# FCC TEST REPORT

| | | |
|---|---|---|
| Client Name | : | Anker Innovations Limited |
| Address | : | Room 1318-19, Hollywood Plaza, 610 Nathan Road, Mongkok, Kowloon, Hong Kong |
| Product Name | : | Roav SmartCharge T1 |
| Date | : | Mar. 12, 2019 |

## Shenzhen Anbotek Compliance Laboratory Limited

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# TEST REPORT

| | | |
|---|---|---|
| Applicant | : | Anker Innovations Limited |
| Manufacturer | : | Anker Innovations Limited |
| Product Name | : | Roav SmartCharge T1 |
| Model No. | : | R5133 |
| Trade Mark | : | ROAV |
| Rating(s) | : | Input: 12-24V⎓ 2A<br>Output: 5V⎓ 0.5A<br>IQ Output: 3.6V-6.5V⎓ 3A/ 6.5V-9V⎓ 2A/ 9V-12V⎓ 1.5A |
| **Test Standard(s)** | **:** | **FCC Part15 Subpart C 2018, Section 15.239** |
| **Test Method(s)** | **:** | **ANSI C63.10: 2013** |

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

| | |
|---|---|
| Date of Receipt | Feb. 19, 2019 |
| Date of Test | Feb. 19~Mar. 12, 2019 |
| Prepared by | (Engineer / Oliay Yang) |
| Reviewer | (Supervisor / Snowy Meng) |
| Approved & Authorized Signer | (Manager / Sally Zhang) |

Anbotek (SZ) Compliance Laboratory Limited Anbotek Product Safety * Approved *


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# 1. General Information

## 1.1. Client Information

| | | |
|---|---|---|
| Applicant | : | Anker Innovations Limited |
| Address | : | Room 1318-19, Hollywood Plaza, 610 Nathan Road, Mongkok, Kowloon, Hong Kong |
| Manufacturer | : | Anker Innovations Limited |
| Address | : | Room 1318-19, Hollywood Plaza, 610 Nathan Road, Mongkok, Kowloon, Hong Kong |
| Factory | : | HU NAN GIANTSUN POWER ELECTRONICS CO., LTD |
| Address | : | Building 16&17, Taiwan Industrial Zone, Nonferrous Metals Industrial Park, Chenzhou, Hunan, China |

## 1.2. Description of Device (EUT)

| | | | |
|---|---|---|---|
| Product Name | : | Roav SmartCharge T1 | |
| Model No. | : | R5133 | |
| Trade Mark | : | ROAV | |
| Test Power Supply | : | DC 12V-24V<br>(Note: Except RE, the rest items only reflect the data of the worst test voltage, namely "DC 12V".) | |
| Product Description | : | Operation Frequency: | 88.1-107.9MHz |
| | | Number of Channel: | 199 Channels |
| | | Modulation Type: | FM |
| | | Antenna Type: | Spring Antenna |
| | | Antenna Gain(Peak): | 1.2 dBi |
| **Remark:** 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.<br>2) This report is for FM module. | | | |

## 1.3. Auxiliary Equipment Used During Test

| | | |
|---|---|---|
| N/A | | |

## 1.4. Description of Test Modes

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

| Pretest Mode | Description |
|---|---|
| Mode 1 | 88.1MHz |
| Mode 2 | 98.1MHz |
| Mode 3 | 107.9MHz |

| For Radiated Emission | |
|---|---|
| Final Test Mode | Description |
| Mode 1 | 88.1MHz |
| Mode 2 | 98.1MHz |
| Mode 3 | 107.9MHz |

Note:

1. The engineering test program was provided and the EUT was programmed to be in continuously transmitting mode.

## 1.5. List of channels

| Channel | Freq. (MHz) | Channel | Freq. (MHz) | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---|---|---|---|---|---|---|---|
| 1 | 88.10 | 51 | 93.10 | 101 | 98.10 | 151 | 103.10 |
| 2 | 88.20 | 52 | 93.20 | 102 | 98.20 | 152 | 103.20 |
| 3 | 88.30 | 53 | 93.30 | 103 | 98.30 | 153 | 103.30 |
| 4 | 88.40 | 54 | 93.40 | 104 | 98.40 | 154 | 103.40 |
| 5 | 88.50 | 55 | 93.50 | 105 | 98.50 | 155 | 103.50 |
| 6 | 88.60 | 56 | 93.60 | 106 | 98.60 | 156 | 103.60 |
| 7 | 88.70 | 57 | 93.70 | 107 | 98.70 | 157 | 103.70 |
| 8 | 88.80 | 58 | 93.80 | 108 | 98.80 | 158 | 103.80 |
| 9 | 88.90 | 59 | 93.90 | 109 | 98.90 | 159 | 103.90 |
| 10 | 89.00 | 60 | 94.00 | 110 | 99.00 | 160 | 104.00 |
| 11 | 89.10 | 61 | 94.10 | 111 | 99.10 | 161 | 104.10 |
| 12 | 89.20 | 62 | 94.20 | 112 | 99.20 | 162 | 104.20 |
| 13 | 89.30 | 63 | 94.30 | 113 | 99.30 | 163 | 104.30 |
| 14 | 89.40 | 64 | 94.40 | 114 | 99.40 | 164 | 104.40 |


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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 15 | 89.50 | 65 | 94.50 | 115 | 99.50 | 165 | 104.50 |
| 16 | 89.60 | 66 | 94.60 | 116 | 99.60 | 166 | 104.60 |
| 17 | 89.70 | 67 | 94.70 | 117 | 99.70 | 167 | 104.70 |
| 18 | 89.80 | 68 | 94.80 | 118 | 99.80 | 168 | 104.80 |
| 19 | 89.90 | 69 | 94.90 | 119 | 99.90 | 169 | 104.90 |
| 20 | 90.00 | 70 | 95.00 | 120 | 100.00 | 170 | 105.00 |
| 21 | 90.10 | 71 | 95.10 | 121 | 100.10 | 171 | 105.10 |
| 22 | 90.20 | 72 | 95.20 | 122 | 100.20 | 172 | 105.20 |
| 23 | 90.30 | 73 | 95.30 | 123 | 100.30 | 173 | 105.30 |
| 24 | 90.40 | 74 | 95.40 | 124 | 100.40 | 174 | 105.40 |
| 25 | 90.50 | 75 | 95.50 | 125 | 100.50 | 175 | 105.50 |
| 26 | 90.60 | 76 | 95.60 | 126 | 100.60 | 176 | 105.60 |
| 27 | 90.70 | 77 | 95.70 | 127 | 100.70 | 177 | 105.70 |
| 28 | 90.80 | 78 | 95.80 | 128 | 100.80 | 178 | 105.80 |
| 29 | 90.90 | 79 | 95.90 | 129 | 100.90 | 179 | 105.90 |
| 30 | 91.00 | 80 | 96.00 | 130 | 101.00 | 180 | 106.00 |
| 31 | 91.10 | 81 | 96.10 | 131 | 101.10 | 181 | 106.10 |
| 32 | 91.20 | 82 | 96.20 | 132 | 101.20 | 182 | 106.20 |
| 33 | 91.30 | 83 | 96.30 | 133 | 101.30 | 183 | 106.30 |
| 34 | 91.40 | 84 | 96.40 | 134 | 101.40 | 184 | 106.40 |
| 35 | 91.50 | 85 | 96.50 | 135 | 101.50 | 185 | 106.50 |
| 36 | 91.60 | 86 | 96.60 | 136 | 101.60 | 186 | 106.60 |
| 37 | 91.70 | 87 | 96.70 | 137 | 101.70 | 187 | 106.70 |
| 38 | 91.80 | 88 | 96.80 | 138 | 101.80 | 188 | 106.80 |
| 39 | 91.90 | 89 | 96.90 | 139 | 101.90 | 189 | 106.90 |
| 40 | 92.00 | 90 | 97.00 | 140 | 102.00 | 190 | 107.00 |
| 41 | 92.10 | 91 | 97.10 | 141 | 102.10 | 191 | 107.10 |
| 42 | 92.20 | 92 | 97.20 | 142 | 102.20 | 192 | 107.20 |
| 43 | 92.30 | 93 | 97.30 | 143 | 102.30 | 193 | 107.30 |
| 44 | 92.40 | 94 | 97.40 | 144 | 102.40 | 194 | 107.40 |
| 45 | 92.50 | 95 | 97.50 | 145 | 102.50 | 195 | 107.50 |
| 46 | 92.60 | 96 | 97.60 | 146 | 102.60 | 196 | 107.60 |
| 47 | 92.70 | 97 | 97.70 | 147 | 102.70 | 197 | 107.70 |
| 48 | 92.80 | 98 | 97.80 | 148 | 102.80 | 198 | 107.80 |
| 49 | 92.90 | 99 | 97.90 | 149 | 102.90 | 199 | 107.90 |
| 50 | 93.00 | 100 | 98.00 | 150 | 103.00 | | |


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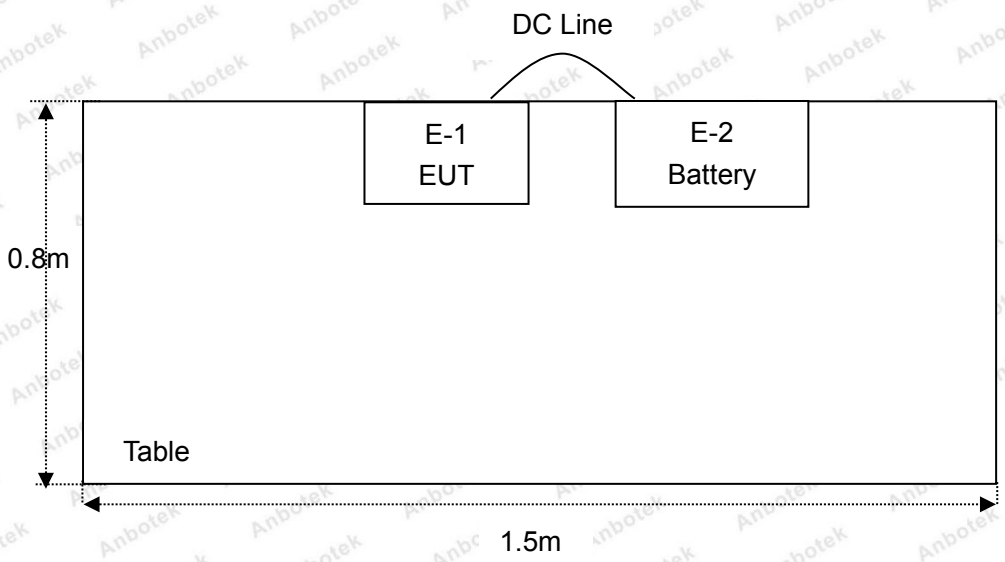
## 1.6. Description Of Test Setup

RE



## 1.7. Test Equipment List

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| 1. | L.I.S.N. Artificial Mains Network | Rohde & Schwarz | ENV216 | 100055 | Nov. 05, 2018 | 1 Year |
| 2. | EMI Test Receiver | Rohde & Schwarz | ESPI3 | 101604 | Nov. 05, 2018 | 1 Year |
| 3. | RF Switching Unit | Compliance Direction | RSU-M2 | 38303 | Nov. 05, 2018 | 1 Year |
| 4. | Spectrum Analysis | Agilent | E4407B | US39390582 | Nov. 05, 2018 | 1 Year |
| 5. | MAX Spectrum Analysis | Agilent | N9020A | MY51170037 | Nov. 05, 2018 | 1 Year |
| 6. | Preamplifier | SKET Electronic | BK1G18G30D | KD17503 | Nov. 05, 2018 | 1 Year |
| 7. | Double Ridged Horn Antenna | Instruments corporation | GTH-0118 | 351600 | Nov. 20, 2018 | 1 Year |
| 8. | Bilog Broadband Antenna | Schwarzbeck | VULB9163 | VULB 9163-289 | Nov. 19, 2018 | 1 Year |
| 9. | Loop Antenna | Schwarzbeck | FMZB1519B | 00053 | Nov. 20, 2018 | 1 Year |
| 10. | Horn Antenna | A-INFO | LB-180400-KF | J211060628 | Nov. 20, 2018 | 1 Year |
| 11. | Pre-amplifier | SONOMA | 310N | 186860 | Nov. 05, 2018 | 1 Year |
| 12. | EMI Test Software EZ-EMC | SHURPLE | N/A | N/A | N/A | N/A |
| 13. | RF Test Control System | YIHENG | YH3000 | 2017430 | Nov. 05, 2018 | 1 Year |
| 14. | Power Sensor | DAER | RPR3006W | 15I00041SN045 | Nov. 05, 2018 | 1 Year |
| 15. | Power Sensor | DAER | RPR3006W | 15I00041SN046 | Nov. 05, 2018 | 1 Year |
| 16. | MXA Spectrum Analysis | Agilent | N9020A | MY51170037 | Nov. 05, 2018 | 1 Year |
| 17. | MXG RF Vector Signal Generator | Agilent | N5182A | MY48180656 | Nov. 05, 2018 | 1 Year |
| 18. | Signal Generator | Agilent | E4421B | MY41000743 | Nov. 05, 2018 | 1 Year |
| 19. | DC Power Supply | IVYTECH | IV3605 | 1804D360510 | Apr. 02, 2018 | 1 Year |
| 20. | Constant Temperature Humidity Chamber | ZHONGJIAN | ZJ-KHWS80B | N/A | Nov. 01, 2018 | 1 Year |

## 1.8. Measurement Uncertainty

| | | |
|---|---|---|
| Radiation Uncertainty | : | Ur = 3.9 dB (Horizontal) |
| | | Ur = 3.8 dB (Vertical) |
| | | |
| Conduction Uncertainty | : | Uc = 3.4 dB |

## 1.9. Description of Test Facility

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

**FCC-Registration No.: 184111**

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registed and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111, July 31, 2017.

**ISED-Registration No.: 8058A-1**

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A-1, June 13, 2016.

**Test Location**

Shenzhen Anbotek Compliance Laboratory Limited.

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# 2. Summary of Test Results

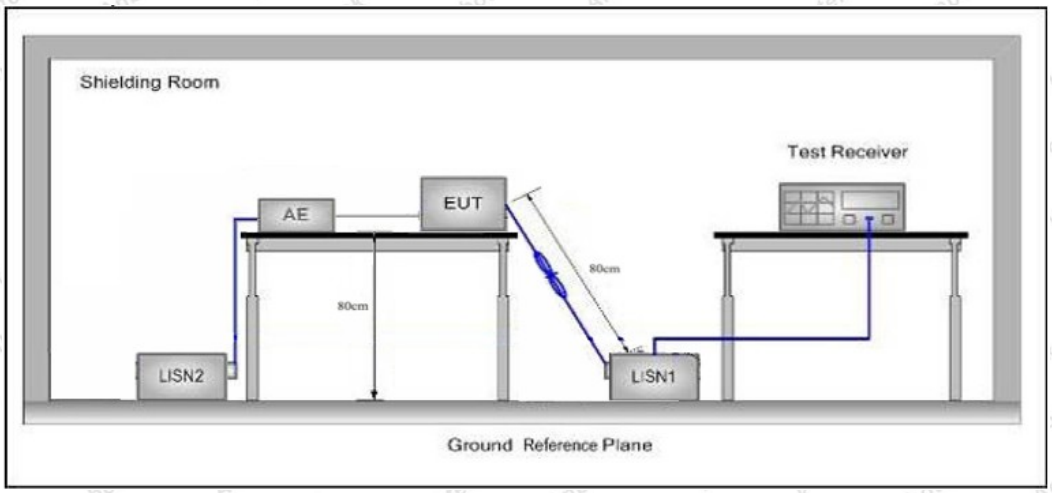
| Standard Section | Test Item | Result |
|---|---|---|
| 15.203 | Antenna Requirement | PASS |
| 15.207 | Conducted Emission | N/A |
| 15.205/15.209/15.239 | Spurious Emission | PASS |
| 15.205 | Band Edge Emission | PASS |
| 15.239 (c) | Occupied Bandwidth | PASS |
| **Remark:** "N/A" is an abbreviation for Not Applicable. | | |

# 3. Conducted Emission Test

## 3.1. Test Standard and Limit

| Test Standard | FCC Part15 Section 15.207 | | |
|---|---|---|---|
| Test Limit | Frequency | Maximum RF Line Voltage (dBuV) | |
| | | Quasi-peak Level | Average Level |
| | 150kHz~500kHz | 66 ~ 56 * | 56 ~ 46 * |
| | 500kHz~5MHz | 56 | 46 |
| | 5MHz~30MHz | 60 | 50 |
| **Remark:** (1) *Decreasing linearly with logarithm of the frequency.<br>(2) The lower limit shall apply at the transition frequency. | | | |

## 3.2. Test Setup




## 3.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10-2013 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

## 3.4. Test Data

The EUT is powered DC 12V/ DC 24V, so there is no need to conduct this test.

The device is vehicle used only.

# 4. Radiation Spurious Emission and Band Edge

## 4.1. Test Standard and Limit

| Test Standard | FCC Part15 C Section 15.209, 15.205 and 15.239(a) | | | | |
|---|---|---|---|---|---|
| Test Limit | Frequency (MHz) | Field strength (microvolt/meter) | Limit (dBuV/m) | Remark | Measurement distance (m) |
| | 0.009MHz~0.490MHz | 2400/F(kHz) | - | - | 300 |
| | 0.490MHz-1.705MHz | 24000/F(kHz) | - | - | 30 |
| | 1.705MHz-30MHz | 30 | - | - | 30 |
| | 30MHz~88MHz | 100 | 40.0 | Quasi-peak | 3 |
| | 88MHz~216MHz | 150 | 43.5 | Quasi-peak | 3 |
| | 216MHz~960MHz | 200 | 46.0 | Quasi-peak | 3 |
| | 960MHz~1000MHz | 500 | 54.0 | Quasi-peak | 3 |
| | Above 1000MHz | 500 | 54.0 | Average | 3 |
| | | - | 74.0 | Peak | 3 |
| **Remark:**<br>(1)The lower limit shall apply at the transition frequency.<br>(2) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device. | | | | | |

According to §15.239(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Emission Level (dBuV/m)=20log Emission Level(uV/m)

The field strength of emission limits have been calculated in below table:

| Fundamental Frequency (MHz) | Field Strength of Fundamental (dBuV/m)@3m |
|---|---|
| 88.1-107.9 | 48 (AVG) |
| | 68 (Peak) |

NOTE:
1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

3. FCC part15.239(b) The field strength of any emissions within the permitted 200 KHz band shall not exceed 250 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

## 4.2. Test Setup

Figure 1. Below 30MHz

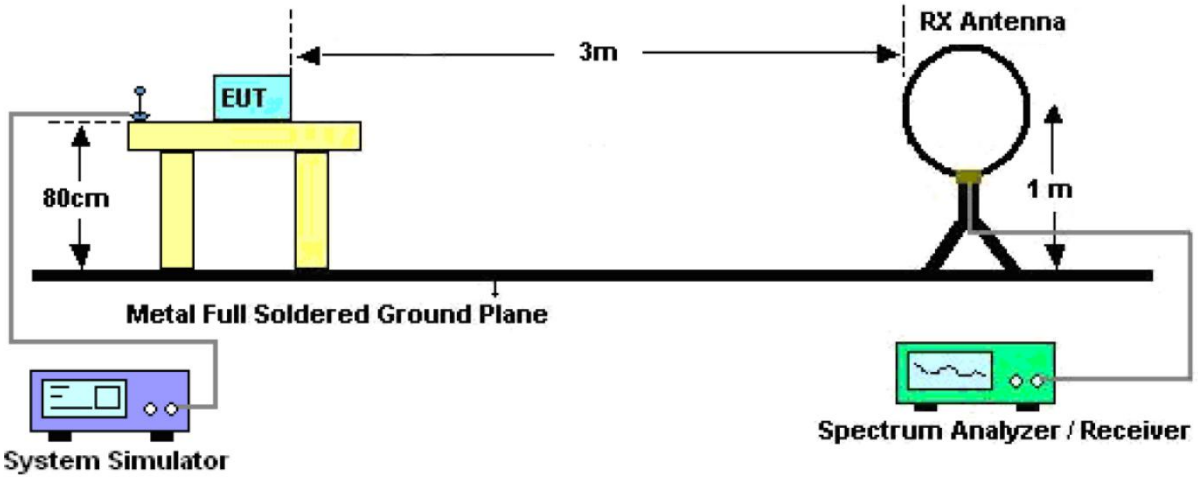



Figure 2. 30MHz to 1GHz

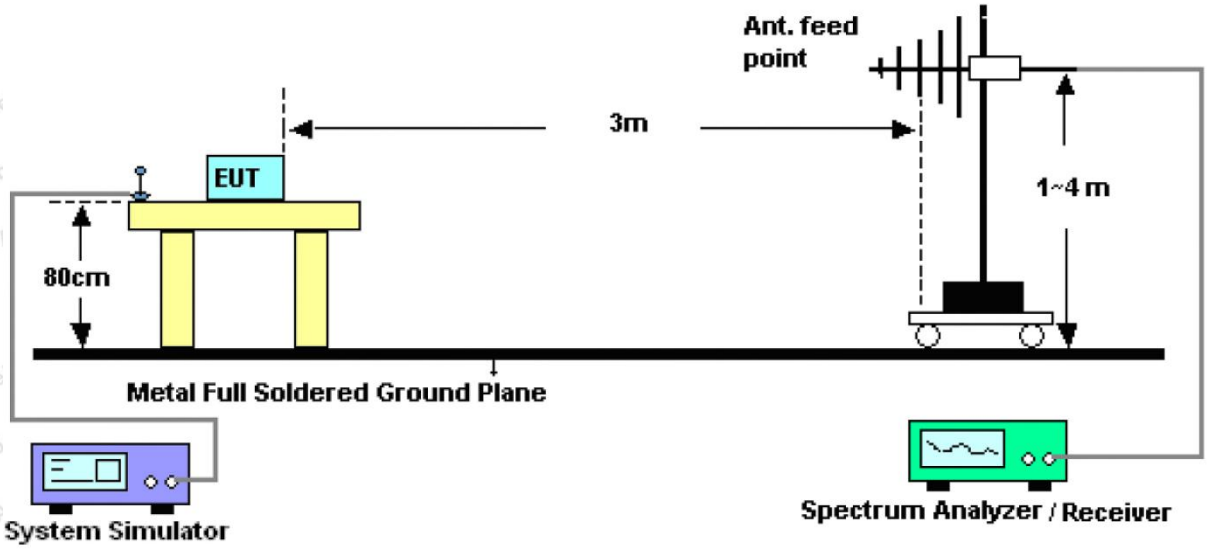
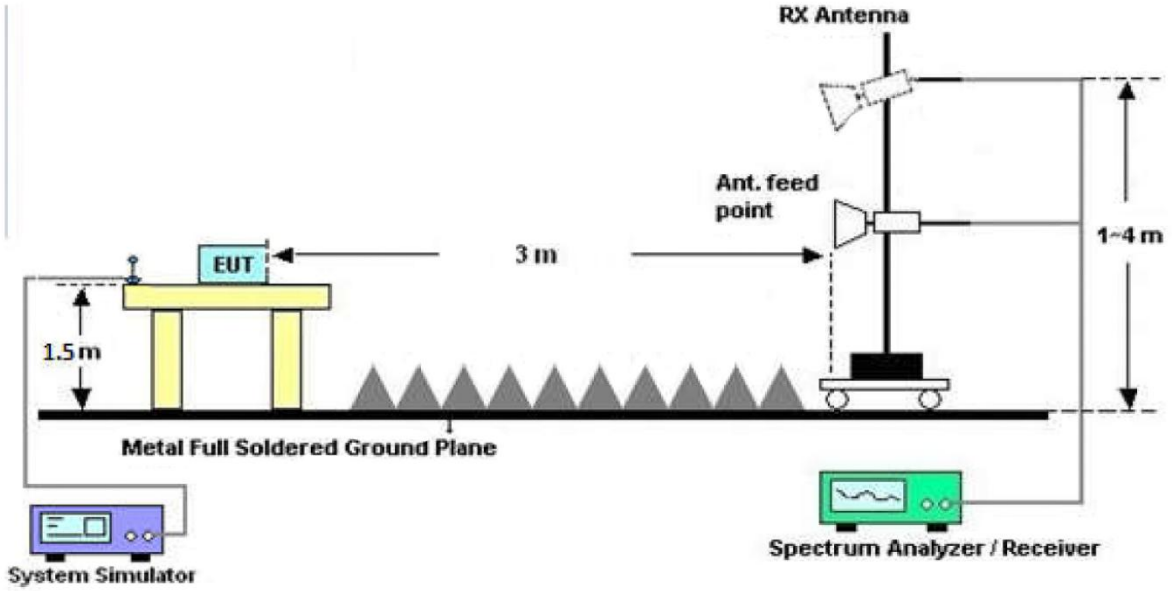



Figure 3. Above 1 GHz




## 4.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.
For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.
The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation.

For the radiated emission test above 1GHz:
Place the measurement antenna 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 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.

For 9kHz to 150kHz, Set the spectrum analyzer as:
RBW = 200Hz, VBW =1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:
RBW = 9KHz, VBW =30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:
RBW = 120kHz, VBW =360kHz,Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For above 1GHz,Set the spectrum analyzer as:
RBW =1MHz, VBW =1MHz, Detector= Peak, Trace mode= Max hold, Sweep- auto couple.
RBW =1MHz, VBW =10Hz, Detector= Average, Trace mode= Max hold, Sweep- auto couple.

## 4.4. Test Data

**PASS**

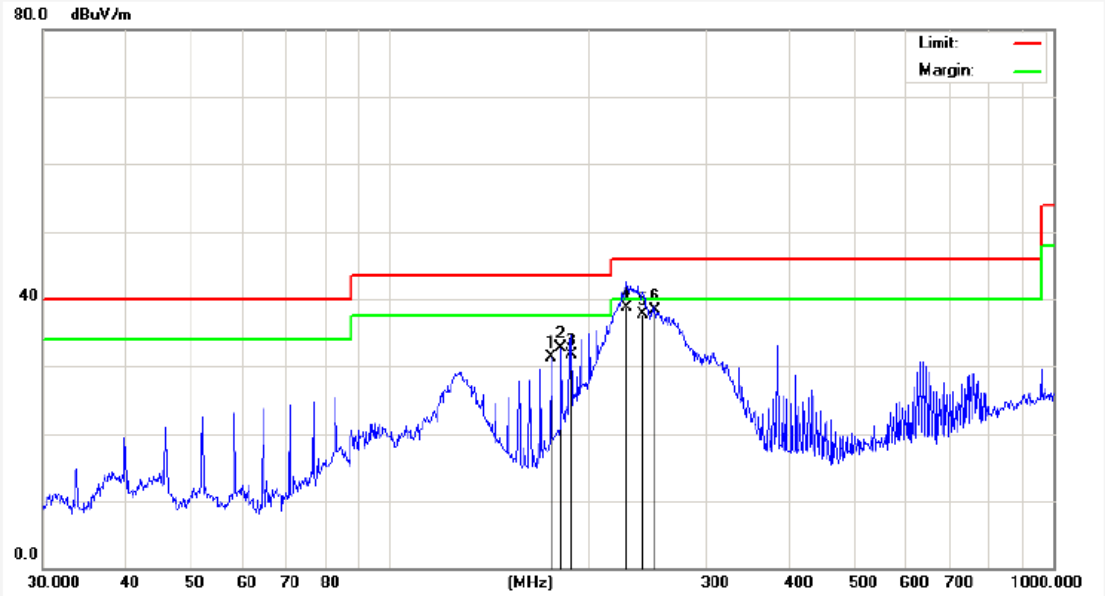
During the test, Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the X-axis is the worst case.

The test results of 9kHz-30MHz was attenuated more than 20dB below the permissible limits, so the results don't record in the report.

worst case: Mode1, only the worst case is recorded in the report.

**Test Results (30~1000MHz)**

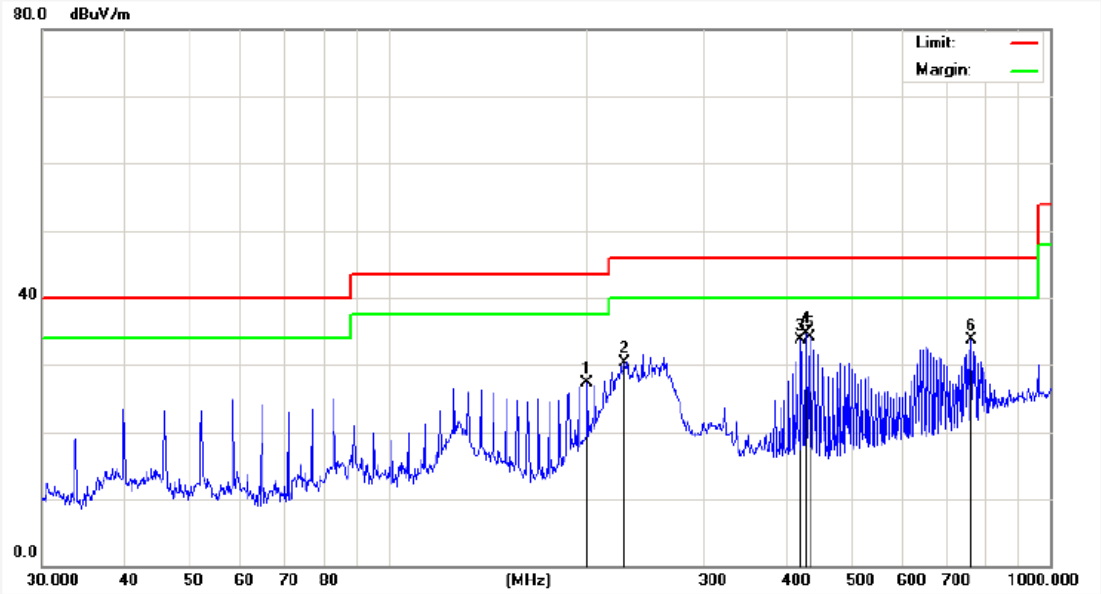
| | | | |
|---|---|---|---|
| Job No.: | SZAWW190219002-02 | Temp.(℃)/Hum.(%RH): | 21.6℃/55%RH |
| Standard: | FCC PART 15C | Power Source: | DC 12V |
| Test Mode: | Mode 1 | Polarization: | Horizontal |




| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Height (cm) | degree (deg) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 175.0368 | 51.95 | -20.71 | 31.24 | 43.50 | -12.26 | QP | 300 | 0 | |
| 2 | 181.2834 | 53.55 | -20.86 | 32.69 | 43.50 | -10.81 | QP | 300 | 77 | |
| 3 | 187.7530 | 52.60 | -20.91 | 31.69 | 43.50 | -11.81 | QP | 300 | 145 | |
| 4 | 227.6906 | 58.26 | -19.61 | 38.65 | 46.00 | -7.35 | QP | 300 | 222 | |
| 5 | 240.8304 | 56.23 | -18.54 | 37.69 | 46.00 | -8.31 | QP | 300 | 266 | |
| 6 | 251.1804 | 57.50 | -19.10 | 38.40 | 46.00 | -7.60 | QP | 300 | 360 | |

**Test Results (30~1000MHz)**

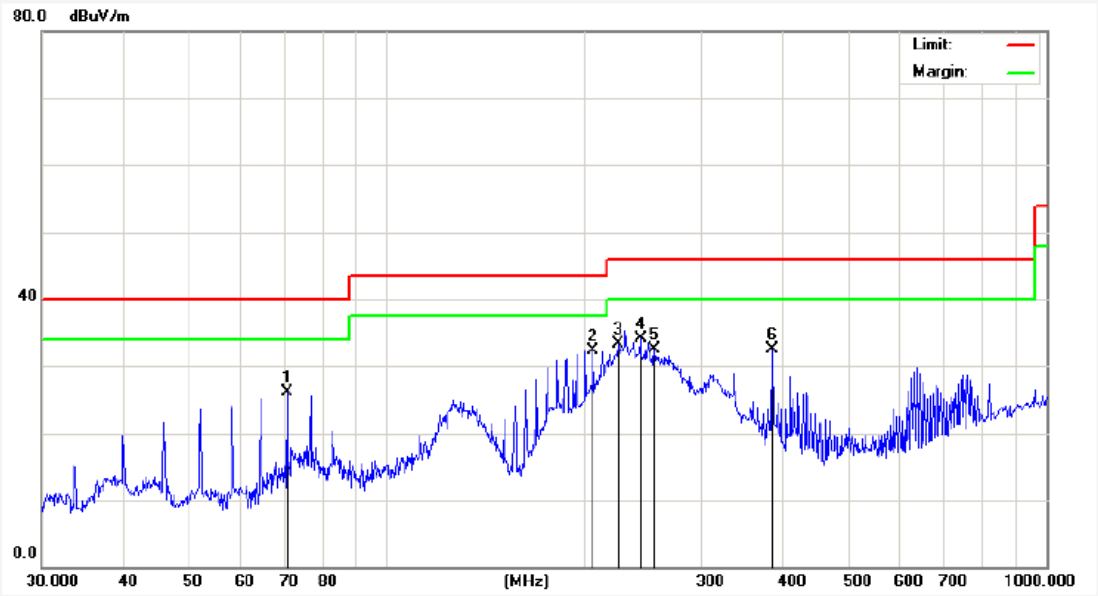
| | | | |
|---|---|---|---|
| Job No.: | SZAWW190219002-02 | Temp.(℃)/Hum.(%RH): | 21.6℃/55%RH |
| Standard: | FCC PART 15C | Power Source: | DC 12V |
| Test Mode: | Mode 1 | Polarization: | Vertical |




| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Height (cm) | degree (deg) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 199.9856 | 43.22 | -15.87 | 27.35 | 43.50 | -16.15 | QP | 300 | 0 | |
| 2 | 227.6906 | 45.30 | -15.00 | 30.30 | 46.00 | -15.70 | QP | 300 | 33 | |
| 3 | 420.5803 | 44.93 | -11.28 | 33.65 | 46.00 | -12.35 | QP | 300 | 163 | |
| 4 | 428.0193 | 46.00 | -11.25 | 34.75 | 46.00 | -11.25 | QP | 300 | 221 | |
| 5 | 434.0651 | 45.33 | -11.24 | 34.09 | 46.00 | -11.91 | QP | 300 | 299 | |
| 6 | 760.7036 | 40.31 | -6.69 | 33.62 | 46.00 | -12.38 | QP | 300 | 360 | |

**Test Results (30~1000MHz)**

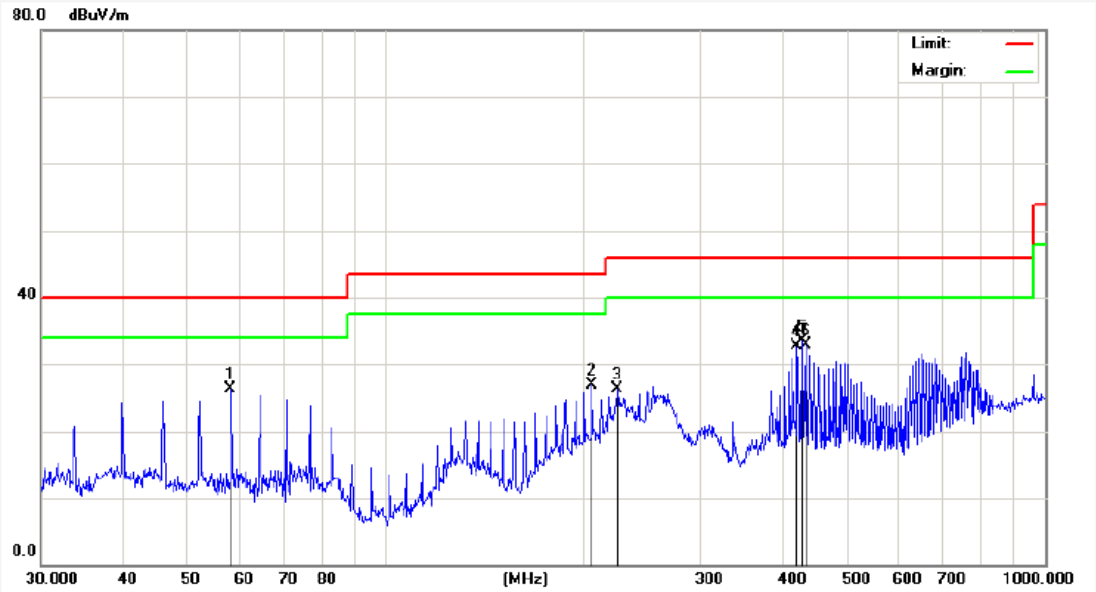
| | | | |
|---|---|---|---|
| Job No.: | SZAWW190219002-02 | Temp.(℃)/Hum.(%RH): | 21.6℃/55%RH |
| Standard: | FCC PART 15C | Power Source: | DC 24V |
| Test Mode: | Mode 1 | Polarization: | Horizontal |




| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Height (cm) | degree (deg) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 70.5836 | 47.97 | -21.92 | 26.05 | 40.00 | -13.95 | QP | 300 | 0 | |
| 2 | 205.6751 | 52.27 | -19.99 | 32.28 | 43.50 | -11.22 | QP | 300 | 11 | |
| 3 | 224.5193 | 53.27 | -19.90 | 33.37 | 46.00 | -12.63 | QP | 300 | 163 | |
| 4 | 242.5253 | 52.72 | -18.63 | 34.09 | 46.00 | -11.91 | QP | 300 | 212 | |
| 5 | 254.7284 | 51.80 | -19.31 | 32.49 | 46.00 | -13.51 | QP | 300 | 333 | |
| 6 | 383.9318 | 45.89 | -13.35 | 32.54 | 46.00 | -13.46 | QP | 300 | 360 | |

**Test Results (30~1000MHz)**

| | | | |
|---|---|---|---|
| Job No.: | SZAWW190219002-02 | Temp.(℃)/Hum.(%RH): | 21.6℃/55%RH |
| Standard: | FCC PART 15C | Power Source: | DC 24V |
| Test Mode: | Mode 1 | Polarization: | Vertical |




| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Height (cm) | degree (deg) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 58.2030 | 43.20 | -16.90 | 26.30 | 40.00 | -13.70 | QP | 300 | 0 | |
| 2 | 205.6751 | 42.69 | -15.71 | 26.98 | 43.50 | -16.52 | QP | 300 | 11 | |
| 3 | 224.5193 | 41.39 | -15.13 | 26.26 | 46.00 | -19.74 | QP | 300 | 161 | |
| 4 | 420.5803 | 43.98 | -11.28 | 32.70 | 46.00 | -13.30 | QP | 300 | 212 | |
| 5 | 428.0193 | 44.81 | -11.25 | 33.56 | 46.00 | -12.44 | QP | 300 | 232 | |
| 6 | 434.0651 | 44.15 | -11.24 | 32.91 | 46.00 | -13.09 | QP | 300 | 360 | |

## TEST RESULT FOR FIELD STRENGTH OF FUNDAMENTAL

| Horizontal | | | | | |
|---|---|---|---|---|---|
| Frequency (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Pass/Fail |
| 88.1 | 46.98 | 68.00 | -21.02 | Peak | Pass |
| 88.1 | 36.98 | 48.00 | -11.02 | AV | Pass |
| 98.1 | 53.65 | 68.00 | -14.35 | Peak | Pass |
| 98.1 | 40.21 | 48.00 | -7.79 | AV | Pass |
| 107.9 | 64.02 | 68.00 | -3.98 | Peak | Pass |
| 107.9 | 44.29 | 48.00 | -3.71 | AV | Pass |

| Vertical | | | | | |
|---|---|---|---|---|---|
| Frequency (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Pass/Fail |
| 88.1 | 42.21 | 68.00 | -25.79 | Peak | Pass |
| 88.1 | 32.95 | 48.00 | -15.05 | AV | Pass |
| 98.1 | 46.32 | 68.00 | -21.68 | Peak | Pass |
| 98.1 | 36.22 | 48.0 | -11.78 | AV | Pass |
| 107.9 | 50.21 | 68.00 | -17.79 | Peak | Pass |
| 107.9 | 41.98 | 48.00 | -6.02 | AV | Pass |

## TEST RESULT FOR FIELD STRENGTH OF BAND EDGE EMISSION

| Frequency (MHz) | Polarization | Level (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Pass/Fail |
|---|---|---|---|---|---|---|
| 88 | V | 32.21 | 40.00 | -7.79 | QP | Pass |
| 88 | H | 35.95 | 40.00 | -5.05 | QP | Pass |
| 108 | V | 34.32 | 43.50 | -9.18 | QP | Pass |
| 108 | H | 38.22 | 43.50 | -5.28 | QP | Pass |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**TEST RESULT(1~25GHz)**

| Test Mode: 107.9MHz | | | | | Test channel: Highest | | | |
|---|---|---|---|---|---|---|---|---|
| Peak Value | | | | | | | | |
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Pol. |
| 1079.00 | 35.86 | 34.72 | 6.79 | 34.09 | 43.28 | 74.00 | -30.72 | V |
| 1186.90 | 30.87 | 37.34 | 7.82 | 34.57 | 41.46 | 74.00 | -32.54 | V |
| 1294.80 | 30.61 | 39.62 | 9.46 | 34.81 | 44.88 | 74.00 | -29.12 | V |
| 1402.70 | * | | | | | 74.00 | | V |
| 1510.60 | * | | | | | 74.00 | | V |
| 1079.00 | 39.85 | 34.72 | 6.79 | 34.09 | 47.27 | 74.00 | -26.73 | H |
| 1186.90 | 32.50 | 37.34 | 7.82 | 34.57 | 43.09 | 74.00 | -30.91 | H |
| 1294.80 | 29.90 | 39.62 | 9.46 | 34.81 | 44.17 | 74.00 | -29.83 | H |
| 1402.70 | * | | | | | 74.00 | | H |
| 1510.60 | * | | | | | 74.00 | | H |
| Average Value | | | | | | | | |
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Pol. |
| 1079.00 | 24.99 | 34.72 | 6.79 | 34.09 | 32.41 | 54.00 | -21.59 | V |
| 1186.90 | 19.75 | 37.34 | 7.82 | 34.57 | 30.34 | 54.00 | -23.66 | V |
| 1294.80 | 18.91 | 39.62 | 9.46 | 34.81 | 33.18 | 54.00 | -20.82 | V |
| 1402.70 | * | | | | | 54.00 | | V |
| 1510.60 | * | | | | | 54.00 | | V |
| 1079.00 | 29.06 | 34.72 | 6.79 | 34.09 | 36.48 | 54.00 | -17.52 | H |
| 1186.90 | 21.83 | 37.34 | 7.82 | 34.57 | 32.42 | 54.00 | -21.58 | H |
| 1294.80 | 18.53 | 39.62 | 9.46 | 34.81 | 32.80 | 54.00 | -21.20 | H |
| 1402.70 | * | | | | | 54.00 | | H |
| 1510.60 | * | | | | | 54.00 | | H |

Remark: 1. Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

2. Only Worse case is reported.


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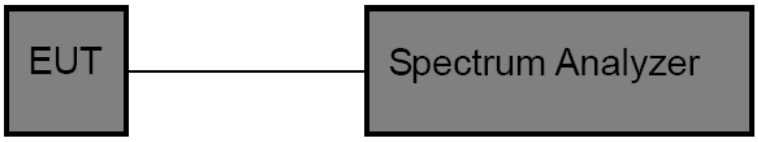
# 5. 20DB Occupy Bandwidth Test

## 5.1. Test Standard and Limit

| | |
|---|---|
| Test Standard | FCC Part15 C Section 15.239 |
| Test Limit | §15.239 (a): Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108 MHz.<br>Limit: 200 KHz |

## 5.2. Test Setup



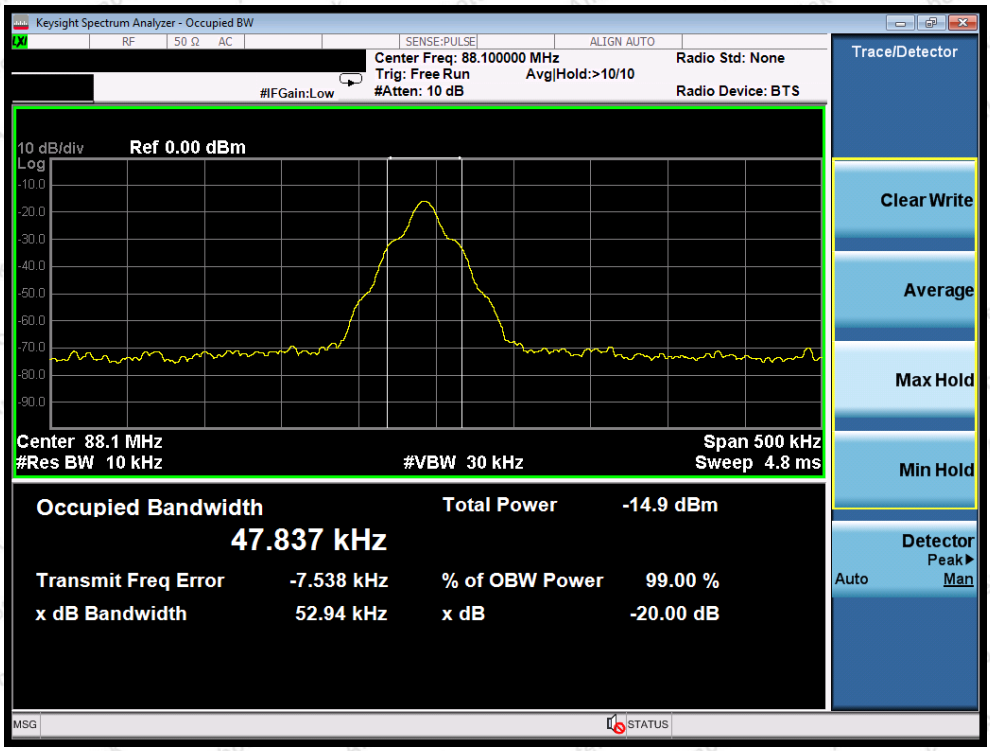

## 5.3. Test Procedure

1. Place the EUT on the table and set it in the continuously transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as:
   RBW = 30kHz, VBW≥3*RBW =100kHz,
   Span= 3MHz
   Detector= Peak
   Trace mode= Max hold.
   Sweep- auto couple.
4. Mark the peak frequency and –20dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

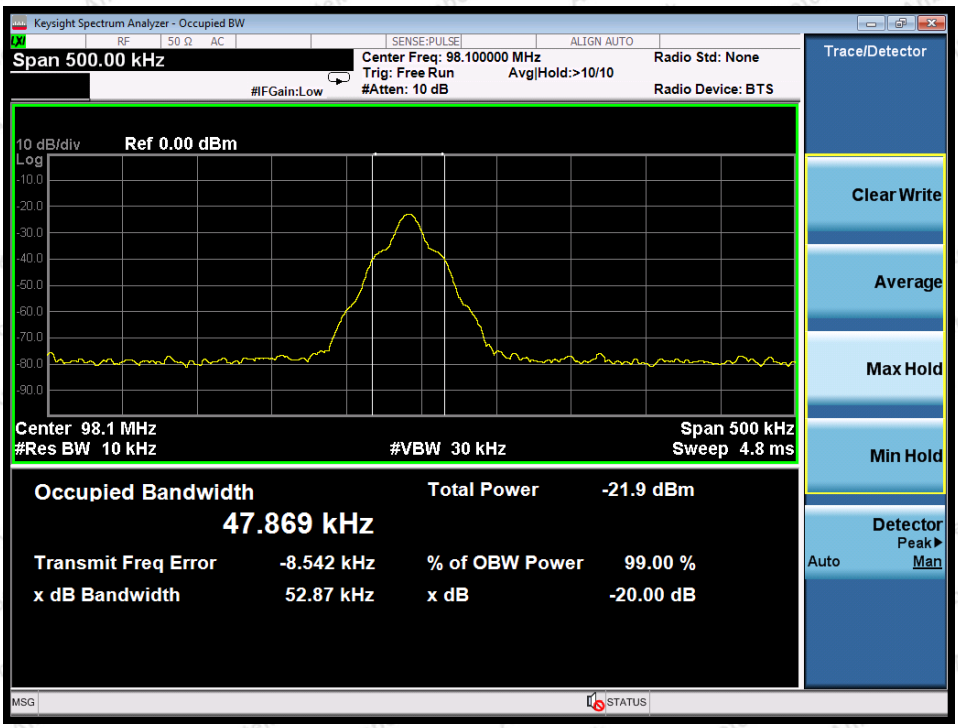
## 5.4. Test Data

| | | | | | |
|---|---|---|---|---|---|
| Test Item | : | 20dB Bandwidth | Test Mode | : | TX Mode |
| Test Voltage | : | DC 12V | Temperature | : | 24℃ |
| Test Result | : | PASS | Humidity | : | 55%RH |

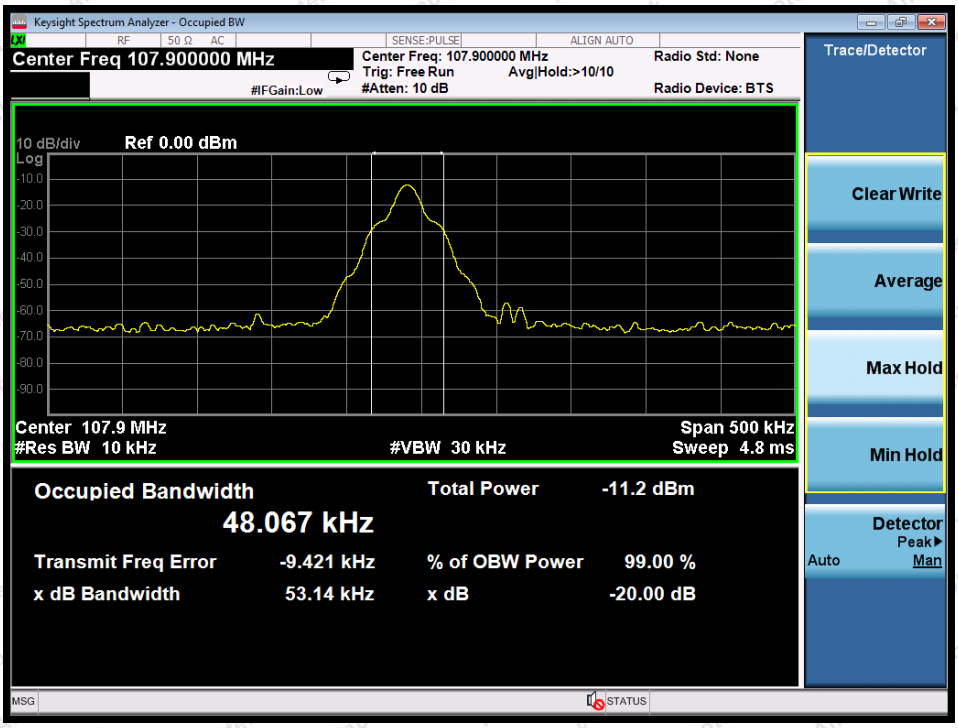
| Test Channel | Frequency (MHz) | 20 dBc Bandwidth (KHz) | Limit (KHz) |
|---|---|---|---|
| Low | 88.1 | 52.94 | 200 |
| Mid | 98.1 | 52.87 | 200 |
| High | 107.9 | 53.14 | 200 |




The Low Channel




The Mid Channel




The High Channel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# 6. Antenna Requirement

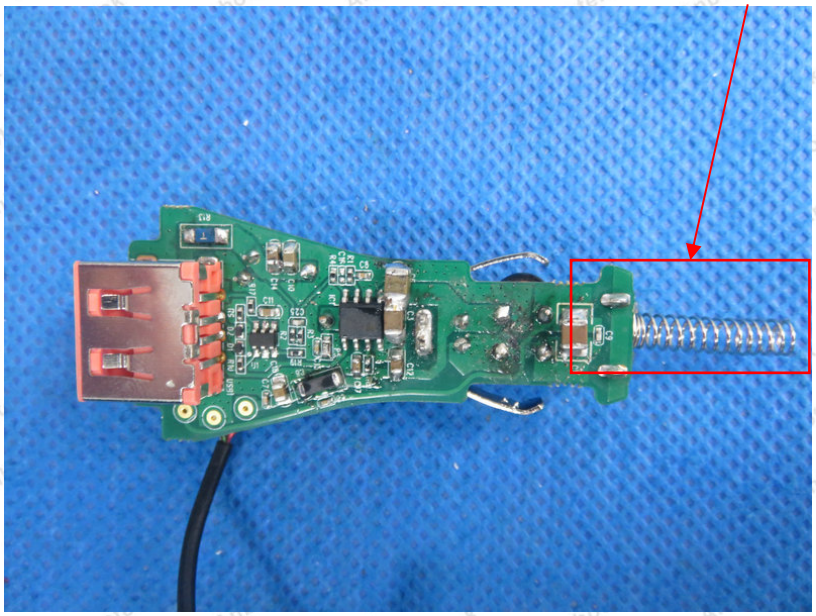
## 6.1. Test Standard and Requirement

| | |
|---|---|
| Test Standard | FCC Part15 Section 15.203 |
| Requirement | 1) 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.<br>Antenna requirement must meet at least one of the following:<br>1) Antenna must be permanently attached to device.<br>2) The antenna must use a unique type of connector to attach to the device.<br>3) Device must be professionally installed. The installer shall be responsible for ensuring that the correct antenna is employed by the device. |

## 6.2. Antenna Connected Construction

The antenna is a Spring Antenna which permanently attached, and the best case gain of the antenna is 1.2 dBi. It complies with the standard requirement.

FM Antenna



---------- End of Report----------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