

# EMC Test Report

Report No.: STS2405032E03

Issued for

Ji lin Test BIO-Electron Co.,Ltd

No. 1165 Ya 'an Road, Beihu Science and Technology  
Development Zone, Changchun City, Jilin Province

Product Name: Water Test Equipment

Brand Name: N/A

Model Name: TR-100

Series Model(s): N/A

Test Standards: BS EN IEC 55014-1:2021  
BS EN IEC 55014-2:2021

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**Revision History**

| Rev. | Issue Date  | Report No.    | Effect Page | Contents      |
|------|-------------|---------------|-------------|---------------|
| 00   | 15 May 2024 | STS2405032E03 | ALL         | Initial Issue |
|      |             |               |             |               |

### 1. TEST SUMMARY

Test procedures according to the technical standards:

| EMC Emission                      |  |                        |           |          |
|-----------------------------------|--|------------------------|-----------|----------|
| Standard                          | Test Item  | Limit                  | Judgement | Remark   |
| BS EN IEC 55014-1:2021            | Conducted Emission on Mains Ports<br>150kHz to 30MHz | ---                    | N/A       |          |
|                                   | Disturbance Power(30-300MHz)                         | Meets the requirements | N/A       | NOTE (1) |
|                                   | Radiated Emission                                    | ---                    | PASS      |          |
| EMC Immunity                      |  |                        |           |          |
| Section<br>BS EN IEC 55014-2:2021 | Test Item  | Performance Criteria   | Judgement | Remark   |
| BS EN 61000-4-2:2009              | Electrostatic discharges                             | B                      | PASS      |          |
| BS EN IEC 61000-4-3:2020          | Continuous RF electromagnetic field disturbances     | A                      | PASS      |          |
| BS EN 61000-4-4:2012              | Electrical fast transients/burst                     | B                      | N/A       |          |
| BS EN 61000-4-5:2014/A1:2017      | Surges   | B                      | N/A       |          |
| BS EN 61000-4-6:2014+AC:2015      | Continuous induced RF disturbances                   | A                      | N/A       |          |
| BS EN 61000-4-8:2010              | Power frequency magnetic field                       | A                      | N/A       |          |
| BS EN IEC 61000-4-11:2020         | Voltage dips and interruptions                       | C / C / C              | N/A       | NOTE (2) |

**Note:**

- (1) Clock frequency less than 30MHz and absorbing clamp met applicable limits (Table 7) reduced by the margin (Table 8).
- (2) Voltage Dip: 100% reduction – Performance Criteria **C**  
 Voltage Dip: 30% reduction – Performance Criteria **C**  
 Voltage Dip: 60% reduction – Performance Criteria **C**
- (3) N/A=Not Applicable.



## 1.1 TEST FACTORY

|                   |   |
|-------------------|---|
| Company Name:     | SHENZHEN STS TEST SERVICES CO.,LTD.   |
| Address:          | 101, Building B, Zhuoke Science Park, No.190 Chongqing Road, ZhanChengShequ, Fuhai Sub-District, Bao'an District, Shenzhen, Guang Dong, China |
| Telephone:        | +86-755 3688 6288   |
| Fax:              | +86-755 3688 6277   |
| Registration No.: | FCC test Firm Registration Number: 625569   |
|                   | IC test Firm Registration Number: 12108A  |
|                   | A2LA Certificate No.: 4338.01   |

## 1.2 MEASUREMENT UNCERTAINTY

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

### A. Conducted Measurement:

| Test Site | Method       | Measurement Frequency Range | U , (dB) | NOTE |
|-----------|--------------|-----------------------------|----------|------|
| STSC01    | CISPR 16-4-2 | 9KHz ~ 150KHz               | 2.19     |      |
|           |              | 150KHz ~ 30MHz              | 2.53     |      |

### B. Radiated Measurement:

| Test Site | Method       | Measurement Frequency Range | U , (dB) | NOTE |
|-----------|--------------|-----------------------------|----------|------|
| STSC02    | CISPR 16-4-2 | 30MHz ~ 1000MHz             | 4.18     |      |
|           |              | 1GHz ~ 6 GHz                | 4.90     |      |



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF THE EUT

|                        |   |
|------------------------|---|
| Product Name           | Water Test Equipment  |
| Brand Name             | N/A   |
| Model Name             | TR-100  |
| Series Model(s)        | N/A   |
| Product Differences    | N/A   |
| Product Description    | <p>The EUT is a Water Test Equipment.</p> <p>Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an Home Appliances Device. More details of EUT technical specification, please refer to the User's Manual.</p> |
| Immunity test category | Category III  |
| Battery                | Rated Voltage: DC 1.5V*2  |

## 2.2 DESCRIPTION OF THE TEST MODES

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

| Pretest Mode | Description |
|--------------|-------------|
| Mode 1       | Working     |

| For Radiated Test |             |
|-------------------|-------------|
| Final Test Mode   | Description |
| Mode 1            | Working     |

| For EMS Test    |             |
|-----------------|-------------|
| Final Test Mode | Description |
| Mode 1          | Working     |

**Note:**

1. For disturbance power test, test mode 1 was the worst case and only this mode was presented in this report.

### 2.3 DESCRIPTION OF THE TEST SETUP

The EUT has been tested with associated equipment below and the test setup please refer to appendix 1 - test setup.

#### Necessary accessories

| Item | Equipment | Mfr/Brand | Model/Type No. | Length | Note |
|------|-----------|-----------|----------------|--------|------|
|      | N/A       | N/A       | N/A            | N/A    | N/A  |
|      |           |           |                |        |      |
|      |           |           |                |        |      |
|      |           |           |                |        |      |
|      |           |           |                |        |      |

#### Support units

| Item | Equipment | Mfr/Brand | Model/Type No. | Length | Note |
|------|-----------|-----------|----------------|--------|------|
|      | N/A       | N/A       | N/A            | N/A    | N/A  |
|      |           |           |                |        |      |
|      |           |           |                |        |      |
|      |           |           |                |        |      |
|      |           |           |                |        |      |

#### Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (2) “YES” means “with core”; “NO” means “without core”.

## 2.4 MEASUREMENT INSTRUMENTS LIST

### 2.4.1 RADIATED TEST SITE

| Kind of Equipment        | Manufacturer               | Type No.   | Serial No. | Last Calibration | Calibrated Until |
|--------------------------|----------------------------|------------|------------|------------------|------------------|
| EMI Test Receiver        | R&S                        | ESCI       | 101427     | 2023.9.25        | 2024.9.24        |
| Bi-log Antenna           | TESEQ                      | CBL6111D   | 45873      | 2023.9.27        | 2024.9.26        |
| Horn Antenna             | SCHWARZBECK                | BBHA 9120D | 9120D-1343 | 2023.9.27        | 2024.9.26        |
| Pre-amplifier(1G-26.5G)  | Agilent                    | HP8449B    | 3008A02383 | 2024.2.23        | 2025.2.22        |
| Pre-amplifier(0.1M-3GHz) | EM                         | EM330      | 060665     | 2024.2.23        | 2025.2.22        |
| Spectrum Analyzer        | Agilent                    | N9020A     | MY49100060 | 2023.9.26        | 2024.9.25        |
| RE Cable (9K-1G)         | N/A                        | R01        | N/A        | 2023.9.25        | 2024.9.24        |
| RE Cable (1G-26G)        | N/A                        | R02        | N/A        | 2023.9.25        | 2024.9.24        |
| Temperature & Humidity   | Mieo                       | HH660      | N/A        | 2023.9.28        | 2024.9.27        |
| Testing Software         | EZ-EMC(Ver.STSLAB-03A1 RE) |            |            |                  |                  |

### 2.4.2 ESD

| Kind of Equipment      | Manufacturer | Type No. | Serial No. | Last Calibration | Calibrated Until |
|------------------------|--------------|----------|------------|------------------|------------------|
| ESD TEST GENERATOR     | TESEQ        | NSG438   | 1175       | 2023.9.27        | 2024.9.26        |
| Temperature & Humidity | N/A          | WS1066   | N/A        | 2024.2.23        | 2025.2.22        |

**2.4.3 RS**

| Kind of Equipment                          | Manufacturer    | Type No.          | Serial No. | Last Calibration | Calibrated Until |
|--|-----------------|-------------------|------------|------------------|------------------|
| Power Meter                                | Agilent         | E4419B            | QB43312265 | 2023.9.25        | 2024.9.24        |
| Power Sensor                               | hp              | E9300A            | US39210170 | 2023.9.25        | 2024.9.24        |
| Power Sensor                               | hp              | E9300A            | US39210476 | 2023.9.25        | 2024.9.24        |
| Signal Generator                           | Agilent         | N5181A            | MY56144718 | 2023.9.25        | 2024.9.24        |
| Power Amplifier                            | MICOTOP         | MPA-80-1000-250   | MPA1711489 | 2023.9.25        | 2024.9.24        |
| Power Amplifier                            | MICOTOP         | MPA-1000-6000-100 | MPA1904132 | 2023.9.25        | 2024.9.24        |
| RS Test Antenna<br>(80-1GHz)               | SCHWARZBECK     | VULP 9118E        | 000999     | N/A              | N/A              |
| RS Test Antenna<br>(1G-10GHz)              | SCHWARZBECK     | STLP 9149         | 000648     | N/A              | N/A              |
| Universal Radio<br>Communication<br>Tester | R&S             | CMU200            | 116337     | 2024.2.23        | 2025.2.22        |
| Audio Analyzer                             | R&S             | UPL               | 100689     | 2024.2.23        | 2025.2.22        |
| Audio<br>Breakthrough<br>Shielding Box     | SKET            | SB_ABT/C35        | N/A        | N/A              | N/A              |
| Ear Simulator                              | SKET            | AE_ABT/C35        | N/A        | N/A              | N/A              |
| Mouth Simulator                            | SKET            | AM_ABT/C35        | N/A        | N/A              | N/A              |
| 1KHz Standard<br>Source                    | SKET            | MSC_ABT/C35       | N/A        | 2023.9.28        | 2024.9.27        |
| Field Probe                                | Narda           | EP601             | 611WX80261 | 2024.2.23        | 2025.2.22        |
| Temperature &<br>Humidity                  | Mieo            | HH660             | N/A        | 2023.9.28        | 2024.9.27        |
| Testing Software                           | EMC-S V1.4.0.53 |                   |            |                  |                  |

### 3. EMC EMISSION TEST

#### 3.1 CONDUCTED EMISSION MEASUREMENT

##### 3.1.1 POWER LINE CONDUCTED EMISSION

(Frequency Range 150KHz-30MHz)

| FREQUENCY (MHz) | At load terminals and additional terminals (dBuV) |         | At mains terminals (dBuV) |           |
|-----------------|---|---------|---------------------------|-----------|
|                 | Quasi-peak  | Average | Quasi-peak                | Average   |
| 0.15 -0.5       | 80.00   | 70.00   | 66 - 56 *                 | 59 - 46 * |
| 0.50 -5.0       | 74.00   | 64.00   | 56.00                     | 46.00     |
| 5.0 -30.0       | 74.00   | 64.00   | 60.00                     | 50.00     |

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

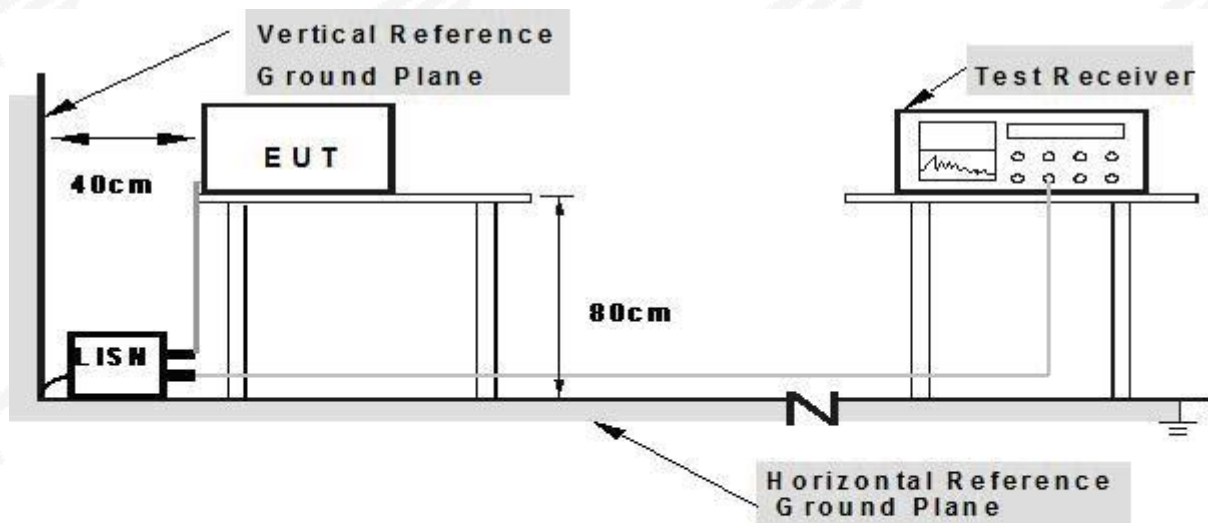
The following table is the setting of the receiver

| Receiver Parameters | Setting  |
|---------------------|----------|
| Attenuation         | 10 dB    |
| Start Frequency     | 0.15 MHz |
| Stop Frequency      | 30 MHz   |
| IF Bandwidth        | 9 kHz    |

### 3.1.2 TEST PROCEDURE

- a. The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 3.1.3 TEST SETUP



- Note: 1. Support units were connected to second LISN.**  
**2. Both of LISN s (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

### 3.1.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the following during the testing.

### 3.1.5 TEST RESULTS

|               |      |                    |     |
|---------------|------|--------------------|-----|
| Temperature:  | --°C | Relative Humidity: | --% |
| Phase:        | L/N  | Test Mode:         | N/A |
| Test Voltage: | N/A  |                    |     |

Note: N/A

### 3.2 DISTURBANCE POWER MEASUREMENT

#### 3.2.1 LIMITS OF THE DISTURBANCE POWER MEASUREMENT (30MHz-300MHz)

**Table 7 – Disturbance power limits – 30 MHz to 300 MHz**

| Frequency range                           | General                                      |              | Tools           |              |                   |              |                 |              |
|---|--|--------------|-----------------|--------------|-------------------|--------------|-----------------|--------------|
|   |  |              | P ≤ 700 W       |              | 700 W < P ≤ 1000W |              | P > 1 000 W     |              |
| 1   | 2  | 3            | 4               | 5            | 6                 | 7            | 8               | 9            |
| MHz                                       | Quasi-peak                                   | Average dBpW | Quasi-peak dBpW | Average dBpW | Quasi-peak dBpW   | Average dBpW | Quasi-peak dBpW | Average dBpW |
| 30 ~ 300                                  | Increasing linearly with the frequency from: |              |                 |              |                   |              |                 |              |
|   | 44 ~ 55                                      | 35 ~ 45      | 44 ~ 55         | 35 ~ 45      | 49 ~ 59           | 39 ~ 49      | 55 ~ 65         | 45 ~ 55      |
| Key<br>P = rated power of the motor only. |  |              |                 |              |                   |              |                 |              |

If the quasi-peak measurements meet the average limit, the EUT shall be deemed to meet both limits and the measurements using the average detector need not be carried out.

**Table 8 – Reduction applicable to Table 7 limits**

| Frequency range   | General                                      |              | Tools           |              |                   |              |                 |              |
|---|--|--------------|-----------------|--------------|-------------------|--------------|-----------------|--------------|
|   |  |              | P ≤ 700 W       |              | 700 W < P ≤ 1000W |              | P > 1 000 W     |              |
| 1   | 2  | 3            | 4               | 5            | 6                 | 7            | 8               | 9            |
| MHz   | Quasi-peak                                   | Average dBpW | Quasi-peak dBpW | Average dBpW | Quasi-peak dBpW   | Average dBpW | Quasi-peak dBpW | Average dBpW |
| 200 ~ 300   | Increasing linearly with the frequency from: |              |                 |              |                   |              |                 |              |
|   | 0 ~ 10                                       | 0            | 0 ~ 10          | 0            | 0 ~ 10            | 0            | 0 ~ 10          | 0            |
| NOTE This table only applies if method a) specified in 4.3.4.2 is followed. |  |              |                 |              |                   |              |                 |              |

Notes:

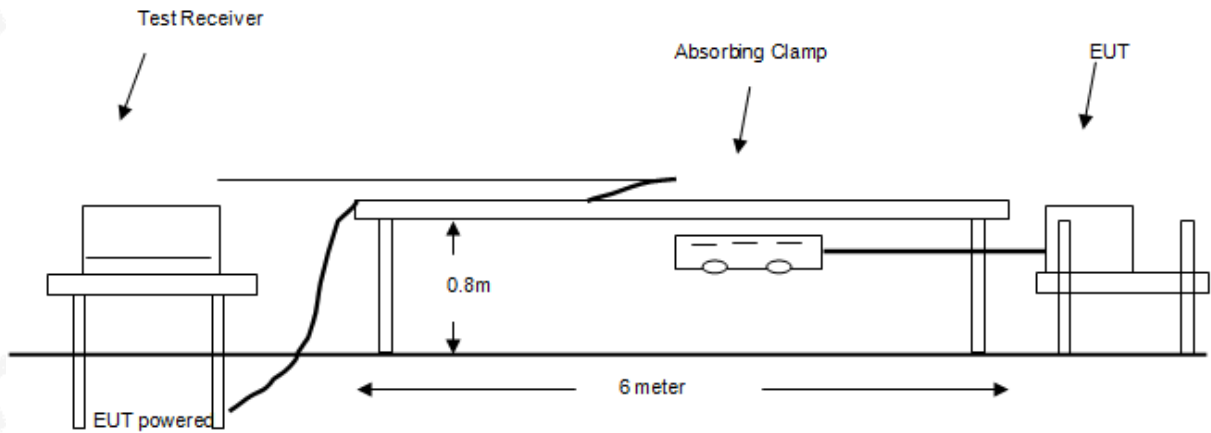
- (1) The limit for radiated test was performed in the following: CISPR14.1.
- (2) The tighter limit applies at the band edges.

#### 3.2.2 TEST PROCEDURE

- a. The EUT is placed on a 0.8 meter height wooden table above the ground plane, and kept at least 0.8 m from other metallic object. The straight portion of main lead would put on 6 m long testing bench (if main lead is shorter than 6 m it should be extended).
- b. Any lead connecting the main appliance to an auxiliary apparatus is disconnected if this does not affect the operation of the appliance, or is isolated by means of ferrite rings (or an absorbing clamp) close to the appliance.
- c. The EUT received AC power source from the outlet socket under the turntable. All support equipment power received from another socket under the turntable.
- d. The EUT test program was started. Emissions were scanned and measured using a receiver connected to the absorbing clamp.
- e. The absorbing clamp is positioned for maximum indication at each test frequency (30MHz to 300MHz), that means is clamp moved along the main lead until the maximum emission value is found.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 3.2.3 TEST SETUP

#### Disturbance Power Test Set-Up



### 3.2.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the following during the testing.

### 3.2.5 TEST RESULTS

#### DISTURBANCE POWER RESULT (30-300MHz)

|               |      |                    |     |
|---------------|------|--------------------|-----|
| Temperature:  | --°C | Relative Humidity: | --% |
| Test Voltage: | N/A  | Note:              | N/A |
| Test Mode:    | N/A  |                    |     |

Note: N/A

### 3.3 RADIATED EMISSION MEASUREMENT

#### 3.3.1 LIMITS OF THE RADIATED EMISSION MEASUREMENT

| FREQUENCY (MHz) | At 10m              | At 3m               |
|-----------------|---------------------|---------------------|
|                 | Quasi-peak (dBuV/m) | Quasi-peak (dBuV/m) |
| 30 ~ 230        | 30                  | 40                  |
| 230 ~ 300       | 37                  | 47                  |
| 230 ~ 1000      | 37                  | 47                  |

| FREQUENCY (MHz) | At 3m         |              |
|-----------------|---------------|--------------|
|                 | Peak (dBuV/m) | Avg (dBuV/m) |
| 1000 ~ 3000     | 70            | 50           |
| 3000 ~ 6000     | 74            | 54           |

Notes:

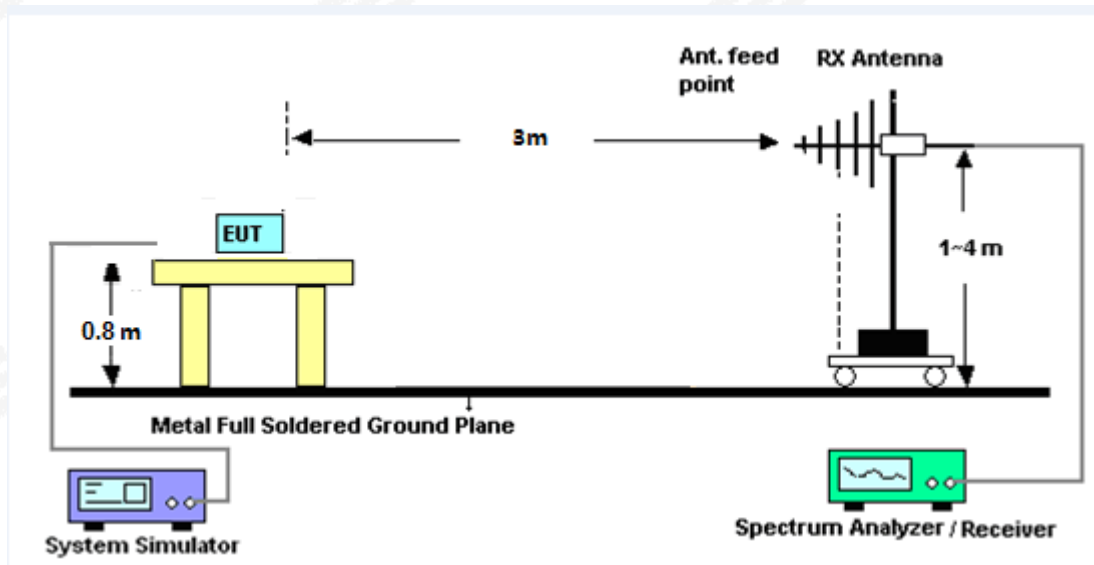
- (1) The limit for radiated test was performed in the following: CISPR 14-1.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m) = 20log Emission level (uV/m).

#### 3.3.2 TEST PROCEDURE

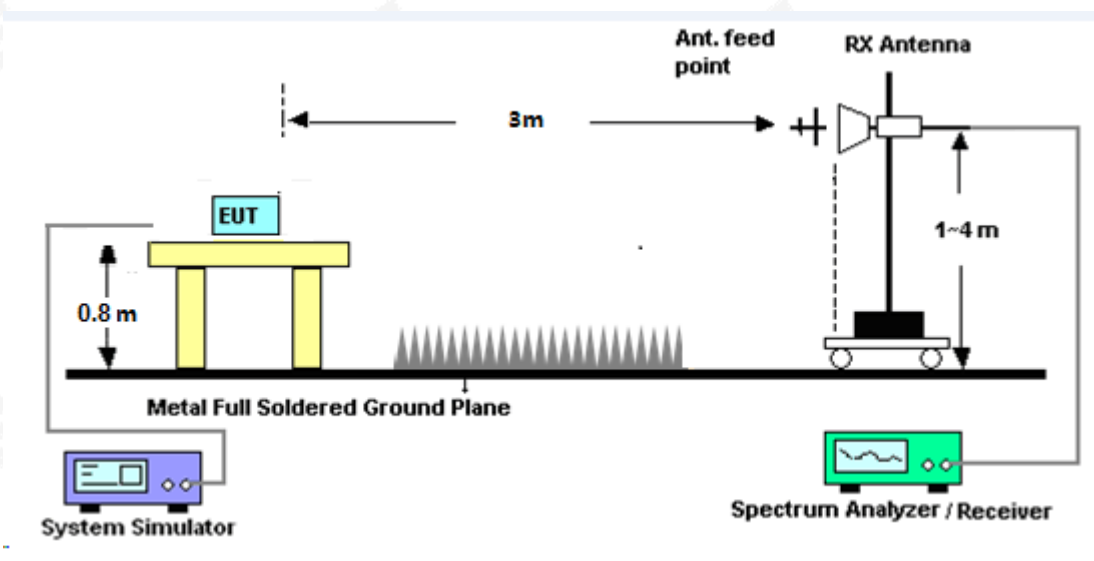
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 3.3.3 TEST SETUP

#### (A) Radiated Emission Test Set-Up Frequency Below 1 GHz



#### (B) Radiated Emission Test Set-Up Frequency Above 1GHz



### 3.3.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the following during the testing.

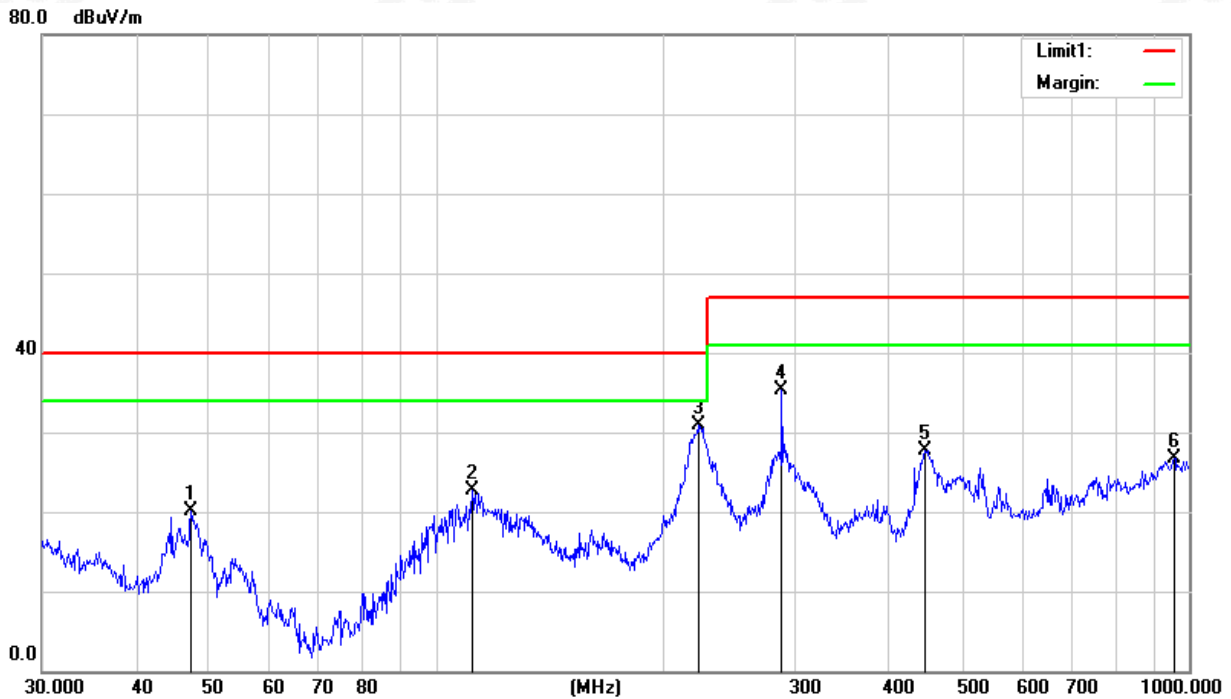
### 3.3.5 TEST RESULTS

|               |            |                    |            |
|---------------|------------|--------------------|------------|
| Temperature:  | 26.1 °C    | Relative Humidity: | 53%        |
| Phase:        | Horizontal | Test Mode:         | Mode 1     |
| Test Voltage: | DC 3V      | Test Date:         | 2024.05.13 |

| No. | Frequency (MHz) | Reading (dBUV) | Correct Factor (dB) | Results (dBUV/m) | Limit (dBUV/m) | Margin (dB) | Detector |
|-----|-----------------|----------------|---------------------|------------------|----------------|-------------|----------|
| 1   | 47.3253         | 40.34          | -20.30              | 20.04            | 40.00          | -19.96      | QP       |
| 2   | 111.7380        | 42.01          | -19.37              | 22.64            | 40.00          | -17.36      | QP       |
| 3   | 222.9501        | 50.17          | -19.32              | 30.85            | 40.00          | -9.15       | QP       |
| 4   | 287.9904        | 51.94          | -16.55              | 35.39            | 47.00          | -11.61      | QP       |
| 5   | 446.4141        | 40.29          | -12.56              | 27.73            | 47.00          | -19.27      | QP       |
| 6   | 955.4380        | 28.70          | -2.02               | 26.68            | 47.00          | -20.32      | QP       |

**Remark:**

1. All readings are Quasi-Peak.
2. Margin = Result (Result = Reading + Factor) – Limit
3. Factor = Cable Loss + Antenna Factor - Amplifier Gain



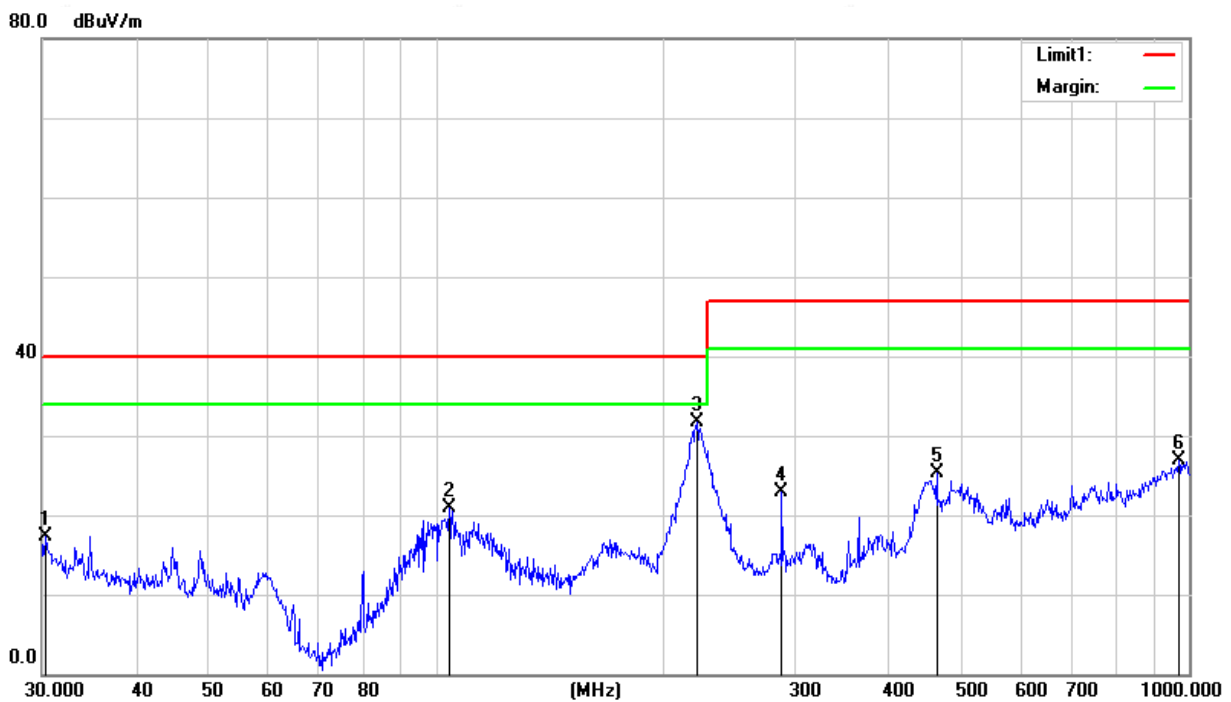


|               |          |                    |            |
|---------------|----------|--------------------|------------|
| Temperature:  | 26.1°C   | Relative Humidity: | 53%        |
| Phase:        | Vertical | Test Mode:         | Mode 1     |
| Test Voltage: | DC 3V    | Test Date:         | 2024.05.13 |

| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor (dB) | Results (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|----------------|---------------------|------------------|----------------|-------------|----------|
| 1   | 30.3172         | 28.55          | -11.21              | 17.34            | 40.00          | -22.66      | QP       |
| 2   | 104.1701        | 40.65          | -19.81              | 20.84            | 40.00          | -19.16      | QP       |
| 3   | 222.1698        | 51.12          | -19.39              | 31.73            | 40.00          | -8.27       | QP       |
| 4   | 287.9904        | 39.36          | -16.55              | 22.81            | 47.00          | -24.19      | QP       |
| 5   | 462.3455        | 36.82          | -11.59              | 25.23            | 47.00          | -21.77      | QP       |
| 6   | 968.9338        | 28.89          | -1.98               | 26.91            | 47.00          | -20.09      | QP       |

Remark:

- 1. All readings are Quasi-Peak.
- 2. Margin = Result (Result = Reading + Factor) - Limit
- 3. Factor = Cable Loss + Antenna Factor - Amplifier Gain



## 4. EMC IMMUNITY TEST

### 4.1 STANDARD COMPLIANCE/SERVIRITY LEVEL/CRITERIA

| Tests<br>Standard No.         | TEST SPECIFICATION                               | Test Mode<br>Test Ports | Perform.<br>Criteria |
|-------------------------------|--|-------------------------|----------------------|
| 1. ESD<br>IEC/BS EN 61000-4-2 | 8KV air discharge<br>4KV contact discharge       | Direct Mode             | B                    |
|                               | 4KV HCP discharge<br>4KV VCP discharge           | Indirect Mode           | B                    |
| 2. RS<br>IEC/BS EN 61000-4-3  | 80 MHz to 1000 MHz, 1000Hz, 80%,<br>AM modulated | Enclosure               | A                    |

## 4.2 GENERAL PERFORMANCE CRITERIA

According to **BS EN 55014-2** standard, the general performance criteria as following:

|                    |  |
|--------------------|--|
| <b>Criterion A</b> | The apparatus shell continues 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 apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the manufacturer does not specify the minimum performance level or the permissible performance loss, 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.   |
| <b>Criterion B</b> | <p>After test, the apparatus shell continues to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomenon below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance.</p> <p>During the test, degradation of performance is however allowed. However, no change of operating state if stored data is allowed to persist after the test. If the manufacturer does not specify the minimum performance level or the permissible performance loss, 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.</p> |
| <b>Criterion C</b> | <p>Temporary loss of function is allowed, provided the functions is self-recoverable or can be restored by the operation of controls by the user in accordance with the manufacturer instructions.</p> <p>Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>  |

### 4.2.1 GENERAL PERFORMANCE CRITERIA TEST SETUP

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the following during the testing.

### 4.3 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

#### 4.3.1 TEST SPECIFICATION

|                       |  |
|-----------------------|--|
| Basic Standard:       | IEC/BS EN 61000-4-2  |
| Discharge Impedance:  | 330 ohm / 150 pF   |
| Required Performance: | B  |
| Discharge Voltage:    | Air Discharge : 2KV/4KV/8KV (Direct)<br>Contact Discharge : 2KV/4KV (Direct/Indirect)                                |
| Polarity:             | Positive & Negative  |
| Number of Discharge:  | Air Discharge: min. 20 times at each test point<br>Contact Discharge: 10 with positive and 10 with negative polarity |
| Discharge Mode:       | Single Discharge   |
| Discharge Period:     | 1 second minimum   |

#### 4.3.2 TEST PROCEDURE

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

- a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation  
The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

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

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.

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

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 complete.

Vertical Coupling Plane (VCP):

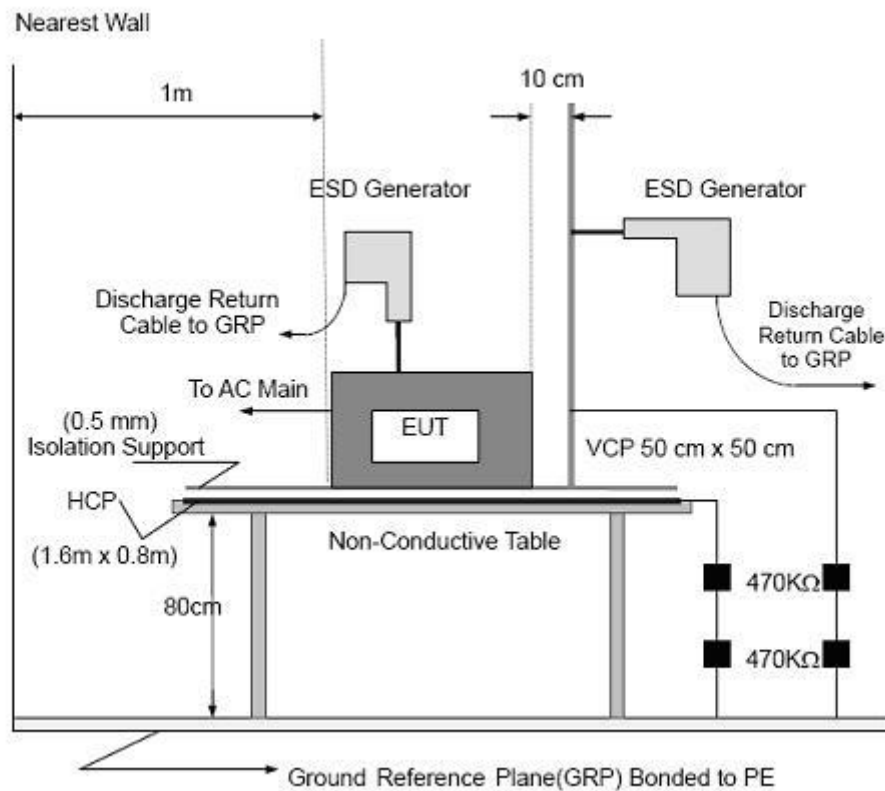
The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

Horizontal Coupling Plane (HCP):

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

- b. Air discharges at insulation surfaces of the EUT.  
It was at least ten single discharges with positive and negative at the same selected point.

### 4.3.3 TEST SETUP



Note:

#### TABLE-TOP EQUIPMENT

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

#### FLOOR-STANDING EQUIPMENT

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

**4.3.4 TEST RESULTS**

|              |           |                    |            |
|--------------|-----------|--------------------|------------|
| Temperature: | 26.8 °C   | Relative Humidity: | 45%        |
| Pressure:    | 1017.8hPa | Test Voltage:      | DC 3V      |
| Test Mode:   | Mode 1    | Test Date:         | 2024.05.14 |

| Discharge Level | Polarity | Test Points | Contact Discharge | Air Discharge | Criterion | Test Result |
|-----------------|----------|-------------|-------------------|---------------|-----------|-------------|
| 2,4             | +/-      | VCP/HCP     | NOTE              | N/A           | B         | A           |
| 2,4,8           | +/-      | Red Dot     | N/A               | NOTE          | B         | A           |

Note: The EUT function was correct during the test.  
Red Dot —Air Discharged  
Green Dot —Contact Discharged

### The Photo for Discharge Points of EUT





## 4.4 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS)

### 4.4.1 TEST SPECIFICATION

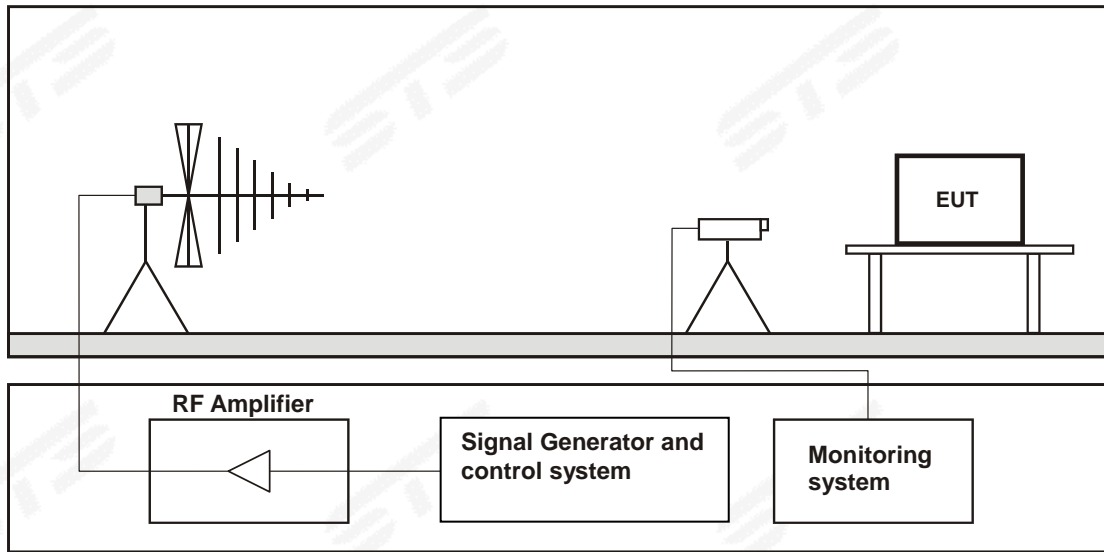
|                       |                                    |
|-----------------------|------------------------------------|
| Basic Standard:       | IEC/BS EN 61000-4-3                |
| Required Performance: | A                                  |
| Frequency Range:      | 80 MHz - 6000 MHz                  |
| Field Strength:       | 3 V/m                              |
| Modulation:           | 1kHz Sine Wave, 80%, AM Modulation |
| Frequency Step:       | 1 % of fundamental                 |
| Polarity of Antenna:  | Horizontal and Vertical            |
| Test Distance:        | 3 m                                |
| Antenna Height:       | 1.5 m                              |
| Dwell Time:           | 3s                                 |

### 4.4.2 TEST PROCEDURE

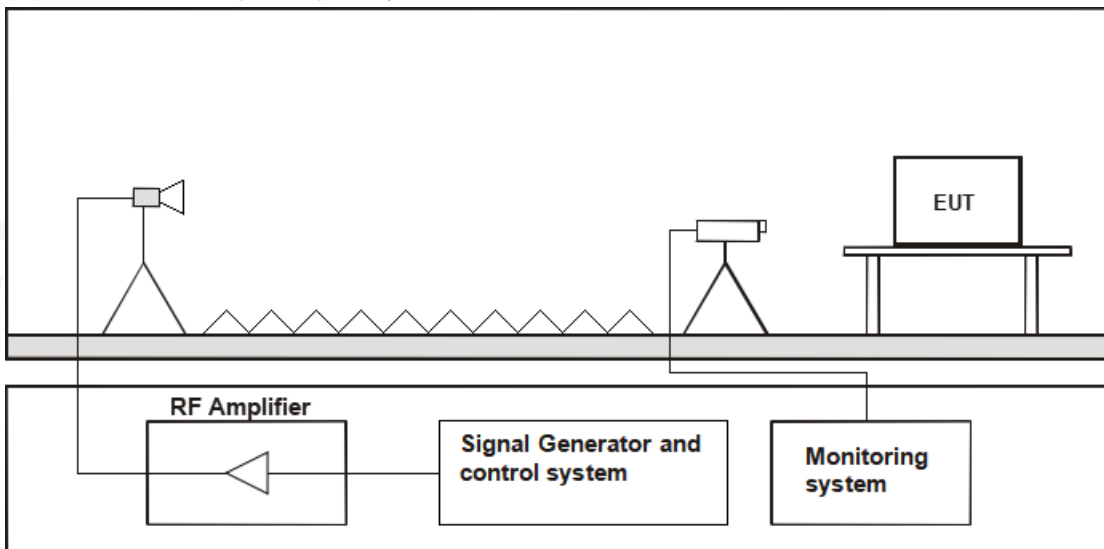
- a. The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- b. The frequency range is swept from 80 MHz to 6000 MHz, with the signal 80% amplitude modulated with a 1kHz sine-wave. The rate of sweep did not exceed 3s, where the frequency range is swept incrementally, the step size was 1% of preceding frequency value.
- c. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

### 4.4.3 TEST SETUP

#### (A) RS Test Set-Up Frequency Below 1GHz



#### (B) RS Test Set-Up Frequency Above 1GHz



Note:

#### TABLE-TOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/BS EN 61000-4-3 was placed on a non-conductive table 0.8 meter in height. The system under test was connected to the power and signal wire according to the relevant installation instructions.

#### FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/BS EN 61000-4-3 was placed on a non-conductive wood support 0.1 meter in height. The system under test was connected to the power and signal wire according to the relevant installation instructions.



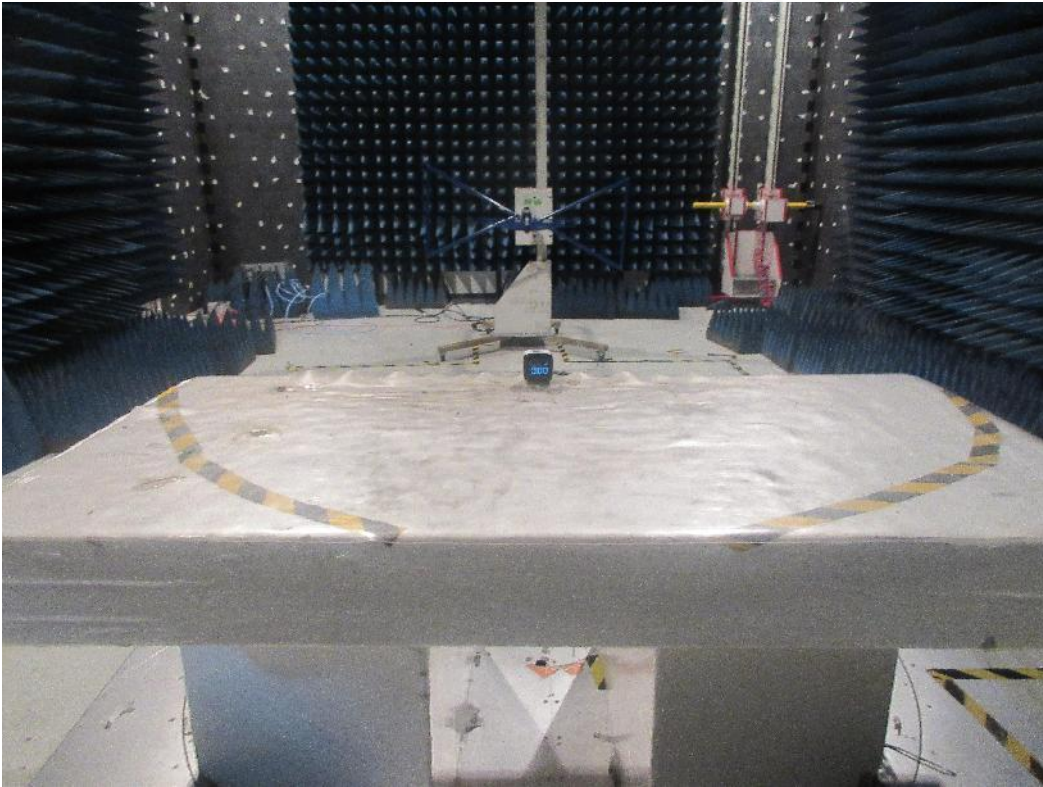
### 4.4.4 TEST RESULTS

|               |        |                    |            |
|---------------|--------|--------------------|------------|
| Temperature:  | 26.8°C | Relative Humidity: | 45%        |
| Test Voltage: | DC 3V  | Test Date:         | 2024.05.14 |
| Test Mode:    | Mode 1 |                    |            |

| Frequency Range (MHz) | RF Field Position | R.F. Field Strength                        | Azimuth | Perform. Criteria | Results | Judgment |
|-----------------------|-------------------|--|---------|-------------------|---------|----------|
| 80MHz - 1000MHz       | H / V             | 3 V/m (rms)<br>AM Modulated<br>1000Hz, 80% | Front   | A                 | A       | PASS     |
|                       |                   |  | Rear    |                   |         |          |
|                       |                   |  | Left    |                   |         |          |
|                       |                   |  | Right   |                   |         |          |

## APPENDIX 1- TEST SETUP

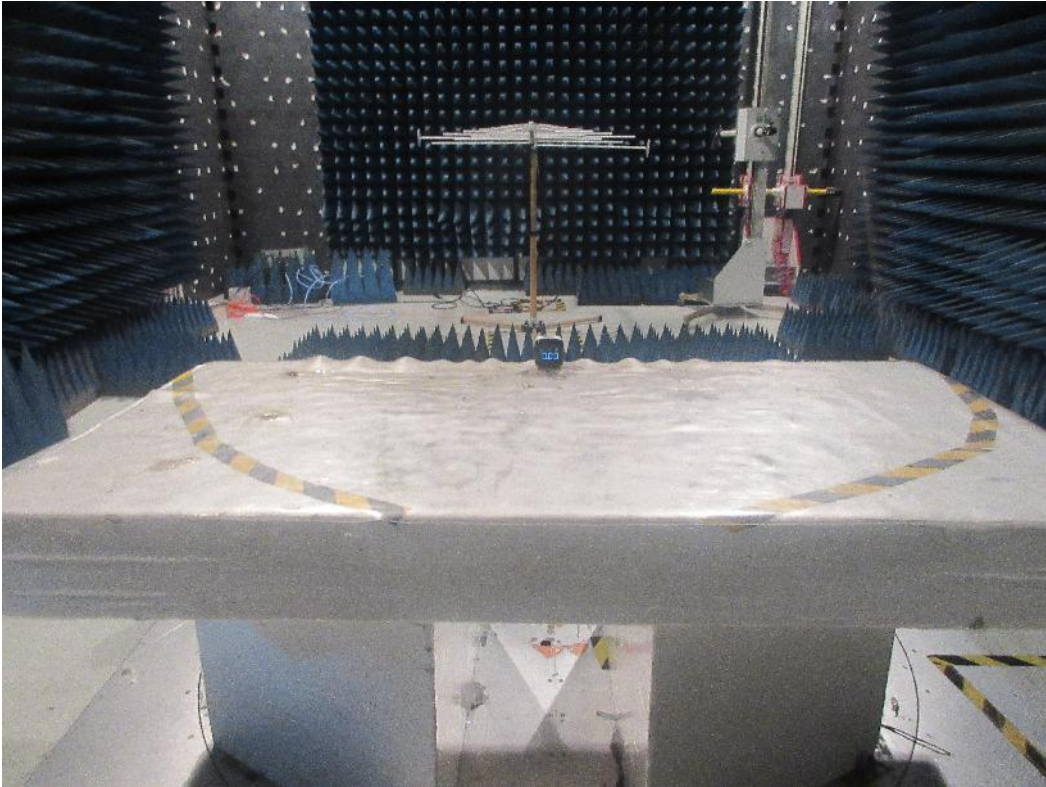
RE (30 - 1000 MHz)



ESD



**RS (80 - 1000 MHz)**



\*\*\*\*\*END OF THE REPORT\*\*\*\*\*