

# RF TEST REPORT



Report No.: 16070264-FCC-R

Supersede Report No.: N/A

|                                                                                                                                      |                                                                        |  |
|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|--|
| Applicant                                                                                                                            | Xiamen PRT Technology Co.,Ltd                                          |  |
| Product Name                                                                                                                         | Bluetooth Module                                                       |  |
| Model No.                                                                                                                            | SCBM4A                                                                 |  |
| Serial No.                                                                                                                           | N/A                                                                    |  |
| Test Standard                                                                                                                        | FCC Part 15.247: 2015, ANSI C63.10: 2013                               |  |
| Test Date                                                                                                                            | March 30 to April 14, 2016                                             |  |
| Issue Date                                                                                                                           | April 14, 2016                                                         |  |
| 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"/>                                                             |                                                                        |  |
| <i>Winnie Zhang</i>                                                                                                                  | <i>David Huang</i>                                                     |  |
| Winnie Zhang<br>Test Engineer                                                                                                        | David Huang<br>Checked By                                              |  |
| This test report may be reproduced in full only<br>Test result presented in this test report is applicable to the tested sample only |                                                                        |  |

Issued by:

**SIEMIC (SHENZHEN-CHINA) LABORATORIES**

Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108

Phone: +86 0755 2601 4629801 Email: [China@siemic.com.cn](mailto:China@siemic.com.cn)

## Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

### 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 | 16070264-FCC-R |
| Page        | 3 of 55        |

This page has been left blank intentionally.

## 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 .....                                              | 7  |
| 6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS .....             | 8  |
| 6.1 ANTENNA REQUIREMENT .....                                      | 8  |
| 6.2 CHANNEL SEPARATION .....                                       | 9  |
| 6.3 20DB BANDWIDTH .....                                           | 13 |
| 6.4 PEAK OUTPUT POWER .....                                        | 17 |
| 6.5 NUMBER OF HOPPING CHANNEL .....                                | 21 |
| 6.6 TIME OF OCCUPANCY (DWEEL TIME) .....                           | 23 |
| 6.7 BAND EDGE .....                                                | 27 |
| 6.8 AC POWER LINE CONDUCTED EMISSIONS .....                        | 35 |
| 6.9 RADIATED SPURIOUS EMISSIONS .....                              | 41 |
| ANNEX A. TEST INSTRUMENT .....                                     | 46 |
| ANNEX B. EUT AND TEST SETUP PHOTOGRAPHS .....                      | 47 |
| ANNEX C. TEST SETUP AND SUPPORTING EQUIPMENT .....                 | 50 |
| ANNEX D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PARTLIST ..... | 54 |
| ANNEX E. DECLARATION OF SIMILARITY .....                           | 55 |

## 1. Report Revision History

| Report No.     | Report Version | Description | Issue Date     |
|----------------|----------------|-------------|----------------|
| 16070264-FCC-R | NONE           | Original    | April 14, 2016 |
|                |                |             |                |
|                |                |             |                |
|                |                |             |                |
|                |                |             |                |

## 2. Customer information

|                  |                                                                                               |
|------------------|-----------------------------------------------------------------------------------------------|
| Applicant Name   | Xiamen PRT Technology Co.,Ltd                                                                 |
| Applicant Add    | 1-303H Unit,1# Zengcuoan North Rd,Torch High-Tech Software park,Siming District Xiamen,Fujian |
| Manufacturer     | CHUANGSHENG(XIAMEN) ELECTRONIC SCIENCE CO.,LTD                                                |
| Manufacturer Add | ROOM 701-30 , NO.89 ANLING TWO ROAD, HULI DISTRICT, XIAMEN                                    |

## 3. Test site information

|                      |                                                                                                                                              |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Lab performing tests | SIEMIC (Shenzhen-China) LABORATORIES                                                                                                         |
| Lab Address          | Zone A, Floor 1, Building 2 Wan Ye Long Technology Park<br>South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China<br>518108 |
| FCC Test Site No.    | 718246                                                                                                                                       |
| IC Test Site No.     | 4842E-1                                                                                                                                      |
| Test Software        | Radiated Emission Program-To Shenzhen v2.0                                                                                                   |

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

|                               |                            |
|-------------------------------|----------------------------|
| Description of EUT:           | Bluetooth Module           |
| Main Model:                   | SCBM4A                     |
| Serial Model:                 | N/A                        |
| Date EUT received:            | March 29, 2016             |
| Test Date(s):                 | March 30 to April 14, 2016 |
| Equipment Category :          | DSS                        |
| Antenna Gain:                 | 1dBi                       |
| Type of Modulation:           | GFSK, $\pi$ /4DQPSK,8DPSK  |
| RF Operating Frequency (ies): | 2402-2480 MHz              |
| Max. Output Power:            | 3.816 dBm                  |
| Number of Channels:           | Bluetooth: 79CH            |
| Port:                         | N/A                        |
| Input Power:                  | Spec: DC 3.3V              |
| Trade Name :                  | N/A                        |
| FCC ID:                       | Z5GSCBM4A                  |

## 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 user 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 antenna:

A permanently attached PCB antenna for Bluetooth, the gain is 1dBi for Bluetooth

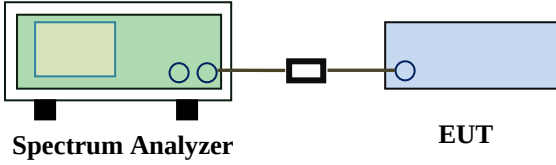
**The antenna meets up with the ANTENNA REQUIREMENT.**

**Result:** Compliance.

## 6.2 Channel Separation

|                      |                |
|----------------------|----------------|
| Temperature          | 25°C           |
| Relative Humidity    | 54%            |
| Atmospheric Pressure | 1012mbar       |
| Test date :          | April 12, 2016 |
| Tested By :          | Winnie Zhang   |

### Requirement(s):

| Spec           | Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Requirement                                                                                                                                                                 | Applicable                                                                           |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| § 15.247(a)(1) | a)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Channel Separation < 20dB BW and 20dB BW < 25KHz ; Channel Separation Limit=25KHz<br>Chanel Separation < 20dB BW and 20dB BW > 25kHz ; Channel Separation Limit=2/3 20dB BW |  |
| Test Setup     |  <p style="text-align: center;">Spectrum Analyzer                      EUT</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                             |                                                                                      |
| Test Procedure | <p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings:</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) ≥ 1% of the span</li> <li>- Video (or Average) Bandwidth (VBW) ≥ 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

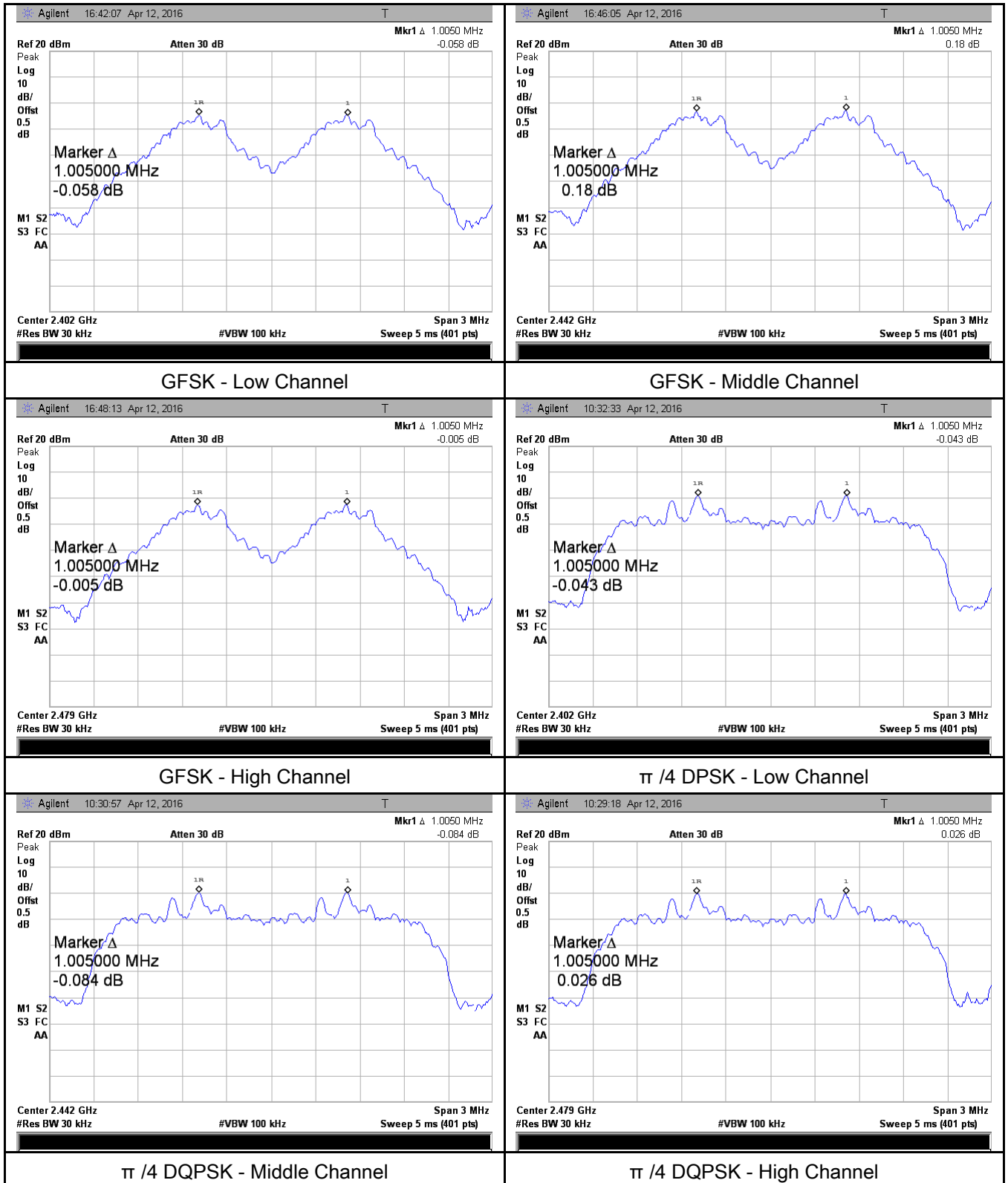
Test Plot ☒ Yes (See below) ☐ N/A

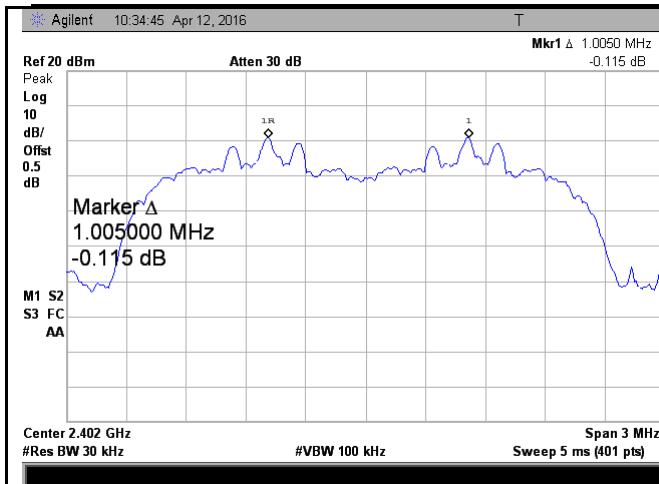
### Channel Separation measurement result

| Type/<br>Modulation            | CH                | CH Freq<br>(MHz) | CH Separation<br>(MHz) | Limit<br>(MHz) | Result |
|--------------------------------|-------------------|------------------|------------------------|----------------|--------|
| CH Separation<br>GFSK          | Low Channel       | 2402             | 1.005                  | 0.954          | Pass   |
|                                | Adjacency Channel | 2403             |                        |                |        |
|                                | Mid Channel       | 2440             | 1.005                  | 0.939          | Pass   |
|                                | Adjacency Channel | 2441             |                        |                |        |
|                                | High Channel      | 2480             | 1.005                  | 0.939          | Pass   |
|                                | Adjacency Channel | 2479             |                        |                |        |
| CH Separation<br>$\pi/4$ DQPSK | Low Channel       | 2402             | 1.005                  | 0.838          | Pass   |
|                                | Adjacency Channel | 2403             |                        |                |        |
|                                | Mid Channel       | 2440             | 1.005                  | 0.820          | Pass   |
|                                | Adjacency Channel | 2441             |                        |                |        |
|                                | High Channel      | 2480             | 1.005                  | 0.819          | Pass   |
|                                | Adjacency Channel | 2479             |                        |                |        |
| CH Separation<br>8DPSK         | Low Channel       | 2402             | 1.005                  | 0.847          | Pass   |
|                                | Adjacency Channel | 2403             |                        |                |        |
|                                | Mid Channel       | 2440             | 1.005                  | 0.845          | Pass   |
|                                | Adjacency Channel | 2441             |                        |                |        |
|                                | High Channel      | 2480             | 1.005                  | 0.843          | Pass   |
|                                | Adjacency Channel | 2479             |                        |                |        |

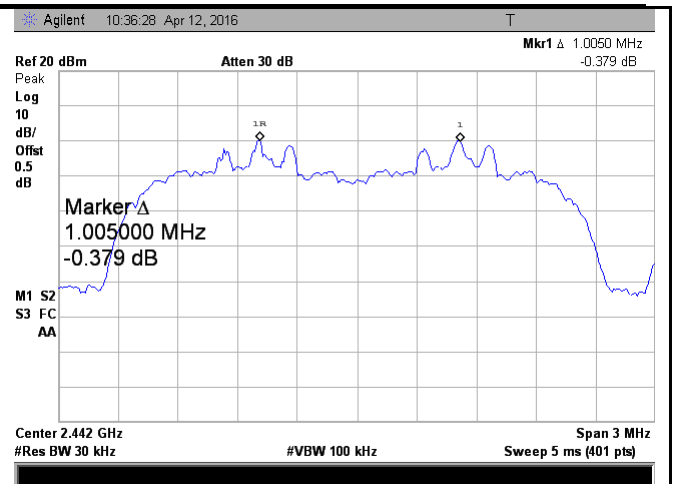
## Test Plots

### Channel Separation measurement result

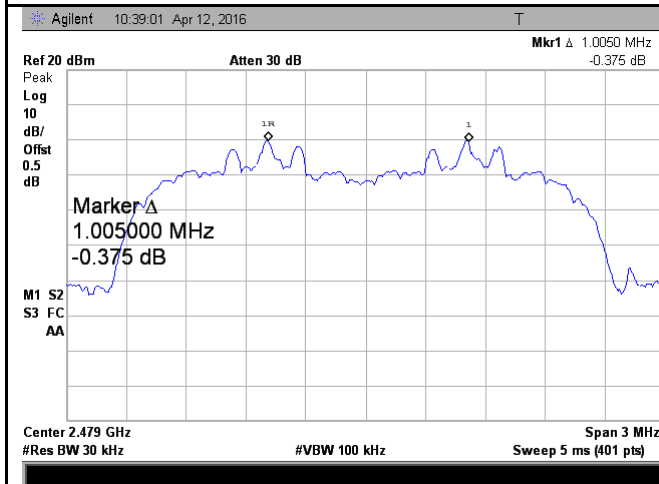




8DPSK - Low Channel



8DPSK - Middle Channel

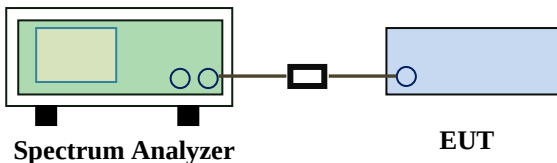


8DPSK - High Channel

### 6.3 20dB Bandwidth

|                      |                |
|----------------------|----------------|
| Temperature          | 25°C           |
| Relative Humidity    | 54%            |
| Atmospheric Pressure | 1012mbar       |
| Test date :          | April 12, 2016 |
| Tested By :          | Winnie Zhang   |

#### Requirement(s):

| Spec              | Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Requirement                                                                                                                                                                    | Applicable                          |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| §15.247(a)<br>(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        |  <p style="text-align: center;">Spectrum Analyzer                      EUT</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                |                                     |
| Test Procedure    | <p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines.<br/>Use the following spectrum analyzer settings:</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</li> </ul> |                                                                                                                                                                                |                                     |

|             |                |
|-------------|----------------|
| Test Report | 16070264-FCC-R |
| Page        | 14 of 55       |

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

Test Data ☒ Yes ☐ N/A

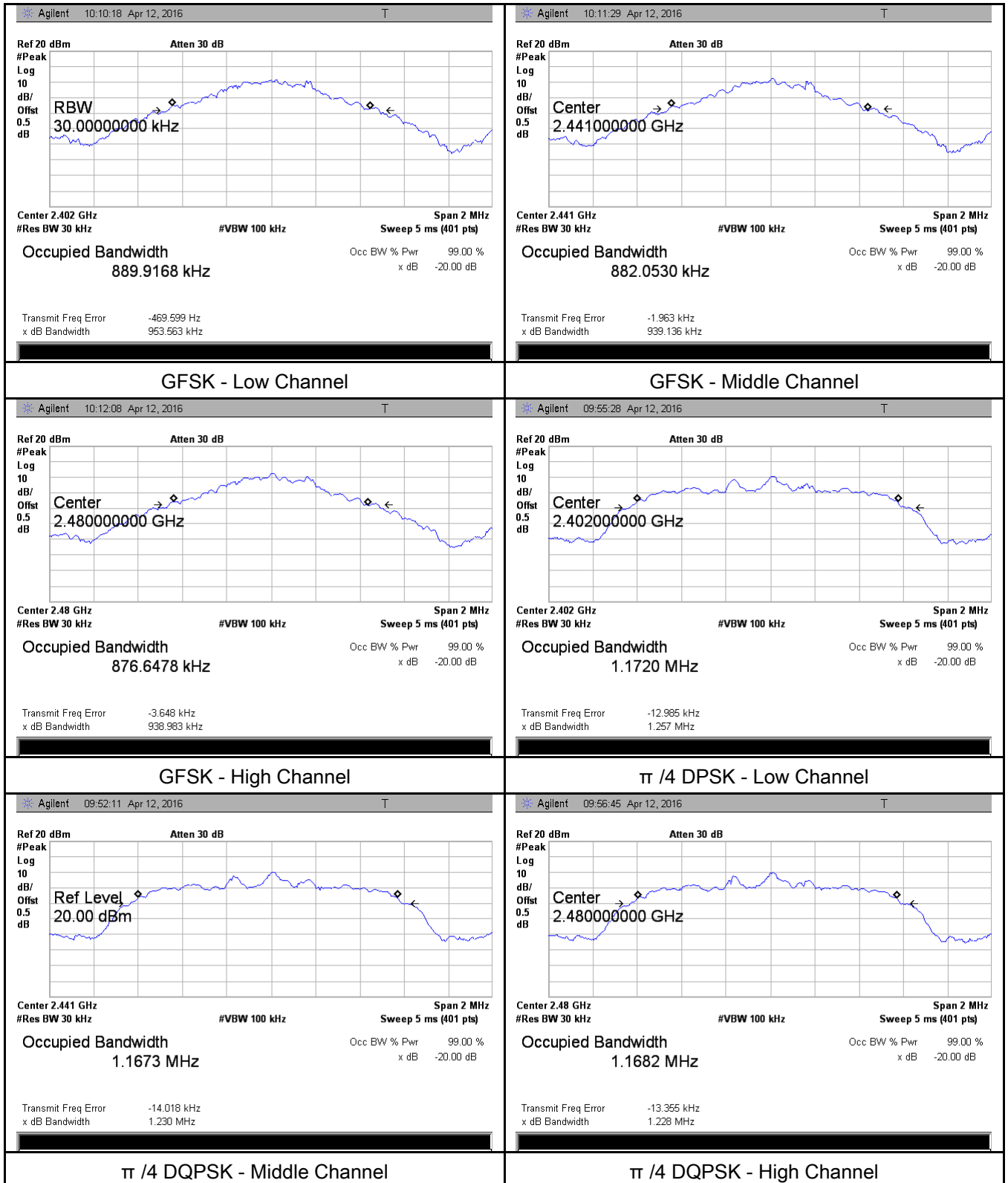
Test Plot ☒ Yes (See below) ☐ N/A

#### Measurement result

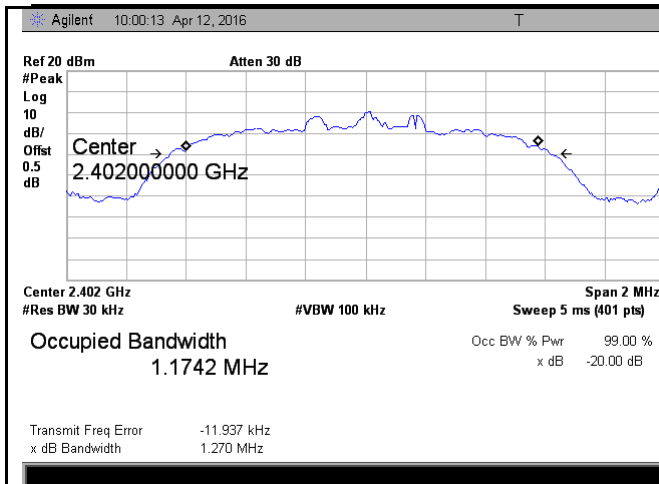
| Modulation     | CH   | CH Freq (MHz) | 20dB Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) |
|----------------|------|---------------|----------------------|------------------------------|
| GFSK           | Low  | 2402          | 0.954                | 0.8899                       |
|                | Mid  | 2441          | 0.939                | 0.8821                       |
|                | High | 2480          | 0.939                | 0.8766                       |
| $\pi$ /4 DQPSK | Low  | 2402          | 1.257                | 1.1720                       |
|                | Mid  | 2441          | 1.230                | 1.1673                       |
|                | High | 2480          | 1.228                | 1.1682                       |
| 8DPSK          | Low  | 2402          | 1.270                | 1.1742                       |
|                | Mid  | 2441          | 1.267                | 1.1728                       |
|                | High | 2480          | 1.265                | 1.1751                       |

## Test Plots

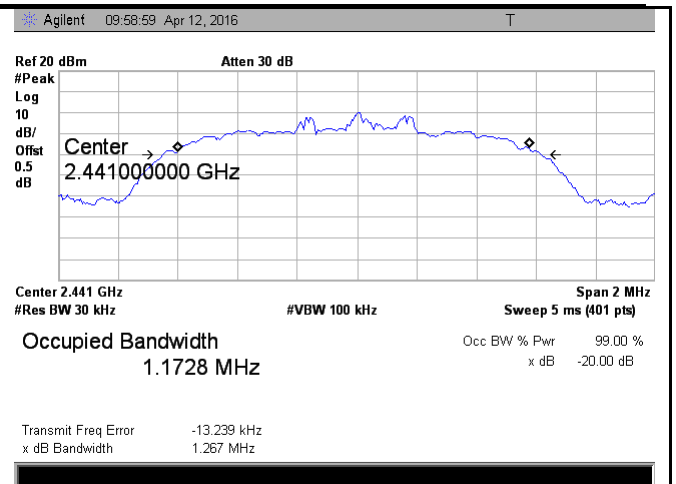
### 20dB Bandwidth measurement result



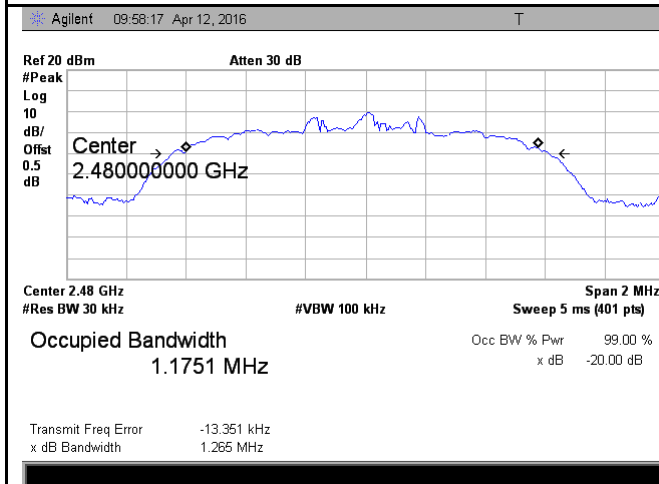
|             |                |
|-------------|----------------|
| Test Report | 16070264-FCC-R |
| Page        | 16 of 55       |



8DPSK - Low Channel



8DPSK - Middle Channel

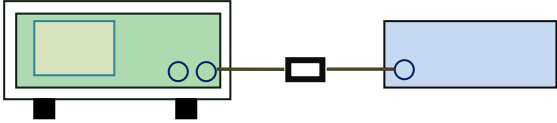


8DPSK - High Channel

## 6.4 Peak Output Power

|                      |                |
|----------------------|----------------|
| Temperature          | 25°C           |
| Relative Humidity    | 54%            |
| Atmospheric Pressure | 1012mbar       |
| Test date :          | April 12, 2016 |
| Tested By :          | Winnie Zhang   |

### Requirement(s):

| Spec              | Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Requirement                                                           | Applicable                          |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------|
| §15.247(b)<br>(3) | 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)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | DTS in 902-928MHz, 2400-2483.5MHz: $\leq 1$ Watt                      | <input type="checkbox"/>            |
| Test Setup        |  <p style="text-align: center;">Spectrum Analyzer                      EUT</p>                                                                                                                                                                                                                                                                                                                                                          |                                                                       |                                     |
| Test Procedure    | <p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines.<br/>Use the following spectrum analyzer settings:</p> <ul style="list-style-type: none"> <li>- Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel</li> <li>- RBW <math>&gt;</math> 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> </ul> |                                                                       |                                     |

|             |                |
|-------------|----------------|
| Test Report | 16070264-FCC-R |
| Page        | 18 of 55       |

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

Test Data ☒ Yes ☐ N/A

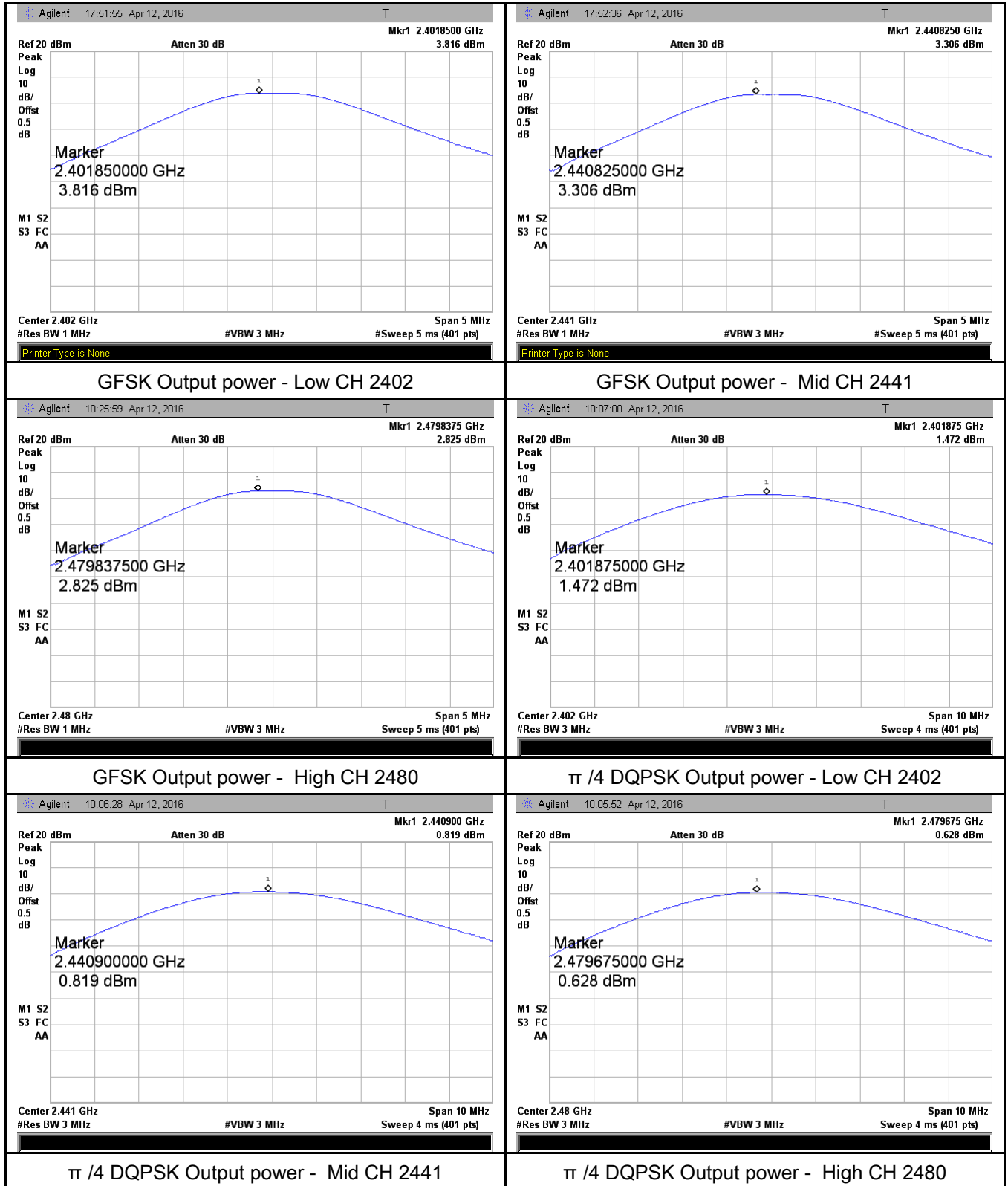
Test Plot ☒ Yes (See below) ☐ N/A

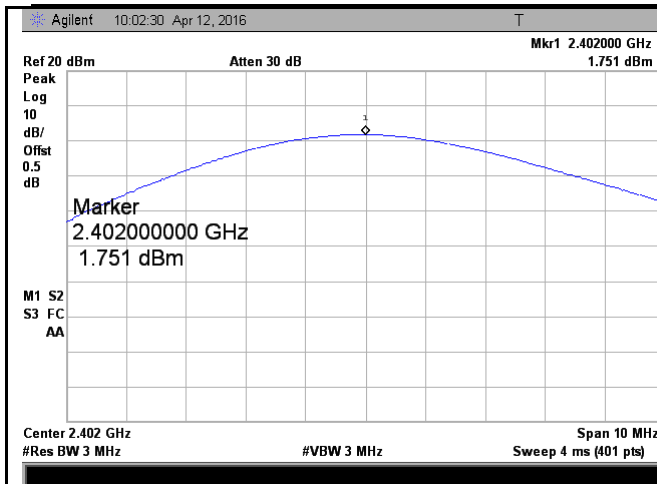
#### Peak Output Power measurement result

| Type         | Modulation     | CH   | Freq (MHz) | Conducted Power (dBm) | Limit (mW) | Result |
|--------------|----------------|------|------------|-----------------------|------------|--------|
| Output power | GFSK           | Low  | 2402       | 3.816                 | 1000       | Pass   |
|              |                | Mid  | 2441       | 3.306                 | 1000       | Pass   |
|              |                | High | 2480       | 2.825                 | 1000       | Pass   |
|              | $\pi$ /4 DQPSK | Low  | 2402       | 1.472                 | 125        | Pass   |
|              |                | Mid  | 2441       | 0.819                 | 125        | Pass   |
|              |                | High | 2480       | 0.628                 | 125        | Pass   |
|              | 8DPSK          | Low  | 2402       | 1.751                 | 125        | Pass   |
|              |                | Mid  | 2441       | 3.126                 | 125        | Pass   |
|              |                | High | 2480       | 2.927                 | 125        | Pass   |

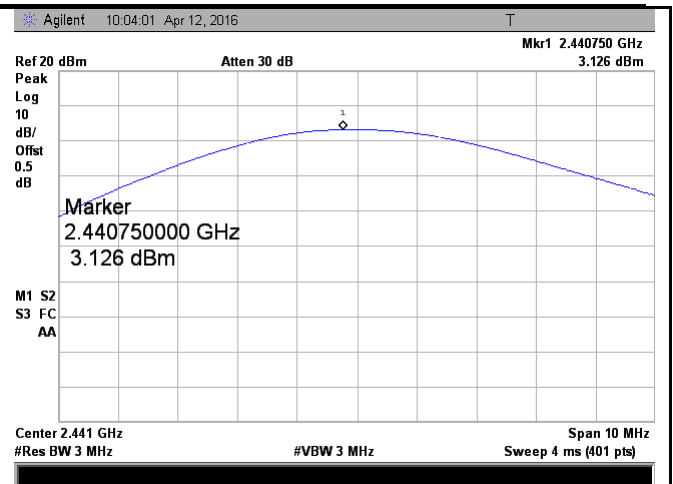
## Test Plots

### Output Power measurement result

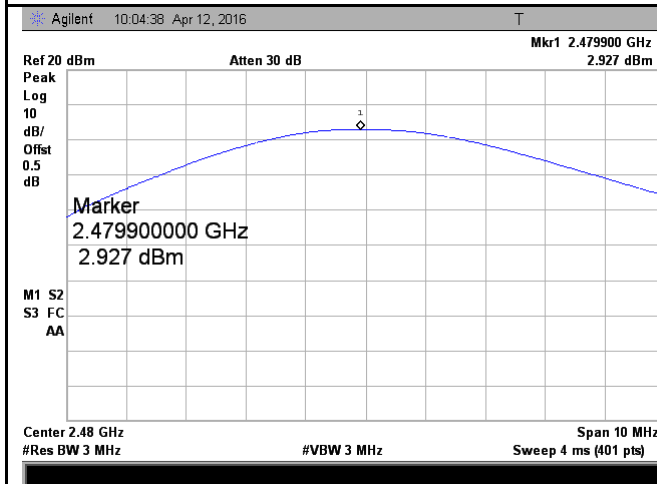




8DPSK Output power - Low CH 2402



8DPSK Output power - Mid CH 2441

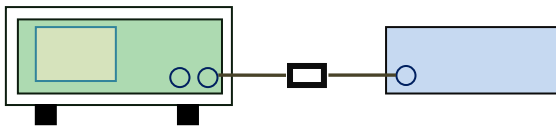


8DPSK Output power - High CH 2480

## 6.5 Number of Hopping Channel

|                      |                |
|----------------------|----------------|
| Temperature          | 25°C           |
| Relative Humidity    | 54%            |
| Atmospheric Pressure | 1012mbar       |
| Test date :          | April 12, 2016 |
| Tested By :          | Winnie Zhang   |

### Requirement(s):

| Spec                   | Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Requirement                               | Applicable                          |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------------|
| §15.247(a)<br>(1)(iii) | a)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | FHSS in 2400-2483.5MHz $\geq$ 15 channels | <input checked="" type="checkbox"/> |
| Test Setup             |  <p style="text-align: center;">Spectrum Analyzer                      EUT</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                           |                                     |
| 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 <math>\geq</math> 1% of the span</li> <li>- VBW <math>\geq</math> 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

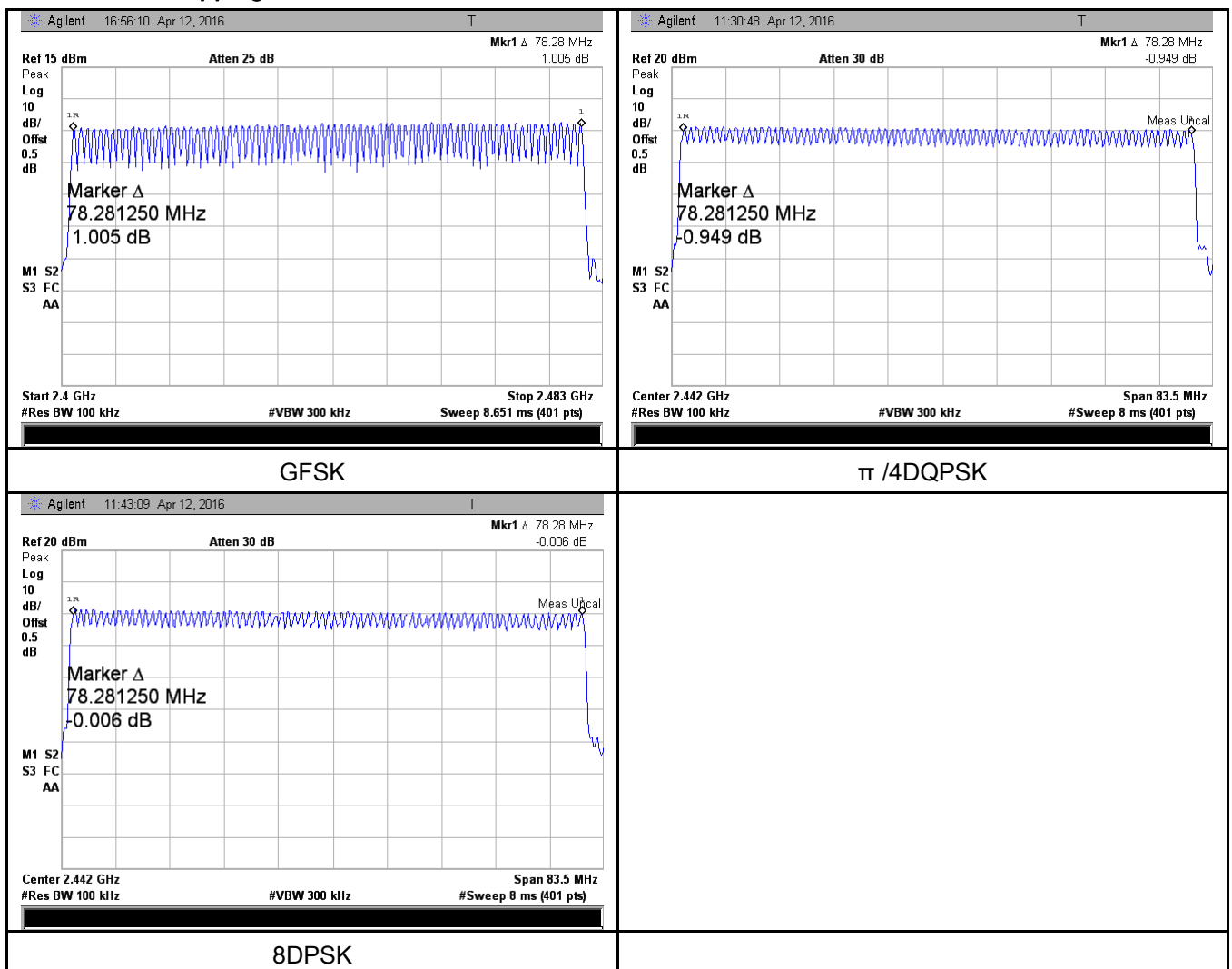
Test Plot    ☒ Yes (See below)                      ☐ N/A

### 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

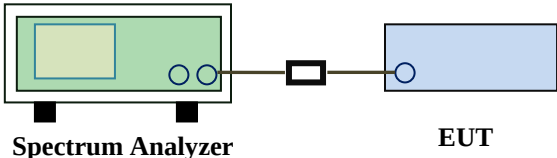
#### Number of Hopping Channels measurement result



## 6.6 Time of Occupancy (Dwell Time)

|                      |                |
|----------------------|----------------|
| Temperature          | 25°C           |
| Relative Humidity    | 54%            |
| Atmospheric Pressure | 1012mbar       |
| Test date :          | April 12, 2016 |
| Tested By :          | Winnie Zhang   |

### Requirement(s):

| Spec                   | Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Requirement       | Applicable                          |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------------------------|
| §15.247(a)<br>(1)(iii) | a)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Dwell Time < 0.4s | <input checked="" type="checkbox"/> |
| Test Setup             |  <p style="text-align: center;">Spectrum Analyzer                      EUT</p>                                                                                                                                                                                                                                                                                                                                    |                   |                                     |
| 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 ≥ 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                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                                     |

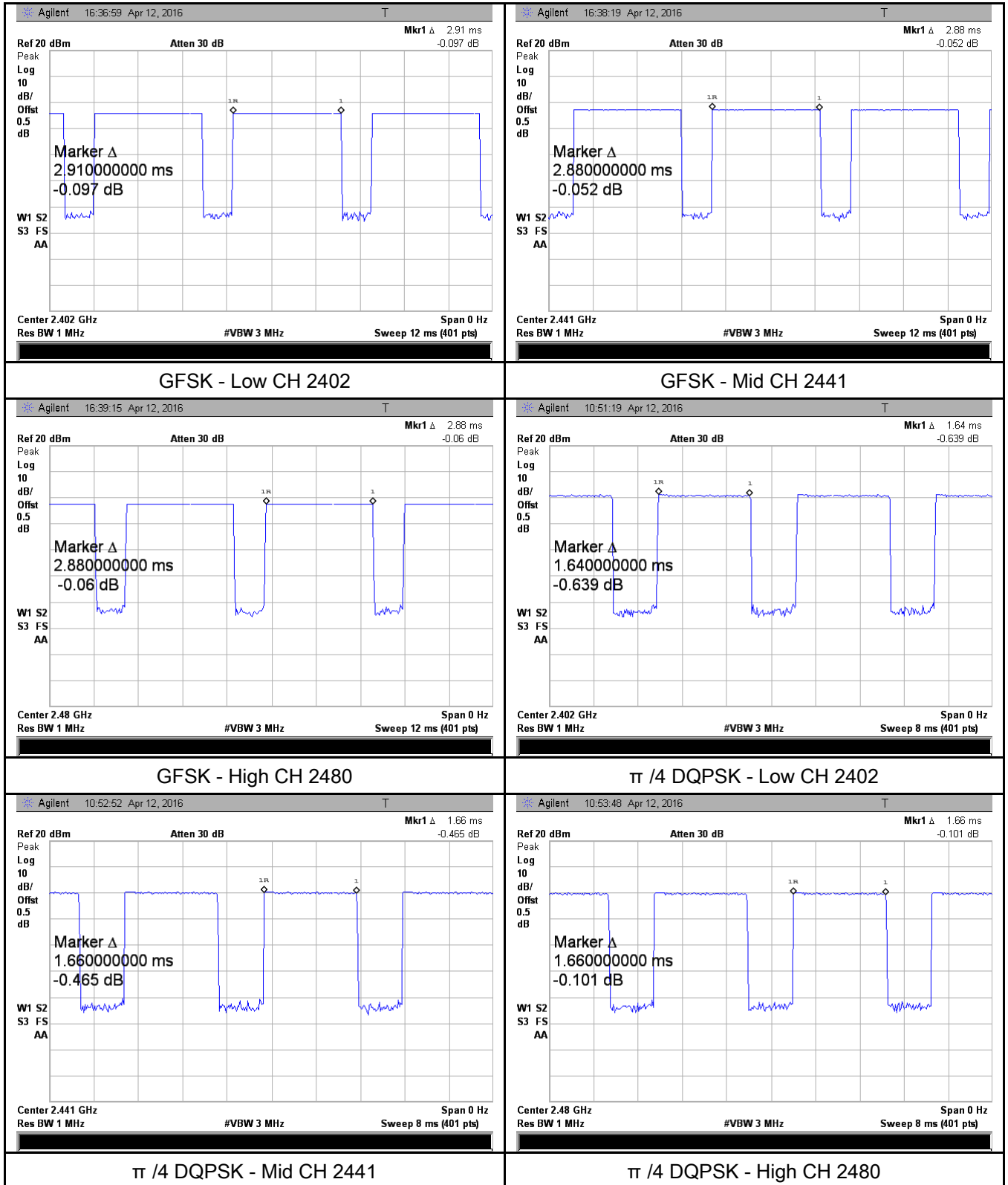
Test Data    ☒ Yes                      ☐ N/A

Test Plot    ☒ Yes (See below)                      ☐ N/A

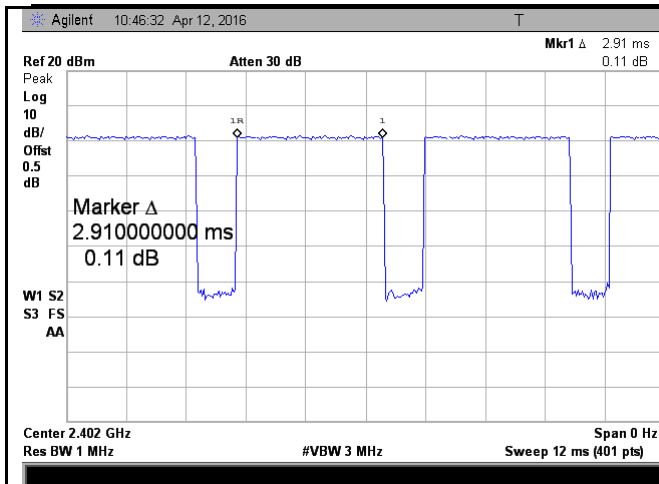
| Type                                                     | Modulation     | CH   | Pulse Width (ms) | Dwell Time (ms) | Limit (ms) | Result |
|----------------------------------------------------------|----------------|------|------------------|-----------------|------------|--------|
| Dwell Time                                               | GFSK           | Low  | 2.910            | 310.400         | 400        | Pass   |
|                                                          |                | Mid  | 2.880            | 307.200         | 400        | Pass   |
|                                                          |                | High | 2.880            | 307.200         | 400        | Pass   |
|                                                          | $\pi$ /4 DQPSK | Low  | 1.640            | 174.933         | 400        | Pass   |
|                                                          |                | Mid  | 1.660            | 177.067         | 400        | Pass   |
|                                                          |                | High | 1.660            | 177.067         | 400        | Pass   |
|                                                          | 8DPSK          | Low  | 2.910            | 310.400         | 400        | Pass   |
|                                                          |                | Mid  | 2.910            | 310.400         | 400        | Pass   |
|                                                          |                | High | 2.850            | 304.000         | 400        | Pass   |
| Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 |                |      |                  |                 |            |        |

## Test Plots

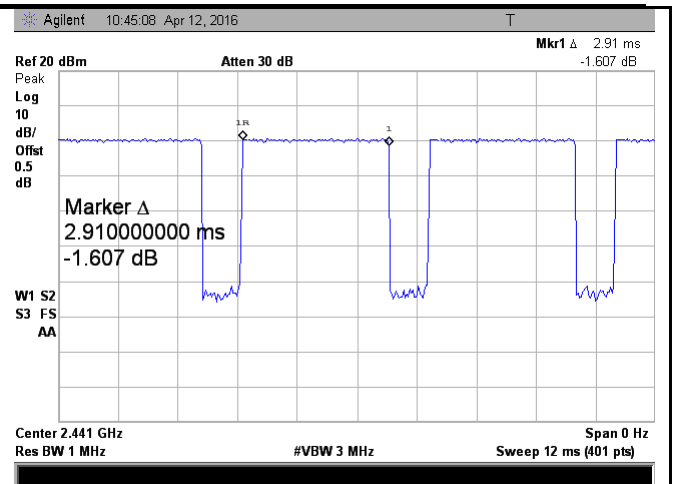
### Dwell Time measurement result



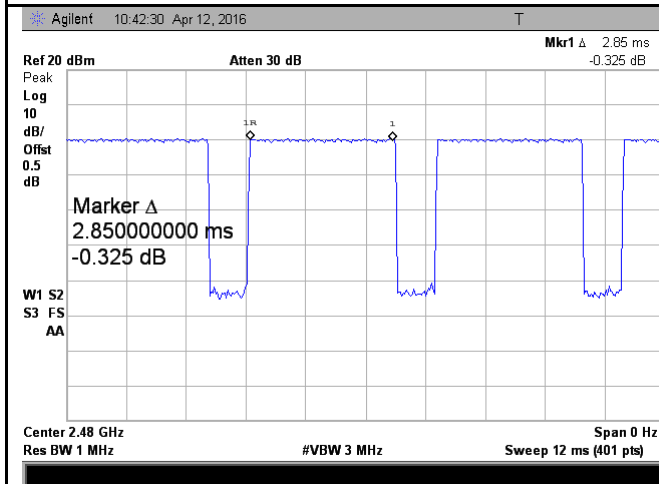
|             |                |
|-------------|----------------|
| Test Report | 16070264-FCC-R |
| Page        | 26 of 55       |



8DPSK - Low CH 2402



8DPSK - Mid CH 2441



8DPSK - High CH 2480

## 6.7 Band Edge

|                      |                |
|----------------------|----------------|
| Temperature          | 23°C           |
| Relative Humidity    | 56%            |
| Atmospheric Pressure | 1014mbar       |
| Test date :          | April 14, 2016 |
| Tested By :          | Winnie Zhang   |

### 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. 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,</li> </ul> |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|             |                |
|-------------|----------------|
| Test Report | 16070264-FCC-R |
| Page        | 28 of 55       |

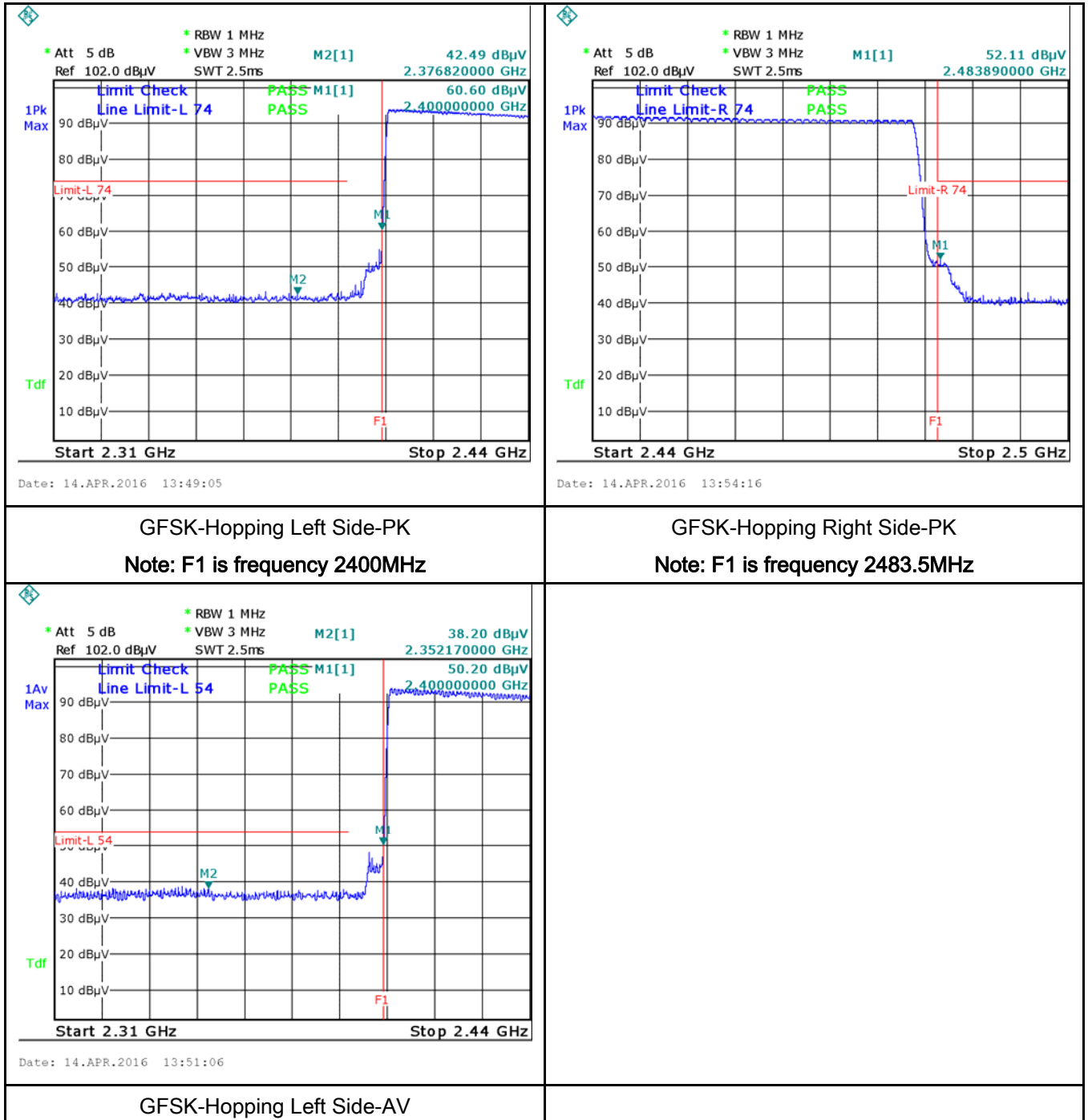
|        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        | <p>and make sure the instrument is operated in its linear range.</p> <ul style="list-style-type: none"> <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 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Result | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

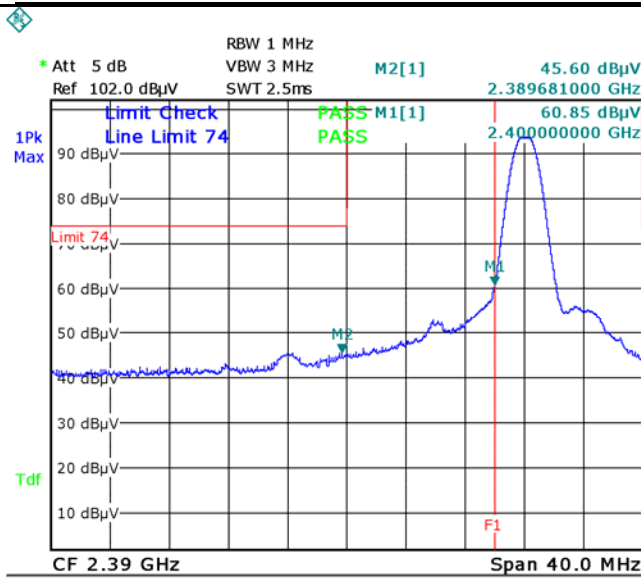
Test Data ☐ Yes ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

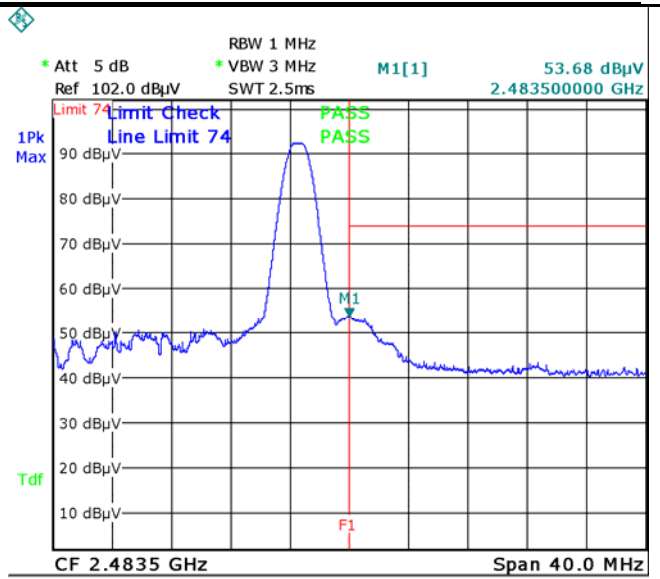
## Test Plots

### GFSK Mode:





Date: 14.APR.2016 11:49:13



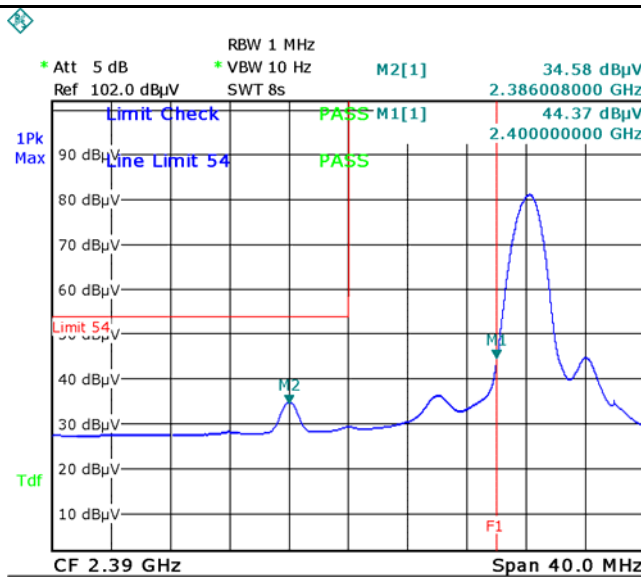
Date: 14.APR.2016 12:16:16

GFSK-Left Side-PK

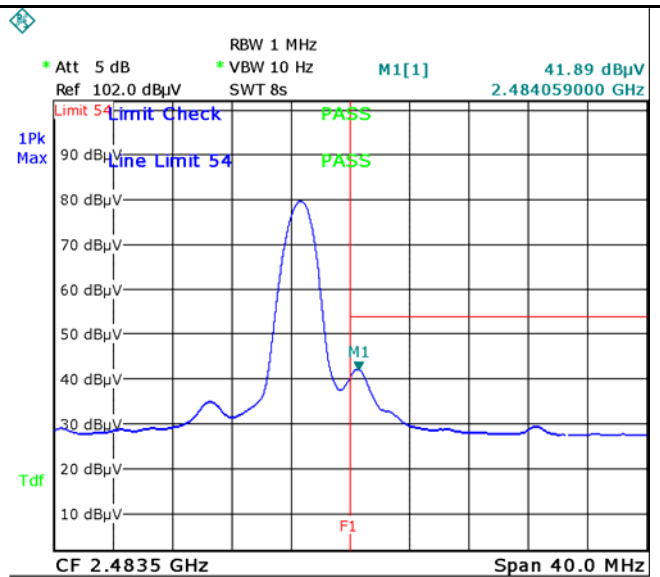
Note: F1 is frequency 2400MHz

GFSK-Right Side-PK

Note: F1 is frequency 2483.5MHz



Date: 14.APR.2016 11:51:51



Date: 14.APR.2016 12:13:52

GFSK-Left Side-AV

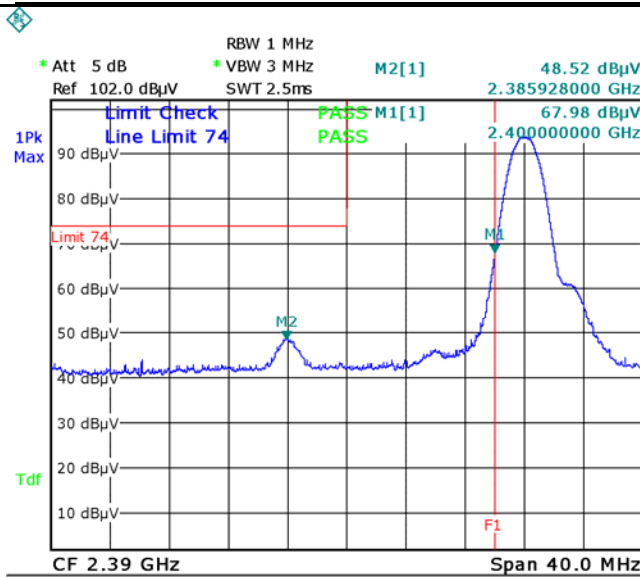
GFSK-Right Side-AV

**Top-Left Plot:  $\pi/4$  DQPSK-Hopping Left Side-PK**  
 Note: F1 is frequency 2400MHz  
 Parameters: Att 5 dB, RBW 1 MHz, VBW 3 MHz, SWT 2.5ms, Ref 102.0 dBμV  
 Frequency Range: Start 2.31 GHz, Stop 2.44 GHz  
 Peak Power: 45.66 dBμV at 2.385640000 GHz  
 Limit: Limit-L 74  
 Status: PASS

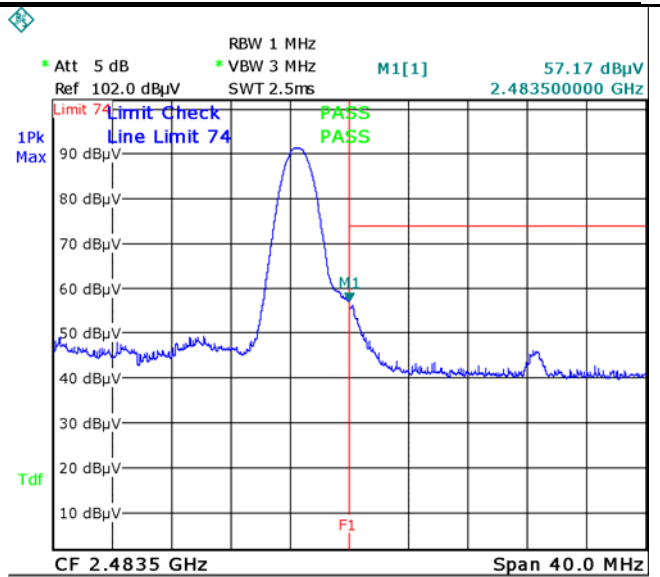
**Top-Right Plot:  $\pi/4$  DQPSK-Hopping Right Side-PK**  
 Note: F1 is frequency 2483.5MHz  
 Parameters: Att 5 dB, RBW 1 MHz, VBW 3 MHz, SWT 2.5ms, Ref 102.0 dBμV  
 Frequency Range: Start 2.44 GHz, Stop 2.5 GHz  
 Peak Power: 54.60 dBμV at 2.483500000 GHz  
 Limit: Limit-R 74  
 Status: PASS

**Bottom-Left Plot:  $\pi/4$  DQPSK-Hopping Left-AV**  
 Parameters: Att 5 dB, RBW 1 MHz, VBW 3 MHz, SWT 2.5ms, Ref 102.0 dBμV  
 Frequency Range: Start 2.31 GHz, Stop 2.44 GHz  
 Peak Power: 42.52 dBμV at 2.387710000 GHz  
 Limit: Limit-L 54  
 Status: PASS

**Bottom-Right Plot:  $\pi/4$  DQPSK-Hopping Right-AV**  
 Parameters: Att 5 dB, RBW 1 MHz, VBW 3 MHz, SWT 2.5ms, Ref 102.0 dBμV  
 Frequency Range: Start 2.44 GHz, Stop 2.5 GHz  
 Peak Power: 48.58 dBμV at 2.483500000 GHz  
 Limit: Limit-R 54  
 Status: PASS



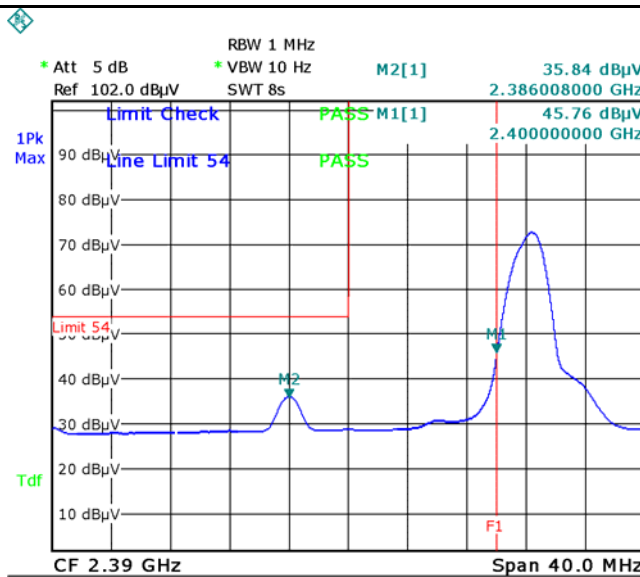
Date: 14.APR.2016 11:58:06



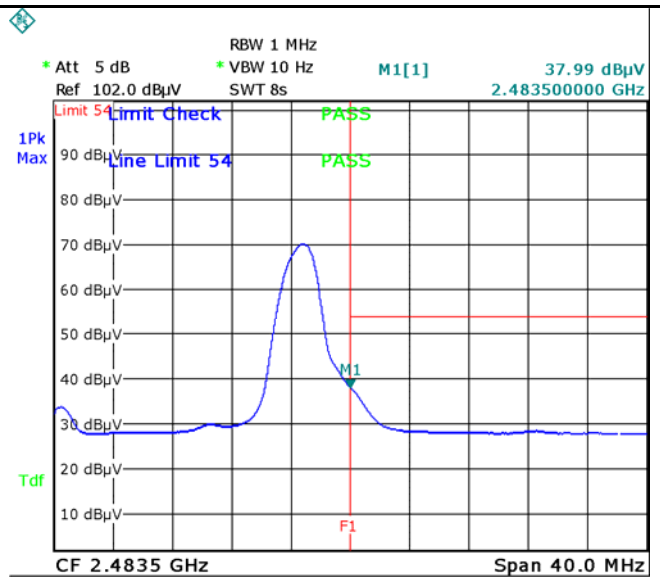
Date: 14.APR.2016 12:07:12

$\pi/4$  DQPSK-Left Side-PK  
Note: F1 is frequency 2400MHz

$\pi/4$  DQPSK-Right Side-PK  
Note: F1 is frequency 2483.5MHz



Date: 14.APR.2016 11:56:50

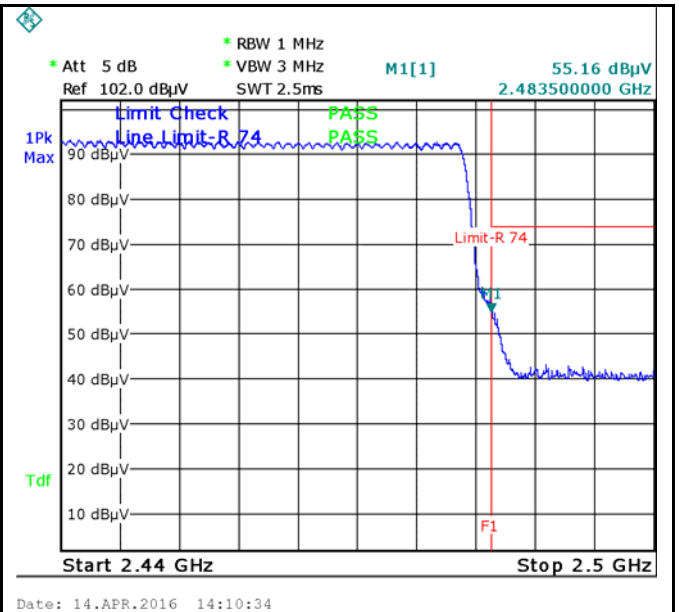
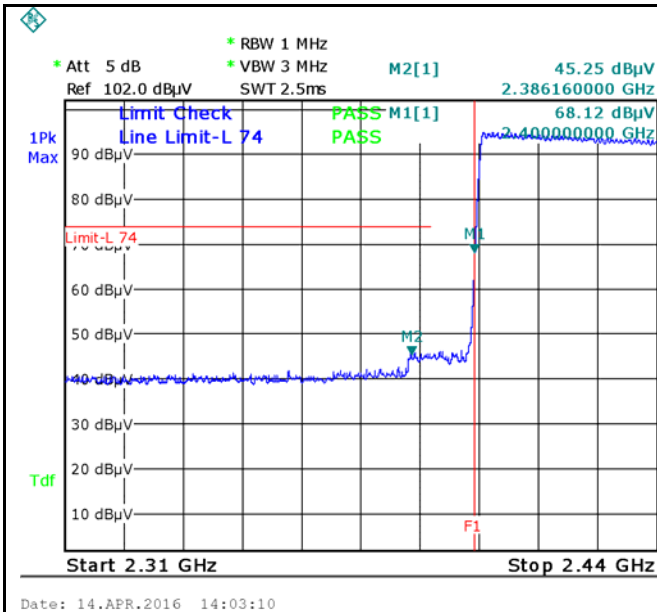


Date: 14.APR.2016 12:08:37

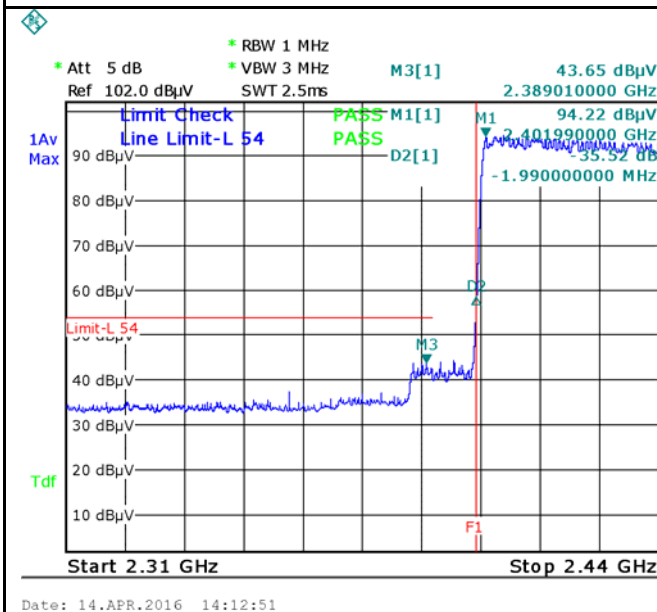
$\pi/4$  DQPSK-Left Side-AV

$\pi/4$  DQPSK-Right Side-AV

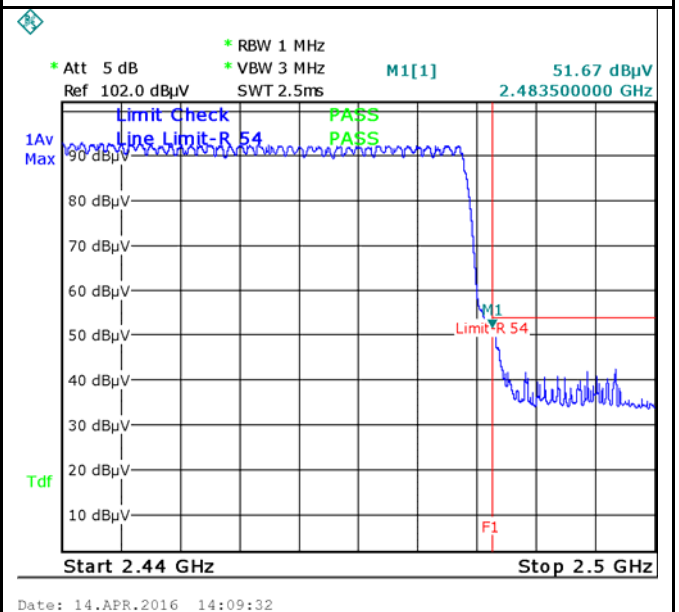
### 8DPSK Mode:



### 8DPSK-Hopping Left Side-PK Note: F1 is frequency 2400MHz

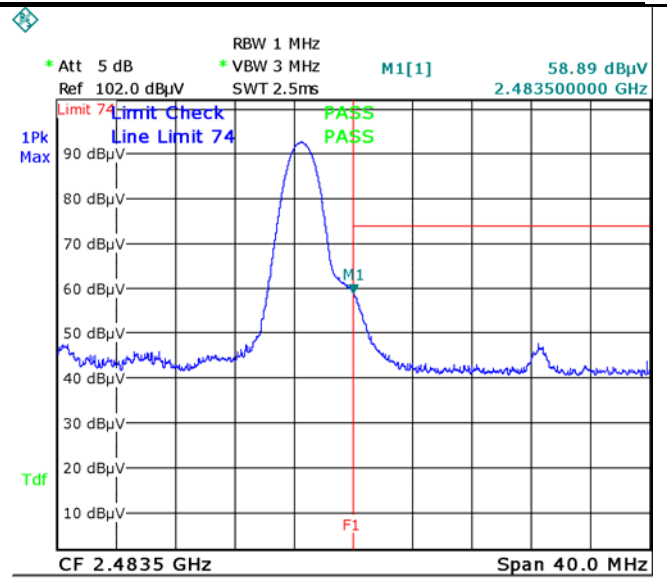
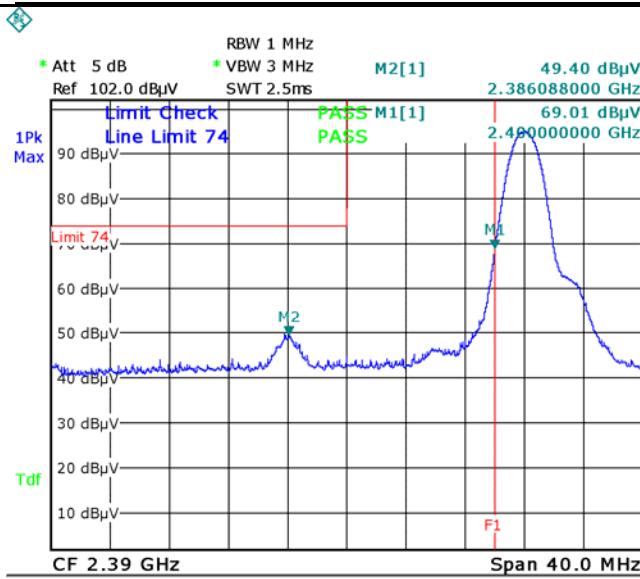


### 8DPSK--Hopping Right Side-PK Note: F1 is frequency 2483.5MHz



### 8DPSK--Hopping Left-AV

### 8DPSK--Hopping Right-AV

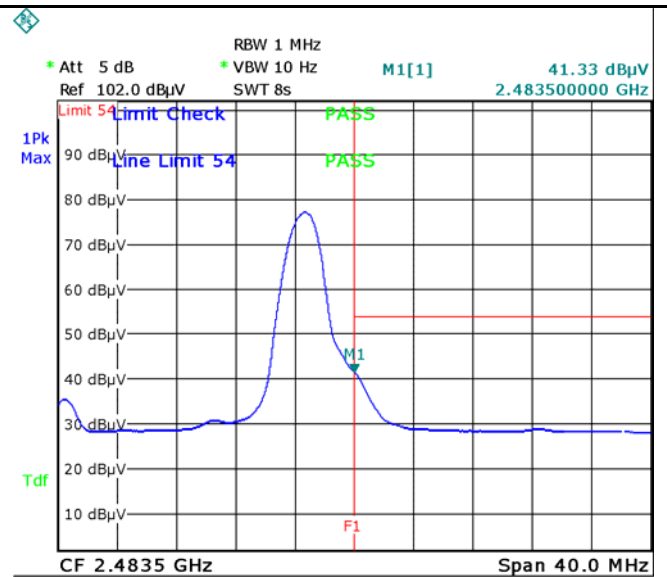
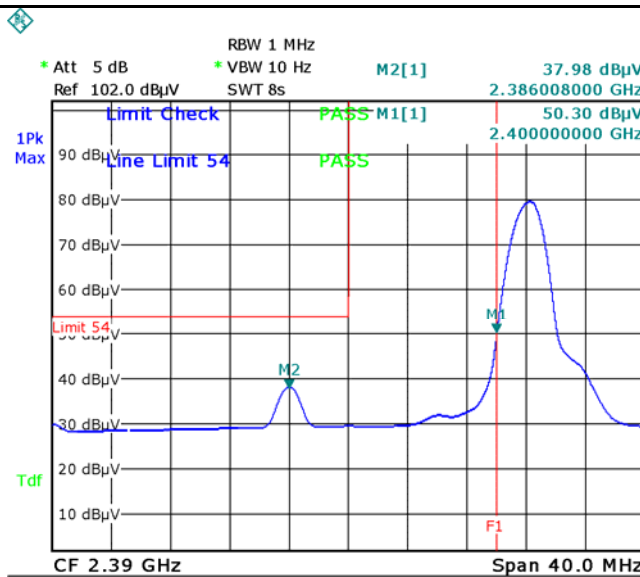


8DPSK--Left Side-PK

Note: F1 is frequency 2400MHz

8DPSK--Right Side-PK

Note: F1 is frequency 2483.5MHz



8DPSK--Left Side-AV

8DPSK--Right Side-AV

## 6.8 AC Power Line Conducted Emissions

|                      |                |
|----------------------|----------------|
| Temperature          | 22°C           |
| Relative Humidity    | 55%            |
| Atmospheric Pressure | 1013mbar       |
| Test date :          | April 13, 2016 |
| Tested By :          | Winnie Zhang   |

### Requirement(s):

| Spec                        | Item | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Applicable                                     |                        |              |  |    |         |            |         |         |         |    |    |        |    |    |
|-----------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|------------------------|--------------|--|----|---------|------------|---------|---------|---------|----|----|--------|----|----|
| 47CFR§15.207, RSS210 (A8.1) | a)   | 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. | <div><input checked="" type="checkbox"/></div> |                        |              |  |    |         |            |         |         |         |    |    |        |    |    |
|                             |      | <table><tr><th rowspan="2">Frequency ranges (MHz)</th><th colspan="2">Limit (dBµV)</th></tr><tr><th>QP</th><th>Average</th></tr><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></table>                                                                                                                                                                         |                                                | Frequency ranges (MHz) | Limit (dBµV) |  | QP | Average | 0.15 ~ 0.5 | 66 – 56 | 56 – 46 | 0.5 ~ 5 | 56 | 46 | 5 ~ 30 | 60 | 50 |
|                             |      | Frequency ranges (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                |                        | Limit (dBµV) |  |    |         |            |         |         |         |    |    |        |    |    |
|                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                | QP                     | Average      |  |    |         |            |         |         |         |    |    |        |    |    |
|                             |      | 0.15 ~ 0.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                | 66 – 56                | 56 – 46      |  |    |         |            |         |         |         |    |    |        |    |    |
| 0.5 ~ 5                     | 56   | 46                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                |                        |              |  |    |         |            |         |         |         |    |    |        |    |    |
| 5 ~ 30                      | 60   | 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                |                        |              |  |    |         |            |         |         |         |    |    |        |    |    |
|                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                |                        |              |  |    |         |            |         |         |         |    |    |        |    |    |
|                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                |                        |              |  |    |         |            |         |         |         |    |    |        |    |    |
|                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                |                        |              |  |    |         |            |         |         |         |    |    |        |    |    |

|            |                                                                                                                                                                                    |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Setup | <p>Note: 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 50W/50mH 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</li> </ol> |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

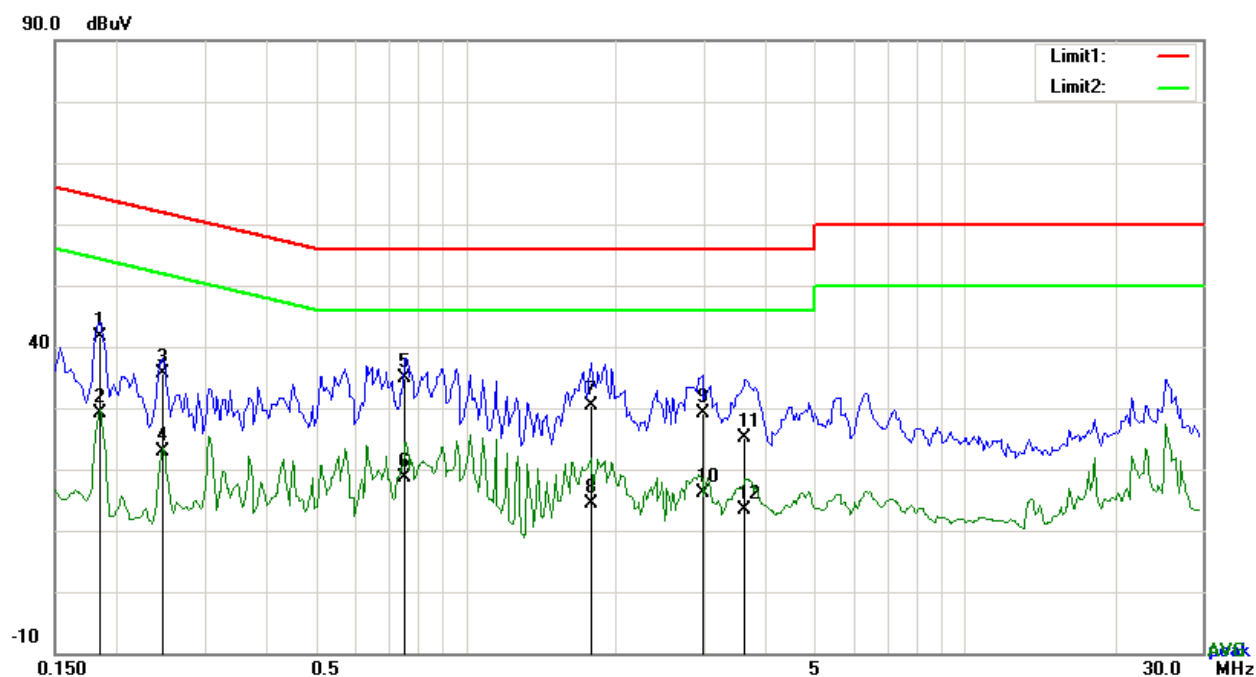
|             |                |
|-------------|----------------|
| Test Report | 16070264-FCC-R |
| Page        | 36 of 55       |

|        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        | <p>coaxial cable.</p> <ol style="list-style-type: none"> <li>4. All other supporting equipment were powered separately from another main supply.</li> <li>5. The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>6. 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>7. 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>8. Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).</li> </ol> |
| Remark |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Result | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

**Test Mode:** Bluetooth Mode

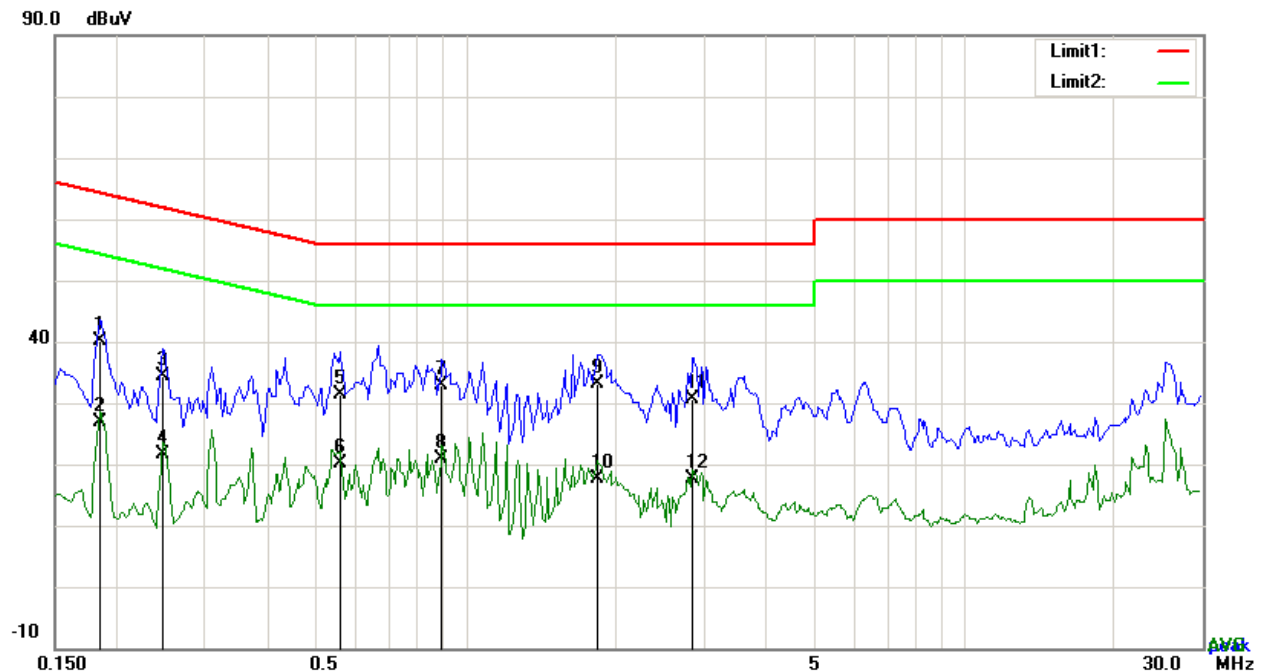


**Test Data**

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

| No. | P/L | Frequency | Reading | Detector | Corrected | Result | Limit  | Margin |
|-----|-----|-----------|---------|----------|-----------|--------|--------|--------|
|     |     | (MHz)     | (dBuV)  |          | (dB)      | (dBuV) | (dBuV) | (dB)   |
| 1   | L1  | 0.1851    | 31.64   | QP       | 10.03     | 41.67  | 64.25  | -22.58 |
| 2   | L1  | 0.1851    | 19.08   | AVG      | 10.03     | 29.11  | 54.25  | -25.14 |
| 3   | L1  | 0.2475    | 25.50   | QP       | 10.03     | 35.53  | 61.84  | -26.31 |
| 4   | L1  | 0.2475    | 12.84   | AVG      | 10.03     | 22.87  | 51.84  | -28.97 |
| 5   | L1  | 0.7584    | 24.90   | QP       | 10.03     | 34.93  | 56.00  | -21.07 |
| 6   | L1  | 0.7584    | 8.52    | AVG      | 10.03     | 18.55  | 46.00  | -27.45 |
| 7   | L1  | 1.7841    | 20.30   | QP       | 10.04     | 30.34  | 56.00  | -25.66 |
| 8   | L1  | 1.7841    | 4.34    | AVG      | 10.04     | 14.38  | 46.00  | -31.62 |
| 9   | L1  | 2.9892    | 19.14   | QP       | 10.05     | 29.19  | 56.00  | -26.81 |
| 10  | L1  | 2.9892    | 5.98    | AVG      | 10.05     | 16.03  | 46.00  | -29.97 |
| 11  | L1  | 3.6279    | 15.07   | QP       | 10.06     | 25.13  | 56.00  | -30.87 |
| 12  | L1  | 3.6279    | 3.38    | AVG      | 10.06     | 13.44  | 46.00  | -32.56 |

**Test Mode:** Bluetooth Mode

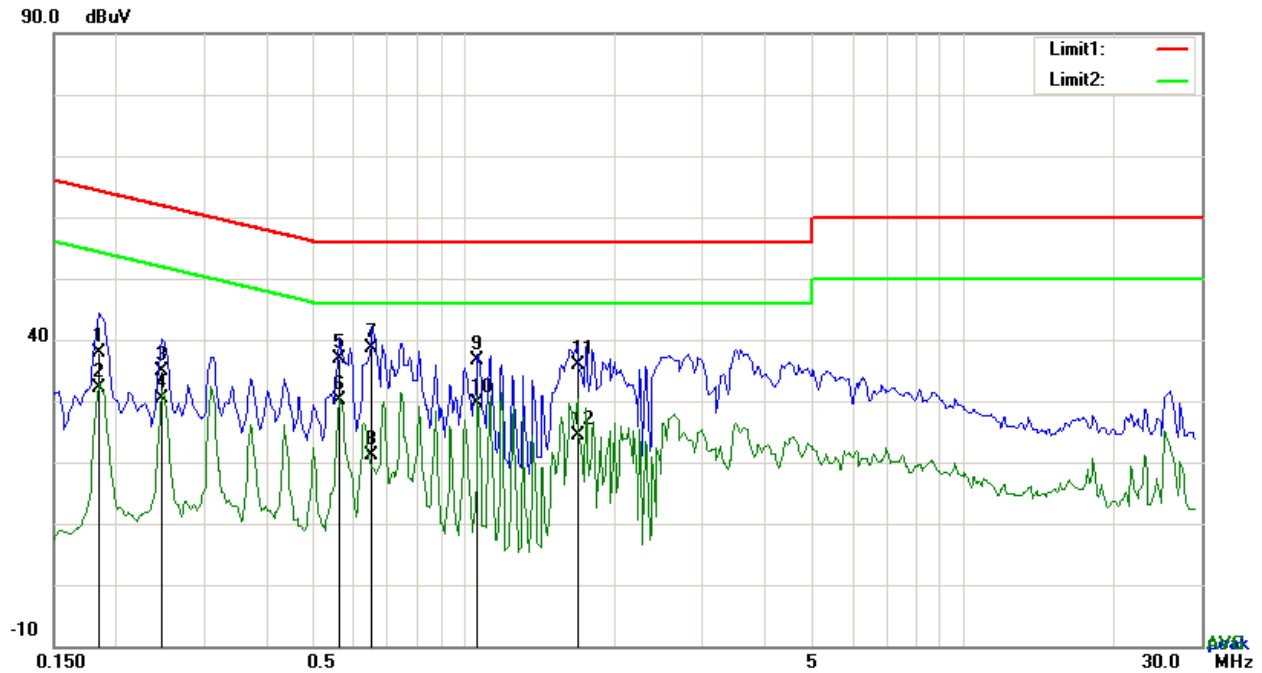


### Test Data

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

| No. | P/L | Frequency | Reading | Detector | Corrected | Result | Limit  | Margin |
|-----|-----|-----------|---------|----------|-----------|--------|--------|--------|
|     |     | (MHz)     | (dBuV)  |          | (dB)      | (dBuV) | (dBuV) | (dB)   |
| 1   | N   | 0.1851    | 30.08   | QP       | 10.02     | 40.10  | 64.25  | -24.15 |
| 2   | N   | 0.1851    | 16.78   | AVG      | 10.02     | 26.80  | 54.25  | -27.45 |
| 3   | N   | 0.2475    | 24.30   | QP       | 10.02     | 34.32  | 61.84  | -27.52 |
| 4   | N   | 0.2475    | 11.70   | AVG      | 10.02     | 21.72  | 51.84  | -30.12 |
| 5   | N   | 0.5595    | 21.38   | QP       | 10.02     | 31.40  | 56.00  | -24.60 |
| 6   | N   | 0.5595    | 10.14   | AVG      | 10.02     | 20.16  | 46.00  | -25.84 |
| 7   | N   | 0.8988    | 22.96   | QP       | 10.03     | 32.99  | 56.00  | -23.01 |
| 8   | N   | 0.8988    | 10.94   | AVG      | 10.03     | 20.97  | 46.00  | -25.03 |
| 9   | N   | 1.8348    | 22.97   | QP       | 10.04     | 33.01  | 56.00  | -22.99 |
| 10  | N   | 1.8348    | 7.58    | AVG      | 10.04     | 17.62  | 46.00  | -28.38 |
| 11  | N   | 2.8488    | 20.67   | QP       | 10.05     | 30.72  | 56.00  | -25.28 |
| 12  | N   | 2.8488    | 7.57    | AVG      | 10.05     | 17.62  | 46.00  | -28.38 |

**Test Mode:** Bluetooth Mode

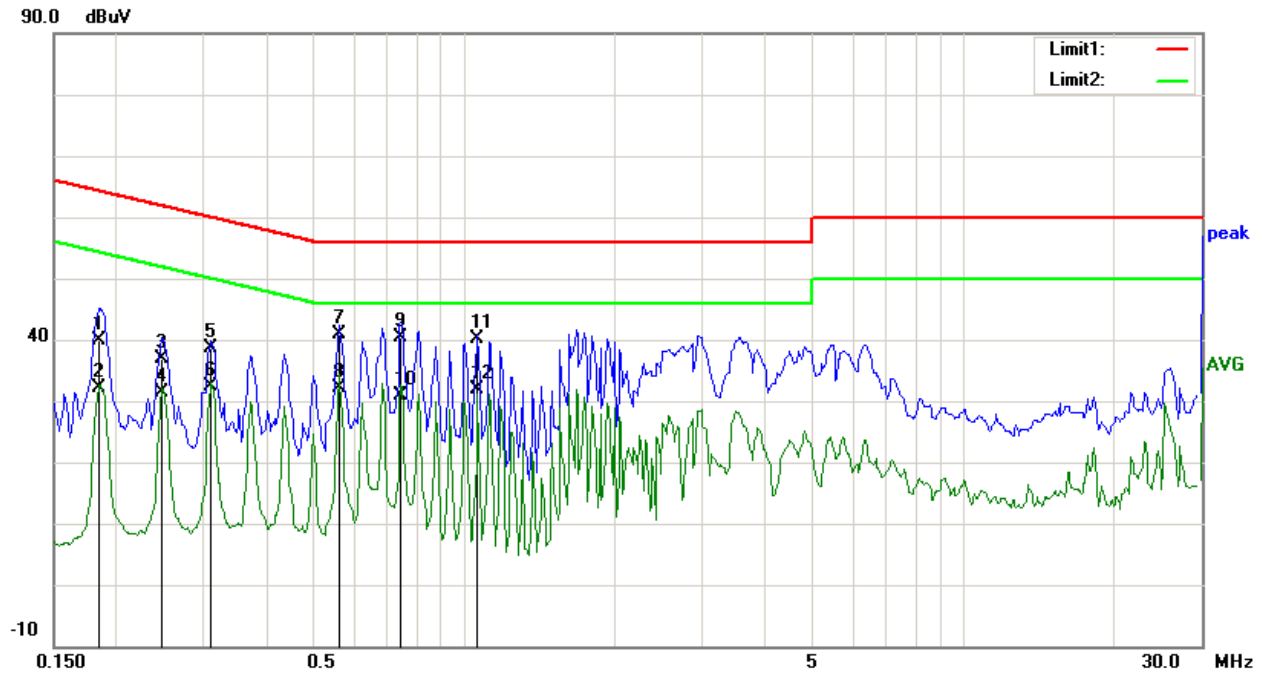


**Test Data**

**Phase Line Plot at 240Vac, 60Hz**

| No. | P/L | Frequency | Reading | Detector | Corrected | Result | Limit  | Margin |
|-----|-----|-----------|---------|----------|-----------|--------|--------|--------|
|     |     | (MHz)     | (dBuV)  |          | (dB}      | (dBuV) | (dBuV) | (dB)   |
| 1   | L1  | 0.1851    | 27.85   | QP       | 10.03     | 37.88  | 64.25  | -26.37 |
| 2   | L1  | 0.1851    | 21.99   | AVG      | 10.03     | 32.02  | 54.25  | -22.23 |
| 3   | L1  | 0.2475    | 24.91   | QP       | 10.03     | 34.94  | 61.84  | -26.90 |
| 4   | L1  | 0.2475    | 20.38   | AVG      | 10.03     | 30.41  | 51.84  | -21.43 |
| 5   | L1  | 0.5595    | 26.90   | QP       | 10.03     | 36.93  | 56.00  | -19.07 |
| 6   | L1  | 0.5595    | 20.04   | AVG      | 10.03     | 30.07  | 46.00  | -15.93 |
| 7   | L1  | 0.6531    | 28.70   | QP       | 10.03     | 38.73  | 56.00  | -17.27 |
| 8   | L1  | 0.6531    | 10.99   | AVG      | 10.03     | 21.02  | 46.00  | -24.98 |
| 9   | L1  | 1.0626    | 26.57   | QP       | 10.03     | 36.60  | 56.00  | -19.40 |
| 10  | L1  | 1.0626    | 19.64   | AVG      | 10.03     | 29.67  | 46.00  | -16.33 |
| 11  | L1  | 1.6827    | 25.90   | QP       | 10.04     | 35.94  | 56.00  | -20.06 |
| 12  | L1  | 1.6827    | 14.35   | AVG      | 10.04     | 24.39  | 46.00  | -21.61 |

**Test Mode:** Bluetooth Mode



### Test Data

#### Phase Neutral Plot at 240Vac, 60Hz

| No. | P/L | Frequency | Reading | Detector | Corrected | Result | Limit  | Margin |
|-----|-----|-----------|---------|----------|-----------|--------|--------|--------|
|     |     | (MHz)     | (dBuV)  |          | (dB)      | (dBuV) | (dBuV) | (dB)   |
| 1   | N   | 0.1851    | 29.80   | QP       | 10.02     | 39.82  | 64.25  | -24.43 |
| 2   | N   | 0.1851    | 22.22   | AVG      | 10.02     | 32.24  | 54.25  | -22.01 |
| 3   | N   | 0.2475    | 26.92   | QP       | 10.02     | 36.94  | 61.84  | -24.90 |
| 4   | N   | 0.2475    | 21.43   | AVG      | 10.02     | 31.45  | 51.84  | -20.39 |
| 5   | N   | 0.3099    | 28.73   | QP       | 10.02     | 38.75  | 59.97  | -21.22 |
| 6   | N   | 0.3099    | 22.42   | AVG      | 10.02     | 32.44  | 49.97  | -17.53 |
| 7   | N   | 0.5595    | 30.86   | QP       | 10.02     | 40.88  | 56.00  | -15.12 |
| 8   | N   | 0.5595    | 22.03   | AVG      | 10.02     | 32.05  | 46.00  | -13.95 |
| 9   | N   | 0.7467    | 30.48   | QP       | 10.02     | 40.50  | 56.00  | -15.50 |
| 10  | N   | 0.7467    | 20.75   | AVG      | 10.02     | 30.77  | 46.00  | -15.23 |
| 11  | N   | 1.0626    | 30.05   | QP       | 10.03     | 40.08  | 56.00  | -15.92 |
| 12  | N   | 1.0626    | 21.81   | AVG      | 10.03     | 31.84  | 46.00  | -14.16 |

## 6.9 Radiated Spurious Emissions

|                      |                |
|----------------------|----------------|
| Temperature          | 23°C           |
| Relative Humidity    | 56%            |
| Atmospheric Pressure | 1014mbar       |
| Test date :          | April 14, 2016 |
| Tested By :          | Winnie Zhang   |

### Requirement(s):

| Spec                                    | Item | Requirement                                                                                                                                                                                                                                                                                                                                   | Applicable                                     |                       |                       |         |     |          |     |         |     |           |     |
|-----------------------------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------|-----------------------|---------|-----|----------|-----|---------|-----|-----------|-----|
| 47CFR§15.205,<br>§15.209,<br>§15.247(d) | a)   | 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 | <div><input checked="" type="checkbox"/></div> |                       |                       |         |     |          |     |         |     |           |     |
|                                         |      | <table><tr><th>Frequency range (MHz)</th><th>Field Strength (µV/m)</th></tr><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></table>                                                                                                   |                                                | Frequency range (MHz) | Field Strength (µV/m) | 30 – 88 | 100 | 88 – 216 | 150 | 216 960 | 200 | Above 960 | 500 |
|                                         |      | Frequency range (MHz)                                                                                                                                                                                                                                                                                                                         |                                                | Field Strength (µV/m) |                       |         |     |          |     |         |     |           |     |
|                                         |      | 30 – 88                                                                                                                                                                                                                                                                                                                                       |                                                | 100                   |                       |         |     |          |     |         |     |           |     |
|                                         |      | 88 – 216                                                                                                                                                                                                                                                                                                                                      |                                                | 150                   |                       |         |     |          |     |         |     |           |     |
|                                         |      | 216 960                                                                                                                                                                                                                                                                                                                                       |                                                | 200                   |                       |         |     |          |     |         |     |           |     |
| Above 960                               | 500  |                                                                                                                                                                                                                                                                                                                                               |                                                |                       |                       |         |     |          |     |         |     |           |     |
|                                         |      |                                                                                                                                                                                                                                                                                                                                               |                                                |                       |                       |         |     |          |     |         |     |           |     |
|                                         |      |                                                                                                                                                                                                                                                                                                                                               |                                                |                       |                       |         |     |          |     |         |     |           |     |
|                                         |      |                                                                                                                                                                                                                                                                                                                                               |                                                |                       |                       |         |     |          |     |         |     |           |     |
|                                         |      |                                                                                                                                                                                                                                                                                                                                               |                                                |                       |                       |         |     |          |     |         |     |           |     |

|            |  |
|------------|--|
| Test Setup |  |
|------------|--|

|           |                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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:</li> </ol> |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|             |                |
|-------------|----------------|
| Test Report | 16070264-FCC-R |
| Page        | 42 of 55       |

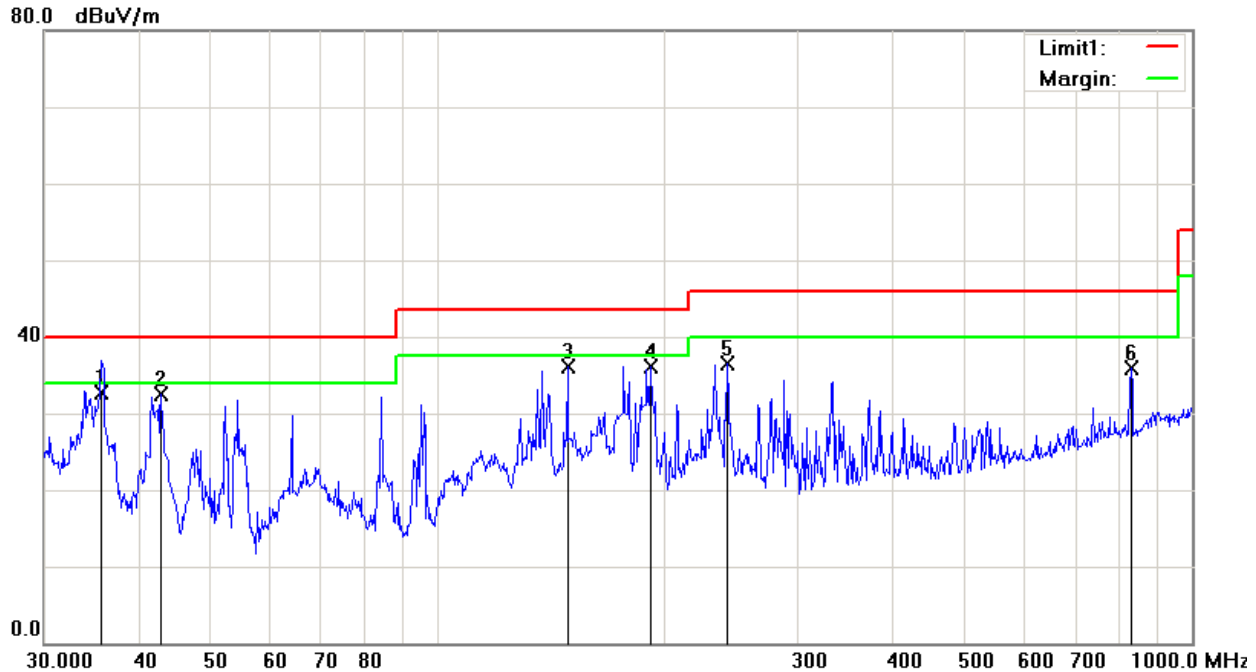
|        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        | <p>a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</p> <p>b. The EUT was then rotated to the direction that gave the maximum emission.</p> <p>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.</p> <p>3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.</p> <p>4. 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.<br/>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.</p> <p>5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</p> |
| Remark |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Result | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

**Test Mode:** Bluetooth Mode

**Below 1GHz**

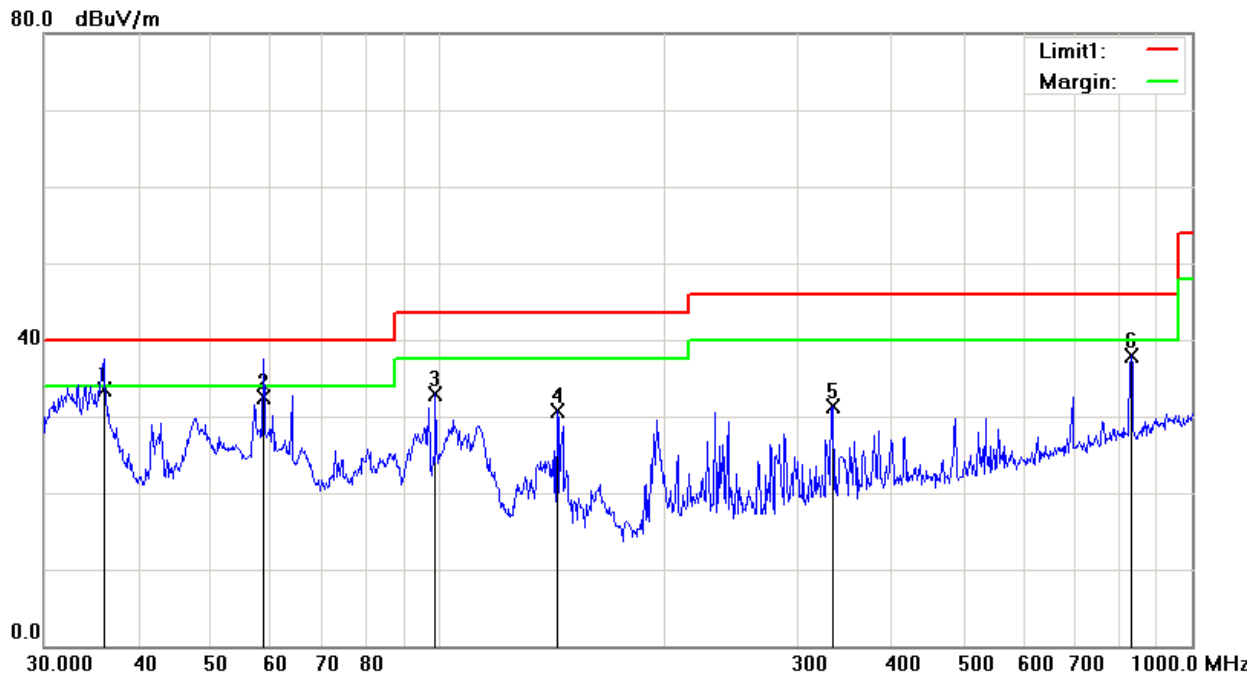


**Test Data**

**Horizontal Polarity Plot @3m**

| No. | P/L | Frequency | Reading  | Detector | Corrected | Result   | Limit    | Margin | Height | Degree |
|-----|-----|-----------|----------|----------|-----------|----------|----------|--------|--------|--------|
|     |     | (MHz)     | (dBuV/m) |          | (dB/m)    | (dBuV/m) | (dBuV/m) | (dB)   | (cm)   | (°)    |
| 1   | H   | 35.7491   | 37.29    | QP       | -4.49     | 32.80    | 40.00    | -7.20  | 100    | 195    |
| 2   | H   | 42.8998   | 41.99    | peak     | -9.53     | 32.46    | 40.00    | -7.54  | 100    | 105    |
| 3   | H   | 148.4410  | 44.60    | peak     | -8.42     | 36.18    | 43.50    | -7.32  | 100    | 0      |
| 4   | H   | 191.0738  | 45.19    | peak     | -9.17     | 36.02    | 43.50    | -7.48  | 100    | 311    |
| 5   | H   | 241.6763  | 45.56    | peak     | -9.11     | 36.45    | 46.00    | -9.55  | 100    | 277    |
| 6   | H   | 830.4002  | 32.38    | peak     | 3.57      | 35.95    | 46.00    | -10.05 | 100    | 55     |

### Below 1GHz



### Test Data

#### Vertical Polarity Plot @3m

| No. | P/L | Frequency | Reading  | Detector | Corrected | Result   | Limit    | Margin | Height | Degree |
|-----|-----|-----------|----------|----------|-----------|----------|----------|--------|--------|--------|
|     |     | (MHz)     | (dBuV/m) |          | (dB/m)    | (dBuV/m) | (dBuV/m) | (dB)   | (cm)   | (°)    |
| 1   | V   | 36.0007   | 38.20    | QP       | -4.67     | 33.53    | 40.00    | -6.47  | 100    | 184    |
| 2   | V   | 58.6126   | 46.67    | QP       | -14.20    | 32.47    | 40.00    | -7.53  | 100    | 210    |
| 3   | V   | 99.1797   | 43.85    | peak     | -11.02    | 32.83    | 43.50    | -10.67 | 100    | 82     |
| 4   | V   | 143.8295  | 39.14    | peak     | -8.48     | 30.66    | 43.50    | -12.84 | 100    | 237    |
| 5   | V   | 333.6867  | 37.16    | peak     | -5.93     | 31.23    | 46.00    | -14.77 | 100    | 37     |
| 6   | V   | 830.4002  | 34.39    | peak     | 3.57      | 37.96    | 46.00    | -8.04  | 100    | 45     |

|            |                   |
|------------|-------------------|
| Test Mode: | Transmitting Mode |
|------------|-------------------|

**GFSK Mode (Worst Case) : Low Channel (2402 MHz)**

| Frequency (MHz) | S.A. Reading (dBμV) | Detector (PK/AV) | Polarity (H/V) | Ant. Factor (dB/m) | Cable Loss (dB) | Pre-Amp. Gain (dB) | Cord. Amp. (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------------------|------------------|----------------|--------------------|-----------------|--------------------|---------------------|----------------|-------------|
| 4804            | 33.87               | AV               | V              | 33.83              | 6.86            | 31.72              | 42.84               | 54             | -11.16      |
| 4804            | 34.25               | AV               | H              | 33.83              | 6.86            | 31.72              | 43.22               | 54             | -10.78      |
| 4804            | 47.35               | PK               | V              | 33.83              | 6.86            | 31.72              | 56.32               | 74             | -17.68      |
| 4804            | 46.54               | PK               | H              | 33.83              | 6.86            | 31.72              | 55.51               | 74             | -18.49      |

**GFSK Mode (Worst Case): Middle Channel (2441 MHz)**

| Frequency (MHz) | S.A. Reading (dBμV) | Detector (PK/AV) | Polarity (H/V) | Ant. Factor (dB/m) | Cable Loss (dB) | Pre-Amp. Gain (dB) | Cord. Amp. (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------------------|------------------|----------------|--------------------|-----------------|--------------------|---------------------|----------------|-------------|
| 4882            | 32.16               | AV               | V              | 33.86              | 6.82            | 31.82              | 41.02               | 54             | -12.98      |
| 4882            | 32.63               | AV               | H              | 33.86              | 6.82            | 31.82              | 41.49               | 54             | -12.51      |
| 4882            | 46.37               | PK               | V              | 33.86              | 6.82            | 31.82              | 55.23               | 74             | -18.77      |
| 4882            | 45.44               | PK               | H              | 33.86              | 6.82            | 31.82              | 54.3                | 74             | -19.7       |

**8DPSK Mode (Worst Case): High Channel (2480 MHz)**

| Frequency (MHz) | S.A. Reading (dBμV) | Detector (PK/AV) | Polarity (H/V) | Ant. Factor (dB/m) | Cable Loss (dB) | Pre-Amp. Gain (dB) | Cord. Amp. (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------------------|------------------|----------------|--------------------|-----------------|--------------------|---------------------|----------------|-------------|
| 4960            | 34.68               | AV               | V              | 33.9               | 6.76            | 31.92              | 43.42               | 54             | -10.58      |
| 4960            | 35.27               | AV               | H              | 33.9               | 6.76            | 31.92              | 44.01               | 54             | -9.99       |
| 4960            | 46.36               | PK               | V              | 33.9               | 6.76            | 31.92              | 55.1                | 74             | -18.9       |
| 4960            | 45.89               | PK               | H              | 33.9               | 6.76            | 31.92              | 54.63               | 74             | -19.37      |

**Note:**

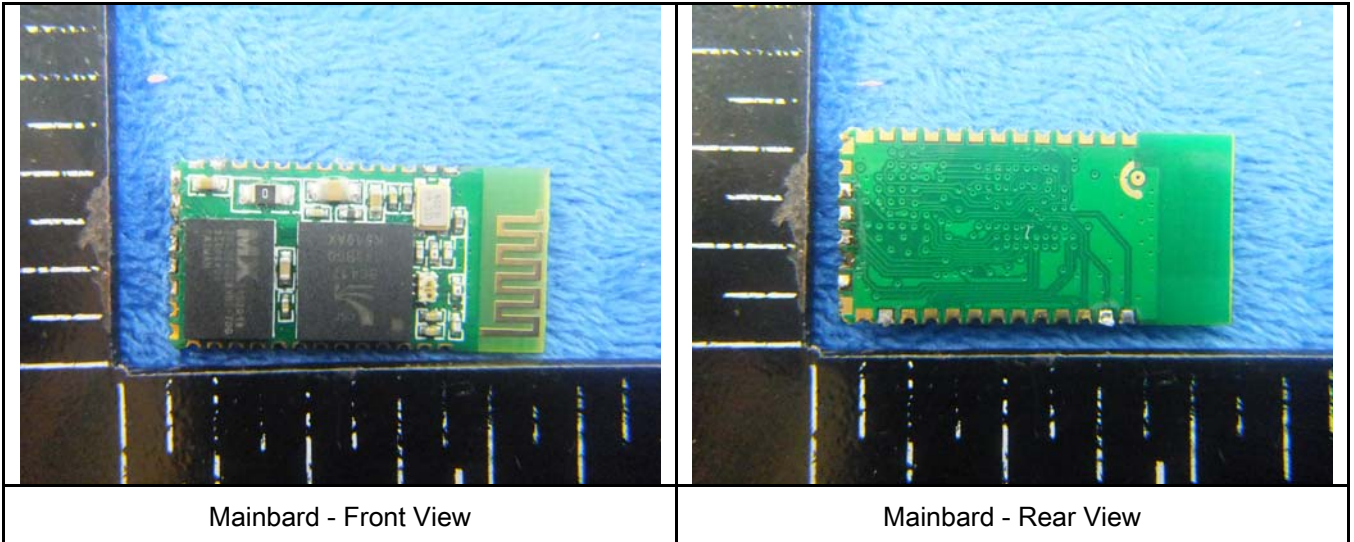
- 1, The testing has been conformed to 10\*2480MHz=24,800MHz
- 2, All other emissions more than 30 dB below the limit

## Annex A. TEST INSTRUMENT

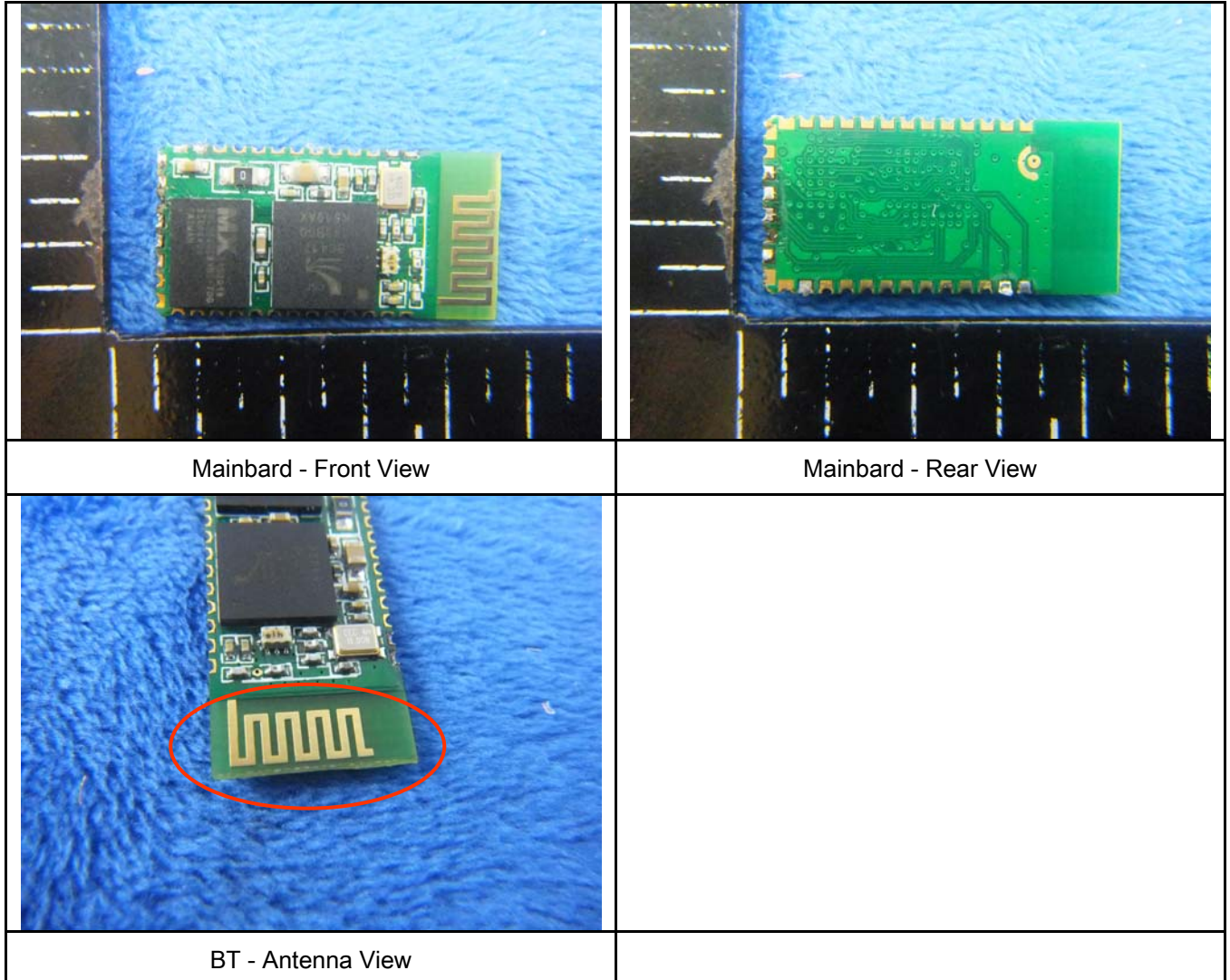
| Instrument                           | Model    | Serial #    | Cal Date   | Cal Due    | In use                              |
|--------------------------------------|----------|-------------|------------|------------|-------------------------------------|
| <b>AC Line Conducted</b>             |          |             |            |            |                                     |
| EMI test receiver                    | ESCS30   | 8471241027  | 09/17/2015 | 09/16/2016 | <input checked="" type="checkbox"/> |
| Line Impedance                       | LI-125A  | 191106      | 09/25/2015 | 09/24/2016 | <input checked="" type="checkbox"/> |
| Line Impedance                       | LI-125A  | 191107      | 09/25/2015 | 09/24/2016 | <input checked="" type="checkbox"/> |
| LISN                                 | ISN T800 | 34373       | 09/25/2015 | 09/24/2016 | <input checked="" type="checkbox"/> |
| Double Ridge Horn Antenna (1 ~18GHz) | AH-118   | 71283       | 09/24/2015 | 09/23/2016 | <input checked="" type="checkbox"/> |
| Transient Limiter                    | LIT-153  | 531118      | 09/01/2015 | 08/31/2016 | <input checked="" type="checkbox"/> |
| <b>RF conducted test</b>             |          |             |            |            |                                     |
| Agilent ESA-E SERIES                 | E4407B   | MY45108319  | 09/17/2015 | 09/16/2016 | <input checked="" type="checkbox"/> |
| Power Splitter                       | 1#       | 1#          | 09/01/2015 | 08/31/2016 | <input checked="" type="checkbox"/> |
| DC Power Supply                      | E3640A   | MY40004013  | 09/17/2015 | 09/16/2016 | <input checked="" type="checkbox"/> |
| <b>Radiated Emissions</b>            |          |             |            |            |                                     |
| EMI test receiver                    | ESL6     | 100262      | 09/17/2015 | 09/16/2016 | <input checked="" type="checkbox"/> |
| Positioning Controller               | UC3000   | MF780208282 | 11/19/2015 | 11/18/2016 | <input checked="" type="checkbox"/> |
| OPT 010 AMPLIFIER (0.1-1300MHz)      | 8447E    | 2727A02430  | 09/01/2015 | 08/31/2016 | <input checked="" type="checkbox"/> |
| Microwave Preamplifier (1 ~ 26.5GHz) | 8449B    | 3008A02402  | 03/24/2016 | 03/23/2017 | <input checked="" type="checkbox"/> |
| Bilog Antenna (30MHz~6GHz)           | JB6      | A110712     | 09/21/2015 | 09/20/2016 | <input checked="" type="checkbox"/> |
| Double Ridge Horn Antenna (1 ~18GHz) | AH-118   | 71283       | 09/24/2015 | 09/23/2016 | <input checked="" type="checkbox"/> |
| Universal Radio Communication Tester | CMU200   | 121393      | 09/25/2015 | 09/24/2016 | <input checked="" type="checkbox"/> |

## Annex B. EUT And Test Setup Photographs

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



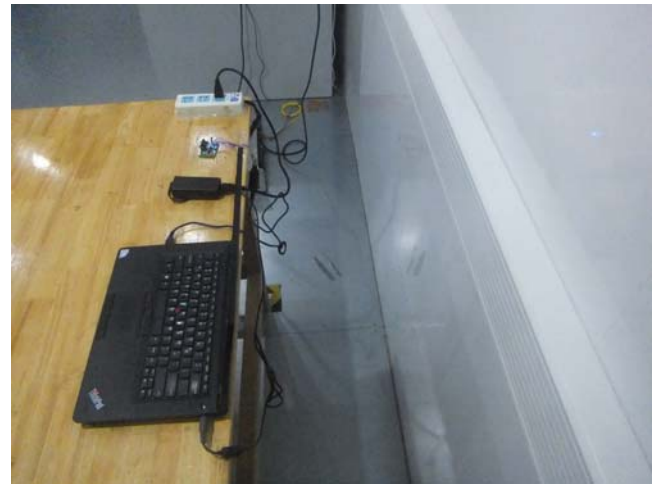
**Annex B.ii. Photograph: EUT Internal Photo**



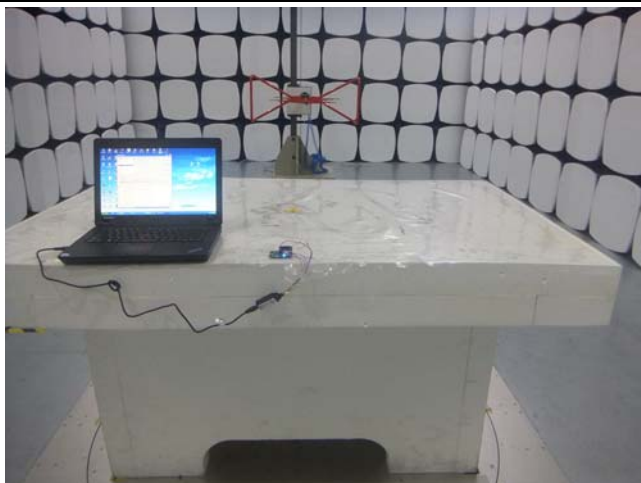
**Annex B.iii. Photograph: Test Setup Photo**



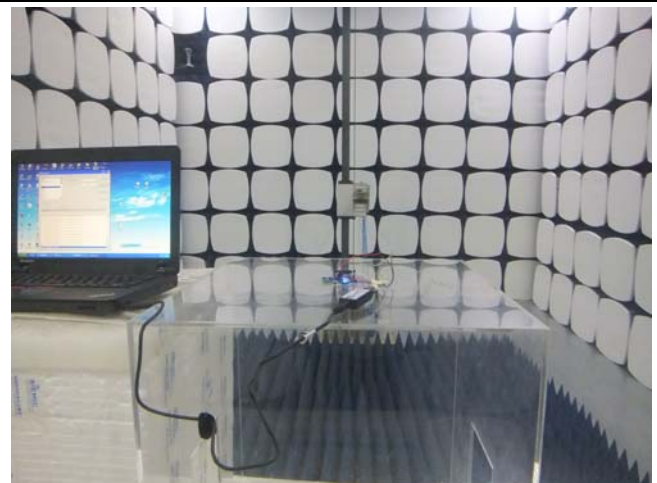
Conducted Emissions Test Setup Front View



Conducted Emissions Test Setup Side View



Radiated Spurious Emissions Test Setup Below  
1GHz

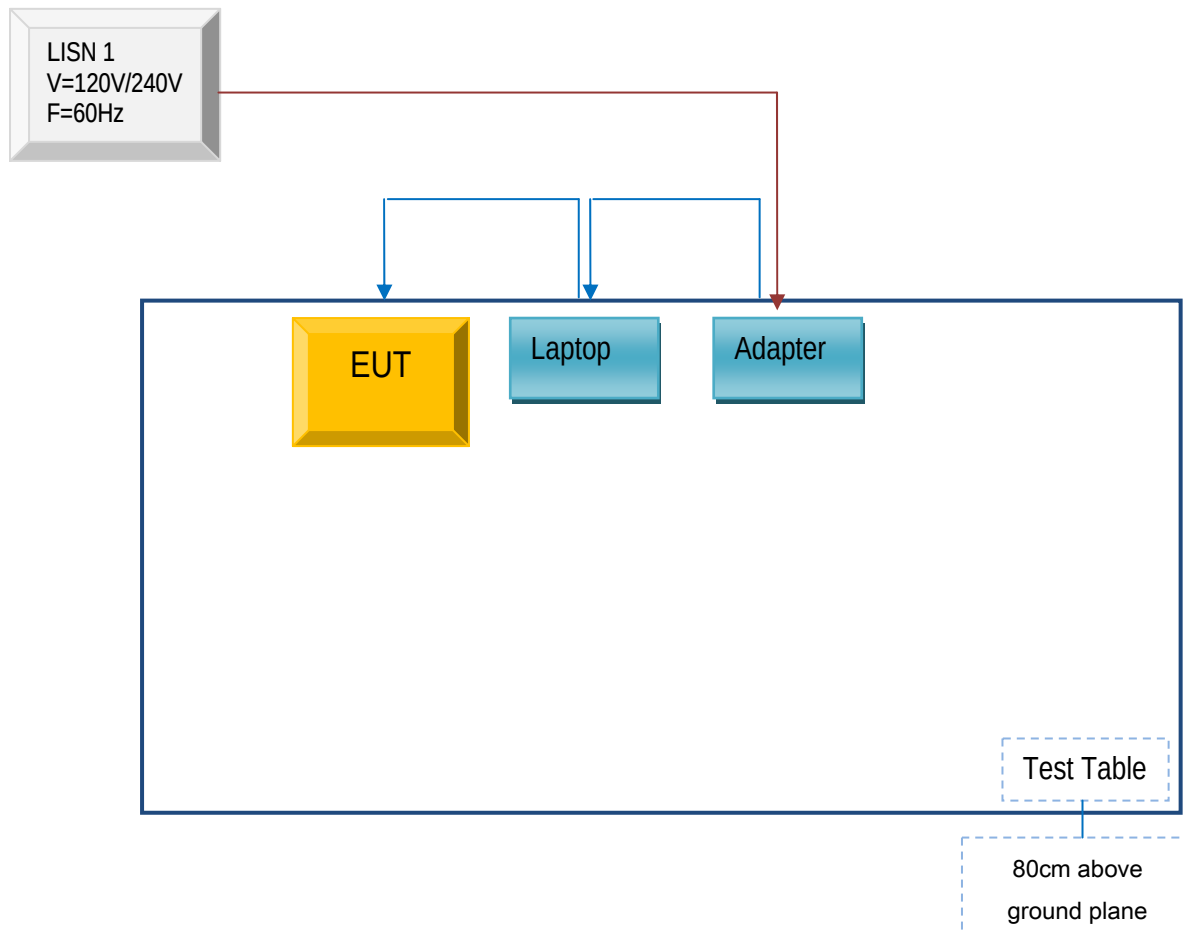


Radiated Spurious Emissions Test Setup Above  
1GHz

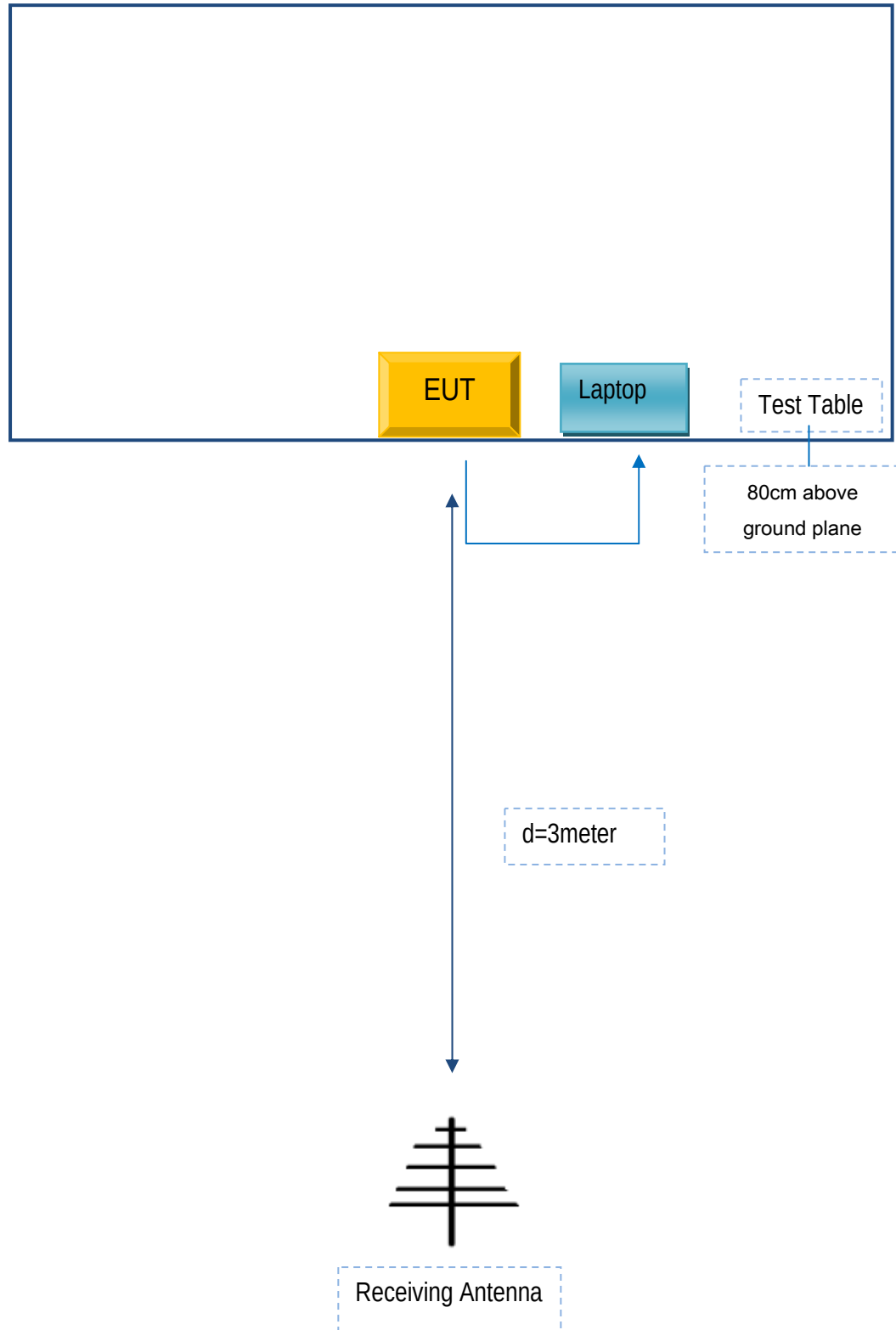
## Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

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

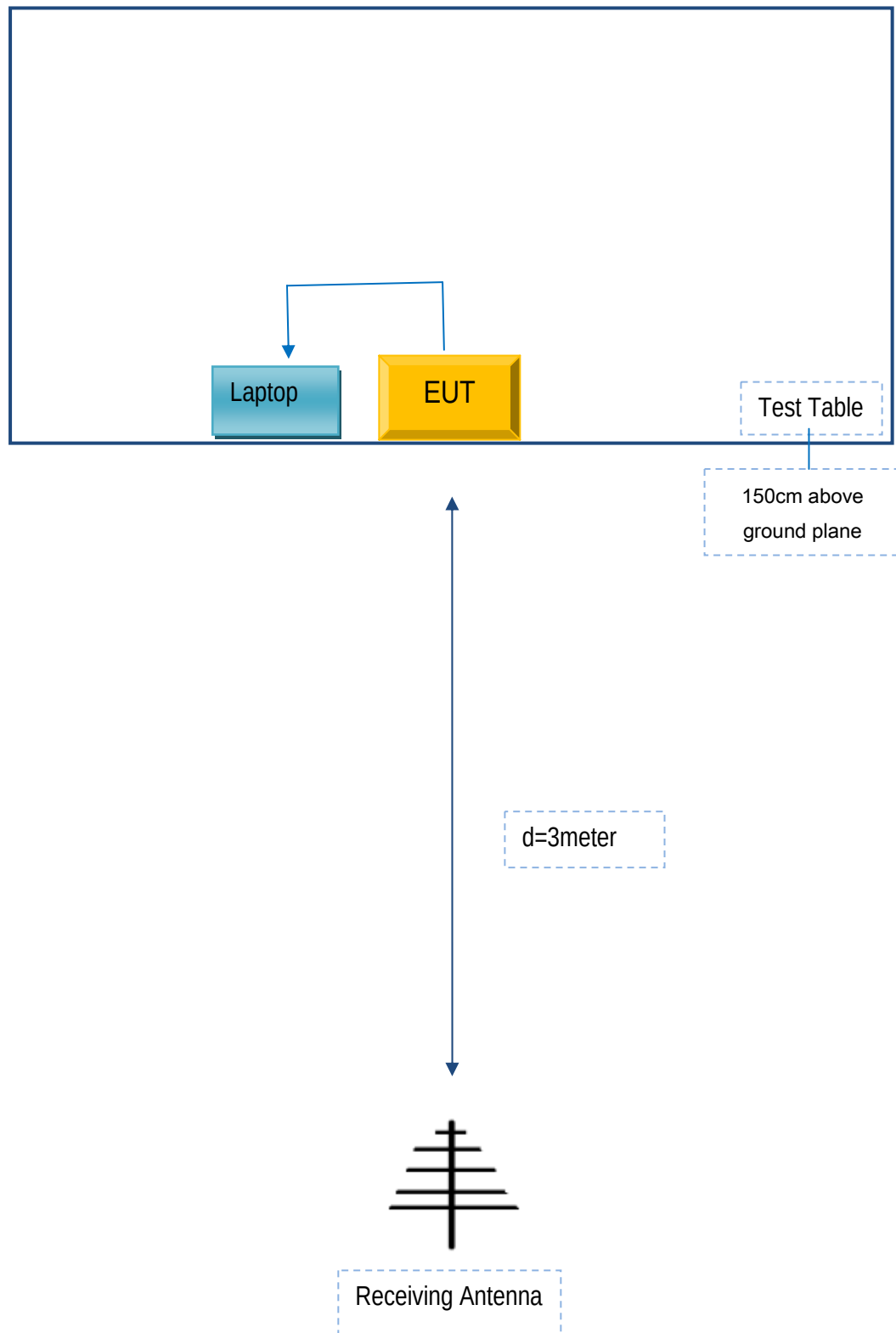
#### Block Configuration Diagram for Conducted Emissions



**Block Configuration Diagram for Radiated Emission ( Below 1GHz ) .**



**Block Configuration Diagram for Radiated Emission ( Above 1GHz ) .**



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

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

### **Supporting Equipment:**

| Manufacturer | Equipment Description | Model | Serial No |
|--------------|-----------------------|-------|-----------|
| Lenovo       | Lenovo Laptop         | E40   | LR-1EHRX  |

### **Supporting Cable:**

| Cable type | Shield Type  | Ferrite Core | Length | Serial No |
|------------|--------------|--------------|--------|-----------|
| USB Cable  | Un-shielding | No           | 0.8m   | ST22100   |

|             |                |
|-------------|----------------|
| Test Report | 16070264-FCC-R |
| Page        | 54 of 55       |

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

N/A

|             |                |
|-------------|----------------|
| Test Report | 16070264-FCC-R |
| Page        | 55 of 55       |

## Annex E. DECLARATION OF SIMILARITY

N/A