



Appendix A

RF Test Data for BLE (Conducted Measurement)

Product Name: Smart Keypad

Test Model: WRK

Environmental Conditions

Temperature:	23.1° C
Relative Humidity:	52.3%
ATM Pressure:	100.0 kPa
Test Engineer:	Taylor Hu
Supervised by:	Ling Zhu



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A.1 -6dB Bandwidth

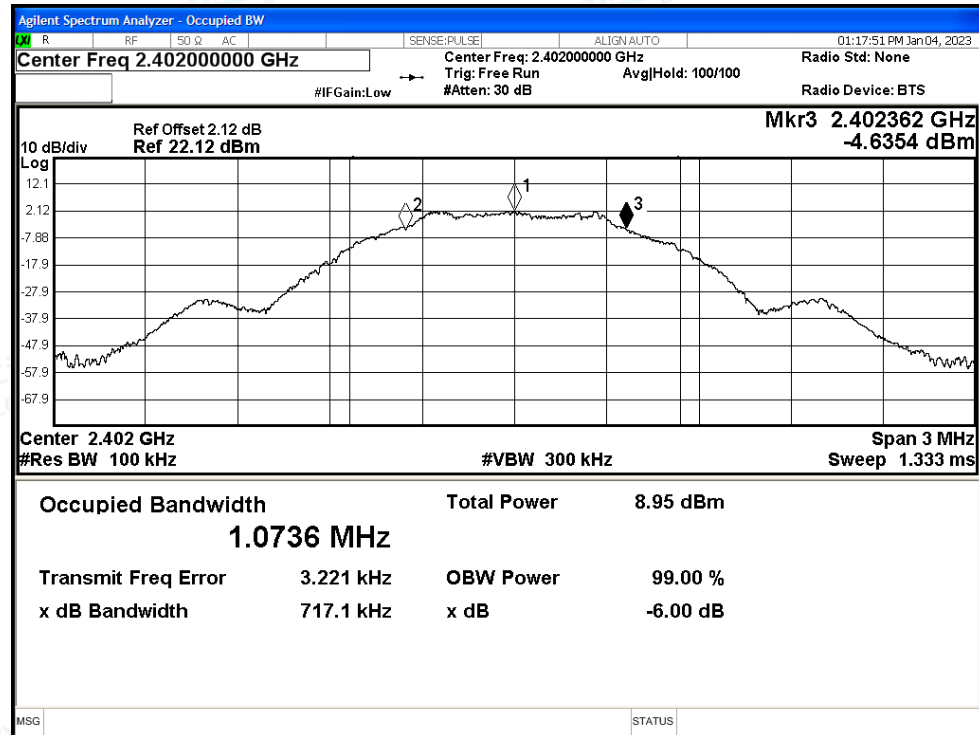
Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	Ant	0.717	≥ 0.5	Pass
NVNT	BLE 1M	2440	Ant	0.709	≥ 0.5	Pass
NVNT	BLE 1M	2480	Ant	0.709	≥ 0.5	Pass
NVNT	BLE 2M	2402	Ant	1.428	≥ 0.5	Pass
NVNT	BLE 2M	2440	Ant	1.281	≥ 0.5	Pass
NVNT	BLE 2M	2480	Ant	1.403	≥ 0.5	Pass



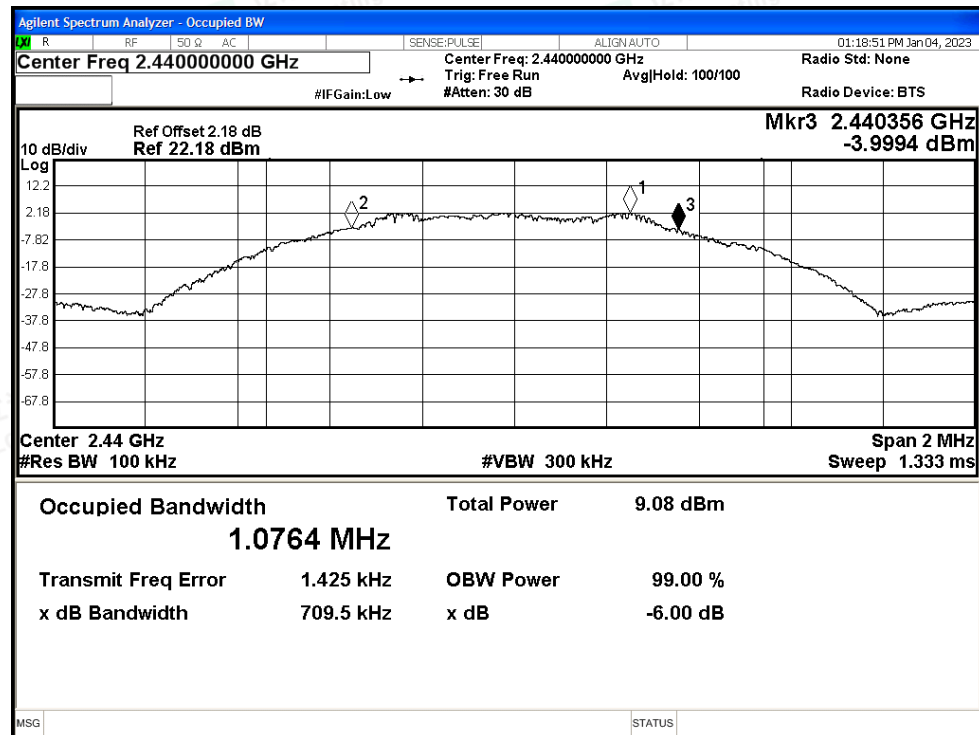


Test Graphs

-6dB Bandwidth NVNT BLE 1M 2402MHz Ant



-6dB Bandwidth NVNT BLE 1M 2440MHz Ant

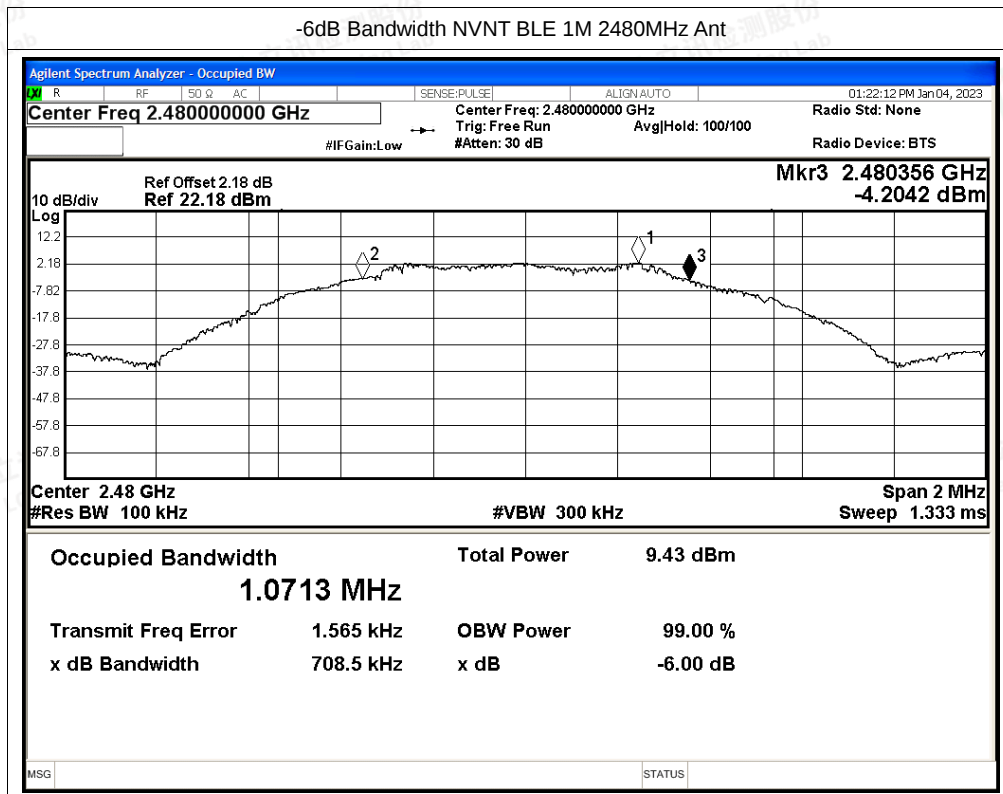


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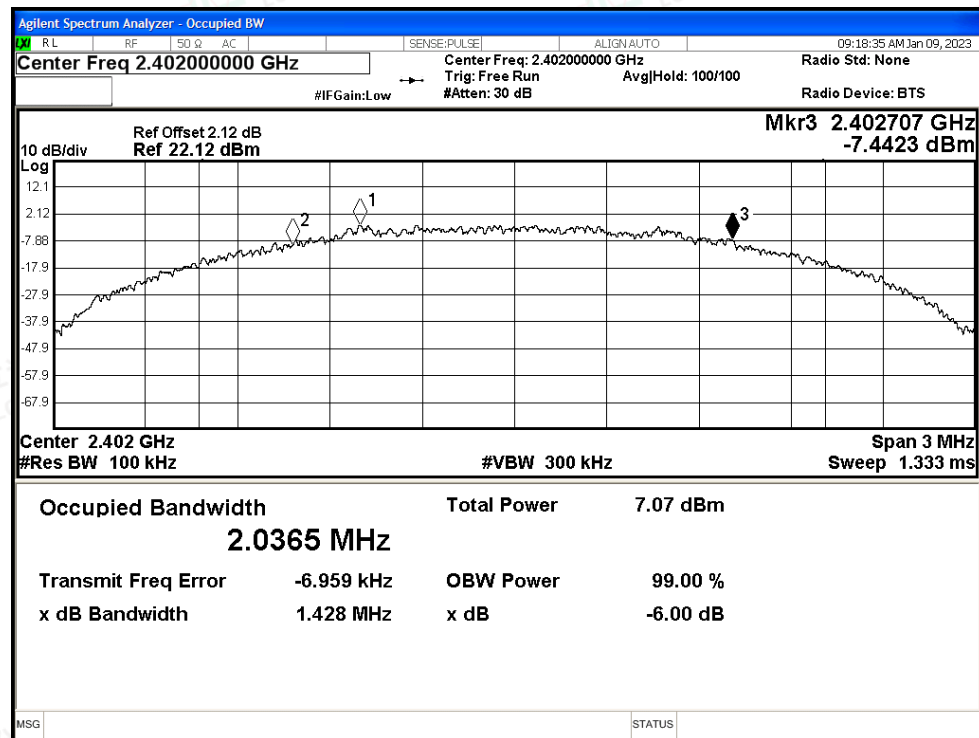
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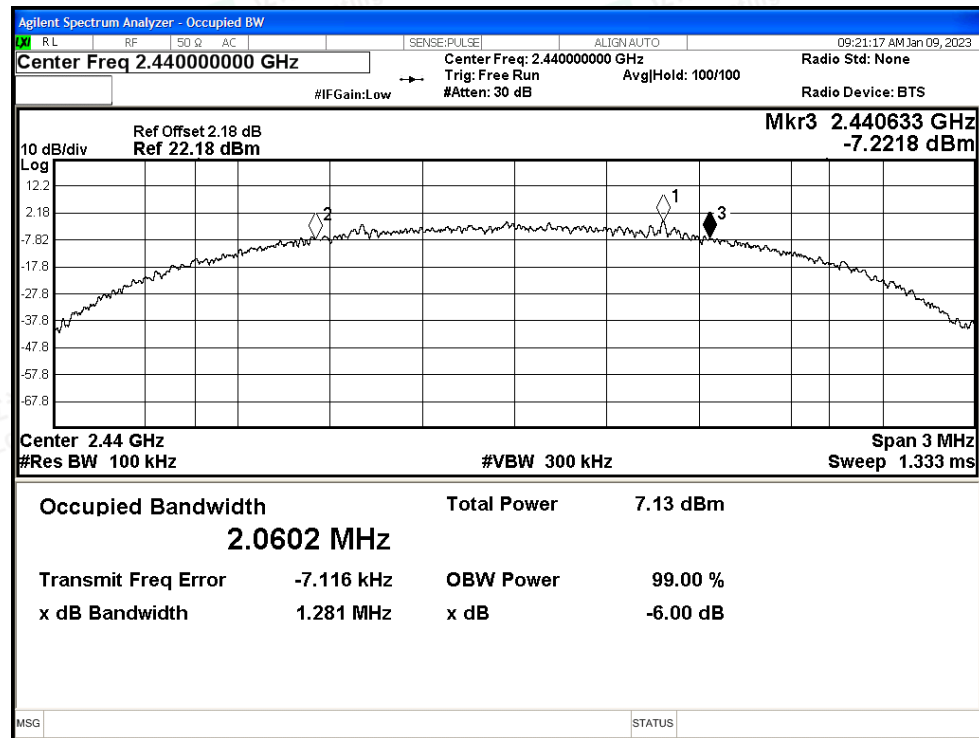


Test Graphs

-6dB Bandwidth NVNT BLE 2M 2402MHz Ant



-6dB Bandwidth NVNT BLE 2M 2440MHz Ant

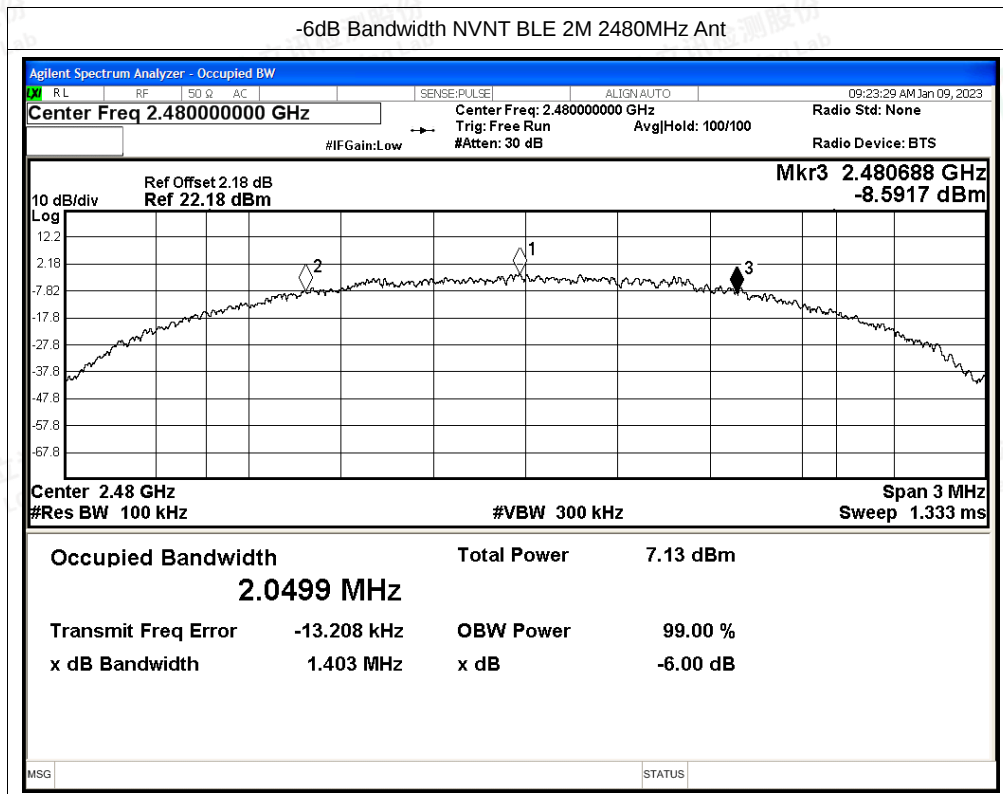


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A.2 Occupied Channel Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	BLE 1M	2402	Ant	0.898
NVNT	BLE 1M	2440	Ant	1.067
NVNT	BLE 1M	2480	Ant	1.066
NVNT	BLE 2M	2402	Ant	2.032
NVNT	BLE 2M	2440	Ant	2.052
NVNT	BLE 2M	2480	Ant	2.025

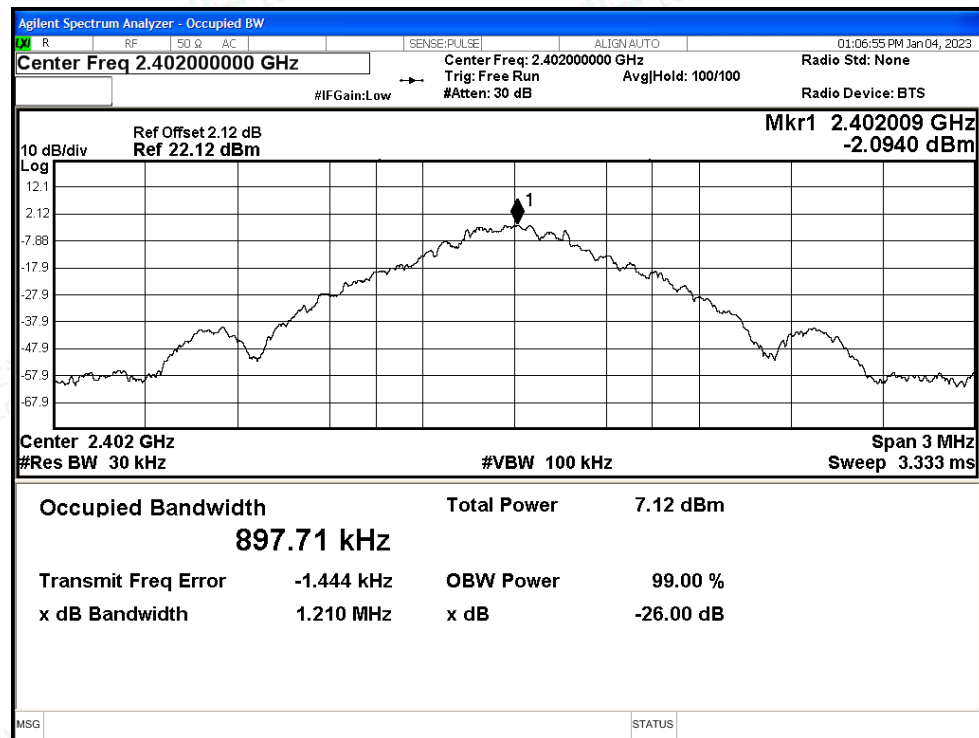


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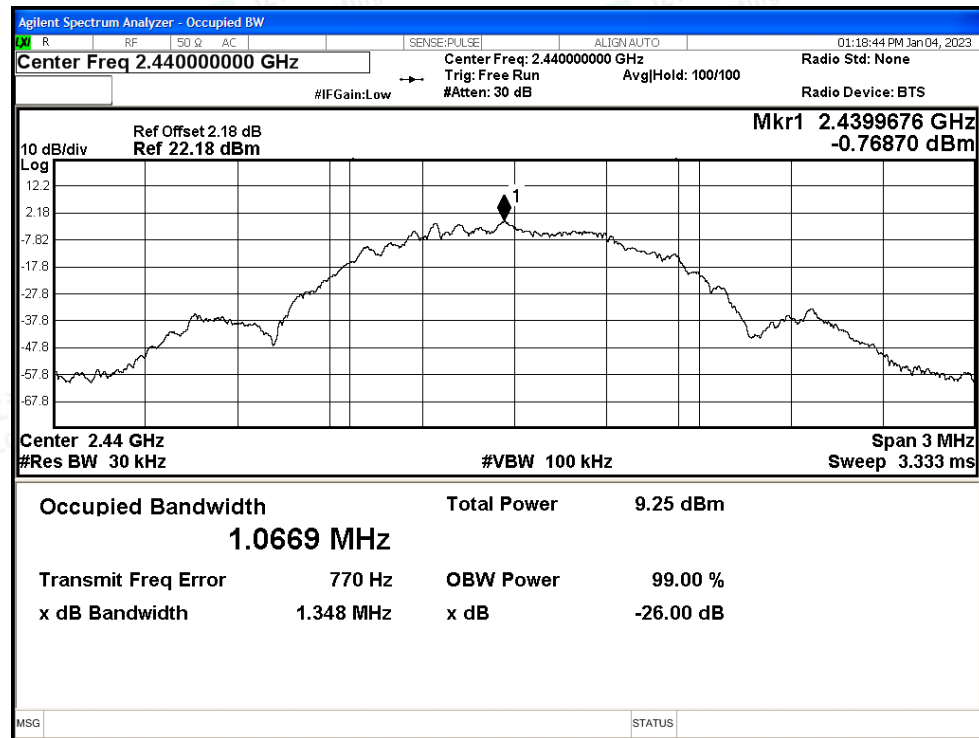


Test Graphs

OBW NVNT BLE 1M 2402MHz Ant



OBW NVNT BLE 1M 2440MHz Ant

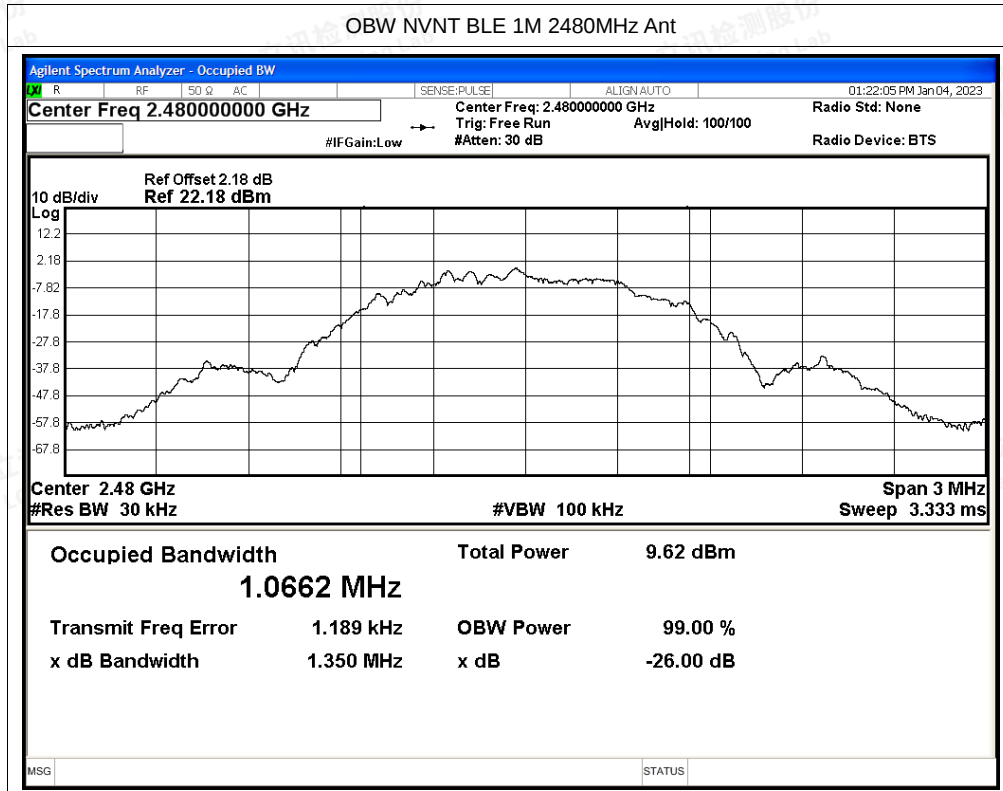


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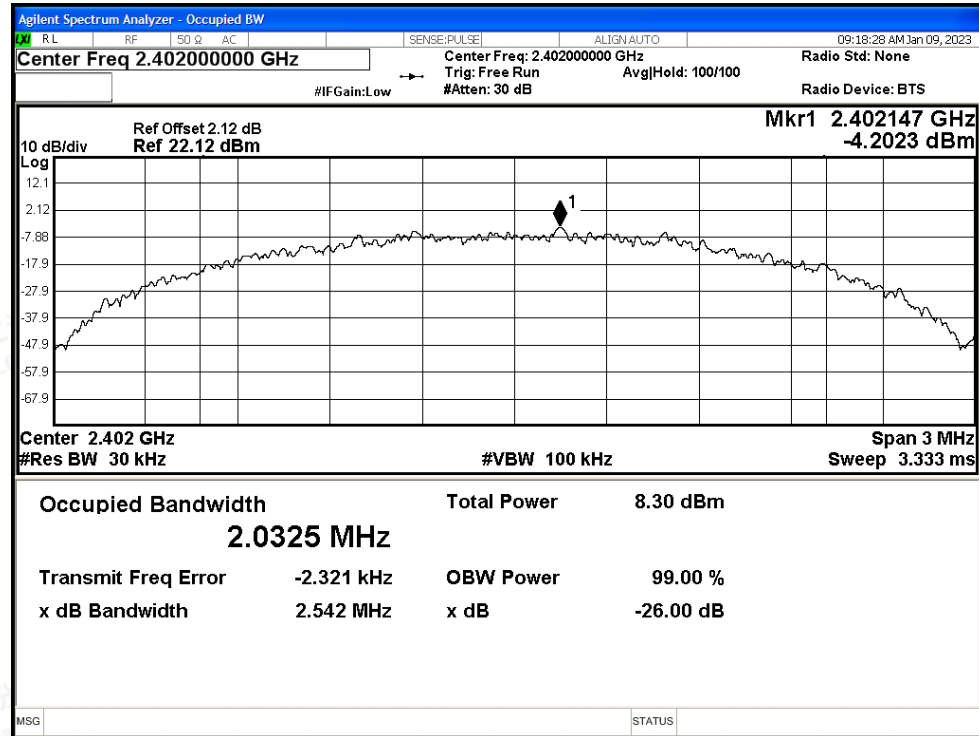
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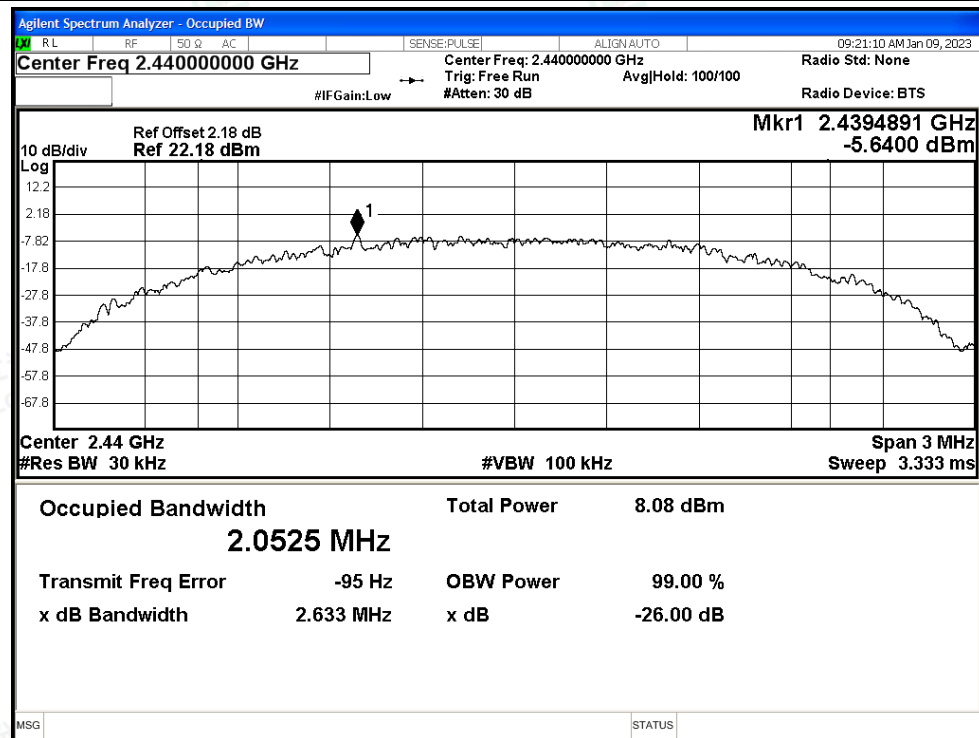


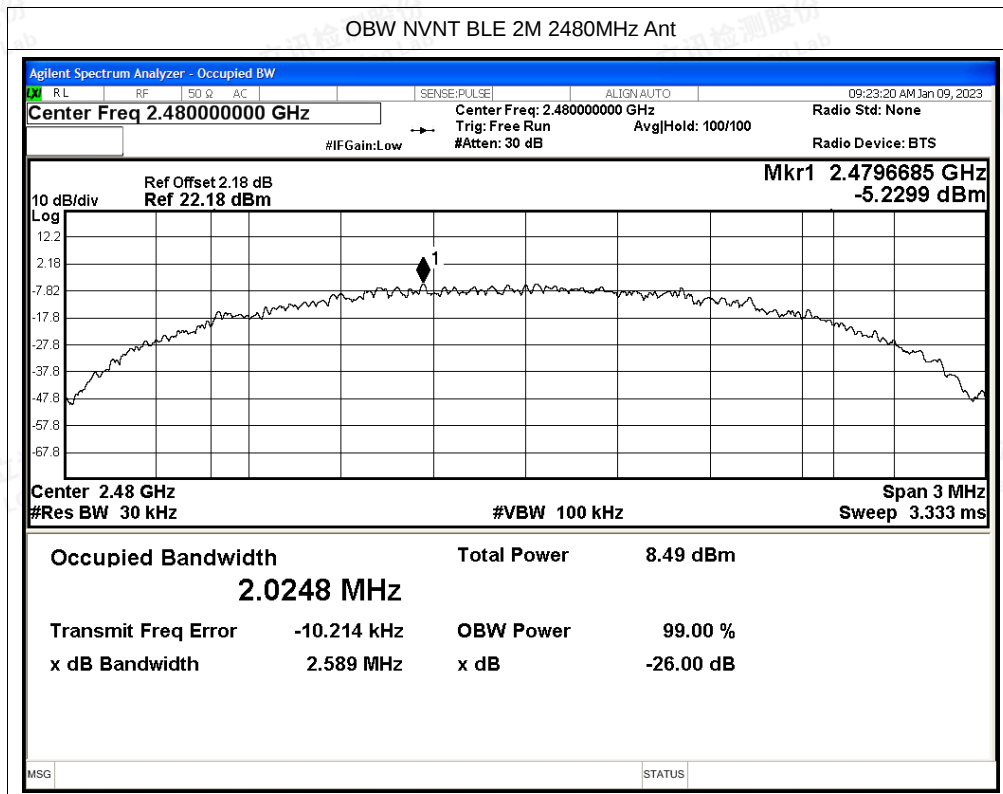
Test Graphs

OBW NVNT BLE 2M 2402MHz Ant



OBW NVNT BLE 2M 2440MHz Ant







A.3 Maximum Conducted Output Power

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant	3.31	30	Pass
NVNT	BLE 1M	2440	Ant	3.42	30	Pass
NVNT	BLE 1M	2480	Ant	3.7	30	Pass
NVNT	BLE 2M	2402	Ant	0.32	30	Pass
NVNT	BLE 2M	2440	Ant	0.44	30	Pass
NVNT	BLE 2M	2480	Ant	0.62	30	Pass

EIRP

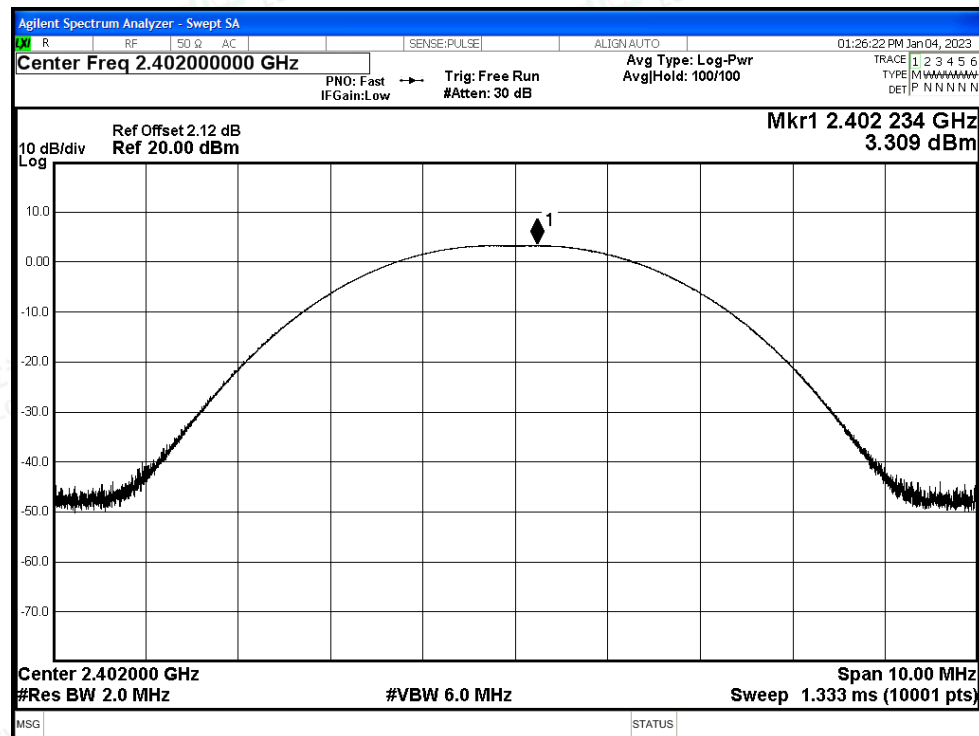
TestMode	Channel	Maximum Peak Output Power [dBm]	Antenna Gain	Report EIRP Power(dBm)	Limit[dBm]	Verdict
BLE_1M	2402	3.31	2.0	5.31	36	PASS
	2440	3.42	2.0	5.42	36	PASS
	2480	3.7	2.0	5.7	36	PASS
BLE_2M	2402	0.32	2.0	2.32	36	PASS
	2440	0.44	2.0	2.44	36	PASS
	2480	0.62	2.0	2.62	36	PASS



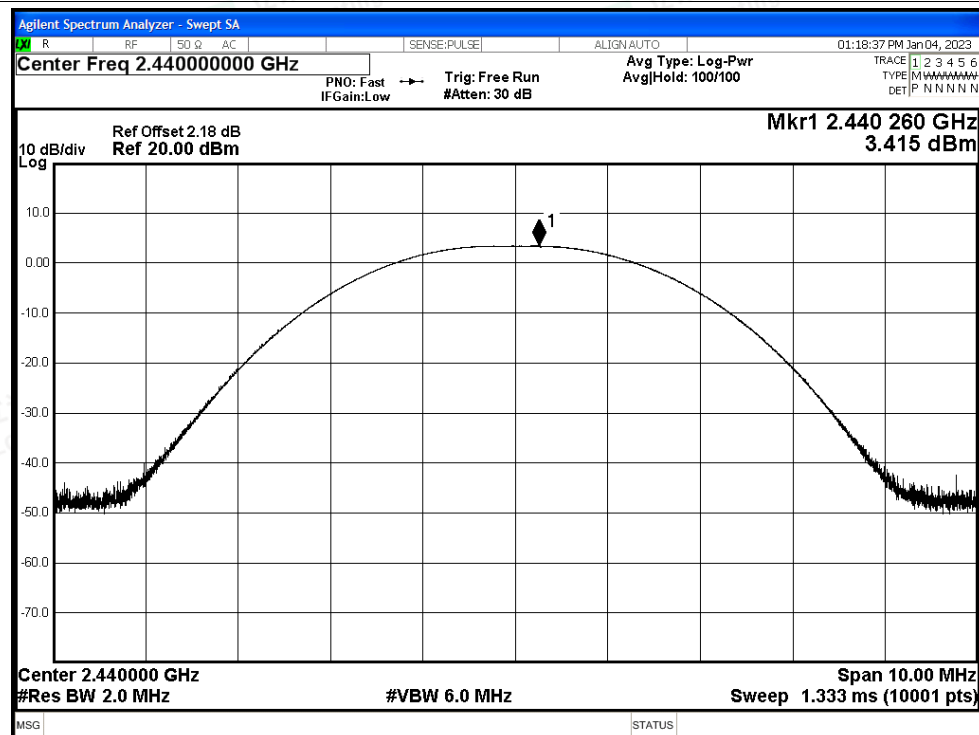


Test Graphs

Power NVNT BLE 1M 2402MHz Ant



Power NVNT BLE 1M 2440MHz Ant

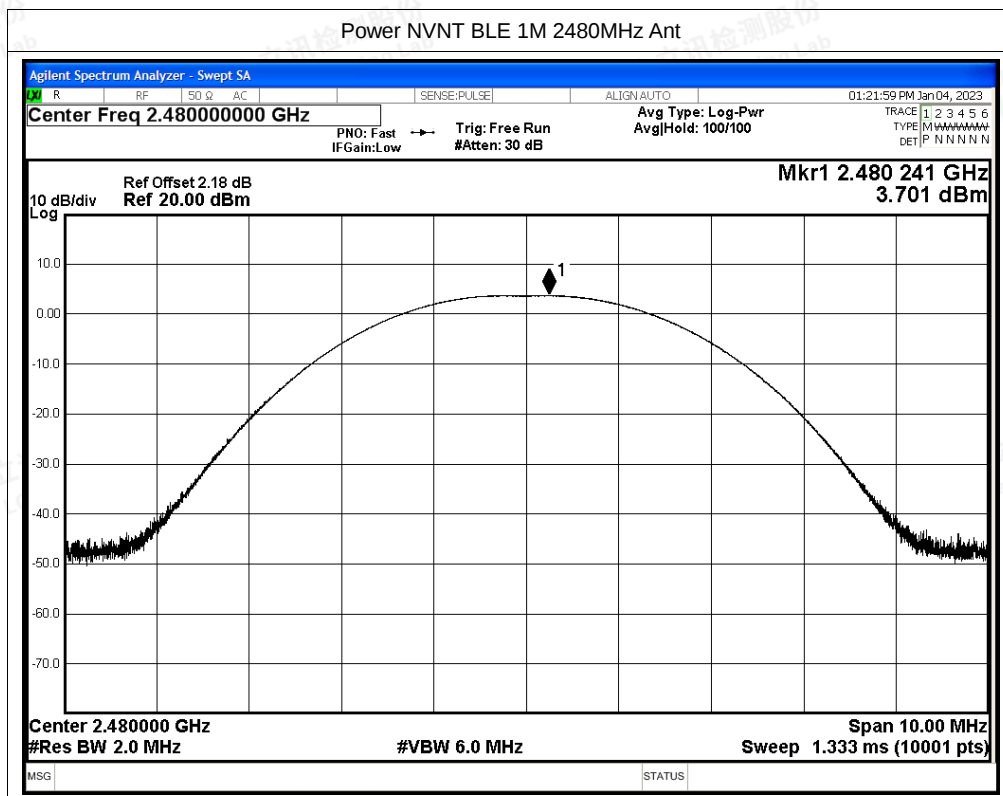


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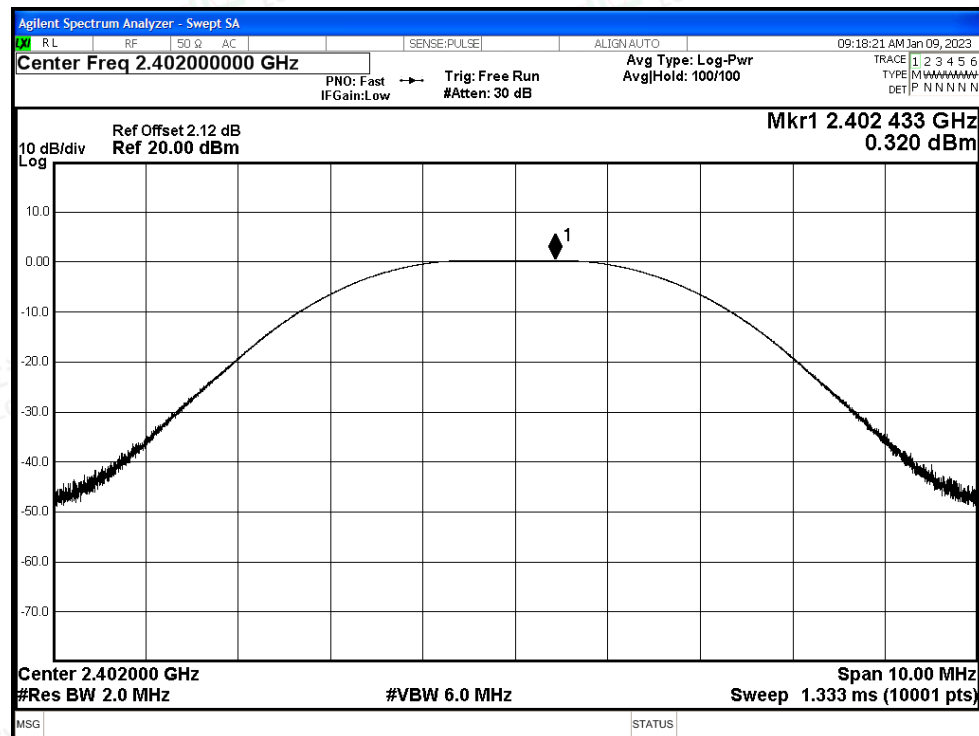
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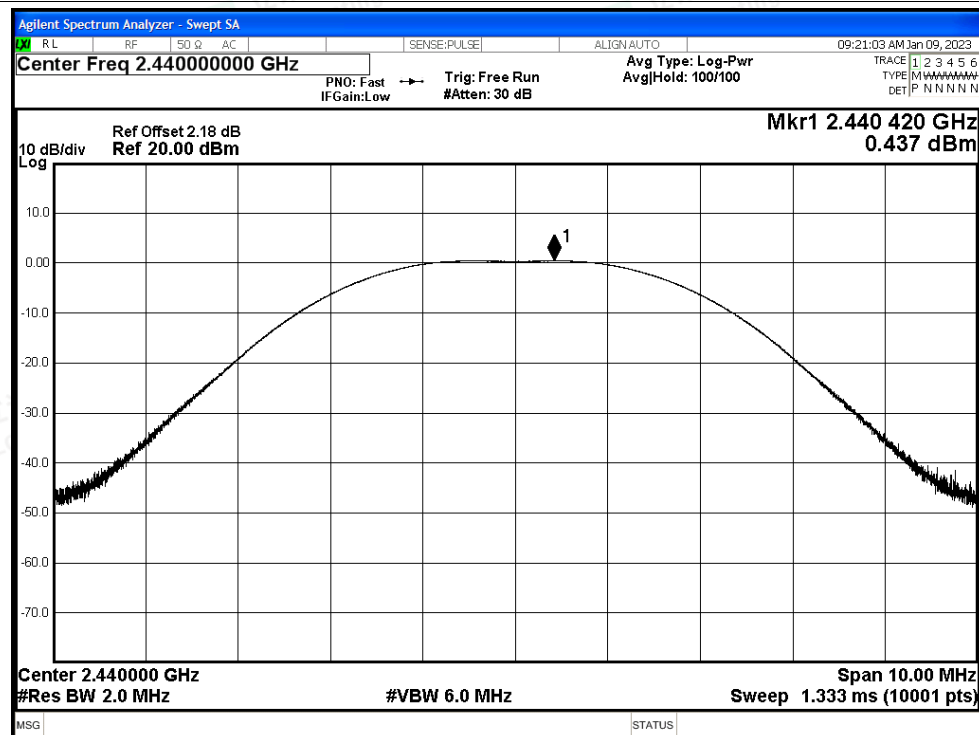


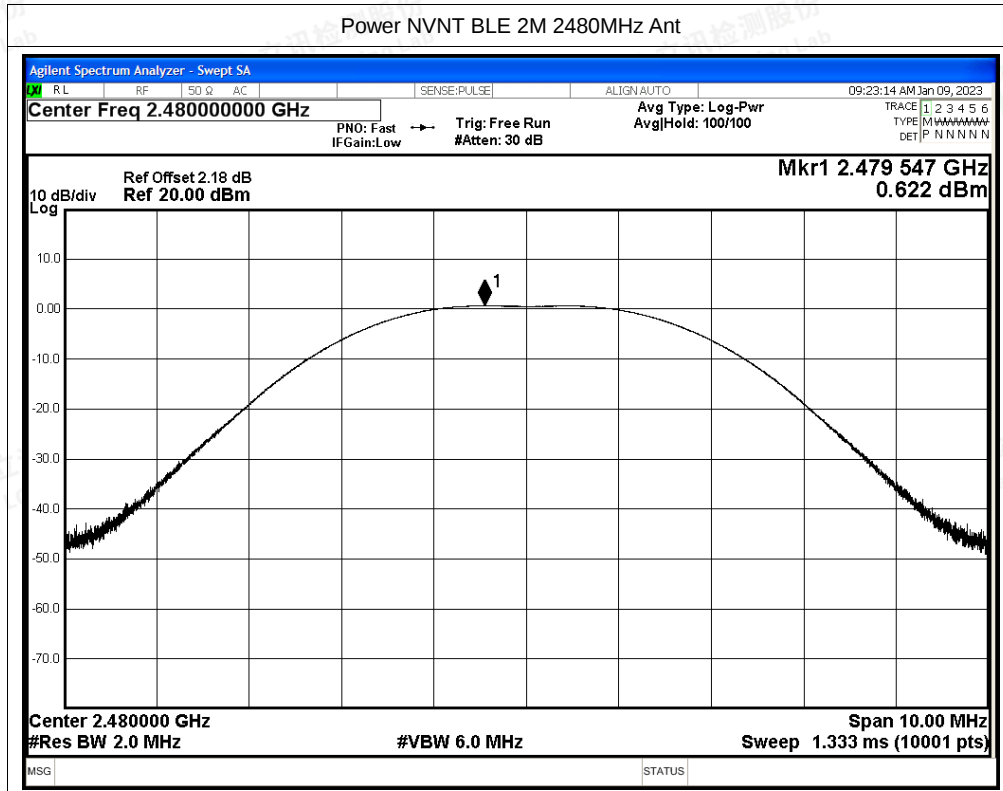
Test Graphs

Power NVNT BLE 2M 2402MHz Ant



Power NVNT BLE 2M 2440MHz Ant







A.4 Maximum Power Spectral Density Level

Condition	Mode	Frequency (MHz)	Antenna	Conducted PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	BLE 1M	2402	Ant	-11.87	8	Pass
NVNT	BLE 1M	2440	Ant	-12.87	8	Pass
NVNT	BLE 1M	2480	Ant	-11.51	8	Pass
NVNT	BLE 2M	2402	Ant	-13.01	8	Pass
NVNT	BLE 2M	2440	Ant	-13.1	8	Pass
NVNT	BLE 2M	2480	Ant	-11.46	8	Pass

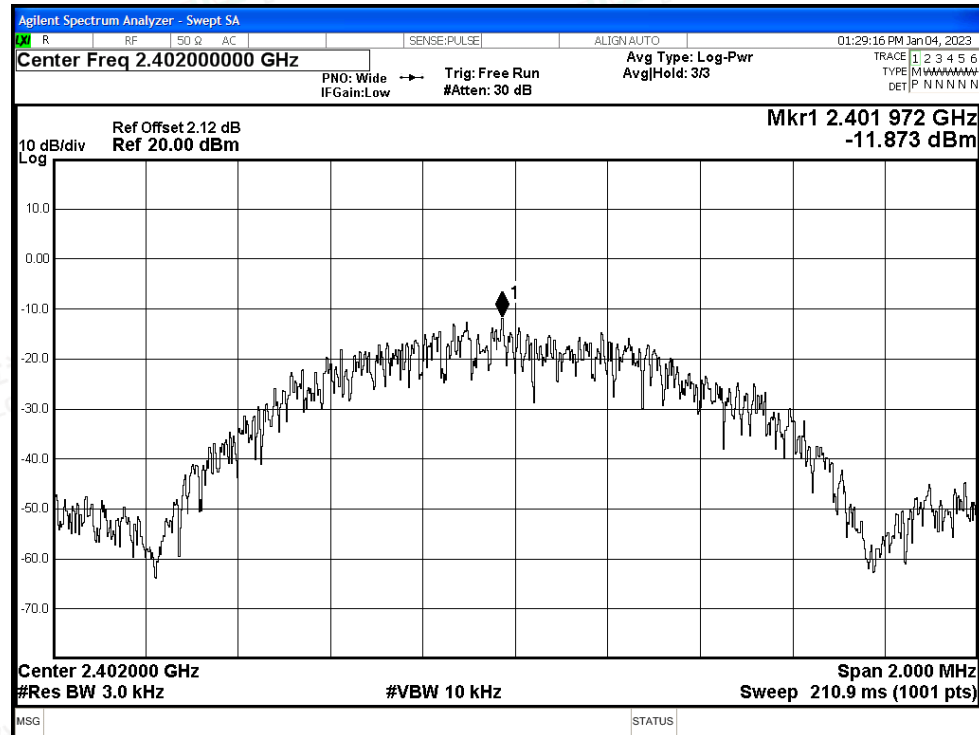


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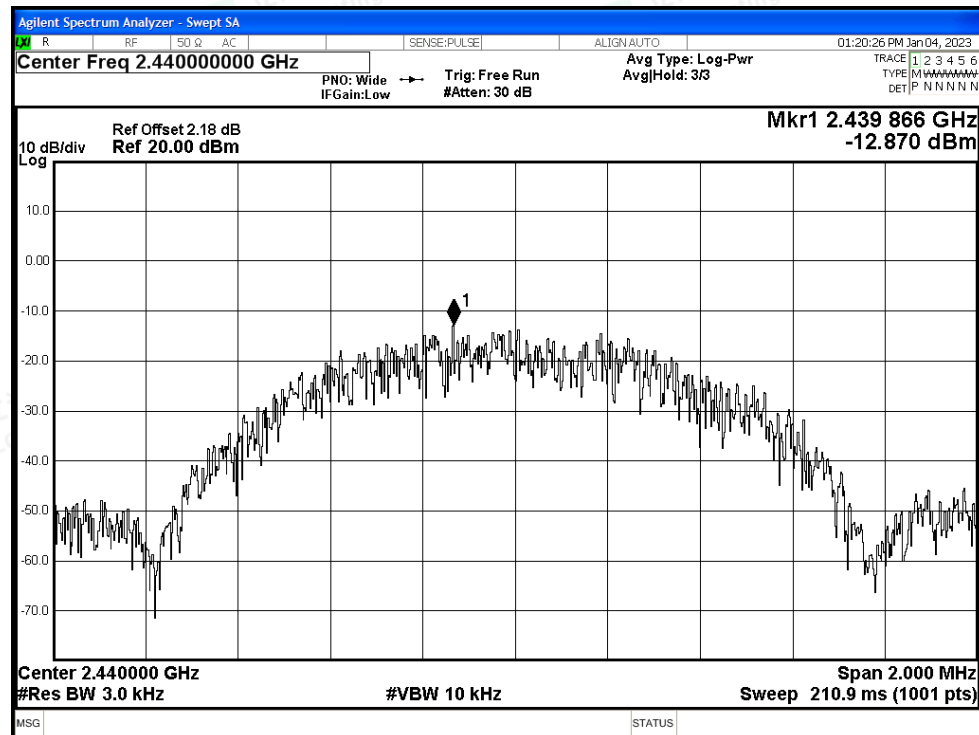


Test Graphs

PSD NVNT BLE 1M 2402MHz Ant



PSD NVNT BLE 1M 2440MHz Ant

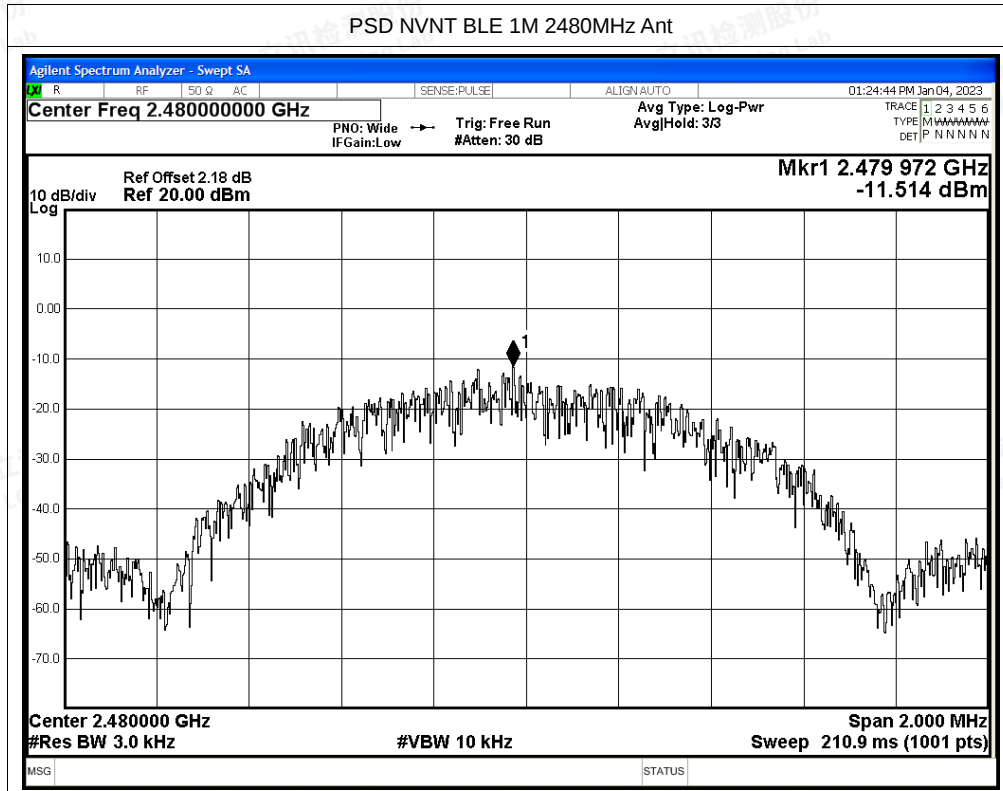


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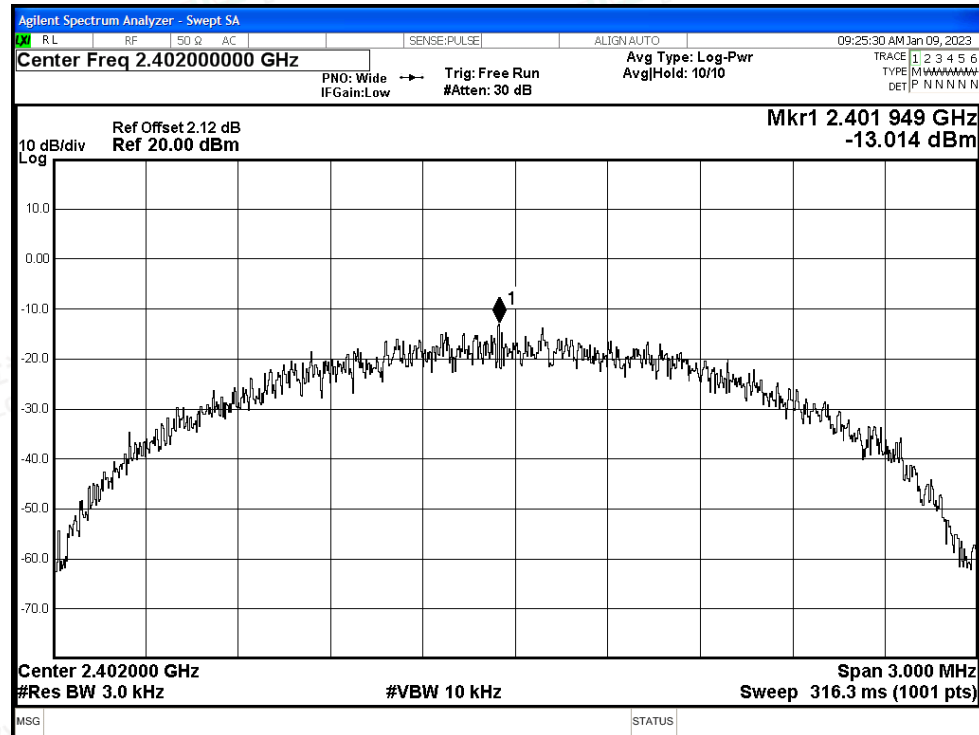
Scan code to check authenticity



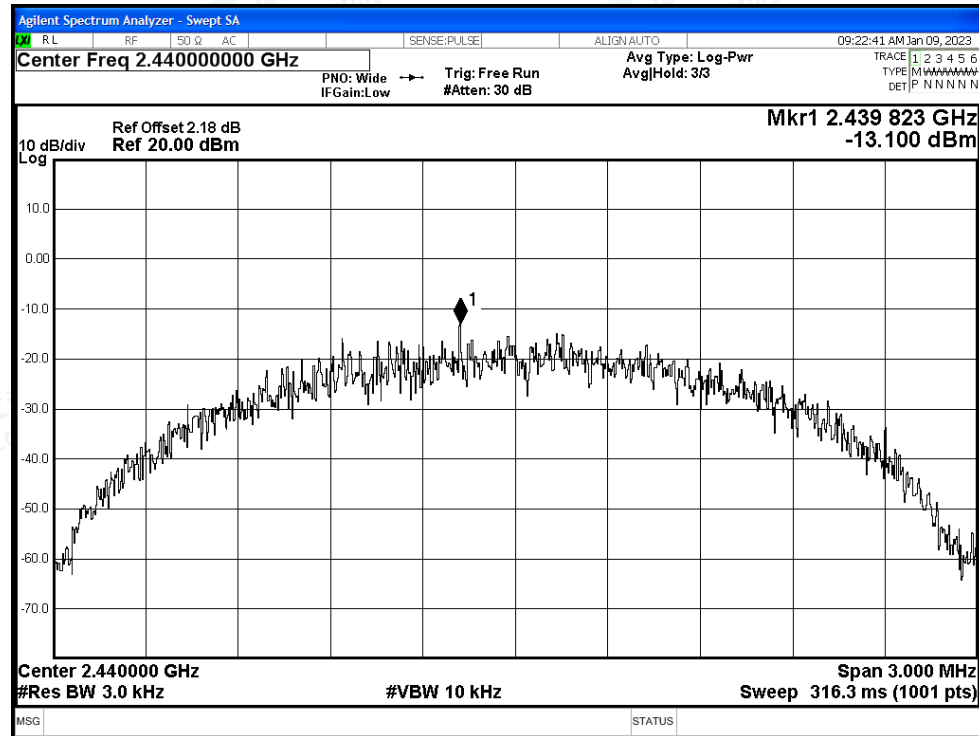


Test Graphs

PSD NVNT BLE 2M 2402MHz Ant



PSD NVNT BLE 2M 2440MHz Ant

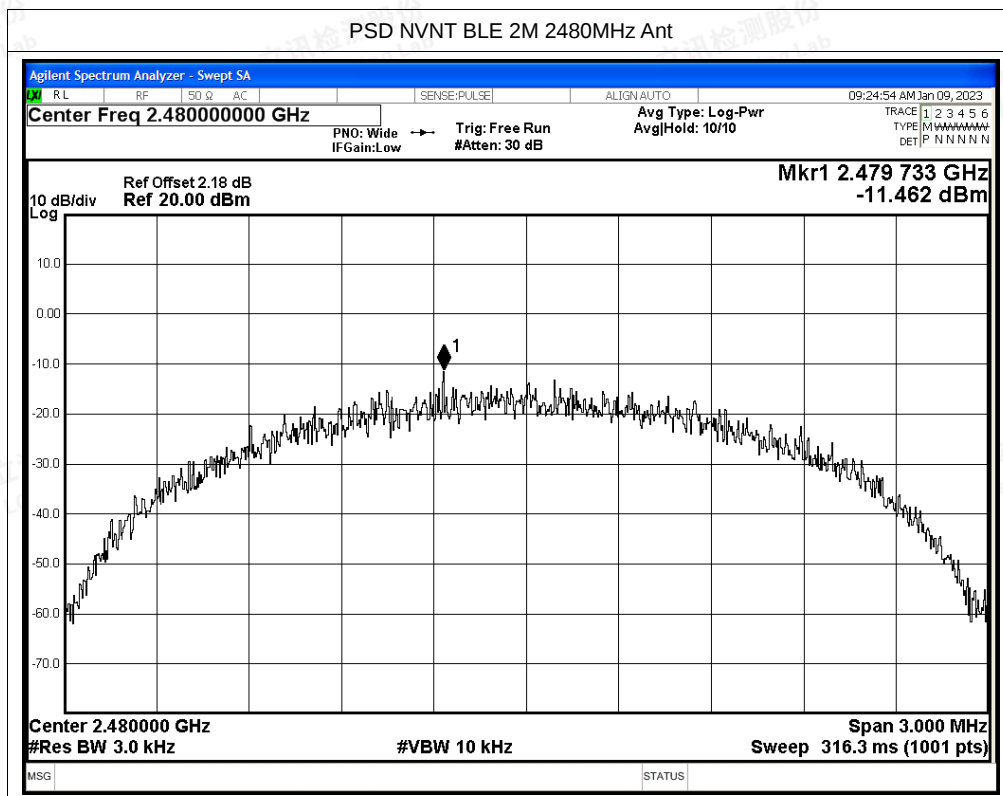


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A.5 Band Edge

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant	-56.16	-20	Pass
NVNT	BLE 1M	2480	Ant	-59.66	-20	Pass
NVNT	BLE 2M	2402	Ant	-33.26	-20	Pass
NVNT	BLE 2M	2480	Ant	-54.77	-20	Pass

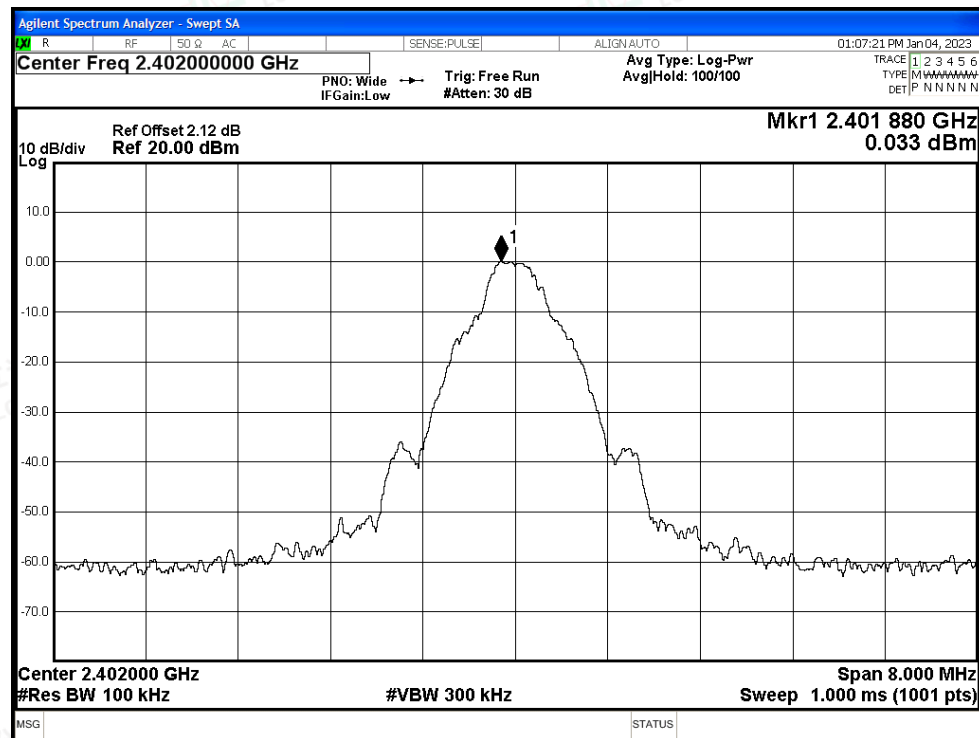


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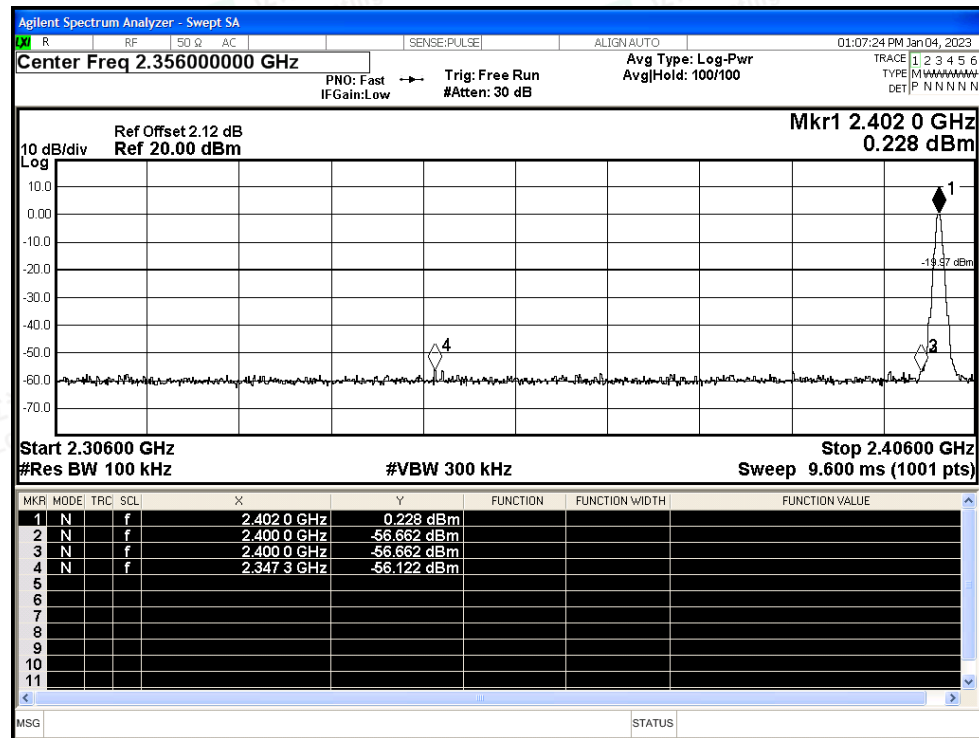


Test Graphs

Band Edge NVNT BLE 1M 2402MHz Ant Ref



Band Edge NVNT BLE 1M 2402MHz Ant Emission

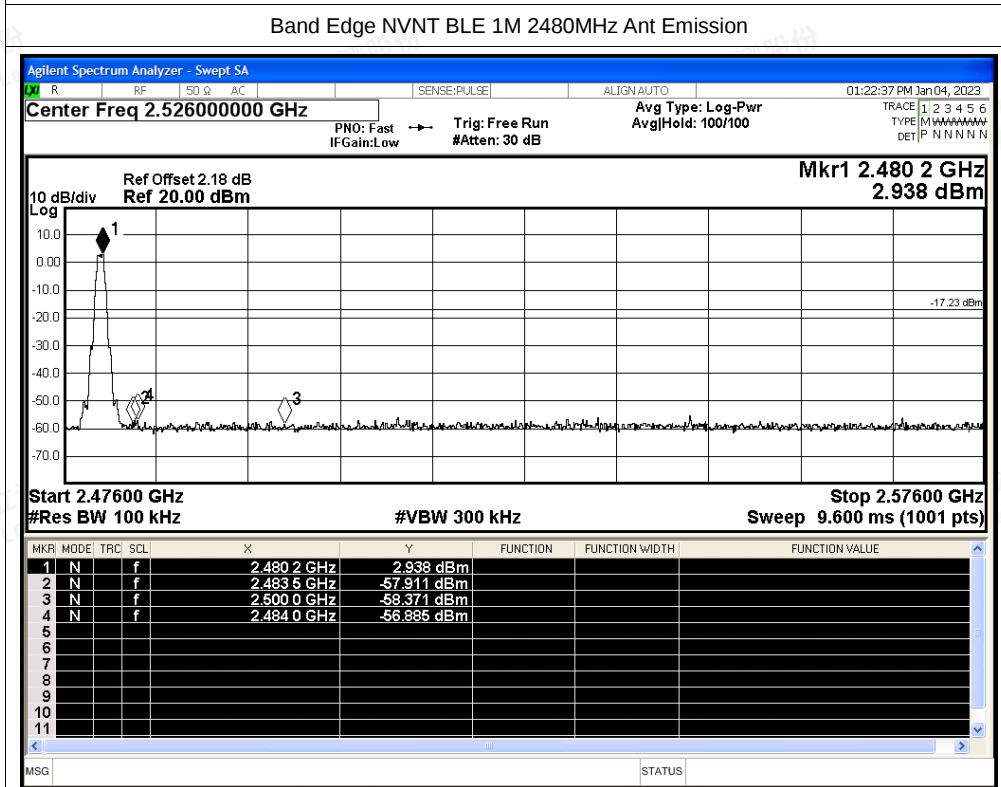
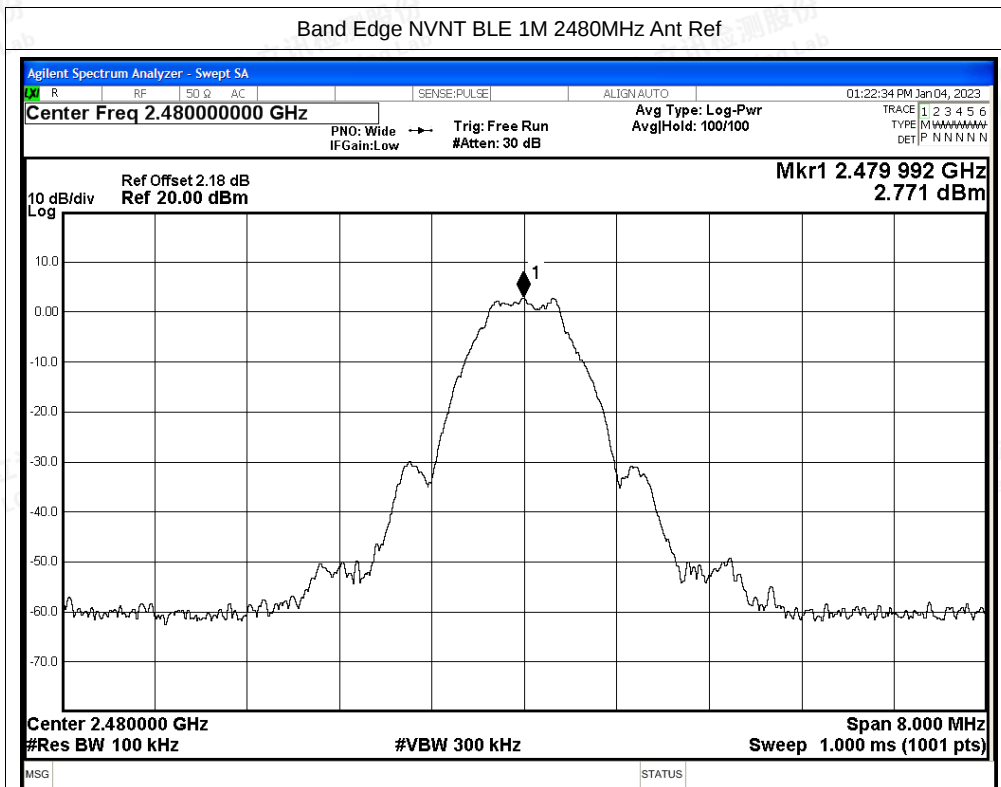


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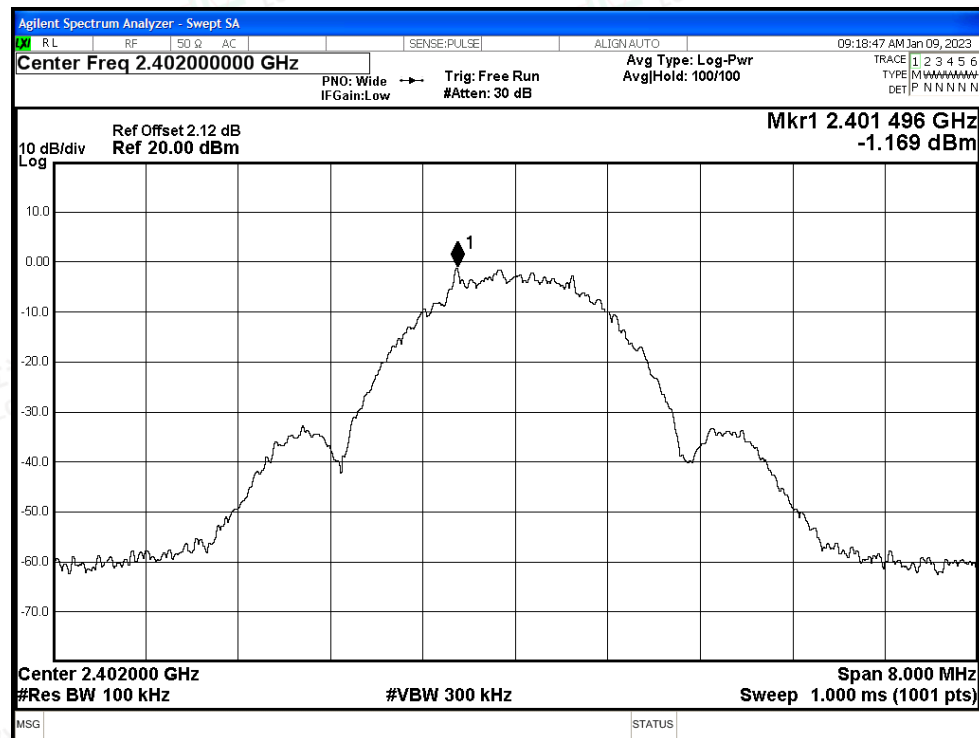
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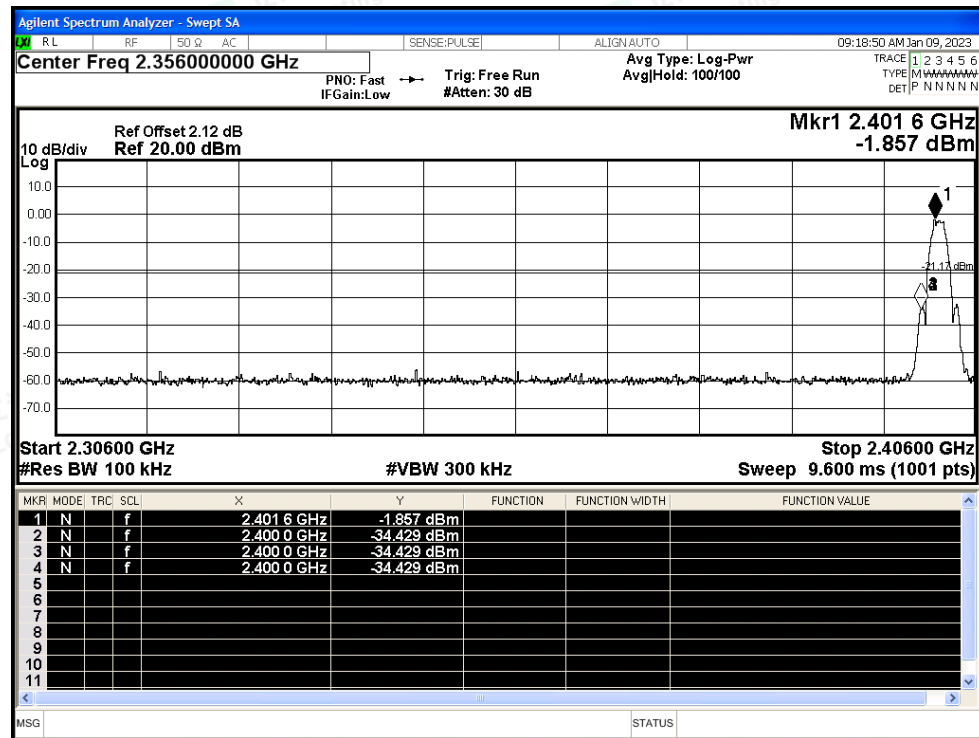


Test Graphs

Band Edge NVNT BLE 2M 2402MHz Ant Ref



Band Edge NVNT BLE 2M 2402MHz Ant Emission



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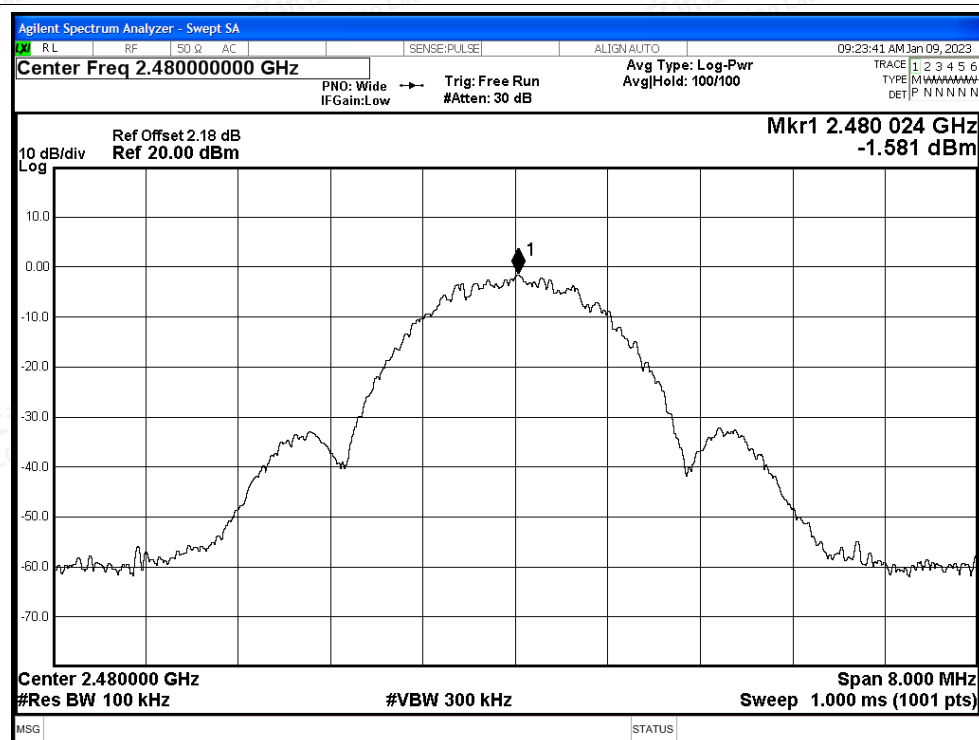
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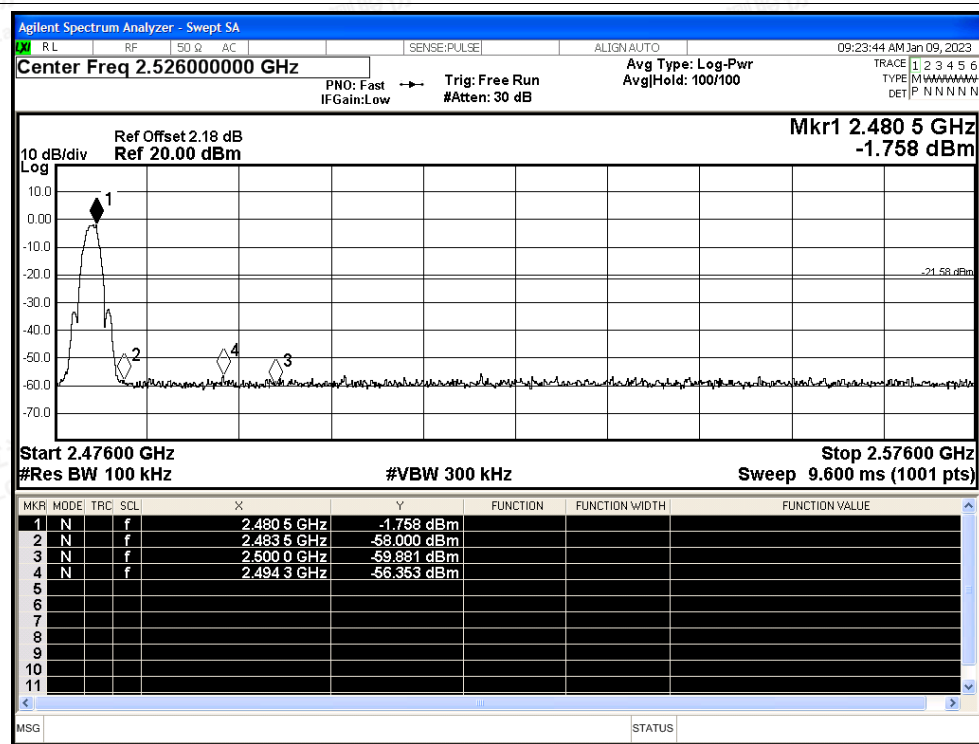
Scan code to check authenticity



Band Edge NVNT BLE 2M 2480MHz Ant Ref



Band Edge NVNT BLE 2M 2480MHz Ant Emission



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A.6 Conducted RF Spurious Emission

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant	-55.24	-20	Pass
NVNT	BLE 1M	2440	Ant	-57.36	-20	Pass
NVNT	BLE 1M	2480	Ant	-57.69	-20	Pass
NVNT	BLE 2M	2402	Ant	-52.73	-20	Pass
NVNT	BLE 2M	2440	Ant	-53.41	-20	Pass
NVNT	BLE 2M	2480	Ant	-53.59	-20	Pass

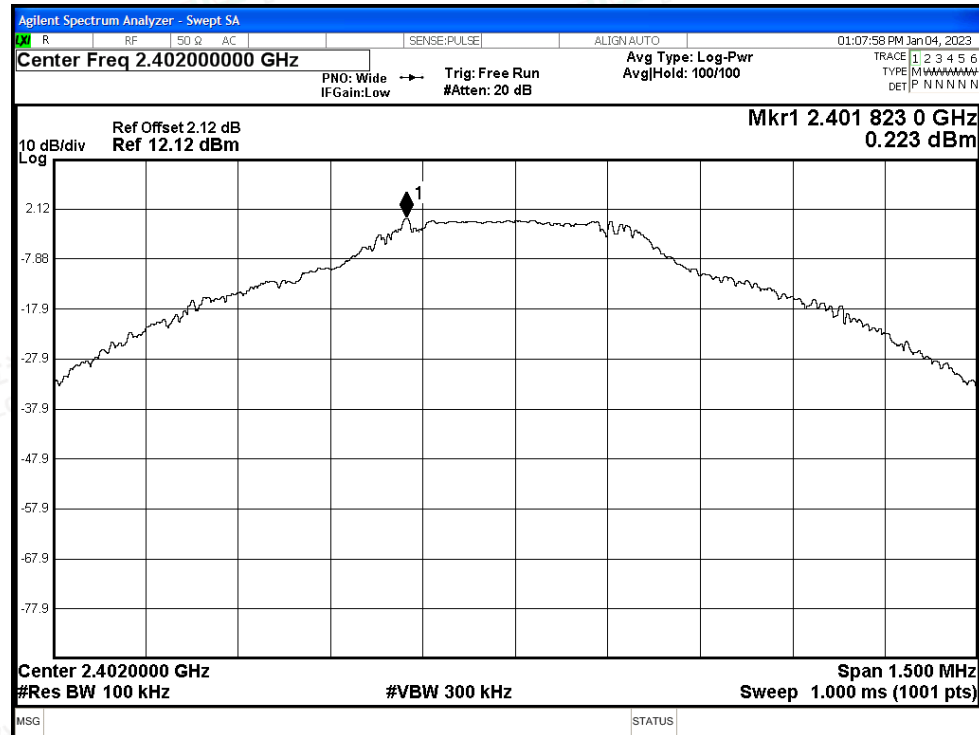


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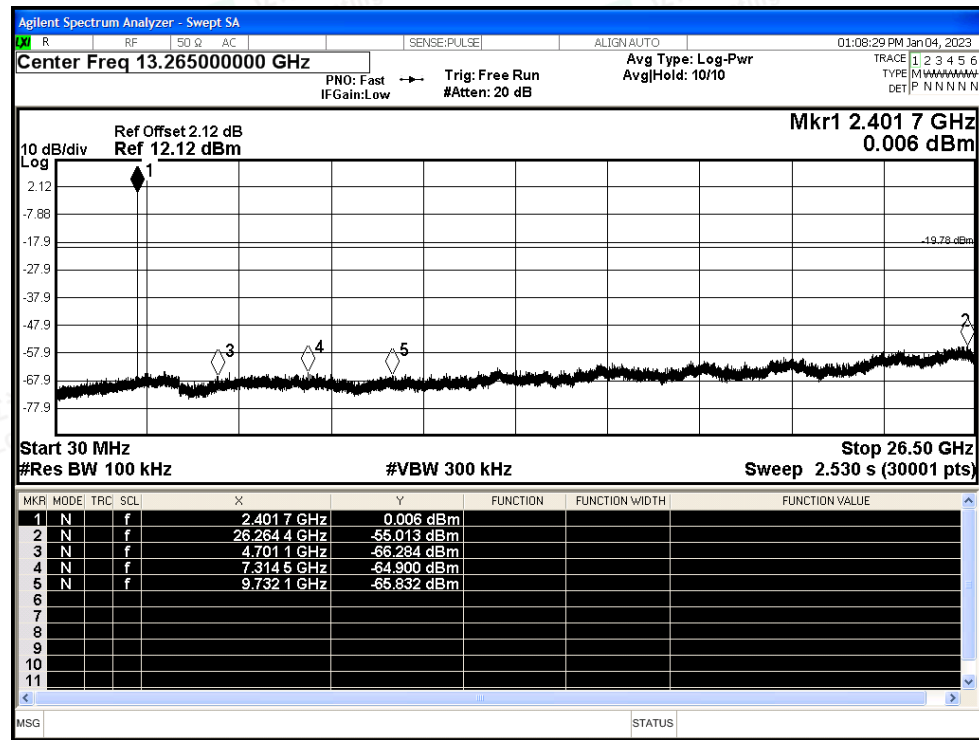


Test Graphs

Tx. Spurious NVNT BLE 1M 2402MHz Ant Ref



Tx. Spurious NVNT BLE 1M 2402MHz Ant Emission



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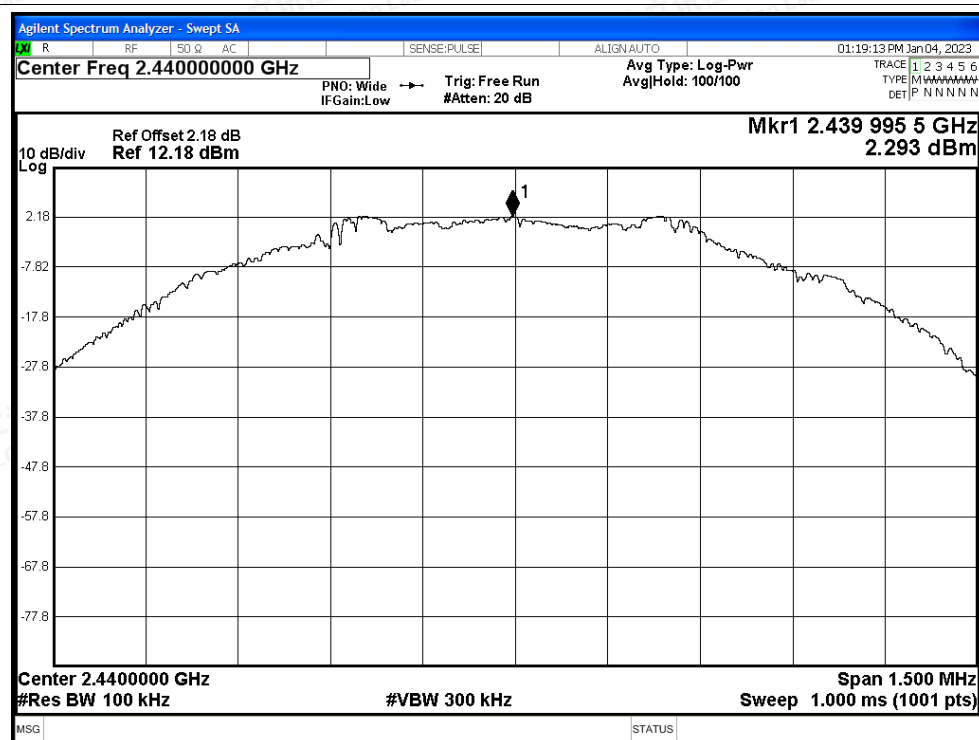
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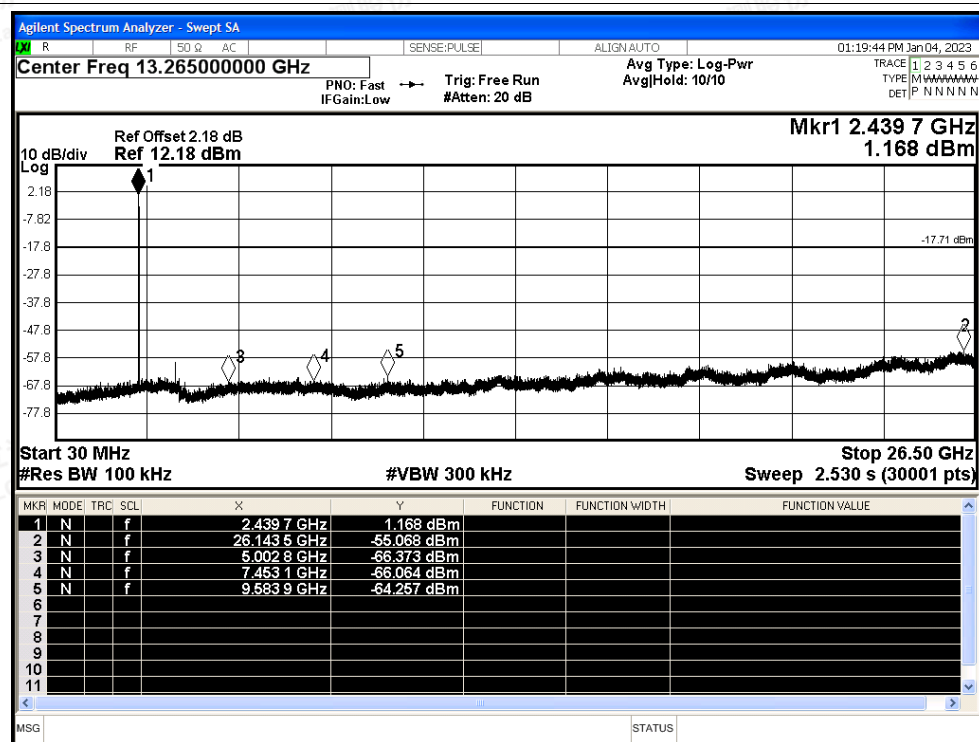
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Tx. Spurious NVNT BLE 1M 2440MHz Ant Ref

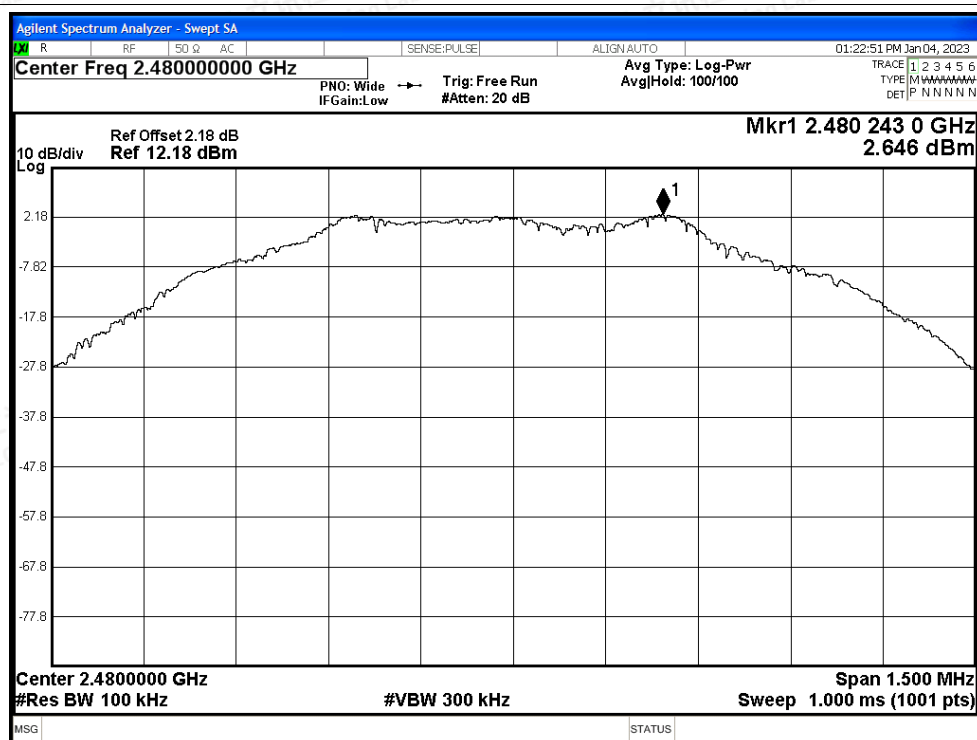


Tx. Spurious NVNT BLE 1M 2440MHz Ant Emission

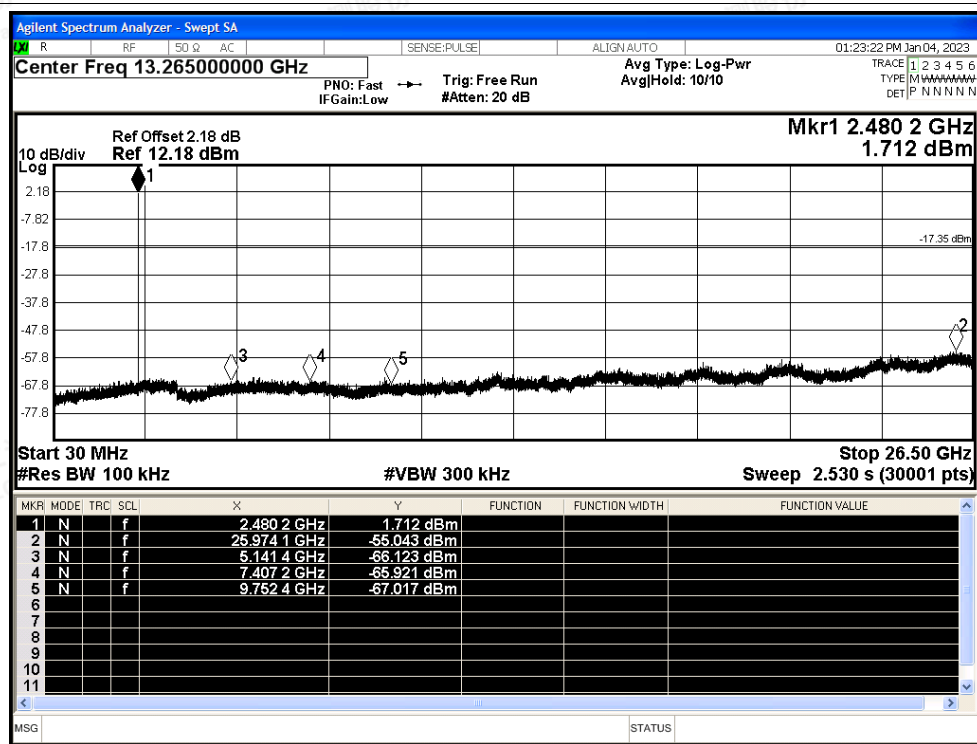




Tx. Spurious NVNT BLE 1M 2480MHz Ant Ref



Tx. Spurious NVNT BLE 1M 2480MHz Ant Emission



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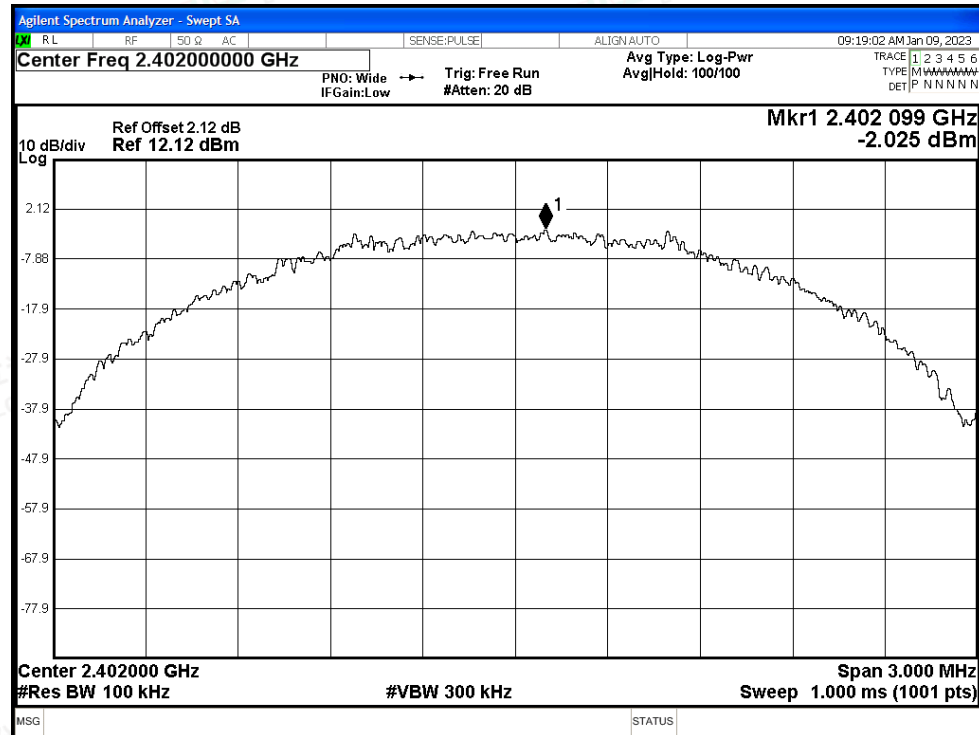
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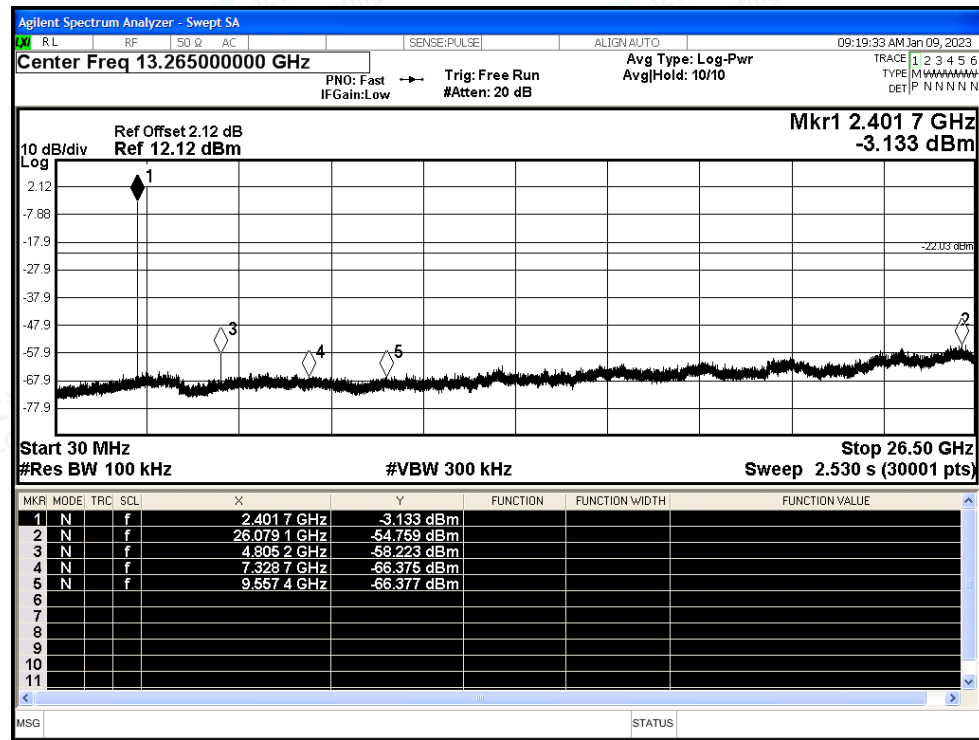


Test Graphs

Tx. Spurious NVNT BLE 2M 2402MHz Ant Ref



Tx. Spurious NVNT BLE 2M 2402MHz Ant Emission



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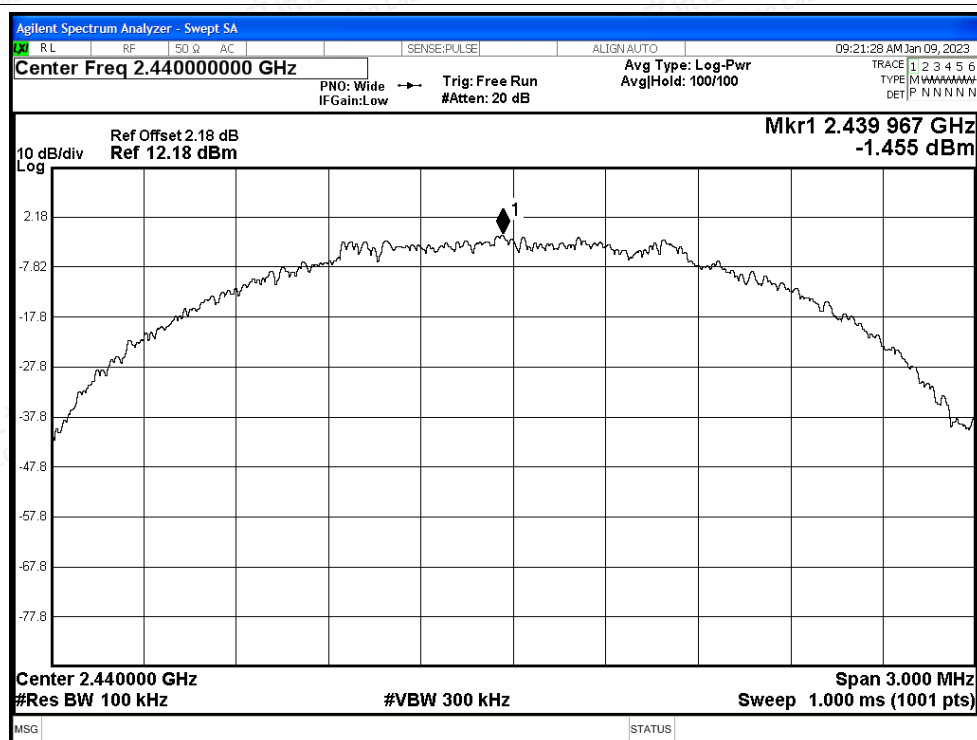
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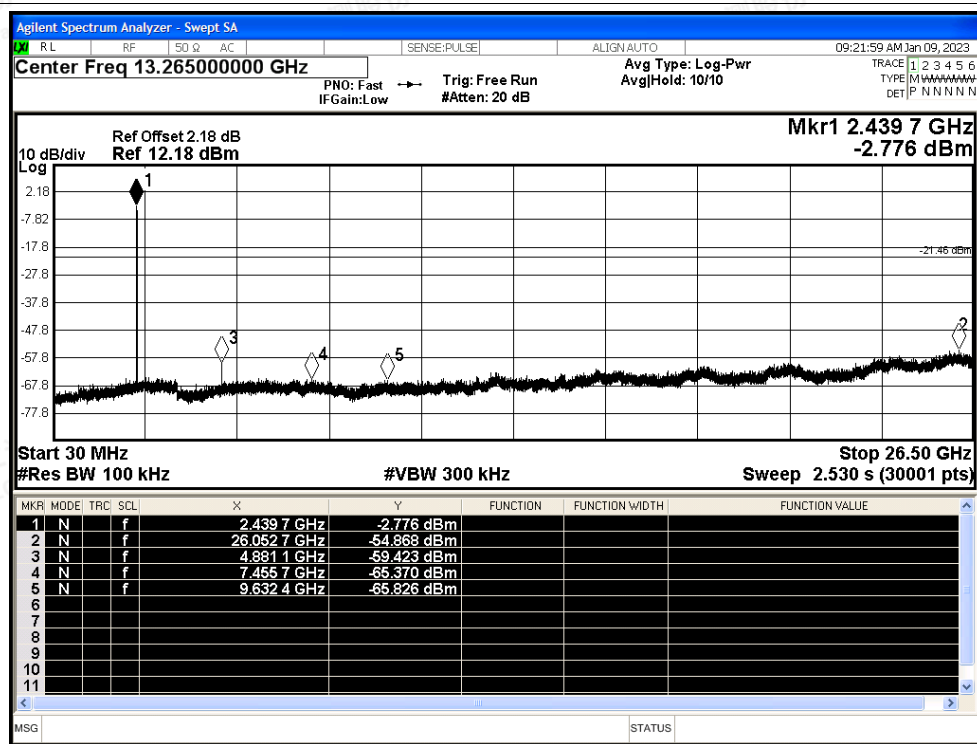
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Tx. Spurious NVNT BLE 2M 2440MHz Ant Ref



Tx. Spurious NVNT BLE 2M 2440MHz Ant Emission



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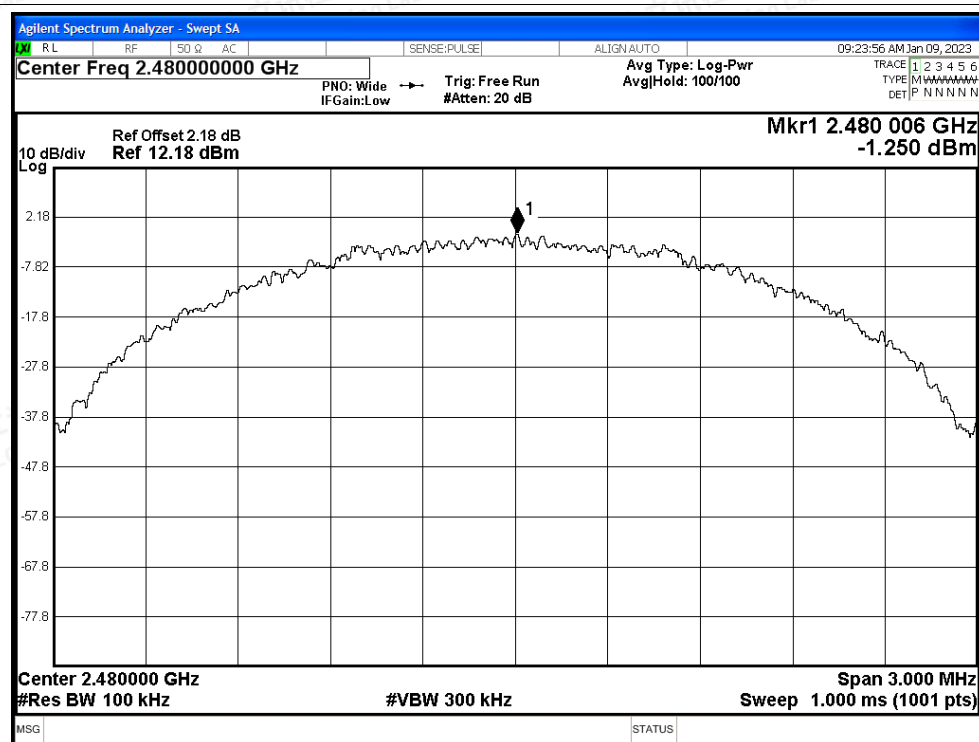
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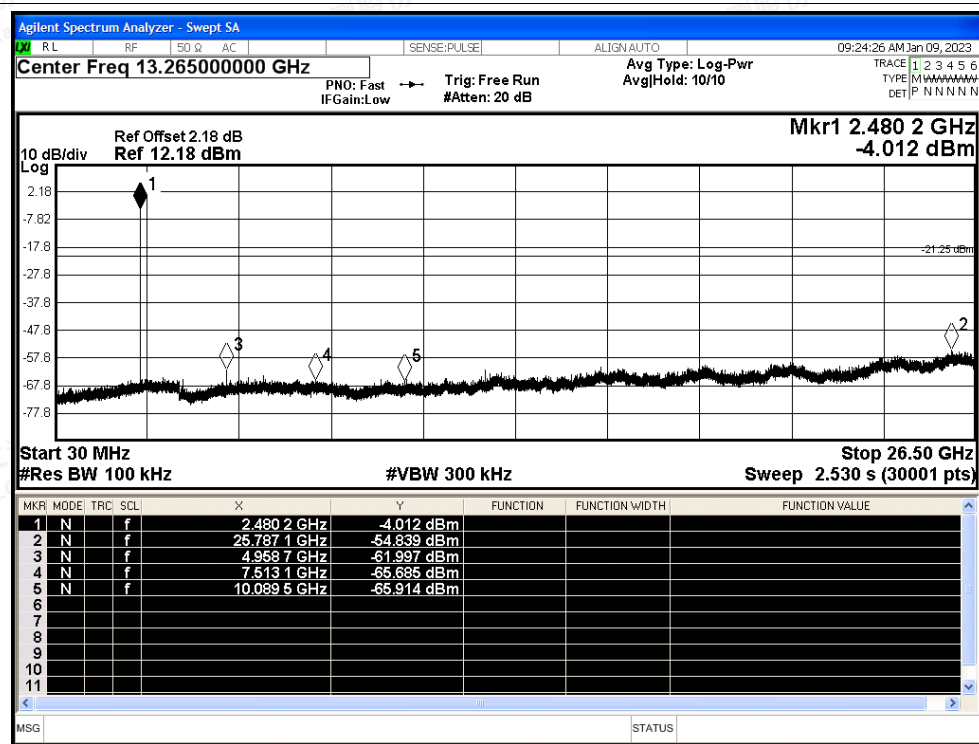
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Tx. Spurious NVNT BLE 2M 2480MHz Ant Ref



Tx. Spurious NVNT BLE 2M 2480MHz Ant Emission



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A.7 Duty Cycle

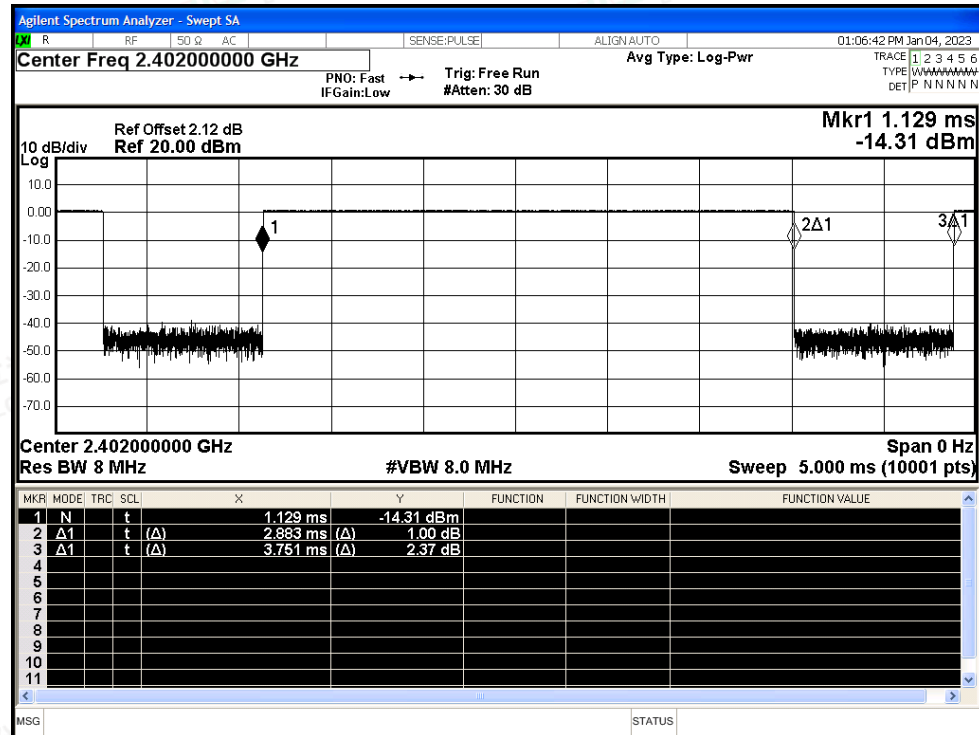
Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	BLE 1M	2402	Ant	76.87	1.14	0.35
NVNT	BLE 1M	2440	Ant	61.44	2.12	2.6
NVNT	BLE 1M	2480	Ant	61.36	2.12	2.61
NVNT	BLE 2M	2402	Ant	100	0	0
NVNT	BLE 2M	2440	Ant	100	0	0
NVNT	BLE 2M	2480	Ant	100	0	0



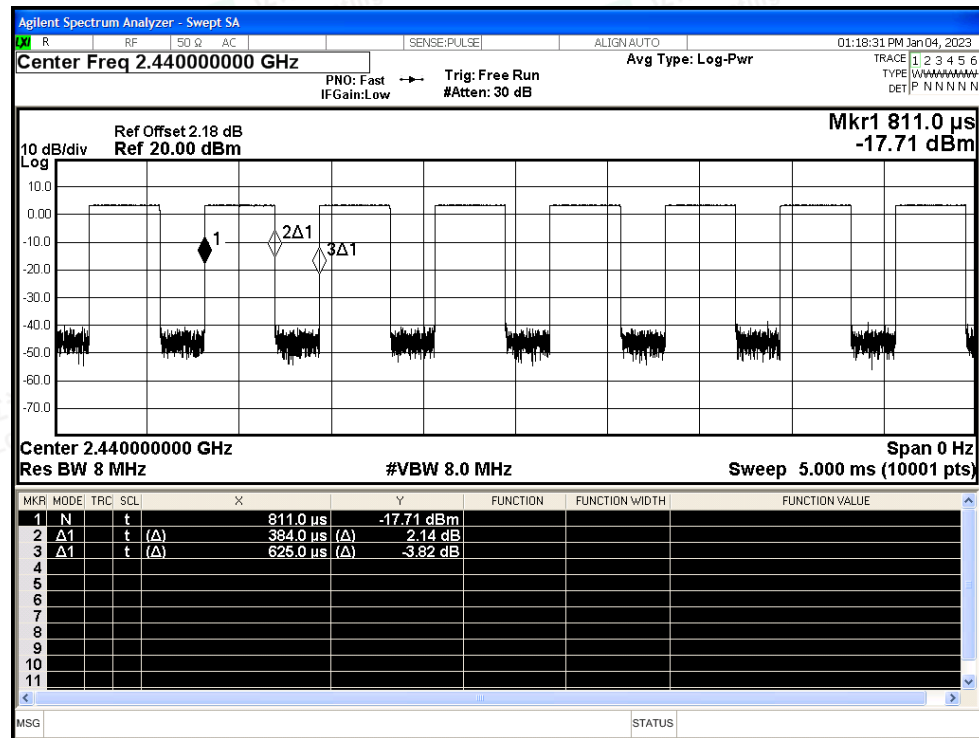


Test Graphs

Duty Cycle NVNT BLE 1M 2402MHz Ant



Duty Cycle NVNT BLE 1M 2440MHz Ant

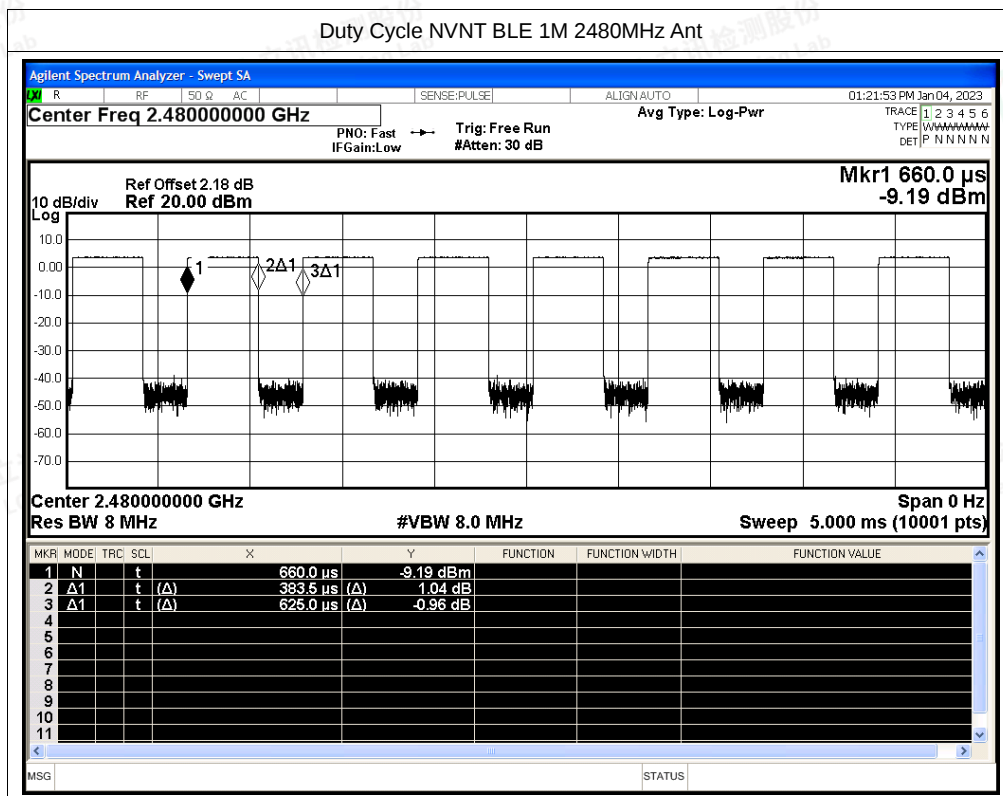


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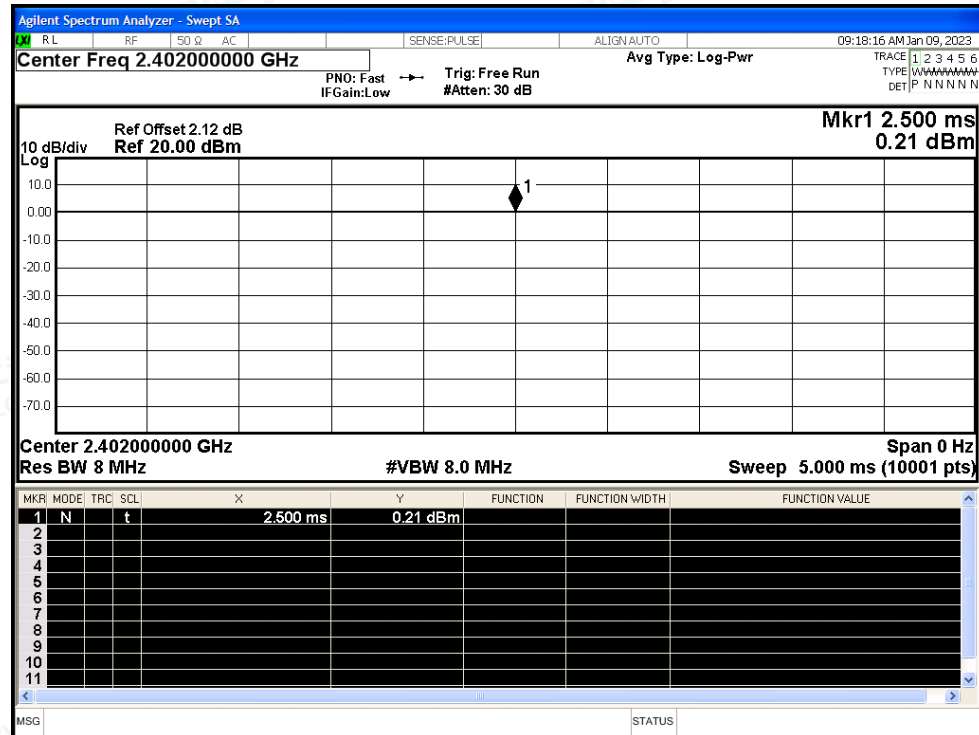
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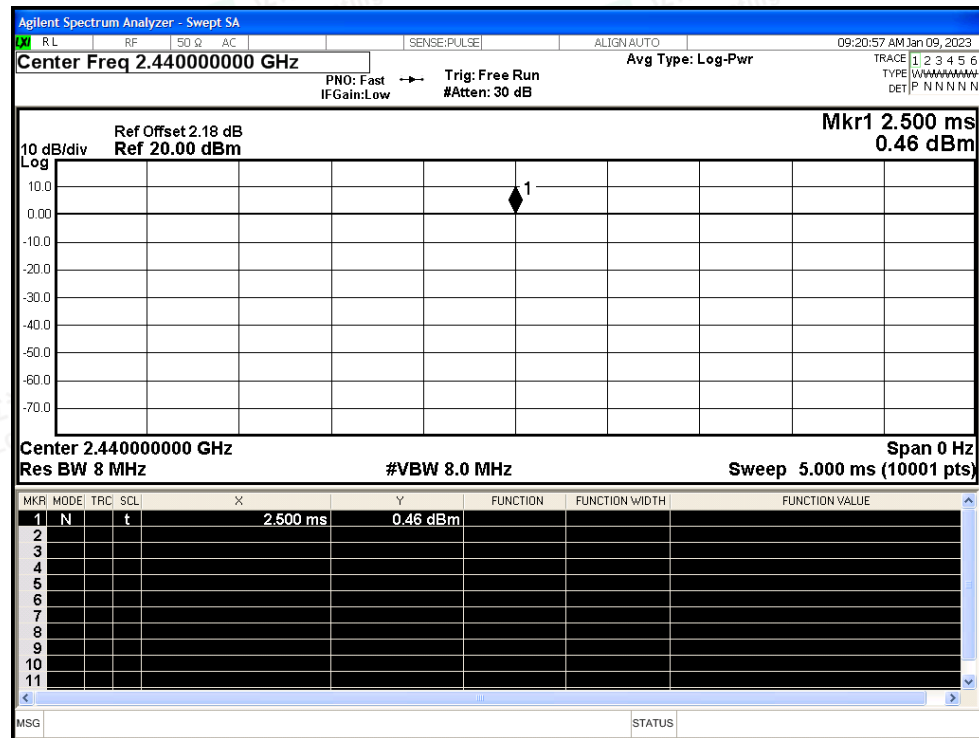


Test Graphs

Duty Cycle NVNT BLE 2M 2402MHz Ant



Duty Cycle NVNT BLE 2M 2440MHz Ant

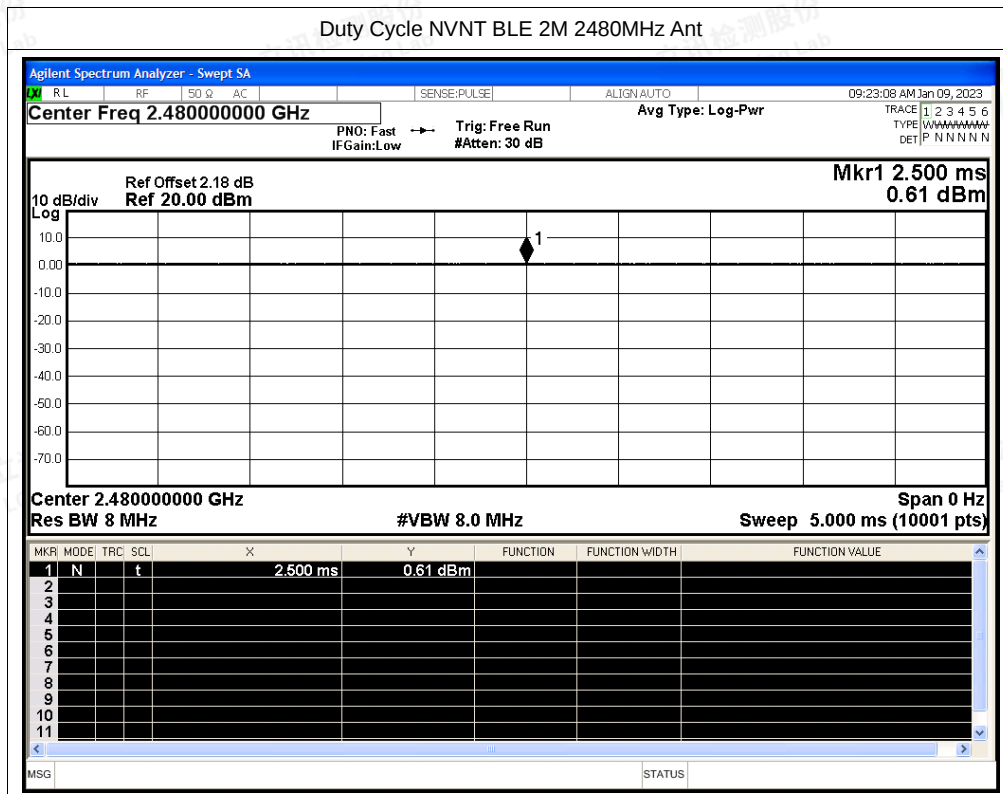


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A.8 Restrict Band

Condition	Mode	Frequency (MHz)	Antenna	Spur Freq (MHz)	Power (dBm)	Gain (dBi)	E (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
NVNT	BLE 1M	2402	Ant	2310	-50.26	2	47	Peak	74	Pass
NVNT	BLE 1M	2402	Ant	2310	-60.24	2	37.02	Average	54	Pass
NVNT	BLE 1M	2402	Ant	2310.672	-47.22	2	50.04	Peak	74	Pass
NVNT	BLE 1M	2402	Ant	2389.68	-59.67	2	37.59	Average	54	Pass
NVNT	BLE 1M	2402	Ant	2390	-50.86	2	46.4	Peak	74	Pass
NVNT	BLE 1M	2402	Ant	2390	-59.68	2	37.58	Average	54	Pass
NVNT	BLE 1M	2480	Ant	2483.5	-48.54	2	48.72	Peak	74	Pass
NVNT	BLE 1M	2480	Ant	2483.5	-58.17	2	39.09	Average	54	Pass
NVNT	BLE 1M	2480	Ant	2487.352	-46.05	2	51.21	Peak	74	Pass
NVNT	BLE 1M	2480	Ant	2483.536	-58.14	2	39.12	Average	54	Pass
NVNT	BLE 1M	2480	Ant	2500	-51.16	2	46.1	Peak	74	Pass
NVNT	BLE 1M	2480	Ant	2500	-59.06	2	38.2	Average	54	Pass
NVNT	BLE 2M	2402	Ant	2310	-50.01	2	47.25	Peak	74	Pass
NVNT	BLE 2M	2402	Ant	2310	-59.31	2	37.95	Average	54	Pass
NVNT	BLE 2M	2402	Ant	2358.864	-47.47	2	49.79	Peak	74	Pass
NVNT	BLE 2M	2402	Ant	2324.88	-58.46	2	38.8	Average	54	Pass
NVNT	BLE 2M	2402	Ant	2390	-51.54	2	45.72	Peak	74	Pass
NVNT	BLE 2M	2402	Ant	2390	-59.27	2	37.99	Average	54	Pass
NVNT	BLE 2M	2480	Ant	2483.5	-49.8	2	47.46	Peak	74	Pass
NVNT	BLE 2M	2480	Ant	2483.5	-55.81	2	41.45	Average	54	Pass
NVNT	BLE 2M	2480	Ant	2497.12	-46.27	2	50.99	Peak	74	Pass
NVNT	BLE 2M	2480	Ant	2483.512	-55.81	2	41.45	Average	54	Pass
NVNT	BLE 2M	2480	Ant	2500	-48.93	2	48.33	Peak	74	Pass
NVNT	BLE 2M	2480	Ant	2500	-59.33	2	37.93	Average	54	Pass

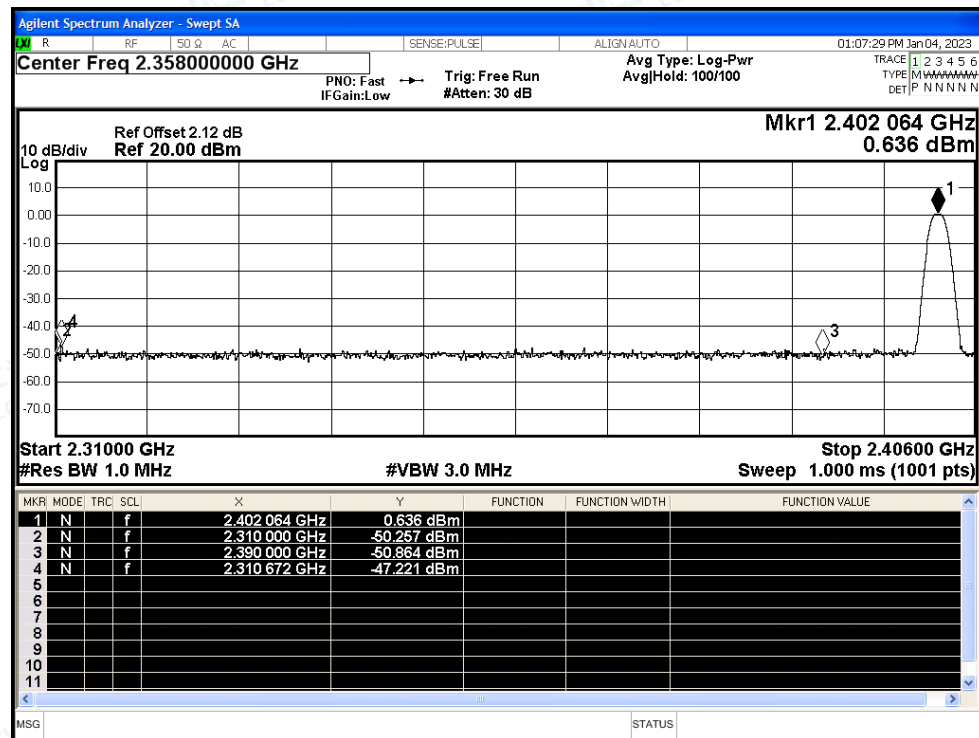


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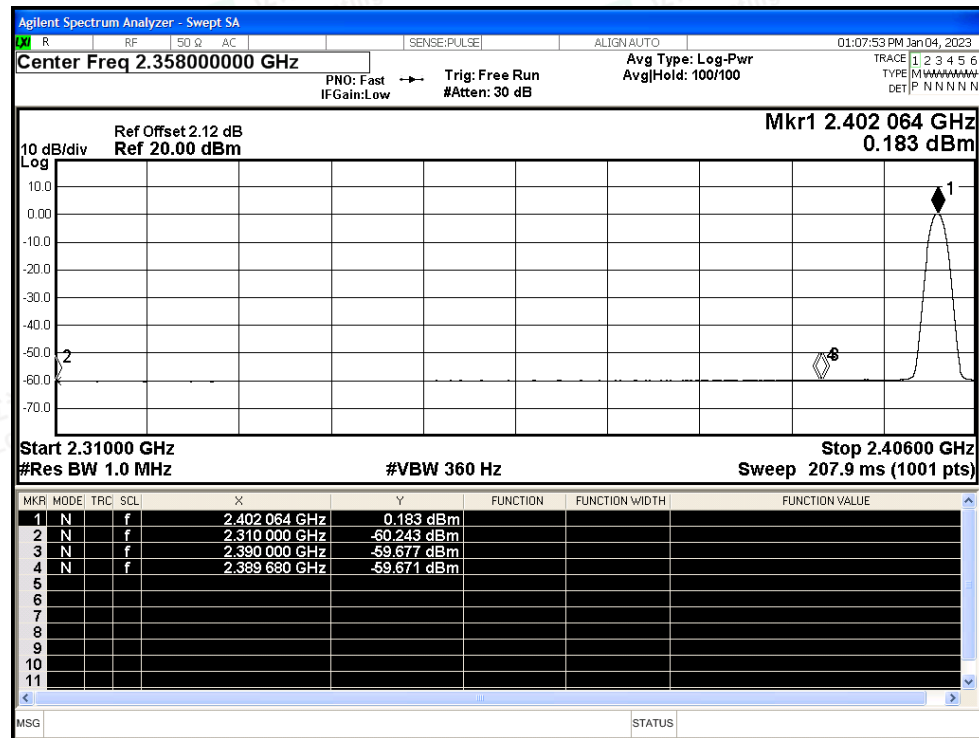


Test Graphs

Restrict Band NVNT BLE 1M 2402MHz Ant Peak



Restrict Band NVNT BLE 1M 2402MHz Ant Average



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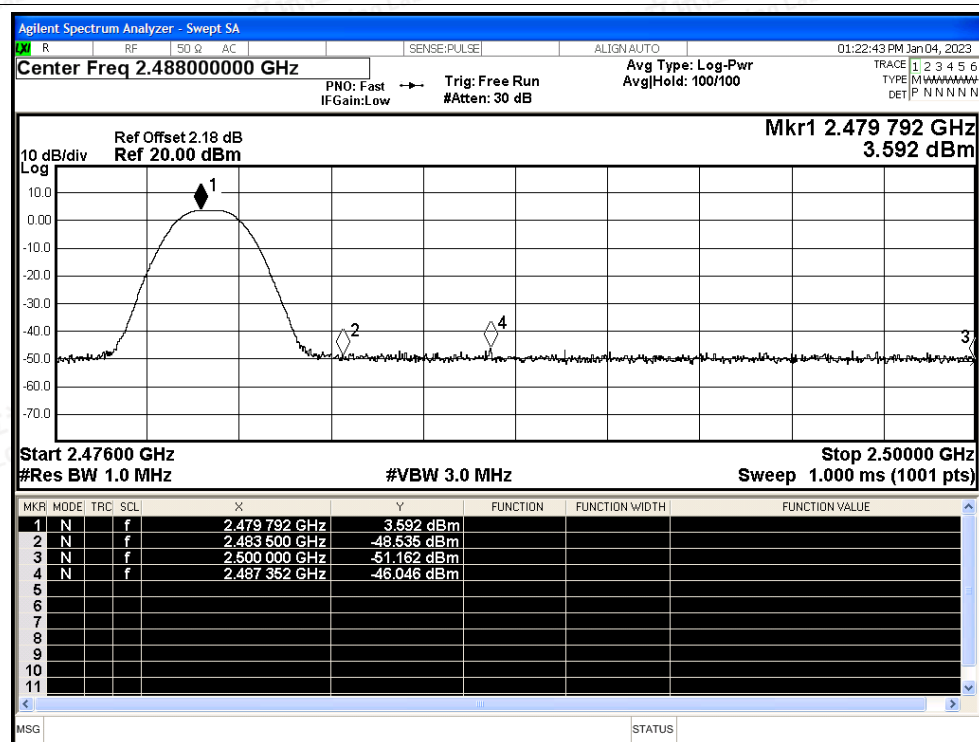
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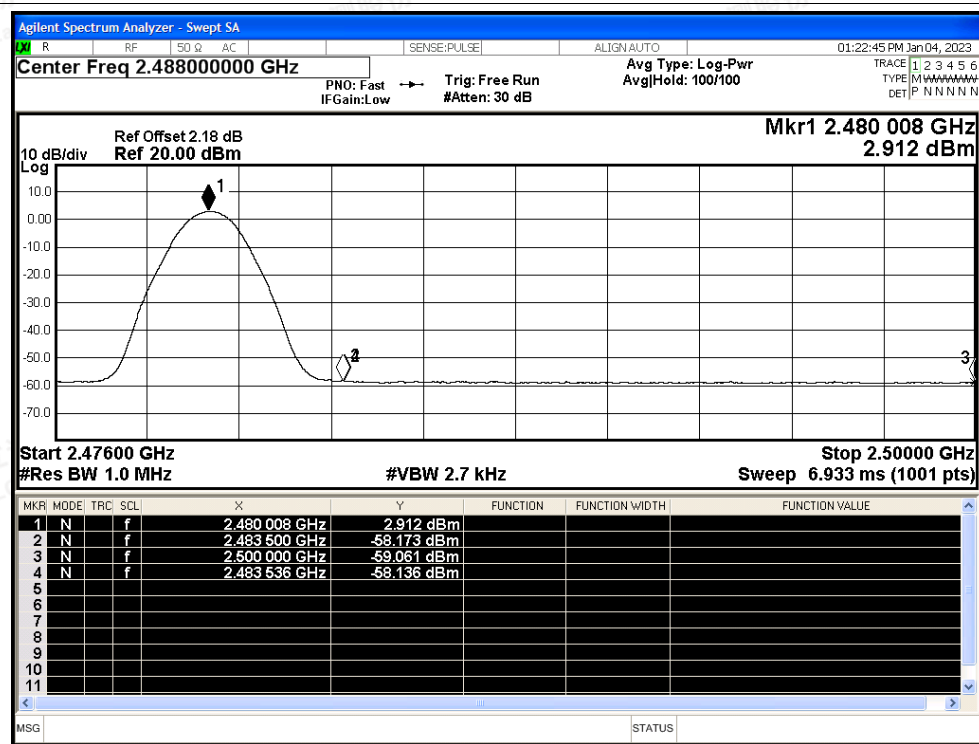
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Restrict Band NVNT BLE 1M 2480MHz Ant Peak



Restrict Band NVNT BLE 1M 2480MHz Ant Average



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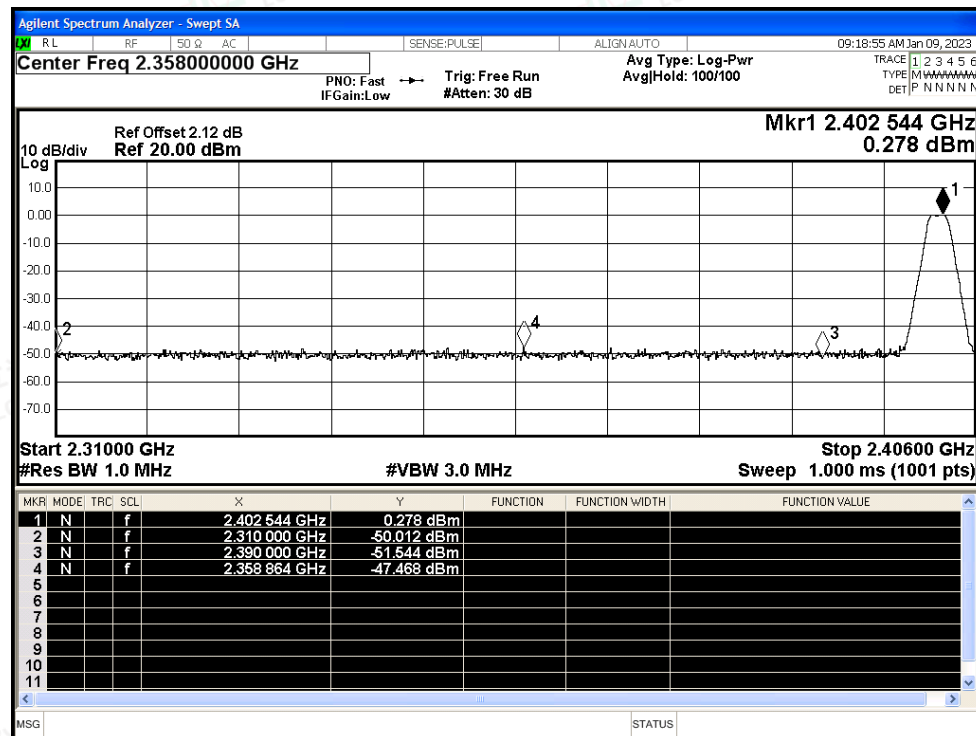
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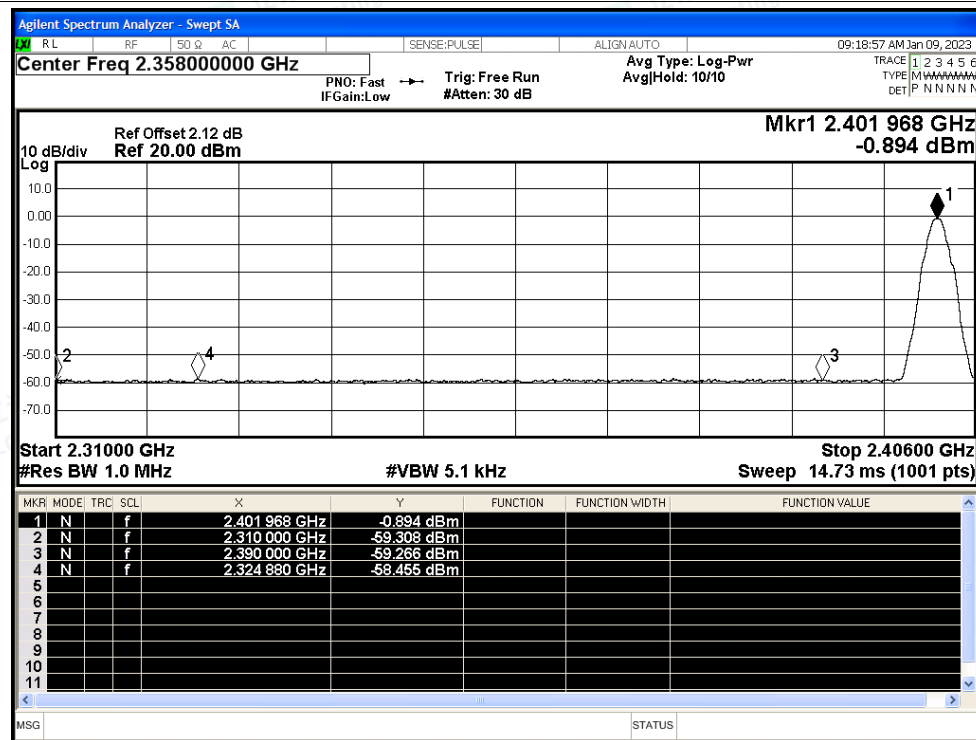


Test Graphs

Restrict Band NVNT BLE 2M 2402MHz Ant Peak



Restrict Band NVNT BLE 2M 2402MHz Ant Average



Shenzhen LCS Compliance Testing Laboratory Ltd.

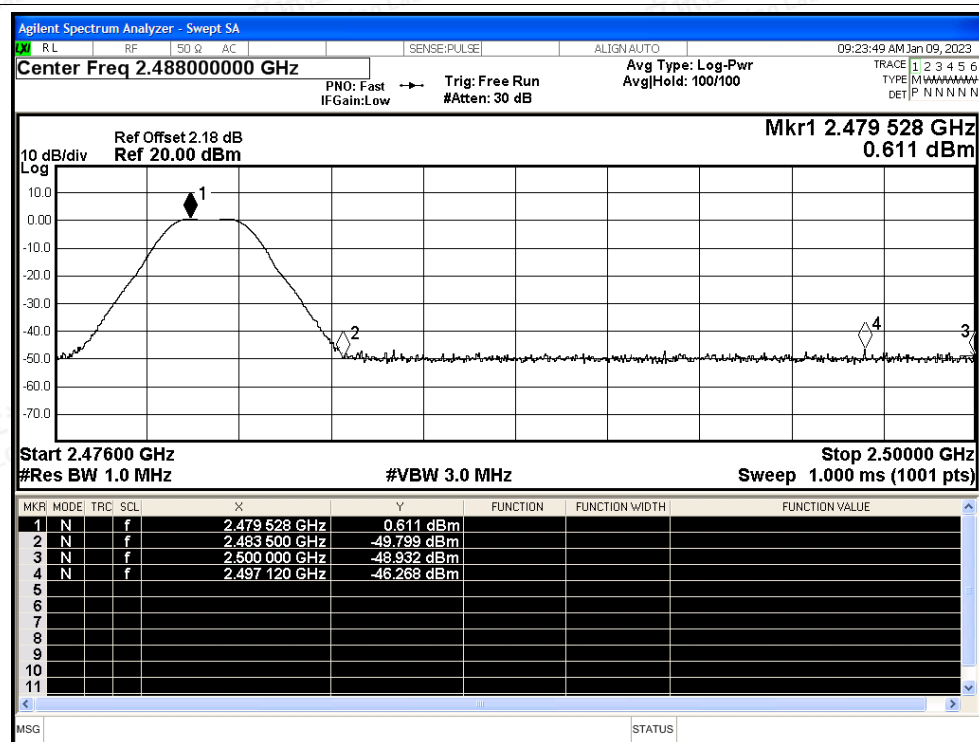
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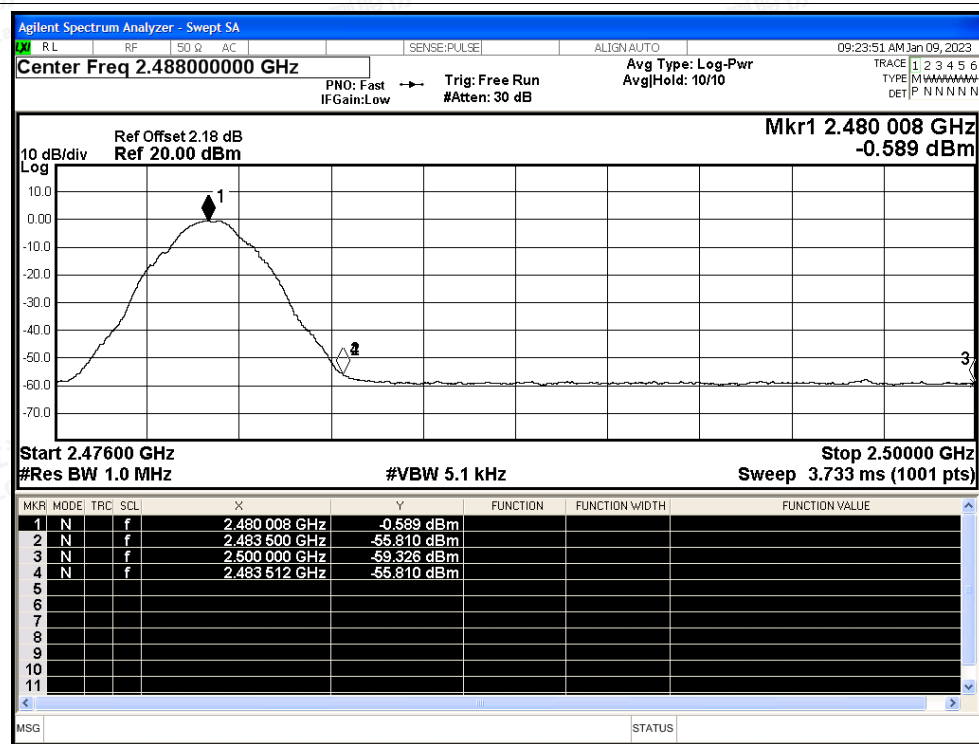
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Restrict Band NVNT BLE 2M 2480MHz Ant Peak



Restrict Band NVNT BLE 2M 2480MHz Ant Average



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