# RED-EMC
# TEST REPORT

| | | |
|---|---|---|
| Client Name | : | Shenzhen Newbit Information Technology Co., ltd |
| Address | : | Room1612-Room 1616, Global Logistics Center Building, Longgang Dist, Shenzhen |
| Product Name | : | Bluetooth Transmission Module |
| Test Model No. | : | XY-MBO21F |
| Report No. | : | CCTI-2024032809-2E |
| Issued Date | : | Apr. 01, 2024 |
| Prepared By | : | Shenzhen CCTI Technology Co., Ltd. |
| Address | : | 7th Floor, Block A, Building E, Yongwei Industrial Park, No. 118, Yongfu Road, Qiaotou, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China |
| Contact Info | : | Service Tel : 0086-400-188-9662<br>CCTI E-mail : ccti@ccti-lab.com<br>CCTI Web : www.ccti-lab.com |

Scan code for report

# TEST REPORT VERIFICATION

| | | |
|---|---|---|
| Applicant | : | Shenzhen Newbit Information Technology Co., ltd |
| Address | : | Room1612-Room 1616, Global Logistics Center Building, Longgang Dist, Shenzhen |
| Manufacturer | : | Shenzhen Newbit Information Technology Co., ltd |
| Address | : | Room1612-Room 1616, Global Logistics Center Building, Longgang Dist, Shenzhen |
| Product Name | : | Bluetooth Transmission Module |
| Model No. | : | XY-MBO21F |
| Series No. | : | XY-MBO26A |
| Trade Mark | : | N/A |
| Rating(s) | : | Input: DC 3.3V |
| Test Date | : | Mar. 25, 2024 to Apr. 01, 2024 |
| **Test Standard(s)** | : | **ETSI EN 301 489-1 V2.2.3 (2019-11)**<br>**Draft ETSI EN 301 489-17 V3.2.6 (2023-06)**<br>**EN 55032:2015+A1:2020+A11:2020, EN 55035:2017+A11:2020**<br>**EN IEC 61000-3-2:2019+A1:2021**<br>**EN 61000-3-3:2013+A1:2019+A2:2021+AC:2022-01** |
| **Test Result** | : | **PASS** |

This device described above has been tested by CCTI, and the test results show that the equipment under test (EUT) is in compliance with the 2014/53/EU RED Directive Art.3.1(b) requirements. The results shown in this test report refer only to the sample(s) tested unless other wise stated and the sample(s) are retained for 30 days only.

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**Producer By** : Betty Liang (Betty Liang / Engineer) **Date** : Apr. 01, 2024

**Authorized Signer** : Corey Mao (Corey Mao / Manager) **Date** : Apr. 01, 2024

SHENZHEN CCTI TECHNOLOGY CO. LTD. APPROVED

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# 1. TEST STANDARDS

The tests were performed according to following standards:

**ETSI EN 301 489-1 V2.2.3 (2019-11)** ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU

**Draft ETSI EN 301 489-17 V3.2.6 (2023-06)** ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility

**EN 55032:2015+A1:2020+A11:2020** 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 up to and including 16 A per phase)

**EN 61000-3-3:2013+A1:2019+A2:2021+AC:2022-01** 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.

## 1.1 TEST FACILITY

Shenzhen CCTI Technology Co., Ltd.

7th Floor, Block A, Building E, Yongwei Industrial Park, No. 118, Yongfu Road, Qiaotou, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

## 1.2 MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CCTI Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen CCTI Technology Co., Ltd. is reported:

| Test | Range | Measurement Uncertainty | Notes |
|---|---|---|---|
| Radiated Emission | 30~1000MHz | 3.90dB | (1) |
| Radiated Emission | 1~18GHz | 4.28dB | (1) |
| Radiated Emission | 18-40GHz | 5.54dB | (1) |
| Conducted Disturbance | 0.15~30MHz | 2.71dB | (1) |

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

## 1.3 TEST DESCRIPTION

| Emission Measurement | | |
|---|---|---|
| **Test Item** | **Standard** | **Judgment** |
| Conducted Emission (AC Mains) | ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.1<br>EN 55032:2015+A1:2020+A11:2020 Annex A.3 | N/A |
| Radiated Emission | | PASS |
| Harmonic Current Emission | ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.1<br>EN IEC 61000-3-2:2019+A1:2021 | N/A |
| Voltage Fluctuations & Flicker | ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.1<br>EN 61000-3-3:2013+A1:2019+A2:2021+AC:2022-01 | N/A |
| **Immunity Measurement** | | |
| **Test Item** | **Standard** | **Judgment** |
| Electrostatic Discharge | ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2 | PASS |
| RF Electromagnetic Field | ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2 | PASS |
| Fast Transients Common Mode | ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2 | N/A |
| Surges, Line to Line and Line to Ground | ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2 | N/A |
| RF Common Mode 0,15 MHz to 80 MHz | ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2 | N/A |
| Transients and Surges | ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2 | N/A |
| Voltage Dips and Interruptions | ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2 | N/A |

**Remark:** The measurement uncertainty is not included in the test result.

中鉴检测 CCTI TESTING

# 2. GENERAL INFORMATION

## 2.1 GENERAL DESCRIPTION OF EUT

| | | |
|---|---|---|
| **EUT Name** | : | Bluetooth Transmission Module |
| **Model No.** | : | XY-MBO21F |
| **Series No.** | : | XY-MBO26A |
| **Model Difference** | : | The model and size of the product are different |
| **Trademark** | : | N/A |
| **Power supply** | : | Input: DC 3.3V |
| **Operation frequency** | : | BT BLE: 2402MHz-2480MHz |
| **Modulation** | : | BT BLE: GFSK, π/4 DQPSK |
| **Antenna Type** | : | PCB Antenna |
| **Intend use environment** | : | Residential, commercial and light industrial environment |

**Remark:**

(1) XY-MBO21F was selected as the test model and the datas have been recorded in this report.

(2) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

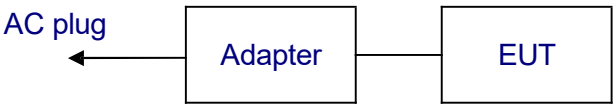
## 2.2 DESCRIPTION OF TEST MODES

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

| Pretest Mode | Description |
|---|---|
| Mode 1 | Charging Mode |
| Mode 2 | Working Mode |

**Fig. 2-1 Configuration of Tested System**

Mode 1:




Mode 2:




**Table 2-1 Equipment Used in Tested System**

| No. | Product | Manufacturer | Model No. | FCC ID |
|---|---|---|---|---|
| 1 | Adapter | HUAWEI | HW-051000CHQ | / |
| 2 | Mobile Phone | MI | MI 11 | / |

## 2.3 MEASUREMENT INSTRUMENTS

### 2.3.1 CONDUCTED EMISSION

| No. | Equipment | Manufacturer | Type No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|---|
| 1 | LISN | R&S | ENV216 | 101313 | Mar. 09, 2024 | Mar. 08, 2025 |
| 2 | LISN | EMCO | 3816/2 | 00042990 | Mar. 09, 2024 | Mar. 08, 2025 |
| 3 | 50Ω Switch | ANRITSU CORP | MP59B | 6200983704 | Mar. 09, 2024 | Mar. 08, 2025 |
| 4 | Test Cable | N/A | C01 | N/A | Mar. 09, 2024 | Mar. 08, 2025 |
| 5 | Test Cable | N/A | C02 | N/A | Mar. 09, 2024 | Mar. 08, 2025 |
| 6 | Test Cable | N/A | C03 | N/A | Mar. 09, 2024 | Mar. 08, 2025 |
| 7 | EMI Test Receiver | R&S | ESCI | 101160 | Mar. 09, 2024 | Mar. 08, 2025 |
| 8 | Passive Voltage Probe | ESH2-Z3 | R&S | 100196 | Mar. 09, 2024 | Mar. 08, 2025 |
| 9 | Triple-Loop Antenna | EVERFINE | LIA-2 | 11020003 | Mar. 09, 2024 | Mar. 08, 2025 |
| 10 | Absorbing Clamp | R&S | MDS-21 | 100423 | Mar. 09, 2024 | Mar. 08, 2025 |
| 11 | Coupling/ Decoupling Network | FRANKONIA | A3011081 | BC01-05 | Mar. 09, 2024 | Mar. 08, 2025 |

### 2.3.2 RADIATED TEST SITE

| No. | Equipment | Manufacturer | Type No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|---|
| 1 | Bilog Antenna | TESEQ | CBL6111D | 31216 | Mar. 09, 2024 | Mar. 08, 2025 |
| 2 | Test Cable | N/A | R-01 | N/A | Mar. 09, 2024 | Mar. 08, 2025 |
| 3 | Test Cable | N/A | R-02 | N/A | Mar. 09, 2024 | Mar. 08, 2025 |
| 4 | EMI Test Receiver | R&S | ESCI-7 | 101318 | Mar. 09, 2024 | Mar. 08, 2025 |
| 5 | Antenna Mast | EM | SC100_1 | N/A | Mar. 09, 2024 | Mar. 08, 2025 |
| 6 | Turn Table | EM | SC100 | 060531 | Mar. 09, 2024 | Mar. 08, 2025 |
| 7 | 50Ω Switch | Anritsu Corp | MP59B | 6200983705 | Mar. 09, 2024 | Mar. 08, 2025 |
| 8 | Spectrum Analyzer | Aglient | E4407B | MY45108040 | Mar. 09, 2024 | Mar. 08, 2025 |
| 9 | Horn Antenna | EM | EM-AH-10180 | 2011071402 | Mar. 09, 2024 | Mar. 08, 2025 |
| 10 | Amplifier | EM | EM-30180 | 060538 | Mar. 09, 2024 | Mar. 08, 2025 |

### 2.3.3 HARMONICS AND FILCK

| No. | Equipment | Manufacturer | Type No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|---|
| 1 | Harmonic & Flicker | EM TEST | DPA500 | 0303-04 | Mar. 09, 2024 | Mar. 08, 2025 |
| 2 | AC Power Source | EM TEST | ACS500 | 0203-01 | Mar. 09, 2024 | Mar. 08, 2025 |

### 2.3.4 ESD

| No. | Equipment | Manufacturer | Type No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|---|
| 1 | ESD TEST GENERATOR | EVERFINE | EMS61000-2 A-V200 | 11040001T | Mar. 09, 2024 | Mar. 08, 2025 |

### 2.3.5 RS (SMQ)

| No. | Equipment | Manufacturer | Type No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|---|
| 1 | Signal Generator | R&S | SMT 06 | 832080/007 | Mar. 09, 2024 | Mar. 08, 2025 |
| 2 | Log-Bicon Antenna | Schwarzbeck | VULB9161 | 4022 | Mar. 09, 2024 | Mar. 08, 2025 |
| 3 | Power Amplifier | AR | 150W1000M1 | 320946 | Mar. 09, 2024 | Mar. 08, 2025 |
| 4 | Microwave Horn Antenna | AR | AT4002A | 321467 | Mar. 09, 2024 | Mar. 08, 2025 |
| 5 | Power Amplifier | AR | 25S1G4A | 308598 | Mar. 09, 2024 | Mar. 08, 2025 |

### 2.3.6 SURGE, EFT/BURST, VOLTAGE INTERRUPTION/DIPS

| No. | Equipment | Manufacturer | Type No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|---|
| 1 | Surge Generator | EVERFINE | EMS61000-5A | 1101002 | Mar. 09, 2024 | Mar. 08, 2025 |
| 2 | DIPS Generator | EVERFINE | EMS61000-1 1K | 1011002 | Mar. 09, 2024 | Mar. 08, 2025 |
| 3 | EFT/B Generator | EVERFINE | EMS61000-4 A-V2 | 1012005 | Mar. 09, 2024 | Mar. 08, 2025 |

### 2.3.7 INJECTION CURRENT

| No. | Equipment | Manufacturer | Type No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|---|
| 1 | Signal Generator | IFR | 2023A | 202301/368 | Mar. 09, 2024 | Mar. 08, 2025 |
| 2 | Power Amplifier | AR | 75A250AM1 | 0320709 | Mar. 09, 2024 | Mar. 08, 2025 |
| 3 | CDN | FCC | FCC-801-M2 | 06043 | Mar. 09, 2024 | Mar. 08, 2025 |
| 4 | EM Clamp | FCC | F-203I-23MM | 504 | Mar. 09, 2024 | Mar. 08, 2025 |

### 2.3.8 MF

| No. | Equipment | Manufacturer | Type No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|---|
| 1 | Generator | EVERFINE | EMS61000-8K | 1007001 | Mar. 09, 2024 | Mar. 08, 2025 |

# 3. EMC EMISSION TEST

## 3.1 CONDUCTED EMISSION MEASUREMENT (AC MAINS)

### 3.1.1 POWER LINE CONDUCTED EMISSION (Frequency Range 150KHz-30MHz)

Please refer to ETSI EN 301 489-1 Clause 8.4.3

The equipment shall meet the class B limits given in CENELEC EN 55032 [1], annex A table A.10.

Alternatively, for equipment intended to be used in an industrial environment or a telecommunication centre, the class A limits given in CENELEC EN 55032 [1], annex A table A.9 can be used.

If EUT is also a FM Receiver, it shall meet CENELEC EN 55032 [3], annex A tables A.13

| FREQUENCY (MHz) | Class A (dBuV) | | Class B (dBuV) | |
|---|---|---|---|---|
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 -0.5 | 79.00 | 66.00 | 66 - 56 * | 56 - 46 * |
| 0.50 -5.0 | 73.00 | 60.00 | 56.00 | 46.00 |
| 5.0 -30.0 | 73.00 | 60.00 | 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.

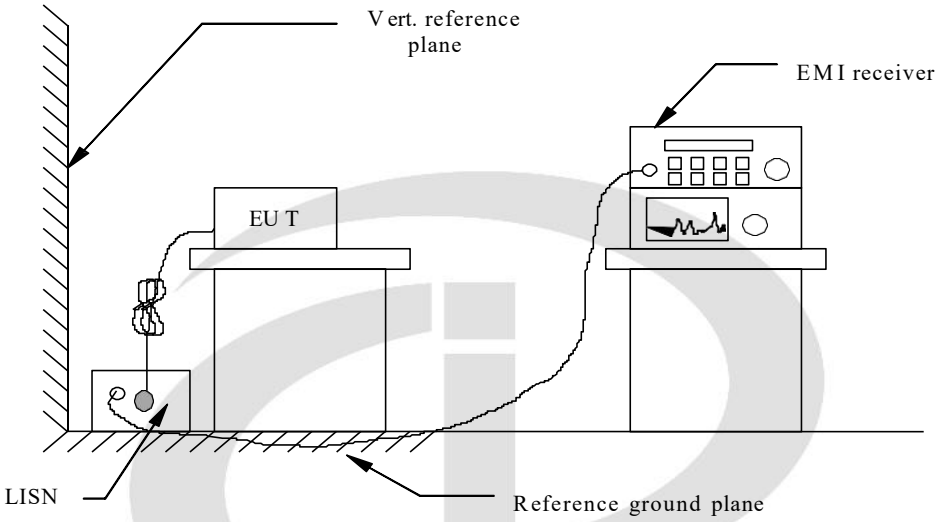
d. LISN at least 80 cm from nearest part of EUT chassis.

e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 3.1.3 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.2** Unless otherwise a special operating condition is specified in the follows during the testing.

### 3.1.4 TEST SETUP




### 3.1.5 TEST RESULTS

The EUT is test by DC power supply, so it is not applicable.

## 3.2 RADIATED EMISSION MEASUREMENT

### 3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT (Below 1000MHz)

Please refer to ETSI EN 301 489-1 Clause 8.2.3

The ancillary equipment shall meet the class B limits given in CENELEC EN 55032 [1], annex A tables A.4 and A.5.

Alternatively, for ancillary equipment intended to be used exclusively in an industrial environment or telecommunication centres, the class A limits given in CENELEC EN 55032 [1], annex A tables A.2 and A.3 may be used.

If EUT is also a FM Receiver, it shall meet CENELEC EN 55032 [3], annex A tables A.6

| FREQUENCY (MHz) | Class A (at 10m) | Class B (at 10m) |
|---|---|---|
| | dBuV/m | dBuV/m |
| 30 – 230 | 40 | 30 |
| 230 – 1000 | 47 | 37 |

**LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)**

| FREQUENCY (MHz) | Class A (at 10m) dBuV/m | | Class B (at 10m) dBuV/m | |
|---|---|---|---|---|
| | Peak | Avg | Peak | Avg |
| 1000 – 3000 | 76 | 56 | 70 | 50 |
| 3000 – 6000 | 80 | 60 | 74 | 54 |

**Notes:**

(1) The limit for radiated test was performed according to as following: CISPR 22/ FCC PART 15B /ICES-003.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

### 3.2.2 TEST PROCEDURE

a. The measuring distance of at 10 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.

b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.

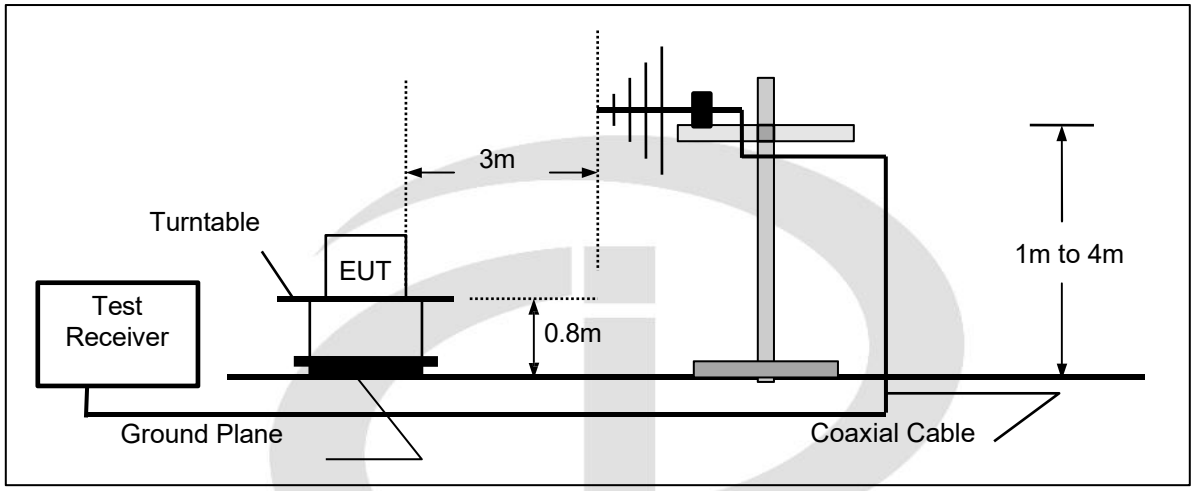
f. For the actual test configuration, please refer to the related Item – EUT Test Photos.

### 3.2.3 EUT OPERATING CONDITIONS

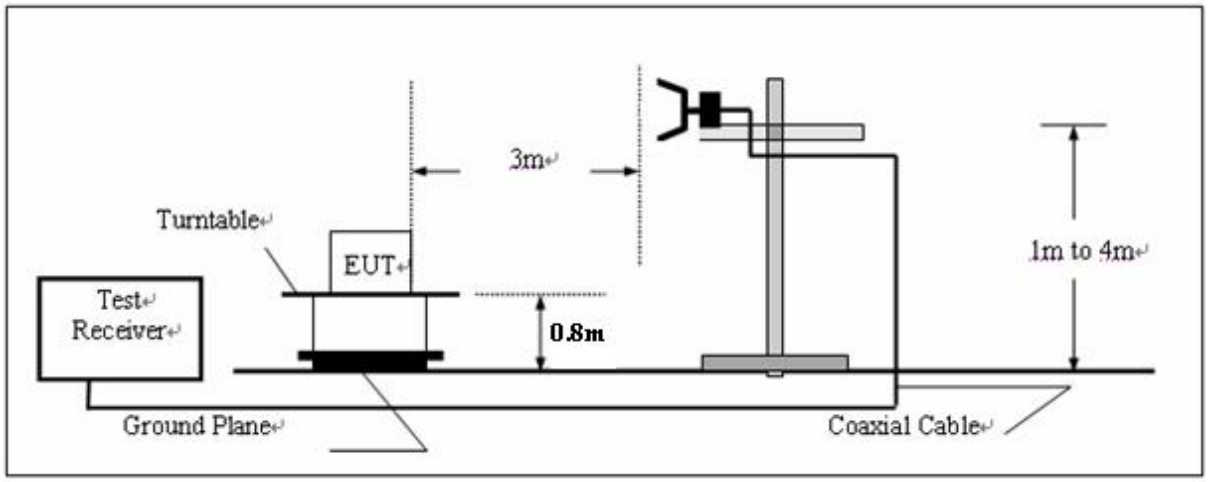
The EUT tested system was configured as the statements of **2.2** Unless otherwise a special operating condition is specified in the follows during the testing.

### 3.2.4 TEST SETUP

(A) Radiated Emission Test Set-UP, Frequency Below 1000MHz




(B) Radiated Emission Test Set-UP, Frequency Above 1000MHz




### 3.2.5 TEST RESULTS (30-1000MHz)

PASS

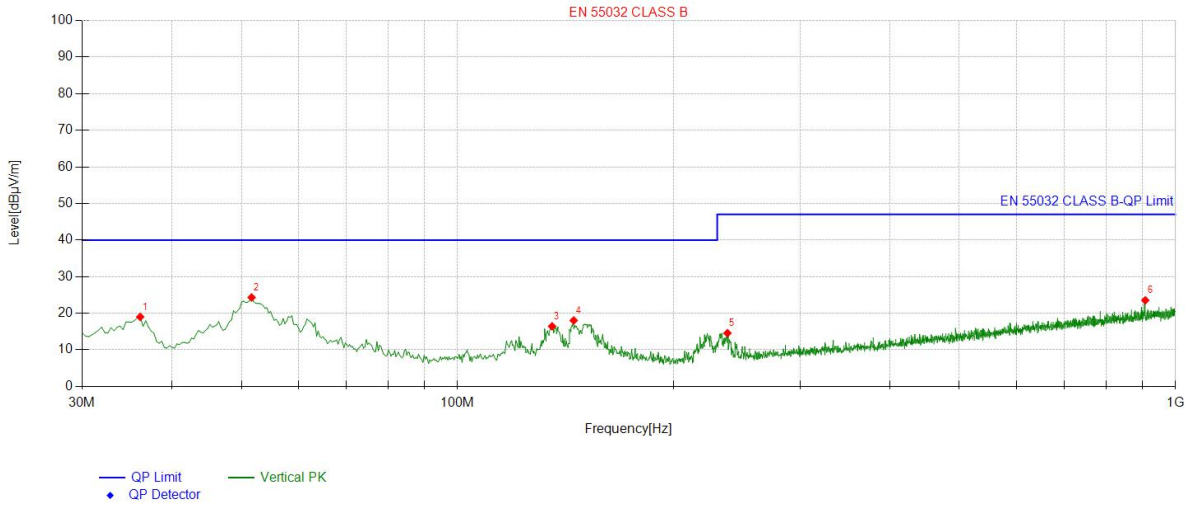
Please refer to the following page.

| EUT: | Bluetooth Transmission Module | Model Name : | XY-MBO21F |
|---|---|---|---|
| Temperature: | 24 ℃ | Relative Humidity: | 54% |
| Pressure: | 1010 hPa | Polarization : | Horizontal |
| Test Voltage : | DC 3.3V From Adapter Input AC 230V/50Hz | Test Mode: | Working |




| Suspected List | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Factor [dB] | Reading [dBµV/m] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 32.587529 | -17.24 | 27.74 | 10.50 | 40.00 | 29.50 | 100 | 282 | Horizontal |
| 2 | 42.290764 | -16.57 | 26.55 | 9.98 | 40.00 | 30.02 | 100 | 253 | Horizontal |
| 3 | 51.670557 | -16.95 | 28.66 | 11.71 | 40.00 | 28.29 | 100 | 133 | Horizontal |
| 4 | 128.64955 | -17.42 | 31.71 | 14.29 | 40.00 | 25.71 | 100 | 336 | Horizontal |
| 5 | 152.58419 | -16.26 | 30.68 | 14.42 | 40.00 | 25.58 | 100 | 11 | Horizontal |
| 6 | 231.82727 | -19.13 | 34.68 | 15.55 | 47.00 | 31.45 | 100 | 65 | Horizontal |

| EUT: | Bluetooth Transmission Module | Model Name : | XY-MBO21F |
|---|---|---|---|
| Temperature: | 24 ℃ | Relative Humidity: | 54% |
| Pressure: | 1010 hPa | Polarization : | Vertical |
| Test Voltage : | DC 3.3V From Adapter Input AC 230V/50Hz | Test Mode: | Working |




| Suspected List | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Factor [dB] | Reading [dBµV/m] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 36.145382 | -16.96 | 35.95 | 18.99 | 40.00 | 21.01 | 100 | 312 | Vertical |
| 2 | 51.670557 | -16.95 | 41.26 | 24.31 | 40.00 | 15.69 | 100 | 154 | Vertical |
| 3 | 135.44181 | -17.02 | 33.43 | 16.41 | 40.00 | 23.59 | 100 | 46 | Vertical |
| 4 | 145.14504 | -16.56 | 34.58 | 18.02 | 40.00 | 21.98 | 100 | 54 | Vertical |
| 5 | 237.64921 | -18.90 | 33.45 | 14.55 | 47.00 | 32.45 | 100 | 241 | Vertical |
| 6 | 907.81927 | -8.25 | 31.78 | 23.53 | 47.00 | 23.47 | 100 | 129 | Vertical |

## 3.3 HARMONIC CURRENT EMISSION

### 3.3.1 LIMITS OF HARMONIC CURRENT EMISSION

| IEC 555-2 | | | | | |
|---|---|---|---|---|---|
| Table - I | | | Table - II | | |
| Equipment Category | Harmonic Order n | Max. Permissible Harmonic Current (in Ampers) | Equipment Category | Harmonic Order n | Max. Permissible Harmonic Current (in Ampers) |
| Non Portable Tools or TV Receivers | Odd Harmonics | | TV Receivers | Odd Harmonics | |
| | 3 | 2.30 | | 3 | 0.80 |
| | 5 | 1.14 | | 5 | 0.60 |
| | 7 | 0.77 | | 7 | 0.45 |
| | 9 | 0.40 | | 9 | 0.30 |
| | 11 | 0.33 | | 11 | 0.17 |
| | 13 | 0.21 | | 13 | 0.12 |
| | 15≤n≤39 | 0.15 · 15/n | | 15≤n≤39 | 0.10 · 15/n |
| | Even Harmonics | | | Even Harmonics | |
| | 2 | 1.08 | | 2 | 0.30 |
| | 4 | 0.43 | | 4 | 0.15 |
| | 8 | 0.30 | | | |
| | 8≤n≤40 | 0.23 · 8/n | | DC | 0.05 |

| EN 61000-3-2/IEC 61000-3-2 | | | | | |
|---|---|---|---|---|---|
| Equipment Category | Max. Permissible Harmonic Current (in Ampers) | Equipment Category | Harmonic Order n | Max. Permissible Harmonic Current (in A) | (mA/w) |
| Class A | Same as Limits Specified in 4-2.1, Table - I, but only odd harmonics required | Class D | 3 | 2.30 | 3.4 |
| | | | 5 | 1.14 | 1.9 |
| | | | 7 | 0.77 | 1.0 |
| | | | 9 | 0.40 | 0.5 |
| | | | 11 | 0.33 | 0.35 |
| | | | 13≤n≤39 | see Table I | 3.85/n |
| | | | only odd harmonics required | | |

### 3.3.2 TEST PROCEDURE

a. 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.

b. The classification of EUT is according to section 5 of EN IEC 61000-3-2:2019+A1:2021.The EUT is classified as follows:

Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

Class B: Portable tools. Portable tools.; Arc welding equipment which is not professional equipment.

Class C: Lighting equipment.

Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors and television receivers.

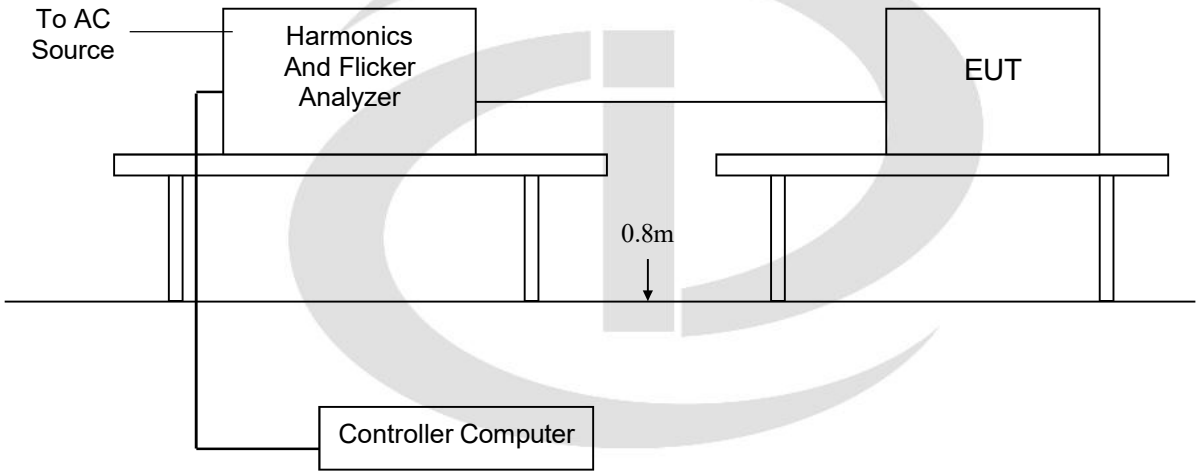
c. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

d. For the actual test configuration, please refer to the related item – EUT Test Photos.

### 3.3.3 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.2** Unless otherwise a special operating condition is specified in the follows during the testing.

### 3.3.4 TEST SETUP




### 3.3.5 TEST RESULTS

The EUT is test by DC power supply, so it is not applicable.

## 3.4 VOLTAGE FLUCTUATION AND FLICKERS

### 3.4.1 LIMITS OF VOLTAGE FLUCTUATION AND FLICKERS

| Tests | Limits | | Descriptions |
|---|---|---|---|
| | IEC555-3 | IEC/EN 61000-3-3 | |
| Pst | ≤ 1.0, Tp= 10 min. | ≤ 1.0, Tp= 10 min. | Short Term Flicker Indicator |
| Plt | N/A | ≤ 0.65, Tp=2 hr. | Long Term Flicker Indicator |
| dc | ≤ 3% | ≤ 3.3% | Relative Steady-State V-Chang |
| dmax | ≤ 4% | ≤ 4% | Maximum Relative V-change |
| d (t) | N/A | ≤ 3.3% for > 500 ms | Relative V-change characteristic |

### 3.4.2 TEST PROCEDURE

a. Harmonic Current Test:
Test was performed according to the procedures specified in Clause 5.0 of IEC555-2 and/or Sub-clause 6.2 of IEC/EN 61000-3-2 depend on which standard adopted for compliance measurement.

b. Fluctuation and Flickers Test:
Tests was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in Clause 5.0/6.0 of IEC555-3 and/or Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.

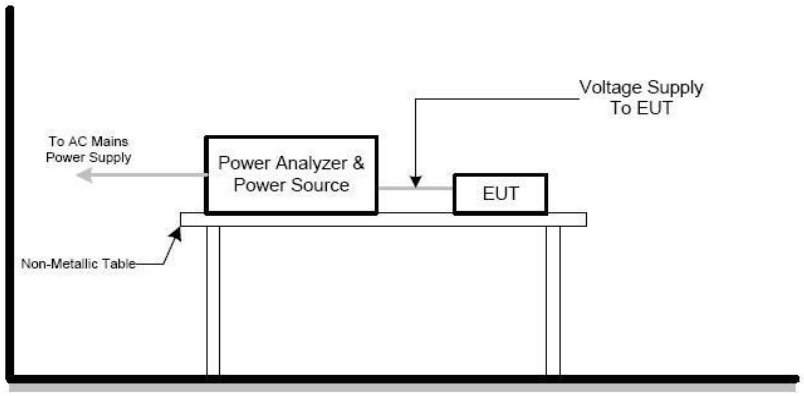
c. All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

d. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 3.4.3 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.2** Unless otherwise a special operating condition is specified in the follows during the testing.

### 3.4.4 TEST SETUP




### 3.4.5 TEST RESULTS

The EUT is test by DC power supply, so it is not applicable.

# 4. EMC IMMUNITY TEST

## 4.1 GENERAL PERFORMANCE CRITERIA

### 4.1.1 PERFORMANCE CRITERIA

According To **EN 301489-17** standard, The General Performance Criteria As Following:

| Criteria | During the test | After the test |
|---|---|---|
| **A** | Shall operate as intended May show degradation of performance (see note 1) Shall be no loss of function Shall be no unintentional transmissions | Shall operate as intended Shall be no degradation of performance (see note 2) Shall be no loss of function Shall be no loss of stored data or user programmable functions |
| **B** | May show loss of function (one or more) May show degradation of performance (see note 1) No unintentional transmissions | Functions shall be self-recoverable Shall operate as intended after recovering Shall be no degradation of performance (see note 2) Shall be no loss of stored data or user programmable functions |
| **C** | May be loss of function (one or more) | Functions shall be recoverable by the operator Shall operate as intended after recovering Shall be no degradation of performance (see note 2) |

NOTE 1: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: no degradation of performance after the test is understood as any degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

**PERFORMANCE FOR TT**

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

**PERFORMANCE FOR TR**

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test.
In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

**PERFORMANCE FOR CT**

The performance criteria A shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an Acknowledgement (ACK) or Not Acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

**PERFORMANCE FOR CR**

The performance criteria A shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

### 4.1.2 GENERAL PERFORMANCE CRITERIA TEST SETUP

The EUT tested system was configured as the statements of **2.2** Unless otherwise a special operating condition is specified in the follows during the testing.

## 4.2 ELECTROSTATIC DISCHARGE TESTING

### 4.2.1 TEST SPECIFICATION

| | |
|---|---|
| Basic Standard: | IEC/EN 61000-4-2 |
| Mode 1 Impedance: | 330 ohm / 150 pF |
| Required Performance | B |
| Mode 1 Voltage: | Air Mode 1:2kV/4kV/8kV (Direct)<br>Contact Mode 1:2kV/4kV (Direct/Indirect) |
| Polarity: | Positive & Negative |
| Number of Mode 1: | Air Mode 1: min. 20 times at each test point<br>Contact Mode 1: min. 200 times in total |
| Mode 1 Mode: | Mode 1 |
| Mode 1 Period: | 1 second minimum |

### 4.2.2 TEST PROCEDURE

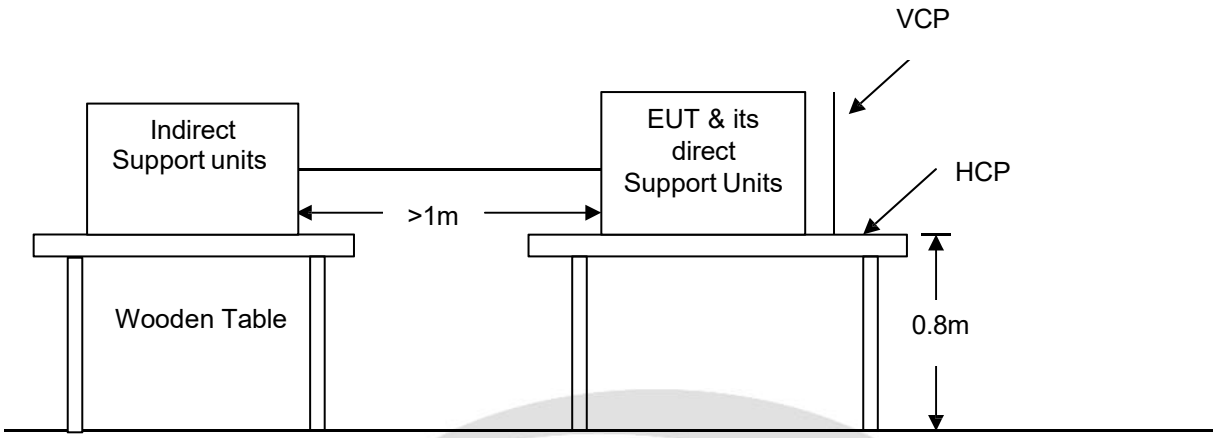
The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

a. Contact discharge was applied to conductive surfaces and coupling planes of the EUT.
During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second. The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges.
If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.
Vertical Coupling Plane (VCP):
The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Mode 1 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 Mode 1 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.

c. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 4.2.3 TEST SETUP




**Ground Reference Plane**

**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, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940k total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC
/EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

**FLOOR-STANDING EQUIPMENT**

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

### 4.2.4 TEST RESULTS

| EUT: | Bluetooth Transmission Module | Model Name : | XY-MBO21F |
|---|---|---|---|
| Temperature: | 25 ℃ | Relative Humidity: | 45% |
| Pressure: | 1010 hPa | Test Power: | DC 3.3V From Adapter Input AC 230V/50Hz |
| Test Mode: | Mode 1 | | |

| Direct discharge | | | | |
|---|---|---|---|---|
| Type of discharge | Discharge voltage (KV) | Observations Performance | Criteria Level | Result |
| Contact discharge | ±2 | No degradation in performance of the EUT was observed (A) | B | Pass |
| | ±4 | A | B | |
| Air discharge | ±2 | A | B | |
| | ±4 | A | B | |
| | ±8 | A | B | |
| **Indirect discharge** | | | | |
| Type of discharge | Discharge voltage (KV) | Observations Performance | Criteria Level | Result |
| HCP (6 sides) | ±2 | A | B | Pass |
| | ±4 | A | B | |
| VCP (4 sides) | ±2 | A | B | |
| | ±4 | A | B | |

**Note:**

(1) P/N denotes the Positive/Negative polarity of the output voltage.

(2) Test condition:

Direct / Indirect (HCP/VCP) discharges: Minimum 50 times (Positive/Negative) at each point.

Air discharges: Minimum 10 times (Positive/Negative) at each point.

(3) N/A - denotes test is not applicable in this test report

(4) There was not any unintentional transmission in standby mode

## 4.3 RF ELECTROMAGNETIC FIELD TEST

### 4.3.1 TEST SPECIFICATION

| | |
|---|---|
| Basic Standard: | IEC/EN 61000-4-3 |
| Required Performance | A |
| Frequency Range: | 80 MHz - 1000 MHz ,1400MHz-2700MHz |
| 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: | at least 3 seconds |
| Test site: | SMQ RS test room |

### 4.3.2 TEST PROCEDURE

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

a. The field strength level was 3V/m.

b. The frequency range is swept from 80 MHz to 1000 MHz, & 1400MHz - 2700MHz with the signal 80%amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5x 10-3 decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

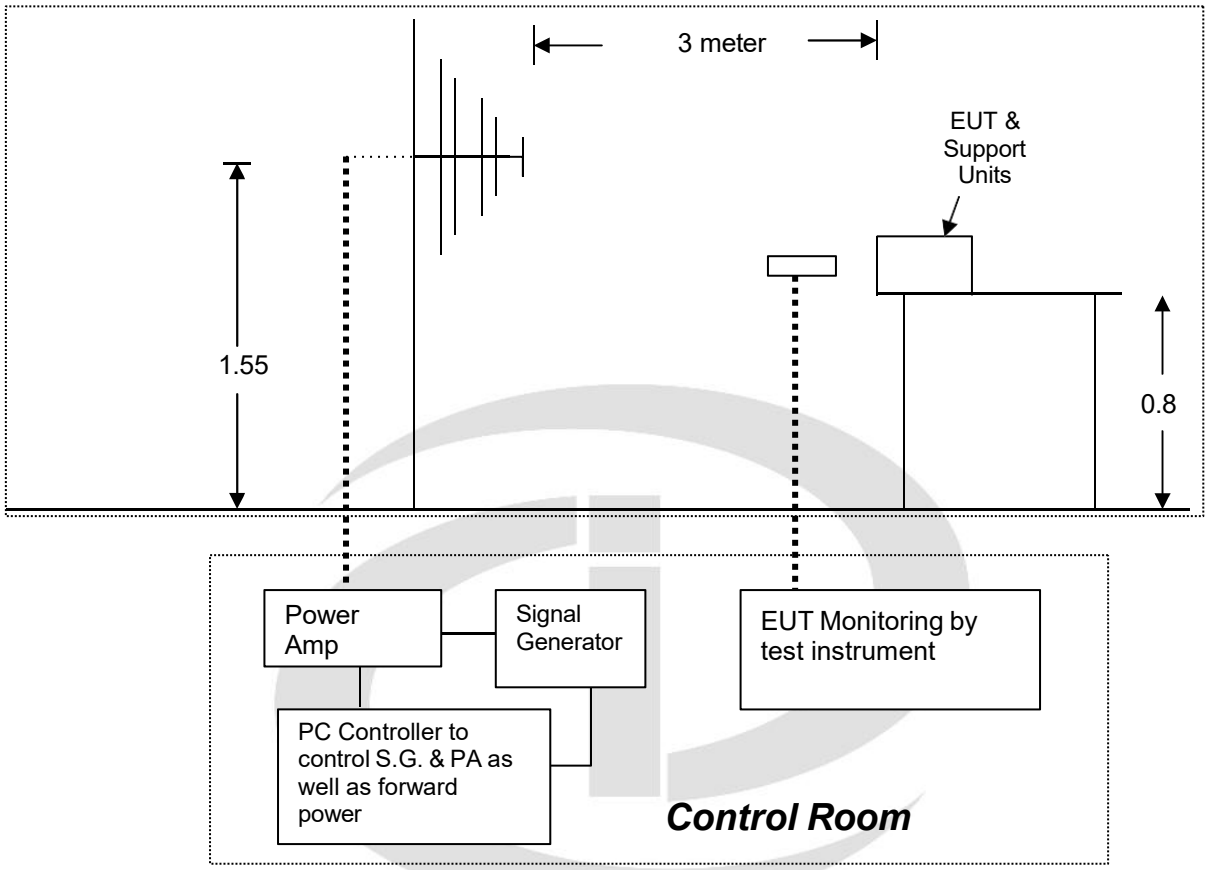
c. Sweep Frequency 900 MHz, with the Duty Cycle:1/8 and Modulation: Pulse 217 Hz (if applicable)

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 test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

f. For the actual test configuration, please refer to the related Item – EUT Test Photos.

### 4.3.3 TEST SETUP




**Note:**

**TABLE-TOP EQUIPMENT**

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

**FLOOR-STANDING EQUIPMENT**

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

### 4.3.4 TEST RESULTS

| EUT: | Bluetooth Transmission Module | Model Name : | XY-MBO21F |
|---|---|---|---|
| Temperature: | 25 ℃ | Relative Humidity: | 45% |
| Pressure: | 1010 hPa | Test Power: | DC 3.3V From Adapter Input AC 230V/50Hz |
| Test Mode: | Mode 1 | | |

| Frequency | Level | Modulation | Antenna Polarization | EUT Face | Observations (Performance Criterion) | Result |
|---|---|---|---|---|---|---|
| 80MHz-6GHz | 3 V/m | 1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=3seconds | V | Front | A | PASS |
| | | | H | | A | PASS |
| | | | V | Rear | A | PASS |
| | | | H | | A | PASS |
| | | | V | Left | A | PASS |
| | | | H | | A | PASS |
| | | | V | Right | A | PASS |
| | | | H | | A | PASS |
| | | | V | Top | A | PASS |
| | | | H | | A | PASS |
| | | | V | Bottom | A | PASS |
| | | | H | | A | PASS |

**Note:**

(1) P/N denotes the Positive/Negative polarity of the output voltage.

(2) N/A - denotes test is not applicable in this test report.

(3) There was no change operated with initial operating during the test.

(4) There was not any unintentional transmission in standby mode

## 4.4 FAST TRANSIENTS COMMON MODE TESTING

### 4.4.1 TEST SPECIFICATION

| | |
|---|---|
| Basic Standard: | IEC/EN 61000-4-4 |
| Required Performance | B |
| Test Voltage: | Power Line:1 kV<br>Signal/Control Line:0.5 KV |
| Polarity: | Positive & Negative |
| Impulse Frequency: | 5 kHz |
| Impulse Wave shape : | 5/50 ns |
| Burst Duration: | 15 ms |
| Burst Period: | 300 ms |
| Test Duration: | Not less than 1 min. |

### 4.4.2 TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min.

The other condition as following manner:

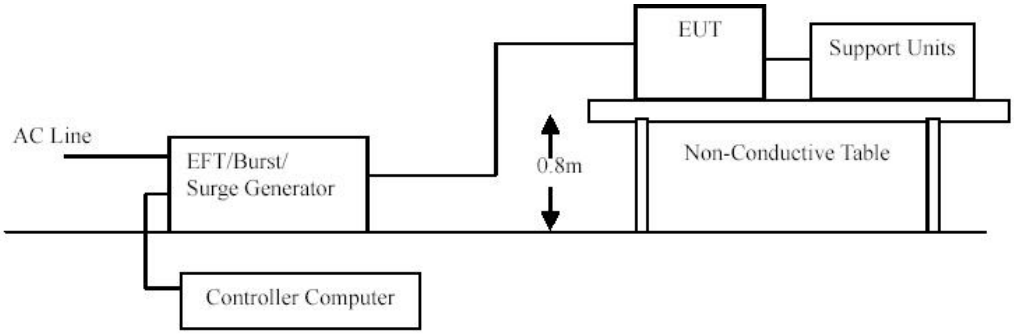
a. The length of power cord between the coupling device and the EUT should not exceed 1 meter.

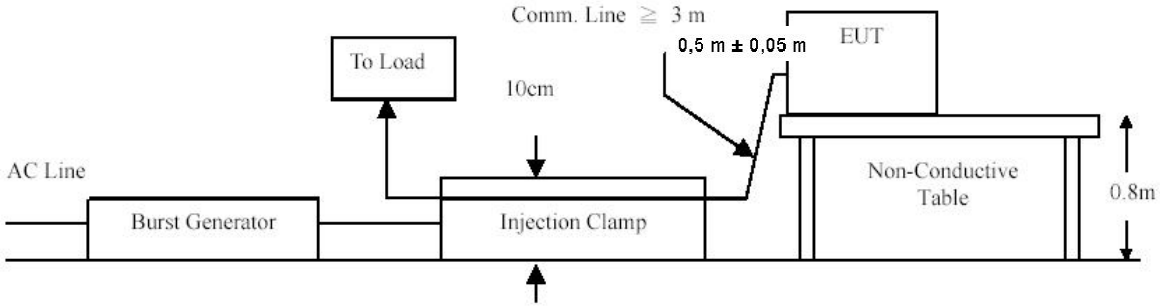
b. Both positive and negative polarity discharges were applied.

c. The duration time of each test sequential was 1 minute.

d. For the actual test configuration, please refer to the related Item – EUT Test Photos.

### 4.4.3 TEST SETUP




**Note:**

**TABLE-TOP EQUIPMENT**

The configuration consisted of a wooden table (0.8m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

**FLOOR-STANDING EQUIPMENT**

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.

### 4.4.4 TEST RESULTS

The EUT is test by DC power supply, so it is not applicable.

## 4.5 SURGE TESTING

### 4.5.1 TEST SPECIFICATION

| | |
|---|---|
| Basic Standard: | IEC/EN 61000-4-5 |
| Required Performance: | B |
| Wave-Shape: | Combination Wave<br>1.2/50 us Open Circuit Voltage<br>8 /20 us Short Circuit Current |
| Test Voltage: | Power Line:0.5 kV, 1 kV, 2 kV |
| Surge Input/Output: | L1-L2, L1-PE, L2-PE |
| Generator Source: | 2 ohm between networks |
| Impedance: | 12 ohm between network and ground |
| Polarity: | Positive/Negative |
| Phase Angle: | 0 /90/180/270 |
| Pulse Repetition Rate: | 1 time / min. (maximum) |
| Number of Tests: | 5 positive and 5 negative at selected points |

### 4.5.2 TEST PROCEDURE

a. For EUT power supply:

The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks shall be 2meters in length (or shorter).

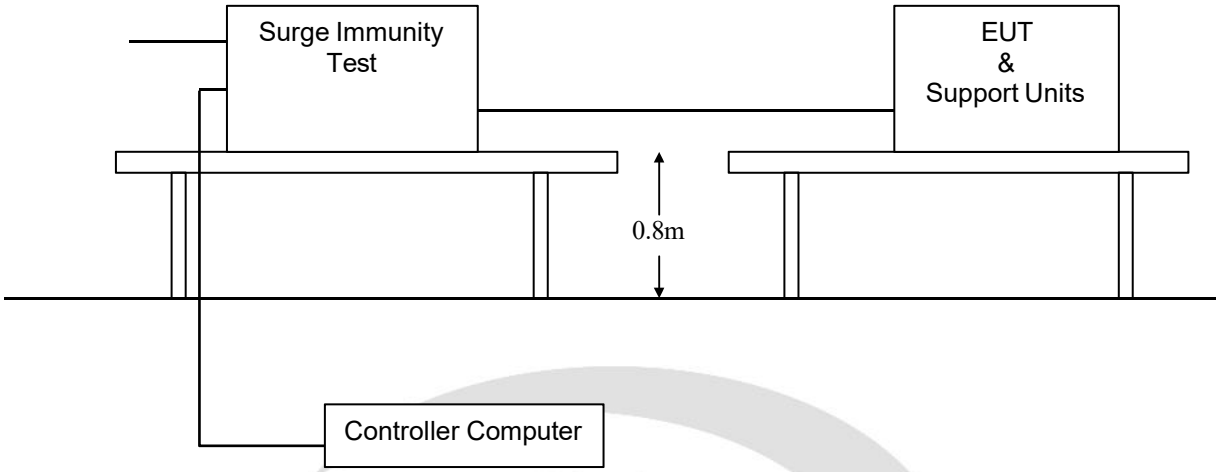
b. For test applied to unshielded asymmetrical operated interconnection lines of EUT: The surge is applied to the lines via the capacitive coupling. The coupling /decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

c. For test applied to unshielded symmetrically operated interconnection /telecommunication lines of EUT:

The surge is applied to the lines via gas arrester coupling. Test levels below the ignition point of the coupling arrester cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

d. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 4.5.3 TEST SETUP




### 4.5.4 TEST RESULTS

The EUT is test by DC power supply, so it is not applicable.

## 4.6 RF-COMMON MODE 0.15MHz TO 80MHz TESTING

### 4.6.1 TEST SPECIFICATION

| | |
|---|---|
| Basic Standard: | IEC/EN 61000-4-6 |
| Required Performance | A |
| Frequency Range: | 0.15 MHz - 80 MHz |
| Field Strength: | 3 Vr.m.s. |
| Modulation: | 1kHz Sine Wave, 80%, AM Modulation |
| Frequency Step: | 1 % of fundamental |
| Dwell Time: | at least 3 seconds |

### 4.6.2 TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min.

a. The other condition as following manner:

b. The field strength level was 3V.

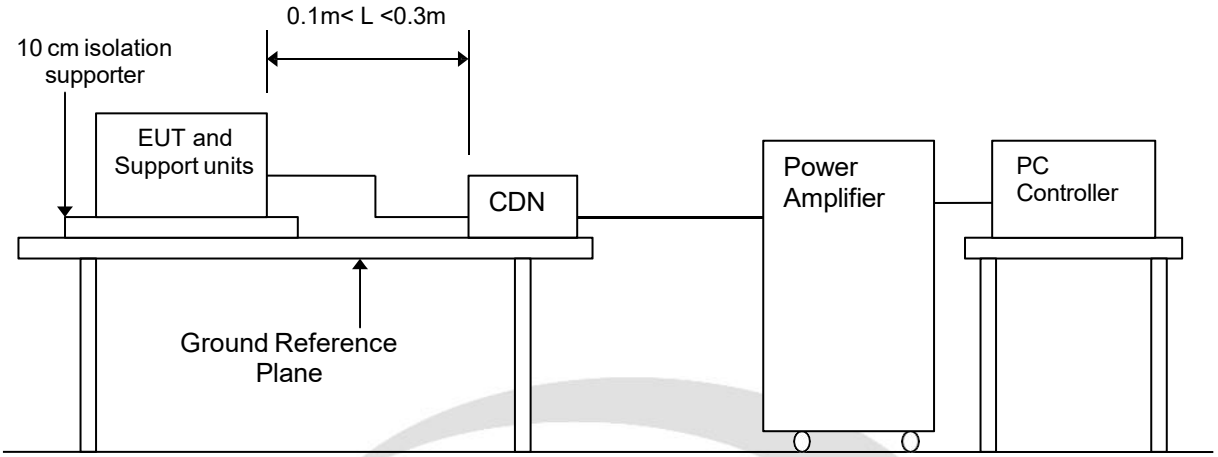
c. The frequency range is swept from 150 KHz to 80 MHz, with the signal 80%amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5x 10-3 decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

d. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

e. For the actual test configuration, please refer to the related Item – EUT Test Photos.

中鉴检测 CCTI TESTING

### 4.6.3 TEST SETUP




For the actual test configuration, please refer to the related Item –EUT Test Photos.

**NOTE:**

FLOOR-STANDING EQUIPMENT

The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

### 4.6.4 TEST RESULTS

The EUT is test by DC power supply, so it is not applicable.

## 4.7 VOLTAGE INTERRUPTION/DIPS TESTING

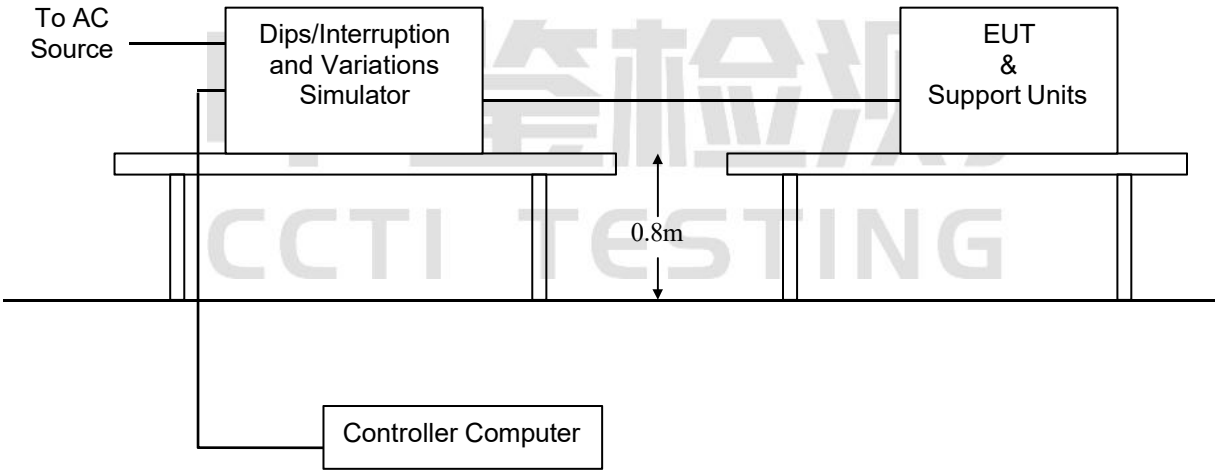
### 4.7.1 TEST SPECIFICATION

| | |
|---|---|
| Basic Standard: | IEC/EN 61000-4-11 |
| Required Performance | 100% reduction, 0.5 Cycle<br>100% reduction, 1.0 Cycle<br>30% reduction, 25 Cycles |
| Voltage Interruptions: | 100% reduction, 250 Cycles |
| Test Duration Time: | Minimum three test events in sequence |
| Interval between Event: | Minimum ten seconds |
| Phase Angle: | 0°/45°/90°/135°/180°/225°/270°/315°/360° |
| Test Cycle: | 3 times |

### 4.7.2 TEST PROCEDURE

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

### 4.7.3 TEST SETUP

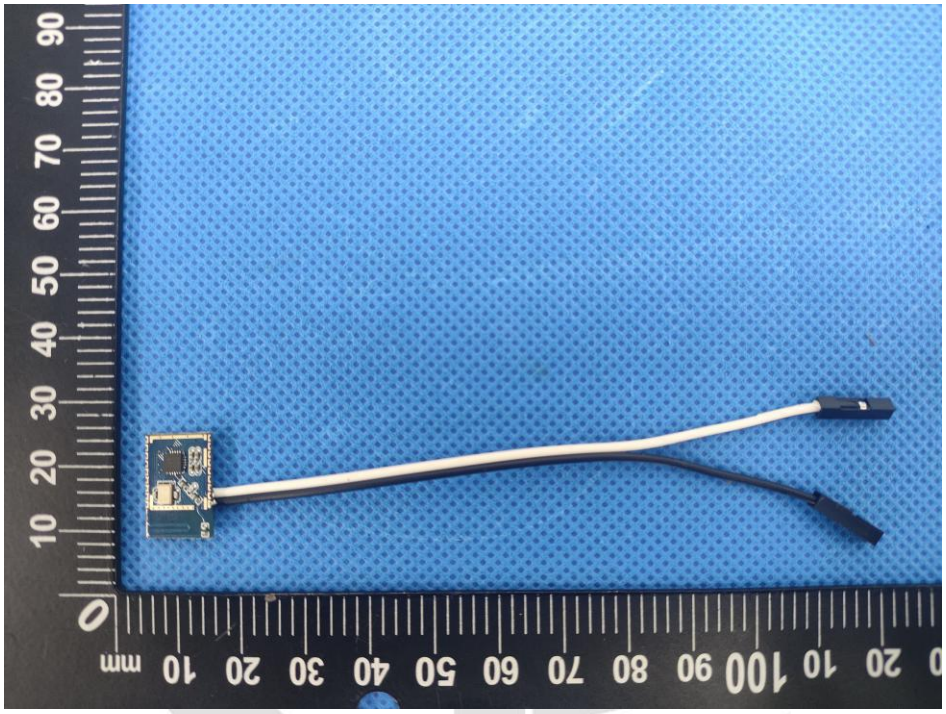



For the actual test configuration, please refer to the related Item –EUT Test Photos.

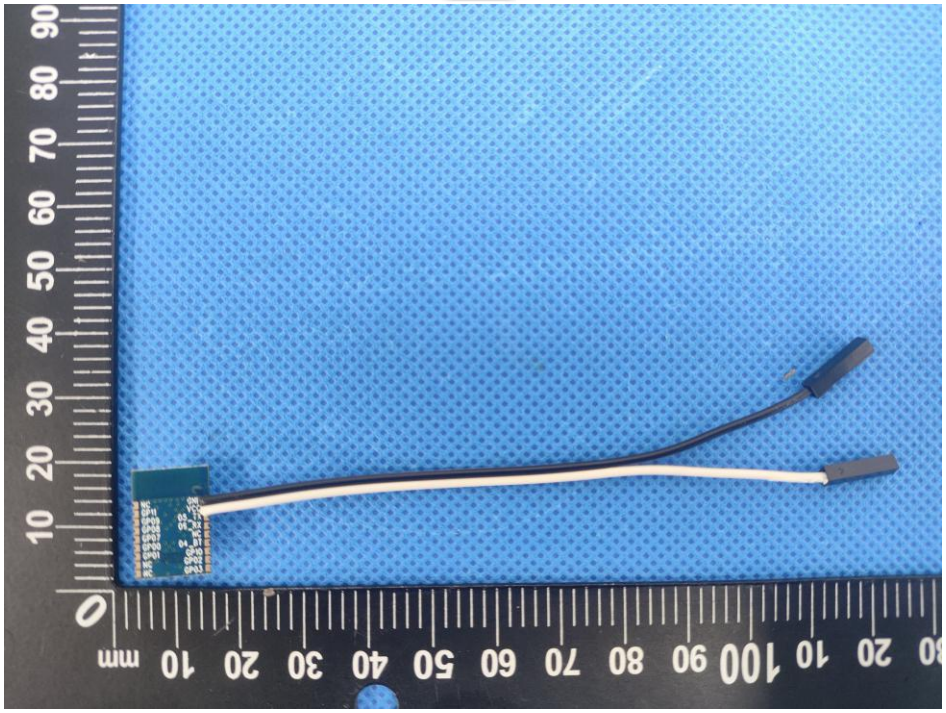
### 4.7.4 TEST RESULTS

The EUT is test by DC power supply, so it is not applicable.

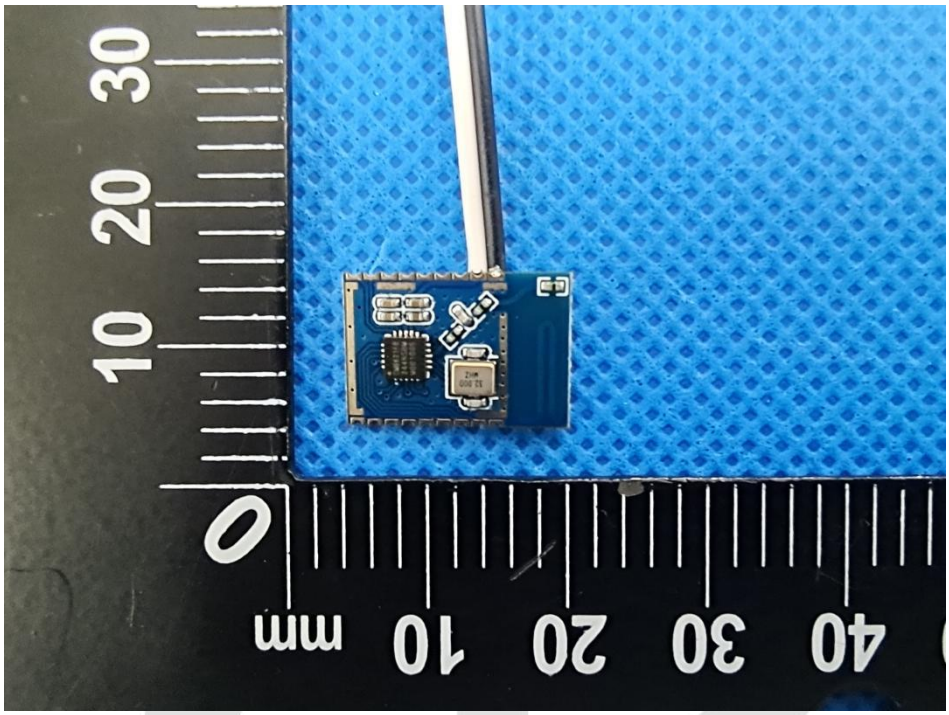
# APPENDIX I -- EUT PHOTOGRAPHS



EUT Photo 1



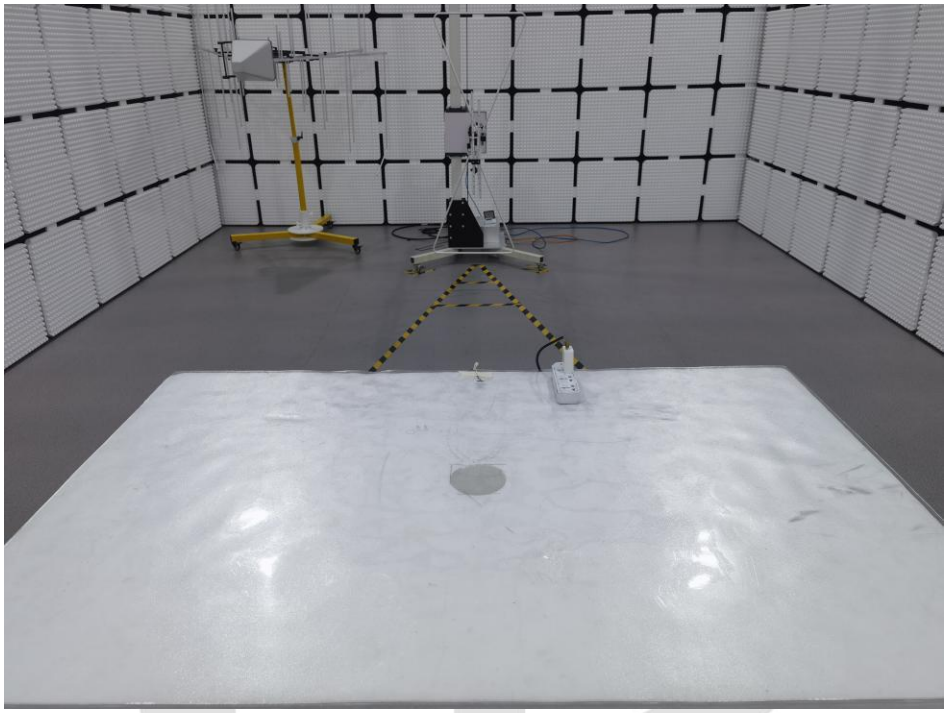
EUT Photo 2




**EUT Photo 3**

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# APPENDIX II -- EUT TEST PHOTOGRAPHS



**Test Photo RE**

※※※※※ **END OF REPORT** ※※※※※

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