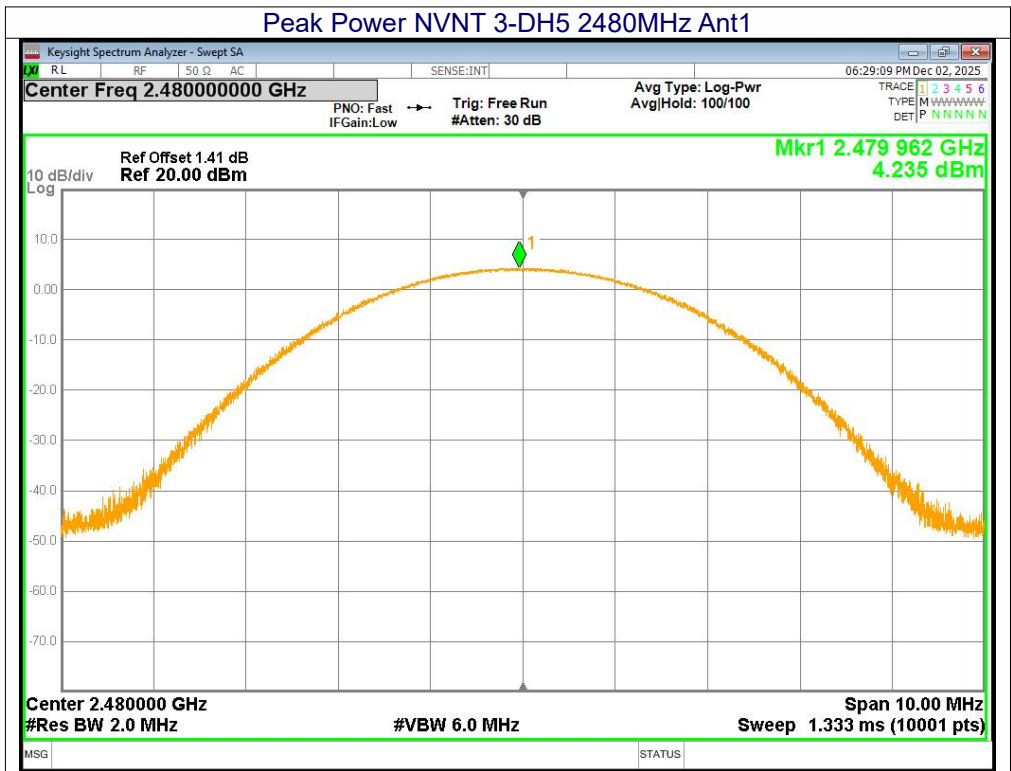




**9. HOPPING CHANNEL SEPARATION**

Test Requirement:	FCC Part15 C Section 15.247 (a)(1), RSS 247 5.1
Test Method:	ANSI C63.10-2020
Receiver setup:	RBW=30KHz, VBW=100KHz, detector=Peak
Limit:	GFSK, $\pi/4$ -DQPSK & 8DSK: 0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)

9.1 Test Setup**9.2 Test procedure**

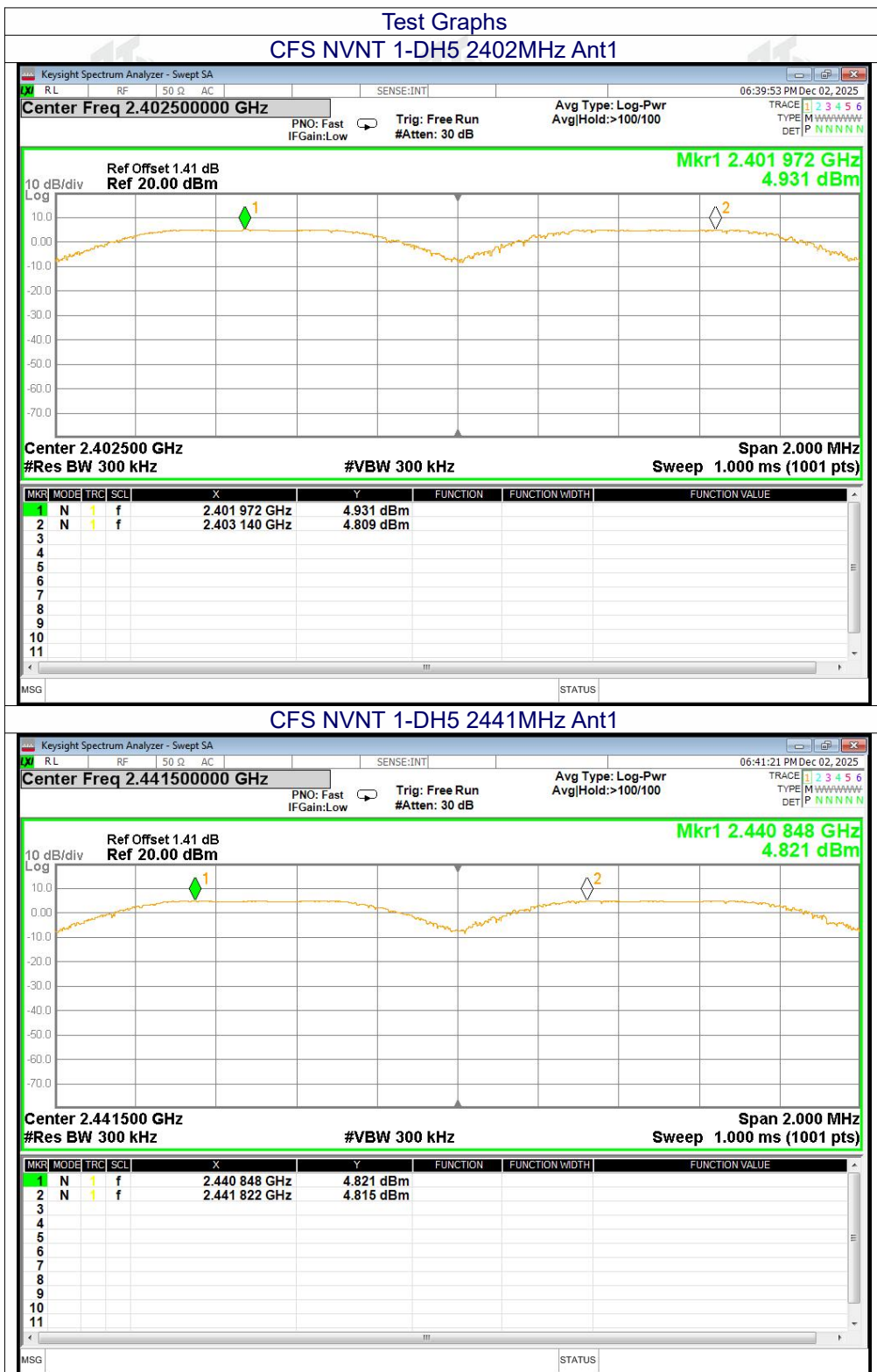
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: GFSK: RBW = 300kHz. VBW = 300kHz , Span = 2.0MHz. $\pi/4$ -DQPSK: RBW = 100kHz. VBW = 100kHz , Span = 2.6MHz. 8DSK: RBW = 100kHz. VBW = 100kHz , Span = 2.0MHz. Sweep = 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.

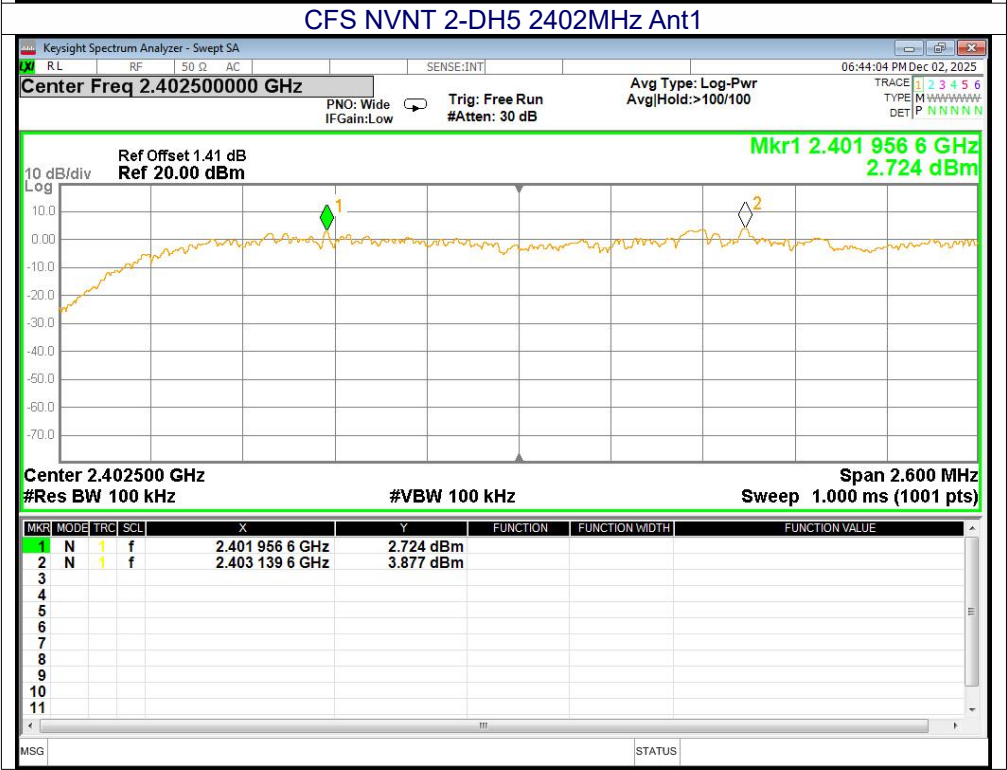
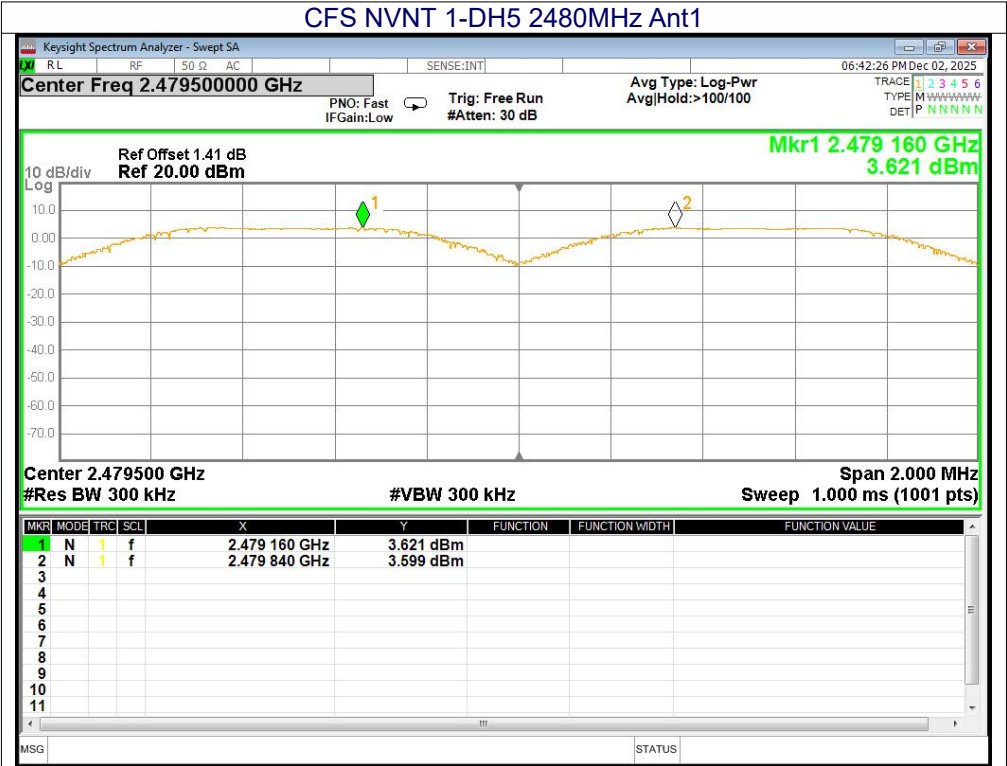
9.3 DEVIATION FROM STANDARD

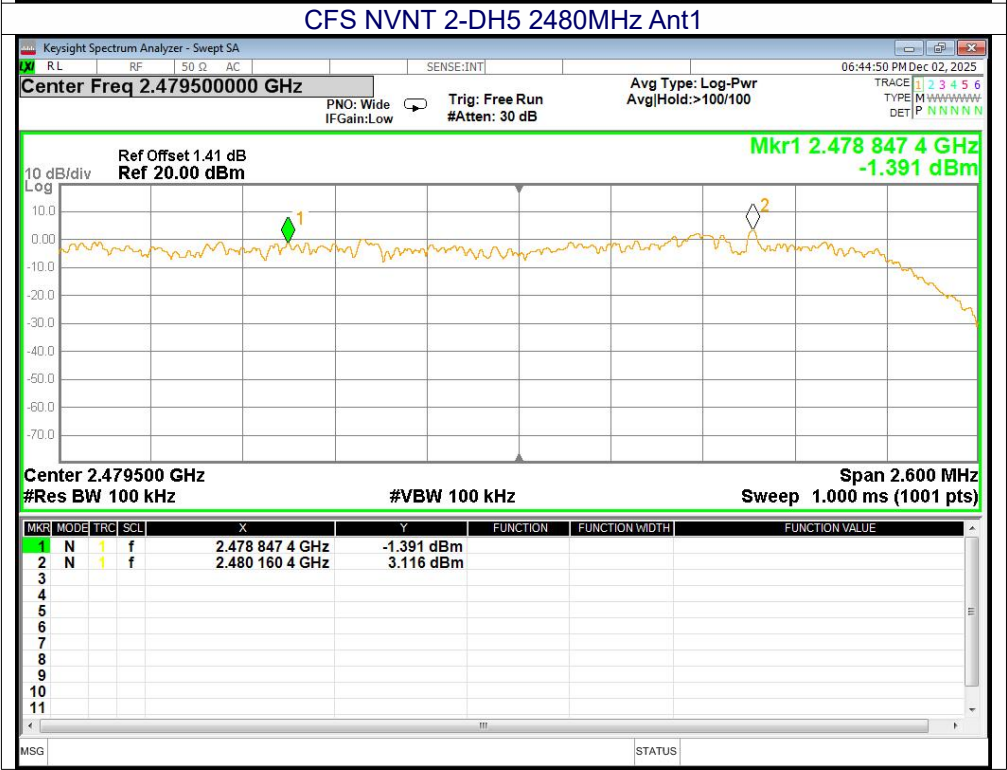
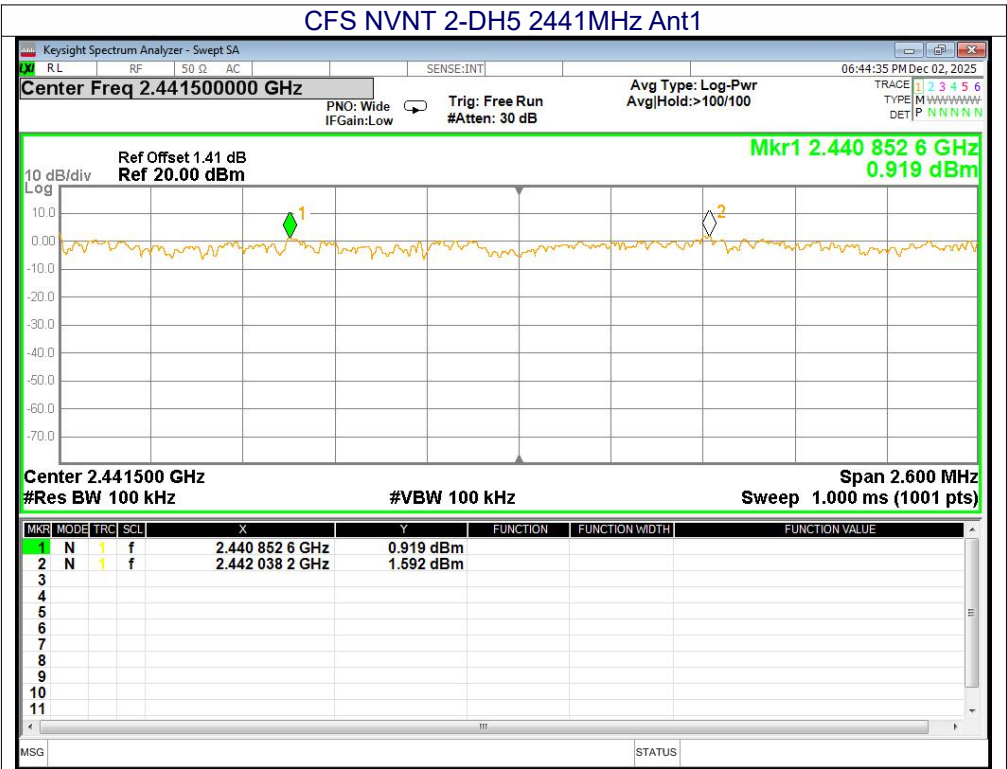
No deviation.

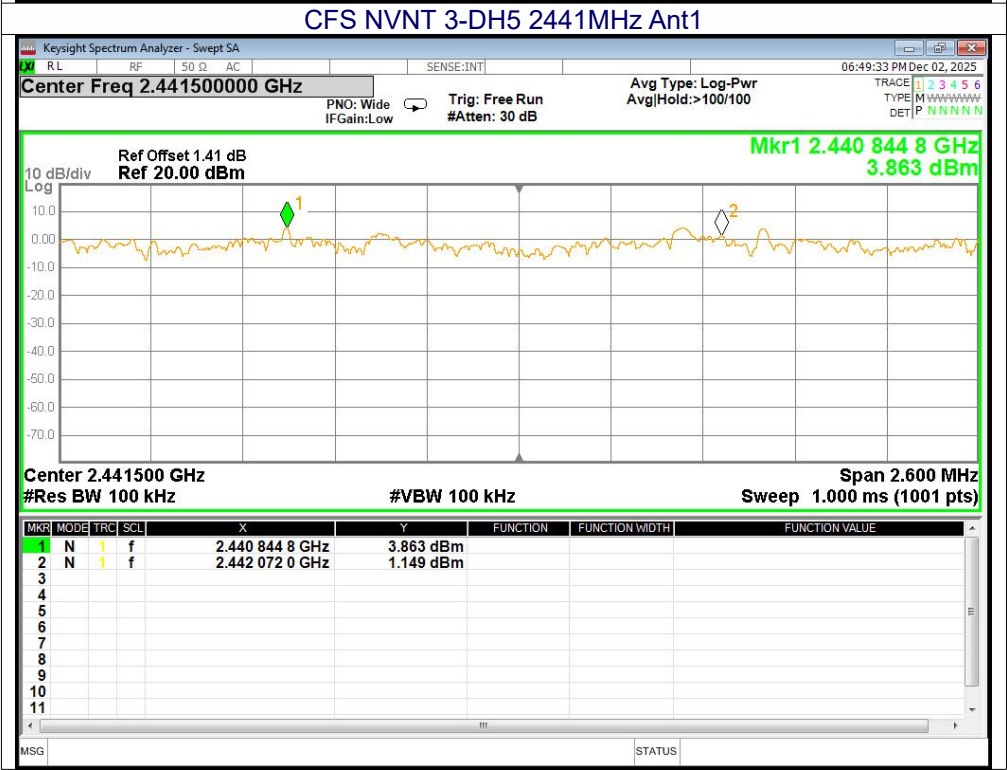
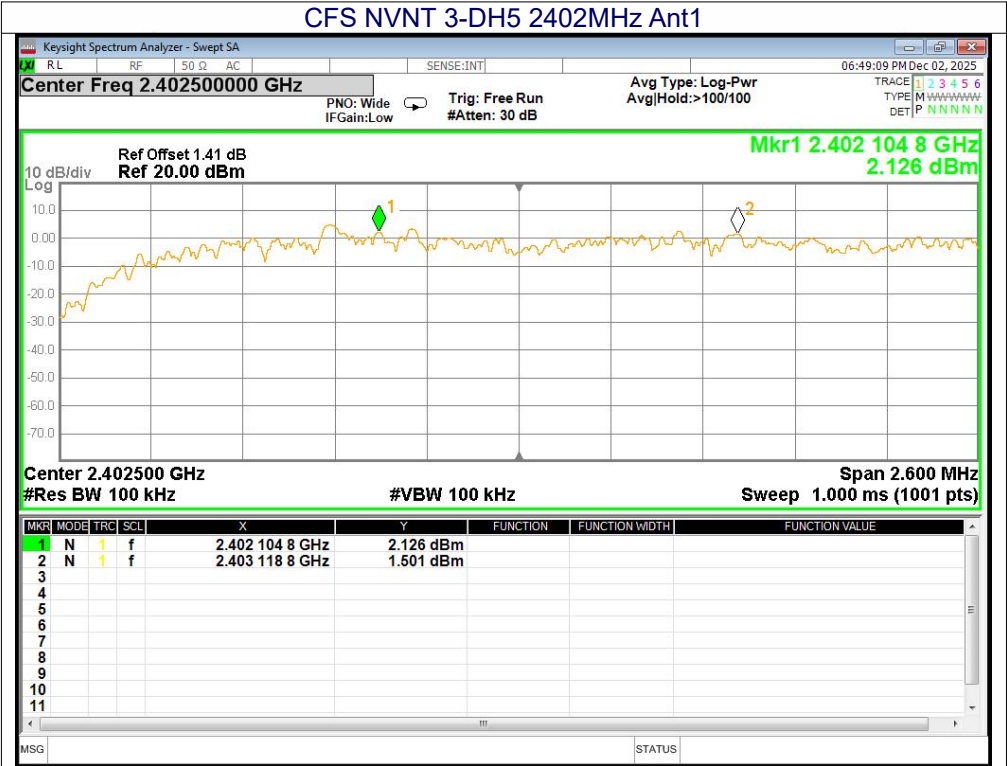
9.4 Test Result

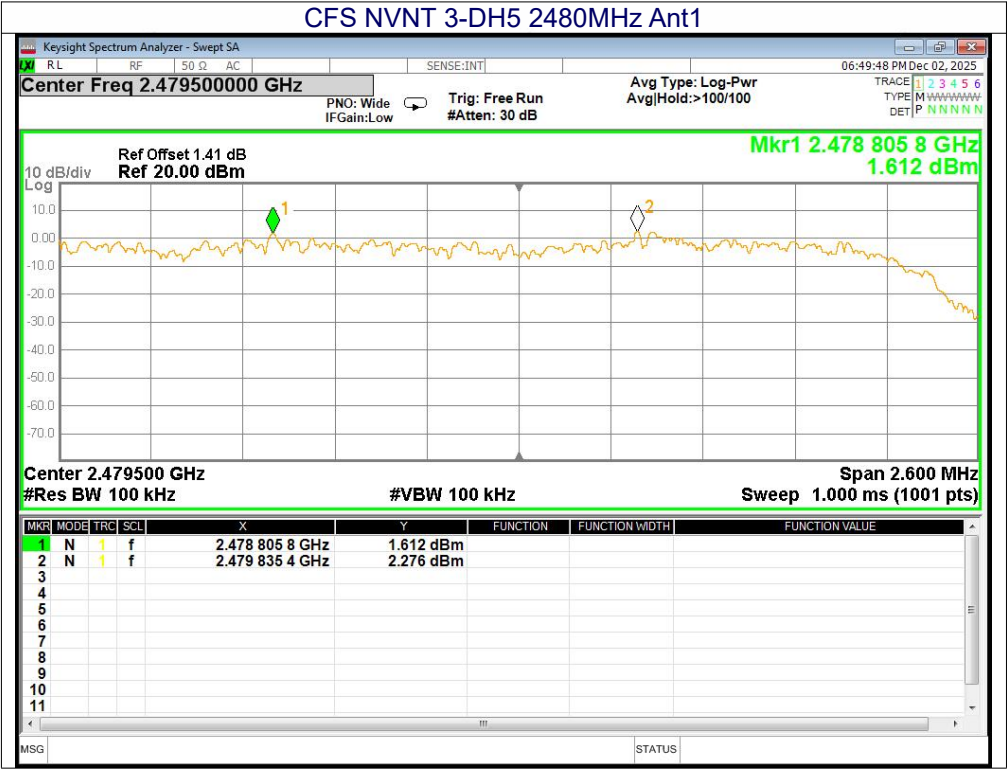
Condition	Mode	Antenna	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	1-DH5	Ant1	2401.972	2403.14	1.168	0.661	Pass
NVNT	1-DH5	Ant1	2440.848	2441.822	0.974	0.666	Pass
NVNT	1-DH5	Ant1	2479.16	2479.84	0.68	0.639	Pass
NVNT	2-DH5	Ant1	2401.9566	2403.1396	1.183	0.897	Pass
NVNT	2-DH5	Ant1	2440.8526	2442.0382	1.1856	0.891	Pass
NVNT	2-DH5	Ant1	2478.8474	2480.1604	1.313	0.878	Pass
NVNT	3-DH5	Ant1	2402.1048	2403.1188	1.014	0.871	Pass
NVNT	3-DH5	Ant1	2440.8448	2442.072	1.2272	0.868	Pass
NVNT	3-DH5	Ant1	2478.8058	2479.8354	1.0296	0.89	Pass











10.NUMBER OF HOPPING FREQUENCY

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii), RSS-247 5.1
Test Method:	ANSI C63.10-2020
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.

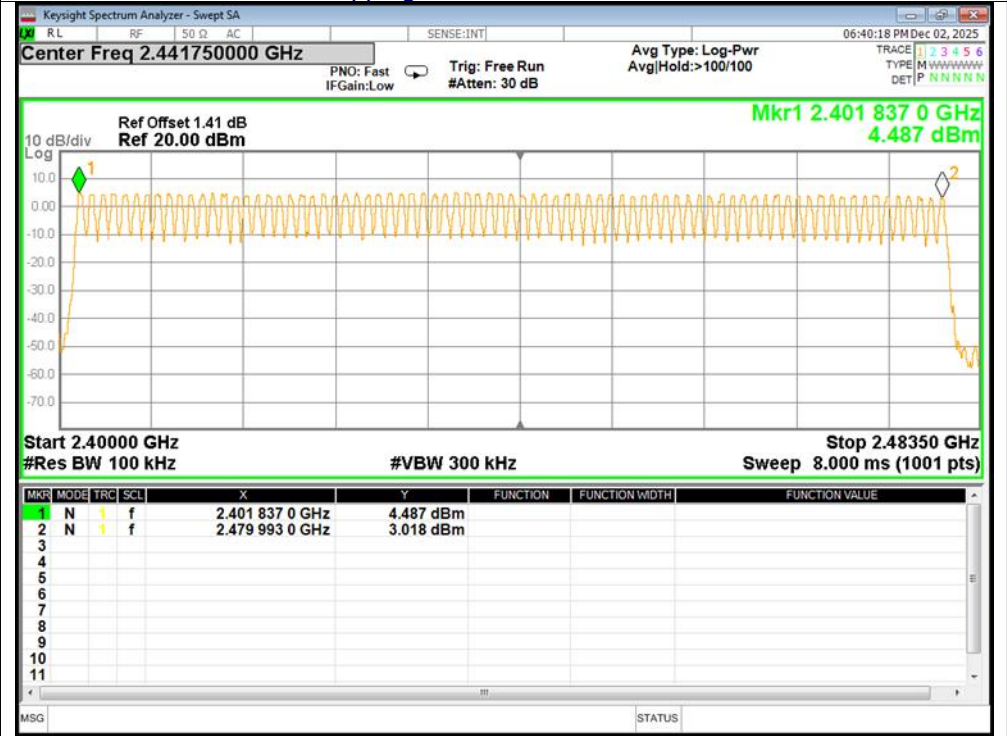
11.4 Test Result

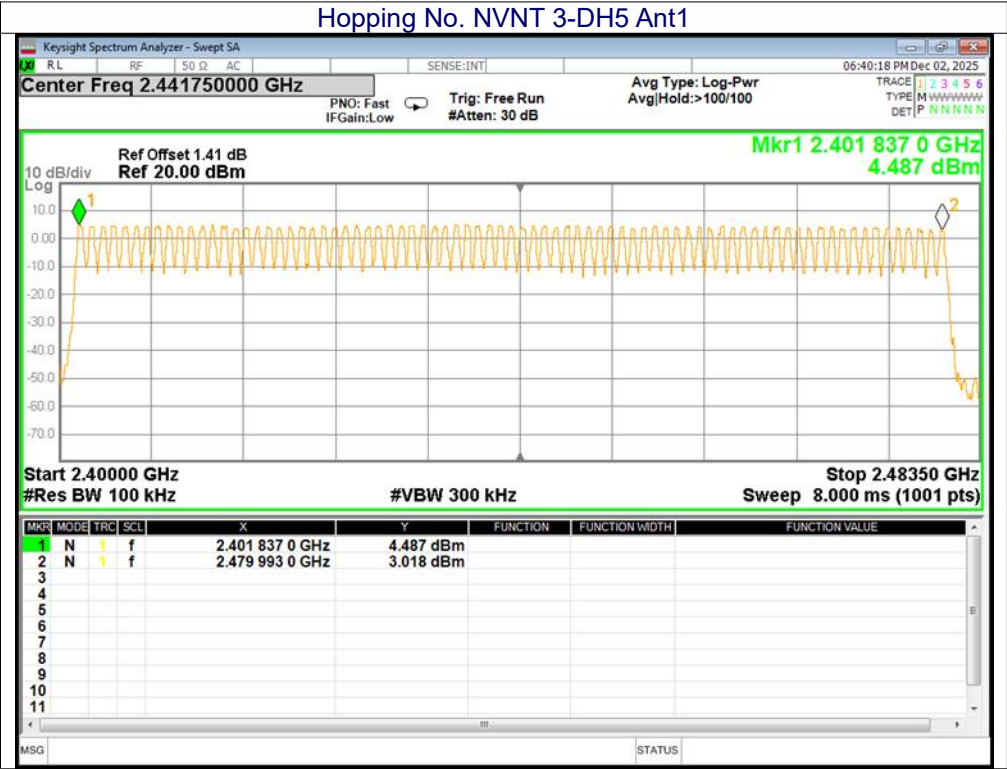
Mode	Antenna	Hopping Number	Limit	Verdict
1-DH5	Ant1	79	15	Pass
2-DH5	Ant1	79	15	Pass
3-DH5	Ant1	79	15	Pass

Test Graphs
Hopping No. NVNT 1-DH5 Ant1



Hopping No. NVNT 2-DH5 Ant1





11. DWELL TIME

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii), RSS-247 5.1
Test Method:	ANSI C63.10-2020
Receiver setup:	RBW=1MHz, VBW=3MHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second

11.1 Test Setup



11.2 Test procedure

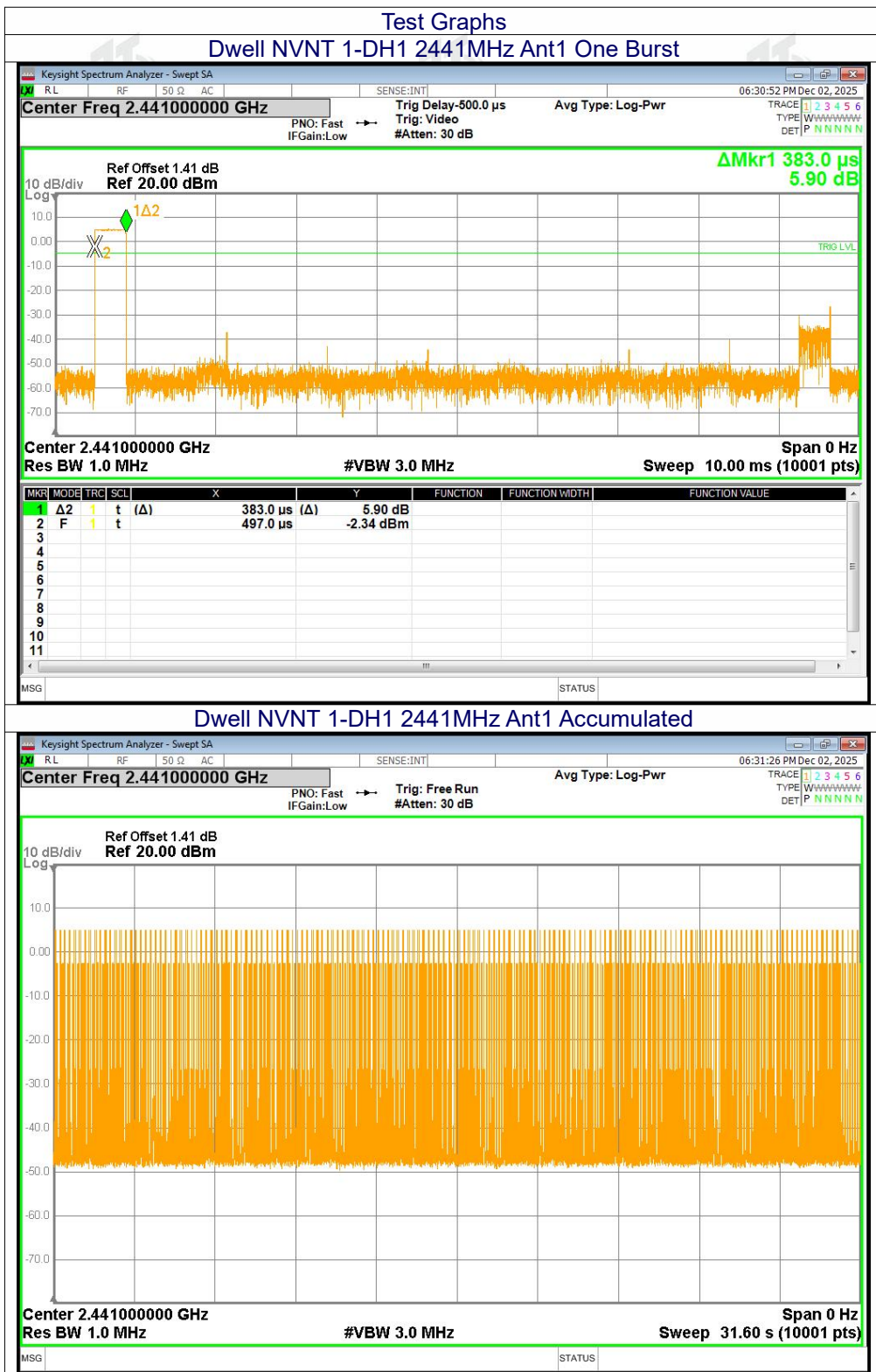
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set spectrum analyzer span = 0Hz;
3. Set RBW = 1MHz and VBW = 3MHz. Sweep = as necessary to capture the entire dwell time per hopping channel. Set the EUT for DH5, DH3 and DH1 packet transmitting.
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).

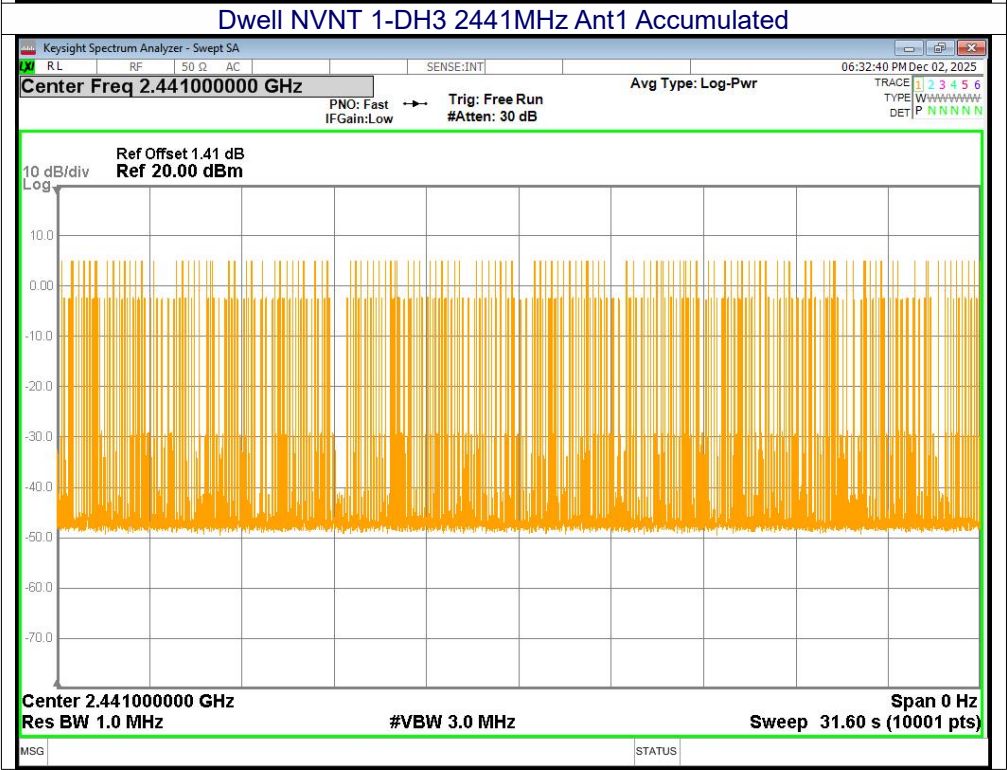
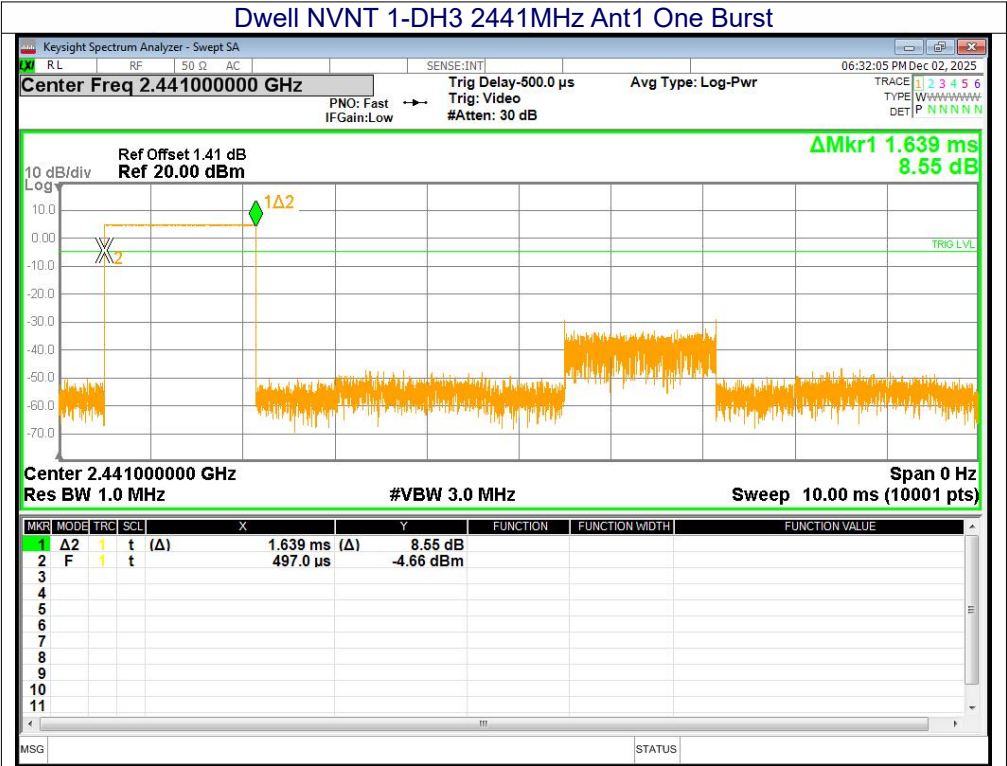
11.3 DEVIATION FROM STANDARD

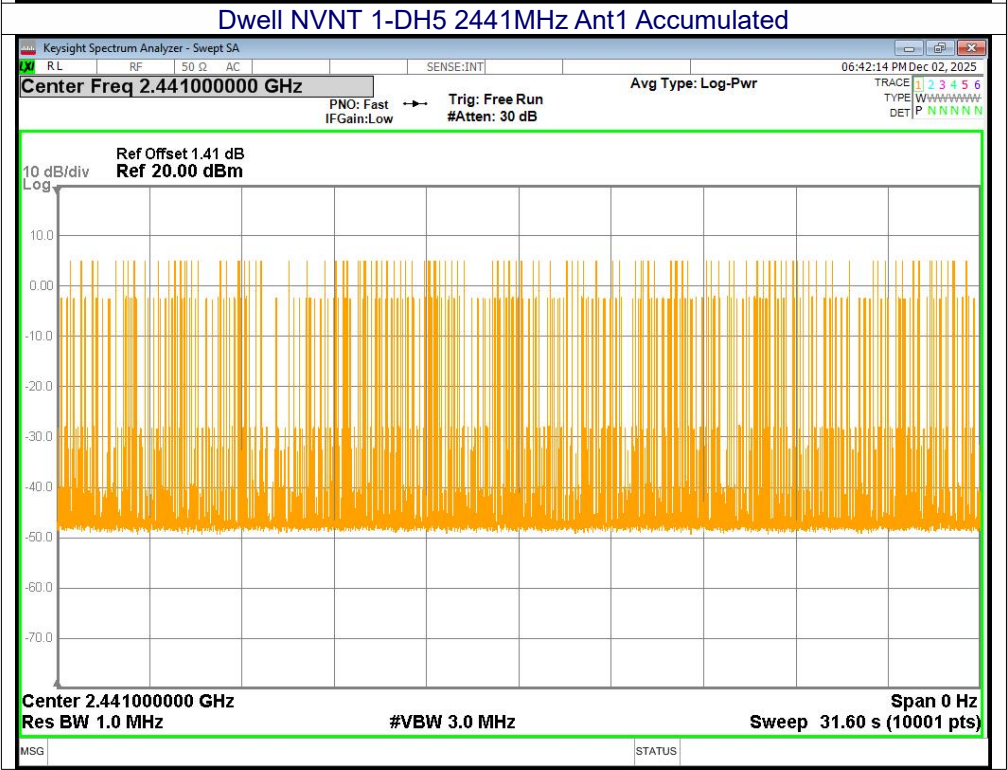
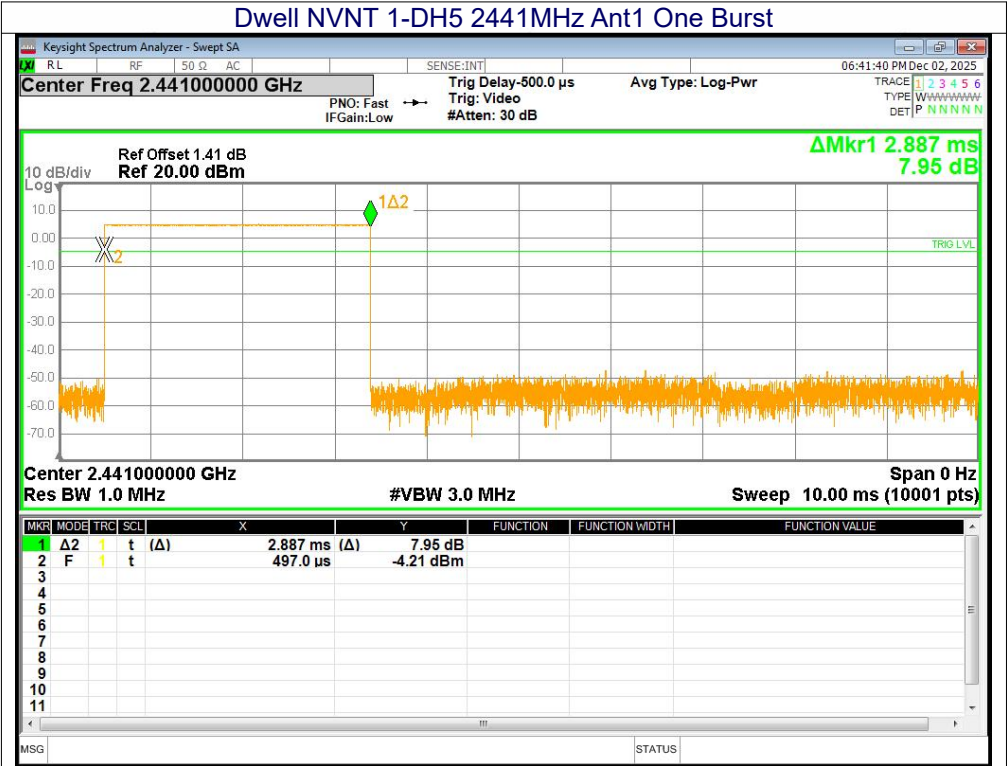
No deviation.

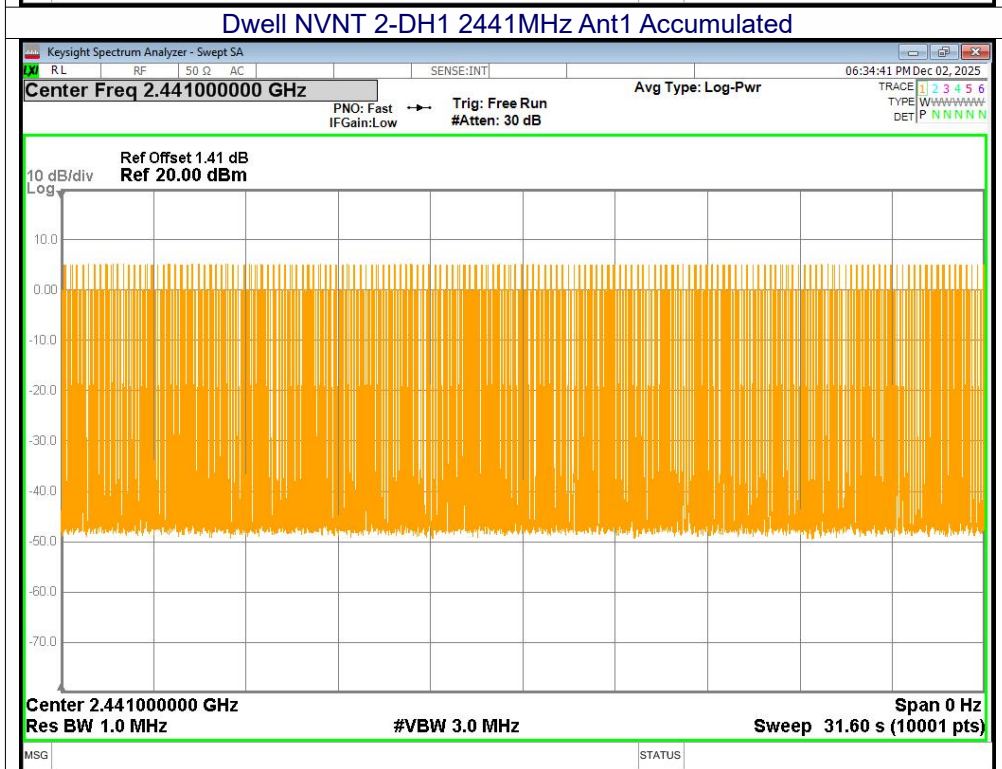
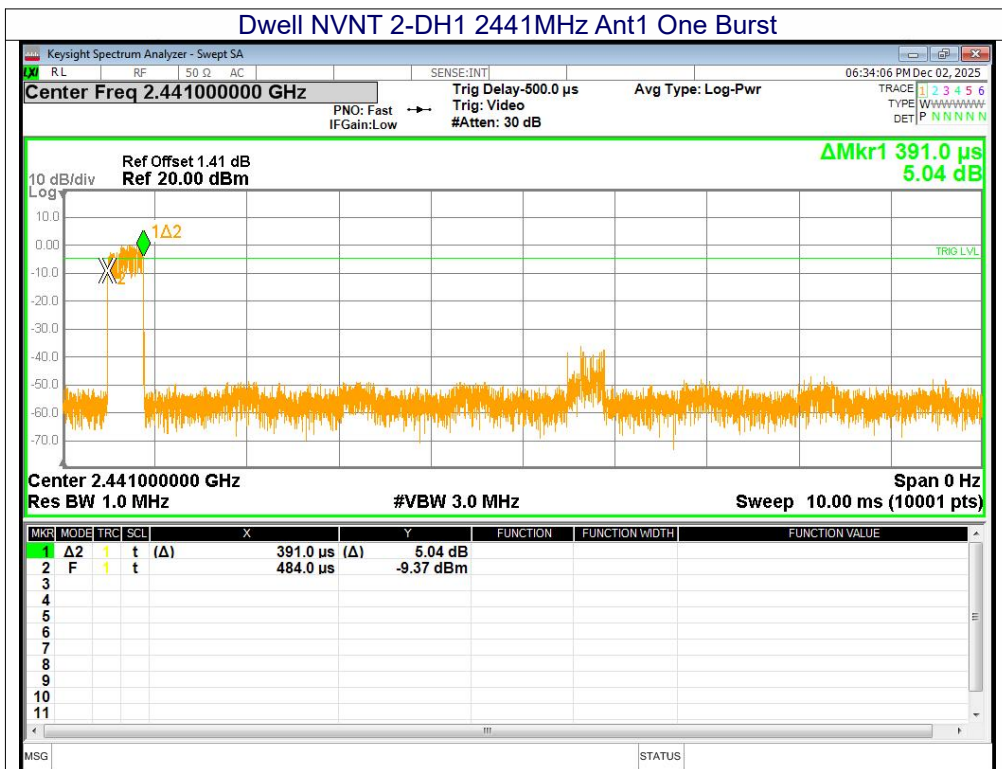
11.4 Test Result

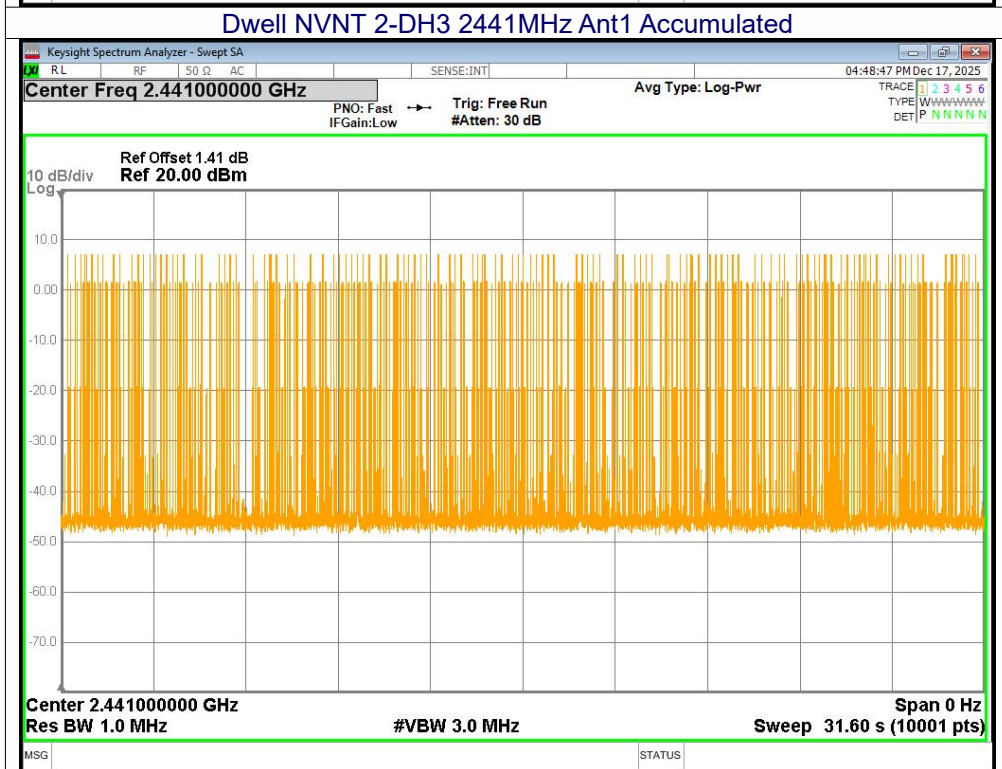
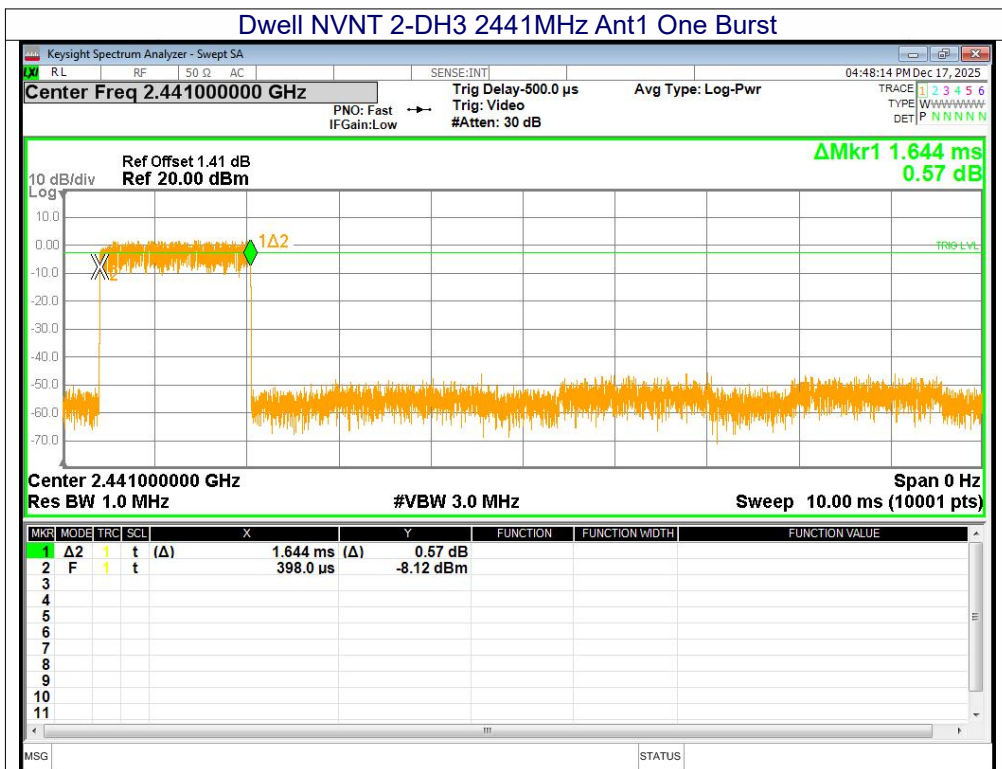
Condition	Mode	Frequency (MHz)	Antenna	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
NVNT	1-DH1	2441	Ant1	0.383	121.411	317	31600	400	Pass
NVNT	1-DH3	2441	Ant1	1.639	262.24	160	31600	400	Pass
NVNT	1-DH5	2441	Ant1	2.887	357.988	124	31600	400	Pass
NVNT	2-DH1	2441	Ant1	0.391	139.978	358	31600	400	Pass
NVNT	2-DH3	2441	Ant1	1.644	267.972	163	31600	400	Pass
NVNT	2-DH5	2441	Ant1	2.891	297.773	103	31600	400	Pass
NVNT	3-DH1	2441	Ant1	0.392	123.872	316	31600	400	Pass
NVNT	3-DH3	2441	Ant1	1.643	379.533	231	31600	400	Pass
NVNT	3-DH5	2441	Ant1	2.893	303.765	105	31600	400	Pass

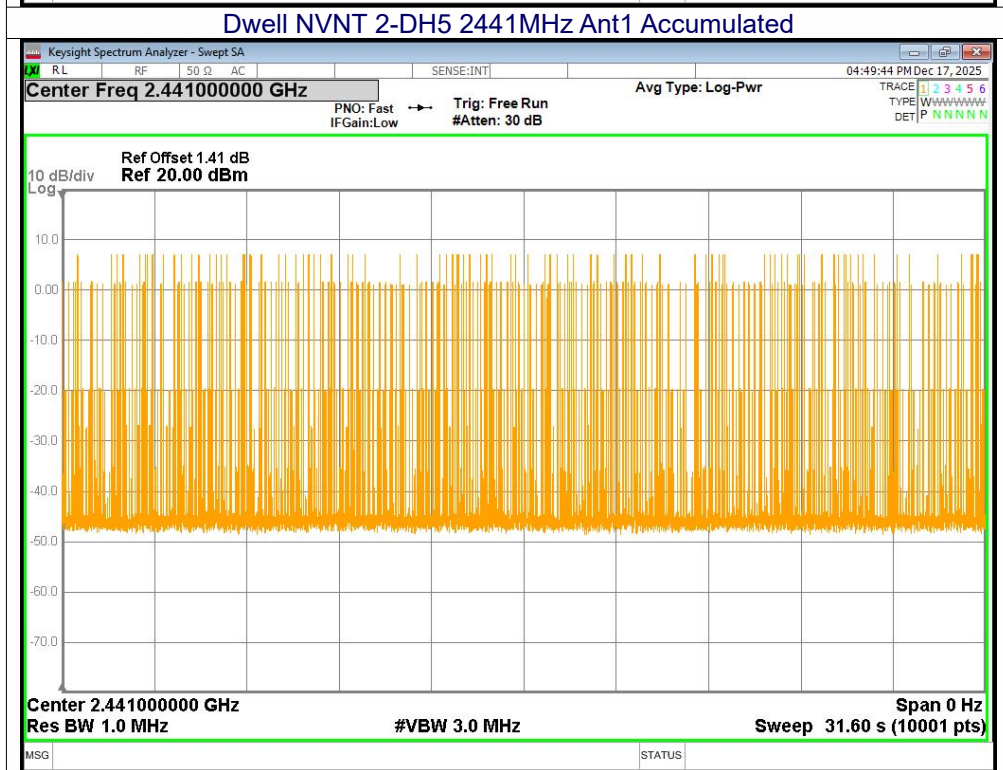
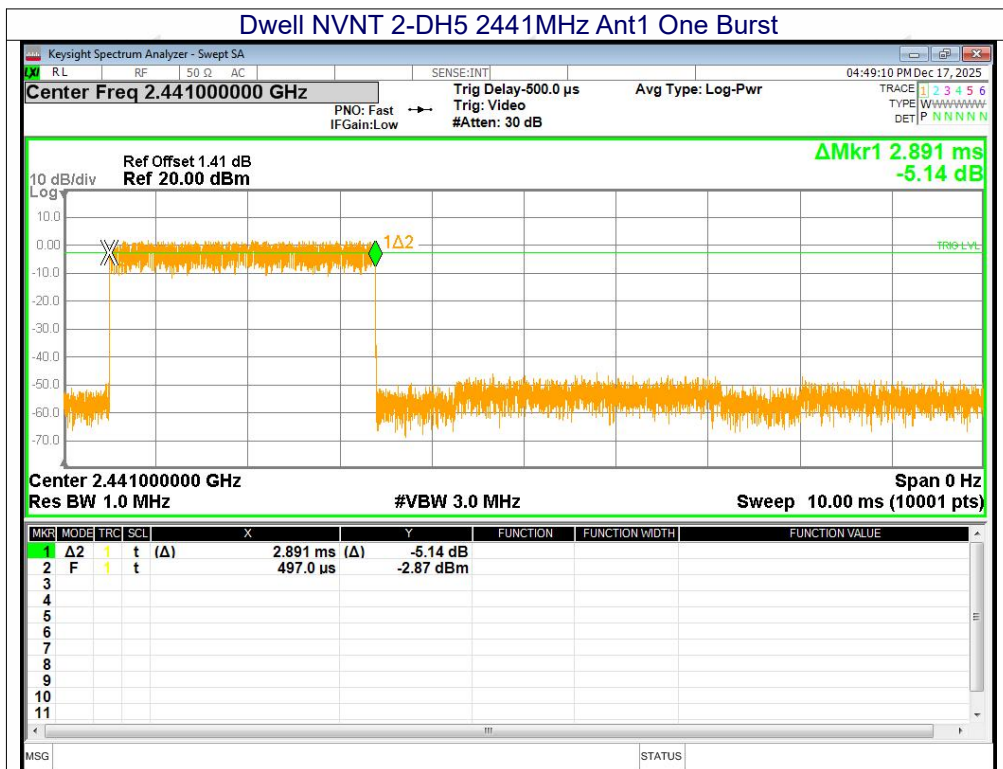


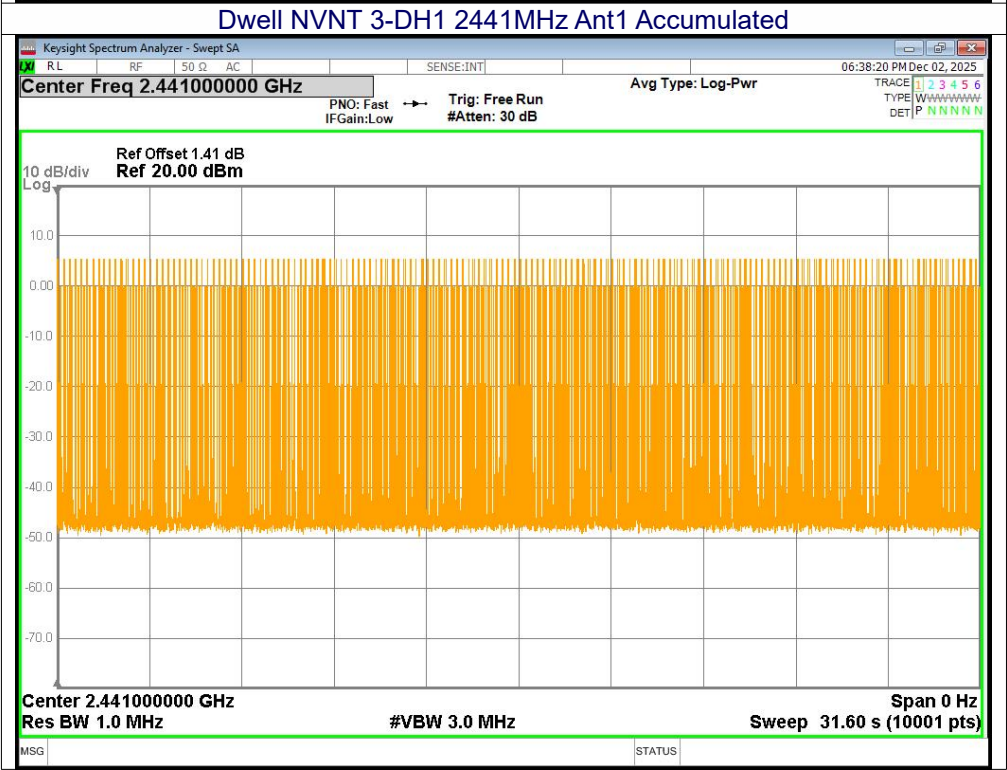
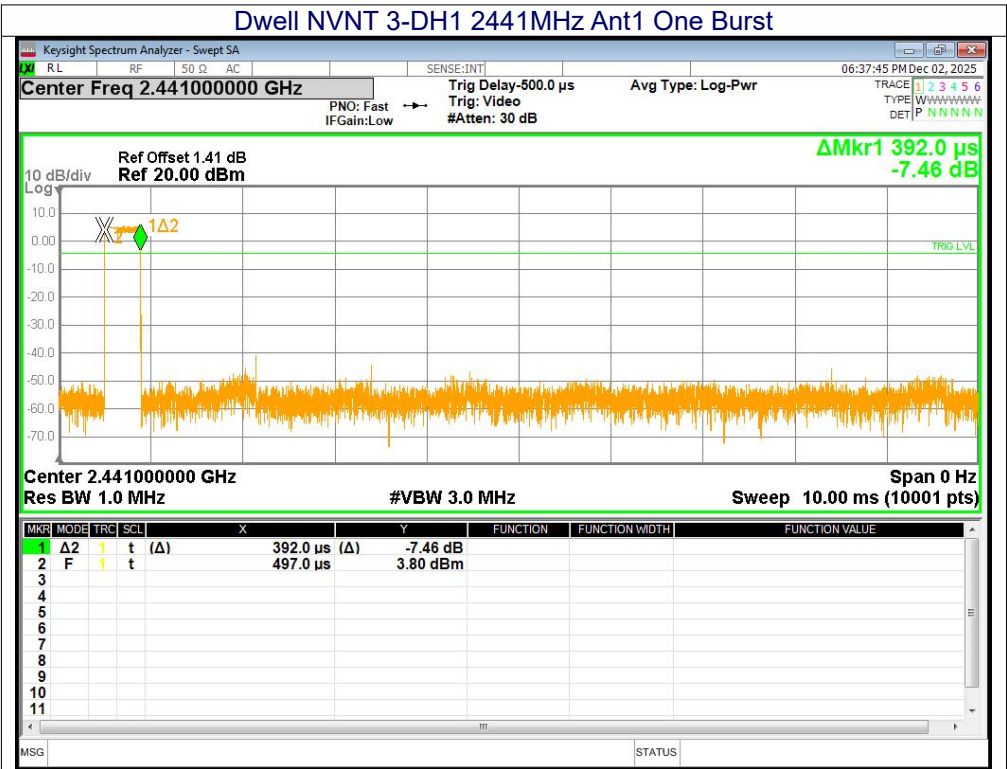


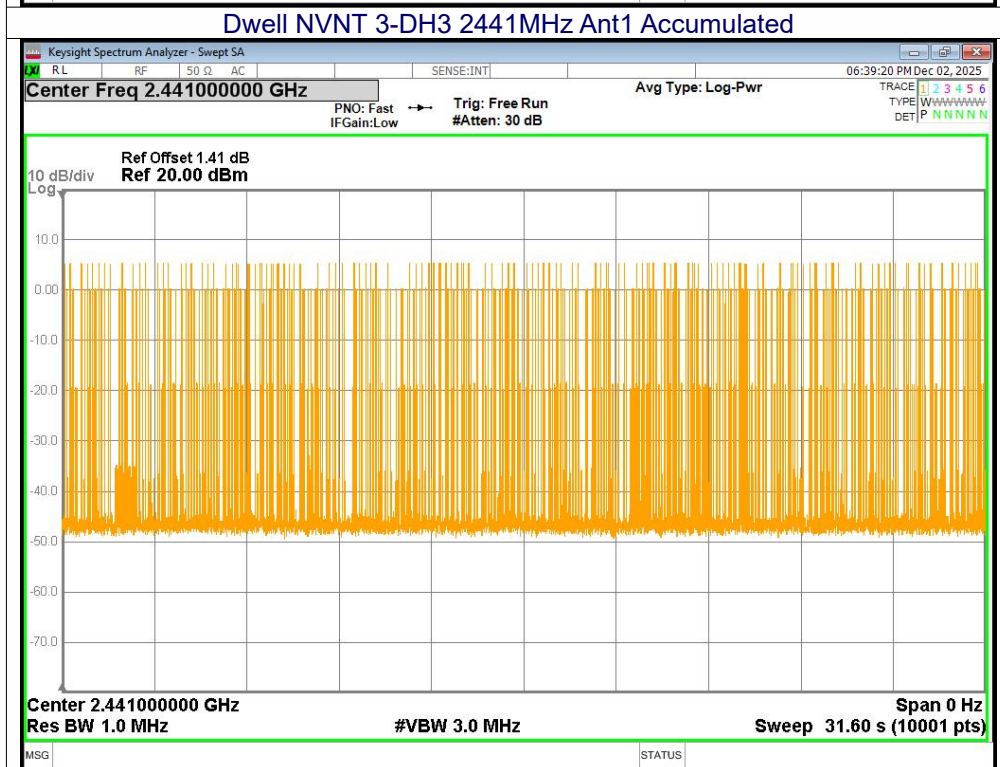
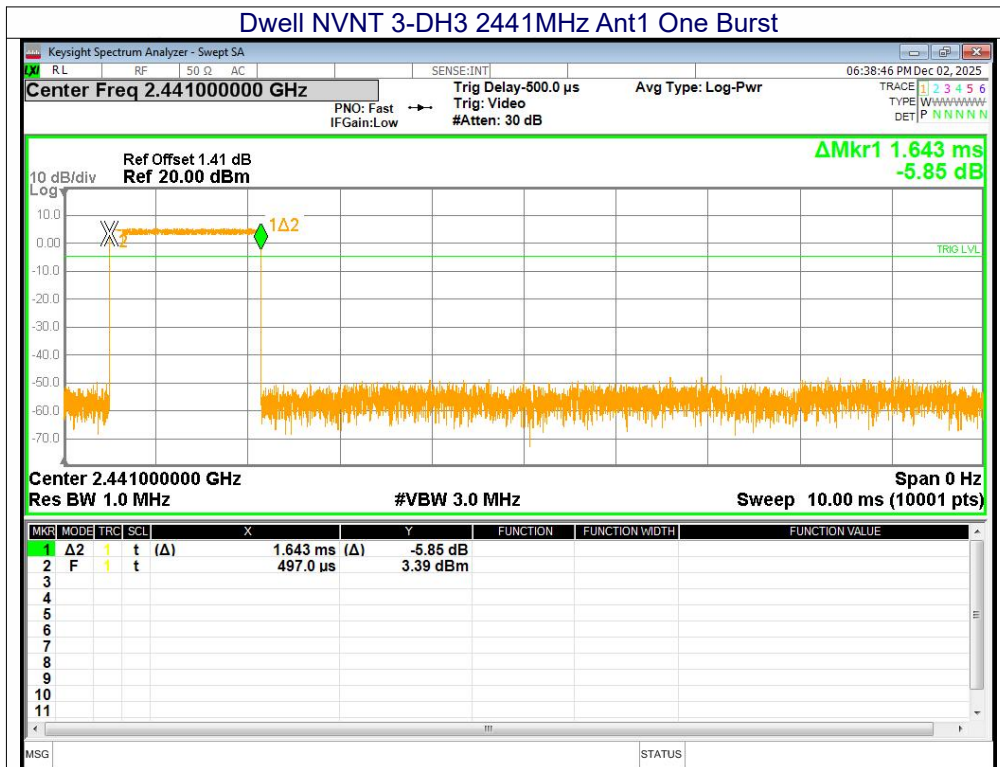


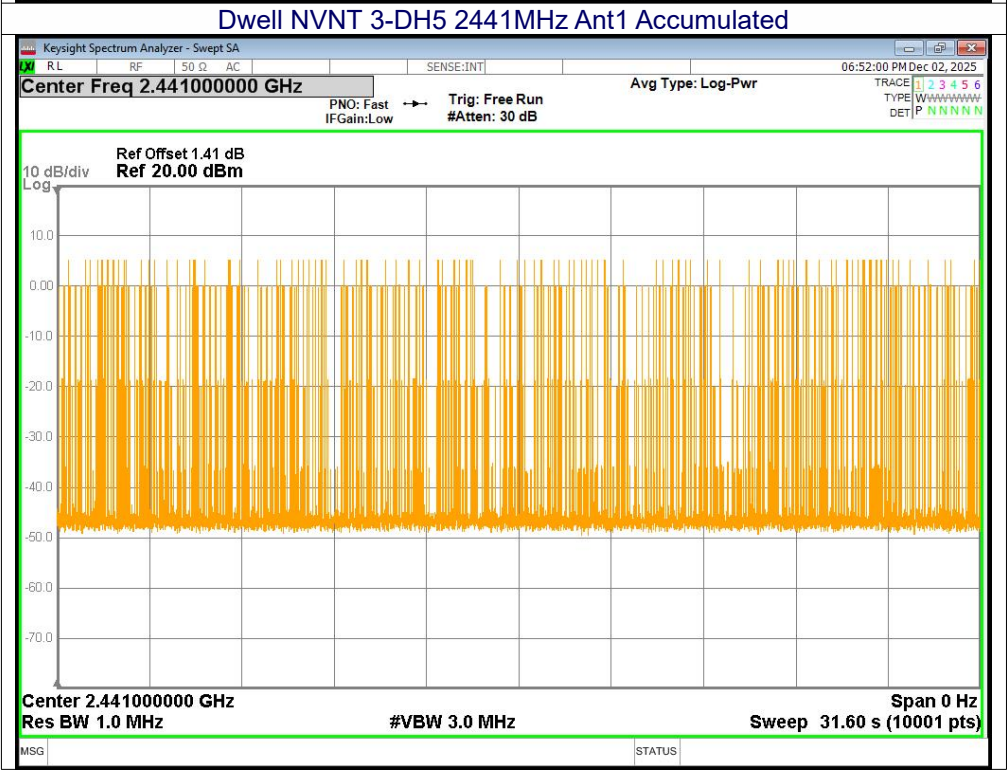
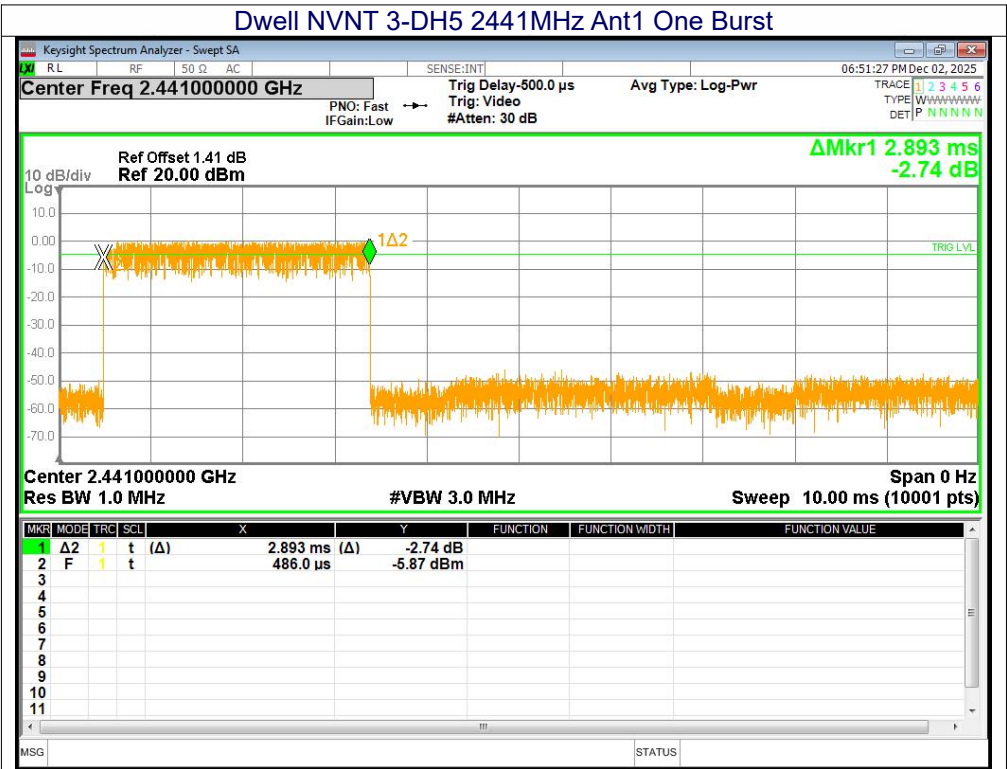












12. Antenna Requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(b)(4), RSS-Gen 6.8
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: 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. The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (EIRP) limits specified in the applicable standard (RSS) for the licence-exempt apparatus. Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level.9 When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.	
EUT Antenna:	
The antenna is PCB antenna, the best case gain of the antennas is 1.7 dBi, reference to the appendix II for details.	



Reference to the appendix I for details.

14. EUT Constructional Details

Reference to the appendix II for details.

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