TCT 通测检测
TESTING CENTRE TECHNOLOGY

# TEST REPORT

| | | |
|---|---|---|
| **FCC ID. ..... :** | 2BGCO-SEMS-TC09E | |
| **Test Report No..... :** | TCT240325E064 | |
| **Date of issue..... :** | May 31, 2024 | |
| **Testing laboratory ..... :** | SHENZHEN TONGCE TESTING LAB | |
| **Testing location/ address:** | 2101 & 2201, Zhenchang Factory Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China | |
| **Applicant's name..... :** | XIAMEN IOTCOMM TECHNOLOGY CO., LTD | |
| **Address..... :** | No. 188, Tongji North Road, Tong'an District, Xiamen, Fujian, China | |
| **Manufacturer's name ... :** | XIAMEN IOTCOMM TECHNOLOGY CO., LTD | |
| **Address..... :** | No. 188, Tongji North Road, Tong'an District, Xiamen, Fujian, China | |
| **Standard(s) ..... :** | FCC CFR Title 47 Part 15 Subpart C Section 15.249<br>ANSI C63.10:2013 | |
| **Product Name..... :** | Terminal Controller | |
| **Trade Mark ..... :** | N/A | |
| **Model/Type reference..... :** | SEMS-TC09E, SEMS-RTU09E | |
| **Rating(s)..... :** | Input: AC 85~305V, 4A<br>Output: AC 85~305V, 4A | |
| **Date of receipt of test item ..... :** | Mar. 25, 2024 | |
| **Date (s) of performance of test..... :** | Mar. 25, 2024 ~ May 31, 2024 | |
| **Tested by (+signature) ... :** | Aaron MO | Aaron Mo |
| **Check by (+signature).... :** | Beryl ZHAO | Beryl Zhao |
| **Approved by (+signature):** | Tomsin | Tomsin |

SHENZHEN TONGCE TESTING LAB TCT

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# 1.General Product Information

## 1.1.EUT description

| | |
|---|---|
| **Product Name.....:** | Terminal Controller |
| **Model/Type reference.....:** | SEMS-TC09E |
| **Sample Number.....:** | TCT240325E064-0101 |
| **Operation Frequency .....:** | 902.40MHz~927.6MHz |
| **Number of Channel .....:** | 64 |
| **Modulation Technology .....:** | GFSK |
| **Antenna Type.....:** | Internal Antenna |
| **Antenna Gain.....:** | 1.32dBi |
| **Rating(s).....:** | Input: AC 85~305V, 4A<br>Output: AC 85~305V, 4A |

Note: The antenna gain listed in this report is provided by applicant, and the test laboratory is not responsible for this parameter.

## 1.2.Model(s) list

| No. | Model No. | Tested with |
|---|---|---|
| 1 | SEMS-TC09E | ☒ |
| Other models | SEMS-RTU09E | ☐ |

Note: SEMS-TC09E is tested model, other models are derivative models. The models are identical in circuit and PCB layout, only different on the model names. So the test data of SEMS-TC09E can represent the remaining models.

## 1.3.Operation Frequency

| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|---|---|
| 1 | 902.4MHz | 17 | 908.8MHz | 33 | 915.2MHz | 49 | 921.6MHz |
| 2 | 902.8MHz | 18 | 909.2MHz | 34 | 915.6MHz | 50 | 922.0MHz |
| 3 | 903.2MHz | 19 | 909.6MHz | 35 | 916.0MHz | 51 | 922.4MHz |
| 4 | 903.6MHz | 20 | 910.0MHz | 36 | 916.4MHz | 52 | 922.8MHz |
| 5 | 904.0MHz | 21 | 910.4MHz | 37 | 916.8MHz | 53 | 923.2MHz |
| 6 | 904.4MHz | 22 | 910.8MHz | 38 | 917.2MHz | 54 | 923.6MHz |
| 7 | 904.8MHz | 23 | 911.2MHz | 39 | 917.6MHz | 55 | 924.0MHz |
| 8 | 905.2MHz | 24 | 911.6MHz | 40 | 918.0MHz | 56 | 924.4MHz |
| 9 | 905.6MHz | 25 | 912.0MHz | 41 | 918.4MHz | 57 | 924.8MHz |
| 10 | 906.0MHz | 26 | 912.4MHz | 42 | 918.8MHz | 58 | 925.2MHz |
| 11 | 906.4MHz | 27 | 912.8MHz | 43 | 919.2MHz | 59 | 925.6MHz |
| 12 | 906.8MHz | 28 | 913.2MHz | 44 | 919.6MHz | 60 | 926.0MHz |
| 13 | 907.2MHz | 29 | 913.6MHz | 45 | 920.0MHz | 61 | 926.4MHz |
| 14 | 907.6MHz | 30 | 914.0MHz | 46 | 920.4MHz | 62 | 926.8MHz |
| 15 | 908.0MHz | 31 | 914.4MHz | 47 | 920.8MHz | 63 | 927.2MHz |
| 16 | 908.4MHz | 32 | 914.8MHz | 48 | 921.2MHz | 64 | 927.6MHz |

***Note:***

*In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:*

| Channel | Frequency |
|---|---|
| The Lowest channel | 902.4MHz |
| The Middle channel | 915.2MHz |
| The Highest channel | 927.6MHz |



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# 2.Test Result Summary

| Requirement | CFR 47 Section | Result |
|---|---|---|
| Antenna Requirement | §15.203 | PASS |
| AC Power Line Conducted Emission | §15.207 | PASS |
| Field Strength of Fundamental | §15.249 (a) | PASS |
| Spurious Emissions | §15.249 (a) (d)/ §15.209 | PASS |
| Band Edge | §15.249 (d)/ §15.205 | PASS |
| 20dB Occupied Bandwidth | §15.215 (c) | PASS |

***Note:***

*1. Pass: Test item meets the requirement.*

*2. Fail: Test item does not meet the requirement.*

*3. N/A: Test case does not apply to the test object.*

*4. The test result judgment is decided by the limit of test standard.*



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# 3.General Information

## 3.1.Test Environment and Mode

| Operating Environment: | | |
|---|---|---|
| Condition | Conducted Emission | Radiated Emission |
| Temperature: | 24.8 °C | 25.6 °C |
| Humidity: | 52 % RH | 53 % RH |
| Atmospheric Pressure: | 1010 mbar | 1010 mbar |
| Test Mode: | | |
| Engineering mode: | Keep the EUT in continuous transmitting by select channel | |
| The sample was placed 0.8m & 1.5m for the measurement below & above 1GHz above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case( Z axis) are shown in Test Results of the following pages. | | |

## 3.2.Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Equipment | Model No. | Serial No. | FCC ID | Trade Name |
|---|---|---|---|---|
| / | / | / | / | / |

***Note:***

*1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*

*2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*



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# 4. Facilities and Accreditations

## 4.1. Facilities

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

- FCC - Registration No.: 645098
  SHENZHEN TONGCE TESTING LAB
  Designation Number: CN1205
  The testing lab has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.
- IC - Registration No.: 10668A-1
  SHENZHEN TONGCE TESTING LAB
  CAB identifier: CN0031
  The testing lab has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing.

## 4.2. Location

SHENZHEN TONGCE TESTING LAB
Address: 2101 & 2201, Zhenchang Factory Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China
TEL: +86-755-27673339

## 4.3. Measurement Uncertainty

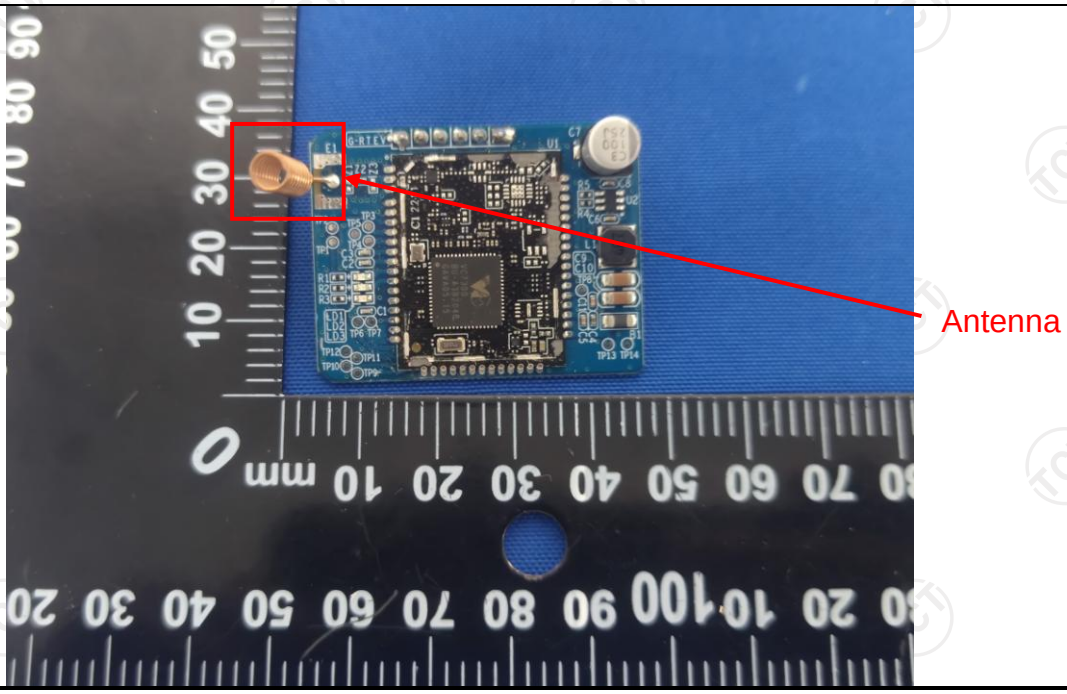
The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

| No. | Item | MU |
|---|---|---|
| 1 | Conducted Emission | ± 3.10 dB |
| 2 | RF power, conducted | ± 0.12 dB |
| 3 | Spurious emissions, conducted | ± 0.11 dB |
| 4 | All emissions, radiated(<1 GHz) | ± 4.56 dB |
| 5 | All emissions, radiated(1 GHz - 18 GHz) | ± 4.22 dB |
| 6 | All emissions, radiated(18 GHz- 40 GHz) | ± 4.36 dB |

# 5.Test Results and Measurement Data

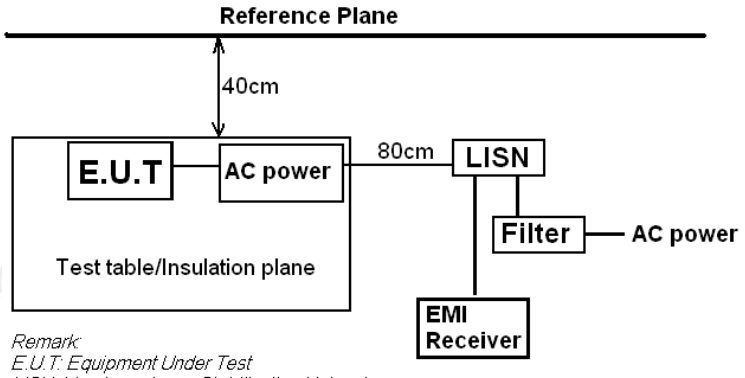
## 5.1.Antenna Requirement

| **Standard requirement:** | FCC Part15 C Section 15.203 |
|---|---|
| 15.203 requirement:<br>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. | |
| **E.U.T Antenna:** | |
| The EUT antenna is Internal antenna which permanently attached, and the best case gain of the antenna is 1.32dBi. | |



## 5.2.Conducted Emission

### 5.2.1. Test Specification

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.207</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Frequency Range:</td><td>150 kHz to 30 MHz</td></tr>
<tr><td>Receiver setup:</td><td>RBW=9 kHz, VBW=30 kHz, Sweep time=auto</td></tr>
<tr><td>Limits:</td><td>
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
</td></tr>
<tr><td>Test Setup:</td><td>


Remark:<br>E.U.T: Equipment Under Test<br>LISN: Line Impedence Stabilization Network<br>Test table height=0.8m
</td></tr>
<tr><td>Test Mode:</td><td>Charging</td></tr>
<tr><td>Test Procedure:</td><td>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.<br>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).<br>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.</td></tr>
<tr><td>Test Result:</td><td>PASS</td></tr>
</table>

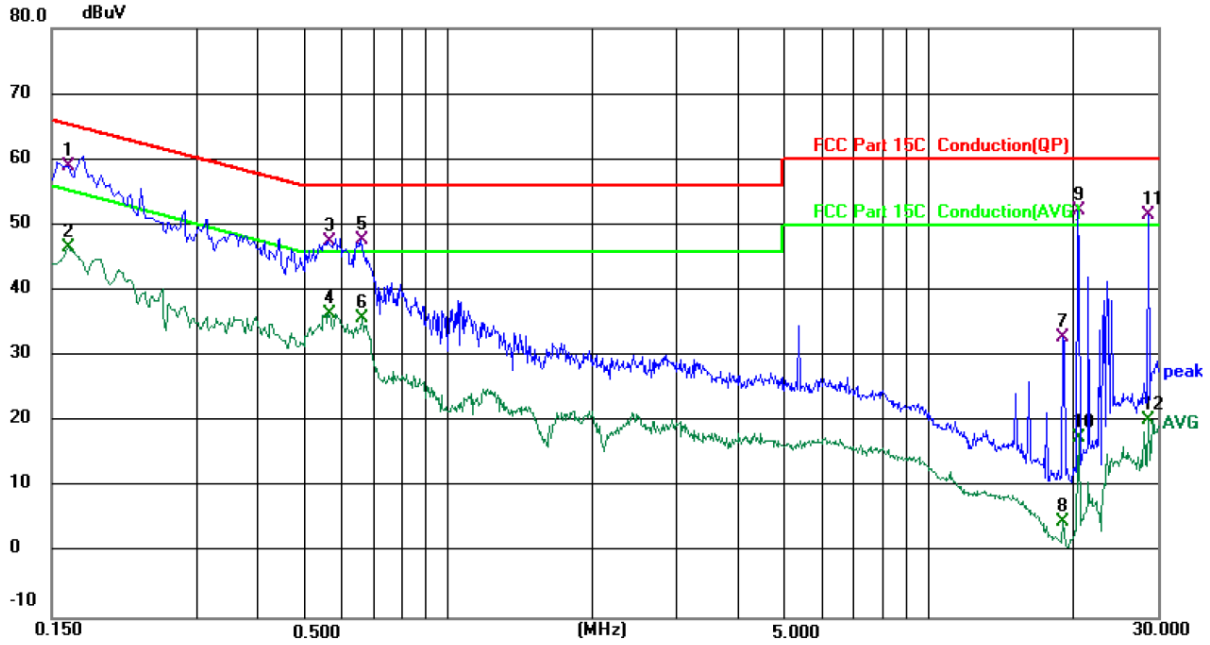
### 5.2.2. Test Instruments

| Conducted Emission Shielding Room Test Site (843) | | | | |
|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model** | **Serial Number** | **Calibration Due** |
| EMI Test Receiver | R&S | ESCI3 | 100898 | Jun. 29, 2024 |
| Line Impedance Stabilisation Newtork(LISN) | Schwarzbeck | NSLK 8126 | 8126453 | Jan. 31, 2025 |
| Line-5 | TCT | CE-05 | / | Jul. 03, 2024 |
| EMI Test Software | Shurple Technology | EZ-EMC | / | / |

### 5.2.3. Test data

**Please refer to following diagram for individual**

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




Site 844 Shielding Room | Phase: *L1* | Temperature: 24.8 (℃) | Humidity: 52 %

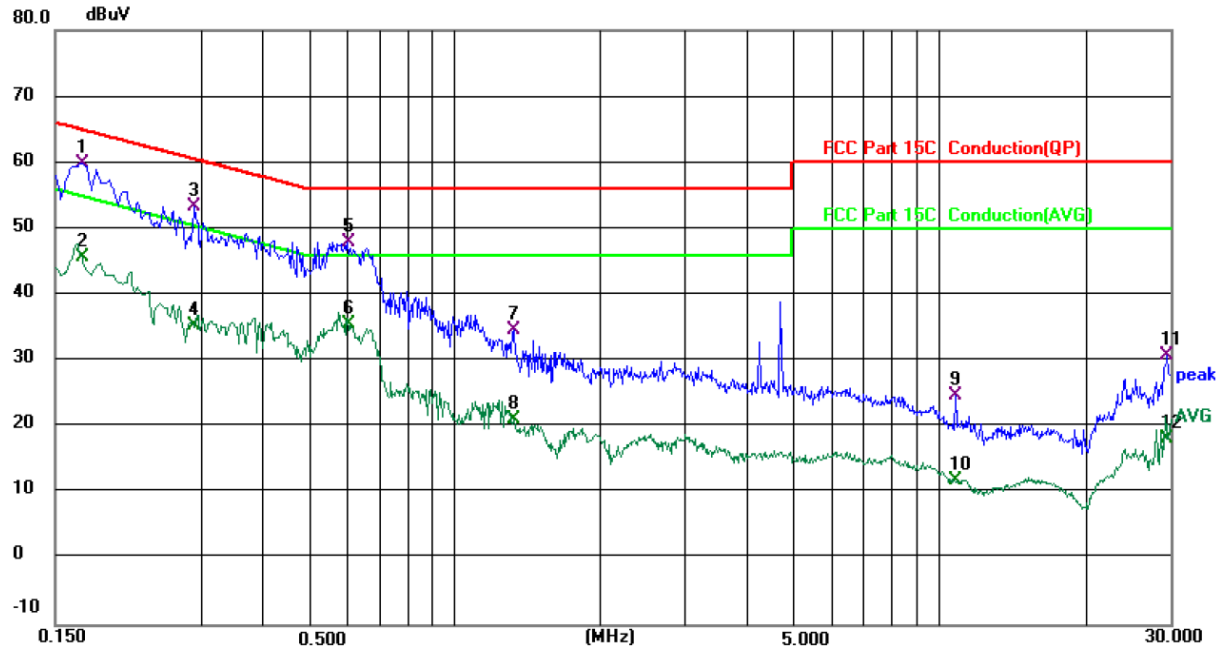
Limit: FCC Part 15C Conduction(QP) | Power: AC 120 V/60 Hz

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | * | 0.1620 | 49.00 | 10.03 | 59.03 | 65.36 | -6.33 | QP | |
| 2 | | 0.1620 | 36.48 | 10.03 | 46.51 | 55.36 | -8.85 | AVG | |
| 3 | | 0.5660 | 38.26 | 9.28 | 47.54 | 56.00 | -8.46 | QP | |
| 4 | | 0.5660 | 27.21 | 9.28 | 36.49 | 46.00 | -9.51 | AVG | |
| 5 | | 0.6660 | 38.59 | 9.19 | 47.78 | 56.00 | -8.22 | QP | |
| 6 | | 0.6660 | 26.67 | 9.19 | 35.86 | 46.00 | -10.14 | AVG | |
| 7 | | 19.0740 | 22.38 | 10.58 | 32.96 | 60.00 | -27.04 | QP | |
| 8 | | 19.0740 | -5.90 | 10.58 | 4.68 | 50.00 | -45.32 | AVG | |
| 9 | | 20.6020 | 41.70 | 10.59 | 52.29 | 60.00 | -7.71 | QP | |
| 10 | | 20.6020 | 7.04 | 10.59 | 17.63 | 50.00 | -32.37 | AVG | |
| 11 | | 28.6140 | 40.55 | 11.05 | 51.60 | 60.00 | -8.40 | QP | |
| 12 | | 28.6140 | 9.20 | 11.05 | 20.25 | 50.00 | -29.75 | AVG | |

***Note:***

*Freq. = Emission frequency in MHz*
*Reading level (dBµV) = Receiver reading*
*Corr. Factor (dB) = LISN factor + Cable loss*
*Measurement (dBµV) = Reading level (dBµV) + Corr. Factor (dB)*
*Limit (dBµV) = Limit stated in standard*
*Margin (dB) = Measurement (dBµV) – Limits (dBµV)*
*Q.P. =Quasi-Peak*
*AVG =average*
** is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz*

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




Site 844 Shielding Room | Phase: *N* | Temperature: 24.8 (℃) | Humidity: 52 %

Limit: FCC Part 15C Conduction(QP) | Power: AC 120 V/60 Hz

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | * | 0.1700 | 49.95 | 10.00 | 59.95 | 64.96 | -5.01 | QP | |
| 2 | | 0.1700 | 35.58 | 10.00 | 45.58 | 54.96 | -9.38 | AVG | |
| 3 | | 0.2900 | 43.59 | 9.83 | 53.42 | 60.52 | -7.10 | QP | |
| 4 | | 0.2900 | 25.44 | 9.83 | 35.27 | 50.52 | -15.25 | AVG | |
| 5 | | 0.6019 | 38.76 | 9.23 | 47.99 | 56.00 | -8.01 | QP | |
| 6 | | 0.6019 | 26.42 | 9.23 | 35.65 | 46.00 | -10.35 | AVG | |
| 7 | | 1.3260 | 24.72 | 9.91 | 34.63 | 56.00 | -21.37 | QP | |
| 8 | | 1.3260 | 11.36 | 9.91 | 21.27 | 46.00 | -24.73 | AVG | |
| 9 | | 10.8139 | 14.12 | 10.62 | 24.74 | 60.00 | -35.26 | QP | |
| 10 | | 10.8139 | 1.21 | 10.62 | 11.83 | 50.00 | -38.17 | AVG | |
| 11 | | 29.6340 | 19.85 | 11.07 | 30.92 | 60.00 | -29.08 | QP | |
| 12 | | 29.6340 | 7.08 | 11.07 | 18.15 | 50.00 | -31.85 | AVG | |

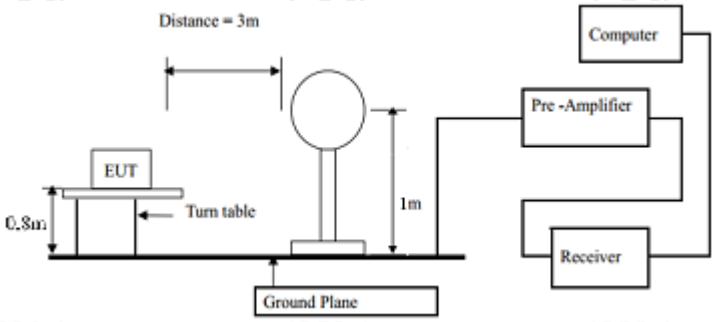
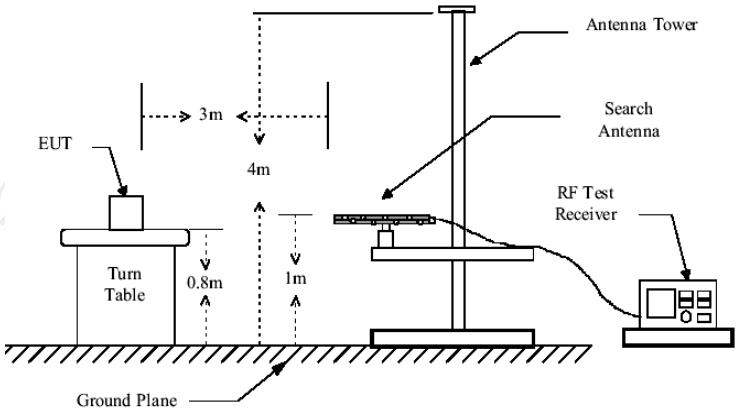
***Note:***

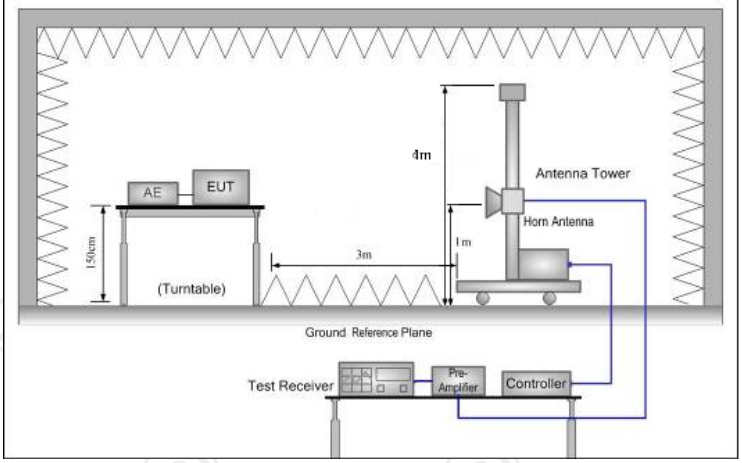
*Freq. = Emission frequency in MHz*
*Reading level (dBµV) = Receiver reading*
*Corr. Factor (dB) = LISN factor + Cable loss*
*Measurement (dBµV) = Reading level (dBµV) + Corr. Factor (dB)*
*Limit (dBµV) = Limit stated in standard*
*Margin (dB) = Measurement (dBµV) – Limits (dBµV)*
*Q.P. =Quasi-Peak AVG =average*
** is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.*

## 5.3.Radiated Emission Measurement

### 5.3.1. Test Specification

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Frequency Range:</td><td>9 kHz to 25 GHz</td></tr>
<tr><td>Measurement Distance:</td><td>3 m</td></tr>
<tr><td>Antenna Polarization:</td><td>Horizontal & Vertical</td></tr>
<tr><td>Receiver Setup:</td><td>
<table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>9kHz- 150kHz</td><td>Quasi-peak</td><td>200Hz</td><td>1kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>150kHz-30MHz</td><td>Quasi-peak</td><td>9kHz</td><td>30kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120kHz</td><td>300kHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit(Field strength of the fundamental signal):</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td rowspan="2">902MHz-928MHz</td><td>94.00</td><td>Average Value</td></tr>
<tr><td>114.00</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Limit(Spurious Emissions):</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(KHz)</td><td>Quasi-peak Value</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(KHz)</td><td>Quasi-peak Value</td></tr>
<tr><td>1.705-30</td><td>30</td><td>Quasi-peak Value</td></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>74.0</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Limit (band edge) :</td><td>Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.</td></tr>
<tr><td>Test Procedure:</td><td>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber in below 1GHz, 1.5m above the ground in above 1GHz. The table was rotated 360 degrees to determine the position of the highest radiation.<br>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.<br>3. The antenna height is varied from one meter to four 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.</td></tr>
</table>

| | |
|---|---|
| | 4. 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.<br>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.<br>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. |
| **Test setup:** | For radiated emissions below 30MHz<br>  <br><br>30MHz to 1GHz<br>  <br><br>Above 1GHz<br>(The diagram below shows the test setup that is utilized to make the measurements for emission from 1GHz to the tenth harmonic of the highest fundamental frequency or to 40GHz emissions, whichever is lower.) |

| | |
|---|---|
| |  |
| **Test results:** | PASS |

### 5.3.2. Test Instruments

| Radiated Emission Test Site (966) | | | | |
|---|---|---|---|---|
| **Name of Equipment** | **Manufacturer** | **Model** | **Serial Number** | **Calibration Due** |
| EMI Test Receiver | R&S | ESIB7 | 100197 | Jun. 29, 2024 |
| Spectrum Analyzer | R&S | FSQ40 | 200061 | Jun. 29, 2024 |
| Pre-amplifier | SKET | LNPA_0118G-45 | SK2021012102 | Jan. 31, 2025 |
| Pre-amplifier | SKET | LNPA_1840G-50 | SK202109203500 | Jan. 31, 2025 |
| Pre-amplifier | HP | 8447D | 2727A05017 | Jun. 27, 2024 |
| Loop antenna | Schwarzbeck | FMZB1519B | 00191 | Jul. 02, 2024 |
| Broadband Antenna | Schwarzbeck | VULB9163 | 340 | Jul. 01, 2024 |
| Horn Antenna | Schwarzbeck | BBHA 9120D | 631 | Jul. 01, 2024 |
| Horn Antenna | Schwarzbeck | BBHA 9170 | 00956 | Feb. 02, 2025 |
| Antenna Mast | Keleto | RE-AM | / | / |
| Coaxial cable | SKET | RC-18G-N-M | / | Jan. 31, 2025 |
| Coaxial cable | SKET | RC_40G-K-M | / | Jan. 31, 2025 |
| EMI Test Software | Shurple Technology | EZ-EMC | / | / |

### 5.3.3. Test Data

**Field Strength of Fundamental**

| Frequency (MHz) | Emission PK (dBuV/m) | Horizontal /Vertical | Limits PK (dBuV/m) | Margin (dB) |
|---|---|---|---|---|
| 902.25 | 93.38 | H | 114 | -27.19 |
| 902.25 | 84.66 | V | 114 | -36.22 |
| 915 | 92.94 | H | 114 | -28.01 |
| 915 | 84.17 | V | 114 | -35.31 |
| 927.6 | 92.30 | H | 114 | -26.14 |
| 927.6 | 83.74 | V | 114 | -37.09 |

| Frequency (MHz) | Emission AV (dBuV/m) | Horizontal /Vertical | Limits AV (dBuV/m) | Margin (dB) |
|---|---|---|---|---|
| 902.25 | 91.87 | H | 94 | -29.69 |
| 902.25 | 82.94 | V | 94 | -35.24 |
| 915 | 90.41 | H | 94 | -30.82 |
| 915 | 82.66 | V | 94 | -34.76 |
| 927.6 | 90.37 | H | 94 | -29.89 |
| 927.6 | 82.01 | V | 94 | -34.94 |

**Spurious Emissions**

**Frequency Range (9 kHz-30MHz)**

| Frequency (MHz) | Level@3m (dBμV/m) | Limit@3m (dBμV/m) |
|---|---|---|
| -- | -- | -- |
| -- | -- | -- |
| -- | -- | -- |
| -- | -- | -- |

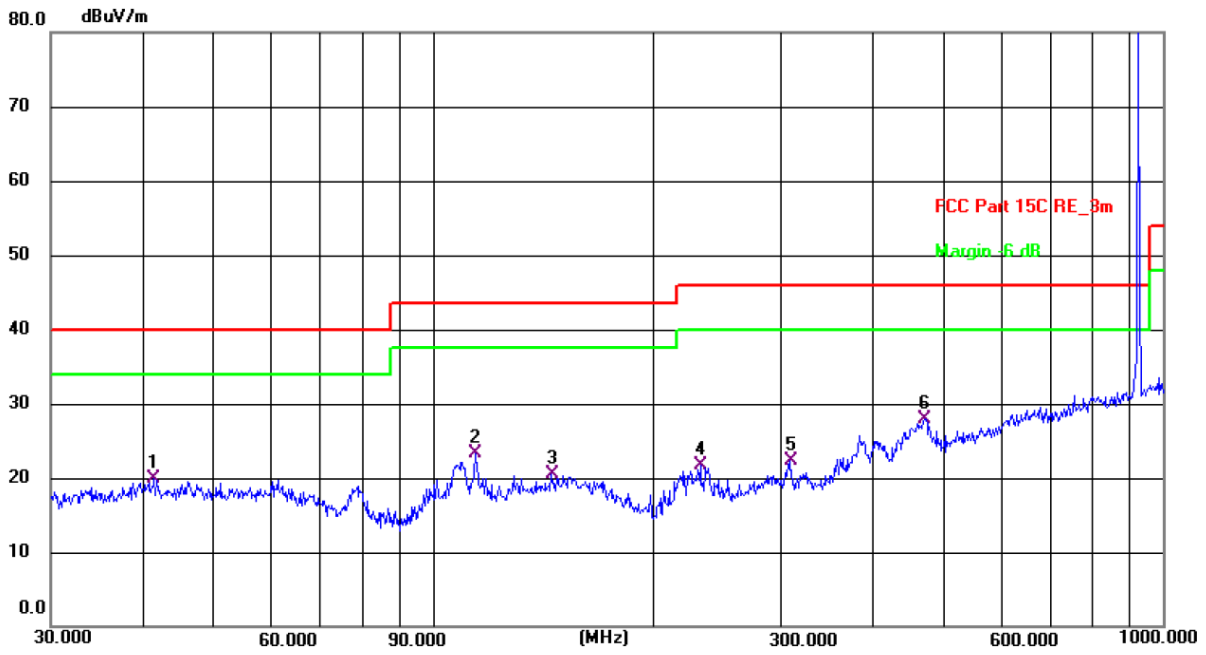
***Note:*** *1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor.*

*2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement.*

*3. For fundamental frequency, RBW >20dB BW , VBW>=RBW, PK detector is for PK value, RMS detector is for AV value.*

**Frequency Range (30MHz-1GHz)**

Horizontal:

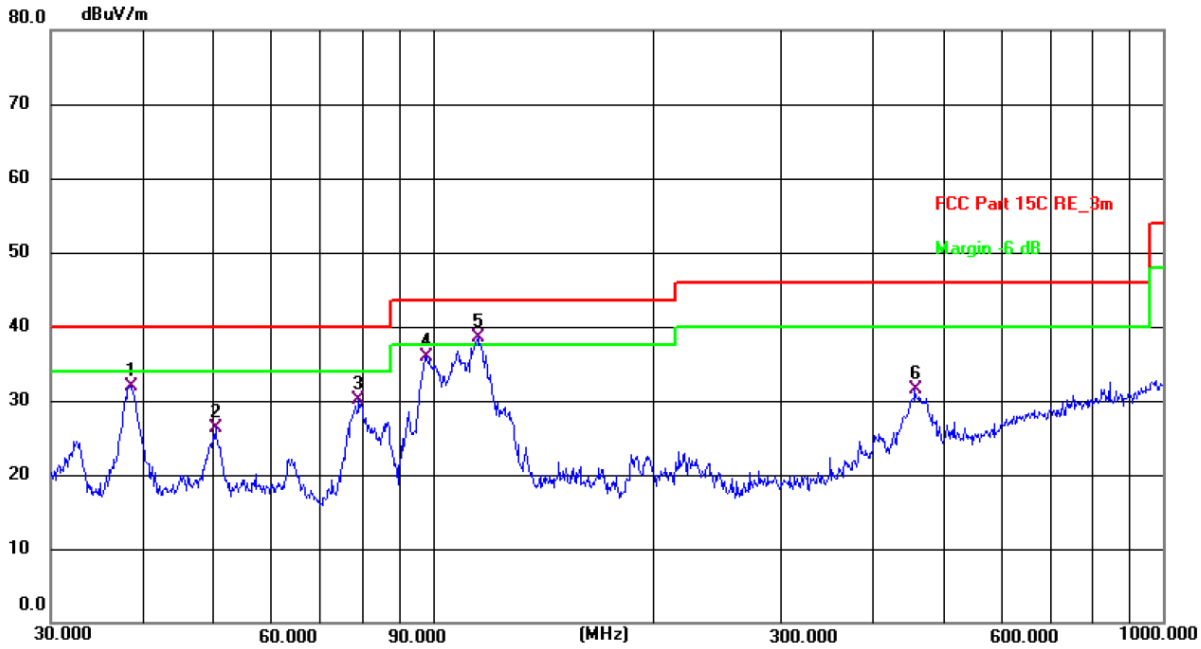



Site 3m Anechoic Chamber Polarization: ***Horizontal*** Temperature: 25.6(C) Humidity: 53 %

Limit: FCC Part 15C RE_3m Power: AC 120 V/60 Hz

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 41.5670 | 5.94 | 14.01 | 19.95 | 40.00 | -20.05 | QP | P | |
| 2 | 114.5146 | 11.28 | 12.10 | 23.38 | 43.50 | -20.12 | QP | P | |
| 3 | 145.3506 | 6.01 | 14.44 | 20.45 | 43.50 | -23.05 | QP | P | |
| 4 | 232.5318 | 9.82 | 11.92 | 21.74 | 46.00 | -24.26 | QP | P | |
| 5 | 308.9126 | 8.26 | 14.08 | 22.34 | 46.00 | -23.66 | QP | P | |
| 6 * | 472.1760 | 9.12 | 18.70 | 27.82 | 46.00 | -18.18 | QP | P | |

Vertical:




Site 3m Anechoic Chamber Polarization: ***Vertical*** Temperature: 25.6(C) Humidity: 53 %

Limit: FCC Part 15C RE_3m Power: AC 120 V/60 Hz

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 38.4809 | 17.99 | 13.91 | 31.90 | 40.00 | -8.10 | QP | P | |
| 2 | 50.4089 | 12.70 | 13.57 | 26.27 | 40.00 | -13.73 | QP | P | |
| 3 | 79.2425 | 19.91 | 10.13 | 30.04 | 40.00 | -9.96 | QP | P | |
| 4 | 98.1418 | 25.11 | 10.79 | 35.90 | 43.50 | -7.60 | QP | P | |
| 5 * | 115.3205 | 26.32 | 12.25 | 38.57 | 43.50 | -4.93 | QP | P | |
| 6 | 457.5073 | 13.25 | 18.29 | 31.54 | 46.00 | -14.46 | QP | P | |

***Note:*** *Measurements were conducted in all channels (high, middle, low), and the worst case (Lowest channel) was submitted only.*

**Above 1GHz**

| Low channel: 902.25MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Ant. Pol. H/V | Peak reading (dBμV) | AV reading (dBuV) | Correction Factor (dB/m) | Emission Level | | Peak limit (dBμV/m) | AV limit (dBμV/m) | Margin (dB) |
| | | | | | Peak (dBμV/m) | AV (dBμV/m) | | | |
| 4804 | H | 49.88 | --- | -3.94 | 45.94 | --- | 74 | 54 | -8.06 |
| 7206 | H | 44.54 | --- | 0.52 | 45.06 | --- | 74 | 54 | -8.94 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | | |
| 4804 | V | 50.17 | --- | -3.94 | 46.23 | --- | 74 | 54 | -7.77 |
| 7206 | V | 45.69 | --- | 0.52 | 46.21 | --- | 74 | 54 | -7.79 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

| Middle channel: 915MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Ant. Pol. H/V | Peak reading (dBμV) | AV reading (dBμV) | Correction Factor (dB/m) | Emission Level | | Peak limit (dBμV/m) | AV limit (dBμV/m) | Margin (dB) |
| | | | | | Peak (dBμV/m) | AV (dBμV/m) | | | |
| 4882 | H | 49.12 | --- | -3.98 | 45.14 | | 74 | 54 | -8.86 |
| 7323 | H | 44.26 | --- | 0.57 | 44.83 | --- | 74 | 54 | -9.17 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | | |
| 4882 | V | 49.89 | --- | -3.98 | 45.91 | --- | 74 | 54 | -8.09 |
| 7323 | V | 43.54 | --- | 0.57 | 44.11 | --- | 74 | 54 | -9.89 |
| --- | --- | --- | --- | --- | --- | ---- | --- | --- | --- |

| High channel: 927.6MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Ant. Pol. H/V | Peak reading (dBμV) | AV reading (dBμV) | Correction Factor (dB/m) | Emission Level | | Peak limit (dBμV/m) | AV limit (dBμV/m) | Margin (dB) |
| | | | | | Peak (dBμV/m) | AV (dBμV/m) | | | |
| 4960 | H | 48.69 | --- | -3.98 | 44.71 | --- | 74 | 54 | -9.29 |
| 7440 | H | 43.11 | --- | 0.57 | 43.68 | --- | 74 | 54 | -10.32 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | | |
| 4960 | V | 51.92 | --- | -3.98 | 47.94 | --- | 74 | 54 | -6.06 |
| 7440 | V | 44.34 | --- | 0.57 | 44.91 | --- | 74 | 54 | -9.09 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

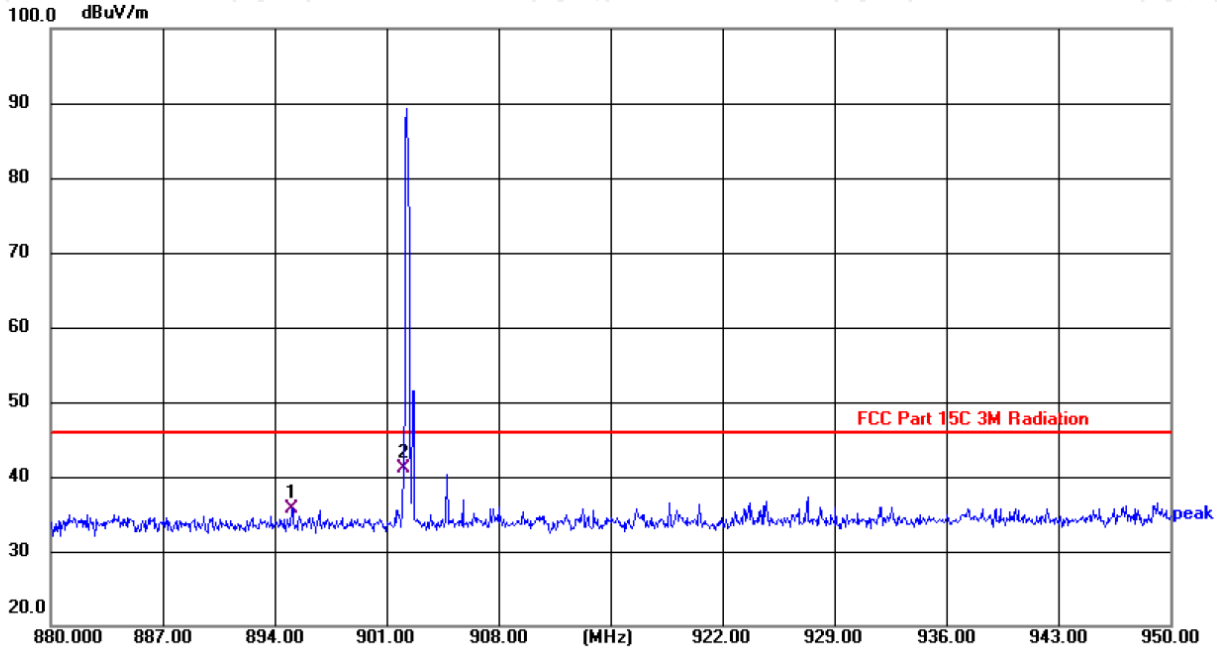
***Note:***

1. *Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier*
2. *Margin (dB) = Emission Level (Peak) (dBμV/m)-Average limit (dBμV/m)*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
4. *Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.*
5. *Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.*
6. *All the restriction bands are compliance with the limit of 15.209.*

**Band Edge Requirement**

Lowest channel 902.25:

Horizontal:

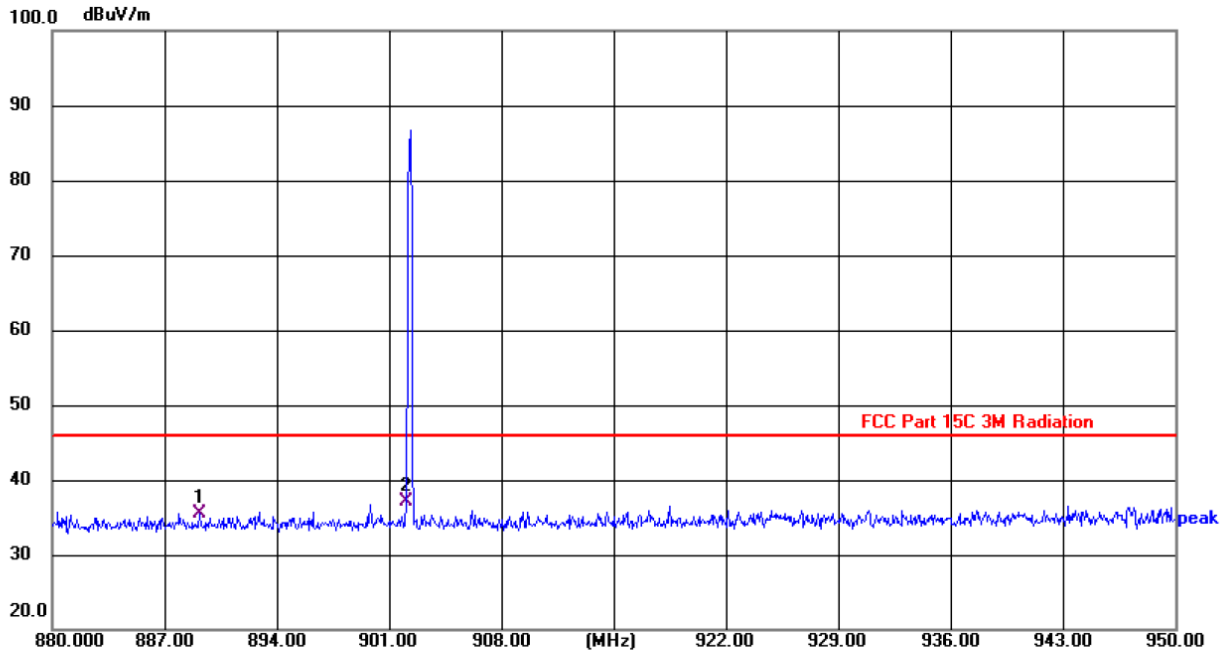



Site: 3m Anechoic Chamber Polarization: ***Horizontal*** Temperature: 25.6(℃) Humidity: 53 %

Limit: FCC Part 15C 3M Radiation Power:AC 120 V/60 Hz

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 895.0500 | 10.53 | 25.17 | 35.70 | 46.00 | -10.30 | QP | P | |
| 2 * | 902.0000 | 15.70 | 25.33 | 41.03 | 46.00 | -4.97 | QP | P | |

Vertical:



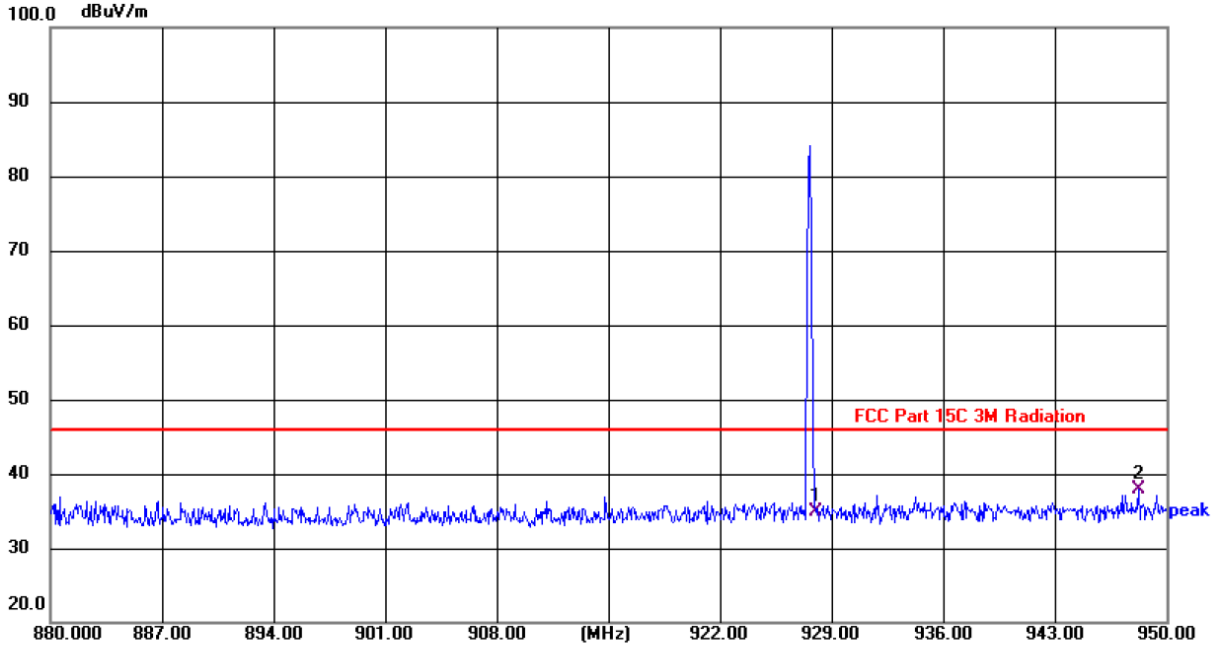

Site: 3m Anechoic Chamber Polarization: ***Vertical*** Temperature: 25.6(℃) Humidity: 53 %

Limit: FCC Part 15C 3M Radiation Power:AC 120 V/60 Hz

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 889.1700 | 10.40 | 25.14 | 35.54 | 46.00 | -10.46 | QP | P | |
| 2 * | 902.0000 | 11.77 | 25.33 | 37.10 | 46.00 | -8.90 | QP | P | |

Highest channel 927.6:

Horizontal:

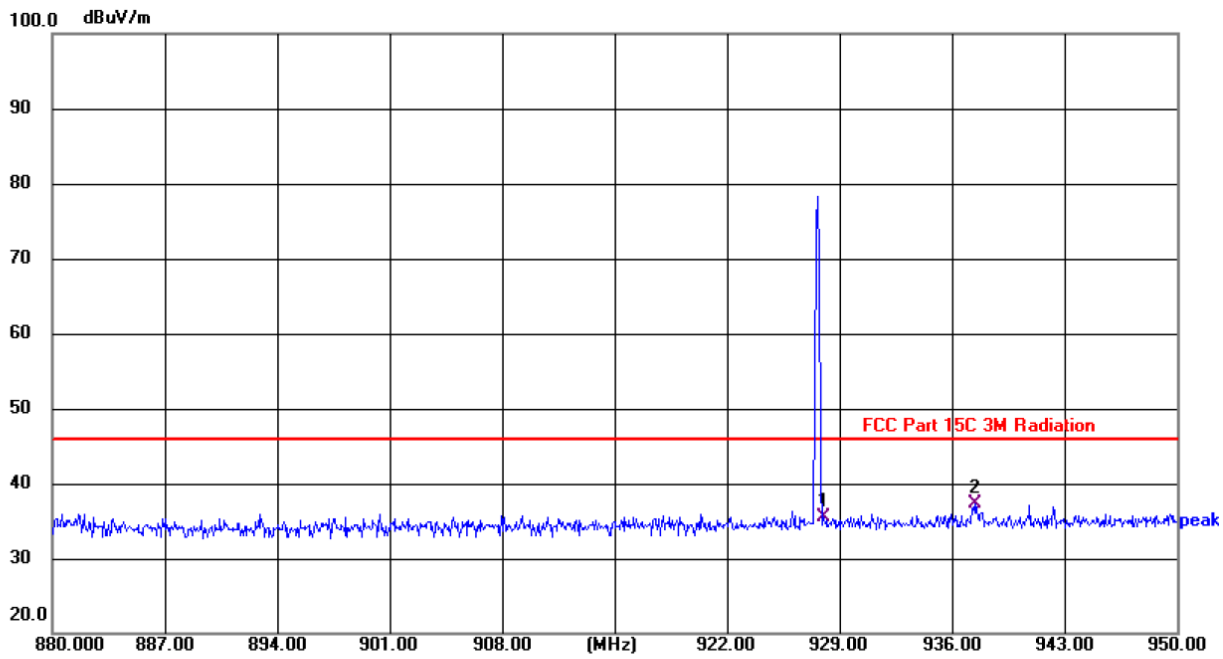



Site: 3m Anechoic Chamber Polarization: ***Horizontal*** Temperature: 25.6(℃) Humidity: 53 %

Limit: FCC Part 15C 3M Radiation Power:AC 120 V/60 Hz

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 928.0000 | 8.98 | 25.84 | 34.82 | 46.00 | -11.18 | QP | P | |
| 2 * | 948.2500 | 11.58 | 26.25 | 37.83 | 46.00 | -8.17 | QP | P | |

Vertical:




Site: 3m Anechoic Chamber Polarization: ***Vertical*** Temperature: 25.6(℃) Humidity: 53 %

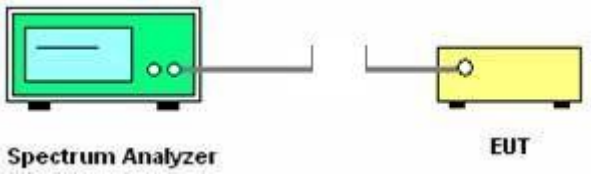
Limit: FCC Part 15C 3M Radiation Power:AC 120 V/60 Hz

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 928.0000 | 9.61 | 25.84 | 35.45 | 46.00 | -10.55 | QP | P | |
| 2 * | 937.4700 | 11.32 | 26.06 | 37.38 | 46.00 | -8.62 | QP | P | |

***Note:*** *Measurements were conducted in all channels (high, middle, low), and the worst case (Lowest channel) was submitted only.*

## 5.4.20dB Occupied Bandwidth

### 5.4.1. Test Specification

| | |
|---|---|
| **Test Requirement:** | FCC Part15 C Section 15.215(c) |
| **Test Method:** | ANSI C63.10: 2013 |
| **Limit:** | N/A |
| | 1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT.<br>2. Set to the maximum power setting and enable the EUT transmit continuously.<br>3. Use the following spectrum analyzer settings for 20dB Bandwidth measurement.<br>Span = approximately 2 to 3 times the 20 dB bandwidth,<br>centered on a hopping channel; RBW≥1% of the 20 dB bandwidth;<br>VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold.<br>4. Measure and record the results in the test report. |
| **Test setup:** |  |
| **Test Mode:** | Transmitting mode with modulation |
| **Test results:** | PASS |

### 5.4.2. Test Instruments

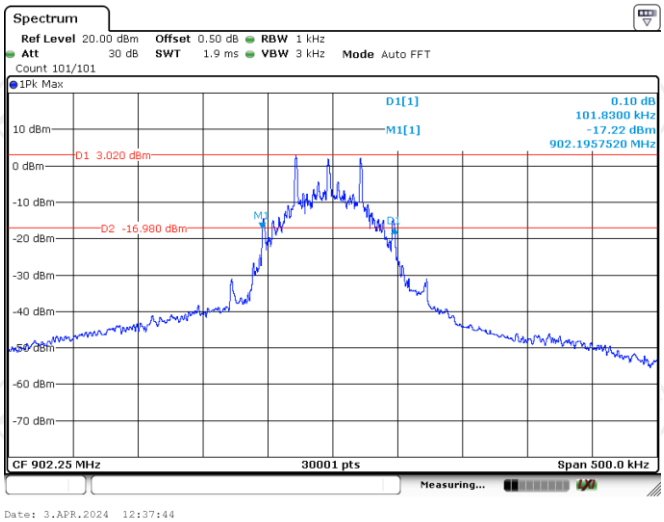
| Equipment | Manufacturer | Model | Serial Number | Calibration Due |
|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSU | 200054 | Jun. 27, 2024 |

### 5.4.3. Test data

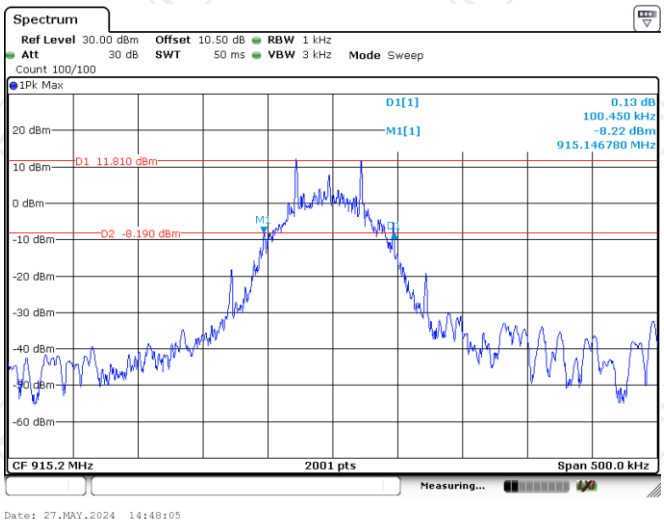
| Test Channel | 20dB Occupy Bandwidth (kHz) | Limit | Conclusion |
|---|---|---|---|
| Lowest | 101.70 | --- | PASS |
| Middle | 100.45 | --- | PASS |
| Highest | 101.20 | --- | PASS |

**Test plots as follows:**

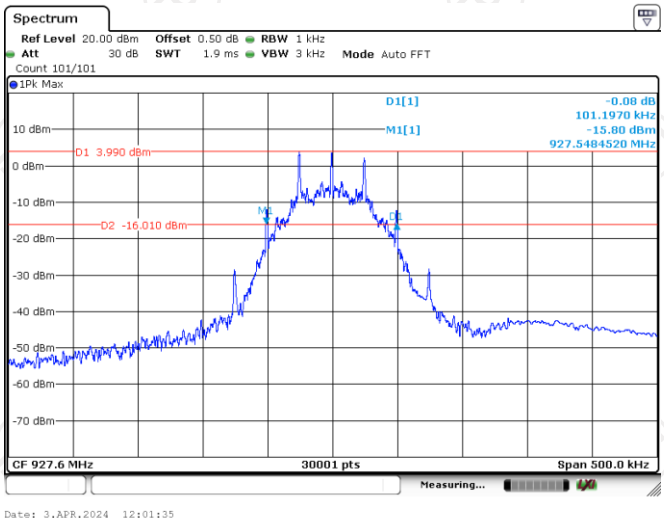
Lowest channel




Middle channel

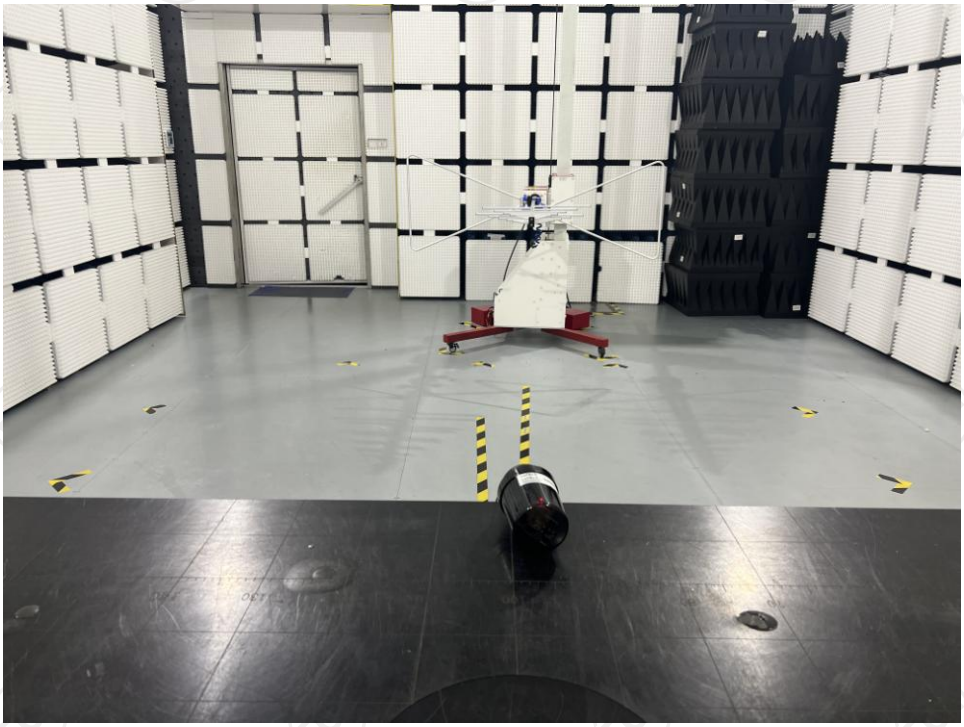


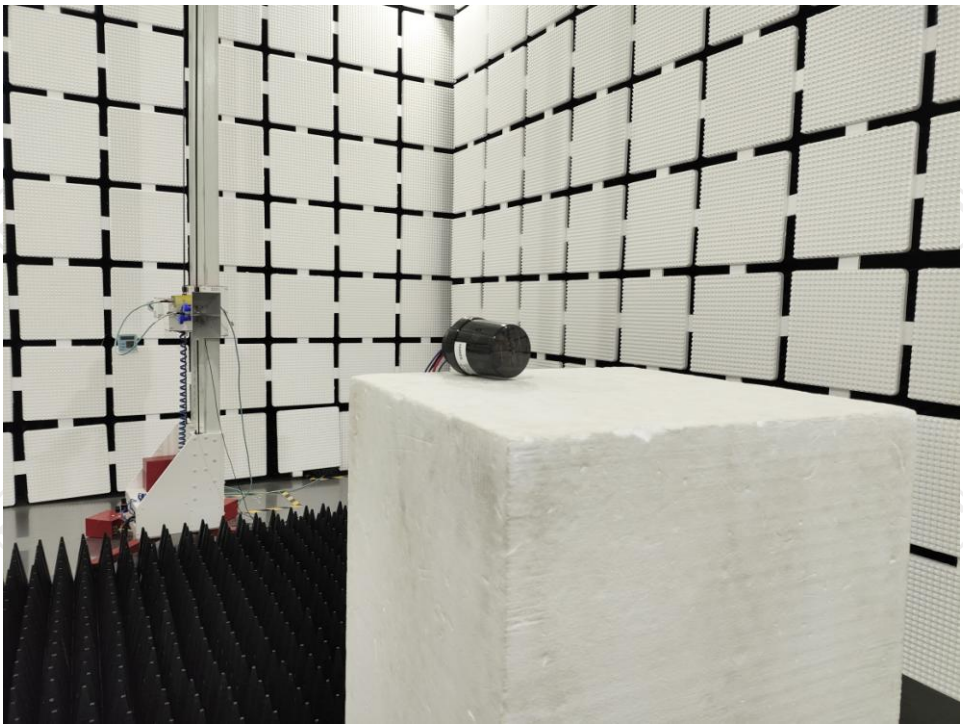

Highest channel



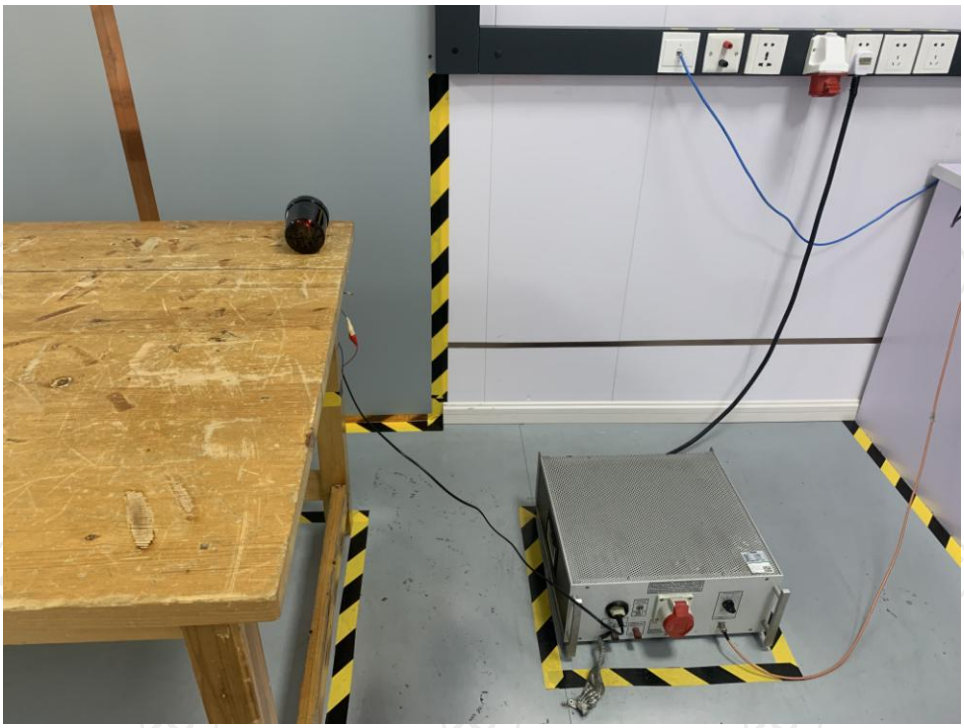
# Appendix A: Photographs of Test Setup

Product: Terminal Controller
Model: SEMS-TC09E
Radiated Emission



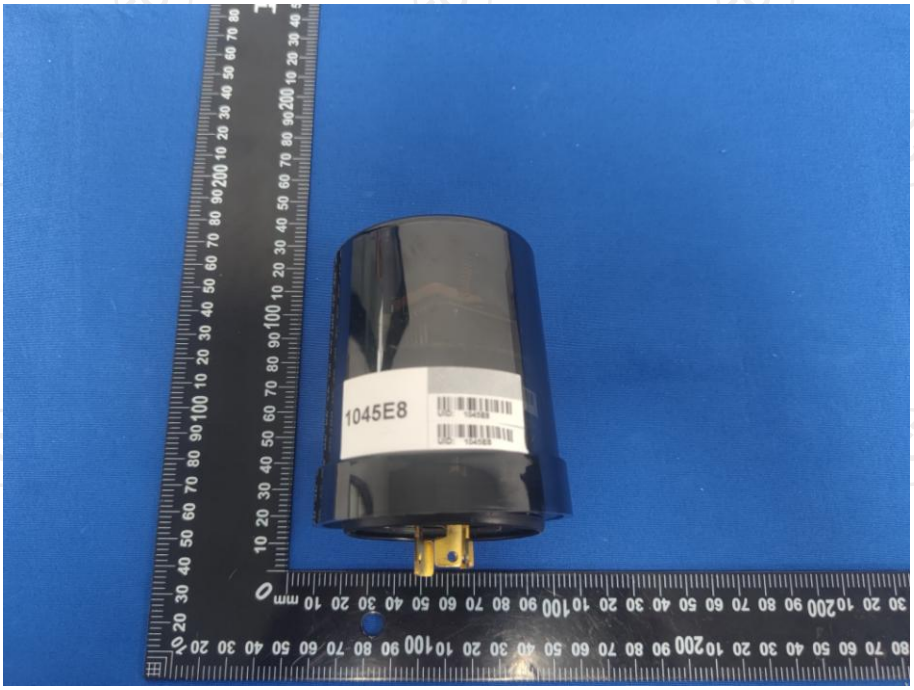


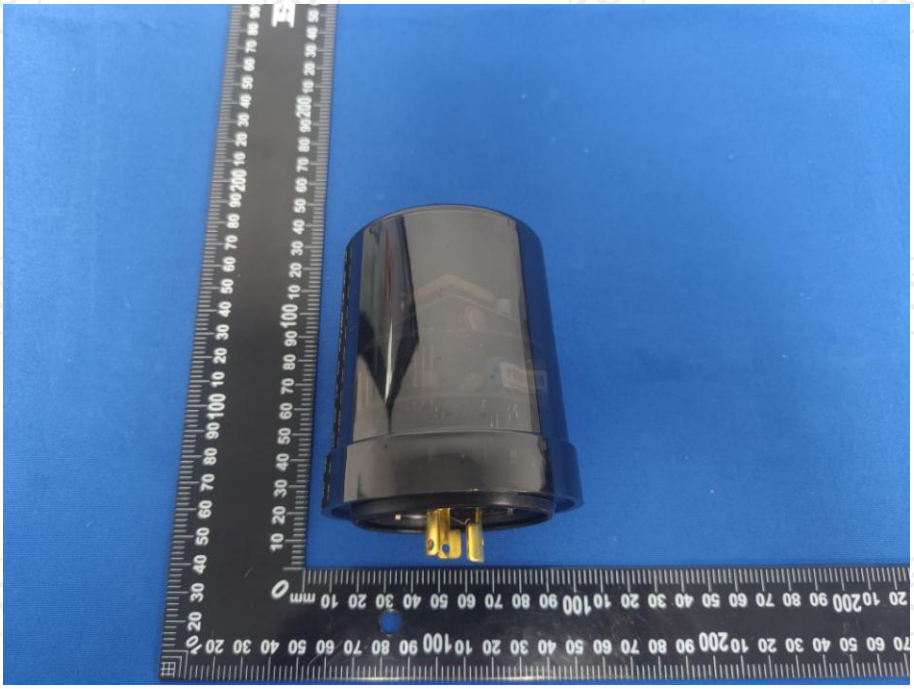
CE

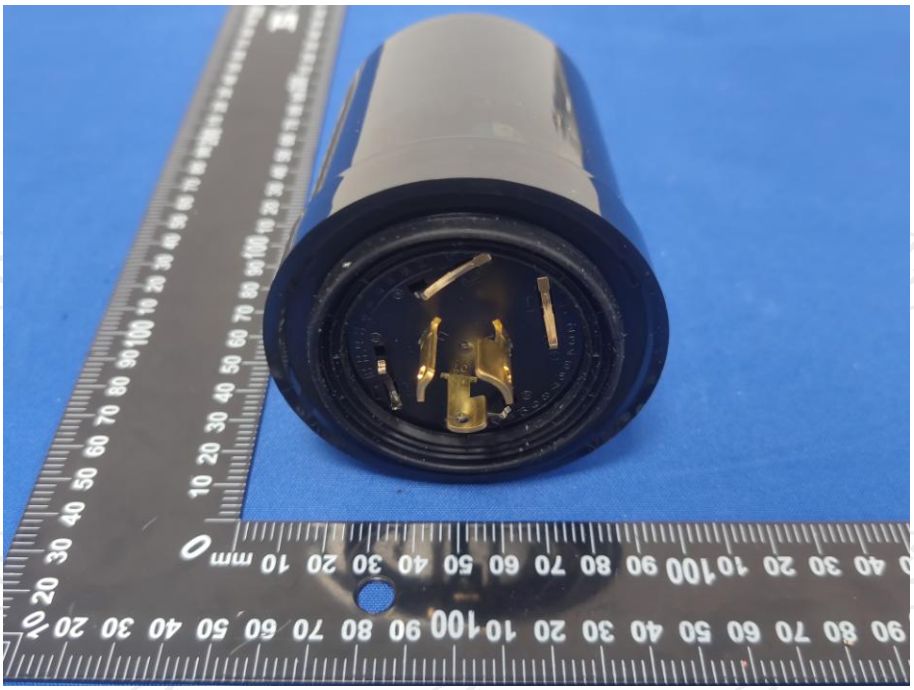


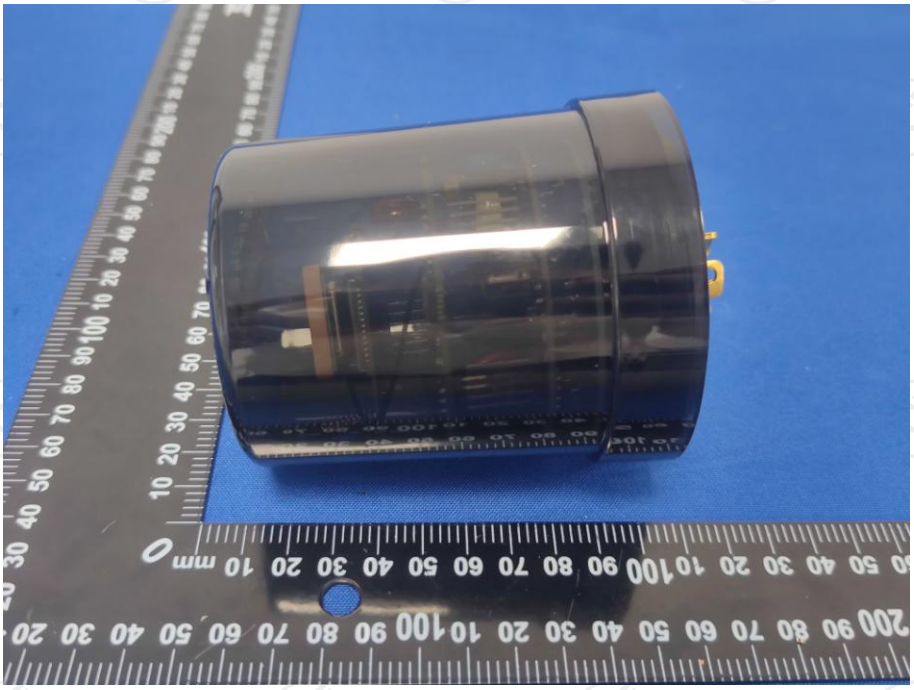
# Appendix B: Photographs of EUT

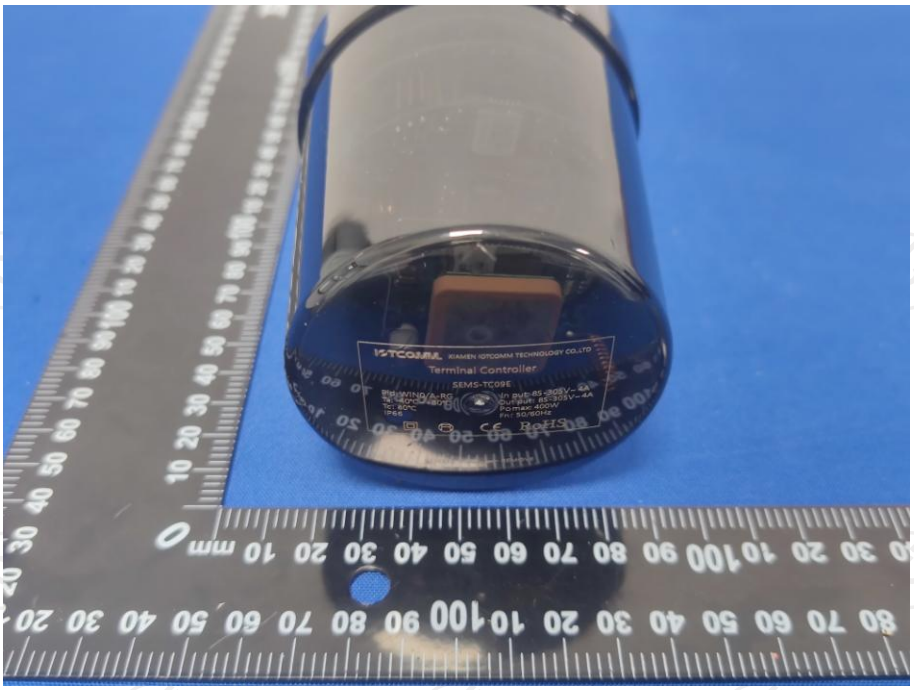
## Product: Terminal Controller
## Model: SEMS-TC09E
## External Photos

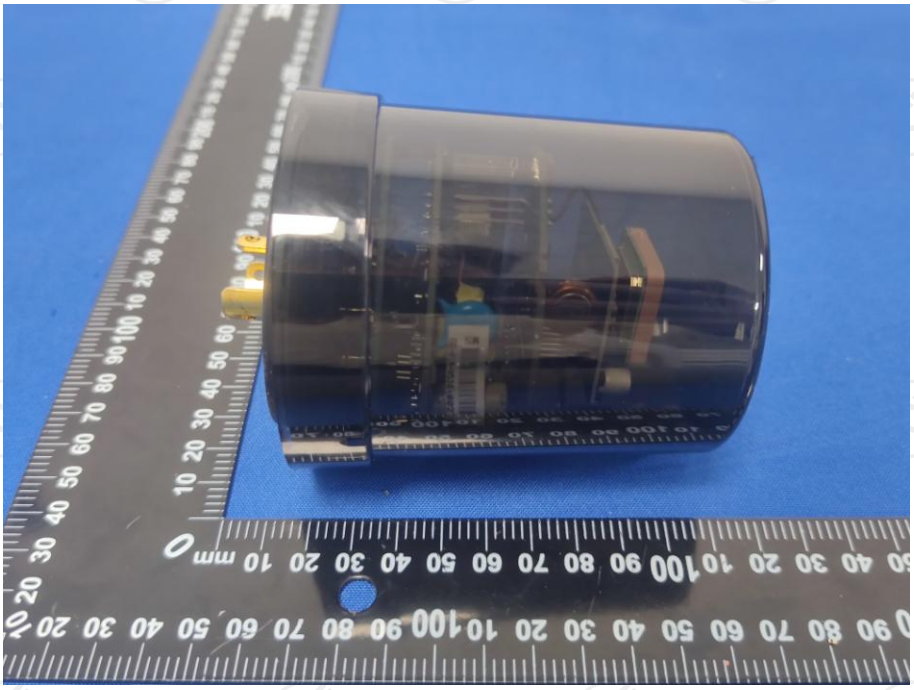


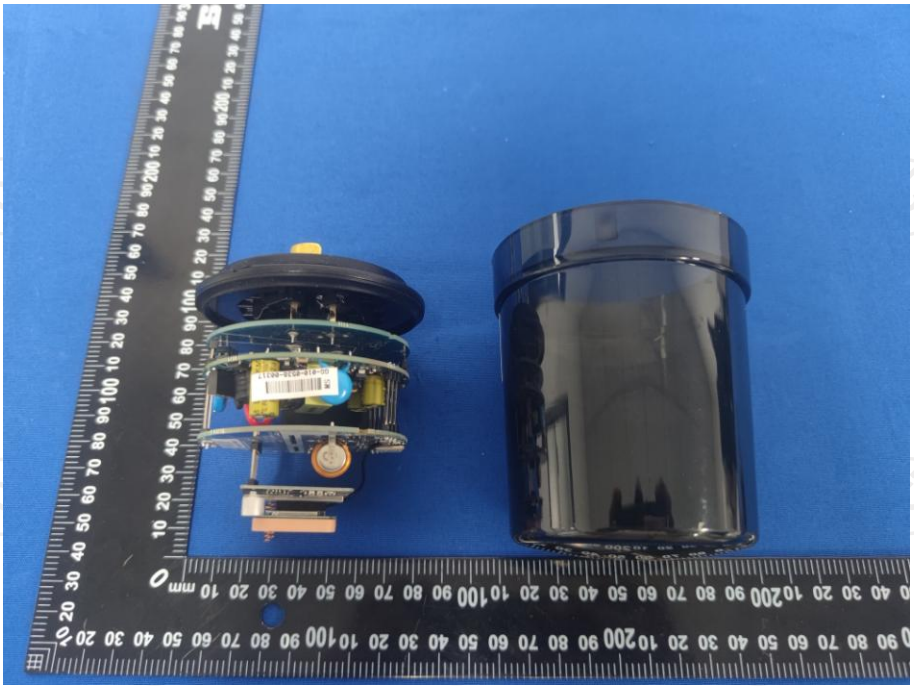


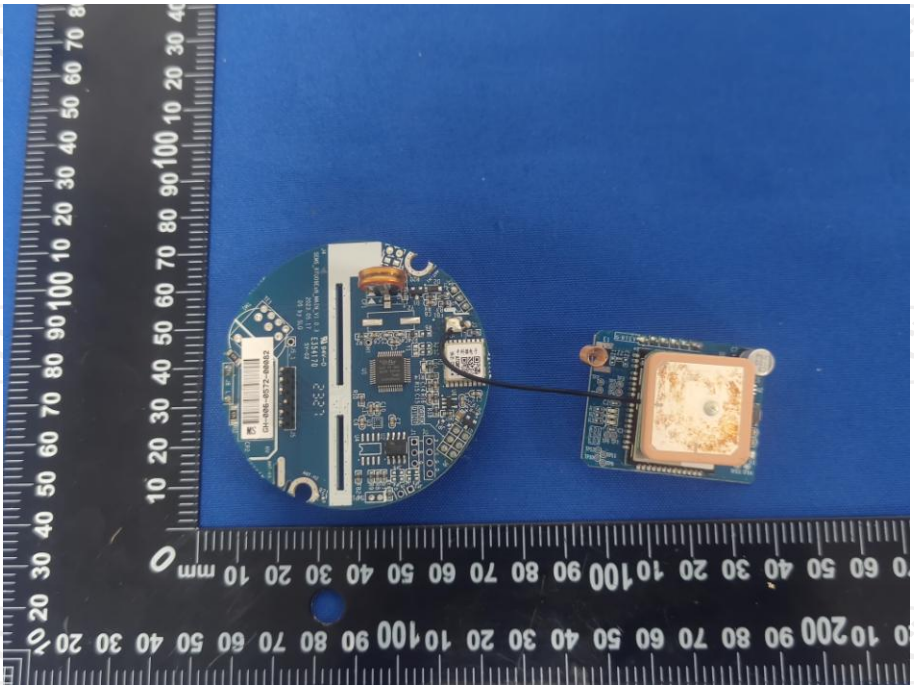


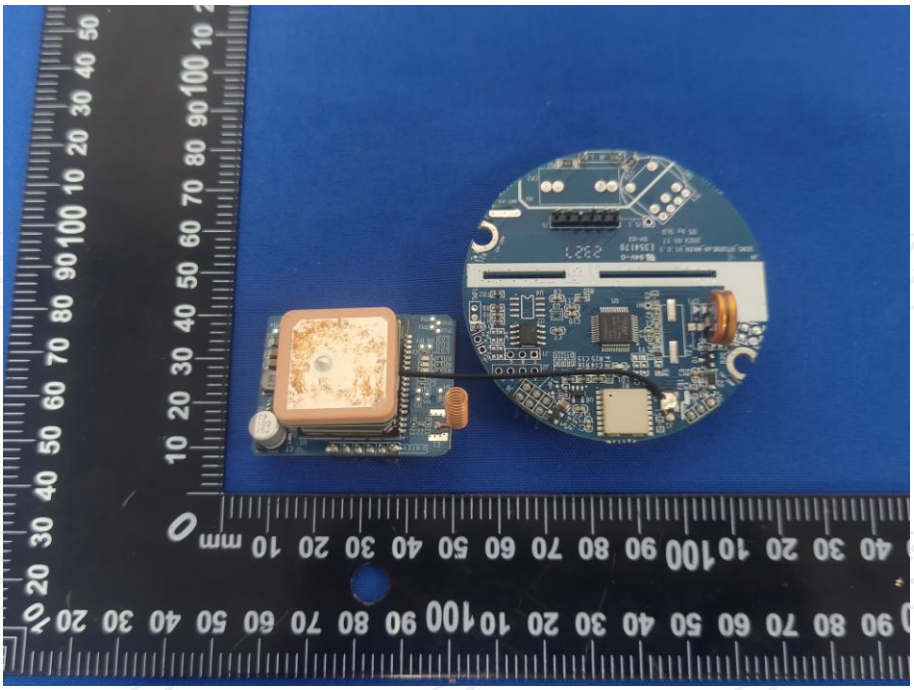

Terminal Controller
SEMS-TC09E

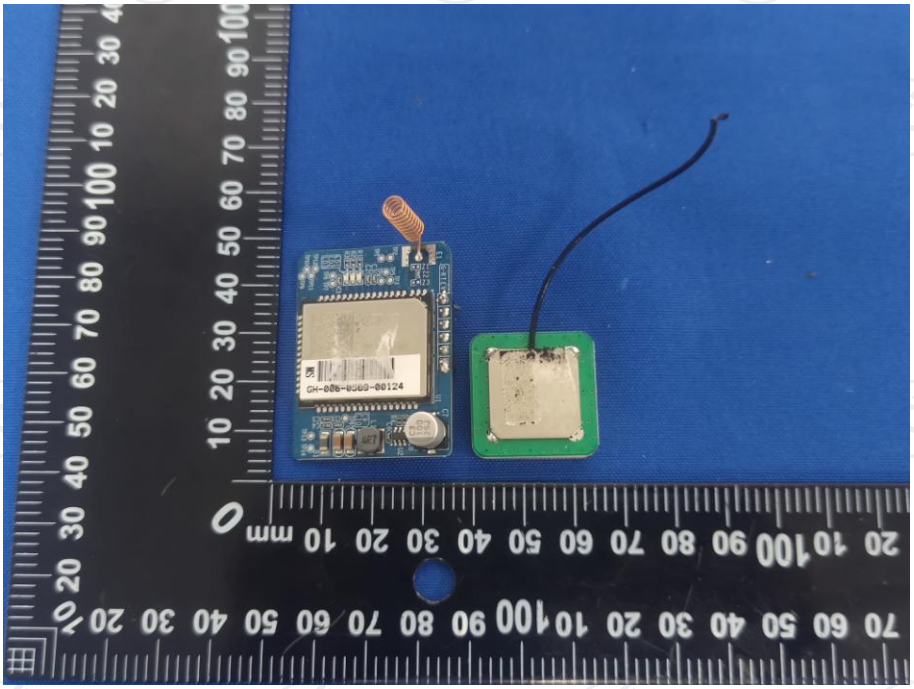


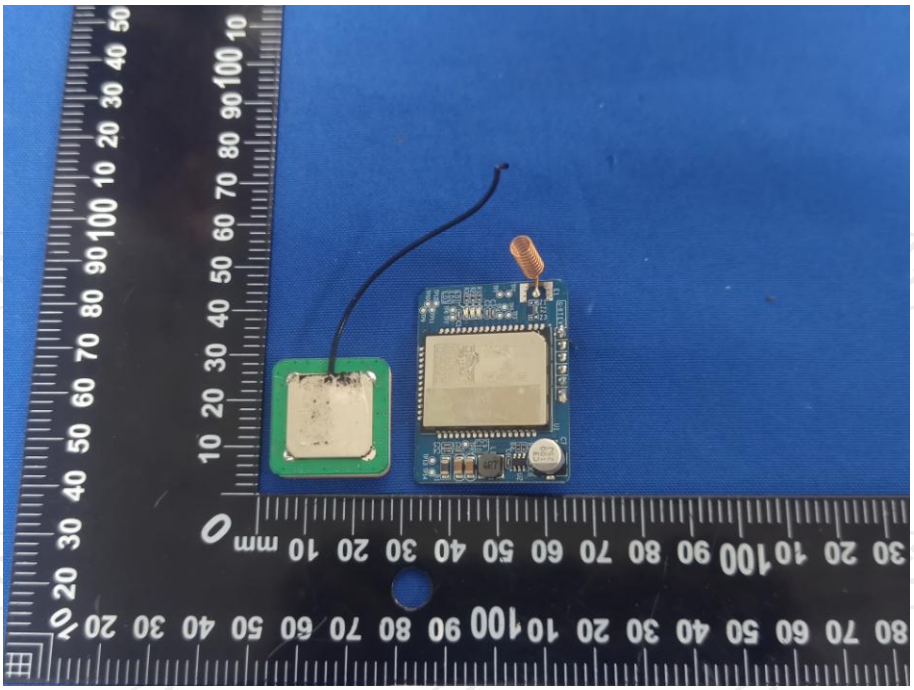
**Product: Terminal Controller**
**Model: SEMS-TC09E**
**Internal Photos**

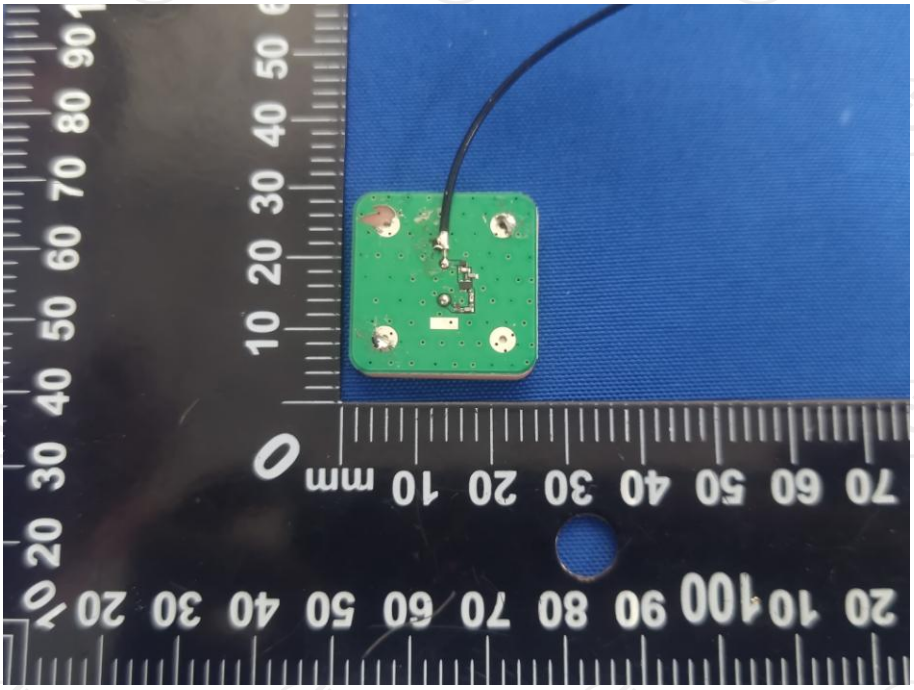


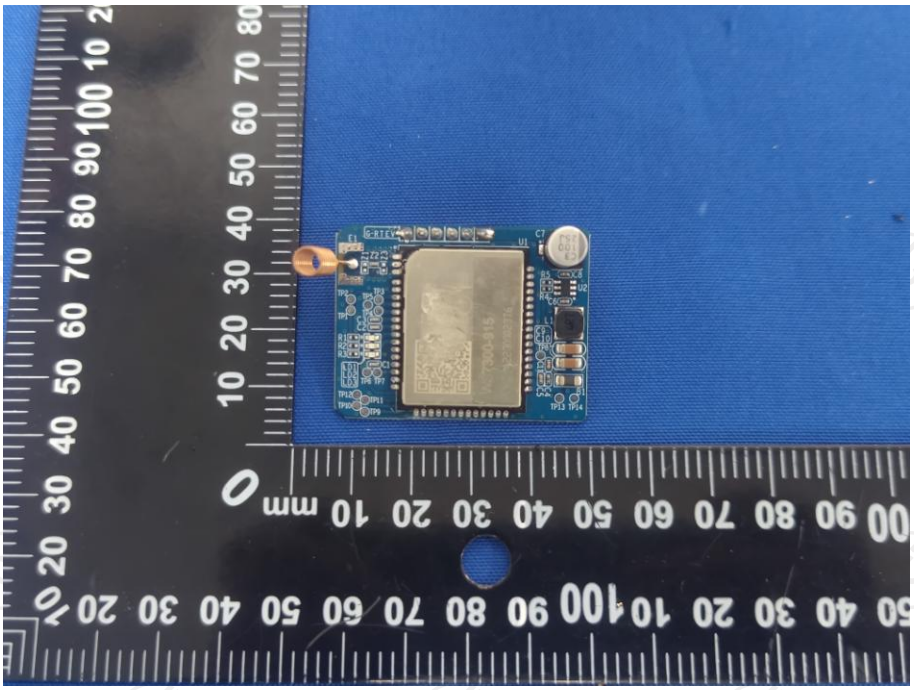


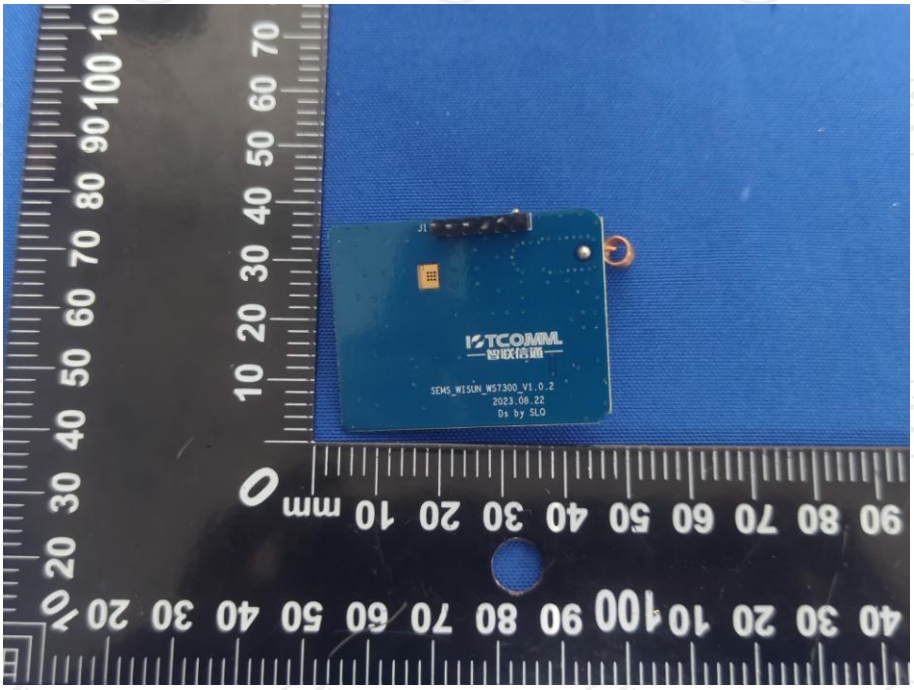


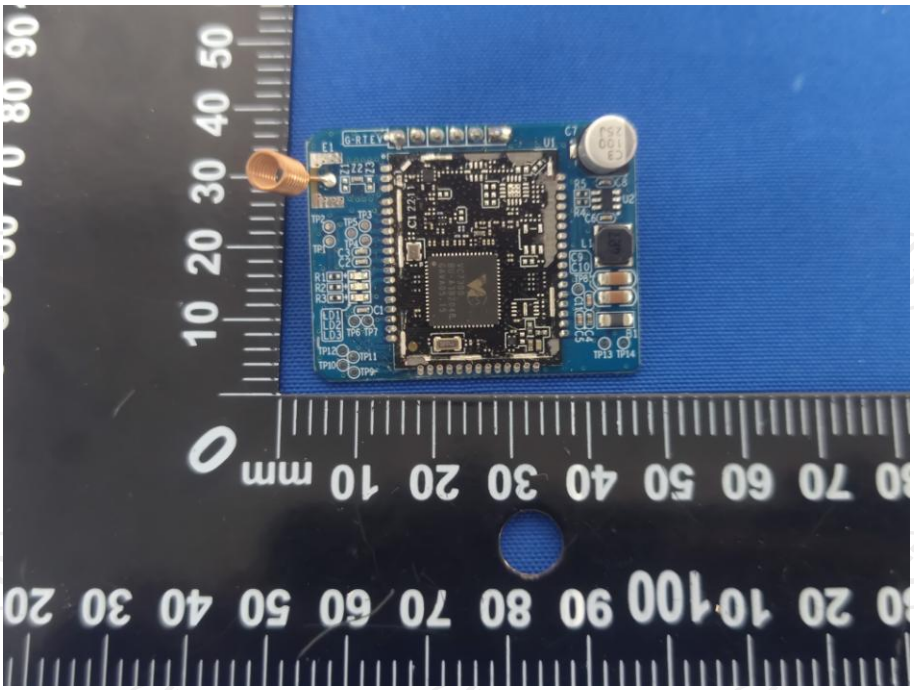


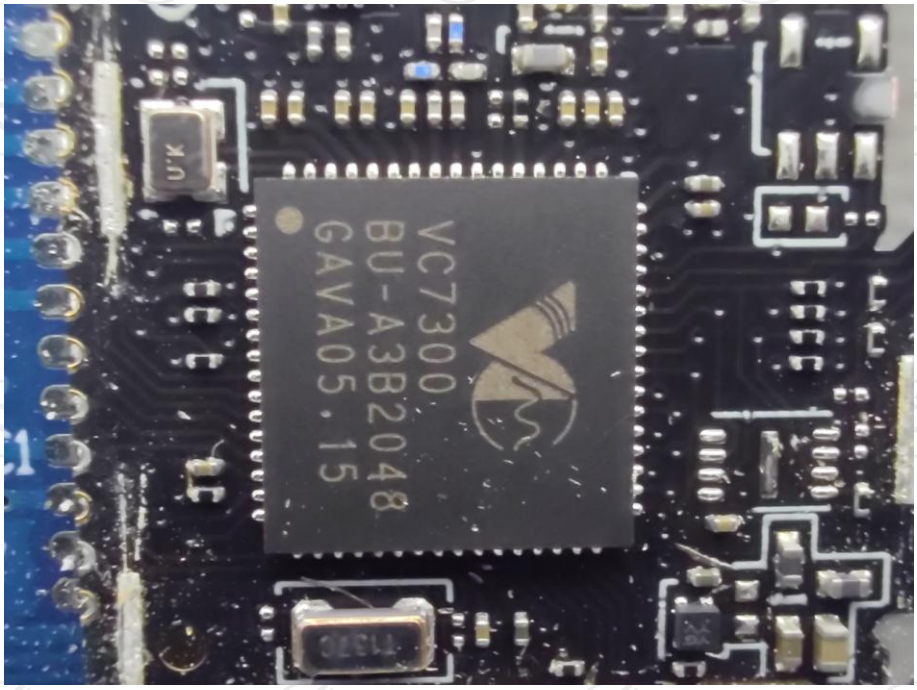







TCOMM
SEMS_WISUN_WS7300_V1.0.2
2023.08.22
Ds by SLQ

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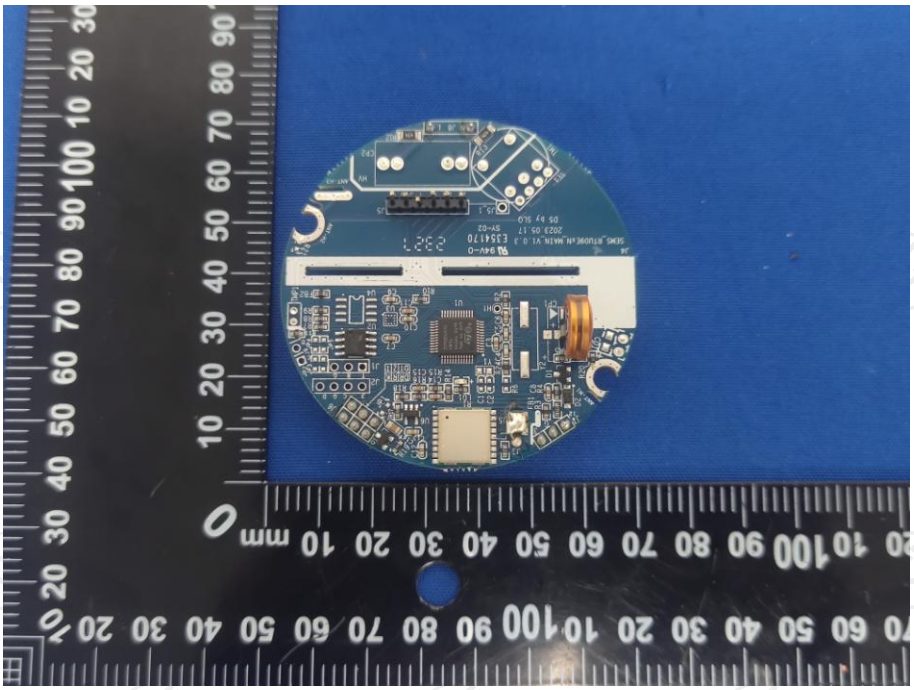

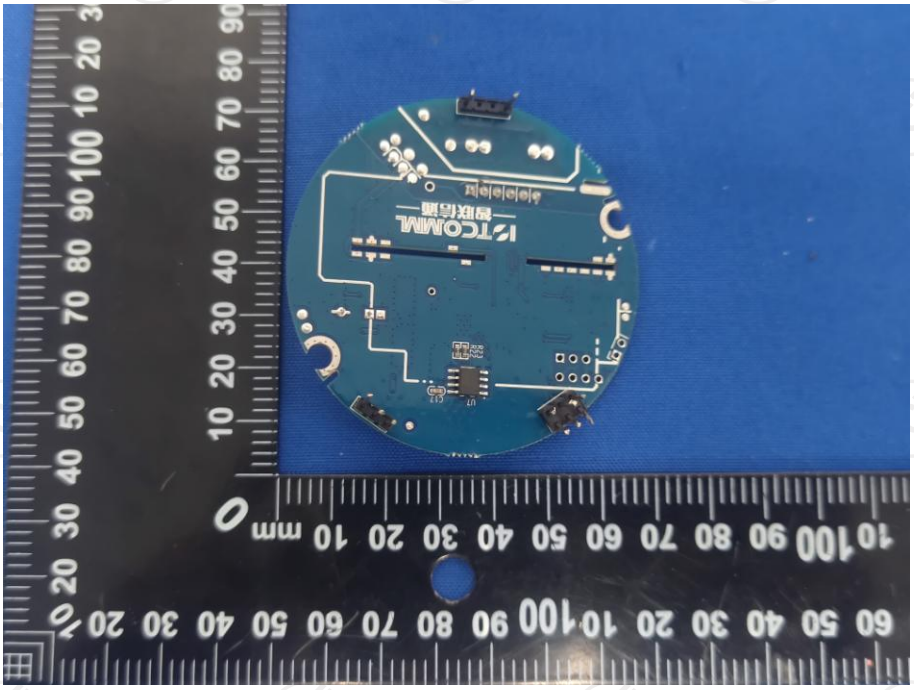

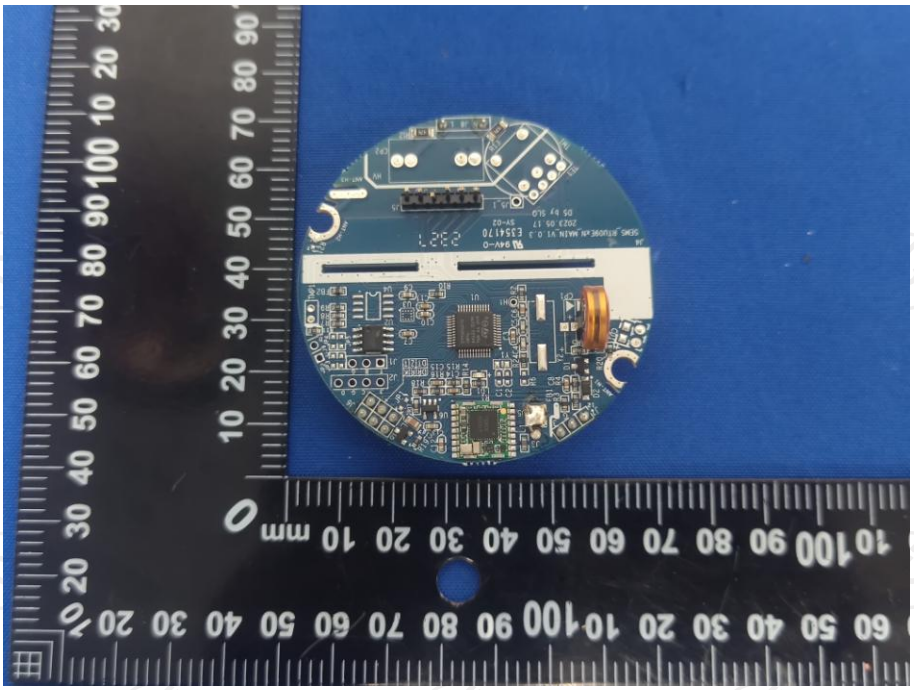

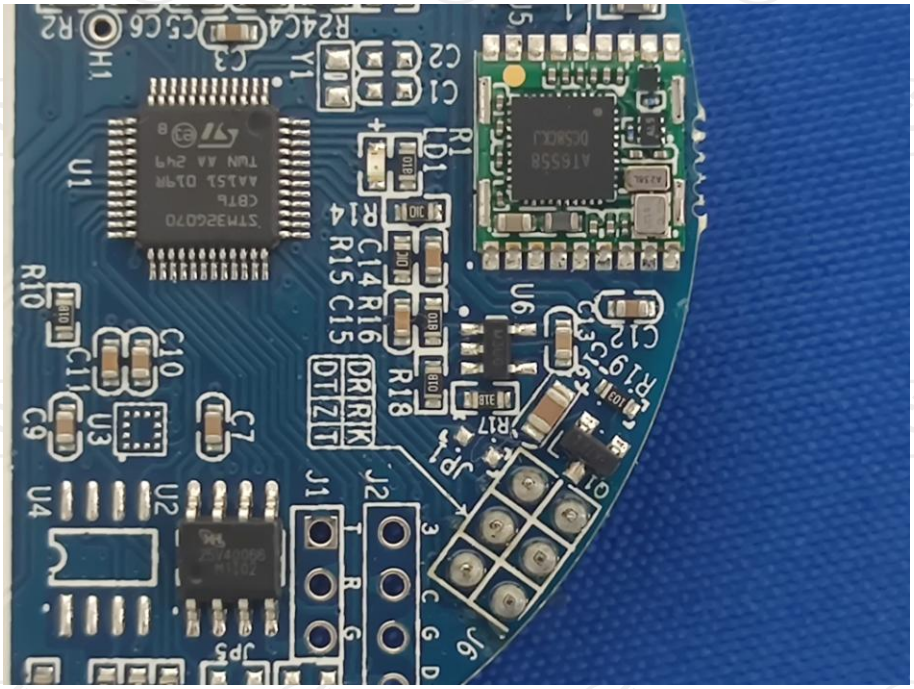

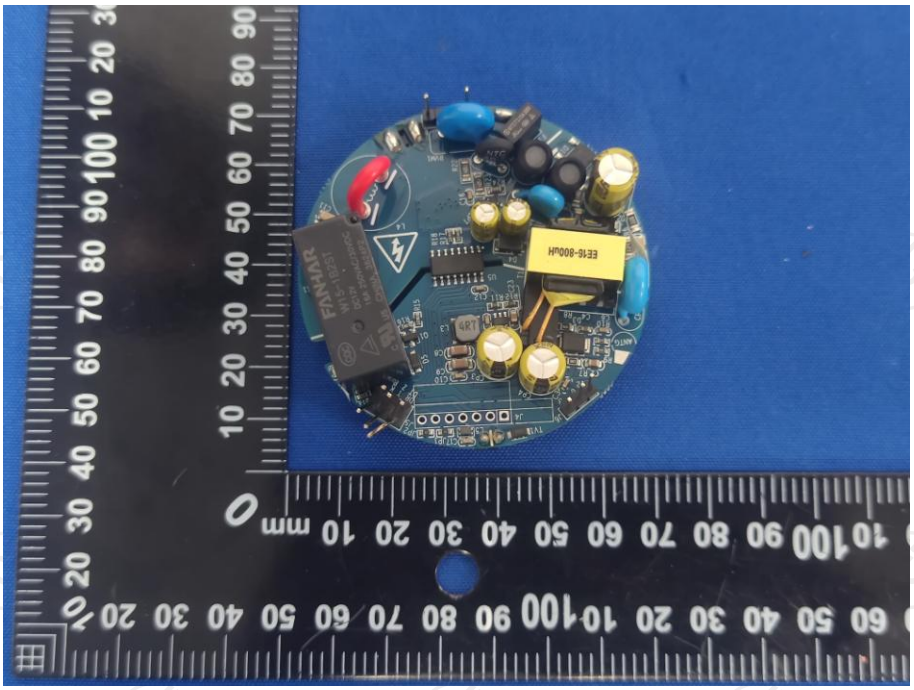

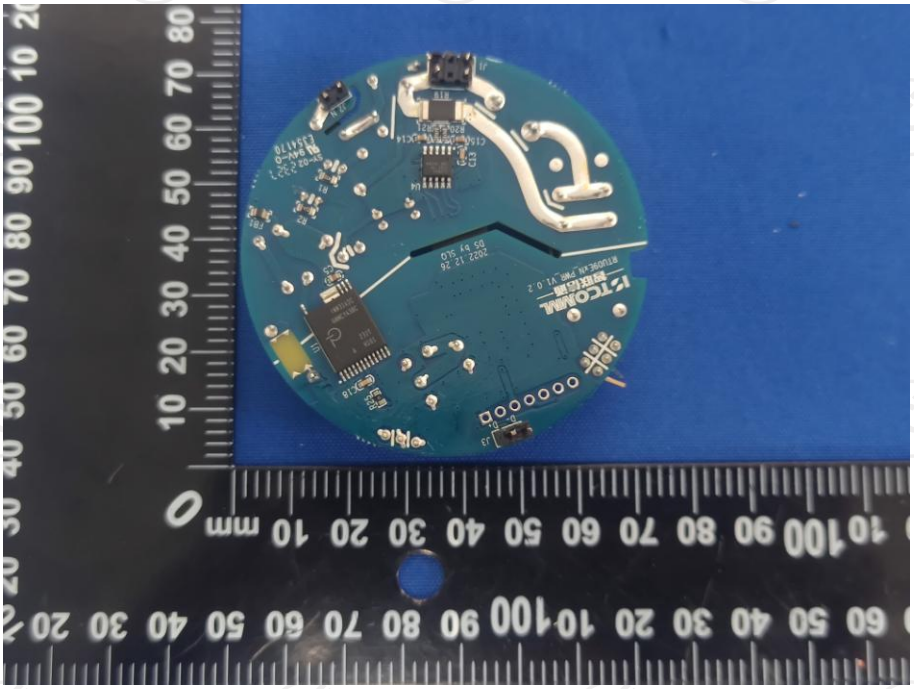

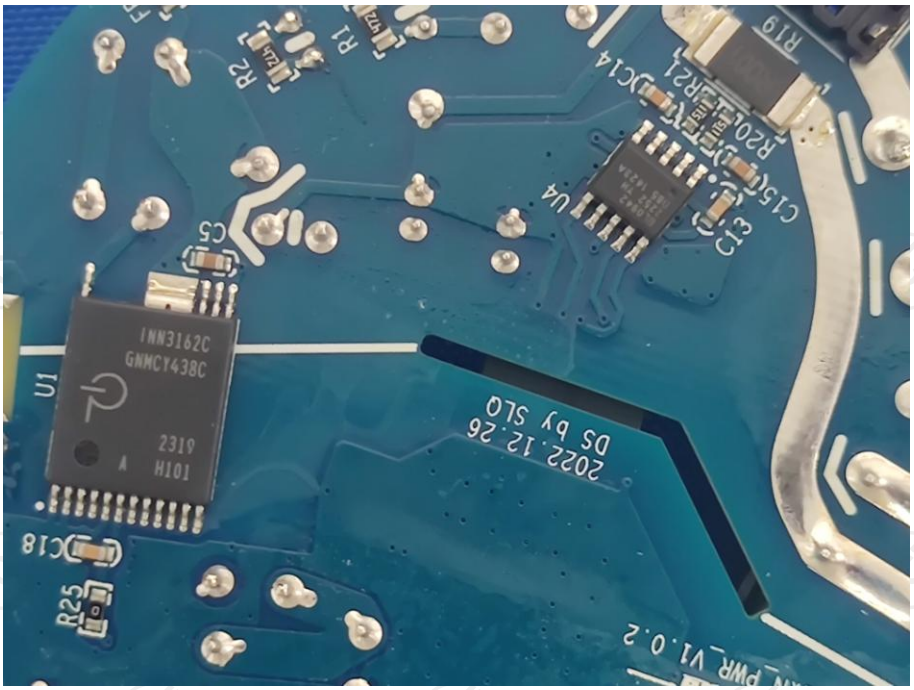


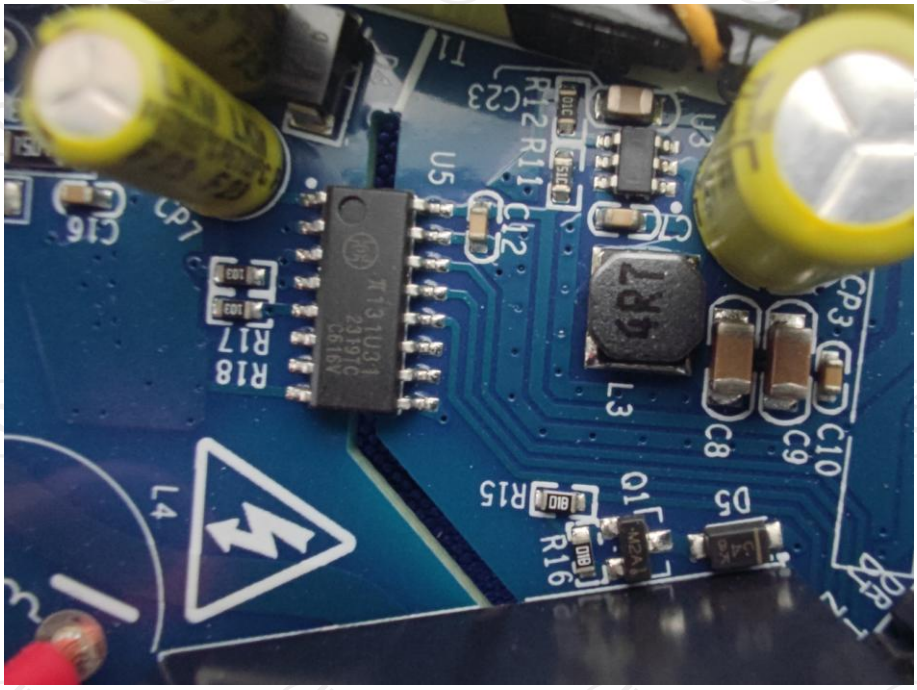




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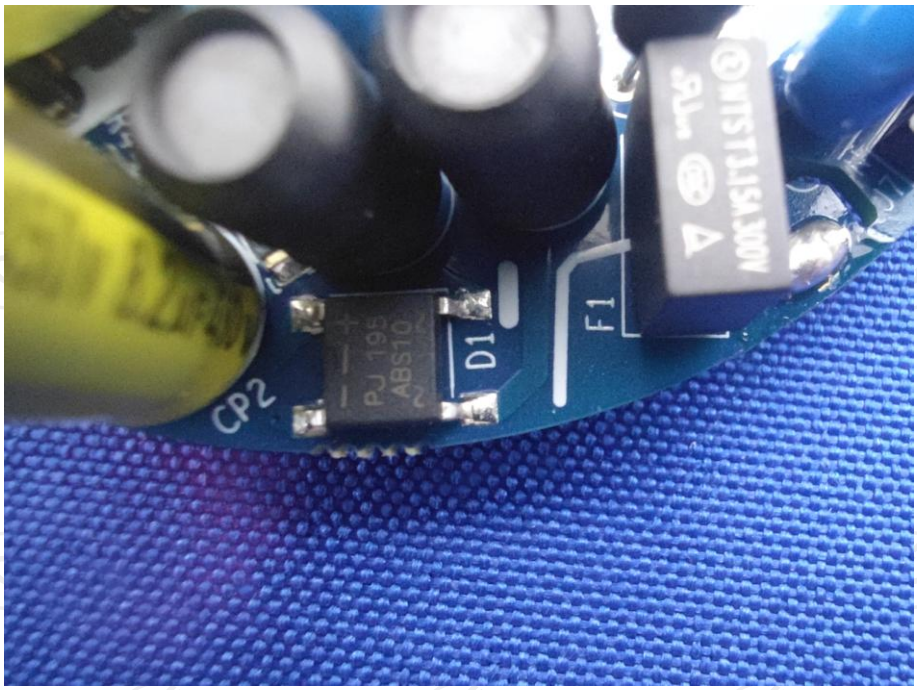
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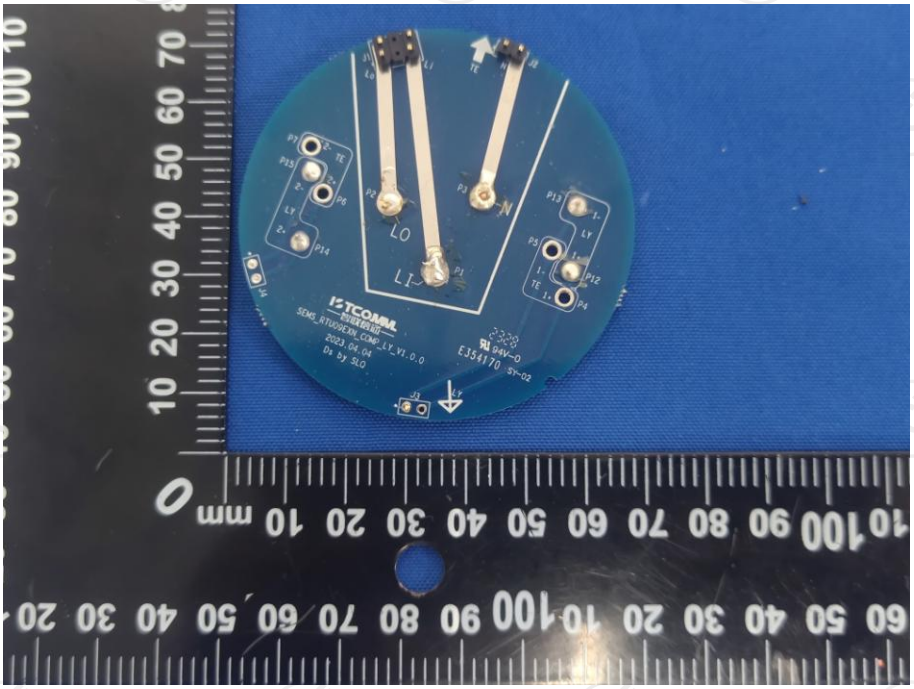
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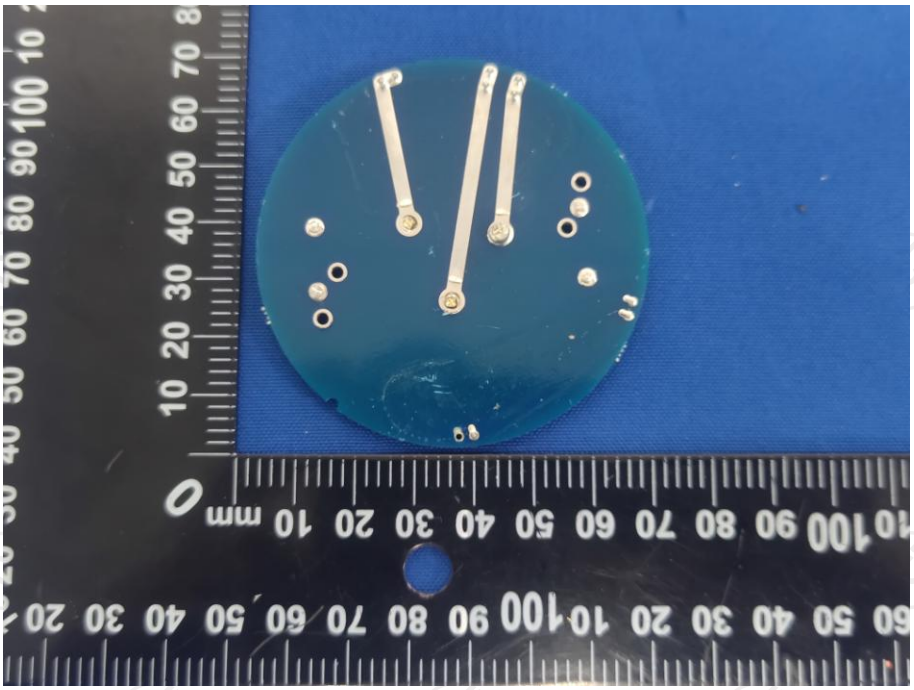

*****END OF REPORT*****