

# FCC TEST REPORT

## FCC ID: 2AH4J-HUB422

Report Number.....: ZHT-240628014E-2

Date of Test.....: June 28, 2024 to Aug. 26, 2024

Date of issue.....: Aug. 26, 2024

Test Result .....: PASS

Testing Laboratory.....: Guangdong Zhonghan Testing Technology Co., Ltd.

Address .....: Room 104, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Applicant's name .....: Consumer 2.0

Address .....: 6300 Wilshire Blvd Suite 620, Los Angeles, CA 90048, United States

Manufacturer's name .....: Consumer 2.0

Address .....: 6300 Wilshire Blvd Suite 620, Los Angeles, CA 90048, United States

Test specification:

Standard.....: FCC CFR Title 47 Part 15 Subpart C Section 15.247

Test procedure.....: ANSI C63.10:2013

Non-standard test method .....: N/A

This device described above has been tested by ZHT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of ZHT, this document may be altered or revised by ZHT, personal only, and shall be noted in the revision of the document.

Product name.....: Rently Hub 4

Trademark .....: /

Model/Type reference.....: HUB422, HUB422-1

Model difference.....: All the model are of the same circuit and RF module, and the only difference is the Storage chip different.

Ratings.....: Input: DC 5V, 2.5A for adapter

Testing procedure and testing location:

Testing Laboratory.....: Guangdong Zhonghan Testing Technology Co., Ltd.

Address.....: Room 104, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Tested by (name + signature).....: Leon Li

Leon Li

Reviewer (name + signature).....: Baret Wu

Baret Wu

Approved (name + signature).....: Levi Lee

Levi Lee



## Table of Contents

|                                                     | Page      |
|-----------------------------------------------------|-----------|
| <b>1. VERSION</b>                                   | <b>5</b>  |
| <b>2. TEST SUMMARY</b>                              | <b>6</b>  |
| 2.1 TEST FACILITY                                   | 7         |
| 2.2 MEASUREMENT UNCERTAINTY                         | 7         |
| <b>3. GENERAL INFORMATION</b>                       | <b>8</b>  |
| 3.1 GENERAL DESCRIPTION OF EUT                      | 8         |
| 3.2 Test Setup Configuration                        | 9         |
| 3.3 Support Equipment                               | 10        |
| 3.4 Test Mode                                       | 10        |
| 3.5 EQUIPMENTS LIST FOR ALL TEST ITEMS              | 11        |
| <b>4. EMC EMISSION TEST</b>                         | <b>13</b> |
| 4.1 Conducted emissions                             | 13        |
| 4.1.1 POWER LINE CONDUCTED EMISSION Limits          | 13        |
| 4.1.2 TEST PROCEDURE                                | 13        |
| 4.1.3 DEVIATION FROM TEST STANDARD                  | 13        |
| 4.1.4 TEST SETUP                                    | 14        |
| 4.1.5 EUT OPERATING CONDITIONS                      | 14        |
| 4.1.6 Test Result                                   | 14        |
| 4.2 Radiated emissions                              | 17        |
| 4.2.1 Radiated Emission Limits                      | 17        |
| 4.2.2 TEST PROCEDURE                                | 17        |
| 4.2.3 DEVIATION FROM TEST STANDARD                  | 18        |
| 4.2.4 TEST SETUP                                    | 18        |
| 4.2.5 EUT OPERATING CONDITIONS                      | 19        |
| 4.2.6 TEST RESULTS                                  | 20        |
| <b>5. RADIATED BAND EMISSION MEASUREMENT</b>        | <b>28</b> |
| 5.1 Test Requirement:                               | 28        |
| 5.2 TEST PROCEDURE                                  | 28        |
| 5.3 DEVIATION FROM TEST STANDARD                    | 29        |
| 5.4 TEST SETUP                                      | 29        |
| 5.5 EUT OPERATING CONDITIONS                        | 29        |
| 5.6 TEST RESULT                                     | 30        |
| <b>6. CONDUCTED BAND EDGE AND SPURIOUS EMISSION</b> | <b>32</b> |
| 6.1 Limit                                           | 32        |
| 6.2 Test Setup                                      | 32        |
| 6.3 Test procedure                                  | 32        |
| 6.4 DEVIATION FROM STANDARD                         | 32        |
| 6.5 Test Result                                     | 33        |
| <b>BAND EDGE</b>                                    | <b>33</b> |
| <b>BAND EDGE(HOPPING)</b>                           | <b>40</b> |
| <b>CONDUCTED RF SPURIOUS EMISSION</b>               | <b>47</b> |
| <b>7. 20DB&amp;99% BANDWIDTH</b>                    | <b>57</b> |
| 7.1 Test Setup                                      | 57        |
| 7.2 Limit                                           | 57        |
| 7.3 Test procedure                                  | 57        |
| 7.4 DEVIATION FROM STANDARD                         | 57        |
| 7.5 Test Result                                     | 57        |
| <b>8. MAXIMUM PEAK OUTPUT POWER</b>                 | <b>67</b> |
| 8.1 Block Diagram Of Test Setup                     | 67        |
| 8.2 Limit                                           | 67        |
| 8.3 Test procedure                                  | 67        |
| 8.4 DEVIATION FROM STANDARD                         | 67        |
| 8.5 Test Result                                     | 67        |
| <b>9. HOPPING CHANNEL SEPARATION</b>                | <b>78</b> |
| 9.1 Test Setup                                      | 78        |
| 9.2 Test procedure                                  | 78        |



|                                             |           |
|---------------------------------------------|-----------|
| 9.3 DEVIATION FROM STANDARD .....           | 78        |
| 9.4 Test Result .....                       | 78        |
| <b>10.NUMBER OF HOPPING FREQUENCY .....</b> | <b>81</b> |
| 10.1 Test Setup .....                       | 81        |
| 10.2 Test procedure .....                   | 81        |
| 10.3 DEVIATION FROM STANDARD .....          | 81        |
| 10.4 Test Result .....                      | 82        |
| <b>11. DWELL TIME .....</b>                 | <b>87</b> |
| 11.1 Test Setup .....                       | 87        |
| 11.2 Test procedure .....                   | 87        |
| 11.3 DEVIATION FROM STANDARD .....          | 87        |
| 11.4 Test Result .....                      | 88        |
| <b>12. ANTENNA REQUIREMENT .....</b>        | <b>98</b> |
| <b>13. TEST SETUP PHOTO .....</b>           | <b>99</b> |
| <b>14. EUT CONSTRUCTIONAL DETAILS .....</b> | <b>99</b> |

1. VERSION

| Report No.       | Version | Description             | Approved      |
|------------------|---------|-------------------------|---------------|
| ZHT-240628014E-2 | Rev.01  | Initial issue of report | Aug. 26, 2024 |
|                  |         |                         |               |
|                  |         |                         |               |

## 2. TEST SUMMARY

Test procedures according to the technical standards:

| FCC Part15 (15.247) , Subpart C |                                            |        |        |
|---------------------------------|--------------------------------------------|--------|--------|
| Standard Section                | Test Item                                  | Result | Remark |
| FCC part 15.203/15.247 (b)(4)   | Antenna Requirement                        | PASS   |        |
| 15.207                          | AC Power Line Conducted Emission           | PASS   |        |
| 15.247 (b)(1)                   | Conducted Peak Output Power                | PASS   |        |
| 15.247 (a)(1)                   | 20dB Occupied Bandwidth<br>99% OCB         | PASS   |        |
| 15.247 (a)(1)                   | Carrier Frequencies Separation             | PASS   |        |
| 15.247 (a)(1)(iii)              | Hopping Channel Number                     | PASS   |        |
| 15.247 (a)(1)(iii)              | Dwell Time                                 | PASS   |        |
| 15.205/15.209                   | Radiated Emission and Restricted Band      | PASS   |        |
| 15.247(d)                       | Conducted Unwanted emissions and Band Edge | PASS   |        |

### NOTE:

- (1) " N/A" denotes test is not applicable in this Test Report
- (2) EUT has two different types of storage chips, with the same circuit design, PCB layout, RF module/circuit, antenna type (s), and antenna location. The RF output power of the Storage chip 1 and Storage chip 2 are not significantly different, while the RF output power of the Storage chip 1 is slightly larger than that of the Storage chip 2. So chose the Storage chip 1 for all the tests.
- (3) All projects of Storage chip 1 and Storage chip 2 have been tested, and the report only reflects the worst test data of Storage chip 1.

## 2.1 TEST FACILITY

Guangdong Zhonghan Testing Technology Co., Ltd.  
Add. : Room 104, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District  
Shenzhen, Guangdong, China

FCC Registration Number: 255941  
Designation Number: CN0325  
IC Registered No.: 29832  
CAB identifier: CN0143

## 2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

| No. | Item                              | Uncertainty               |
|-----|-----------------------------------|---------------------------|
| 1   | Conducted Emission Test           | $\pm 1.38\text{dB}$       |
| 2   | RF conducted power                | $\pm 0.16\text{dB}$       |
| 3   | Conducted spurious emissions      | $\pm 0.21\text{dB}$       |
| 4   | All radiated emissions (9k-30MHz) | $\pm 4.68\text{dB}$       |
| 5   | All radiated emissions (<1G)      | $\pm 4.68\text{dB}$       |
| 6   | All radiated emissions (>1G)      | $\pm 4.89\text{dB}$       |
| 7   | Temperature                       | $\pm 0.5^{\circ}\text{C}$ |
| 8   | Humidity                          | $\pm 2\%$                 |
| 9   | Occupied Bandwidth                | $\pm 4.96\text{dB}$       |



### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

|                          |                                                    |
|--------------------------|----------------------------------------------------|
| Product Name:            | Rently Hub 4                                       |
| Test Model No.:          | HUB422, HUB422-1                                   |
| Hardware Version:        | V1.0                                               |
| Software Version:        | V1.0                                               |
| Sample(s) Status:        | Engineer sample                                    |
| Channel numbers:         | 79                                                 |
| Channel separation:      | 2402MHz-2480MHz                                    |
| Modulation technology:   | GFSK, $\pi/4$ DQPSK, 8DPSK                         |
| Antenna Type:            | External Antenna                                   |
| Antenna gain:            | 2.89dBi                                            |
| Power supply:            | Input: DC 5V, 2.5A for adapter                     |
| SWITCHING POWER ADAPTER: | Input: AC 100-240V, 50/60Hz<br>Output: DC 5V, 2.5A |
| Sample Number:           | 240628014E-1#, 240628014E-2#                       |

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

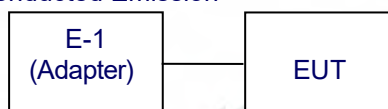
Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| Test channel        | Frequency |
|---------------------|-----------|
| The lowest channel  | 2402MHz   |
| The middle channel  | 2441MHz   |
| The Highest channel | 2480MHz   |

### 3.2 Test Setup Configuration

Conducted Emission



Radiated Emission



### 3.3 Support Equipment

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Item | Equipment | Mfr/Brand | Model/Type No. | Series No. | Note |
|------|-----------|-----------|----------------|------------|------|
| E-1  | Adapter   | /         | KN-CA018005    | /          | EUT  |
|      |           |           |                |            |      |
|      |           |           |                |            |      |

| Item | Shielded Type | Ferrite Core | Length | Note |
|------|---------------|--------------|--------|------|
|      |               |              |        |      |
|      |               |              |        |      |
|      |               |              |        |      |

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) The test software is the Bluetooth RF Test Tool which can set the EUT into the individual test modes.TX Power:7

### 3.4 Test Mode

|                                                                                                                                                                                                                                       |                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Transmitting mode                                                                                                                                                                                                                     | Keep the EUT in continuously transmitting mode. |
| Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data. |                                                 |



## 3.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

## Radiation Test equipment

| Item | Equipment                          | Manufacturer | Model        | Serial No. | Last Cal.     | Next Cal.     |
|------|------------------------------------|--------------|--------------|------------|---------------|---------------|
| 1    | Receiver                           | R&S          | ESCI         | 100874     | May 10, 2024  | May 09, 2025  |
| 2    | Loop antenna                       | EMCI         | LAP600       | 272        | May 10, 2024  | May 09, 2025  |
| 3    | Amplifier                          | Schwarzbeck  | BBV 9743 B   | 00378      | May 10, 2024  | May 09, 2025  |
| 4    | Amplifier                          | Schwarzbeck  | BBV 9718 B   | 00040      | May 10, 2024  | May 09, 2025  |
| 5    | Bilog Antenna                      | Schwarzbeck  | VULB9168     | 00498      | Aug. 04, 2023 | Aug. 03, 2024 |
| 6    | Horn Antenna                       | Schwarzbeck  | BBHA9120D    | 02623      | May 16, 2024  | May 15, 2025  |
| 7    | Horn Antenna                       | A.H.SYSTEMS  | SAS574       | 588        | May 10, 2024  | May 09, 2025  |
| 8    | Amplifier                          | AEROFLEX     | 100KHz-40GHz | 097        | May 10, 2024  | May 09, 2025  |
| 9    | Spectrum Analyzer                  | R&S          | FSV40        | 101413     | May 10, 2024  | May 09, 2025  |
| 10   | 966 Anechoic Chamber               | EMToni       | 9m6m6m       | /          | Nov. 25, 2021 | Nov. 24, 2024 |
| 11   | Spectrum Analyzer                  | KEYSIGHT     | N9020A       | MY53420208 | May 10, 2024  | May 09, 2025  |
| 12   | WIDBAND RADIO COMMUNICATION TESTER | R&S          | CMW500       | 109863     | May 10, 2024  | May 09, 2025  |
| 13   | Single Generator                   | Agilent      | N5182A       | MY48180575 | May 10, 2024  | May 09, 2025  |
| 14   | Power Sensor                       | MWRFTest     | MW100-RFCB   | /          | May 10, 2024  | May 09, 2025  |
| 15   | Power Amplifier Shielding Room     | EMToni       | 2m3m3m       | /          | Nov. 25, 2021 | Nov. 24, 2024 |

Conduction Test equipment

| Equipment                 | Manufacturer | Model      | Serial No.  | Last Cal.     | Next Cal.     |
|---------------------------|--------------|------------|-------------|---------------|---------------|
| Receiver                  | R&S          | ESCI       | 100874      | May 10, 2024  | May 09, 2025  |
| LISN                      | R&S          | ENV216     | 102794      | May 10, 2024  | May 09, 2025  |
| ISN CAT 6                 | Schwarzbeck  | NTFM 8158  | 00318       | May 10, 2024  | May 09, 2025  |
| ISN CAT 5                 | Schwarzbeck  | CAT5 8158  | 00343       | May 10, 2024  | May 09, 2025  |
| Capacitive Voltage Probe  | Schwarzbeck  | CVP 9222 C | 00101       | May 10, 2024  | May 09, 2025  |
| Current Transformer Clamp | Schwarzbeck  | SW 9605    | SW9605 #209 | May 10, 2024  | May 09, 2025  |
| CE Shielding Room         | EMToni       | 9m4m3m     | /           | Nov. 25, 2021 | Nov. 24, 2024 |

Conducted Test equipment

| Item | Equipment         | Manufacturer | Model      | Serial No. | Last Cal.    | Next Cal.    |
|------|-------------------|--------------|------------|------------|--------------|--------------|
| 1    | Spectrum Analyzer | R&S          | FSV40      | 101413     | May 10, 2024 | May 09, 2025 |
| 2    | Spectrum Analyzer | KEYSIGHT     | N9020A     | MY53420208 | May 10, 2024 | May 09, 2025 |
| 3    | Power Sensor      | MWRFTtest    | MW100-RFCB | /          | May 10, 2024 | May 09, 2025 |

#### 4. EMC EMISSION TEST

##### 4.1 Conducted emissions

|                       |                                          |
|-----------------------|------------------------------------------|
| Test Requirement:     | FCC Part15 C Section 15.207, RSS-Gen 8.8 |
| Test Method:          | ANSI C63.10:2013                         |
| Test Frequency Range: | 150KHz to 30MHz                          |
| Receiver setup:       | RBW=9KHz, VBW=30KHz, Sweep time=auto     |

##### 4.1.1 POWER LINE CONDUCTED EMISSION Limits

| FREQUENCY (MHz) | Limit (dBuV) |           | Standard |
|-----------------|--------------|-----------|----------|
|                 | Quasi-peak   | Average   |          |
| 0.15 -0.5       | 66 - 56 *    | 56 - 46 * | FCC      |
| 0.50 -5.0       | 56.00        | 46.00     | FCC      |
| 5.0 -30.0       | 60.00        | 50.00     | FCC      |

Note:

(1) \*Decreases with the logarithm of the frequency.

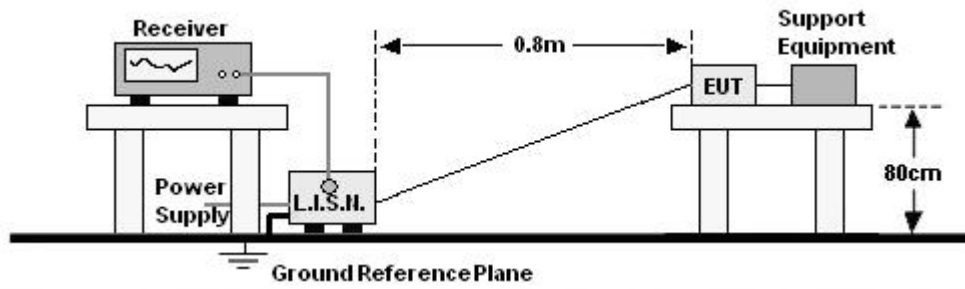
##### 4.1.2 TEST PROCEDURE

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

##### 4.1.3 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.4 TEST SETUP

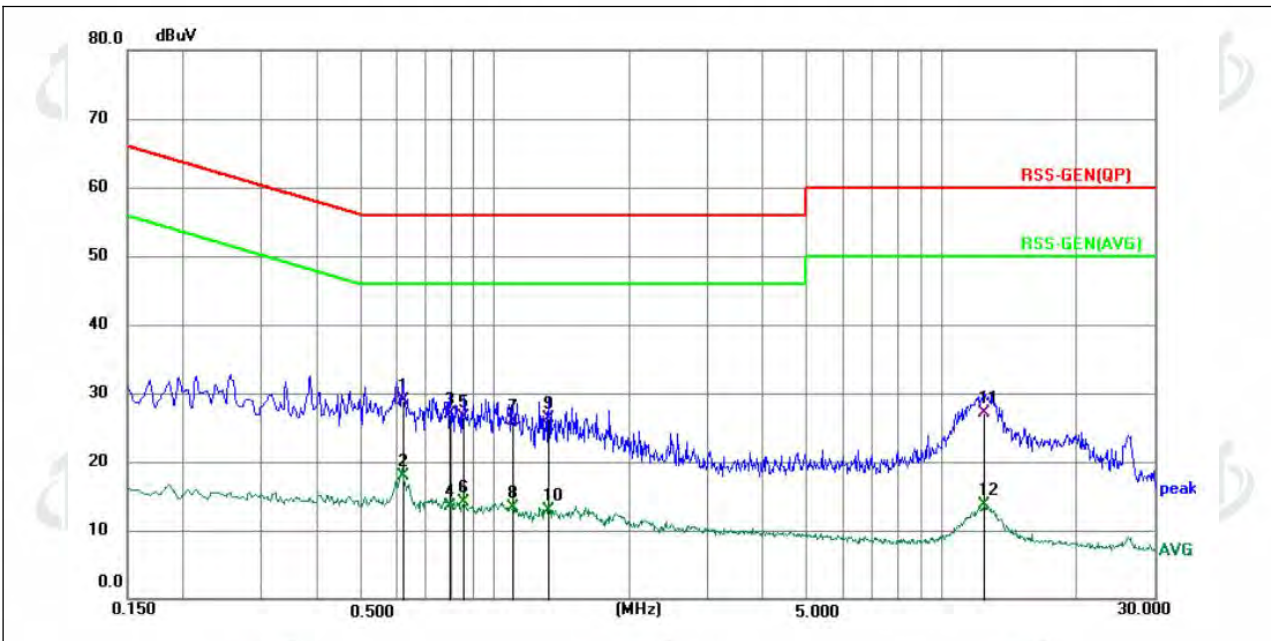


#### 4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

#### 4.1.6 Test Result

|               |              |                     |     |
|---------------|--------------|---------------------|-----|
| Temperature:  | 24.3℃        | Relative Humidity : | 50% |
| Pressure:     | 101kPa       | Phase :             | L   |
| Test Voltage: | AC 120V/60Hz |                     |     |

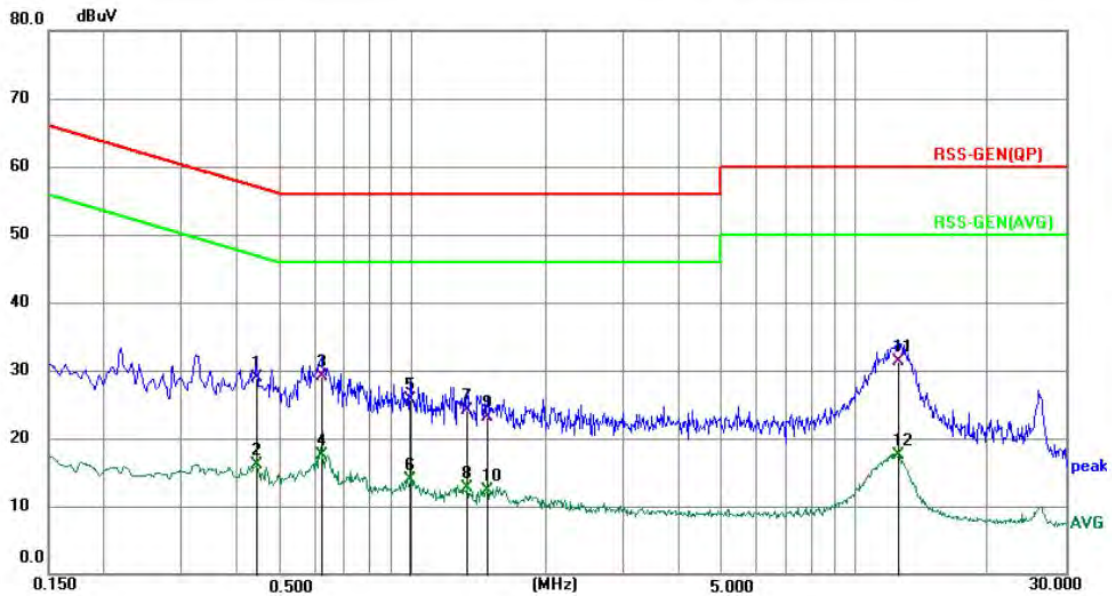


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|-------------|--------------|--------------|-------------|----------|-----|
| 1 * | 0.6225          | 18.90          | 10.03       | 28.93        | 56.00        | -27.07      | QP       | P   |
| 2   | 0.6225          | 7.90           | 10.03       | 17.93        | 46.00        | -28.07      | AVG      | P   |
| 3   | 0.7934          | 16.89          | 10.04       | 26.93        | 56.00        | -29.07      | QP       | P   |
| 4   | 0.7934          | 3.37           | 10.04       | 13.41        | 46.00        | -32.59      | AVG      | P   |
| 5   | 0.8520          | 16.52          | 10.05       | 26.57        | 56.00        | -29.43      | QP       | P   |
| 6   | 0.8520          | 4.10           | 10.05       | 14.15        | 46.00        | -31.85      | AVG      | P   |
| 7   | 1.0994          | 15.83          | 10.06       | 25.89        | 56.00        | -30.11      | QP       | P   |
| 8   | 1.0994          | 3.27           | 10.06       | 13.33        | 46.00        | -32.67      | AVG      | P   |
| 9   | 1.3200          | 16.16          | 10.06       | 26.22        | 56.00        | -29.78      | QP       | P   |
| 10  | 1.3200          | 2.89           | 10.06       | 12.95        | 46.00        | -33.05      | AVG      | P   |
| 11  | 12.4934         | 17.01          | 10.09       | 27.10        | 60.00        | -32.90      | QP       | P   |
| 12  | 12.4934         | 3.53           | 10.09       | 13.62        | 50.00        | -36.38      | AVG      | P   |

**Notes:**

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Measurement Level = Reading level + Correct Factor

|               |              |                     |     |
|---------------|--------------|---------------------|-----|
| Temperature:  | 24.3℃        | Relative Humidity : | 50% |
| Pressure:     | 101kPa       | Phase :             | N   |
| Test Voltage: | AC 120V/60Hz |                     |     |



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|-------------|--------------|--------------|-------------|----------|-----|
| 1   | 0.4425          | 18.85          | 10.00       | 28.85        | 57.01        | -28.16      | QP       | P   |
| 2   | 0.4425          | 6.04           | 10.00       | 16.04        | 47.01        | -30.97      | AVG      | P   |
| 3 * | 0.6225          | 18.98          | 10.03       | 29.01        | 56.00        | -26.99      | QP       | P   |
| 4   | 0.6225          | 7.53           | 10.03       | 17.56        | 46.00        | -28.44      | AVG      | P   |
| 5   | 0.9870          | 15.61          | 10.06       | 25.67        | 56.00        | -30.33      | QP       | P   |
| 6   | 0.9870          | 3.77           | 10.06       | 13.83        | 46.00        | -32.17      | AVG      | P   |
| 7   | 1.3290          | 13.99          | 10.06       | 24.05        | 56.00        | -31.95      | QP       | P   |
| 8   | 1.3290          | 2.68           | 10.06       | 12.74        | 46.00        | -33.26      | AVG      | P   |
| 9   | 1.4775          | 12.95          | 10.07       | 23.02        | 56.00        | -32.98      | QP       | P   |
| 10  | 1.4775          | 2.28           | 10.07       | 12.35        | 46.00        | -33.65      | AVG      | P   |
| 11  | 12.5700         | 21.24          | 10.09       | 31.33        | 60.00        | -28.67      | QP       | P   |
| 12  | 12.5700         | 7.37           | 10.09       | 17.46        | 50.00        | -32.54      | AVG      | P   |

**Notes:**

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Measurement Level = Reading level + Correct Factor



## 4.2 Radiated emissions

|                       |                                                        |            |        |        |            |
|-----------------------|--------------------------------------------------------|------------|--------|--------|------------|
| Test Requirement:     | FCC Part15 C Section 15.209, RSS-Gen 8.9, RSS-Gen 8.10 |            |        |        |            |
| Test Method:          | ANSI C63.10:2013                                       |            |        |        |            |
| Test Frequency Range: | 9kHz to 25GHz                                          |            |        |        |            |
| Test site:            | Measurement Distance: 3m                               |            |        |        |            |
| Receiver setup:       | Frequency                                              | Detector   | RBW    | VBW    | Value      |
|                       | 9KHz-150KHz                                            | Quasi-peak | 200Hz  | 600Hz  | Quasi-peak |
|                       | 150KHz-30MHz                                           | Quasi-peak | 9KHz   | 30KHz  | Quasi-peak |
|                       | 30MHz-1GHz                                             | Quasi-peak | 100KHz | 300KHz | Quasi-peak |
|                       | Above 1GHz                                             | Peak       | 1MHz   | 3MHz   | Peak       |
|                       |                                                        | Average    | 1MHz   | 10Hz   | Average    |

## 4.2.1 Radiated Emission Limits

| Frequencies (MHz) | Field Strength (micровolts/meter) | Measurement Distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009~0.490       | 2400/F(KHz)                       | 300                           |
| 0.490~1.705       | 24000/F(KHz)                      | 30                            |
| 1.705~30.0        | 30                                | 30                            |
| 30~88             | 100                               | 3                             |
| 88~216            | 150                               | 3                             |
| 216~960           | 200                               | 3                             |
| Above 960         | 500                               | 3                             |

## LIMITS OF RADIATED EMISSION MEASUREMENT

| FREQUENCY (MHz) | Limit (dBuV/m) (at 3M) |         |
|-----------------|------------------------|---------|
|                 | PEAK                   | AVERAGE |
| Above 1000      | 74                     | 54      |

## Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

## 4.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre( Above 18GHz the distance is 1 meter and table is 1.5 metre).
- h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel

Note:

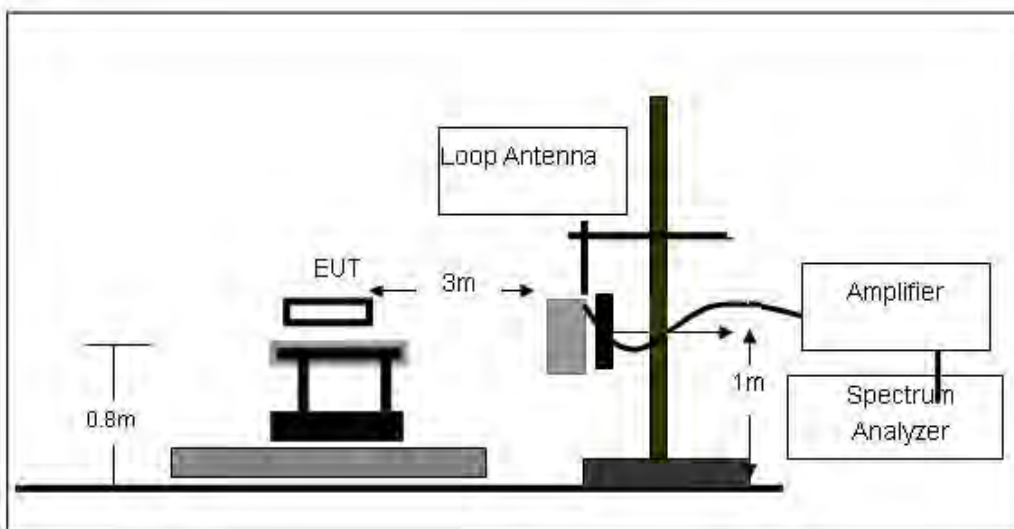
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

#### 4.2.3 DEVIATION FROM TEST STANDARD

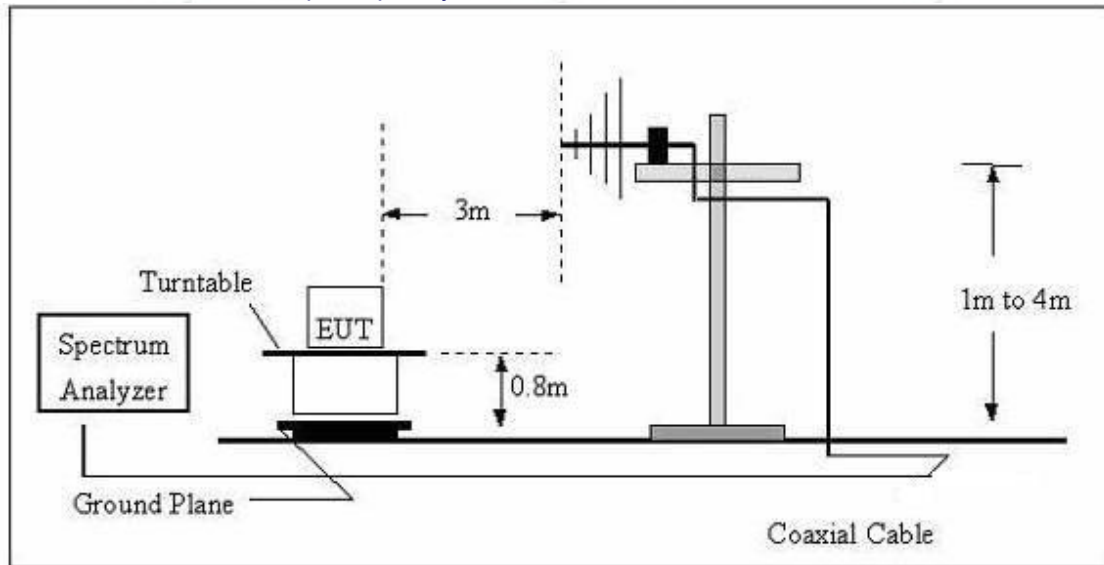
No deviation

#### 4.2.4 TEST SETUP

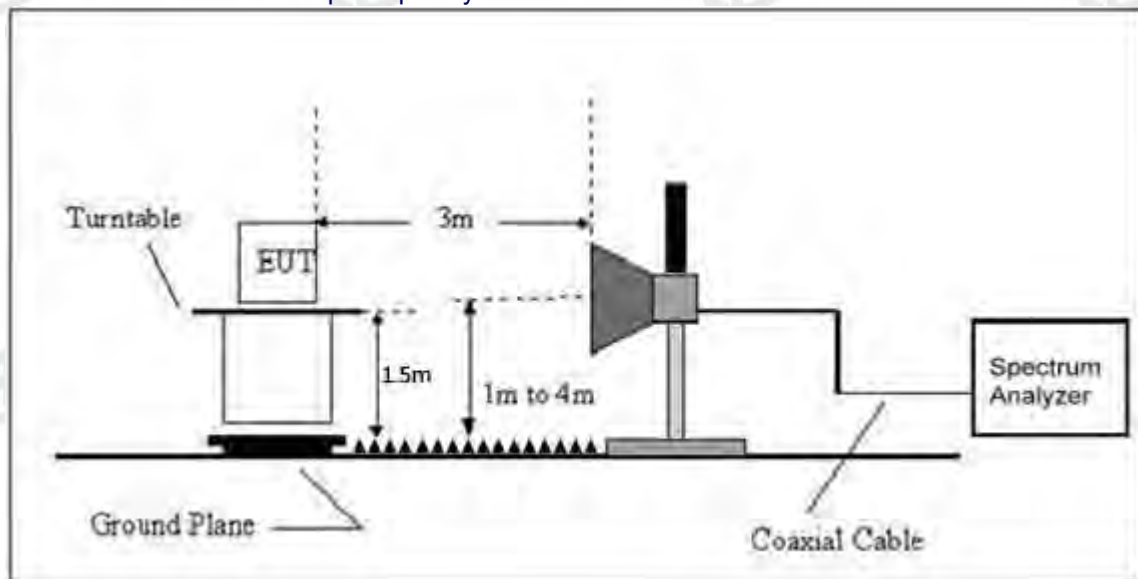
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



4.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

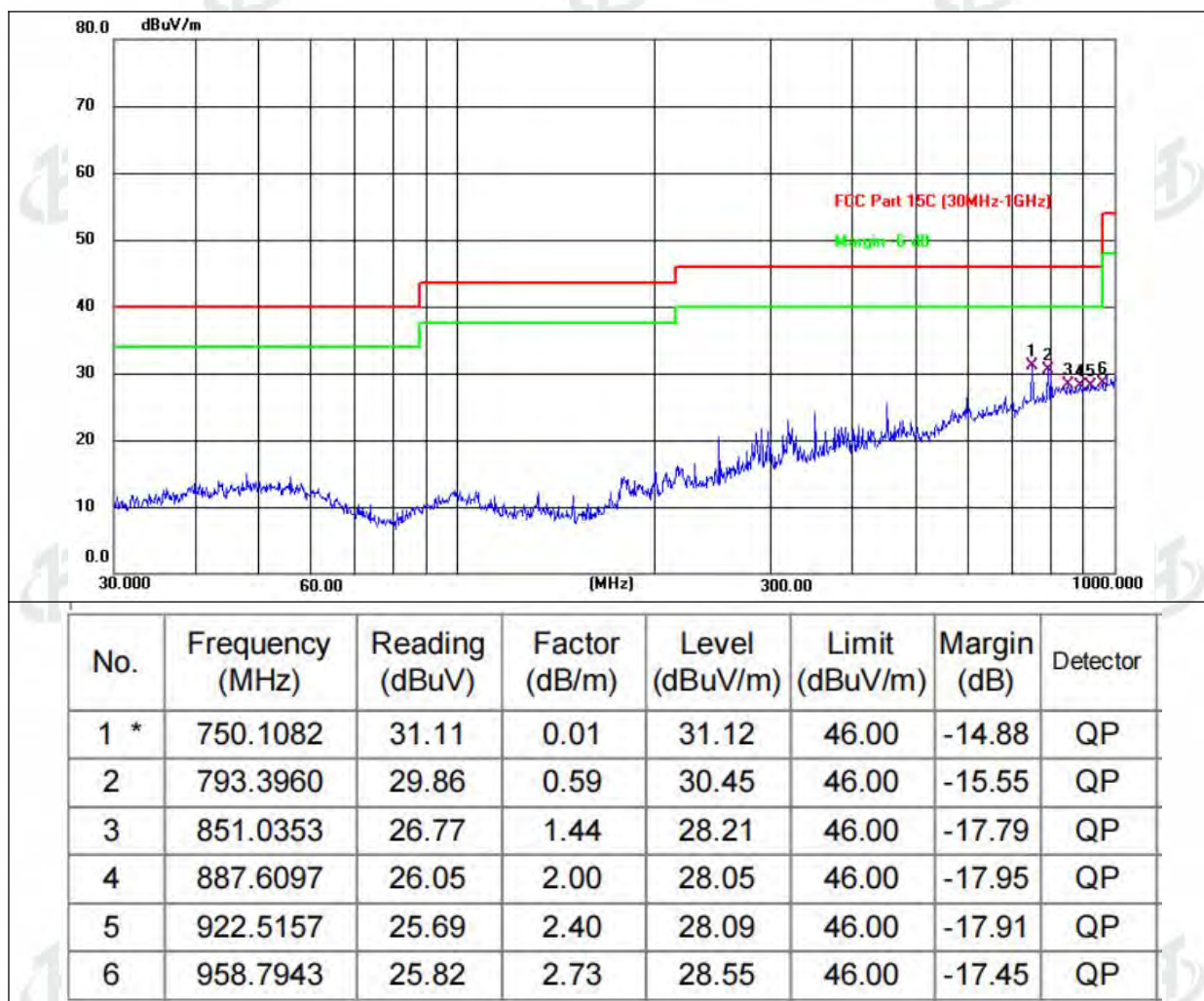
#### 4.2.6 TEST RESULTS

Between 9KHz – 30MHz

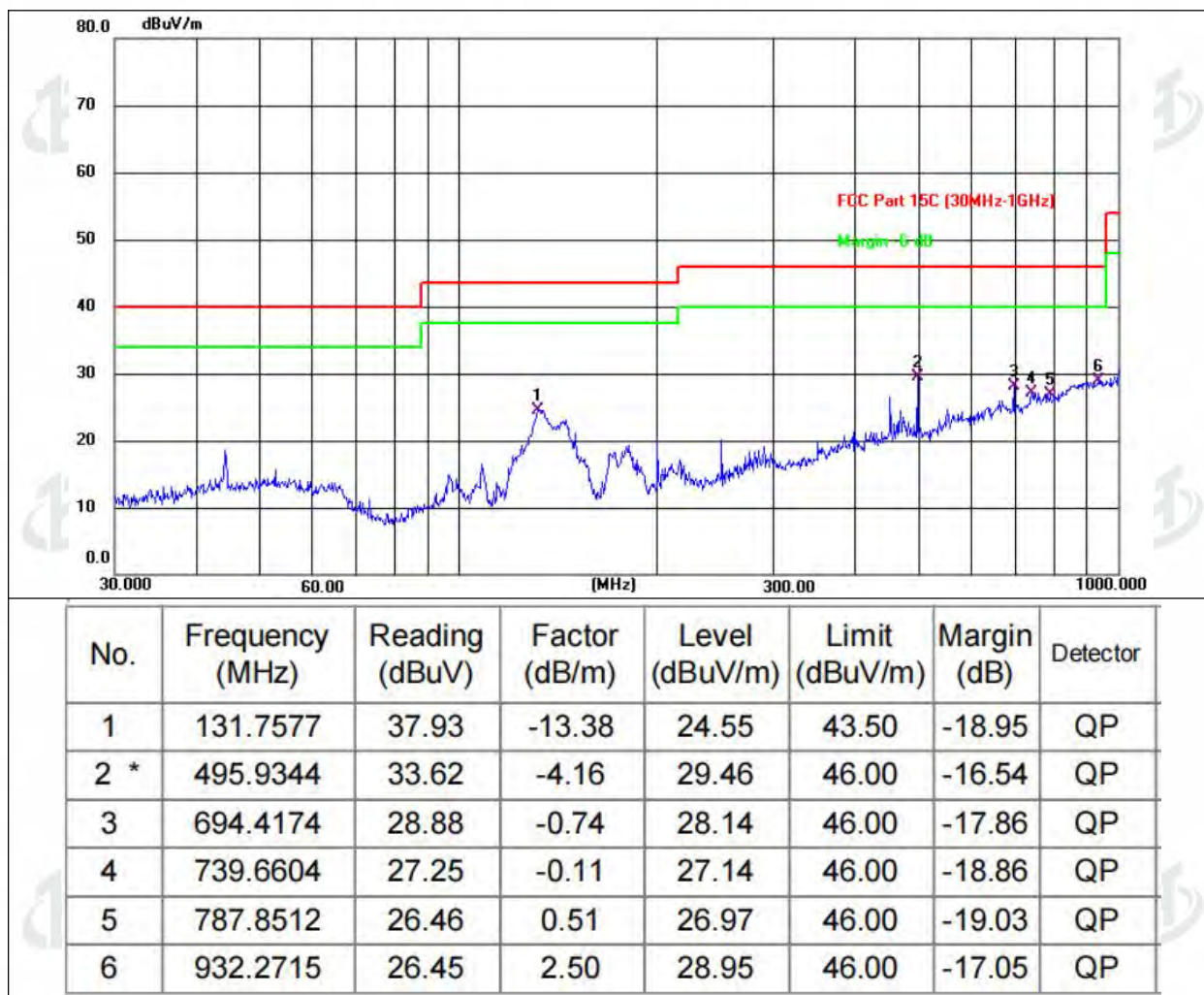
The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o), the test result no need to reported.

Between 30MHz – 1GHz

|               |              |                    |            |
|---------------|--------------|--------------------|------------|
| Temperature:  | 25.2℃        | Relative Humidity: | 50%        |
| Pressure:     | 1010kPa      | Polarization:      | Horizontal |
| Test Voltage: | AC 120V/60Hz |                    |            |



|               |              |                    |          |
|---------------|--------------|--------------------|----------|
| Temperature:  | 25.2℃        | Relative Humidity: | 50%      |
| Pressure:     | 1010kPa      | Polarization:      | Vertical |
| Test Voltage: | AC 120V/60Hz |                    |          |



**Remarks:**

- 1.Final Level =Receiver Read level + Antenna Factor + Cable Loss
- 2.The emission levels of other frequencies are very lower than the limit and not show in test report.
- 3.The test data shows only the worst case GFSK mode(Low Channel:2402MHz).



1GHz~25GHz

## GFSK

| Polar (H/V)         | Frequency (MHz) | Meter Reading (dBuV) | Pre-amplifier (dB) | Cable Loss (dB) | Antenna Factor (dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Detector Type |
|---------------------|-----------------|----------------------|--------------------|-----------------|---------------------|-------------------------|-----------------|-------------|---------------|
| Low Channel:2402MHz |                 |                      |                    |                 |                     |                         |                 |             |               |
| V                   | 4804.00         | 55.07                | 30.55              | 5.77            | 24.66               | 54.95                   | 74              | -19.05      | Pk            |
| V                   | 4804.00         | 42.91                | 30.55              | 5.77            | 24.66               | 42.79                   | 54              | -11.21      | AV            |
| V                   | 7206.00         | 58.59                | 30.33              | 6.32            | 24.55               | 59.13                   | 74              | -14.87      | Pk            |
| V                   | 7206.00         | 44.75                | 30.33              | 6.32            | 24.55               | 45.29                   | 54              | -8.71       | AV            |
| V                   | 9608.00         | 59.22                | 30.55              | 5.77            | 24.66               | 59.1                    | 74              | -14.9       | Pk            |
| V                   | 9608.00         | 41.07                | 30.55              | 5.77            | 24.66               | 40.95                   | 54              | -13.05      | AV            |
| V                   | 12010.00        | 58.49                | 30.33              | 6.32            | 24.55               | 59.03                   | 74              | -14.97      | Pk            |
| V                   | 12010.00        | 43.39                | 30.33              | 6.32            | 24.55               | 43.93                   | 54              | -10.07      | AV            |
| H                   | 4804.00         | 55.71                | 30.55              | 5.77            | 24.66               | 55.59                   | 74              | -18.41      | Pk            |
| H                   | 4804.00         | 41.62                | 30.55              | 5.77            | 24.66               | 41.5                    | 54              | -12.5       | AV            |
| H                   | 7206.00         | 57.88                | 30.33              | 6.32            | 24.55               | 58.42                   | 74              | -15.58      | Pk            |
| H                   | 7206.00         | 43.44                | 30.33              | 6.32            | 24.55               | 43.98                   | 54              | -10.02      | AV            |
| H                   | 9608.00         | 56.64                | 30.55              | 5.77            | 24.66               | 56.52                   | 74              | -17.48      | Pk            |
| H                   | 9608.00         | 41.63                | 30.55              | 5.77            | 24.66               | 41.51                   | 54              | -12.49      | AV            |
| H                   | 12010.00        | 58.97                | 30.33              | 6.32            | 24.55               | 59.51                   | 74              | -14.49      | Pk            |
| H                   | 12010.00        | 41.27                | 30.33              | 6.32            | 24.55               | 41.81                   | 54              | -12.19      | AV            |

| Polar (H/V)            | Frequency (MHz) | Meter Reading (dBuV) | Pre-amplifier (dB) | Cable Loss (dB) | Antenna Factor (dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Detector Type |
|------------------------|-----------------|----------------------|--------------------|-----------------|---------------------|-------------------------|-----------------|-------------|---------------|
| Middle Channel:2441MHz |                 |                      |                    |                 |                     |                         |                 |             |               |
| V                      | 4882.00         | 58.34                | 30.55              | 5.77            | 24.66               | 58.22                   | 74              | -15.78      | Pk            |
| V                      | 4882.00         | 41.18                | 30.55              | 5.77            | 24.66               | 41.06                   | 54              | -12.94      | AV            |
| V                      | 7323.00         | 58.23                | 30.33              | 6.32            | 24.55               | 58.77                   | 74              | -15.23      | Pk            |
| V                      | 7323.00         | 44.34                | 30.33              | 6.32            | 24.55               | 44.88                   | 54              | -9.12       | AV            |
| V                      | 9764.00         | 58.32                | 30.55              | 5.77            | 24.66               | 58.2                    | 74              | -15.8       | Pk            |
| V                      | 9764.00         | 41.23                | 30.55              | 5.77            | 24.66               | 41.11                   | 54              | -12.89      | AV            |
| V                      | 12205.00        | 57.39                | 30.33              | 6.32            | 24.55               | 57.93                   | 74              | -16.07      | Pk            |
| V                      | 12205.00        | 41.75                | 30.33              | 6.32            | 24.55               | 42.29                   | 54              | -11.71      | AV            |
| H                      | 4882.00         | 59.42                | 30.55              | 5.77            | 24.66               | 59.3                    | 74              | -14.7       | Pk            |
| H                      | 4882.00         | 44                   | 30.55              | 5.77            | 24.66               | 43.88                   | 54              | -10.12      | AV            |
| H                      | 7323.00         | 56.77                | 30.33              | 6.32            | 24.55               | 57.31                   | 74              | -16.69      | Pk            |
| H                      | 7323.00         | 41.94                | 30.33              | 6.32            | 24.55               | 42.48                   | 54              | -11.52      | AV            |
| H                      | 9764.00         | 56.3                 | 30.55              | 5.77            | 24.66               | 56.18                   | 74              | -17.82      | Pk            |
| H                      | 9764.00         | 43.34                | 30.55              | 5.77            | 24.66               | 43.22                   | 54              | -10.78      | AV            |
| H                      | 12205.00        | 57.25                | 30.33              | 6.32            | 24.55               | 57.79                   | 74              | -16.21      | Pk            |
| H                      | 12205.00        | 43.03                | 30.33              | 6.32            | 24.55               | 43.57                   | 54              | -10.43      | AV            |

| Polar<br>(H/V)       | Frequency<br>(MHz) | Meter<br>Reading<br>(dBuV) | Pre-ampli<br>fier<br>(dB) | Cable<br>Loss<br>(dB) | Antenna<br>Factor<br>(dB) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Detector<br>Type |
|----------------------|--------------------|----------------------------|---------------------------|-----------------------|---------------------------|-------------------------------|--------------------|----------------|------------------|
| High Channel:2480MHz |                    |                            |                           |                       |                           |                               |                    |                |                  |
| V                    | 4960.00            | 55.82                      | 30.55                     | 5.77                  | 24.66                     | 55.7                          | 74                 | -18.3          | Pk               |
| V                    | 4960.00            | 41.92                      | 30.55                     | 5.77                  | 24.66                     | 41.8                          | 54                 | -12.2          | AV               |
| V                    | 7440.00            | 55.34                      | 30.33                     | 6.32                  | 24.55                     | 55.88                         | 74                 | -18.12         | Pk               |
| V                    | 7440.00            | 43.71                      | 30.33                     | 6.32                  | 24.55                     | 44.25                         | 54                 | -9.75          | AV               |
| V                    | 9920.00            | 55.81                      | 30.55                     | 5.77                  | 24.66                     | 55.69                         | 74                 | -18.31         | Pk               |
| V                    | 9920.00            | 41.25                      | 30.55                     | 5.77                  | 24.66                     | 41.13                         | 54                 | -12.87         | AV               |
| V                    | 12400.00           | 58.83                      | 30.33                     | 6.32                  | 24.55                     | 59.37                         | 74                 | -14.63         | Pk               |
| V                    | 12400.00           | 41.29                      | 30.33                     | 6.32                  | 24.55                     | 41.83                         | 54                 | -12.17         | AV               |
| H                    | 4960.00            | 56.48                      | 30.55                     | 5.77                  | 24.66                     | 56.36                         | 74                 | -17.64         | Pk               |
| H                    | 4960.00            | 41.62                      | 30.55                     | 5.77                  | 24.66                     | 41.5                          | 54                 | -12.5          | AV               |
| H                    | 7440.00            | 55.52                      | 30.33                     | 6.32                  | 24.55                     | 56.06                         | 74                 | -17.94         | Pk               |
| H                    | 7440.00            | 41.3                       | 30.33                     | 6.32                  | 24.55                     | 41.84                         | 54                 | -12.16         | AV               |
| H                    | 9920.00            | 59.9                       | 30.55                     | 5.77                  | 24.66                     | 59.78                         | 74                 | -14.22         | Pk               |
| H                    | 9920.00            | 42.91                      | 30.55                     | 5.77                  | 24.66                     | 42.79                         | 54                 | -11.21         | AV               |
| H                    | 12400.00           | 57.02                      | 30.33                     | 6.32                  | 24.55                     | 57.56                         | 74                 | -16.44         | Pk               |
| H                    | 12400.00           | 41.77                      | 30.33                     | 6.32                  | 24.55                     | 42.31                         | 54                 | -11.69         | AV               |

**Remark:**

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,  
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

$\pi/4$ DQPSK

| Polar<br>(H/V)      | Frequency | Meter<br>Reading | Pre-ampli<br>fier | Cable<br>Loss | Antenna<br>Factor | Emission<br>Level | Limits   | Margin | Detector<br>Type |
|---------------------|-----------|------------------|-------------------|---------------|-------------------|-------------------|----------|--------|------------------|
|                     | (MHz)     | (dBuV)           | (dB)              | (dB)          | (dB)              | (dBuV/m)          | (dBuV/m) | (dB)   |                  |
| Low Channel:2402MHz |           |                  |                   |               |                   |                   |          |        |                  |
| V                   | 4804.00   | 57.18            | 30.55             | 5.77          | 24.66             | 57.06             | 74       | -16.94 | Pk               |
| V                   | 4804.00   | 43.3             | 30.55             | 5.77          | 24.66             | 43.18             | 54       | -10.82 | AV               |
| V                   | 7206.00   | 56.13            | 30.33             | 6.32          | 24.55             | 56.67             | 74       | -17.33 | Pk               |
| V                   | 7206.00   | 43.03            | 30.33             | 6.32          | 24.55             | 43.57             | 54       | -10.43 | AV               |
| V                   | 9608.00   | 56.97            | 30.55             | 5.77          | 24.66             | 56.85             | 74       | -17.15 | Pk               |
| V                   | 9608.00   | 44.01            | 30.55             | 5.77          | 24.66             | 43.89             | 54       | -10.11 | AV               |
| V                   | 12010.00  | 55.32            | 30.33             | 6.32          | 24.55             | 55.86             | 74       | -18.14 | Pk               |
| V                   | 12010.00  | 42.46            | 30.33             | 6.32          | 24.55             | 43                | 54       | -11    | AV               |
| H                   | 4804.00   | 59.95            | 30.55             | 5.77          | 24.66             | 59.83             | 74       | -14.17 | Pk               |
| H                   | 4804.00   | 41.92            | 30.55             | 5.77          | 24.66             | 41.8              | 54       | -12.2  | AV               |
| H                   | 7206.00   | 58.32            | 30.33             | 6.32          | 24.55             | 58.86             | 74       | -15.14 | Pk               |
| H                   | 7206.00   | 42.7             | 30.33             | 6.32          | 24.55             | 43.24             | 54       | -10.76 | AV               |
| H                   | 9608.00   | 59.24            | 30.55             | 5.77          | 24.66             | 59.12             | 74       | -14.88 | Pk               |
| H                   | 9608.00   | 41.94            | 30.55             | 5.77          | 24.66             | 41.82             | 54       | -12.18 | AV               |
| H                   | 12010.00  | 56.74            | 30.33             | 6.32          | 24.55             | 57.28             | 74       | -16.72 | Pk               |
| H                   | 12010.00  | 41.59            | 30.33             | 6.32          | 24.55             | 42.13             | 54       | -11.87 | AV               |

| Polar<br>(H/V)         | Frequency | Meter<br>Reading | Pre-ampli<br>fier | Cable<br>Loss | Antenna<br>Factor | Emission<br>Level | Limits   | Margin | Detector<br>Type |
|------------------------|-----------|------------------|-------------------|---------------|-------------------|-------------------|----------|--------|------------------|
|                        | (MHz)     | (dBuV)           | (dB)              | (dB)          | (dB)              | (dBuV/m)          | (dBuV/m) | (dB)   |                  |
| Middle Channel:2441MHz |           |                  |                   |               |                   |                   |          |        |                  |
| V                      | 4882.00   | 56.8             | 30.55             | 5.77          | 24.66             | 56.68             | 74       | -17.32 | Pk               |
| V                      | 4882.00   | 41.07            | 30.55             | 5.77          | 24.66             | 40.95             | 54       | -13.05 | AV               |
| V                      | 7323.00   | 58.69            | 30.33             | 6.32          | 24.55             | 59.23             | 74       | -14.77 | Pk               |
| V                      | 7323.00   | 41.3             | 30.33             | 6.32          | 24.55             | 41.84             | 54       | -12.16 | AV               |
| V                      | 9764.00   | 58.35            | 30.55             | 5.77          | 24.66             | 58.23             | 74       | -15.77 | Pk               |
| V                      | 9764.00   | 42.38            | 30.55             | 5.77          | 24.66             | 42.26             | 54       | -11.74 | AV               |
| V                      | 12205.00  | 58.44            | 30.33             | 6.32          | 24.55             | 58.98             | 74       | -15.02 | Pk               |
| V                      | 12205.00  | 43.98            | 30.33             | 6.32          | 24.55             | 44.52             | 54       | -9.48  | AV               |
| H                      | 4882.00   | 56.83            | 30.55             | 5.77          | 24.66             | 56.71             | 74       | -17.29 | Pk               |
| H                      | 4882.00   | 41.47            | 30.55             | 5.77          | 24.66             | 41.35             | 54       | -12.65 | AV               |
| H                      | 7323.00   | 55.3             | 30.33             | 6.32          | 24.55             | 55.84             | 74       | -18.16 | Pk               |
| H                      | 7323.00   | 41.04            | 30.33             | 6.32          | 24.55             | 41.58             | 54       | -12.42 | AV               |
| H                      | 9764.00   | 59.47            | 30.55             | 5.77          | 24.66             | 59.35             | 74       | -14.65 | Pk               |
| H                      | 9764.00   | 41.05            | 30.55             | 5.77          | 24.66             | 40.93             | 54       | -13.07 | AV               |
| H                      | 12205.00  | 56.16            | 30.33             | 6.32          | 24.55             | 56.7              | 74       | -17.3  | Pk               |
| H                      | 12205.00  | 44.02            | 30.33             | 6.32          | 24.55             | 44.56             | 54       | -9.44  | AV               |

| Polar<br>(H/V)       | Frequency<br>(MHz) | Meter<br>Reading<br>(dBuV) | Pre-ampli<br>fier<br>(dB) | Cable<br>Loss<br>(dB) | Antenna<br>Factor<br>(dB) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Detector<br>Type |
|----------------------|--------------------|----------------------------|---------------------------|-----------------------|---------------------------|-------------------------------|--------------------|----------------|------------------|
| High Channel:2480MHz |                    |                            |                           |                       |                           |                               |                    |                |                  |
| V                    | 4960.00            | 58.8                       | 30.55                     | 5.77                  | 24.66                     | 58.68                         | 74                 | -15.32         | Pk               |
| V                    | 4960.00            | 41.38                      | 30.55                     | 5.77                  | 24.66                     | 41.26                         | 54                 | -12.74         | AV               |
| V                    | 7440.00            | 59.34                      | 30.33                     | 6.32                  | 24.55                     | 59.88                         | 74                 | -14.12         | Pk               |
| V                    | 7440.00            | 44.47                      | 30.33                     | 6.32                  | 24.55                     | 45.01                         | 54                 | -8.99          | AV               |
| V                    | 9920.00            | 58.73                      | 30.55                     | 5.77                  | 24.66                     | 58.61                         | 74                 | -15.39         | Pk               |
| V                    | 9920.00            | 41.41                      | 30.55                     | 5.77                  | 24.66                     | 41.29                         | 54                 | -12.71         | AV               |
| V                    | 12400.00           | 56.47                      | 30.33                     | 6.32                  | 24.55                     | 57.01                         | 74                 | -16.99         | Pk               |
| V                    | 12400.00           | 41.06                      | 30.33                     | 6.32                  | 24.55                     | 41.6                          | 54                 | -12.4          | AV               |
| H                    | 4960.00            | 58.66                      | 30.55                     | 5.77                  | 24.66                     | 58.54                         | 74                 | -15.46         | Pk               |
| H                    | 4960.00            | 41.57                      | 30.55                     | 5.77                  | 24.66                     | 41.45                         | 54                 | -12.55         | AV               |
| H                    | 7440.00            | 59.98                      | 30.33                     | 6.32                  | 24.55                     | 60.52                         | 74                 | -13.48         | Pk               |
| H                    | 7440.00            | 41.42                      | 30.33                     | 6.32                  | 24.55                     | 41.96                         | 54                 | -12.04         | AV               |
| H                    | 9920.00            | 59.21                      | 30.55                     | 5.77                  | 24.66                     | 59.09                         | 74                 | -14.91         | Pk               |
| H                    | 9920.00            | 44.66                      | 30.55                     | 5.77                  | 24.66                     | 44.54                         | 54                 | -9.46          | AV               |
| H                    | 12400.00           | 59.72                      | 30.33                     | 6.32                  | 24.55                     | 60.26                         | 74                 | -13.74         | Pk               |
| H                    | 12400.00           | 41.92                      | 30.33                     | 6.32                  | 24.55                     | 42.46                         | 54                 | -11.54         | AV               |

**Remark:**

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,  
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

8DPSK

| Polar<br>(H/V)      | Frequency | Meter<br>Reading | Pre-ampli<br>fier | Cable<br>Loss | Antenna<br>Factor | Emission<br>Level | Limits   | Margin | Detector<br>Type |
|---------------------|-----------|------------------|-------------------|---------------|-------------------|-------------------|----------|--------|------------------|
|                     | (MHz)     | (dBuV)           | (dB)              | (dB)          | (dB)              | (dBuV/m)          | (dBuV/m) | (dB)   |                  |
| Low Channel:2402MHz |           |                  |                   |               |                   |                   |          |        |                  |
| V                   | 4804.00   | 58.61            | 30.55             | 5.77          | 24.66             | 58.49             | 74       | -15.51 | Pk               |
| V                   | 4804.00   | 42.8             | 30.55             | 5.77          | 24.66             | 42.68             | 54       | -11.32 | AV               |
| V                   | 7206.00   | 55.94            | 30.33             | 6.32          | 24.55             | 56.48             | 74       | -17.52 | Pk               |
| V                   | 7206.00   | 43.14            | 30.33             | 6.32          | 24.55             | 43.68             | 54       | -10.32 | AV               |
| V                   | 9608.00   | 57.41            | 30.55             | 5.77          | 24.66             | 57.29             | 74       | -16.71 | Pk               |
| V                   | 9608.00   | 41.29            | 30.55             | 5.77          | 24.66             | 41.17             | 54       | -12.83 | AV               |
| V                   | 12010.00  | 56.36            | 30.33             | 6.32          | 24.55             | 56.9              | 74       | -17.1  | Pk               |
| V                   | 12010.00  | 44.11            | 30.33             | 6.32          | 24.55             | 44.65             | 54       | -9.35  | AV               |
| H                   | 4804.00   | 58.19            | 30.55             | 5.77          | 24.66             | 58.07             | 74       | -15.93 | Pk               |
| H                   | 4804.00   | 41.2             | 30.55             | 5.77          | 24.66             | 41.08             | 54       | -12.92 | AV               |
| H                   | 7206.00   | 59.51            | 30.33             | 6.32          | 24.55             | 60.05             | 74       | -13.95 | Pk               |
| H                   | 7206.00   | 43.16            | 30.33             | 6.32          | 24.55             | 43.7              | 54       | -10.3  | AV               |
| H                   | 9608.00   | 59.6             | 30.55             | 5.77          | 24.66             | 59.48             | 74       | -14.52 | Pk               |
| H                   | 9608.00   | 41.8             | 30.55             | 5.77          | 24.66             | 41.68             | 54       | -12.32 | AV               |
| H                   | 12010.00  | 59.96            | 30.33             | 6.32          | 24.55             | 60.5              | 74       | -13.5  | Pk               |
| H                   | 12010.00  | 41.23            | 30.33             | 6.32          | 24.55             | 41.77             | 54       | -12.23 | AV               |

| Polar<br>(H/V)         | Frequency | Meter<br>Reading | Pre-ampli<br>fier | Cable<br>Loss | Antenna<br>Factor | Emission<br>Level | Limits   | Margin | Detector<br>Type |
|------------------------|-----------|------------------|-------------------|---------------|-------------------|-------------------|----------|--------|------------------|
|                        | (MHz)     | (dBuV)           | (dB)              | (dB)          | (dB)              | (dBuV/m)          | (dBuV/m) | (dB)   |                  |
| Middle Channel:2441MHz |           |                  |                   |               |                   |                   |          |        |                  |
| V                      | 4882.00   | 56.03            | 30.55             | 5.77          | 24.66             | 55.91             | 74       | -18.09 | Pk               |
| V                      | 4882.00   | 41.6             | 30.55             | 5.77          | 24.66             | 41.48             | 54       | -12.52 | AV               |
| V                      | 7323.00   | 56.32            | 30.33             | 6.32          | 24.55             | 56.86             | 74       | -17.14 | Pk               |
| V                      | 7323.00   | 42.49            | 30.33             | 6.32          | 24.55             | 43.03             | 54       | -10.97 | AV               |
| V                      | 9764.00   | 58               | 30.55             | 5.77          | 24.66             | 57.88             | 74       | -16.12 | Pk               |
| V                      | 9764.00   | 42.63            | 30.55             | 5.77          | 24.66             | 42.51             | 54       | -11.49 | AV               |
| V                      | 12205.00  | 56.92            | 30.33             | 6.32          | 24.55             | 57.46             | 74       | -16.54 | Pk               |
| V                      | 12205.00  | 42.78            | 30.33             | 6.32          | 24.55             | 43.32             | 54       | -10.68 | AV               |
| H                      | 4882.00   | 56.33            | 30.55             | 5.77          | 24.66             | 56.21             | 74       | -17.79 | Pk               |
| H                      | 4882.00   | 42.42            | 30.55             | 5.77          | 24.66             | 42.3              | 54       | -11.7  | AV               |
| H                      | 7323.00   | 57.41            | 30.33             | 6.32          | 24.55             | 57.95             | 74       | -16.05 | Pk               |
| H                      | 7323.00   | 41.78            | 30.33             | 6.32          | 24.55             | 42.32             | 54       | -11.68 | AV               |
| H                      | 9764.00   | 56.34            | 30.55             | 5.77          | 24.66             | 56.22             | 74       | -17.78 | Pk               |
| H                      | 9764.00   | 41.07            | 30.55             | 5.77          | 24.66             | 40.95             | 54       | -13.05 | AV               |
| H                      | 12205.00  | 56.34            | 30.33             | 6.32          | 24.55             | 56.88             | 74       | -17.12 | Pk               |
| H                      | 12205.00  | 42.62            | 30.33             | 6.32          | 24.55             | 43.16             | 54       | -10.84 | AV               |

| Polar<br>(H/V)       | Frequency<br>(MHz) | Meter<br>Reading<br>(dBuV) | Pre-ampli<br>fier<br>(dB) | Cable<br>Loss<br>(dB) | Antenna<br>Factor<br>(dB) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Detector<br>Type |
|----------------------|--------------------|----------------------------|---------------------------|-----------------------|---------------------------|-------------------------------|--------------------|----------------|------------------|
| High Channel:2480MHz |                    |                            |                           |                       |                           |                               |                    |                |                  |
| V                    | 4960.00            | 55.4                       | 30.55                     | 5.77                  | 24.66                     | 55.28                         | 74                 | -18.72         | Pk               |
| V                    | 4960.00            | 41.09                      | 30.55                     | 5.77                  | 24.66                     | 40.97                         | 54                 | -13.03         | AV               |
| V                    | 7440.00            | 56.12                      | 30.33                     | 6.32                  | 24.55                     | 56.66                         | 74                 | -17.34         | Pk               |
| V                    | 7440.00            | 41.39                      | 30.33                     | 6.32                  | 24.55                     | 41.93                         | 54                 | -12.07         | AV               |
| V                    | 9920.00            | 57.82                      | 30.55                     | 5.77                  | 24.66                     | 57.7                          | 74                 | -16.3          | Pk               |
| V                    | 9920.00            | 41.83                      | 30.55                     | 5.77                  | 24.66                     | 41.71                         | 54                 | -12.29         | AV               |
| V                    | 12400.00           | 57.51                      | 30.33                     | 6.32                  | 24.55                     | 58.05                         | 74                 | -15.95         | Pk               |
| V                    | 12400.00           | 41.69                      | 30.33                     | 6.32                  | 24.55                     | 42.23                         | 54                 | -11.77         | AV               |
| H                    | 4960.00            | 58.01                      | 30.55                     | 5.77                  | 24.66                     | 57.89                         | 74                 | -16.11         | Pk               |
| H                    | 4960.00            | 41.61                      | 30.55                     | 5.77                  | 24.66                     | 41.49                         | 54                 | -12.51         | AV               |
| H                    | 7440.00            | 56.01                      | 30.33                     | 6.32                  | 24.55                     | 56.55                         | 74                 | -17.45         | Pk               |
| H                    | 7440.00            | 43.57                      | 30.33                     | 6.32                  | 24.55                     | 44.11                         | 54                 | -9.89          | AV               |
| H                    | 9920.00            | 55.65                      | 30.55                     | 5.77                  | 24.66                     | 55.53                         | 74                 | -18.47         | Pk               |
| H                    | 9920.00            | 43.75                      | 30.55                     | 5.77                  | 24.66                     | 43.63                         | 54                 | -10.37         | AV               |
| H                    | 12400.00           | 59.12                      | 30.33                     | 6.32                  | 24.55                     | 59.66                         | 74                 | -14.34         | Pk               |
| H                    | 12400.00           | 41.67                      | 30.33                     | 6.32                  | 24.55                     | 42.21                         | 54                 | -11.79         | AV               |

**Remark:**

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,  
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

## 5. RADIATED BAND EMISSION MEASUREMENT

### 5.1 Test Requirement:

|                       |                                                                                                    |          |      |      |         |
|-----------------------|----------------------------------------------------------------------------------------------------|----------|------|------|---------|
| Test Requirement:     | FCC Part15 C Section 15.209 and 15.205, RSS-Gen 8.9, RSS-Gen 8.10                                  |          |      |      |         |
| Test Method:          | ANSI C63.10: 2013                                                                                  |          |      |      |         |
| Test Frequency Range: | All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed. |          |      |      |         |
| Test site:            | Measurement Distance: 3m                                                                           |          |      |      |         |
| Receiver setup:       | Frequency                                                                                          | Detector | RBW  | VBW  | Value   |
|                       | Above 1GHz                                                                                         | Peak     | 1MHz | 3MHz | Peak    |
|                       |                                                                                                    | Average  | 1MHz | 3MHz | Average |

### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

| FREQUENCY (MHz) | Limit (dBuV/m) (at 3M) |         |
|-----------------|------------------------|---------|
|                 | PEAK                   | AVERAGE |
| Above 1000      | 74                     | 54      |

#### Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

| Spectrum Parameter                    | Setting                                          |
|---------------------------------------|--------------------------------------------------|
| Attenuation                           | Auto                                             |
| Start Frequency                       | 2300MHz                                          |
| Stop Frequency                        | 2520                                             |
| RB / VB (emission in restricted band) | 1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average |

### 5.2 TEST PROCEDURE

Above 1GHz test procedure as below:

- a. 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel,the Highest channel

#### Note:

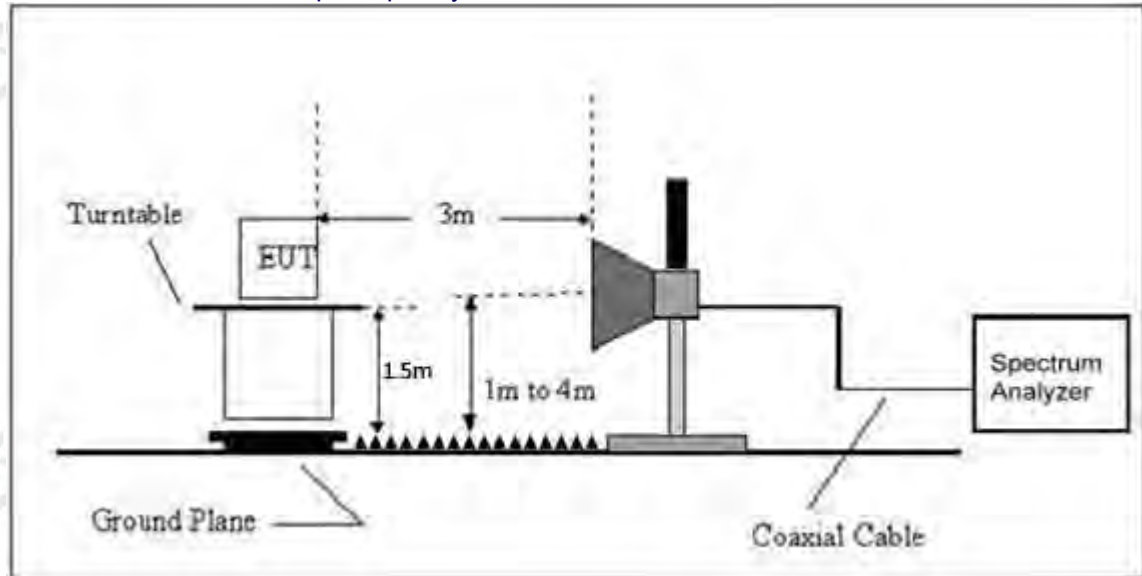
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

### 5.3 DEVIATION FROM TEST STANDARD

No deviation

### 5.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



### 5.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



## 5.6 TEST RESULT

|                   | Polar<br>(H/V)        | Frequency<br>(MHz) | Meter<br>Reading<br>(dBuV) | Pre-<br>amplifier<br>(dB) | Cable<br>Loss<br>(dB) | Antenna<br>Factor<br>(dB/m) | Emission<br>level<br>(dBuV/m) | Limit<br>(dBuV<br>/m) | Margi<br>n<br>(dB) | Detec<br>tor<br>Type | Result |
|-------------------|-----------------------|--------------------|----------------------------|---------------------------|-----------------------|-----------------------------|-------------------------------|-----------------------|--------------------|----------------------|--------|
| GFSK              | Low Channel: 2402MHz  |                    |                            |                           |                       |                             |                               |                       |                    |                      |        |
|                   | H                     | 2390.00            | 59.95                      | 30.22                     | 4.85                  | 23.98                       | 58.56                         | 74.00                 | -15.44             | PK                   | PASS   |
|                   | H                     | 2390.00            | 46.30                      | 30.22                     | 4.85                  | 23.98                       | 44.91                         | 54.00                 | -9.09              | AV                   | PASS   |
|                   | H                     | 2400.00            | 61.26                      | 30.22                     | 4.85                  | 23.98                       | 59.87                         | 74.00                 | -14.13             | PK                   | PASS   |
|                   | H                     | 2400.00            | 48.43                      | 30.22                     | 4.85                  | 23.98                       | 47.04                         | 54.00                 | -6.96              | AV                   | PASS   |
|                   | V                     | 2390.00            | 61.21                      | 30.22                     | 4.85                  | 23.98                       | 59.82                         | 74.00                 | -14.18             | PK                   | PASS   |
|                   | V                     | 2390.00            | 48.37                      | 30.22                     | 4.85                  | 23.98                       | 46.98                         | 54.00                 | -7.02              | AV                   | PASS   |
|                   | V                     | 2400.00            | 61.30                      | 30.22                     | 4.85                  | 23.98                       | 59.91                         | 74.00                 | -14.09             | PK                   | PASS   |
|                   | V                     | 2400.00            | 46.75                      | 30.22                     | 4.85                  | 23.98                       | 45.36                         | 54.00                 | -8.64              | AV                   | PASS   |
|                   | High Channel: 2480MHz |                    |                            |                           |                       |                             |                               |                       |                    |                      |        |
|                   | H                     | 2483.50            | 61.81                      | 30.22                     | 4.85                  | 23.98                       | 60.42                         | 74.00                 | -13.58             | PK                   | PASS   |
|                   | H                     | 2483.50            | 47.09                      | 30.22                     | 4.85                  | 23.98                       | 45.70                         | 54.00                 | -8.30              | AV                   | PASS   |
|                   | H                     | 2500.00            | 61.91                      | 30.22                     | 4.85                  | 23.98                       | 60.52                         | 74.00                 | -13.48             | PK                   | PASS   |
|                   | H                     | 2500.00            | 47.78                      | 30.22                     | 4.85                  | 23.98                       | 46.39                         | 54.00                 | -7.61              | AV                   | PASS   |
|                   | V                     | 2483.50            | 59.61                      | 30.22                     | 4.85                  | 23.98                       | 58.22                         | 74.00                 | -15.78             | PK                   | PASS   |
|                   | V                     | 2483.50            | 48.49                      | 30.22                     | 4.85                  | 23.98                       | 47.10                         | 54.00                 | -6.90              | AV                   | PASS   |
|                   | V                     | 2500.00            | 61.47                      | 30.22                     | 4.85                  | 23.98                       | 60.08                         | 74.00                 | -13.92             | PK                   | PASS   |
|                   | V                     | 2500.00            | 47.67                      | 30.22                     | 4.85                  | 23.98                       | 46.28                         | 54.00                 | -7.72              | AV                   | PASS   |
| $\pi/4$ DQPS<br>K | Low Channel: 2402MHz  |                    |                            |                           |                       |                             |                               |                       |                    |                      |        |
|                   | H                     | 2390.00            | 59.60                      | 30.22                     | 4.85                  | 23.98                       | 58.21                         | 74.00                 | -15.79             | PK                   | PASS   |
|                   | H                     | 2390.00            | 47.00                      | 30.22                     | 4.85                  | 23.98                       | 45.61                         | 54.00                 | -8.39              | AV                   | PASS   |
|                   | H                     | 2400.00            | 59.23                      | 30.22                     | 4.85                  | 23.98                       | 57.84                         | 74.00                 | -16.16             | PK                   | PASS   |
|                   | H                     | 2400.00            | 46.42                      | 30.22                     | 4.85                  | 23.98                       | 45.03                         | 54.00                 | -8.97              | AV                   | PASS   |
|                   | V                     | 2390.00            | 61.74                      | 30.22                     | 4.85                  | 23.98                       | 60.35                         | 74.00                 | -13.65             | PK                   | PASS   |
|                   | V                     | 2390.00            | 48.27                      | 30.22                     | 4.85                  | 23.98                       | 46.88                         | 54.00                 | -7.12              | AV                   | PASS   |
|                   | V                     | 2400.00            | 62.53                      | 30.22                     | 4.85                  | 23.98                       | 61.14                         | 74.00                 | -12.86             | PK                   | PASS   |
|                   | V                     | 2400.00            | 46.05                      | 30.22                     | 4.85                  | 23.98                       | 44.66                         | 54.00                 | -9.34              | AV                   | PASS   |
|                   | High Channel: 2480MHz |                    |                            |                           |                       |                             |                               |                       |                    |                      |        |
|                   | H                     | 2483.50            | 60.65                      | 30.22                     | 4.85                  | 23.98                       | 59.26                         | 74.00                 | -14.74             | PK                   | PASS   |
|                   | H                     | 2483.50            | 46.41                      | 30.22                     | 4.85                  | 23.98                       | 45.02                         | 54.00                 | -8.98              | AV                   | PASS   |
|                   | H                     | 2500.00            | 59.82                      | 30.22                     | 4.85                  | 23.98                       | 58.43                         | 74.00                 | -15.57             | PK                   | PASS   |
|                   | H                     | 2500.00            | 47.02                      | 30.22                     | 4.85                  | 23.98                       | 45.63                         | 54.00                 | -8.37              | AV                   | PASS   |
|                   | V                     | 2483.50            | 60.35                      | 30.22                     | 4.85                  | 23.98                       | 58.96                         | 74.00                 | -15.04             | PK                   | PASS   |
|                   | V                     | 2483.50            | 48.45                      | 30.22                     | 4.85                  | 23.98                       | 47.06                         | 54.00                 | -6.94              | AV                   | PASS   |
|                   | V                     | 2500.00            | 60.15                      | 30.22                     | 4.85                  | 23.98                       | 58.76                         | 74.00                 | -15.24             | PK                   | PASS   |
|                   | V                     | 2500.00            | 47.98                      | 30.22                     | 4.85                  | 23.98                       | 46.59                         | 54.00                 | -7.41              | AV                   | PASS   |

|                                                                                                                                   |                       |         |       |       |      |       |       |       |        |    |      |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------|-------|-------|------|-------|-------|-------|--------|----|------|
| 8DPSK                                                                                                                             | Low Channel: 2402MHz  |         |       |       |      |       |       |       |        |    |      |
|                                                                                                                                   | H                     | 2390.00 | 59.24 | 30.22 | 4.85 | 23.98 | 57.85 | 74.00 | -16.15 | PK | PASS |
|                                                                                                                                   | H                     | 2390.00 | 48.99 | 30.22 | 4.85 | 23.98 | 47.60 | 54.00 | -6.40  | AV | PASS |
|                                                                                                                                   | H                     | 2400.00 | 59.44 | 30.22 | 4.85 | 23.98 | 58.05 | 74.00 | -15.95 | PK | PASS |
|                                                                                                                                   | H                     | 2400.00 | 46.49 | 30.22 | 4.85 | 23.98 | 45.10 | 54.00 | -8.90  | AV | PASS |
|                                                                                                                                   | V                     | 2390.00 | 60.61 | 30.22 | 4.85 | 23.98 | 59.22 | 74.00 | -14.78 | PK | PASS |
|                                                                                                                                   | V                     | 2390.00 | 47.13 | 30.22 | 4.85 | 23.98 | 45.74 | 54.00 | -8.26  | AV | PASS |
|                                                                                                                                   | V                     | 2400.00 | 62.67 | 30.22 | 4.85 | 23.98 | 61.28 | 74.00 | -12.72 | PK | PASS |
|                                                                                                                                   | V                     | 2400.00 | 47.90 | 30.22 | 4.85 | 23.98 | 46.51 | 54.00 | -7.49  | AV | PASS |
|                                                                                                                                   | High Channel: 2480MHz |         |       |       |      |       |       |       |        |    |      |
|                                                                                                                                   | H                     | 2483.50 | 61.10 | 30.22 | 4.85 | 23.98 | 59.71 | 74.00 | -14.29 | PK | PASS |
|                                                                                                                                   | H                     | 2483.50 | 46.27 | 30.22 | 4.85 | 23.98 | 44.88 | 54.00 | -9.12  | AV | PASS |
|                                                                                                                                   | H                     | 2500.00 | 60.64 | 30.22 | 4.85 | 23.98 | 59.25 | 74.00 | -14.75 | PK | PASS |
|                                                                                                                                   | H                     | 2500.00 | 47.18 | 30.22 | 4.85 | 23.98 | 45.79 | 54.00 | -8.21  | AV | PASS |
|                                                                                                                                   | V                     | 2483.50 | 59.49 | 30.22 | 4.85 | 23.98 | 58.10 | 74.00 | -15.90 | PK | PASS |
|                                                                                                                                   | V                     | 2483.50 | 46.51 | 30.22 | 4.85 | 23.98 | 45.12 | 54.00 | -8.88  | AV | PASS |
|                                                                                                                                   | V                     | 2500.00 | 61.86 | 30.22 | 4.85 | 23.98 | 60.47 | 74.00 | -13.53 | PK | PASS |
|                                                                                                                                   | V                     | 2500.00 | 48.73 | 30.22 | 4.85 | 23.98 | 47.34 | 54.00 | -6.66  | AV | PASS |
| <b>Remark:</b><br>1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit |                       |         |       |       |      |       |       |       |        |    |      |

## 6. CONDUCTED BAND EDGE AND SPURIOUS EMISSION

|                   |                                              |
|-------------------|----------------------------------------------|
| Test Requirement: | FCC Part15 C Section 15.247 (d), RSS-247 5.5 |
| Test Method:      | ANSI C63.10                                  |

### 6.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

According to RSS-247§5.5 and RSS-Gen§8.9, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) or RSS-Gen is not required.

### 6.2 Test Setup



### 6.3 Test procedure

Using the following spectrum analyzer setting:

- A) Set the RBW = 100KHz.
- B) Set the VBW = 300KHz.
- C) Sweep time = auto couple.
- D) Detector function = peak.
- E) Trace mode = max hold.
- F) Allow trace to fully stabilize.

### 6.4 DEVIATION FROM STANDARD

No deviation.

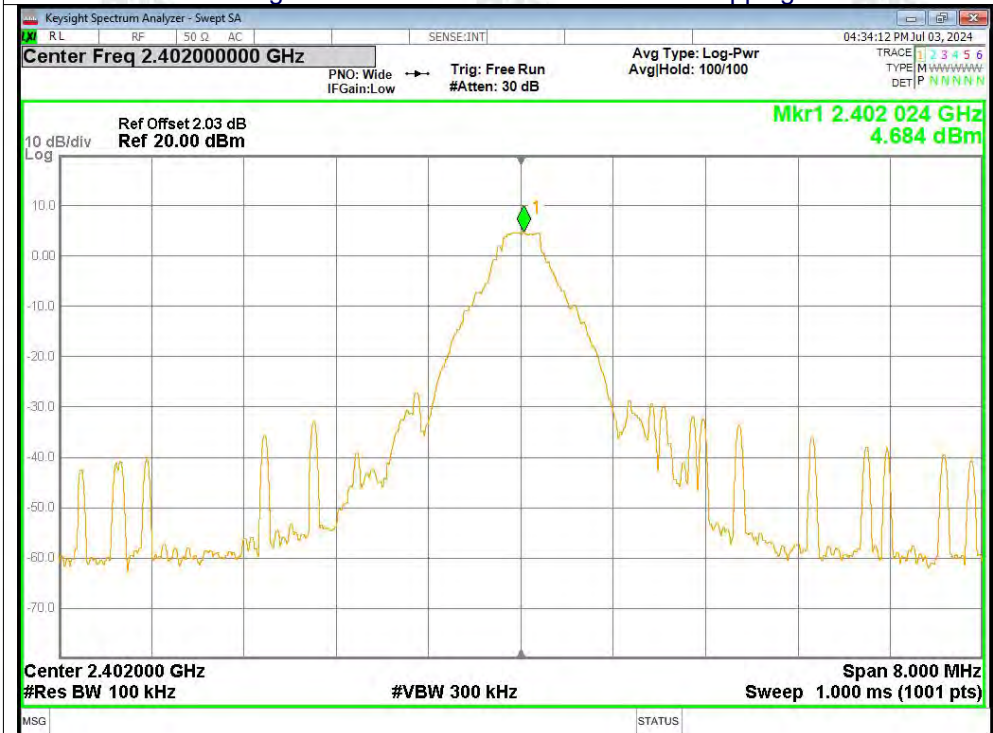
6.5 Test Result

**Band Edge**

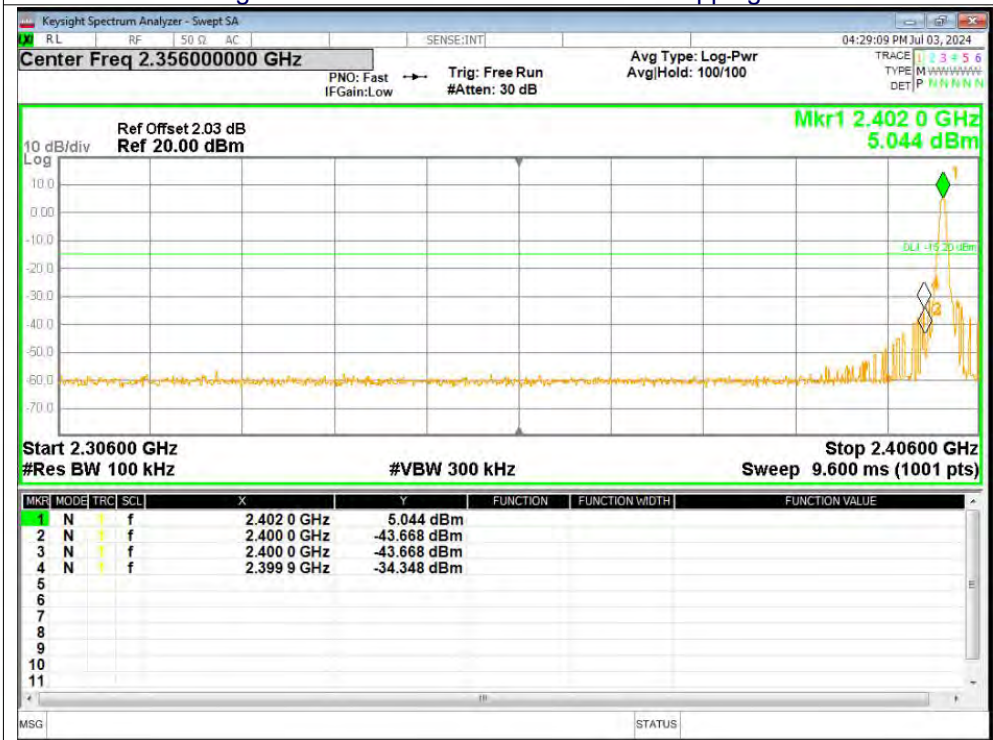
| Condition | Mode  | Frequency (MHz) | Antenna | Hopping Mode | Max Value (dBc) | Limit (dBc) | Verdict |
|-----------|-------|-----------------|---------|--------------|-----------------|-------------|---------|
| NVNT      | 1-DH5 | 2402            | Ant1    | No-Hopping   | -39.03          | -20         | Pass    |
| NVNT      | 1-DH5 | 2480            | Ant1    | No-Hopping   | -43.62          | -20         | Pass    |
| NVNT      | 2-DH5 | 2402            | Ant1    | No-Hopping   | -38.14          | -20         | Pass    |
| NVNT      | 2-DH5 | 2480            | Ant1    | No-Hopping   | -43.77          | -20         | Pass    |
| NVNT      | 3-DH5 | 2402            | Ant1    | No-Hopping   | -40.98          | -20         | Pass    |
| NVNT      | 3-DH5 | 2480            | Ant1    | No-Hopping   | -45.3           | -20         | Pass    |

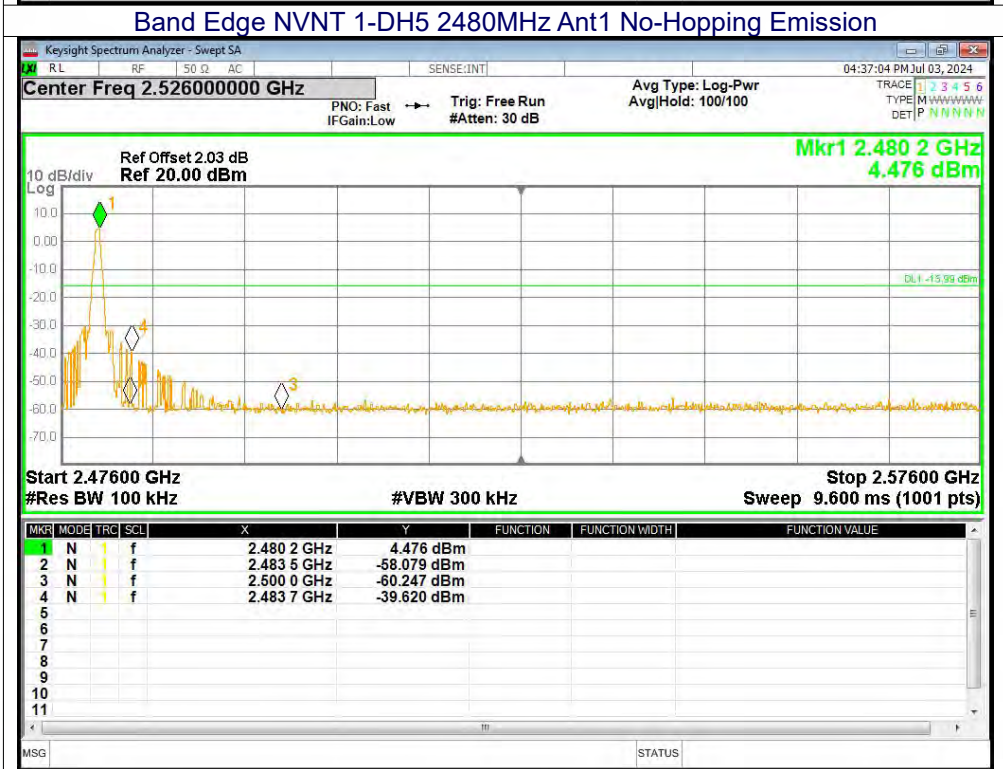
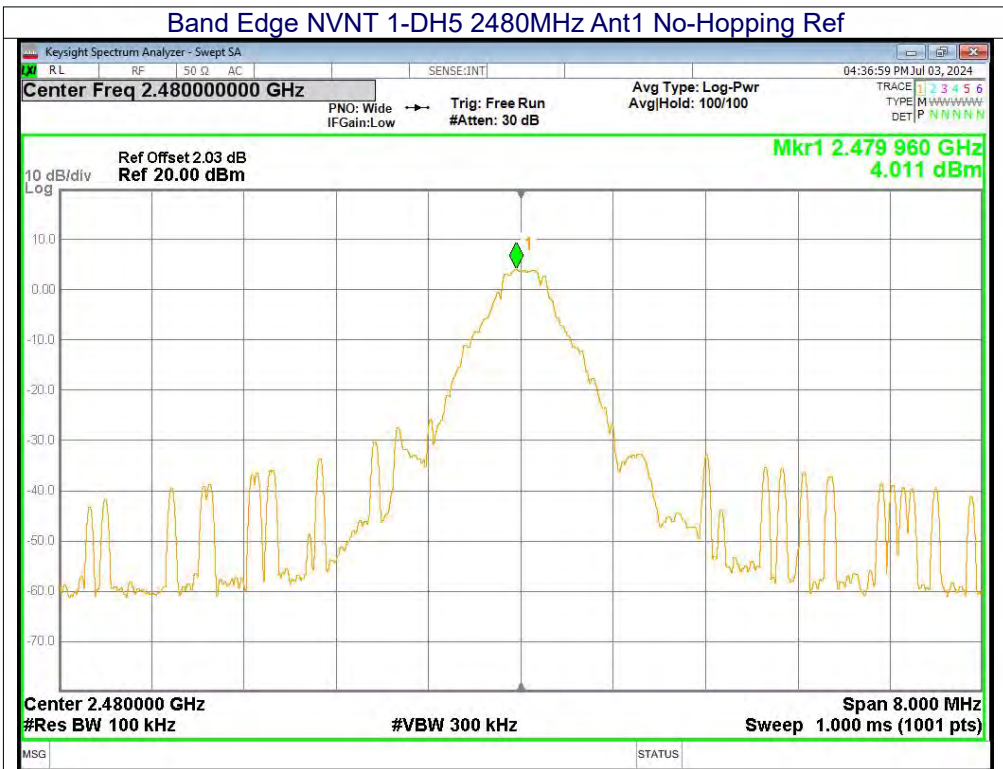
### Test Graphs

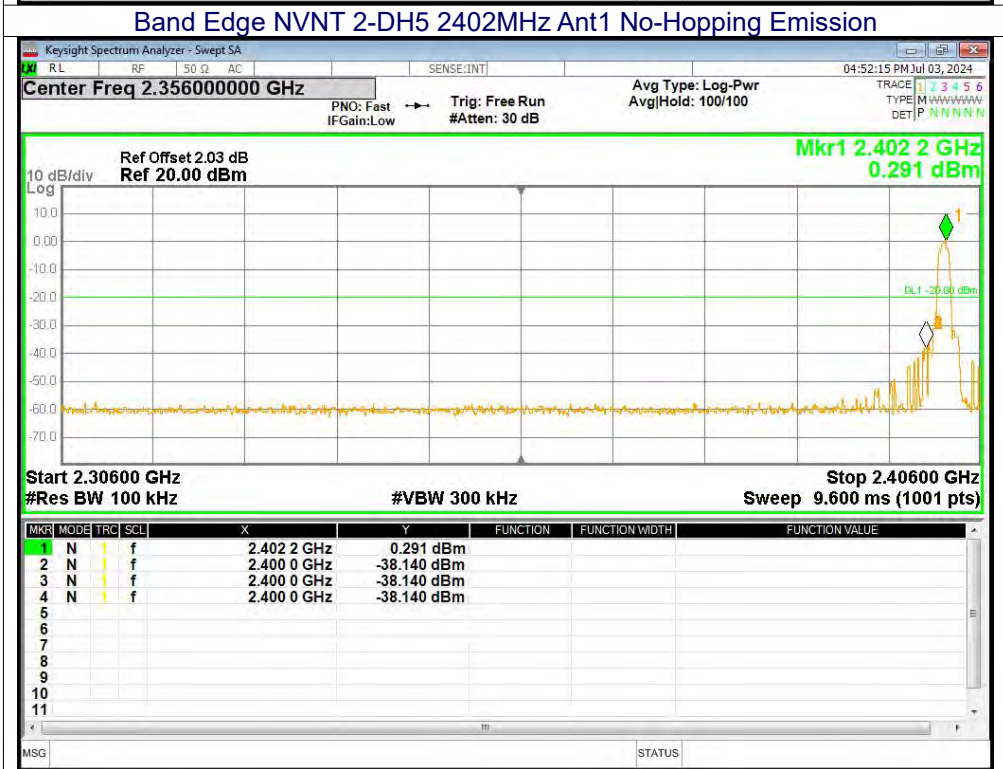
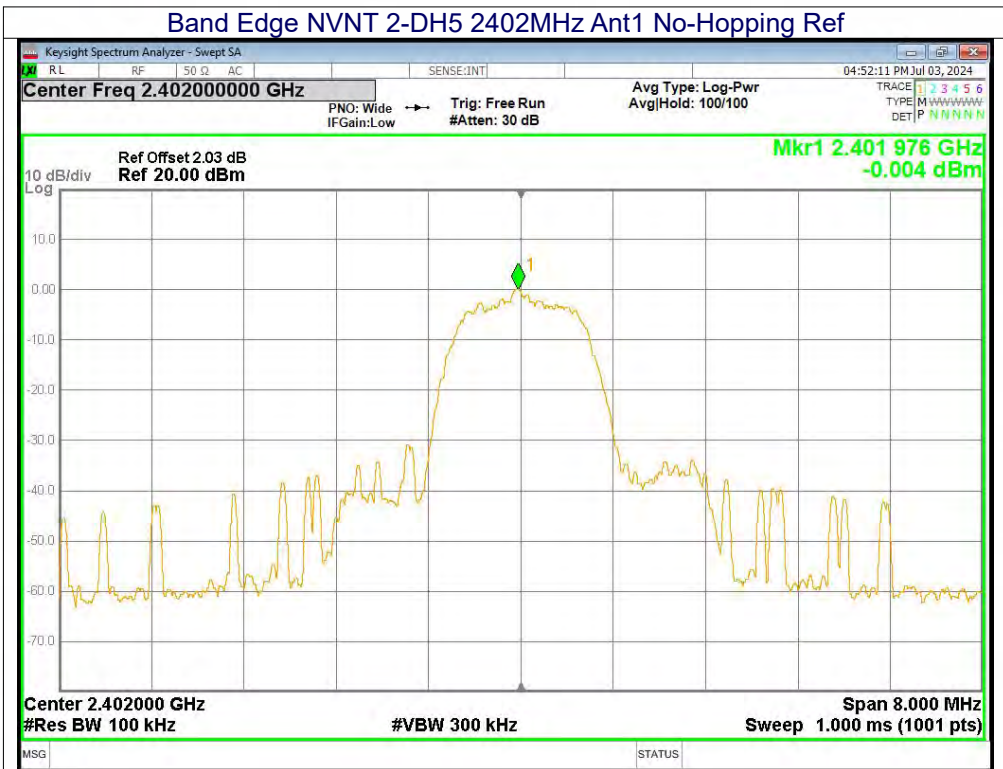
#### Band Edge NVNT 1-DH5 2402MHz Ant1 No-Hopping Ref

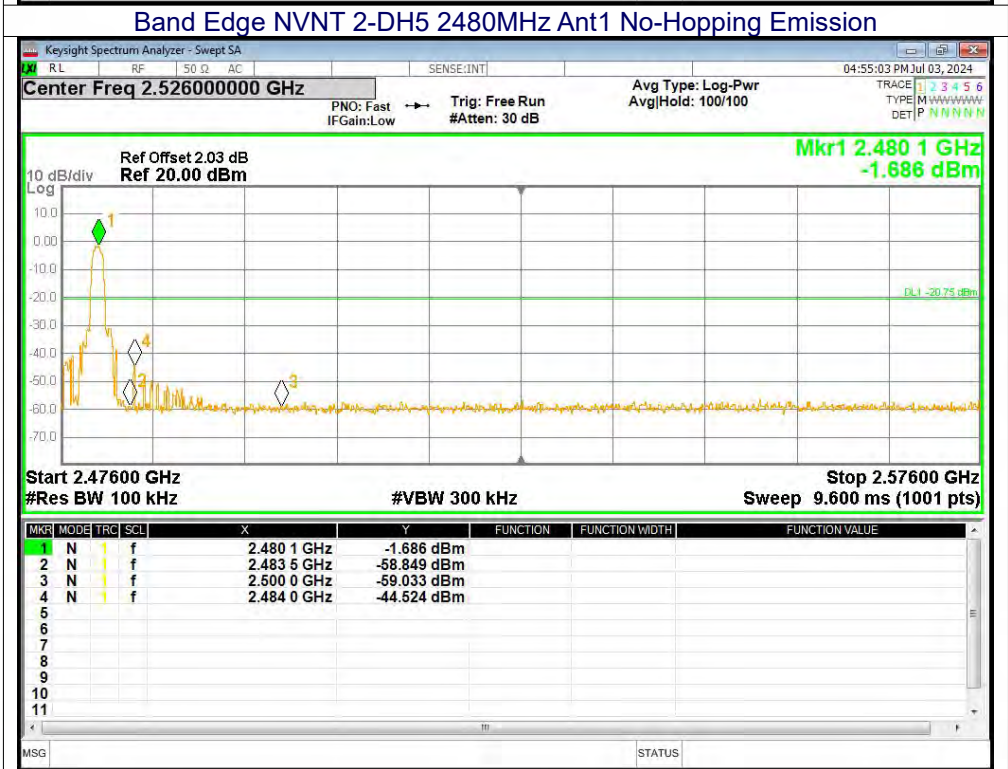
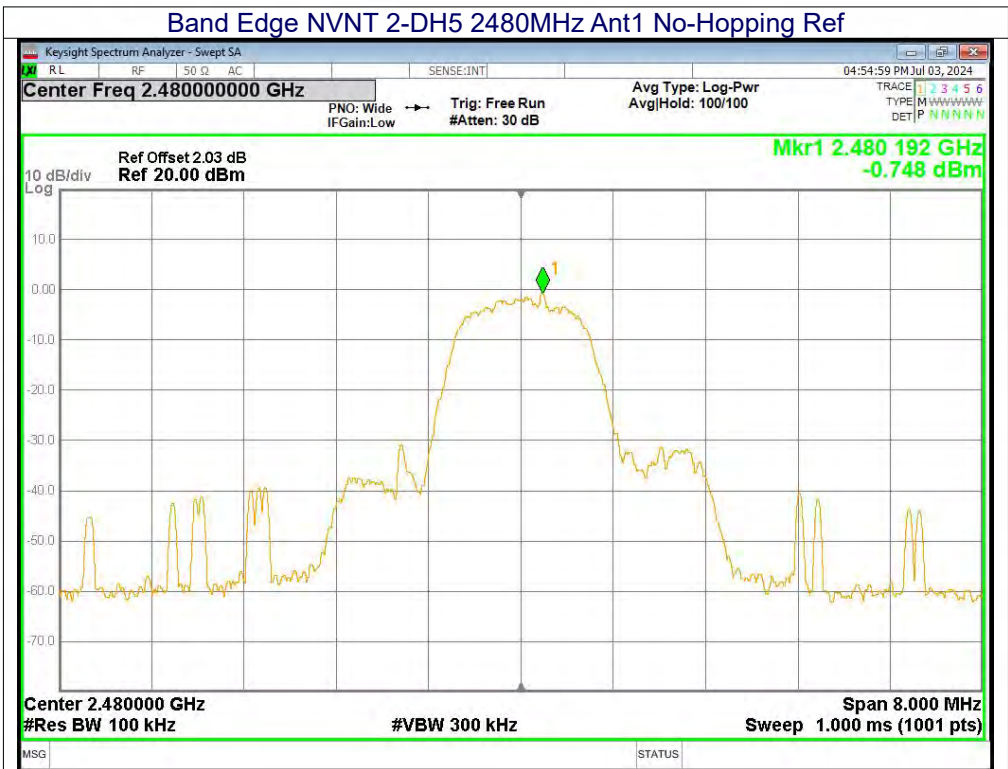


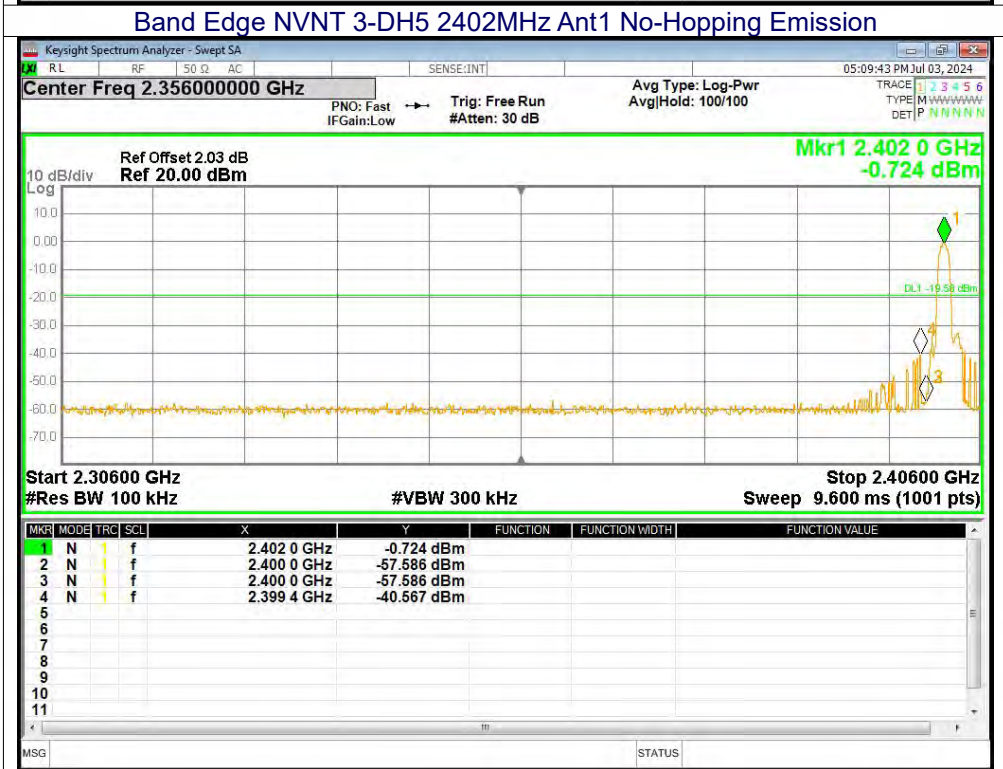
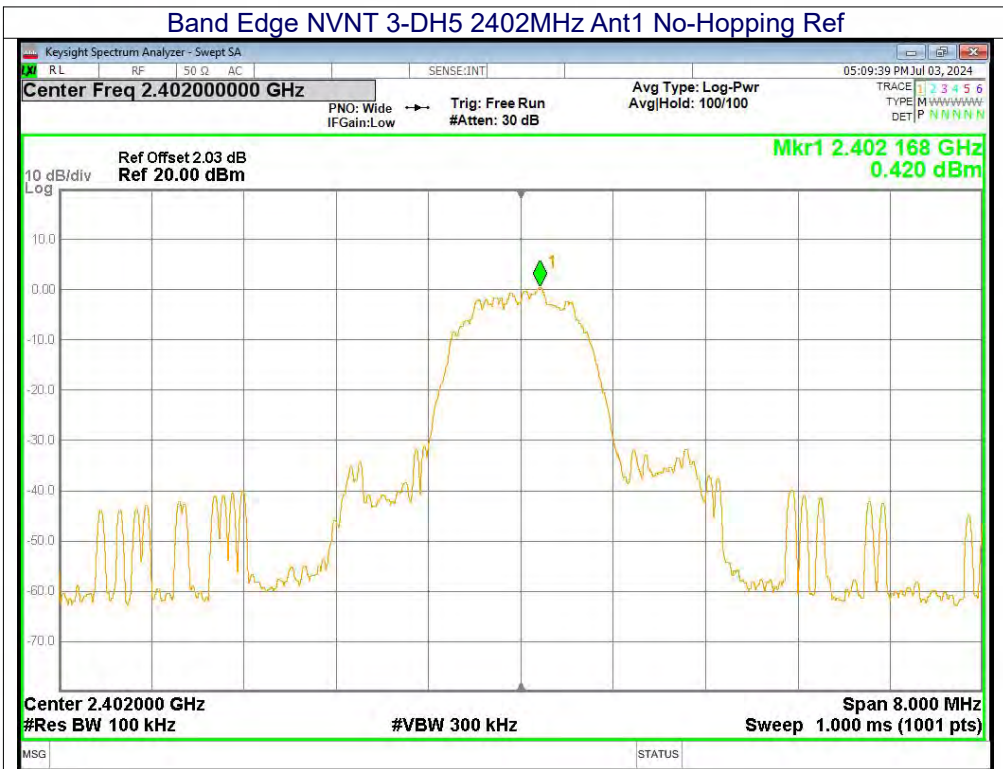
#### Band Edge NVNT 1-DH5 2402MHz Ant1 No-Hopping Emission

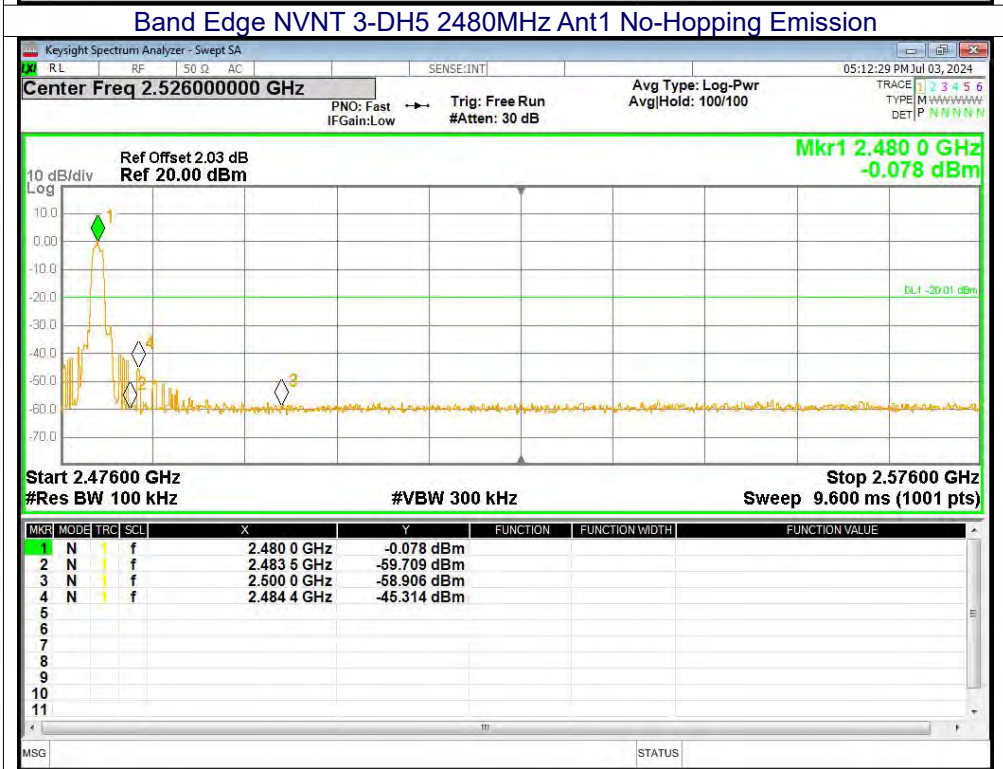
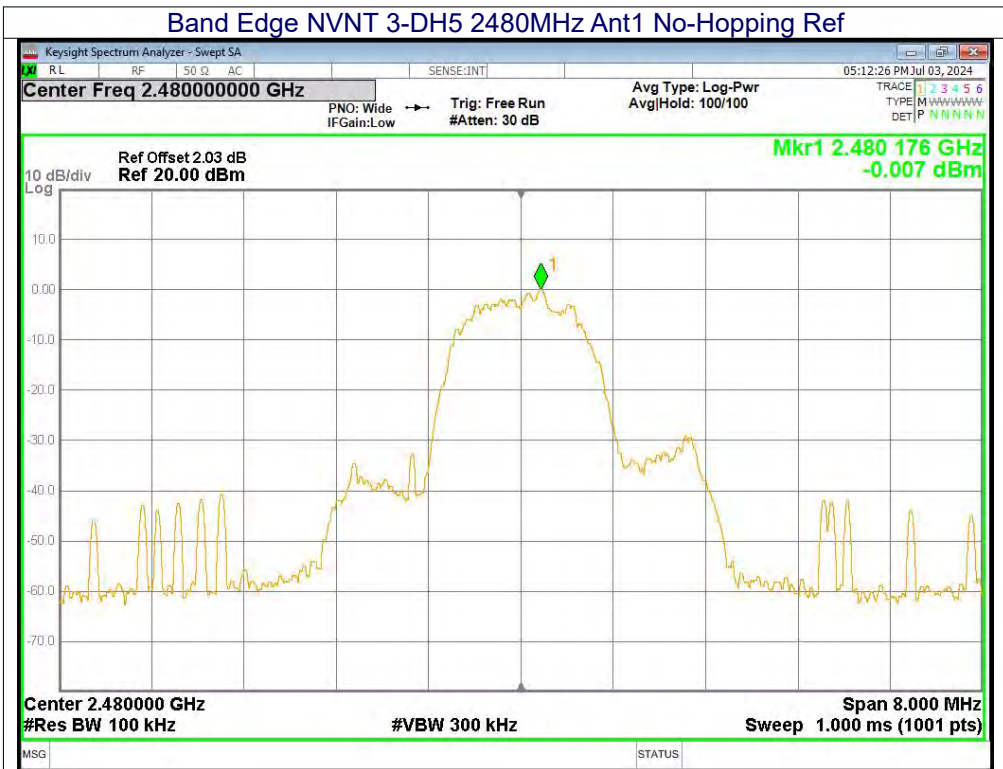










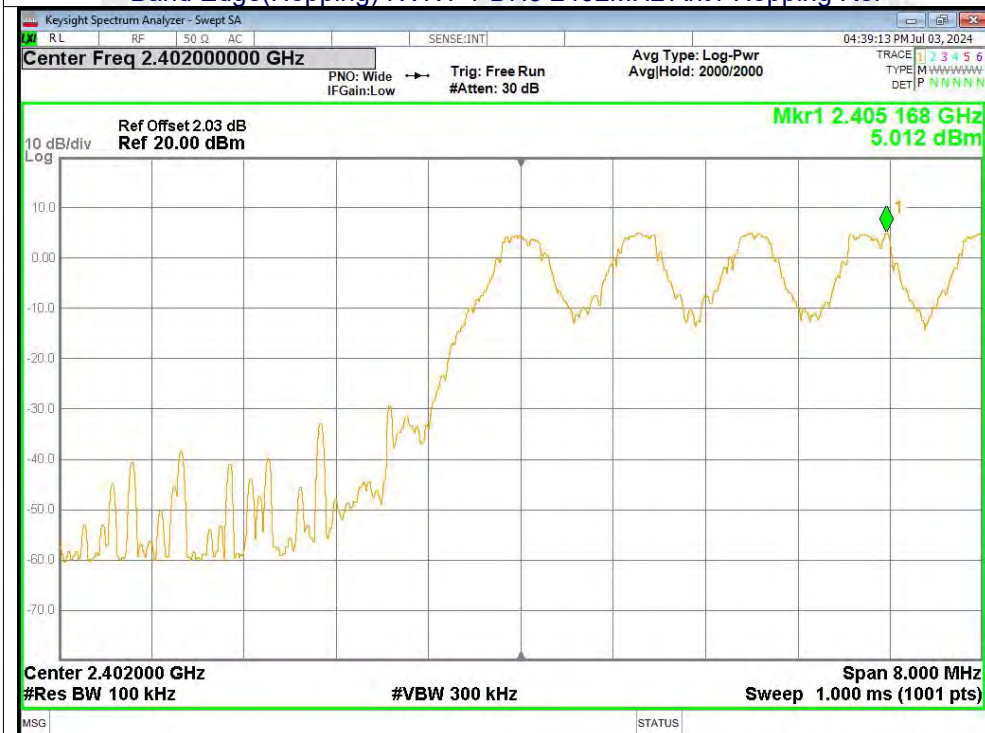


Band Edge(Hopping)

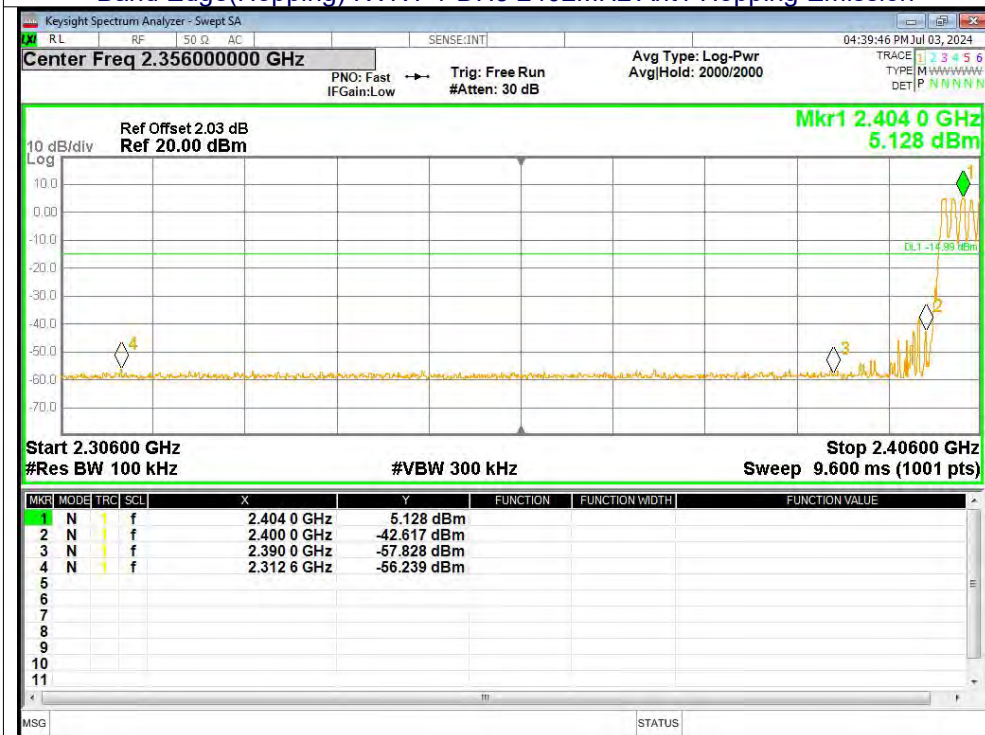
| Mode  | Frequency (MHz) | Antenna | Hopping Mode | Max Value (dBc) | Limit (dBc) | Verdict |
|-------|-----------------|---------|--------------|-----------------|-------------|---------|
| 1-DH5 | 2402            | Ant1    | Hopping      | -61.24          | -20         | Pass    |
| 1-DH5 | 2480            | Ant1    | Hopping      | -45.46          | -20         | Pass    |
| 2-DH5 | 2402            | Ant1    | Hopping      | -55.52          | -20         | Pass    |
| 2-DH5 | 2480            | Ant1    | Hopping      | -43.47          | -20         | Pass    |
| 3-DH5 | 2402            | Ant1    | Hopping      | -57.22          | -20         | Pass    |
| 3-DH5 | 2480            | Ant1    | Hopping      | -44.7           | -20         | Pass    |

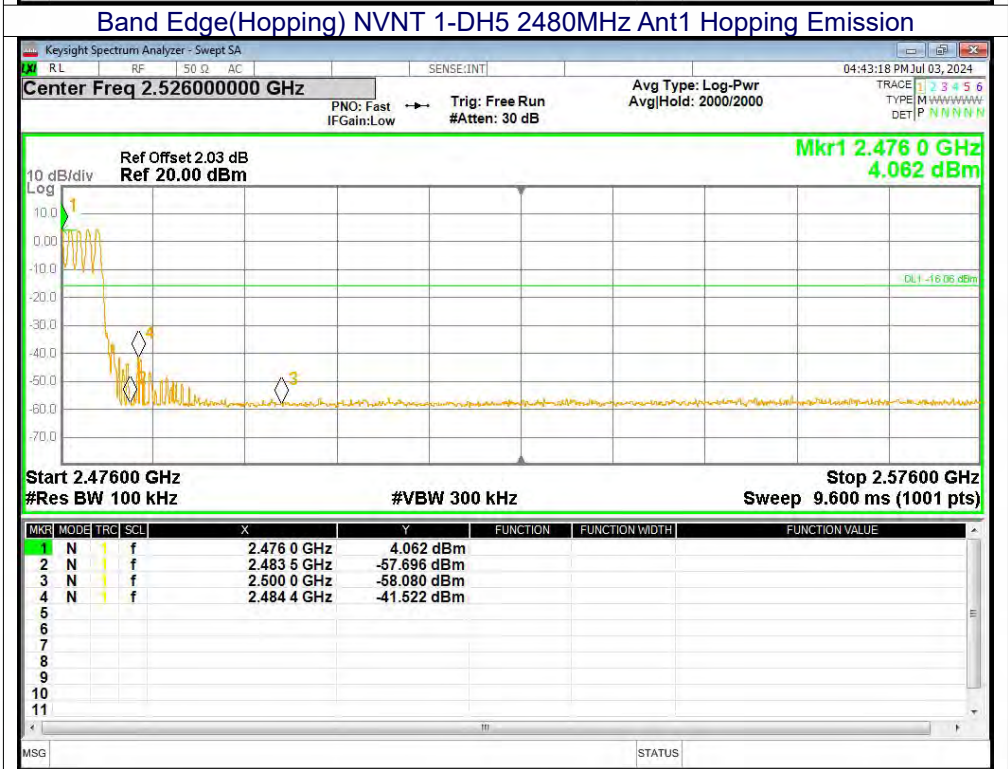
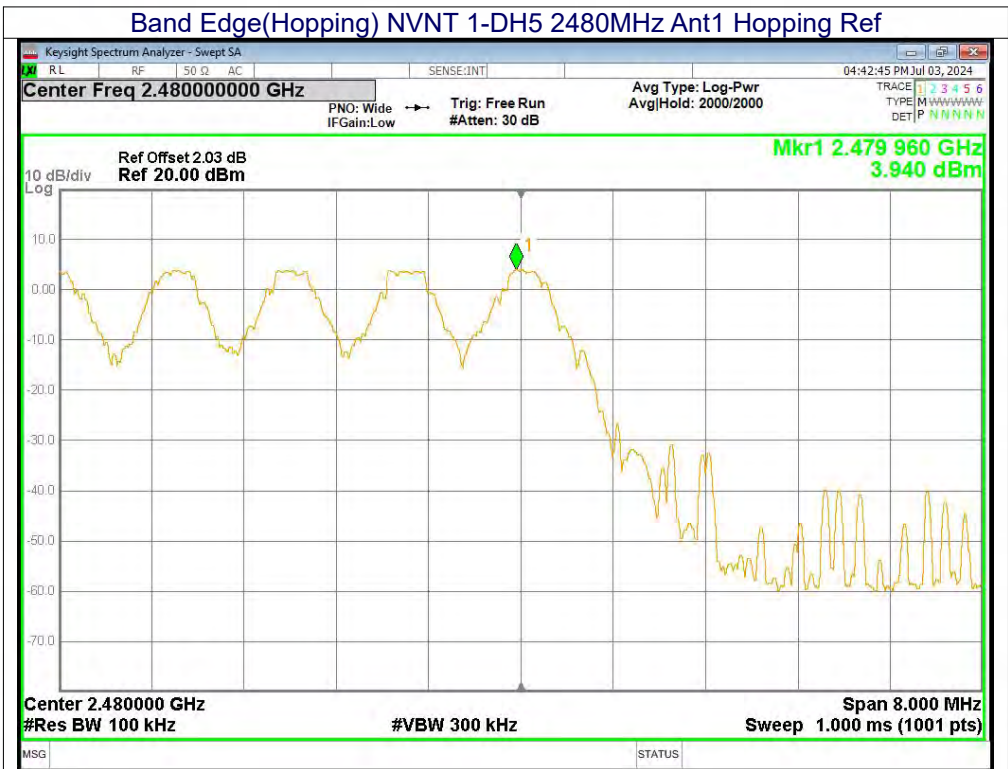
### Test Graphs

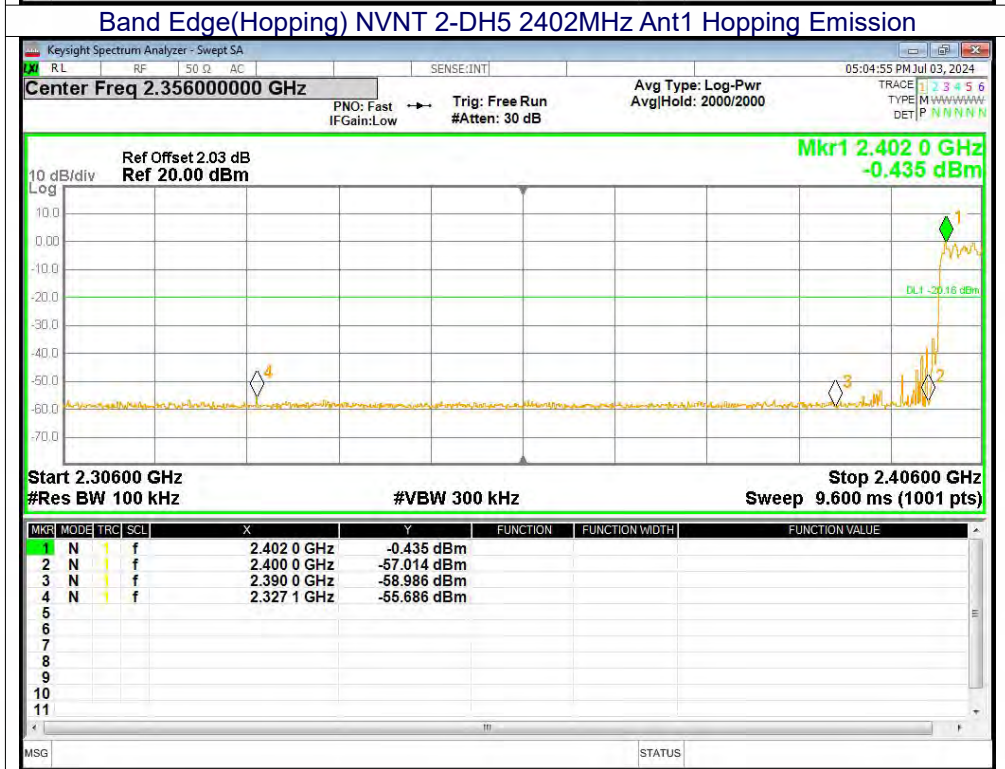
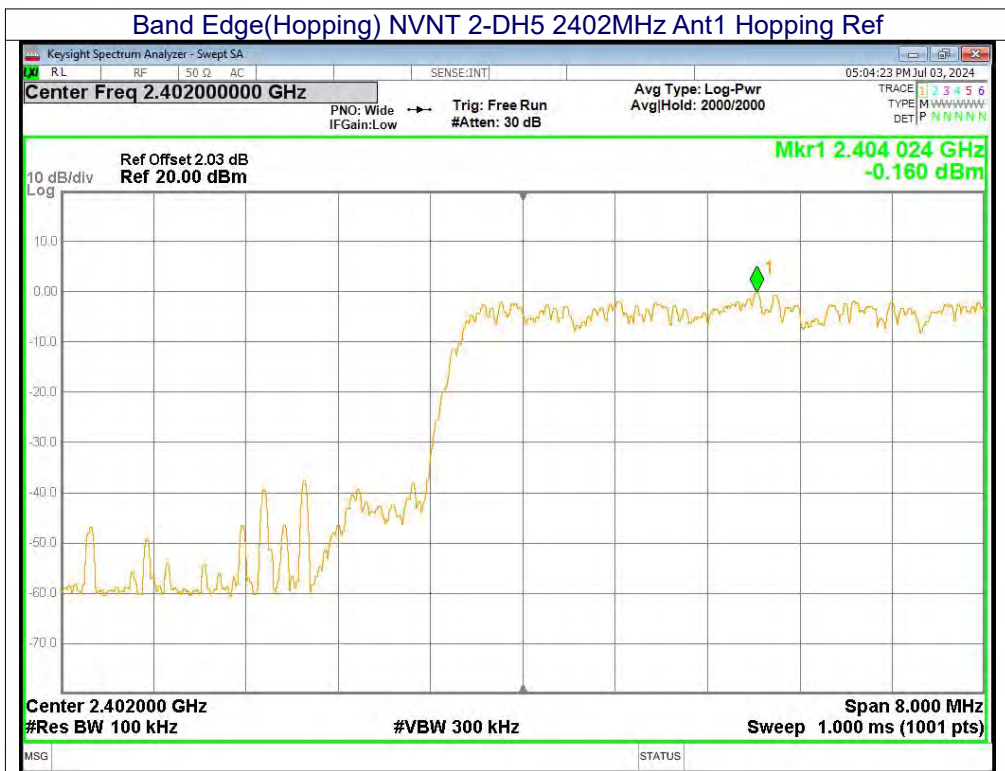
#### Band Edge(Hopping) NVNT 1-DH5 2402MHz Ant1 Hopping Ref

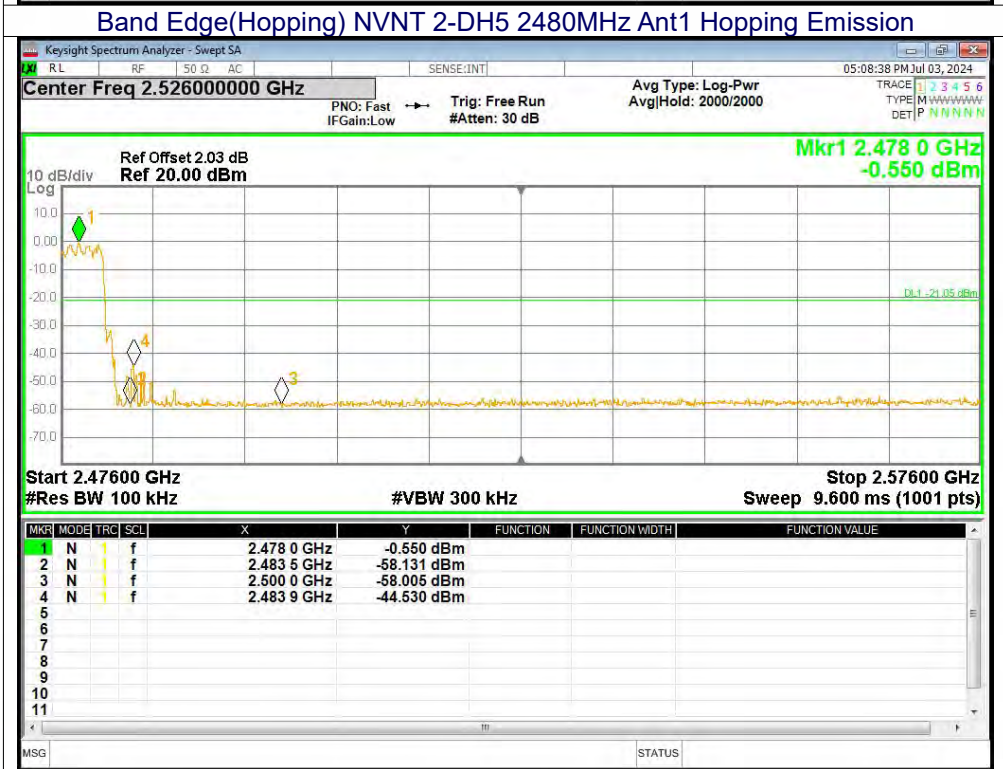
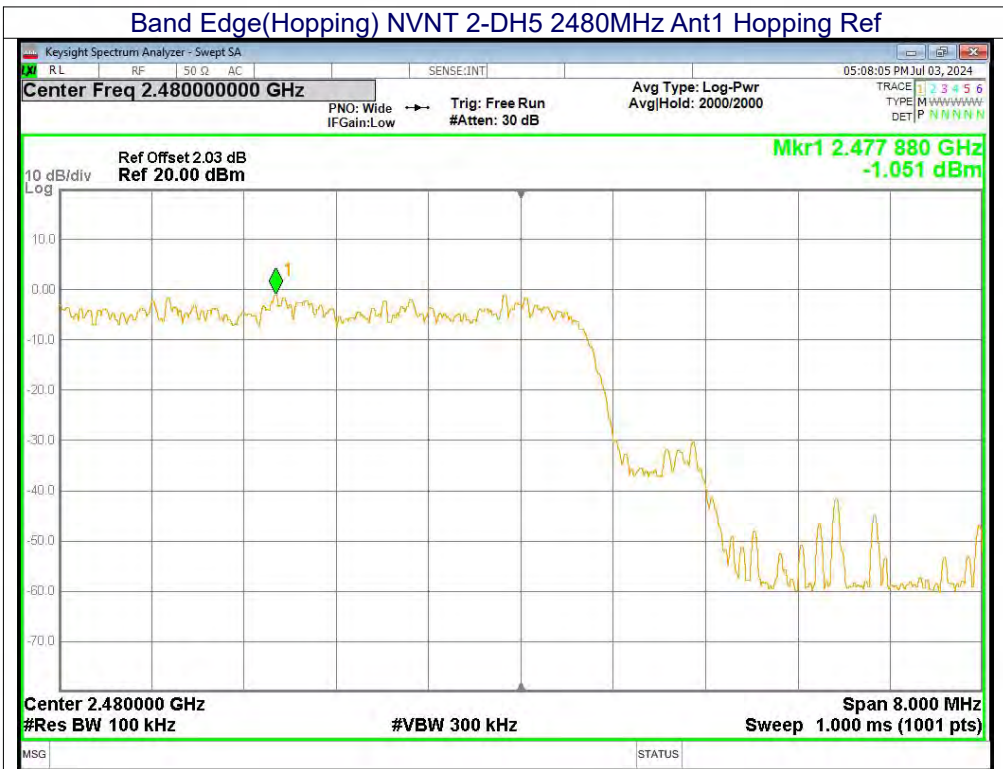


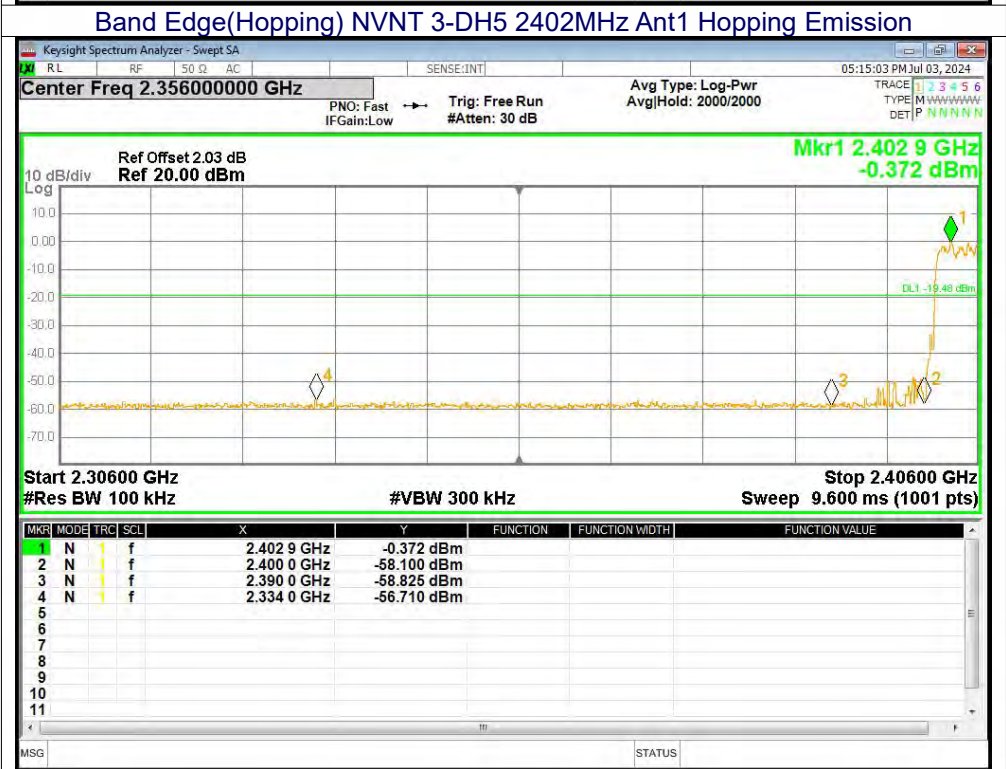
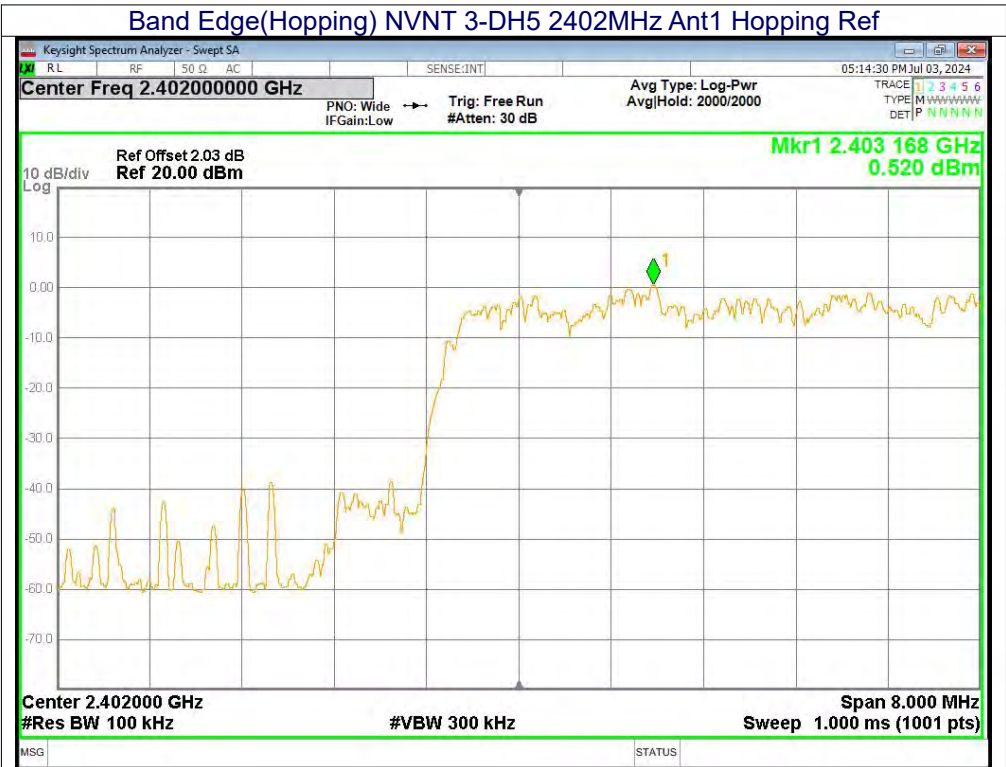
#### Band Edge(Hopping) NVNT 1-DH5 2402MHz Ant1 Hopping Emission

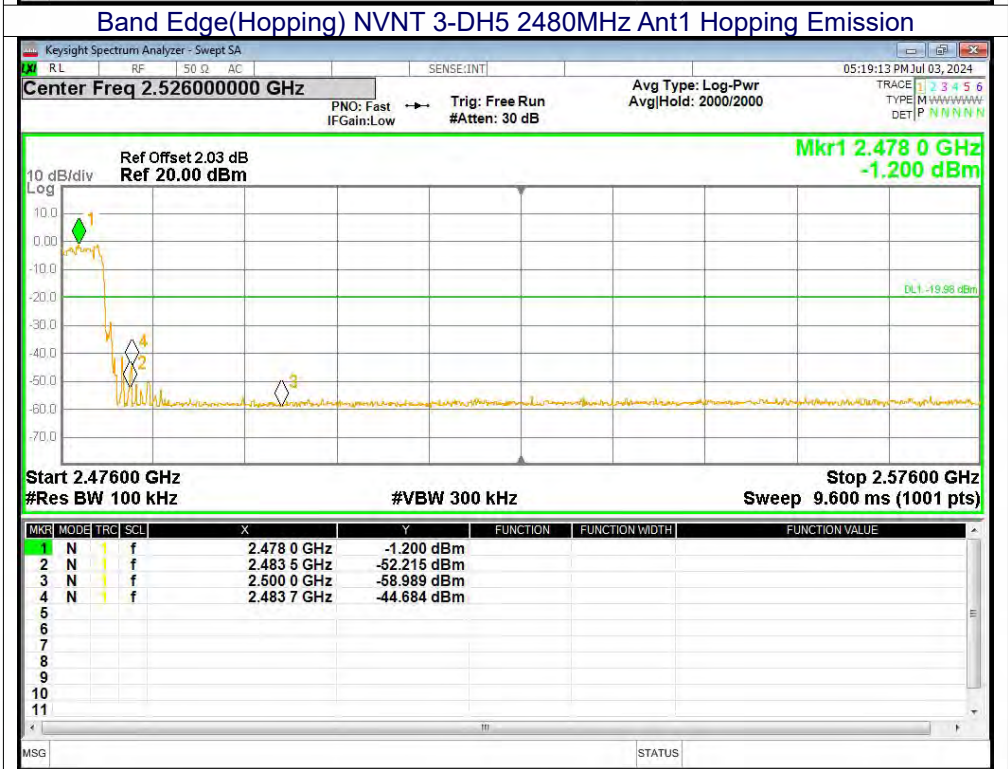
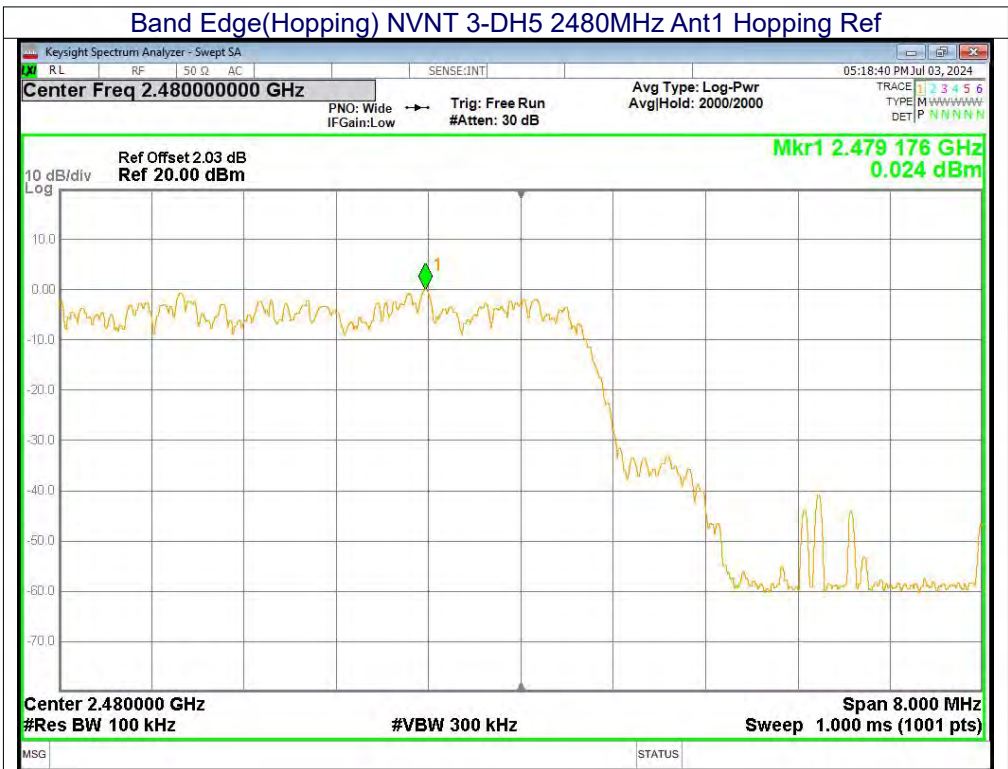












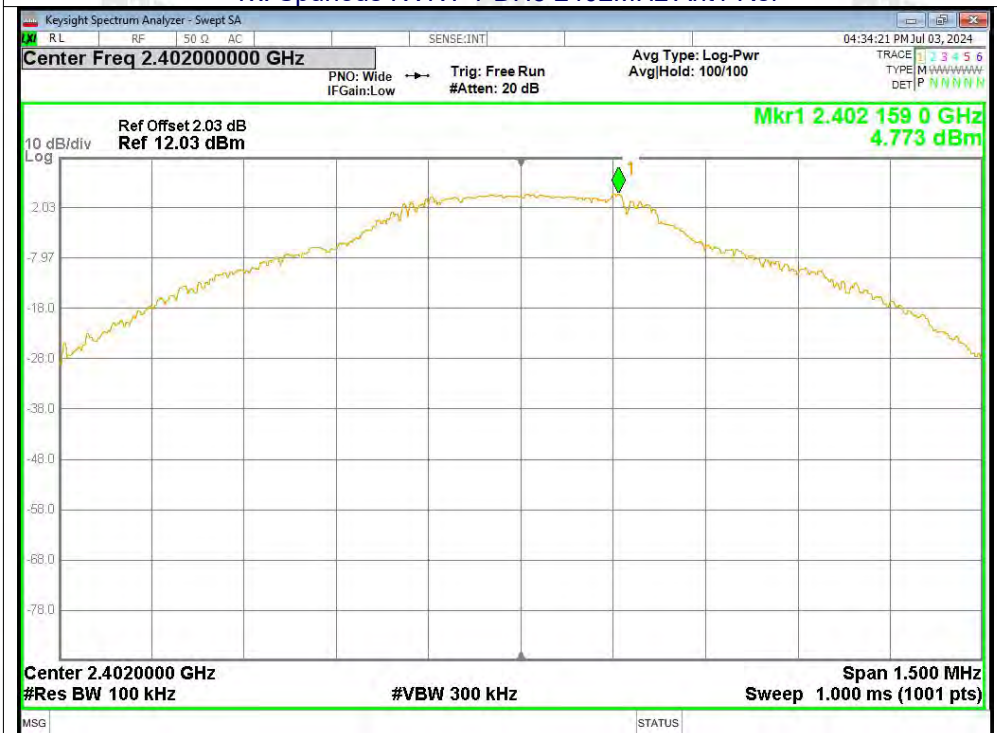


## Conducted RF Spurious Emission

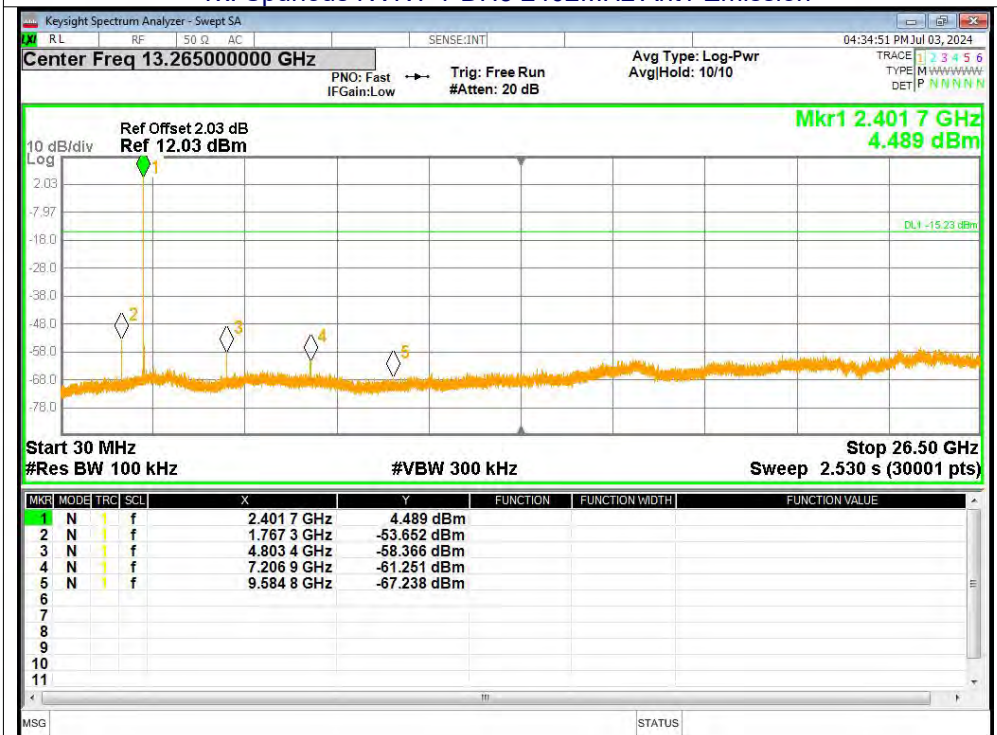
| Condition | Mode  | Frequency (MHz) | Antenna | Max Value (dBc) | Limit (dBc) | Verdict |
|-----------|-------|-----------------|---------|-----------------|-------------|---------|
| NVNT      | 1-DH5 | 2402            | Ant1    | -58.42          | -20         | Pass    |
| NVNT      | 1-DH5 | 2441            | Ant1    | -60.66          | -20         | Pass    |
| NVNT      | 1-DH5 | 2480            | Ant1    | -59.54          | -20         | Pass    |
| NVNT      | 2-DH5 | 2402            | Ant1    | -56.62          | -20         | Pass    |
| NVNT      | 2-DH5 | 2441            | Ant1    | -56.68          | -20         | Pass    |
| NVNT      | 2-DH5 | 2480            | Ant1    | -55.73          | -20         | Pass    |
| NVNT      | 3-DH5 | 2402            | Ant1    | -56.52          | -20         | Pass    |
| NVNT      | 3-DH5 | 2441            | Ant1    | -55.42          | -20         | Pass    |
| NVNT      | 3-DH5 | 2480            | Ant1    | -56.08          | -20         | Pass    |

### Test Graphs

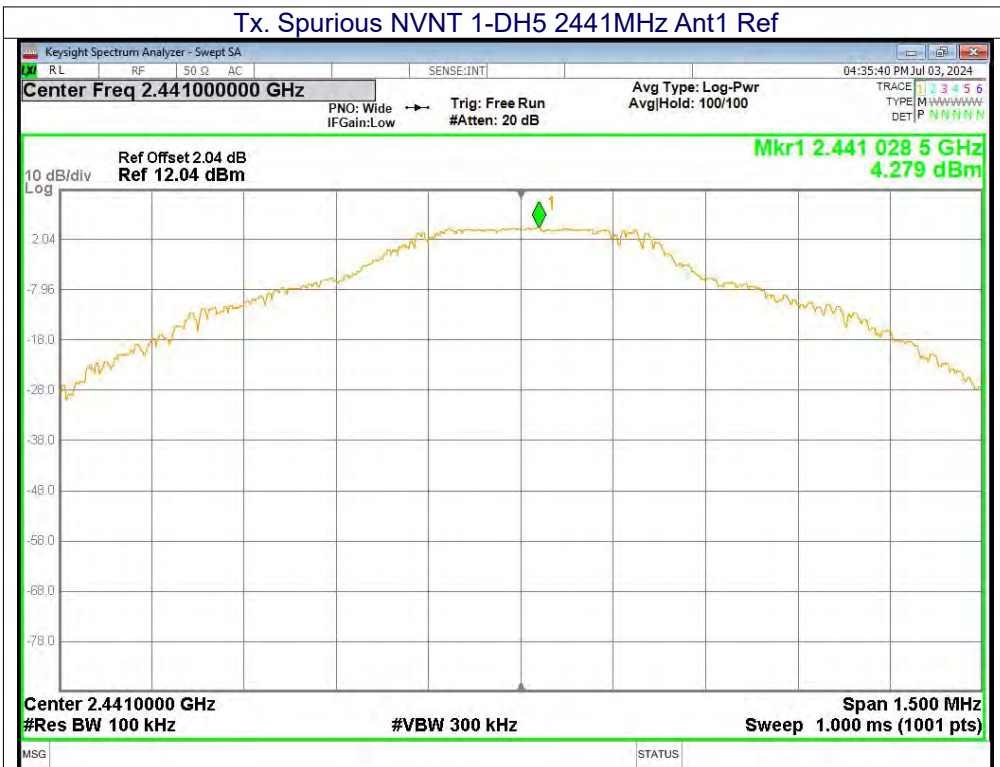
#### Tx. Spurious NVNT 1-DH5 2402MHz Ant1 Ref



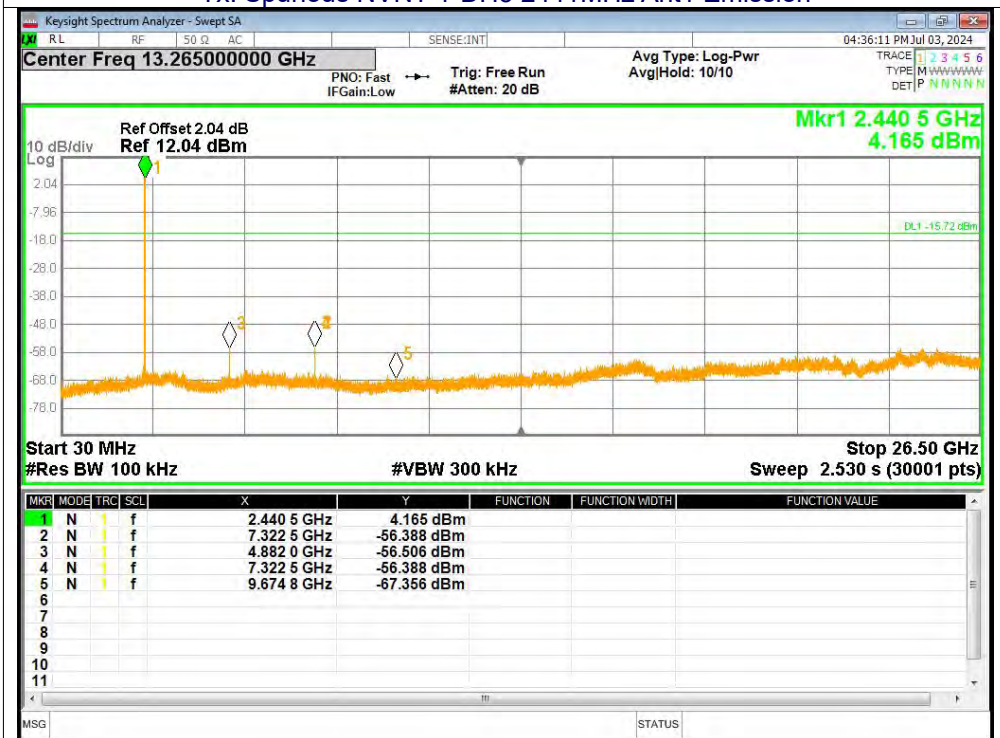
#### Tx. Spurious NVNT 1-DH5 2402MHz Ant1 Emission

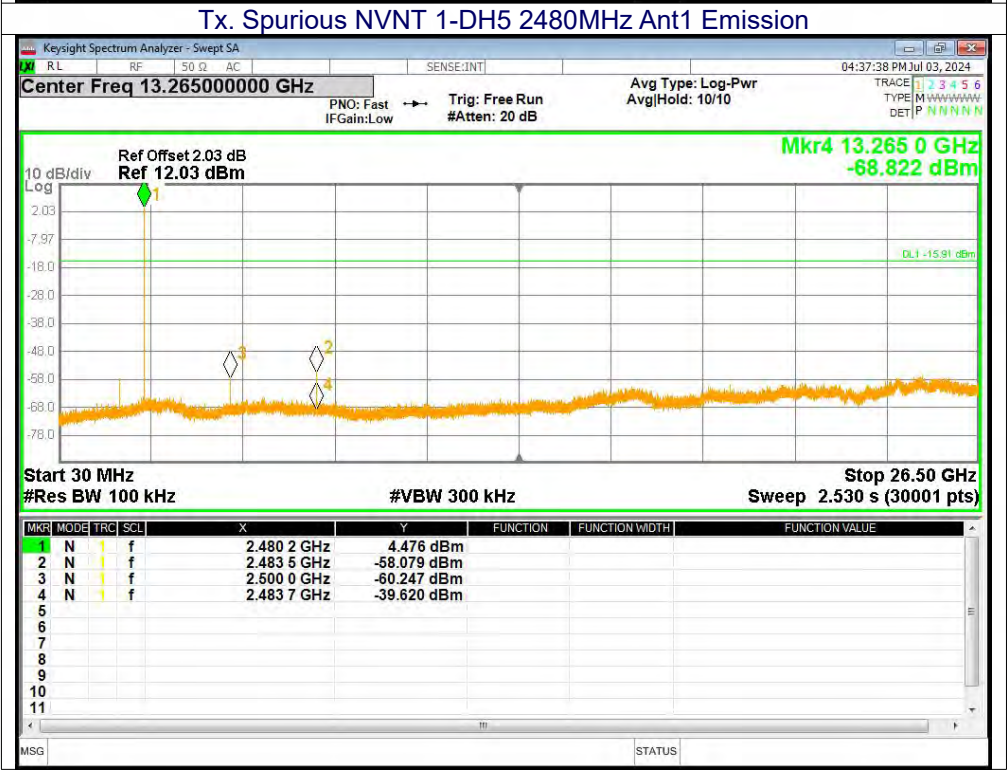
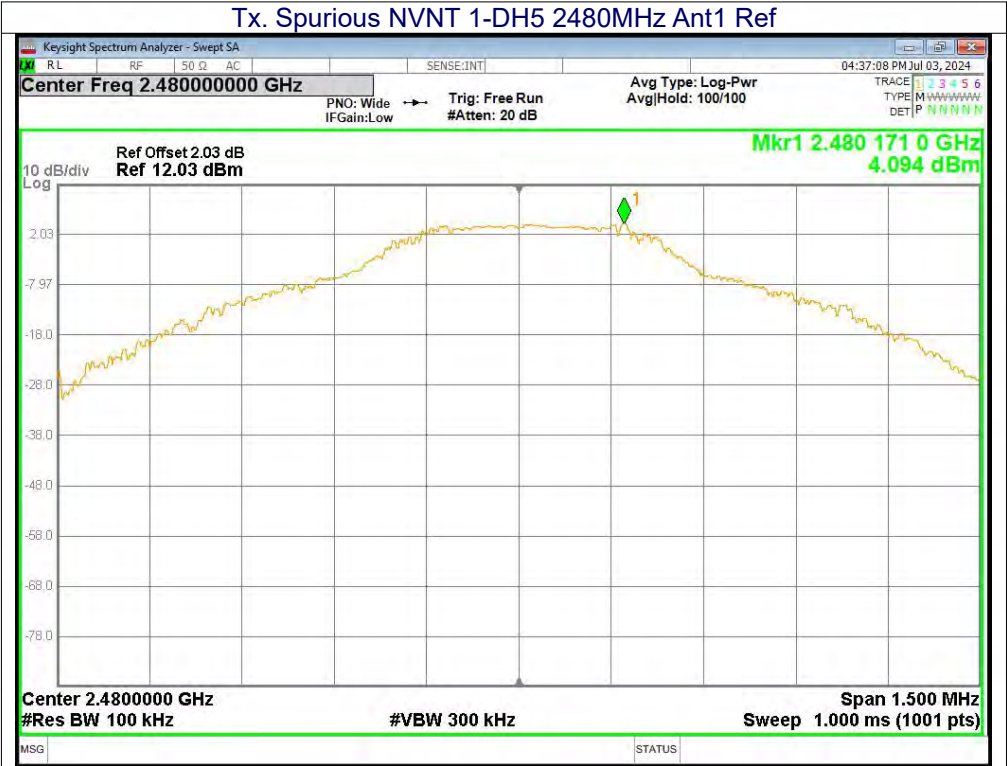


### Tx. Spurious NVNT 1-DH5 2441MHz Ant1 Ref

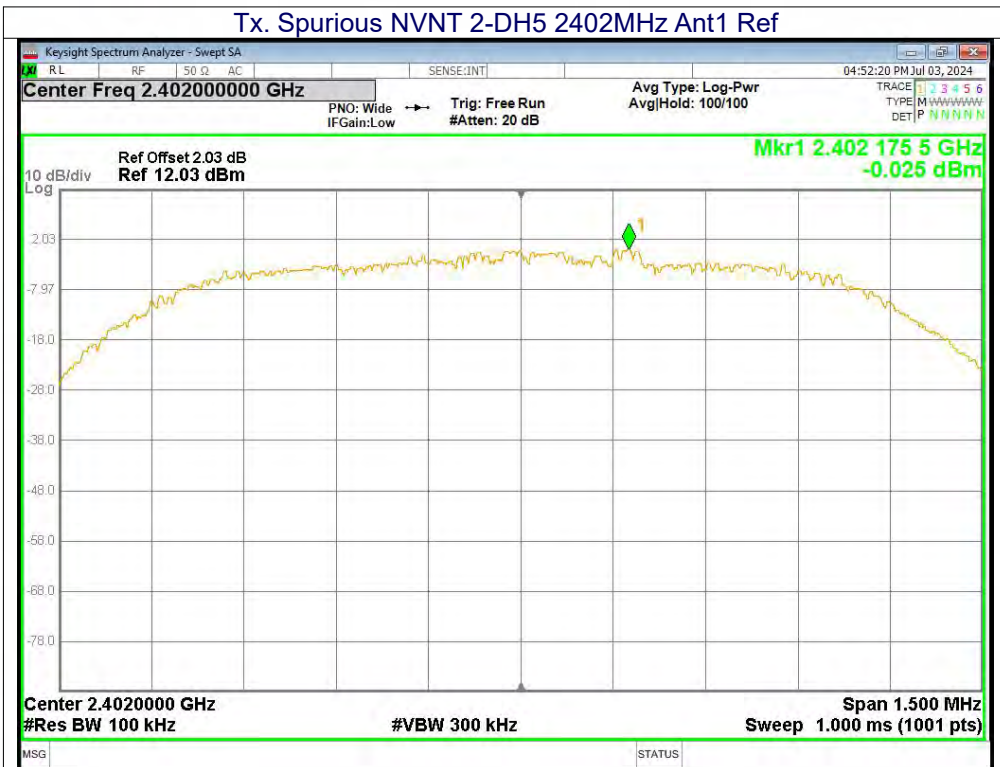


### Tx. Spurious NVNT 1-DH5 2441MHz Ant1 Emission

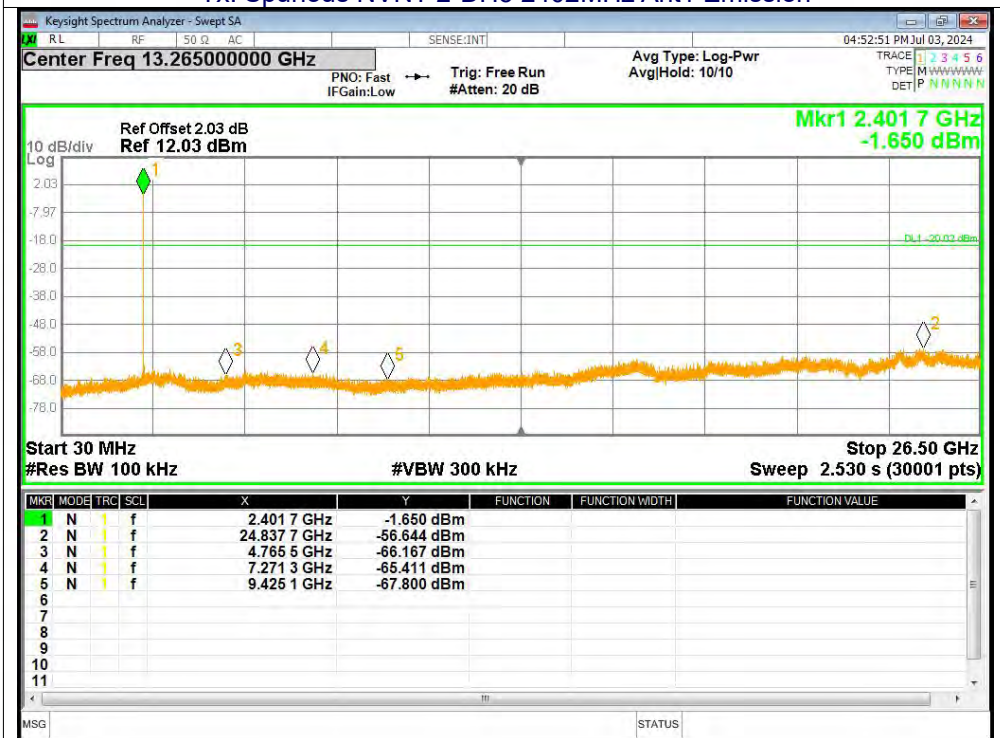




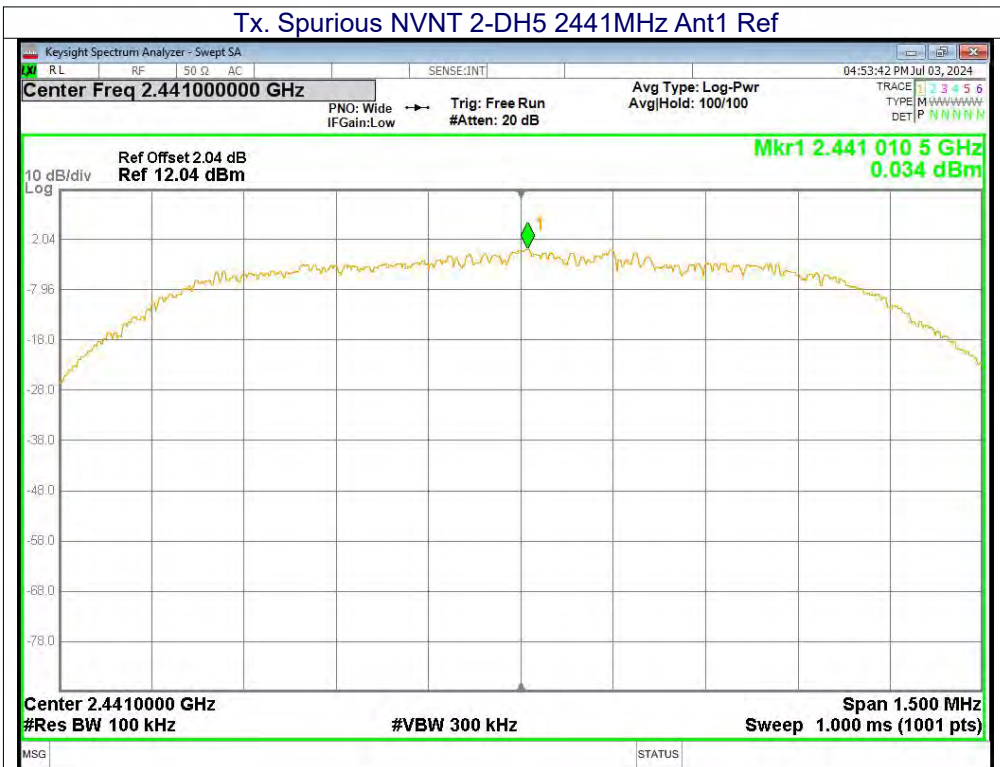
### Tx. Spurious NVNT 2-DH5 2402MHz Ant1 Ref



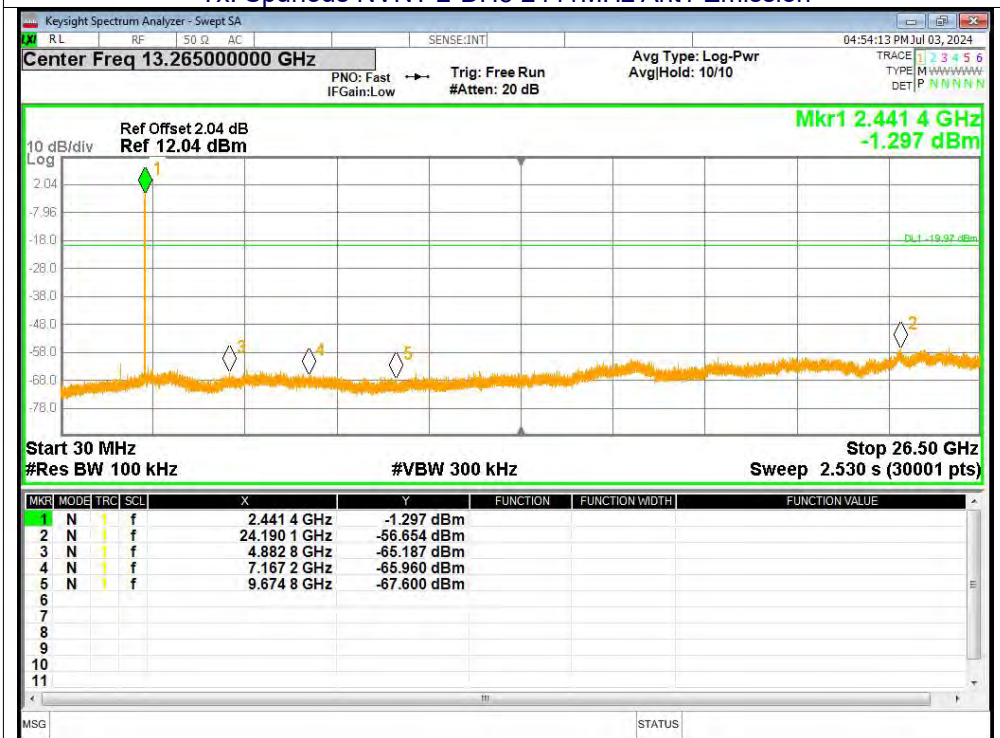
### Tx. Spurious NVNT 2-DH5 2402MHz Ant1 Emission

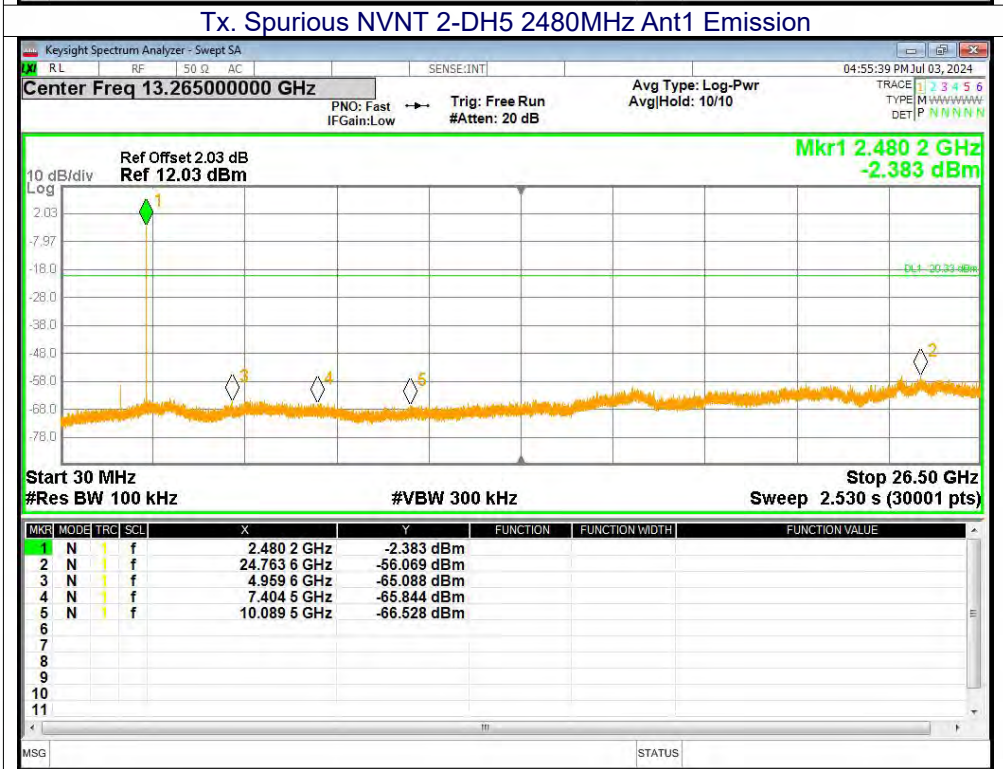
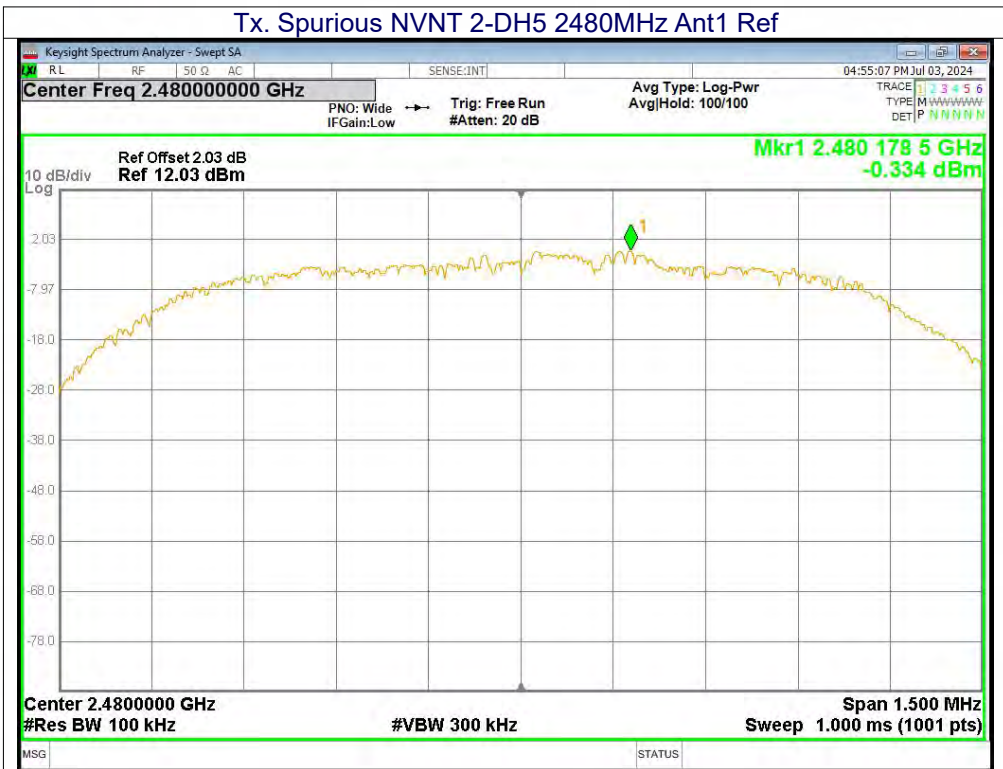


### Tx. Spurious NVNT 2-DH5 2441MHz Ant1 Ref

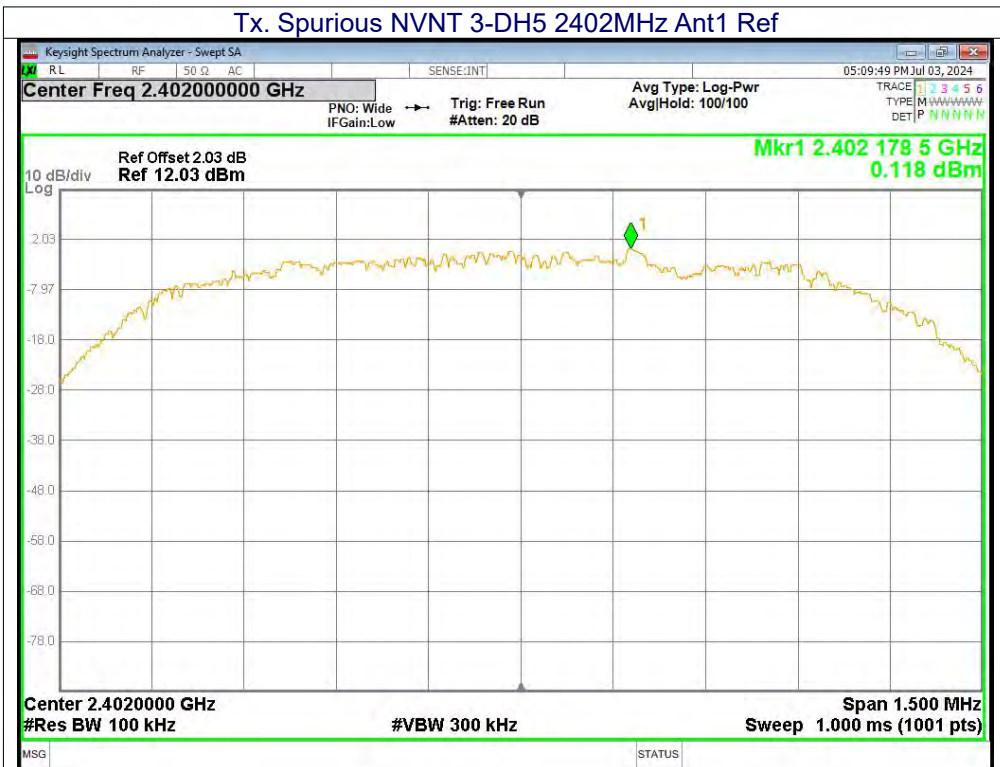


### Tx. Spurious NVNT 2-DH5 2441MHz Ant1 Emission

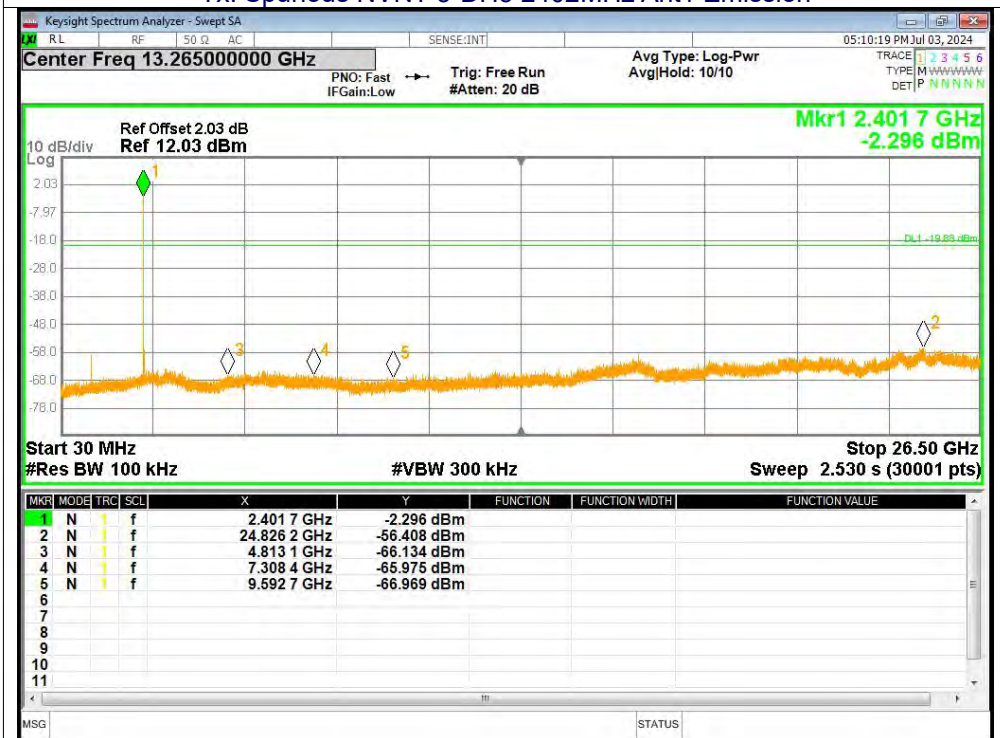


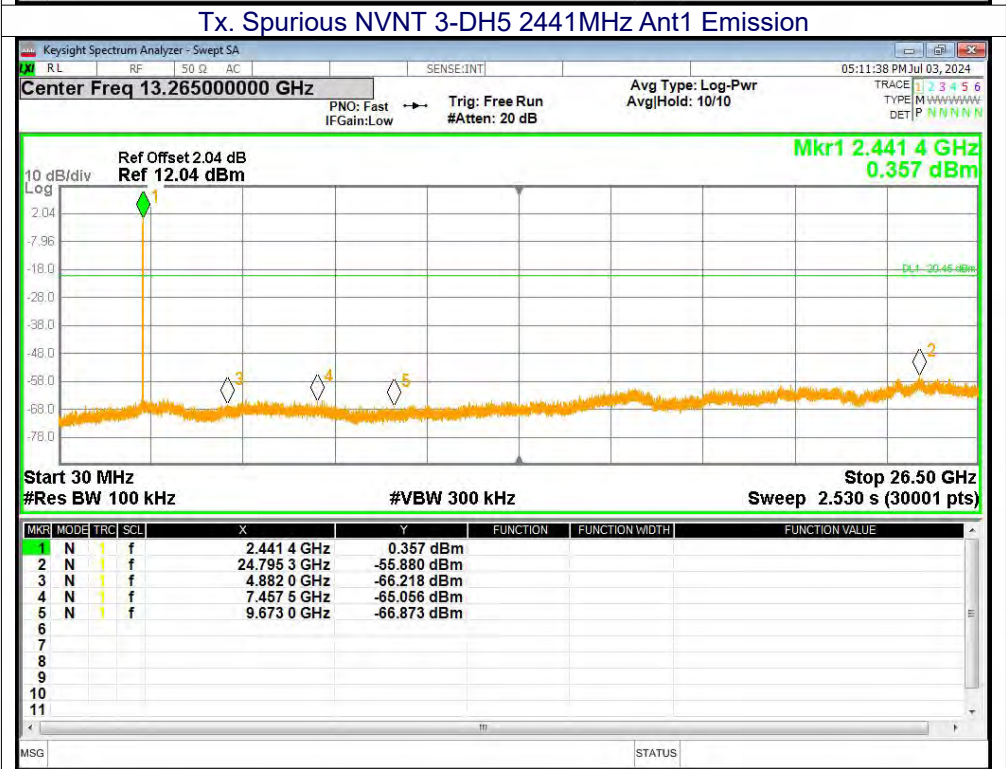
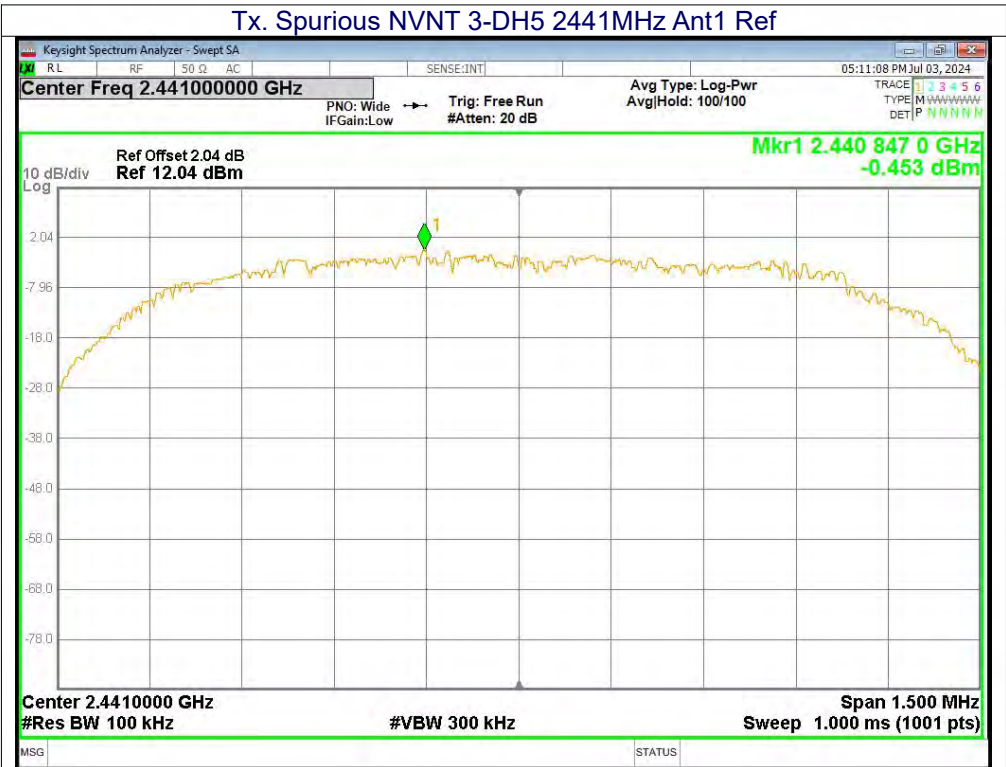


### Tx. Spurious NVNT 3-DH5 2402MHz Ant1 Ref

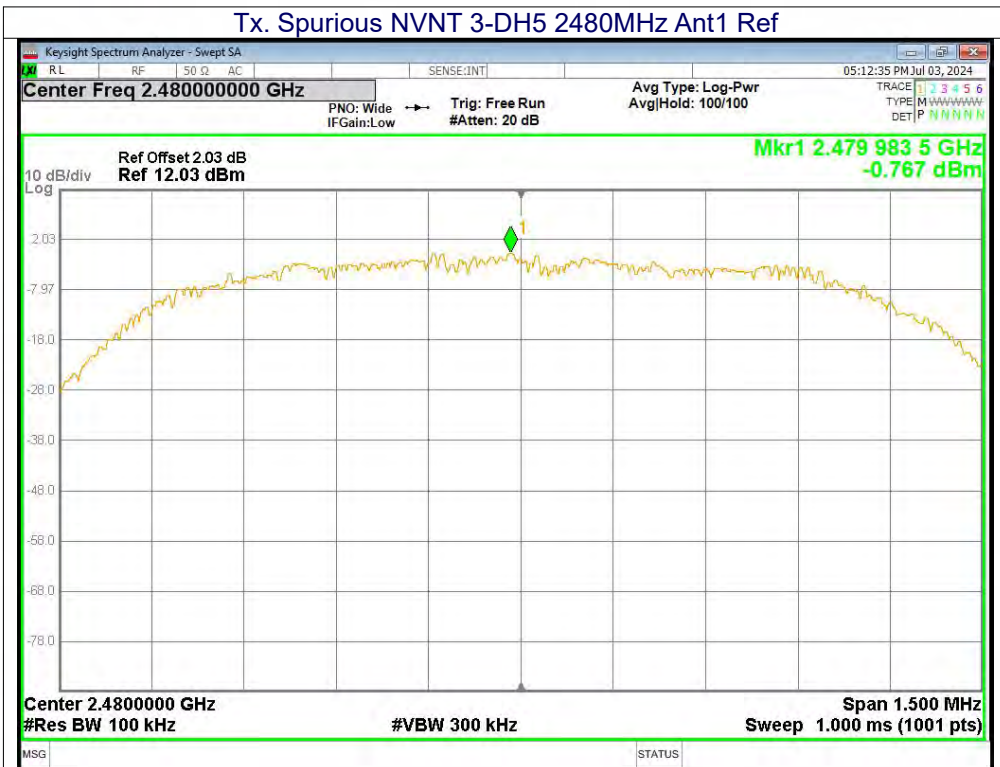


### Tx. Spurious NVNT 3-DH5 2402MHz Ant1 Emission

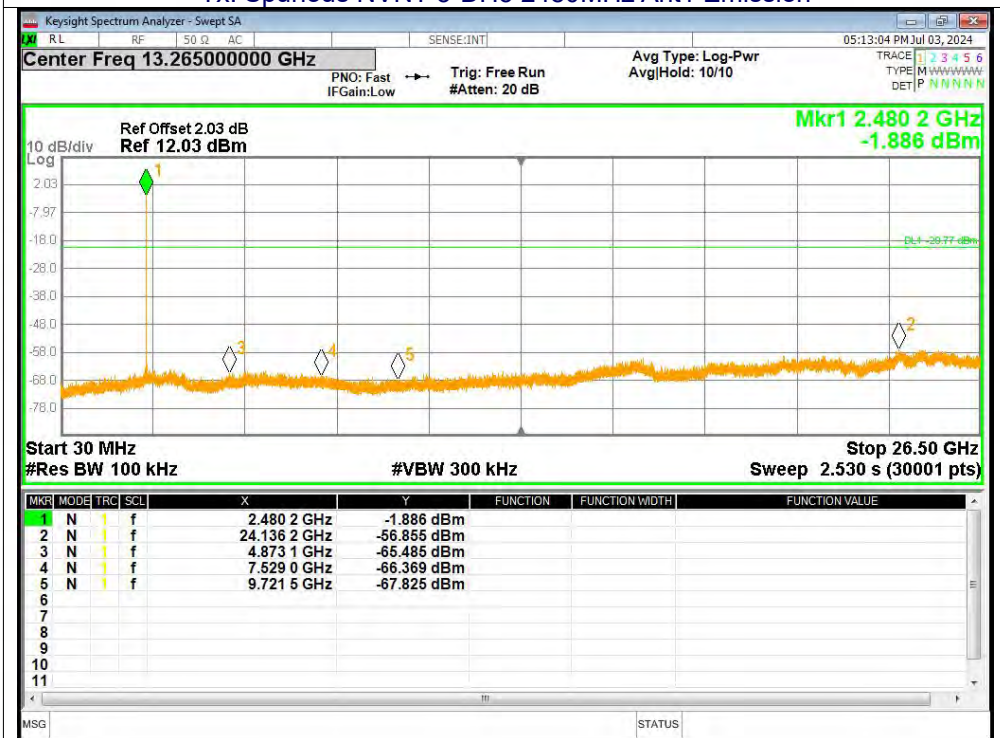




### Tx. Spurious NVNT 3-DH5 2480MHz Ant1 Ref



### Tx. Spurious NVNT 3-DH5 2480MHz Ant1 Emission



**7. 20DB&99% BANDWIDTH**

|                   |                                                              |
|-------------------|--------------------------------------------------------------|
| Test Requirement: | FCC Part15 C Section 15.247 (a)(1), RSS 247 5.1, RSS-Gen 6.7 |
| Test Method:      | ANSI C63.10:2013                                             |

**7.1 Test Setup****7.2 Limit**

According to RSS-247§5.1(a)& §5.1(b), 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

**7.3 Test procedure**

1. Set RBW = 30 kHz.
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
8. The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30KHz RBW and 100 KHz VBW record the 99% bandwidth.

**7.4 DEVIATION FROM STANDARD**

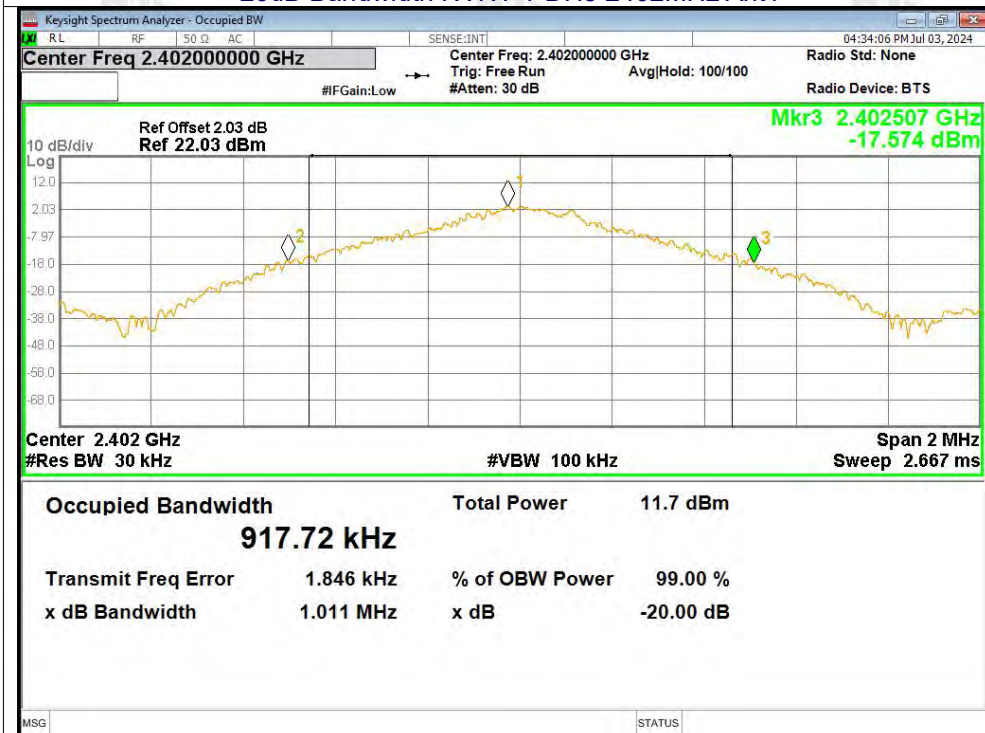
No deviation.

**7.5 Test Result**

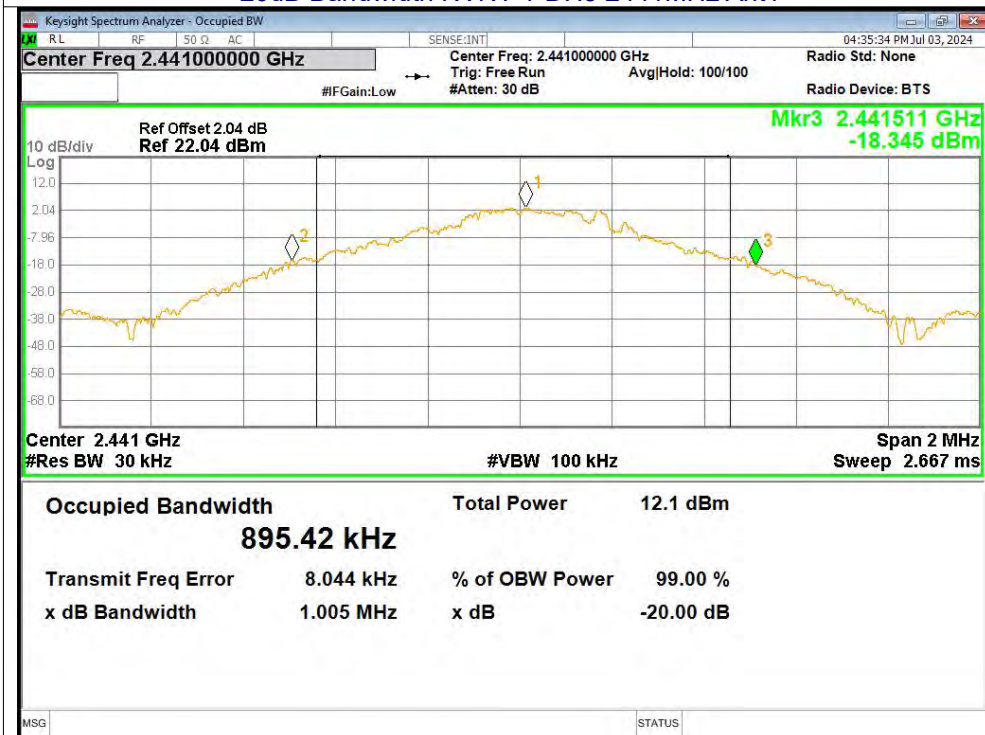
| Mode          | Test channel | 20dB Emission Bandwidth (MHz) | 99%Bandwidth (MHz) | Result |
|---------------|--------------|-------------------------------|--------------------|--------|
| GFSK          | Lowest       | 1.011                         | 0.914              | Pass   |
|               | Middle       | 1.005                         | 0.915              |        |
|               | Highest      | 1.044                         | 0.917              |        |
| $\pi/4$ DQPSK | Lowest       | 1.362                         | 1.221              | Pass   |
|               | Middle       | 1.374                         | 1.232              |        |
|               | Highest      | 1.377                         | 1.243              |        |
| 8DPSK         | Lowest       | 1.336                         | 1.213              | Pass   |
|               | Middle       | 1.34                          | 1.225              |        |
|               | Highest      | 1.337                         | 1.225              |        |

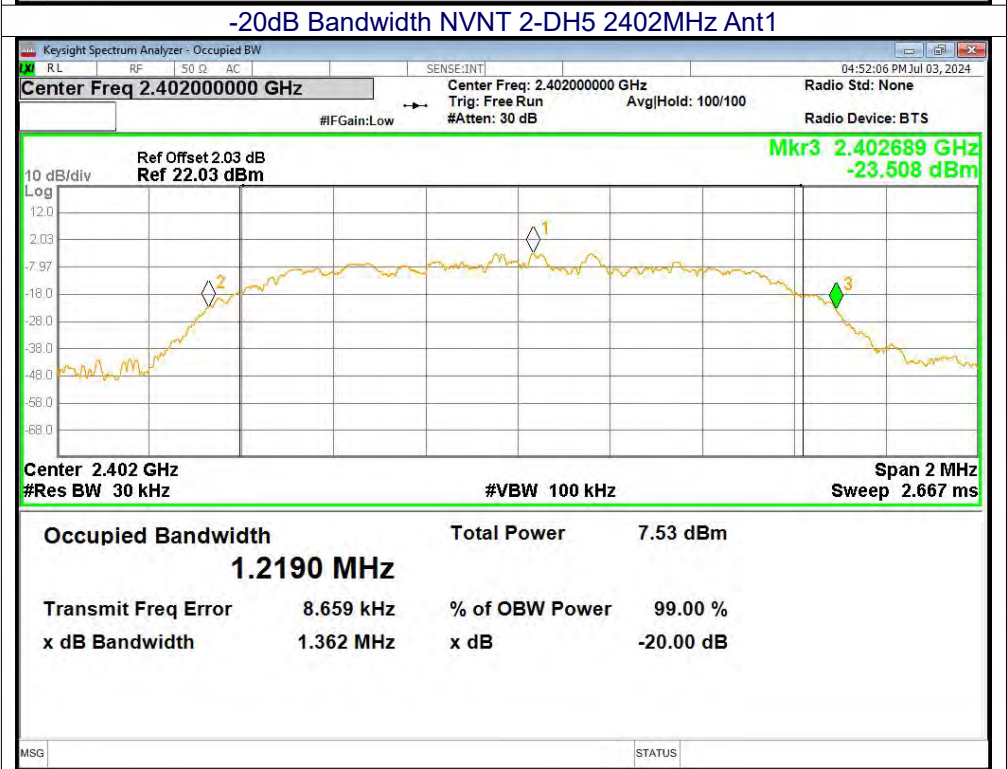
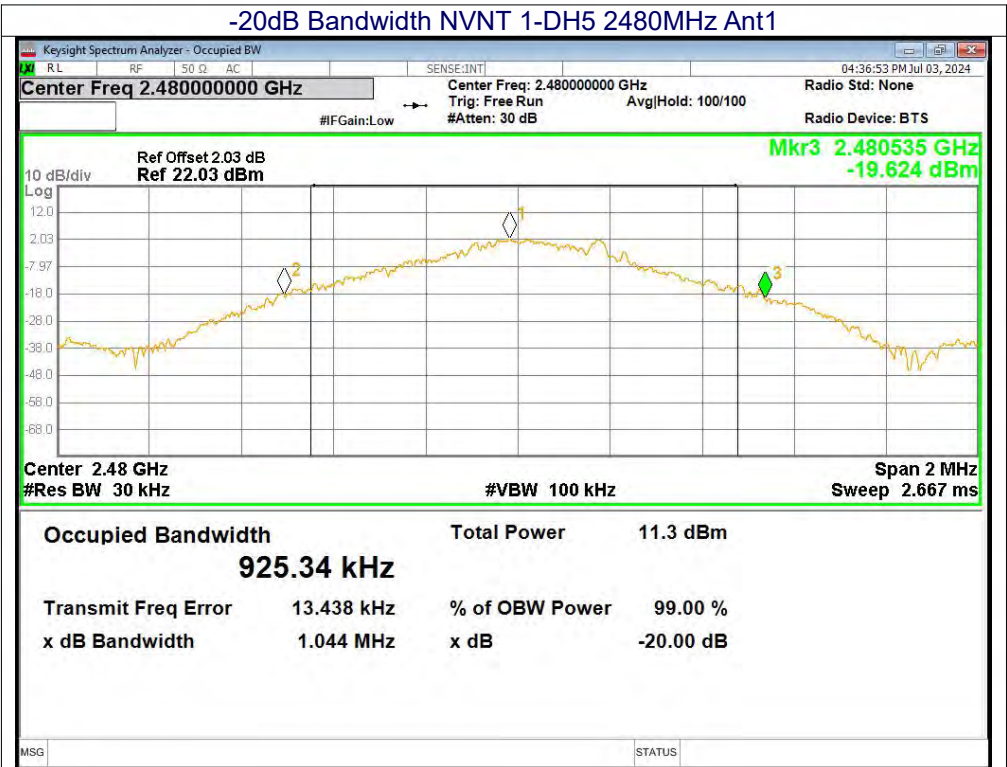
### Test Graphs

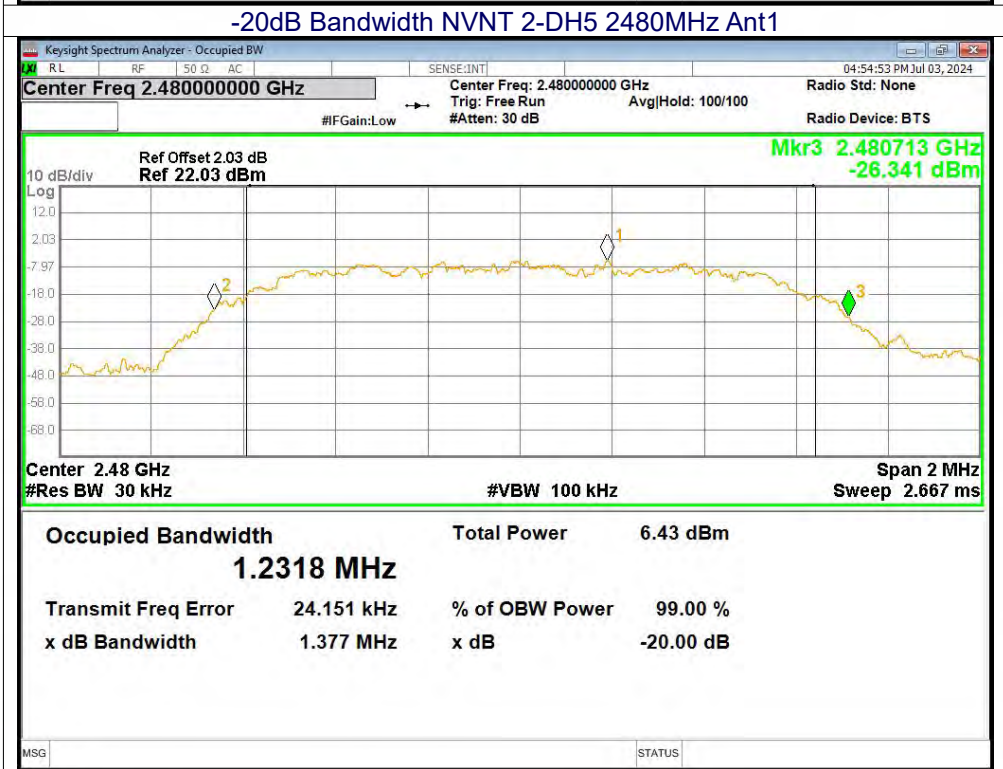
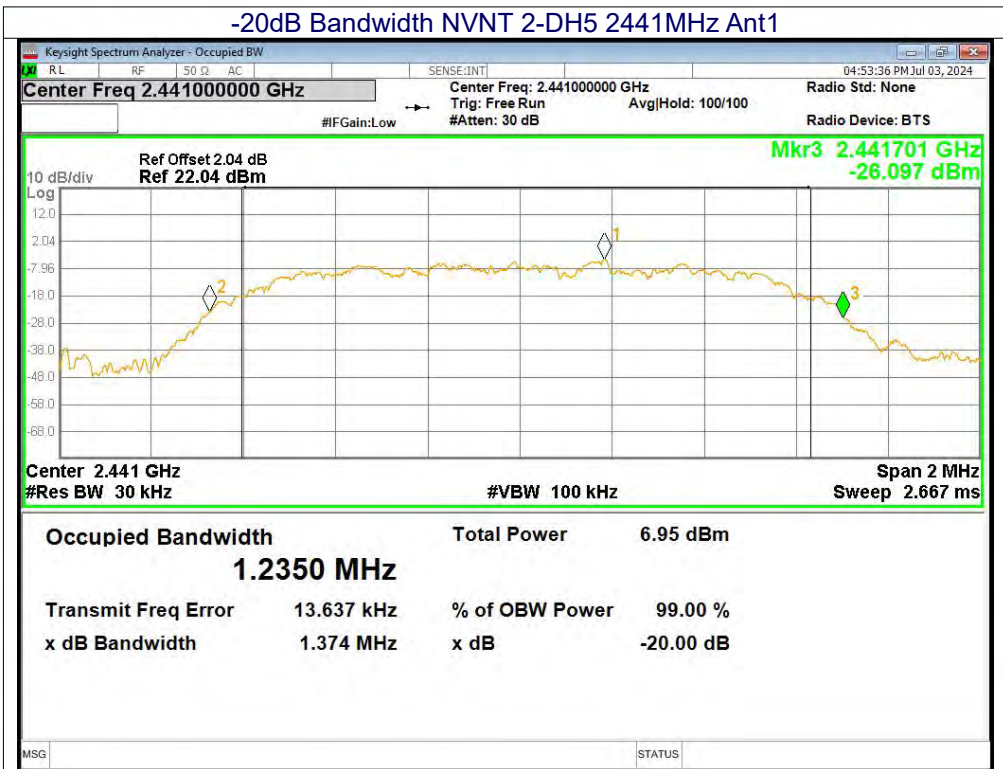
#### -20dB Bandwidth NVNT 1-DH5 2402MHz Ant1

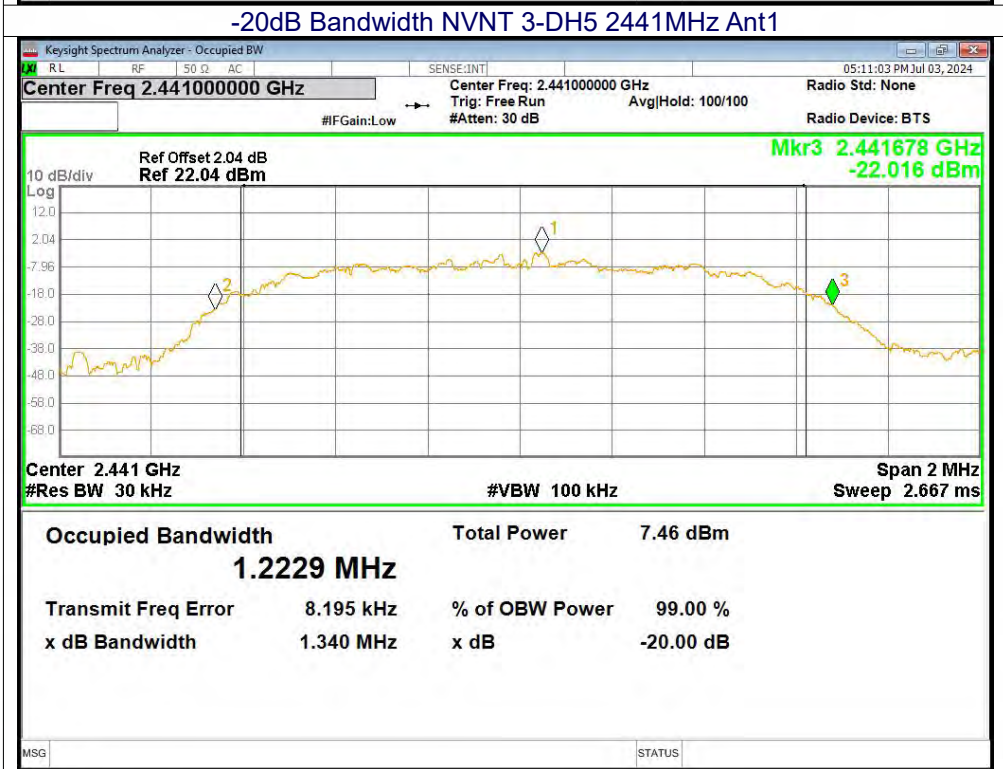
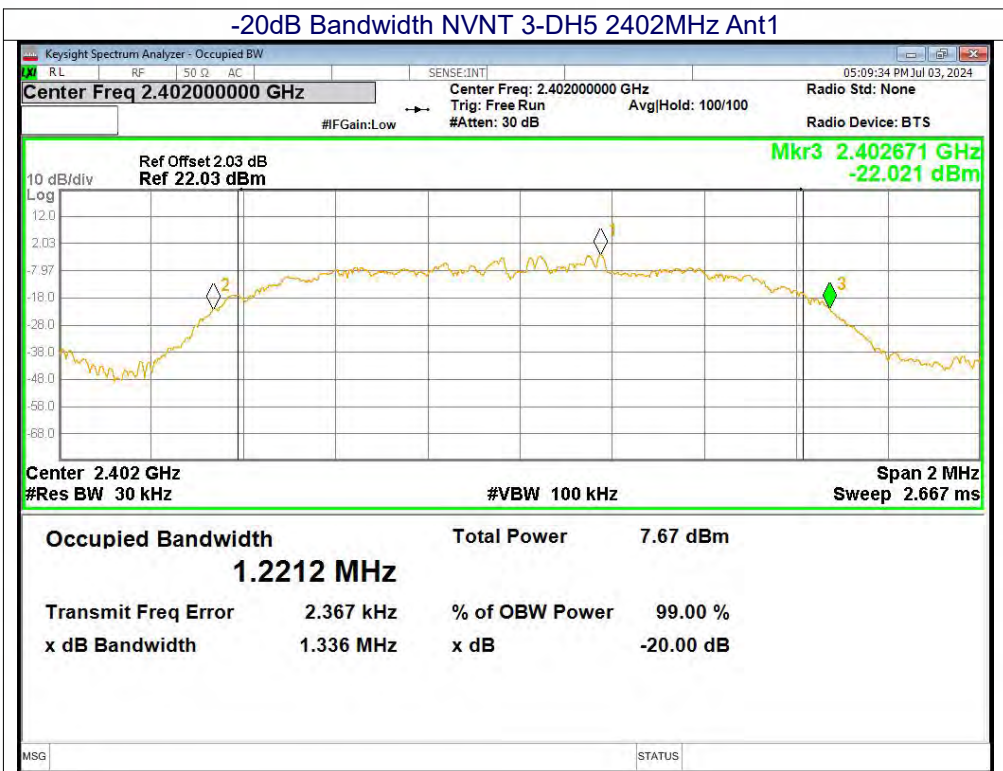


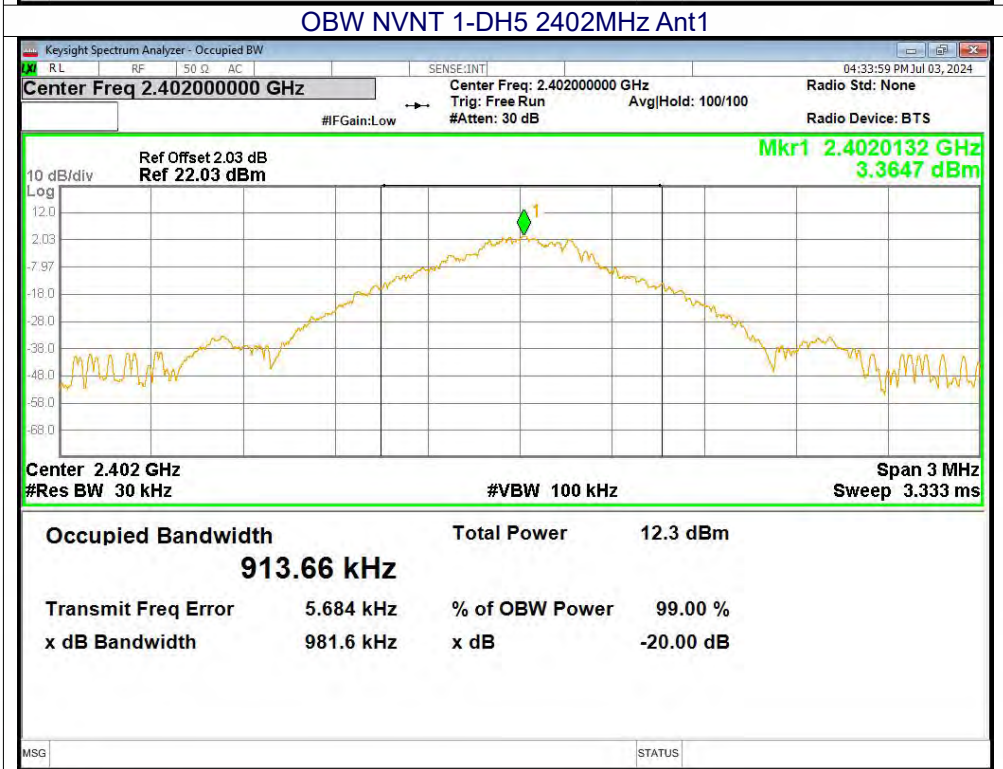
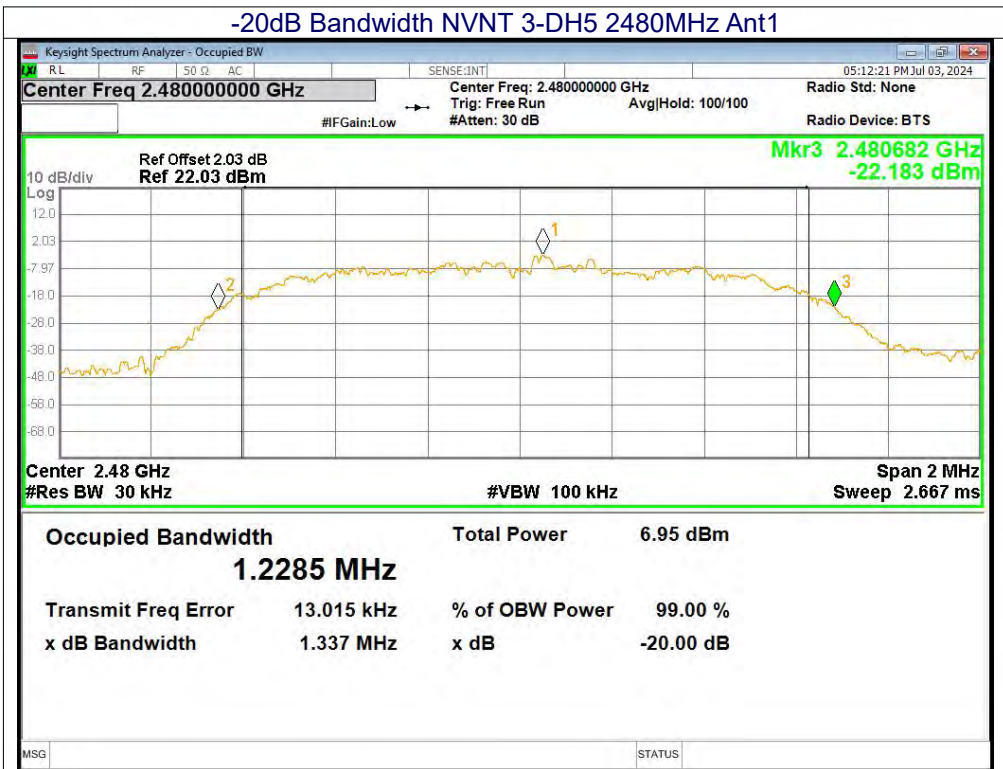
#### -20dB Bandwidth NVNT 1-DH5 2441MHz Ant1



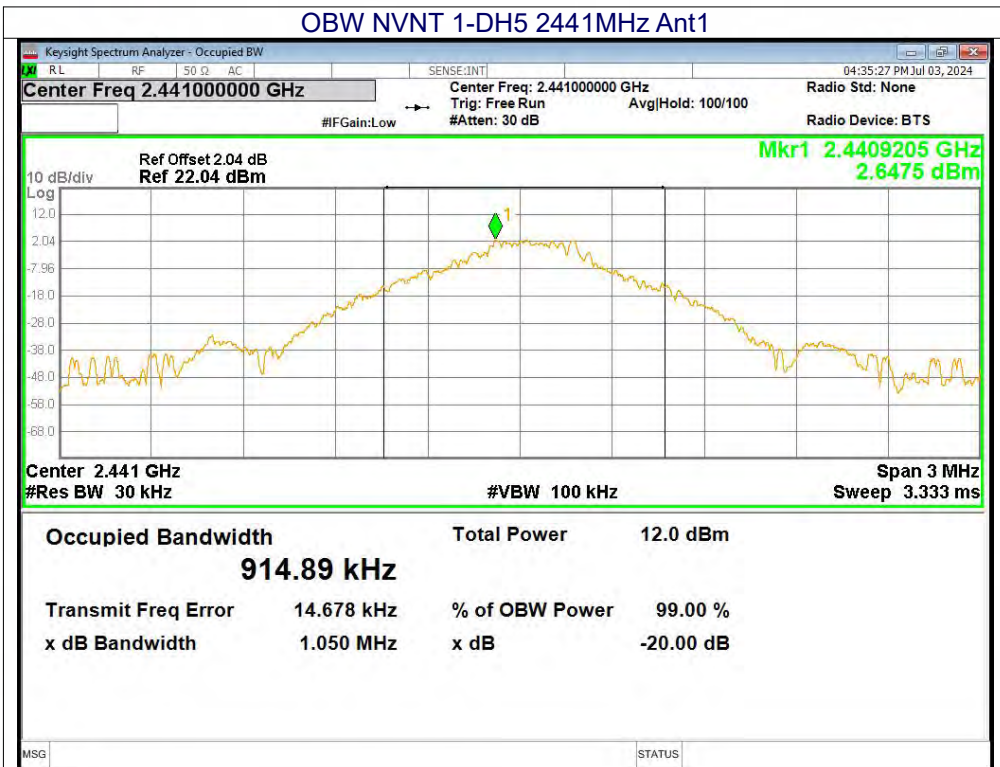








### OBW NVNT 1-DH5 2441MHz Ant1



### OBW NVNT 1-DH5 2480MHz Ant1

