

# FCC RADIO TEST REPORT

## FCC ID: 2AB9SM55

**Product** : Bluetooth Speaker

**Trade Name** : Jonter , ARGENTO SC

**Model Name** : M55, SP2858

### Prepared for

Shenzhen Jonter Digital Co.,Ltd

3F/4B, Hezhou Jinfo Industrial Park, Hezhou, Xixiang Street, Baoan District,  
Shenzhen, Guangdong, China

### Prepared by

DongGuan Precise Testing Service Co.,Ltd.

Building D, Baoding Technology Park, Guangming Road 2, Guangming  
Community, Dongcheng District, Dongguan, Guangdong, China

## TEST RESULT CERTIFICATION

**Applicant's name** ..... Shenzhen Jonter Digital Co.,Ltd

Address ..... 3F/4B, Hezhou Jinfo Industrial Park, Hezhou, Xixiang Street,  
Baoan District, Shenzhen, Guangdong, China

**Manufacture's Name**... Shenzhen Jonter Digital Co.,Ltd

Address ..... 3F/4B, Hezhou Jinfo Industrial Park, Hezhou, Xixiang Street,  
Baoan District, Shenzhen, Guangdong, China

### Product description

Product name ..... Bluetooth Speaker

Model and/or type

reference ..... M55, SP2858

In all, the original product and the alternative product are the same.

**Standards** ..... FCC Part15.249

Test procedure ..... ANSI C63.4-2014

This device described above has been tested by PTS, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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**Date of Test** .....

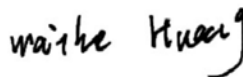
Date (s) of performance of tests ..... April. 03, 2015 ~ April. 21, 2015

Date of Issue ..... Apr. 21, 2015

Test Result..... **Pass**

Tested by

:



Maiké Huang / Engineer

Authorized  
Signatory :



Chris Du / Manager

## 2 Test Summary

| Test Items                  | Test Requirement                 | Result |
|-----------------------------|----------------------------------|--------|
| Spurious Radiated Emissions | 15.205(a)<br>15.209<br>15.249(d) | PASS   |
| Band edge Emissions         | 15.249(d)                        | PASS   |
| Conducted Emissions         | 15.207                           | PASS   |
| 20dB Bandwidth              | 15.215c<br>15.249                | PASS   |

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### 3 General Information

#### 3.1 General Description of E.U.T.

|                             |                                                             |
|-----------------------------|-------------------------------------------------------------|
| <b>Product Name</b>         | : Bluetooth Speaker                                         |
| <b>Model No.</b>            | : M55, SP2858                                               |
| <b>Brand Name</b>           | : Jonter , ARGENTO SC                                       |
| <b>Operation Frequency</b>  | : 2402MHz ~ 2480MHz,79 channels in total, separated by 1MHz |
| <b>Type of Modulation</b>   | : GFSK, Pi/4DQPSK, 8DPSK                                    |
| <b>Antenna installation</b> | : PCB Printed Antenna                                       |
| <b>Antenna Gain</b>         | : 0 dBi                                                     |
| <b>Bluetooth version</b>    | :2.1+EDR                                                    |
| <b>hardware version</b>     | :JO01                                                       |
| <b>software version</b>     | :V4.0                                                       |
| <b>Serial number</b>        | :01                                                         |

#### 3.2 Details of E.U.T.

|                       |                                                     |
|-----------------------|-----------------------------------------------------|
| <b>Technical Data</b> | : (1)DC 3.7V from battery<br>(2) DC 5V from adapter |
|-----------------------|-----------------------------------------------------|

#### 3.3 Channel List

| Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) |
|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|
| 1           | 2402            | 2           | 2403            | 3           | 2404            | 4           | 2405            |
| 5           | 2406            | 6           | 2407            | 7           | 2408            | 8           | 2409            |
| 9           | 2410            | 10          | 2411            | 11          | 2412            | 12          | 2413            |
| 13          | 2414            | 14          | 2415            | 15          | 2416            | 16          | 2417            |
| 17          | 2418            | 18          | 2419            | 19          | 2420            | 20          | 2421            |
| 21          | 2422            | 22          | 2423            | 23          | 2424            | 24          | 2425            |
| 25          | 2426            | 26          | 2427            | 27          | 2428            | 28          | 2429            |
| 29          | 2430            | 30          | 2431            | 31          | 2432            | 32          | 2433            |
| 33          | 2434            | 34          | 2435            | 35          | 2436            | 36          | 2437            |
| 37          | 2438            | 38          | 2439            | 39          | 2440            | 40          | 2441            |
| 41          | 2442            | 42          | 2443            | 43          | 2444            | 44          | 2445            |
| 45          | 2446            | 46          | 2447            | 47          | 2448            | 48          | 2449            |
| 49          | 2450            | 50          | 2451            | 51          | 2452            | 52          | 2453            |
| 53          | 2454            | 54          | 2455            | 55          | 2456            | 56          | 2457            |
| 57          | 2458            | 58          | 2459            | 59          | 2460            | 60          | 2461            |
| 61          | 2462            | 62          | 2463            | 63          | 2464            | 64          | 2465            |
| 65          | 2466            | 66          | 2467            | 67          | 2468            | 68          | 2469            |
| 69          | 2470            | 70          | 2471            | 71          | 2472            | 72          | 2473            |
| 73          | 2474            | 74          | 2475            | 75          | 2476            | 76          | 2477            |
| 77          | 2478            | 78          | 2479            | 79          | 2480            | -           | -               |

#### 3.4 Description of Support Units

| No. | Equipment | Manufacturer | Model No.    | Serial No. |
|-----|-----------|--------------|--------------|------------|
| 1.  | Adapter   | Huawei       | HW-050200C3W | N/A        |

### **3.5 Test Facility**

The test facility has a test site registered with the following organizations:

Dongguan Quality Supervision Testing Center

Add.: B#, Dongguan Quality Supervision Testing Center, NO.2 South Industry Road,  
Songshan Lake, Dongguan City, 523808, China.

FCC Registration No.: 817095

## 4 Equipment Used during Test

### 4.1 Equipments List

| Mains Terminal Disturbance Voltage (Conducted Emission) |                            |                      |             |              |             |               |
|---------------------------------------------------------|----------------------------|----------------------|-------------|--------------|-------------|---------------|
| Item                                                    | Equipment                  | Manufacturer         | Model No.   | Serial No.   | Last Cal.   | Cal. Interval |
| 1.                                                      | EMI Test Receiver          | R&S                  | ESCI        | 100229       | Sep.17,2014 | 1 Year        |
| 2.                                                      | LISN                       | SCHWARZBECK          | NSLK 8128   | 8127437      | Sep.17,2014 | 1 Year        |
| 3.                                                      | Cable                      | LARGE                | RF300       | -            | Sep.17,2014 | 1 Year        |
| 3m Semi-anechoic Chamber for Radiation                  |                            |                      |             |              |             |               |
| Item                                                    | Equipment                  | Manufacturer         | Model No.   | Serial No.   | Last Cal.   | Cal. Interval |
| 1                                                       | EMC Analyzer               | Agilent              | E7405A      | MY45114943   | Sep.17,2014 | 1 Year        |
| 2                                                       | Active Loop Antenna        | Beijing Dazhi        | ZN30900A    | -            | Sep.17,2014 | 1 Year        |
| 3                                                       | Trilog Broadband Antenna   | SCHWARZBECK          | VULB9163    | 9613-248     | Apr.19,2015 | 1 Year        |
| 4                                                       | Coaxial Cable (below 1GHz) | Top                  | TYPE16(13M) | -            | Sep.17,2014 | 1 Year        |
| 5                                                       | Broad-band Horn Antenna    | SCHWARZBECK          | BBHA 9120 D | 667          | Apr.19,2015 | 1 Year        |
| 6                                                       | Horn Antenna               | SCHWARZBECK          | BBHA 9170   | 335          | Apr.19,2015 | 1 Year        |
| 7                                                       | Broadband Preamplifier     | COMPLIANCE DIRECTION | PAP-1G18    | 2004         | Apr.06,2015 | 1 Year        |
| 8                                                       | Coaxial Cable (above 1GHz) | Top                  | 25MHz-18GHz | EW02014-7    | Apr.19,2015 | 1 Year        |
| 9                                                       | Horn Antenna               | EM                   | EM-AH-10180 | 2011071402   | Apr.19,2015 | 1 Year        |
| 10                                                      | Spectrum analyzer          | R&S                  | FSU         | 1166.1660.26 | Apr.19,2015 | 1 Year        |
| 11                                                      | Antenna connector          | Top                  | PR032       | 032          | Apr.19,2015 | 1 Year        |

### 4.2 Measurement Uncertainty

| Parameter                | Uncertainty                                    |
|--------------------------|------------------------------------------------|
| Radio Frequency          | $\pm 1 \times 10^{-6}$                         |
| Bandwidth                | $\pm 1.5 \times 10^{-6}$                       |
| RF Power                 | $\pm 1.0$ dB                                   |
| RF Power Density         | $\pm 2.2$ dB                                   |
| Temperature              | $\pm 1$ °C                                     |
| DC Source                | $\pm 0.05\%$                                   |
| Radiated Emissions test  | $\pm 5.03$ dB<br>(Bilog antenna 30M~1000MHz)   |
|                          | $\pm 4.74$ dB<br>(Horn antenna 1000M~25000MHz) |
| Conducted Emissions test | 3.64dB (150kHz~30MHz)                          |

### 4.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No. 110 Dongguan Zhuang RD. Guangzhou, P.R.China.

## 5 Conducted Emission

|                   |                                                                                                                            |
|-------------------|----------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC CFR 47 Part 15 Section 15.207                                                                                          |
| Test Method:      | ANSI C63.4:2014                                                                                                            |
| Test Result:      | PASS                                                                                                                       |
| Frequency Range:  | 150 kHz to 30 MHz                                                                                                          |
| Class:            | Class B                                                                                                                    |
| Limit:            | 66-56 dB $\mu$ V between 0.15 MHz & 0.5 MHz<br>56 dB $\mu$ V between 0.5 MHz & 5MHz<br>60 dB $\mu$ V between 5 MHz & 30MHz |
| Detector:         | Peak for pre-scan (9 kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit          |

### 5.1 E.U.T. Operation

#### Operating Environment:

Temperature: 25.5 °C

Humidity: 51 % RH

Atmospheric Pressure: 1012 mbar

Voltage: AC 120V/60Hz

#### EUT Operation:

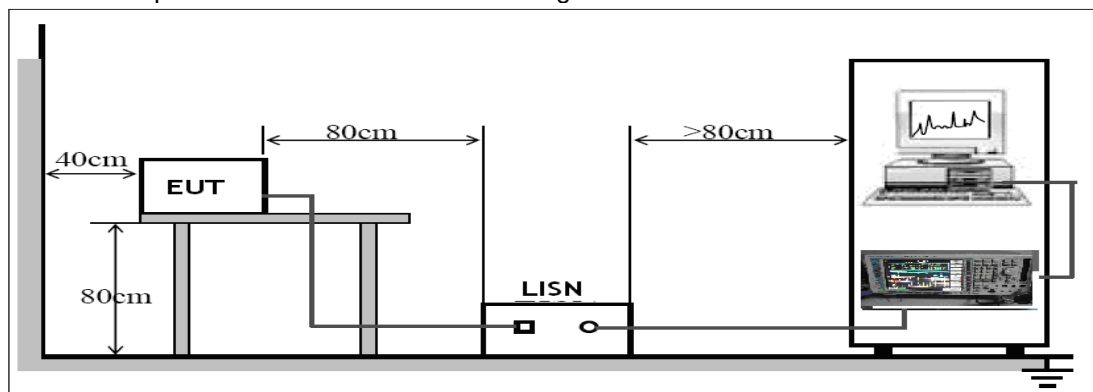
The EUT was tested according to ANSI C63.4:2014. The frequency spectrum from 150 kHz to 30MHz was investigated.

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

The EUT was in transmitting mode, The worst mode was GFSK low channel, the data was recording in the report.

### 5.2 EUT Setup

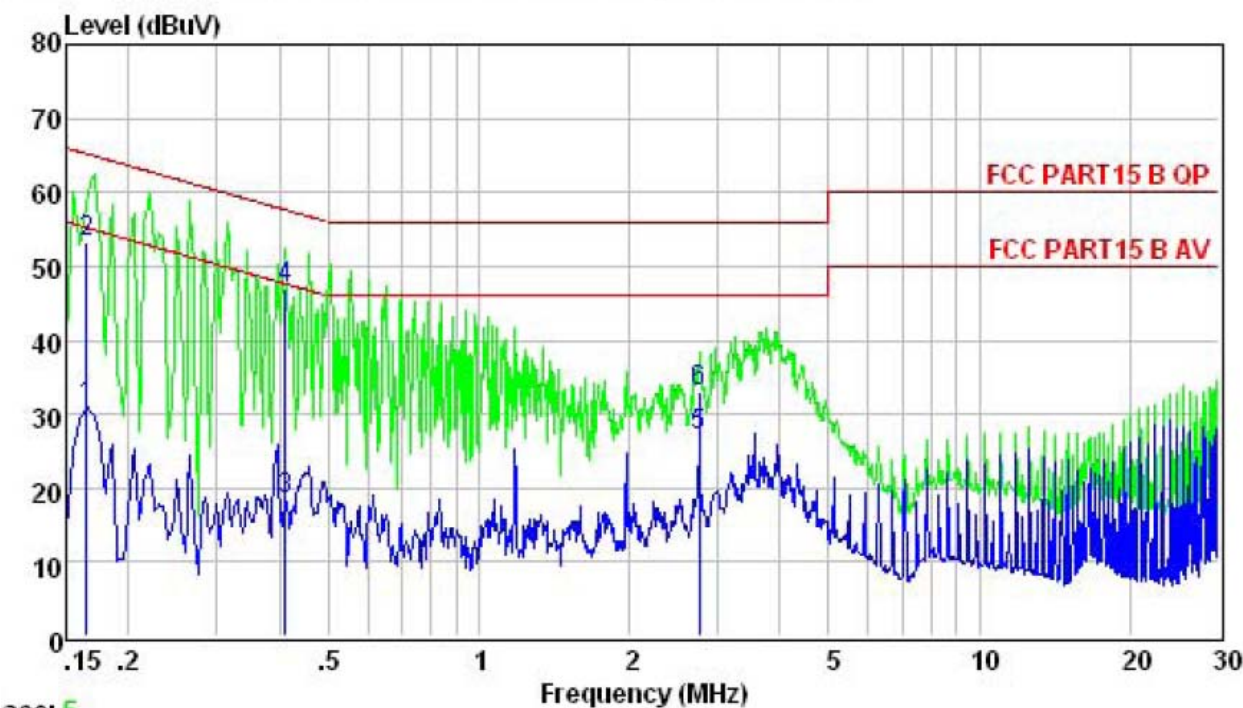
The EUT was placed on the test table in shielding room.





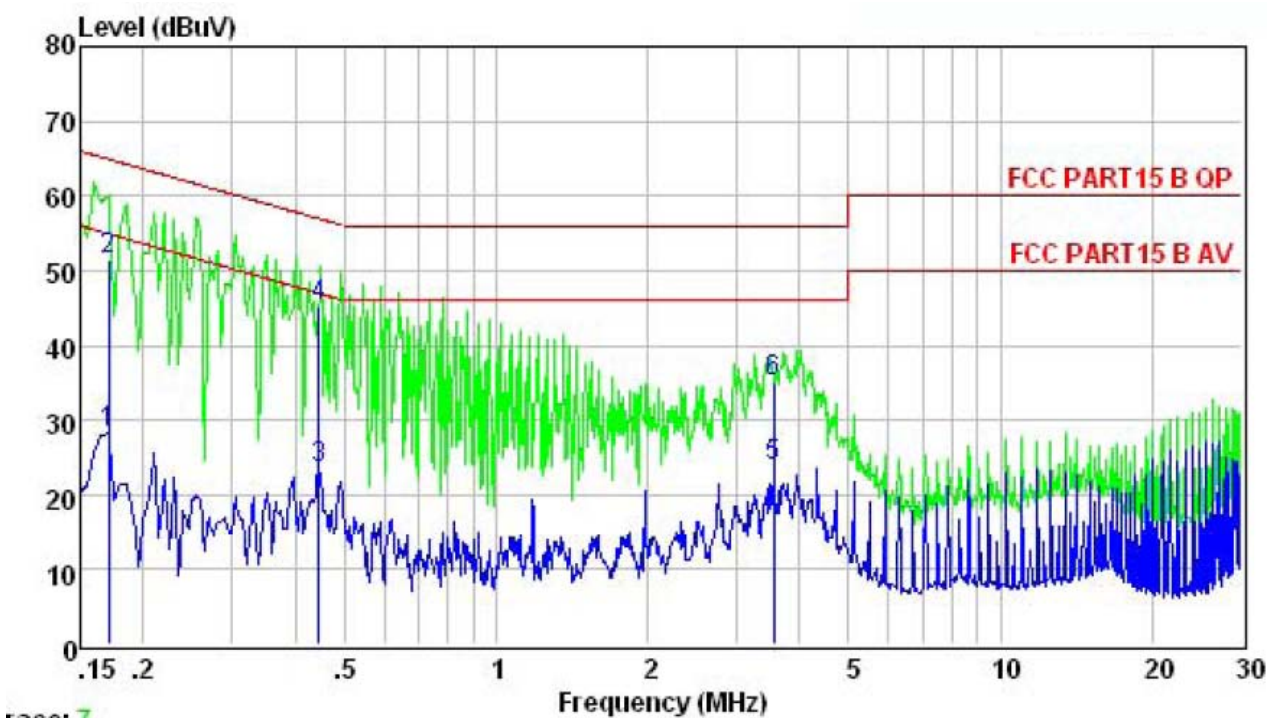
5.3 Conducted Emission Test Result

Line



|   | Freq  | Level | Limit | Over   |         |
|---|-------|-------|-------|--------|---------|
|   | MHz   | dBuV  | Line  | Limit  | Remark  |
| 1 | 0.165 | 31.03 | 55.21 | -24.18 | Average |
| 2 | 0.165 | 53.26 | 65.21 | -11.95 | QP      |
| 3 | 0.410 | 18.53 | 47.64 | -29.11 | Average |
| 4 | 0.410 | 46.96 | 57.64 | -10.68 | QP      |
| 5 | 2.750 | 26.97 | 46.00 | -19.03 | Average |
| 6 | 2.750 | 33.14 | 56.00 | -22.86 | QP      |

Neutral



|   | Freq  | Level | Limit | Over   |         |
|---|-------|-------|-------|--------|---------|
|   | MHz   | dBuV  | Line  | Limit  | Remark  |
| 1 | 0.170 | 28.16 | 54.94 | -26.78 | Average |
| 2 | 0.170 | 51.35 | 64.94 | -13.59 | QP      |
| 3 | 0.444 | 23.56 | 46.98 | -23.42 | Average |
| 4 | 0.444 | 45.26 | 56.98 | -11.72 | QP      |
| 5 | 3.547 | 23.87 | 46.00 | -22.13 | Average |
| 6 | 3.547 | 35.12 | 56.00 | -20.88 | QP      |

## 6 Spurious Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.249

Test Method: DA 00-705

Test Result: PASS

Measurement Distance: 3m

Limit:

| Frequency<br>(MHz) | Field Strength |                 | Field Strength Limit at 3m Measurement Dist |                                |
|--------------------|----------------|-----------------|---------------------------------------------|--------------------------------|
|                    | uV/m           | Distance<br>(m) | uV/m                                        | dBuV/m                         |
| 0.009 ~ 0.490      | 2400/F(kHz)    | 300             | 10000 * 2400/F(kHz)                         | $20\log^{(2400/F(kHz))} + 80$  |
| 0.490 ~ 1.705      | 24000/F(kHz)   | 30              | 100 * 24000/F(kHz)                          | $20\log^{(24000/F(kHz))} + 40$ |
| 1.705 ~ 30         | 30             | 30              | 100 * 30                                    | $20\log^{(30)} + 40$           |
| 30 ~ 88            | 100            | 3               | 100                                         | $20\log^{(100)}$               |
| 88 ~ 216           | 150            | 3               | 150                                         | $20\log^{(150)}$               |
| 216 ~ 960          | 200            | 3               | 200                                         | $20\log^{(200)}$               |
| Above 960          | 500            | 3               | 500                                         | $20\log^{(500)}$               |

### 6.1 EUT Operation :

Operating Environment:

Temperature: 25.5 °C

Humidity: 51 % RH

Atmospheric Pressure: 1010 mbar

Voltage: DC 3.7V from battery

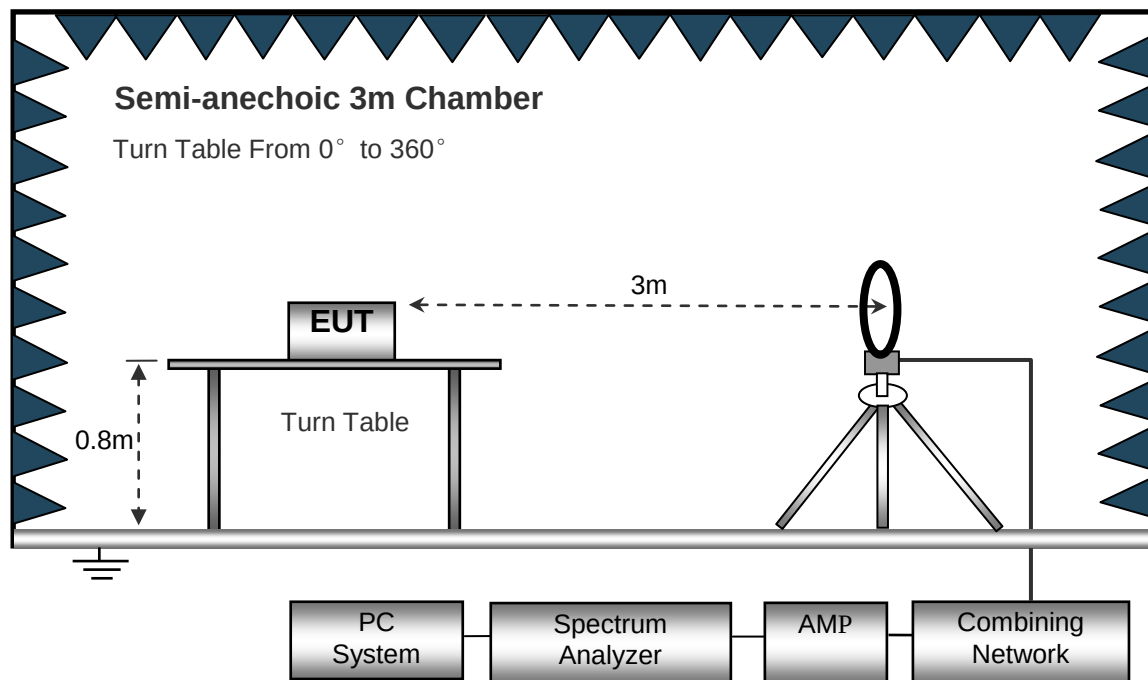
#### Operation Mode:

The EUT was tested in transmitting mode, and the data were shown as follow.

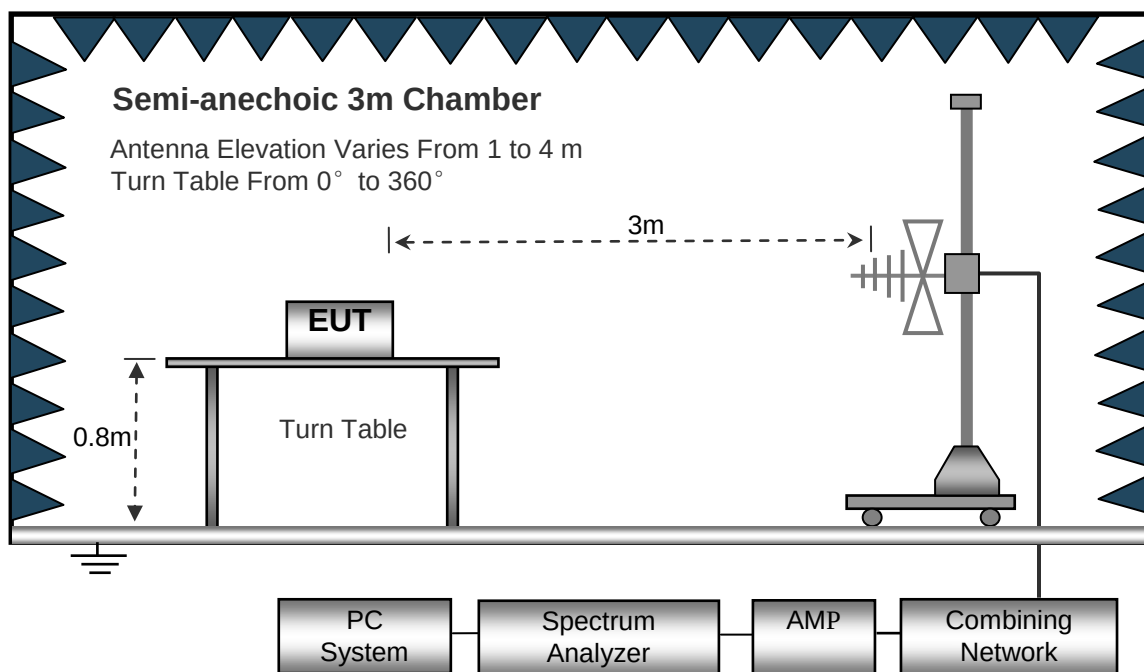
## 6.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4:2014.

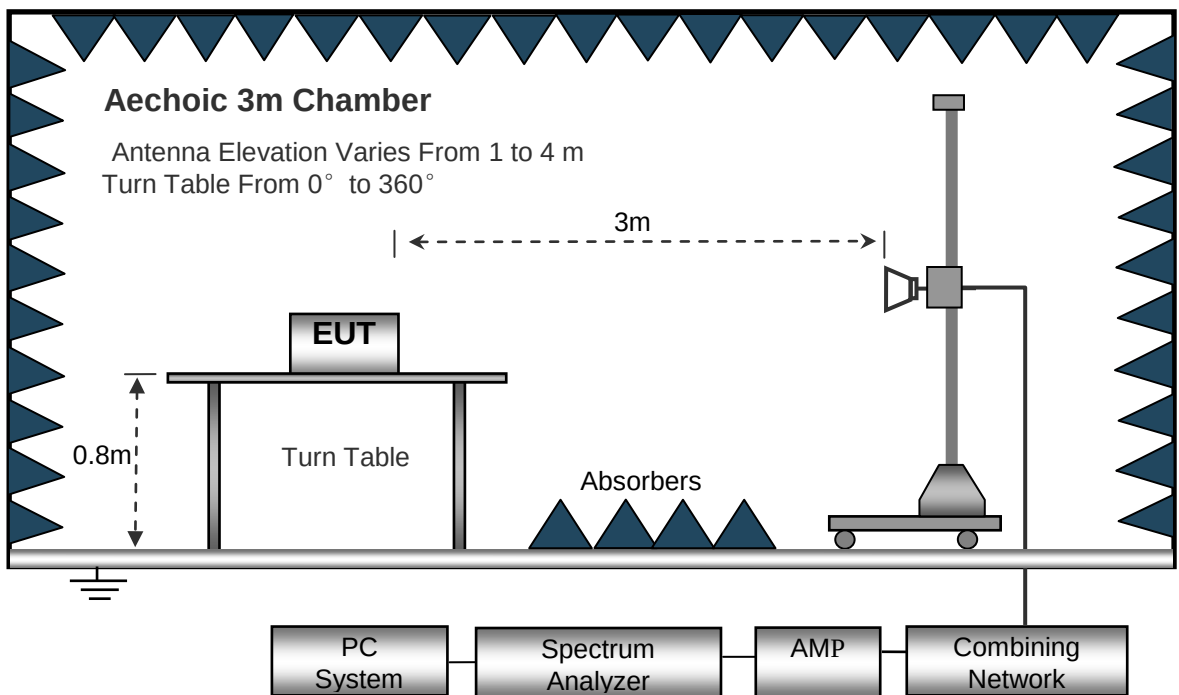
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



### 6.3 Spectrum Analyzer Setup

According to FCC Part15 Rules, the system was tested 9kHz to 25000MHz.

Below 30MHz

Sweep Speed ..... Auto  
IF Bandwidth.....10kHz  
Video Bandwidth.....10kHz  
Resolution Bandwidth.....10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto  
Detector .....PK  
Resolution Bandwidth.....100kHz  
Video Bandwidth.....300kHz

Above 1GHz

Sweep Speed ..... Auto  
Detector .....PK  
Resolution Bandwidth.....1MHz  
Video Bandwidth.....3MHz  
Detector .....Ave.  
Resolution Bandwidth.....1MHz  
Video Bandwidth.....10Hz

## 6.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

## 6.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

## 6.6 Summary of Test Results

### Test Frequency: Below 30MHz

The measurements were more than 20 dB below the limit and not reported.

### Test Frequency: 30MHz ~ 18GHz

Test mode: transmitting

### Test Frequency: 18~25GHz

The measurements were more than 20 dB below the limit and not reported.

Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the X-axis which it is worse case.

All the modulation modes were tested, the data of the worst mode were recorded in the following pages.

|                                               | Freq.  | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | FCC Part 15.249/209/205 |        |
|-----------------------------------------------|--------|------------------|-------------|------------------|------------|-------|------------------|---------------------|-------------------------|--------|
|                                               |        |                  |             |                  | Height     | Polar |                  |                     | Limit                   | Result |
|                                               | (MHz)  | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m)                |        |
| <b>GFSK<br/>Lower<br/>Channel<br/>2402MHz</b> | 46.57  | 14.06            | QP          | 24               | 2.8        | H     | 16.31            | 30.37               | 40.00                   | Pass   |
|                                               | 87.63  | 15.57            | QP          | 74               | 2.3        | H     | 16.59            | 32.16               | 40.00                   | Pass   |
|                                               | 109.31 | 15.29            | QP          | 59               | 1.8        | H     | 17.11            | 32.40               | 43.50                   | Pass   |
|                                               | 343.47 | 17.31            | QP          | 33               | 2.9        | H     | 17.52            | 34.83               | 43.50                   | Pass   |
|                                               | 418.52 | 16.42            | QP          | 48               | 3.7        | H     | 17.47            | 33.89               | 46.00                   | Pass   |
|                                               | 611.24 | 15.06            | QP          | 74               | 4.0        | H     | 17.52            | 32.58               | 46.00                   | Pass   |
|                                               | 54.27  | 17.43            | QP          | 63               | 1.1        | V     | 16.61            | 34.04               | 40.00                   | Pass   |
|                                               | 110.24 | 18.16            | QP          | 152              | 1.5        | V     | 16.17            | 34.33               | 43.50                   | Pass   |
|                                               | 185.02 | 16.25            | QP          | 257              | 1.0        | V     | 16.71            | 32.96               | 43.50                   | Pass   |
|                                               | 288.47 | 18.32            | QP          | 16               | 1.1        | V     | 17.15            | 35.47               | 43.50                   | Pass   |
|                                               | 526.53 | 15.61            | QP          | 34               | 1.7        | V     | 17.86            | 33.47               | 46.00                   | Pass   |
|                                               | 803.26 | 16.02            | QP          | 178              | 1.5        | V     | 17.97            | 33.99               | 46.00                   | Pass   |

|                                               | Freq.   | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | FCC Part 15.249/209/205 |        |
|-----------------------------------------------|---------|------------------|-------------|------------------|------------|-------|------------------|---------------------|-------------------------|--------|
|                                               |         |                  |             |                  | Height     | Polar |                  |                     | Limit                   | Result |
|                                               | (MHz)   | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m)                |        |
| <b>GFSK<br/>Lower<br/>Channel<br/>2402MHz</b> | 2402.00 | 102.35           | PK          | 36               | 2.2        | H     | 1.31             | 103.66              | 114.00                  | Pass   |
|                                               | 2402.00 | 88.24            | Ave         | 36               | 2.2        | H     | 1.31             | 89.55               | 94.00                   | Pass   |
|                                               | 4804.00 | 57.26            | PK          | 42               | 2.3        | H     | -1.06            | 56.20               | 74.00                   | Pass   |
|                                               | 4804.00 | 48.35            | Ave         | 42               | 2.3        | H     | -1.06            | 47.29               | 54.00                   | Pass   |
|                                               | 2402.00 | 101.29           | PK          | 0                | 1.3        | V     | 1.31             | 102.60              | 114.00                  | Pass   |
|                                               | 2402.00 | 87.53            | Ave         | 0                | 1.3        | V     | 1.31             | 88.84               | 94.00                   | Pass   |
|                                               | 4804.00 | 58.27            | PK          | 91               | 1.4        | V     | -1.06            | 57.21               | 74.00                   | Pass   |
|                                               | 4804.00 | 46.87            | Ave         | 91               | 1.4        | V     | -1.06            | 45.81               | 54.00                   | Pass   |

Note: Other harmonics emissions are lower than 20dB below the allowable limit.

|                                                | Freq.   | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | FCC Part 15.249/209/205 |        |
|------------------------------------------------|---------|------------------|-------------|------------------|------------|-------|------------------|---------------------|-------------------------|--------|
|                                                |         |                  |             |                  | Height     | Polar |                  |                     | Limit                   | Margin |
|                                                | (MHz)   | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m)                | (dB)   |
| <b>GFSK<br/>Middle<br/>Channel<br/>2441MHz</b> | 2441.00 | 102.21           | PK          | 43               | 2.7        | H     | 0.85             | 103.06              | 114.00                  | Pass   |
|                                                | 2441.00 | 87.78            | Ave         | 43               | 2.7        | H     | 0.85             | 88.63               | 94.00                   | Pass   |
|                                                | 4882.00 | 54.12            | PK          | 57               | 1.0        | H     | -0.62            | 53.50               | 74.00                   | Pass   |
|                                                | 4882.00 | 43.36            | Ave         | 57               | 1.0        | H     | -0.62            | 42.74               | 54.00                   | Pass   |
|                                                | 2441.00 | 102.12           | PK          | 62               | 1.5        | V     | 0.85             | 102.97              | 114.00                  | Pass   |
|                                                | 2441.00 | 87.16            | Ave         | 62               | 1.5        | V     | 0.85             | 88.01               | 94.00                   | Pass   |
|                                                | 4882.00 | 55.03            | PK          | 1                | 1.0        | V     | -0.62            | 54.41               | 74.00                   | Pass   |
|                                                | 4882.00 | 44.43            | Ave         | 1                | 1.0        | V     | -0.62            | 43.81               | 54.00                   | Pass   |

|                                               |         |        |     |     |     |   |       |        |        |      |
|-----------------------------------------------|---------|--------|-----|-----|-----|---|-------|--------|--------|------|
| <b>GFSK<br/>Upper<br/>Channel<br/>2480MHz</b> | 2480.00 | 102.42 | PK  | 24  | 2.1 | H | 0.53  | 102.95 | 114.00 | Pass |
|                                               | 2480.00 | 87.86  | Ave | 24  | 2.1 | H | 0.53  | 88.39  | 94.00  | Pass |
|                                               | 4960.00 | 52.26  | PK  | 88  | 3.5 | H | -0.24 | 52.02  | 74.00  | Pass |
|                                               | 4960.00 | 43.26  | Ave | 88  | 3.5 | H | -0.24 | 43.02  | 54.00  | Pass |
|                                               | 2480.00 | 101.58 | PK  | 124 | 1.0 | V | 0.53  | 102.11 | 114.00 | Pass |
|                                               | 2480.00 | 87.13  | Ave | 124 | 1.0 | V | 0.53  | 87.66  | 94.00  | Pass |
|                                               | 4960.00 | 54.42  | PK  | 163 | 1.5 | V | -0.24 | 54.18  | 74.00  | Pass |
|                                               | 4960.00 | 43.47  | Ave | 163 | 1.5 | V | -0.24 | 43.23  | 54.00  | Pass |

|                                                    |         |        |     |     |     |   |       |        |        |      |
|----------------------------------------------------|---------|--------|-----|-----|-----|---|-------|--------|--------|------|
| <b>PI/4 DPSK<br/>Lower<br/>Channel<br/>2402MHz</b> | 2402.00 | 102.42 | PK  | 158 | 2.8 | H | 1.31  | 103.73 | 114.00 | Pass |
|                                                    | 2402.00 | 87.53  | Ave | 158 | 2.8 | H | 1.31  | 88.84  | 94.00  | Pass |
|                                                    | 4804.00 | 55.12  | PK  | 47  | 1.5 | H | -1.06 | 54.06  | 74.00  | Pass |
|                                                    | 4804.00 | 44.25  | Ave | 47  | 1.5 | H | -1.06 | 43.19  | 54.00  | Pass |
|                                                    | 2402.00 | 101.53 | PK  | 63  | 1.1 | V | 1.31  | 102.84 | 114.00 | Pass |
|                                                    | 2402.00 | 87.38  | Ave | 63  | 1.1 | V | 1.31  | 88.69  | 94.00  | Pass |
|                                                    | 4804.00 | 54.42  | PK  | 157 | 1.4 | V | -1.06 | 53.36  | 74.00  | Pass |
|                                                    | 4804.00 | 44.06  | Ave | 157 | 1.4 | V | -1.06 | 43.00  | 54.00  | Pass |



Note: Other harmonics emissions are lower than 20dB below the allowable limit.

|                                                         | Freq.   | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | FCC Part 15.249/209/205 |        |
|---------------------------------------------------------|---------|------------------|-------------|------------------|------------|-------|------------------|---------------------|-------------------------|--------|
|                                                         |         |                  |             |                  | Height     | Polar |                  |                     | Limit                   | Margin |
|                                                         | (MHz)   | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m)                | (dB)   |
| <b>PI/4<br/>DPSK<br/>Middle<br/>Channel<br/>2441MHz</b> | 2441.00 | 102.16           | PK          | 93               | 2.5        | H     | 0.85             | 103.01              | 114.00                  | Pass   |
|                                                         | 2441.00 | 87.26            | Ave         | 93               | 2.5        | H     | 0.85             | 88.11               | 94.00                   | Pass   |
|                                                         | 4882.00 | 54.53            | PK          | 55               | 1.1        | H     | -0.62            | 53.91               | 74.00                   | Pass   |
|                                                         | 4882.00 | 44.21            | Ave         | 55               | 1.2        | H     | -0.62            | 43.59               | 54.00                   | Pass   |
|                                                         | 2441.00 | 102.06           | PK          | 91               | 2.7        | V     | 0.85             | 102.91              | 114.00                  | Pass   |
|                                                         | 2441.00 | 87.42            | Ave         | 91               | 2.7        | V     | 0.85             | 88.27               | 94.00                   | Pass   |
|                                                         | 4882.00 | 53.23            | PK          | 126              | 1.1        | V     | -0.62            | 52.61               | 74.00                   | Pass   |
|                                                         | 4882.00 | 44.27            | Ave         | 126              | 1.1        | V     | -0.62            | 43.65               | 54.00                   | Pass   |

|                                                        |         |        |     |     |     |   |       |        |        |      |
|--------------------------------------------------------|---------|--------|-----|-----|-----|---|-------|--------|--------|------|
| <b>PI/4<br/>DPSK<br/>Upper<br/>Channel<br/>2480MHz</b> | 2480.00 | 101.43 | PK  | 252 | 1.2 | H | 0.53  | 101.96 | 114.00 | Pass |
|                                                        | 2480.00 | 84.26  | Ave | 252 | 1.2 | H | 0.53  | 84.79  | 94.00  | Pass |
|                                                        | 4960.00 | 54.03  | PK  | 178 | 1.1 | H | -0.24 | 53.79  | 74.00  | Pass |
|                                                        | 4960.00 | 44.27  | Ave | 178 | 1.1 | H | -0.24 | 44.03  | 54.00  | Pass |
|                                                        | 2480.00 | 102.26 | PK  | 24  | 1.5 | V | 0.53  | 102.79 | 114.00 | Pass |
|                                                        | 2480.00 | 88.01  | Ave | 24  | 1.5 | V | 0.53  | 88.54  | 94.00  | Pass |
|                                                        | 4960.00 | 54.26  | PK  | 122 | 1.7 | V | -0.24 | 54.02  | 74.00  | Pass |
|                                                        | 4960.00 | 44.33  | Ave | 122 | 1.7 | V | -0.24 | 44.09  | 54.00  | Pass |

|                                                |         |        |     |     |     |   |       |        |        |      |
|------------------------------------------------|---------|--------|-----|-----|-----|---|-------|--------|--------|------|
| <b>8DPSK<br/>Lower<br/>Channel<br/>2402MHz</b> | 2402.00 | 101.24 | PK  | 186 | 1.8 | H | 1.31  | 102.55 | 114.00 | Pass |
|                                                | 2402.00 | 87.29  | Ave | 186 | 1.8 | H | 1.31  | 88.60  | 94.00  | Pass |
|                                                | 4804.00 | 53.54  | PK  | 66  | 1.1 | H | -1.06 | 52.48  | 74.00  | Pass |
|                                                | 4804.00 | 44.21  | Ave | 66  | 1.1 | H | -1.06 | 43.15  | 54.00  | Pass |
|                                                | 2402.00 | 102.21 | PK  | 58  | 1.5 | V | 1.31  | 103.52 | 114.00 | Pass |
|                                                | 2402.00 | 88.43  | Ave | 58  | 1.5 | V | 1.31  | 89.74  | 94.00  | Pass |
|                                                | 4804.00 | 55.06  | PK  | 193 | 1.1 | V | -1.06 | 54.00  | 74.00  | Pass |
|                                                | 4804.00 | 45.43  | Ave | 193 | 1.1 | V | -1.06 | 44.37  | 54.00  | Pass |

Note: Other harmonics emissions are lower than 20dB below the allowable limit.

|                                                 | Freq.   | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | FCC Part 15.249/209/205 |        |
|-------------------------------------------------|---------|------------------|-------------|------------------|------------|-------|------------------|---------------------|-------------------------|--------|
|                                                 |         |                  |             |                  | Height     | Polar |                  |                     | Limit                   | Margin |
|                                                 | (MHz)   | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m)                | (dB)   |
| <b>8DPSK<br/>Middle<br/>Channel<br/>2441MHz</b> | 2441.00 | 102.42           | PK          | 26               | 2.1        | H     | 0.85             | 103.27              | 114.00                  | Pass   |
|                                                 | 2441.00 | 87.47            | Ave         | 26               | 2.1        | H     | 0.85             | 88.32               | 94.00                   | Pass   |
|                                                 | 4882.00 | 54.62            | PK          | 178              | 1.7        | H     | -0.62            | 54.00               | 74.00                   | Pass   |
|                                                 | 4882.00 | 46.31            | Ave         | 178              | 1.7        | H     | -0.62            | 45.69               | 54.00                   | Pass   |
|                                                 | 2441.00 | 102.28           | PK          | 22               | 1.2        | V     | 0.85             | 103.13              | 114.00                  | Pass   |
|                                                 | 2441.00 | 87.11            | Ave         | 22               | 1.2        | V     | 0.85             | 87.96               | 94.00                   | Pass   |
|                                                 | 4882.00 | 53.24            | PK          | 63               | 1.1        | V     | -0.62            | 52.62               | 74.00                   | Pass   |
|                                                 | 4882.00 | 42.74            | Ave         | 63               | 1.1        | V     | -0.62            | 42.12               | 54.00                   | Pass   |

|                                                |         |        |     |     |     |   |       |        |        |      |
|------------------------------------------------|---------|--------|-----|-----|-----|---|-------|--------|--------|------|
| <b>8DPSK<br/>Upper<br/>Channel<br/>2480MHz</b> | 2480.00 | 102.53 | PK  | 38  | 2.5 | H | 0.53  | 103.06 | 114.00 | Pass |
|                                                | 2480.00 | 87.42  | Ave | 38  | 2.5 | H | 0.53  | 87.95  | 94.00  | Pass |
|                                                | 4960.00 | 54.21  | PK  | 174 | 3.1 | H | -0.24 | 53.97  | 74.00  | Pass |
|                                                | 4960.00 | 43.62  | Ave | 174 | 3.1 | H | -0.24 | 43.38  | 54.00  | Pass |
|                                                | 2480.00 | 102.42 | PK  | 112 | 1.2 | V | 0.53  | 102.95 | 114.00 | Pass |
|                                                | 2480.00 | 87.26  | Ave | 112 | 1.2 | V | 0.53  | 87.79  | 94.00  | Pass |
|                                                | 4960.00 | 53.25  | PK  | 137 | 1.1 | V | -0.24 | 53.01  | 74.00  | Pass |
|                                                | 4960.00 | 42.57  | Ave | 137 | 1.1 | V | -0.24 | 42.33  | 54.00  | Pass |

Note: Other harmonics emissions are lower than 20dB below the allowable limit.

## 7 Band Edge Measurement

|                   |                                                                                                                                                                                                                                   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | Section 15.249(d) In addition, radiated emissions which fall in the restricted bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)). |
| Test Method:      | DA 00-705                                                                                                                                                                                                                         |
| Limit:            | 40.0 dBuV/m between 30MHz & 88MHz;<br>43.5 dBuV/m between 88MHz & 216MHz;<br>46.0 dBuV/m between 216MHz & 960MHz;<br>54.0 dBuV/m above 960MHz.<br>74.0 dBuV/m for peak above 1GHz<br>54.0 dBuV/m for AVG above 1GHz               |

### 7.1 Test Procedure

1. The EUT was placed on a turntable which is 0.8m above ground plane
2. Measurement Distance is 3m
3. Detector:
  - For Peak value:  
RBW = 1 MHz for  $f \geq 1$  GHz  
VBW  $\geq$  RBW; Sweep = auto  
Detector function = peak  
Trace = max hold
  - For AVG value:  
RBW = 1 MHz for  $f \geq 1$  GHz  
VBW = 10Hz; Sweep = auto  
Detector function = AVG  
Trace = max hold
4. Continuous transmitting

### 7.2 Test Result:

Test result shown as follows:

## GFSK

|           | Frequency<br>(MHz) | Antenna<br>polarization<br>(H/V) | Test<br>Frequency<br>(MHz) | Emission<br>(dBuV/m) | Band edge Limit<br>(dBuV/m) |       | Result |
|-----------|--------------------|----------------------------------|----------------------------|----------------------|-----------------------------|-------|--------|
|           |                    |                                  |                            | PK                   | PK                          | AV    |        |
| Hopping   | <2400              | H                                | 2386.23                    | 49.58                | 74.00                       | 54.00 | Pass   |
|           | <2400              | V                                | 2389.26                    | 49.52                | 74.00                       | 54.00 | Pass   |
|           | >2483.5            | H                                | 2488.59                    | 50.03                | 74.00                       | 54.00 | Pass   |
|           | >2483.5            | V                                | 2486.24                    | 50.68                | 74.00                       | 54.00 | Pass   |
| Unhopping | <2400              | H                                | 2387.59                    | 49.97                | 74.00                       | 54.00 | Pass   |
|           | <2400              | V                                | 2381.22                    | 50.03                | 74.00                       | 54.00 | Pass   |
|           | >2483.5            | H                                | 2486.31                    | 50.94                | 74.00                       | 54.00 | Pass   |
|           | >2483.5            | V                                | 2487.28                    | 50.39                | 74.00                       | 54.00 | Pass   |

## PI/4 DPSK

|           | Frequency<br>(MHz) | Antenna<br>polarization<br>(H/V) | Test<br>Frequency<br>(MHz) | Emission<br>(dBuV/m) | Band edge Limit<br>(dBuV/m) |       | Result |
|-----------|--------------------|----------------------------------|----------------------------|----------------------|-----------------------------|-------|--------|
|           |                    |                                  |                            | PK                   | PK                          | AV    |        |
| Hopping   | <2400              | H                                | 2384.36                    | 50.47                | 74.00                       | 54.00 | Pass   |
|           | <2400              | V                                | 2386.21                    | 50.62                | 74.00                       | 54.00 | Pass   |
|           | >2483.5            | H                                | 2487.26                    | 50.06                | 74.00                       | 54.00 | Pass   |
|           | >2483.5            | V                                | 2486.87                    | 50.31                | 74.00                       | 54.00 | Pass   |
| Unhopping | <2400              | H                                | 2393.12                    | 49.87                | 74.00                       | 54.00 | Pass   |
|           | <2400              | V                                | 2394.01                    | 49.39                | 74.00                       | 54.00 | Pass   |
|           | >2483.5            | H                                | 2486.17                    | 50.06                | 74.00                       | 54.00 | Pass   |
|           | >2483.5            | V                                | 2486.84                    | 50.11                | 74.00                       | 54.00 | Pass   |

## 8-DPSK

|           | Frequency<br>(MHz) | Antenna<br>polarization<br>(H/V) | Test<br>Frequency<br>(MHz) | Emission<br>(dBuV/m) | Band edge Limit<br>(dBuV/m) |       | Result |
|-----------|--------------------|----------------------------------|----------------------------|----------------------|-----------------------------|-------|--------|
|           |                    |                                  |                            | PK                   | PK                          | AV    |        |
| Hopping   | <2400              | H                                | 2392.15                    | 50.62                | 74.00                       | 54.00 | Pass   |
|           | <2400              | V                                | 2393.35                    | 50.34                | 74.00                       | 54.00 | Pass   |
|           | >2483.5            | H                                | 2486.12                    | 49.95                | 74.00                       | 54.00 | Pass   |
|           | >2483.5            | V                                | 2486.54                    | 50.03                | 74.00                       | 54.00 | Pass   |
| Unhopping | <2400              | H                                | 2389.57                    | 50.23                | 74.00                       | 54.00 | Pass   |
|           | <2400              | V                                | 2391.24                    | 50.37                | 74.00                       | 54.00 | Pass   |
|           | >2483.5            | H                                | 2486.58                    | 49.87                | 74.00                       | 54.00 | Pass   |
|           | >2483.5            | V                                | 2488.48                    | 49.85                | 74.00                       | 54.00 | Pass   |

## 8 20 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.249

Test Method: DA 00-705

Test Mode: Test in fixing operating frequency at low, Middle, high channel.

### 8.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

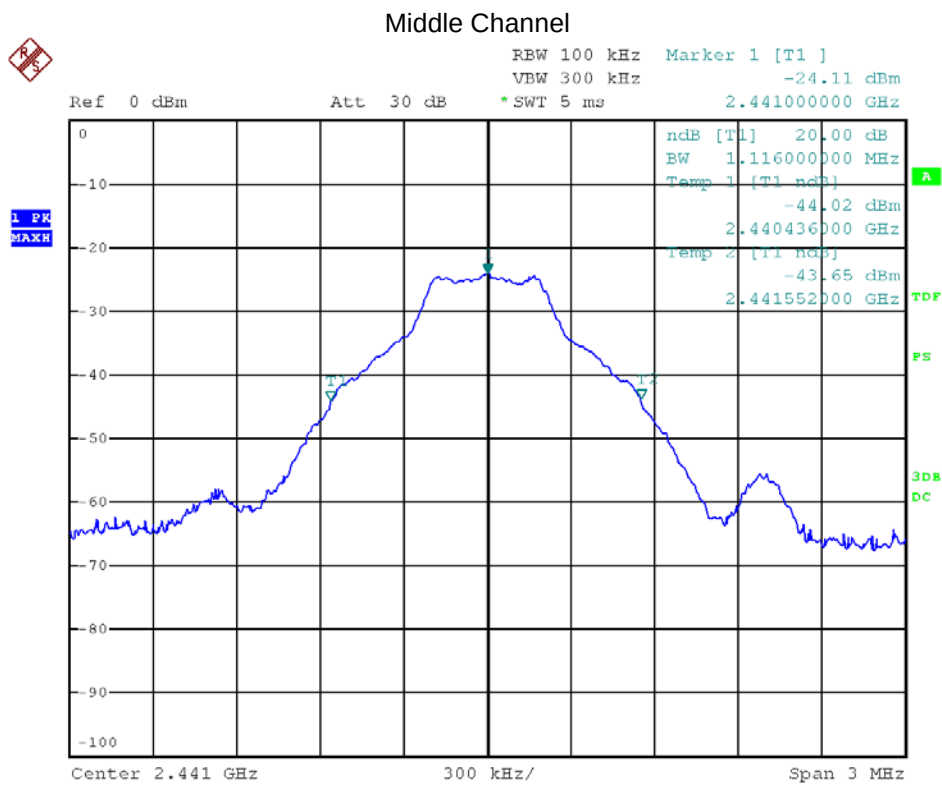
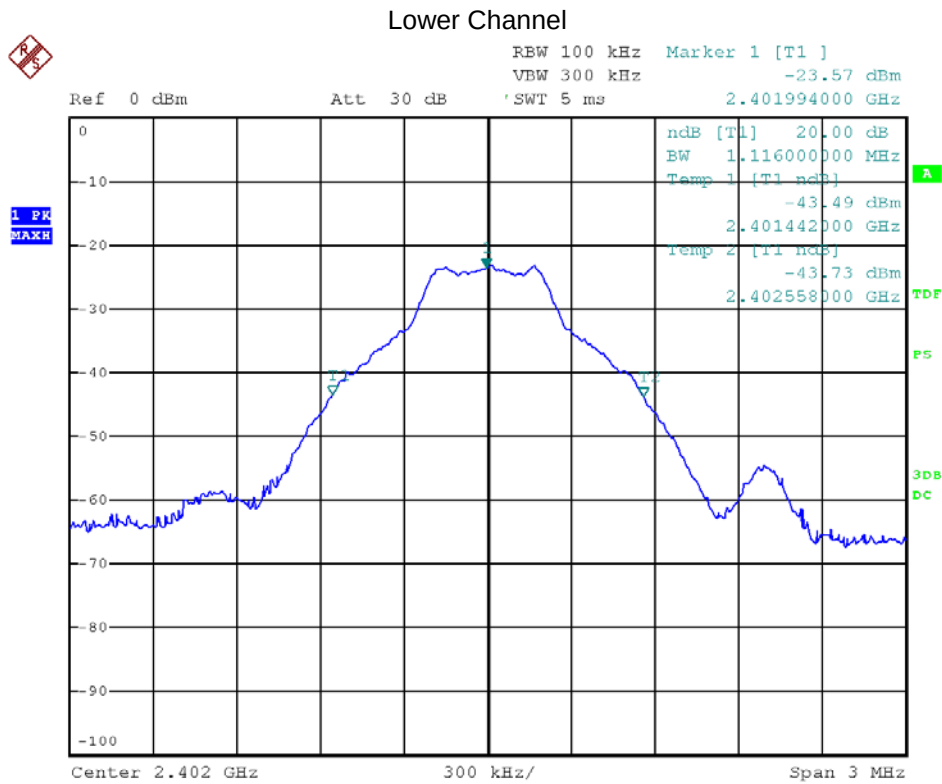
### 8.2 Test Result:

| Modulation | Test Channel | Bandwidth(MHz) |
|------------|--------------|----------------|
| GFSK       | Lower        | 0.825          |
|            | Middle       | 0.833          |
|            | Upper        | 0.825          |
| Pi/4DQPSK  | Lower        | 1.087          |
|            | Middle       | 1.087          |
|            | Upper        | 1.096          |
| 8DPSK      | Lower        | 1.116          |
|            | Middle       | 1.116          |
|            | Upper        | 1.122          |

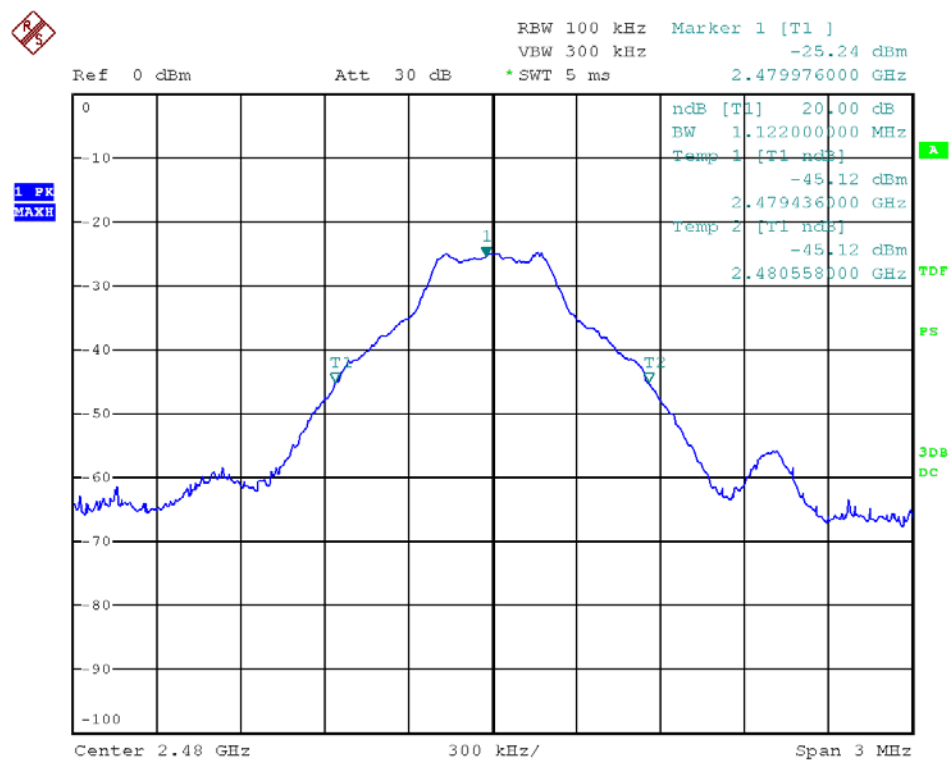
For pretest, the worst mode was 8DPSK, the data only show the 8DPSK mode.

Test result plot as follows:

Modulation: 8DPSK



Upper Channel



## **9 Antenna Requirement**

According to the FCC Part 15 Paragraph 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. This product has a PCB printed antenna, fulfill the requirement of this section.

===== End of Test Report =====