# FCC SDOC TEST REPORT

## FCC ID:2BNA2-XR-01

For

Central air conditioning thermostat

Model: XR-01

Prepared for: GUANGZHOU SMART ENERGY TECHNOLOGY CO.,LTD
Room 1501, Yueneng Building, No.45-6 Tianhe Road, Yuexiu District, Guangzhou City

Prepared by: Shenzhen NCT Testing Technology Co., Ltd.
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Report Number: NCT25002152E1-1
Date of Test: Dec. 20, 2024 ~ Jan. 16, 2025
Date of Issue: Jan. 16, 2025

Tested By: Shine Wu
Shine Wu

Reported By: Keven Wu
Keven Wu

Reviewed By: Henry Wang
Henry Wang

*The results detailed in this test report relate only to the specific sample(s) tested. It is the Application's responsibility to ensure that all production units are manufactured with equivalent EMC characteristics. This report is not to be reproduced except in full, without written approval from NCT Testing Technology*

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## 1.0 General Information

1.1 Client Information

| | |
|---|---|
| Application: | GUANGZHOU SMART ENERGY TECHNOLOGY CO.,LTD |
| Address of Application: | Room 1501, Yueneng Building, No.45-6 Tianhe Road, Yuexiu District, Guangzhou City |
| Manufacturer: | GUANGZHOU SMART ENERGY TECHNOLOGY CO.,LTD |
| Address of Manufacturer: | Room 1501, Yueneng Building, No.45-6 Tianhe Road, Yuexiu District, Guangzhou City |

1.2 General Description of E.U.T.

| | |
|---|---|
| Product Name: | Central air conditioning thermostat |
| Model: | XR-01 |
| Additional Model: | N/A |
| Trade Mark: | easylink |
| Power Supply: | AC 100-240V/50Hz/60Hz |
| Memo: | According client required |
| Model Difference: | N/A |
| Remark: | N/A |

1.3 Test Facility:

| | |
|---|---|
| Site Description: | |
| EMC Lab.: | Accredited by CNAS, 2022-09-27<br>The certificate is valid until 2028.01.07<br>The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2017)<br>The Certificate Registration Number is L8251<br><br>Designation Number: CN1347<br>Test Firm Registration Number: 894804<br>Accredited by A2LA, June 14, 2023<br>The Certificate Registration Number is 6837.01<br><br>Accredited by Industry Canada, November 09, 2018<br>The Conformity Assessment Body Identifier is CN0150<br>Company Number: 30806 |
| Name of Test Lab: | Shenzhen NCT Testing Technology Co., Ltd. |
| Address of Test Lab: | B2A101, B2A201, B2A202, Fuqiao 6th Area, Xintian Community, Fuhai Street, Baoan District, Shenzhen, China. |
| Telephone: | +86-400-8868-419 |

1.4 Version:

| Report No. | Version | Description | Approved |
|---|---|---|---|
| NCT240472622XE1-1 | Rev.01 | Initial issue of report | Jan. 16, 2025 |
| | | | |
| | | | |

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2008

| 2.0 List of Measurement Equipment | | | | | |
|---|---|---|---|---|---|
| **Conducted emission** | | | | | |
| **Name** | **Model No.** | **Serial No.** | **Manufacturer** | **Date of Cal.** | **Due Date** |
| EMI Test Receiver | ESPI | 101604 | RS | 2024/6/17 | 2025/6/16 |
| LISN | ENV 216 | 102796 | RS | 2024/6/17 | 2025/6/16 |
| LISN | VN1-13S | 004023 | CRANAGE | 2024/6/17 | 2025/6/16 |

| **Radiated emission** | | | | | |
|---|---|---|---|---|---|
| **Name** | **Model No.** | **Serial No.** | **Manufacturer** | **Date of Cal.** | **Due Date** |
| EMI Test Receiver | ESCI | 101178 | RS | 2024/6/17 | 2025/6/16 |
| Spectrum Analyzer | N9020A | MY50510202 | Agilent | 2024/6/17 | 2025/6/16 |
| Amplifier | BBV 9743 B | 00374 | SCHWARZBECK | 2024/6/17 | 2025/6/16 |
| Bilog Antenna | VULB9162 | 00473 | SCHNARZBECK | 2023/3/19 | 2025/3/18 |
| Horn antenna | BBHA 9120 D | 02622 | SCHNARZBECK | 2023/3/19 | 2025/3/18 |
| Preamplifier | BBV 9718D | 00042 | SCHNARZBECK | 2024/6/17 | 2025/6/16 |

**3.0 Technical Details**

3.1 Investigations Requested

Perform Electromagnetic Interference [EMI] tests for FCC Requirement.

3.2 Test Standards

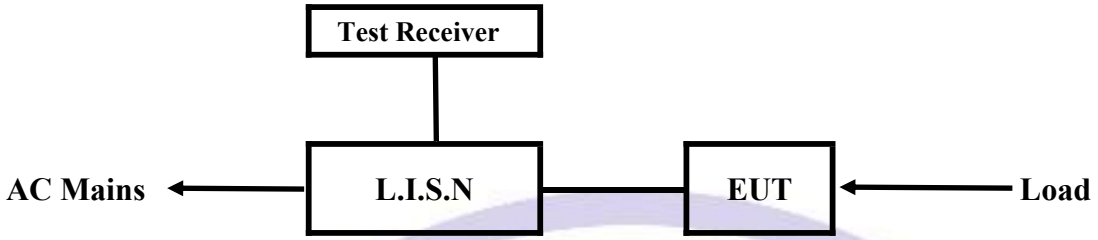
FCC Part 15 Subpart B

3.3 Measurement Uncertainty（95% confidence levels, k=2)

| No. | Item | MU |
|---|---|---|
| 1. | Temperature | ±0.1℃ |
| 2. | Humidity | ±1.0% |
| 3. | Spurious emissions, conducted | ±3.24dB |
| 4. | All emissions, radiated | ±5.03dB |

**4.0 Power Line Conducted Emission Test**

4.1 Schematics of the test



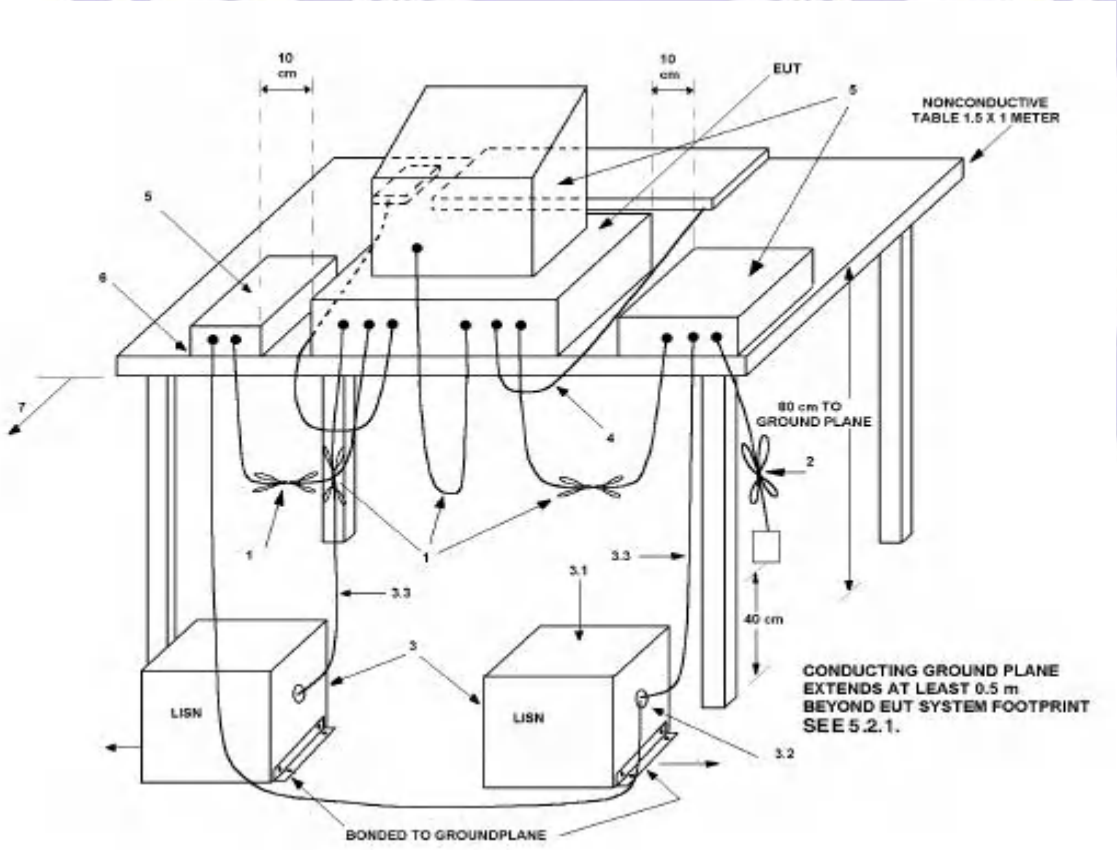

EUT: Equipment Under Test

4.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2014.The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.4 –2014.

Test Voltage: 120V~, 60HZ

Block diagram of Test setup



4.3 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2014

1) Setup the EUT and simulators as shown on the following

2) Enable AF signal and confirm EUT active to normal condition

4.4 Test Equipment

Please refer to the Section 2

4.5 Power line conducted Emission Limit

| Frequency(MHz) | Class A Limits (dBμV) | | Class B Limits (dBμV) | |
|---|---|---|---|---|
| | Quasi-peak Level | Average Level | Quasi-peak Level | Average Level |
| 0.15 ～ 0.50 | 79.0 | 66.0 | 66.0～56.0* | 56.0～46.0* |
| 0.50 ～ 5.00 | 73.0 | 60.0 | 56.0 | 46.0 |
| 5.00 ～ 30.00 | 73.0 | 60.0 | 60.0 | 50.0 |

Notes: 1. *Decreasing linearly with logarithm of frequency.

2. The tighter limit shall apply at the transition frequencies

4.6 Photo documentation of the test set-up

Please refer to the Section 7

4.7 Test specification:

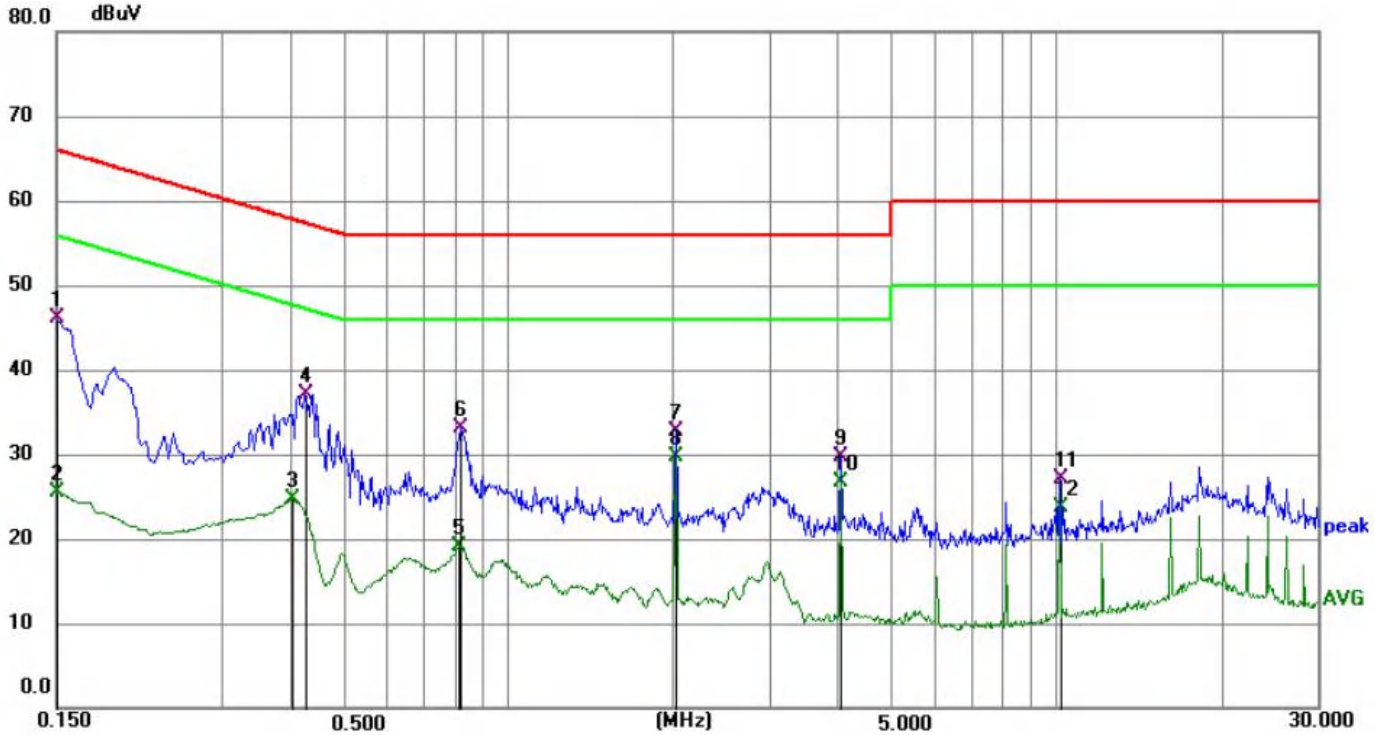
Environmental conditions: Temperature: 26° C Humidity: 56% Atmospheric pressure: 103kPa

Frequency range: 0.15 MHz – 30 MHz

4.8 Test result Pass

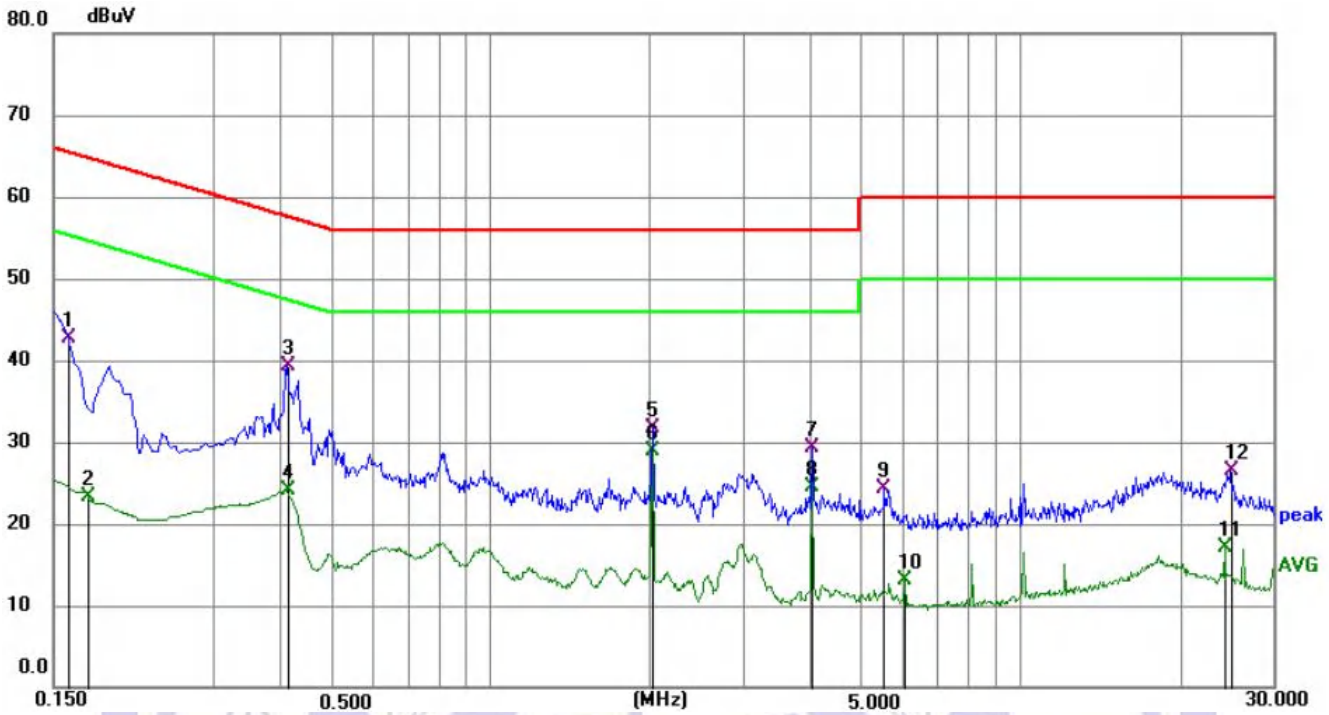
Remarks: According to the FCC Part 15 Subpart B

**A Conducted Emission on Live Terminal of the power line (150kHz to 30MHz)**




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.1500 | 35.46 | 10.59 | 46.05 | 66.00 | -19.95 | QP | P |
| 2 | 0.1500 | 15.01 | 10.59 | 25.60 | 56.00 | -30.40 | AVG | P |
| 3 | 0.4020 | 14.01 | 10.61 | 24.62 | 47.81 | -23.19 | AVG | P |
| 4 | 0.4245 | 26.55 | 10.62 | 37.17 | 57.36 | -20.19 | QP | P |
| 5 | 0.8158 | 8.49 | 10.65 | 19.14 | 46.00 | -26.86 | AVG | P |
| 6 | 0.8205 | 22.51 | 10.65 | 33.16 | 56.00 | -22.84 | QP | P |
| 7 | 2.0264 | 22.00 | 10.68 | 32.68 | 56.00 | -23.32 | QP | P |
| 8 * | 2.0264 | 18.95 | 10.68 | 29.63 | 46.00 | -16.37 | AVG | P |
| 9 | 4.0560 | 18.92 | 10.73 | 29.65 | 56.00 | -26.35 | QP | P |
| 10 | 4.0560 | 16.05 | 10.73 | 26.78 | 46.00 | -19.22 | AVG | P |
| 11 | 10.1395 | 16.19 | 10.84 | 27.03 | 60.00 | -32.97 | QP | P |
| 12 | 10.1395 | 12.87 | 10.84 | 23.71 | 50.00 | -26.29 | AVG | P |

**B Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)**




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.1598 | 32.16 | 10.58 | 42.74 | 65.47 | -22.73 | QP | P |
| 2 | 0.1749 | 12.65 | 10.57 | 23.22 | 54.72 | -31.50 | AVG | P |
| 3 | 0.4110 | 28.79 | 10.61 | 39.40 | 57.63 | -18.23 | QP | P |
| 4 | 0.4110 | 13.40 | 10.61 | 24.01 | 47.63 | -23.62 | AVG | P |
| 5 | 2.0264 | 21.09 | 10.68 | 31.77 | 56.00 | -24.23 | QP | P |
| 6 * | 2.0264 | 18.13 | 10.68 | 28.81 | 46.00 | -17.19 | AVG | P |
| 7 | 4.0560 | 18.41 | 10.83 | 29.24 | 56.00 | -26.76 | QP | P |
| 8 | 4.0560 | 13.66 | 10.83 | 24.49 | 46.00 | -21.51 | AVG | P |
| 9 | 5.5445 | 13.40 | 10.82 | 24.22 | 60.00 | -35.78 | QP | P |
| 10 | 6.0845 | 2.35 | 10.82 | 13.17 | 50.00 | -36.83 | AVG | P |
| 11 | 24.3280 | 5.99 | 11.20 | 17.19 | 50.00 | -32.81 | AVG | P |
| 12 | 25.0525 | 15.41 | 11.18 | 26.59 | 60.00 | -33.41 | QP | P |

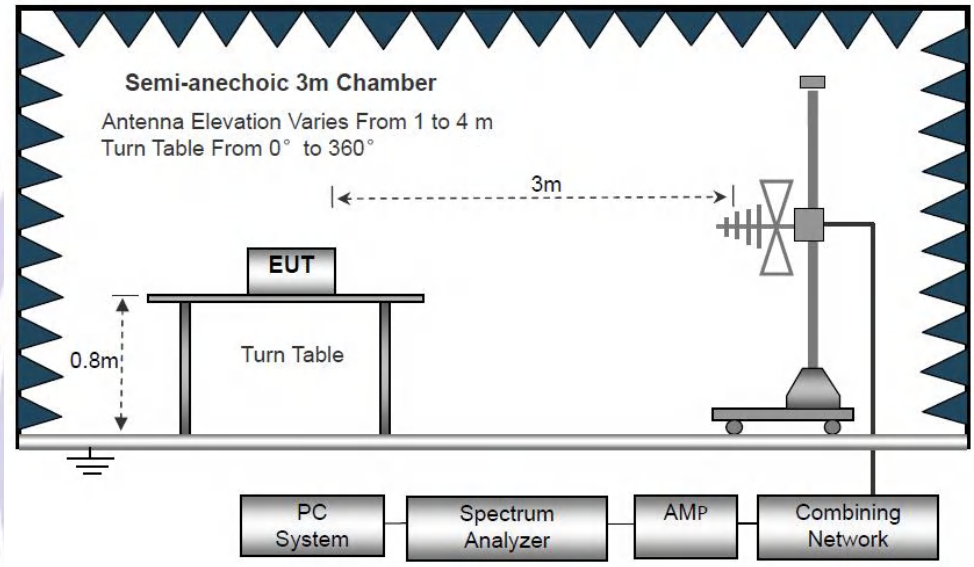
**5.0 Radiated Emission Test**

5.1 Test Method and test Procedure:

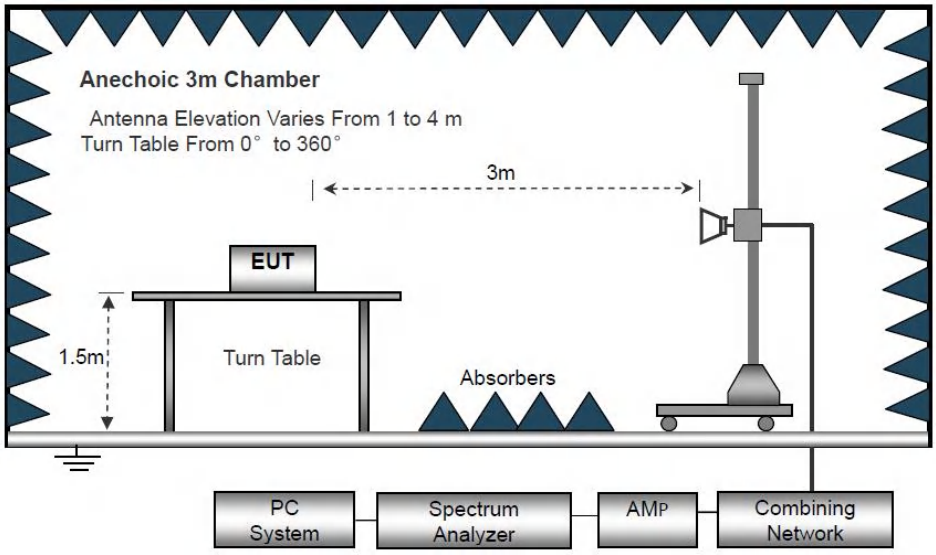
1) The EUT was tested according to ANSI C63.4 –2014.
2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-2014.
3) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
4) The antenna polarization: Vertical polarization and Horizontal polarization.

**Block diagram of Test setup**

The test setup for emission measurement from 30 MHz to 1 GHz.




The test setup for emission measurement above 1 GHz




5.2 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2014

5.3 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

| Frequency Range (MHz) | Distance (m) | Field strength (dBμV/m) |
|---|---|---|
| 30-88 | 3 | 40.0 |
| 88-216 | 3 | 43.5 |
| 216-960 | 3 | 46.0 |
| Above 960 | 3 | 54.0 |

Limit for radiated emissions at frequencies above 1 GHz for class B equipment

| Frequency (MHz) | Distance (Meters) | Field Strengths Limit (dBμV/m) | |
|---|---|---|---|
| | | Peak | Average |
| Above 960 | 3 | 74 | 54 |
| **Remark**: N/A | | | |

Note: 1) The frequency spectrum from 30MHz to 8GHz was investigated. All reading from 30MHz to 1GHz are quasi-peak values with a resolution bandwidth of 120KHz. For measurement above 1GHz, peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK.

2) Measurements were made at 3 meters.

3) If measurement is not made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula Ld1 = Ld2 * (d2/d1)

5.4 Photo documentation of the test set-up

Please refer to the Section 7

5.5 Test Equipment:

Please refer to the Section 2

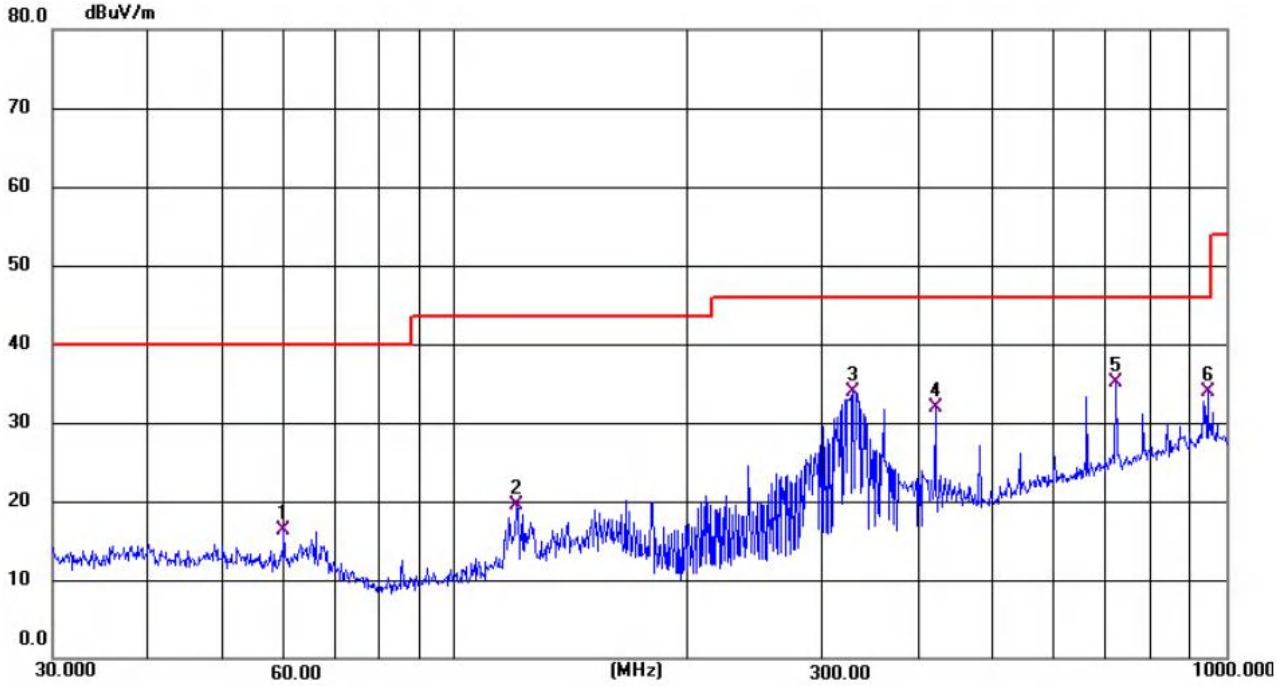
5.6 Test specification:

Environmental conditions: Temperature 26° C Humidity: 56% Atmospheric pressure: 103kPa

5.7 Test result Pass

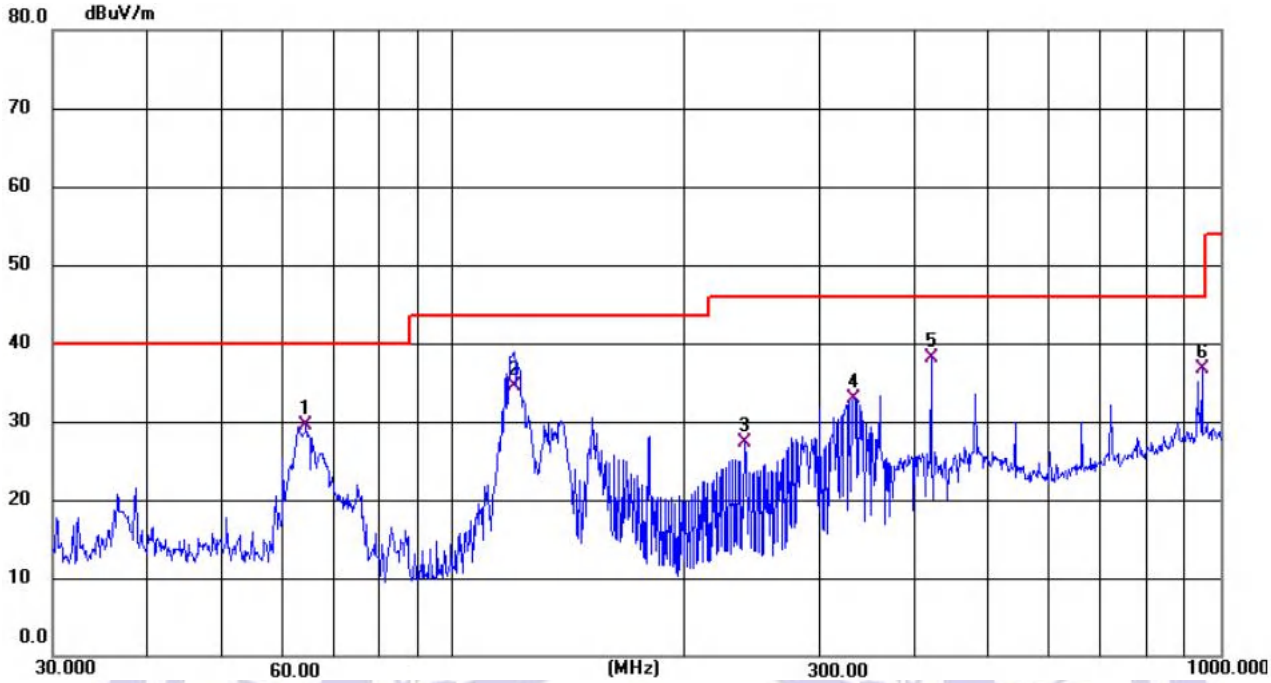
Remarks: According to the FCC Part 15 Subpart B

**A. Radiated Emission In Horizontal (30MHz----1000MHz)**



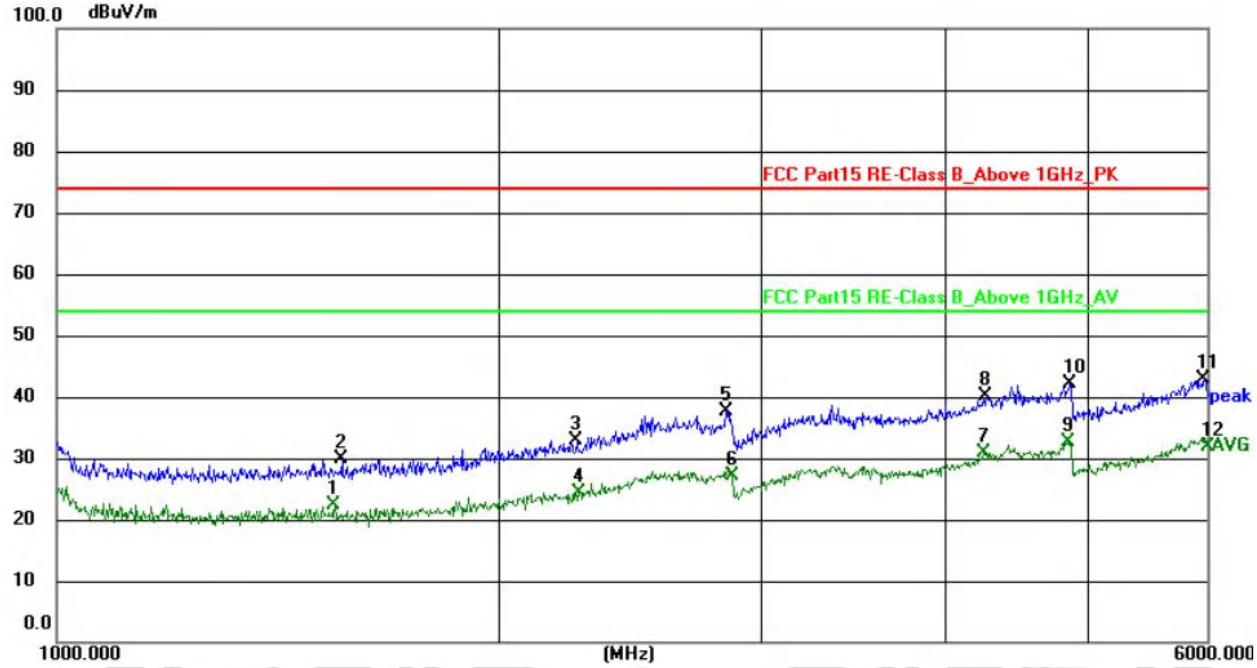

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 59.9954 | 32.27 | -15.99 | 16.28 | 40.00 | -23.72 | QP |
| 2 | 120.1291 | 35.96 | -16.40 | 19.56 | 43.50 | -23.94 | QP |
| 3 | 328.4627 | 47.94 | -14.04 | 33.90 | 46.00 | -12.10 | QP |
| 4 | 420.0645 | 43.76 | -11.84 | 31.92 | 46.00 | -14.08 | QP |
| 5 * | 720.0827 | 41.34 | -6.21 | 35.13 | 46.00 | -10.87 | QP |
| 6 | 948.4284 | 37.07 | -3.25 | 33.82 | 46.00 | -12.18 | QP |

**B. Radiated Emission In Vertical (30MHz----1000MHz)**



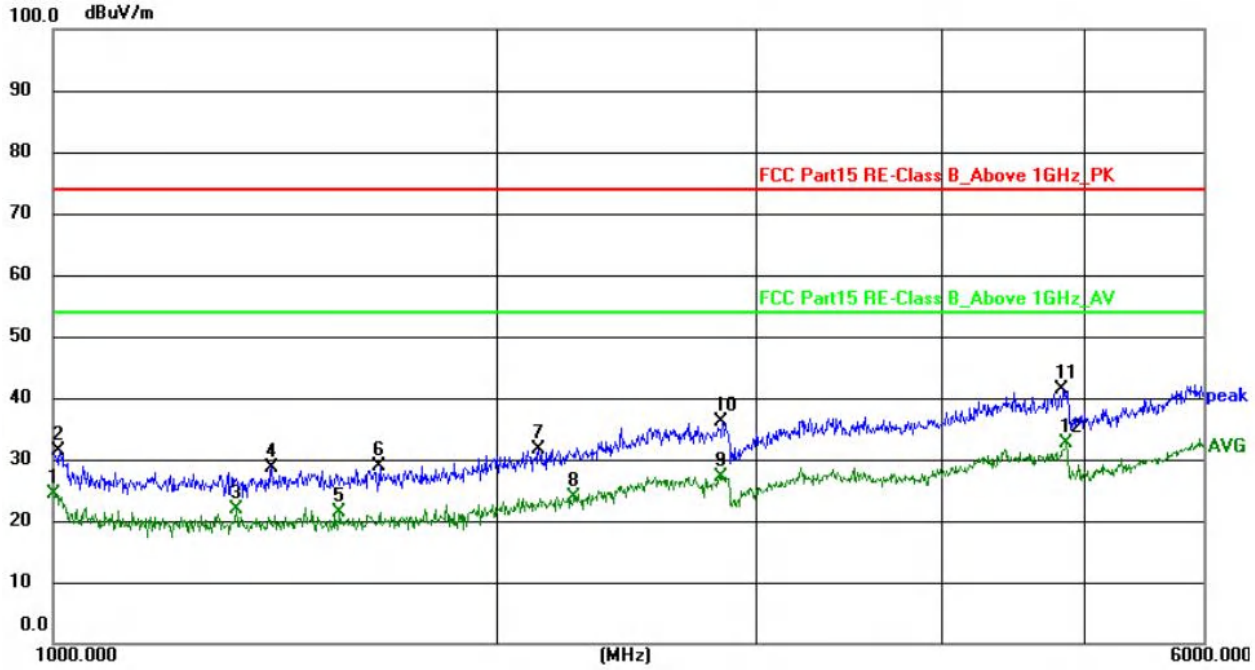

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 64.2751 | 46.29 | -16.76 | 29.53 | 40.00 | -10.47 | QP |
| 2 | 119.8976 | 51.90 | -17.32 | 34.58 | 43.50 | -8.92 | QP |
| 3 | 239.9874 | 44.82 | -17.54 | 27.28 | 46.00 | -18.72 | QP |
| 4 | 332.5187 | 47.11 | -14.25 | 32.86 | 46.00 | -13.14 | QP |
| 5 * | 420.0645 | 50.07 | -12.04 | 38.03 | 46.00 | -7.97 | QP |
| 6 | 948.7610 | 38.40 | -1.77 | 36.63 | 46.00 | -9.37 | QP |

**B. Radiated Emission In Horizontal (1000MHz----6000MHz)**




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 1545.854 | 31.47 | -9.12 | 22.35 | 54.00 | -31.65 | AVG |
| 2 | 1561.583 | 38.99 | -9.14 | 29.85 | 74.00 | -44.15 | peak |
| 3 | 2254.080 | 39.67 | -6.90 | 32.77 | 74.00 | -41.23 | peak |
| 4 | 2262.578 | 31.33 | -6.89 | 24.44 | 54.00 | -29.56 | AVG |
| 5 | 2849.643 | 42.93 | -5.26 | 37.67 | 74.00 | -36.33 | peak |
| 6 | 2863.976 | 32.25 | -5.19 | 27.06 | 54.00 | -26.94 | AVG |
| 7 | 4249.308 | 33.02 | -2.12 | 30.90 | 54.00 | -23.10 | AVG |
| 8 | 4260.362 | 42.15 | -2.11 | 40.04 | 74.00 | -33.96 | peak |
| 9 * | 4837.461 | 33.48 | -0.93 | 32.55 | 54.00 | -21.45 | AVG |
| 10 | 4856.132 | 43.09 | -0.87 | 42.22 | 74.00 | -31.78 | peak |
| 11 | 5987.113 | 41.17 | 1.66 | 42.83 | 74.00 | -31.17 | peak |
| 12 | 6000.000 | 30.30 | 1.70 | 32.00 | 54.00 | -22.00 | AVG |

**B. Radiated Emission In Vertical (1000MHz----6000MHz)**




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 1000.627 | 33.85 | -9.40 | 24.45 | 54.00 | -29.55 | AVG |
| 2 | 1011.986 | 40.87 | -9.37 | 31.50 | 74.00 | -42.50 | peak |
| 3 | 1333.194 | 30.86 | -9.03 | 21.83 | 54.00 | -32.17 | AVG |
| 4 | 1407.448 | 37.53 | -9.02 | 28.51 | 74.00 | -45.49 | peak |
| 5 | 1564.804 | 30.56 | -9.15 | 21.41 | 54.00 | -32.59 | AVG |
| 6 | 1666.227 | 38.10 | -9.20 | 28.90 | 74.00 | -45.10 | peak |
| 7 | 2135.925 | 38.73 | -7.08 | 31.65 | 74.00 | -42.35 | peak |
| 8 | 2254.282 | 30.86 | -6.90 | 23.96 | 54.00 | -30.04 | AVG |
| 9 | 2835.891 | 32.58 | -5.33 | 27.25 | 54.00 | -26.75 | AVG |
| 10 | 2846.326 | 41.34 | -5.27 | 36.07 | 74.00 | -37.93 | peak |
| 11 | 4831.830 | 42.22 | -0.95 | 41.27 | 74.00 | -32.73 | peak |
| 12 * | 4858.308 | 33.51 | -0.86 | 32.65 | 54.00 | -21.35 | AVG |

## 6.0 FCC Label

**This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.**

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

**Mark Location: On the product body**

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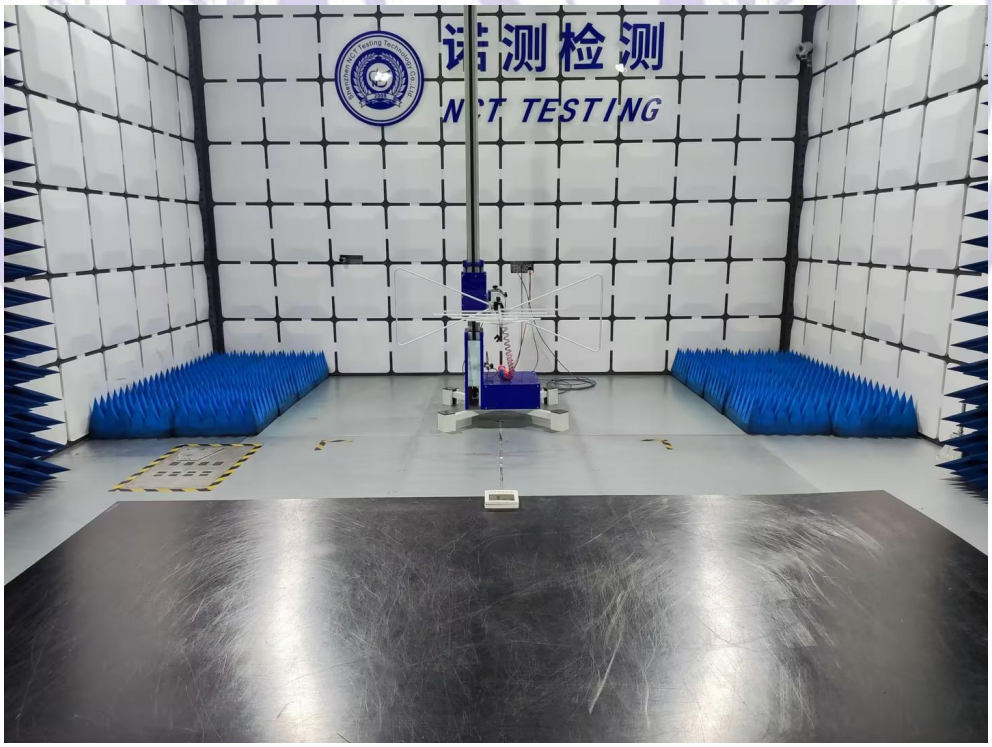
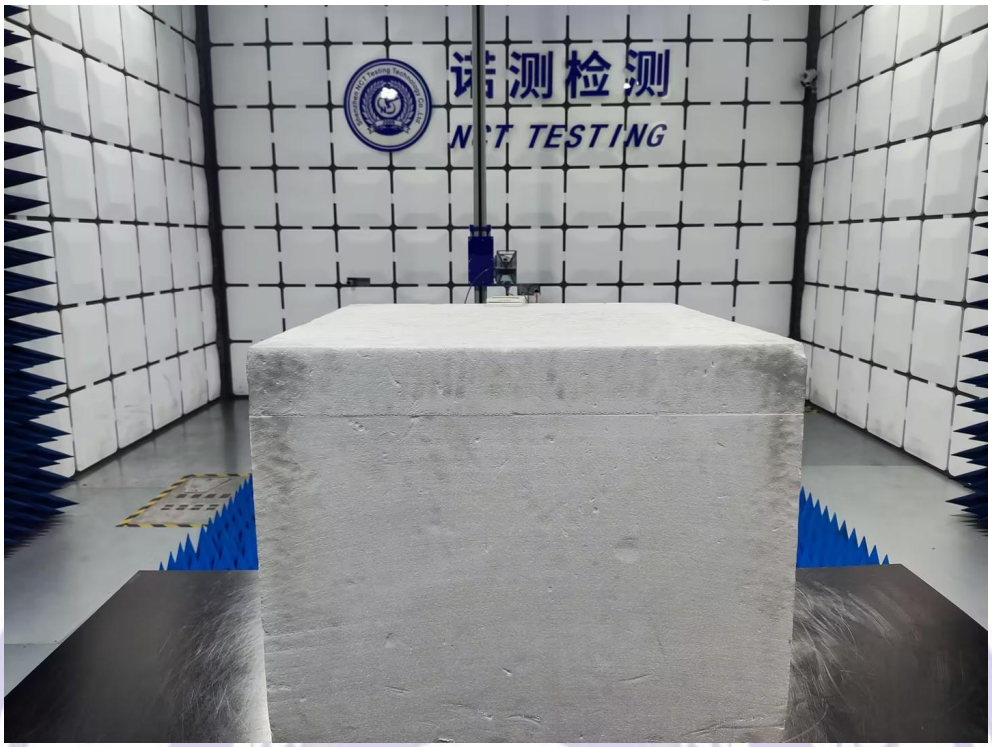
**7.0 Photos of testing**

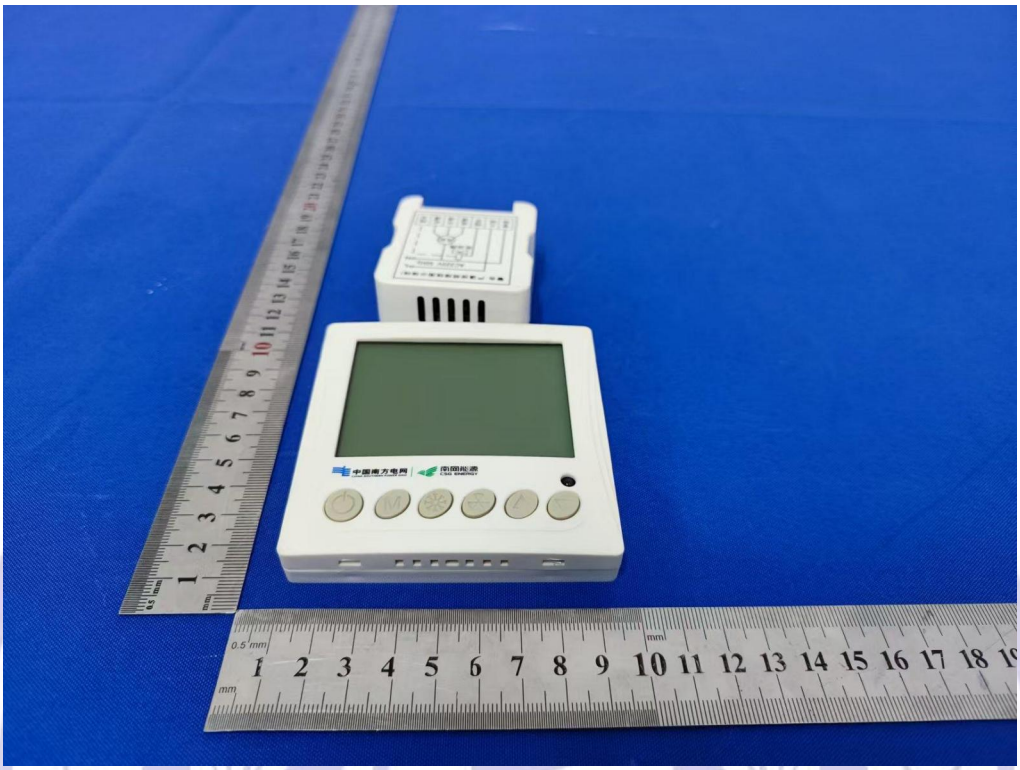
Conducted Emission Test View

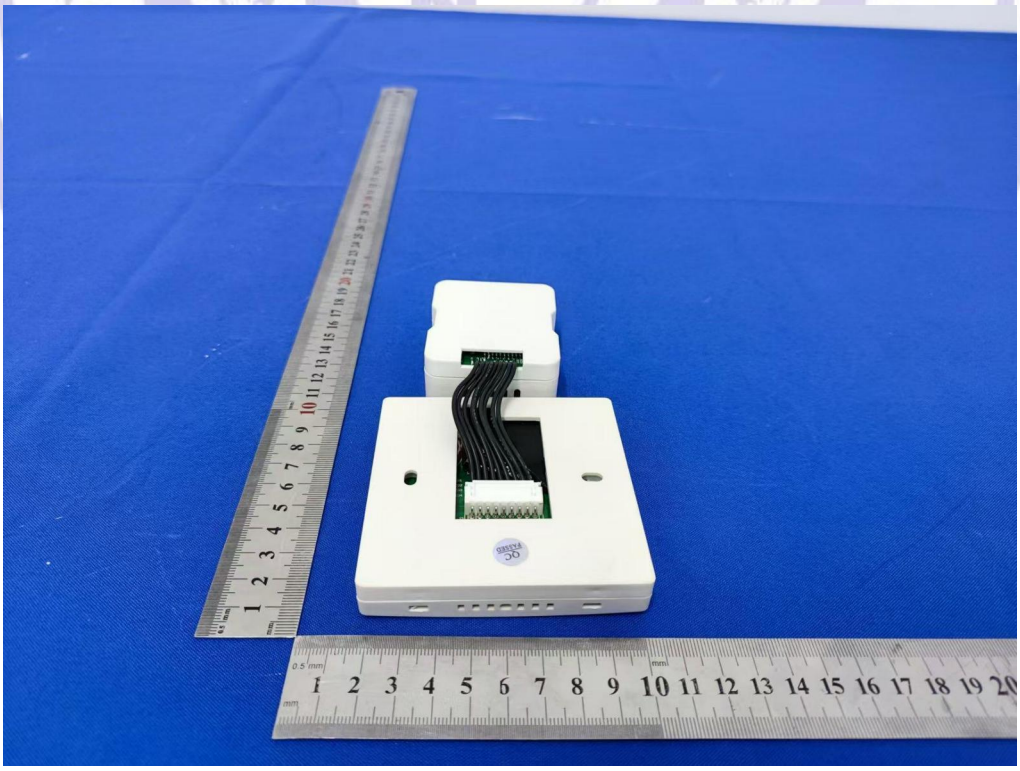
Radiated Emission test View

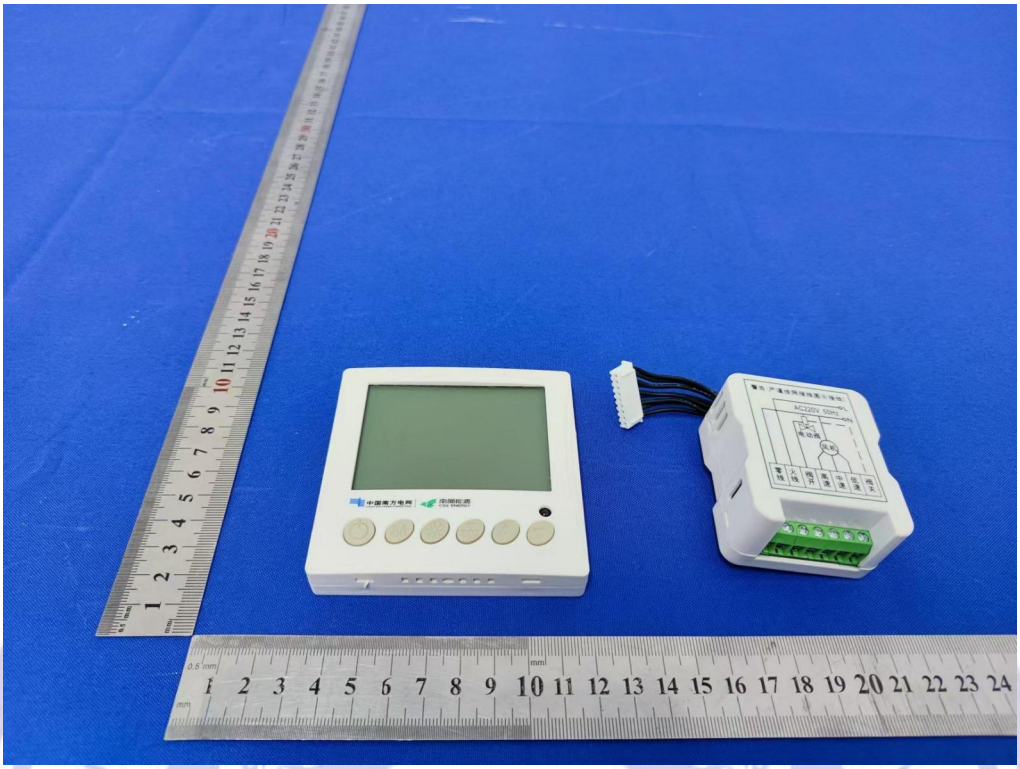


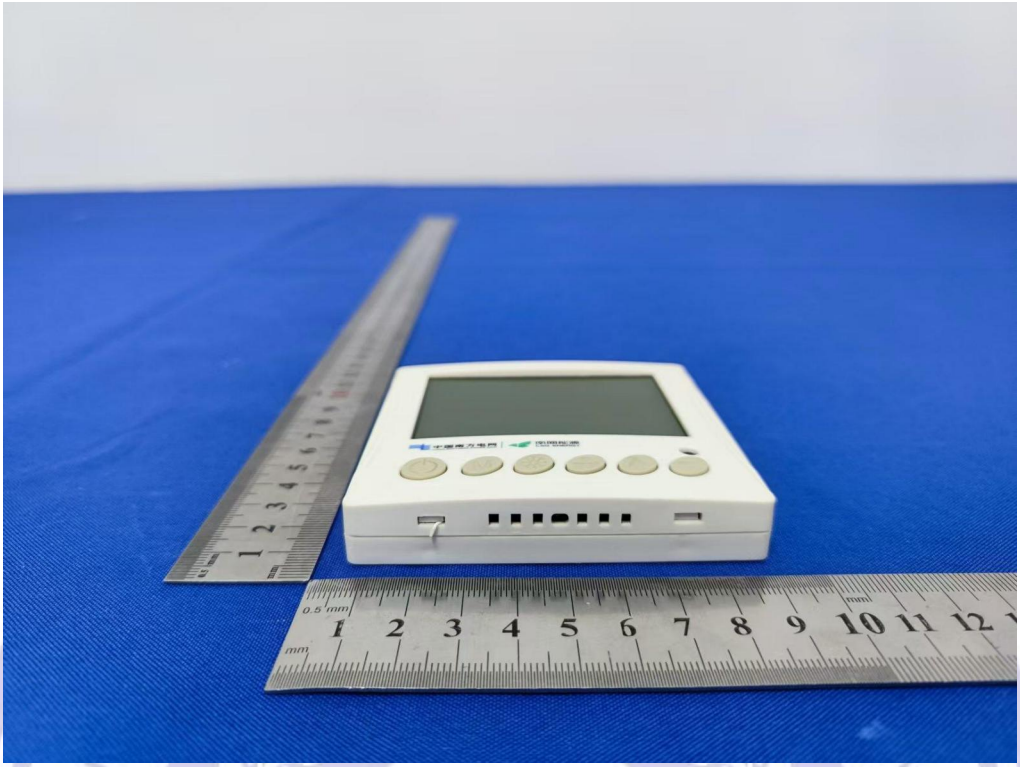

诺测检测
NCT TESTING

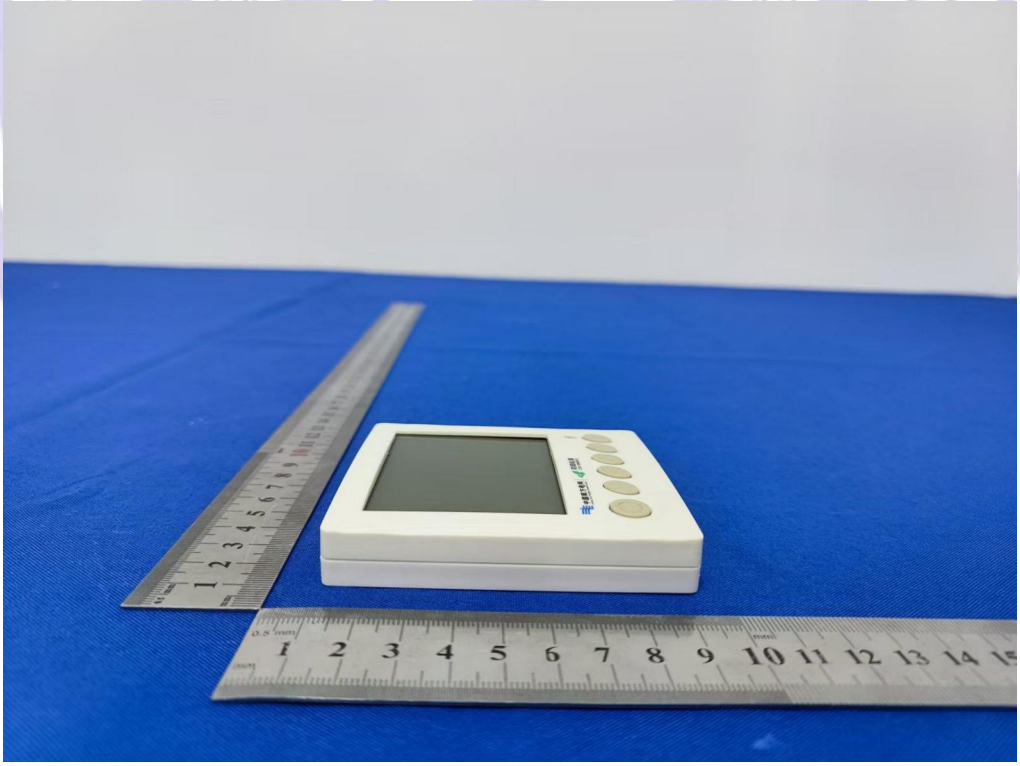
**8.0 Photos of the EUT**

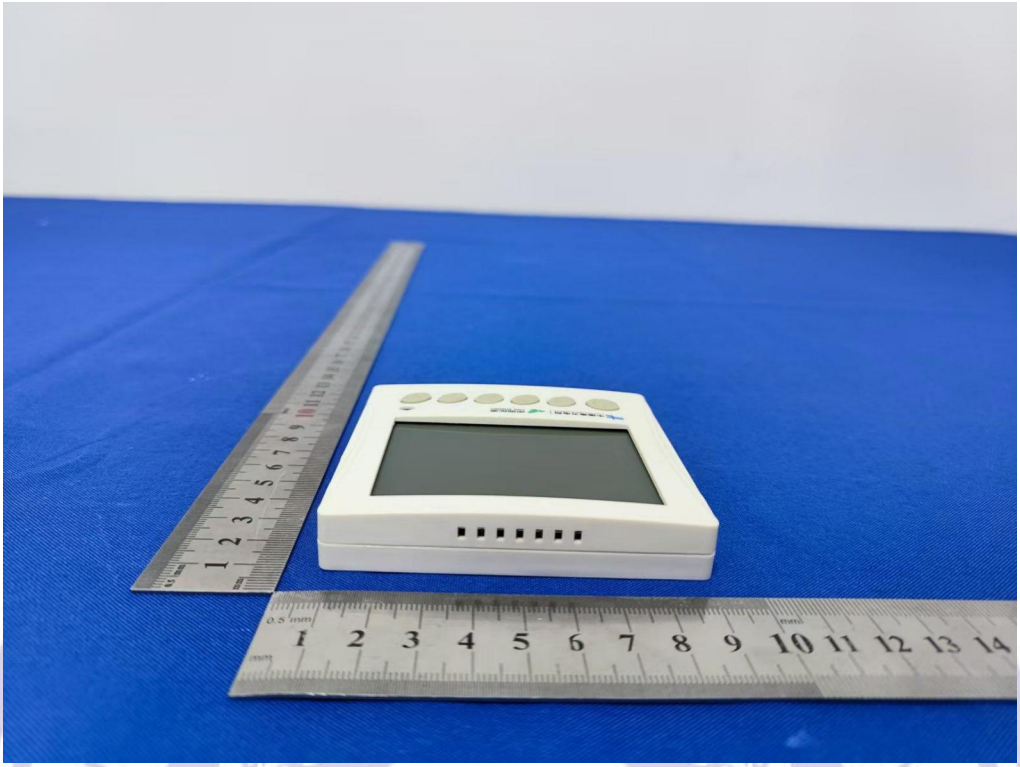


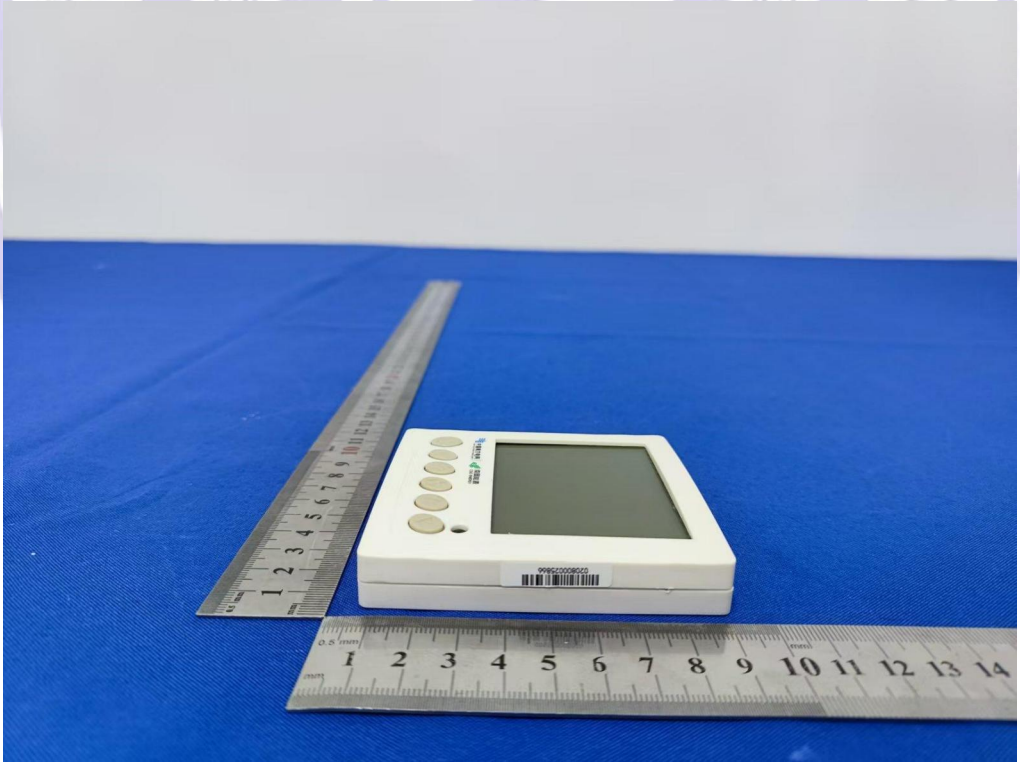


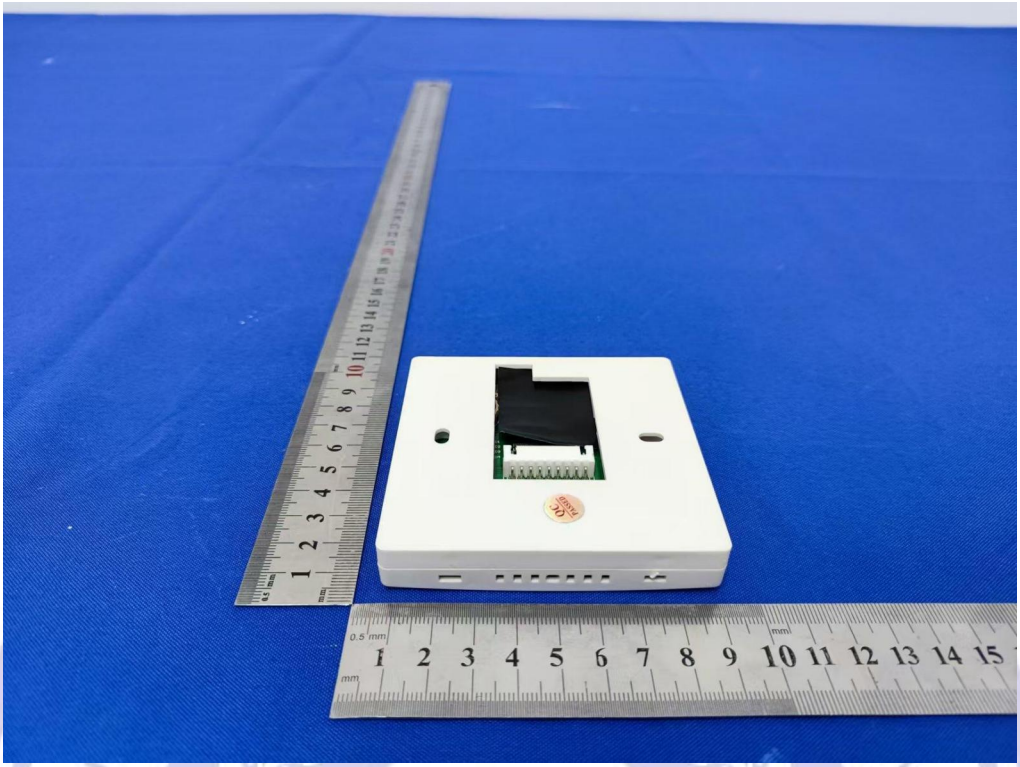


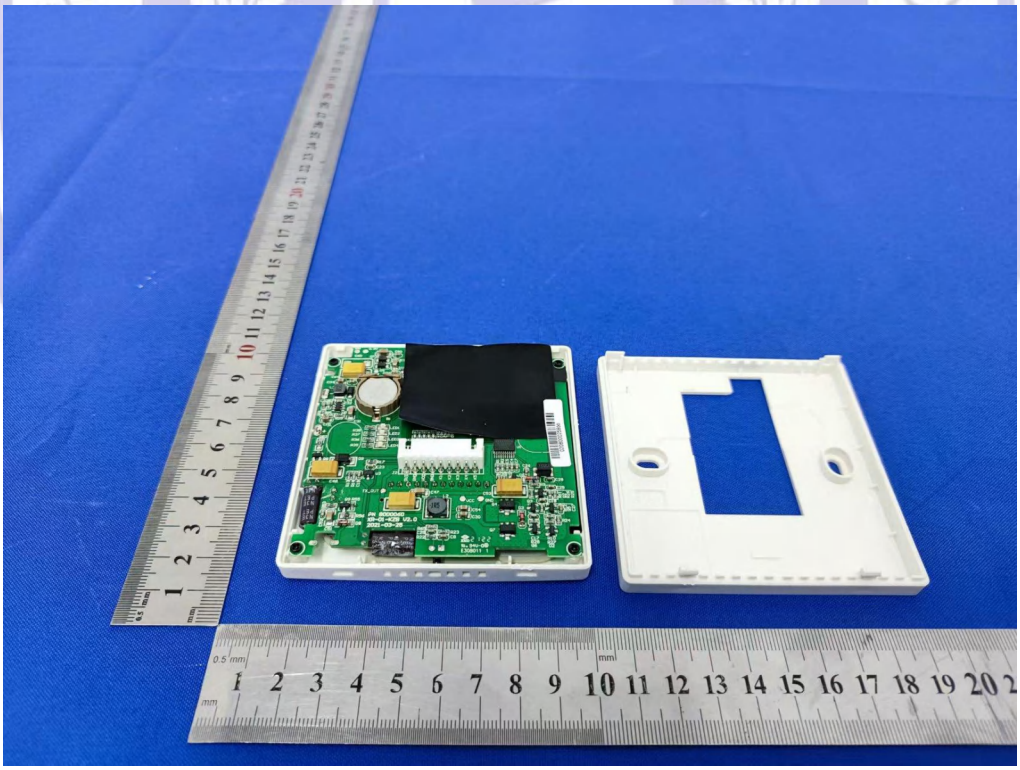


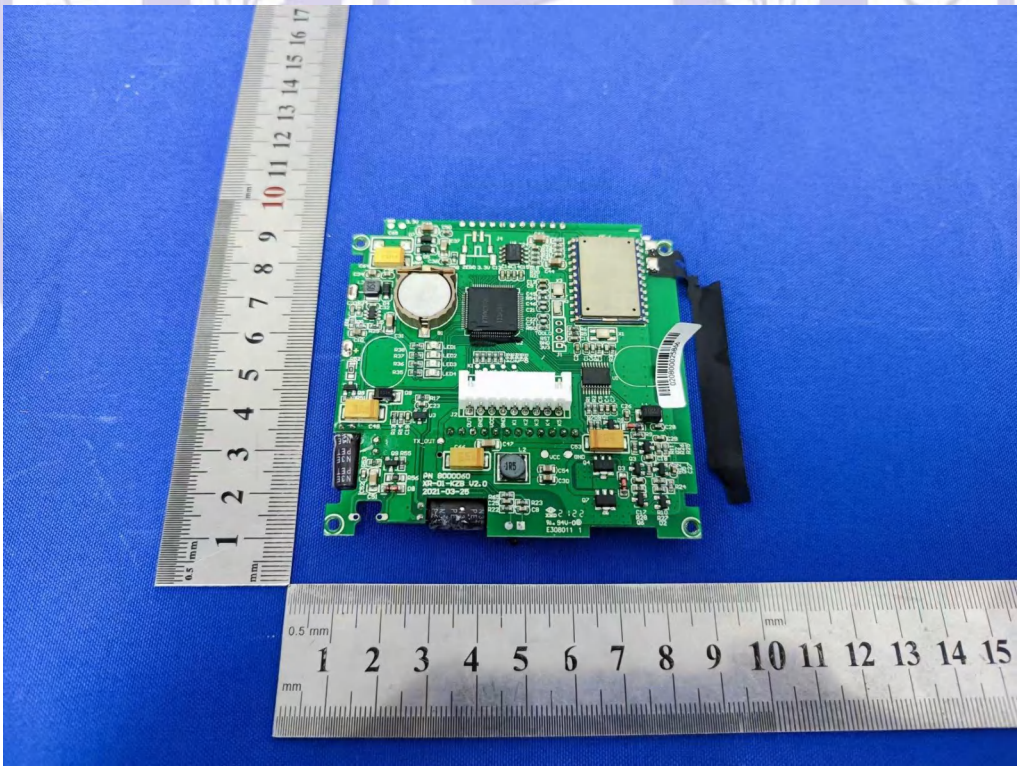


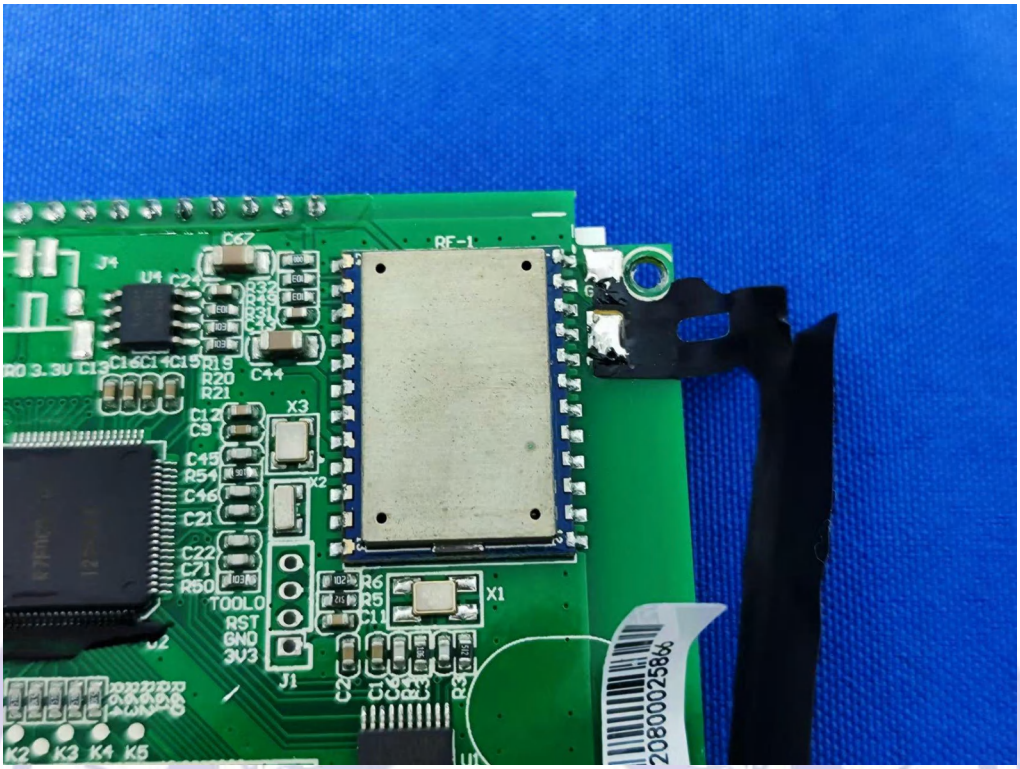











RF-1
C67
J4
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C24
C44
X3
X2
X1
TOOLO
RST
GND
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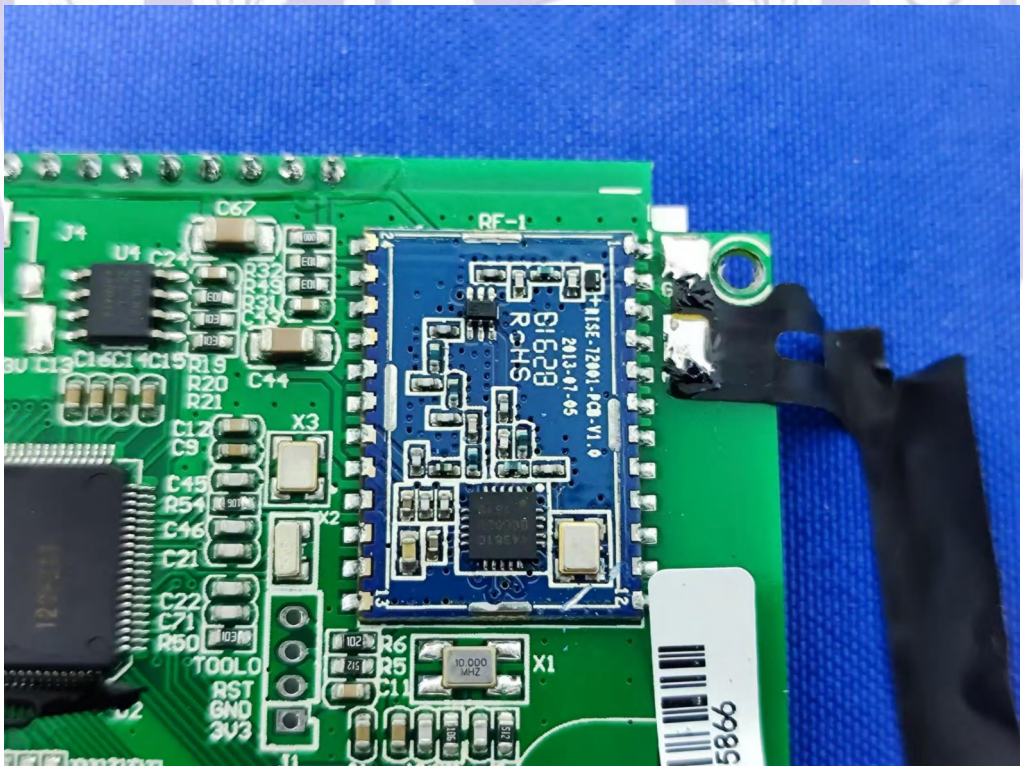
J1
K2
K3
K4
K5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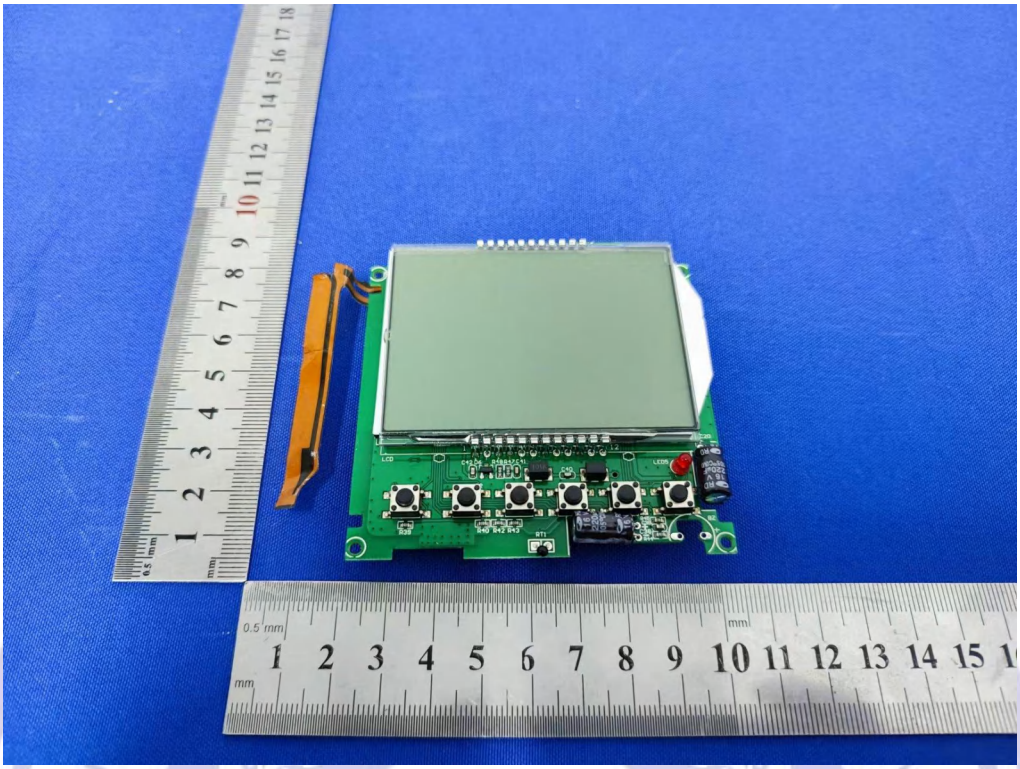
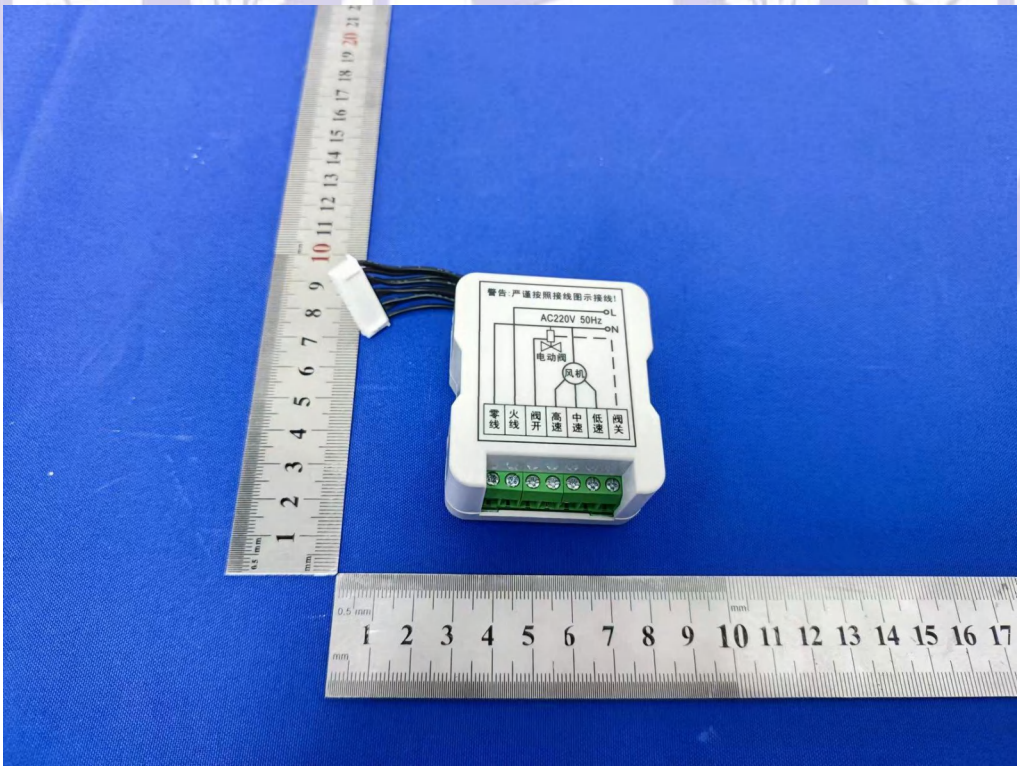
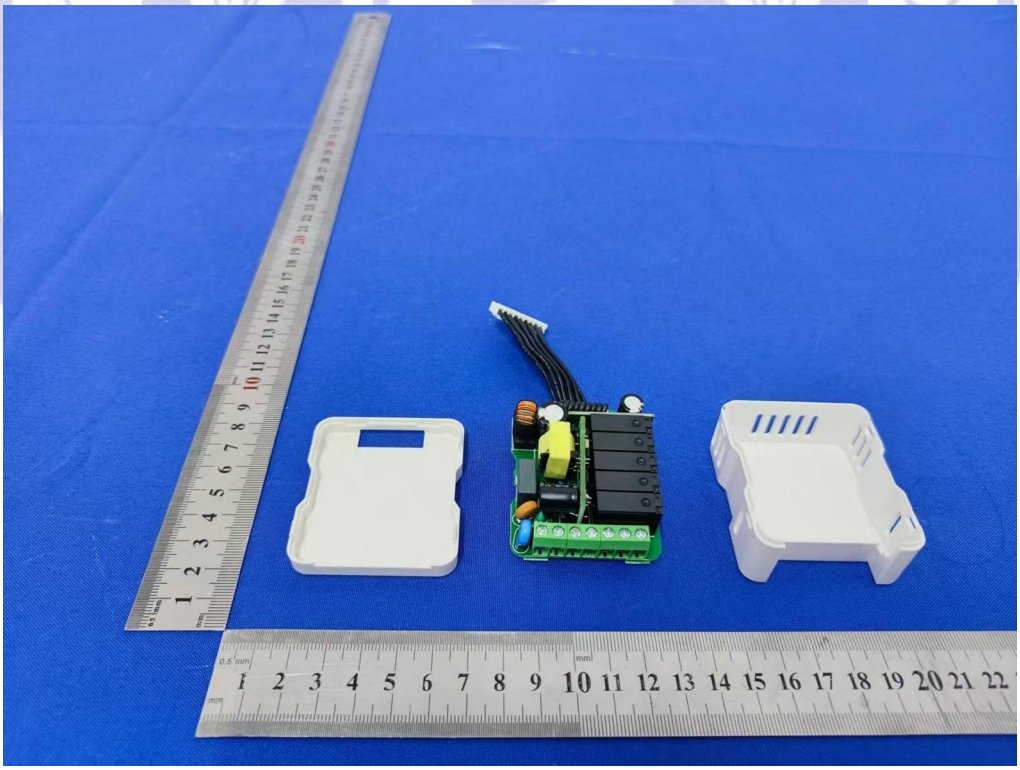
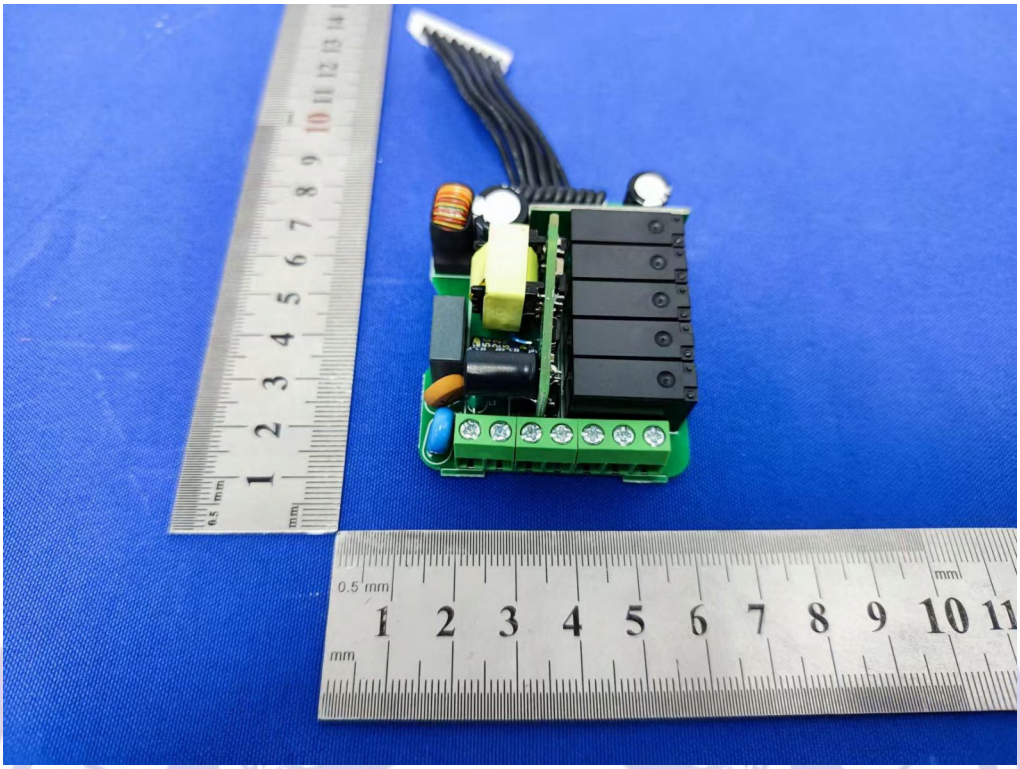
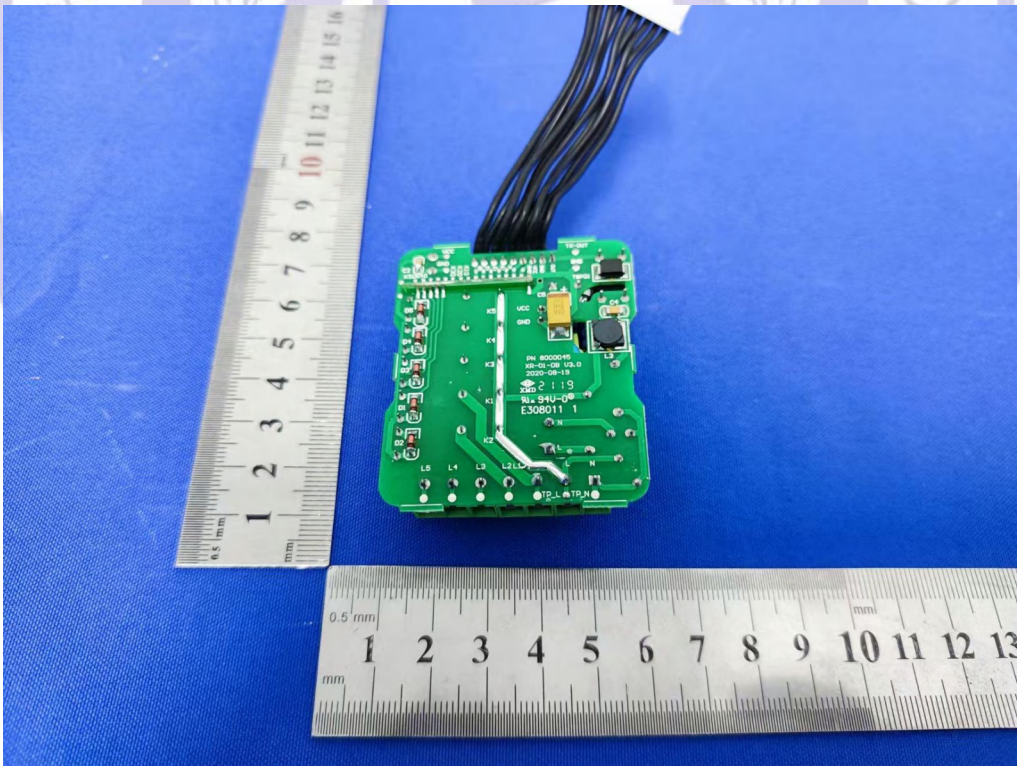



警告：严谨按照接线图示接线！
AC220V 50Hz
L
N
电动阀
风机
零线
火线
阀开
高速
中速
低速
阀关







**--End of the report--**