

FCC Appendix RF Test Data for BLE

Product Name: Smart Diagnostic System

Test Model: P720

Environmental Conditions

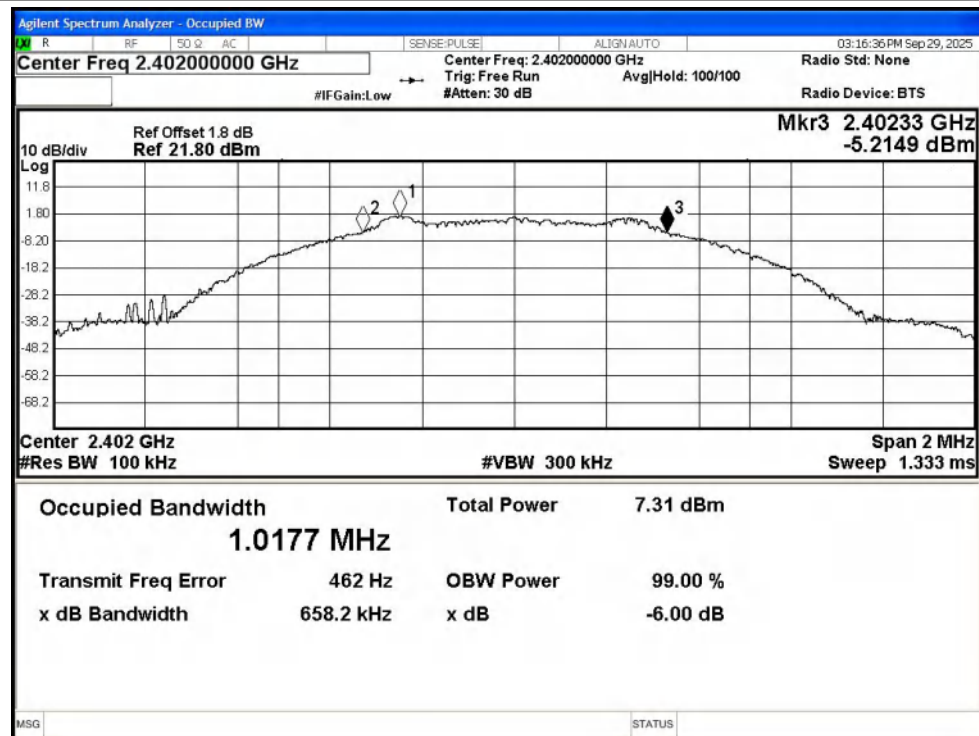
Temperature:	23.8° C
Relative Humidity:	52.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Zoey Cao
Supervised by:	Eric Wang

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

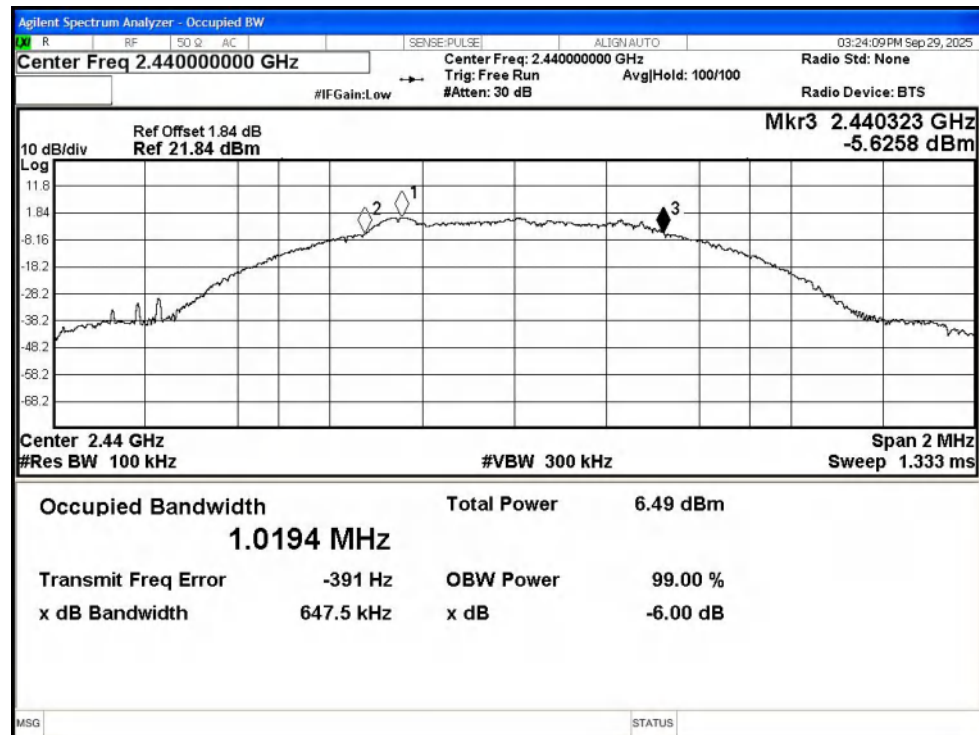
Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	Ant1	0.658	≥ 0.5	Pass
NVNT	BLE 1M	2440	Ant1	0.648	≥ 0.5	Pass
NVNT	BLE 1M	2480	Ant1	0.657	≥ 0.5	Pass
NVNT	BLE 2M	2402	Ant1	1.12	≥ 0.5	Pass
NVNT	BLE 2M	2440	Ant1	1.261	≥ 0.5	Pass
NVNT	BLE 2M	2480	Ant1	1.154	≥ 0.5	Pass

Test Graphs

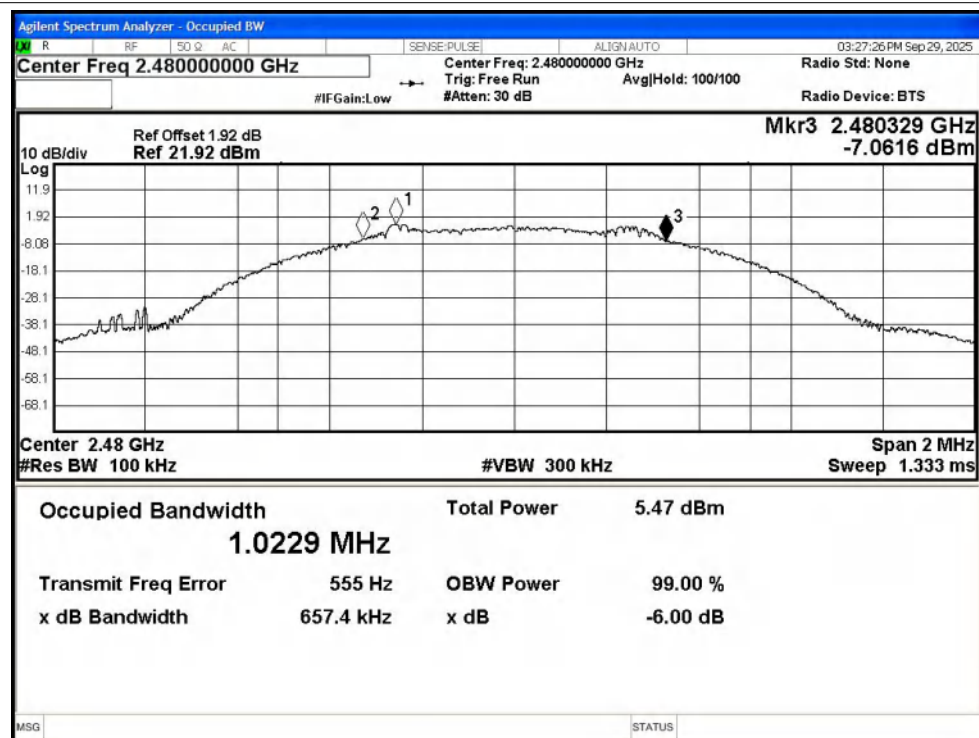
-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



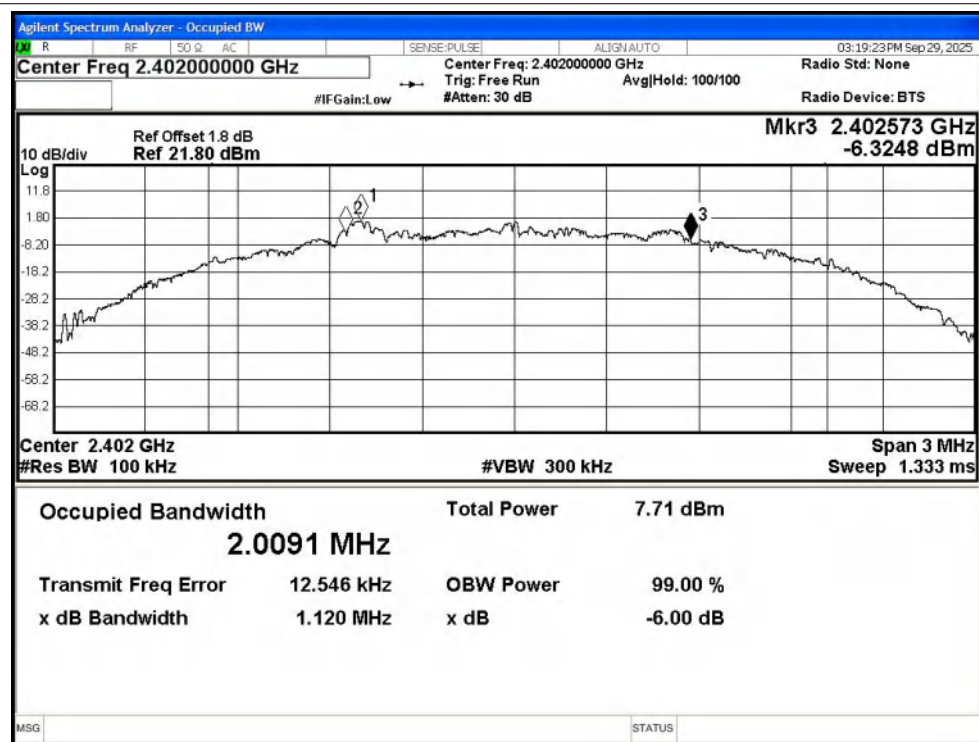
-6dB Bandwidth NVNT BLE 1M 2440MHz Ant1



-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1



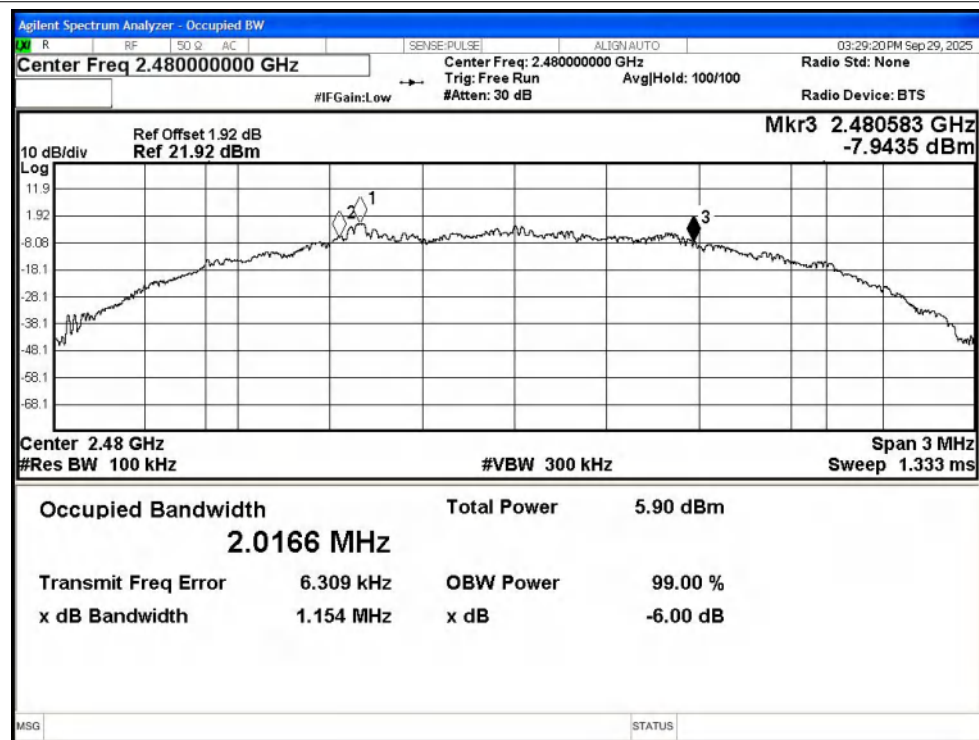
-6dB Bandwidth NVNT BLE 2M 2402MHz Ant1



-6dB Bandwidth NVNT BLE 2M 2440MHz Ant1



-6dB Bandwidth NVNT BLE 2M 2480MHz Ant1



2 Maximum Peak Conducted Output Power

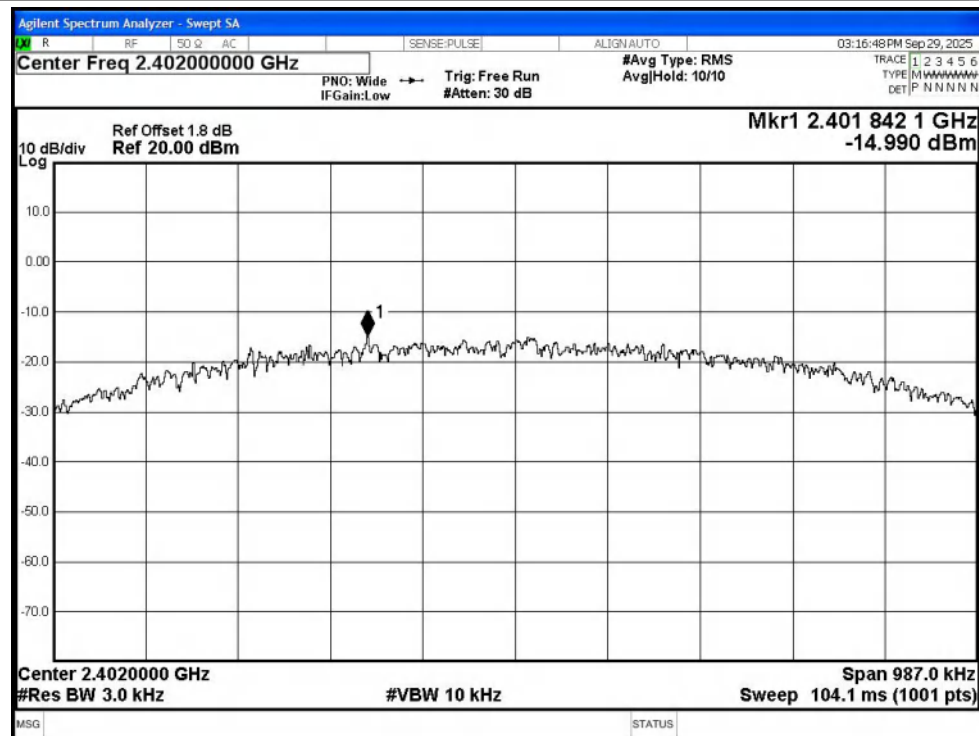
Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	1.45	30	Pass
NVNT	BLE 1M	2440	Ant1	0.64	30	Pass
NVNT	BLE 1M	2480	Ant1	-0.31	30	Pass
NVNT	BLE 2M	2402	Ant1	1.35	30	Pass
NVNT	BLE 2M	2440	Ant1	0.44	30	Pass
NVNT	BLE 2M	2480	Ant1	-0.47	30	Pass

3 Maximum Power Spectral Density Level

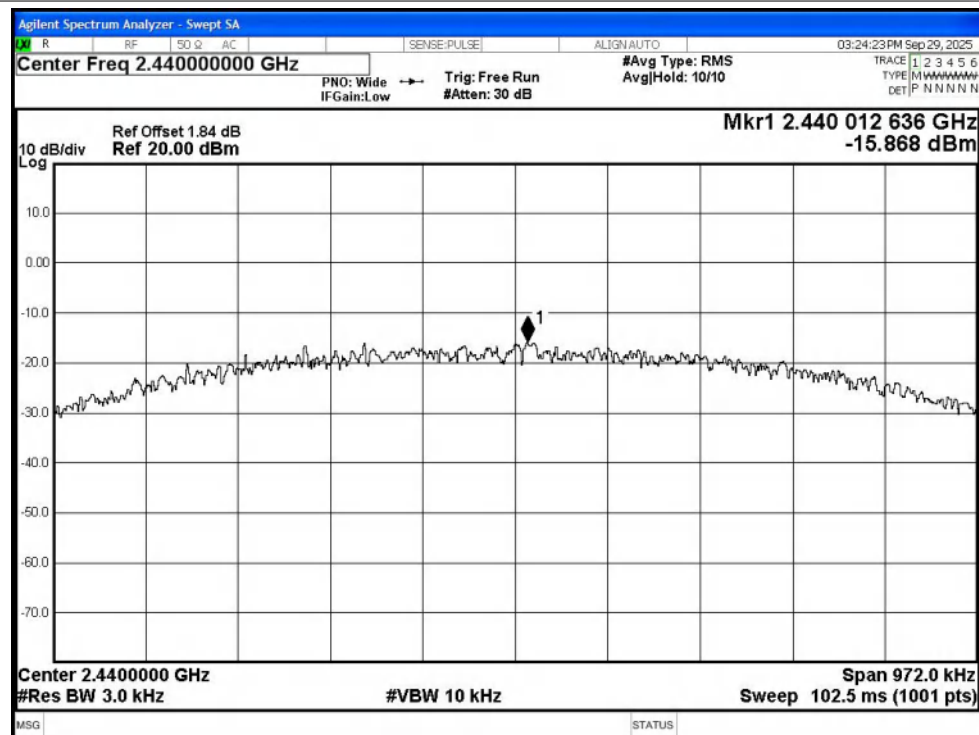
Condition	Mode	Frequency (MHz)	Antenna	Conducted PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	BLE 1M	2402	Ant1	-14.99	8	Pass
NVNT	BLE 1M	2440	Ant1	-15.87	8	Pass
NVNT	BLE 1M	2480	Ant1	-17.11	8	Pass
NVNT	BLE 2M	2402	Ant1	-18.81	8	Pass
NVNT	BLE 2M	2440	Ant1	-19.52	8	Pass
NVNT	BLE 2M	2480	Ant1	-20.25	8	Pass

Test Graphs

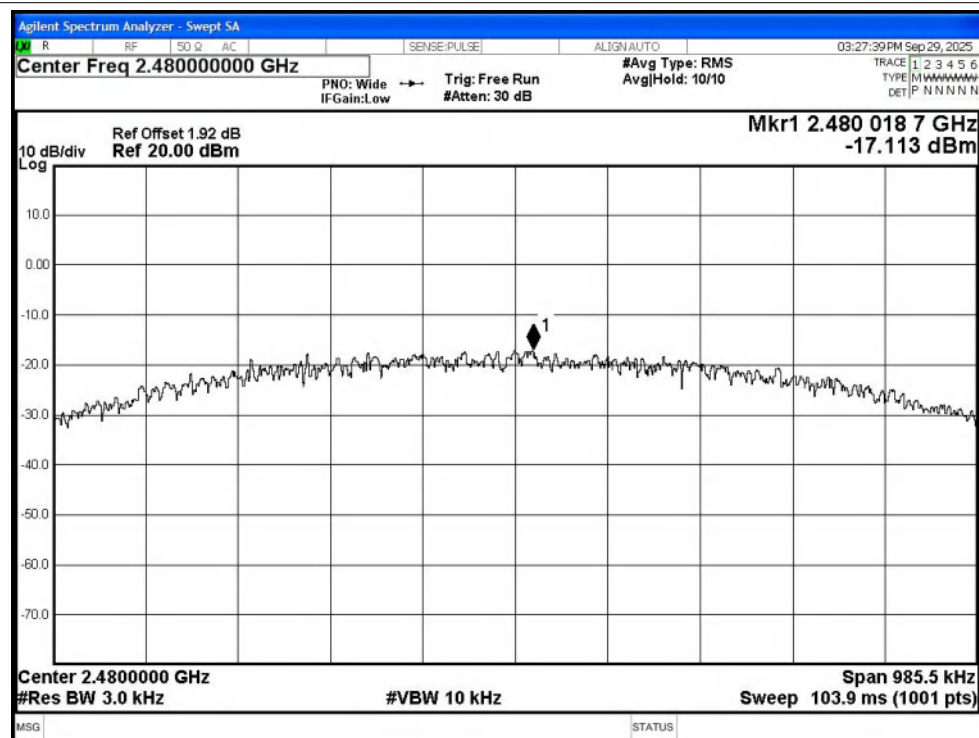
PSD NVNT BLE 1M 2402MHz Ant1



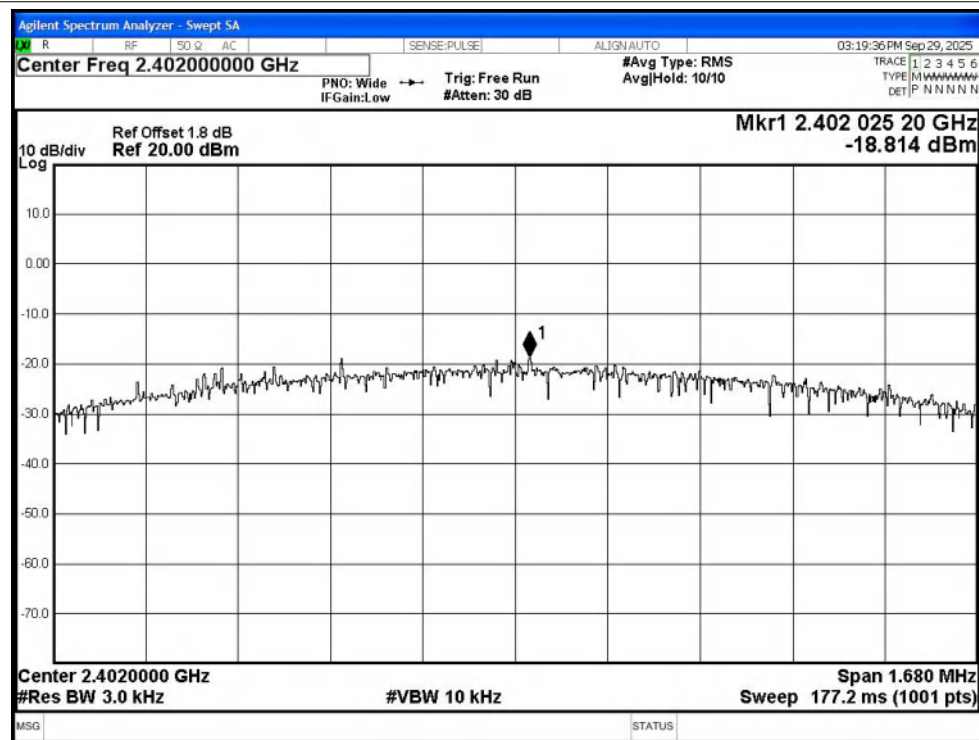
PSD NVNT BLE 1M 2440MHz Ant1



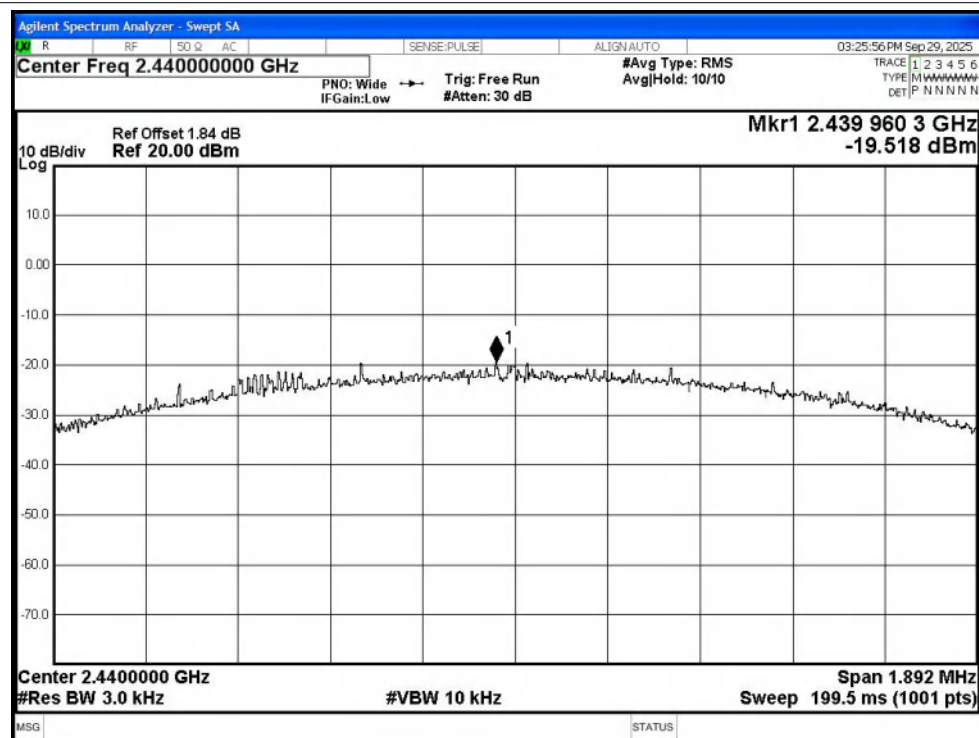
PSD NVNT BLE 1M 2480MHz Ant1



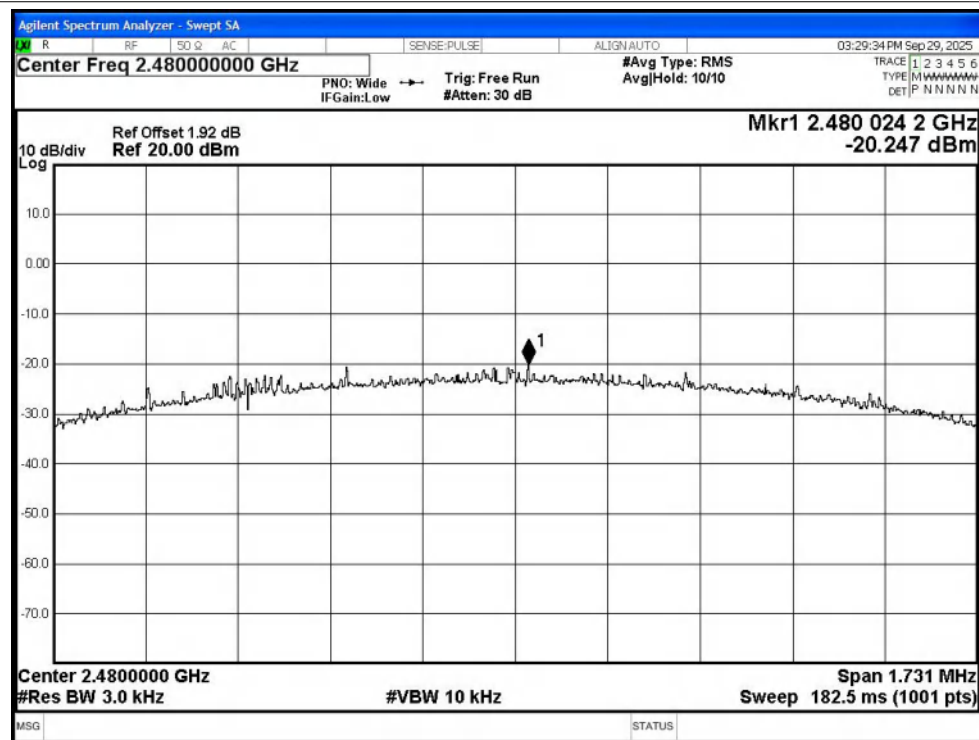
PSD NVNT BLE 2M 2402MHz Ant1



PSD NVNT BLE 2M 2440MHz Ant1



PSD NVNT BLE 2M 2480MHz Ant1

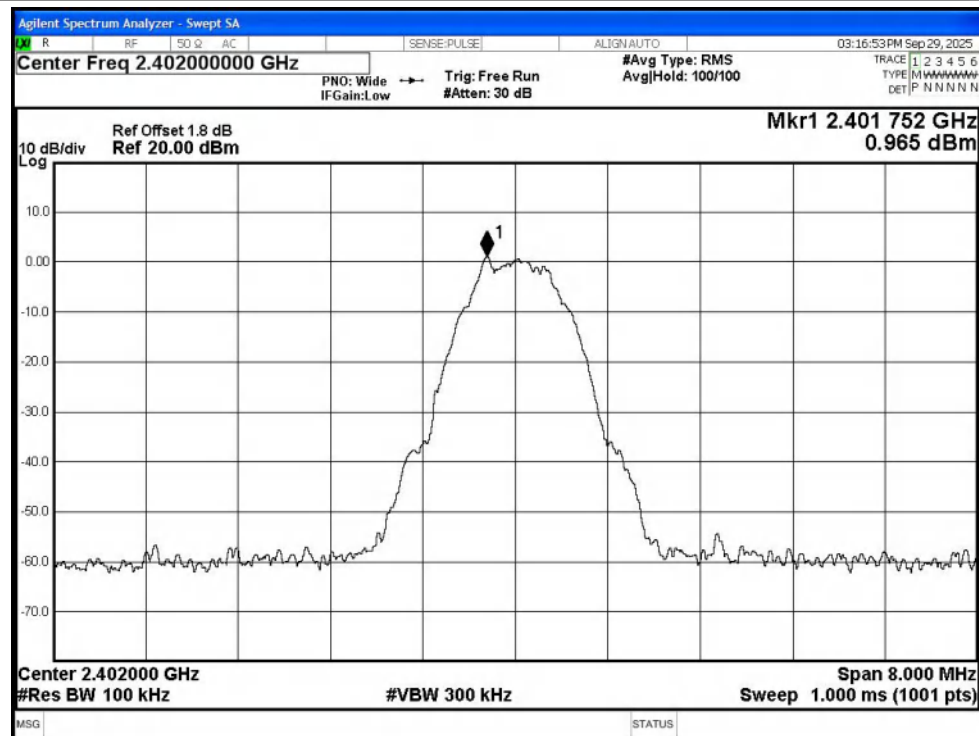


4 Band Edge

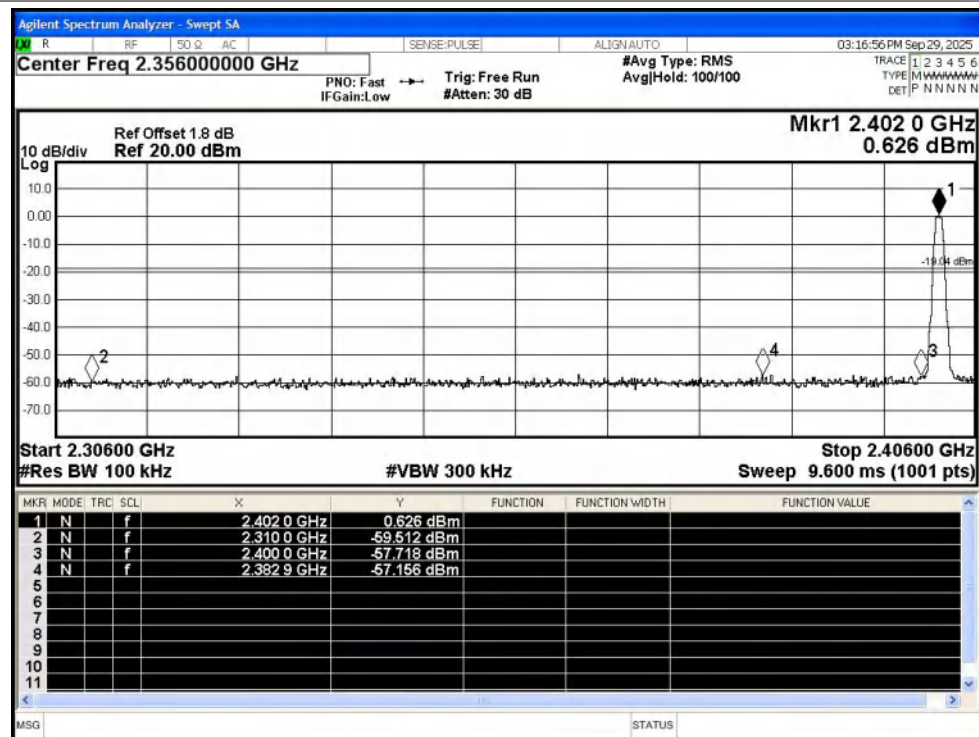
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-58.12	-20	Pass
NVNT	BLE 1M	2480	Ant1	-55.4	-20	Pass
NVNT	BLE 2M	2402	Ant1	-45.06	-20	Pass
NVNT	BLE 2M	2480	Ant1	-55.82	-20	Pass

Test Graphs

Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



Agilent Spectrum Analyzer - Swept SA

R F SQ Z AC SENSE/PULSE ALIGN/AUTO 03:27:47 PM Sep 29, 2025

Center Freq 2.52600000 GHz

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

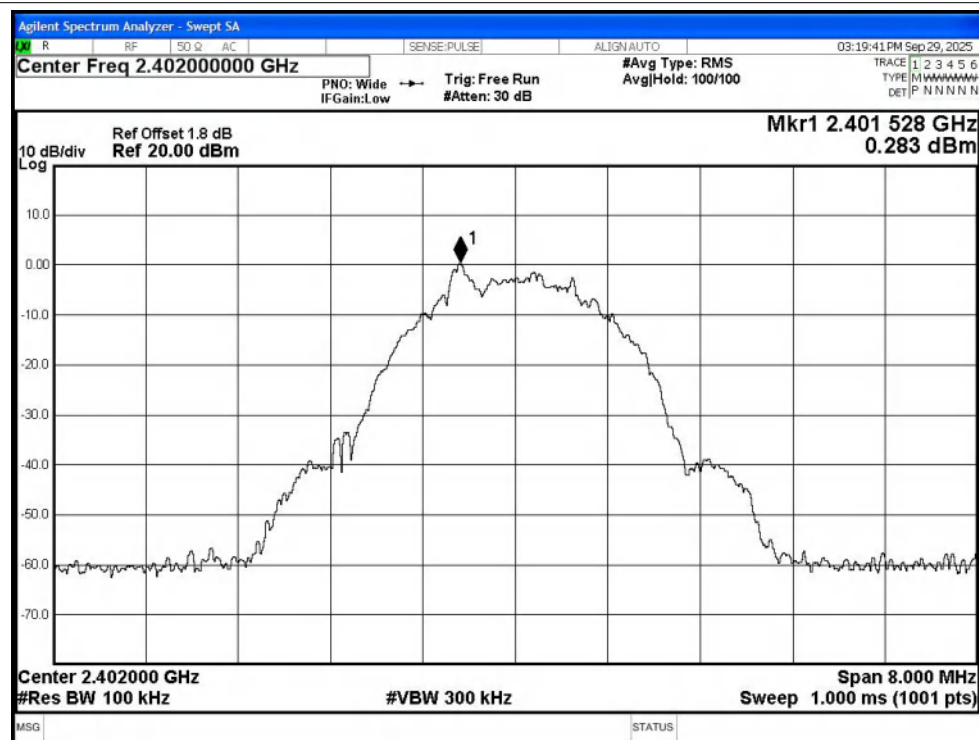
Ref Offset 1.92 dB Ref 20.00 dBm Mkr1 2.479 8 GHz -0.736 dBm

10 dB/div Log

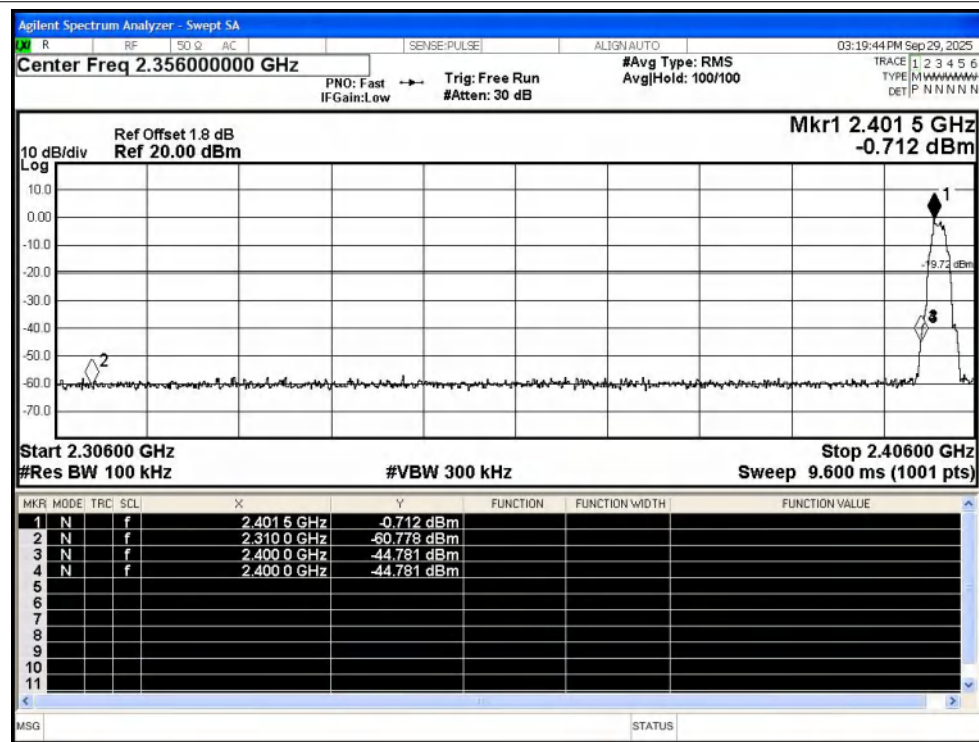
MKR MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	f	2.479 8 GHz	-0.736 dBm			
2	N	f	2.483 5 GHz	-58.683 dBm			
3	N	f	2.500 0 GHz	-60.092 dBm			
4	N	f	2.487 8 GHz	-56.988 dBm			
5							
6							
7							
8							
9							
10							
11							

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

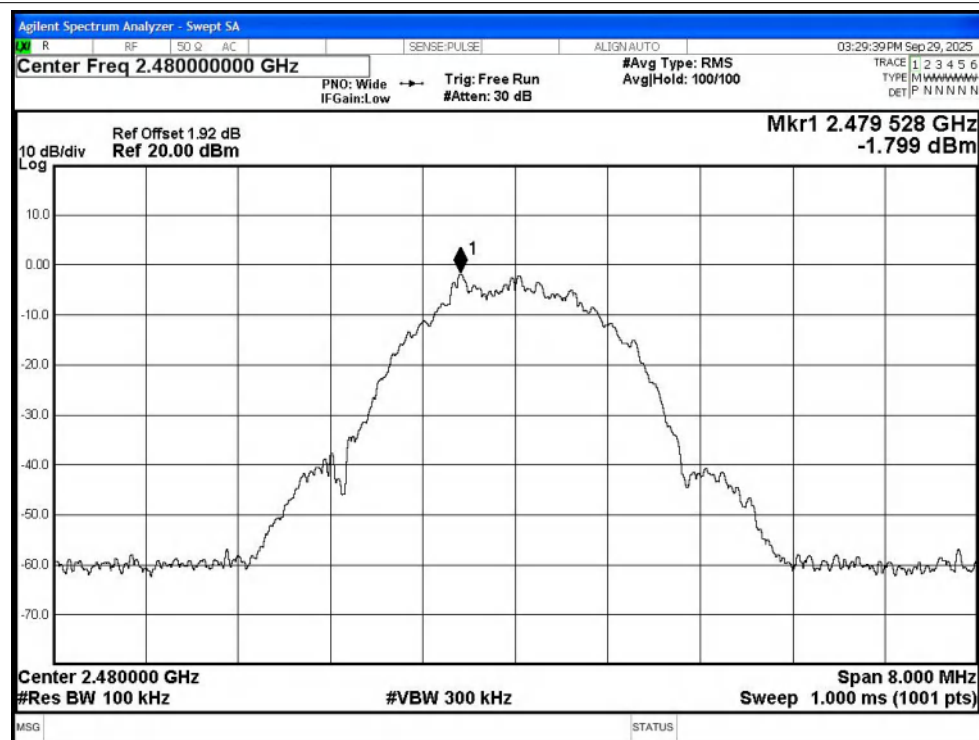
Band Edge NVNT BLE 2M 2402MHz Ant1 Ref



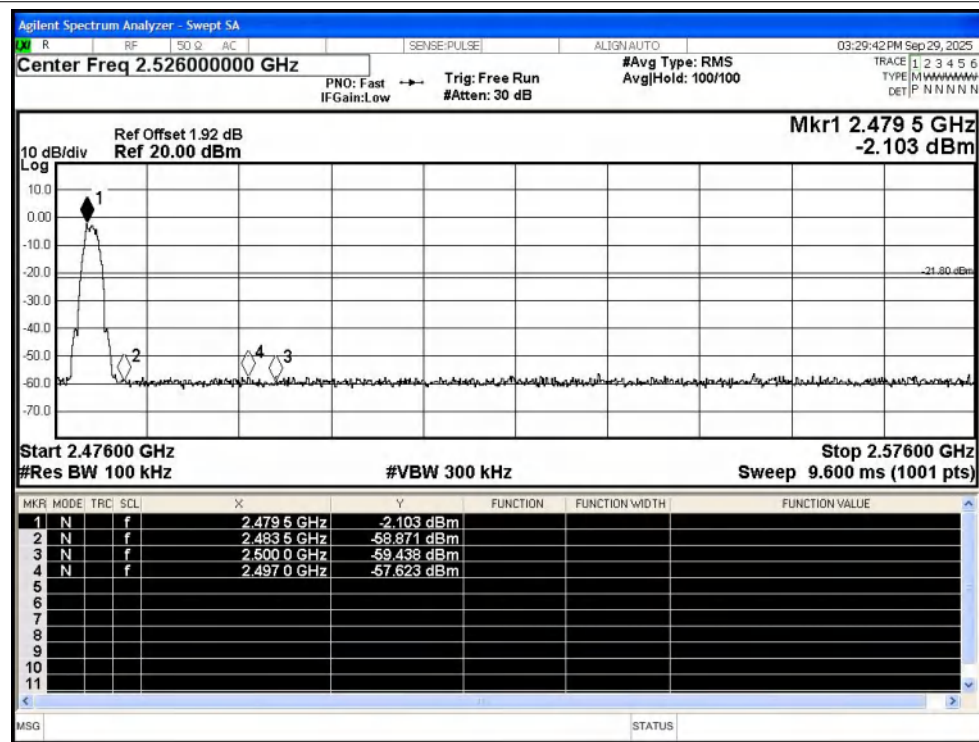
Band Edge NVNT BLE 2M 2402MHz Ant1 Emission



Band Edge NVNT BLE 2M 2480MHz Ant1 Ref

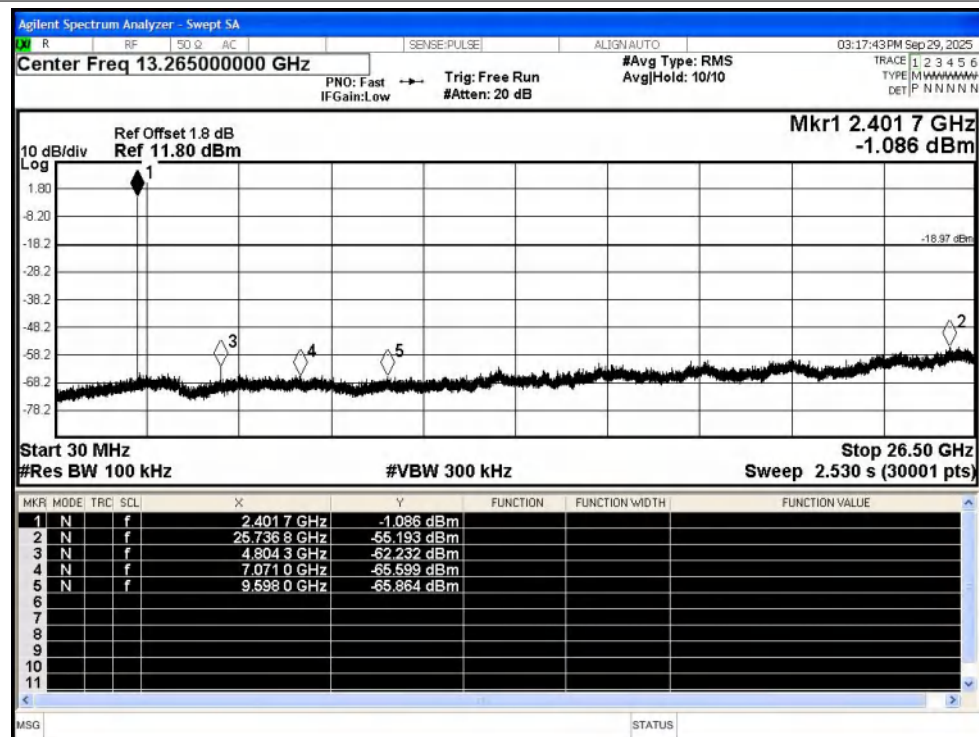


Band Edge NVNT BLE 2M 2480MHz Ant1 Emission

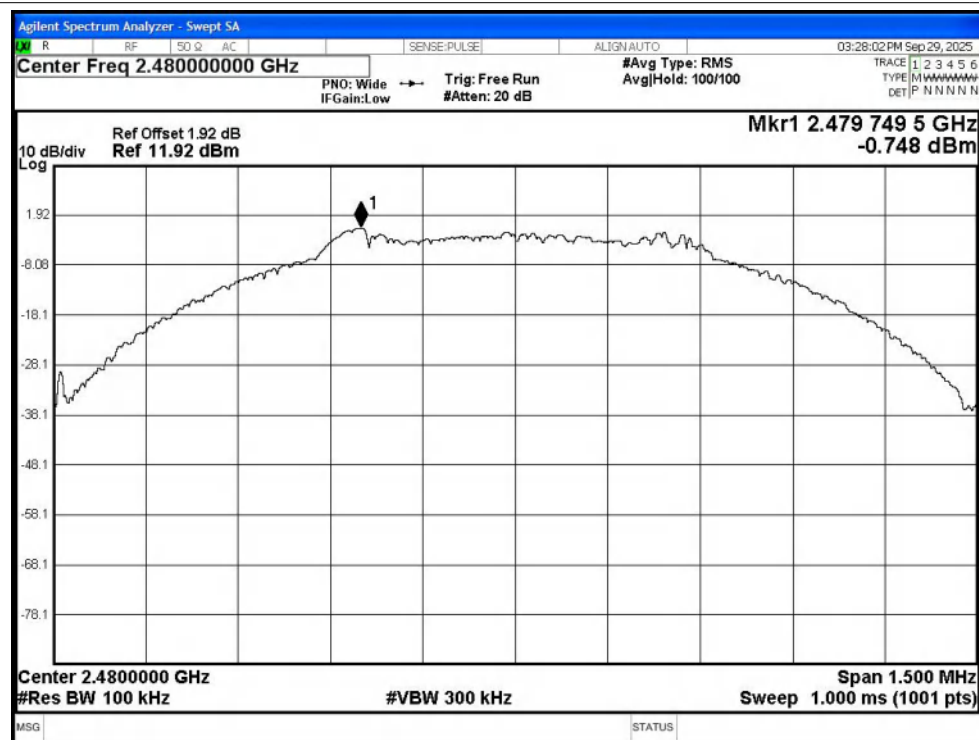


5 Conducted RF Spurious Emission

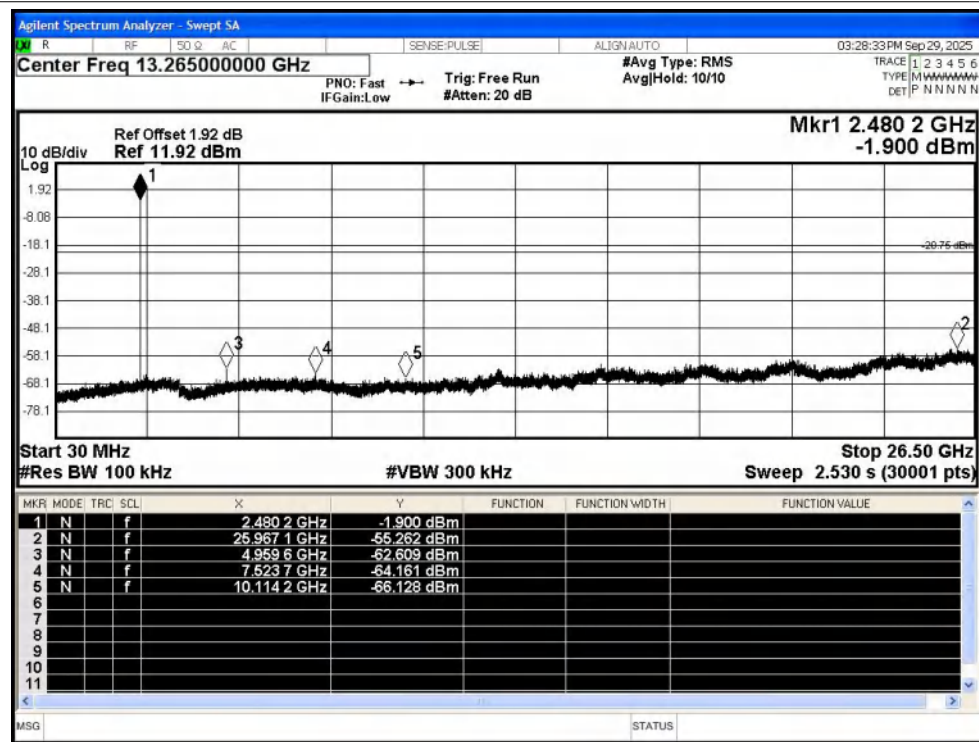
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-56.22	-20	Pass
NVNT	BLE 1M	2440	Ant1	-55.7	-20	Pass
NVNT	BLE 1M	2480	Ant1	-54.51	-20	Pass
NVNT	BLE 2M	2402	Ant1	-56.33	-20	Pass
NVNT	BLE 2M	2440	Ant1	-55.19	-20	Pass
NVNT	BLE 2M	2480	Ant1	-52.2	-20	Pass



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission



Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Ref

Agilent Spectrum Analyzer - Swept SA

03:19:57 PM Sep 29, 2025

Center Freq 2.40200000 GHz

PN0: Wide IFGain: Low

Trig: Free Run #Atten: 20 dB

#Avg Type: RMS AvgHold: 100/100

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

Ref Offset 1.8 dB
Ref 11.80 dBm

Mkr1 2.402 009 GHz
0.405 dBm

10 dB/div
Log

Center 2.402000 GHz
#Res BW 100 kHz

#VBW 300 kHz

Span 3.000 MHz
Sweep 1.000 ms (1001 pts)

MSG STATUS

Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Emission

Agilent Spectrum Analyzer - Swept SA

Center Freq 13.265000000 GHz

Ref Offset 1.8 dB
Ref 11.80 dBm

Mkr1 2.401 7 GHz
-2.293 dBm

Start 30 MHz
#Res BW 100 kHz

#VBW 300 kHz

Stop 26.50 GHz
Sweep 2.530 s (30001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		f	2.401 7 GHz	-2.293 dBm			
2	N		f	26.036 8 GHz	-55.925 dBm			
3	N		f	4.805 2 GHz	-61.712 dBm			
4	N		f	7.038 4 GHz	-66.212 dBm			
5	N		f	9.558 3 GHz	-65.744 dBm			

Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Ref

Agilent Spectrum Analyzer - Swept SA

03:29:54 PM Sep 29, 2025

Center Freq 2.48000000 GHz

PN0: Wide IFGain: Low

Trig: Free Run #Atten: 20 dB

#Avg Type: RMS AvgHold: 100/100

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

Ref Offset 1.92 dB
Ref 11.92 dBm

Mkr1 2.479 520 GHz
-2.645 dBm

10 dB/div
Log

1.92
-8.08
-18.1
-28.1
-38.1
-48.1
-58.1
-68.1
-78.1

Center 2.480000 GHz
#Res BW 100 kHz

#VBW 300 kHz

Span 3.000 MHz
Sweep 1.000 ms (1001 pts)

MSG STATUS

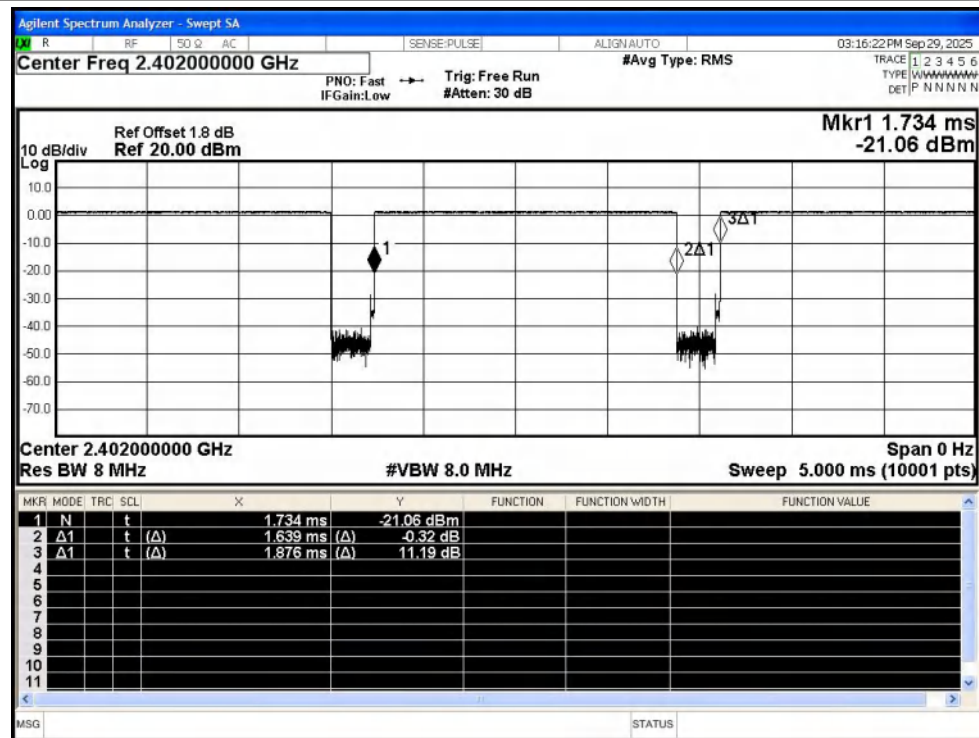
[illegible]

6 Duty Cycle

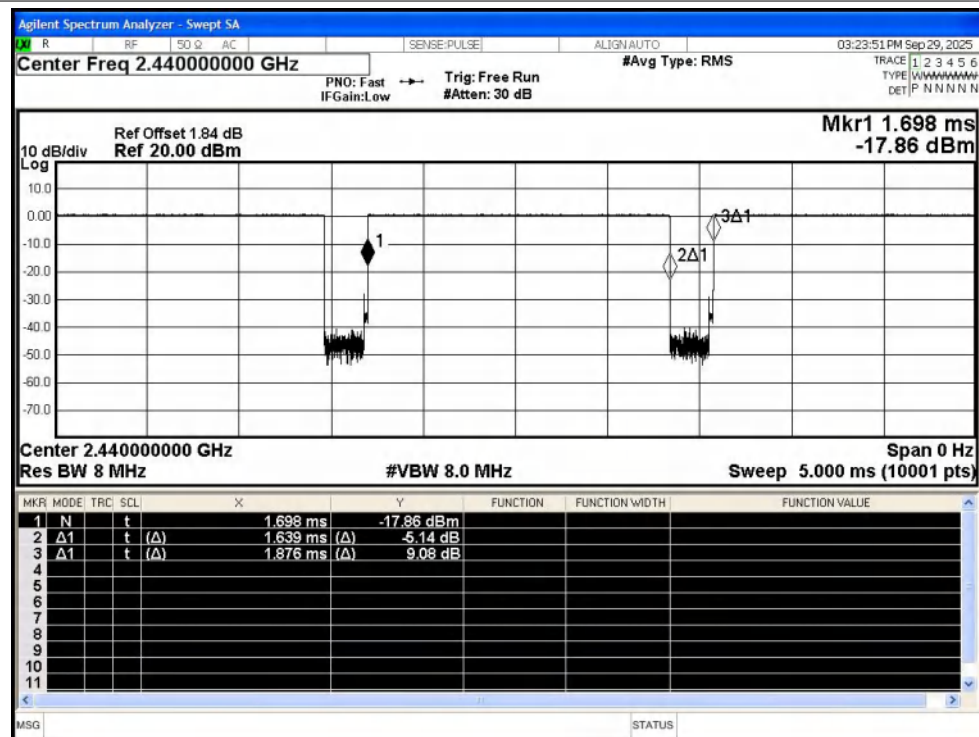
Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	BLE 1M	2402	Ant1	87.39	0.59	0.61
NVNT	BLE 1M	2440	Ant1	87.39	0.59	0.61
NVNT	BLE 1M	2480	Ant1	87.36	0.59	0.61
NVNT	BLE 2M	2402	Ant1	65.92	1.81	1.21
NVNT	BLE 2M	2440	Ant1	65.92	1.81	1.21
NVNT	BLE 2M	2480	Ant1	65.93	1.81	1.21

Test Graphs

Duty Cycle NVNT BLE 1M 2402MHz Ant1



Duty Cycle NVNT BLE 1M 2440MHz Ant1

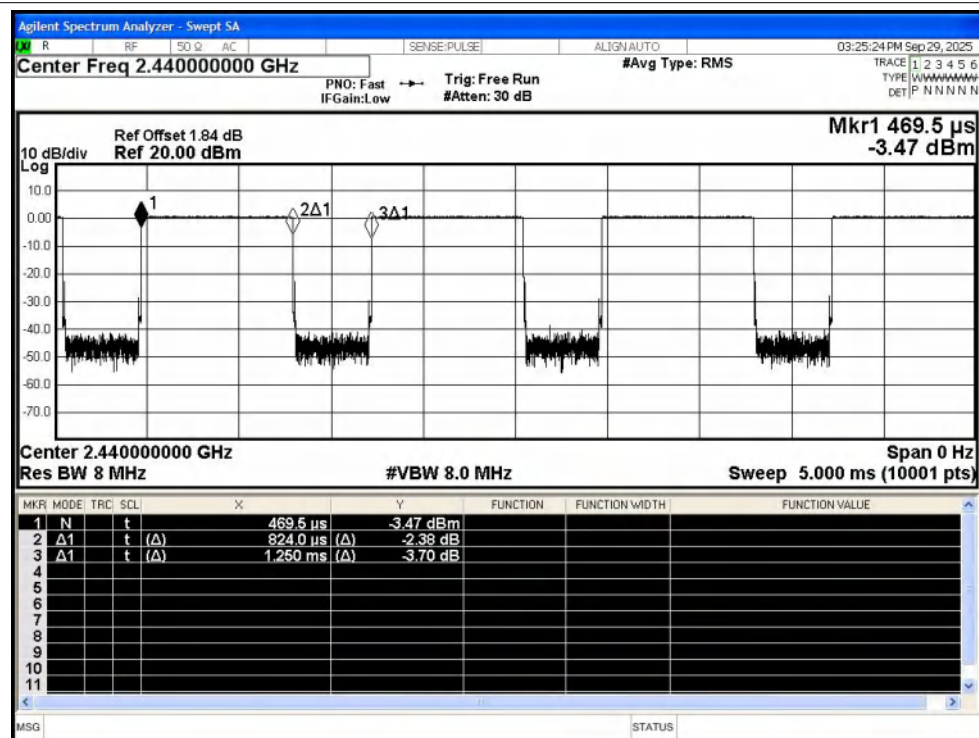


[illegible]

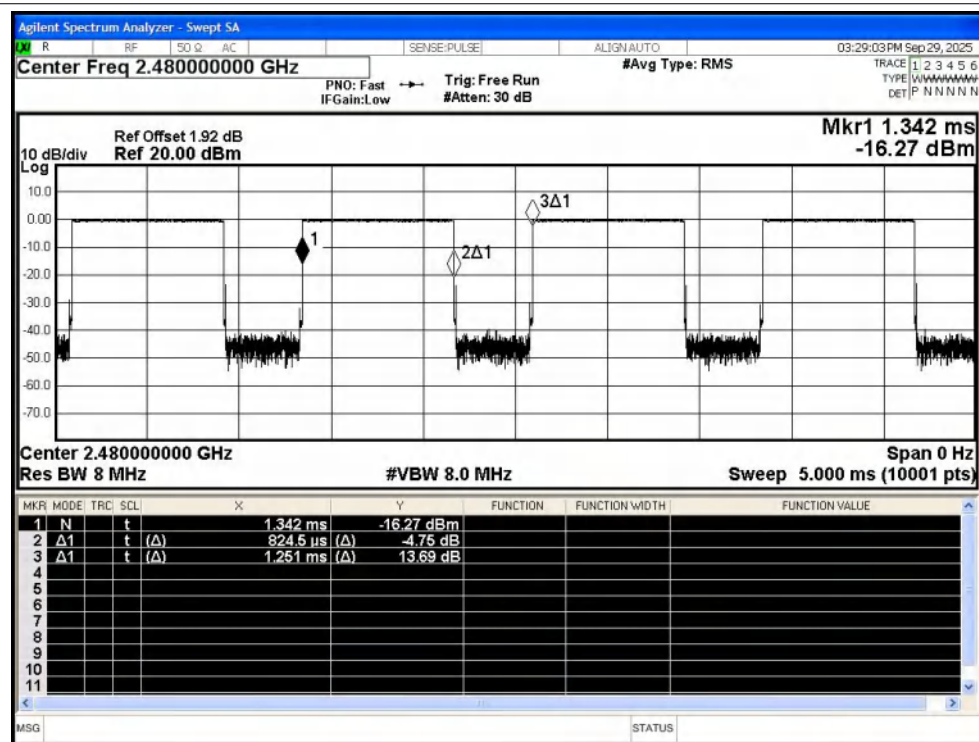
Duty Cycle NVNT BLE 2M 2402MHz Ant1

Agilent Spectrum Analyzer - Swept SA
R RF 50 Q AC SENSE-PULSE ALIGN-AUTO 03:19:03 PM Sep 29, 2025
Center Freq 2.402000000 GHz #Avg Type: RMS
PNO: Fast IFGain: Low Trig: Free Run #Atten: 30 dB
TRACE 1 2 3 4 5 6
TYPE WWWWWWWW
DET P N N N N N
Ref Offset 1.8 dB Mkr1 1.395 ms
Ref 20.00 dBm 0.42 dBm
10 dB/div Log
1 2Δ1 3Δ1
Center 2.402000000 GHz Span 0 Hz
Res BW 8 MHz #VBW 8.0 MHz Sweep 10.00 ms (10001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N t 1.395 ms 0.42 dBm
2 Δ1 t (Δ) 824.0 μs 0.72 dB
3 Δ1 t (Δ) 1.250 ms (-0.01 dB)
4
5
6
7
8
9
10
11

Duty Cycle NVNT BLE 2M 2440MHz Ant1



Duty Cycle NVNT BLE 2M 2480MHz Ant1



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	-50.45	2.35	-	47.13	Peak	74	Pass
NVNT	BLE 1M	2402	Ant1	2310	-58.63	2.35	0.59	39.54	Average	54	Pass
NVNT	BLE 1M	2402	Ant1	2368.752	-47.55	2.35	-	50.03	Peak	74	Pass
NVNT	BLE 1M	2402	Ant1	2375.664	-58.38	2.35	0.59	39.79	Average	54	Pass
NVNT	BLE 1M	2402	Ant1	2390	-49.52	2.35	-	48.06	Peak	74	Pass
NVNT	BLE 1M	2402	Ant1	2390	-58.76	2.35	0.59	39.41	Average	54	Pass
NVNT	BLE 1M	2480	Ant1	2483.5	-50.06	2.35	-	47.52	Peak	74	Pass
NVNT	BLE 1M	2480	Ant1	2483.5	-57.98	2.35	0.59	40.19	Average	54	Pass
NVNT	BLE 1M	2480	Ant1	2484.424	-45.21	2.35	-	52.37	Peak	74	Pass
NVNT	BLE 1M	2480	Ant1	2487.376	-57.73	2.35	0.59	40.44	Average	54	Pass
NVNT	BLE 1M	2480	Ant1	2500	-51.32	2.35	-	46.26	Peak	74	Pass
NVNT	BLE 1M	2480	Ant1	2500	-58.05	2.35	0.59	40.12	Average	54	Pass
NVNT	BLE 2M	2402	Ant1	2310	-49.72	2.35	-	47.86	Peak	74	Pass
NVNT	BLE 2M	2402	Ant1	2310	-59.12	2.35	1.81	40.27	Average	54	Pass
NVNT	BLE 2M	2402	Ant1	2365.296	-47.68	2.35	-	49.9	Peak	74	Pass
NVNT	BLE 2M	2402	Ant1	2387.088	-57.84	2.35	1.81	41.55	Average	54	Pass
NVNT	BLE 2M	2402	Ant1	2390	-51.86	2.35	-	45.72	Peak	74	Pass
NVNT	BLE 2M	2402	Ant1	2390	-58.37	2.35	1.81	41.02	Average	54	Pass
NVNT	BLE 2M	2480	Ant1	2483.5	-45.73	2.35	-	51.85	Peak	74	Pass
NVNT	BLE 2M	2480	Ant1	2483.5	-57.97	2.35	1.81	41.42	Average	54	Pass
NVNT	BLE 2M	2480	Ant1	2485.384	-44.03	2.35	-	53.55	Peak	74	Pass
NVNT	BLE 2M	2480	Ant1	2487.064	-56.9	2.35	1.81	42.49	Average	54	Pass
NVNT	BLE 2M	2480	Ant1	2500	-49.62	2.35	-	47.96	Peak	74	Pass
NVNT	BLE 2M	2480	Ant1	2500	-57.54	2.35	1.81	41.85	Average	54	Pass

Agilent Spectrum Analyzer - Swept SA

Center Freq 2.358000000 GHz

Ref Offset 1.8 dB
Ref 20.00 dBm

Mkr1 2.402 640 GHz
1.215 dBm

Start 2.31000 GHz
#Res BW 1.0 MHz

Stop 2.40600 GHz
Sweep 1.000 ms (1001 pts)

#VBW 3.0 MHz

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		f	2.402 640 GHz	1.215 dBm			
2	N		f	2.310 000 GHz	-49.717 dBm			
3	N		f	2.390 000 GHz	-51.859 dBm			
4	N		f	2.365 296 GHz	-47.682 dBm			

[illegible]

[illegible][illegible]