TCT 通测检测
TESTING CENTRE TECHNOLOGY

# TEST REPORT

| | |
|---|---|
| **FCC ID. ..... :** | 2BBVL-AION7XX01 |
| **Test Report No..... :** | TCT240523E013 |
| **Date of issue..... :** | Jul. 22, 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..... :** | TES Touch Embedded Solutions Inc. Taiwan Branch |
| **Address..... :** | 7F., No.141, Sec. 3, Ren ai Rd., Da an Dist., Taipei City 106, Taiwan, 222106 China |
| **Manufacturer's name ... :** | TES Touch Embedded Solutions Inc. Taiwan Branch |
| **Address..... :** | 7F., No.141, Sec. 3, Ren ai Rd., Da an Dist., Taipei City 106, Taiwan, 222106 China |
| **Standard(s) ..... :** | FCC CFR Title 47 Part 15 Subpart C Section 15.247<br>FCC KDB 558074 D01 15.247 Meas Guidance v05r02<br>ANSI C63.10:2013 |
| **Product Name..... :** | AIO Core Board module |
| **Trade Mark ..... :** | TES/MicroTouch |
| **Model/Type reference..... :** | AION7XX01 |
| **Rating(s)..... :** | DC 4.2V |
| **Date of receipt of test item ..... :** | May 23, 2024 |
| **Date (s) of performance of test..... :** | May 23, 2024 ~ Jul. 22, 2024 |
| **Tested by (+signature) ... :** | Aaron MO |
| **Check by (+signature).... :** | Beryl ZHAO |
| **Approved by (+signature):** | Tomsin |

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# 1. General Product Information

## 1.1. EUT description

| | |
|---|---|
| **Product Name.....:** | AIO Core Board module |
| **Model/Type reference.....:** | AION7XX01 |
| **Sample Number.....:** | TCT240523E013-0101 |
| **Bluetooth Version .....:** | V5.2 (This report is for BDR+EDR) |
| **Operation Frequency .....:** | 2402MHz~2480MHz |
| **Transfer Rate .....:** | 1/2/3 Mbits/s |
| **Number of Channel .....:** | 79 |
| **Modulation Type.....:** | GFSK, π/4-DQPSK, 8DPSK |
| **Modulation Technology .....:** | FHSS |
| **Antenna Type.....:** | External Antenna |
| **Antenna Gain.....:** | Support two antenna:<br>Antenna a:<br>-1.96dBi<br>Antenna b:<br>1.54dBi |
| **Rating(s).....:** | DC 4.2V |

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

None.

## 1.3. Operation Frequency

| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|---|---|
| 0 | 2402MHz | 20 | 2422MHz | 40 | 2442MHz | 60 | 2462MHz |
| 1 | 2403MHz | 21 | 2423MHz | 41 | 2443MHz | 61 | 2463MHz |
| … | … | … | … | … | … | … | … |
| 10 | 2412MHz | 30 | 2432MHz | 50 | 2452MHz | 70 | 2472MHz |
| 11 | 2413MHz | 31 | 2433MHz | 51 | 2453MHz | 71 | 2473MHz |
| … | … | … | … | … | … | … | … |
| 18 | 2420MHz | 38 | 2440MHz | 58 | 2460MHz | 78 | 2480MHz |
| 19 | 2421MHz | 39 | 2441MHz | 59 | 2461MHz | - | |

Remark: Channel 0, 39 & 78 have been tested for GFSK, π/4-DQPSK, 8DPSK modulation mode.

## 2. Test Result Summary

| Requirement | CFR 47 Section | Result |
|---|---|---|
| Antenna Requirement | §15.203/§15.247 (c) | PASS |
| AC Power Line Conducted Emission | §15.207 | PASS |
| Conducted Peak Output Power | §15.247 (b)(1) | PASS |
| 20dB Occupied Bandwidth | §15.247 (a)(1) | PASS |
| Carrier Frequencies Separation | §15.247 (a)(1) | PASS |
| Hopping Channel Number | §15.247 (a)(1) | PASS |
| Dwell Time | §15.247 (a)(1) | PASS |
| Radiated Emission | §15.205/§15.209 | PASS |
| Band Edge | §15.247(d) | 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.*

*5. Those test results (Conducted Output Power, 20dB Occupied Bandwidth, Carrier Frequencies Separation, Hopping Channel Number, Dwell Time, Band Edge) was based on FCC ID: 2BBVL-AION7XX01; Change antenna.*

# 3. General Information

## 3.1. Test environment and mode

| Operating Environment: | | |
|---|---|---|
| Condition | Conducted Emission | Radiated Emission |
| Temperature: | 22.8 °C | 25.1 °C |
| Humidity: | 49 % RH | 53 % RH |
| Atmospheric Pressure: | 1010 mbar | 1010 mbar |
| Voltage: | DC 4.2V by Mainboard (Mainboard power by adapter) | |
| Test Software: | | |
| Software Information: | ADB Tool | |
| Power Level: | Ox05 | |
| 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.<br>DH1 DH3 DH5 all have been tested, only worse case DH1 is reported. | | |

## 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 |
|---|---|---|---|---|
| BOX PC | TBX-100N7020011002 | / | / | MicroTouch |
| Media Player | IDX-300 | / | / | MicroTouch |

***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.*
3. *For conducted measurements (Output Power, 20dB Occupied Bandwidth, Carrier Frequencies Separation, Hopping Channel Number, Dwell Time, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.*

# 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

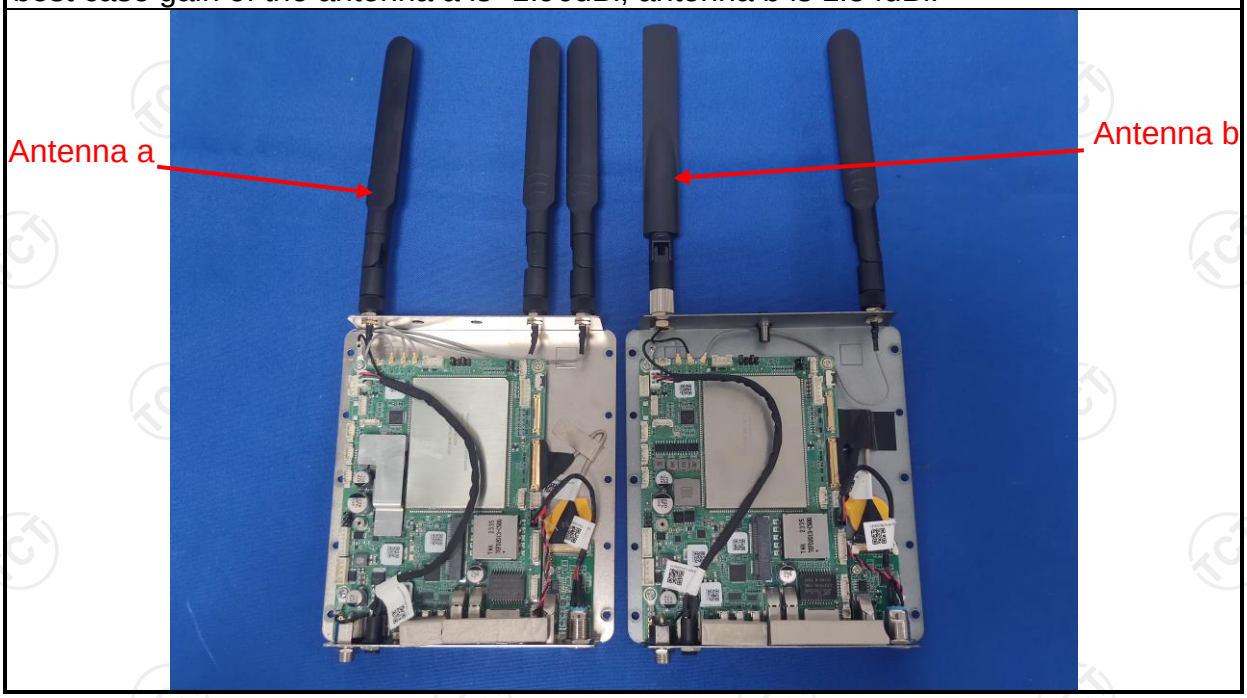
The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

| 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

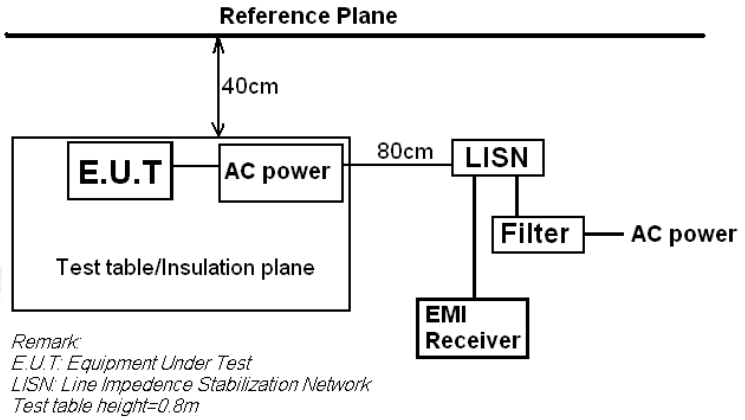
## 5.1. Antenna requirement

| **Standard requirement:** | FCC Part15 C Section 15.203 /247(c) |
|---|---|
| 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.<br>15.247(c) (1)(i) requirement:<br>(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi. | |
| **E.U.T Antenna:** | |
| The EUT test with a external antenna for maximum gain which are detachable, and the best case gain of the antenna a is -1.96dBi, antenna b is 1.54dBi. | |



## 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>


</td></tr>
<tr><td>Test Mode:</td><td>Transmitting Mode</td></tr>
<tr><td>Test Procedure:</td><td>1. The E.U.T is connected to an adapter 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>

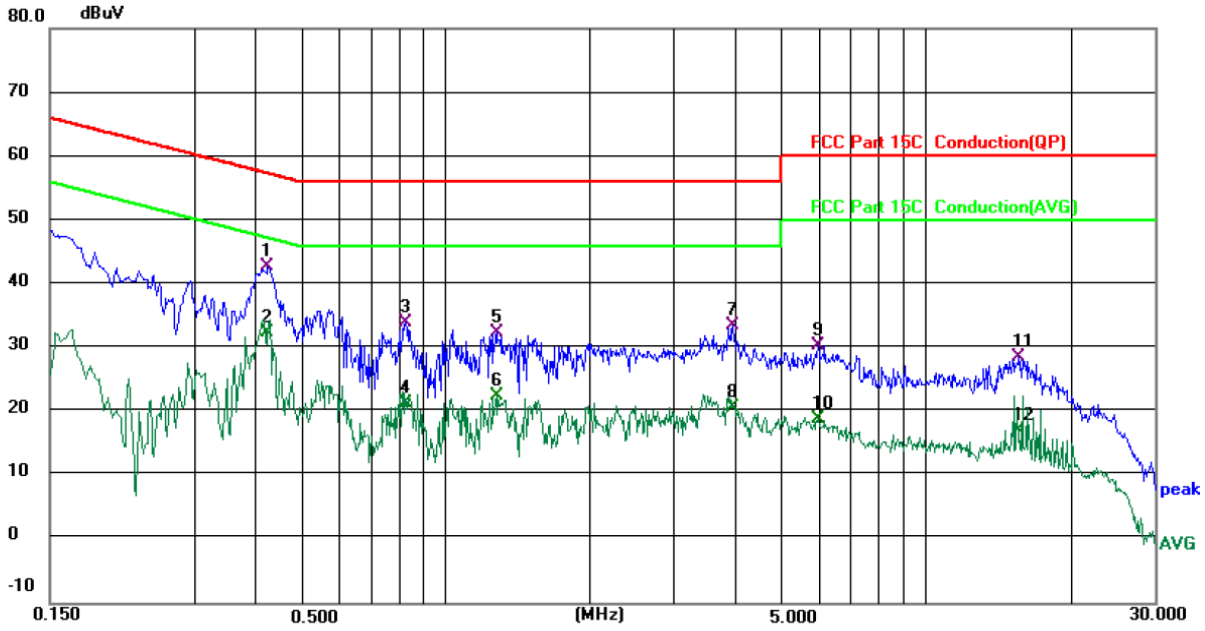
### 5.2.2. Test Instruments

| Conducted Emission Shielding Room Test Site (843) | | | | |
|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model** | **Serial Number** | **Calibration Due** |
| EMI Test Receiver | R&S | ESCI3 | 100898 | Jun. 26, 2025 |
| LISN | Schwarzbeck | NSLK 8126 | 8126453 | Jan. 31, 2025 |
| Attenuator | N/A | 10dB | 164080 | Jun. 26, 2025 |
| Line-5 | TCT | CE-05 | / | Jun. 26, 2025 |
| EMI Test Software | EZ_EMC | EMEC-3A1 | 1.1.4.2 | / |

### 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: 22.8 (℃) | Humidity: 49 %

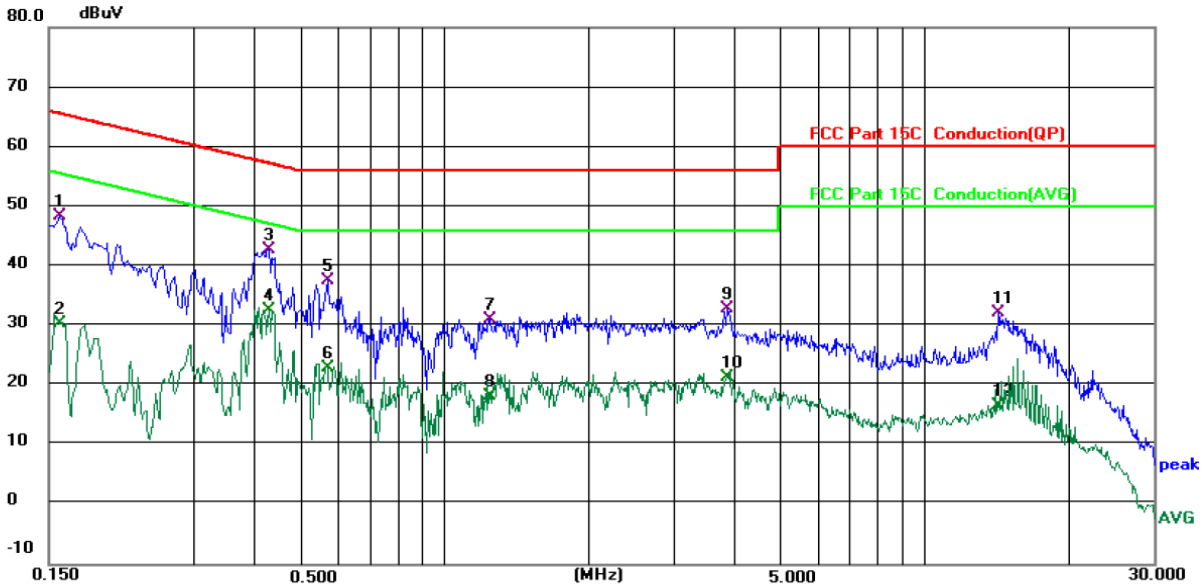
Limit: FCC Part 15C Conduction(QP) | Power: DC 4.2 V

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | * | 0.4259 | 33.45 | 9.41 | 42.86 | 57.33 | -14.47 | QP | |
| 2 | | 0.4259 | 23.10 | 9.41 | 32.51 | 47.33 | -14.82 | AVG | |
| 3 | | 0.8300 | 24.93 | 9.05 | 33.98 | 56.00 | -22.02 | QP | |
| 4 | | 0.8300 | 12.39 | 9.05 | 21.44 | 46.00 | -24.56 | AVG | |
| 5 | | 1.2780 | 22.50 | 9.94 | 32.44 | 56.00 | -23.56 | QP | |
| 6 | | 1.2780 | 12.50 | 9.94 | 22.44 | 46.00 | -23.56 | AVG | |
| 7 | | 3.9660 | 23.23 | 10.29 | 33.52 | 56.00 | -22.48 | QP | |
| 8 | | 3.9660 | 10.45 | 10.29 | 20.74 | 46.00 | -25.26 | AVG | |
| 9 | | 5.9618 | 19.92 | 10.45 | 30.37 | 60.00 | -29.63 | QP | |
| 10 | | 5.9618 | 8.37 | 10.45 | 18.82 | 50.00 | -31.18 | AVG | |
| 11 | | 15.7140 | 18.04 | 10.60 | 28.64 | 60.00 | -31.36 | QP | |
| 12 | | 15.7140 | 6.58 | 10.60 | 17.18 | 50.00 | -32.82 | 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: 22.8 (℃) | Humidity: 49 %

Limit: FCC Part 15C Conduction(QP) | Power: DC 4.2 V

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1580 | 38.37 | 10.01 | 48.38 | 65.57 | -17.19 | QP | |
| 2 | | 0.1580 | 20.47 | 10.01 | 30.48 | 55.57 | -25.09 | AVG | |
| 3 | * | 0.4300 | 33.45 | 9.39 | 42.84 | 57.25 | -14.41 | QP | |
| 4 | | 0.4300 | 23.17 | 9.39 | 32.56 | 47.25 | -14.69 | AVG | |
| 5 | | 0.5700 | 28.33 | 9.25 | 37.58 | 56.00 | -18.42 | QP | |
| 6 | | 0.5700 | 13.81 | 9.25 | 23.06 | 46.00 | -22.94 | AVG | |
| 7 | | 1.2459 | 21.25 | 9.88 | 31.13 | 56.00 | -24.87 | QP | |
| 8 | | 1.2459 | 8.46 | 9.88 | 18.34 | 46.00 | -27.66 | AVG | |
| 9 | | 3.8860 | 22.60 | 10.20 | 32.80 | 56.00 | -23.20 | QP | |
| 10 | | 3.8860 | 11.16 | 10.20 | 21.36 | 46.00 | -24.64 | AVG | |
| 11 | | 14.2780 | 21.59 | 10.59 | 32.18 | 60.00 | -27.82 | QP | |
| 12 | | 14.2780 | 5.99 | 10.59 | 16.58 | 50.00 | -33.42 | AVG | |

***Note1:*** *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.*

***Note2:*** *Measurements were conducted in all three channels (high, middle, low) and three modulation (GFSK, Pi/4 DQPSK, 8DPSK), and the worst case Mode (Middle channel and 8DPSK) was submitted only. Antenna a and Antenna b have been tested, but the test data only show the worst case model (Antenna b) in this report.*

## 5.3. Radiated Spurious Emission Measurement

### 5.3.1. Test Specification

| | |
|---|---|
| **Test Requirement:** | FCC Part15 C Section 15.209 |
| **Test Method:** | ANSI C63.10:2013 |
| **Frequency Range:** | 9 kHz to 25 GHz |
| **Measurement Distance:** | 3 m |
| **Antenna Polarization:** | Horizontal & Vertical |

**Receiver Setup:**

| Frequency | Detector | RBW | VBW | Remark |
|---|---|---|---|---|
| 9kHz- 150kHz | Quasi-peak | 200Hz | 1kHz | Quasi-peak Value |
| 150kHz-30MHz | Quasi-peak | 9kHz | 30kHz | Quasi-peak Value |
| 30MHz-1GHz | Quasi-peak | 120KHz | 300KHz | Quasi-peak Value |
| Above 1GHz | Peak | 1MHz | 3MHz | Peak Value |
| | Peak | 1MHz | 10Hz | Average Value |

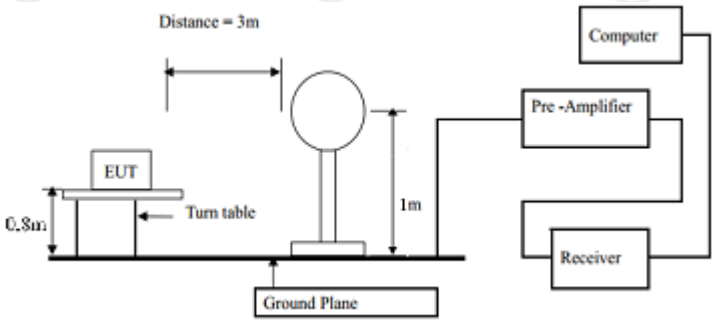
**Limit:**

| Frequency | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009-0.490 | 2400/F(KHz) | 300 |
| 0.490-1.705 | 24000/F(KHz) | 30 |
| 1.705-30 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

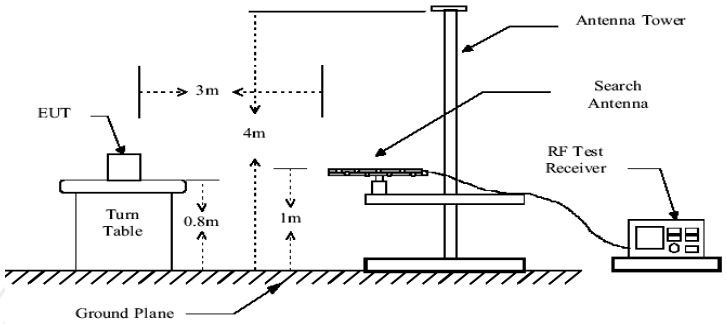
| Frequency | Field Strength (microvolts/meter) | Measurement Distance (meters) | Detector |
|---|---|---|---|
| Above 1GHz | 500 | 3 | Average |
| | 5000 | 3 | Peak |

**Test setup:**

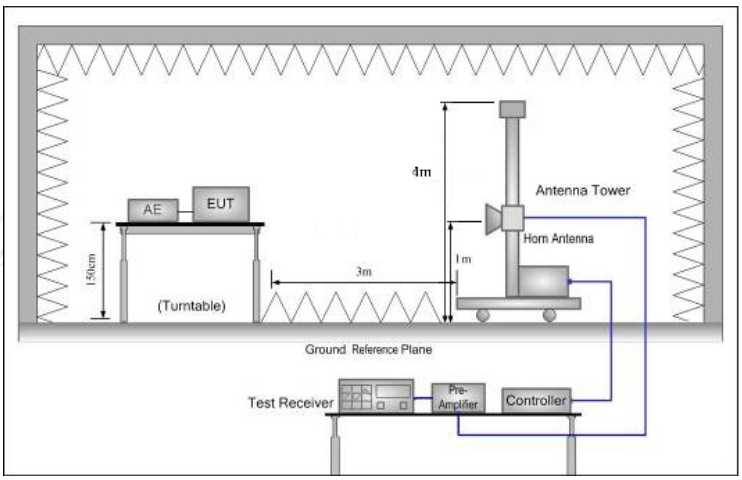
For radiated emissions below 30MHz




30MHz to 1GHz




Above 1GHz




| | |
|---|---|
| **Test Mode:** | Transmitting mode with modulation |
| **Test Procedure:** | 1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10:2013 Measurement Guidelines.<br>2. For the radiated emission test below 1GHz:<br>The EUT was placed on a turntable with 0.8 meter above ground. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high PASS filter are used for the test in order to get better signal level.<br>For the radiated emission test above 1GHz:<br>Place the measurement antenna on a turntable with 1.5 meter above ground, which is away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission |



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| | |
|---|---|
| | and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.<br>3. Set to the maximum power setting and enable the EUT transmit continuously.<br>4. Use the following spectrum analyzer settings:<br>(1) Span shall wide enough to fully capture the emission being measured;<br>(2) Set RBW=120 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW≥RBW;<br>Sweep = auto; Detector function = peak; Trace = max hold for peak<br>(3) For average measurement: use duty cycle correction factor method per<br>15.35(c). Duty cycle = On time/100 milliseconds<br>On time =N1*L1+N2*L2+...+Nn-1*LNn-1+Nn*Ln<br>Where N1 is number of type 1 pulses, L1 is length of type 1 pulses, etc.<br>Average Emission Level = Peak Emission Level + 20*log(Duty cycle)<br>Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level |
| **Test results:** | PASS |

### 5.3.2. Test Instruments

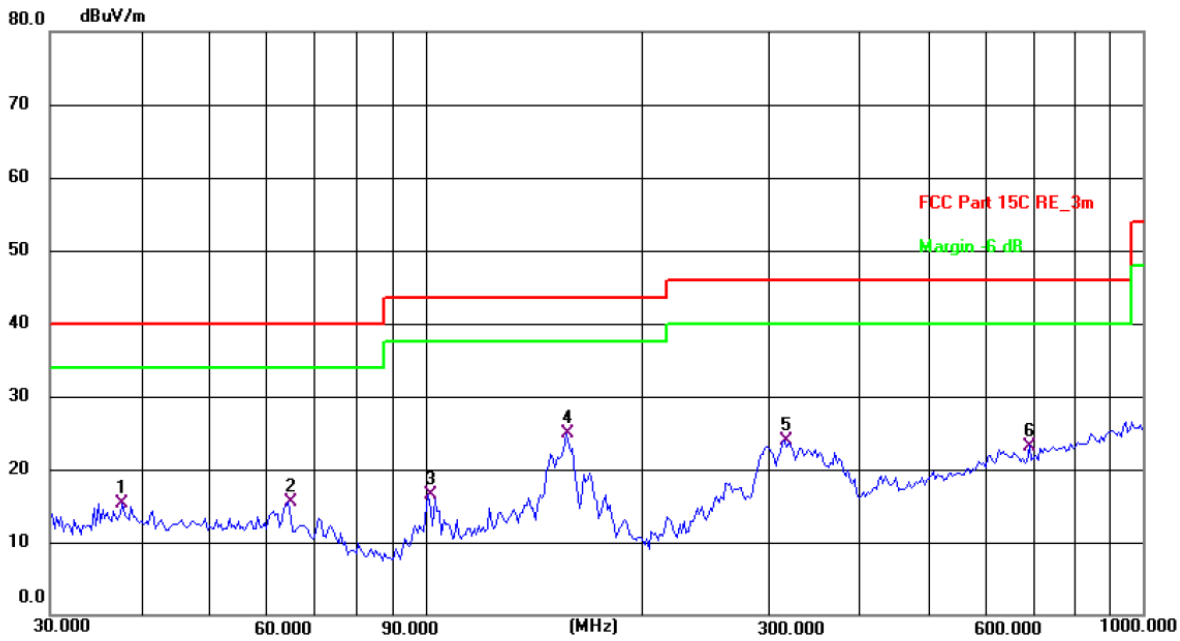
| Radiated Emission Test Site (966) | | | | |
|---|---|---|---|---|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| EMI Test Receiver | R&S | ESCI7 | 100529 | Jan. 31, 2025 |
| Spectrum Analyzer | R&S | FSQ40 | 200061 | Jun. 26, 2025 |
| Pre-amplifier | HP | 8447D | 2727A05017 | Jun. 26, 2025 |
| Pre-amplifier | SKET | LNPA_0118G-45 | SK2021012102 | Jan. 31, 2025 |
| Pre-amplifier | SKET | LNPA_1840G-50 | SK202109203500 | Jan. 31, 2025 |
| Loop antenna | Schwarzbeck | FMZB1519B | 00191 | Jun. 26, 2025 |
| Broadband Antenna | Schwarzbeck | VULB9163 | 340 | Jun. 28, 2025 |
| Horn Antenna | Schwarzbeck | BBHA 9120D | 631 | Jun. 28, 2025 |
| Horn Antenna | Schwarzbeck | BBHA 9170 | 00956 | Feb. 02, 2025 |
| Coaxial cable | SKET | RE-03-D | / | Jun. 26, 2025 |
| Coaxial cable | SKET | RE-03-M | / | Jun. 26, 2025 |
| Coaxial cable | SKET | RE-03-L | / | Jun. 26, 2025 |
| Coaxial cable | SKET | RE-04-D | / | Jun. 26, 2025 |
| Coaxial cable | SKET | RE-04-M | / | Jun. 26, 2025 |
| Coaxial cable | SKET | RE-04-L | / | Jun. 26, 2025 |
| Antenna Mast | Keleto | RE-AM | / | / |
| EMI Test Software | EZ_EMC | FA-03A2 RE+ | 1.1.4.2 | / |

### 5.3.3. Test Data

**Please refer to following diagram for individual**

**Below 1GHz**

Horizontal:

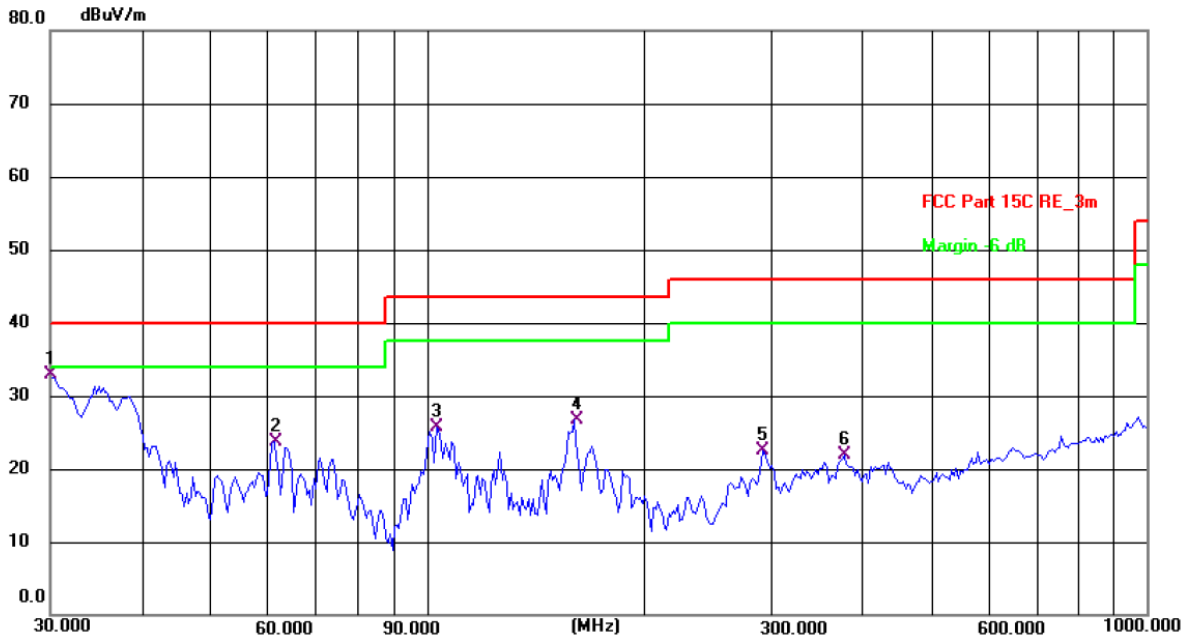



Site: 3m Anechoic Chamber1 Polarization: ***Horizontal*** Temperature: 25.1(C) Humidity: 53 %

Limit: FCC Part 15C RE_3m Power: DC 4.2 V

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 37.8121 | 27.55 | -12.17 | 15.38 | 40.00 | -24.62 | QP | P | |
| 2 | 64.4331 | 28.77 | -13.36 | 15.41 | 40.00 | -24.59 | QP | P | |
| 3 | 100.9339 | 31.87 | -15.32 | 16.55 | 43.50 | -26.95 | QP | P | |
| 4 * | 157.0074 | 36.11 | -11.28 | 24.83 | 43.50 | -18.67 | QP | P | |
| 5 | 316.5890 | 34.23 | -10.42 | 23.81 | 46.00 | -22.19 | QP | P | |
| 6 | 694.4174 | 27.50 | -4.30 | 23.20 | 46.00 | -22.80 | QP | P | |

Vertical:




Site: 3m Anechoic Chamber1 Polarization: ***Vertical*** Temperature: 25.1(C) Humidity: 53 %

Limit: FCC Part 15C RE_3m Power: DC 4.2 V

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 * | 30.0000 | 45.88 | -13.00 | 32.88 | 40.00 | -7.12 | QP | P | |
| 2 | 61.3463 | 36.47 | -12.86 | 23.61 | 40.00 | -16.39 | QP | P | |
| 3 | 103.0800 | 40.72 | -15.09 | 25.63 | 43.50 | -17.87 | QP | P | |
| 4 | 160.3456 | 38.01 | -11.37 | 26.64 | 43.50 | -16.86 | QP | P | |
| 5 | 293.0842 | 33.51 | -11.05 | 22.46 | 46.00 | -23.54 | QP | P | |
| 6 | 379.9141 | 31.37 | -9.55 | 21.82 | 46.00 | -24.18 | QP | P | |

***Note:*** *1. The low frequency, which started from 9KHz~30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.*

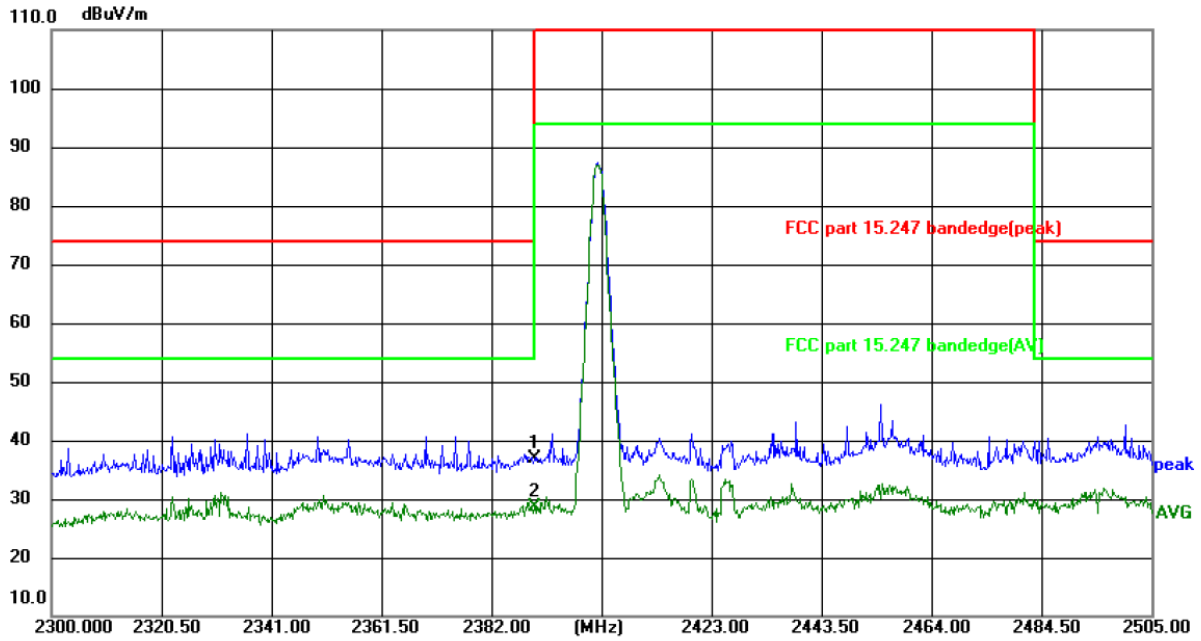
*2. Measurements were conducted in all three channels (high, middle, low) and three modulation (GFSK, Pi/4 DQPSK, 8DPSK) and the worst case Mode (Middle channel and 8DPSK) was submitted only. Antenna a and Antenna b have been tested, but the test data only show the worst case model (Antenna b) in this report.*

*3. Freq. = Emission frequency in MHz*
*Measurement (dBμV/m) = Reading level (dBμV) + Corr. Factor (dB)*
*Correction Factor= Antenna Factor + Cable loss – Pre-amplifier*
*Limit (dBμV/m) = Limit stated in standard*
*Over (dB) = Measurement (dBμV/m) – Limits (dBμV/m)*
** is meaning the worst frequency has been tested in the test frequency range.*

**Test Result of Radiated Spurious at Band edges**

Lowest channel 2402:

Horizontal:

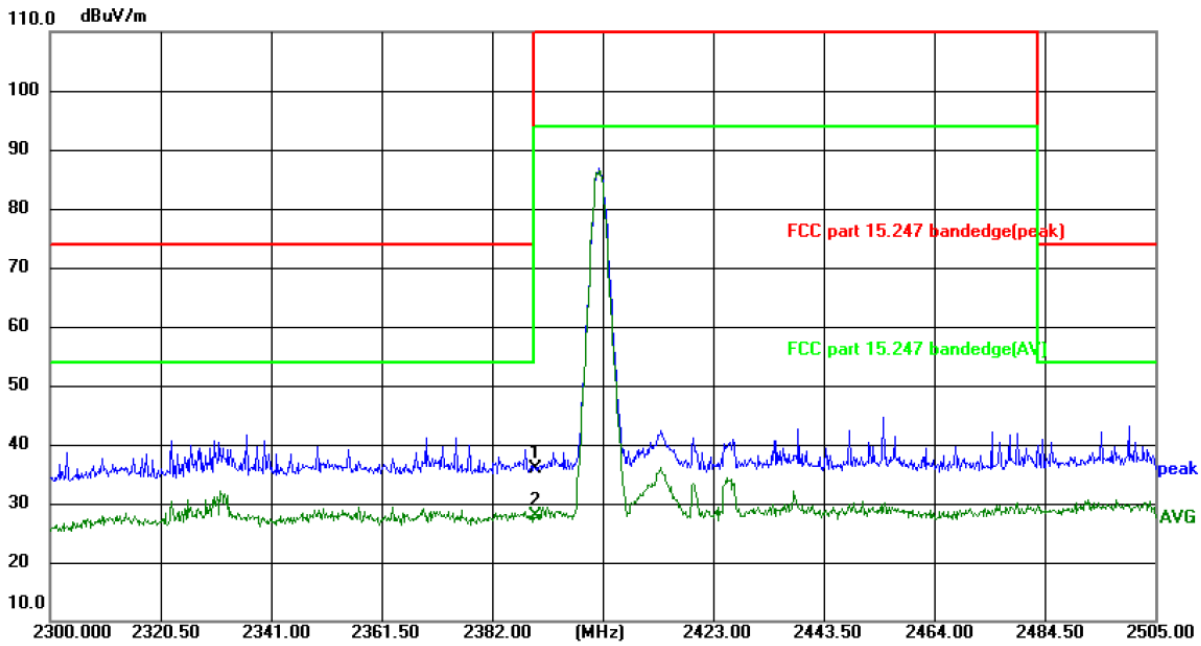



Site: 3m Anechoic Chamber Polarization: ***Horizontal*** Temperature: 23.1(℃) Humidity: 60 %

Limit: FCC part 15.247 bandedge(peak) Power: DC 4.2 V

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2390.000 | 52.78 | -15.86 | 36.92 | 74.00 | -37.08 | peak | P | |
| 2 * | 2390.000 | 44.58 | -15.86 | 28.72 | 54.00 | -25.28 | AVG | P | |

Vertical:



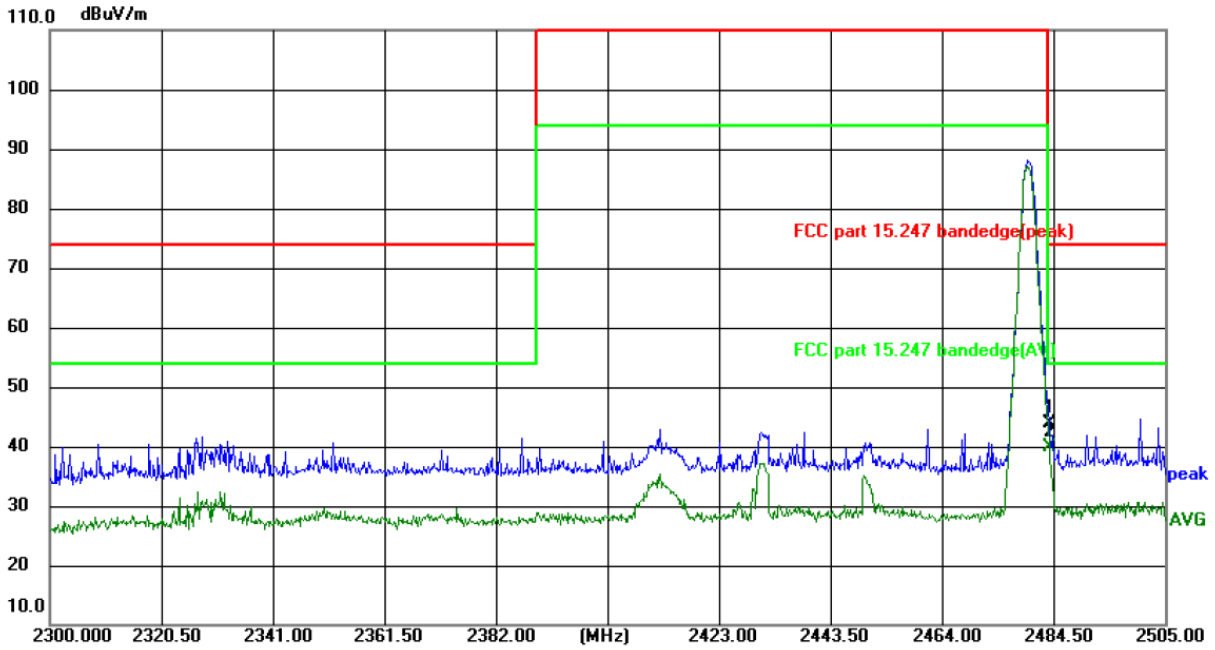

Site: 3m Anechoic Chamber Polarization: ***Vertical*** Temperature: 23.1(℃) Humidity: 60 %

Limit: FCC part 15.247 bandedge(peak) Power: DC 4.2 V

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2390.000 | 51.78 | -15.86 | 35.92 | 74.00 | -38.08 | peak | P | |
| 2 * | 2390.000 | 43.66 | -15.86 | 27.80 | 54.00 | -26.20 | AVG | P | |

Highest channel 2480:

Horizontal:

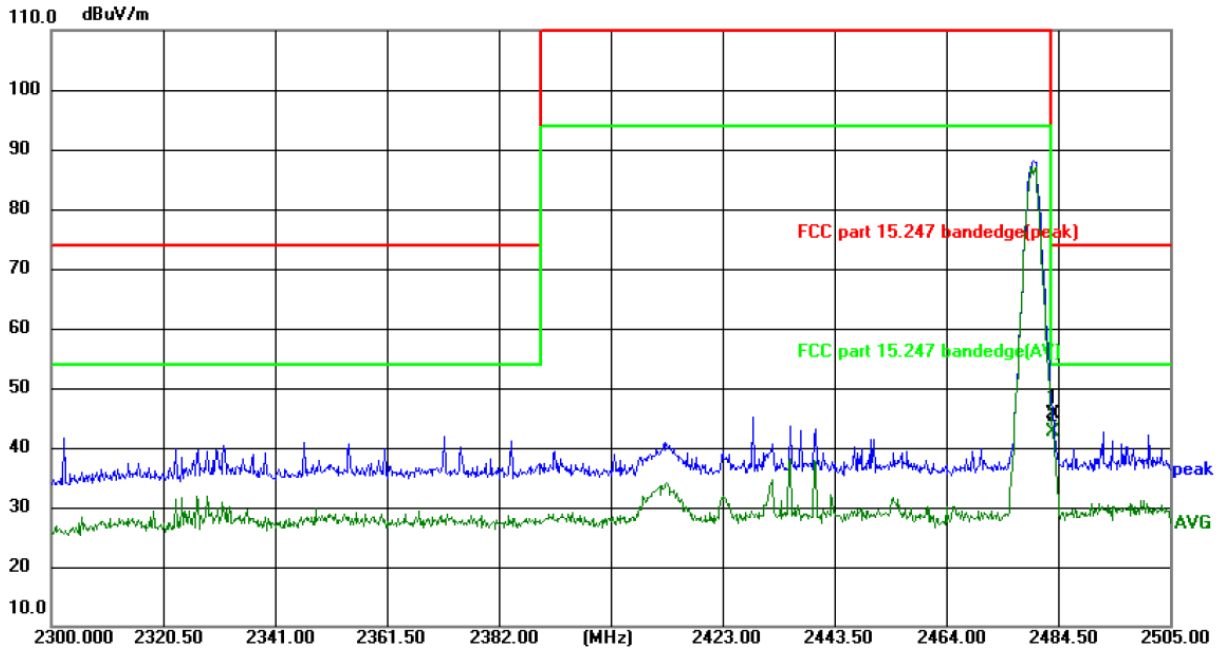



Site: 3m Anechoic Chamber Polarization: ***Horizontal*** Temperature: 23.1(℃) Humidity: 60 %

Limit: FCC part 15.247 bandedge(peak) Power: DC 4.2 V

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 59.81 | -15.87 | 43.94 | 74.00 | -30.06 | peak | P | |
| 2 * | 2483.500 | 55.78 | -15.87 | 39.91 | 54.00 | -14.09 | AVG | P | |

Vertical:




Site: 3m Anechoic Chamber Polarization: ***Vertical*** Temperature: 23.1(℃) Humidity: 60 %

Limit: FCC part 15.247 bandedge(peak) Power: DC 4.2 V

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 61.44 | -15.87 | 45.57 | 74.00 | -28.43 | peak | P | |
| 2 * | 2483.500 | 58.46 | -15.87 | 42.59 | 54.00 | -11.41 | AVG | P | |

***Note:*** *1. Measurements were conducted in all three modulation (GFSK, Pi/4 DQPSK, 8DPSK), and the worst case Mode (8DPSK) was submitted only.*

*2. Antenna a and Antenna b have been tested, but the test data only show the worst case model (Antenna b) in this report.*

## Above 1GHz

| Modulation Type: 8DPSK | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Low channel: 2402 MHz | | | | | | | | | |
| 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 | 44.62 | --- | 0.66 | 45.28 | --- | 74 | 54 | -8.72 |
| 7206 | H | 34.99 | --- | 9.50 | 44.49 | --- | 74 | 54 | -9.51 |
| --- | H | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | | |
| 4804 | V | 45.25 | --- | 0.66 | 45.91 | --- | 74 | 54 | -8.09 |
| 7206 | V | 34.87 | --- | 9.50 | 44.37 | --- | 74 | 54 | -9.63 |
| --- | V | --- | --- | --- | --- | --- | --- | --- | --- |

| Middle channel: 2441 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 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 | 44.94 | --- | 0.99 | 45.93 | --- | 74 | 54 | -8.07 |
| 7323 | H | 35.21 | --- | 9.87 | 45.08 | --- | 74 | 54 | -8.92 |
| --- | H | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | | |
| 4882 | V | 44.57 | --- | 0.99 | 45.56 | --- | 74 | 54 | -8.44 |
| 7323 | V | 34.39 | --- | 9.87 | 44.26 | --- | 74 | 54 | -9.74 |
| --- | V | --- | --- | --- | --- | ---- | --- | --- | --- |

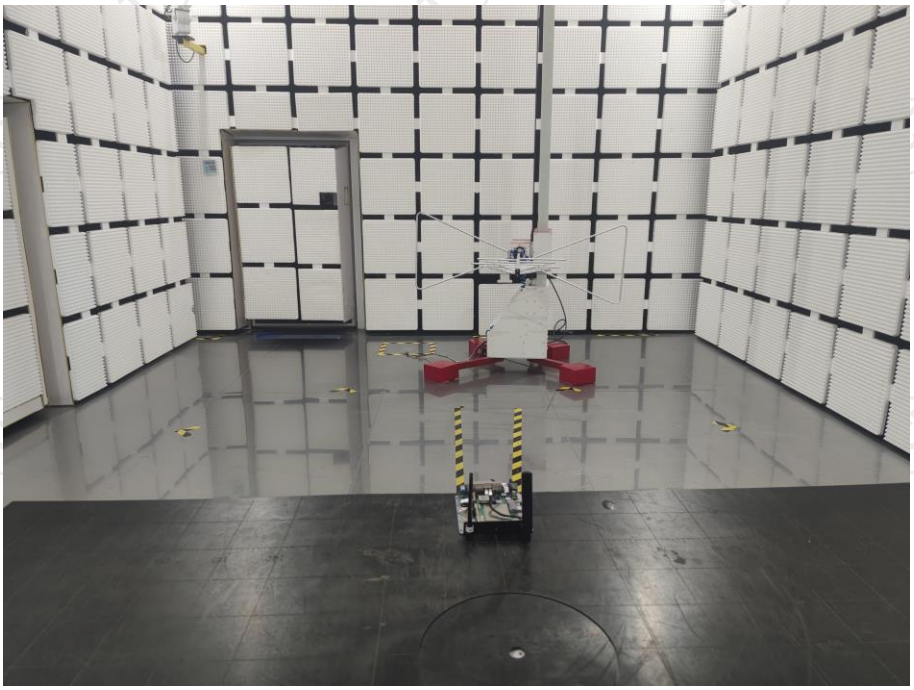
| High channel: 2480 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Ant. Pol. H/V | Peak reading (dBμV) | AV reading (dBμV) | Correction Factor (dB/m) | Emission Level | | Peak limit (dBμV/m) | AV limit (dBμV/m) | Margin (dB) |
| | | | | | Peak (dBμV/m) | AV (dBμV/m) | | | |
| 4960 | H | 45.99 | --- | 1.33 | 47.32 | --- | 74 | 54 | -6.68 |
| 7440 | H | 35.27 | --- | 10.22 | 45.49 | --- | 74 | 54 | -8.51 |
| --- | H | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | | |
| 4960 | V | 44.43 | --- | 1.33 | 45.76 | --- | 74 | 54 | -8.24 |
| 7440 | V | 34.51 | --- | 10.22 | 44.73 | --- | 74 | 54 | -9.27 |
| --- | V | --- | --- | --- | --- | --- | --- | --- | --- |

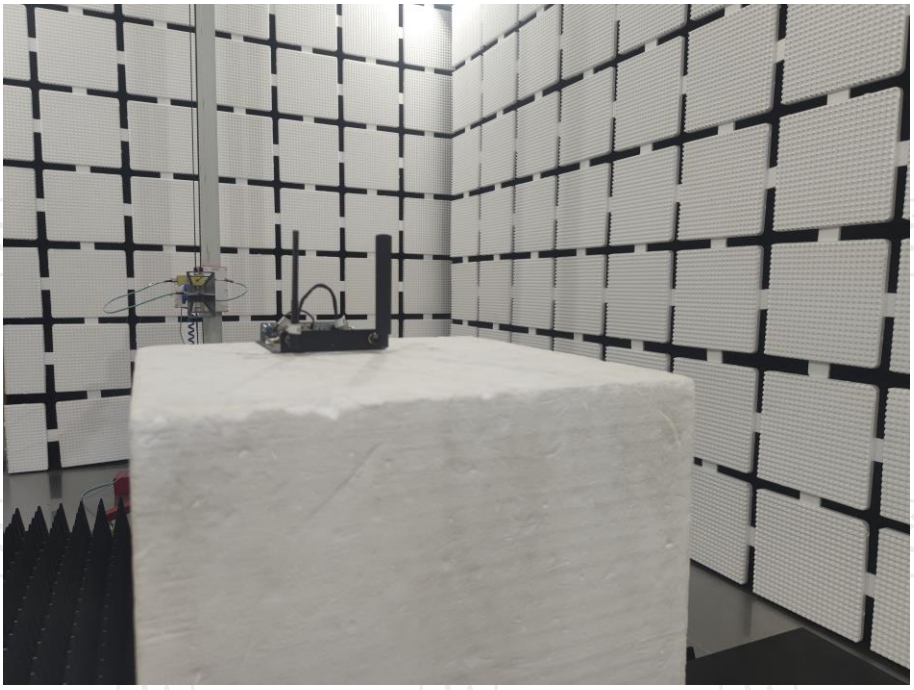
***Note:***

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. *Measurements were conducted in all three modulation (GFSK, Pi/4 DQPSK, 8DPSK), and the worst case Mode (8DPSK) was submitted only.*
7. *Antenna a and Antenna b have been tested, but the test data only show the worst case model (Antenna b) in this report.*
8. *All the restriction bands are compliance with the limit of 15.209.*

# Appendix B: Photographs of Test Setup

Product: AIO Core Board module
Model: AION7XX01
Radiated Emission







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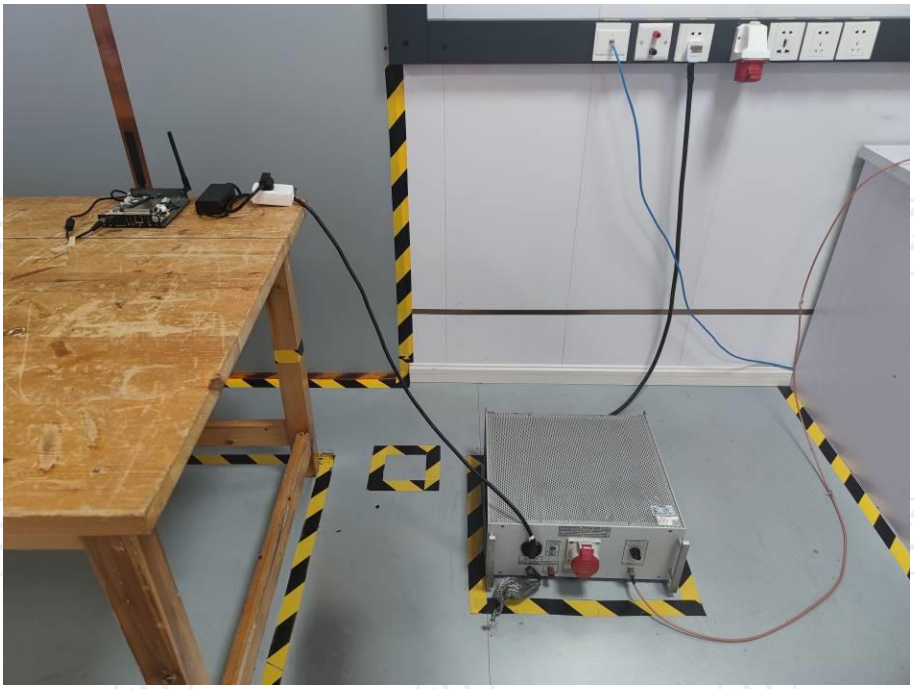
Conducted Emission

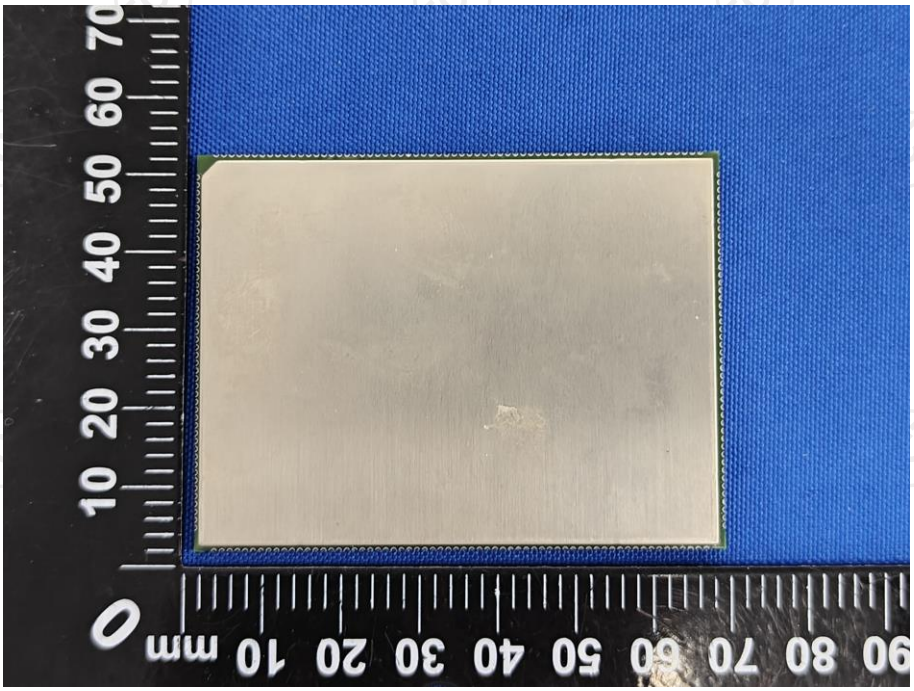


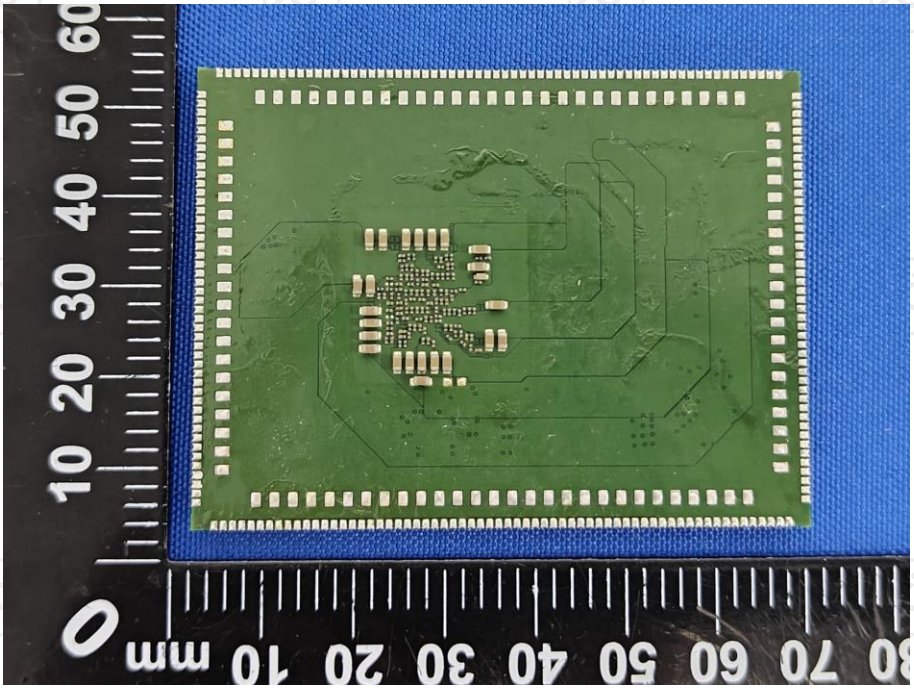
# Appendix C: Photographs of EUT

**Product: AIO Core Board module**

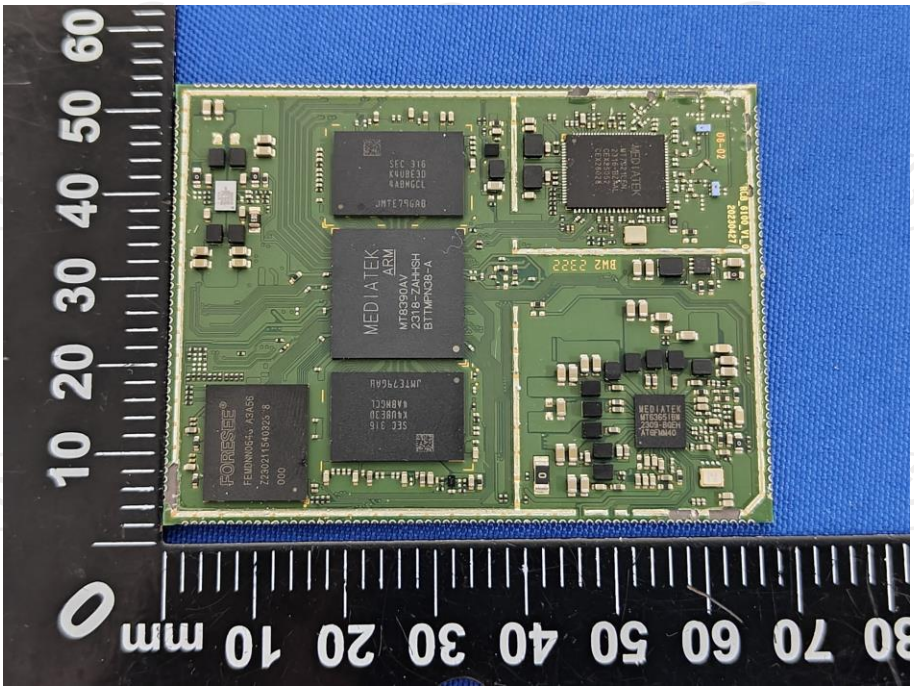
**Model: AION7XX01**

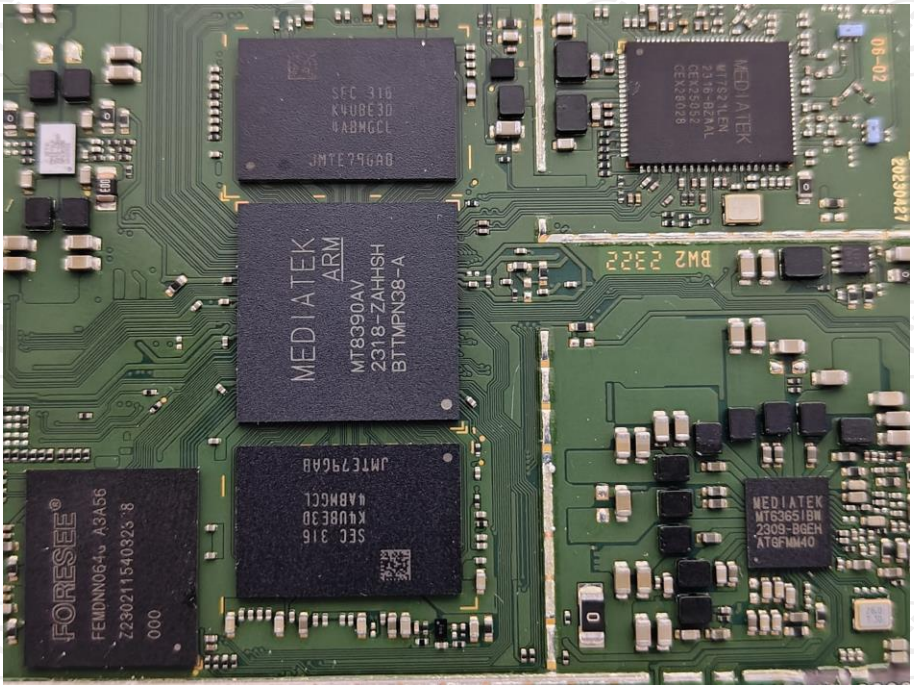
**External Photos**





**Product: AIO Core Board module**
**Model: AION7XX01**
**Internal Photos**




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