

FCC Appendix RF Test Data for BLE

Product Name: Smart Diagnostic System

Test Model: P902

Environmental Conditions

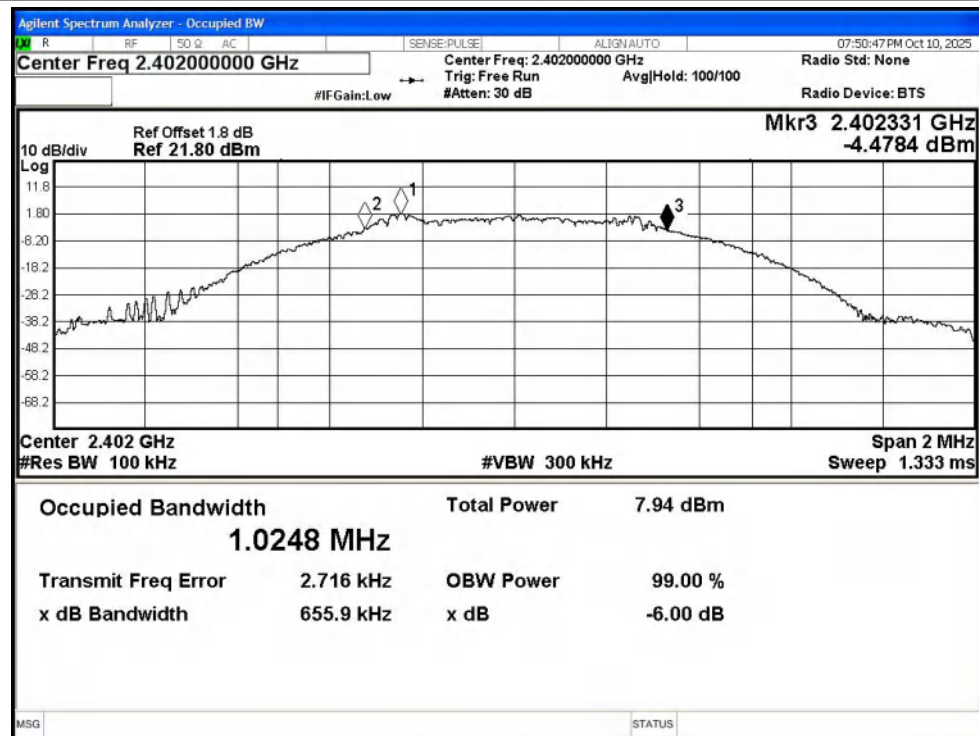
Temperature:	23.8 ° C
Relative Humidity:	52.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Zoey Cao
Supervised by:	Eric Wang

For ESP32 modular:**1. -6dB Bandwidth**

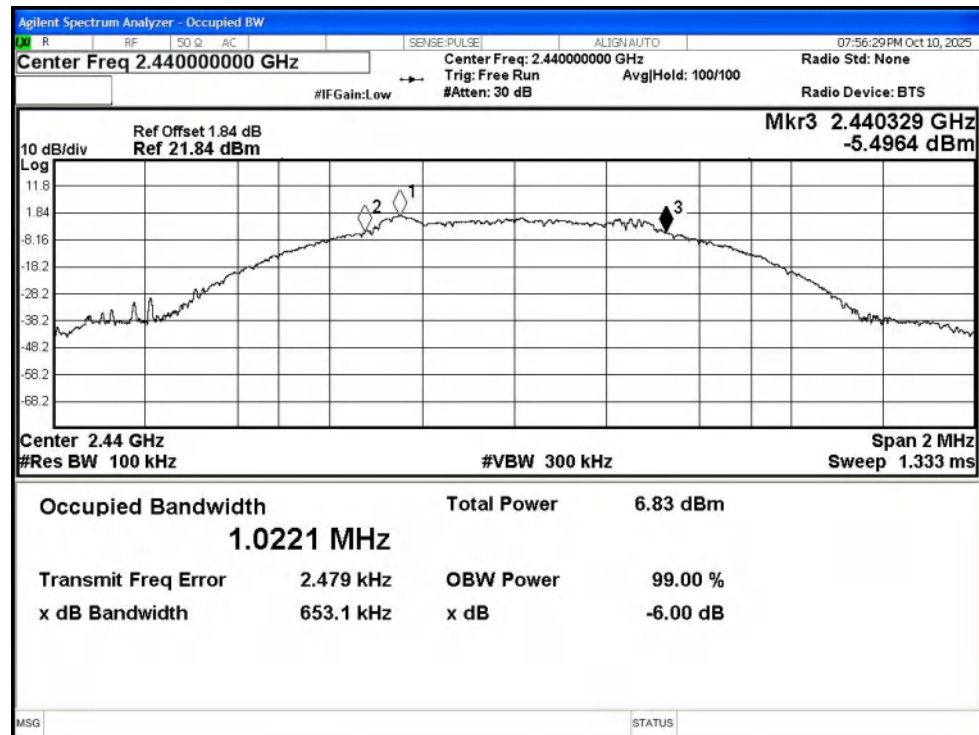
Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	Ant0	0.656	≥ 0.5	Pass
NVNT	BLE 1M	2440	Ant0	0.653	≥ 0.5	Pass
NVNT	BLE 1M	2480	Ant0	0.656	≥ 0.5	Pass
NVNT	BLE 2M	2402	Ant0	1.144	≥ 0.5	Pass
NVNT	BLE 2M	2440	Ant0	1.157	≥ 0.5	Pass
NVNT	BLE 2M	2480	Ant0	1.158	≥ 0.5	Pass

Test Graphs

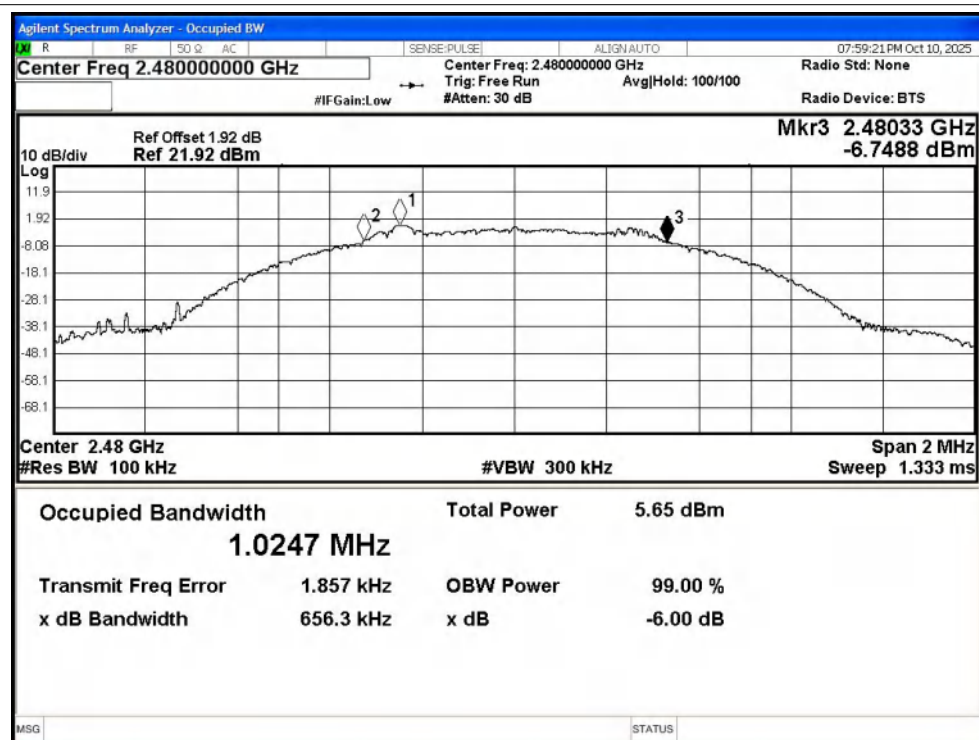
-6dB Bandwidth NVNT BLE 1M 2402MHz Ant0



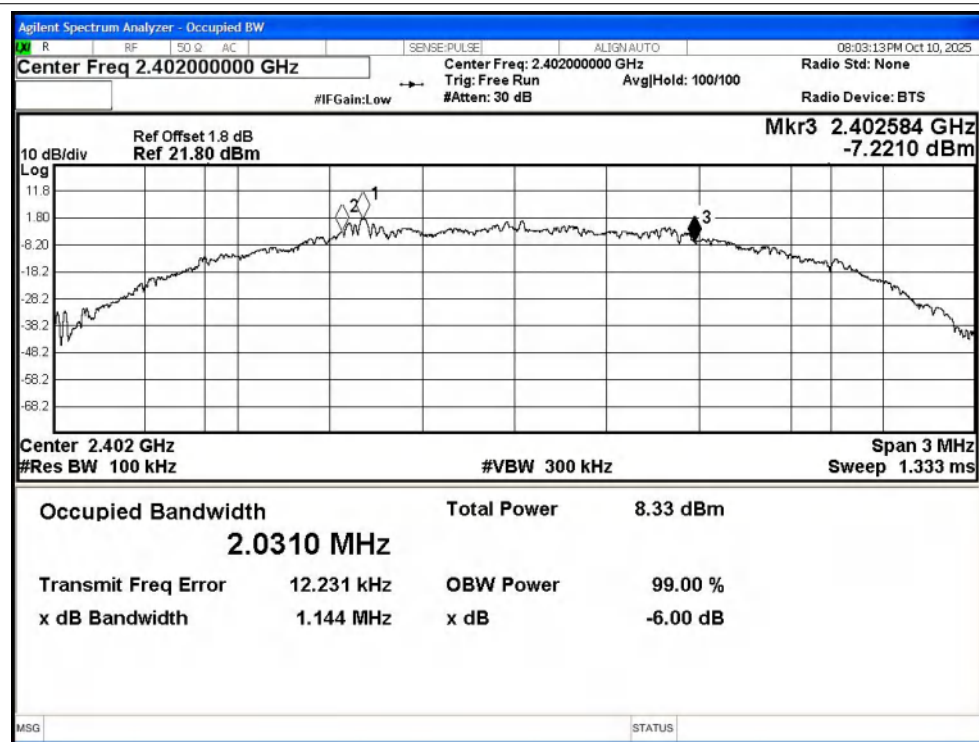
-6dB Bandwidth NVNT BLE 1M 2440MHz Ant0



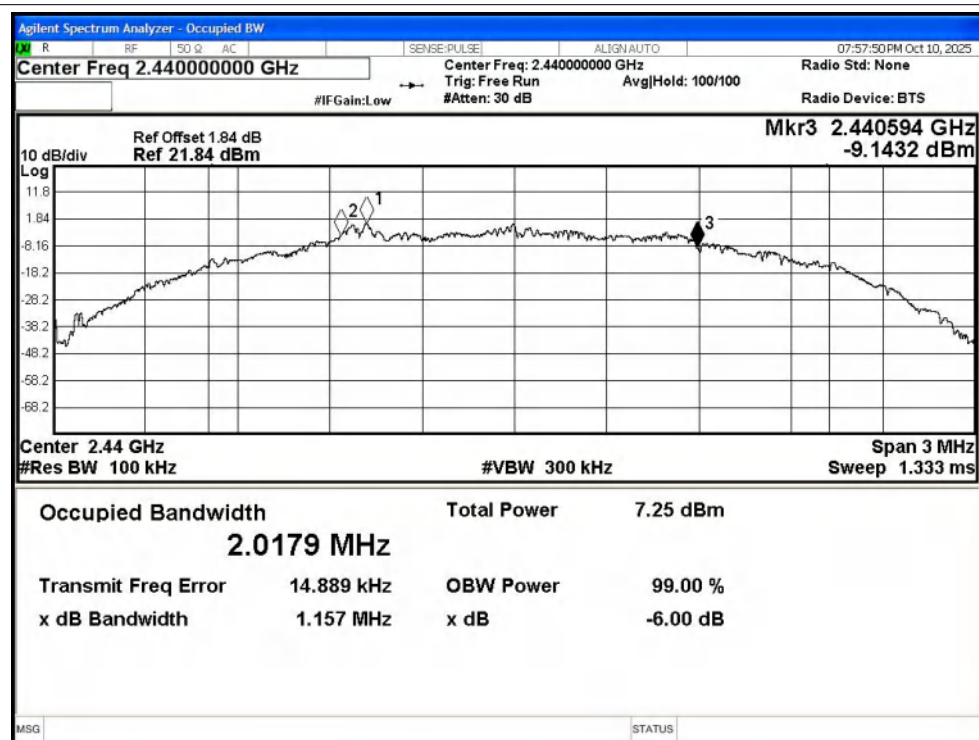
-6dB Bandwidth NVNT BLE 1M 2480MHz Ant0



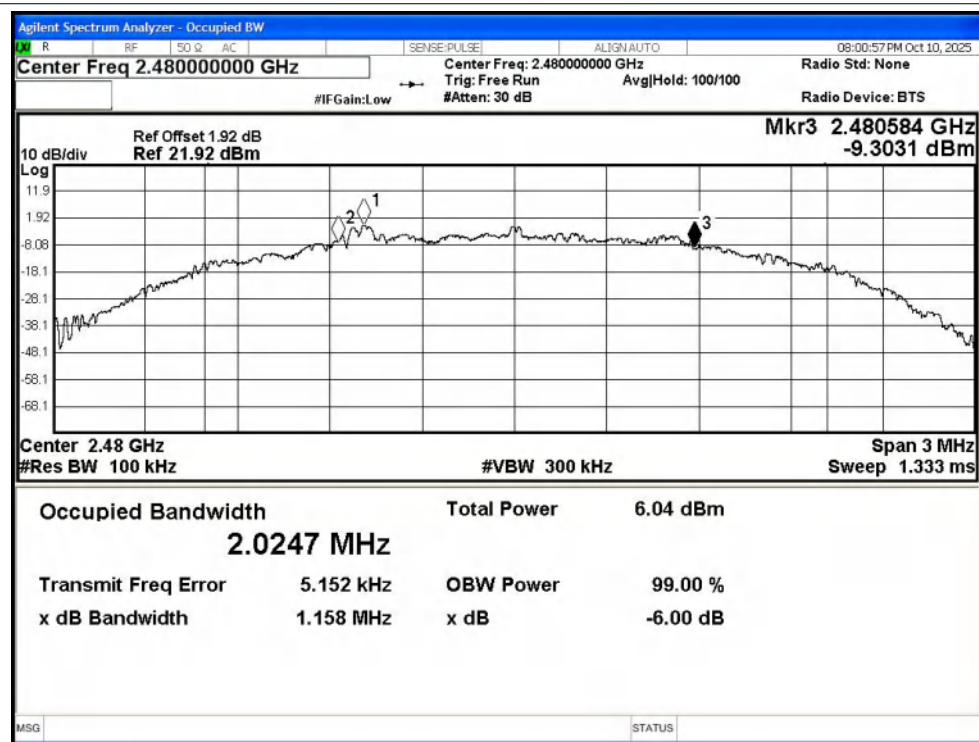
-6dB Bandwidth NVNT BLE 2M 2402MHz Ant0



-6dB Bandwidth NVNT BLE 2M 2440MHz Ant0



-6dB Bandwidth NVNT BLE 2M 2480MHz Ant0



2. Maximum Peak Conducted Output Power

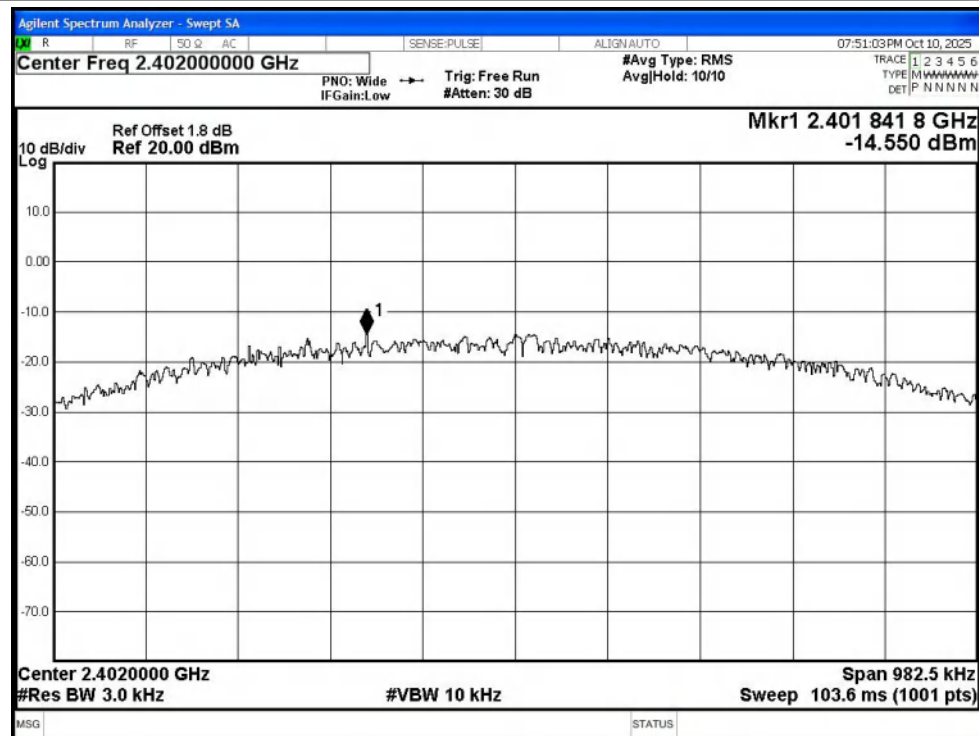
Condition	Mode	Frequency (MHz)	Antenna	Total Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant0	2.18	30	Pass
NVNT	BLE 1M	2440	Ant0	1.00	30	Pass
NVNT	BLE 1M	2480	Ant0	-0.12	30	Pass
NVNT	BLE 2M	2402	Ant0	2.06	30	Pass
NVNT	BLE 2M	2440	Ant0	0.82	30	Pass
NVNT	BLE 2M	2480	Ant0	-0.31	30	Pass

3. Maximum Power Spectral Density Level

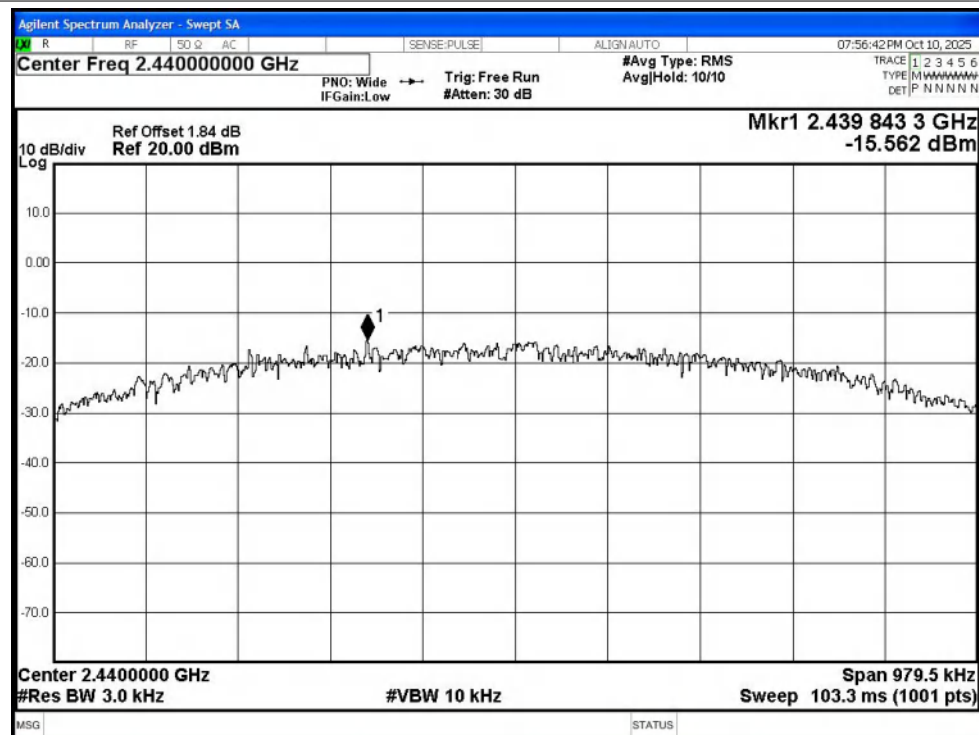
Condition	Mode	Frequency (MHz)	Antenna	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	BLE 1M	2402	Ant0	-14.55	8	Pass
NVNT	BLE 1M	2440	Ant0	-15.56	8	Pass
NVNT	BLE 1M	2480	Ant0	-16.68	8	Pass
NVNT	BLE 2M	2402	Ant0	-17.7	8	Pass
NVNT	BLE 2M	2440	Ant0	-18.68	8	Pass
NVNT	BLE 2M	2480	Ant0	-20.04	8	Pass

Test Graphs

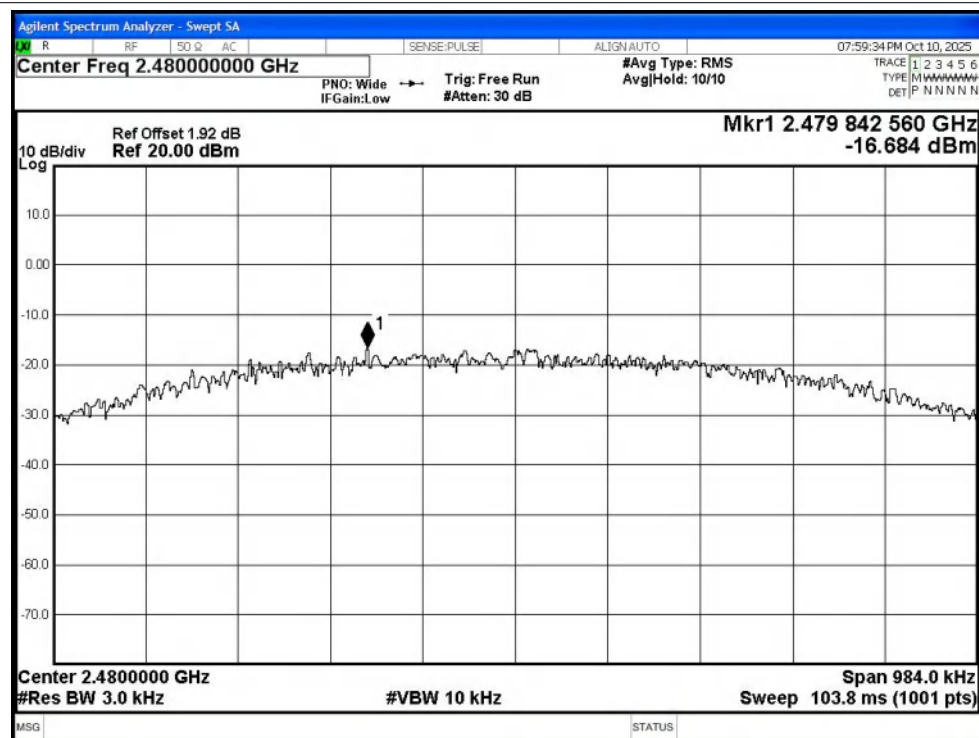
PSD NVNT BLE 1M 2402MHz Ant0



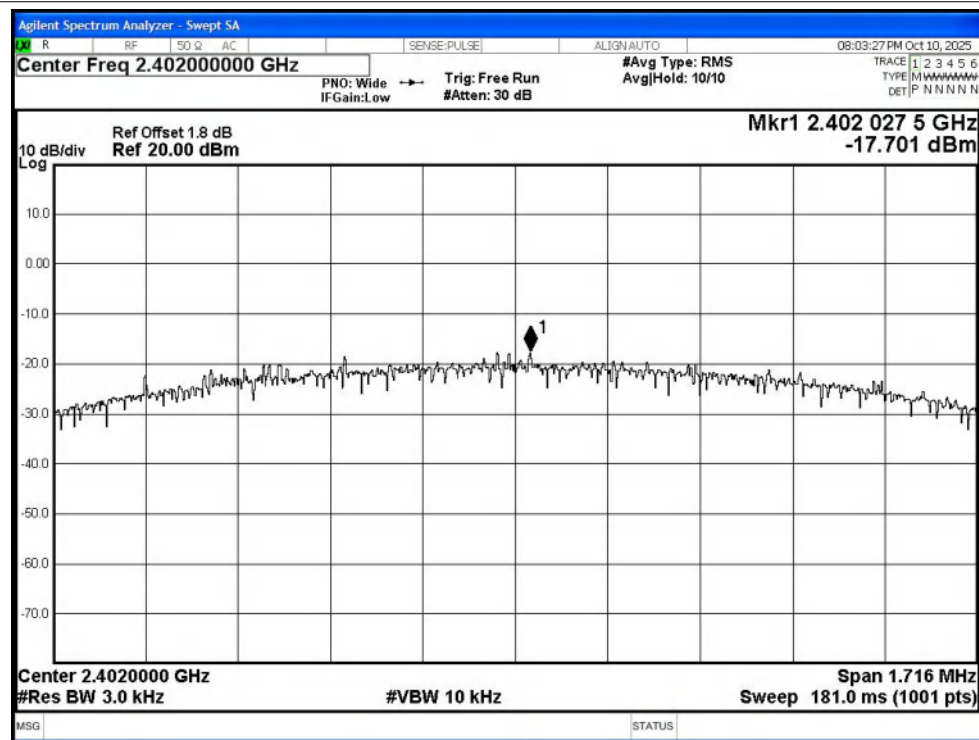
PSD NVNT BLE 1M 2440MHz Ant0



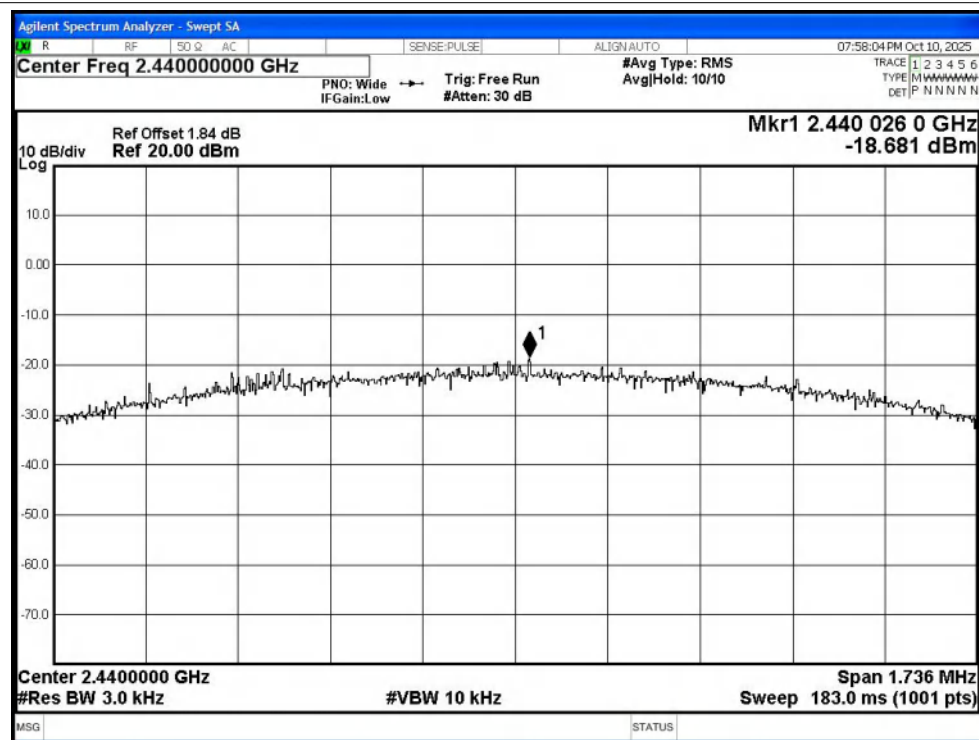
PSD NVNT BLE 1M 2480MHz Ant0



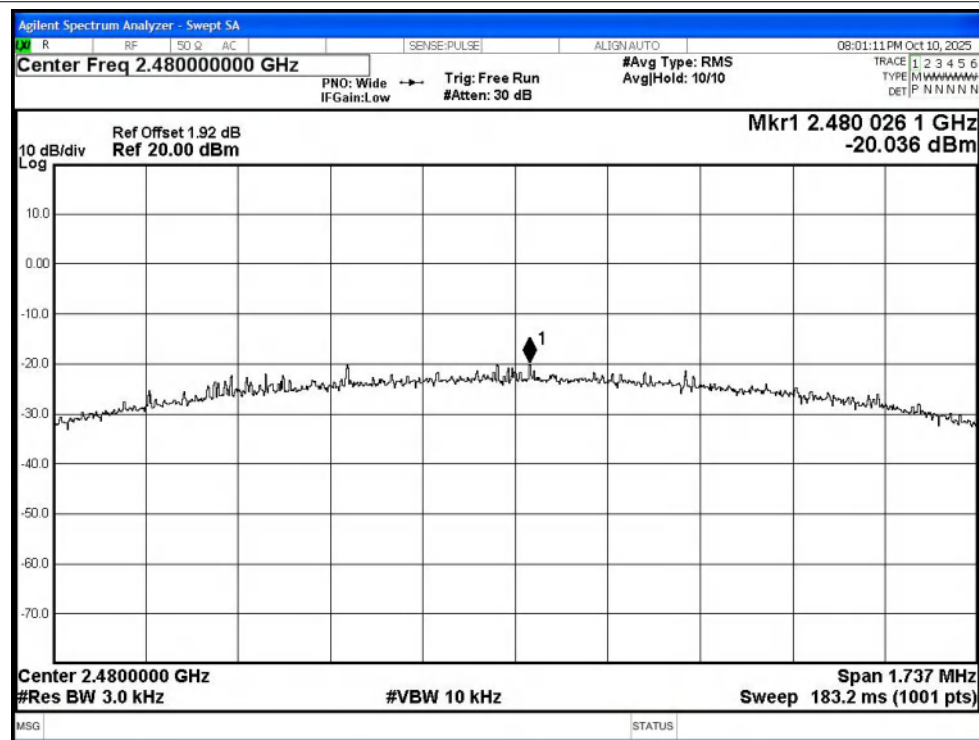
PSD NVNT BLE 2M 2402MHz Ant0



PSD NVNT BLE 2M 2440MHz Ant0



PSD NVNT BLE 2M 2480MHz Ant0

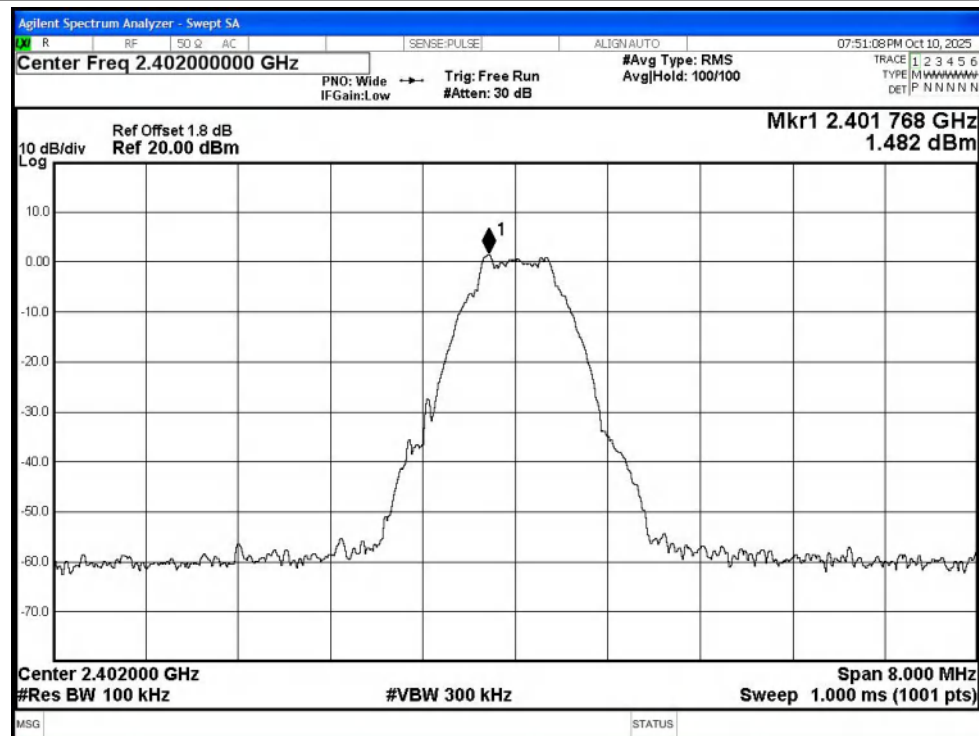


4. Band Edge

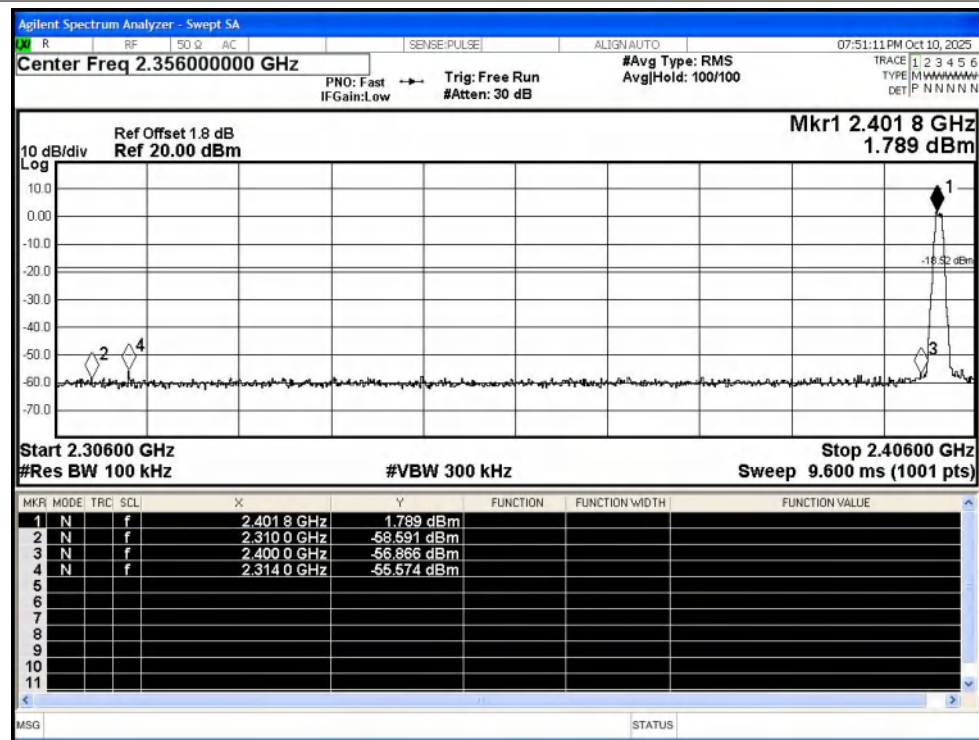
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant0	-57.06	-20	Pass
NVNT	BLE 1M	2480	Ant0	-56.76	-20	Pass
NVNT	BLE 2M	2402	Ant0	-44.5	-20	Pass
NVNT	BLE 2M	2480	Ant0	-55.13	-20	Pass

Test Graphs

Band Edge NVNT BLE 1M 2402MHz Ant0 Ref



Band Edge NVNT BLE 1M 2402MHz Ant0 Emission



Agilent Spectrum Analyzer - Swept SA

R RF SO Q AC SENSE:PULSE ALIGN:AUTO 07:59:42 PM Oct 10, 2025

Center Freq 2.52600000 GHz

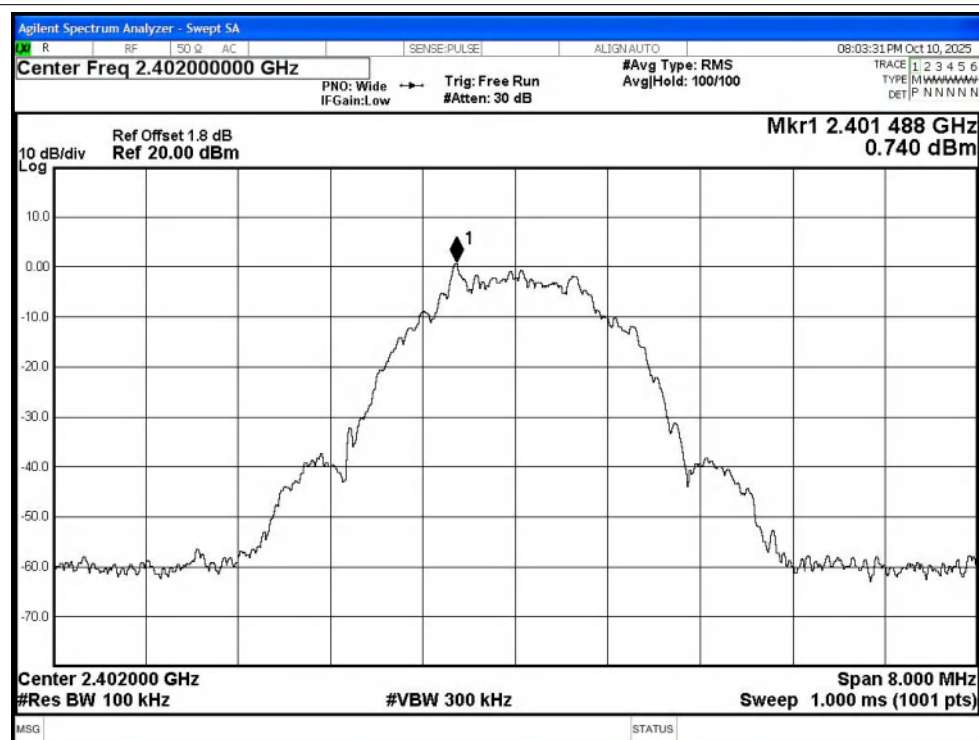
PNO: Fast IF Gain: Low Trig: Free Run #Atten: 30 dB #Avg Type: RMS Avg Hold: 100/100

Ref Offset 1.92 dB Ref 20.00 dBm Mkr1 2.479 8 GHz -0.566 dBm

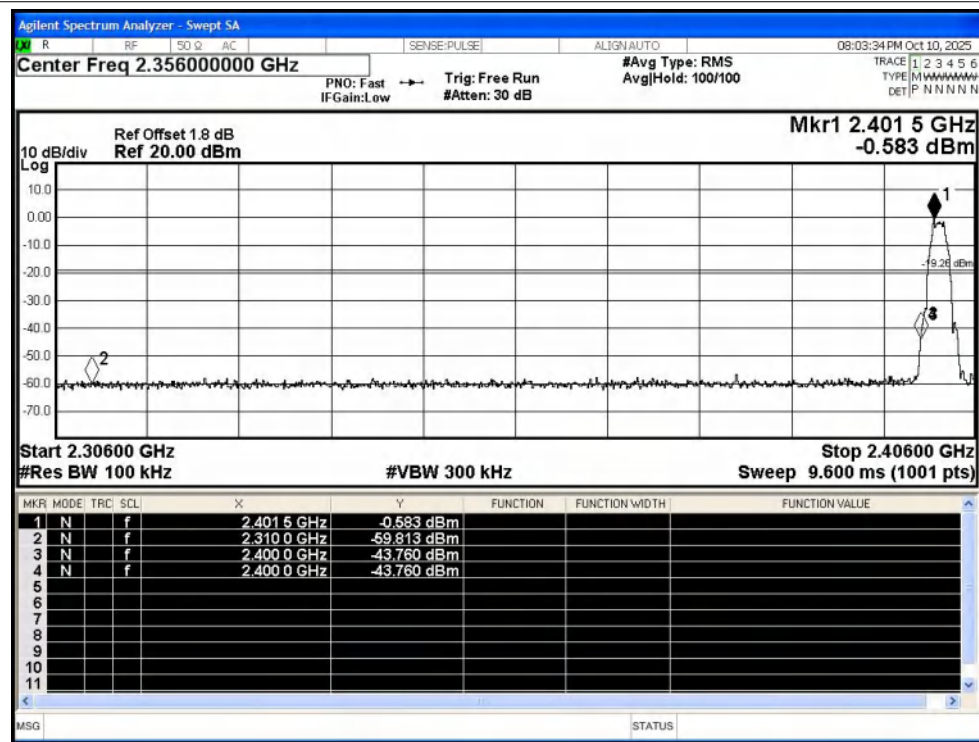
MKR MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	f	2.479 8 GHz	-0.566 dBm			
2	N	f	2.483 5 GHz	-57.832 dBm			
3	N	f	2.500 0 GHz	-59.132 dBm			
4	N	f	2.493 8 GHz	-57.295 dBm			

Start 2.47600 GHz Stop 2.57600 GHz
#Res BW 100 kHz #VBW 300 kHz Sweep 9.600 ms (1001 pts)

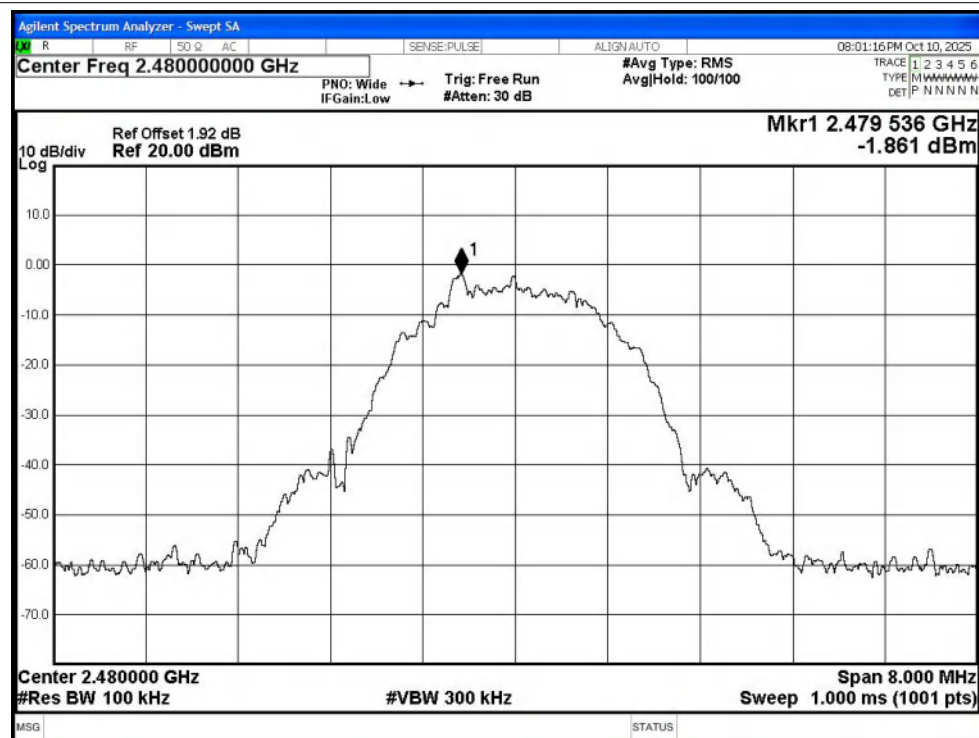
Band Edge NVNT BLE 2M 2402MHz Ant0 Ref



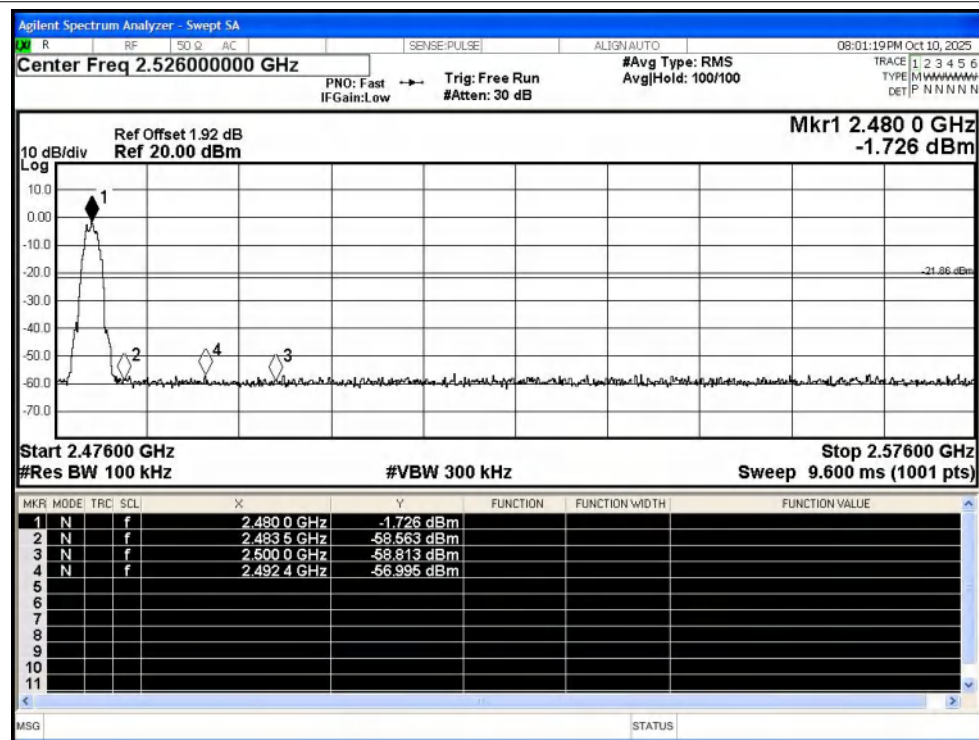
Band Edge NVNT BLE 2M 2402MHz Ant0 Emission



Band Edge NVNT BLE 2M 2480MHz Ant0 Ref



Band Edge NVNT BLE 2M 2480MHz Ant0 Emission

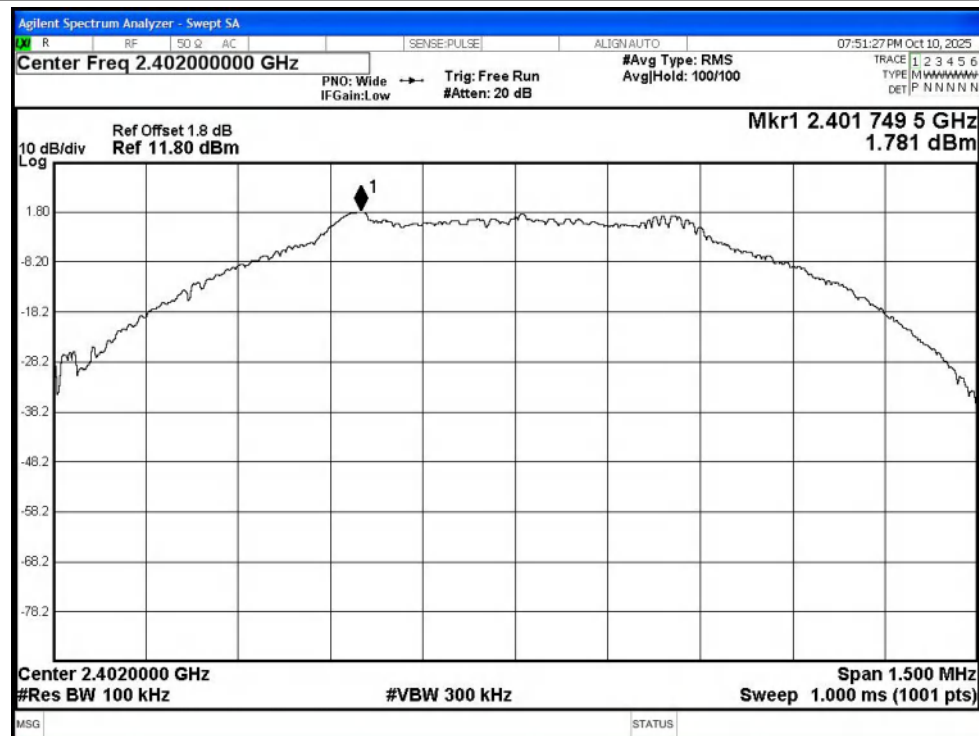


5. Conducted RF Spurious Emission

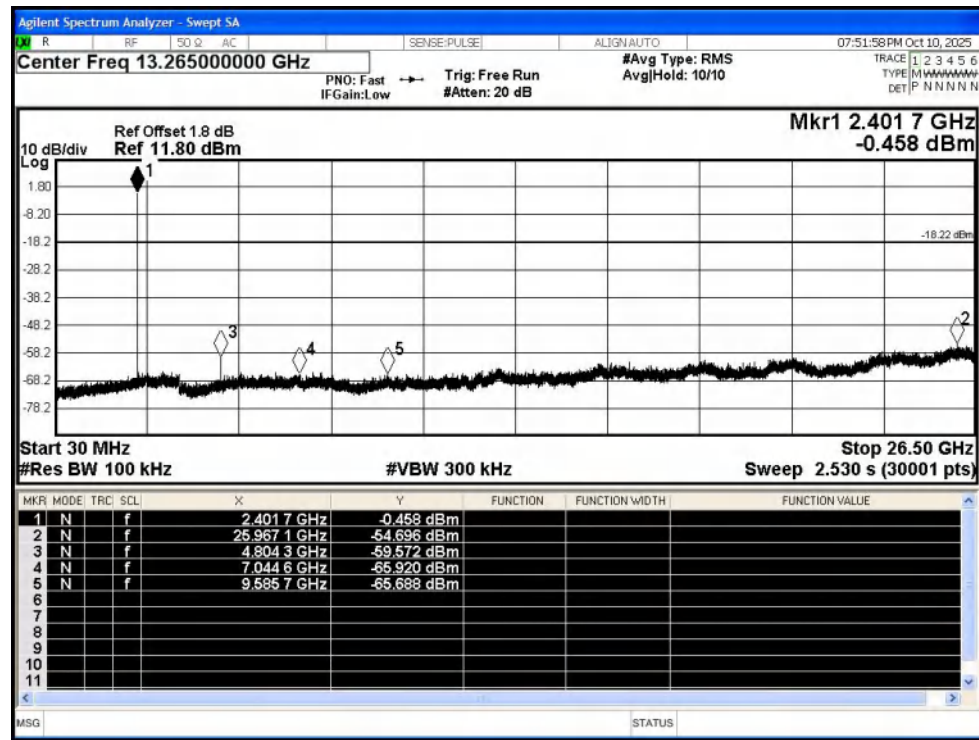
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant0	-56.48	-20	Pass
NVNT	BLE 1M	2440	Ant0	-56.31	-20	Pass
NVNT	BLE 1M	2480	Ant0	-54.41	-20	Pass
NVNT	BLE 2M	2402	Ant0	-56.74	-20	Pass
NVNT	BLE 2M	2440	Ant0	-54.94	-20	Pass
NVNT	BLE 2M	2480	Ant0	-54.97	-20	Pass

Test Graphs

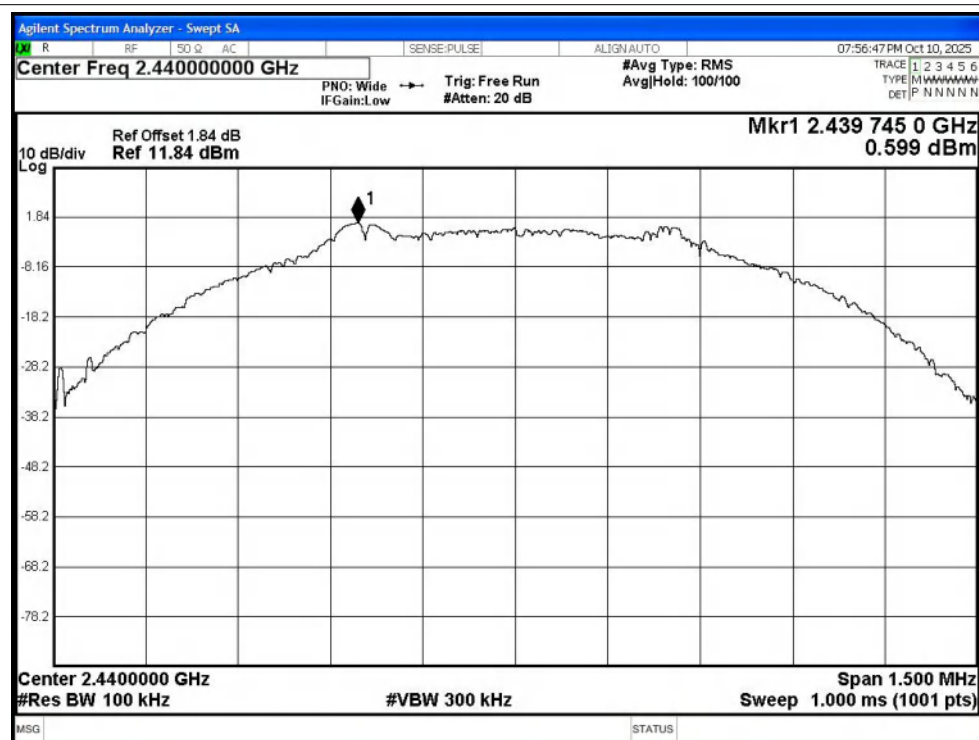
Tx. Spurious NVNT BLE 1M 2402MHz Ant0 Ref



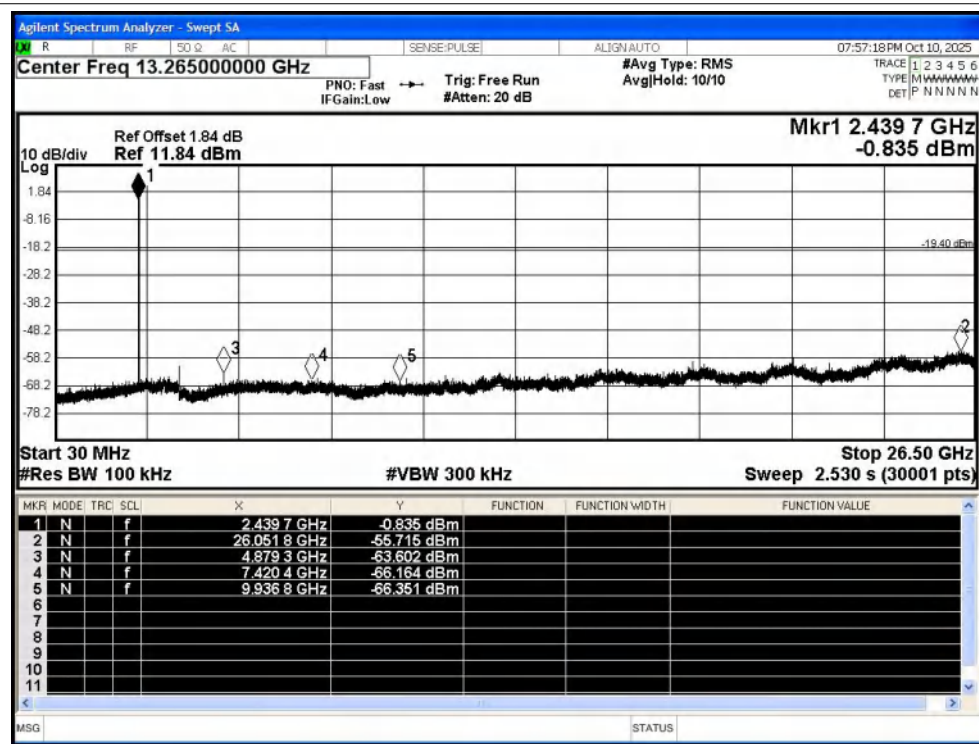
Tx. Spurious NVNT BLE 1M 2402MHz Ant0 Emission



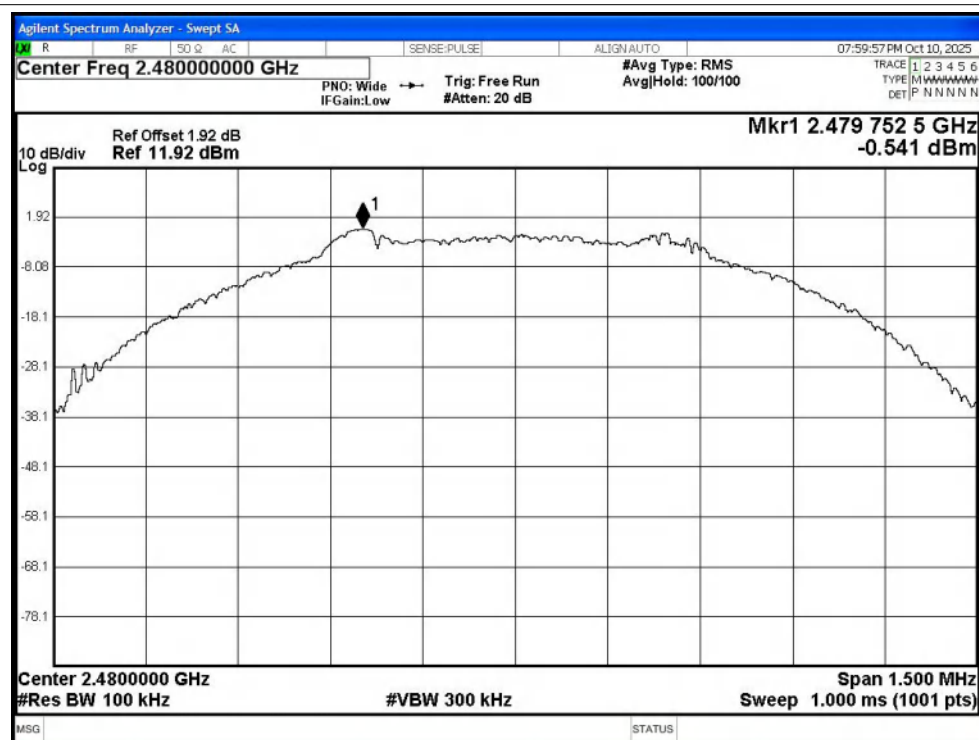
Tx. Spurious NVNT BLE 1M 2440MHz Ant0 Ref



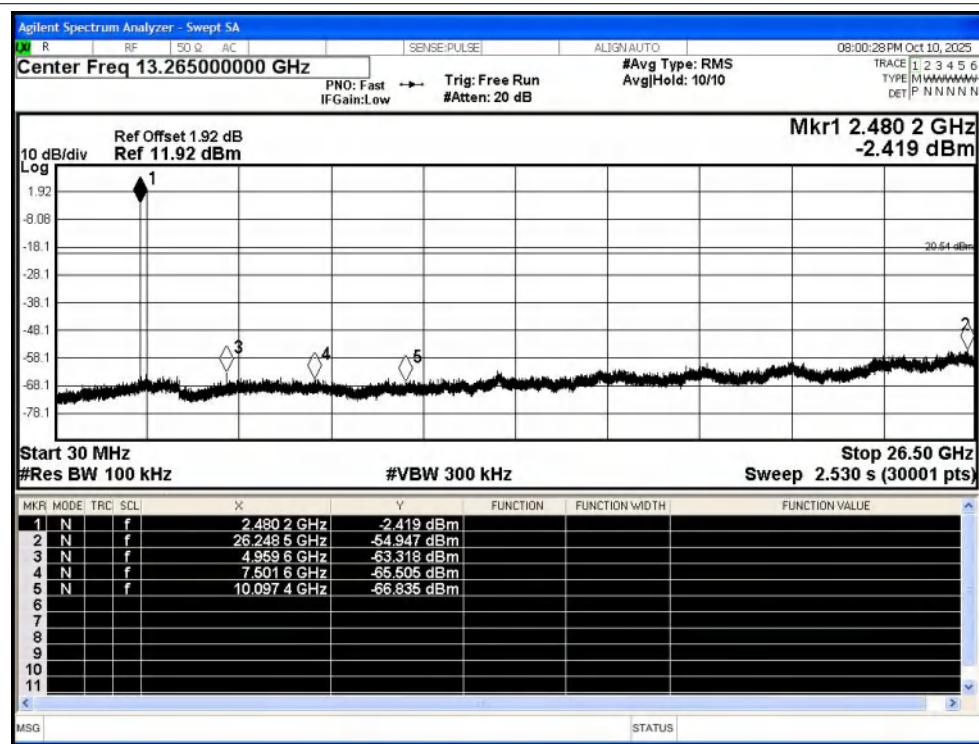
Tx. Spurious NVNT BLE 1M 2440MHz Ant0 Emission



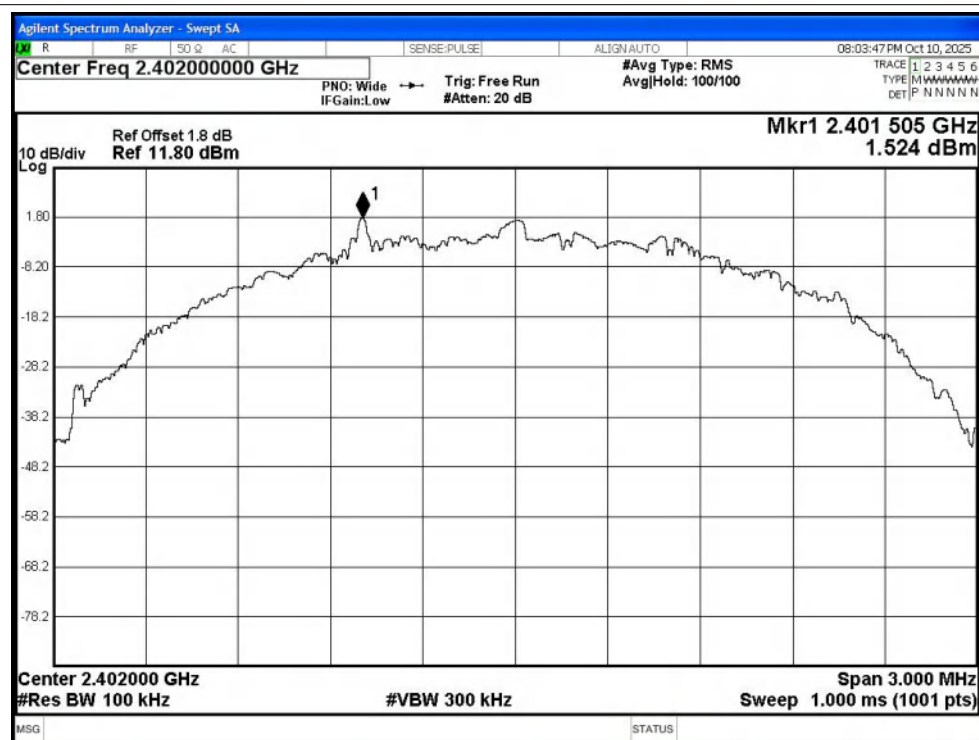
Tx. Spurious NVNT BLE 1M 2480MHz Ant0 Ref



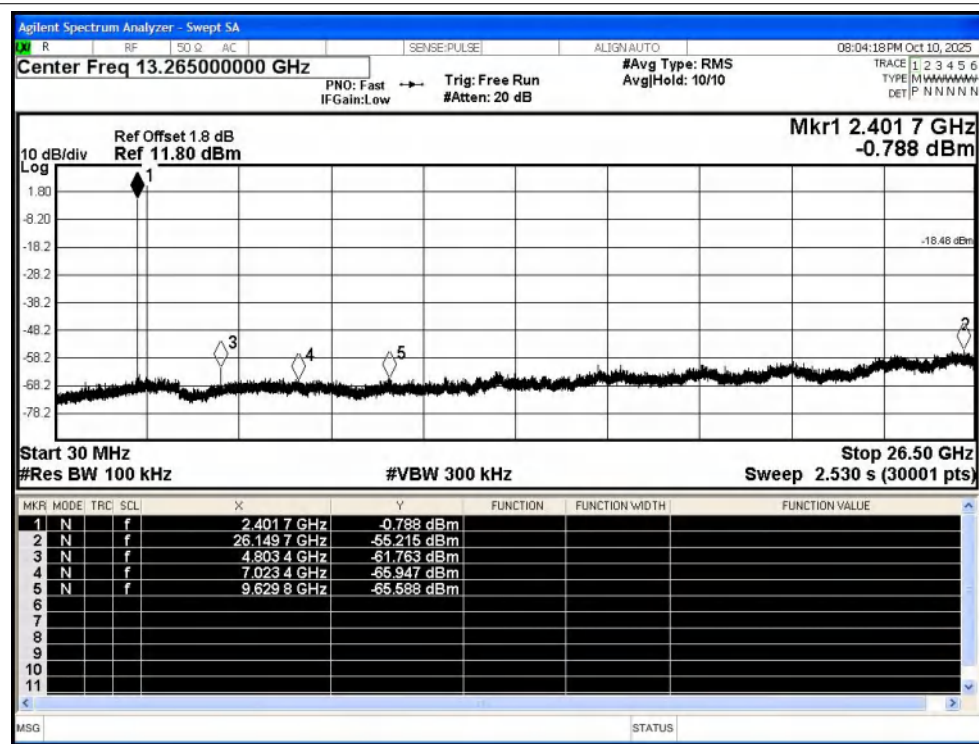
Tx. Spurious NVNT BLE 1M 2480MHz Ant0 Emission



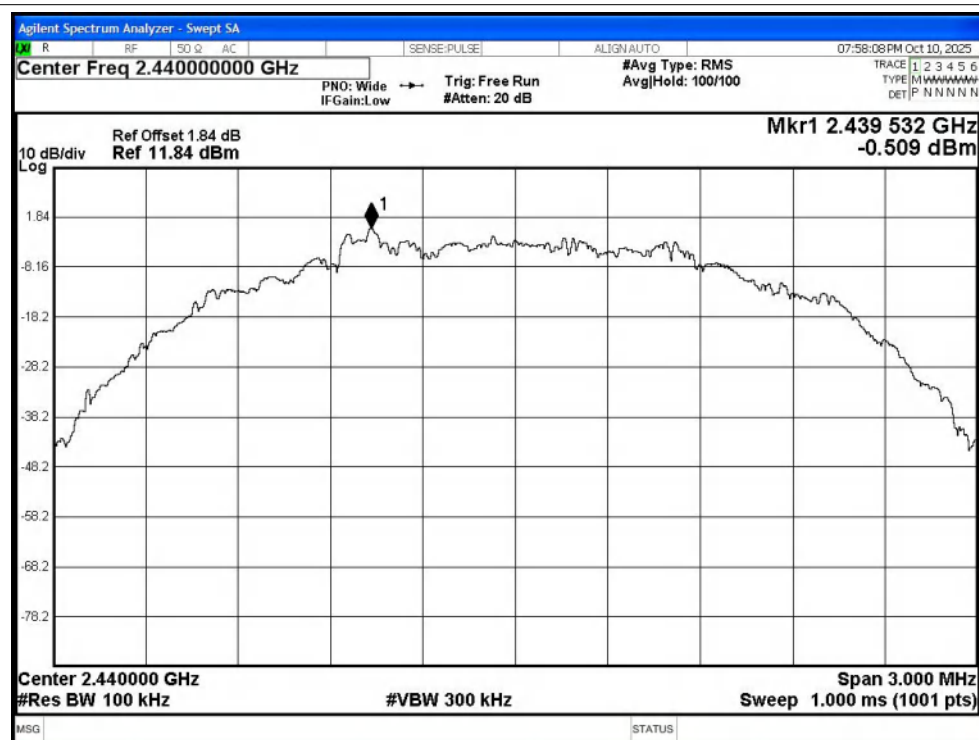
Tx. Spurious NVNT BLE 2M 2402MHz Ant0 Ref



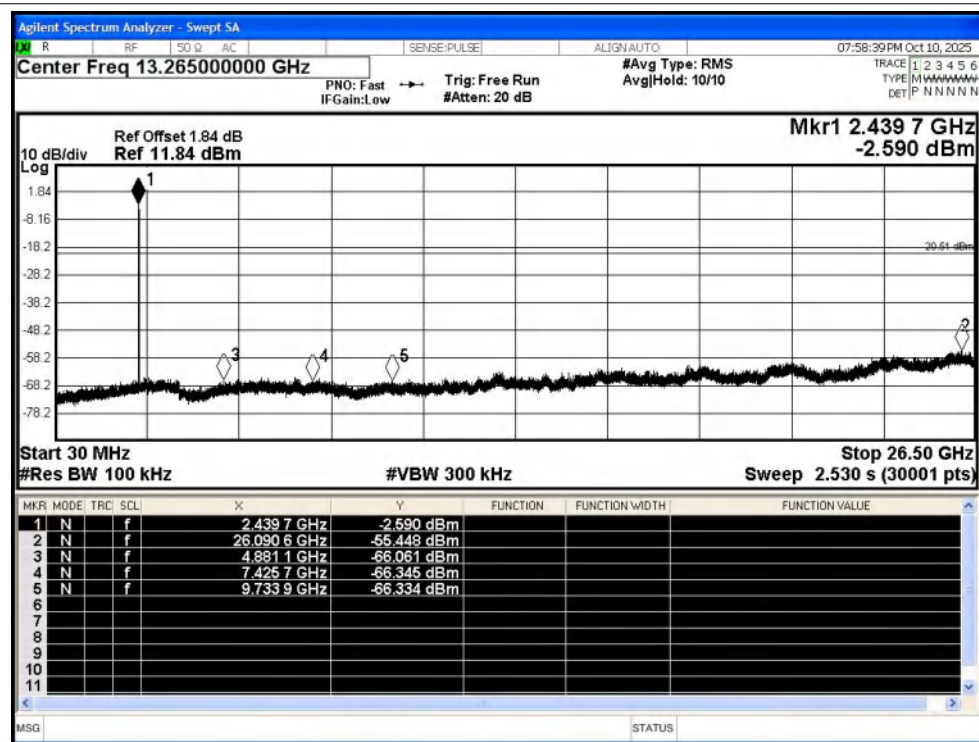
Tx. Spurious NVNT BLE 2M 2402MHz Ant0 Emission



Tx. Spurious NVNT BLE 2M 2440MHz Ant0 Ref



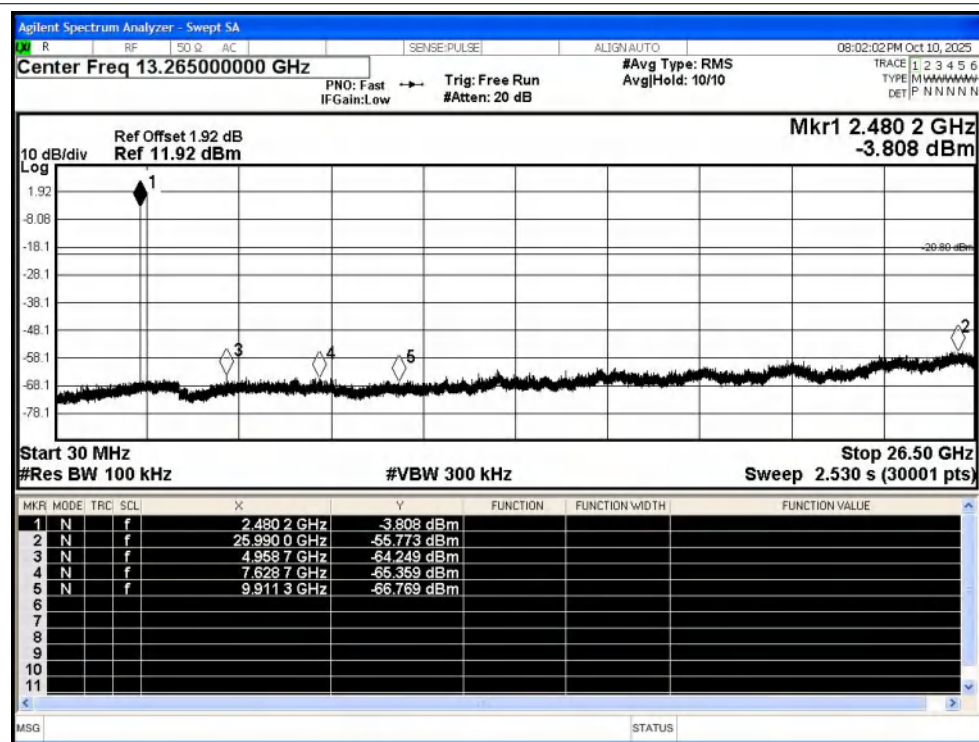
Tx. Spurious NVNT BLE 2M 2440MHz Ant0 Emission



Tx. Spurious NVNT BLE 2M 2480MHz Ant0 Ref



Tx. Spurious NVNT BLE 2M 2480MHz Ant0 Emission

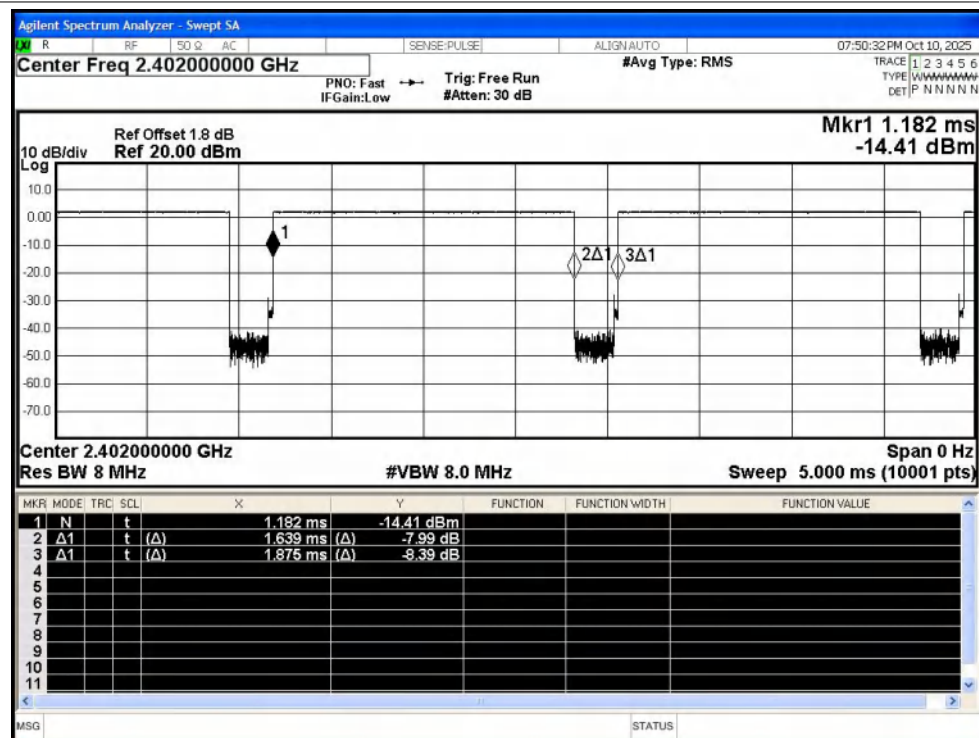


6. Duty Cycle

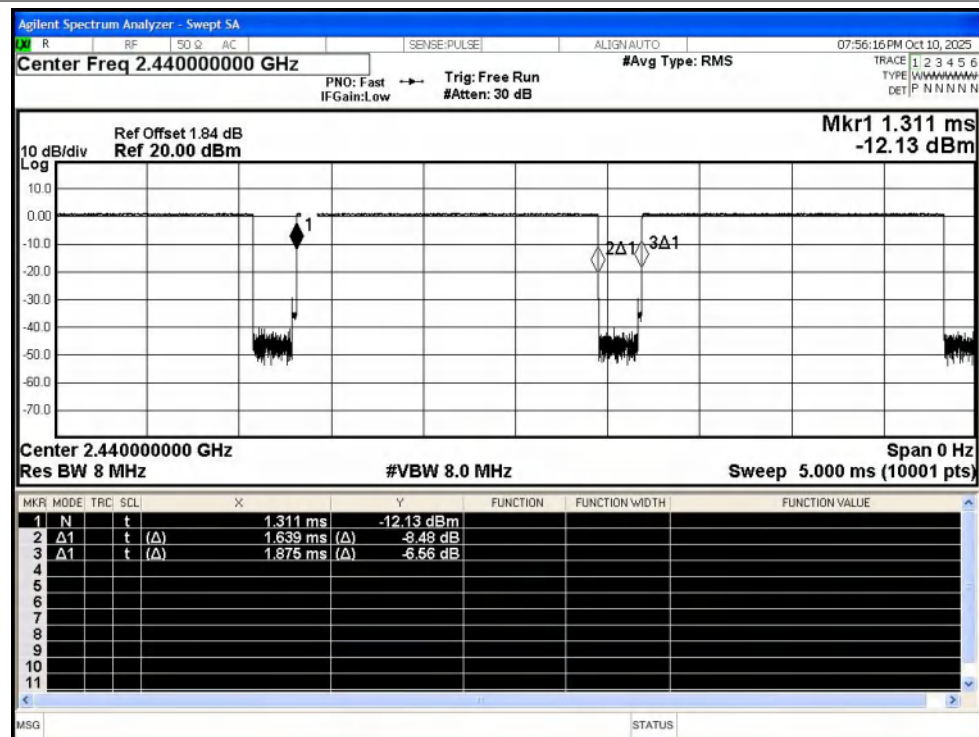
Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	BLE 1M	2402	Ant0	87.41	0.58	0.61
NVNT	BLE 1M	2440	Ant0	87.39	0.59	0.61
NVNT	BLE 1M	2480	Ant0	87.39	0.59	0.61
NVNT	BLE 2M	2402	Ant0	65.92	1.81	1.21
NVNT	BLE 2M	2440	Ant0	65.92	1.81	1.21
NVNT	BLE 2M	2480	Ant0	65.92	1.81	1.21

Test Graphs

Duty Cycle NVNT BLE 1M 2402MHz Ant0



Duty Cycle NVNT BLE 1M 2440MHz Ant0



[illegible][illegible]

[illegible]

Agilent Spectrum Analyzer - Swept SA

R RF SO Q AC SENSE-PULSE ALIGN AUTO 08:00:44 PM Oct 10, 2025

Center Freq 2.480000000 GHz #Avg Type: RMS

PNO: Fast IF Gain: Low Trig: Free Run #Atten: 30 dB

Ref Offset 1.92 dB Ref 20.00 dBm

Mkr1 761.5 μ s -7.40 dBm

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		t	761.5 μ s	-7.40 dBm			
2	Δ 1		t (Δ)	824.0 μ s	6.51 dB			
3	Δ 1		t (Δ)	1.250 ms	-5.48 dB			
4								
5								
6								
7								
8								
9								
10								
11								

Center 2.480000000 GHz Span 0 Hz

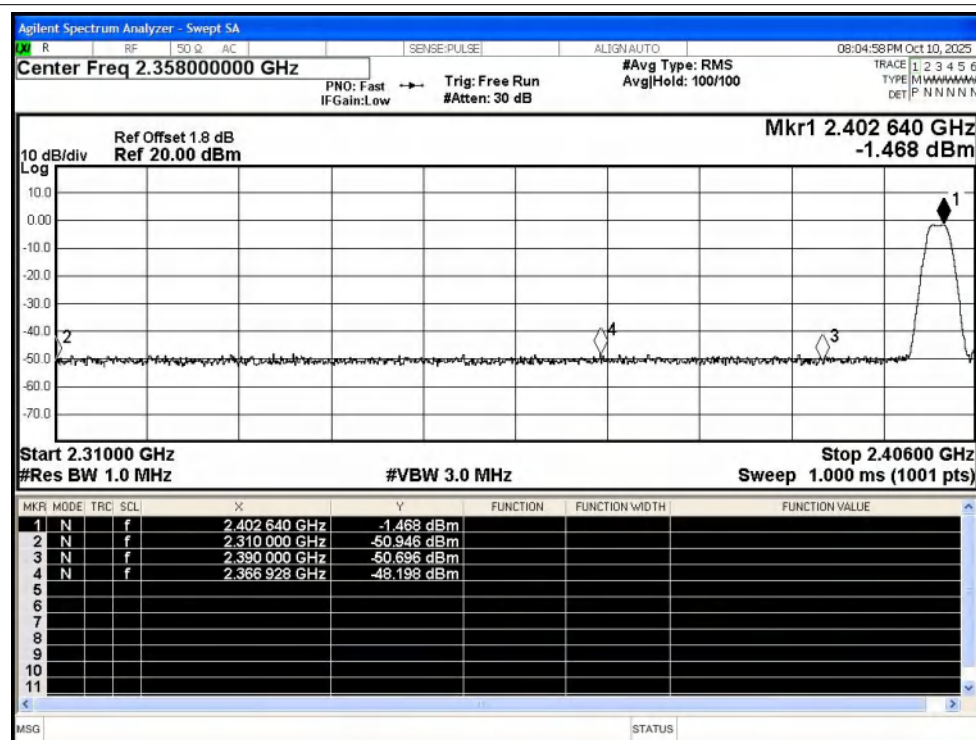
Res BW 8 MHz #VBW 8.0 MHz Sweep 5.000 ms (10001 pts)

MSG STATUS

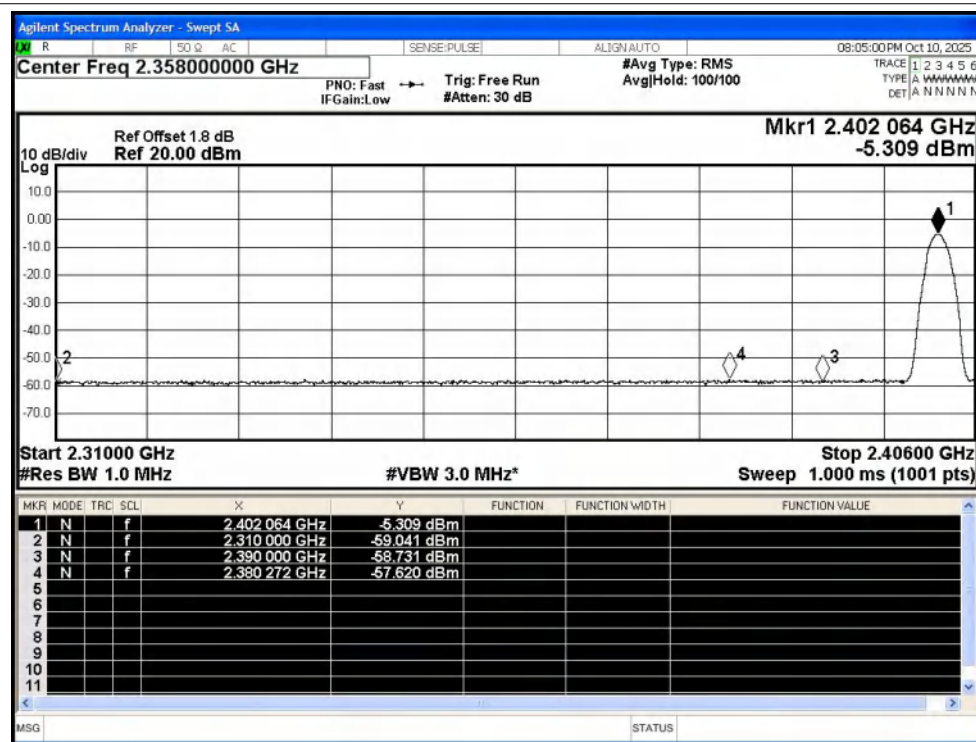
7. Restrict Band

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	Ant0	2310	-49.95	2	-	47.31	Peak	74	Pass
NVNT	BLE 1M	2402	Ant0	2310	-58.91	2	0.58	38.93	Average	54	Pass
NVNT	BLE 1M	2402	Ant0	2368.56	-46.87	2	-	50.39	Peak	74	Pass
NVNT	BLE 1M	2402	Ant0	2370.48	-58.35	2	0.58	39.41	Average	54	Pass
NVNT	BLE 1M	2402	Ant0	2390	-51.21	2	-	46.05	Peak	74	Pass
NVNT	BLE 1M	2402	Ant0	2390	-58.43	2	0.58	39.41	Average	54	Pass
NVNT	BLE 1M	2480	Ant0	2483.5	-49.93	2	-	47.33	Peak	74	Pass
NVNT	BLE 1M	2480	Ant0	2483.5	-57.79	2	0.59	40.06	Average	54	Pass
NVNT	BLE 1M	2480	Ant0	2483.872	-45.33	2	-	51.93	Peak	74	Pass
NVNT	BLE 1M	2480	Ant0	2483.56	-57.56	2	0.59	40.29	Average	54	Pass
NVNT	BLE 1M	2480	Ant0	2500	-50.39	2	-	46.87	Peak	74	Pass
NVNT	BLE 1M	2480	Ant0	2500	-58.19	2	0.59	39.66	Average	54	Pass
NVNT	BLE 2M	2402	Ant0	2310	-50.95	2	-	46.31	Peak	74	Pass
NVNT	BLE 2M	2402	Ant0	2310	-59.04	2	1.81	40.03	Average	54	Pass
NVNT	BLE 2M	2402	Ant0	2366.928	-48.2	2	-	49.06	Peak	74	Pass
NVNT	BLE 2M	2402	Ant0	2380.272	-57.62	2	1.81	41.45	Average	54	Pass
NVNT	BLE 2M	2402	Ant0	2390	-50.7	2	-	46.56	Peak	74	Pass
NVNT	BLE 2M	2402	Ant0	2390	-58.73	2	1.81	40.34	Average	54	Pass
NVNT	BLE 2M	2480	Ant0	2483.5	-50.54	2	-	46.72	Peak	74	Pass
NVNT	BLE 2M	2480	Ant0	2483.5	-58.09	2	1.81	40.98	Average	54	Pass
NVNT	BLE 2M	2480	Ant0	2486.2	-43.63	2	-	53.63	Peak	74	Pass
NVNT	BLE 2M	2480	Ant0	2483.8	-56.92	2	1.81	42.15	Average	54	Pass
NVNT	BLE 2M	2480	Ant0	2500	-51.24	2	-	46.02	Peak	74	Pass
NVNT	BLE 2M	2480	Ant0	2500	-58.11	2	1.81	40.96	Average	54	Pass

Restrict Band NVNT BLE 2M 2402MHz Ant0 Peak



Restrict Band NVNT BLE 2M 2402MHz Ant0 Average



Agilent Spectrum Analyzer - Swept SA

Center Freq 2.488000000 GHz

Ref Offset 1.92 dB
Ref 20.00 dBm

Mkr1 2.479 504 GHz
-0.411 dBm

Start 2.47600 GHz
#Res BW 1.0 MHz

Stop 2.50000 GHz
Sweep 1.000 ms (1001 pts)

#VBW 3.0 MHz

PN0: Fast IFGain:Low Trig: Free Run #Atten: 30 dB

#Avg Type: RMS Avg|Hold: 100/100

08:01:24 PM Oct 10, 2025

TRACE 1 2 3 4 5 6
TYPE M W W W W W W W
DET P N N N N N N

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		f	2.479 504 GHz	-0.411 dBm			
2	N		f	2.483 500 GHz	-50.544 dBm			
3	N		f	2.500 000 GHz	-51.237 dBm			
4	N		f	2.486 200 GHz	-43.627 dBm			

Agilent Spectrum Analyzer - Swept SA

SENSE: PULSE

ALIGN: AUTO

08:01:26 PM Oct 10, 2025

Center Freq 2.488000000 GHz

PNO: Fast IF Gain: Low

Trig: Free Run

#Ave Type: RMS

Avg/Hold: 100/100

TRACE 1 2 3 4 5 6

TYPE A W W W W W W

DET A N N N N N

Ref Offset 1.92 dB

Ref 20.00 dBm

Mkr1 2.480 032 GHz

-2.986 dBm

10 dB/div

Log

Start 2.47600 GHz

#Res BW 1.0 MHz

#VBW 3.0 MHz*

Stop 2.50000 GHz

Sweep 1.000 ms (1001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	f		2.480 032 GHz	-2.986 dBm			
2	N	f		2.483 500 GHz	-58.088 dBm			
3	N	f		2.500 000 GHz	-58.106 dBm			
4	N	f		2.483 800 GHz	-56.918 dBm			
5								
6								
7								
8								
9								
10								
11								

MSG

STATUS