



8. Maximum Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(1)
Test Method:	ANSI C63.10:2013

8.1 Block Diagram Of Test Setup



8.2 Limit

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

For FHSs operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W if the hopset uses 75 or more hopping channels; the maximum peak conducted output power shall not exceed 0.125 W if the hopset uses less than 75 hopping channels. The e.i.r.p. shall not exceed 4 W.

8.3 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.

8.4 DEVIATION FROM STANDARD

No deviation.

8.5 Test Result

Mode	Test channel	Peak Output Power (dBm)	FCC Limit (dBm)	Result
GFSK	Lowest	-0.22	21.00	Pass
	Middle	0.4		
	Highest	0.27		
$\pi/4$ DQPSK	Lowest	1.69	21.00	Pass
	Middle	2.53		
	Highest	2.38		
8DPSK	Lowest	2.33	21.00	Pass
	Middle	3.13		
	Highest	3.01		

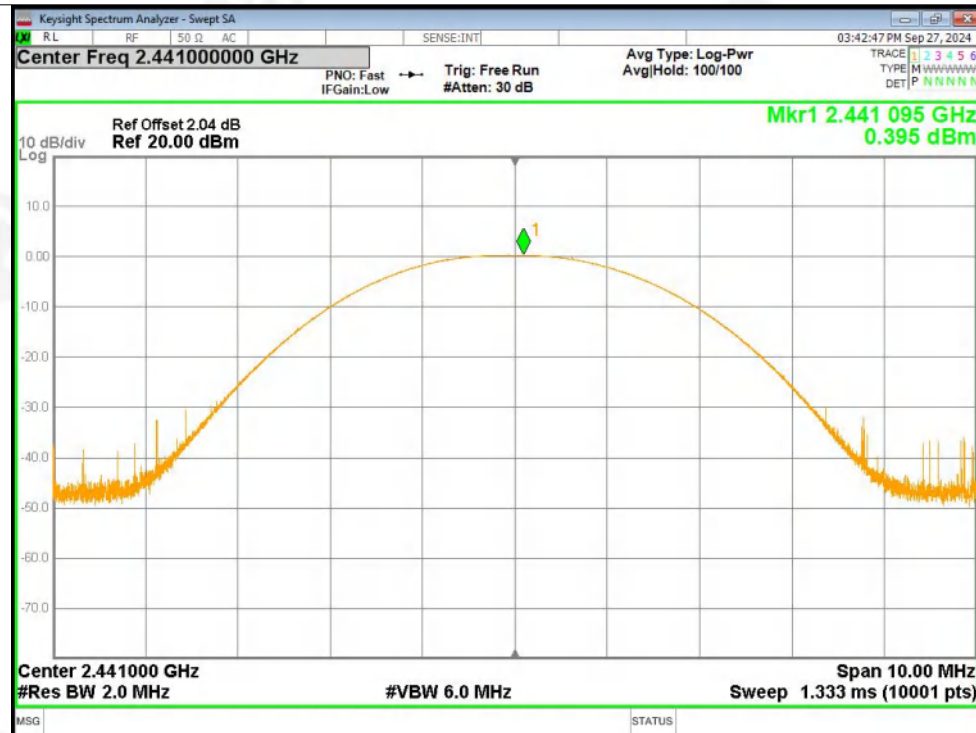


Test Graphs

Peak Power NVNT 1-DH5 2402MHz Ant1



Peak Power NVNT 1-DH5 2441MHz Ant1

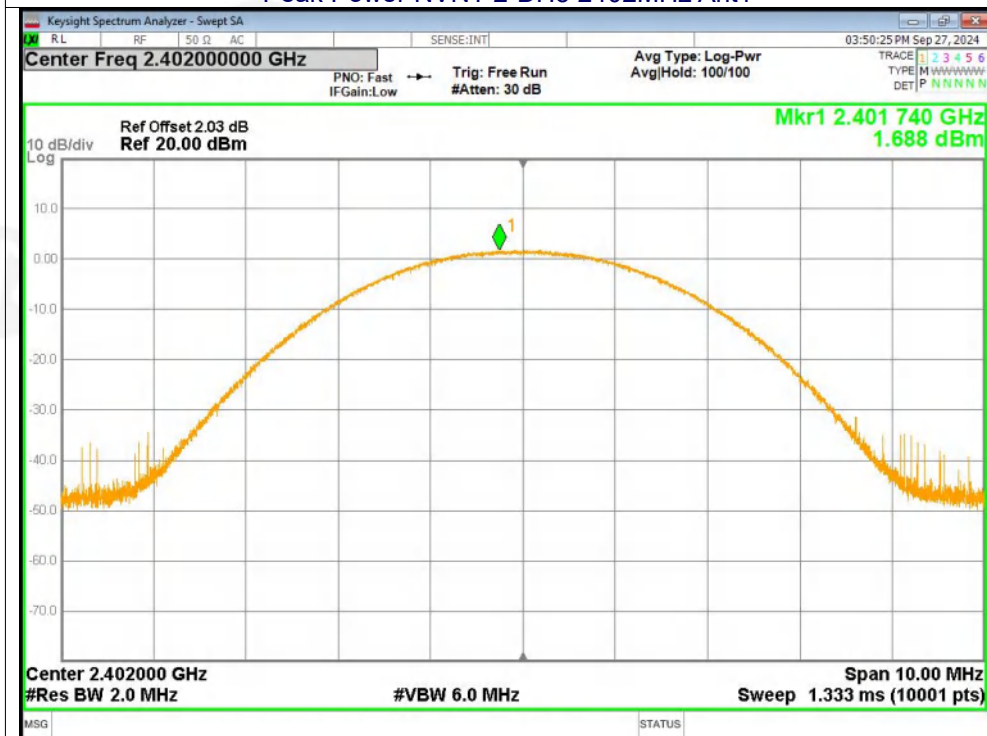




Peak Power NVNT 1-DH5 2480MHz Ant1

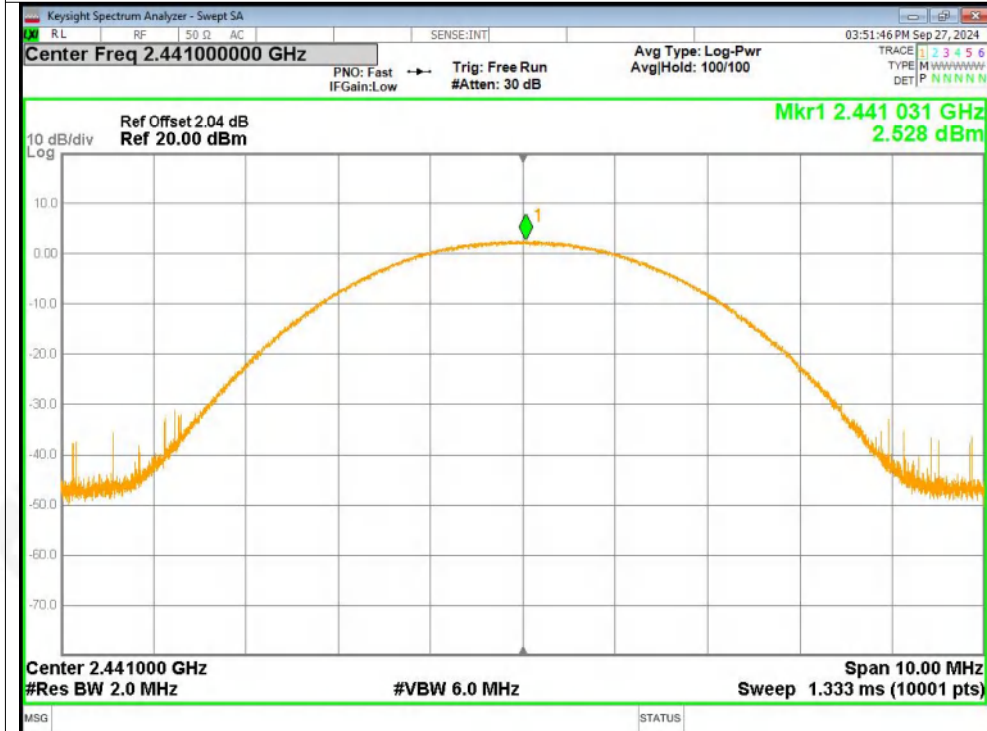


Peak Power NVNT 2-DH5 2402MHz Ant1

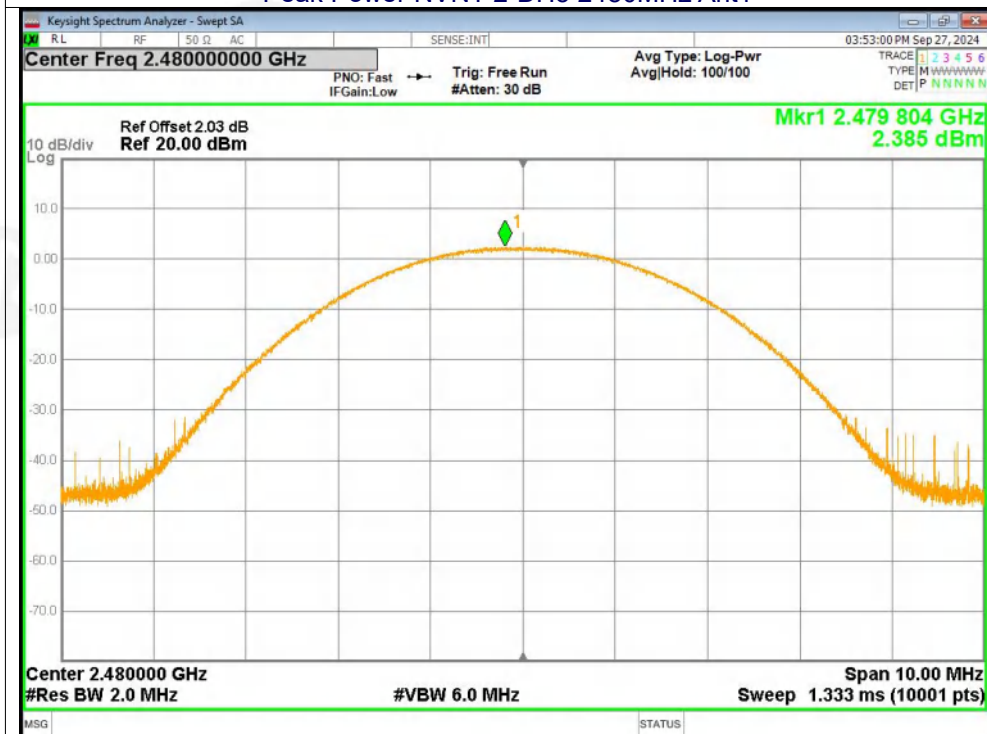




Peak Power NVNT 2-DH5 2441MHz Ant1

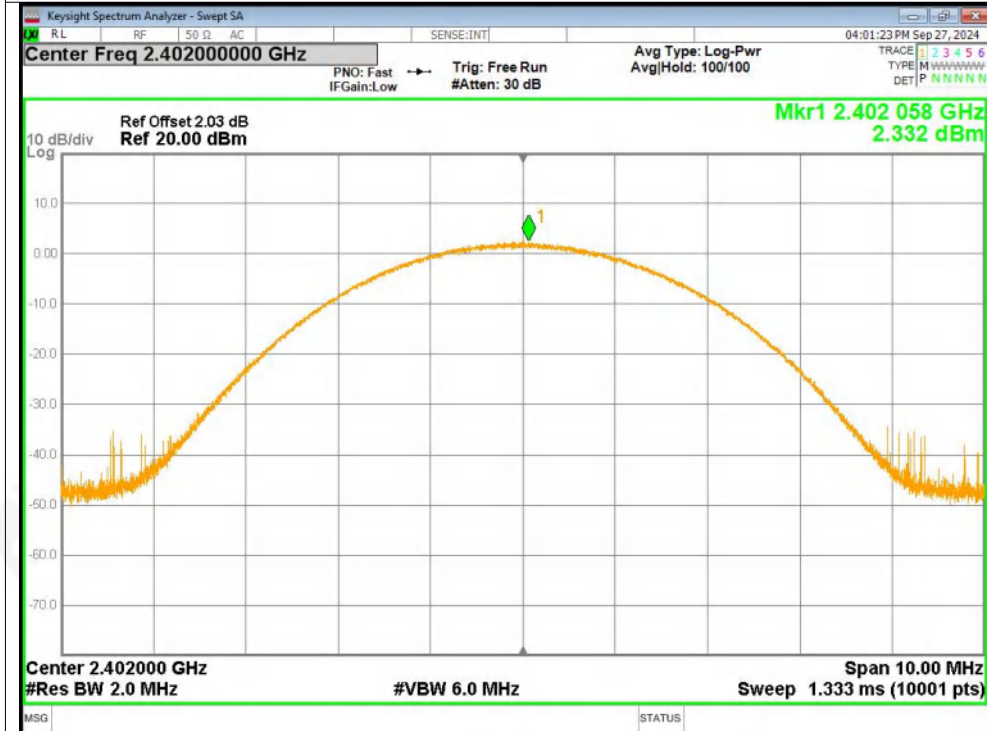


Peak Power NVNT 2-DH5 2480MHz Ant1

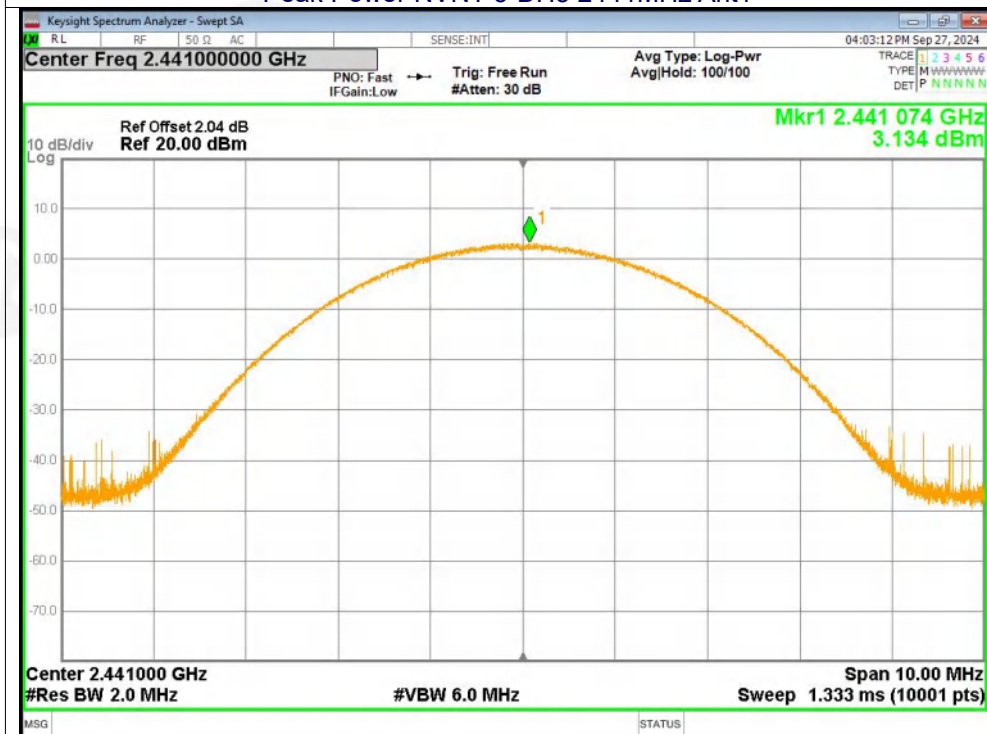


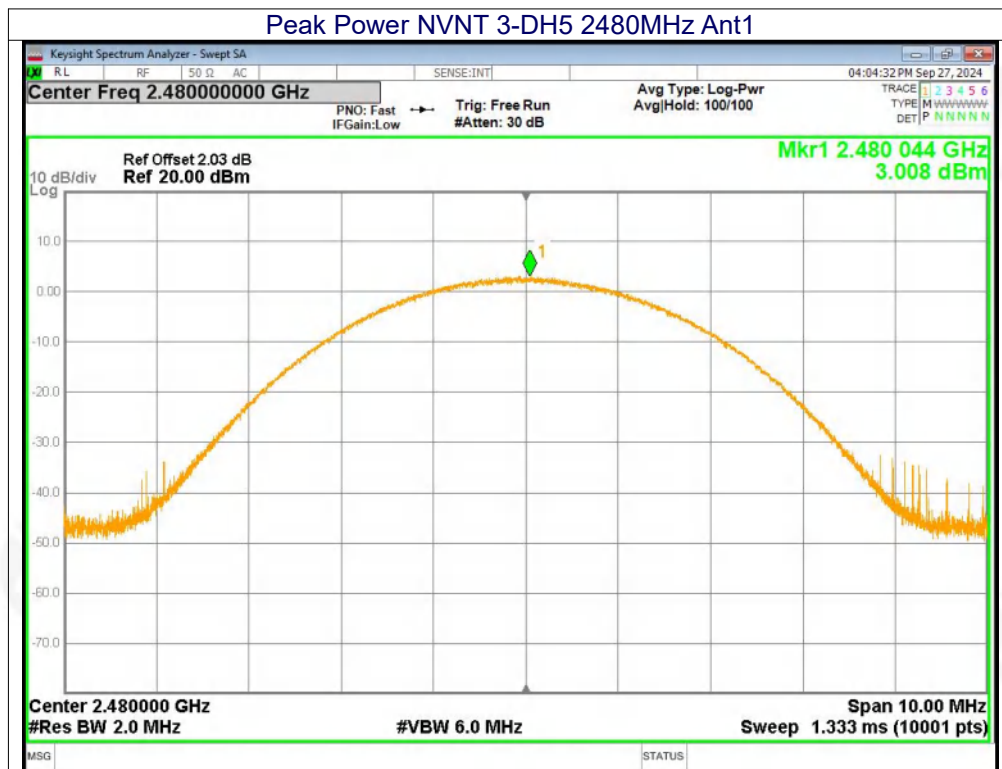


Peak Power NVNT 3-DH5 2402MHz Ant1



Peak Power NVNT 3-DH5 2441MHz Ant1







9. Hopping Channel Separation

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100KHz, VBW=300KHz, detector=Peak
Limit:	GFSK, $\pi/4$ -DQPSK: 0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)

9.1 Test Setup



9.2 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.

9.3 DEVIATION FROM STANDARD

No deviation.

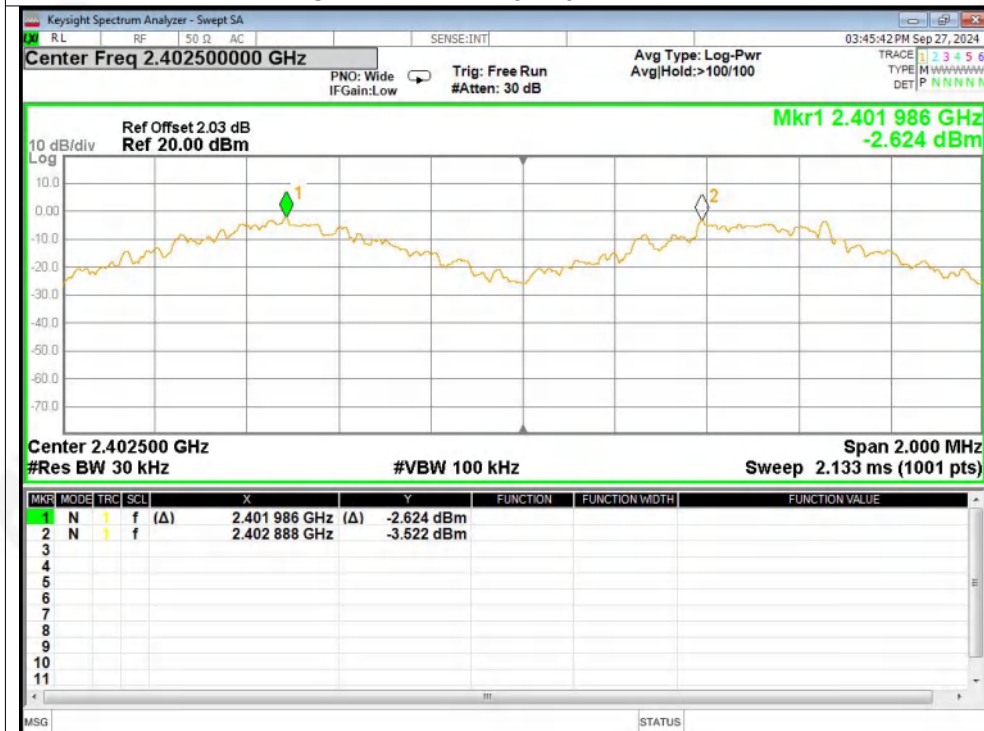


9.4 Test Result

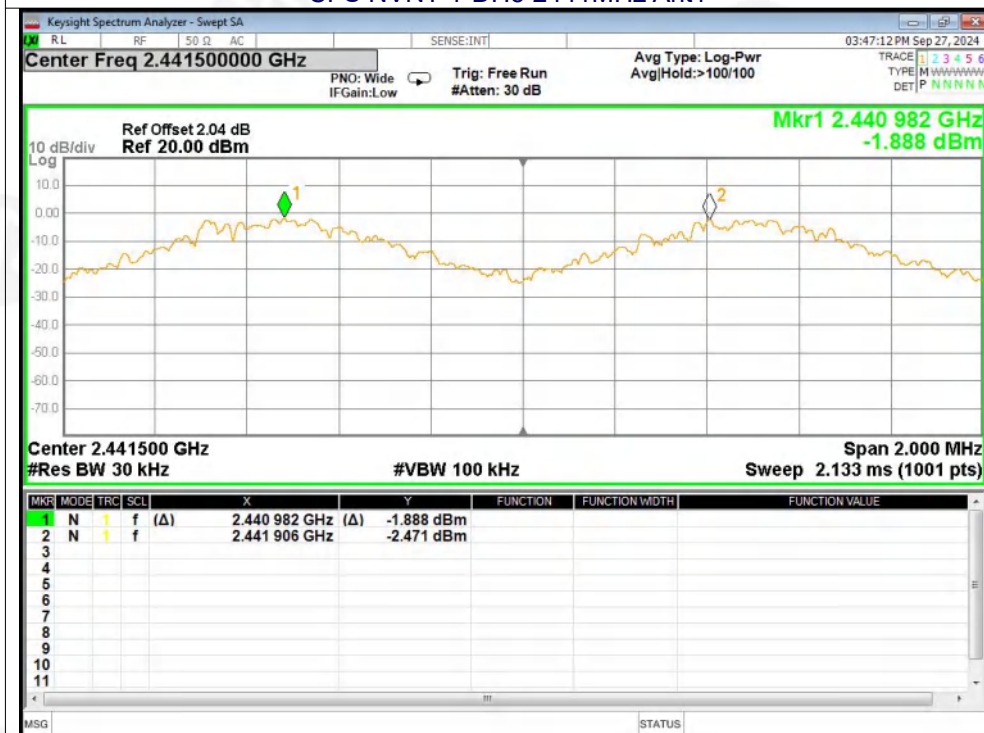
Modulation	Test Channel	Separation (MHz)	Limit(MHz)	Result
GFSK	Low	0.902	0.63	PASS
GFSK	Middle	0.924	0.631	PASS
GFSK	High	1.084	0.634	PASS
$\pi/4$ DQPSK	Low	1.106	0.871	PASS
$\pi/4$ DQPSK	Middle	1.118	0.871	PASS
$\pi/4$ DQPSK	High	1.01	0.875	PASS
8DPSK	Low	1	0.871	PASS
8DPSK	Middle	0.984	0.867	PASS
8DPSK	High	0.926	0.861	PASS



Test Graphs CFS NVNT 1-DH5 2402MHz Ant1

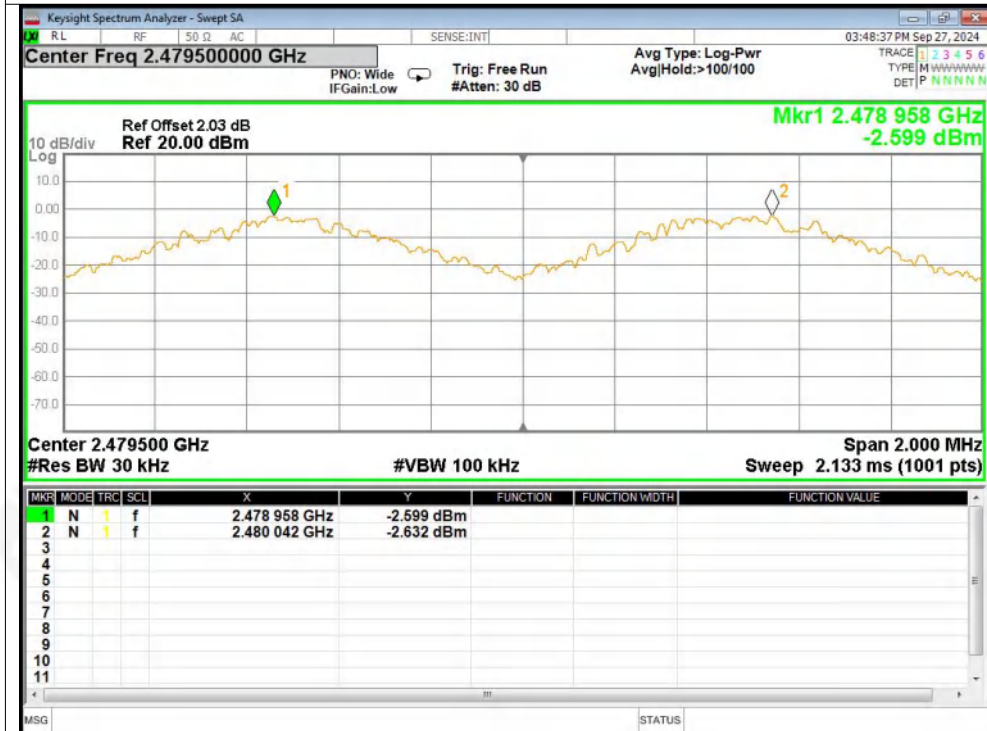


CFS NVNT 1-DH5 2441MHz Ant1

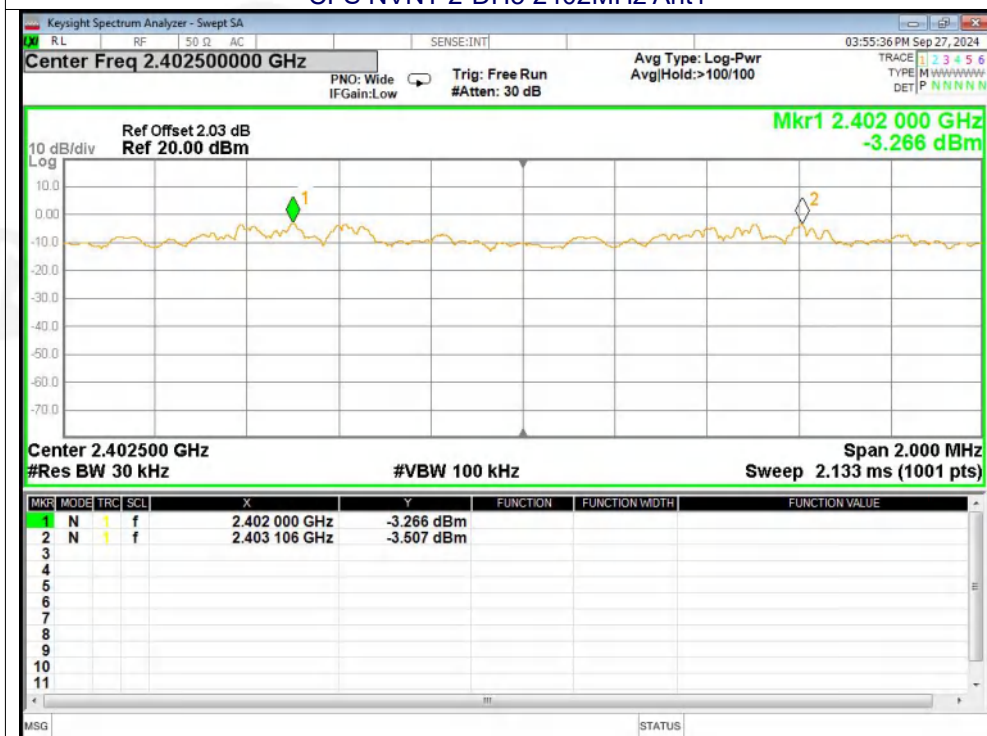




CFS NVNT 1-DH5 2480MHz Ant1

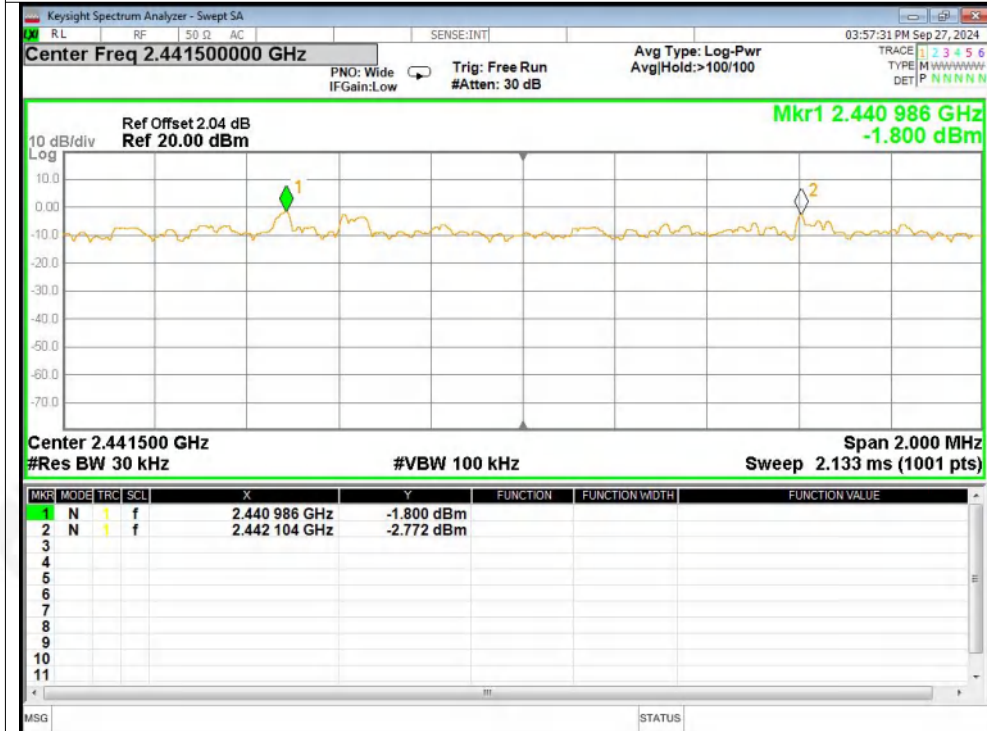


CFS NVNT 2-DH5 2402MHz Ant1

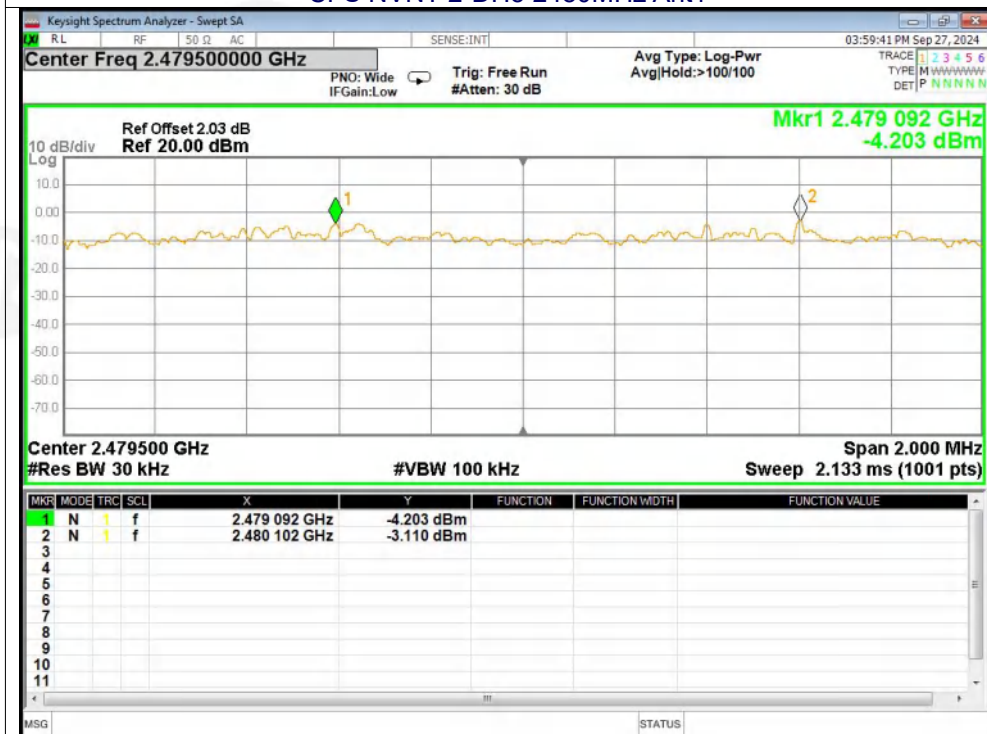




CFS NVNT 2-DH5 2441MHz Ant1

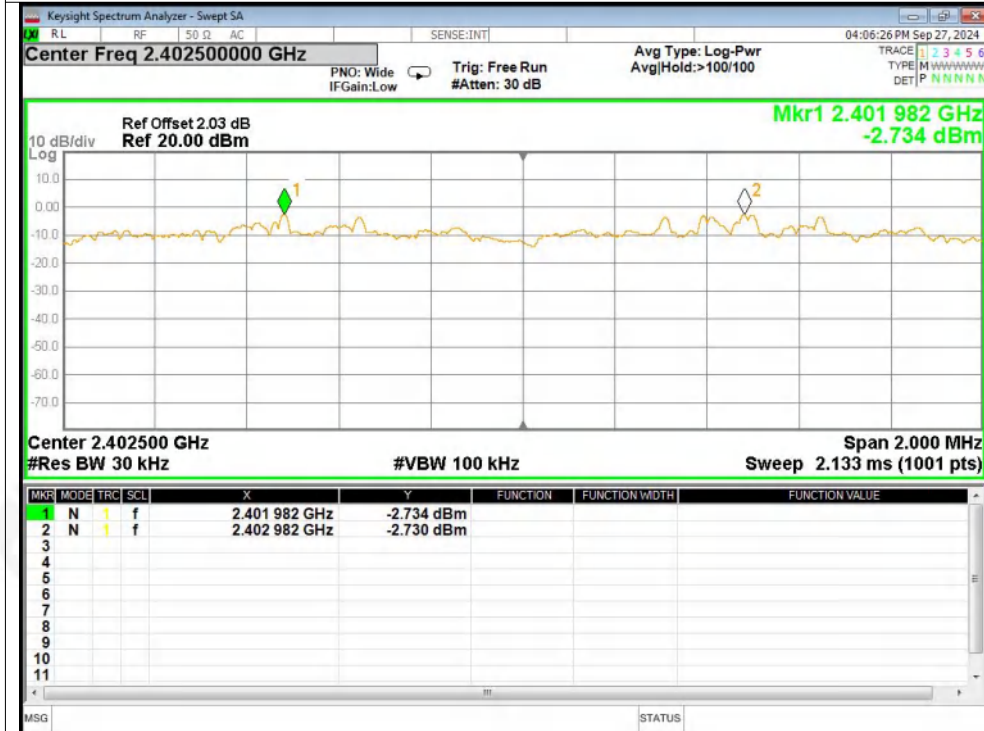


CFS NVNT 2-DH5 2480MHz Ant1

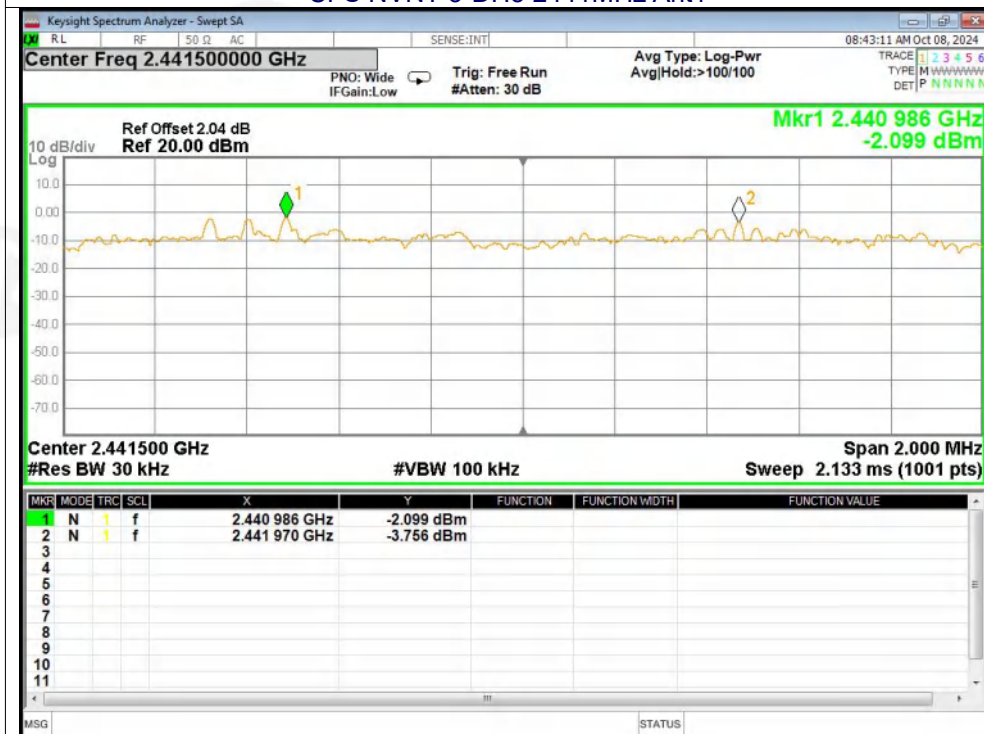


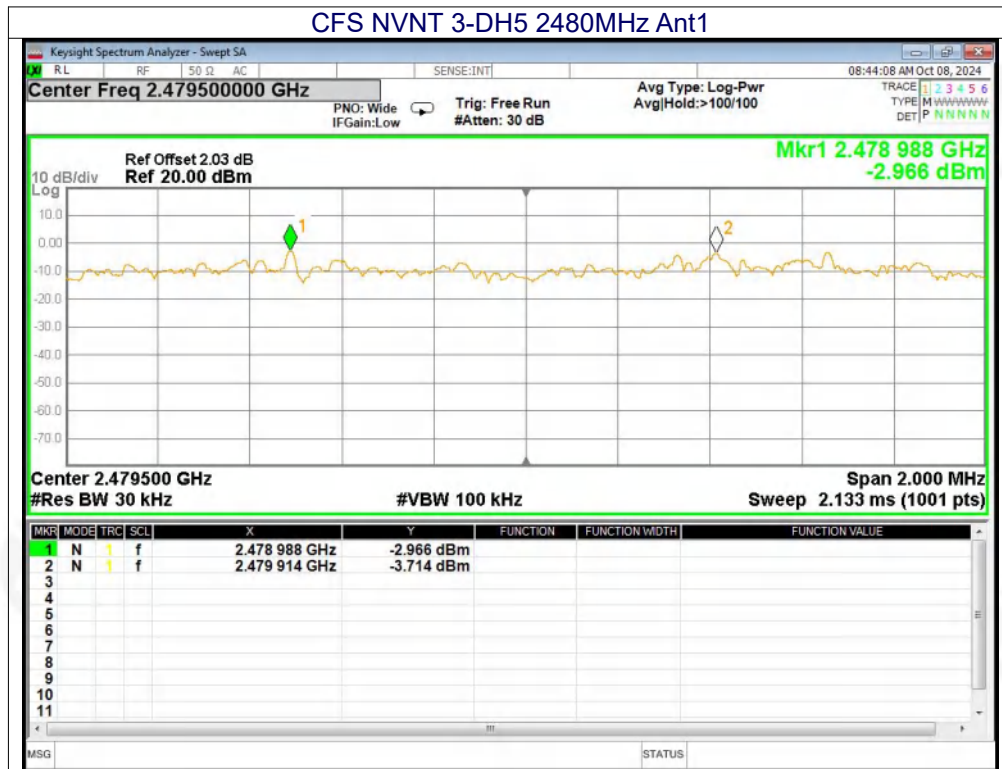


CFS NVNT 3-DH5 2402MHz Ant1



CFS NVNT 3-DH5 2441MHz Ant1







10.NUMBER OF HOPPING FREQUENCY

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels

10.1 Test Setup



10.2 Test procedure

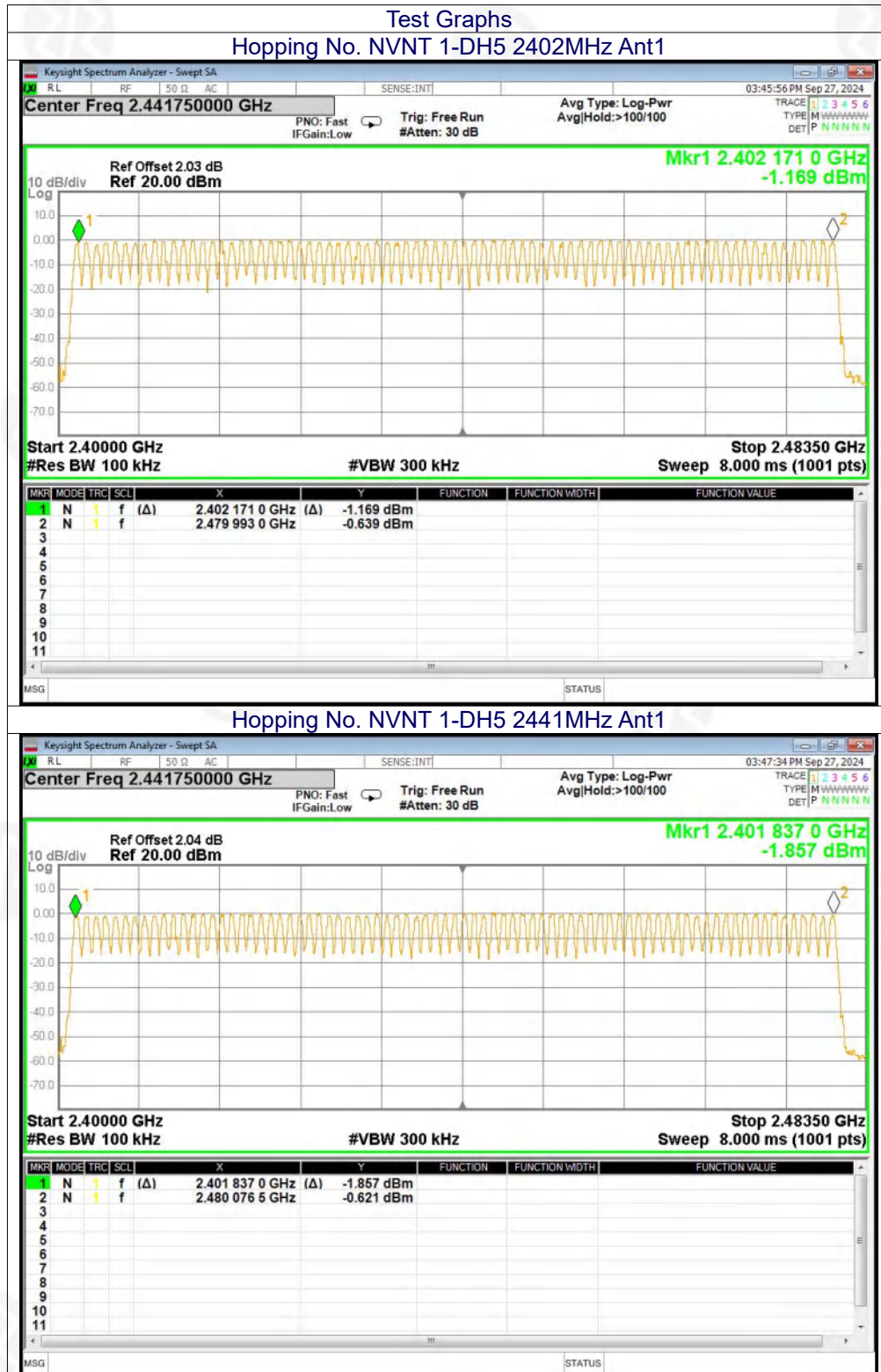
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100kHz. VBW = 300kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to 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;

10.3 DEVIATION FROM STANDARD

No deviation.

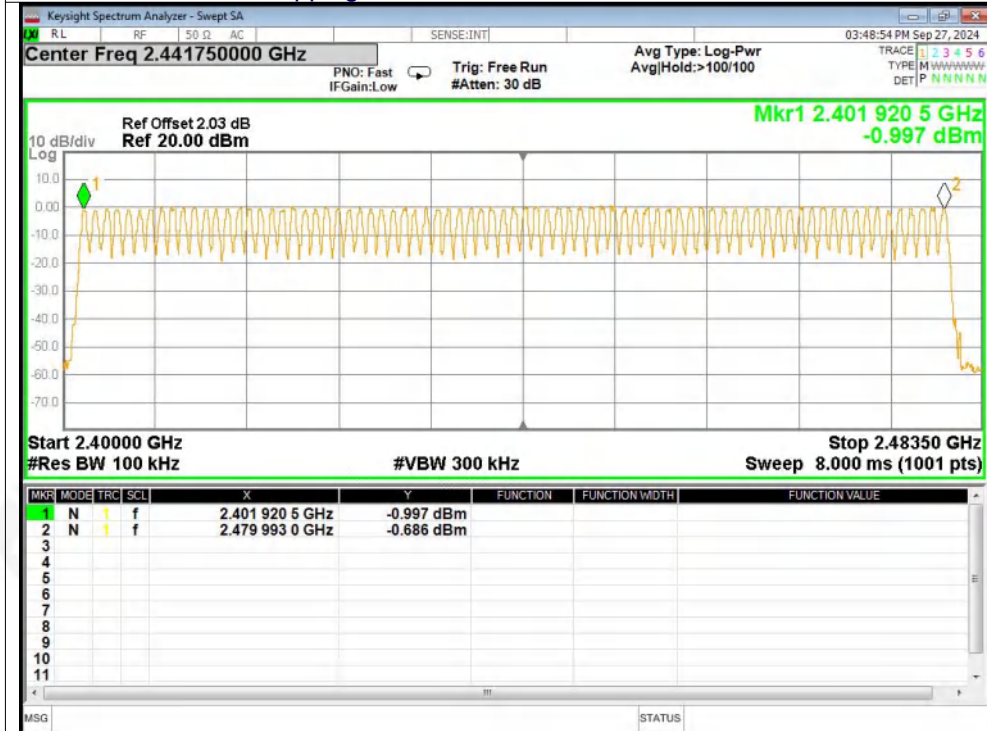


10.4 Test Result

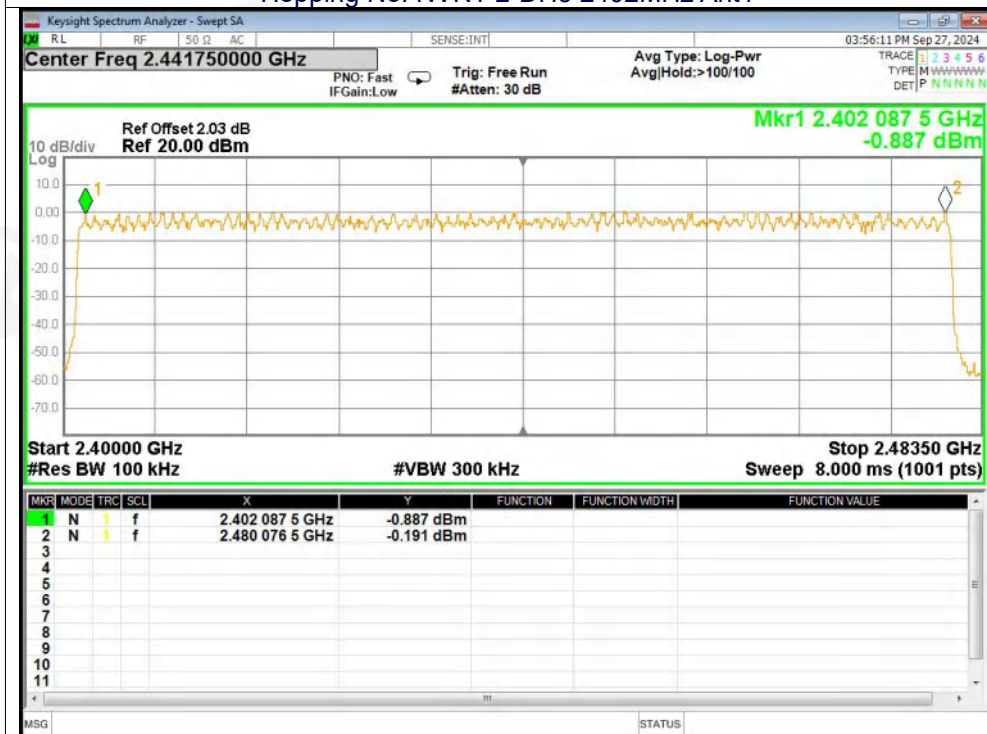




Hopping No. NVNT 1-DH5 2480MHz Ant1



Hopping No. NVNT 2-DH5 2402MHz Ant1

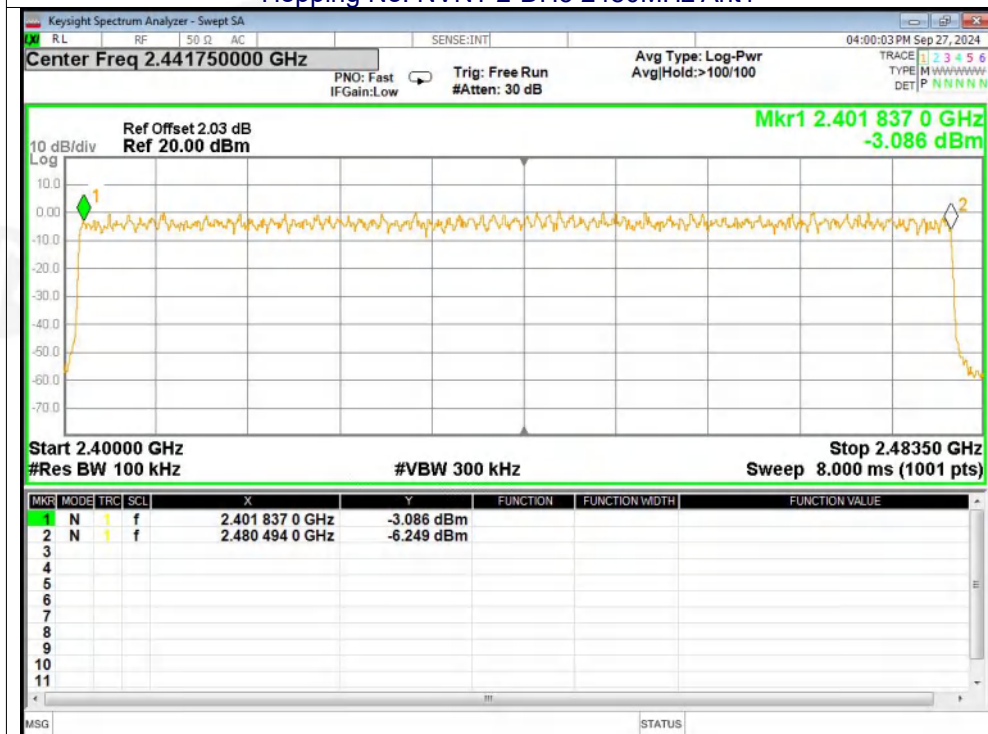




Hopping No. NVNT 2-DH5 2441MHz Ant1

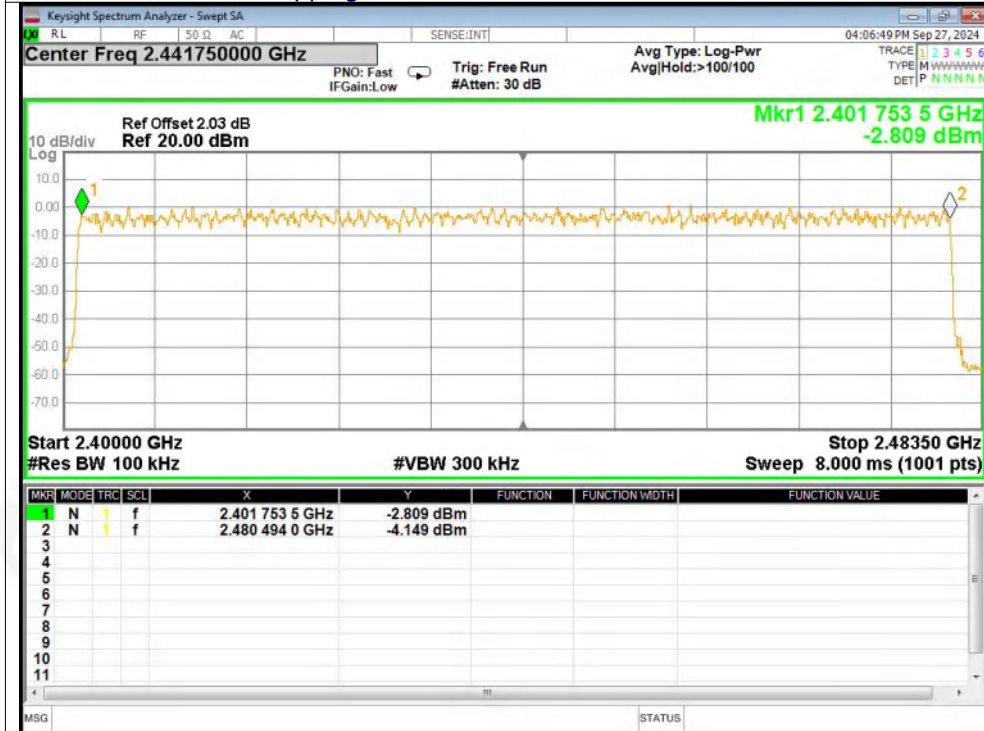


Hopping No. NVNT 2-DH5 2480MHz Ant1

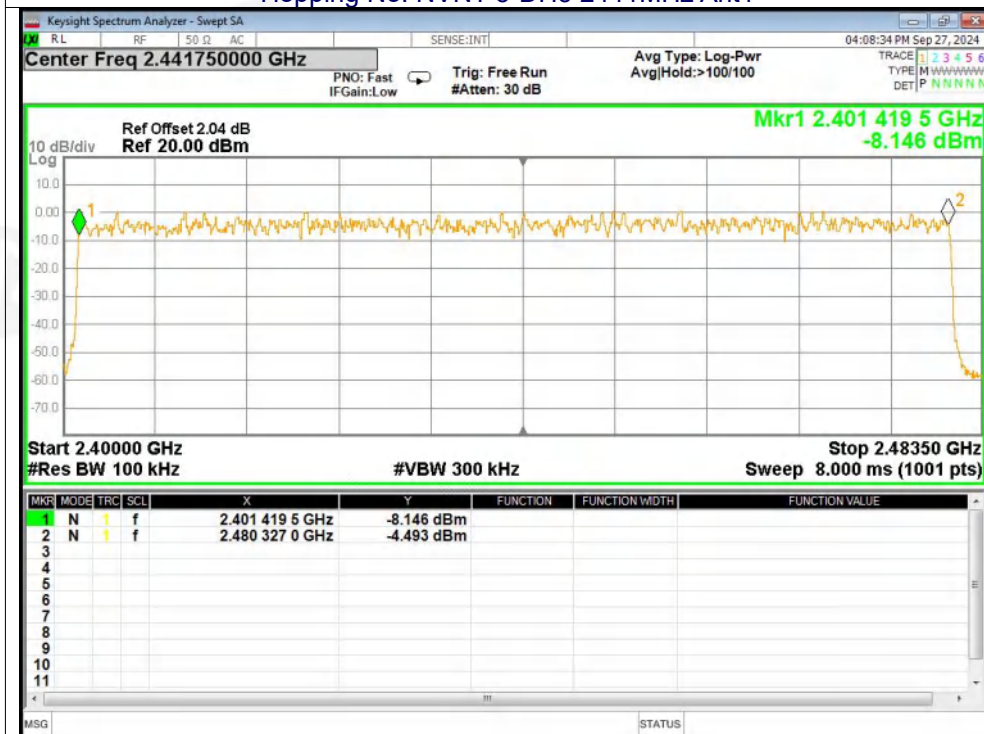


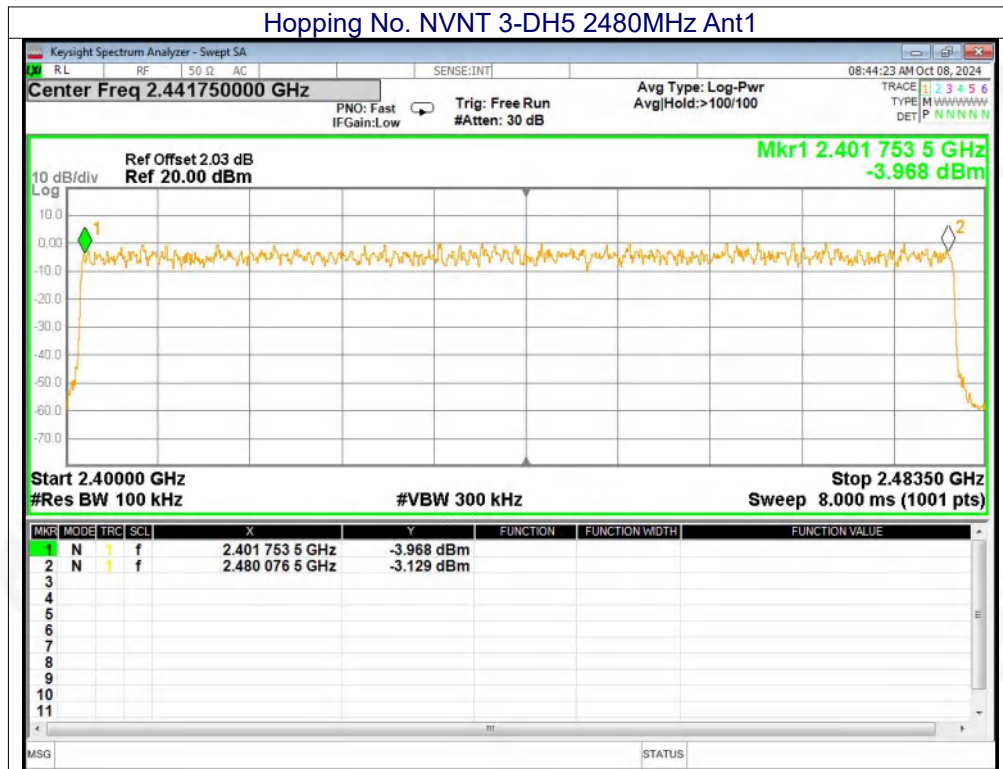


Hopping No. NVNT 3-DH5 2402MHz Ant1



Hopping No. NVNT 3-DH5 2441MHz Ant1







11. DWELL TIME

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=1MHz, VBW=3MHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second

11.1 Test Setup



11.2 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 = 0Hz;
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).

11.3 DEVIATION FROM STANDARD

No deviation.



11.4 Test Result

Mode	Frequency (MHz)	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
1-DH1	2441	0.4	128	320	31600	400	Pass
1-DH3	2441	1.657	258.492	156	31600	400	Pass
1-DH5	2441	2.901	322.011	111	31600	400	Pass
2-DH1	2441	0.407	129.426	318	31600	400	Pass
2-DH3	2441	1.662	257.61	155	31600	400	Pass
2-DH5	2441	2.907	316.863	109	31600	400	Pass
3-DH1	2441	0.407	129.426	318	31600	400	Pass
3-DH3	2441	1.66	270.58	163	31600	400	Pass
3-DH5	2441	2.911	299.833	103	31600	400	Pass

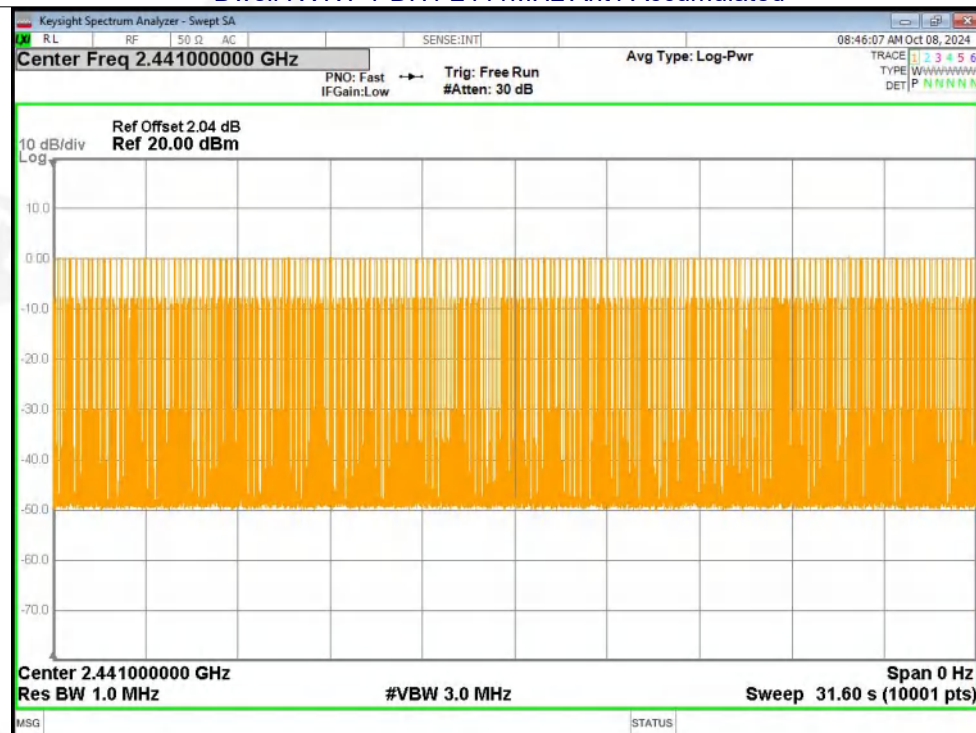


Test Graphs

Dwell NVNT 1-DH1 2441MHz Ant1 One Burst



Dwell NVNT 1-DH1 2441MHz Ant1 Accumulated

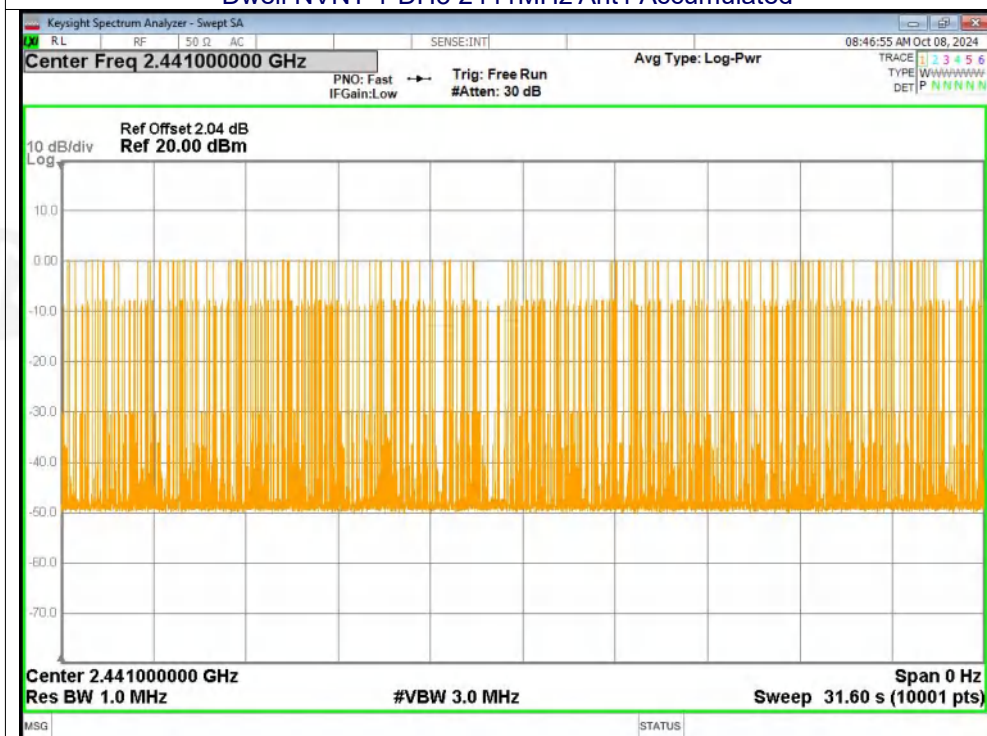




Dwell NVNT 1-DH3 2441MHz Ant1 One Burst



Dwell NVNT 1-DH3 2441MHz Ant1 Accumulated





Dwell NVNT 1-DH5 2441MHz Ant1 One Burst



Dwell NVNT 1-DH5 2441MHz Ant1 Accumulated

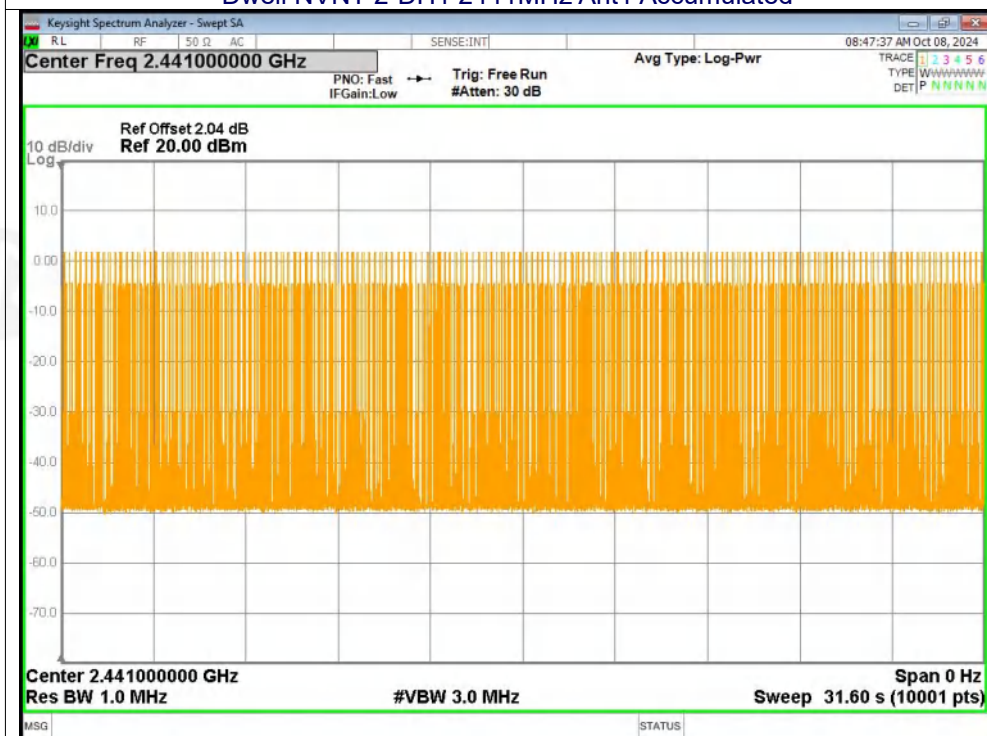




Dwell NVNT 2-DH1 2441MHz Ant1 One Burst

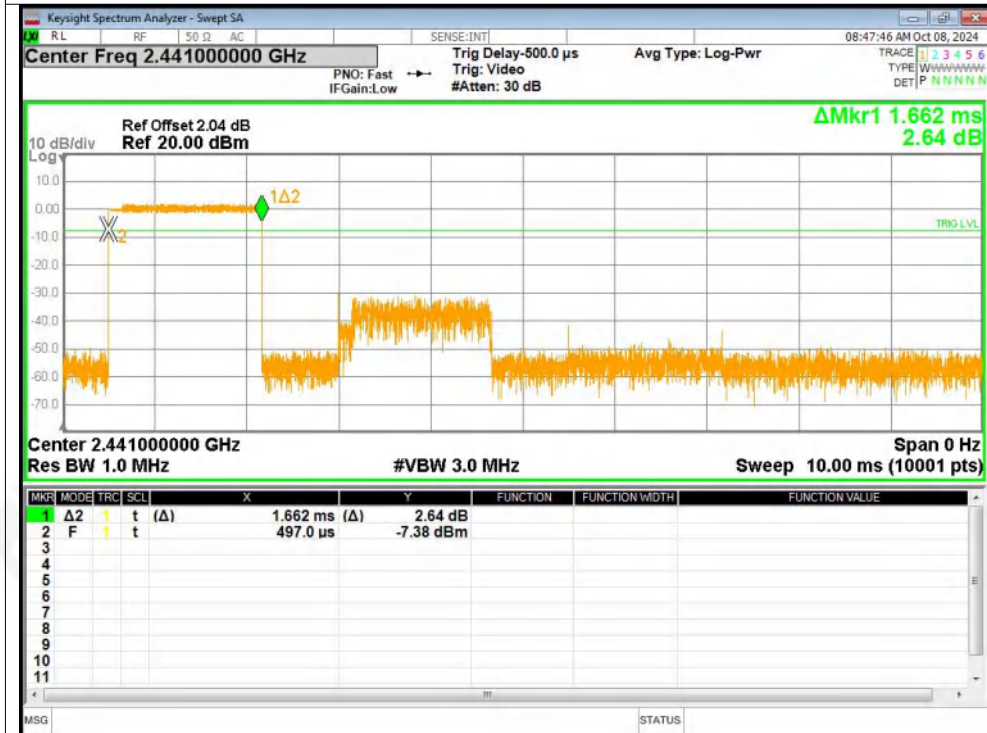


Dwell NVNT 2-DH1 2441MHz Ant1 Accumulated

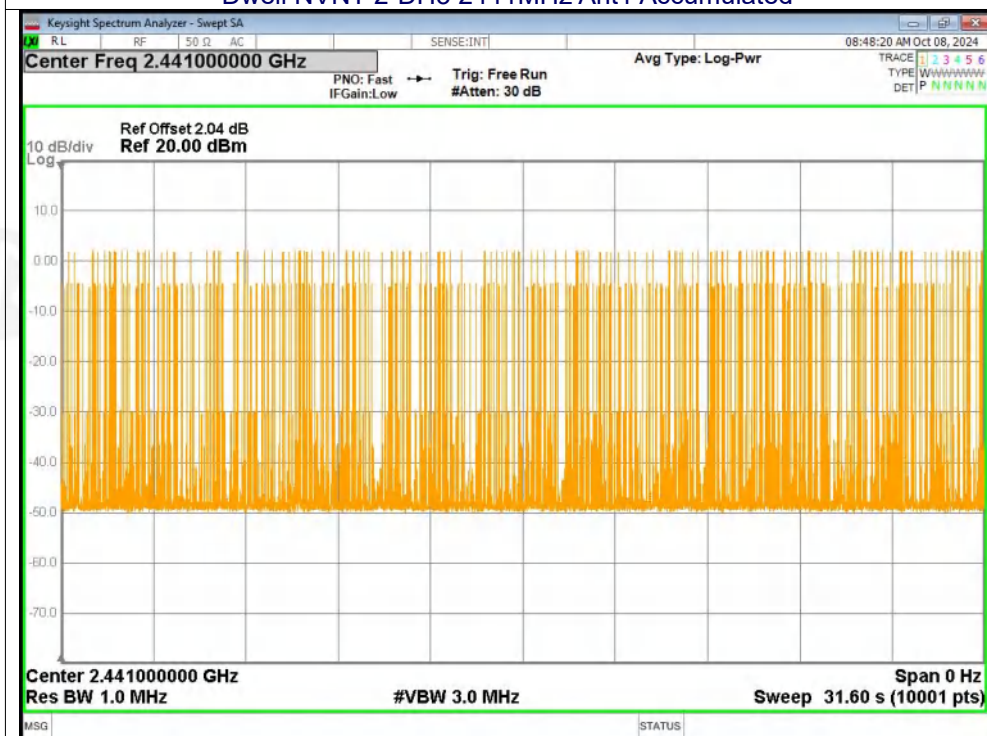




Dwell NVNT 2-DH3 2441MHz Ant1 One Burst



Dwell NVNT 2-DH3 2441MHz Ant1 Accumulated

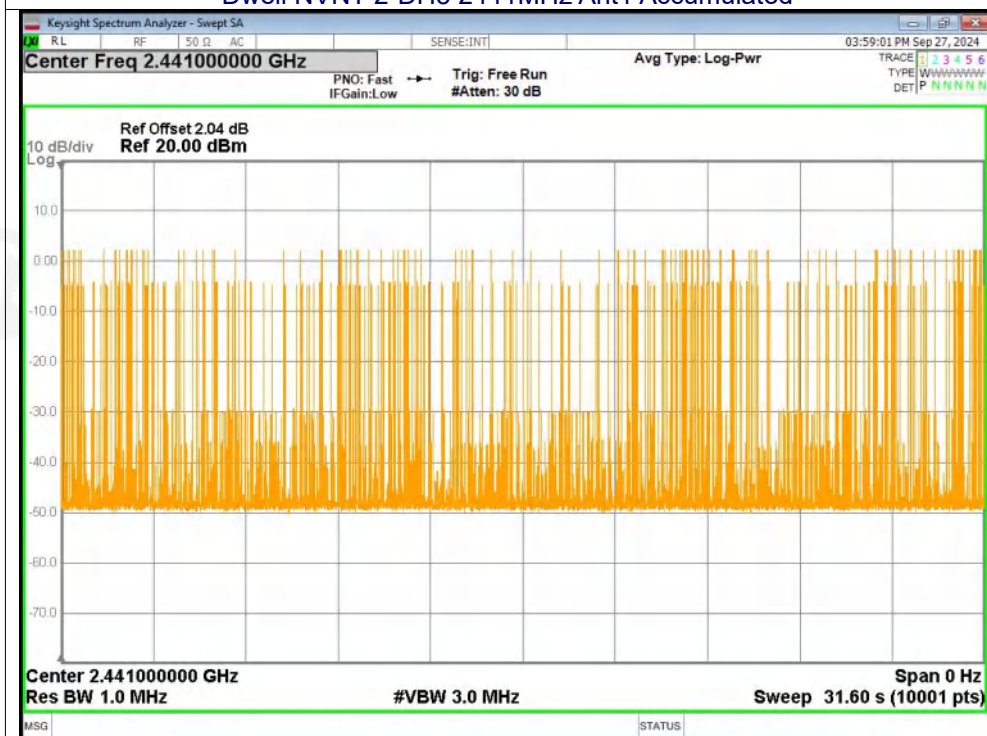




Dwell NVNT 2-DH5 2441MHz Ant1 One Burst

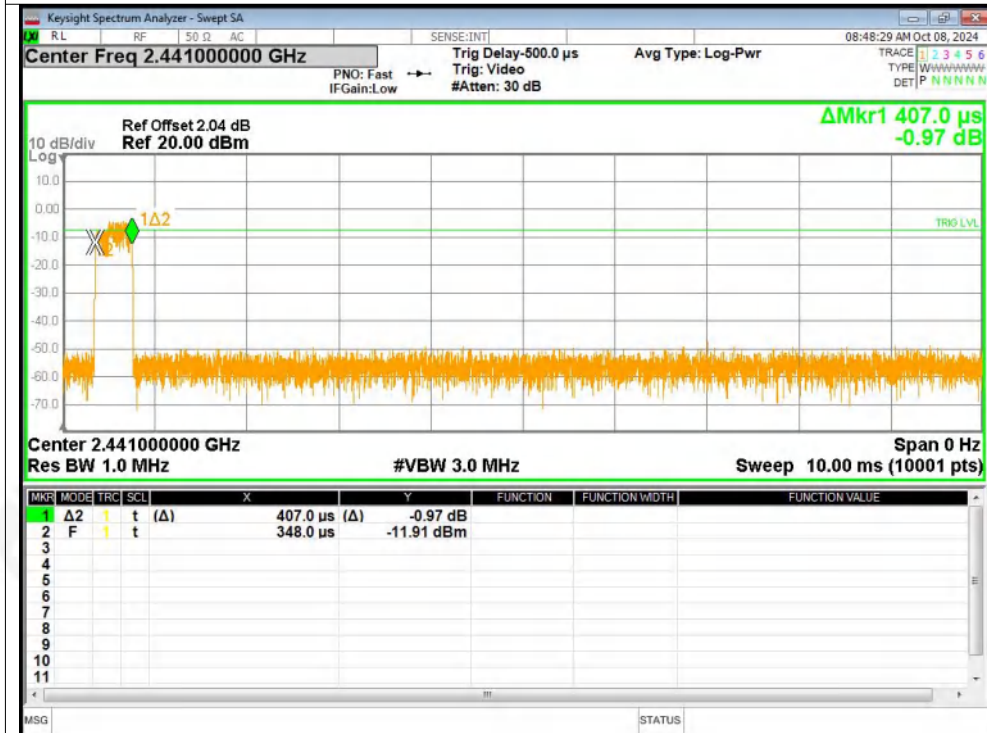


Dwell NVNT 2-DH5 2441MHz Ant1 Accumulated

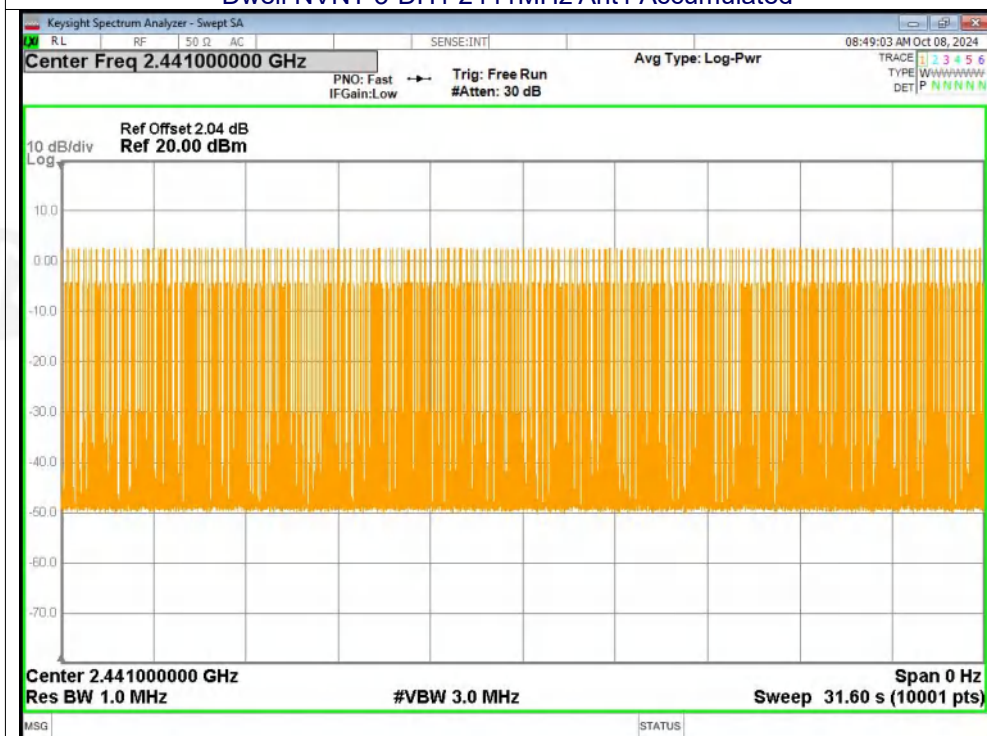




Dwell NVNT 3-DH1 2441MHz Ant1 One Burst



Dwell NVNT 3-DH1 2441MHz Ant1 Accumulated

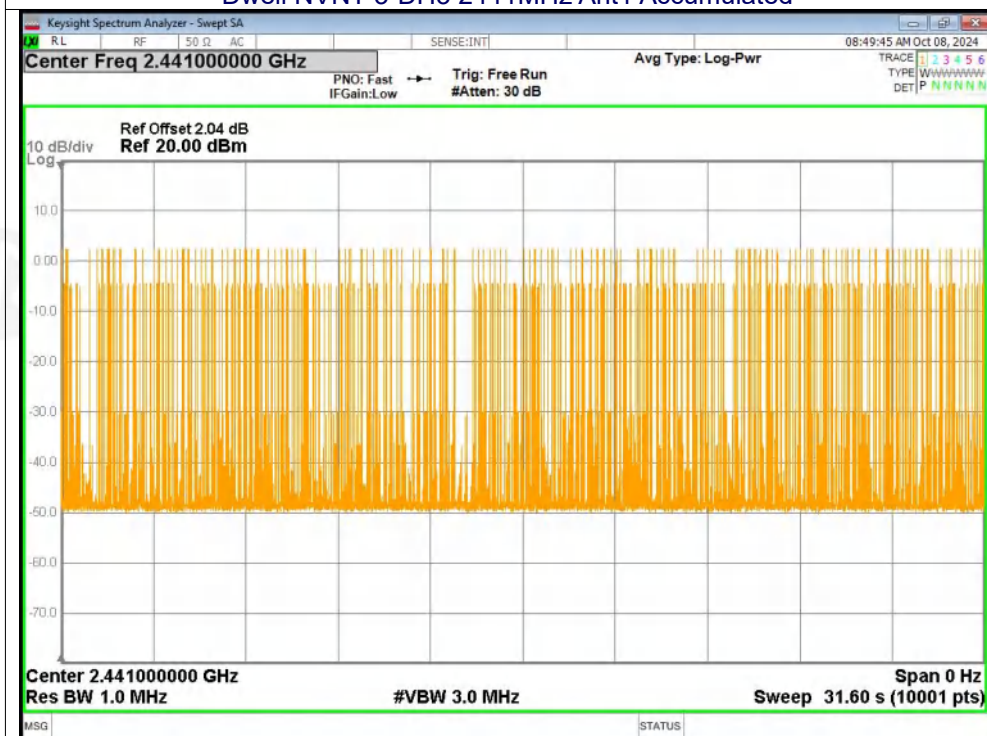




Dwell NVNT 3-DH3 2441MHz Ant1 One Burst

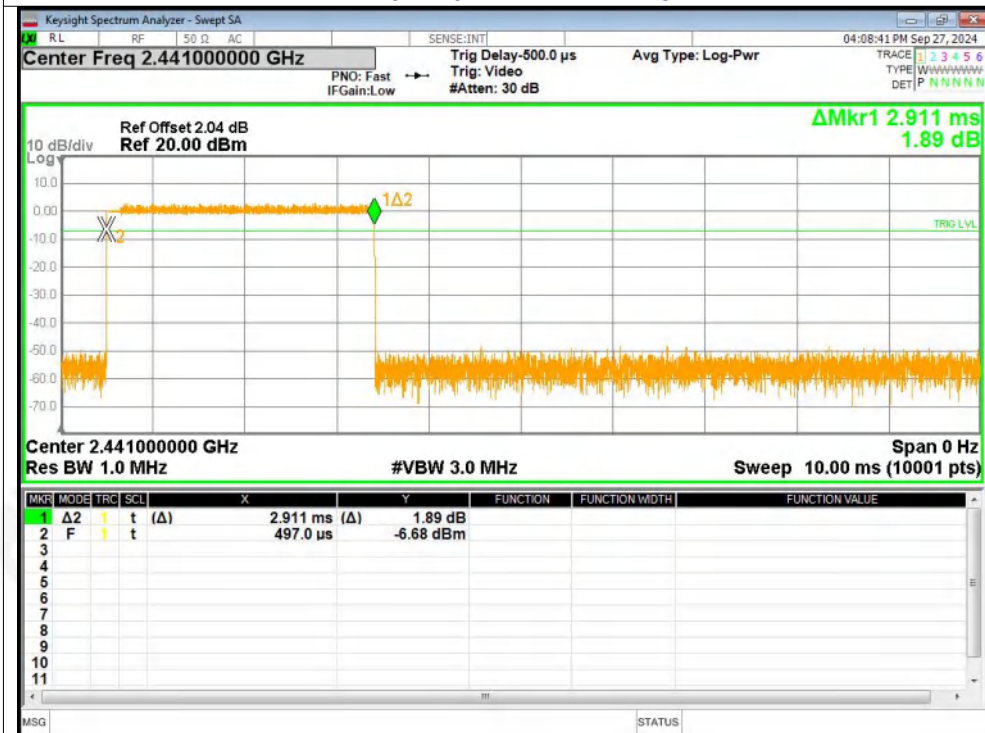


Dwell NVNT 3-DH3 2441MHz Ant1 Accumulated

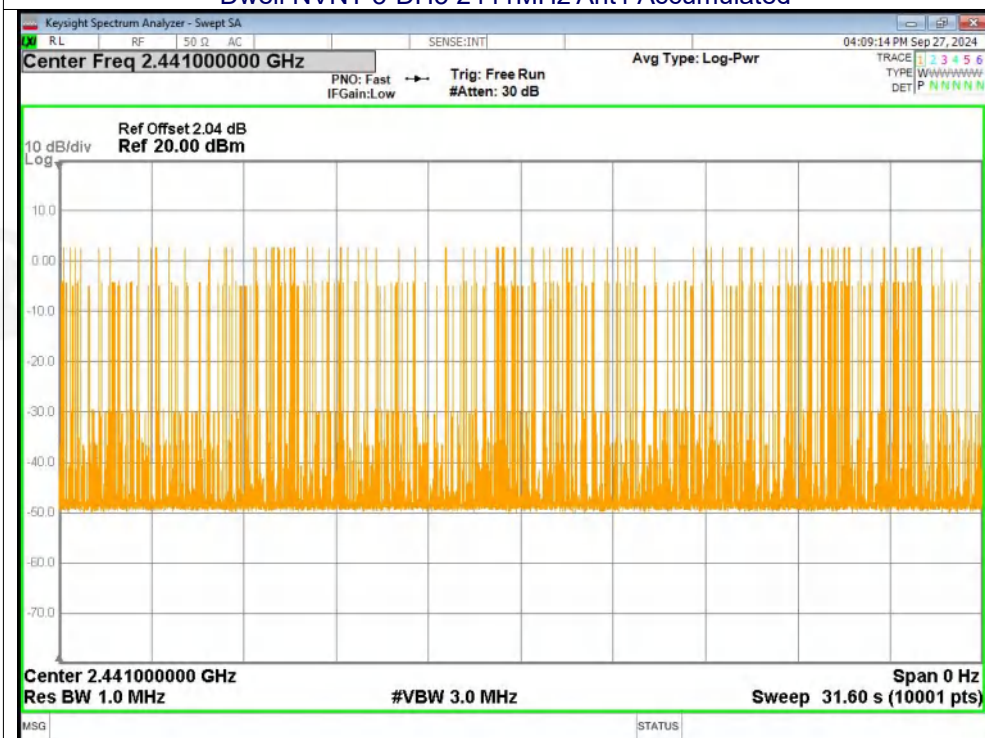




Dwell NVNT 3-DH5 2441MHz Ant1 One Burst



Dwell NVNT 3-DH5 2441MHz Ant1 Accumulated



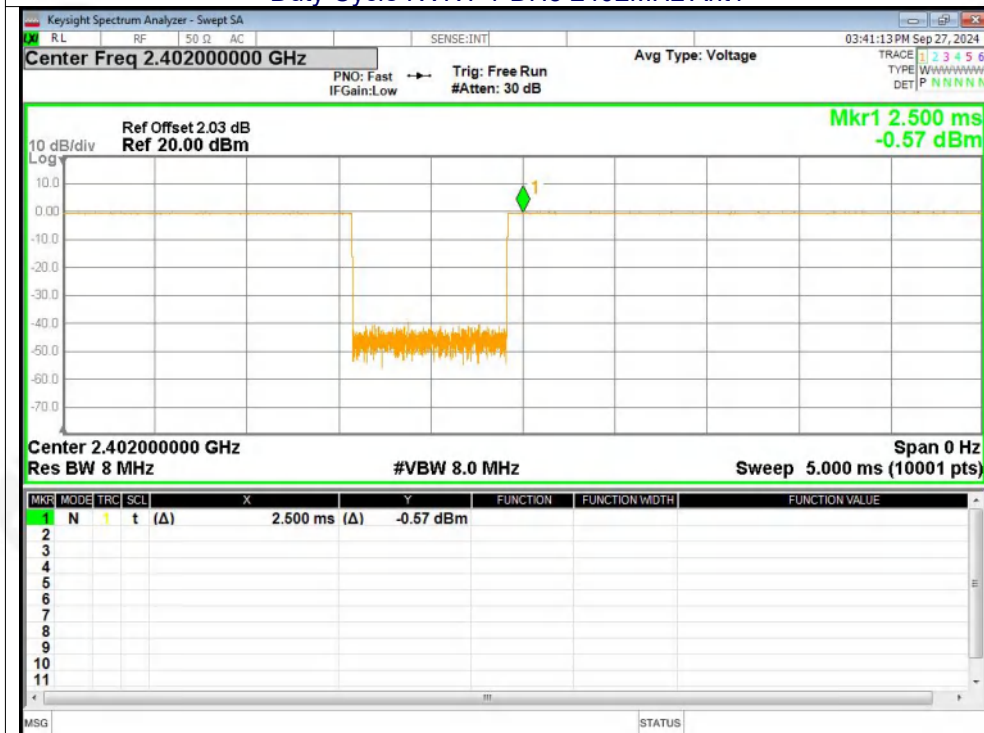


Duty Cycle

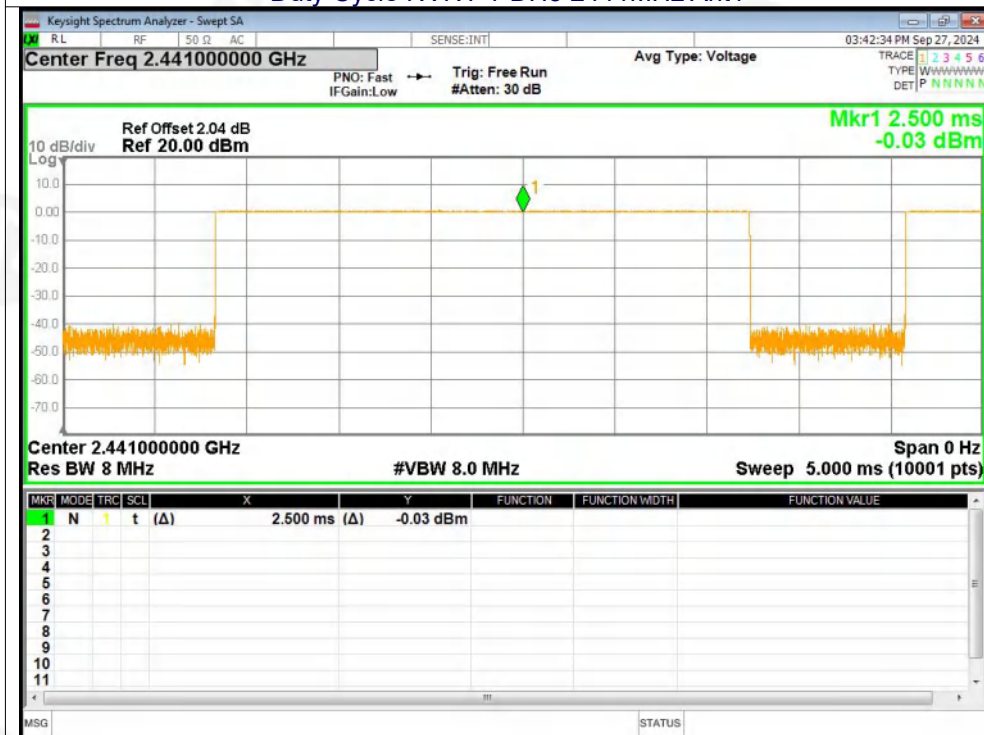
Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	1-DH5	2402	Ant1	83.15	0.8	0
NVNT	1-DH5	2441	Ant1	66.63	1.76	0
NVNT	1-DH5	2480	Ant1	77.54	1.1	0.34
NVNT	2-DH5	2402	Ant1	83.28	0.79	0
NVNT	2-DH5	2441	Ant1	83.28	0.79	0
NVNT	2-DH5	2480	Ant1	79.06	1.02	0
NVNT	3-DH5	2402	Ant1	83.29	0.79	0
NVNT	3-DH5	2441	Ant1	76.79	1.15	0
NVNT	3-DH5	2480	Ant1	76.63	1.16	0



Test Graphs Duty Cycle NVNT 1-DH5 2402MHz Ant1

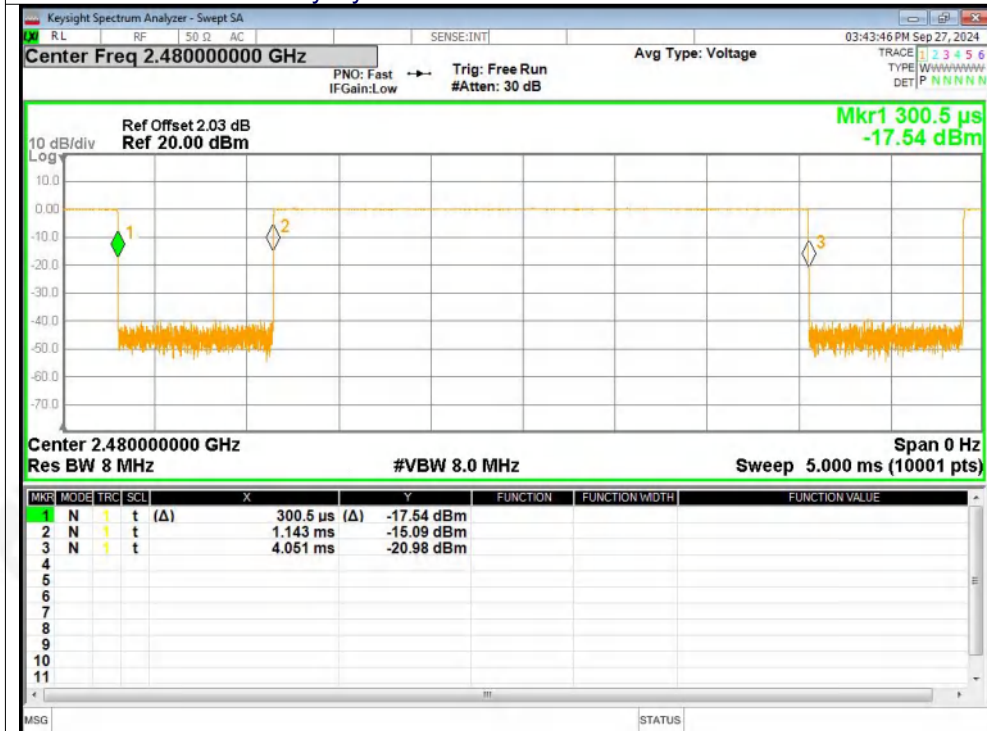


Duty Cycle NVNT 1-DH5 2441MHz Ant1

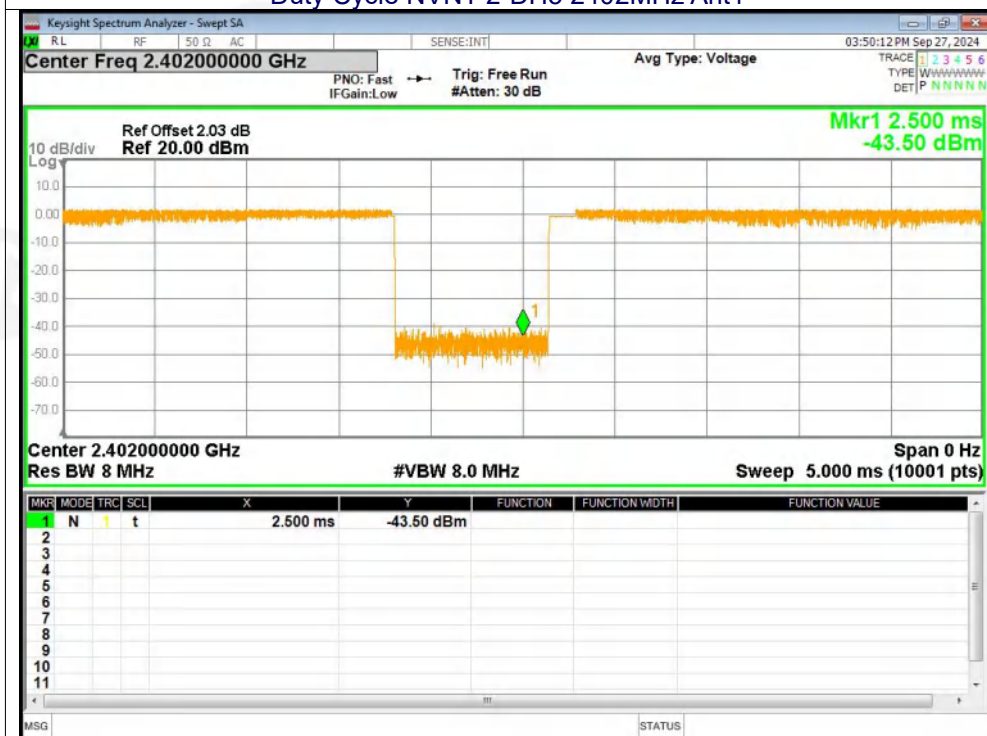




Duty Cycle NVNT 1-DH5 2480MHz Ant1

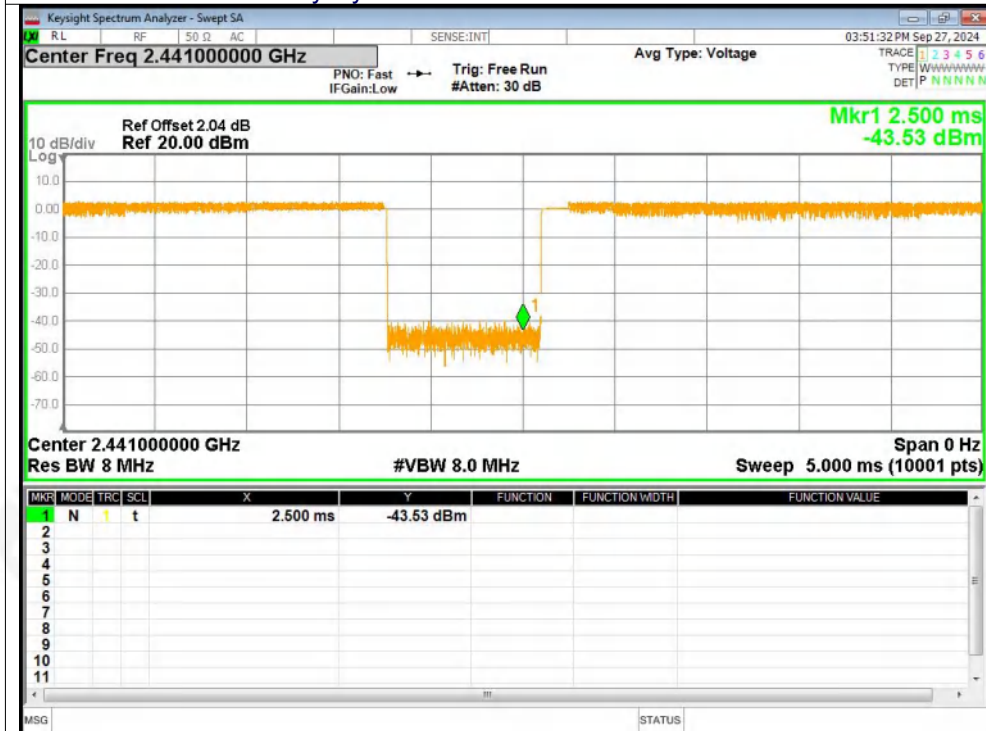


Duty Cycle NVNT 2-DH5 2402MHz Ant1

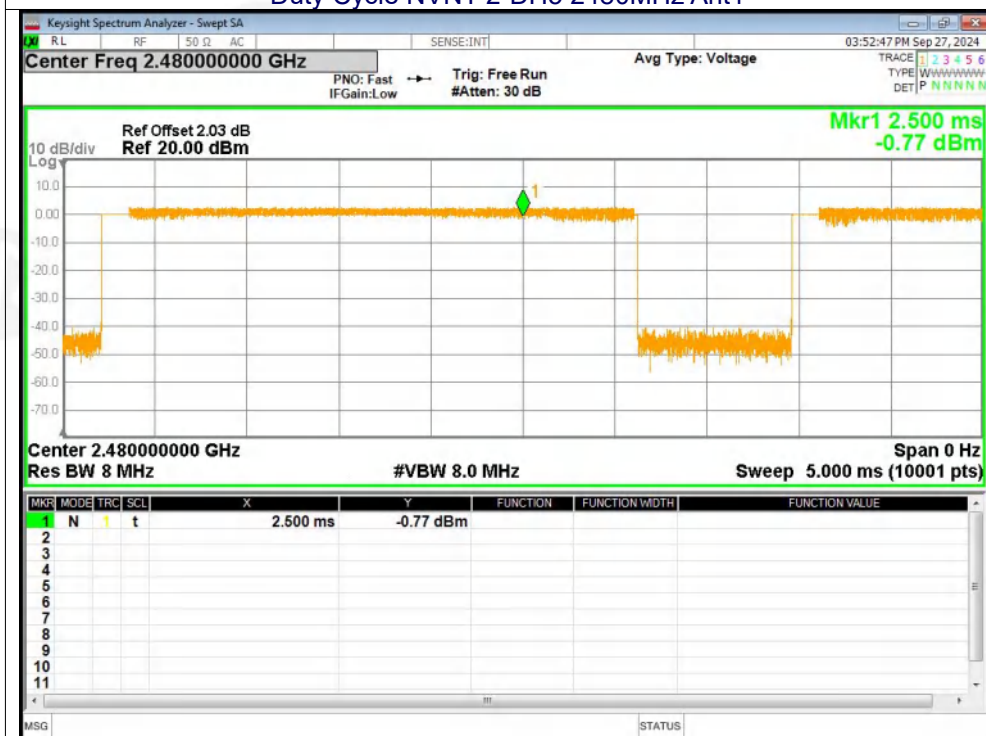




Duty Cycle NVNT 2-DH5 2441MHz Ant1

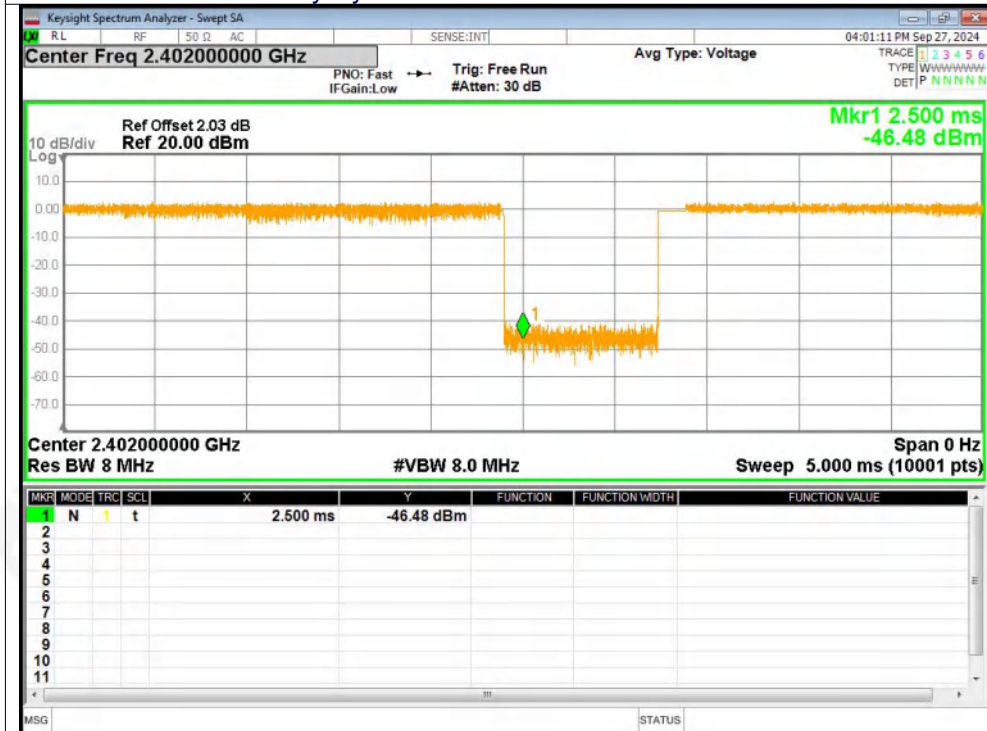


Duty Cycle NVNT 2-DH5 2480MHz Ant1

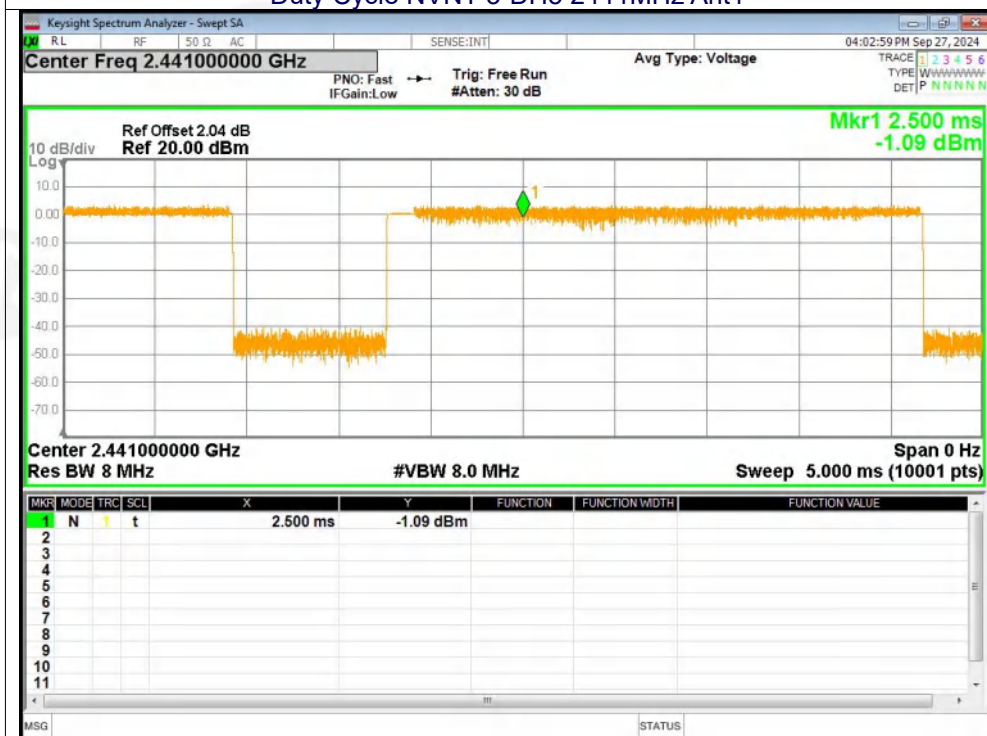


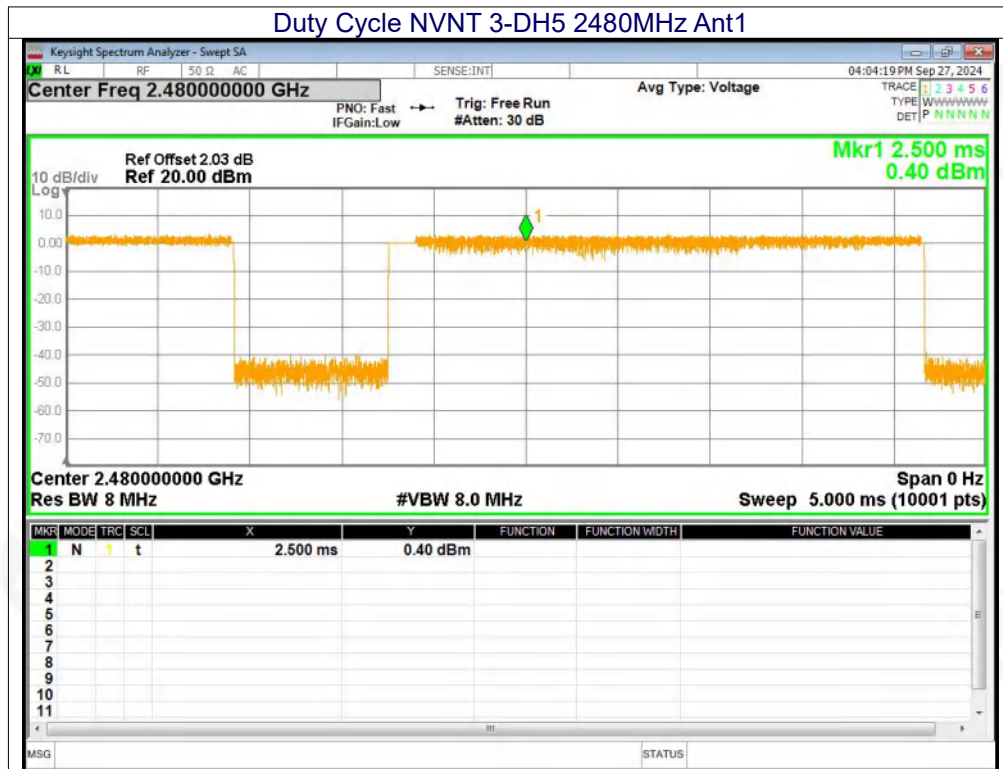


Duty Cycle NVNT 3-DH5 2402MHz Ant1



Duty Cycle NVNT 3-DH5 2441MHz Ant1







12. Antenna Requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(b)(4)
15.203 requirement: 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(b) (4) requirement: (4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
EUT Antenna:	
The antenna is Chip Antenna, the best case gain of the antennas is 0dBi, reference to the appendix II for details	



13. Test Setup Photo

Reference to the appendix I for details.

14. EUT Constructional Details

Reference to the appendix II for details.

***** END OF REPORT *****