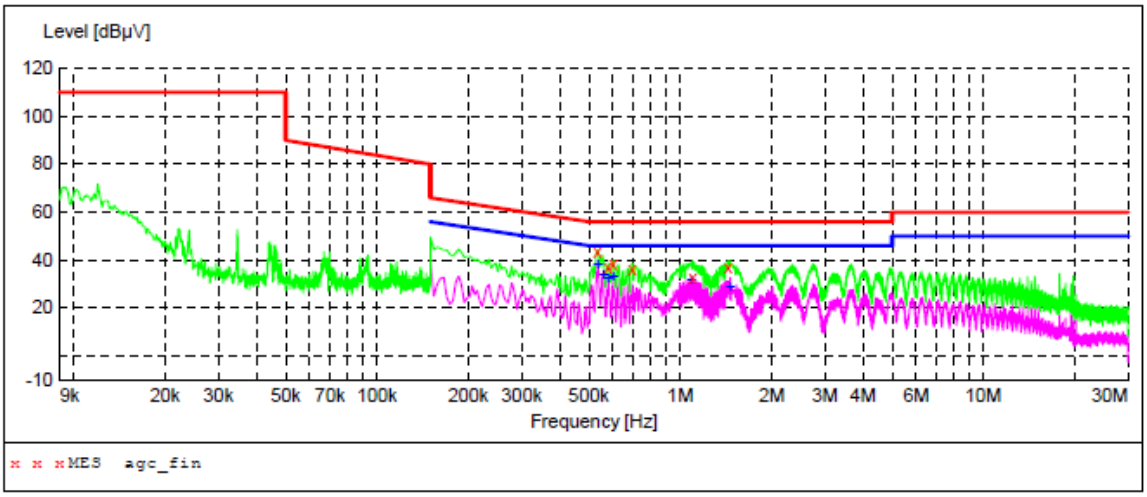
LINE CONDUCTED EMISSION TEST-N




*MEASUREMENT RESULT: "agc_fin"*

2021/7/23 10:50

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line |
|---|---|---|---|---|---|---|
| 0.534000 | 43.40 | 5.4 | 56 | 12.6 | QP | N |
| 0.578000 | 37.10 | 5.4 | 56 | 18.9 | QP | N |
| 0.602000 | 38.40 | 5.4 | 56 | 17.6 | QP | N |
| 0.694000 | 36.60 | 5.4 | 56 | 19.4 | QP | N |
| 1.102000 | 32.90 | 5.6 | 56 | 23.1 | QP | N |
| 1.438000 | 37.10 | 6.0 | 56 | 18.9 | QP | N |

*MEASUREMENT RESULT: "agc_fin2"*

2021/7/23 10:50

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line |
|---|---|---|---|---|---|---|
| 0.534000 | 38.20 | 5.4 | 46 | 7.8 | AV | N |
| 0.558000 | 34.40 | 5.4 | 46 | 11.6 | AV | N |
| 0.578000 | 32.40 | 5.4 | 46 | 13.6 | AV | N |
| 0.602000 | 33.40 | 5.4 | 46 | 12.6 | AV | N |
| 1.090000 | 31.90 | 5.6 | 46 | 14.1 | AV | N |
| 1.462000 | 29.30 | 6.0 | 46 | 16.7 | AV | N |

**RESULT: PASS**

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## 10 EN IEC 55015 RADIATED EMISSION TEST

### 10.1 LIMITS OF RADIATED DISTURBANCES

Limits for radiated disturbance 30M to1 GHz at a measurement distance of 3 m

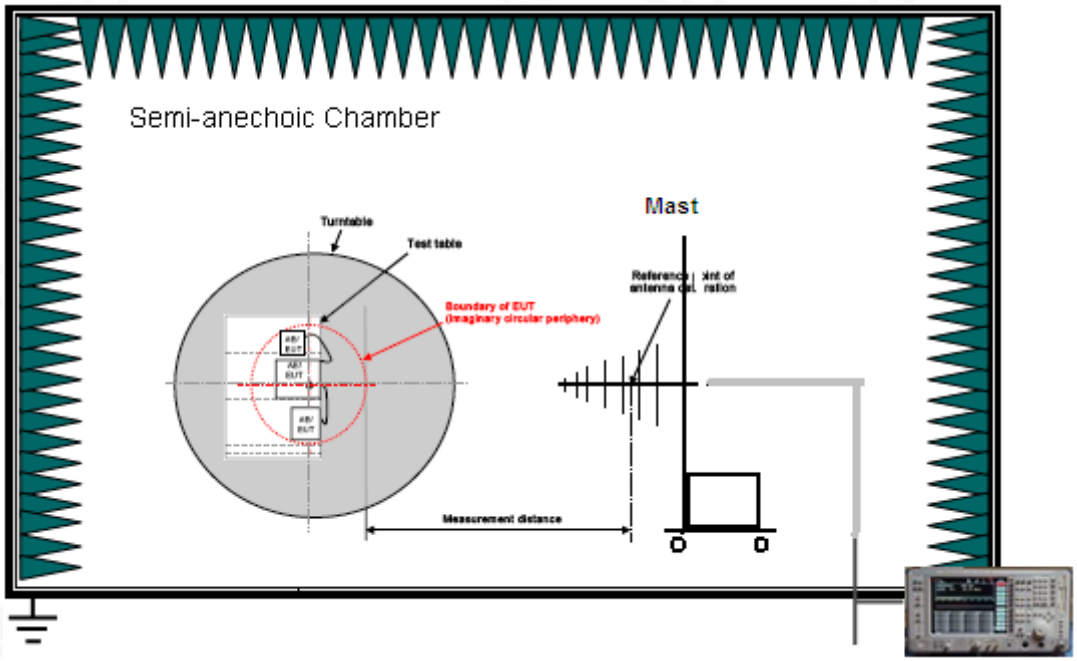
| Frequency range (MHz) | Quasi peak limits(dBuV/m), for Class B ITE, at 3m measurement distance |
|---|---|
| 30 - 230 | 40 |
| 230 - 1000 | 47 |

Notes:

1. The lower limit shall apply at the transition frequency.
2. Additional provisions may be required for cases where interference occurs.

### 10.2 BLOCK DIAGRAM OF TEST SETUP

System Diagram of Connections between EUT and Simulators

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## 10.3 PROCEDURE OF RADIATED EMISSION TEST

(1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane as per EN IEC 55015 (see Test Facility for the dimensions of the ground plane used).When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 10cm non-conductive covering to insulate the EUT from the ground plane.
(2) Support equipment, if needed, was placed as per EN IEC 55015.
(3) All I/O cables were positioned to simulate typical actual usage as per EN IEC 55015.
(4) The EUT received DC 5V power from adapter which received AC230V 50Hz power from socket under the turntable.
(5) The antenna was placed at 3 meters away from the EUT as stated in EN IEC 55015. The antenna connected to the Analyzer via a cable and at times a pre-amplifier would be used.
(6) The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
(7) The test mode(s) were scanned during the test:
(8) Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and Q.P./Peak reading is presented.

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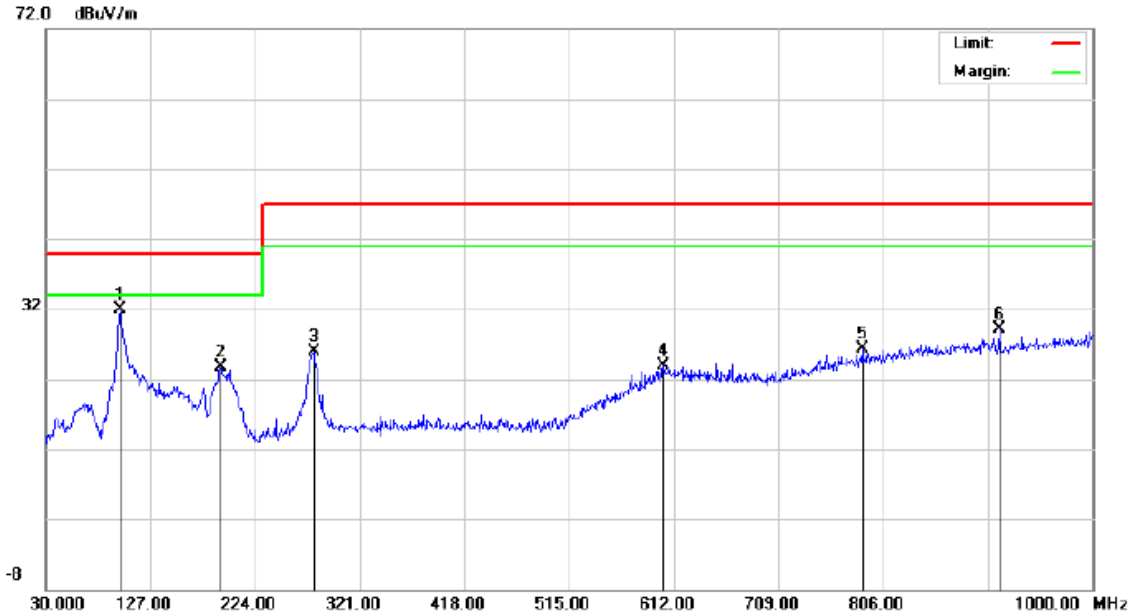
## 10.4 TEST RESULT OF RADIATED EMISSION TEST

Radiated Emission Test at 3m Distance-Horizontal




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | * | 98.8700 | 22.27 | 9.70 | 31.97 | 40.00 | -8.03 | peak |
| 2 | | 191.9900 | 16.35 | 7.44 | 23.79 | 40.00 | -16.21 | peak |
| 3 | | 278.3200 | 16.07 | 9.80 | 25.87 | 47.00 | -21.13 | peak |
| 4 | | 602.3000 | 7.03 | 16.93 | 23.96 | 47.00 | -23.04 | peak |
| 5 | | 786.6000 | 7.27 | 18.97 | 26.24 | 47.00 | -20.76 | peak |
| 6 | | 913.6700 | 8.19 | 20.83 | 29.02 | 47.00 | -17.98 | peak |

**RESULT: PASS**

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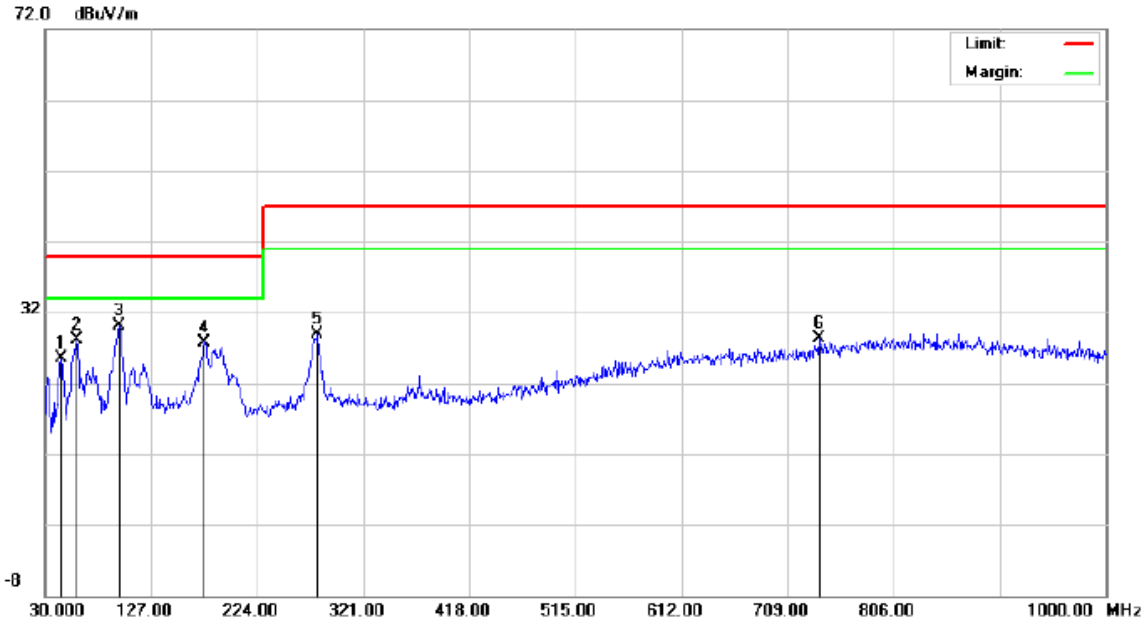
Radiated Emission Test at 3m Distance-Vertical




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 44.5500 | 16.24 | 9.31 | 25.55 | 40.00 | -14.45 | peak |
| 2 | | 59.1000 | 13.87 | 14.28 | 28.15 | 40.00 | -11.85 | peak |
| 3 | * | 97.9000 | 21.60 | 8.42 | 30.02 | 40.00 | -9.98 | peak |
| 4 | | 175.5000 | 15.88 | 11.92 | 27.80 | 40.00 | -12.20 | peak |
| 5 | | 279.2900 | 14.07 | 14.88 | 28.95 | 47.00 | -18.05 | peak |
| 6 | | 738.1000 | 7.24 | 21.01 | 28.25 | 47.00 | -18.75 | peak |

**RESULT: PASS**

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## 11 EN IEC 55015 RADIATED ELECTROMAGNETIC DISTURBANCE TEST

### 11.1 LIMITS OF RADIATED ELECTROMAGNETIC DISTURBANCE IN THE RANGE 9 KHZ TO 30 MHZ

| Frequency Range | Limits for Loop Diameter dB(uA)* | | |
|---|---|---|---|
| | 2m | 3m | 4m |
| 9 KHz-70 KHz | 88* | 81* | 75* |
| 70 KHz-150 KHz | 88 to 58** | 81 to 51** | 75 to 45** |
| 150 kHz-3.0 MHz | 58 to 22** | 51 to 15** | 45 to 9** |
| 3.0 MHz-30 MHz | 22*** | 15 to 16*** | 9 to 12*** |

Note:

*At the transition frequency, the lower limit applies.

** Decreasing linearly with the logarithm of the frequency. For electrode less lamps and luminaries, the limit in the frequency range of 2.2 MHz to 3.0 MHz is 58 dB(uA) for 2m, 51 dB(uA) for 3m and 45 dB(uA) for 4m loop diameter.

*** Increasing linearly with the logarithm of the frequency.

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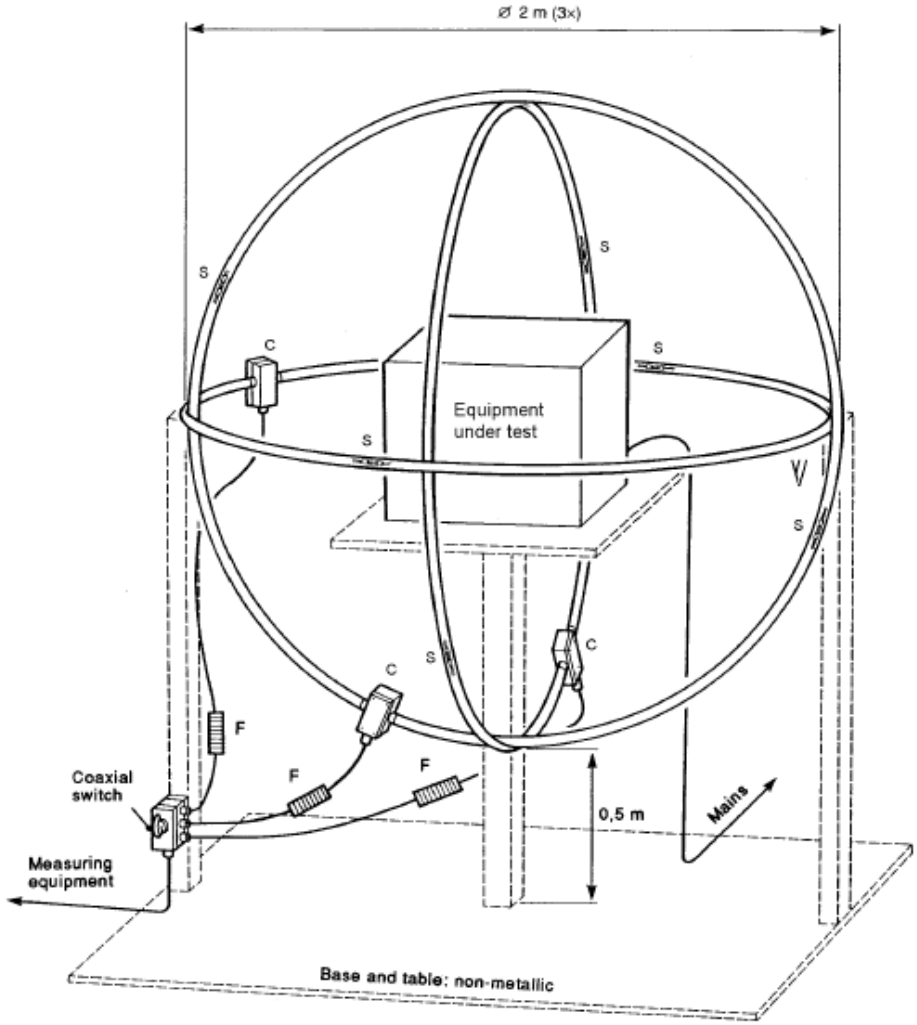
## 11.2 BLOCK DIAGRAM OF TEST SETUP




## 11.3 TEST PROCEDURE

The magnetic component shall be measured by means of a loop antenna as described in EN IEC 55015. The lighting equipment shall be placed in the centre of the antenna, and the position is not critical.
The test object was operated at its upper limit of its rated voltage and its rated frequency. The induced current in the loop antenna is measured by means of a current probe(1V/A) and the CISPR measuring receiver. By means of a coaxial switch the three field directions can be measured in sequence. Each value shall fulfill the requirements given.

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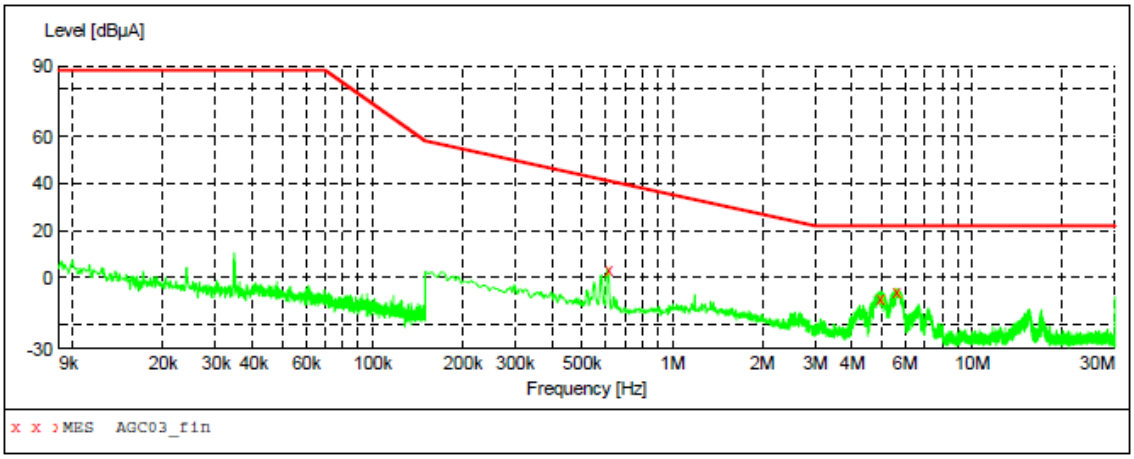
## 11.4 TEST RESULTS OF RADIATED ELECTROMAGNETIC DISTURBANCE

X




***MEASUREMENT RESULT: "AGC03_fin"***

| Frequency MHz | Level dBµA | Transd dB | Limit dBµA | Margin dB | Det. | Loop | Azimuth deg |
|---|---|---|---|---|---|---|---|
| 0.610000 | 3.60 | -19.7 | 41 | 37.5 | QP | X | 0.00 |
| 4.930000 | -9.10 | -21.6 | 22 | 31.1 | QP | X | 0.00 |
| 5.590000 | -6.00 | -21.4 | 22 | 28.0 | QP | X | 0.00 |

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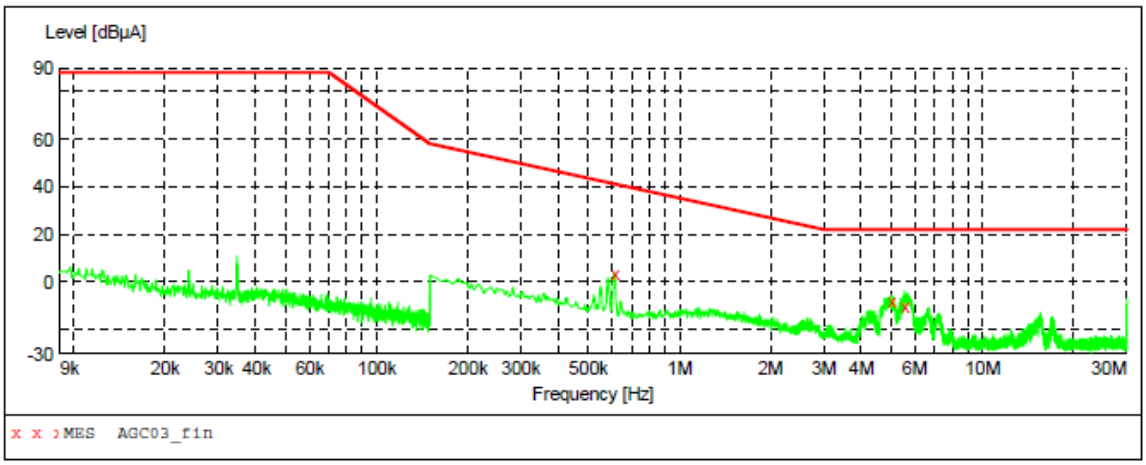
Y




***MEASUREMENT RESULT: "AGC03_fin"***

| Frequency MHz | Level dBµA | Transd dB | Limit dBµA | Margin dB | Det. | Loop | Azimuth deg |
|---|---|---|---|---|---|---|---|
| 0.610000 | 3.50 | -19.7 | 41 | 37.6 | QP | Y | 0.00 |
| 5.010000 | -7.80 | -21.6 | 22 | 29.8 | QP | Y | 0.00 |
| 5.554000 | -10.10 | -21.4 | 22 | 32.1 | QP | Y | 0.00 |

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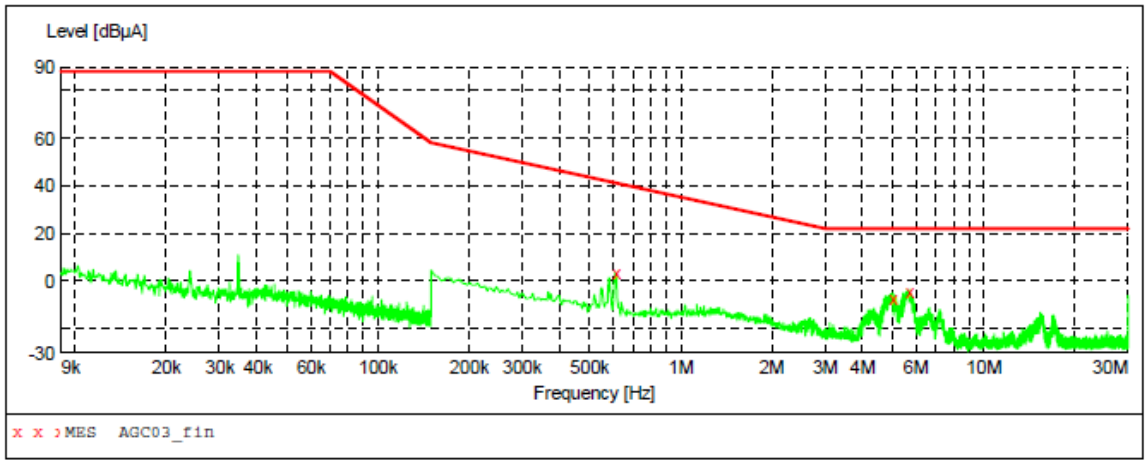
Z




***MEASUREMENT RESULT: "AGC03_fin"***

| Frequency MHz | Level dBµA | Transd dB | Limit dBµA | Margin dB | Det. | Loop | Azimuth deg |
|---|---|---|---|---|---|---|---|
| 0.610000 | 3.50 | -19.7 | 41 | 37.6 | QP | Z | 0.00 |
| 5.010000 | -7.30 | -21.6 | 22 | 29.3 | QP | Z | 0.00 |
| 5.698000 | -4.10 | -21.3 | 22 | 26.1 | QP | Z | 0.00 |

**RESULT: PASS**

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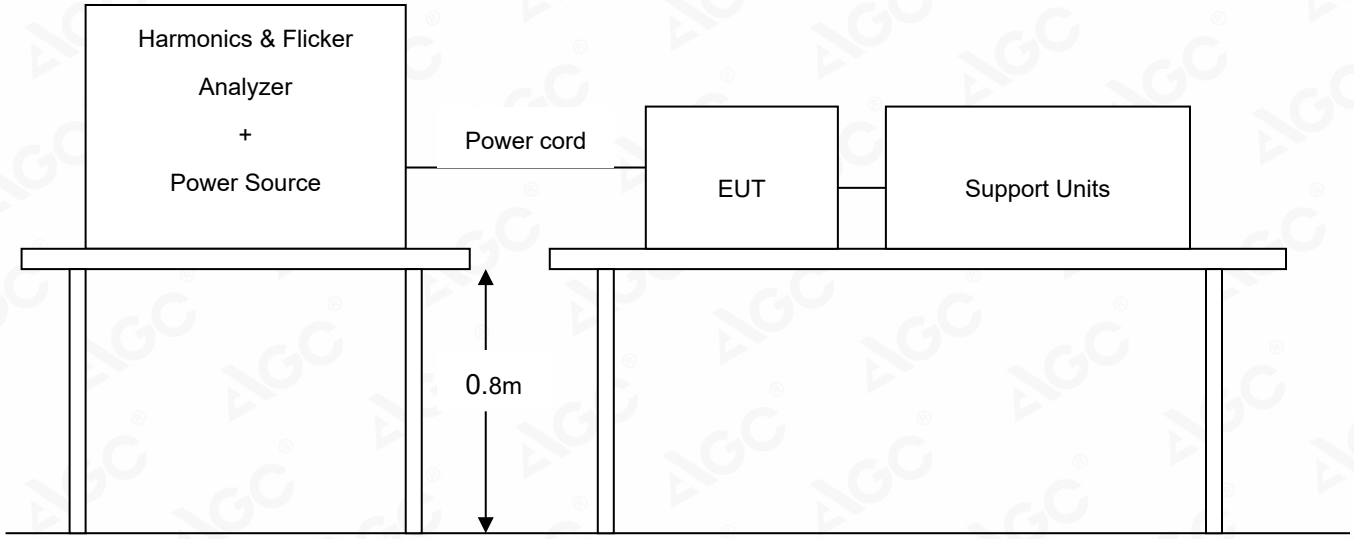
## 12 EN IEC 61000-3-2 POWER HARMONICS TEST

### POWER HARMONICS MEASUREMENT

| | |
|---|---|
| **Port** | AC mains |
| **Basic Standard** | EN IEC 61000-3-2 |
| **Limits** | CLASS C |
| **Temperature** | 24.6°C |
| **Humidity** | 55.0% RH |

### 12.1 BLOCK DIAGRAM OF TEST SETUP




### 12.2 RESULT

Note: Owning to the power of EUT is less than 25W, so test is not applicable.

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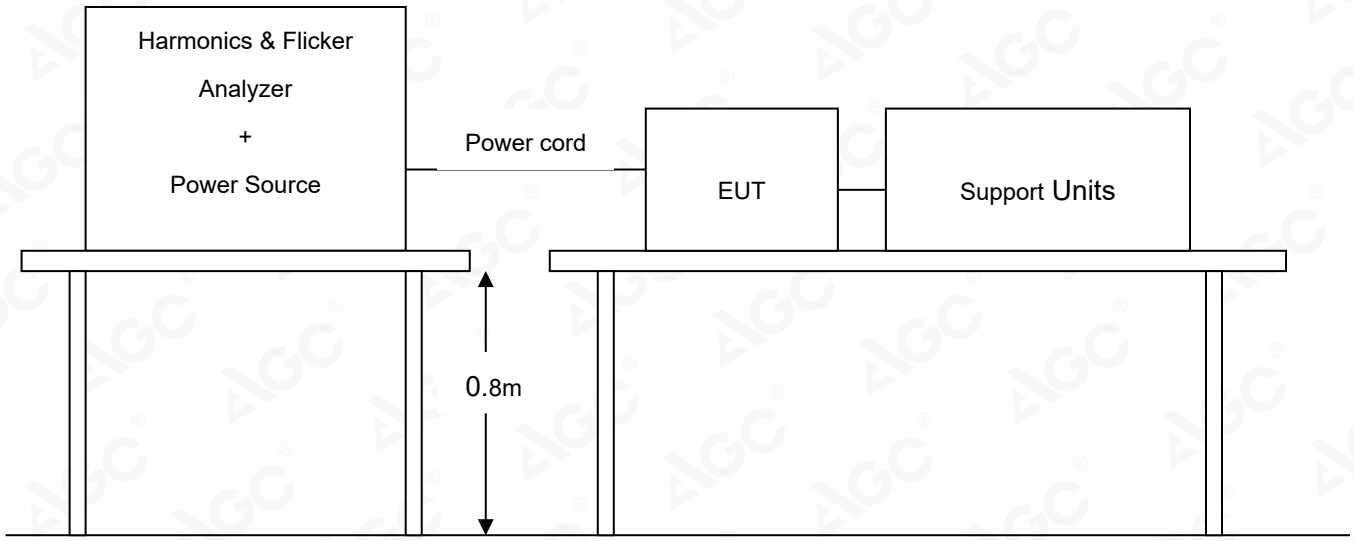
## 13 EN 61000-3-3 VOLTAGE FLUCTUATION / FLICKER TEST

### VOLTAGE FLUCTUATION/FLICKER MEASUREMENT

| | |
|---|---|
| **Port** | AC mains |
| **Basic Standard** | EN 61000-3-3 |
| **Limits** | §5 of EN 61000-3-3 |
| **Temperature** | 24.6ºC |
| **Humidity** | 55.0% RH |

### 13.1 BLOCK DIAGRAM OF TEST SETUP

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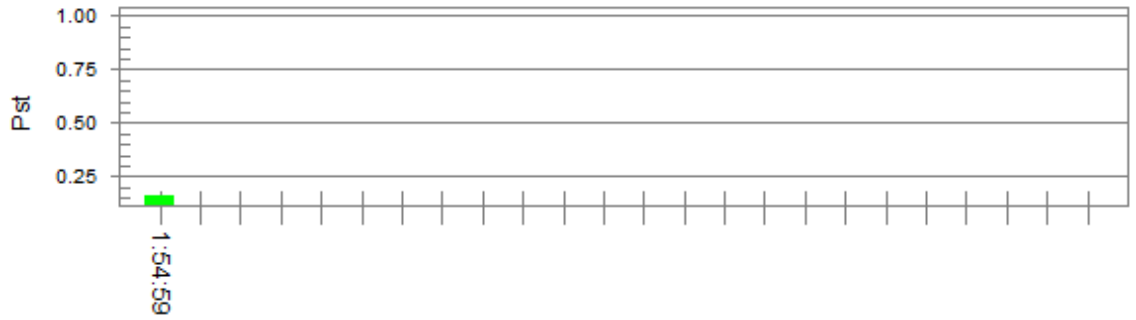
**13.2 RESULT**

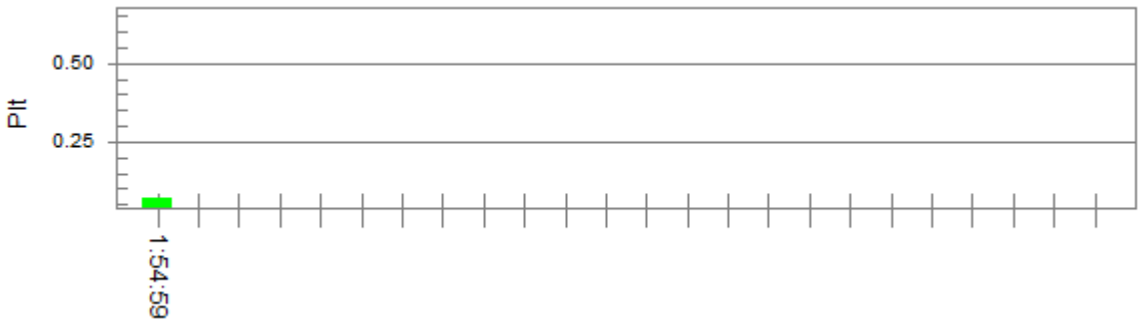
## Flicker Test Summary per EN/EN61000-3-3 (Run time)

$Pst_i$ and limit line

European Limit




Plt and limit line




Parameter values recorded during the test:

| | | | | |
|---|---|---|---|---|
| Vrms at the end of test (Volt): | 230.65 | | | |
| Highest dt (%): | 0.00 | Test limit (%): | 3.30 | Pass |
| Time(mS) > dt: | 0.0 | Test limit (mS): | 500.0 | Pass |
| Highest dc (%): | 0.00 | Test limit (%): | 3.30 | Pass |
| Highest dmax (%): | 0.00 | Test limit (%): | 4.00 | Pass |
| Highest Pst (10 min. period): | 0.173 | Test limit: | 1.000 | Pass |
| Highest Plt (2 hr. period): | 0.068 | Test limit: | 0.650 | Pass |

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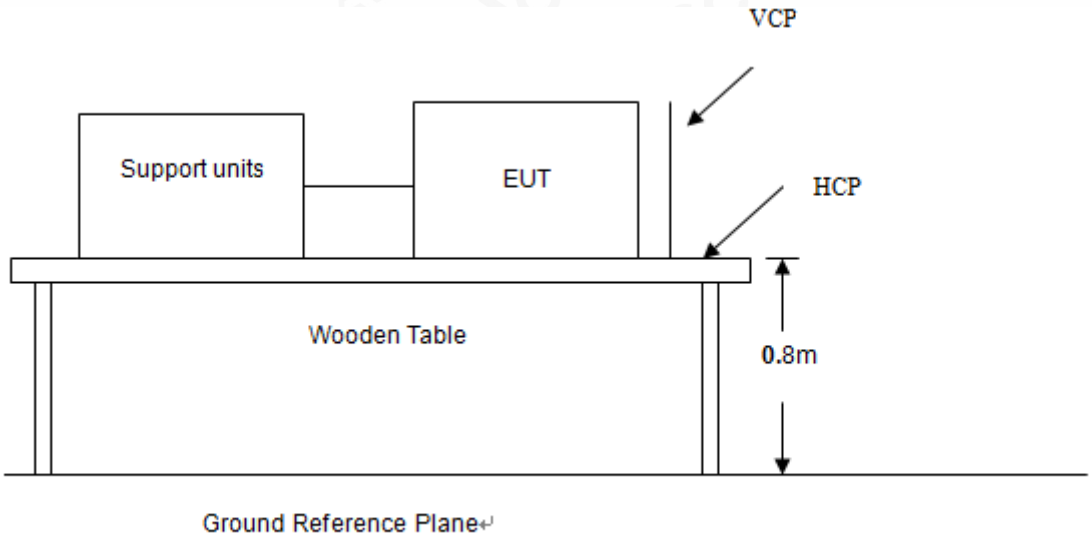
## 14 EN 61000-4-2 ESD IMMUNITY TEST

### ELECTROSTATIC DISCHARGE (ESD) IMMUNITY TEST

| | |
|---|---|
| **Port** | Enclosure |
| **Basic Standard** | EN 61000-4-2 |
| **Test Level** | ± 8.0 kV (Air Discharge)<br>± 4.0 kV (Contact Discharge)<br>± 4.0 kV (Indirect Discharge) |
| **Standard require** | B |
| **Temperature** | 24.3°C |
| **Humidity** | 56.8% RH |

### 14.1 BLOCK DIAGRAM OF TEST SETUP

(The 470 k ohm resistors are installed per standard requirement)

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## 14.2 TEST PROCEDURE

The EUT was located 0.1 m minimum from all side of the HCP.
The support units were located 1 m minimum away from the EUT.
EUT worked with resistance load, and make sure EUT worked normally.
Actives the communication function if the EUT with such port(s).
As per the requirement of EN 61547: Contact discharge is the preferred test method, twenty discharges (10 with positive and 10 with negative polarity) shall be applied on each accessible metallic part of the enclosure, terminals are excluded. Air discharges shall be used where contact discharges cannot be applied. Discharges shall be applied on the horizontal or vertical coupling planes as specified in EN 61000-4-2.
The following test condition was followed during the tests.

**Note:** As per the A2 to EN 61000-4-2, a bleed resistor cable is connected between the EUT and HCP during the test.

The electrostatic discharges were applied as follows:

| Voltage | Coupling | Test Performance | Result |
|---|---|---|---|
| ±4kV | Contact Discharge | No function loss | A |
| ±4kV | Indirect Discharge HCP (Front) | No function loss | A |
| ±4kV | Indirect Discharge HCP (Left) | No function loss | A |
| ±4kV | Indirect Discharge HCP (Right) | No function loss | A |
| ±4kV | Indirect Discharge HCP (Back) | No function loss | A |
| ±4kV | Indirect Discharge VCP (Front) | No function loss | A |
| ±4kV | Indirect Discharge VCP (Left) | No function loss | A |
| ±4kV | Indirect Discharge VCP (Back) | No function loss | A |
| ±4kV | Indirect Discharge VCP (Right) | No function loss | A |
| ±8kV | Air Discharge | No function loss | A |

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### 14.3 PERFORMANCE & RESULT

| | |
|---|---|
| **Criteria A:** | The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. |
| **Criteria B:** | The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. |
| **Criteria C:** | Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls. |

☒***PASS*** ☐***FAIL***

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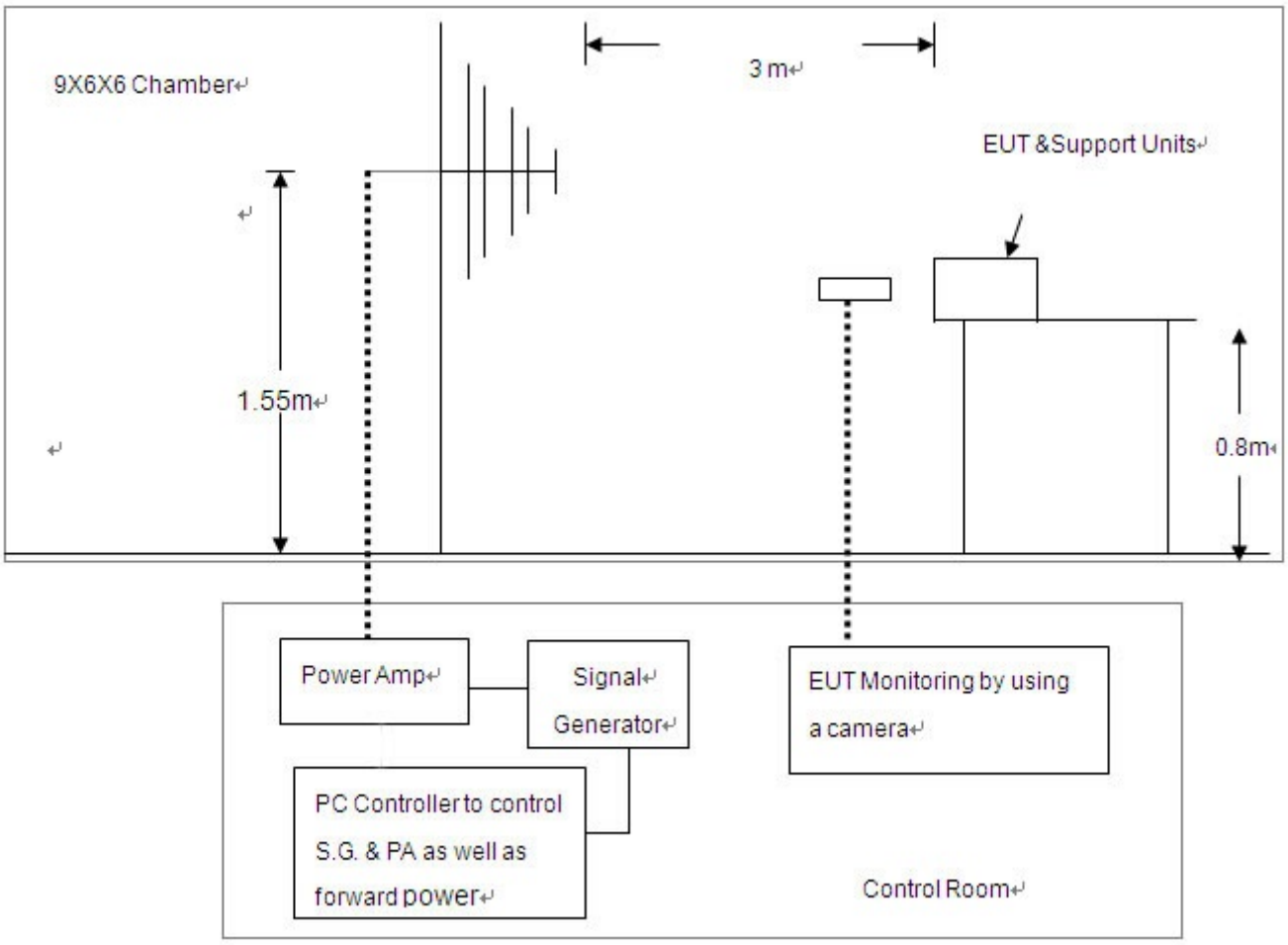
## 15 EN 61000-4-3 RS IMMUNITY TEST

### RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST

| | |
|---|---|
| **Port** | Enclosure |
| **Basic Standard** | EN 61000-4-3 |
| **Test Level:** | 3V/m with 80% AM. 1kHz Modulation. |
| **Standard require** | A |
| **Temperature** | 23.4°C |
| **Humidity** | 58.0% RH |

### 15.1 BLOCK DIAGRAM OF TEST SETUP

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## 15.2 TEST PROCEDURE

The EUT was located at the edge of supporting table keep 3 meter away from transmitting antenna, it just the calibrated square area of field uniformity. The support units were located outside of the uniformity area, but the cable(s) connected with EUT were exposed to the calibrated field as per EN 61000-4-3.
EUT worked with resistance load, and make sure EUT worked normally.
Setting the testing parameters of RS test software per EN 61000-4-3.
Performing the test at each side of with specified level (3V/m) at 1% steps and test frequency from 80MHz to 1000MHz.
Recording the test result in following table.

**EN 61000-4-3 Final test conditions:**
Test level: 3V/m
Steps: 1 % of fundamental
Dwell Time: 1 sec

| Range (MHz) | Field | Modulation | Polarity | Position | Test Performance | Result |
|---|---|---|---|---|---|---|
| 80-1000 | 3V/m | AM | H | Front | No function loss | A |
| 80-1000 | 3V/m | AM | H | Left | No function loss | A |
| 80-1000 | 3V/m | AM | H | Back | No function loss | A |
| 80-1000 | 3V/m | AM | H | Right | No function loss | A |
| 80-1000 | 3V/m | AM | V | Front | No function loss | A |
| 80-1000 | 3V/m | AM | V | Left | No function loss | A |
| 80-1000 | 3V/m | AM | V | Back | No function loss | A |
| 80-1000 | 3V/m | AM | V | Right | No function loss | A |

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## 15.3 PERFORMANCE & RESULT

| | |
|---|---|
| **Criteria A:** | The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. |
| **Criteria B:** | The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. |
| **Criteria C:** | Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls. |

☒***PASS*** ☐***FAIL***

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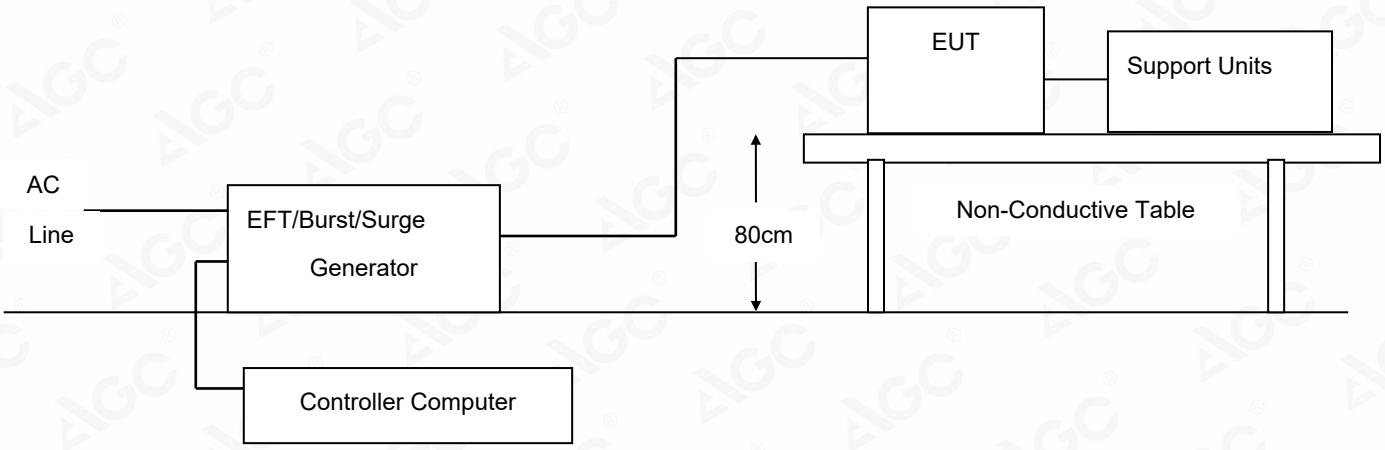
## 16 EN 61000-4-4 EFT IMMUNITY TEST

### ELECTRICAL FAST TRANSIENTS/BURST IMMUNITY TEST

| | |
|---|---|
| **Port** | On Power Supply Lines |
| **Basic Standard** | EN 61000-4-4 |
| **Test Level** | +/- 1kV for Power Supply Lines |
| **Standard require** | B |
| **Temperature** | 22.7°C |
| **Humidity** | 58.0% RH |

### 16.1 BLOCK DIAGRAM OF TEST SETUP

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## 16.2 TEST PROCEDURE

The EUT and support units were located on a wooden table 0.1m away from ground reference plane.
A 1.0 meter long power cord was attached to EUT during the test.
The length of communication cable between communication port and clamp was keeping within 1 meter.
EUT worked with resistance load, and make sure EUT worked normally.
Related peripherals work during the test.
Recording the test result as shown in following table.

**Test conditions:**
Impulse Frequency: 5 kHz
Tr/Th: 5/50ns
Burst Duration: 15ms
Burst Period: 300ms

| Inject Line | Voltage kV | Inject Method | Test Performance | Result |
|---|---|---|---|---|
| L+N | +/- 1 | direct | No function loss | A |

## 16.3 PERFORMANCE & RESULT

| | |
|---|---|
| **Criteria A:** | The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. |
| **Criteria B:** | The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. |
| **Criteria C:** | Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls. |

☒***PASS*** ☐***FAIL***

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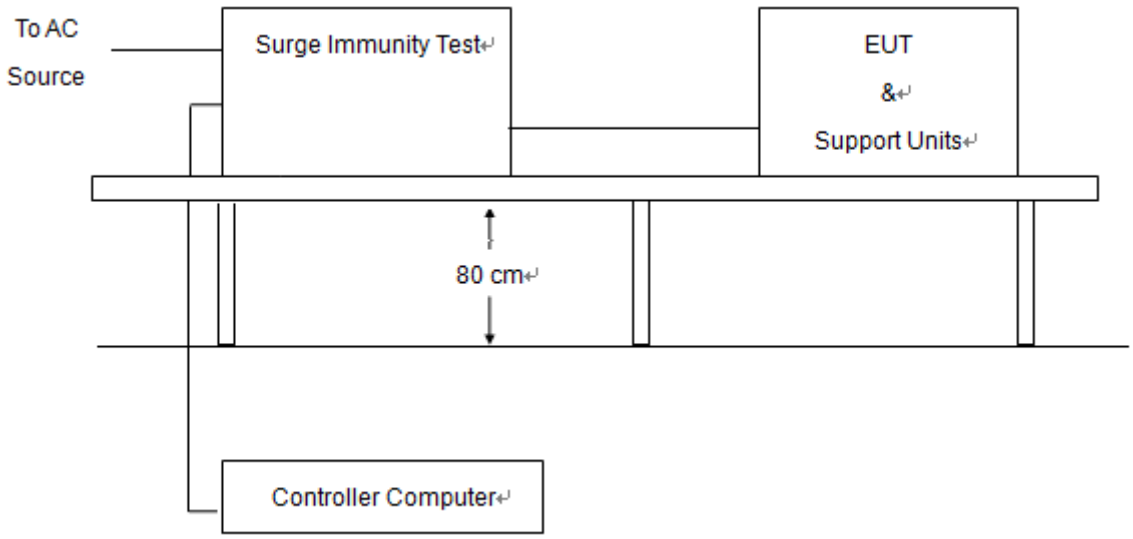
## 17 EN 61000-4-5 SURGE IMMUNITY TEST

### SURGE IMMUNITY TEST

| | |
|---|---|
| **Port** | On Power Supply Lines |
| **Basic Standard** | EN 61000-4-5 |
| **Requirements** | +/-0.5kV (Line to Line)<br>+/-1kV (Line to Ground)<br>(Applicable for power less than 25W) |
| **Standard require** | B |
| **Temperature** | 22.7°C |
| **Humidity** | 57.0% RH |

### 17.1 BLOCK DIAGRAM OF TEST SETUP

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## 17.2 TEST PROCEDURE

The EUT and support units were located on a wooden table 0.8 m away from ground floor.
EUT worked with resistance load, and make sure EUT worked normally.
Recording the test result as shown in following table.

**Test conditions:**

| | |
|---|---|
| **Voltage Waveform** | 1.2/50 *us* |
| **Current Waveform** | 8/20 *us* |
| **Polarity** | Positive/Negative |
| **Phase angle** | 90º, 270º |
| **Number of Test** | 5 |

| Coupling Line | Voltage (kV) | Polarity | Coupling Method | Result |
|---|---|---|---|---|
| L1-N | 0.5 | Positive | Capacitive | No function loss |
| L1-N | 0.5 | Negative | Capacitive | No function loss |

## 17.3 PERFORMANCE & RESULT

| | |
|---|---|
| **Criteria A:** | The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. |
| **Criteria B:** | The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. |
| **Criteria C:** | Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls. |

☒***PASS*** ☐***FAIL***

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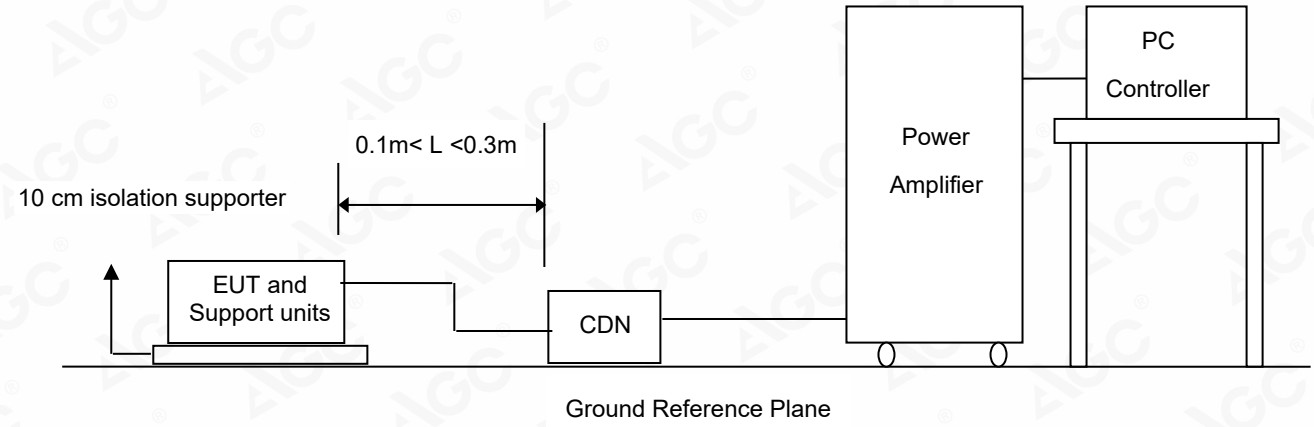
## 18 EN 61000-4-6 CS IMMUNITY TEST

| | |
|---|---|
| **Port** | On Power Supply Lines |
| **Basic Standard** | EN 61000-4-6 |
| **Requirements** | 3V with 80% AM. 1 kHz Modulation |
| **Standard require** | A |
| **Temperature** | 23.7°C |
| **Humidity** | 57.3% RH |

### 18.1 BLOCK DIAGRAM OF TEST SETUP

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## 18.2 TEST PROCEDURE

The EUT and support units were located at a ground reference plane with the interposition of a 0.1 m thickness insulating support and the CDN was located on GRP directly.
EUT worked with resistance load, and make sure EUT worked normally.
Related peripherals work during the test.
Setting the testing parameters of CS test software per EN 61000-4-6.
Recording the test result in following table.

**Test conditions:**

| | |
|---|---|
| **Frequency Range** | 0.15MHz-80MHz |
| **Frequency Step** | 1% of fundamental |
| **Dwell Time** | 1 sec |

| Range (MHz) | Strength | Modulation | Test Performance | Result |
|---|---|---|---|---|
| 0.15-80 | 3V | AM | No function loss | A |

## 18.3 PERFORMANCE & RESULT

| | |
|---|---|
| **Criteria A:** | The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. |
| **Criteria B:** | The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. |
| **Criteria C:** | Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls. |

☒***PASS*** ☐***FAIL***

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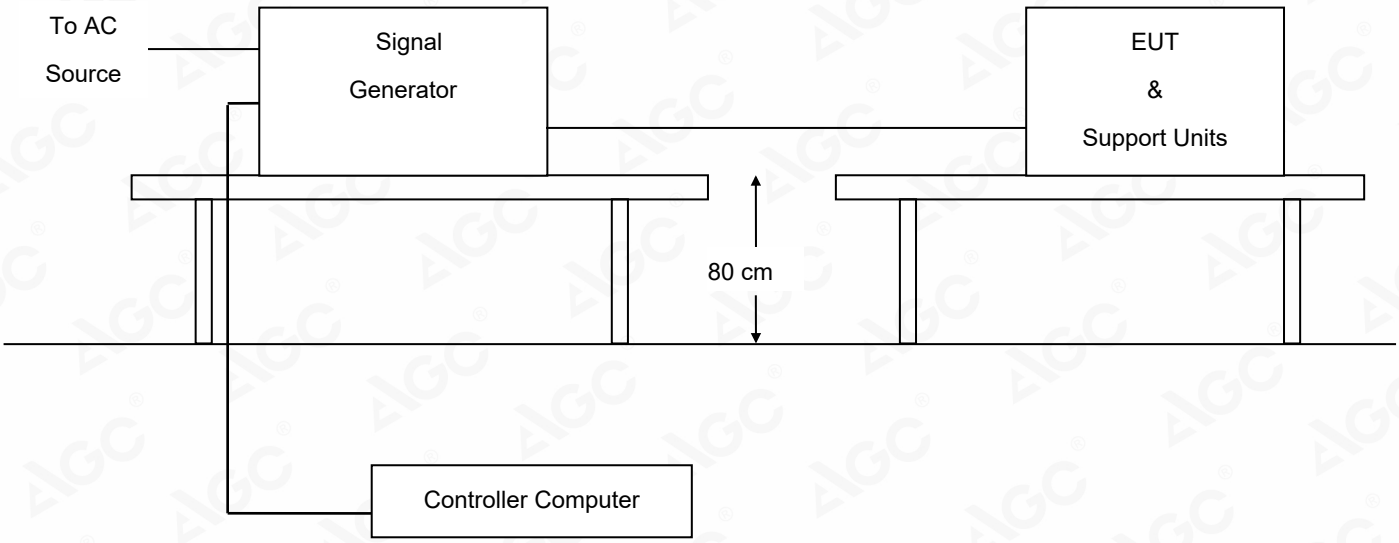
## 19 EN 61000-4-8 PFMF TEST

### POWER FREQUENCY MAGNETIC FIELDS IMMUNITY TEST

| | |
|---|---|
| **Port** | Enclosure |
| **Basic Standard** | EN 61000-4-8 |
| **Requirements** | 50/60 Hz, 3A/m |
| **Standard require** | A |
| **Temperature** | 22.7°C |
| **Humidity** | 57.0% RH |

### 19.1 BLOCK DIAGRAM OF TEST SETUP

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## 19.2 TEST PROCEDURE

The EUT shall be subjected to the test magnetic field by using the induction coil of standard dimensions (1m × 1m). The induction coil shall then be rotated by 90° in order to expose the EUT to the test field with different orientations.

**Test Conditions:**

| Frequency | Polarity | Level | Test Performance | Performance Result |
|---|---|---|---|---|
| 50 Hz | X | 3 A/m | No function loss | A |
| 50 Hz | Y | 3 A/m | No function loss | A |
| 50 Hz | Z | 3 A/m | No function loss | A |

## 19.3 PERFORMANCE & RESULT

| | |
|---|---|
| **Criteria A:** | The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. |
| **Criteria B:** | The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. |
| **Criteria C:** | Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls. |

☒***PASS*** ☐***FAIL***

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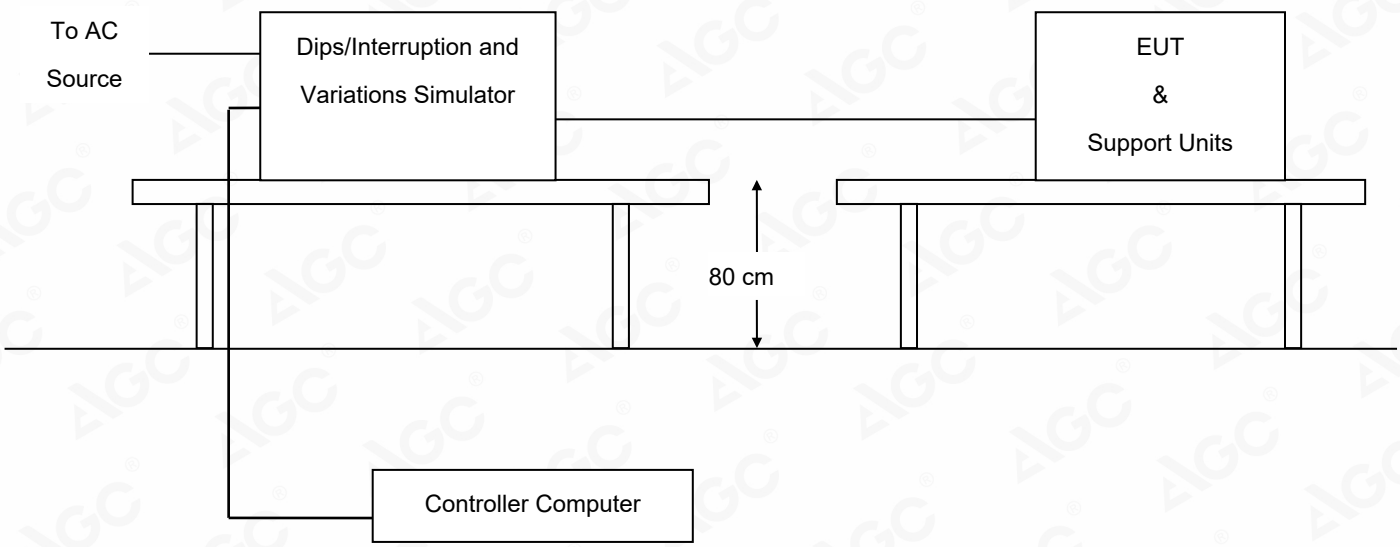
## 20 EN 61000-4-11 DIPS IMMUNITY TEST

### VOLTAGE DIPS, SHORT INTERRUPTIONS AND VOLTAGE VARIATIONS IMMUNITY TEST

| | |
|---|---|
| **Port** | On Power Supply Lines |
| **Basic Standard** | EN 61000-4-11 |
| **Requirements** | PHASE ANGLE 0, 45, 90, 135, 180, 225, 270, 315 degrees |
| **Test Interval** | Min. 10 sec. |
| **Temperature** | 22.7°C |
| **Humidity** | 57.0% RH |

### 20.1 BLOCK DIAGRAM OF TEST SETUP

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## 20.2 TEST PROCEDURE

The EUT and support units were located on a wooden table, 0.1 m away from ground floor.
EUT worked with resistance load, and make sure EUT worked normally.
Setting the parameter of tests and then perform the test software of test simulator.
Conditions changes to occur at 0 degree crossover point of the voltage waveform.
Recording the test result in test record form.

**Test conditions:**

The duration with a sequence of three dips/interruptions with interval of 10 s minimum (Between each test event)

**Voltage Dips and Interruptions:**

| Test Level % $U_T$ | Reduction (%) | Duration ( periods) | Observation | Performance Result |
|---|---|---|---|---|
| 0 | 100 | 0.5 | Normal | A |
| 70 | 30 | 10 | Normal | A |

## 20.3 INTERPRETATION

| | |
|---|---|
| **Criteria A:** | The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. |
| **Criteria B:** | The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. |
| **Criteria C:** | Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls. |

☒***PASS*** ☐***FAIL***

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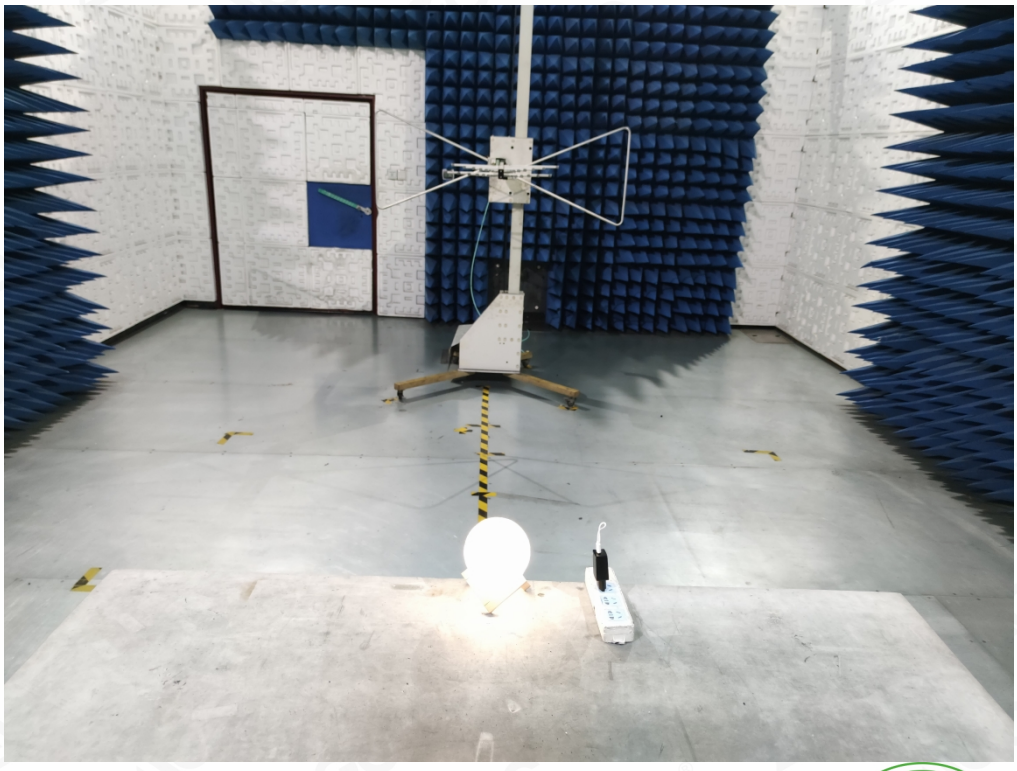
## APPENDIX A: PHOTOGRAPHS OF TEST SETUP

EN IEC 55015 CONDUCTED EMISSION TEST SETUP



EN IEC 55015 RADIATED EMISSION TEST SETUP



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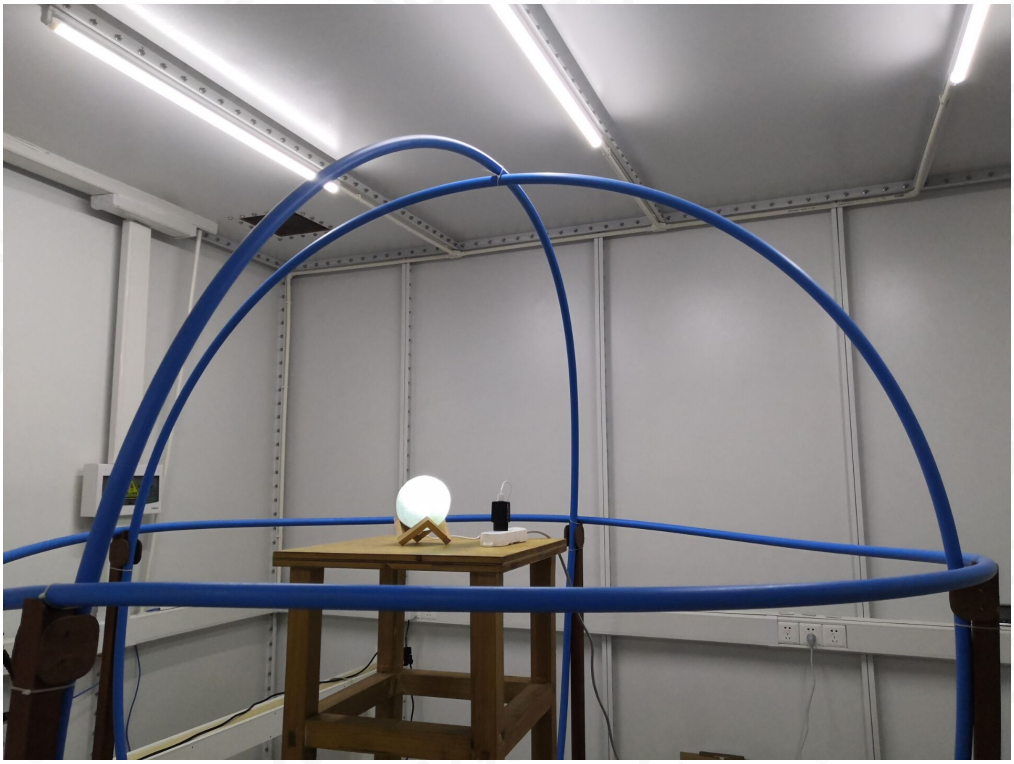
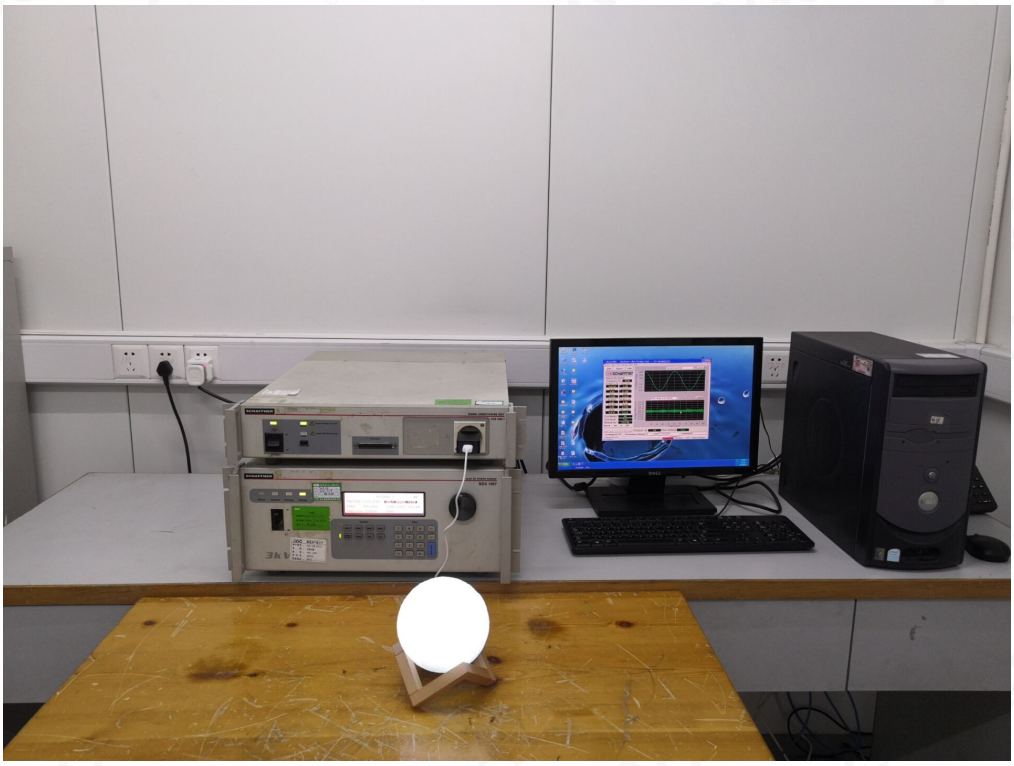
EN IEC 55015 RADIATED ELECTROMAGNETIC DISTURBANCE TEST



EN 61000-3-3 VOLTAGE FLUCTUATION / FLICKER TEST



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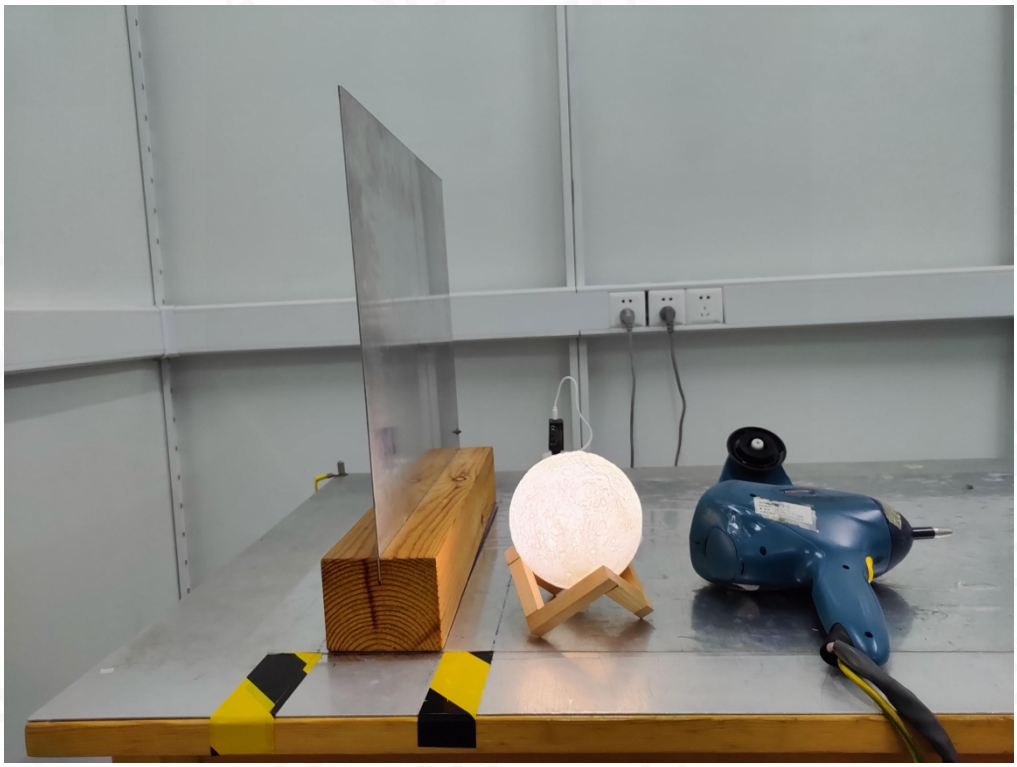
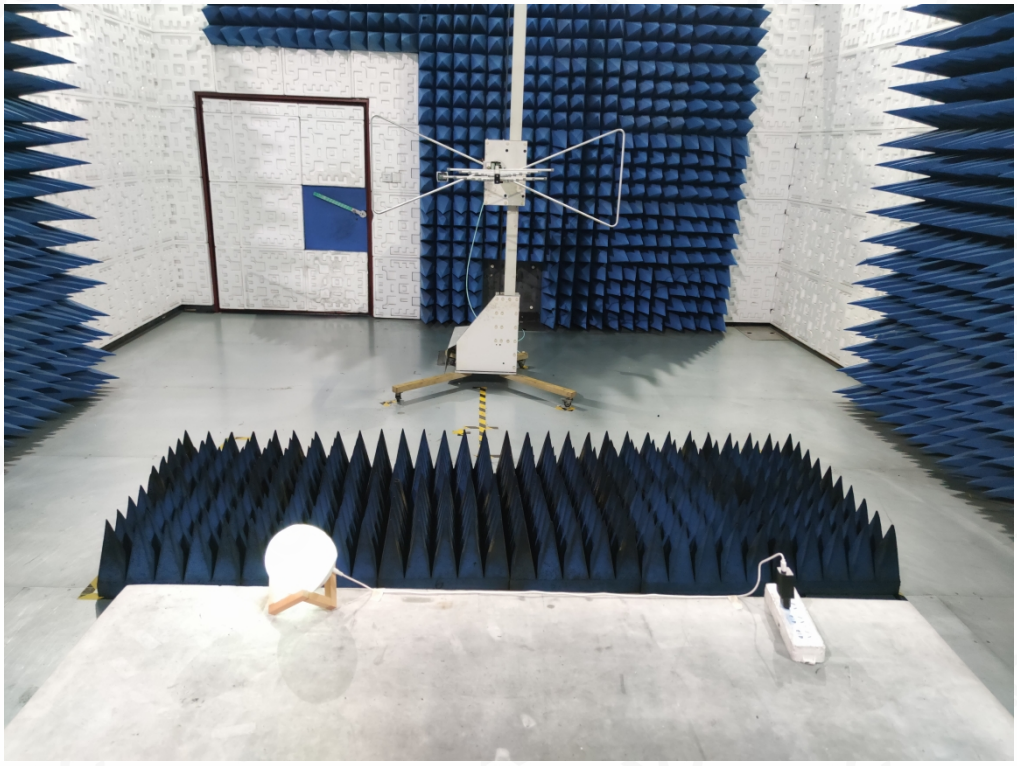
EN 61000-4-2 ESD IMMUNITY TEST SETUP



EN 61000-4-3 RS IMMUNITY TEST SETUP



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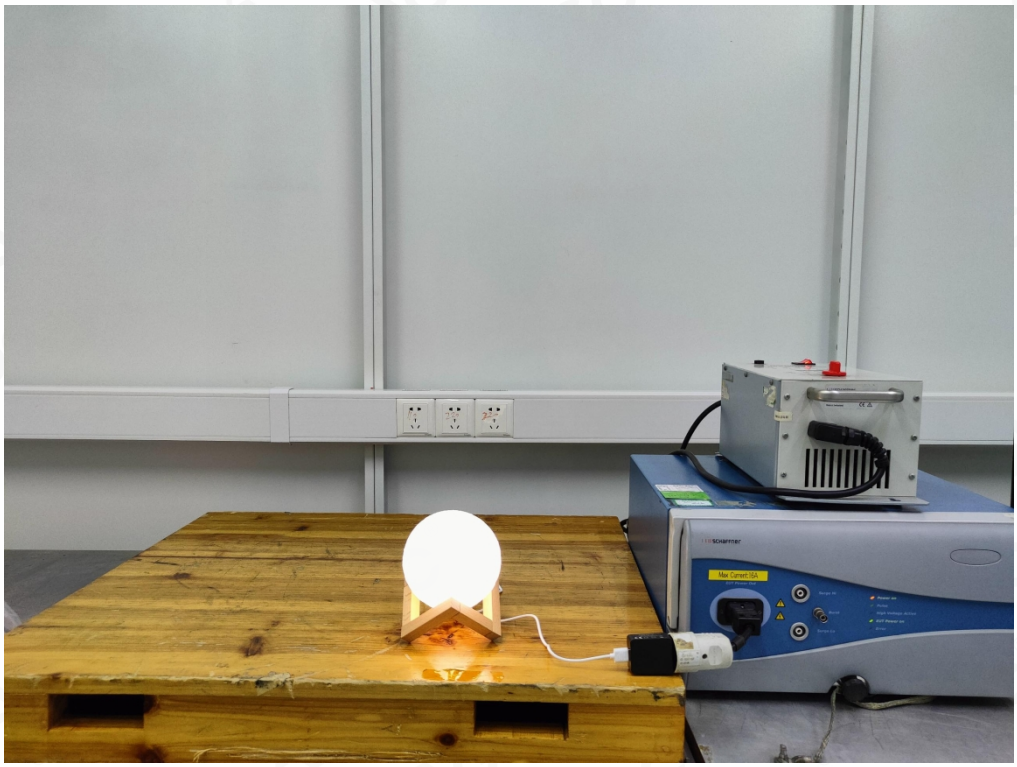
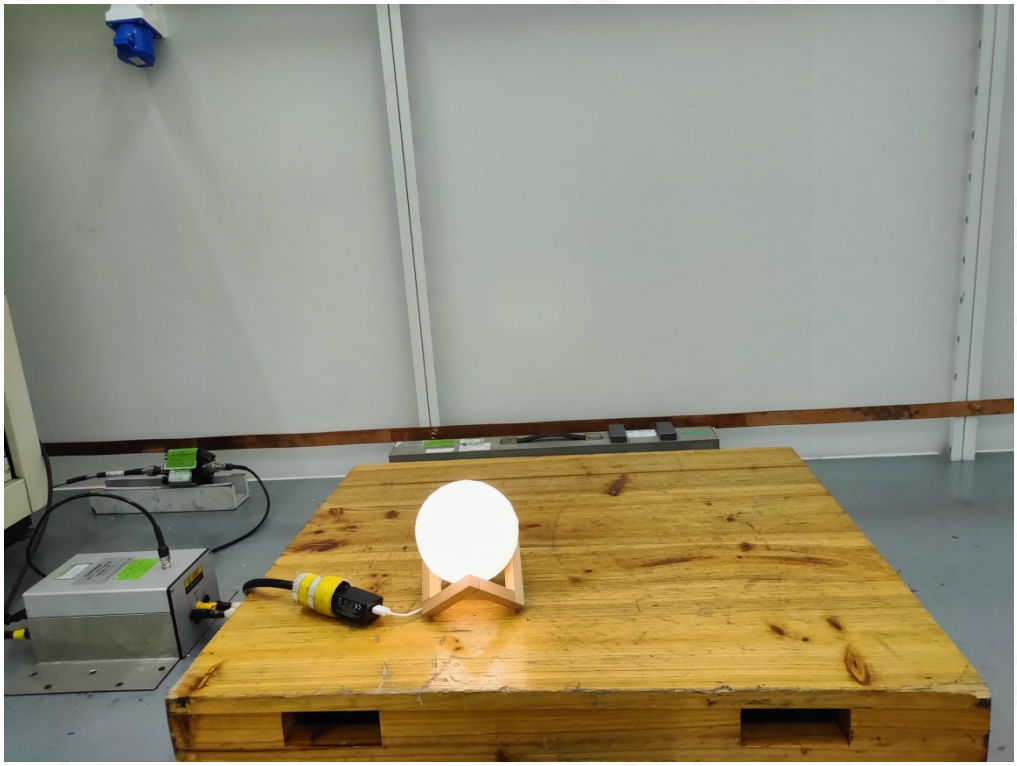
EN 61000-4-4/-5/-11 EFT SURGE AND DIPS IMMUNITY TEST SETUP

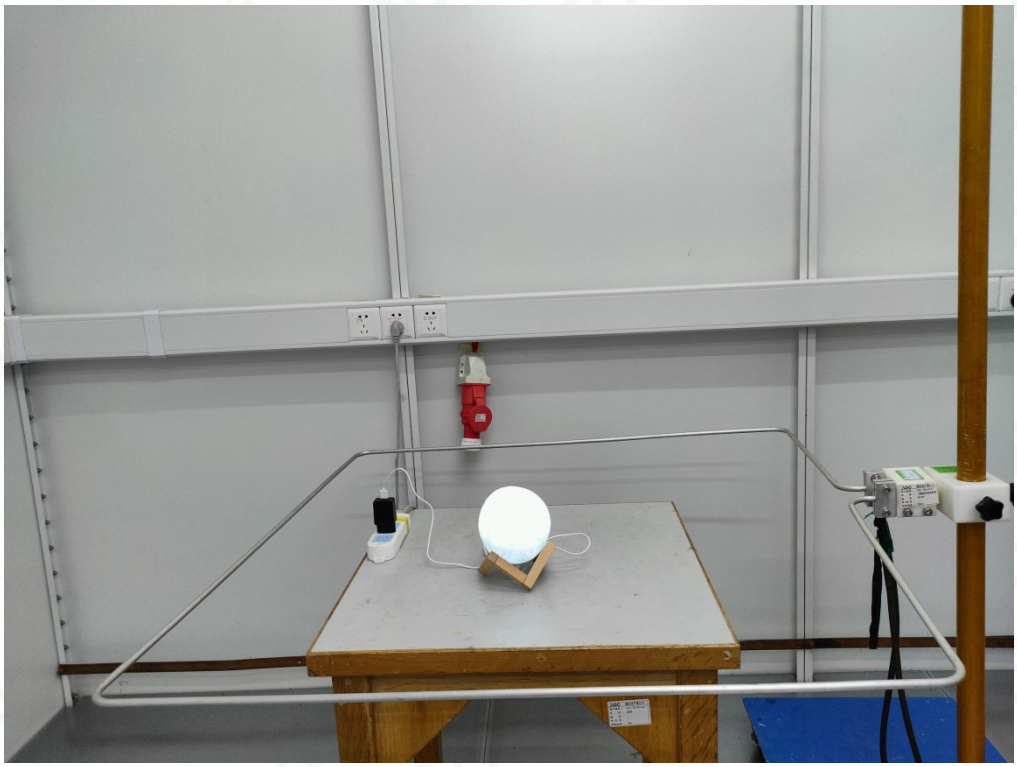


EN 61000-4-6 CS IMMUNITY TEST SETUP



Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc-cert.com.

EN 61000-4-8 PFMF TEST SETUP



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## APPENDIX B: PHOTOGRAPHS OF EUT

Refer to the Report No.: AGC12440210702AP01

**----END OF REPORT----**

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Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

3.The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

4. The non-CMA report issued by AGC is only permitted to be used by the client as internal reference use and shall not be used for public demonstration purpose.

5. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

6. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

7. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.

8.Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

9. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.

10. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc-cert.com.