

## TEST REPORT

**Product** : Dual Shade LED Lamp  
with Bluetooth Speaker  
**Trade mark** : OttLite  
**Model/Type reference** : HSD9036A  
**Serial Number** : N/A  
**Report Number** : EED32K00158501  
**FCC ID** : 2A17B-HSD9036A  
**Date of Issue** : Jul. 09, 2018  
**Test Standards** : 47 CFR Part 15 Subpart C  
**Test result** : PASS

Prepared for:

**Ottlite Technologies Inc.**  
**220 West 7th Avenue, STE 100, Tampa,**  
**Florida, United States**

Prepared by:

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Jul. 09, 2018

Check No.: 2447690621



## 2 Version

| Version No. | Date          | Description |
|-------------|---------------|-------------|
| 00          | Jul. 09, 2018 | Original    |
|             |               |             |
|             |               |             |

### 3 Test Summary

| Test Item                                      | Test Requirement                                                               | Test method      | Result |
|------------------------------------------------|--------------------------------------------------------------------------------|------------------|--------|
| <b>Antenna Requirement</b>                     | 47 CFR Part 15 Subpart C Section 15.203/15.247 (c)                             | ANSI C63.10-2013 | PASS   |
| <b>AC Power Line Conducted Emission</b>        | 47 CFR Part 15 Subpart C Section 15.207                                        | ANSI C63.10-2013 | PASS   |
| <b>Conducted Peak Output Power</b>             | 47 CFR Part 15 Subpart C Section 15.247 (b)(1)                                 | ANSI C63.10-2013 | PASS   |
| <b>20dB Occupied Bandwidth</b>                 | 47 CFR Part 15 Subpart C Section 15.247 (a)(1)                                 | ANSI C63.10-2013 | PASS   |
| <b>Carrier Frequencies Separation</b>          | 47 CFR Part 15 Subpart C Section 15.247 (a)(1)                                 | ANSI C63.10-2013 | PASS   |
| <b>Hopping Channel Number</b>                  | 47 CFR Part 15 Subpart C Section 15.247 (b)                                    | ANSI C63.10-2013 | PASS   |
| <b>Dwell Time</b>                              | 47 CFR Part 15 Subpart C Section 15.247 (a)(1)                                 | ANSI C63.10-2013 | PASS   |
| <b>Pseudorandom Frequency Hopping Sequence</b> | 47 CFR Part 15 Subpart C Section 15.247(b)(4)&TCB Exclusion List (7 July 2002) | ANSI C63.10-2013 | PASS   |
| <b>RF Conducted Spurious Emissions</b>         | 47 CFR Part 15 Subpart C Section 15.247(d)                                     | ANSI C63.10-2013 | PASS   |
| <b>Radiated Spurious emissions</b>             | 47 CFR Part 15 Subpart C Section 15.205/15.209                                 | ANSI C63.10-2013 | PASS   |

Remark:

Test according to ANSI C63.4-2014 & ANSI C63.10-2013.

The tested sample(s) and the sample information are provided by the client.

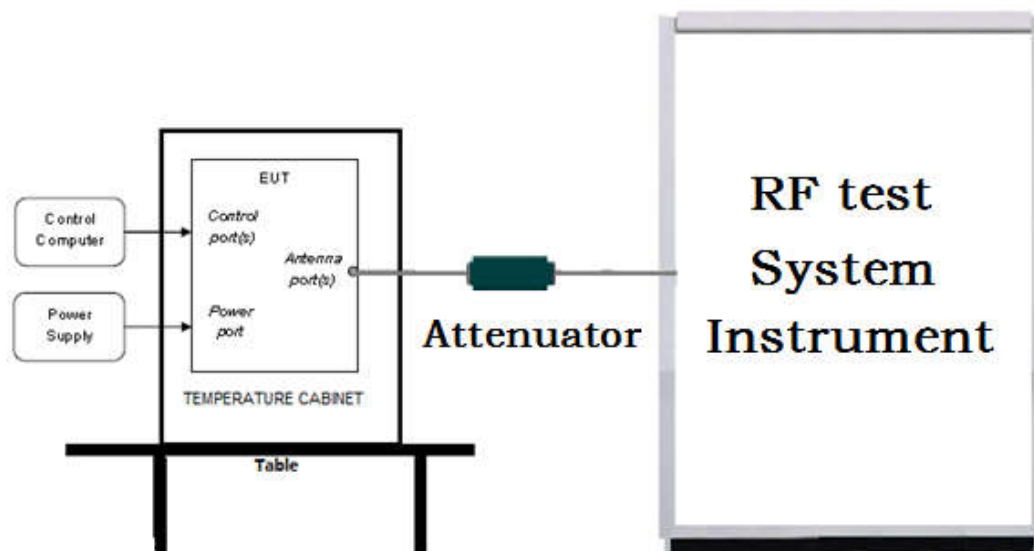
## 4 Content

|                                                                       |           |
|-----------------------------------------------------------------------|-----------|
| <b>1 COVER PAGE</b>                                                   | <b>1</b>  |
| <b>2 VERSION</b>                                                      | <b>2</b>  |
| <b>3 TEST SUMMARY</b>                                                 | <b>3</b>  |
| <b>4 CONTENT</b>                                                      | <b>4</b>  |
| <b>5 TEST REQUIREMENT</b>                                             | <b>5</b>  |
| 5.1 TEST SETUP                                                        | 5         |
| 5.1.1 For Conducted test setup                                        | 5         |
| 5.1.2 For Radiated Emissions test setup                               | 5         |
| 5.1.3 For Conducted Emissions test setup                              | 6         |
| 5.2 TEST ENVIRONMENT                                                  | 6         |
| 5.3 TEST CONDITION                                                    | 6         |
| <b>6 GENERAL INFORMATION</b>                                          | <b>7</b>  |
| 6.1 CLIENT INFORMATION                                                | 7         |
| 6.2 GENERAL DESCRIPTION OF EUT                                        | 7         |
| 6.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD                 | 7         |
| 6.4 DESCRIPTION OF SUPPORT UNITS                                      | 8         |
| 6.5 TEST LOCATION                                                     | 8         |
| 6.6 DEVIATION FROM STANDARDS                                          | 8         |
| 6.7 ABNORMALITIES FROM STANDARD CONDITIONS                            | 8         |
| 6.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER                       | 9         |
| 6.9 MEASUREMENT UNCERTAINTY (95% CONFIDENCE LEVELS, K=2)              | 9         |
| <b>7 EQUIPMENT LIST</b>                                               | <b>10</b> |
| <b>8 RADIO TECHNICAL REQUIREMENTS SPECIFICATION</b>                   | <b>12</b> |
| Appendix A): 20dB Occupied Bandwidth                                  | 13        |
| Appendix B): Carrier Frequency Separation                             | 16        |
| Appendix C): Dwell Time                                               | 19        |
| Appendix D): Hopping Channel Number                                   | 23        |
| Appendix E): Conducted Peak Output Power                              | 24        |
| Appendix F): Band-edge for RF Conducted Emissions                     | 27        |
| Appendix G): RF Conducted Spurious Emissions                          | 30        |
| Appendix H): Pseudorandom Frequency Hopping Sequence                  | 35        |
| Appendix I): Antenna Requirement                                      | 36        |
| Appendix J): AC Power Line Conducted Emission                         | 37        |
| Appendix K): Restricted bands around fundamental frequency (Radiated) | 40        |
| Appendix L): Radiated Spurious Emissions                              | 49        |
| <b>PHOTOGRAPHS OF TEST SETUP</b>                                      | <b>55</b> |
| <b>PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS</b>                      | <b>57</b> |

## 5 Test Requirement

### 5.1 Test setup

#### 5.1.1 For Conducted test setup



#### 5.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

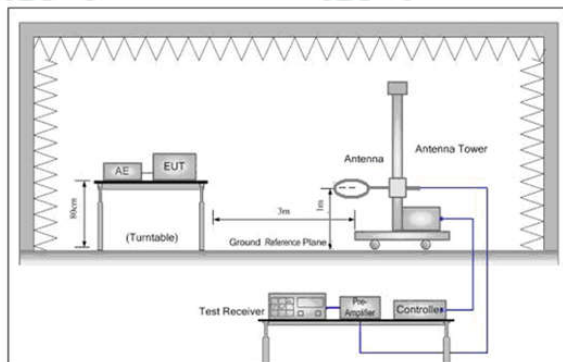


Figure 1. Below 30MHz

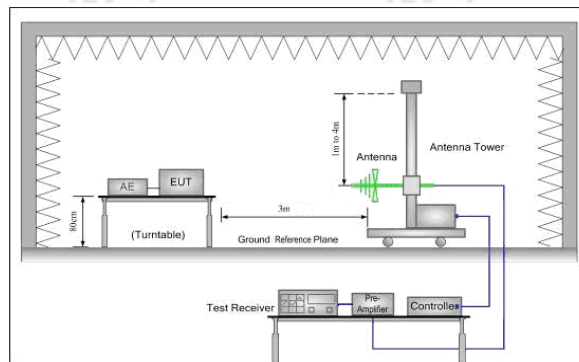


Figure 2. 30MHz to 1GHz

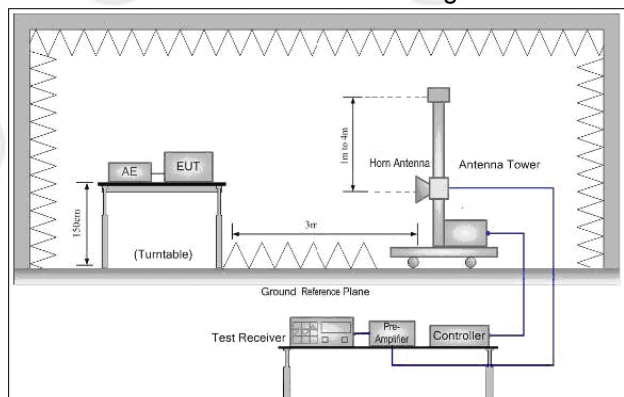
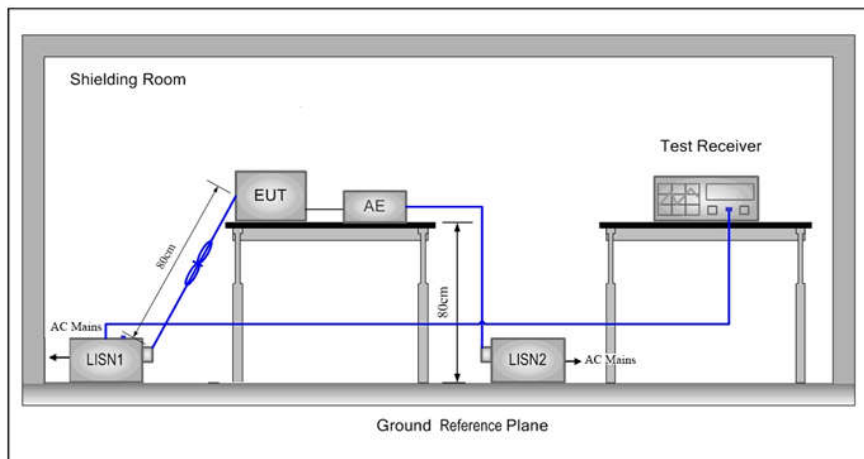


Figure 3. Above 1GHz

### 5.1.3 For Conducted Emissions test setup

#### Conducted Emissions setup



## 5.2 Test Environment

| Operating Environment: |          |
|------------------------|----------|
| Temperature:           | 25 °C    |
| Humidity:              | 51 % RH  |
| Atmospheric Pressure:  | 1010mbar |

## 5.3 Test Condition

| Test Mode                          | Tx/Rx            | RF Channel |            |           |
|------------------------------------|------------------|------------|------------|-----------|
|                                    |                  | Low(L)     | Middle(M)  | High(H)   |
| GFSK/ $\pi$ /4DQPSK(DH1, DH3, DH5) | 2402MHz ~2480MHz | Channel 1  | Channel 40 | Channel79 |
|                                    |                  | 2402MHz    | 2441MHz    | 2480MHz   |

Test mode:

**Pre-scan under all rate at lowest channel 1**

| Mode      | GFSK   |        |        |
|-----------|--------|--------|--------|
| packets   | 1-DH1  | 1-DH3  | 1-DH5  |
| EIRP(dBm) | -4.841 | -4.830 | -4.825 |

| Mode      | $\pi$ /4DQPSK |        |        |
|-----------|---------------|--------|--------|
| packets   | 2-DH1         | 2-DH3  | 2-DH5  |
| EIRP(dBm) | -3.495        | -3.480 | -3.479 |

Through Pre-scan, 1-DH5 packet the power is the worst case of GFSK, 2-DH5 packet the power is the worst case of  $\pi$ /4DQPSK.

## 6 General Information

### 6.1 Client Information

|                          |                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Applicant:               | Ottlite Technologies Inc.                                                                                                       |
| Address of Applicant:    | 220 West 7th Avenue, STE 100, Tampa, Florida, United States                                                                     |
| Manufacturer:            | SHENZHEN HIGHSTAR ELECTRICAL CO.,LTD.                                                                                           |
| Address of Manufacturer: | 2F,4&5F, Building6, Ya Lian Highstar Industrial Zone, 5022 Wuhe Avenue, Bantian Street, Longgang District Shenzhen 518129 China |
| Factory:                 | SHENZHEN HIGHSTAR ELECTRICAL CO.,LTD.                                                                                           |
| Address of Factory:      | 2F,4&5F, Building6, Ya Lian Highstar Industrial Zone, 5022 Wuhe Avenue, Bantian Street, Longgang District Shenzhen 518129 China |

### 6.2 General Description of EUT

|                                  |                                                                                                   |
|----------------------------------|---------------------------------------------------------------------------------------------------|
| Product Name:                    | Dual Shade LED Lamp with Bluetooth Speaker                                                        |
| Model No.(EUT):                  | HSD9036A                                                                                          |
| Trade mark:                      | OttLite                                                                                           |
| EUT Supports Radios application: | BT 4.2 Signal mode, 2402-2480MHz;                                                                 |
| Hardware Version:                | rev.1.2(manufacturer declare)                                                                     |
| Firmware version:                | rev.2.4(manufacturer declare)                                                                     |
| Power Supply:                    | AC adapter:<br>MODEL No.: TEKA024-0503000UK<br>INPUT: 100-240V~50/60Hz, 0.7A MAX<br>OUTPUT: 5V 3A |
| Sample Received Date:            | Jun. 21, 2018                                                                                     |
| Sample tested Date:              | Jun. 21, 2018 to Jul. 05, 2018                                                                    |

### 6.3 Product Specification subjective to this standard

|                        |                                         |
|------------------------|-----------------------------------------|
| Operation Frequency:   | 2402MHz~2480MHz                         |
| Bluetooth Version:     | BT 4.2 Signal mode                      |
| Modulation Technique:  | Frequency Hopping Spread Spectrum(FHSS) |
| Modulation Type:       | GFSK, $\pi/4$ DQPSK                     |
| Number of Channel:     | 79                                      |
| Hopping Channel Type:  | Adaptive Frequency Hopping systems      |
| Sample Type:           | Mobile production                       |
| Test Power Grade:      | Transmit Power:2(manufacturer declare)  |
| Test Software of EUT:  | FCCAssist.exe(manufacturer declare)     |
| Antenna Type and Gain: | Type: PCB Antenna; Gain: -0.58 dBi      |
| Test Voltage:          | AC 120V, 60Hz                           |

| Operation Frequency each of channel |           |         |           |         |           |         |           |
|-------------------------------------|-----------|---------|-----------|---------|-----------|---------|-----------|
| Channel                             | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 1                                   | 2402MHz   | 21      | 2422MHz   | 41      | 2442MHz   | 61      | 2462MHz   |
| 2                                   | 2403MHz   | 22      | 2423MHz   | 42      | 2443MHz   | 62      | 2463MHz   |
| 3                                   | 2404MHz   | 23      | 2424MHz   | 43      | 2444MHz   | 63      | 2464MHz   |
| 4                                   | 2405MHz   | 24      | 2425MHz   | 44      | 2445MHz   | 64      | 2465MHz   |
| 5                                   | 2406MHz   | 25      | 2426MHz   | 45      | 2446MHz   | 65      | 2466MHz   |
| 6                                   | 2407MHz   | 26      | 2427MHz   | 46      | 2447MHz   | 66      | 2467MHz   |
| 7                                   | 2408MHz   | 27      | 2428MHz   | 47      | 2448MHz   | 67      | 2468MHz   |
| 8                                   | 2409MHz   | 28      | 2429MHz   | 48      | 2449MHz   | 68      | 2469MHz   |
| 9                                   | 2410MHz   | 29      | 2430MHz   | 49      | 2450MHz   | 69      | 2470MHz   |
| 10                                  | 2411MHz   | 30      | 2431MHz   | 50      | 2451MHz   | 70      | 2471MHz   |
| 11                                  | 2412MHz   | 31      | 2432MHz   | 51      | 2452MHz   | 71      | 2472MHz   |
| 12                                  | 2413MHz   | 32      | 2433MHz   | 52      | 2453MHz   | 72      | 2473MHz   |
| 13                                  | 2414MHz   | 33      | 2434MHz   | 53      | 2454MHz   | 73      | 2474MHz   |
| 14                                  | 2415MHz   | 34      | 2435MHz   | 54      | 2455MHz   | 74      | 2475MHz   |
| 15                                  | 2416MHz   | 35      | 2436MHz   | 55      | 2456MHz   | 75      | 2476MHz   |
| 16                                  | 2417MHz   | 36      | 2437MHz   | 56      | 2457MHz   | 76      | 2477MHz   |
| 17                                  | 2418MHz   | 37      | 2438MHz   | 57      | 2458MHz   | 77      | 2478MHz   |
| 18                                  | 2419MHz   | 38      | 2439MHz   | 58      | 2459MHz   | 78      | 2479MHz   |
| 19                                  | 2420MHz   | 39      | 2440MHz   | 59      | 2460MHz   | 79      | 2480MHz   |
| 20                                  | 2421MHz   | 40      | 2441MHz   | 60      | 2461MHz   |         |           |

## 6.4 Description of Support Units

The EUT has been tested independently.

## 6.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd.

Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, Guangdong, China 518101

Telephone: +86 (0) 755 33683668 Fax: +86 (0) 755 33683385

No tests were sub-contracted.

FCC Designation No.: CN1164

## 6.6 Deviation from Standards

None.

## 6.7 Abnormalities from Standard Conditions

None.

## 6.8 Other Information Requested by the Customer

None.

## 6.9 Measurement Uncertainty (95% confidence levels, k=2)

| No. | Item                            | Measurement Uncertainty |
|-----|---------------------------------|-------------------------|
| 1   | Radio Frequency                 | $7.9 \times 10^{-8}$    |
| 2   | RF power, conducted             | 0.31dB (30MHz-1GHz)     |
|     |                                 | 0.57dB (1GHz-18GHz)     |
| 3   | Radiated Spurious emission test | 4.5dB (30MHz-1GHz)      |
|     |                                 | 4.8dB (1GHz-12.75GHz)   |
| 4   | Conduction emission             | 3.6dB (9kHz to 150kHz)  |
|     |                                 | 3.2dB (150kHz to 30MHz) |
| 5   | Temperature test                | 0.64°C                  |
| 6   | Humidity test                   | 2.8%                    |
| 7   | DC power voltages               | 0.025%                  |

## 7 Equipment List

| RF test system                      |              |                                  |               |                        |                            |
|-------------------------------------|--------------|----------------------------------|---------------|------------------------|----------------------------|
| Equipment                           | Manufacturer | Model No.                        | Serial Number | Cal. Date (mm-dd-yyyy) | Cal. Due date (mm-dd-yyyy) |
| Signal Generator                    | Keysight     | E8257D                           | MY53401106    | 03-13-2018             | 03-12-2019                 |
| Spectrum Analyzer                   | Keysight     | N9010A                           | MY54510339    | 03-13-2018             | 03-12-2019                 |
| Signal Generator                    | Keysight     | N5182B                           | MY53051549    | 03-13-2018             | 03-12-2019                 |
| High-pass filter                    | Sinoscite    | FL3CX03WG<br>18NM12-<br>0398-002 | ---           | 01-10-2018             | 01-09-2019                 |
| DC Power                            | Keysight     | E3642A                           | MY54426035    | 03-13-2018             | 03-12-2019                 |
| power meter &<br>power sensor       | R&S          | OSP120                           | 101374        | 03-13-2018             | 03-12-2019                 |
| RF control unit                     | JS Tonscend  | JS0806-2                         | 158060006     | 03-13-2018             | 03-12-2019                 |
| Temperature / Humidity<br>Indicator | Defu         | TH128                            | ---           | 07-08-2017             | 07-07-2018                 |

| Conducted disturbance Test         |              |           |               |                        |                            |
|------------------------------------|--------------|-----------|---------------|------------------------|----------------------------|
| Equipment                          | Manufacturer | Model No. | Serial Number | Cal. date (mm-dd-yyyy) | Cal. Due date (mm-dd-yyyy) |
| Receiver                           | R&S          | ESCI      | 100009        | 05-25-2018             | 05-24-2019                 |
| Temperature/ Humidity<br>Indicator | TAYLOR       | 1451      | 1905          | 05-02-2018             | 05-01-2019                 |
| LISN                               | schwarzbeck  | NNLK8121  | 8121-529      | 05-11-2018             | 05-10-2019                 |

| 3M Semi/full-anechoic Chamber    |                   |                              |               |                           |                               |
|----------------------------------|-------------------|------------------------------|---------------|---------------------------|-------------------------------|
| Equipment                        | Manufacturer      | Model No.                    | Serial Number | Cal. date<br>(mm-dd-yyyy) | Cal. Due date<br>(mm-dd-yyyy) |
| 3M Chamber & Accessory Equipment | TDK               | SAC-3                        | ---           | 06-04-2016                | 06-03-2019                    |
| Spectrum Analyzer                | Agilent           | E4443A                       | MY45300910    | 11-16-2017                | 11-15-2018                    |
| TRILOG Broadband Antenna         | SCHWARZBEC<br>K   | VULB9163                     | 9163-618      | 08-15-2017                | 08-14-2018                    |
| Microwave Preamplifier           | JS Tonscend       | EMC051845SE                  | 980380        | 01-19-2018                | 01-18-2019                    |
| Horn Antenna                     | ETS-LINDGREN      | 3117                         | 00057407      | 07-20-2015                | 07-18-2018                    |
| Loop Antenna                     | ETS               | 6502                         | 00071730      | 06-22-2017                | 06-21-2019                    |
| Spectrum Analyzer                | R&S               | FSP40                        | 100416        | 05-11-2018                | 05-10-2019                    |
| Receiver                         | R&S               | ESCI                         | 100435        | 05-25-2018                | 05-24-2019                    |
| Double ridge horn antenna        | A.H.SYSTEMS       | SAS-574                      | 6042          | 06-05-2018                | 06-03-2021                    |
| Pre-amplifier                    | A.H.SYSTEMS       | PAP-1840-60                  | 6041          | 06-05-2018                | 06-03-2021                    |
| LISN                             | schwarzbeck       | NNBM8125                     | 81251547      | 05-11-2018                | 05-10-2019                    |
| LISN                             | schwarzbeck       | NNBM8125                     | 81251548      | 05-11-2018                | 05-10-2019                    |
| Signal Generator                 | Agilent           | E4438C                       | MY45095744    | 03-13-2018                | 03-12-2019                    |
| Signal Generator                 | Keysight          | E8257D                       | MY53401106    | 03-13-2018                | 03-12-2019                    |
| Temperature/ Humidity Indicator  | TAYLOR            | 1451                         | 1905          | 05-02-2018                | 05-01-2019                    |
| Cable line                       | Fulai(7M)         | SF106                        | 5219/6A       | 01-10-2018                | 01-09-2019                    |
| Cable line                       | Fulai(6M)         | SF106                        | 5220/6A       | 01-10-2018                | 01-09-2019                    |
| Cable line                       | Fulai(3M)         | SF106                        | 5216/6A       | 01-10-2018                | 01-09-2019                    |
| Cable line                       | Fulai(3M)         | SF106                        | 5217/6A       | 01-10-2018                | 01-09-2019                    |
| High-pass filter                 | Sinoscite         | FL3CX03WG18<br>NM12-0398-002 | ---           | 01-10-2018                | 01-09-2019                    |
| High-pass filter                 | MICRO-<br>TRONICS | SPA-F-63029-4                | ---           | 01-10-2018                | 01-09-2019                    |
| band rejection filter            | Sinoscite         | FL5CX01CA09<br>CL12-0395-001 | ---           | 01-10-2018                | 01-09-2019                    |
| band rejection filter            | Sinoscite         | FL5CX01CA08<br>CL12-0393-001 | ---           | 01-10-2018                | 01-09-2019                    |
| band rejection filter            | Sinoscite         | FL5CX02CA04<br>CL12-0396-002 | ---           | 01-10-2018                | 01-09-2019                    |
| band rejection filter            | Sinoscite         | FL5CX02CA03<br>CL12-0394-001 | ---           | 01-10-2018                | 01-09-2019                    |

## 8 Radio Technical Requirements Specification

### Reference documents for testing:

| No. | Identity         | Document Title                                                     |
|-----|------------------|--------------------------------------------------------------------|
| 1   | FCC Part15C      | Subpart C-Intentional Radiators                                    |
| 2   | ANSI C63.10-2013 | American National Standard for Testing Unlicensed Wireless Devices |

### Test Results List:

| Test requirement                  | Test method | Test item                                                          | Verdict | Note        |
|-----------------------------------|-------------|--------------------------------------------------------------------|---------|-------------|
| Part15C Section 15.247 (a)(1)     | ANSI 63.10  | 20dB Occupied Bandwidth                                            | PASS    | Appendix A) |
| Part15C Section 15.247 (a)(1)     | ANSI 63.10  | Carrier Frequencies Separation                                     | PASS    | Appendix B) |
| Part15C Section 15.247 (a)(1)     | ANSI 63.10  | Dwell Time                                                         | PASS    | Appendix C) |
| Part15C Section 15.247 (b)        | ANSI 63.10  | Hopping Channel Number                                             | PASS    | Appendix D) |
| Part15C Section 15.247 (b)(1)     | ANSI 63.10  | Conducted Peak Output Power                                        | PASS    | Appendix E) |
| Part15C Section 15.247(d)         | ANSI 63.10  | Band-edge for RF Conducted Emissions                               | PASS    | Appendix F) |
| Part15C Section 15.247(d)         | ANSI 63.10  | RF Conducted Spurious Emissions                                    | PASS    | Appendix G) |
| Part15C Section 15.247 (a)(1)     | ANSI 63.10  | Pseudorandom Frequency Hopping Sequence                            | PASS    | Appendix H) |
| Part15C Section 15.203/15.247 (c) | ANSI 63.10  | Antenna Requirement                                                | PASS    | Appendix I) |
| Part15C Section 15.207            | ANSI 63.10  | AC Power Line Conducted Emission                                   | PASS    | Appendix J) |
| Part15C Section 15.205/15.209     | ANSI 63.10  | Restricted bands around fundamental frequency (Radiated) Emission) | PASS    | Appendix K) |
| Part15C Section 15.205/15.209     | ANSI 63.10  | Radiated Spurious Emissions                                        | PASS    | Appendix L) |

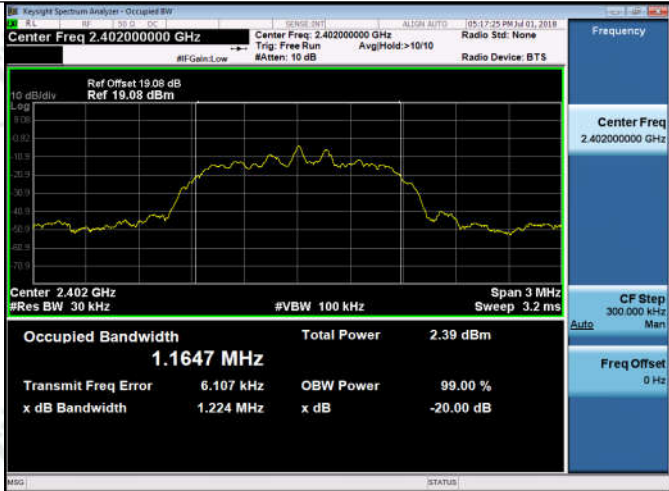
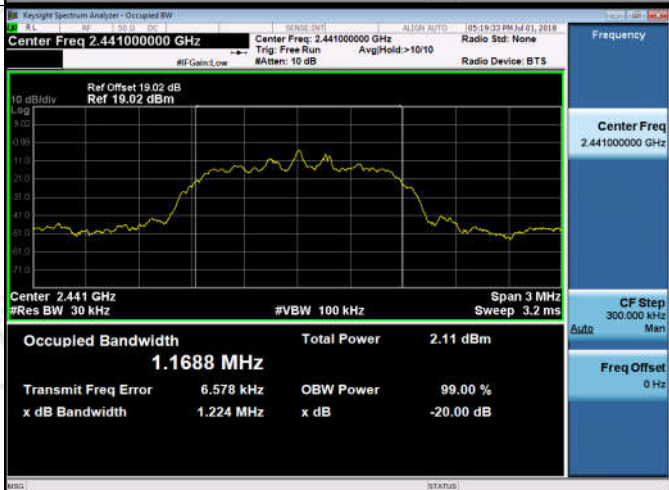
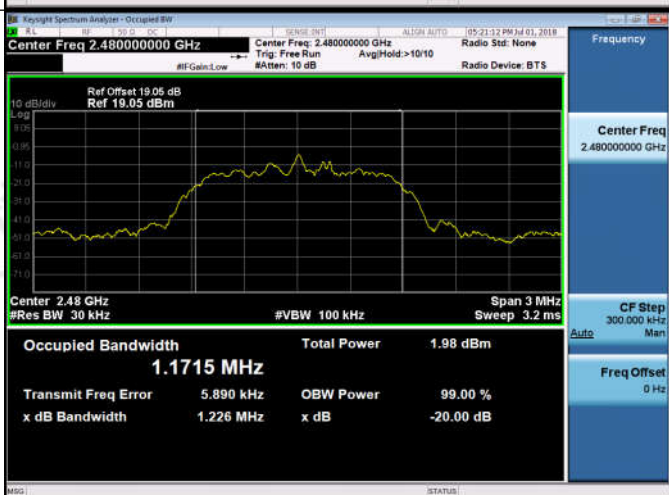
## Appendix A): 20dB Occupied Bandwidth

### Test Result

| Mode          | Channel. | 20dB Bandwidth [MHz] | 99% OBW [MHz] | Verdict |
|---------------|----------|----------------------|---------------|---------|
| GFSK          | LCH      | 0.9173               | 0.84462       | PASS    |
| GFSK          | MCH      | 0.8567               | 0.83921       | PASS    |
| GFSK          | HCH      | 0.9108               | 0.84194       | PASS    |
| $\pi/4$ DQPSK | LCH      | 1.224                | 1.1647        | PASS    |
| $\pi/4$ DQPSK | MCH      | 1.224                | 1.1688        | PASS    |
| $\pi/4$ DQPSK | HCH      | 1.226                | 1.1715        | PASS    |

## Test Graph



|                                    |                                                                                      |
|------------------------------------|--------------------------------------------------------------------------------------|
| <p><math>\pi/4</math>DQPSK/LCH</p> |    |
| <p><math>\pi/4</math>DQPSK/MCH</p> |   |
| <p><math>\pi/4</math>DQPSK/HCH</p> |  |

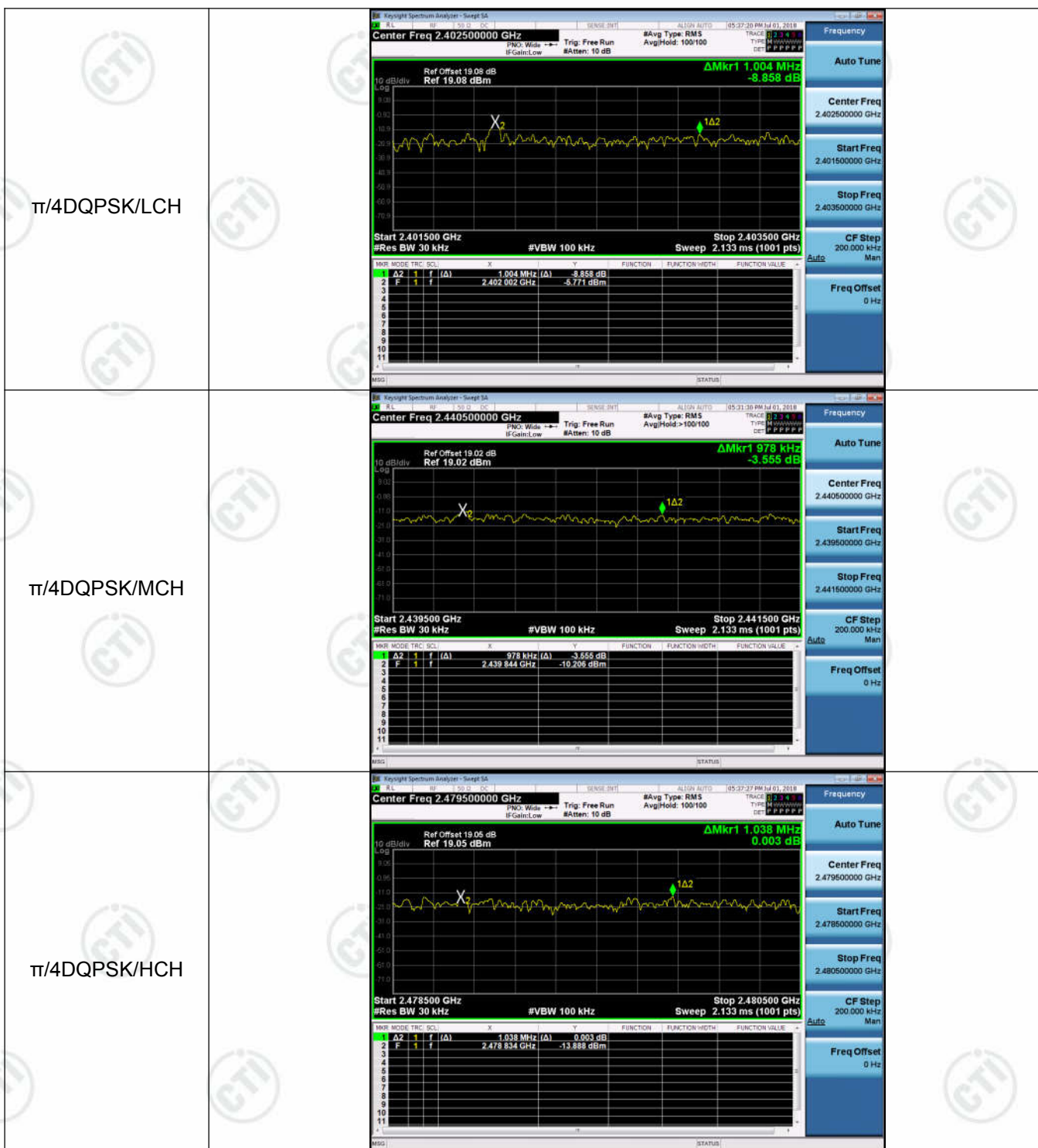
## Appendix B): Carrier Frequency Separation

Result Table

| Mode          | Channel. | Carrier Frequency Separation [MHz] | Verdict |
|---------------|----------|------------------------------------|---------|
| GFSK          | LCH      | 1.010                              | PASS    |
| GFSK          | MCH      | 0.976                              | PASS    |
| GFSK          | HCH      | 1.094                              | PASS    |
| $\pi/4$ DQPSK | LCH      | 1.004                              | PASS    |
| $\pi/4$ DQPSK | MCH      | 0.978                              | PASS    |
| $\pi/4$ DQPSK | HCH      | 1.038                              | PASS    |

## Test Graph





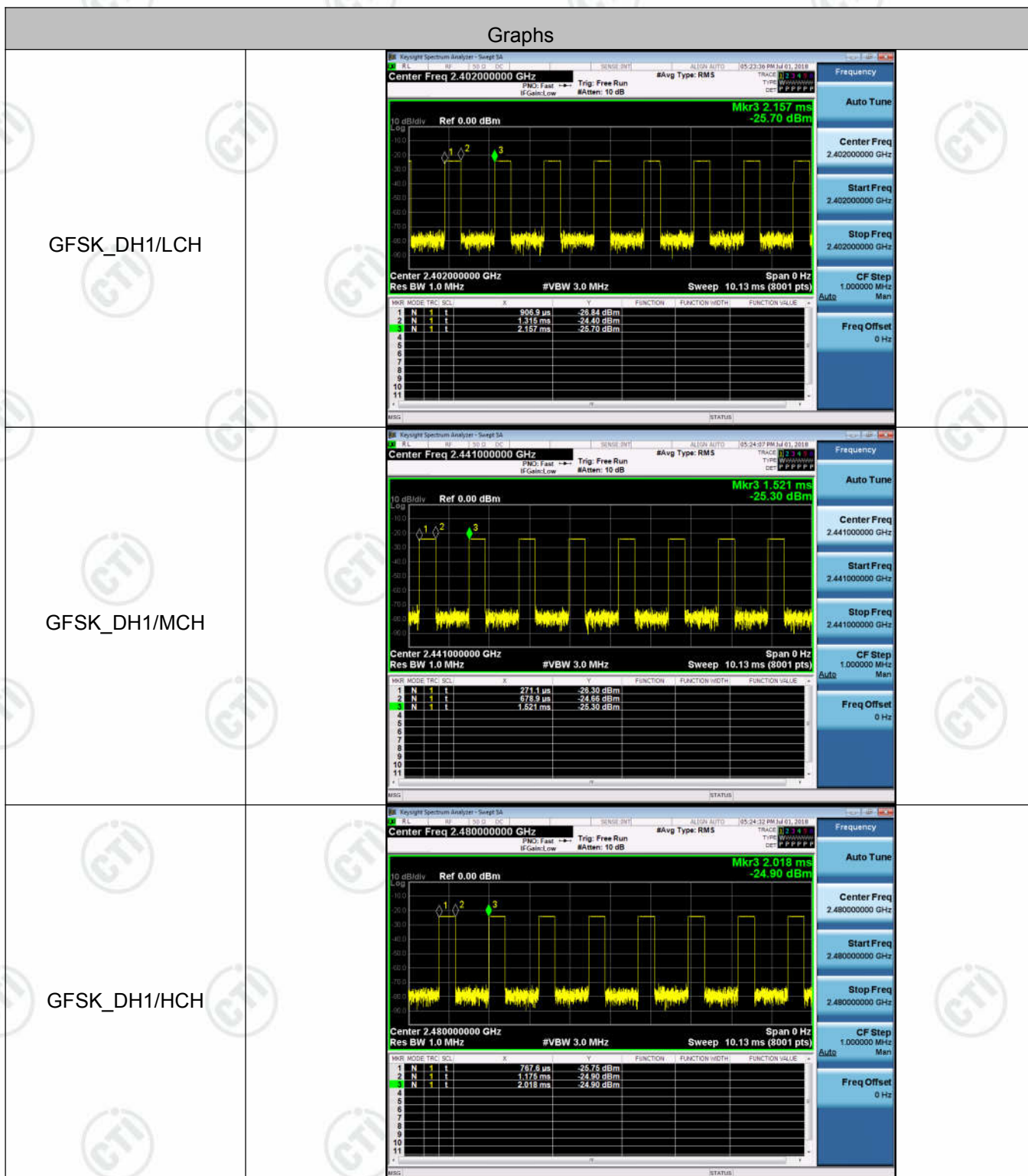
## Appendix C): Dwell Time

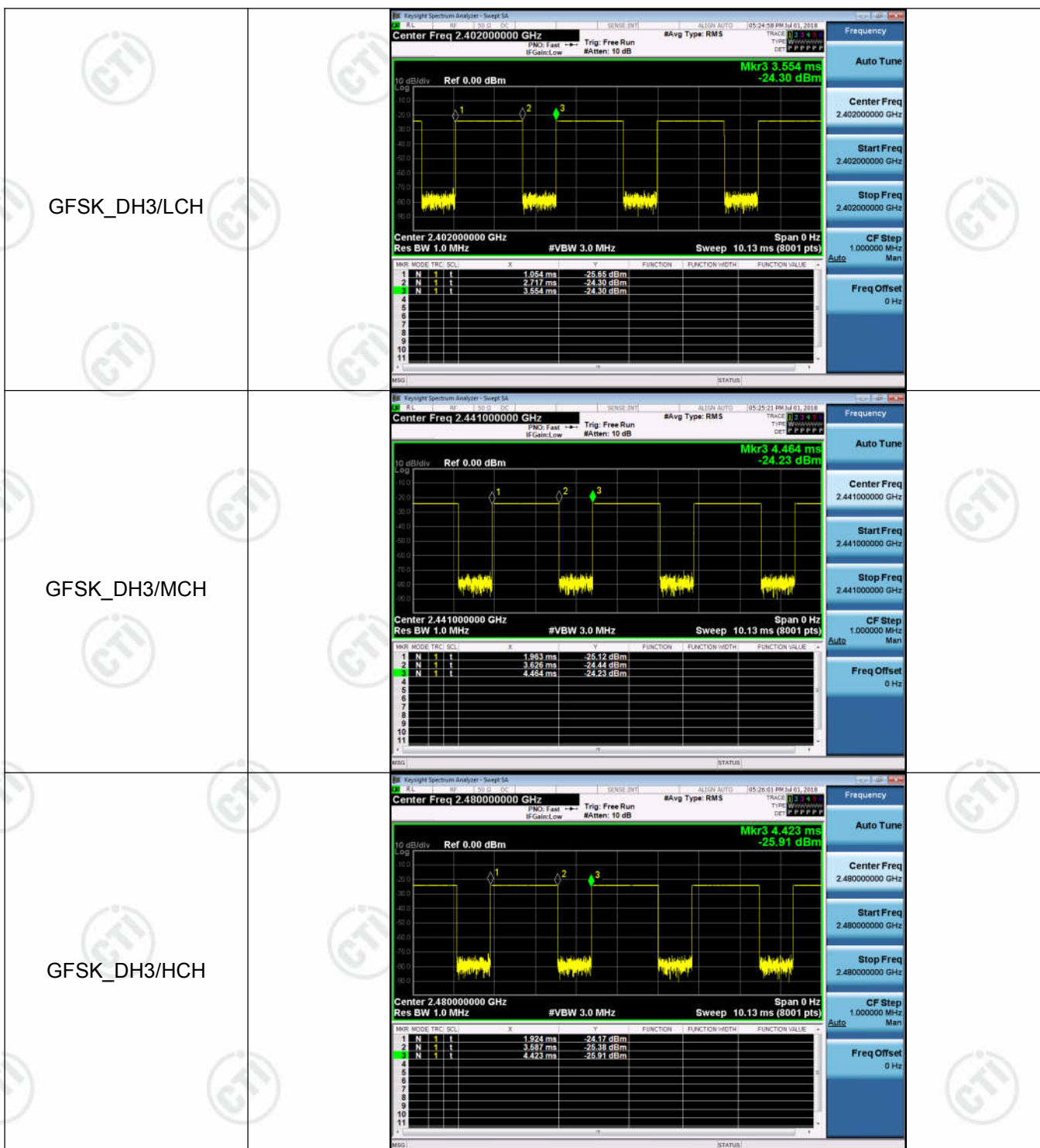
### Result Table

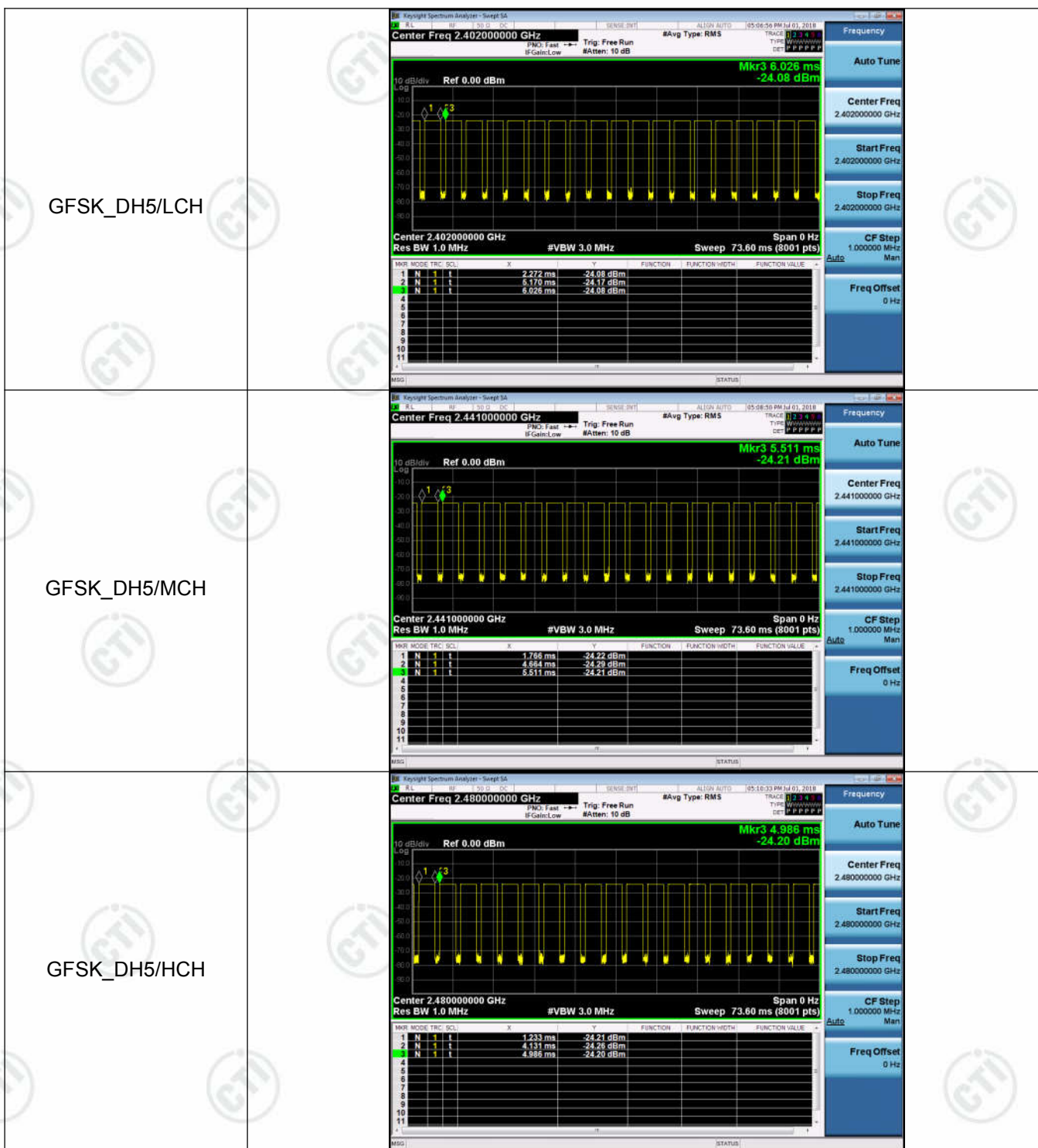
| Mode | Packet | Channel | Burst Width<br>[ms/hop/ch] | Total<br>Hops[hop*ch] | Dwell<br>Time[s] | Duty<br>Cycle [%] | Verdict |
|------|--------|---------|----------------------------|-----------------------|------------------|-------------------|---------|
| GFSK | DH1    | LCH     | 0.407867                   | 320                   | 0.131            | 0.33              | PASS    |
| GFSK | DH1    | MCH     | 0.407866                   | 320                   | 0.131            | 0.33              | PASS    |
| GFSK | DH1    | HCH     | 0.40787                    | 320                   | 0.131            | 0.33              | PASS    |
| GFSK | DH3    | LCH     | 1.66313                    | 160                   | 0.266            | 0.67              | PASS    |
| GFSK | DH3    | MCH     | 1.66314                    | 160                   | 0.266            | 0.67              | PASS    |
| GFSK | DH3    | HCH     | 1.66313                    | 160                   | 0.266            | 0.67              | PASS    |
| GFSK | DH5    | LCH     | 2.898                      | 106.7                 | 0.309            | 0.77              | PASS    |
| GFSK | DH5    | MCH     | 2.898                      | 106.7                 | 0.309            | 0.77              | PASS    |
| GFSK | DH5    | HCH     | 2.898                      | 106.7                 | 0.309            | 0.77              | PASS    |

Remark : All modes are tested, only the worst mode GFSK is reported.

## Test Graph





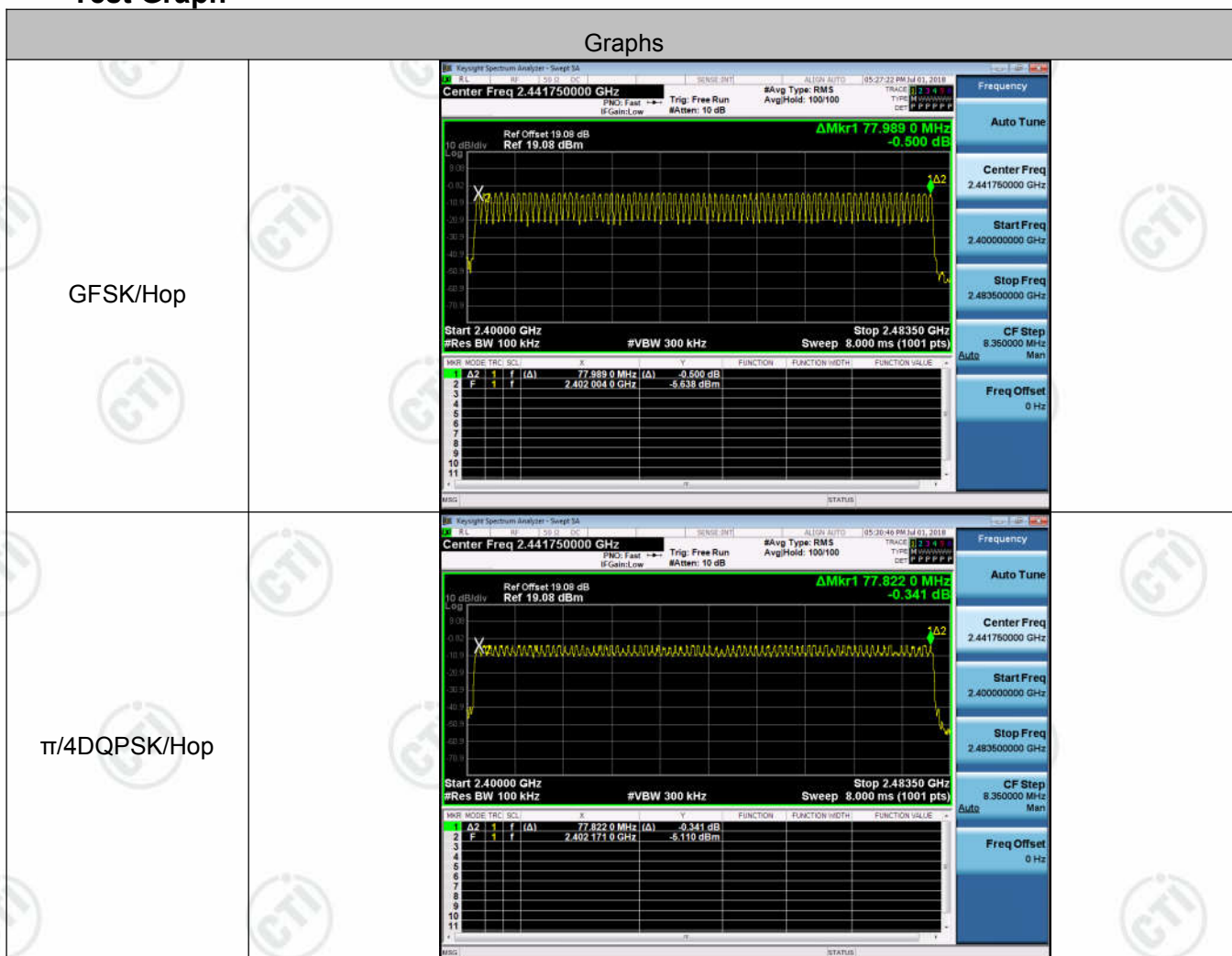


## Appendix D): Hopping Channel Number

### Result Table

| Mode          | Channel. | Number of Hopping Channel | Verdict |
|---------------|----------|---------------------------|---------|
| GFSK          | Hop      | 79                        | PASS    |
| $\pi/4$ DQPSK | Hop      | 79                        | PASS    |

### Test Graph

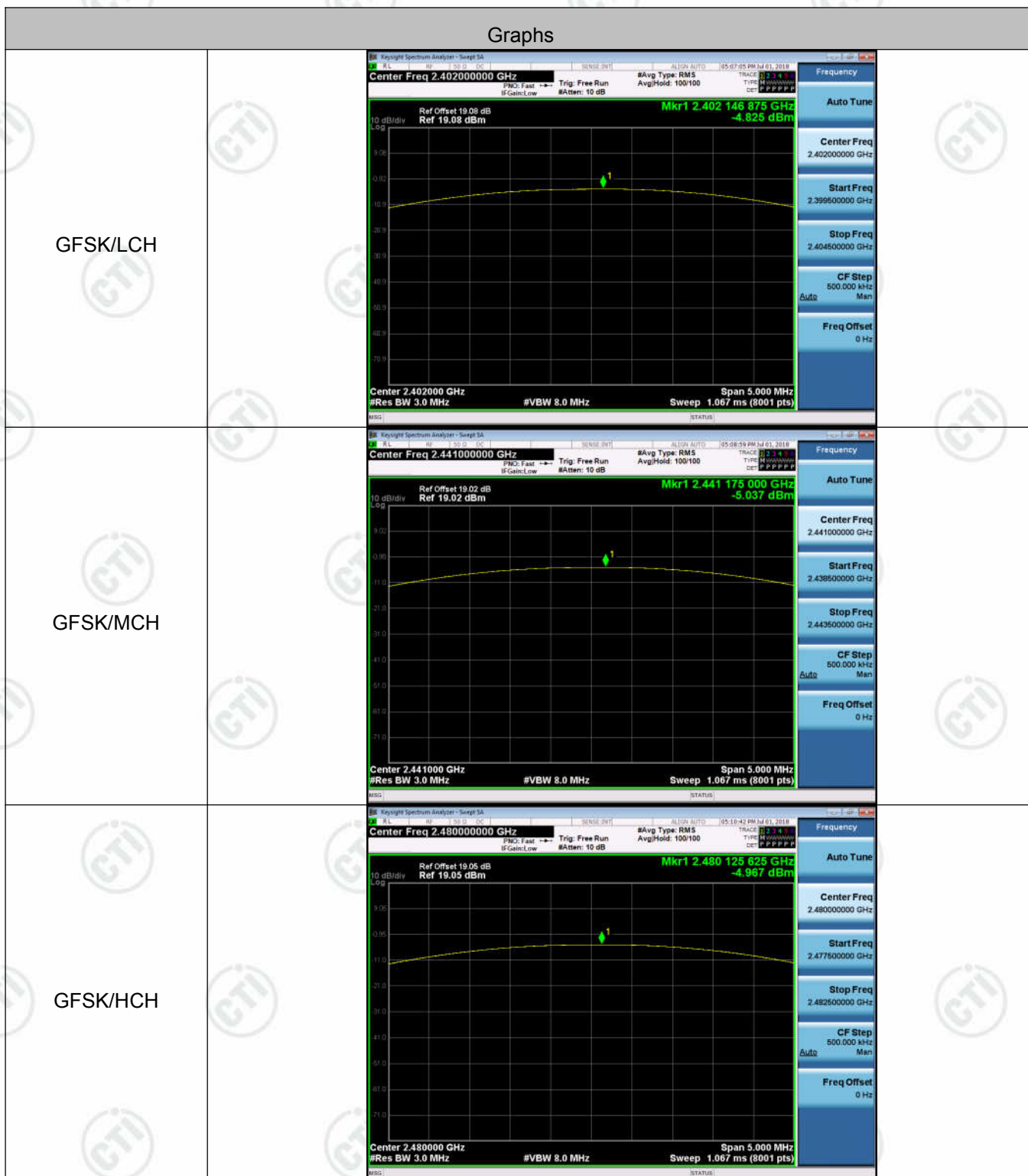


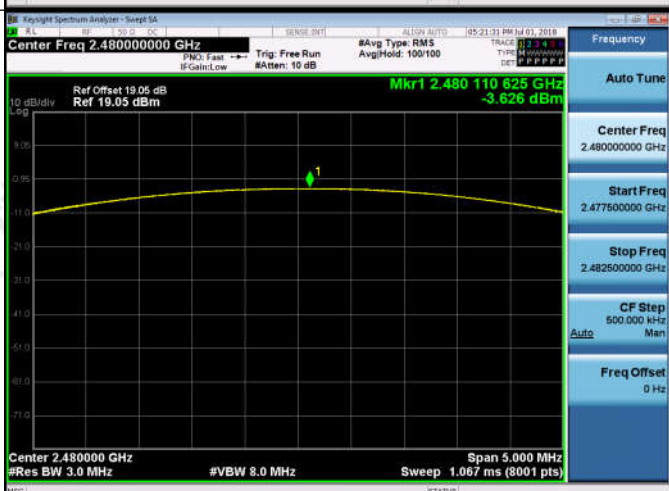
## Appendix E): Conducted Peak Output Power

### Result Table

| Mode          | Channel. | Maximum Peak Output Power [dBm] | Verdict |
|---------------|----------|---------------------------------|---------|
| GFSK          | LCH      | -4.825                          | PASS    |
| GFSK          | MCH      | -5.037                          | PASS    |
| GFSK          | HCH      | -4.967                          | PASS    |
| $\pi/4$ DQPSK | LCH      | -3.479                          | PASS    |
| $\pi/4$ DQPSK | MCH      | -3.661                          | PASS    |
| $\pi/4$ DQPSK | HCH      | -3.626                          | PASS    |

## Test Graph



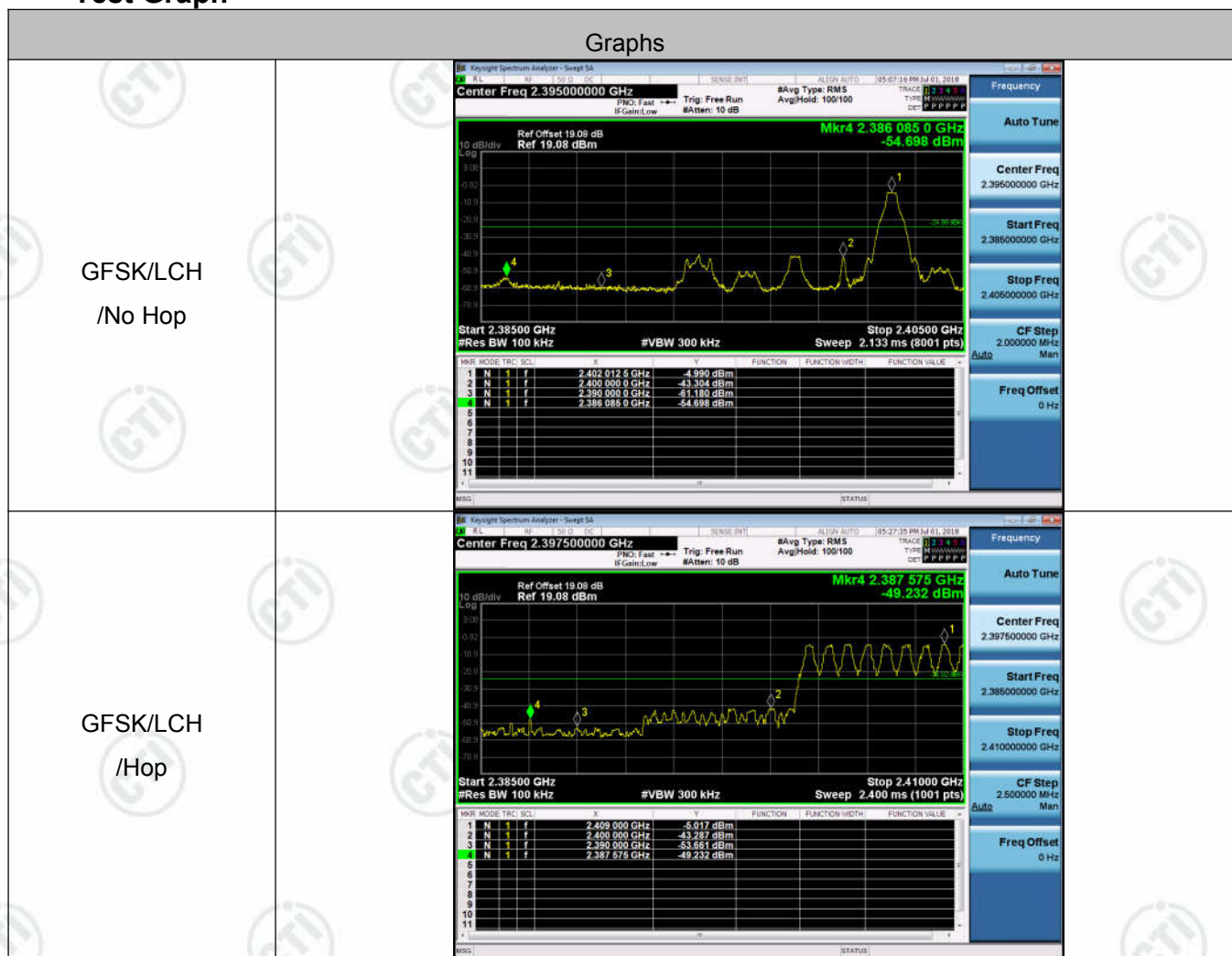
|                                    |                                                                                      |
|------------------------------------|--------------------------------------------------------------------------------------|
| <p><math>\pi/4</math>DQPSK/LCH</p> |    |
| <p><math>\pi/4</math>DQPSK/MCH</p> |   |
| <p><math>\pi/4</math>DQPSK/HCH</p> |  |

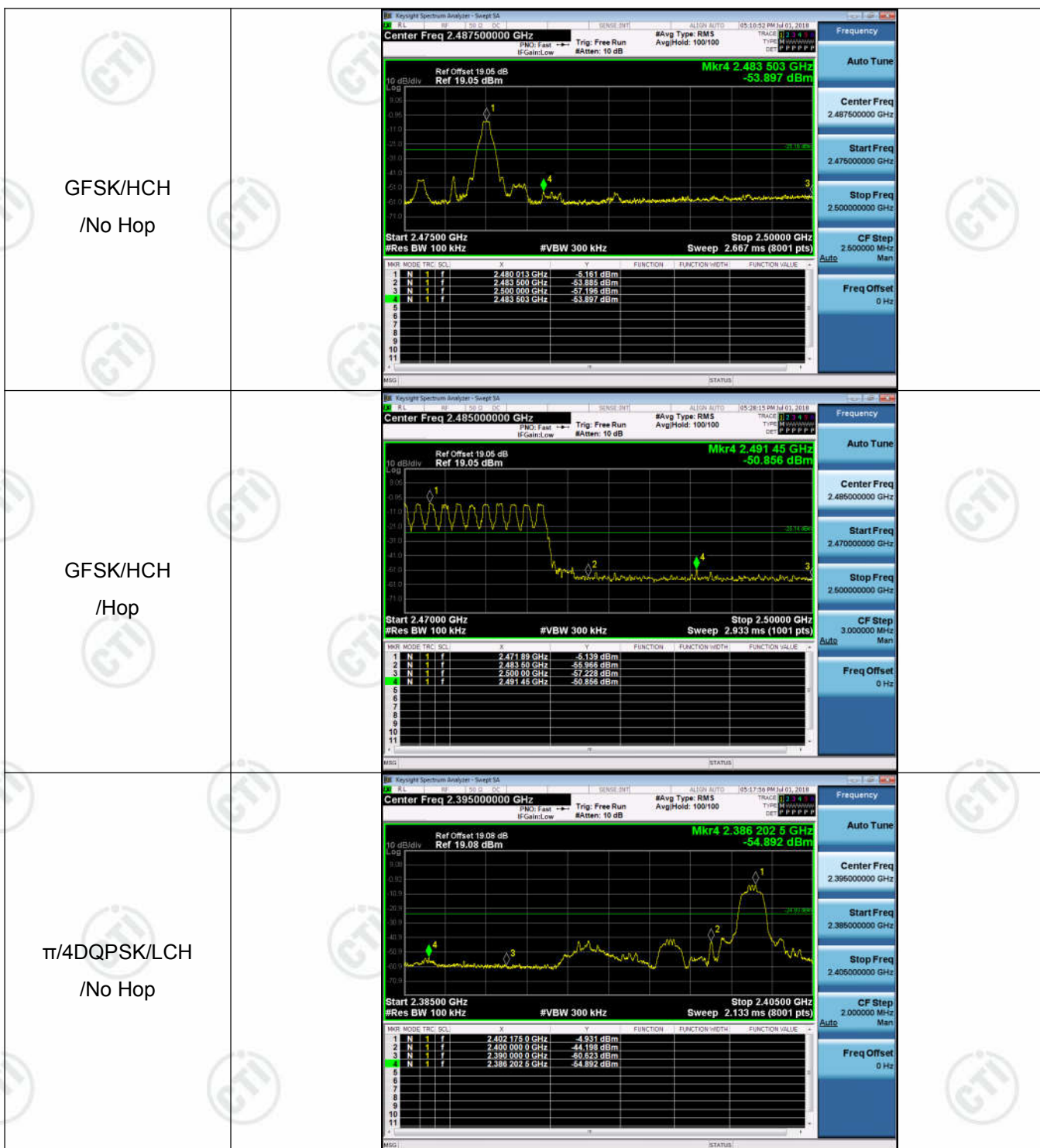
## Appendix F): Band-edge for RF Conducted Emissions

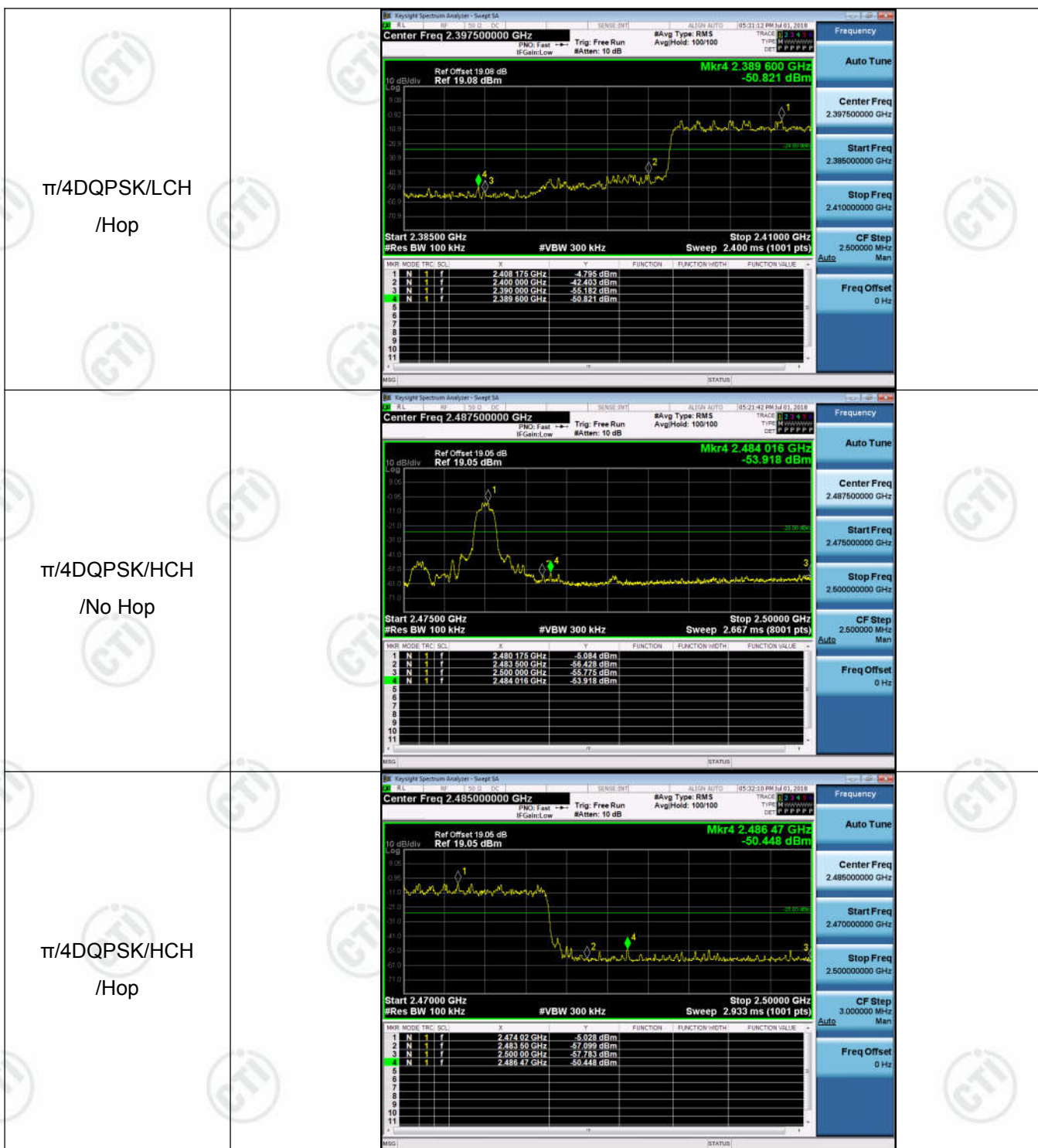
Result Table

| Mode          | Channel | Carrier Frequency [MHz] | Carrier Power [dBm] | Frequency Hopping | Max Spurious Level [dBm] | Limit [dBm] | Verdict |
|---------------|---------|-------------------------|---------------------|-------------------|--------------------------|-------------|---------|
| GFSK          | LCH     | 2402                    | -4.990              | Off               | -54.698                  | -24.99      | PASS    |
|               |         |                         | -5.017              | On                | -49.232                  | -25.02      | PASS    |
| GFSK          | HCH     | 2480                    | -5.161              | Off               | -53.897                  | -25.16      | PASS    |
|               |         |                         | -5.139              | On                | -50.856                  | -25.14      | PASS    |
| $\pi/4$ DQPSK | LCH     | 2402                    | -4.931              | Off               | -54.892                  | -24.93      | PASS    |
|               |         |                         | -4.795              | On                | -50.821                  | -24.8       | PASS    |
| $\pi/4$ DQPSK | HCH     | 2480                    | -5.084              | Off               | -53.918                  | -25.08      | PASS    |
|               |         |                         | -5.028              | On                | -50.448                  | -25.03      | PASS    |

Test Graph





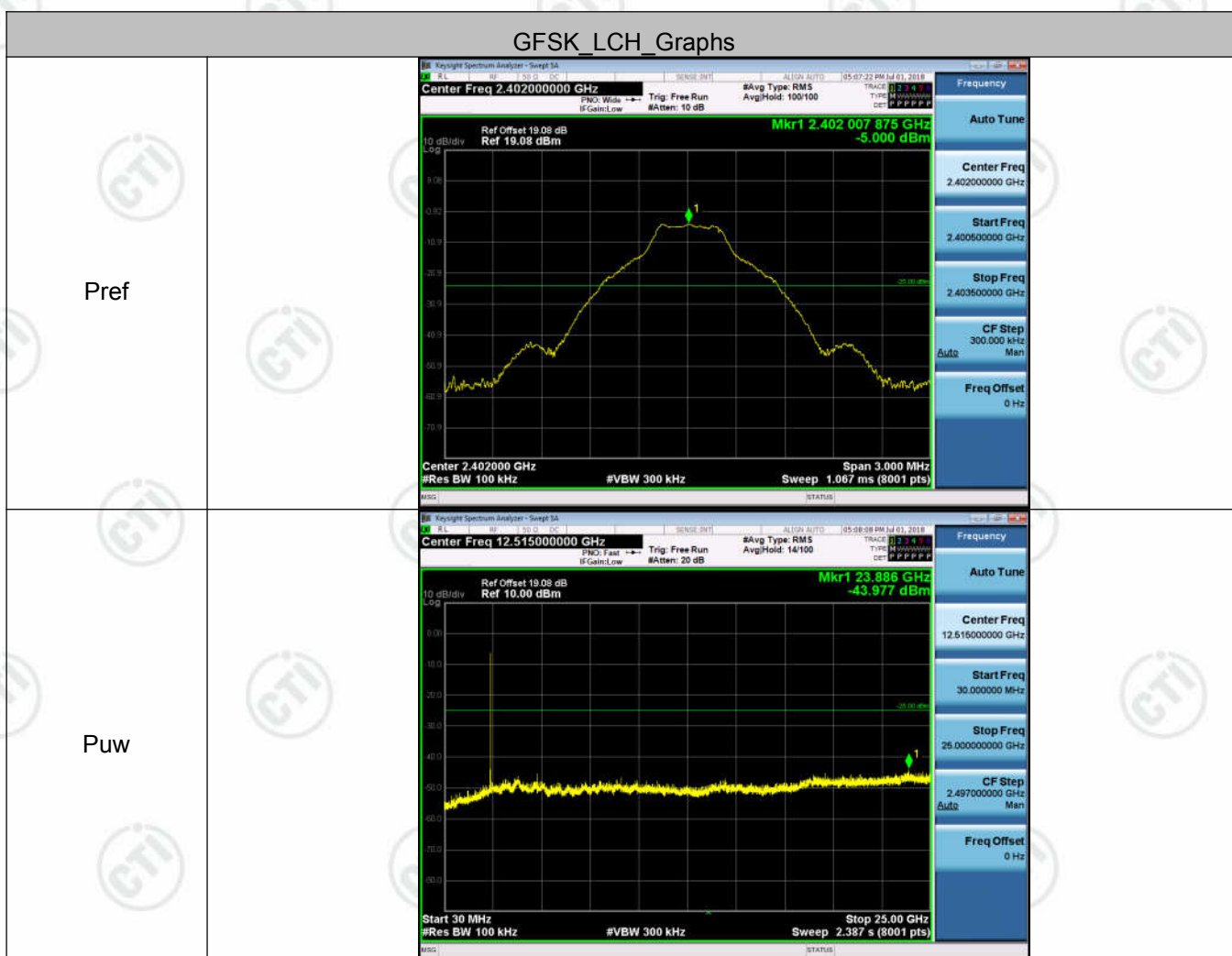


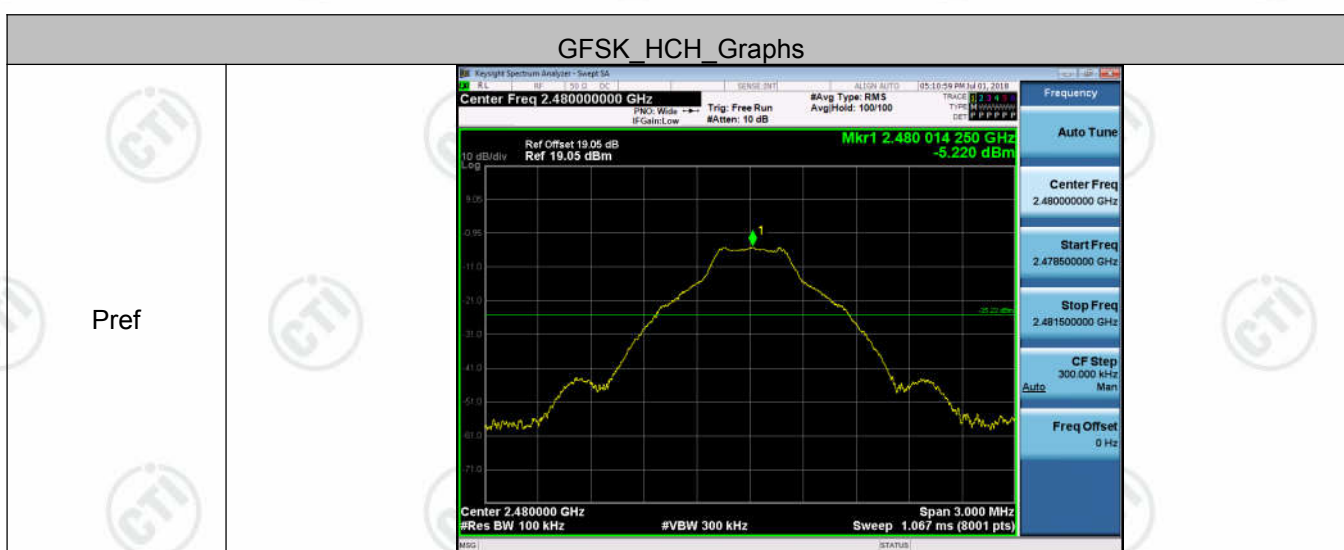
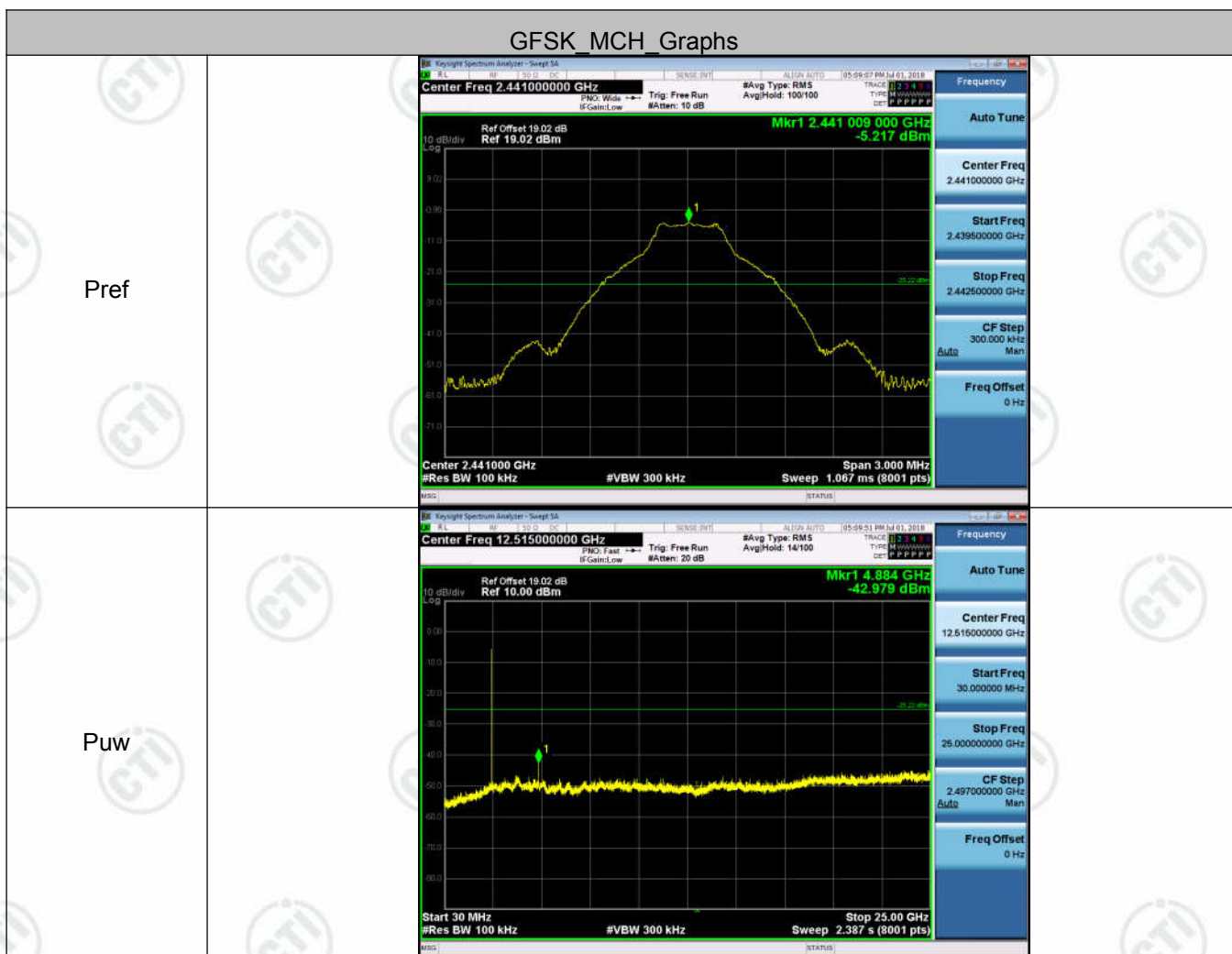
## Appendix G): RF Conducted Spurious Emissions

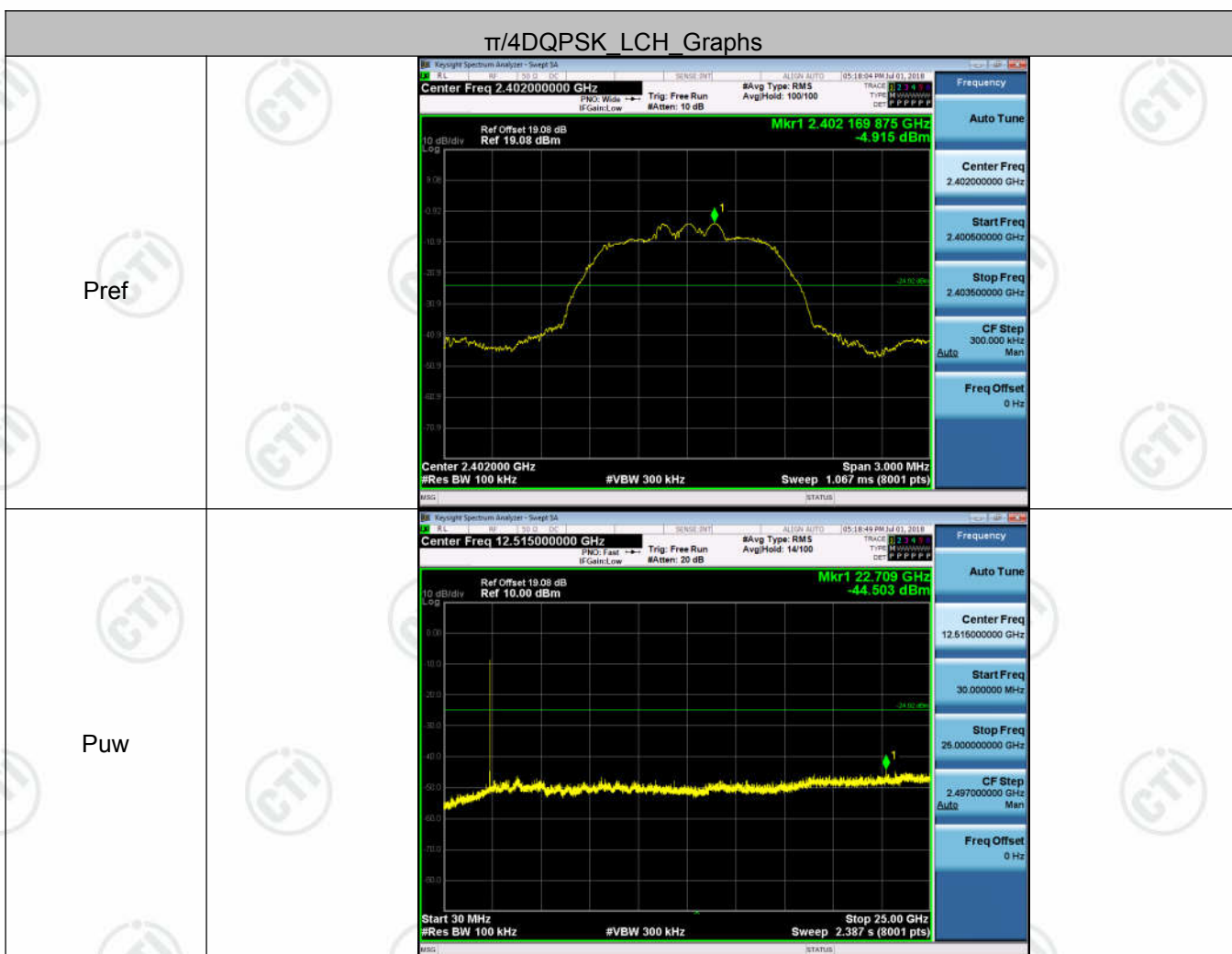
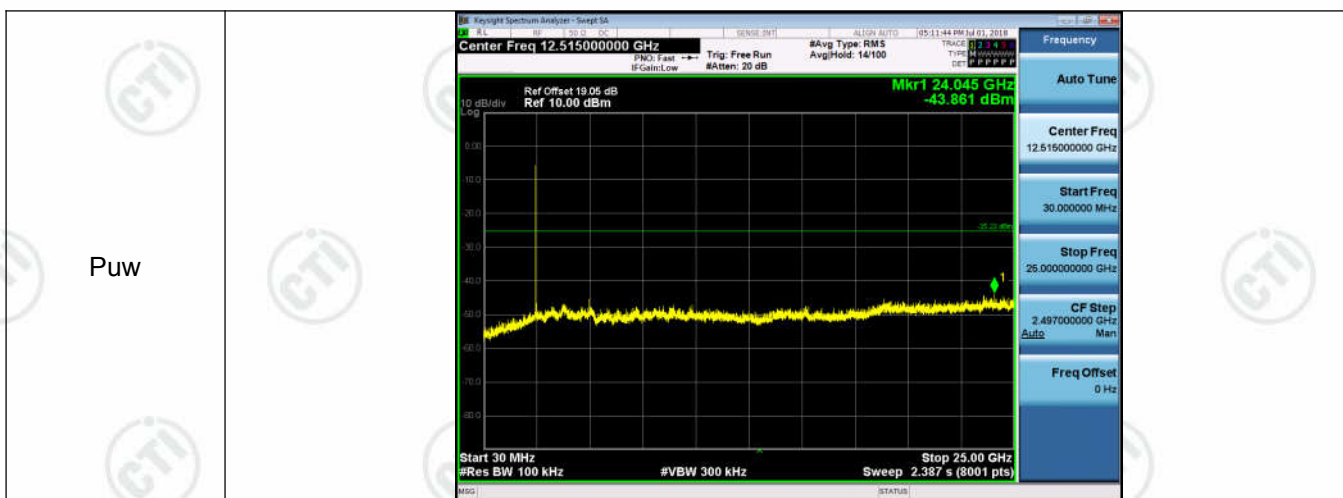
### Result Table

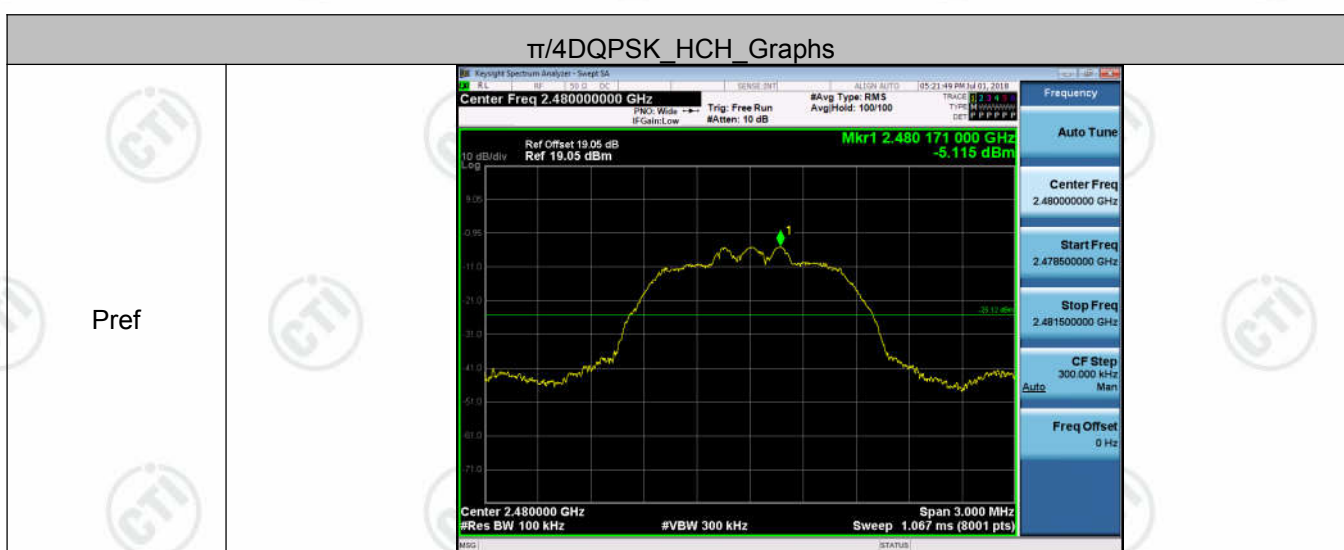
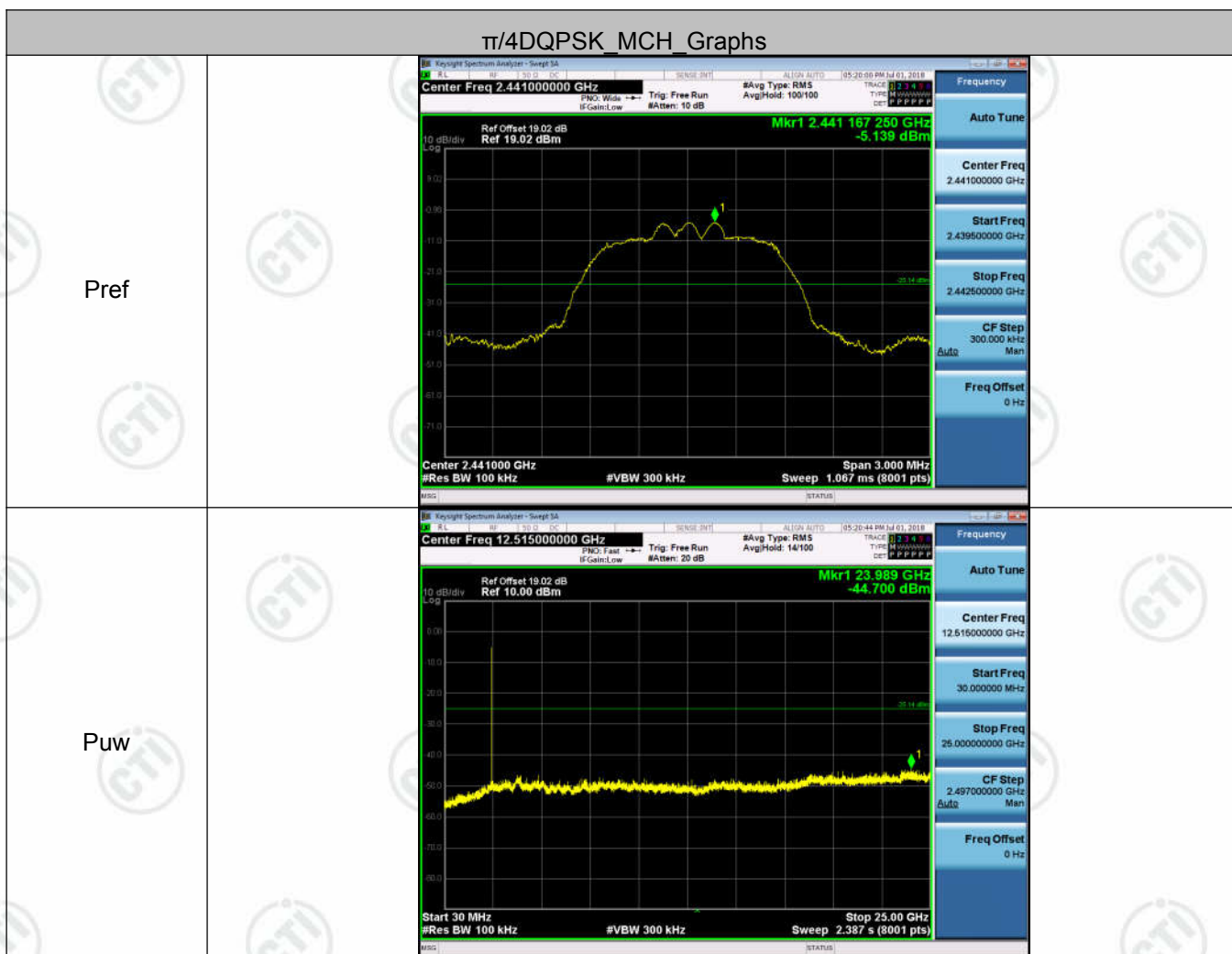
| Mode          | Channel | Pref [dBm] | Puw[dBm] | Verdict |
|---------------|---------|------------|----------|---------|
| GFSK          | LCH     | -5.000     | <Limit   | PASS    |
| GFSK          | MCH     | -5.217     | <Limit   | PASS    |
| GFSK          | HCH     | -5.220     | <Limit   | PASS    |
| $\pi/4$ DQPSK | LCH     | -4.915     | <Limit   | PASS    |
| $\pi/4$ DQPSK | MCH     | -5.139     | <Limit   | PASS    |
| $\pi/4$ DQPSK | HCH     | -5.115     | <Limit   | PASS    |

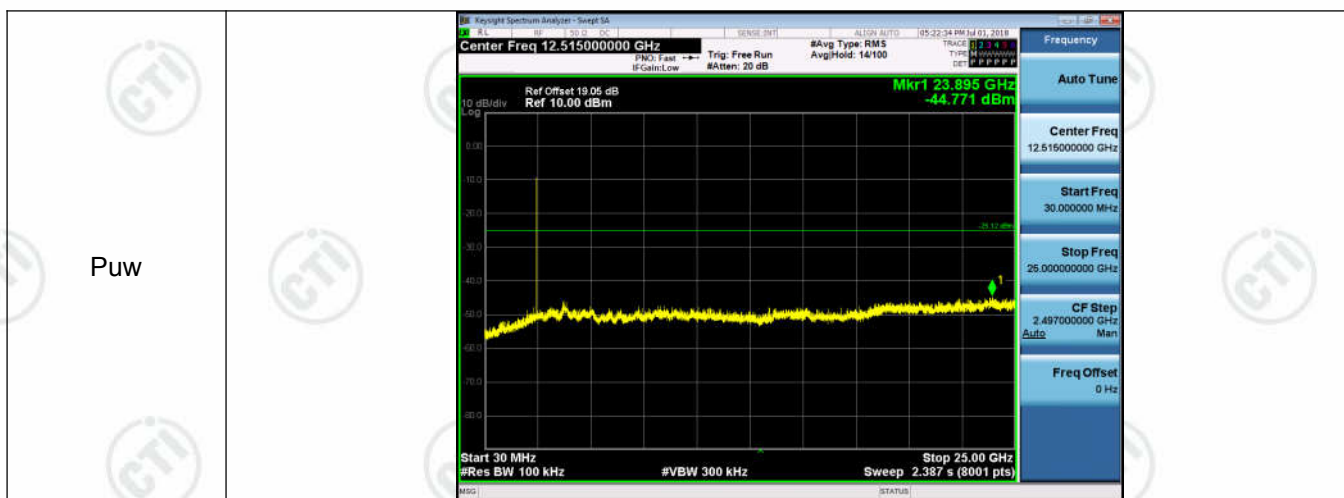
### Test Graph











## Appendix H): Pseudorandom Frequency Hopping Sequence

| Test Requirement:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 47 CFR Part 15C Section 15.247 (a)(1) requirement: |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| <p>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.</p> <p>Alternatively. Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.</p>                                                                                                                                                                                             |                                                    |
| EUT Pseudorandom Frequency Hopping Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                    |
| <p>The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones.</p> <ul style="list-style-type: none"> <li>• Number of shift register stages: 9</li> <li>• Length of pseudo-random sequence: <math>2^9 - 1 = 511</math> bits</li> <li>• Longest sequence of zeros: 8 (non-inverted signal)</li> </ul> <div data-bbox="316 972 1362 1120" data-label="Diagram"> </div> <p><i>Linear Feedback Shift Register for Generation of the PRBS sequence</i></p> <p>An example of Pseudorandom Frequency Hopping Sequence as follow:</p> <div data-bbox="287 1218 1270 1366" data-label="Figure"> </div> <p>Each frequency used equally on the average by each transmitter.</p> <p>The system receivers have input bandwidths that match the hopping channel bandwidths of their Corresponding transmitters and shift frequencies in synchronization with the transmitted signals.</p> |                                                    |
| <p>The device does not have the ability to be coordinated with other FHSS systems in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitters.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                    |

## Appendix I): Antenna Requirement

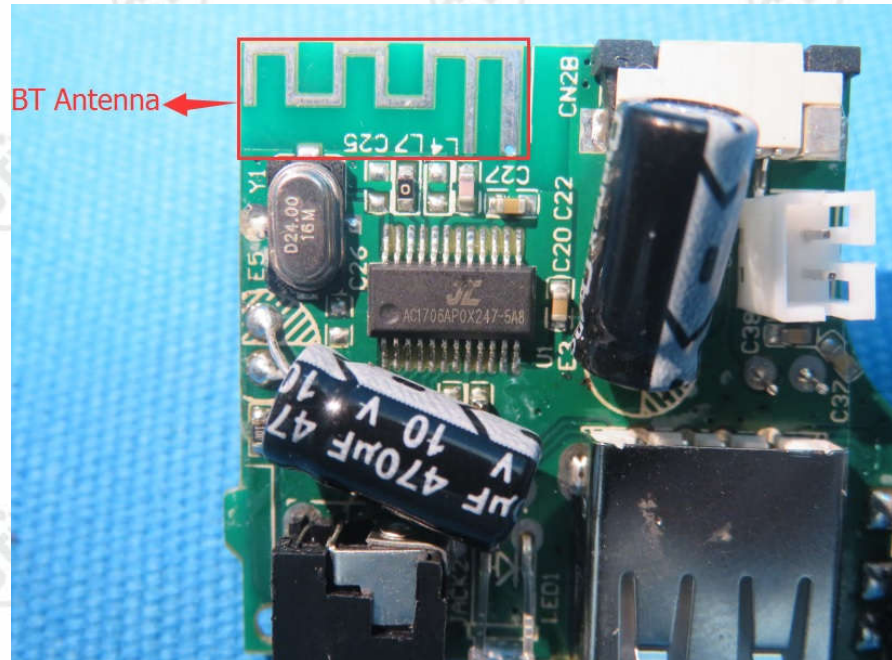
### 15.203 requirement:

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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

### 15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### EUT Antenna:



The antenna is PCB antenna and no consideration of replacement. The best case gain of the antenna is -0.58dBi.

## Appendix J): AC Power Line Conducted Emission

| Test Procedure:       | <p>Test frequency range :150KHz-30MHz</p> <p>1)The mains terminal disturbance voltage test was conducted in a shielded room.</p> <p>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.</p> <p>3)The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,</p> <p>4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.</p> <p>5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.</p> |                       |              |  |            |         |          |           |           |       |    |    |      |    |    |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------------|--|------------|---------|----------|-----------|-----------|-------|----|----|------|----|----|
| Limit:                | <table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBμV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 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> <p>* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.</p> <p>NOTE : The lower limit is applicable at the transition frequency</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Frequency range (MHz) | Limit (dBμV) |  | Quasi-peak | Average | 0.15-0.5 | 66 to 56* | 56 to 46* | 0.5-5 | 56 | 46 | 5-30 | 60 | 50 |
| Frequency range (MHz) | Limit (dBμV)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                       |              |  |            |         |          |           |           |       |    |    |      |    |    |
|                       | Quasi-peak                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Average               |              |  |            |         |          |           |           |       |    |    |      |    |    |
| 0.15-0.5              | 66 to 56*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 56 to 46*             |              |  |            |         |          |           |           |       |    |    |      |    |    |
| 0.5-5                 | 56                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 46                    |              |  |            |         |          |           |           |       |    |    |      |    |    |
| 5-30                  | 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 50                    |              |  |            |         |          |           |           |       |    |    |      |    |    |

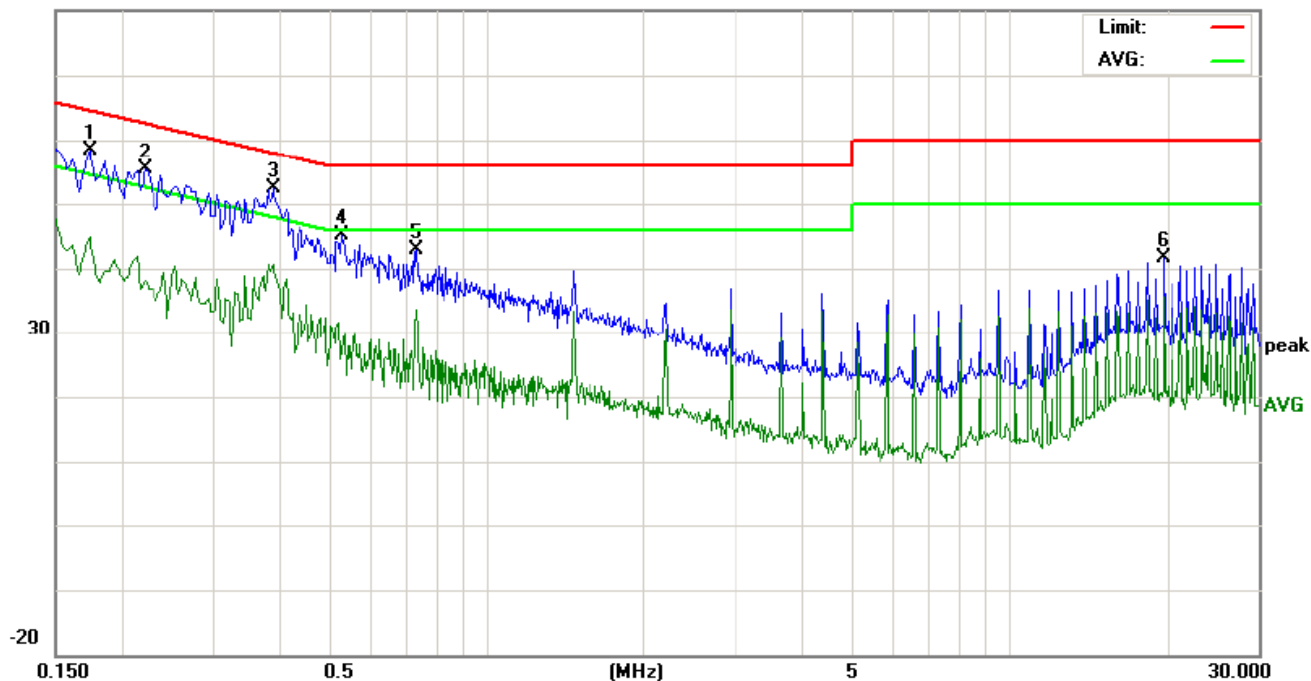
### Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak mission were detected.

Live line:

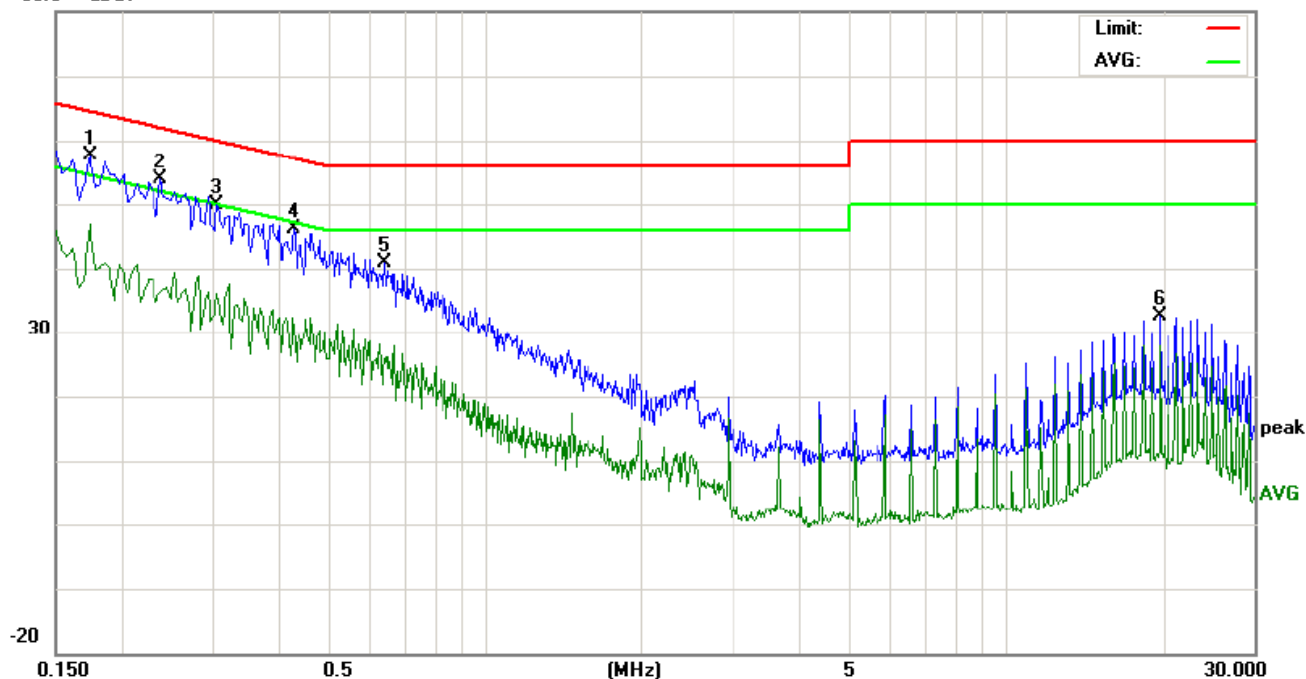
80.0 dBuV



| No. | Freq.<br>MHz | Reading_Level<br>(dBuV) |       |       | Correct<br>Factor<br>dB | Measurement<br>(dBuV) |       |       | Limit<br>(dBuV) |       | Margin<br>(dB) |        | P/F | Comment |
|-----|--------------|-------------------------|-------|-------|-------------------------|-----------------------|-------|-------|-----------------|-------|----------------|--------|-----|---------|
|     |              | Peak                    | QP    | AVG   |                         | peak                  | QP    | AVG   | QP              | AVG   | QP             | AVG    |     |         |
| 1   | 0.1740       | 48.73                   | 43.87 | 31.18 | 9.74                    | 58.47                 | 53.61 | 40.92 | 64.76           | 54.76 | -11.15         | -13.84 | P   |         |
| 2   | 0.2220       | 45.53                   | 39.69 | 28.05 | 9.73                    | 55.26                 | 49.42 | 37.78 | 62.74           | 52.74 | -13.32         | -14.96 | P   |         |
| 3   | 0.3899       | 42.55                   | 40.00 | 30.59 | 9.75                    | 52.30                 | 49.75 | 40.34 | 58.06           | 48.06 | -8.31          | -7.72  | P   |         |
| 4   | 0.5299       | 35.47                   | 29.63 | 17.77 | 9.72                    | 45.19                 | 39.35 | 27.49 | 56.00           | 46.00 | -16.65         | -18.51 | P   |         |
| 5   | 0.7340       | 33.00                   | 28.96 | 23.41 | 9.75                    | 42.75                 | 38.71 | 33.16 | 56.00           | 46.00 | -17.29         | -12.84 | P   |         |
| 6   | 19.8060      | 31.57                   | 29.74 | 24.86 | 10.06                   | 41.63                 | 39.80 | 34.92 | 60.00           | 50.00 | -20.20         | -15.08 | P   |         |

Neutral line:

80.0 dBuV



| No. | Freq.<br>MHz | Reading_Level<br>(dBuV) |       |       | Correct<br>Factor<br>dB | Measurement<br>(dBuV) |       |       | Limit<br>(dBuV) |       | Margin<br>(dB) |        | P/F | Comment |
|-----|--------------|-------------------------|-------|-------|-------------------------|-----------------------|-------|-------|-----------------|-------|----------------|--------|-----|---------|
|     |              | Peak                    | QP    | AVG   |                         | peak                  | QP    | AVG   | QP              | AVG   | QP             | AVG    |     |         |
| 1   | 0.1740       | 47.78                   | 43.38 | 30.79 | 9.74                    | 57.52                 | 53.12 | 40.53 | 64.76           | 54.76 | -11.64         | -14.23 | P   |         |
| 2   | 0.2380       | 44.02                   | 38.52 | 25.92 | 9.74                    | 53.76                 | 48.26 | 35.66 | 62.16           | 52.16 | -13.90         | -16.50 | P   |         |
| 3   | 0.3060       | 40.21                   | 34.52 | 22.10 | 9.78                    | 49.99                 | 44.30 | 31.88 | 60.08           | 50.08 | -15.78         | -18.20 | P   |         |
| 4   | 0.4300       | 36.31                   | 30.52 | 18.69 | 9.74                    | 46.05                 | 40.26 | 28.43 | 57.25           | 47.25 | -16.99         | -18.82 | P   |         |
| 5   | 0.6419       | 31.10                   | 24.85 | 15.31 | 9.75                    | 40.85                 | 34.60 | 25.06 | 56.00           | 46.00 | -21.40         | -20.94 | P   |         |
| 6   | 19.8060      | 22.44                   | 20.72 | 15.52 | 10.06                   | 32.50                 | 30.78 | 25.58 | 60.00           | 50.00 | -29.22         | -24.42 | P   |         |

Notes:

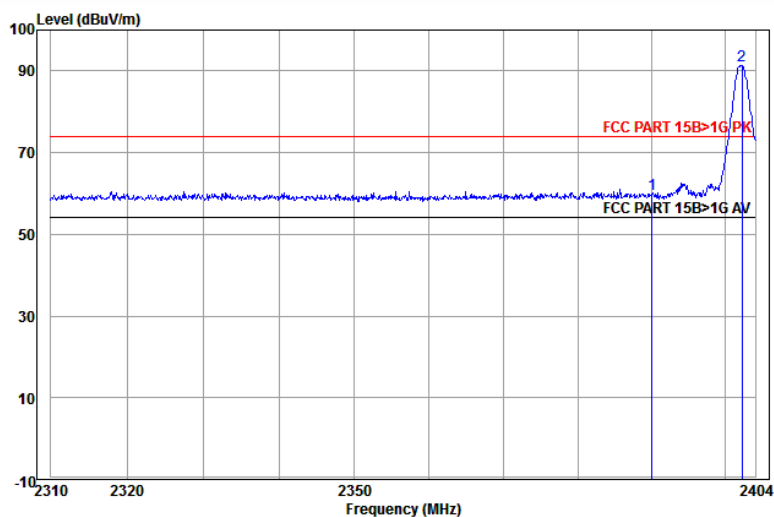
1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.

## Appendix K):Restricted bands around fundamental frequency (Radiated)

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                  |        |            |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------------|--------|------------|
| Receiver Setup: | Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Detector           | RBW              | VBW    | Remark     |
|                 | 30MHz-1GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Quasi-peak         | 100 kHz          | 300kHz | Quasi-peak |
|                 | Above 1GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Peak               | 1MHz             | 3MHz   | Peak       |
|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Peak               | 1MHz             | 10Hz   | Average    |
| Test Procedure: | <p><b>Below 1GHz test procedure as below:</b></p> <ol style="list-style-type: none"> <li>The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel</li> </ol> <p><b>Above 1GHz test procedure as below:</b></p> <ol style="list-style-type: none"> <li>Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter( Above 18GHz the distance is 1 meter and table is 1.5 meter).</li> <li>b. Test the EUT in the lowest channel , the Highest channel</li> <li>The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.</li> <li>Repeat above procedures until all frequencies measured was complete.</li> </ol> |                    |                  |        |            |
| Limit:          | Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Limit (dBμV/m @3m) | Remark           |        |            |
|                 | 30MHz-88MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 40.0               | Quasi-peak Value |        |            |
|                 | 88MHz-216MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 43.5               | Quasi-peak Value |        |            |
|                 | 216MHz-960MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 46.0               | Quasi-peak Value |        |            |
|                 | 960MHz-1GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 54.0               | Quasi-peak Value |        |            |
|                 | Above 1GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 54.0               | Average Value    |        |            |
|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 74.0               | Peak Value       |        |            |

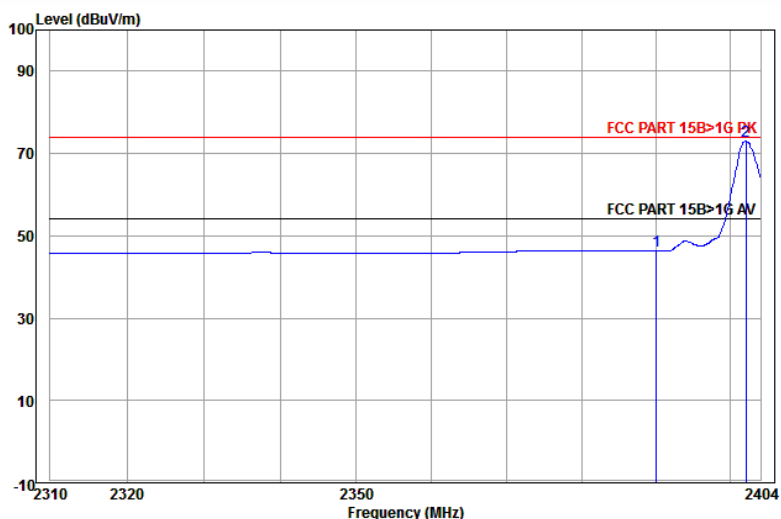
**Test plot as follows:**

|                  |            |               |        |         |      |            |
|------------------|------------|---------------|--------|---------|------|------------|
| Worse case mode: | GFSK (DH5) | Test channel: | Lowest | Remark: | Peak | Horizontal |
|------------------|------------|---------------|--------|---------|------|------------|



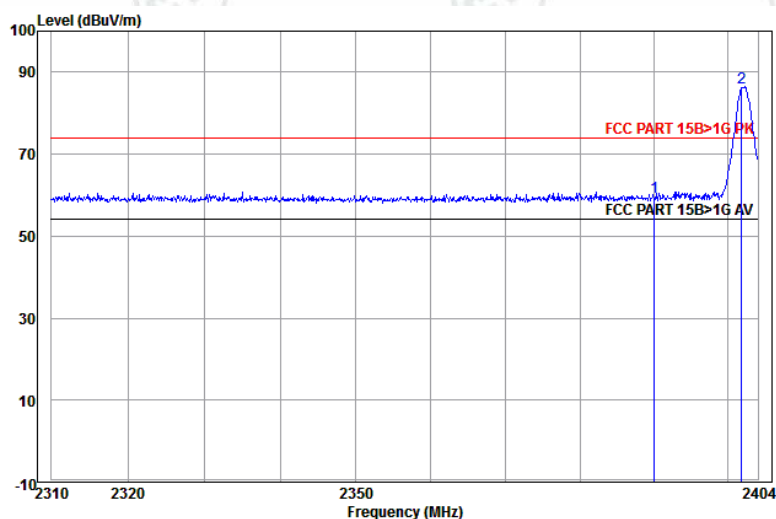
|      | Ant Freq | Cable Factor | Loss | Read Level | Level  | Limit Line | Over Limit | Pol/Phase  | Remark |
|------|----------|--------------|------|------------|--------|------------|------------|------------|--------|
|      | MHz      | dB/m         | dB   | dBuV       | dBuV/m | dBuV/m     | dB         |            |        |
| 1    | 2390.000 | 32.53        | 3.07 | 24.34      | 59.94  | 74.00      | -14.06     | Horizontal |        |
| 2 pp | 2402.179 | 32.56        | 3.07 | 55.68      | 91.31  | 74.00      | 17.31      | Horizontal |        |

|                  |            |               |        |         |         |            |
|------------------|------------|---------------|--------|---------|---------|------------|
| Worse case mode: | GFSK (DH5) | Test channel: | Lowest | Remark: | Average | Horizontal |
|------------------|------------|---------------|--------|---------|---------|------------|



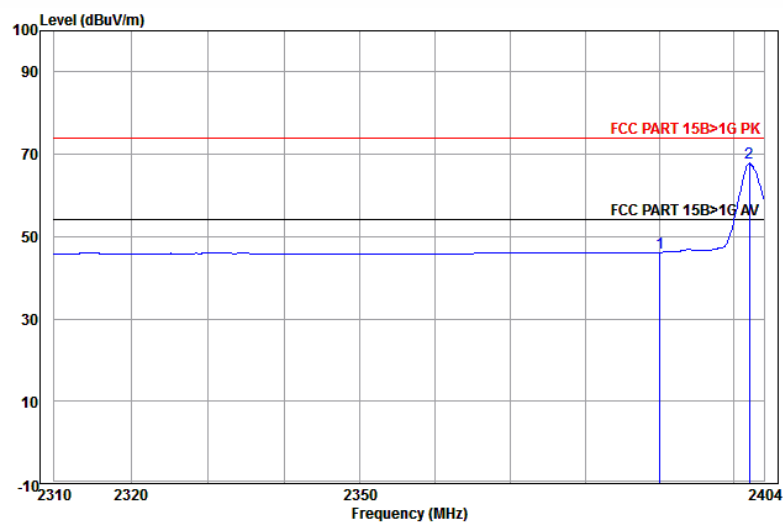
|      | Ant Freq | Cable Factor | Loss | Read Level | Level  | Limit Line | Over Limit | Pol/Phase  | Remark  |
|------|----------|--------------|------|------------|--------|------------|------------|------------|---------|
|      | MHz      | dB/m         | dB   | dBuV       | dBuV/m | dBuV/m     | dB         |            |         |
| 1    | 2390.000 | 32.53        | 3.07 | 10.62      | 46.22  | 54.00      | -7.78      | Horizontal | Average |
| 2 pp | 2402.083 | 32.56        | 3.07 | 37.34      | 72.97  | 54.00      | 18.97      | Horizontal | Average |

|                  |            |               |        |         |      |          |
|------------------|------------|---------------|--------|---------|------|----------|
| Worse case mode: | GFSK (DH5) | Test channel: | Lowest | Remark: | Peak | Vertical |
|------------------|------------|---------------|--------|---------|------|----------|



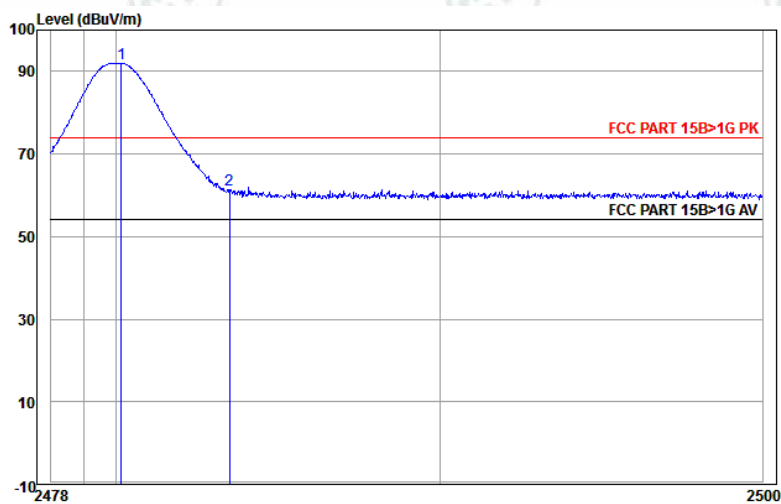
|      | Ant<br>Freq | Factor | Cable<br>Loss | Read<br>Level | Level  | Limit<br>Line | Over<br>Limit | Pol/Phase | Remark |
|------|-------------|--------|---------------|---------------|--------|---------------|---------------|-----------|--------|
|      | MHz         | dB/m   | dB            | dBuV          | dBuV/m | dBuV/m        | dB            |           |        |
| 1    | 2390.000    | 32.53  | 3.07          | 23.82         | 59.42  | 74.00         | -14.58        | Vertical  |        |
| 2 pp | 2401.796    | 32.56  | 3.07          | 50.60         | 86.23  | 74.00         | 12.23         | Vertical  |        |

|                  |            |               |        |         |         |          |
|------------------|------------|---------------|--------|---------|---------|----------|
| Worse case mode: | GFSK (DH5) | Test channel: | Lowest | Remark: | Average | Vertical |
|------------------|------------|---------------|--------|---------|---------|----------|



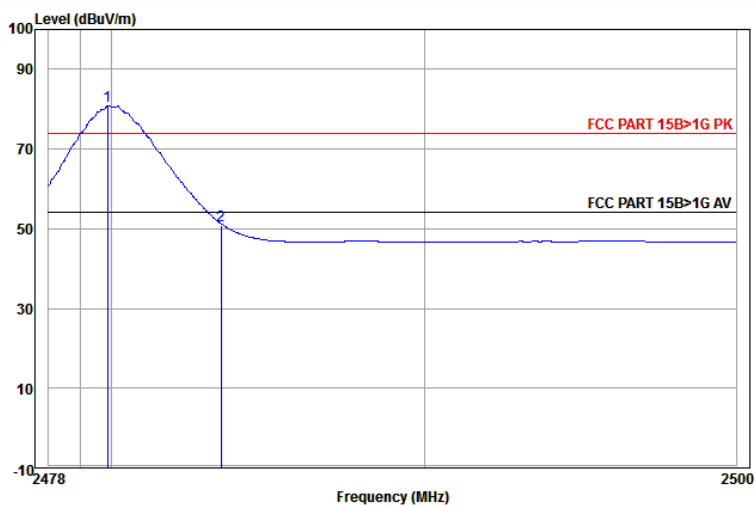
|      | Ant<br>Freq | Factor | Cable<br>Loss | Read<br>Level | Level  | Limit<br>Line | Over<br>Limit | Pol/Phase | Remark  |
|------|-------------|--------|---------------|---------------|--------|---------------|---------------|-----------|---------|
|      | MHz         | dB/m   | dB            | dBuV          | dBuV/m | dBuV/m        | dB            |           |         |
| 1    | 2390.000    | 32.53  | 3.07          | 10.59         | 46.19  | 54.00         | -7.81         | Vertical  | Average |
| 2 pp | 2402.083    | 32.56  | 3.07          | 32.20         | 67.83  | 54.00         | 13.83         | Vertical  | Average |

|                  |            |               |         |         |      |            |
|------------------|------------|---------------|---------|---------|------|------------|
| Worse case mode: | GFSK (DH5) | Test channel: | Highest | Remark: | Peak | Horizontal |
|------------------|------------|---------------|---------|---------|------|------------|



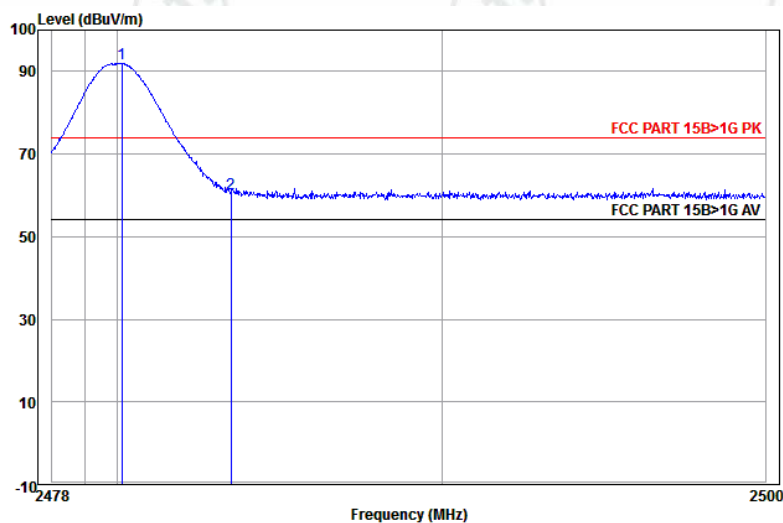
|      | Ant<br>Freq | Cable<br>Factor | Read<br>Level | Level | Limit<br>Line | Over<br>Limit | Pol/Phase | Remark     |
|------|-------------|-----------------|---------------|-------|---------------|---------------|-----------|------------|
|      | MHz         | dB/m            | dB            | dBuV  | dBuV/m        | dBuV/m        | dB        |            |
| 1 pp | 2480.169    | 32.71           | 3.12          | 56.14 | 91.97         | 74.00         | 17.97     | Horizontal |
| 2    | 2483.500    | 32.71           | 3.12          | 25.45 | 61.28         | 74.00         | -12.72    | Horizontal |

|                  |            |               |         |         |         |            |
|------------------|------------|---------------|---------|---------|---------|------------|
| Worse case mode: | GFSK (DH5) | Test channel: | Highest | Remark: | Average | Horizontal |
|------------------|------------|---------------|---------|---------|---------|------------|



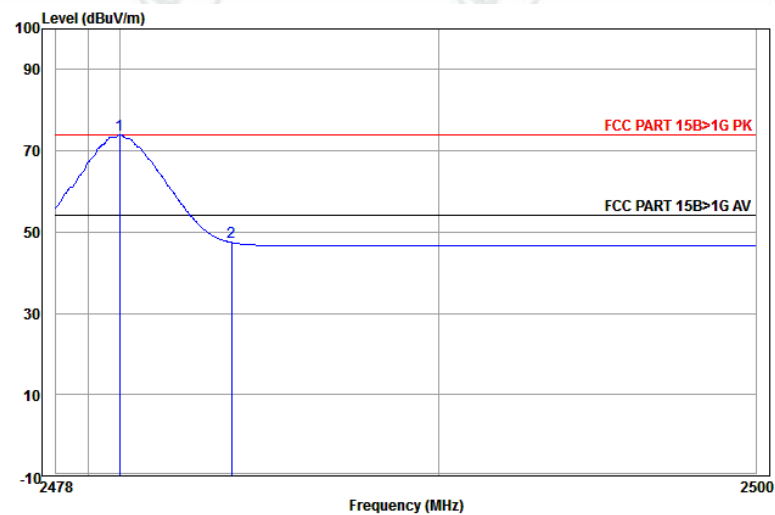
|      | Ant<br>Freq | Cable<br>Factor | Read<br>Level | Level | Limit<br>Line | Over<br>Limit | Pol/Phase | Remark             |
|------|-------------|-----------------|---------------|-------|---------------|---------------|-----------|--------------------|
|      | MHz         | dB/m            | dB            | dBuV  | dBuV/m        | dBuV/m        | dB        |                    |
| 1 pp | 2479.884    | 32.71           | 3.12          | 45.05 | 80.88         | 54.00         | 26.88     | Horizontal Average |
| 2    | 2483.500    | 32.71           | 3.12          | 15.09 | 50.92         | 54.00         | -3.08     | Horizontal Average |

|                  |            |               |         |         |      |          |
|------------------|------------|---------------|---------|---------|------|----------|
| Worse case mode: | GFSK (DH5) | Test channel: | Highest | Remark: | Peak | Vertical |
|------------------|------------|---------------|---------|---------|------|----------|



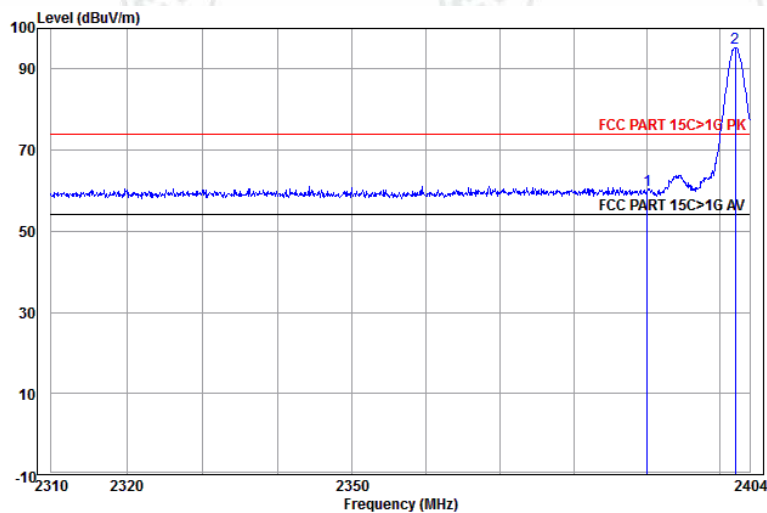
|               | Ant    | Cable | Read  | Level  | Limit  | Over   | Pol/Phase | Remark |
|---------------|--------|-------|-------|--------|--------|--------|-----------|--------|
| Freq          | Factor | Loss  | Level | Level  | Line   | Limit  |           |        |
| MHz           | dB/m   | dB    | dBuV  | dBuV/m | dBuV/m | dB     |           |        |
| 1 pp 2480.147 | 32.71  | 3.12  | 56.01 | 91.84  | 74.00  | 17.84  | Vertical  |        |
| 2 2483.500    | 32.71  | 3.12  | 24.56 | 60.39  | 74.00  | -13.61 | Vertical  |        |

|                  |            |               |         |         |         |          |
|------------------|------------|---------------|---------|---------|---------|----------|
| Worse case mode: | GFSK (DH5) | Test channel: | Highest | Remark: | Average | Vertical |
|------------------|------------|---------------|---------|---------|---------|----------|



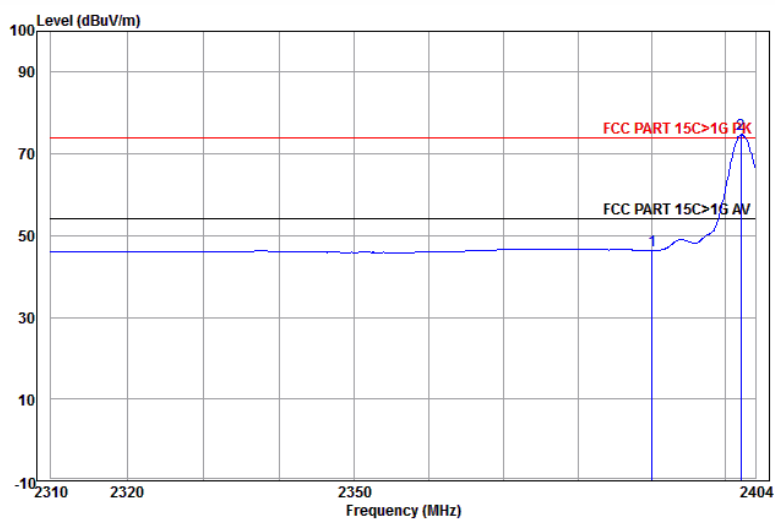
|               | Ant    | Cable | Read  | Level  | Limit  | Over  | Pol/Phase | Remark  |
|---------------|--------|-------|-------|--------|--------|-------|-----------|---------|
| Freq          | Factor | Loss  | Level | Level  | Line   | Limit |           |         |
| MHz           | dB/m   | dB    | dBuV  | dBuV/m | dBuV/m | dB    |           |         |
| 1 pp 2479.994 | 32.71  | 3.12  | 38.21 | 74.04  | 54.00  | 20.04 | Vertical  | Average |
| 2 2483.500    | 32.71  | 3.12  | 11.58 | 47.41  | 54.00  | -6.59 | Vertical  | Average |

|                  |                      |               |        |         |      |            |
|------------------|----------------------|---------------|--------|---------|------|------------|
| Worse case mode: | $\pi/4$ DQPSK (2DH5) | Test channel: | Lowest | Remark: | Peak | Horizontal |
|------------------|----------------------|---------------|--------|---------|------|------------|



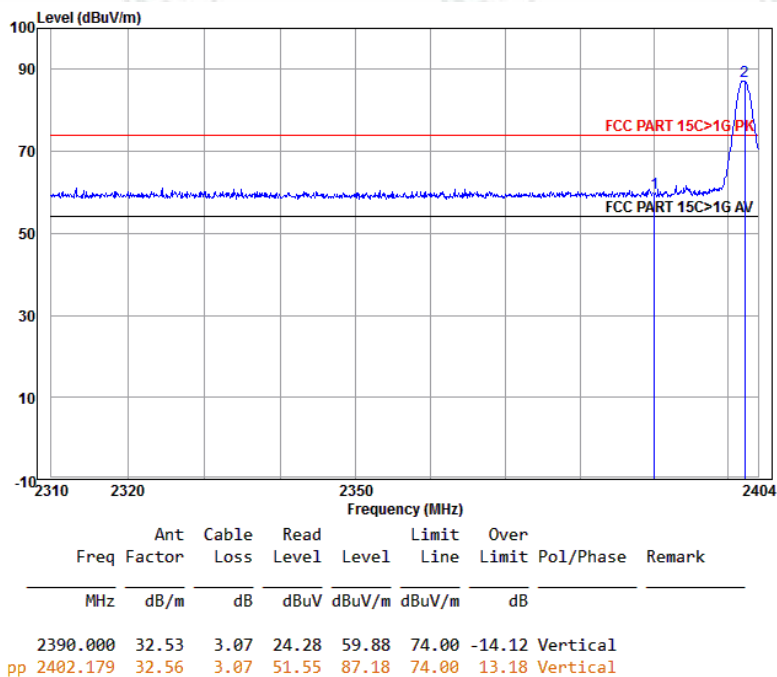
|      | Ant Freq | Cable Factor | Read Level | Level | Limit Line | Over Limit | Pol/Phase | Remark     |
|------|----------|--------------|------------|-------|------------|------------|-----------|------------|
|      | MHz      | dB/m         | dB         | dBuV  | dBuV/m     | dBuV/m     | dB        |            |
| 1    | 2390.000 | 32.53        | 3.07       | 24.40 | 60.00      | 74.00      | -14.00    | Horizontal |
| 2 pp | 2402.083 | 32.56        | 3.07       | 59.53 | 95.16      | 74.00      | 21.16     | Horizontal |

|                  |                      |               |        |         |         |            |
|------------------|----------------------|---------------|--------|---------|---------|------------|
| Worse case mode: | $\pi/4$ DQPSK (2DH5) | Test channel: | Lowest | Remark: | Average | Horizontal |
|------------------|----------------------|---------------|--------|---------|---------|------------|

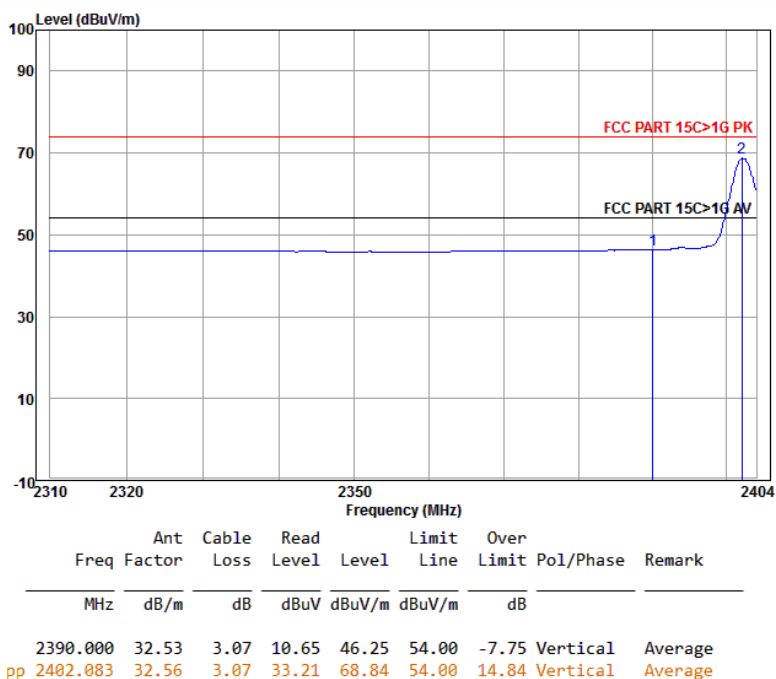


|      | Ant Freq | Cable Factor | Read Level | Level | Limit Line | Over Limit | Pol/Phase | Remark             |
|------|----------|--------------|------------|-------|------------|------------|-----------|--------------------|
|      | MHz      | dB/m         | dB         | dBuV  | dBuV/m     | dBuV/m     | dB        |                    |
| 1    | 2390.000 | 32.53        | 3.07       | 10.83 | 46.43      | 54.00      | -7.57     | Horizontal Average |
| 2 pp | 2402.083 | 32.56        | 3.07       | 39.25 | 74.88      | 54.00      | 20.88     | Horizontal Average |

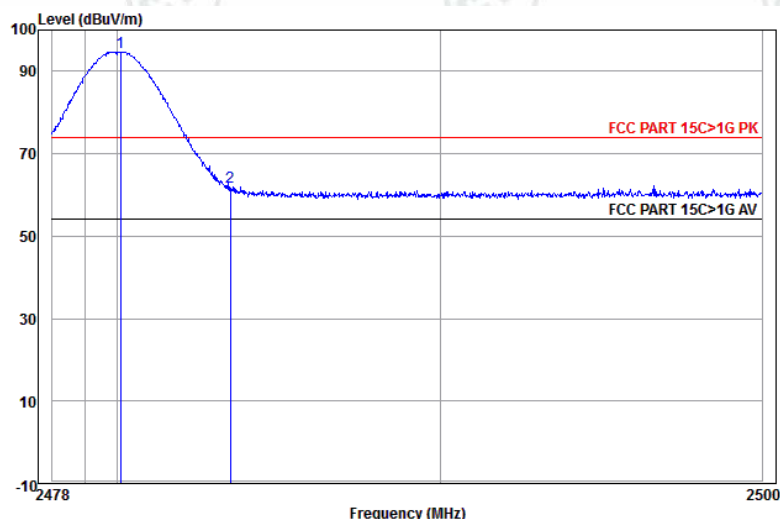
|                  |                      |               |        |         |      |          |
|------------------|----------------------|---------------|--------|---------|------|----------|
| Worse case mode: | $\pi/4$ DQPSK (2DH5) | Test channel: | Lowest | Remark: | Peak | Vertical |
|------------------|----------------------|---------------|--------|---------|------|----------|



|                  |                      |               |        |         |         |          |
|------------------|----------------------|---------------|--------|---------|---------|----------|
| Worse case mode: | $\pi/4$ DQPSK (2DH5) | Test channel: | Lowest | Remark: | Average | Vertical |
|------------------|----------------------|---------------|--------|---------|---------|----------|

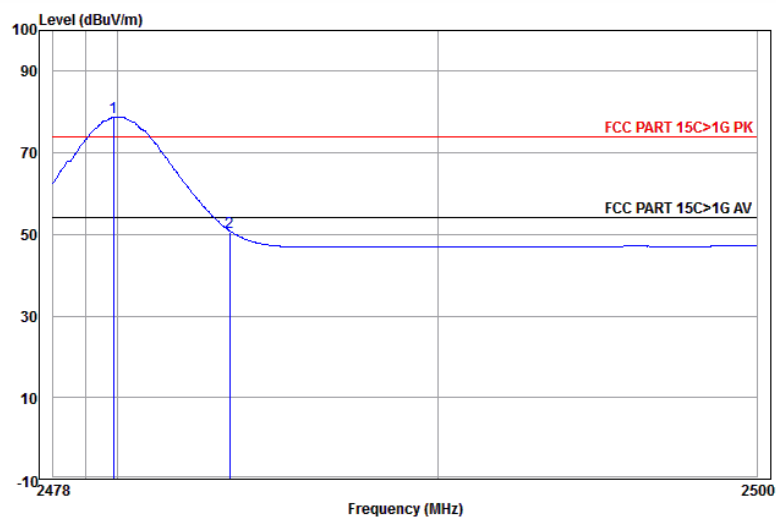


|                  |                      |               |         |         |      |            |
|------------------|----------------------|---------------|---------|---------|------|------------|
| Worse case mode: | $\pi/4$ DQPSK (2DH5) | Test channel: | Highest | Remark: | Peak | Horizontal |
|------------------|----------------------|---------------|---------|---------|------|------------|



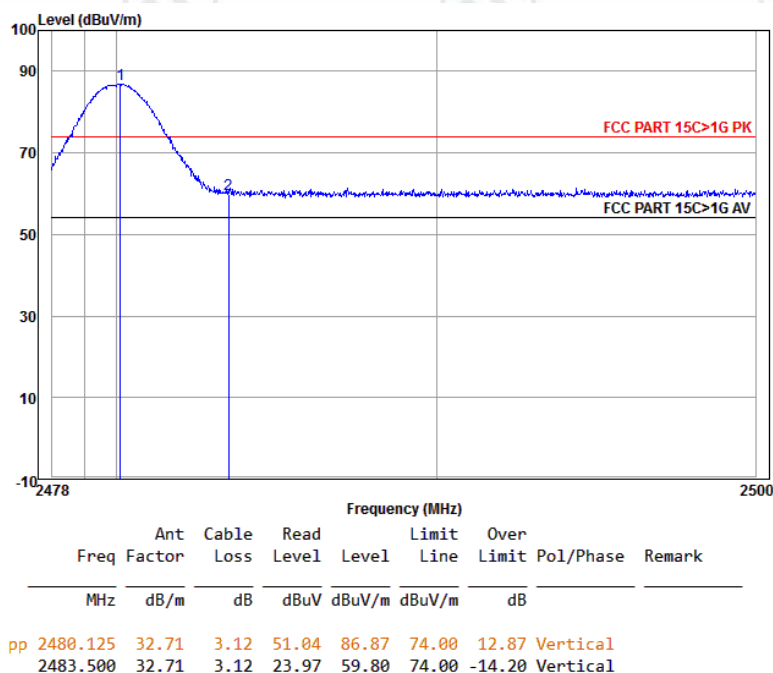
|      | Freq     | Ant Factor | Cable Loss | Read Level | Level  | Limit Line | Over Limit | Pol/Phase  | Remark |
|------|----------|------------|------------|------------|--------|------------|------------|------------|--------|
|      | MHz      | dB/m       | dB         | dBuV       | dBuV/m | dBuV/m     | dB         |            |        |
| 1 pp | 2480.104 | 32.71      | 3.12       | 58.89      | 94.72  | 74.00      | 20.72      | Horizontal |        |
| 2    | 2483.500 | 32.71      | 3.12       | 26.06      | 61.89  | 74.00      | -12.11     | Horizontal |        |

|                  |                      |               |         |         |         |            |
|------------------|----------------------|---------------|---------|---------|---------|------------|
| Worse case mode: | $\pi/4$ DQPSK (2DH5) | Test channel: | Highest | Remark: | Average | Horizontal |
|------------------|----------------------|---------------|---------|---------|---------|------------|

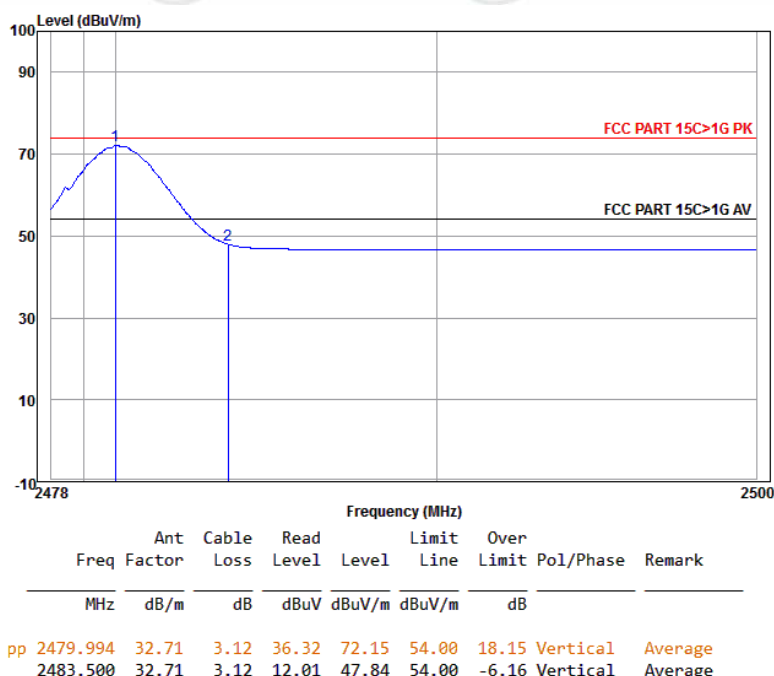


|      | Freq     | Ant Factor | Cable Loss | Read Level | Level  | Limit Line | Over Limit | Pol/Phase  | Remark  |
|------|----------|------------|------------|------------|--------|------------|------------|------------|---------|
|      | MHz      | dB/m       | dB         | dBuV       | dBuV/m | dBuV/m     | dB         |            |         |
| 1 pp | 2479.884 | 32.71      | 3.12       | 43.03      | 78.86  | 54.00      | 24.86      | Horizontal | Average |
| 2    | 2483.500 | 32.71      | 3.12       | 14.70      | 50.53  | 54.00      | -3.47      | Horizontal | Average |

|                  |                      |               |         |         |      |          |
|------------------|----------------------|---------------|---------|---------|------|----------|
| Worse case mode: | $\pi/4$ DQPSK (2DH5) | Test channel: | Highest | Remark: | Peak | Vertical |
|------------------|----------------------|---------------|---------|---------|------|----------|



|                  |                      |               |         |         |         |          |
|------------------|----------------------|---------------|---------|---------|---------|----------|
| Worse case mode: | $\pi/4$ DQPSK (2DH5) | Test channel: | Highest | Remark: | Average | Vertical |
|------------------|----------------------|---------------|---------|---------|---------|----------|



Note:1)Through Pre-scan Non-hopping transmitting mode and charge+transmitter mode with all kind of modulation and all kind of data type, find the 1-DH5 of data type is the worse case of GFSK modulation type, the 2-DH5 of data type is the worse case of  $\pi/4$ DQPSK modulation type.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading -Correct Factor

Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

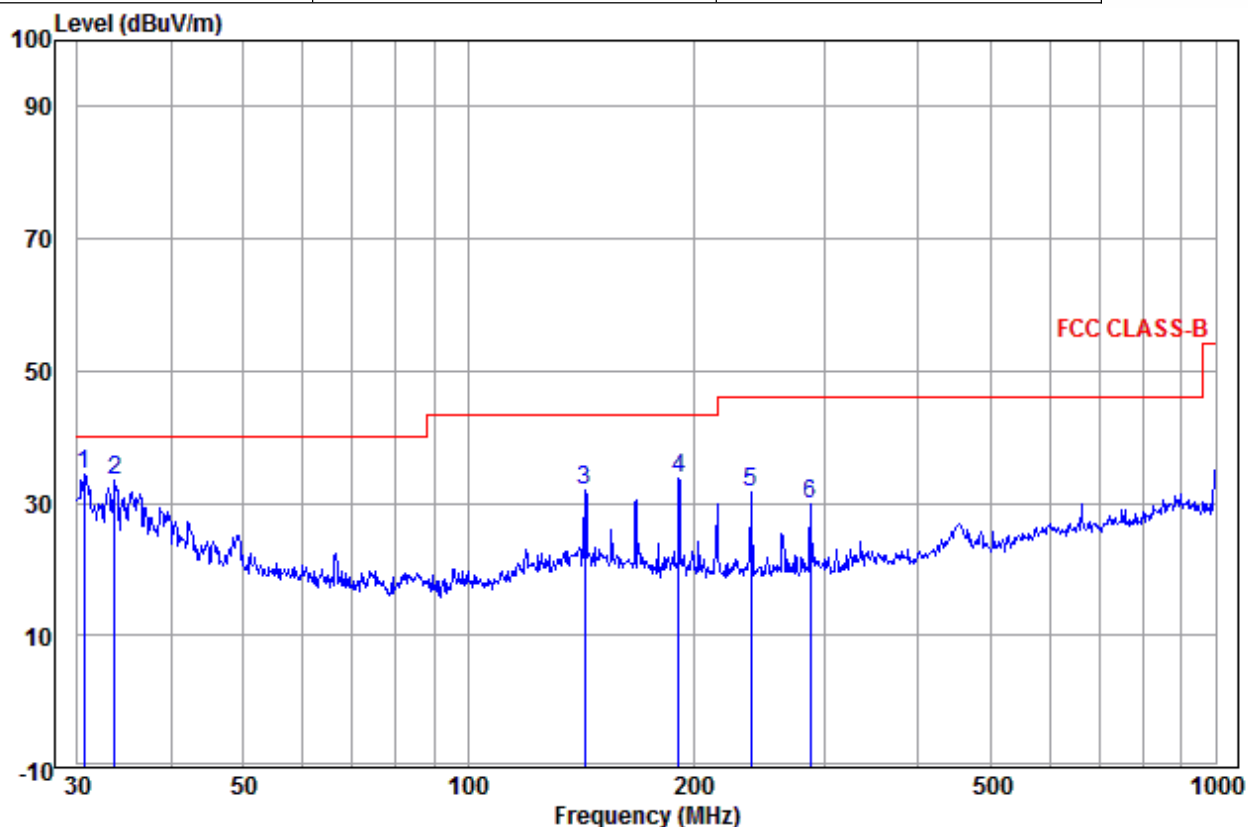
## Appendix L): Radiated Spurious Emissions

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                             |                                  |                |            |                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------|------------|--------------------------|
| Receiver Setup:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Frequency                                                                                                                                                                                                                                                                   | Detector                         | RBW            | VBW        | Remark                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.009MHz-0.090MHz                                                                                                                                                                                                                                                           | Peak                             | 10kHz          | 30kHz      | Peak                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.009MHz-0.090MHz                                                                                                                                                                                                                                                           | Average                          | 10kHz          | 30kHz      | Average                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.090MHz-0.110MHz                                                                                                                                                                                                                                                           | Quasi-peak                       | 10kHz          | 30kHz      | Quasi-peak               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.110MHz-0.490MHz                                                                                                                                                                                                                                                           | Peak                             | 10kHz          | 30kHz      | Peak                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.110MHz-0.490MHz                                                                                                                                                                                                                                                           | Average                          | 10kHz          | 30kHz      | Average                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.490MHz -30MHz                                                                                                                                                                                                                                                             | Quasi-peak                       | 10kHz          | 30kHz      | Quasi-peak               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 30MHz-1GHz                                                                                                                                                                                                                                                                  | Quasi-peak                       | 100 kHz        | 300kHz     | Quasi-peak               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Above 1GHz                                                                                                                                                                                                                                                                  | Peak                             | 1MHz           | 3MHz       | Peak                     |
| Peak                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                             | 1MHz                             | 10Hz           | Average    |                          |
| Test Procedure:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                             |                                  |                |            |                          |
| Below 1GHz test procedure as below:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                             |                                  |                |            |                          |
| <p>a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</p> <p>c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</p> <p>d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</p> |                                                                                                                                                                                                                                                                             |                                  |                |            |                          |
| Above 1GHz test procedure as below:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                             |                                  |                |            |                          |
| <p>g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter( Above 18GHz the distance is 1 meter and table is 1.5 meter).</p> <p>h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel</p> <p>i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.</p> <p>j. Repeat above procedures until all frequencies measured was complete.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                             |                                  |                |            |                          |
| Limit:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Frequency                                                                                                                                                                                                                                                                   | Field strength (microvolt/meter) | Limit (dBμV/m) | Remark     | Measurement distance (m) |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.009MHz-0.490MHz                                                                                                                                                                                                                                                           | 2400/F(kHz)                      | -              | -          | 300                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.490MHz-1.705MHz                                                                                                                                                                                                                                                           | 24000/F(kHz)                     | -              | -          | 30                       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1.705MHz-30MHz                                                                                                                                                                                                                                                              | 30                               | -              | -          | 30                       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 30MHz-88MHz                                                                                                                                                                                                                                                                 | 100                              | 40.0           | Quasi-peak | 3                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 88MHz-216MHz                                                                                                                                                                                                                                                                | 150                              | 43.5           | Quasi-peak | 3                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 216MHz-960MHz                                                                                                                                                                                                                                                               | 200                              | 46.0           | Quasi-peak | 3                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 960MHz-1GHz                                                                                                                                                                                                                                                                 | 500                              | 54.0           | Quasi-peak | 3                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Above 1GHz                                                                                                                                                                                                                                                                  | 500                              | 54.0           | Average    | 3                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device. |                                  |                |            |                          |

# **Radiated Spurious Emissions test Data:** **Radiated Emission below 1GHz**

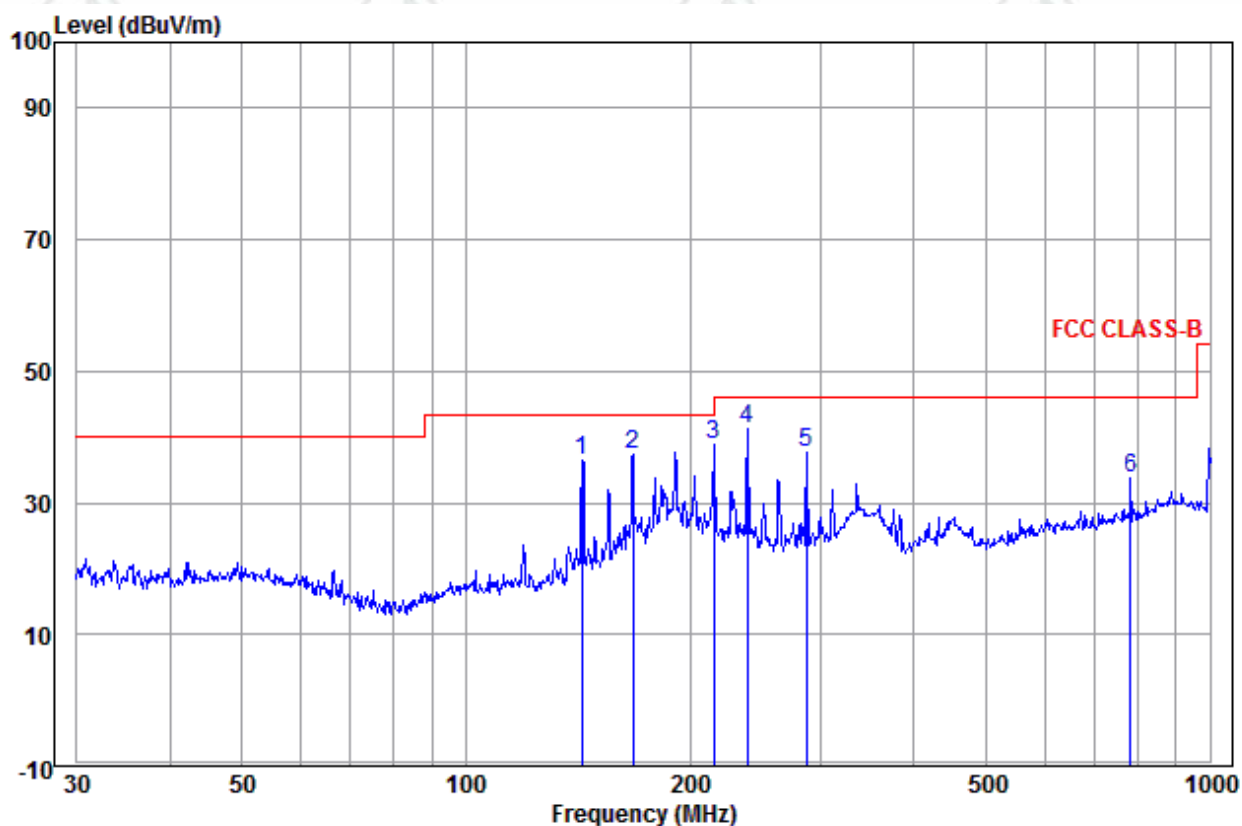
30MHz~1GHz (QP)

Test mode: Transmitting Vertical



|   | Ant Freq  | Cable Factor | Cable Loss | Read Level | Limit Level | Over Limit | Pol/Phase | Remark      |
|---|-----------|--------------|------------|------------|-------------|------------|-----------|-------------|
|   | MHz       | dB/m         | dB         | dBuV       | dBuV/m      | dB         |           |             |
| 1 | pp 30.638 | 12.04        | 0.09       | 22.23      | 34.36       | 40.00      | -5.64     | Vertical QP |
| 2 | 33.680    | 12.66        | 0.07       | 20.87      | 33.60       | 40.00      | -6.40     | Vertical QP |
| 3 | 143.326   | 9.22         | 0.61       | 22.24      | 32.07       | 43.50      | -11.43    | Vertical QP |
| 4 | 191.074   | 11.07        | 1.02       | 21.59      | 33.68       | 43.50      | -9.82     | Vertical QP |
| 5 | 239.147   | 12.38        | 1.29       | 17.98      | 31.65       | 46.00      | -14.35    | Vertical QP |
| 6 | 286.982   | 13.21        | 1.14       | 15.46      | 29.81       | 46.00      | -16.19    | Vertical QP |

|            |              |            |
|------------|--------------|------------|
| Test mode: | Transmitting | Horizontal |
|------------|--------------|------------|



|      | Ant Freq | Ant Factor | Cable Loss | Read Level | Level  | Limit Line | Over Limit | Pol/Phase  | Remark |
|------|----------|------------|------------|------------|--------|------------|------------|------------|--------|
|      | MHz      | dB/m       | dB         | dBuV       | dBuV/m | dBuV/m     | dB         |            |        |
| 1    | 143.326  | 9.22       | 0.61       | 26.71      | 36.54  | 43.50      | -6.96      | Horizontal | QP     |
| 2    | 167.824  | 9.85       | 0.80       | 26.62      | 37.27  | 43.50      | -6.23      | Horizontal | QP     |
| 3 pp | 215.268  | 11.86      | 1.18       | 25.71      | 38.75  | 43.50      | -4.75      | Horizontal | QP     |
| 4    | 239.147  | 12.38      | 1.29       | 27.52      | 41.19  | 46.00      | -4.81      | Horizontal | QP     |
| 5    | 286.982  | 13.21      | 1.14       | 23.34      | 37.69  | 46.00      | -8.31      | Horizontal | QP     |
| 6    | 782.345  | 19.70      | 2.48       | 11.63      | 33.81  | 46.00      | -12.19     | Horizontal | QP     |

**Transmitter Emission above 1GHz**

| Worse case mode: |                       | GFSK(1-DH5)     |                        | Test channel:     |                | Lowest              | Remark: Peak    |        |                 |
|------------------|-----------------------|-----------------|------------------------|-------------------|----------------|---------------------|-----------------|--------|-----------------|
| Frequency (MHz)  | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Gain (dB) | Read Level (dBμV) | Level (dBμV/m) | Limit Line (dBμV/m) | Over Limit (dB) | Result | Antenna Polaxis |
| 1350.362         | 30.57                 | 2.09            | 44.18                  | 47.33             | 35.81          | 74.00               | -38.19          | Pass   | H               |
| 1549.344         | 30.96                 | 2.35            | 43.94                  | 47.89             | 37.26          | 74.00               | -36.74          | Pass   | H               |
| 4804.000         | 34.69                 | 5.98            | 44.60                  | 47.94             | 44.01          | 74.00               | -29.99          | Pass   | H               |
| 5971.290         | 35.88                 | 7.41            | 44.50                  | 47.89             | 46.68          | 74.00               | -27.32          | Pass   | H               |
| 7206.000         | 36.42                 | 6.97            | 44.77                  | 44.51             | 43.13          | 74.00               | -30.87          | Pass   | H               |
| 9608.000         | 37.88                 | 6.98            | 45.58                  | 46.42             | 45.70          | 74.00               | -28.30          | Pass   | H               |
| 1270.334         | 30.39                 | 1.97            | 44.29                  | 48.59             | 36.66          | 74.00               | -37.34          | Pass   | V               |
| 1533.648         | 30.93                 | 2.33            | 43.96                  | 47.23             | 36.53          | 74.00               | -37.47          | Pass   | V               |
| 4804.000         | 34.69                 | 5.98            | 44.60                  | 47.82             | 43.89          | 74.00               | -30.11          | Pass   | V               |
| 5325.007         | 35.38                 | 6.74            | 44.57                  | 49.79             | 47.34          | 74.00               | -26.66          | Pass   | V               |
| 7206.000         | 36.42                 | 6.97            | 44.77                  | 43.83             | 42.45          | 74.00               | -31.55          | Pass   | V               |
| 9608.000         | 37.88                 | 6.98            | 45.58                  | 45.83             | 45.11          | 74.00               | -28.89          | Pass   | V               |

| Worse case mode: |                       | GFSK(1-DH5)     |                        | Test channel:     |                | Middle              | Remark: Peak    |        |                 |
|------------------|-----------------------|-----------------|------------------------|-------------------|----------------|---------------------|-----------------|--------|-----------------|
| Frequency (MHz)  | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Gain (dB) | Read Level (dBμV) | Level (dBμV/m) | Limit Line (dBμV/m) | Over Limit (dB) | Result | Antenna Polaxis |
| 1323.141         | 30.51                 | 2.05            | 44.22                  | 48.20             | 36.54          | 74.00               | -37.46          | Pass   | H               |
| 1569.189         | 31.00                 | 2.37            | 43.92                  | 47.40             | 36.85          | 74.00               | -37.15          | Pass   | H               |
| 1899.278         | 31.55                 | 2.74            | 43.59                  | 47.91             | 38.61          | 74.00               | -35.39          | Pass   | H               |
| 4880.000         | 34.85                 | 6.13            | 44.60                  | 45.69             | 42.07          | 74.00               | -31.93          | Pass   | H               |
| 7320.000         | 36.43                 | 6.85            | 44.87                  | 44.09             | 42.50          | 74.00               | -31.50          | Pass   | H               |
| 9760.000         | 38.05                 | 7.12            | 45.55                  | 45.72             | 45.34          | 74.00               | -28.66          | Pass   | H               |
| 1276.818         | 30.41                 | 1.98            | 44.28                  | 47.80             | 35.91          | 74.00               | -38.09          | Pass   | V               |
| 1889.633         | 31.54                 | 2.73            | 43.60                  | 46.60             | 37.27          | 74.00               | -36.73          | Pass   | V               |
| 4880.000         | 34.85                 | 6.13            | 44.60                  | 45.89             | 42.27          | 74.00               | -31.73          | Pass   | V               |
| 5986.509         | 35.89                 | 7.43            | 44.50                  | 47.15             | 45.97          | 74.00               | -28.03          | Pass   | V               |
| 7320.000         | 36.43                 | 6.85            | 44.87                  | 43.87             | 42.28          | 74.00               | -31.72          | Pass   | V               |
| 9760.000         | 38.05                 | 7.12            | 45.55                  | 47.14             | 46.76          | 74.00               | -27.24          | Pass   | V               |

| Worse case mode: |                       | GFSK(1-DH5)     |                        | Test channel:     |                | Highest             | Remark: Peak    |        |                 |
|------------------|-----------------------|-----------------|------------------------|-------------------|----------------|---------------------|-----------------|--------|-----------------|
| Frequency (MHz)  | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Gain (dB) | Read Level (dBμV) | Level (dBμV/m) | Limit Line (dBμV/m) | Over Limit (dB) | Result | Antenna Polaxis |
| 1410.080         | 30.69                 | 2.17            | 44.11                  | 48.18             | 36.93          | 74.00               | -37.07          | Pass   | H               |
| 1541.476         | 30.95                 | 2.34            | 43.95                  | 48.10             | 37.44          | 74.00               | -36.56          | Pass   | H               |
| 4960.000         | 35.02                 | 6.29            | 44.60                  | 47.20             | 43.91          | 74.00               | -30.09          | Pass   | H               |
| 6017.064         | 35.91                 | 7.44            | 44.50                  | 47.70             | 46.55          | 74.00               | -27.45          | Pass   | H               |
| 7440.000         | 36.45                 | 6.73            | 44.97                  | 44.41             | 42.62          | 74.00               | -31.38          | Pass   | H               |
| 9920.000         | 38.22                 | 7.26            | 45.52                  | 46.88             | 46.84          | 74.00               | -27.16          | Pass   | H               |
| 1263.883         | 30.38                 | 1.96            | 44.29                  | 47.39             | 35.44          | 74.00               | -38.56          | Pass   | V               |
| 1593.340         | 31.04                 | 2.40            | 43.89                  | 47.46             | 37.01          | 74.00               | -36.99          | Pass   | V               |
| 4960.000         | 35.02                 | 6.29            | 44.60                  | 46.34             | 43.05          | 74.00               | -30.95          | Pass   | V               |
| 5689.360         | 35.67                 | 7.13            | 44.53                  | 48.12             | 46.39          | 74.00               | -27.61          | Pass   | V               |
| 7440.000         | 36.45                 | 6.73            | 44.97                  | 43.68             | 41.89          | 74.00               | -32.11          | Pass   | V               |
| 9920.000         | 38.22                 | 7.26            | 45.52                  | 46.94             | 46.90          | 74.00               | -27.10          | Pass   | V               |

| Worse case mode: |                       | π/4DQPSK(2-DH5) |                        | Test channel:     |                | Lowest              | Remark: Peak    |        |                 |
|------------------|-----------------------|-----------------|------------------------|-------------------|----------------|---------------------|-----------------|--------|-----------------|
| Frequency (MHz)  | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Gain (dB) | Read Level (dBμV) | Level (dBμV/m) | Limit Line (dBμV/m) | Over Limit (dB) | Result | Antenna Polaxis |
| 1276.818         | 30.41                 | 1.98            | 44.28                  | 49.01             | 37.12          | 74.00               | -36.88          | Pass   | H               |
| 1553.293         | 30.97                 | 2.35            | 43.94                  | 48.33             | 37.71          | 74.00               | -36.29          | Pass   | H               |
| 4804.000         | 34.69                 | 5.98            | 44.60                  | 48.08             | 44.15          | 74.00               | -29.85          | Pass   | H               |
| 5297.966         | 35.35                 | 6.71            | 44.57                  | 49.35             | 46.84          | 74.00               | -27.16          | Pass   | H               |
| 7206.000         | 36.42                 | 6.97            | 44.77                  | 44.91             | 43.53          | 74.00               | -30.47          | Pass   | H               |
| 9608.000         | 37.88                 | 6.98            | 45.58                  | 45.87             | 45.15          | 74.00               | -28.85          | Pass   | H               |
| 1346.929         | 30.56                 | 2.08            | 44.18                  | 48.46             | 36.92          | 74.00               | -37.08          | Pass   | V               |
| 1617.862         | 31.09                 | 2.43            | 43.87                  | 48.38             | 38.03          | 74.00               | -35.97          | Pass   | V               |
| 4804.000         | 34.69                 | 5.98            | 44.60                  | 48.04             | 44.11          | 74.00               | -29.89          | Pass   | V               |
| 5325.007         | 35.38                 | 6.74            | 44.57                  | 49.75             | 47.30          | 74.00               | -26.70          | Pass   | V               |
| 7206.000         | 36.42                 | 6.97            | 44.77                  | 44.74             | 43.36          | 74.00               | -30.64          | Pass   | V               |
| 9608.000         | 37.88                 | 6.98            | 45.58                  | 46.51             | 45.79          | 74.00               | -28.21          | Pass   | V               |

| Worse case mode: |                       | $\pi/4$ DQPSK(2-DH5) |                        | Test channel:           |                      | Middle                    | Remark: Peak    |        |                 |
|------------------|-----------------------|----------------------|------------------------|-------------------------|----------------------|---------------------------|-----------------|--------|-----------------|
| Frequency (MHz)  | Antenna Factor (dB/m) | Cable Loss (dB)      | Preamplifier Gain (dB) | Read Level (dB $\mu$ V) | Level (dB $\mu$ V/m) | Limit Line (dB $\mu$ V/m) | Over Limit (dB) | Result | Antenna Polaxis |
| 1270.334         | 30.39                 | 1.97                 | 44.29                  | 48.87                   | 36.94                | 74.00                     | -37.06          | Pass   | H               |
| 1689.410         | 31.21                 | 2.52                 | 43.79                  | 47.73                   | 37.67                | 74.00                     | -36.33          | Pass   | H               |
| 4880.000         | 34.85                 | 6.13                 | 44.60                  | 46.80                   | 43.18                | 74.00                     | -30.82          | Pass   | H               |
| 5986.509         | 35.89                 | 7.43                 | 44.50                  | 47.78                   | 46.60                | 74.00                     | -27.40          | Pass   | H               |
| 7320.000         | 36.43                 | 6.85                 | 44.87                  | 45.39                   | 43.80                | 74.00                     | -30.20          | Pass   | H               |
| 9760.000         | 38.05                 | 7.12                 | 45.55                  | 46.35                   | 45.97                | 74.00                     | -28.03          | Pass   | H               |
| 1299.773         | 30.46                 | 2.01                 | 44.25                  | 47.72                   | 35.94                | 74.00                     | -38.06          | Pass   | V               |
| 1557.252         | 30.98                 | 2.36                 | 43.93                  | 47.87                   | 37.28                | 74.00                     | -36.72          | Pass   | V               |
| 4880.000         | 34.85                 | 6.13                 | 44.60                  | 46.19                   | 42.57                | 74.00                     | -31.43          | Pass   | V               |
| 5956.109         | 35.87                 | 7.40                 | 44.50                  | 47.89                   | 46.66                | 74.00                     | -27.34          | Pass   | V               |
| 7320.000         | 36.43                 | 6.85                 | 44.87                  | 44.38                   | 42.79                | 74.00                     | -31.21          | Pass   | V               |
| 9760.000         | 38.05                 | 7.12                 | 45.55                  | 46.21                   | 45.83                | 74.00                     | -28.17          | Pass   | V               |

| Worse case mode: |                       | $\pi/4$ DQPSK(2-DH5) |                        | Test channel:           |                      | Highest                   | Remark: Peak    |        |                 |
|------------------|-----------------------|----------------------|------------------------|-------------------------|----------------------|---------------------------|-----------------|--------|-----------------|
| Frequency (MHz)  | Antenna Factor (dB/m) | Cable Loss (dB)      | Preamplifier Gain (dB) | Read Level (dB $\mu$ V) | Level (dB $\mu$ V/m) | Limit Line (dB $\mu$ V/m) | Over Limit (dB) | Result | Antenna Polaxis |
| 1267.104         | 30.38                 | 1.96                 | 44.29                  | 47.90                   | 35.95                | 74.00                     | -38.05          | Pass   | H               |
| 1333.284         | 30.53                 | 2.06                 | 44.20                  | 47.47                   | 35.86                | 74.00                     | -38.14          | Pass   | H               |
| 4960.000         | 35.02                 | 6.29                 | 44.60                  | 47.52                   | 44.23                | 74.00                     | -29.77          | Pass   | H               |
| 5325.007         | 35.38                 | 6.74                 | 44.57                  | 49.02                   | 46.57                | 74.00                     | -27.43          | Pass   | H               |
| 7440.000         | 36.45                 | 6.73                 | 44.97                  | 44.18                   | 42.39                | 74.00                     | -31.61          | Pass   | H               |
| 9920.000         | 38.22                 | 7.26                 | 45.52                  | 46.35                   | 46.31                | 74.00                     | -27.69          | Pass   | H               |
| 1254.268         | 30.35                 | 1.94                 | 44.31                  | 48.06                   | 36.04                | 74.00                     | -37.96          | Pass   | V               |
| 1537.557         | 30.94                 | 2.34                 | 43.96                  | 48.36                   | 37.68                | 74.00                     | -36.32          | Pass   | V               |
| 4960.000         | 35.02                 | 6.29                 | 44.60                  | 46.86                   | 43.57                | 74.00                     | -30.43          | Pass   | V               |
| 5986.509         | 35.89                 | 7.43                 | 44.50                  | 47.74                   | 46.56                | 74.00                     | -27.44          | Pass   | V               |
| 7440.000         | 36.45                 | 6.73                 | 44.97                  | 44.23                   | 42.44                | 74.00                     | -31.56          | Pass   | V               |
| 9920.000         | 38.22                 | 7.26                 | 45.52                  | 47.19                   | 47.15                | 74.00                     | -26.85          | Pass   | V               |

Note:

1) Through Pre-scan Non-hopping transmitting mode and charge+transmitter mode with all kind of modulation and all kind of data type, find the 1-DH5 of data type is the worse case of GFSK modulation type, the 2-DH5 of data type is the worse case of  $\pi/4$ DQPSK modulation type.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading - Correct Factor

Correct Factor = Preamplifier Factor - Antenna Factor - Cable Factor

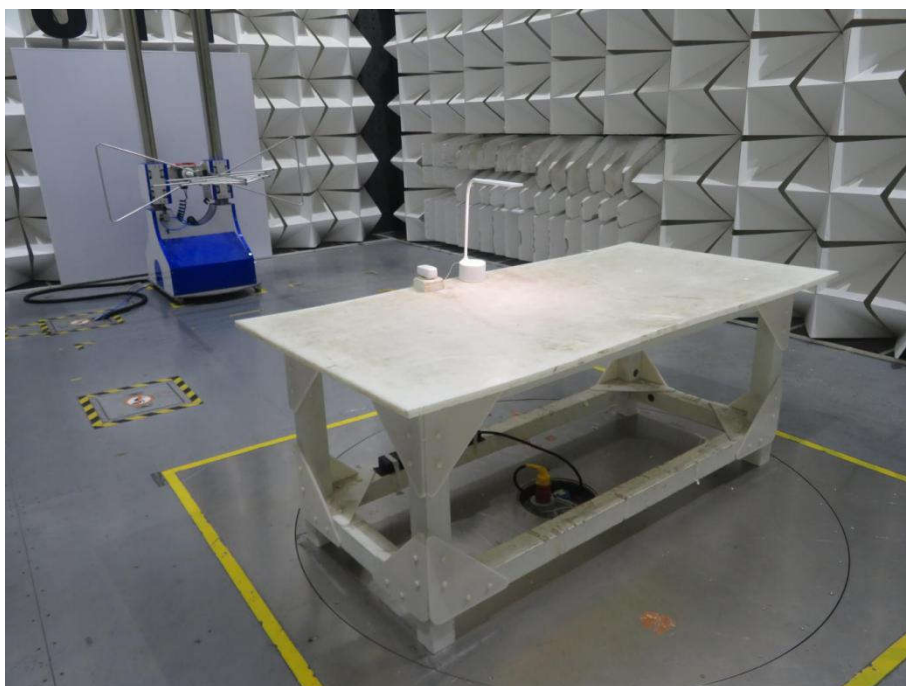
3) Scan from 9kHz to 25GHz, the disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

## PHOTOGRAPHS OF TEST SETUP

Test model No.: HSD9036A



**Radiated spurious emission Test Setup-1(Below 30MHz)**



**Radiated spurious emission Test Setup-2(30MHz-1GHz)**



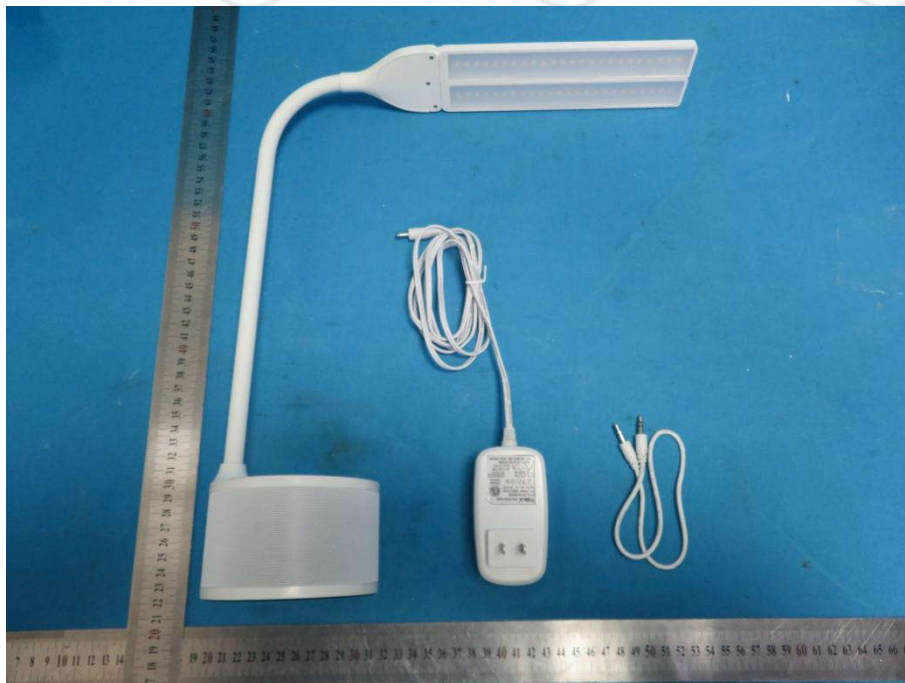
**Radiated spurious emission Test Setup-3(Above 1GHz)**



**Conducted Emissions Test Setup**

## PHOTOGRAPHS OF EUT Constructional Details

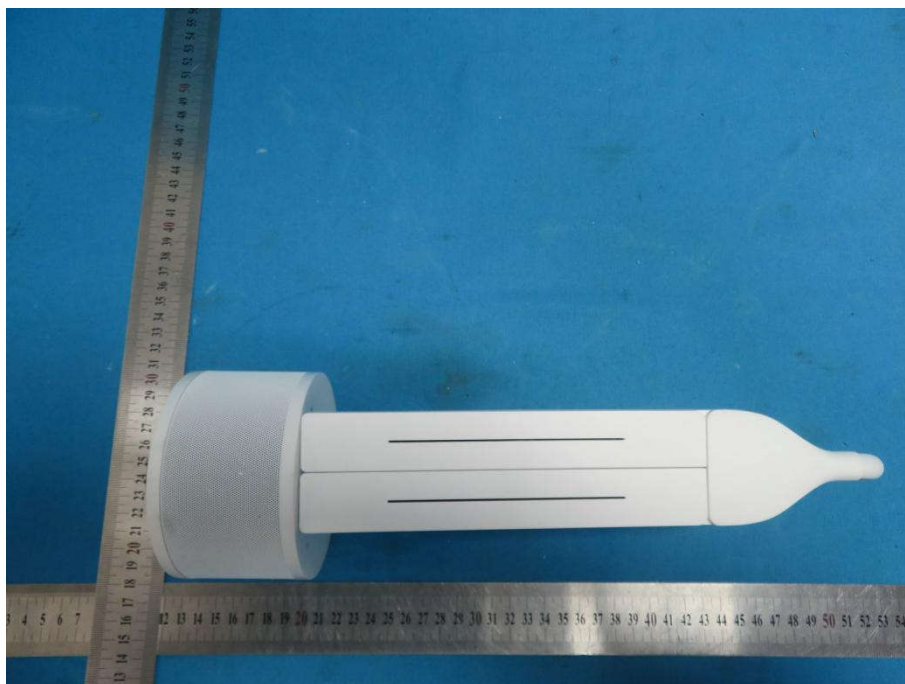
Test model No.: HSD9036A



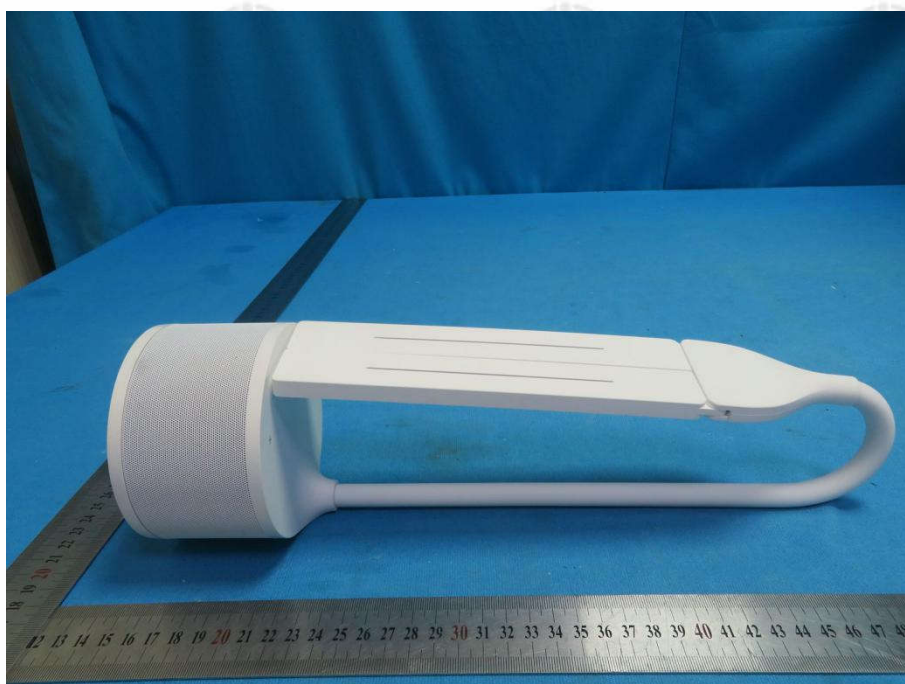
View of Product-1



View of Product-2



View of Product-3



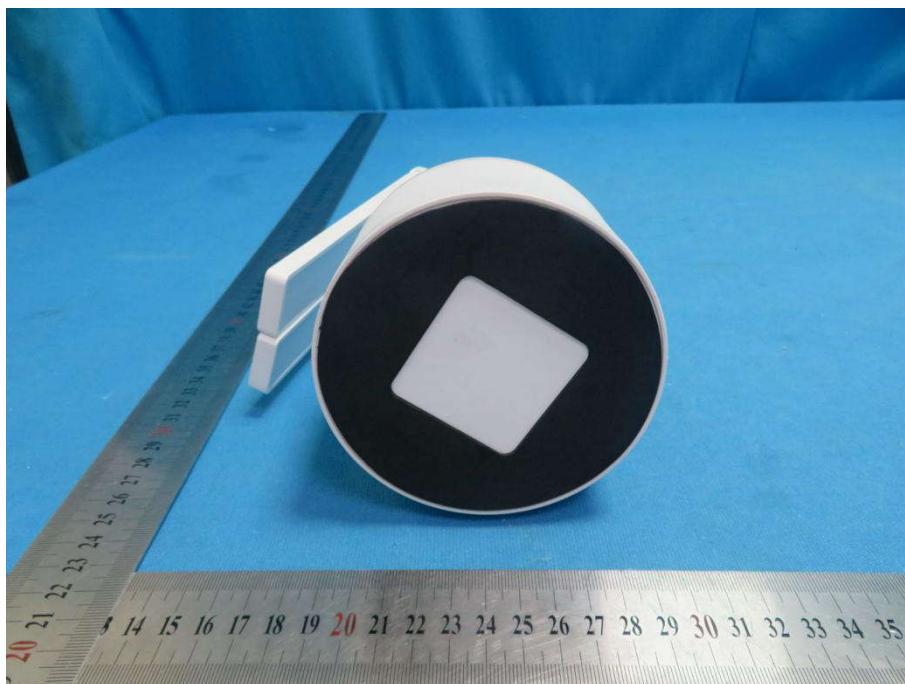
View of Product-4



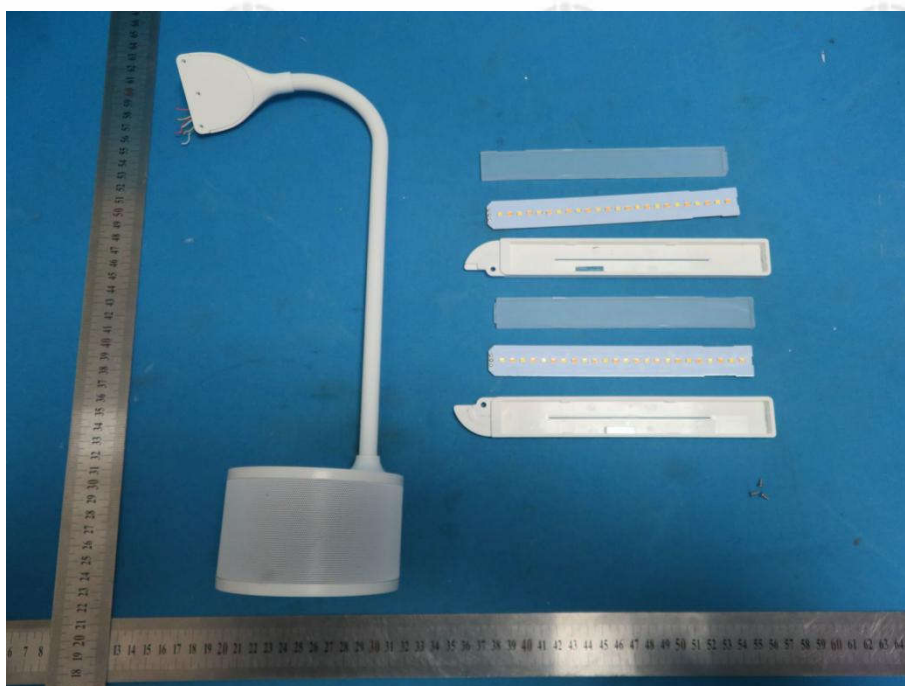
View of Product-5



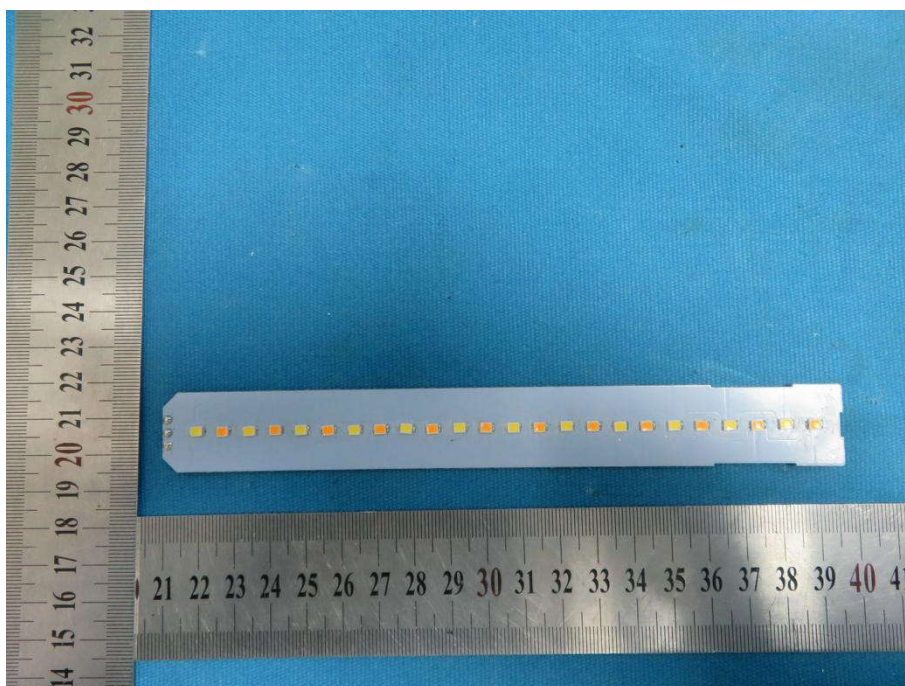
View of Product-6



View of Product-7



View of Product-8



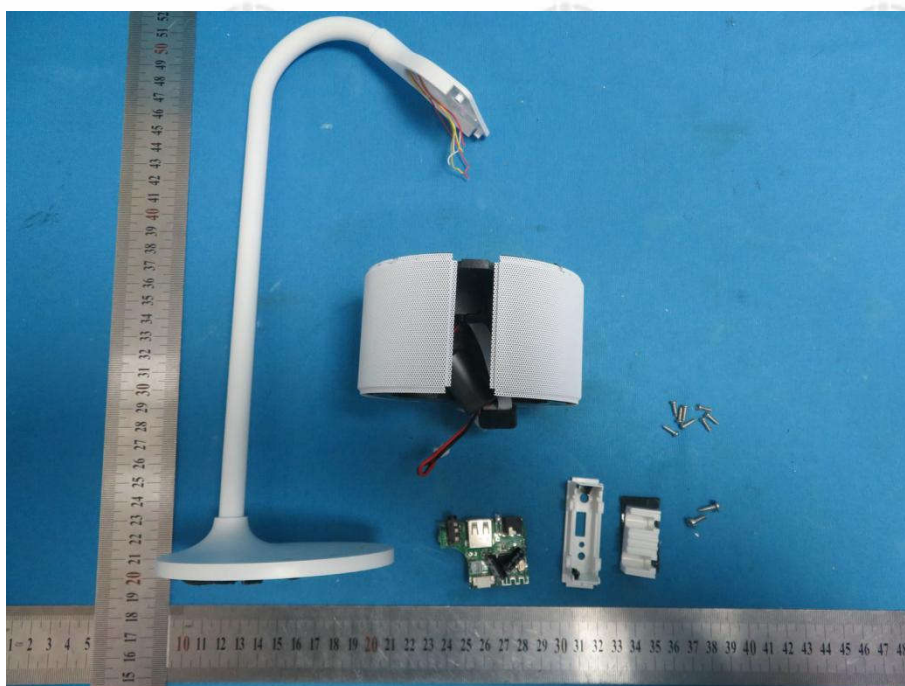
View of Product-9



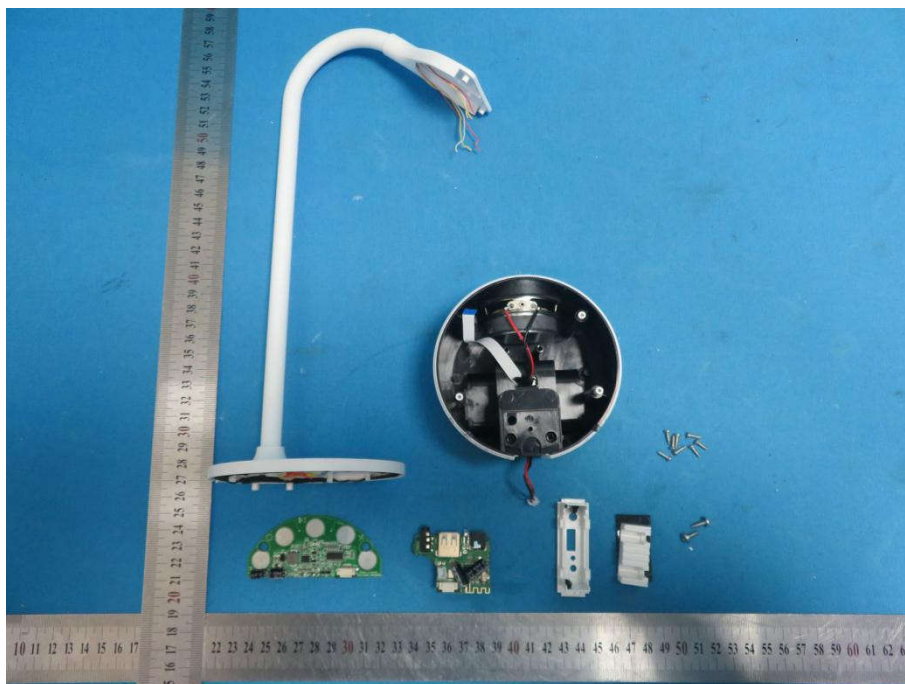
View of Product-10



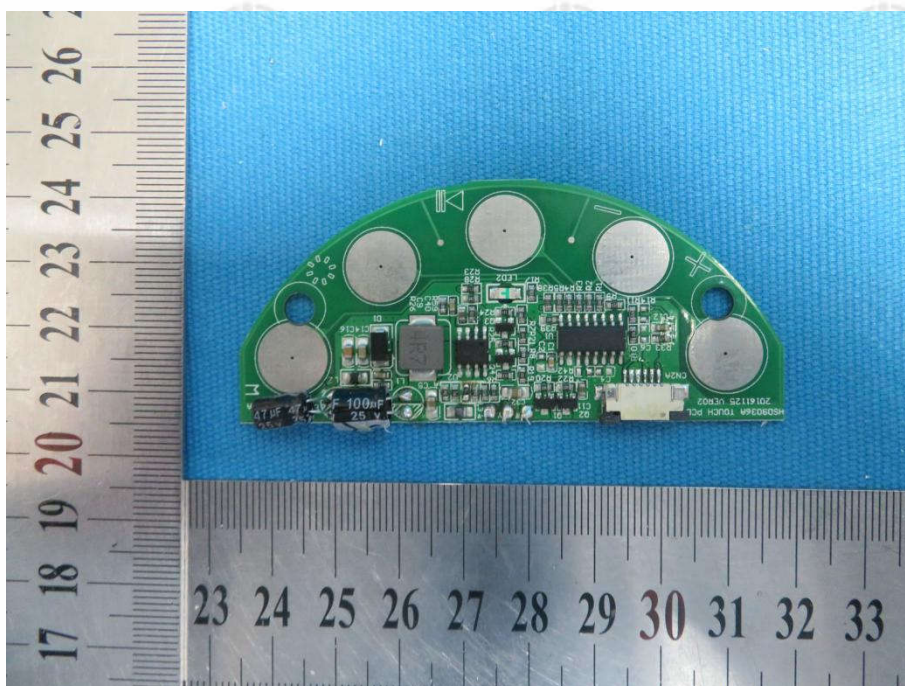
View of Product-11



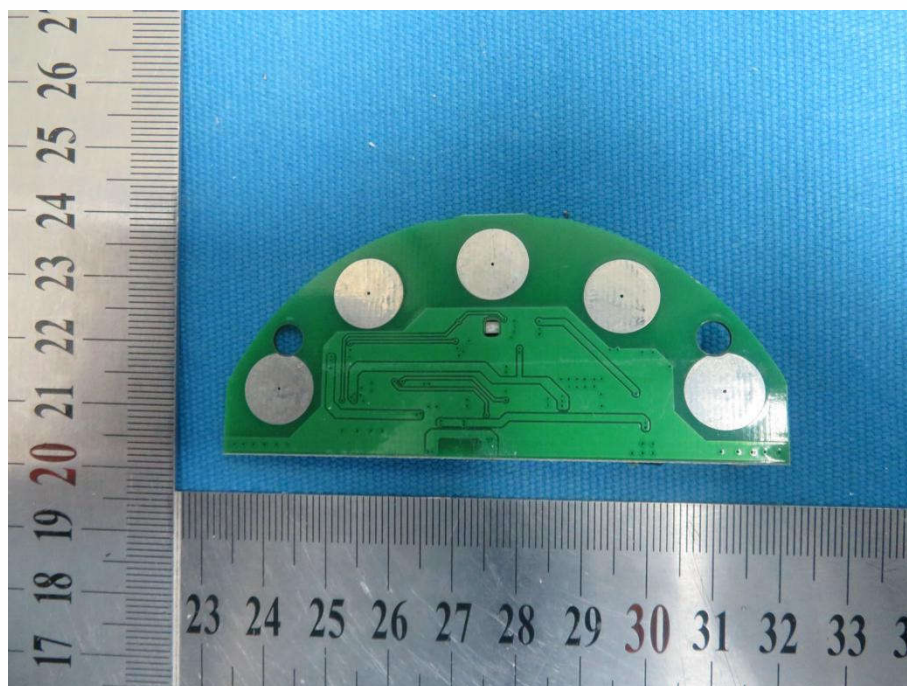
View of Product-12



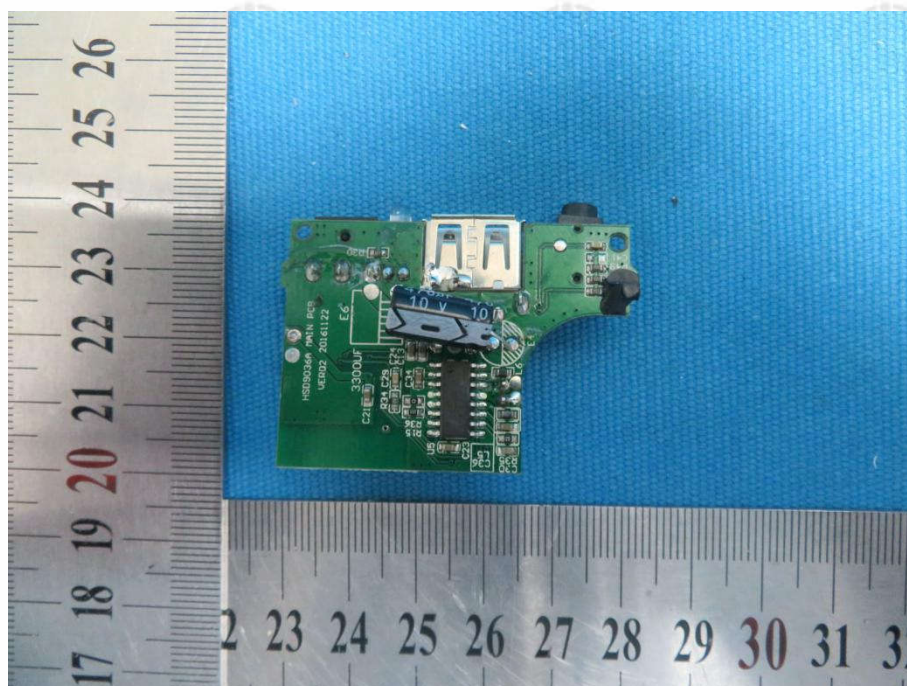
View of Product-13



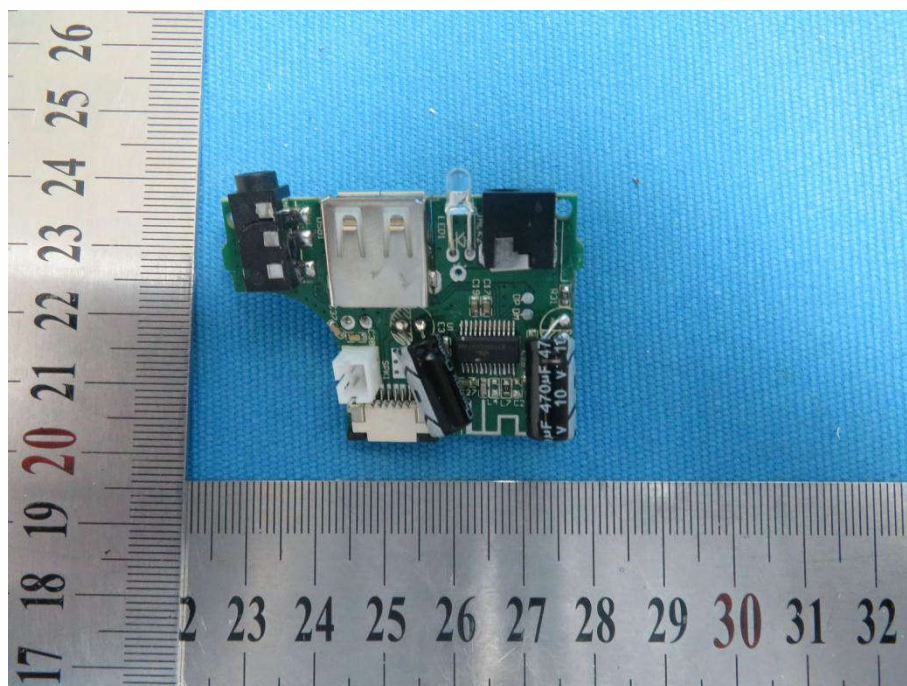
View of Product-14



View of Product-15



View of Product-16



View of Product-17



View of Product-18



View of Product-19



View of Product-20



View of Product-21



View of Product-22



View of Product-23



View of Product-24



View of Product-25



View of Product-26

\*\*\* End of Report \*\*\*

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