Appendix A

RF Test Data for BT (Conducted Measurement)

Product Name: Portable Speaker

Test Model: Lumina210

Environmental Conditions

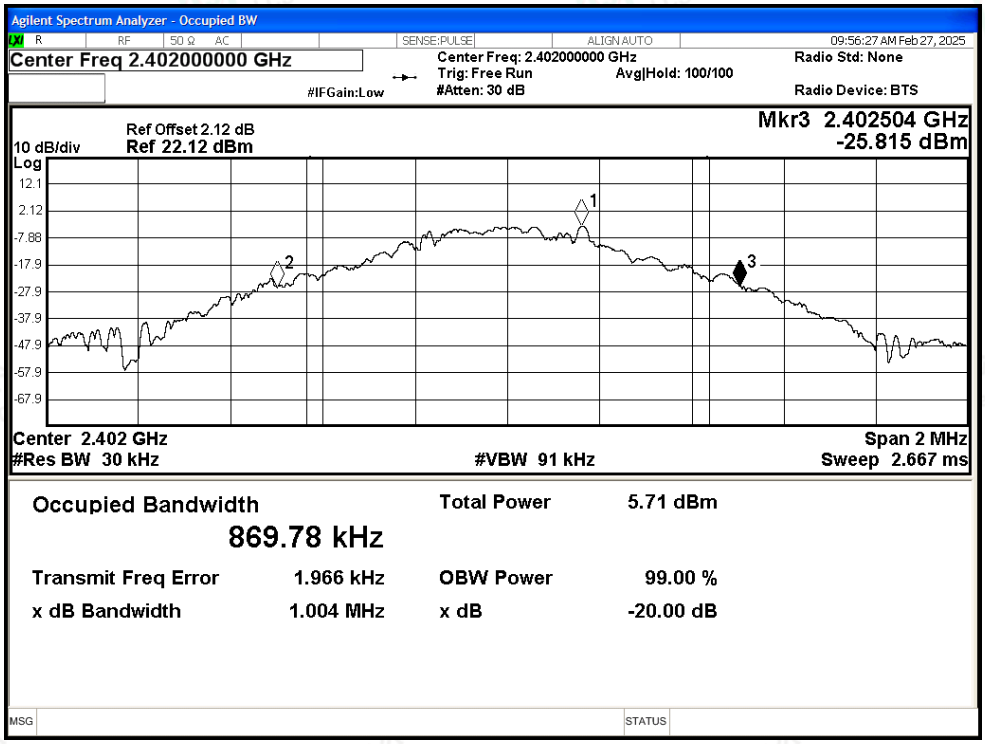
Temperature:	23.8°C
Relative Humidity:	52.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Jay Luo
Supervised by:	Nick Peng

A.1 -20dB Bandwidth

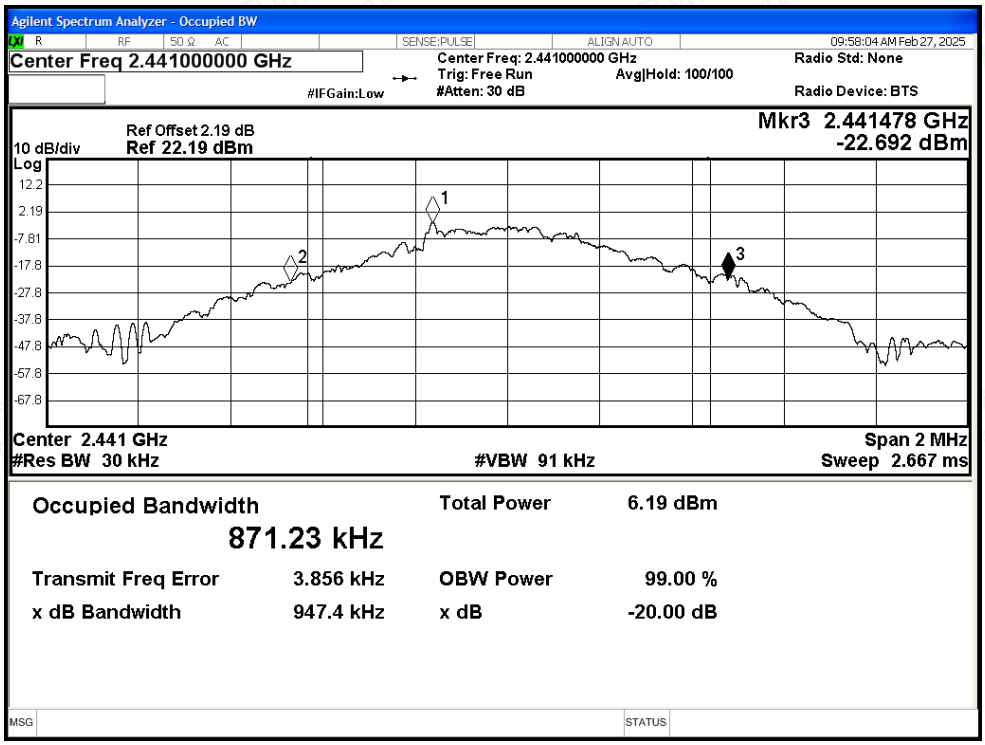
Condition	Mode	Frequency (MHz)	Antenna	-20 dB Bandwidth (MHz)	Limit -20 dB Bandwidth (MHz)	Verdict
NVNT	1-DH5	2402	Ant1	1.004	N/A	Pass
NVNT	1-DH5	2441	Ant1	0.947	N/A	Pass
NVNT	1-DH5	2480	Ant1	0.947	N/A	Pass
NVNT	2-DH5	2402	Ant1	1.325	N/A	Pass
NVNT	2-DH5	2441	Ant1	1.284	N/A	Pass
NVNT	2-DH5	2480	Ant1	1.284	N/A	Pass
NVNT	3-DH5	2402	Ant1	1.294	N/A	Pass
NVNT	3-DH5	2441	Ant1	1.305	N/A	Pass
NVNT	3-DH5	2480	Ant1	1.305	N/A	Pass

Test Graphs

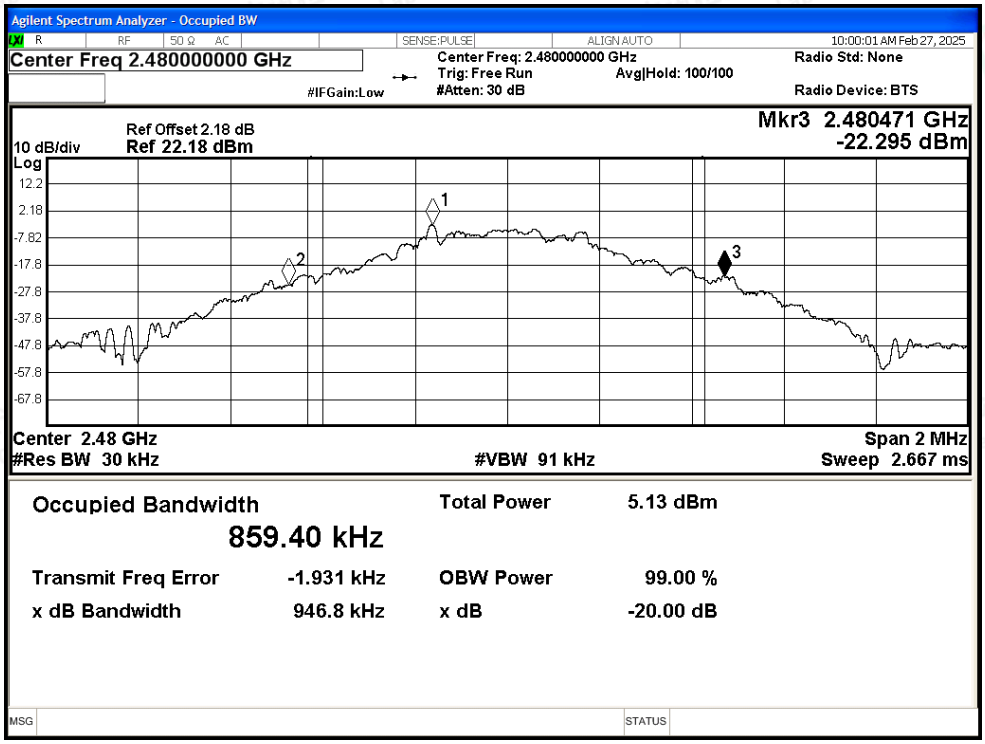
-20dB Bandwidth NVNT 1-DH5 2402MHz Ant1



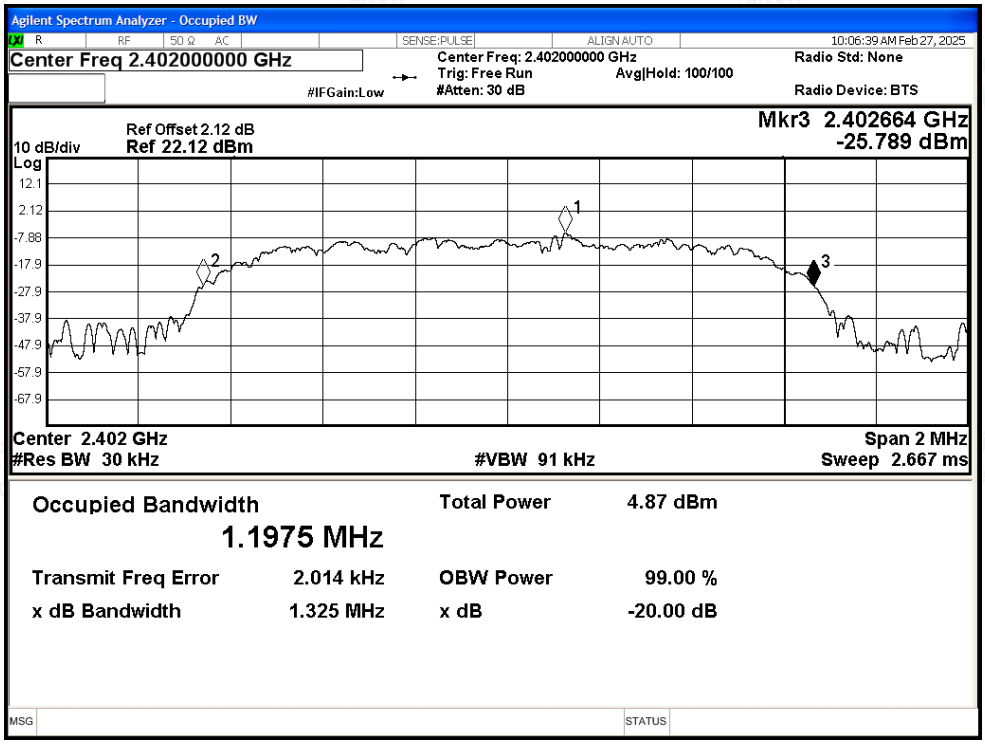
-20dB Bandwidth NVNT 1-DH5 2441MHz Ant1



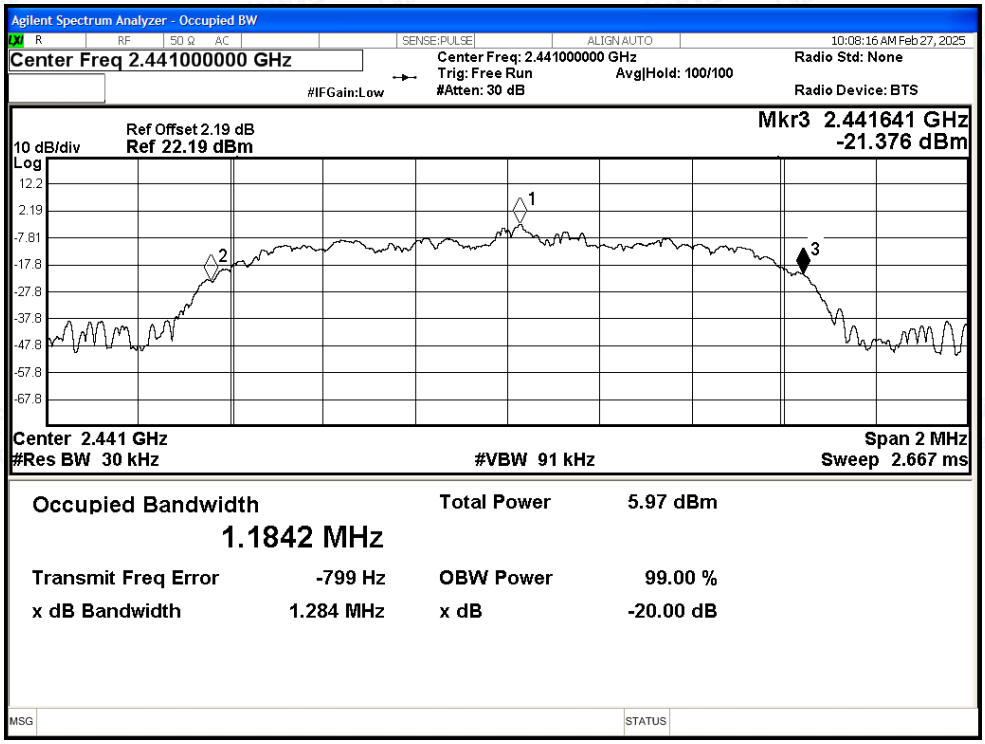
-20dB Bandwidth NVNT 1-DH5 2480MHz Ant1



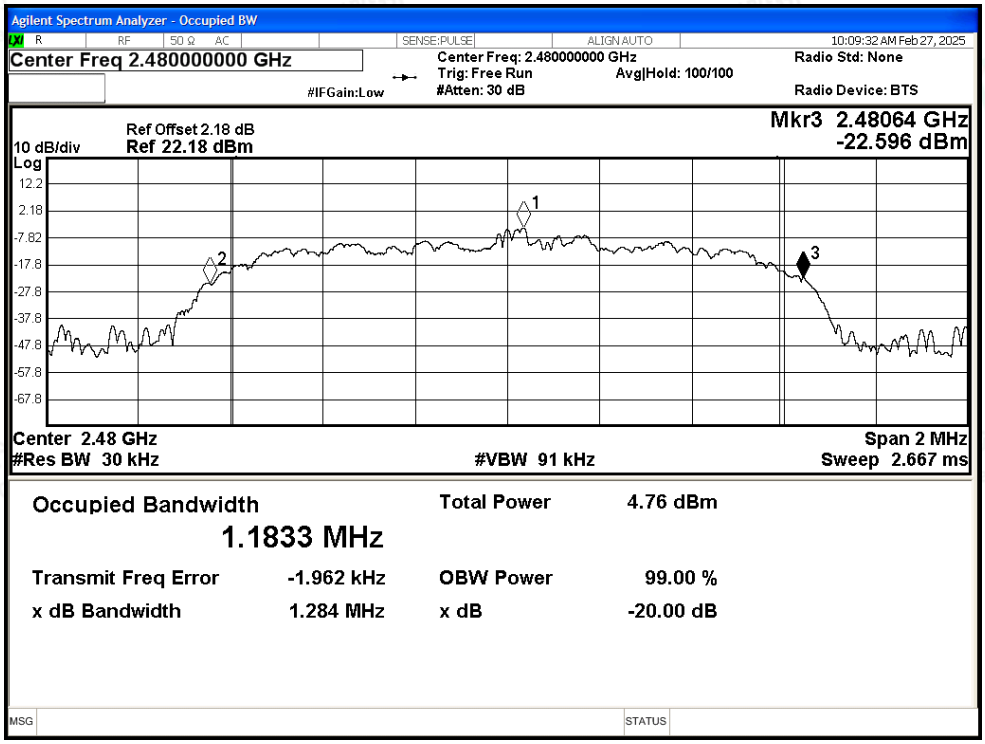
-20dB Bandwidth NVNT 2-DH5 2402MHz Ant1



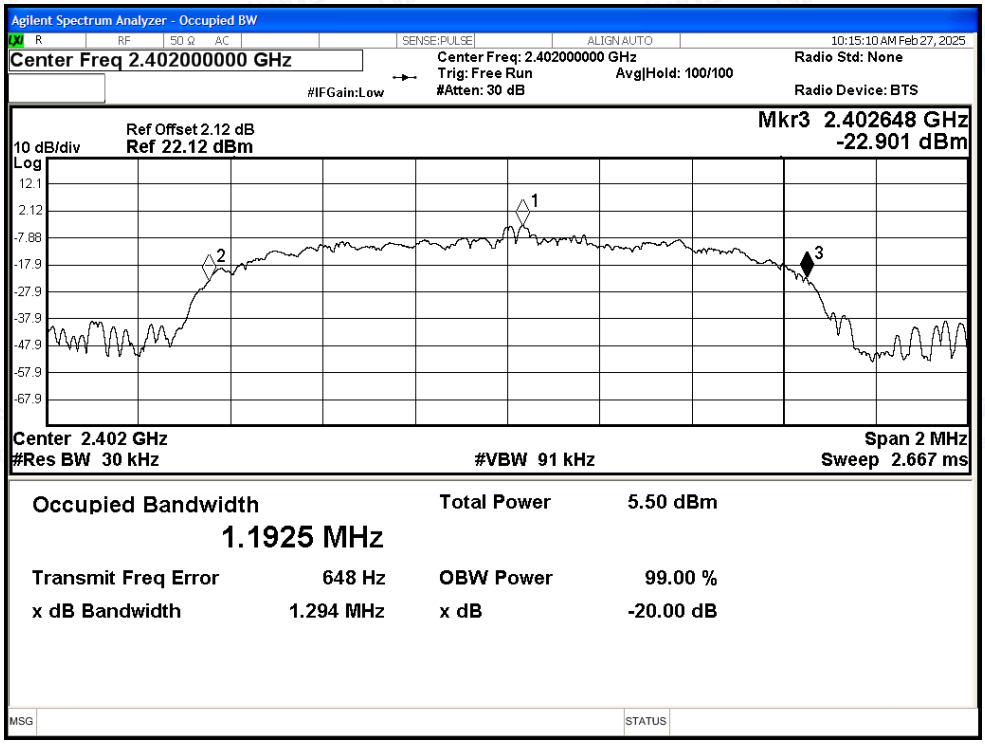
-20dB Bandwidth NVNT 2-DH5 2441MHz Ant1



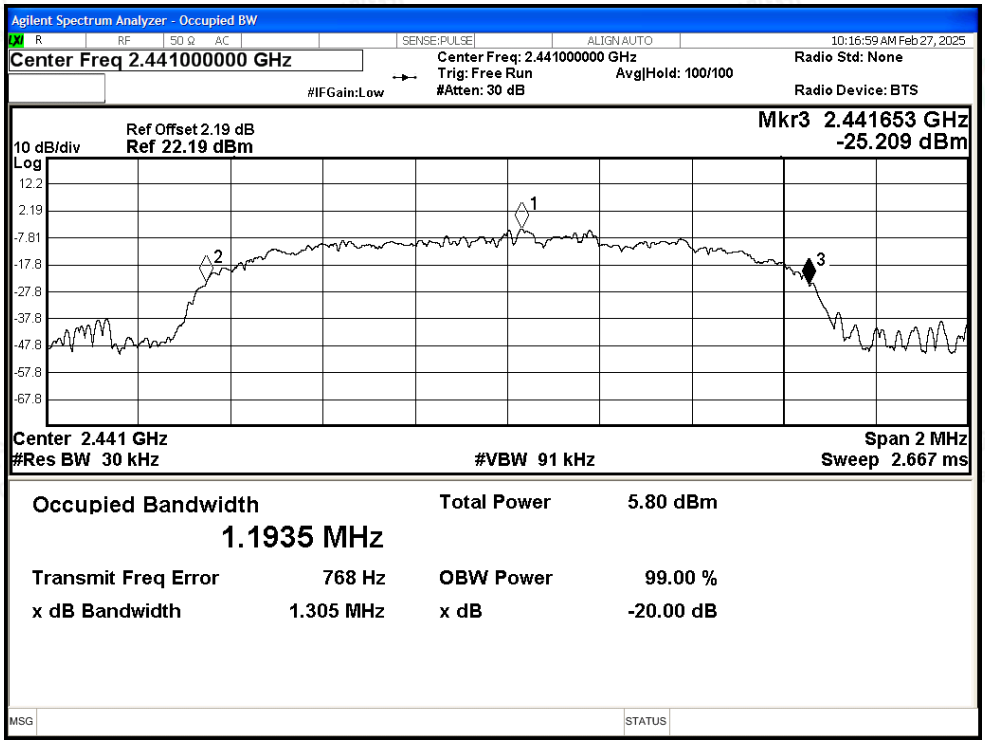
-20dB Bandwidth NVNT 2-DH5 2480MHz Ant1



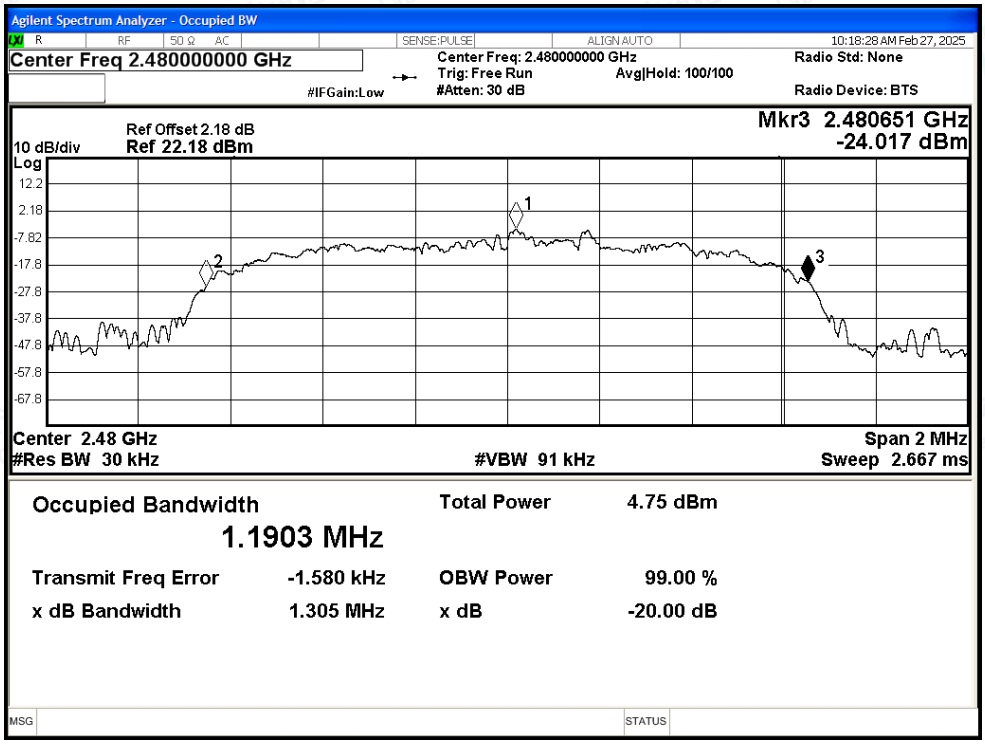
-20dB Bandwidth NVNT 3-DH5 2402MHz Ant1



-20dB Bandwidth NVNT 3-DH5 2441MHz Ant1



-20dB Bandwidth NVNT 3-DH5 2480MHz Ant1

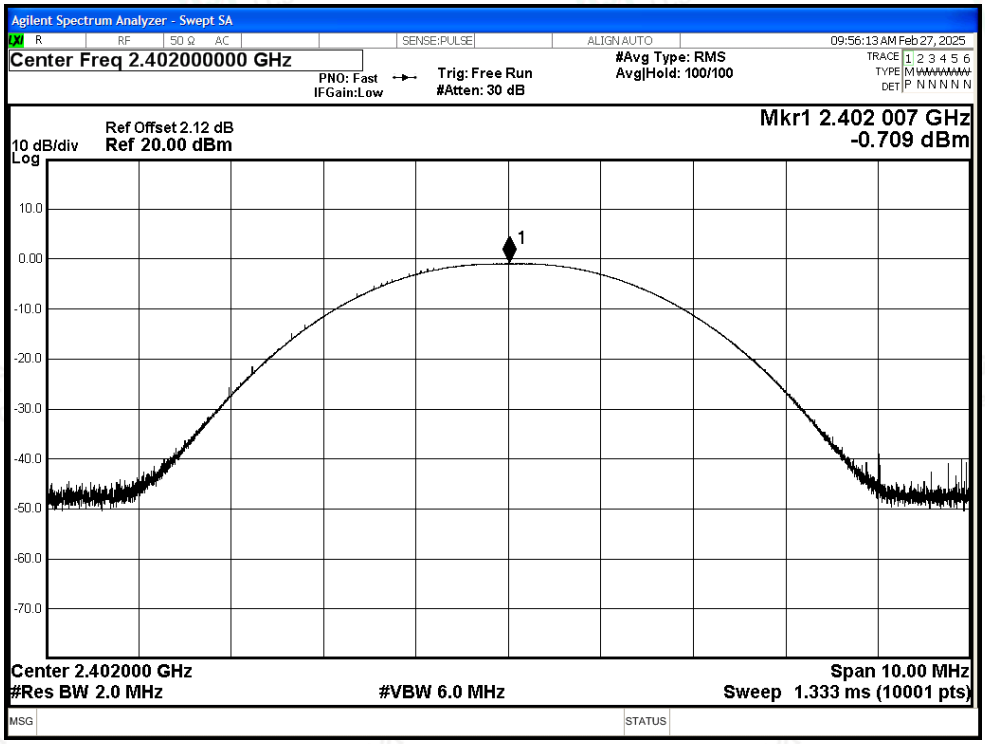


A.2 Maximum Peak Conducted Output Power

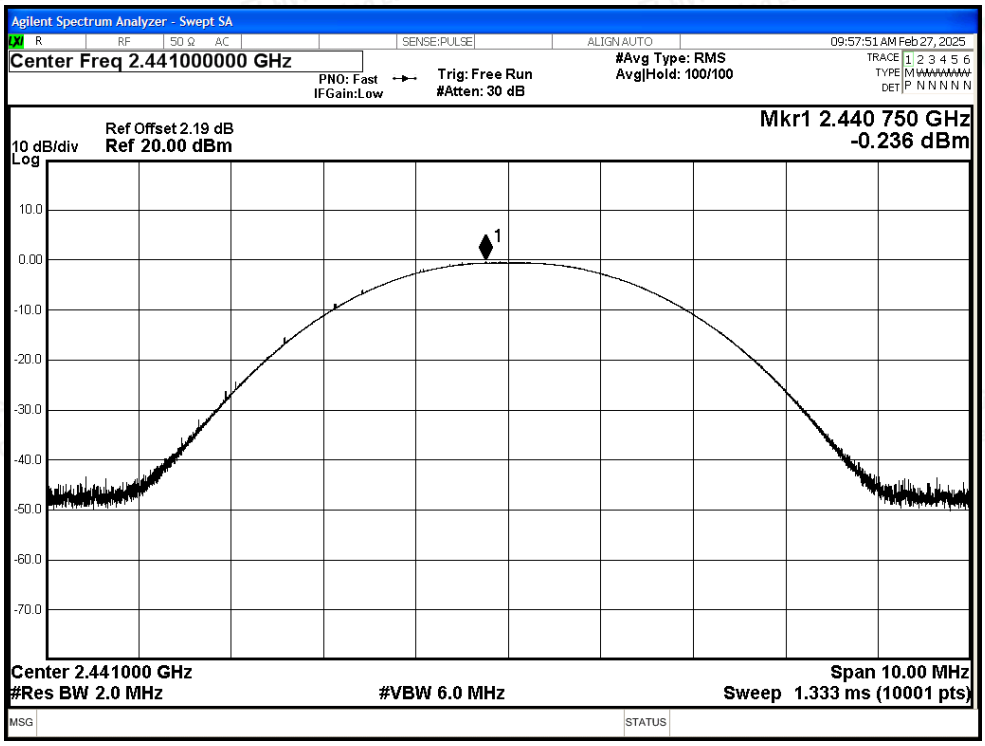
Condition	Mode	Frequency (MHz)	Antenna	Total Power (dBm)	Limit (dBm)	Verdict
NVNT	1-DH5	2402	Ant1	-0.71	21	Pass
NVNT	1-DH5	2441	Ant1	-0.24	21	Pass
NVNT	1-DH5	2480	Ant1	-1.46	21	Pass
NVNT	2-DH5	2402	Ant1	1.14	21	Pass
NVNT	2-DH5	2441	Ant1	1.48	21	Pass
NVNT	2-DH5	2480	Ant1	0.23	21	Pass
NVNT	3-DH5	2402	Ant1	1.42	21	Pass
NVNT	3-DH5	2441	Ant1	1.82	21	Pass
NVNT	3-DH5	2480	Ant1	0.66	21	Pass

Test Graphs

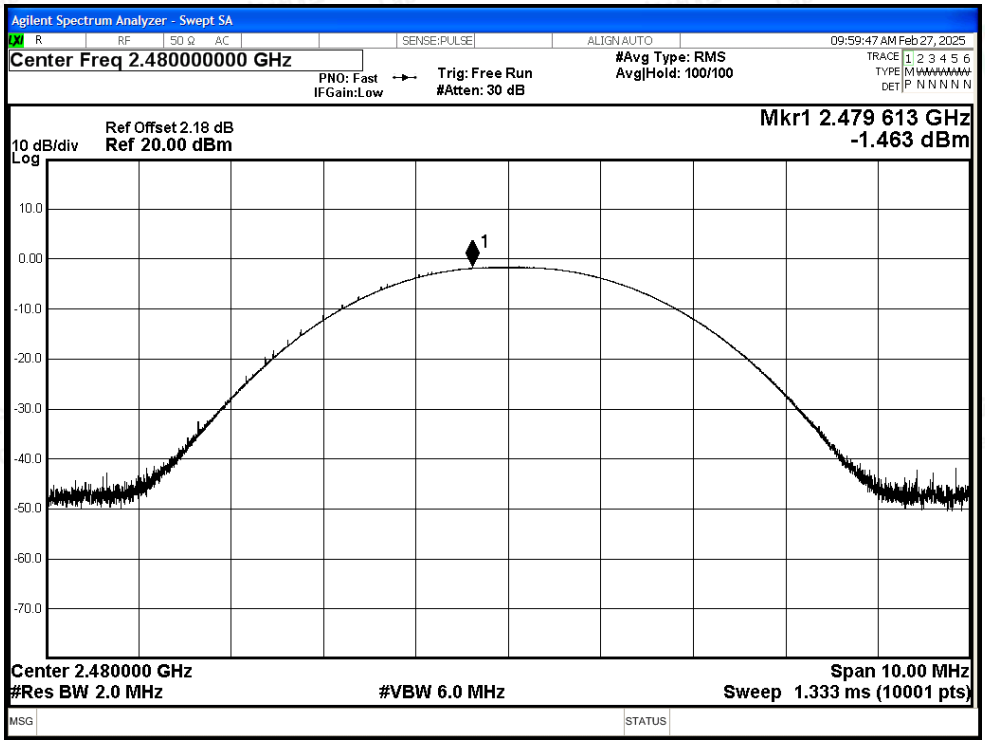
Power NVNT 1-DH5 2402MHz Ant1



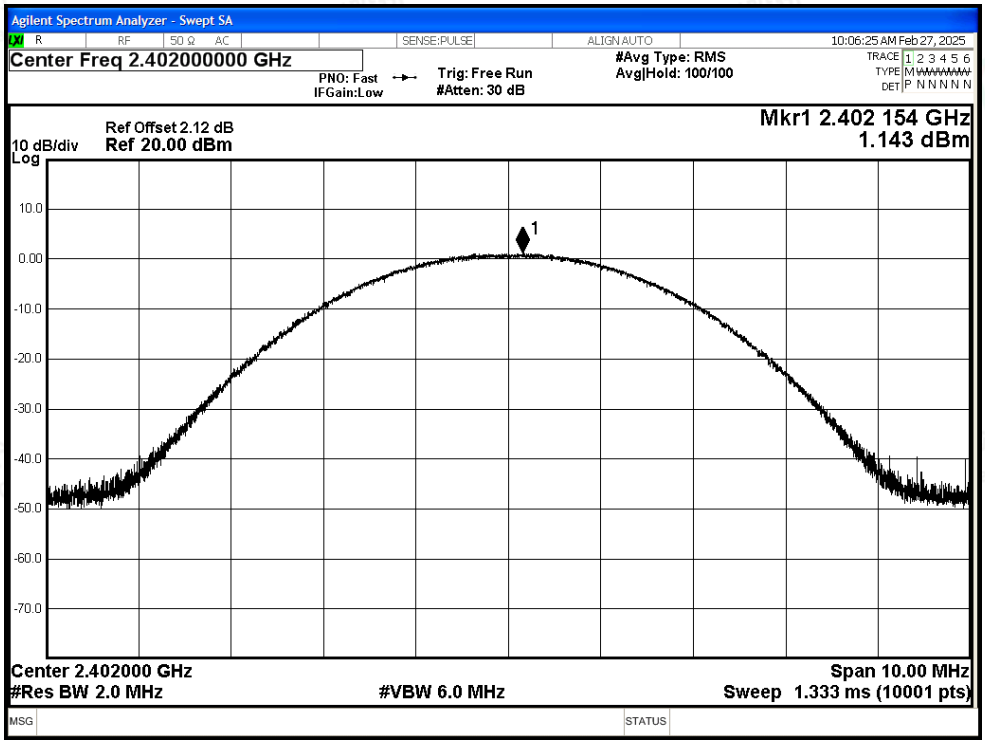
Power NVNT 1-DH5 2441MHz Ant1



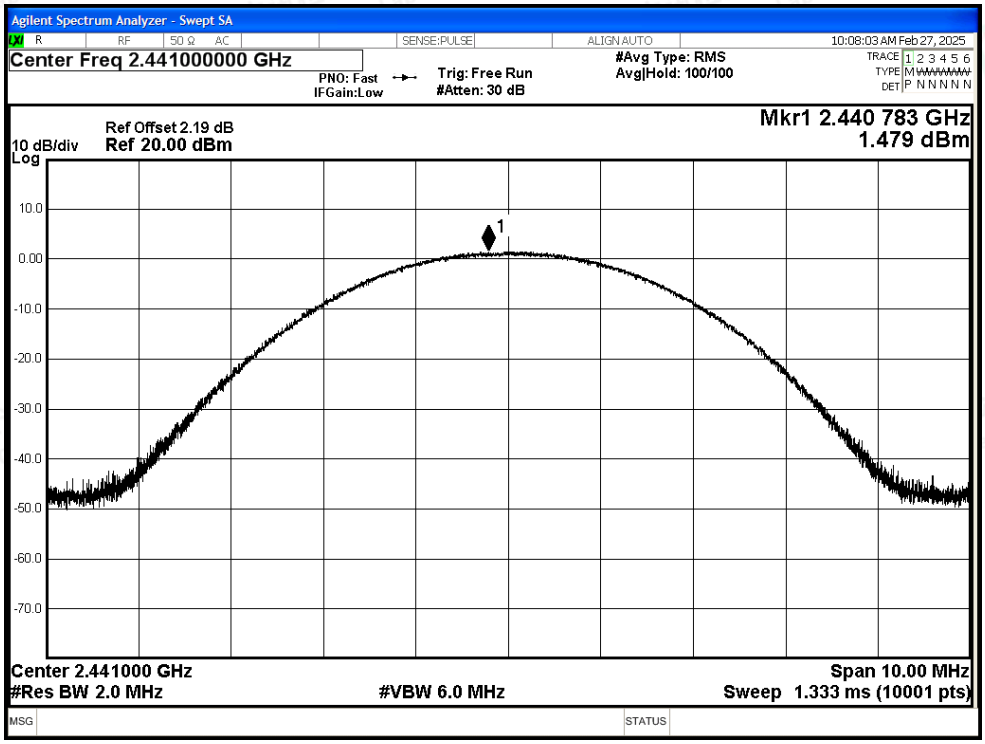
Power NVNT 1-DH5 2480MHz Ant1



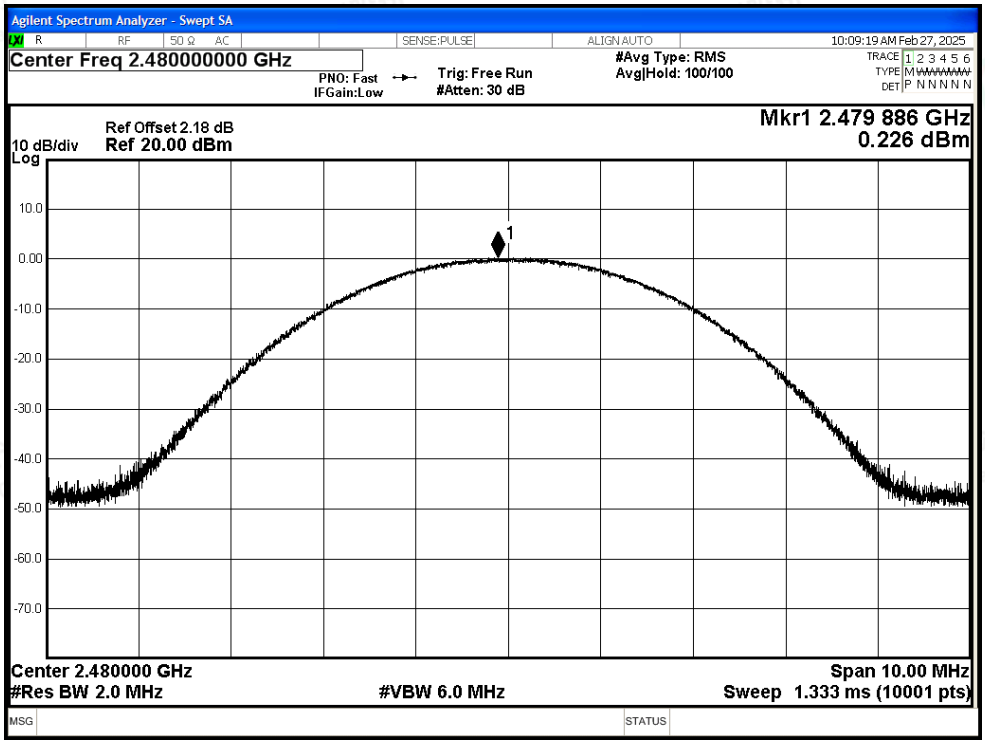
Power NVNT 2-DH5 2402MHz Ant1



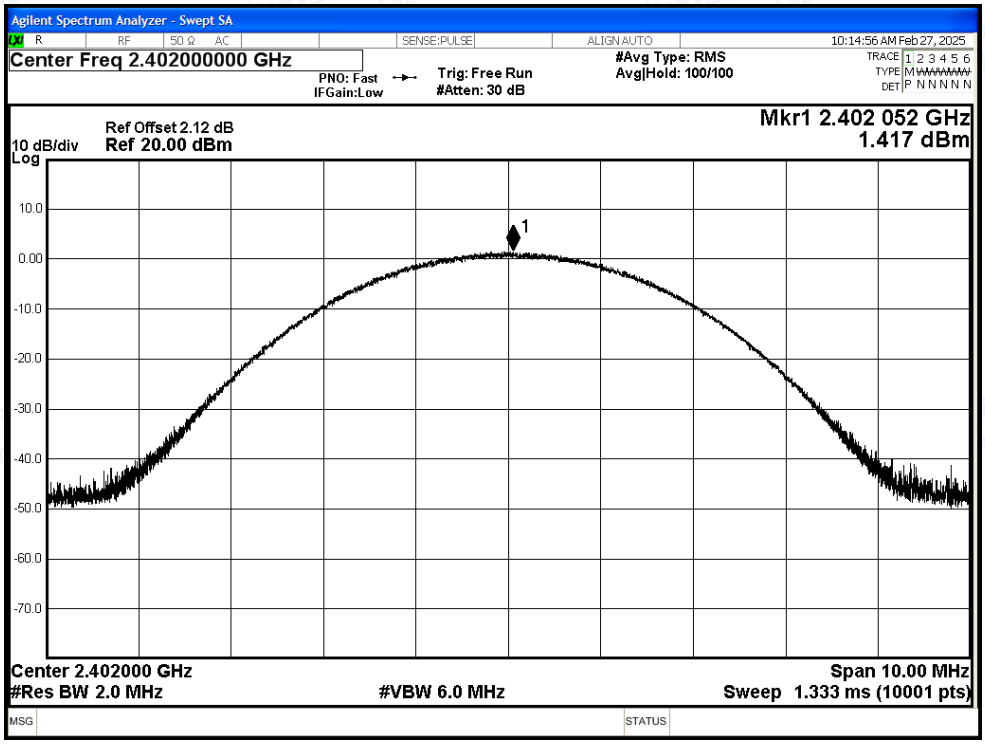
Power NVNT 2-DH5 2441MHz Ant1



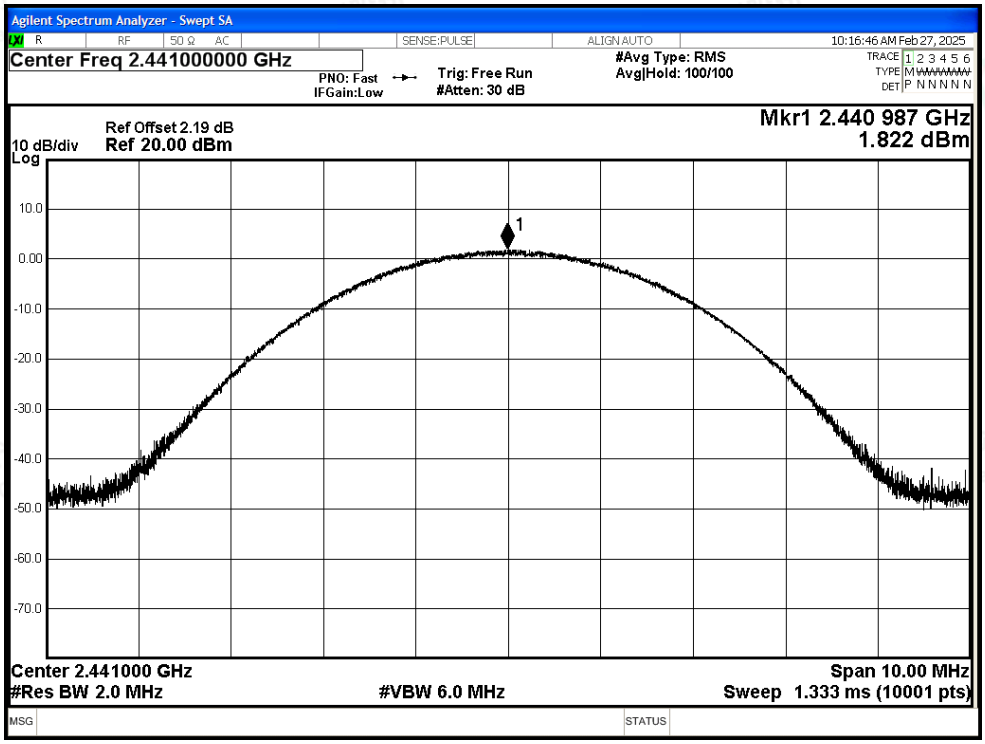
Power NVNT 2-DH5 2480MHz Ant1



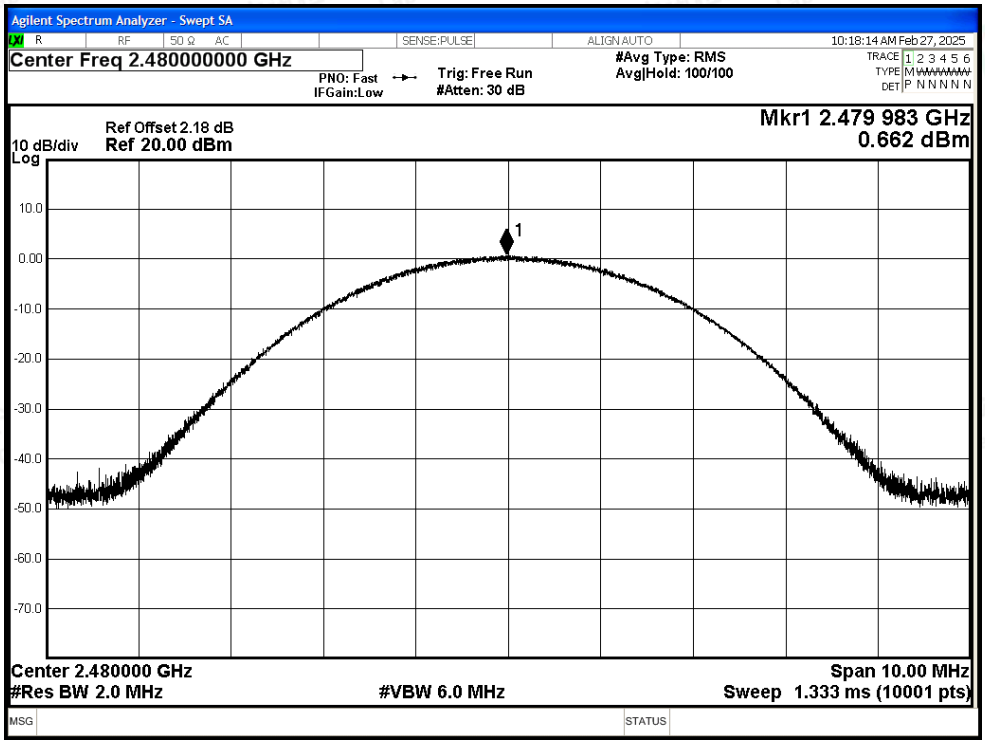
Power NVNT 3-DH5 2402MHz Ant1



Power NVNT 3-DH5 2441MHz Ant1



Power NVNT 3-DH5 2480MHz Ant1

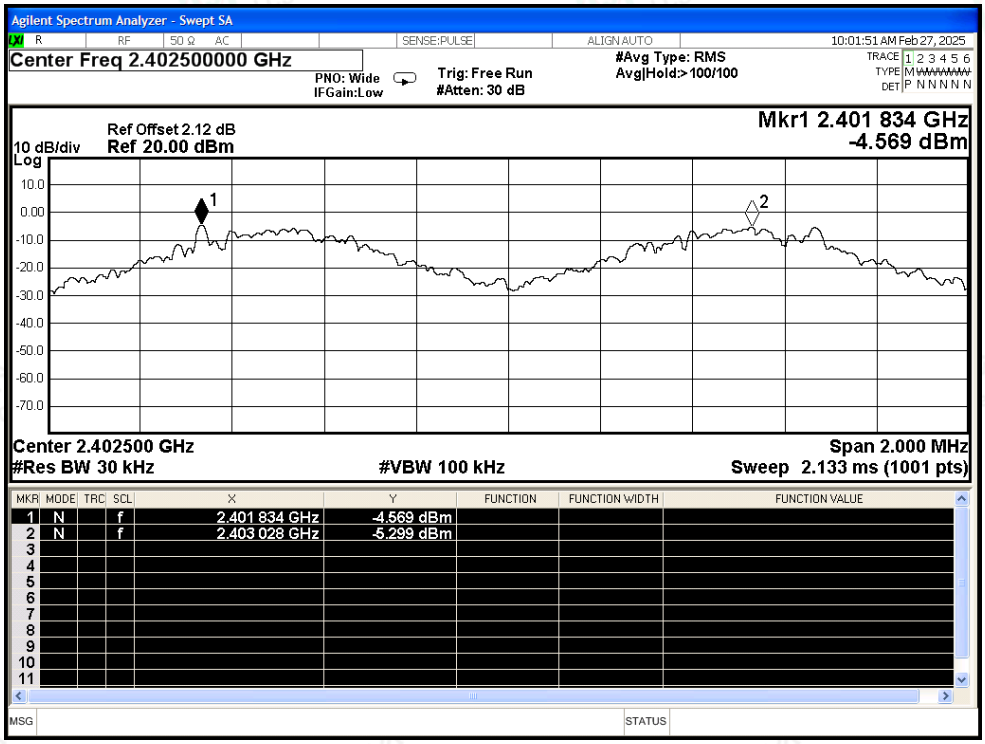


A.3 Carrier Frequencies Separation

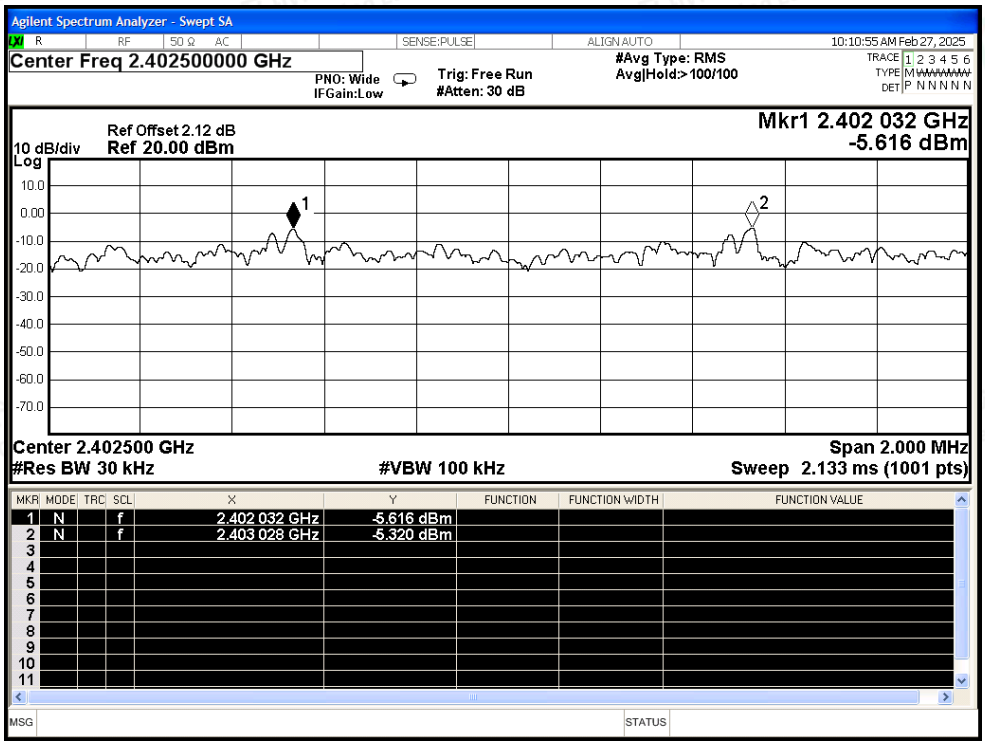
Condition	Mode	Antenna	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	1-DH5	Ant1	2401.834	2403.028	1.194	0.669	Pass
NVNT	2-DH5	Ant1	2402.032	2403.028	0.996	0.883	Pass
NVNT	3-DH5	Ant1	2402.032	2403.024	0.992	0.870	Pass

Test Graphs

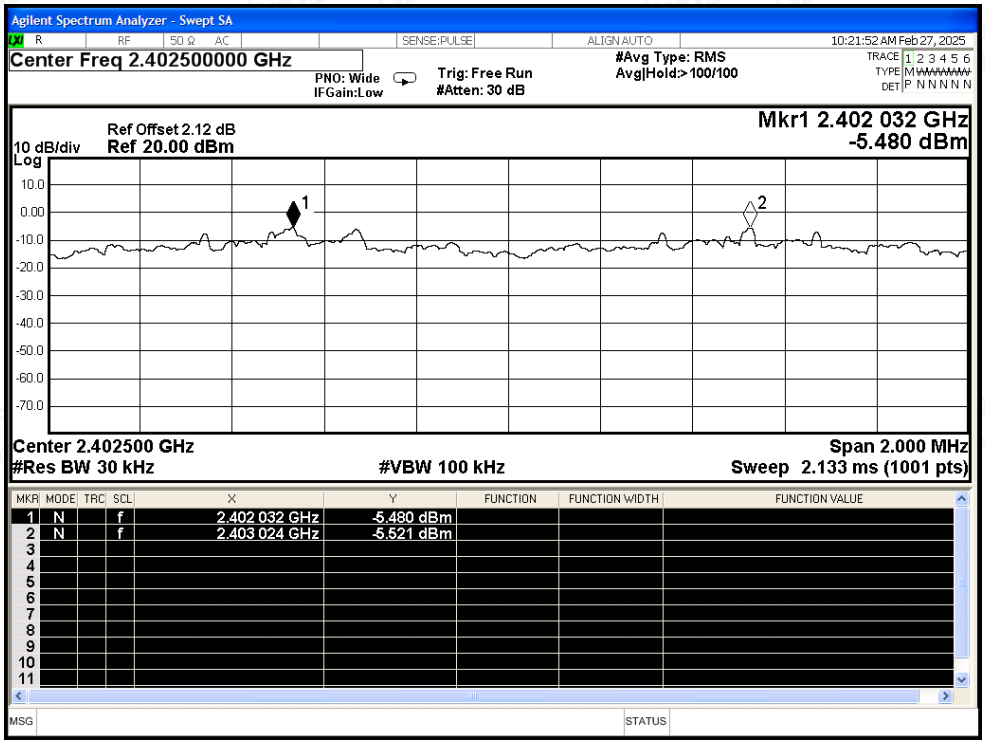
CFS NVNT 1-DH5 2402MHz Ant1



CFS NVNT 2-DH5 2402MHz Ant1



CFS NVNT 3-DH5 2402MHz Ant1

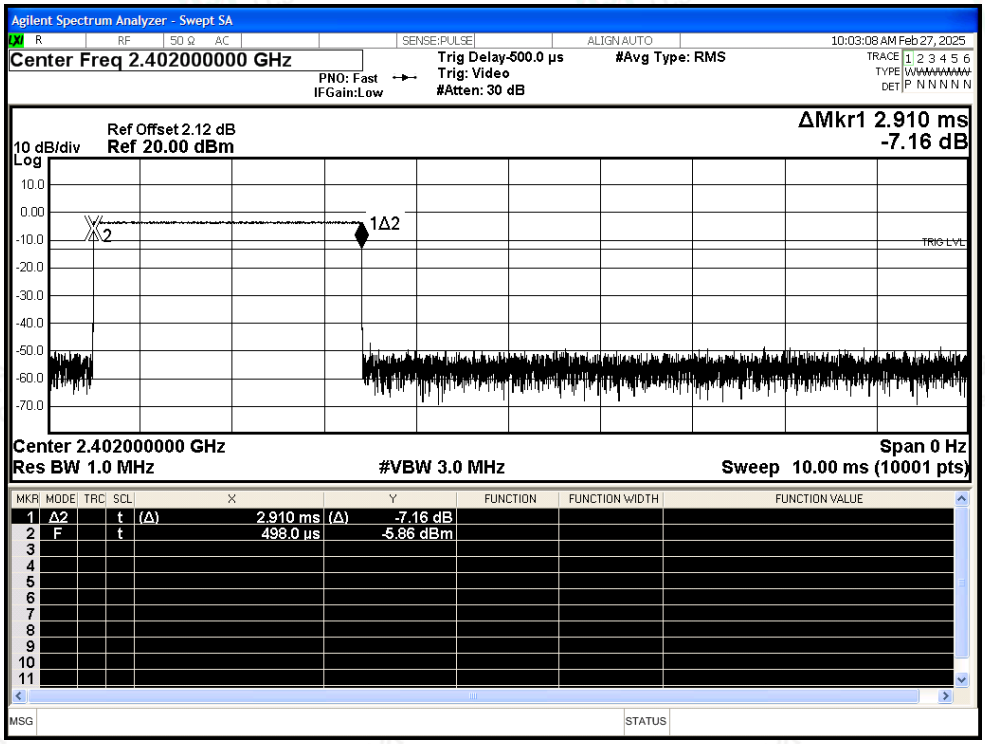


A.4 Dwell Time

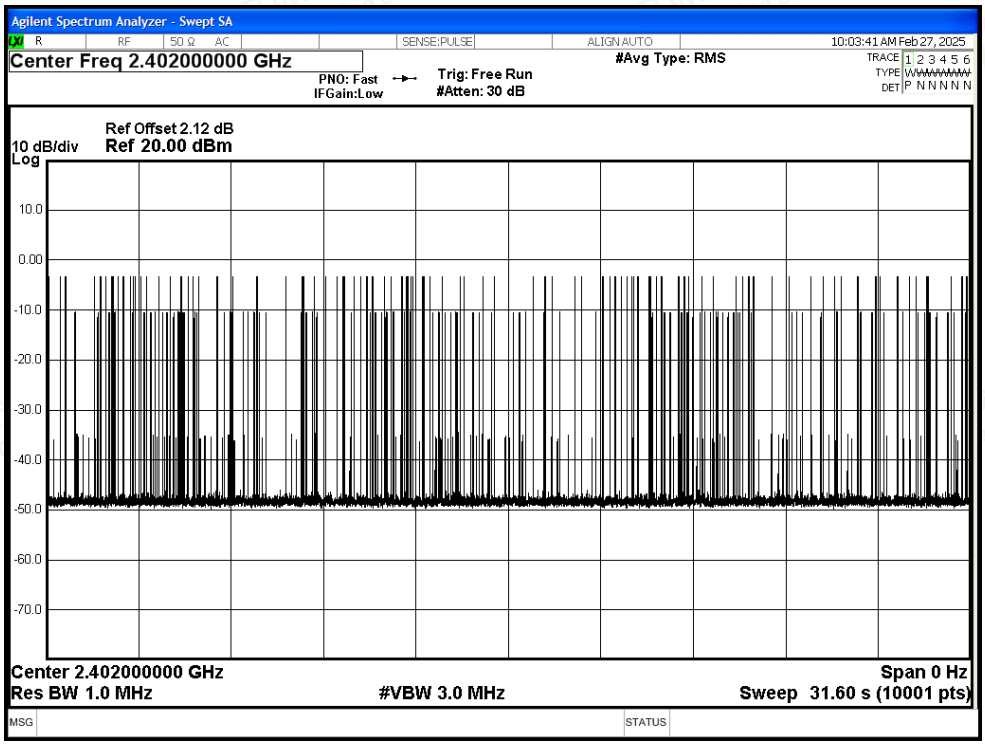
Condition	Mode	Frequency (MHz)	Antenna	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
NVNT	1-DH5	2402	Ant1	2.91	320.1	110	31600	400	Pass
NVNT	2-DH5	2402	Ant1	2.899	298.597	103	31600	400	Pass
NVNT	3-DH5	2402	Ant1	2.897	298.391	103	31600	400	Pass

Test Graphs

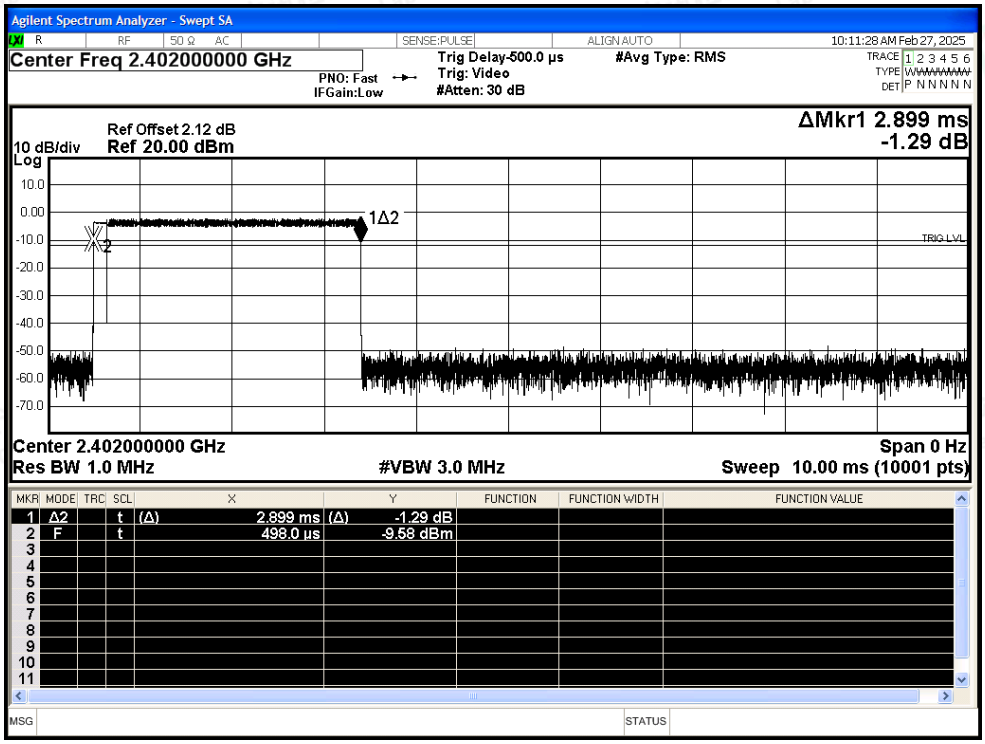
Dwell NVNT 1-DH5 2402MHz Ant1 One Burst



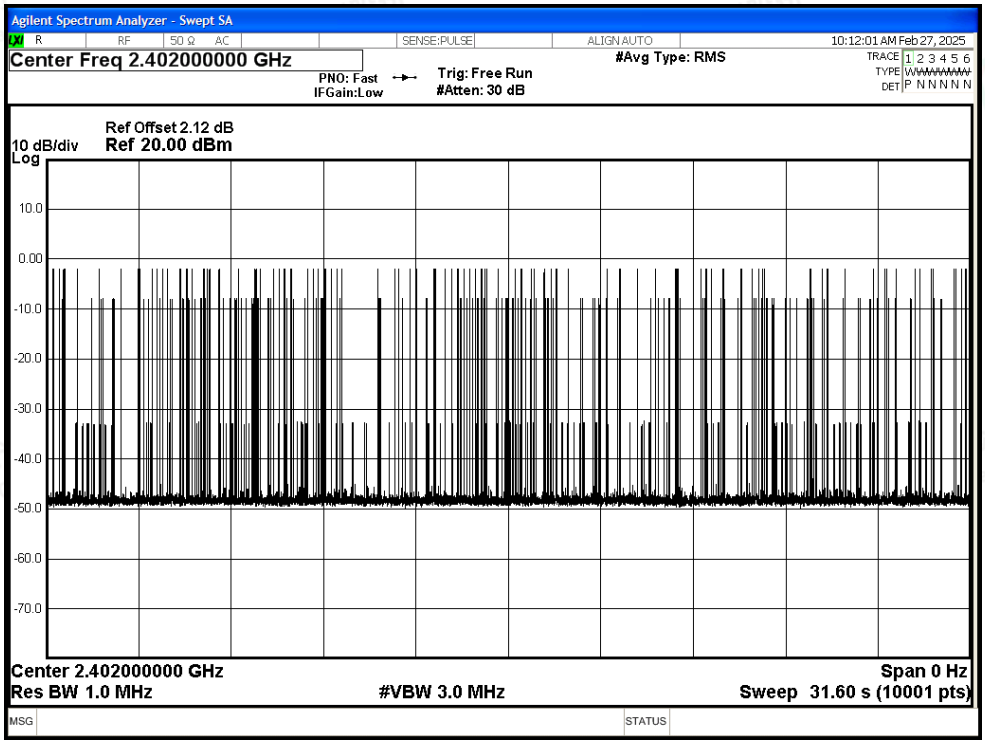
Dwell NVNT 1-DH5 2402MHz Ant1 Accumulated



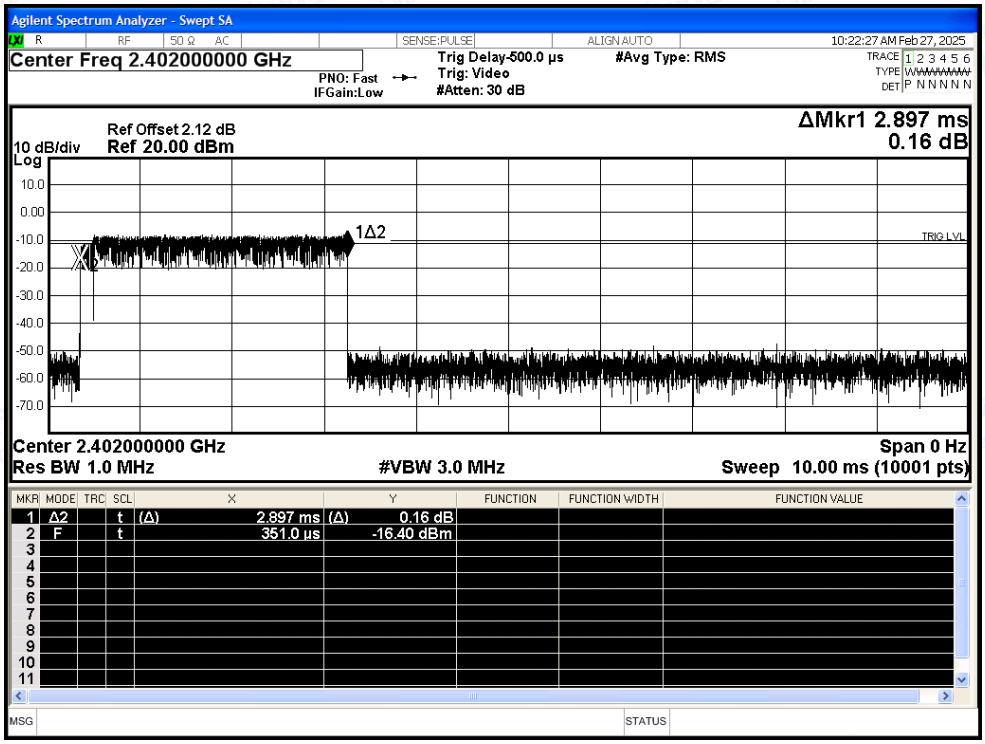
Dwell NVNT 2-DH5 2402MHz Ant1 One Burst



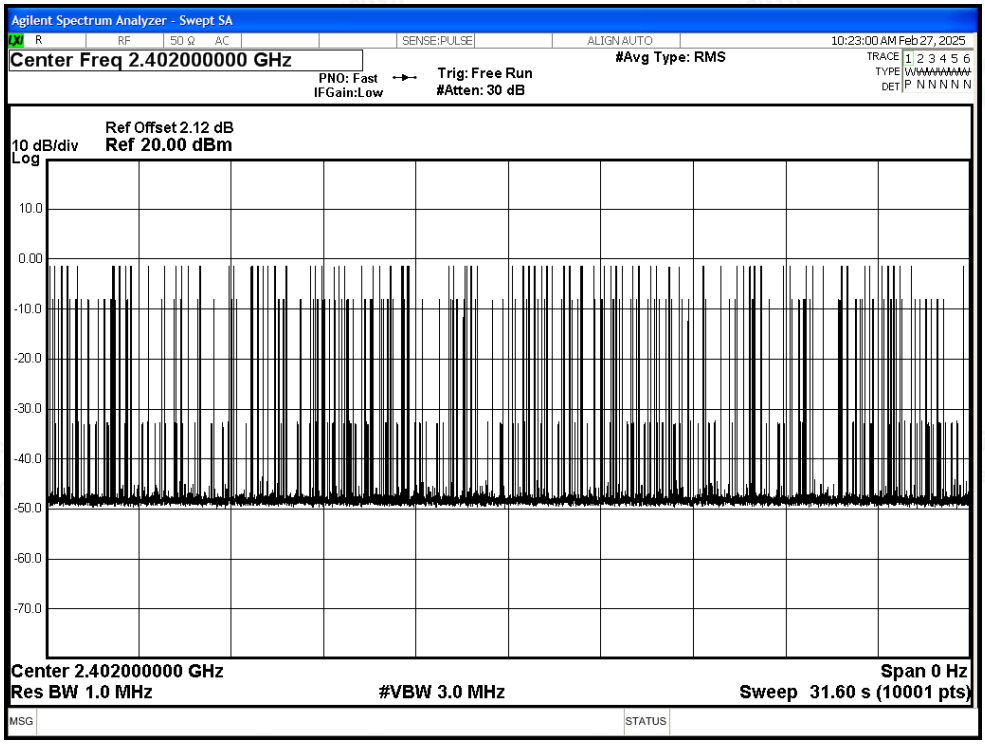
Dwell NVNT 2-DH5 2402MHz Ant1 Accumulated



Dwell NVNT 3-DH5 2402MHz Ant1 One Burst



Dwell NVNT 3-DH5 2402MHz Ant1 Accumulated

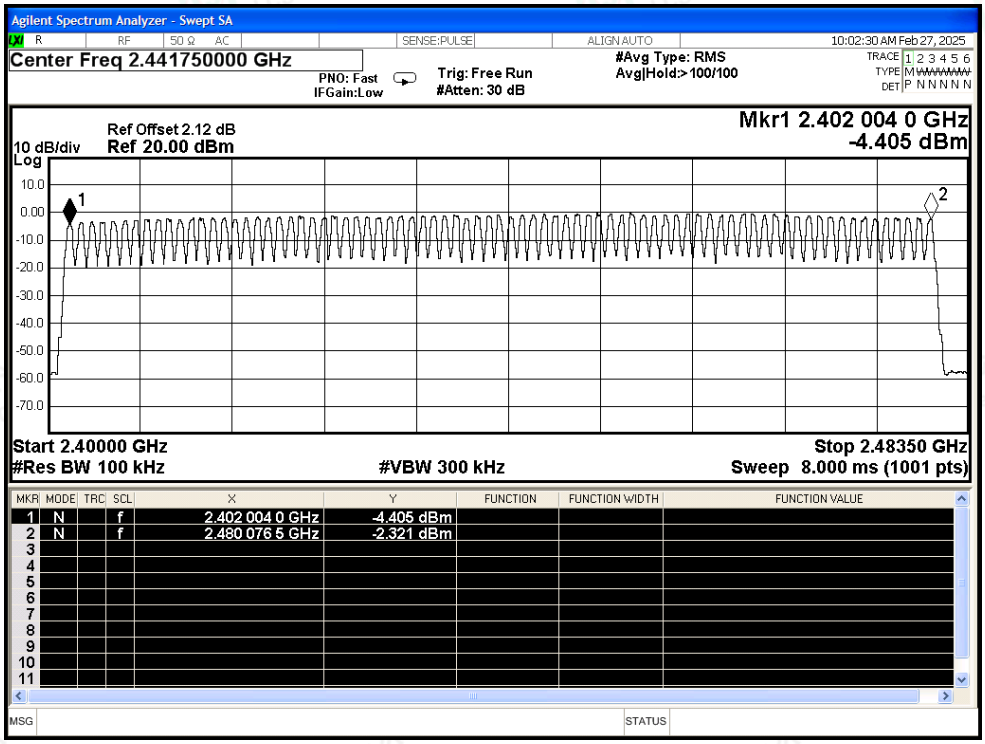


A.5 Number of Hopping Channel

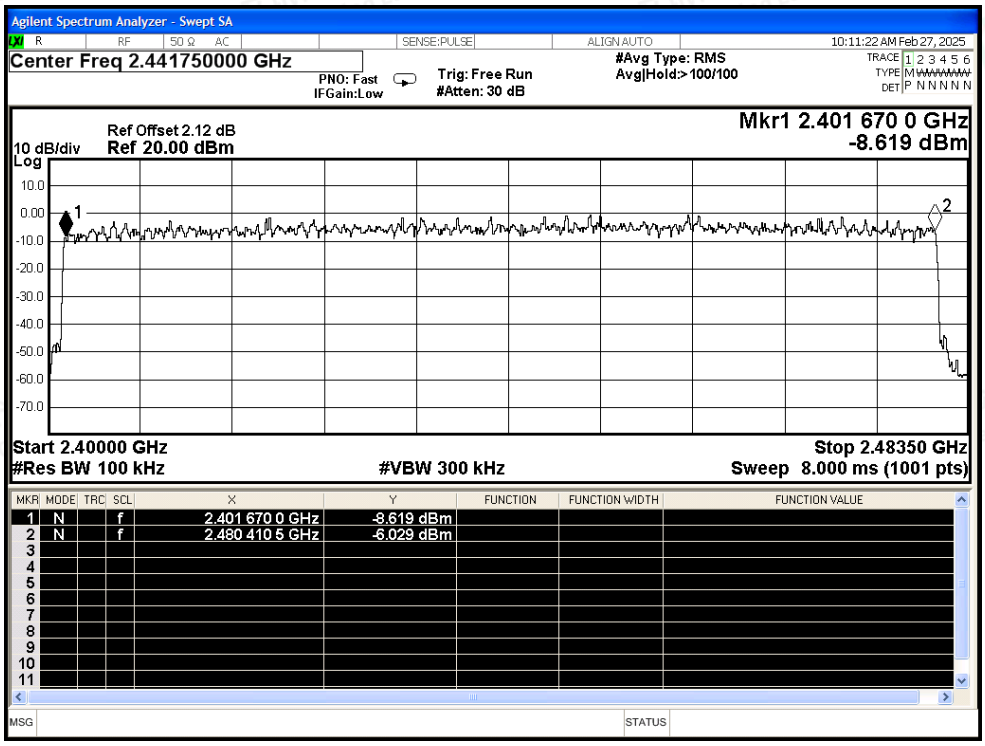
Condition	Mode	Antenna	Hopping Number	Limit	Verdict
NVNT	1-DH5	Ant1	79	15	Pass
NVNT	2-DH5	Ant1	79	15	Pass
NVNT	3-DH5	Ant1	79	15	Pass

Test Graphs

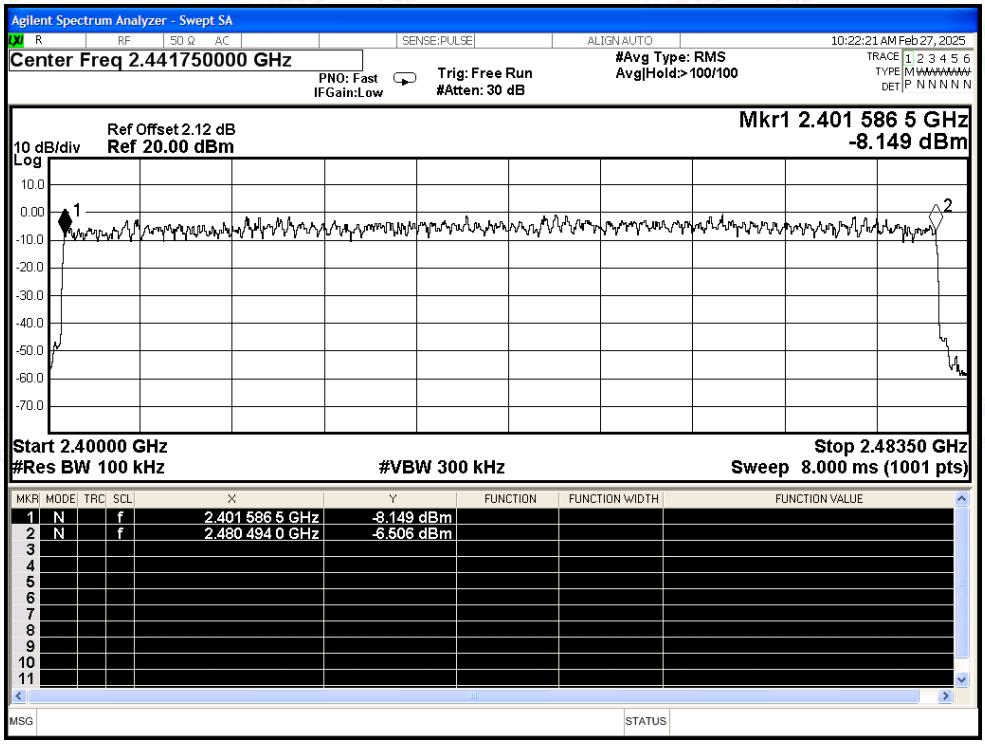
Hopping No. NVNT 1-DH5 2402MHz Ant1



Hopping No. NVNT 2-DH5 2402MHz Ant1



Hopping No. NVNT 3-DH5 2402MHz Ant1

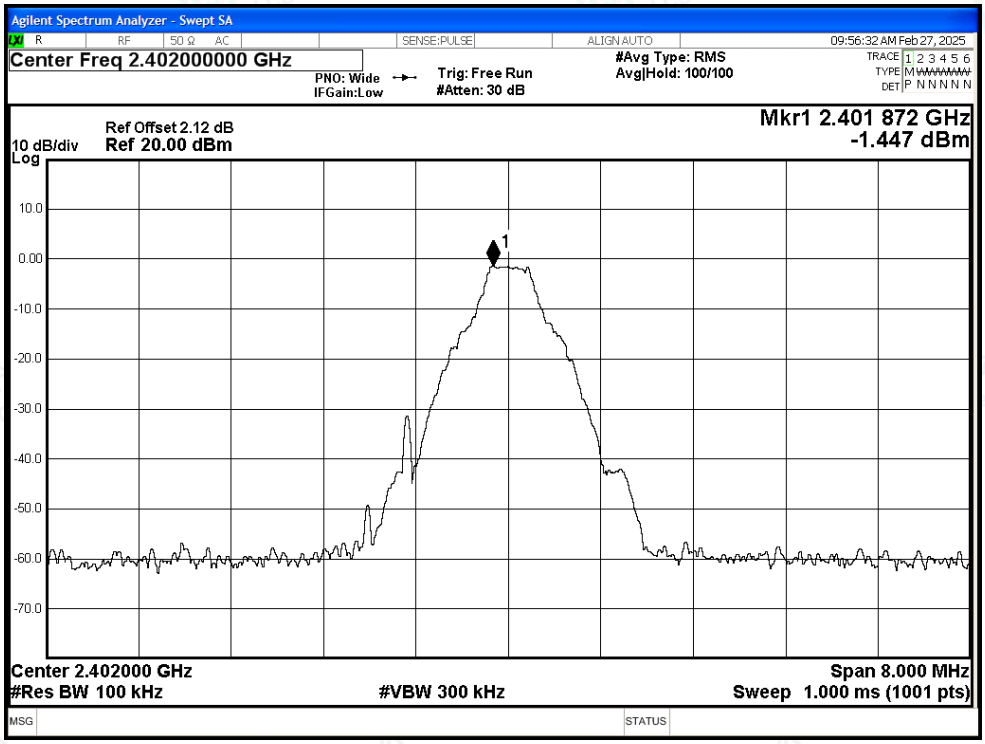


A.6 Band Edge

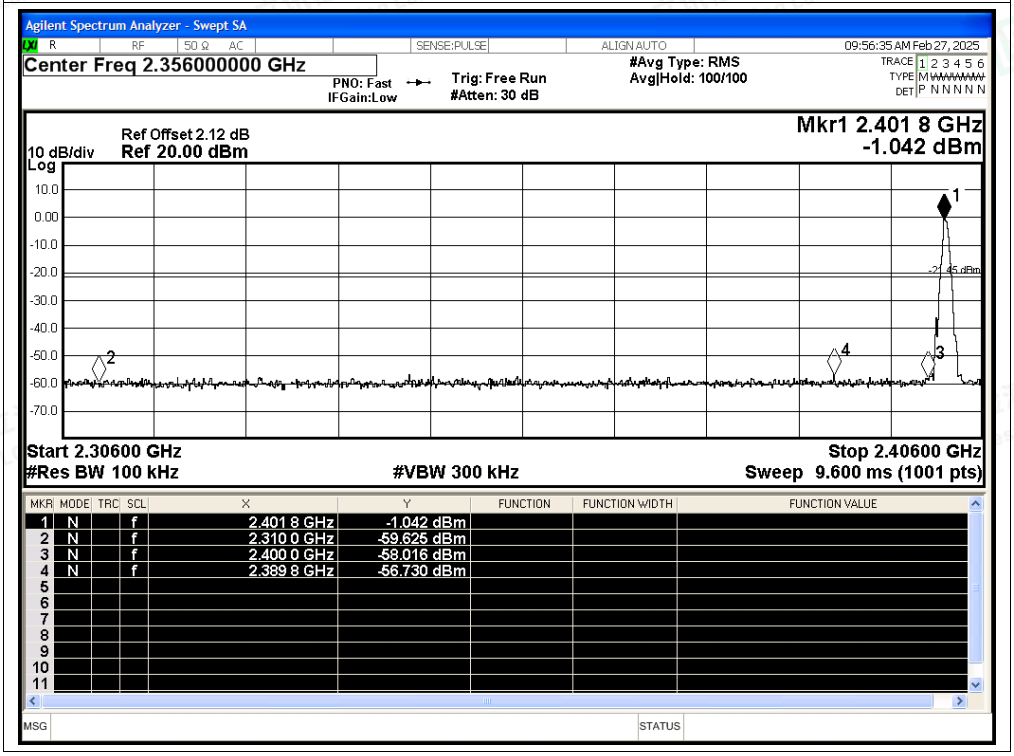
Condition	Mode	Frequency (MHz)	Antenna	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	1-DH5	2402	Ant1	No-Hopping	-55.28	-20	Pass
NVNT	1-DH5	2480	Ant1	No-Hopping	-53.06	-20	Pass
NVNT	2-DH5	2402	Ant1	No-Hopping	-51.69	-20	Pass
NVNT	2-DH5	2480	Ant1	No-Hopping	-53.95	-20	Pass
NVNT	3-DH5	2402	Ant1	No-Hopping	-51.39	-20	Pass
NVNT	3-DH5	2480	Ant1	No-Hopping	-55.33	-20	Pass

Test Graphs

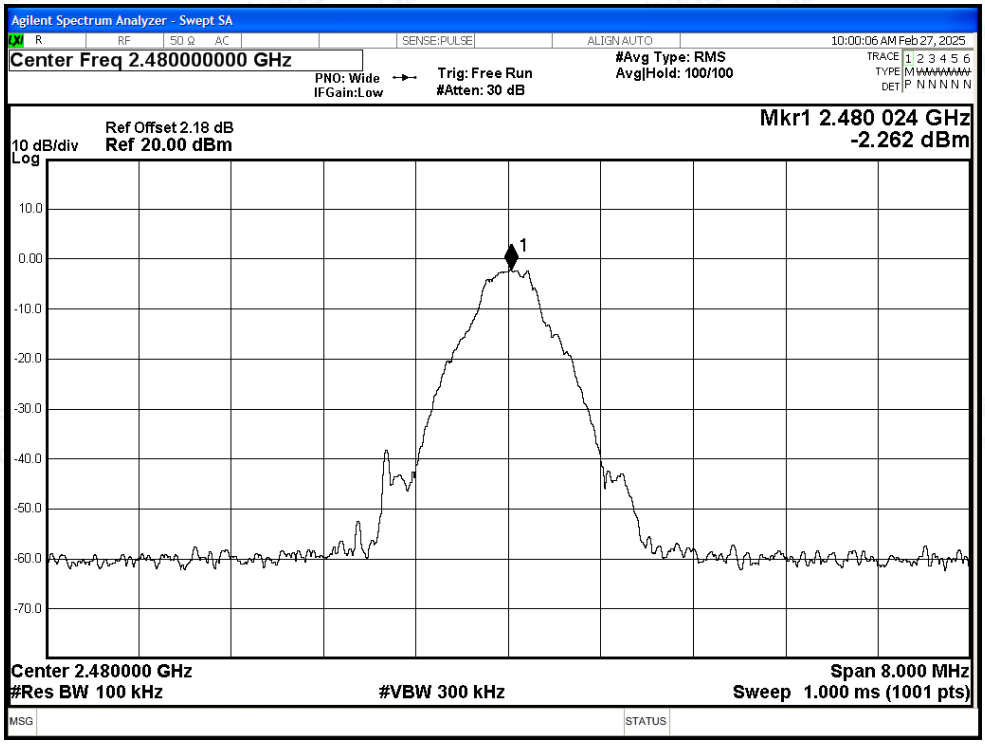
Band Edge NVNT 1-DH5 2402MHz Ant1 No-Hopping Ref



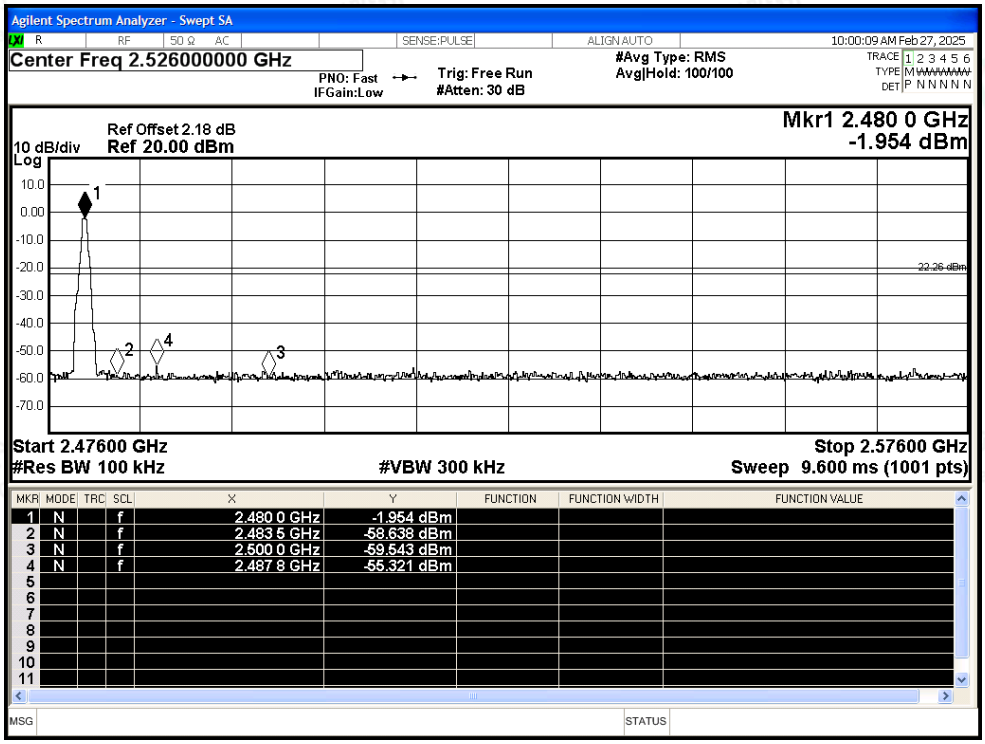
Band Edge NVNT 1-DH5 2402MHz Ant1 No-Hopping Emission



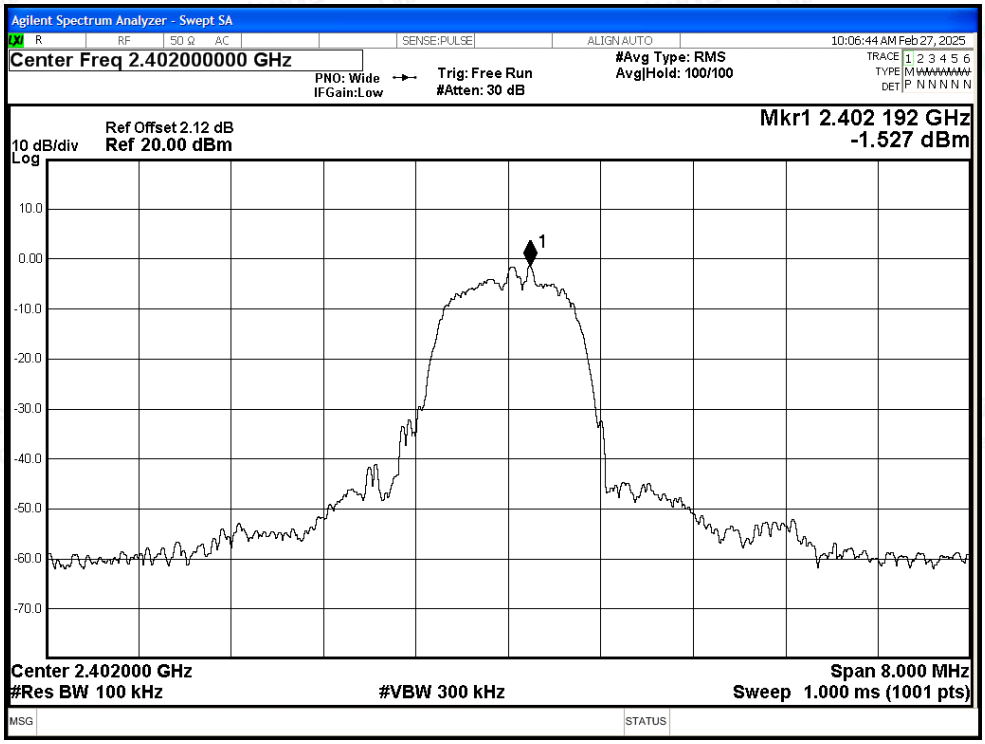
Band Edge NVNT 1-DH5 2480MHz Ant1 No-Hopping Ref



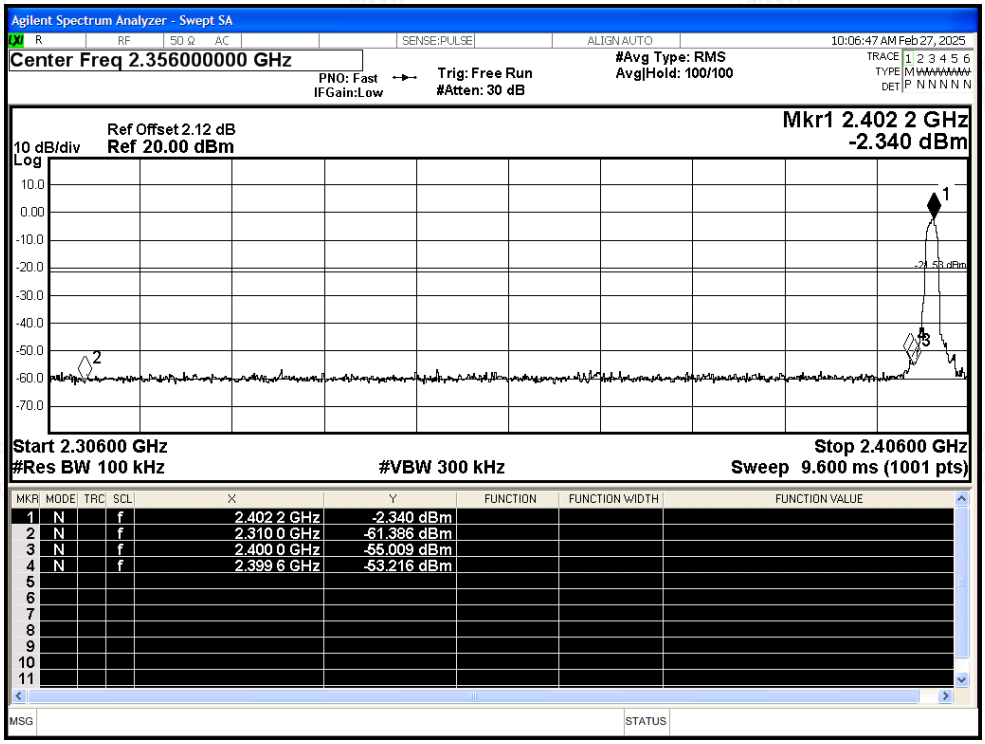
Band Edge NVNT 1-DH5 2480MHz Ant1 No-Hopping Emission



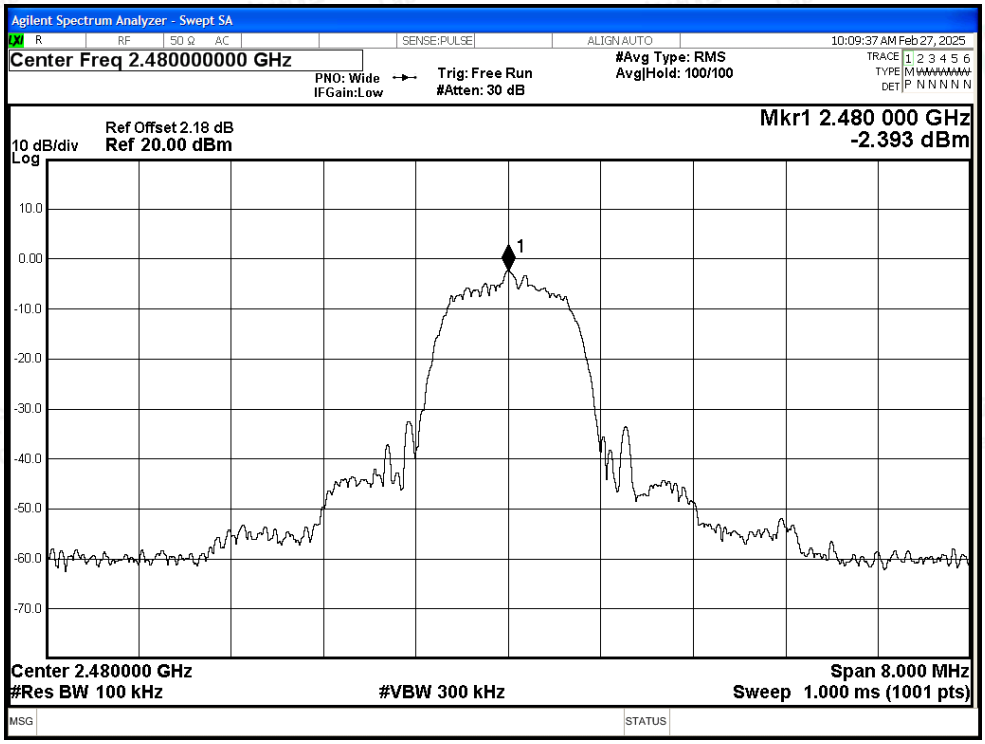
Band Edge NVNT 2-DH5 2402MHz Ant1 No-Hopping Ref



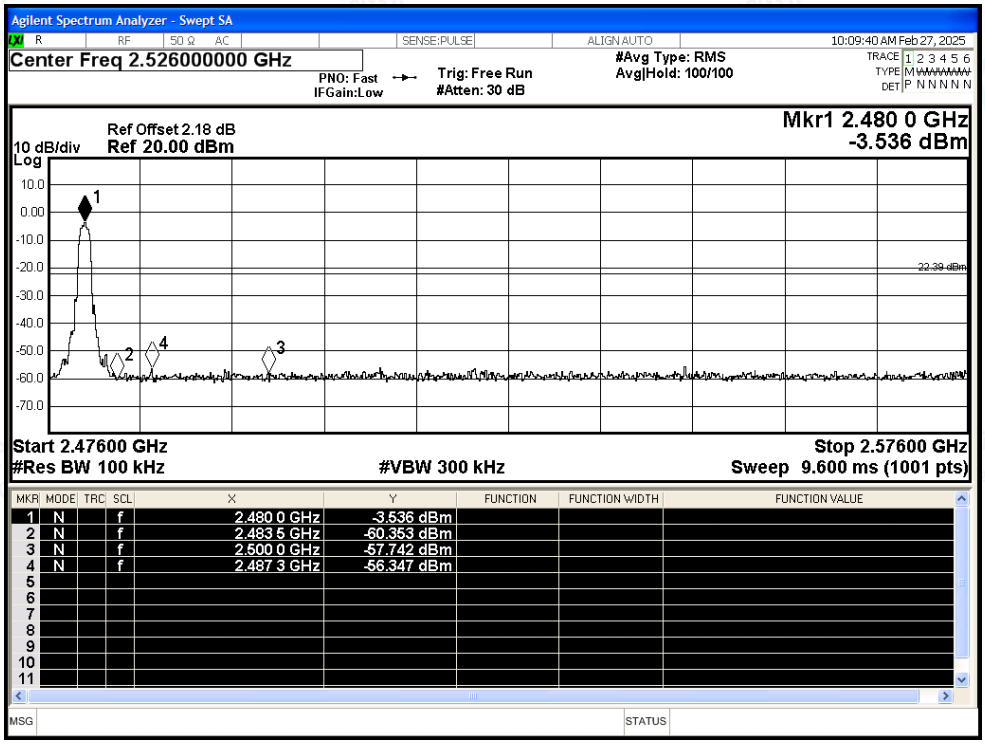
Band Edge NVNT 2-DH5 2402MHz Ant1 No-Hopping Emission



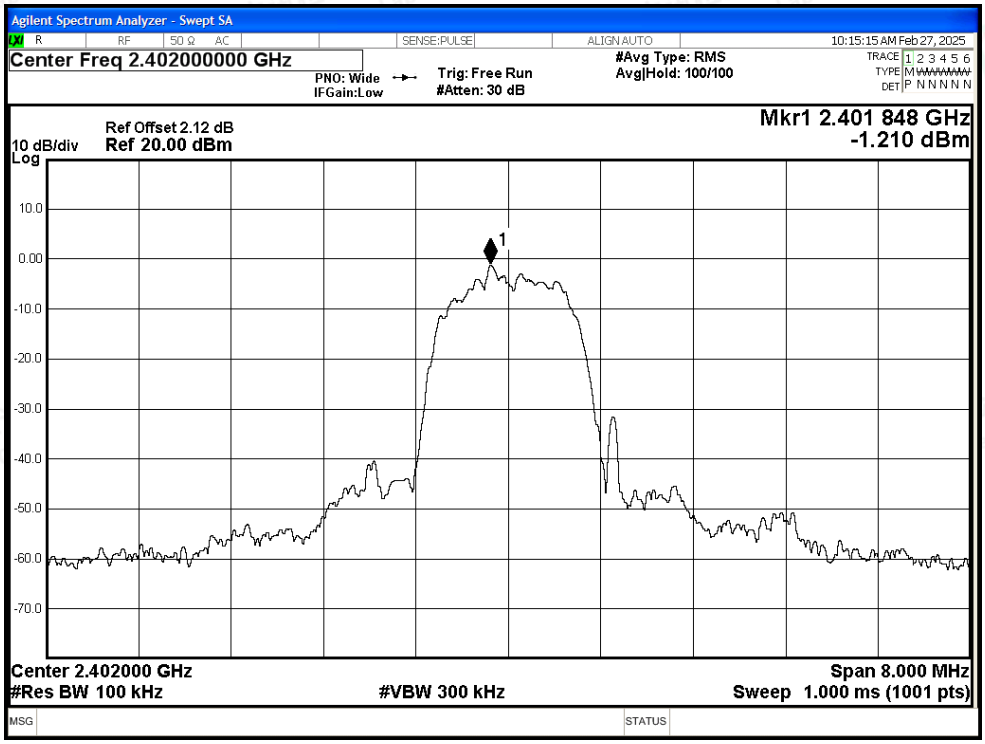
Band Edge NVNT 2-DH5 2480MHz Ant1 No-Hopping Ref



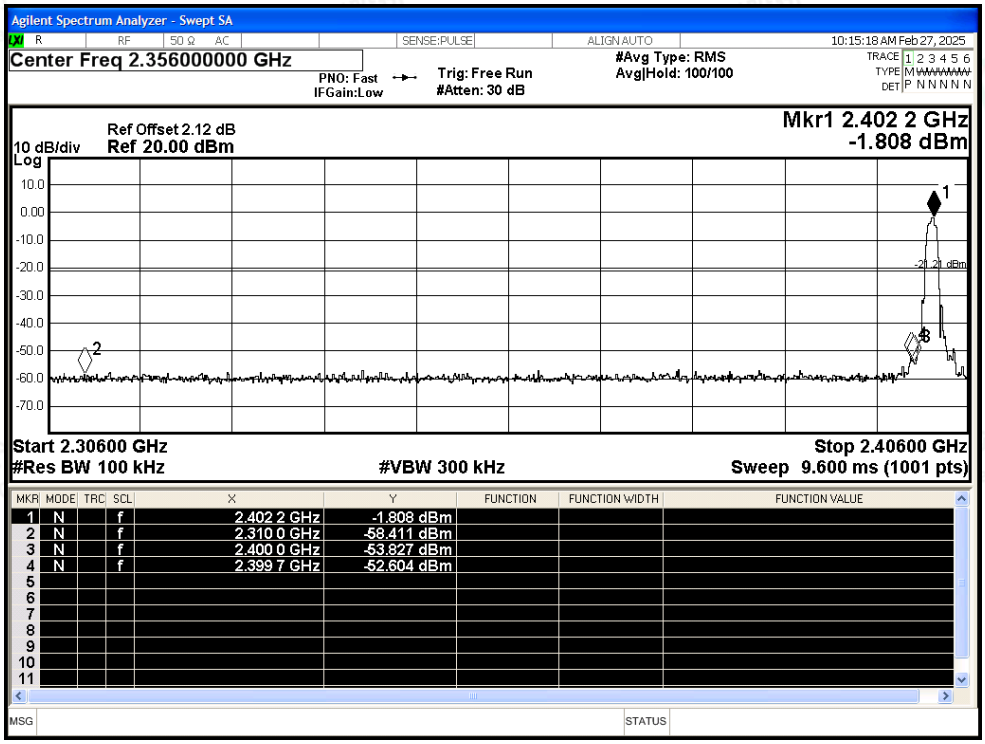
Band Edge NVNT 2-DH5 2480MHz Ant1 No-Hopping Emission



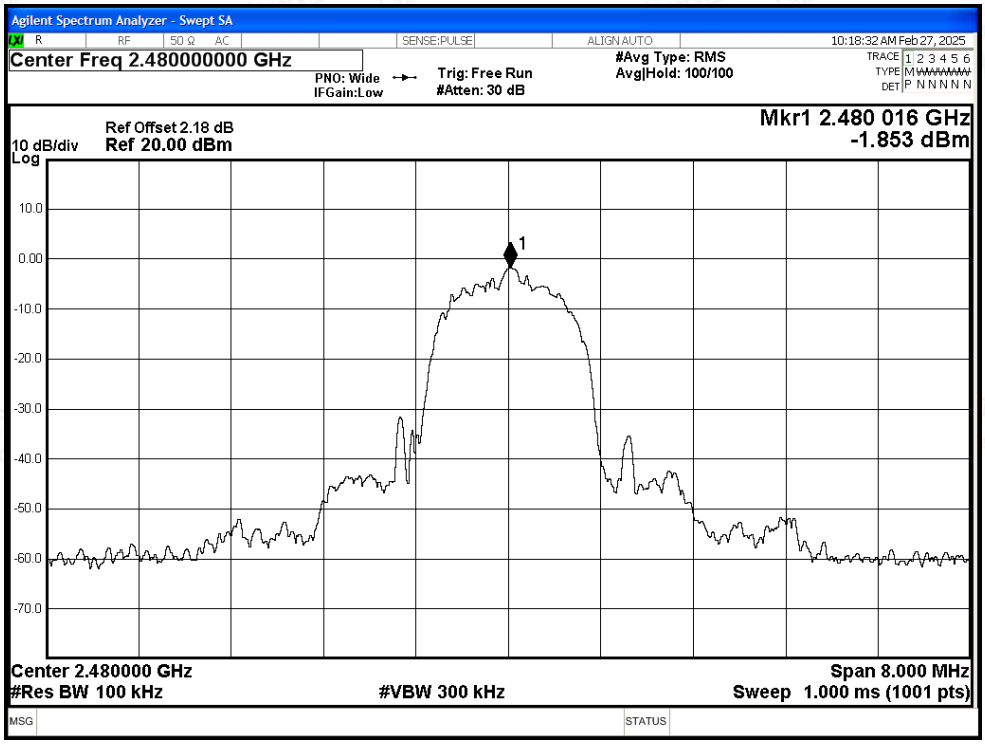
Band Edge NVNT 3-DH5 2402MHz Ant1 No-Hopping Ref



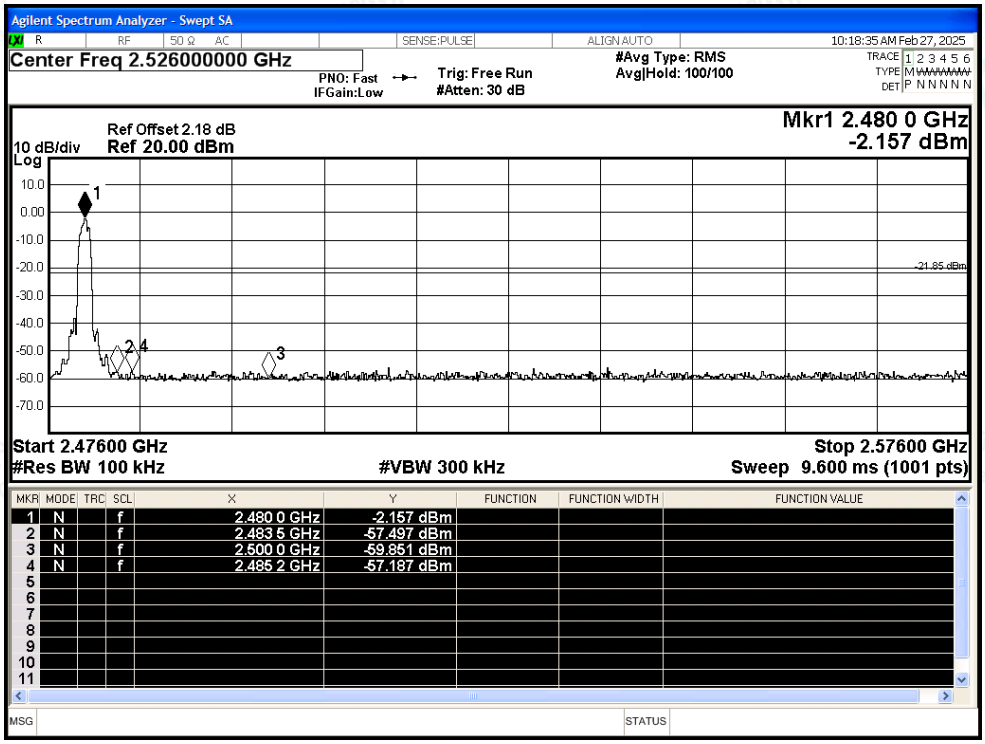
Band Edge NVNT 3-DH5 2402MHz Ant1 No-Hopping Emission



Band Edge NVNT 3-DH5 2480MHz Ant1 No-Hopping Ref



Band Edge NVNT 3-DH5 2480MHz Ant1 No-Hopping Emission

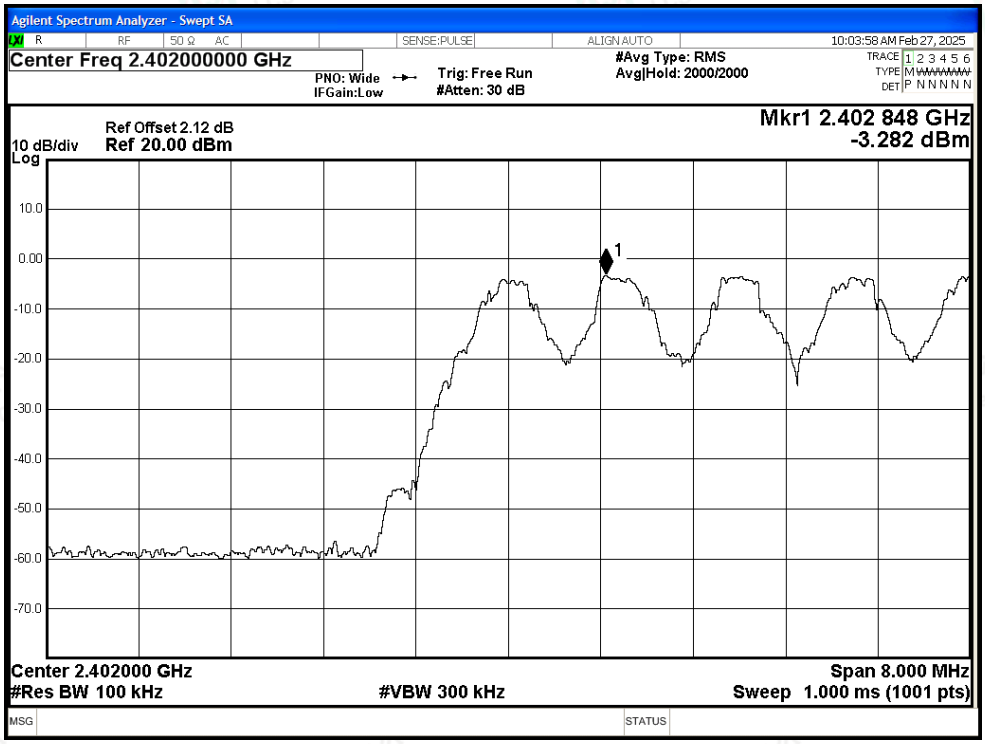


(Hopping)

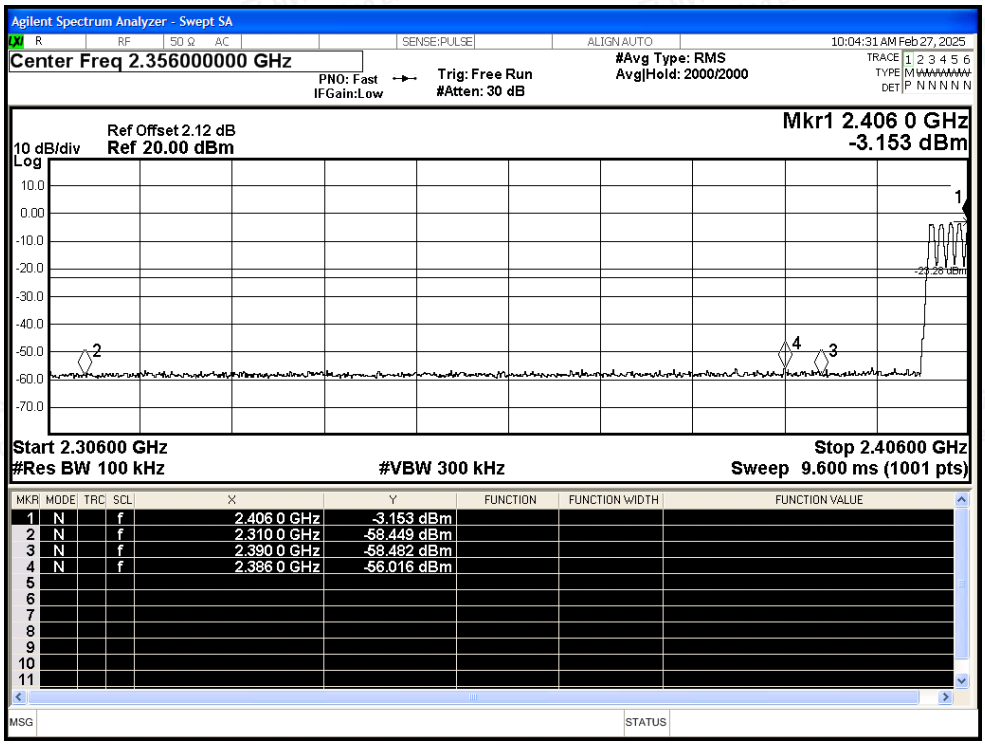
Condition	Mode	Frequency (MHz)	Antenna	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	1-DH5	2402	Ant1	Hopping	-52.73	-20	Pass
NVNT	1-DH5	2480	Ant1	Hopping	-54.56	-20	Pass
NVNT	2-DH5	2402	Ant1	Hopping	-52.76	-20	Pass
NVNT	2-DH5	2480	Ant1	Hopping	-53.97	-20	Pass
NVNT	3-DH5	2402	Ant1	Hopping	-51.5	-20	Pass
NVNT	3-DH5	2480	Ant1	Hopping	-54.13	-20	Pass

Test Graphs

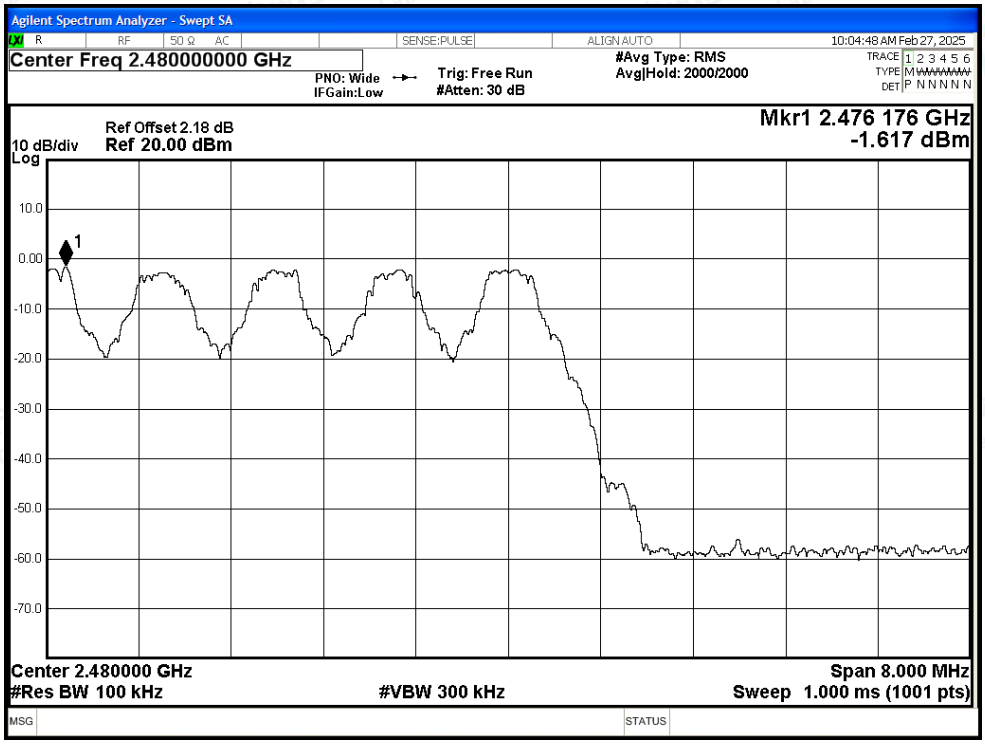
Band Edge(Hopping) NVNT 1-DH5 2402MHz Ant1 Hopping Ref



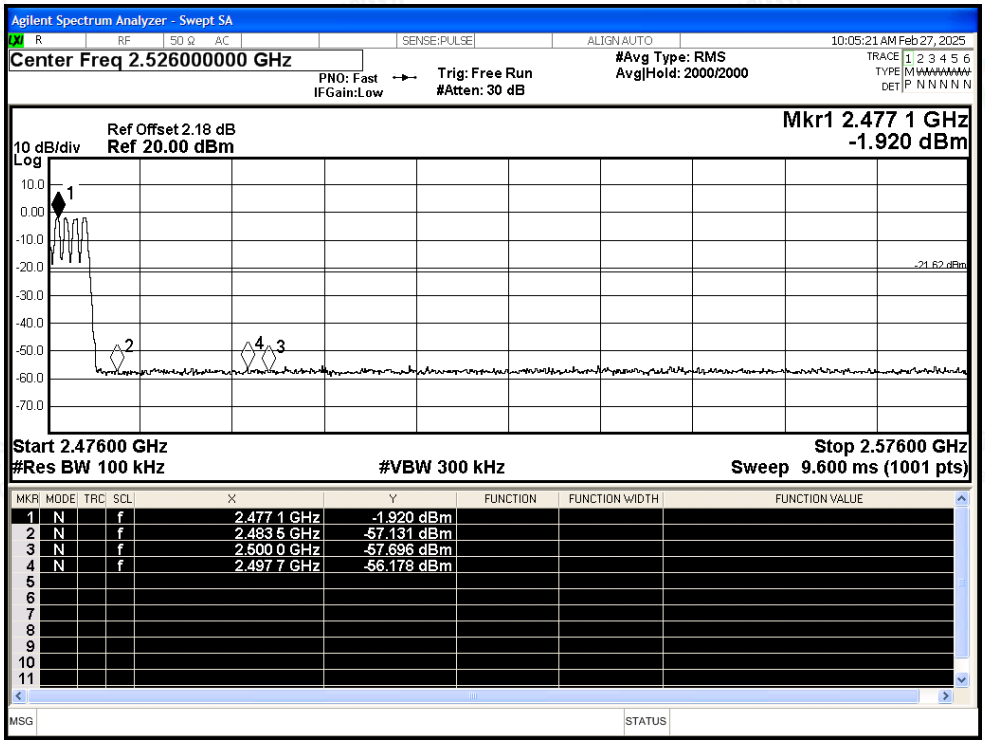
Band Edge(Hopping) NVNT 1-DH5 2402MHz Ant1 Hopping Emission



Band Edge(Hopping) NVNT 1-DH5 2480MHz Ant1 Hopping Ref

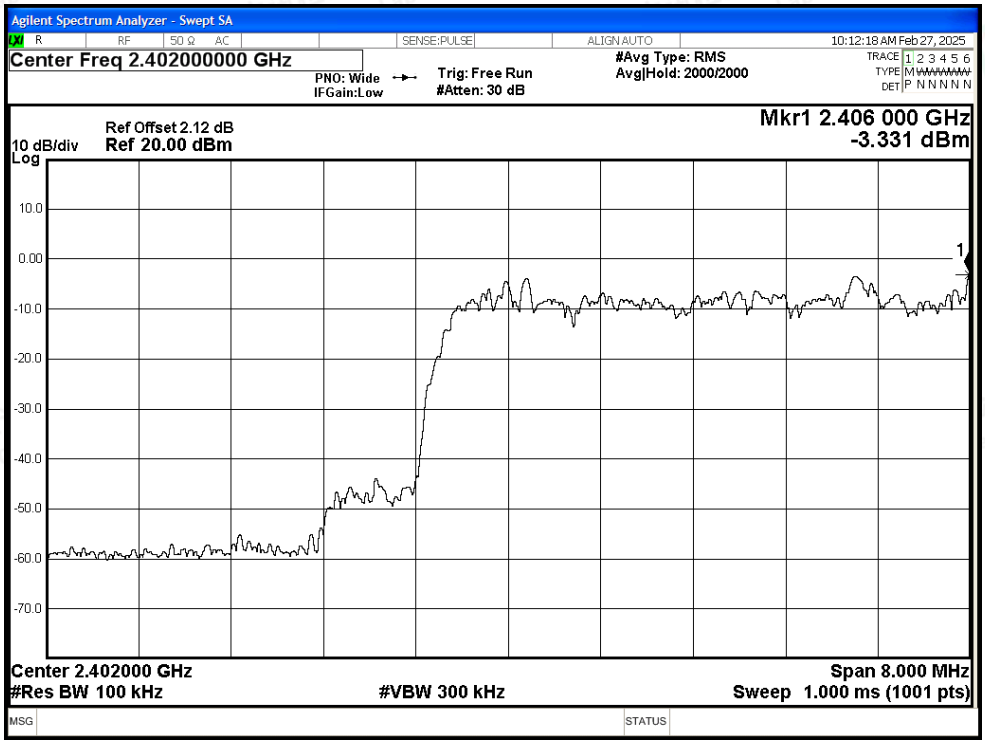


Band Edge(Hopping) NVNT 1-DH5 2480MHz Ant1 Hopping Emission

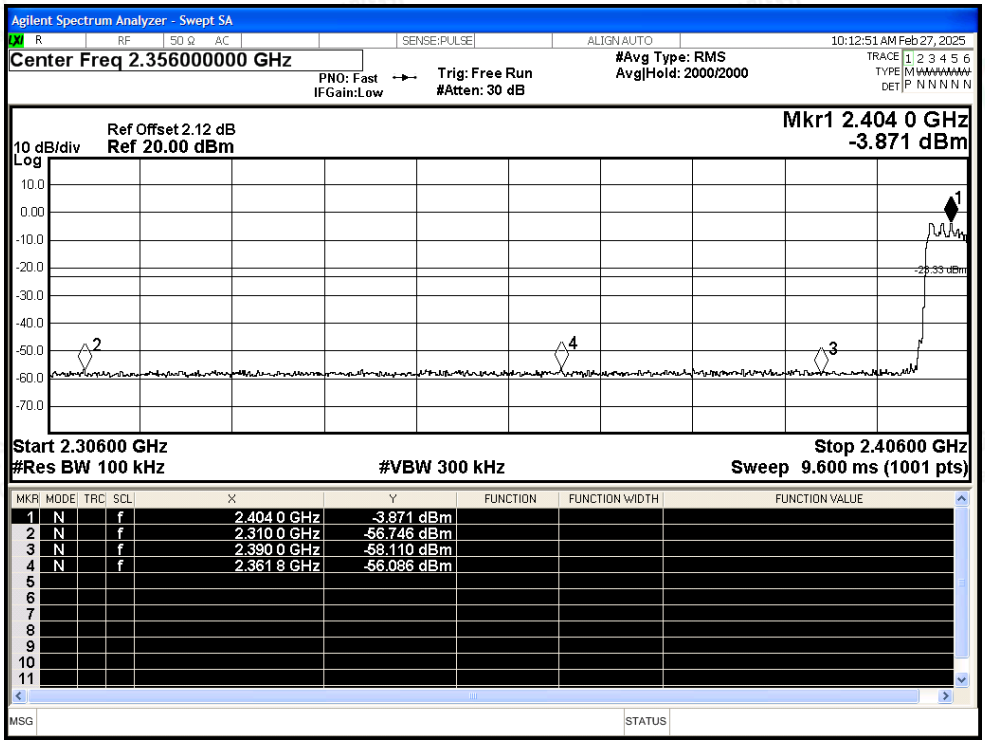


MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		f	2.477 1 GHz	-1.920 dBm			
2	N		f	2.483 5 GHz	-57.131 dBm			
3	N		f	2.500 0 GHz	-57.696 dBm			
4	N		f	2.497 7 GHz	-56.178 dBm			
5								
6								
7								
8								
9								
10								
11								

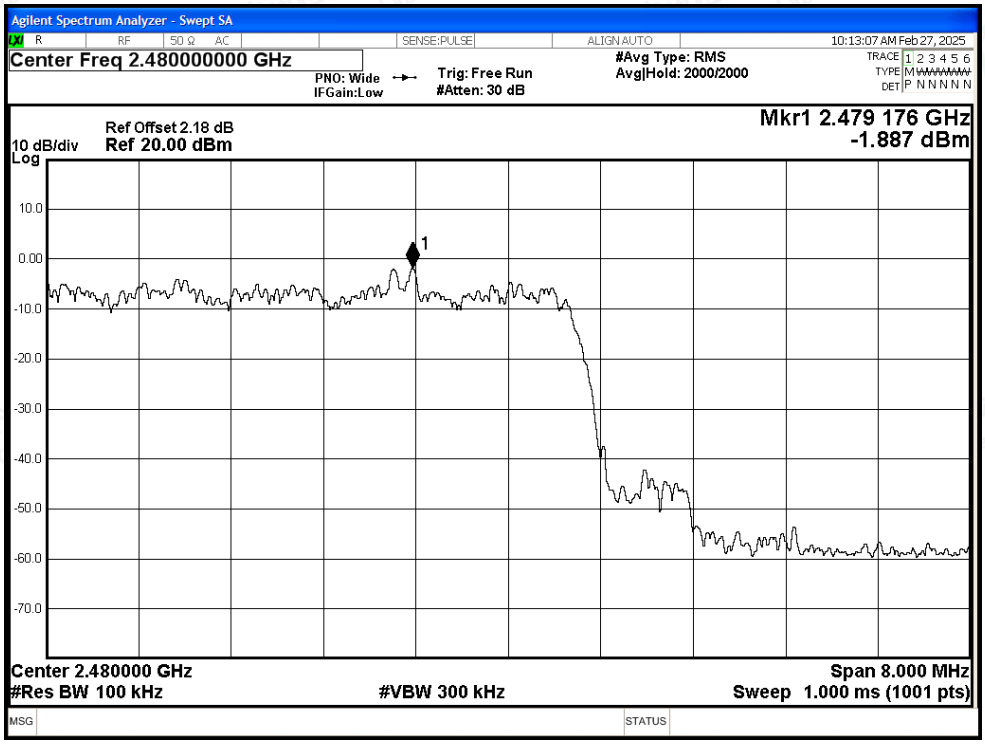
Band Edge(Hopping) NVNT 2-DH5 2402MHz Ant1 Hopping Ref



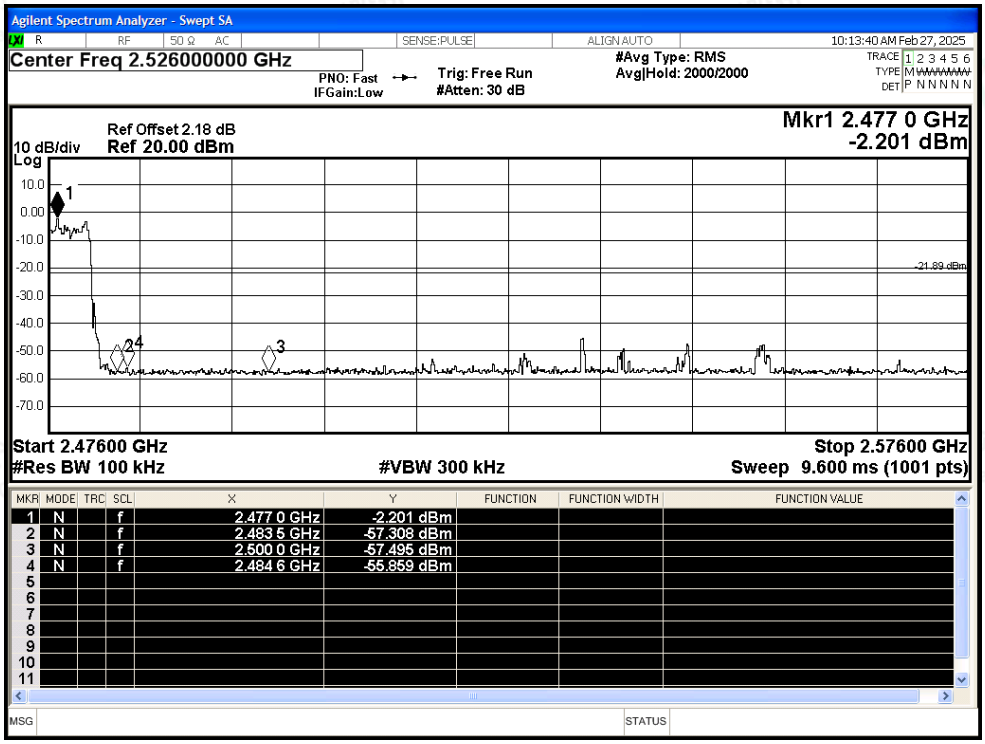
Band Edge(Hopping) NVNT 2-DH5 2402MHz Ant1 Hopping Emission



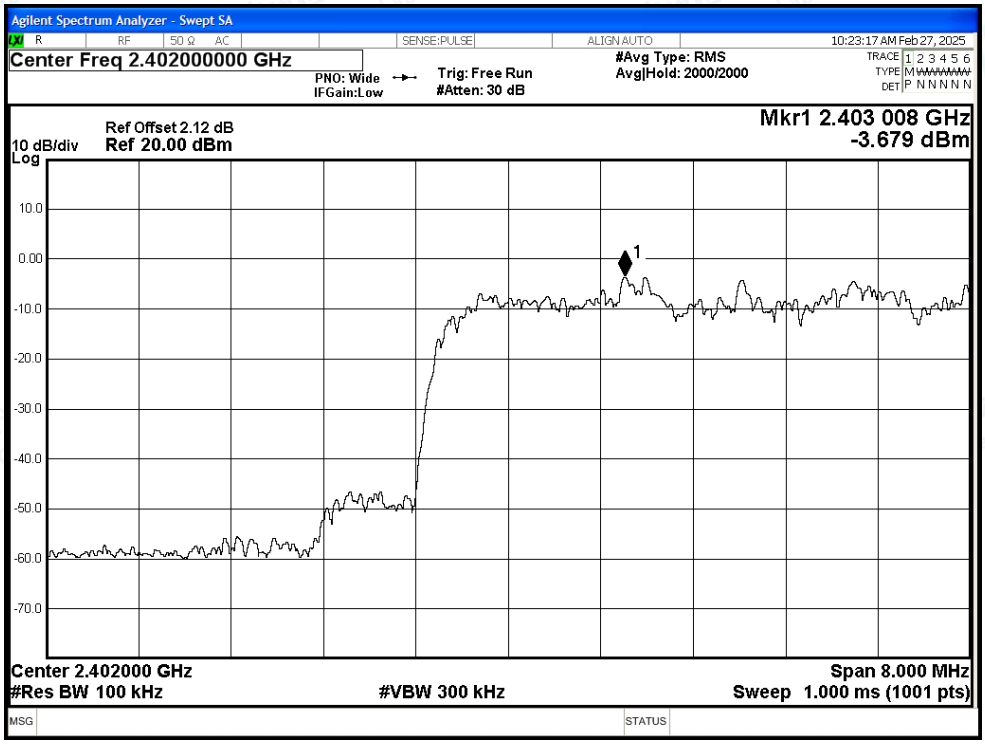
Band Edge(Hopping) NVNT 2-DH5 2480MHz Ant1 Hopping Ref



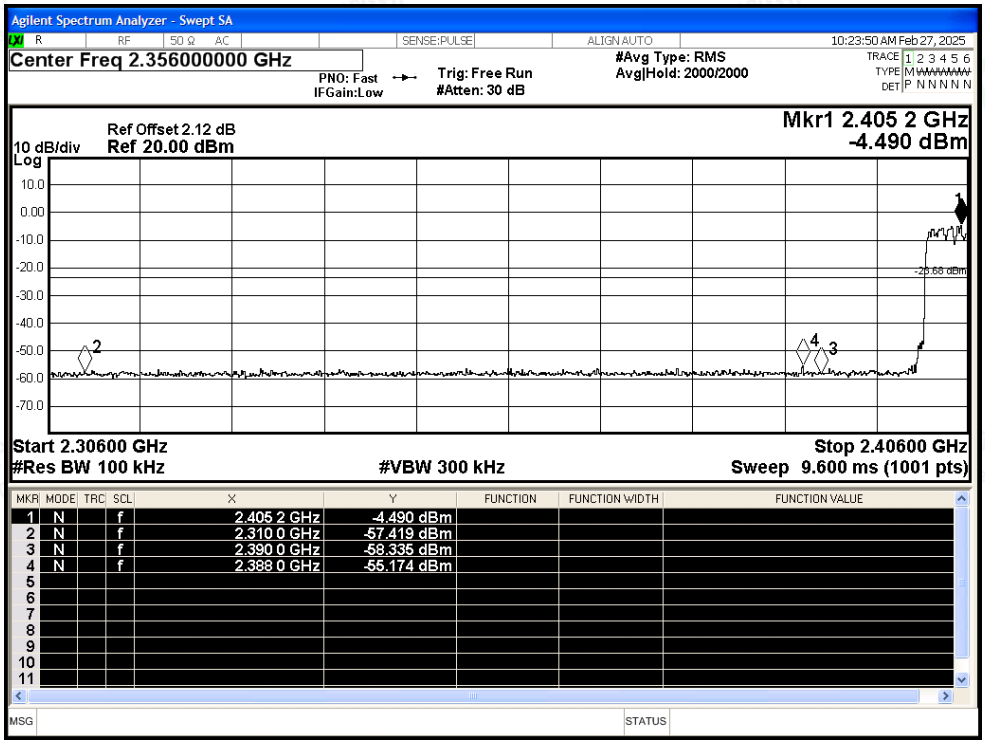
Band Edge(Hopping) NVNT 2-DH5 2480MHz Ant1 Hopping Emission



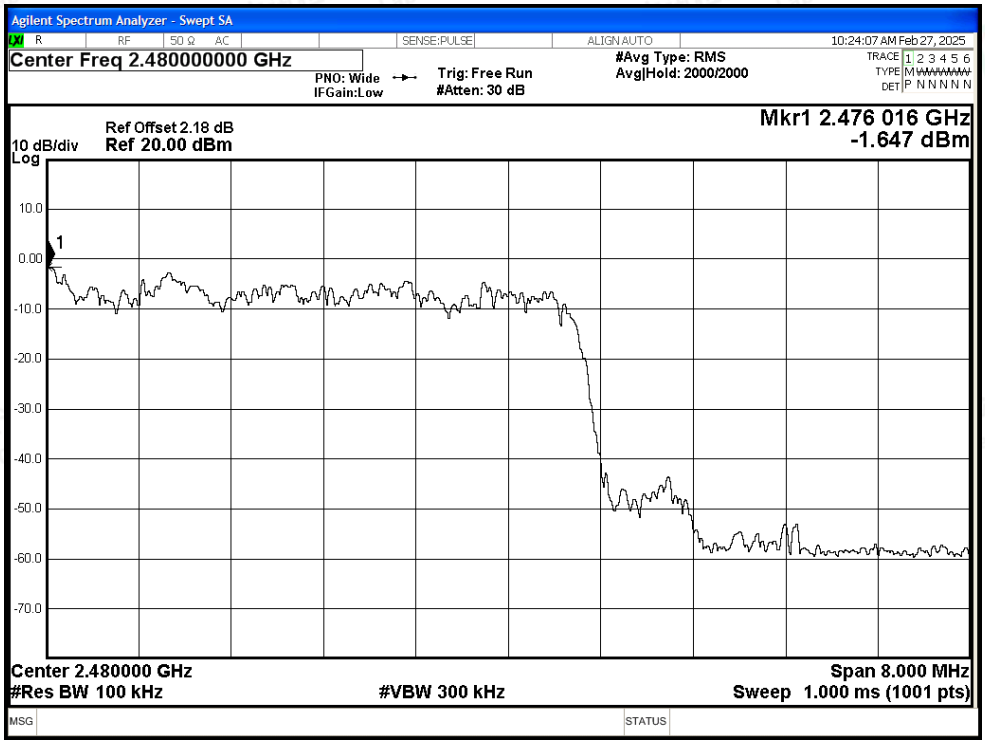
Band Edge(Hopping) NVNT 3-DH5 2402MHz Ant1 Hopping Ref



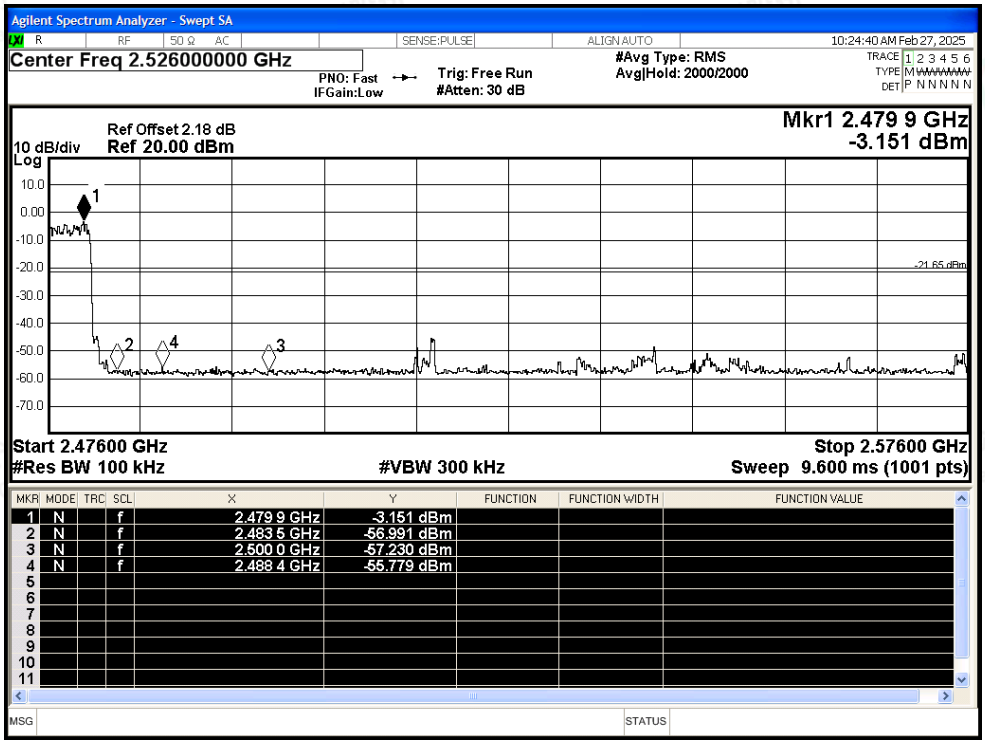
Band Edge(Hopping) NVNT 3-DH5 2402MHz Ant1 Hopping Emission



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



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

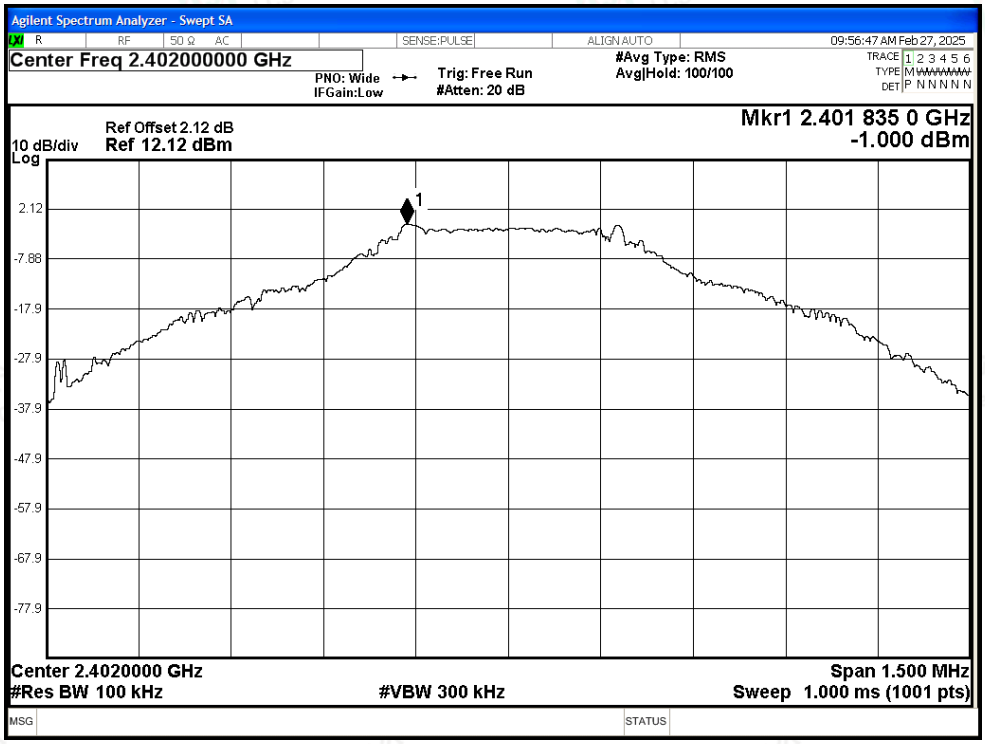


A.7 Conducted RF Spurious Emission

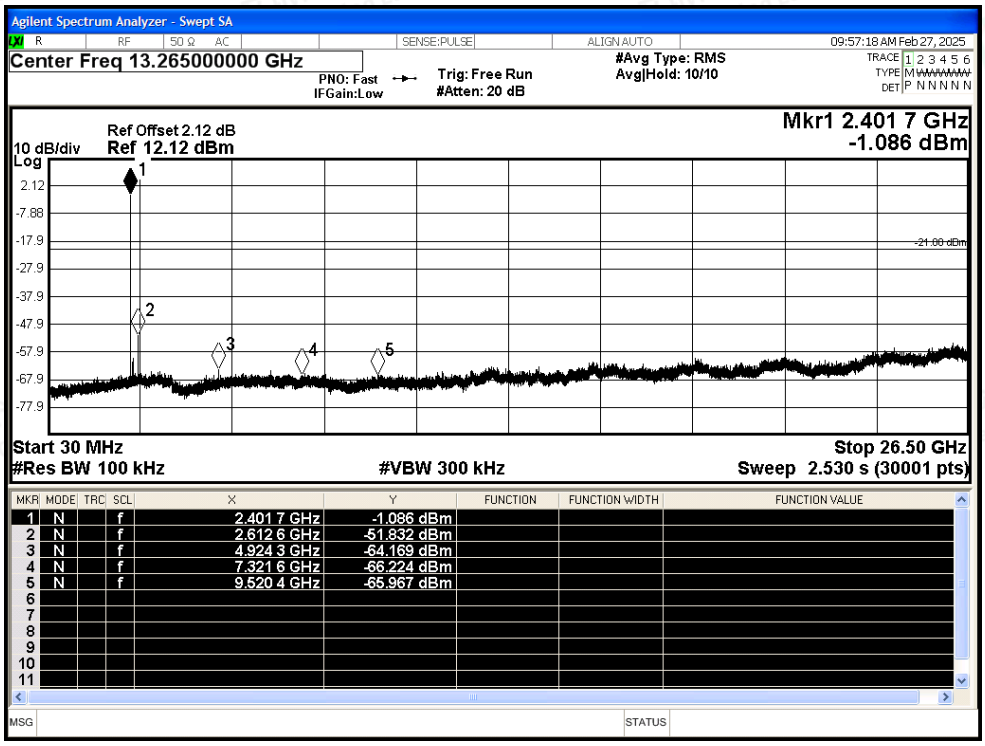
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	1-DH5	2402	Ant1	-50.83	-20	Pass
NVNT	1-DH5	2441	Ant1	-53	-20	Pass
NVNT	1-DH5	2480	Ant1	-53.81	-20	Pass
NVNT	2-DH5	2402	Ant1	-53.73	-20	Pass
NVNT	2-DH5	2441	Ant1	-53.9	-20	Pass
NVNT	2-DH5	2480	Ant1	-50.51	-20	Pass
NVNT	3-DH5	2402	Ant1	-54.67	-20	Pass
NVNT	3-DH5	2441	Ant1	-53.97	-20	Pass
NVNT	3-DH5	2480	Ant1	-50.9	-20	Pass

Test Graphs

Tx. Spurious NVNT 1-DH5 2402MHz Ant1 Ref

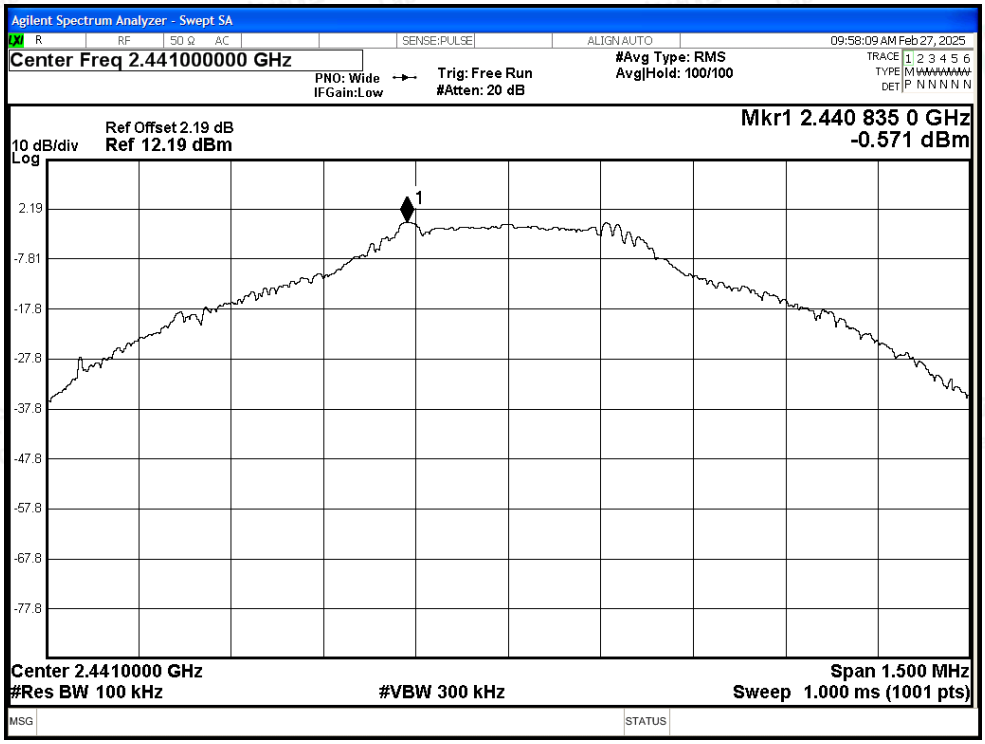


Tx. Spurious NVNT 1-DH5 2402MHz Ant1 Emission

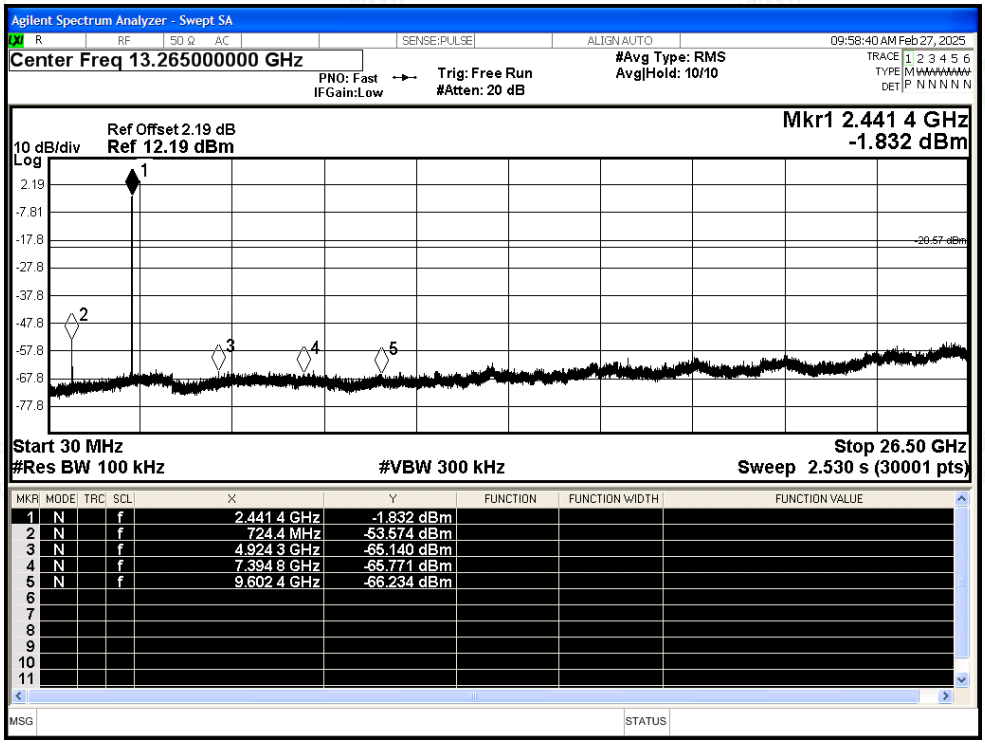


MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		f	2.401 7 GHz	-1.086 dBm			
2	N		f	2.612 6 GHz	-51.832 dBm			
3	N		f	4.924 3 GHz	-64.169 dBm			
4	N		f	7.321 6 GHz	-66.224 dBm			
5	N		f	9.520 4 GHz	-65.967 dBm			
6								
7								
8								
9								
10								
11								

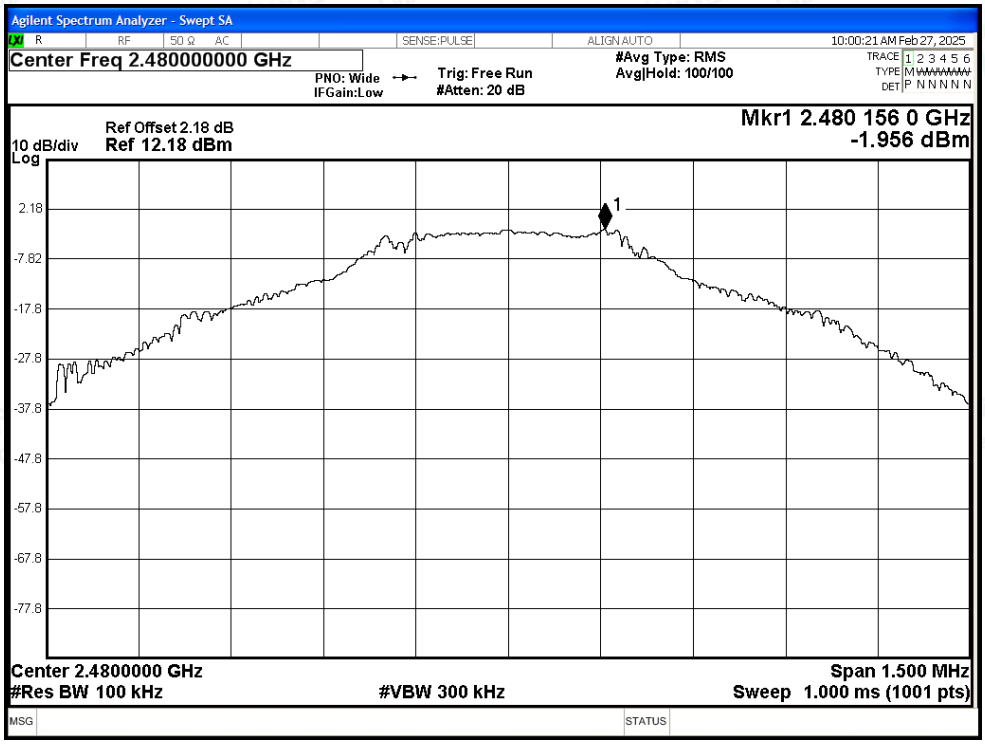
Tx. Spurious NVNT 1-DH5 2441MHz Ant1 Ref



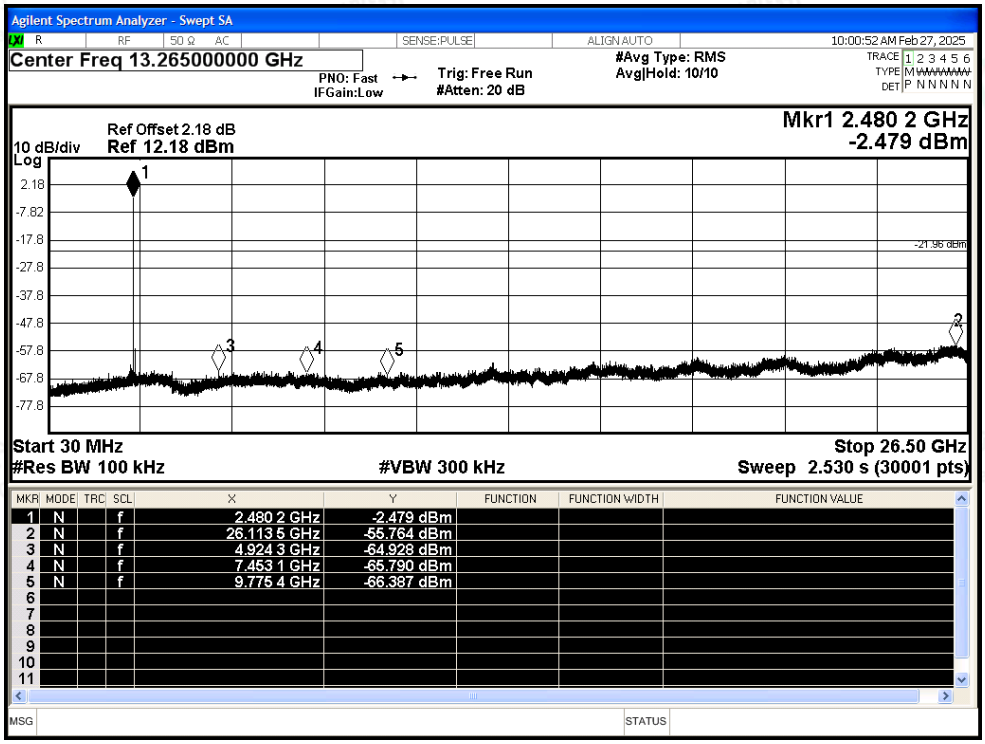
Tx. Spurious NVNT 1-DH5 2441MHz Ant1 Emission



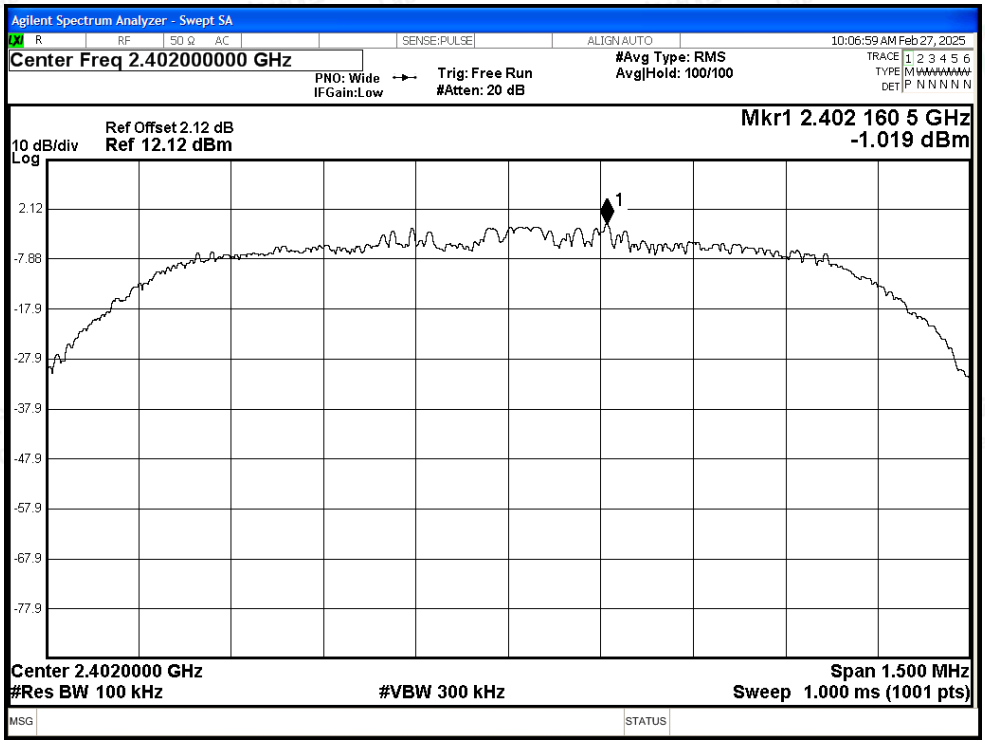
Tx. Spurious NVNT 1-DH5 2480MHz Ant1 Ref



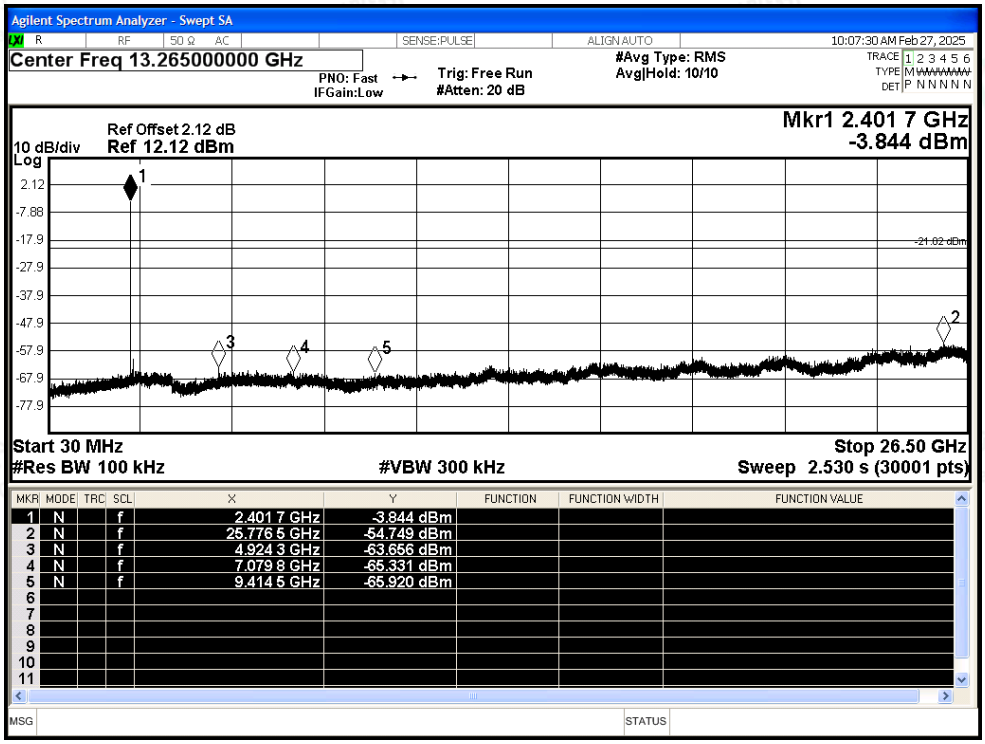
Tx. Spurious NVNT 1-DH5 2480MHz Ant1 Emission



Tx. Spurious NVNT 2-DH5 2402MHz Ant1 Ref

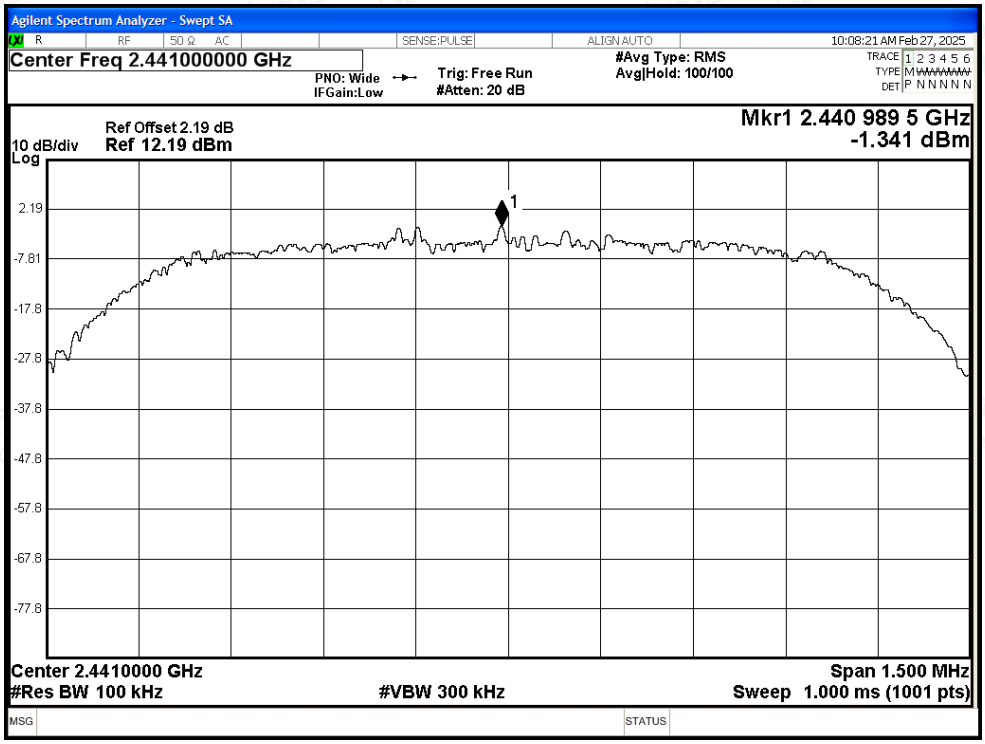


Tx. Spurious NVNT 2-DH5 2402MHz Ant1 Emission

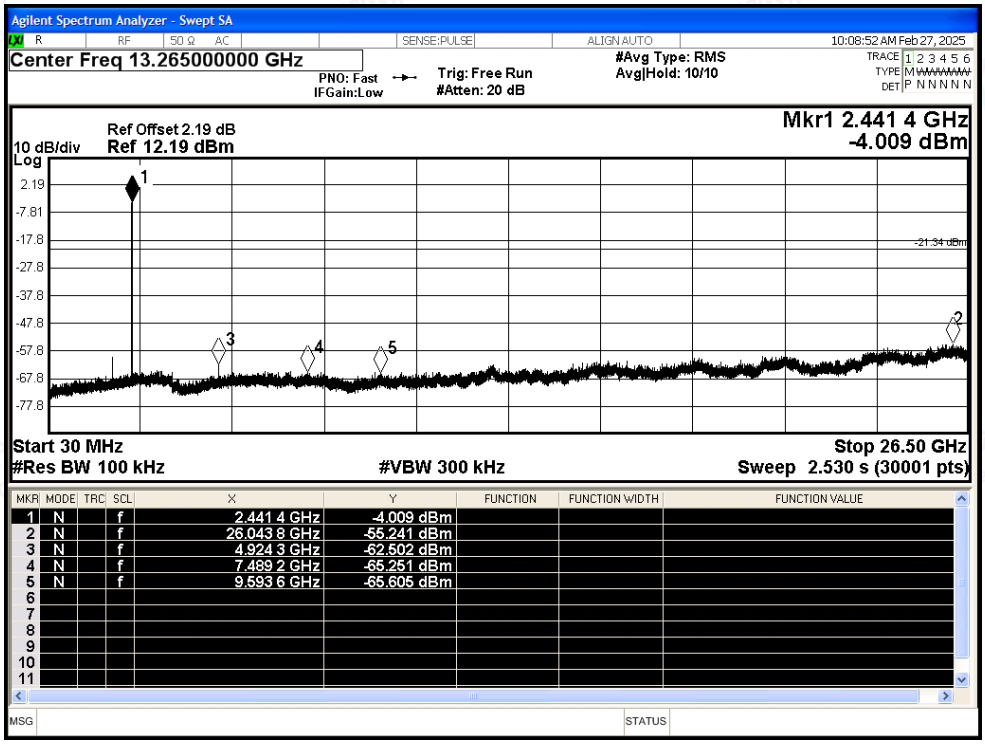


MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		f	2.401 7 GHz	-3.844 dBm			
2	N		f	25.776 5 GHz	-54.749 dBm			
3	N		f	4.924 3 GHz	-63.656 dBm			
4	N		f	7.079 8 GHz	-65.331 dBm			
5	N		f	9.414 5 GHz	-65.920 dBm			
6								
7								
8								
9								
10								
11								

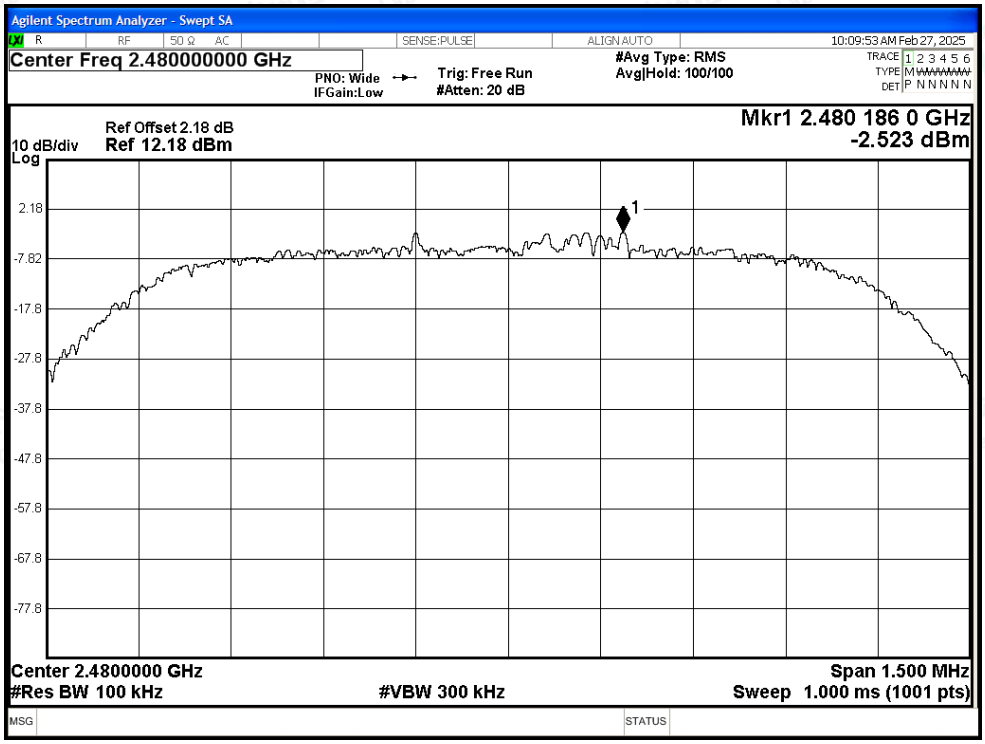
Tx. Spurious NVNT 2-DH5 2441MHz Ant1 Ref



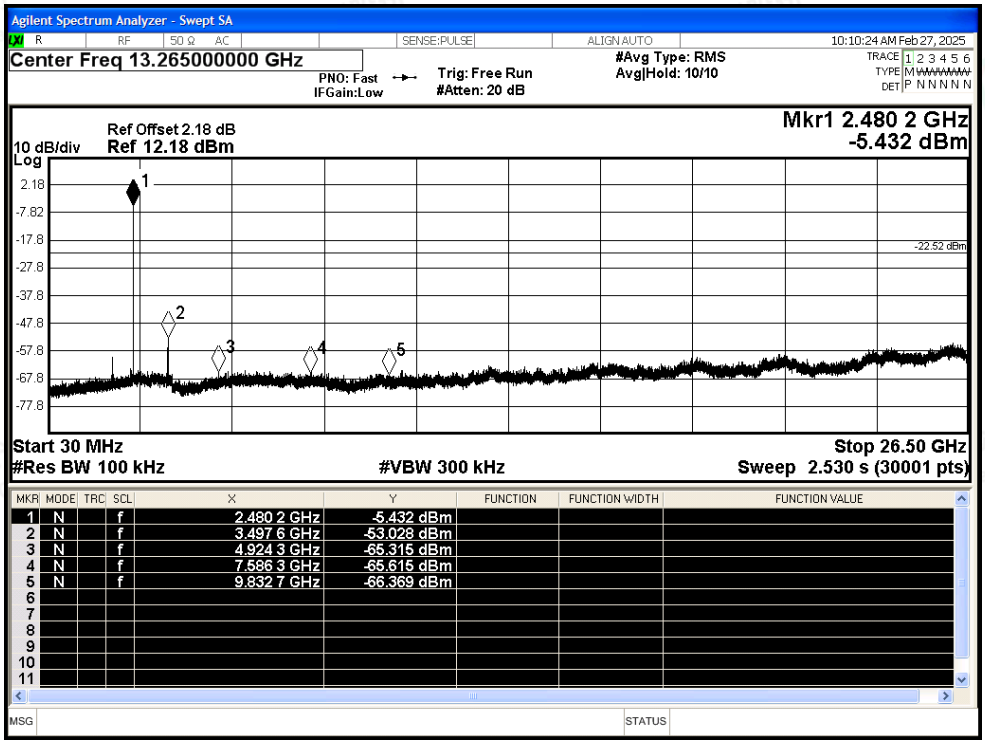
Tx. Spurious NVNT 2-DH5 2441MHz Ant1 Emission



Tx. Spurious NVNT 2-DH5 2480MHz Ant1 Ref

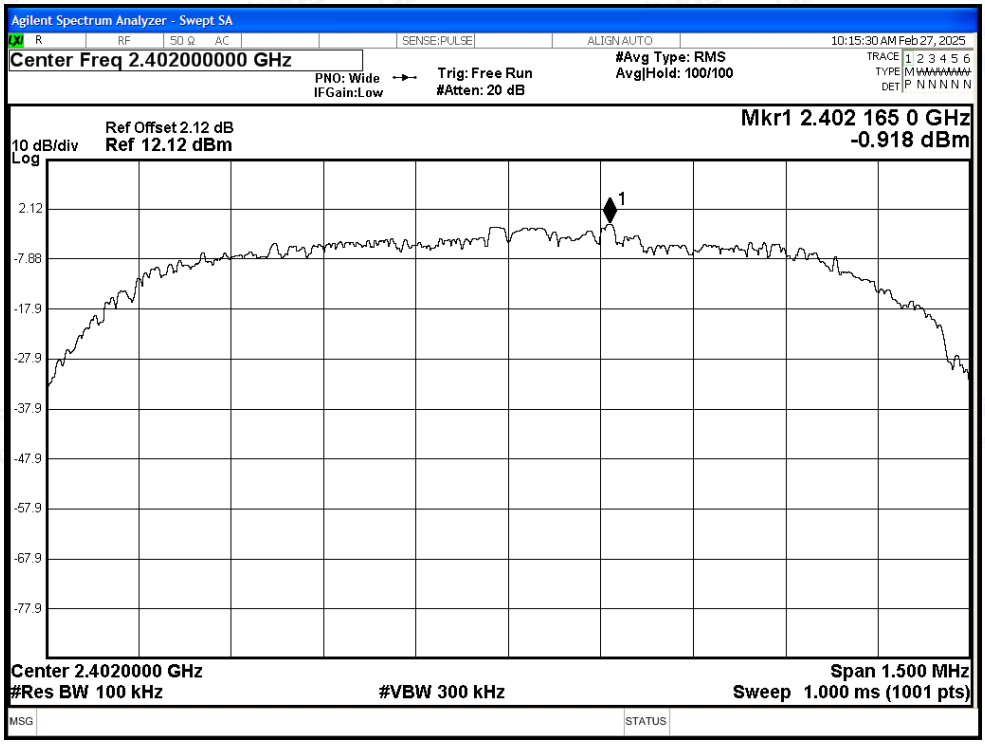


Tx. Spurious NVNT 2-DH5 2480MHz Ant1 Emission

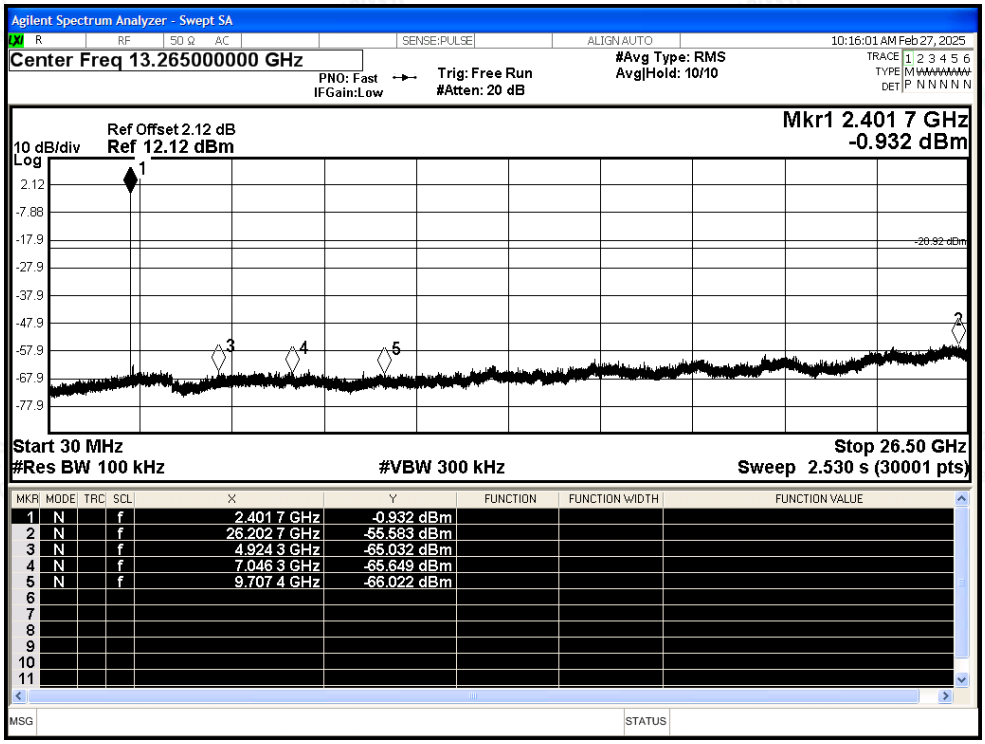


MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		f	2.480 2 GHz	-5.432 dBm			
2	N		f	3.497 6 GHz	-53.028 dBm			
3	N		f	4.924 3 GHz	-65.315 dBm			
4	N		f	7.586 3 GHz	-65.615 dBm			
5	N		f	9.832 7 GHz	-66.369 dBm			
6								
7								
8								
9								
10								
11								

Tx. Spurious NVNT 3-DH5 2402MHz Ant1 Ref

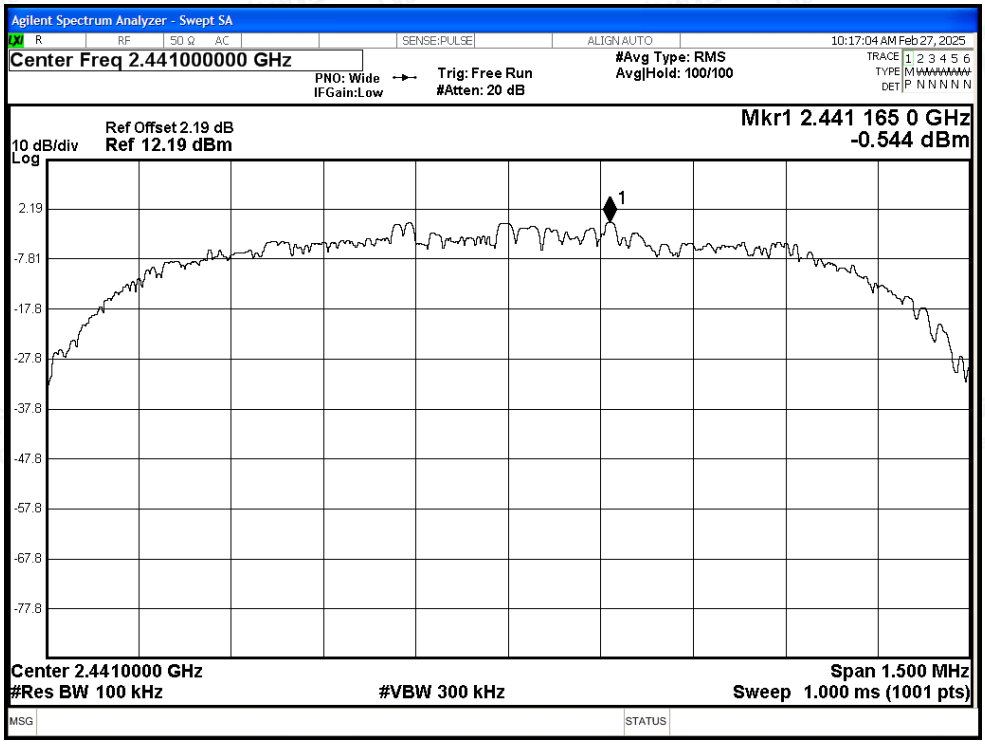


Tx. Spurious NVNT 3-DH5 2402MHz Ant1 Emission

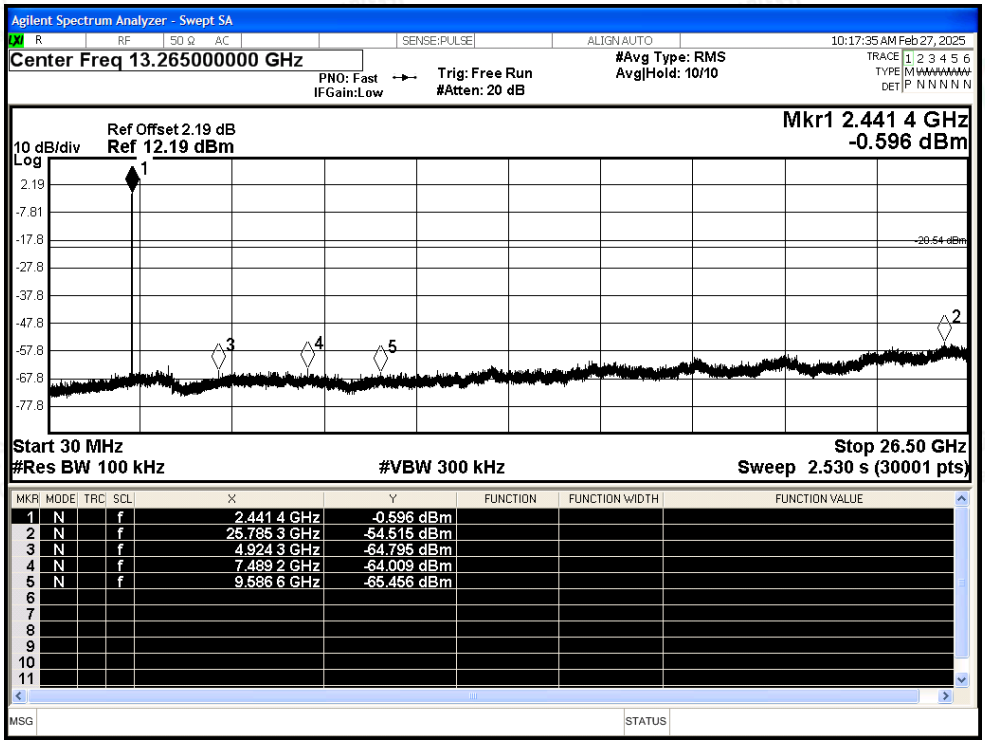


MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		f	2.401 7 GHz	-0.932 dBm			
2	N		f	26.202 7 GHz	-55.583 dBm			
3	N		f	4.924 3 GHz	-65.032 dBm			
4	N		f	7.046 3 GHz	-65.649 dBm			
5	N		f	9.707 4 GHz	-66.022 dBm			
6								
7								
8								
9								
10								
11								

Tx. Spurious NVNT 3-DH5 2441MHz Ant1 Ref

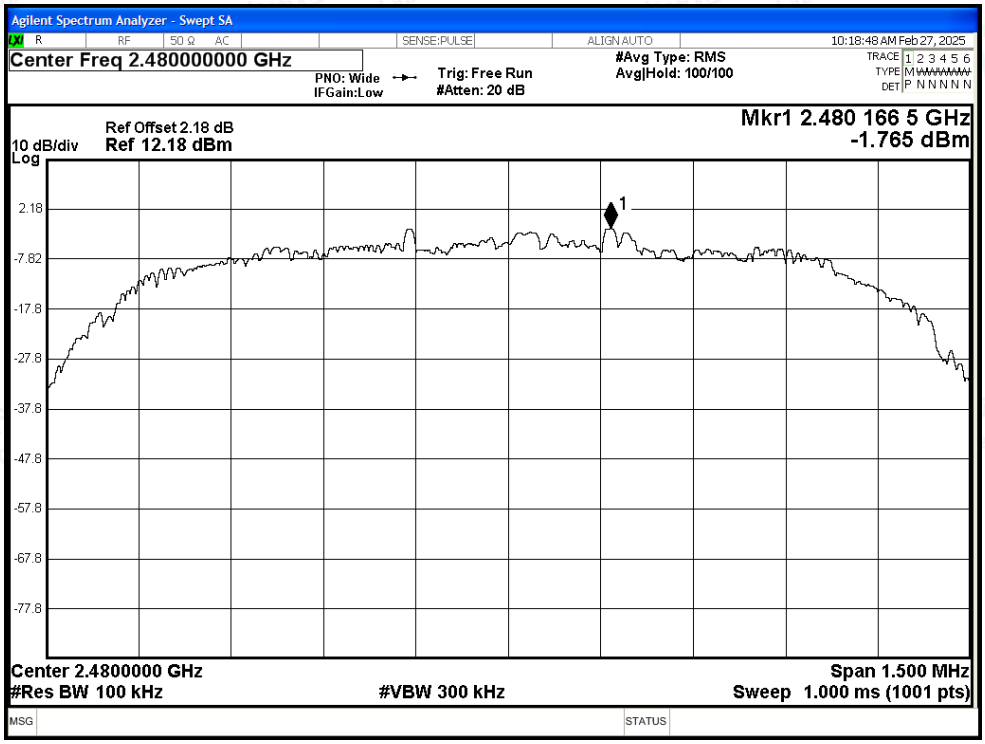


Tx. Spurious NVNT 3-DH5 2441MHz Ant1 Emission

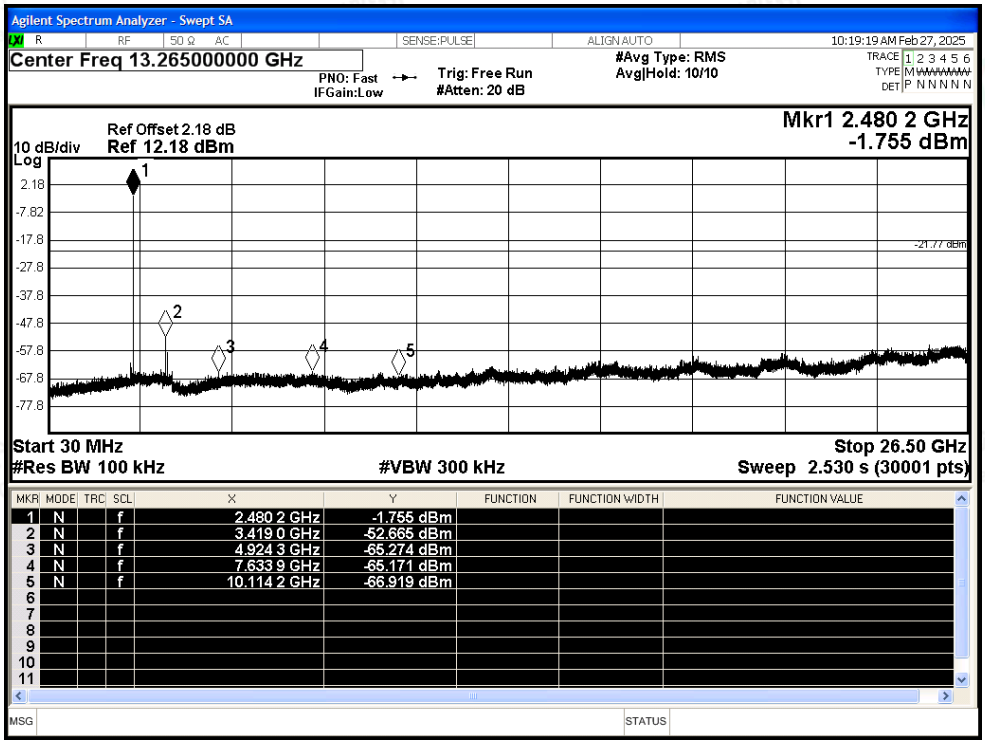


MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		f	2.441 4 GHz	-0.596 dBm			
2	N		f	25.785 3 GHz	-54.515 dBm			
3	N		f	4.924 3 GHz	-64.795 dBm			
4	N		f	7.489 2 GHz	-64.009 dBm			
5	N		f	9.586 6 GHz	-65.456 dBm			
6								
7								
8								
9								
10								
11								

Tx. Spurious NVNT 3-DH5 2480MHz Ant1 Ref



Tx. Spurious NVNT 3-DH5 2480MHz Ant1 Emission

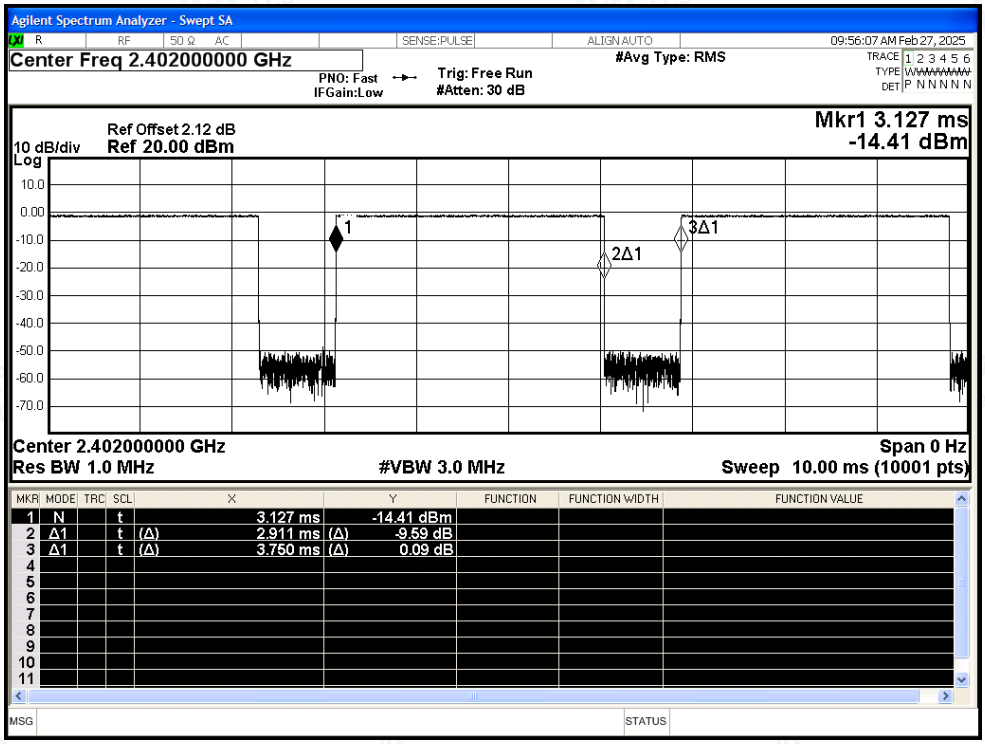


A.8 Duty Cycle

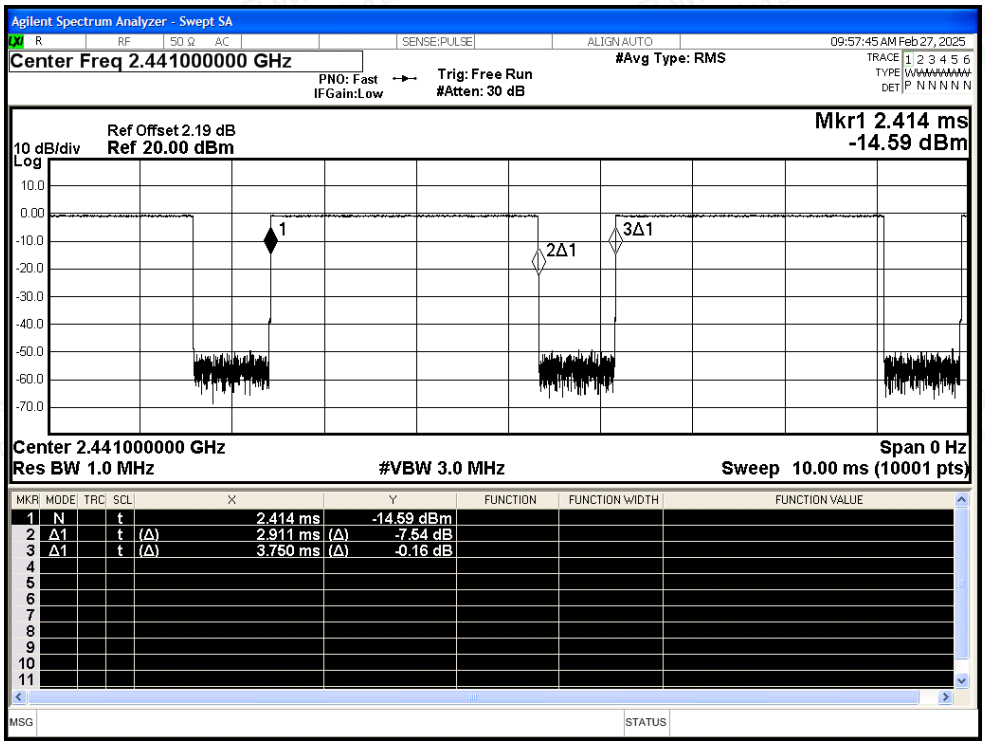
Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	1-DH5	2402	Ant1	77.63	1.1	0.34
NVNT	1-DH5	2441	Ant1	77.63	1.1	0.34
NVNT	1-DH5	2480	Ant1	77.63	1.1	0.34
NVNT	2-DH5	2402	Ant1	77.29	1.12	0.34
NVNT	2-DH5	2441	Ant1	77.33	1.12	0.34
NVNT	2-DH5	2480	Ant1	77.28	1.12	0.35
NVNT	3-DH5	2402	Ant1	77.28	1.12	0.35
NVNT	3-DH5	2441	Ant1	77.33	1.12	0.34
NVNT	3-DH5	2480	Ant1	77.23	1.12	0.35

Test Graphs

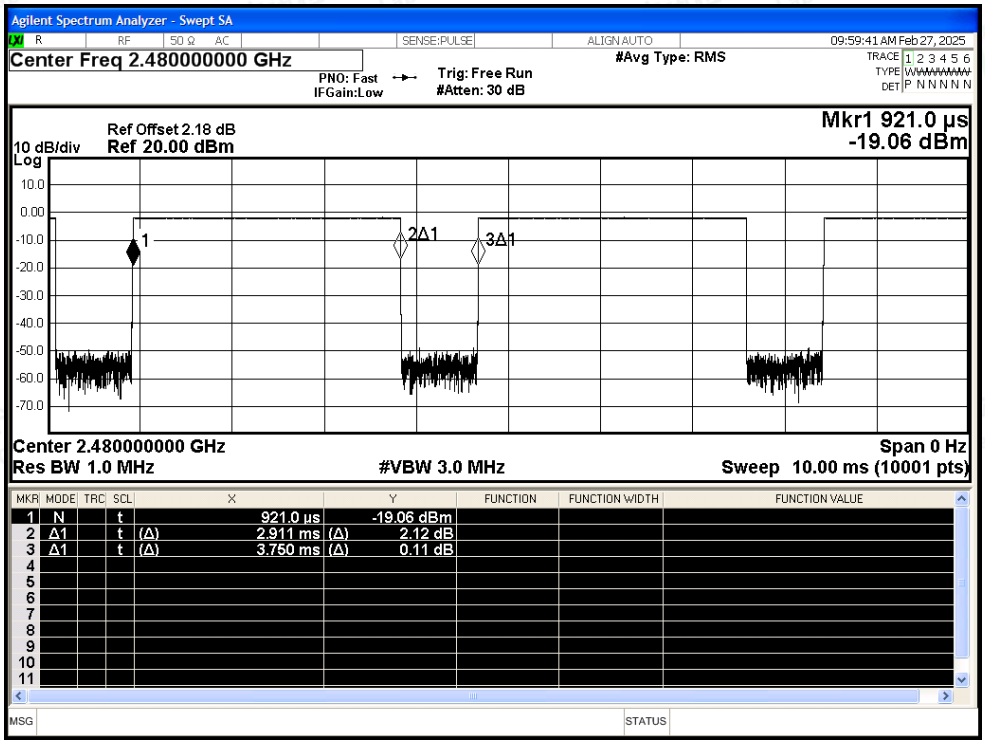
Duty Cycle NVNT 1-DH5 2402MHz Ant1



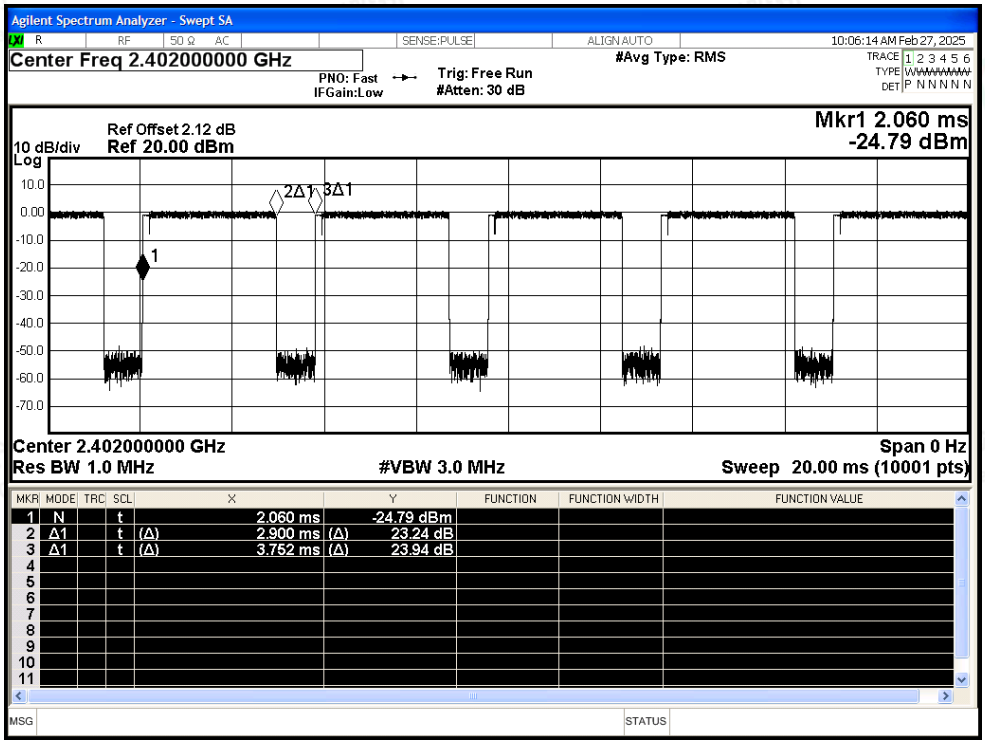
Duty Cycle NVNT 1-DH5 2441MHz Ant1



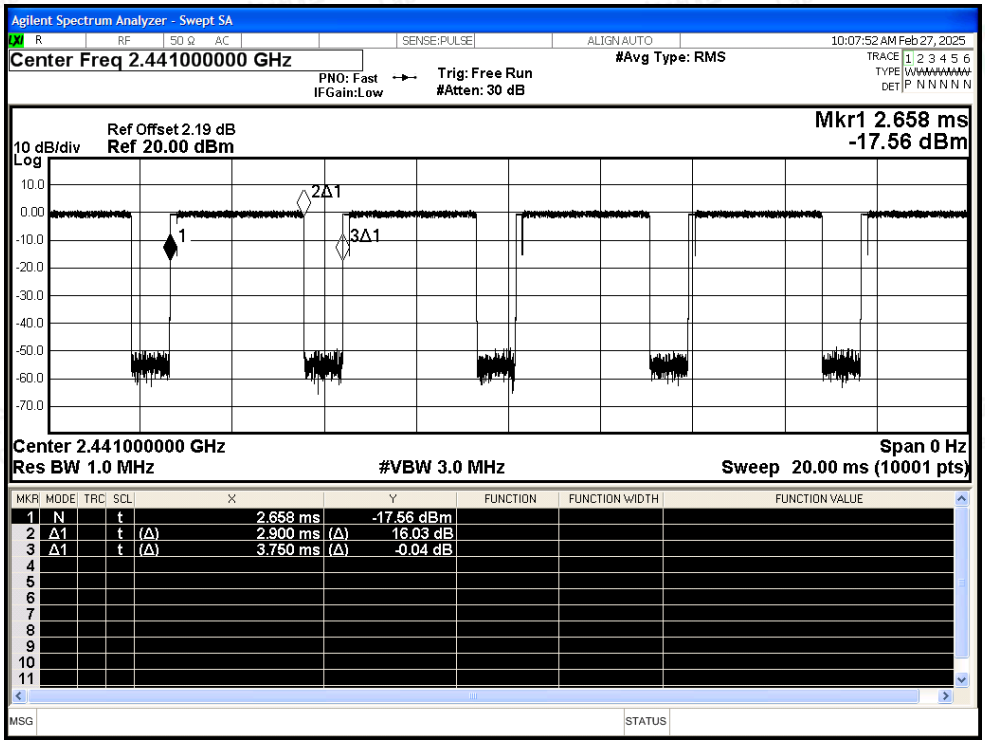
Duty Cycle NVNT 1-DH5 2480MHz Ant1



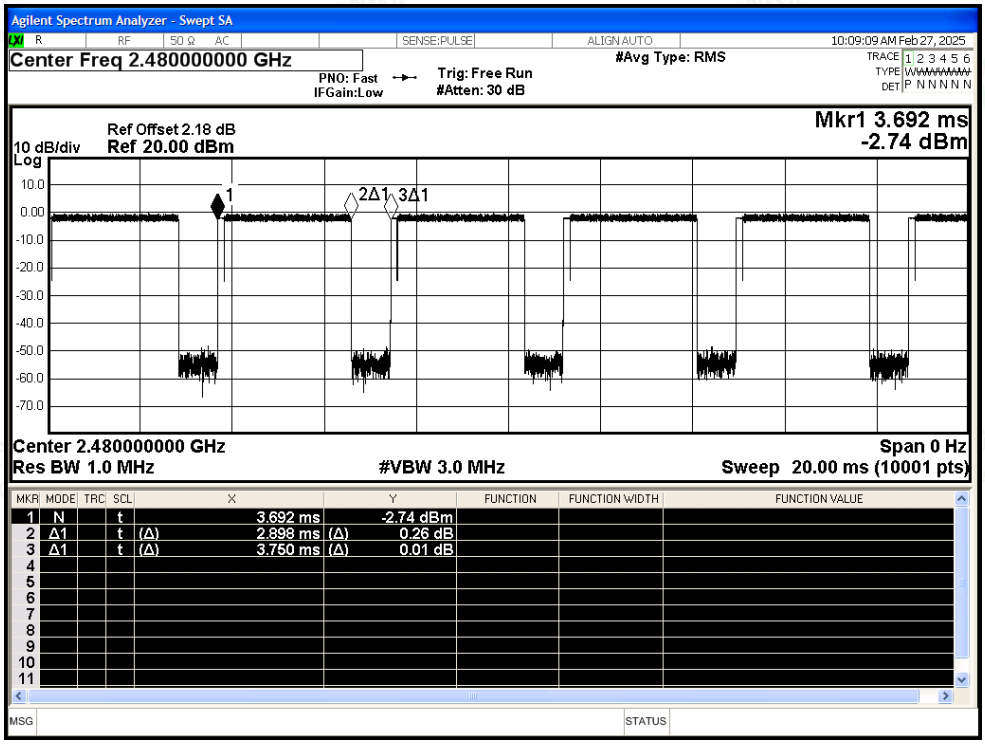
Duty Cycle NVNT 2-DH5 2402MHz Ant1



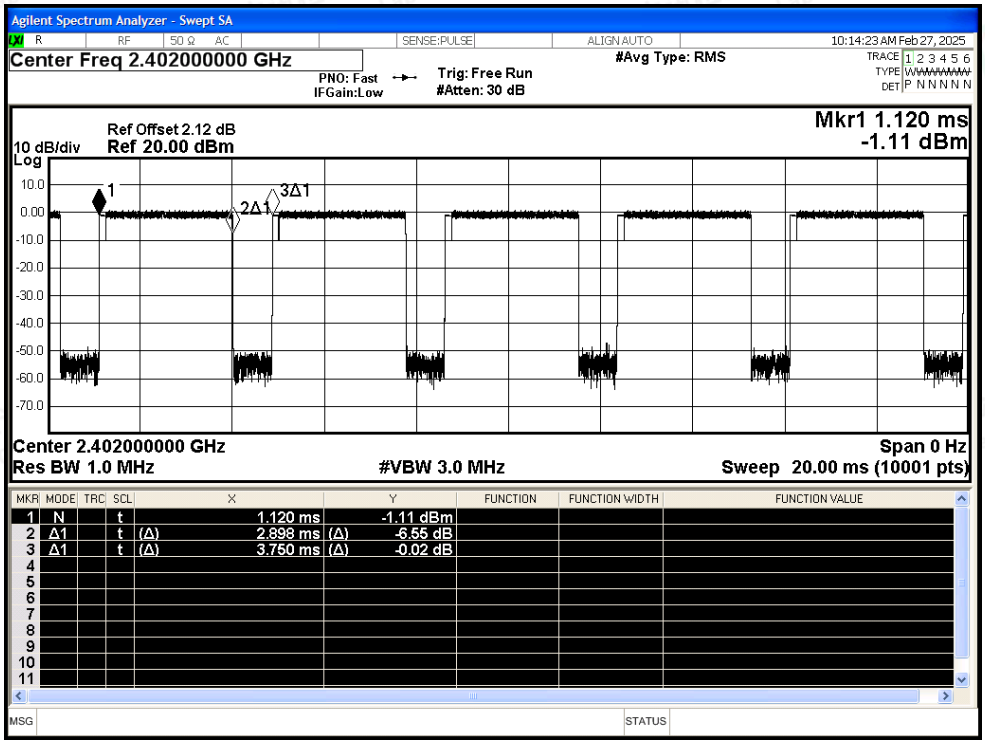
Duty Cycle NVNT 2-DH5 2441MHz Ant1



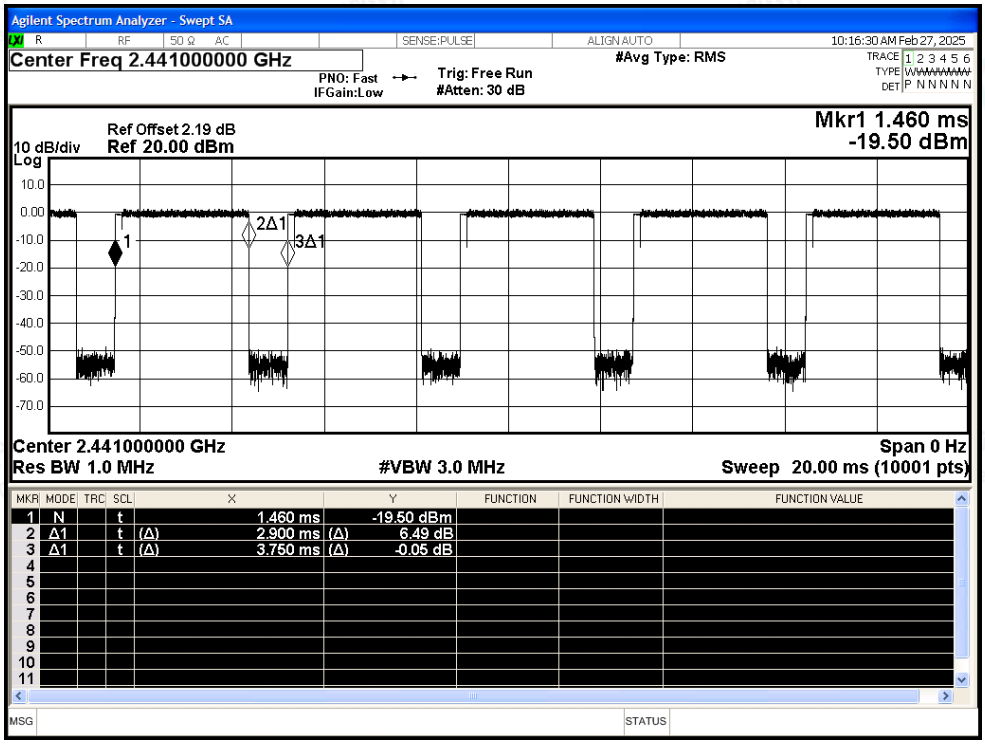
Duty Cycle NVNT 2-DH5 2480MHz Ant1



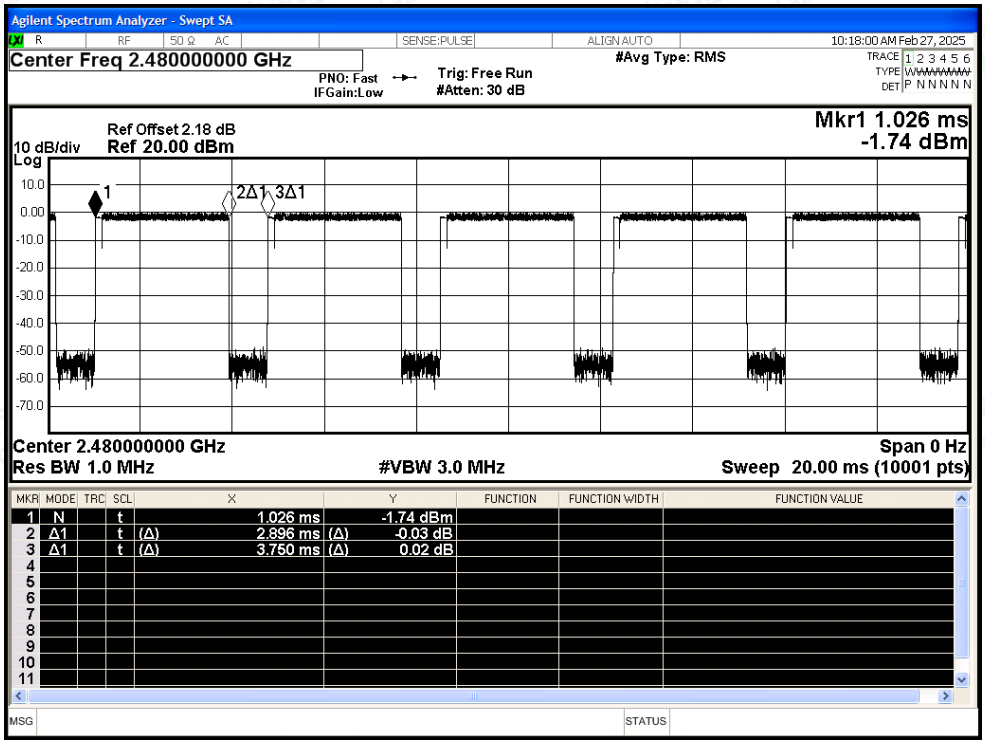
Duty Cycle NVNT 3-DH5 2402MHz Ant1



Duty Cycle NVNT 3-DH5 2441MHz Ant1



Duty Cycle NVNT 3-DH5 2480MHz Ant1

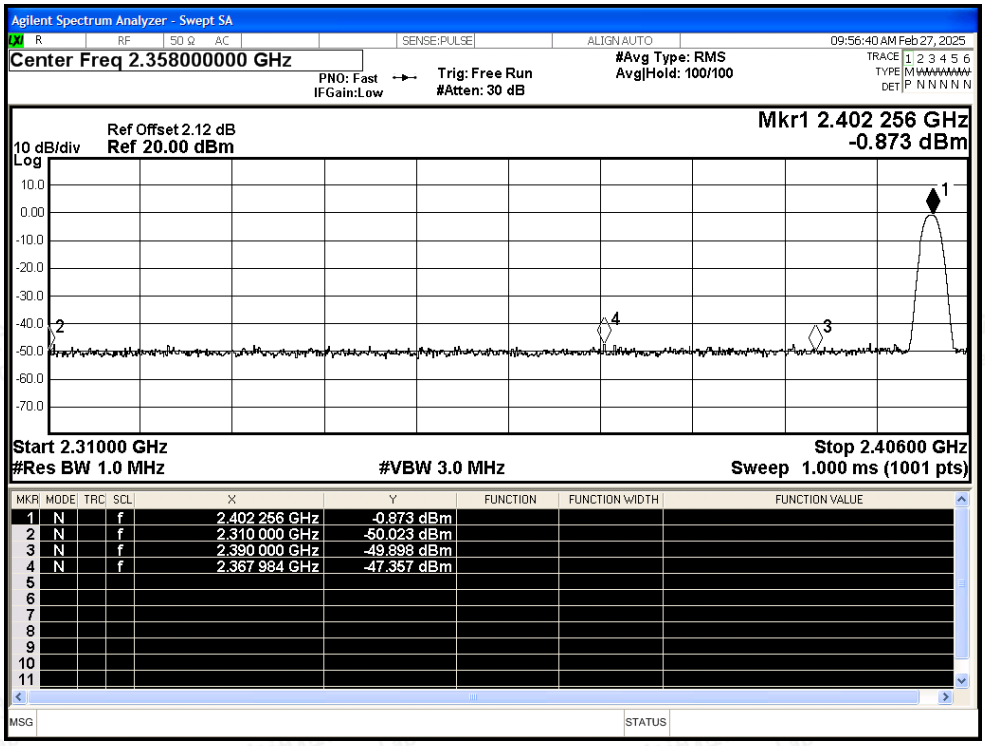


A.9 Restrict Band

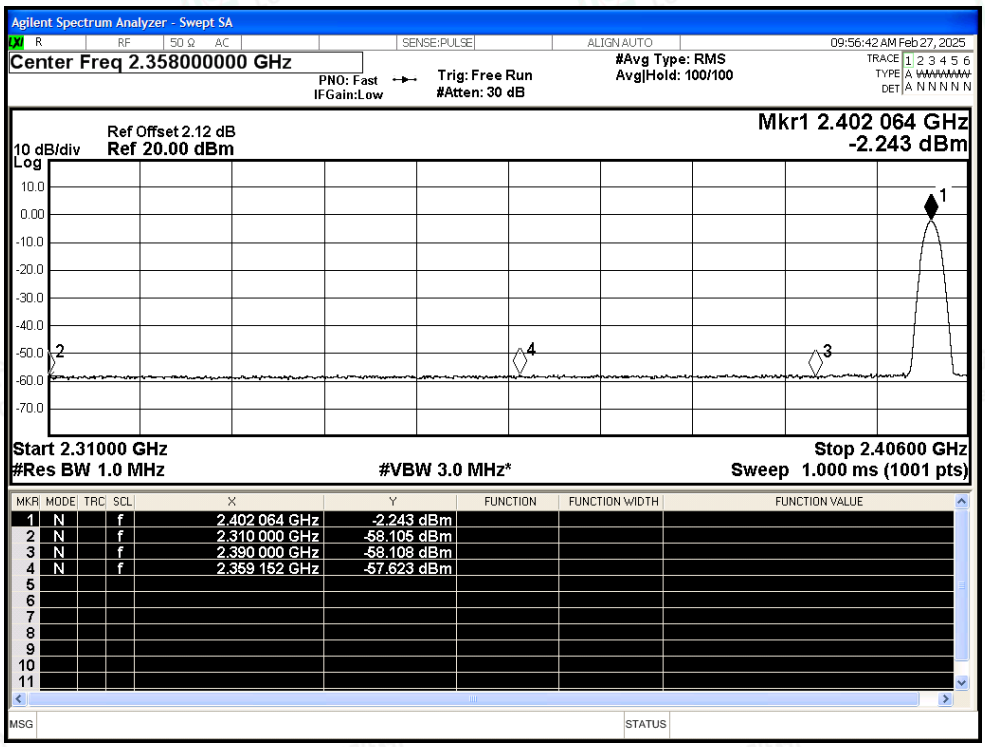
Condition	Mode	Frequency (MHz)	Antenna	Hopping Mode	Spur Freq (MHz)	Power (dBm)	Gain (dBi)	Duty Factor (dB)	E (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
NVNT	1-DH5	2402	Ant1	No-Hopping	2310	-50.02	2.0	-	47.24	Peak	74	Pass
NVNT	1-DH5	2402	Ant1	No-Hopping	2310	-58.11	2.0	1.1	40.25	Average	54	Pass
NVNT	1-DH5	2402	Ant1	No-Hopping	2367.984	-47.36	2.0	-	49.9	Peak	74	Pass
NVNT	1-DH5	2402	Ant1	No-Hopping	2359.152	-57.62	2.0	1.1	40.74	Average	54	Pass
NVNT	1-DH5	2402	Ant1	No-Hopping	2390	-49.9	2.0	-	47.36	Peak	74	Pass
NVNT	1-DH5	2402	Ant1	No-Hopping	2390	-58.11	2.0	1.1	40.25	Average	54	Pass
NVNT	1-DH5	2480	Ant1	No-Hopping	2483.5	-50.25	2.0	-	47.01	Peak	74	Pass
NVNT	1-DH5	2480	Ant1	No-Hopping	2483.5	-57.98	2.0	1.1	40.38	Average	54	Pass
NVNT	1-DH5	2480	Ant1	No-Hopping	2491.072	-46.84	2.0	-	50.42	Peak	74	Pass
NVNT	1-DH5	2480	Ant1	No-Hopping	2483.944	-56.95	2.0	1.1	41.41	Average	54	Pass
NVNT	1-DH5	2480	Ant1	No-Hopping	2500	-50.52	2.0	-	46.74	Peak	74	Pass
NVNT	1-DH5	2480	Ant1	No-Hopping	2500	-57.5	2.0	1.1	40.86	Average	54	Pass
NVNT	2-DH5	2402	Ant1	No-Hopping	2310	-50.96	2.0	-	46.3	Peak	74	Pass
NVNT	2-DH5	2402	Ant1	No-Hopping	2310	-58.84	2.0	1.12	39.54	Average	54	Pass
NVNT	2-DH5	2402	Ant1	No-Hopping	2348.592	-47.27	2.0	-	49.99	Peak	74	Pass
NVNT	2-DH5	2402	Ant1	No-Hopping	2377.872	-57.45	2.0	1.12	40.93	Average	54	Pass
NVNT	2-DH5	2402	Ant1	No-Hopping	2390	-49.77	2.0	-	47.49	Peak	74	Pass
NVNT	2-DH5	2402	Ant1	No-Hopping	2390	-58.3	2.0	1.12	40.08	Average	54	Pass
NVNT	2-DH5	2480	Ant1	No-Hopping	2483.5	-49.19	2.0	-	48.07	Peak	74	Pass
NVNT	2-DH5	2480	Ant1	No-Hopping	2483.5	-57.17	2.0	1.12	41.21	Average	54	Pass
NVNT	2-DH5	2480	Ant1	No-Hopping	2489.608	-46.86	2.0	-	50.4	Peak	74	Pass
NVNT	2-DH5	2480	Ant1	No-Hopping	2483.632	-56.82	2.0	1.12	41.56	Average	54	Pass
NVNT	2-DH5	2480	Ant1	No-Hopping	2500	-47.65	2.0	-	49.61	Peak	74	Pass
NVNT	2-DH5	2480	Ant1	No-Hopping	2500	-58.4	2.0	1.12	39.98	Average	54	Pass
NVNT	3-DH5	2402	Ant1	No-Hopping	2310	-50.3	2.0	-	46.96	Peak	74	Pass
NVNT	3-DH5	2402	Ant1	No-Hopping	2310	-58.14	2.0	1.12	40.24	Average	54	Pass
NVNT	3-DH5	2402	Ant1	No-Hopping	2381.904	-47.21	2.0	-	50.05	Peak	74	Pass
NVNT	3-DH5	2402	Ant1	No-Hopping	2379.024	-57.39	2.0	1.12	40.99	Average	54	Pass
NVNT	3-DH5	2402	Ant1	No-Hopping	2390	-49.67	2.0	-	47.59	Peak	74	Pass
NVNT	3-DH5	2402	Ant1	No-Hopping	2390	-58.64	2.0	1.12	39.74	Average	54	Pass
NVNT	3-DH5	2480	Ant1	No-Hopping	2483.5	-48.72	2.0	-	48.54	Peak	74	Pass
NVNT	3-DH5	2480	Ant1	No-Hopping	2483.5	-57.09	2.0	1.12	41.29	Average	54	Pass
NVNT	3-DH5	2480	Ant1	No-Hopping	2483.536	-46.49	2.0	-	50.77	Peak	74	Pass
NVNT	3-DH5	2480	Ant1	No-Hopping	2484.376	-56.98	2.0	1.12	41.4	Average	54	Pass
NVNT	3-DH5	2480	Ant1	No-Hopping	2500	-49.44	2.0	-	47.82	Peak	74	Pass
NVNT	3-DH5	2480	Ant1	No-Hopping	2500	-58.21	2.0	1.12	40.17	Average	54	Pass

Test Graphs

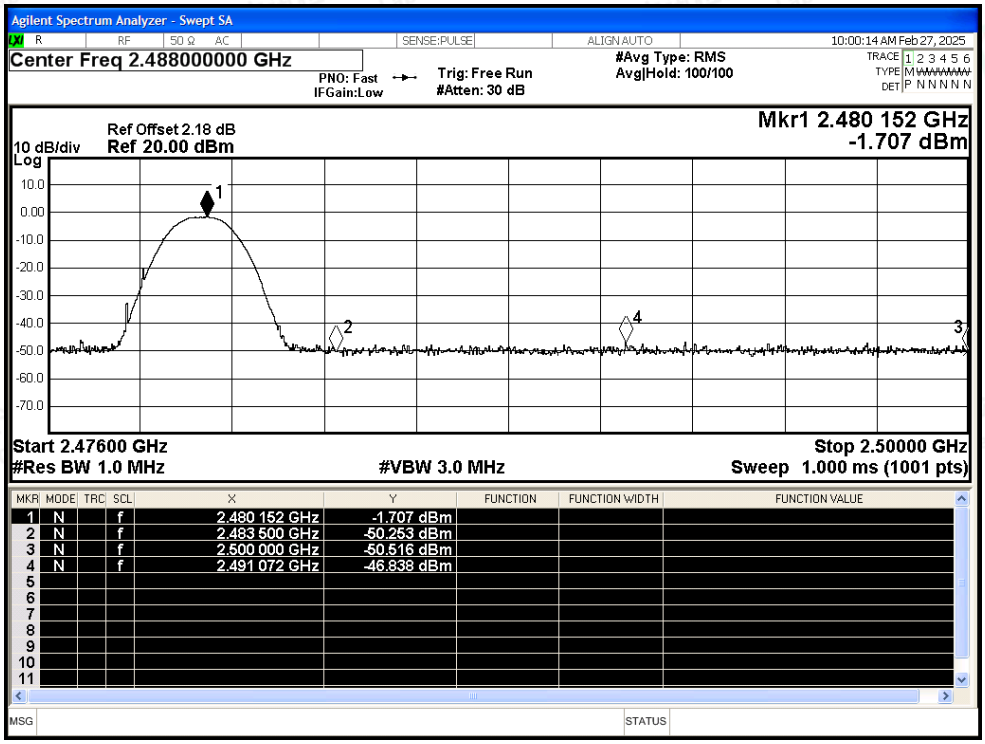
Restrict Band NVNT 1-DH5 2402MHz Ant1 No-Hopping Peak



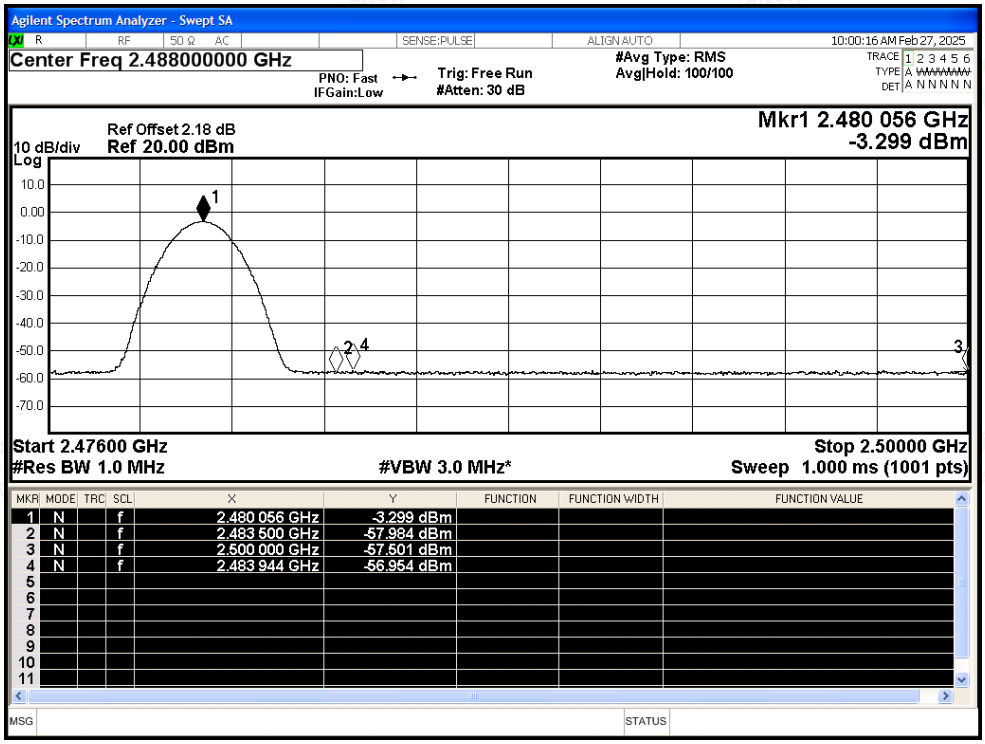
Restrict Band NVNT 1-DH5 2402MHz Ant1 No-Hopping Average



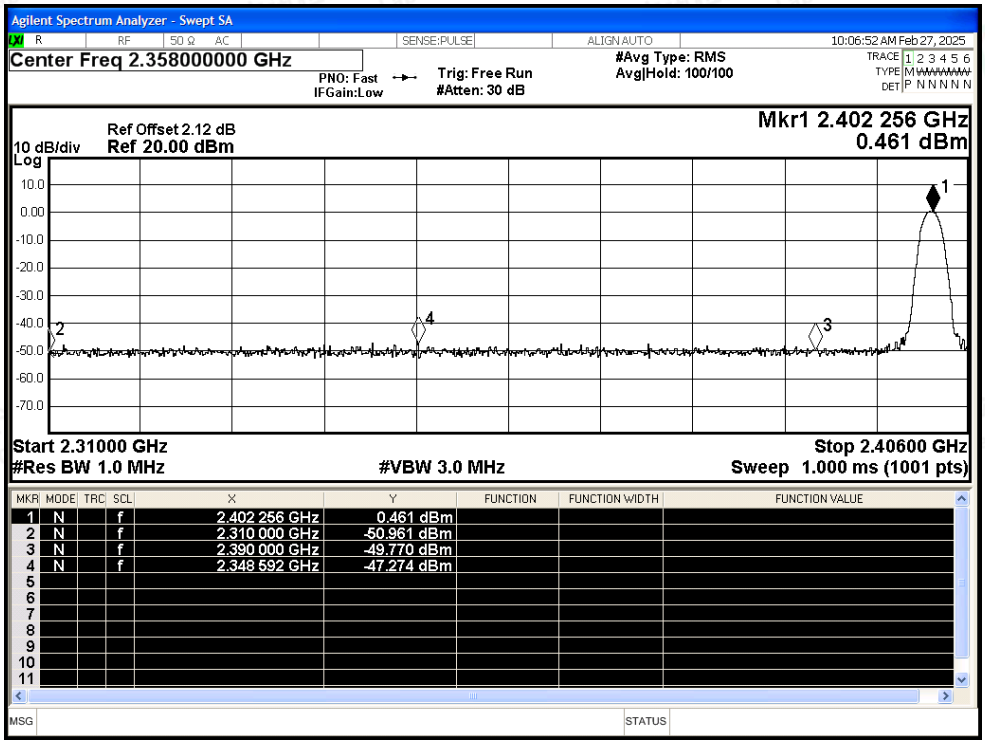
Restrict Band NVNT 1-DH5 2480MHz Ant1 No-Hopping Peak



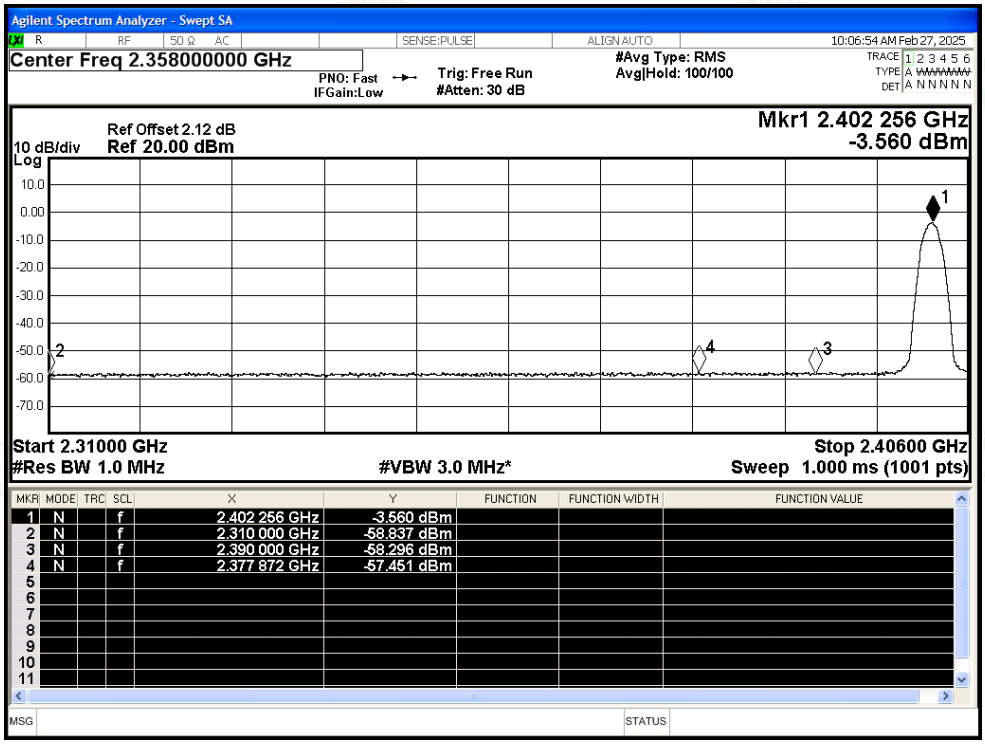
Restrict Band NVNT 1-DH5 2480MHz Ant1 No-Hopping Average



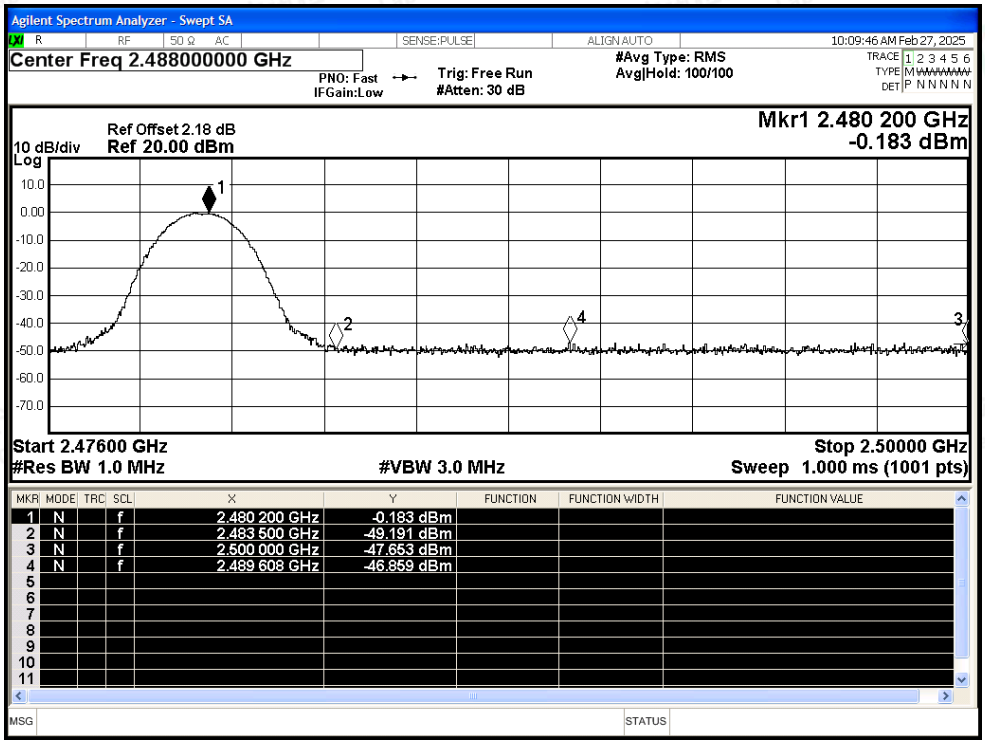
Restrict Band NVNT 2-DH5 2402MHz Ant1 No-Hopping Peak



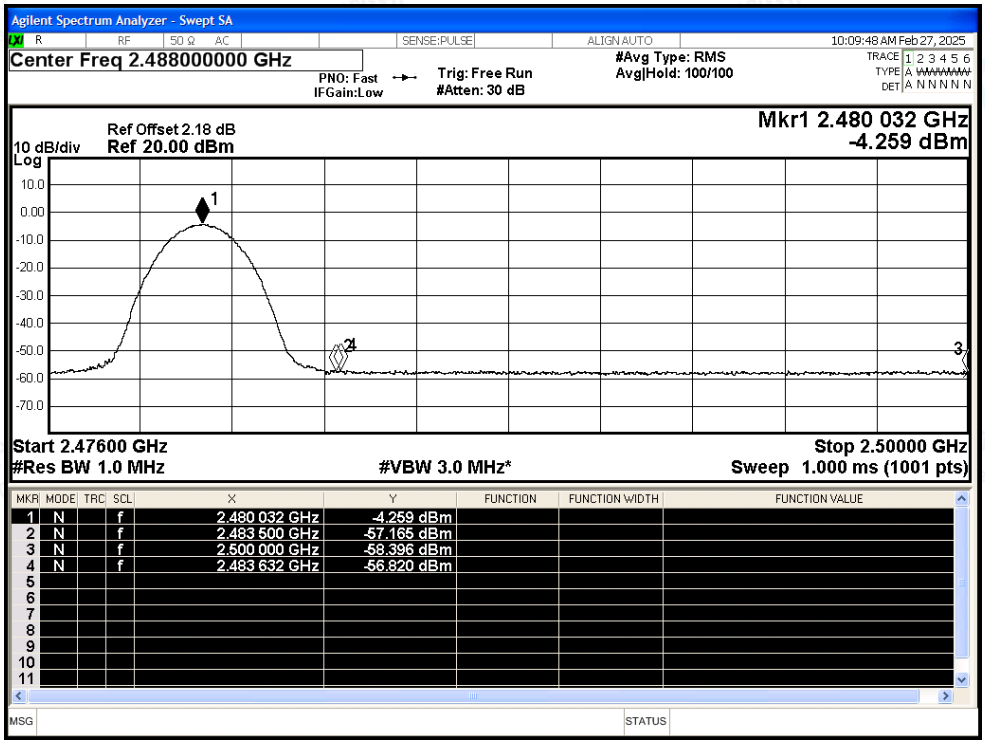
Restrict Band NVNT 2-DH5 2402MHz Ant1 No-Hopping Average



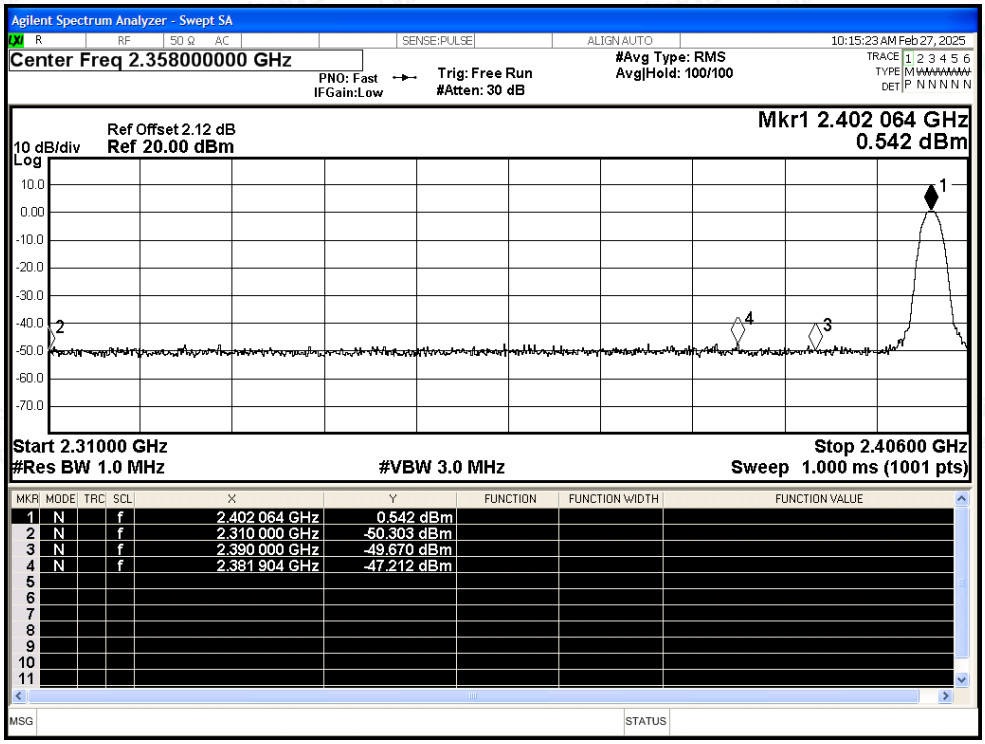
Restrict Band NVNT 2-DH5 2480MHz Ant1 No-Hopping Peak



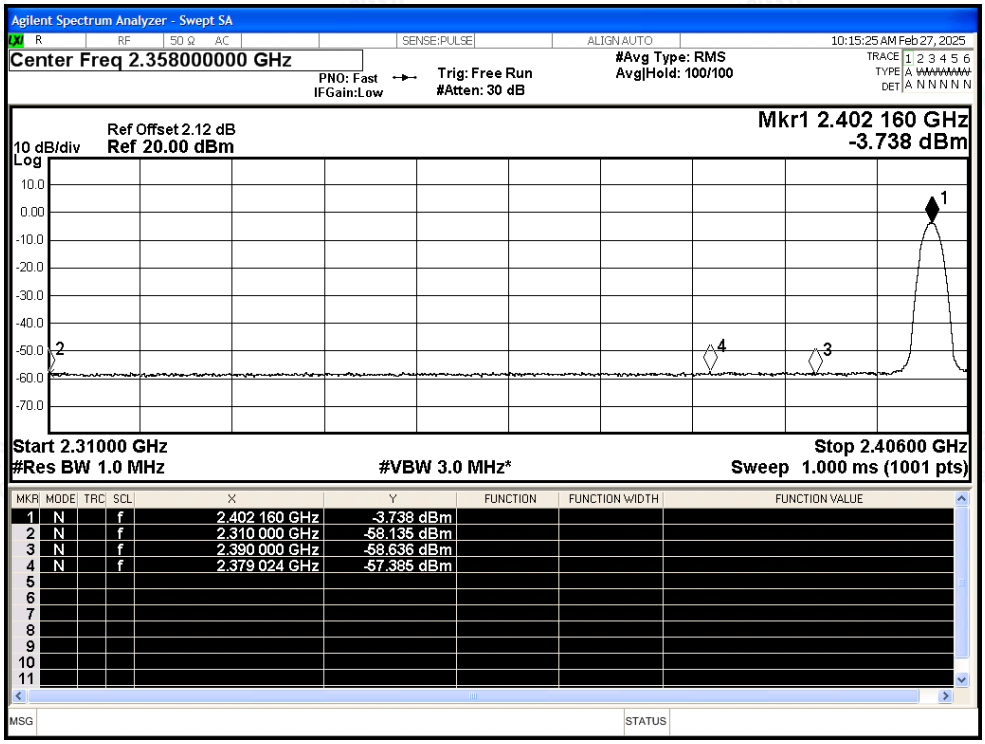
Restrict Band NVNT 2-DH5 2480MHz Ant1 No-Hopping Average



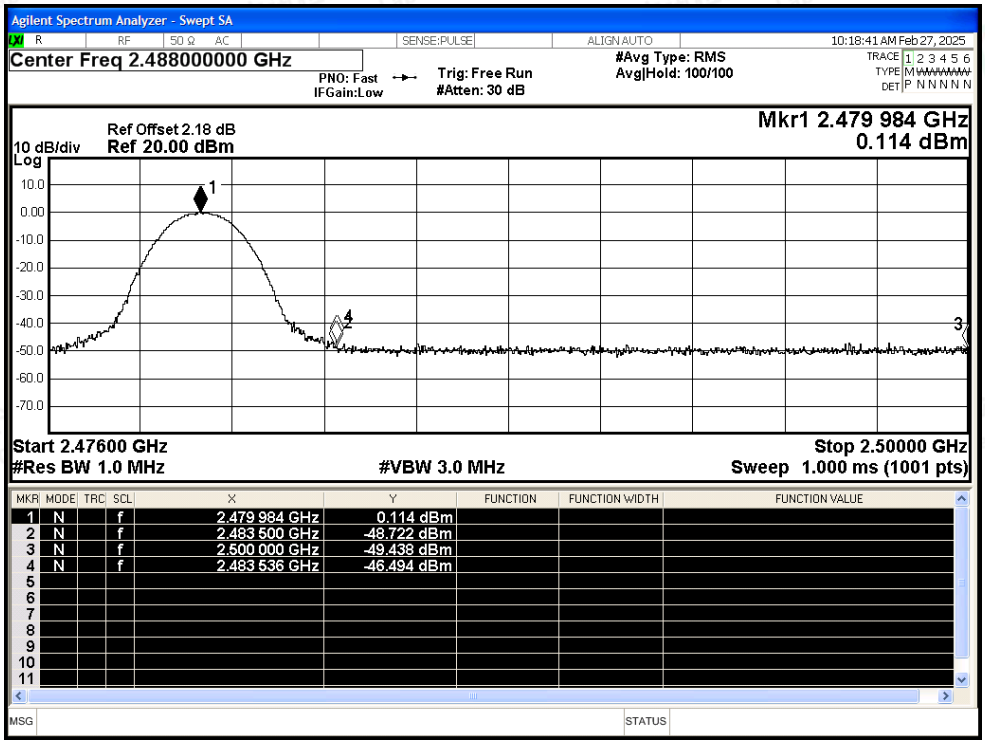
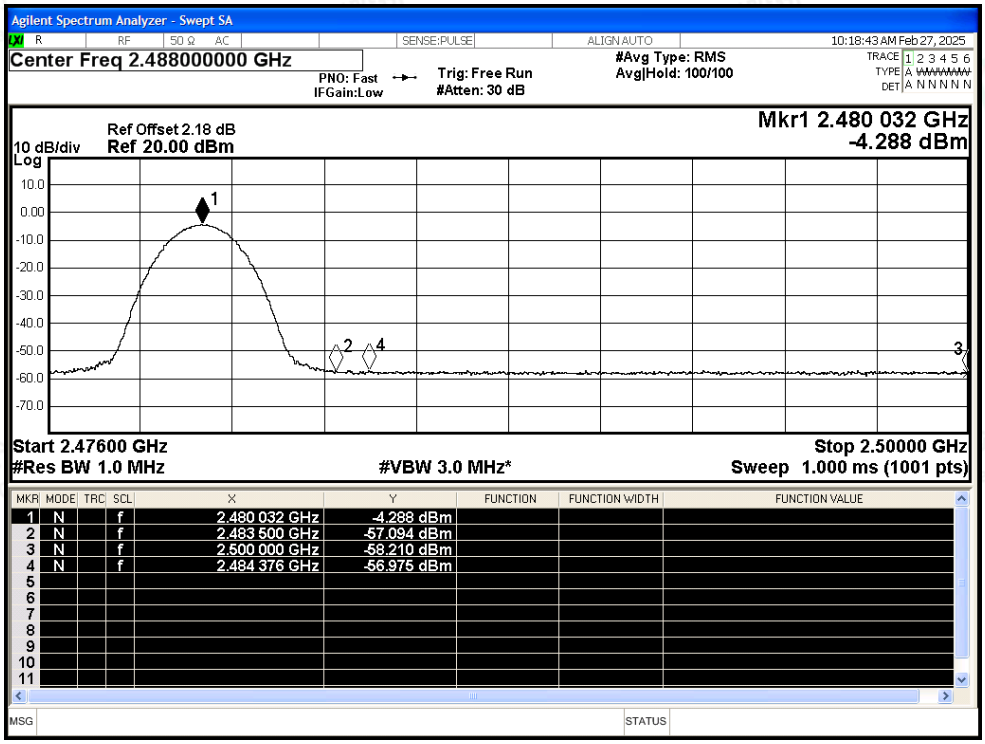
Restrict Band NVNT 3-DH5 2402MHz Ant1 No-Hopping Peak



Restrict Band NVNT 3-DH5 2402MHz Ant1 No-Hopping Average



Restrict Band NVNT 3-DH5 2480MHz Ant1 No-Hopping Peak



Restrict Band NVNT 3-DH5 2480MHz Ant1 No-Hopping Average