

# RF TEST REPORT



Report No.: 18020308-FCC-R1

Supersede Report No.: N/A

|  |   |                               |
|--|---|-------------------------------|
| Applicant  | Shenzhen Shuaixian Electronic Equipment Co., Ltd. |                               |
| Product Name   | Bluetooth Earphones                               |                               |
| Model No.  | SX-888  |                               |
| Serial No.   | SX-888A,SX-888B,SX-888C                           |                               |
| Test Standard  | FCC Part 15.247: 2017, ANSI C63.10: 2013          |                               |
| Test Date  | March 26 to March 29, 2018                        |                               |
| Issue Date   | April 02, 2018                                    |                               |
| Test Result  | <input checked="" type="checkbox"/> Pass          | <input type="checkbox"/> Fail |
| Equipment complied with the specification  | <input checked="" type="checkbox"/>               |                               |
| Equipment did not comply with the specification  | <input type="checkbox"/>                          |                               |
| Amos Xia   | Deon Dai  |                               |
| Amos Xia<br>Test Engineer  | Deon Dai<br>Engineer Reviewer                     |                               |
| <p>This test report may be reproduced in full only<br/>Test result presented in this test report is applicable to the tested sample only</p> |   |                               |

Issued by:

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## Laboratories Introduction

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### Accreditations for Conformity Assessment

| Country/Region | Scope                              |
|----------------|------------------------------------|
| USA            | EMC, RF/Wireless, SAR, Telecom     |
| Canada         | EMC, RF/Wireless, SAR, Telecom     |
| Taiwan         | EMC, RF, Telecom, SAR, Safety      |
| Hong Kong      | RF/Wireless, SAR, Telecom          |
| Australia      | EMC, RF, Telecom, SAR, Safety      |
| Korea          | EMI, EMS, RF, SAR, Telecom, Safety |
| Japan          | EMI, RF/Wireless, SAR, Telecom     |
| Singapore      | EMC, RF, SAR, Telecom              |
| Europe         | EMC, RF, SAR, Telecom, Safety      |



|                 |                 |
|-----------------|-----------------|
| Test Report No. | 18020308-FCC-R1 |
| Page            | 3 of 73         |

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## CONTENTS

|   |    |
|---|----|
| 1. REPORT REVISION HISTORY.....                                   | 5  |
| 2. CUSTOMER INFORMATION .....                                     | 5  |
| 3. TEST SITE INFORMATION.....                                     | 5  |
| 4. EQUIPMENT UNDER TEST (EUT) INFORMATION .....                   | 6  |
| 5. TEST SUMMARY .....   | 8  |
| 6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS .....            | 9  |
| 6.1 ANTENNA REQUIREMENT.....                                      | 9  |
| 6.2 CHANNEL SEPARATION.....                                       | 10 |
| 6.3 20DB BANDWIDTH .....  | 14 |
| 6.4 PEAK OUTPUT POWER .....                                       | 18 |
| 6.5 NUMBER OF HOPPING CHANNEL .....                               | 22 |
| 6.6 TIME OF OCCUPANCY (DWELL TIME) .....                          | 25 |
| 6.7 BAND EDGE .....   | 29 |
| 6.8 CONDUCTED EMISSIONS .....                                     | 49 |
| 6.9 RADIATED EMISSIONS.....                                       | 55 |
| ANNEX A. TEST INSTRUMENT.....                                     | 61 |
| ANNEX B. EUT AND TEST SETUP PHOTOGRAPHS .....                     | 62 |
| ANNEX C. TEST SETUP AND SUPPORTING EQUIPMENT.....                 | 69 |
| ANNEX D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PARTLIST..... | 72 |
| ANNEX E. DECLARATION OF SIMILARITY .....                          | 73 |

## 1. Report Revision History

| Report No.      | Report Version | Description | Issue Date     |
|-----------------|----------------|-------------|----------------|
| 18020308-FCC-R1 | NONE           | Original    | April 02, 2018 |
|                 |                |             |                |
|                 |                |             |                |
|                 |                |             |                |
|                 |                |             |                |
|                 |                |             |                |

## 2. Customer information

|                  |  |
|------------------|--|
| Applicant Name   | Shenzhen Shuaixian Electronic Equipment Co., Ltd.  |
| Applicant Add    | No.10 Lane 3, Longxing Rd., Dakang Long Village, Henggang Town,Longgang Dist., Shenzhen, China |
| Manufacturer     | Shenzhen Shuaixian Electronic Equipment Co., Ltd.  |
| Manufacturer Add | No.10 Lane 3, Longxing Rd., Dakang Long Village, Henggang Town,Longgang Dist., Shenzhen, China |

## 3. Test site information

|                      |  |
|----------------------|--|
| Lab performing tests | SIEMIC (Nanjing-China) Laboratories  |
| Lab Address          | 2-1 Longcang Avenue Yuhua Economic and Technology Development Park, Nanjing, China |
| FCC Test Site No.    | 694825   |
| IC Test Site No.     | 4842B-1  |
| Test Software        | EZ_EMU   |

#### 4. Equipment under Test (EUT) Information

Description of EUT: Bluetooth Earphones

Main Model: SX-888

Serial Model: SX-888A,SX-888B,SX-888C

Date EUT received: March 19, 2018

Test Date(s): March 26 to March 29, 2018

Antenna Gain: Bluetooth: -0.5 dBi

Type of Modulation: Bluetooth: GFSK, π/4DQPSK, 8DPSK

RF Operating Frequency (ies): Bluetooth: 2402-2480 MHz

Max. Output Power: 0.827 dBm

Number of Channels: Bluetooth: 79CH

Port: USB Port

Input Power: DC:3.3-4.2V  
Battery: 16mAh 0.592Wh 3.7V

Trade Name : N/A

FCC ID: UHB-SX-888

### Operating Channel list

| Channel | Frequency(MHz) |
|---------|----------------|---------|----------------|---------|----------------|---------|----------------|---------|----------------|
| 00      | 2402           | 17      | 2419           | 34      | 2436           | 51      | 2453           | 68      | 2470           |
| 01      | 2403           | 18      | 2420           | 35      | 2437           | 52      | 2454           | 69      | 2471           |
| 02      | 2404           | 19      | 2421           | 36      | 2438           | 53      | 2455           | 70      | 2472           |
| 03      | 2405           | 20      | 2422           | 37      | 2439           | 54      | 2456           | 71      | 2473           |
| 04      | 2406           | 21      | 2423           | 38      | 2440           | 55      | 2457           | 72      | 2474           |
| 05      | 2407           | 22      | 2424           | 39      | 2441           | 56      | 2458           | 73      | 2475           |
| 06      | 2408           | 23      | 2425           | 40      | 2442           | 57      | 2459           | 74      | 2476           |
| 07      | 2409           | 24      | 2426           | 41      | 2443           | 58      | 2460           | 75      | 2477           |
| 08      | 2410           | 25      | 2427           | 42      | 2444           | 59      | 2461           | 76      | 2478           |
| 09      | 2411           | 26      | 2428           | 43      | 2445           | 60      | 2462           | 77      | 2479           |
| 10      | 2412           | 27      | 2429           | 44      | 2446           | 61      | 2463           | 78      | 2480           |
| 11      | 2413           | 28      | 2430           | 45      | 2447           | 62      | 2464           |         |                |
| 12      | 2414           | 29      | 2431           | 46      | 2448           | 63      | 2465           |         |                |
| 13      | 2415           | 30      | 2432           | 47      | 2449           | 64      | 2466           |         |                |
| 14      | 2416           | 31      | 2433           | 48      | 2450           | 65      | 2467           |         |                |
| 15      | 2417           | 32      | 2434           | 49      | 2451           | 66      | 2468           |         |                |
| 16      | 2418           | 33      | 2435           | 50      | 2452           | 67      | 2469           |         |                |

## 5. Test Summary

The product was tested in accordance with the following specifications.  
 All testing has been performed according to below product classification:

| FCC Rules                    | Description of Test            | Result     |
|------------------------------|--------------------------------|------------|
| §15.203                      | Antenna Requirement            | Compliance |
| §15.247(a)(1)                | Channel Separation             | Compliance |
| §15.247(a)(1)                | 20 dB Bandwidth                | Compliance |
| §15.247(b)(1)                | Peak Output Power              | Compliance |
| §15.247(a)(1)(iii)           | Number of Hopping Channel      | Compliance |
| §15.247(a)(1)(iii)           | Time of Occupancy (Dwell Time) | Compliance |
| §15.247(d)                   | Band Edge                      | Compliance |
| §15.207(a)                   | AC Line Conducted Emissions    | Compliance |
| §15.205, §15.209, §15.247(d) | Radiated Emissions             | Compliance |

### Measurement Uncertainty

| Emissions                                 |   |               |
|---|---|---------------|
| Test Item                                 | Description   | Uncertainty   |
| Band Edge and Radiated Spurious Emissions | Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m) | +5.6dB/-4.5dB |
| -   | -   | -             |

## 6. Measurements, Examination And Derived Results

### 6.1 Antenna Requirement

#### Applicable Standard

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. 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 replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit. And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### Antenna Connector Construction

The EUT has 1 antennas:

A permanently attached PCB antenna for Bluetooth, the gain is -0.5 dBi for Bluetooth.

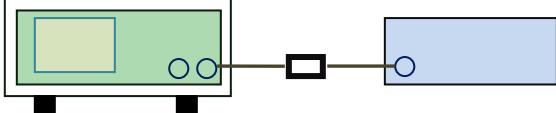
**Antenna must be permanently attached to the unit ,it meets up with the ANTENNA REQUIREMENT.**

**Result:** Compliant.

## 6.2 Channel Separation

|                      |                |
|----------------------|----------------|
| Temperature          | 23°C           |
| Relative Humidity    | 51%            |
| Atmospheric Pressure | 1018mbar       |
| Test date :          | March 26, 2018 |
| Tested By :          | Amos Xia       |

### Requirement(s):

| Spec           | Item   | Requirement   | Applicable                          |
|----------------|--|---|-------------------------------------|
| § 15.247(a)(1) | a)   | Channel Separation < 20dB BW and 20dB BW < 25KHz ;<br>Channel Separation Limit=25KHz<br>Chanel Separation < 20dB BW and 20dB BW > 25kHz ;<br>Channel Separation Limit=2/3 20dB BW | <input checked="" type="checkbox"/> |
| Test Setup     |    |   |                                     |
| Test Procedure | <p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines.<br/> <u>Use the following spectrum analyzer settings:</u></p> <ul style="list-style-type: none"> <li>- The EUT must have its hopping function enabled</li> <li>- Span = wide enough to capture the peaks of two adjacent channels</li> <li>- Resolution (or IF) Bandwidth (RBW) <math>\geq</math> 1% of the span</li> <li>- Video (or Average) Bandwidth (VBW) <math>\geq</math> RBW</li> <li>- Sweep = auto</li> <li>- Detector function = peak</li> <li>- Trace = max hold</li> <li>- Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.</li> </ul> |   |                                     |
| Remark         |  |   |                                     |
| Result         | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail   |   |                                     |

Test Data     Yes       N/A

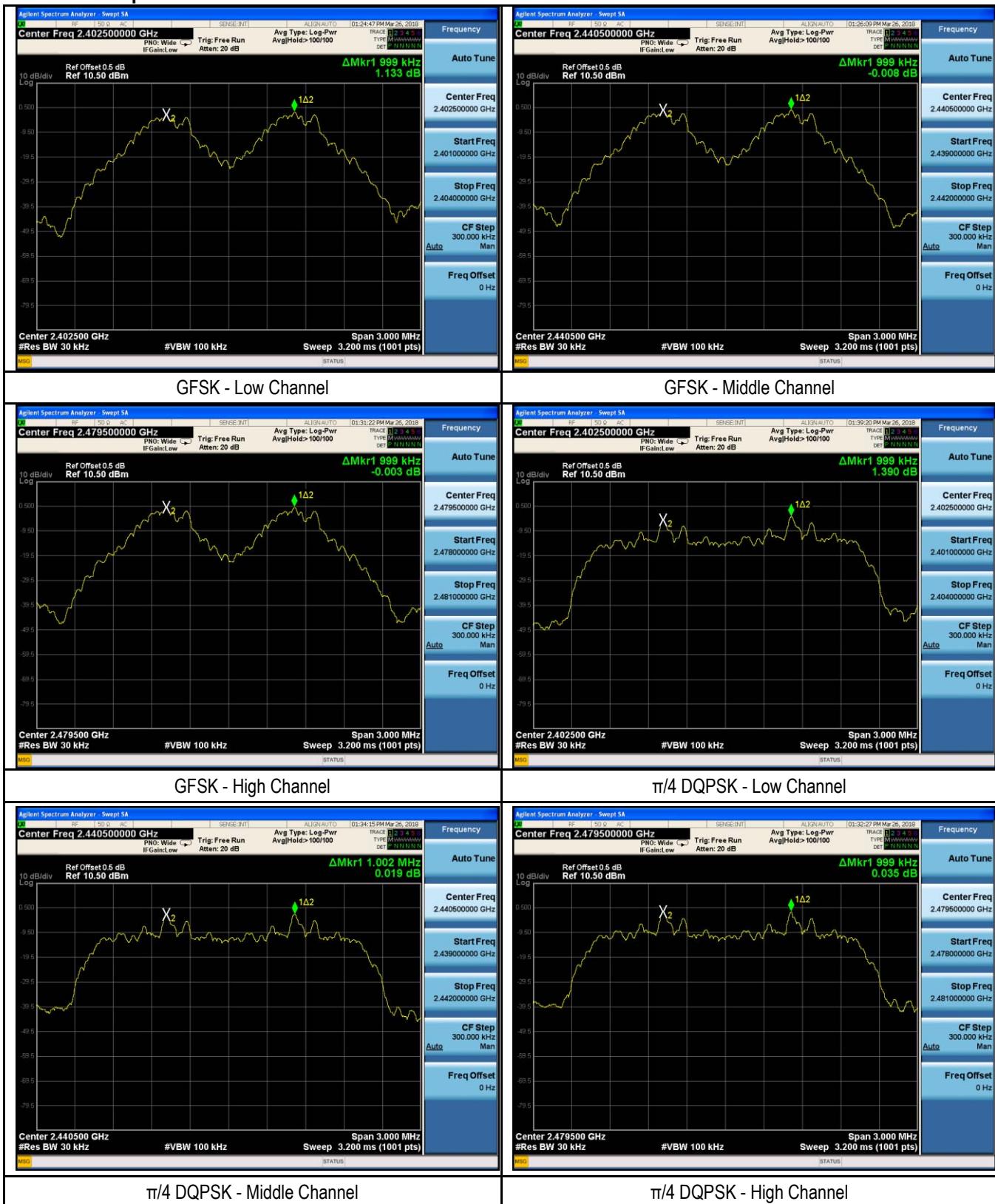
Test Plot     Yes (See below)       N/A

**Channel Separation measurement result**

| Type Modulation         | CH                | CH Freq (MHz) | CH Separation (MHz) | Limit (MHz) | Result |
|-------------------------|-------------------|---------------|---------------------|-------------|--------|
| CH Separation GFSK      | Low Channel       | 2402          | 0.999               | 0.9480      | Pass   |
|                         | Adjacency Channel | 2403          |                     |             |        |
|                         | Mid Channel       | 2440          |                     |             |        |
|                         | Adjacency Channel | 2441          | 0.999               | 0.9408      | Pass   |
|                         | High Channel      | 2480          |                     |             |        |
|                         | Adjacency Channel | 2479          |                     |             |        |
| CH Separation π/4 DQPSK | Low Channel       | 2402          | 0.999               | 0.8407      | Pass   |
|                         | Adjacency Channel | 2403          |                     |             |        |
|                         | Mid Channel       | 2440          |                     |             |        |
|                         | Adjacency Channel | 2441          | 1.002               | 0.8207      | Pass   |
|                         | High Channel      | 2480          |                     |             |        |
|                         | Adjacency Channel | 2479          |                     |             |        |
| CH Separation 8DPSK     | Low Channel       | 2402          | 0.999               | 0.8533      | Pass   |
|                         | Adjacency Channel | 2403          |                     |             |        |
|                         | Mid Channel       | 2440          |                     |             |        |
|                         | Adjacency Channel | 2441          | 1.002               | 0.8420      | Pass   |
|                         | High Channel      | 2480          |                     |             |        |
|                         | Adjacency Channel | 2479          |                     |             |        |

## Test Plots

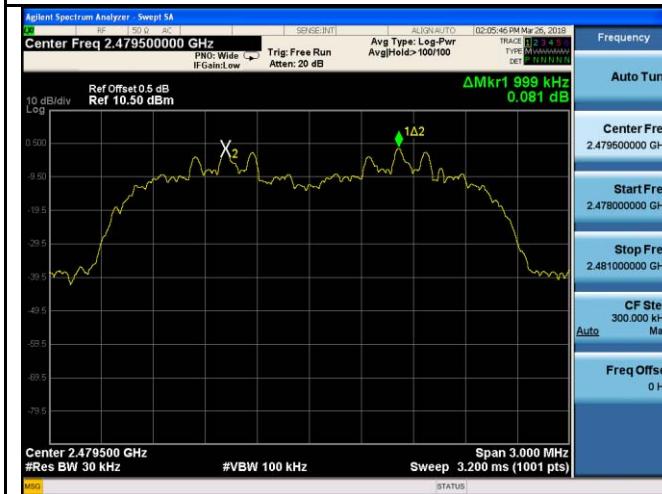
### Channel Separation measurement result





8DPSK - Low Channel

8DPSK - Middle Channel

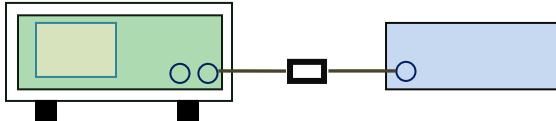


8DPSK - High Channel

### 6.3 20dB Bandwidth

|                      |                |
|----------------------|----------------|
| Temperature          | 23°C           |
| Relative Humidity    | 51%            |
| Atmospheric Pressure | 1018mbar       |
| Test date :          | March 26, 2018 |
| Tested By :          | Amos Xia       |

**Requirement(s):**

| Spec           | Item   | Requirement  | Applicable                          |
|----------------|--|--|-------------------------------------|
| §15.247(a) (1) | a)   | Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. | <input checked="" type="checkbox"/> |
| Test Setup     |    |  |                                     |
| Test Procedure | <p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines.</p> <p><u>Use the following spectrum analyzer settings:</u></p> <ul style="list-style-type: none"> <li>- Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel</li> <li>- RBW <math>\geq</math> 1% of the 20 dB bandwidth</li> <li>- VBW <math>\geq</math> RBW</li> <li>- Sweep = auto</li> <li>- Detector function = peak</li> <li>- Trace = max hold.</li> <li>- The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).</li> </ul> |  |                                     |
| Remark         |  |  |                                     |
| Result         | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail   |  |                                     |

**Test Data**     Yes       N/A

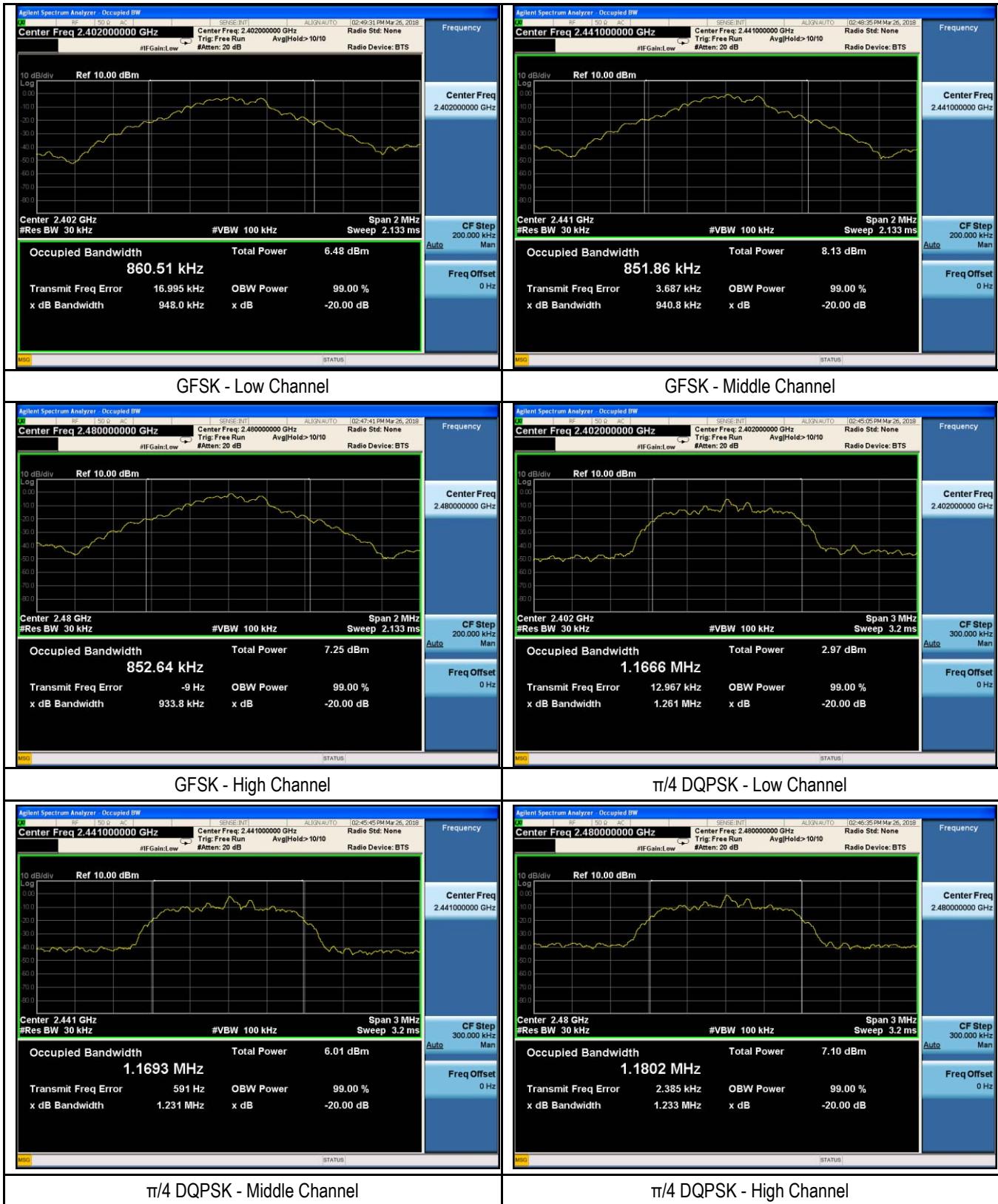
**Test Plot**     Yes (See below)       N/A

### Measurement result

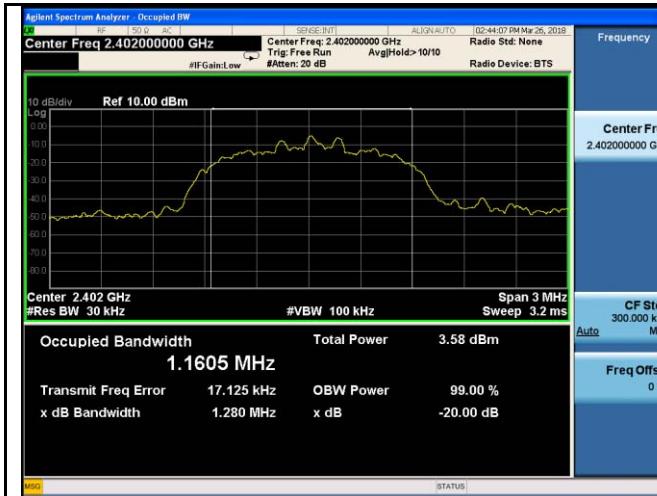
| Modulation    | CH   | CH Freq (MHz) | 20dB Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) |
|---------------|------|---------------|----------------------|------------------------------|
| GFSK          | Low  | 2402          | 0.9480               | 0.86051                      |
|               | Mid  | 2441          | 0.9408               | 0.85186                      |
|               | High | 2480          | 0.9338               | 0.85264                      |
| $\pi/4$ DQPSK | Low  | 2402          | 1.261                | 1.1666                       |
|               | Mid  | 2441          | 1.231                | 1.1693                       |
|               | High | 2480          | 1.233                | 1.1802                       |
| 8-DPSK        | Low  | 2402          | 1.280                | 1.1605                       |
|               | Mid  | 2441          | 1.263                | 1.1610                       |
|               | High | 2480          | 1.265                | 1.1751                       |

## Test Plots

### 20dB Bandwidth measurement result



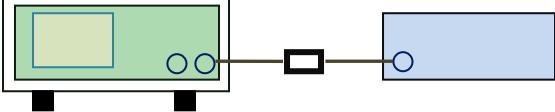
|                 |                 |
|-----------------|-----------------|
| Test Report No. | 18020308-FCC-R1 |
| Page            | 17 of 73        |



## 6.4 Peak Output Power

|                      |                |
|----------------------|----------------|
| Temperature          | 23°C           |
| Relative Humidity    | 51%            |
| Atmospheric Pressure | 1018mbar       |
| Test date :          | March 26, 2018 |
| Tested By :          | Amos Xia       |

### Requirement(s):

| Spec           | Item   | Requirement  | Applicable                          |
|----------------|--|--|-------------------------------------|
| §15.247(b) (2) | a)   | FHSS in 2400-2483.5MHz with $\geq$ 75 channels: $\leq$ 1 Watt  | <input checked="" type="checkbox"/> |
|                | b)   | FHSS in 5725-5850MHz: $\leq$ 1 Watt  | <input type="checkbox"/>            |
|                | c)   | For all other FHSS in the 2400-2483.5MHz band: $\leq$ 0.125 Watt.  | <input checked="" type="checkbox"/> |
|                | d)   | FHSS in 902-928MHz with $\geq$ 50 channels: $\leq$ 1 Watt  | <input type="checkbox"/>            |
|                | e)   | FHSS in 902-928MHz with $\geq$ 25 & $<$ 50 channels: $\leq$ 0.25 Watt  | <input type="checkbox"/>            |
|                | f)   | DSSS in 902-928MHz, 2400-2483.5MHz, 5725-5850MHz: $\leq$ 1 Watt  | <input type="checkbox"/>            |
| Test Setup     |  |   |                                     |
| Test Procedure |  | <p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines.<br/> <u>Use the following spectrum analyzer settings:</u></p> <ul style="list-style-type: none"> <li>- Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel</li> <li>- RBW &gt; the 20 dB bandwidth of the emission being measured</li> <li>- VBW <math>\geq</math>RBW</li> <li>- Sweep = auto</li> <li>- Detector function = peak</li> <li>- Trace = max hold</li> <li>- Allow the trace to stabilize.</li> <li>- Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (see the note above regarding external attenuation and cable loss). The limit is specified in one of the subparagraphs of this Section. Submit this plot. A peak responding power meter may be used instead of a spectrum analyzer.</li> </ul> |                                     |
| Remark         |  |  |                                     |
| Result         | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail |  |                                     |

Test Data  Yes       N/A

Test Plot  Yes (See below)       N/A

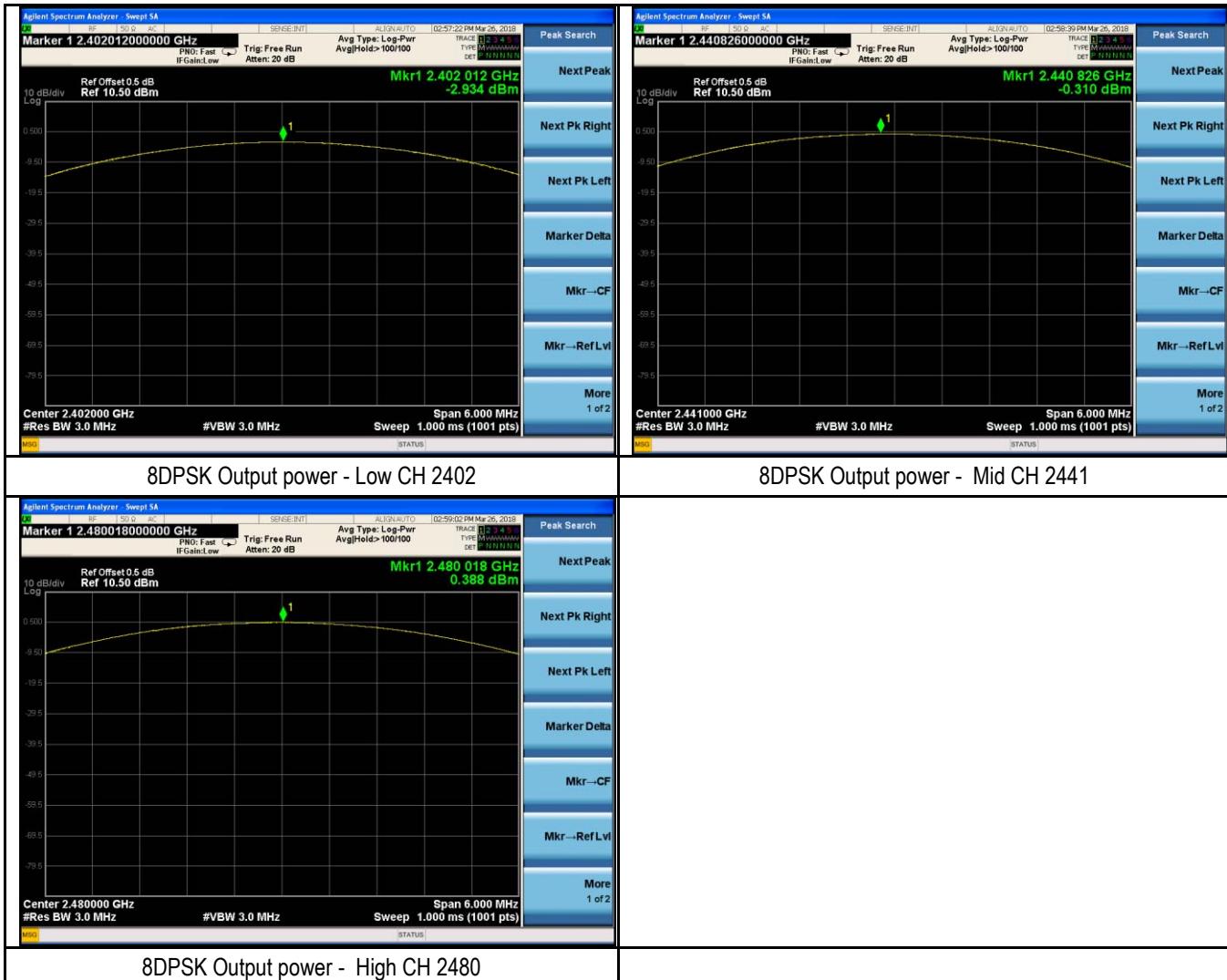
#### Peak Output Power measurement result

| Type         | Modulation    | CH   | Freq (MHz) | Conducted Power (dBm) | Limit (mW) | Result |
|--------------|---------------|------|------------|-----------------------|------------|--------|
| Output Power | GFSK          | Low  | 2402       | -1.169                | 30         | Pass   |
|              |               | Mid  | 2441       | 0.350                 | 30         | Pass   |
|              |               | High | 2480       | 0.827                 | 30         | Pass   |
|              | $\pi/4$ DQPSK | Low  | 2402       | -3.148                | 125        | Pass   |
|              |               | Mid  | 2441       | -0.507                | 125        | Pass   |
|              |               | High | 2480       | 0.168                 | 125        | Pass   |
|              | 8-DPSK        | Low  | 2402       | -2.934                | 125        | Pass   |
|              |               | Mid  | 2441       | -0.310                | 125        | Pass   |
|              |               | High | 2480       | 0.388                 | 125        | Pass   |

## Test Plots

### Output Power measurement result

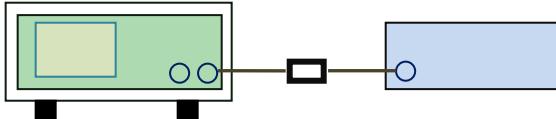




## 6.5 Number of Hopping Channel

|                      |                |
|----------------------|----------------|
| Temperature          | 23°C           |
| Relative Humidity    | 51%            |
| Atmospheric Pressure | 1018mbar       |
| Test date :          | March 26, 2018 |
| Tested By :          | Amos Xia       |

### Requirement(s):

| Spec                   | Item  | Requirement                          | Applicable                          |
|------------------------|---|--------------------------------------|-------------------------------------|
| §15.247(a)<br>(1)(iii) | a)  | FHSS in 2400-2483.5MHz ≥ 15 channels | <input checked="" type="checkbox"/> |
| Test Setup             |   |                                      |                                     |
| Test Procedure         | <p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines.<br/> <u>Use the following spectrum analyzer settings:</u><br/> The EUT must have its hopping function enabled.</p> <ul style="list-style-type: none"> <li>- Span = the frequency band of operation</li> <li>- RBW ≥ 1% of the span</li> <li>- VBW ≥ RBW</li> <li>- Sweep = auto</li> <li>- Detector function = peak</li> <li>- Trace = max hold</li> <li>- Allow trace to fully stabilize.</li> <li>- It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).</li> </ul> |                                      |                                     |
| Remark                 |   |                                      |                                     |
| Result                 | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail  |                                      |                                     |

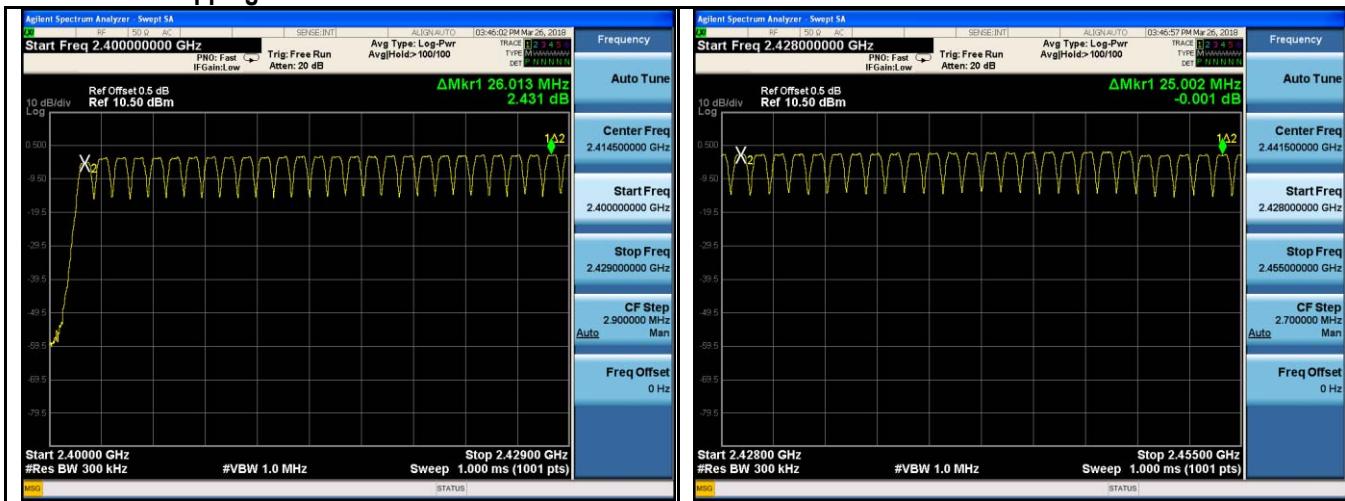
**Test Data**     Yes       N/A  
**Test Plot**     Yes (See below)       N/A

### Number of Hopping Channel measurement result

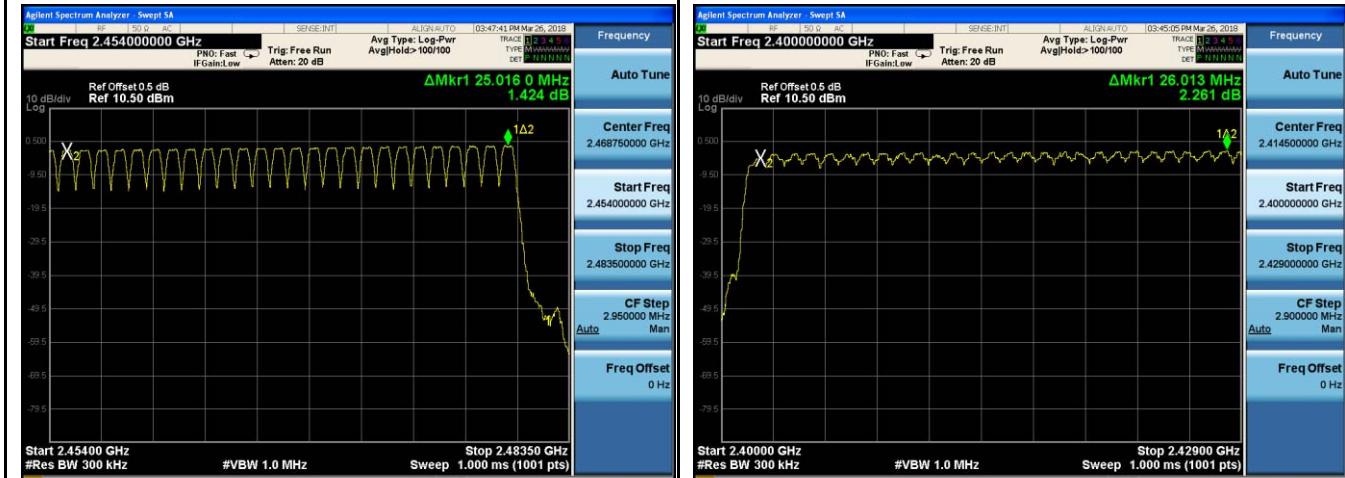
| Type                      | Modulation    | Frequency Range | Number of Hopping Channel | Limit |
|---------------------------|---------------|-----------------|---------------------------|-------|
| Number of Hopping Channel | GFSK          | 2400-2483.5     | 79                        | 15    |
|                           | $\pi/4$ DQPSK | 2400-2483.5     | 79                        | 15    |
|                           | 8-DPSK        | 2400-2483.5     | 79                        | 15    |

### Test Plots

#### Number of Hopping Channels measurement result



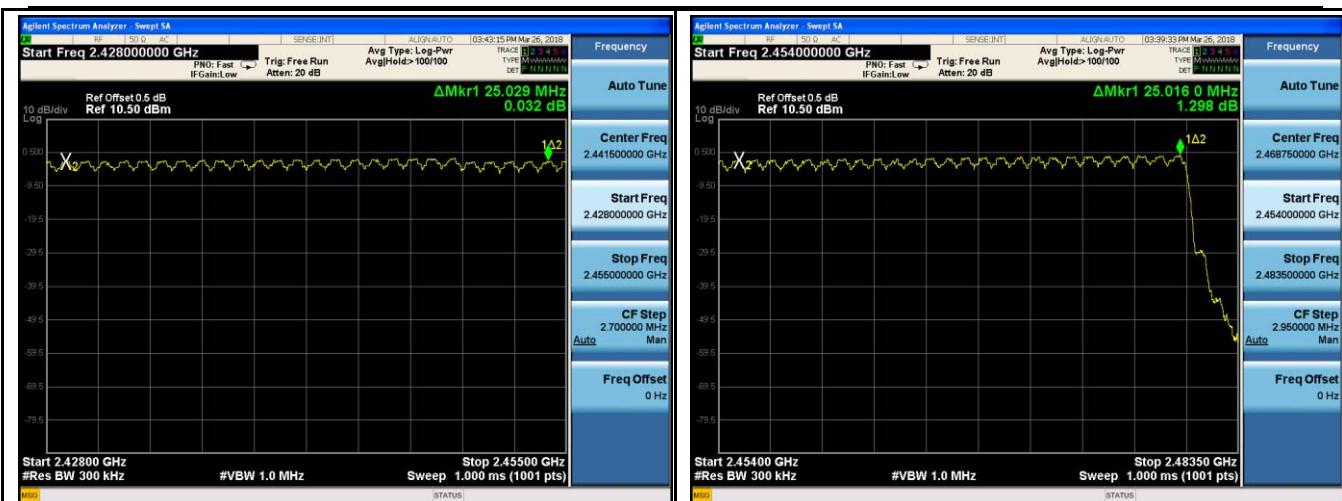
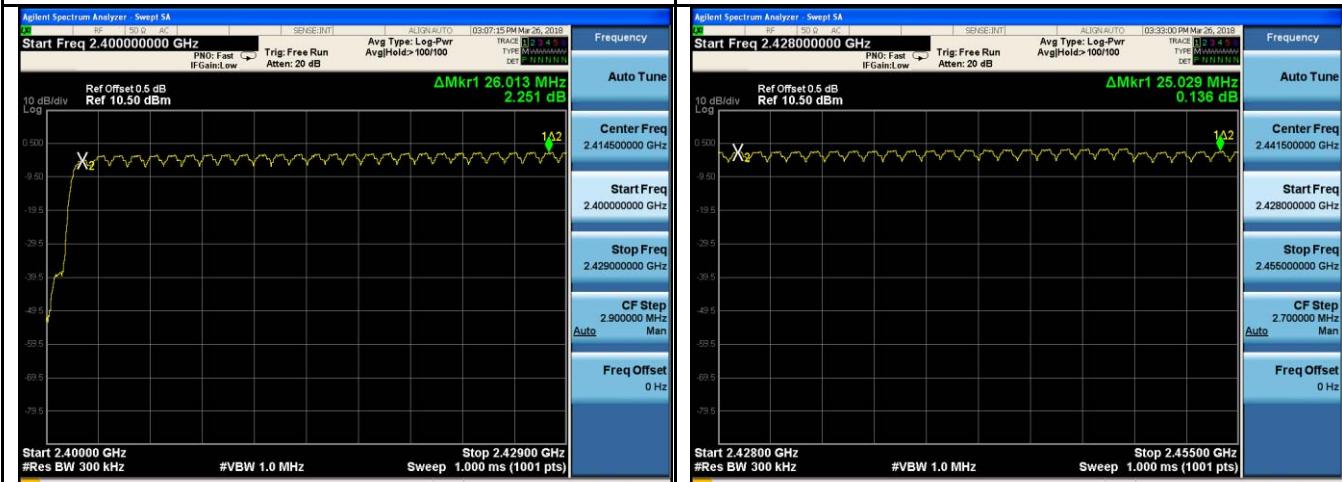
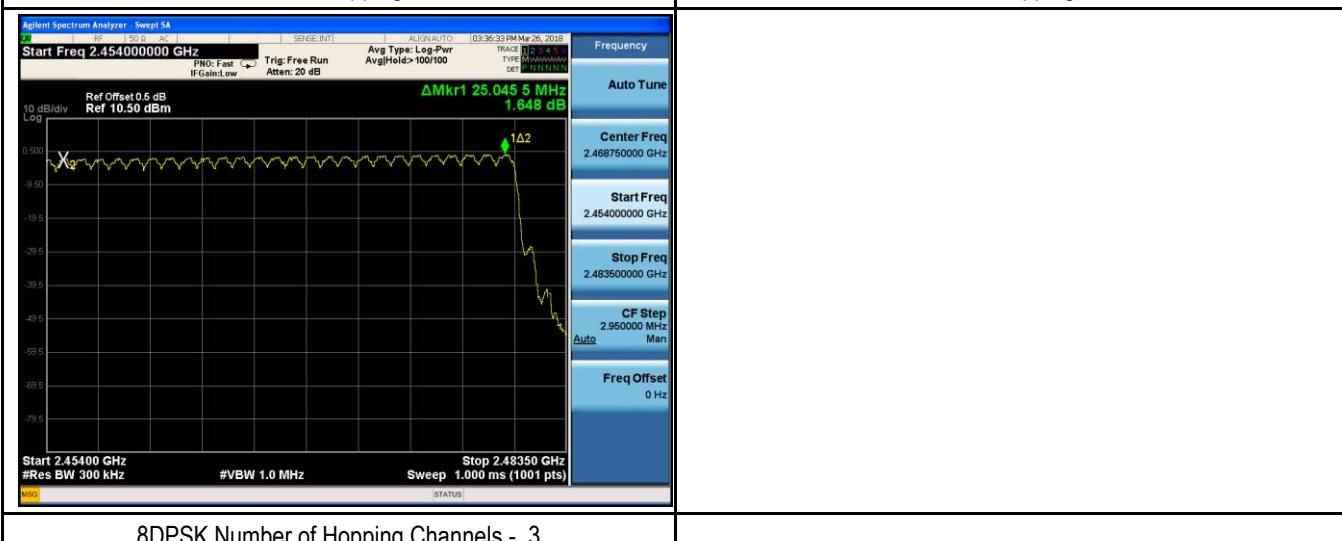
GFSK Number of Hopping Channels - 1



GFSK Number of Hopping Channels – 3

GFSK Number of Hopping Channels - 2

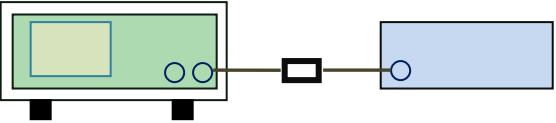
$\pi/4$  DQPSK Number of Hopping Channels - 1

**π/4 DQPSK Number of Hopping Channels - 2****8DPSK Number of Hopping Channels - 1****8DPSK Number of Hopping Channels - 3**

## 6.6 Time of Occupancy (Dwell Time)

|                      |                |
|----------------------|----------------|
| Temperature          | 23°C           |
| Relative Humidity    | 51%            |
| Atmospheric Pressure | 1018mbar       |
| Test date :          | March 26, 2018 |
| Tested By :          | Amos Xia       |

### Requirement(s):

| Spec                   | Item   | Requirement       | Applicable                          |
|------------------------|--|-------------------|-------------------------------------|
| §15.247(a)<br>(1)(iii) | a)   | Dwell Time < 0.4s | <input checked="" type="checkbox"/> |
| Test Setup             |    |                   |                                     |
| Test Procedure         | <p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines.<br/> <u>Use the following spectrum analyzer</u></p> <ul style="list-style-type: none"> <li>- Span = zero span, centered on a hopping channel</li> <li>- RBW = 1 MHz</li> <li>- VBW <math>\geq</math>RBW</li> <li>- Sweep = as necessary to capture the entire dwell time per hopping channel</li> <li>- Detector function = peak</li> <li>- Trace = max hold</li> <li>- use the marker-delta function to determine the dwell time</li> </ul> |                   |                                     |
| Remark                 |  |                   |                                     |
| Result                 | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail   |                   |                                     |

Test Data     Yes       N/A

Test Plot     Yes (See below)       N/A

**Dwell Time measurement result**

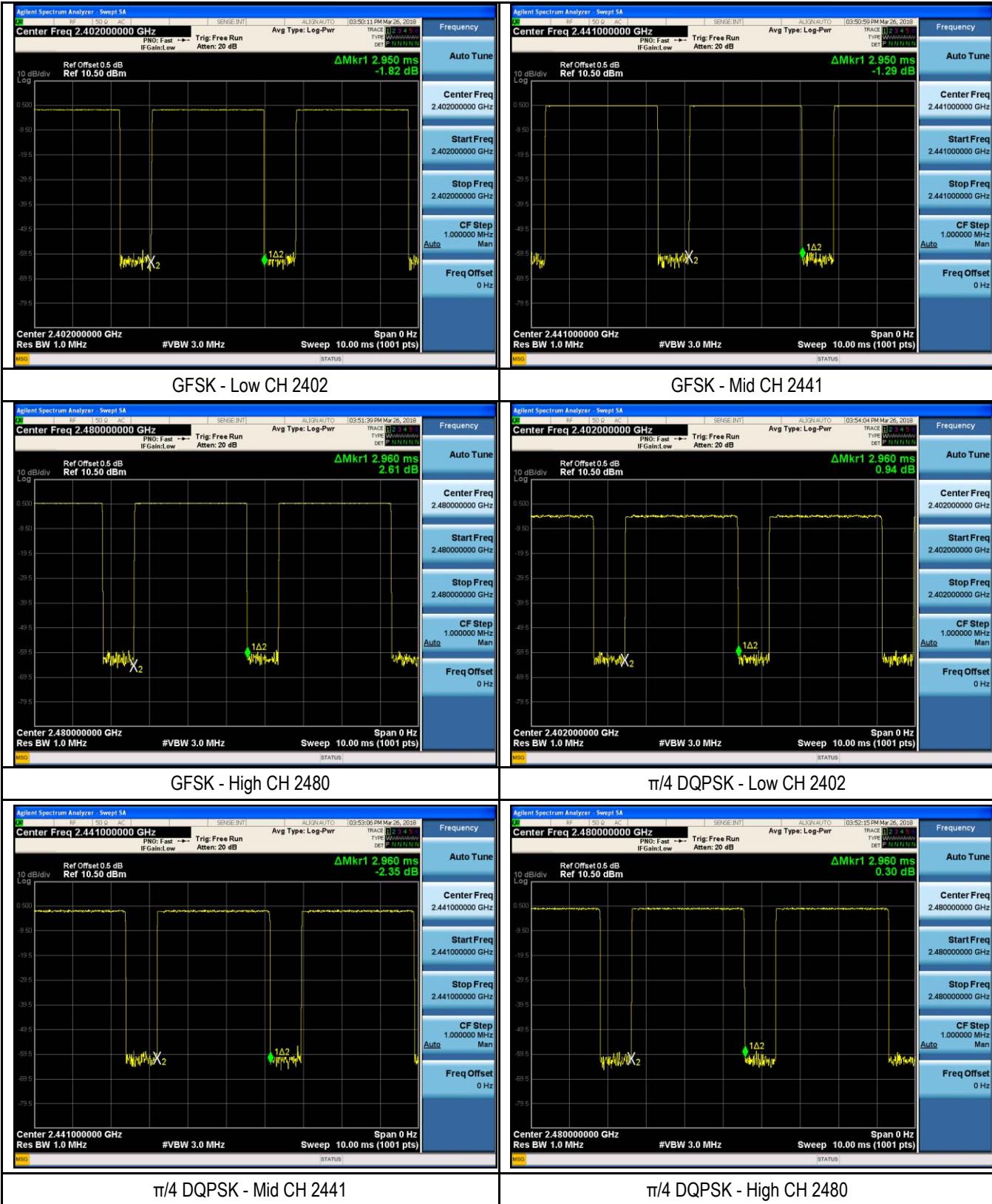
| Type       | Modulation    | CH   | Pulse Width (ms) | Dwell Time (ms) | Limit (ms) | Result |
|------------|---------------|------|------------------|-----------------|------------|--------|
| Dwell Time | GFSK          | Low  | 2.950            | 314.7           | 400        | Pass   |
|            |               | Mid  | 2.950            | 314.7           | 400        | Pass   |
|            |               | High | 2.960            | 315.7           | 400        | Pass   |
|            | $\pi/4$ DQPSK | Low  | 2.960            | 315.7           | 400        | Pass   |
|            |               | Mid  | 2.960            | 315.7           | 400        | Pass   |
|            |               | High | 2.960            | 315.7           | 400        | Pass   |
|            | 8-DPSK        | Low  | 2.970            | 316.8           | 400        | Pass   |
|            |               | Mid  | 2.960            | 315.7           | 400        | Pass   |
|            |               | High | 2.970            | 316.8           | 400        | Pass   |

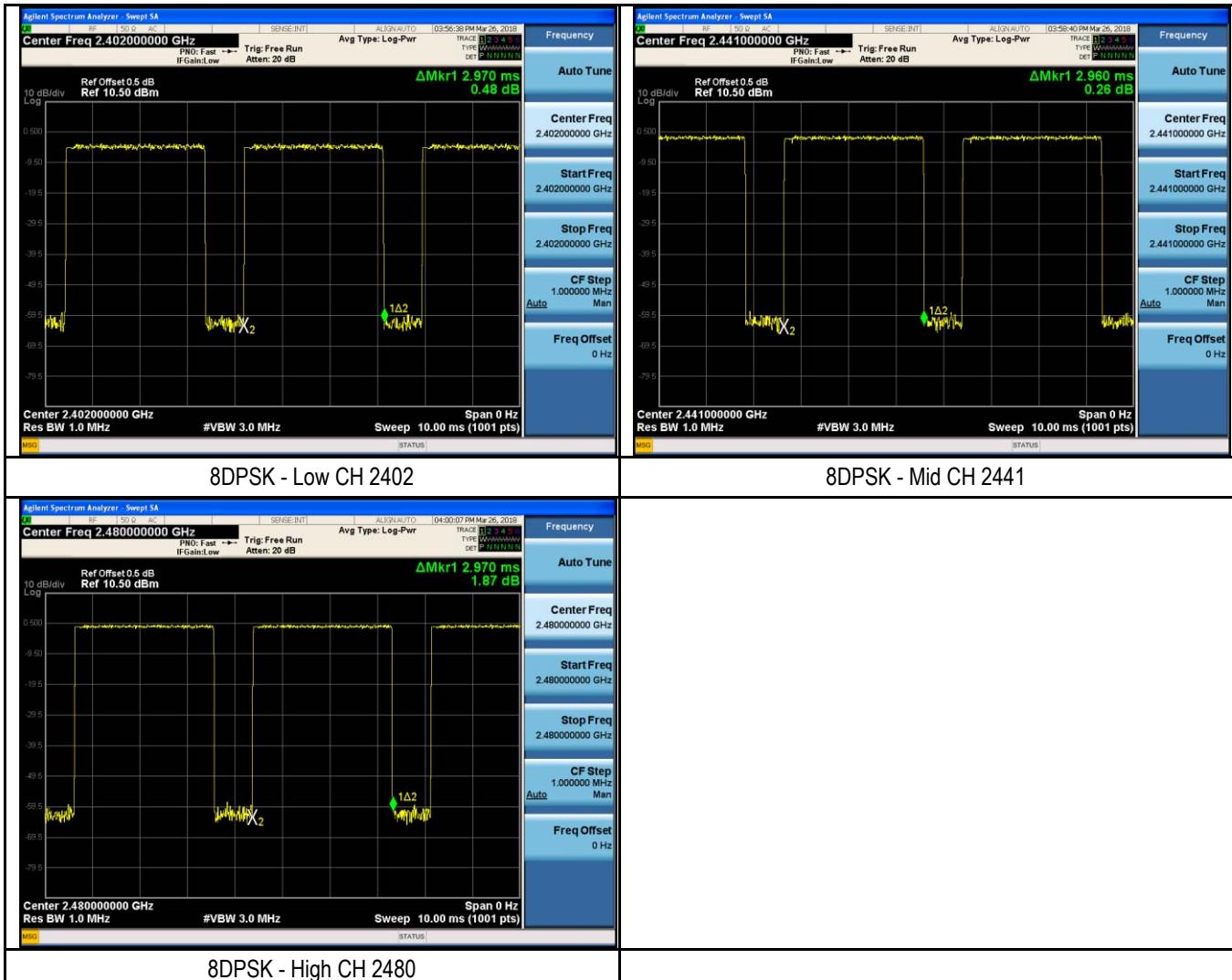
Note: Dwell time=Pulse Time (ms)  $\times$  (1600  $\div$  6  $\div$  79)  $\times$  31.6

Note : All packet have been tested ( DH1、DH3、DH5 ) ,but only worst ( DH5 ) case is the reported.

## Test Plots

### Dwell Time measurement result

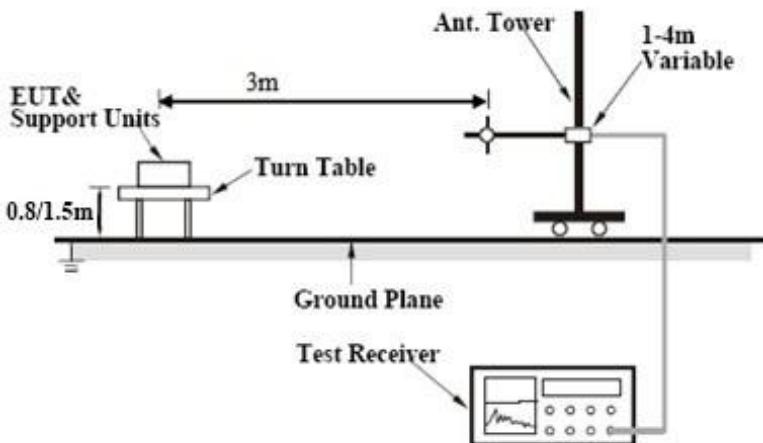




## 6.7 Band Edge

|                      |                |
|----------------------|----------------|
| Temperature          | 23°C           |
| Relative Humidity    | 51%            |
| Atmospheric Pressure | 1018mbar       |
| Test date :          | March 29, 2018 |
| Tested By :          | Amos Xia       |

### Requirement(s):

| Spec                   | Item  | Requirement   | Applicable                          |
|------------------------|---|---|-------------------------------------|
| §15.247(a)<br>(1)(iii) | a)  | 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. | <input checked="" type="checkbox"/> |
| Test Setup             |    |   |                                     |
| Test Procedure         | <p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines.<br/>Radiated Method Only</p> <ul style="list-style-type: none"> <li>- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.</li> <li>- 2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and 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.</li> <li>- 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below: <ul style="list-style-type: none"> <li>a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.</li> <li>b. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz.</li> <li>c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz.</li> </ul> </li> <li>- 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.</li> <li>- 5. Repeat above procedures until all measured frequencies were complete.</li> </ul> |   |                                     |
| Remark                 |   |   |                                     |



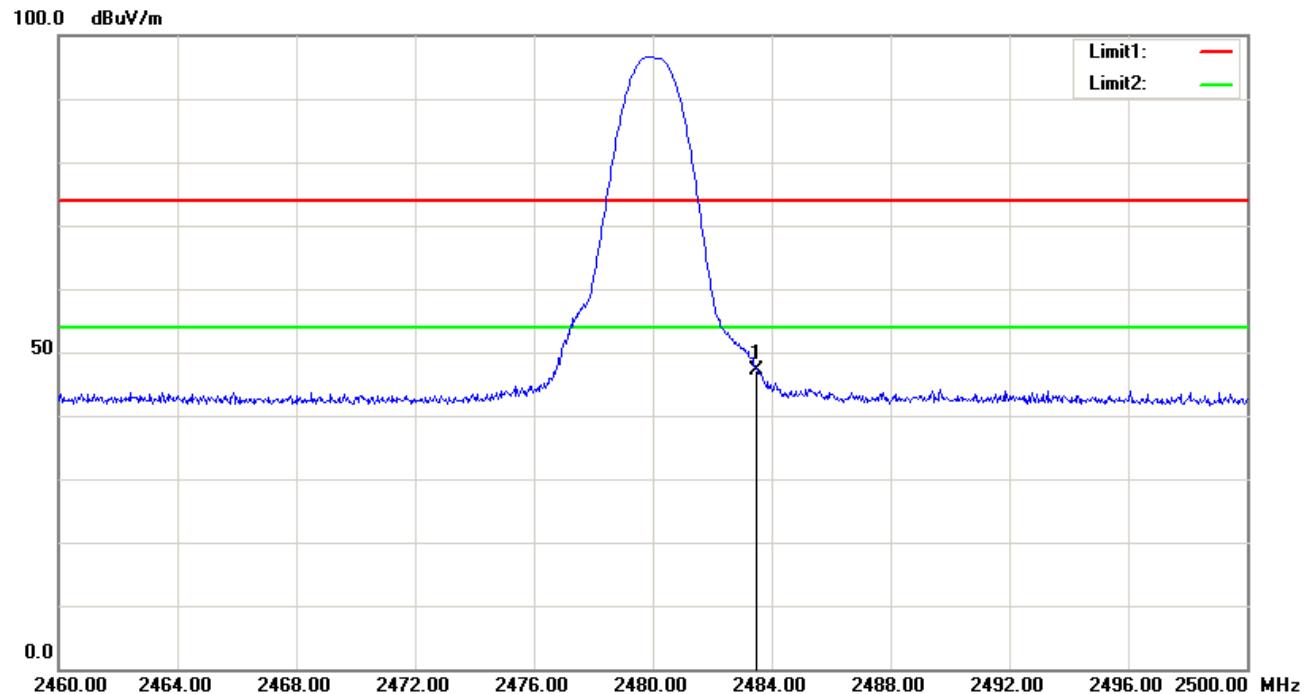
|                 |                 |
|-----------------|-----------------|
| Test Report No. | 18020308-FCC-R1 |
| Page            | 30 of 73        |

|        |  |                               |
|--------|--|-------------------------------|
| Result | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail |
|--------|--|-------------------------------|

Test Data     Yes                       N/A

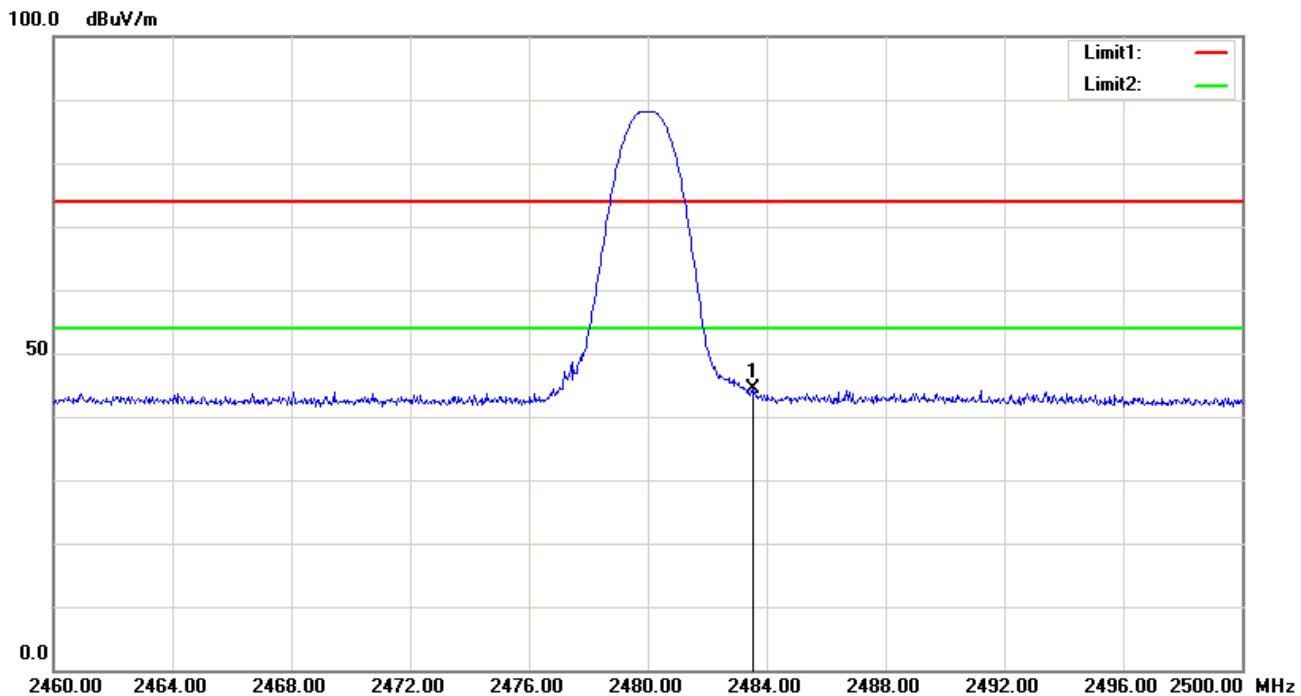
Test Plot     Yes (See below)     N/A

**Test Plots**  
**GFSK Mode**



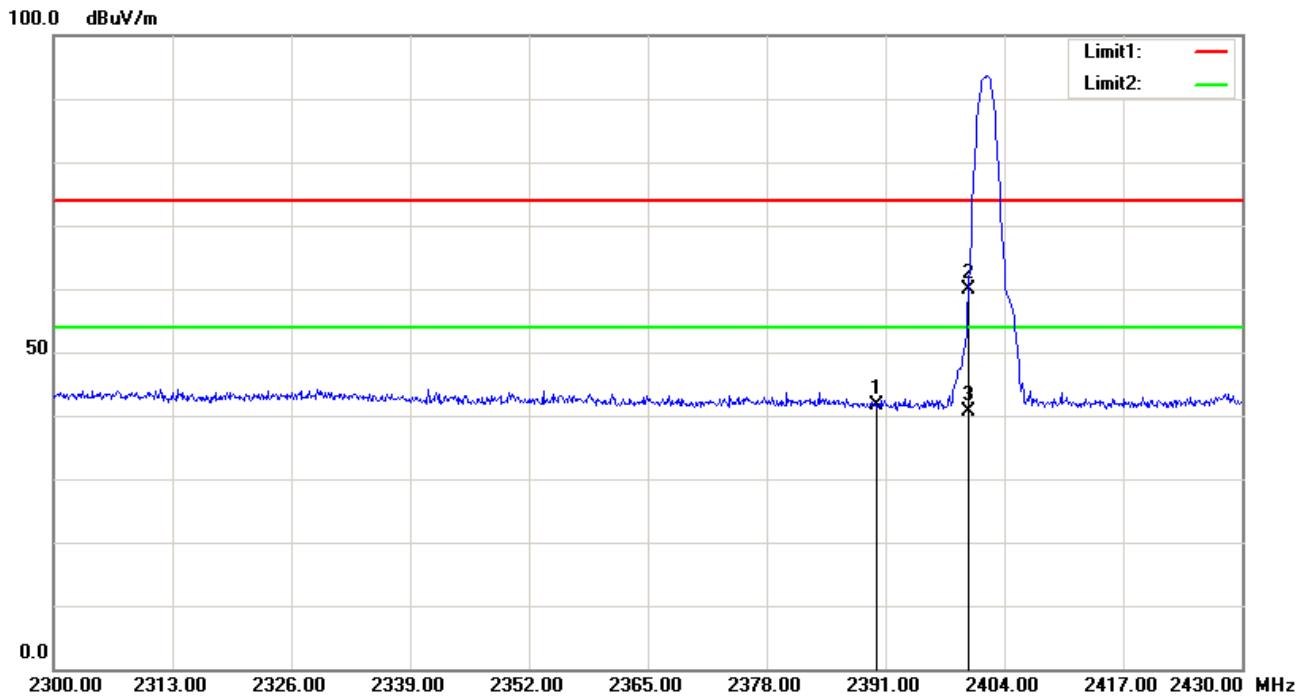
GFSK – Horizontal – Right

| No. | Frequency<br>(MHz) | Reading<br>(dB <sub>UV</sub> /m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dB <sub>UV</sub> /m) | Limit<br>(dB <sub>UV</sub> /m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|----------------------------------|----------|-----------------|--------------|---------------|---------------------------------|--------------------------------|----------------|----------------|---------------|
| 1   | 2483.500           | 64.02                            | peak     | 31.59           | 52.63        | 4.06          | 47.04                           | 74.00                          | -26.96         | 100            | 0             |



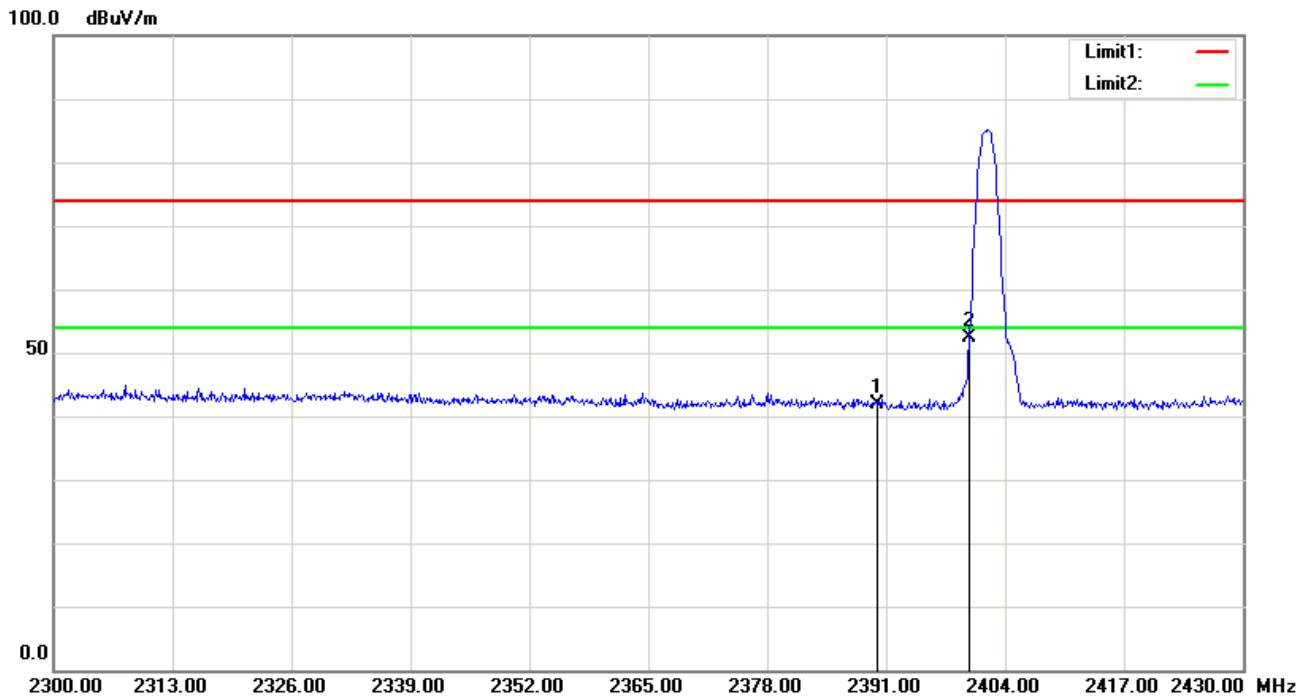
GFSK – Vertical – Right

| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|---------------------|----------|-----------------|--------------|---------------|--------------------|-------------------|----------------|----------------|---------------|
| 1   | 2483.500           | 61.26               | peak     | 31.59           | 52.63        | 4.06          | 44.28              | 74.00             | -29.72         | 200            | 296           |



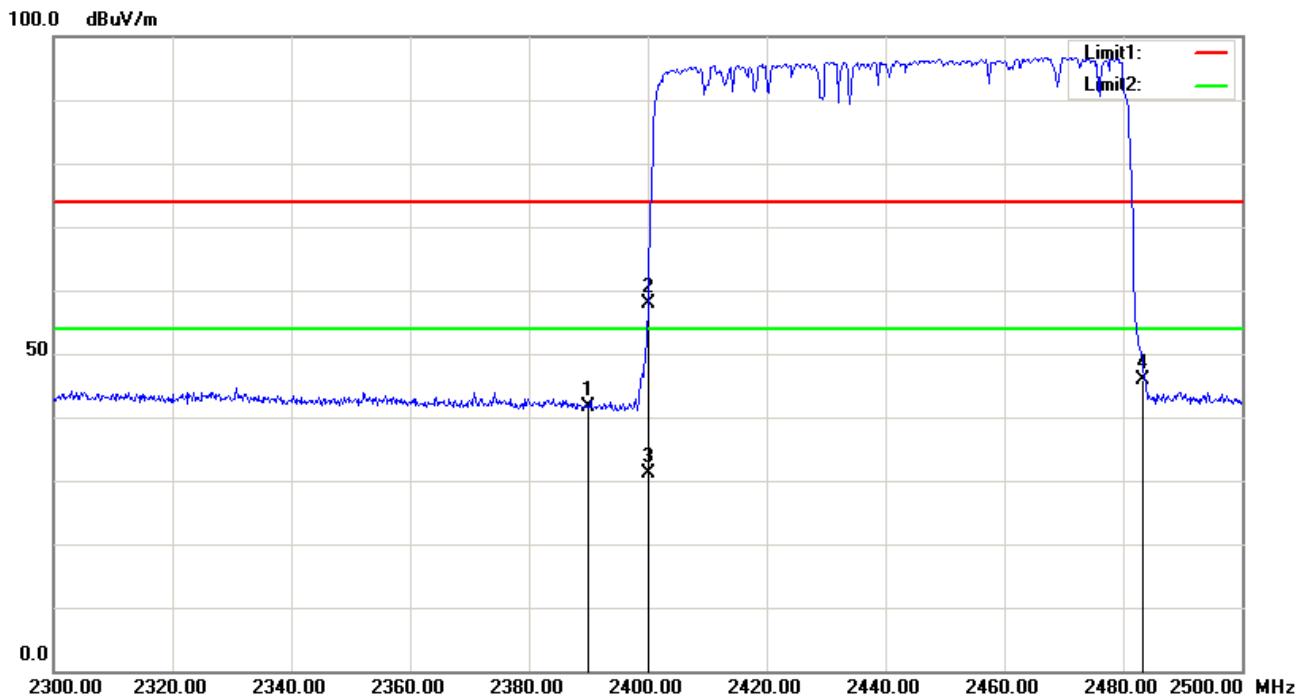
GFSK – Horizontal – Left

| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|---------------------|----------|-----------------|--------------|---------------|--------------------|-------------------|----------------|----------------|---------------|
| 1   | 2390.000           | 58.67               | peak     | 31.53           | 52.55        | 4.02          | 41.67              | 74.00             | -32.33         | 200            | 198           |
| 2   | 2400.000           | 76.96               | peak     | 31.54           | 52.56        | 4.01          | 59.95              | 74.00             | -14.05         | 100            | 351           |
| 3   | 2400.000           | 57.67               | AVG      | 31.54           | 52.56        | 4.01          | 40.66              | 54.00             | -13.34         | 100            | 351           |



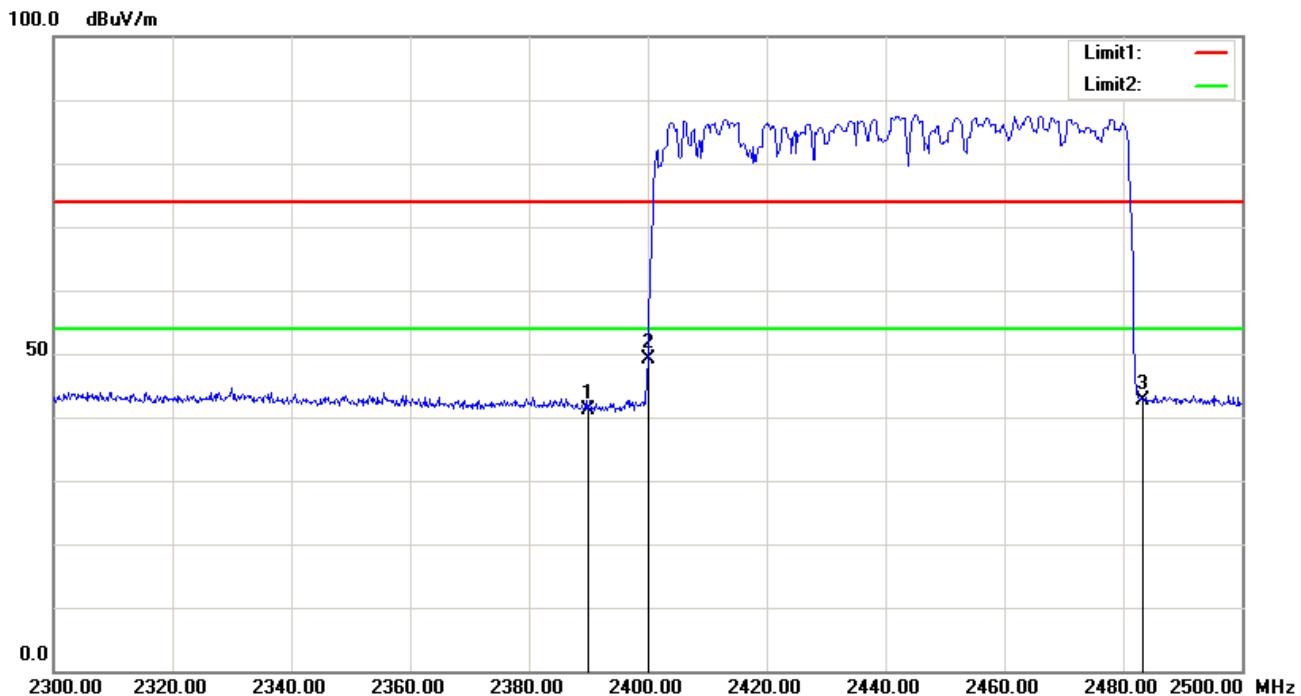
GFSK – Vertical – Left

| No. | Frequency<br>(MHz) | Reading<br>(dB <sub>uV/m</sub> ) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dB <sub>uV/m</sub> ) | Limit<br>(dB <sub>uV/m</sub> ) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|----------------------------------|----------|-----------------|--------------|---------------|---------------------------------|--------------------------------|----------------|----------------|---------------|
| 1   | 2390.000           | 58.83                            | peak     | 31.53           | 52.55        | 4.02          | 41.83                           | 74.00                          | -32.17         | 100            | 76            |
| 2   | 2400.000           | 69.37                            | peak     | 31.54           | 52.56        | 4.01          | 52.36                           | 74.00                          | -21.64         | 200            | 246           |



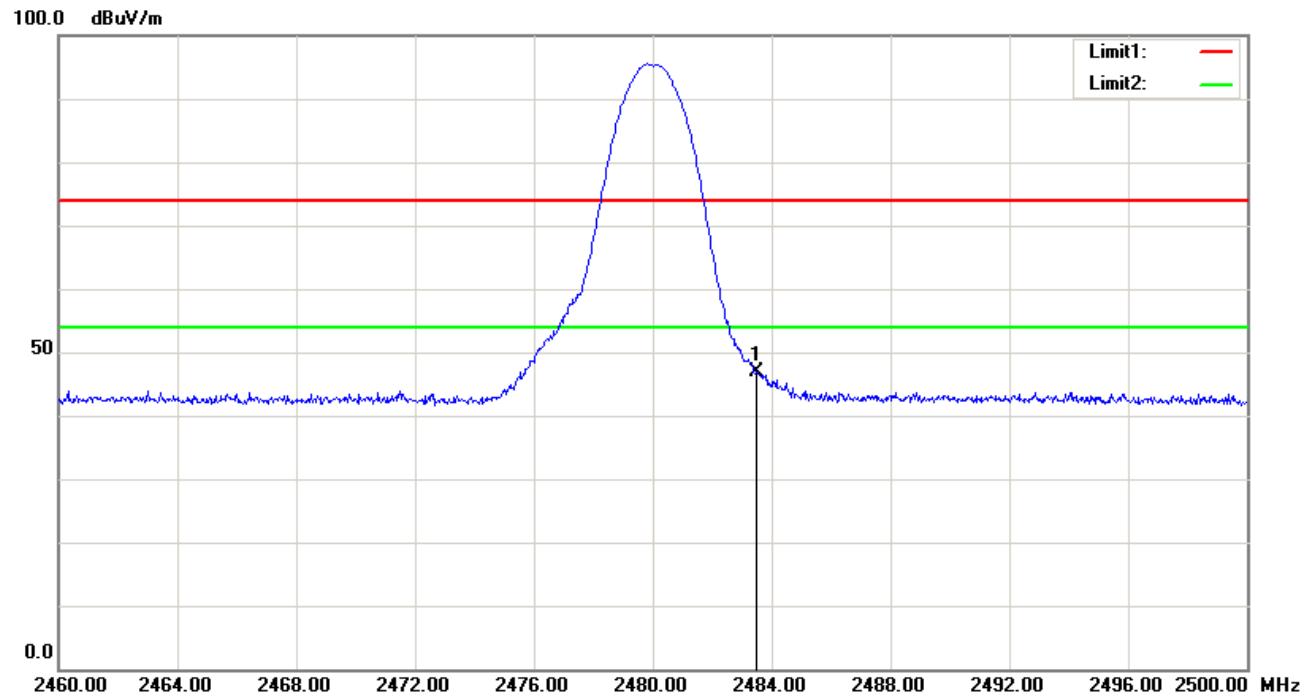
GFSK- Horizontal – Hopping

| No. | Frequency<br>(MHz) | Reading<br>(dB <sub>UV</sub> /m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dB <sub>UV</sub> /m) | Limit<br>(dB <sub>UV</sub> /m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|----------------------------------|----------|-----------------|--------------|---------------|---------------------------------|--------------------------------|----------------|----------------|---------------|
| 1   | 2390.000           | 58.67                            | peak     | 31.53           | 52.55        | 4.02          | 41.67                           | 74.00                          | -32.33         | 100            | 154           |
| 2   | 2400.000           | 74.99                            | peak     | 31.54           | 52.56        | 4.01          | 57.98                           | 74.00                          | -16.02         | 100            | 347           |
| 3   | 2400.000           | 48.05                            | AVG      | 31.54           | 52.56        | 4.01          | 31.04                           | 54.00                          | -22.96         | 100            | 347           |
| 4   | 2483.500           | 62.98                            | peak     | 31.59           | 52.63        | 4.06          | 46.00                           | 74.00                          | -28.00         | 100            | 1             |

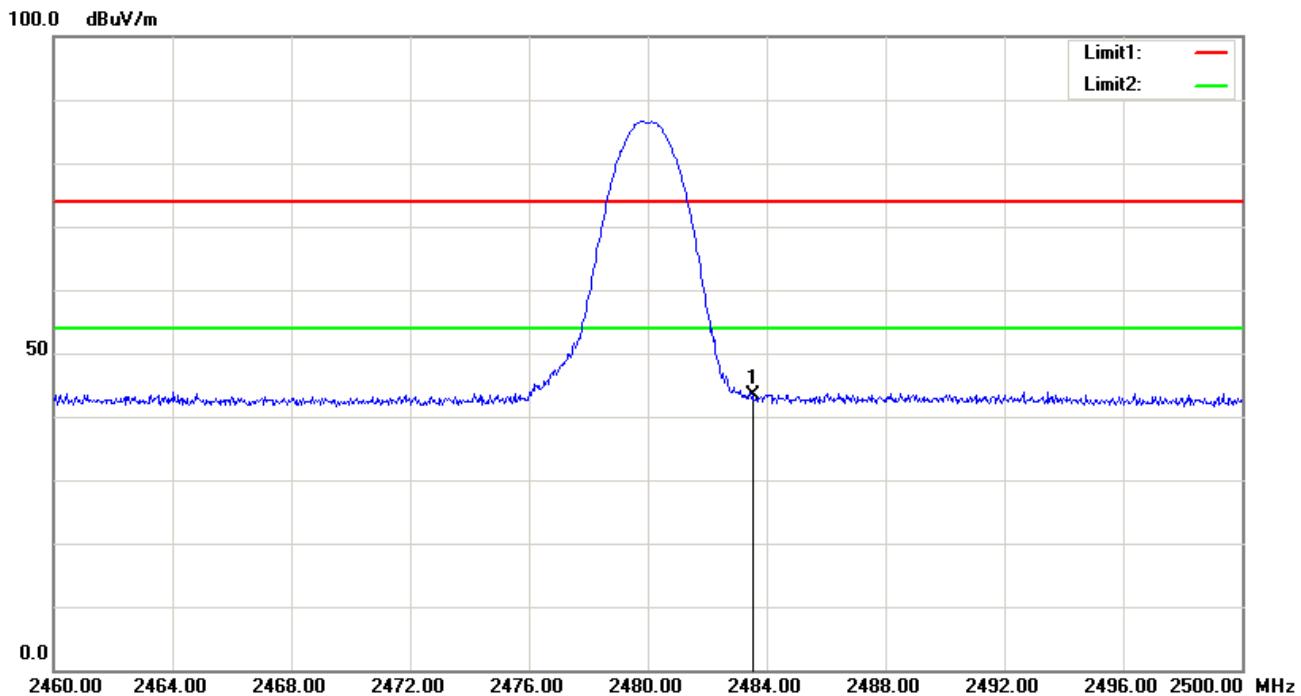


GFSK- Vertical – Hopping

| No. | Frequency<br>(MHz) | Reading<br>(dB <sub>uV/m</sub> ) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dB <sub>uV/m</sub> ) | Limit<br>(dB <sub>uV/m</sub> ) | Margin<br>(dB) | Height<br>(cm) | Degree<br>( ) |
|-----|--------------------|----------------------------------|----------|-----------------|--------------|---------------|---------------------------------|--------------------------------|----------------|----------------|---------------|
| 1   | 2390.000           | 58.15                            | peak     | 31.53           | 52.55        | 4.02          | 41.15                           | 74.00                          | -32.85         | 200            | 359           |
| 2   | 2400.000           | 66.25                            | peak     | 31.54           | 52.56        | 4.01          | 49.24                           | 74.00                          | -24.76         | 200            | 25            |
| 3   | 2483.500           | 59.49                            | peak     | 31.59           | 52.63        | 4.06          | 42.51                           | 74.00                          | -31.49         | 100            | 191           |

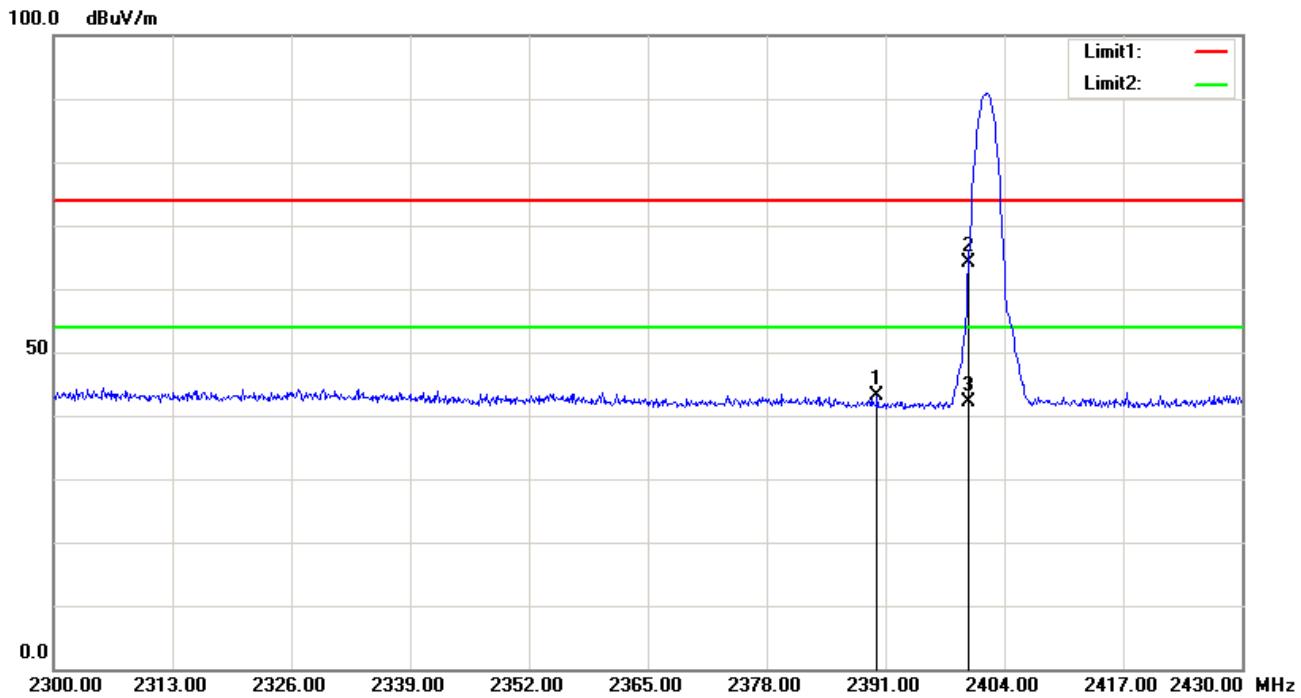
**$\pi/4$  DQPSK Mode**

 **$\pi/4$  DQPSK – Horizontal – Right**

| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|---------------------|----------|-----------------|--------------|---------------|--------------------|-------------------|----------------|----------------|---------------|
| 1   | 2483.500           | 63.77               | peak     | 31.59           | 52.63        | 4.06          | 46.79              | 74.00             | -27.21         | 200            | 360           |



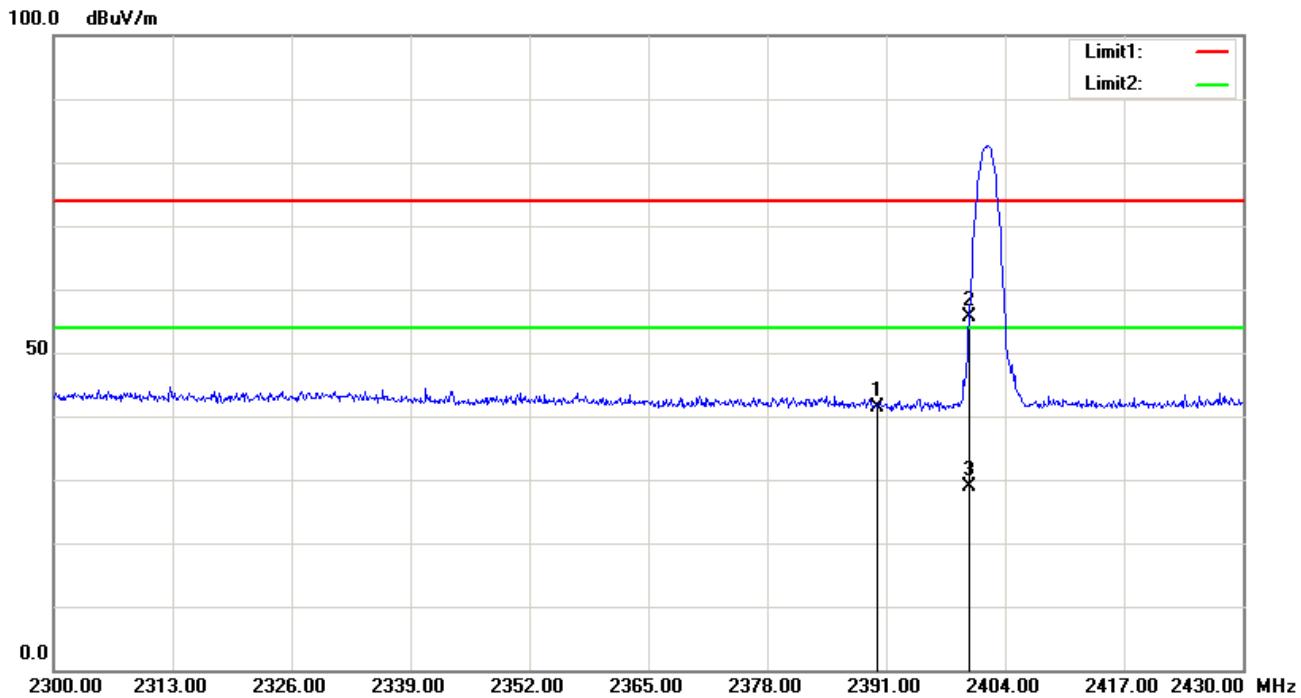
$\pi/4$  DQPSK – Vertical – Right

| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|---------------------|----------|-----------------|--------------|---------------|--------------------|-------------------|----------------|----------------|---------------|
| 1   | 2483.500           | 60.31               | peak     | 31.59           | 52.63        | 4.06          | 43.33              | 74.00             | -30.67         | 200            | 243           |



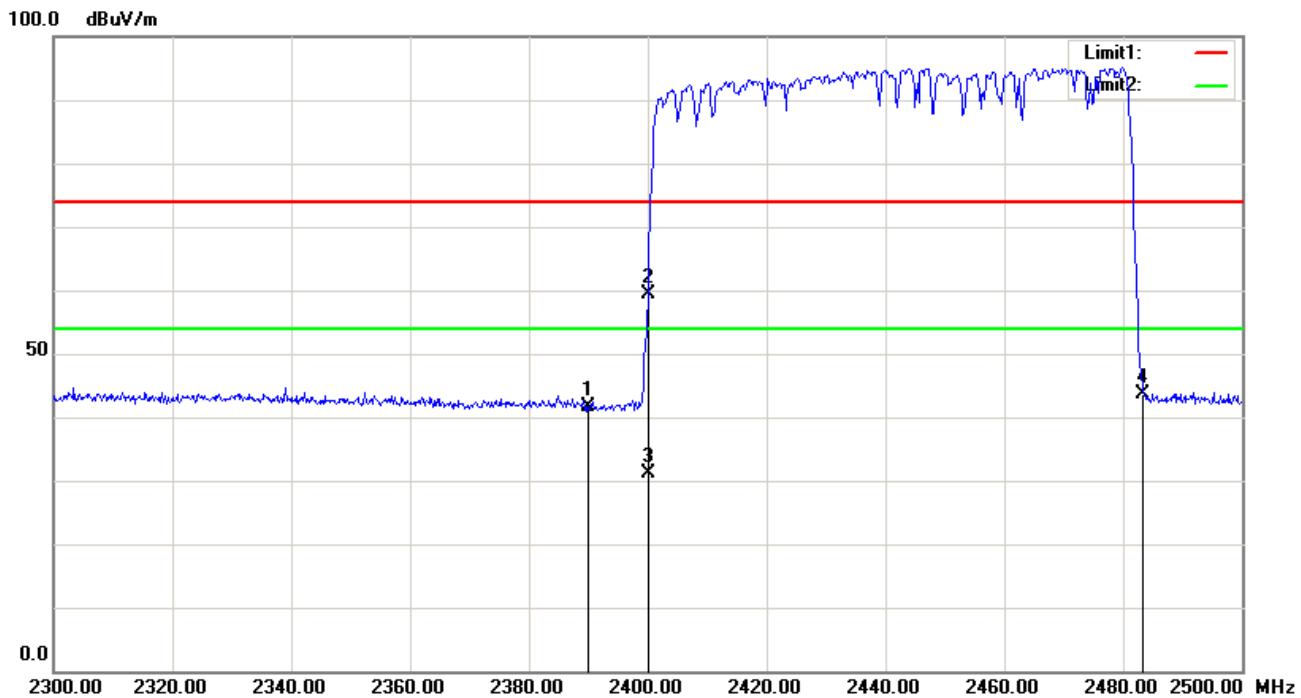
$\pi/4$  DQPSK – Horizontal – Left

| No. | Frequency<br>(MHz) | Reading<br>(dB <sub>UV</sub> /m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dB <sub>UV</sub> /m) | Limit<br>(dB <sub>UV</sub> /m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|----------------------------------|----------|-----------------|--------------|---------------|---------------------------------|--------------------------------|----------------|----------------|---------------|
| 1   | 2390.000           | 60.14                            | peak     | 31.53           | 52.55        | 4.02          | 43.14                           | 74.00                          | -30.86         | 200            | 359           |
| 2   | 2400.000           | 81.14                            | peak     | 31.54           | 52.56        | 4.01          | 64.13                           | 74.00                          | -9.87          | 100            | 347           |
| 3   | 2400.000           | 59.15                            | AVG      | 31.54           | 52.56        | 4.01          | 42.14                           | 54.00                          | -11.86         | 100            | 347           |



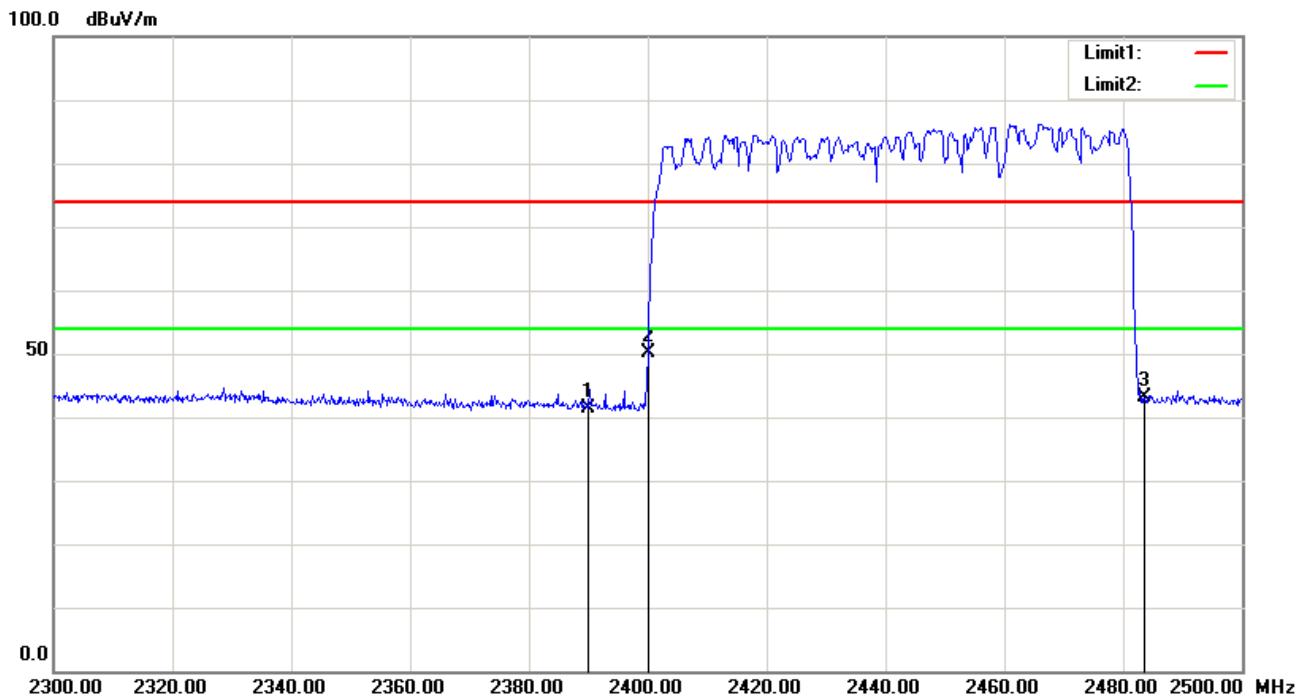
$\pi/4$  DQPSK – Vertical – Left

| No. | Frequency<br>(MHz) | Reading<br>(dB <sub>uV/m</sub> ) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dB <sub>uV/m</sub> ) | Limit<br>(dB <sub>uV/m</sub> ) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|----------------------------------|----------|-----------------|--------------|---------------|---------------------------------|--------------------------------|----------------|----------------|---------------|
| 1   | 2390.000           | 58.26                            | peak     | 31.53           | 52.55        | 4.02          | 41.26                           | 74.00                          | -32.74         | 100            | 0             |
| 2   | 2400.000           | 72.70                            | peak     | 31.54           | 52.56        | 4.01          | 55.69                           | 74.00                          | -18.31         | 200            | 251           |
| 3   | 2400.000           | 45.81                            | AVG      | 31.54           | 52.56        | 4.01          | 28.80                           | 54.00                          | -25.20         | 200            | 251           |



$\pi/4$  DQPSK - Horizontal – Hopping

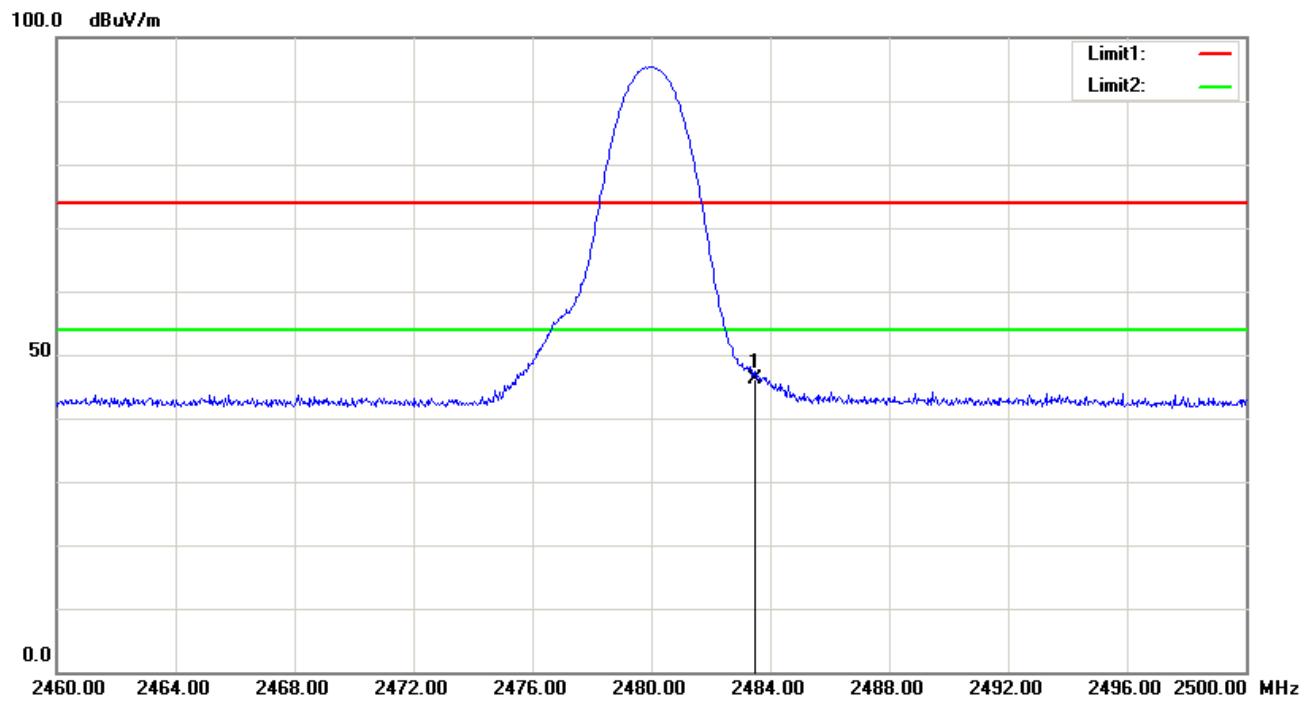
| No. | Frequency<br>(MHz) | Reading<br>(dB <sub>UV</sub> /m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dB <sub>UV</sub> /m) | Limit<br>(dB <sub>UV</sub> /m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|----------------------------------|----------|-----------------|--------------|---------------|---------------------------------|--------------------------------|----------------|----------------|---------------|
| 1   | 2390.000           | 58.63                            | peak     | 31.53           | 52.55        | 4.02          | 41.63                           | 74.00                          | -32.37         | 100            | 89            |
| 2   | 2400.000           | 76.38                            | peak     | 31.54           | 52.56        | 4.01          | 59.37                           | 74.00                          | -14.63         | 200            | 358           |
| 3   | 2400.000           | 48.15                            | AVG      | 31.54           | 52.56        | 4.01          | 31.14                           | 54.00                          | -22.86         | 200            | 358           |
| 4   | 2483.500           | 60.68                            | peak     | 31.59           | 52.63        | 4.06          | 43.70                           | 74.00                          | -30.30         | 200            | 346           |
| 1   | 2390.000           | 58.63                            | peak     | 31.53           | 52.55        | 4.02          | 41.63                           | 74.00                          | -32.37         | 99             | 89            |



$\pi/4$  DQPSK - Vertical – Hopping

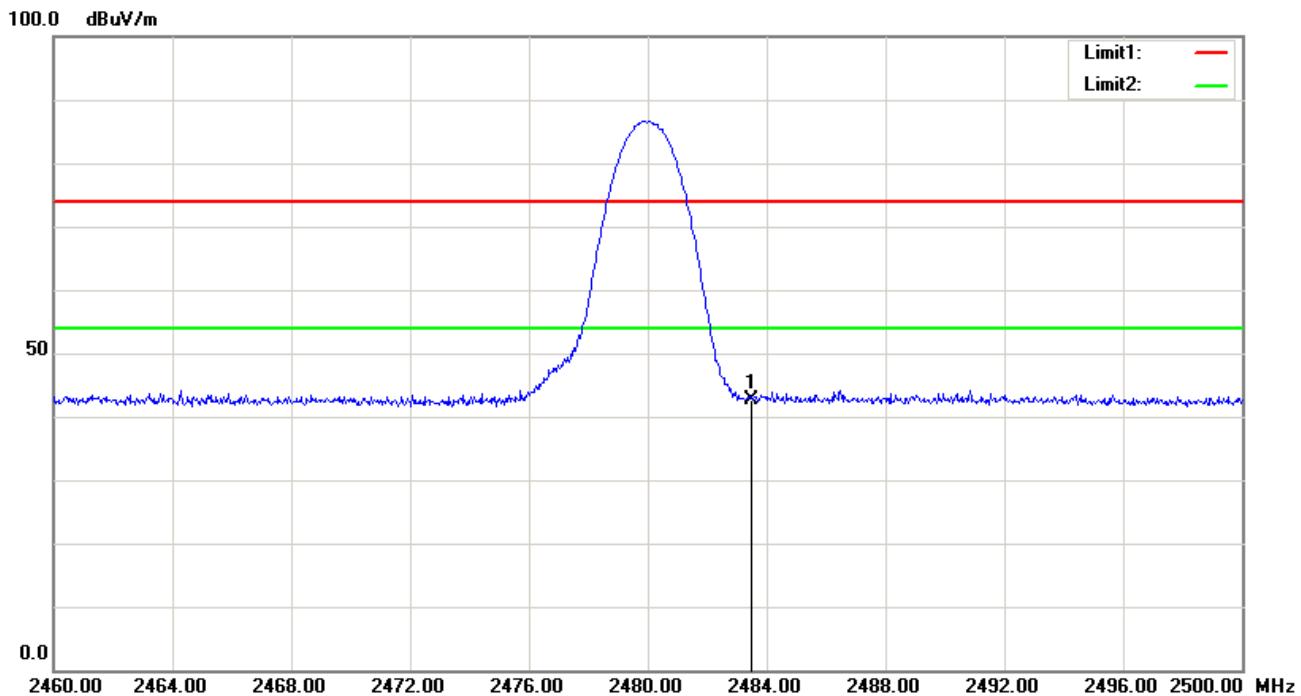
| No. | Frequency<br>(MHz) | Reading<br>(dB <sub>B</sub> uV/m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dB <sub>B</sub> uV/m) | Limit<br>(dB <sub>B</sub> uV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>( ) |
|-----|--------------------|-----------------------------------|----------|-----------------|--------------|---------------|----------------------------------|---------------------------------|----------------|----------------|---------------|
| 1   | 2390.000           | 58.29                             | peak     | 31.53           | 52.55        | 4.02          | 41.29                            | 74.00                           | -32.71         | 100            | 25            |
| 2   | 2400.000           | 67.15                             | peak     | 31.54           | 52.56        | 4.01          | 50.14                            | 74.00                           | -23.86         | 200            | 225           |
| 3   | 2483.500           | 60.21                             | peak     | 31.59           | 52.63        | 4.06          | 43.23                            | 74.00                           | -30.77         | 200            | 188           |

### 8-DPSK Mode



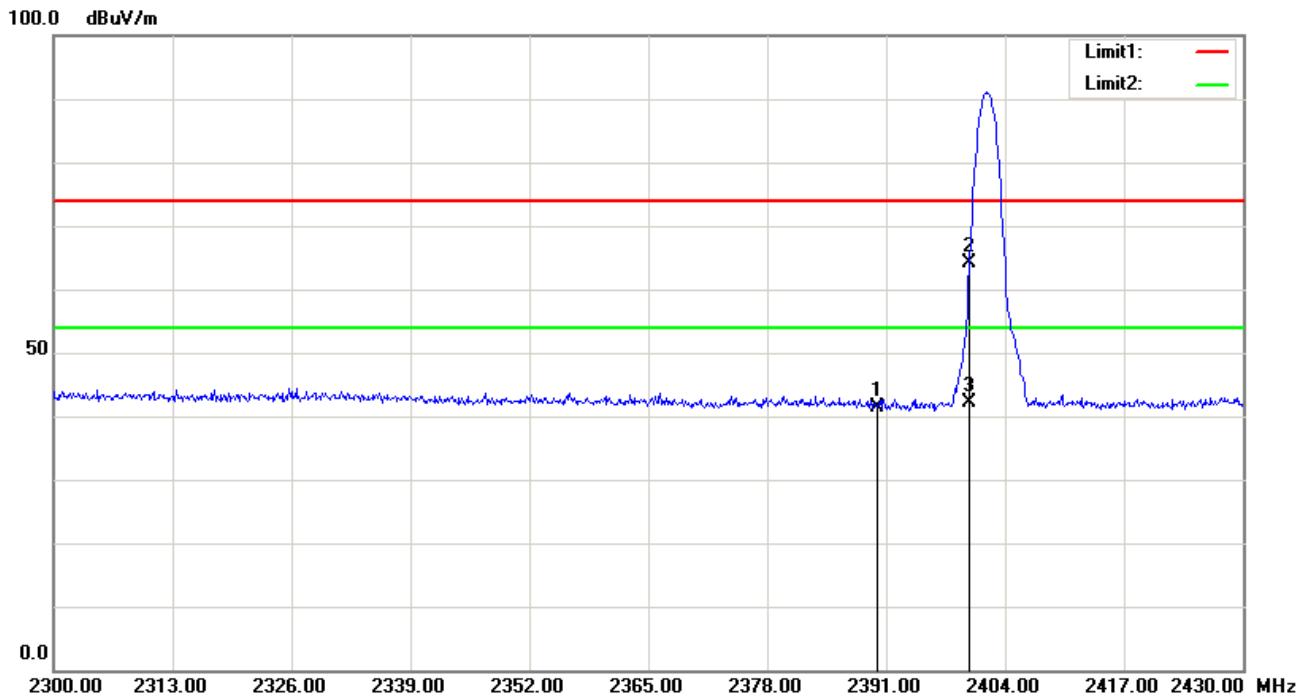
8-DPSK – Horizontal – Right

| No. | Frequency<br>(MHz) | Reading<br>(dB <sub>uV/m</sub> ) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dB <sub>uV/m</sub> ) | Limit<br>(dB <sub>uV/m</sub> ) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|----------------------------------|----------|-----------------|--------------|---------------|---------------------------------|--------------------------------|----------------|----------------|---------------|
| 1   | 2483.500           | 63.11                            | peak     | 31.59           | 52.63        | 4.06          | 46.13                           | 74.00                          | -27.87         | 144            | 360           |



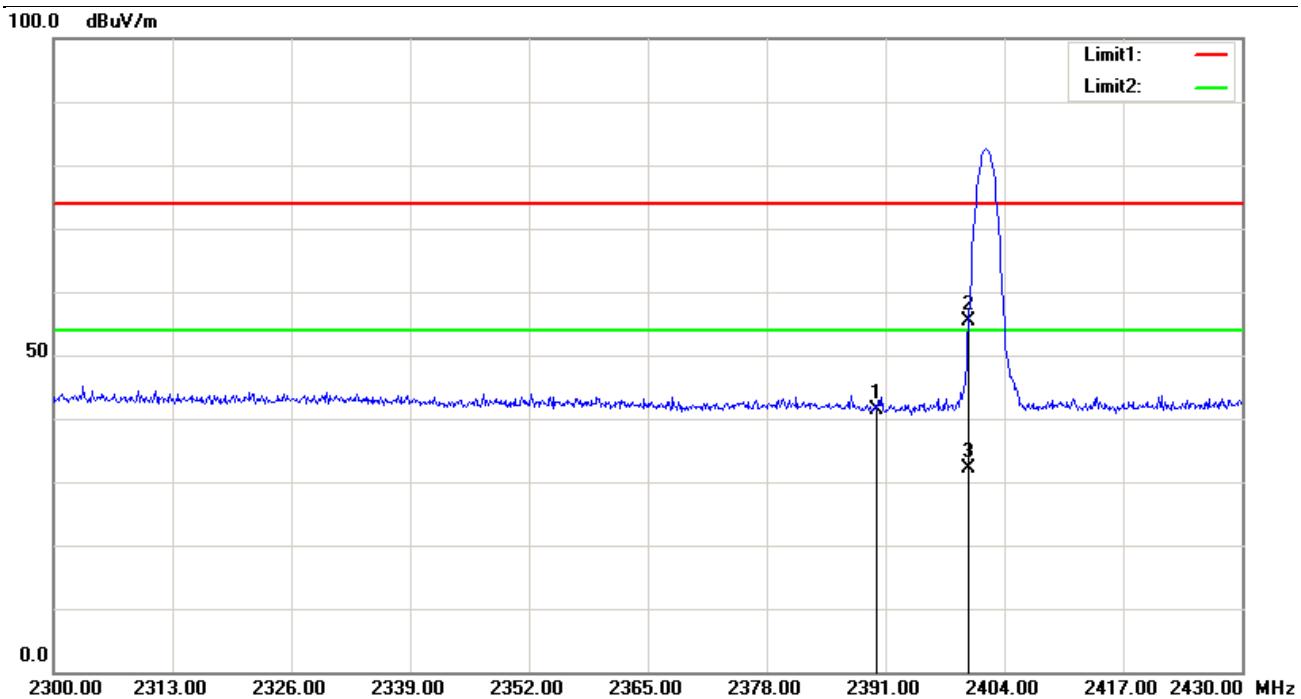
8-DPSK – Vertical – Right

| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|---------------------|----------|-----------------|--------------|---------------|--------------------|-------------------|----------------|----------------|---------------|
| 1   | 2483.500           | 59.71               | peak     | 31.59           | 52.63        | 4.06          | 42.73              | 74.00             | -31.27         | 100            | 262           |



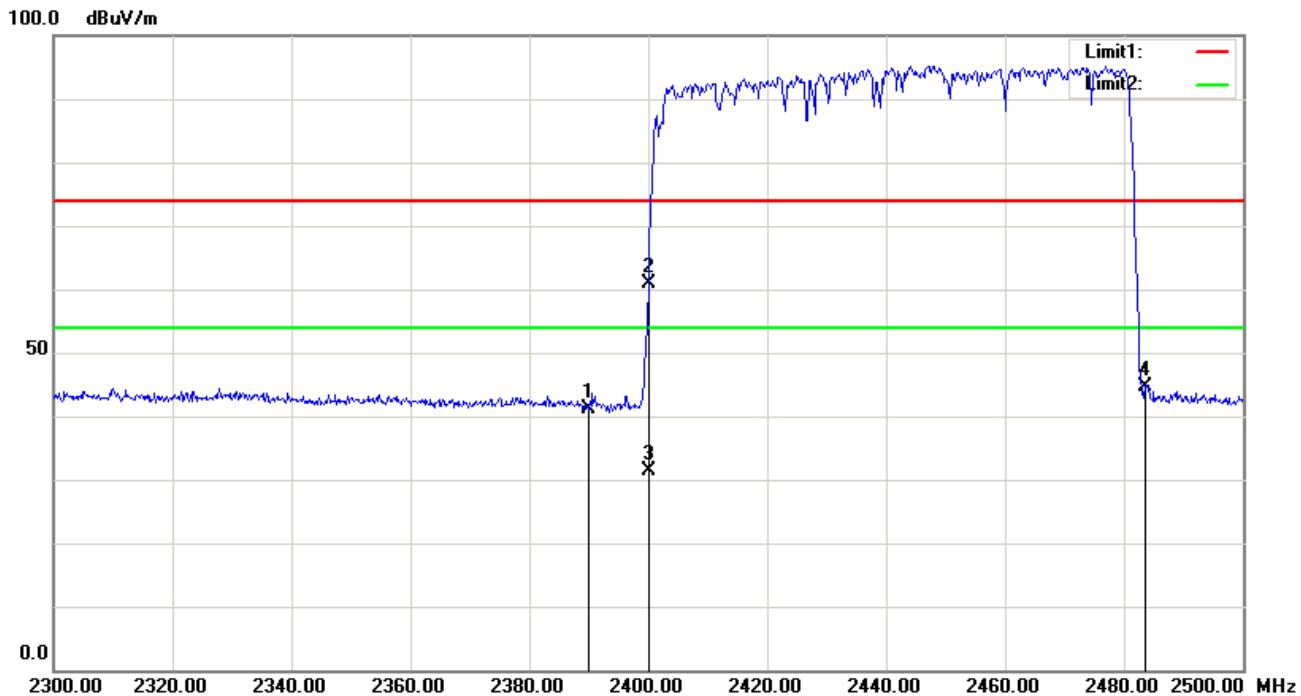
8-DPSK – Horizontal – Left

| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|---------------------|----------|-----------------|--------------|---------------|--------------------|-------------------|----------------|----------------|---------------|
| 1   | 2390.000           | 58.38               | peak     | 31.53           | 52.55        | 4.02          | 41.38              | 74.00             | -32.62         | 100            | 216           |
| 2   | 2400.000           | 81.10               | peak     | 31.54           | 52.56        | 4.01          | 64.09              | 74.00             | -9.91          | 200            | 352           |
| 3   | 2400.000           | 59.14               | AVG      | 31.54           | 52.56        | 4.01          | 42.13              | 54.00             | -11.87         | 200            | 352           |



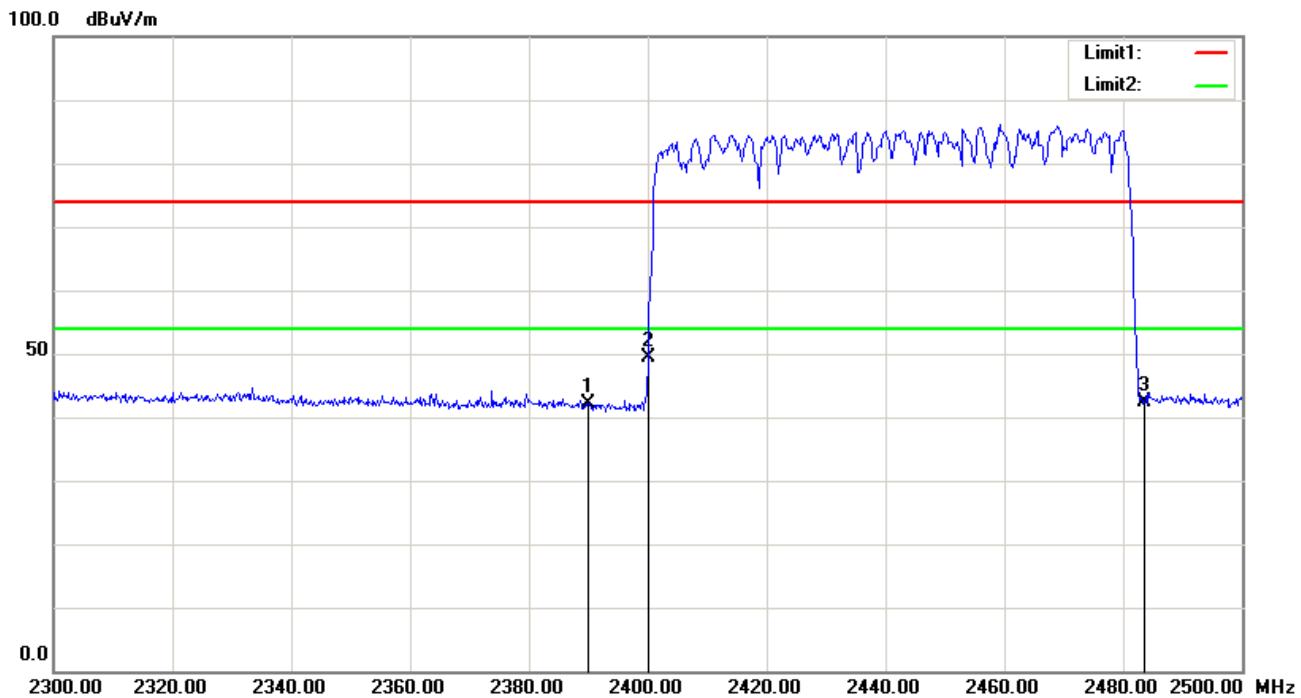
#### 8-DPSK- Vertical – Left

| No. | Frequency<br>(MHz) | Reading<br>(dB <sub>uV/m</sub> ) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dB <sub>uV/m</sub> ) | Limit<br>(dB <sub>uV/m</sub> ) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|----------------------------------|----------|-----------------|--------------|---------------|---------------------------------|--------------------------------|----------------|----------------|---------------|
| 1   | 2390.000           | 58.31                            | peak     | 31.53           | 52.55        | 4.02          | 41.31                           | 74.00                          | -32.69         | 200            | 342           |
| 2   | 2400.000           | 72.36                            | peak     | 31.54           | 52.56        | 4.01          | 55.35                           | 74.00                          | -18.65         | 200            | 247           |
| 3   | 2400.000           | 49.08                            | AVG      | 31.54           | 52.56        | 4.01          | 32.07                           | 54.00                          | -21.93         | 200            | 247           |



8-DPSK - Horizontal – Hopping

| No. | Frequency<br>(MHz) | Reading<br>(dB <sub>uV/m</sub> ) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dB <sub>uV/m</sub> ) | Limit<br>(dB <sub>uV/m</sub> ) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|----------------------------------|----------|-----------------|--------------|---------------|---------------------------------|--------------------------------|----------------|----------------|---------------|
| 1   | 2390.000           | 58.20                            | peak     | 31.53           | 52.55        | 4.02          | 41.20                           | 74.00                          | -32.80         | 100            | 214           |
| 2   | 2400.000           | 77.79                            | peak     | 31.54           | 52.56        | 4.01          | 60.78                           | 74.00                          | -13.22         | 100            | 356           |
| 3   | 2400.000           | 48.41                            | AVG      | 31.54           | 52.56        | 4.01          | 31.40                           | 54.00                          | -22.60         | 100            | 356           |
| 4   | 2483.500           | 61.62                            | peak     | 31.59           | 52.63        | 4.06          | 44.64                           | 74.00                          | -29.36         | 100            | 360           |



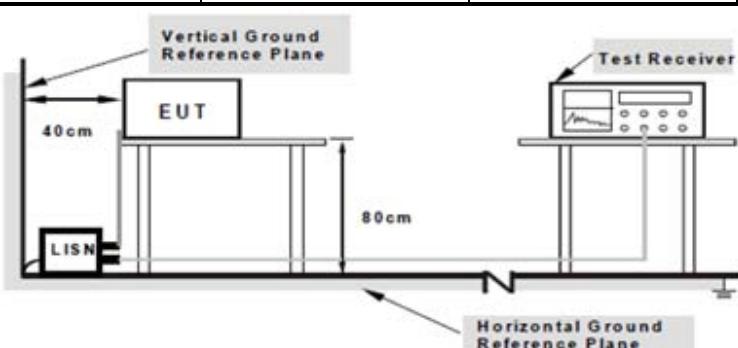
8-DPSK - Vertical – Hopping

| No. | Frequency<br>(MHz) | Reading<br>(dB <sub>UV</sub> /m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dB <sub>UV</sub> /m) | Limit<br>(dB <sub>UV</sub> /m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|----------------------------------|----------|-----------------|--------------|---------------|---------------------------------|--------------------------------|----------------|----------------|---------------|
| 1   | 2390.000           | 59.14                            | peak     | 31.53           | 52.55        | 4.02          | 42.14                           | 74.00                          | -31.86         | 100            | 351           |
| 2   | 2400.000           | 66.38                            | peak     | 31.54           | 52.56        | 4.01          | 49.37                           | 74.00                          | -24.63         | 200            | 260           |
| 3   | 2483.500           | 59.47                            | peak     | 31.59           | 52.63        | 4.06          | 42.49                           | 74.00                          | -31.51         | 189            | 360           |

## 6.8 Conducted Emissions

|                      |                |
|----------------------|----------------|
| Temperature          | 23°C           |
| Relative Humidity    | 51%            |
| Atmospheric Pressure | 1018mbar       |
| Test date :          | March 29, 2018 |
| Tested By :          | Amos Xia       |

### Requirement(s):

| Spec                   | Item   | Requirement  | Applicable             |                    |  |  |    |         |            |    |    |          |    |    |                        |                    |  |  |    |         |            |         |         |         |    |    |        |    |    |                                     |
|------------------------|--|--|------------------------|--------------------|--|--|----|---------|------------|----|----|----------|----|----|------------------------|--------------------|--|--|----|---------|------------|---------|---------|---------|----|----|--------|----|----|-------------------------------------|
| 47CFR§15.20<br>7       | a)   | <p>For Low-power radio-frequency devices that 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 the limits in the following table, as measured using a 50 [mu]H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequencies ranges.</p> <p><b>Class A Limit</b></p> <table border="1"> <thead> <tr> <th>Frequency ranges (MHz)</th> <th colspan="2">Limit (dB<math>\mu</math>V)</th> </tr> <tr> <th></th> <th>QP</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15 ~ 0.5</td> <td>79</td> <td>66</td> </tr> <tr> <td>0.5 ~ 30</td> <td>73</td> <td>60</td> </tr> </tbody> </table> <p><b>Class B Limit</b></p> <table border="1"> <thead> <tr> <th>Frequency ranges (MHz)</th> <th colspan="2">Limit (dB<math>\mu</math>V)</th> </tr> <tr> <th></th> <th>QP</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15 ~ 0.5</td> <td>66 – 56</td> <td>56 – 46</td> </tr> <tr> <td>0.5 ~ 5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5 ~ 30</td> <td>60</td> <td>50</td> </tr> </tbody> </table> | Frequency ranges (MHz) | Limit (dB $\mu$ V) |  |  | QP | Average | 0.15 ~ 0.5 | 79 | 66 | 0.5 ~ 30 | 73 | 60 | Frequency ranges (MHz) | Limit (dB $\mu$ V) |  |  | QP | Average | 0.15 ~ 0.5 | 66 – 56 | 56 – 46 | 0.5 ~ 5 | 56 | 46 | 5 ~ 30 | 60 | 50 | <input checked="" type="checkbox"/> |
| Frequency ranges (MHz) | Limit (dB $\mu$ V)   |  |                        |                    |  |  |    |         |            |    |    |          |    |    |                        |                    |  |  |    |         |            |         |         |         |    |    |        |    |    |                                     |
|                        | QP   | Average  |                        |                    |  |  |    |         |            |    |    |          |    |    |                        |                    |  |  |    |         |            |         |         |         |    |    |        |    |    |                                     |
| 0.15 ~ 0.5             | 79   | 66   |                        |                    |  |  |    |         |            |    |    |          |    |    |                        |                    |  |  |    |         |            |         |         |         |    |    |        |    |    |                                     |
| 0.5 ~ 30               | 73   | 60   |                        |                    |  |  |    |         |            |    |    |          |    |    |                        |                    |  |  |    |         |            |         |         |         |    |    |        |    |    |                                     |
| Frequency ranges (MHz) | Limit (dB $\mu$ V)   |  |                        |                    |  |  |    |         |            |    |    |          |    |    |                        |                    |  |  |    |         |            |         |         |         |    |    |        |    |    |                                     |
|                        | QP   | Average  |                        |                    |  |  |    |         |            |    |    |          |    |    |                        |                    |  |  |    |         |            |         |         |         |    |    |        |    |    |                                     |
| 0.15 ~ 0.5             | 66 – 56  | 56 – 46  |                        |                    |  |  |    |         |            |    |    |          |    |    |                        |                    |  |  |    |         |            |         |         |         |    |    |        |    |    |                                     |
| 0.5 ~ 5                | 56   | 46   |                        |                    |  |  |    |         |            |    |    |          |    |    |                        |                    |  |  |    |         |            |         |         |         |    |    |        |    |    |                                     |
| 5 ~ 30                 | 60   | 50   |                        |                    |  |  |    |         |            |    |    |          |    |    |                        |                    |  |  |    |         |            |         |         |         |    |    |        |    |    |                                     |
| Test Setup             |  <p><b>Note:</b> 1. Support units were connected to second LISN.<br/>2. Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</p>   |  |                        |                    |  |  |    |         |            |    |    |          |    |    |                        |                    |  |  |    |         |            |         |         |         |    |    |        |    |    |                                     |
| Procedure              | <ol style="list-style-type: none"> <li>The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.</li> <li>The power supply for the EUT was fed through a 50 [mu]H/50 EUT LISN, connected to filtered mains.</li> <li>The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.</li> <li>All other supporting equipment were powered separately from another main supply.</li> <li>The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.</li> <li>High peaks, relative to the limit line, The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz.</li> <li>Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).</li> </ol> |  |                        |                    |  |  |    |         |            |    |    |          |    |    |                        |                    |  |  |    |         |            |         |         |         |    |    |        |    |    |                                     |
| Remark                 | We test 3 modulations, only show GFSK test data in the report.   |  |                        |                    |  |  |    |         |            |    |    |          |    |    |                        |                    |  |  |    |         |            |         |         |         |    |    |        |    |    |                                     |
| Result                 | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail   |  |                        |                    |  |  |    |         |            |    |    |          |    |    |                        |                    |  |  |    |         |            |         |         |         |    |    |        |    |    |                                     |

|                 |                 |
|-----------------|-----------------|
| Test Report No. | 18020308-FCC-R1 |
| Page            | 50 of 73        |

**Test Data**  Yes  N/A

**Test Plot**  Yes (See below)  N/A

#### Data sample

| No. | Frequency<br>(MHz) | Reading<br>(dB $\mu$ V) | Detector | Lisn/Isn<br>(dB) | Ps_Lmt<br>(dB) | Cab_L<br>(dB) | Result<br>(dB $\mu$ V) | Limit<br>(dB $\mu$ V) | Margin<br>(dB) |
|-----|--------------------|-------------------------|----------|------------------|----------------|---------------|------------------------|-----------------------|----------------|
|     |                    |                         |          |                  |                |               |                        |                       |                |

Frequency (MHz) = Emission frequency in MHz

Reading (dB $\mu$ V) = Receiver Reading Value

Detector=Quasi Peak Detector or Average Detector

Lisn/ISN= Insertion loss of LISN

Ps\_Lmt= Insertion loss of transient limiter (The transient limiter included 10dB attenuation)

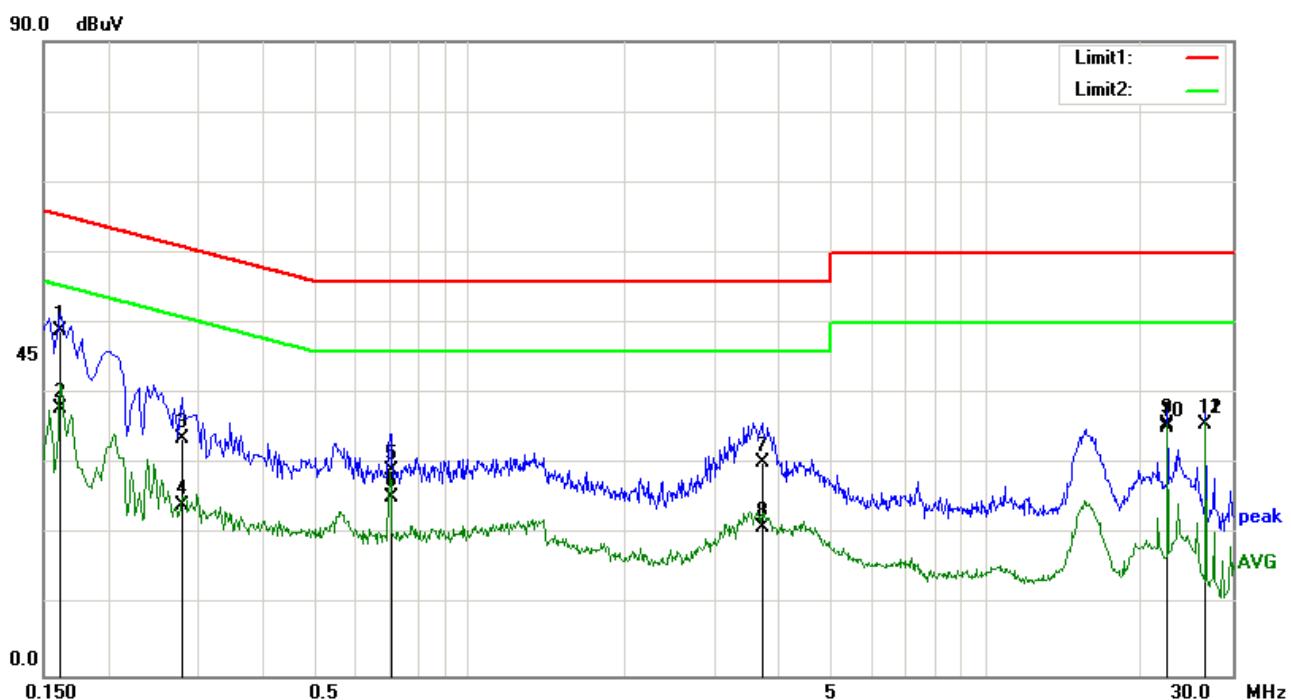
Cab\_L= cable loss

Result (dB $\mu$ V) = Reading Value + Corrected Value

Limit (dB $\mu$ V) = Limit stated in standard

#### Calculation Formula:

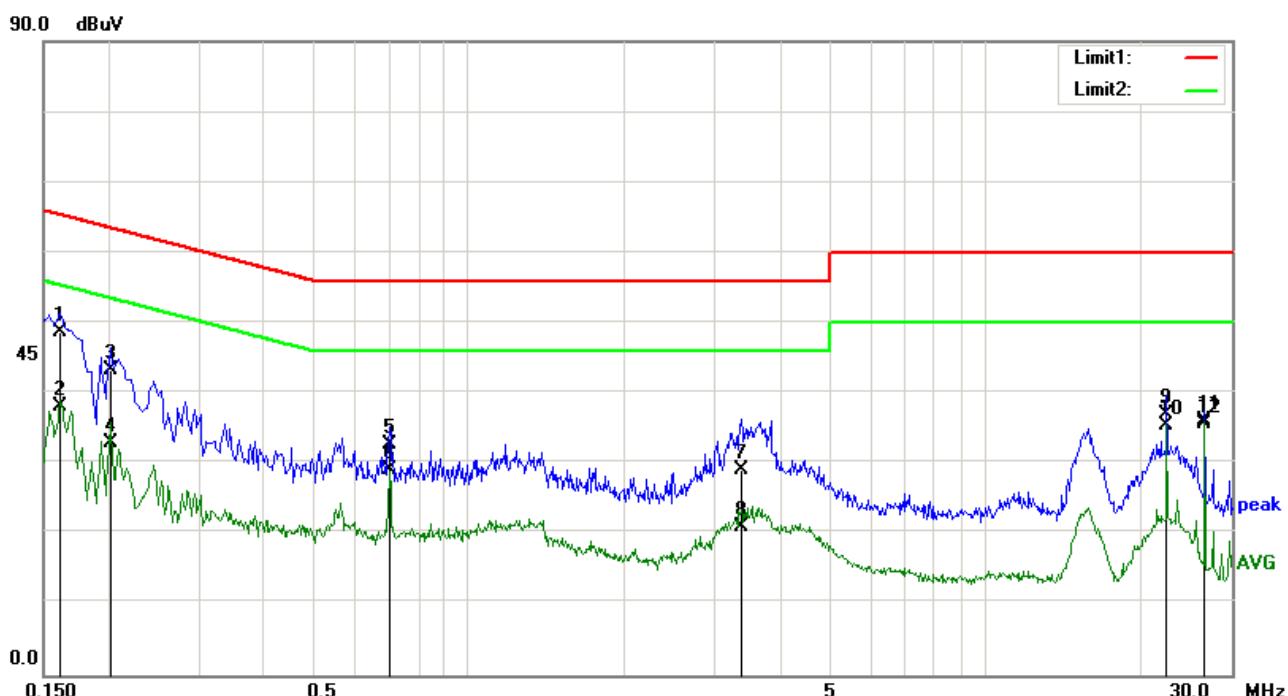
Margin (dB) = Result (dB $\mu$ V) – limit (dB $\mu$ V)

**Test Mode:**
**Transmitting BT Mode ( GFSK - High Channel )**


### Test Data

#### Phase Line Plot at 120Vac, 60Hz

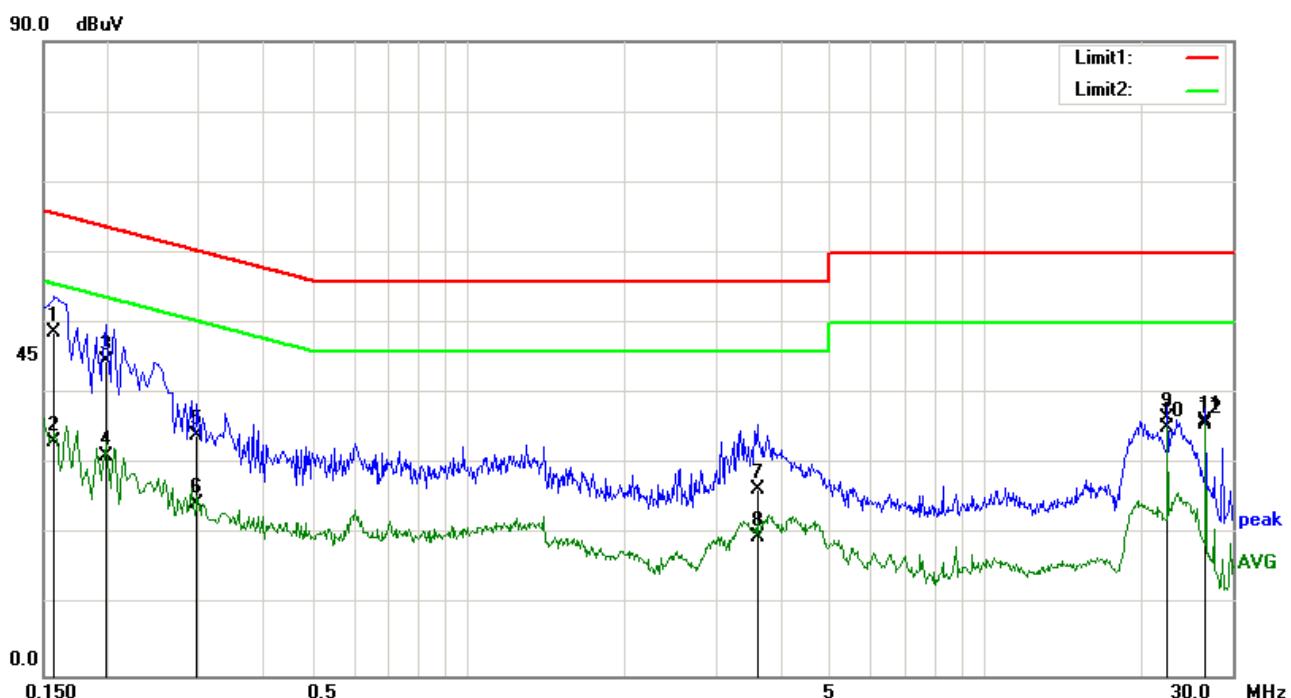
| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Detector | Lisn/Isn<br>(dB) | Ps_Lmt<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) |
|-----|--------------------|-------------------|----------|------------------|----------------|---------------|------------------|-----------------|----------------|
| 1   | 0.1620             | 38.42             | QP       | 0.10             | -10.00         | 0.34          | 48.86            | 65.36           | -16.50         |
| 2   | 0.1620             | 27.45             | AVG      | 0.10             | -10.00         | 0.34          | 37.89            | 55.36           | -17.47         |
| 3   | 0.2780             | 23.41             | QP       | 0.11             | -10.00         | 0.20          | 33.72            | 60.88           | -27.16         |
| 4   | 0.2780             | 13.85             | AVG      | 0.11             | -10.00         | 0.20          | 24.16            | 50.88           | -26.72         |
| 5   | 0.7060             | 18.88             | QP       | 0.13             | -10.00         | 0.20          | 29.21            | 56.00           | -26.79         |
| 6   | 0.7060             | 14.91             | AVG      | 0.13             | -10.00         | 0.20          | 25.24            | 46.00           | -20.76         |
| 7   | 3.6900             | 19.69             | QP       | 0.22             | -10.00         | 0.25          | 30.16            | 56.00           | -25.84         |
| 8   | 3.6900             | 10.68             | AVG      | 0.22             | -10.00         | 0.25          | 21.15            | 46.00           | -24.85         |
| 9   | 22.5300            | 23.90             | QP       | 1.19             | -10.00         | 0.66          | 35.75            | 60.00           | -24.25         |
| 10  | 22.5300            | 23.45             | AVG      | 1.19             | -10.00         | 0.66          | 35.30            | 50.00           | -14.70         |
| 11  | 26.6260            | 23.78             | QP       | 1.27             | -10.00         | 0.70          | 35.75            | 60.00           | -24.25         |
| 12  | 26.6260            | 23.71             | AVG      | 1.27             | -10.00         | 0.70          | 35.68            | 50.00           | -14.32         |

**Test Mode:**
**Transmitting BT Mode ( GFSK - High Channel )**


### Test Data

**Phase Neutral Plot at 120Vac, 60Hz**

| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Detector | Lisn/Isn<br>(dB) | Ps_Lmt<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) |
|-----|--------------------|-------------------|----------|------------------|----------------|---------------|------------------|-----------------|----------------|
| 1   | 0.1620             | 38.35             | QP       | 0.11             | -10.00         | 0.34          | 48.80            | 65.36           | -16.56         |
| 2   | 0.1620             | 27.75             | AVG      | 0.11             | -10.00         | 0.34          | 38.20            | 55.36           | -17.16         |
| 3   | 0.2020             | 32.97             | QP       | 0.10             | -10.00         | 0.28          | 43.35            | 63.53           | -20.18         |
| 4   | 0.2020             | 22.67             | AVG      | 0.10             | -10.00         | 0.28          | 33.05            | 53.53           | -20.48         |
| 5   | 0.7020             | 22.44             | QP       | 0.12             | -10.00         | 0.20          | 32.76            | 56.00           | -23.24         |
| 6   | 0.7020             | 18.90             | AVG      | 0.12             | -10.00         | 0.20          | 29.22            | 46.00           | -16.78         |
| 7   | 3.3700             | 18.74             | QP       | 0.22             | -10.00         | 0.24          | 29.20            | 56.00           | -26.80         |
| 8   | 3.3700             | 10.48             | AVG      | 0.22             | -10.00         | 0.24          | 20.94            | 46.00           | -25.06         |
| 9   | 22.5300            | 24.97             | QP       | 1.31             | -10.00         | 0.66          | 36.94            | 60.00           | -23.06         |
| 10  | 22.5300            | 23.52             | AVG      | 1.31             | -10.00         | 0.66          | 35.49            | 50.00           | -14.51         |
| 11  | 26.6260            | 23.92             | QP       | 1.41             | -10.00         | 0.70          | 36.03            | 60.00           | -23.97         |
| 12  | 26.6260            | 23.61             | AVG      | 1.41             | -10.00         | 0.70          | 35.72            | 50.00           | -14.28         |

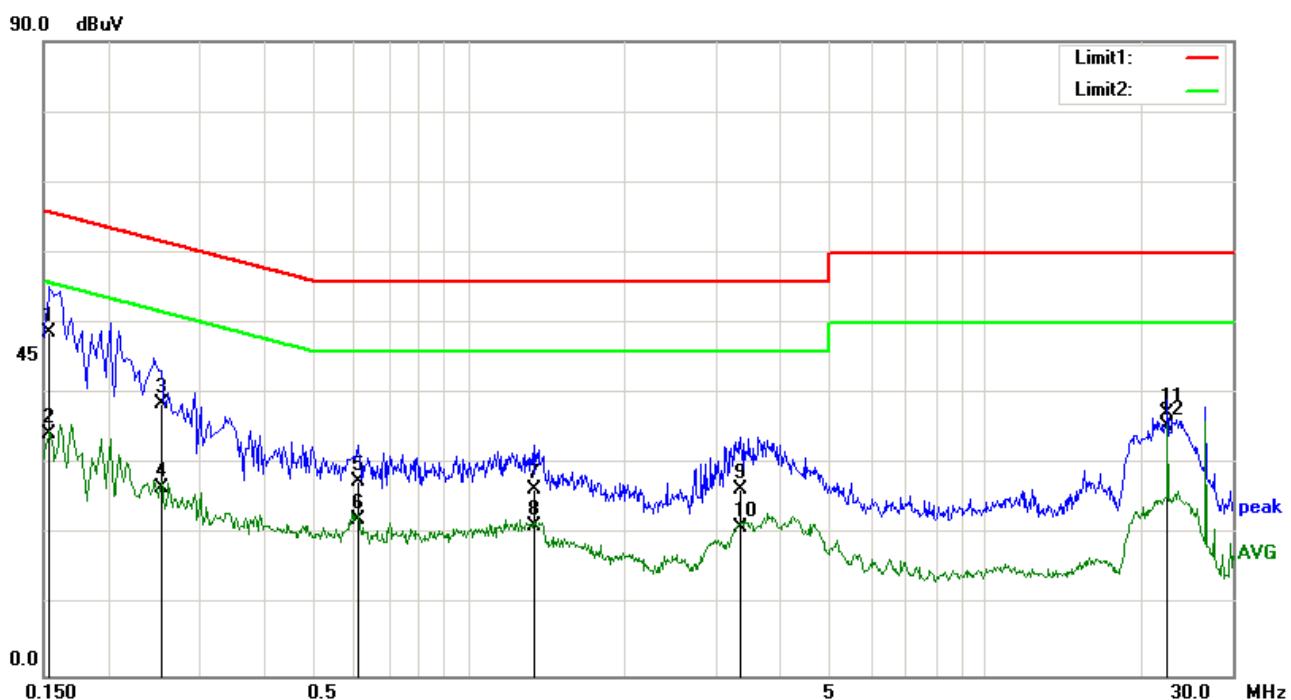
**Test Mode:**
**Transmitting BT Mode ( GFSK - High Channel )**


### Test Data

#### Phase Line Plot at 230Vac, 50Hz

| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Detector | Lisn/Isn<br>(dB) | Ps_Lmt<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) |
|-----|--------------------|-------------------|----------|------------------|----------------|---------------|------------------|-----------------|----------------|
| 1   | 0.1580             | 38.18             | QP       | 0.10             | -10.00         | 0.35          | 48.63            | 65.57           | -16.94         |
| 2   | 0.1580             | 22.78             | AVG      | 0.10             | -10.00         | 0.35          | 33.23            | 55.57           | -22.34         |
| 3   | 0.1980             | 34.22             | QP       | 0.10             | -10.00         | 0.28          | 44.60            | 63.69           | -19.09         |
| 4   | 0.1980             | 20.84             | AVG      | 0.10             | -10.00         | 0.28          | 31.22            | 53.69           | -22.47         |
| 5   | 0.2980             | 23.71             | QP       | 0.11             | -10.00         | 0.20          | 34.02            | 60.30           | -26.28         |
| 6   | 0.2980             | 14.07             | AVG      | 0.11             | -10.00         | 0.20          | 24.38            | 50.30           | -25.92         |
| 7   | 3.6060             | 15.99             | QP       | 0.22             | -10.00         | 0.25          | 26.46            | 56.00           | -29.54         |
| 8   | 3.6060             | 9.26              | AVG      | 0.22             | -10.00         | 0.25          | 19.73            | 46.00           | -26.27         |
| 9   | 22.5300            | 24.78             | QP       | 1.19             | -10.00         | 0.66          | 36.63            | 60.00           | -23.37         |
| 10  | 22.5300            | 23.47             | AVG      | 1.19             | -10.00         | 0.66          | 35.32            | 50.00           | -14.68         |
| 11  | 26.6260            | 24.20             | QP       | 1.27             | -10.00         | 0.70          | 36.17            | 60.00           | -23.83         |
| 12  | 26.6260            | 23.72             | AVG      | 1.27             | -10.00         | 0.70          | 35.69            | 50.00           | -14.31         |

**Test Mode:** Transmitting BT Mode ( GFSK - High Channel )



### Test Data

Phase Neutral Plot at 230Vac, 50Hz

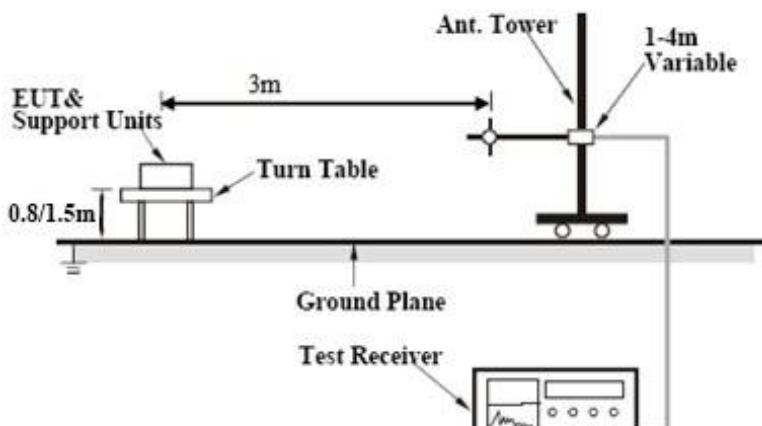
| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Detector | Lisn/Isn<br>(dB) | Ps_Lmt<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) |
|-----|--------------------|-------------------|----------|------------------|----------------|---------------|------------------|-----------------|----------------|
| 1   | 0.1540             | 38.17             | QP       | 0.11             | -10.00         | 0.35          | 48.63            | 65.78           | -17.15         |
| 2   | 0.1540             | 23.86             | AVG      | 0.11             | -10.00         | 0.35          | 34.32            | 55.78           | -21.46         |
| 3   | 0.2540             | 28.26             | QP       | 0.10             | -10.00         | 0.20          | 38.56            | 61.63           | -23.07         |
| 4   | 0.2540             | 16.37             | AVG      | 0.10             | -10.00         | 0.20          | 26.67            | 51.63           | -24.96         |
| 5   | 0.6100             | 17.26             | QP       | 0.12             | -10.00         | 0.21          | 27.59            | 56.00           | -28.41         |
| 6   | 0.6100             | 11.91             | AVG      | 0.12             | -10.00         | 0.21          | 22.24            | 46.00           | -23.76         |
| 7   | 1.3380             | 16.05             | QP       | 0.14             | -10.00         | 0.21          | 26.40            | 56.00           | -29.60         |
| 8   | 1.3380             | 10.92             | AVG      | 0.14             | -10.00         | 0.21          | 21.27            | 46.00           | -24.73         |
| 9   | 3.3500             | 16.02             | QP       | 0.22             | -10.00         | 0.24          | 26.48            | 56.00           | -29.52         |
| 10  | 3.3500             | 10.58             | AVG      | 0.22             | -10.00         | 0.24          | 21.04            | 46.00           | -24.96         |
| 11  | 22.5300            | 25.22             | QP       | 1.31             | -10.00         | 0.66          | 37.19            | 60.00           | -22.81         |
| 12  | 22.5300            | 23.40             | AVG      | 1.31             | -10.00         | 0.66          | 35.37            | 50.00           | -14.63         |

Note: We test 3 modulations, only show GFSK test data in the report.

## 6.9 Radiated Emissions

|                      |                |
|----------------------|----------------|
| Temperature          | 23°C           |
| Relative Humidity    | 51%            |
| Atmospheric Pressure | 1018mbar       |
| Test date :          | March 29, 2018 |
| Tested By :          | Amos Xia       |

**Requirement(s):**

| Spec                                     | Item                        | Requirement  | Applicable            |                             |         |    |          |     |           |     |           |     |                       |                             |         |     |          |     |           |     |           |     |                                     |
|--|-----------------------------|--|-----------------------|-----------------------------|---------|----|----------|-----|-----------|-----|-----------|-----|-----------------------|-----------------------------|---------|-----|----------|-----|-----------|-----|-----------|-----|-------------------------------------|
| 47CFR§15.20<br>5, §15.209,<br>§15.247(d) | a)                          | <p>Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges</p> <p style="text-align: center;"><b>Class A Limit</b></p> <table border="1"> <thead> <tr> <th>Frequency range (MHz)</th> <th>Field Strength (<math>\mu</math>V/m)</th> </tr> </thead> <tbody> <tr> <td>30 – 88</td> <td>90</td> </tr> <tr> <td>88 – 216</td> <td>150</td> </tr> <tr> <td>216 – 960</td> <td>210</td> </tr> <tr> <td>Above 960</td> <td>300</td> </tr> </tbody> </table> <p style="text-align: center;"><b>Class B Limit</b></p> <table border="1"> <thead> <tr> <th>Frequency range (MHz)</th> <th>Field Strength (<math>\mu</math>V/m)</th> </tr> </thead> <tbody> <tr> <td>30 – 88</td> <td>100</td> </tr> <tr> <td>88 – 216</td> <td>150</td> </tr> <tr> <td>216 – 960</td> <td>200</td> </tr> <tr> <td>Above 960</td> <td>500</td> </tr> </tbody> </table>  | Frequency range (MHz) | Field Strength ( $\mu$ V/m) | 30 – 88 | 90 | 88 – 216 | 150 | 216 – 960 | 210 | Above 960 | 300 | Frequency range (MHz) | Field Strength ( $\mu$ V/m) | 30 – 88 | 100 | 88 – 216 | 150 | 216 – 960 | 200 | Above 960 | 500 | <input checked="" type="checkbox"/> |
| Frequency range (MHz)                    | Field Strength ( $\mu$ V/m) |  |                       |                             |         |    |          |     |           |     |           |     |                       |                             |         |     |          |     |           |     |           |     |                                     |
| 30 – 88                                  | 90                          |  |                       |                             |         |    |          |     |           |     |           |     |                       |                             |         |     |          |     |           |     |           |     |                                     |
| 88 – 216                                 | 150                         |  |                       |                             |         |    |          |     |           |     |           |     |                       |                             |         |     |          |     |           |     |           |     |                                     |
| 216 – 960                                | 210                         |  |                       |                             |         |    |          |     |           |     |           |     |                       |                             |         |     |          |     |           |     |           |     |                                     |
| Above 960                                | 300                         |  |                       |                             |         |    |          |     |           |     |           |     |                       |                             |         |     |          |     |           |     |           |     |                                     |
| Frequency range (MHz)                    | Field Strength ( $\mu$ V/m) |  |                       |                             |         |    |          |     |           |     |           |     |                       |                             |         |     |          |     |           |     |           |     |                                     |
| 30 – 88                                  | 100                         |  |                       |                             |         |    |          |     |           |     |           |     |                       |                             |         |     |          |     |           |     |           |     |                                     |
| 88 – 216                                 | 150                         |  |                       |                             |         |    |          |     |           |     |           |     |                       |                             |         |     |          |     |           |     |           |     |                                     |
| 216 – 960                                | 200                         |  |                       |                             |         |    |          |     |           |     |           |     |                       |                             |         |     |          |     |           |     |           |     |                                     |
| Above 960                                | 500                         |  |                       |                             |         |    |          |     |           |     |           |     |                       |                             |         |     |          |     |           |     |           |     |                                     |
| Test Setup                               |                             |  <p>The diagram illustrates the test setup for radiated emissions. It shows a 'Turn Table' mounted on a 'Ground Plane'. A 'EUT &amp; Support Units' is positioned on the turn table. An 'Ant. Tower' is connected to the EUT via a cable. The distance between the EUT and the turn table is 3m. The height of the EUT is indicated as 0.8/1.5m. The antenna tower has a '1-4m Variable' height adjustment. A 'Test Receiver' is connected to the antenna tower to measure the emissions.</p>  |                       |                             |         |    |          |     |           |     |           |     |                       |                             |         |     |          |     |           |     |           |     |                                     |
| Procedure                                |                             | <ol style="list-style-type: none"> <li>The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: <ol style="list-style-type: none"> <li>Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</li> <li>The EUT was then rotated to the direction that gave the maximum emission.</li> <li>Finally, the antenna height was adjusted to the height that gave the maximum emission.</li> </ol> </li> <li>The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-Peak detection at frequency below 1GHz.</li> <li>The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz.</li> <li>The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz</li> </ol> |                       |                             |         |    |          |     |           |     |           |     |                       |                             |         |     |          |     |           |     |           |     |                                     |

|        |  |
|--------|--|
|        | 5. with Peak detection for Average Measurement as below at frequency above 1GHz.<br>Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured. |
| Remark | We test 3 modulations, only show GFSK test data in the report.   |
| Result | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail   |

Test Data  Yes  N/A

Test Plot  Yes (See below)  N/A

#### Data sample

| No. | Frequency<br>(MHz) | Reading<br>(dB $\mu$ V/m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dB $\mu$ V/m) | Limit<br>(dB $\mu$ V/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|---------------------------|----------|-----------------|--------------|---------------|--------------------------|-------------------------|----------------|----------------|---------------|
|     |                    |                           |          |                 |              |               |                          |                         |                |                |               |

Frequency (MHz) = Emission frequency in MHz

Reading (dB $\mu$ V/m) = Receiver Reading Value

Detector= Peak Detector or Quasi Peak Detector

Ant\_F=Antenna Factor

PA\_G=Pre-Amplifier Gain

Cab\_L=Cable Loss

Result (dB $\mu$ V/m) = Read ing Value + Corrected Value

Limit (dB $\mu$ V/m) = Limit stated in standard

Height (cm) = Height of Receiver antenna

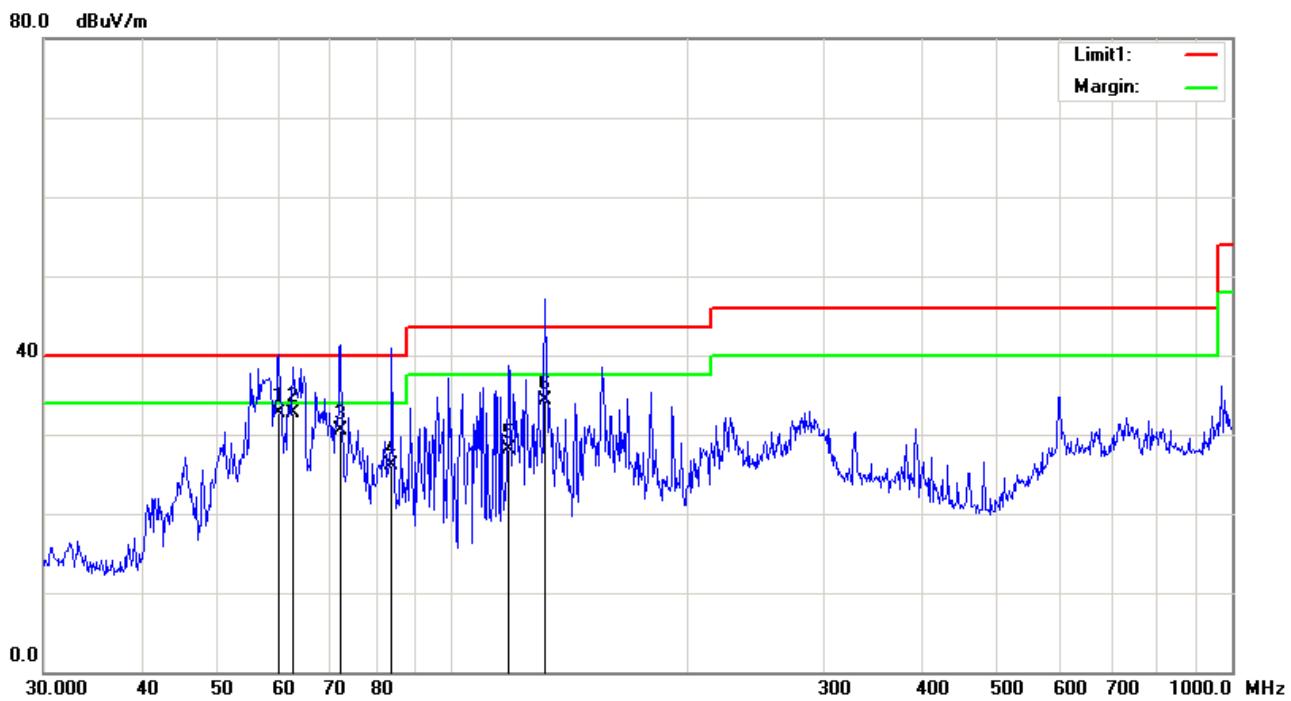
Degree = Turn table degree

#### Calculation Formula:

Margin (dB) = Result (dB $\mu$ V/m) – limit (dB $\mu$ V/m)

**Test Mode:**
**Transmitting BT Mode ( GFSK- High Channel )**

### Below 1GHz



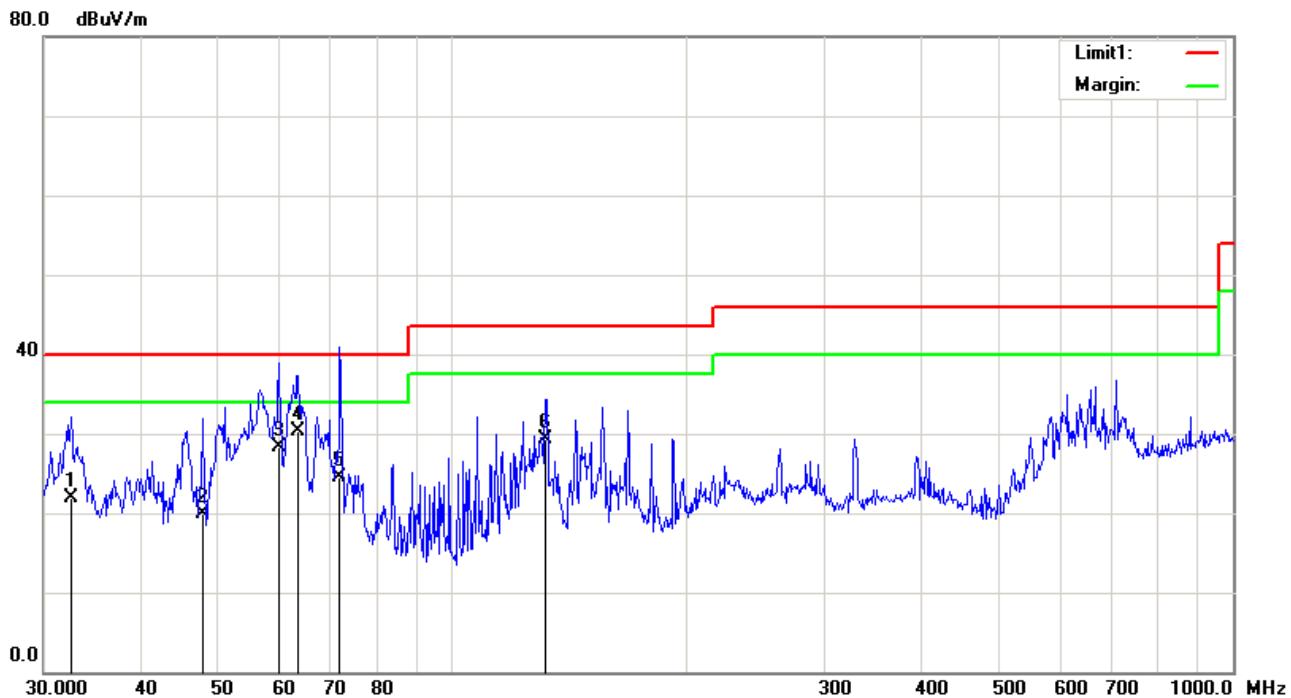
### Test Data

#### Horizontal Polarity Plot @3m

| No. | Frequency (MHz) | Reading (dBuV/m) | Detector | Ant_F (dB/m) | PA_G (dB) | Cab_L (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (°) |
|-----|-----------------|------------------|----------|--------------|-----------|------------|-----------------|----------------|-------------|-------------|------------|
| 1   | 60.0691         | 69.19            | QP       | 9.49         | 47.28     | 1.30       | 32.70           | 40.00          | -7.30       | 300         | 176        |
| 2   | 62.6507         | 69.12            | QP       | 9.81         | 47.47     | 1.34       | 32.80           | 40.00          | -7.20       | 200         | 180        |
| 3   | 72.0843         | 66.50            | QP       | 10.47        | 47.91     | 1.44       | 30.50           | 40.00          | -9.50       | 300         | 360        |
| 4   | 83.8156         | 62.73            | QP       | 9.59         | 47.58     | 1.46       | 26.20           | 40.00          | -13.80      | 300         | 177        |
| 5   | 118.1862        | 56.98            | QP       | 15.86        | 46.50     | 1.76       | 28.10           | 43.50          | -15.40      | 300         | 18         |
| 6   | 131.7577        | 65.23            | QP       | 14.71        | 47.42     | 1.88       | 34.40           | 43.50          | -9.10       | 300         | 194        |

**Test Mode:**
**Transmitting BT Mode ( GFSK- High Channel )**

### Below 1GHz



### Vertical Polarity Plot @3m

| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|---------------------|----------|-----------------|--------------|---------------|--------------------|-------------------|----------------|----------------|---------------|
| 1   | 32.5198            | 46.51               | QP       | 20.13           | 45.66        | 0.92          | 21.90              | 40.00             | -18.10         | 100            | 0             |
| 2   | 47.9940            | 54.56               | QP       | 10.40           | 46.27        | 1.21          | 19.90              | 40.00             | -20.10         | 100            | 298           |
| 3   | 60.0691            | 66.52               | QP       | 7.86            | 47.28        | 1.30          | 28.40              | 40.00             | -11.60         | 100            | 96            |
| 4   | 63.5356            | 67.72               | QP       | 8.76            | 47.53        | 1.35          | 30.30              | 40.00             | -9.70          | 100            | 359           |
| 5   | 71.8320            | 61.19               | QP       | 9.88            | 47.91        | 1.44          | 24.60              | 40.00             | -15.40         | 200            | 217           |
| 6   | 131.7577           | 59.26               | QP       | 15.68           | 47.42        | 1.88          | 29.40              | 43.50             | -14.10         | 100            | 167           |

Note: We test 3 modulations, only show GFSK test data in the report.

**Test Mode:** Transmitting BT Mode ( GFSK )

**Mode: GFSK (Worst Case)**

**Above 1GHz**  
**Low Channel (2402 MHz)**  
**Horizontal**

| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|---------------------|----------|-----------------|--------------|---------------|--------------------|-------------------|----------------|----------------|---------------|
| 1   | 1867.000           | 66.98               | peak     | 30.53           | 51.61        | 3.99          | 49.89              | 74.00             | -24.11         | 100            | 217           |
| 2   | 2139.000           | 62.92               | peak     | 31.38           | 52.35        | 4.13          | 46.08              | 74.00             | -27.92         | 200            | 0             |
| 3   | 2564.000           | 61.34               | peak     | 31.59           | 52.66        | 4.11          | 44.38              | 74.00             | -29.62         | 200            | 231           |
| 4   | 4804.000           | 57.06               | peak     | 33.18           | 53.35        | 6.10          | 42.99              | 74.00             | -31.01         | 200            | 350           |
| 5   | 5981.000           | 54.96               | peak     | 33.40           | 51.36        | 5.87          | 42.87              | 74.00             | -31.13         | 100            | 214           |
| 6   | 8106.000           | 55.98               | peak     | 36.07           | 54.53        | 7.96          | 45.48              | 74.00             | -28.52         | 200            | 298           |

**Vertical**

| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|---------------------|----------|-----------------|--------------|---------------|--------------------|-------------------|----------------|----------------|---------------|
| 1   | 1595.000           | 62.95               | peak     | 28.95           | 50.31        | 3.91          | 45.50              | 74.00             | -28.50         | 100            | 291           |
| 2   | 1867.000           | 67.61               | peak     | 30.53           | 51.61        | 3.99          | 50.52              | 74.00             | -23.48         | 200            | 21            |
| 3   | 2139.000           | 61.86               | peak     | 31.38           | 52.35        | 4.13          | 45.02              | 74.00             | -28.98         | 100            | 298           |
| 4   | 4332.000           | 57.29               | peak     | 32.13           | 52.32        | 5.91          | 43.01              | 74.00             | -30.99         | 194            | 0             |
| 5   | 4804.000           | 56.55               | peak     | 33.03           | 53.05        | 6.13          | 42.66              | 74.00             | -31.34         | 100            | 115           |
| 6   | 6321.000           | 55.71               | peak     | 33.91           | 52.28        | 5.84          | 43.18              | 74.00             | -30.82         | 100            | 84            |

**Middle Channel (2441 MHz)**  
**Horizontal**

| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|---------------------|----------|-----------------|--------------|---------------|--------------------|-------------------|----------------|----------------|---------------|
| 1   | 1867.000           | 66.80               | peak     | 30.53           | 51.61        | 3.99          | 49.71              | 74.00             | -24.29         | 200            | 11            |
| 2   | 2139.000           | 63.37               | peak     | 31.38           | 52.35        | 4.13          | 46.53              | 74.00             | -27.47         | 200            | 235           |
| 3   | 4502.000           | 56.85               | peak     | 32.50           | 51.99        | 5.85          | 43.21              | 74.00             | -30.79         | 200            | 29            |
| 4   | 4882.000           | 57.44               | peak     | 33.33           | 53.66        | 6.00          | 43.11              | 74.00             | -30.89         | 100            | 75            |
| 5   | 5845.000           | 55.67               | peak     | 33.43           | 51.97        | 6.02          | 43.15              | 74.00             | -30.85         | 100            | 90            |
| 6   | 7324.000           | 58.35               | peak     | 34.82           | 55.04        | 7.15          | 45.28              | 74.00             | -28.72         | 200            | 200           |

**Vertical**

| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|---------------------|----------|-----------------|--------------|---------------|--------------------|-------------------|----------------|----------------|---------------|
| 1   | 1850.000           | 67.67               | peak     | 30.43           | 51.53        | 4.00          | 50.57              | 74.00             | -23.43         | 200            | 165           |
| 2   | 2139.000           | 61.77               | peak     | 31.38           | 52.35        | 4.13          | 44.93              | 74.00             | -29.07         | 200            | 25            |
| 3   | 4553.000           | 56.04               | peak     | 32.62           | 52.22        | 6.01          | 42.45              | 74.00             | -31.55         | 99             | 58            |
| 4   | 4882.000           | 56.31               | peak     | 33.29           | 53.58        | 6.03          | 42.05              | 74.00             | -31.95         | 99             | 44            |
| 5   | 5692.000           | 56.26               | peak     | 33.46           | 52.65        | 6.13          | 43.20              | 74.00             | -30.80         | 200            | 234           |
| 6   | 7324.000           | 61.04               | peak     | 34.82           | 55.04        | 7.15          | 47.97              | 74.00             | -26.03         | 99             | 305           |

**High Channel (2480 MHz)  
Horizontal**

| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|---------------------|----------|-----------------|--------------|---------------|--------------------|-------------------|----------------|----------------|---------------|
| 1   | 1867.000           | 67.72               | peak     | 30.53           | 51.61        | 3.99          | 50.63              | 74.00             | -23.37         | 99             | 307           |
| 2   | 2139.000           | 62.23               | peak     | 31.38           | 52.35        | 4.13          | 45.39              | 74.00             | -28.61         | 200            | 111           |
| 3   | 4349.000           | 57.55               | peak     | 32.17           | 52.28        | 5.88          | 43.32              | 74.00             | -30.68         | 200            | 47            |
| 4   | 4960.000           | 57.66               | peak     | 33.51           | 54.04        | 5.88          | 43.01              | 74.00             | -30.99         | 99             | 79            |
| 5   | 6015.000           | 55.02               | peak     | 33.42           | 51.33        | 5.85          | 42.96              | 74.00             | -31.04         | 162            | 360           |
| 6   | 7443.000           | 59.54               | peak     | 35.01           | 54.87        | 7.33          | 47.01              | 74.00             | -26.99         | 200            | 198           |

**Vertical**

| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Detector | Ant_F<br>(dB/m) | PA_G<br>(dB) | Cab_L<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) |
|-----|--------------------|---------------------|----------|-----------------|--------------|---------------|--------------------|-------------------|----------------|----------------|---------------|
| 1   | 1850.000           | 66.28               | peak     | 30.43           | 51.53        | 4.00          | 49.18              | 74.00             | -24.82         | 200            | 38            |
| 2   | 2139.000           | 63.44               | peak     | 31.38           | 52.35        | 4.13          | 46.60              | 74.00             | -27.40         | 200            | 52            |
| 3   | 4349.000           | 57.26               | peak     | 32.17           | 52.28        | 5.88          | 43.03              | 74.00             | -30.97         | 200            | 125           |
| 4   | 4960.000           | 56.29               | peak     | 32.84           | 52.67        | 6.15          | 42.61              | 74.00             | -31.39         | 100            | 177           |
| 5   | 6151.000           | 55.41               | peak     | 33.64           | 51.75        | 5.85          | 43.15              | 74.00             | -30.85         | 100            | 342           |
| 6   | 7443.000           | 61.48               | peak     | 35.01           | 54.87        | 7.33          | 48.95              | 74.00             | -25.05         | 100            | 310           |

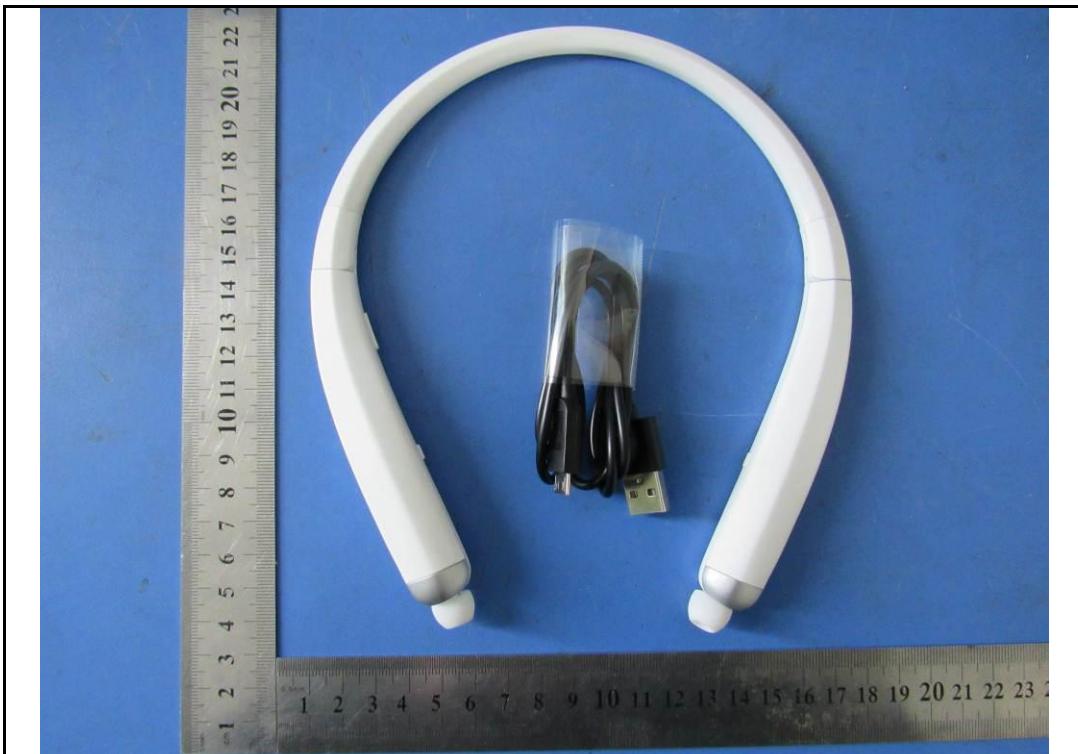
Note: We test 3 modulations, only show GFSK test data in the report.

## Annex A. TEST INSTRUMENT

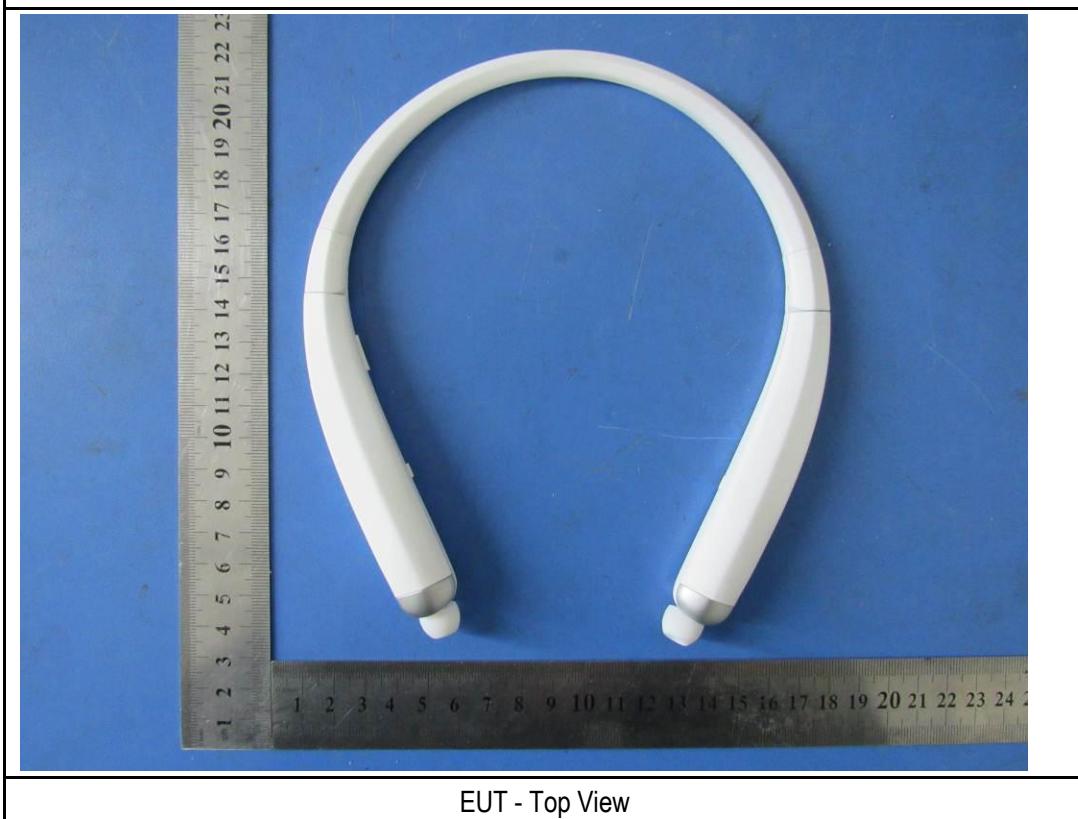
| Instrument                           | Model        | Serial #       | Cal Date   | Cal Due    | In use                              |
|--------------------------------------|--------------|----------------|------------|------------|-------------------------------------|
| <b>Conducted Emissions</b>           |              |                |            |            |                                     |
| R&S EMI Test Receiver                | ESPI3        | 101216         | 05/03/2017 | 05/02/2018 | <input checked="" type="checkbox"/> |
| V-LISN                               | ESH3-Z5      | 838979/005     | 05/15/2017 | 05/14/2018 | <input checked="" type="checkbox"/> |
| INFOMW Antenna<br>(1 ~18GHz)         | JXTXLB-10180 | J2031081120092 | 10/08/2017 | 10/07/2018 | <input checked="" type="checkbox"/> |
| SIEMIC EZ_EMC<br>Conducted Emissions | Ver.ICP-03A1 | N/A            | N/A        | N/A        | <input checked="" type="checkbox"/> |
| <b>RF conducted test</b>             |              |                |            |            |                                     |
| R&S EMI Receiver                     | ESPI3        | 101216         | 05/03/2017 | 05/02/2018 | <input checked="" type="checkbox"/> |
| Power Splitter                       | 1#           | 1#             | 02/02/2018 | 02/01/2019 | <input checked="" type="checkbox"/> |
| Spectrum Analyzer                    | N9010A       | MY47191130     | 05/03/2017 | 05/02/2018 | <input checked="" type="checkbox"/> |
| Temperature/Humidity<br>Chamber      | 1007H        | N/A            | 01/07/2018 | 01/06/2019 | <input checked="" type="checkbox"/> |
| <b>Radiated Emissions</b>            |              |                |            |            |                                     |
| Spectrum Analyzer                    | N9010A       | MY47191130     | 05/03/2017 | 05/02/2018 | <input checked="" type="checkbox"/> |
| R&S EMI Receiver                     | ESPI3        | 101216         | 05/03/2017 | 05/02/2018 | <input checked="" type="checkbox"/> |
| Antenna (30MHz~6GHz)                 | JB6          | A121411        | 10/31/2017 | 10/30/2018 | <input checked="" type="checkbox"/> |
| EMCO Horn Antenna<br>(1 ~18GHz)      | 3115         | N/A            | 11/15/2017 | 11/14/2018 | <input checked="" type="checkbox"/> |
| INFOMW Antenna<br>(1 ~18GHz)         | JXTXLB-10180 | J2031081120092 | 10/09/2017 | 10/08/2018 | <input checked="" type="checkbox"/> |
| Horn Antenna (18~40GHz)              | AH-840       | 101013         | 04/30/2017 | 04/29/2018 | N/A                                 |
| Microwave Pre-Amp<br>(18~40GHz)      | PA-840       | 181250         | 05/28/2017 | 05/27/2018 | N/A                                 |
| Hp Pre-Amplifier                     | 8447F        | 1937A01160     | 10/31/2017 | 10/30/2018 | <input checked="" type="checkbox"/> |
| Agilent Pre-Amplifier                | 8449B        | N/A            | 10/31/2017 | 10/30/2018 | <input checked="" type="checkbox"/> |
| SIEMIC EZ_EMC<br>Conducted Emissions | Ver.ICP-03A1 | N/A            | N/A        | N/A        | <input checked="" type="checkbox"/> |

## Annex B. EUT And Test Setup Photographs

### Annex B.i. Photograph: EUT External Photo



The Whole of EUT - Front View



EUT - Top View

|                 |                 |
|-----------------|-----------------|
| Test Report No. | 18020308-FCC-R1 |
| Page            | 63 of 73        |

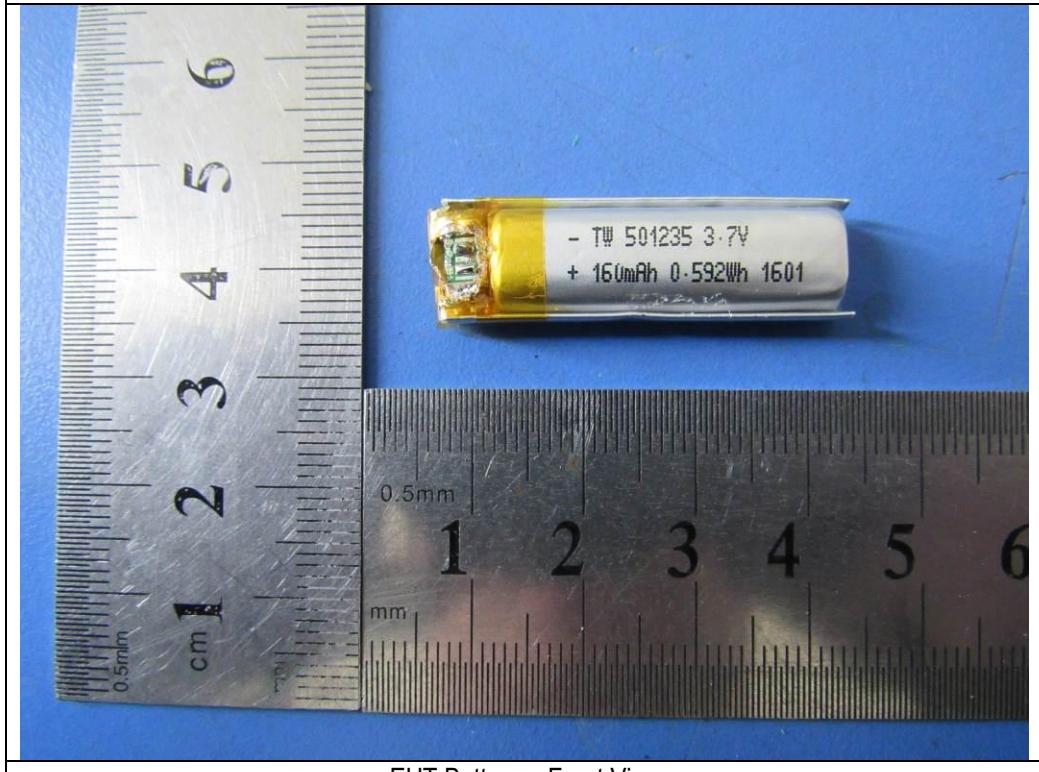


EUT - Bottom View

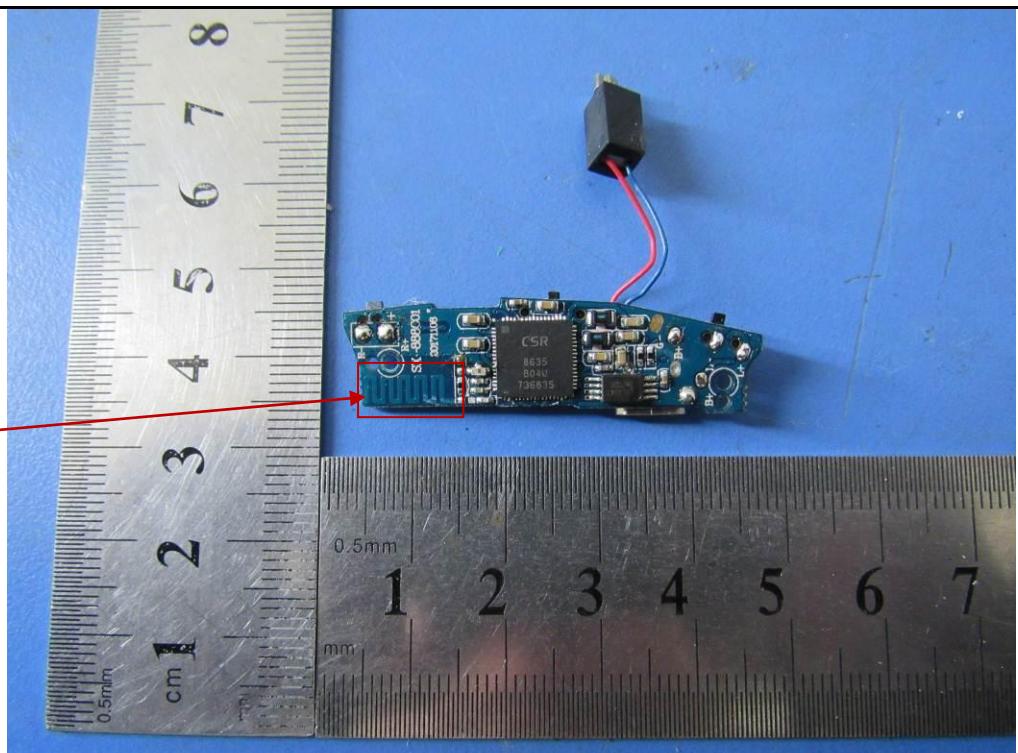
**Annex B.ii. Photograph: EUT Internal Photo**



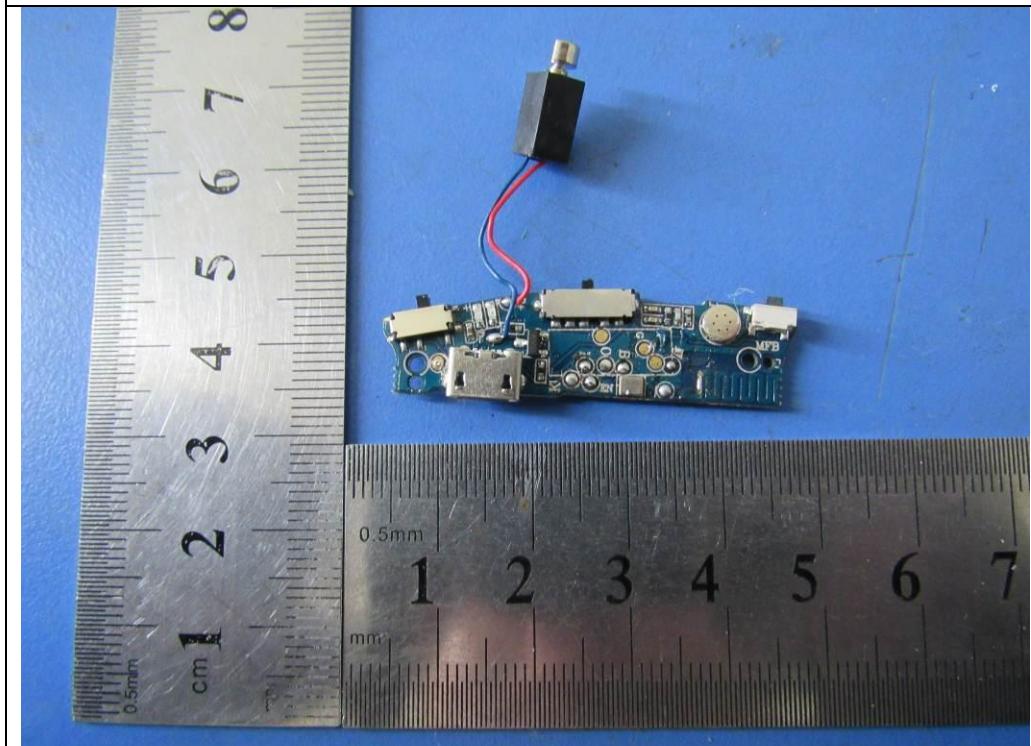
EUT – Uncover Front View - 1



EUT Battery – Front View



EUT PCB – Front View



EUT PCB – Rear View

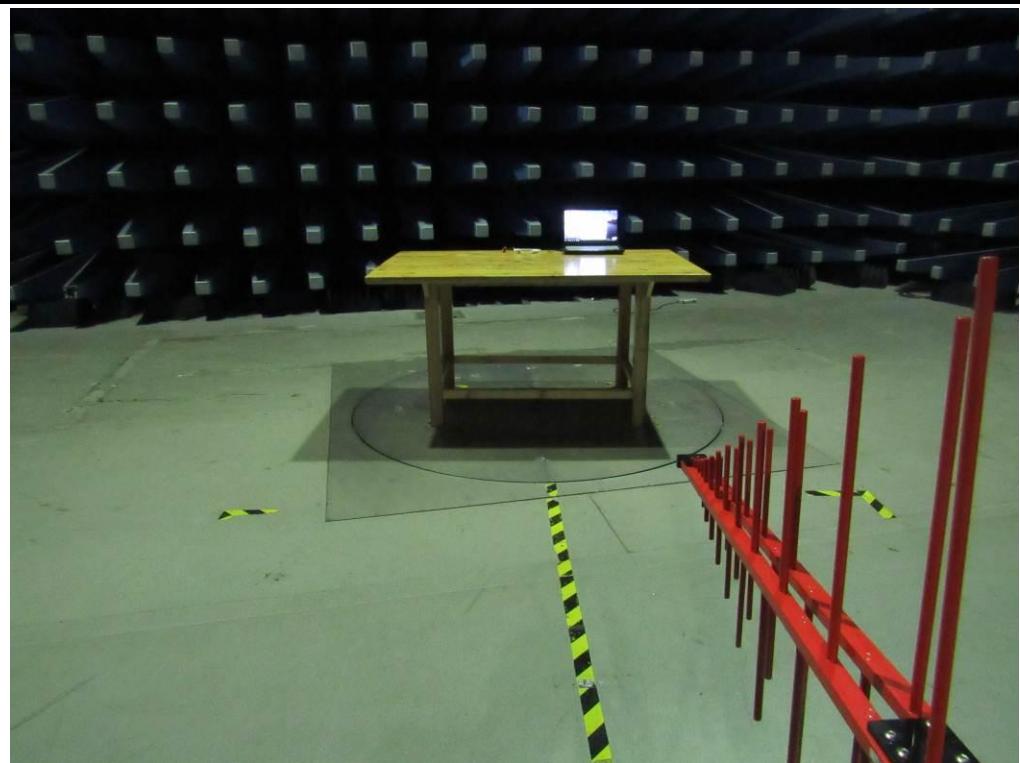
**Annex B.iii. Photograph: Test Setup Photo**



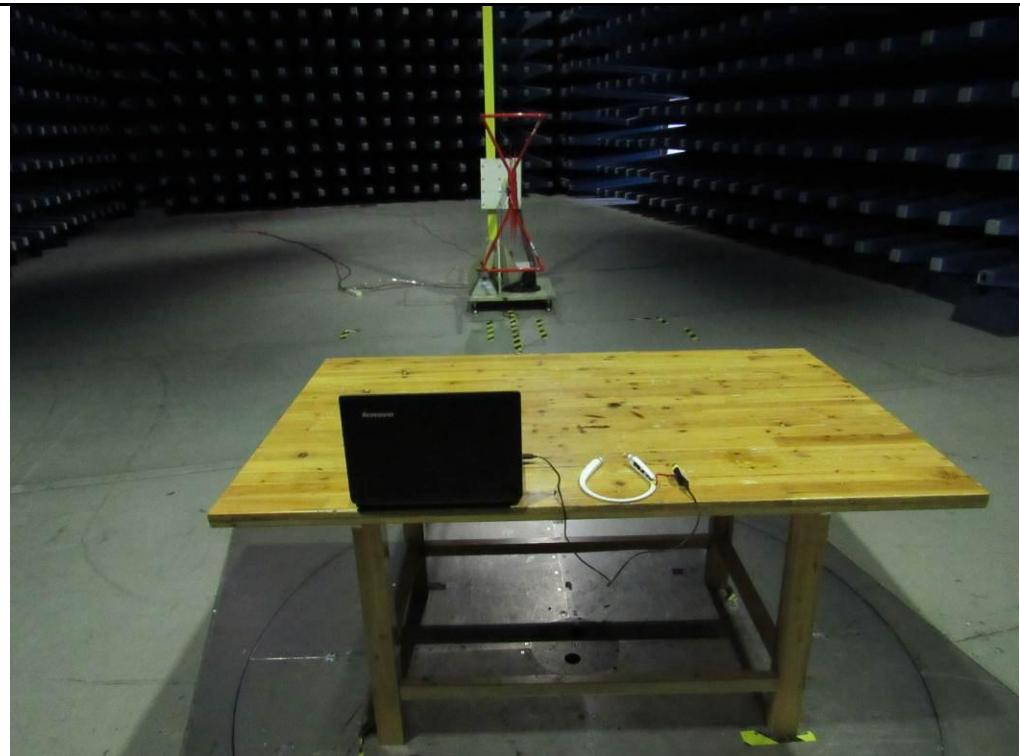
Conducted Emissions Test Setup Front View



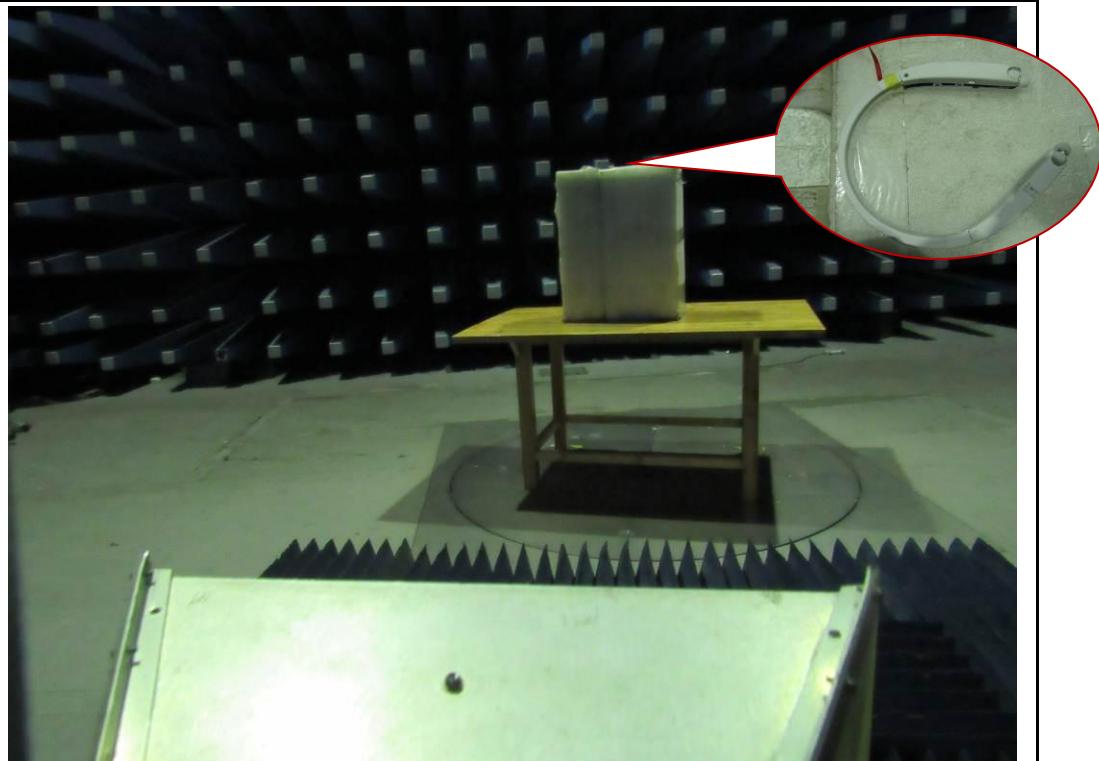
Conducted Emissions Test Setup Side View



Radiated Spurious Emissions Test Setup Below 1GHz



Radiated Spurious Emissions Test Setup Above 1GHz

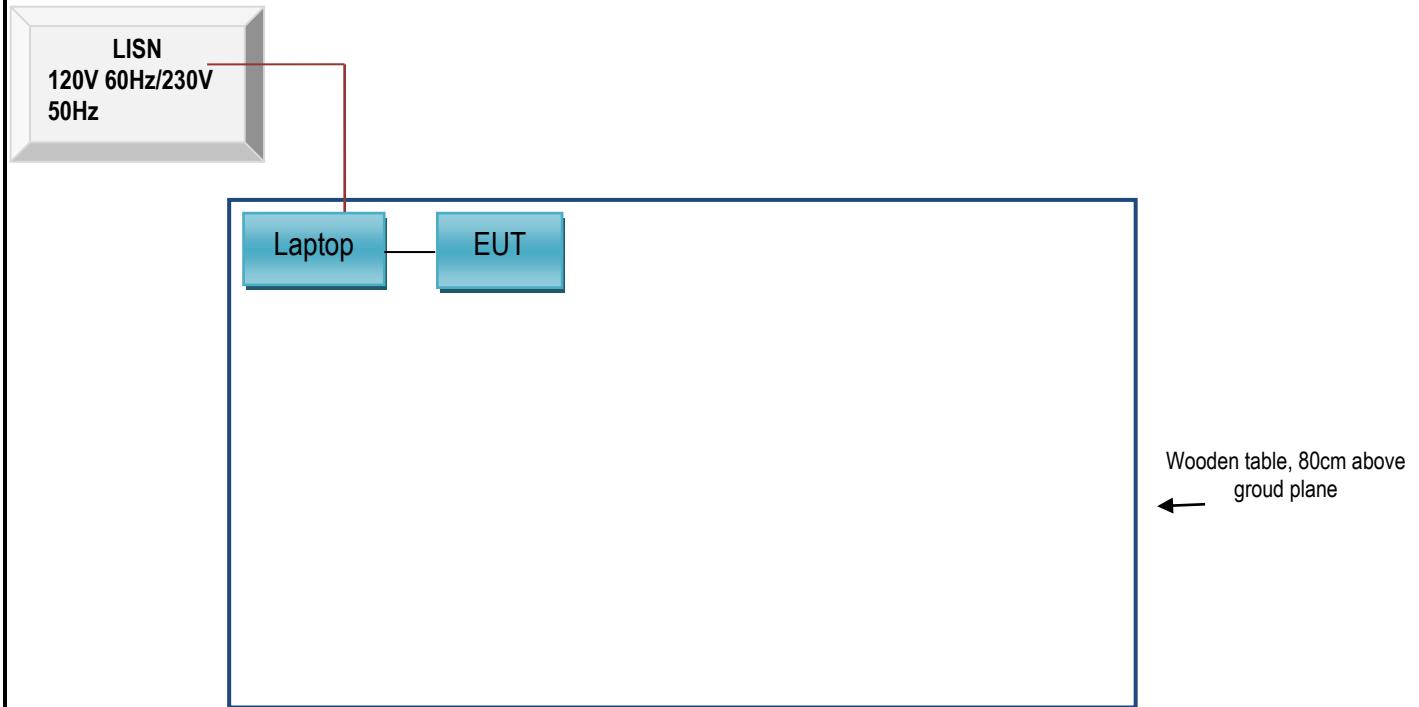


Radiated Spurious Emissions Test Setup Above 1GHz

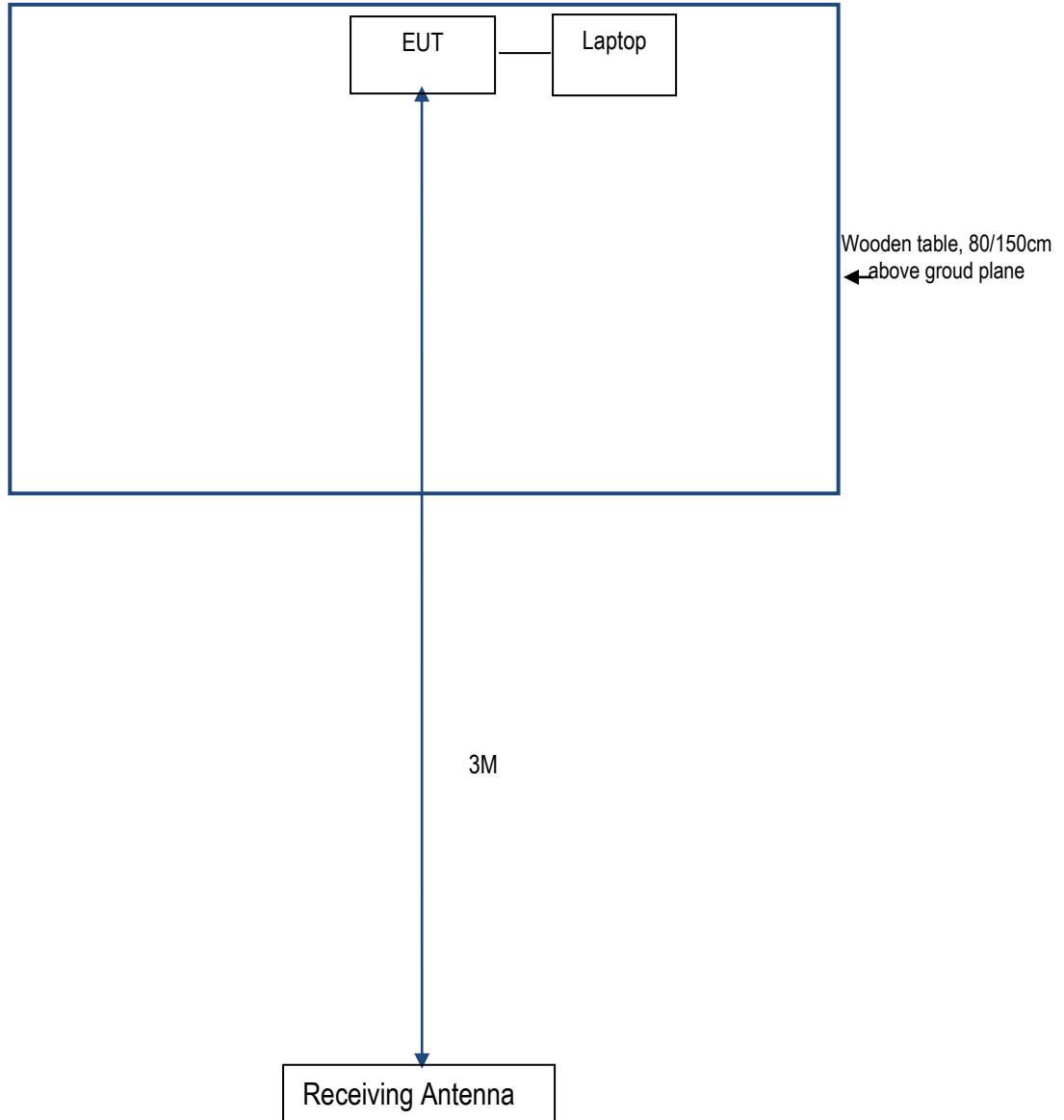
## Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

### Annex C.ii. TEST SET UP BLOCK

Block Configuration Diagram for AC Line Conducted Emissions



### Block Configuration Diagram for Radiated Emissions



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#### **Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION**

The following is a description of supporting equipment and details of cables used with the EUT.

| Manufacturer | Equipment Description | Model | Calibration Date | Calibration Due Date |
|--------------|-----------------------|-------|------------------|----------------------|
| Lenovo       | Laptop                | Y471A | N/A              | N/A                  |

|                 |                 |
|-----------------|-----------------|
| Test Report No. | 18020308-FCC-R1 |
| Page            | 72 of 73        |

## Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see attachment

## Annex E. DECLARATION OF SIMILARITY

To: SIEMIC INC.

## Declaration letter

Dear Sir,

For our business issue and marketing requirement, we would like to list different models numbers on the FCC certificates and reports, as following:

Model No.: Model name SX-888  
Model name SX-888A SX-888B SX-888C

The difference between the two models Model name SX-888 and Model name SX-888A SX-888B SX-888C are as follows:

The Serial Model Name Model name SX-888A SX-888B SX-888C Different model name and shape only, like all the other.

Thank you!

FCC ID: UHB-SX-888

Signature:



Printed name/title: Ye Jie Bin/General Manager  
Contact information /Address: Shenzhen Shuaixian Electronic Equipment Co., Ltd.  
No.10 Lane 3, Longxing Rd., Dakang Long Village,Henggang  
Town, Longgang Dist., Shenzhen,518116 China