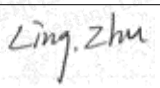
Appendix A

RF Test Data for BLE (Conducted Measurement)

Product Name: Smart Plug and Gateway

Test Model: HUB1

Environmental Conditions

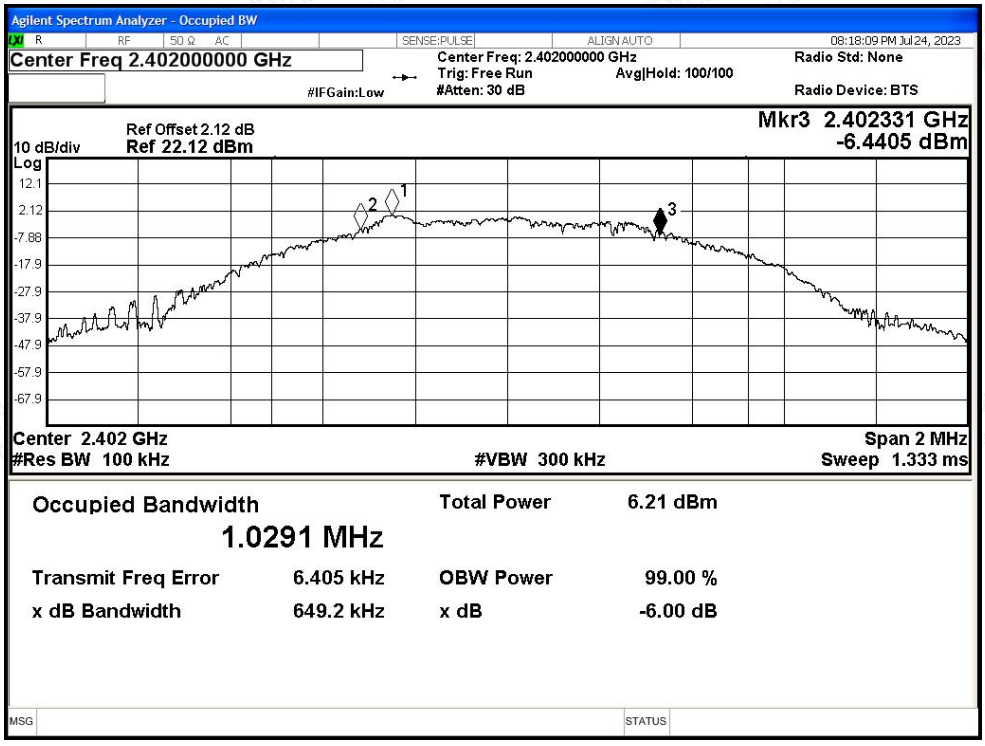
Temperature:	23.5° C
Relative Humidity:	52.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Nick Peng
	
Supervised by:	Ling Zhu
	

A.1 -6dB Bandwidth

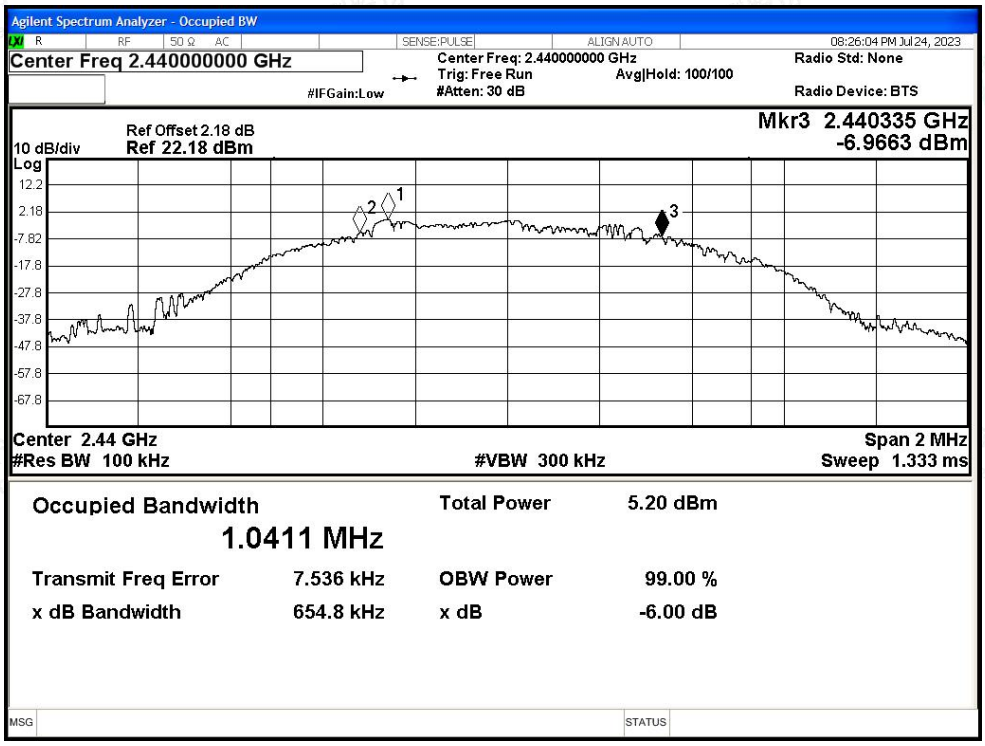
Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	Ant1	0.649	>=0.5	Pass
NVNT	BLE 1M	2440	Ant1	0.655	>=0.5	Pass
NVNT	BLE 1M	2480	Ant1	0.641	>=0.5	Pass

Test Graphs

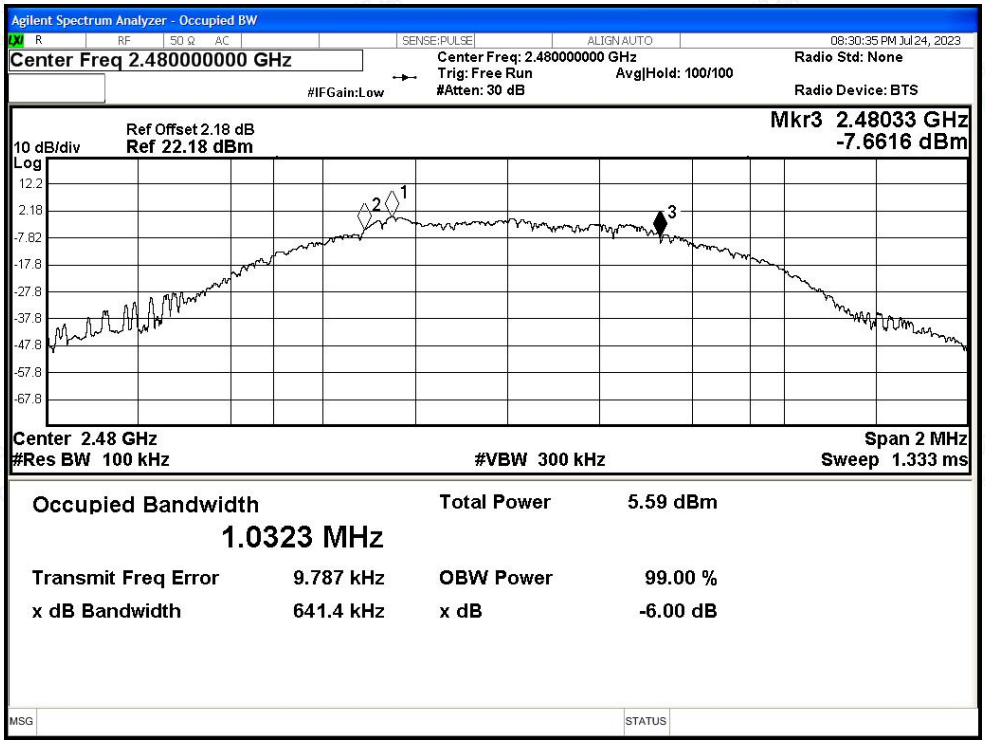
-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



-6dB Bandwidth NVNT BLE 1M 2440MHz Ant1



-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1

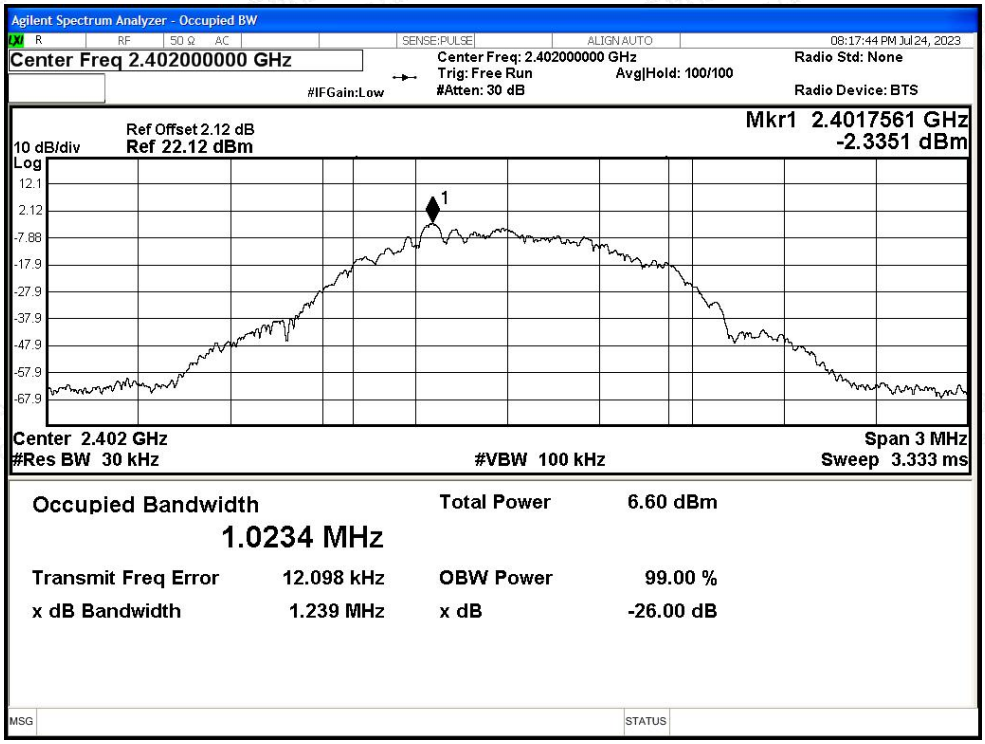


A.2 Occupied Channel Bandwidth

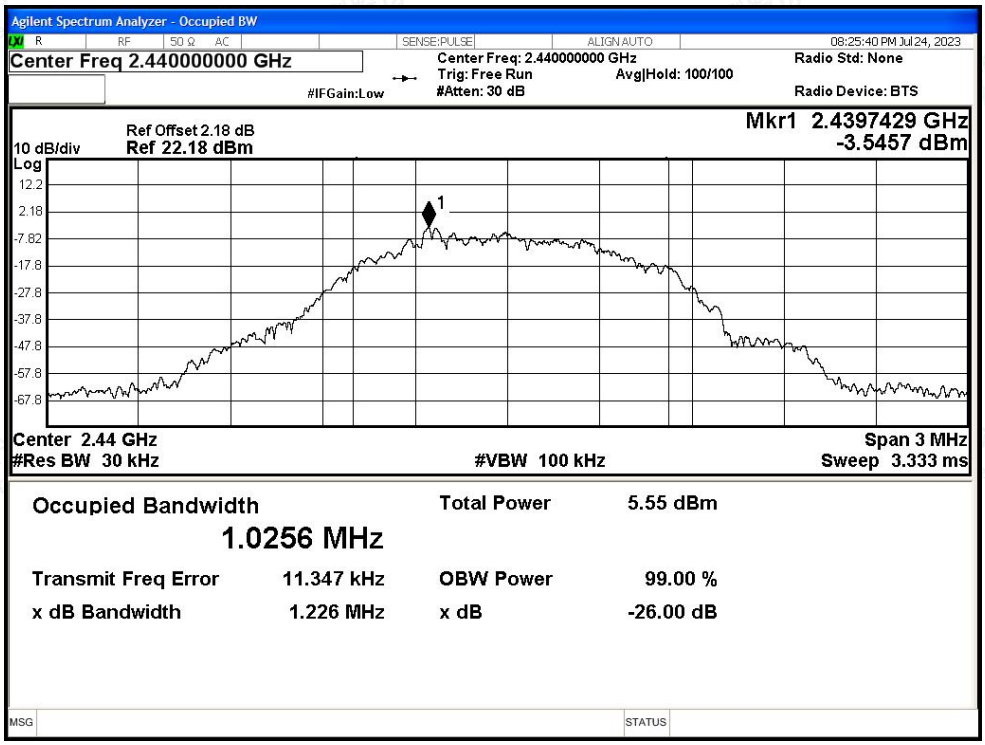
Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	BLE 1M	2402	Ant1	1.023
NVNT	BLE 1M	2440	Ant1	1.026
NVNT	BLE 1M	2480	Ant1	1.025

Test Graphs

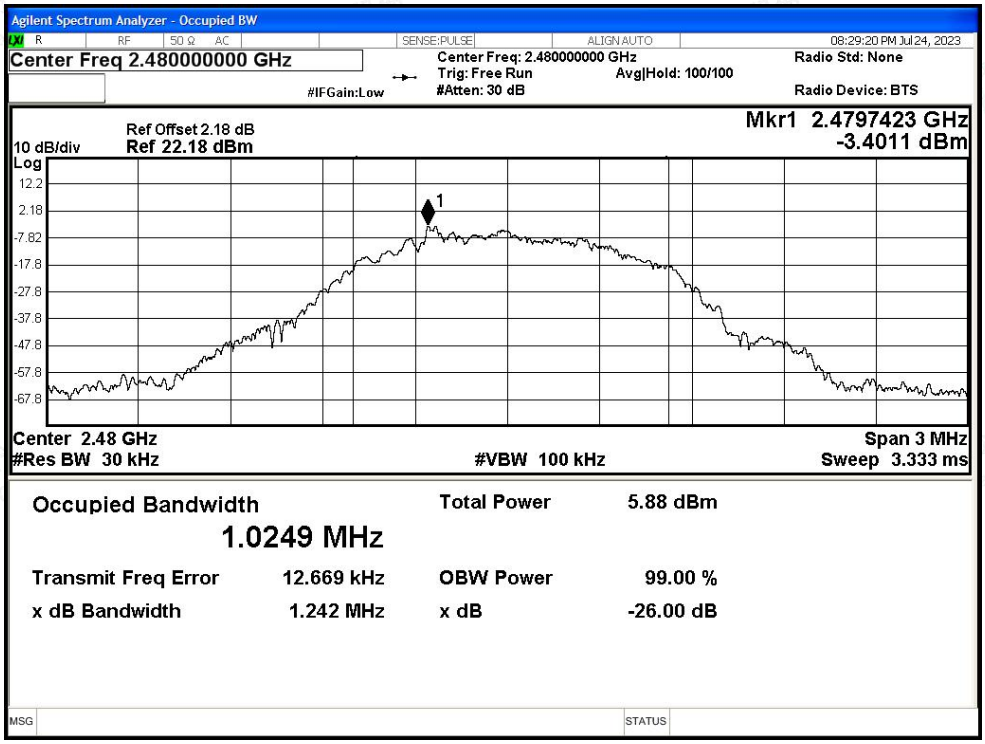
OBW NVNT BLE 1M 2402MHz Ant1



OBW NVNT BLE 1M 2440MHz Ant1



OBW NVNT BLE 1M 2480MHz Ant1



A.3 Maximum Conducted Output Power

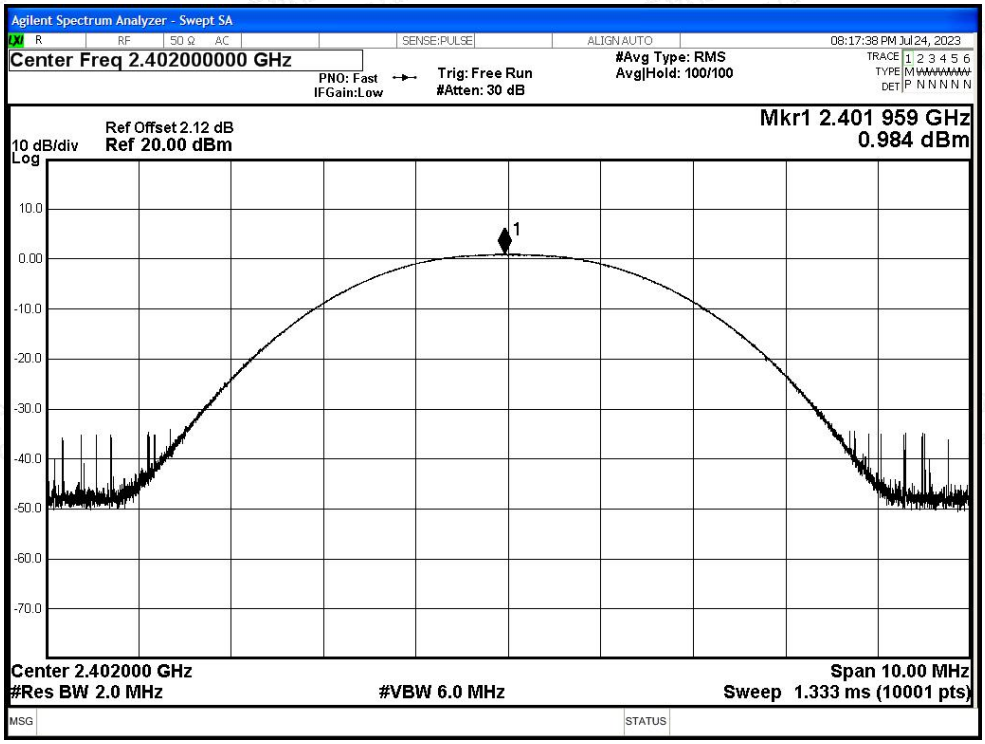
Condition	Mode	Frequency (MHz)	Antenna	Total Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	0.98	30	Pass
NVNT	BLE 1M	2440	Ant1	0.19	30	Pass
NVNT	BLE 1M	2480	Ant1	0.41	30	Pass

EIRP

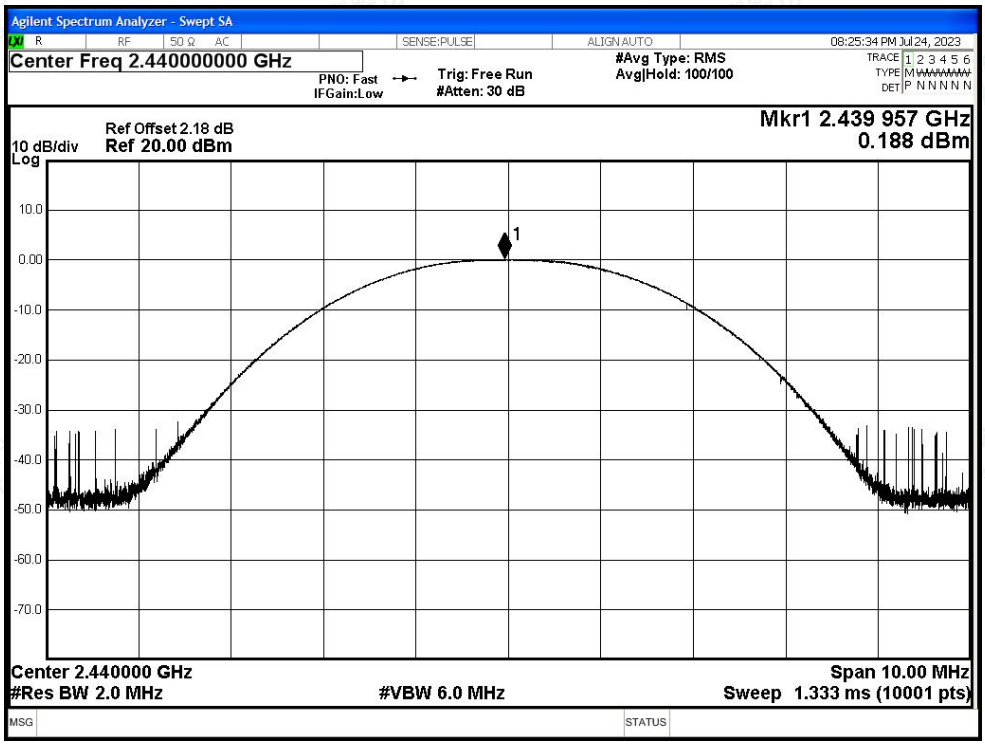
Condition	Mode	Frequency (MHz)	Antenna	Maximum Peak Output Power [dBm]	Antenna Gain	Report EIRP Power(dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	0.98	3.59	4.57	36	Pass
NVNT	BLE 1M	2440	Ant1	0.19	3.59	3.78	36	Pass
NVNT	BLE 1M	2480	Ant1	0.41	3.59	4.0	36	Pass

Test Graphs

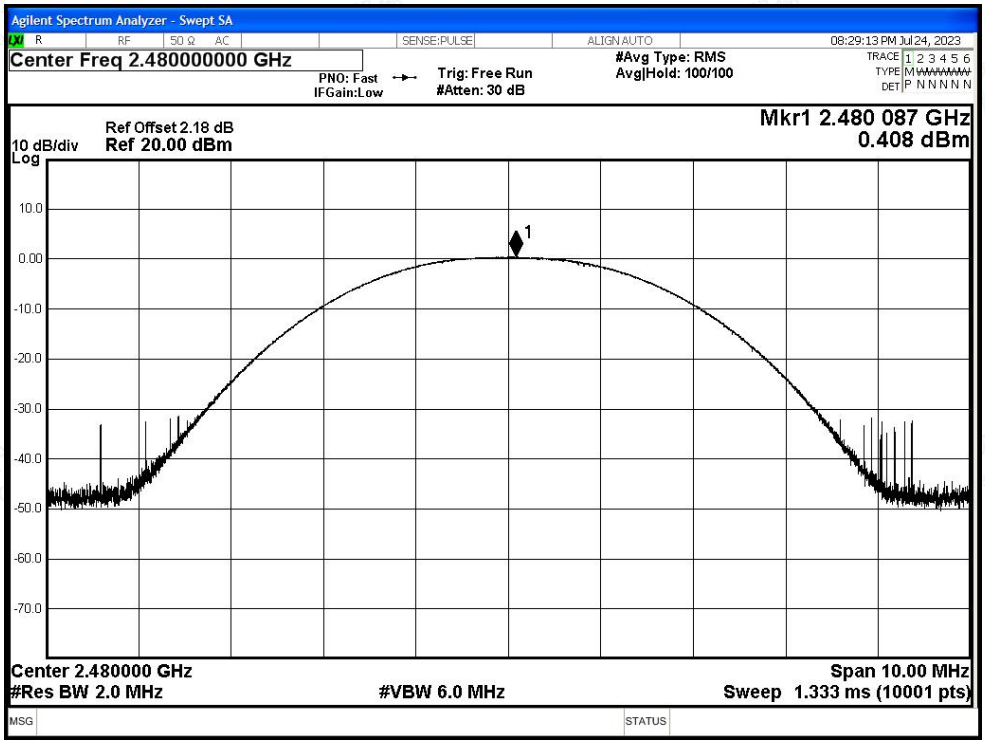
Power NVNT BLE 1M 2402MHz Ant1



Power NVNT BLE 1M 2440MHz Ant1



Power NVNT BLE 1M 2480MHz Ant1

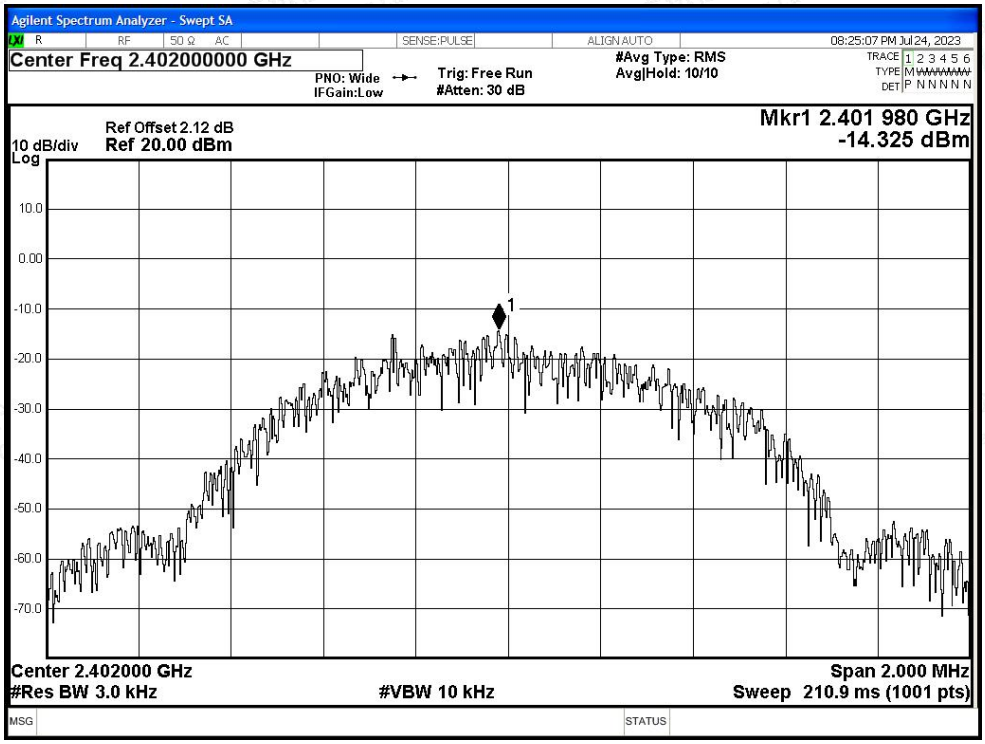


A.4 Maximum Power Spectral Density Level

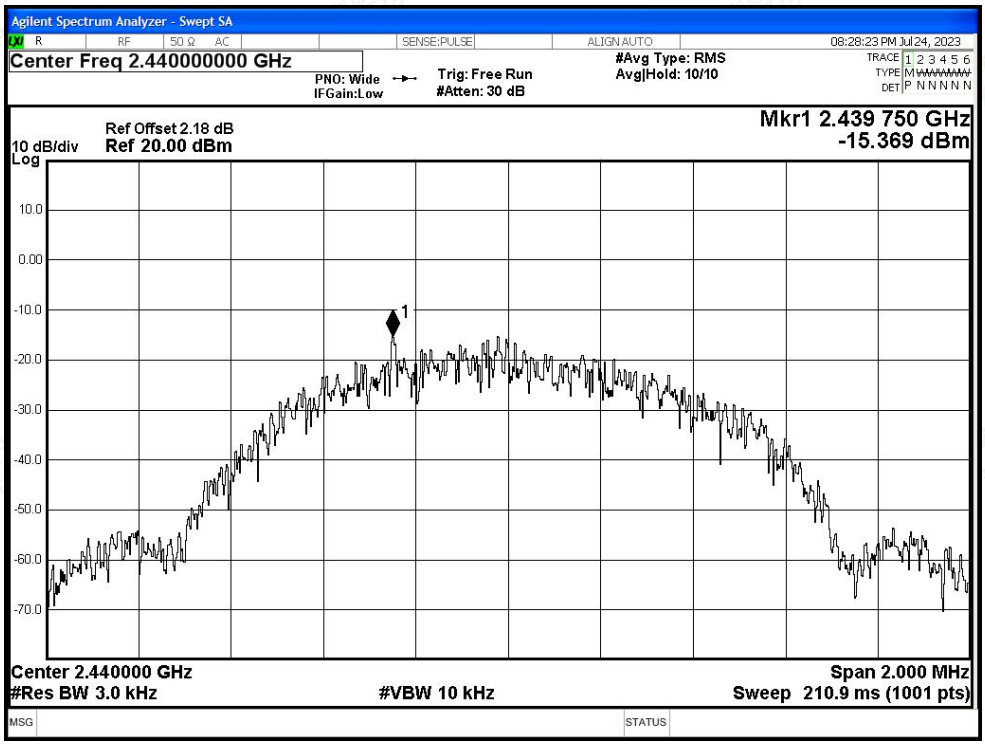
Condition	Mode	Frequency (MHz)	Antenna	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	BLE 1M	2402	Ant1	-14.33	8	Pass
NVNT	BLE 1M	2440	Ant1	-15.37	8	Pass
NVNT	BLE 1M	2480	Ant1	-15.32	8	Pass

Test Graphs

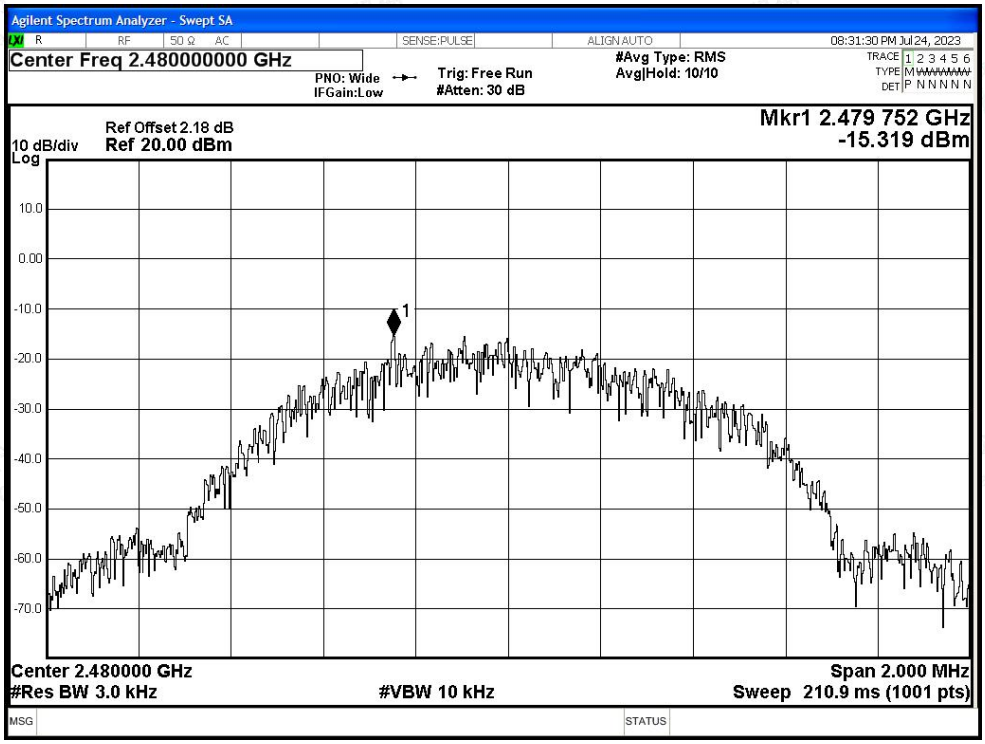
PSD NVNT BLE 1M 2402MHz Ant1



PSD NVNT BLE 1M 2440MHz Ant1



PSD NVNT BLE 1M 2480MHz Ant1

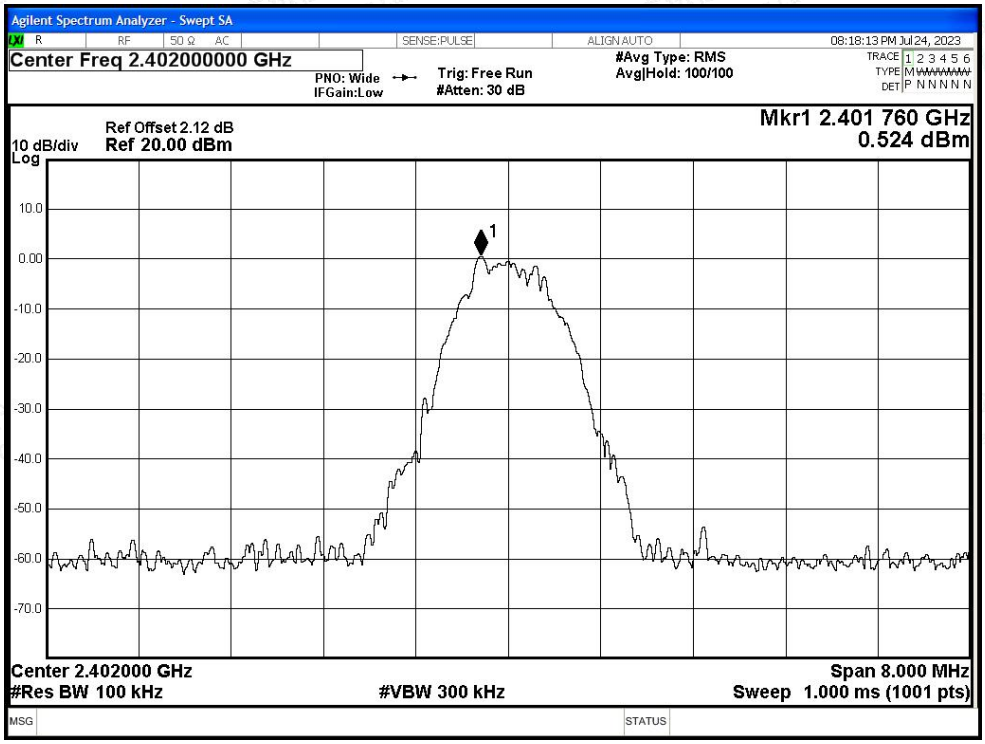


A.5 Band Edge

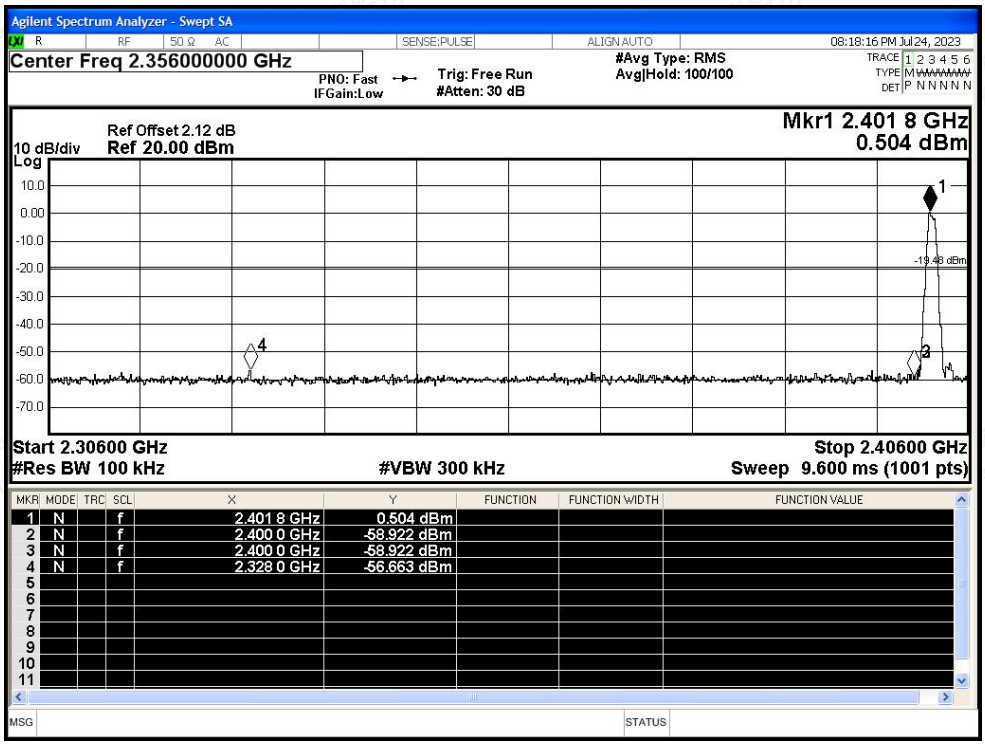
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-57.19	-20	Pass
NVNT	BLE 1M	2480	Ant1	-55.33	-20	Pass

Test Graphs

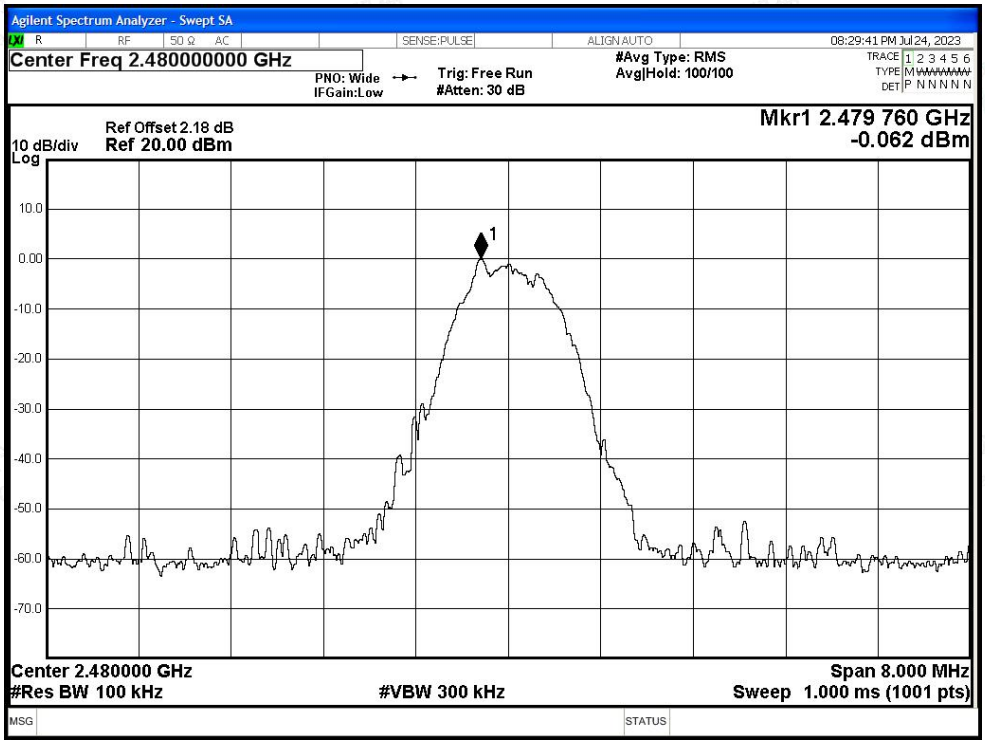
Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



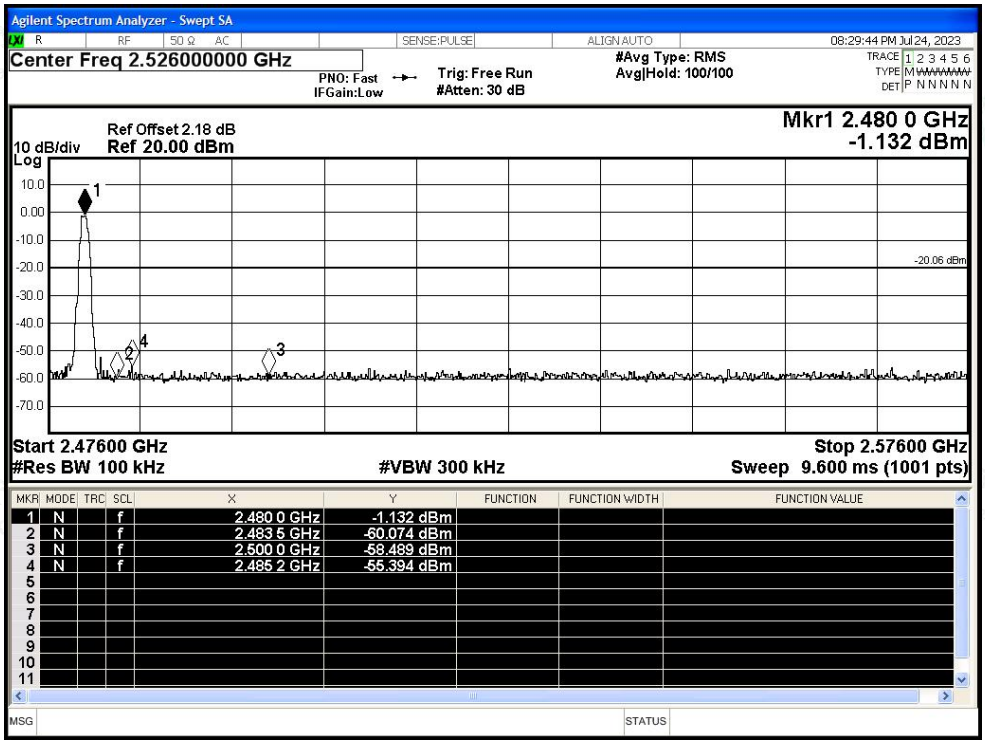
Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



Band Edge NVNT BLE 1M 2480MHz Ant1 Ref



Band Edge NVNT BLE 1M 2480MHz Ant1 Emission

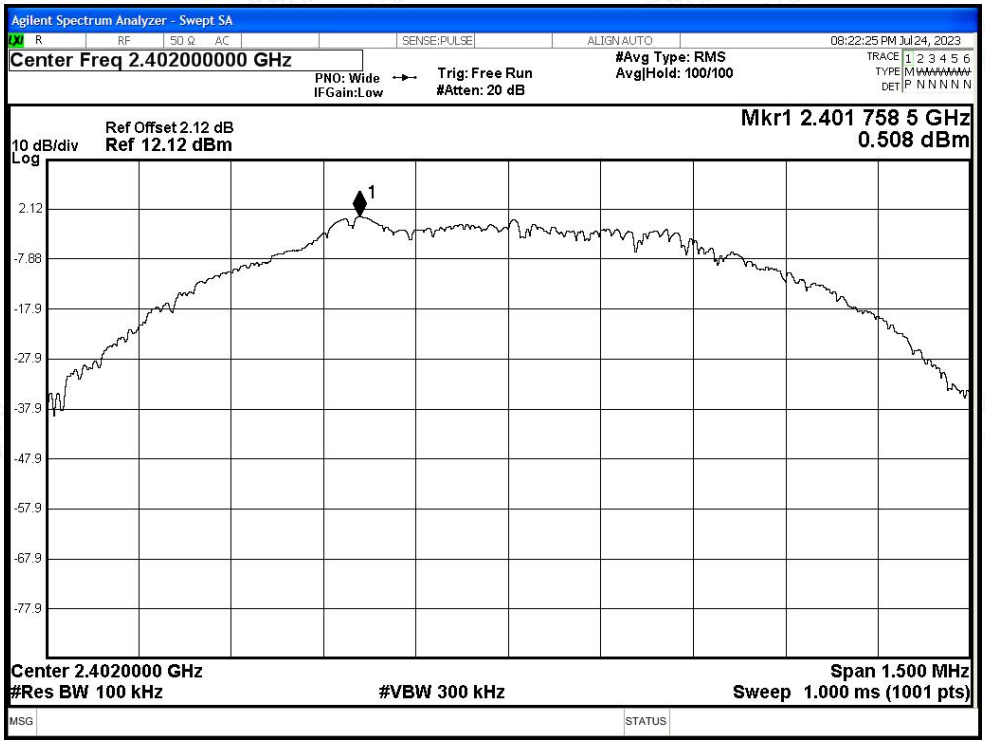


A.6 Conducted RF Spurious Emission

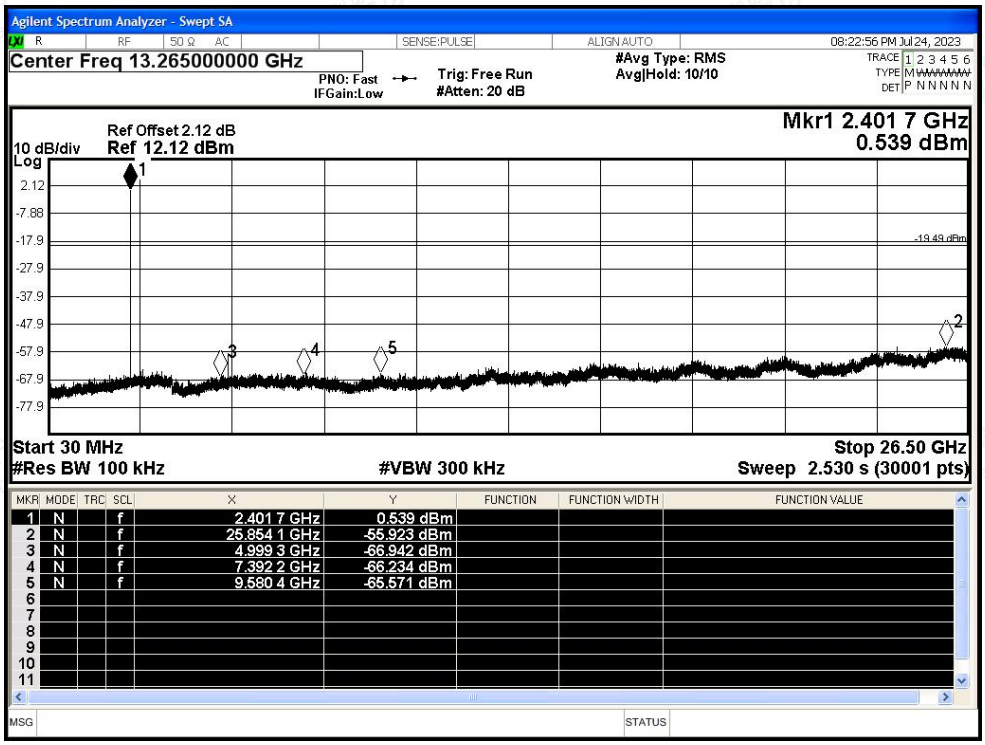
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-56.43	-20	Pass
NVNT	BLE 1M	2440	Ant1	-54.91	-20	Pass
NVNT	BLE 1M	2480	Ant1	-45.25	-20	Pass

Test Graphs

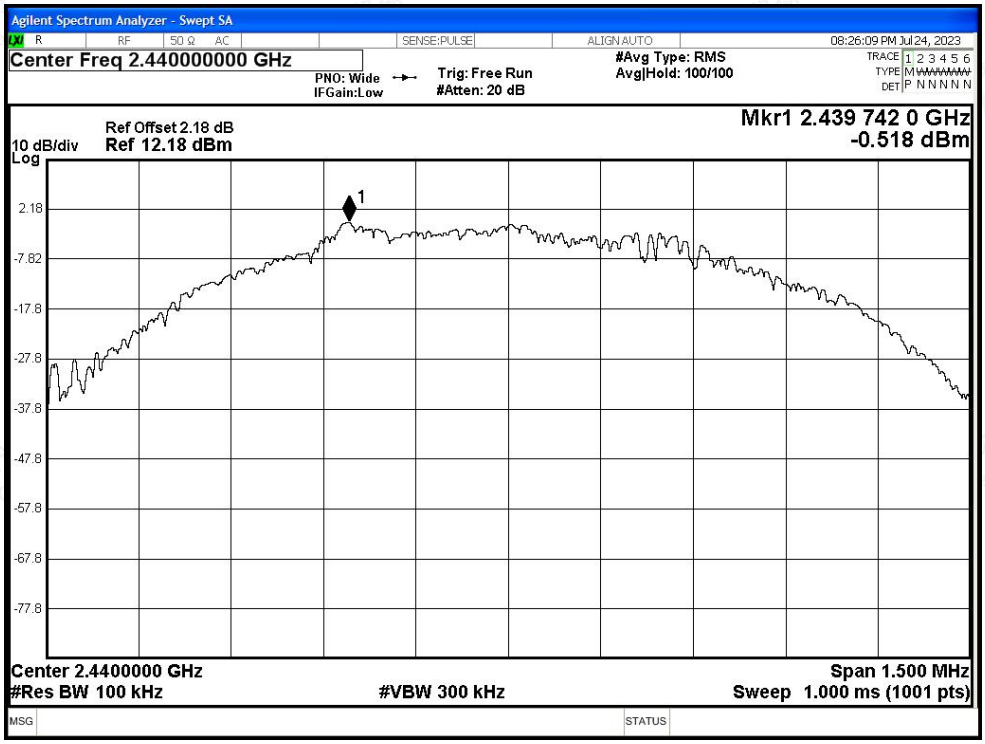
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref



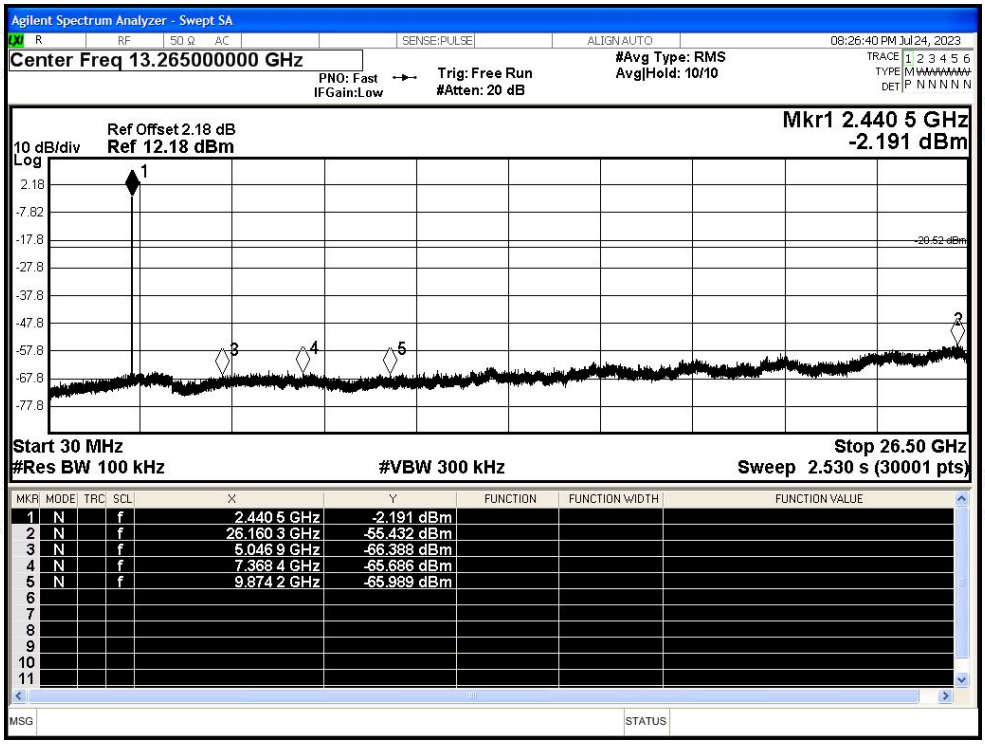
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission



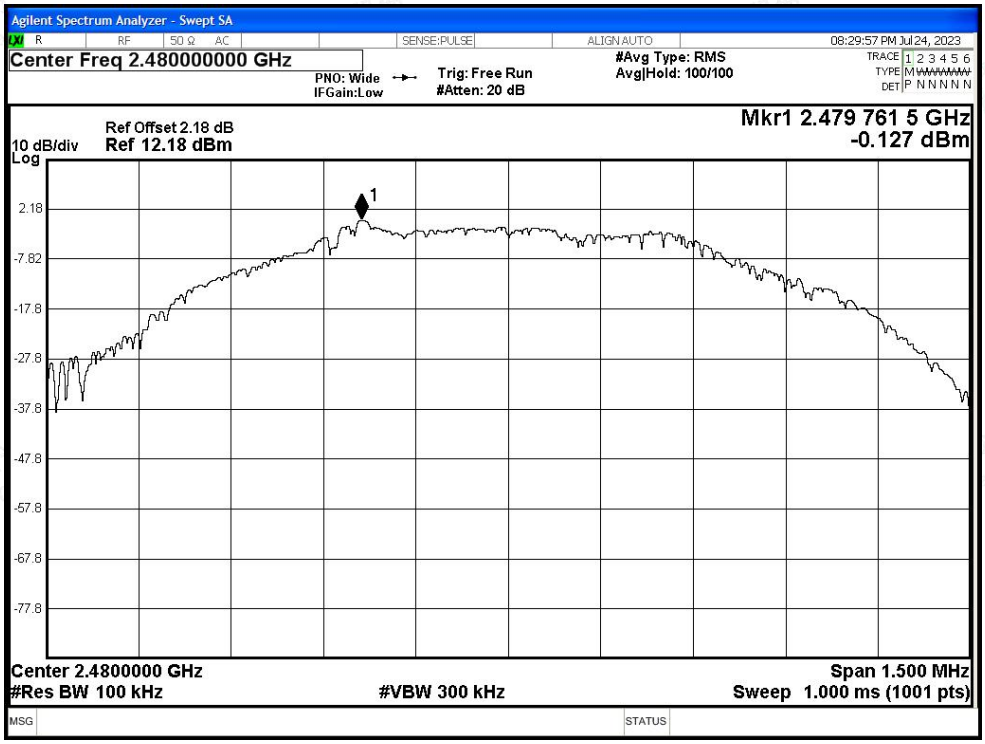
Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Ref



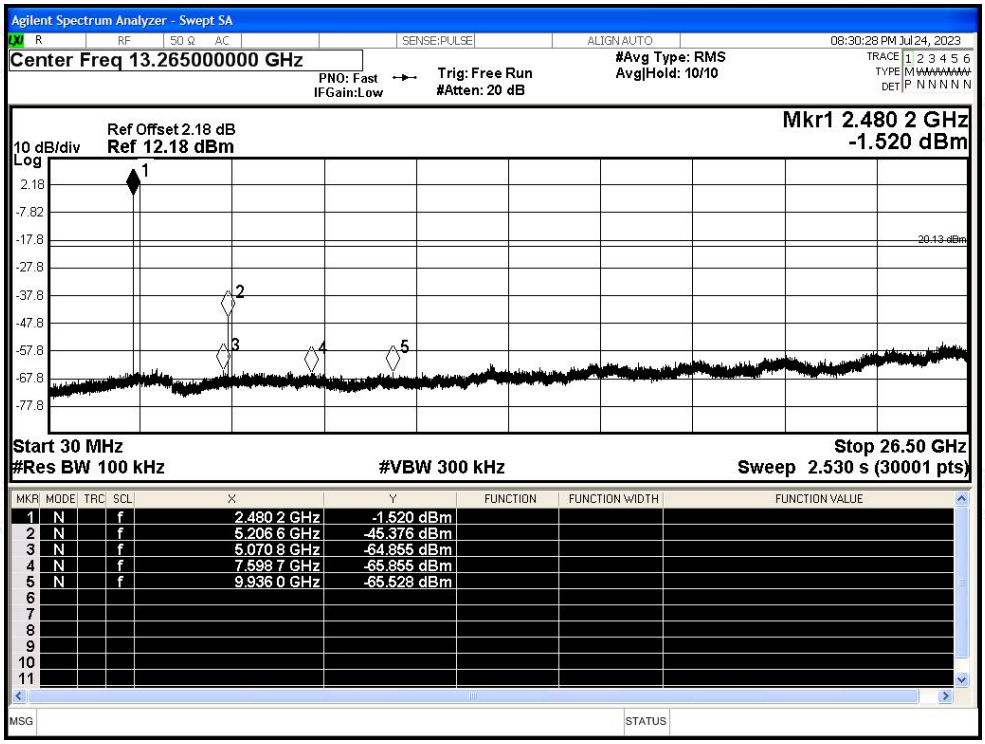
Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission



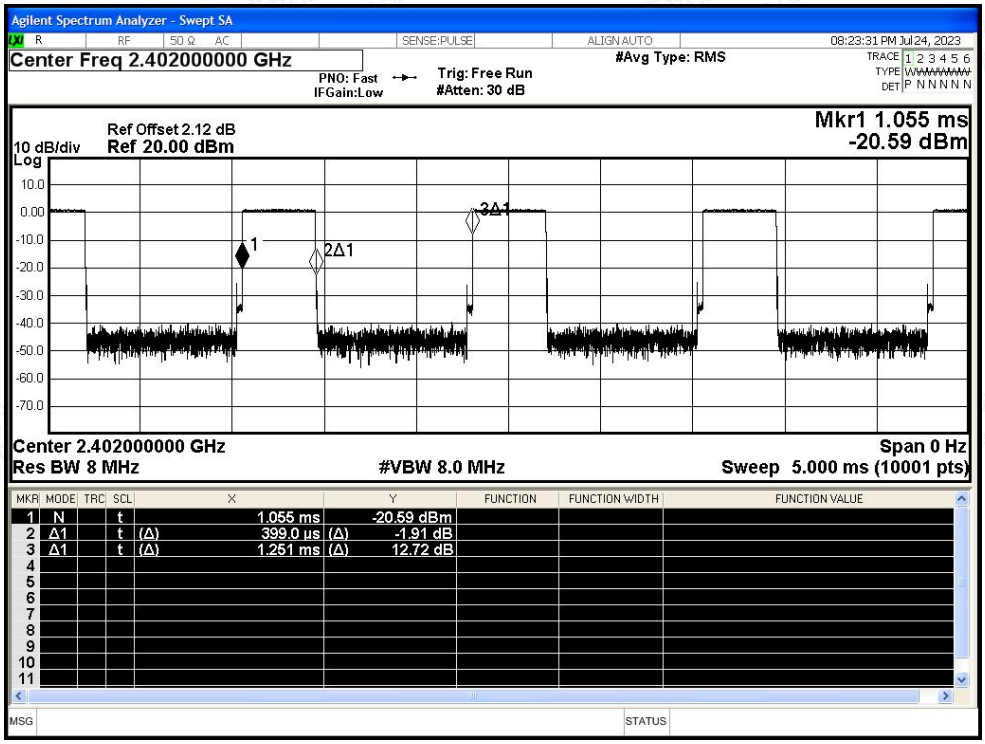
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		f	2.480 2 GHz	-1.520 dBm			
2	N		f	5.206 6 GHz	-45.376 dBm			
3	N		f	5.070 8 GHz	-64.855 dBm			
4	N		f	7.598 7 GHz	-65.855 dBm			
5	N		f	9.936 0 GHz	-65.528 dBm			
6								
7								
8								
9								
10								
11								

A.7 Duty Cycle

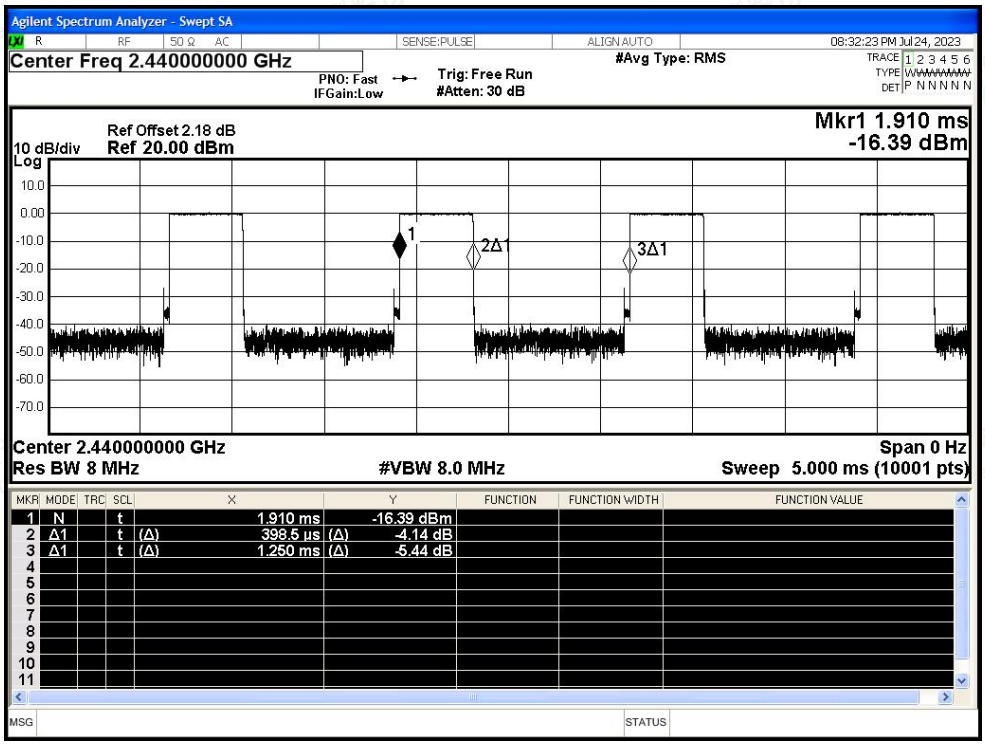
Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	BLE 1M	2402	Ant1	31.91	4.96	2.51
NVNT	BLE 1M	2440	Ant1	31.88	4.96	2.51
NVNT	BLE 1M	2480	Ant1	31.88	4.96	2.51

Test Graphs

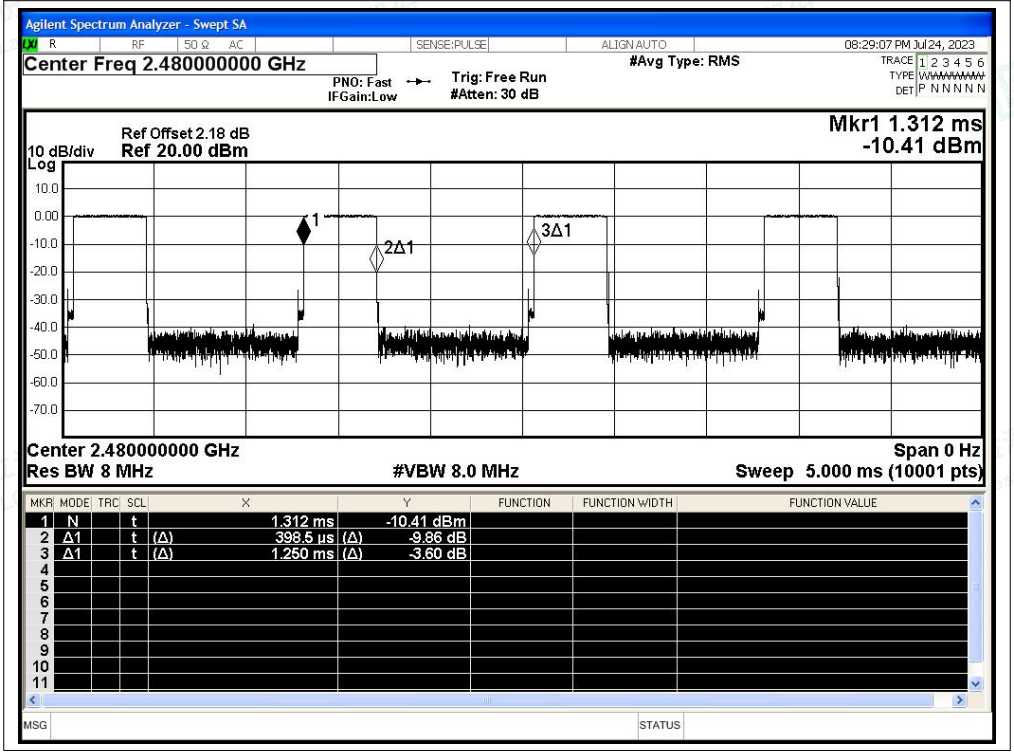
Duty Cycle NVNT BLE 1M 2402MHz Ant1



Duty Cycle NVNT BLE 1M 2440MHz Ant1



Duty Cycle NVNT BLE 1M 2480MHz Ant1

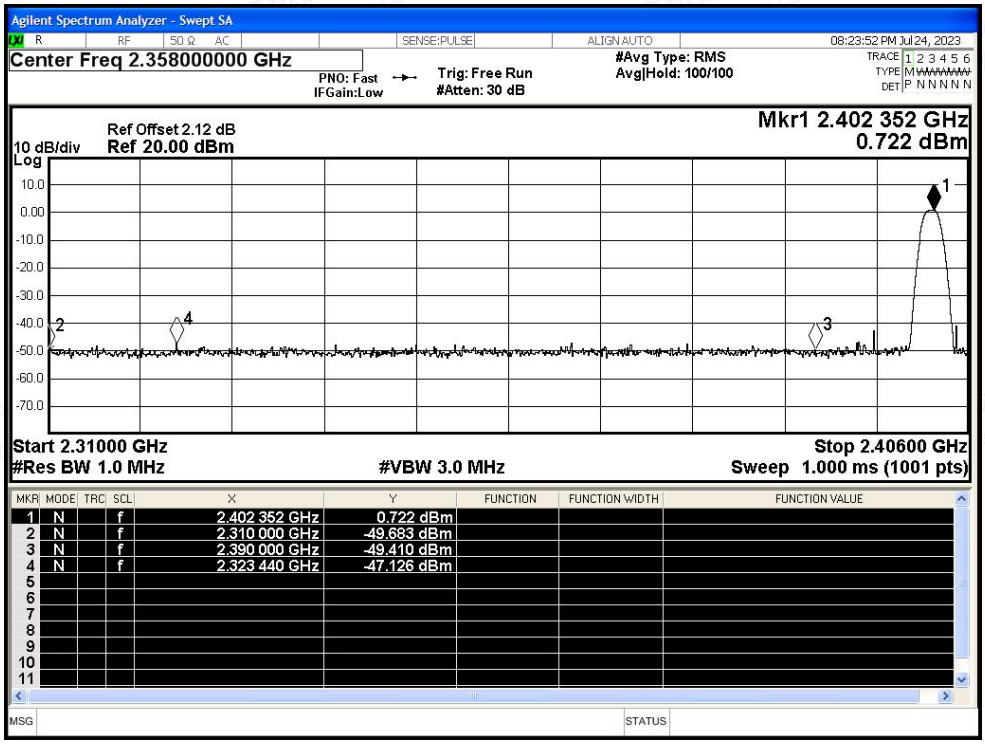


A.8 Restrict Band

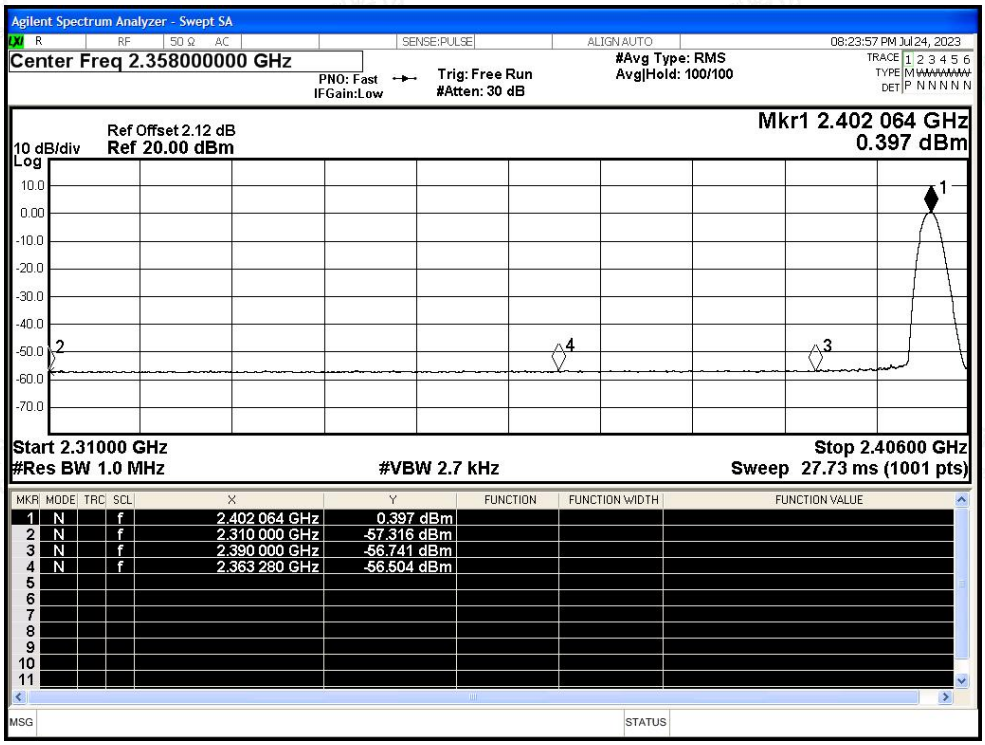
Condition	Mode	Frequency (MHz)	Antenna	Spur Freq (MHz)	Power (dBm)	Gain (dBi)	E (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
NVNT	BLE 1M	2402	Ant1	2310	-49.68	3.59	49.17	Peak	74	Pass
NVNT	BLE 1M	2402	Ant1	2310	-57.32	3.59	41.53	Average	54	Pass
NVNT	BLE 1M	2402	Ant1	2323.44	-47.13	3.59	51.72	Peak	74	Pass
NVNT	BLE 1M	2402	Ant1	2363.28	-56.5	3.59	42.35	Average	54	Pass
NVNT	BLE 1M	2402	Ant1	2390	-49.41	3.59	49.44	Peak	74	Pass
NVNT	BLE 1M	2402	Ant1	2390	-56.74	3.59	42.11	Average	54	Pass
NVNT	BLE 1M	2480	Ant1	2483.5	-50.78	3.59	48.07	Peak	74	Pass
NVNT	BLE 1M	2480	Ant1	2483.5	-54.97	3.59	43.88	Average	54	Pass
NVNT	BLE 1M	2480	Ant1	2485.576	-40.51	3.59	58.34	Peak	74	Pass
NVNT	BLE 1M	2480	Ant1	2483.512	-54.97	3.59	43.88	Average	54	Pass
NVNT	BLE 1M	2480	Ant1	2500	-50.23	3.59	48.62	Peak	74	Pass
NVNT	BLE 1M	2480	Ant1	2500	-56.85	3.59	42.00	Average	54	Pass

Test Graphs

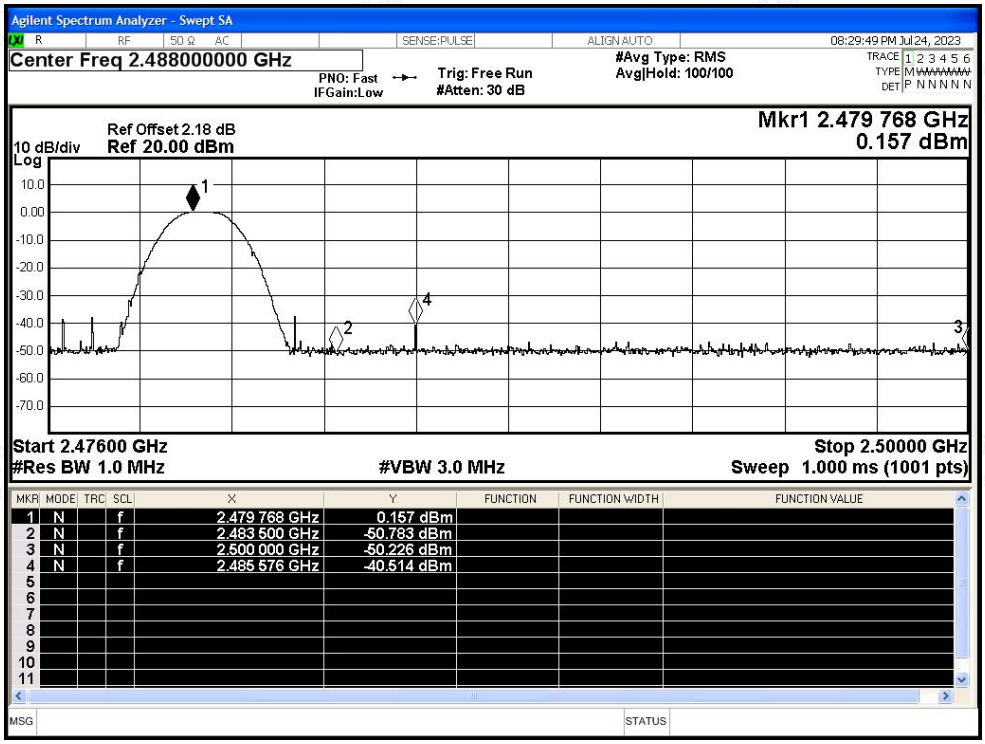
Restrict Band NVNT BLE 1M 2402MHz Ant1 Peak



Restrict Band NVNT BLE 1M 2402MHz Ant1 Average



Restrict Band NVNT BLE 1M 2480MHz Ant1 Peak



Restrict Band NVNT BLE 1M 2480MHz Ant1 Average