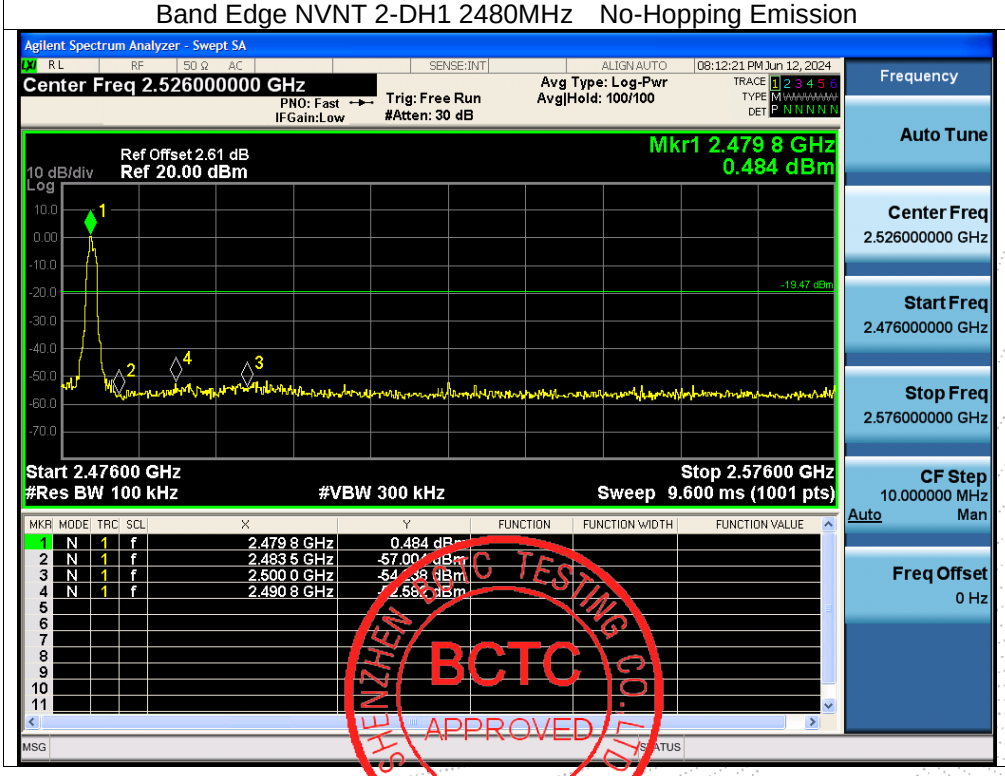
Band Edge NVNT 2-DH1 2480MHz No-Hopping Ref

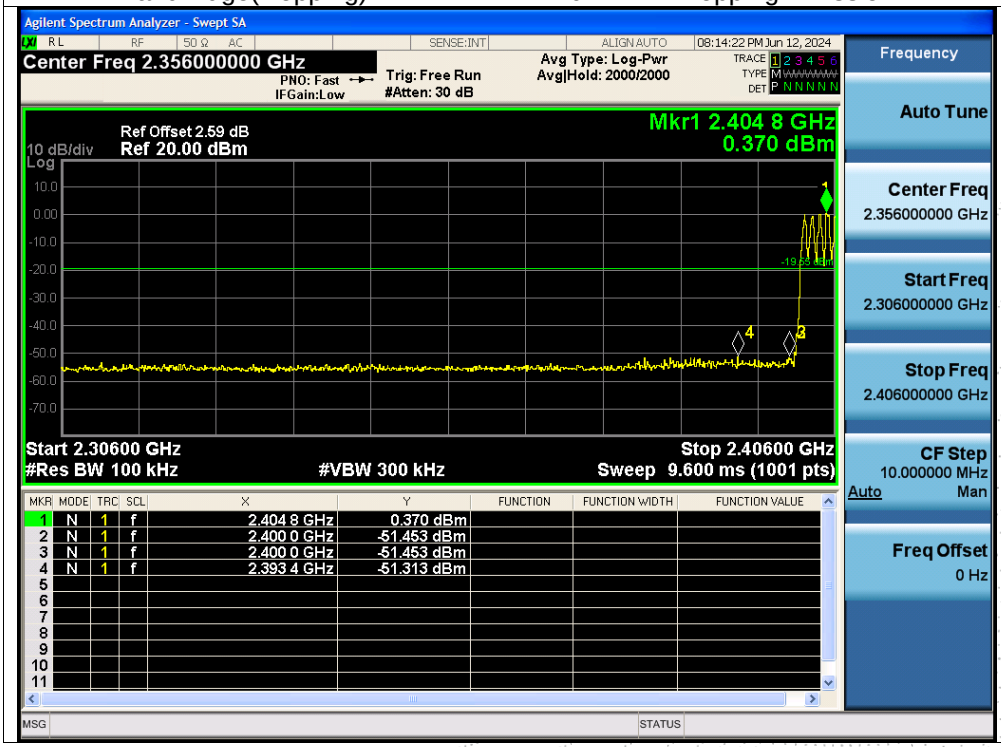
Band Edge NVNT 2-DH1 2480MHz No-Hopping Emission



Test Graphs

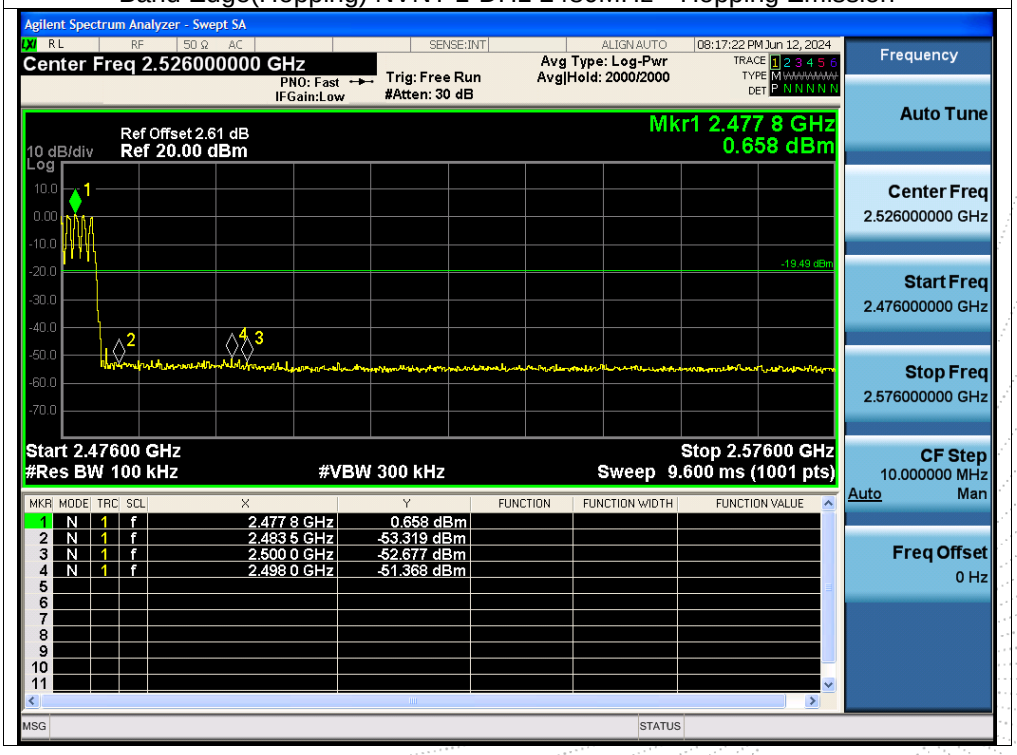
Band Edge(Hopping) NVNT 1-DH1 2402MHz Hopping Ref

Band Edge(Hopping) NVNT 1-DH1 2402MHz Hopping Emission



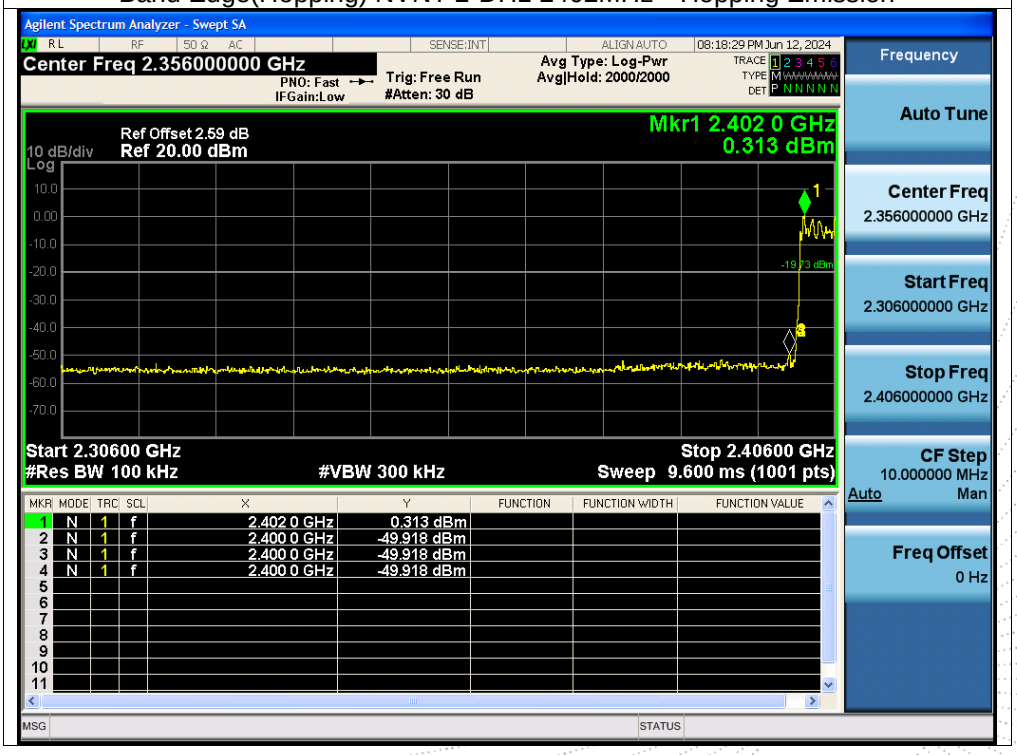
Band Edge(Hopping) NVNT 1-DH1 2480MHz Hopping Ref

Band Edge(Hopping) NVNT 1-DH1 2480MHz Hopping Emission



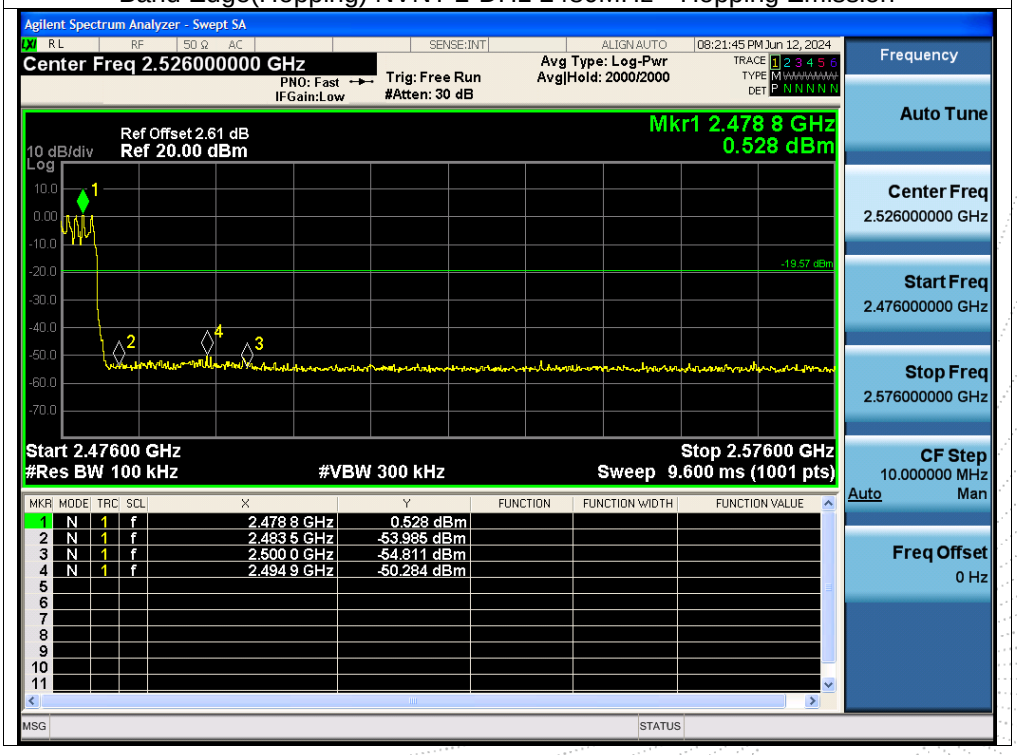
Band Edge(Hopping) NVNT 2-DH1 2402MHz Hopping Ref

Band Edge(Hopping) NVNT 2-DH1 2402MHz Hopping Emission



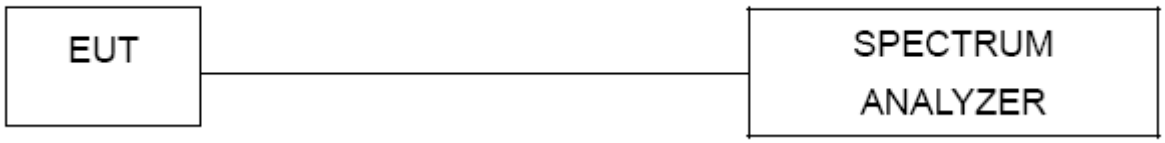
Band Edge(Hopping) NVNT 2-DH1 2480MHz Hopping Ref

Band Edge(Hopping) NVNT 2-DH1 2480MHz Hopping Emission



10. 20 dB Bandwidth

10.1 Block Diagram Of Test Setup



10.2 Limit

N/A

10.3 Test procedure

1. Set RBW = 30kHz.
2. Set the video bandwidth (VBW) ≥ 3 x 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.

10.4 Test Result

Left

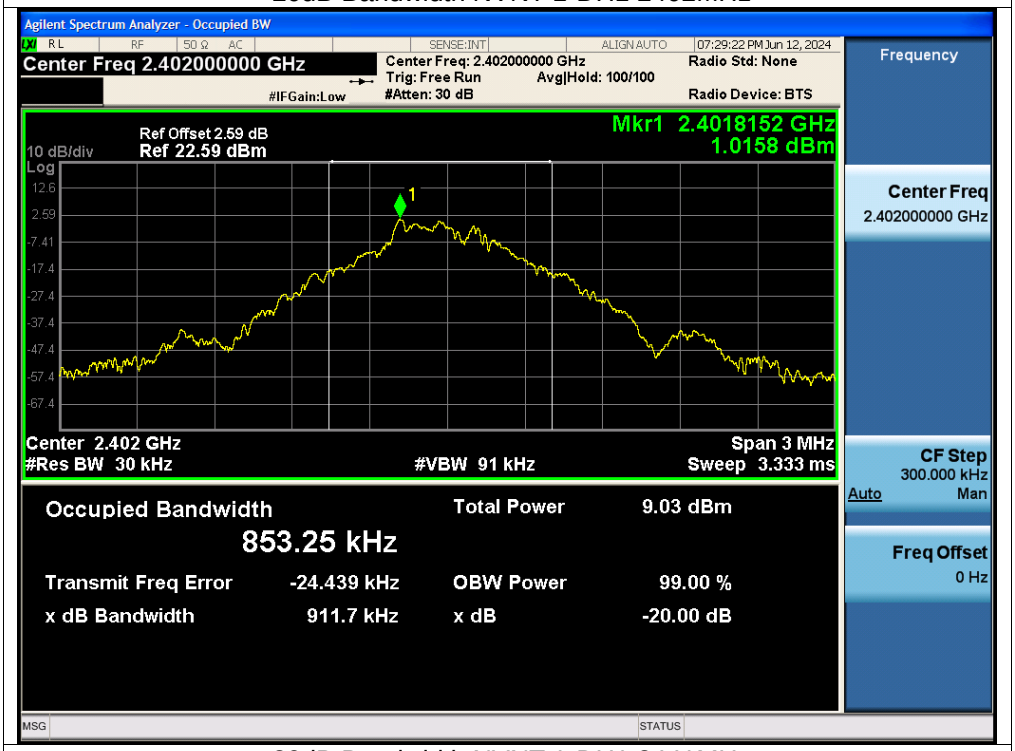
Condition	Mode	Frequency (MHz)	-20 dB Bandwidth (MHz)	Verdict
NVNT	1-DH1	2402	0.912	Pass
NVNT	1-DH1	2441	0.902	Pass
NVNT	1-DH1	2480	1.023	Pass
NVNT	2-DH1	2402	1.241	Pass
NVNT	2-DH1	2441	1.244	Pass
NVNT	2-DH1	2480	1.246	Pass

Right

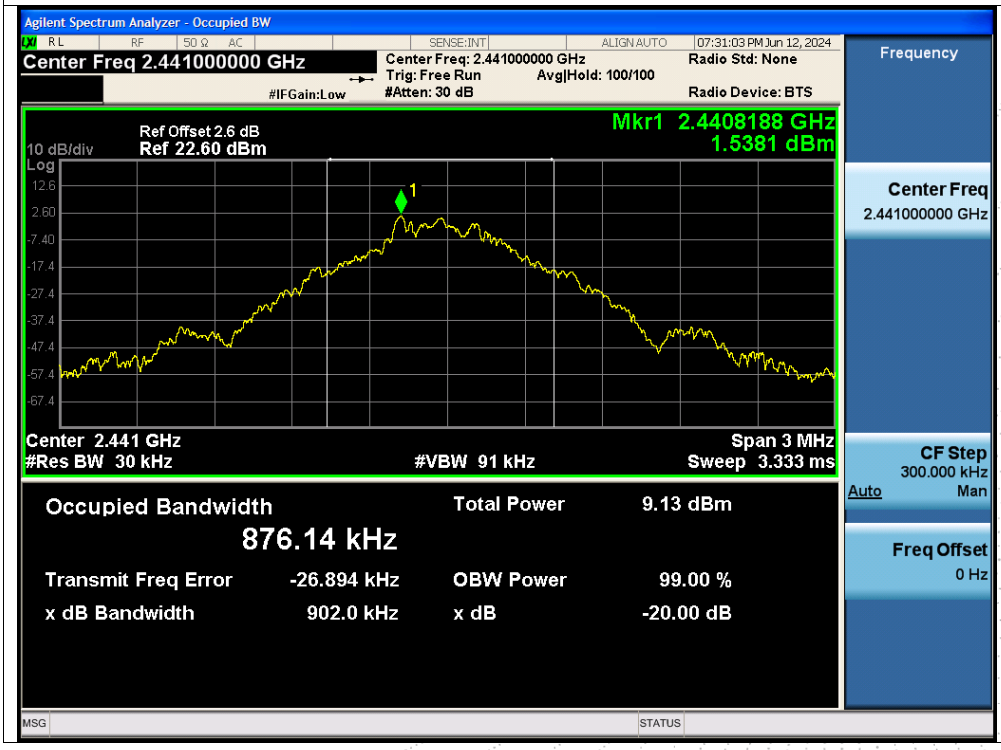
Condition	Mode	Frequency (MHz)	-20 dB Bandwidth (MHz)	Verdict
NVNT	1-DH1	2402	0.869	Pass
NVNT	1-DH1	2441	0.915	Pass
NVNT	1-DH1	2480	0.920	Pass
NVNT	2-DH1	2402	1.272	Pass
NVNT	2-DH1	2441	1.231	Pass
NVNT	2-DH1	2480	1.212	Pass

Left

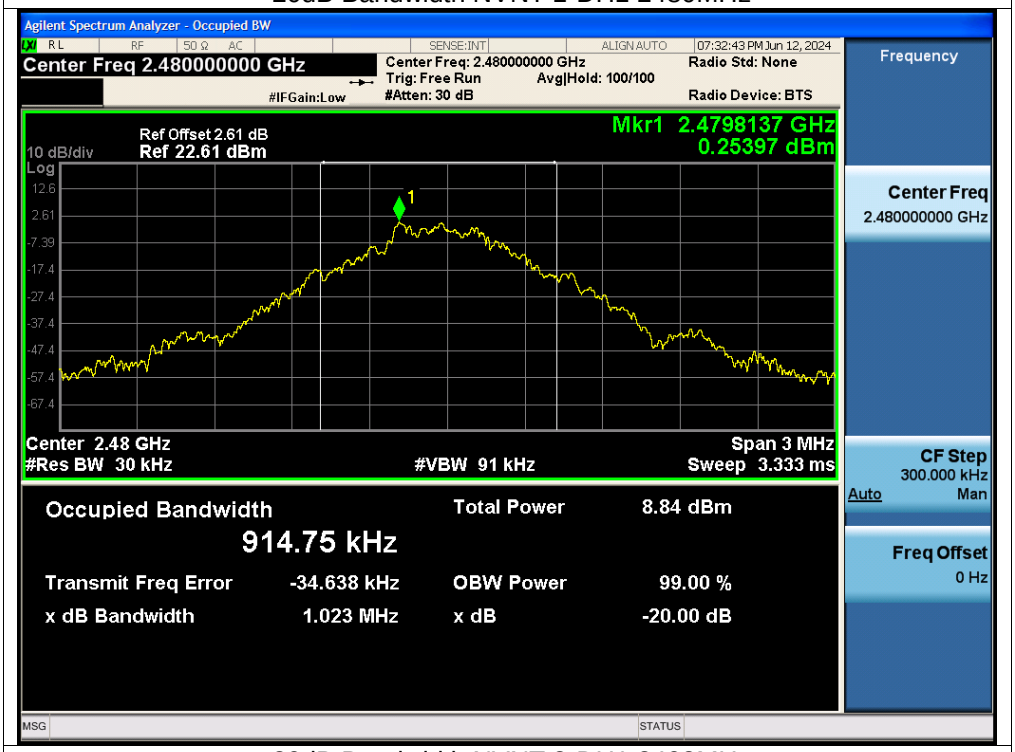
Test Graphs
-20dB Bandwidth NVNT 1-DH1 2402MHz



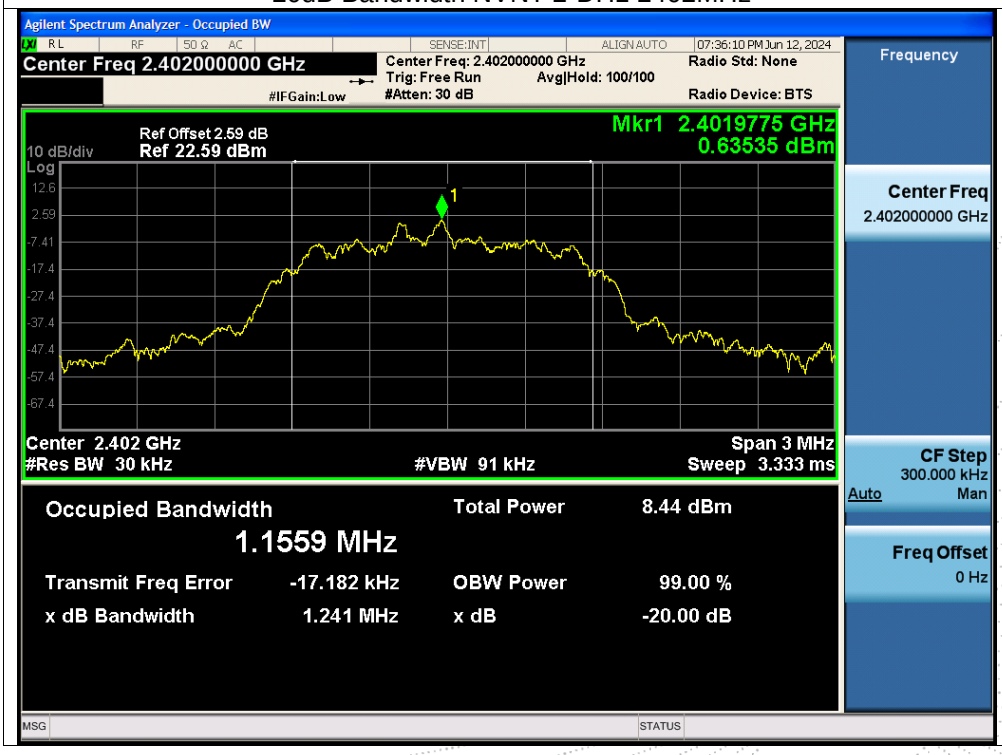
-20dB Bandwidth NVNT 1-DH1 2441MHz



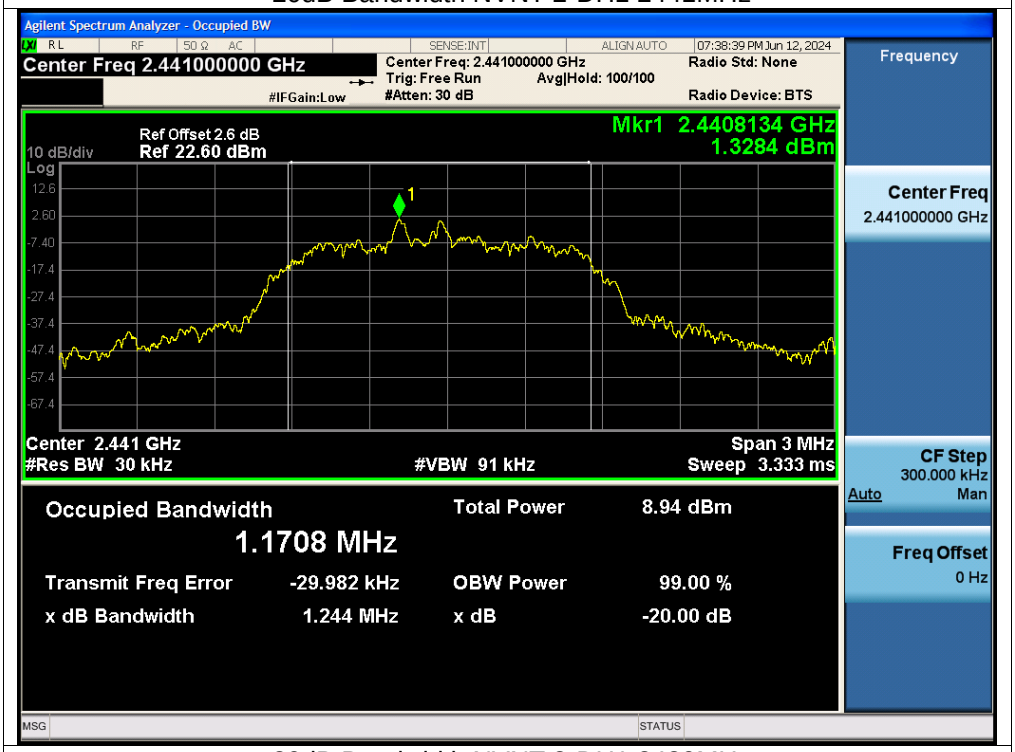
-20dB Bandwidth NVNT 1-DH1 2480MHz



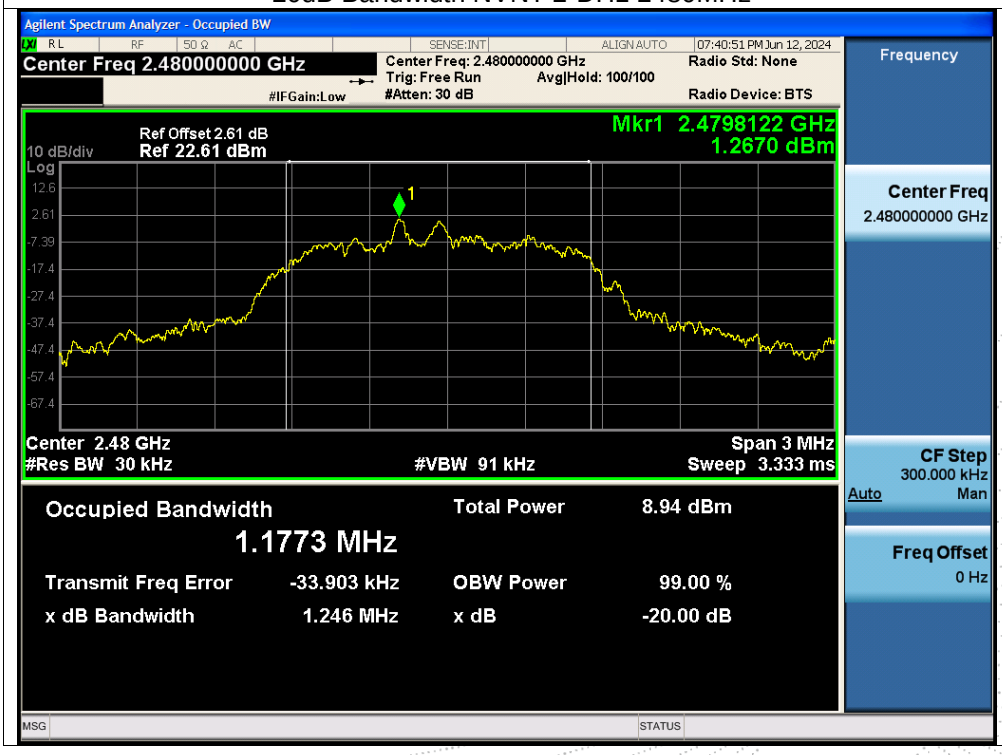
-20dB Bandwidth NVNT 2-DH1 2402MHz



-20dB Bandwidth NVNT 2-DH1 2441MHz



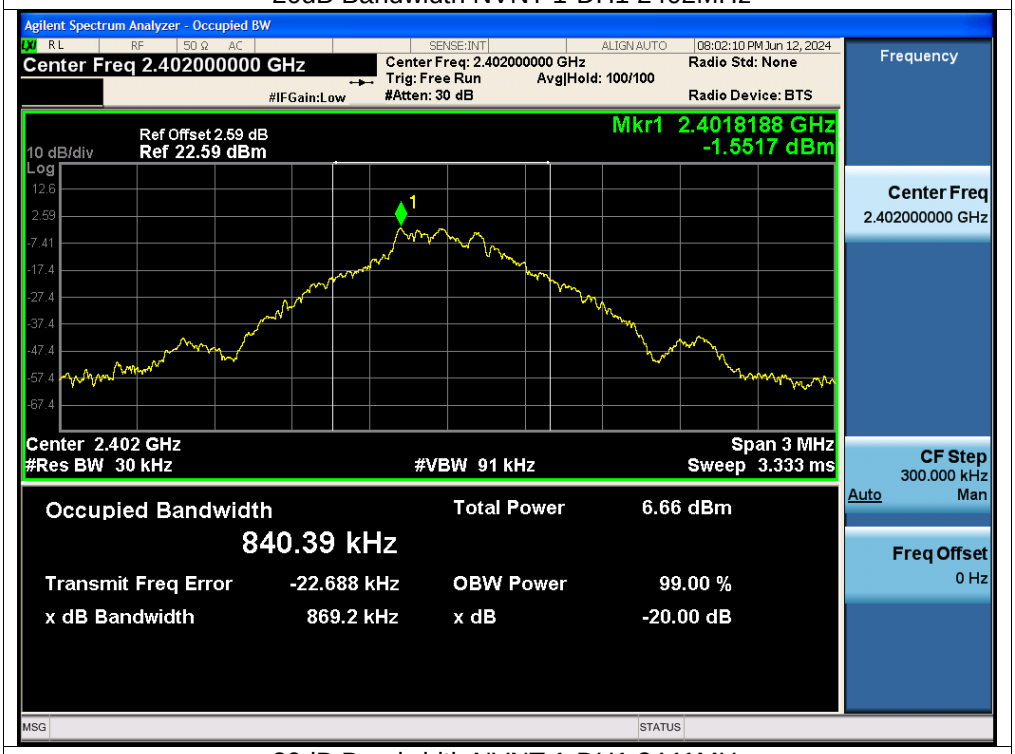
-20dB Bandwidth NVNT 2-DH1 2480MHz



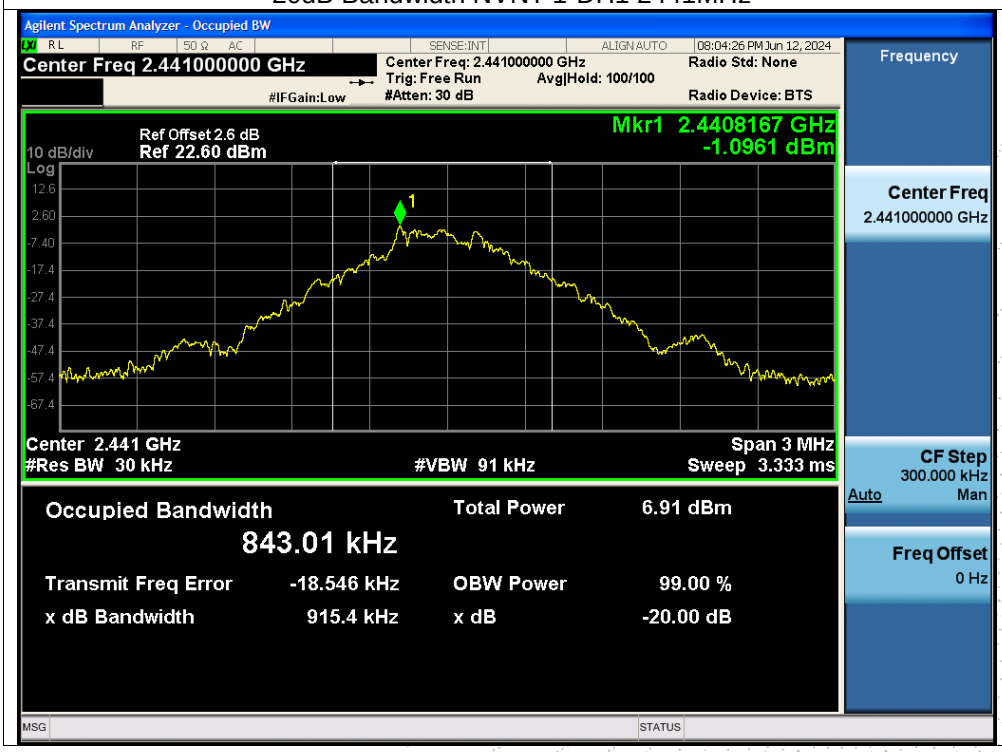
Right

Test Graphs

-20dB Bandwidth NVNT 1-DH1 2402MHz

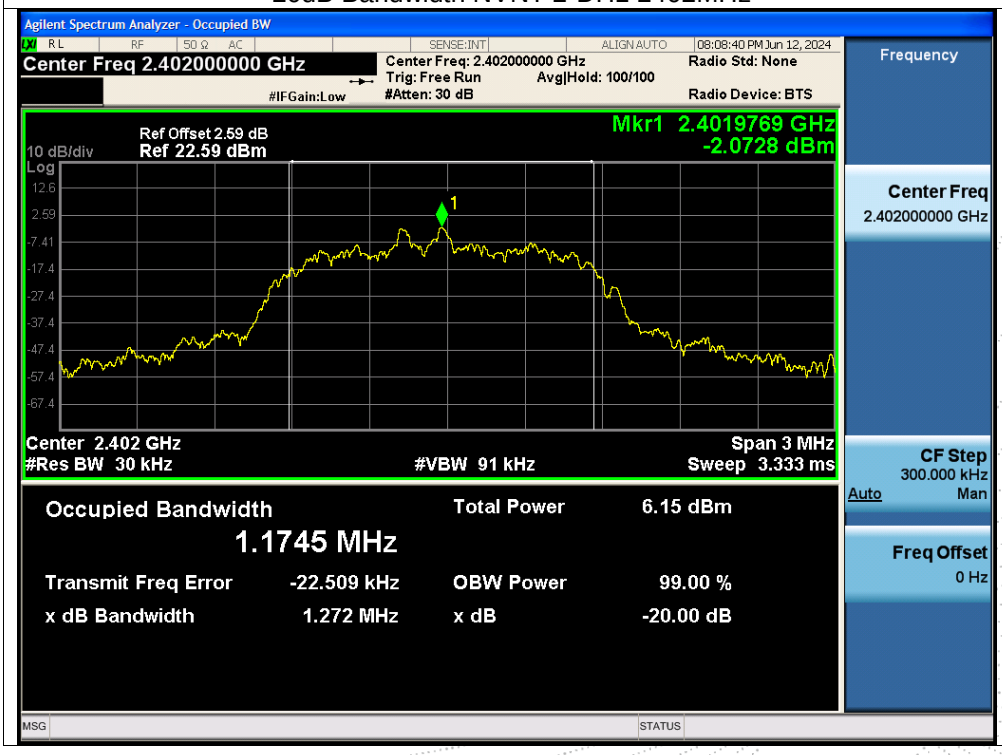


-20dB Bandwidth NVNT 1-DH1 2441MHz

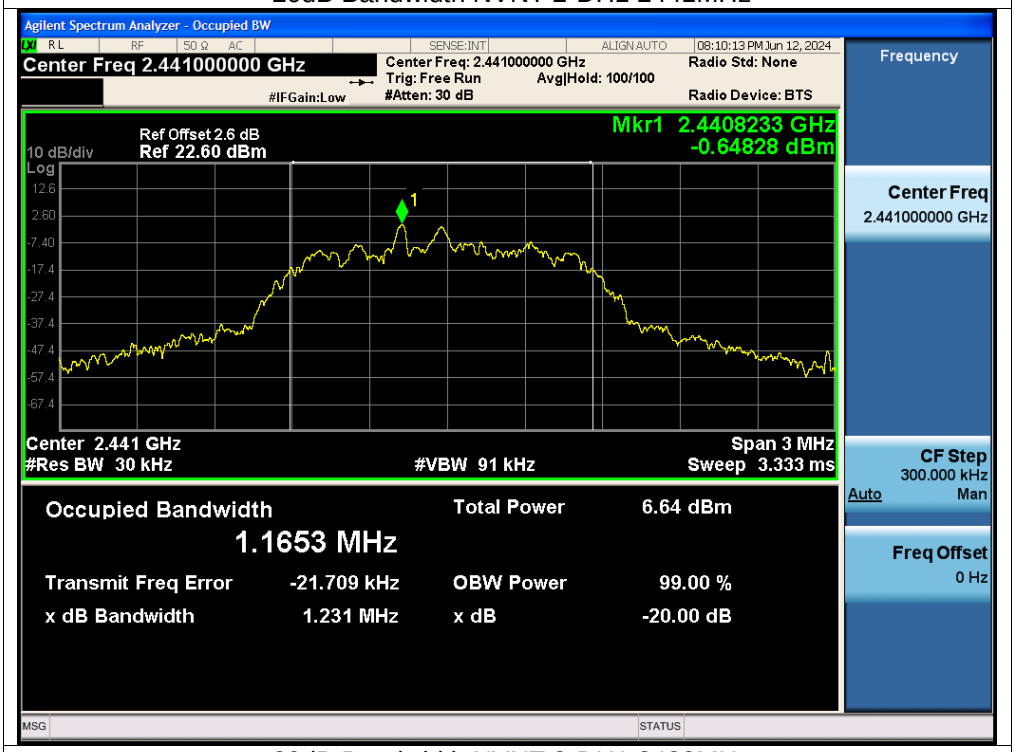


-20dB Bandwidth NVNT 1-DH1 2480MHz

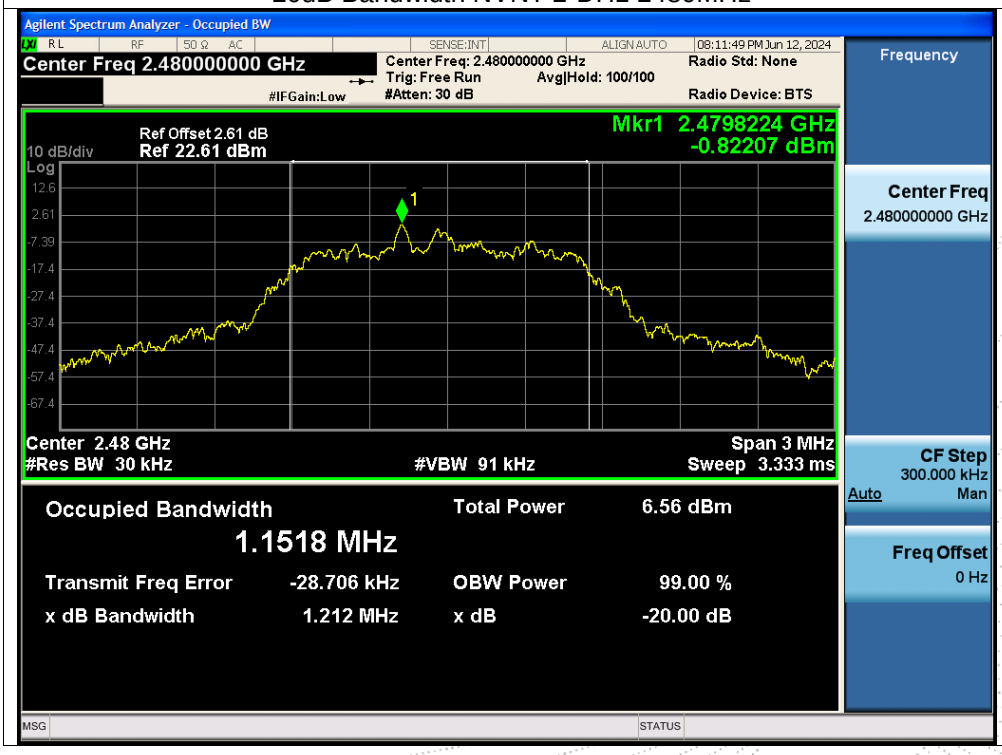
-20dB Bandwidth NVNT 2-DH1 2402MHz



-20dB Bandwidth NVNT 2-DH1 2441MHz

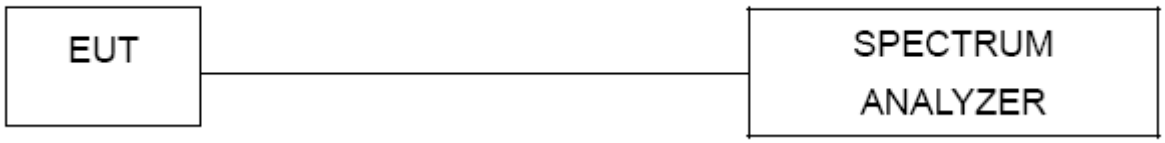


-20dB Bandwidth NVNT 2-DH1 2480MHz



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

Left

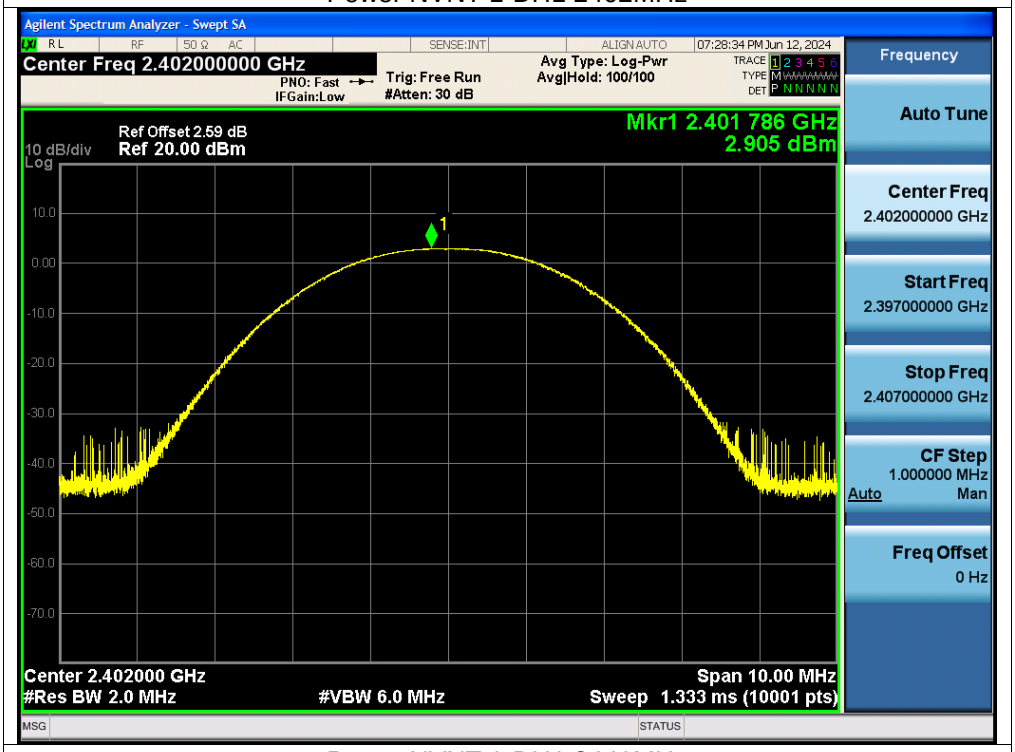
Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	1-DH1	2402	2.91	21	Pass
NVNT	1-DH1	2441	3.31	21	Pass
NVNT	1-DH1	2480	3.08	21	Pass
NVNT	2-DH1	2402	3.55	21	Pass
NVNT	2-DH1	2441	3.97	21	Pass
NVNT	2-DH1	2480	3.85	21	Pass

Right

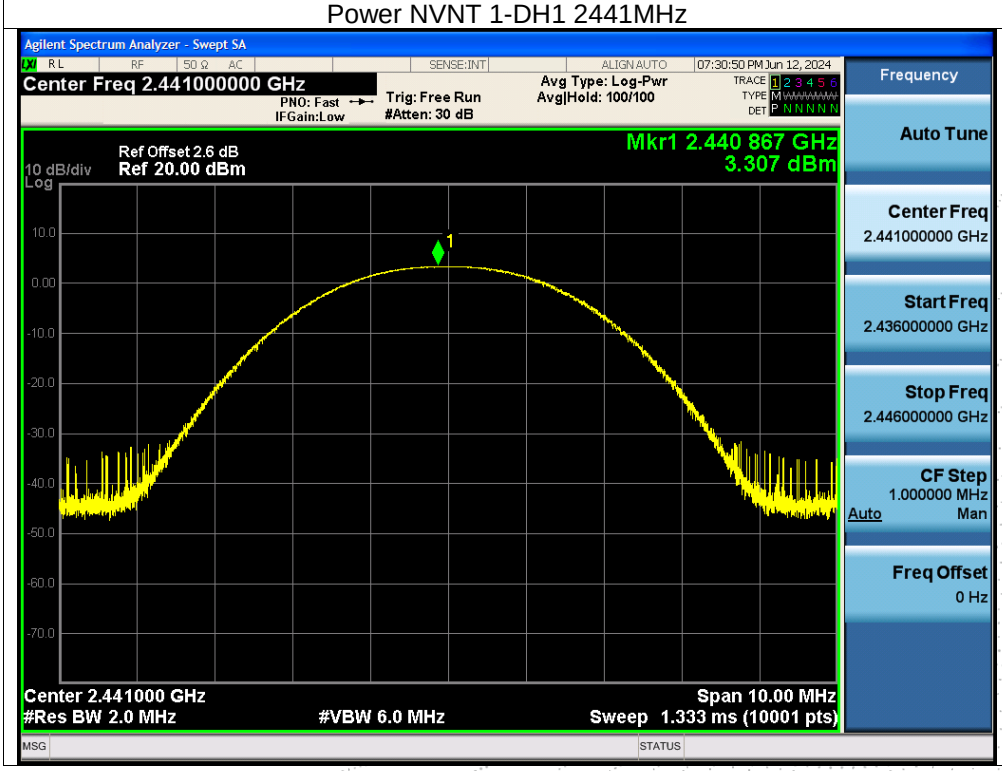
Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	1-DH1	2402	0.76	21	Pass
NVNT	1-DH1	2441	0.98	21	Pass
NVNT	1-DH1	2480	0.78	21	Pass
NVNT	2-DH1	2402	1.49	21	Pass
NVNT	2-DH1	2441	1.83	21	Pass
NVNT	2-DH1	2480	1.66	21	Pass

Test Graphs

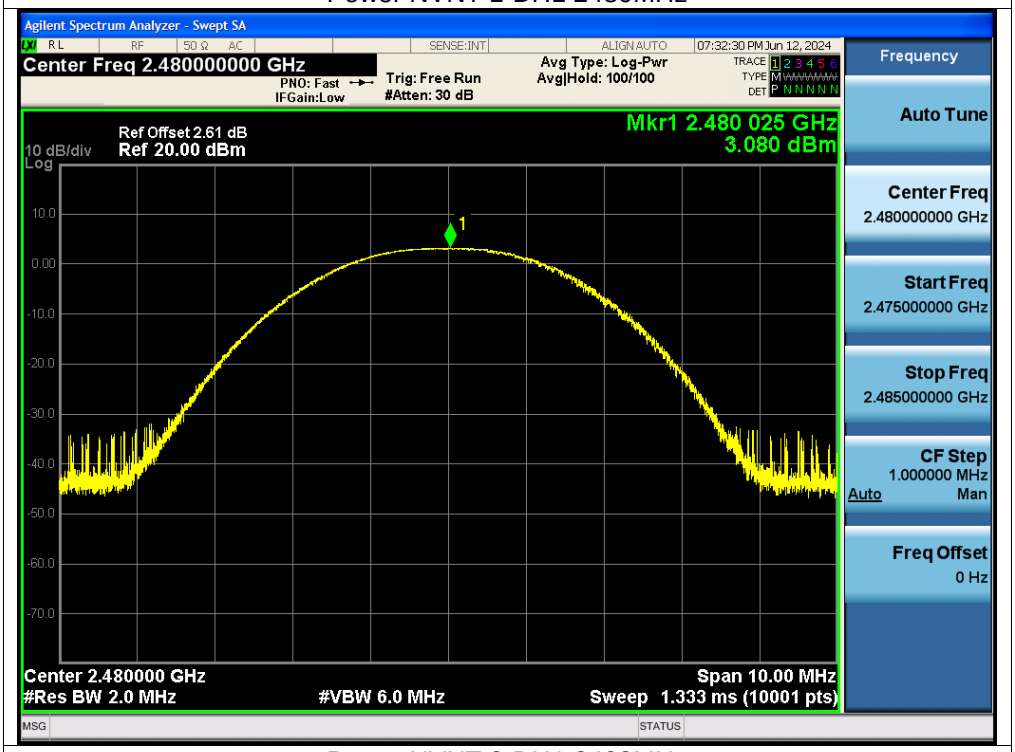
Power NVNT 1-DH1 2402MHz



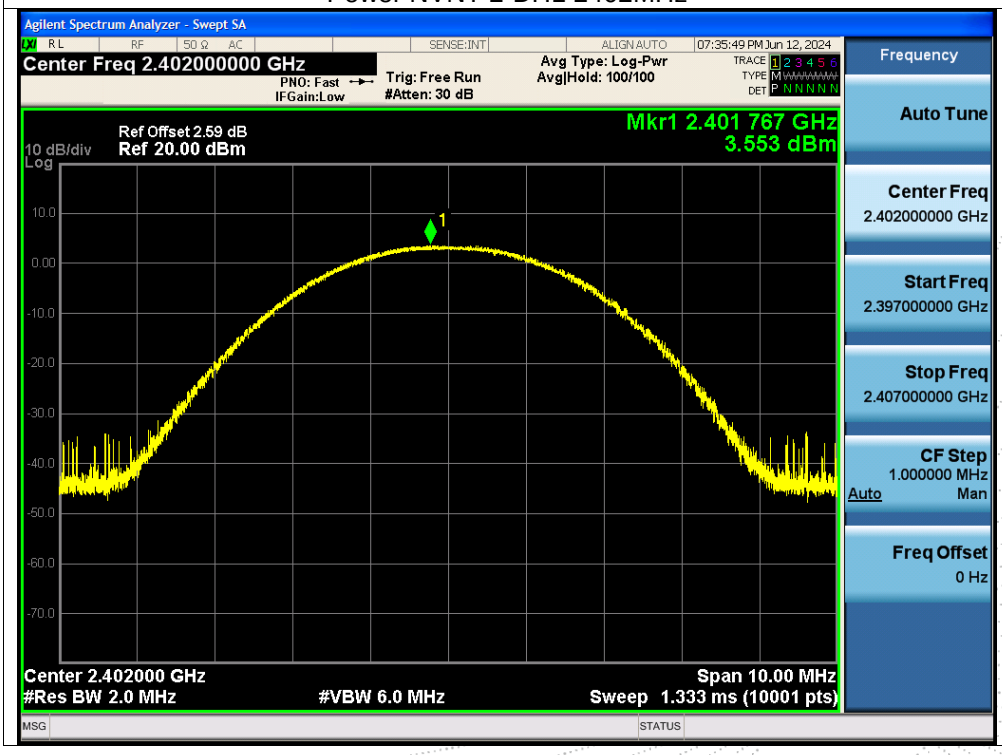
Power NVNT 1-DH1 2441MHz



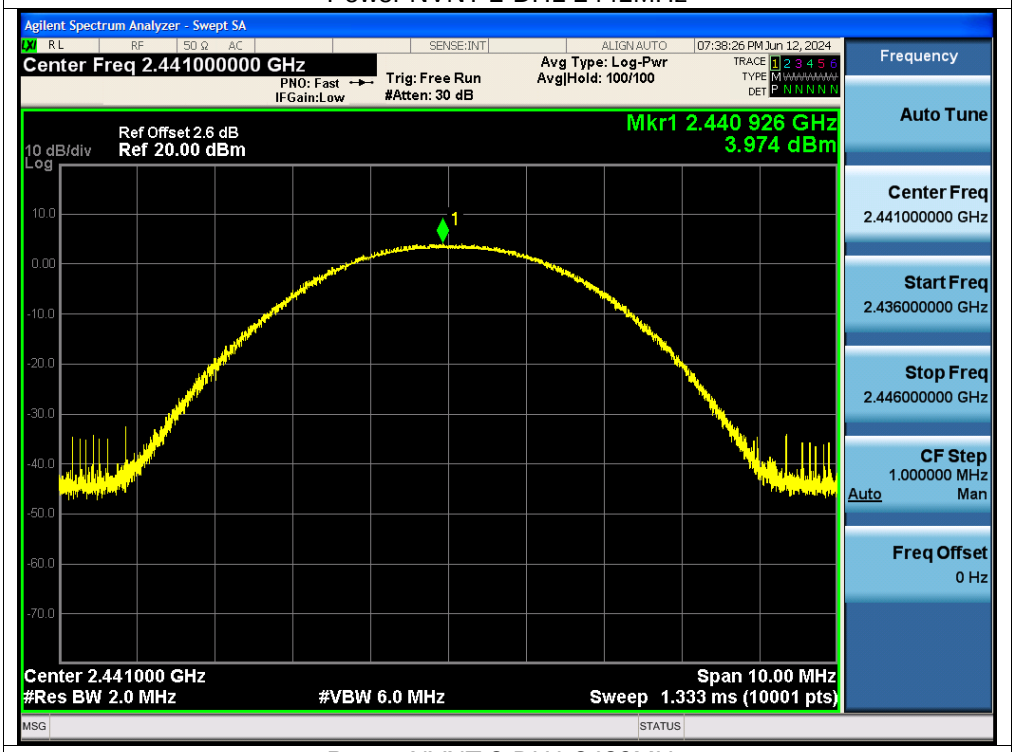
Power NVNT 1-DH1 2480MHz



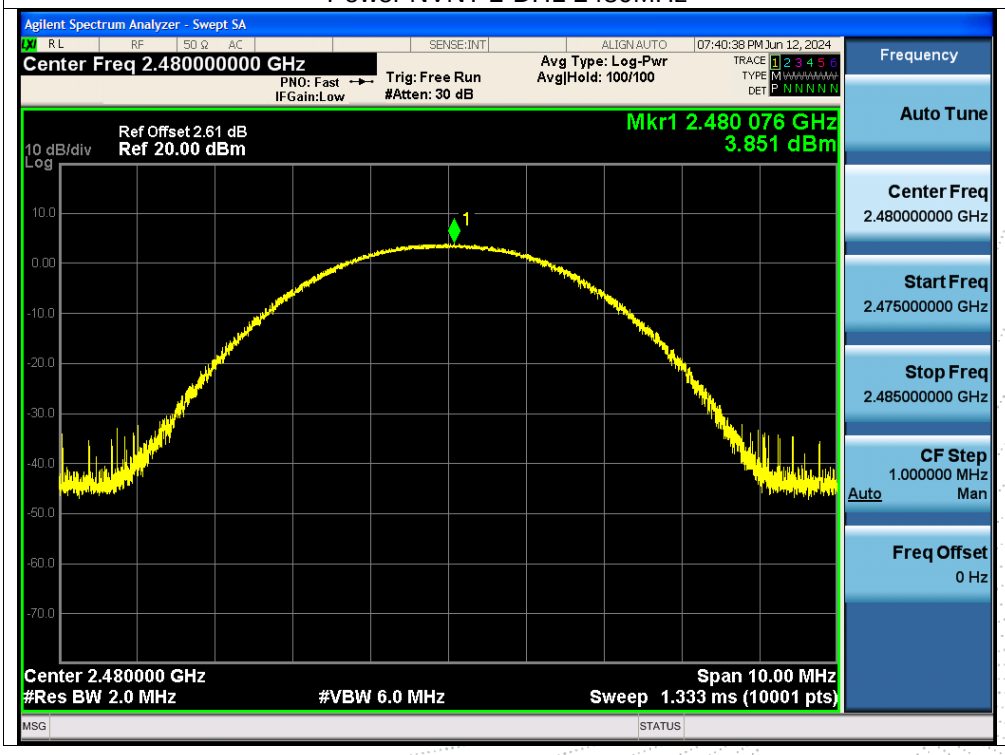
Power NVNT 2-DH1 2402MHz



Power NVNT 2-DH1 2441MHz

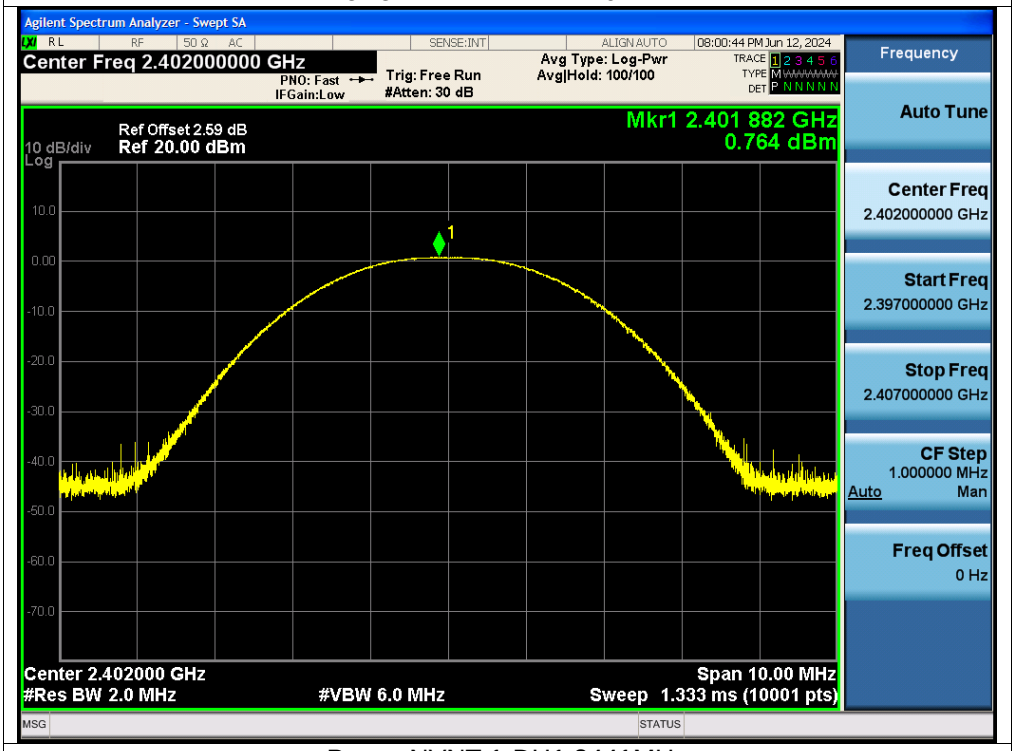


Power NVNT 2-DH1 2480MHz

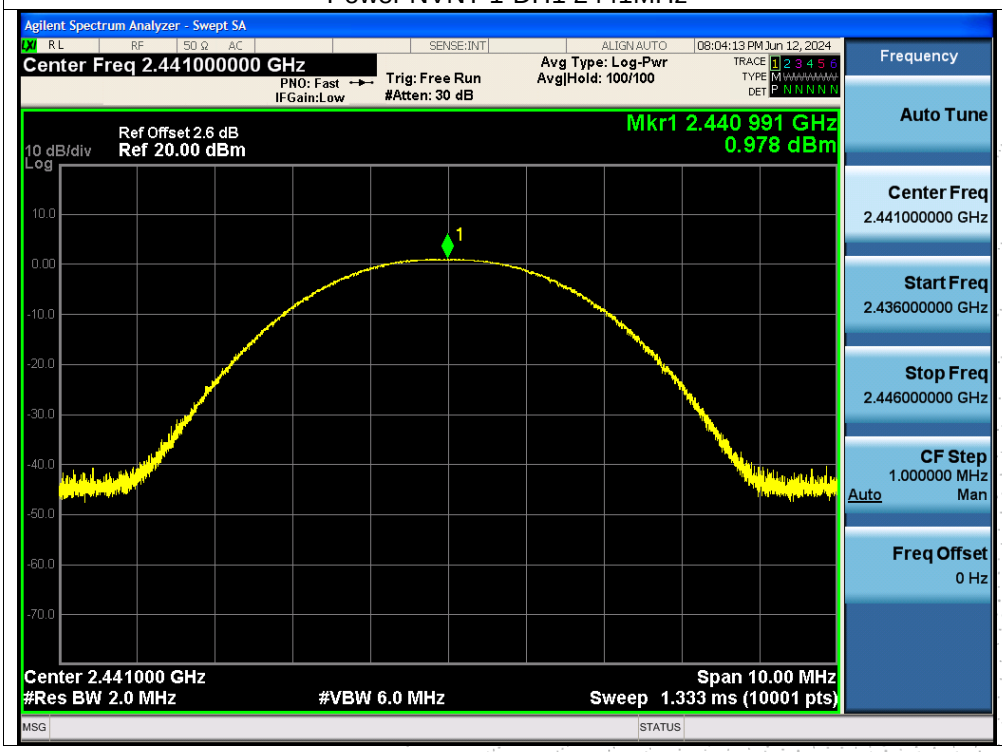


Right

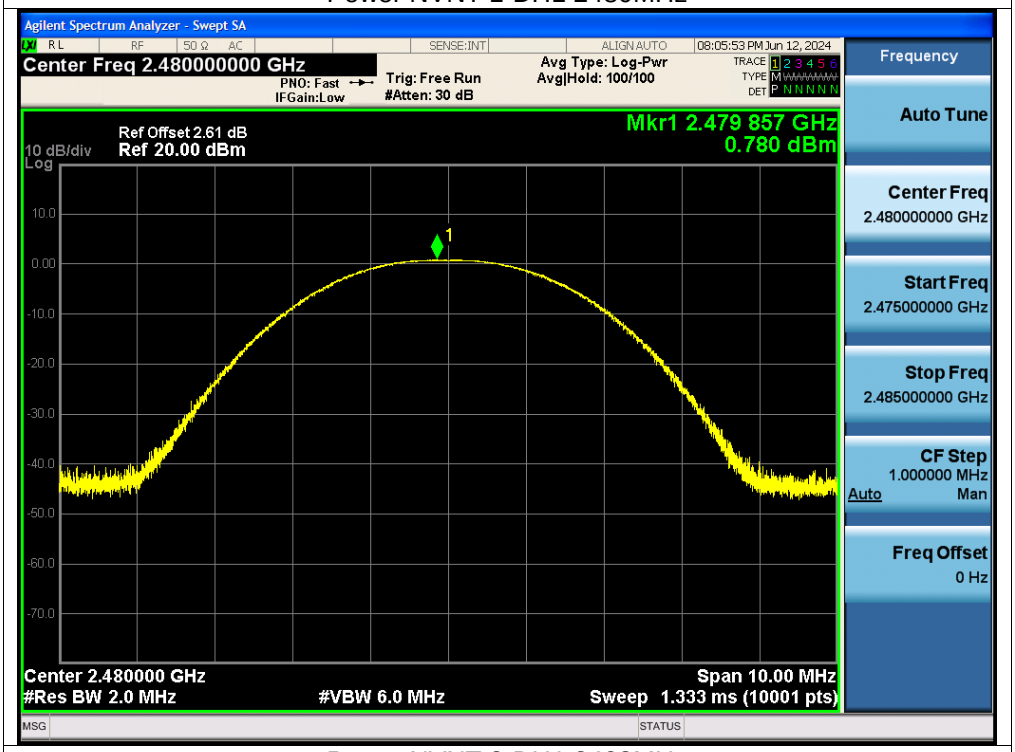
Test Graphs
Power NVNT 1-DH1 2402MHz



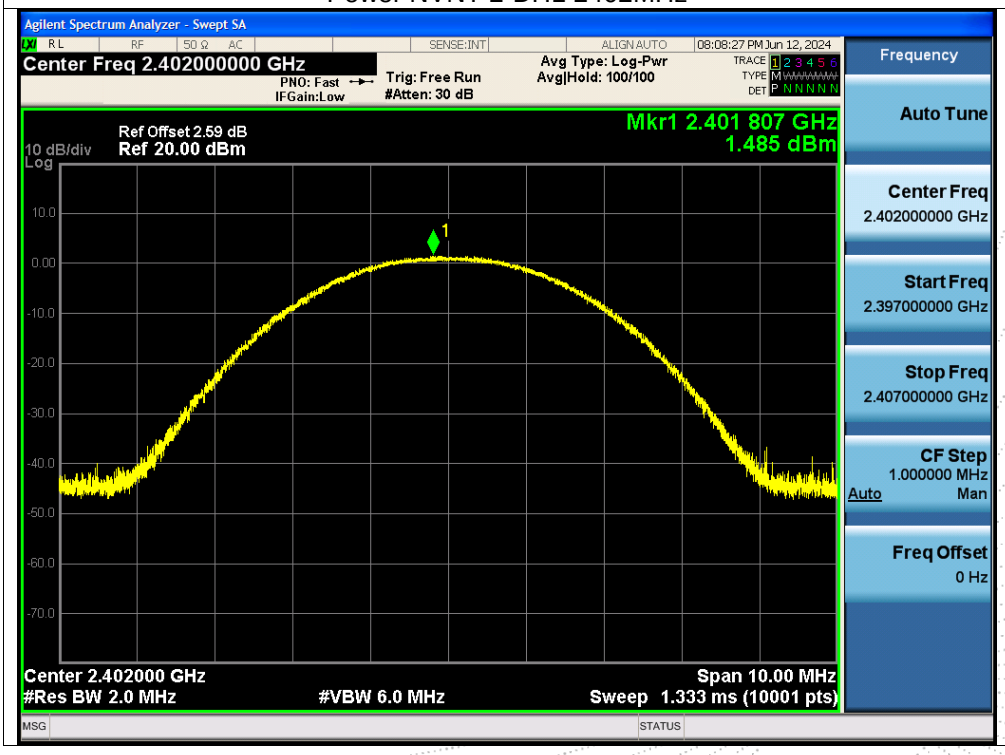
Power NVNT 1-DH1 2441MHz



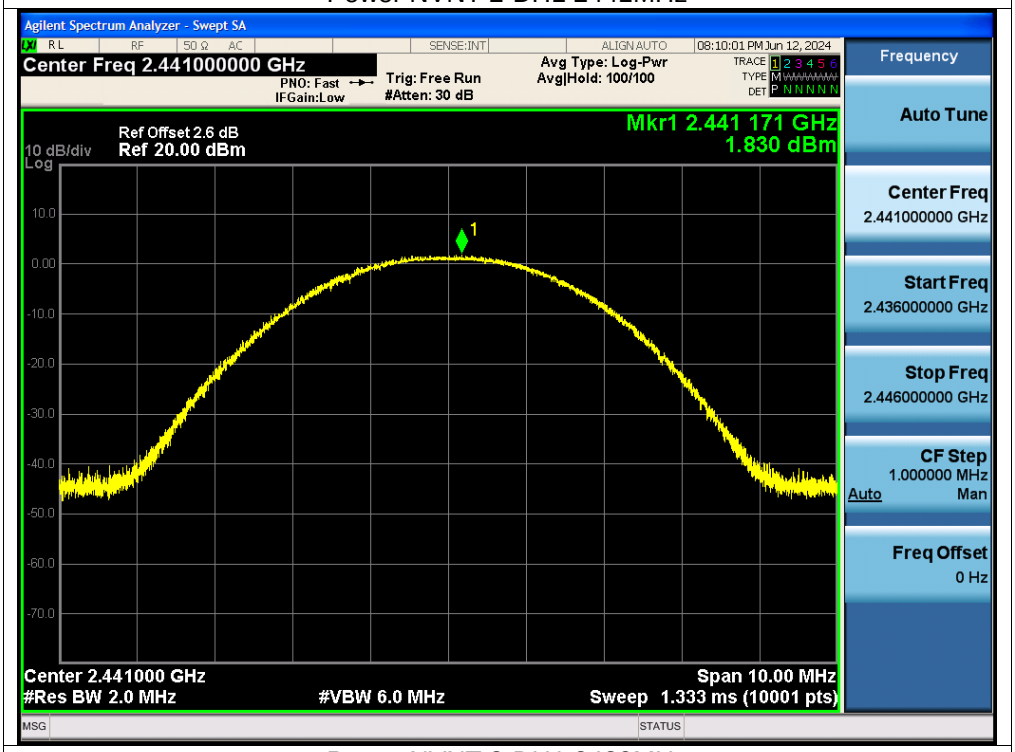
Power NVNT 1-DH1 2480MHz



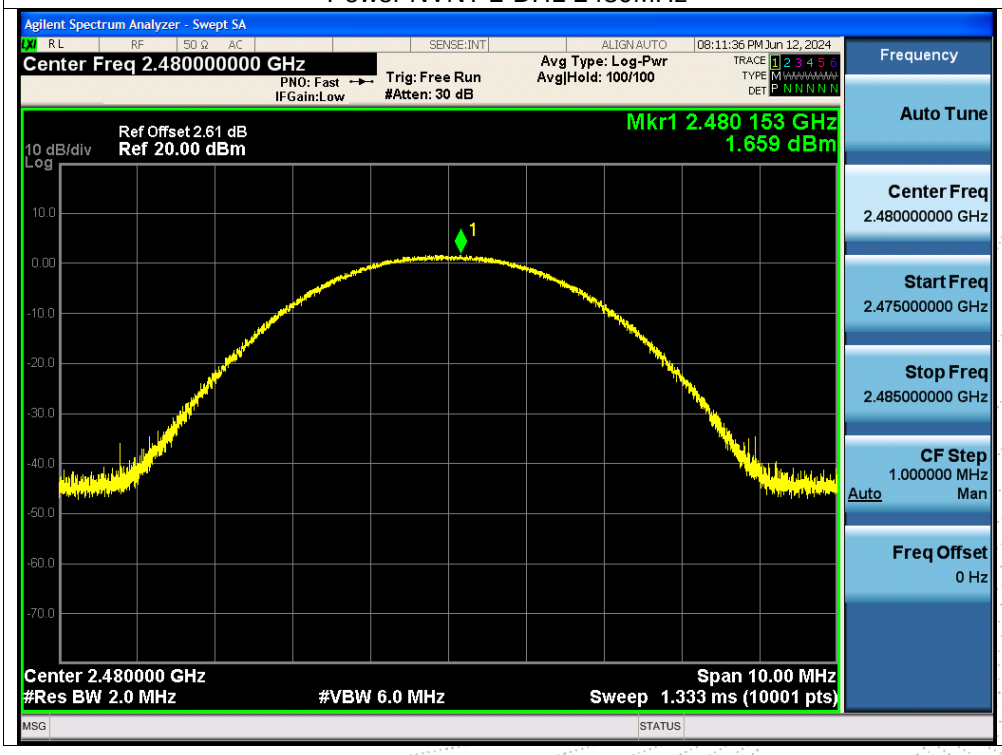
Power NVNT 2-DH1 2402MHz



Power NVNT 2-DH1 2441MHz

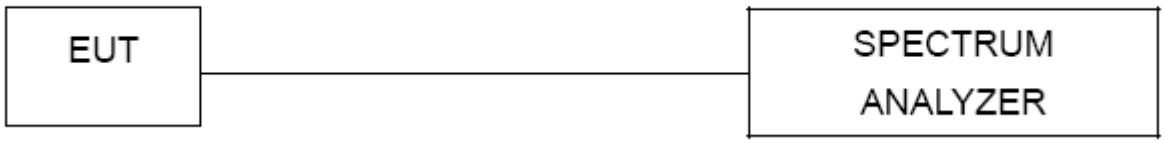


Power NVNT 2-DH1 2480MHz



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

Left

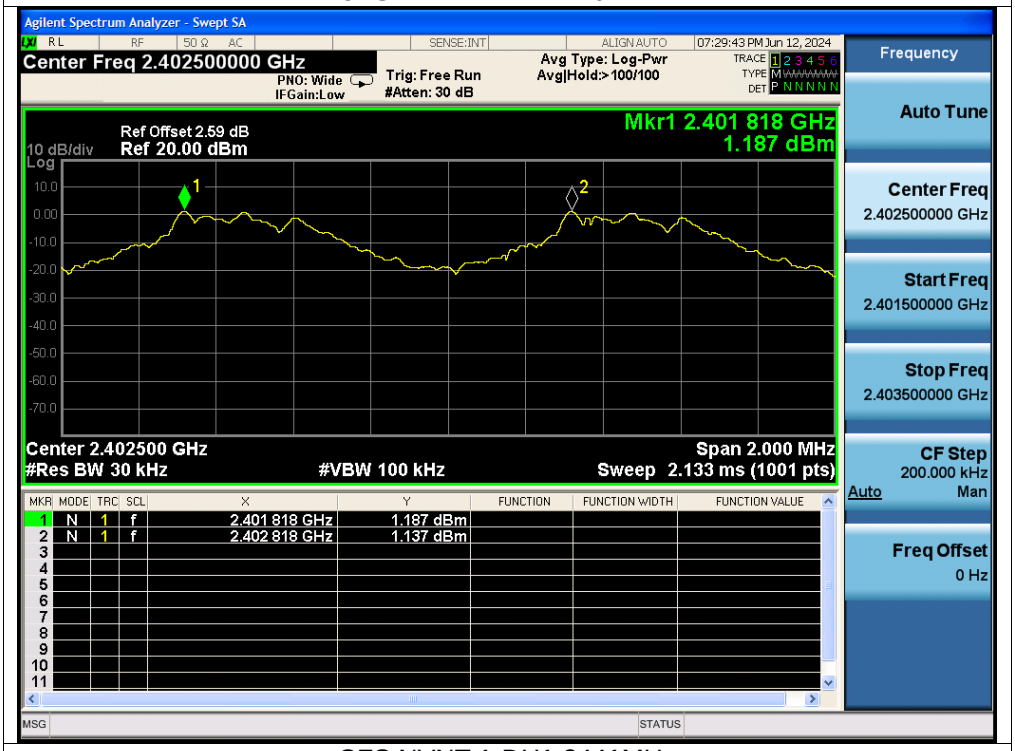
odulation	Test Channel	Separation (MHz)	Limit(MHz)	Result
GFSK	Low	1.000	0.608	PASS
GFSK	Middle	0.998	0.601	PASS
GFSK	High	0.998	0.682	PASS
π/4 DQPSK	Low	0.996	0.827	PASS
π/4 DQPSK	Middle	1.000	0.829	PASS
π/4 DQPSK	High	0.996	0.831	PASS

Right

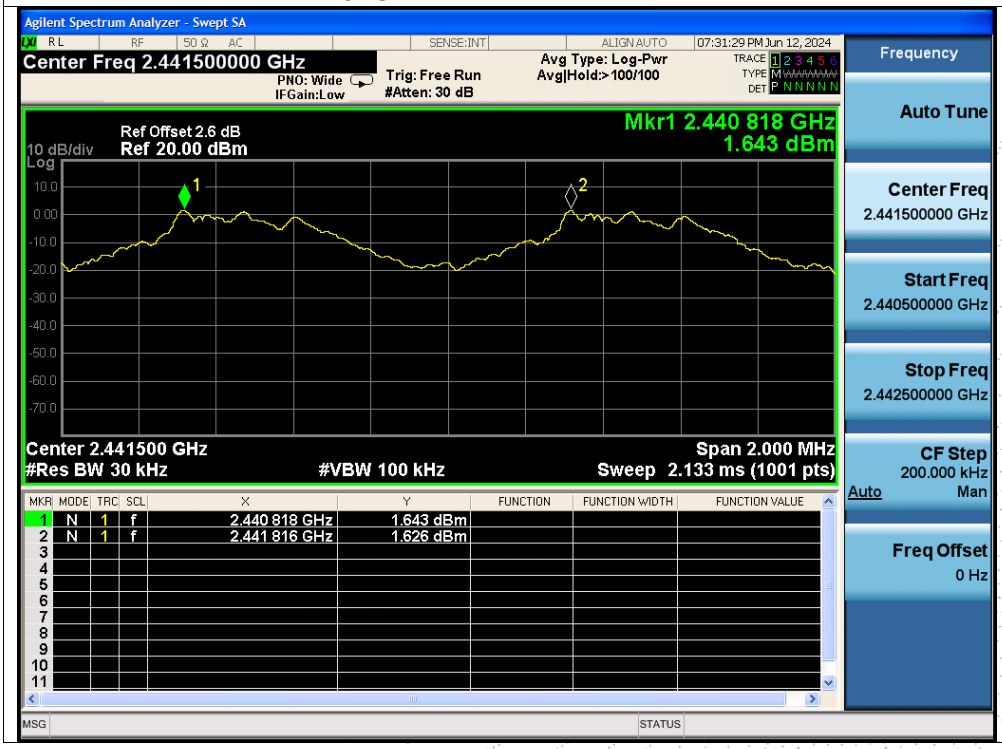
odulation	Test Channel	Separation (MHz)	Limit(MHz)	Result
GFSK	Low	1.002	0.579	PASS
GFSK	Middle	1.002	0.610	PASS
GFSK	High	0.996	0.613	PASS
π/4 DQPSK	Low	1.000	0.848	PASS
π/4 DQPSK	Middle	0.998	0.821	PASS
π/4 DQPSK	High	1.000	0.808	PASS

Test Graphs

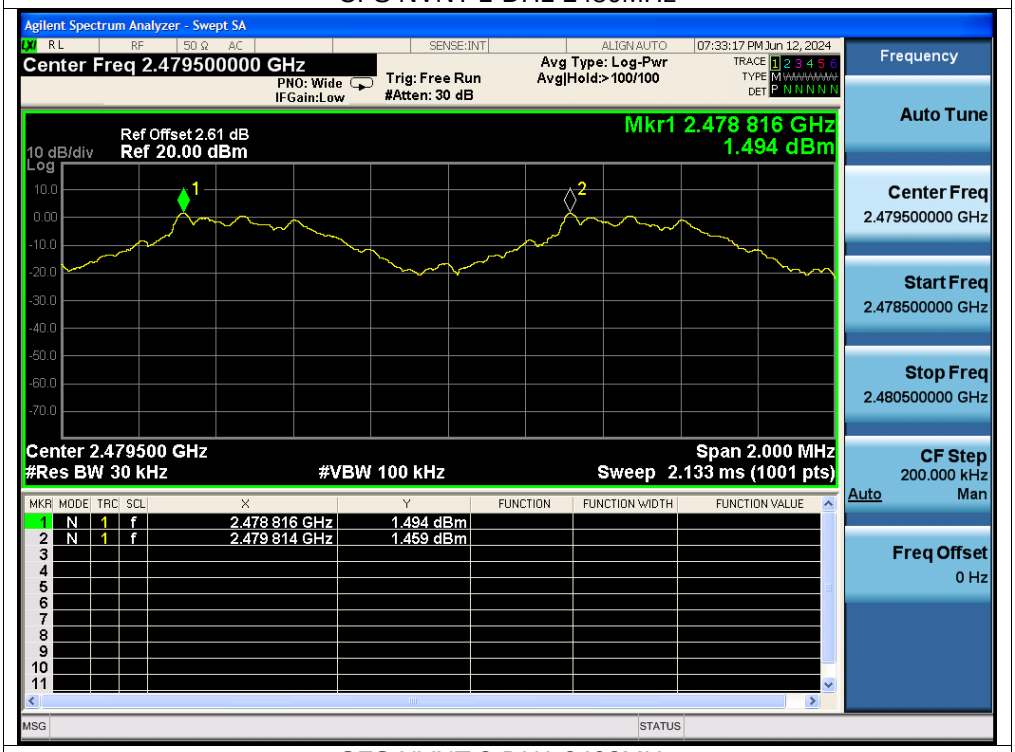
CFS NVNT 1-DH1 2402MHz



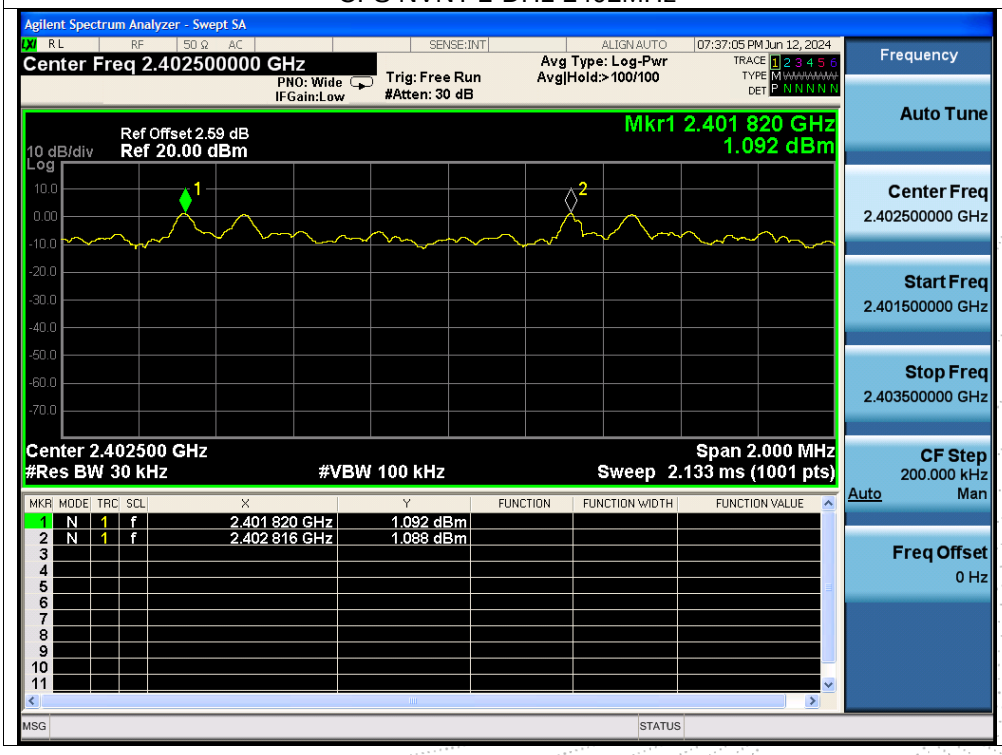
CFS NVNT 1-DH1 2441MHz



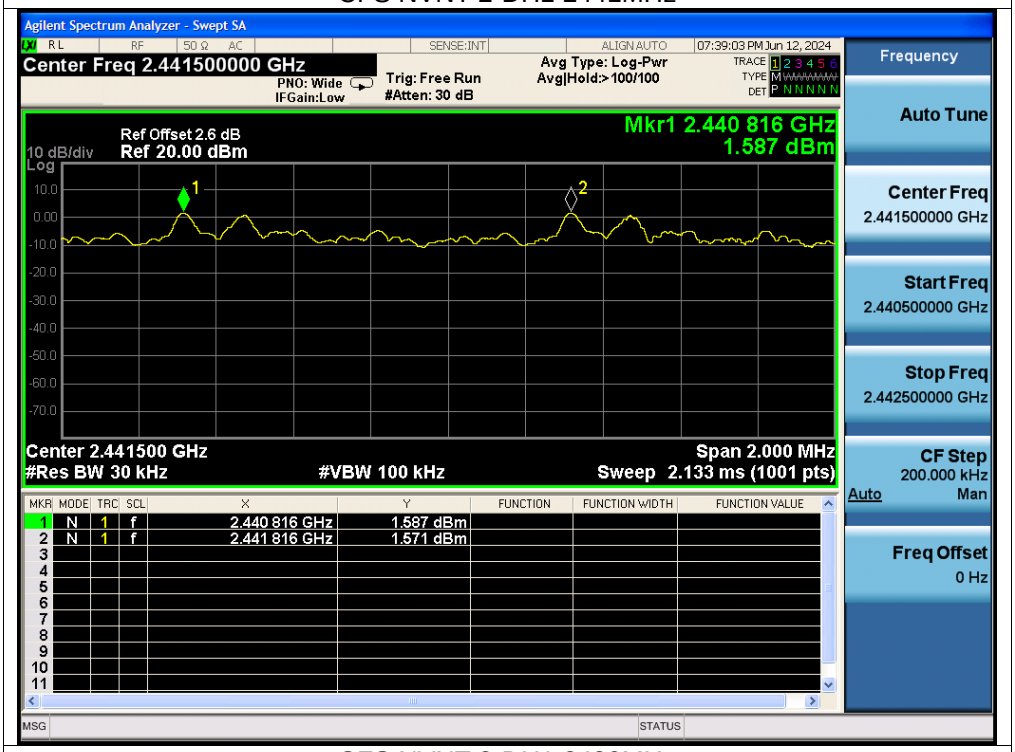
CFS NVNT 1-DH1 2480MHz



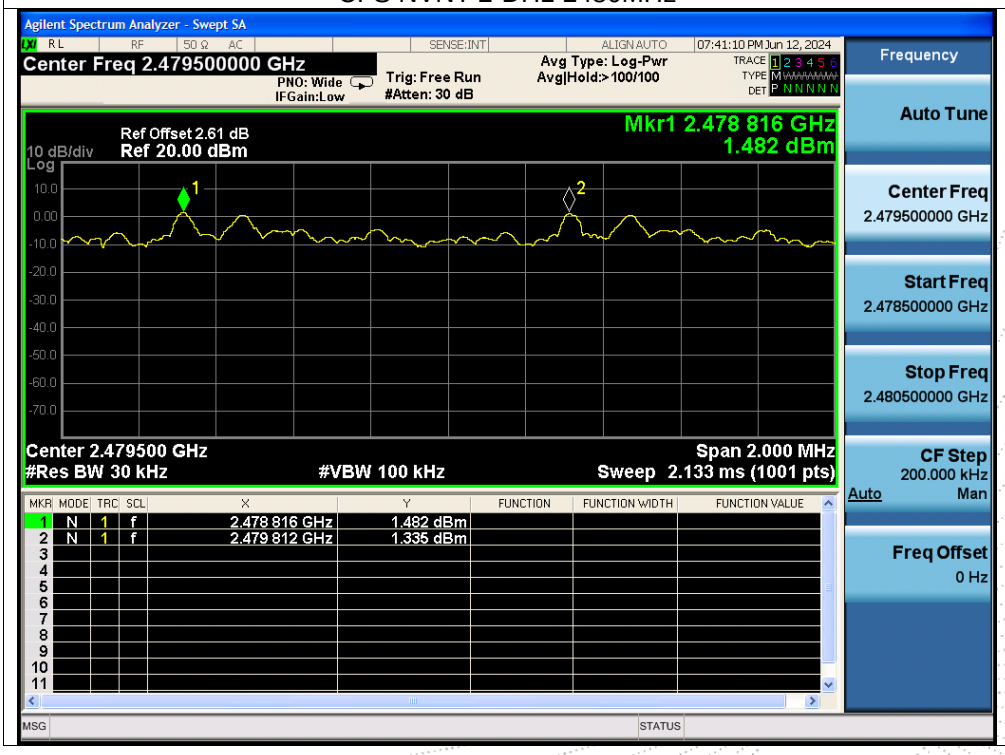
CFS NVNT 2-DH1 2402MHz



CFS NVNT 2-DH1 2441MHz

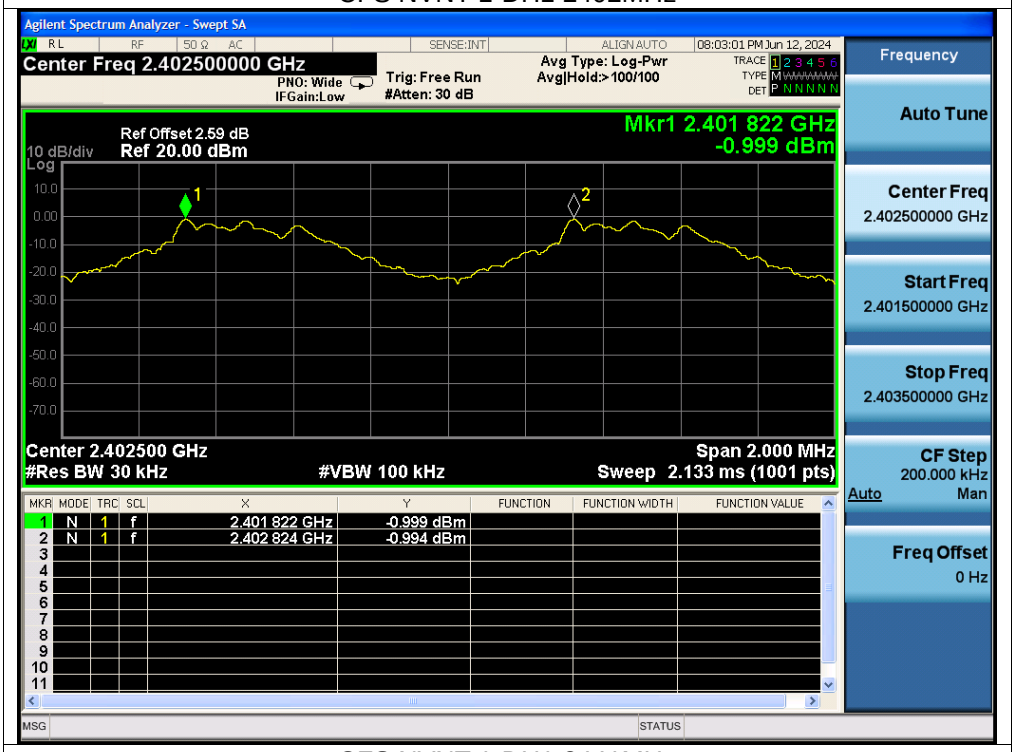


CFS NVNT 2-DH1 2480MHz

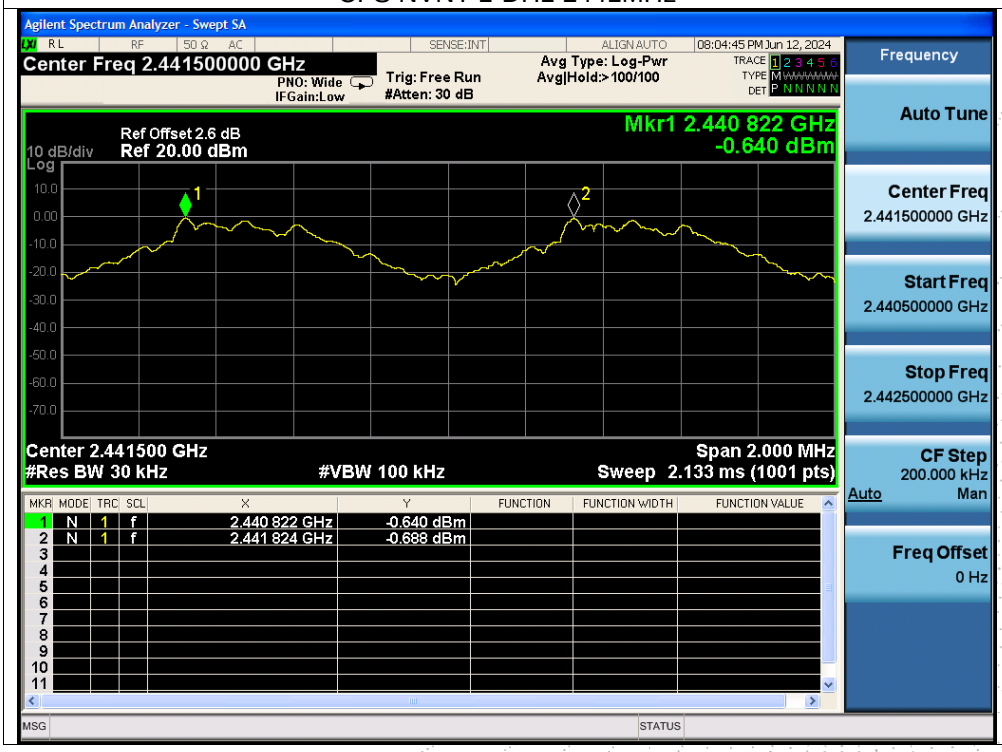


Right

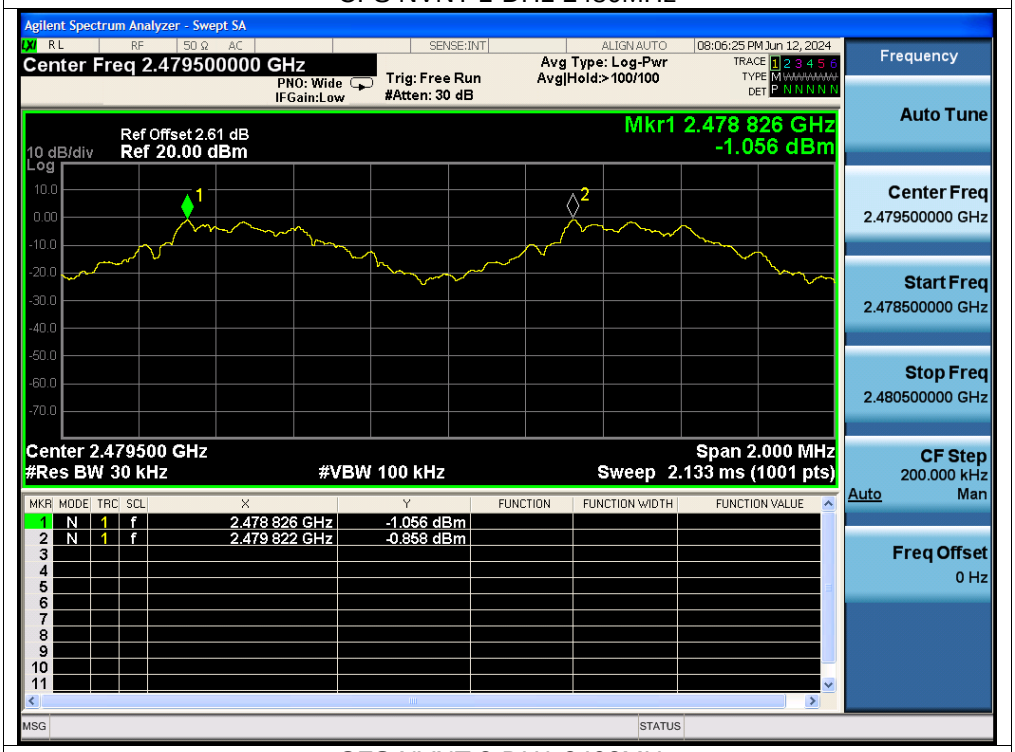
Test Graphs
CFS NVNT 1-DH1 2402MHz



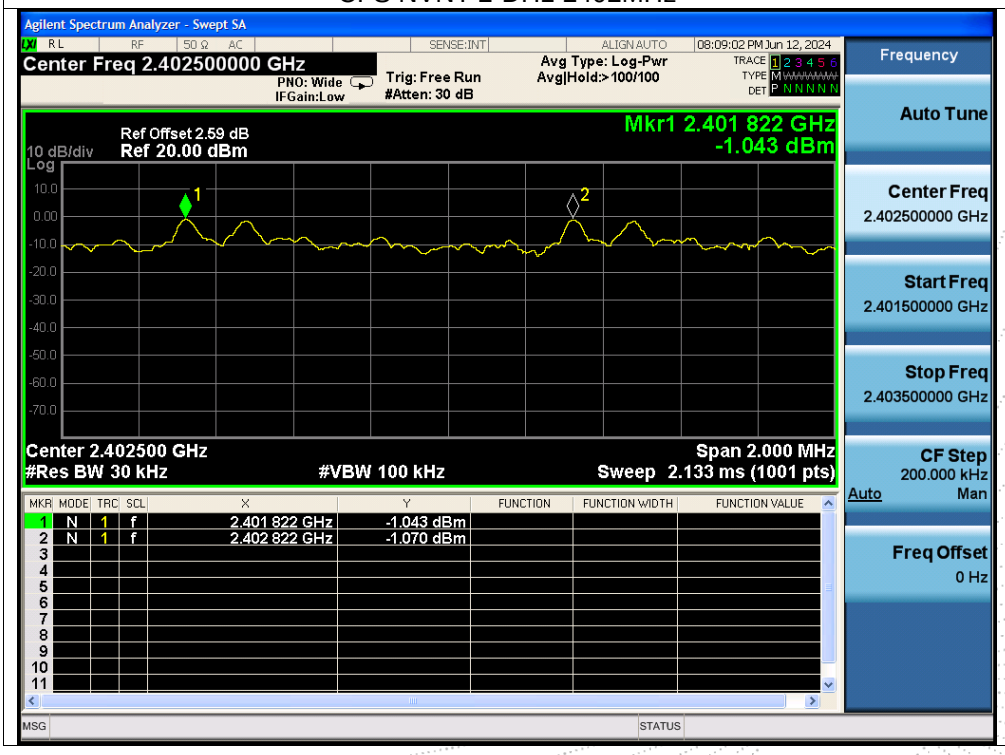
CFS NVNT 1-DH1 2441MHz



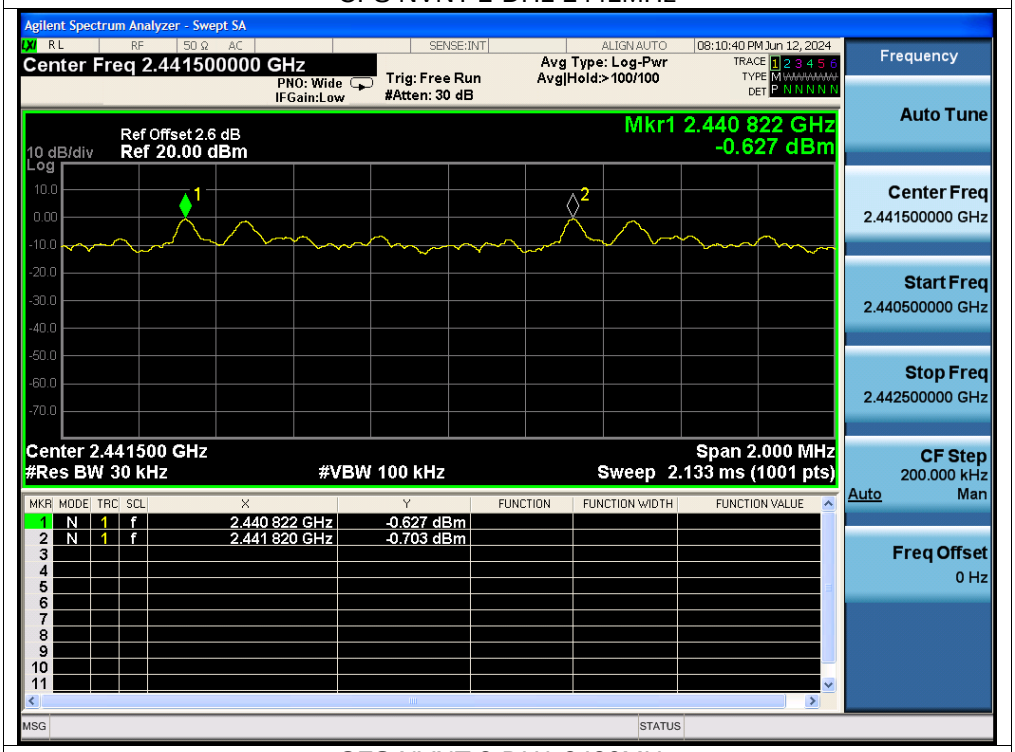
CFS NVNT 1-DH1 2480MHz



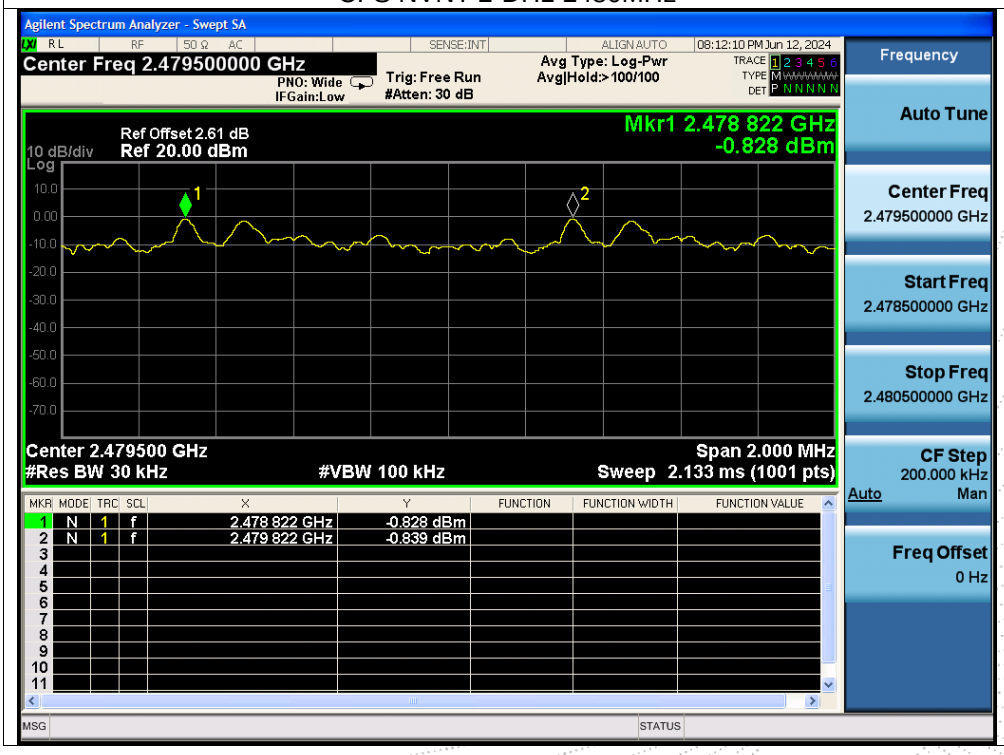
CFS NVNT 2-DH1 2402MHz



CFS NVNT 2-DH1 2441MHz

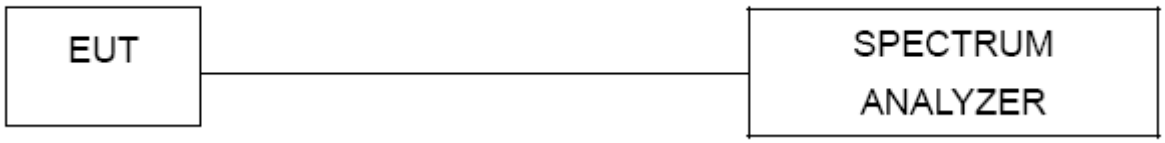


CFS NVNT 2-DH1 2480MHz



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

Left

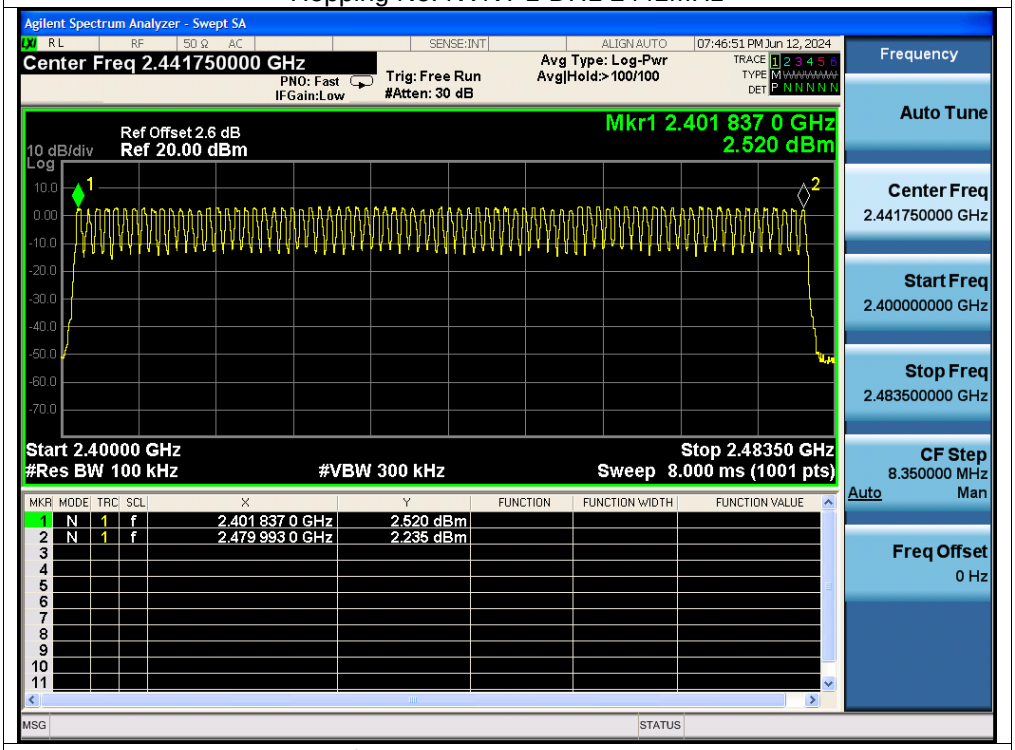
Condition	Mode	Hopping Number	Limit	Verdict
NVNT	1-DH1	79	15	Pass
NVNT	2-DH1	79	15	Pass

Right

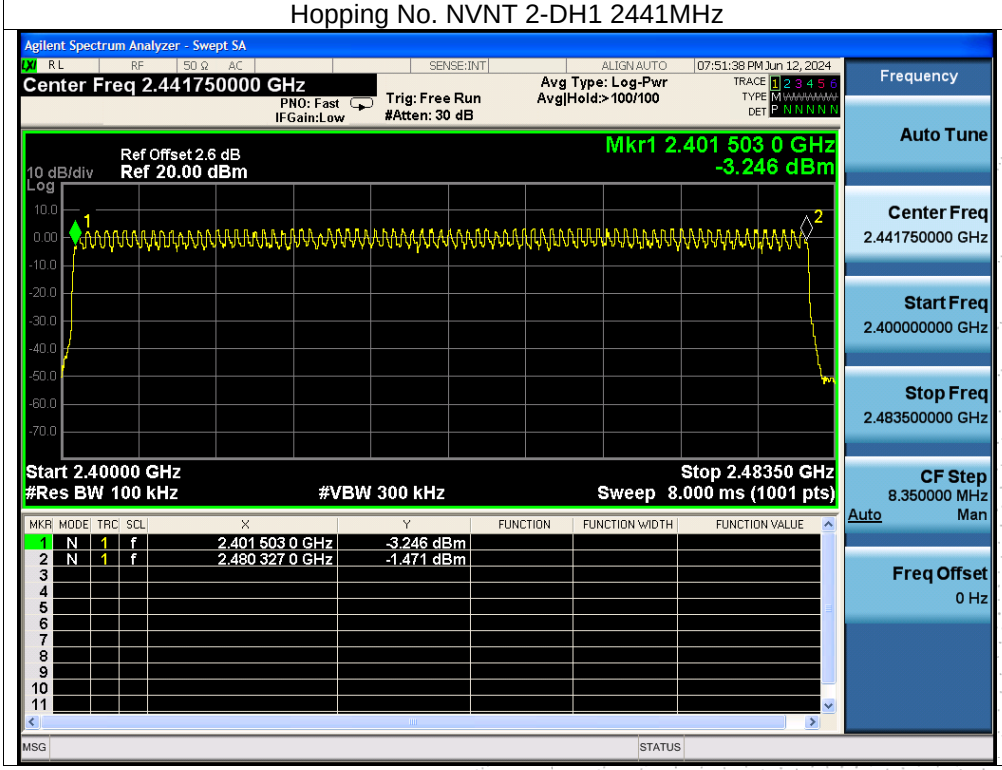
Condition	Mode	Hopping Number	Limit	Verdict
NVNT	1-DH1	79	15	Pass
NVNT	2-DH1	79	15	Pass

Test Graphs

Hopping No. NVNT 1-DH1 2441MHz

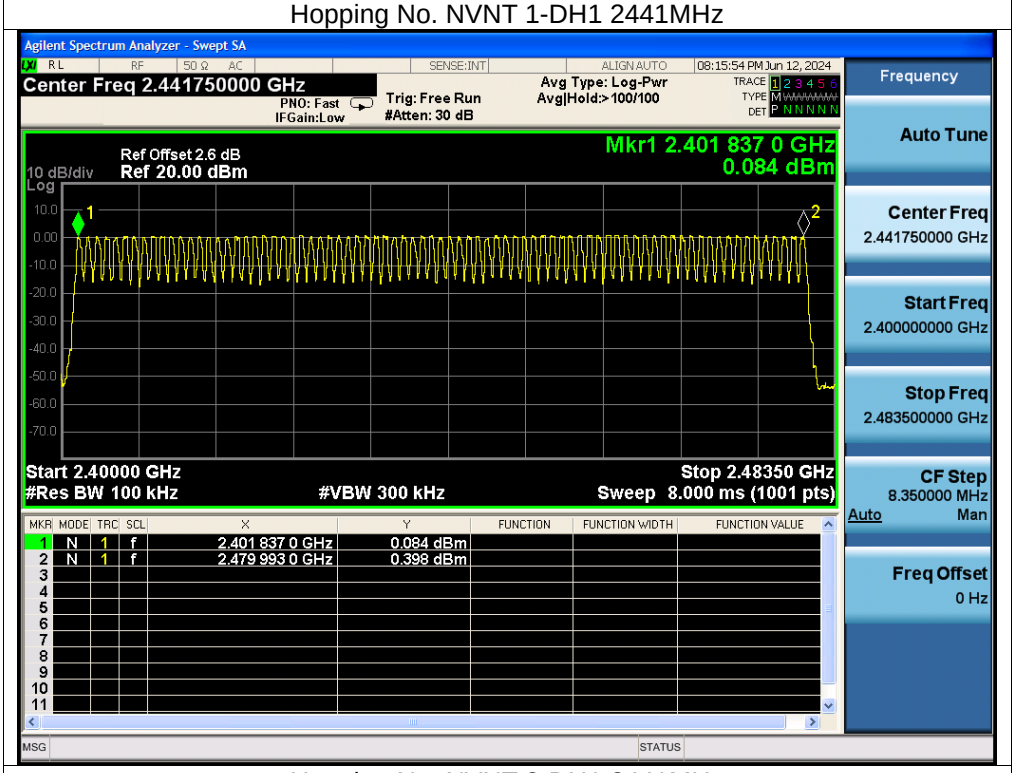


Hopping No. NVNT 2-DH1 2441MHz

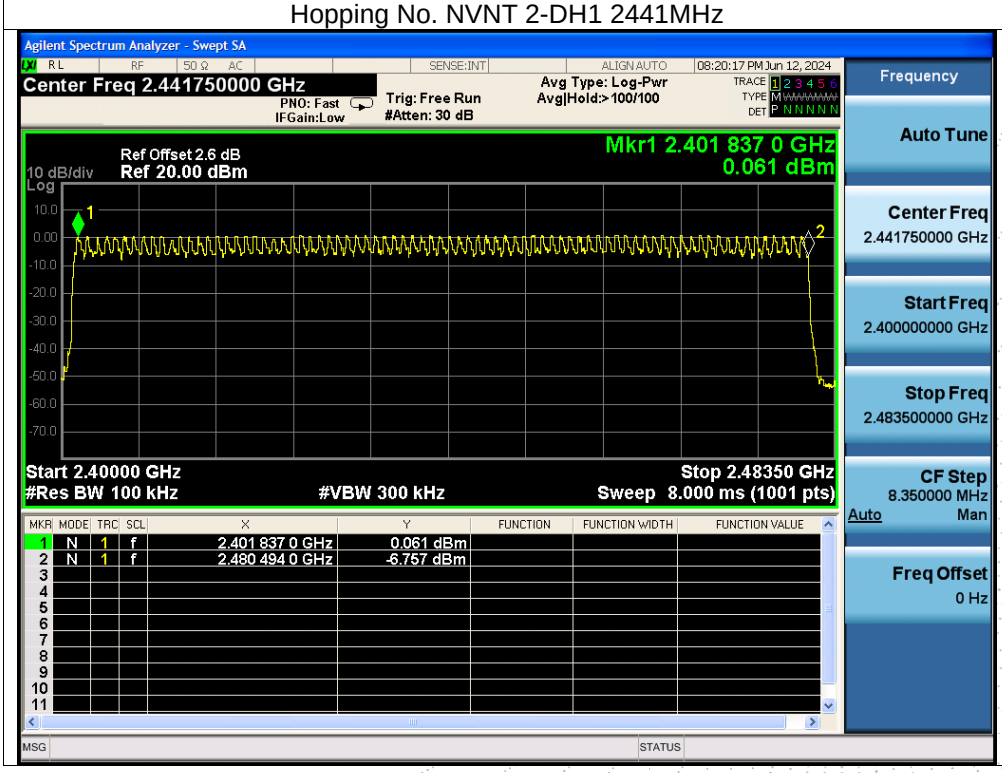


Right

Test Graphs
Hopping No. NVNT 1-DH1 2441MHz

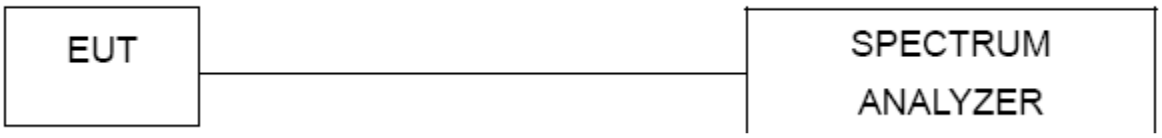


Hopping No. NVNT 2-DH1 2441MHz



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

Left

Mode	Frequency (MHz)	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
1-DH1	2441	0.383	121.028	316	31600	400	Pass
1-DH3	2441	1.638	275.184	168	31600	400	Pass
1-DH5	2441	2.885	308.695	107	31600	400	Pass
2-DH1	2441	0.391	123.165	315	31600	400	Pass
2-DH3	2441	1.642	247.942	151	31600	400	Pass
2-DH5	2441	2.887	291.587	101	31600	400	Pass

Note: Total Dwell Time (ms) = Pulse Time (ms)*Burst Count

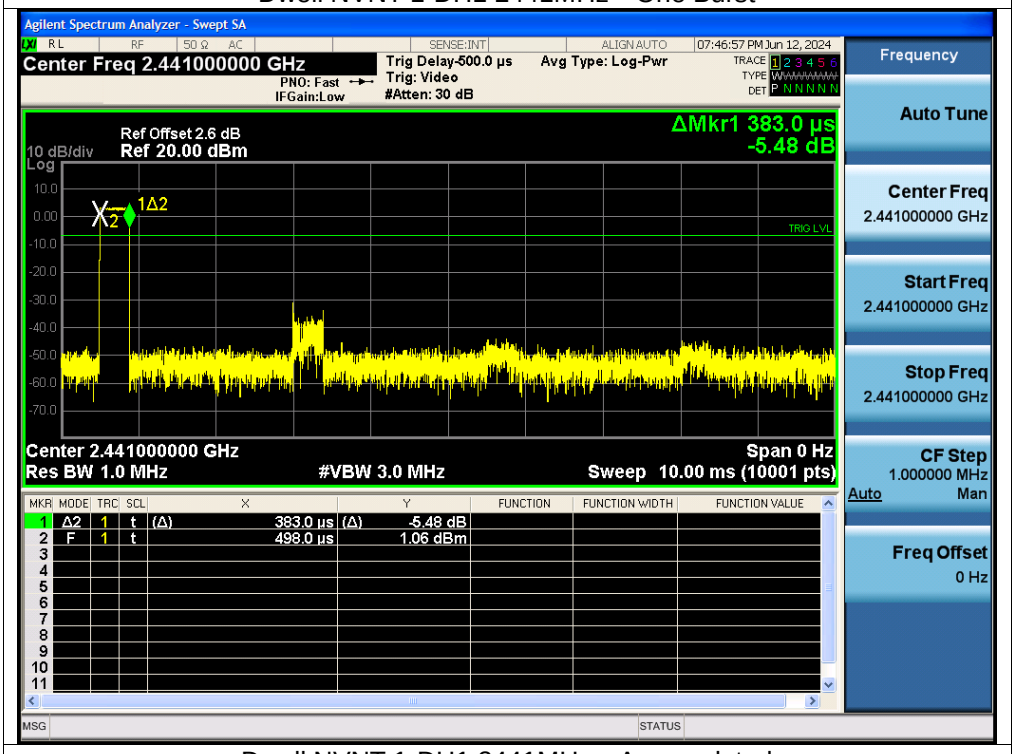
Right

Mode	Frequency (MHz)	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
1-DH1	2441	0.384	121.728	317	31600	400	Pass
1-DH3	2441	1.638	263.718	161	31600	400	Pass
1-DH5	2441	2.886	303.03	105	31600	400	Pass
2-DH1	2441	0.393	124.974	318	31600	400	Pass
2-DH3	2441	1.643	257.951	157	31600	400	Pass
2-DH5	2441	2.891	329.574	114	31600	400	Pass

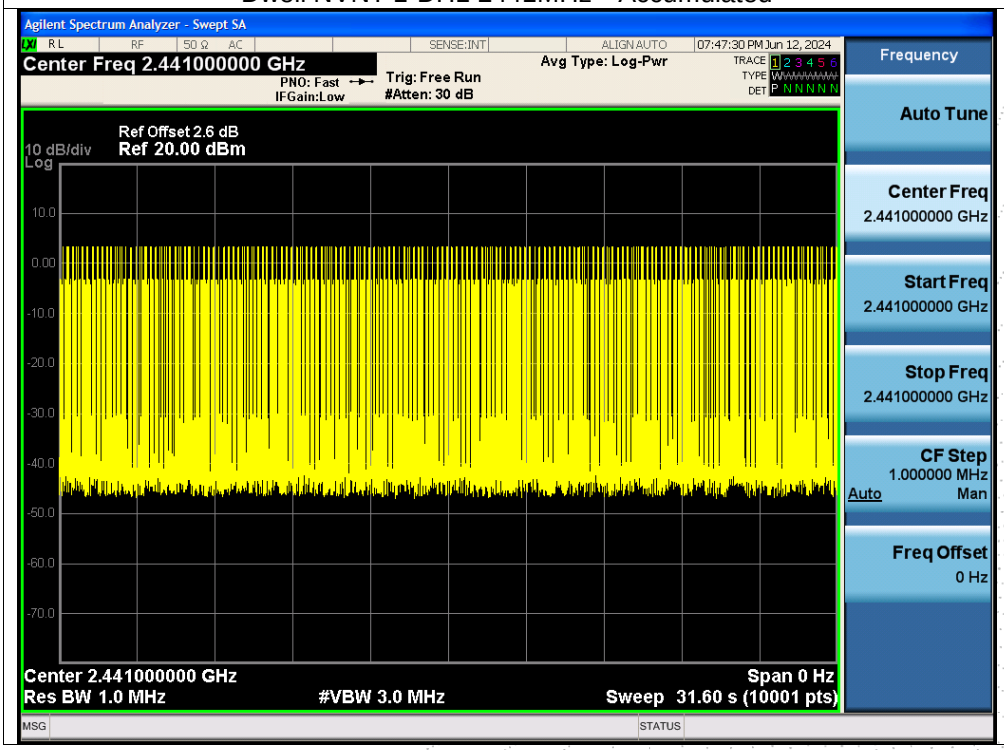
Note: Total Dwell Time (ms) = Pulse Time (ms)*Burst Count

Left

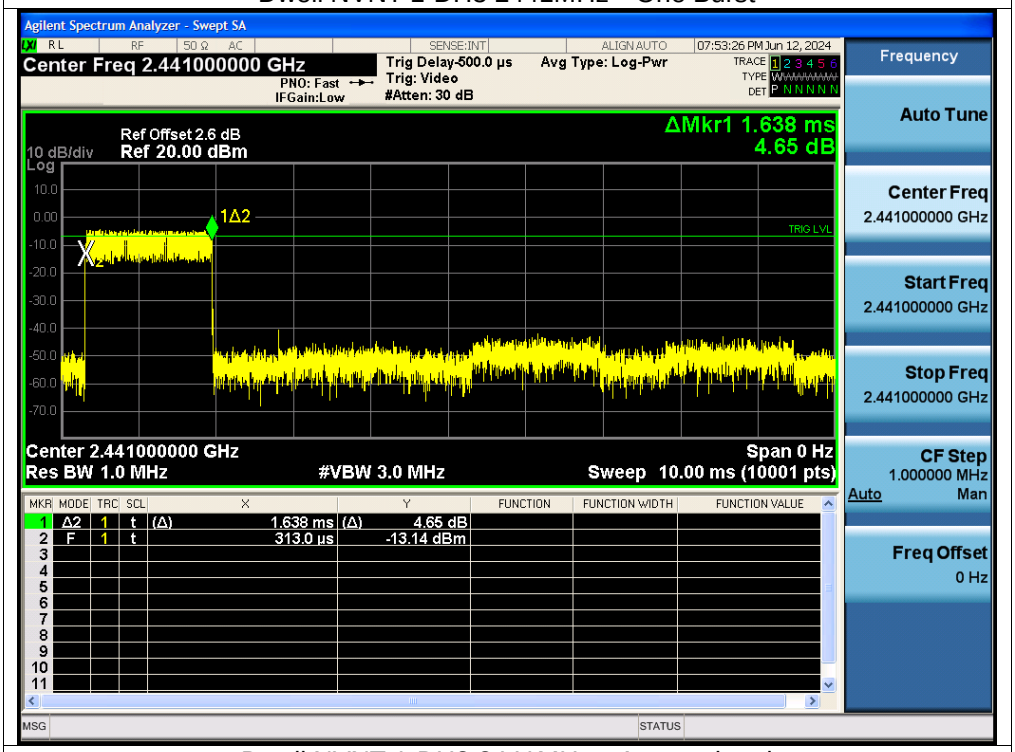
Test Graphs
Dwell NVNT 1-DH1 2441MHz One Burst



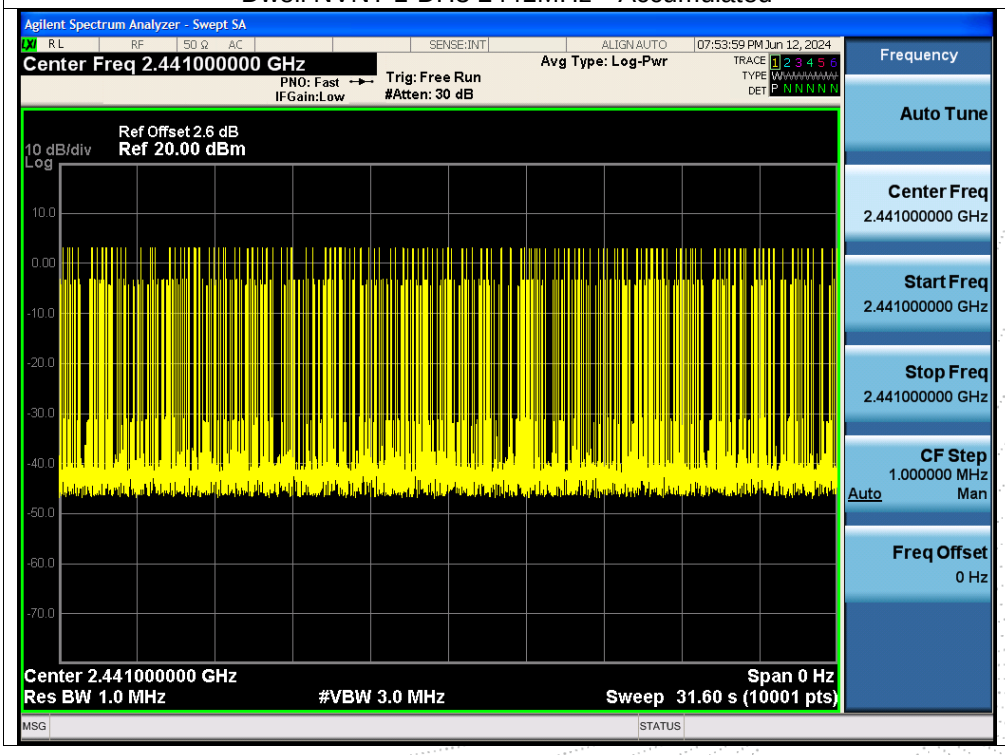
Dwell NVNT 1-DH1 2441MHz Accumulated



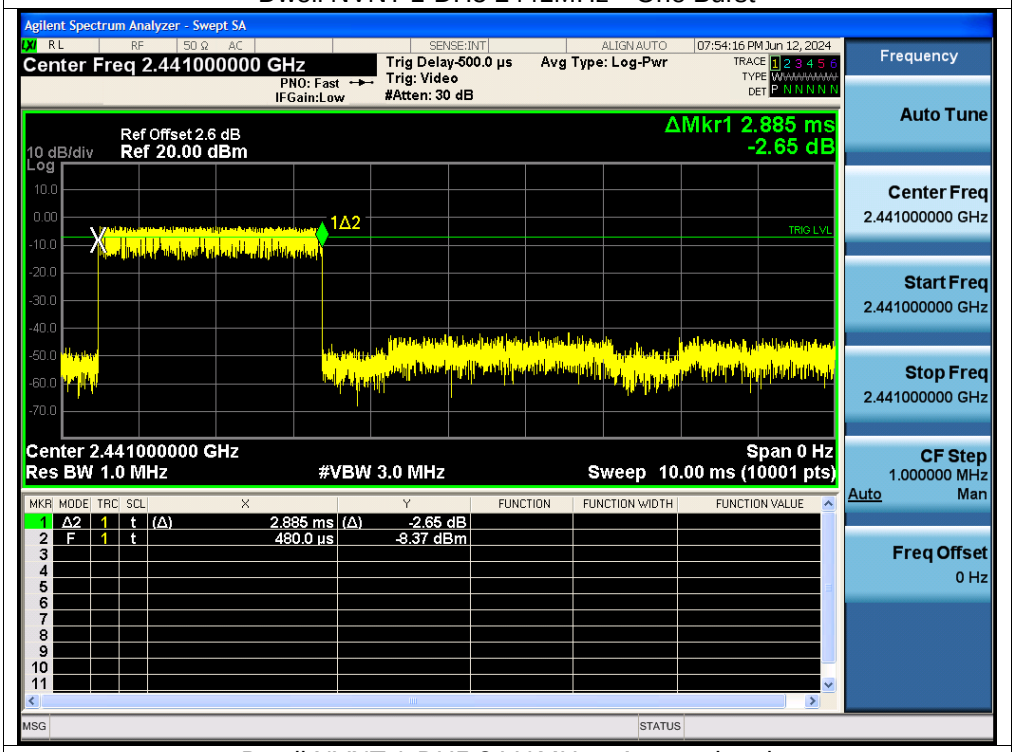
Dwell NVNT 1-DH3 2441MHz One Burst



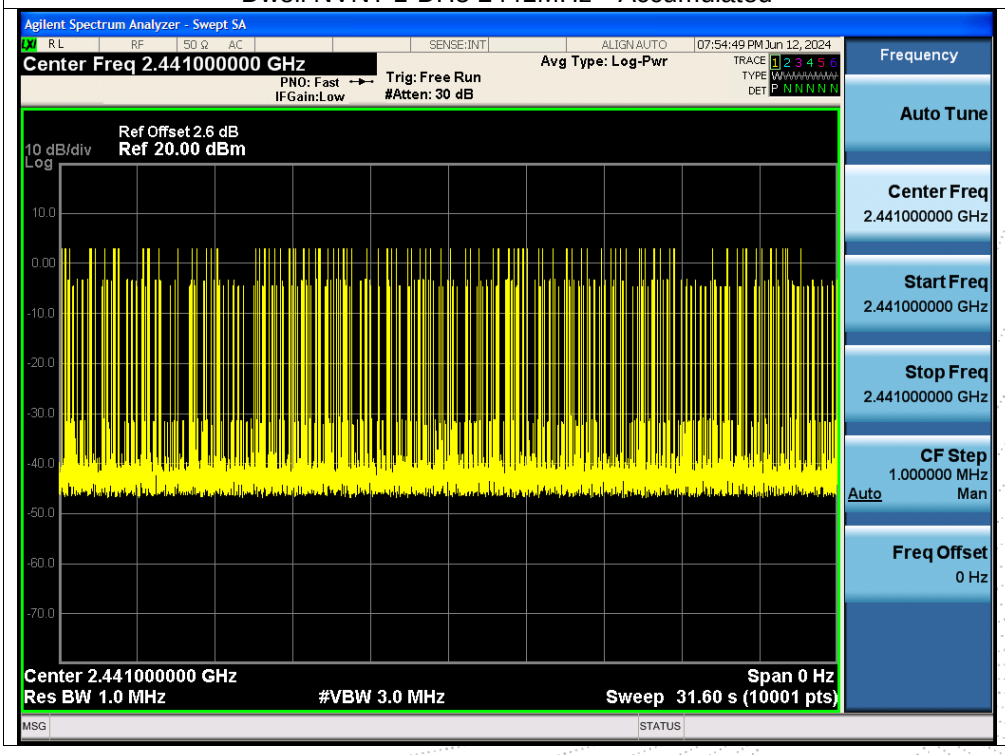
Dwell NVNT 1-DH3 2441MHz Accumulated



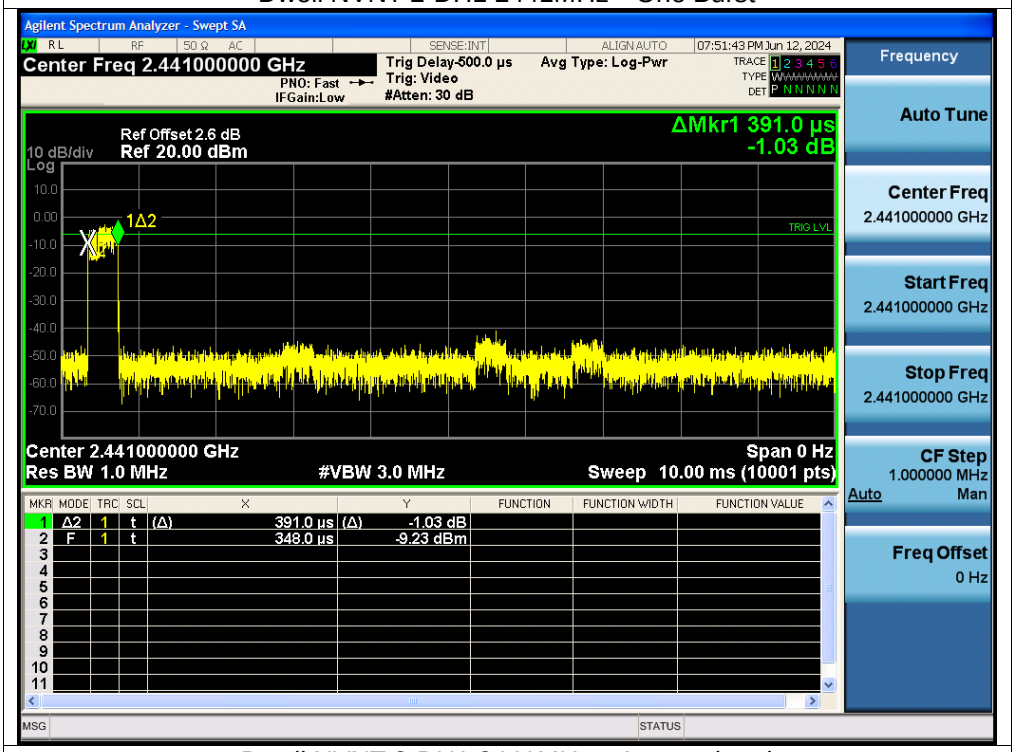
Dwell NVNT 1-DH5 2441MHz One Burst



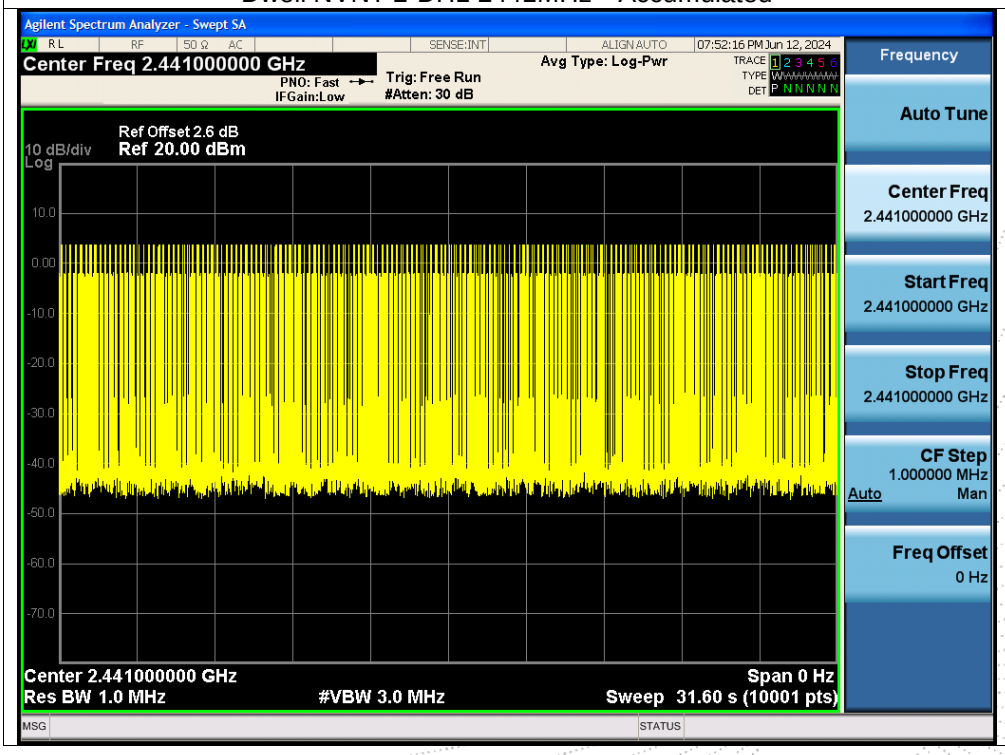
Dwell NVNT 1-DH5 2441MHz Accumulated



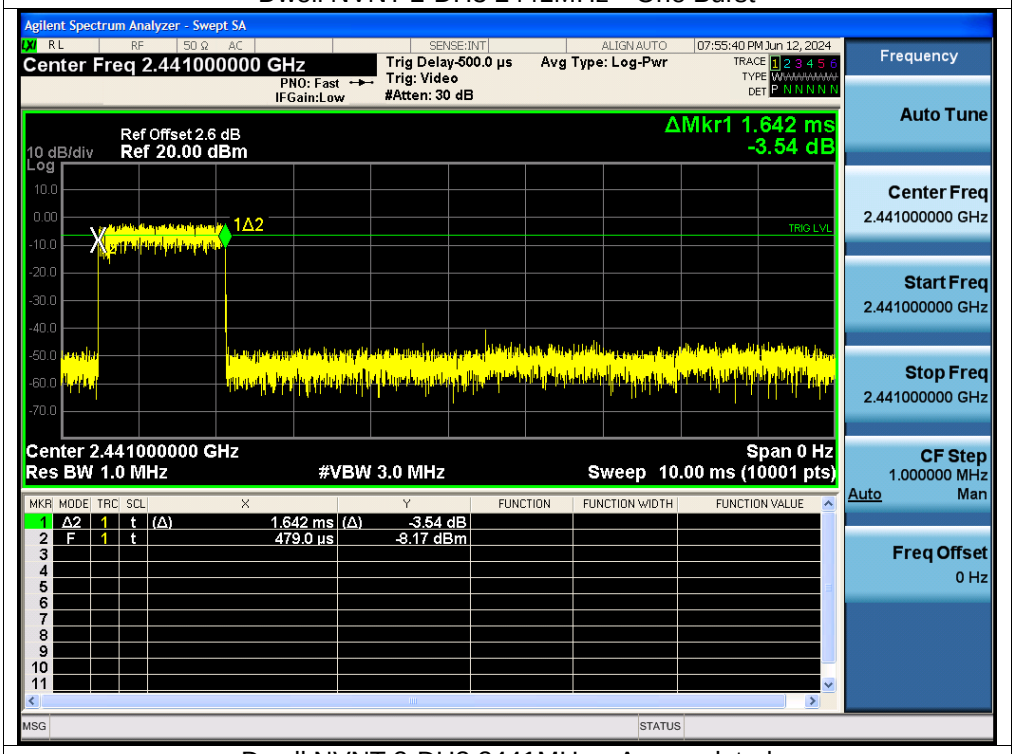
Dwell NVNT 2-DH1 2441MHz One Burst



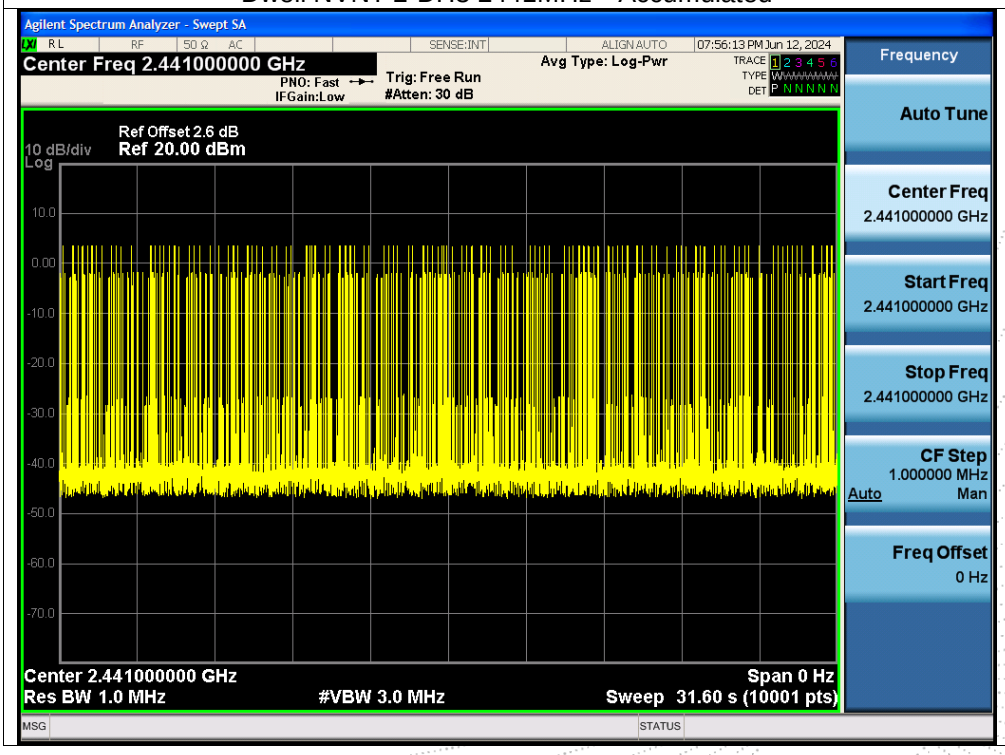
Dwell NVNT 2-DH1 2441MHz Accumulated



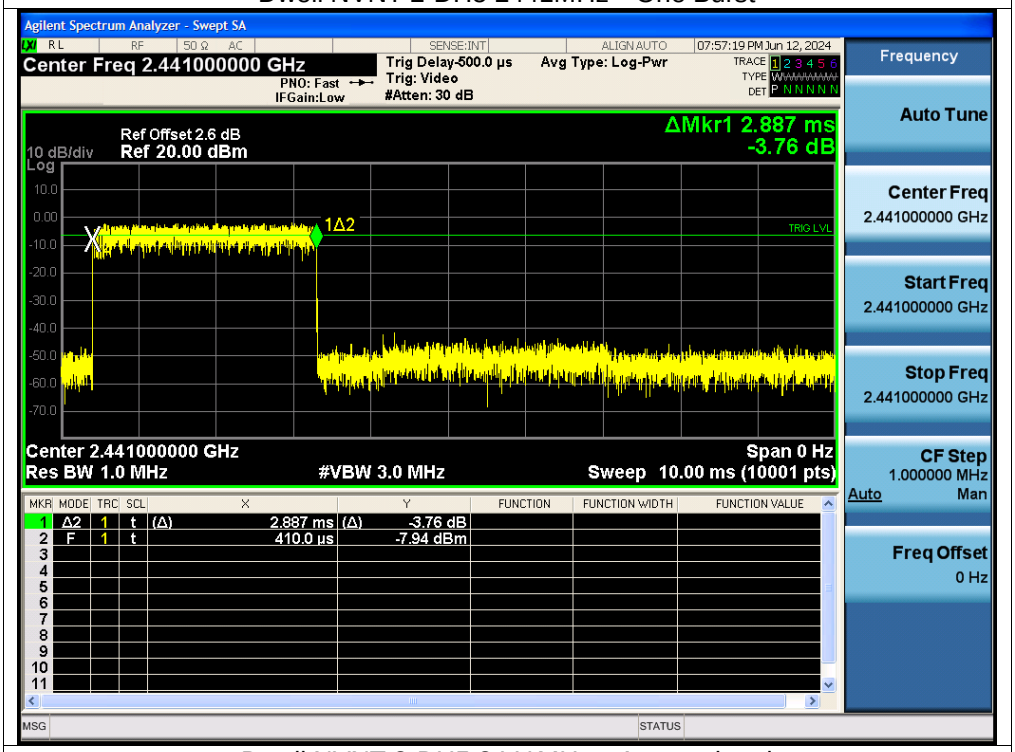
Dwell NVNT 2-DH3 2441MHz One Burst



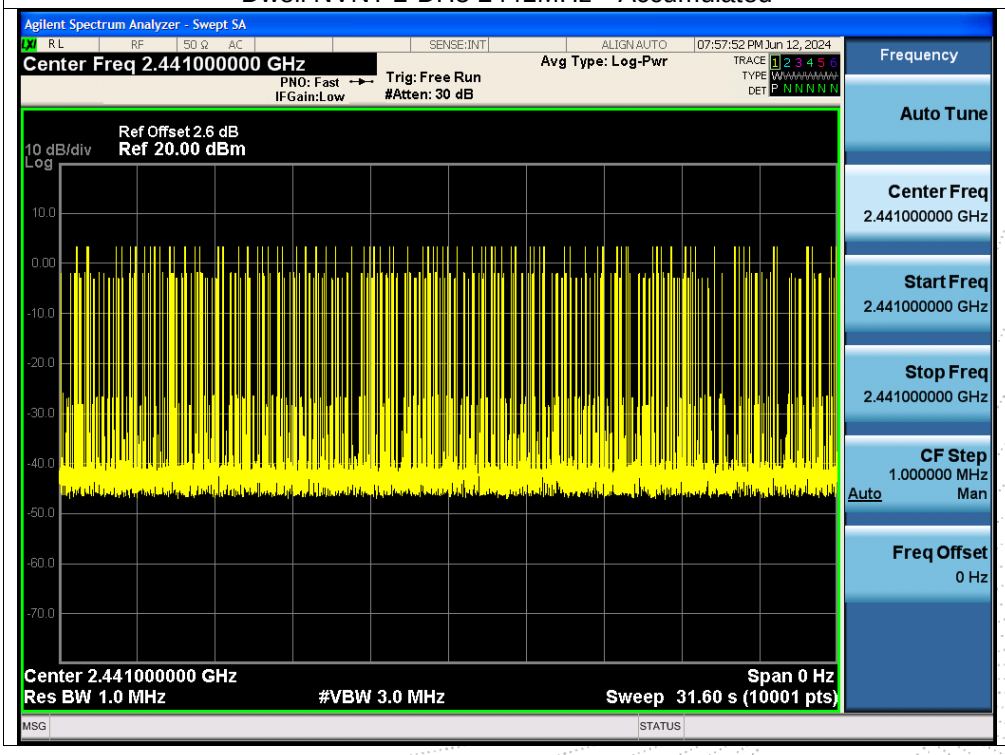
Dwell NVNT 2-DH3 2441MHz Accumulated



Dwell NVNT 2-DH5 2441MHz One Burst

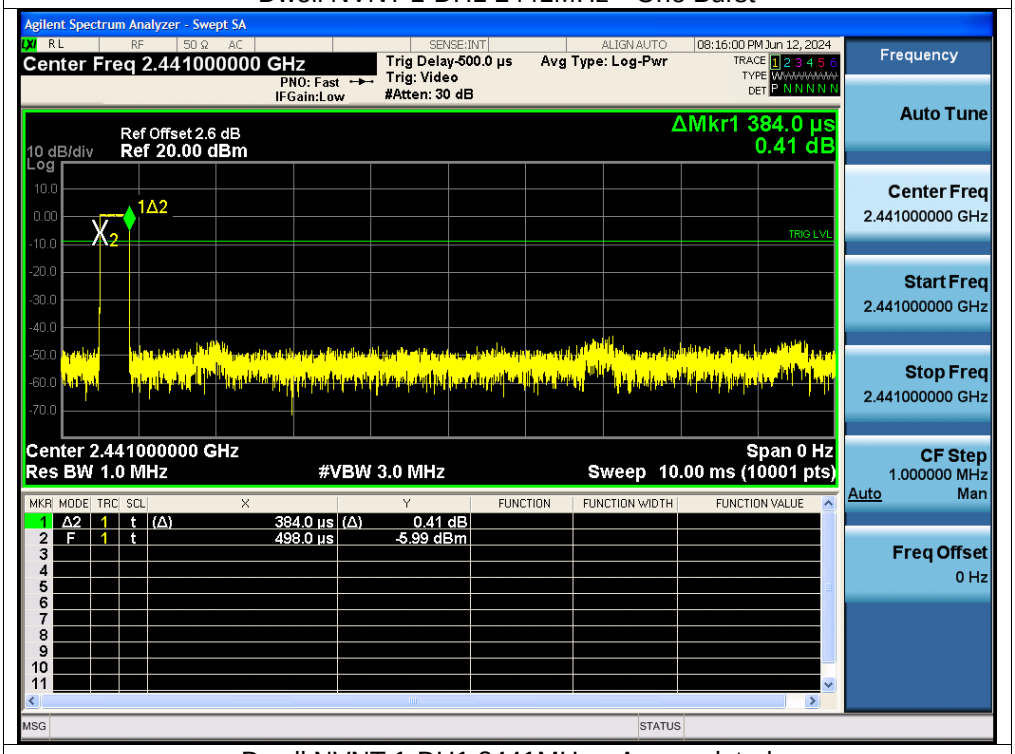


Dwell NVNT 2-DH5 2441MHz Accumulated

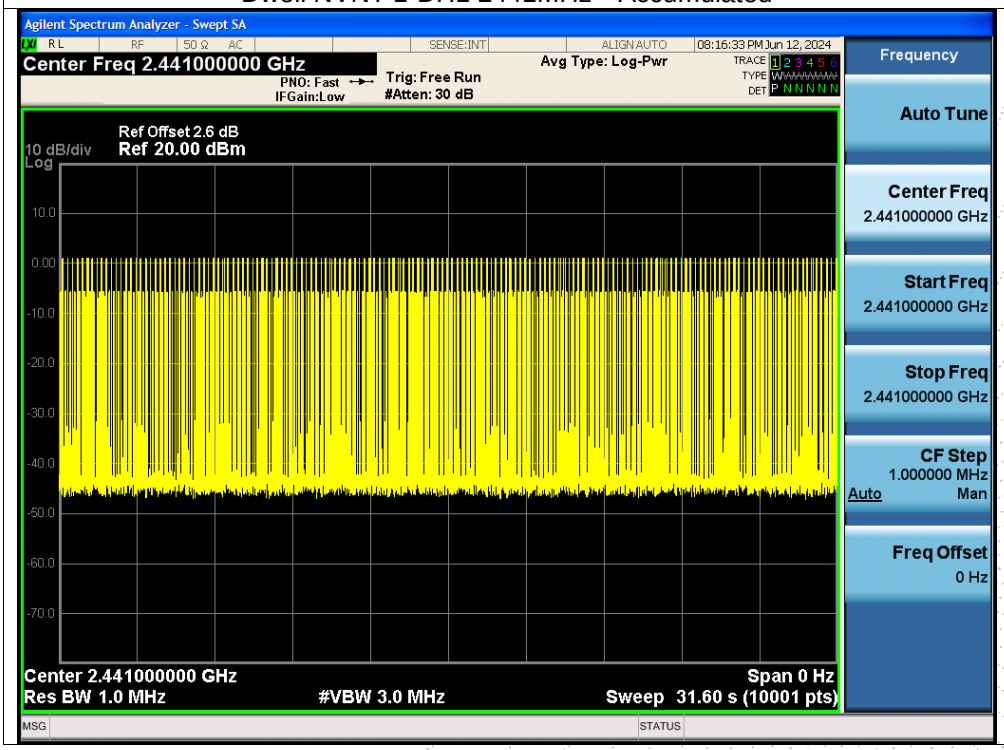


Right

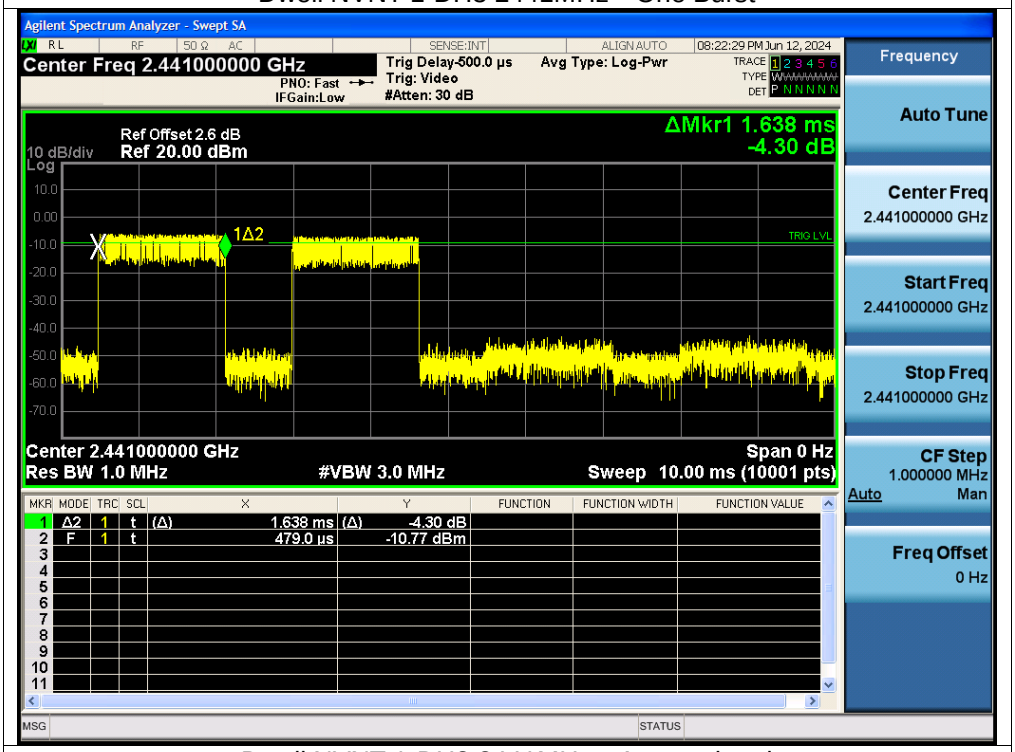
Test Graphs
Dwell NVNT 1-DH1 2441MHz One Burst



Dwell NVNT 1-DH1 2441MHz Accumulated



Dwell NVNT 1-DH3 2441MHz One Burst



Dwell NVNT 1-DH3 2441MHz Accumulated