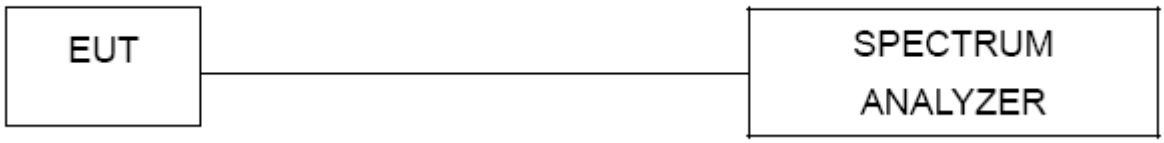
# 11. Maximum Peak Output Power

## 11.1 Block Diagram Of Test Setup




## 11.2 Limit

| FCC Part15 (15.247) , Subpart C | | | | |
|---|---|---|---|---|
| **Section** | **Test Item** | **Limit** | **Frequency Range (MHz)** | **Result** |
| 15.247(b)(1) | Peak Output Power | 0.125 watt or 21dBm | 2400-2483.5 | PASS |

## 11.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer: RBW = 2MHz. VBW = 6MHz. Sweep = auto; Detector Function = Peak.

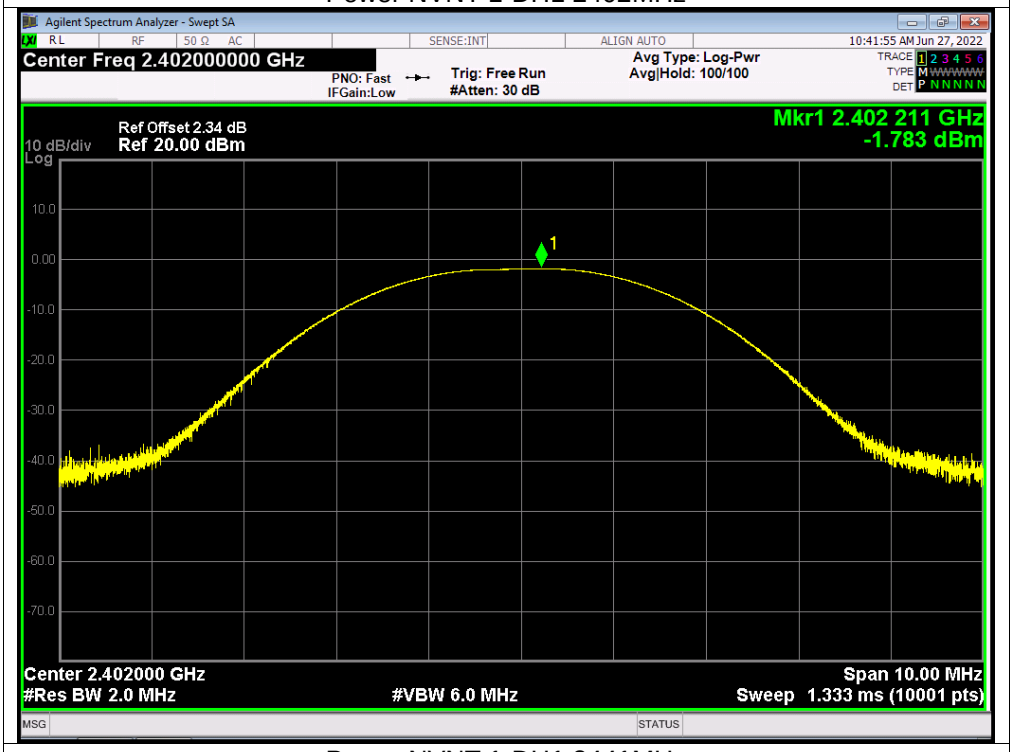
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

## 11.4 Test Result

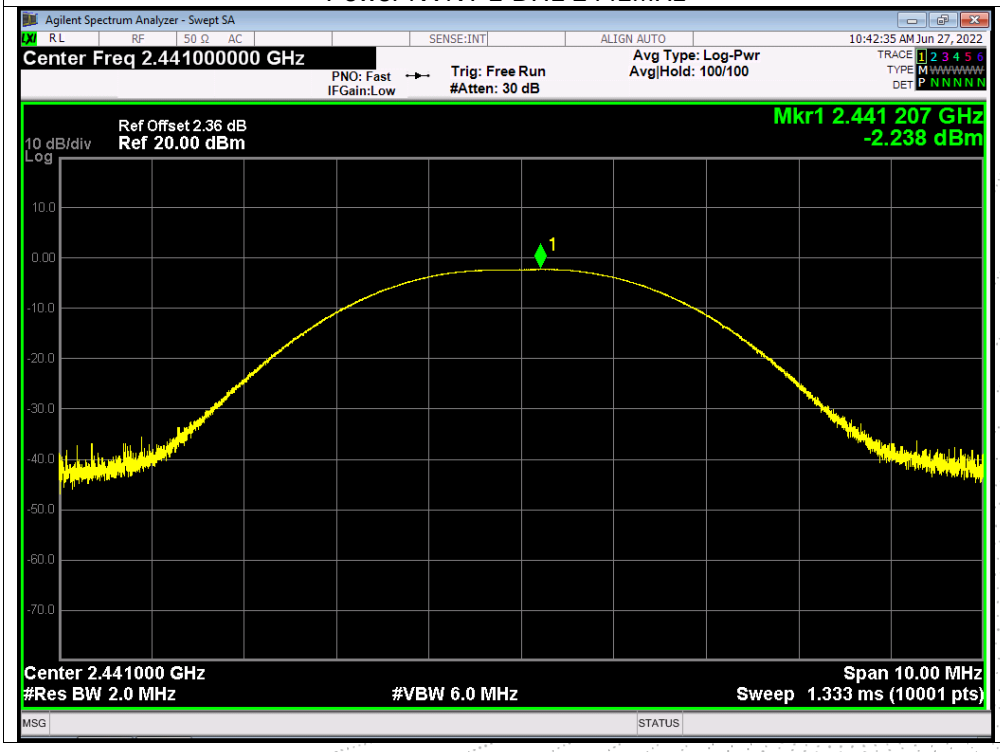
| Data | Mode | Frequency (MHz) | Conducted Power (dBm) | Limit (dBm) | Verdict |
|---|---|---|---|---|---|
| Left | 1-DH1 | 2402 | -1.78 | 21 | Pass |
| | 1-DH1 | 2441 | -2.24 | 21 | Pass |
| | 1-DH1 | 2480 | -2.76 | 21 | Pass |
| | 2-DH1 | 2402 | -0.99 | 21 | Pass |
| | 2-DH1 | 2441 | -1.51 | 21 | Pass |
| | 2-DH1 | 2480 | -1.93 | 21 | Pass |
| Right | 1-DH1 | 2402 | -1.75 | 21 | Pass |
| | 1-DH1 | 2441 | -2.26 | 21 | Pass |
| | 1-DH1 | 2480 | -2.73 | 21 | Pass |
| | 2-DH1 | 2402 | -0.94 | 21 | Pass |
| | 2-DH1 | 2441 | -1.41 | 21 | Pass |
| | 2-DH1 | 2480 | -1.89 | 21 | Pass |

**Left**

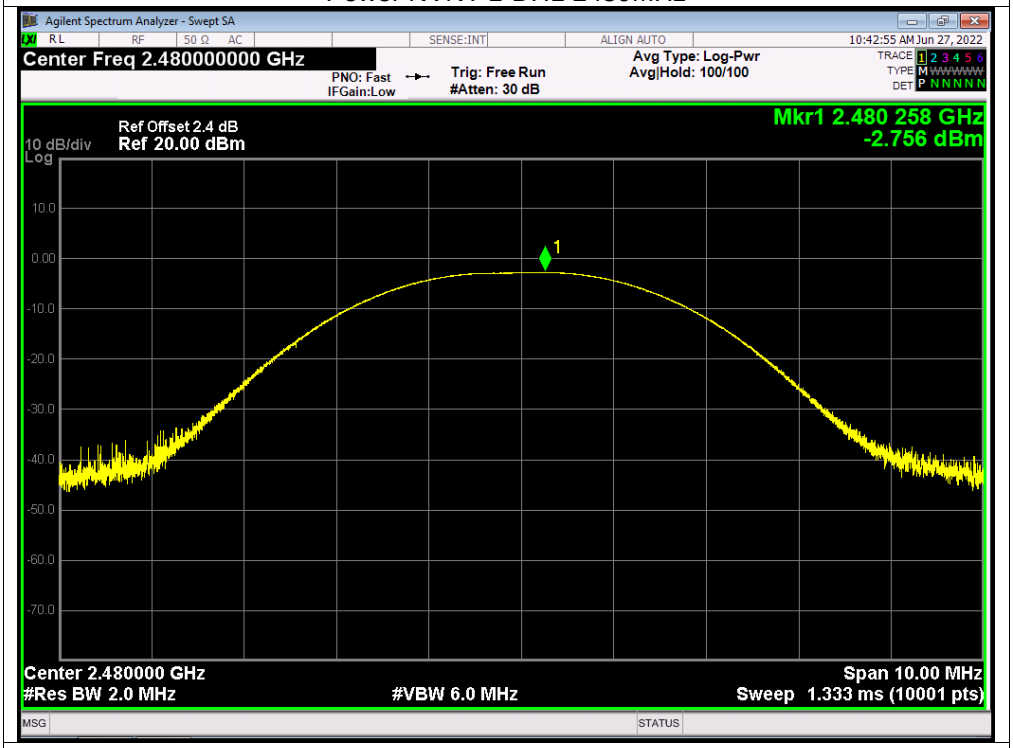
| Test Graphs |
| --- |
| Power NVNT 1-DH1 2402MHz |



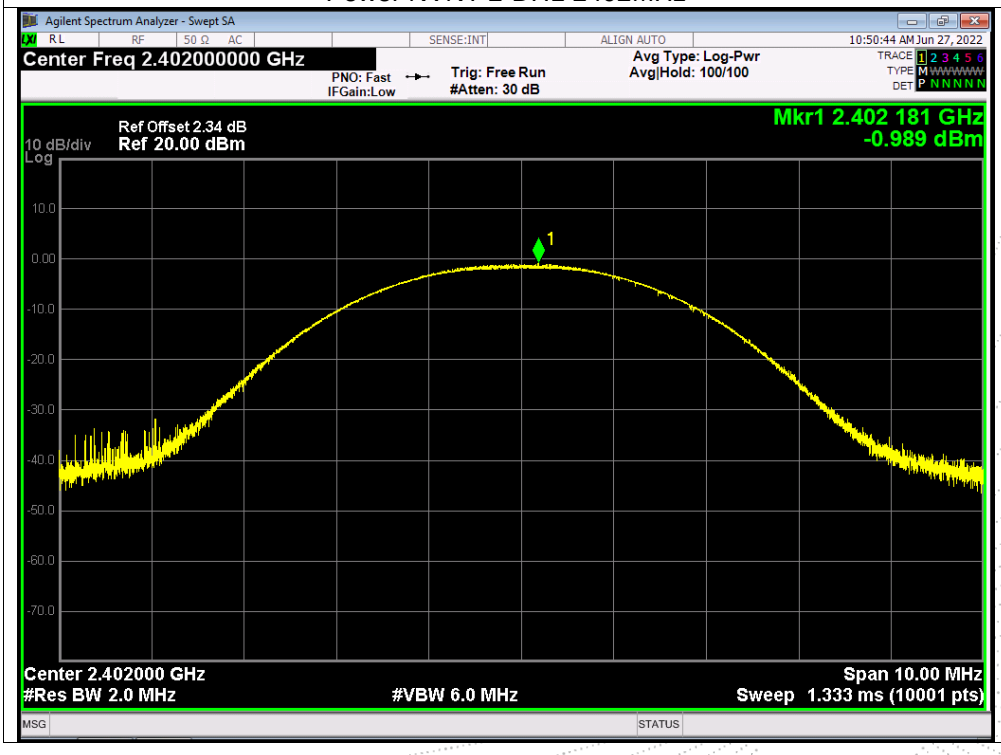

| Power NVNT 1-DH1 2441MHz |
| --- |



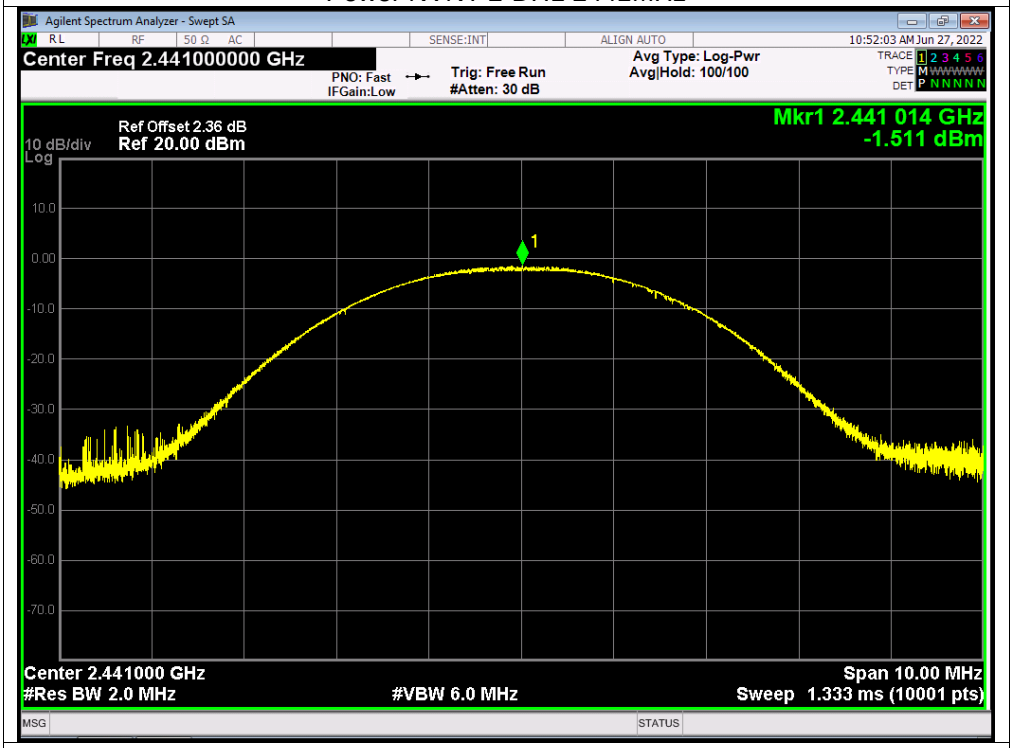
Power NVNT 1-DH1 2480MHz



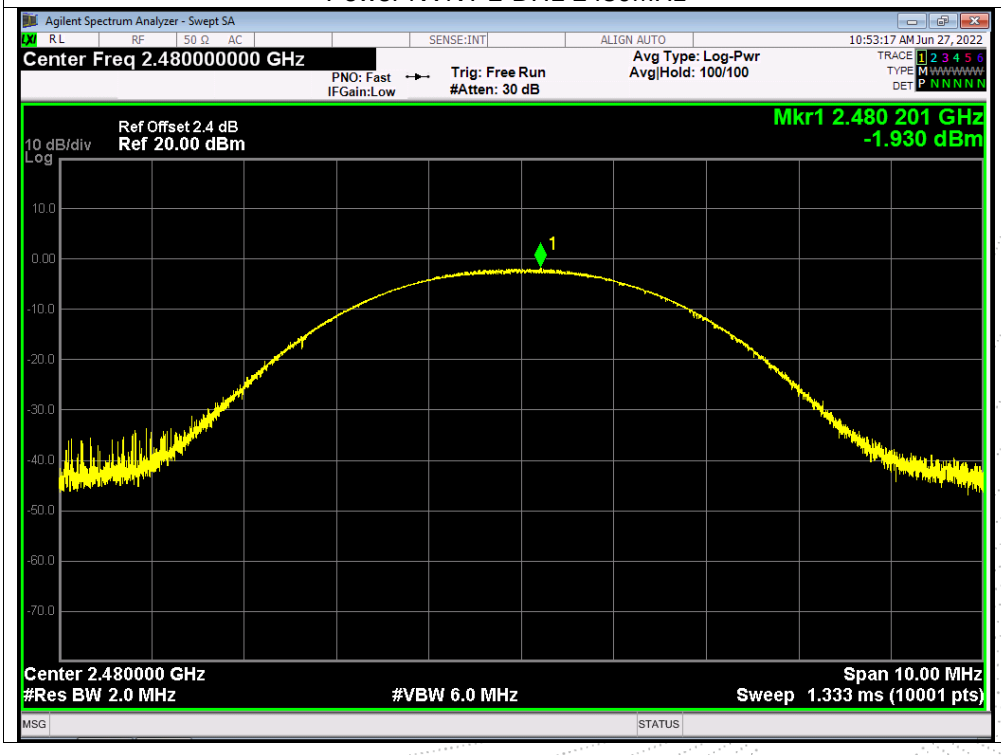

Power NVNT 2-DH1 2402MHz



Power NVNT 2-DH1 2441MHz

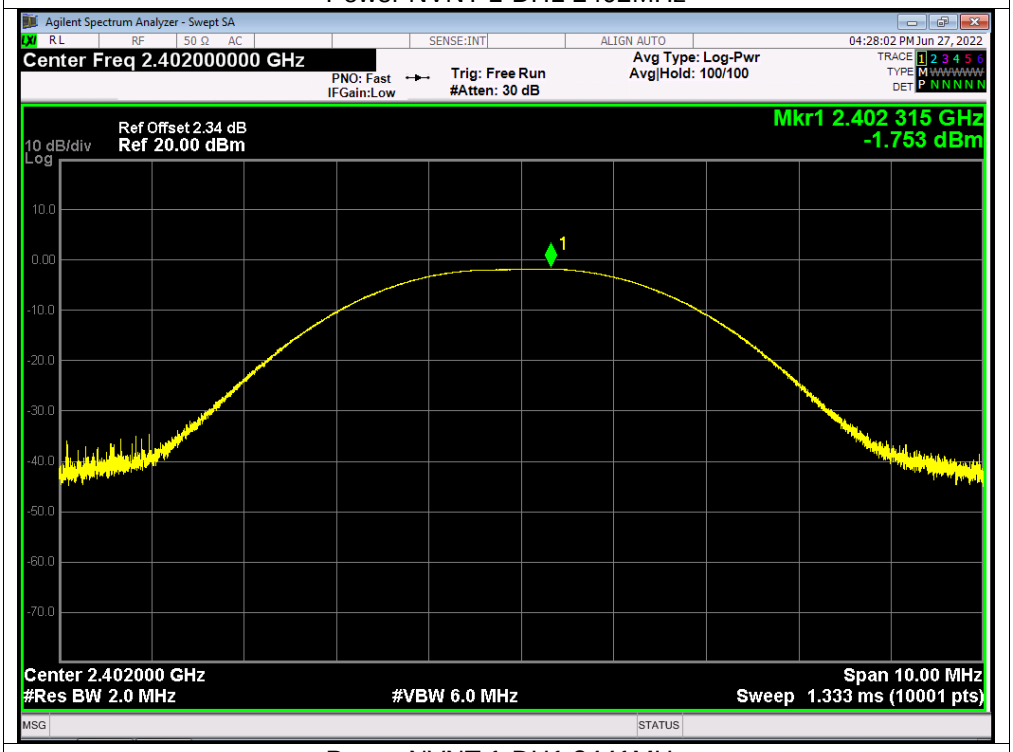



Power NVNT 2-DH1 2480MHz

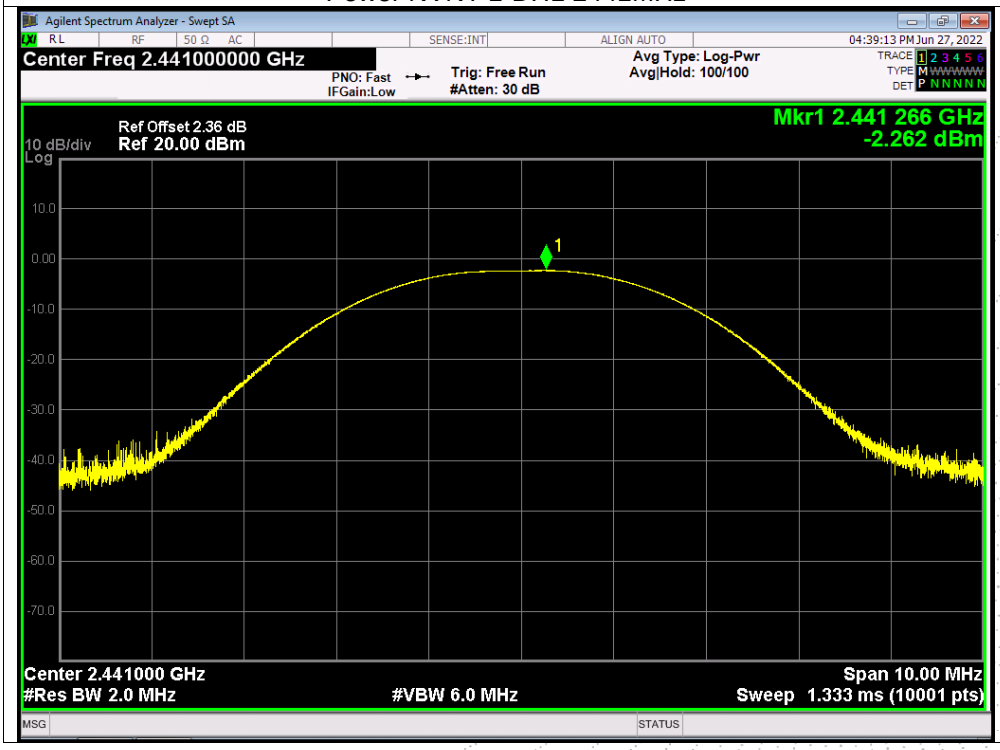


**Right**

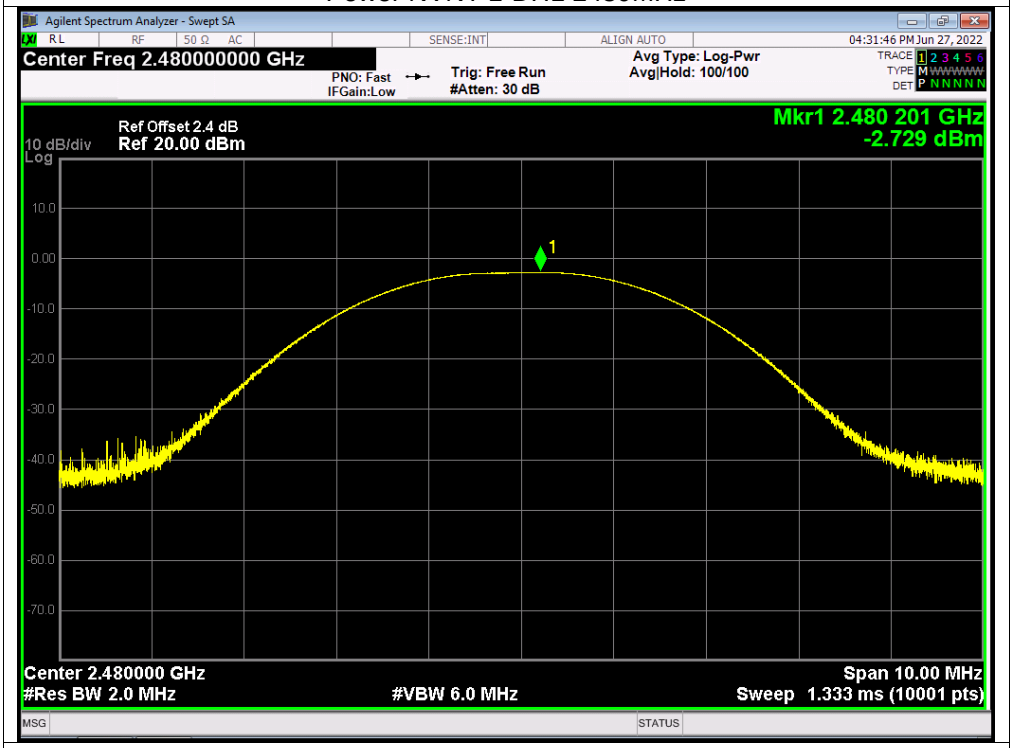
| Test Graphs |
| --- |
| Power NVNT 1-DH1 2402MHz |



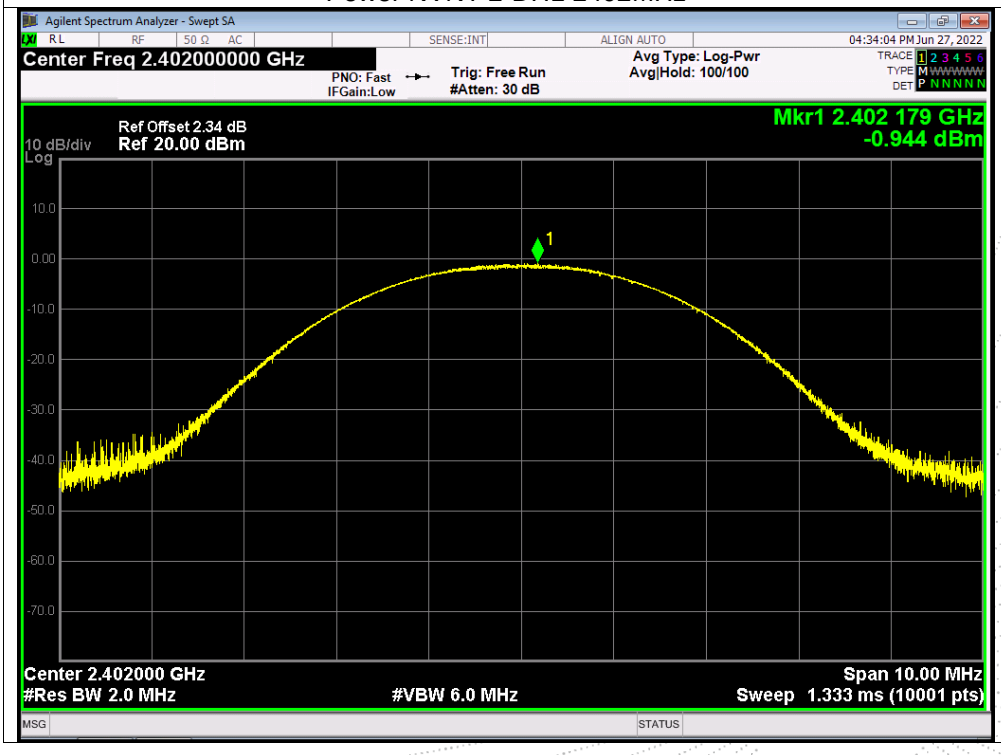

| Power NVNT 1-DH1 2441MHz |
| --- |



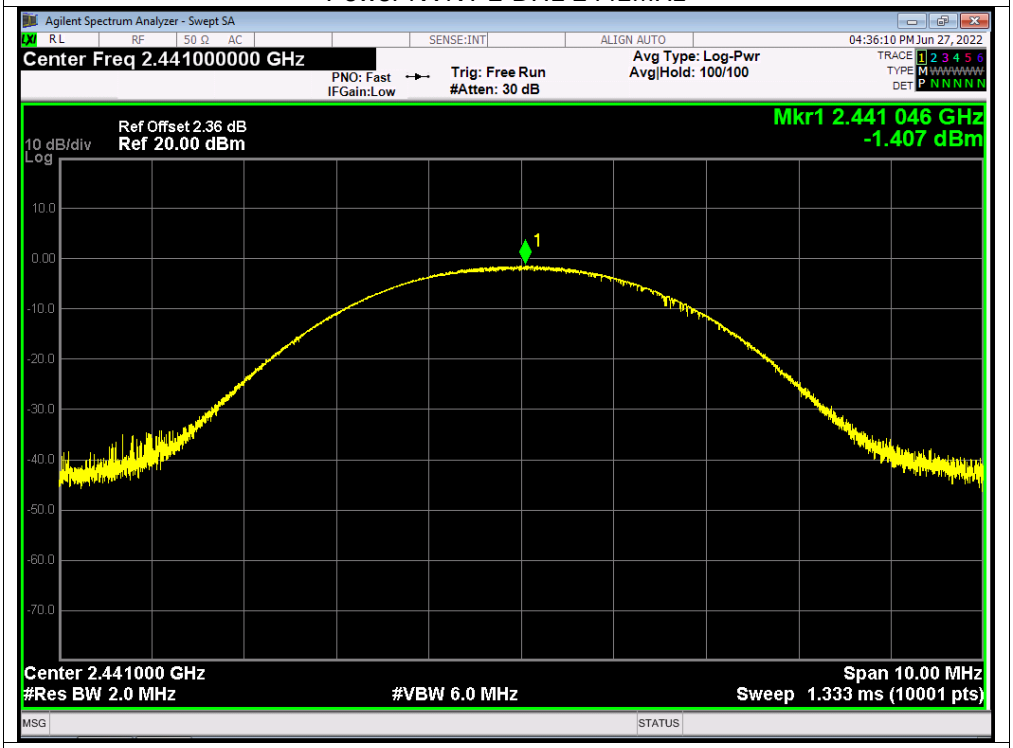
Power NVNT 1-DH1 2480MHz



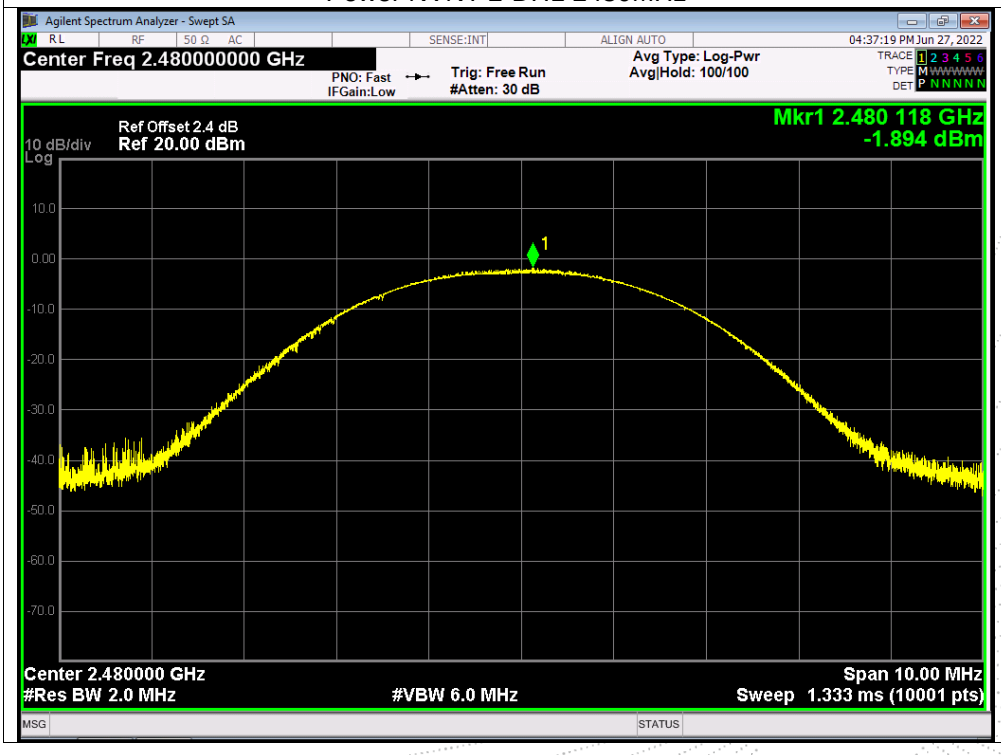

Power NVNT 2-DH1 2402MHz



Power NVNT 2-DH1 2441MHz

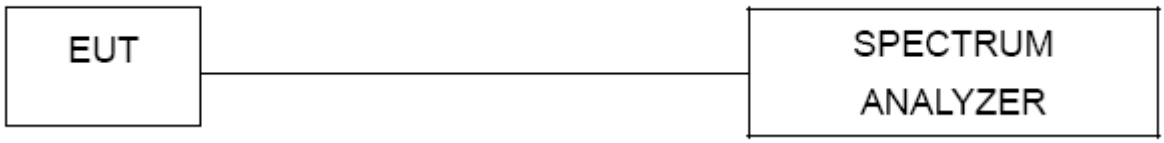



Power NVNT 2-DH1 2480MHz



# 12. Hopping Channel Separation

## 12.1 Block Diagram Of Test Setup




## 12.2 Limit

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 0.125W.

## 12.3 Test procedure

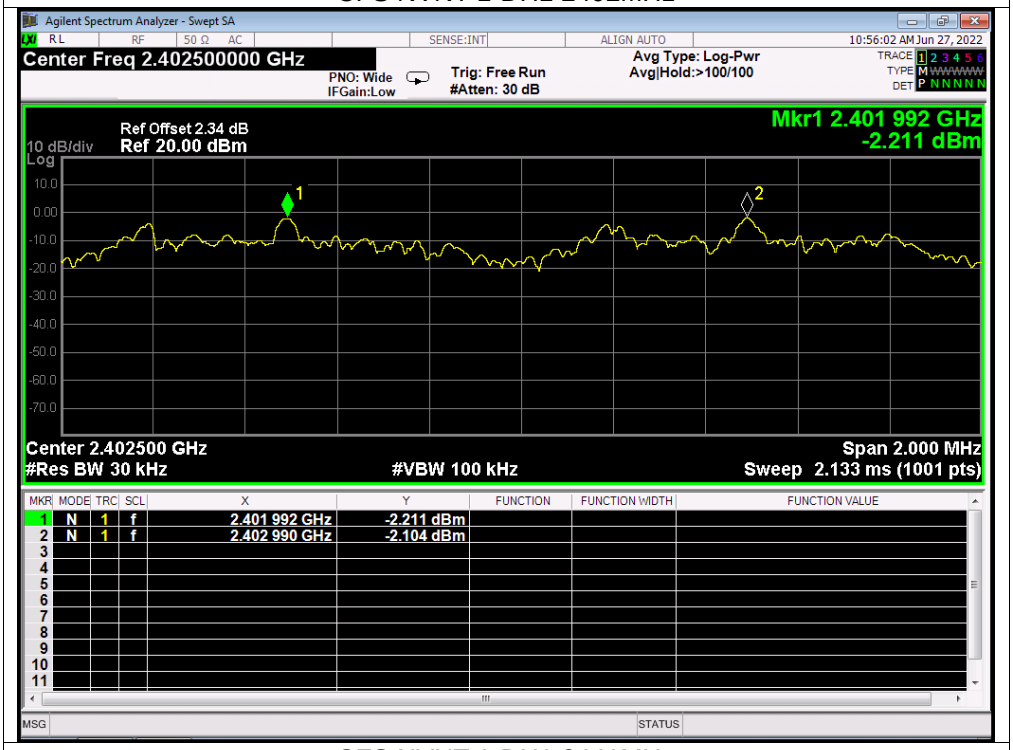
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 30kHz. VBW = 100kHz , Span = 2.0MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

## 12.4 Test Result

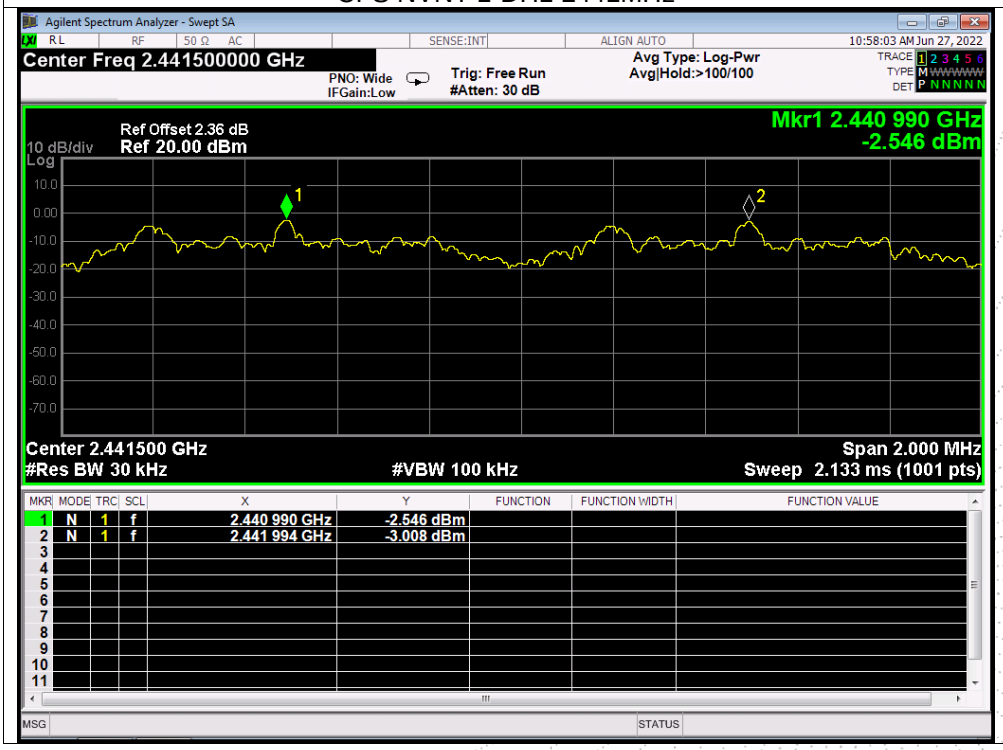
| Data | Condition | Mode | Hopping Freq1 (MHz) | Hopping Freq2 (MHz) | HFS (MHz) | Limit (MHz) | Verdict |
|---|---|---|---|---|---|---|---|
| **Left** | NVNT | 1-DH1 | 2401.992 | 2402.990 | 0.998 | 0.733 | Pass |
| | NVNT | 1-DH1 | 2440.990 | 2441.994 | 1.004 | 0.723 | Pass |
| | NVNT | 1-DH1 | 2478.992 | 2479.990 | 0.998 | 0.711 | Pass |
| | NVNT | 2-DH1 | 2401.990 | 2402.994 | 1.004 | 0.758 | Pass |
| | NVNT | 2-DH1 | 2440.990 | 2441.990 | 1.000 | 0.819 | Pass |
| | NVNT | 2-DH1 | 2478.994 | 2479.994 | 1.000 | 0.806 | Pass |
| **Right** | NVNT | 1-DH1 | 2401.988 | 2402.988 | 1.000 | 0.724 | Pass |
| | NVNT | 1-DH1 | 2440.988 | 2441.988 | 1.000 | 0.722 | Pass |
| | NVNT | 1-DH1 | 2478.988 | 2479.988 | 1.000 | 0.725 | Pass |
| | NVNT | 2-DH1 | 2401.986 | 2402.988 | 1.002 | 0.818 | Pass |
| | NVNT | 2-DH1 | 2440.990 | 2441.990 | 1.000 | 0.777 | Pass |
| | NVNT | 2-DH1 | 2478.988 | 2479.984 | 0.996 | 0.782 | Pass |

**Left**

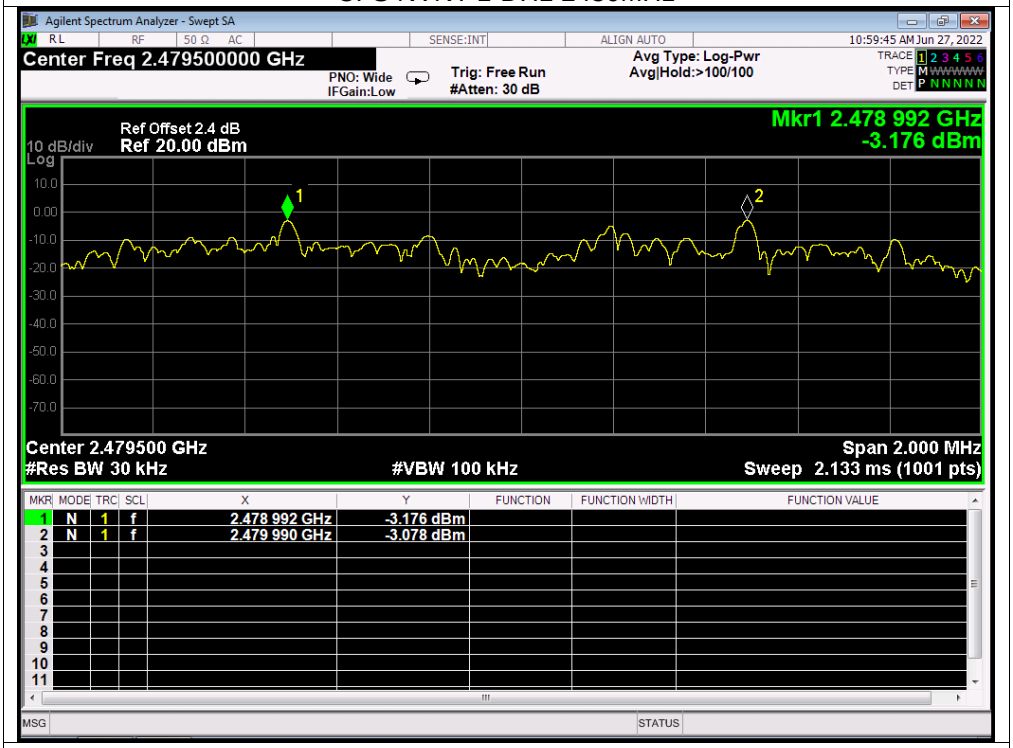
| Test Graphs |
| --- |
| CFS NVNT 1-DH1 2402MHz |



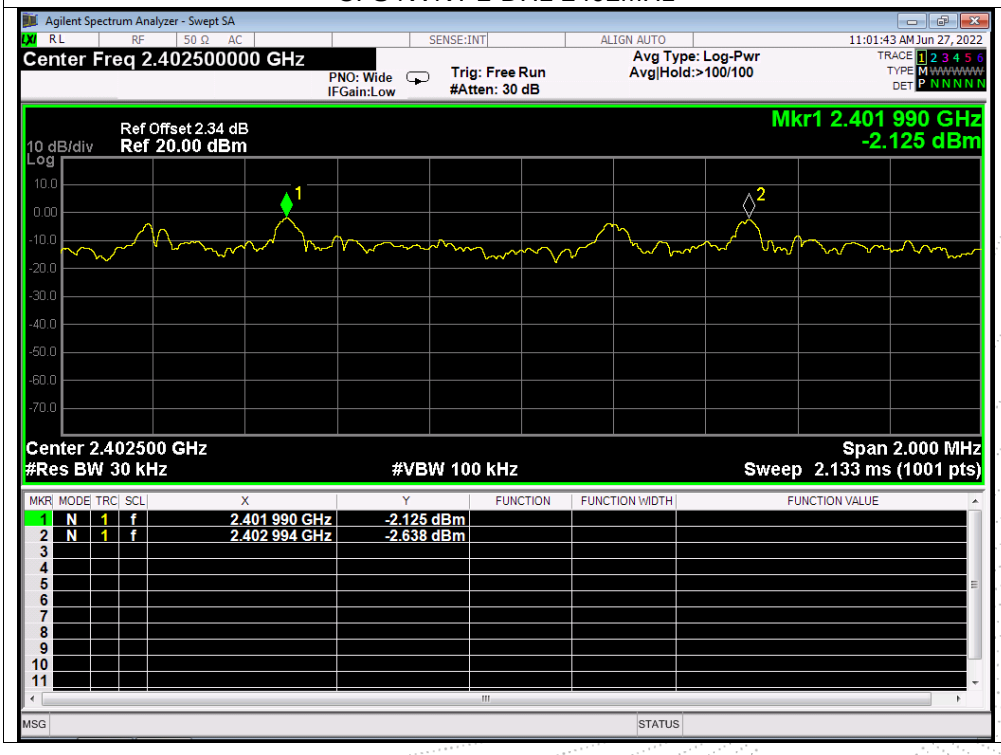

| CFS NVNT 1-DH1 2441MHz |
| --- |



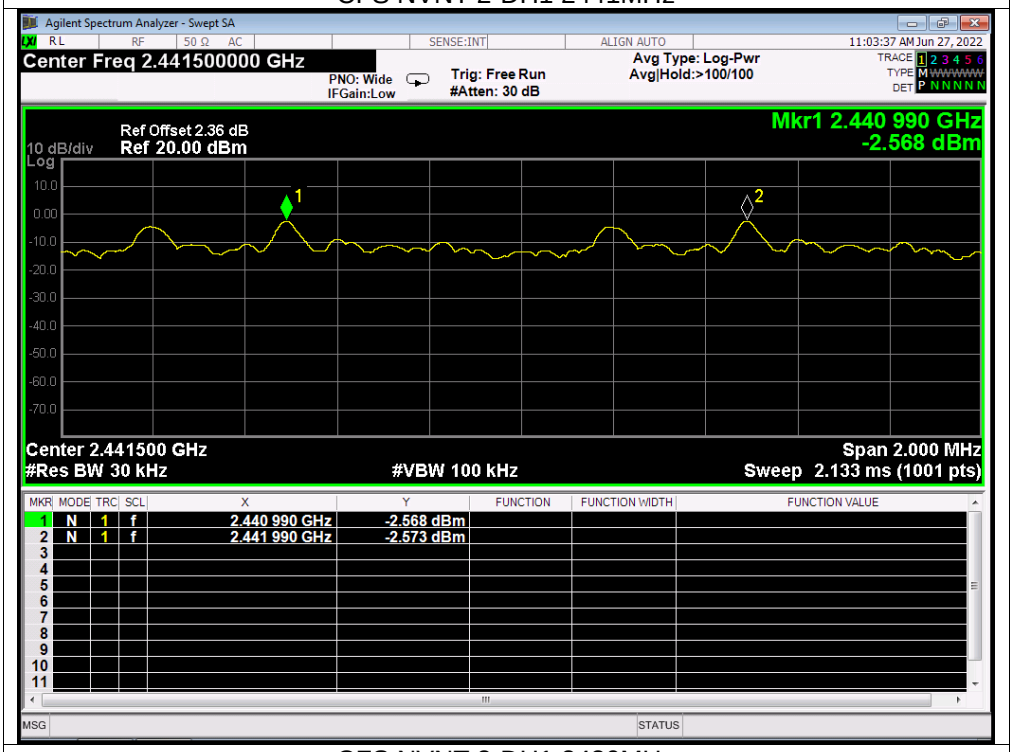
CFS NVNT 1-DH1 2480MHz



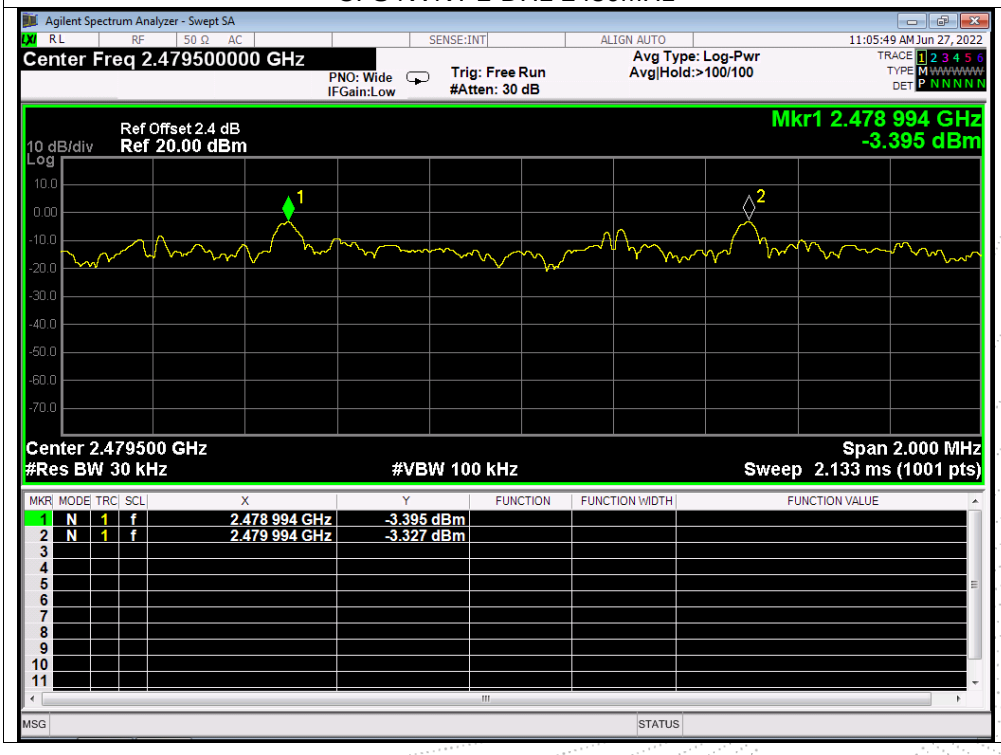

CFS NVNT 2-DH1 2402MHz



CFS NVNT 2-DH1 2441MHz



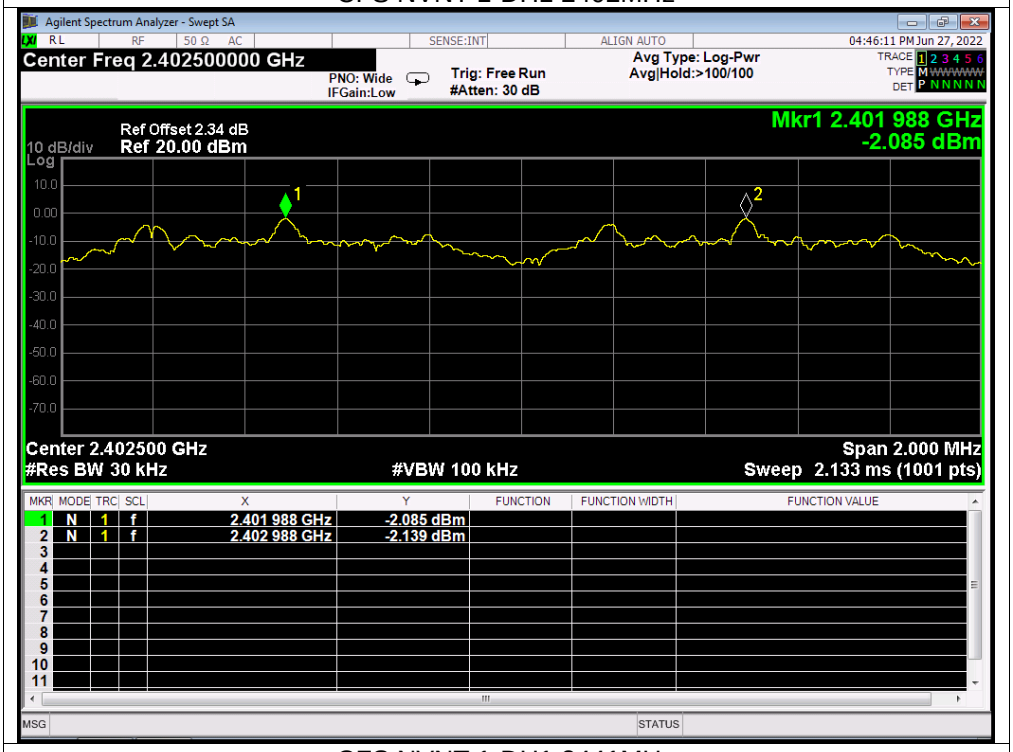

CFS NVNT 2-DH1 2480MHz



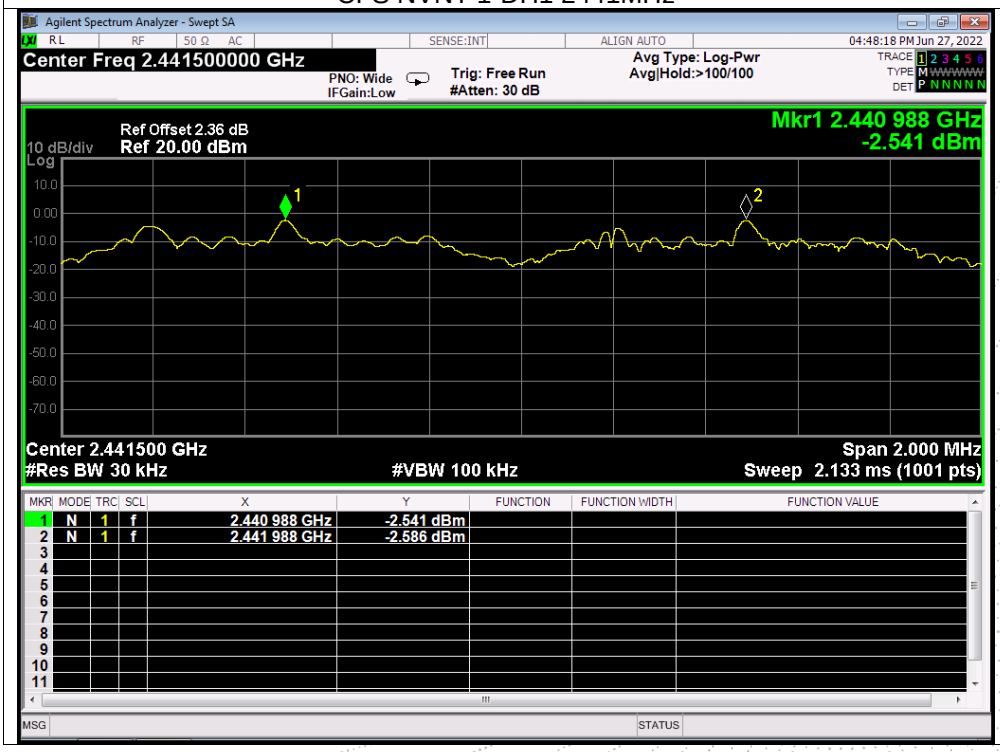
**Right**

Test Graphs

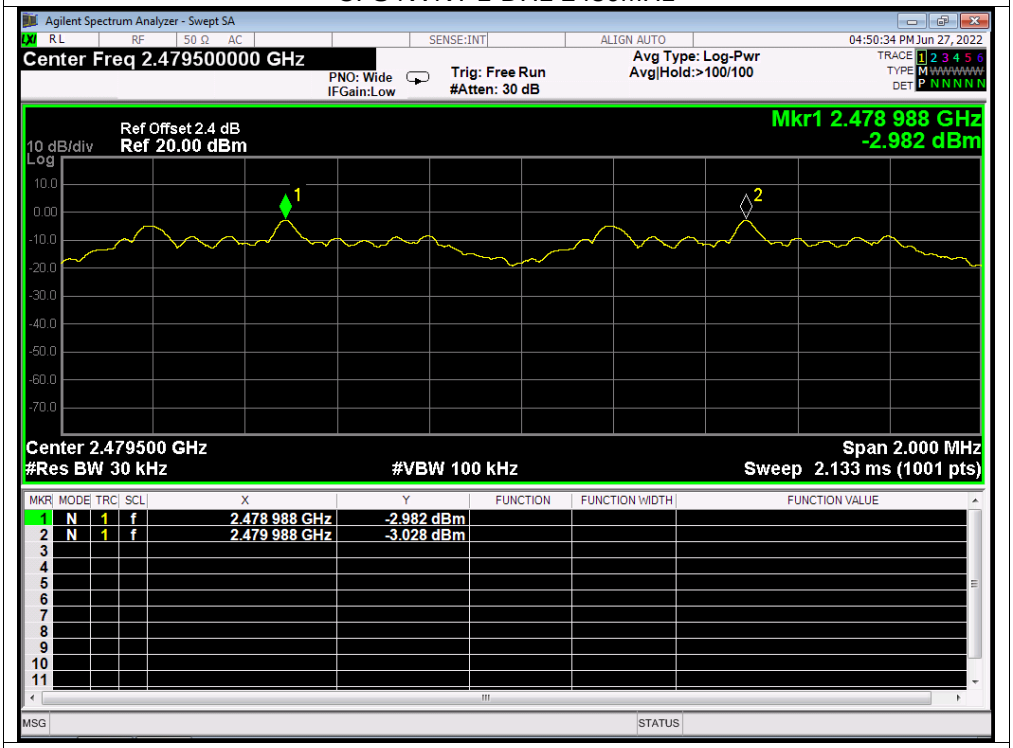
CFS NVNT 1-DH1 2402MHz



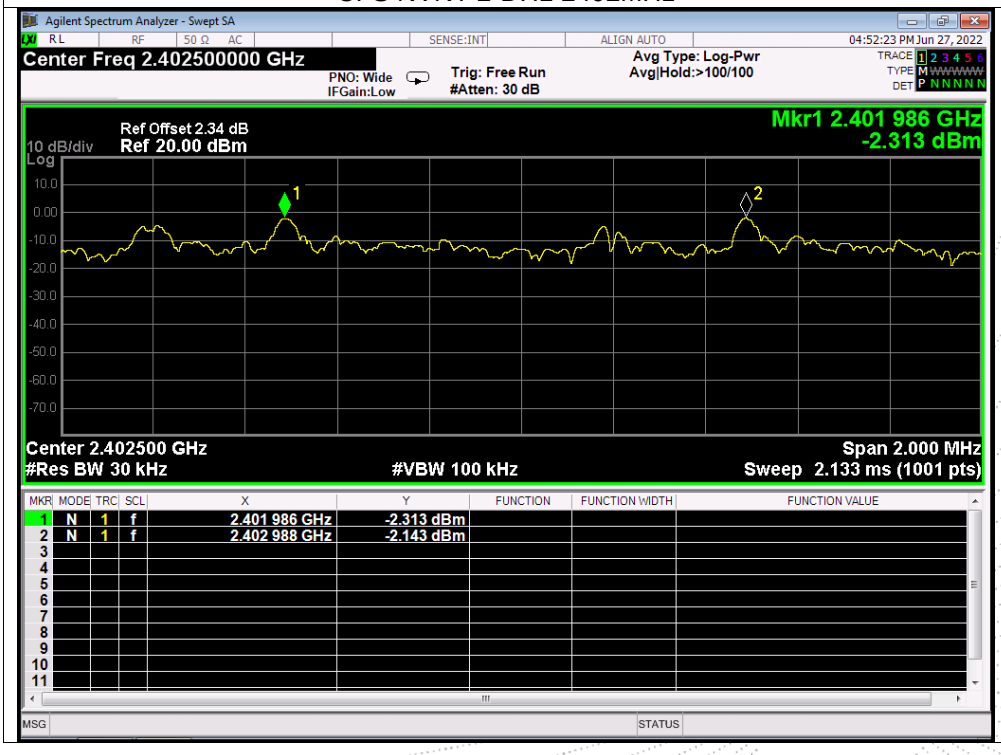

CFS NVNT 1-DH1 2441MHz



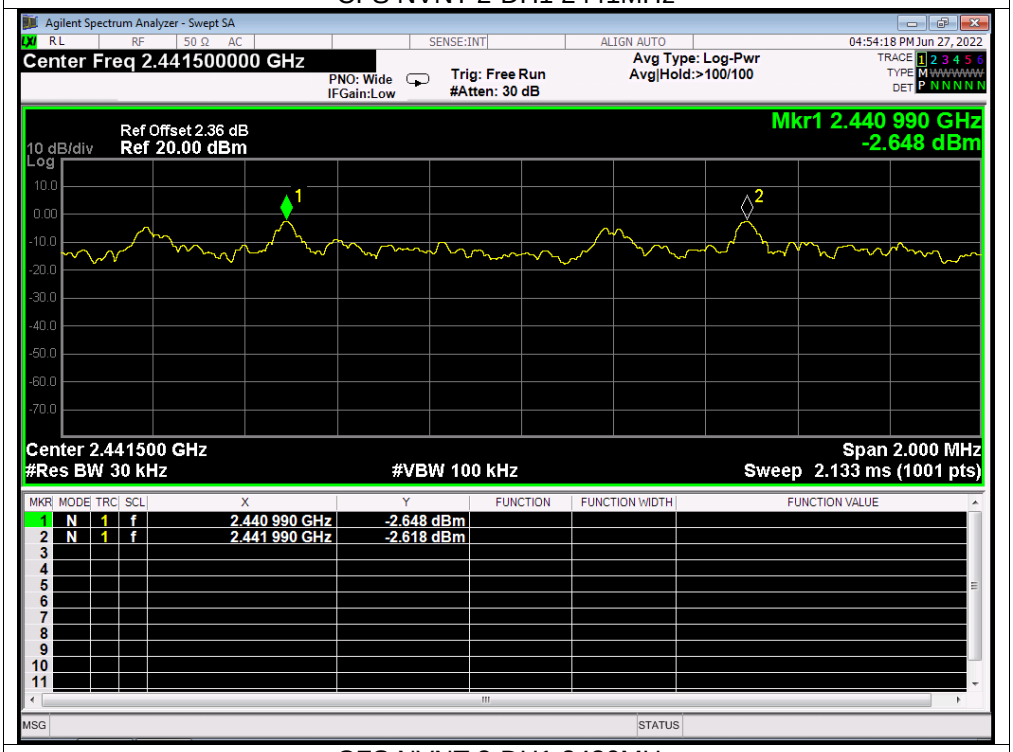
CFS NVNT 1-DH1 2480MHz



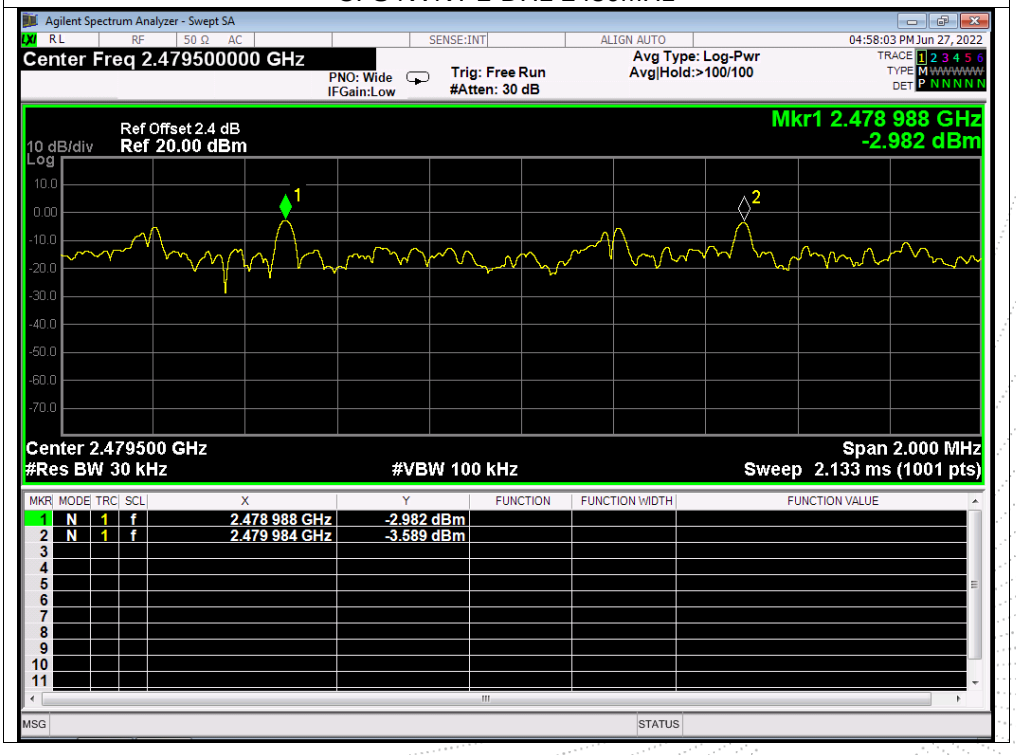

CFS NVNT 2-DH1 2402MHz



CFS NVNT 2-DH1 2441MHz




CFS NVNT 2-DH1 2480MHz



# 13. Number Of Hopping Frequency

## 13.1 Block Diagram Of Test Setup


## 13.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

## 13.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer: RBW = 100kHz. VBW = 300kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.

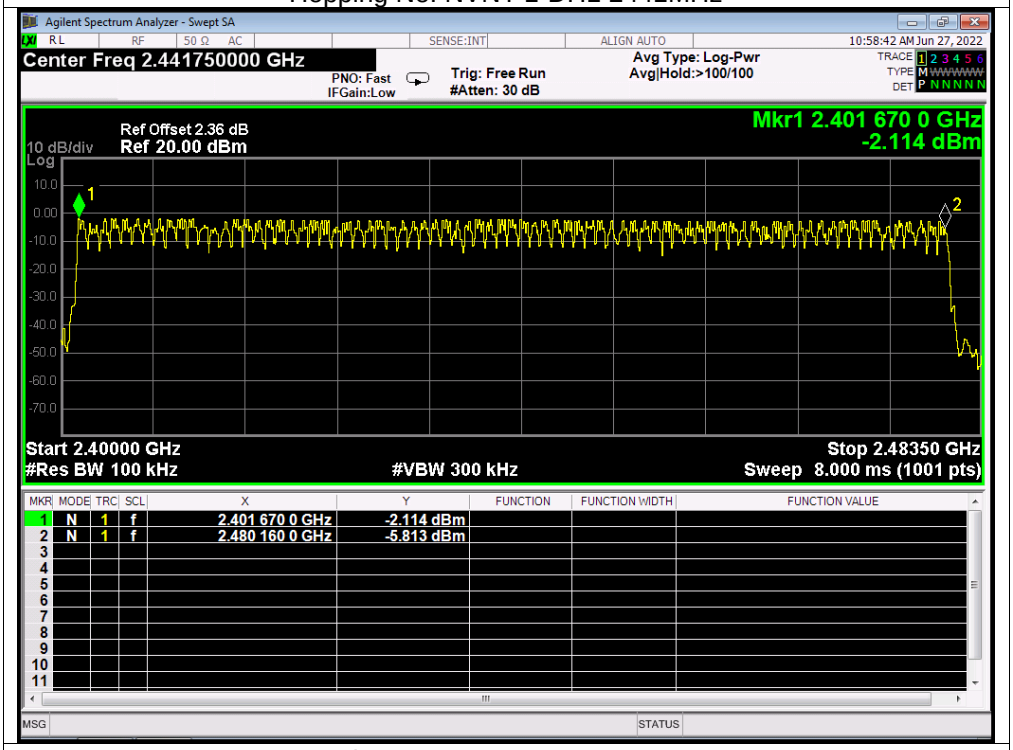
4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.4835GHz. Sweep=auto;

## 13.4 Test Result

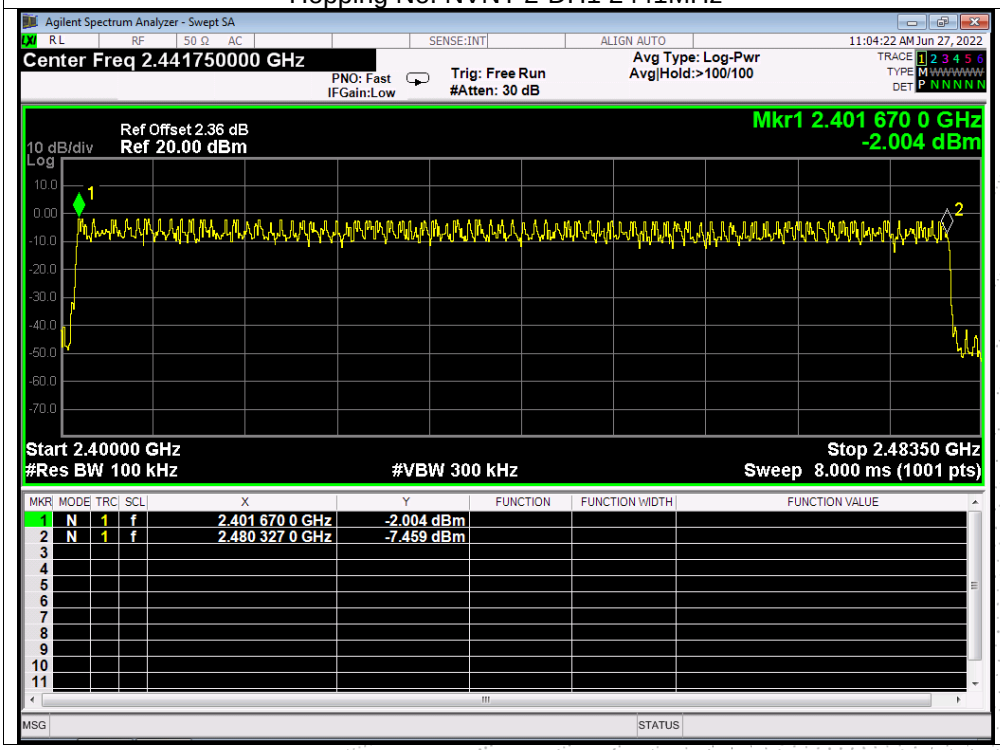
| Data | Condition | Mode | Hopping Number | Limit | Verdict |
|---|---|---|---|---|---|
| **Left** | NVNT | 1-DH1 | 79 | 15 | Pass |
| | NVNT | 2-DH1 | 79 | 15 | Pass |
| **Right** | NVNT | 1-DH1 | 79 | 15 | Pass |
| | NVNT | 2-DH1 | 79 | 15 | Pass |

**Left**

| Test Graphs |
| --- |
| Hopping No. NVNT 1-DH1 2441MHz |

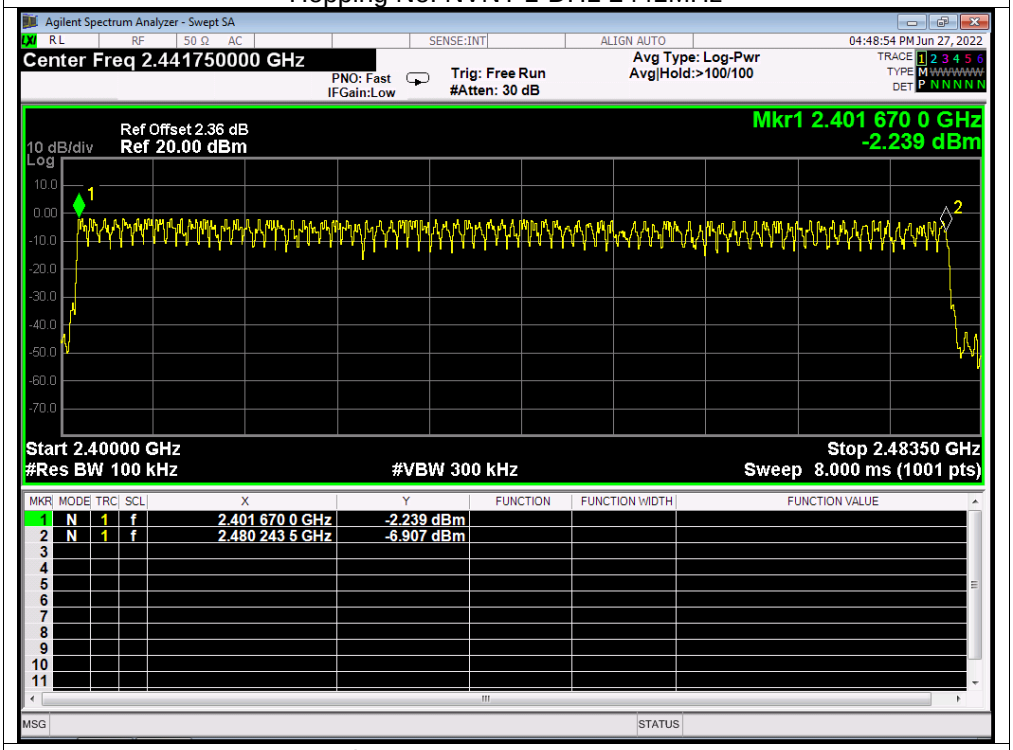



| Hopping No. NVNT 2-DH1 2441MHz |
| --- |

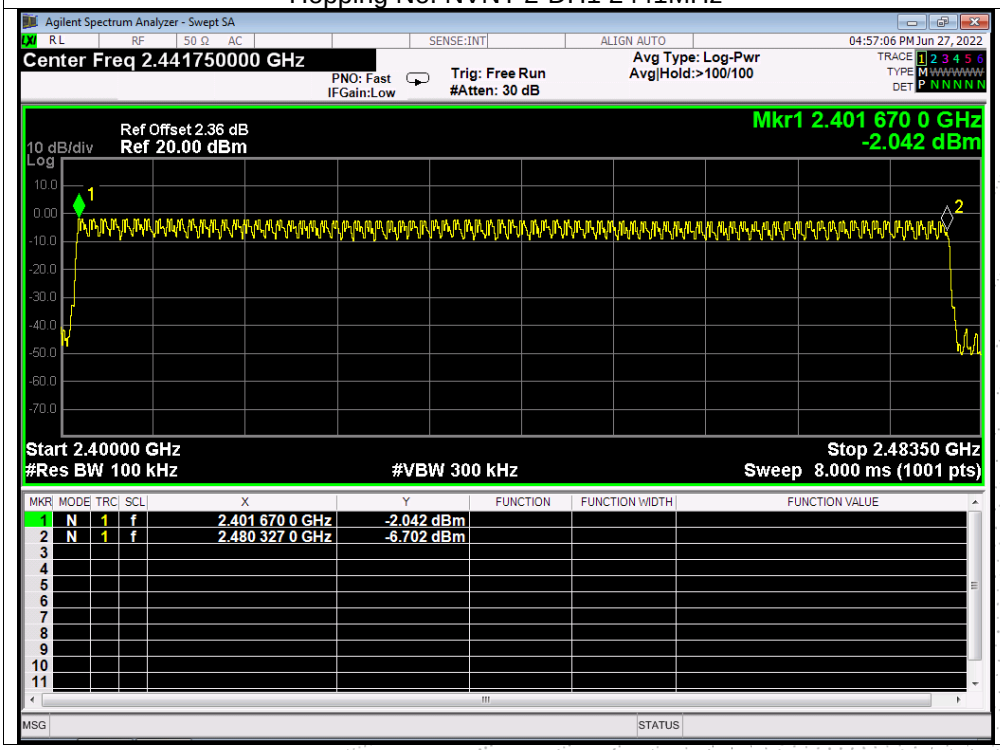


**Right**

| Test Graphs |
| --- |
| Hopping No. NVNT 1-DH1 2441MHz |




| Hopping No. NVNT 2-DH1 2441MHz |
| --- |



# 14. Dwell Time

## 14.1 Block Diagram Of Test Setup


## 14.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

## 14.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set spectrum analyzer span = 0. Centred on a hopping channel;
3. Set RBW = 1MHz and VBW = 3MHz.Sweep = as necessary to capture the entire dwell time per hopping channel. Set the EUT for DH5, DH3 and DH1 packet transmitting.
4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

## 14.4 Test Result

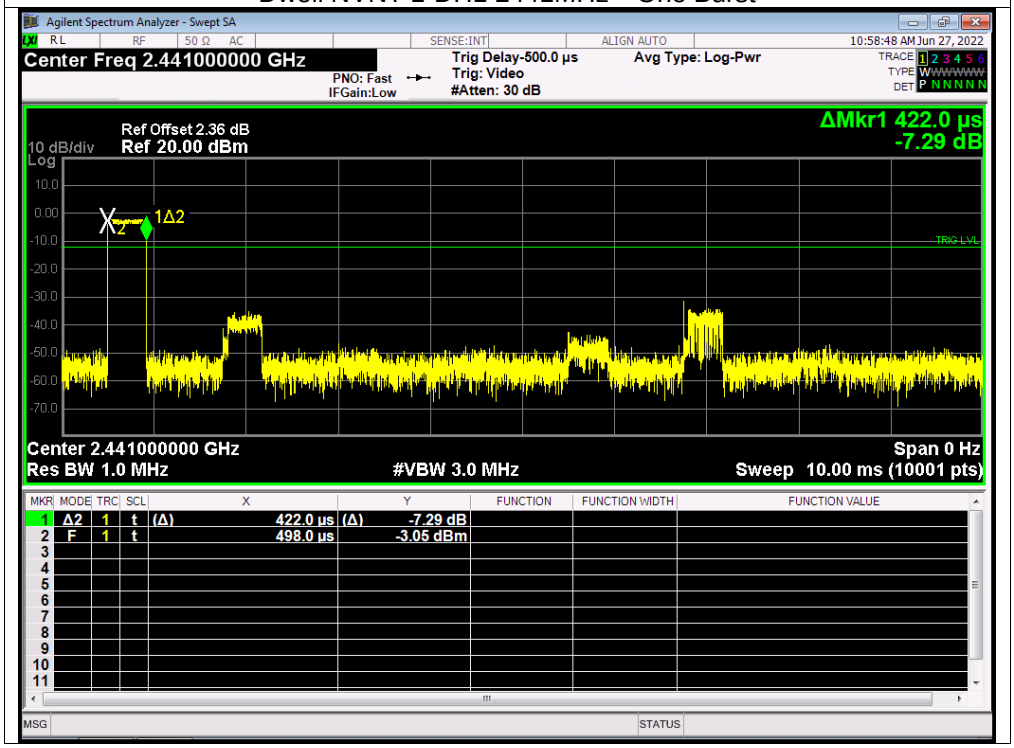
DH5 Packet permit maximum 1600 / 79 / 6 hops per second in each channel
(5 time slots RX, 1 time slot TX).
DH3 Packet permit maximum 1600 / 79 / 4 hops per second in each channel
(3 time slots RX, 1 time slot TX).
DH1 Packet permit maximum 1600 / 79 /2 hops per second in each channel
(1 time slot RX, 1 time slot TX). So, the Dwell Time can be calculated as follows:

DH5:1600/79/6*0.4*79*(MkrDelta)/1000
DH3:1600/79/4*0.4*79*(MkrDelta)/1000
DH1:1600/79/2*0.4*79*(MkrDelta)/1000
Remark: Mkr Delta is once pulse time.

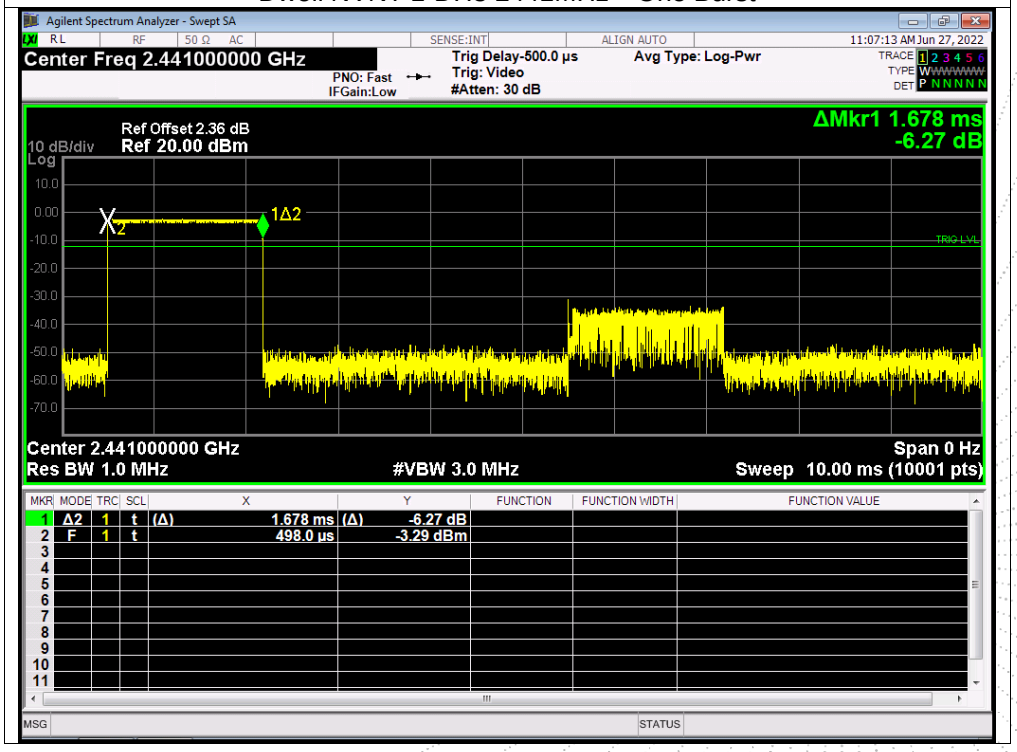
| Data | Condition | Mode | Frequency (MHz) | Pulse Time (ms) | Total Dwell Time (ms) | Limit (ms) | Verdict |
|---|---|---|---|---|---|---|---|
| Left | NVNT | 1-DH1 | 2441 | 0.422 | 132.930 | 400 | Pass |
| | NVNT | 1-DH3 | 2441 | 1.678 | 273.514 | 400 | Pass |
| | NVNT | 1-DH5 | 2441 | 2.921 | 300.863 | 400 | Pass |
| | NVNT | 2-DH1 | 2441 | 0.432 | 136.512 | 400 | Pass |
| | NVNT | 2-DH3 | 2441 | 1.683 | 269.280 | 400 | Pass |
| | NVNT | 2-DH5 | 2441 | 2.932 | 319.588 | 400 | Pass |
| Right | NVNT | 1-DH1 | 2441 | 0.422 | 132.086 | 400 | Pass |
| | NVNT | 1-DH3 | 2441 | 1.673 | 269.353 | 400 | Pass |
| | NVNT | 1-DH5 | 2441 | 2.925 | 301.275 | 400 | Pass |
| | NVNT | 2-DH1 | 2441 | 0.432 | 135.648 | 400 | Pass |
| | NVNT | 2-DH3 | 2441 | 1.682 | 274.166 | 400 | Pass |
| | NVNT | 2-DH5 | 2441 | 2.931 | 337.065 | 400 | Pass |

**Left**

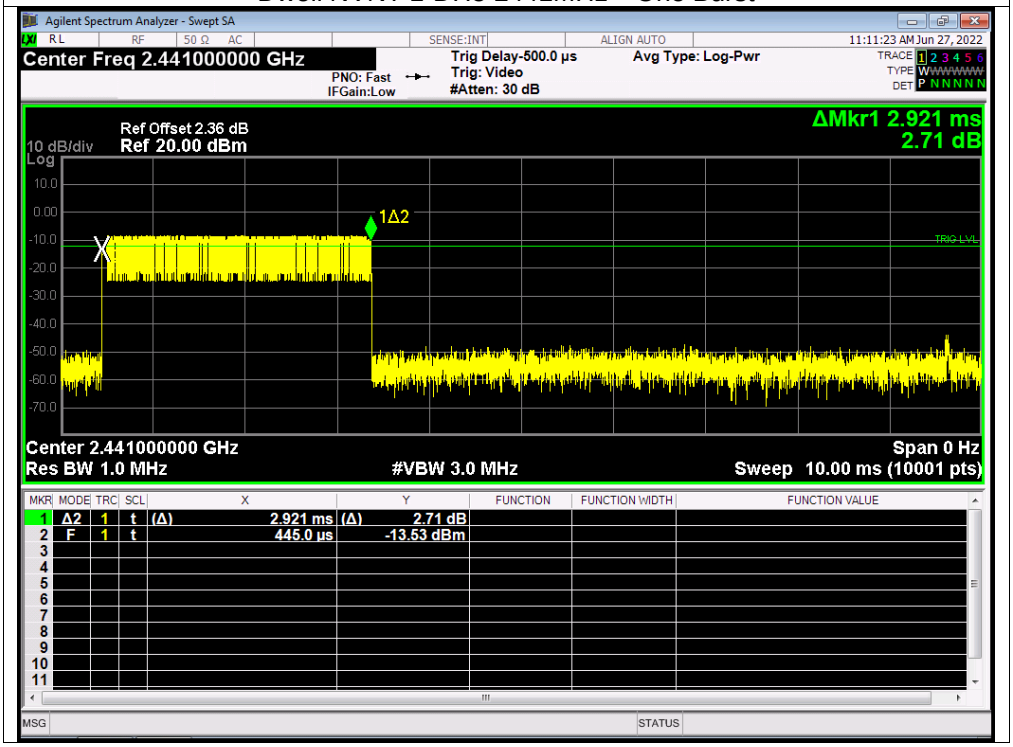
| Test Graphs |
| --- |
| Dwell NVNT 1-DH1 2441MHz One Burst |



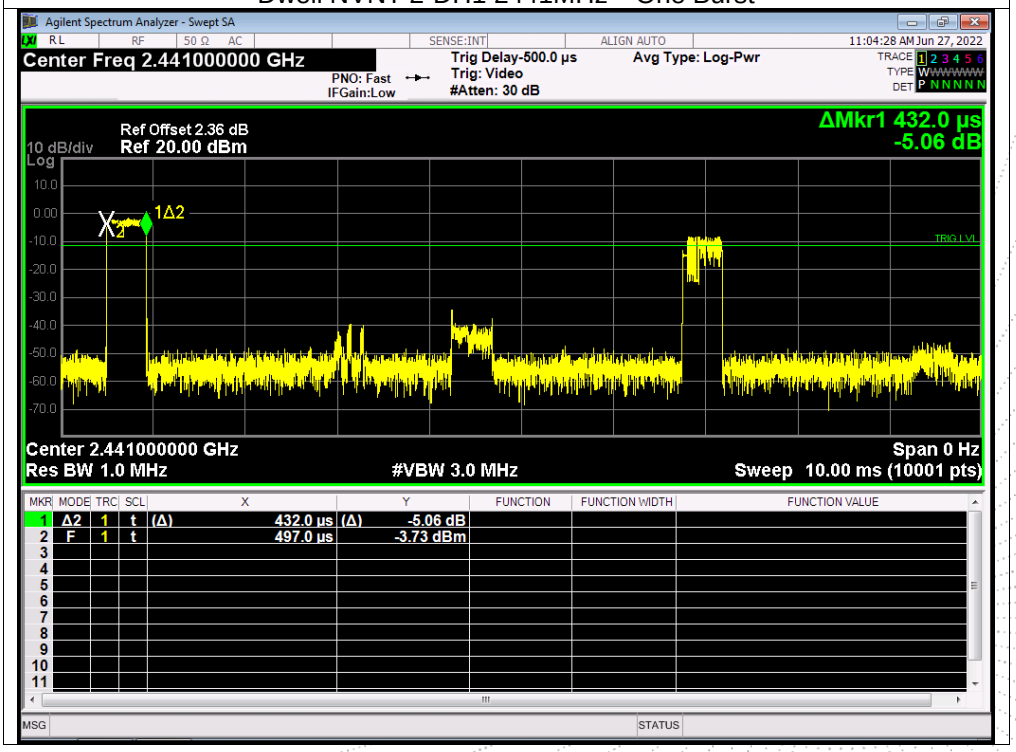

| Dwell NVNT 1-DH3 2441MHz One Burst |
| --- |



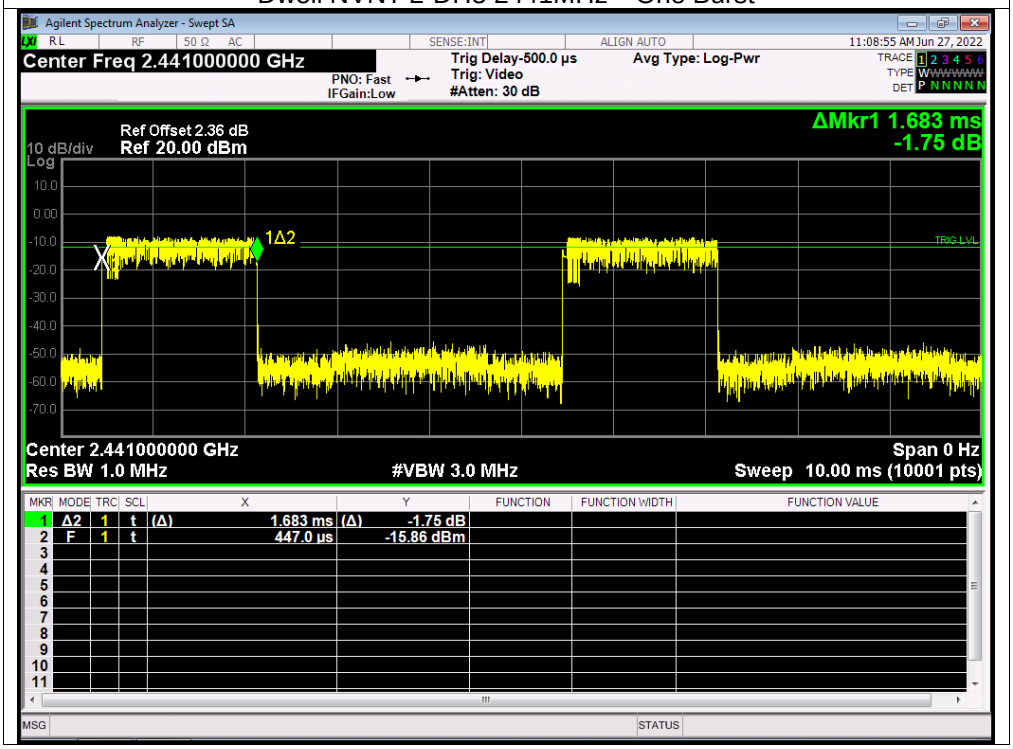
Dwell NVNT 1-DH5 2441MHz One Burst



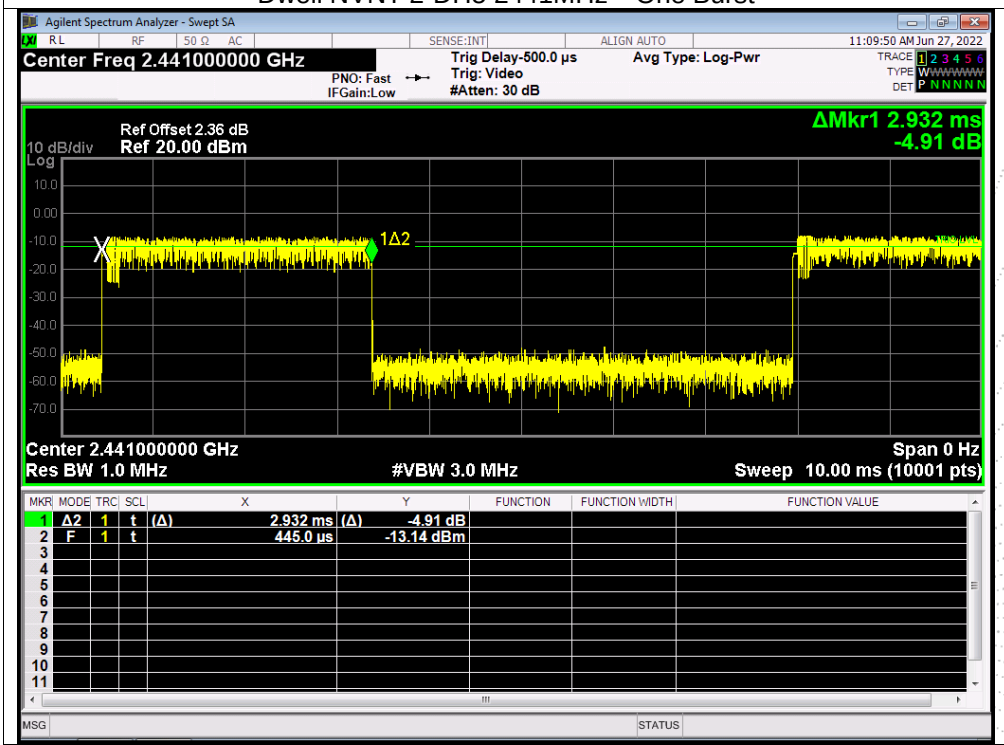

Dwell NVNT 2-DH1 2441MHz One Burst



Dwell NVNT 2-DH3 2441MHz One Burst

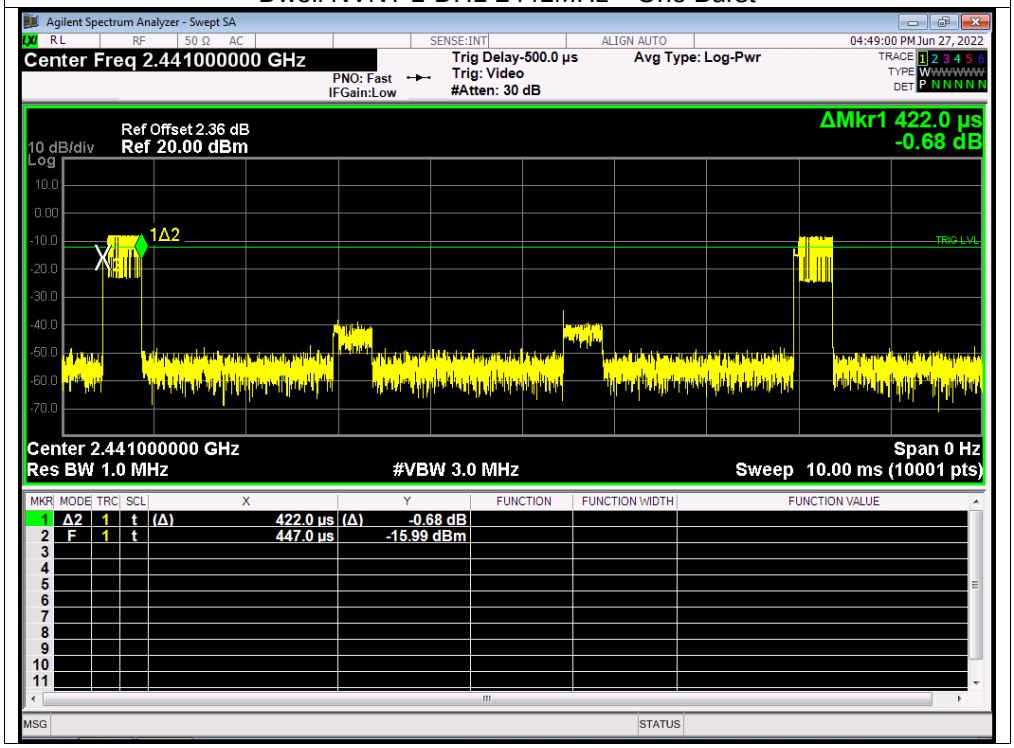



Dwell NVNT 2-DH5 2441MHz One Burst

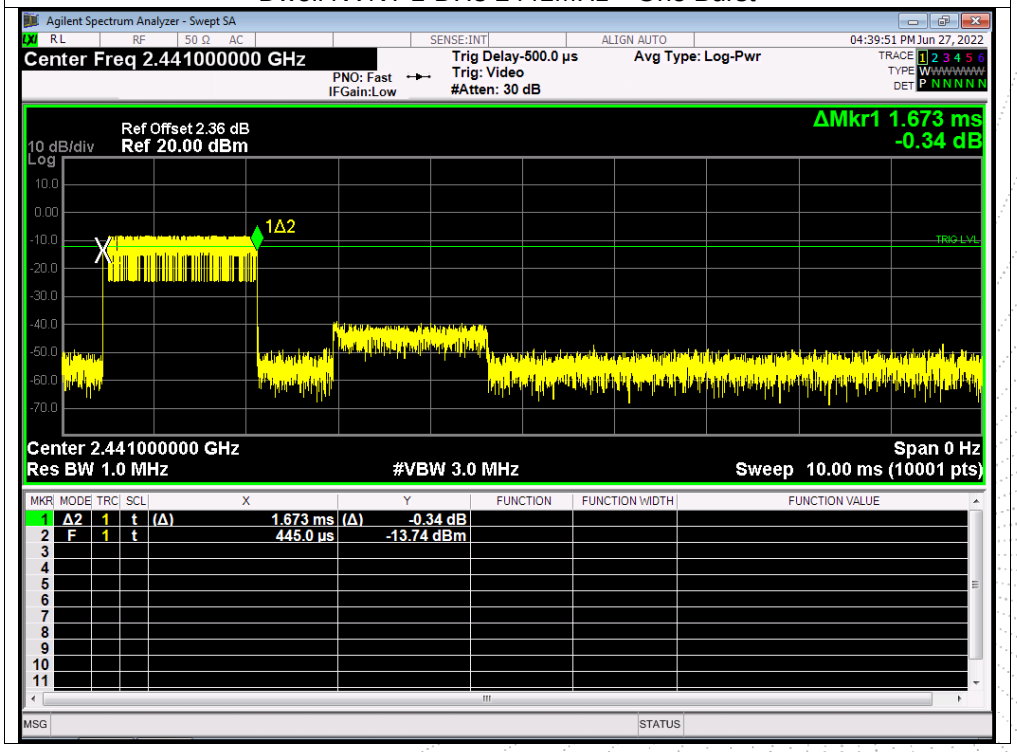


**Right**

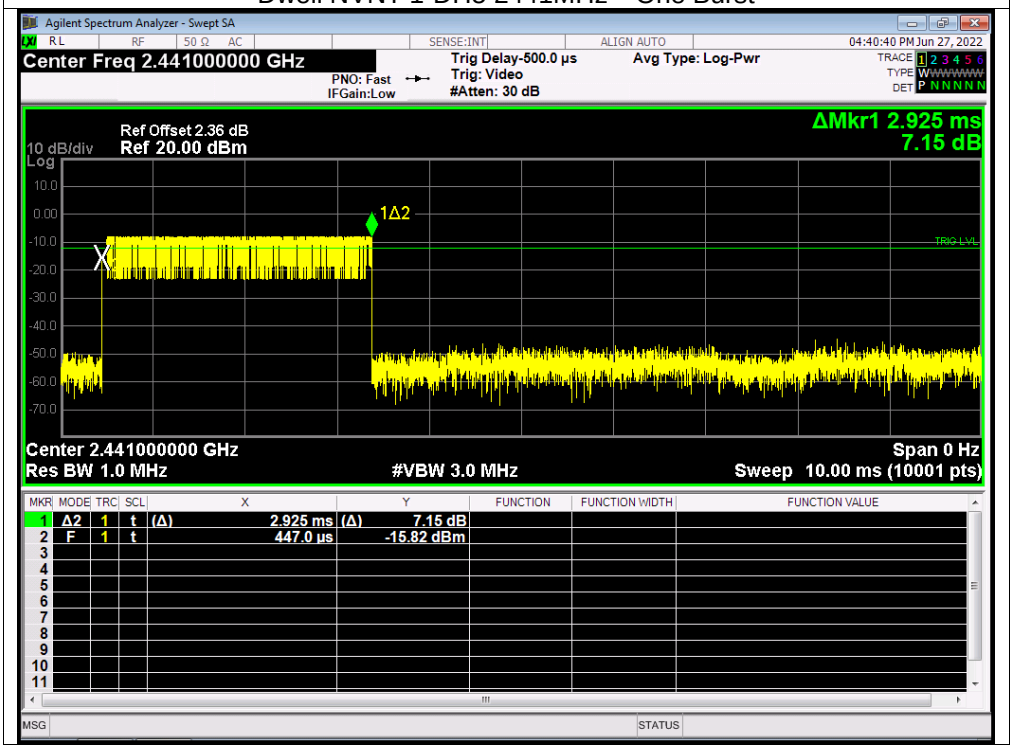
| Test Graphs |
| --- |
| Dwell NVNT 1-DH1 2441MHz One Burst |



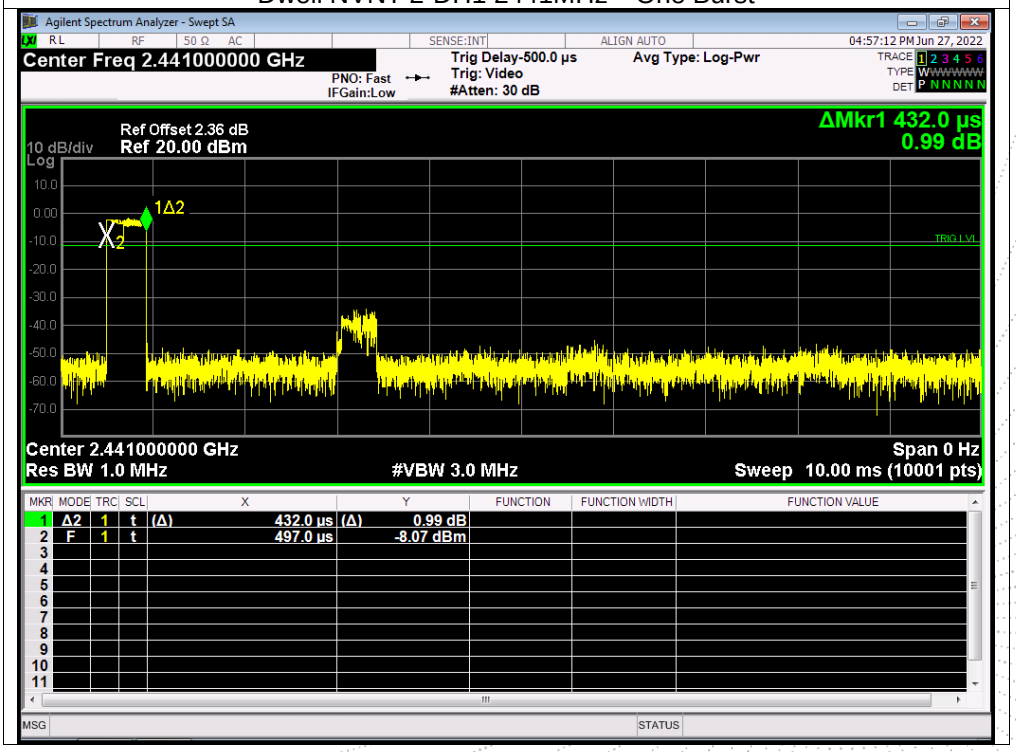

| Dwell NVNT 1-DH3 2441MHz One Burst |
| --- |



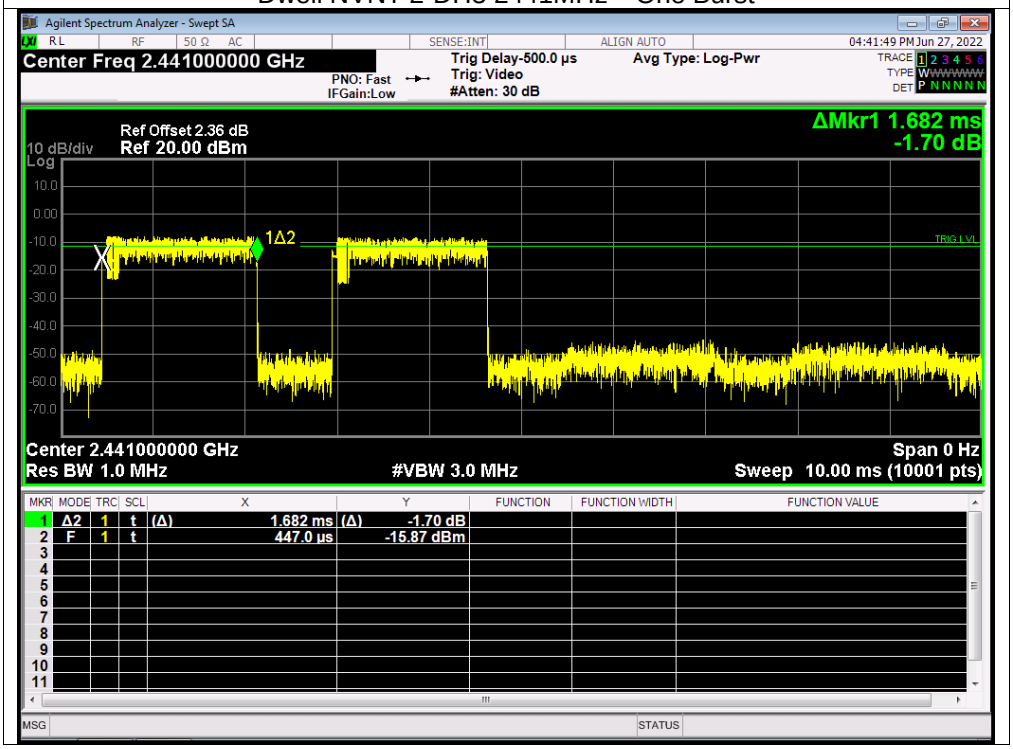
Dwell NVNT 1-DH5 2441MHz One Burst



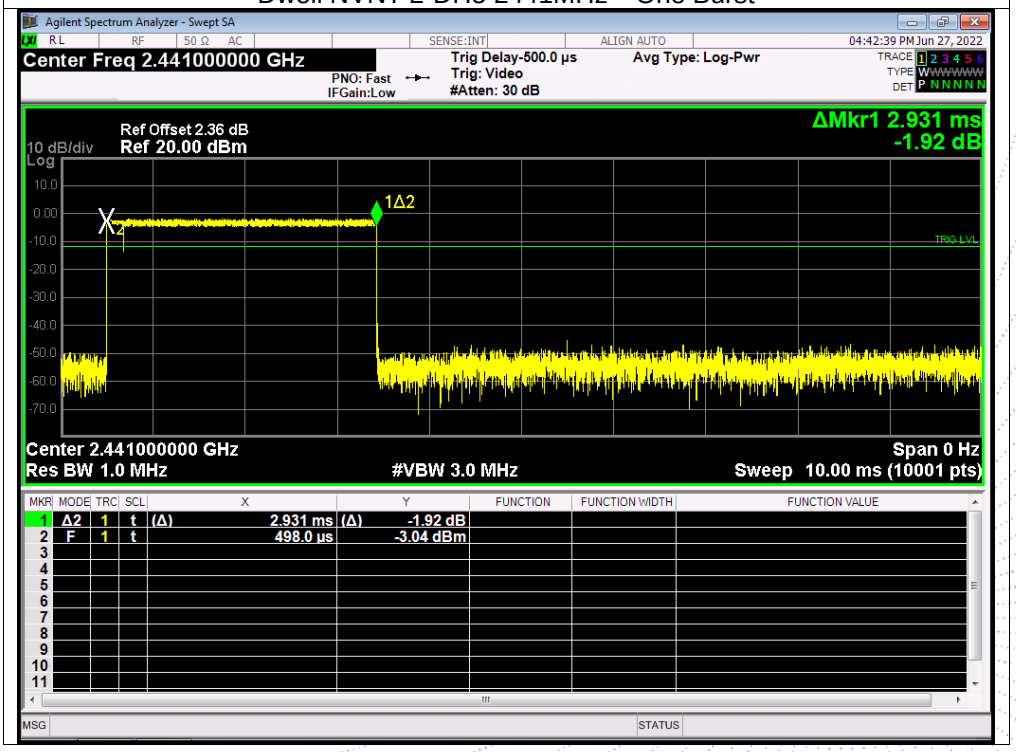

Dwell NVNT 2-DH1 2441MHz One Burst



Dwell NVNT 2-DH3 2441MHz One Burst




Dwell NVNT 2-DH5 2441MHz One Burst



# 15. Antenna Requirement

## 15.1 Limit

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

## 15.2 Test Result

The EUT antenna is Chip antenna, fulfill the requirement of this section.

## 16. EUT Photographs

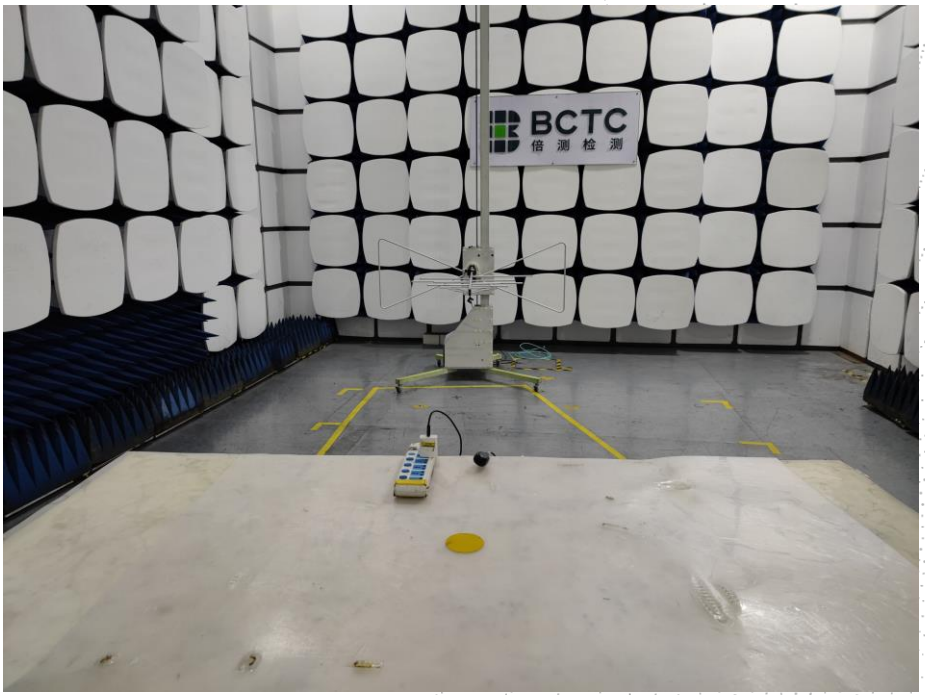
EUT Photo

NOTE: Appendix-Photographs Of EUT Constructional Details

## 17. EUT Test Setup Photographs

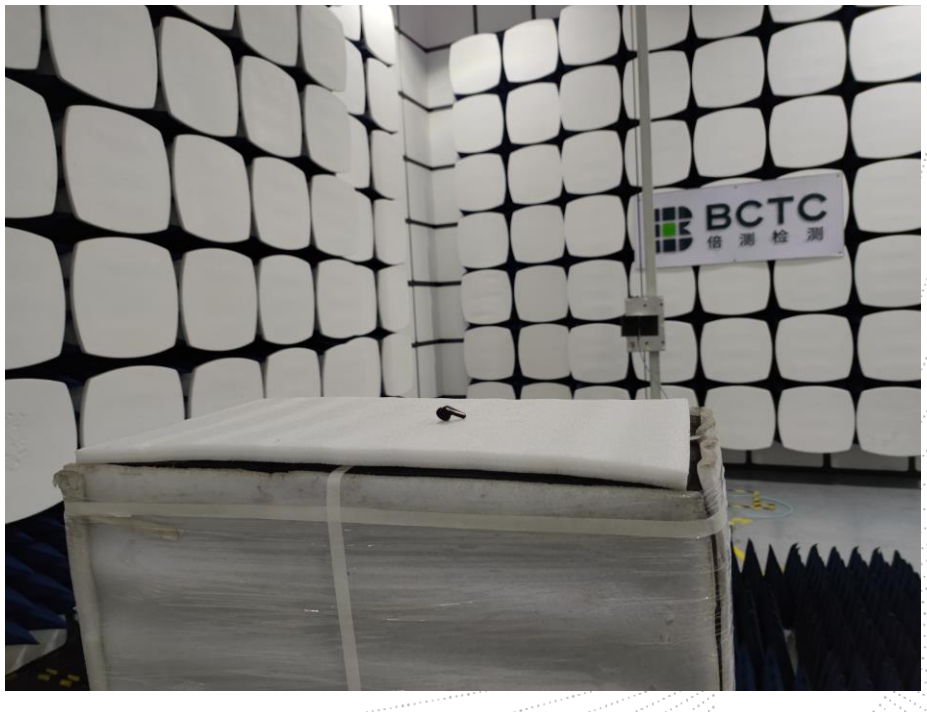
Conducted emissions

Radiated Measurement Photos



Left


Right



# STATEMENT

1.The equipment lists are traceable to the national reference standards.

2.The test report can not be partially copied unless prior written approval is issued from our lab.

3.The test report is invalid without stamp of laboratory.

4.The test report is invalid without signature of person(s) testing and authorizing.

5.The test process and test result is only related to the Unit Under Test.

6.The quality system of our laboratory is in accordance with ISO/IEC17025.

7.If there is any objection to report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

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E-Mail：bctc@bctc-lab.com.cn

※※※※※ **END** ※※※※※