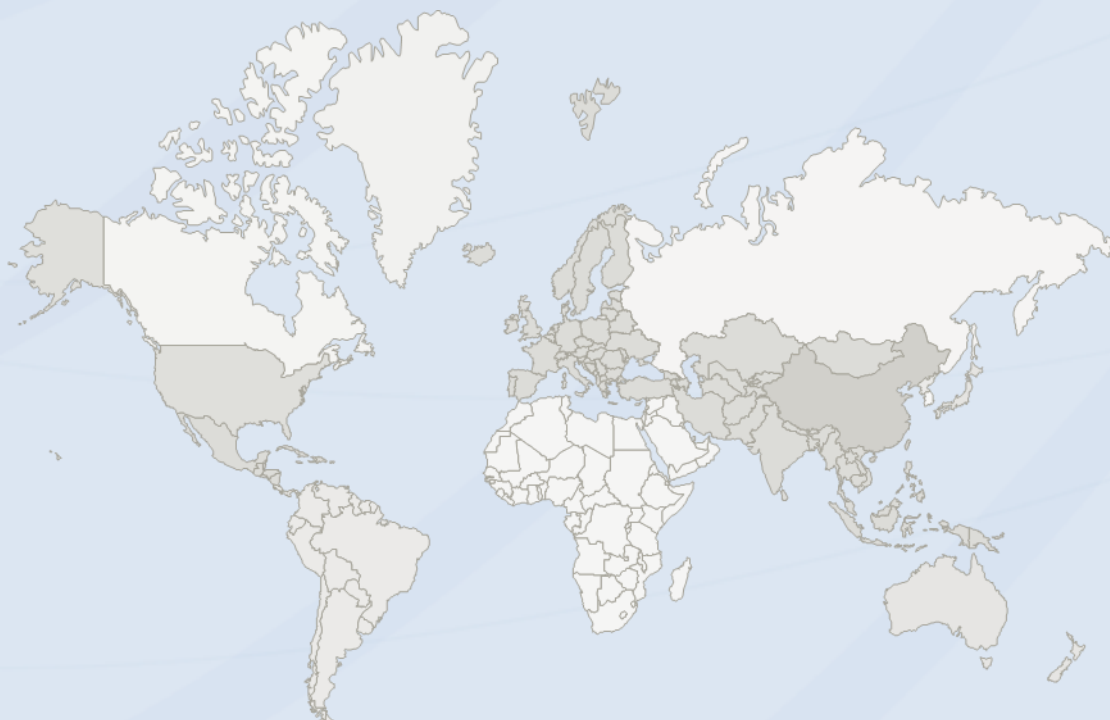


# TEST REPORT

**Report No.** ..... : NTC-ER2103011  
**Applicant's name** ..... : Qinwei Technology Co., LIMITED  
**Address** ..... : Room904, Block B, Dongpu Fuyuan, Shatoujiao,  
Yantian Districk, Shenzhen



## DONGGUAN NEW TESTING CENTRE CO., LTD

Ⓞ Address: 3F, No. 1 the 1st North Industry Road, Songshan Lake Science & Technology Park, Dongguan, Guangdong, China, 523808

☎ Tel: +86-769-22212079

🌐 Web: <http://www.ntc-cert.com>

✉ E-mail: dave@ntc-cert.com

## TABLE OF CONTENTS

|                                                           |          |
|-----------------------------------------------------------|----------|
| <b>Test Report Declare</b> .....                          | <b>3</b> |
| 1. Summary of test results .....                          | 4        |
| 2. General test information .....                         | 5        |
| 2.1. Description of EUT .....                             | 5        |
| 2.2. Detail models.....                                   | 6        |
| 2.3. Block diagram EUT configuration for test .....       | 6        |
| 2.4. Test environment conditions .....                    | 7        |
| 2.5. Measurement uncertainty .....                        | 8        |
| 2.6. Test Peripheral List.....                            | 8        |
| 3. Power Line Conducted Emission Test .....               | 9        |
| 3.1. Test equipment .....                                 | 9        |
| 3.2. Block diagram of test setup.....                     | 9        |
| 3.3. Power Line Conducted Emission Limits (Class B) ..... | 9        |
| 3.4. Test Procedure.....                                  | 10       |
| 3.5. Test Result.....                                     | 10       |
| 4. Radiated emission test.....                            | 13       |
| 4.1. Test equipment .....                                 | 13       |
| 4.2. Block diagram of test setup.....                     | 14       |
| 4.3. Limit .....                                          | 16       |
| 4.4. Test Procedure.....                                  | 17       |
| 4.5. Test result .....                                    | 17       |
| 5. Maximum Peak Output Power .....                        | 23       |
| 5.1. Applied procedures / Limit.....                      | 23       |
| 5.2. Test procedure .....                                 | 23       |
| 5.3. Deviation from standard.....                         | 23       |
| 5.4. Test setup .....                                     | 23       |
| 5.5. TEST RESULTS .....                                   | 23       |
| 6. BANDWIDTH TEST .....                                   | 29       |
| 6.1. Applied procedures / Limit.....                      | 29       |
| 6.2. Test procedure .....                                 | 29       |
| 6.3. Deviation from standard.....                         | 29       |
| 6.4. Test setup .....                                     | 29       |
| 6.5. Test results .....                                   | 29       |

|       |                                     |    |
|-------|-------------------------------------|----|
| 7.    | Carrier Frequencies Separated ..... | 35 |
| 7.1.  | Applied procedures / Limit.....     | 35 |
| 7.2.  | Test procedure .....                | 35 |
| 7.3.  | Deviation from standard.....        | 35 |
| 7.4.  | Test setup .....                    | 35 |
| 7.5.  | Test results .....                  | 35 |
| 8.    | Hopping Channel Number.....         | 41 |
| 8.1.  | Applied procedures / Limit.....     | 41 |
| 8.2.  | Test procedure .....                | 41 |
| 8.3.  | Deviation from standard.....        | 41 |
| 8.4.  | Test setup .....                    | 41 |
| 8.5.  | Test result .....                   | 41 |
| 9.    | Dwell time .....                    | 46 |
| 9.1.  | Applied procedures / Limit.....     | 46 |
| 9.2.  | Test procedure .....                | 46 |
| 9.3.  | Deviation from standard.....        | 46 |
| 9.4.  | Test setup .....                    | 46 |
| 9.5.  | Test result .....                   | 46 |
| 10.   | Band edge.....                      | 61 |
| 10.1. | Applied procedures / Limit.....     | 61 |
| 10.2. | Test procedure .....                | 61 |
| 10.3. | Deviation from standard.....        | 61 |
| 10.4. | Test setup .....                    | 61 |
| 10.5. | Test results .....                  | 61 |
| 11.   | Conducted Spurious Emissions.....   | 68 |
| 11.1. | Applied procedures / Limit.....     | 68 |
| 11.2. | Test procedure .....                | 68 |
| 11.3. | Deviation from standard.....        | 68 |
| 11.4. | Test setup .....                    | 68 |
| 11.5. | Test results .....                  | 68 |
| 12.   | Antenna Requirement.....            | 79 |
| 12.1. | Standard requirement .....          | 79 |
| 12.2. | EUT Antenna.....                    | 79 |
| 13.   | Test setup photograph.....          | 80 |
| 14.   | Photos of the EUT .....             | 82 |

## TEST REPORT DECLARE

|                             |   |                                                                                                                      |
|-----------------------------|---|----------------------------------------------------------------------------------------------------------------------|
| <b>FCC ID</b>               | : | 2AS3C-BT50RTK                                                                                                        |
| <b>Applicant</b>            | : | Qinwei Technology Co., LIMITED                                                                                       |
| <b>Address</b>              | : | Room904, Block B, Dongpu Fuyuan, Shatoujiao, Yantian<br>Districk, Shenzhen                                           |
| <b>Equipment under Test</b> | : | USB Bluetooth 5.0 Adapter                                                                                            |
| <b>Model No</b>             | : | BT50RTK                                                                                                              |
| <b>Trade Mark</b>           | : | N/A                                                                                                                  |
| <b>Manufacturer</b>         | : | Qinwei Technology Co., LIMITED                                                                                       |
| <b>Address</b>              | : | Room904, Block B, Dongpu Fuyuan, Shatoujiao, Yantian<br>Districk, Shenzhen                                           |
| <b>Test Laboratory</b>      | : | Dongguan New Testing Centre Co., Ltd                                                                                 |
| <b>Address</b>              | : | 3F, No. 1 the 1st North Industry Road, Songshan Lake Science<br>&Technology Park, Dongguan, Guangdong, China, 523808 |

### Test Standard Used:

FCC Rules and Regulations Part 15 Subpart C: 2017, ANSI C63.10:2013.  
RSS-247: Issue 2 February 2017, RSS-Gen: March 6, 2019.

### We Declare:

The equipment described above is tested by Dongguan New Testing Centre Co., Ltd and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Dongguan New Testing Centre Co., Ltd is assumed of full responsibility for the accuracy and completeness of these tests.

**After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above standards.**

|                      |                              |                        |              |
|----------------------|------------------------------|------------------------|--------------|
| <b>Report No.:</b>   | NTC-ER2103011                |                        |              |
| <b>Date of Test:</b> | Feb.20, 2021 to Mar.08, 2021 | <b>Date of Report:</b> | Mar.09, 2021 |

### Prepared By:

*Jeffrey Zhang*  
**Jeffrey Zhang/Engineer**



*Dave*  
**Dave Gao/LAB Manager**

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan New Testing Centre Co., Ltd

## 1. Summary of test results

| Description of Test Item      | Standard                                                                      | Results |
|-------------------------------|-------------------------------------------------------------------------------|---------|
| Antenna Requirement           | FCC Part 15 Subpart C:2019<br>ANSI C63.10:2013<br>RSS-247: 2017; RSS-Gen:2019 | PASS    |
| Conduction Emissions          | FCC Part 15 Subpart C:2019<br>ANSI C63.10:2013<br>RSS-247: 2017; RSS-Gen:2019 | PASS    |
| Radiated Emissions            | FCC Part 15 Subpart C:2019<br>ANSI C63.10:2013<br>RSS-247: 2017; RSS-Gen:2019 | PASS    |
| Carrier Frequencies Separated | FCC Part 15 Subpart C:2019<br>ANSI C63.10:2013<br>RSS-247: 2017; RSS-Gen:2019 | PASS    |
| Bandwidth                     | FCC Part 15 Subpart C:2019<br>ANSI C63.10:2013<br>RSS-247: 2017; RSS-Gen:2019 | PASS    |
| Hopping Channel Number        | FCC Part 15 Subpart C:2019<br>ANSI C63.10:2013<br>RSS-247: 2017; RSS-Gen:2019 | PASS    |
| Dwell Time                    | FCC Part 15 Subpart C:2019<br>ANSI C63.10:2013<br>RSS-247: 2017; RSS-Gen:2019 | PASS    |
| Maximum Peak Output Power     | FCC Part 15 Subpart C:2019<br>ANSI C63.10:2013<br>RSS-247: 2017; RSS-Gen:2019 | PASS    |
| Band edge                     | FCC Part 15 Subpart C:2019<br>ANSI C63.10:2013<br>RSS-247: 2017; RSS-Gen:2019 | PASS    |
| Conducted Spurious Emissions  | FCC Part 15 Subpart C:2019<br>ANSI C63.10:2013<br>RSS-247: 2017; RSS-Gen:2019 | PASS    |

## 2. General test information

### 2.1. Description of EUT

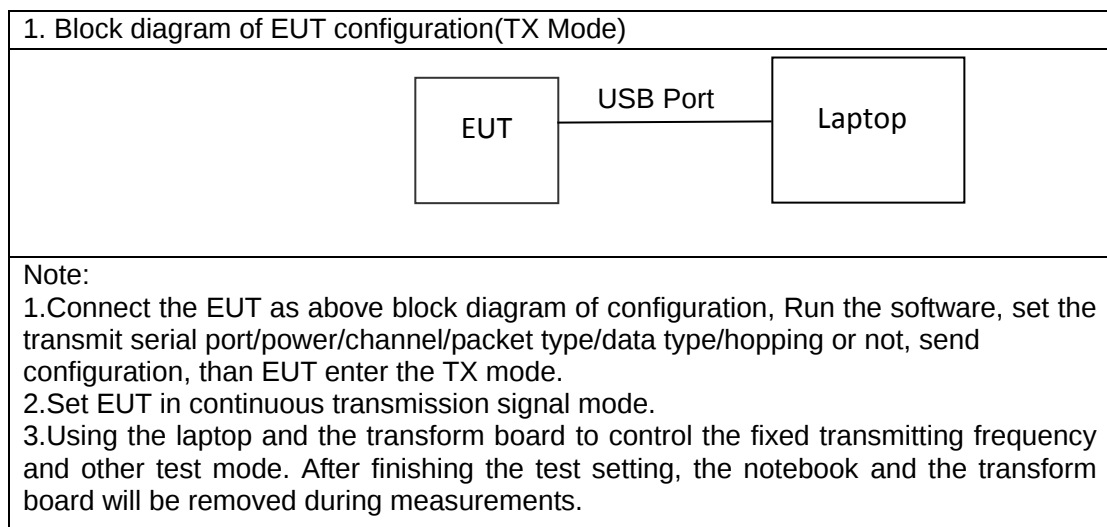
|                          |   |                                             |
|--------------------------|---|---------------------------------------------|
| EUT* Name                | : | USB Bluetooth 5.0 Adapter                   |
| Test model               | : | BT50RTK                                     |
| EUT function description | : | Please reference user manual of this device |
| Power supply             | : | 5Vdc from USB port                          |
| Trade mark               | : | N/A                                         |
| Operation frequency      | : | 2402-2480MHz                                |
| Number of channel        | : | 79                                          |
| Modulation Technology    | : | GFSK, $\pi/4$ -DQPSK, 8DPSK                 |
| Bluetooth version        | : | 5.0                                         |
| H/W No.                  | : | V 1.0                                       |
| S/W No.                  | : | V 1.0                                       |
| BT Antenna Type          | : | PCB antenna                                 |
| BT Antenna Gain          | : | 1.5 dBi                                     |

Note: 1,EUT is the ab. of equipment under test.

## 2.2. Detail models

| Model   | Rating             | Note |
|---------|--------------------|------|
| BT50RTK | 5Vdc from USB port | /    |

## 2.3. Block diagram EUT configuration for test



## 2.4. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

(1) E.U.T. test conditions:

15.31(e): For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

(2) Test frequencies:

According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and. If required reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

| Frequency range over which device operates | Number of frequencies | Location in the range of operation          |
|--------------------------------------------|-----------------------|---------------------------------------------|
| 1 MHz or less                              | 1                     | Middle                                      |
| 1 to 10 MHz                                | 2                     | 1 near top and 1 near bottom                |
| More than 10 MHz                           | 3                     | 1 near top, 1 near middle and 1 near bottom |

(3) Frequency range of radiated measurements:

According to the 15.33, the test range will be up to the tenth harmonic of the highest fundamental frequency.

(4) Pre-test the EUT in all transmitting mode at the lowest (2402 MHz), middle (2441 MHz) and highest (2480 MHz) channel with different data packet and conducted to determine the worst-case mode,

The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

## 2.5. Measurement uncertainty

| Test Item                                                 | Uncertainty           |
|-----------------------------------------------------------|-----------------------|
| Uncertainty for Conduction emission test                  | 2.44dB                |
| Uncertainty for Radiation Emission test<br>(30MHz – 1GHz) | 3.14 dB (Polarize: V) |
|                                                           | 3.16 dB (Polarize: H) |
| Uncertainty for Radiation Emission test<br>(1GHz – 18GHz) | 4.27 dB (Polarize: V) |
|                                                           | 4.51 dB (Polarize: H) |
| Uncertainty for conducted RF Power                        | 0.63dB                |
| Stop Transmitting Time Test                               | ±0.5%                 |
| Uncertainty for frequency error                           | 5.8 x 10-8            |

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

## 2.6. Test Peripheral List

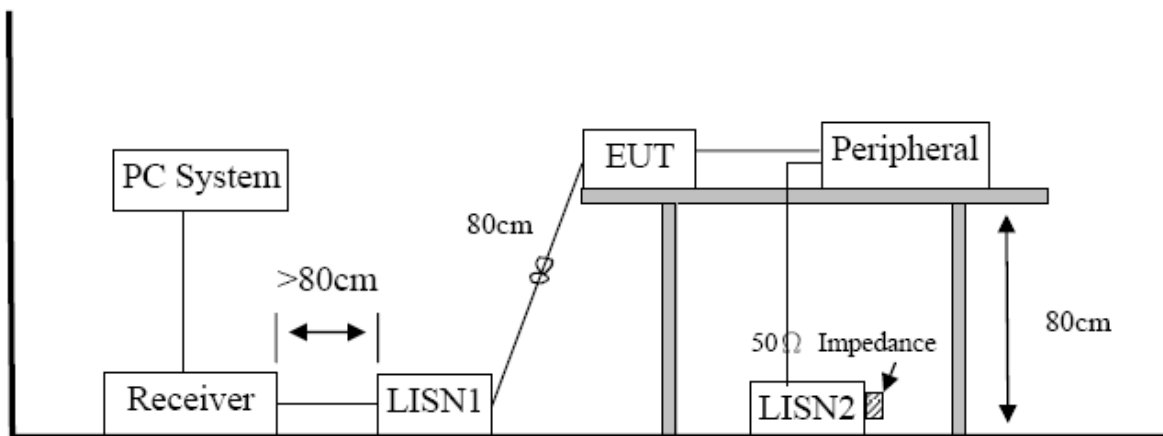
| No. | Equipment     | Manufacturer | FCC approved | Model No. | Serial No. | signal cable |
|-----|---------------|--------------|--------------|-----------|------------|--------------|
| 1   | Laptop        | lenovo       | DOC          | 7457      | 7457A82    | N/A          |
| 2   | AC/DC Adapter | Yuewei       | YW-212W      | --        | --         | 2            |

### 3. Power Line Conducted Emission Test

#### 3.1. Test equipment

| Item | Equipment            | Manufacturer | Model No.           | Serial No.   | Last Cal.  | Cal. Interval |
|------|----------------------|--------------|---------------------|--------------|------------|---------------|
| 1    | Test Receiver        | R&S          | ESPI                | 100146       | 2021-01-10 | 1 Year        |
| 2    | LISN                 | R&S          | ENV216              | 3650.6550.06 | 2020-05-25 | 1 Year        |
| 3    | Pulse Limiter        | R&S          | ESH3-Z2             | 0357-8810.54 | 2020-05-25 | 1 Year        |
| 4    | RF Cable             | HUBER        | SUCOFLEX100         | 30722/4E     | 2019-05-13 | 2 Year        |
| 5    | MEASUREMENT SOFTWARE | FARAD        | EZ-EMC(VER:1.1.4.2) | N/A          | N/A        | N/A           |

#### 3.2. BLOCK DIAGRAM OF TEST SETUP



#### 3.3. Power Line Conducted Emission Limits (Class B)

| Frequency       | Quasi-Peak Level<br>dB( $\mu$ V) | Average Level<br>dB( $\mu$ V) |
|-----------------|----------------------------------|-------------------------------|
| 150kHz ~ 500kHz | 66 ~ 56*                         | 56 ~ 46*                      |
| 500kHz ~ 5MHz   | 56                               | 46                            |
| 5MHz ~ 30MHz    | 60                               | 50                            |

Note 1: \* Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

### 3.4. Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.3 and test equipment as described in clause 3.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.3 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 KHz.

### 3.5. Test Result

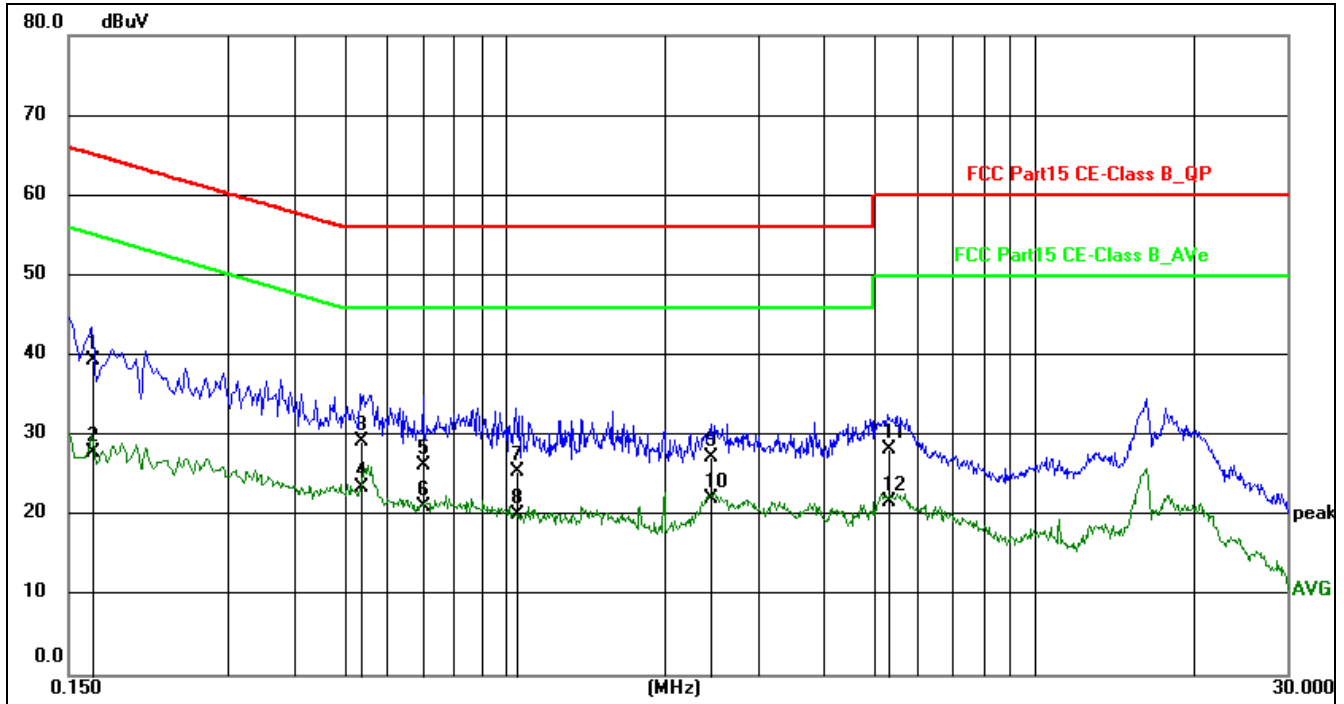
#### **PASS. (See below detailed test result)**

Note1: All emissions not reported below are too low against the prescribed limits.

Note2: "----" means Peak detection; "----" means Average detection

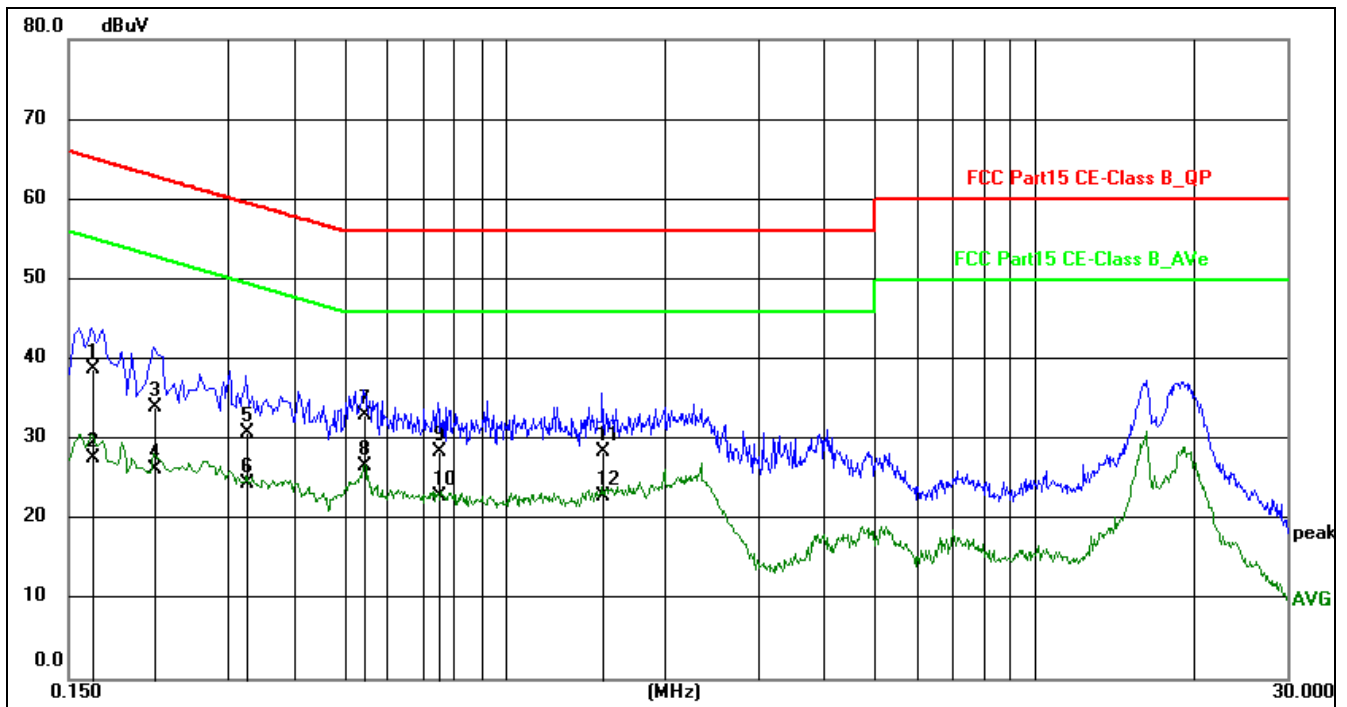
Note3: Measurement = Reading Level + Factor, Margin= Measurement-Limit

## Conducted Emission Test Result



|               |                               |                       |                              |
|---------------|-------------------------------|-----------------------|------------------------------|
| <b>Site:</b>  |                               | <b>Phase:</b> L1      | <b>Temperature(C):</b> 24(C) |
| <b>Limit:</b> | FCC Part15 CE-Class B_QP      |                       | <b>Humidity(%):</b> 63%      |
| <b>EUT:</b>   | USB Bluetooth 5.0 Adapter     | <b>Test Time:</b>     | 2021/2/25                    |
| <b>M/N.:</b>  | BT50RTK                       | <b>Power Rating:</b>  | DC 5V by laptop input        |
|               |                               |                       | AC120V/60Hz                  |
| <b>Mode:</b>  | Tx mode (2402MHz- Worst case) | <b>Test Engineer:</b> |                              |
| <b>Note:</b>  |                               |                       |                              |

| No. | Frequency (MHz) | Reading Level(dBuV) | Factor (dB) | Measure-ment(dBuV) | Limit (dBuV) | Margin (dB) | Detector | Comment |
|-----|-----------------|---------------------|-------------|--------------------|--------------|-------------|----------|---------|
| 1   | 0.1660          | 29.57               | 9.84        | 39.41              | 65.16        | -25.75      | QP       |         |
| 2   | 0.1660          | 18.07               | 9.84        | 27.91              | 55.16        | -27.25      | AVG      |         |
| 3   | 0.5340          | 19.72               | 9.65        | 29.37              | 56.00        | -26.63      | QP       |         |
| 4 * | 0.5340          | 13.79               | 9.65        | 23.44              | 46.00        | -22.56      | AVG      |         |
| 5   | 0.7019          | 16.71               | 9.65        | 26.36              | 56.00        | -29.64      | QP       |         |
| 6   | 0.7019          | 11.41               | 9.65        | 21.06              | 46.00        | -24.94      | AVG      |         |
| 7   | 1.0540          | 15.91               | 9.62        | 25.53              | 56.00        | -30.47      | QP       |         |
| 8   | 1.0540          | 10.53               | 9.62        | 20.15              | 46.00        | -25.85      | AVG      |         |
| 9   | 2.4500          | 17.65               | 9.63        | 27.28              | 56.00        | -28.72      | QP       |         |
| 10  | 2.4500          | 12.54               | 9.63        | 22.17              | 46.00        | -23.83      | AVG      |         |
| 11  | 5.2900          | 18.53               | 9.68        | 28.21              | 60.00        | -31.79      | QP       |         |
| 12  | 5.2900          | 12.14               | 9.68        | 21.82              | 50.00        | -28.18      | AVG      |         |



|               |                               |                       |                              |
|---------------|-------------------------------|-----------------------|------------------------------|
| <b>Site:</b>  |                               | <b>Phase:</b> N       | <b>Temperature(C):</b> 24(C) |
| <b>Limit:</b> | FCC Part15 CE-Class B_QP      |                       | <b>Humidity(%):</b> 63%      |
| <b>EUT:</b>   | USB Bluetooth 5.0 Adapter     | <b>Test Time:</b>     | 2021/2/25                    |
| <b>M/N.:</b>  | BT50RTK                       | <b>Power Rating:</b>  | DC 5V by laptop input        |
|               |                               |                       | AC120V/60Hz                  |
| <b>Mode:</b>  | Tx mode (2402MHz- Worst case) | <b>Test Engineer:</b> |                              |
| <b>Note:</b>  |                               |                       |                              |

| No. | Frequency (MHz) | Reading Level(dBuV) | Factor (dB) | Measurement(dBuV) | Limit (dBuV) | Margin (dB) | Detector | Comment |
|-----|-----------------|---------------------|-------------|-------------------|--------------|-------------|----------|---------|
| 1   | 0.1660          | 28.99               | 9.72        | 38.71             | 65.16        | -26.45      | QP       |         |
| 2   | 0.1660          | 17.95               | 9.72        | 27.67             | 55.16        | -27.49      | AVG      |         |
| 3   | 0.2180          | 24.30               | 9.73        | 34.03             | 62.89        | -28.86      | QP       |         |
| 4   | 0.2180          | 16.51               | 9.73        | 26.24             | 52.89        | -26.65      | AVG      |         |
| 5   | 0.3260          | 20.94               | 9.85        | 30.79             | 59.55        | -28.76      | QP       |         |
| 6   | 0.3260          | 14.72               | 9.85        | 24.57             | 49.55        | -24.98      | AVG      |         |
| 7   | 0.5420          | 23.55               | 9.58        | 33.13             | 56.00        | -22.87      | QP       |         |
| 8 * | 0.5420          | 17.07               | 9.58        | 26.65             | 46.00        | -19.35      | AVG      |         |
| 9   | 0.7500          | 18.78               | 9.62        | 28.40             | 56.00        | -27.60      | QP       |         |
| 10  | 0.7500          | 13.24               | 9.62        | 22.86             | 46.00        | -23.14      | AVG      |         |
| 11  | 1.5300          | 18.82               | 9.67        | 28.49             | 56.00        | -27.51      | QP       |         |
| 12  | 1.5300          | 13.25               | 9.67        | 22.92             | 46.00        | -23.08      | AVG      |         |

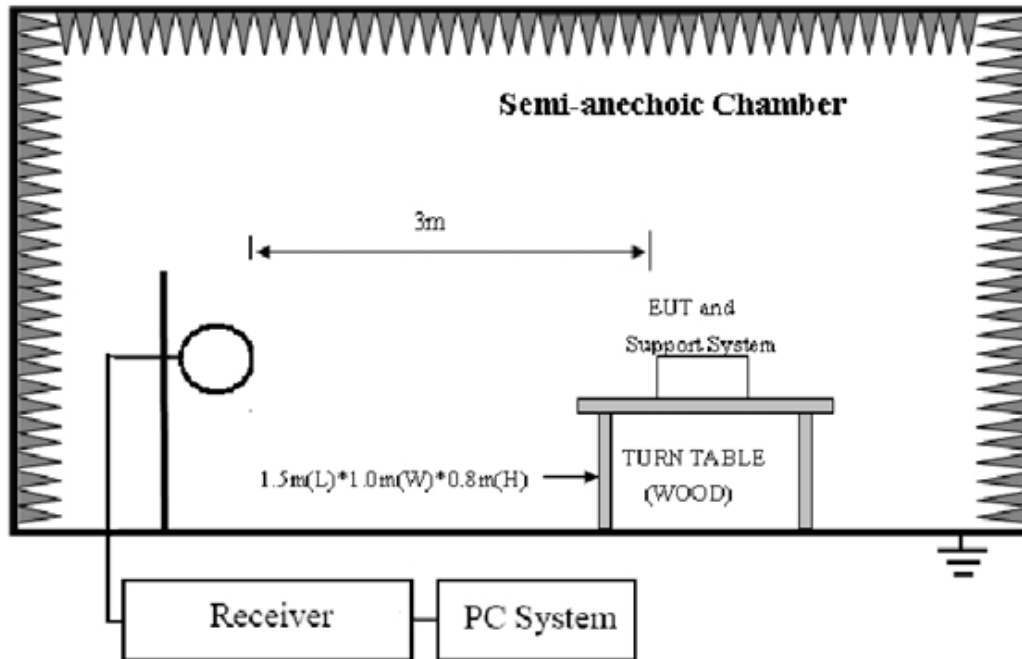
## 4. Radiated emission test

### 4.1. Test equipment

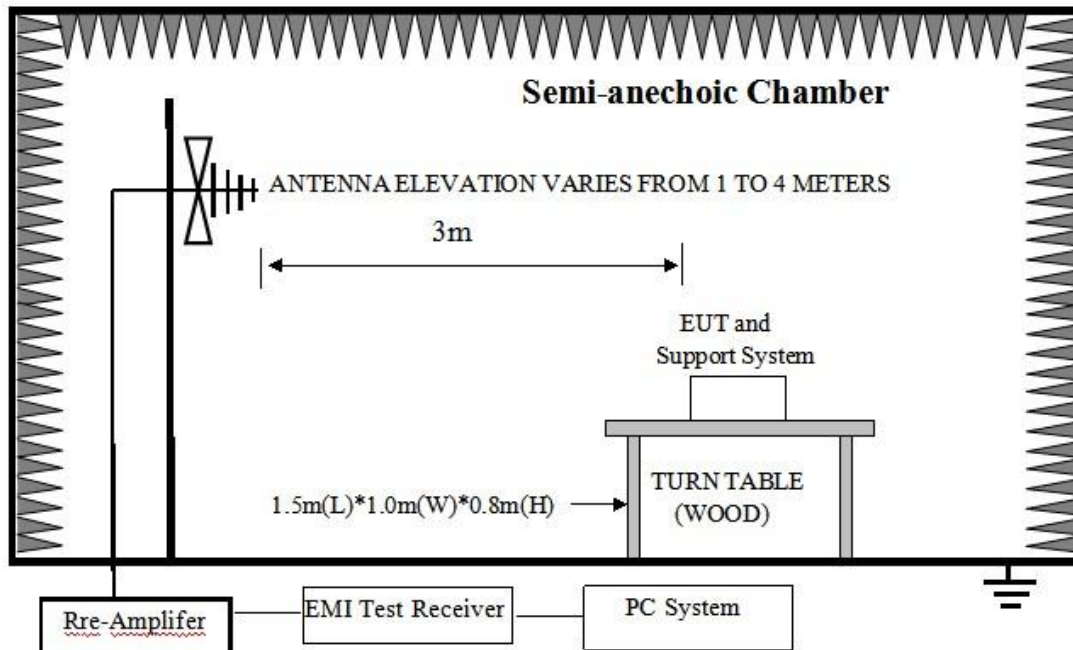
| Item | Equipment                  | Manufacturer | Model No.               | Serial No.         | Last Cal.  | Cal. Interval |
|------|----------------------------|--------------|-------------------------|--------------------|------------|---------------|
| 1    | EMI Test Receiver          | R&S          | ESR                     | 7250-30406<br>7528 | 2020-05-25 | 1Year         |
| 2    | Trilog Broadband Antenna   | Schwarzbeck  | VULB9168                | 00969              | 2019-06-14 | 2 Year        |
| 3    | Active Loop antenna        | Schwarzbeck  | FMZB-1519               | 1519-038           | 2019-05-23 | 2Year         |
| 4    | Horn antenna               | Schwarzbeck  | BBHA9120D               | 453                | 2019-05-23 | 2Year         |
| 5    | Double Ridged Horn Antenna | A.H. System  | SAS-574                 | 584                | 2019-05-23 | 2Year         |
| 6    | Pre-amplifier              | R&S          | SCU18                   | 105326             | 2020-05-25 | 1Year         |
| 7    | RF Cable                   | GORE         | OSQ01Q010<br>78.7       | SN1545847<br>3     | 2019-05-13 | 2 Year        |
| 8    | RF Cable                   | GORE         | OSQ01Q010<br>78.7       | SN1545847<br>4     | 2019-05-13 | 2 Year        |
| 9    | Measurement software       | Farad        | EZ-EMC(VE<br>R:1.1.4.2) | N/A                | N/A        | N/A           |

## 4.2. Block diagram of test setup

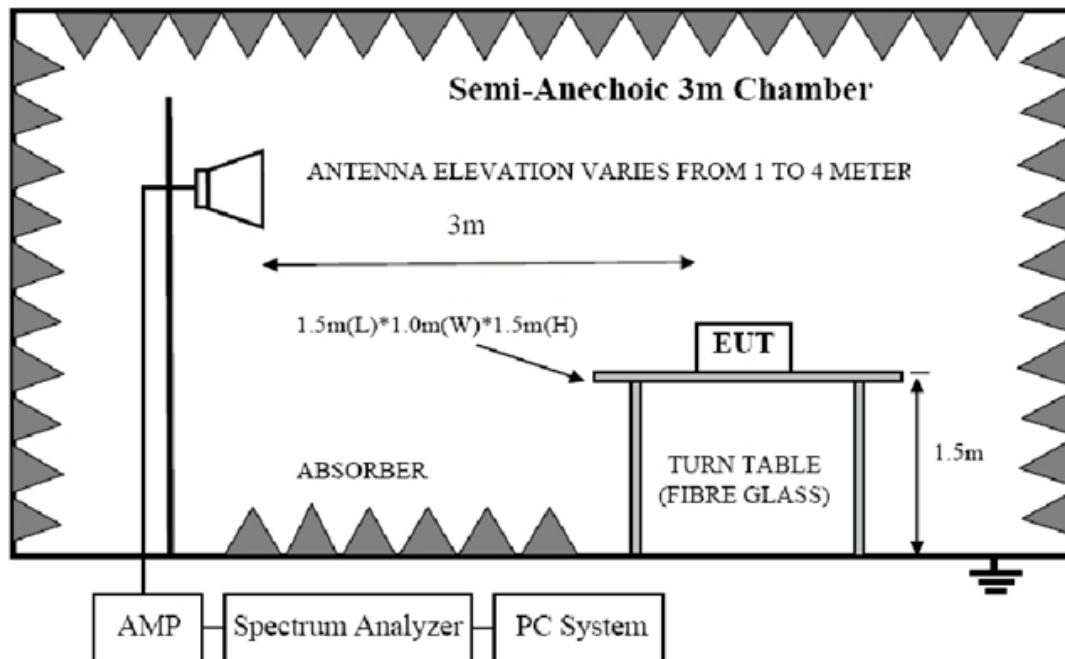
In 3m Anechoic Chamber Test Setup Diagram for 9KHz to 30MHz:



In 3m Anechoic Chamber Test Setup Diagram for 30MHz to 1GHz:



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz:



### 4.3. Limit

FCC 15.205 Restricted frequency band:

| MHz                        | MHz                   | MHz             | GHz              |
|----------------------------|-----------------------|-----------------|------------------|
| 0.090 - 0.110              | 16.42 - 16.423        | 399.9 - 410     | 4.5 - 5.15       |
| <sup>1</sup> 0.495 - 0.505 | 16.69475 - 16.69525   | 608 - 614       | 5.35 - 5.46      |
| 2.1735 - 2.1905            | 16.80425 - 16.80475   | 960 - 1240      | 7.25 - 7.75      |
| 4.125 - 4.128              | 25.5 - 25.67          | 1300 - 1427     | 8.025 - 8.5      |
| 4.17725 - 4.17775          | 37.5 - 38.25          | 1435 - 1626.5   | 9.0 - 9.2        |
| 4.20725 - 4.20775          | 73 - 74.6             | 1645.5 - 1646.5 | 9.3 - 9.5        |
| 6.215 - 6.218              | 74.8 - 75.2           | 1660 - 1710     | 10.6 - 12.7      |
| 6.26775 - 6.26825          | 108 - 121.94          | 1718.8 - 1722.2 | 13.25 - 13.4     |
| 6.31175 - 6.31225          | 123 - 138             | 2200 - 2300     | 14.47 - 14.5     |
| 8.291 - 8.294              | 149.9 - 150.05        | 2310 - 2390     | 15.35 - 16.2     |
| 8.362 - 8.366              | 156.52475 - 156.52525 | 2483.5 - 2500   | 17.7 - 21.4      |
| 8.37625 - 8.38675          | 156.7 - 156.9         | 2690 - 2900     | 22.01 - 23.12    |
| 8.41425 - 8.41475          | 162.0125 - 167.17     | 3260 - 3267     | 23.6 - 24.0      |
| 12.29 - 12.293             | 167.72 - 173.2        | 3332 - 3339     | 31.2 - 31.8      |
| 12.51975 - 12.52025        | 240 - 285             | 3345.8 - 3358   | 36.43 - 36.5     |
| 12.57675 - 12.57725        | 322 - 335.4           | 3600 - 4400     | ( <sup>2</sup> ) |

FCC 15.109 Limit

| Frequency (MHz) | Distance (Meters) | Field Strengths Limits dB(μV)/m |
|-----------------|-------------------|---------------------------------|
| 30--88          | 3                 | 40.0                            |
| 88--216         | 3                 | 43.5                            |
| 216--960        | 3                 | 46.0                            |
| 960--1000       | 3                 | 54.0                            |
| Above 1GHz      | 3                 | Peak: 74.0                      |
|                 | 3                 | Average: 54.0                   |

Note: (1) The smaller limit shall apply at the cross point between two frequency bands.

(2) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

(3) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9-90KHz, 110-490KHz and above 1000MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

(4) At frequencies below 30MHz, measurement may be performed at a distance closer than that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$\text{Limit}_{3m}(\text{dB}\mu\text{V}/\text{m}) = \text{Limit}_{30m}(\text{dB}\mu\text{V}/\text{m}) + 40\log(30m/3m)$$

(5) All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.109, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.109 limits.

#### 4.4. Test Procedure

##### Procedure of Preliminary Test

Configuration EUT to simulate typical usage as described in clause 2.3 and test equipment as described in clause 4.2 of this report.

Mains cables, telephone lines or other connections to auxiliary equipment located outside the test are shall drape to the floor, be fitted with ferrite clamps or ferrite tubes placed on the floor at the point where the cable reaches the floor and then routed to the place where they leave the turntable. No extension cords shall be used to mains receptacle.

EUT height should be 0.8m for below 1GHz and 1.5m for above 1GHz at ground with absorbers.

The antenna was placed at 3 meter away from the EUT as stated in ANSI C63.10. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.

The Analyzer / Receiver quickly scanned from 30MHz to 18GHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

The X, Y, Z three axial are tested and the report only the worst case.

The emissions from 9KHz to 1GHz, QP or average values were measured with EMI receiver with below RBW:

| Frequency band | RBW    |
|----------------|--------|
| 9KHz-150KHz    | 200Hz  |
| 150KHz-30MHz   | 9KHz   |
| 30MHz-1GHz     | 120KHz |

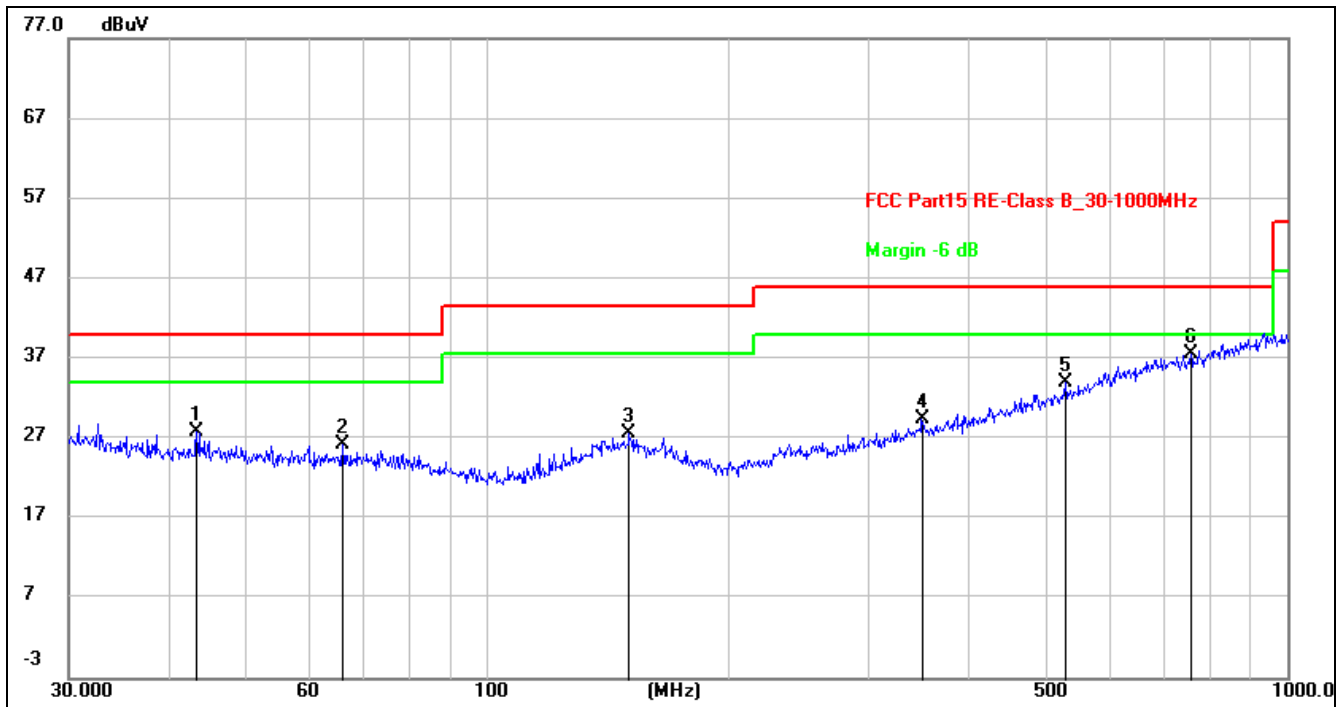
For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RMS detector RBW 1MHz VBW 3MHz for Average measure.

#### 4.5. Test result

**PASS. (See below detailed test result)**

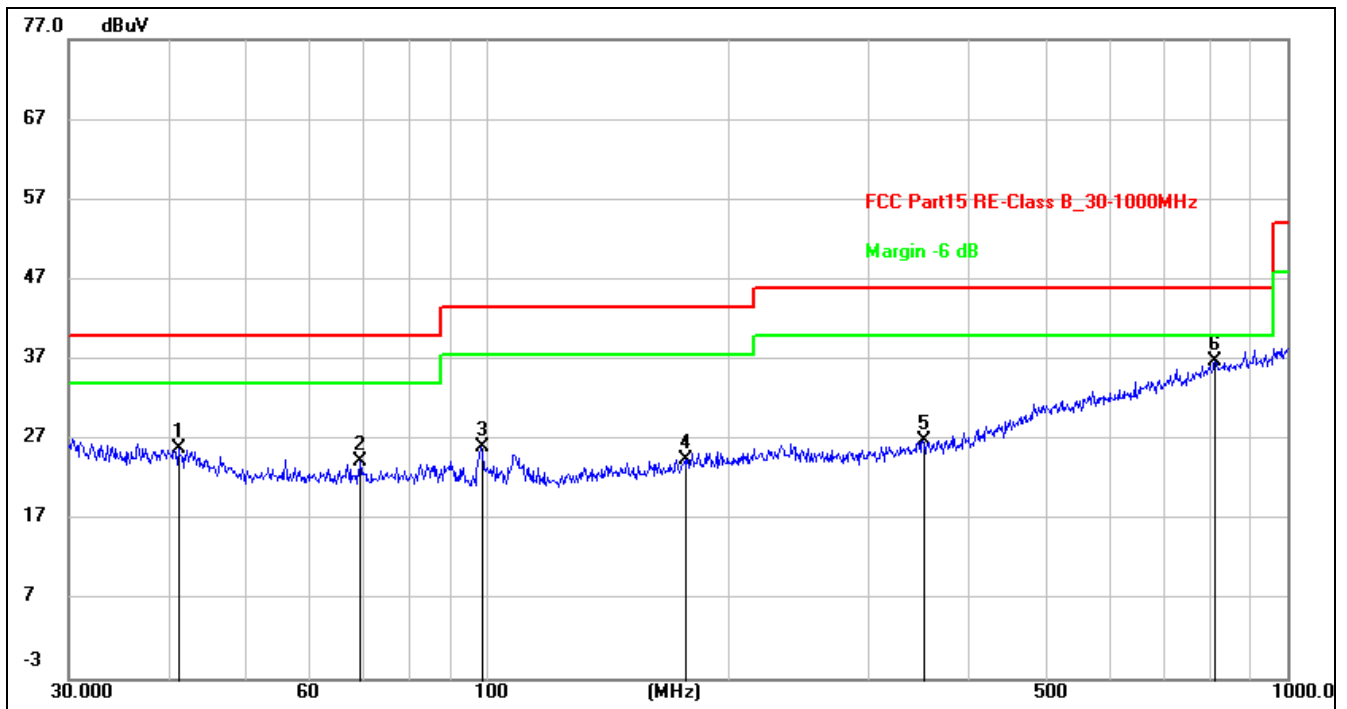
9K-30MHz: Emission detected are more than 20dB below the limit line.

## Radiated Emission Test Result



|               |                                  |                             |                              |
|---------------|----------------------------------|-----------------------------|------------------------------|
| <b>Site:</b>  |                                  | <b>Antenna::</b> Horizontal | <b>Temperature(C):</b> 24(C) |
| <b>Limit:</b> | FCC Part15 RE-Class B_30-1000MHz |                             | <b>Humidity(%):</b> 60%      |
| <b>EUT:</b>   | USB Bluetooth 5.0 Adapter        | <b>Test Time:</b>           | 2021/2/25                    |
| <b>M/N.:</b>  | BT50RTK                          | <b>Power Rating:</b>        | DC 5V by laptop input        |
|               |                                  |                             | AC120V/60Hz                  |
| <b>Mode:</b>  | Tx mode (2402MHz- Worst case)    | <b>Test Engineer:</b>       |                              |
| <b>Note:</b>  |                                  |                             |                              |

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Det. | Height (cm) | Azimuth (deg) | Remark |
|-----|-----------------|----------------|-------------|--------------|--------------|-------------|------|-------------|---------------|--------|
| 1   | 43.3534         | 12.21          | 15.67       | 27.88        | 40.00        | -12.12      | peak | 100         | 324           |        |
| 2   | 66.0342         | 11.28          | 14.94       | 26.22        | 40.00        | -13.78      | peak | 200         | 183           |        |
| 3   | 150.5377        | 11.29          | 16.42       | 27.71        | 43.50        | -15.79      | peak | 200         | 4             |        |
| 4   | 349.2500        | 12.71          | 16.65       | 29.36        | 46.00        | -16.64      | peak | 100         | 355           |        |
| 5   | 528.2458        | 13.48          | 20.54       | 34.02        | 46.00        | -11.98      | peak | 100         | 311           |        |
| 6 * | 758.0407        | 13.23          | 24.32       | 37.55        | 46.00        | -8.45       | peak | 200         | 43            |        |



|               |                                  |                           |                              |
|---------------|----------------------------------|---------------------------|------------------------------|
| <b>Site:</b>  |                                  | <b>Antenna::</b> Vertical | <b>Temperature(C):</b> 24(C) |
| <b>Limit:</b> | FCC Part15 RE-Class B_30-1000MHz |                           | <b>Humidity(%):</b> 60%      |
| <b>EUT:</b>   | USB Bluetooth 5.0 Adapter        | <b>Test Time:</b>         | 2021/2/25                    |
| <b>M/N.:</b>  | BT50RTK                          | <b>Power Rating:</b>      | DC 5V by laptop input        |
|               |                                  |                           | AC120V/60Hz                  |
| <b>Mode:</b>  | Tx mode (2402MHz- Worst case)    | <b>Test Engineer:</b>     |                              |
| <b>Note:</b>  |                                  |                           |                              |

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Det. | Height (cm) | Azimuth (deg) | Remark |
|-----|-----------------|----------------|-------------|--------------|--------------|-------------|------|-------------|---------------|--------|
| 1   | 41.1320         | 11.04          | 14.92       | 25.96        | 40.00        | -14.04      | peak | 100         | 3             |        |
| 2   | 69.3568         | 11.73          | 12.57       | 24.30        | 40.00        | -15.70      | peak | 100         | 3             |        |
| 3   | 98.1419         | 14.47          | 11.64       | 26.11        | 43.50        | -17.39      | peak | 100         | 3             |        |
| 4   | 176.8878        | 11.74          | 12.80       | 24.54        | 43.50        | -18.96      | peak | 100         | 72            |        |
| 5   | 350.4768        | 12.15          | 14.71       | 26.86        | 46.00        | -19.14      | peak | 100         | 3             |        |
| 6 * | 813.1115        | 13.09          | 23.67       | 36.76        | 46.00        | -9.24       | peak | 100         | 40            |        |

|                      |                                                                                            |                    |                                     |
|----------------------|--------------------------------------------------------------------------------------------|--------------------|-------------------------------------|
| EUT:                 | USB Bluetooth 5.0 Adapter                                                                  | Model Name :       | BT50RTK                             |
| Temperature:         | 23 °C                                                                                      | Test Engineer      | Jack                                |
| Pressure:            | 1010 hPa                                                                                   | Relative Humidity: | 60%                                 |
| Test Mode :          | Tx 8DPSK (worst)                                                                           | Test Voltage :     | DC 5V by adapter input<br>120V/60Hz |
| Measurement Distance | 3 m                                                                                        | Frequency Range    | 1-25 GHz                            |
| RBW/VBW              | Spurious emission: 1MHz/3MHz for Peak, 1MHz/10Hz for Average, PK detector is for them all. |                    |                                     |

(a) Antenna polarization: Horizontal

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|-----------------|----------------------|---------------------|------------------------|----------------|-----------|---------------|
| 2390.00         | 46.06                | 4.68                | 50.74                  | 74.00          | -23.26    | peak          |
| 2390.00         | 41.10                | 4.68                | 45.78                  | 54.00          | -8.22     | AVG           |
| 4804.00         | 48.29                | 5.06                | 53.35                  | 74.00          | -20.65    | peak          |
| 4804.00         | 38.82                | 5.06                | 43.88                  | 54.00          | -10.12    | AVG           |
| 7206.00         | 41.17                | 7.03                | 48.20                  | 74.00          | -25.80    | peak          |
| 7206.00         | 34.89                | 7.03                | 41.92                  | 54.00          | -12.08    | AVG           |

(b) Antenna polarization: Vertical

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|-----------------|----------------------|---------------------|------------------------|----------------|-----------|---------------|
| 2390.00         | 50.24                | 4.68                | 54.92                  | 74.00          | -19.08    | peak          |
| 2390.00         | 36.04                | 4.68                | 40.72                  | 54.00          | -13.28    | AVG           |
| 4804.00         | 49.35                | 5.06                | 54.41                  | 74.00          | -19.59    | peak          |
| 4804.00         | 38.15                | 5.06                | 43.21                  | 54.00          | -10.79    | AVG           |
| 7206.00         | 50.51                | 7.03                | 57.54                  | 74.00          | -16.46    | peak          |
| 7206.00         | 33.29                | 7.03                | 40.32                  | 54.00          | -13.68    | AVG           |

Note:

**8~25GHz at least have 20dB margin. No recording in the test report.**

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss–Pre-amplifier

Lowest Channel: 2402 MHz

Data rate: 3Mbps

## (a) Antenna polarization: Horizontal

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|-----------------|----------------------|---------------------|------------------------|----------------|-----------|---------------|
| 4882.00         | 47.70                | 5.14                | 52.84                  | 74.00          | -21.16    | peak          |
| 4882.00         | 39.54                | 5.14                | 44.68                  | 54.00          | -9.32     | AVG           |
| 7323.00         | 47.26                | 7.54                | 54.80                  | 74.00          | -19.20    | peak          |
| 7323.00         | 33.68                | 7.54                | 41.22                  | 54.00          | -12.78    | AVG           |

## (b) Antenna polarization: Vertical

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|-----------------|----------------------|---------------------|------------------------|----------------|-----------|---------------|
| 4882.00         | 48.40                | 5.14                | 53.54                  | 74.00          | -20.46    | peak          |
| 4882.00         | 39.61                | 5.14                | 44.75                  | 54.00          | -9.25     | AVG           |
| 7323.00         | 39.27                | 7.54                | 46.81                  | 74.00          | -27.19    | peak          |
| 7323.00         | 38.39                | 7.54                | 45.93                  | 54.00          | -8.07     | AVG           |

Note:

**8~25GHz at least have 20dB margin. No recording in the test report.**

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss–Pre-amplifier

Middle Channel: 2441 MHz

Data rate: 3Mbps

## (a) Antenna polarization: Horizontal

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|-----------------|----------------------|---------------------|------------------------|----------------|-----------|---------------|
| 2483.50         | 52.11                | 4.71                | 56.82                  | 74.00          | -17.18    | peak          |
| 2483.50         | 34.91                | 4.71                | 39.62                  | 54.00          | -14.38    | AVG           |
| 4960.00         | 48.97                | 5.22                | 54.19                  | 74.00          | -19.81    | peak          |
| 4960.00         | 36.88                | 5.22                | 42.10                  | 54.00          | -11.90    | AVG           |
| 7440.00         | 40.05                | 8.06                | 48.11                  | 74.00          | -25.89    | peak          |
| 7440.00         | 30.92                | 8.06                | 38.98                  | 54.00          | -15.02    | AVG           |

## (b) Antenna polarization: Vertical

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|-----------------|----------------------|---------------------|------------------------|----------------|-----------|---------------|
| 2483.50         | 54.99                | 4.71                | 59.70                  | 74.00          | -14.30    | peak          |
| 2483.50         | 39.82                | 4.71                | 44.53                  | 54.00          | -9.47     | AVG           |
| 4960.00         | 46.26                | 5.22                | 51.48                  | 74.00          | -22.52    | peak          |
| 4960.00         | 38.48                | 5.22                | 43.70                  | 54.00          | -10.30    | AVG           |
| 7440.00         | 48.92                | 8.06                | 56.98                  | 74.00          | -17.02    | peak          |
| 7440.00         | 32.66                | 8.06                | 40.72                  | 54.00          | -13.28    | AVG           |

Note:

**8~25GHz at least have 20dB margin. No recording in the test report.**

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss–Pre-amplifier

Highest channel: 2480 MHz

Data rate: 3Mbps

## 5. Maximum Peak Output Power

### 5.1. Applied procedures / Limit

15.247(a) (1) 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. 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.

15.247(b) (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

### 5.2. Test procedure

- (1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as  
Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel  
RBW > the 20 dB bandwidth of the emission being measured, VBW ≥ RBW, Sweep = auto  
Detector function = peak, Trace = max hold
- (2) The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.
- (3) The above procedure shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range with modulated mode. Also shall be performed at different modes of operation.

### 5.3. Deviation from standard

No deviation.

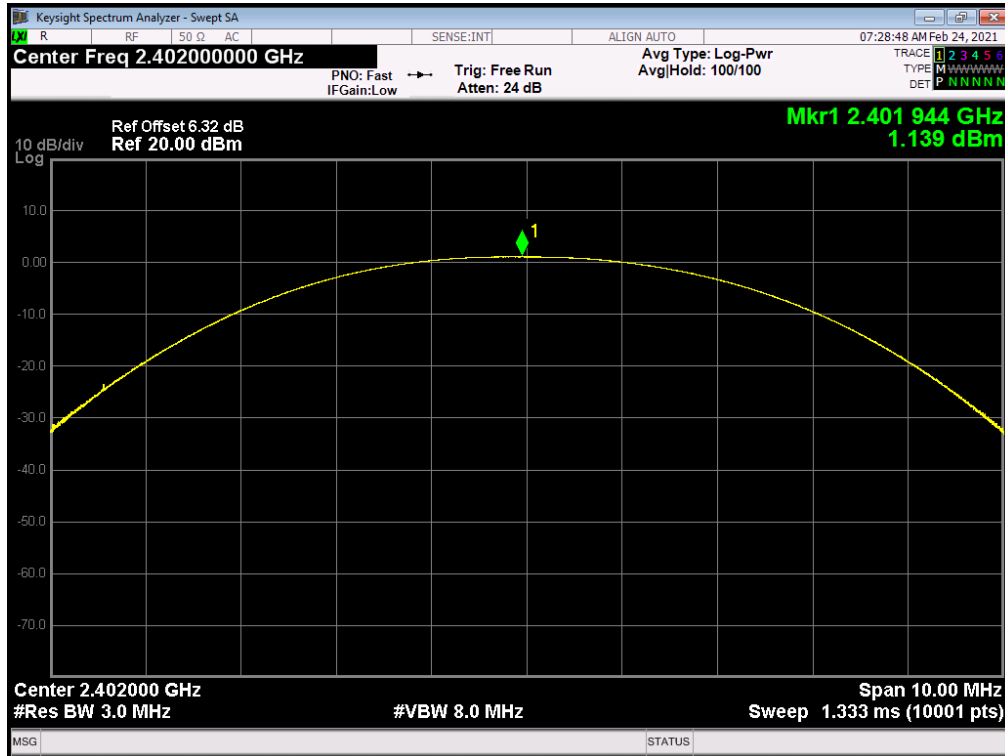
### 5.4. Test setup



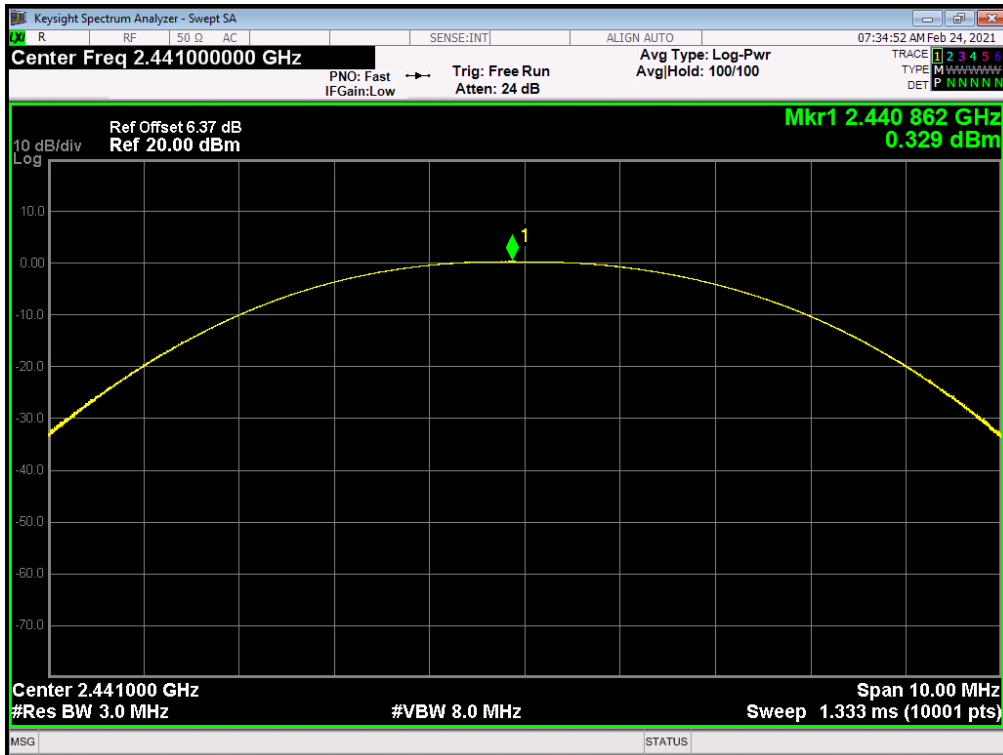
### 5.5. TEST RESULTS

| Condition | Mode  | Frequency (MHz) | Antenna | Conducted Power (dBm) | Duty Factor (dB) | Total Power (dBm) | Limit (dBm) | Verdict |
|-----------|-------|-----------------|---------|-----------------------|------------------|-------------------|-------------|---------|
| NVNT      | 1-DH1 | 2402            | Ant 1   | 1.139                 | 0                | 1.139             | 21          | Pass    |
| NVNT      | 1-DH1 | 2441            | Ant 1   | 0.329                 | 0                | 0.329             | 21          | Pass    |
| NVNT      | 1-DH1 | 2480            | Ant 1   | 0.688                 | 0                | 0.688             | 21          | Pass    |

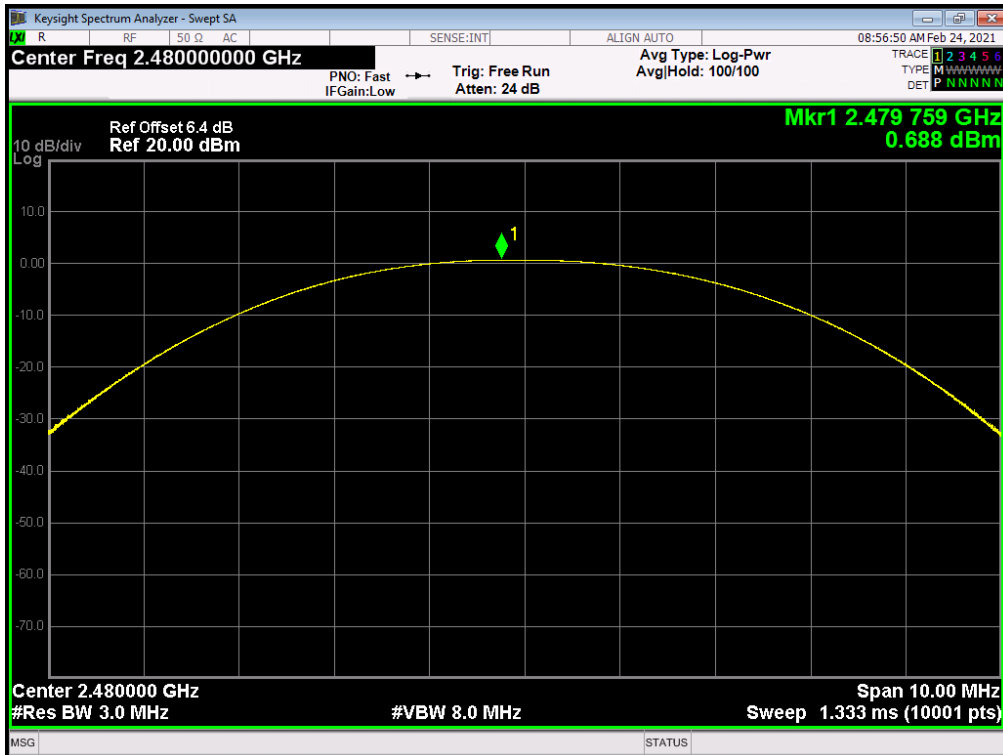
Power NVNT 1-DH1 2402MHz Ant1



Power NVNT 1-DH1 2441MHz Ant1

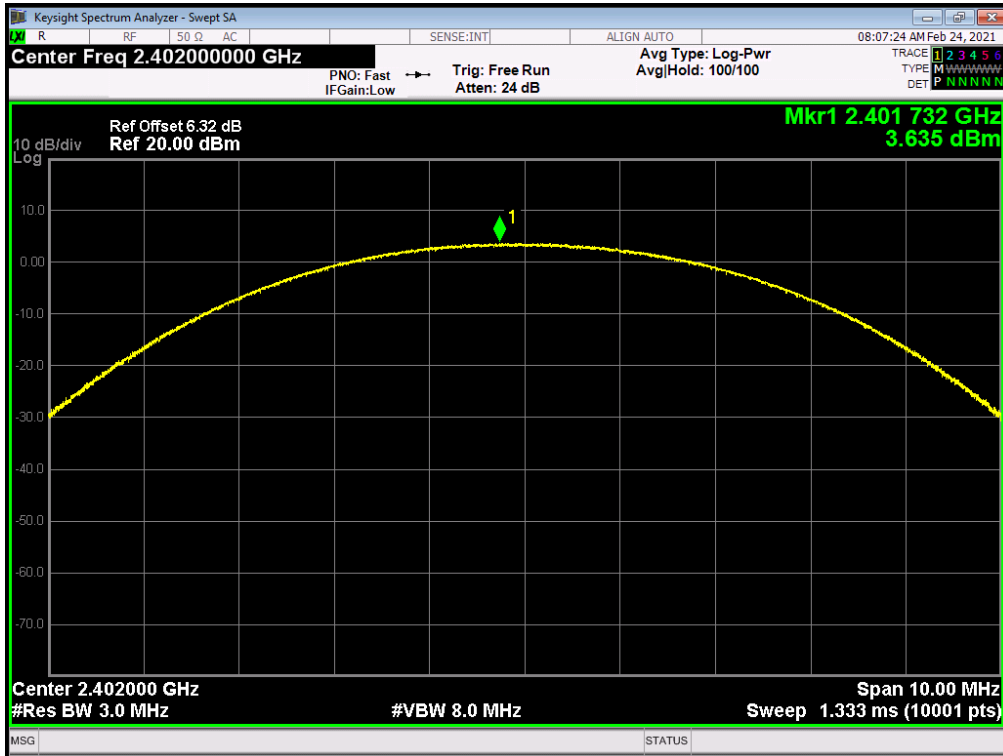


Power NVNT 1-DH1 2480MHz Ant1

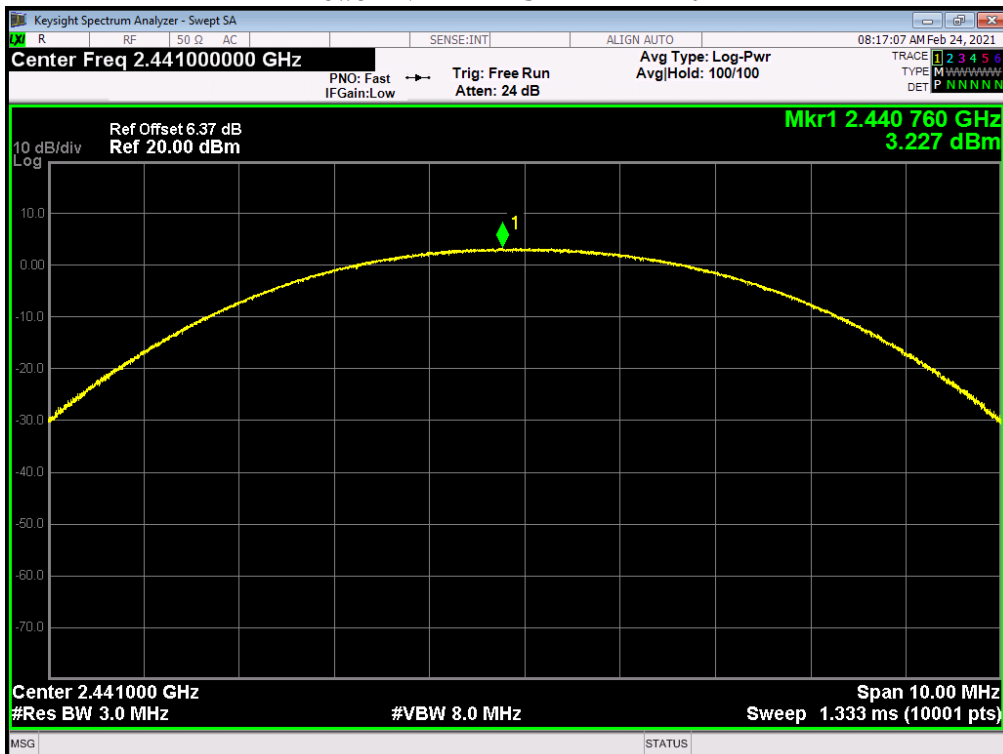


| Condition | Mode  | Frequency (MHz) | Antenna | Conducted Power (dBm) | Duty Factor (dB) | Total Power (dBm) | Limit (dBm) | Verdict |
|-----------|-------|-----------------|---------|-----------------------|------------------|-------------------|-------------|---------|
| NVNT      | 2-DH3 | 2402            | Ant 1   | 3.635                 | 0                | 3.635             | 21          | Pass    |
| NVNT      | 2-DH3 | 2441            | Ant 1   | 3.227                 | 0                | 3.227             | 21          | Pass    |
| NVNT      | 2-DH3 | 2480            | Ant 1   | 2.437                 | 0                | 2.437             | 21          | Pass    |

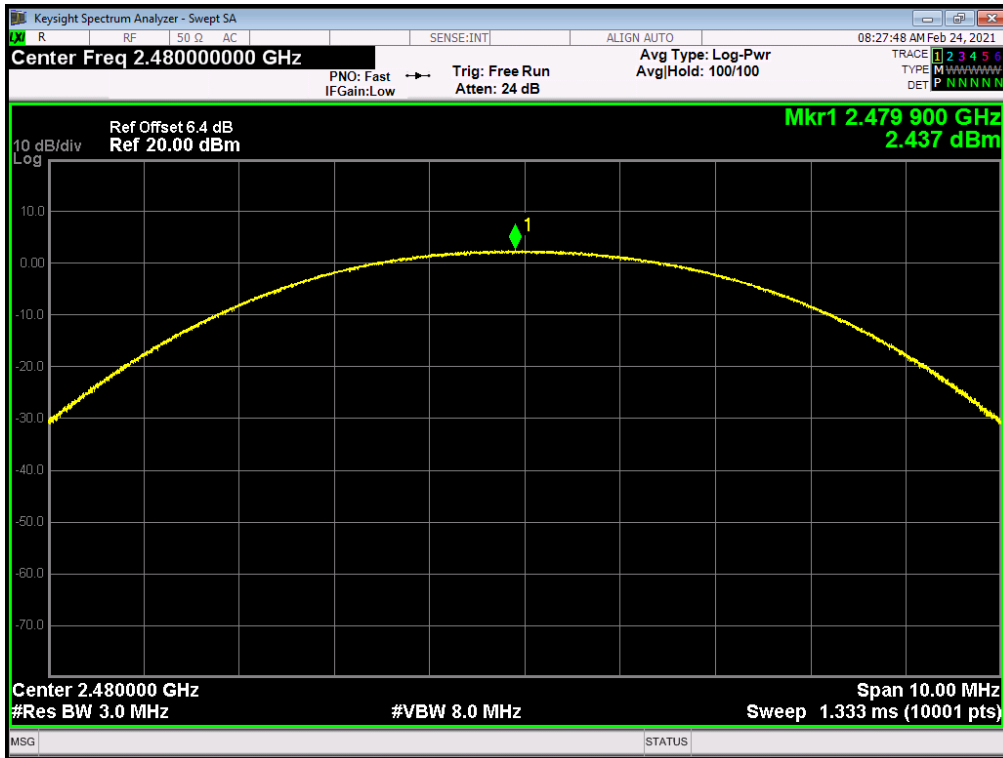
Power NVNT 2-DH3 2402MHz Ant1



Power NVNT 2-DH3 2441MHz Ant1

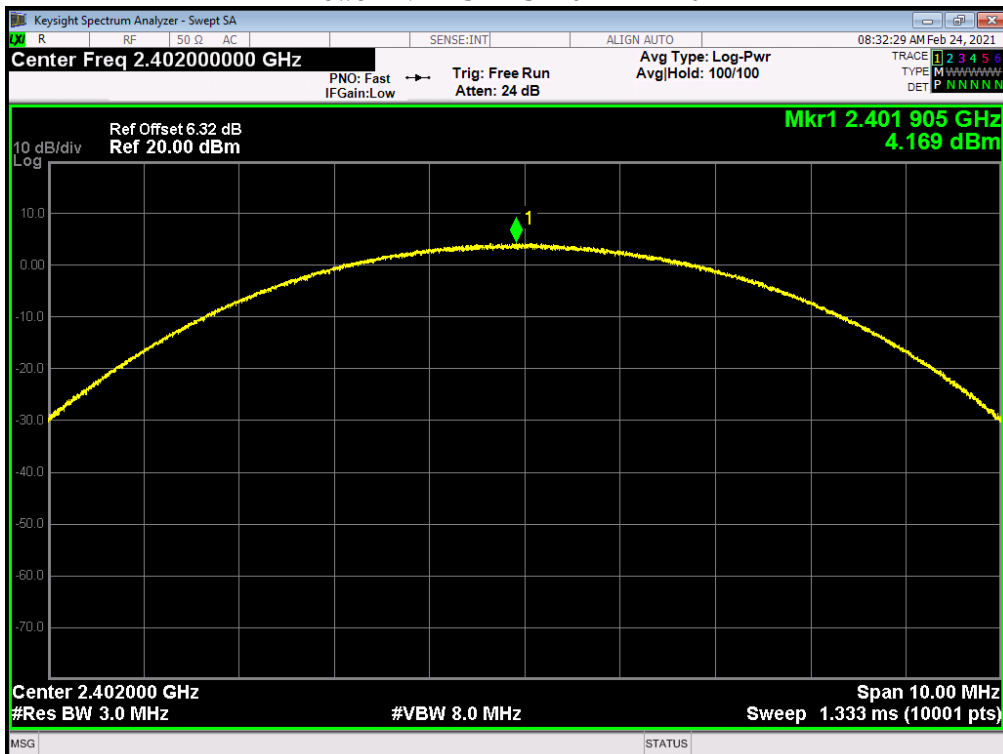


Power NVNT 2-DH3 2480MHz Ant1

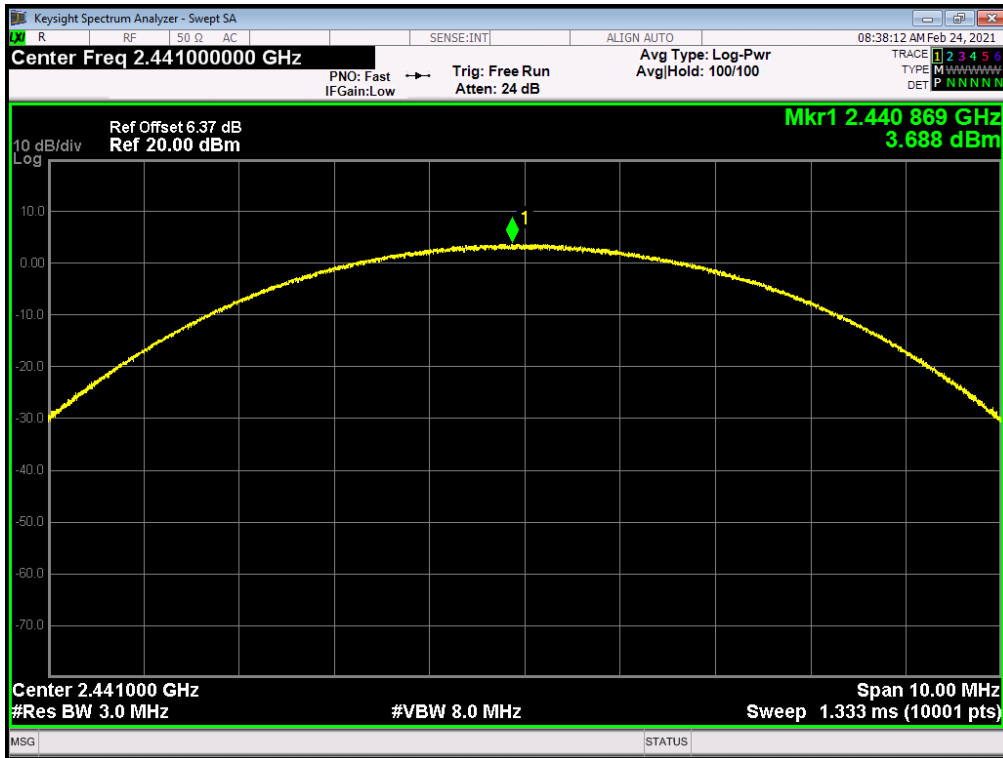


| Condition | Mode  | Frequency (MHz) | Antenna | Conducted Power (dBm) | Duty Factor (dB) | Total Power (dBm) | Limit (dBm) | Verdict |
|-----------|-------|-----------------|---------|-----------------------|------------------|-------------------|-------------|---------|
| NVNT      | 3-DH5 | 2402            | Ant 1   | 4.169                 | 0                | 4.169             | 21          | Pass    |
| NVNT      | 3-DH5 | 2441            | Ant 1   | 3.688                 | 0                | 3.688             | 21          | Pass    |
| NVNT      | 3-DH5 | 2480            | Ant 1   | 2.967                 | 0                | 2.967             | 21          | Pass    |

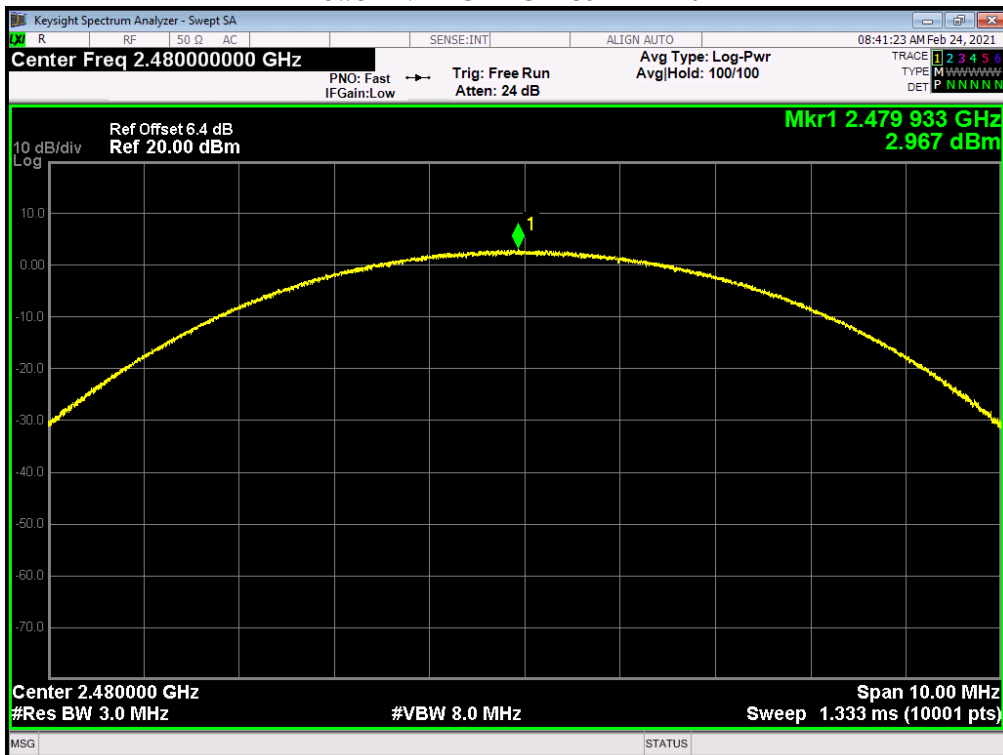
Power NVNT 3-DH5 2402MHz Ant1



Power NVNT 3-DH5 2441MHz Ant1



Power NVNT 3-DH5 2480MHz Ant1



## 6. BANDWIDTH TEST

### 6.1. Applied procedures / 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.

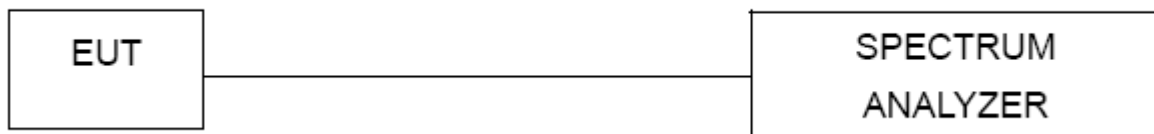
### 6.2. Test procedure

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel  
RBW  $\geq$  1% of the 20 dB bandwidth, VBW  $\geq$  RBW, Sweep = auto, Detector function = peak  
Trace = max hold

### 6.3. Deviation from standard

No deviation.

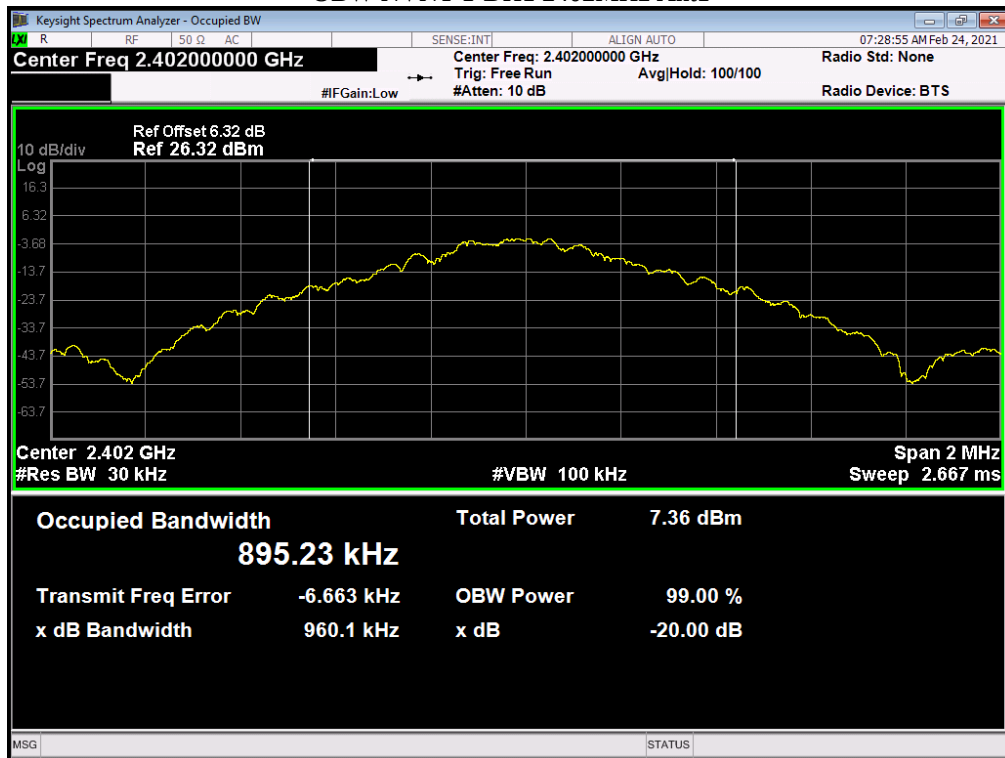
### 6.4. Test setup



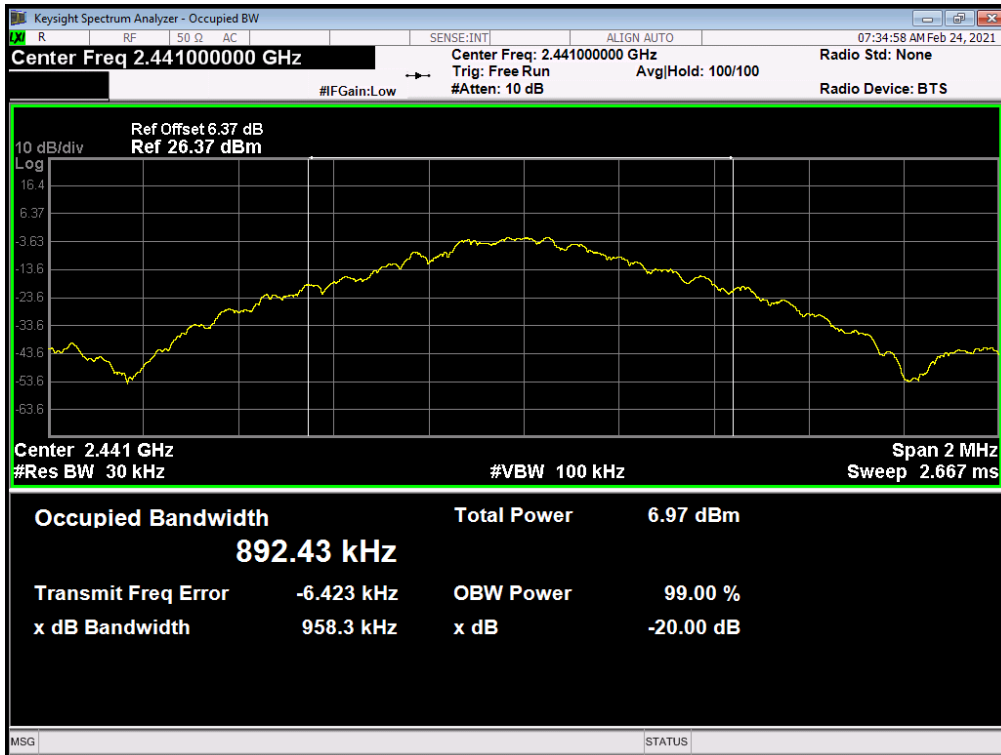
### 6.5. Test results

| Condition | Mode  | Frequency (MHz) | Antenna | 99% OBW (MHz) | -20 dB Bandwidth (MHz) | Limit -20 dB Bandwidth (MHz) | Verdict |
|-----------|-------|-----------------|---------|---------------|------------------------|------------------------------|---------|
| NVNT      | 1-DH1 | 2402            | Ant 1   | 0.8952        | 0.9601                 | 0                            | Pass    |
| NVNT      | 1-DH1 | 2441            | Ant 1   | 0.8924        | 0.9583                 | 0                            | Pass    |
| NVNT      | 1-DH1 | 2480            | Ant 1   | 0.8942        | 0.9617                 | 0                            | Pass    |

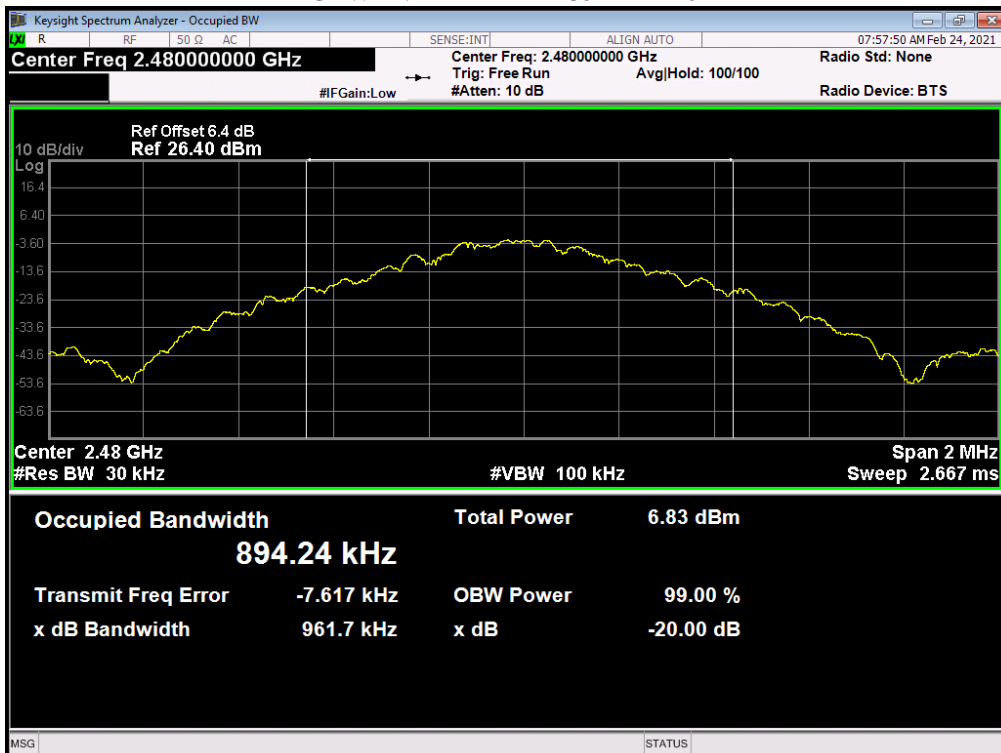
OBW NVNT 1-DH1 2402MHz Ant1



OBW NVNT 1-DH1 2441MHz Ant1

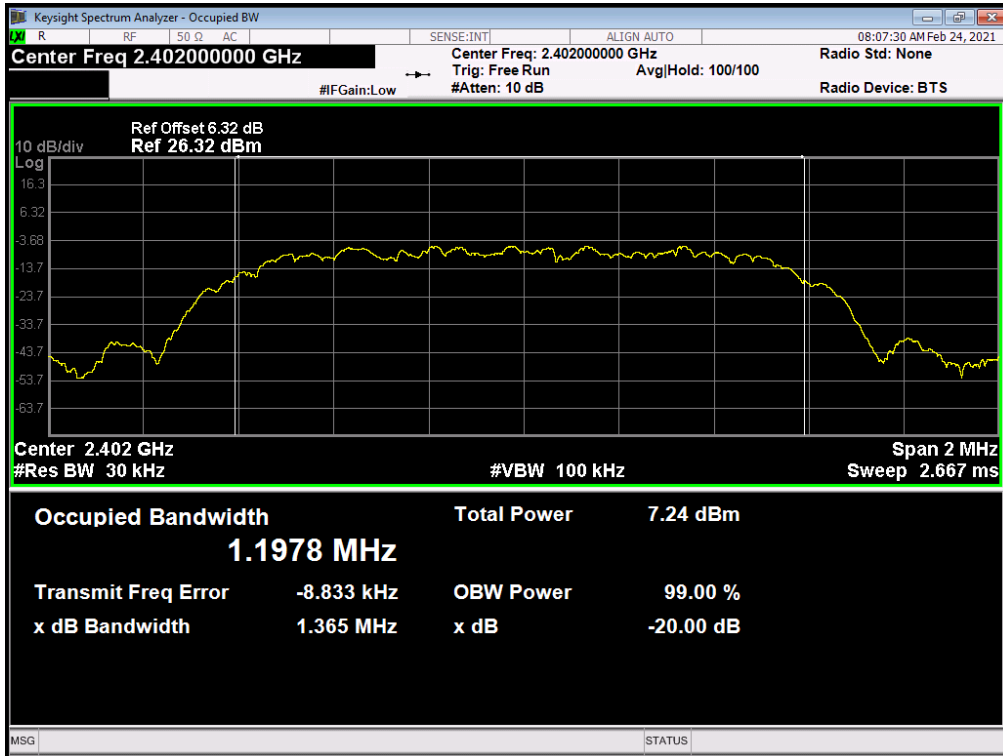


OBW NVNT 1-DH1 2480MHz Ant1

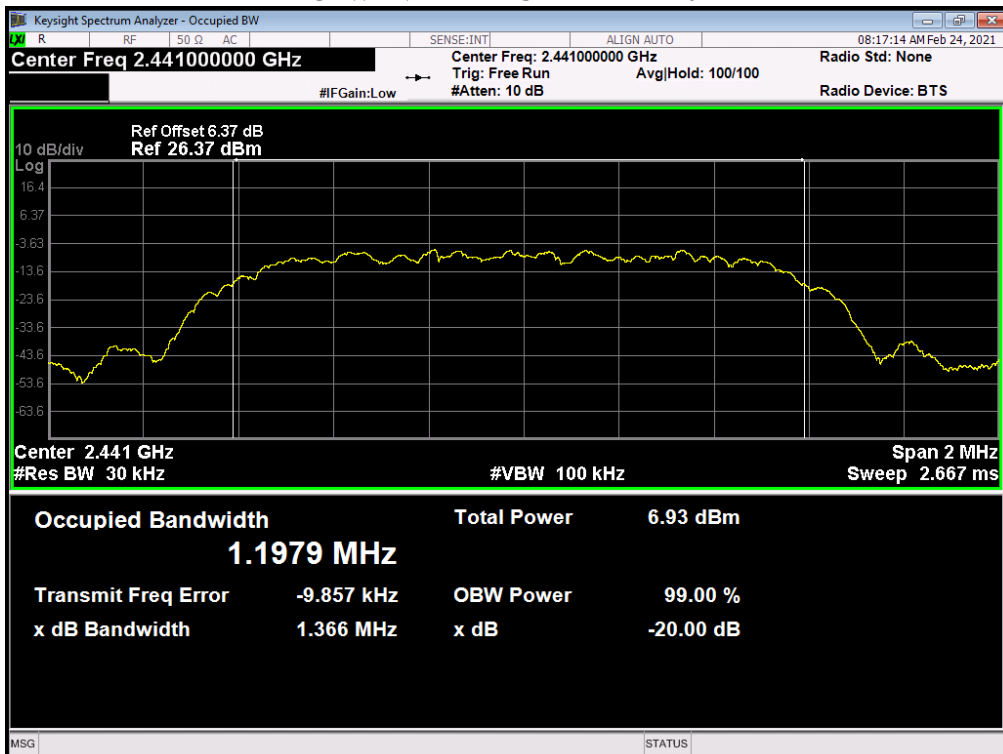


| Condition | Mode  | Frequency (MHz) | Antenna | 99% OBW (MHz) | -20 dB Bandwidth (MHz) | Limit -20 dB Bandwidth (MHz) | Verdict |
|-----------|-------|-----------------|---------|---------------|------------------------|------------------------------|---------|
| NVNT      | 2-DH3 | 2402            | Ant 1   | 1.1978        | 1.3649                 | 0                            | Pass    |
| NVNT      | 2-DH3 | 2441            | Ant 1   | 1.1979        | 1.3659                 | 0                            | Pass    |
| NVNT      | 2-DH3 | 2480            | Ant 1   | 1.1991        | 1.3658                 | 0                            | Pass    |

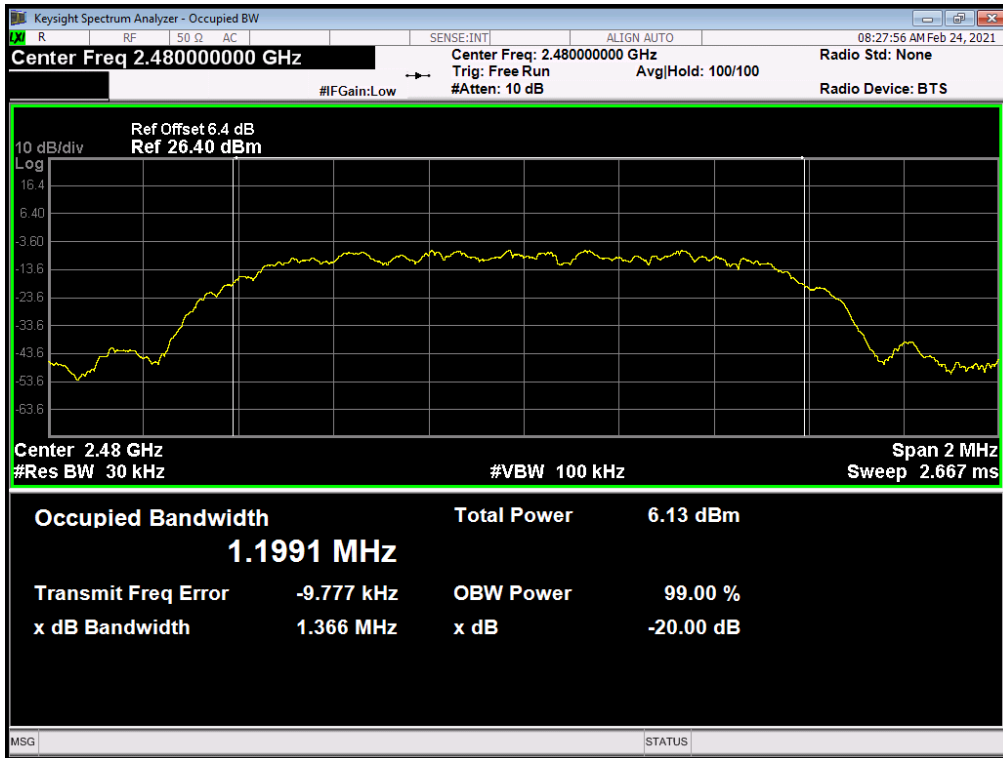
OBW NVNT 2-DH3 2402MHz Ant1



OBW NVNT 2-DH3 2441MHz Ant1

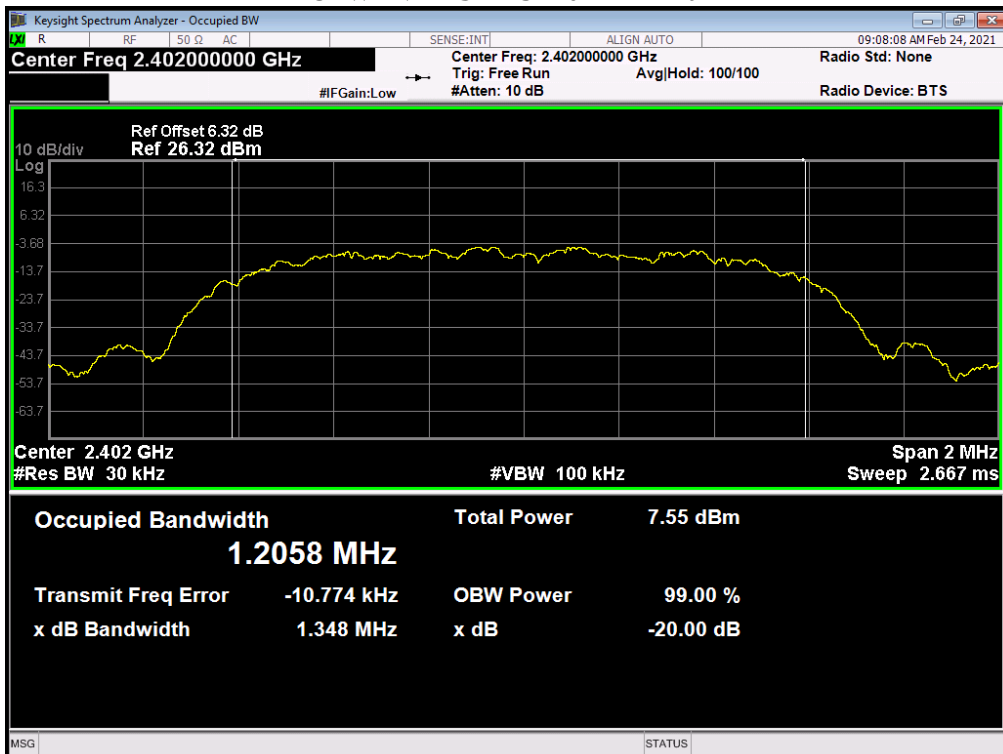


OBW NVNT 2-DH3 2480MHz Ant1

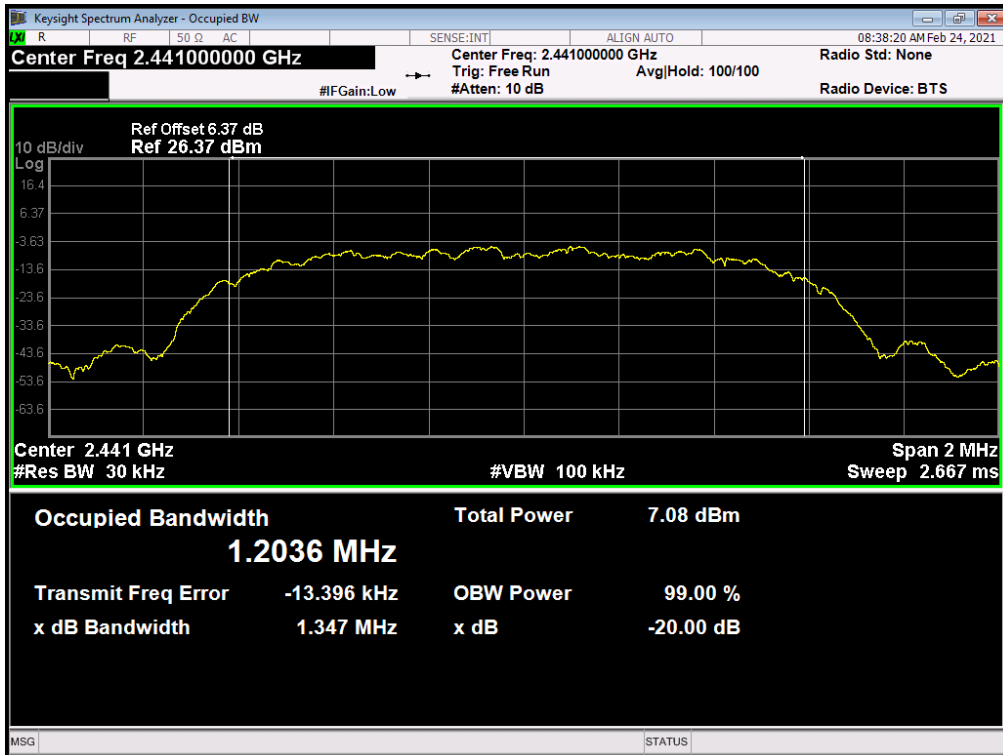


| Condition | Mode  | Frequency (MHz) | Antenna | 99% OBW (MHz) | -20 dB Bandwidth (MHz) | Limit -20 dB Bandwidth (MHz) | Verdict |
|-----------|-------|-----------------|---------|---------------|------------------------|------------------------------|---------|
| NVNT      | 3-DH5 | 2402            | Ant 1   | 1.2058        | 1.3482                 | 0                            | Pass    |
| NVNT      | 3-DH5 | 2441            | Ant 1   | 1.2036        | 1.3468                 | 0                            | Pass    |
| NVNT      | 3-DH5 | 2480            | Ant 1   | 1.2054        | 1.3472                 | 0                            | Pass    |

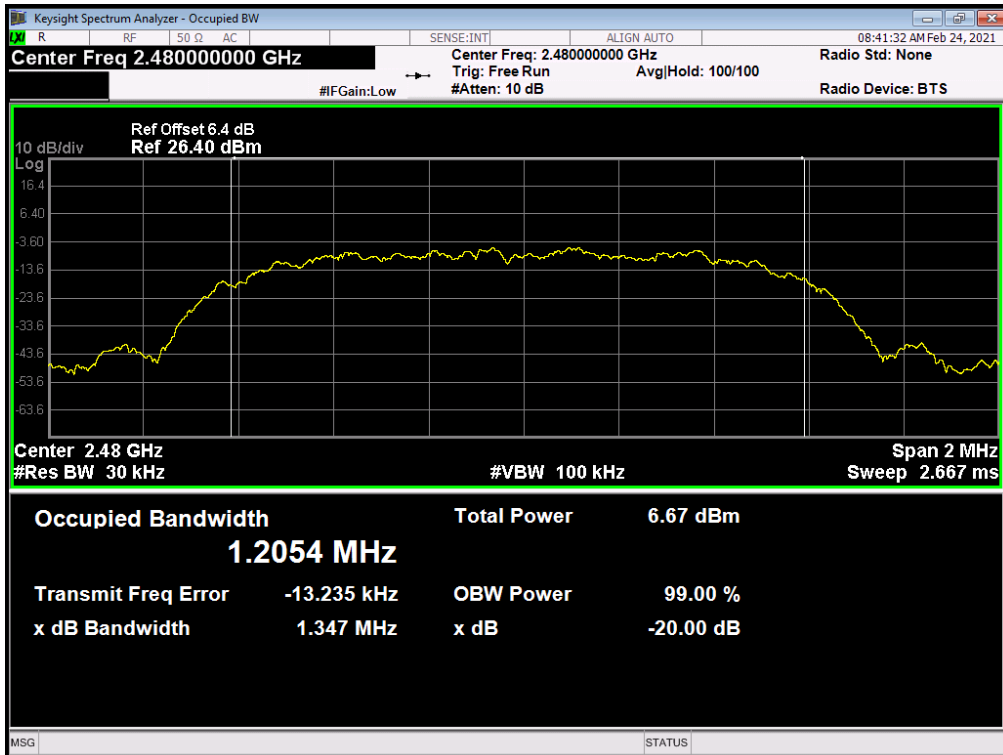
OBW NVNT 3-DH5 2402MHz Ant1



OBW NVNT 3-DH5 2441MHz Ant1



OBW NVNT 3-DH5 2480MHz Ant1



## 7. Carrier Frequencies Separated

### 7.1. Applied procedures / Limit

15.247(a) (1) 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. 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.

### 7.2. Test procedure

- (1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as  
Span = wide enough to capture the peaks of two adjacent channels, Resolution (or IF)  
Bandwidth (RBW)  $\geq 1\%$  of the span, Video (or Average) Bandwidth (VBW)  $\geq$  RBW  
Sweep = auto, Detector function = peak, Trace = max hold
- (2) The EUT should be transmitting at its maximum data rate. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.
- (3) The above procedure shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range with modulated mode. also shall be performed at different modes of operation.

### 7.3. Deviation from standard

No deviation.

### 7.4. Test setup



### 7.5. Test results

| Condition | Mode  | Hopping Freq1 (MHz) | Hopping Freq2 (MHz) | HFS (MHz) | Limit (MHz) | Verdict |
|-----------|-------|---------------------|---------------------|-----------|-------------|---------|
| NVNT      | 1-DH1 | 2401.99             | 2402.983            | 0.993     | 0.64        | Pass    |
| NVNT      | 1-DH1 | 2440.984            | 2441.83             | 0.846     | 0.639       | Pass    |
| NVNT      | 1-DH1 | 2478.963            | 2480.022            | 1.059     | 0.641       | Pass    |

CFS NVNT 1-DH1 2402MHz



CFS NVNT 1-DH1 2441MHz

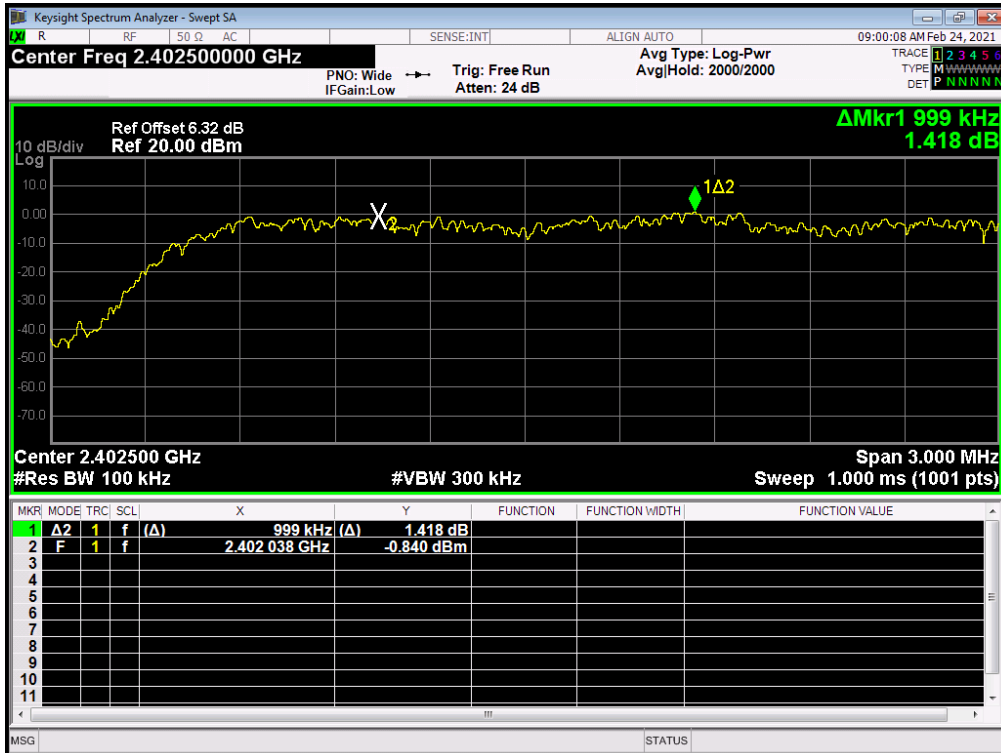


CFS NVNT 1-DH1 2480MHz

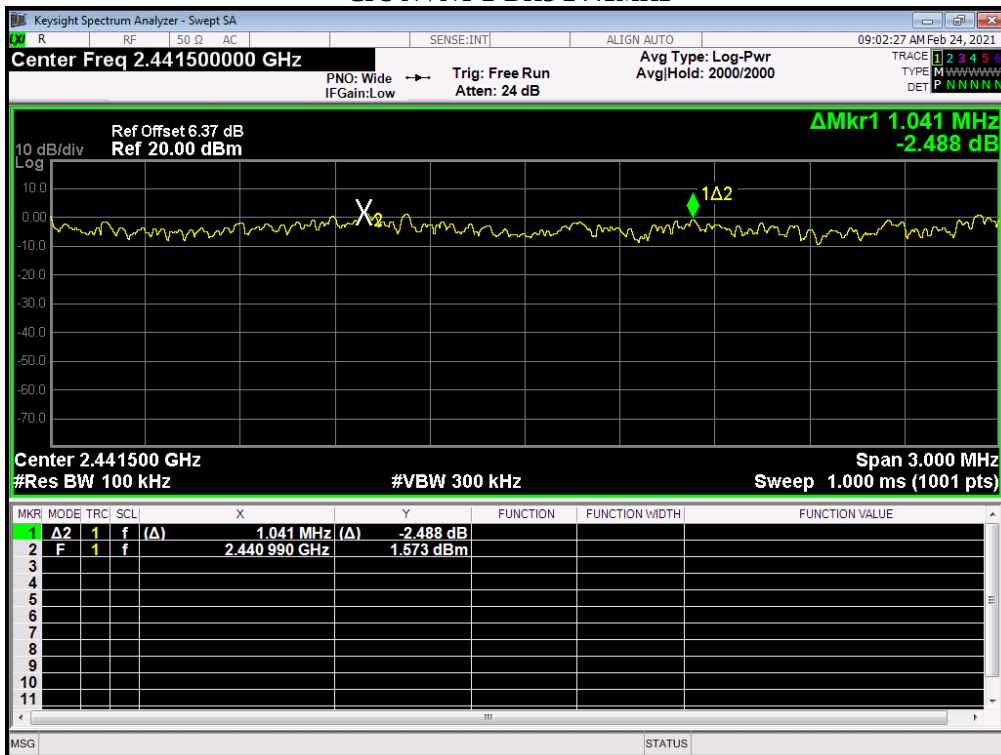


| Condition | Mode  | Hopping Freq1 (MHz) | Hopping Freq2 (MHz) | HFS (MHz) | Limit (MHz) | Verdict |
|-----------|-------|---------------------|---------------------|-----------|-------------|---------|
| NVNT      | 2-DH3 | 2402.038            | 2403.037            | 0.999     | 0.898       | Pass    |
| NVNT      | 2-DH3 | 2440.99             | 2442.031            | 1.041     | 0.898       | Pass    |
| NVNT      | 2-DH3 | 2478.942            | 2479.92             | 0.978     | 0.898       | Pass    |

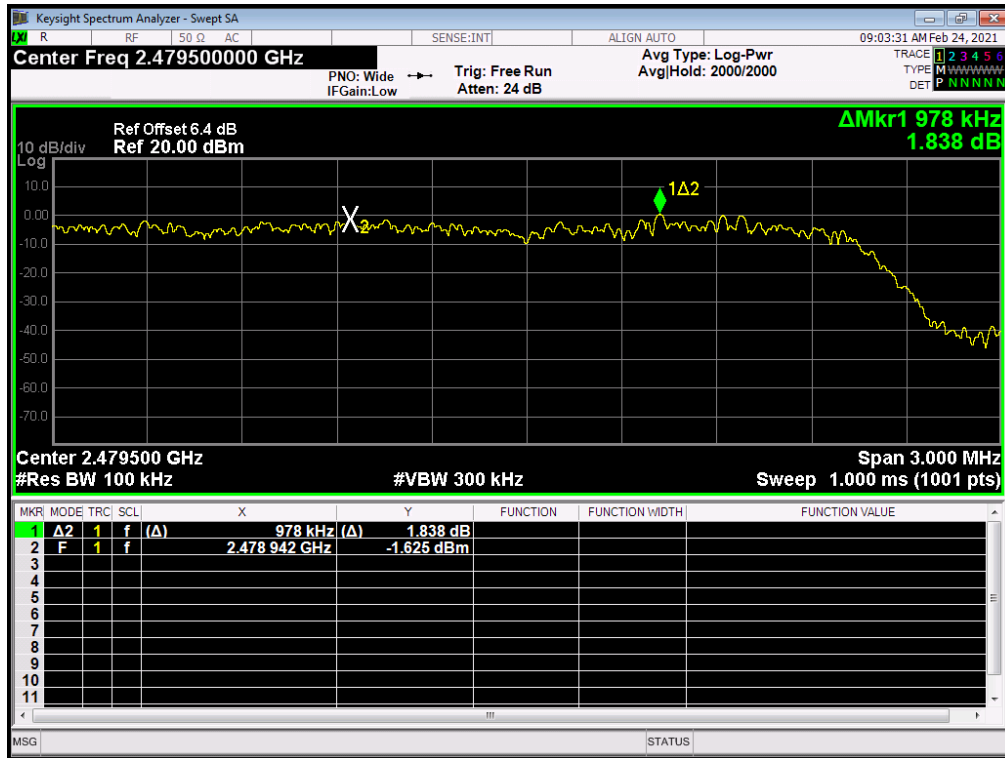
CFS NVNT 2-DH3 2402MHz



CFS NVNT 2-DH3 2441MHz

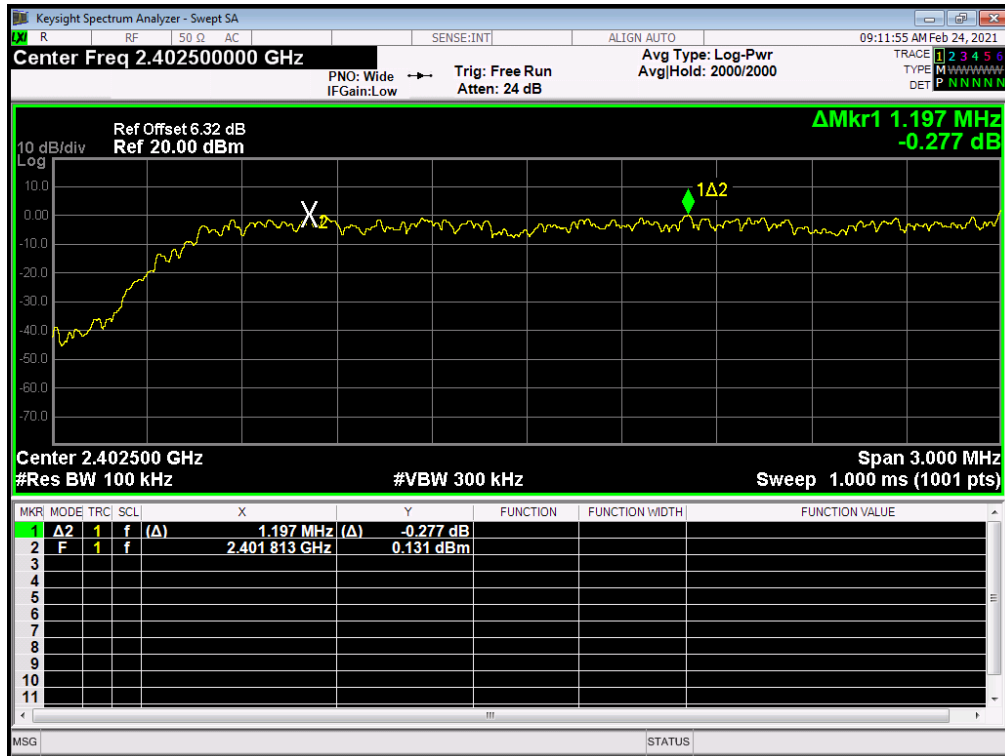


CFS NVNT 2-DH3 2480MHz

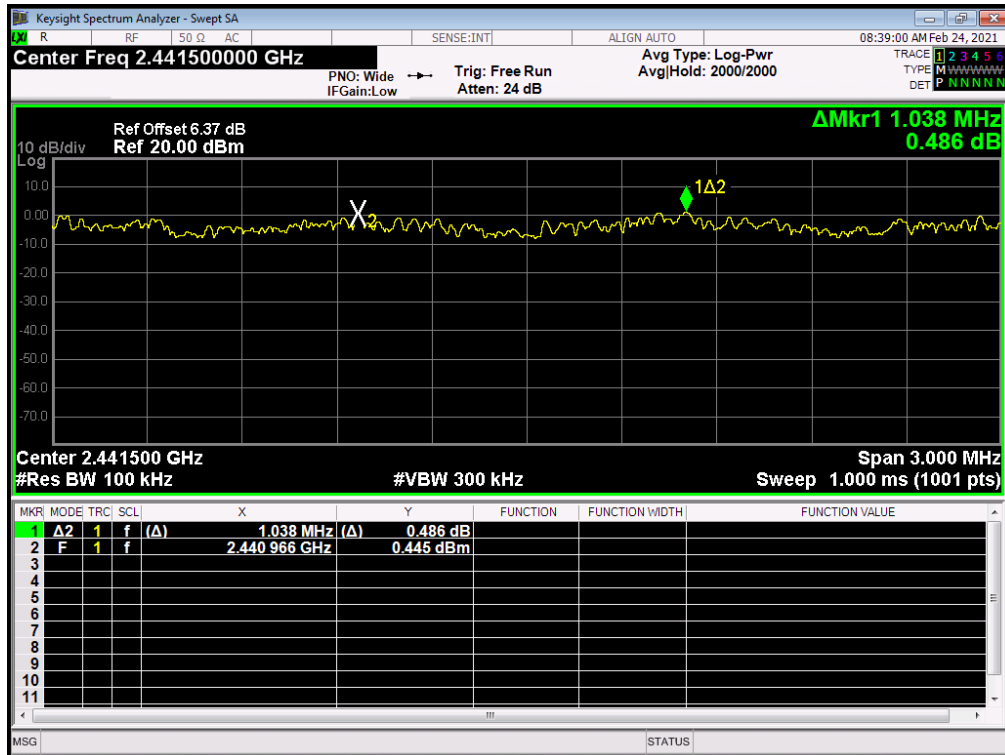


| Condition | Mode  | Hopping Freq1 (MHz) | Hopping Freq2 (MHz) | HFS (MHz) | Limit (MHz) | Verdict |
|-----------|-------|---------------------|---------------------|-----------|-------------|---------|
| NVNT      | 3-DH5 | 2401.813            | 2403.01             | 1.197     | 0.899       | Pass    |
| NVNT      | 3-DH5 | 2440.966            | 2442.004            | 1.038     | 0.898       | Pass    |
| NVNT      | 3-DH5 | 2478.831            | 2479.827            | 0.996     | 0.898       | Pass    |

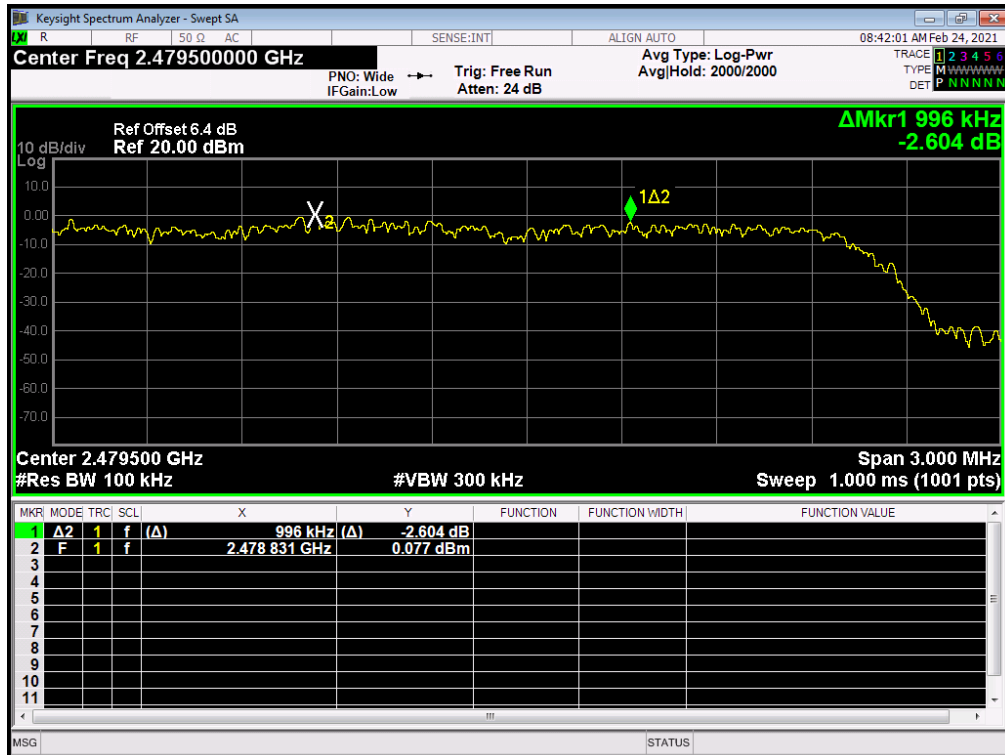
CFS NVNT 3-DH5 2402MHz



CFS NVNT 3-DH5 2441MHz



CFS NVNT 3-DH5 2480MHz



## 8. Hopping Channel Number

### 8.1. Applied procedures / Limit

15.247(a) (1) (iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

### 8.2. Test procedure

- (1) Connected the antenna port to the Spectrum Analyzer , set the Spectrum Analyzer as  
Span = the frequency band of operation, RBW  $\geq$  1% of the span, VBW  $\geq$  RBW Sweep = auto  
Detector function = peak, Trace = max hold
- (2) The EUT should be have its hopping function enabled. Maxhold and record hopping channels  
It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies.

### 8.3. Deviation from standard

No deviation.

### 8.4. Test setup



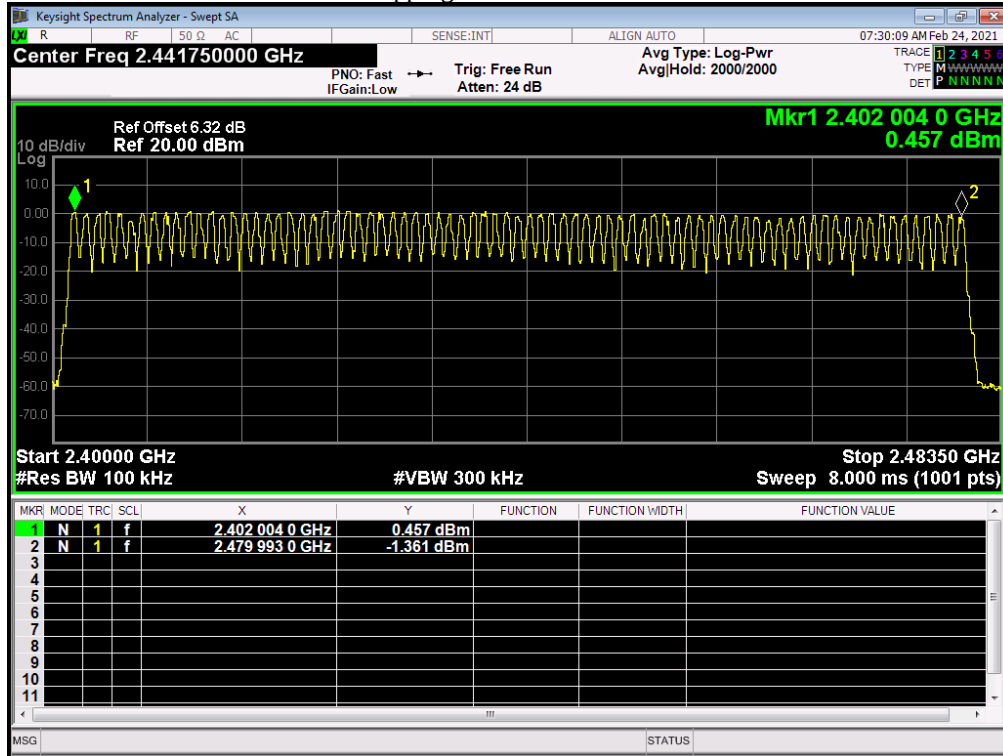
### 8.5. Test result

## Number of Hopping Channel

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

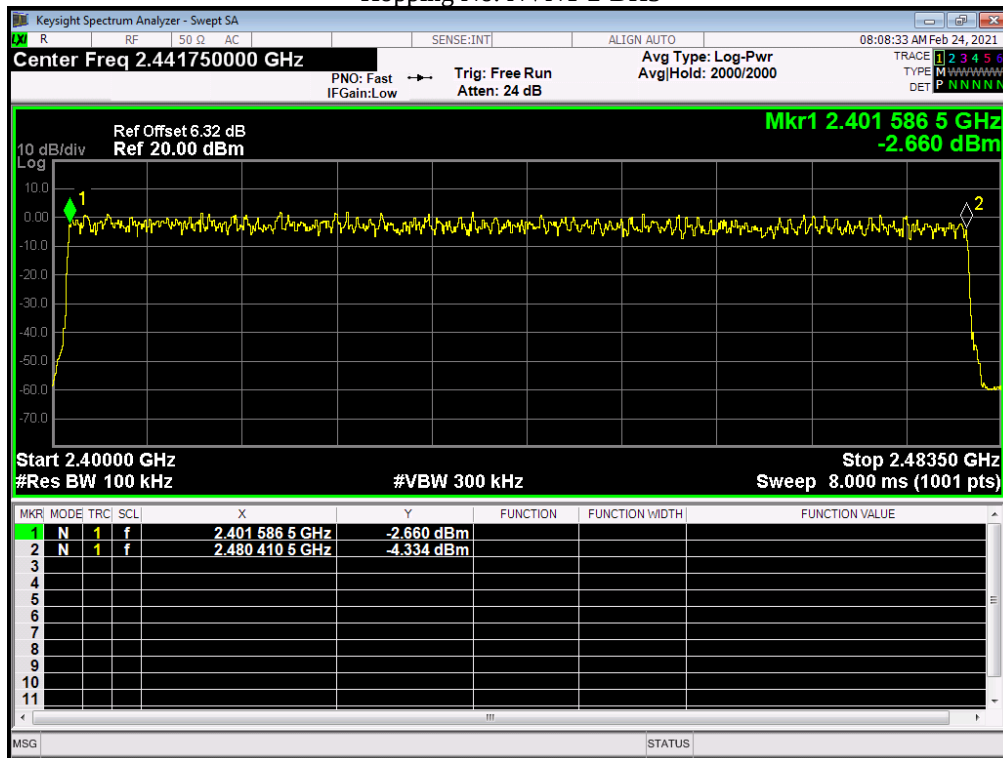
| Condition | Mode  | Hopping Number | Limit | Verdict |
|-----------|-------|----------------|-------|---------|
| NVNT      | 1-DH1 | 79             | 15    | Pass    |

Hopping No. NVNT 1-DH1



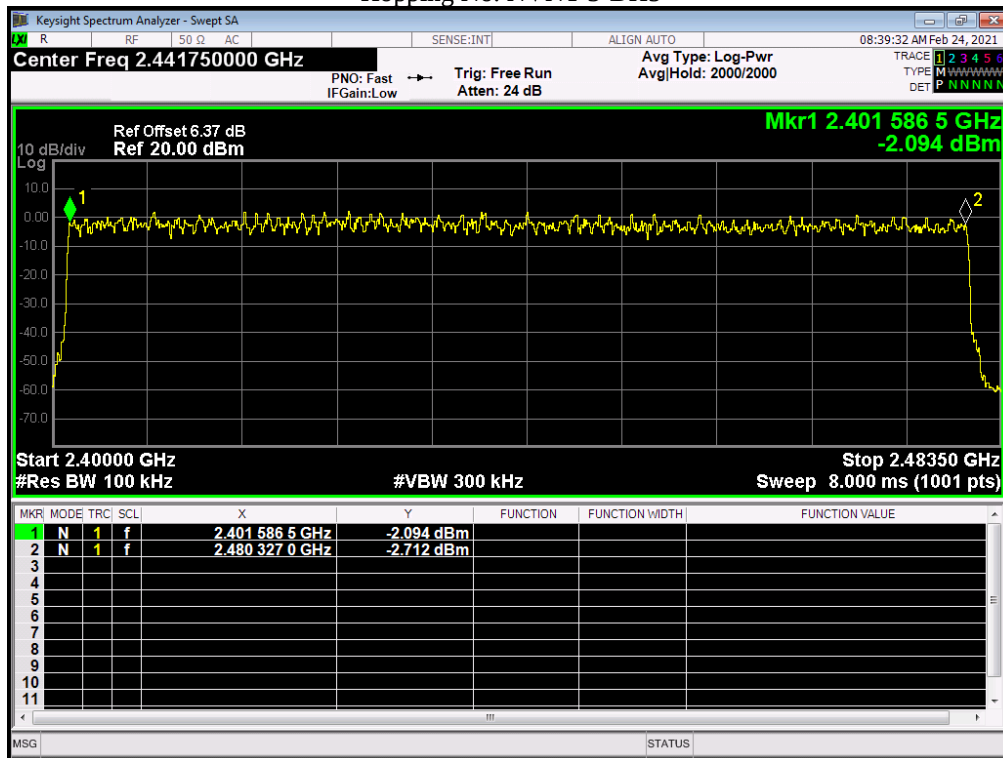
| Condition | Mode  | Hopping Number | Limit | Verdict |
|-----------|-------|----------------|-------|---------|
| NVNT      | 2-DH3 | 79             | 15    | Pass    |

Hopping No. NVNT 2-DH3



| Condition | Mode  | Hopping Number | Limit | Verdict |
|-----------|-------|----------------|-------|---------|
| NVNT      | 3-DH5 | 79             | 15    | Pass    |

Hopping No. NVNT 3-DH5



## 9. Dwell time

### 9.1. Applied procedures / Limit

15.247(a) (1) (iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

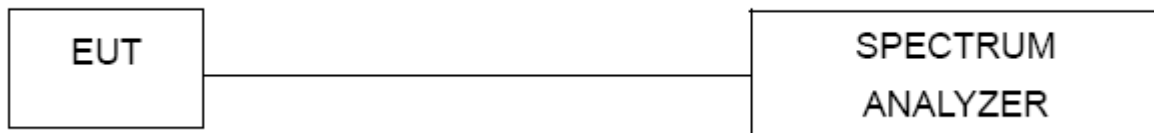
### 9.2. Test procedure

- (1) Place the EUT on the table in the chamber or connect the antenna port of the EUT to spectrum analyzer and set it in transmitting mode.
- (2) Set RBW of spectrum analyzer to 1MHz, VBW  $\geq$  RBW
- (3) Use a video trigger with the trigger level set to enable triggering only on full pulses.
- (4) Sweep Time is more than once pulse time.
- (5) Set the center frequency on any frequency would be measure and set the frequency span to BT50RTK span.
- (6) Measure the maximum time duration of one single pulse.
- (7) Set the EUT for DH5, DH3 and DH1 packet transmitting.
- (8) Measure the maximum time duration of one single pulse.
- (9) A Period Time =  $79 \times 0.4 = 31.6$  S  
DH1 Time Slot: Reading \*  $(1600/2) \times 31.6/79$   
DH3 Time Slot: Reading \*  $(1600/4) \times 31.6/79$   
DH5 Time Slot: Reading \*  $(1600/6) \times 31.6/79$

### 9.3. Deviation from standard

No deviation.

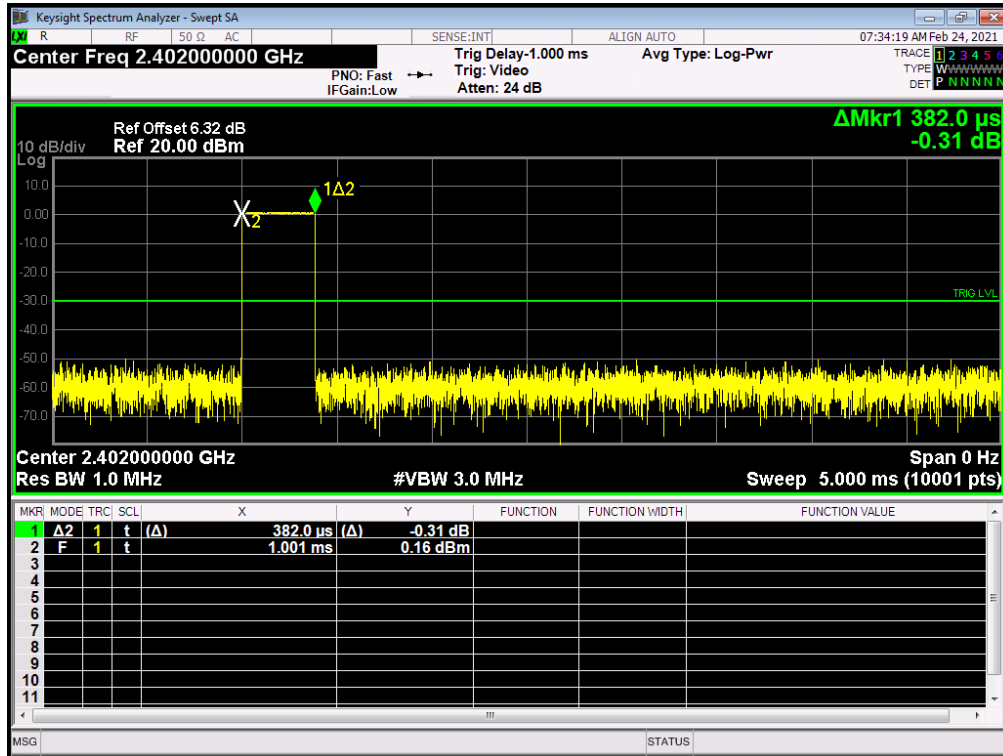
### 9.4. Test setup



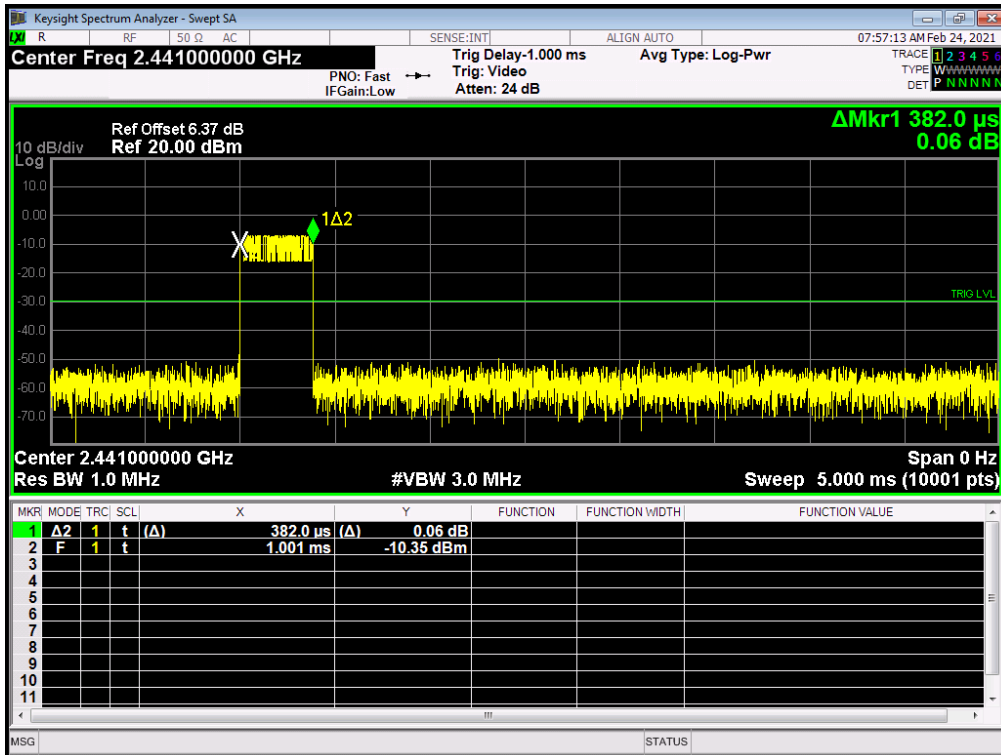
### 9.5. Test result

| Condition | Mode  | Frequency (MHz) | Pulse Time (ms) | Total Dwell Time (ms) | Period Time (ms) | Limit (ms) | Verdict |
|-----------|-------|-----------------|-----------------|-----------------------|------------------|------------|---------|
| NVNT      | 1-DH1 | 2402            | 0.382           | 122.24                | 31600            | 400        | Pass    |
| NVNT      | 1-DH1 | 2441            | 0.382           | 122.24                | 31600            | 400        | Pass    |
| NVNT      | 1-DH1 | 2480            | 0.382           | 122.24                | 31600            | 400        | Pass    |

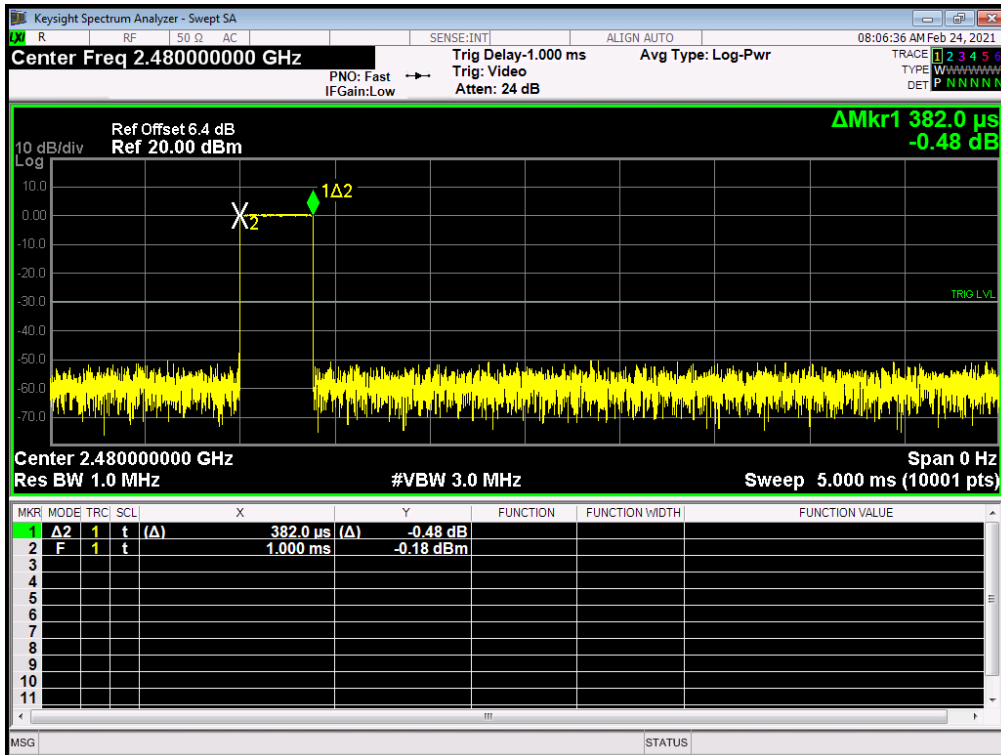
Dwell NVNT 1-DH1 2402MHz



Dwell NVNT 1-DH1 2441MHz

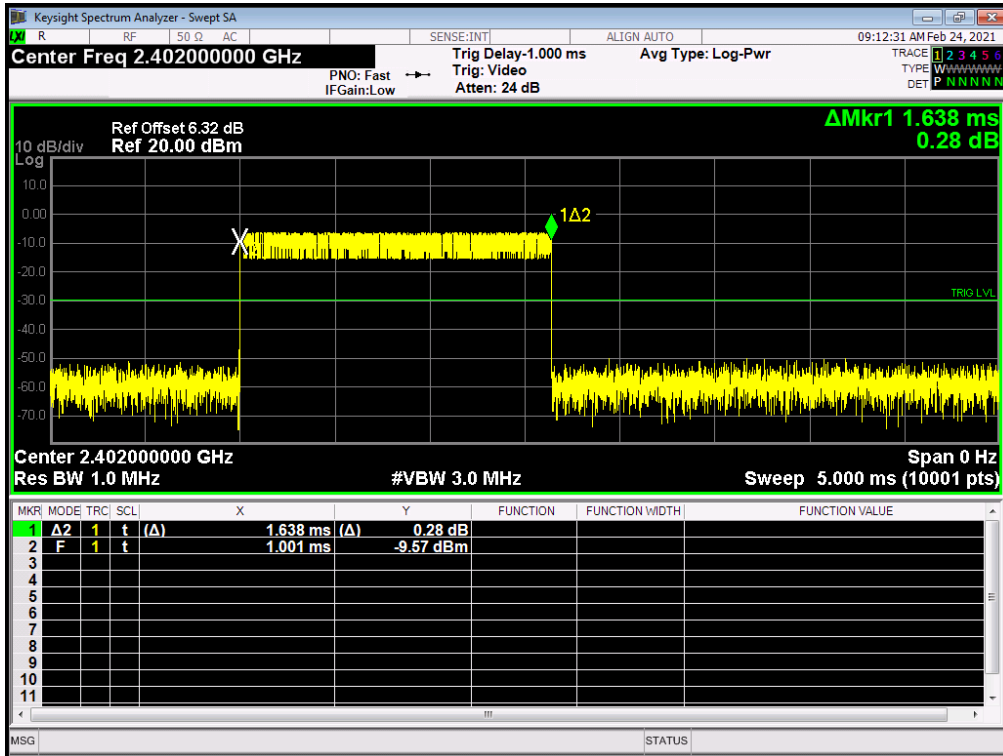


Dwell NVNT 1-DH1 2480MHz

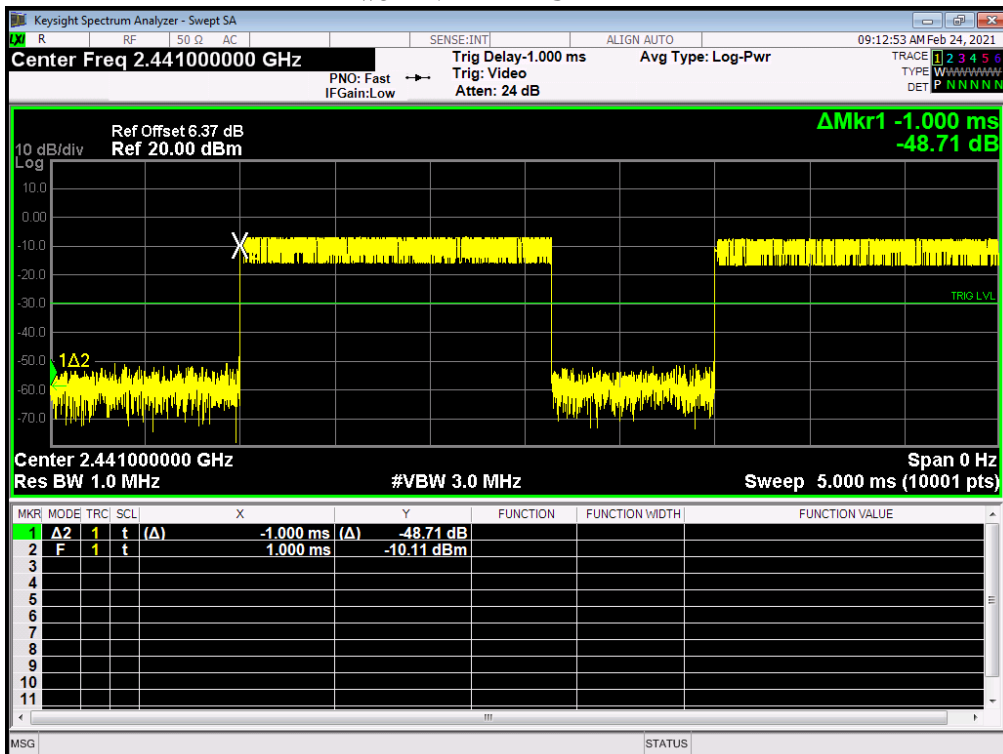


| Condition | Mode  | Frequency (MHz) | Pulse Time (ms) | Total Dwell Time (ms) | Period Time (ms) | Limit (ms) | Verdict |
|-----------|-------|-----------------|-----------------|-----------------------|------------------|------------|---------|
| NVNT      | 1-DH3 | 2402            | 1.638           | 262.08                | 31600            | 400        | Pass    |
| NVNT      | 1-DH3 | 2441            | -1              | -160                  | 31600            | 400        | Pass    |
| NVNT      | 1-DH3 | 2480            | 1.638           | 262.08                | 31600            | 400        | Pass    |

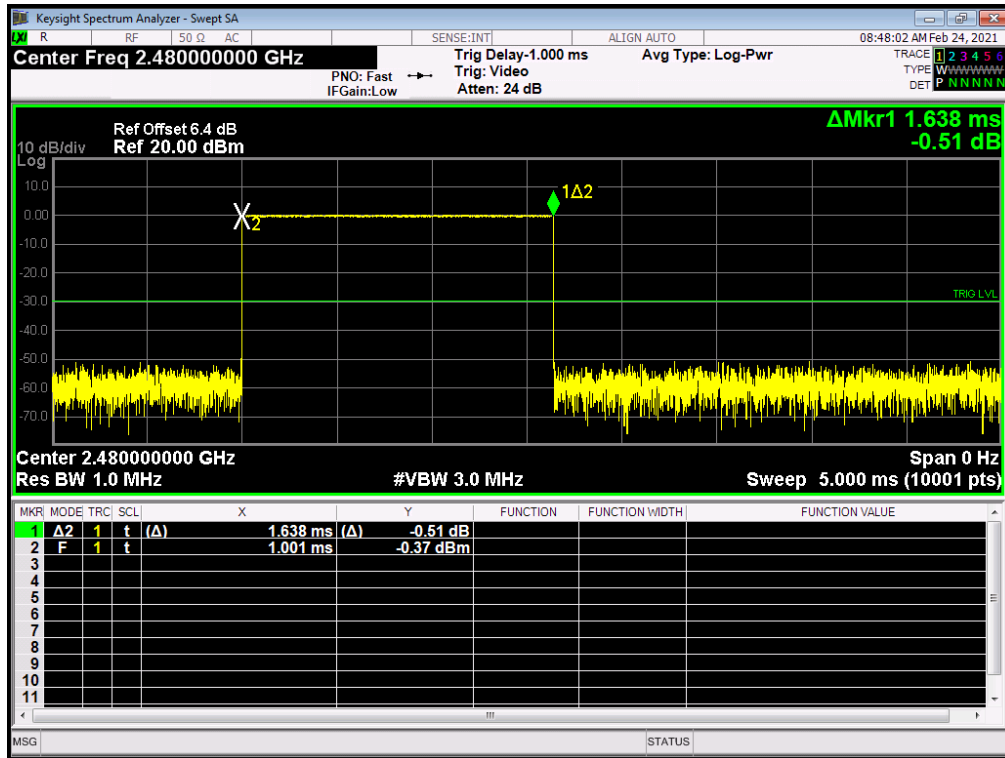
Dwell NVNT 1-DH3 2402MHz



Dwell NVNT 1-DH3 2441MHz

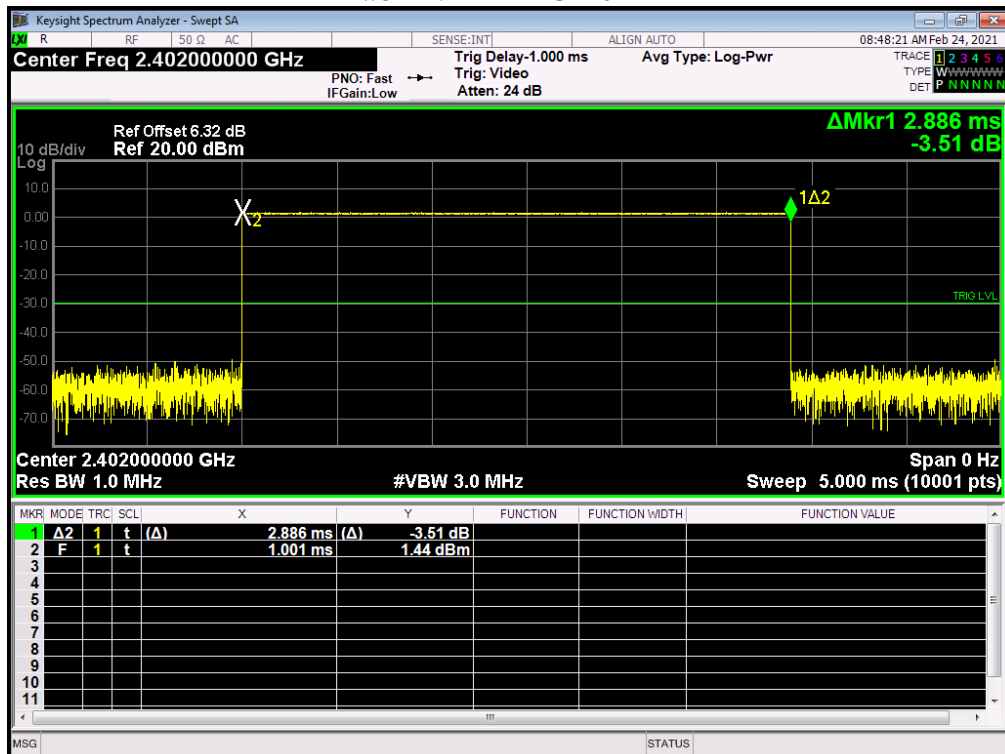


Dwell NVNT 1-DH3 2480MHz

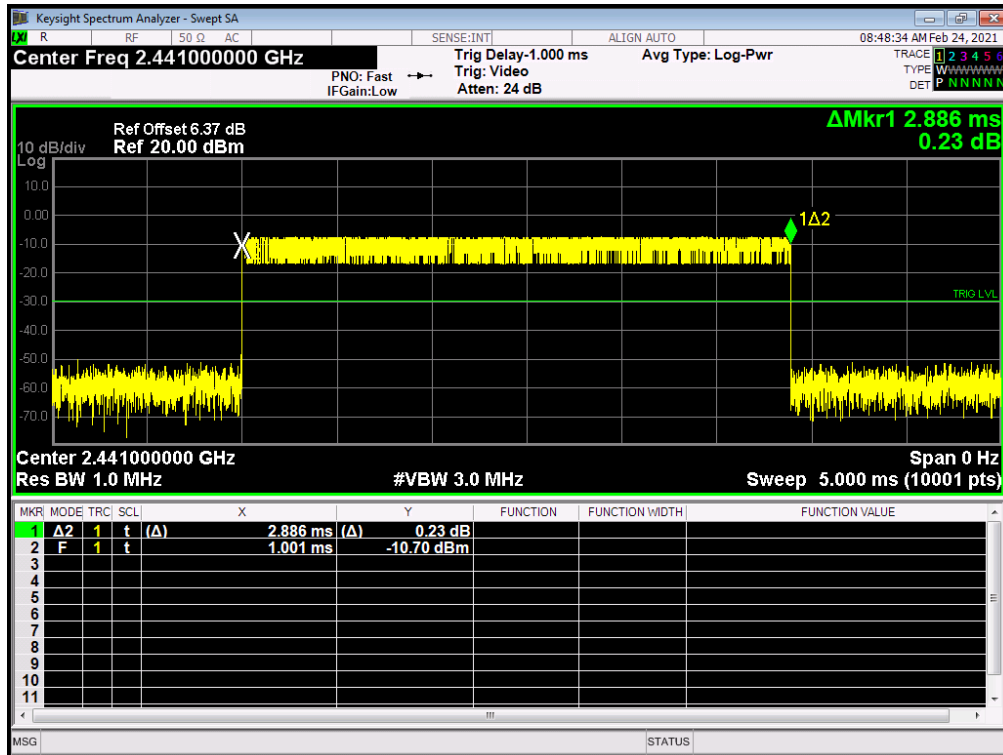


| Condition | Mode  | Frequency (MHz) | Pulse Time (ms) | Total Dwell Time (ms) | Period Time (ms) | Limit (ms) | Verdict |
|-----------|-------|-----------------|-----------------|-----------------------|------------------|------------|---------|
| NVNT      | 1-DH5 | 2402            | 2.886           | 307.84                | 31600            | 400        | Pass    |
| NVNT      | 1-DH5 | 2441            | 2.886           | 307.84                | 31600            | 400        | Pass    |
| NVNT      | 1-DH5 | 2480            | 2.887           | 307.947               | 31600            | 400        | Pass    |

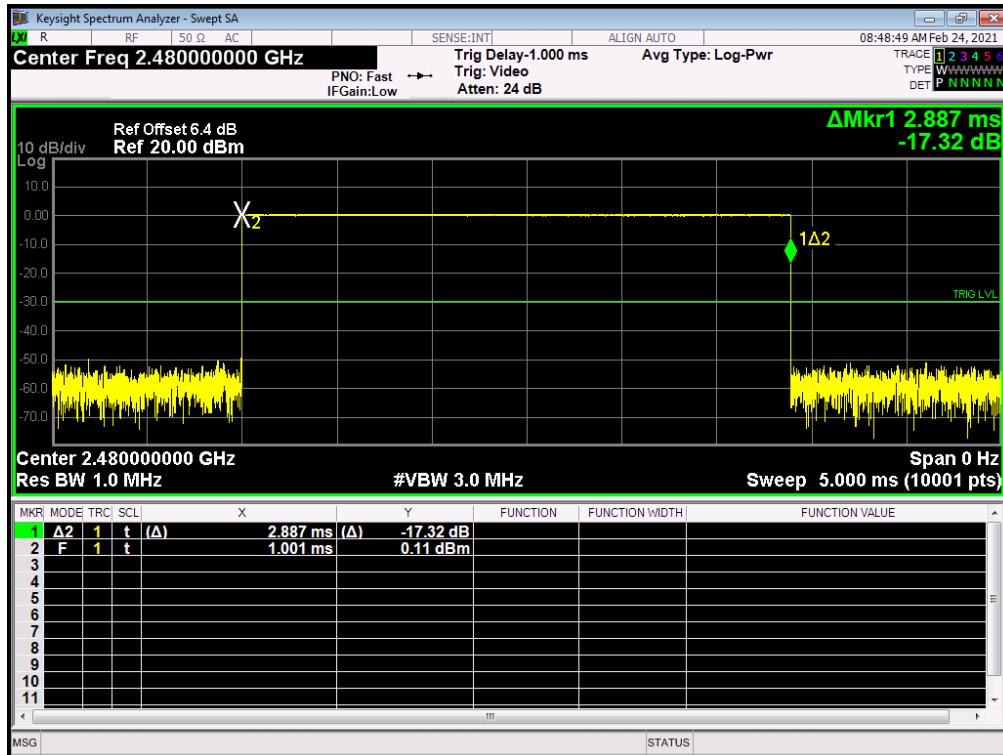
Dwell NVNT 1-DH5 2402MHz



Dwell NVNT 1-DH5 2441MHz

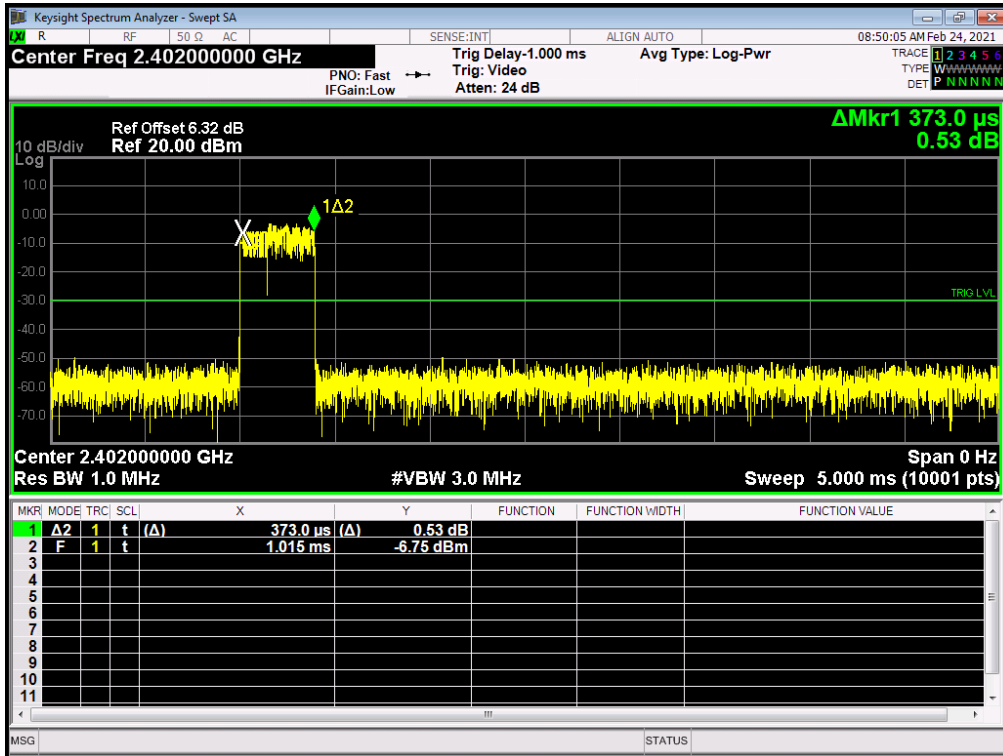


Dwell NVNT 1-DH5 2480MHz

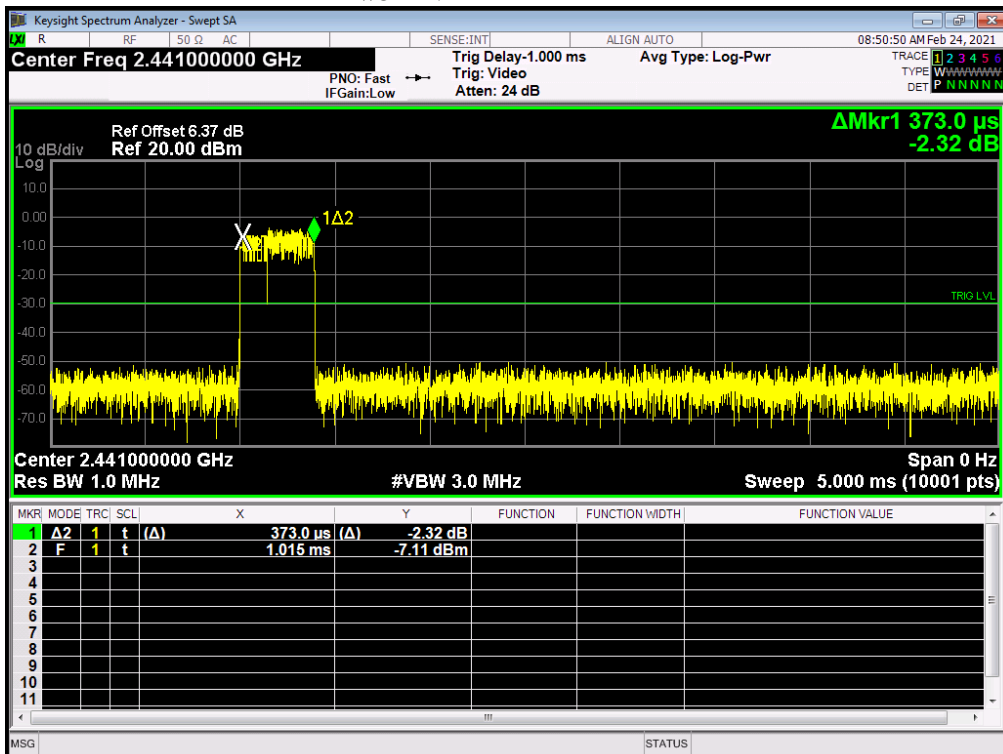


| Condition | Mode  | Frequency (MHz) | Pulse Time (ms) | Total Dwell Time (ms) | Period Time (ms) | Limit (ms) | Verdict |
|-----------|-------|-----------------|-----------------|-----------------------|------------------|------------|---------|
| NVNT      | 2-DH1 | 2402            | 0.373           | 119.36                | 31600            | 400        | Pass    |
| NVNT      | 2-DH1 | 2441            | 0.373           | 119.36                | 31600            | 400        | Pass    |
| NVNT      | 2-DH1 | 2480            | 0.375           | 120                   | 31600            | 400        | Pass    |

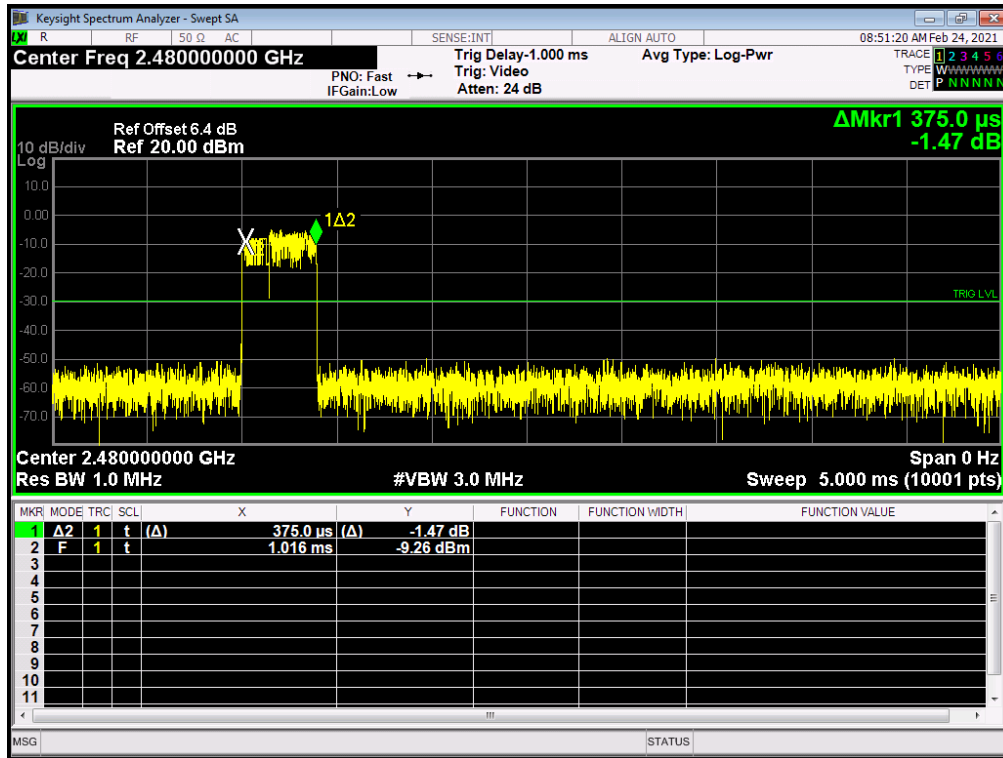
Dwell NVNT 2-DH1 2402MHz



Dwell NVNT 2-DH1 2441MHz

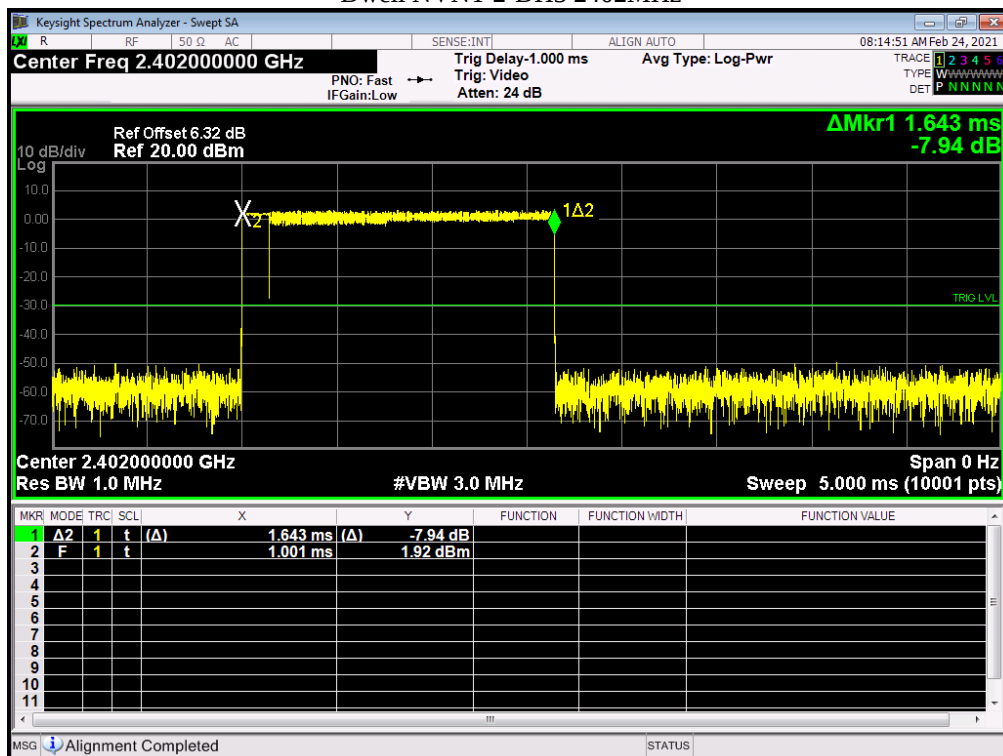


Dwell NVNT 2-DH1 2480MHz

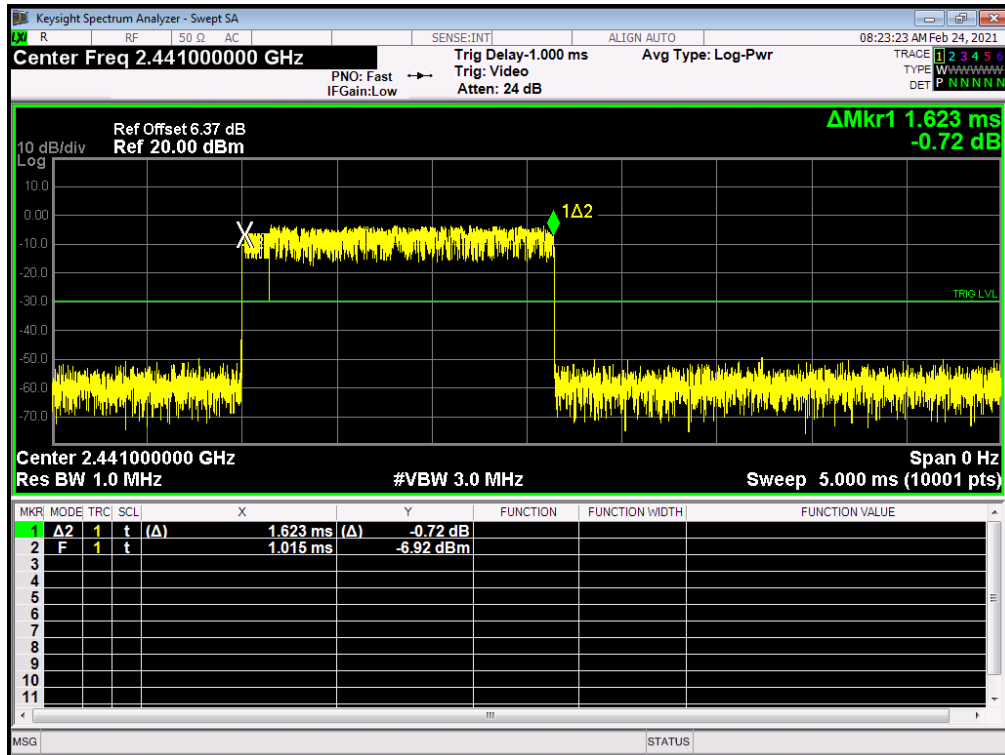


| Condition | Mode  | Frequency (MHz) | Pulse Time (ms) | Total Dwell Time (ms) | Period Time (ms) | Limit (ms) | Verdict |
|-----------|-------|-----------------|-----------------|-----------------------|------------------|------------|---------|
| NVNT      | 2-DH3 | 2402            | 1.643           | 262.88                | 31600            | 400        | Pass    |
| NVNT      | 2-DH3 | 2441            | 1.623           | 259.68                | 31600            | 400        | Pass    |
| NVNT      | 2-DH3 | 2480            | 1.627           | 260.32                | 31600            | 400        | Pass    |

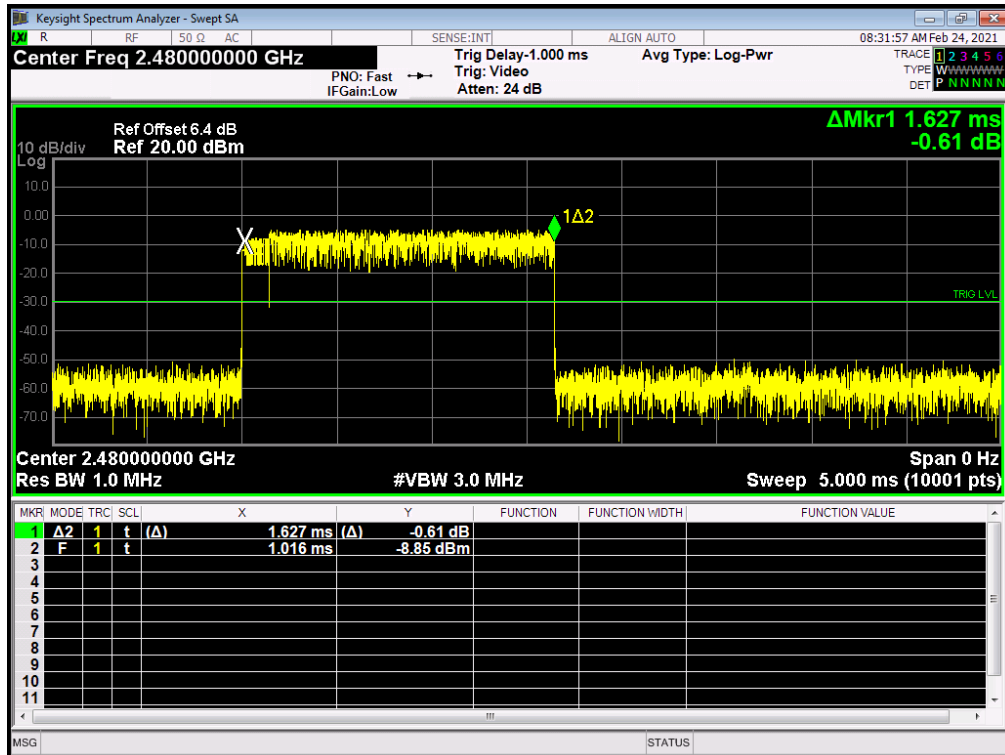
Dwell NVNT 2-DH3 2402MHz



Dwell NVNT 2-DH3 2441MHz

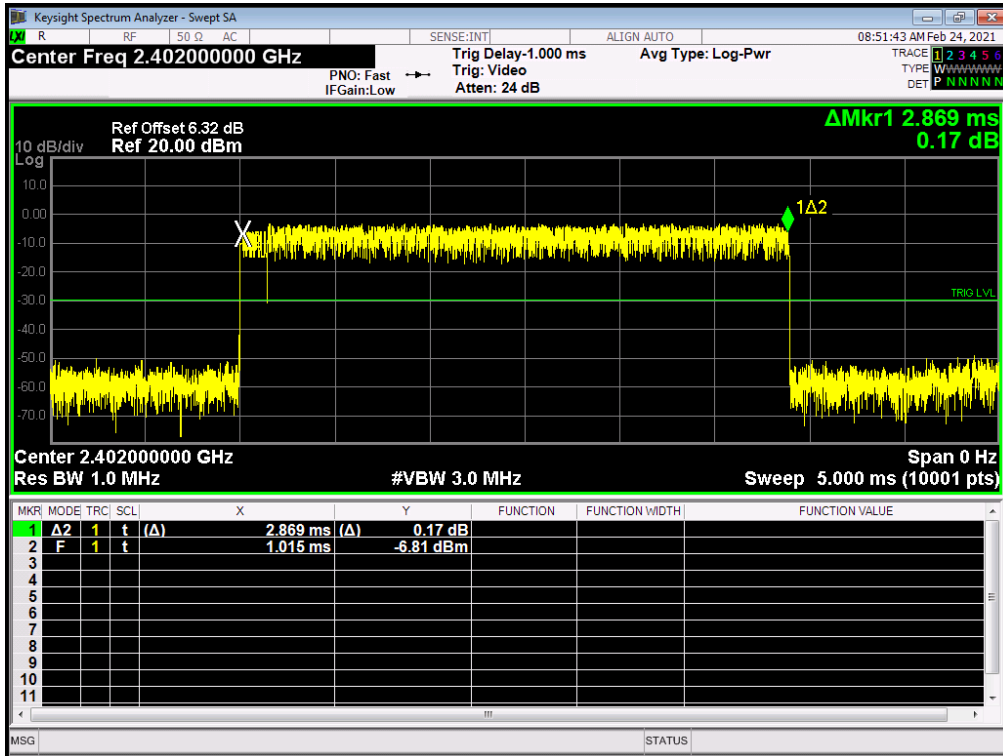


Dwell NVNT 2-DH3 2480MHz



| Condition | Mode  | Frequency (MHz) | Pulse Time (ms) | Total Dwell Time (ms) | Period Time (ms) | Limit (ms) | Verdict |
|-----------|-------|-----------------|-----------------|-----------------------|------------------|------------|---------|
| NVNT      | 2-DH5 | 2402            | 2.869           | 306.027               | 31600            | 400        | Pass    |
| NVNT      | 2-DH5 | 2441            | 2.891           | 308.373               | 31600            | 400        | Pass    |
| NVNT      | 2-DH5 | 2480            | 2.875           | 306.667               | 31600            | 400        | Pass    |

Dwell NVNT 2-DH5 2402MHz



Dwell NVNT 2-DH5 2441MHz

