



## FCC Test Report

**Report No.:** ACHM-18OC0807VTSHPB-1

**FCC ID:** 2ARXX-BIC16042

**Product:** Koozie Speaker Cooler

**Model:** 16042

**Received Date:** Oct.13, 2018

**Test Date:** Oct.13, 2018 to Nov.27, 2018

**Issued Date:** Nov.28, 2018

**Applicant:** Xiamen Obaili Manufacturing Ltd.

**Address:** 45 Building, Huli Industrial Park, Meixi Road, Xike, Tong'an District, Xiamen, Fujian, China

**Manufacturer:** Xiamen Obaili Manufacturing Ltd.

**Address:** 45 Building, Huli Industrial Park, Meixi Road, Xike, Tong'an District, Xiamen, Fujian, China

**Issued By:** BUREAU VERITAS ADT (Shanghai) Corporation

**Lab Address:** No. 829, Xinzhuang Road, Shanghai, P.R.China (201612)

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## Table of Contents

|                                                      |    |
|------------------------------------------------------|----|
| Release Control Record .....                         | 4  |
| 1 Certificate of Conformity .....                    | 5  |
| 2 Summary of Test Results .....                      | 6  |
| 2.1 Test Instruments .....                           | 7  |
| 2.2 Measurement Uncertainty .....                    | 8  |
| 2.3 Modification Record .....                        | 8  |
| 3 General Information .....                          | 9  |
| 3.1 General Description of EUT .....                 | 9  |
| 3.2 Description of Test Modes .....                  | 10 |
| 3.2.1 Test Mode Applicability: .....                 | 10 |
| 3.2.2 Test Condition: .....                          | 12 |
| 3.3 Description of Support Units .....               | 13 |
| 3.4 General Description of Applied Standards .....   | 13 |
| 4 Test Procedure and Results .....                   | 14 |
| 4.1 Conducted Emission Measurement .....             | 14 |
| 4.1.1 Limit .....                                    | 14 |
| 4.1.2 Test Setup .....                               | 14 |
| 4.1.3 Test Procedures .....                          | 14 |
| 4.1.4 Deviation of Test Standard .....               | 14 |
| 4.1.5 Test Results .....                             | 15 |
| 4.2 Number of Hopping Frequency Used .....           | 19 |
| 4.2.1 Limit .....                                    | 19 |
| 4.2.2 Test Setup .....                               | 19 |
| 4.2.3 Test Procedures .....                          | 19 |
| 4.2.4 Deviation of Test Standard .....               | 19 |
| 4.2.5 Test Results .....                             | 20 |
| 4.3 Dwell Time on Each Channel .....                 | 21 |
| 4.3.1 Limit .....                                    | 21 |
| 4.3.2 Test Setup .....                               | 21 |
| 4.3.3 Test Procedures .....                          | 21 |
| 4.3.4 Deviation of Test Standard .....               | 21 |
| 4.3.5 Test Results .....                             | 22 |
| 4.4 Channel Bandwidth .....                          | 29 |
| 4.4.1 Limit .....                                    | 29 |
| 4.4.2 Test Setup .....                               | 29 |
| 4.4.3 Test Procedures .....                          | 29 |
| 4.4.4 Deviation of Test Standard .....               | 29 |
| 4.4.5 EUT Operating Condition .....                  | 29 |
| 4.4.6 Test Results .....                             | 30 |
| 4.5 Hopping Channel Separation .....                 | 33 |
| 4.5.1 Limit .....                                    | 33 |
| 4.5.2 Test Setup .....                               | 33 |
| 4.5.3 Test Procedures .....                          | 33 |
| 4.5.4 Deviation of Test Standard .....               | 33 |
| 4.5.5 Test Results .....                             | 34 |
| 4.6 Maximum Output Power .....                       | 35 |
| 4.6.1 Limit .....                                    | 35 |
| 4.6.2 Test Setup .....                               | 35 |
| 4.6.3 Test Procedures .....                          | 35 |
| 4.6.4 Deviation of Test Standard .....               | 35 |
| 4.6.5 EUT Operating Condition .....                  | 35 |
| 4.6.6 Test Results .....                             | 36 |
| 4.7 Conducted Out of Band Emission Measurement ..... | 37 |

|       |                                     |    |
|-------|-------------------------------------|----|
| 4.7.1 | Limit .....                         | 39 |
| 4.7.2 | Test Procedures.....                | 39 |
| 4.7.3 | Deviation of Test Standard .....    | 39 |
| 4.7.4 | Test Results .....                  | 39 |
| 4.8   | Radiated Emission Measurement ..... | 50 |
| 4.8.1 | Limits .....                        | 50 |
| 4.8.2 | Test Procedures.....                | 50 |
| 4.8.3 | Deviation from Test Standard .....  | 51 |
| 4.8.4 | Test Setup.....                     | 52 |
| 4.8.5 | EUT Operating Conditions.....       | 53 |
| 4.8.6 | Test Results .....                  | 53 |
| 5     | Pictures of Test Arrangements ..... | 57 |



### Release Control Record

| Issue No.             | Description      | Date Issued  |
|-----------------------|------------------|--------------|
| ACHM-18OC0807VTSHPB-1 | Original release | Nov.28, 2018 |

## 1 Certificate of Conformity

**Product:** Koozie Speaker Kooler

**Brand:** --

**Model:** 16042

**Applicant:** Xiamen Obaili Manufacturing Ltd.

**Test Date:** Oct.13, 2018 to Nov.27, 2018

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.10:2013

The above equipment has been tested by **BUREAU VERITAS ADT (Shanghai) Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :** chao jun shi, **Date:** Nov.28, 2018  
Chaojun SHI  
Testing Engineer

**Approved by :** Joy zhu, **Date:** Nov.28, 2018  
Joy ZHU  
Testing Manager

## 2 Summary of Test Results

The EUT has been tested according to the following specifications:

| 47 CFR FCC Part 15, Subpart C (SECTION 15.247) |                                                                                                               |        |                                |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------|--------|--------------------------------|
| FCC Clause                                     | Test Item                                                                                                     | Result | Remarks                        |
| 15.207                                         | AC Power Conducted Emission                                                                                   | PASS   | Meet the requirement of limit. |
| 15.247(a)(1)(iii)                              | Number of Hopping Frequency Used                                                                              | PASS   | Meet the requirement of limit. |
| 15.247(a)(1)(iii)                              | Dwell Time on Each Channel                                                                                    | PASS   | Meet the requirement of limit. |
| 15.247(a)(1)                                   | 1. Hopping Channel Separation<br>2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System | PASS   | Meet the requirement of limit. |
| 15.247(b)                                      | Maximum Peak Output Power                                                                                     | PASS   | Meet the requirement of limit. |
| 15.205 /<br>15.209 /<br>15.247(d)              | Radiated Emissions & Band Edge Measurement                                                                    | PASS   | Meet the requirement of limit. |
| 15.203                                         | Antenna Requirement                                                                                           | PASS   | No antenna connector is used.  |

Note: The data shown in the report is the worst case data when the EUT is powered by USB.

## 2.1 Test Instruments

| Equipment                                   | Manufacturer | Model No.    | Serial No. | Last Cal. | Next Cal. |
|---------------------------------------------|--------------|--------------|------------|-----------|-----------|
| Double Ridged Broadband Horn (30MHz-1.5GHz) | Schwarzbeck  | VULB9168     | E1A1036    | Feb.10,17 | Feb.09,19 |
| Horn Antenna (1GHz -18GHz)                  | Schwarzbeck  | BBHA9120D    | E1A1017    | Aug.27,17 | Aug.26,19 |
| Pre-Amplifier(9kHz-1GHz)                    | SONOMA       | 310          | E1A2007    | Oct.15,18 | Oct.14,19 |
| Pre-Amplifier(1GHz-26.5GHz)                 | Agilent      | 8449B        | E1A2002    | Mar.27,18 | Mar.26,19 |
| Signal Generator                            | Keysight     | N5171B       | E1S9016    | Jun.11,18 | Jun.10,19 |
| Signal Generator                            | Keysight     | N5182B       | E1S9017    | Jun.11,18 | Jun.10,19 |
| Wireless Connectivity Tester                | R&S          | CMW270       | E1S9021    | N/A       | N/A       |
| Spectrum Analyzer                           | R&S          | FSP30        | E1S1002    | Jul.24,18 | Jul.23,19 |
| Spectrum Analyzer                           | Keysight     | N9030B       | E1S1003    | Mar.16,18 | Mar.15,19 |
| Spectrum Analyzer                           | Keysight     | N9020A       | E1S1004    | Jul.24,18 | Jul.23,19 |
| RF Control Unit                             | Toscend      | JS0806-2     | E1C5003    | N/A       | N/A       |
| DC Power supply                             | Chroma       | 62024p-80-60 | S1S1009    | Mar.27,18 | Mar.26,19 |
| Humidity&Temp Programmable Tester           | ESPEC        | SE TH-Z-042U | C1TH002    | Jun.27,18 | Jun.26,19 |
| Test Software                               | Toscend      | JS1120-3     | N/A        | N/A       | N/A       |
| Test Software                               | Toscend      | JS36-RSE     | N/A        | N/A       | N/A       |

## 2.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

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

| Measurement                        | Frequency      | Expanded Uncertainty<br>( $k=2$ ) ( $\pm$ ) |
|------------------------------------|----------------|---------------------------------------------|
| Conducted Emissions at mains ports | 150kHz ~ 30MHz | 1.83 dB                                     |
| Radiated Emissions up to 1 GHz     | 30MHz ~ 1GHz   | 5.36 dB                                     |
| Radiated Emissions above 1 GHz     | 1GHz ~ 6GHz    | 3.47 dB                                     |
|                                    | 6GHz ~ 18GHz   | 3.75 dB                                     |
|                                    | 18GHz ~ 40GHz  | 3.30 dB                                     |

## 2.3 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

|                       |                       |
|-----------------------|-----------------------|
| Product               | Koozie Speaker Cooler |
| Brand                 | --                    |
| Test Model            | 16042                 |
| Model Difference      | --                    |
| Power Rating          | USB                   |
| Modulation Type       | GFSK, $\pi/4$ -DQPSK  |
| Modulation Technology | BT-EDR, FHSS          |
| Operating Frequency   | 2.402 ~ 2.480GHz      |
| Number of Channel     | 79                    |
| Output Power          | -4.23dBm              |
| Antenna Type          | PCB antenna           |
| Antenna Connector     | --                    |
| Antenna Gain          | -0.58dBi              |

Note: For more details, please refer to the User's manual of the EUT.

### 3.2 Description of Test Modes

79 channels are provided for BT-EDR mode:

| Channel | Freq. (MHz) | Channel | Freq. (MHz) | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---------|-------------|---------|-------------|---------|-------------|---------|-------------|
| 0       | 2402        | 20      | 2422        | 40      | 2442        | 60      | 2462        |
| 1       | 2403        | 21      | 2423        | 41      | 2443        | 61      | 2463        |
| 2       | 2404        | 22      | 2424        | 42      | 2444        | 62      | 2464        |
| 3       | 2405        | 23      | 2425        | 43      | 2445        | 63      | 2465        |
| 4       | 2406        | 24      | 2426        | 44      | 2446        | 64      | 2466        |
| 5       | 2407        | 25      | 2427        | 45      | 2447        | 65      | 2467        |
| 6       | 2408        | 26      | 2428        | 46      | 2448        | 66      | 2468        |
| 7       | 2409        | 27      | 2429        | 47      | 2449        | 67      | 2469        |
| 8       | 2410        | 28      | 2430        | 48      | 2450        | 68      | 2470        |
| 9       | 2411        | 29      | 2431        | 49      | 2451        | 69      | 2471        |
| 10      | 2412        | 30      | 2432        | 50      | 2452        | 70      | 2472        |
| 11      | 2413        | 31      | 2433        | 51      | 2453        | 71      | 2473        |
| 12      | 2414        | 32      | 2434        | 52      | 2454        | 72      | 2474        |
| 13      | 2415        | 33      | 2435        | 53      | 2455        | 73      | 2475        |
| 14      | 2416        | 34      | 2436        | 54      | 2456        | 74      | 2476        |
| 15      | 2417        | 35      | 2437        | 55      | 2457        | 75      | 2477        |
| 16      | 2418        | 36      | 2438        | 56      | 2458        | 76      | 2478        |
| 17      | 2419        | 37      | 2439        | 57      | 2459        | 77      | 2479        |
| 18      | 2420        | 38      | 2440        | 58      | 2460        | 78      | 2480        |
| 19      | 2421        | 39      | 2441        | 59      | 2461        |         |             |

#### 3.2.1 Test Mode Applicability:

| EUT Configure Mode | Applicable to |         |     |      | Description |
|--------------------|---------------|---------|-----|------|-------------|
|                    | RE ≥ 1G       | RE < 1G | PLC | APCM |             |
| -                  | √             | √       | -   | √    | -           |

Where **RE≥1G**: Radiated Emission above 1GHz

**RE≤1G**: Radiated Emission below 1GHz

**PLC**: Power Line Conducted Emission

**APCM**: Antenna Port Conducted Measurement

#### **Radiated Emission Test (Above 1 GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT<br>CONFIGURE<br>MODE | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION<br>TECHNOLOGY | MODULATION<br>TYPE | PACKET TYPE |
|--------------------------|----------------------|-------------------|--------------------------|--------------------|-------------|
| -                        | 0 to 78              | 0, 39, 78         | FHSS                     | GFSK               | DH5         |
| -                        | 0 to 78              | 0, 39, 78         | FHSS                     | $\pi/4$ -DQPSK     | 2DH5        |

#### **Radiated Emission Test (Below 1 GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT<br>CONFIGURE<br>MODE | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION<br>TECHNOLOGY | MODULATION<br>TYPE | PACKET TYPE |
|--------------------------|----------------------|-------------------|--------------------------|--------------------|-------------|
| -                        | 0 to 78              | 78                | FHSS                     | $\pi/4$ -DQPSK     | 2DH5        |

#### **Power Line Conducted Emission Test:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT<br>CONFIGURE<br>MODE | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION<br>TECHNOLOGY | MODULATION<br>TYPE | PACKET TYPE |
|--------------------------|----------------------|-------------------|--------------------------|--------------------|-------------|
| -                        | 0 to 78              | 78                | FHSS                     | $\pi/4$ -DQPSK     | 2DH5        |

#### **Antenna Port Conducted Measurement**

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT<br>CONFIGURE<br>MODE | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION<br>TECHNOLOGY | MODULATION<br>TYPE | PACKET TYPE |
|--------------------------|----------------------|-------------------|--------------------------|--------------------|-------------|
| -                        | 0 to 78              | 0, 39, 78         | FHSS                     | GFSK               | DH5         |
| -                        | 0 to 78              | 0, 39, 78         | FHSS                     | $\pi/4$ -DQPSK     | 2DH5        |

### 3.2.2 Test Condition:

| Applicable to | Normal Environmental Conditions | Normal Input Power |
|---------------|---------------------------------|--------------------|
| RE $\geq$ 1G  | 23deg. C, 58%RH                 | Power by USB       |
| RE < 1G       | 23deg. C, 58%RH                 | Power by USB       |
| PLC           | 22deg. C, 54%RH                 | Power by USB       |
| APCM          | 25deg. C, 60%RH                 | Power by USB       |

### 3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

### 3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standard:

**FCC Part 15, Subpart C (15.247)**

**FCC DA 00705**

**ANSI C63.10:2013**

All relaxed test items have been performed and recorded as per the above standard.

## 4 Test Procedure and Results

### 4.1 Conducted Emission Measurement

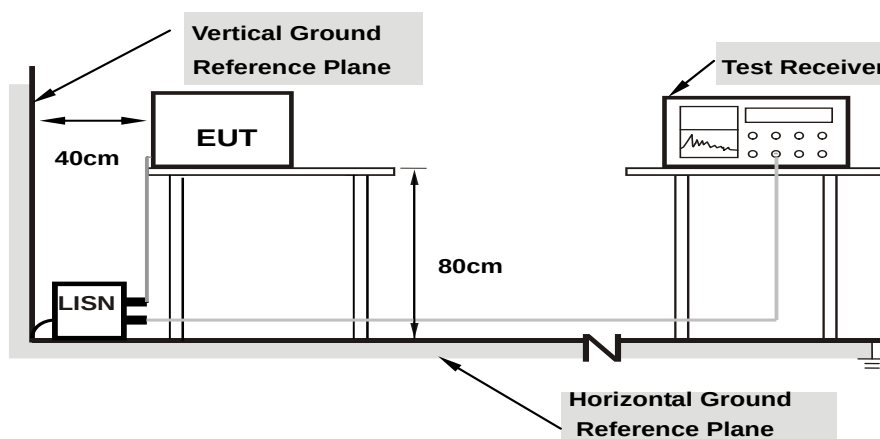
#### 4.1.1 Limit

| Frequency (MHz) | Conducted Limit (dBuV) |         |
|-----------------|------------------------|---------|
|                 | Quasi-peak             | Average |
| 0.15 - 0.5      | 66 - 56                | 56 - 46 |
| 0.50 - 5.0      | 56                     | 46      |
| 5.0 - 30.0      | 60                     | 50      |

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

#### 4.1.2 Test Setup



Note: 1.Support units were connected to second LISN.

#### 4.1.3 Test Procedures

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

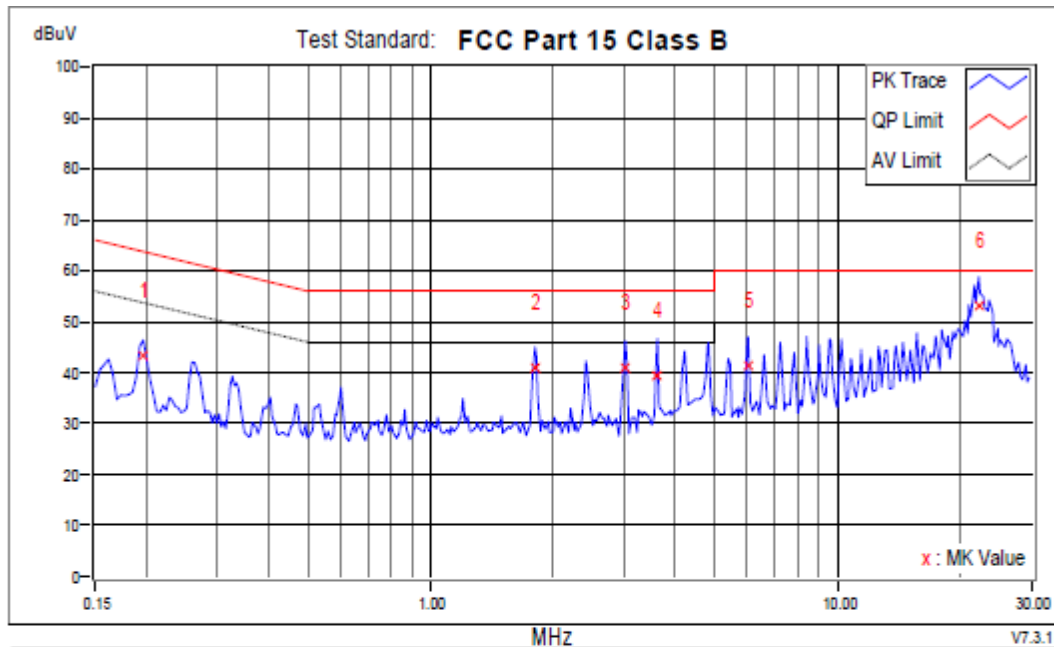
**NOTE:** The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

#### 4.1.4 Deviation of Test Standard

No deviation.

#### 4.1.5 Test Results AC120V

| Phase | Line (L) | Detector Function | Quasi-Peak (QP) /<br>Average (AV) |
|-------|----------|-------------------|-----------------------------------|
|-------|----------|-------------------|-----------------------------------|

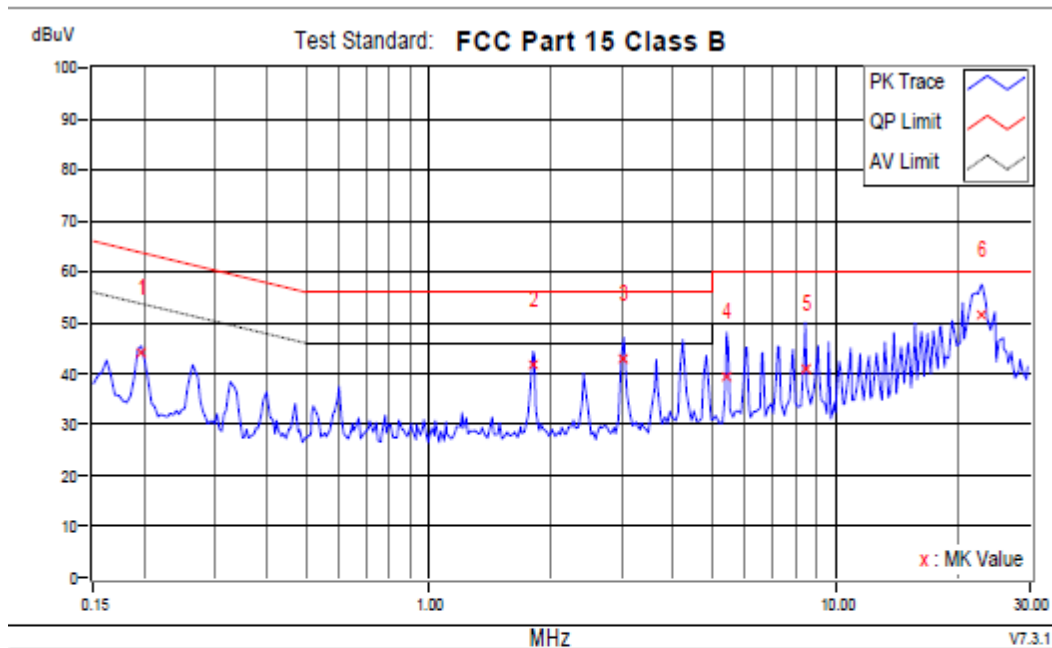


| No. | Frequency<br>MHz | Corr.<br>Factor<br>dB | Reading<br>dBuV |       | Emission<br>dBuV |       | Limit<br>dBuV |       | Margins<br>dB |        | Notes |
|-----|------------------|-----------------------|-----------------|-------|------------------|-------|---------------|-------|---------------|--------|-------|
|     |                  |                       | QP              | AV    | QP               | AV    | QP            | AV    | QP            | AV     |       |
| 1   | 0.19692          | 9.89                  | 33.56           | 28.96 | 43.45            | 38.85 | 63.74         | 53.74 | -20.29        | -14.89 |       |
| 2   | 1.80937          | 9.77                  | 31.40           | 24.81 | 41.17            | 34.58 | 56.00         | 46.00 | -14.83        | -11.42 |       |
| 3   | 3.01365          | 9.90                  | 31.12           | 24.21 | 41.02            | 34.11 | 56.00         | 46.00 | -14.98        | -11.89 |       |
| 4   | 3.61579          | 9.95                  | 29.36           | 21.08 | 39.31            | 31.03 | 56.00         | 46.00 | -16.69        | -14.97 |       |
| 5   | 6.04390          | 10.15                 | 31.14           | 20.08 | 41.29            | 30.23 | 60.00         | 50.00 | -18.71        | -19.77 |       |
| +6  | 22.30868         | 10.18                 | 43.06           | 33.62 | 53.24            | 43.80 | 60.00         | 50.00 | -6.76         | -6.20  |       |

#### REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

|       |             |                   |                                |
|-------|-------------|-------------------|--------------------------------|
| Phase | Neutral (N) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|-------|-------------|-------------------|--------------------------------|



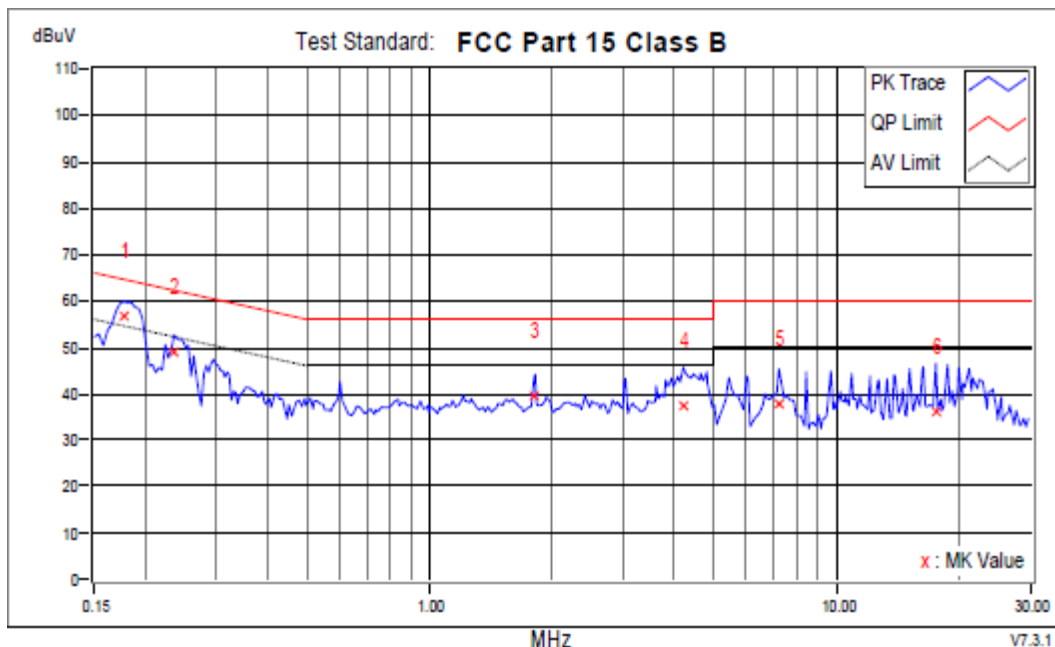
|     | Frequency | Corr. Factor | Reading dBuV |       | Emission dBuV |       | Limit dBuV |       | Margins dB |        | Notes |
|-----|-----------|--------------|--------------|-------|---------------|-------|------------|-------|------------|--------|-------|
| No. | MHz       | dB           | QP           | AV    | QP            | AV    | QP         | AV    | QP         | AV     |       |
| 1   | 0.19692   | 9.83         | 34.34        | 29.06 | 44.17         | 38.89 | 63.74      | 53.74 | -19.57     | -14.85 |       |
| 2   | 1.80937   | 9.96         | 31.88        | 25.74 | 41.84         | 35.70 | 56.00      | 46.00 | -14.16     | -10.30 |       |
| 3   | 3.02538   | 10.06        | 33.00        | 25.81 | 43.06         | 35.87 | 56.00      | 46.00 | -12.94     | -10.13 |       |
| 4   | 5.41439   | 9.84         | 29.72        | 20.49 | 39.56         | 30.33 | 60.00      | 50.00 | -20.44     | -19.67 |       |
| 5   | 8.45246   | 10.28        | 30.64        | 22.05 | 40.92         | 32.33 | 60.00      | 50.00 | -19.08     | -17.67 |       |
| +6  | 22.92255  | 10.34        | 41.20        | 33.06 | 51.54         | 43.40 | 60.00      | 50.00 | -8.46      | -6.60  |       |
|     |           |              |              |       |               |       |            |       |            |        |       |
|     |           |              |              |       |               |       |            |       |            |        |       |

**REMARKS:**

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

**AC240V**

| Phase | Line (L) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|-------|----------|-------------------|--------------------------------|
|-------|----------|-------------------|--------------------------------|

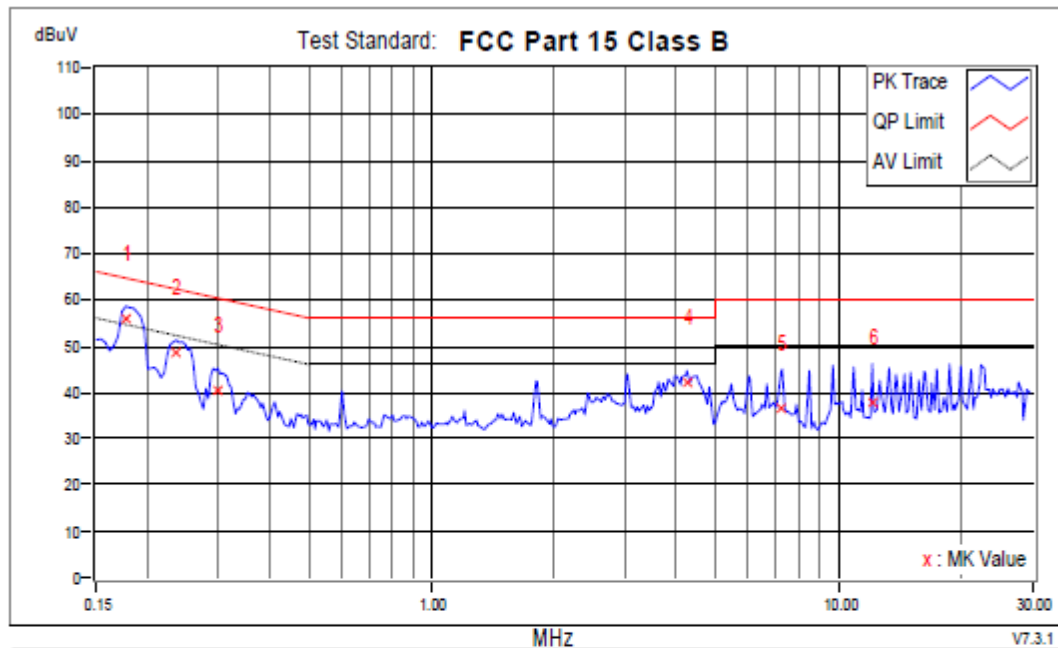


|     | Frequency | Corr. Factor | Reading |       | Emission |       | Limits |       | Margins |        | Notes |
|-----|-----------|--------------|---------|-------|----------|-------|--------|-------|---------|--------|-------|
| No. | MHz       | dB           | QP      | AV    | QP       | AV    | QP     | AV    | QP      | AV     |       |
| +1  | 0.17737   | 9.88         | 46.84   | 29.06 | 56.72    | 38.94 | 64.61  | 54.61 | -7.89   | -15.67 |       |
| 2   | 0.23602   | 9.83         | 39.04   | 22.99 | 48.87    | 32.82 | 62.24  | 52.24 | -13.36  | -19.41 |       |
| 3   | 1.82110   | 9.77         | 29.68   | 23.62 | 39.45    | 33.39 | 56.00  | 46.00 | -16.55  | -12.61 |       |
| 4   | 4.21011   | 10.01        | 27.54   | 20.63 | 37.55    | 30.64 | 56.00  | 46.00 | -18.45  | -15.36 |       |
| 5   | 7.23254   | 10.23        | 27.70   | 22.31 | 37.93    | 32.54 | 60.00  | 50.00 | -22.07  | -17.46 |       |
| 6   | 17.60104  | 10.32        | 25.88   | 18.15 | 36.20    | 28.47 | 60.00  | 50.00 | -23.80  | -21.53 |       |

**REMARKS:**

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

|       |             |                   |                                |
|-------|-------------|-------------------|--------------------------------|
| Phase | Neutral (N) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|-------|-------------|-------------------|--------------------------------|



| No. | Frequency | Corr. Factor | Reading |       | Emission |       | Limits |       | Margins |        | Notes |
|-----|-----------|--------------|---------|-------|----------|-------|--------|-------|---------|--------|-------|
|     | MHz       | dB           | QP      | AV    | QP       | AV    | QP     | AV    | QP      | AV     |       |
| +1  | 0.17737   | 9.85         | 46.00   | 28.55 | 55.85    | 38.40 | 64.61  | 54.61 | -8.76   | -16.21 |       |
| 2   | 0.23602   | 9.86         | 38.52   | 21.30 | 48.38    | 31.16 | 62.24  | 52.24 | -13.86  | -21.08 |       |
| 3   | 0.29858   | 9.90         | 30.54   | 17.70 | 40.44    | 27.60 | 60.28  | 50.28 | -19.84  | -22.68 |       |
| 4   | 4.24921   | 9.86         | 32.24   | 24.39 | 42.10    | 34.25 | 56.00  | 46.00 | -13.90  | -11.75 |       |
| 5   | 7.28728   | 10.23        | 26.50   | 20.36 | 36.73    | 30.59 | 60.00  | 50.00 | -23.27  | -19.41 |       |
| 6   | 12.13877  | 10.53        | 27.46   | 22.14 | 37.99    | 32.67 | 60.00  | 50.00 | -22.01  | -17.33 |       |

#### REMARKS:

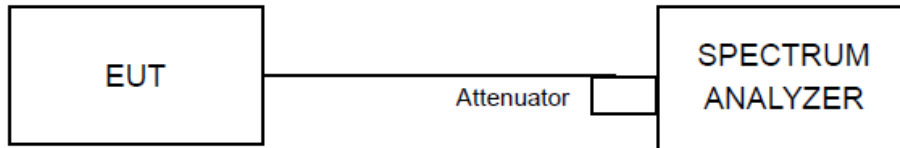
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

## 4.2 Number of Hopping Frequency Used

### 4.2.1 Limit

At least 15 channels frequencies, and should be equally spaced.

### 4.2.2 Test Setup



### 4.2.3 Test Procedures

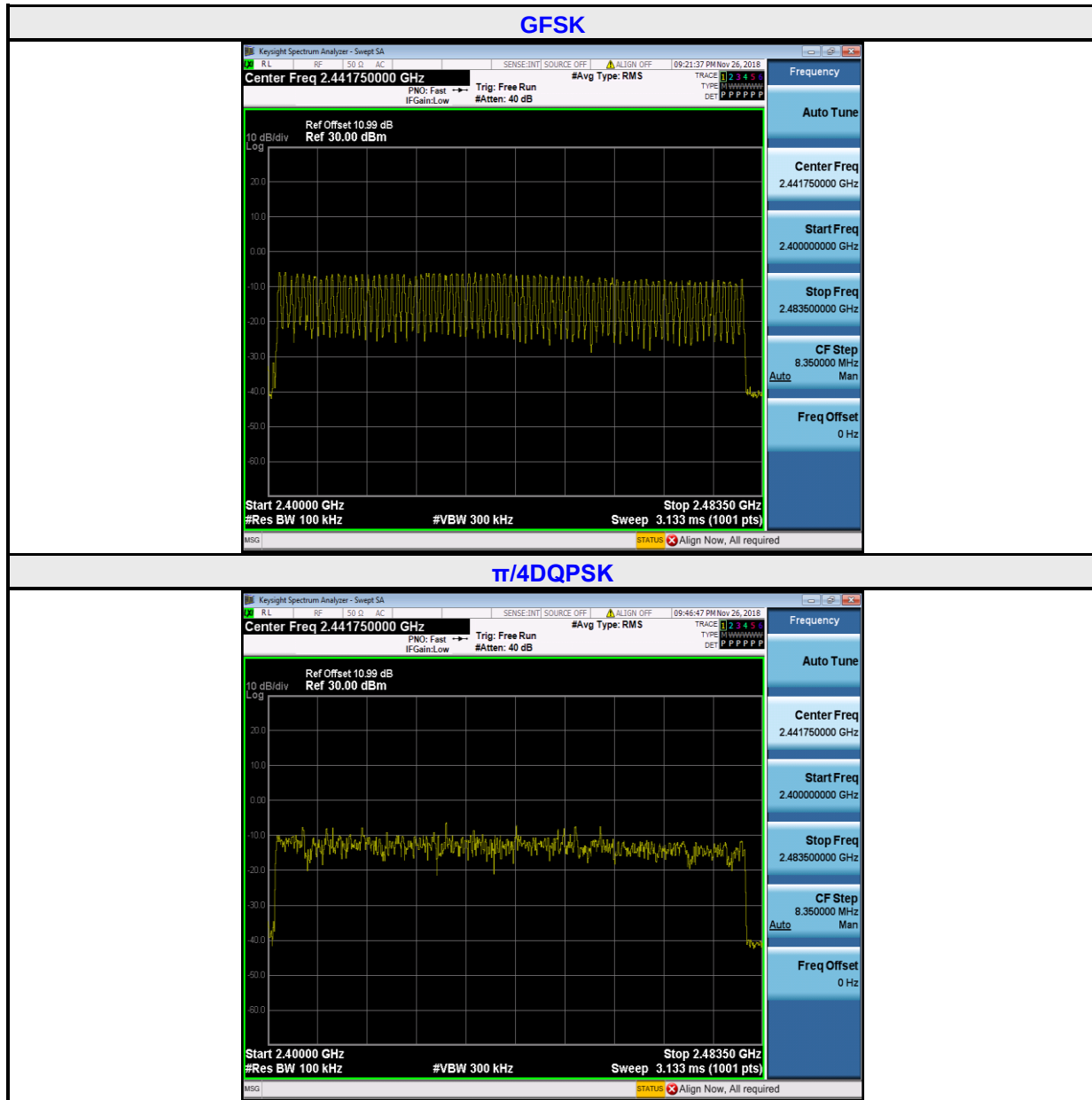
- Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- Set the SA on View mode and then plot the result on SA screen.
- Repeat above procedures until all frequencies measured were complete.

### 4.2.4 Deviation of Test Standard

No deviation.

#### 4.2.5 Test Results

There are 79 hopping frequencies in the hopping mode. Please refer to next page for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

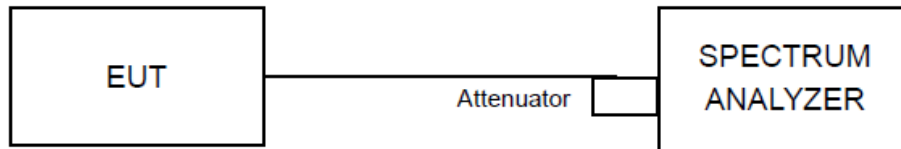


### 4.3 Dwell Time on Each Channel

#### 4.3.1 Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

#### 4.3.2 Test Setup



#### 4.3.3 Test Procedures

- Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- Adjust the center frequency of SA on any frequency to be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- Repeat above procedures until all different time-slot modes have been completed.

#### 4.3.4 Deviation of Test Standard

No deviation.

#### 4.3.5 Test Results

##### GFSK

| Mode | Number of transmission in a<br>31.6 (79Hopping*0.4) | Length of<br>transmission time<br>(msec) | Result<br>(msec) | Limit<br>(msec) |
|------|-----------------------------------------------------|------------------------------------------|------------------|-----------------|
| DH1  | 330                                                 | 0.37                                     | 123              | 400             |
| DH3  | 100                                                 | 1.63                                     | 163              | 400             |
| DH5  | 10                                                  | 2.88                                     | 29               | 400             |

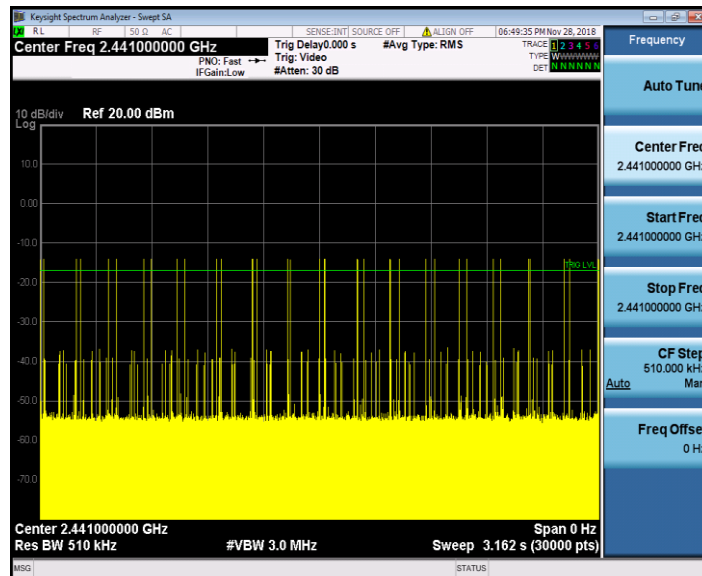
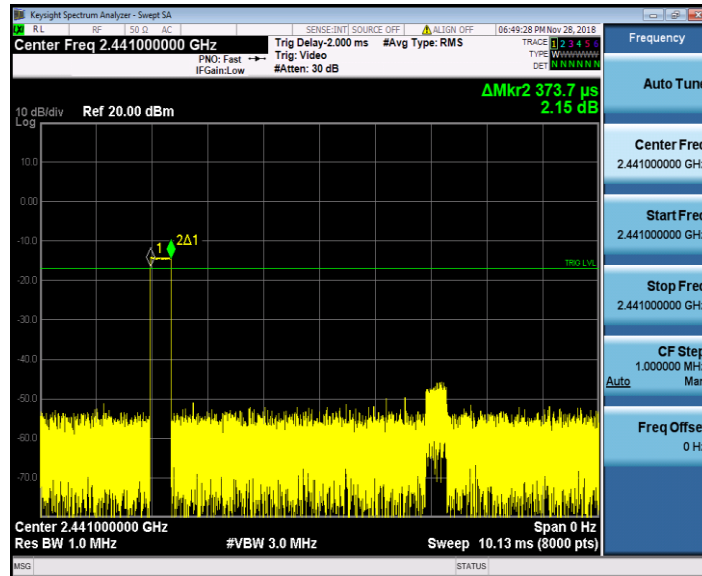
##### $\pi/4$ DQPSK

| Mode | Number of transmission in a<br>31.6 (79Hopping*0.4) | Length of<br>transmission time<br>(msec) | Result<br>(msec) | Limit<br>(msec) |
|------|-----------------------------------------------------|------------------------------------------|------------------|-----------------|
| DH1  | 320                                                 | 0.38                                     | 123              | 400             |
| DH3  | 100                                                 | 1.64                                     | 164              | 400             |
| DH5  | 100                                                 | 2.89                                     | 289              | 400             |

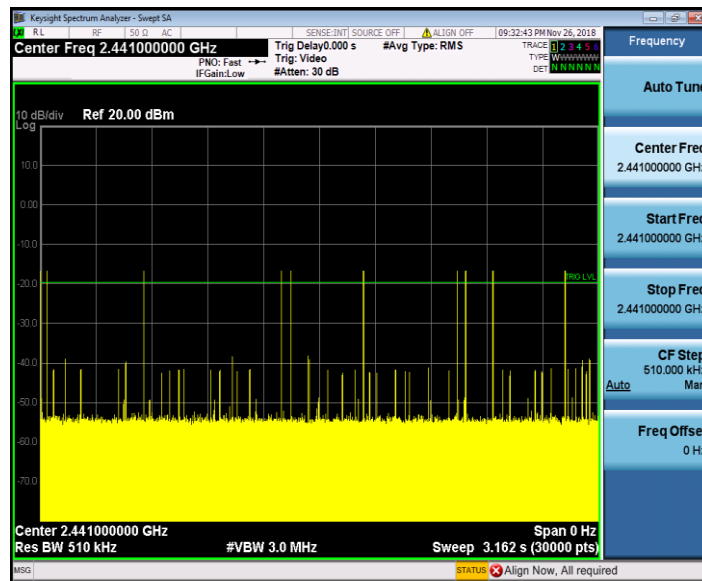
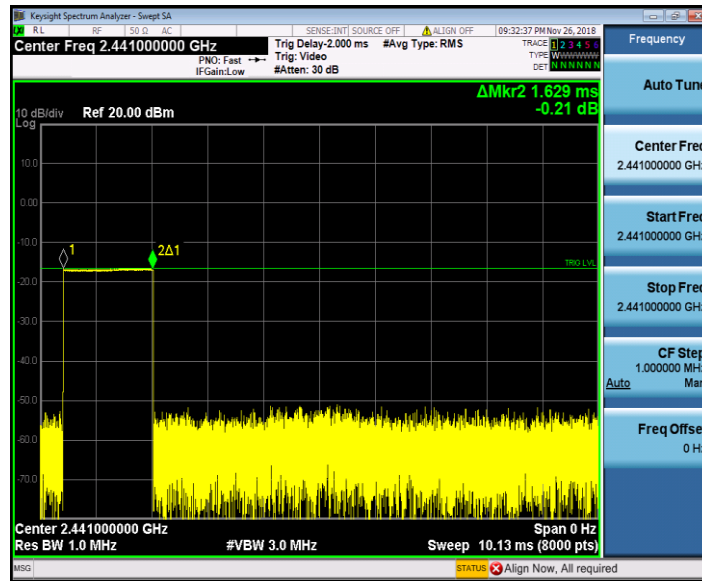
**NOTE:** Test plots of the transmitting time slot are shown on next page.

## GFSK

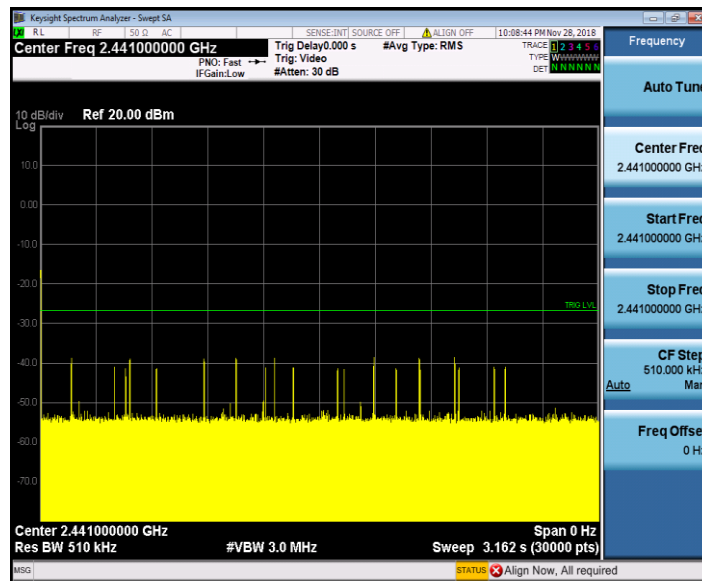
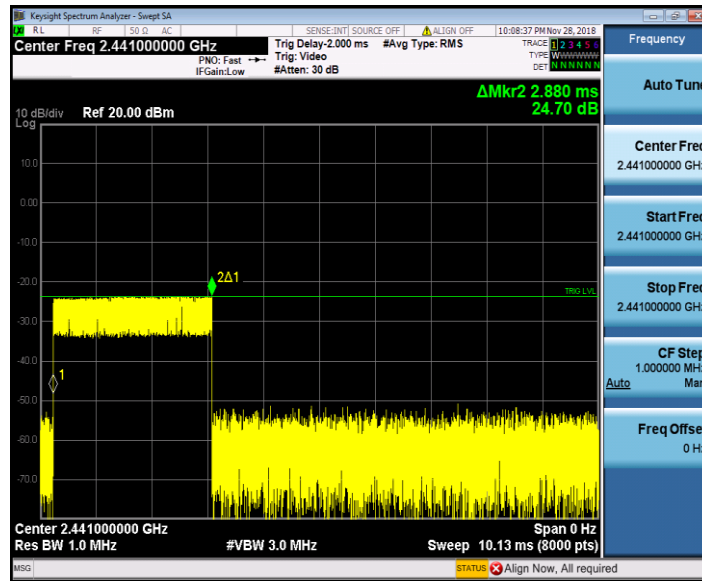
### DH1



### DH3

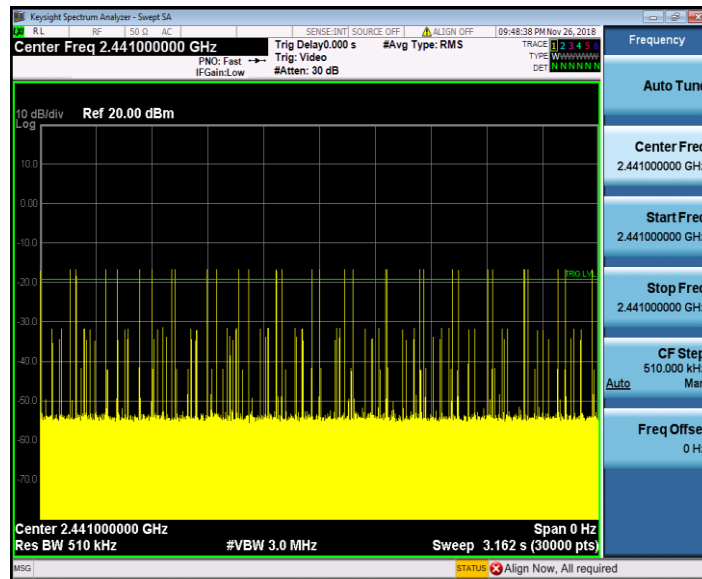
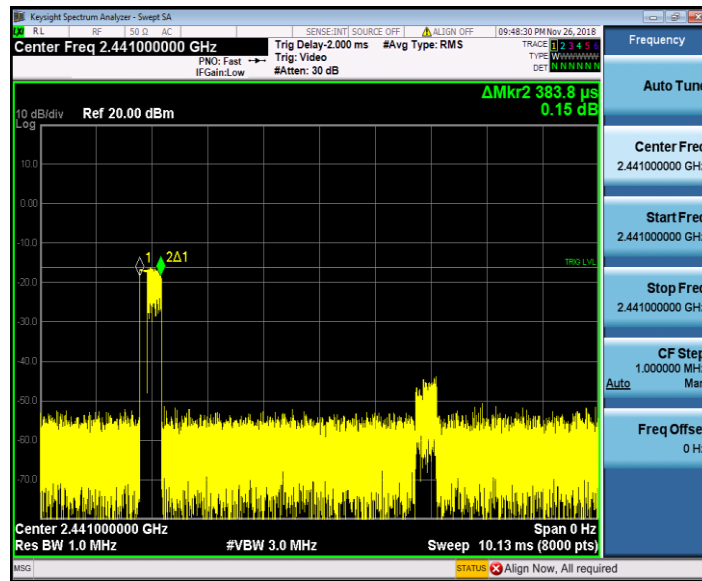


## DH5

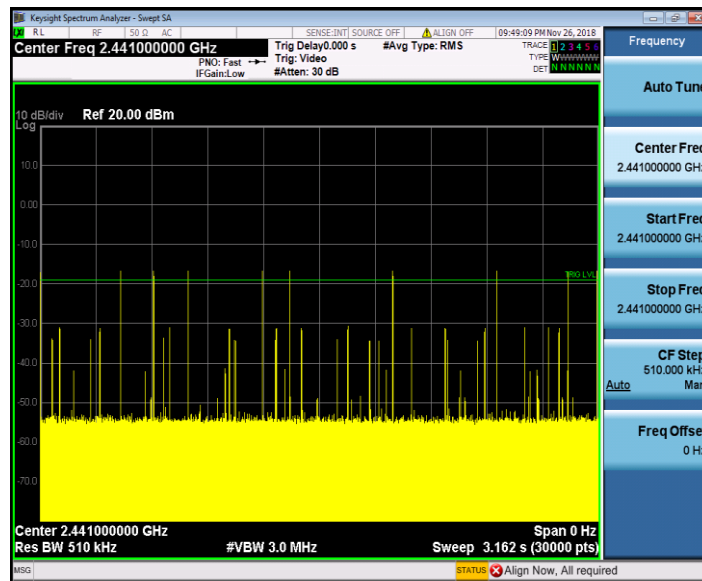
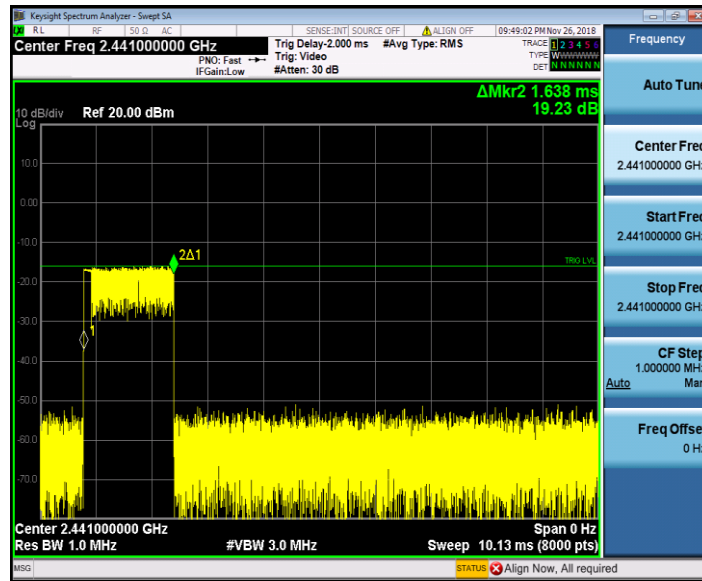


$\pi/4$ DQPSK

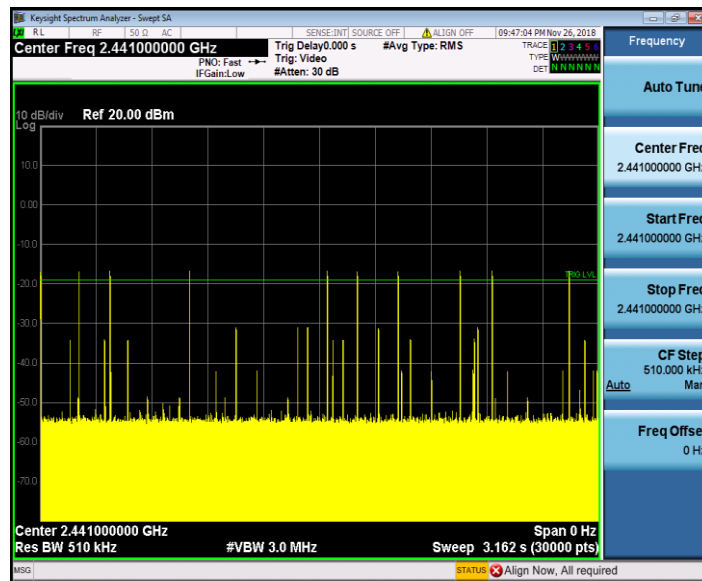
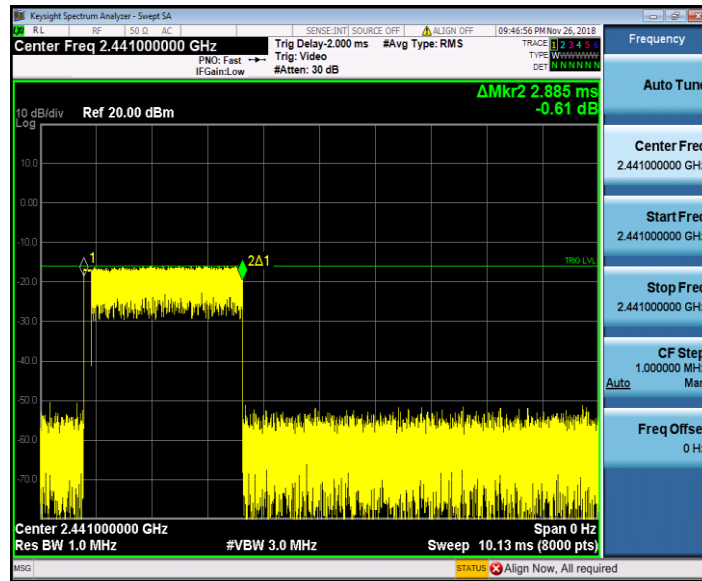
DH1



### DH3



## DH5

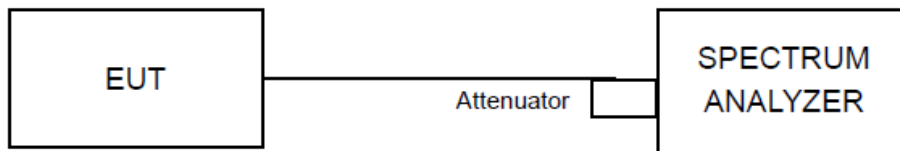


## 4.4 Channel Bandwidth

### 4.4.1 Limit

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dB bandwidth of hopping channel shall be a minimum limit for the hopping channel separation.

### 4.4.2 Test Setup



### 4.4.3 Test Procedures

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- Repeat above procedures until all frequencies measured were complete.

### 4.4.4 Deviation of Test Standard

No deviation.

### 4.4.5 EUT Operating Condition

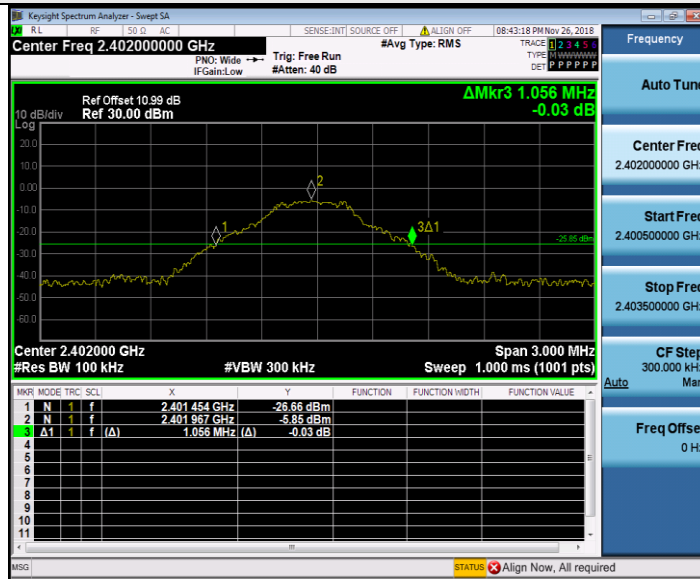
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

#### 4.4.6 Test Results

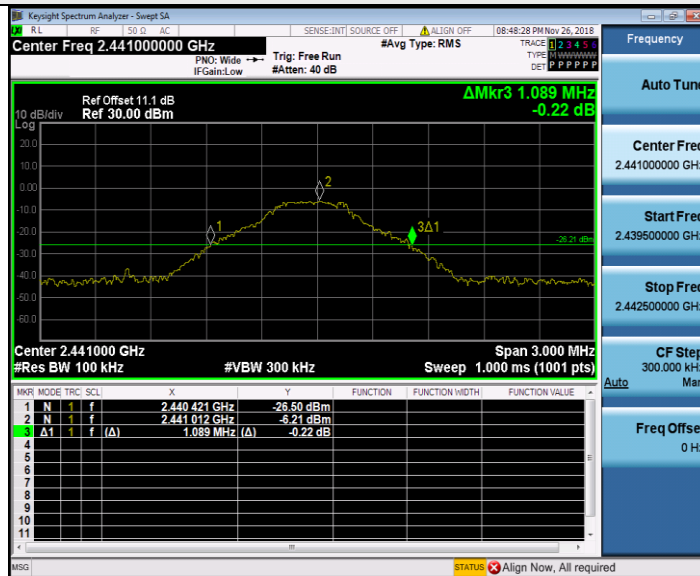
| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) |               |
|---------|-----------------|----------------------|---------------|
|         |                 | GFSK                 | $\pi/4$ DQPSK |
| 0       | 2402            | 1.056                | 1.377         |
| 39      | 2441            | 1.089                | 1.359         |
| 78      | 2480            | 1.101                | 1.413         |

#### Spectrum Plot

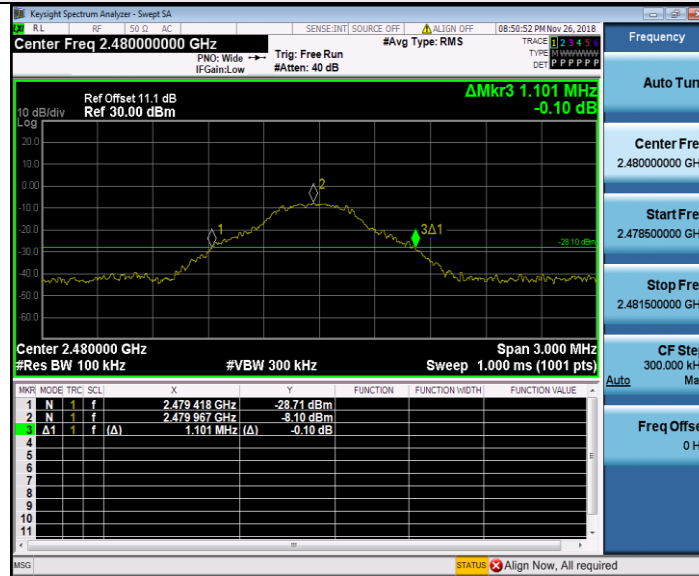
##### GFSK 2402MHz



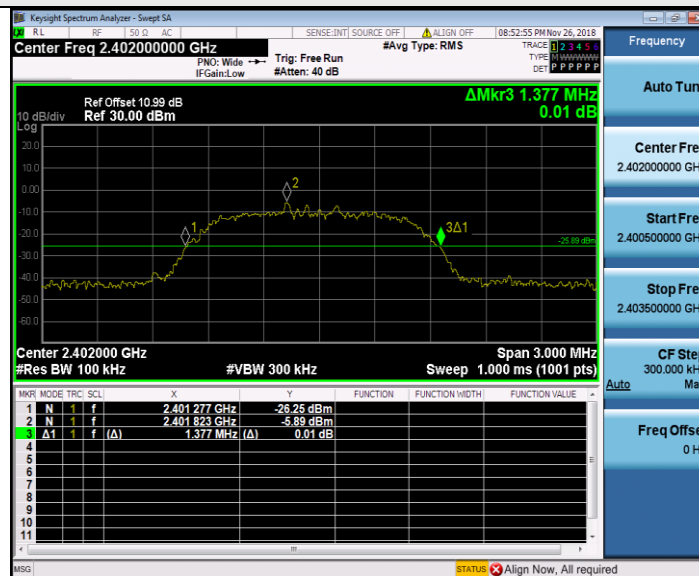
##### GFSK 2441MHz



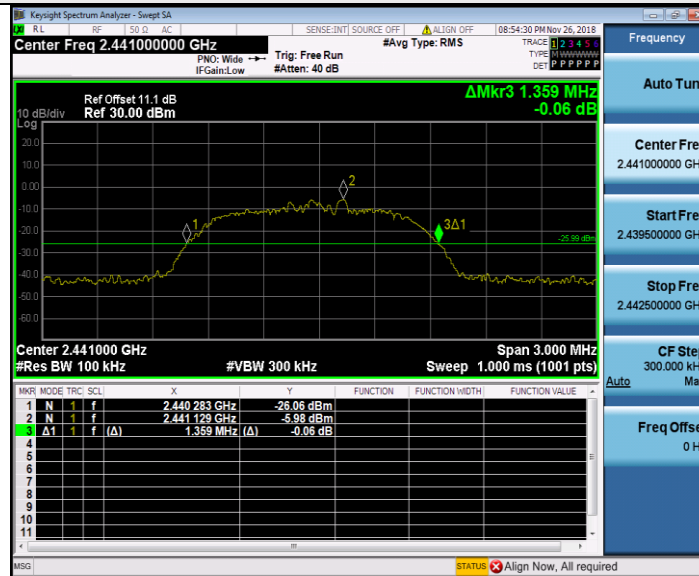
## GFSK 2480MHz



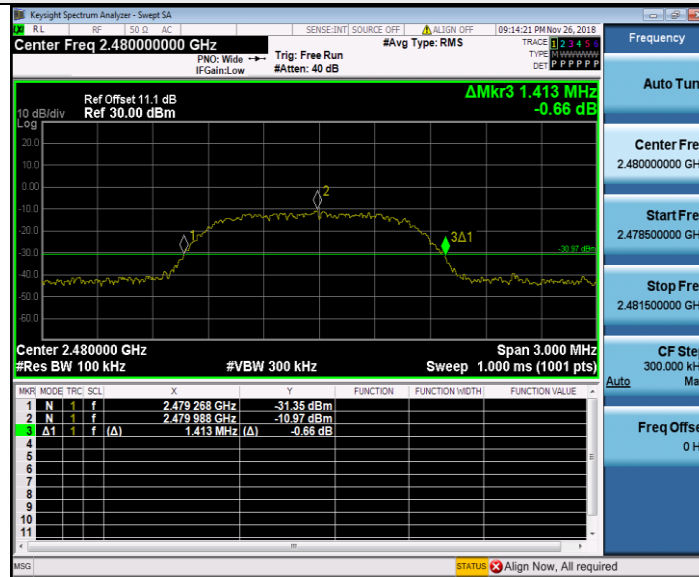
## $\pi/4$ DQPSK 2402MHz



## $\pi/4$ DQPSK 2441MHz



## $\pi/4$ DQPSK 2480MHz

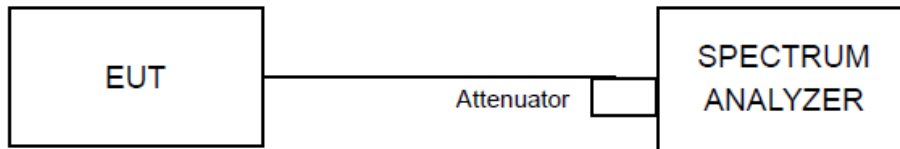


## 4.5 Hopping Channel Separation

### 4.5.1 Limit

At least 25kHz or two-third of 20dB hopping channel bandwidth (whichever is greater)

### 4.5.2 Test Setup



### 4.5.3 Test Procedures

Measurement Procedure REF

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
- By using the MaxHold function record the separation of two adjacent channels.
- Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
- Repeat above procedures until all frequencies measured were complete.

### 4.5.4 Deviation of Test Standard

No deviation.

#### 4.5.5 Test Results

| Test Mode     | Channel | Result | Limit | Pass / Fail |
|---------------|---------|--------|-------|-------------|
| GFSK          | HOP     | 0.866  | 0.734 | PASS        |
| $\pi/4$ DQPSK | HOP     | 1.316  | 0.942 | PASS        |

#### Spectrum Plot

##### GFSK



##### $\pi/4$ DQPSK

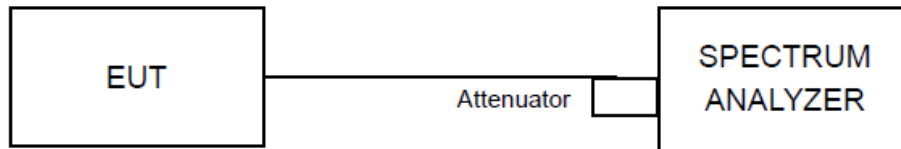


## 4.6 Maximum Output Power

### 4.6.1 Limit

The Maximum Output Power Measurement is 125mW(21dBm).

### 4.6.2 Test Setup



### 4.6.3 Test Procedures

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3MHz RBW and 10 MHz VBW.
- Measure the captured power within the band and recording the plot.
- Repeat above procedures until all frequencies required were complete.

### 4.6.4 Deviation of Test Standard

No deviation.

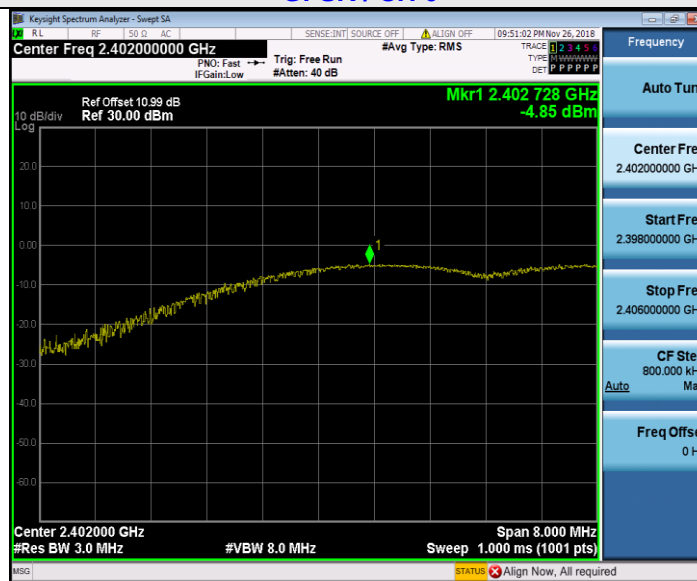
### 4.6.5 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

#### 4.6.6 Test Results

| Test Mode     | Channel | Result (dBm) | Limit (dBm) | Pass / Fail |
|---------------|---------|--------------|-------------|-------------|
| GFSK          | 0       | -4.85        | 21          | PASS        |
| GFSK          | 39      | -4.86        | 21          | PASS        |
| GFSK          | 78      | -6.87        | 21          | PASS        |
| $\pi/4$ DQPSK | 0       | -4.63        | 21          | PASS        |
| $\pi/4$ DQPSK | 39      | -4.23        | 21          | PASS        |
| $\pi/4$ DQPSK | 78      | -6.17        | 21          | PASS        |

#### GFSK / CH 0



#### GFSK / CH 39



### GFSK / CH 78



### $\pi/4$ DQPSK / CH 0

