



Appendix A

RF Test Data for BT LE (Conducted Measurement)

Product Name: SMART GATEWAY 20

Test Model: SMART GATEWAY 20

Environmental Conditions

Temperature:	23.8°C
Relative Humidity:	52.3%
ATM Pressure:	100.0 kPa
Test Engineer:	Jerry Chu
Supervised by:	Nick Peng



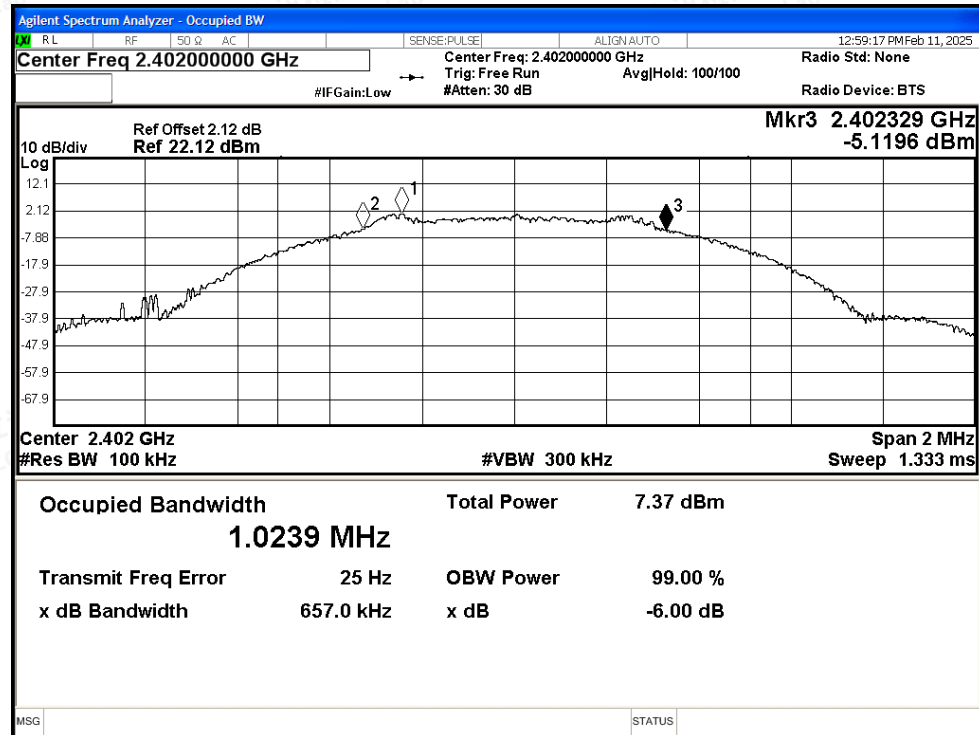
A.1 -6dB Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	Ant1	0.657	≥ 0.5	Pass
NVNT	BLE 1M	2440	Ant1	0.639	≥ 0.5	Pass
NVNT	BLE 1M	2480	Ant1	0.672	≥ 0.5	Pass
NVNT	BLE 2M	2402	Ant1	1.116	≥ 0.5	Pass
NVNT	BLE 2M	2440	Ant1	1.143	≥ 0.5	Pass
NVNT	BLE 2M	2480	Ant1	1.136	≥ 0.5	Pass

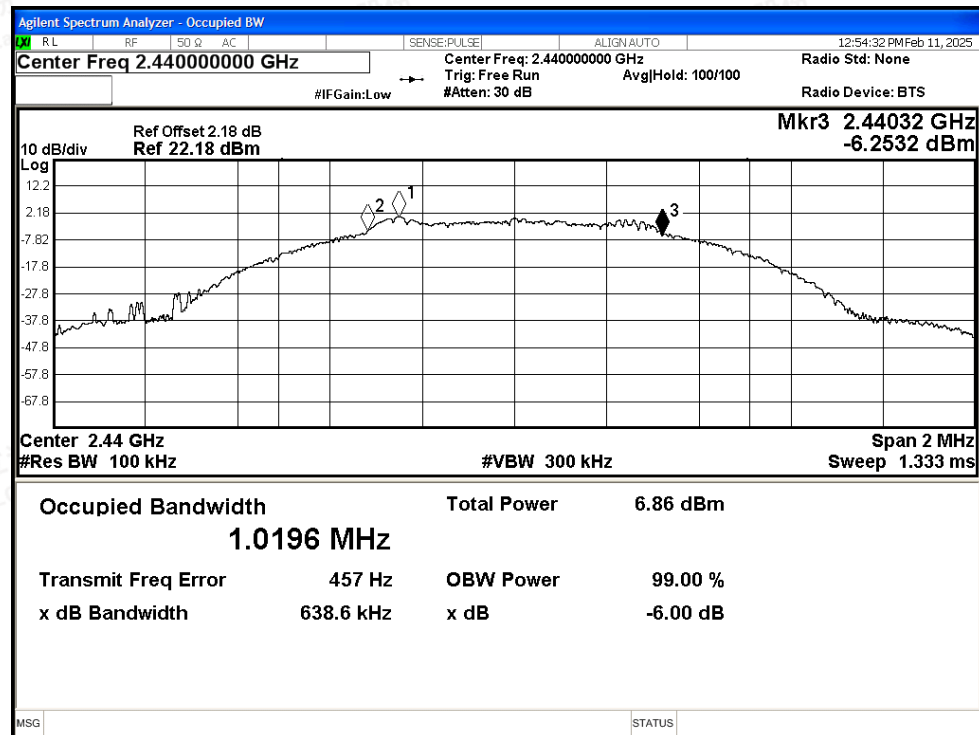


Test Graphs

-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1

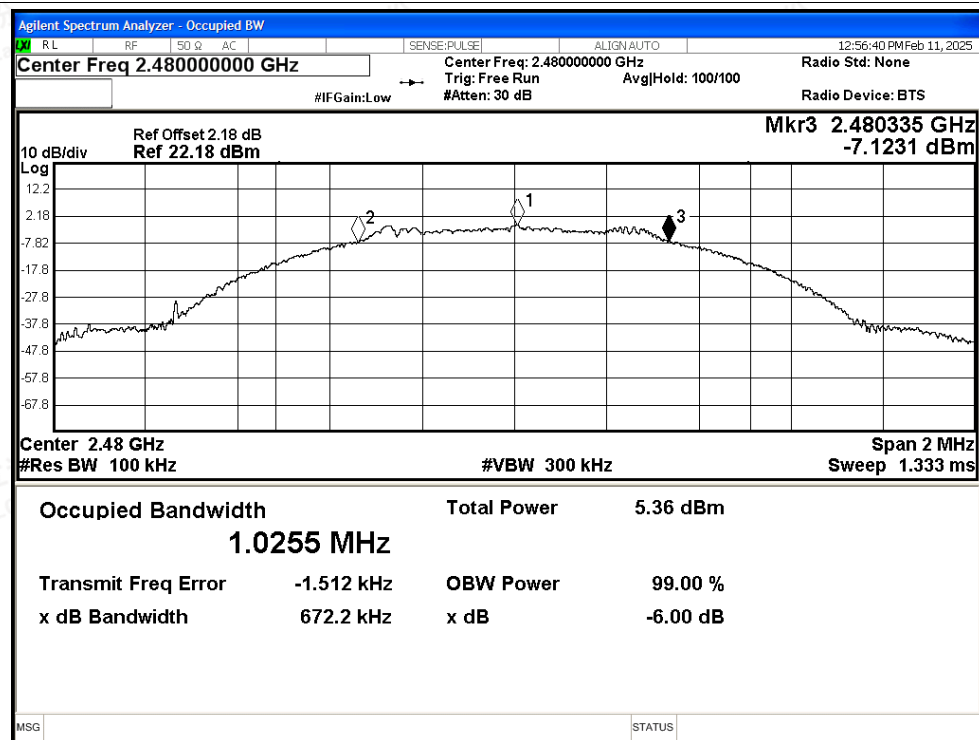


-6dB Bandwidth NVNT BLE 1M 2440MHz Ant1



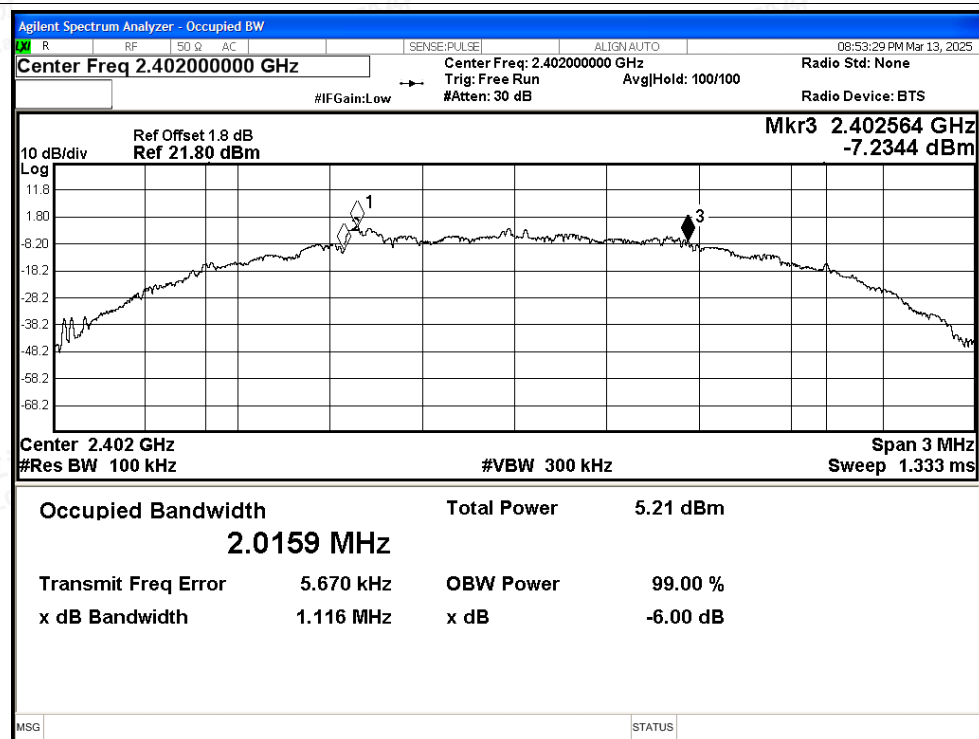


-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1



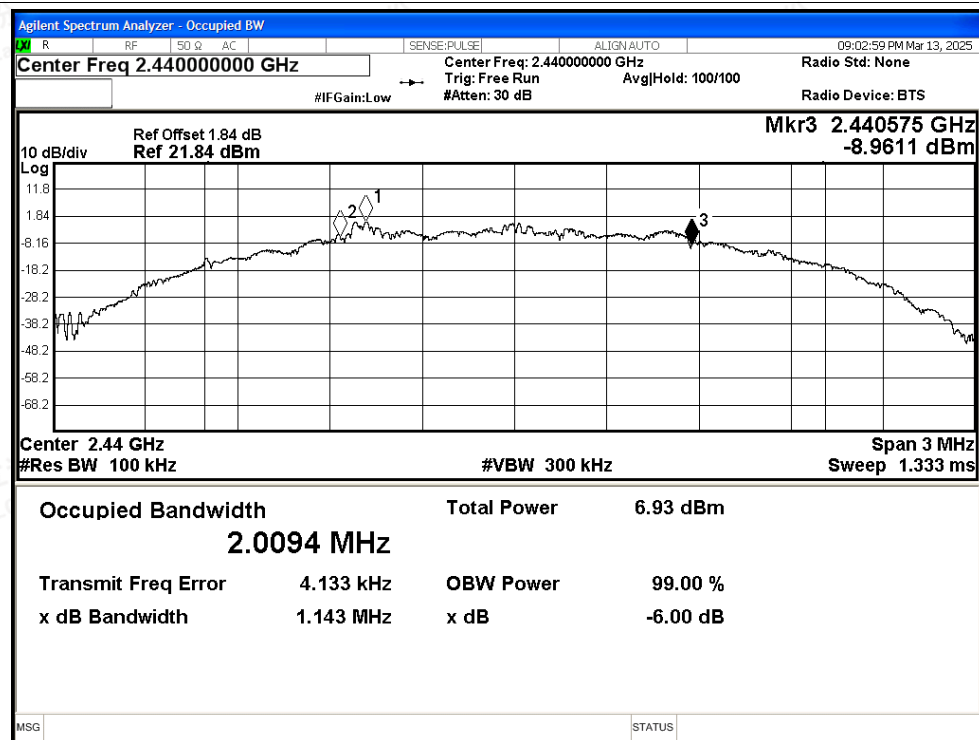
Test Graphs

-6dB Bandwidth NVNT BLE 2M 2402MHz Ant1

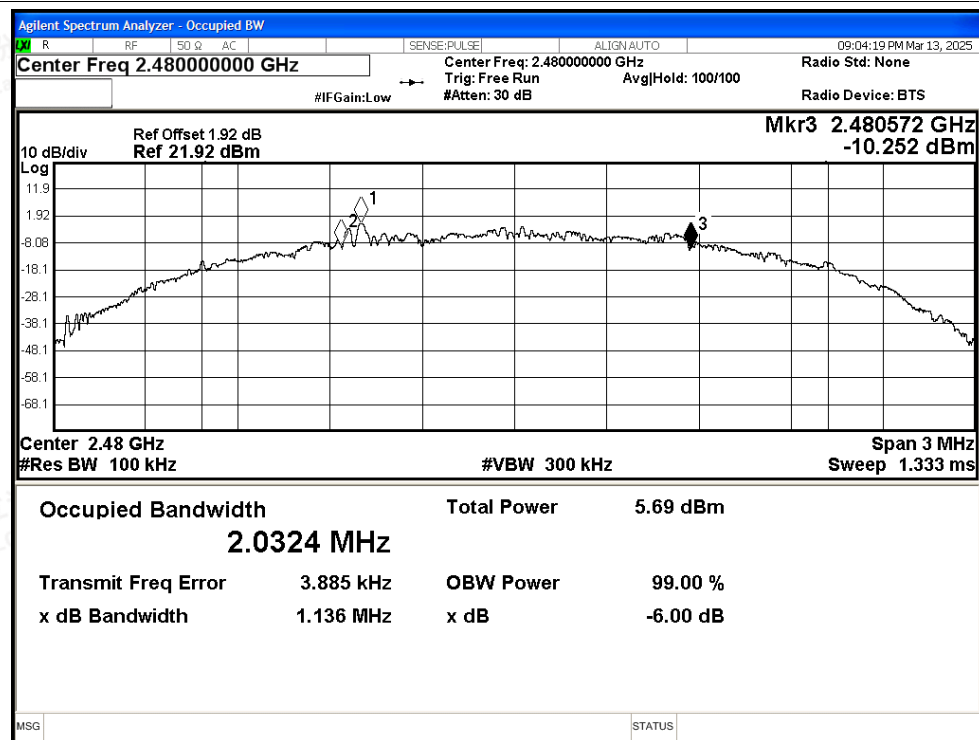




-6dB Bandwidth NVNT BLE 2M 2440MHz Ant1



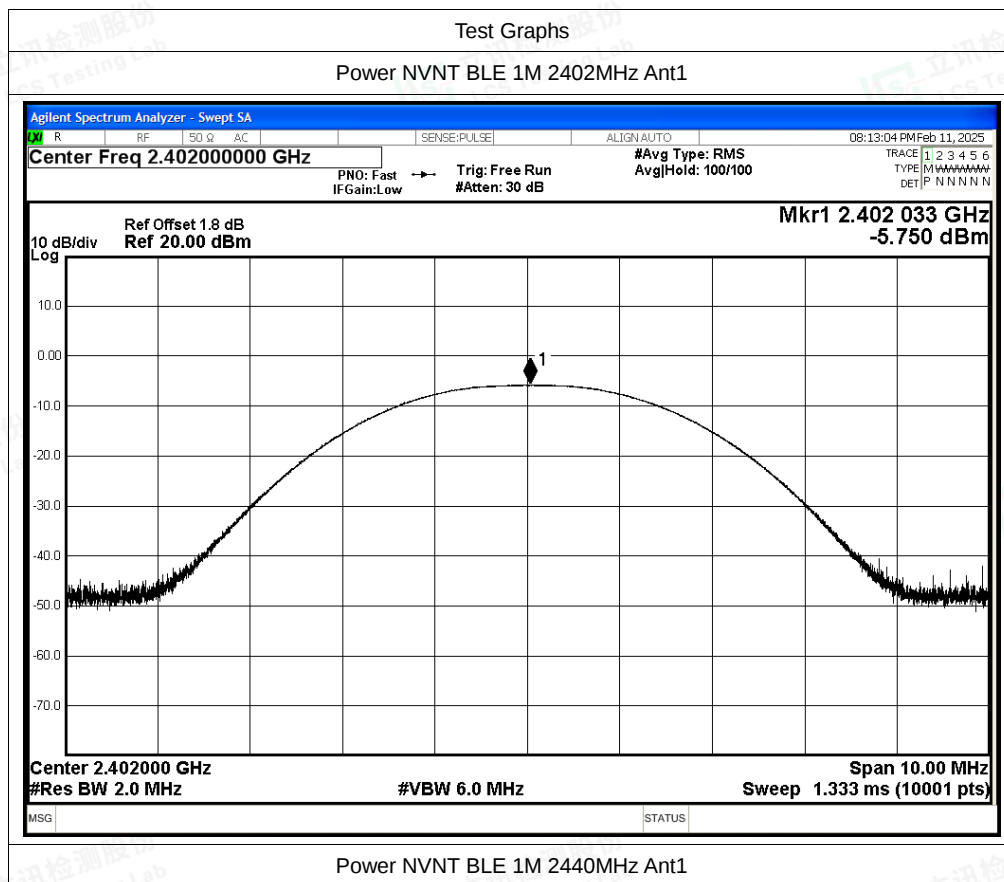
-6dB Bandwidth NVNT BLE 2M 2480MHz Ant1

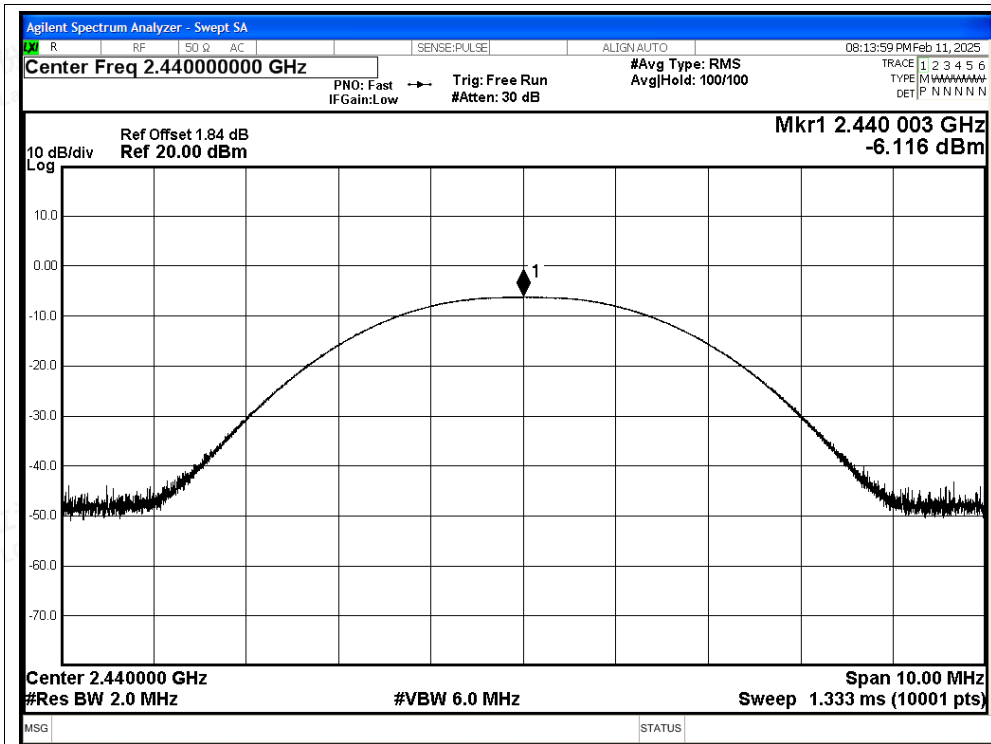




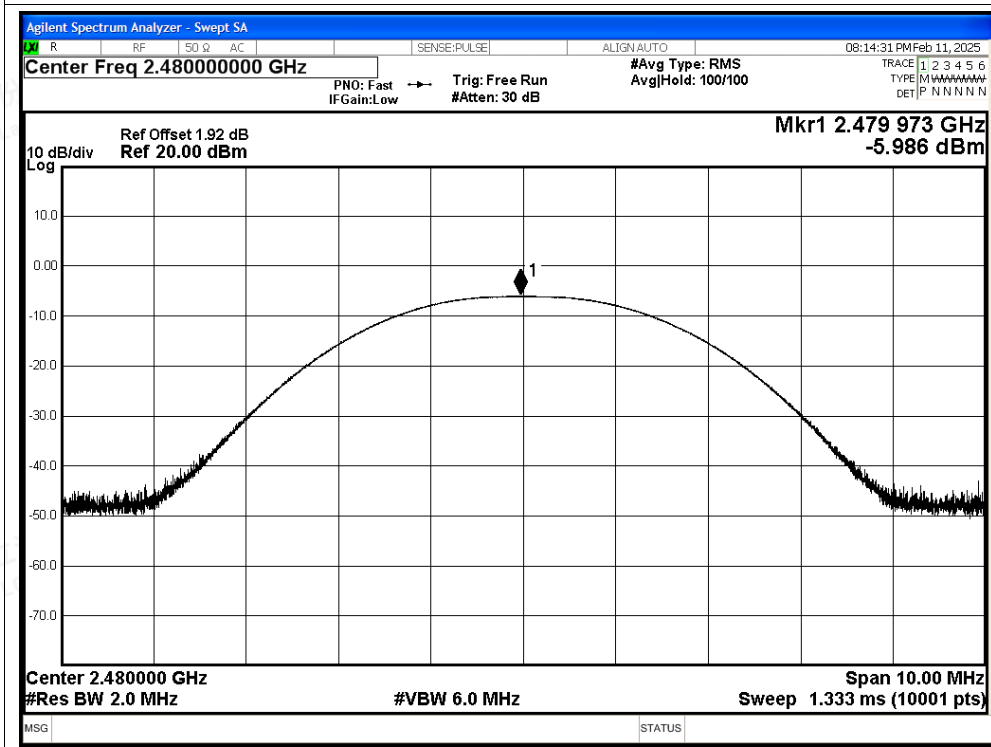
A.2 Maximum Peak Conducted Output Power

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	-5.75	30	Pass
NVNT	BLE 1M	2440	Ant1	-6.12	30	Pass
NVNT	BLE 1M	2480	Ant1	-5.99	30	Pass
NVNT	BLE 2M	2402	Ant1	-5.75	30	Pass
NVNT	BLE 2M	2440	Ant1	-6.12	30	Pass
NVNT	BLE 2M	2480	Ant1	-5.99	30	Pass



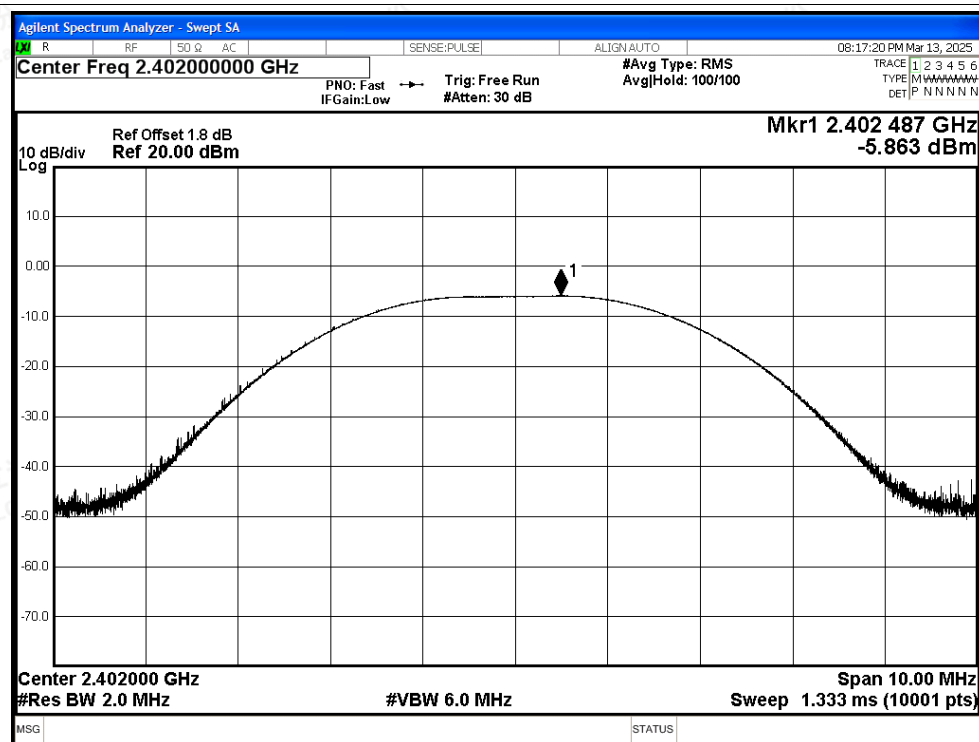


Power NVNT BLE 1M 2480MHz Ant1

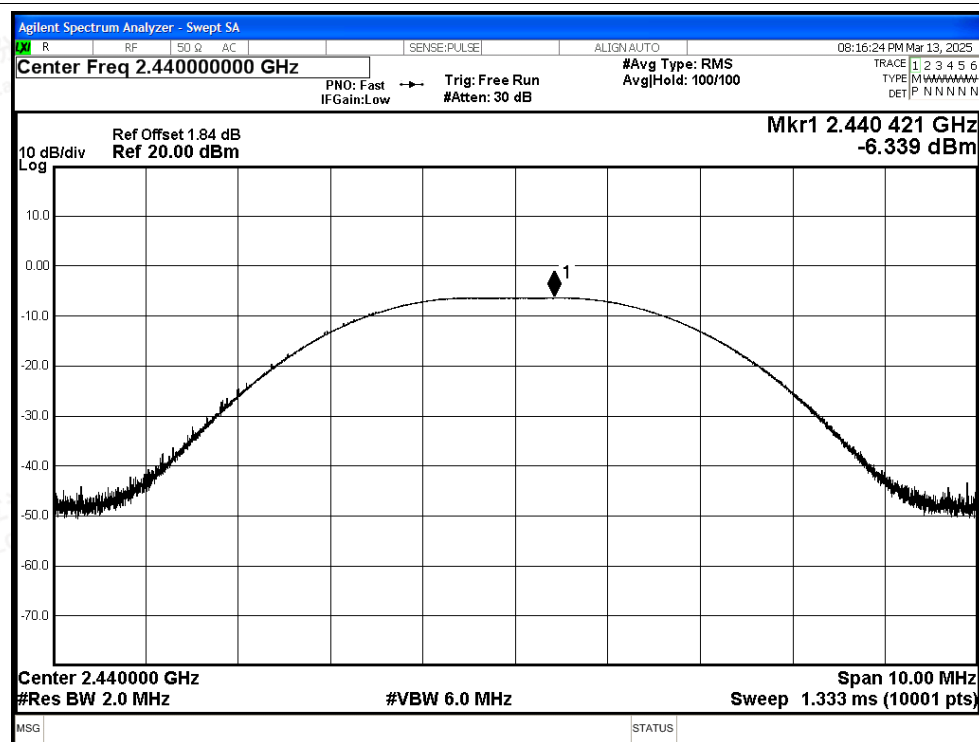


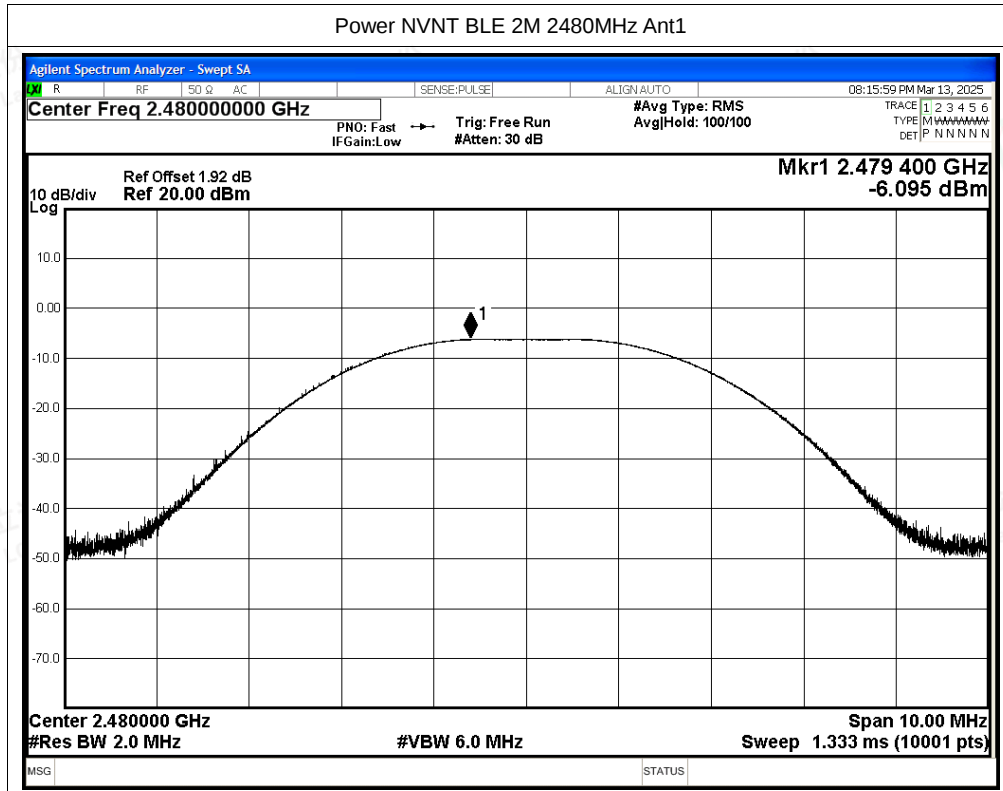


Power NVNT BLE 2M 2402MHz Ant1



Power NVNT BLE 2M 2440MHz Ant1







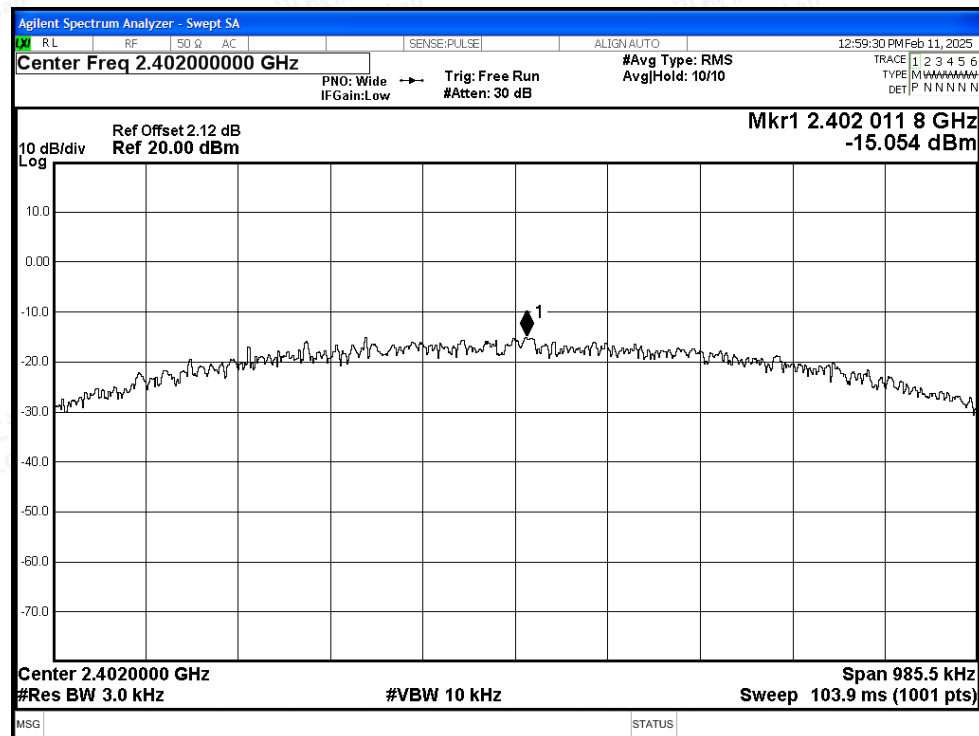
A.3 Maximum Power Spectral Density Level

Condition	Mode	Frequency (MHz)	Antenna	Conducted PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	BLE 1M	2402	Ant1	-15.05	8	Pass
NVNT	BLE 1M	2440	Ant1	-15.8	8	Pass
NVNT	BLE 1M	2480	Ant1	-16.91	8	Pass
NVNT	BLE 2M	2402	Ant1	-21.12	8	Pass
NVNT	BLE 2M	2440	Ant1	-19.31	8	Pass
NVNT	BLE 2M	2480	Ant1	-19.98	8	Pass

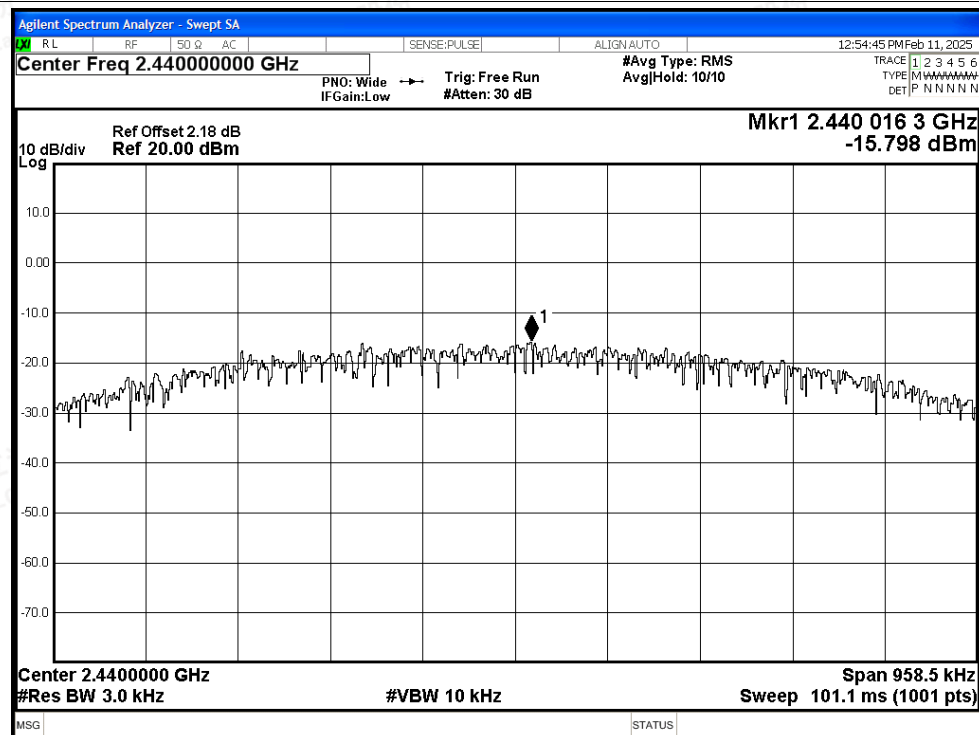


Test Graphs

PSD NVNT BLE 1M 2402MHz Ant1

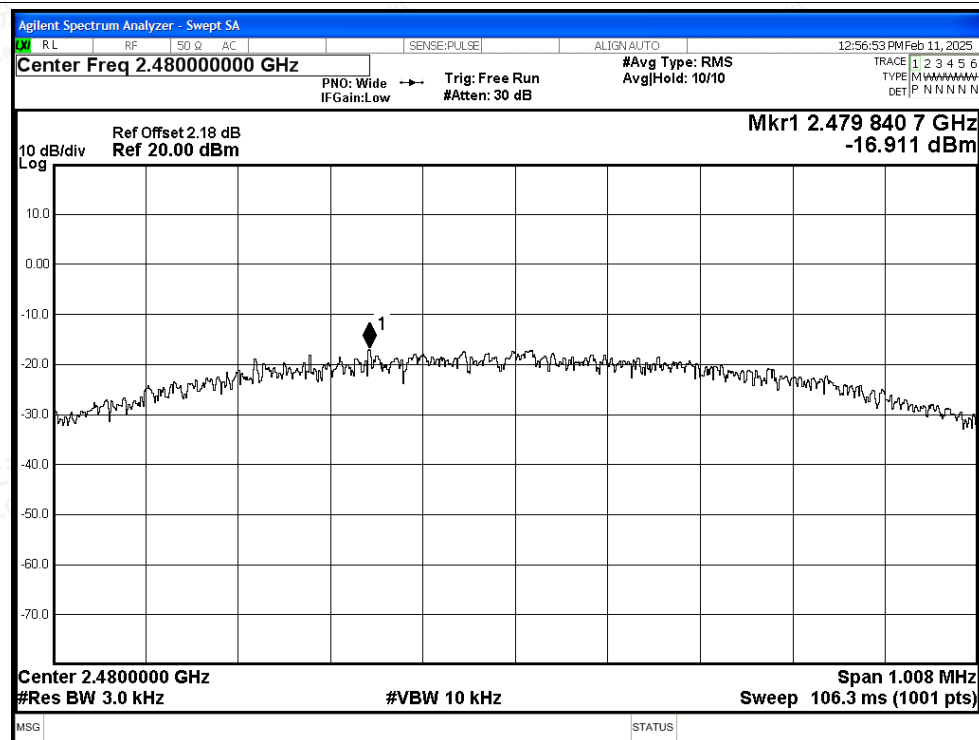


PSD NVNT BLE 1M 2440MHz Ant1



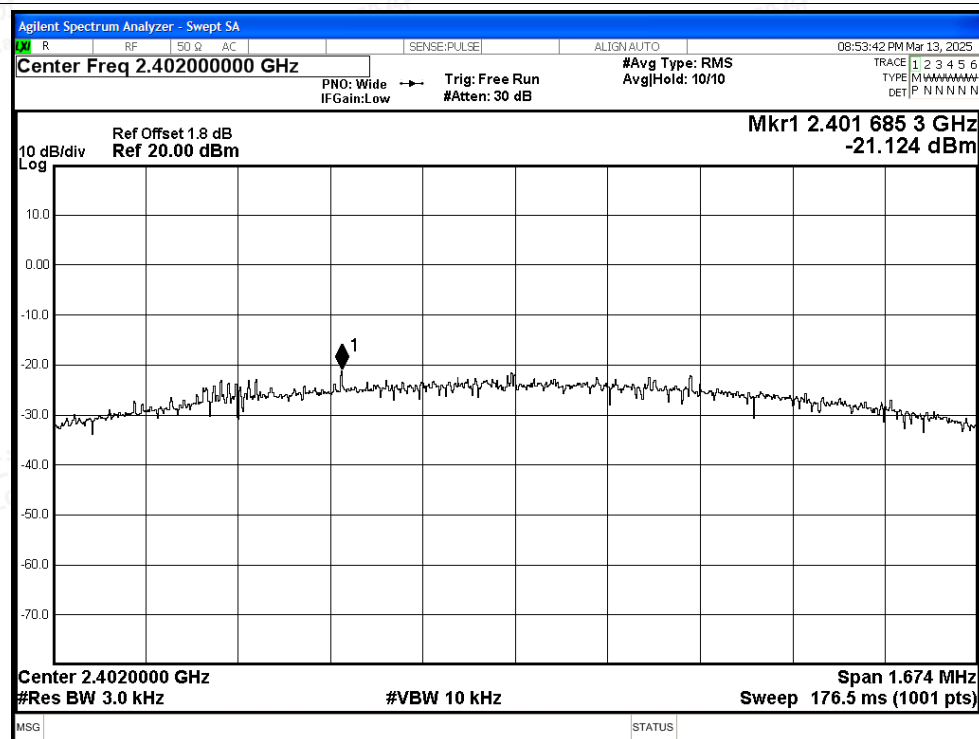


PSD NVNT BLE 1M 2480MHz Ant1



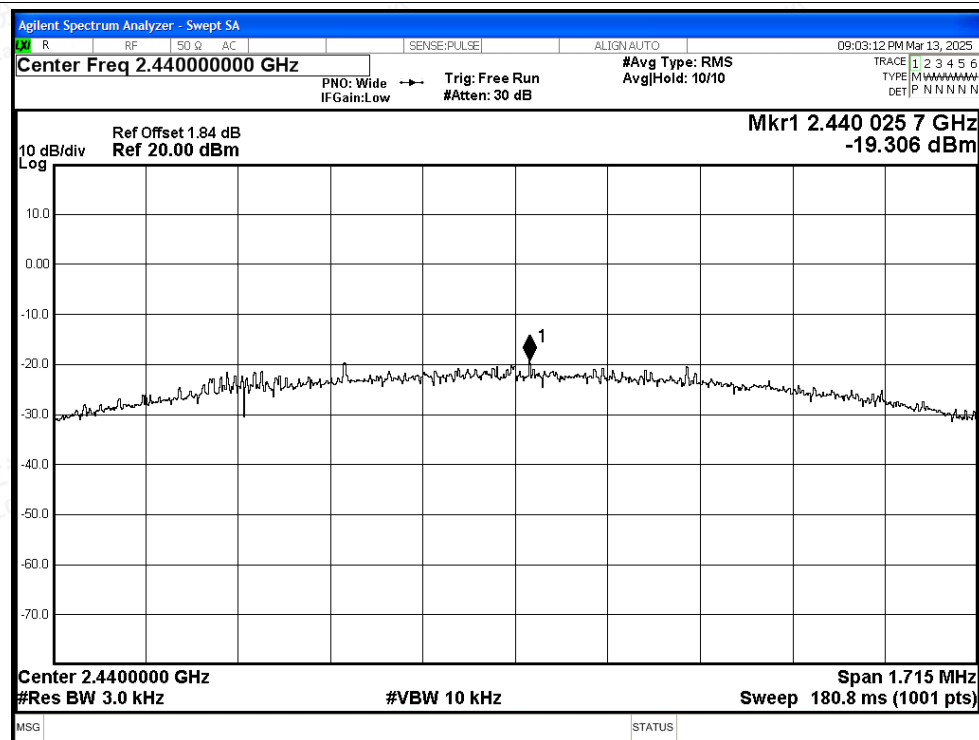
Test Graphs

PSD NVNT BLE 2M 2402MHz Ant1

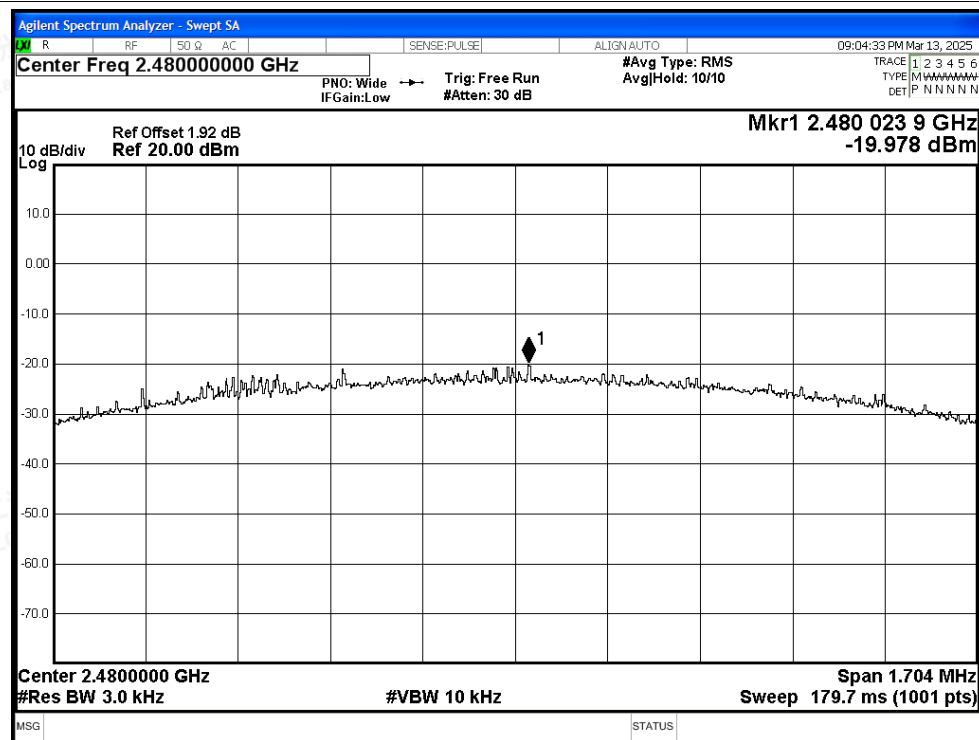




PSD NVNT BLE 2M 2440MHz Ant1



PSD NVNT BLE 2M 2480MHz Ant1





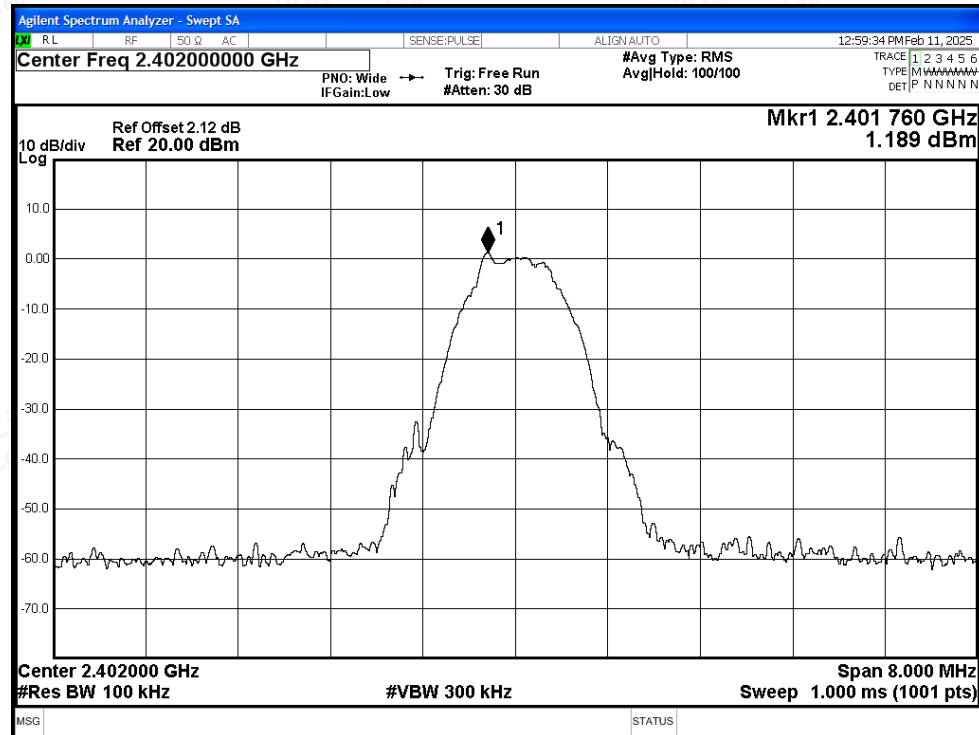
A.4 Band Edge

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-58.17	-20	Pass
NVNT	BLE 1M	2480	Ant1	-55.74	-20	Pass
NVNT	BLE 2M	2402	Ant1	-43.68	-20	Pass
NVNT	BLE 2M	2480	Ant1	-55.36	-20	Pass

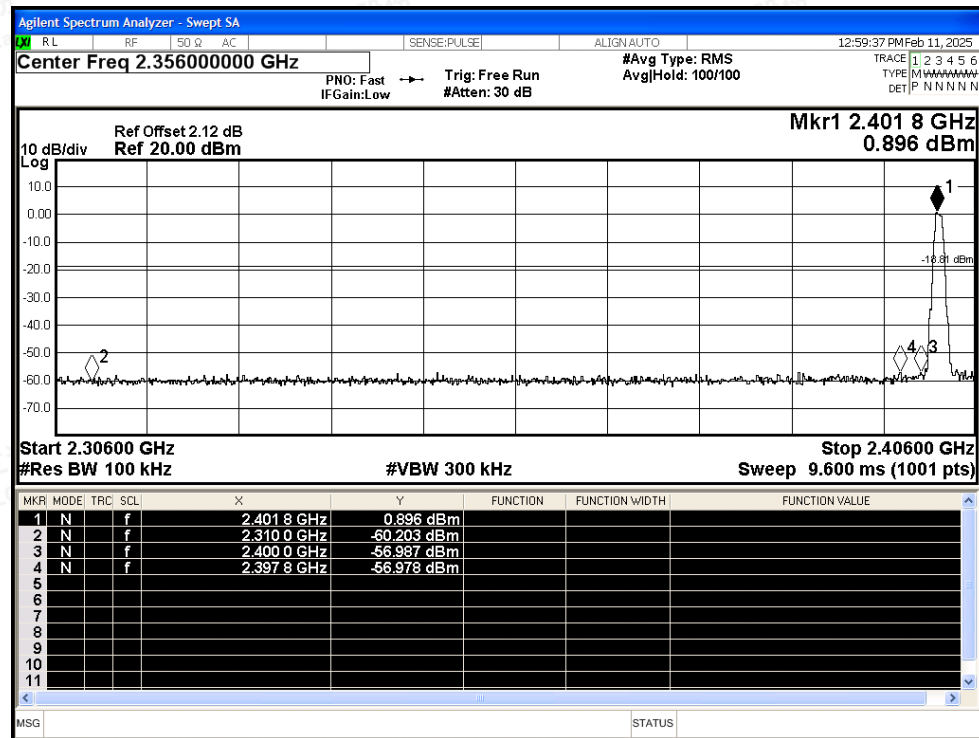


Test Graphs

Band Edge NVNT BLE 1M 2402MHz Ant1 Ref

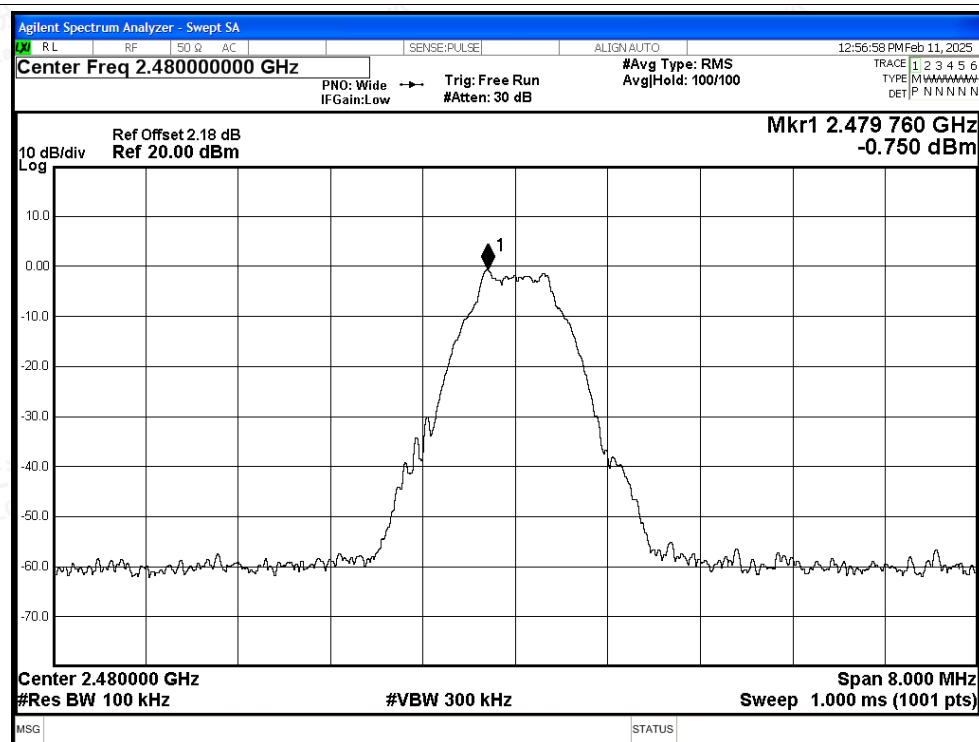


Band Edge NVNT BLE 1M 2402MHz Ant1 Emission

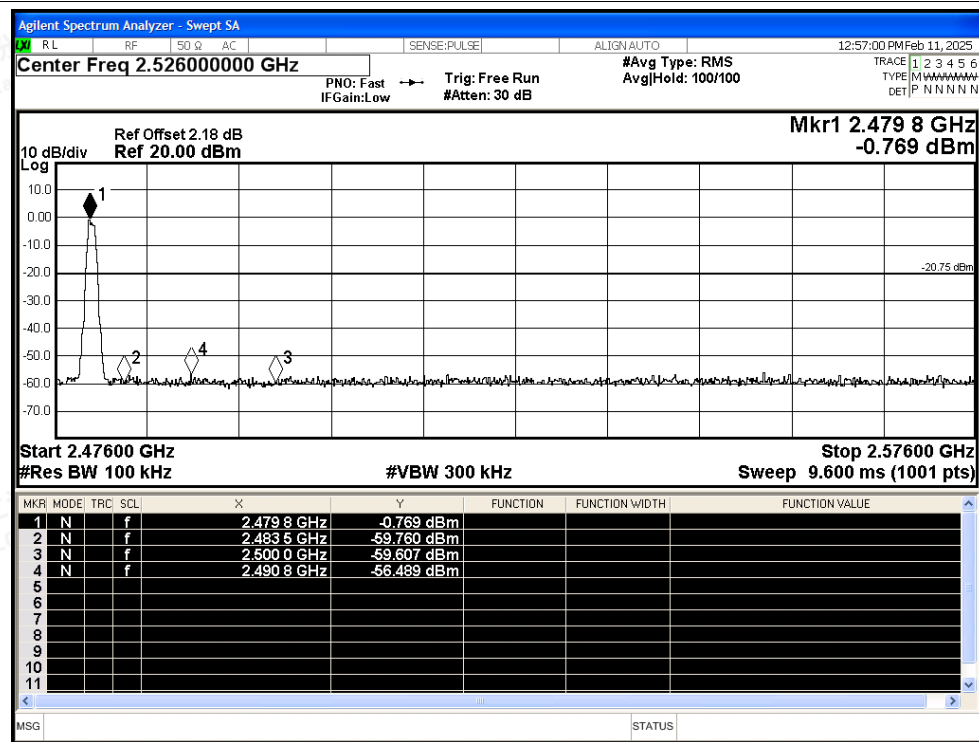




Band Edge NVNT BLE 1M 2480MHz Ant1 Ref



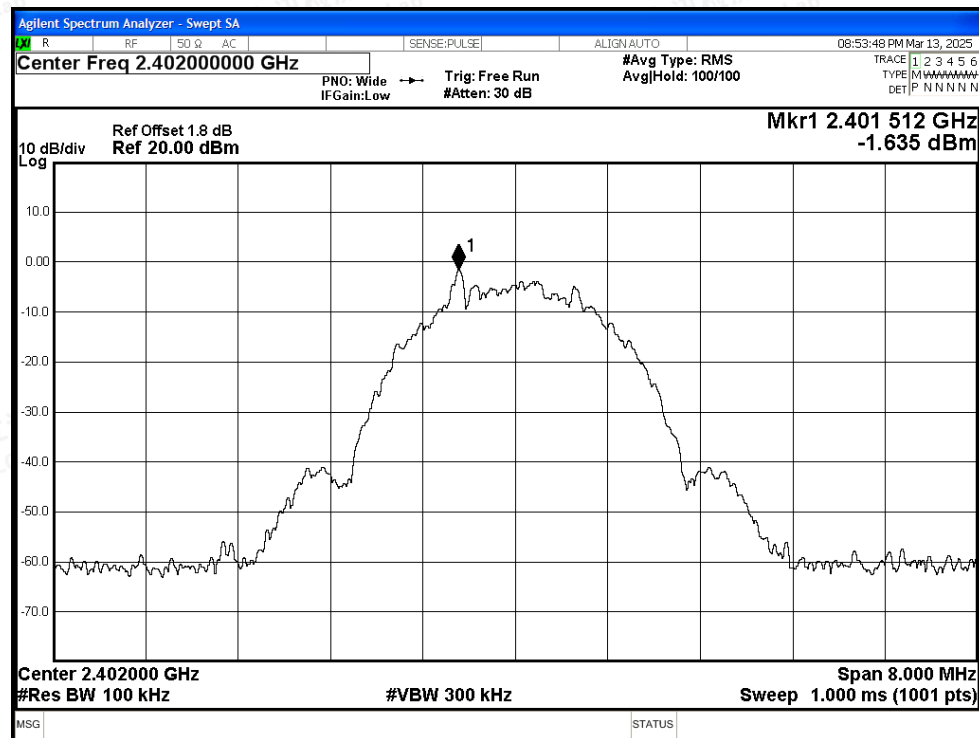
Band Edge NVNT BLE 1M 2480MHz Ant1 Emission



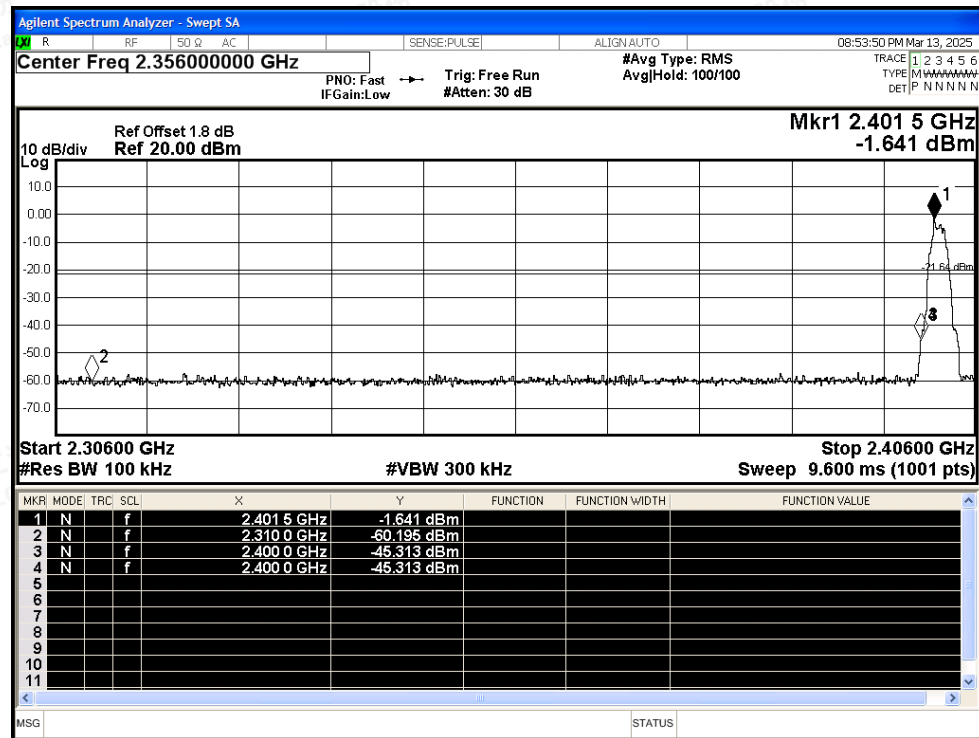


Test Graphs

Band Edge NVNT BLE 2M 2402MHz Ant1 Ref

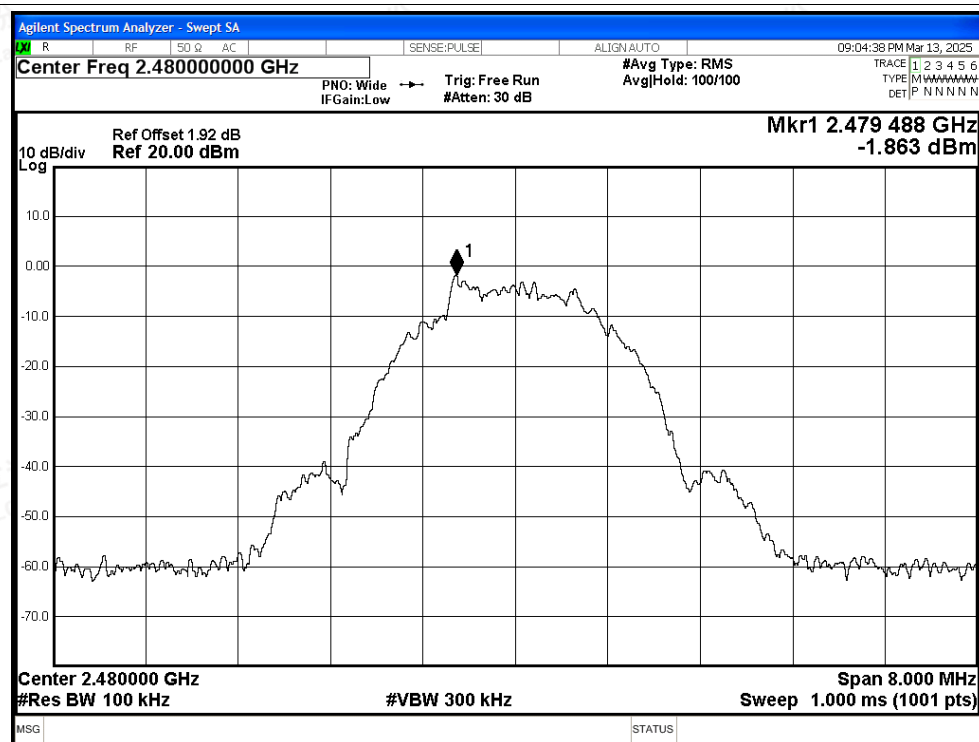


Band Edge NVNT BLE 2M 2402MHz Ant1 Emission

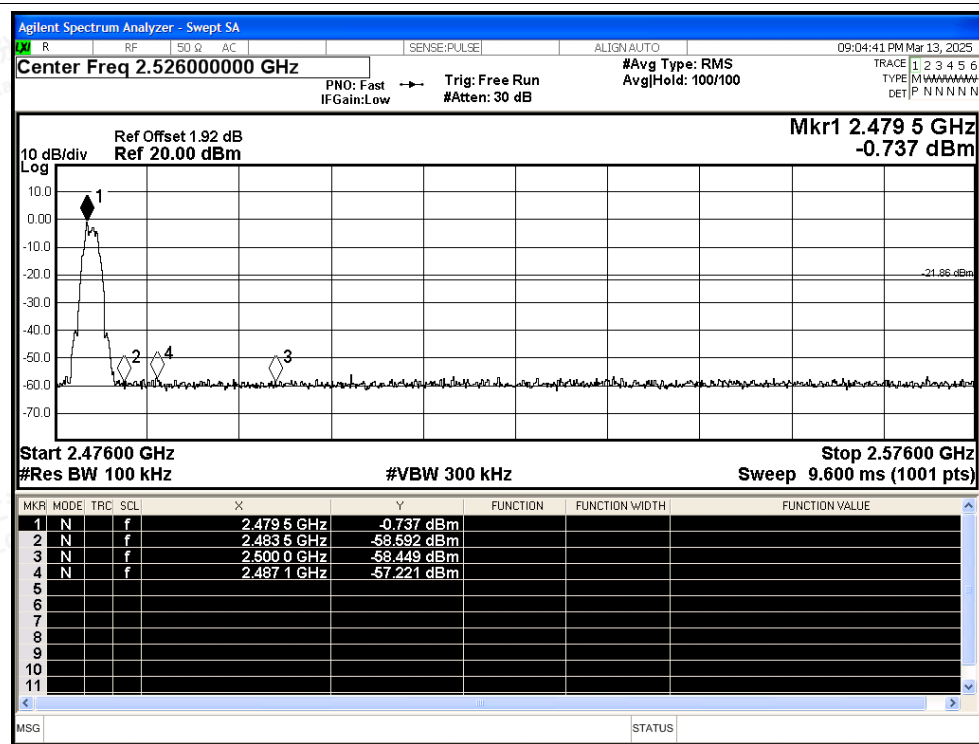




Band Edge NVNT BLE 2M 2480MHz Ant1 Ref



Band Edge NVNT BLE 2M 2480MHz Ant1 Emission



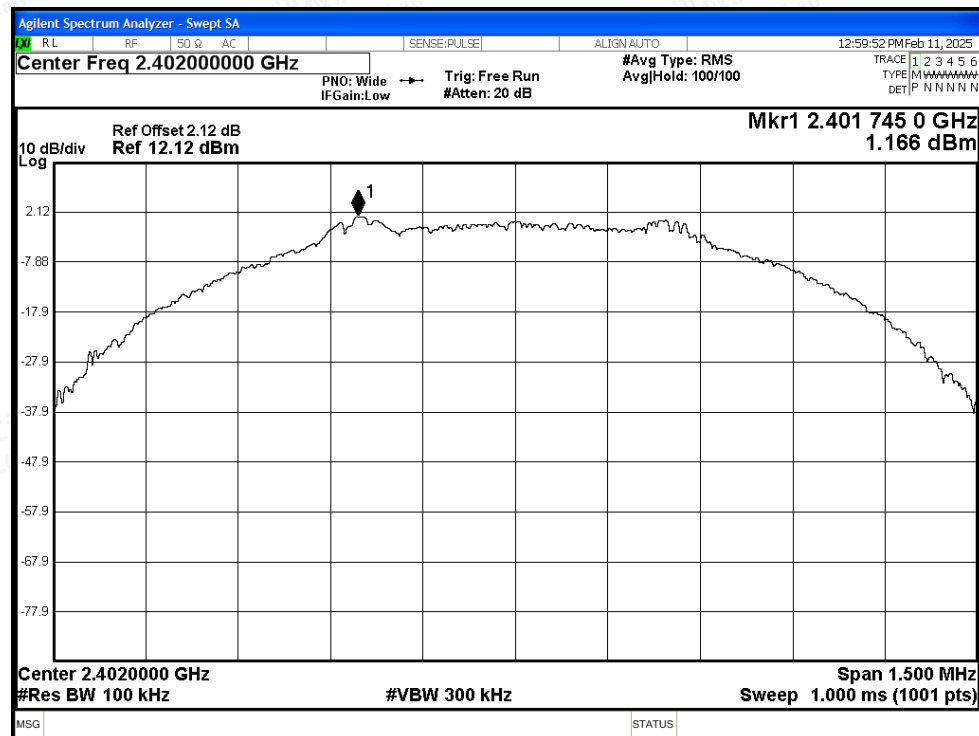


A.5 Conducted RF Spurious Emission

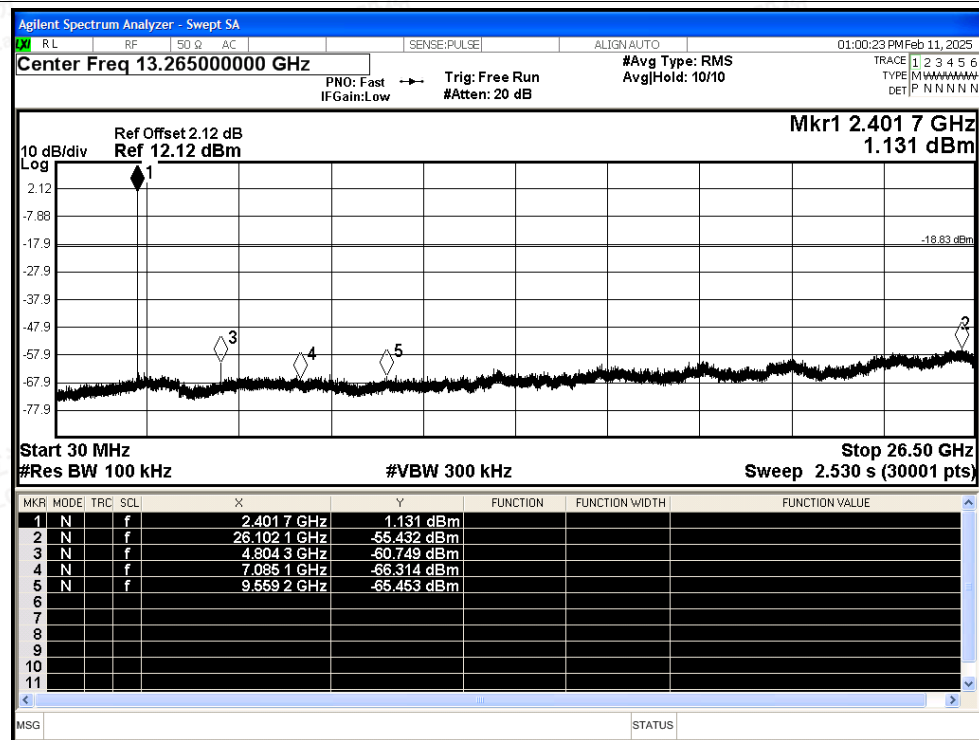
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-56.6	-20	Pass
NVNT	BLE 1M	2440	Ant1	-56.19	-20	Pass
NVNT	BLE 1M	2480	Ant1	-53.78	-20	Pass
NVNT	BLE 2M	2402	Ant1	-53.01	-20	Pass
NVNT	BLE 2M	2440	Ant1	-54.5	-20	Pass
NVNT	BLE 2M	2480	Ant1	-54.03	-20	Pass

Test Graphs

Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref

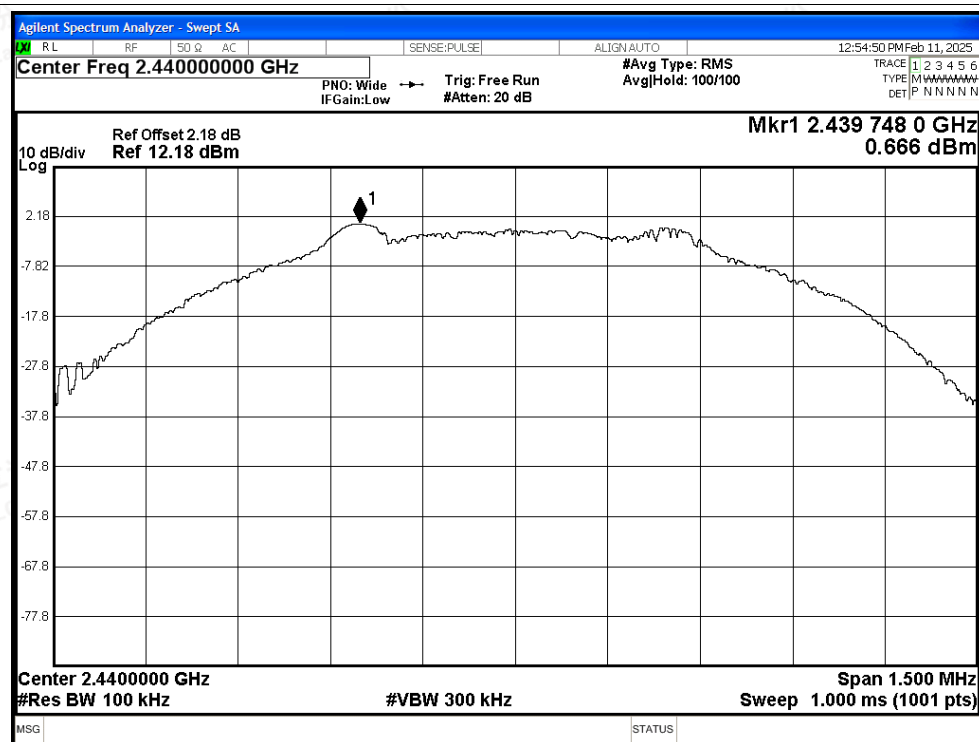


Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission

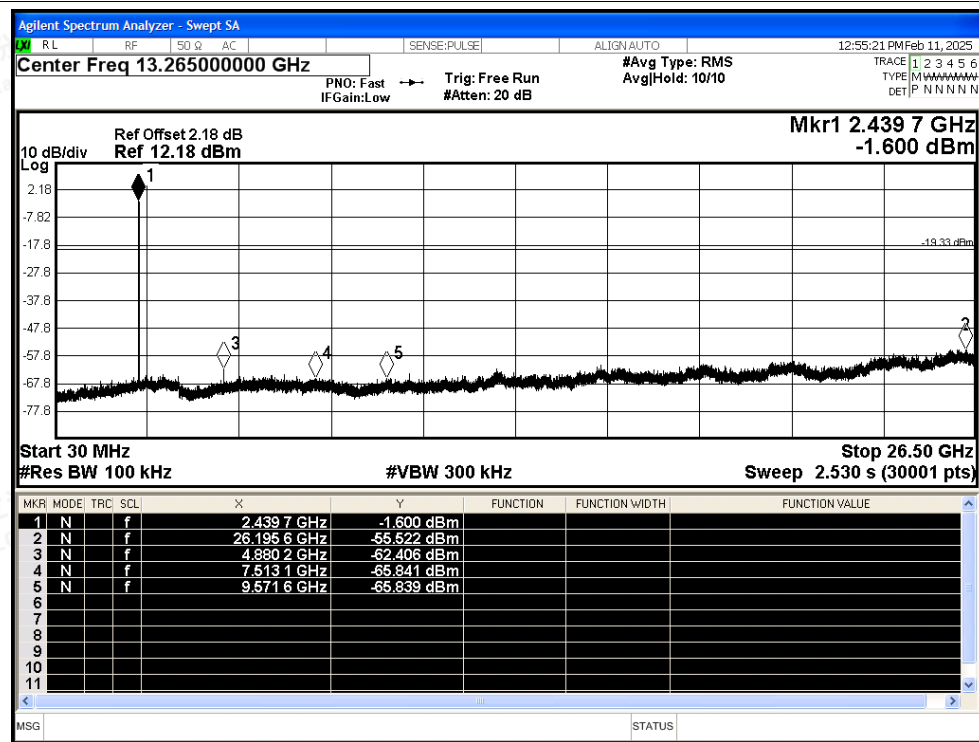




Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Ref

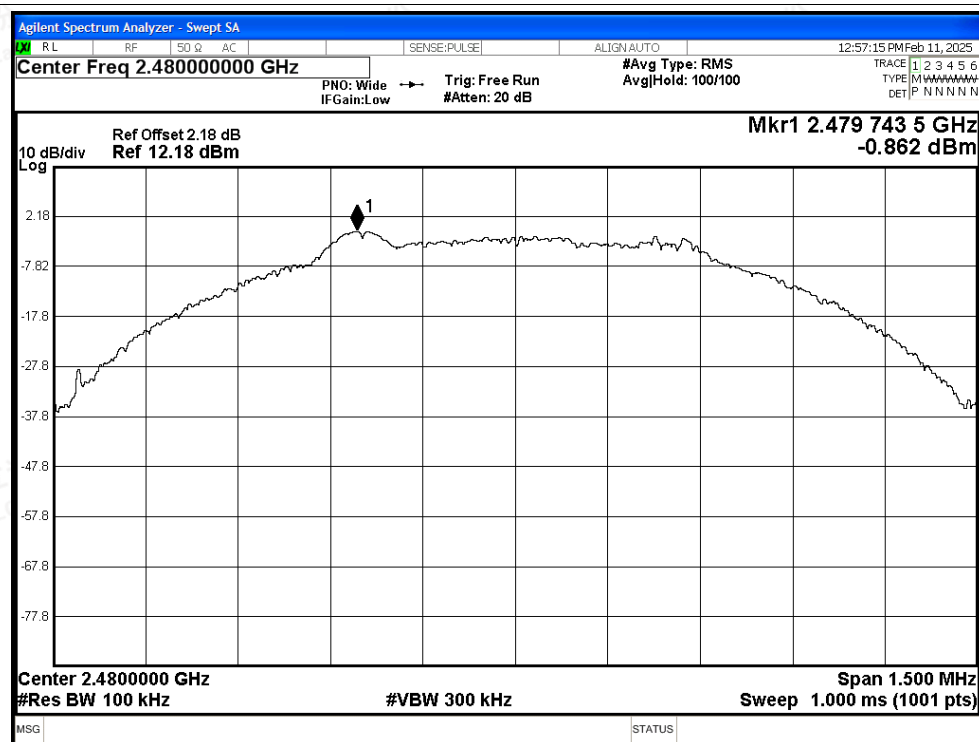


Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission

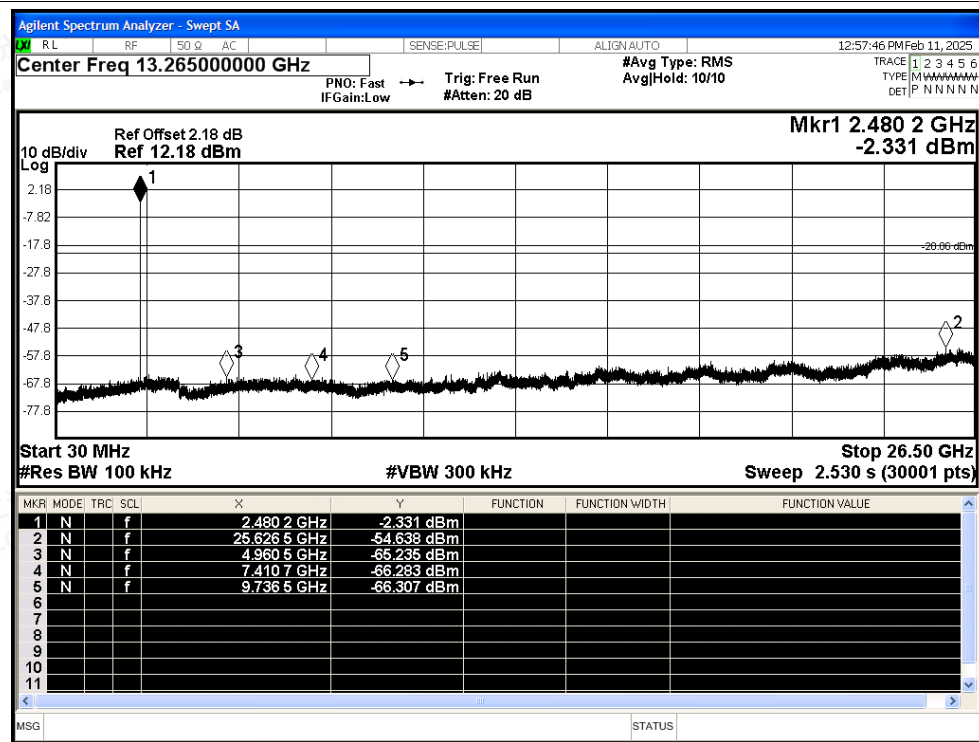




Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref

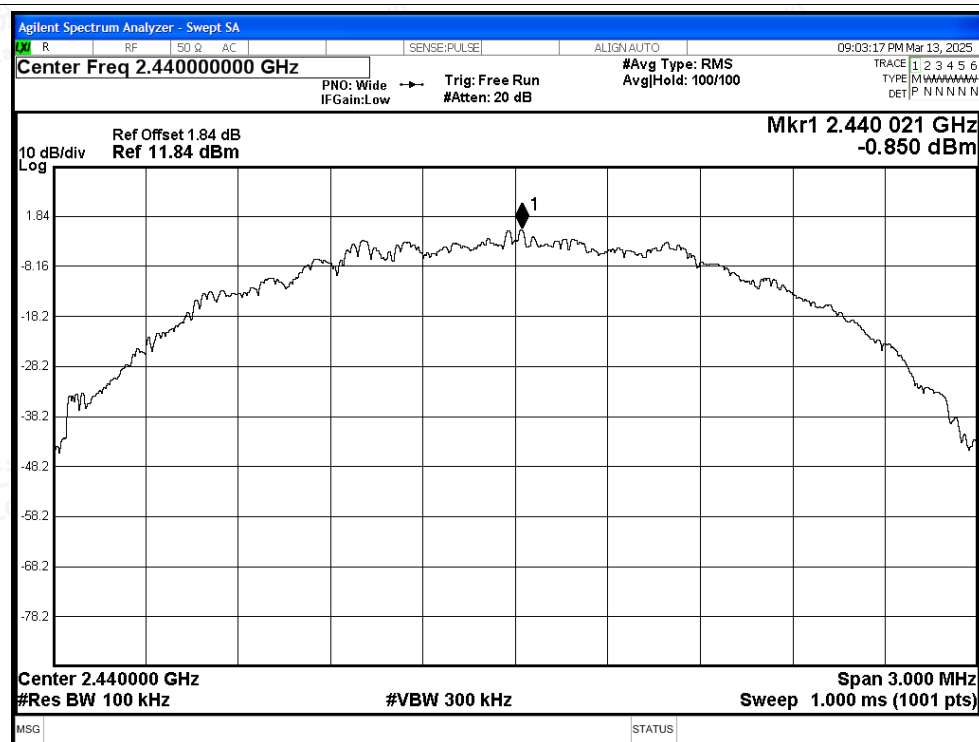


Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission

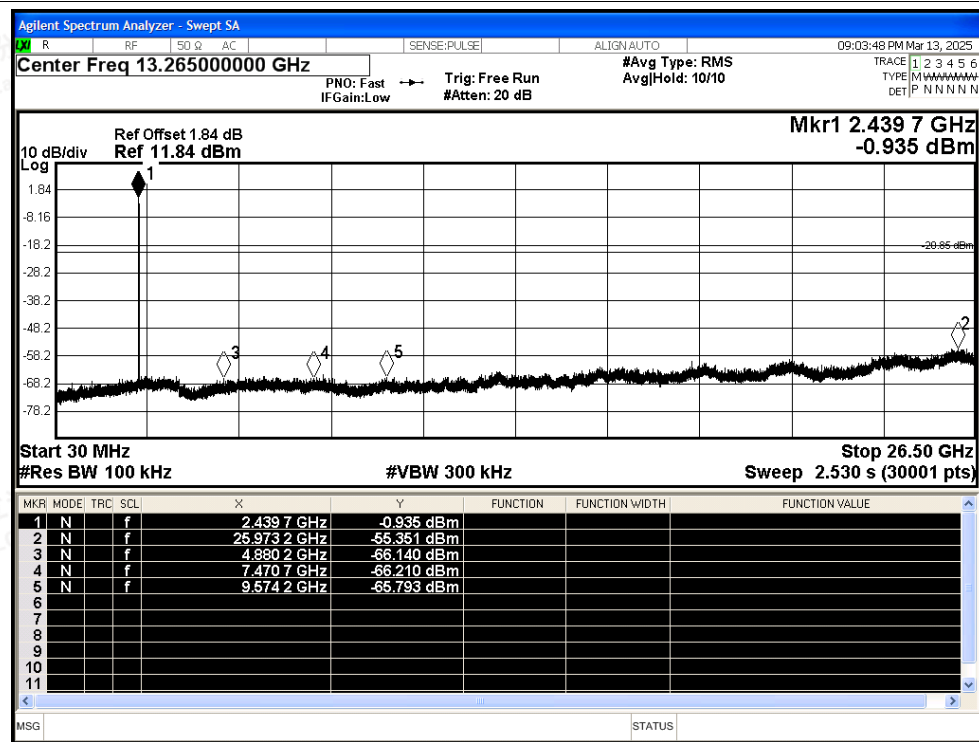




Tx. Spurious NVNT BLE 2M 2440MHz Ant1 Ref

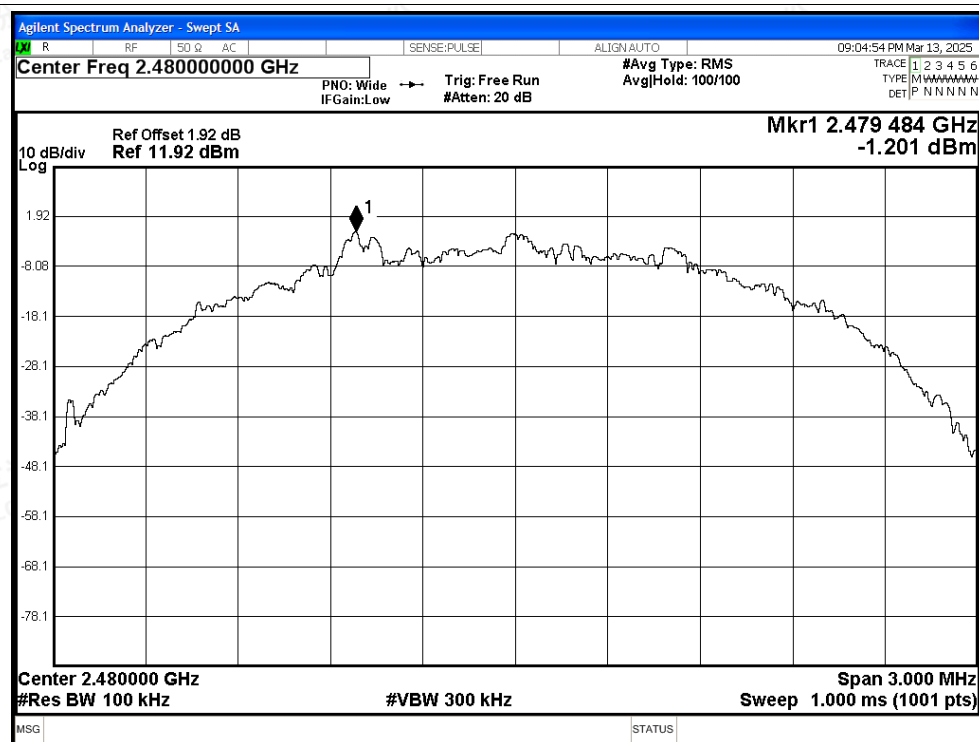


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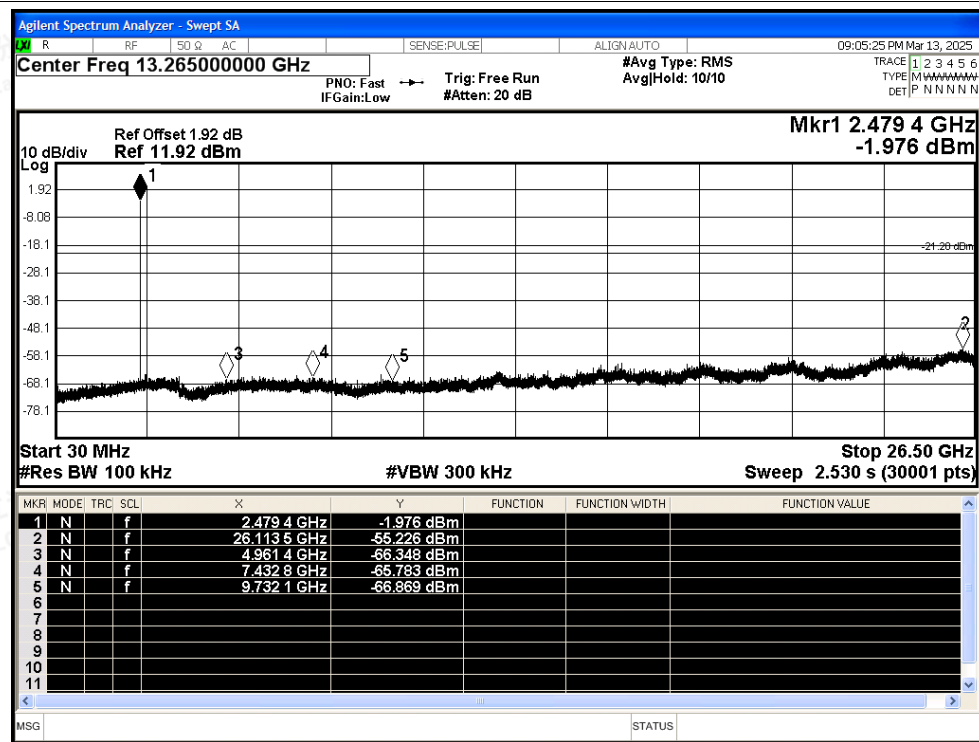




Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Ref



Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Emission





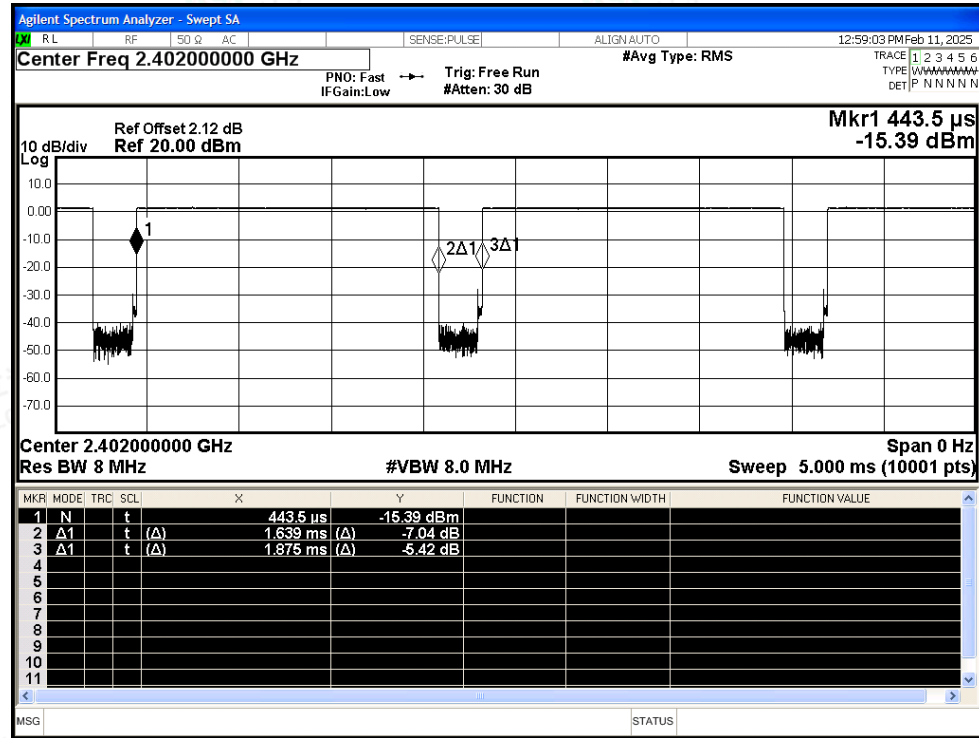
A.6 Duty Cycle

Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	BLE 1M	2402	Ant1	87.41	0.58	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	65.92	1.81	1.21
NVNT	BLE 2M	2440	Ant1	65.96	1.81	1.21
NVNT	BLE 2M	2480	Ant1	65.96	1.81	1.21

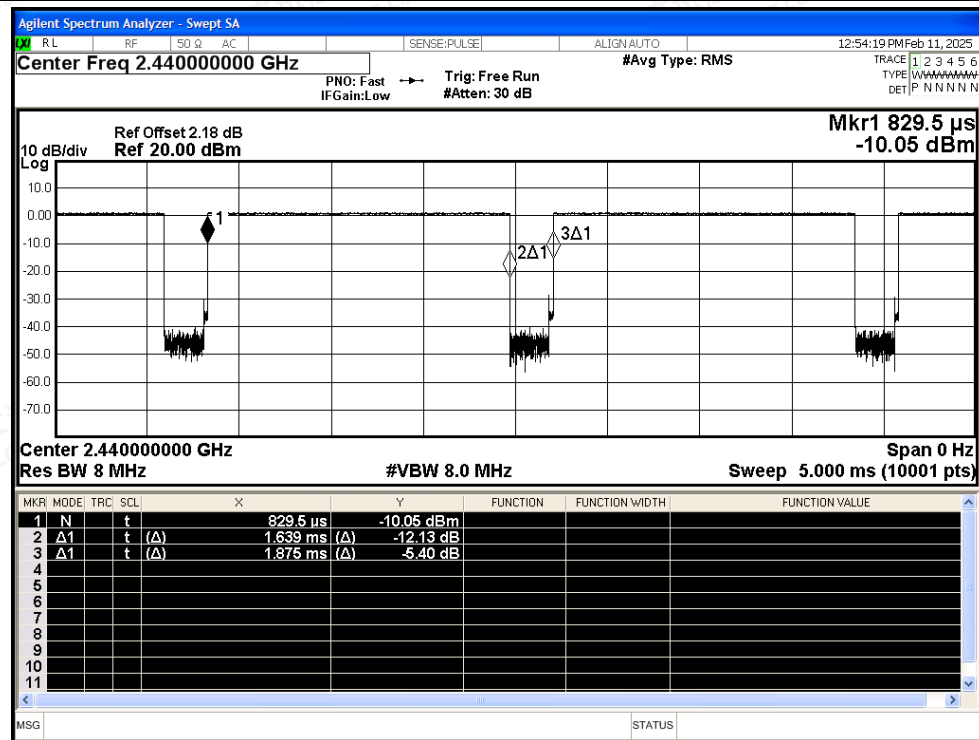


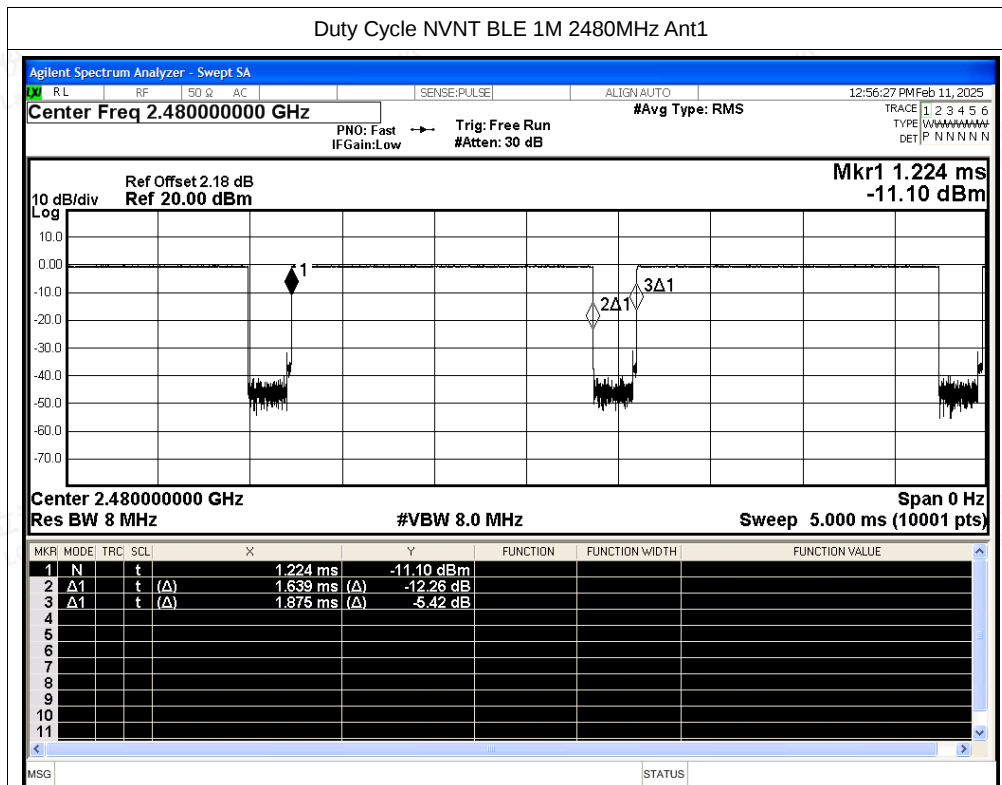
Test Graphs

Duty Cycle NVNT BLE 1M 2402MHz Ant1

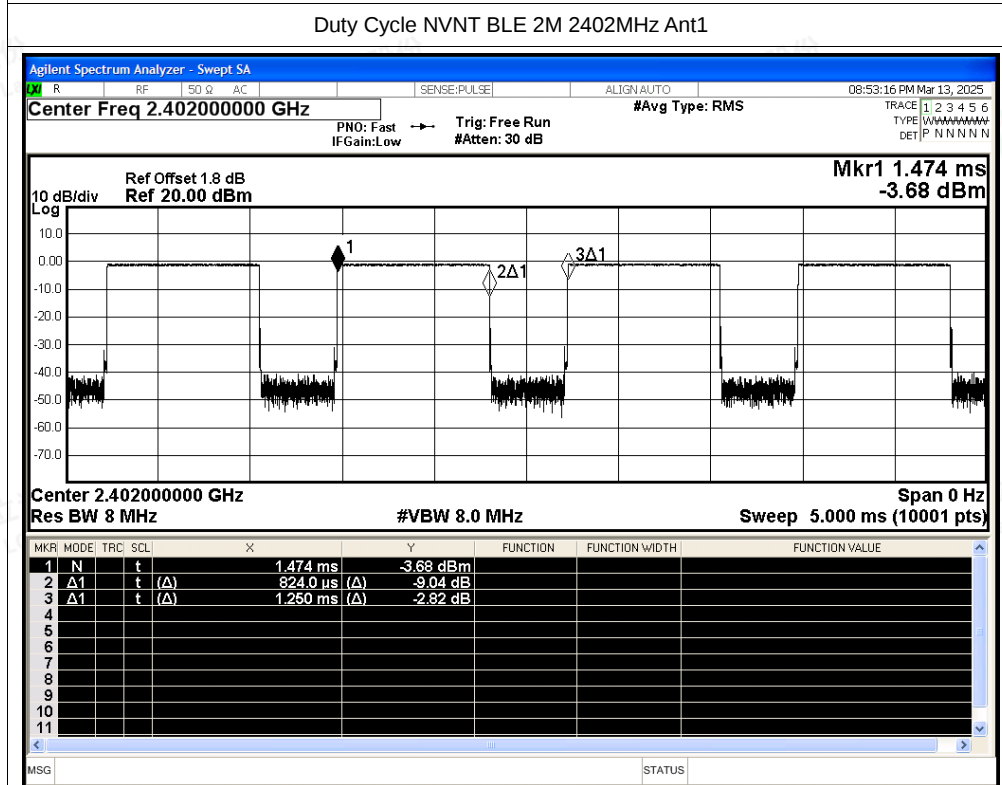


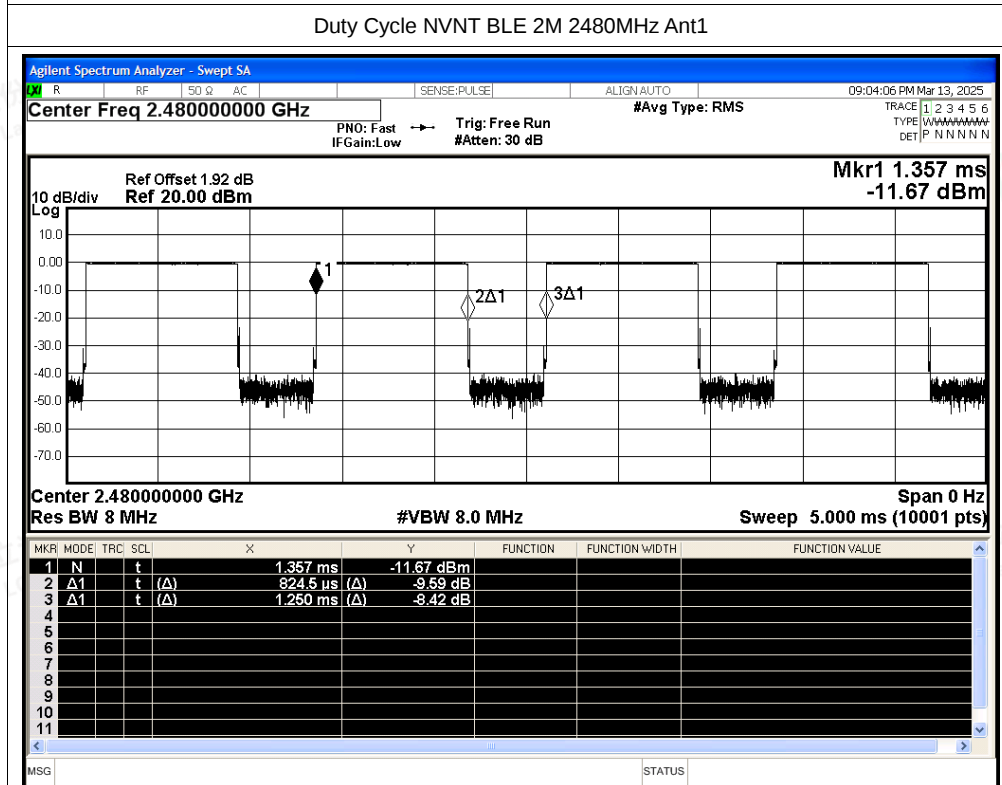
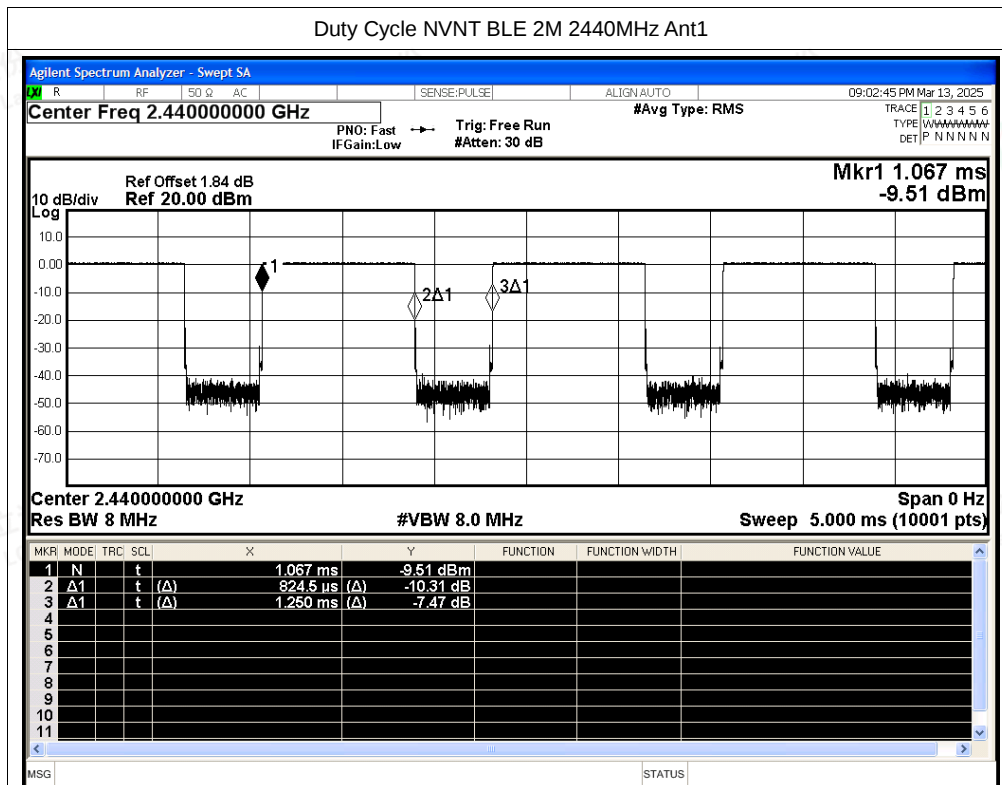
Duty Cycle NVNT BLE 1M 2440MHz Ant1





Test Graphs





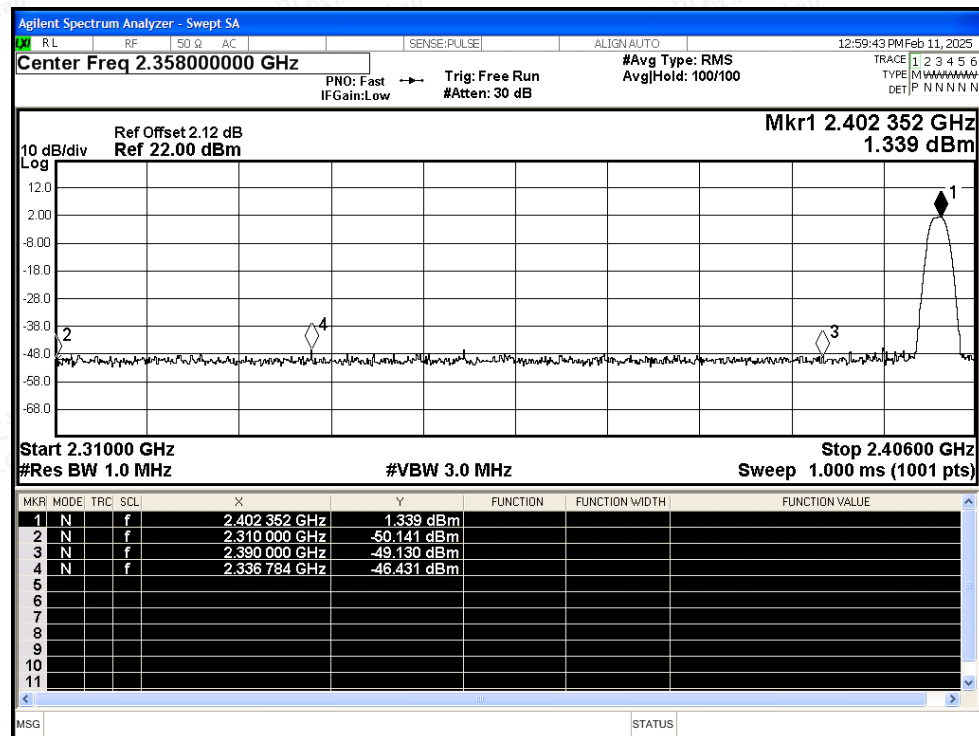


A.7 Restrict Band

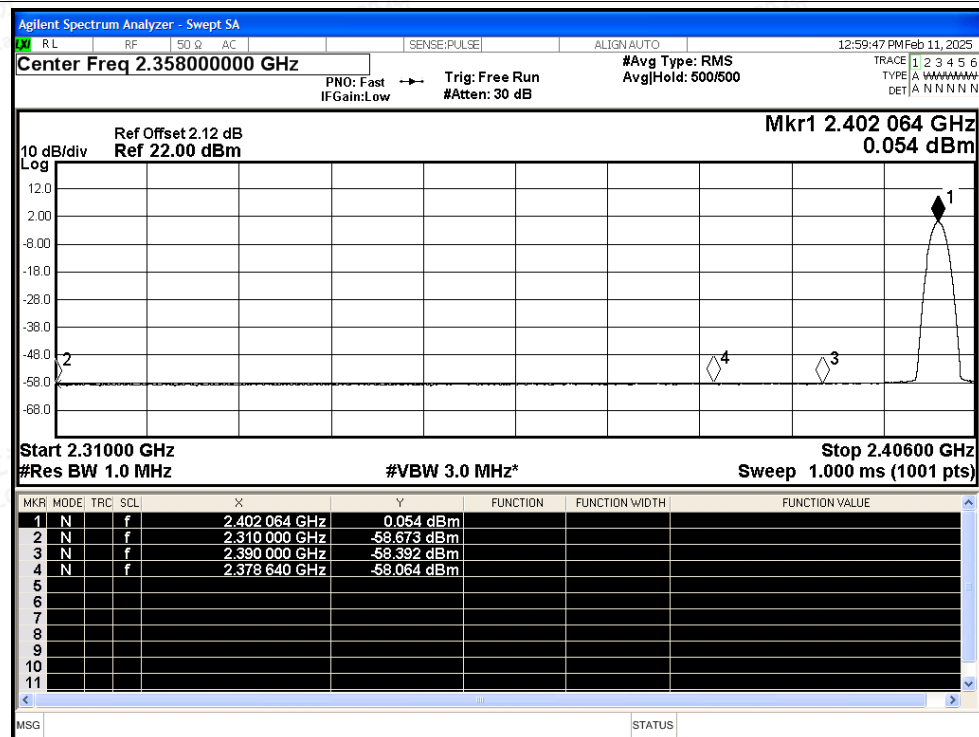
Condition	Mode	Frequency (MHz)	Antenna	Spur Freq (MHz)	Power (dBm)	Gain (dBi)	Duty Factor (dB)	E (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
NVNT	BLE 1M	2402	Ant1	2310	-50.14	2	-	47.12	Peak	74	Pass
NVNT	BLE 1M	2402	Ant1	2310	-58.67	2	0.58	39.17	Average	54	Pass
NVNT	BLE 1M	2402	Ant1	2336.784	-46.43	2	-	50.83	Peak	74	Pass
NVNT	BLE 1M	2402	Ant1	2378.64	-58.06	2	0.58	39.78	Average	54	Pass
NVNT	BLE 1M	2402	Ant1	2390	-49.13	2	-	48.13	Peak	74	Pass
NVNT	BLE 1M	2402	Ant1	2390	-58.39	2	0.58	39.45	Average	54	Pass
NVNT	BLE 1M	2480	Ant1	2483.5	-50.08	2	-	47.18	Peak	74	Pass
NVNT	BLE 1M	2480	Ant1	2483.5	-57.54	2	0.59	40.31	Average	54	Pass
NVNT	BLE 1M	2480	Ant1	2483.704	-43.37	2	-	53.89	Peak	74	Pass
NVNT	BLE 1M	2480	Ant1	2484.616	-57.44	2	0.59	40.41	Average	54	Pass
NVNT	BLE 1M	2480	Ant1	2500	-48.18	2	-	49.08	Peak	74	Pass
NVNT	BLE 1M	2480	Ant1	2500	-58.06	2	0.59	39.79	Average	54	Pass
NVNT	BLE 2M	2402	Ant1	2310	-51.34	2	-	45.92	Peak	74	Pass
NVNT	BLE 2M	2402	Ant1	2310	-59.09	2	1.81	39.98	Average	54	Pass
NVNT	BLE 2M	2402	Ant1	2316.144	-47.21	2	-	50.05	Peak	74	Pass
NVNT	BLE 2M	2402	Ant1	2388.336	-57.89	2	1.81	41.18	Average	54	Pass
NVNT	BLE 2M	2402	Ant1	2390	-50.16	2	-	47.1	Peak	74	Pass
NVNT	BLE 2M	2402	Ant1	2390	-58.45	2	1.81	40.62	Average	54	Pass
NVNT	BLE 2M	2480	Ant1	2483.5	-47.7	2	-	49.56	Peak	74	Pass
NVNT	BLE 2M	2480	Ant1	2483.5	-57.7	2	1.81	41.37	Average	54	Pass
NVNT	BLE 2M	2480	Ant1	2484.568	-44.17	2	-	53.09	Peak	74	Pass
NVNT	BLE 2M	2480	Ant1	2483.872	-56.94	2	1.81	42.13	Average	54	Pass
NVNT	BLE 2M	2480	Ant1	2500	-49.97	2	-	47.29	Peak	74	Pass
NVNT	BLE 2M	2480	Ant1	2500	-57.98	2	1.81	41.09	Average	54	Pass

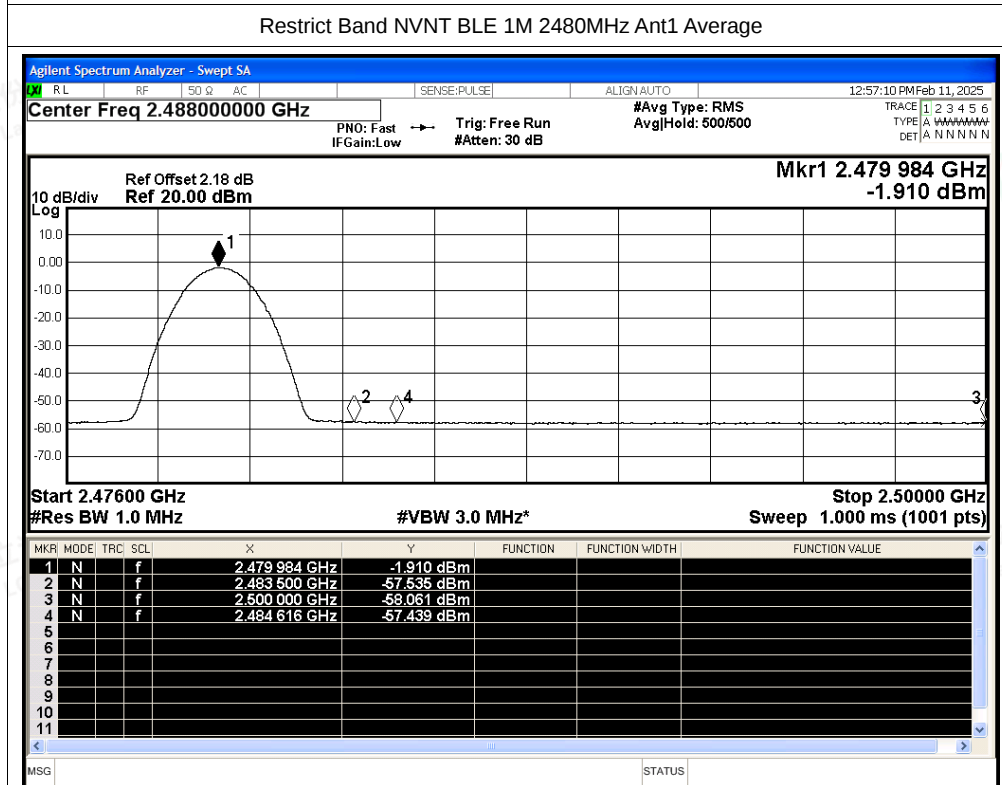
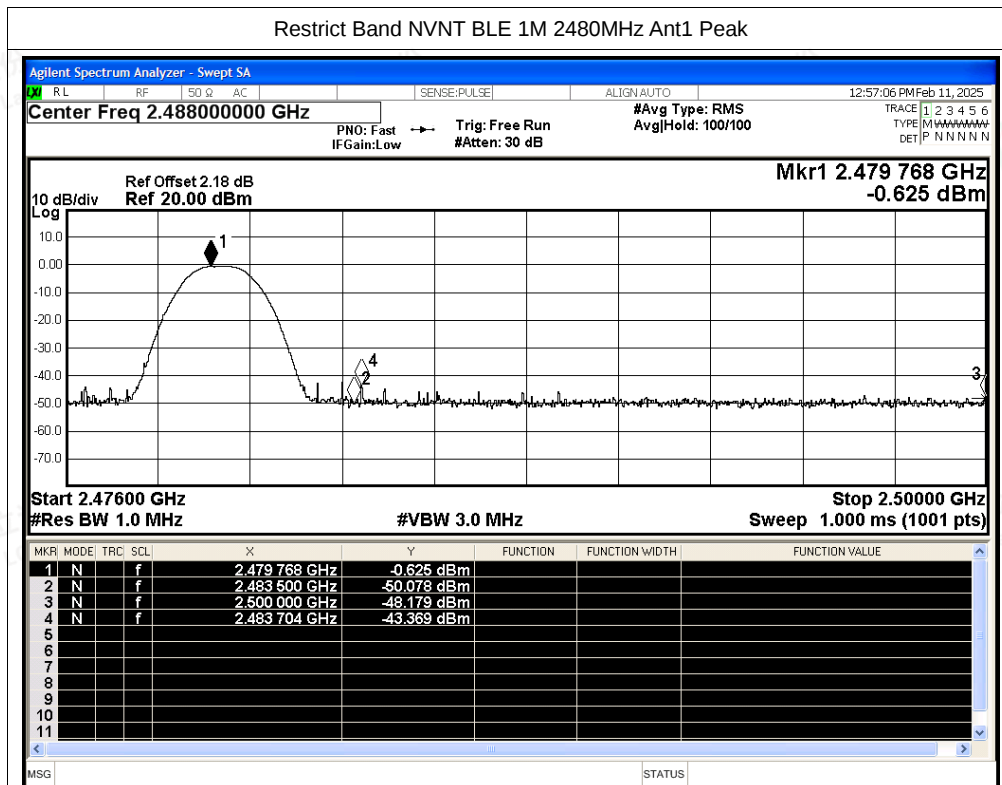
Test Graphs

Restrict Band NVNT BLE 1M 2402MHz Ant1 Peak



Restrict Band NVNT BLE 1M 2402MHz Ant1 Average





Report No.: LCSA11144241EA

