# FCC TEST REPORT

**Test report**
**On Behalf of**
**Hangzhou Roombanker Technology Co., Ltd.**
**For**
**Outdoor Siren**
**Model No.: RBAD-SO1-915, RBAD-SO1-915(US), RBAD-SOx-915 (X:0~9 or X:A~Z), RBAD-SOx-915-(YY)/ZZZ (X:0~9 or X:A~Z), (Y:0~9 or Y:A~Z)/( Z:0~9 or Z:A~Z)**

**FCC ID: 2AUXBRBAD-SO1915**

| | |
|---|---|
| **Prepared for :** | **Hangzhou Roombanker Technology Co., Ltd.**<br>A#801 Wantong center,Hangzhou,China |
| **Prepared By :** | **Shenzhen CTA Testing Technology Co., Ltd.**<br>**Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community,Fuhai Street, Bao′ an District, Shenzhen, China** |
| **Date of Test:** | **2023/12/13 ~2023/12/27** |
| **Date of Report:** | **2024/1/5** |
| **Report Number:** | **CTA24020200301** |

The test report apply only to the specific sample(s) tested under stated test conditions
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

# TEST RESULT CERTIFICATION

| | |
|---|---|
| **Applicant's name**.....: | **Hangzhou Roombanker Technology Co., Ltd.** |
| Address .....: | A#801 Wantong center,Hangzhou,China |
| **Manufacture's Name** .....: | **Zhejiang Dusun Electron Co.,Ltd.** |
| Address .....: | No.640 Feng Qing St,DeQing Zhejiang China |

**Product description**

| | |
|---|---|
| Trade Mark.....: | Roombanker |
| Product name.....: | Outdoor Siren |
| Model and/or type reference .: | RBAD-SO1-915, RBAD-SO1-915(US), RBAD-SOx-915 (X:0~9 or X:A~Z), RBAD-SOx-915-(YY)/ZZZ (X:0~9 or X:A~Z), (Y:0~9 or Y:A~Z)/( Z:0~9 or Z:A~Z) |
| **Standards**.....: | FCC Rules and Regulations Part 15 Subpart C Section 15.249<br>ANSI C63.10: 2013 |



| | |
|---|---|
| **Date of Test**.....: | |
| Date (s) of performance of tests .....: | 2023/12/13 ~2023/12/27 |
| Date of Issue.....: | 2024/1/5 |
| Test Result .....: | **Pass** |

Testing Engineer **:** Zoey Cao

(Zoey Cao)

Technical Manager **:** Amy Wen

(Amy Wen)

Authorized Signatory **:** Eric Wang

(Eric Wang)

**Revision History**

| Revision | Issue Date | Revisions | Revised By |
|---|---|---|---|
| 00 | 2024/1/5 | Initial Issue | Andy Zhang |
| | | | |
| | | | |

# TABLE OF CONTENTS

# 1. GENERAL INFORMATION

## 1.1. Description of Device (EUT)

| | | |
|---|---|---|
| Product Name | : | Outdoor Siren |
| Model Number | : | RBAD-SO1-915, RBAD-SO1-915(US), RBAD-SOx-915 (X:0~9 or X:A~Z), RBAD-SOx-915-(YY)/ZZZ (X:0~9 or X:A~Z), (Y:0~9 or Y:A~Z)/( Z:0~9 or Z:A~Z) |
| Model Difference Declaration | : | All the same except for the name |
| Test Model | : | RBAD-SO1-915 |
| Power Supply | : | DC 3.7V by battery charge from DC 12V |
| Hardware version | : | KR-SJ2-V0.2-23A3 |
| Software version | : | V1.0.0 |
| Sample ID | : | CTA24020200301–1#&CTA24020200301–2# |
| SRD | | |
| Frequency Range | : | 903 – 927 MHz |
| Channel Number | : | 241 Channels |
| Modulation Technology | : | FSK |
| Antenna Type And Gain | : | Spring antenna / 3.12dBi(Max) |

*Note 1: Antenna position refer to EUT Photos*
*Note 2: The above information supplied by the applicant*

### 1.2 EUT configuration

The following peripheral devices and interface cables were connected during the measure ment:
● - supplied by the manufacturer
○ - supplied by the lab

| | | | |
|---|---|---|---|
| ○ | / | Model: | / |
| | | Input: | / |
| | | Output: | / |
| | | Lab. Code: | / |

### 1.3 External I/O Cable

| I/O Port Description | Quantity | Cable |
|---|---|---|
| DC 12V Port | 1 | N/A |
| N/A | N/A | N/A |

## 1.4. Description of Test Facility

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

FCC-Registration No.: 517856 Designation Number: CN1318
Shenzhen CTA Testing Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

Industry Canada Registration Number. Is: 27890 CAB identifier: CN0127

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing.

A2LA-Lab Cert. No.: 6534.01
Shenzhen CTA Testing Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4 and CISPR 16-1-4:2010.

## 1.5. Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Shenzhen CTA Testing Technology Co., Ltd.'s quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

## 1.6. Measurement Uncertainty

| Test Item | | Frequency Range | Uncertainty | Note |
|---|---|---|---|---|
| Radiation Uncertainty | : | 9KHz~30MHz | ±3.08dB | (1) |
| | | 30MHz~1000MHz | ±3.92dB | (1) |
| | | 1GHz~40GHz | ±4.28dB | (1) |
| Conduction Uncertainty | : | 150kHz~30MHz | ±2.71dB | (1) |

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 1.7. Description of Test Modes

The EUT has been tested under operating condition.

All test modes were tested, only the result of the worst case was recorded in the report.

**Test Channel**

| Channel | Transmitting Frequency (MHz) |
|---|---|
| 0 | 903.0 |
| 120 | 915.0 |
| 240 | 927.0 |

# 2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen CTA Testing Technology Co., Ltd.

## 2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

## 2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.249 under the FCC Rules Part 15 Subpart C.

## 2.3. General Test Procedures

### 2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

### 2.3.2 Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013

# 3. SYSTEM TEST CONFIGURATION

## 3.1. Justification

The system was configured for testing in a continuous transmits condition.

## 3.2. EUT Exercise Software

The system was configured for Bluetooth testing in a continuous transmits condition and change test channels by software (sscom V5.13.1) provided by application.

## 3.3. Special Accessories

| No. | Equipment | Manufacturer | Model No. | Serial No. | Length | shielded/ unshielded | Notes |
|---|---|---|---|---|---|---|---|
| 1 | PC | ASUS | K43S | X16-96081 | / | / | / |

## 3.4. Block Diagram/Schematics

Please refer to the related document

## 3.5. Equipment Modifications

Shenzhen CTA Testing Technology Co., Ltd. has not done any modification on the EUT.

## 3.6. Test Setup

Please refer to the test setup photo.

# 4. SUMMARY OF TEST RESULTS

| Applied Standard: FCC Part 15 Subpart C | | | |
|---|---|---|---|
| **FCC Rules** | **Description of Test** | **Test Sample** | **Result** |
| / | Duty Cycle | CTA24020200301–1# | Compliant |
| §15.249(a), §15.249(c), §15.249(e) | Field strength of fundamental | CTA24020200301–1# | Compliant |
| §15.205, §15.249(d) | Emissions at Restricted Band | CTA24020200301–1# | Compliant |
| §15.207(a) | Conducted Emissions | CTA24020200301–1# CTA24020200301–2# | N/A |
| §15.203 | Antenna Requirements | N/A | Compliant |
| §15.215 | 20 dB Bandwidth | CTA24020200301–1# | Compliant |

# 5. TEST RESULT

## 5.1. On Time and Duty Cycle

### 5.1.1. Standard Applicable

None; for reporting purpose only.

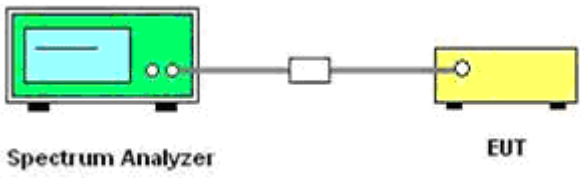
### 5.1.2. Measuring Instruments and Setting

Please refer to equipment's list in this report. The following table is the setting of the spectrum analyzer.

### 5.1.3. Test Procedures

1. Set the centre frequency of the spectrum analyzer to the transmitting frequency;
2. Set the span=0MHz, RBW=8MHz, VBW=8MHz, Sweep time=100ms;
3. Detector = peak;
4. Trace mode = Single hold.

### 5.1.4. Test Setup Layout



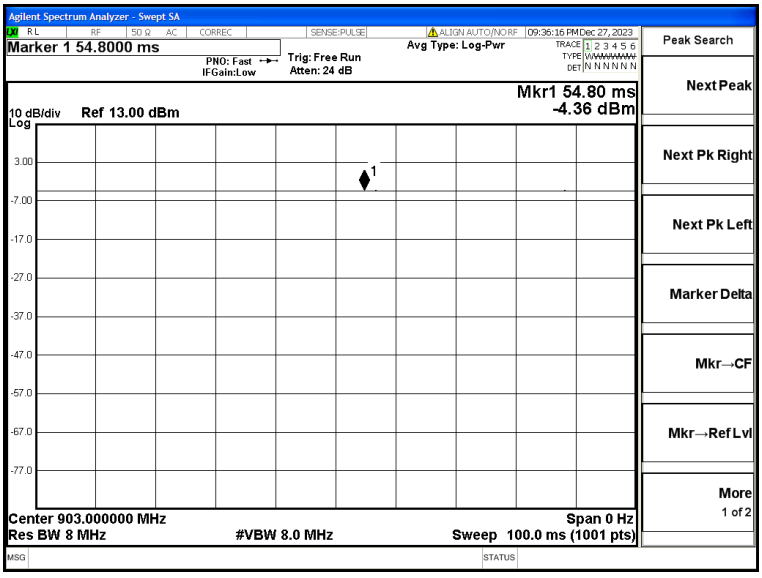

### 5.1.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

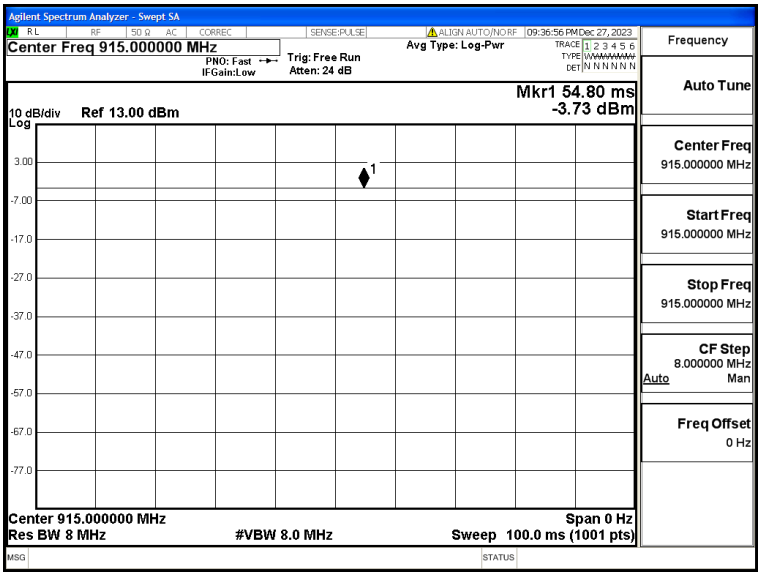
### 5.1.6. Test result

| Frequency(MHz) | On Time B (ms) | Period (ms) | Duty Cycle x (Linear) | Duty Cycle (%) | Duty Cycle Correction Factor (dB) | 1/B Minimum VBW(KHz) |
|---|---|---|---|---|---|---|
| 903 | 100 | 100 | 1 | 100 | 0 | 0.010 |
| 915 | 100 | 100 | 1 | 100 | 0 | 0.010 |
| 927 | 100 | 100 | 1 | 100 | 0 | 0.010 |

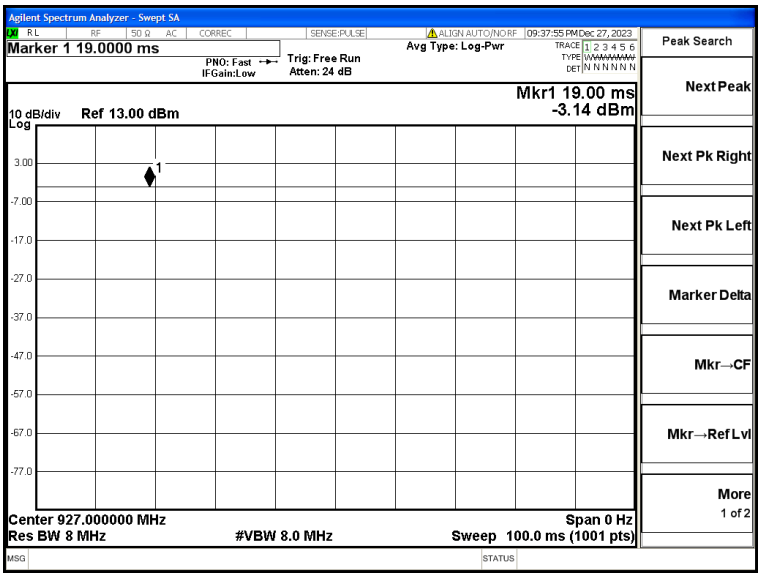
## *On Time and Duty Cycle*




## *903MHz*




## *915MHz*




## *927MHz*

## 5.2. Radiated Emissions Measurement

### 5.2.1. Standard Applicable

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090-0.110 | 16.42-16.423 | 399.9-410 | 4.5-5.15 |
| \1\ 0.495-0.505 | 16.69475-16.69525 | 608-614 | 5.35-5.46 |
| 2.1735-2.1905 | 16.80425-16.80475 | 960-1240 | 7.25-7.75 |
| 4.125-4.128 | 25.5-25.67 | 1300-1427 | 8.025-8.5 |
| 4.17725-4.17775 | 37.5-38.25 | 1435-1626.5 | 9.0-9.2 |
| 4.20725-4.20775 | 73-74.6 | 1645.5-1646.5 | 9.3-9.5 |
| 6.215-6.218 | 74.8-75.2 | 1660-1710 | 10.6-12.7 |
| 6.26775-6.26825 | 108-121.94 | 1718.8-1722.2 | 13.25-13.4 |
| 6.31175-6.31225 | 123-138 | 2200-2300 | 14.47-14.5 |
| 8.291-8.294 | 149.9-150.05 | 2310-2390 | 15.35-16.2 |
| 8.362-8.366 | 156.52475-156.52525 | 2483.5-2500 | 17.7-21.4 |
| 8.37625-8.38675 | 156.7-156.9 | 2690-2900 | 22.01-23.12 |
| 8.41425-8.41475 | 162.0125-167.17 | 3260-3267 | 23.6-24.0 |
| 12.29-12.293. | 167.72-173.2 | 3332-3339 | 31.2-31.8 |
| 12.51975-12.52025 | 240-285 | 3345.8-3358 | 36.43-36.5 |
| 12.57675-12.57725 | 322-335.4 | 3600-4400 | (\2\) |
| 13.36-13.41 | | | |

\1\ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

\2\ Above 38.6

According to §15.249 (d): 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 §15.209, whichever is the lesser attenuation

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(KHz) | 300 |
| 0.490~1.705 | 24000/F(KHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

According to §15.249 (a): Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

| Fundamental frequency | Field strength of fundamental | | Field strength of harmonics | |
|---|---|---|---|---|
| | millivolts/meter | dBuV/m | microvolts/meter | dBuV/m |
| 902-928 MHz | 50 | 94 | 500 | 54 |
| 2400-2483.5 MHz | 50 | 94 | 500 | 54 |
| 5725-5875 MHz | 50 | 94 | 500 | 54 |
| 24.0-24.25 GHz | 250 | 108 | 2500 | 68 |

As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field

strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth

5.2.2. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start Frequency | 1000 MHz |
| Stop Frequency | 10th carrier harmonic |
| RB / VB (Emission in restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average |
| RB / VB (Emission in non-restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average |

| Receiver Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9kHz~150kHz / RB/VB 200Hz/1KHz for QP/AVG |
| Start ~ Stop Frequency | 150kHz~30MHz / RB/VB 9kHz/30KHz for QP/AVG |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB/VB 120kHz/1MHz for QP |

5.2.3. Test Procedures

**1) Sequence of testing 9 kHz to 30 MHz**

**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

**Premeasurement:**

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna height is 1.3 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

**Final measurement:**

--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

**2) Sequence of testing 30 MHz to 1 GHz**

**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

**Premeasurement:**

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

**Final measurement:**

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

**3) Sequence of testing 1 GHz to 18 GHz**

**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

**Premeasurement:**

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

**Final measurement:**

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

**4) Sequence of testing above 18 GHz**

**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 1 meter.

--- The EUT was set into operation.

**Premeasurement:**

--- The antenna is moved spherical over the EUT in different polarizations of the antenna.

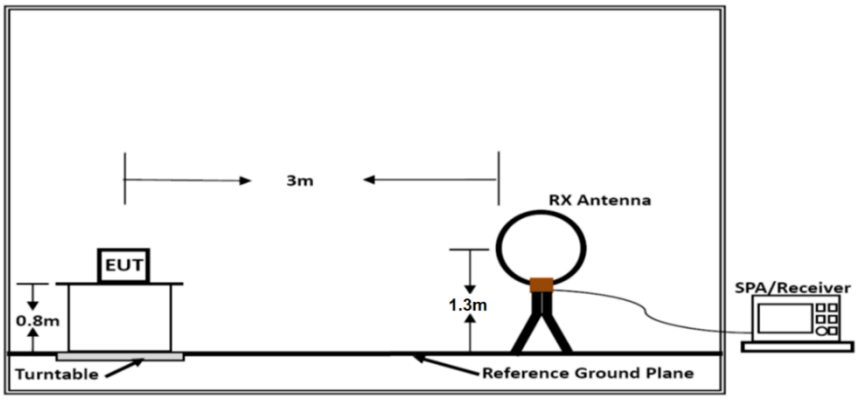
**Final measurement:**

--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

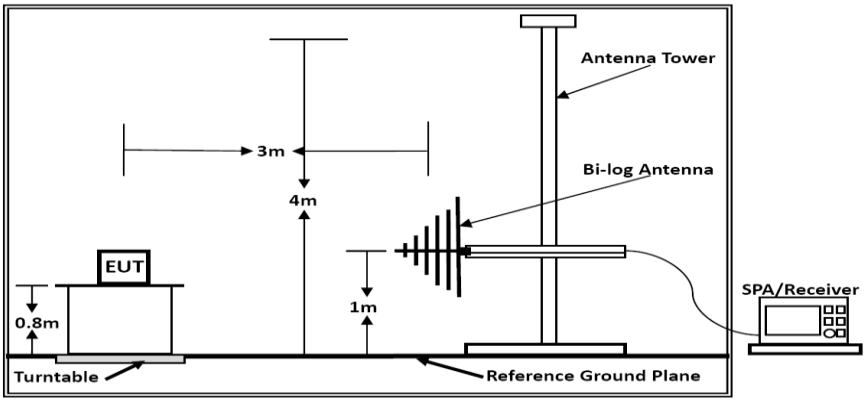
--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

5.2.4. Test Setup Layout

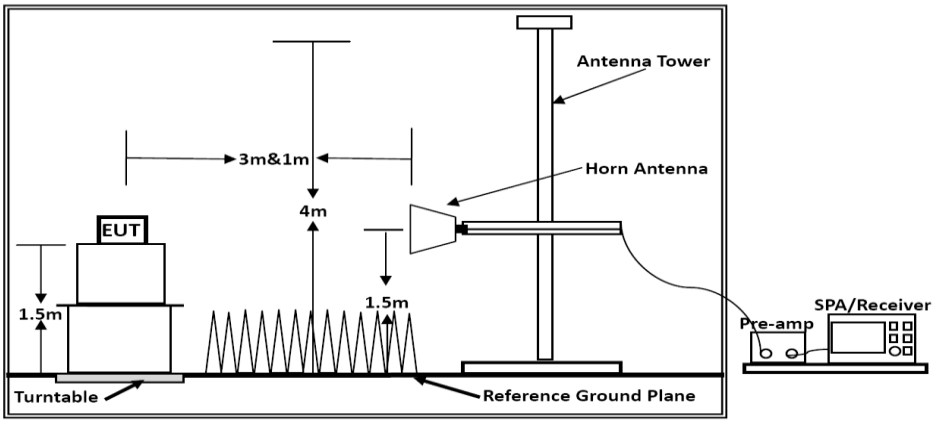
For radiated emissions below 30MHz




Below 30MHz




Below 1GHz




Above 1GHz

Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

Distance extrapolation factor = 20 log (specific distanc [3m] / test distance [1m]) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

5.2.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

6.6.6. Radiated Emissions

| Temperature | 22.8℃ | Humidity | 56% |
|---|---|---|---|
| Test Engineer | Anna Hu | Configurations | Low Channel/High Channel |

*(i) Results of Radiated Emissions (9 kHz~30MHz)*

| Freq. (MHz) | Level (dBuV) | Over Limit (dB) | Over Limit (dBuV) | Remark |
|---|---|---|---|---|
| - | - | - | - | See Note |

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor.

**PASS.**

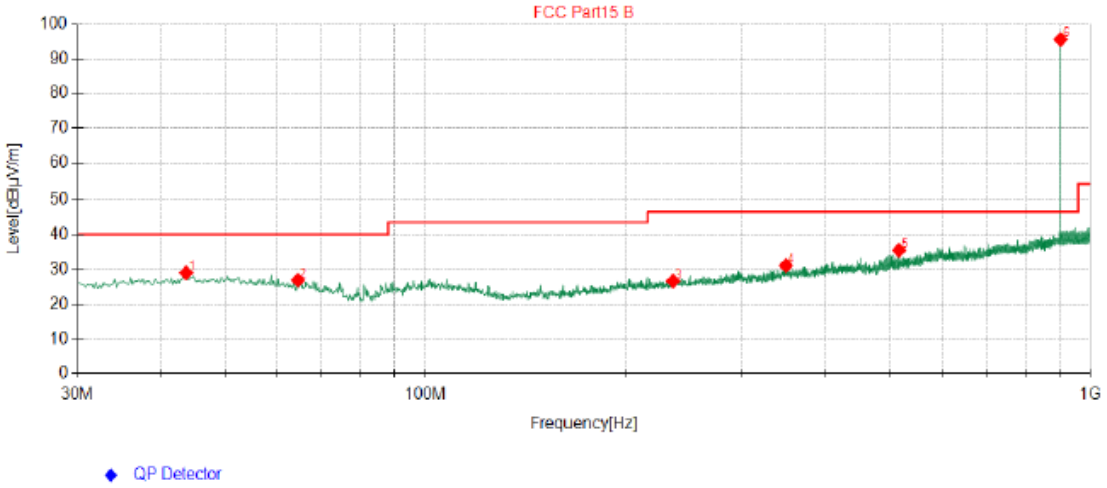
Only record the worst test result in this report.

The test data please refer to following page.

***(ii)*** *Results of Radiated Emissions (30MHz ~1GHz)*

***Below 1GHz (Low Channel)***

*Vertical*



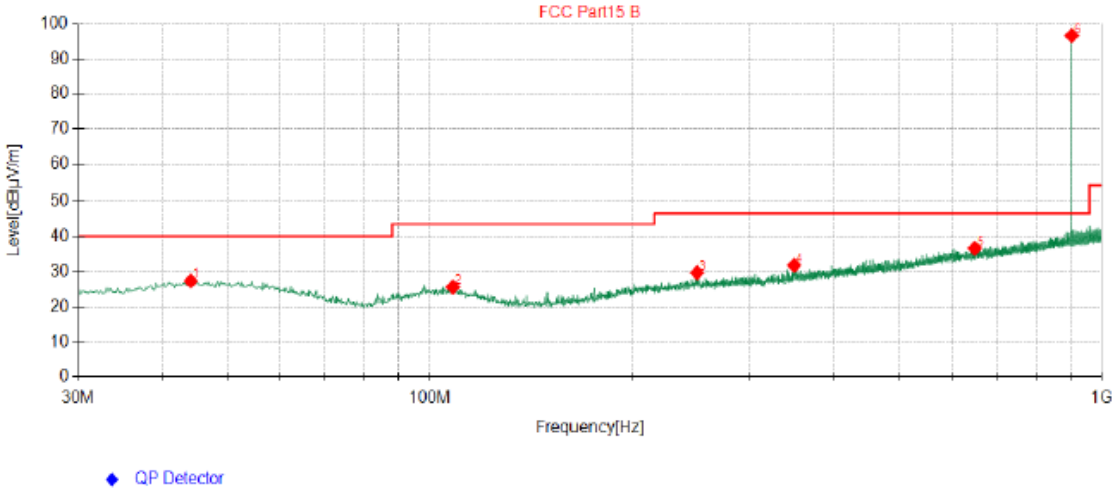

| Suspected Data List | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Reading [dBµV] | Factor [dB/m] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 43.70 | 43.02 | -14.03 | 28.99 | 40.00 | 11.01 | 100 | 352 | Vertical |
| 2 | 64.36 | 42.92 | -16.04 | 26.88 | 40.00 | 13.12 | 100 | 144 | Vertical |
| 3 | 235.9 | 40.90 | -14.29 | 26.61 | 46.50 | 19.89 | 100 | 59 | Vertical |
| 4 | 348.8 | 41.97 | -10.88 | 31.09 | 46.50 | 15.41 | 100 | 357 | Vertical |
| 5 | 516.11 | 43.56 | -8.13 | 35.43 | 46.50 | 11.07 | 100 | 276 | Vertical |
| 6 | 903 | 96.72 | -1.19 | 95.53 | 46.50 | -49.03 | 100 | 182 | Vertical |

| Final Data List | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Reading [dBµV] | Factor [dB/m] | AV Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 903 | 90.30 | -1.19 | 89.11 | 94 | 4.89 | 100 | 182 | Vertical |

***Average Power = 89.11– 95.2 = -6.09dBm***

****Note:*
*1. Level [dBµV/m] = Reading [dBµV] + Factor [dB/m]*
*2. Margin [dB] = Limit [dBµV/m] - Level [dBµV/m]*

*Horizontal*




| Suspected Data List | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Reading [dBµV] | Factor [dB/m] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 44.13 | 41.34 | -14.04 | 27.30 | 40.00 | 12.70 | 100 | 345 | Horizontal |
| 2 | 108.3 | 41.59 | -16.00 | 25.59 | 43.50 | 17.91 | 100 | 216 | Horizontal |
| 3 | 250.11 | 43.53 | -13.87 | 29.66 | 46.50 | 16.84 | 100 | 221 | Horizontal |
| 4 | 348.8 | 43.22 | -11.45 | 31.77 | 46.50 | 14.73 | 100 | 232 | Horizontal |
| 5 | 647.7 | 41.58 | -5.00 | 36.58 | 46.50 | 9.92 | 100 | 274 | Horizontal |
| 6 | 903 | 97.58 | -1.00 | 96.58 | 46.50 | -50.08 | 100 | 192 | Horizontal |

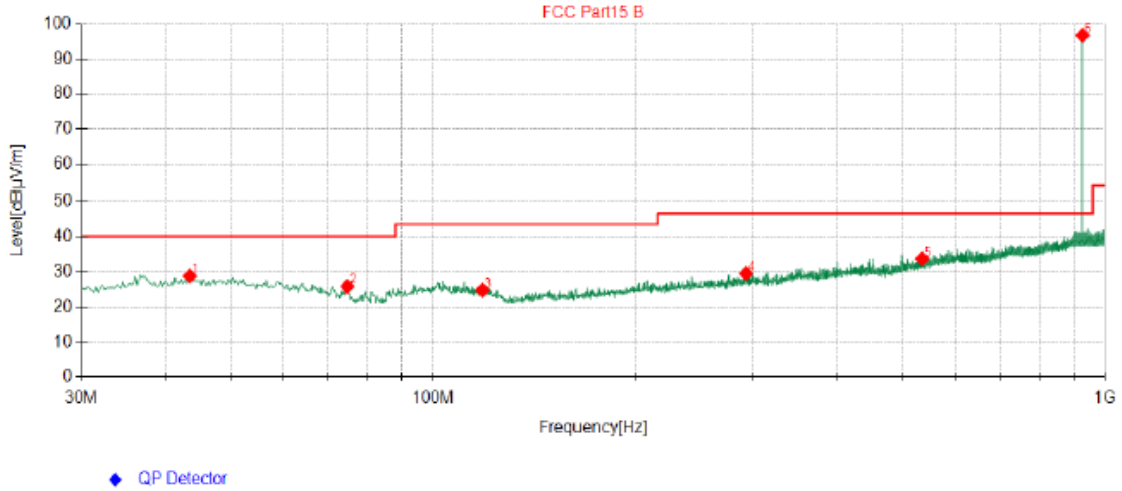
| Final Data List | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Reading [dBµV] | Factor [dB/m] | AV Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 903 | 90.05 | -1.00 | 89.33 | 94 | 4.67 | 100 | 192 | Horizontal |

***Average Power = 90.37– 95.2 = -5.87dBm***

****Note:*
*1. Level [dBµV/m] = Reading [dBµV] + Factor [dB/m]*
*2. Margin [dB] = Limit [dBµV/m] - Level [dBµV/m]*

***Below 1GHz (High Channel)***

*Vertical*




| Suspected Data List | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Reading [dBµV] | Factor [dB/m] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 43.48 | 42.84 | -14.05 | 28.79 | 40.00 | 11.21 | 100 | 244 | Vertical |
| 2 | 74.58 | 44.06 | -18.26 | 25.80 | 40.00 | 14.20 | 100 | 300 | Vertical |
| 3 | 118.52 | 40.89 | -16.15 | 24.74 | 43.50 | 18.76 | 100 | 198 | Vertical |
| 4 | 292.5 | 42.03 | -12.54 | 29.49 | 46.50 | 17.01 | 100 | 341 | Vertical |
| 5 | 535.0 | 41.35 | -7.73 | 33.62 | 46.50 | 12.88 | 100 | 328 | Vertical |
| 6 | 927 | 97.49 | -0.81 | 96.68 | 46.50 | -50.18 | 100 | 304 | Vertical |

| Final Data List | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Reading [dBµV] | Factor [dB/m] | AV Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 927 | 90.17 | -0.81 | 89.36 | 94 | 4.64 | 100 | 304 | Vertical |

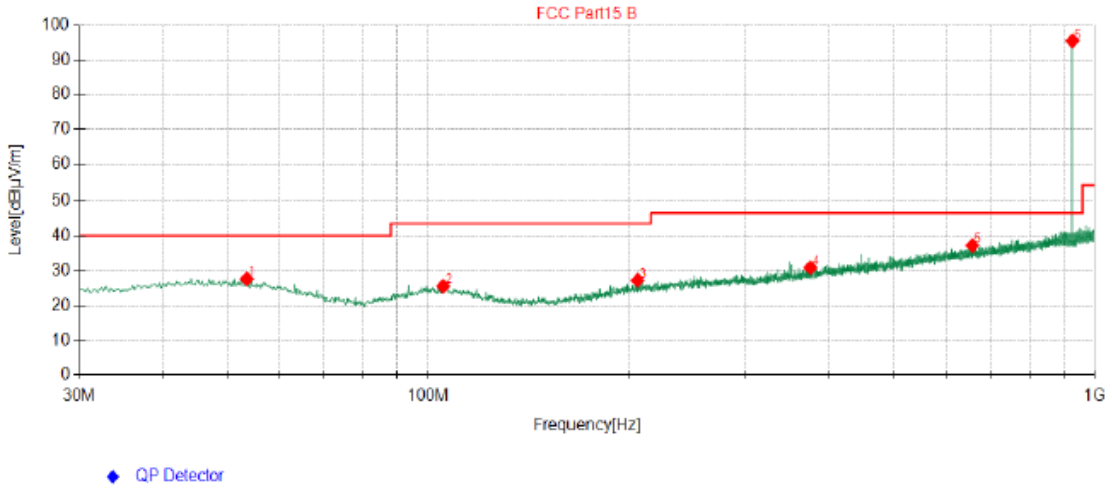
***Average Power = 89.36– 95.2 = -5.84dBm***

****Note:*

*1. Level [dBµV/m] = Reading [dBµV] + Factor [dB/m]*

*2. Margin [dB] = Limit [dBµV/m] - Level [dBµV/m]*

*Horizontal*




| Suspected Data List | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Reading [dBµV] | Factor [dB/m] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 53.49 | 42.31 | -14.69 | 27.62 | 40.00 | 12.38 | 100 | 71 | Horizontal |
| 2 | 105.4 | 41.52 | -16.00 | 25.52 | 43.50 | 17.98 | 100 | 239 | Horizontal |
| 3 | 206.3 | 42.45 | -15.24 | 27.21 | 43.50 | 16.29 | 100 | 293 | Horizontal |
| 4 | 374.9 | 41.57 | -10.73 | 30.84 | 46.50 | 15.66 | 100 | 270 | Horizontal |
| 5 | 656.1 | 42.10 | -4.90 | 37.20 | 46.50 | 9.30 | 100 | 135 | Horizontal |
| 6 | 927 | 95.12 | -0.72 | 95.40 | 46.50 | -48.90 | 100 | 40 | Horizontal |

| Final Data List | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Reading [dBµV] | Factor [dB/m] | AV Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 927 | 90.05 | -0.72 | 89.33 | 94 | 4.67 | 100 | 40 | Horizontal |

***Average Power = 89.33– 95.2 = -5.87dBm***

****Note:*
*1. Level [dBµV/m] = Reading [dBµV] + Factor [dB/m]*
*2. Margin [dB] = Limit [dBµV/m] - Level [dBµV/m]*

*(iii) Results for Radiated Emissions (1GHz – 10GHz)*

*Channel 903MHz*

| Freq. MHz | Reading dBuv | Ant. Fac dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 1806.00 | 55.33 | 33.06 | 35.04 | 3.94 | 57.29 | 74.00 | 16.71 | Peak | Horizontal |
| 1806.00 | 39.89 | 33.06 | 35.04 | 3.94 | 41.85 | 54.00 | 12.15 | Average | Horizontal |
| 1806.00 | 59.56 | 33.06 | 35.04 | 3.94 | 61.52 | 74.00 | 12.48 | Peak | Vertical |
| 1806.00 | 43.40 | 33.06 | 35.04 | 3.94 | 45.36 | 54.00 | 8.64 | Average | Vertical |

*Channel 915MHz*

| Freq. MHz | Reading dBuv | Ant. Fac dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 1830.00 | 56.66 | 33.16 | 35.15 | 3.96 | 58.63 | 74.00 | 15.37 | Peak | Horizontal |
| 1830.00 | 43.99 | 33.16 | 35.15 | 3.96 | 45.96 | 54.00 | 8.04 | Average | Horizontal |
| 1830.00 | 58.06 | 33.16 | 35.15 | 3.96 | 60.03 | 74.00 | 13.97 | Peak | Vertical |
| 1830.00 | 42.11 | 33.16 | 35.15 | 3.96 | 44.08 | 54.00 | 9.92 | Average | Vertical |

*Channel 927 MHz*

| Freq. MHz | Reading dBuv | Ant. Fac dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 1854.00 | 57.04 | 33.26 | 35.14 | 3.98 | 59.14 | 74.00 | 14.86 | Peak | Horizontal |
| 1854.00 | 43.56 | 33.26 | 35.14 | 3.98 | 45.66 | 54.00 | 8.34 | Average | Horizontal |
| 1854.00 | 52.38 | 33.26 | 35.14 | 3.98 | 54.48 | 74.00 | 19.52 | Peak | Vertical |
| 1854.00 | 39.01 | 33.26 | 35.14 | 3.98 | 41.11 | 54.00 | 12.89 | Average | Vertical |

***Notes:***

*1. Measuring frequencies from 9 KHz - 10$^{th}$ harmonic or 26.5GHz (which is less), No emission found between lowest internal used/generated frequency to 30MHz.*

*2. Radiated emissions measured in frequency range from 9 KHz ~10$^{th}$ harmonic or 26.5GHz (which is less) were made with an instrument using Peak detector mode.*

*3. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*

*4.Measured = Reading + Ant. Fac - Pre. Fac. + Cab. Loss; Margin = Limit - Measured*

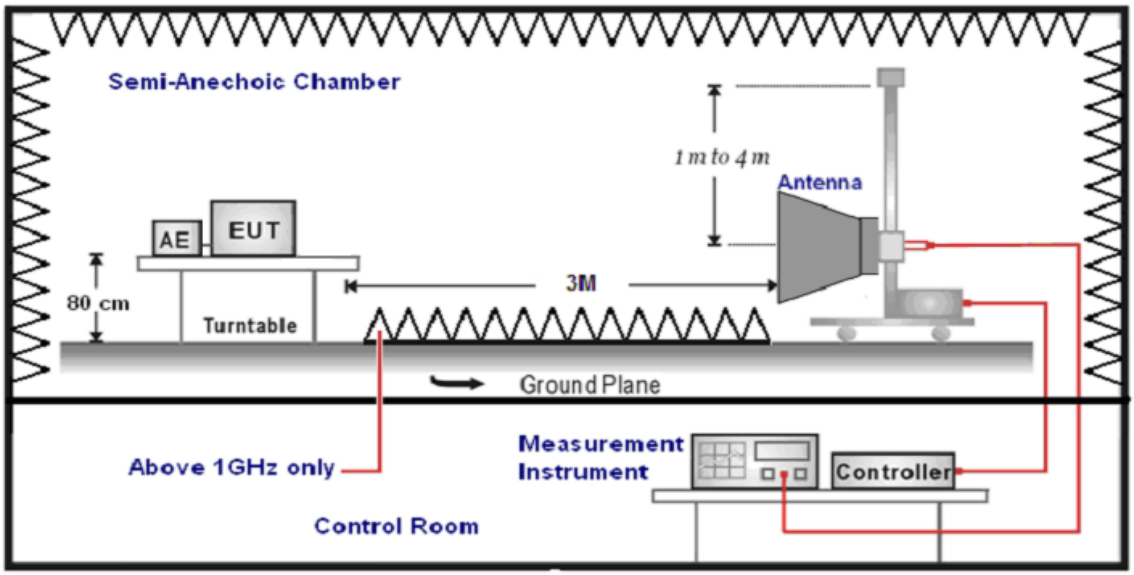
## 5.3. Band-edge measurements for radiated emissions

### 5.3.1 Standard Applicable

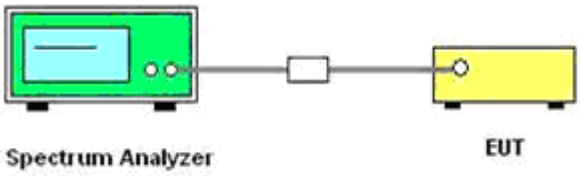
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### 5.3.2 Test Setup Layout

**☒For Radiated**




**☐For Conducted**




### 5.3.3. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of Spectrum Analyzer.

### 5.3.4. Test Procedures

**☒Radiated Method:**

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT.

3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed..
5. The distance between test antenna and EUT was 3 meter:
6. Setting test receiver/spectrum as following table states:

| Test Frequency range | Test Receiver/Spectrum Setting | Detector |
|---|---|---|
| 1GHz-40GHz | Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto<br>Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto | Peak |

☐**Conducted Method:**

According to KDB 558074 D01 for Antenna-port conducted measurement. Antenna-port conducted measurements may also be used as an alternative to radiated measurements for demonstrating compliance in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case spurious emissions is required.

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to an EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz for peak detector and RBW=1MHz, VBW=1/B for AV detector.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.
6. Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency (see 12.2.2, 12.2.3, and 12.2.4 for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
7. Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see 12.2.5 for guidance on determining the applicable antenna gain)
8. Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies ≤ 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies > 1000 MHz).
9. For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW).
10. Convert the result ant EIRP level to an equivalent electric field strength using the following relationship:

E = EIRP – 20log D + 104.77=EIRP+95.23

Where:
E = electric field strength in dBμV/m,
EIRP = equivalent isotropic radiated power in dBm
D = specified measurement distance in meters.

11. Since the out-of-band characteristics of the EUT transmit antenna will often be unknown, the use of a conservative antenna gain value is necessary. Thus, when determining the EIRP based on the measured conducted power, the upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater. However, for devices that operate in multiple frequency bands while using the same transmit antenna, the highest gain of the antenna within the operating band nearest in frequency to the restricted band emission being measured may be used in lieu of the overall highest gain when the emission is at a frequency that is within 20 percent of the nearest band edge frequency, but in no case shall a value less than 2 dBi be used.
12. Per KDB662911 D01 section b) In cases where a combination of conducted measurements and cabinet radiated measurements are permitted to demonstrate compliance with absolute radiated out-of-band and spurious limits (e.g., KDB Publications 558074 for DTS and 789033 for U-NII), the conducted measurements must be combined with directional gain to compute the radiated levels of the out-of-band and spurious emissions as described in this section.
13. Compare the resultant electric field strength level to the applicable regulatory limit.
14. Perform radiated spurious emission test duress until all measured frequencies were complete.

5.3.5 Test Results

Pass

According to 15.205, the restrict band is far from working frequency, it consider to compliance with 15.205(a) from radiated emission result in 5.2.7 of this report

## 5.4. Power line conducted emissions

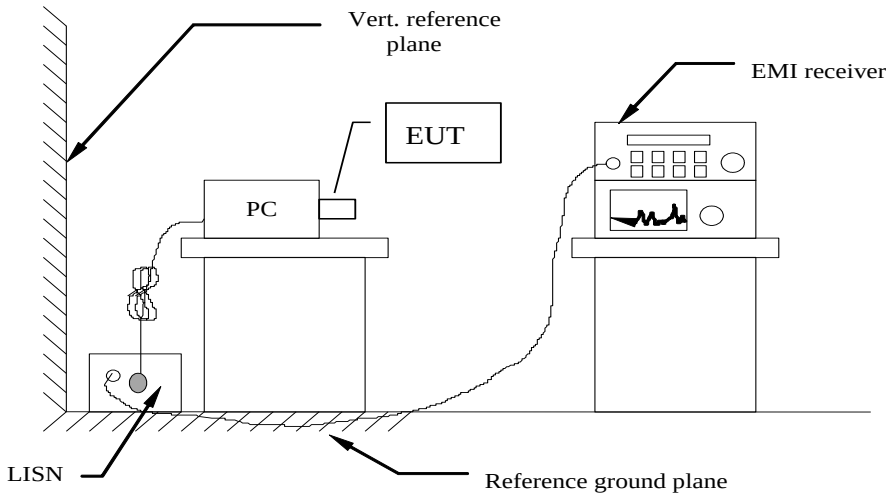
### 5.4.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

| Frequency Range (MHz) | Limits (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 to 0.50 | 66 to 56 | 56 to 46 |
| 0.50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

* Decreasing linearly with the logarithm of the frequency

### 5.4.2 Block Diagram of Test Setup




### 5.4.3 Test Results

*Not applicable*

## 5.5. Antenna Requirements

### 5.5.1. Standard Applicable

According to antenna requirement of §15.203.

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 shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

### 5.5.2. Antenna Connected Construction

#### 5.5.2.1. Standard Applicable

According to § 15.203, 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.

#### 5.5.2.2. Antenna Connector Construction

The directional gains of antenna used for transmitting is 0.0dBi, and the antenna is a Internal antenna connect to PCB board and no consideration of replacement. Please see EUT photo for details.

#### 5.5.2.3. Results: Compliance.

## 5.6. 20 dB Spectrum Bandwidth Measurement

### 5.6.1. Standard Applicable

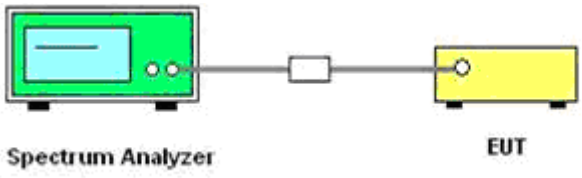
According to antenna requirement of §15.215

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated

### 5.4.2. Test Procedures

1. Set the centre frequency of the spectrum analyzer to the transmitting frequency;
2. Set the span=0MHz, RBW=100kHz, VBW=300kHz, Sweep time=100ms;
3. Detector = peak;
4. Trace mode = Single hold.

### 5.6.3. Test Setup Layout



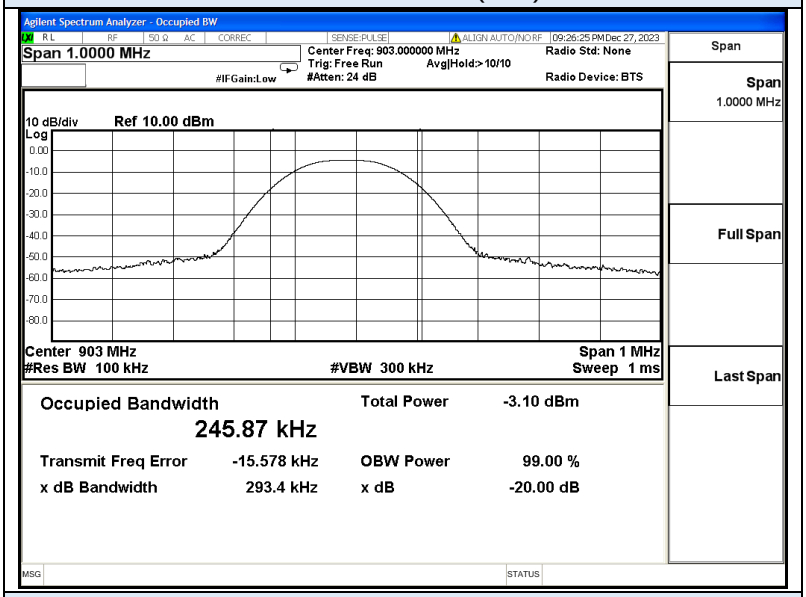

### 5.6.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

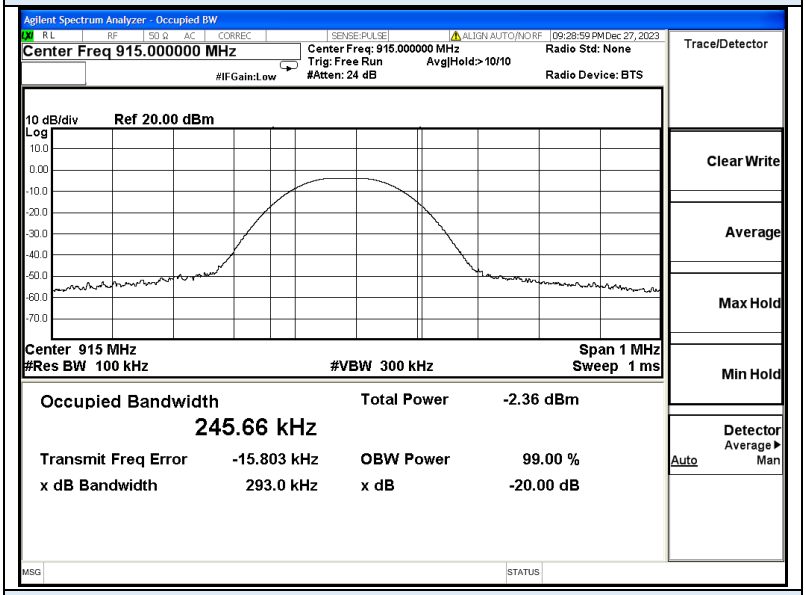
### 5.4.5. Test Result

| Frequency(MHz) | 20 dB Bandwidth (kHz) |
|---|---|
| 903 | 293.4 |
| 915 | 293.0 |
| 927 | 293.3 |

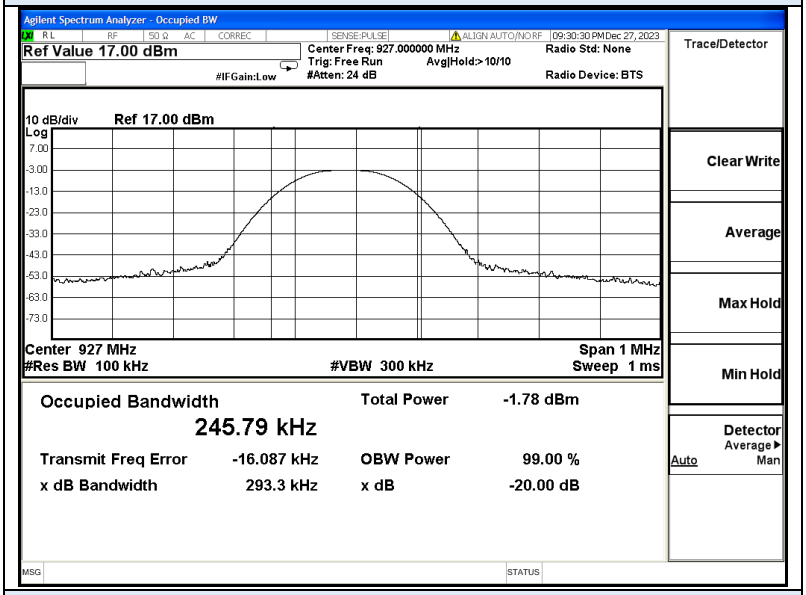
20 dB Bandwidth(kHz)




903MHz




915MHz




927MHz

# 6. LIST OF MEASURING EQUIPMENTS

| Test Equipment | Manufacturer | Model No. | Equipment No. | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| LISN | R&S | ENV216 | CTA-308 | 2023/08/02 | 2024/08/01 |
| LISN | R&S | ENV216 | CTA-314 | 2023/08/02 | 2024/08/01 |
| EMI Test Receiver | R&S | ESPI | CTA-307 | 2023/08/02 | 2024/08/01 |
| EMI Test Receiver | R&S | ESCI | CTA-306 | 2023/08/02 | 2024/08/01 |
| Spectrum Analyzer | Agilent | N9020A | CTA-301 | 2023/08/02 | 2024/08/01 |
| Spectrum Analyzer | R&S | FSP | CTA-337 | 2023/08/02 | 2024/08/01 |
| Vector Signal generator | Agilent | N5182A | CTA-305 | 2023/08/02 | 2024/08/01 |
| Analog Signal Generator | R&S | SML03 | CTA-304 | 2023/08/02 | 2024/08/01 |
| WIDEBAND RADIO COMMUNICATION TESTER | CMW500 | R&S | CTA-302 | 2023/08/02 | 2024/08/01 |
| Temperature and humidity meter | Chigo | ZG-7020 | CTA-326 | 2023/08/02 | 2024/08/01 |
| Ultra-Broadband Antenna | Schwarzbeck | VULB9163 | CTA-310 | 2023/10/17 | 2024/10/16 |
| Horn Antenna | Schwarzbeck | BBHA 9120D | CTA-309 | 2023/10/13 | 2024/10/12 |
| Loop Antenna | Zhinan | ZN30900C | CTA-311 | 2023/10/17 | 2024/10/16 |
| Horn Antenna | Beijing Hangwei Dayang | OBH100400 | CTA-336 | 2021/08/07 | 2024/08/06 |
| Amplifier | Schwarzbeck | BBV 9745 | CTA-312 | 2023/08/02 | 2024/08/01 |
| Amplifier | Taiwan chengyi | EMC051845B | CTA-313 | 2023/08/02 | 2024/08/01 |
| Directional coupler | NARDA | 4226-10 | CTA-303 | 2023/08/02 | 2024/08/01 |
| High-Pass Filter | XingBo | XBLBQ-GTA18 | CTA-402 | 2023/08/02 | 2024/08/01 |
| High-Pass Filter | XingBo | XBLBQ-GTA27 | CTA-403 | 2023/08/02 | 2024/08/01 |
| Automated filter bank | Tonscend | JS0806-F | CTA-404 | 2023/08/02 | 2024/08/01 |

| | | | | | |
|---|---|---|---|---|---|
| Power Sensor | Agilent | U2021XA | CTA-405 | 2023/08/02 | 2024/08/01 |
| Amplifier | Schwarzbeck | BBV9719 | CTA-406 | 2023/08/02 | 2024/08/01 |

| Test Equipment | Manufacturer | Model No. | Version number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| EMI Test Software | Tonscend | TS®JS32-RE | 5.0.0.2 | N/A | N/A |
| EMI Test Software | Tonscend | TS®JS32-CE | 5.0.0.1 | N/A | N/A |
| RF Test Software | Tonscend | TS®JS1120-3 | 3.1.65 | N/A | N/A |
| RF Test Software | Tonscend | TS®JS1120 | 3.1.46 | N/A | N/A |

## 7. TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separated files for Test Setup Photos of the EUT.

## 8. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

## 9. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

----------THE END OF REPORT----------