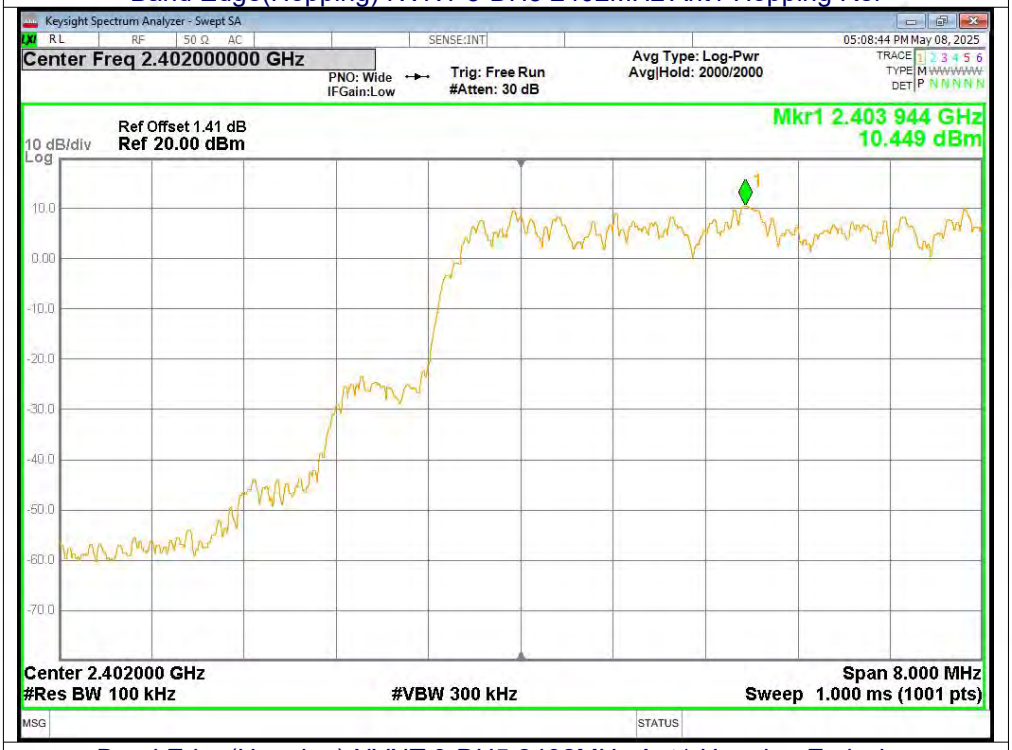
Band Edge(Hopping) NVNT 2-DH5 2402MHz Ant1 Hopping Ref

Band Edge(Hopping) NVNT 2-DH5 2402MHz Ant1 Hopping Emission

Band Edge(Hopping) NVNT 2-DH5 2480MHz Ant1 Hopping Ref

Band Edge(Hopping) NVNT 2-DH5 2480MHz Ant1 Hopping Emission

Band Edge(Hopping) NVNT 3-DH5 2402MHz Ant1 Hopping Ref



Band Edge(Hopping) NVNT 3-DH5 2402MHz Ant1 Hopping Emission

Band Edge(Hopping) NVNT 3-DH5 2480MHz Ant1 Hopping Ref

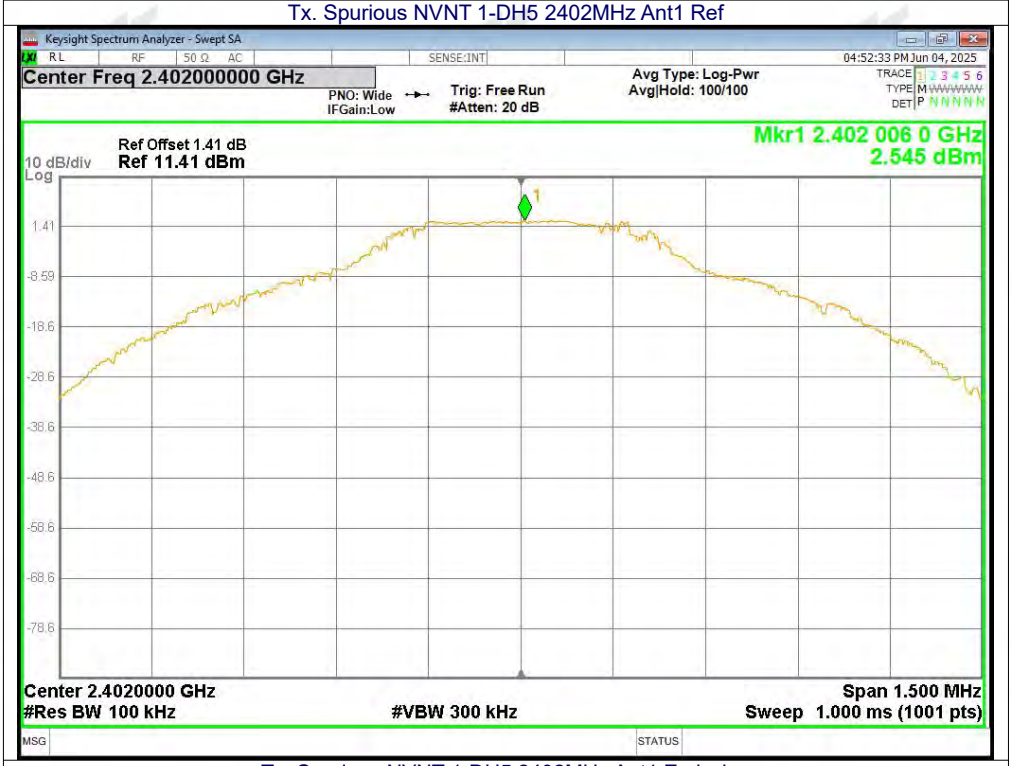
Band Edge(Hopping) NVNT 3-DH5 2480MHz Ant1 Hopping Emission

Conducted RF Spurious Emission

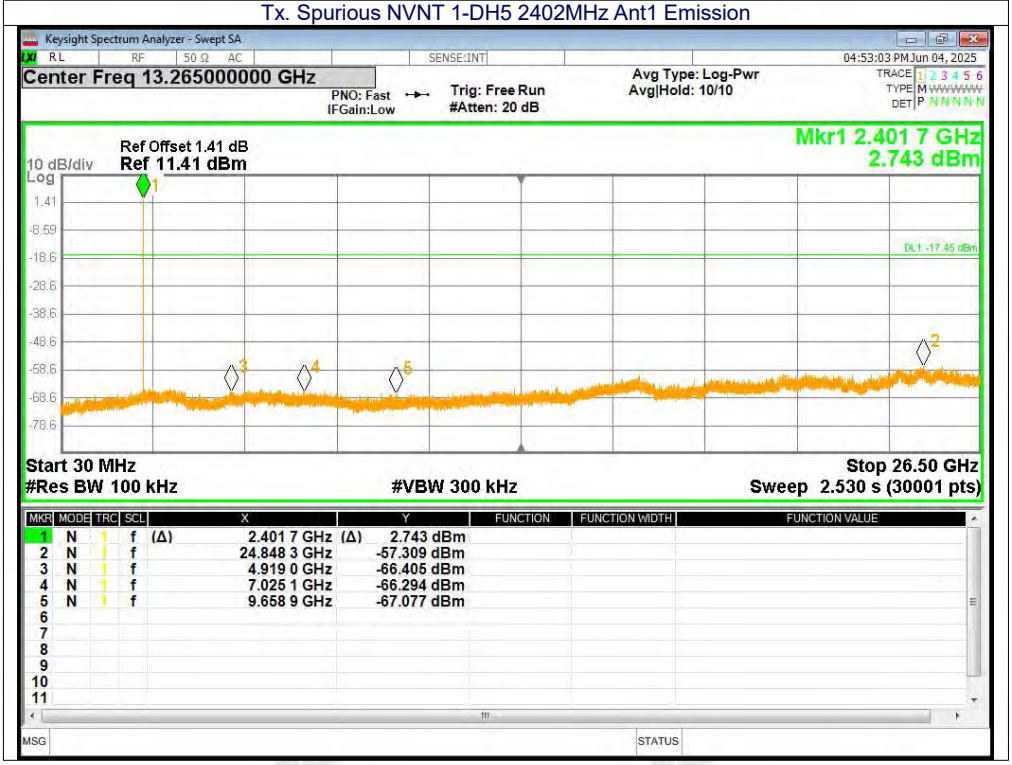
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	1-DH5	2402	Ant1	-59.85	-20	Pass
NVNT	1-DH5	2441	Ant1	-59.57	-20	Pass
NVNT	1-DH5	2480	Ant1	-58.31	-20	Pass
NVNT	2-DH5	2402	Ant1	-59.08	-20	Pass
NVNT	2-DH5	2441	Ant1	-58.81	-20	Pass
NVNT	2-DH5	2480	Ant1	-56.46	-20	Pass
NVNT	3-DH5	2402	Ant1	-58.02	-20	Pass
NVNT	3-DH5	2441	Ant1	-59.13	-20	Pass
NVNT	3-DH5	2480	Ant1	-55.99	-20	Pass

Test Graphs

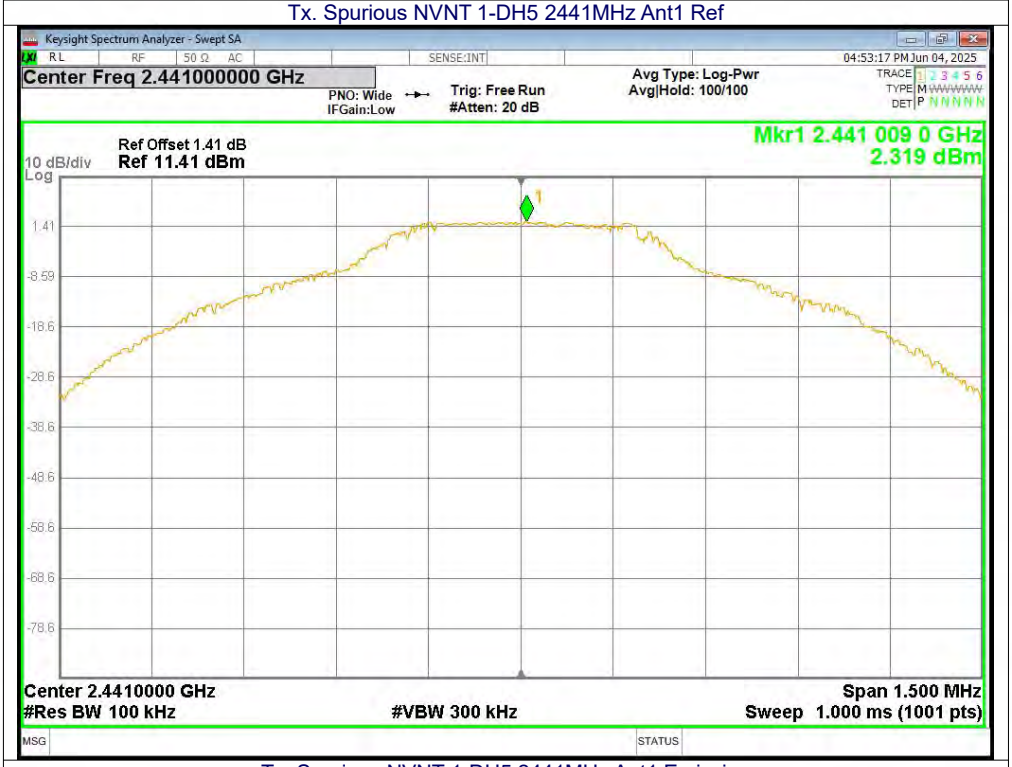
Tx. Spurious NVNT 1-DH5 2402MHz Ant1 Ref



Tx. Spurious NVNT 1-DH5 2402MHz Ant1 Emission



Tx. Spurious NVNT 1-DH5 2441MHz Ant1 Ref



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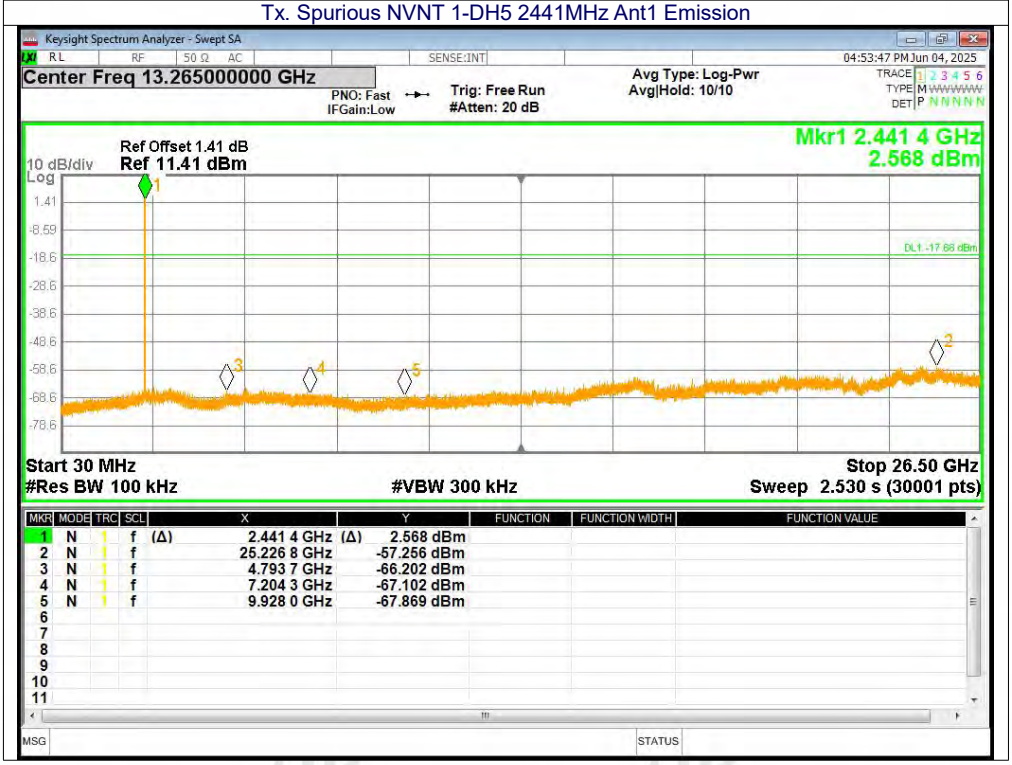

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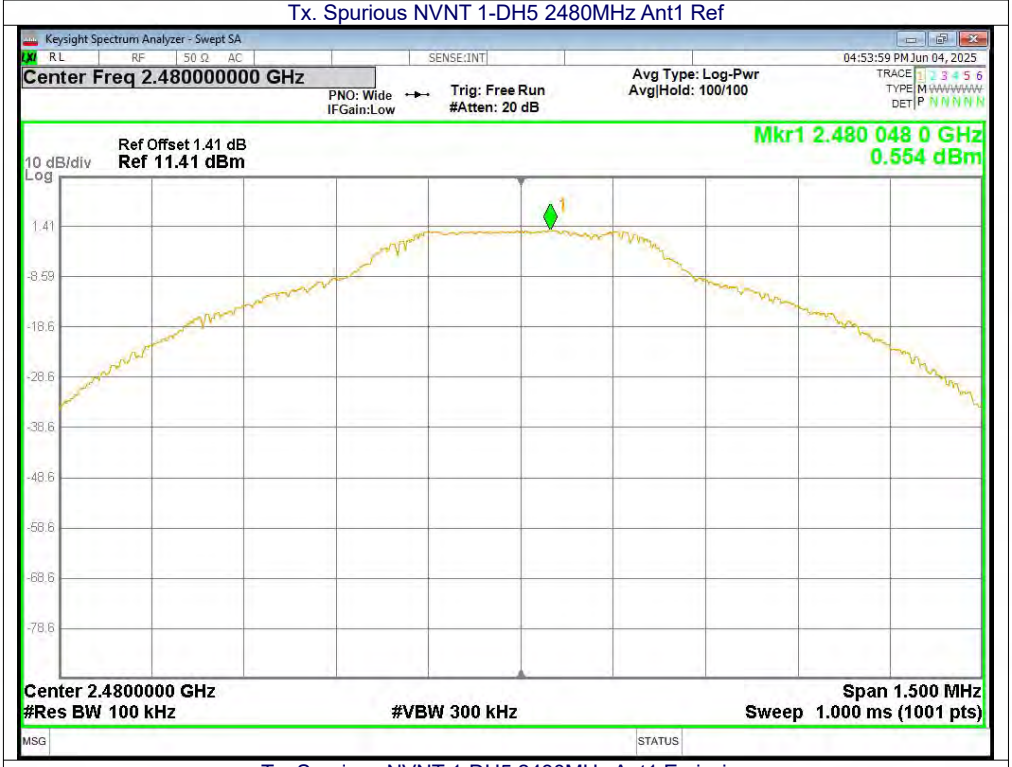

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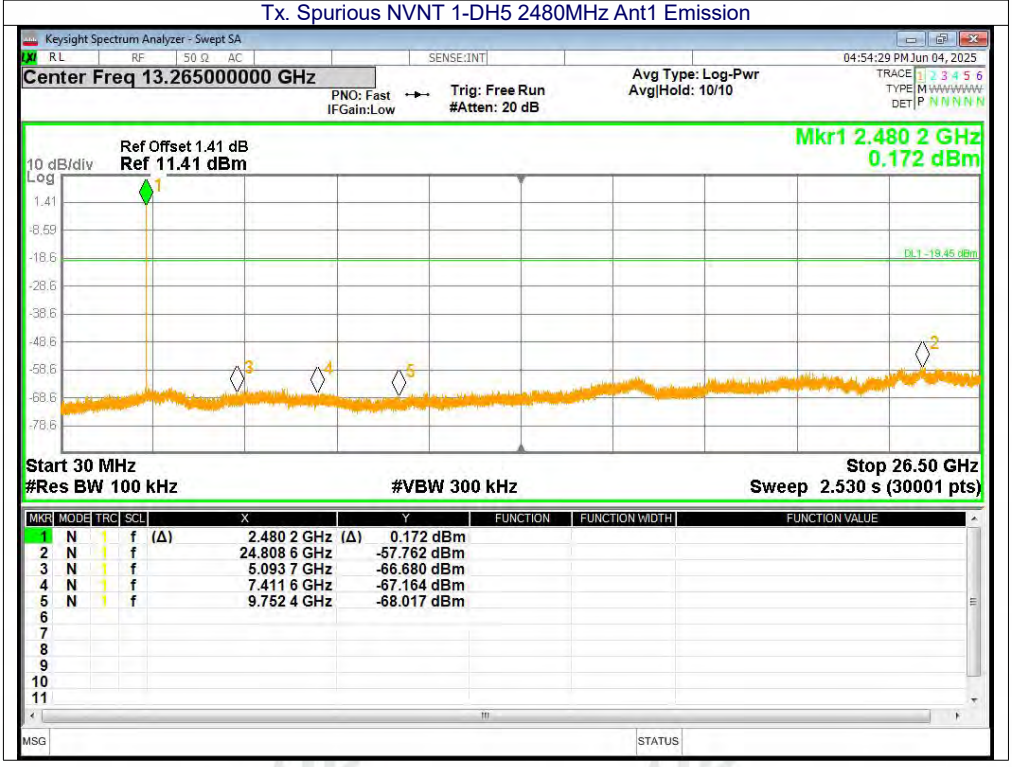

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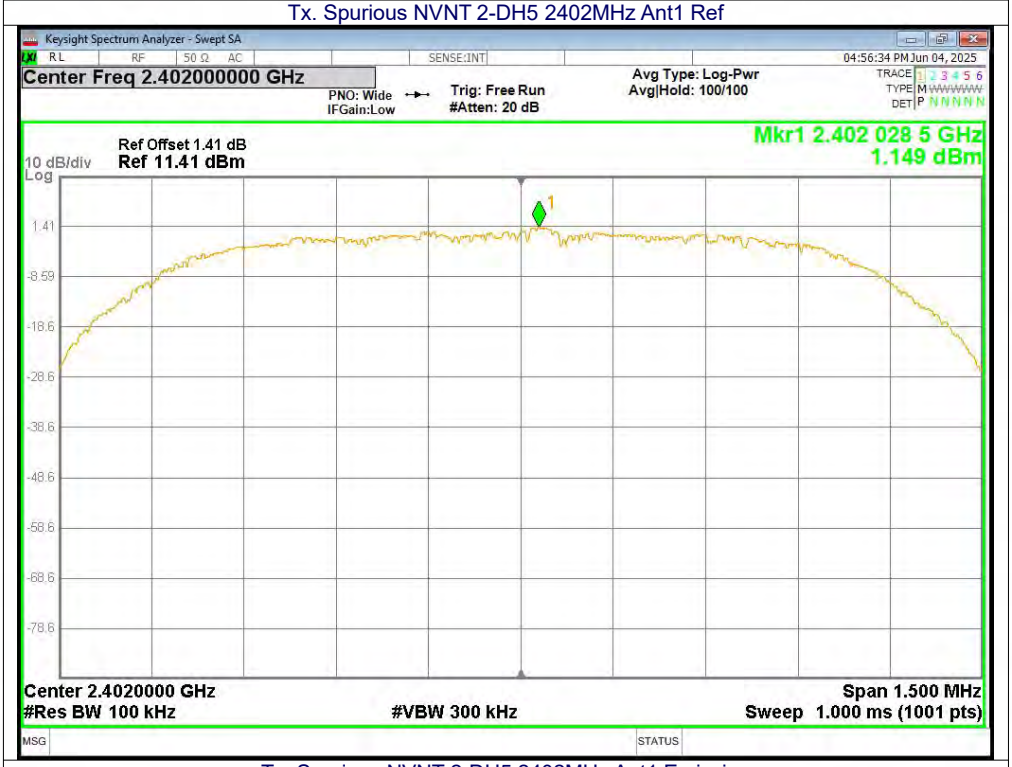

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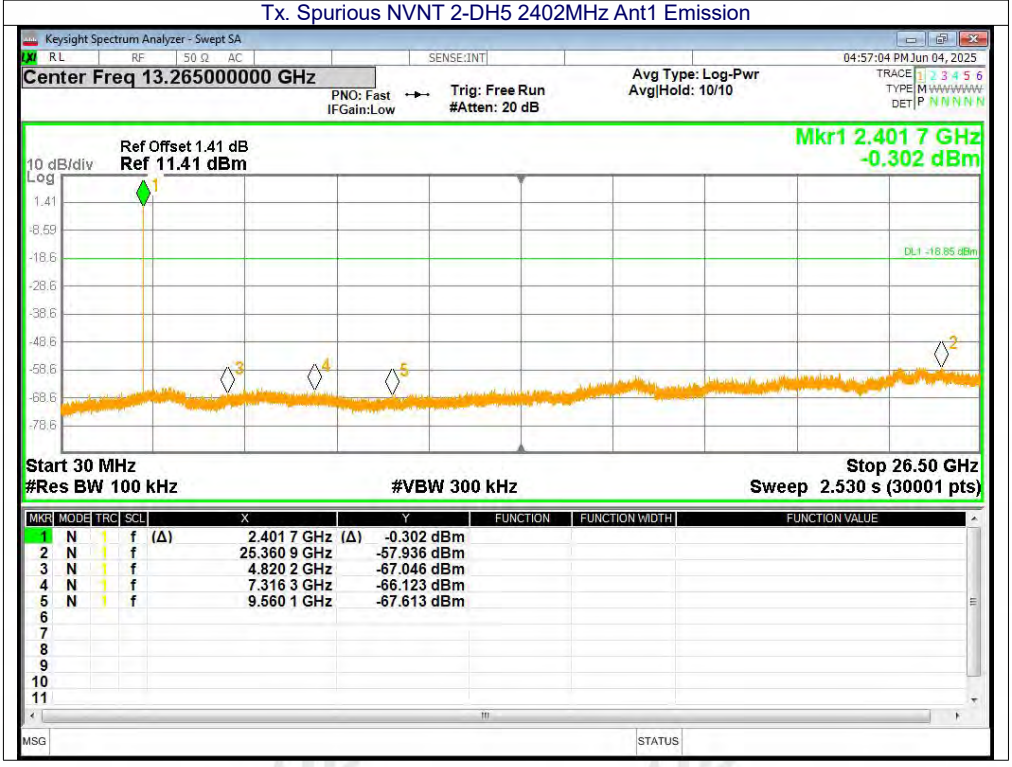

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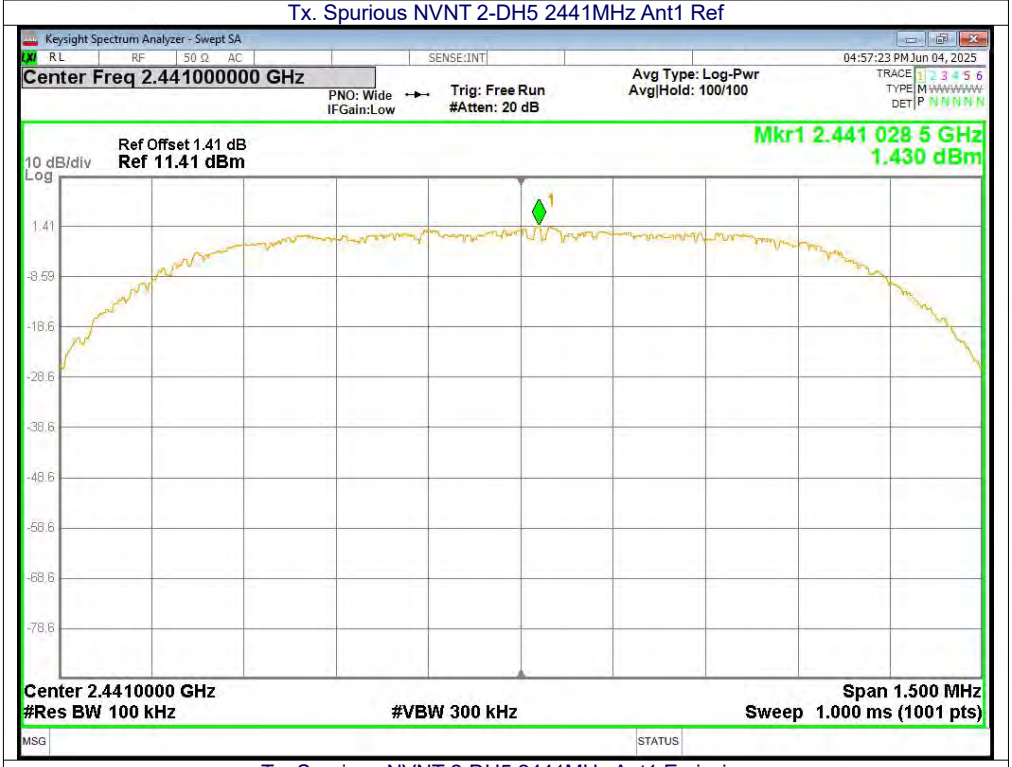

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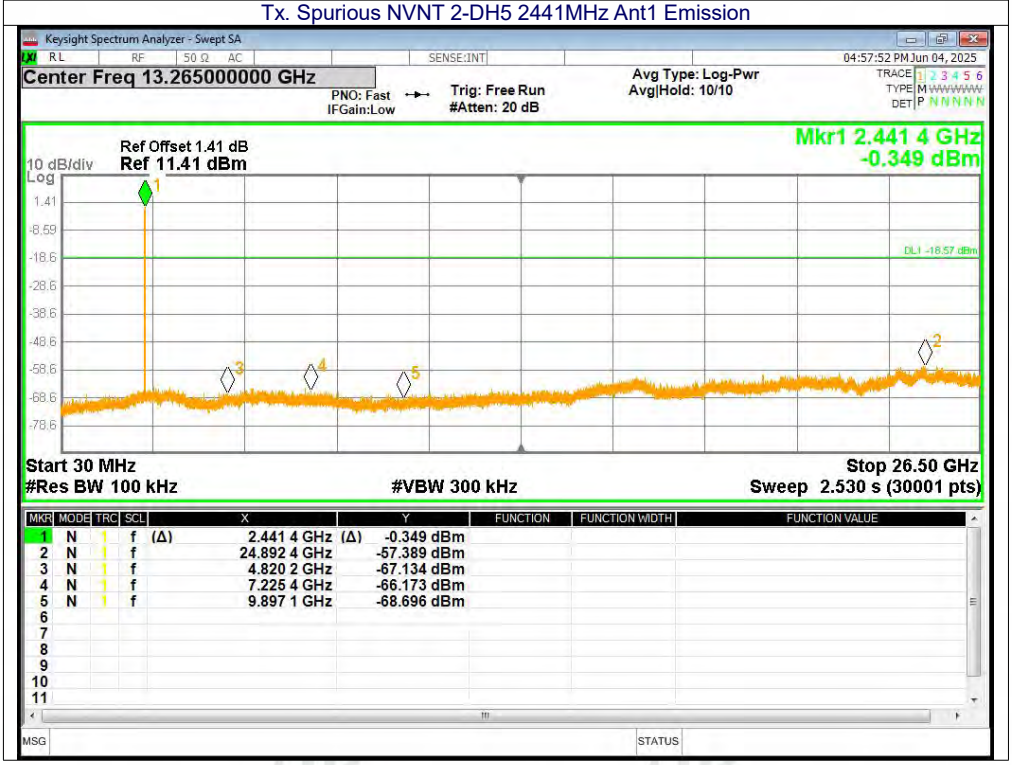

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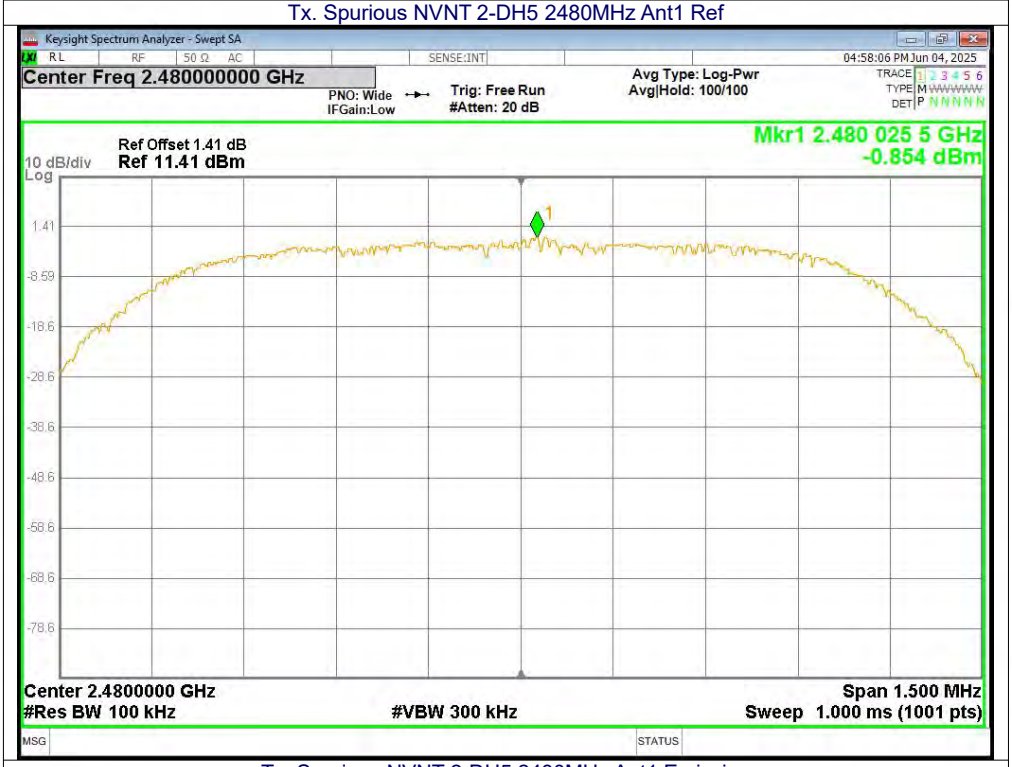

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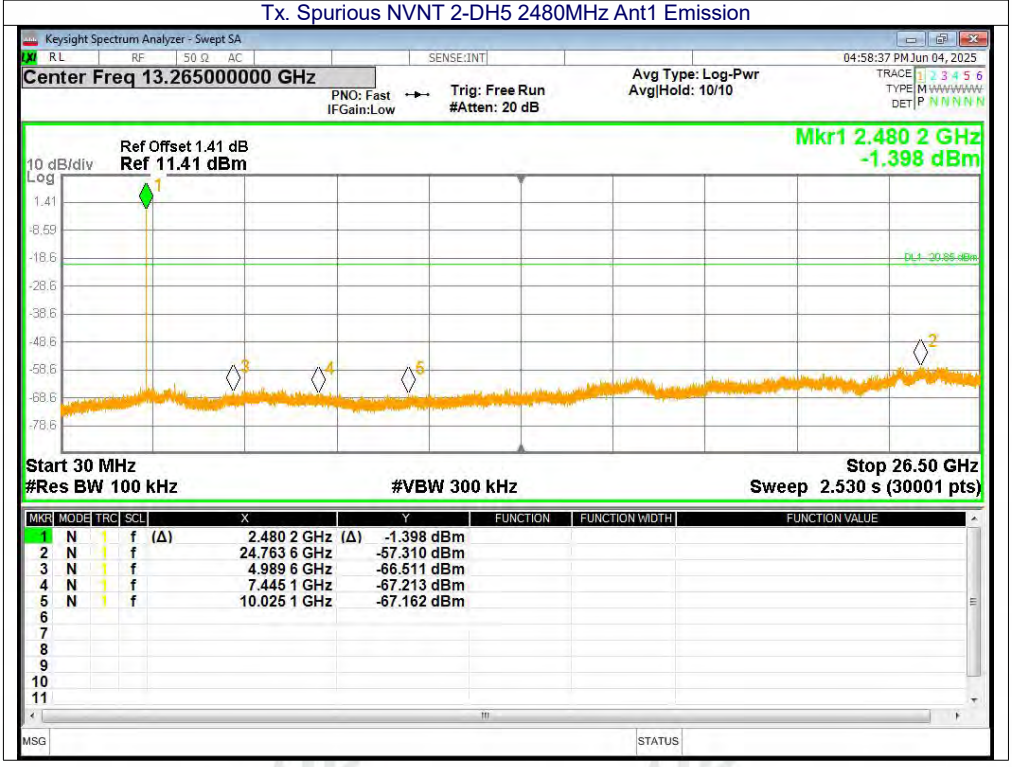

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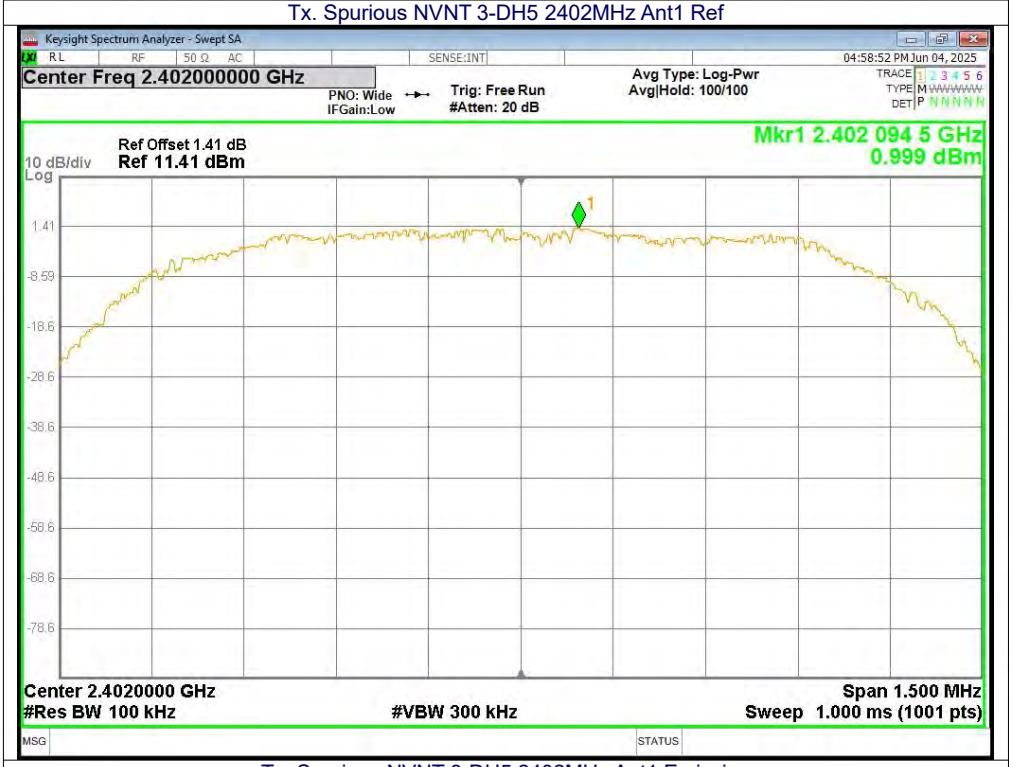

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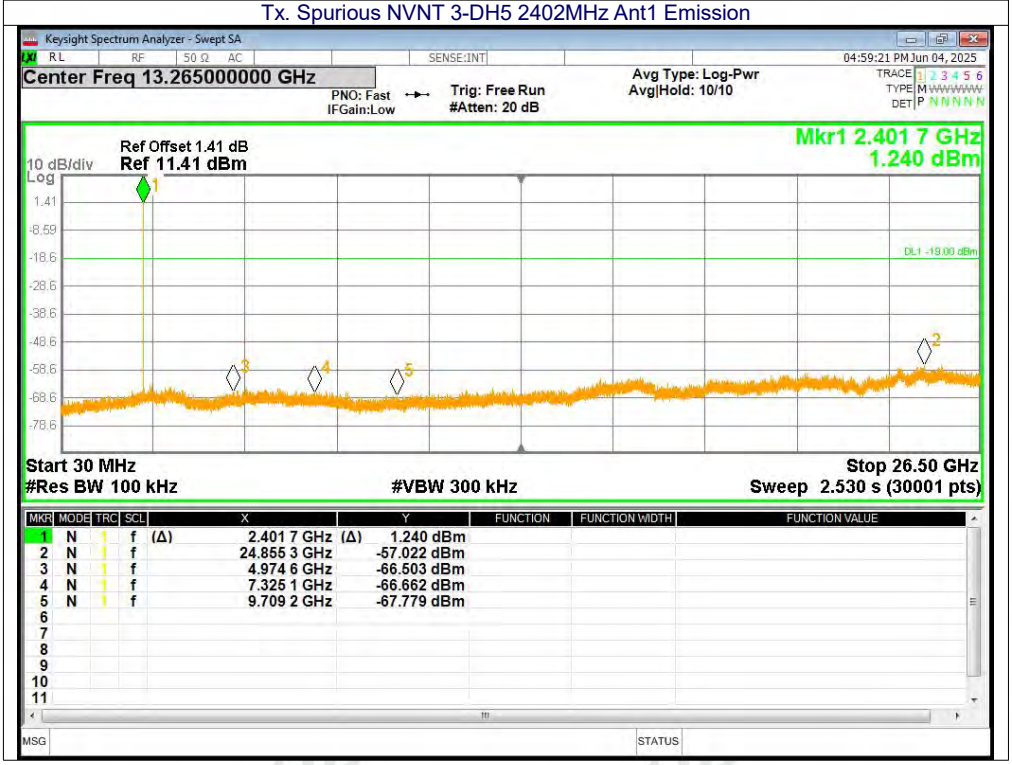

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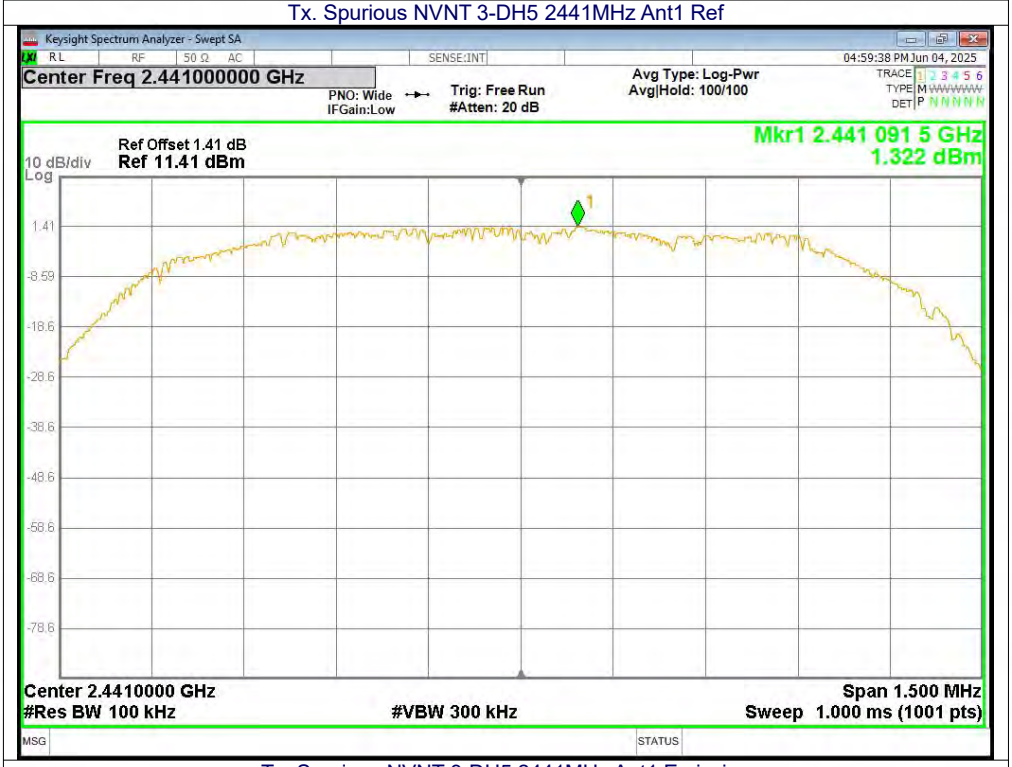
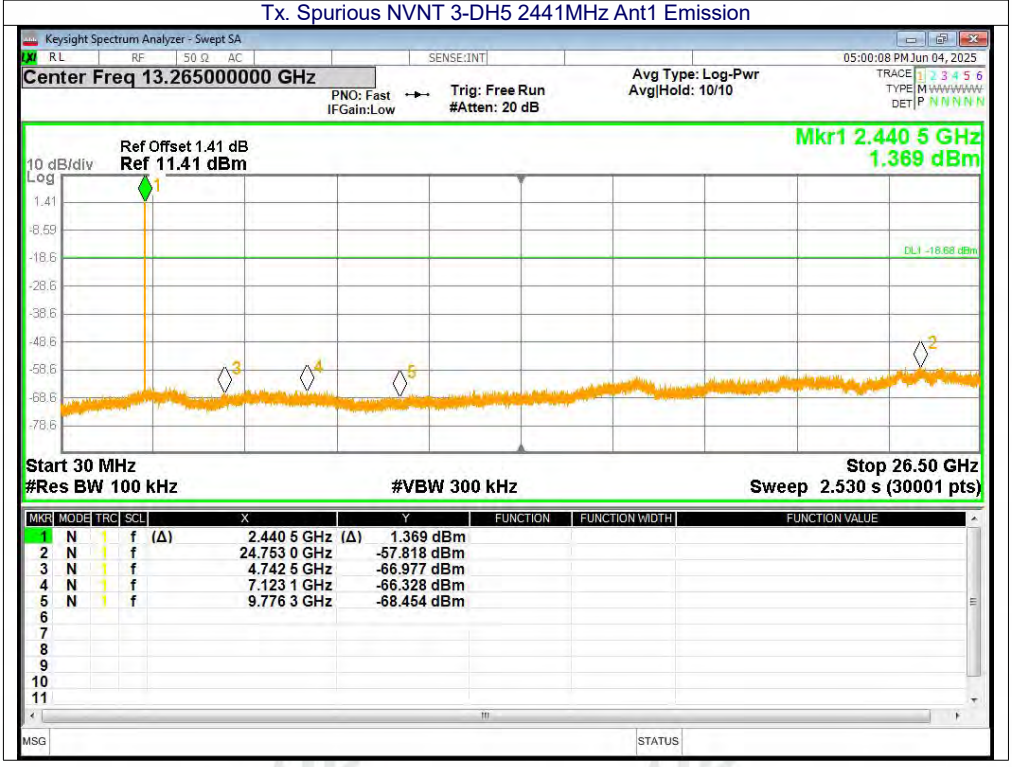


Tx. Spurious NVNT 3-DH5 2441MHz Ant1 Emission



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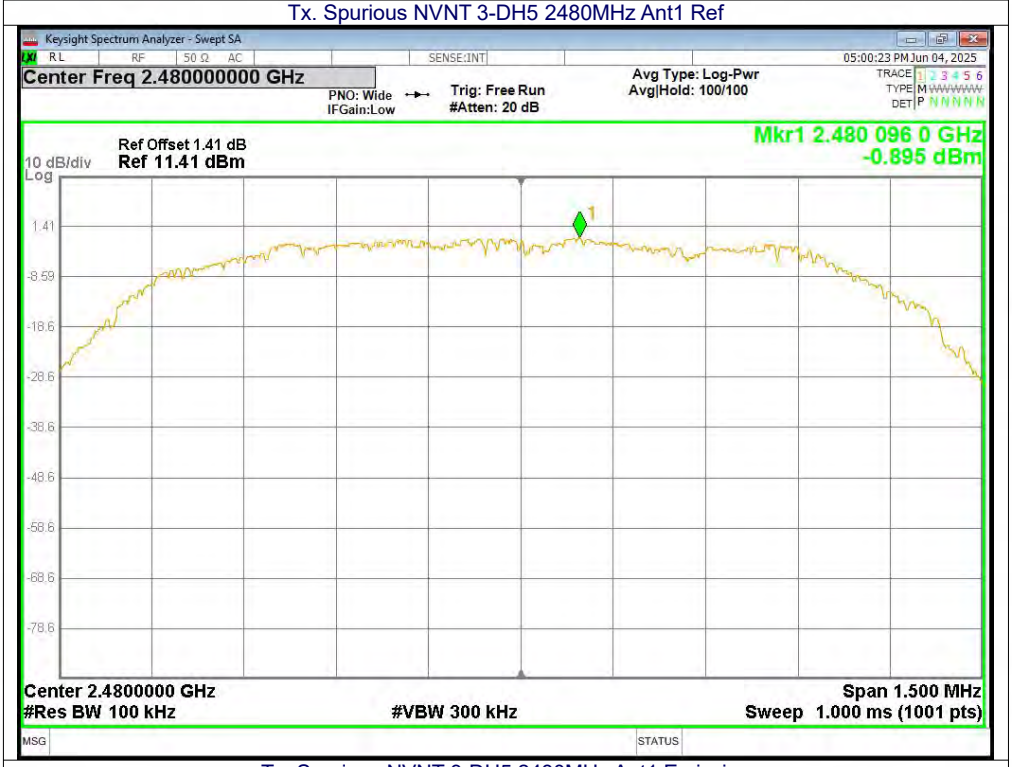

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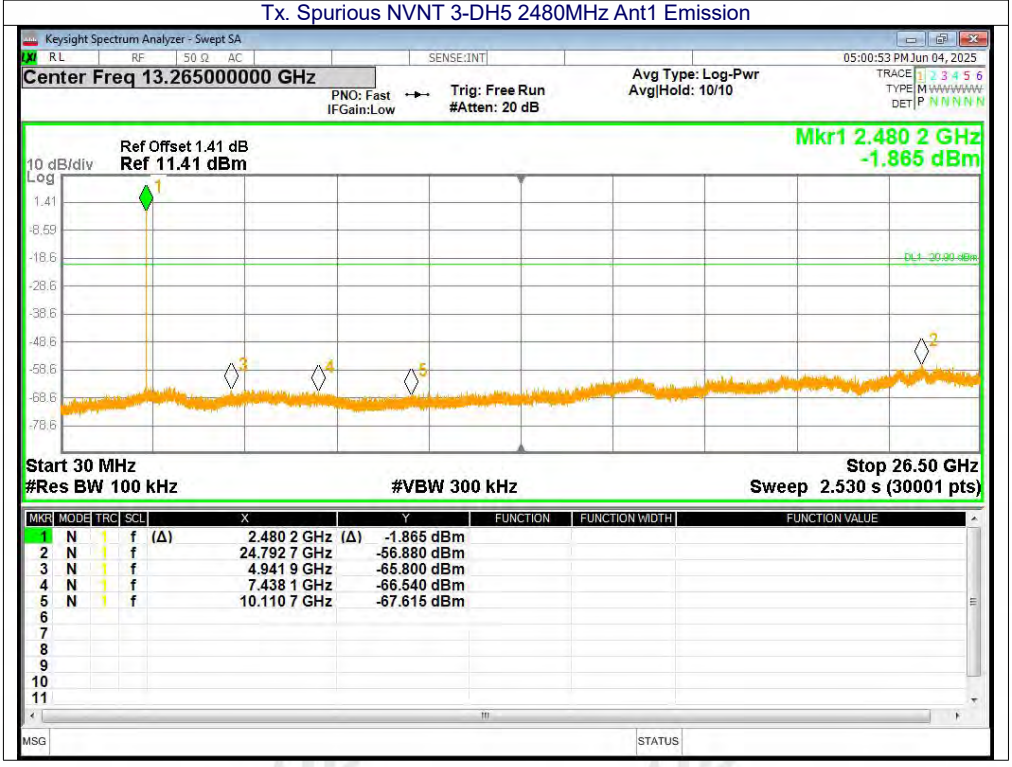
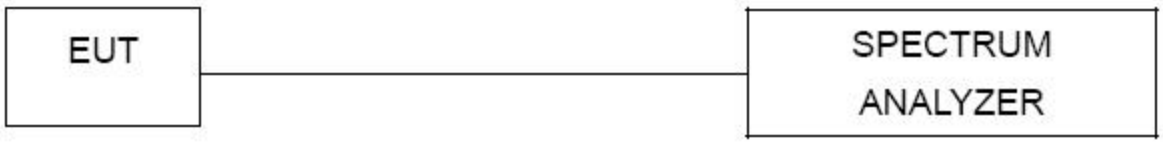


8. 20DB&99% BANDWIDTH

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

8.1 Test Setup



8.2 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.

8.3 Test procedure

1. Set RBW = 30 kHz.
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.
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.

8.4 DEVIATION FROM STANDARD

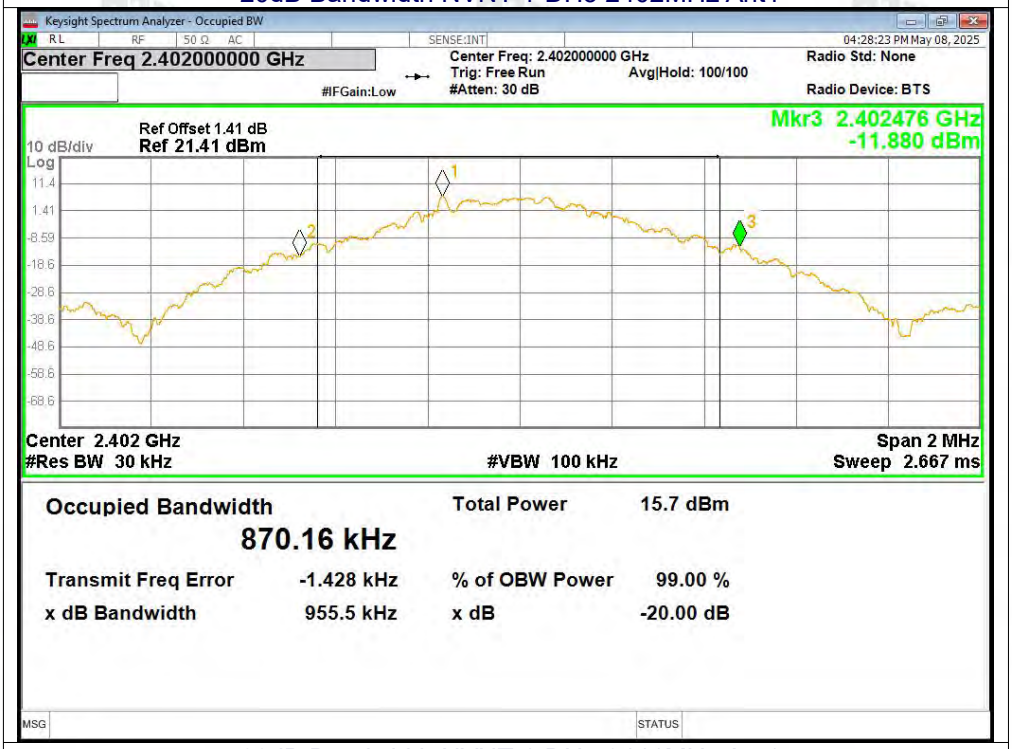
No deviation.

8.5 Test Result

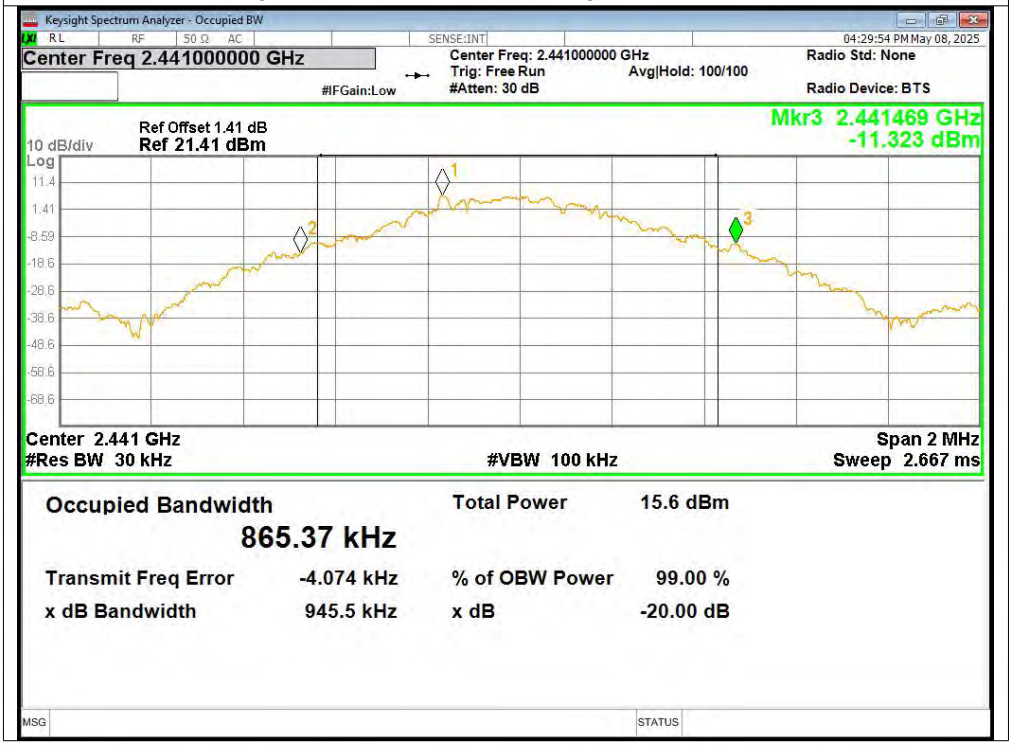
Mode	Test channel	20dB Emission Bandwidth (MHz)	99%Bandwidth (MHz)	Result
GFSK	Lowest	0.956	0.859	Pass
	Middle	0.945	0.877	
	Highest	0.953	0.868	
π/4DQPSK	Lowest	1.328	1.186	Pass
	Middle	1.274	1.179	
	Highest	1.307	1.193	
8DPSK	Lowest	1.297	1.215	Pass
	Middle	1.296	1.193	
	Highest	1.299	1.211	

Test Graphs

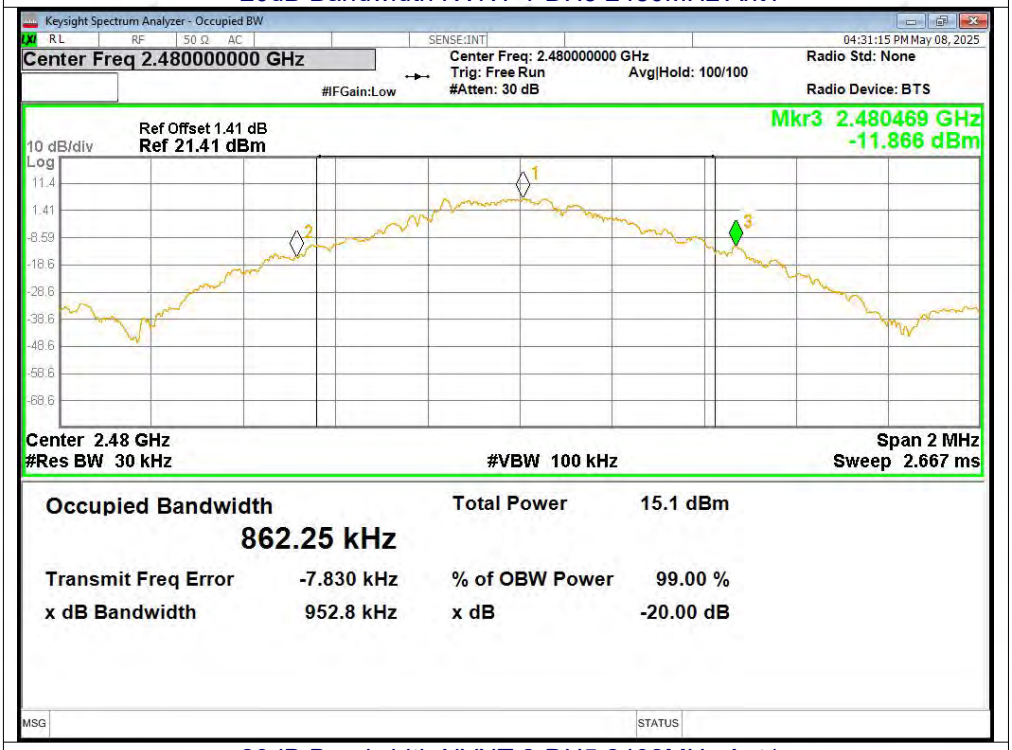
-20dB Bandwidth NVNT 1-DH5 2402MHz Ant1



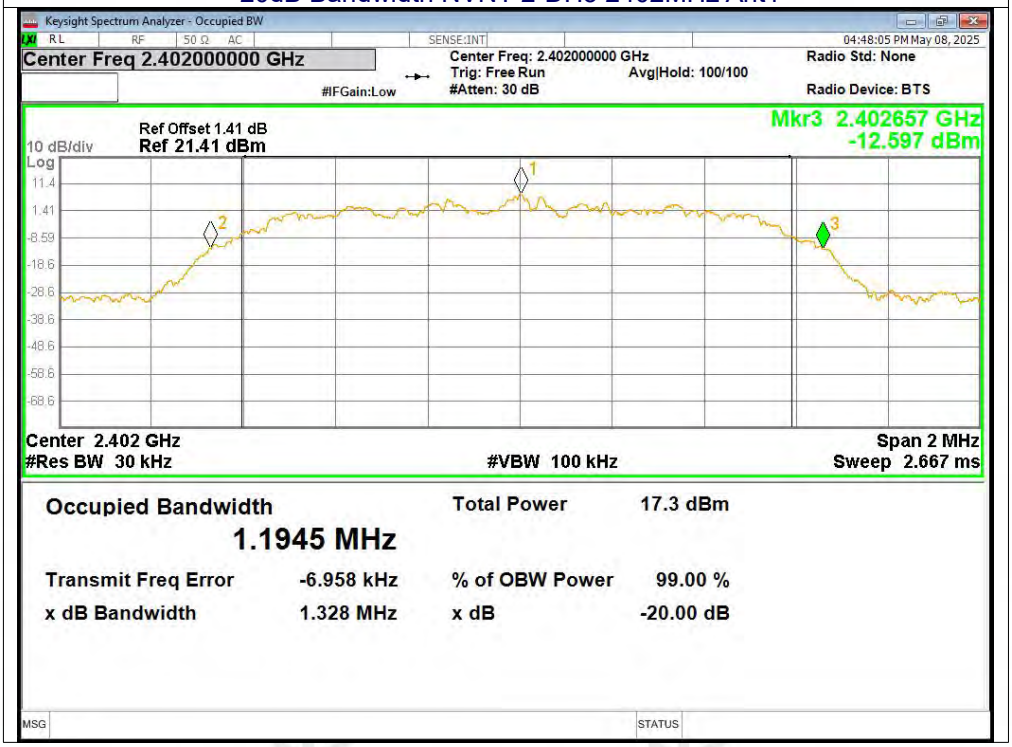
-20dB Bandwidth NVNT 1-DH5 2441MHz Ant1



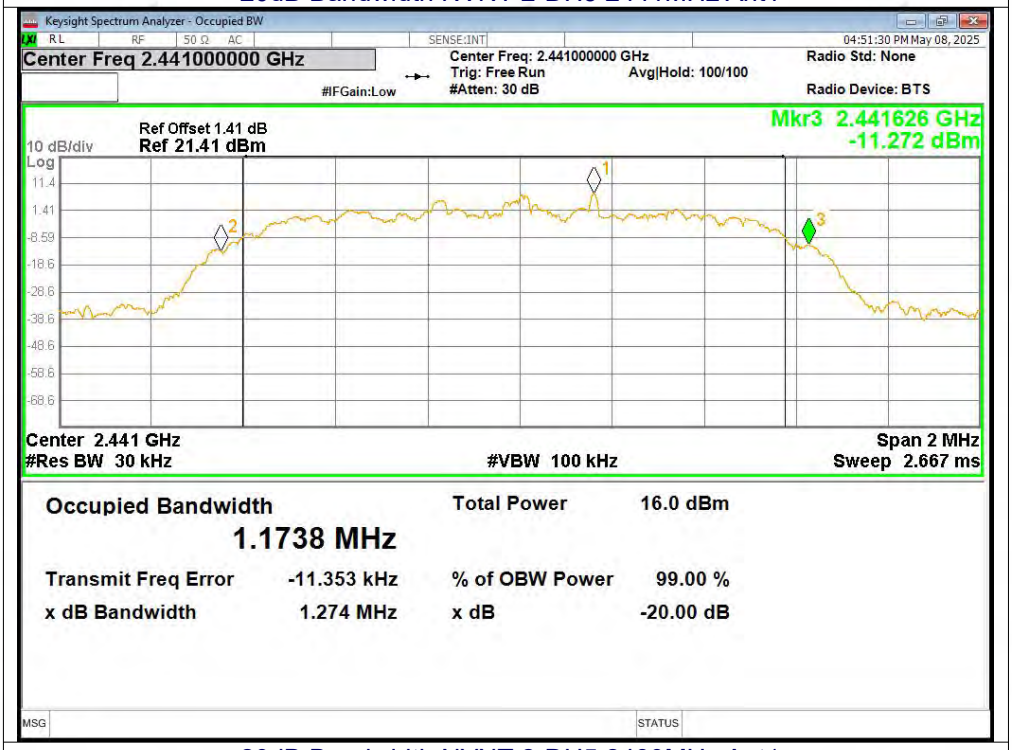
-20dB Bandwidth NVNT 1-DH5 2480MHz Ant1



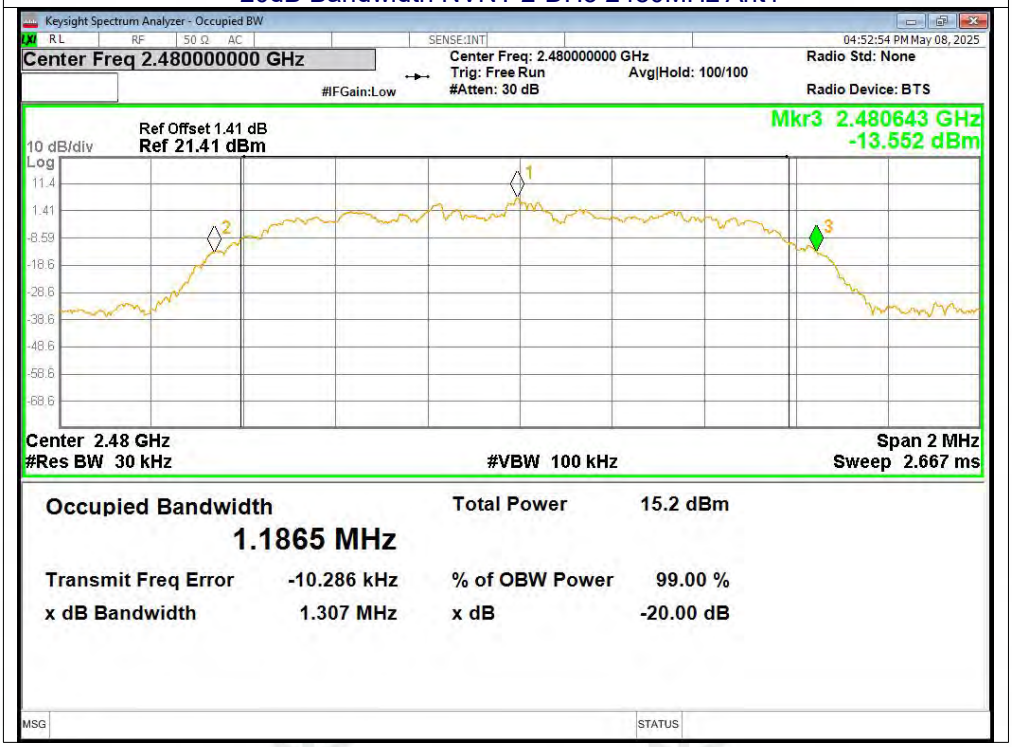
-20dB Bandwidth NVNT 2-DH5 2402MHz Ant1



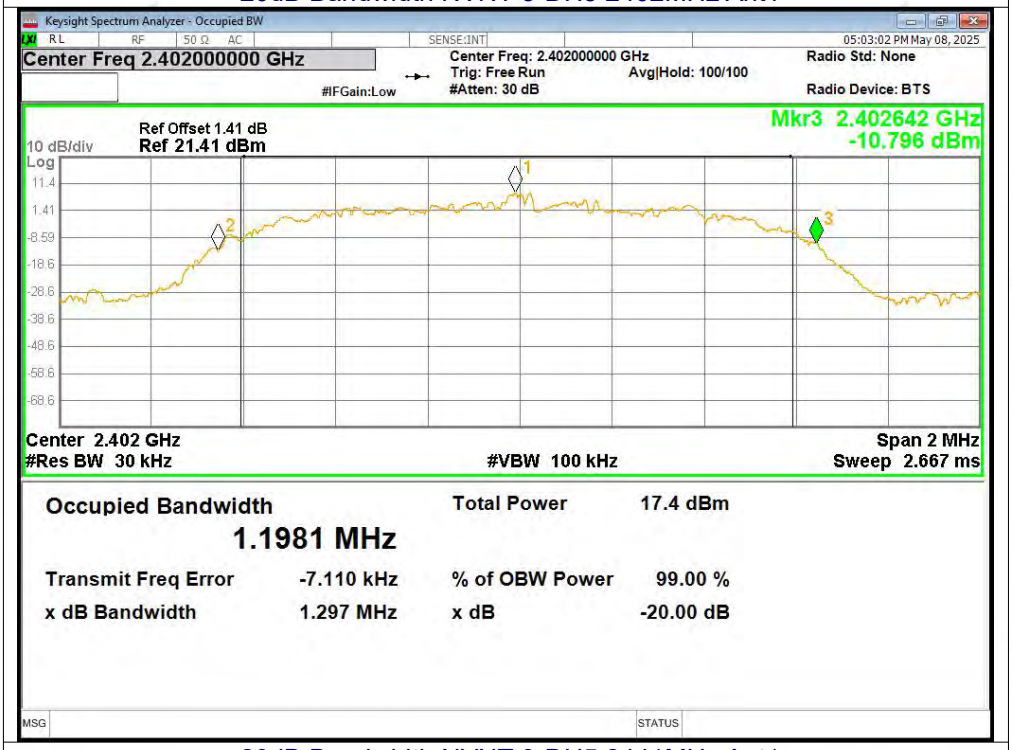
-20dB Bandwidth NVNT 2-DH5 2441MHz Ant1



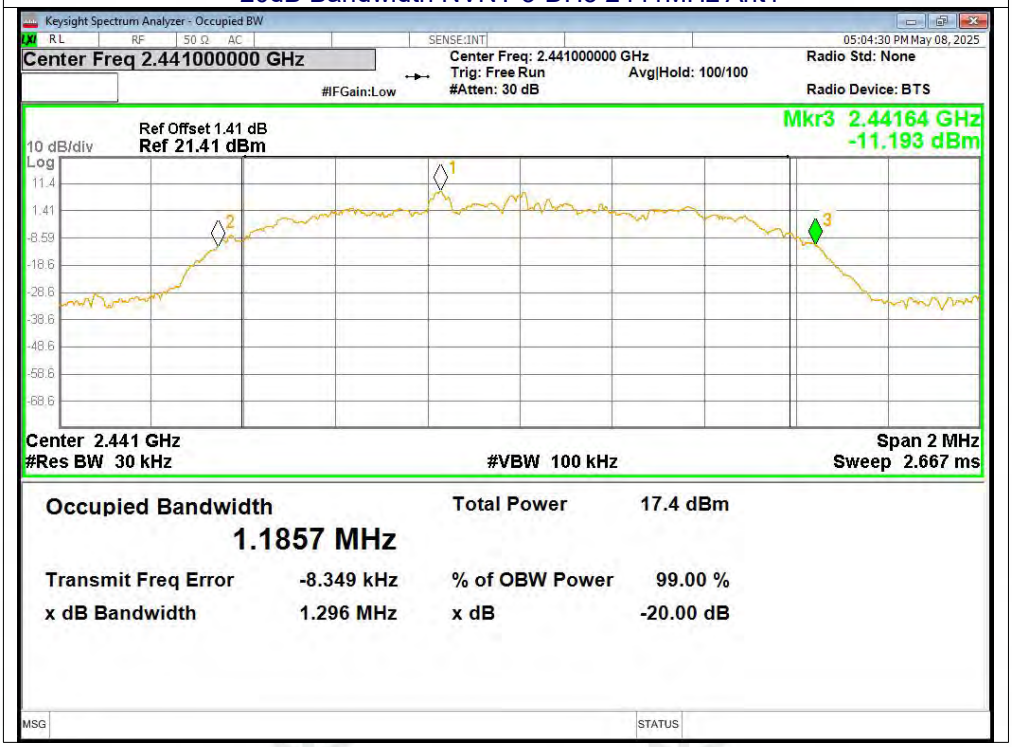
-20dB Bandwidth NVNT 2-DH5 2480MHz Ant1



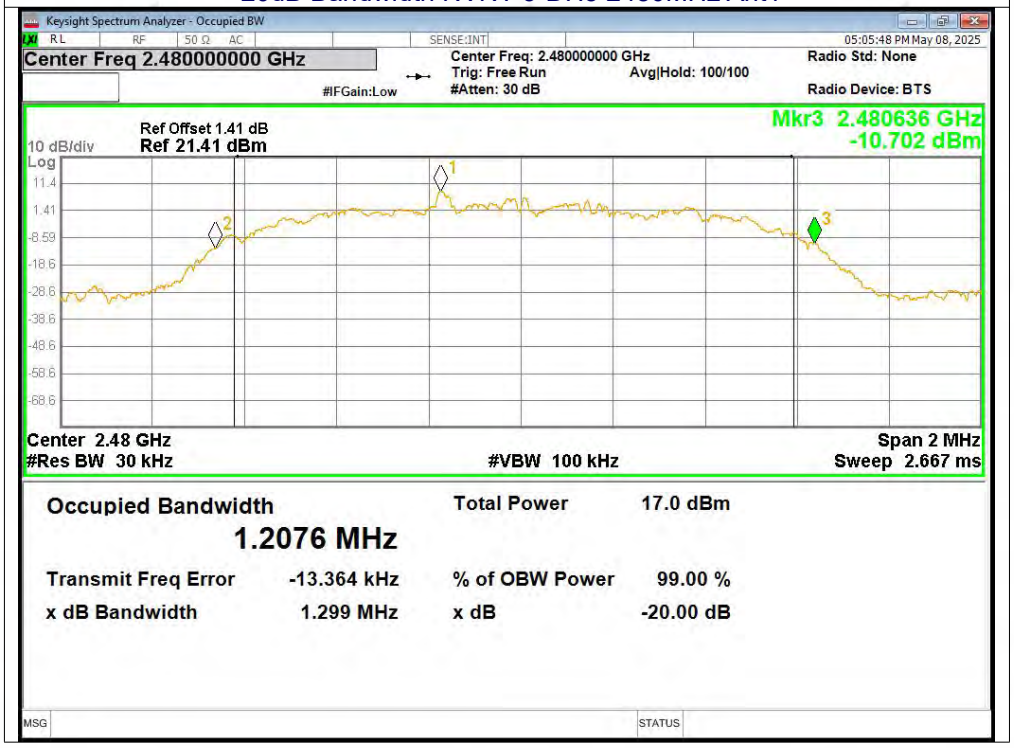
-20dB Bandwidth NVNT 3-DH5 2402MHz Ant1



-20dB Bandwidth NVNT 3-DH5 2441MHz Ant1

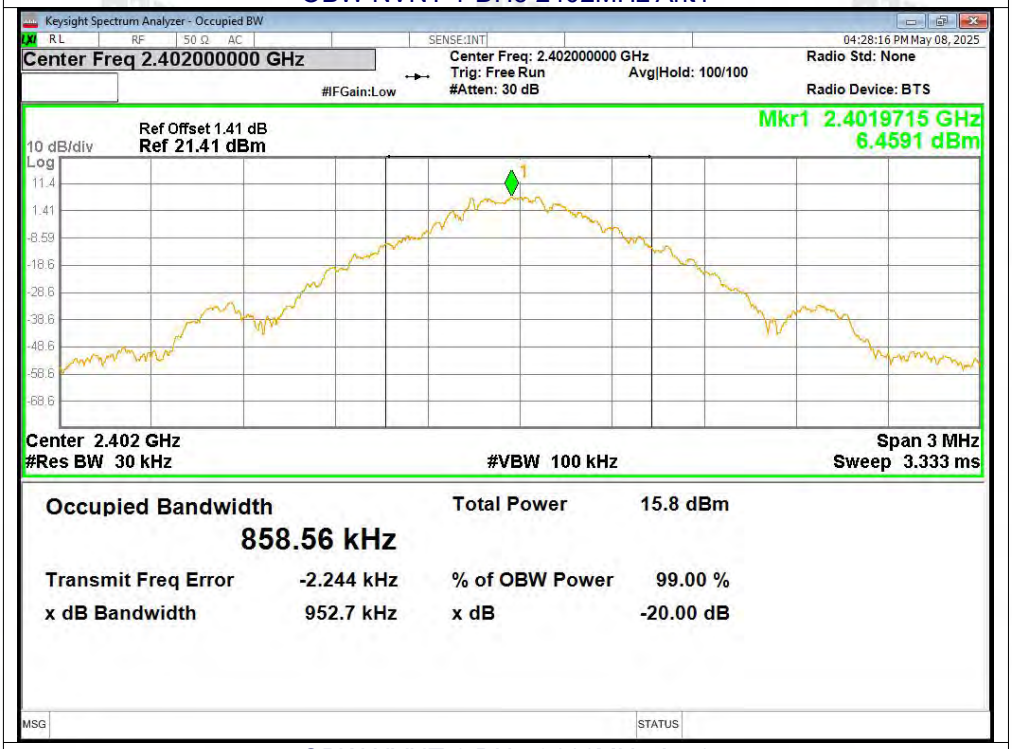


-20dB Bandwidth NVNT 3-DH5 2480MHz Ant1

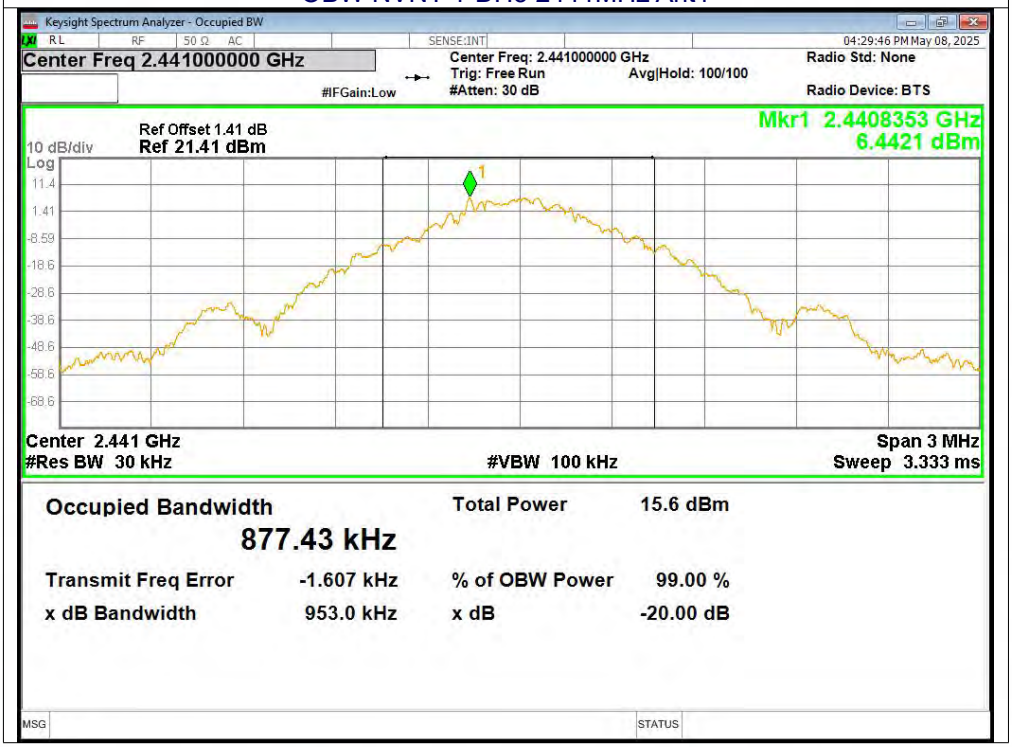


Test Graphs

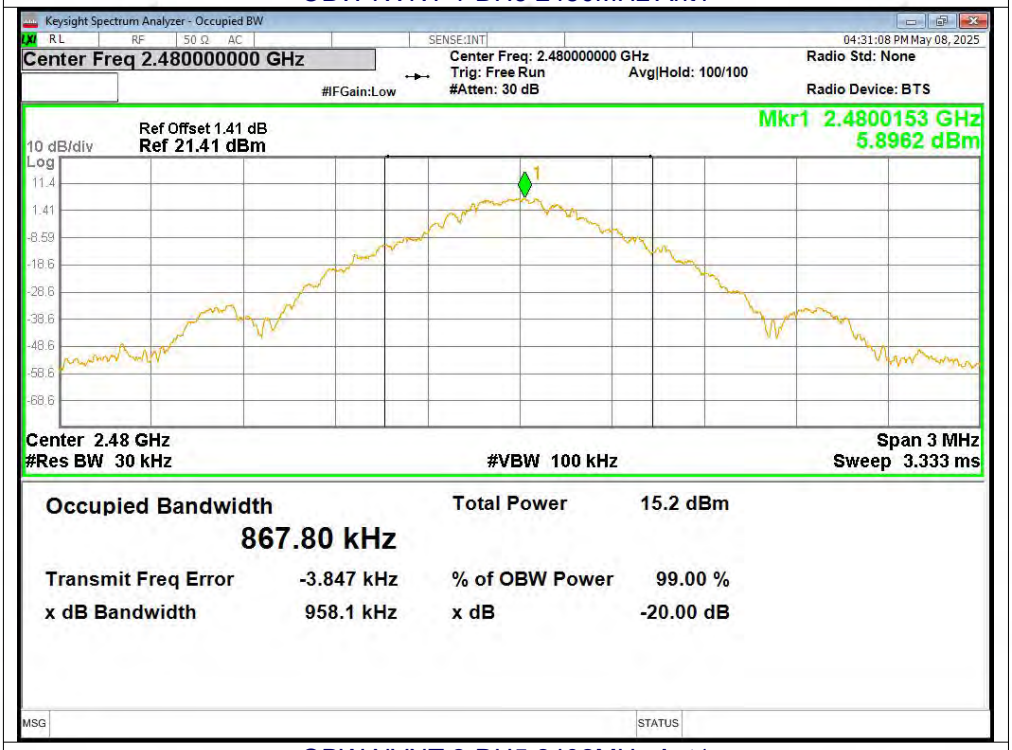
OBW NVNT 1-DH5 2402MHz Ant1



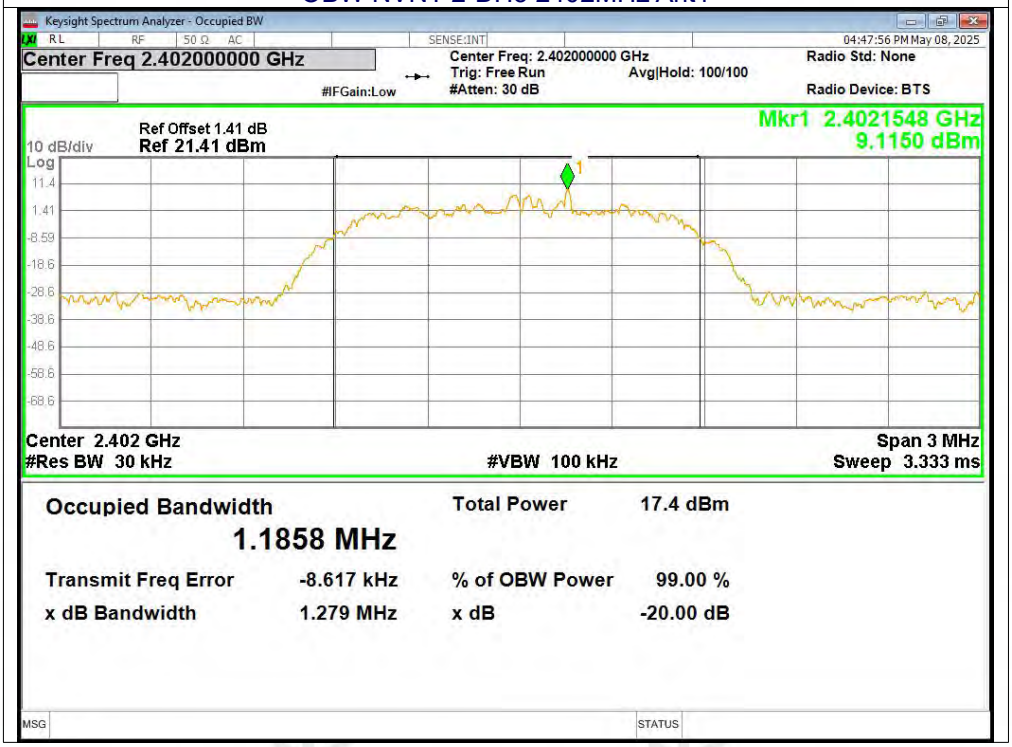
OBW NVNT 1-DH5 2441MHz Ant1



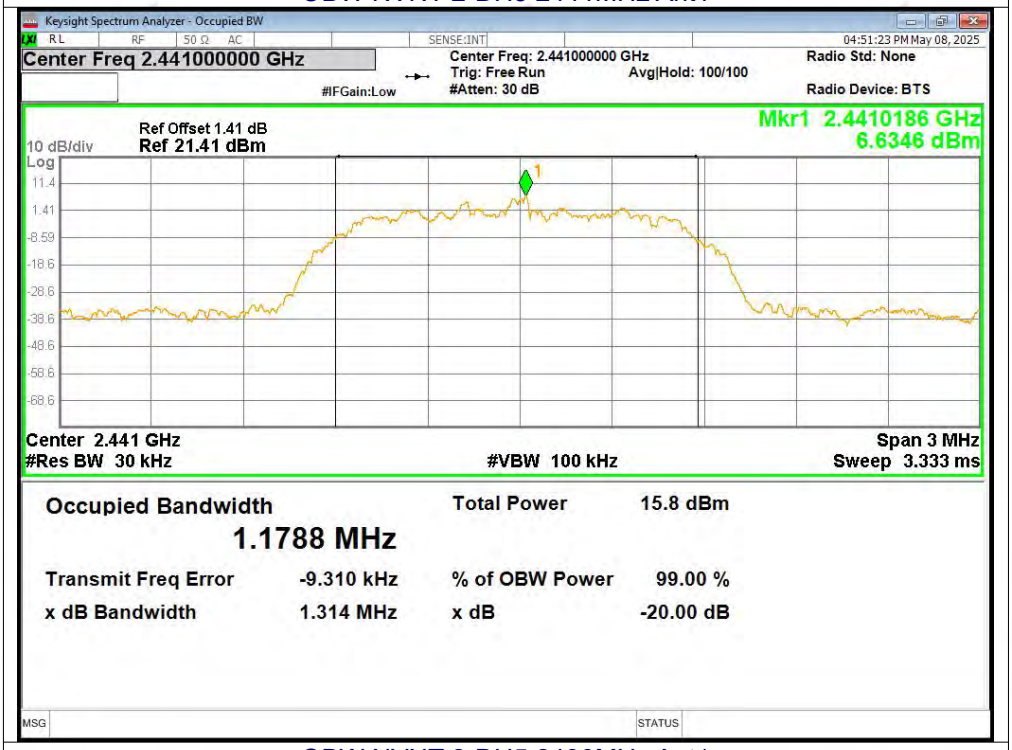
OBW NVNT 1-DH5 2480MHz Ant1



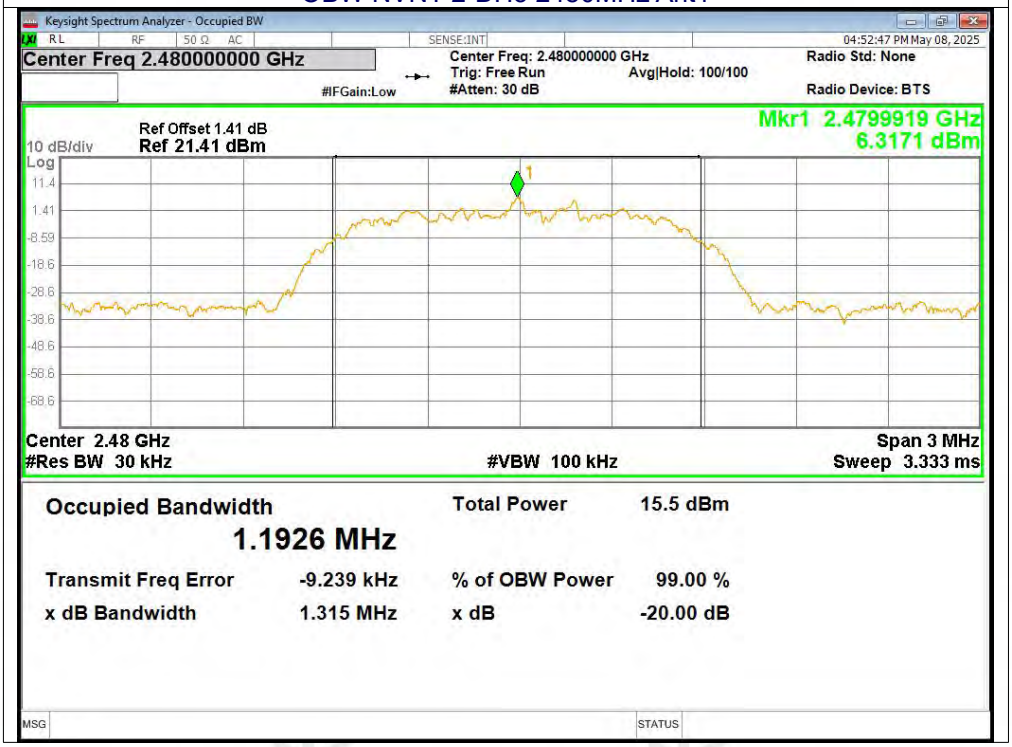
OBW NVNT 2-DH5 2402MHz Ant1



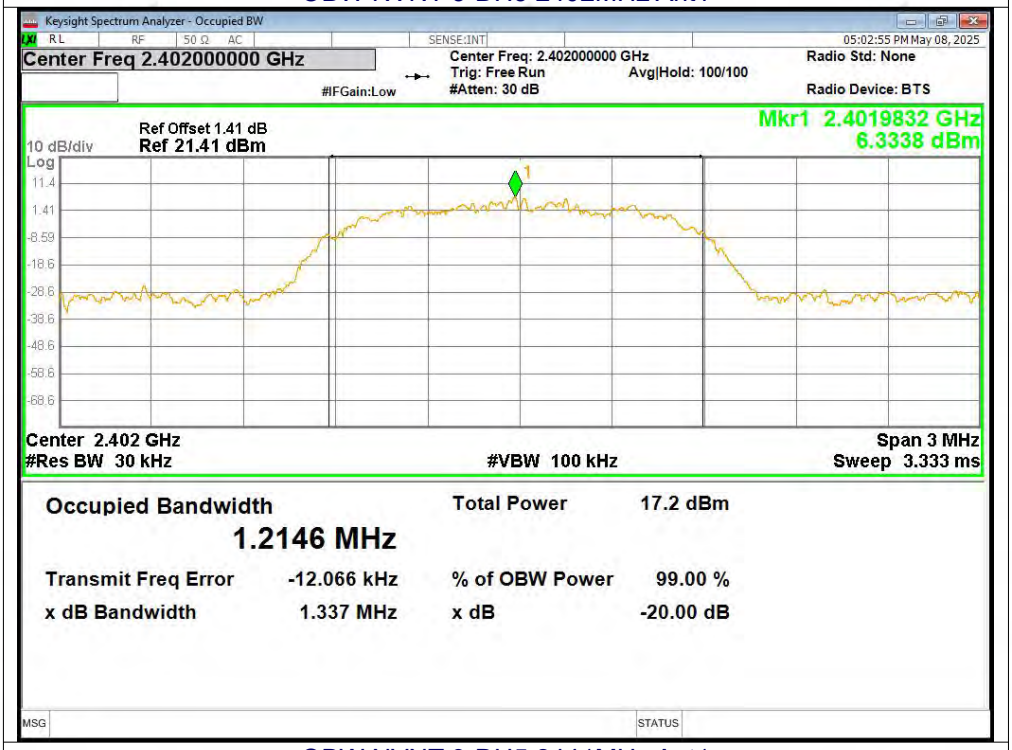
OBW NVNT 2-DH5 2441MHz Ant1



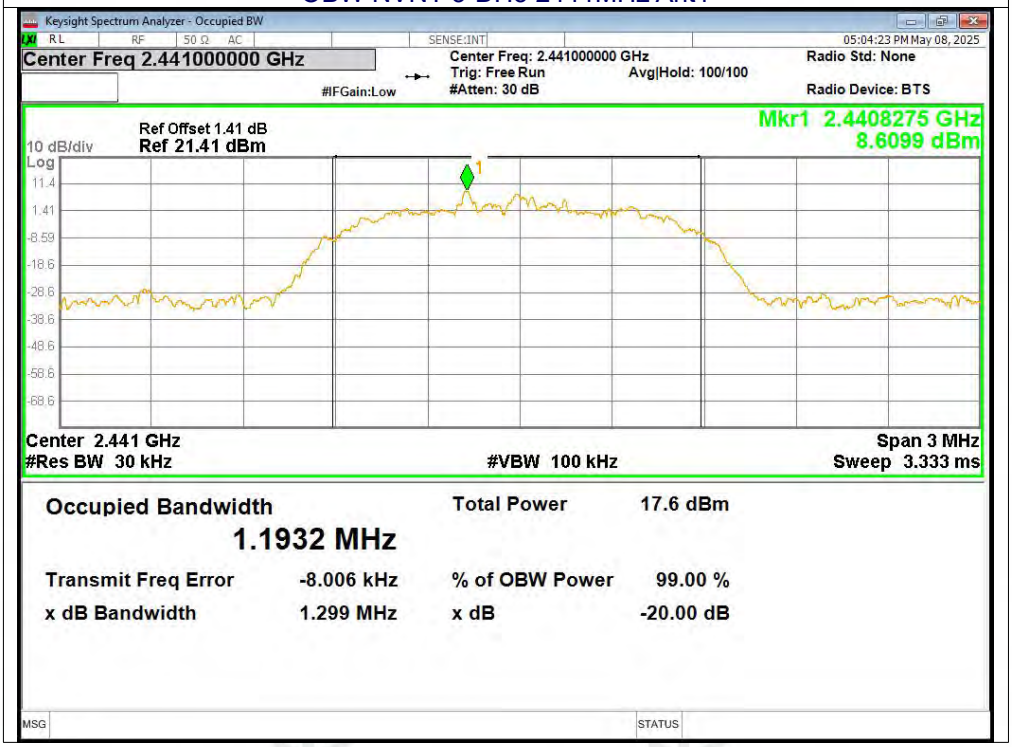
OBW NVNT 2-DH5 2480MHz Ant1



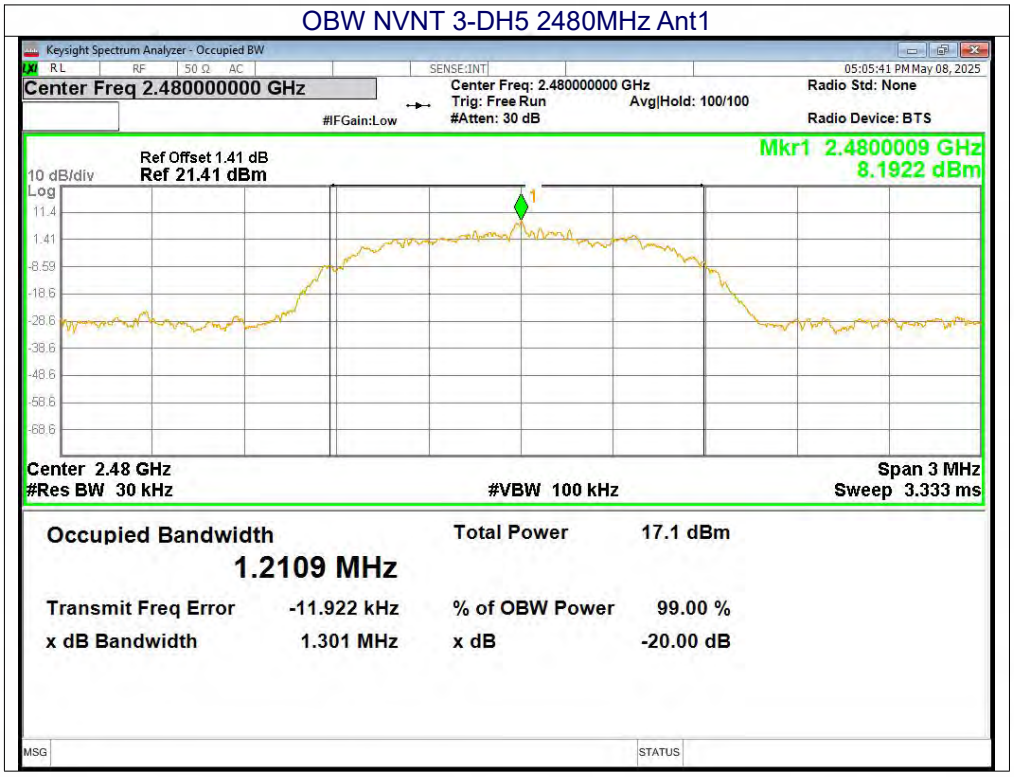
OBW NVNT 3-DH5 2402MHz Ant1



OBW NVNT 3-DH5 2441MHz Ant1



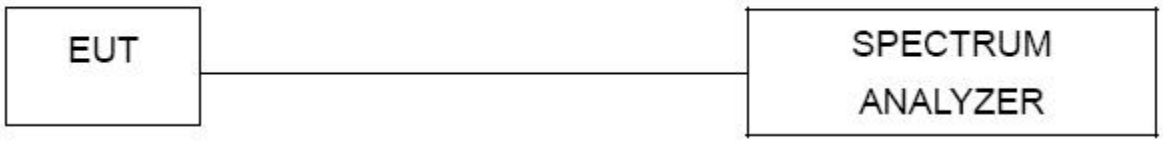
OBW NVNT 3-DH5 2480MHz Ant1



9. Maximum Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(1), RSS 247 5.4 (b)
Test Method:	ANSI C63.10:2013

9.1 Block Diagram Of Test Setup



9.2 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.

9.3 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.

9.4 DEVIATION FROM STANDARD

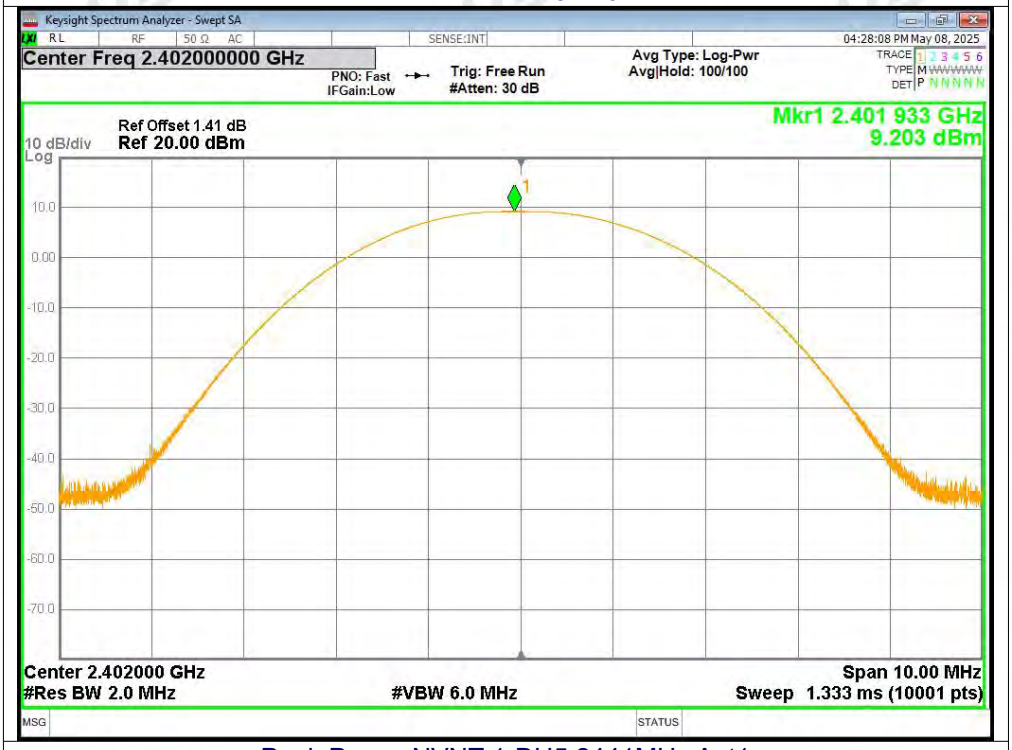
No deviation.

9.5 Test Result

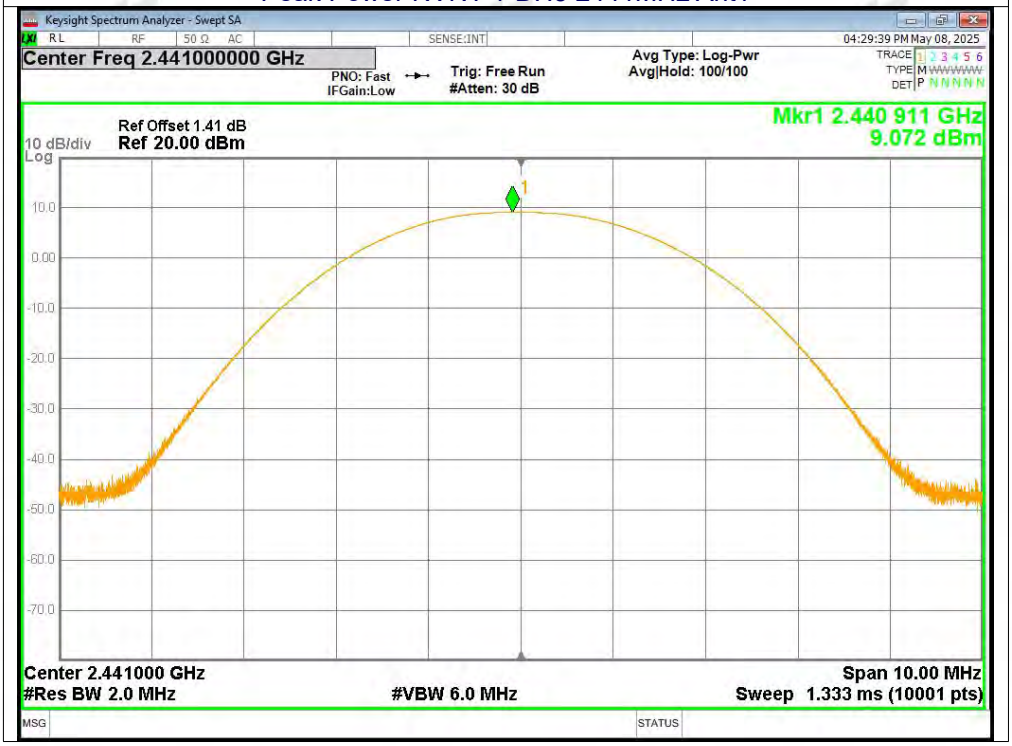
Mode	Test channel	Peak Output Power (dBm)	Peak Output Power Limit (dBm)	Result
GFSK	Lowest	9.2	21.00	Pass
	Middle	9.07		
	Highest	8.6		
π/4DQPSK	Lowest	12.04	21.00	Pass
	Middle	11		
	Highest	10.76		
8DPSK	Lowest	12.49	21.00	Pass
	Middle	12.24		
	Highest	11.86		

Test Graphs

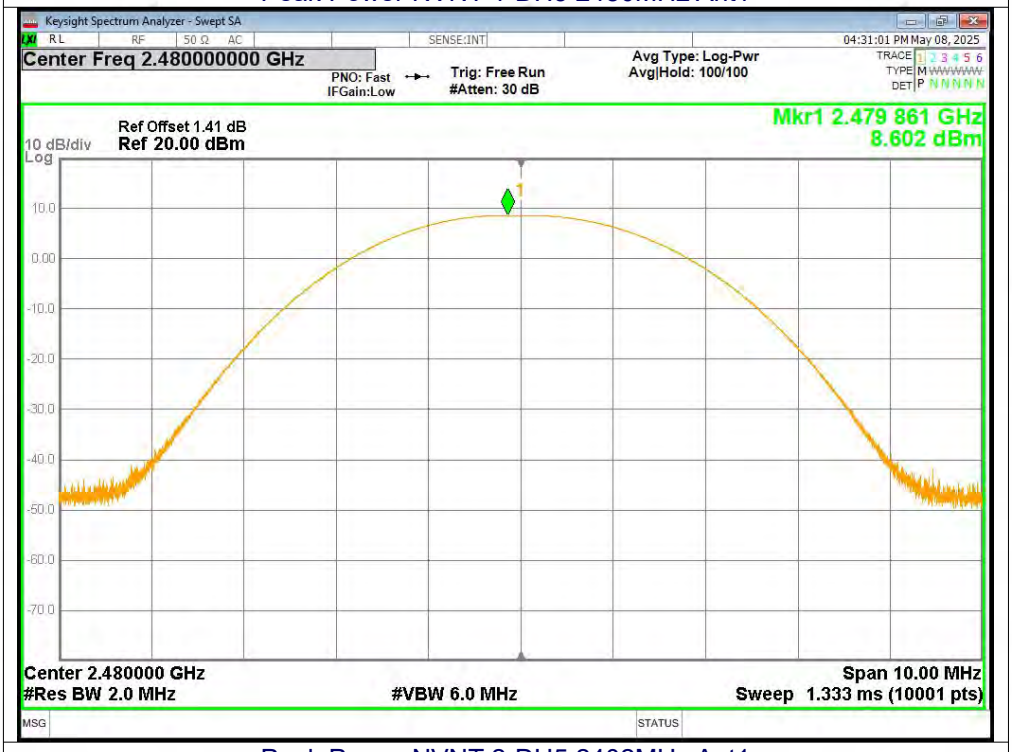
Peak Power NVNT 1-DH5 2402MHz Ant1



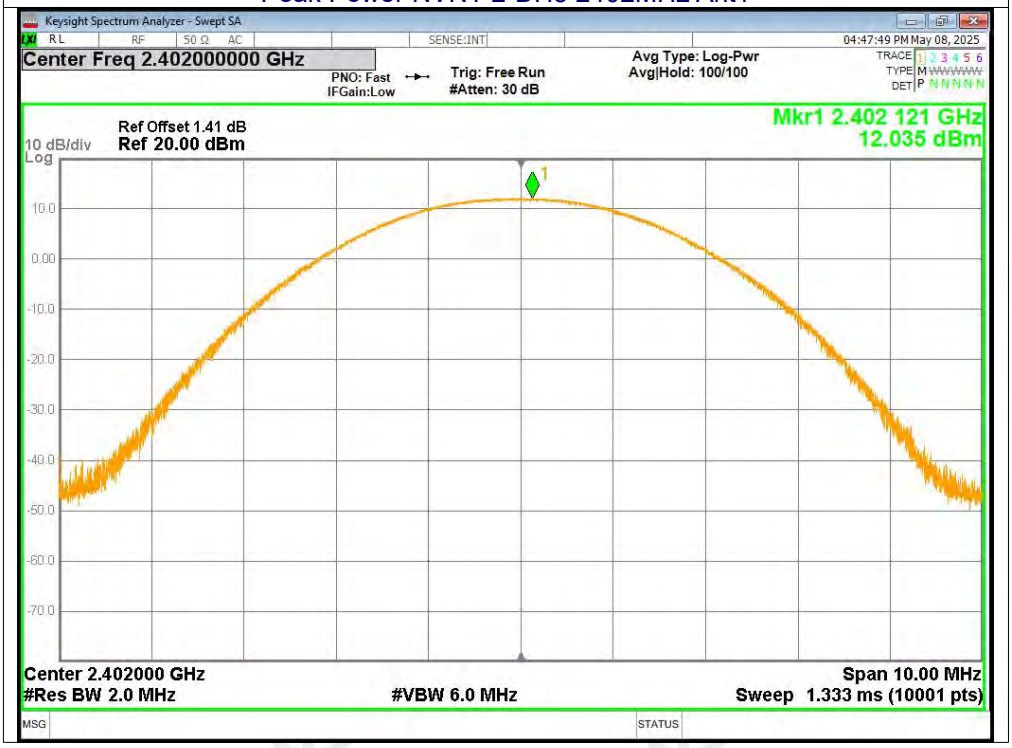
Peak Power NVNT 1-DH5 2441MHz Ant1



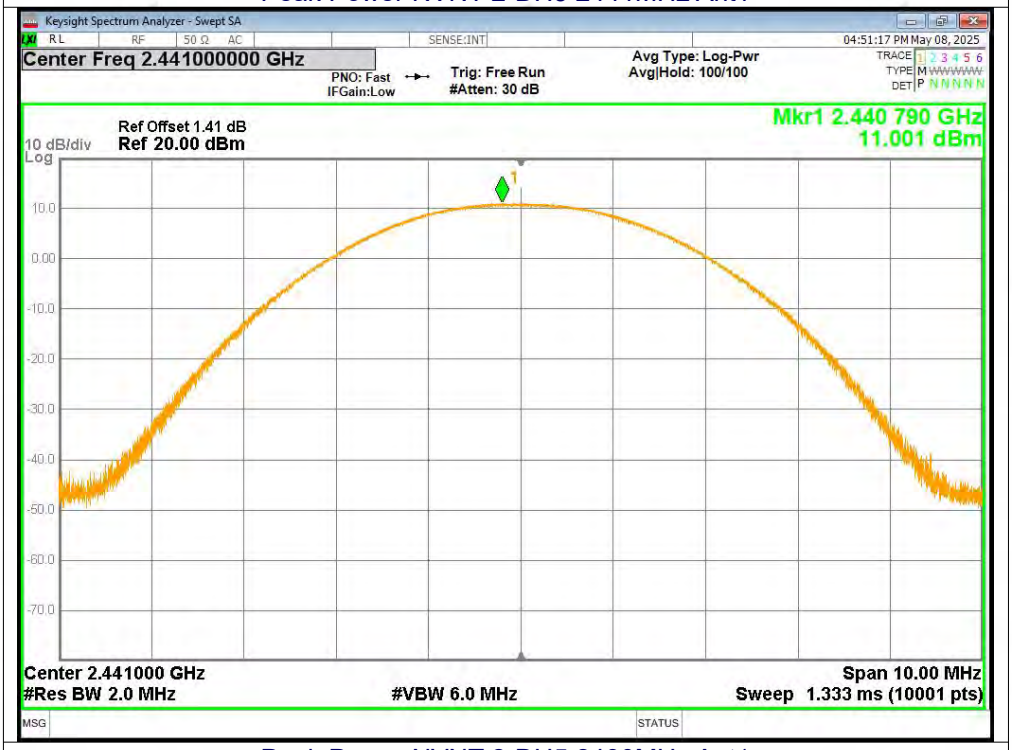
Peak Power NVNT 1-DH5 2480MHz Ant1



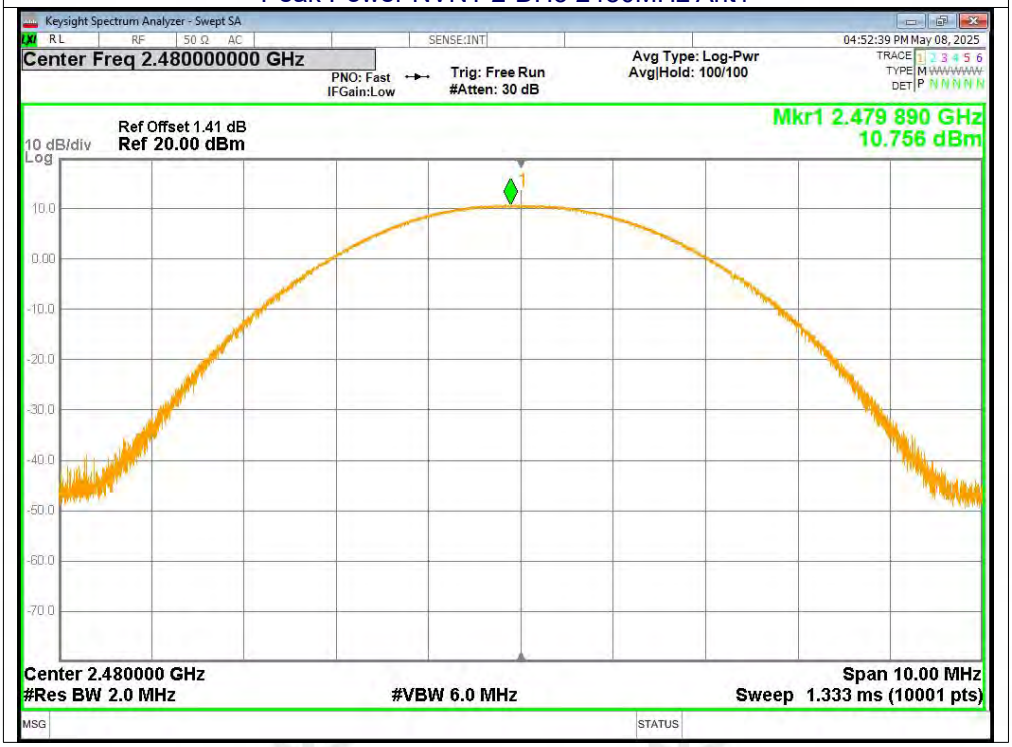
Peak Power NVNT 2-DH5 2402MHz Ant1



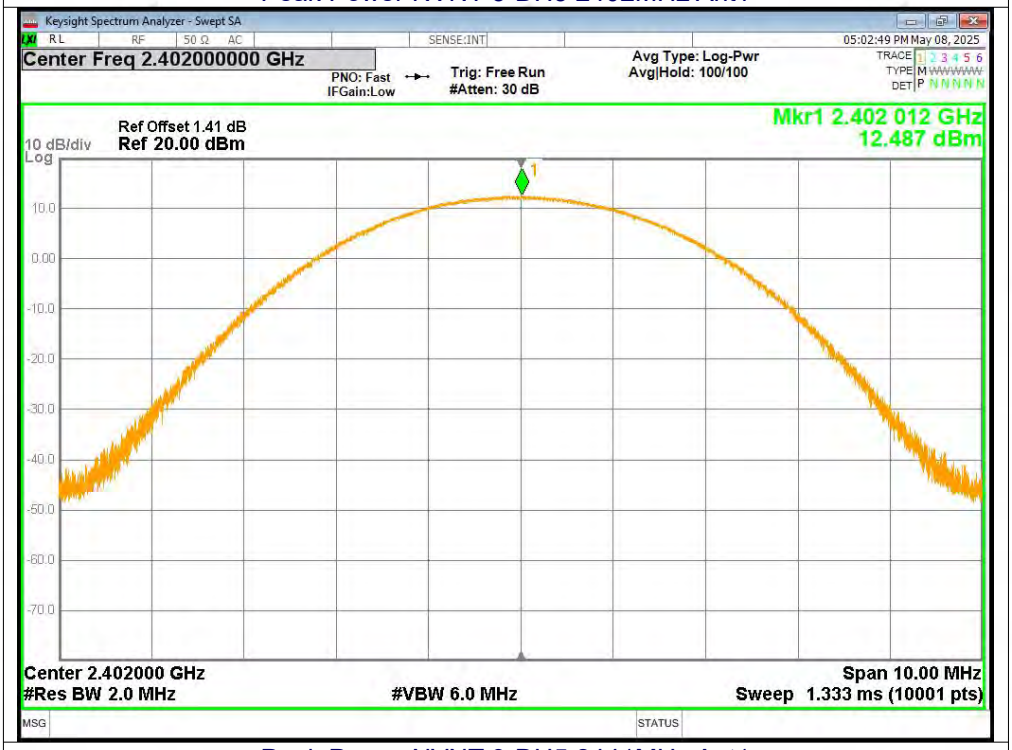
Peak Power NVNT 2-DH5 2441MHz Ant1



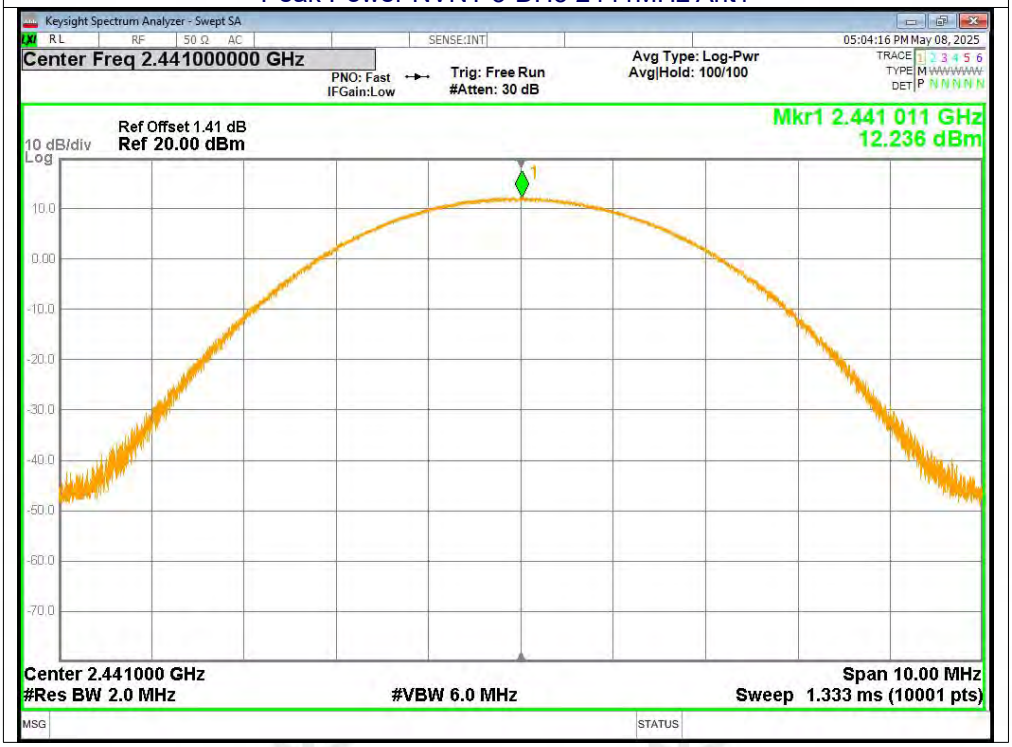
Peak Power NVNT 2-DH5 2480MHz Ant1



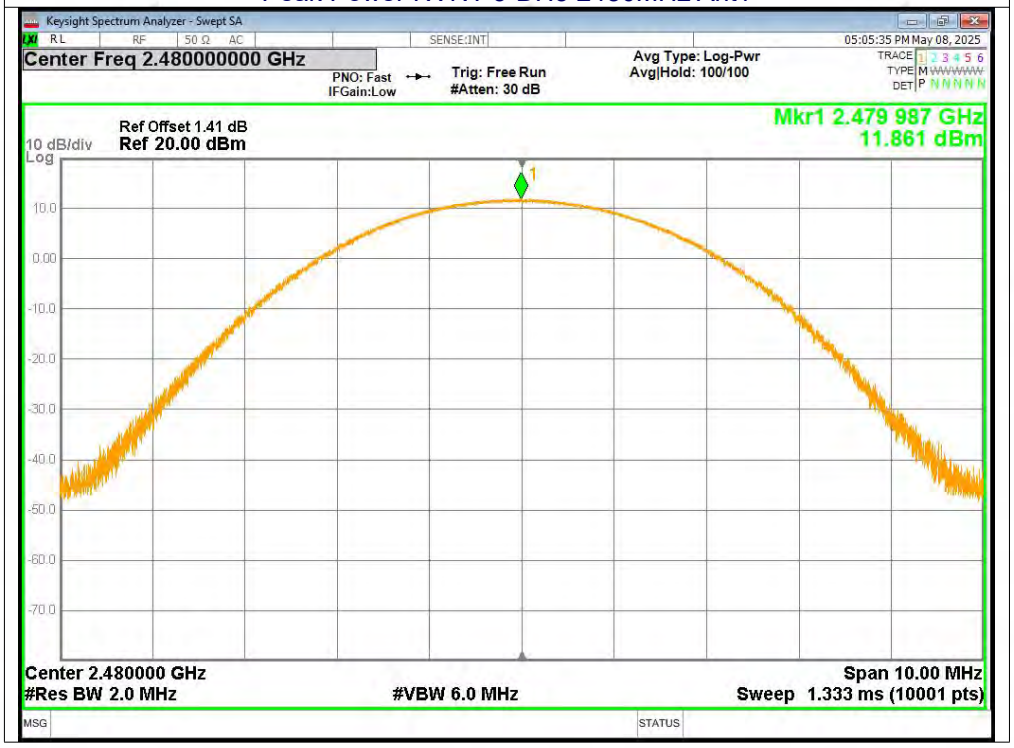
Peak Power NVNT 3-DH5 2402MHz Ant1



Peak Power NVNT 3-DH5 2441MHz Ant1



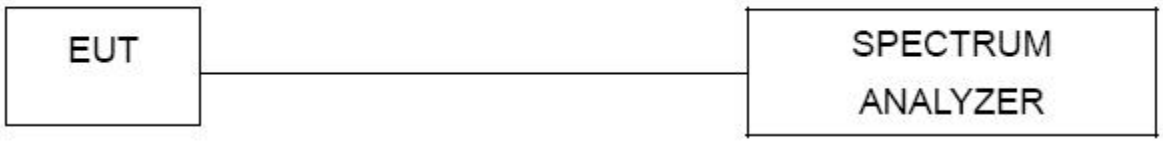
Peak Power NVNT 3-DH5 2480MHz Ant1



10. HOPPING CHANNEL SEPARATION

Test Requirement:	FCC Part15 C Section 15.247 (a)(1), RSS 247 5.1
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=30KHz, VBW=100KHz, detector=Peak
Limit:	GFSK, π/4-DQPSK & 8DSK: 0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)

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 = 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.

10.3 DEVIATION FROM STANDARD

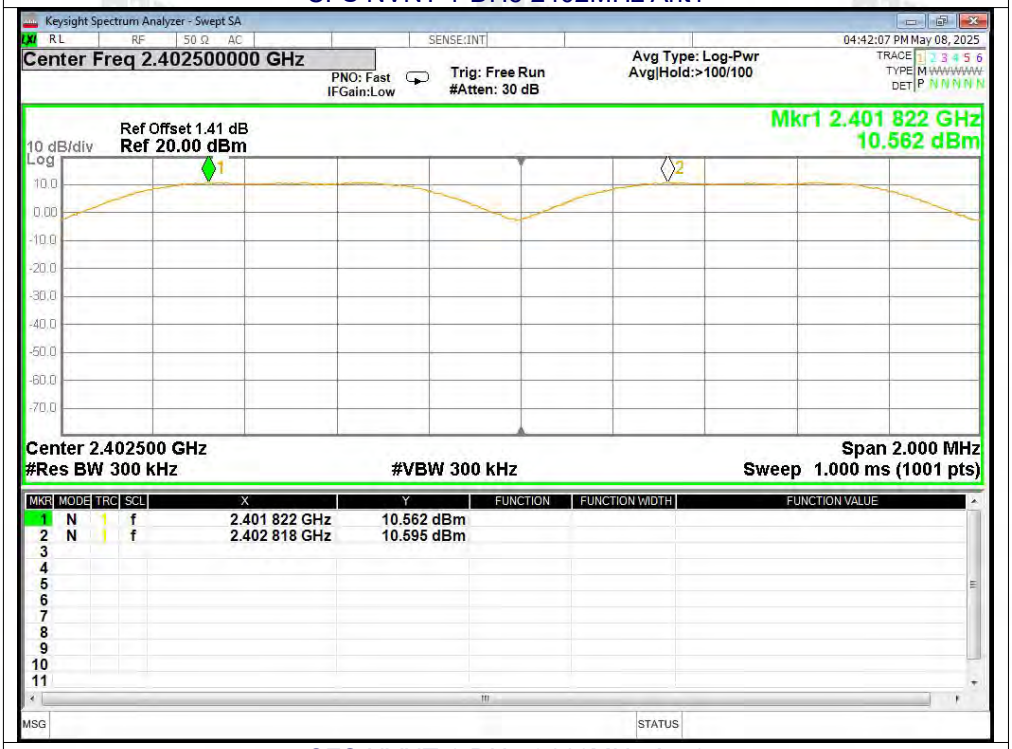
No deviation.

10.4 Test Result

Condition	Mode	Antenna	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	1-DH5	Ant1	2401.822	2402.818	0.996	0.637	Pass
NVNT	1-DH5	Ant1	2440.818	2441.968	1.15	0.63	Pass
NVNT	1-DH5	Ant1	2478.816	2479.828	1.012	0.635	Pass
NVNT	2-DH5	Ant1	2401.7928	2402.8224	1.0296	0.885	Pass
NVNT	2-DH5	Ant1	2440.8136	2441.9654	1.1518	0.849	Pass
NVNT	2-DH5	Ant1	2478.8032	2479.8016	0.9984	0.871	Pass
NVNT	3-DH5	Ant1	2401.98	2402.9862	1.0062	0.865	Pass
NVNT	3-DH5	Ant1	2440.8058	2441.8016	0.9958	0.864	Pass
NVNT	3-DH5	Ant1	2478.8162	2479.9836	1.1674	0.866	Pass

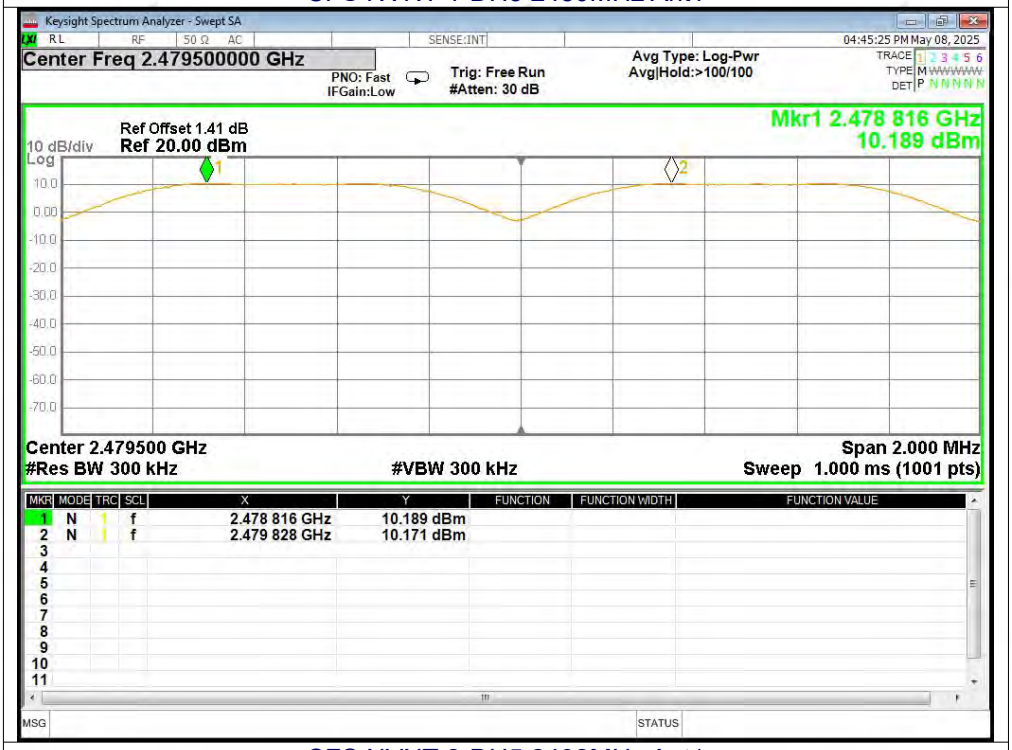
Test Graphs

CFS NVNT 1-DH5 2402MHz Ant1



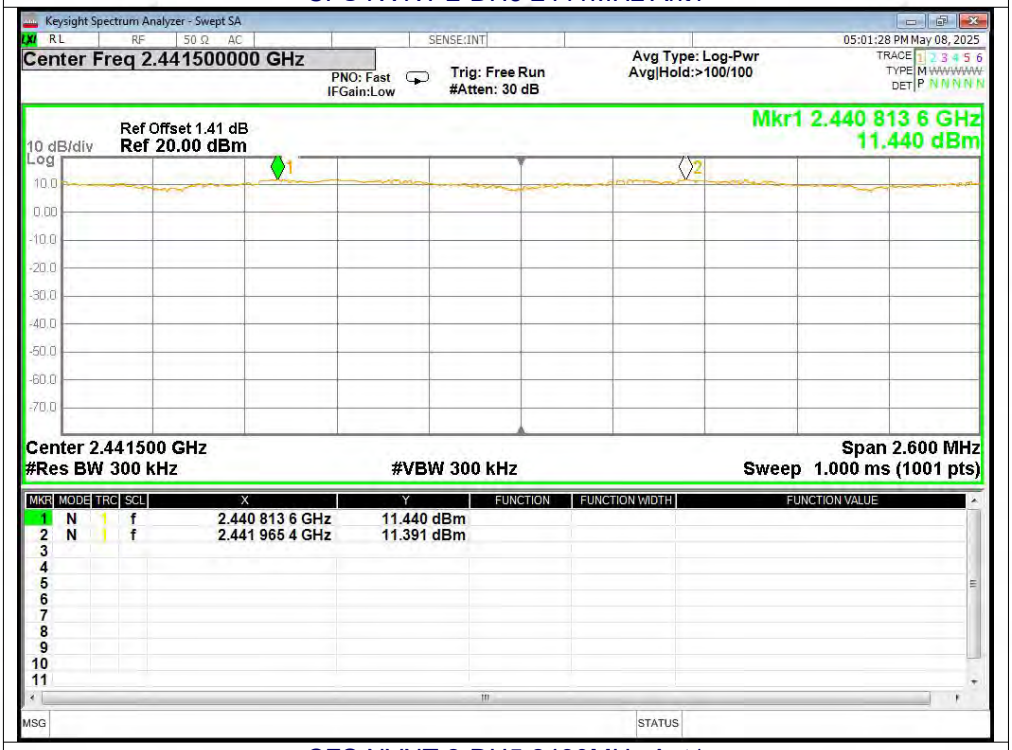
CFS NVNT 1-DH5 2441MHz Ant1

CFS NVNT 1-DH5 2480MHz Ant1

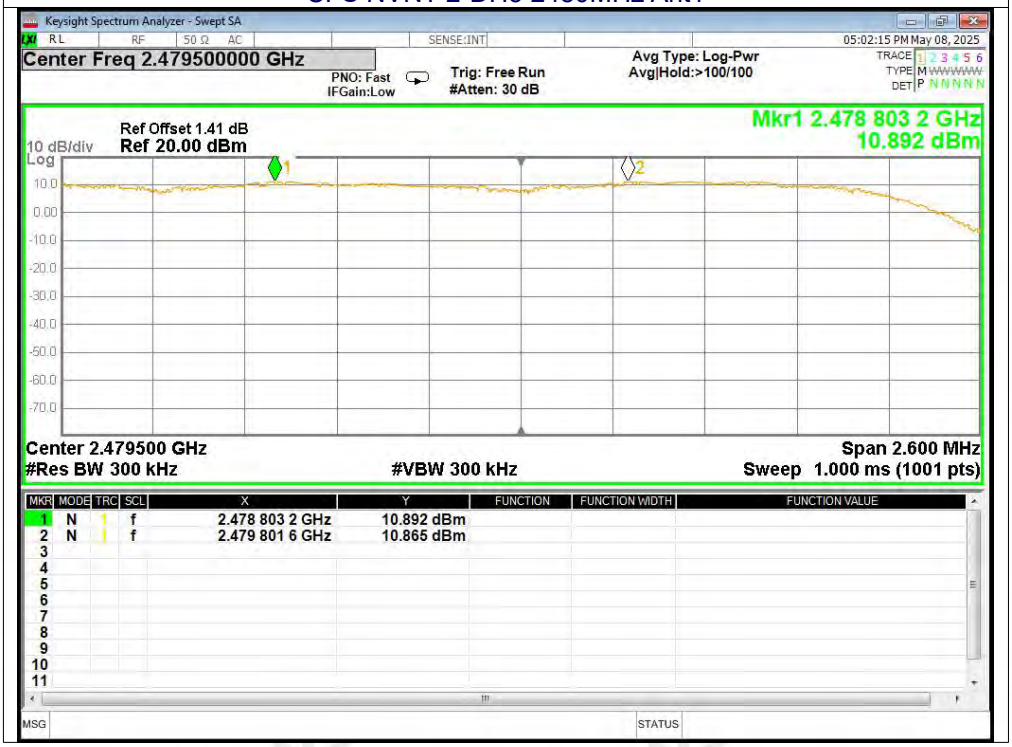


CFS NVNT 2-DH5 2402MHz Ant1

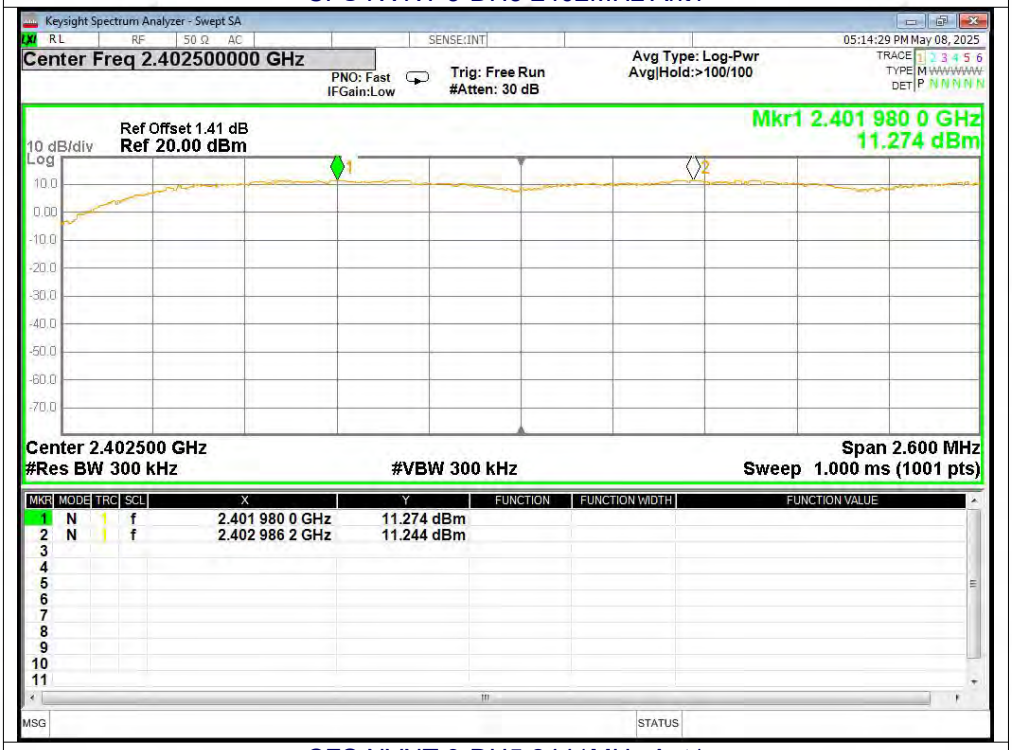
CFS NVNT 2-DH5 2441MHz Ant1



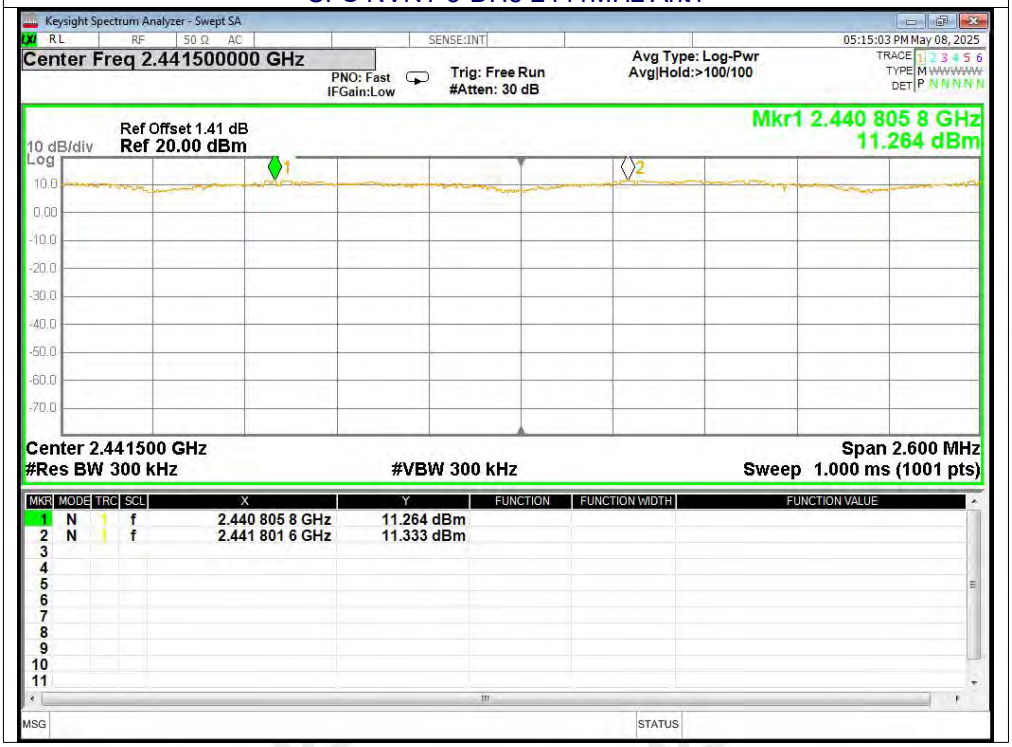
CFS NVNT 2-DH5 2480MHz Ant1



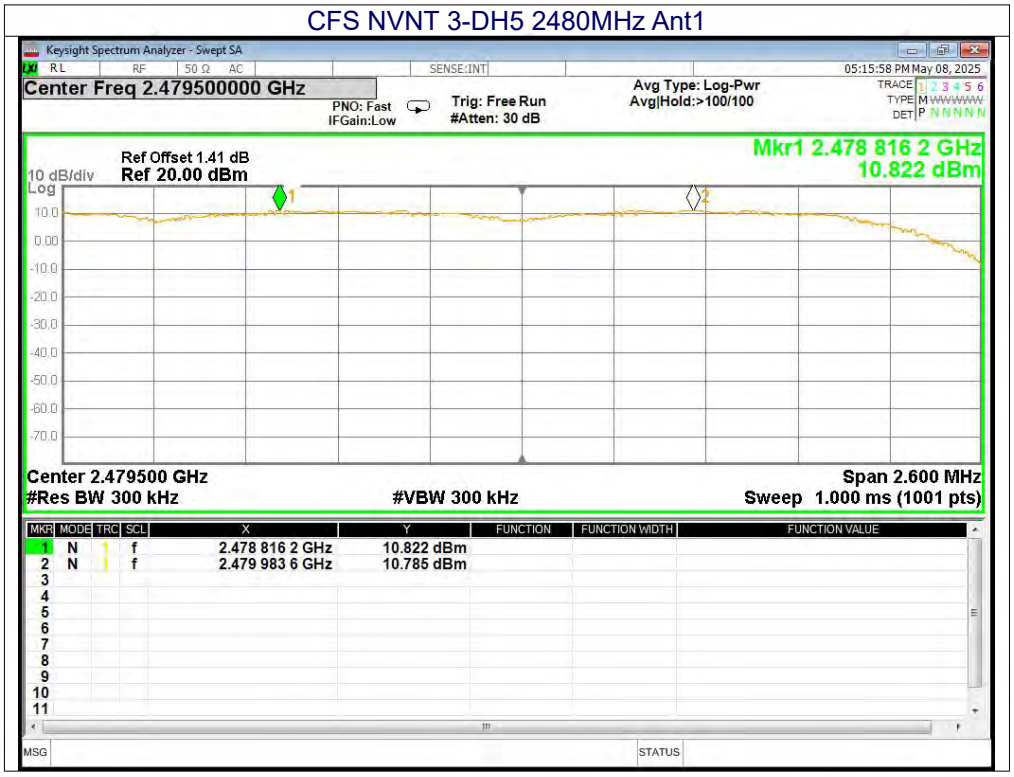
CFS NVNT 3-DH5 2402MHz Ant1



CFS NVNT 3-DH5 2441MHz Ant1



CFS NVNT 3-DH5 2480MHz Ant1



11.NUMBER OF HOPPING FREQUENCY

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii), RSS-247 5.1
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels

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 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;

11.3 DEVIATION FROM STANDARD

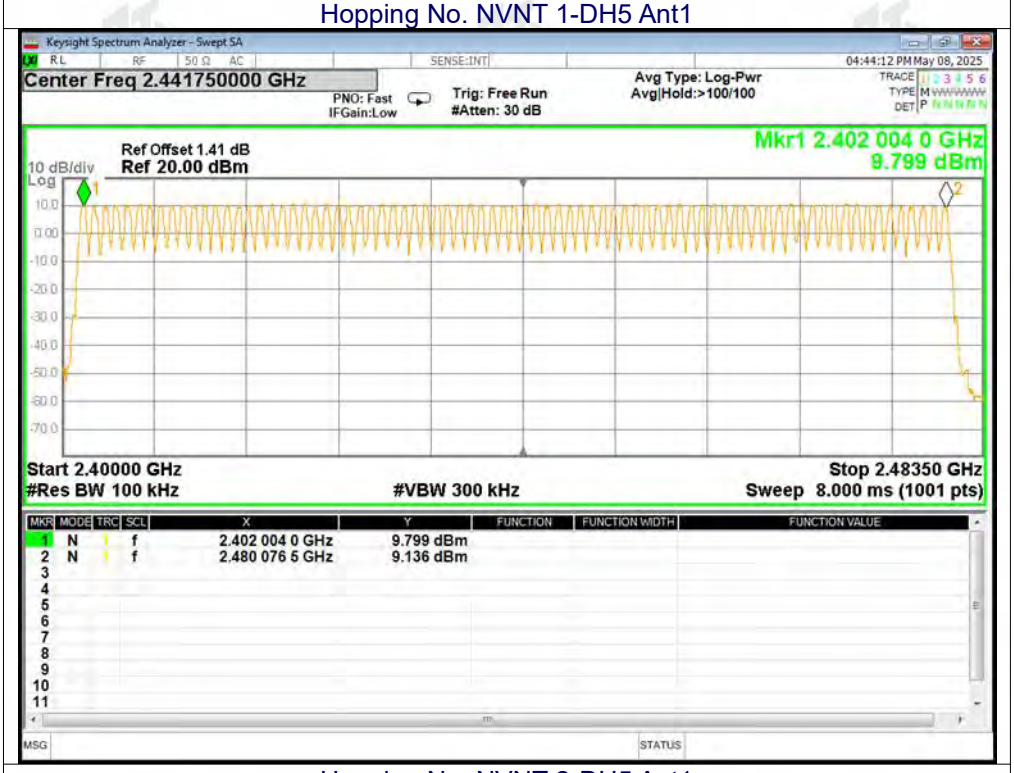
No deviation.

11.4 Test Result

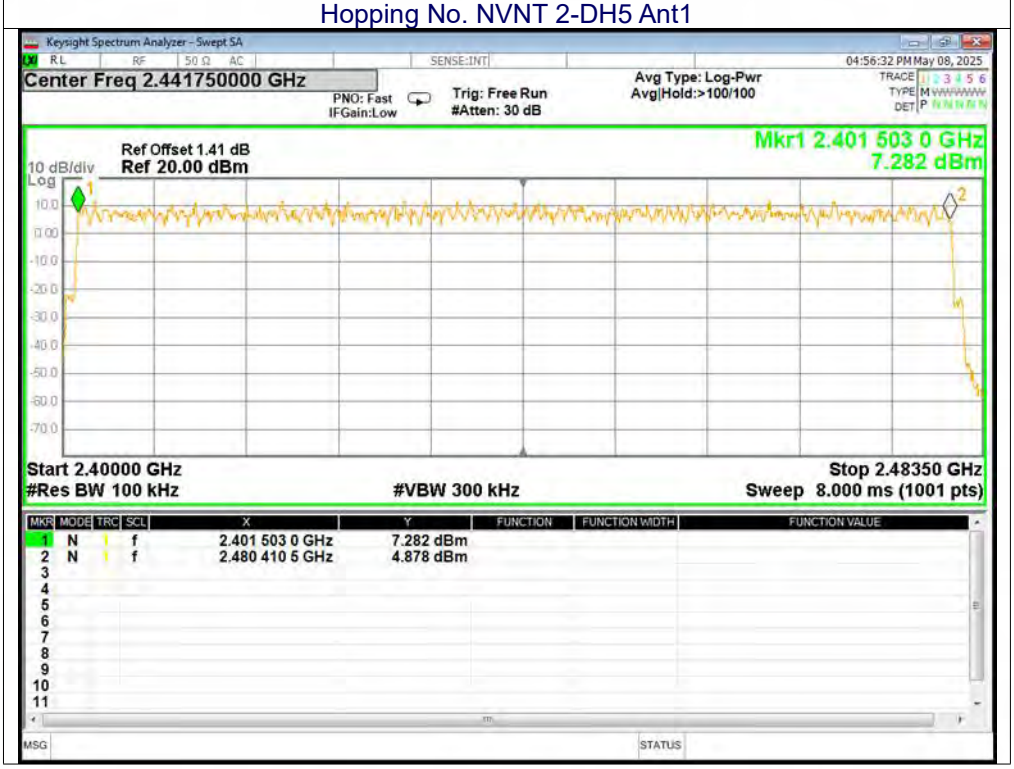
Mode	Antenna	Hopping Number	Limit	Verdict
1-DH5	Ant1	79	15	Pass
2-DH5	Ant1	79	15	Pass
3-DH5	Ant1	79	15	Pass

Test Graphs

Hopping No. NVNT 1-DH5 Ant1



Hopping No. NVNT 2-DH5 Ant1



Hopping No. NVNT 3-DH5 Ant1

12. DWELL TIME

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii), RSS-247 5.1
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=1MHz, VBW=3MHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second

12.1 Test Setup

12.2 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).

12.3 DEVIATION FROM STANDARD

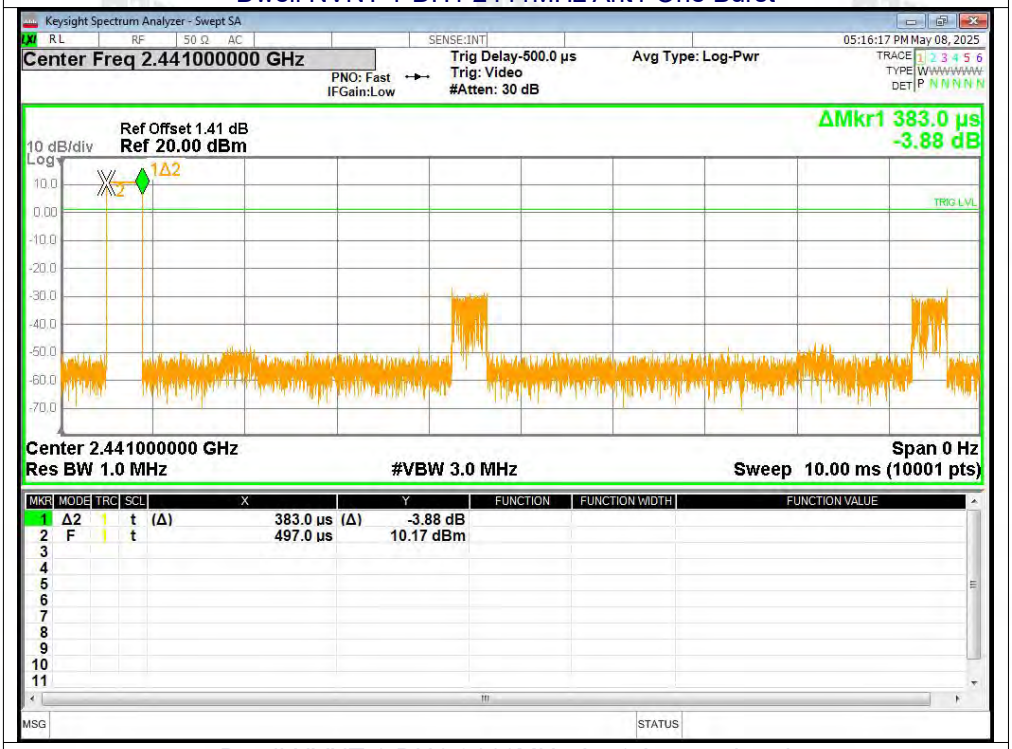
No deviation.

12.4 Test Result

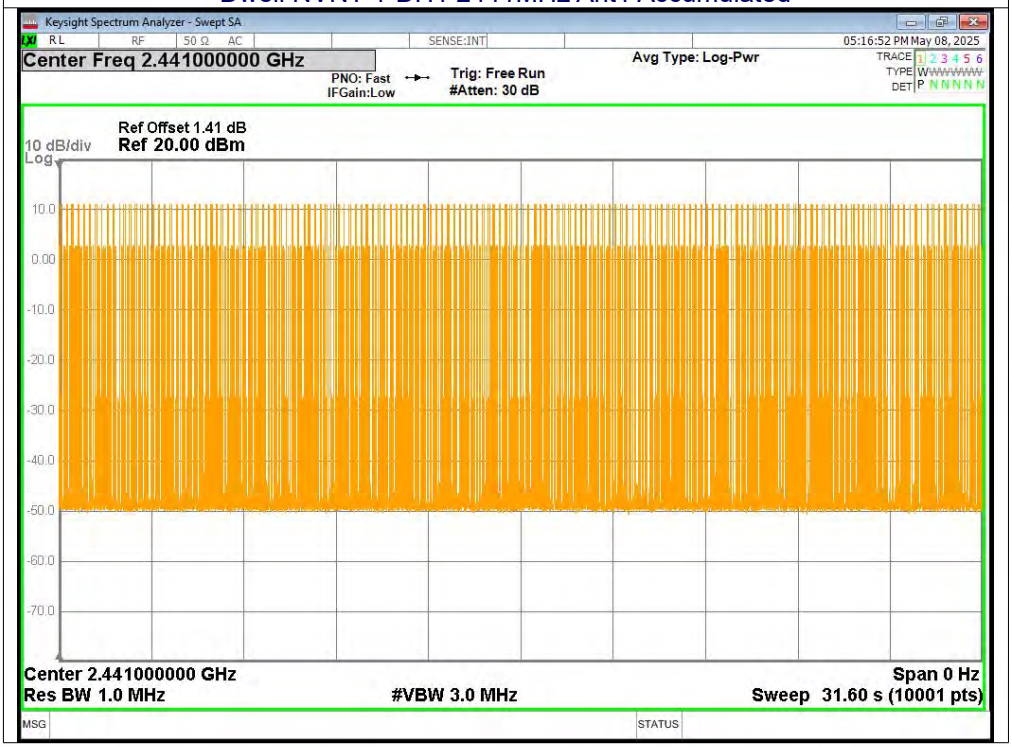
Condition	Mode	Frequency (MHz)	Antenna	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
NVNT	1-DH1	2441	Ant1	0.383	121.794	318	31600	400	Pass
NVNT	1-DH3	2441	Ant1	1.638	276.822	169	31600	400	Pass
NVNT	1-DH5	2441	Ant1	2.887	300.248	104	31600	400	Pass
NVNT	2-DH1	2441	Ant1	0.392	124.656	318	31600	400	Pass
NVNT	2-DH3	2441	Ant1	1.643	269.452	164	31600	400	Pass
NVNT	2-DH5	2441	Ant1	2.892	321.012	111	31600	400	Pass
NVNT	3-DH1	2441	Ant1	0.391	123.947	317	31600	400	Pass
NVNT	3-DH3	2441	Ant1	1.642	269.288	164	31600	400	Pass
NVNT	3-DH5	2441	Ant1	2.894	295.188	102	31600	400	Pass

Test Graphs

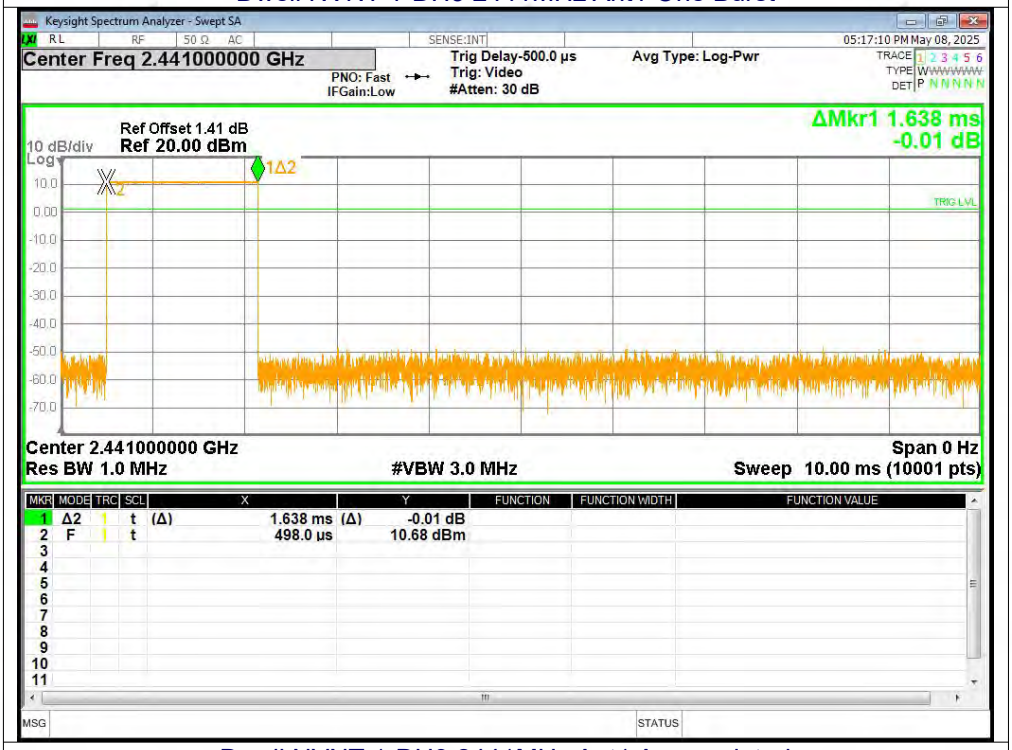
Dwell NVNT 1-DH1 2441MHz Ant1 One Burst



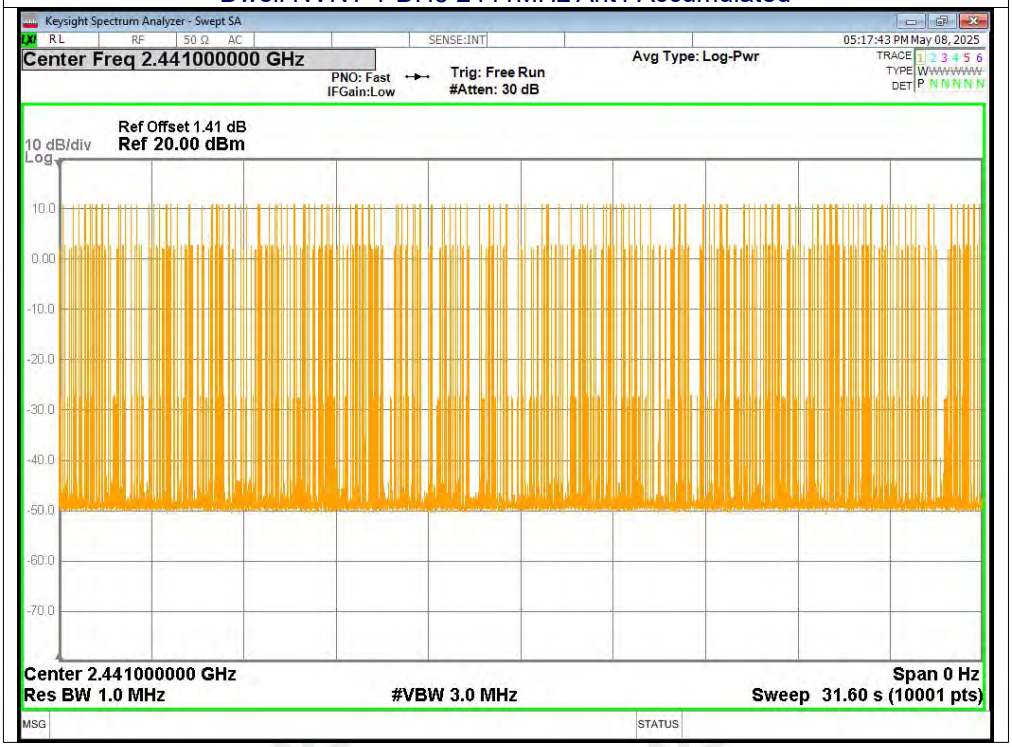
Dwell NVNT 1-DH1 2441MHz Ant1 Accumulated



Dwell NVNT 1-DH3 2441MHz Ant1 One Burst

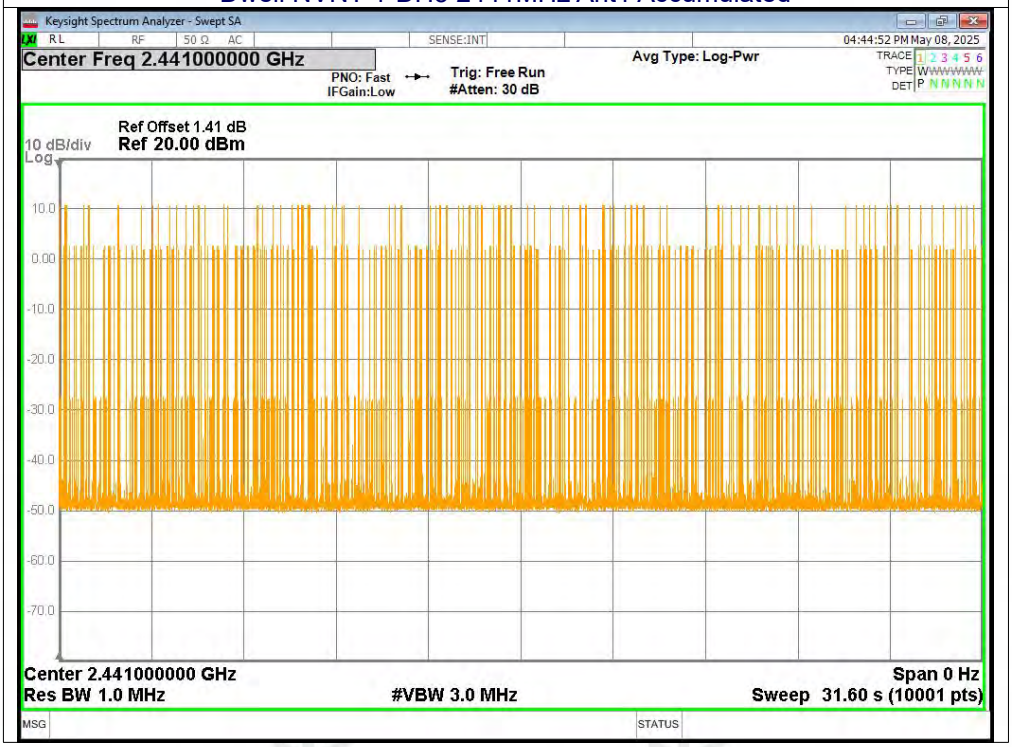


Dwell NVNT 1-DH3 2441MHz Ant1 Accumulated



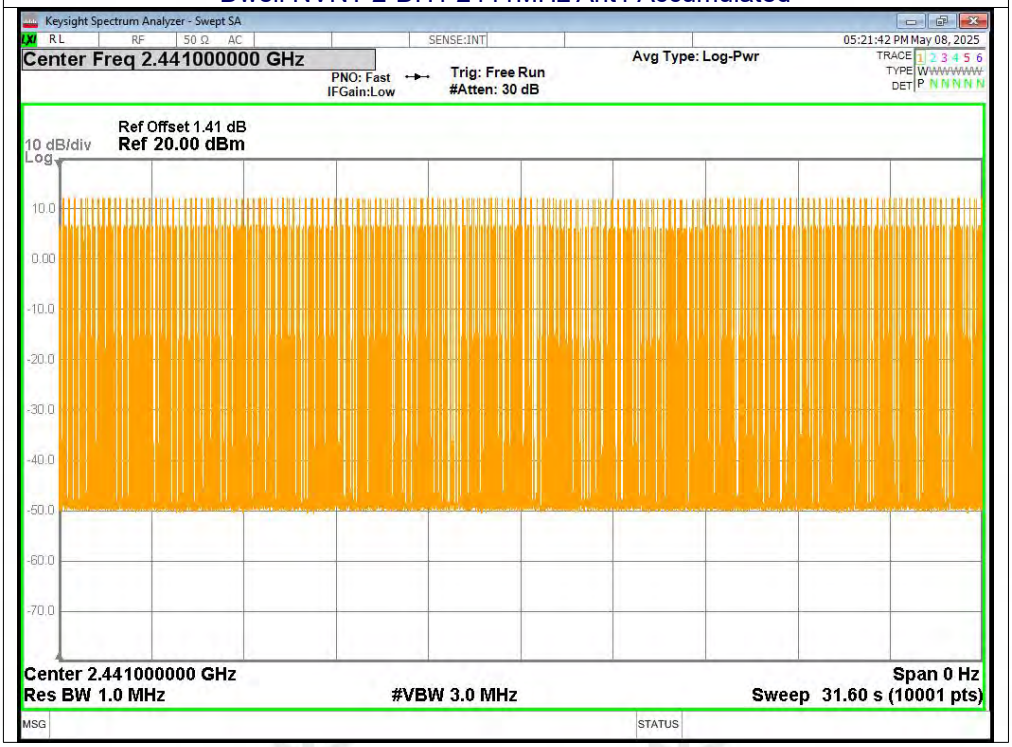
Dwell NVNT 1-DH5 2441MHz Ant1 One Burst

Dwell NVNT 1-DH5 2441MHz Ant1 Accumulated



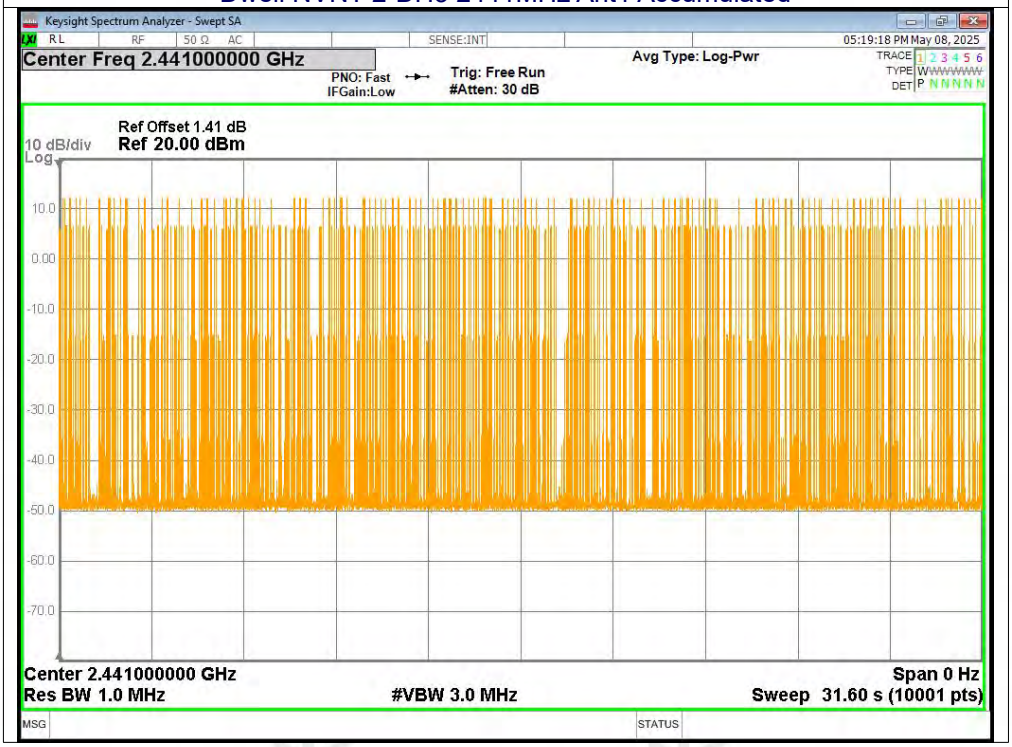
Dwell NVNT 2-DH1 2441MHz Ant1 One Burst

Dwell NVNT 2-DH1 2441MHz Ant1 Accumulated

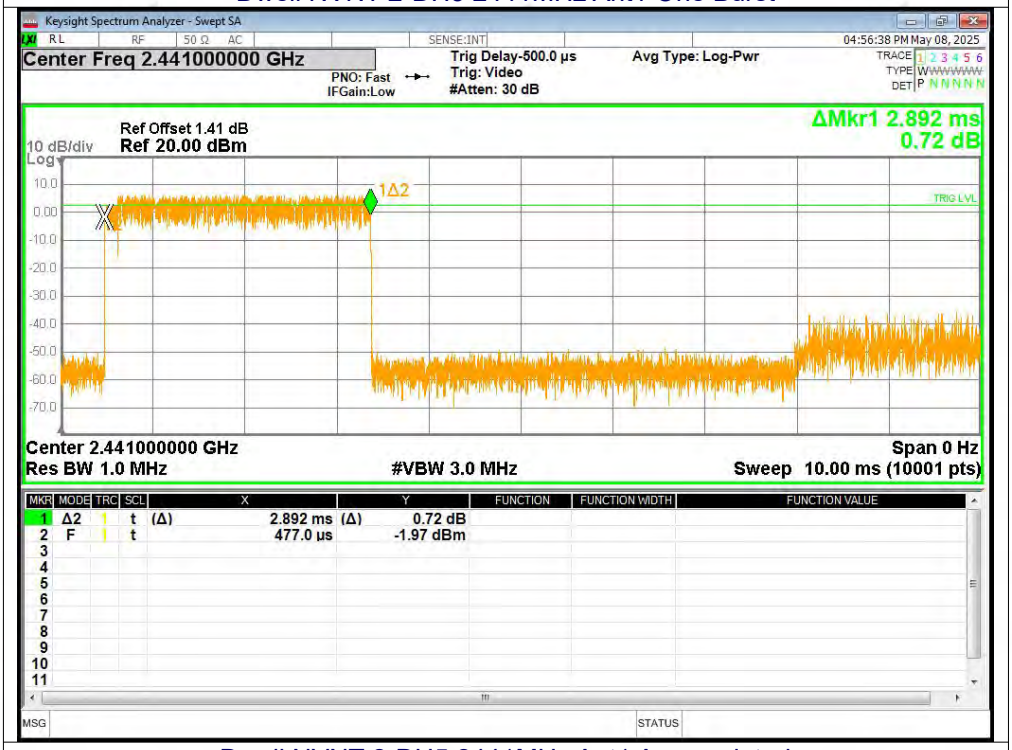


Dwell NVNT 2-DH3 2441MHz Ant1 One Burst

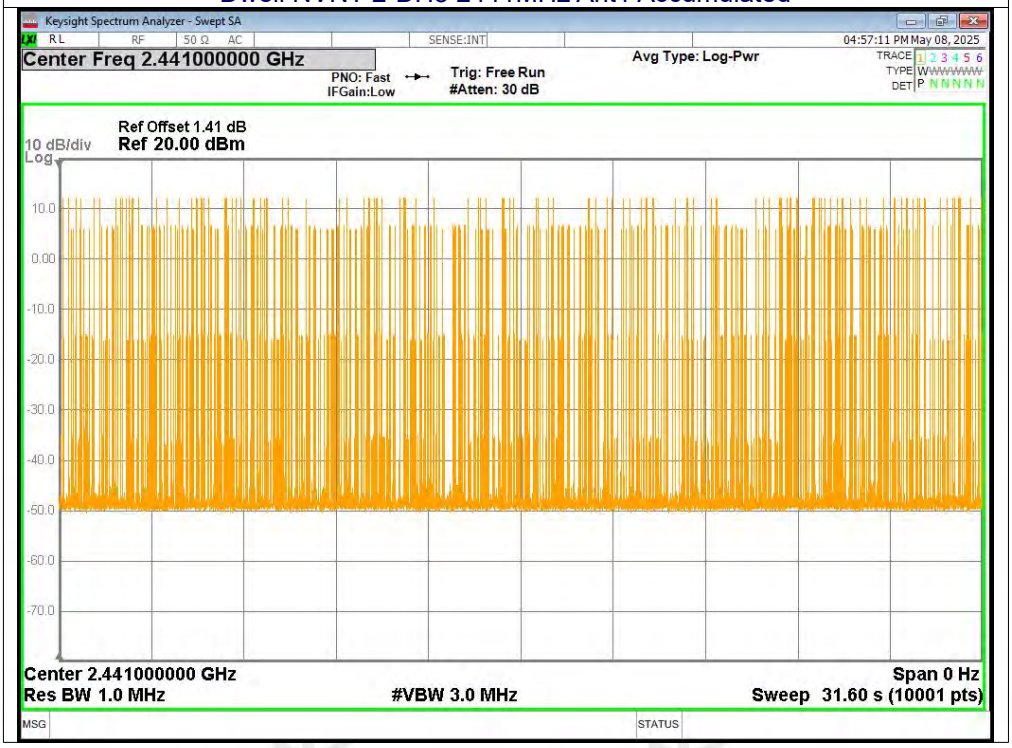
Dwell NVNT 2-DH3 2441MHz Ant1 Accumulated



Dwell NVNT 2-DH5 2441MHz Ant1 One Burst



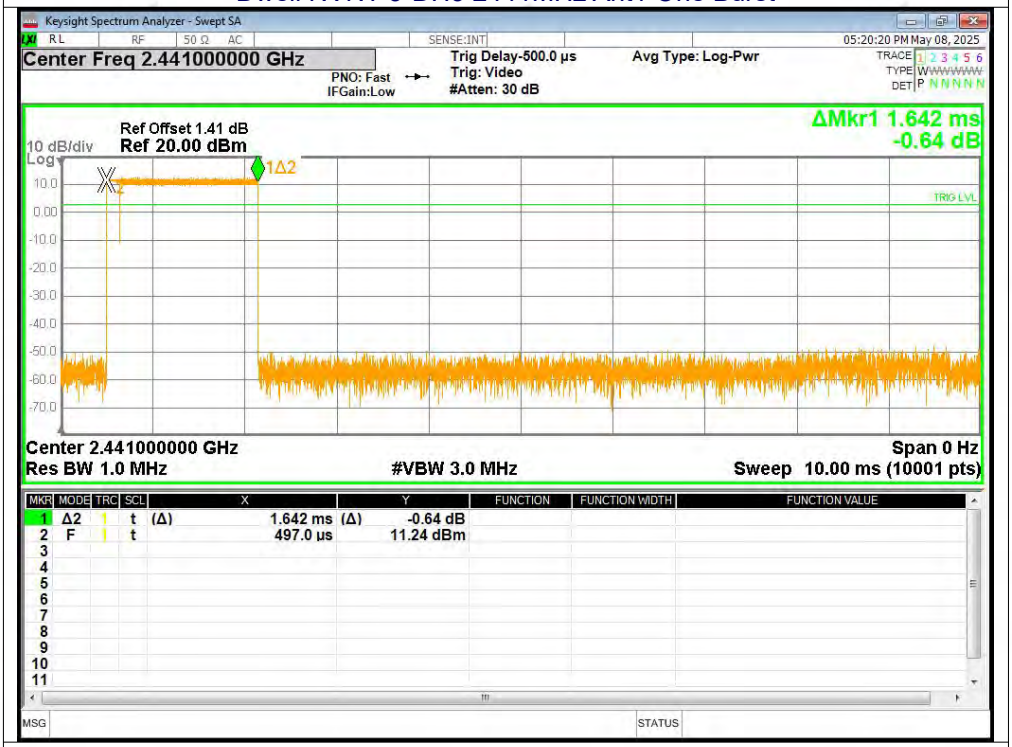
Dwell NVNT 2-DH5 2441MHz Ant1 Accumulated



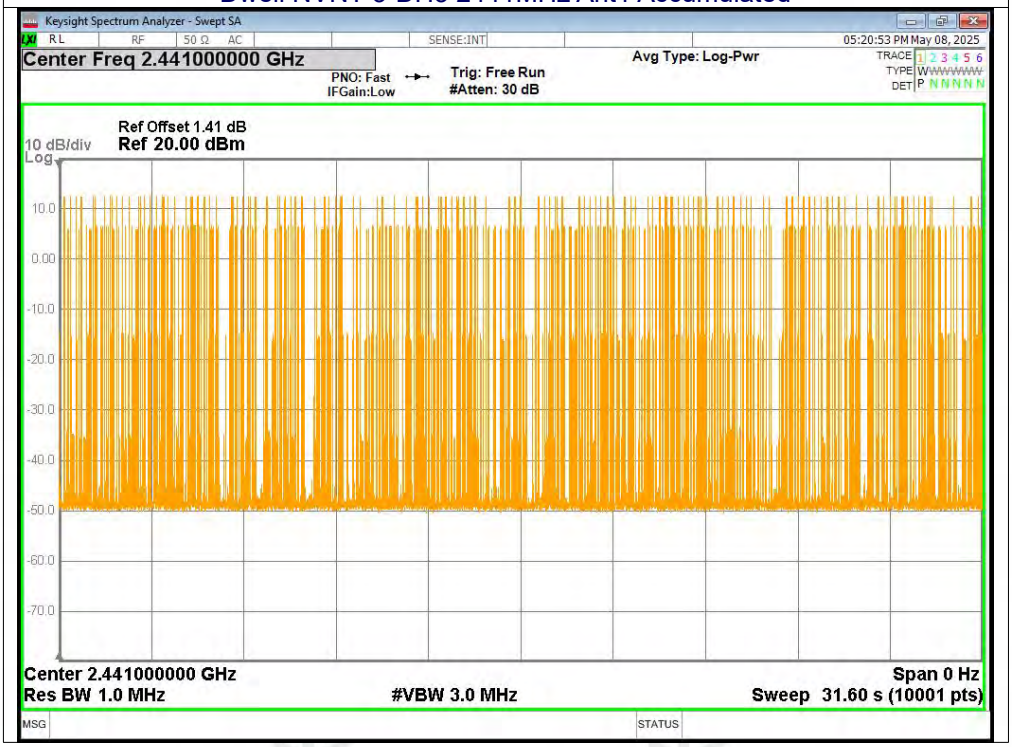
Dwell NVNT 3-DH1 2441MHz Ant1 One Burst

Dwell NVNT 3-DH1 2441MHz Ant1 Accumulated

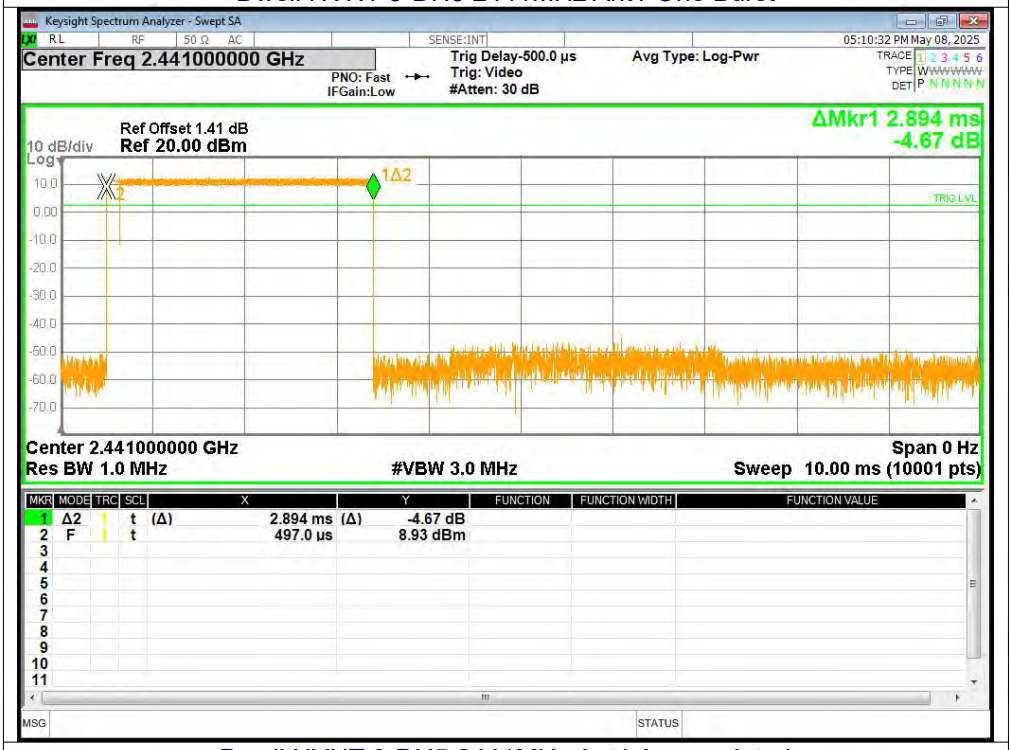
Dwell NVNT 3-DH3 2441MHz Ant1 One Burst



Dwell NVNT 3-DH3 2441MHz Ant1 Accumulated



Dwell NVNT 3-DH5 2441MHz Ant1 One Burst



Dwell NVNT 3-DH5 2441MHz Ant1 Accumulated

13. 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 FPC antenna, the best case gain of the antennas is 3.11dBi, reference to the appendix II for details

14. Test Setup Photo

Reference to the appendix I for details.

15. EUT Constructional Details

Reference to the appendix II for details.

※※※※※ **END OF REPORT** ※※※※※