# FCC REPORT

| | |
|---|---|
| **Applicant:** | Shanghai Sunmi Technology Co.,Ltd. |
| **Address of Applicant:** | Room 605, Block 7, KIC Plaza, No.388 Song Hu Road Yang Pu District, Shanghai 200433, China |

**Equipment Under Test (EUT)**

| | |
|---|---|
| Product Name: | POS System |
| Model No.: | W1402 |
| **FCC ID:** | 2AH25W1403 |
| **Applicable standards:** | FCC CFR Title 47 Part 15 Subpart C Section 15.407:2015 |
| **Date of sample receipt:** | December 28, 2016 |
| **Date of Test:** | December 28, 2016-January 03, 2017 |
| **Date of report issue:** | January 06, 2017 |
| **Test Result :** | PASS * |

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

**Robinson Lo**
**Laboratory Manager**

# 2 Version

| Version No. | Date | Description |
|---|---|---|
| *00* | *January 06, 2017* | *Original* |
| | | |
| | | |
| | | |
| | | |

***Prepared By:*** Edward.Pan ***Date:*** *January 06, 2017*

***Project Engineer***

***Check By:*** Andy.Wu ***Date:*** *January 06, 2017*

***Reviewer***

# 3 Contents

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# 4 Test Summary

| Test Item | Section in CFR 47 | Result |
|---|---|---|
| Antenna requirement | 15.203 | PASS |
| AC Power Line Conducted Emission | 15.207 | PASS |
| Peak Transmit Power | 15.407(a)(1) | N/A |
| Power Spectral Density | 15.407(a)(1) | N/A |
| Undesirable Emission | 15.407(b)(6), 15.205/15.209 | N/A |
| Radiated Emission | 15.205/15.209 | PASS |
| Band Edge | 15.205 | N/A |
| Frequency Stability | 15.407(f) | N/A |

*Remark:*

*Pass: The EUT complies with the essential requirements in the standard.*

*N/A: Not applicable*

## 4.1 Measurement Uncertainty

| Test Item | Frequency Range | Measurement Uncertainty | Notes |
|---|---|---|---|
| Radiated Emission | 9kHz ~ 30MHz | ± 4.34dB | (1) |
| Radiated Emission | 30MHz ~ 1000MHz | ± 4.24dB | (1) |
| Radiated Emission | 1GHz ~ 40GHz | ± 4.68dB | (1) |
| AC Power Line Conducted Emission | 0.15MHz ~ 30MHz | ± 3.45dB | (1) |
| Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%. | | | |
| Remark: Test according to ANSI C63.10:2013 and ANSI C63.4:2014 | | | |

# 5 General Information

## 5.1 Client Information

| | |
|---|---|
| Applicant: | Shanghai Sunmi Technology Co.,Ltd. |
| Address of Applicant: | Room 605, Block 7, KIC Plaza, No.388 Song Hu Road Yang Pu District, Shanghai 200433, China |
| Manufacturer: | Shanghai Sunmi Technology Co.,Ltd. |
| Address of Manufacturer: | Room 605, Block 7, KIC Plaza, No.388 Song Hu Road Yang Pu District, Shanghai 200433, China |
| Factory: | Huizhou BYD Electronics Co.,Ltd. |
| Address of Factory: | Xiangshui River,Economic Development Zone,Daya Bay, Huizhou,Guangdong,P.R.China |

## 5.2 General Description of EUT

| | |
|---|---|
| Product Name: | POS System |
| Model No.: | W1402 |
| Operation Frequency: | 802.11a/802.11n(HT20): 5180MHz ~ 5240MHz;<br>802.11n(HT40): 5190MHz ~ 5230MHz |
| Channel numbers: | 802.11a/802.11n(HT20): 4;<br>802.11n(HT40): 2 |
| Channel separation: | 802.11a/802.11n(HT20): 20MHz;<br>802.11n(HT40): 40MHz |
| Modulation technology: | OFDM(64QAM, 16QAM, QPSK, BPSK) |
| Antenna Type: | Integral antenna |
| Antenna gain: | -5.1dBi |
| Power supply: | AC Adaptor<br>Model No.:EA10681P-240<br>Input: AC 100-240V, 50/60Hz, 2.0A<br>Output: DC 24V, 2.5A |

## 5.3 Test mode

| | |
|---|---|
| Transmitting mode | Keep the EUT in transmitting with modulation.<br>EUT was test with 99% duty cycle at its maximum power control level. |
| *Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.* | |

## 5.4 Test Facility

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

● **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fuly described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, June 22, 2016.

● **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. Has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016.

## 5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, sBaoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

## 5.6 Description of Support Units

None.

## 5.7 Deviation from Standards

None.

## 5.8 Abnormalities from Standard Conditions

None.

## 5.9 Other Information Requested by the Customer

None.

## 5.10 Test Instruments list

| Radiated Emission: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | 3m Semi- Anechoic Chamber | ZhongYu Electron | 9.2(L)*6.2(W)* 6.4(H) | GTS250 | July. 03 2015 | July. 02 2020 |
| 2 | Control Room | ZhongYu Electron | 6.2(L)*2.5(W)* 2.4(H) | GTS251 | N/A | N/A |
| 3 | EMI Test Receiver | Rohde & Schwarz | ESU26 | GTS203 | June. 29 2016 | June. 28 2017 |
| 4 | Spectrum analyzer | Agilent | E4447A | GTS516 | June. 29 2016 | June. 28 2017 |
| 5 | Spectrum Analyzer | Agilent | E4440A | GTS533 | June. 29 2016 | June. 28 2017 |
| 6 | BiConiLog Antenna | SCHWARZBECK MESS-ELEKTRONIK | VULB9163 | GTS214 | June. 29 2016 | June. 28 2017 |
| 7 | Double -ridged waveguide horn | SCHWARZBECK MESS-ELEKTRONIK | 9120D-829 | GTS208 | June. 29 2016 | June. 28 2017 |
| 8 | Horn Antenna | ETS-LINDGREN | 3160 | GTS217 | June. 29 2016 | June. 28 2017 |
| 9 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| 10 | Coaxial Cable | GTS | N/A | GTS213 | June. 29 2016 | June. 28 2017 |
| 11 | Coaxial Cable | GTS | N/A | GTS211 | June. 29 2016 | June. 28 2017 |
| 12 | Coaxial cable | GTS | N/A | GTS210 | June. 29 2016 | June. 28 2017 |
| 13 | Coaxial Cable | GTS | N/A | GTS212 | June. 29 2016 | June. 28 2017 |
| 14 | Amplifier(100kHz-3GHz) | HP | 8347A | GTS204 | June. 29 2016 | June. 28 2017 |
| 15 | Amplifier(2GHz-20GHz) | HP | 8349B | GTS206 | June. 29 2016 | June. 28 2017 |
| 16 | Amplifier (18-40GHz) | MITEQ | AMF-6F-18004000-29-8P | GTS534 | June. 29 2016 | June. 28 2017 |
| 17 | Band filter | Amindeon | 82346 | GTS219 | June. 29 2016 | June. 28 2017 |
| 18 | Constant temperature and humidity box | Oregon Scientific | BA-888 | GTS248 | June. 29 2016 | June. 28 2017 |
| 19 | D.C. Power Supply | Instek | PS-3030 | GTS232 | June. 29 2016 | June. 28 2017 |
| 20 | Universal radio communication tester | Rohde & Schwarz | CMU200 | GTS235 | June. 29 2016 | June. 28 2017 |
| 21 | Splitter | Agilent | 11636B | GTS237 | June. 29 2016 | June. 28 2017 |
| 22 | Power Meter | Anritsu | ML2495A | GTS540 | June. 29 2016 | June. 28 2017 |
| 23 | Power Sensor | Anritsu | MA2411B | GTS541 | June. 29 2016 | June. 28 2017 |

| Conducted Emission: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | Shielding Room | ZhongYu Electron | 7.3(L)x3.1(W)x2.9(H) | GTS252 | May 16 2014 | May 15 2019 |
| 2 | EMI Test Receiver | R&S | ESCI 7 | GTS552 | June 29 2016 | June 28 2017 |
| 3 | Pulse Limiter | R&S | ESH3-Z2 | GTS224 | June 29 2016 | June 28 2017 |
| 4 | Coaxial Switch | ANRITSU CORP | MP59B | GTS225 | June 29 2016 | June 28 2017 |
| 5 | Artificial Mains Network | SCHWARZBECK MESS | NSLK8127 | GTS226 | June 29 2016 | June 28 2017 |
| 6 | Coaxial Cable | GTS | N/A | GTS227 | June 29 2016 | June 28 2017 |
| 7 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| 8 | Thermo meter | KTJ | TA328 | GTS233 | June 29 2016 | June 28 2017 |

| General used equipment: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | Barometer | ChangChun | DYM3 | GTS257 | June 29 2016 | June 28 2017 |

# 5 Test results and Measurement Data

## 5.1 Antenna requirement:

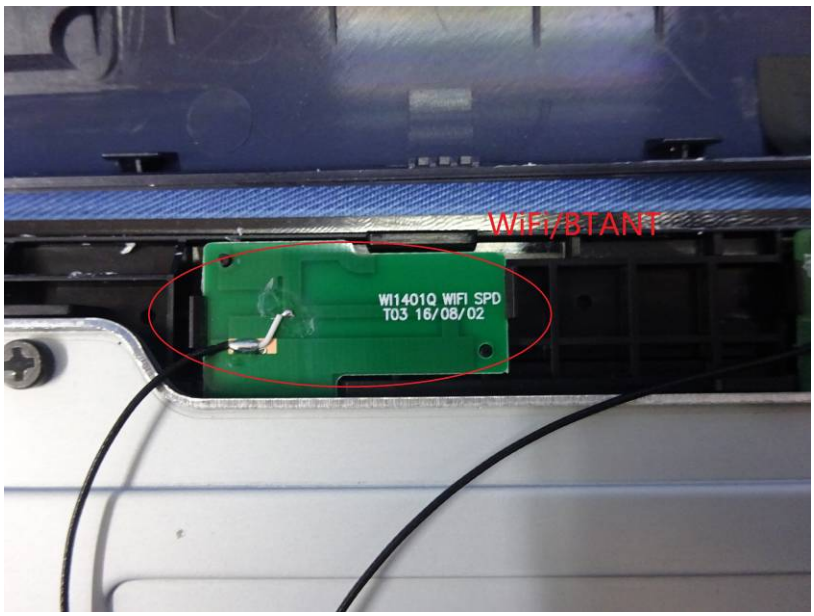
| | |
|---|---|
| **Standard requirement:** | FCC Part15 C Section 15.203 |

*15.203 requirement:*

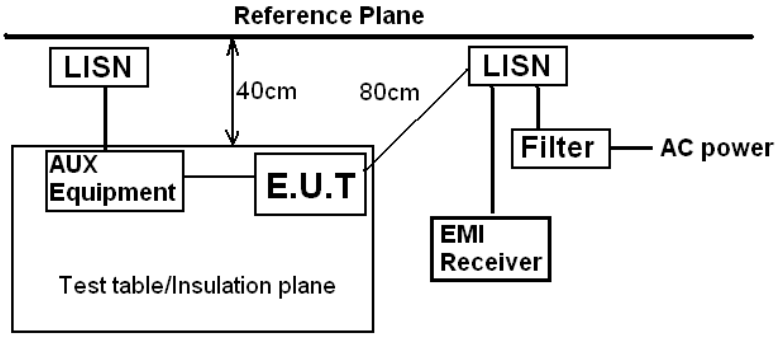
*An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 antenna is Integral antenna. The best case gain of the antenna is -5.1dBi.*



## 5.2 Conducted Emissions

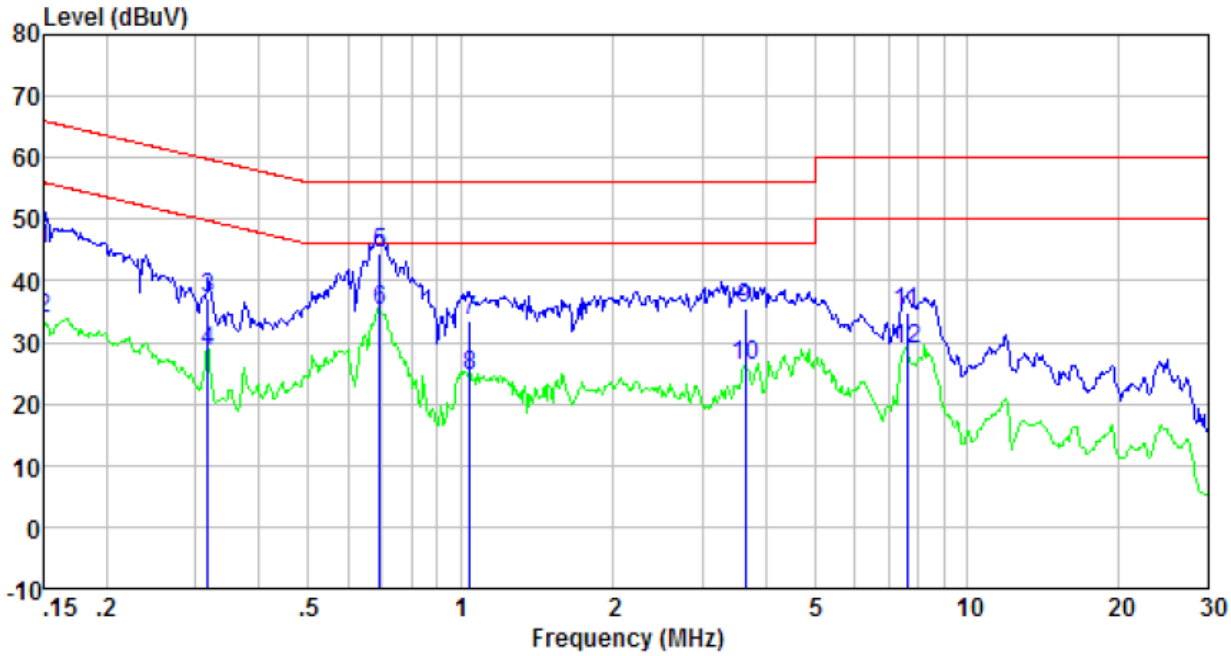
<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.207</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td>150KHz to 30MHz</td></tr>
<tr><td>Class / Severity:</td><td>Class B</td></tr>
<tr><td>Receiver setup:</td><td>RBW=9KHz, VBW=30KHz</td></tr>
<tr><td>Limit:</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>
* Decreases with the logarithm of the frequency.
</td></tr>
<tr><td>Test procedure</td><td>The E.U.T and simulators are connected to the main power through a line impedance stabilization network(L.I.S.N.). The provide a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs). 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 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 Instruments:</td><td>Refer to section 5.10 for details</td></tr>
<tr><td>Test mode:</td><td>Refer to section 5.3 for details</td></tr>
<tr><td>Test results:</td><td>Pass</td></tr>
</table>

**Measurement Data**

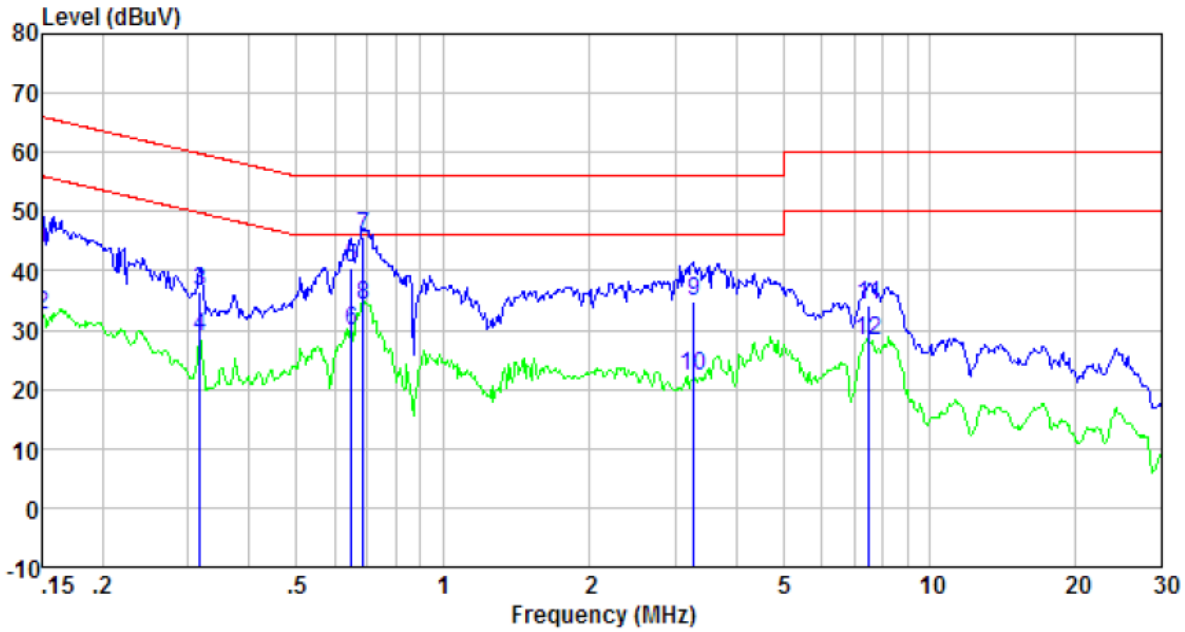
An initial pre-scan was performed on the line and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

**Line:**




| Freq MHz | Reading level dBuV | lISN/ISN factor dB | Cable loss dB | level dBuV | Limit level dBuV | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|
| 0.150 | 44.54 | 0.42 | 0.12 | 45.08 | 66.00 | -20.92 | QP |
| 0.150 | 33.32 | 0.42 | 0.12 | 33.86 | 56.00 | -22.14 | Average |
| 0.317 | 36.64 | 0.44 | 0.10 | 37.18 | 59.80 | -22.62 | QP |
| 0.317 | 28.02 | 0.44 | 0.10 | 28.56 | 49.80 | -21.24 | Average |
| 0.694 | 44.07 | 0.28 | 0.13 | 44.48 | 56.00 | -11.52 | QP |
| 0.694 | 34.70 | 0.28 | 0.13 | 35.11 | 46.00 | -10.89 | Average |
| 1.043 | 33.07 | 0.25 | 0.13 | 33.45 | 56.00 | -22.55 | QP |
| 1.043 | 24.20 | 0.25 | 0.13 | 24.58 | 46.00 | -21.42 | Average |
| 3.642 | 35.10 | 0.21 | 0.15 | 35.46 | 56.00 | -20.54 | QP |
| 3.642 | 25.86 | 0.21 | 0.15 | 26.22 | 46.00 | -19.78 | Average |
| 7.606 | 34.43 | 0.22 | 0.18 | 34.83 | 60.00 | -25.17 | QP |
| 7.606 | 28.46 | 0.22 | 0.18 | 28.86 | 50.00 | -21.14 | Average |

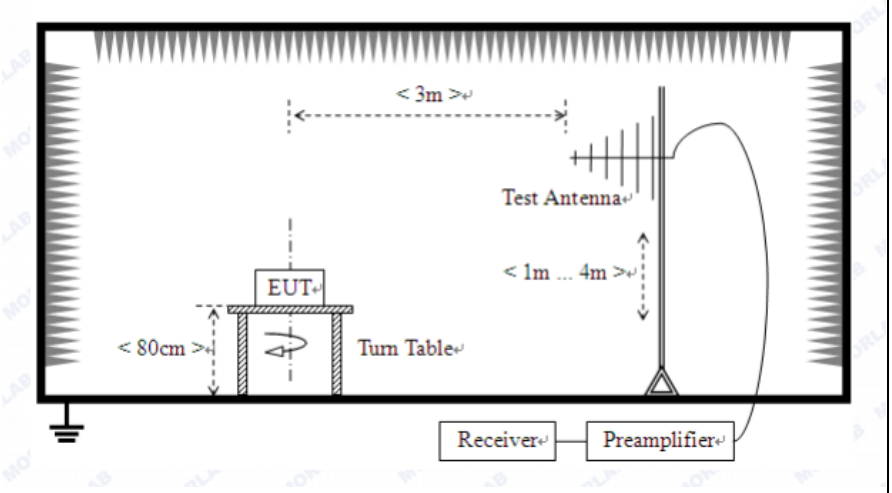
**Neutral:**

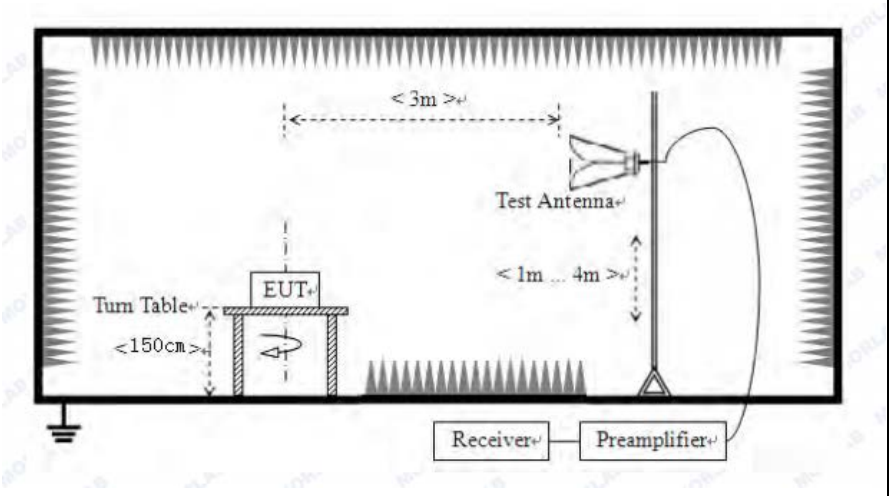



| Freq MHz | Reading level dBuV | lISN/ISN factor dB | Cable loss dB | level dBuV | Limit level dBuV | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|
| 0.150 | 43.38 | 0.41 | 0.12 | 43.91 | 66.00 | -22.09 | QP |
| 0.150 | 32.01 | 0.41 | 0.12 | 32.54 | 56.00 | -23.46 | Average |
| 0.317 | 36.13 | 0.42 | 0.10 | 36.65 | 59.80 | -23.15 | QP |
| 0.317 | 28.34 | 0.42 | 0.10 | 28.86 | 49.80 | -20.94 | Average |
| 0.647 | 39.97 | 0.26 | 0.13 | 40.36 | 56.00 | -15.64 | QP |
| 0.647 | 29.52 | 0.26 | 0.13 | 29.91 | 46.00 | -16.09 | Average |
| 0.686 | 45.34 | 0.25 | 0.13 | 45.72 | 56.00 | -10.28 | QP |
| 0.686 | 33.95 | 0.25 | 0.13 | 34.33 | 46.00 | -11.67 | Average |
| 3.276 | 34.50 | 0.21 | 0.15 | 34.86 | 56.00 | -21.14 | QP |
| 3.276 | 21.71 | 0.21 | 0.15 | 22.07 | 46.00 | -23.93 | Average |
| 7.526 | 33.92 | 0.22 | 0.18 | 34.32 | 60.00 | -25.68 | QP |
| 7.526 | 27.87 | 0.22 | 0.18 | 28.27 | 50.00 | -21.73 | Average |

## 5.3 Radiated Emission

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209 and 15.205</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td>30MHz to 40GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m (Semi-Anechoic Chamber)</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Value</th></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</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>AV</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency</th><th>Limit (dBuV/m @3m)</th><th>Remark</th></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>
</table>
</td></tr>
<tr><td>Test Procedure:</td><td>
Substitution method was performed to determine the actual ERP emission levels of the EUT.<br>
The following test procedure as below:<br><br>
1>.Below 1GHz test procedure:<br>
1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. 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.<br>
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 rotable 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.<br><br>
2>.Above 1GHz test procedure:<br>
1. On the test site as test setup graph above,the EUT shall be placed at the 0.8m support on the turntable and in the position closest to normal use as declared by the provider.<br>
2. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter.The output of the test antenna shall be connected to the measuring
</td></tr>
</table>

| | |
|---|---|
| | receiver.<br>3. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test.<br>4. The test antenna shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.<br>5. Repeat step 4 for test frequency with the test antenna polarized horizontally.<br>6. Remove the transmitter and replace it with a substitution antenna<br>7. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.<br>8. Repeat step 7 with both antennas horizontally polarized for each test frequency.<br>9. Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula:<br>EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)<br>where:<br>Pg is the generator output power into the substitution antenna. |
| Test setup: | Below 1GHz<br>  <br><br>Above 1GHz |

| | |
|---|---|
| |  |
| Test Instruments: | Refer to section 5.10 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Pass |

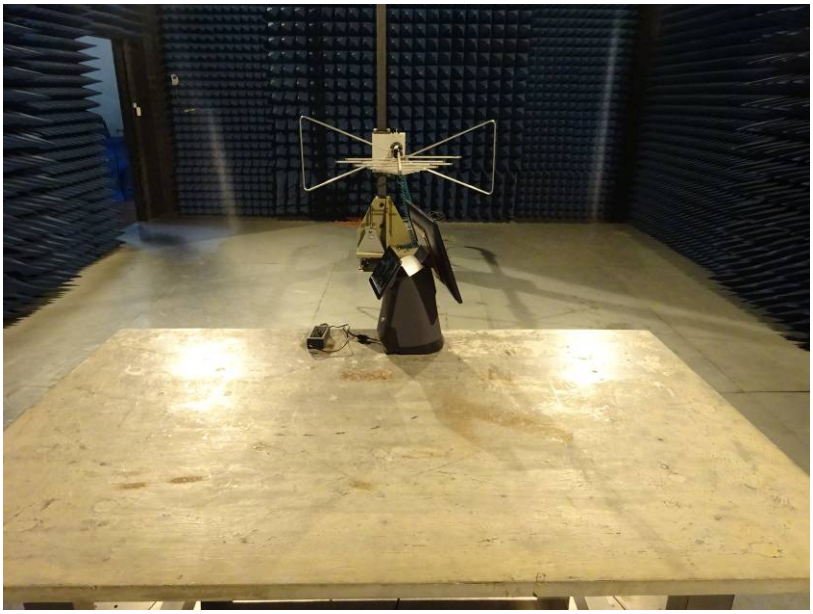
**Measurement Data:**

**Below 1GHz**

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|---|---|
| 44.74 | 41.89 | 15.55 | 0.72 | 30.02 | 28.14 | 40.00 | -11.86 | Vertical |
| 50.94 | 45.82 | 15.21 | 0.78 | 29.99 | 31.82 | 40.00 | -8.18 | Vertical |
| 83.52 | 49.12 | 11.87 | 1.06 | 29.78 | 32.27 | 40.00 | -7.73 | Vertical |
| 187.10 | 46.31 | 12.32 | 1.78 | 29.25 | 31.16 | 43.50 | -12.34 | Vertical |
| 275.16 | 42.20 | 14.55 | 2.25 | 29.83 | 29.17 | 46.00 | -16.83 | Vertical |
| 499.43 | 38.20 | 18.58 | 3.30 | 29.30 | 30.78 | 46.00 | -15.22 | Vertical |
| 71.08 | 38.43 | 10.45 | 0.95 | 29.85 | 19.98 | 40.00 | -20.02 | Horizontal |
| 79.24 | 39.05 | 10.43 | 1.02 | 29.80 | 20.70 | 40.00 | -19.30 | Horizontal |
| 174.42 | 42.31 | 11.29 | 1.71 | 29.30 | 26.01 | 43.50 | -17.49 | Horizontal |
| 216.02 | 42.00 | 13.07 | 1.93 | 29.36 | 27.64 | 46.00 | -18.36 | Horizontal |
| 272.28 | 47.32 | 14.46 | 2.24 | 29.81 | 34.21 | 46.00 | -11.79 | Horizontal |
| 351.71 | 44.02 | 16.30 | 2.63 | 29.73 | 33.22 | 46.00 | -12.78 | Horizontal |

# 6 Test Setup Photo

Radiated Emission



Conducted Emission

# 7 EUT Constructional Details

Reference to the test report No. GTS201609000126E01

---END---