



Appendix A

RF Test Data for BLE (Conducted Measurement)

Product Name: Inventory control beacon tag

Test Model: BIN001-2

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 -6dB Bandwidth

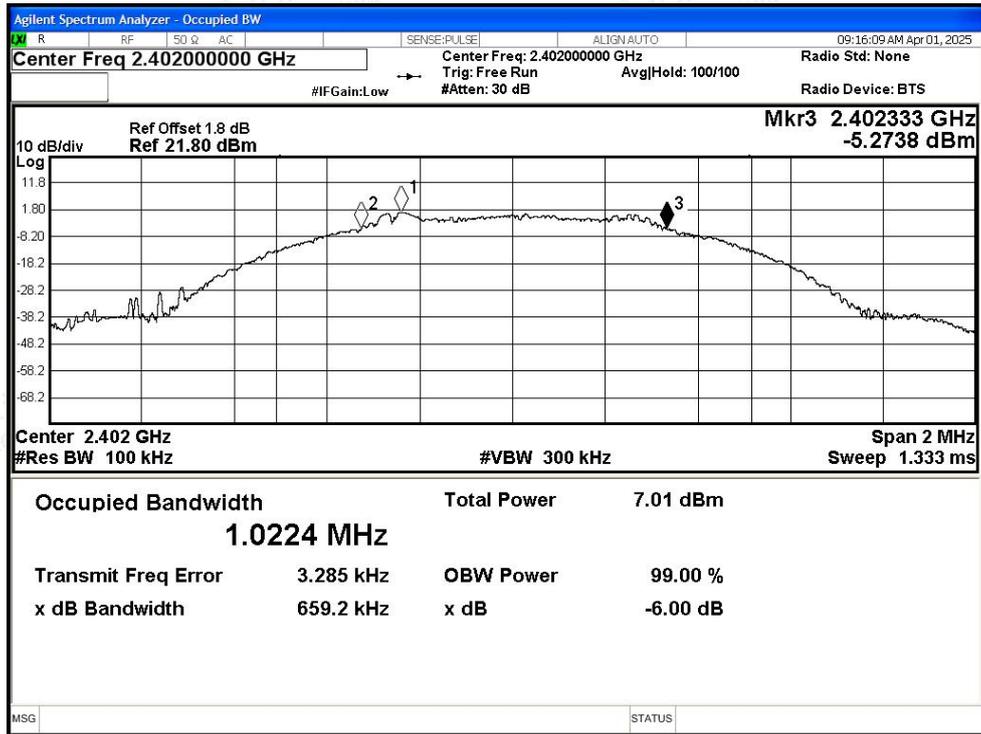
Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	Ant1	0.659	≥ 0.5	Pass
NVNT	BLE 1M	2440	Ant1	0.672	≥ 0.5	Pass
NVNT	BLE 1M	2480	Ant1	0.654	≥ 0.5	Pass
NVNT	BLE 2M	2402	Ant1	1.131	≥ 0.5	Pass
NVNT	BLE 2M	2440	Ant1	1.121	≥ 0.5	Pass
NVNT	BLE 2M	2480	Ant1	1.156	≥ 0.5	Pass



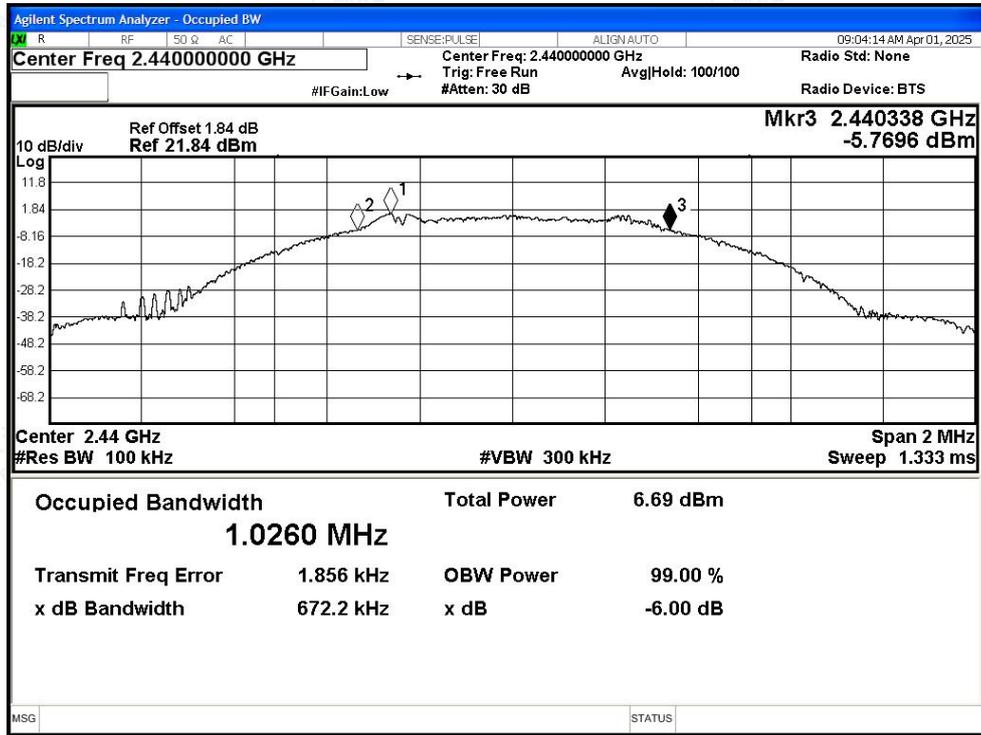


Test Graphs

-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1

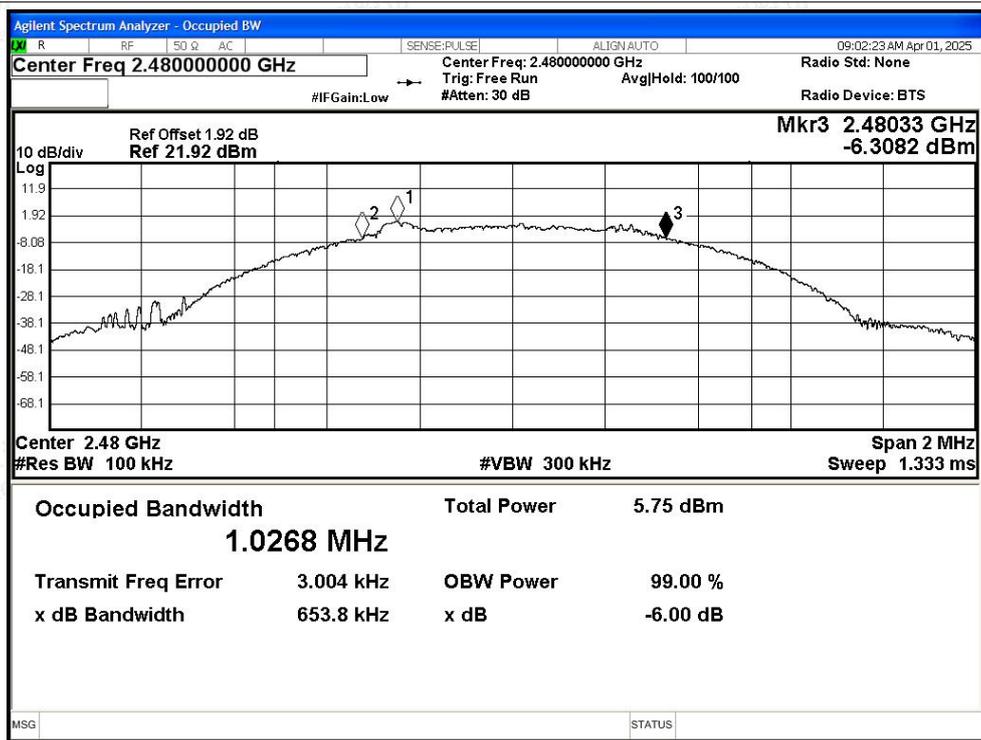


-6dB Bandwidth NVNT BLE 1M 2440MHz Ant1

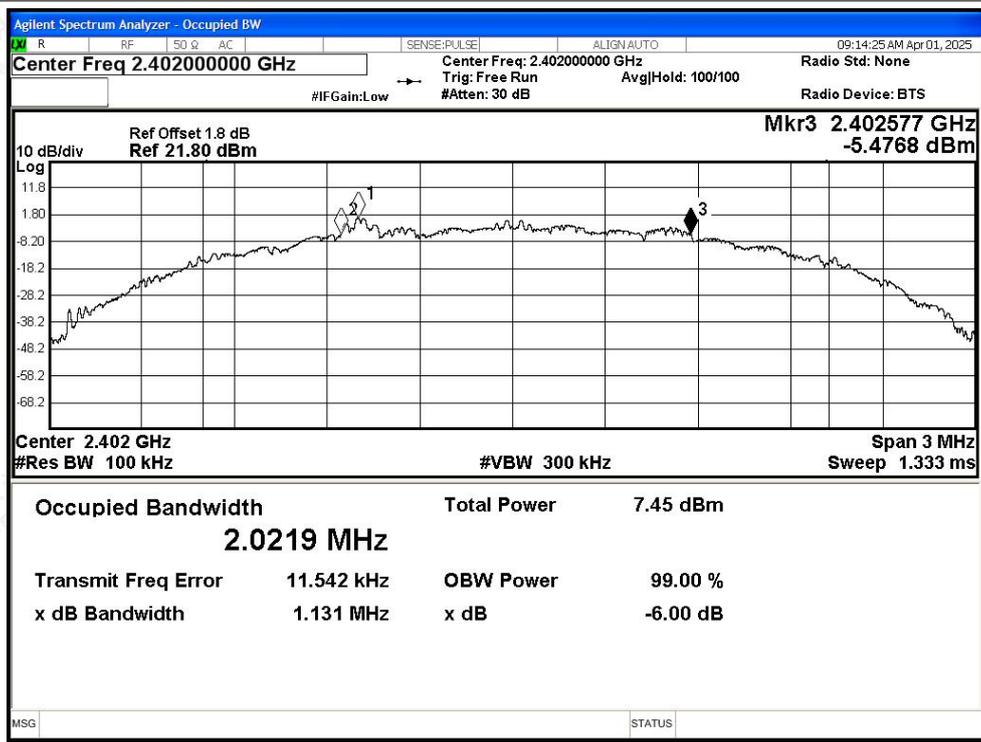




-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1

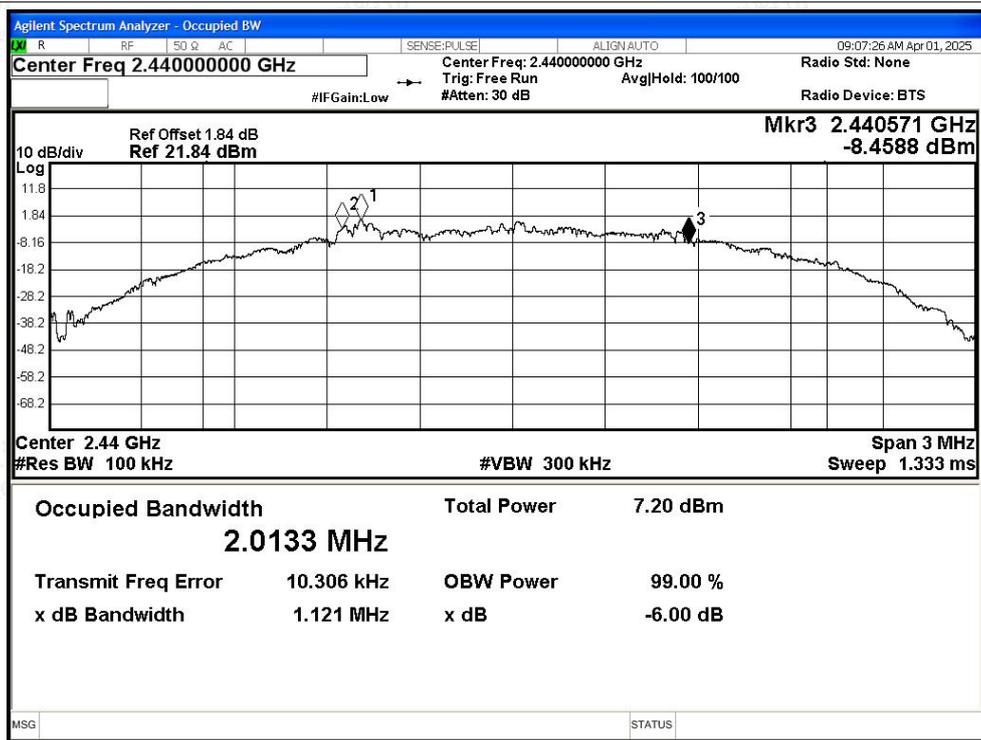


-6dB Bandwidth NVNT BLE 2M 2402MHz Ant1

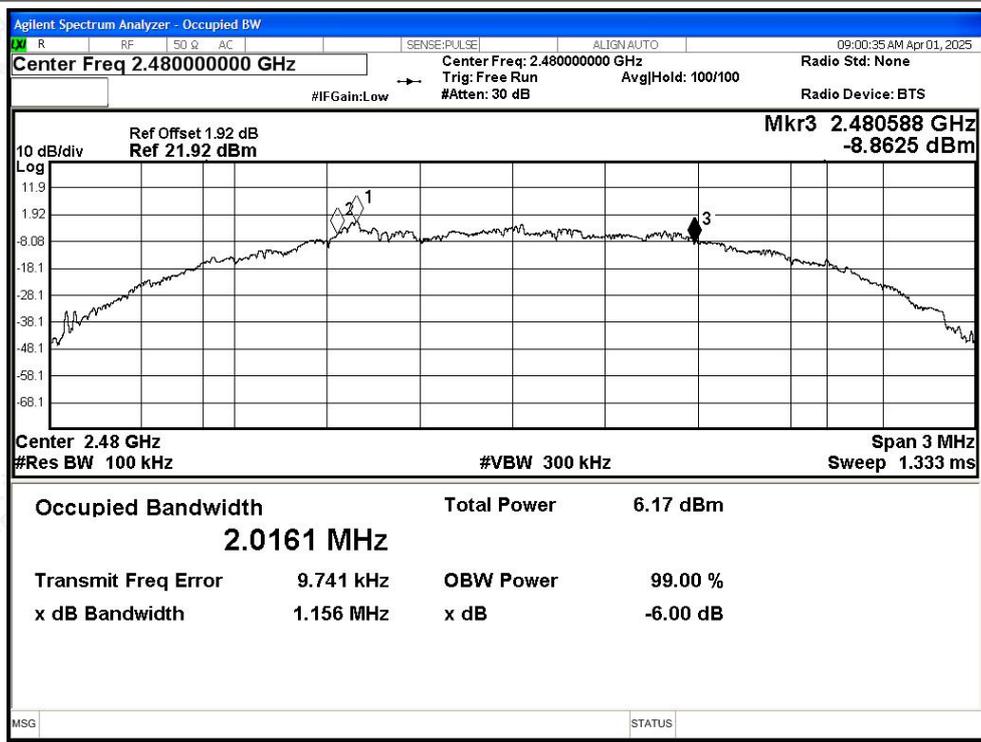




-6dB Bandwidth NVNT BLE 2M 2440MHz Ant1



-6dB Bandwidth NVNT BLE 2M 2480MHz Ant1





A.2 Maximum Peak Conducted Output Power

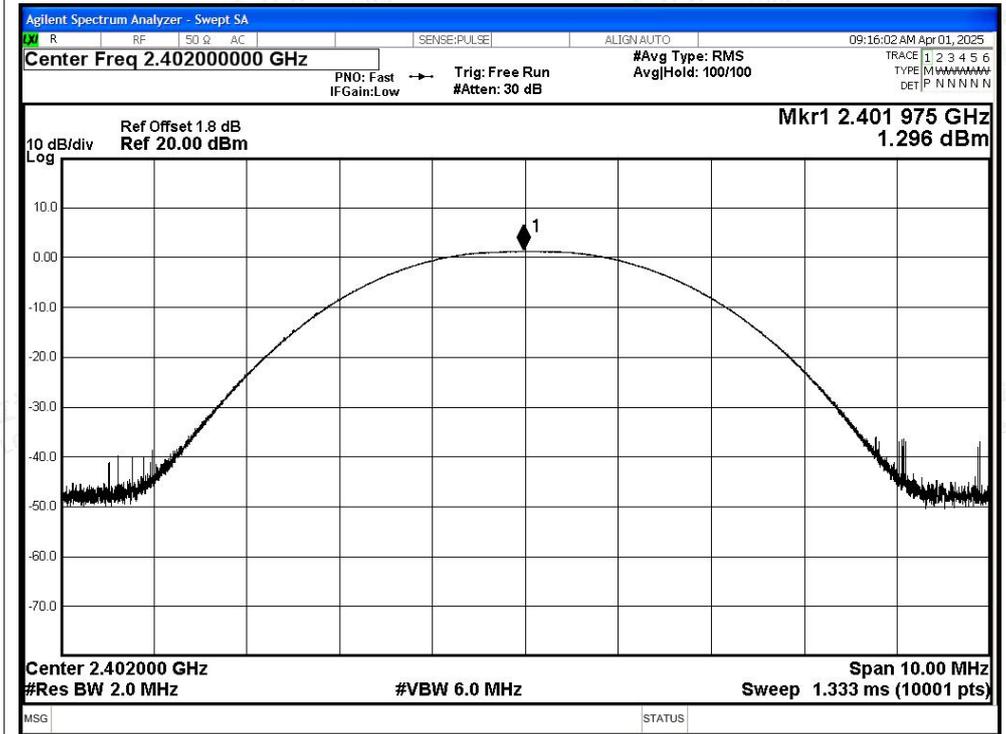
Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	1.3	30	Pass
NVNT	BLE 1M	2440	Ant1	1	30	Pass
NVNT	BLE 1M	2480	Ant1	0.03	30	Pass
NVNT	BLE 2M	2402	Ant1	1.13	30	Pass
NVNT	BLE 2M	2440	Ant1	0.84	30	Pass
NVNT	BLE 2M	2480	Ant1	-0.16	30	Pass



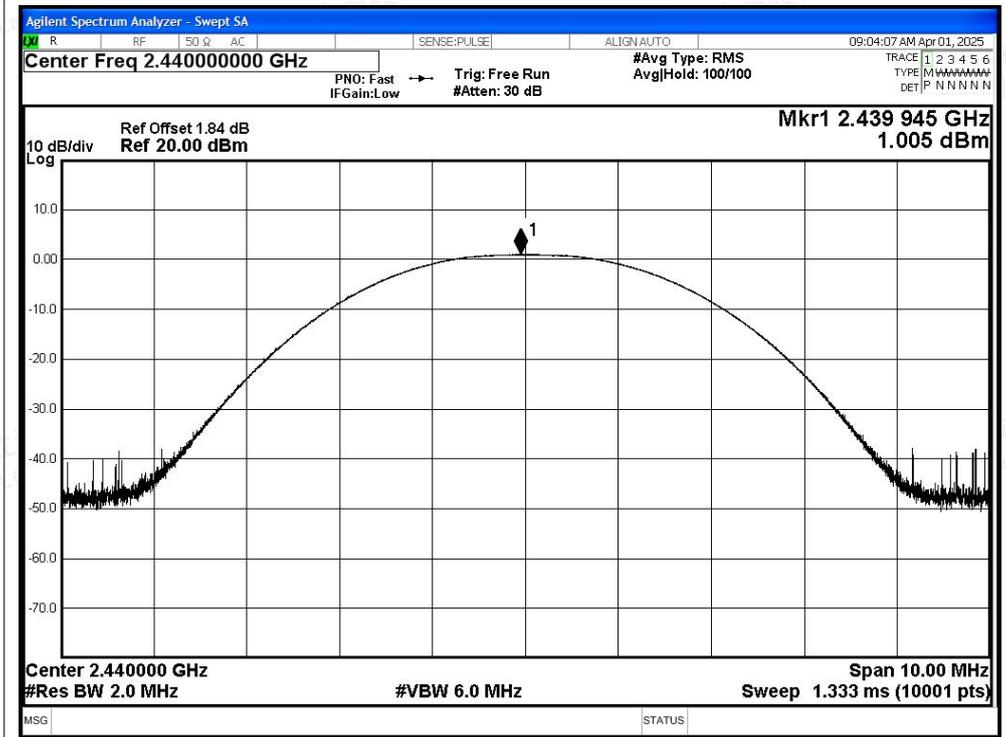


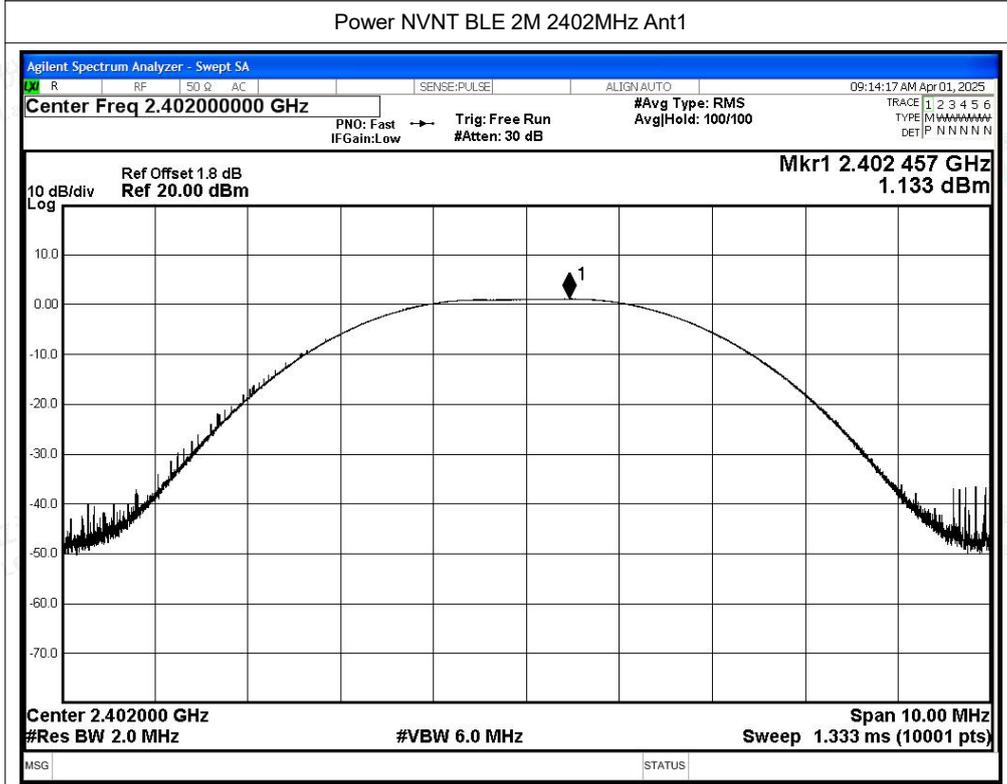
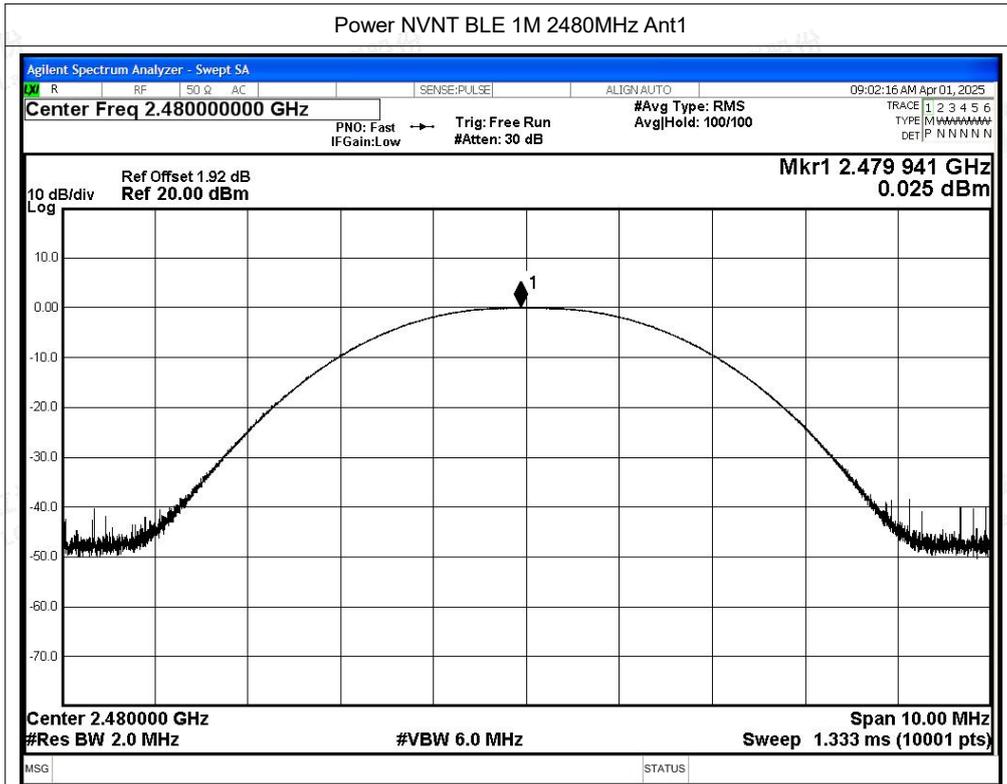
Test Graphs

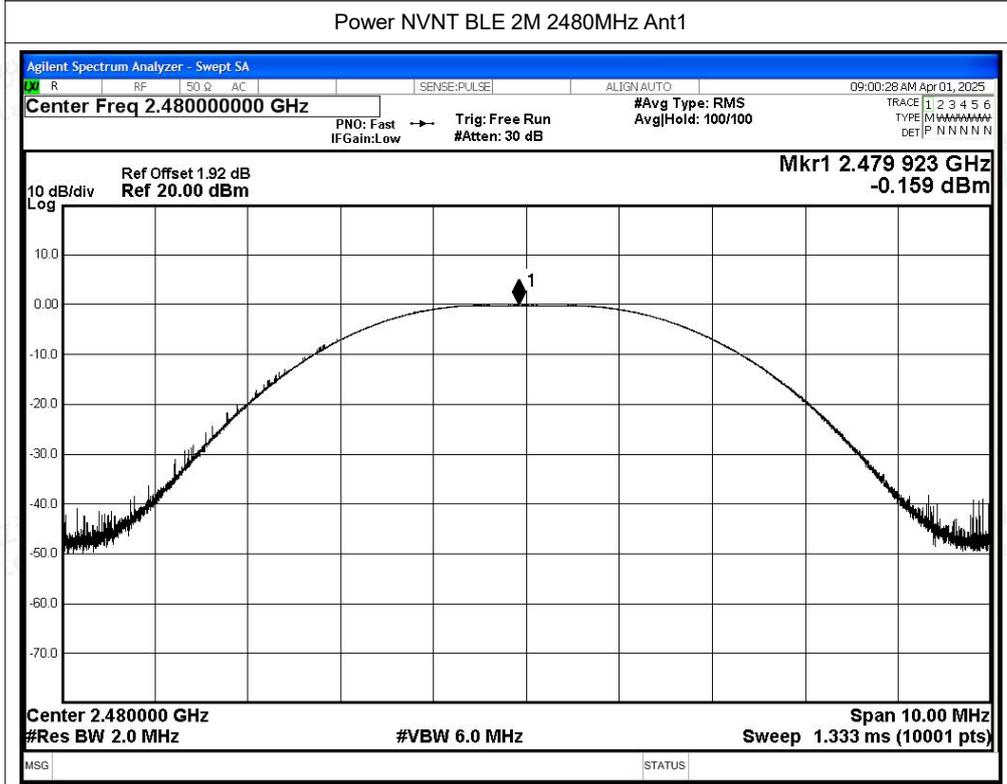
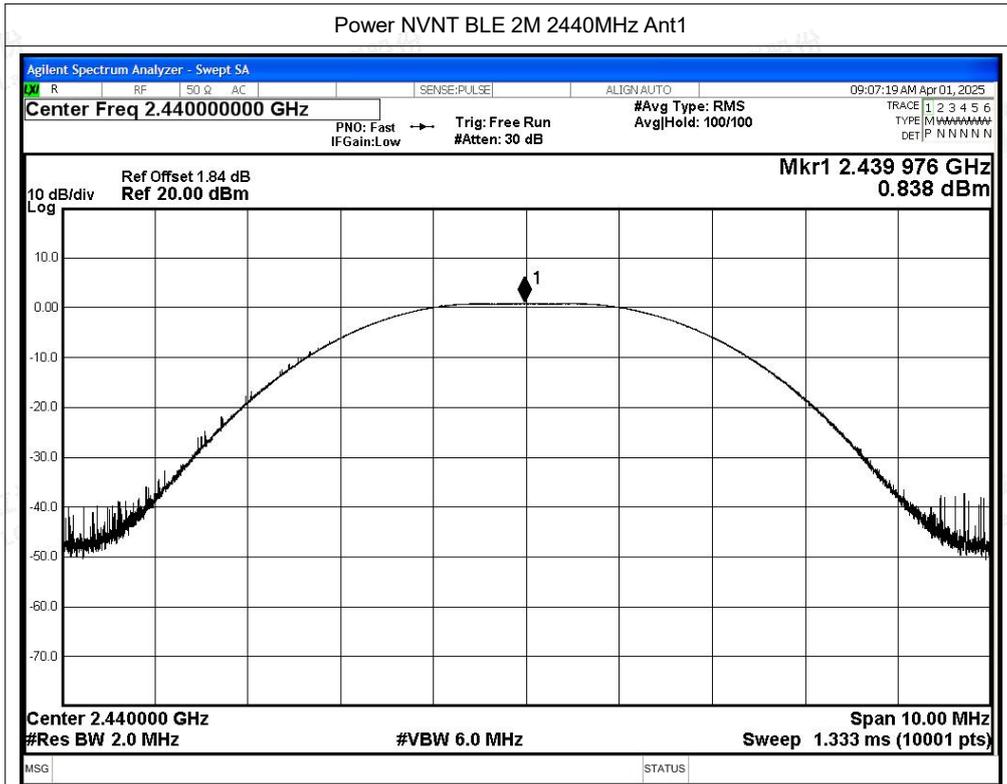
Power NVNT BLE 1M 2402MHz Ant1



Power NVNT BLE 1M 2440MHz Ant1









A.3 Maximum Power Spectral Density Level

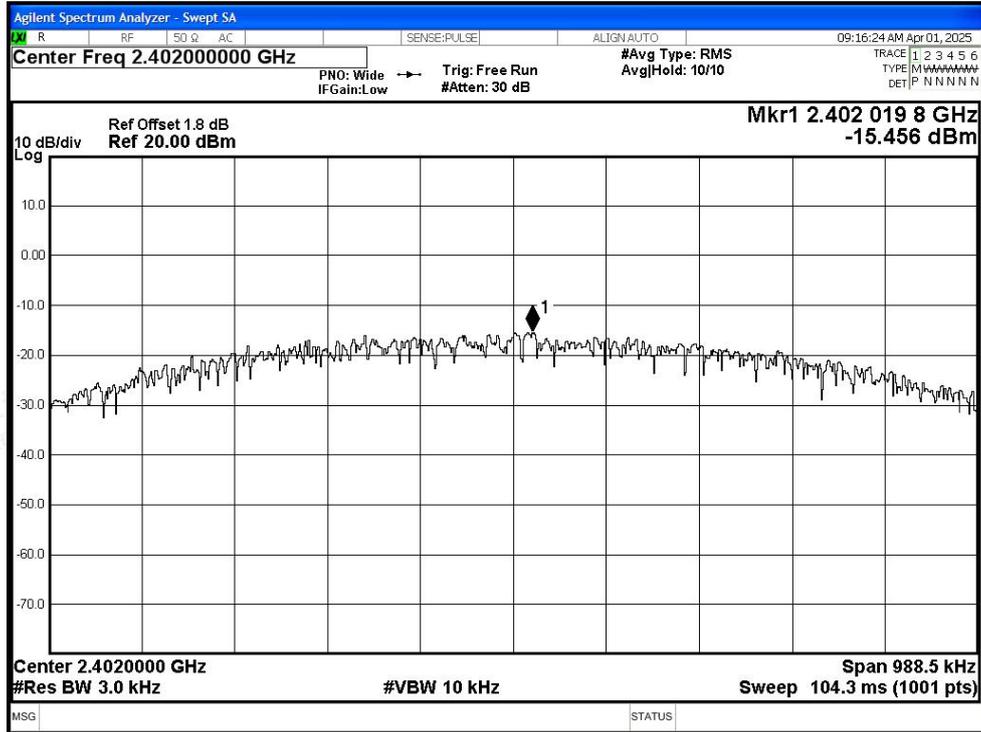
Condition	Mode	Frequency (MHz)	Antenna	Conducted PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	BLE 1M	2402	Ant1	-15.46	8	Pass
NVNT	BLE 1M	2440	Ant1	-15.53	8	Pass
NVNT	BLE 1M	2480	Ant1	-16.58	8	Pass
NVNT	BLE 2M	2402	Ant1	-18.73	8	Pass
NVNT	BLE 2M	2440	Ant1	-19.15	8	Pass
NVNT	BLE 2M	2480	Ant1	-20.05	8	Pass



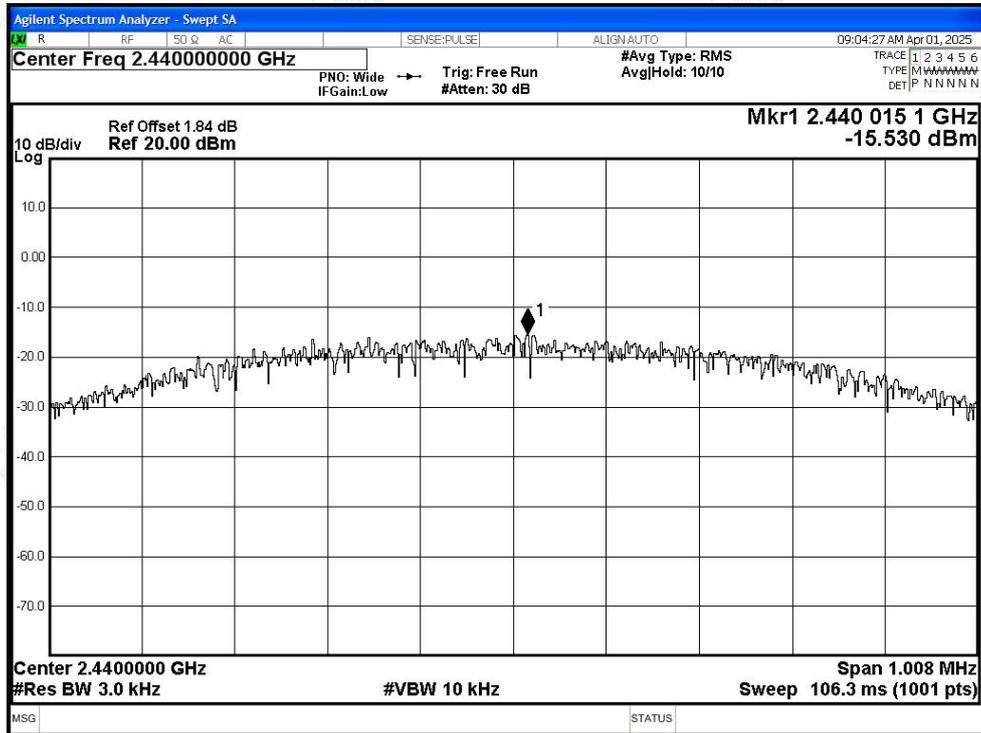


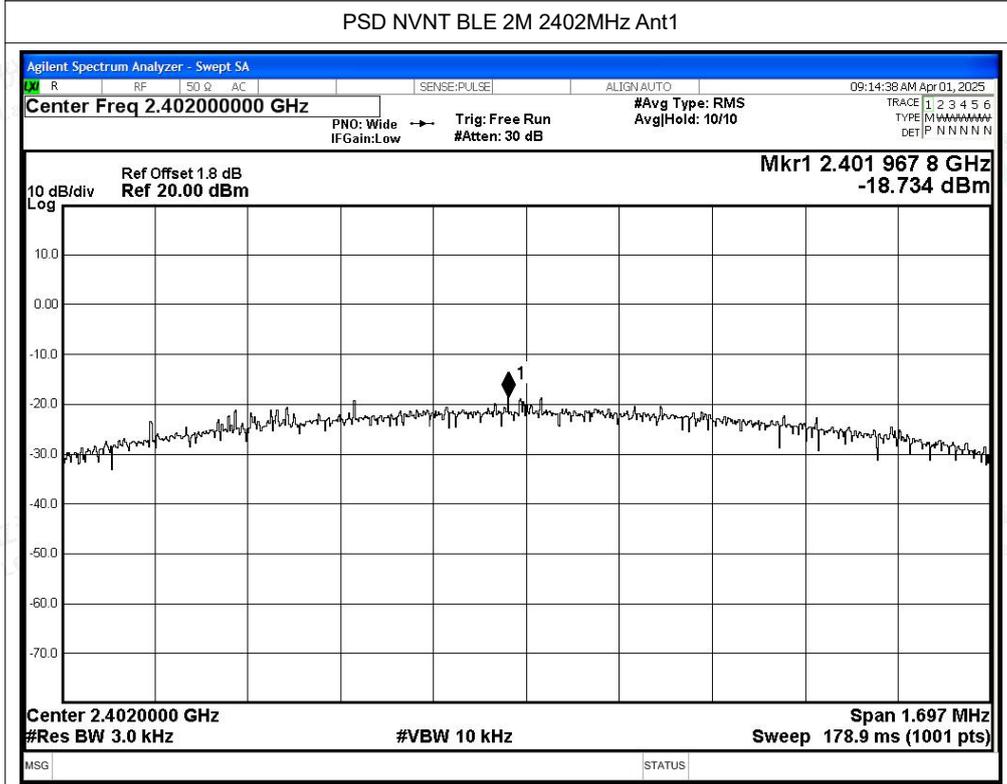
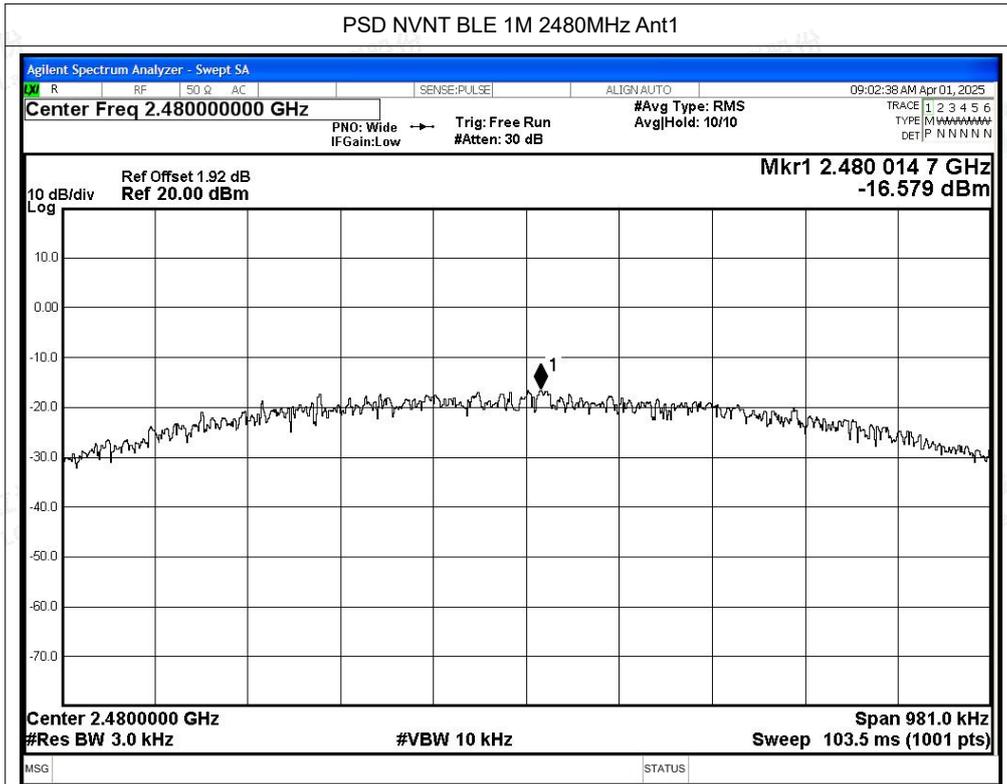
Test Graphs

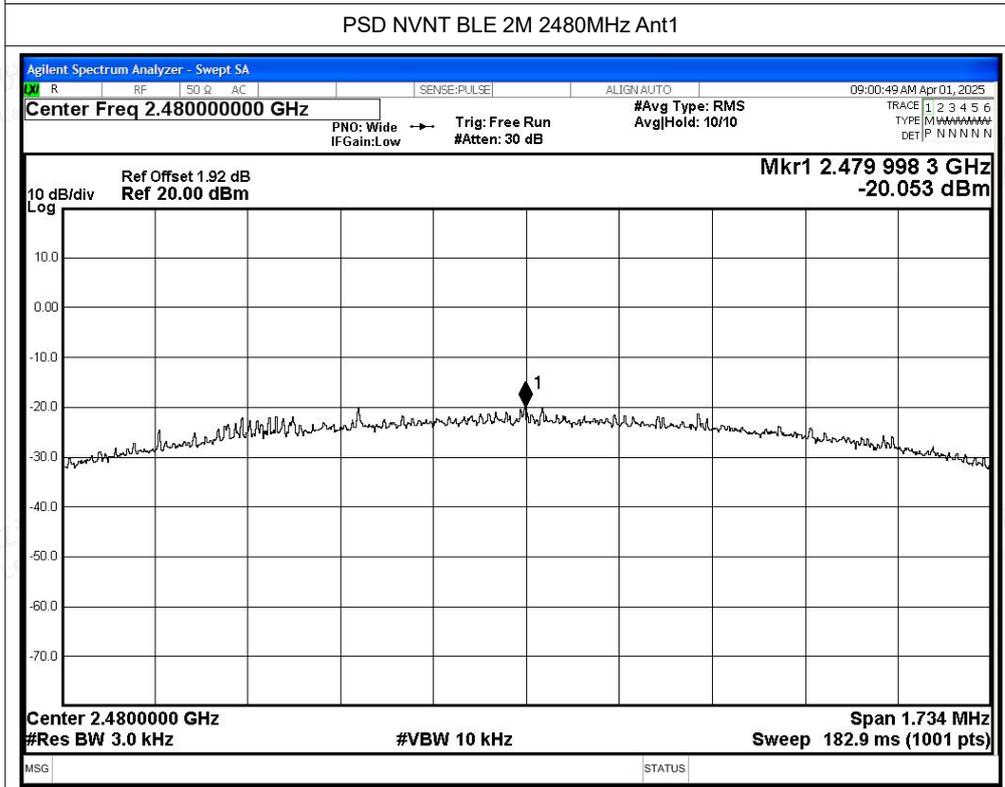
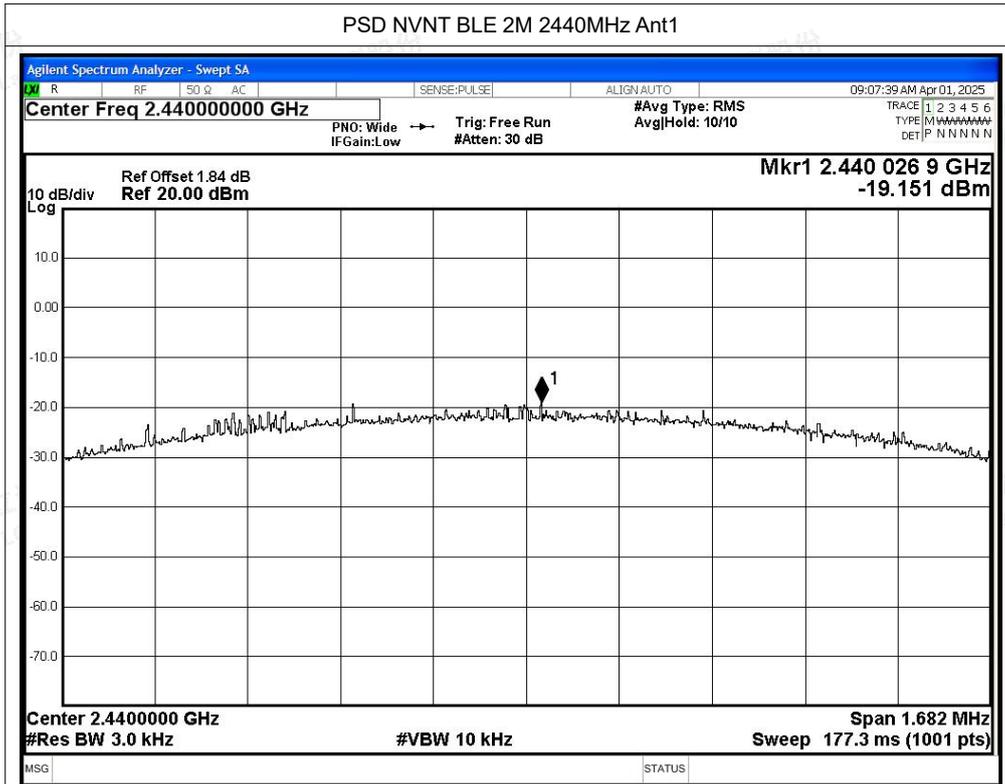
PSD NVNT BLE 1M 2402MHz Ant1



PSD NVNT BLE 1M 2440MHz Ant1









A.4 Band Edge

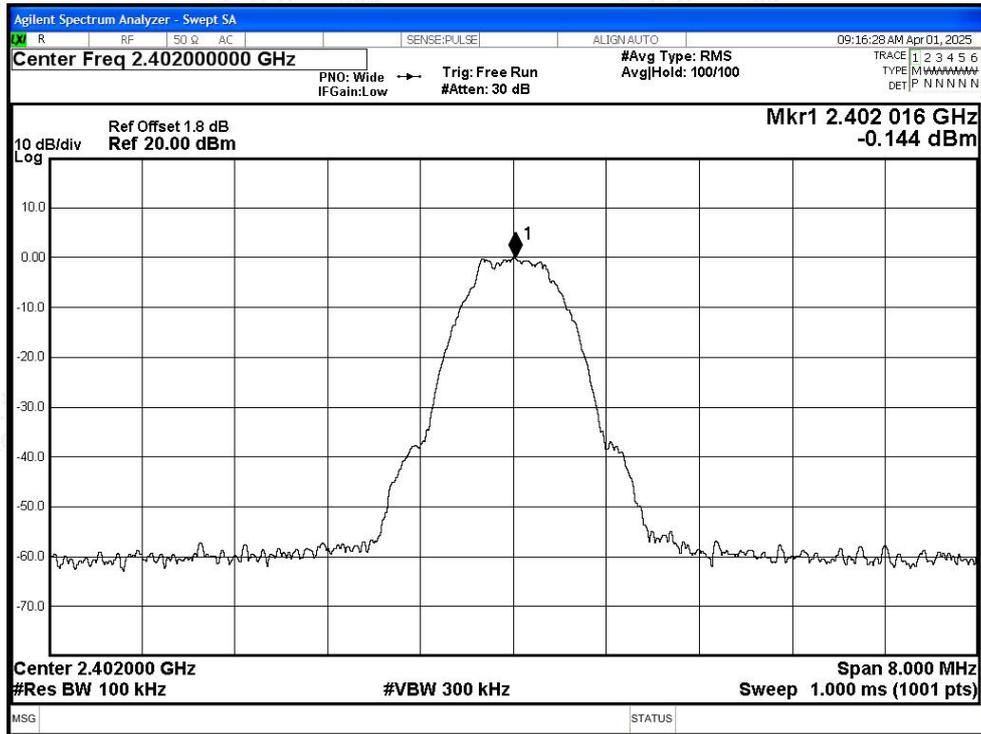
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-56.74	-20	Pass
NVNT	BLE 1M	2480	Ant1	-56.35	-20	Pass
NVNT	BLE 2M	2402	Ant1	-45.41	-20	Pass
NVNT	BLE 2M	2480	Ant1	-56.17	-20	Pass



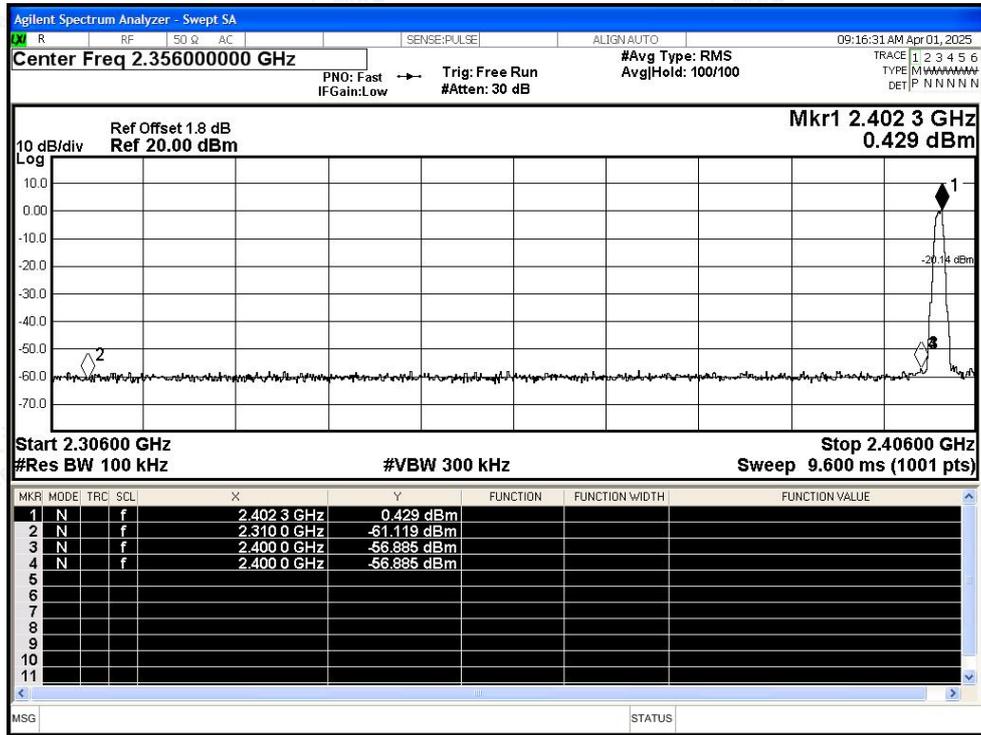


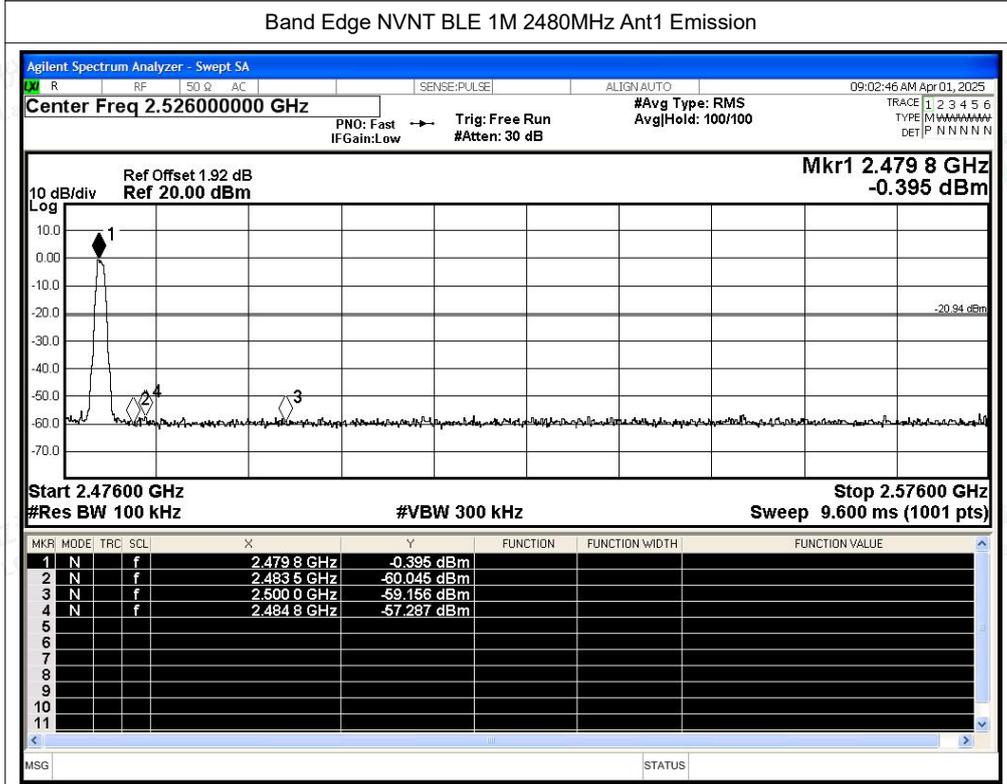
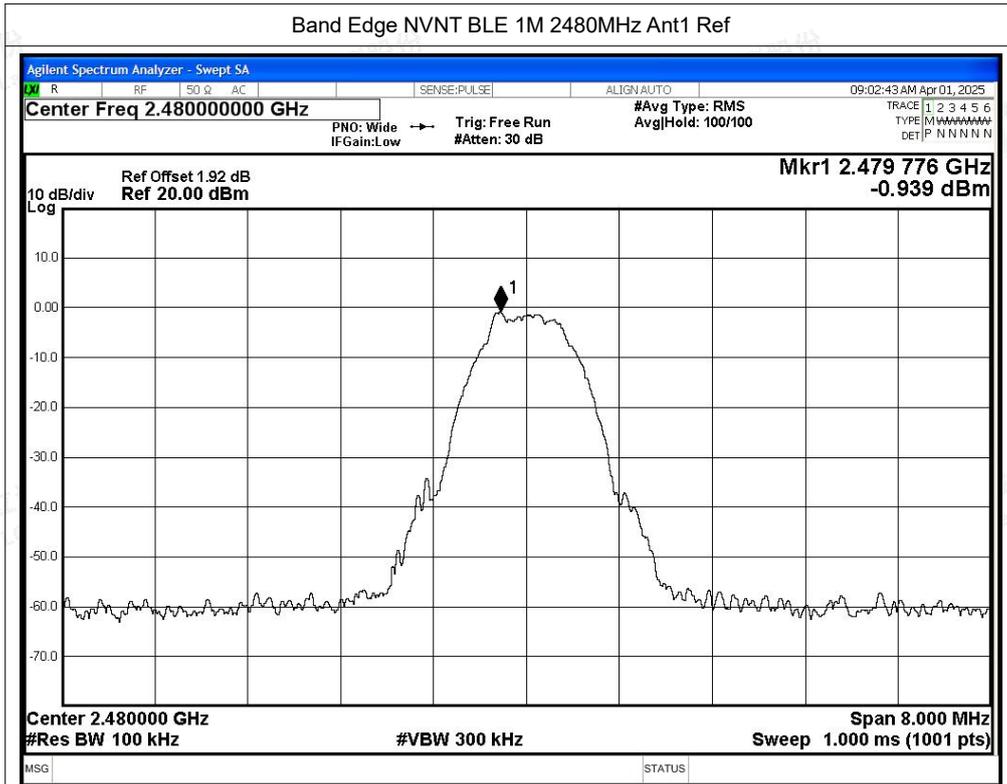
Test Graphs

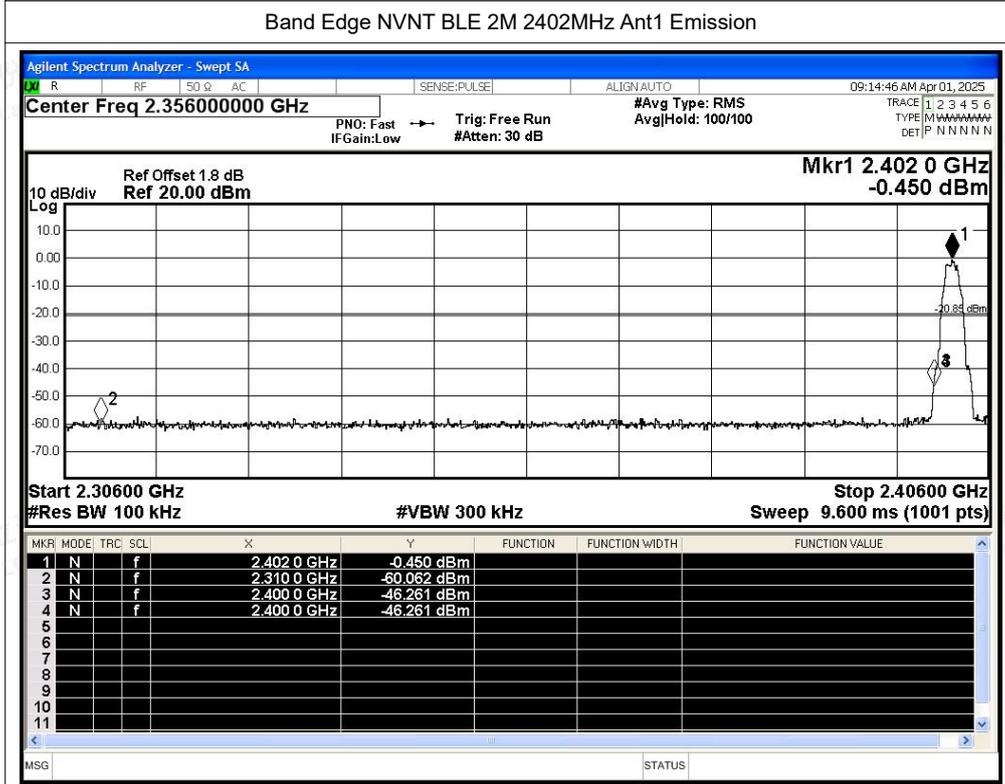
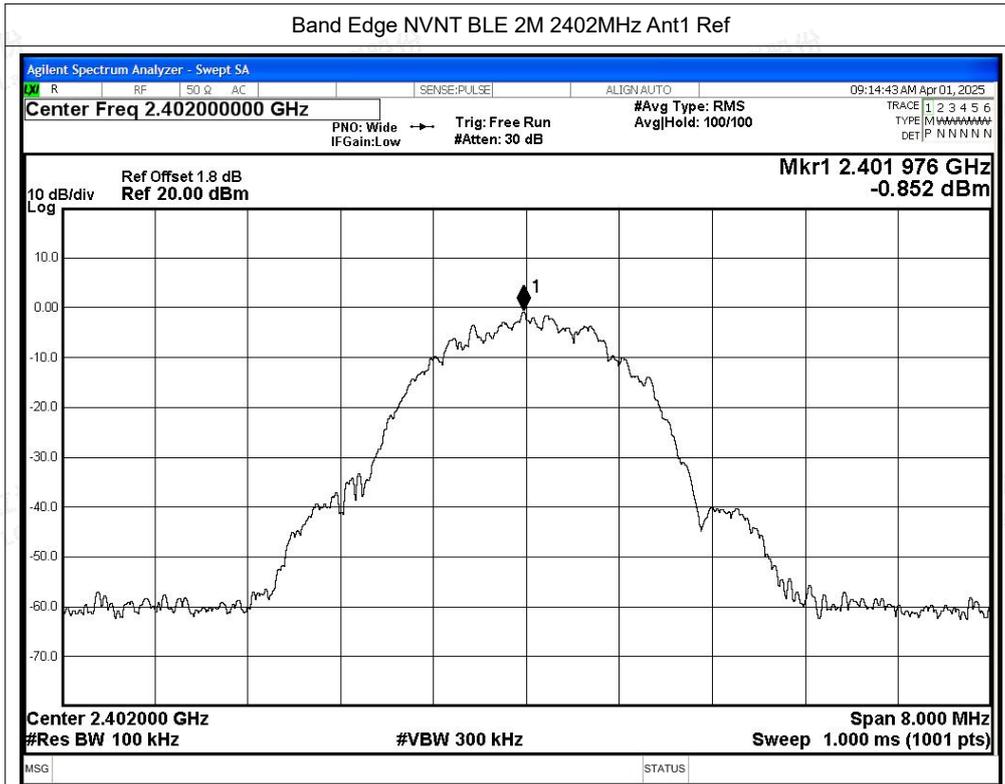
Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



Band Edge NVNT BLE 1M 2402MHz Ant1 Emission

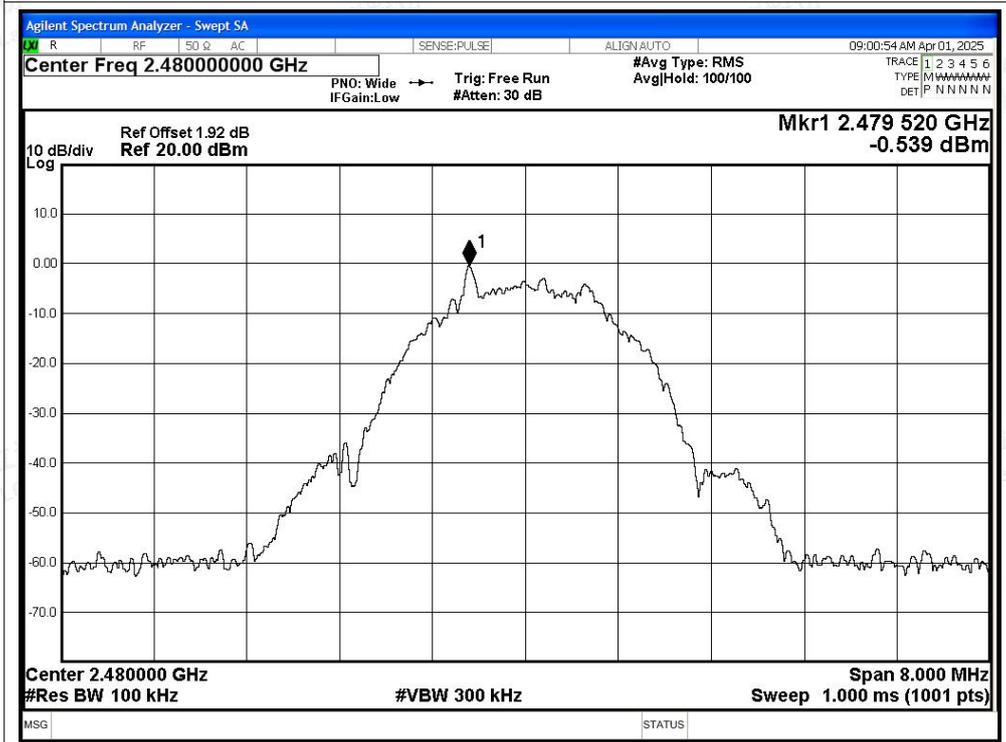




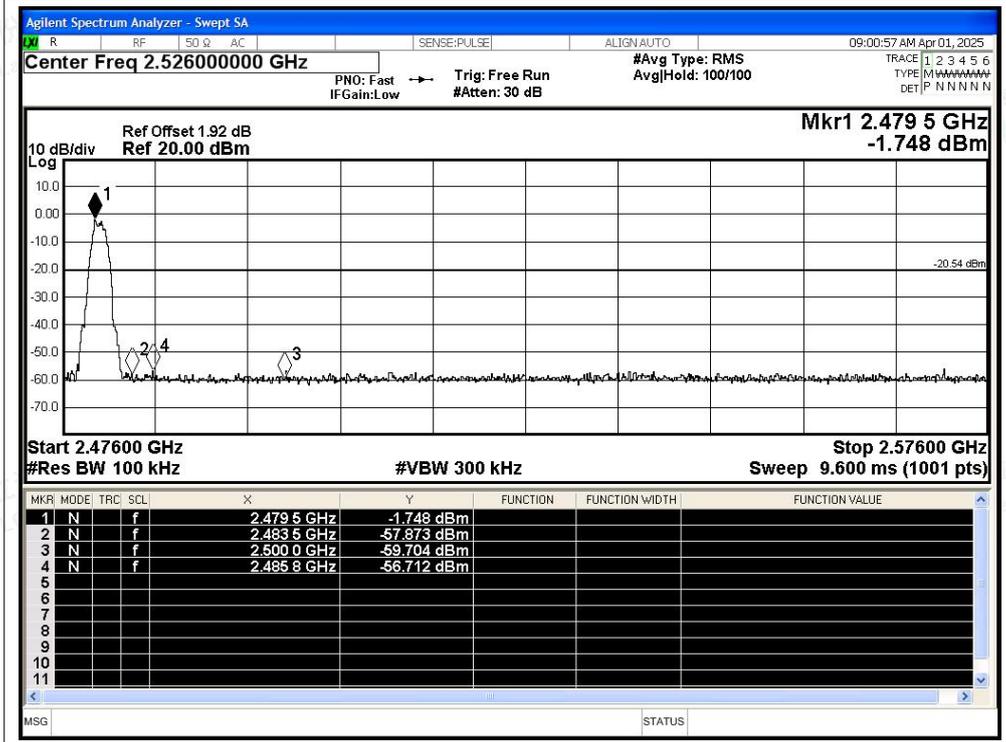




Band Edge NVNT BLE 2M 2480MHz Ant1 Ref



Band Edge NVNT BLE 2M 2480MHz Ant1 Emission





A.5 Conducted RF Spurious Emission

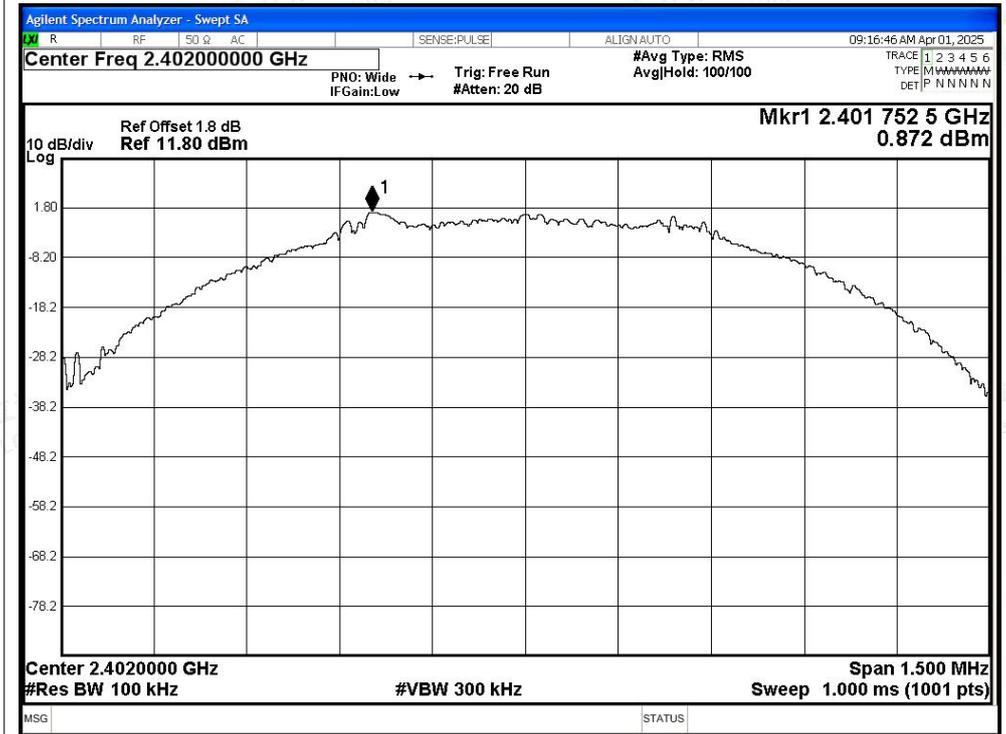
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-56.58	-20	Pass
NVNT	BLE 1M	2440	Ant1	-55.43	-20	Pass
NVNT	BLE 1M	2480	Ant1	-55.39	-20	Pass
NVNT	BLE 2M	2402	Ant1	-55.83	-20	Pass
NVNT	BLE 2M	2440	Ant1	-54.19	-20	Pass
NVNT	BLE 2M	2480	Ant1	-54.87	-20	Pass



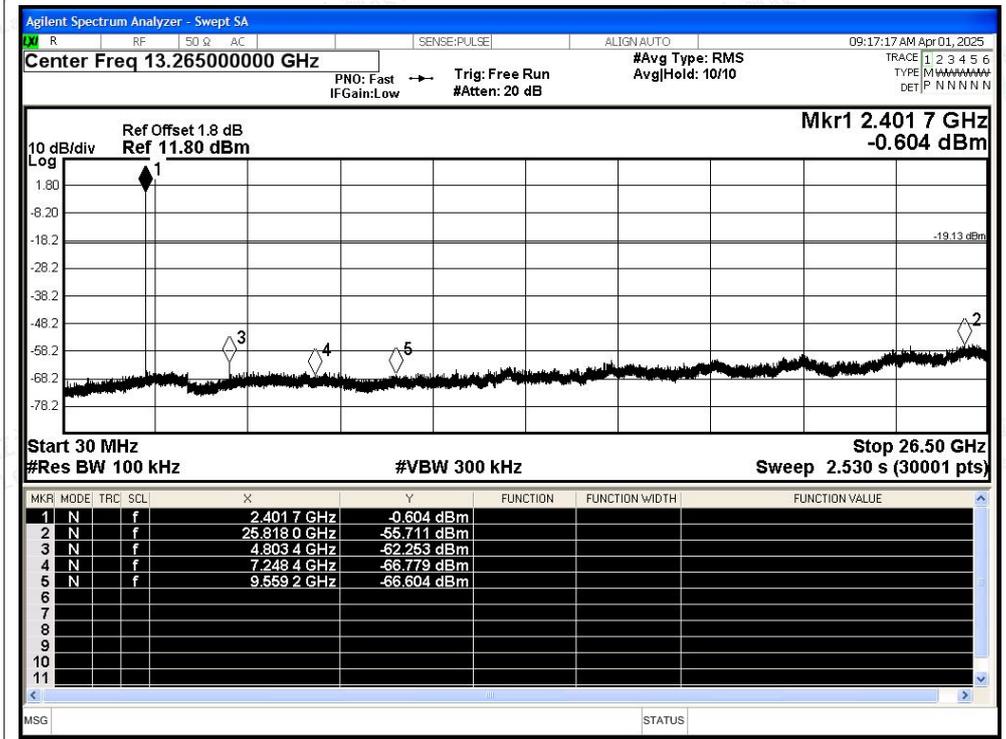


Test Graphs

Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref

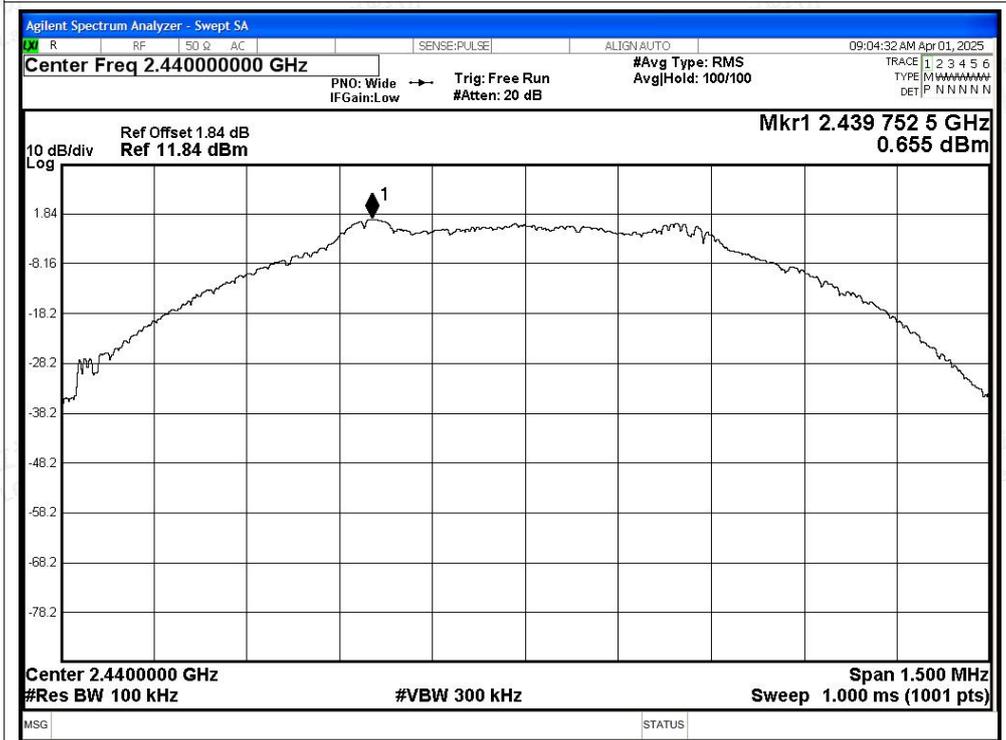


Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission

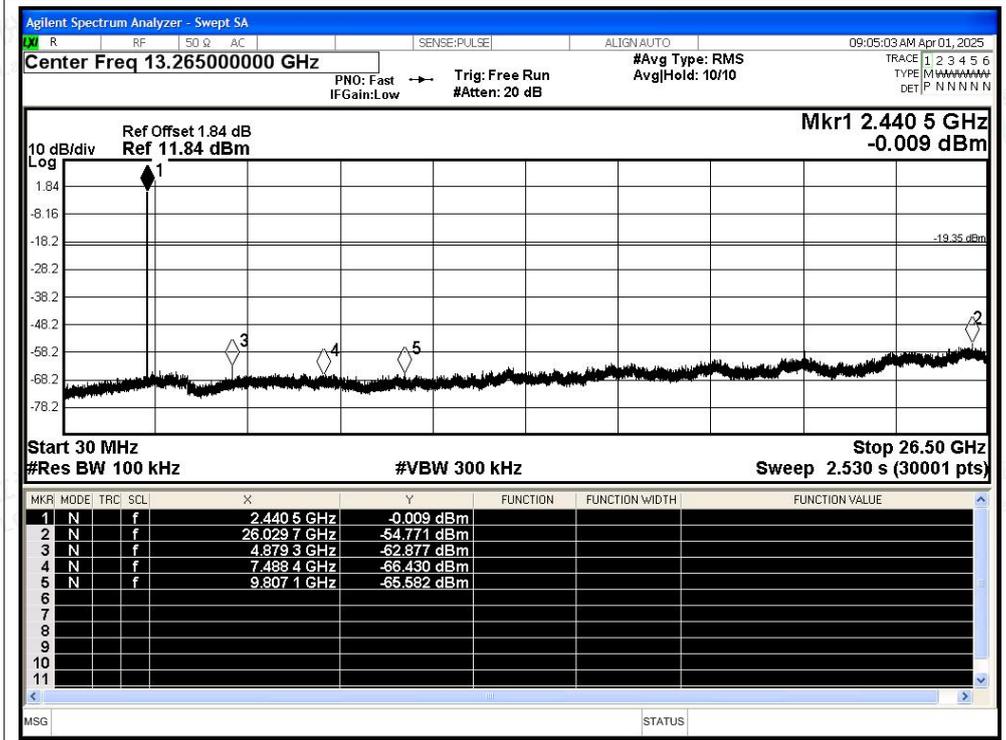




Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Ref

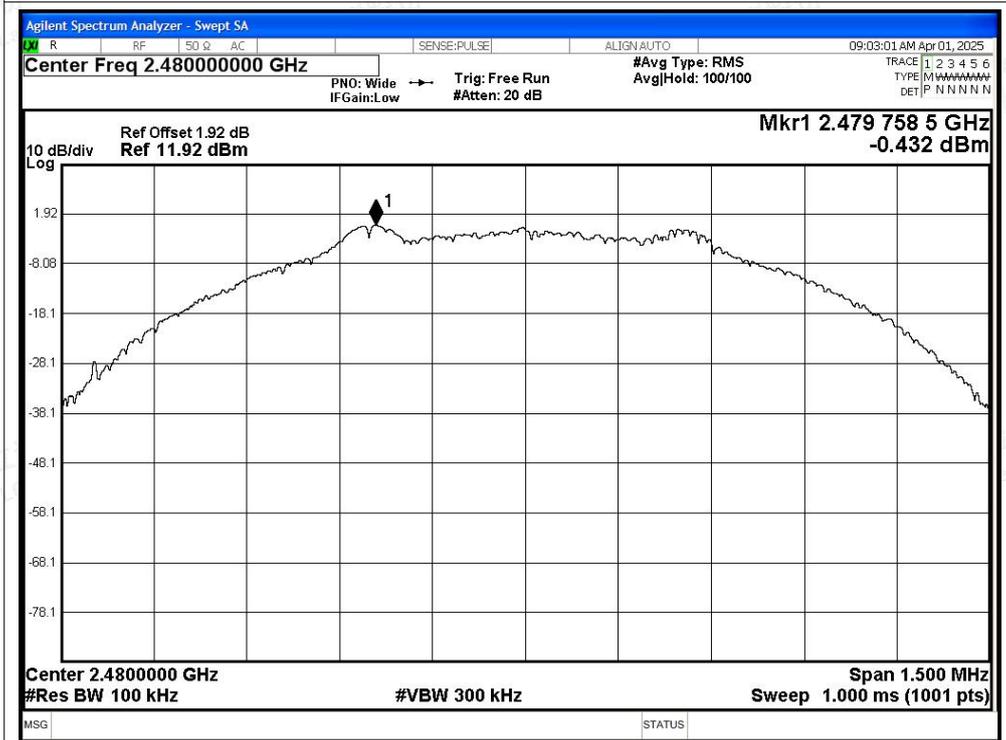


Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission

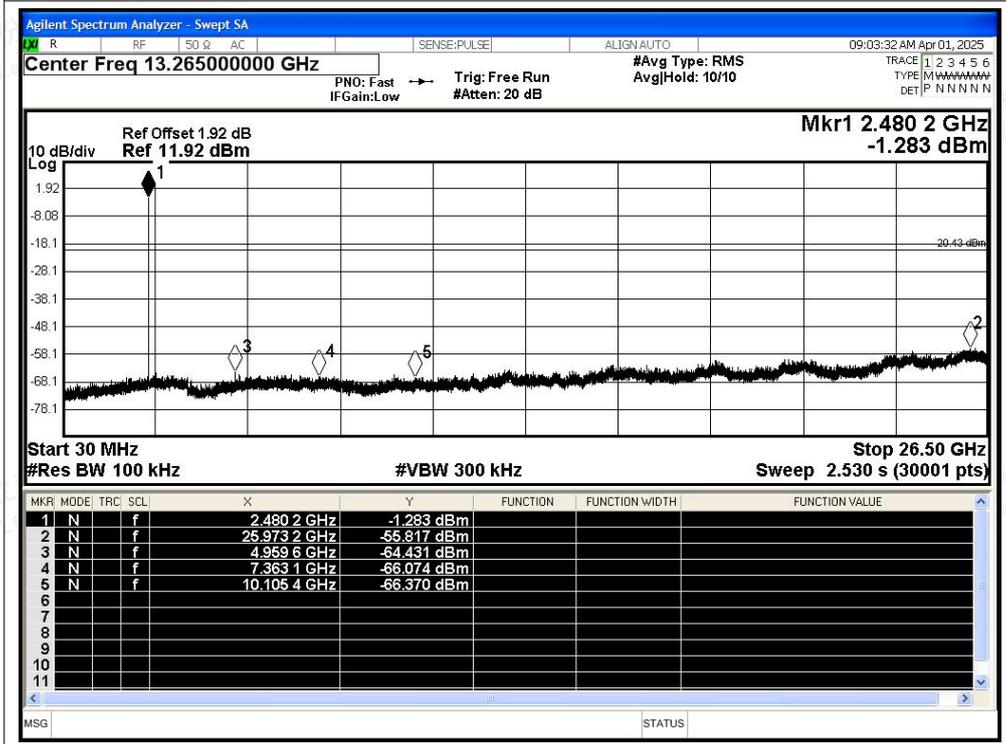




Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission

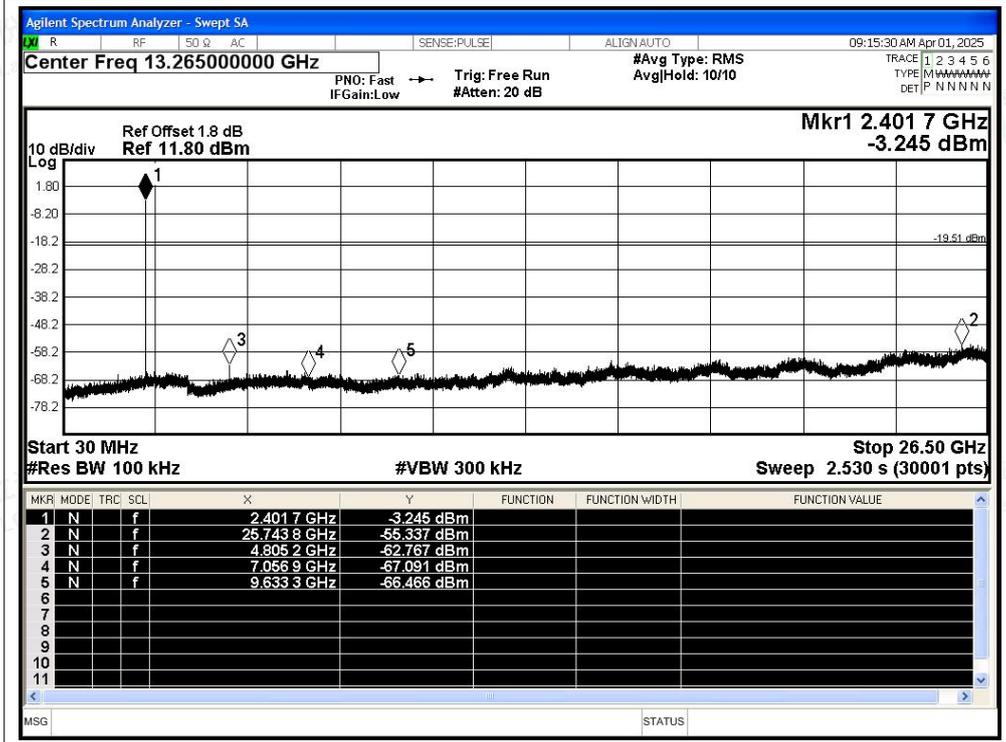




Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Ref



Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Emission

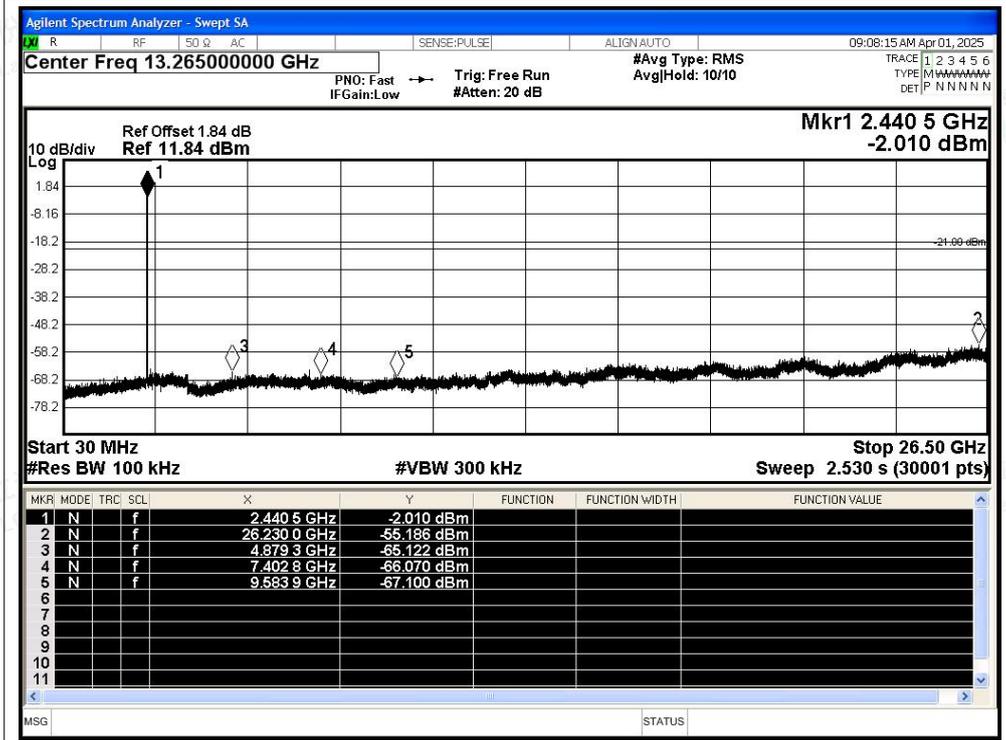




Tx. Spurious NVNT BLE 2M 2440MHz Ant1 Ref



Tx. Spurious NVNT BLE 2M 2440MHz Ant1 Emission

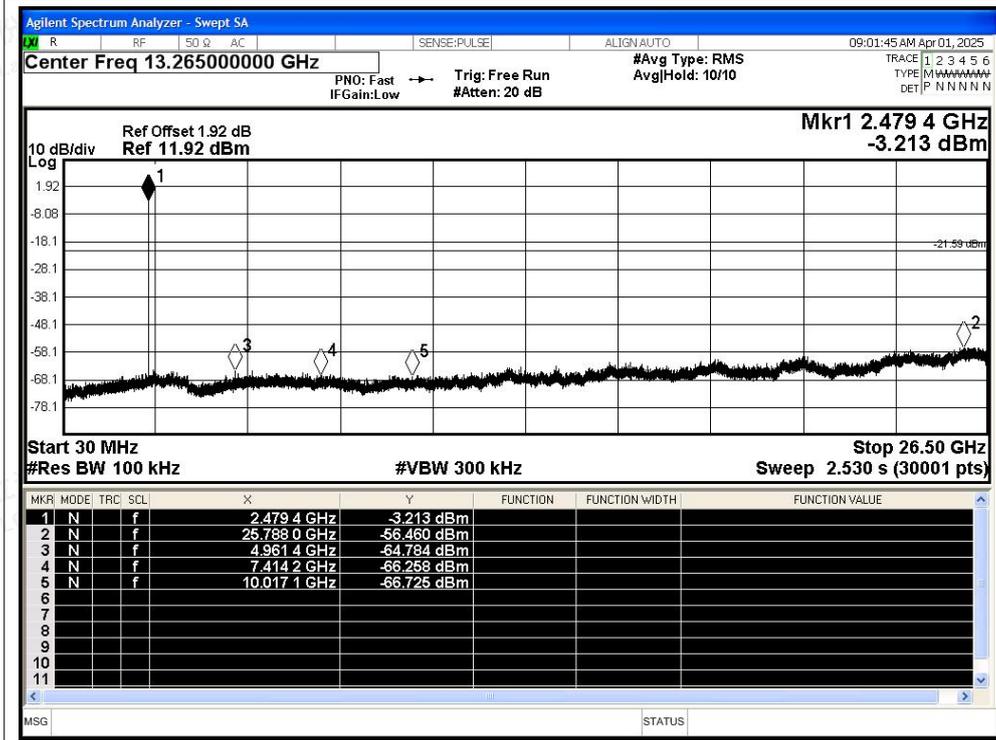




Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Ref



Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Emission





A.6 Duty Cycle

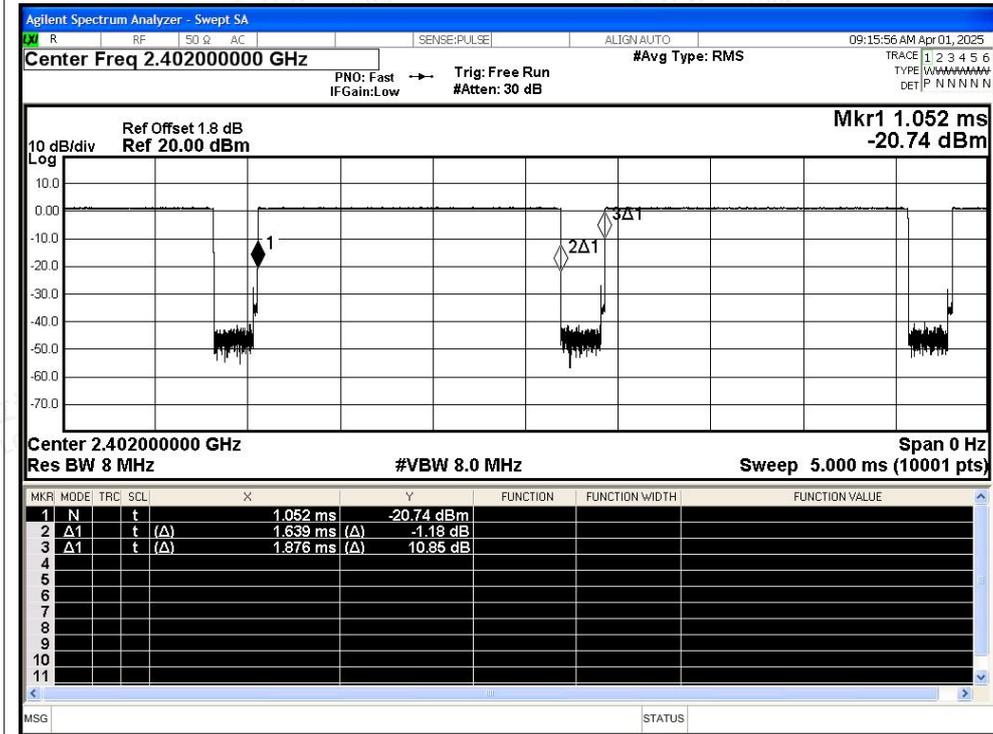
Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	BLE 1M	2402	Ant1	87.39	0.59	0.61
NVNT	BLE 1M	2440	Ant1	87.39	0.59	0.61
NVNT	BLE 1M	2480	Ant1	87.39	0.59	0.61
NVNT	BLE 2M	2402	Ant1	66	1.8	1.21
NVNT	BLE 2M	2440	Ant1	65.96	1.81	1.21
NVNT	BLE 2M	2480	Ant1	65.92	1.81	1.21



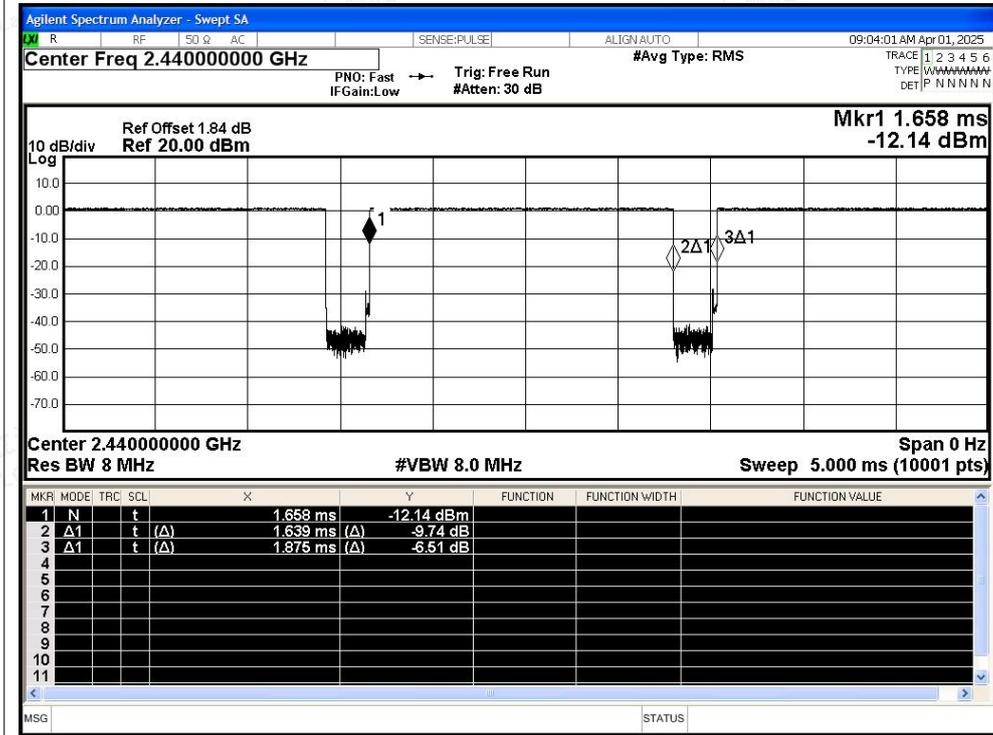


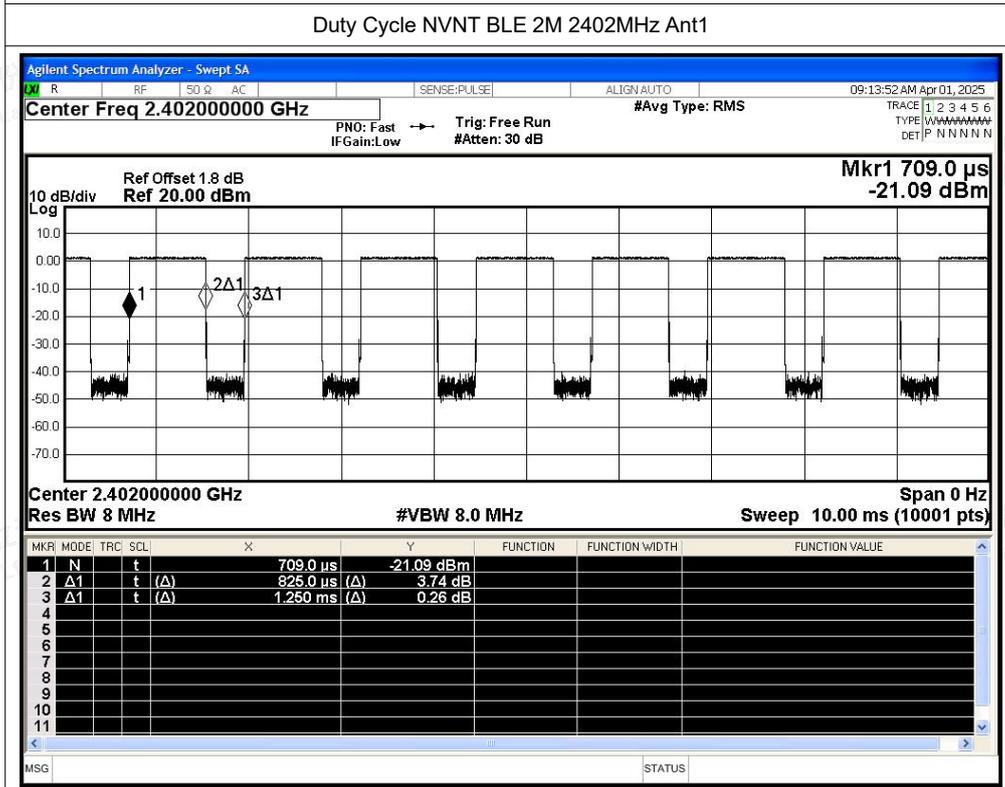
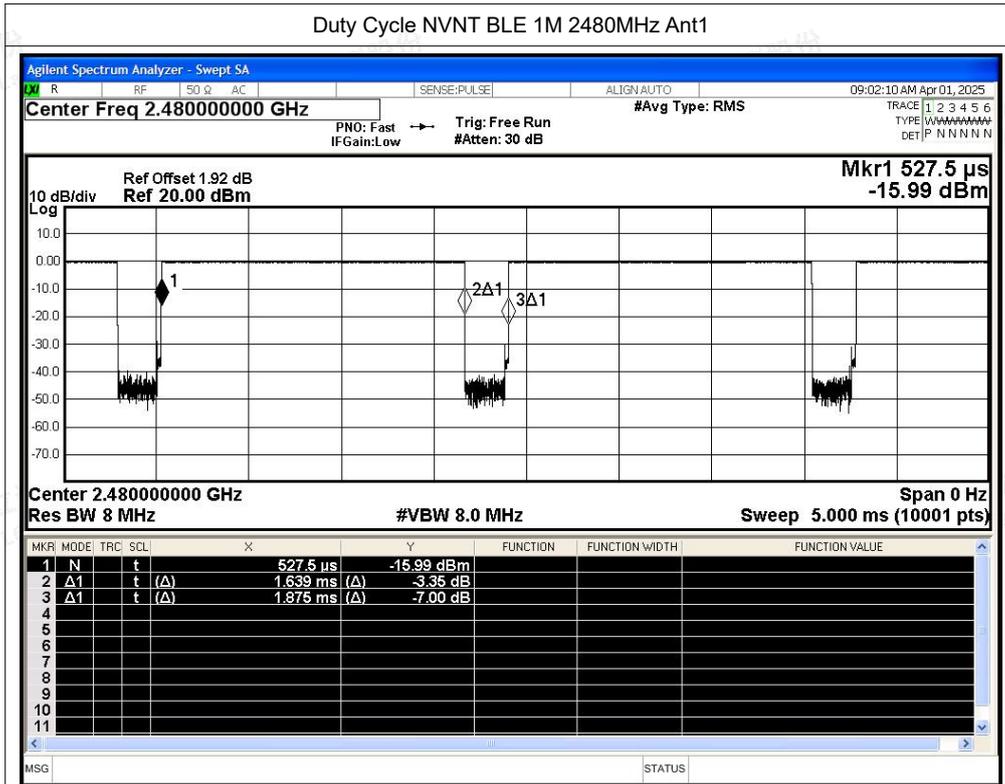
Test Graphs

Duty Cycle NVNT BLE 1M 2402MHz Ant1



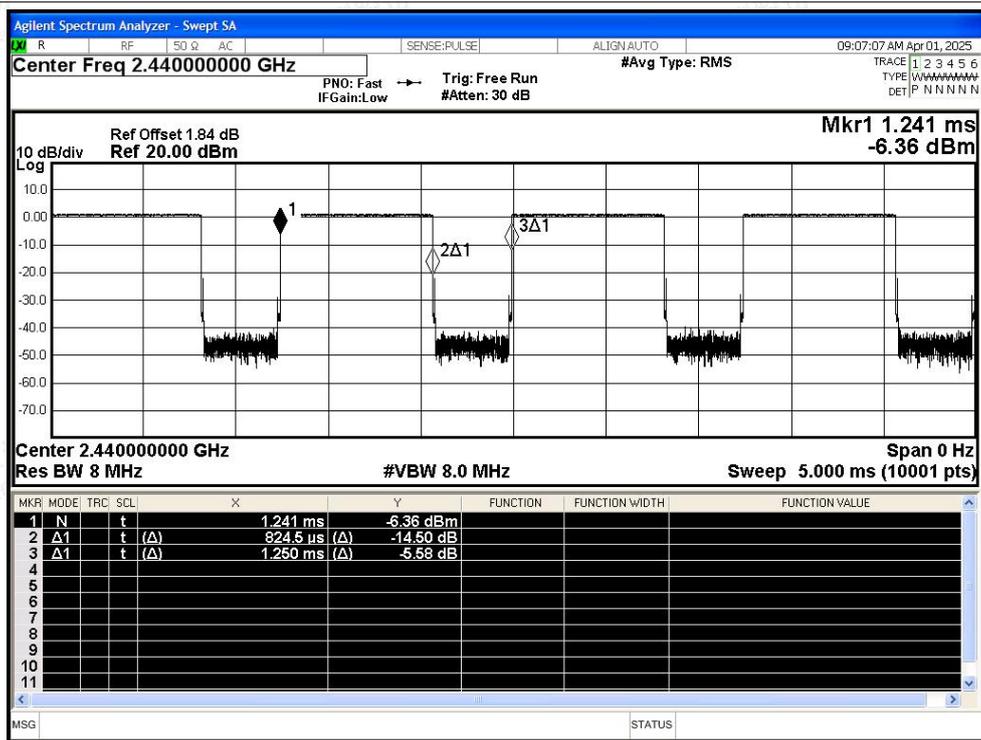
Duty Cycle NVNT BLE 1M 2440MHz Ant1



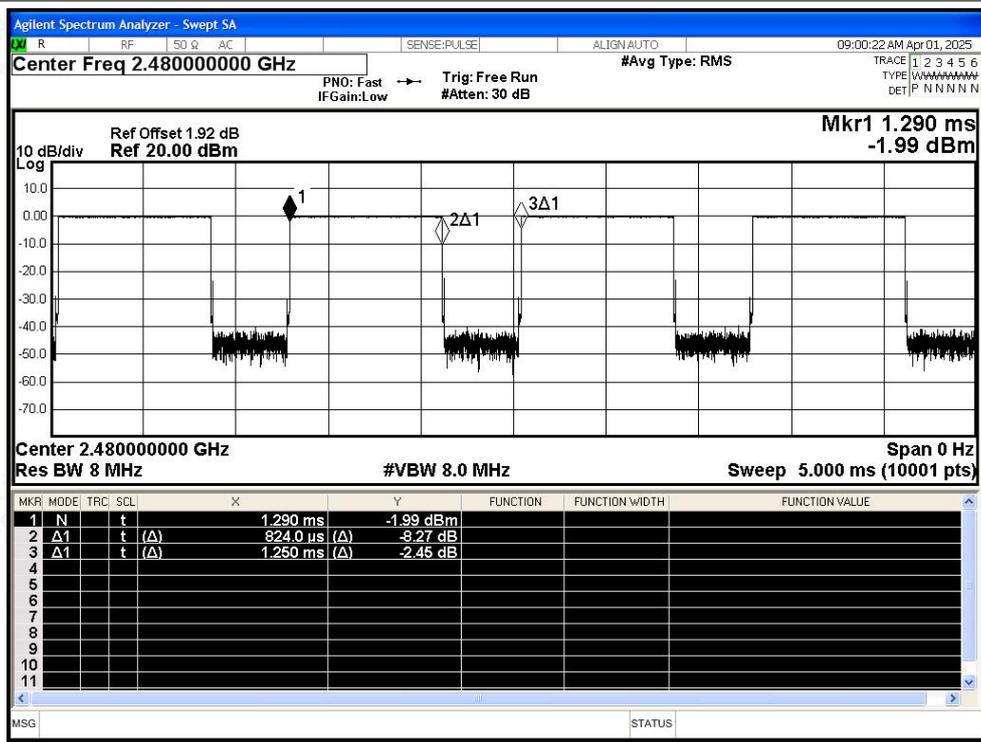




Duty Cycle NVNT BLE 2M 2440MHz Ant1



Duty Cycle NVNT BLE 2M 2480MHz Ant1





A.7 Restrict Band

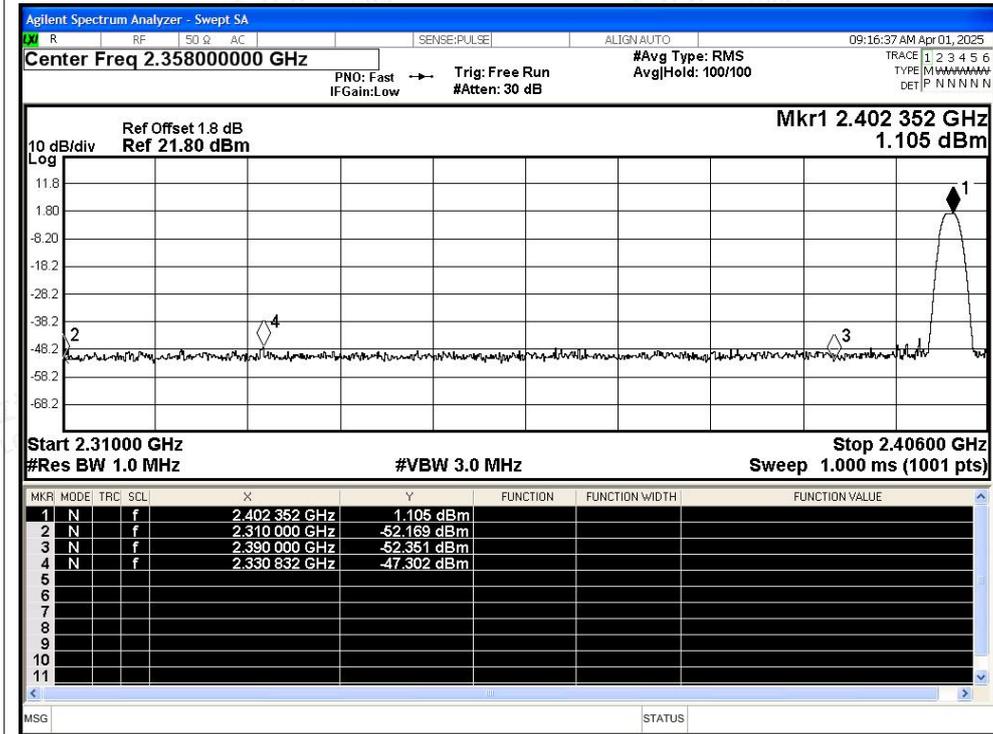
Condition	Mode	Frequency (MHz)	Antenna	Spur Freq (MHz)	Power (dBm)	Gain (dBi)	Duty Factor (dB)	E (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
NVNT	BLE 1M	2402	Ant1	2310	-52.17	3.2	-	46.29	Peak	74	Pass
NVNT	BLE 1M	2402	Ant1	2310	-59.03	3.2	0.59	40.02	Average	54	Pass
NVNT	BLE 1M	2402	Ant1	2330.832	-47.3	3.2	-	51.16	Peak	74	Pass
NVNT	BLE 1M	2402	Ant1	2365.968	-58.27	3.2	0.59	40.78	Average	54	Pass
NVNT	BLE 1M	2402	Ant1	2390	-52.35	3.2	-	46.11	Peak	74	Pass
NVNT	BLE 1M	2402	Ant1	2390	-58.93	3.2	0.59	40.12	Average	54	Pass
NVNT	BLE 1M	2480	Ant1	2483.5	-47.2	3.2	-	51.26	Peak	74	Pass
NVNT	BLE 1M	2480	Ant1	2483.5	-57.87	3.2	0.59	41.18	Average	54	Pass
NVNT	BLE 1M	2480	Ant1	2484.28	-46.19	3.2	-	52.27	Peak	74	Pass
NVNT	BLE 1M	2480	Ant1	2484.088	-57.66	3.2	0.59	41.39	Average	54	Pass
NVNT	BLE 1M	2480	Ant1	2500	-49.69	3.2	-	48.77	Peak	74	Pass
NVNT	BLE 1M	2480	Ant1	2500	-58.04	3.2	0.59	41.01	Average	54	Pass
NVNT	BLE 2M	2402	Ant1	2310	-49.71	3.2	-	48.75	Peak	74	Pass
NVNT	BLE 2M	2402	Ant1	2310	-59.03	3.2	1.8	41.23	Average	54	Pass
NVNT	BLE 2M	2402	Ant1	2349.36	-48.26	3.2	-	50.20	Peak	74	Pass
NVNT	BLE 2M	2402	Ant1	2340.432	-57.92	3.2	1.8	42.34	Average	54	Pass
NVNT	BLE 2M	2402	Ant1	2390	-51.82	3.2	-	46.64	Peak	74	Pass
NVNT	BLE 2M	2402	Ant1	2390	-58.61	3.2	1.8	41.65	Average	54	Pass
NVNT	BLE 2M	2480	Ant1	2483.5	-50.16	3.2	-	48.30	Peak	74	Pass
NVNT	BLE 2M	2480	Ant1	2483.5	-57.91	3.2	1.81	42.36	Average	54	Pass
NVNT	BLE 2M	2480	Ant1	2487.016	-44.44	3.2	-	54.02	Peak	74	Pass
NVNT	BLE 2M	2480	Ant1	2485.552	-57.11	3.2	1.81	43.16	Average	54	Pass
NVNT	BLE 2M	2480	Ant1	2500	-49.99	3.2	-	48.47	Peak	74	Pass
NVNT	BLE 2M	2480	Ant1	2500	-58.23	3.2	1.81	42.04	Average	54	Pass



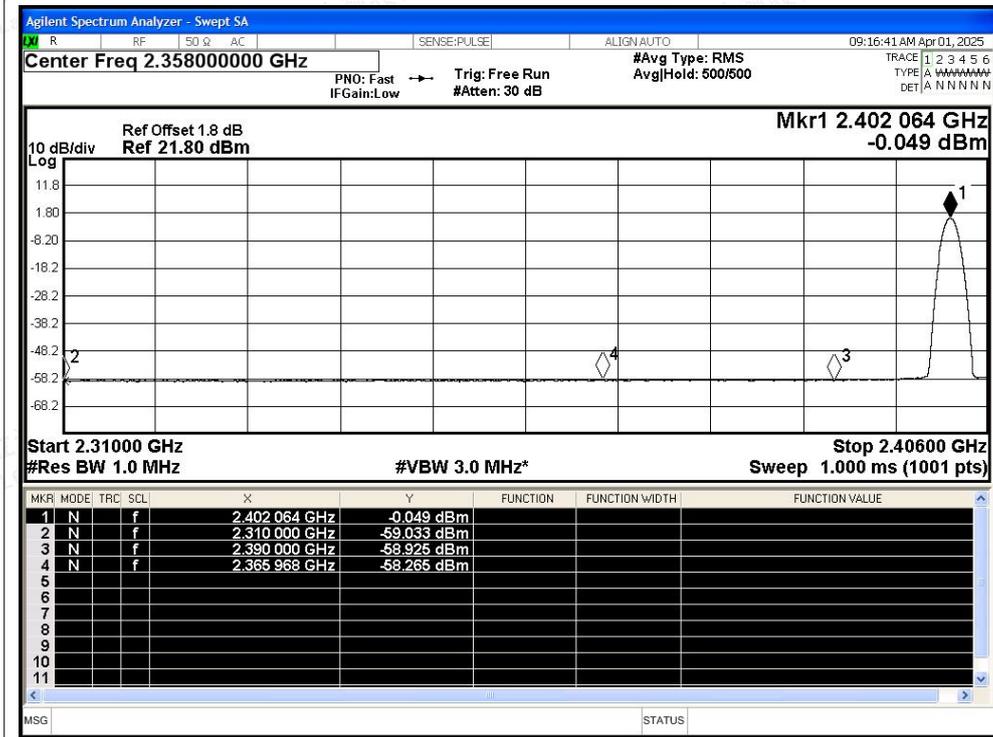


Test Graphs

Restrict Band NVNT BLE 1M 2402MHz Ant1 Peak

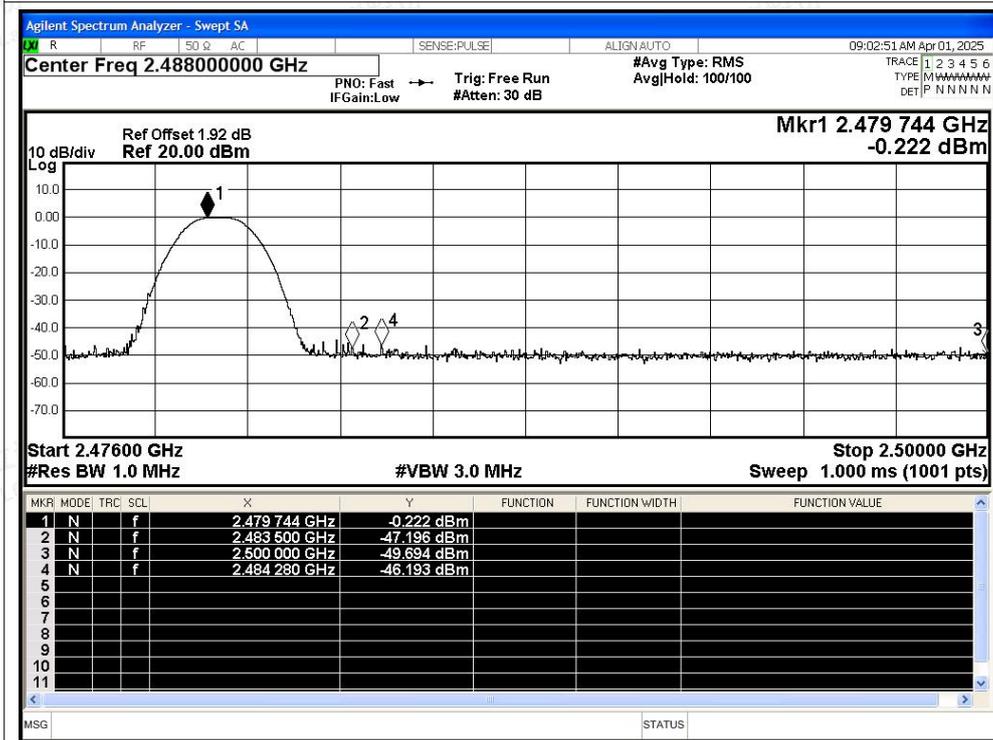


Restrict Band NVNT BLE 1M 2402MHz Ant1 Average

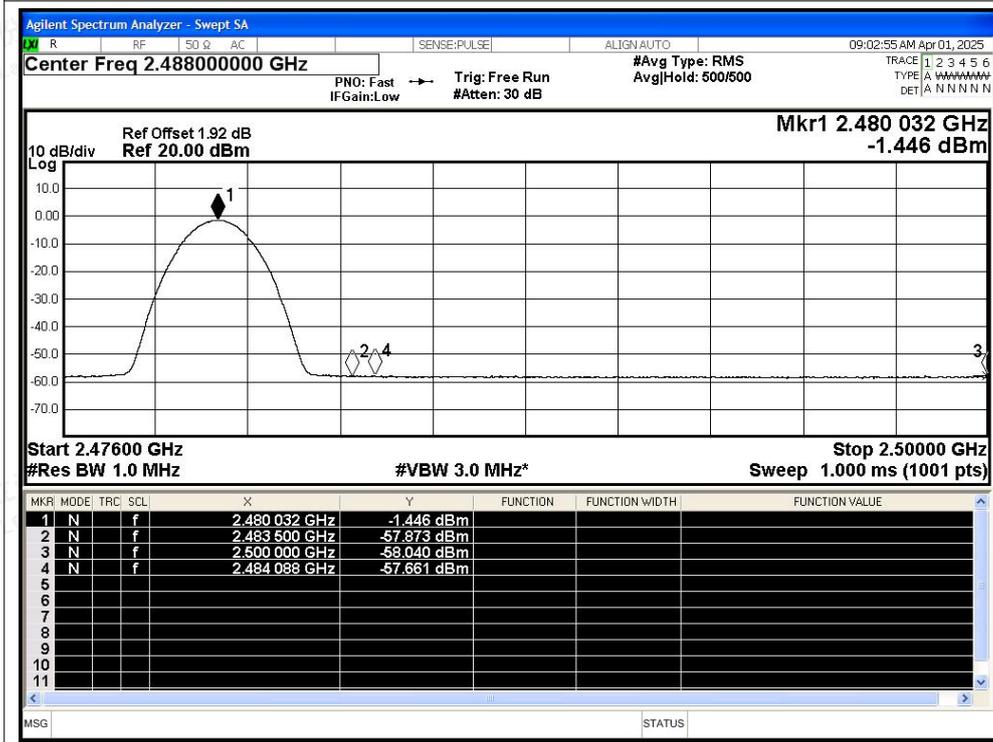




Restrict Band NVNT BLE 1M 2480MHz Ant1 Peak

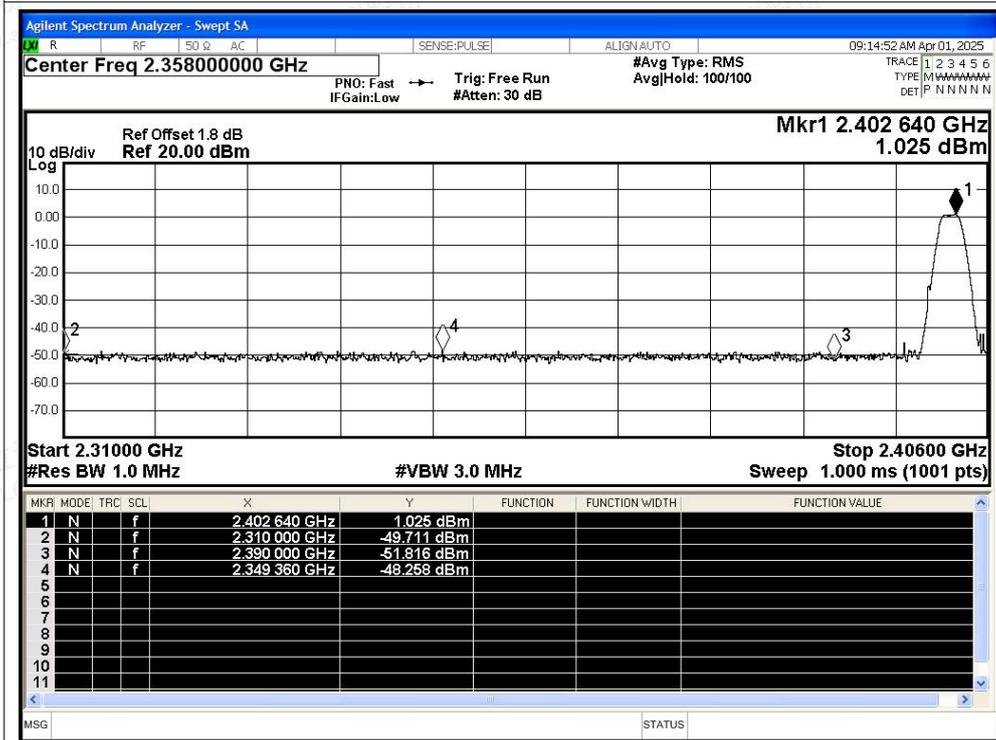


Restrict Band NVNT BLE 1M 2480MHz Ant1 Average

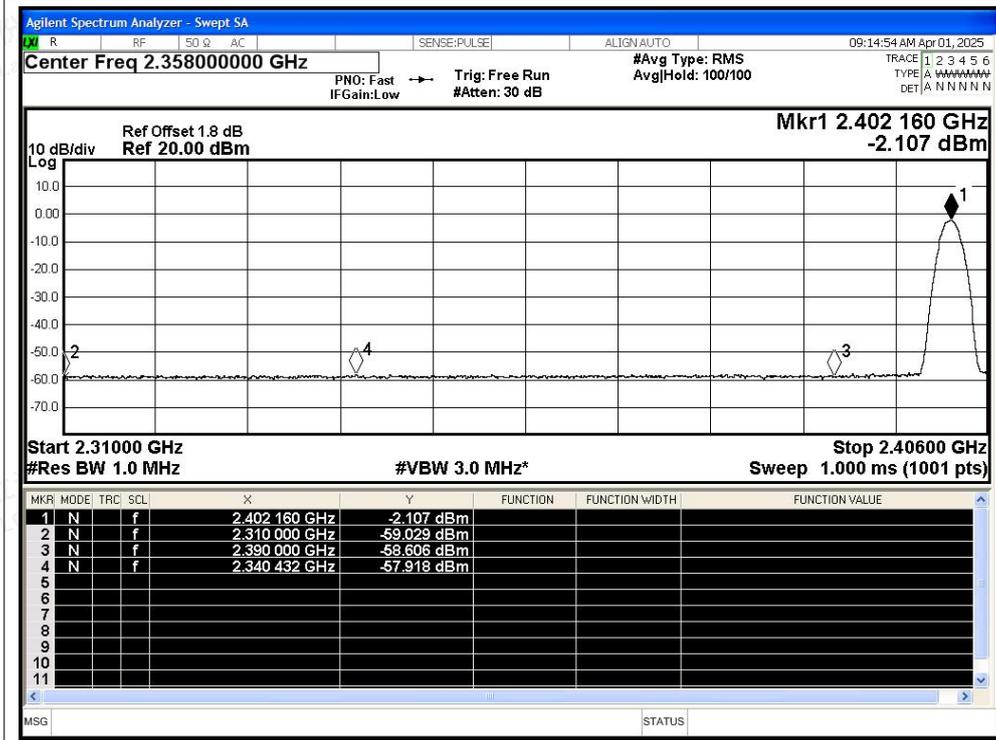




Restrict Band NVNT BLE 2M 2402MHz Ant1 Peak

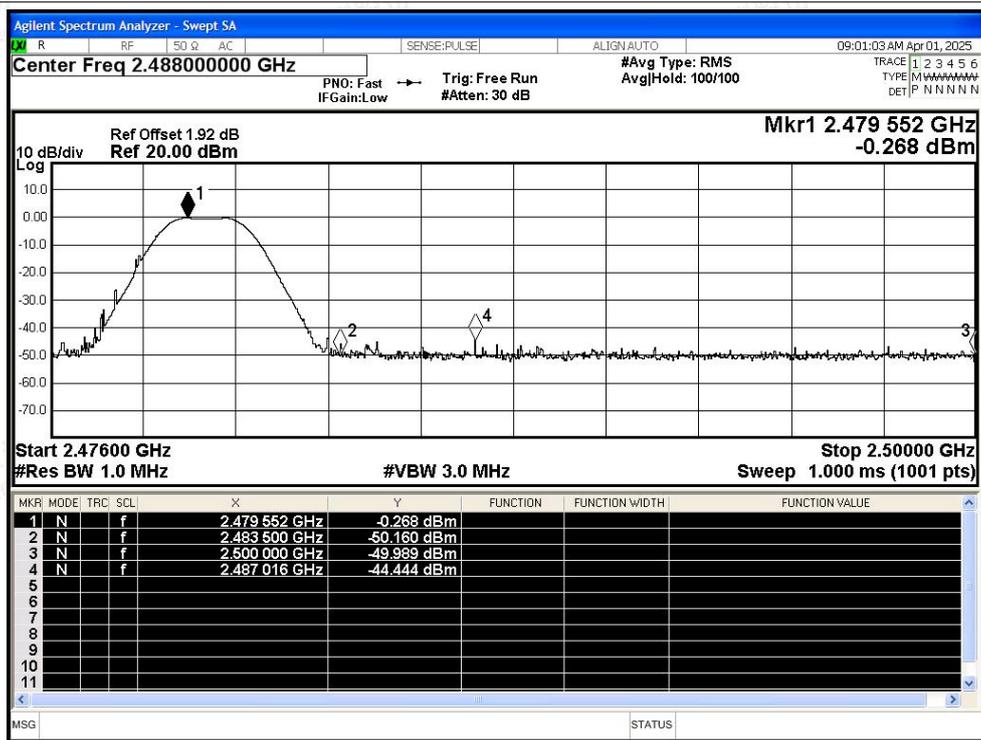


Restrict Band NVNT BLE 2M 2402MHz Ant1 Average





Restrict Band NVNT BLE 2M 2480MHz Ant1 Peak



Restrict Band NVNT BLE 2M 2480MHz Ant1 Average

