# EMC Test Report

Report No.: AGC05443240610ER01

| | | |
|---|---|---|
| **PRODUCT DESIGNATION** | : | Wireless Power bank |
| **BRAND NAME** | : | N/A |
| **MODEL NAME** | : | MO2375 |
| **APPLICANT** | : | MID OCEAN BRANDS B.V. |
| **DATE OF ISSUE** | : | Jun. 21, 2024 |
| **STANDARD(S)** | : | ETSI EN 301 489-1 V2.2.3 (2019-11)<br>ETSI EN 301489-3 V2.3.2 (2023-01) |
| **REPORT VERSION** | : | V1.0 |

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

## Report Revise Record

| Report Version | Revise Time | Issued Date | Valid Version | Notes |
|---|---|---|---|---|
| V1.0 | / | Jun. 21, 2024 | Valid | Initial Release |

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## 1. TEST REPORT CERTIFICATION

| | |
|---|---|
| **Applicant** | MID OCEAN BRANDS B.V. |
| **Address** | Unit 201 2/F,. Laford Centre, 838 Lai Chi Kok Road, Cheung Sha Wan, Kowloon, Hongkong |
| **Manufacturer** | MID OCEAN BRANDS B.V. |
| **Address** | Unit 201 2/F,. Laford Centre, 838 Lai Chi Kok Road, Cheung Sha Wan, Kowloon, Hongkong |
| **Factory** | MID OCEAN BRANDS B.V. |
| **Address** | Unit 201 2/F,. Laford Centre, 838 Lai Chi Kok Road, Cheung Sha Wan, Kowloon, Hongkong |
| **Product Designation** | Wireless Power bank |
| **Brand Name** | N/A |
| **Test Model** | MO2375 |
| **Series Model(s)** | N/A |
| **Difference Description** | N/A |
| **Date of receipt of test item** | Jun. 07, 2024 |
| **Date of test** | Jun. 07, 2024 to Jun. 21, 2024 |
| **Deviation** | None |
| **Condition of Test Sample** | Normal |
| **Test Result** | Pass |
| **Report Template** | AGCRT-EC-EMC |

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

| | | |
|---|---|---|
| Prepared By | Thea Huang<br>Thea Huang<br>(Project Engineer) | Jun. 21, 2024 |
| Reviewed By | Calvin Liu<br>Calvin Liu<br>(Reviewer) | Jun. 21, 2024 |
| Approved By | Max Zhang<br>Max Zhang<br>(Authorized Officer) | Jun. 21, 2024 |

# 2. GENERAL INFORMATION

## 2.1. DESCRIPTION OF EUT

Details of technical specification refer to the description in follows:

| | |
|---|---|
| **Operating Frequency** | 110kHz-205kHz |
| **Hardware Version** | V1.0 |
| **Software Version** | V1.0 |
| **Antenna Type** | Coil Antenna |
| **EUT Input Rating** | Type-C Input: DC 5V/2.4A, 9V/2A |
| **EUT Output Rating** | Type-C Output: DC 5V/3A, 9V/2.22A, 12V/1.66A<br>USB-A Output: DC5V 3A, 9V 2A, 12V 1.5A |
| **Wireless Charging Output Power** | 5W, 7.5W, 10W, 15W |

## 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 301489-3 V2.3.2 (2023-01).

| | |
|---|---|
| **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 301 489-3** | Electro Magnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU |

## 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 | PASS |
| 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 | 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.

## 2.5. ENVIRONMENTAL CONDITIONS

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

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

## 3. TEST MODE DESCRIPTION

| TEST MODE DESCRIPTION | |
|---|---|
| **NO.** | **EMI TEST MODE DESCRIPTION** |
| 1 | Wireless charging Mode(Full load) + AC/DC adapter + USB load |
| 2 | Wireless charging Mode(Half load) + AC/DC adapter + USB load |
| 3 | Wireless charging Mode(Null load) + AC/DC adapter + USB load |
| 4 | Wireless charging Mode (Full load) + USB load + Type C load |
| 5 | Wireless charging Mode (Half load) + USB load + Type C load |
| 6 | Wireless charging Mode (Null load) + USB load + Type C load |
| **NO.** | **EMS TEST MODE DESCRIPTION** |
| 1 | Wireless charging Mode(Full load) + AC/DC adapter + USB load |
| 2 | Wireless charging Mode(Half load) + AC/DC adapter + USB load |
| 3 | Wireless charging Mode(Null load) + AC/DC adapter + USB load |
| 4 | Wireless charging Mode (Full load) + USB load + Type C load |
| 5 | Wireless charging Mode (Half load) + USB load + Type C load |
| 6 | Wireless charging Mode (Null load) + USB load + Type C load |
| Note:<br>1. All modes have been tested and only the worst mode test data recorded in the test report. | |

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

| I/O Port of EUT | | | |
|---|---|---|---|
| **I/O Port Type** | **Number** | **Cable Description** | **Tested With** |
| USB Type-C | 1 | 0.3m unshielded | 1 |
| USB Type-A | 1 | -- | 1 |

## 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 Conducted Emission, Uc = ±2.9dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.9 dB

## 5. SUPPORT EQUIPMENT

| Product Name | Manufacturer | Model | Mains cable | Signal cable | Specifications |
|---|---|---|---|---|---|
| Adapter | Jinbaotong | K-T10E0502000E | -- | -- | -- |
| Cement Resistance | -- | -- | -- | -- | -- |
| Digital multimeter | FLUKE | 15B+ | -- | -- | -- |

Note: All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

## 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 | ESPI | 101206 | May 28, 2024 | May 27, 2025 |
| Artificial power network | R&S | ESH2-Z5 | 100086 | May 28, 2024 | May 27, 2025 |
| Attenuator | East sheep | LM-XX-6-5W | N/A | Jun. 09, 2023 | Jun. 08, 2025 |
| Test Software | R&S | V1.71 | 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 | Feb. 01, 2024 | Jan. 31, 2025 |
| Wideband Antenna | SCHWARZBECK | VULB9168 | D69250 | May 11, 2023 | May 10, 2025 |
| Attenuator | East sheep | LM-XX-6-5W | N/A | Jun. 09, 2023 | Jun. 08, 2025 |
| Test Software | Tonscend | JS32-RE(Ver.2.5) | N/A | N/A | N/A |

### 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 | May 24, 2024 | May 23, 2025 |
| AC Source | Schaffner | NSG 1007 | 56825 | May 24, 2024 | May 23, 2025 |
| Test Software | TC | 4.29.0 | N/A | N/A | N/A |

### TEST EQUIPMENT OF ESD TEST

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| ESD Simulator | Schaffner | NSG 438 | 782 | Nov. 13, 2023 | Nov. 12, 2024 |

**TEST EQUIPMENT OF SURGE/EFT/DIPS TEST**

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Lightning Surge/EFT/DIPS Generator | Schaffner | Modula 6150 | 34437 | May 24, 2024 | May 23, 2025 |
| Test Software | TC | 2.31 | N/A | N/A | N/A |

**TEST EQUIPMENT OF RS IMMUNITY TEST**

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Horn Antenna | ETS | 3117 | 00034609 | Mar. 31, 2024 | Mar. 30, 2025 |
| Signal Generator | Aglient | N5182A | MY49060745 | Feb. 01, 2024 | Jan. 31, 2025 |
| Directional coupler | Werlatone | C6026-10 | 99482 | Feb .01, 2024 | Jan. 31, 2026 |
| Directional coupler | Werlatone | C5571-10 | 99463 | Feb .01, 2024 | Jan. 31, 2026 |
| Amplifer | Rflight | NTWPA-2560100 | 17063183 | Oct. 13, 2023 | Oct. 12, 2024 |
| Power Amplifier | KALMUS | 7100LC | 04-02/17-06-001 | N/A | N/A |
| Power Probe | R&S | URV5-Z4 | 100124 | Mar. 24, 2023 | Mar. 23, 2025 |
| Power Meter | R&S | NRVD | 8323781027 | Mar. 24, 2022 | Mar. 23, 2025 |
| Biconilog Antenna | ETS | 3142C | 00060447 | N/A | N/A |
| Test Software | Tonscend | 2.0.1.8 | N/A | N/A | N/A |

**TEST EQUIPMENT OF CS IMMUNITY TEST**

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Directional coupler | Werlatone | C5571-10 | 99463 | Feb .01, 2024 | Jan. 31, 2026 |
| Signal Generator | Aglient | E4421B | MY43351603 | Feb. 01, 2024 | Jan. 31, 2025 |
| 6dB attenuator | ZHINAN | E-002 | N/A | Aug. 04, 2022 | Aug. 03, 2024 |
| Power Amplifier | AR | 75A250 | 18464 | Oct. 13, 2023 | Oct. 12, 2024 |
| CDN | ZHINAN | ZN3751 | 15004 | Aug. 03, 2022 | Aug. 02, 2024 |
| Power Probe | R&S | URV5-Z4 | 100124 | Mar. 24, 2023 | Mar. 23, 2025 |
| Power Meter | R&S | NRVD | 8323781027 | Mar. 24, 2023 | Mar. 23, 2025 |
| Test Software | Tonscend | 2.0.1.7 | N/A | N/A | N/A |

# 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 |

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

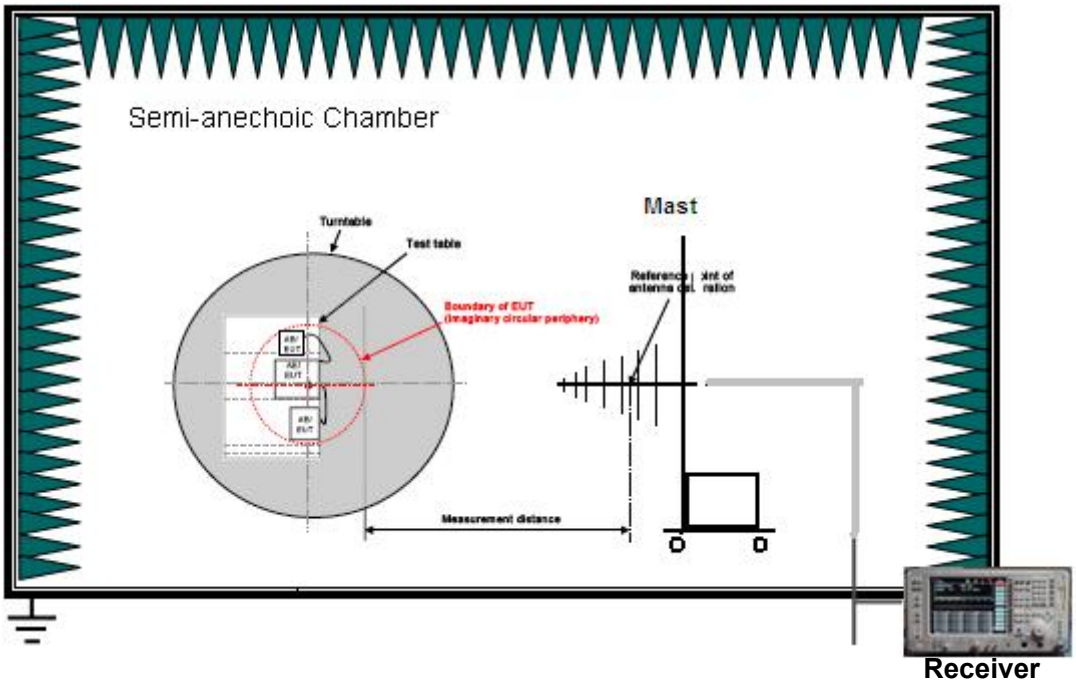
## 7.2. TEST PROCEDURE

(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.
(5).The test-receiver system was set to Peak Detector Function and Specified Bandwidth with Maximum Hold Mode. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emission that did not have 10dB margin would be retested one by one using the quasi-peak method.

## 7.3. BLOCK DIAGRAM OF TEST SETUP

System Diagram of Connections between EUT and Simulators

**Radiated Disturbance below 1 GHz**



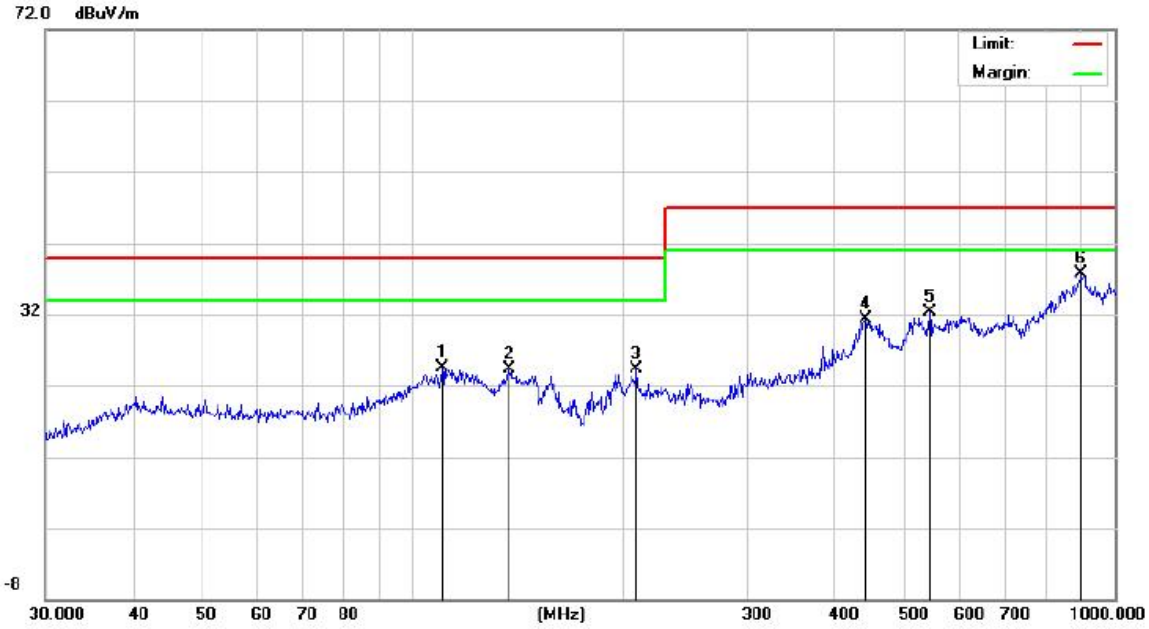

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

## 7.4 TEST RESULT

The test modes were carried out for all modes.

The worst test mode of the EUT was Mode 3, and its test data was showed as the follow:

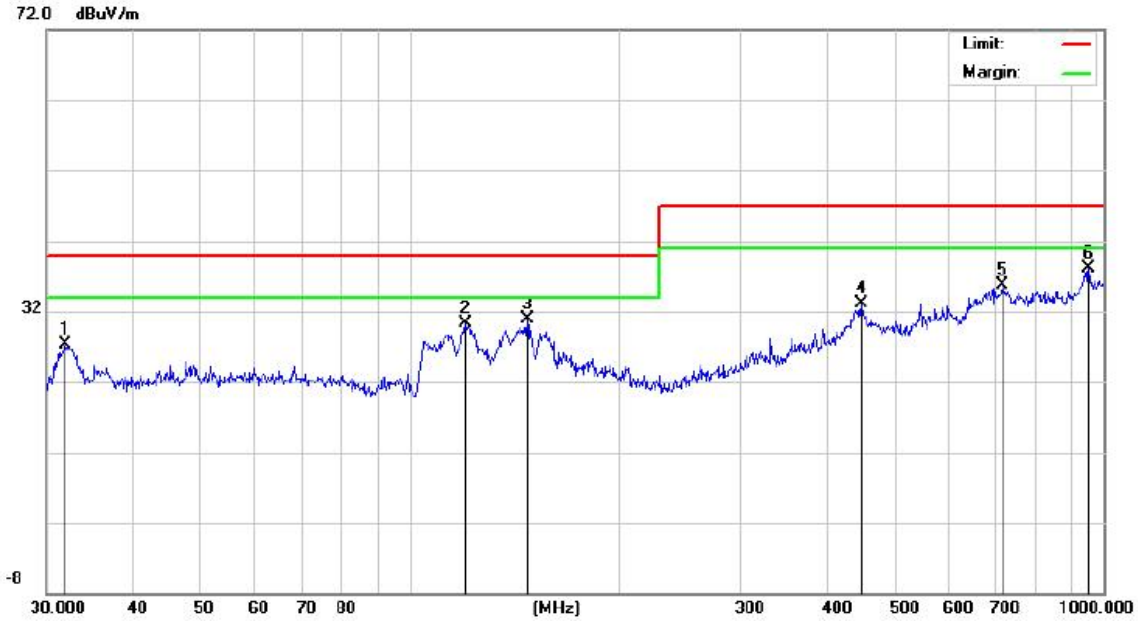
RADIATED EMISSION BELOW 1GHZ–HORIZONTAL




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 110.1816 | 8.19 | 16.30 | 24.49 | 40.00 | -15.51 | peak |
| 2 | | 137.4202 | 9.02 | 15.35 | 24.37 | 40.00 | -15.63 | peak |
| 3 | | 208.5803 | 9.79 | 14.46 | 24.25 | 40.00 | -15.75 | peak |
| 4 | | 441.7426 | 6.18 | 25.04 | 31.22 | 47.00 | -15.78 | peak |
| 5 | | 545.1826 | 8.34 | 23.98 | 32.32 | 47.00 | -14.68 | peak |
| 6 | * | 896.9965 | 6.34 | 31.42 | 37.76 | 47.00 | -9.24 | peak |

**RESULT: PASS**

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 | | 31.9546 | 12.99 | 14.24 | 27.23 | 40.00 | -12.77 | peak |
| 2 | | 120.2766 | 12.61 | 17.71 | 30.32 | 40.00 | -9.68 | peak |
| 3 | | 147.9214 | 12.72 | 18.20 | 30.92 | 40.00 | -9.08 | peak |
| 4 | | 447.9822 | 7.27 | 25.74 | 33.01 | 47.00 | -13.99 | peak |
| 5 | | 716.6820 | 7.11 | 28.68 | 35.79 | 47.00 | -11.21 | peak |
| 6 | * | 952.0937 | 7.53 | 30.52 | 38.05 | 47.00 | -8.95 | peak |

**RESULT: PASS**

# 8. MAINS TERMINAL DISTURBANCE VOLTAGE MEASUREMENT

## 8.1. LIMITS OF MAINS TERMINAL DISTURBANCE VOLTAGE

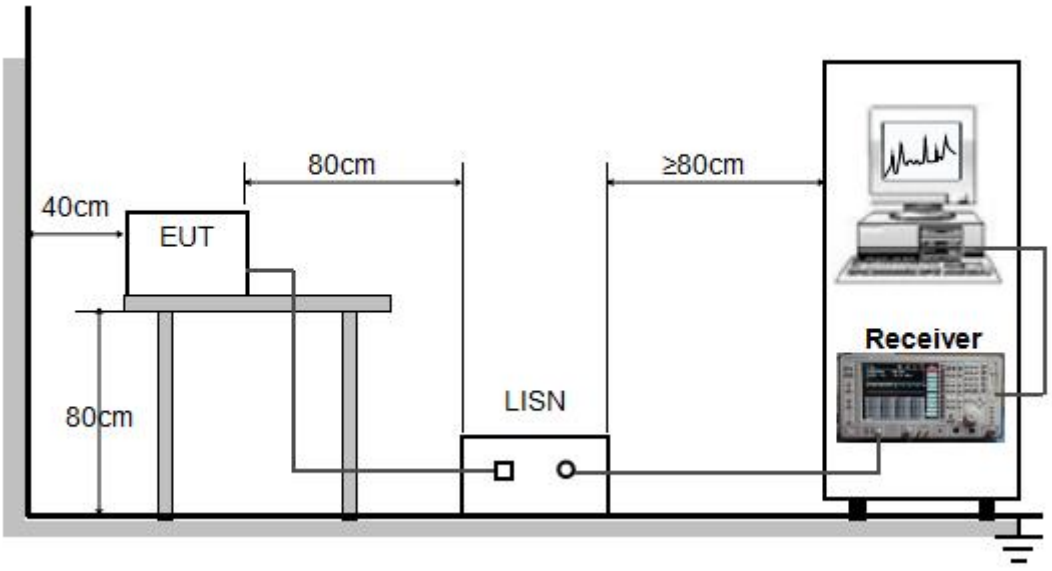
| Frequency range (MHz) | Limits (dBuV) Class B ITE | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.50 | 66 to 56 | 56 to 46 |
| 0.50-5 | 56 | 46 |
| 5-30 | 60 | 50 |

**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.

## 8.3. TEST SETUP



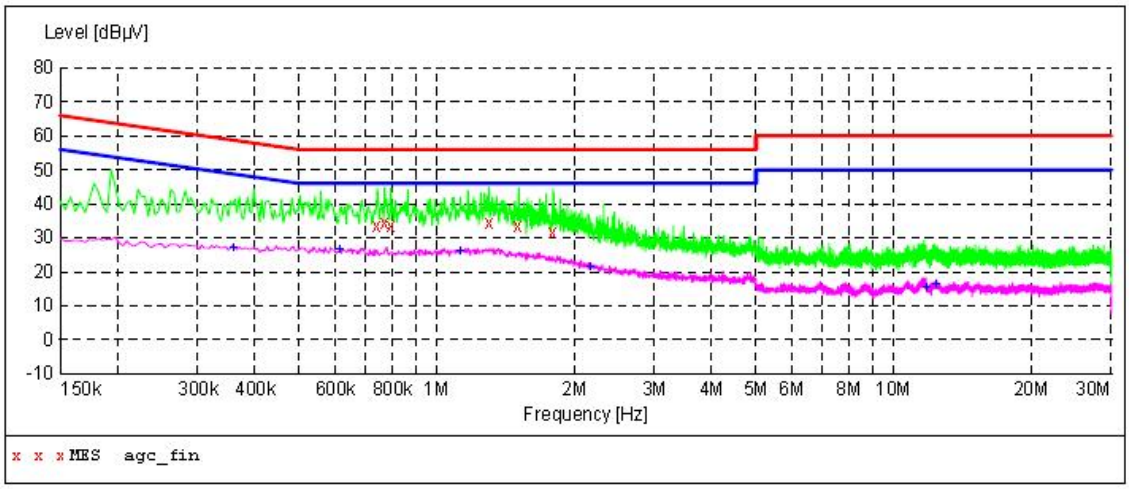

For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

## 8.4. TEST RESULT

The test modes were carried out for mode 1, mode 2 and mode 3.

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

LINE CONCUTED EMISSION TEST-L




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

2024/6/17 17:24

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line |
|---|---|---|---|---|---|---|
| 0.742000 | 33.30 | 6.2 | 56 | 22.7 | QP | L1 |
| 0.770000 | 34.60 | 6.2 | 56 | 21.4 | QP | L1 |
| 0.794000 | 33.30 | 6.2 | 56 | 22.7 | QP | L1 |
| 1.302000 | 34.20 | 6.2 | 56 | 21.8 | QP | L1 |
| 1.514000 | 33.50 | 6.2 | 56 | 22.5 | QP | L1 |
| 1.798000 | 31.50 | 6.2 | 56 | 24.5 | QP | L1 |

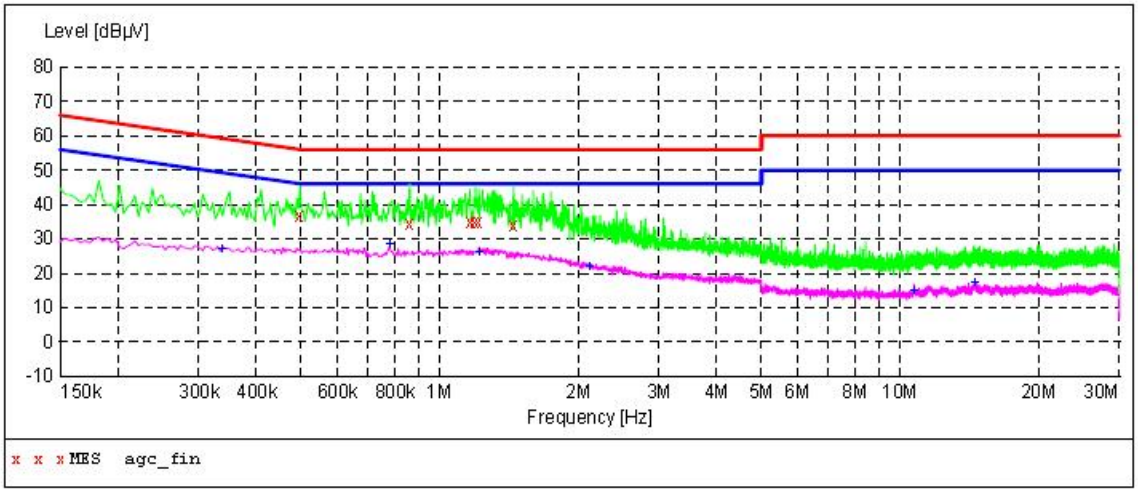
***MEASUREMENT RESULT: "agc_fin2"***

2024/6/17 17:24

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line |
|---|---|---|---|---|---|---|
| 0.358000 | 27.00 | 6.1 | 49 | 21.8 | AV | L1 |
| 0.614000 | 26.30 | 6.2 | 46 | 19.7 | AV | L1 |
| 1.130000 | 26.20 | 6.2 | 46 | 19.8 | AV | L1 |
| 2.170000 | 21.60 | 6.3 | 46 | 24.4 | AV | L1 |
| 11.786000 | 15.50 | 6.7 | 50 | 34.5 | AV | L1 |
| 12.414000 | 16.30 | 6.8 | 50 | 33.7 | AV | L1 |

**RESULT: PASS**

LINE CONCUTED EMISSION TEST-N




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

2024/6/17 17:20

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line |
|---|---|---|---|---|---|---|
| 0.498000 | 36.70 | 6.1 | 56 | 19.3 | QP | N |
| 0.862000 | 34.40 | 6.2 | 56 | 21.6 | QP | N |
| 1.166000 | 34.90 | 6.2 | 56 | 21.1 | QP | N |
| 1.198000 | 34.80 | 6.2 | 56 | 21.2 | QP | N |
| 1.218000 | 34.80 | 6.2 | 56 | 21.2 | QP | N |
| 1.450000 | 34.00 | 6.2 | 56 | 22.0 | QP | N |

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

2024/6/17 17:20

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line |
|---|---|---|---|---|---|---|
| 0.338000 | 27.20 | 6.1 | 49 | 22.1 | AV | N |
| 0.778000 | 28.50 | 6.2 | 46 | 17.5 | AV | N |
| 1.218000 | 26.20 | 6.2 | 46 | 19.8 | AV | N |
| 2.122000 | 21.90 | 6.2 | 46 | 24.1 | AV | N |
| 10.742000 | 14.70 | 6.7 | 50 | 35.3 | AV | N |
| 14.526000 | 17.10 | 6.8 | 50 | 32.9 | AV | N |

**RESULT: PASS**

# 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 |

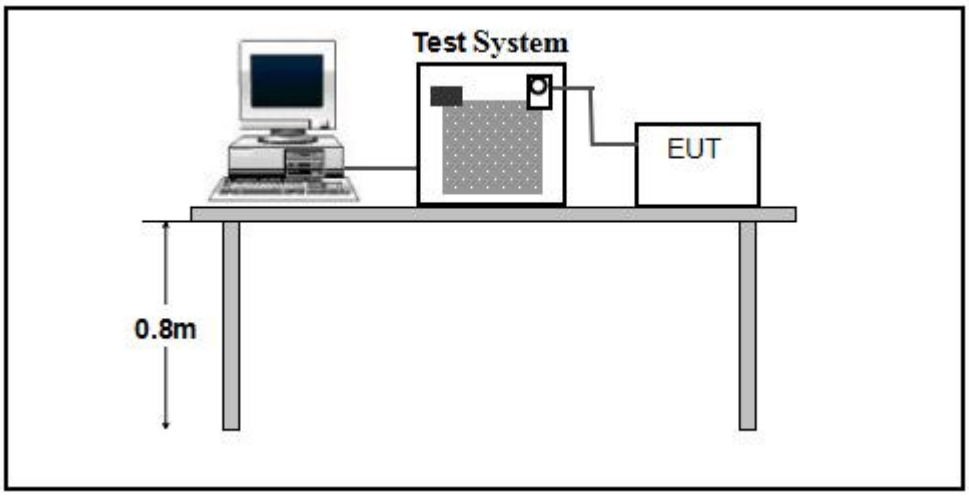
**Note:** 1. According to section 5 of EN IEC 61000-3-2:2019/A1:2021, the EUT is Class A equipment.

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.

### 9.3. TEST SETUP




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

### 9.4. TEST RESULT

Note: Equipment with a rated power less than or equal to 75W is deemed to fulfilled all relevant requirements of this standard without testing.

# 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**

The test modes were carried out for mode 1, mode 2 and mode 3.

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

| Test Parameter | Measurement Value | Limit | Remarks |
|---|---|---|---|
| Time(mS) > dt: | 0.0 | 500.0 | Pass |
| Highest dc (%): | 0.00 | 3.30 | Pass |
| Highest dmax (%): | 0.00 | 4.00 | Pass |
| Highest Pst (10 min. period): | 0.248 | 1.000 | Pass |
| Highest Plt (2 hr. period): | 0.108 | 0.650 | Pass |

**Note:** operating mode include all modes of EMS in page 9.

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

**3. Performance Table**

| EN 301 489-3 Performance criteria | | |
|---|---|---|
| **Criteria** | **During Test** | **After Test** |
| A | Operate as intended<br>No loss of function<br>No unintentional responses | Operate as intended<br>No loss of function<br>No degradation of performance<br>No loss of stored data or user programmable functions |
| B | May show loss of function<br>No unintentional responses | Operate as intended<br>Lost function(s) shall be self-recoverable<br>No degradation of performance<br>No loss of stored data or user programmable functions |
| • performance criterion A applies for immunity tests with phenomena of a continuous nature;<br>• performance criterion B applies for immunity tests with phenomena of a transient nature. | | |
| Where "operate as intended" or "no loss of function" is specified, the EUT shall demonstrate correct functioning as described in EN 301 489-3 clause 5.<br>Where the EUT has more than one mode of operation, an unplanned transition from one mode to another is considered as an unintentional response. The EUT shall be tested in sufficient modes to confirm there are no such unintentional responses. | | |

# 12. ELECTROSTATIC DISCHARGE IMMUNITY TEST

## 12.1. TEST SPECIFICATION

| | |
|---|---|
| **Basic Standard** | EN 61000-4-2 |
| **Discharge Impedance** | 330Ω/150 pF |
| **Discharge Voltage** | Air Discharge:±8kV, Contact Discharge:±4kV |
| **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.

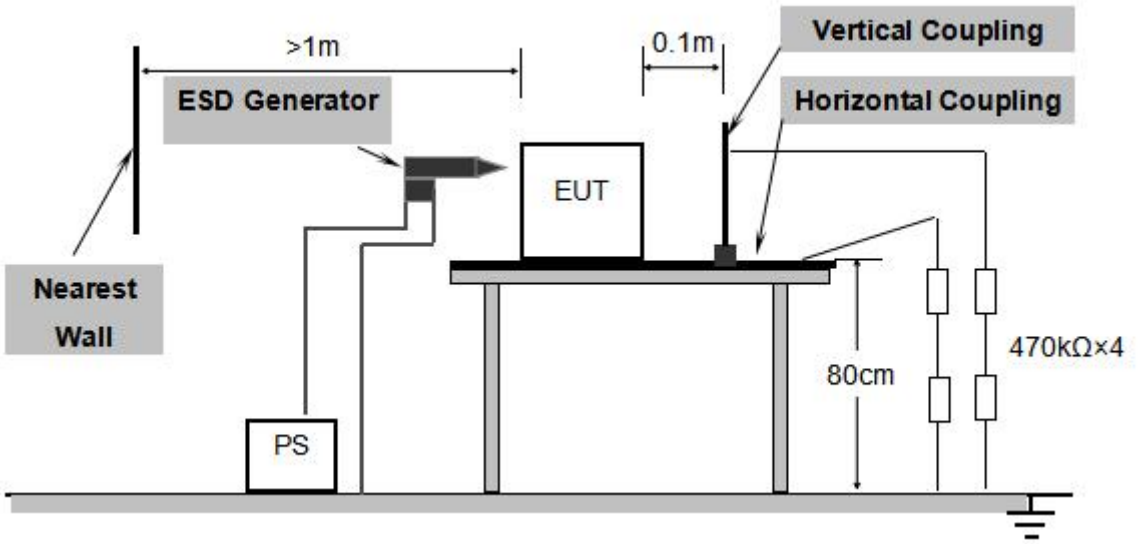
e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

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.

## 12.3. TEST SETUP




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

**ESD location:**

Blue line: Air Discharge

Red line: Contact discharge

### 12.4. TEST RESULT

| Times of Discharge | Voltage | Coupling | Test Mode | Performance criteria |
|---|---|---|---|---|
| Mini 25 / Point | ±2kV; ±4kV | Contact discharge | Mode 1/2/3/4/5/6 | A |
| Mini 25 / Point | ±2kV; ±4kV; ±8kV | Air Discharge | Mode 1/2/3/4/5/6 | A |
| Mini 25 / Point | ±4kV | Indirect Discharge HCP | Mode 1/2/3/4/5/6 | A |
| Mini 25 / Point | ±4kV | Indirect Discharge VCP | Mode 1/2/3/4/5/6 | A |
| A: No degradation in the performance of the EUT was observed. | | | | |

### 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. |

☒ ***Compliance*** ☐ ***Not Compliance***

# 13. RADIATED, RADIO FREQUENCY ELECTROMAGNETIC FIELD IMMUNITY TEST

## 13.1. TEST SPECIFICATION

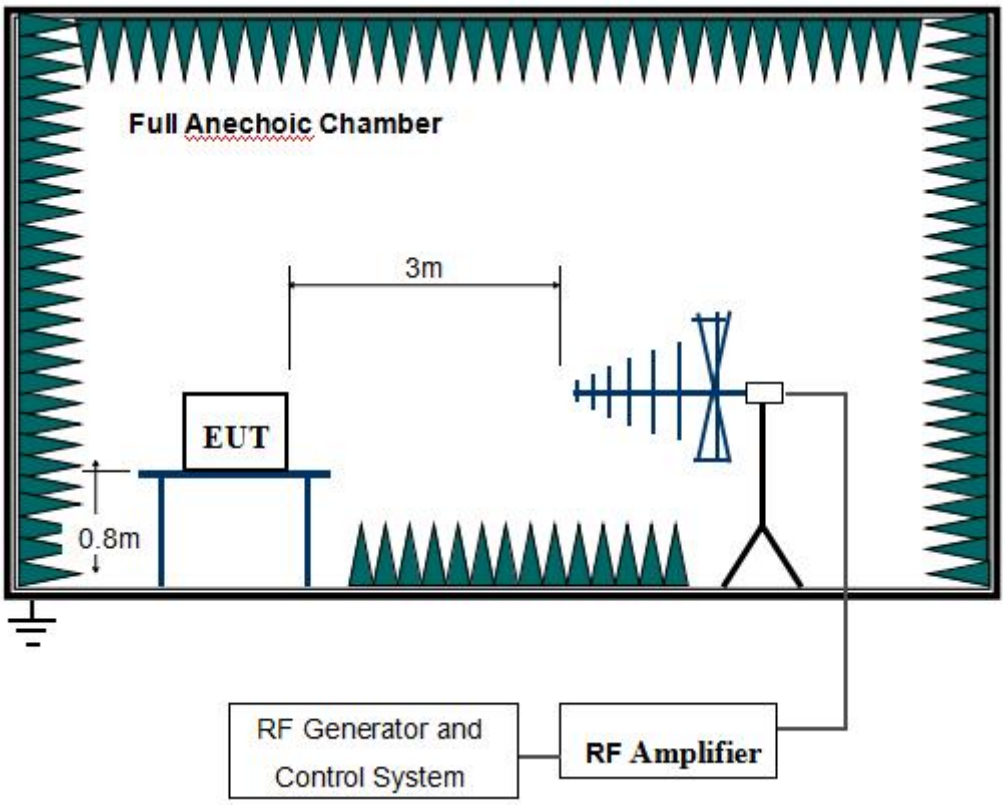
| | |
|---|---|
| **Basic Standard** | EN 61000-4-3 |
| **Frequency Range** | 80MHz–6000MHz |
| **Field Strength** | 3V/m |
| **Modulation** | 1 kHz sine wave, 80%, AM modulation |
| **Frequency Step** | 1% of fundamental |
| **Polarity of Antenna** | Horizontal and Vertical |
| **Test Distance** | 3m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

### 13.3. TEST SETUP




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

### 13.4. TEST RESULT

| Freq. Range (MHz) | Field | Modulation | Polarity | Position | Test Mode | Performance criteria |
|---|---|---|---|---|---|---|
| 80-1000 | 3V/m | Yes | H | Front | Mode 1/2/3/4/5/6 | A |
| 80-1000 | 3V/m | Yes | H | Back | Mode 1/2/3/4/5/6 | A |
| 80-1000 | 3V/m | Yes | H | Left | Mode 1/2/3/4/5/6 | A |
| 80-1000 | 3V/m | Yes | H | Right | Mode 1/2/3/4/5/6 | A |
| 80-1000 | 3V/m | Yes | V | Front | Mode 1/2/3/4/5/6 | A |
| 80-1000 | 3V/m | Yes | V | Back | Mode 1/2/3/4/5/6 | A |
| 80-1000 | 3V/m | Yes | V | Left | Mode 1/2/3/4/5/6 | A |
| 80-1000 | 3V/m | Yes | V | Right | Mode 1/2/3/4/5/6 | A |
| A: No degradation 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. |

☒ ***Compliance*** ☐ ***Not Compliance***

# 14. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

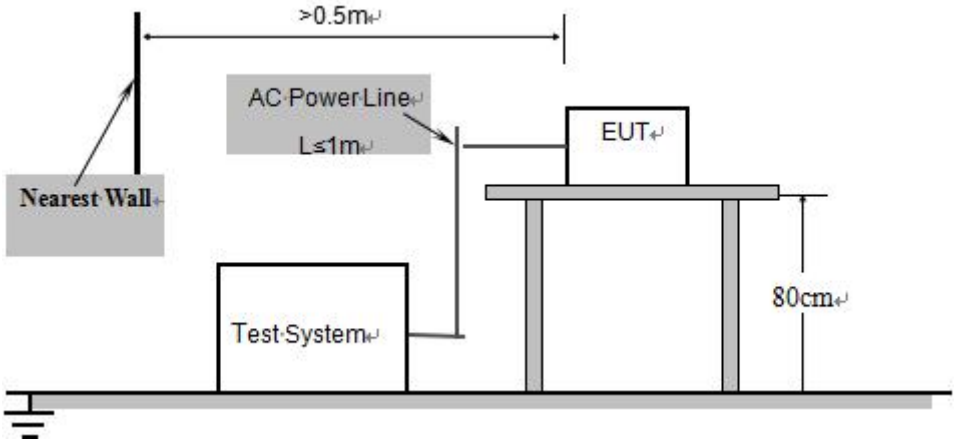
## 14.1. TEST SPECIFICATION

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

## 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 I：Photographs of the Test Configuration.

### 14.4. TEST RESULT

| Test Point | Polarity | Test Level (kV) | Test Mode | Performance criteria |
|---|---|---|---|---|
| a.c. port, L | +/- | 1 | Mode 1/2/3 | A |
| a.c. port, N | +/- | 1 | Mode 1/2/3 | A |
| a.c. port, L-N | +/- | 1 | Mode 1/2/3 | A |
| A: No degradation in the performance of the EUT was observed. | | | | |

**Note:** operating mode include all modes of EMS in page 9.

### 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. |

☒ ***Compliance*** ☐ ***Not Compliance***

# 15. SURGE IMMUNITY TEST

## 15.1. TEST SPECIFICATION

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

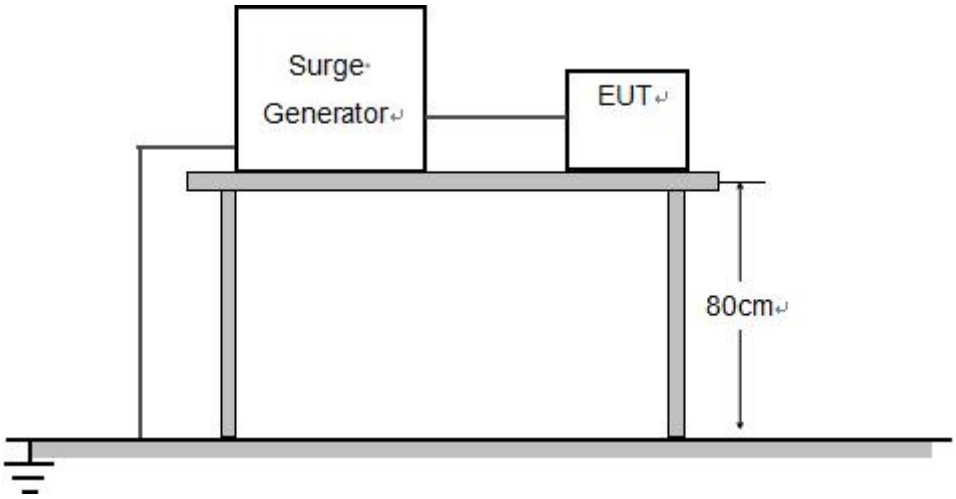
## 15.2. TEST PROCEDURE

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 I：Photographs of the Test Configuration.

### 15.4. TEST RESULT

| Coupling Line | Polarity | Voltage (kV) | Test Mode | Performance criteria |
|---|---|---|---|---|
| a.c. power, L-N | +/- | 1.0 | Mode 1/2/3 | A |
| A: No degradation in the performance of the EUT was observed. | | | | |

**Note:** operating mode include all modes of EMS in page 9.

### 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. |

☒ ***Compliance*** ☐ ***Not Compliance***

# 16. IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS

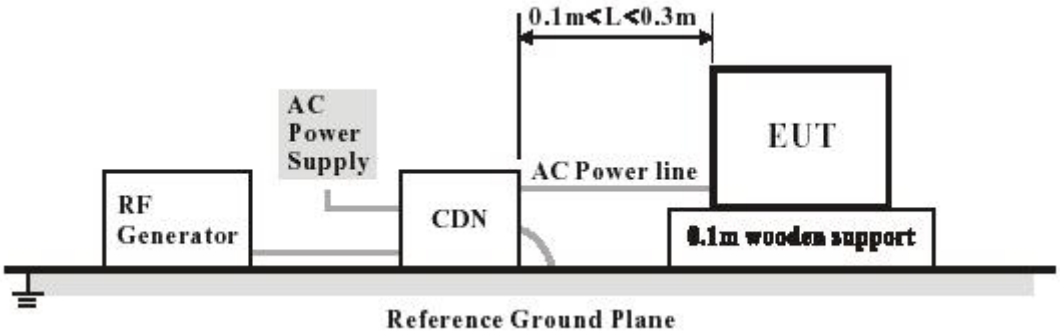
## 16.1. TEST SPECIFICATION

| | |
|---|---|
| **Basic Standard** | EN 61000-4-6 |
| **Frequency Range** | 0.15MHz–80MHz |
| **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 I：Photographs of the Test Configuration.

### 16.4. TEST RESULT

| Test Point | Frequency (MHz) | Level (V rms) | Test Mode | Performance criteria |
|---|---|---|---|---|
| a.c. port | 0.15 – 80 | 3 | Mode 1/2/3 | A |
| A: No degradation in the performance of the EUT was observed. | | | | |

**Note:** operating mode include all modes of EMS in page 9.

### 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. |

☒ ***Compliance*** ☐ ***Not Compliance***

# 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° |

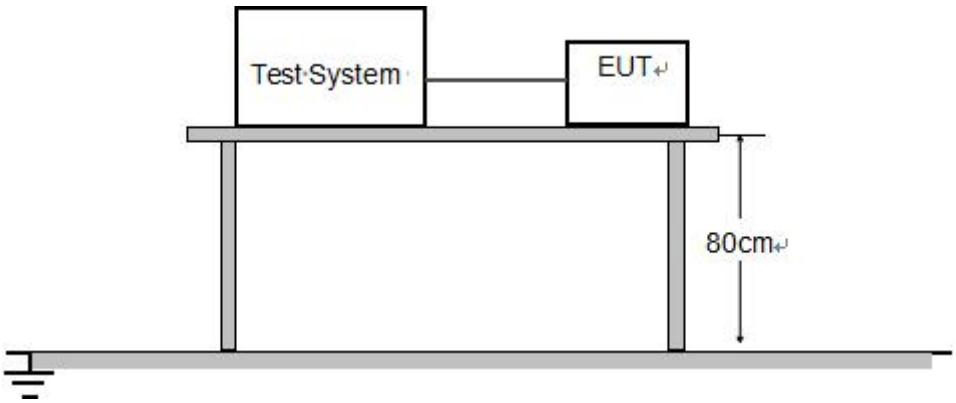
## 17.2. TEST PROCEDURE

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 I, Photographs of the Test Configuration.

### 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 1/2/3 | A |
| | 100% | 1 | 3 | 10 | Mode 1/2/3 | A |
| | 30% | 25 | 3 | 10 | Mode 1/2/3 | A |
| Voltage interruptions | 100% | 250 | 3 | 10 | Mode 1/2/3 | B |

A: No degradation in the performance of the EUT was observed.
B: Stop charging during the test and self-recoverable after test.
Performance Note: For a 70 % residual voltage dip and voltage interruption tests, the following performance criteria apply: Lost functions can be recoverable by user or operator because the equipment is powered solely from the AC mains supply (without the use of a parallel battery back-up).

**Note:** operating mode include all modes of EMS in page 9.

### 17.5. PERFORMANCE

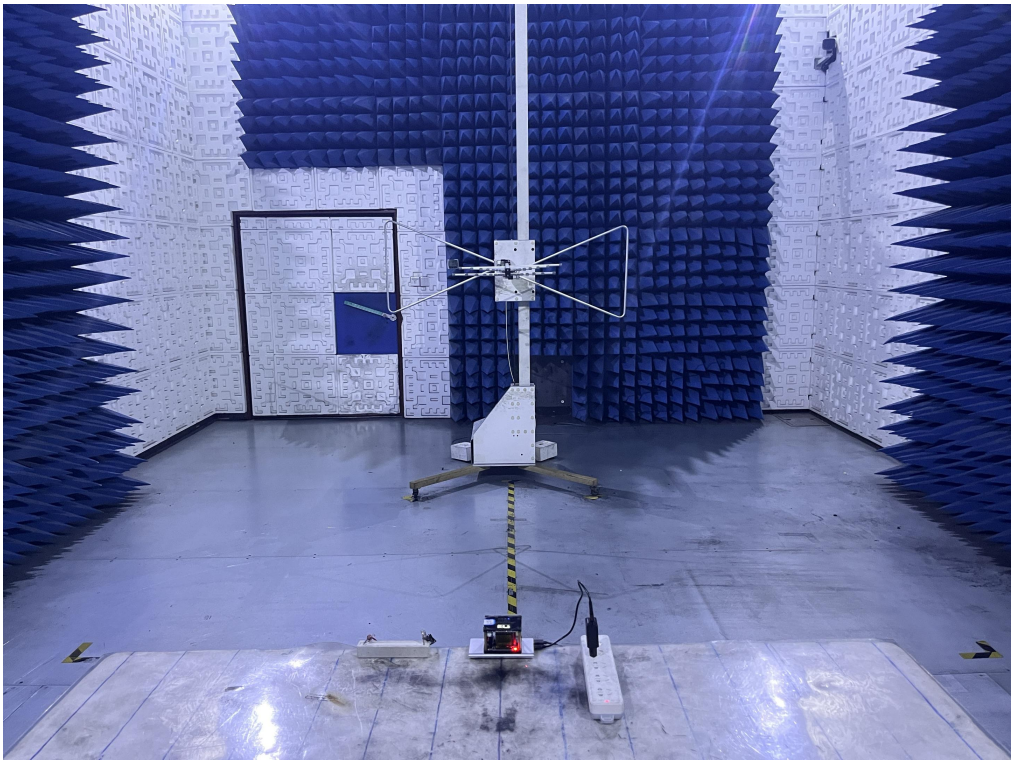
| | |
|---|---|
| ☒ **Criteria A:** | The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a 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. |

☒ ***Compliance*** ☐ ***Not Compliance***

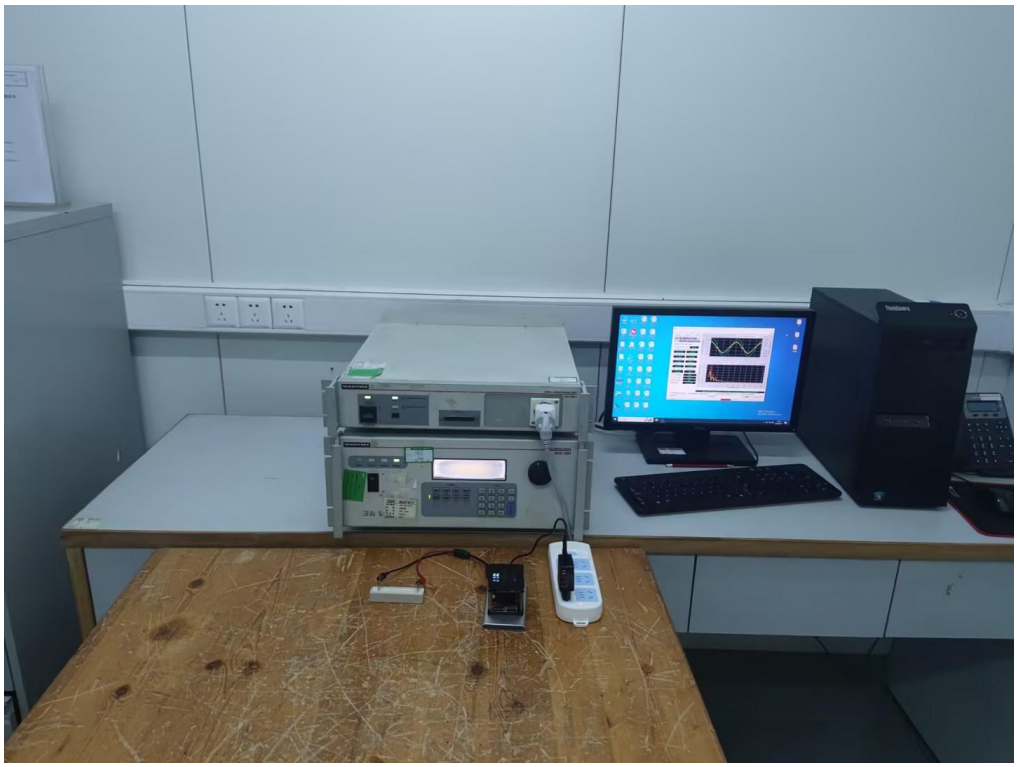
# APPENDIX I: PHOTOGRAPHS OF TEST SETUP

LINE CONDUCTED EMISSION TEST SETUP

RADIATED EMISSION TEST SETUP (Below 1GHz)

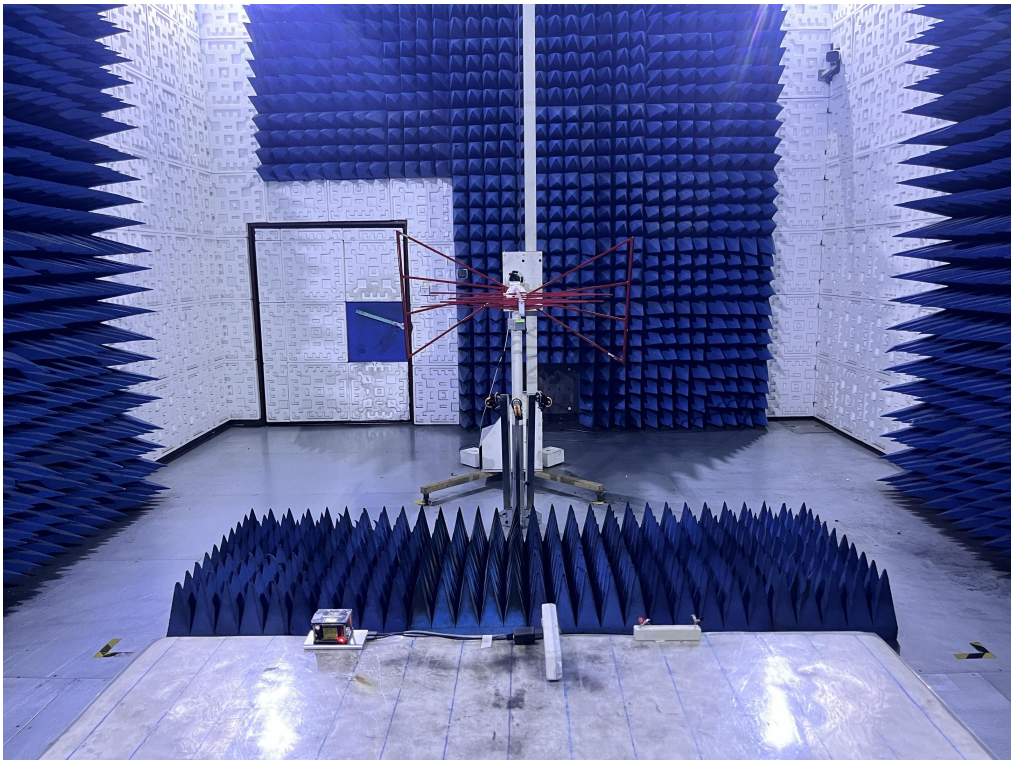


EN61000-3-3 VOLTAGE FLUCTUATION ANDFLICKER TEST SETUP



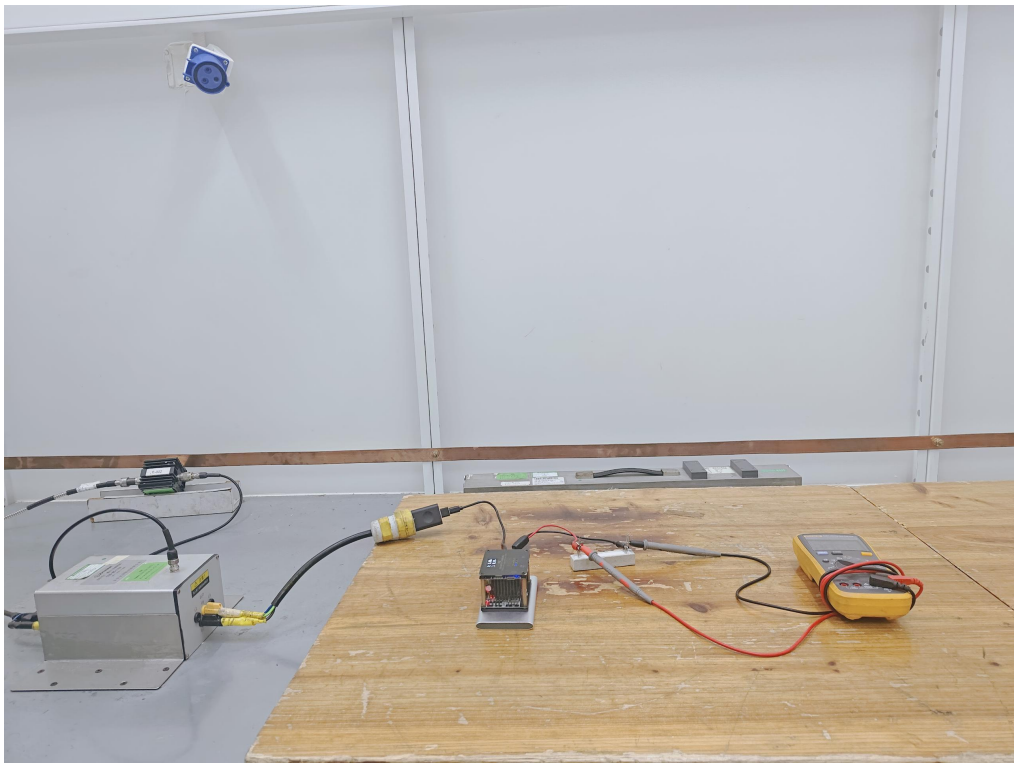
EN 61000-4-2 ESD TEST SETUP

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



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

EN 61000-4-6 CS IMMUNITY TEST SETUP



## APPENDIX II: PHOTOGRAPHS OF THE EUT

Refer to the Report No.: AGC05443240610AP01

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

# 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. 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.

5. 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.

6. 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.

7.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.

8. 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.

9. 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.

# EMC Test Report

Report No.: AGC05443240610EE01

| | | |
|---|---|---|
| **PRODUCT DESIGNATION** | : | Wireless Power bank |
| **BRAND NAME** | : | N/A |
| **MODEL NAME** | : | MO2375 |
| **APPLICANT** | : | MID OCEAN BRANDS B.V. |
| **DATE OF ISSUE** | : | Jun. 21, 2024 |
| **STANDARD(S)** | : | EN 55032:2015/A1:2020<br>EN 55035:2017/A11:2020<br>EN IEC 61000-3-2:2019/A1:2021<br>EN 61000-3-3:2013/A2:2021 |
| **REPORT VERSION** | : | V1.0 |

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

**Report Revise Record**

| Report Version | Revise Time | Issued Date | Valid Version | Notes |
|---|---|---|---|---|
| V1.0 | / | Jun. 21, 2024 | Valid | Initial release |

## Table of contents

## 1. General information

| | |
|---|---|
| Applicant | MID OCEAN BRANDS B.V. |
| Address | Unit 201 2/F,. Laford Centre, 838 Lai Chi Kok Road, Cheung Sha Wan, Kowloon, Hongkong |
| Manufacturer | MID OCEAN BRANDS B.V. |
| Address | Unit 201 2/F,. Laford Centre, 838 Lai Chi Kok Road, Cheung Sha Wan, Kowloon, Hongkong |
| Factory | MID OCEAN BRANDS B.V. |
| Address | Unit 201 2/F,. Laford Centre, 838 Lai Chi Kok Road, Cheung Sha Wan, Kowloon, Hongkong |
| Product Designation | Wireless Power bank |
| Brand Name | N/A |
| Test Model | MO2375 |
| Series Model(s) | N/A |
| Difference Description | N/A |
| Deviation from Standard | No any deviation from the test method |
| Date of receipt of test item | Jun. 07, 2024 |
| Date of Test | Jun. 07, 2024 to Jun. 21, 2024 |
| Test Result | Pass |
| Test Report Form No | AGCER-EMC-GEN-V1 |
| Note: The test results of this report relate only to the tested sample identified in this report. | |

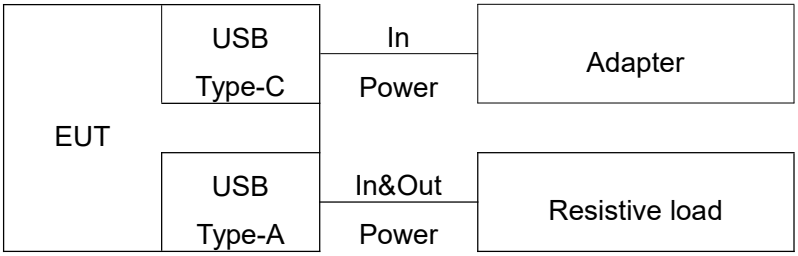
| | | |
|---|---|---|
| Prepared By | Thea Huang<br>Thea Huang<br>(Project Engineer) | Jun. 21, 2024 |
| Reviewed By | Calvin Liu<br>Calvin Liu<br>(Reviewer) | Jun. 21, 2024 |
| Approved By | Max Zhang<br>Max Zhang<br>(Authorized Officer) | Jun. 21, 2024 |

# 2. Description of Test Configuration

## 2.1. Technical Description of Product

| | |
|---|---|
| Categorization of Equipment | Class B equipment |
| Test arrangements of EUT | Table-top |
| Hardware Version | V1.0 |
| Software Version | V1.0 |
| Highest Internal Frequency | Less than 108MHz |
| EUT Input Rating | Type-C Input: DC 5V/2.4A, 9V/2A |
| EUT Output Rating | Type-C Output: DC 5V/3A, 9V/2.22A, 12V/1.66A<br>USB-A Output: DC5V 3A, 9V 2A, 12V 1.5A |
| Wireless Charging Output Power | 5W, 7.5W, 10W, 15W |
| Adapter Information | N/A |
| Battery Information | DC 3.7V 5000mAh 18.5Wh |

**Connection Diagram of Host System**




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

| Port Type | Input/Output | Number | Cable Description |
|---|---|---|---|
| USB Type-C | In | 1 | 0.3m unshielded |
| USB Type-A | In&Out | 1 | -- |

## 2.2. Description of Support Equipment

| Device Type | Manufacturer | Model Name | Specifications | Data Cable | Power Cable |
|---|---|---|---|---|---|
| Adapter | Jinbaotong | K-T10E0502000E | -- | -- | -- |
| Cement Resistance | -- | -- | -- | -- | -- |
| Digital multimeter | FLUKE | 15B+ | -- | -- | -- |

## 2.3. Description of Test Modes

| No. | Test Mode Description | Worst |
|---|---|---|
| 1 | EUT + AC/DC adapter(DC 9V/2A) + USB load（Full Load） | -- |
| 2 | EUT + USB load + Type C load | -- |
| 3 | EUT + Type C load (Full Load） | -- |
| 4 | EUT + AC/DC adapter(DC 5V/2.4A) + USB load（Full Load） | -- |

Note:

1. All modes have been tested and only the worst mode test data recorded in the test report.

# 3. Summary of Measurement Results and Uncertainty

## 3.1. Test Specifications

| | |
|---|---|
| EN 55032:2015/A1:2020 | Electromagnetic compatibility of multimedia equipment - Emission requirements |
| EN 55035:2017/A11:2020 | Electromagnetic compatibility of multimedia equipment - Immunity requirements |
| EN IEC 61000-3-2:2019/A1:2021 | Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current 16 A per phase) |
| EN 61000-3-3:2013/A2:2021 | Electromagnetic compatibility (EMC) Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection |

## 3.2. Description of Measurement Results

| Test items | Test Standard(s) | Verdict |
|---|---|---|
| Conducted emissions from the AC mains power ports | EN 55032 | Pass |
| Radiated emissions at frequencies up to 1 GHz | EN 55032 | Pass |
| Harmonic current emissions | EN IEC 61000-3-2 | Pass |
| Voltage fluctuations and flicker | EN 61000-3-3 | Pass |
| Electrostatic discharge | IEC 61000-4-2 [a] | Pass |
| Radio-frequency electromagnetic field | IEC 61000-4-3 [a] | Pass |
| Fast transients | IEC 61000-4-4 [a] | Pass |
| Surges | IEC 61000-4-5 [a] | Pass |
| Radio-frequency common mode (Injected currents) | IEC 61000-4-6 [a] | Pass |
| Voltage dips and interruptions | IEC 61000-4-11 [a] | Pass |

Note:
a. The applicable versions of the basic standards are defined in the standard which listed in the test specification.

Performance table

| Performance Criteria for Immunity | |
|---|---|
| Performance criterion A | The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended. |
| Performance criterion B | During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test. After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.<br>If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended. |
| Performance criterion C | Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.<br>Information stored in non-volatile memory, or protected by a battery backup, shall not be lost. |

### 3.3. Description of Measurement Uncertainty

The reported uncertainty of measurement y ±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

| Item | Measurement Uncertainty |
|---|---|
| Conducted emissions from the AC mains power ports | Uc = ±2.9 dB |
| Radiated emissions at frequencies up to 1 GHz | Uc = ±3.9 dB |
| Radiated emissions at frequencies above 1 GHz | Uc = ±4.9 dB |

## 4. Test Facility

Laboratory name: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Laboratory Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

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

**CNAS-Lab Code: L5488**

Attestation of Global Compliance (Shenzhen) Co., Ltd. is accredited in accordance with the recognized International Standard ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories).

**A2LA-Lab Cert. No.: 5054.02**

Attestation of Global Compliance (Shenzhen) Co., Ltd. is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This laboratory also meets the requirements of any additional program requirements in the Electrical field.

**FCC-Registration No.: 975832**

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

**IC-Registration No.: 24842**

**CAB identifier: CN0063**

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

**VCCI Membership No.: 4112**

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered in accordance with VCCI Council Rules.

VCCI Registration No. C-20098 for conducted emissions at AC main power ports

VCCI Registration No. T-20102 for conducted emissions at telecommunication ports

VCCI Registration No. R-20136 for radiated emissions below 1GHz

VCCI Registration No. G-20132 for radiated emissions above 1GHz

# 5. Measurement of Conducted Emissions from the AC Mains Power Ports

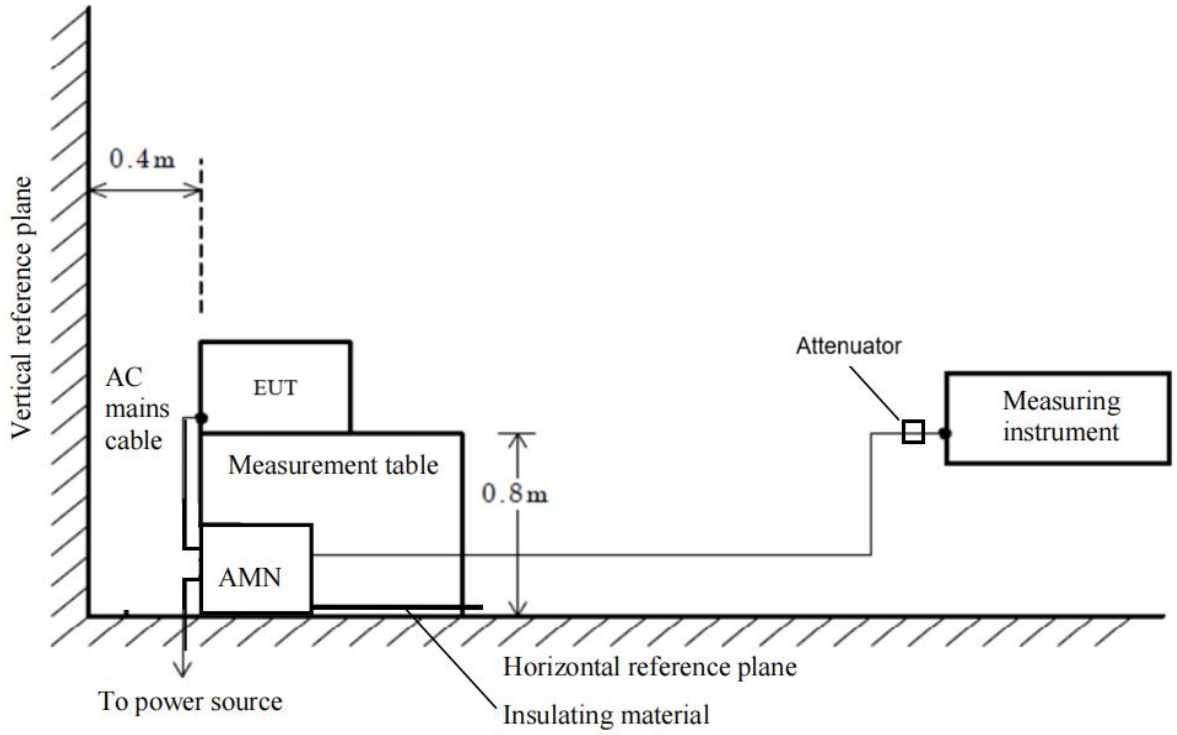
## 5.1. Requirements

Requirements for conducted emissions, low voltage AC mains port

| Network device | Detector type/ bandwidth | Frequency Range (MHz) | Limits dB(μV) | Measurement specifications |
|---|---|---|---|---|
| AMN | Quasi-peak/ 9kHz | 0.15 to 0.5 | 66 to 56 | Instrumentation: CISPR 16-1-1, Clauses 4, 5 and 7<br>Networks: CISPR 16-1-2, Clause 4<br>Method: CISPR 16-2-1, Clause 7<br>Set-up: CISPR 16-2-1, Clause 7 |
| | | 0.5 to 5 | 56 | |
| | | 5 to 30 | 60 | |
| | Average/ 9kHz | 0.15 to 0.5 | 56 to 46 | |
| | | 0.5 to 5 | 46 | |
| | | 5 to 30 | 50 | |

**Note:**
1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.5MHz.

## 5.2. Block Diagram of Test Setup



## 5.3. Equipment Details

Measuring Instruments

| Instruments | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Test Receiver | R&S | ESPI | 101206 | May 28, 2024 | May 27, 2025 |
| Artificial Mains Network | R&S | ESH2-Z5 | 100086 | May 28, 2024 | May 27, 2025 |
| Attenuator | East sheep | LM-XX-6-5W | N/A | Jun. 09, 2023 | Jun. 08, 2025 |

Measuring Software

| Software Name | Manufacturer | Details |
|---|---|---|
| ES-K1 | R&S | For EMC Measurement, Version 1.71 |

## 5.4. Configuration of the EUT and method of measurement

a. The EUT 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, the EUT was placed on the top surface of a measurement table, 0.8 m high from the horizontal reference plane, and was positioned at a distance of 0.4 m away from the vertical reference plane. When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 10 cm non-conductive covering to insulate the EUT from the ground plane.

b. Support equipment, if needed, was placed as per CISPR 16-2-1.

c. All I/O cables were positioned to simulate typical actual usage as per CISPR 16-2-1.

d. The EMI receiver measured the emission levels emanating from the EUT into the AC Mains through an Artificial Mains Network (AMN) and an attenuator used on the front end of the EMI receiver. Testing included measurements on all live and neutral lines.

e. The more description of the tests, the test methods, and the test set-ups are given in the applicable test standard.

f. Record at least six highest emissions relative to the limits at each frequency of interest unless the emission is 10 dB or greater below the limit.

g. A conducted emission is calculated by the following equation:

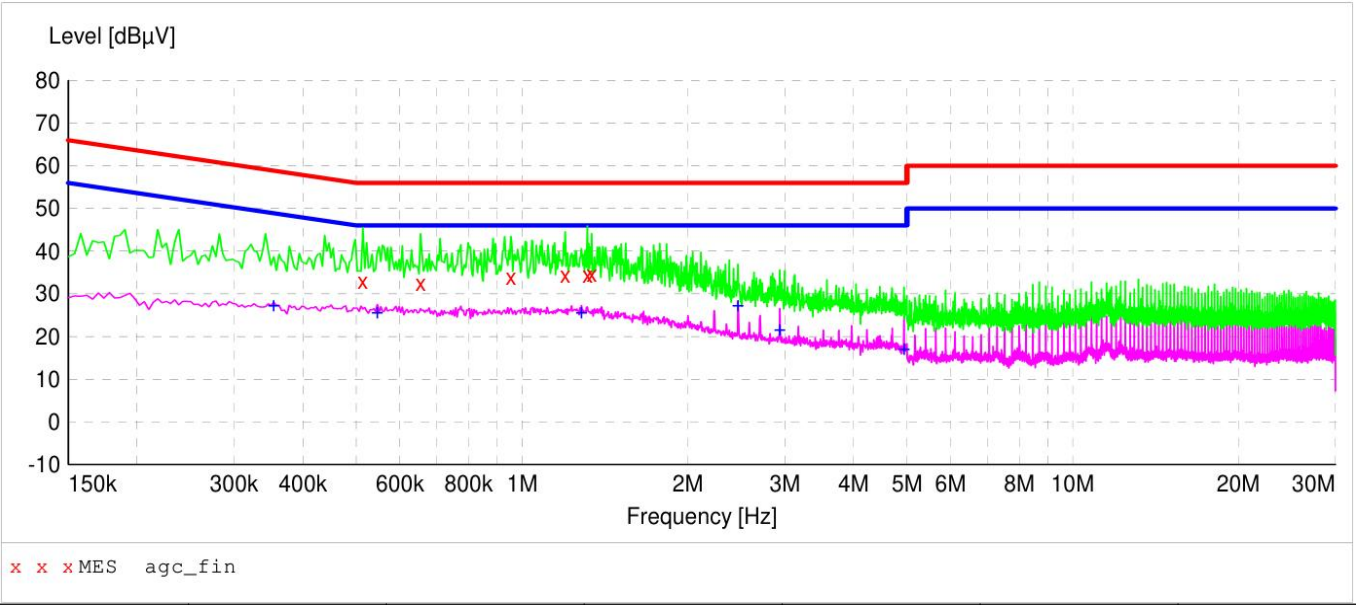
- Measurement Level (dBμV) = Receiver reading (dBμV) + Tansd (dB)
- Transd(dB)= AMN Factor(dB)+Cable Loss(dB)+Attenuation(dB)
- Margin= Limit-Level

### 5.5. Test Summary

| Test Engineer | Jimu Lao | Temperature | 23.8 ℃ |
|---|---|---|---|
| Test Date | 2024-06-17 | Air Pressure | 985 Mbar |
| Worst Mode | Mode 4 | Relative Humidity | 66.6 % |
| Verdict | Pass | | |

Test graph and data for Conducted Emission

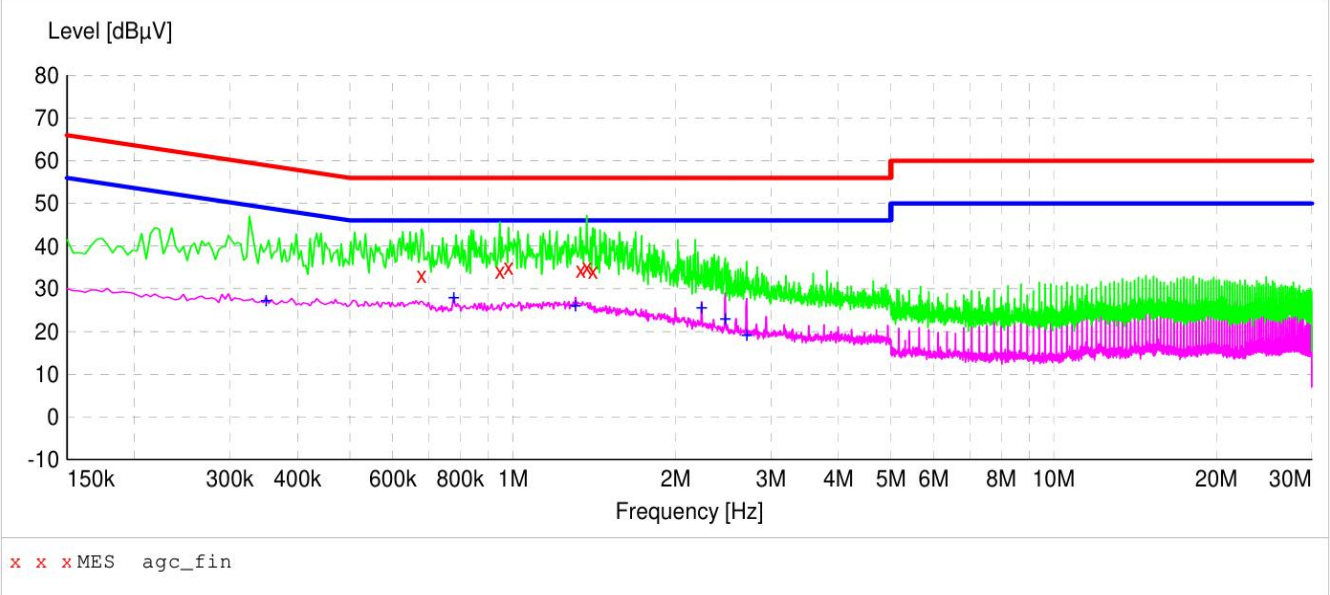
Test Mode: Mode 4




| Frequency [MHz] | Level [dBµV] | Factor [dB] | Limit [dBµV] | Margin [dB] | Detector | Line |
|---|---|---|---|---|---|---|
| 0.514000 | 33.0 | 6.2 | 56.0 | 23.0 | QP | L1 |
| 0.654000 | 32.5 | 6.2 | 56.0 | 23.5 | QP | L1 |
| 0.954000 | 33.9 | 6.2 | 56.0 | 22.1 | QP | L1 |
| 1.198000 | 34.5 | 6.2 | 56.0 | 21.5 | QP | L1 |
| 1.314000 | 34.3 | 6.2 | 56.0 | 21.7 | QP | L1 |
| 1.338000 | 34.7 | 6.2 | 56.0 | 21.3 | QP | L1 |
| 0.354000 | 27.7 | 6.1 | 48.9 | 21.2 | AV | L1 |
| 0.546000 | 26.2 | 6.2 | 46.0 | 19.8 | AV | L1 |
| 1.282000 | 26.2 | 6.2 | 46.0 | 19.8 | AV | L1 |
| 2.466000 | 27.8 | 6.3 | 46.0 | 18.2 | AV | L1 |
| 2.938000 | 22.1 | 6.3 | 46.0 | 23.9 | AV | L1 |
| 4.938000 | 17.5 | 6.3 | 46.0 | 28.5 | AV | L1 |

Test graph and data for Conducted Emission

Test Mode: Mode 4




| Frequency [MHz] | Level [dBµV] | Factor [dB] | Limit [dBµV] | Margin [dB] | Detector | Line |
|---|---|---|---|---|---|---|
| 0.678000 | 33.3 | 6.2 | 56.0 | 22.7 | QP | N |
| 0.946000 | 34.2 | 6.2 | 56.0 | 21.8 | QP | N |
| 0.982000 | 35.1 | 6.2 | 56.0 | 20.9 | QP | N |
| 1.334000 | 34.4 | 6.2 | 56.0 | 21.6 | QP | N |
| 1.370000 | 35.1 | 6.2 | 56.0 | 20.9 | QP | N |
| 1.406000 | 34.1 | 6.2 | 56.0 | 21.9 | QP | N |
| 0.350000 | 27.7 | 6.1 | 49.0 | 21.3 | AV | N |
| 0.778000 | 28.5 | 6.2 | 46.0 | 17.5 | AV | N |
| 1.306000 | 26.5 | 6.2 | 46.0 | 19.5 | AV | N |
| 2.234000 | 26.1 | 6.3 | 46.0 | 19.9 | AV | N |
| 2.470000 | 23.6 | 6.3 | 46.0 | 22.4 | AV | N |
| 2.706000 | 19.8 | 6.3 | 46.0 | 26.2 | AV | N |

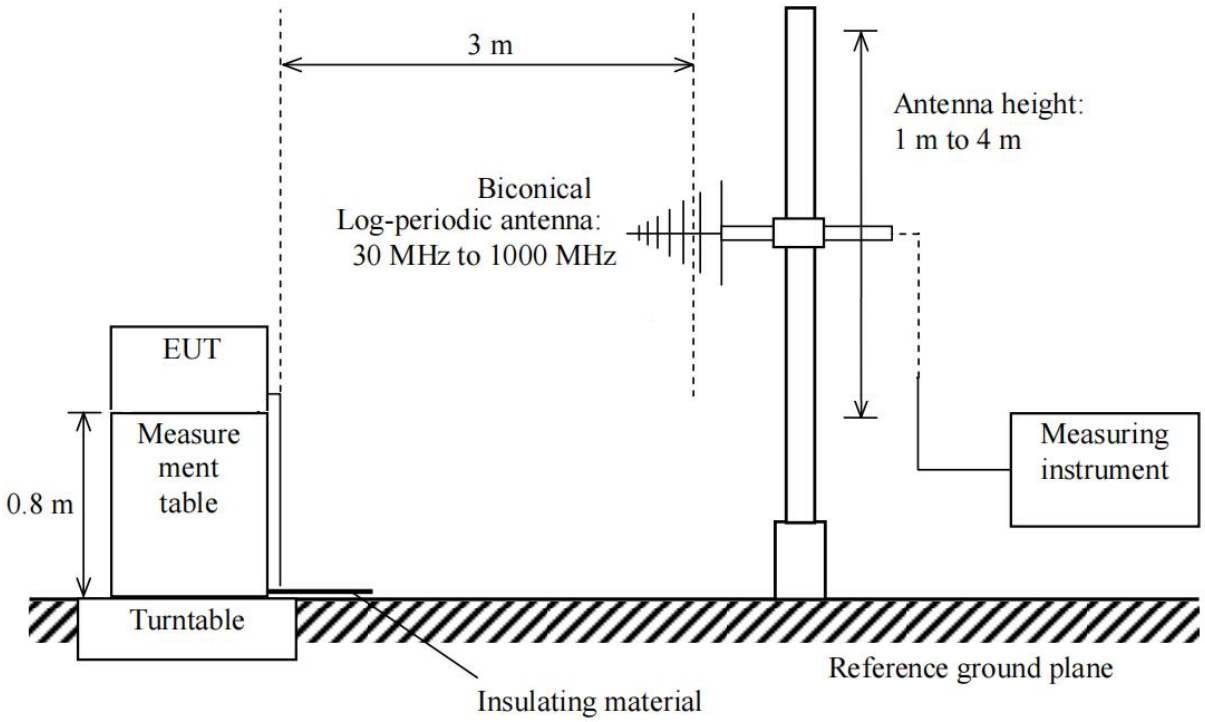
# 6. Measurement of Radiated Emissions at Frequencies up to 1 GHz

## 6.1. Requirements

Requirements for radiated emissions at frequencies up to 1 GHz at 3m distance

| Test facility | Detector type/ bandwidth | Frequency Range (MHz) | Limits dB(μV/m) | Measurement specifications |
|---|---|---|---|---|
| SAC | Quasi-peak/ 120kHz | 30 to 230 | 40 | Instrumentation: CISPR 16-1-1, Clauses 4, 5<br>Antennas: CISPR 16-1-4, Clause 4.5<br>Test Site: CISPR 16-1-4, Clause 6<br>Method: CISPR 16-2-3, Clause 7.6 |
| | | 230 to 1000 | 47 | |
| **Note:**<br>1. The lower limit shall apply at the transition frequency. | | | | |

## 6.2. Block Diagram of Test Setup



## 6.3. Equipment Details

Measuring Instruments

| Instruments | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Test Receiver | R&S | ESCI | 10096 | Feb. 01, 2024 | Jan. 31, 2025 |
| Antenna | SCHWARZBECK | VULB9168 | D69250 | May 11, 2023 | May 10, 2025 |
| Attenuator | East sheep | LM-XX-6-5W | N/A | Jun. 09, 2023 | Jun. 08, 2025 |

Measuring Software

| Software Name | Manufacturer | Details |
|---|---|---|
| EZ-EMC | FARA | For EMC Measurement, Version RA-03A |

## 6.4. Configuration of the EUT and method of measurement

a. The EUT 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, the EUT was placed on the top surface of a measurement table, 0.8 m high from the horizontal reference plane. When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 10 cm non-conductive covering to insulate the EUT from the ground plane.

b. Support equipment, if needed, was placed as per CISPR 16-2-3.

c. All I/O cables were positioned to simulate typical actual usage as per CISPR 16-2-3.

d. The maximum receiving level of radiated emissions from the EUT was measured while the turntable was rotated from 0° to 360° and the antenna height was scanned between 1 m and 4 m. The cables were laid out to attain the maximum level of radiated emissions.

e. The more description of the tests, the test methods, and the test set-ups are given in the applicable test standard.

f. Record at least six highest emissions relative to the limits at each frequency of interest unless the emission is 10 dB or greater below the limit.

g. A radiated emission is calculated by the following equation:

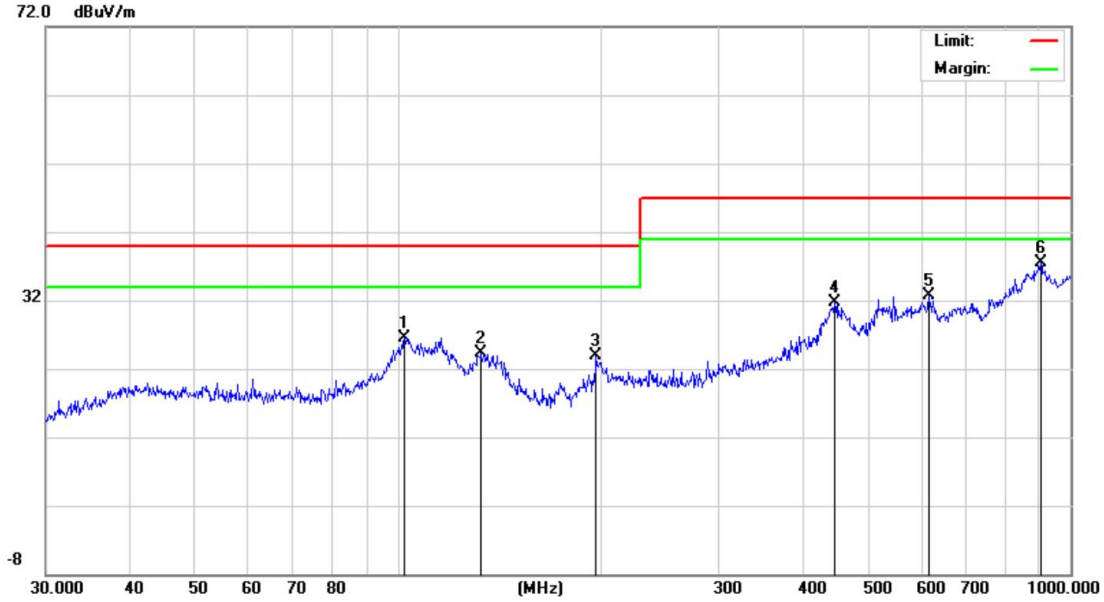
- Measurement Level dB(μV/m) = Receiver reading dB(μV) + Factor(dB/m)
- Factor(dB/m) = Antenna Factor(dB/m) + Cable Loss(dB)
- Margin= Limit-Level

### 6.5. Test Summary

| | | | |
|---|---|---|---|
| Test Engineer | Carpe Lin | Temperature | 23.3 ℃ |
| Test Date | 2024-06-21 | Air Pressure | 985 Mbar |
| Worst Mode | Mode 1 | Relative Humidity | 59.8 % |
| Verdict | Pass | | |

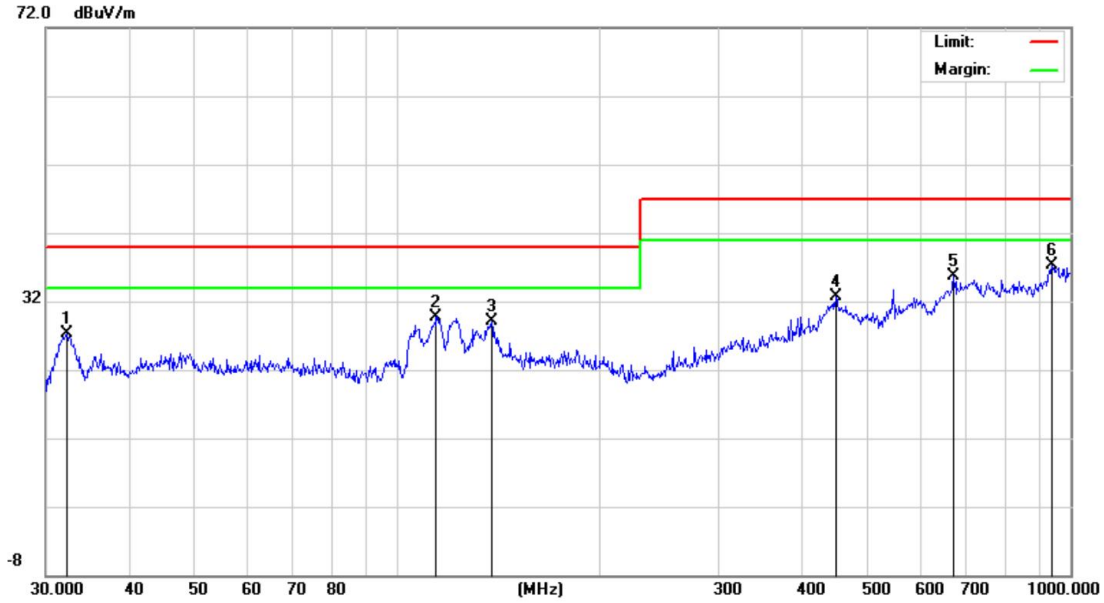
Test graph and data for Radiated Emission up to 1GHz

Test Mode: Mode 1




| No. | Frequency [MHz] | Level [dBµV/m] | Factor dB | Limit [dBµV/m] | Margin dB | Detector | Polarity |
|---|---|---|---|---|---|---|---|
| 1 | 102.3597 | 26.60 | 16.22 | 40.00 | 13.4 | peak | Horizontal |
| 2 | 133.1511 | 24.21 | 15.61 | 40.00 | 15.79 | peak | Horizontal |
| 3 | 197.2001 | 23.88 | 14.18 | 40.00 | 16.12 | peak | Horizontal |
| 4 | 446.4141 | 31.62 | 24.88 | 47.00 | 15.38 | peak | Horizontal |
| 5 | 616.3718 | 32.62 | 25.18 | 47.00 | 14.38 | peak | Horizontal |
| 6 | 903.3094 | 37.51 | 31.34 | 47.00 | 9.49 | peak | Horizontal |

| Test graph and data for Radiated Emission up to 1GHz |
|---|
| Test Mode: Mode 1 |




| No. | Frequency [MHz] | Level [dBµV/m] | Factor dB | Limit [dBµV/m] | Margin dB | Detector | Polarity |
|---|---|---|---|---|---|---|---|
| 1 | 32.1795 | 27.34 | 14.32 | 40.00 | 12.66 | peak | Vertical |
| 2 | 114.1138 | 29.65 | 16.67 | 40.00 | 10.35 | peak | Vertical |
| 3 | 137.9028 | 29.16 | 18.15 | 40.00 | 10.84 | peak | Vertical |
| 4 | 447.9822 | 32.73 | 25.74 | 47.00 | 14.27 | peak | Vertical |
| 5 | 670.4893 | 35.66 | 27.60 | 47.00 | 11.34 | peak | Vertical |
| 6 | 938.8326 | 37.23 | 30.84 | 47.00 | 9.77 | peak | Vertical |

# 7. Measurement of Harmonic Current Emissions

## 7.1. Requirements

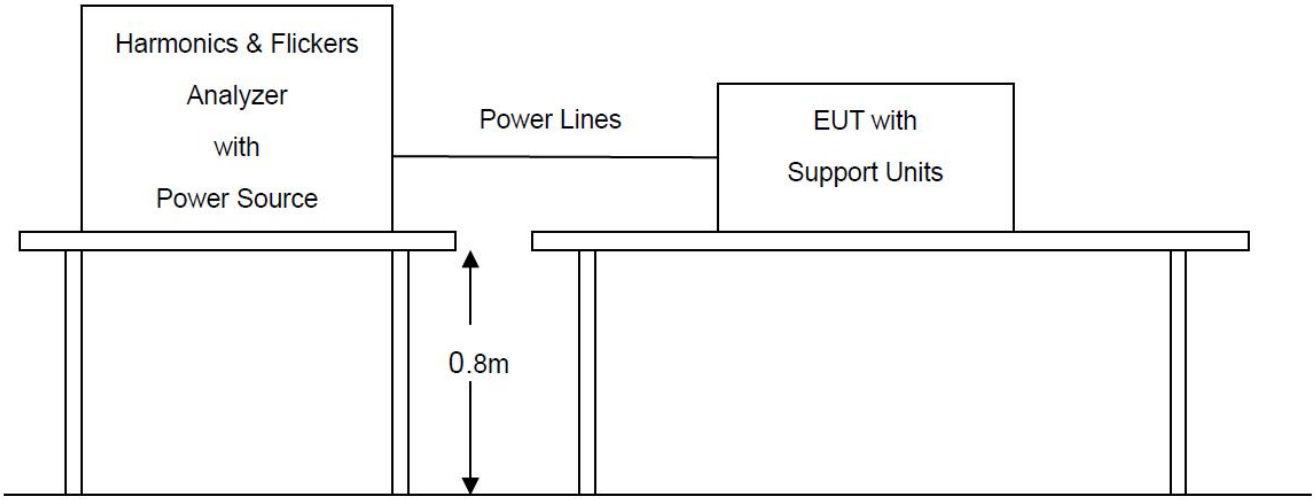
Applicable test standard(s): EN IEC 61000-3-2:2019/A1:2021

Limits of Harmonic Current Emissions

| Harmonic order *h* | Limits | | | | |
|---|---|---|---|---|---|
| | Class A | Class B | Class C[a] | Class D | |
| | Maximum permissible harmonic current (A) | | Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency (%) | Maximum permissible harmonic current per watt (mA/W) | Maximum permissible harmonic current (A) |
| 3 | 2.30 | 3.45 | 27[b] | 3.4 | 2.30 |
| 5 | 1.14 | 1.71 | 10 | 1.9 | 1.14 |
| 7 | 0.77 | 1.155 | 7 | 1.0 | 0.77 |
| 9 | 0.40 | 0.6 | 5 | 0.5 | 0.40 |
| 11 | 0.33 | 0.495 | 3 | 0.35 | 0.33 |
| 13 | 0.21 | 0.315 | 3 | 3.85/13 | 0.21 |
| 15≤*h*≤39(odd harmonics only) | 2.25/*h* | 3.375/*h* | 3 | 3.85/*h* | 2.25/*h* |
| 2 | 1.08 | 1.62 | 2 | Not applicable | Not applicable |
| 4 | 0.43 | 0.645 | Not applicable | | |
| 6 | 0.30 | 0.45 | | | |
| 8≤*h*≤40(even harmonics only) | 1.84/*h* | 2.76/*h* | | | |
| Note:<br>(a) For some Class C products, other emission limits apply.<br>(b) The limit is determined based on the assumption of modern lighting technologies having power factors of 0.90 or higher. | | | | | |

The application of limits had been as defined in the applicable test standard.

## 7.2. Block Diagram of Test Setup




## 7.3. Equipment Details

Measuring Instruments

| Instruments | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Signal Conditioning Unit | Schaffner | CCN1000-1 | 72431 | May 24, 2024 | May 23, 2025 |
| AC Source | Schaffner | NSG 1007 | 56825 | May 24, 2024 | May 23, 2025 |

Measuring Software

| Software Name | Manufacturer | Details |
|---|---|---|
| CTS 4 | AMETEK | For harmonics and flickers measurement, version 4.29.0 |

## 7.4. Configuration of the EUT and method of measurement

a. The test shall be conducted according to the general requirements given in the applicable test standard. The test duration had been as defined in the applicable test standard.

b. The measurement of harmonic currents shall be performed as follows:

- for each harmonic order, measure the 1.5 s smoothed RMS harmonic current in each discrete Fourier transform (DFT) time window;
- calculate the arithmetic average of the measured values from the DFT time windows, over the entire observation period.

c. The value of the active input power to be used for the calculation of limits shall be determined as follows:

- measure the 1.5 s smoothed active input power in each DFT time window;
- determine the maximum of the measured values of active power from the DFT time windows over the entire duration of the test.

d. The harmonic currents and the active input power shall be measured under the same test conditions but need not be measured simultaneously.

### 7.5. Test Summary

Equipment with a rated power less than or equal to 75W is deemed to fulfil all relevant requirements of this standard without testing.

# 8. Measurement of Voltage Fluctuations and Flicker

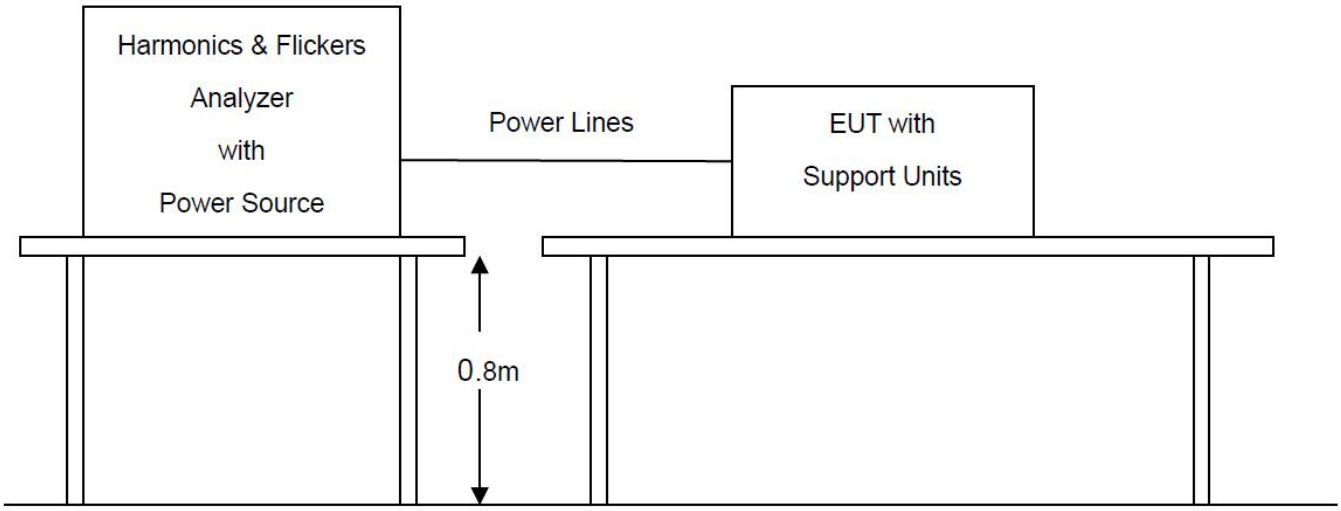
## 8.1. Requirements

Applicable test standard(s): EN 61000-3-3:2013/A2:2021

Limits of Voltage Fluctuations and Flicker

| Parameters | Definitions | Limits |
|---|---|---|
| $T_{max}$ | the accumulated time value of *d(t)* with a deviation exceeding 3.3 % during a single voltage change at the EUT terminals | ⩽500 ms |
| $d_c$ | the maximum relative steady-state voltage change | ⩽3.3% |
| $d_{max}$ | the maximum relative voltage change | ☒ ⩽4%<br>☐ ⩽6%<br>☐ ⩽7% |
| ☒ $P_{st}$ | short-term flicker severity | ⩽1.0 |
| ☐ $P_{lt}$ | long-term flicker severity | ⩽0.65 |

## 8.2. Block Diagram of Test Setup




## 8.3. Equipment Details

Measuring Instruments

| Instruments | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Signal Conditioning Unit | Schaffner | CCN1000-1 | 72431 | May 24, 2024 | May 23, 2025 |
| AC Source | Schaffner | NSG 1007 | 56825 | May 24, 2024 | May 23, 2025 |

Measuring Software

| Software Name | Manufacturer | Details |
|---|---|---|
| CTS 4 | AMETEK | For harmonics and flickers measurement, version 4.29.0 |

## 8.4. Configuration of the EUT and method of measurement

a. The test shall be conducted according to the general requirements given in the applicable test standard. The test duration and test condition had been as defined in the applicable test standard.

b. All types of voltage fluctuations would been assessed by direct measurement using a flicker meter which complies with the specification given in IEC 61000-4-15:2010.

## 8.5. Test Summary

| | | | |
|---|---|---|---|
| Test Engineer | Jimu Lao | Temperature | 23.8 ℃ |
| Test Date | 2024-06-17 | Air Pressure | 985 Mbar |
| Worst Mode | Mode 4 | Relative Humidity | 66.6 % |
| Verdict | Pass | | |

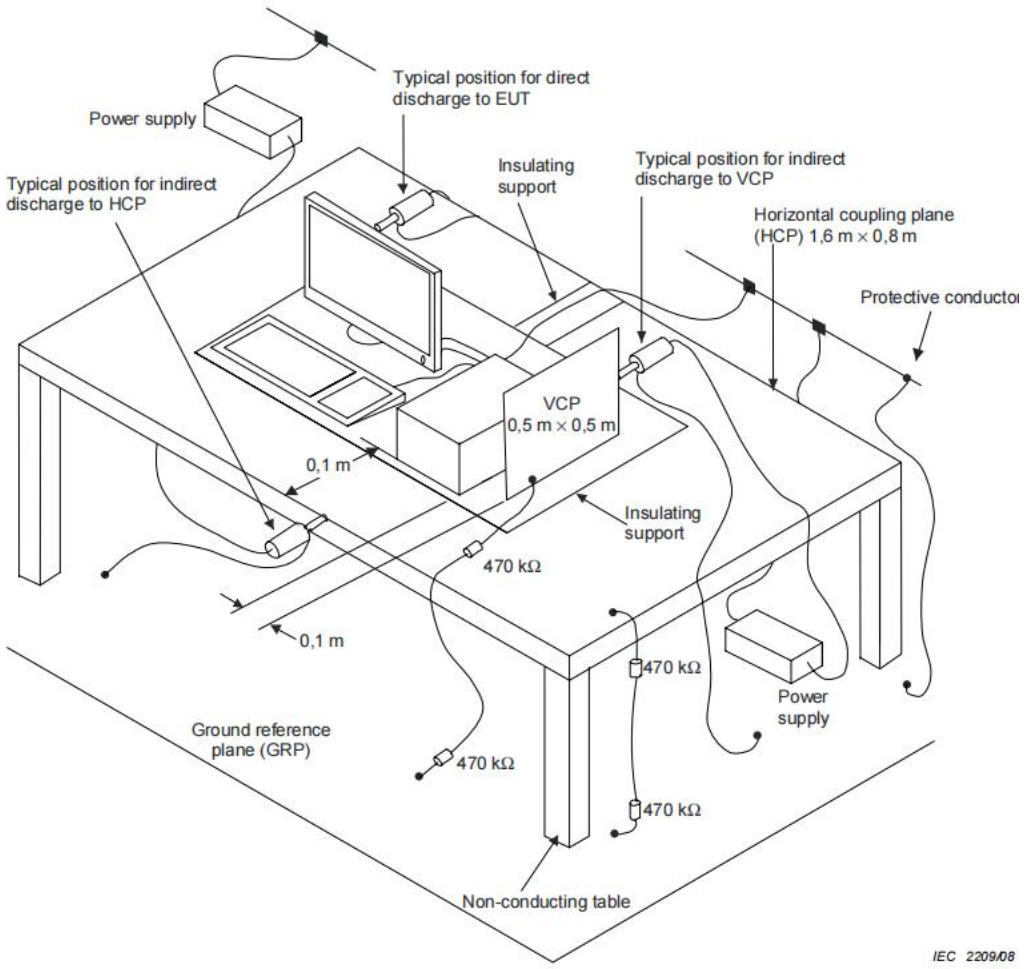
| Parameters | Measurement Value | Limits |
|---|---|---|
| $T_{max}$ | 0 | ⩽500 ms |
| $d_c$ | 0.00 | ⩽3.3% |
| $d_{max}$ | 0.00 | ⩽4% |
| $P_{st}$ | 0.250 | ⩽1.0 |

# 9. Measurement of Electrostatic discharge

## 9.1. Requirements

| | |
|---|---|
| Port | Enclosure |
| Basic Standard | IEC 61000-4-2 |
| Test Level | ±8.0 kV (Air Discharge)<br>±4.0 kV (Contact Discharge)<br>±4.0 kV (Indirect Discharge) |
| Required Performance Criterion | B |
| Time Between Each Discharge: | 1 second |
| Number of Discharge for Each Applied Voltage | 10 |

## 9.2. Block Diagram of Test Setup



### 9.3. Equipment Details

Measuring Instruments

| Instruments | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| ESD Simulator | Schaffner | NSG 438 | 782 | Nov. 13, 2023 | Nov. 12, 2024 |

Measuring Software

| Software Name | Manufacturer | Details |
|---|---|---|
| -- | -- | -- |

### 9.4. Configuration of the EUT and method of measurement

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.
i. The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance criterion defined in the report.

### 9.5. Test Summary

| Test Engineer | Ikun Yu | Temperature | 24.2 ℃ |
|---|---|---|---|
| Test Date | 2024-06-18 | Air Pressure | 985 Mbar |
| Test Mode(s) | Mode 1/2/3/4 | Relative Humidity | 52.6 % |
| Verdict | Pass | | |

| Voltage | Coupling | Observation | Performance |
|---|---|---|---|
| ±4kV | Contact Discharge | No degradation of performance | A |
| ±2KV, ±4kV, ±8kV | Air Discharge | No degradation of performance | A |
| ±4kV | Indirect Discharge HCP | No degradation of performance | A |
| ±4kV | Indirect Discharge VCP | No degradation of performance | A |

Blue line: Air Discharge
Red line: Contact discharge

# 10. Measurement of Radio-Frequency Electromagnetic Field

## 10.1. Requirements

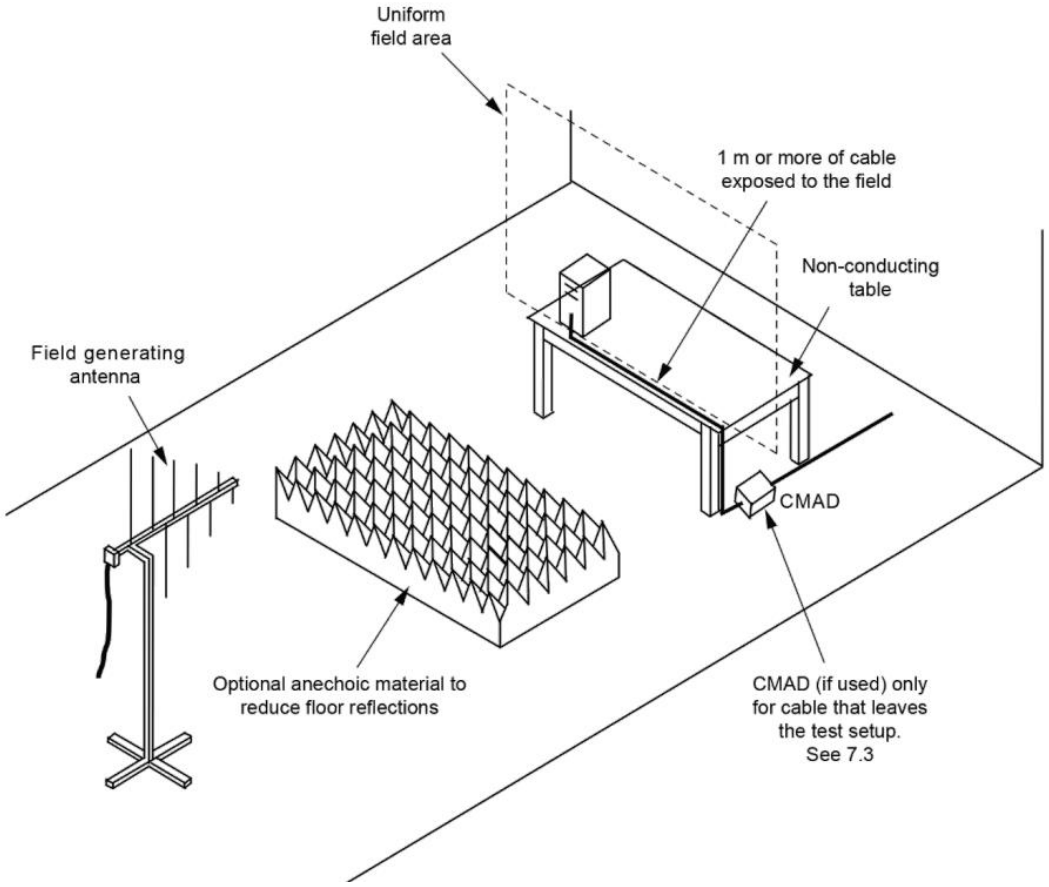
| | |
|---|---|
| Port | Enclosure |
| Basic Standard | IEC 61000-4-3 |
| Test Level | Swept test:<br>3V/m with 80% AM. 1kHz Modulation at 80 to 1000MHz<br>Spot test (Frequency (±1 %)):<br>3V/m with 80% AM. 1kHz Modulation at 1800, 2600, 3500, 5000MHz |
| Required Performance Criterion | A |
| Antenna polarization | Vertical and Horizontal |
| Step size increment [a] | 1% |
| Dwell time [b] | ≤5 seconds |
| Test Distance | 3m |
| EUT position facing antenna | Front side, back side, left side and right side |

Notes:

a. Recognizing that a 1% step size is preferred, the frequency range can be swept incrementally with a step size not exceeding 4% of the previous frequency with a test level of twice the value of the specified test level in order to reduce the testing time for equipment requiring testing in multiple configurations and/or long cycle times.

b. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to be able to respond. However, the dwell time shall not exceed 5 seconds at each of the frequencies during the scan. The time to exercise the EUT is not interpreted as a total time of a program or a cycle but related to the reaction time in case of failure of the EUT.

## 10.2. Block Diagram of Test Setup



### 10.3. Equipment Details

Measuring Instruments

| Instruments | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Signal Generator | Aglient | N5182A | MY50140530 | Feb. 01, 2024 | Jan. 31, 2025 |
| Power Probe | R&S | URV5-Z4 | 100124 | Mar. 24, 2023 | Mar. 23, 2025 |
| Power Meter | R&S | NRVD | 8323781027 | Mar. 24, 2023 | Mar. 23, 2025 |
| Directional coupler | Werlatone | C5571-10 | 99463 | Feb. 01, 2024 | Jan. 31, 2026 |
| Directional coupler | Werlatone | C5571-10 | 99482 | Feb. 01, 2024 | Jan. 31, 2026 |
| Power Amplifier | KALMUS | 7100LC | 04-02/17-06-001 | Sep. 21, 2023 | Sep. 20, 2024 |
| Power Amplifier | Milmega | AS0104-55_55 | 1004793 | Oct. 13, 2023 | Oct. 12, 2024 |
| Power Amplifier | Rflight | NTWPA-2560100 | 17063183 | Oct. 13, 2023 | Oct. 12, 2024 |
| Wideband Antenna | ETS | 3142C | 00060447 | -- | -- |
| Horn Antenna | ETS | 3117 | 00034609 | Mar. 31, 2024 | Mar. 30, 2025 |

Measuring Software

| Software Name | Manufacturer | Details |
|---|---|---|
| TS+[JS35-RS] | Tonscend | For EMC measurement, version 2.0.1.8 |

### 10.4. Configuration of the EUT and method of measurement

a. The Equipment Under Test (EUT) was positioned within the Uniform Field Area (UFA) on a supporting table, ensuring a 3-meter separation from the transmitting antenna. This setup aligns with the calibrated square area, guaranteeing field uniformity during testing. The supporting units were strategically located outside the UFA to avoid any potential interference. Nonetheless, the cables connected to the EUT were intentionally exposed to the precisely calibrated field within the UFA.

b. Before testing, it will verify the proper operation of the test equipment/system. This verification will involve measuring the field strength at one point within the Uniform Field Area (UFA) at various frequencies.

c. The test shall be performed according to the above requirements and block diagram which shall specify the test setup.

d. The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance criterion defined in the report.

### 10.5. Test Summary

| | | | |
|---|---|---|---|
| Test Engineer | Carpe Lin | Temperature | 23.3 ℃ |
| Test Date | 2024-06-21 | Air Pressure | 985 Mbar |
| Test Mode(s) | Mode 1/2/3/4 | Relative Humidity | 59.8 % |
| Verdict | Pass | | |

Swept test:

| Frequency | Exposed Side | Field Strength (V/m) | Observation | Performance |
|---|---|---|---|---|
| 80MHz to 6GHz | Front | 3V/m (rms) | No degradation of performance | A |
| 80MHz to 6GHz | Left | 3V/m (rms) | No degradation of performance | A |
| 80MHz to 6GHz | Rear | 3V/m (rms) | No degradation of performance | A |
| 80MHz to 6GHz | Right | 3V/m (rms) | No degradation of performance | A |

Spot test (Frequency (±1 %)):

| Frequency | Exposed Side | Field Strength (V/m) | Observation | Performance |
|---|---|---|---|---|
| 1800, 2600, 3500, 5000MHz | Front | 3V/m (rms) | No degradation of performance | A |
| 1800, 2600, 3500, 5000MHz | Left | 3V/m (rms) | No degradation of performance | A |
| 1800, 2600, 3500, 5000MHz | Rear | 3V/m (rms) | No degradation of performance | A |
| 1800, 2600, 3500, 5000MHz | Right | 3V/m (rms) | No degradation of performance | A |

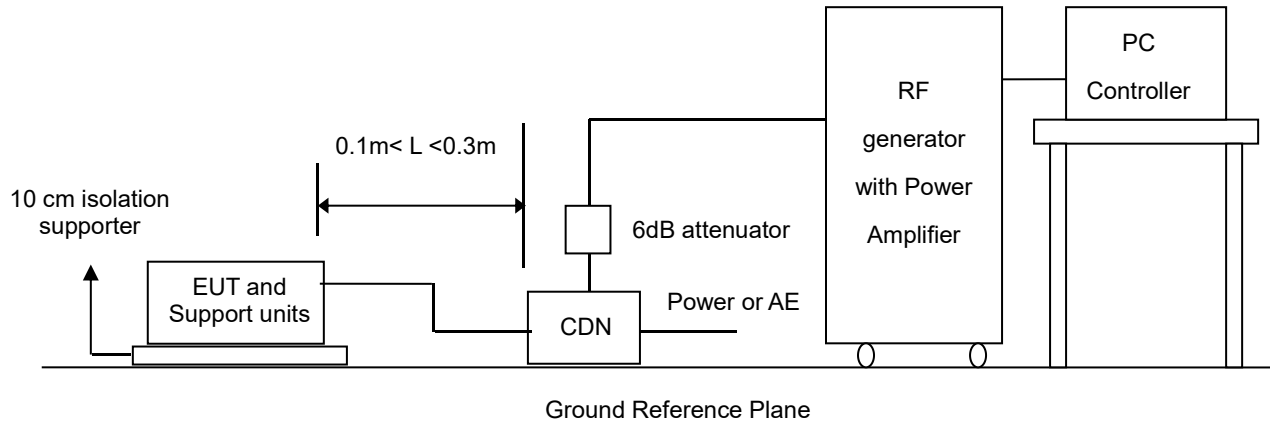
# 11. Measurement of Radio-frequency common mode

## 11.1. Requirements

| | | | |
|---|---|---|---|
| Port | ☒AC mains power ports | ☐ Analogue/digital data ports [a] | ☐ DC network power ports [a] |
| Basic Standard | IEC 61000-4-6 | | |
| Required Performance Criterion | A | | |
| Test Level | 0.15 to 10 MHz, 3 V RMS (unmodulated), 80 % AM (1 kHz)<br>10 to 30 MHz, 3 to 1 V RMS (unmodulated), 80 % AM (1 kHz)<br>30 to 80 MHz, 1 V RMS (unmodulated), 80 % AM (1 kHz) | | |
| Step size increment [b] | 1% | | |
| Dwell time [c] | ≤5 seconds | | |

Notes:
a. Applicable only to ports which, according to the manufacturer's specification, supports cable lengths greater than 3 m.
b. Recognizing that a 1% step size is preferred, the frequency range can be swept incrementally with a step size not exceeding 4% of the previous frequency with a test level of twice the value of the specified test level in order to reduce the testing time for equipment requiring testing in multiple configurations and/or long cycle times.
c. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to be able to respond. However, the dwell time shall not exceed 5 seconds at each of the frequencies during the scan. The time to exercise the EUT is not interpreted as a total time of a program or a cycle but related to the reaction time in case of failure of the EUT.

## 11.2. Block Diagram of Test Setup



### 11.3. Equipment Details

Measuring Instruments

| Instruments | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Power Amplifier | AR | 75A250 | 18464 | Oct. 13, 2023 | Oct. 12, 2024 |
| CDN | ZHINAN | ZN3751 | 15004 | Aug. 03, 2022 | Aug. 02, 2024 |
| 6dB attenuator | ZHINAN | E-002 | N/A | Aug. 04, 2022 | Aug. 03, 2024 |
| Power Probe | R&S | URV5-Z4 | 100124 | Mar. 24, 2023 | Mar. 23, 2025 |
| Power Meter | R&S | NRVD | 8323781027 | Mar. 24, 2023 | Mar. 23, 2025 |
| Directional Coupler | Werlatone | C5571-10 | 99463 | Feb. 01, 2024 | Jan. 31, 2026 |
| Signal Generator | Keysight | E4421B | MY43351603 | Feb. 01, 2024 | Jan. 31, 2025 |

Measuring Software

| Software Name | Manufacturer | Details |
|---|---|---|
| TS+[JS35-CS] | Tonscend | For EMC measurement, version 2.0.1.7 |

### 11.4. Configuration of the EUT and method of measurement

a. The Equipment Under Test (EUT) shall be tested within its intended operating and climatic conditions.

b. The test generator and the coupling/decoupling network shall be placed directly on, and bonded to, the ground reference plane. The test shall be performed with the test generator connected to each of the coupling devices (CDN, EM clamp, current clamp) in turn. All other cables not under test shall either be disconnected (when functionally allowed) or provided with decoupling networks or unterminated CDNs only.

c. The test shall be performed according to the above requirements and block diagram which shall specify the test setup.

d. The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance criterion defined in the report.

### 11.5. Test Summary

| Test Engineer | Ikun Yu | Temperature | 24.2 ℃ |
|---|---|---|---|
| Test Date | 2024-06-18 | Air Pressure | 985 Mbar |
| Test Mode(s) | Mode 1/4 | Relative Humidity | 52.6 % |
| Verdict | Pass | | |

| Test port | Test Level | Coupling method | Observation | Performance |
|---|---|---|---|---|
| AC Mains Input | 0.15 to 10 MHz: 3 V | CDN | No degradation of performance | A |
| | 10 to 30 MHz: 3 to 1 V | | | |
| | 30 to 80 MHz, 1 V | | | |

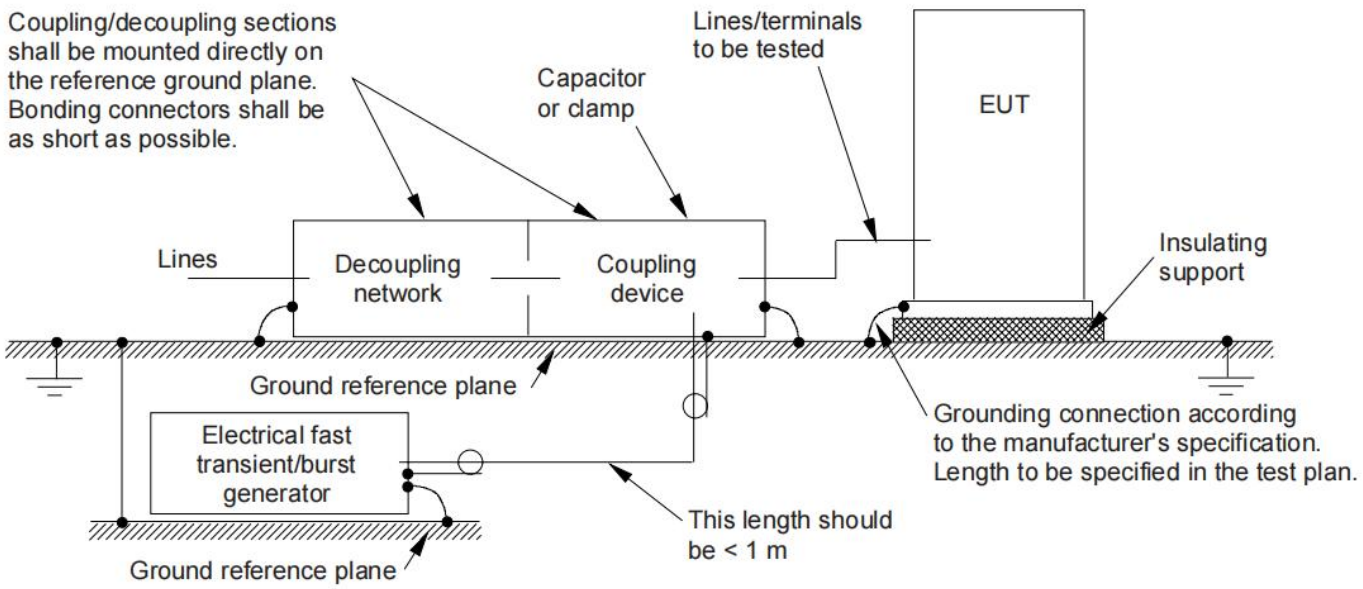
# 12. Measurement of Fast Transients

## 12.1. Requirements

| Port | ☒AC mains power ports | ☐ Analogue/digital data ports [a] | ☐ DC network power ports [a] |
|---|---|---|---|
| Basic Standard | IEC 61000-4-4 | | |
| Required Performance Criterion | B | | |
| Test Level | 1 kV (peak) | 0.5 kV (peak) | 0.5 kV (peak) |
| Polarity | Positive/Negative | | |
| Impulse Frequency | 5kHz | | |
| Impulse wave shape | 5/50ns | | |
| Burst Duration | 15ms | | |
| Burst Period | 300ms | | |

Notes:
a. Applicable only to ports which, according to the manufacturer's specification, supports cable lengths greater than 3 m.

## 12.2. Block Diagram of Test Setup



## 12.3. Equipment Details

Measuring Instruments

| Instruments | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| EFT/Surge/DIPS Generator | Schaffner | Modula 6150 | 34437 | May 24, 2024 | May 23, 2025 |

Measuring Software

| Software Name | Manufacturer | Details |
|---|---|---|
| WinModula | Schaffner | For EFT/Surge/Dips measurement, version 2.31 c |

## 12.4. Configuration of the EUT and method of measurement

a. The Equipment Under Test (EUT), whether stationary floor-mounted or table top, and equipment designed to be mounted in other configurations, shall be placed on a ground reference plane and shall be insulated from it by an insulating support 0,1 m ± 0,01 m thick.

b. The test generator and the coupling/decoupling network shall be placed directly on, and bonded to, the ground reference plane.

c. The EUT shall be arranged and connected to satisfy its functional requirements, according to the equipment installation specifications. The minimum distance between the EUT and all other conductive structures (e.g. the walls of a shielded room), except the ground reference plane shall be more than 0,5 m. All cables to the EUT shall be placed on the insulation support 0,1 m above the ground reference plane. Cables not subject to electrical fast transients shall be routed as far as possible from the cable under test to minimize the coupling between the cables.

d. The test voltages shall be coupled to all of the EUT ports including those between two units of equipment involved in the test, unless the length of the interconnecting cable makes it impossible to test.

e. Either a direct coupling network or a capacitive clamp shall be used for the application of the test voltages.

f. The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance criterion defined in the report.

### 12.5. Test Summary

| Test Engineer | Ikun Yu | Temperature | 24.5 ℃ |
|---|---|---|---|
| Test Date | 2024-06-18 | Air Pressure | 985 Mbar |
| Test Mode(s) | Mode 1/4 | Relative Humidity | 52.5 % |
| Verdict | Pass | | |

| Inject Line | Voltage(kV) | Inject Method | Observation | Performance |
|---|---|---|---|---|
| AC Lines | 0.5, 1 | Direct | No degradation of performance | A |

# 13. Measurement of Surges

## 13.1. Requirements

| Port | ☒ AC mains power ports [a] | ☐ Analogue/digital data ports [b, c, d and e] | | ☐ DC network power ports [f] |
|---|---|---|---|---|
| | | ☐ Unshielded symmetrical | ☐ Coaxial or shielded | |
| Basic Standard | IEC 61000-4-5 | | | |
| Required Performance Criterion | B | C | B | B |
| Test Level | Line to line: 1 kV; Line to ground: 2 kV | primary protection is intended: 1 and 4 kV (line to ground); primary protection is not intended: 1 kV (line to ground) | shield to ground: 0.5 kV | Line to ground: 0.5 kV |
| Tr/Th | 1.2/50 (8/20) μs | 10/700 (5/320) μs | 1.2/50 (8/20) μs | 1.2/50 (8/20) μs |
| Number of impulses | Five positive and five negative impulses | | | |
| Time between successive impulses | 1 min | | | |

Notes:

a. The number of pulses applied shall be as follows:
- Five positive pulses line-to-neutral at 90° phase.
- Five negative pulses line-to-neutral at 270° phase.

The following additional pulses are required only if the EUT has an earth connection or if the EUT is earthed via any AE:
- Five positive pulses line-to-earth at 90° phase.
- Five negative pulses line-to-earth at 270° phase.
- Five negative pulses neutral-to-earth at 90° phase.
- Five positive pulses neutral-to-earth at 270° phase.

b. Applicable only to ports which, according to the manufacturer's specification, supports cable lengths greater than 3 m.

c. Surges are applied with primary protection fitted. Where possible, use the actual primary protector intended to be used in the installation.

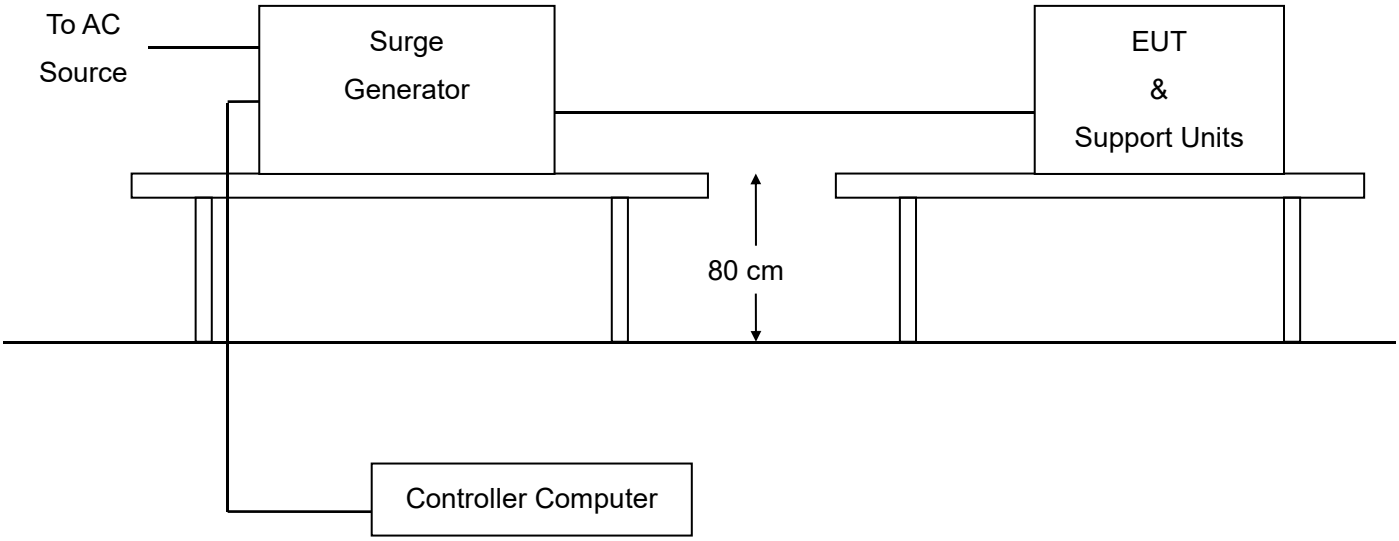
d. Where the surge coupling network for the 10/700 (5/320) μs waveform affects the functioning of high speed data ports, the test shall be carried out using a 1.2/50 (8/20) μs waveform and appropriate coupling network.

e. Surges are applicable to ports which satisfy all of the following conditions:
- May connect directly to cables that leave the building structure.
- Defined as an antenna port, a wired network port, or a broadcast receiver tuner port.

Typical ports covered include xDSL, PSTN, CATV, antenna and similar. Excluded ports are LAN and similar.

f. Applicable only to ports which, according to the manufacturer's specification, may connect directly to outdoor cables.

## 13.2. Block Diagram of Test Setup




## 13.3. Equipment Details

Measuring Instruments

| Instruments | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| EFT/Surge/DIPS Generator | Schaffner | Modula 6150 | 34437 | May 24, 2024 | May 23, 2025 |

Measuring Software

| Software Name | Manufacturer | Details |
|---|---|---|
| WinModula | Schaffner | For EFT/Surge/Dips measurement, version 2.31 c |

### 13.4. Configuration of the EUT and method of measurement

a. Verification shall be performed. It is preferable to perform the verification prior to the test.

b. The test shall be performed according to the above requirements and block diagram which shall specify the test setup.

c. When testing line-to-ground, the lines are tested individually in sequence, if there is no other specification.

d. The test procedure shall also consider the non-linear current-voltage characteristics of the equipment under test. Therefore, all lower test levels including the selected test level shall be tested.

e. The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance criterion defined in the report.

### 13.5. Test Summary

| | | | |
|---|---|---|---|
| Test Engineer | Ikun Yu | Temperature | 24.5 ℃ |
| Test Date | 2024-06-18 | Air Pressure | 985 Mbar |
| Test Mode(s) | Mode 1/4 | Relative Humidity | 52.5 % |
| Verdict | Pass | | |

| Test port | Coupling | Voltage(kV) | Observation | Performance |
|---|---|---|---|---|
| AC Mains Input | line-to-neutral | 0.5, 1 | No degradation of performance | A |

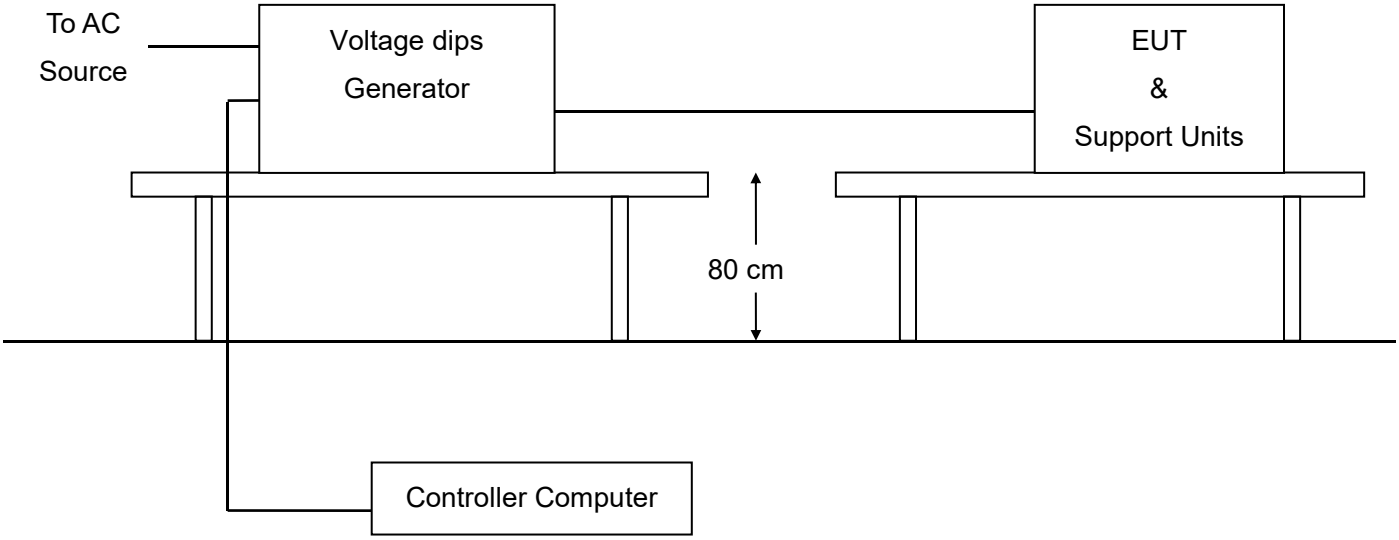
# 14. Measurement of Voltage dips and interruptions

## 14.1. Requirements

| | | | |
|---|---|---|---|
| Port | AC mains power ports | | |
| Basic Standard | IEC 61000-4-11 | | |
| Required Performance Criterion | B | B | C |
| Residual voltage [a] | < 5 % | 70 % | < 5 % |
| Number of cycles [b] | 0.5 | 25 for 50 Hz<br>30 for 60 Hz | 250 for 50 Hz<br>300 for 60 Hz |
| Variation/dip repetition | Sequence of three dips/interruptions with an interval of 10 seconds between each test | | |

Notes:
a. Changes to occur at 0 degree crossover point of the voltage waveform. If the EUT does not demonstrate compliance when tested with 0 degree switching, the test shall be repeated with the switching occurring at both 90 degrees and 270 degrees. If the EUT satisfies these alternative requirements, then it fulfils the requirements.
b. Apply at only one supply frequency of the EUT.

## 14.2. Block Diagram of Test Setup



### 14.3. Equipment Details

Measuring Instruments

| Instruments | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| EFT/Surge/DIPS Generator | Schaffner | Modula 6150 | 34437 | May 24, 2024 | May 23, 2025 |

Measuring Software

| Software Name | Manufacturer | Details |
|---|---|---|
| WinModula | Schaffner | For EFT/Surge/Dips measurement, version 2.31 c |

### 14.4. Configuration of the EUT and method of measurement

a. The test shall be performed according to the above requirements and block diagram which shall specify the test setup.

b. The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance criterion defined in the report.

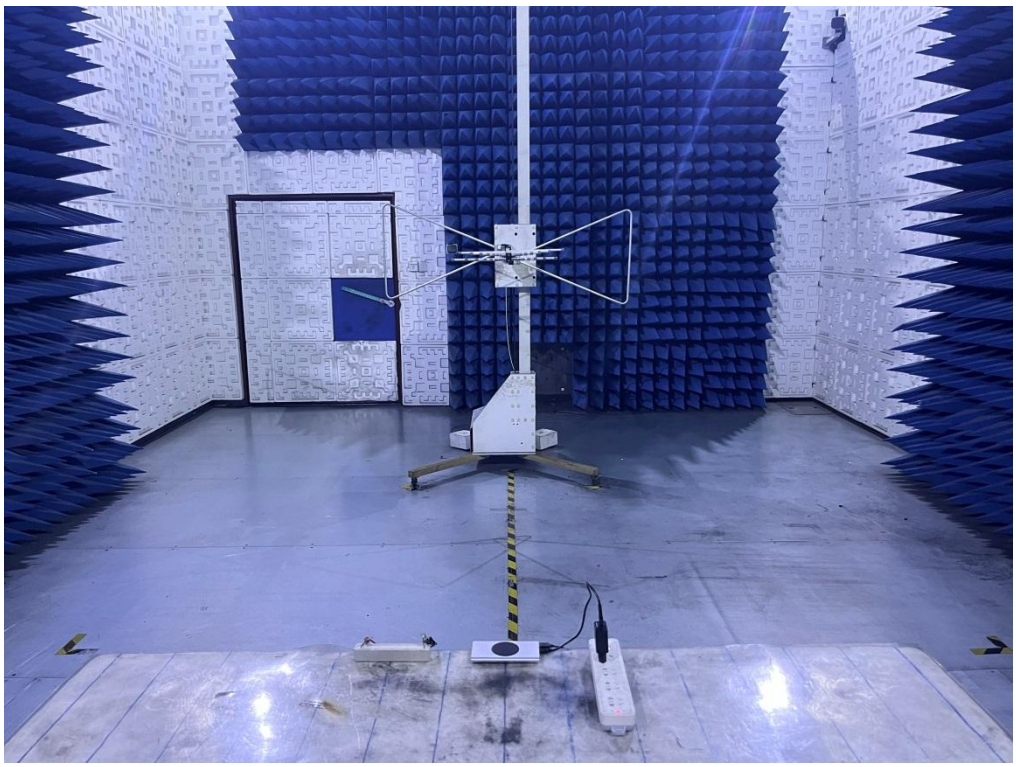
### 14.5. Test Summary

| | | | |
|---|---|---|---|
| Test Engineer | Ikun Yu | Temperature | 24.5 ℃ |
| Test Date | 2024-06-18 | Air Pressure | 985 Mbar |
| Test Mode(s) | Mode 1/4 | Relative Humidity | 52.5 % |
| Verdict | Pass | | |

| Test port | Residual voltage (%) | Cycles | Observation | Performance |
|---|---|---|---|---|
| AC Mains Input | < 5 | 0.5 | No degradation of performance | A |
| | 70 | 25 | No degradation of performance | A |
| | < 5 | 250 | EUT power cycled | B |

## 15. Photographs of Test Setup

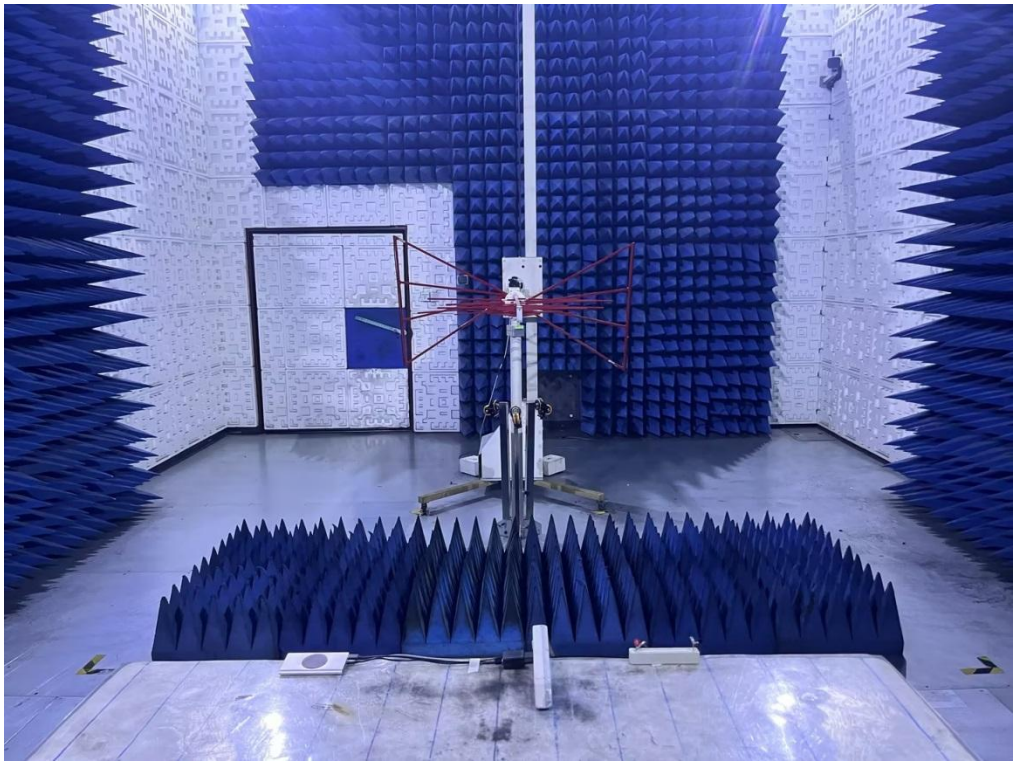
Conducted emissions from the AC mains power ports



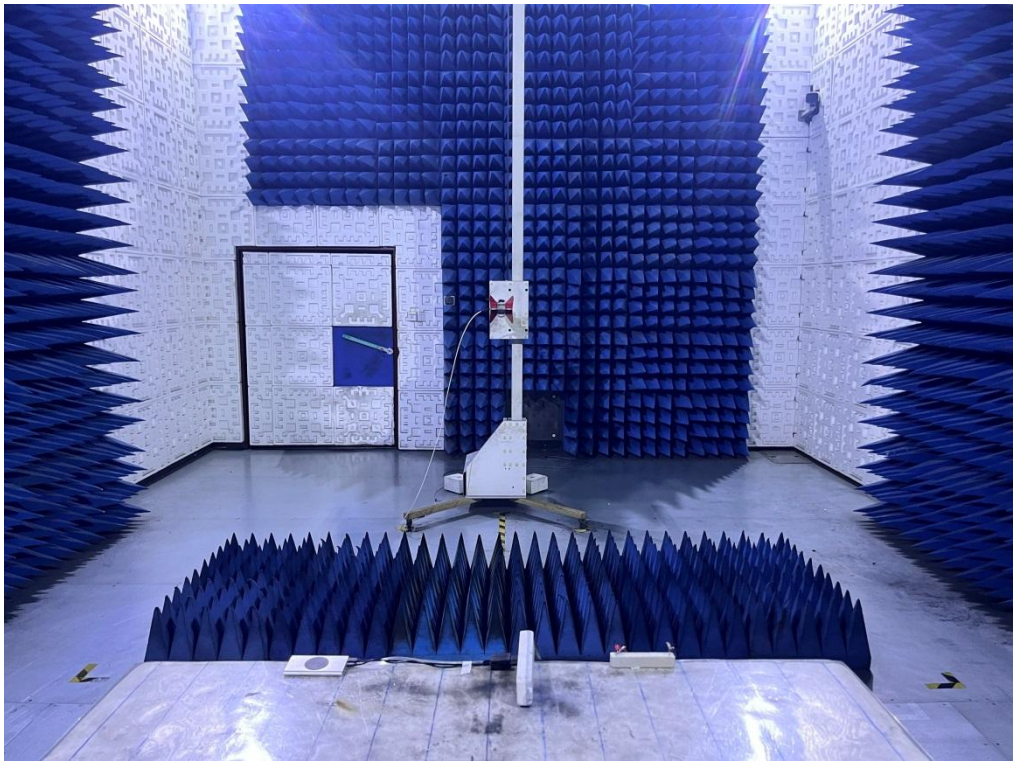
Radiated emissions at frequencies up to 1 GHz

Harmonic current emissions & Voltage fluctuations and flicker

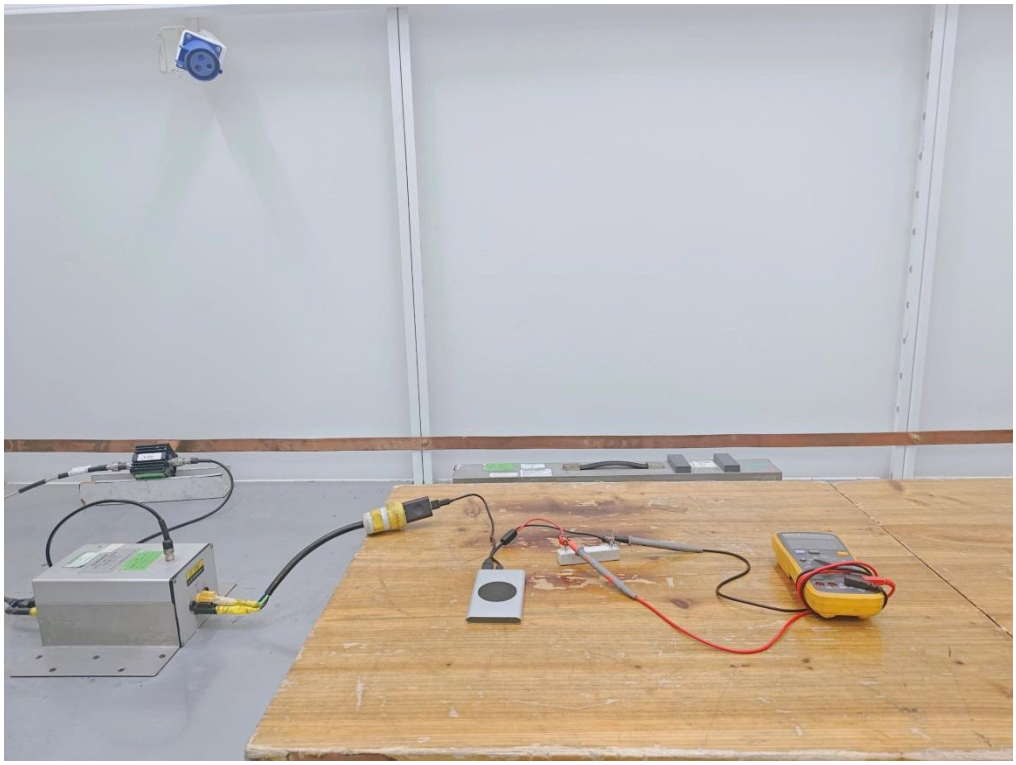
Electrostatic discharge



Radio-frequency electromagnetic field up to 1 GHz



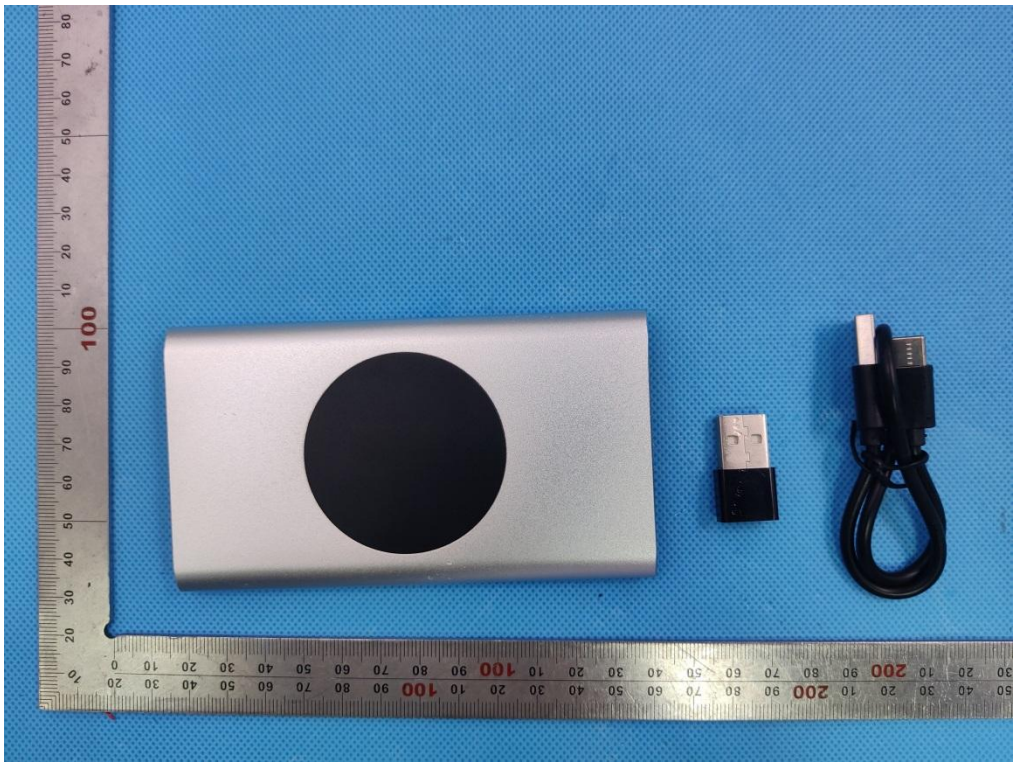
Radio-frequency electromagnetic field above 1 GHz



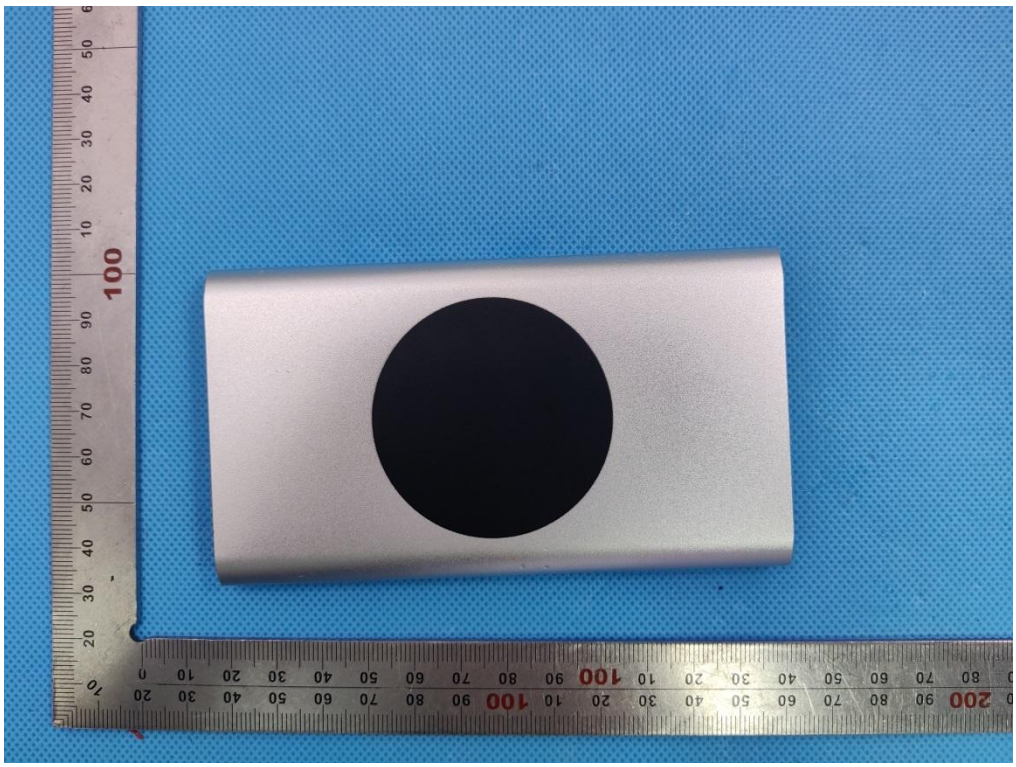
Radio-frequency common mode at the AC mains power ports

Fast transients/Surges/ Voltage dips at the AC mains power ports

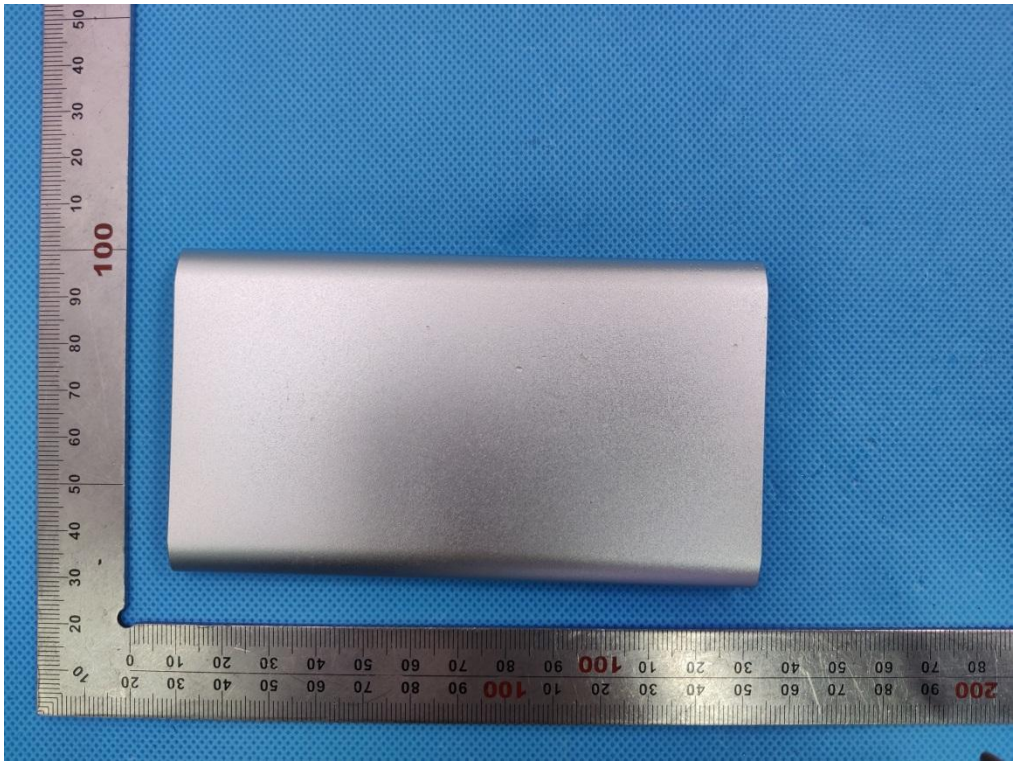
## 16. Photographs of EUT



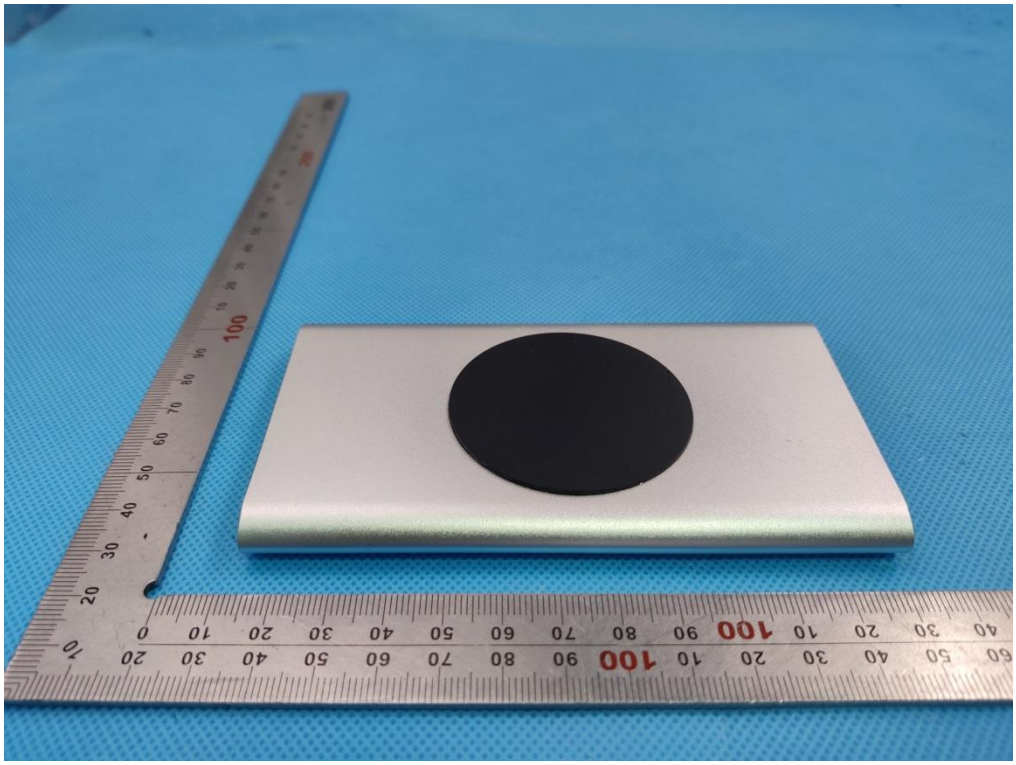
All view of EUT



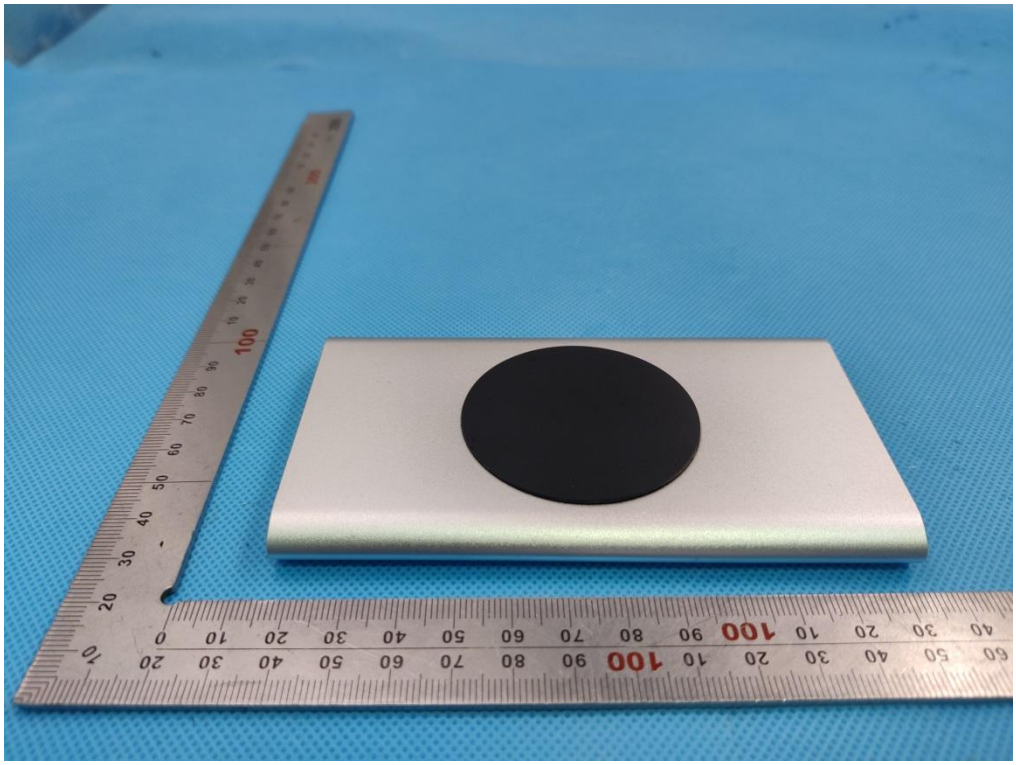
Top view of EUT



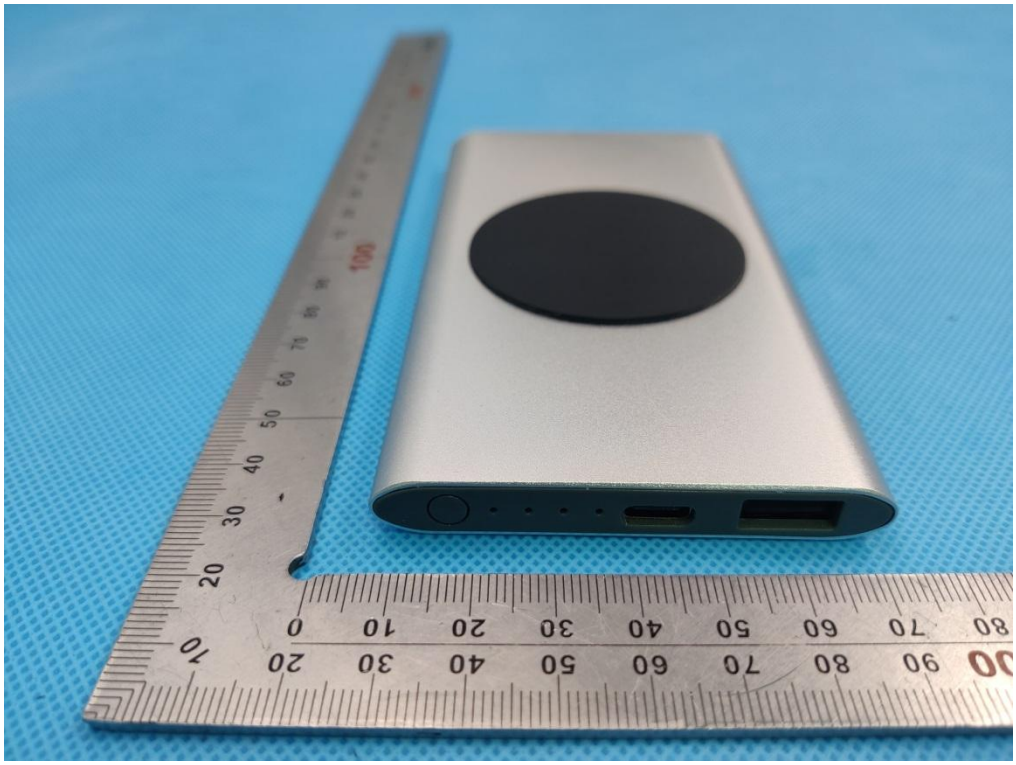
Bottom view of EUT



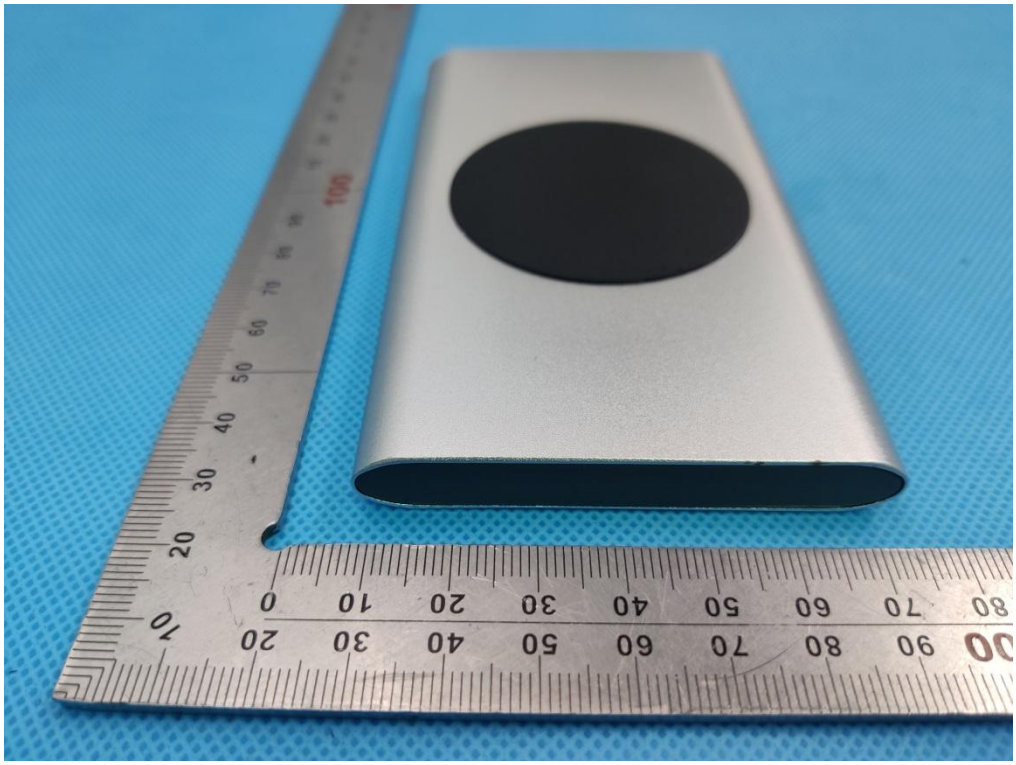
Front view of EUT



Back view of EUT

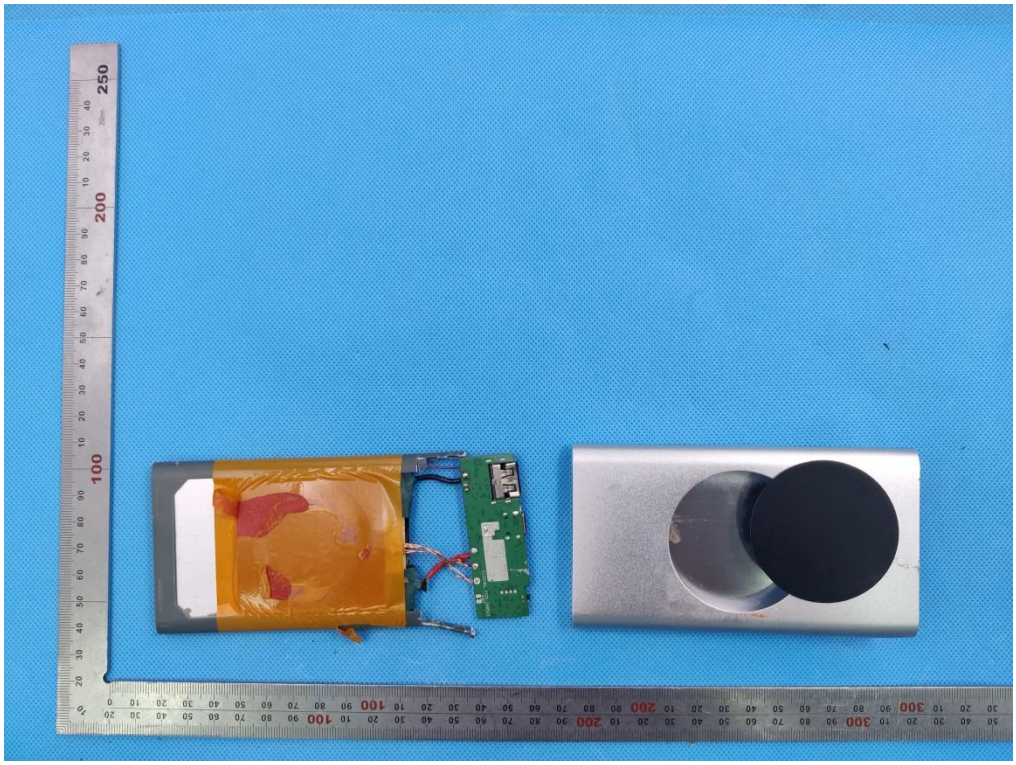


Left view of EUT

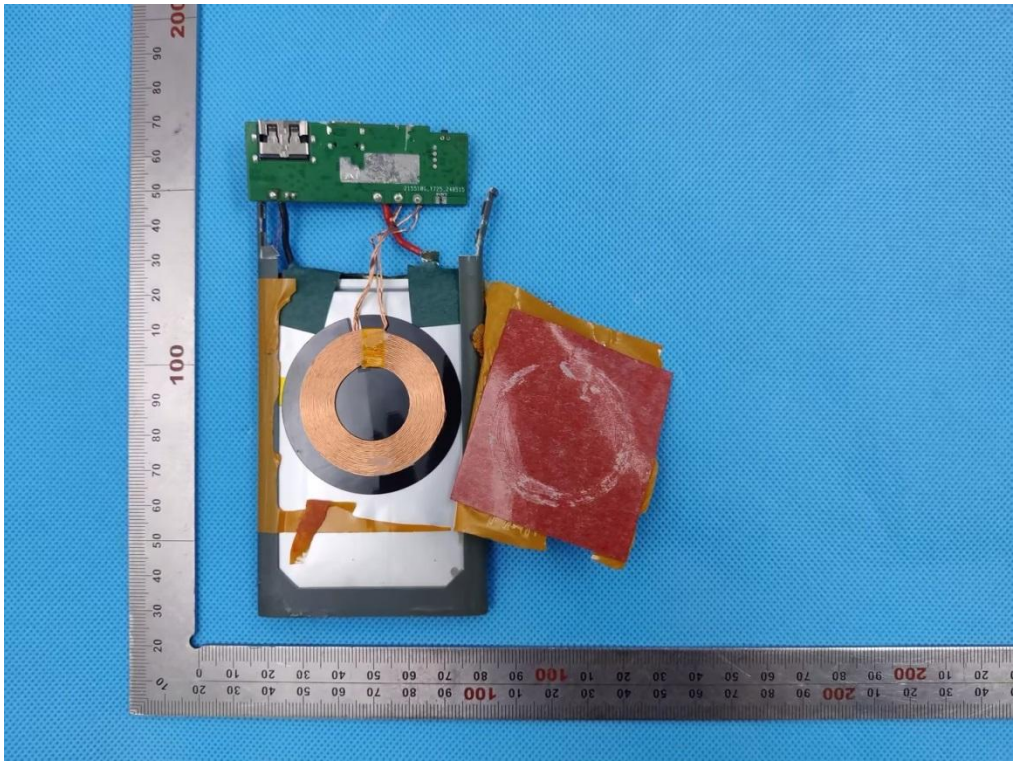


Right view of EUT

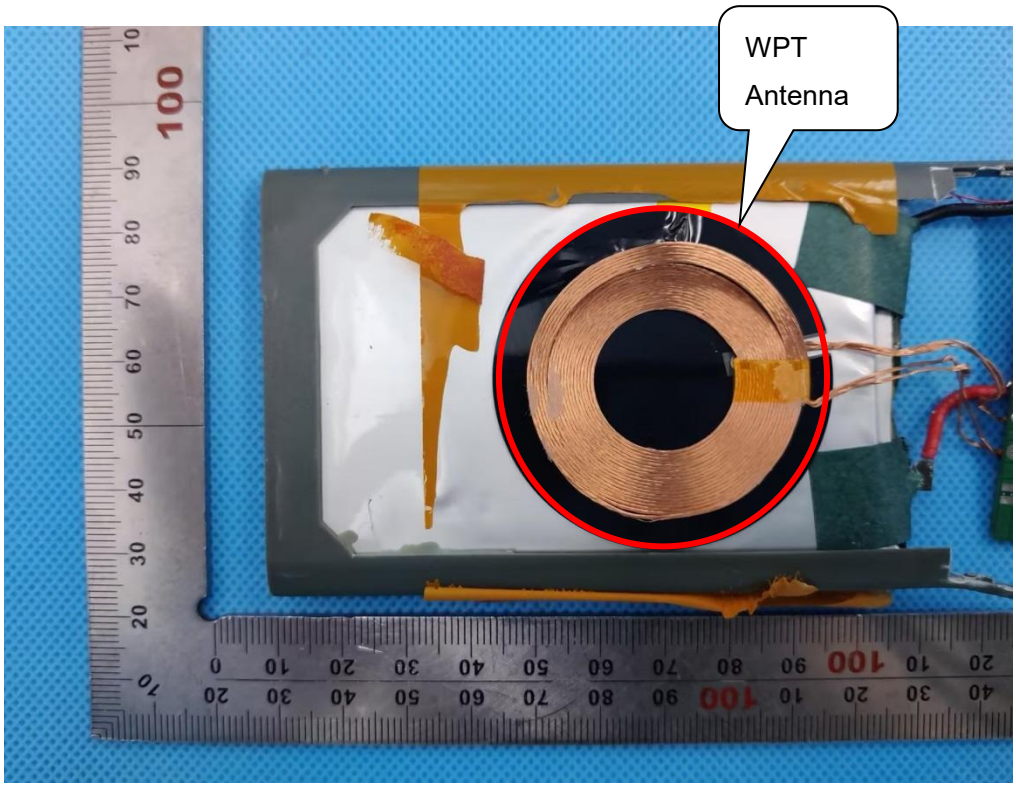
Port view of EUT



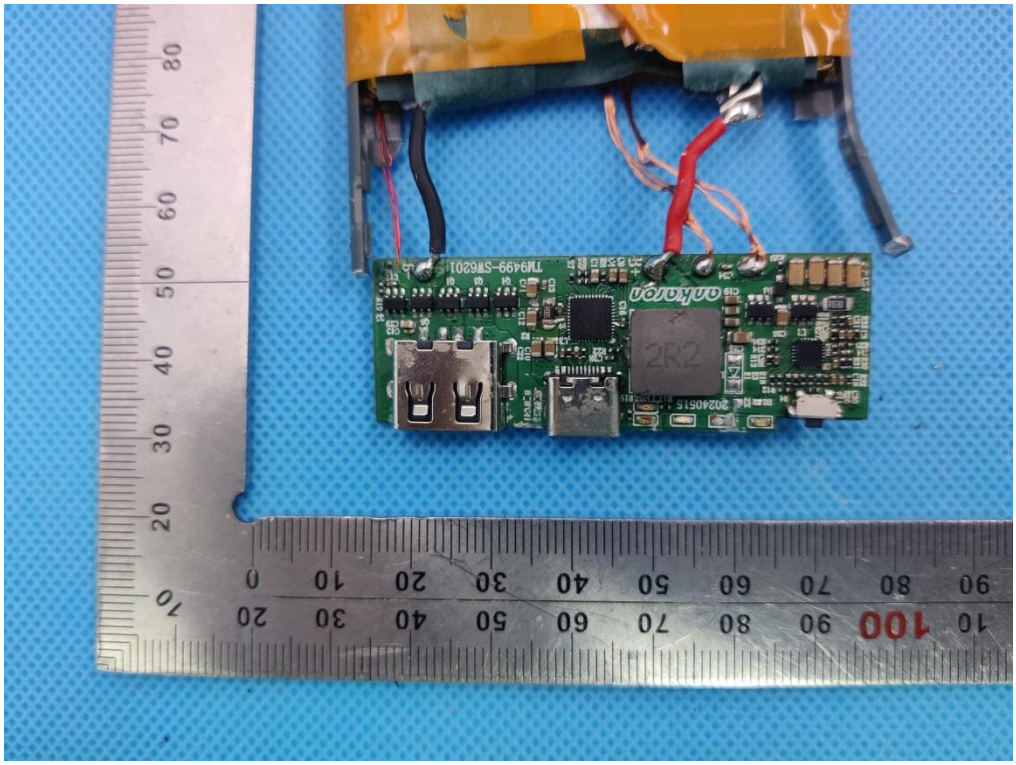
Open view of EUT



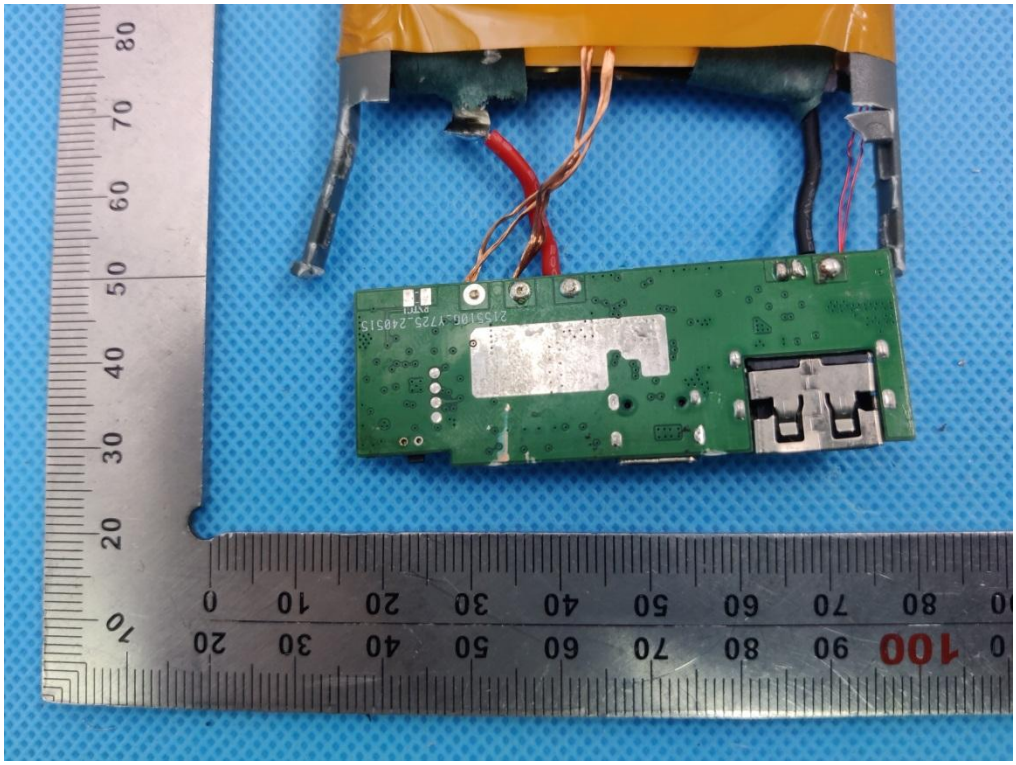
Internal view-1 of EUT



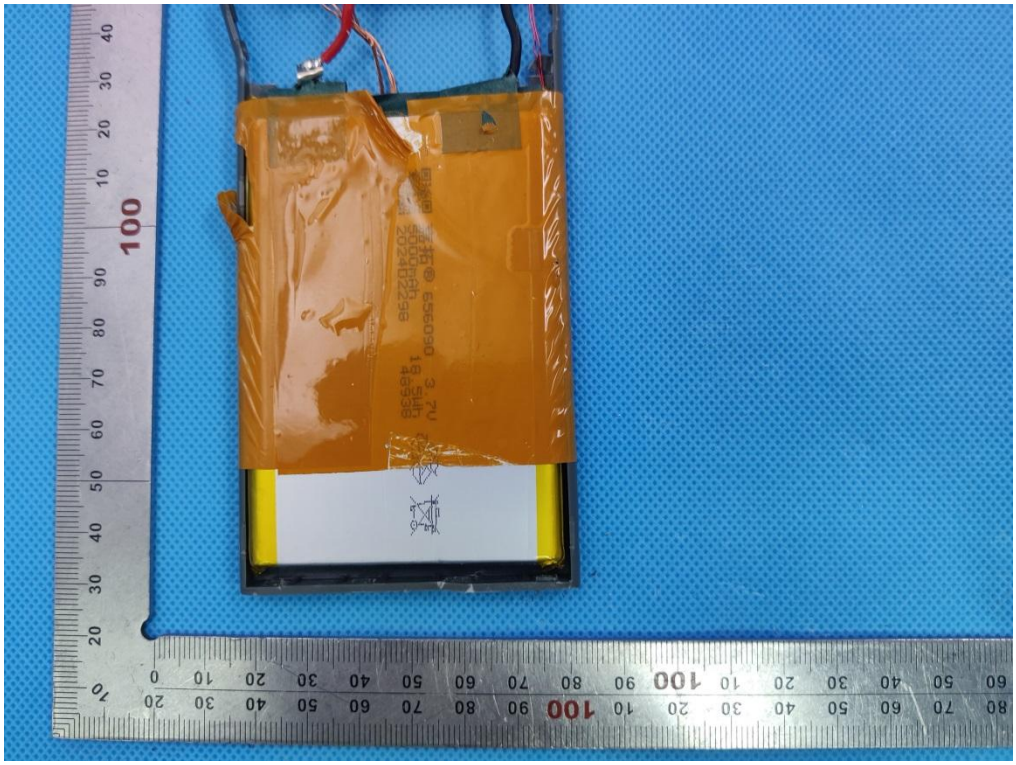

Internal view-2 of EUT



Internal view-3 of EUT



Internal view-4 of EUT



Battery view of EUT

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

# 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. 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.

5. 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.

6. 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.

7.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.

8. 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.

9. 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.