



Appendix A

RF Test Data for BLE (Conducted Measurement)

Product Name: SWIFT TAG

Test Model: AT53A

Environmental Conditions

Temperature:	23.1°C
Relative Humidity:	52.3%
ATM Pressure:	100.0 kPa
Test Engineer:	Jay Luo
Supervised by:	Nick Peng



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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	Ant1	0.653	≥ 0.5	Pass
NVNT	BLE 1M	2440	Ant1	0.654	≥ 0.5	Pass
NVNT	BLE 1M	2480	Ant1	0.653	≥ 0.5	Pass
NVNT	BLE 2M	2402	Ant1	1.139	≥ 0.5	Pass
NVNT	BLE 2M	2440	Ant1	1.151	≥ 0.5	Pass
NVNT	BLE 2M	2480	Ant1	1.148	≥ 0.5	Pass

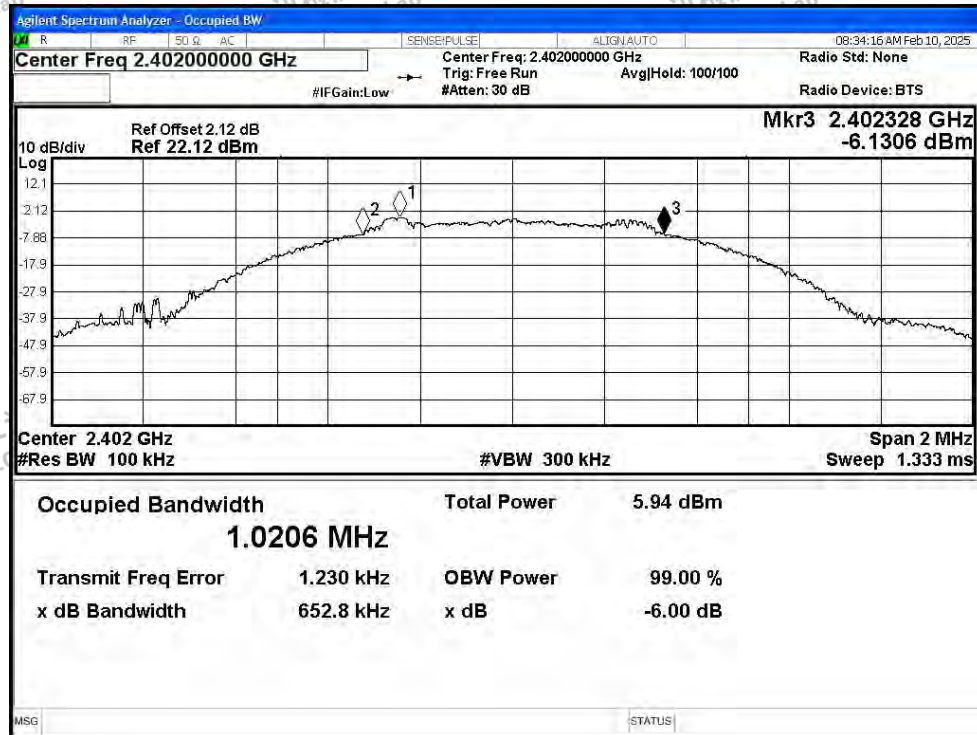


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Test Graphs

-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



-6dB Bandwidth NVNT BLE 1M 2440MHz Ant1



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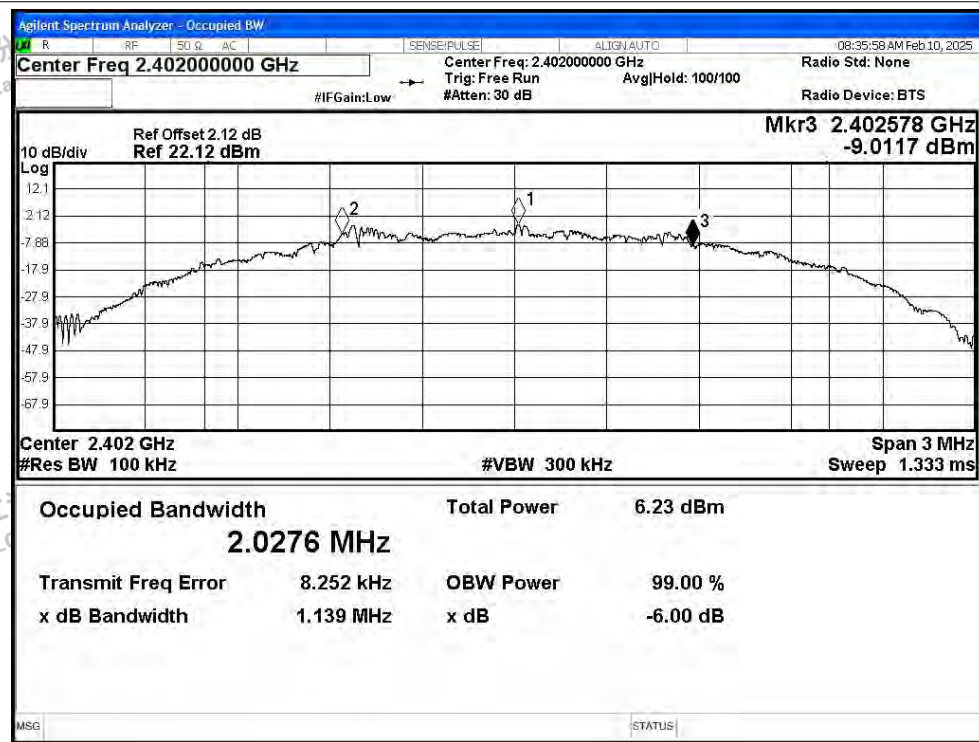
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-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1



-6dB Bandwidth NVNT BLE 2M 2402MHz Ant1



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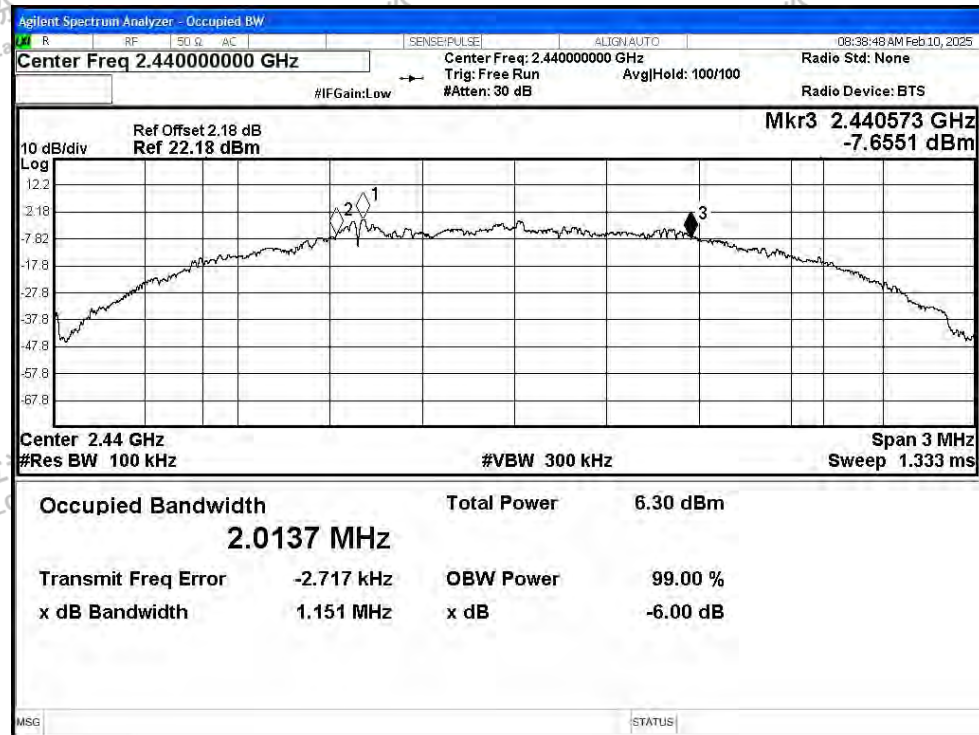
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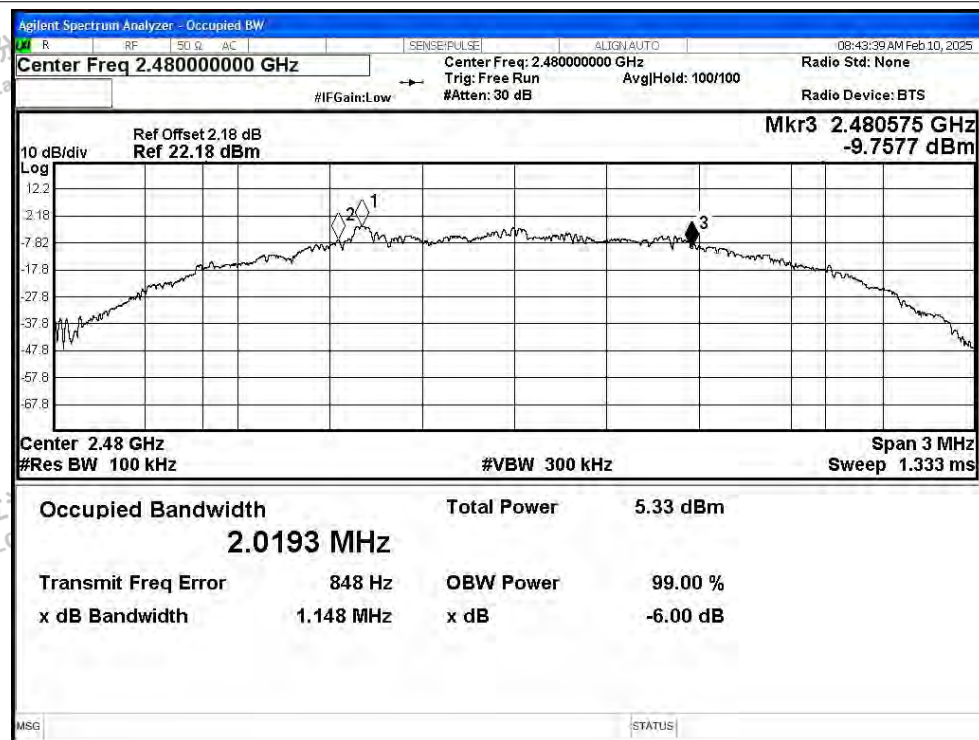
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-6dB Bandwidth NVNT BLE 2M 2440MHz Ant1



-6dB Bandwidth NVNT BLE 2M 2480MHz Ant1



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A.2 Maximum Conducted Output Power

Condition	Mode	Frequency (MHz)	Antenna	Total Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	0.13	30	Pass
NVNT	BLE 1M	2440	Ant1	0.23	30	Pass
NVNT	BLE 1M	2480	Ant1	-0.96	30	Pass
NVNT	BLE 2M	2402	Ant1	0.01	30	Pass
NVNT	BLE 2M	2440	Ant1	-0.02	30	Pass
NVNT	BLE 2M	2480	Ant1	0.28	30	Pass



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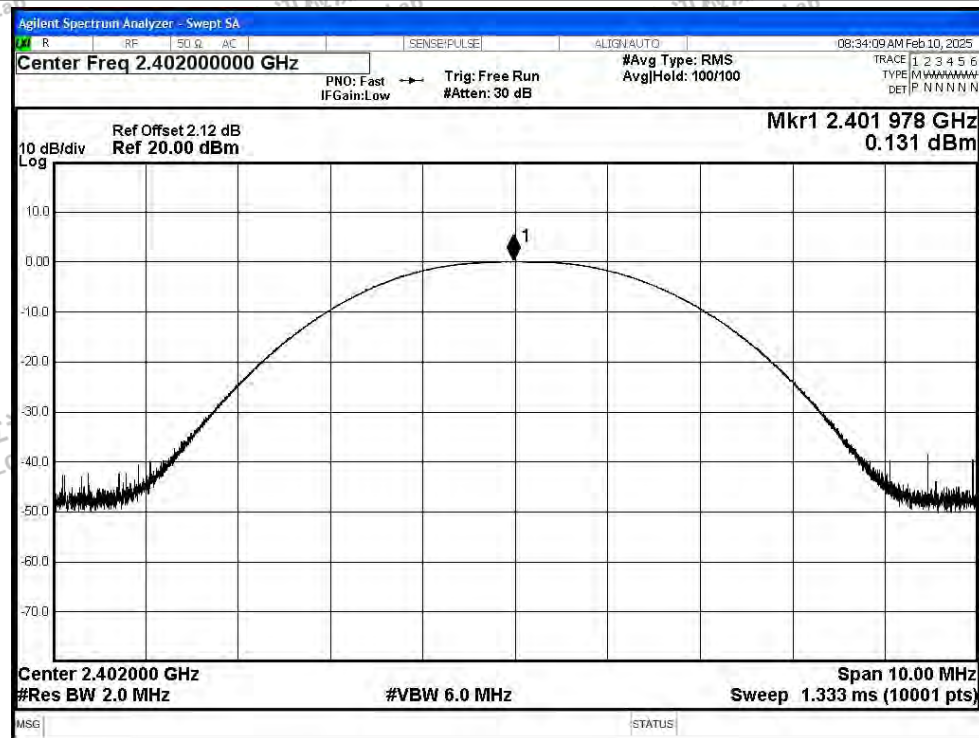
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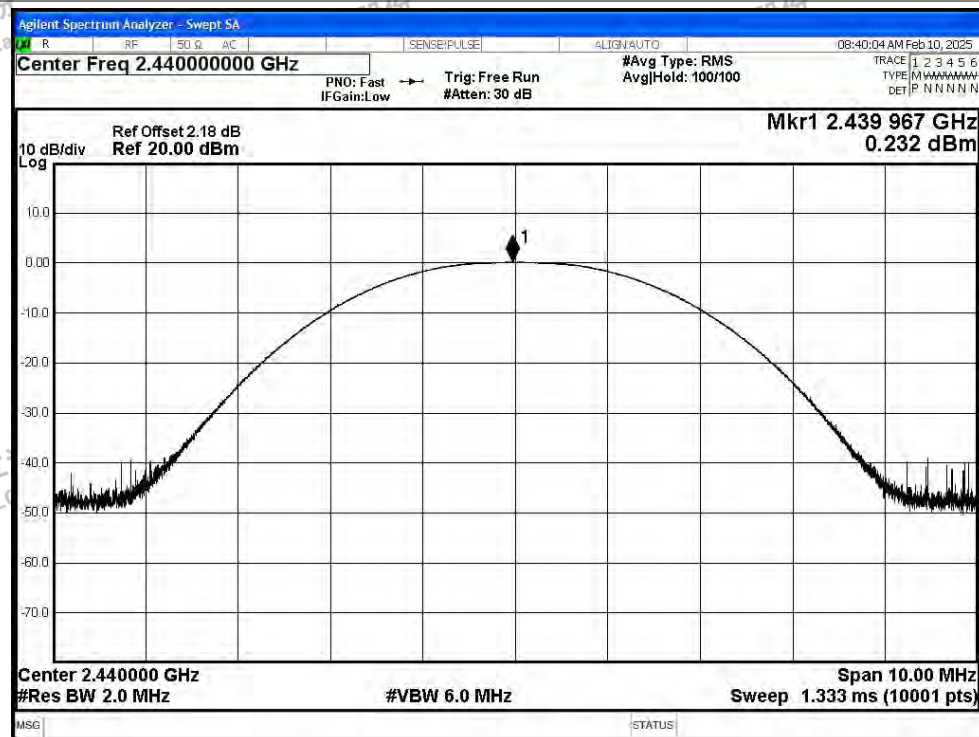


Test Graphs

Power NVNT BLE 1M 2402MHz Ant1



Power NVNT BLE 1M 2440MHz Ant1



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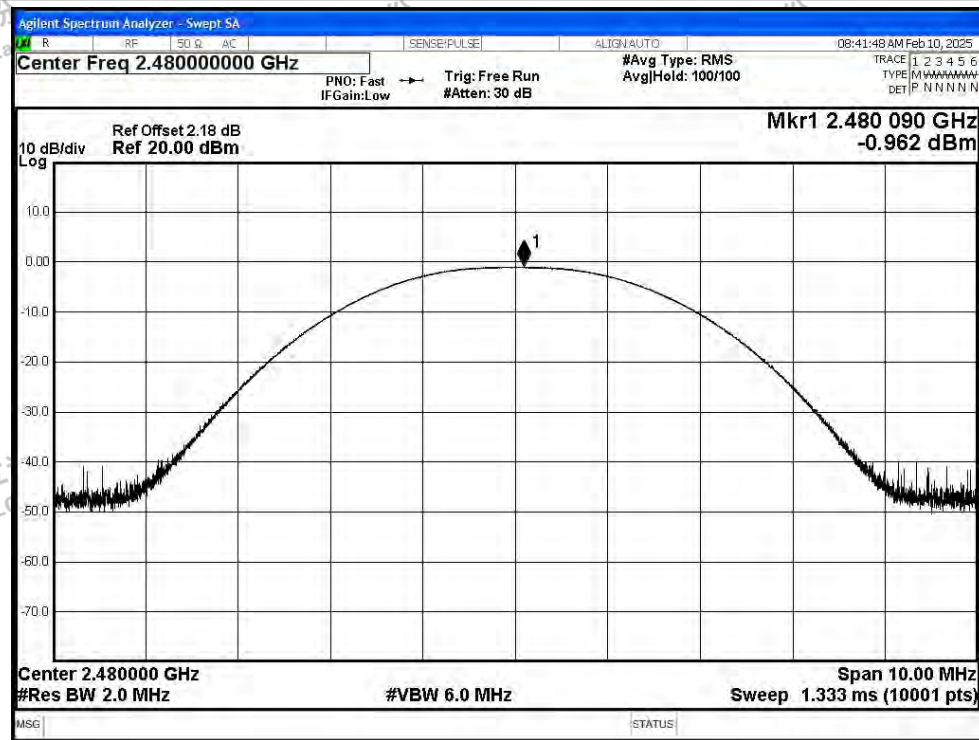
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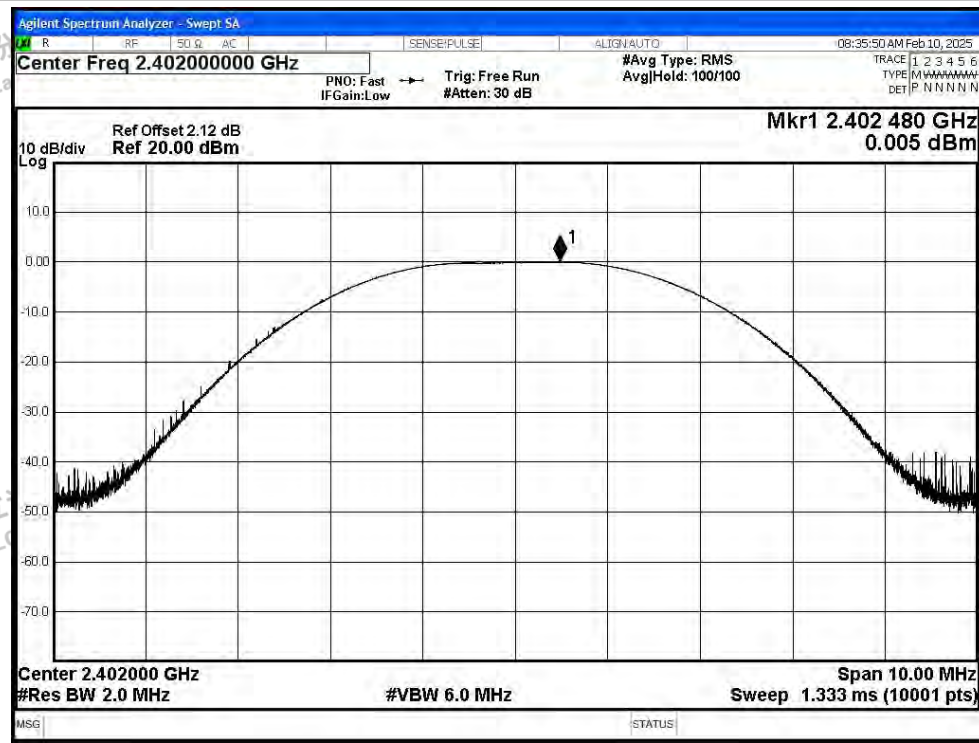
Scan code to check authenticity



Power NVNT BLE 1M 2480MHz Ant1

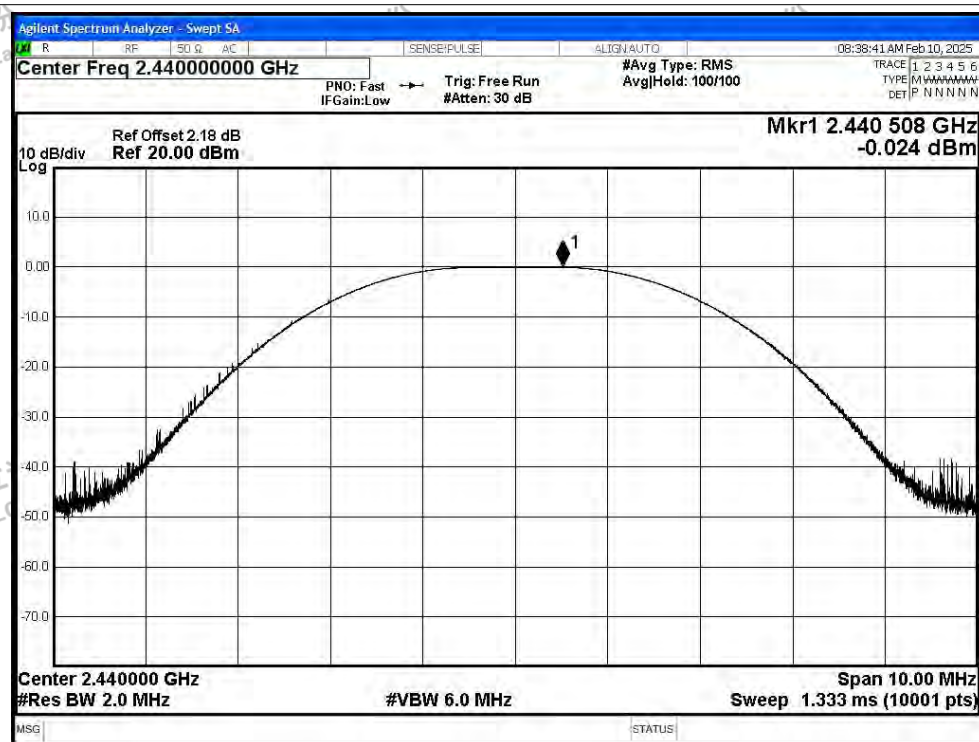


Power NVNT BLE 2M 2402MHz Ant1

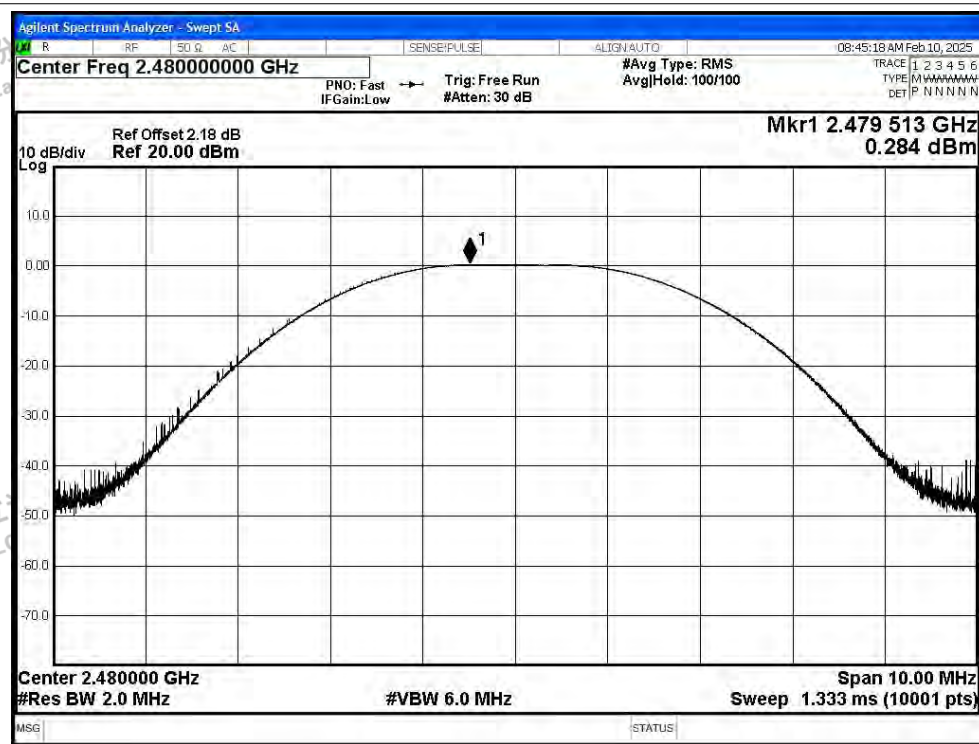




Power NVNT BLE 2M 2440MHz Ant1



Power NVNT BLE 2M 2480MHz Ant1





A.3 Maximum Power Spectral Density Level

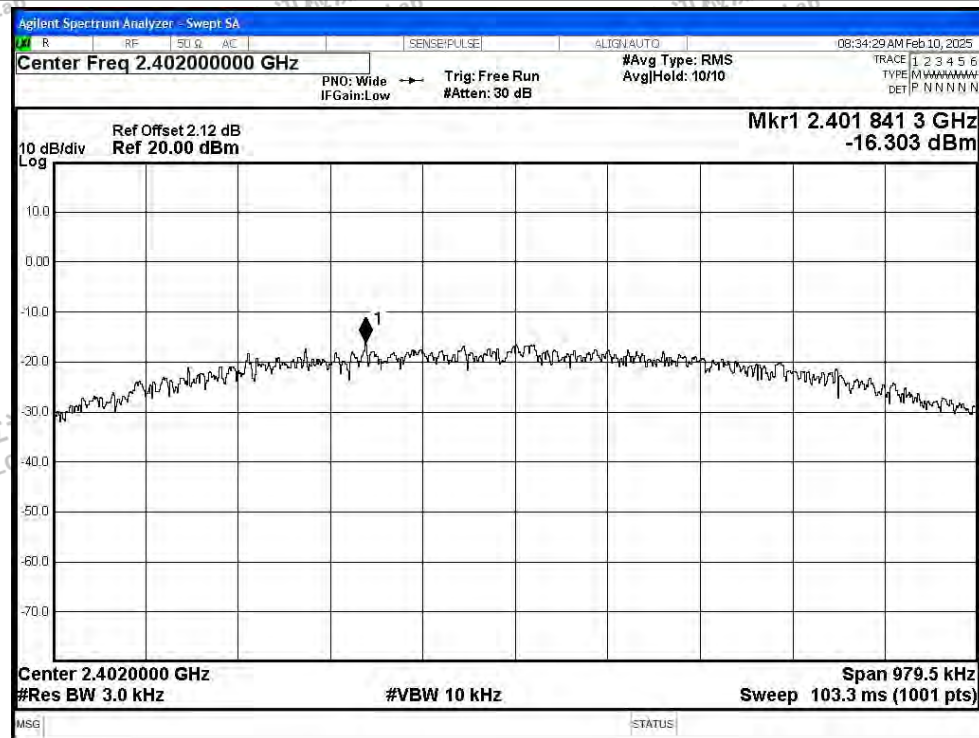
Condition	Mode	Frequency (MHz)	Antenna	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	BLE 1M	2402	Ant1	-16.30	8	Pass
NVNT	BLE 1M	2440	Ant1	-16.36	8	Pass
NVNT	BLE 1M	2480	Ant1	-17.54	8	Pass
NVNT	BLE 2M	2402	Ant1	-19.60	8	Pass
NVNT	BLE 2M	2440	Ant1	-19.51	8	Pass
NVNT	BLE 2M	2480	Ant1	-20.72	8	Pass



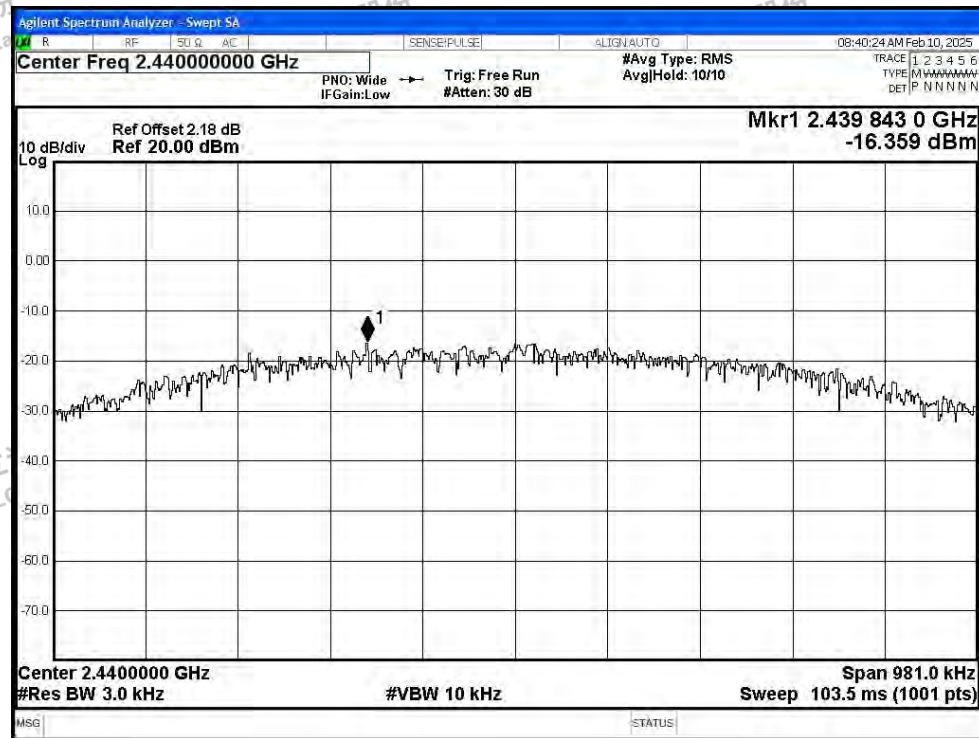


Test Graphs

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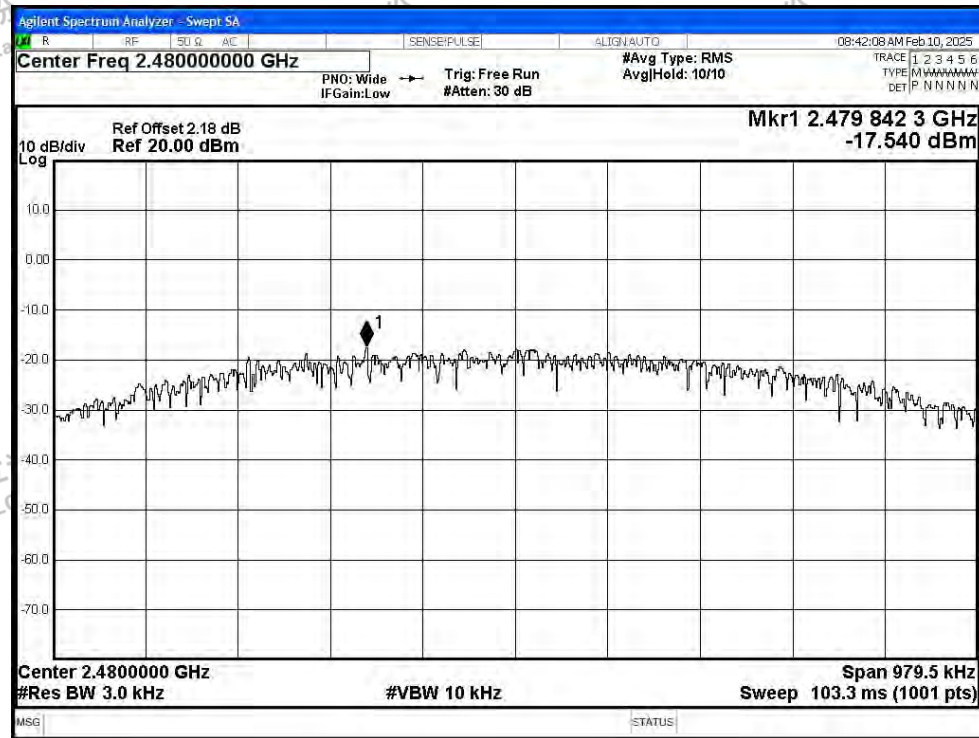


PSD NVNT BLE 1M 2440MHz Ant1

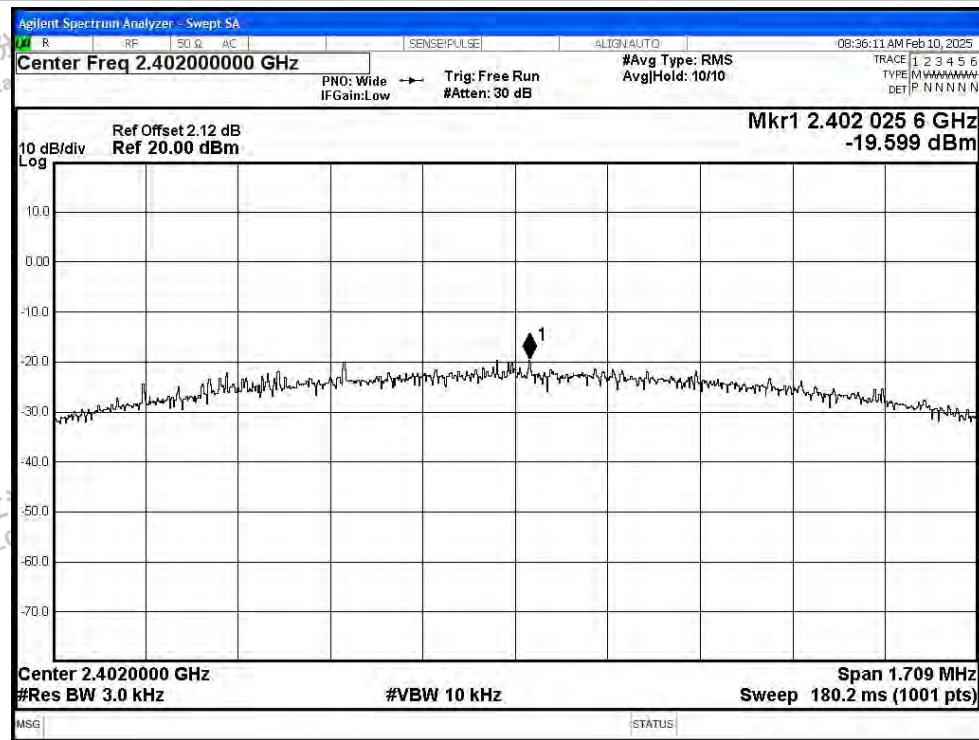




PSD NVNT BLE 1M 2480MHz Ant1

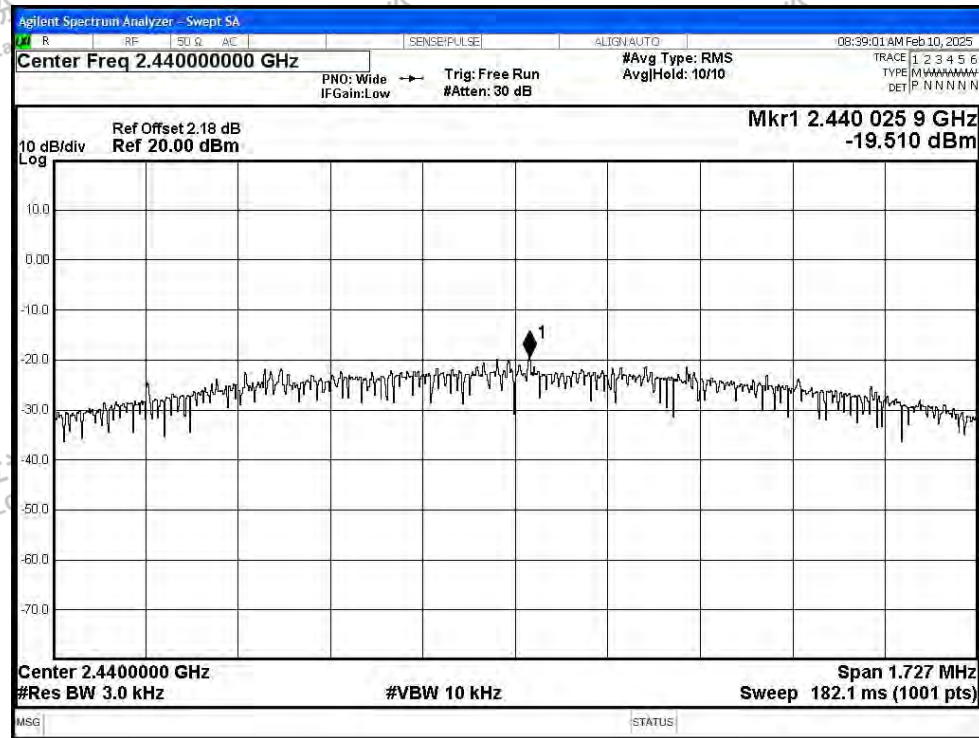


PSD NVNT BLE 2M 2402MHz Ant1

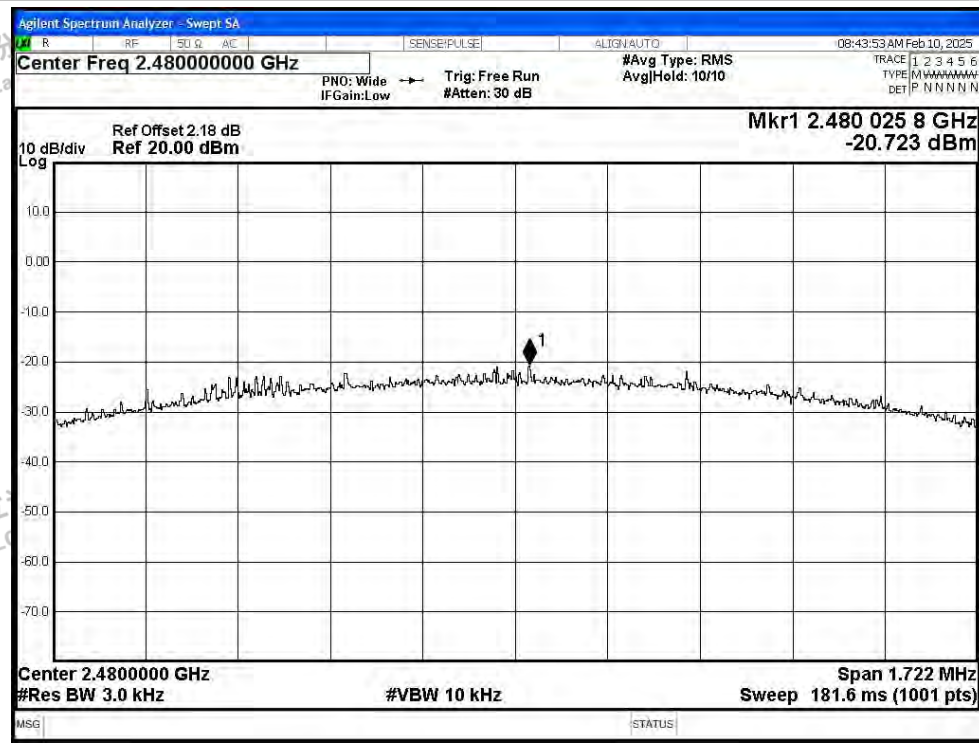




PSD NVNT BLE 2M 2440MHz Ant1



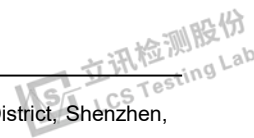
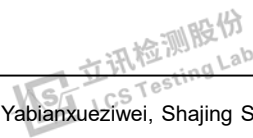
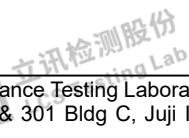
PSD NVNT BLE 2M 2480MHz Ant1





A.4 Band Edge

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-56.01	-20	Pass
NVNT	BLE 1M	2480	Ant1	-55.9	-20	Pass
NVNT	BLE 2M	2402	Ant1	-45.18	-20	Pass
NVNT	BLE 2M	2480	Ant1	-54.98	-20	Pass

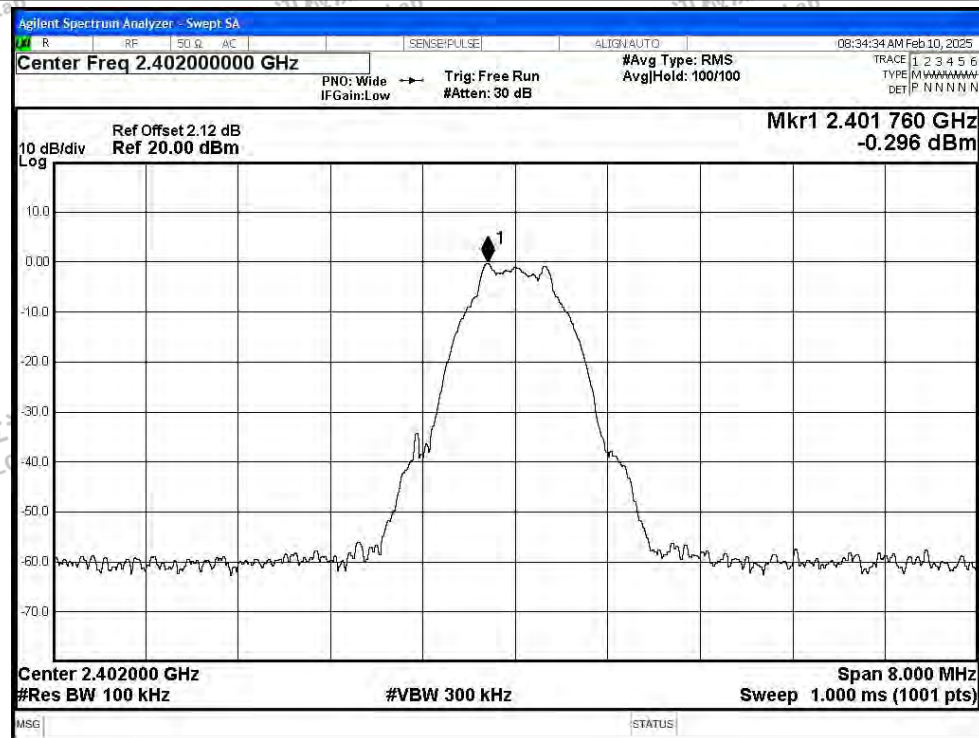


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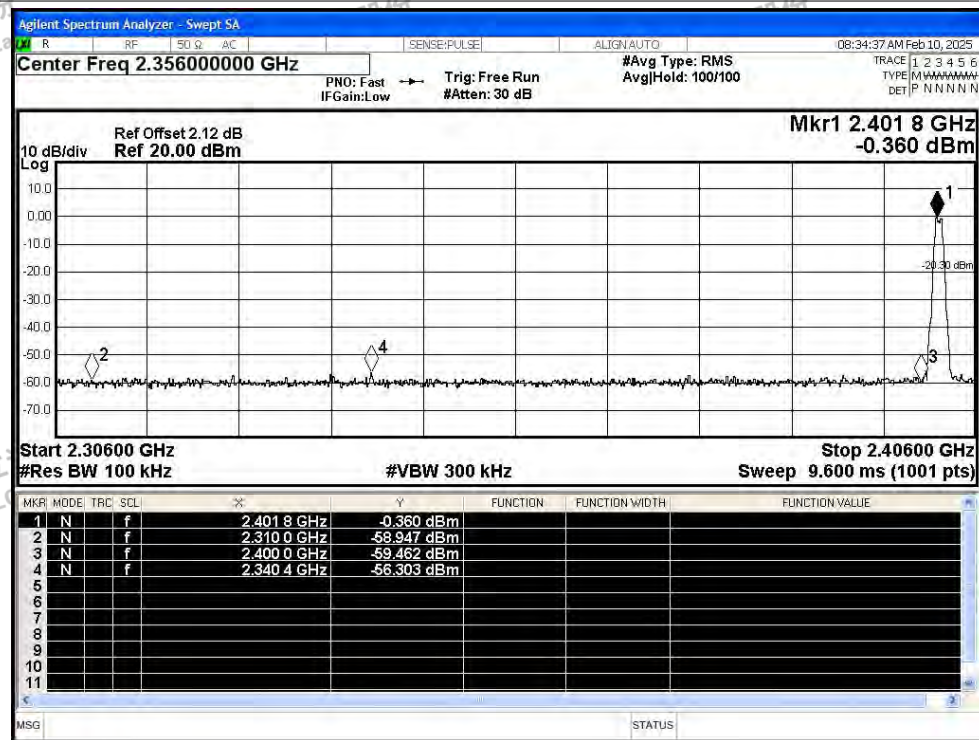


Test Graphs

Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



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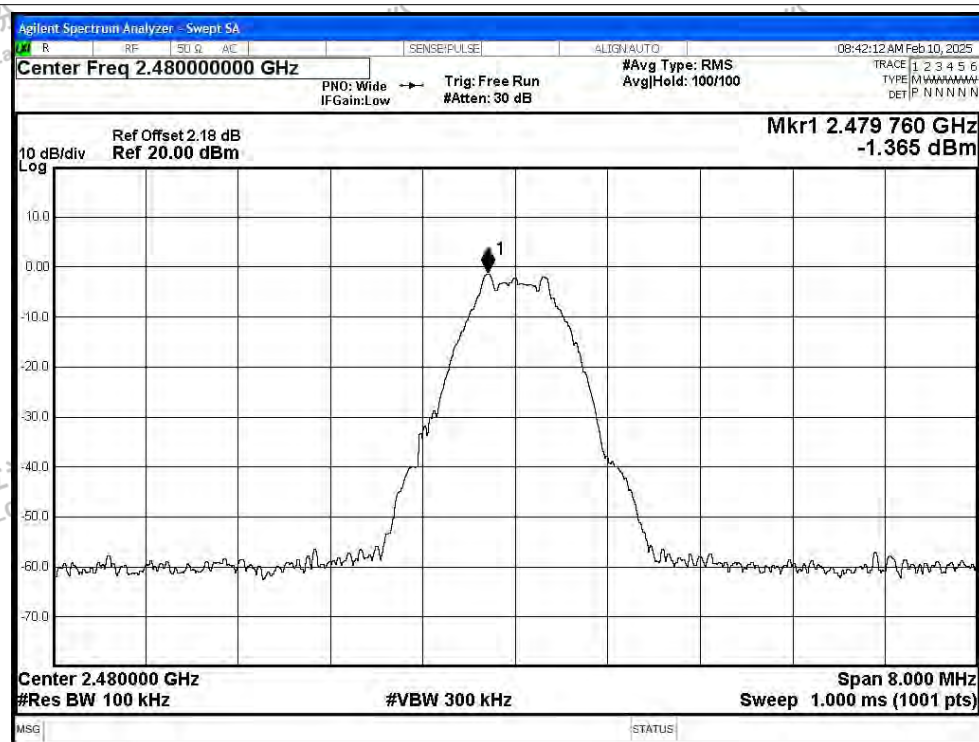
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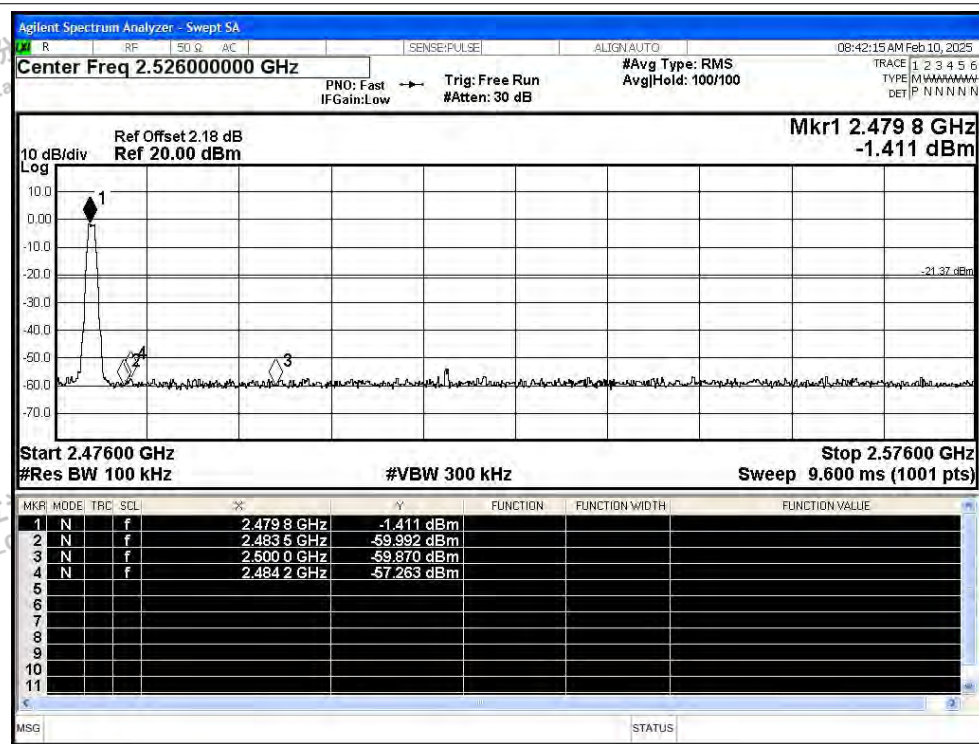
Scan code to check authenticity



Band Edge NVNT BLE 1M 2480MHz Ant1 Ref



Band Edge NVNT BLE 1M 2480MHz Ant1 Emission



Shenzhen LCS Compliance Testing Laboratory Ltd.

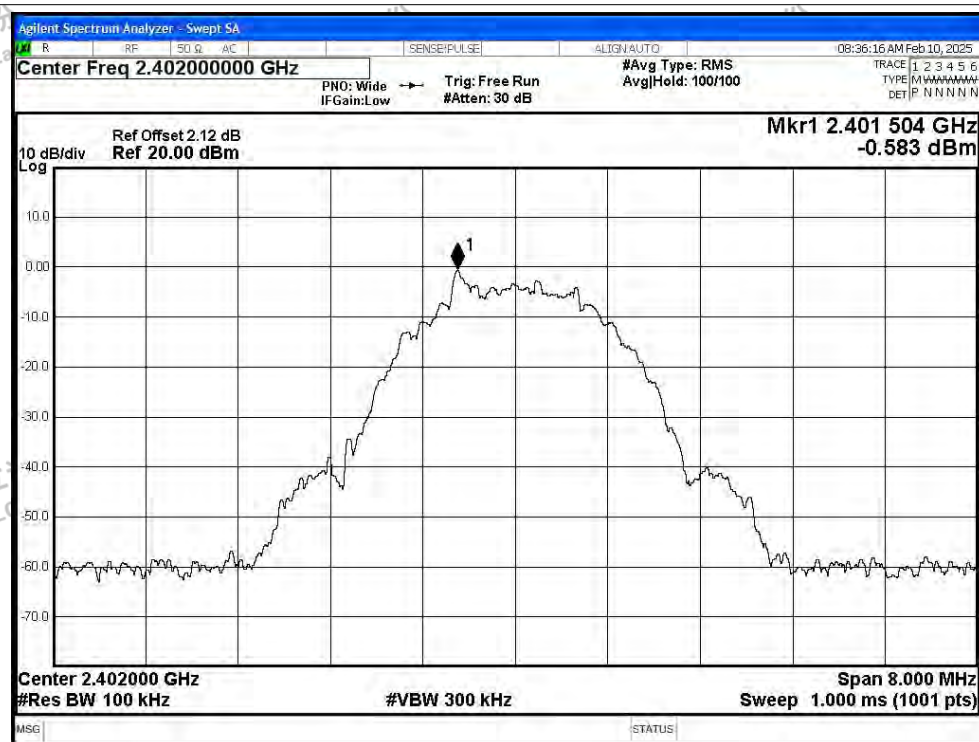
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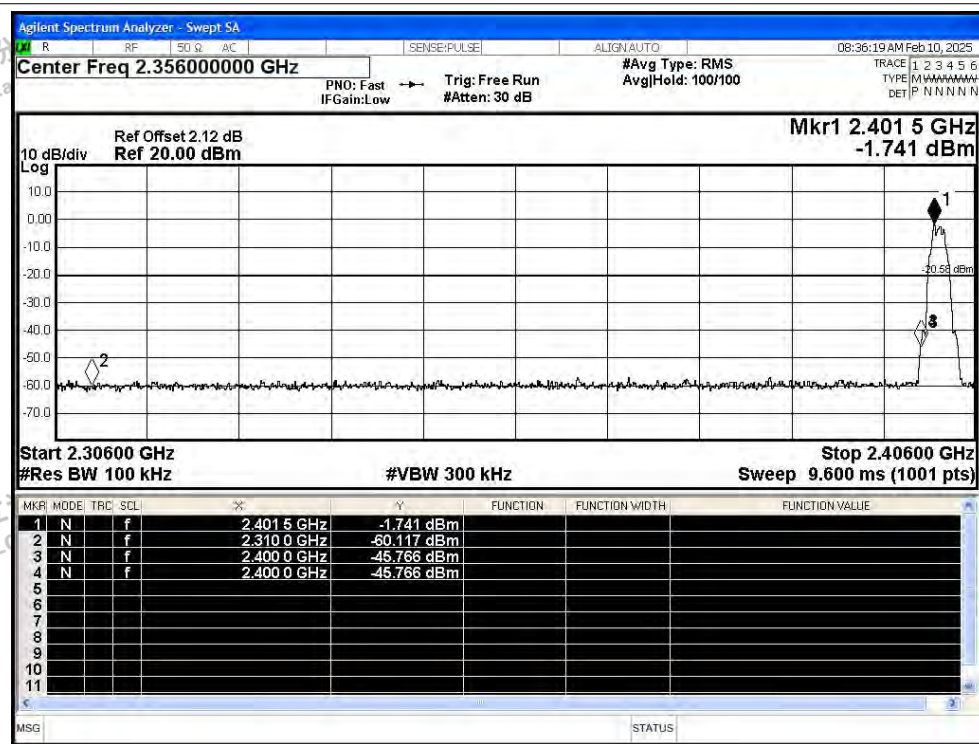
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Band Edge NVNT BLE 2M 2402MHz Ant1 Ref



Band Edge NVNT BLE 2M 2402MHz Ant1 Emission



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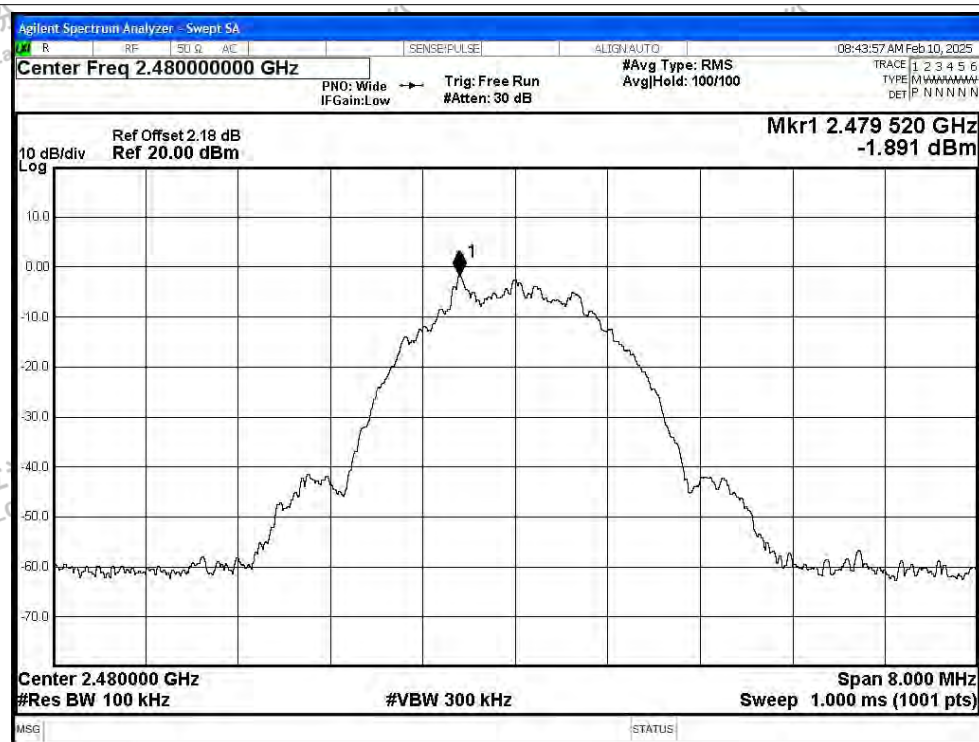
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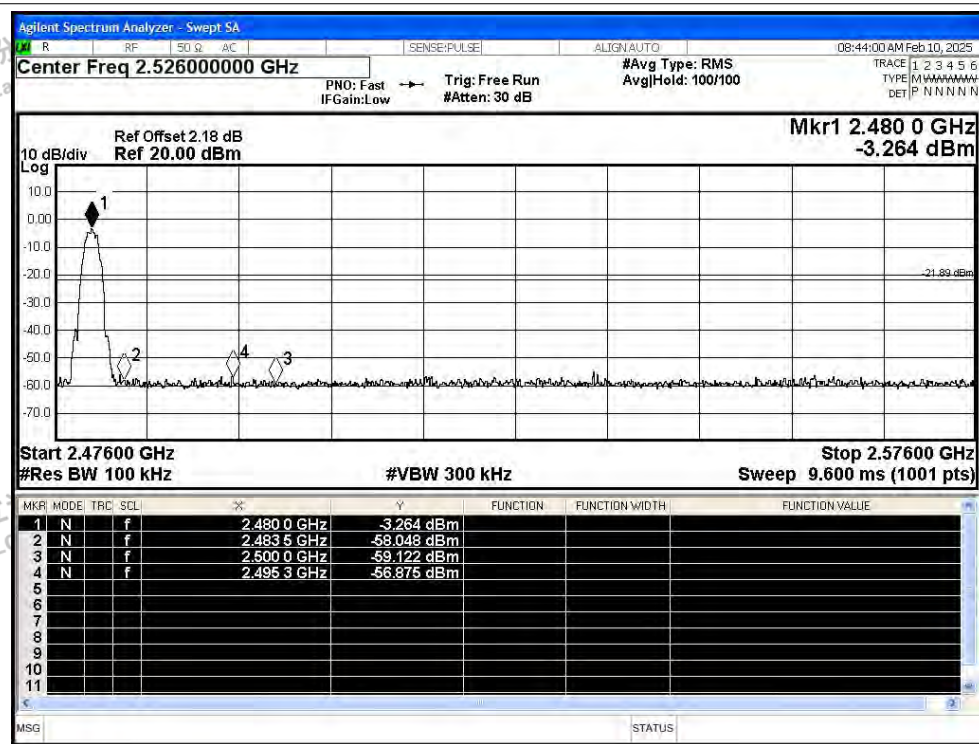
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Band Edge NVNT BLE 2M 2480MHz Ant1 Ref



Band Edge NVNT BLE 2M 2480MHz Ant1 Emission



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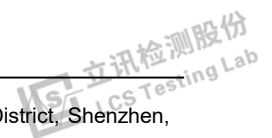
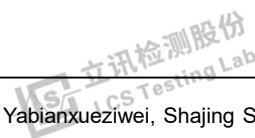
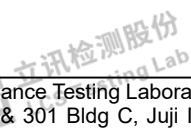
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A.5 Conducted RF Spurious Emission

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-55.52	-20	Pass
NVNT	BLE 1M	2440	Ant1	-55.12	-20	Pass
NVNT	BLE 1M	2480	Ant1	-53.8	-20	Pass
NVNT	BLE 2M	2402	Ant1	-55.15	-20	Pass
NVNT	BLE 2M	2440	Ant1	-54.02	-20	Pass
NVNT	BLE 2M	2480	Ant1	-53.66	-20	Pass

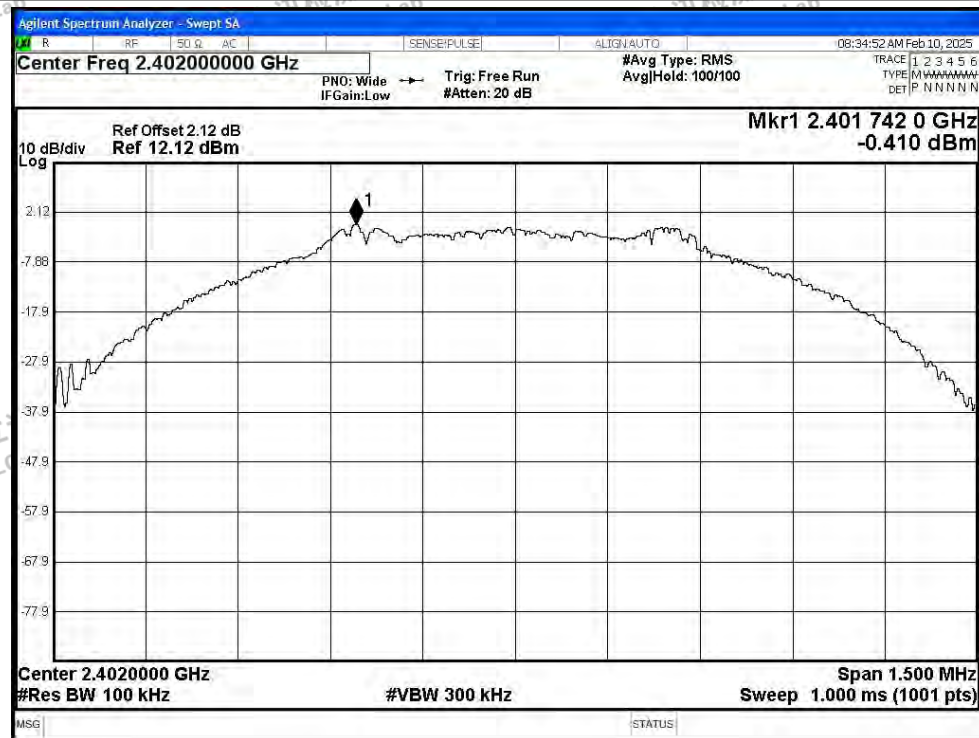


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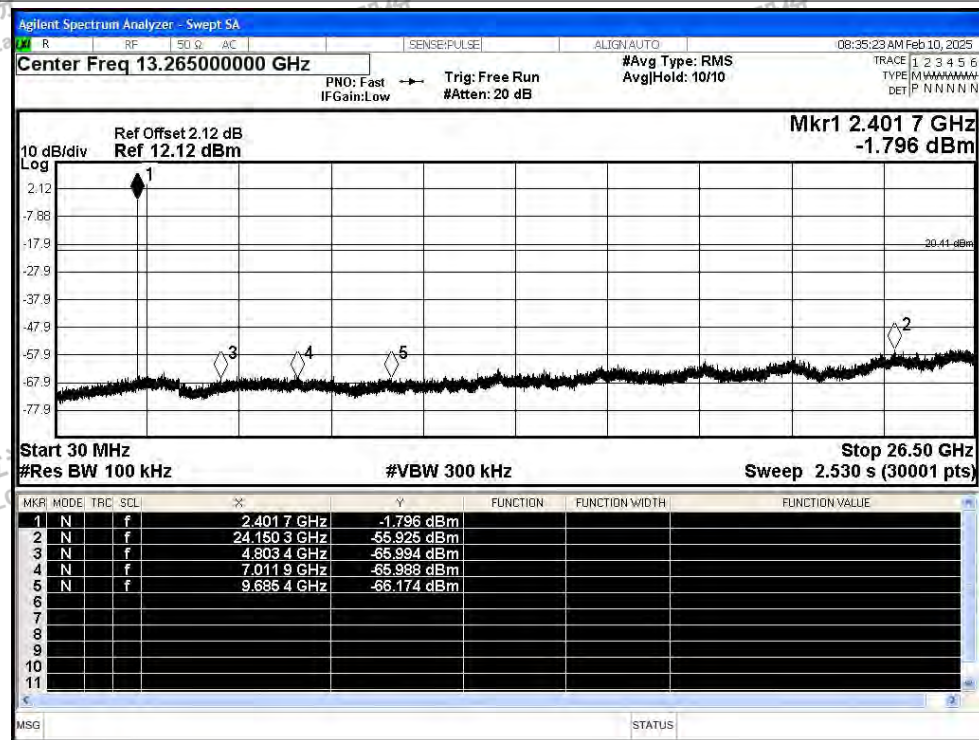


Test Graphs

Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref



Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission



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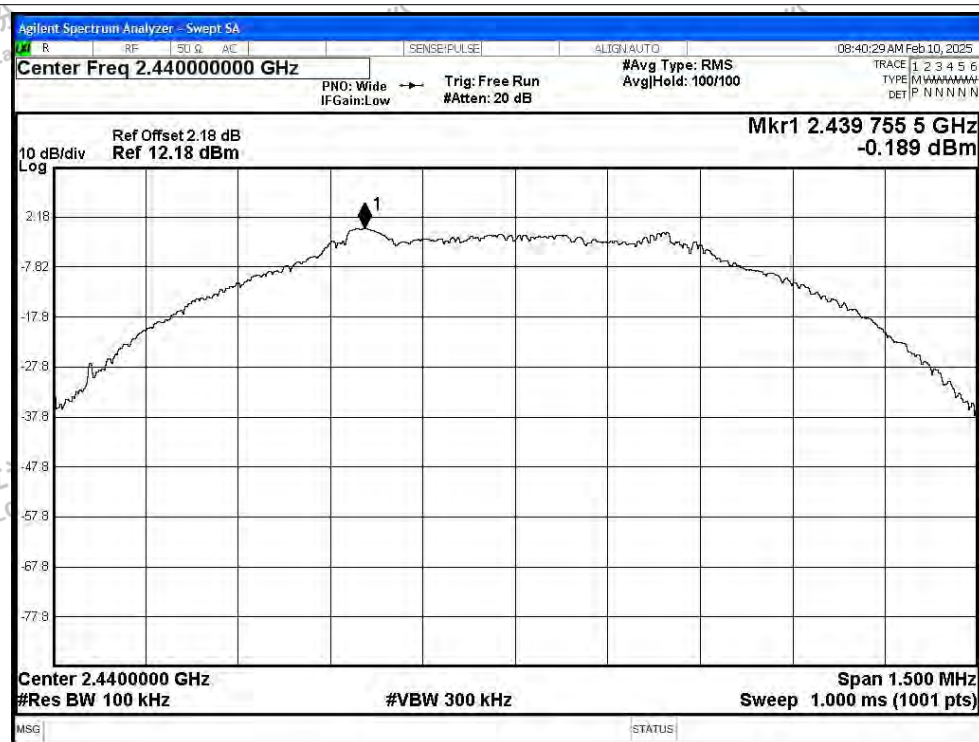
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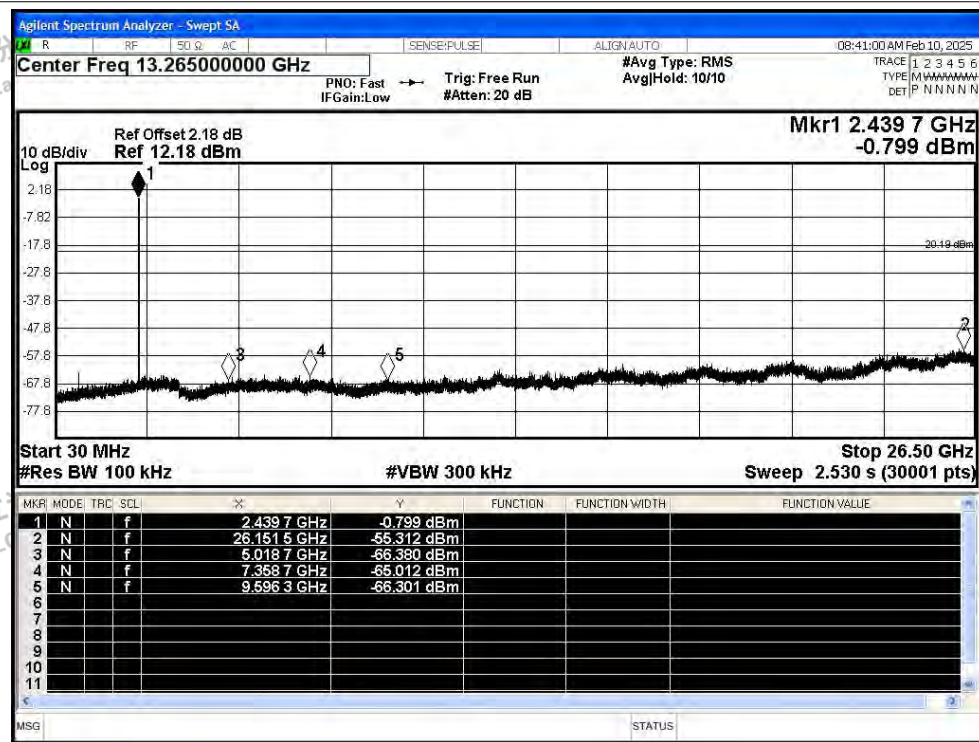
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Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Ref



Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission



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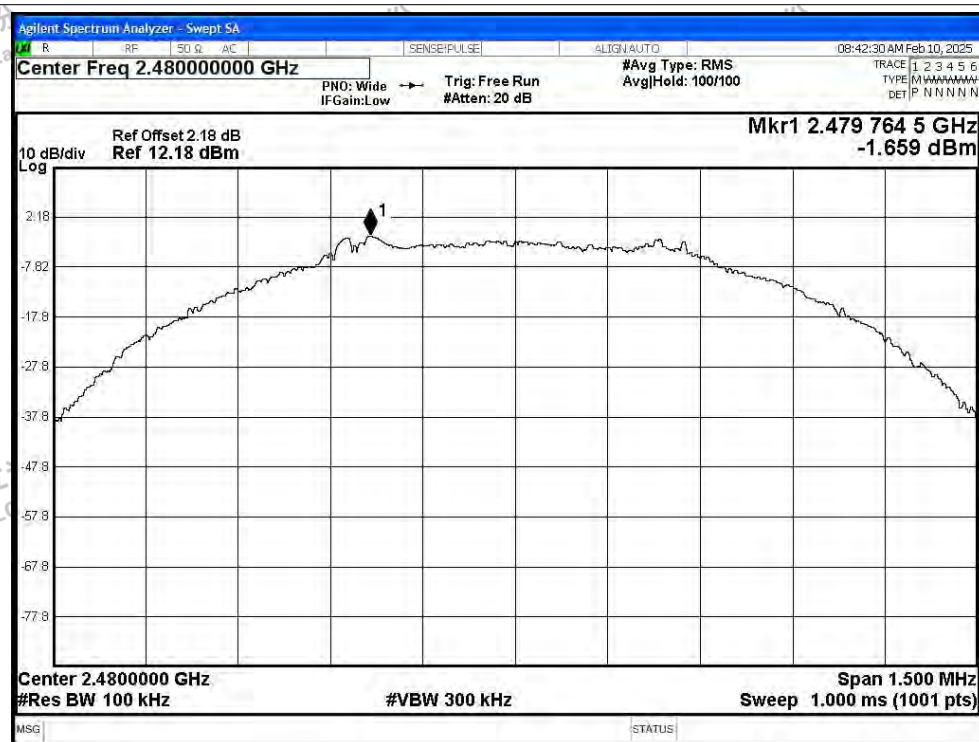
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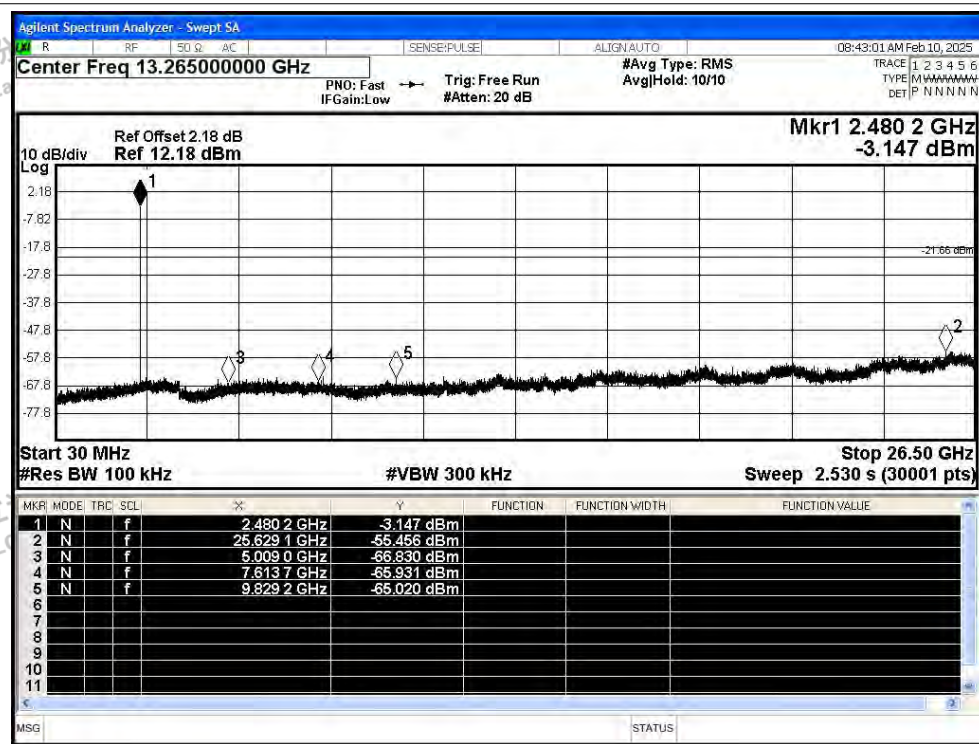
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Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission



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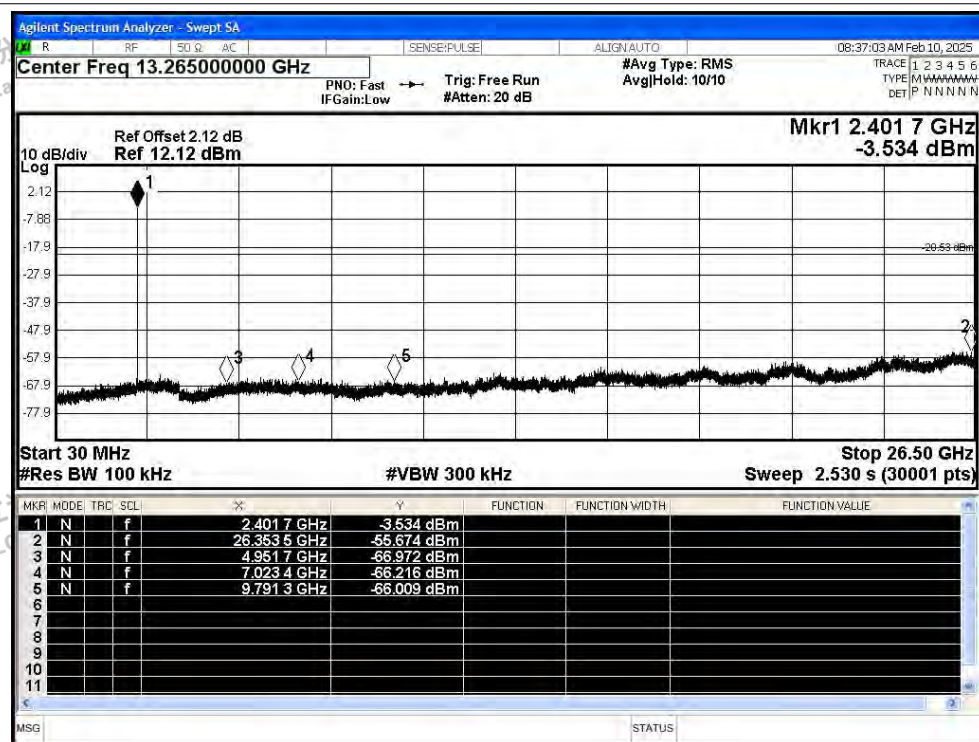
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Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Ref



Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Emission



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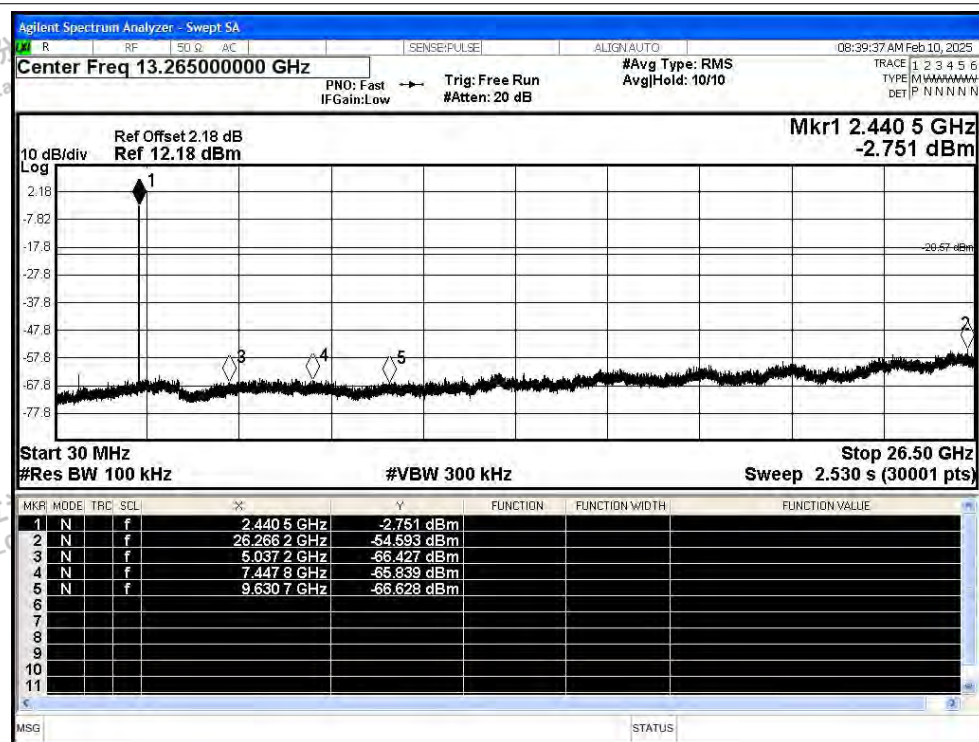
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Tx. Spurious NVNT BLE 2M 2440MHz Ant1 Ref



Tx. Spurious NVNT BLE 2M 2440MHz Ant1 Emission



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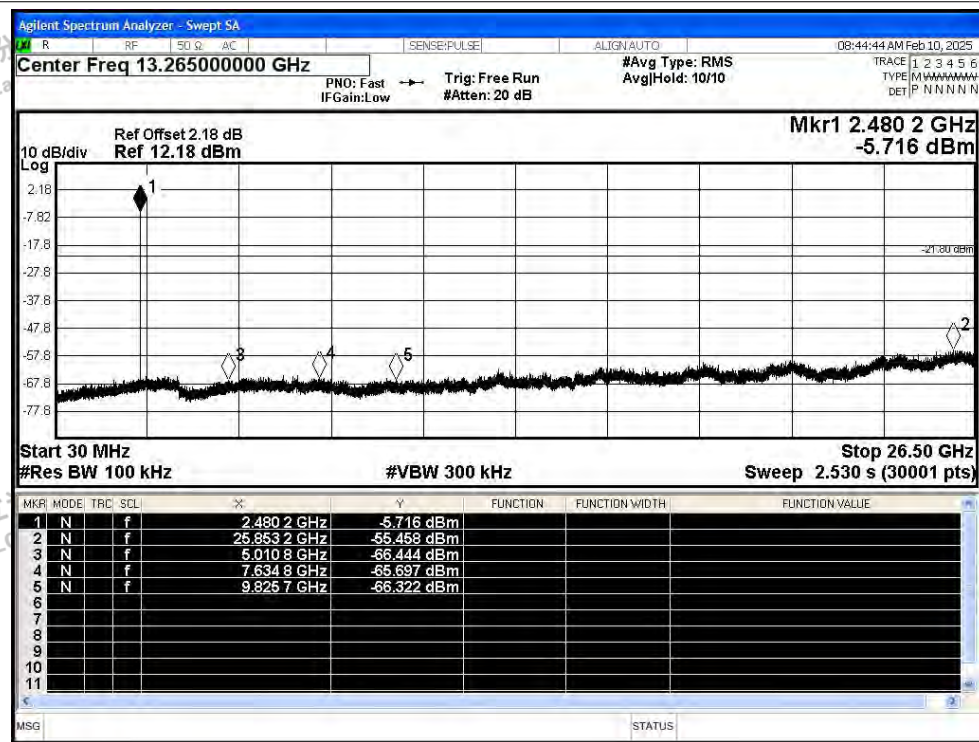
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Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Ref



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	87.39	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	65.96	1.81	1.21
NVNT	BLE 2M	2440	Ant1	65.92	1.81	1.21
NVNT	BLE 2M	2480	Ant1	65.93	1.81	1.21

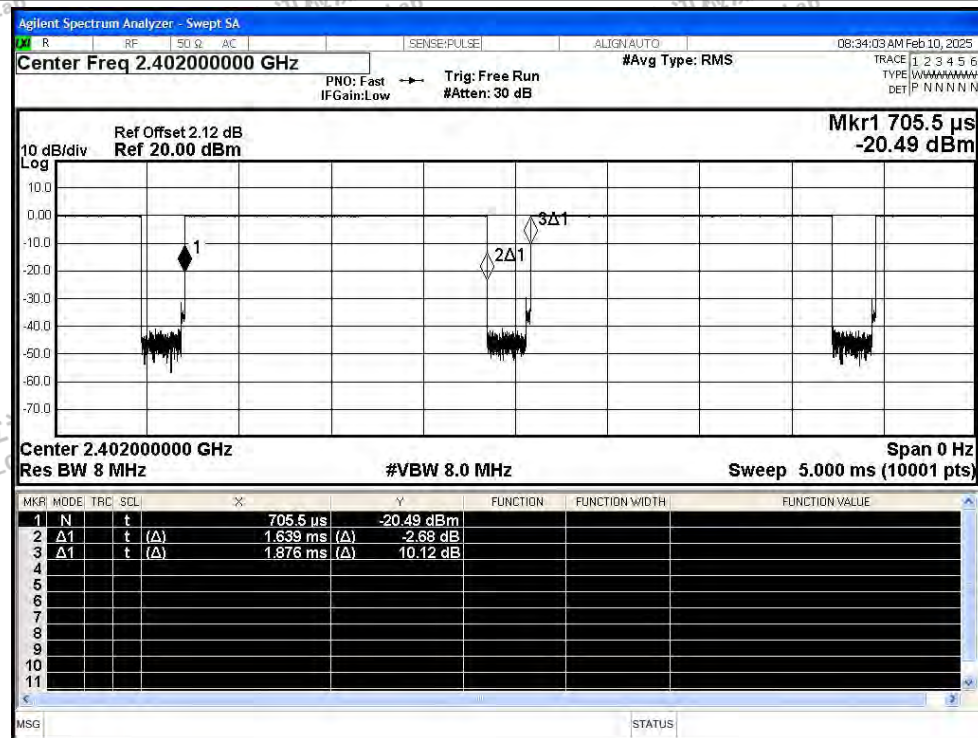


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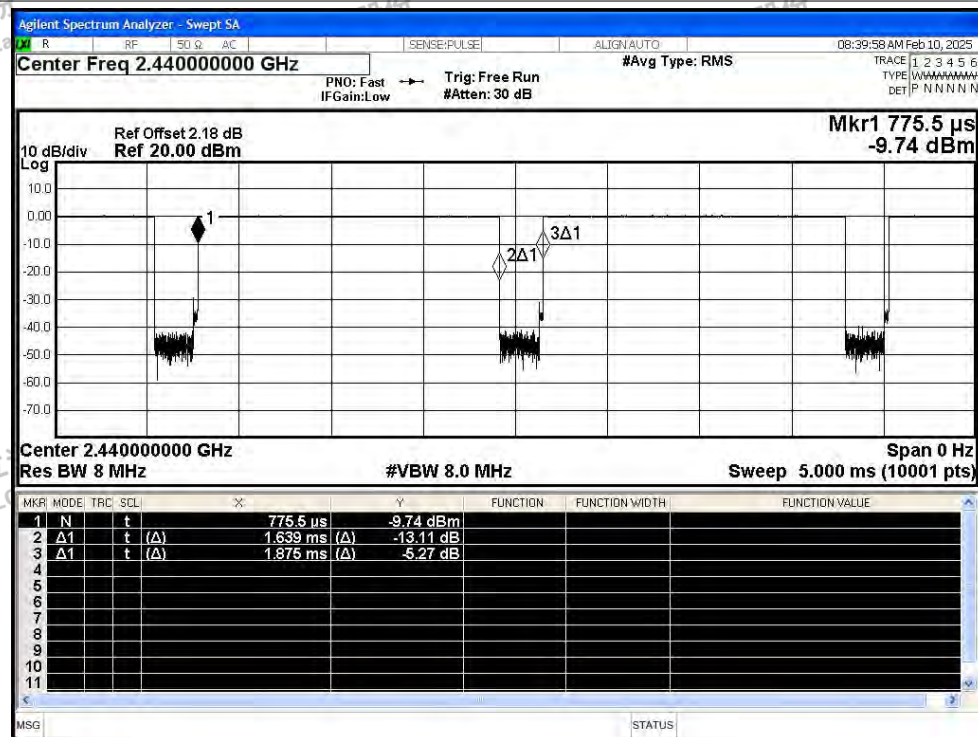


Test Graphs

Duty Cycle NVNT BLE 1M 2402MHz Ant1



Duty Cycle NVNT BLE 1M 2440MHz Ant1



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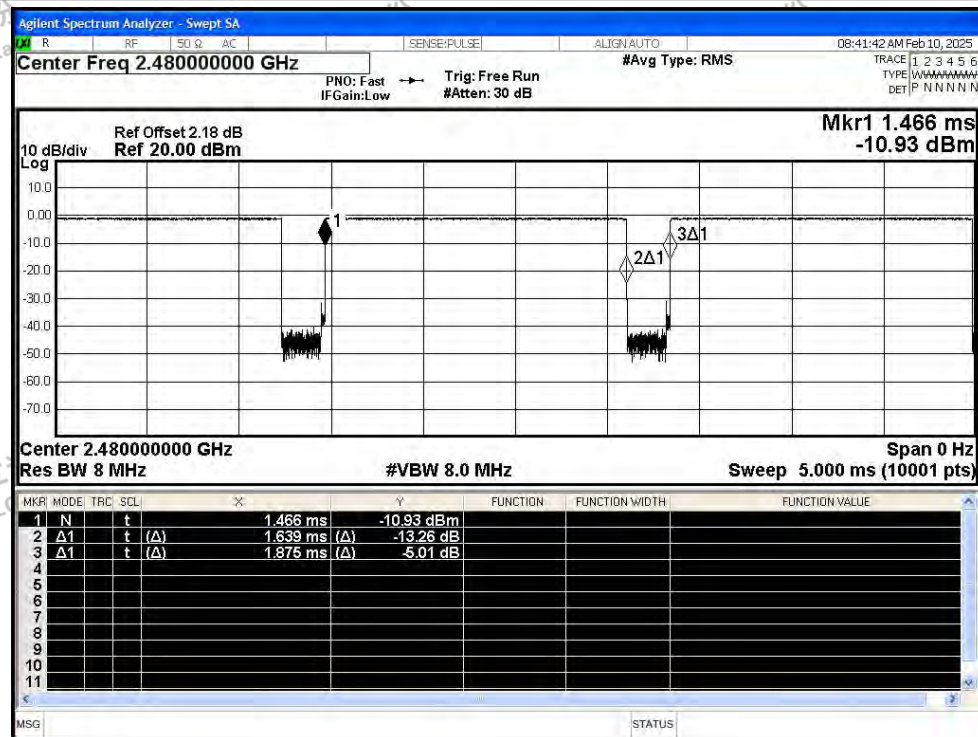
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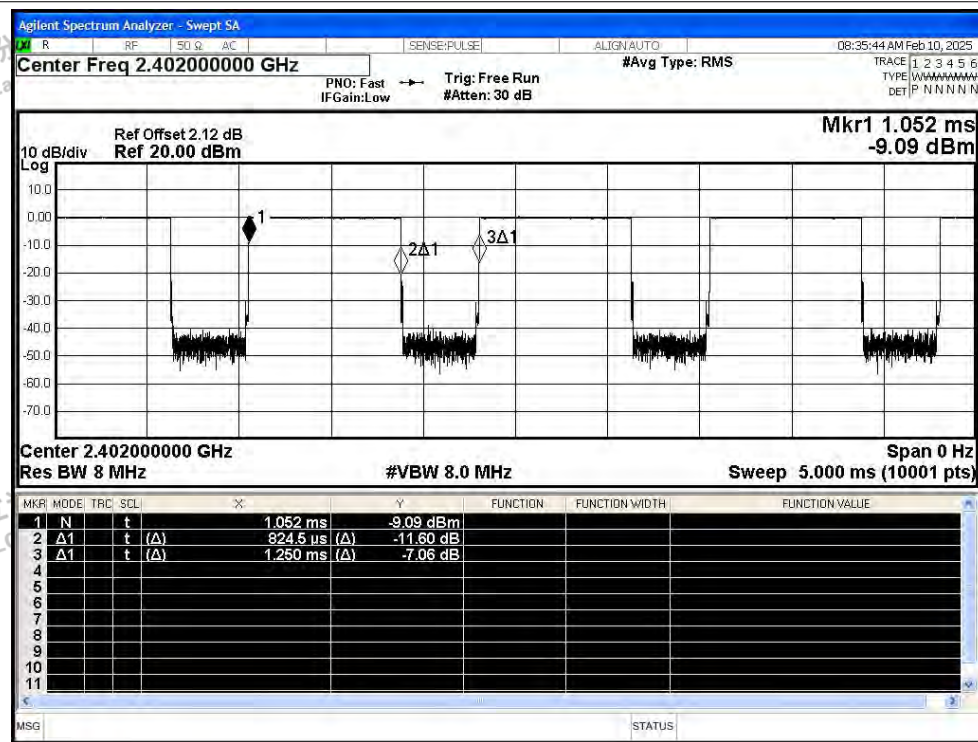
Scan code to check authenticity



Duty Cycle NVNT BLE 1M 2480MHz Ant1



Duty Cycle NVNT BLE 2M 2402MHz Ant1



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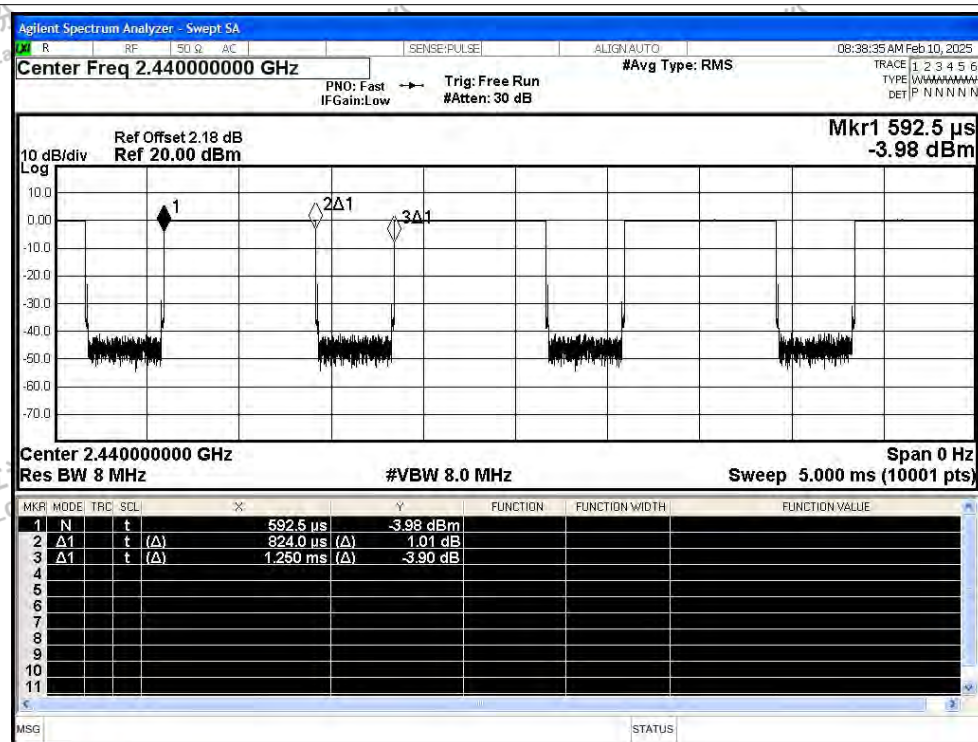
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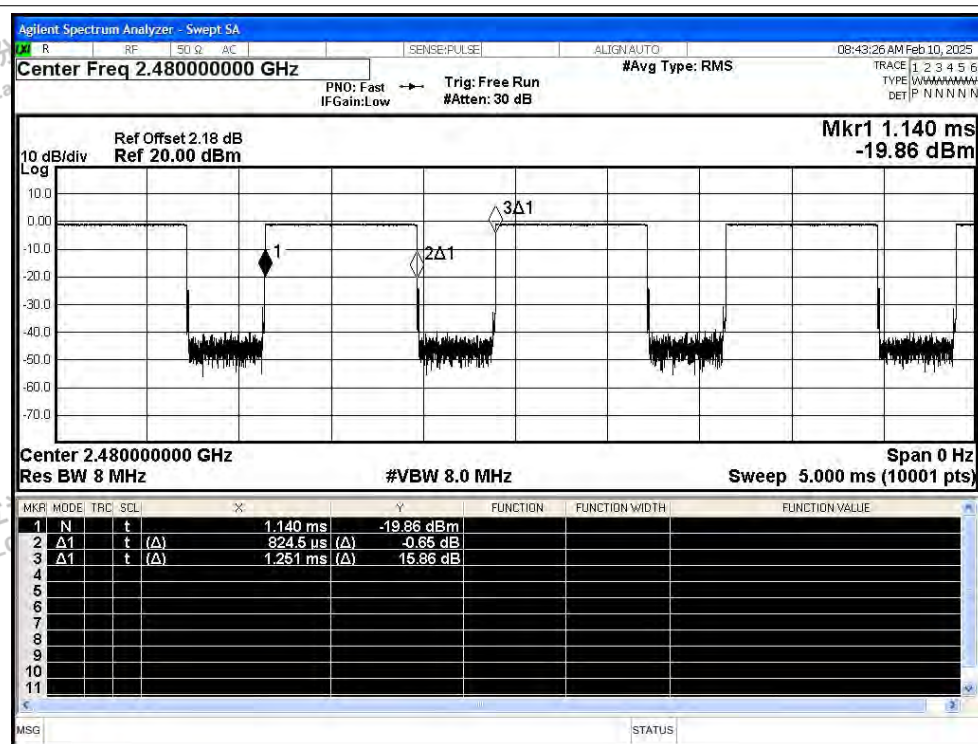
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Duty Cycle NVNT BLE 2M 2440MHz Ant1



Duty Cycle NVNT BLE 2M 2480MHz Ant1



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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	-48.86	2.0	-	48.6	Peak	74	Pass
NVNT	BLE 1M	2402	Ant1	2310	-58.73	2.0	0.59	39.32	Average	54	Pass
NVNT	BLE 1M	2402	Ant1	2377.776	-46.94	2.0	-	50.52	Peak	74	Pass
NVNT	BLE 1M	2402	Ant1	2369.52	-58.13	2.0	0.59	39.92	Average	54	Pass
NVNT	BLE 1M	2402	Ant1	2390	-50.79	2.0	-	46.67	Peak	74	Pass
NVNT	BLE 1M	2402	Ant1	2390	-58.43	2.0	0.59	39.62	Average	54	Pass
NVNT	BLE 1M	2480	Ant1	2483.5	-50.57	2.0	-	46.89	Peak	74	Pass
NVNT	BLE 1M	2480	Ant1	2483.5	-57.49	2.0	0.59	40.56	Average	54	Pass
NVNT	BLE 1M	2480	Ant1	2486.104	-46.71	2.0	-	50.75	Peak	74	Pass
NVNT	BLE 1M	2480	Ant1	2483.512	-57.49	2.0	0.59	40.56	Average	54	Pass
NVNT	BLE 1M	2480	Ant1	2500	-49.93	2.0	-	47.53	Peak	74	Pass
NVNT	BLE 1M	2480	Ant1	2500	-57.73	2.0	0.59	40.32	Average	54	Pass
NVNT	BLE 2M	2402	Ant1	2310	-50.58	2.0	-	46.88	Peak	74	Pass
NVNT	BLE 2M	2402	Ant1	2310	-58.91	2.0	1.81	40.36	Average	54	Pass
NVNT	BLE 2M	2402	Ant1	2331.792	-46.99	2.0	-	50.47	Peak	74	Pass
NVNT	BLE 2M	2402	Ant1	2385.648	-57.66	2.0	1.81	41.61	Average	54	Pass
NVNT	BLE 2M	2402	Ant1	2390	-51.24	2.0	-	46.22	Peak	74	Pass
NVNT	BLE 2M	2402	Ant1	2390	-58.85	2.0	1.81	40.42	Average	54	Pass
NVNT	BLE 2M	2480	Ant1	2483.5	-49.81	2.0	-	47.65	Peak	74	Pass
NVNT	BLE 2M	2480	Ant1	2483.5	-57.99	2.0	1.81	41.28	Average	54	Pass
NVNT	BLE 2M	2480	Ant1	2487.76	-46.33	2.0	-	51.13	Peak	74	Pass
NVNT	BLE 2M	2480	Ant1	2485.768	-57.1	2.0	1.81	42.17	Average	54	Pass
NVNT	BLE 2M	2480	Ant1	2500	-50.39	2.0	-	47.07	Peak	74	Pass
NVNT	BLE 2M	2480	Ant1	2500	-57.91	2.0	1.81	41.36	Average	54	Pass

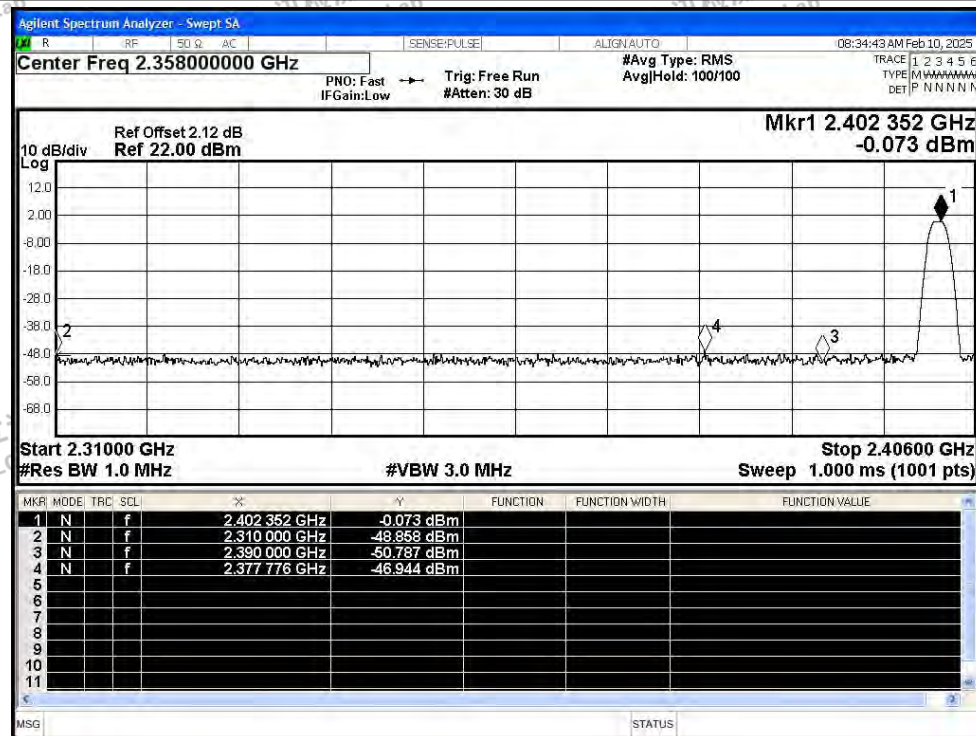


Shenzhen LCS Compliance Testing Laboratory Ltd.
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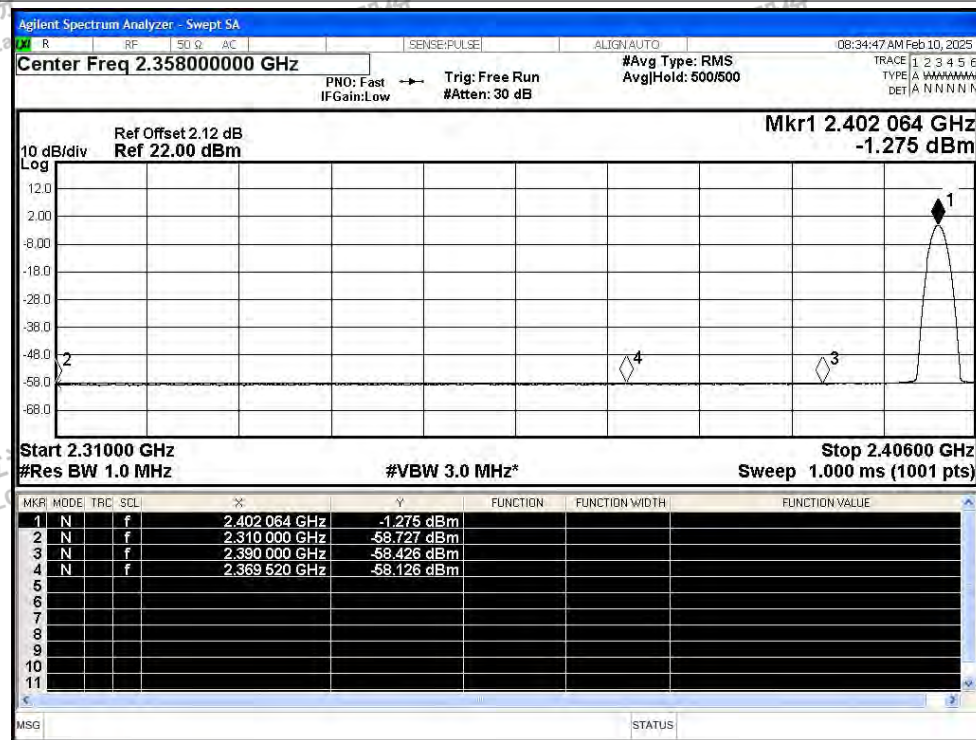


Test Graphs

Restrict Band NVNT BLE 1M 2402MHz Ant1 Peak



Restrict Band NVNT BLE 1M 2402MHz Ant1 Average



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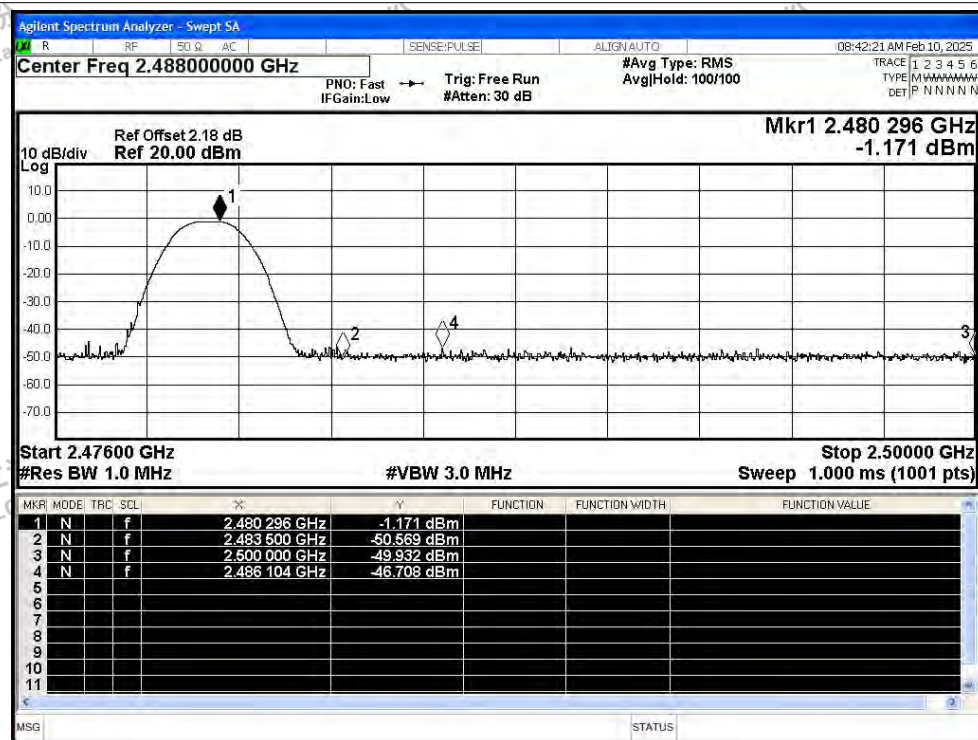
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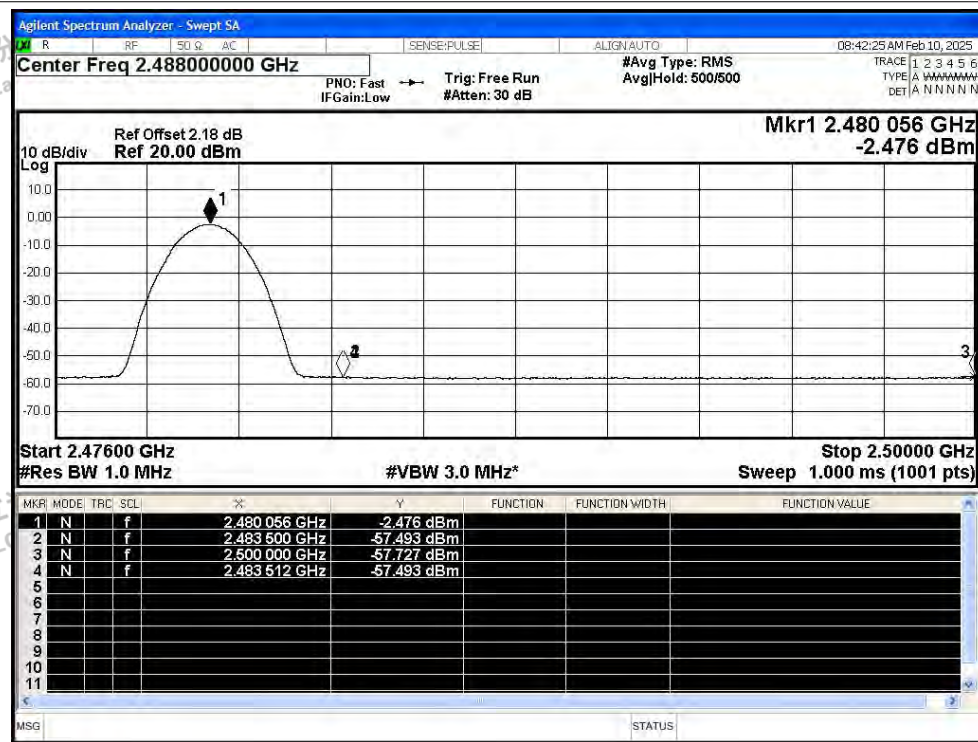
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Restrict Band NVNT BLE 1M 2480MHz Ant1 Peak



Restrict Band NVNT BLE 1M 2480MHz Ant1 Average



Shenzhen LCS Compliance Testing Laboratory Ltd.

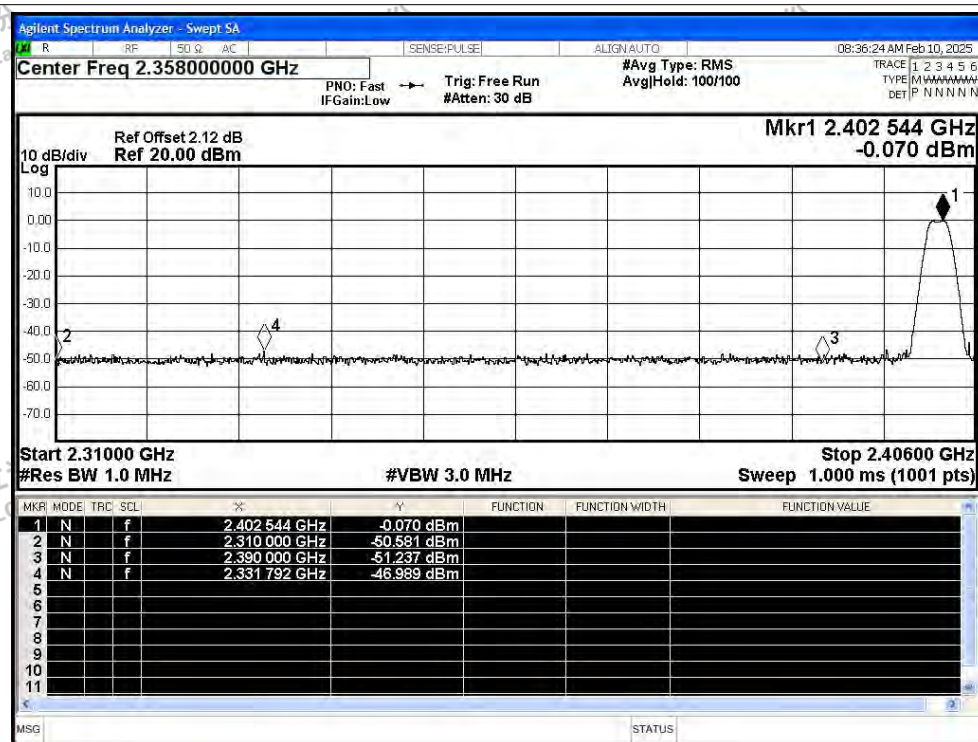
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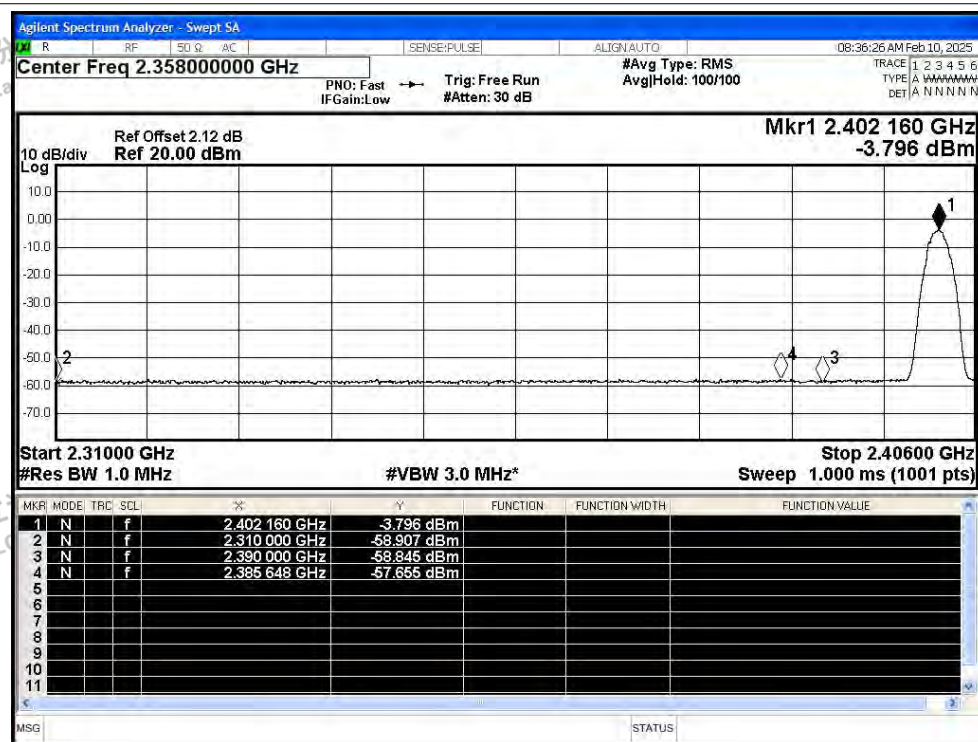
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Restrict Band NVNT BLE 2M 2402MHz Ant1 Peak



Restrict Band NVNT BLE 2M 2402MHz Ant1 Average



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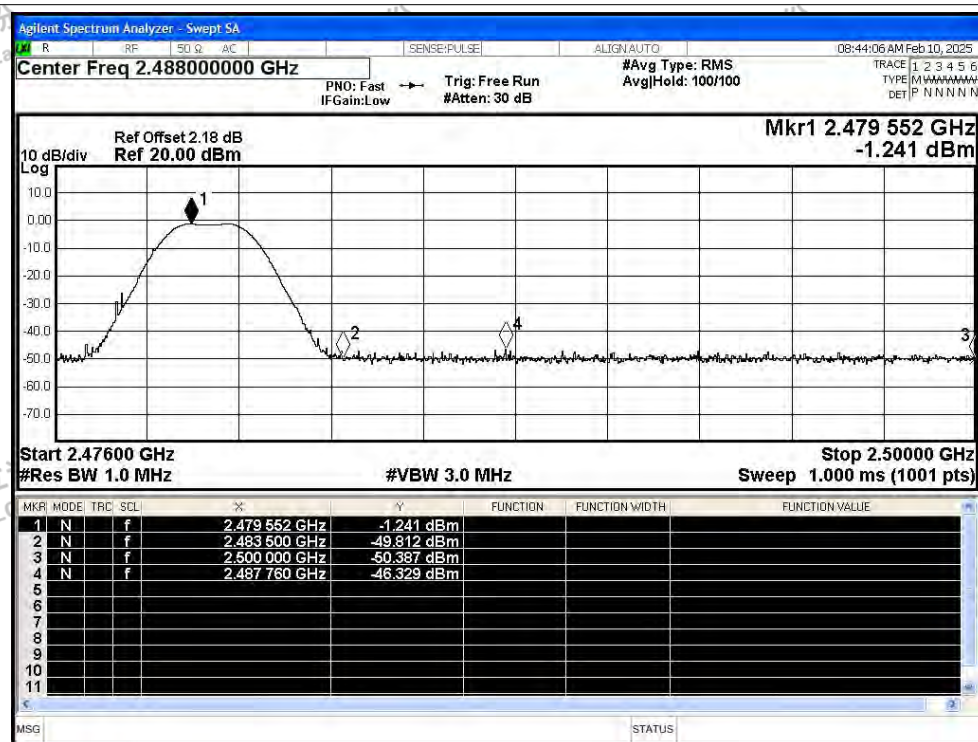
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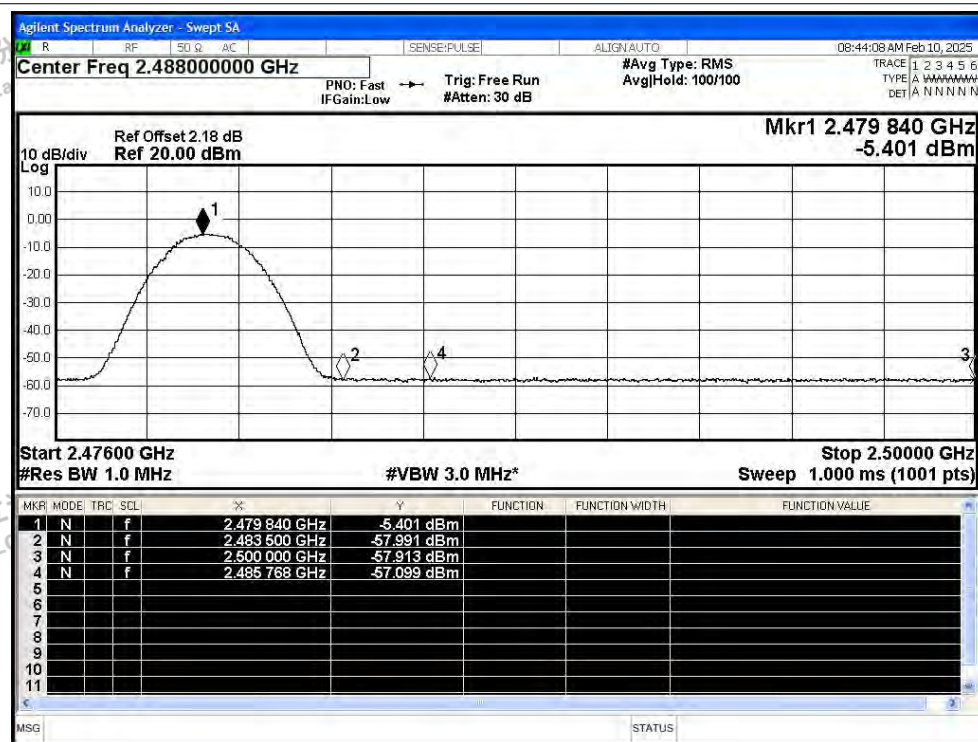
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Restrict Band NVNT BLE 2M 2480MHz Ant1 Peak



Restrict Band NVNT BLE 2M 2480MHz Ant1 Average



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