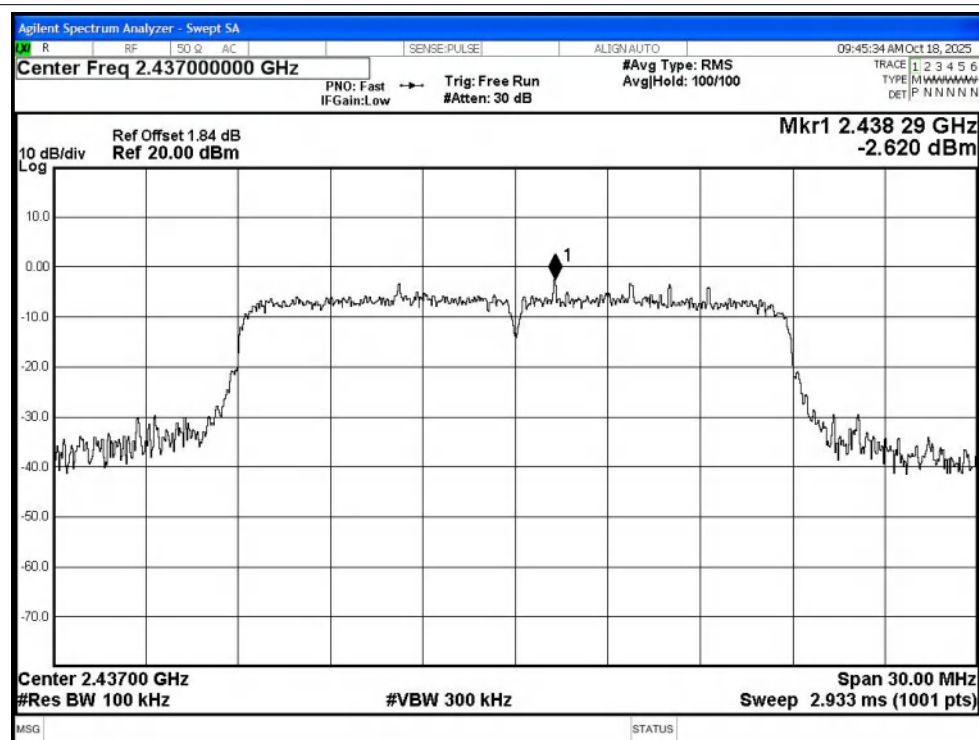
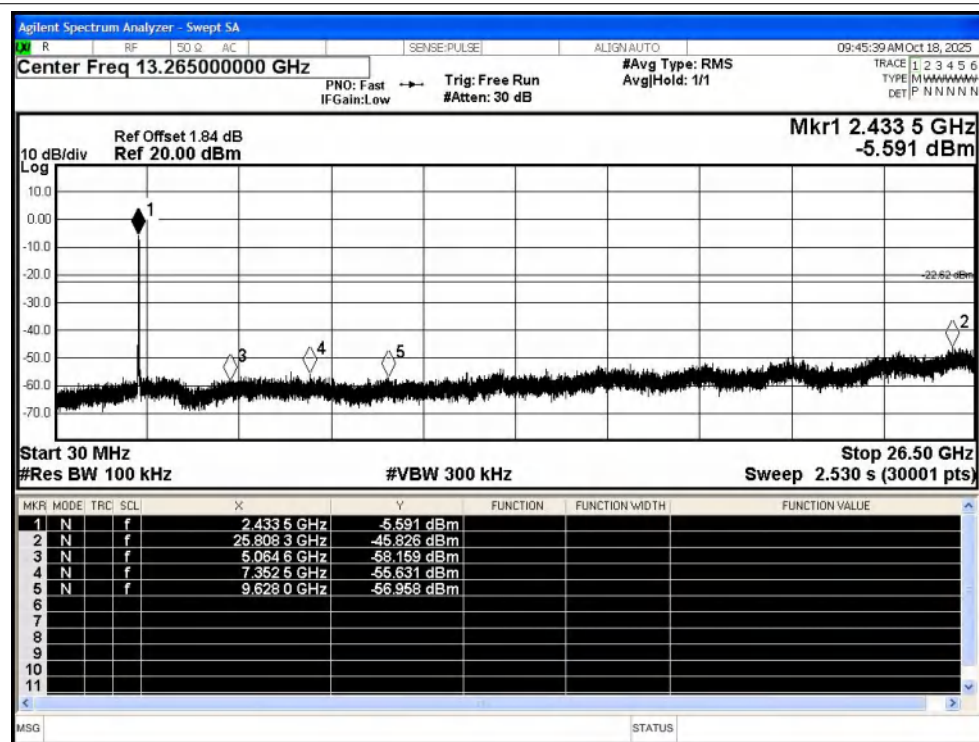


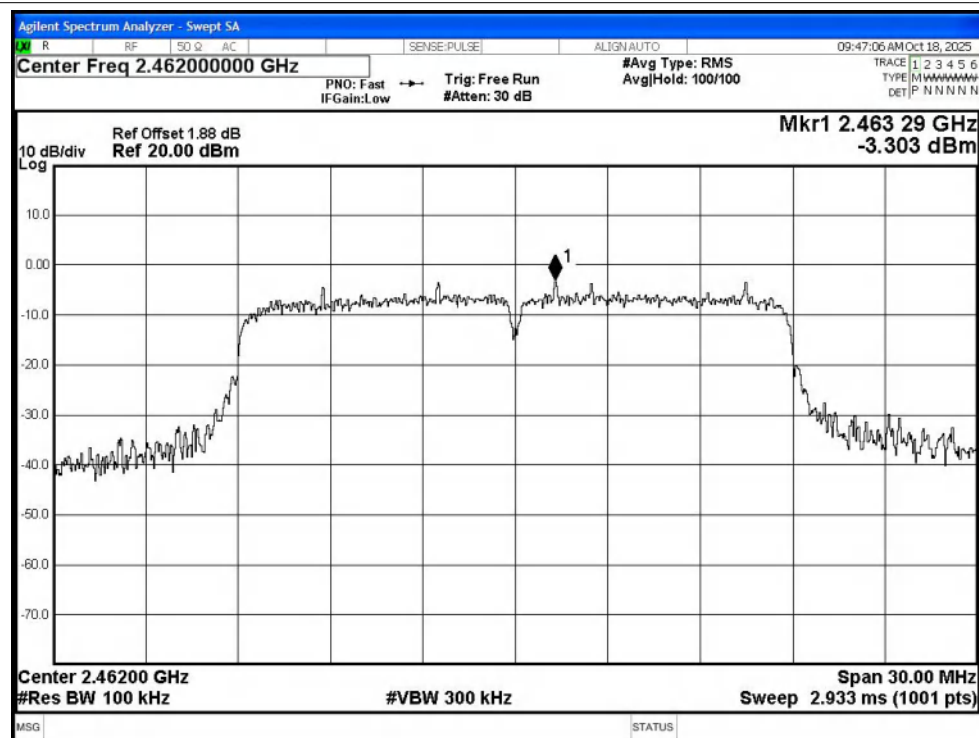
Tx. Spurious NVNT n20 2437MHz Ant1 Ref



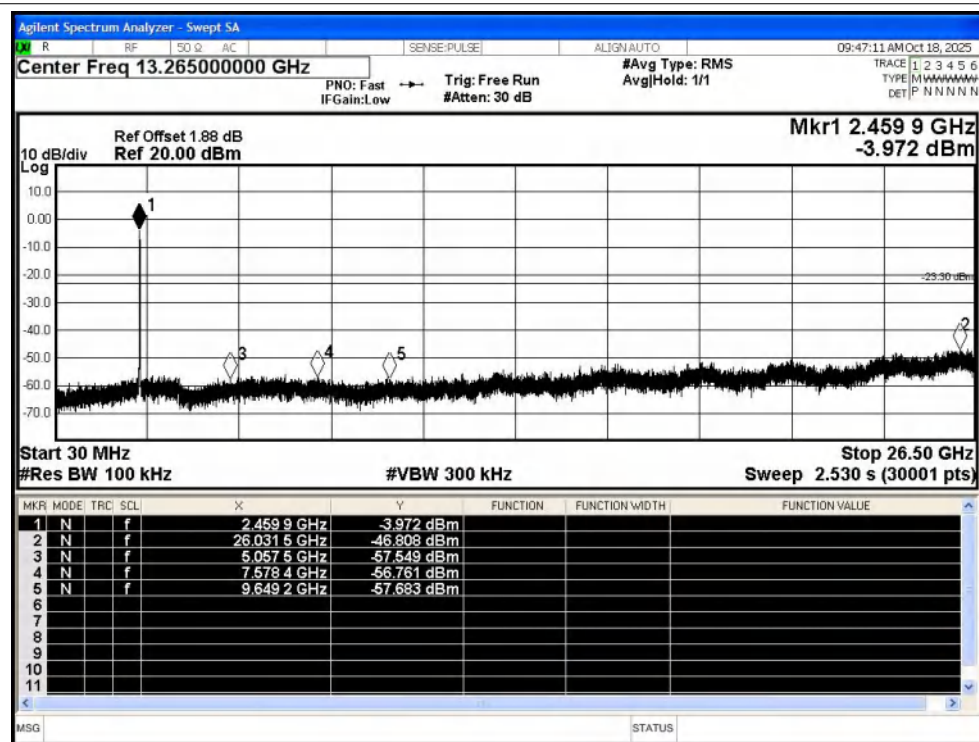
Tx. Spurious NVNT n20 2437MHz Ant1 Emission



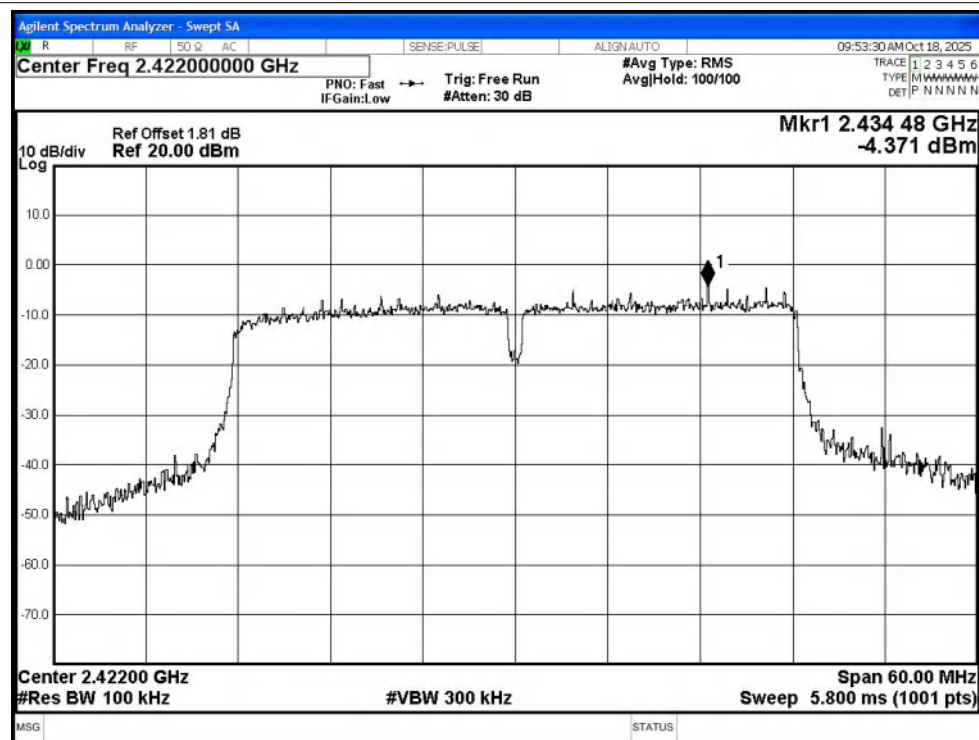
Tx. Spurious NVNT n20 2462MHz Ant1 Ref



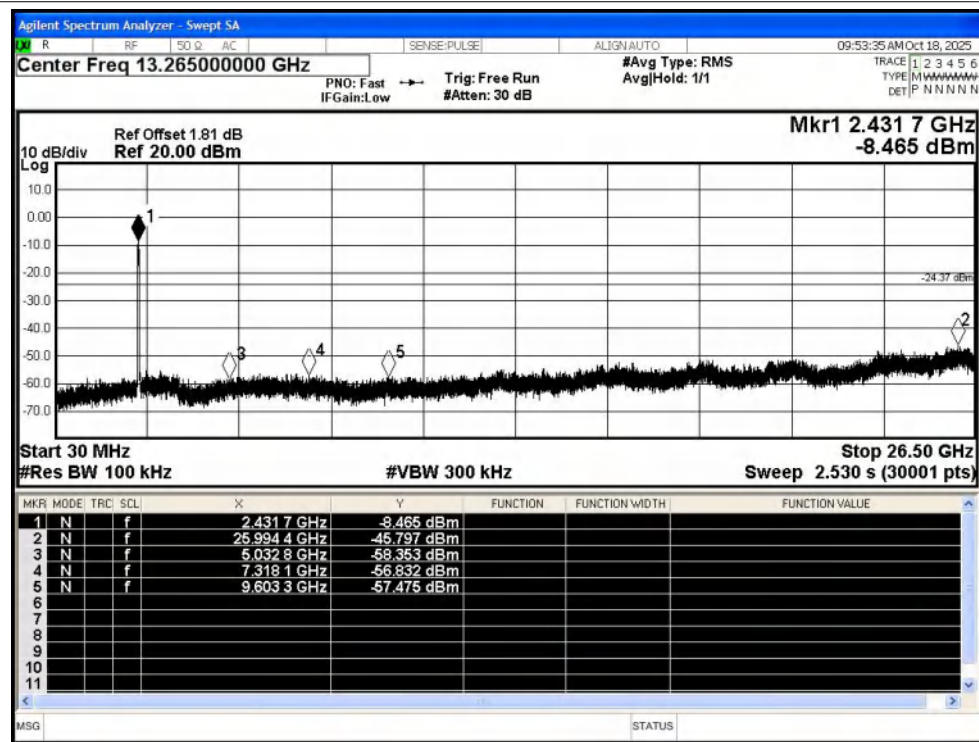
Tx. Spurious NVNT n20 2462MHz Ant1 Emission



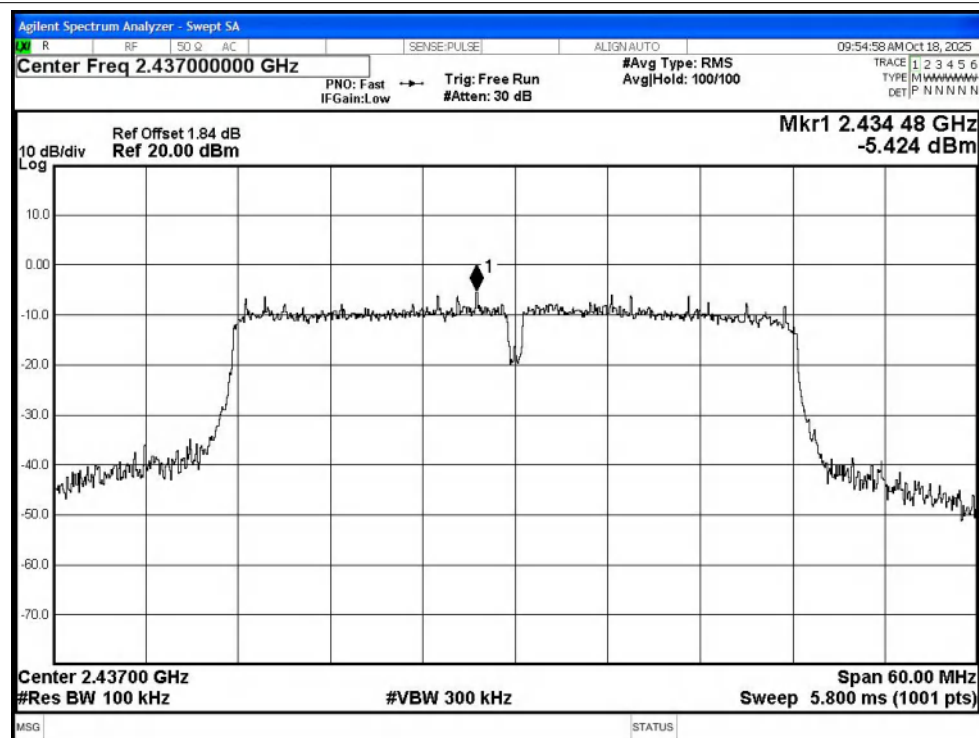
Tx. Spurious NVNT n40 2422MHz Ant1 Ref



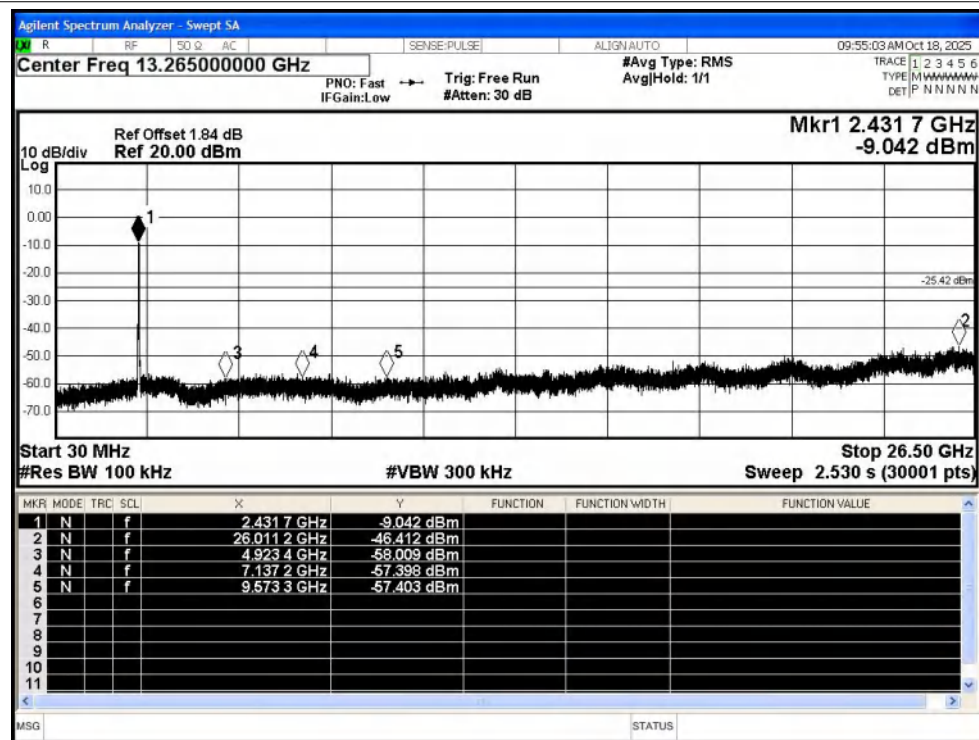
Tx. Spurious NVNT n40 2422MHz Ant1 Emission



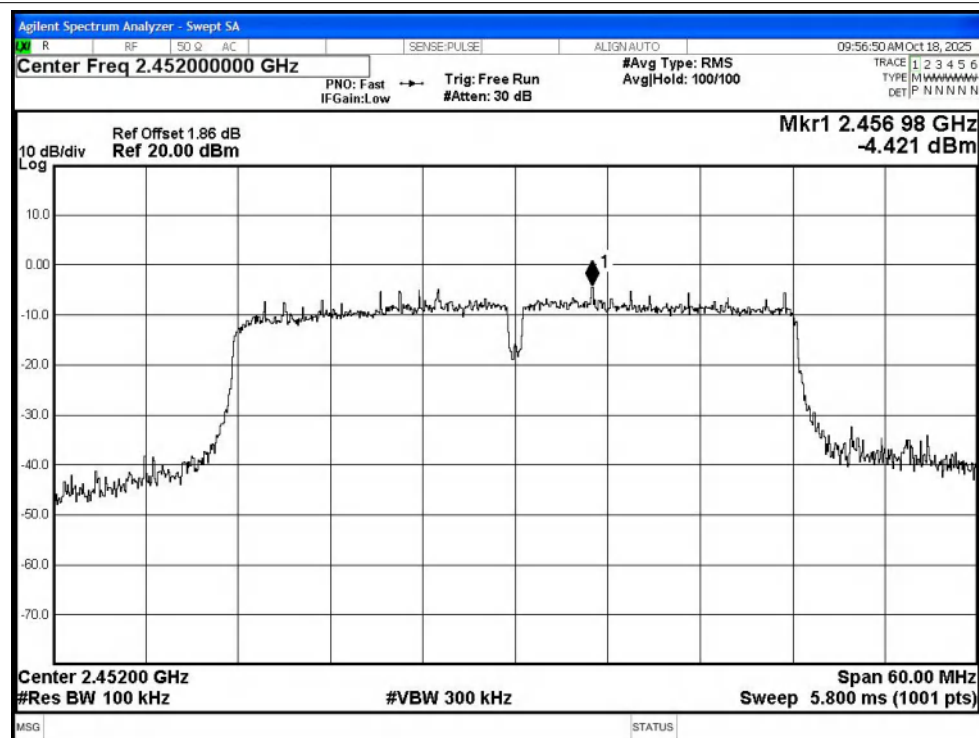
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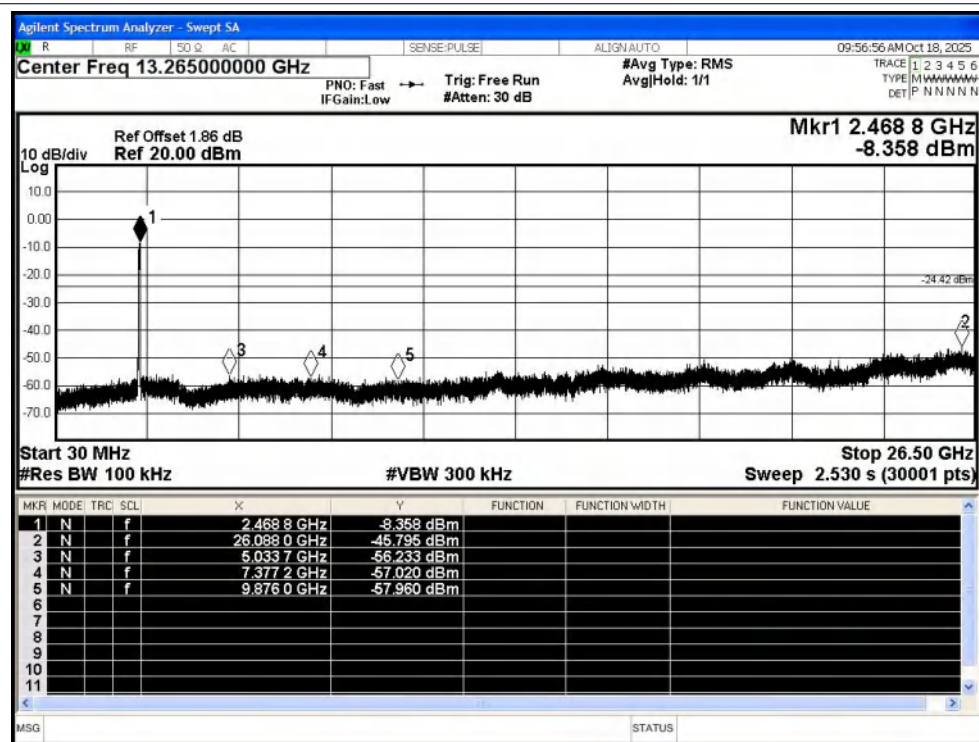
Tx. Spurious NVNT n40 2437MHz Ant1 Emission



Tx. Spurious NVNT n40 2452MHz Ant1 Ref



Tx. Spurious NVNT n40 2452MHz Ant1 Emission



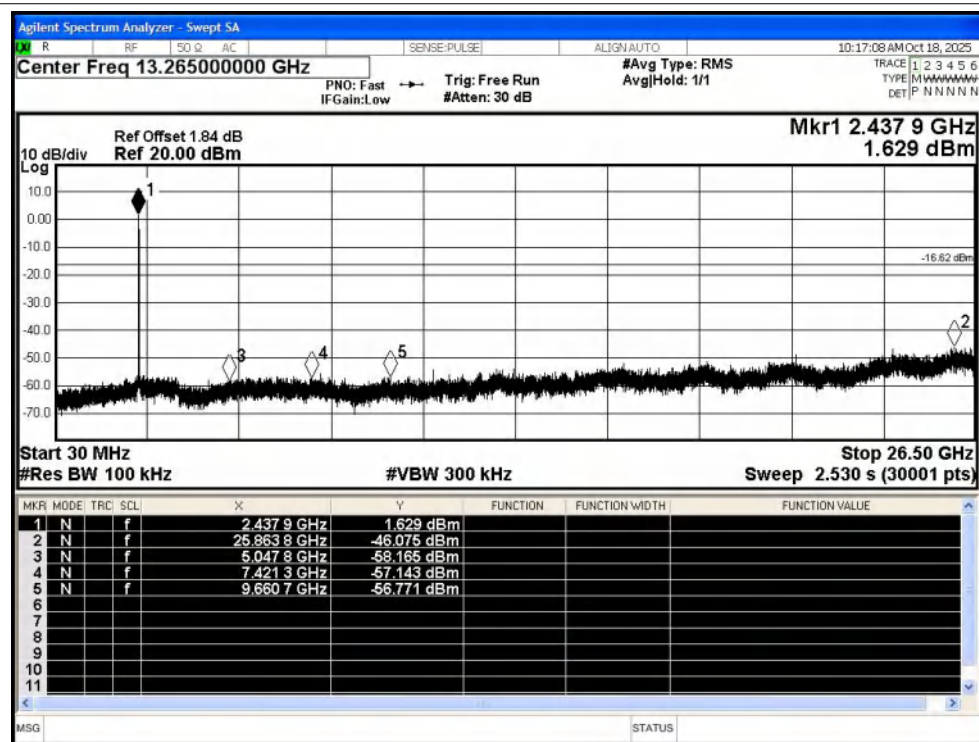
ESP32:

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	b	2412	Ant2	-50.25	-20	Pass
NVNT	b	2437	Ant2	-49.46	-20	Pass
NVNT	b	2462	Ant2	-49.69	-20	Pass
NVNT	g	2412	Ant2	-44.62	-20	Pass
NVNT	g	2437	Ant2	-42.81	-20	Pass
NVNT	g	2462	Ant2	-43.11	-20	Pass
NVNT	n20	2412	Ant2	-44.91	-20	Pass
NVNT	n20	2437	Ant2	-43.25	-20	Pass
NVNT	n20	2462	Ant2	-43.96	-20	Pass
NVNT	n40	2422	Ant2	-40.74	-20	Pass
NVNT	n40	2437	Ant2	-39.86	-20	Pass
NVNT	n40	2452	Ant2	-41.11	-20	Pass

Tx. Spurious NVNT b 2437MHz Ant2 Ref



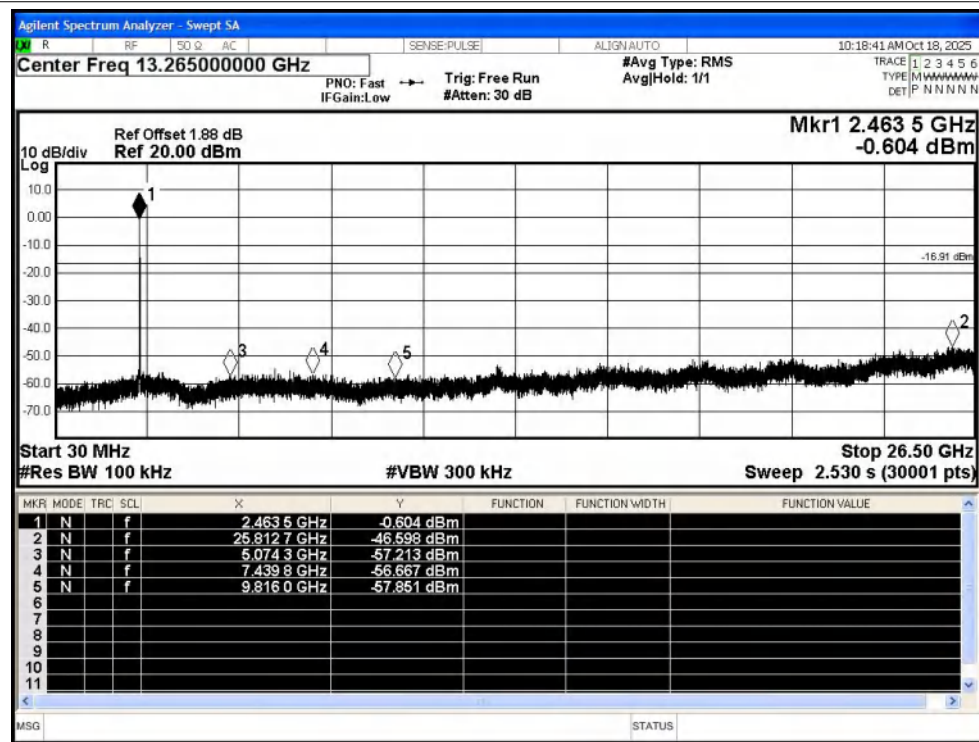
Tx. Spurious NVNT b 2437MHz Ant2 Emission



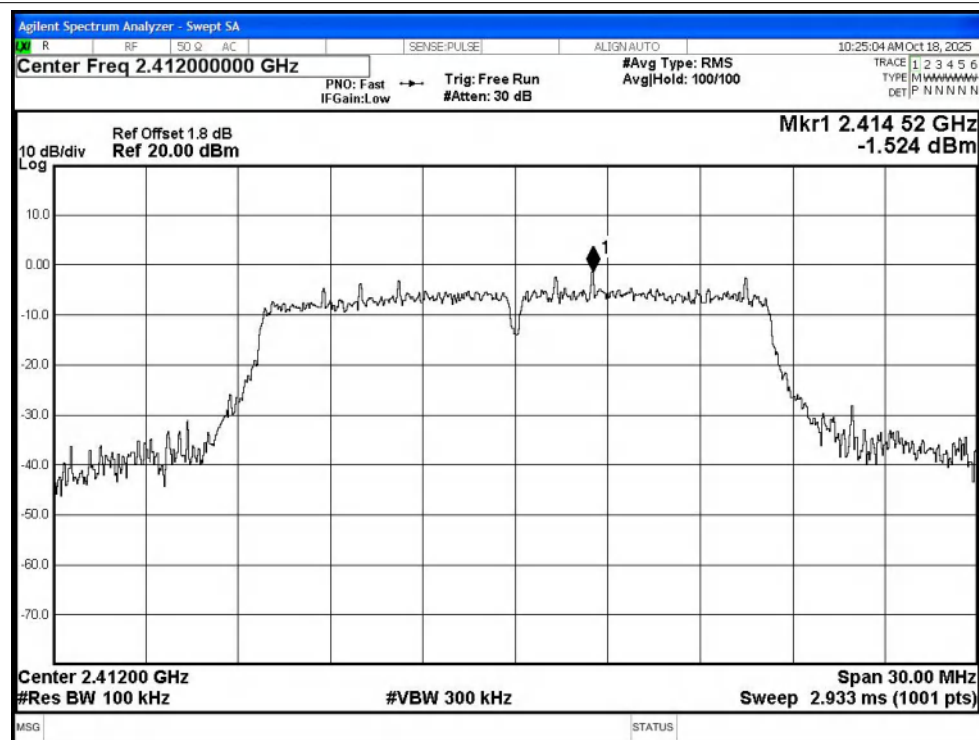
Tx. Spurious NVNT b 2462MHz Ant2 Ref



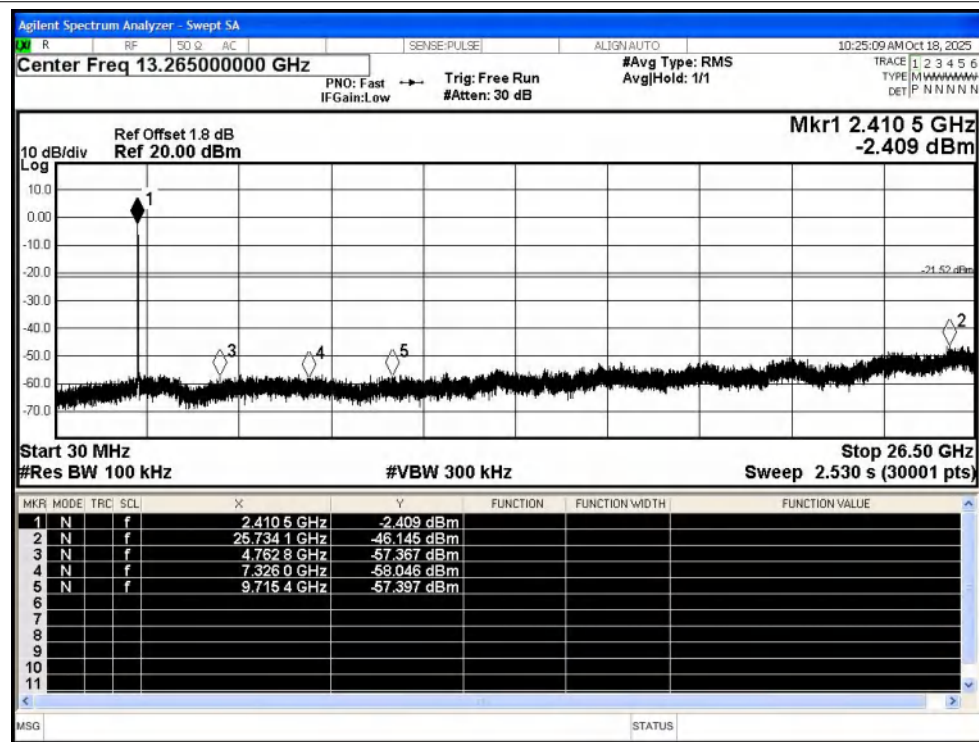
Tx. Spurious NVNT b 2462MHz Ant2 Emission



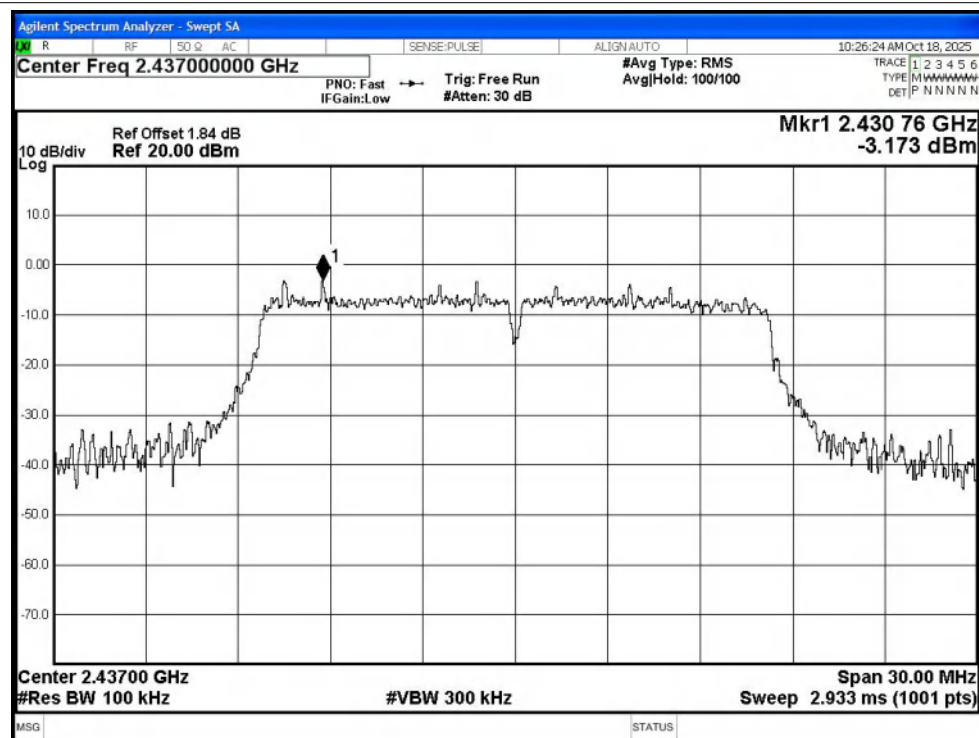
Tx. Spurious NVNT g 2412MHz Ant2 Ref



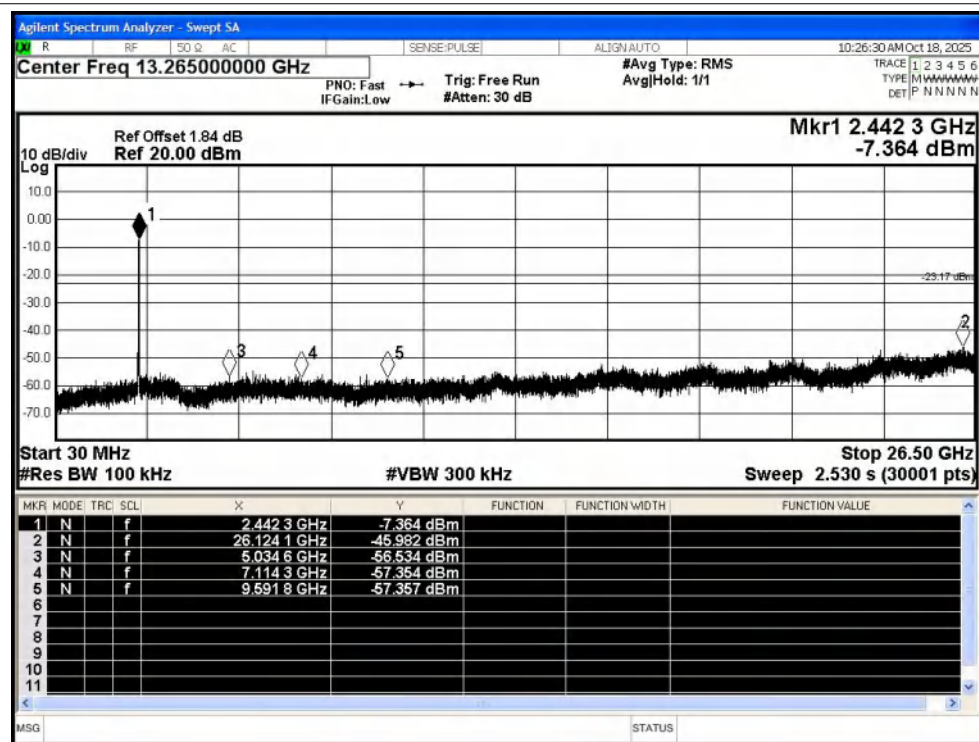
Tx. Spurious NVNT g 2412MHz Ant2 Emission



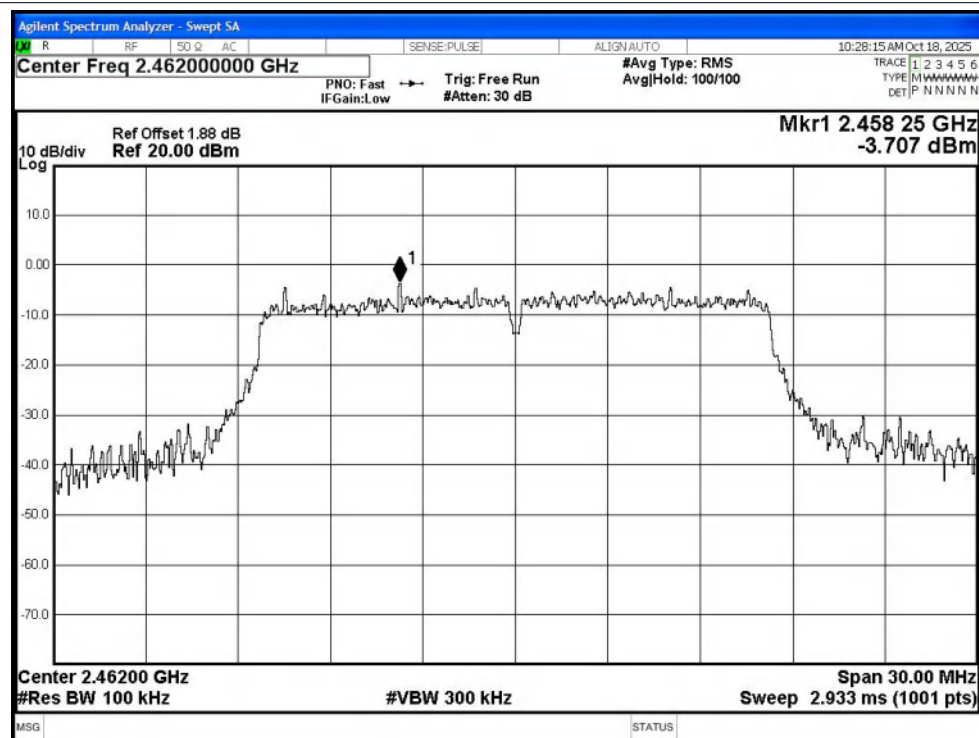
Tx. Spurious NVNT g 2437MHz Ant2 Ref



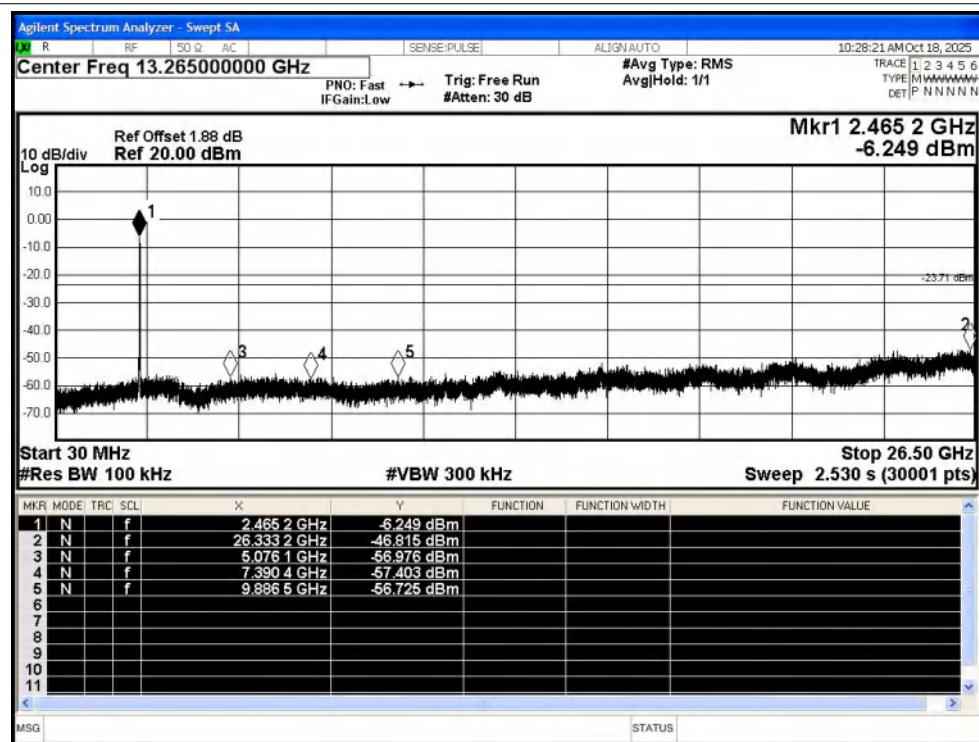
Tx. Spurious NVNT g 2437MHz Ant2 Emission



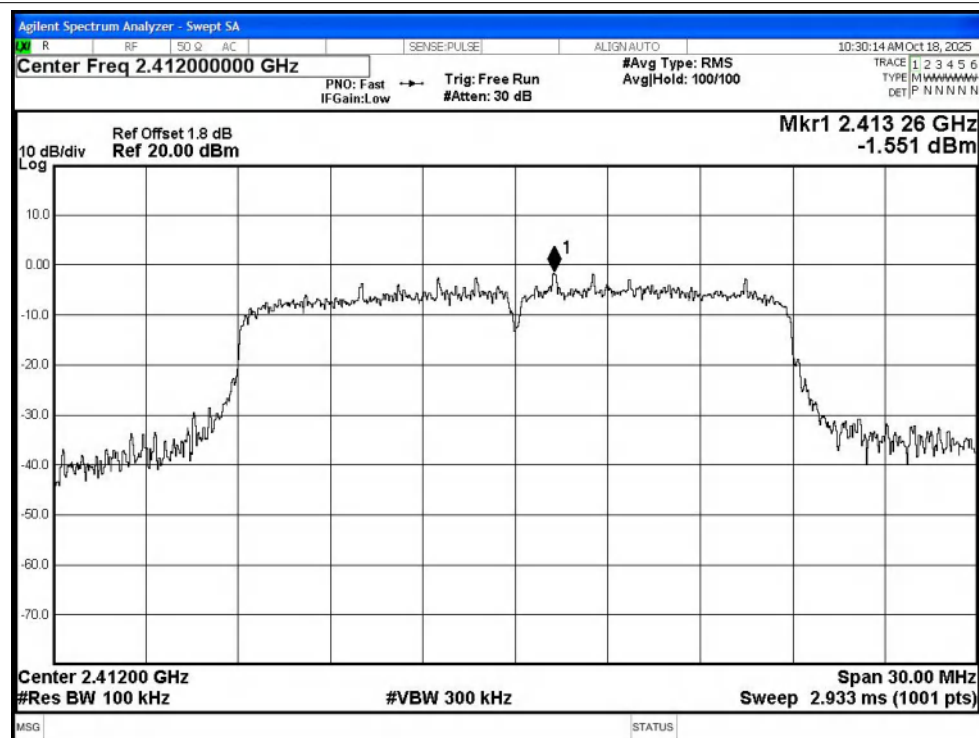
Tx. Spurious NVNT g 2462MHz Ant2 Ref



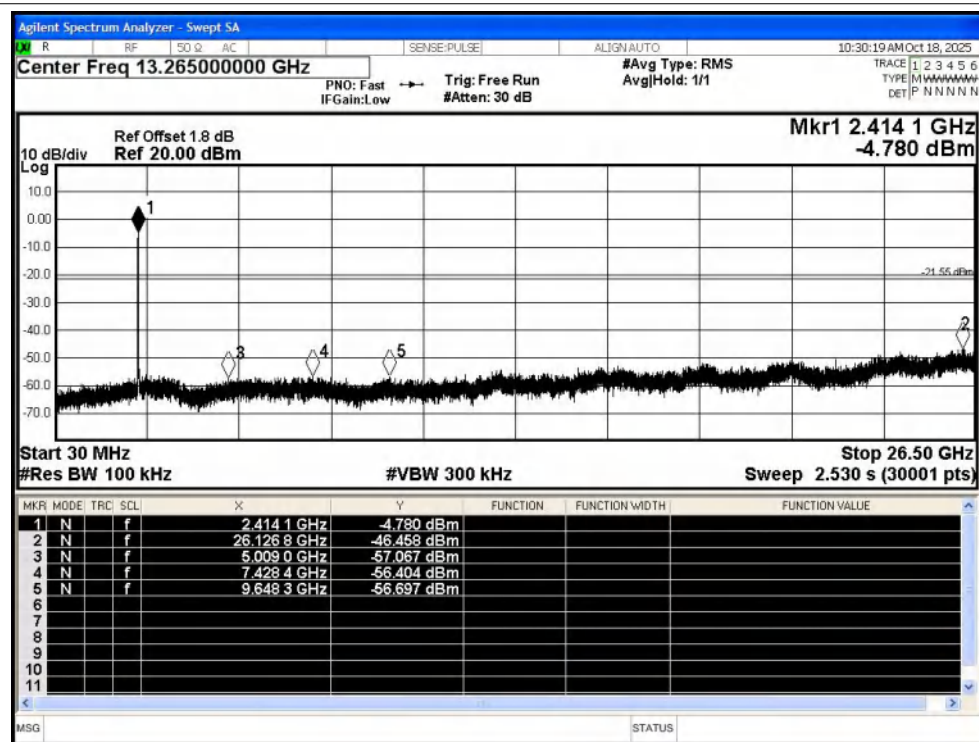
Tx. Spurious NVNT g 2462MHz Ant2 Emission



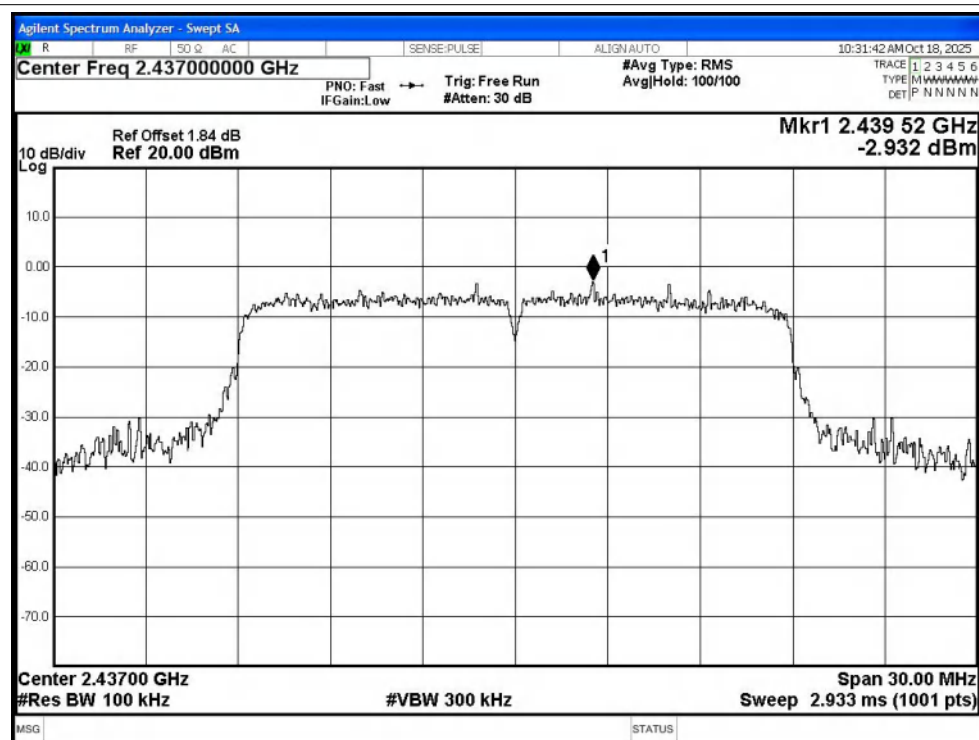
Tx. Spurious NVNT n20 2412MHz Ant2 Ref



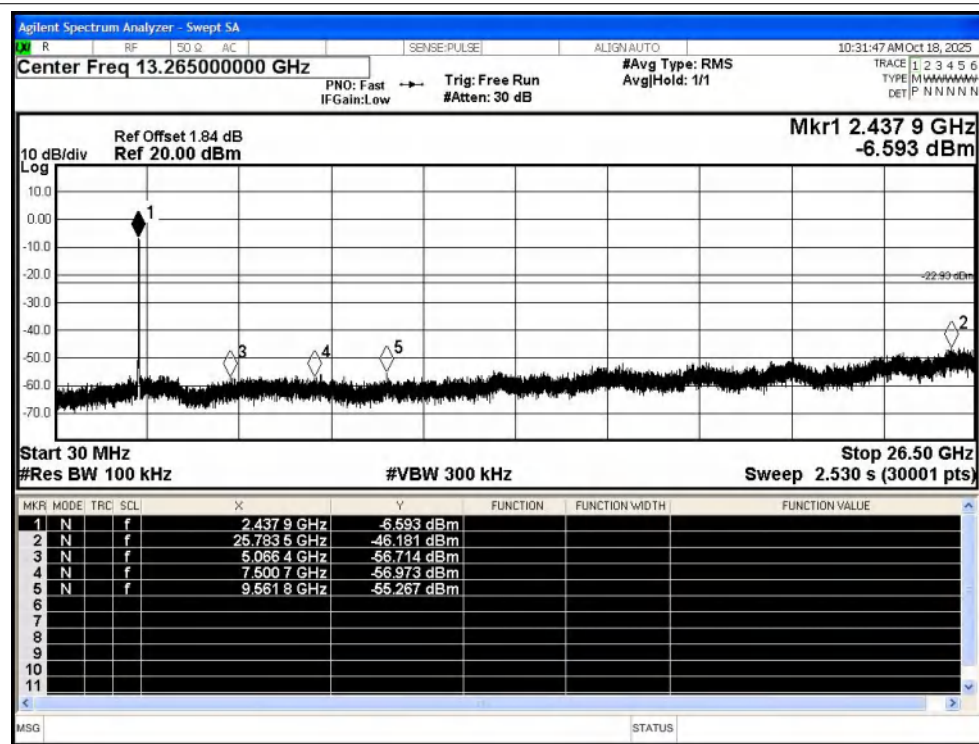
Tx. Spurious NVNT n20 2412MHz Ant2 Emission



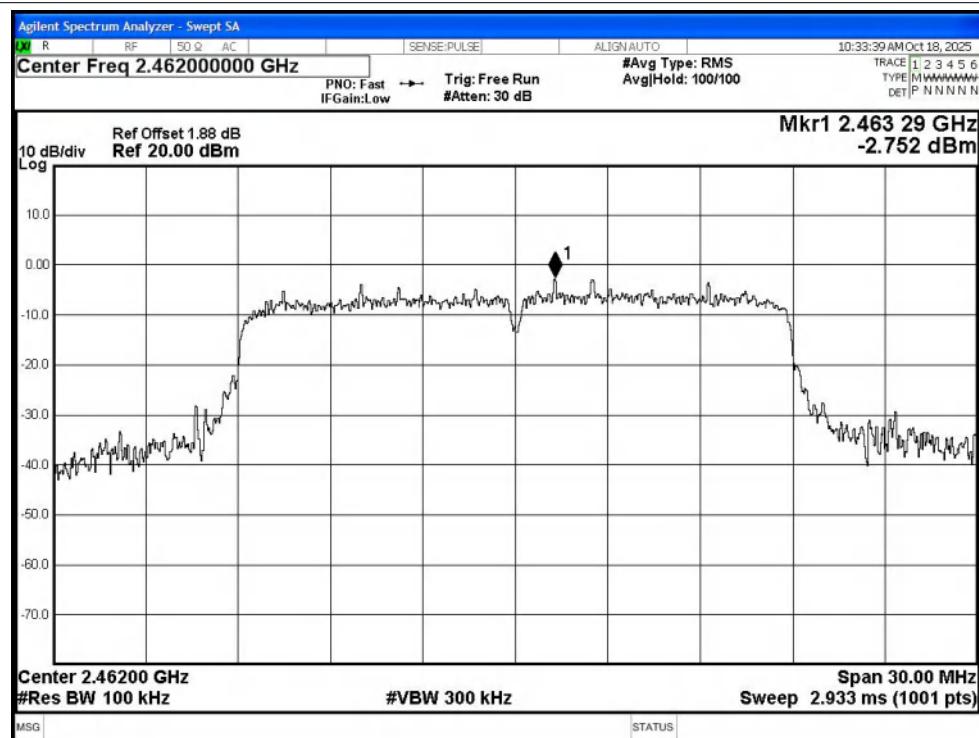
Tx. Spurious NVNT n20 2437MHz Ant2 Ref



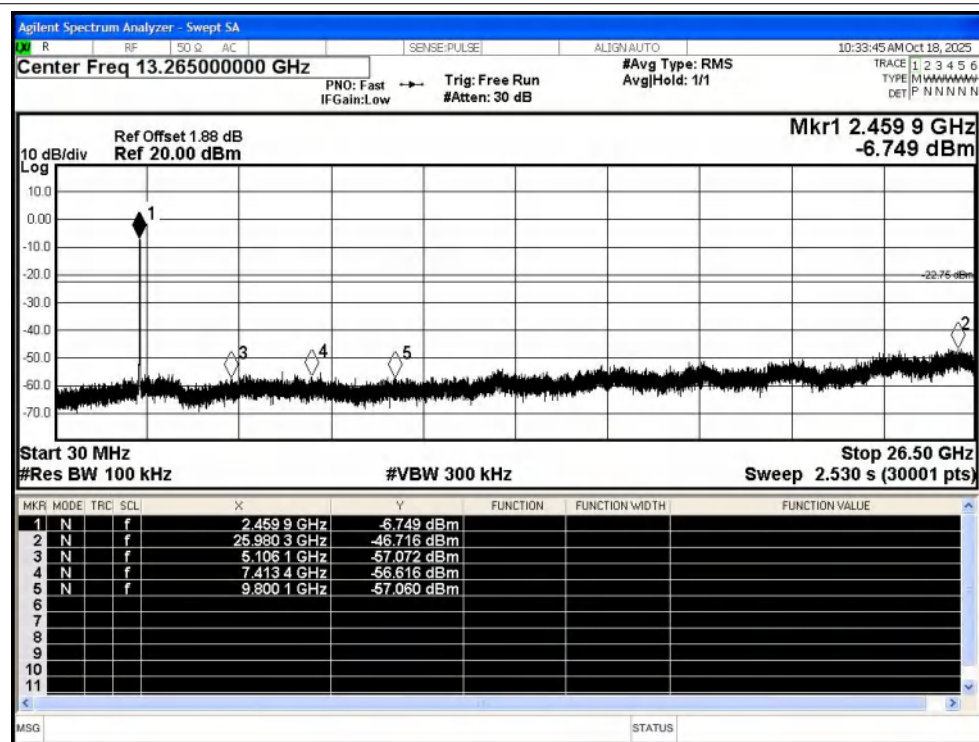
Tx. Spurious NVNT n20 2437MHz Ant2 Emission



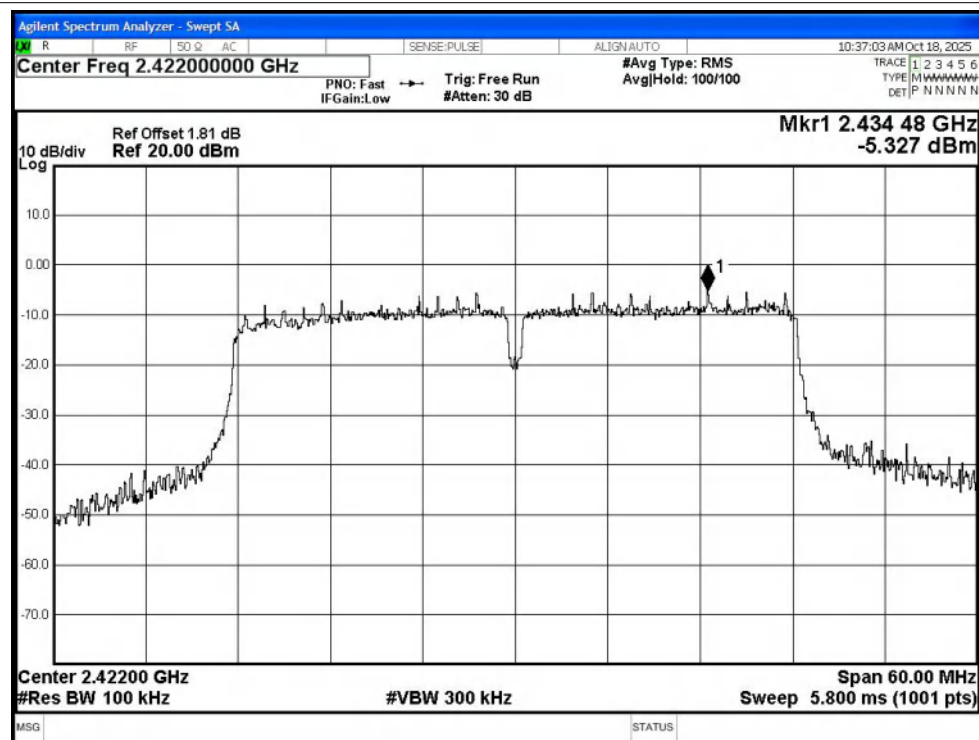
Tx. Spurious NVNT n20 2462MHz Ant2 Ref



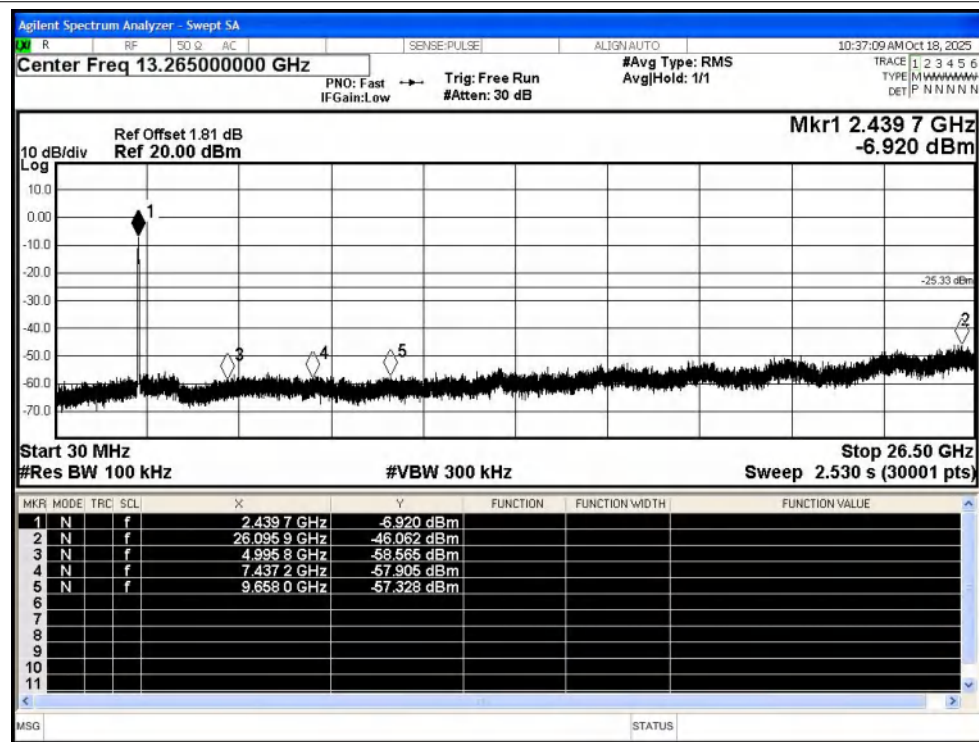
Tx. Spurious NVNT n20 2462MHz Ant2 Emission



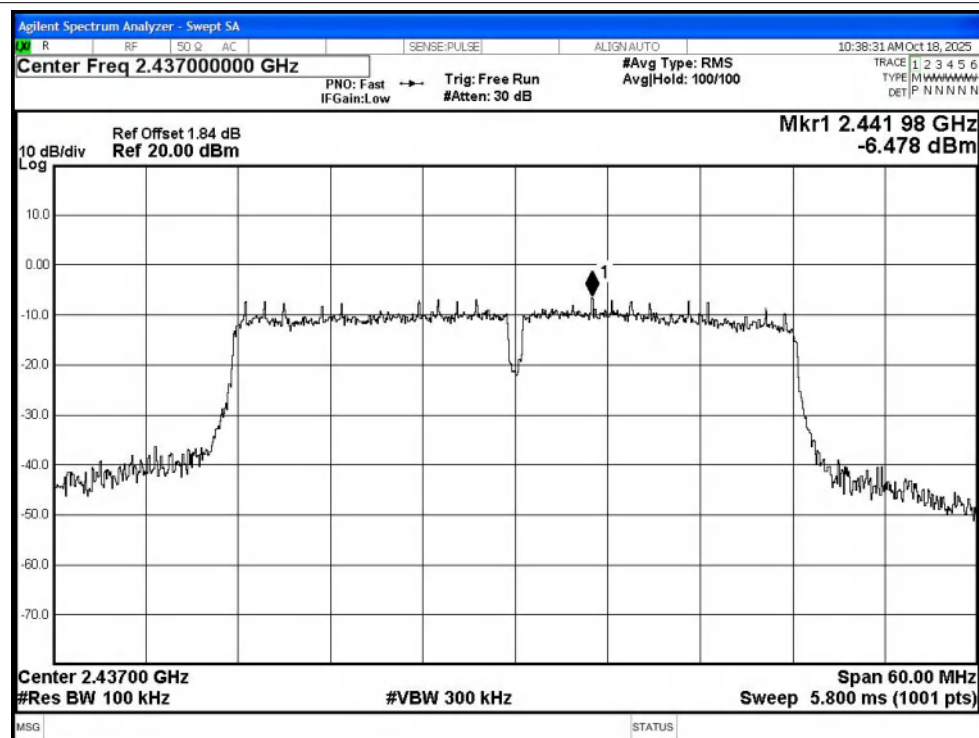
Tx. Spurious NVNT n40 2422MHz Ant2 Ref



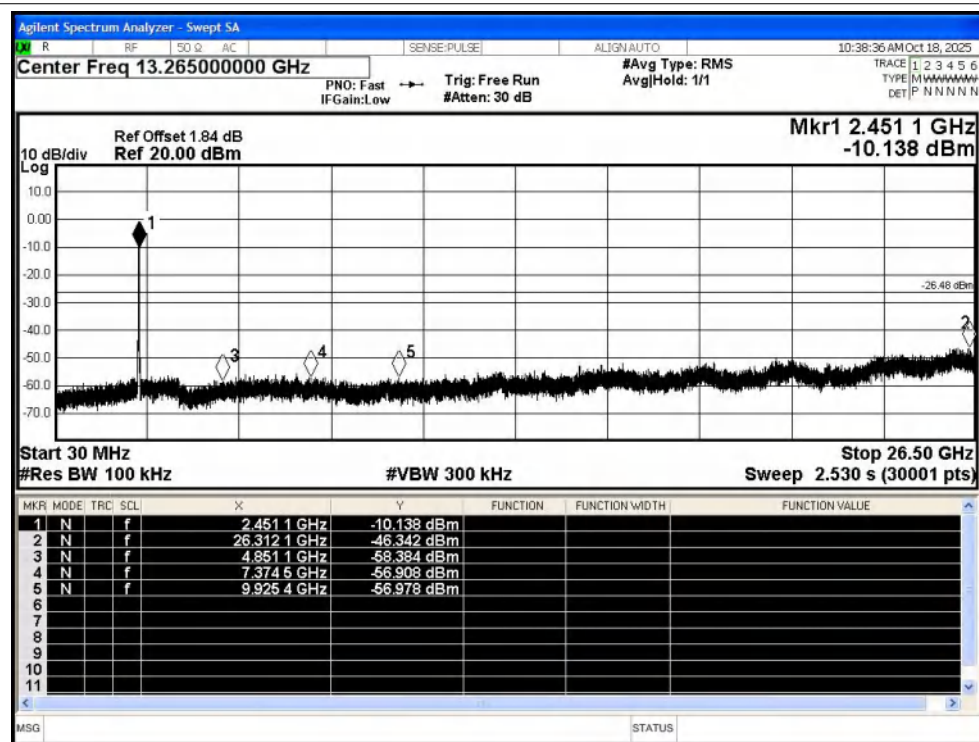
Tx. Spurious NVNT n40 2422MHz Ant2 Emission



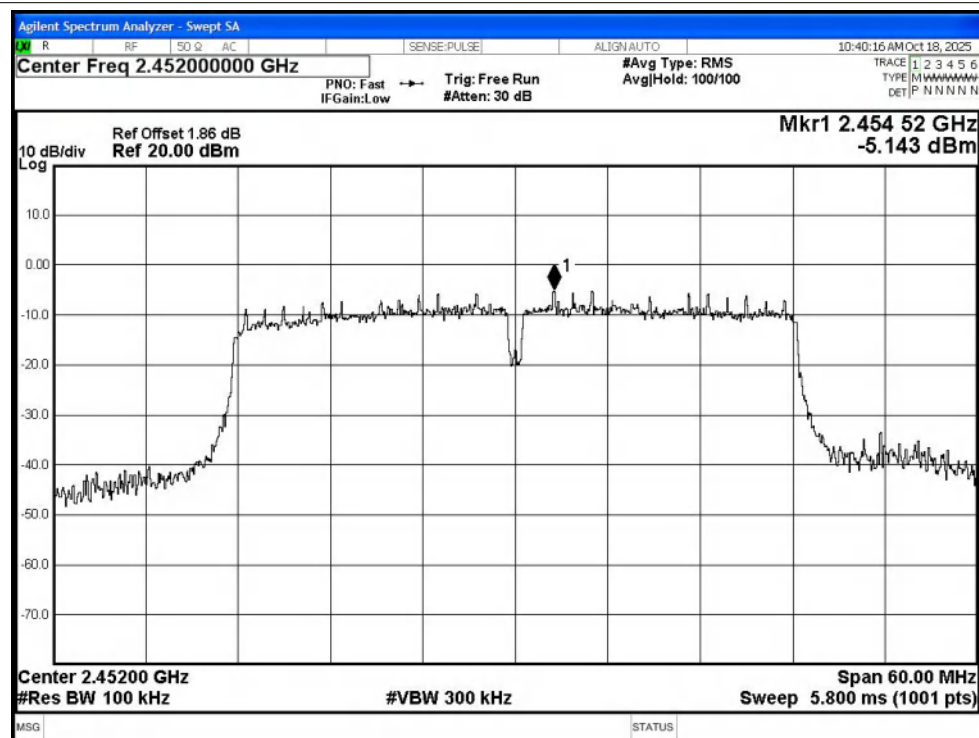
Tx. Spurious NVNT n40 2437MHz Ant2 Ref



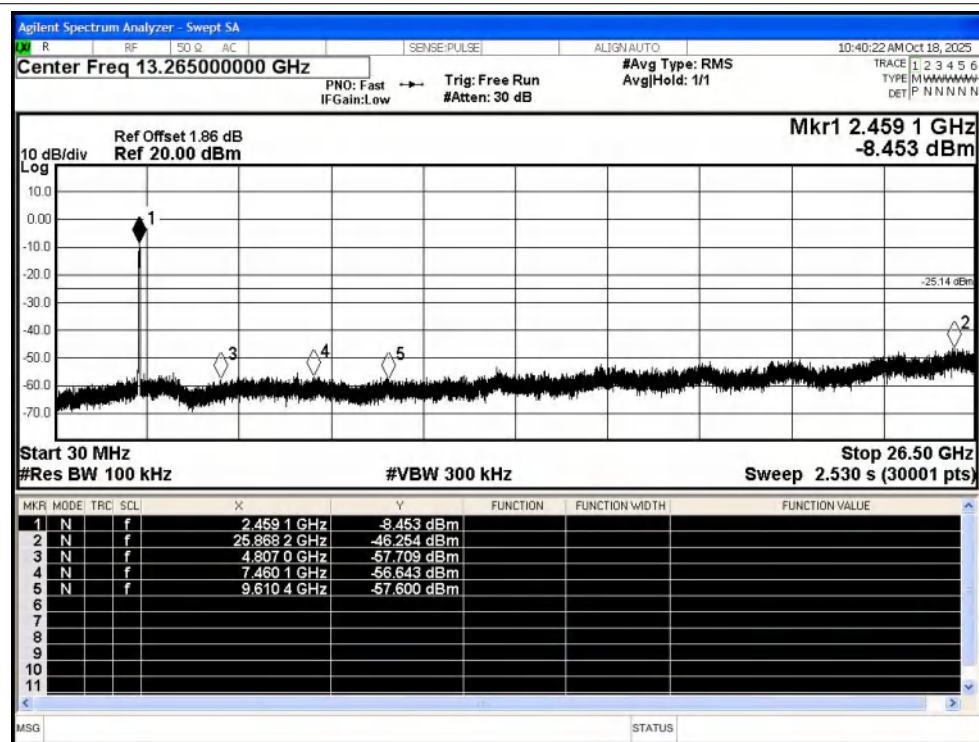
Tx. Spurious NVNT n40 2437MHz Ant2 Emission



Tx. Spurious NVNT n40 2452MHz Ant2 Ref



Tx. Spurious NVNT n40 2452MHz Ant2 Emission

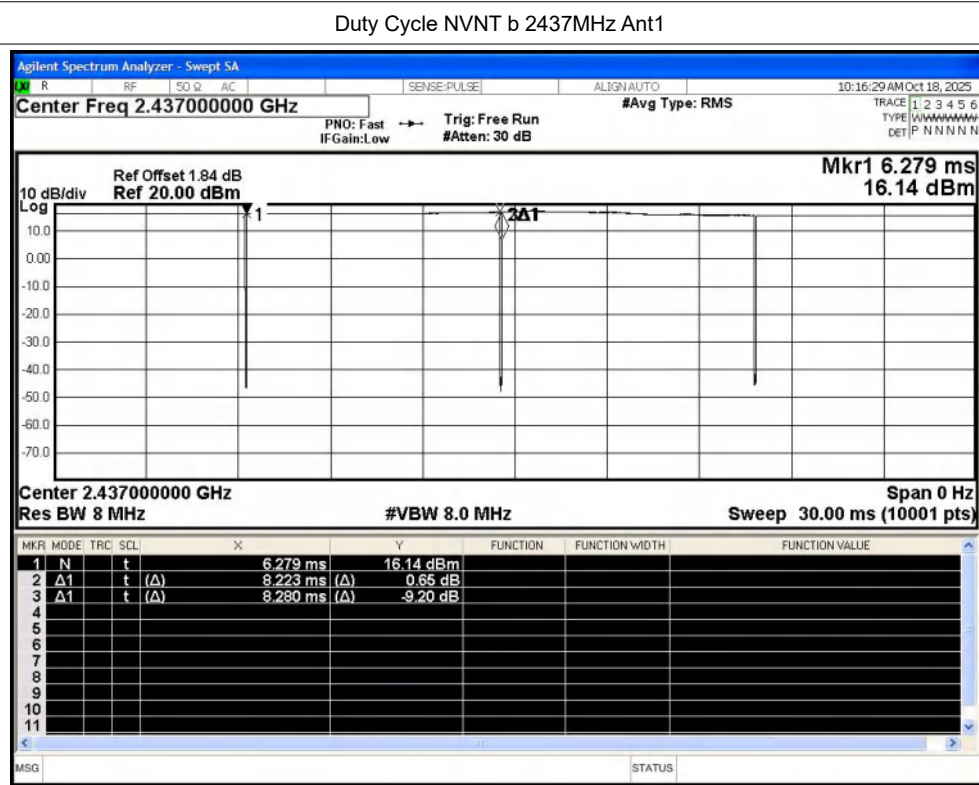


6. Duty Cycle

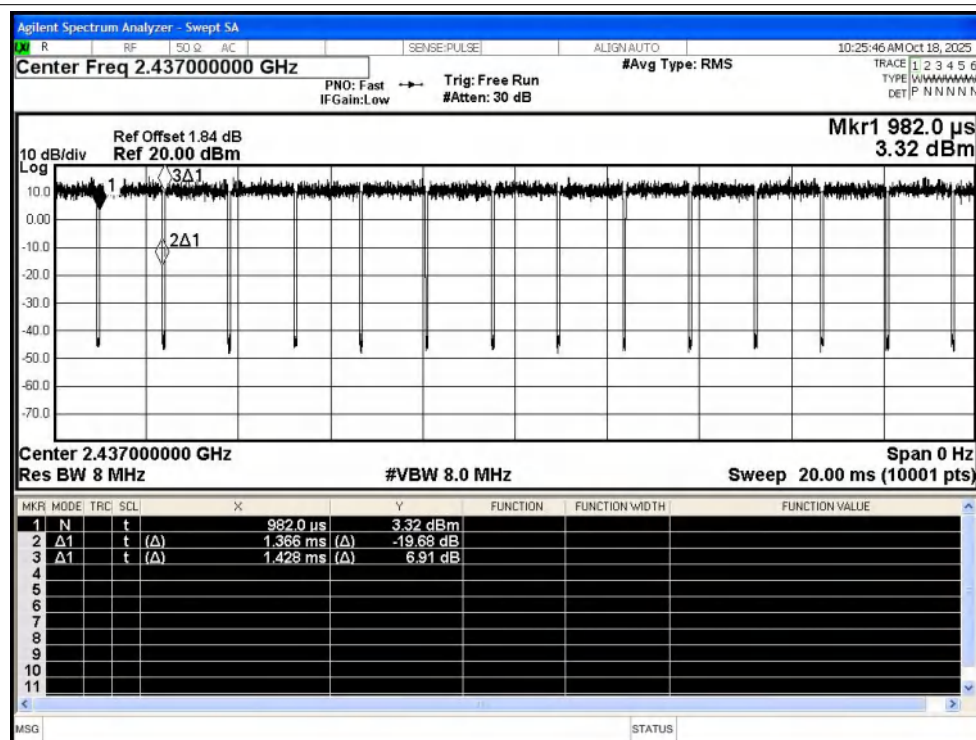
RTL8821:

Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	b	2412	Ant1	99.31	0	0.12
NVNT	b	2437	Ant1	99.31	0	0.12
NVNT	b	2462	Ant1	99.31	0	0.12
NVNT	g	2412	Ant1	95.66	0.19	0.73
NVNT	g	2437	Ant1	95.66	0.19	0.73
NVNT	g	2462	Ant1	95.52	0.2	0.73
NVNT	n20	2412	Ant1	94.9	0.23	0.87
NVNT	n20	2437	Ant1	94.74	0.23	0.87
NVNT	n20	2462	Ant1	94.74	0.23	0.87
NVNT	n40	2422	Ant1	90	0.46	1.74
NVNT	n40	2437	Ant1	90.28	0.44	1.74
NVNT	n40	2452	Ant1	90.28	0.44	1.74

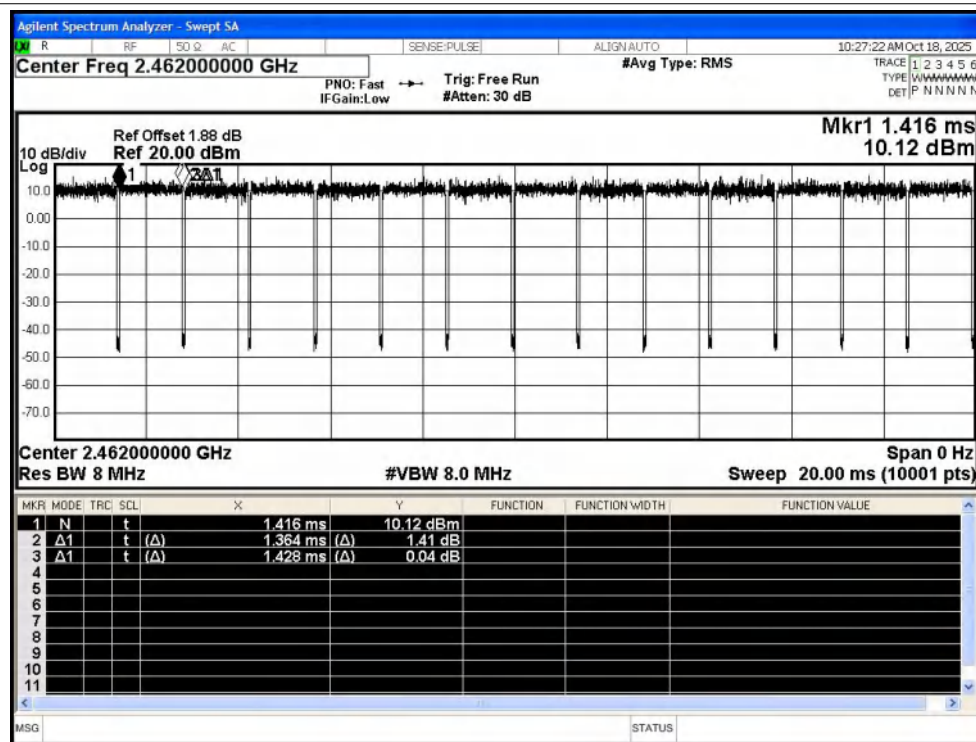
Duty Cycle NVNT b 2412MHz Ant1



Duty Cycle NVNT g 2437MHz Ant1



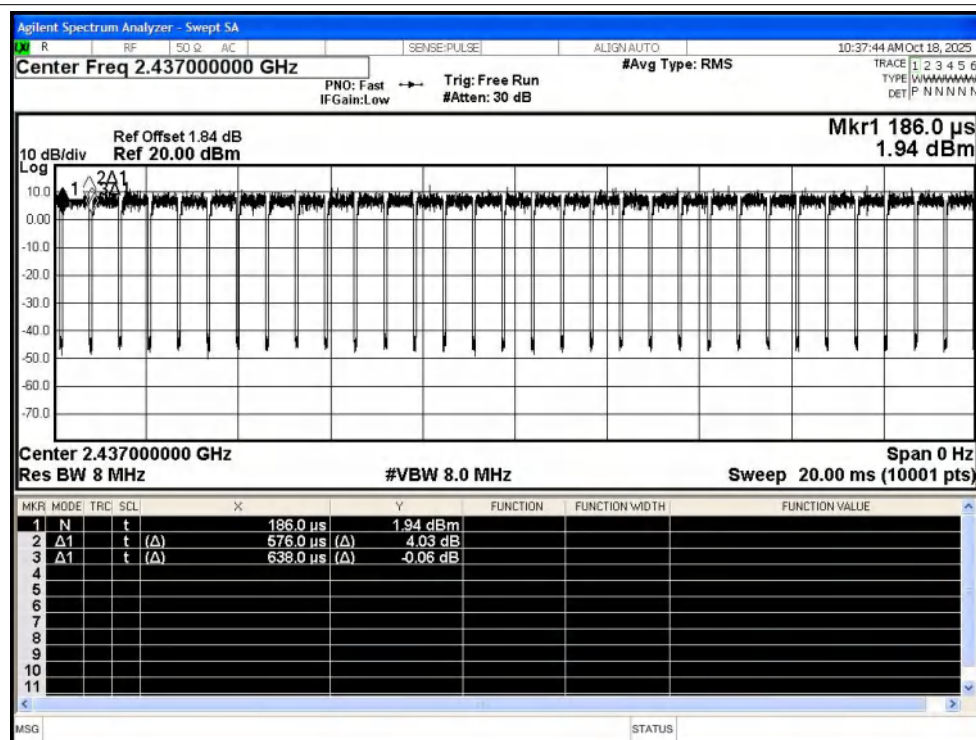
Duty Cycle NVNT g 2462MHz Ant1



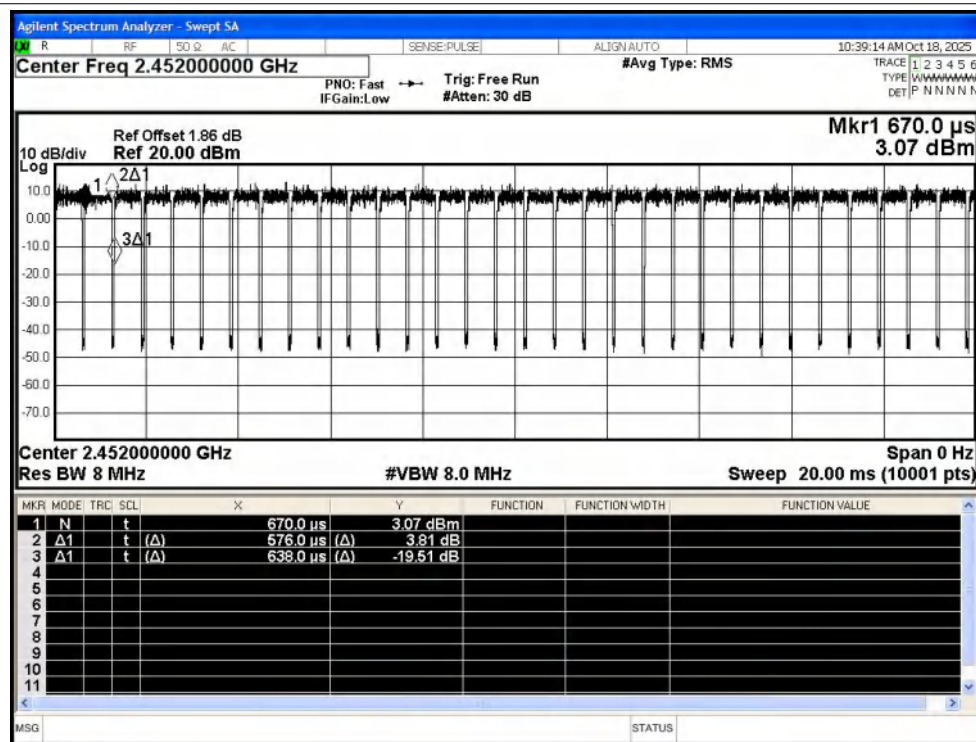
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Duty Cycle NVNT n40 2437MHz Ant1



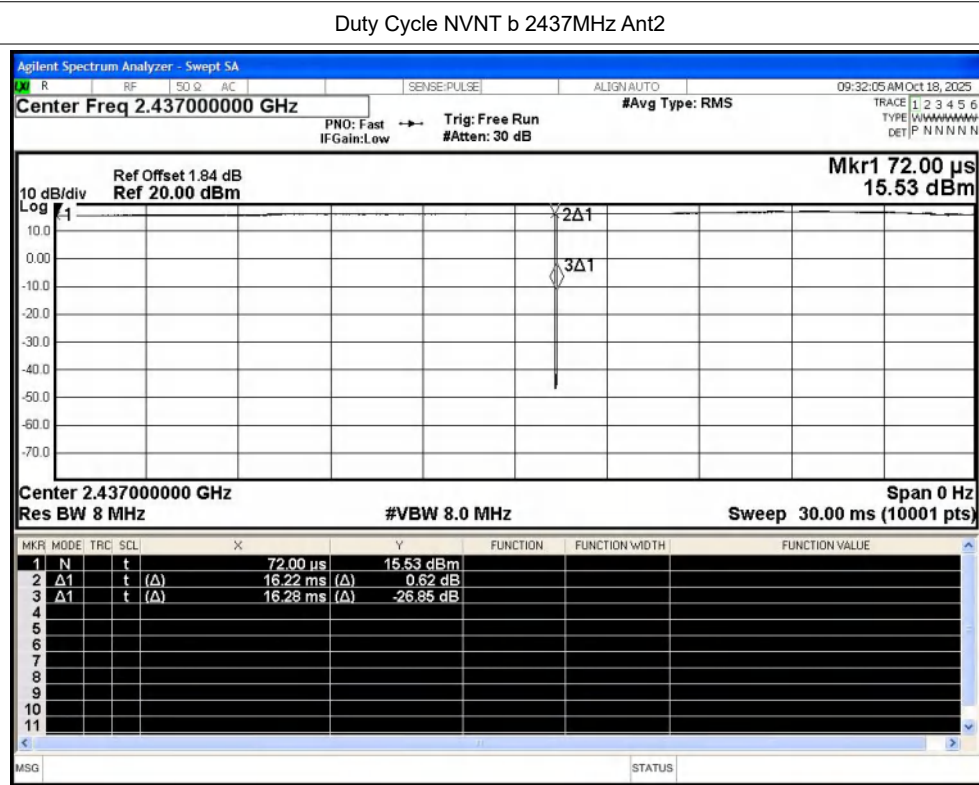
Duty Cycle NVNT n40 2452MHz Ant1



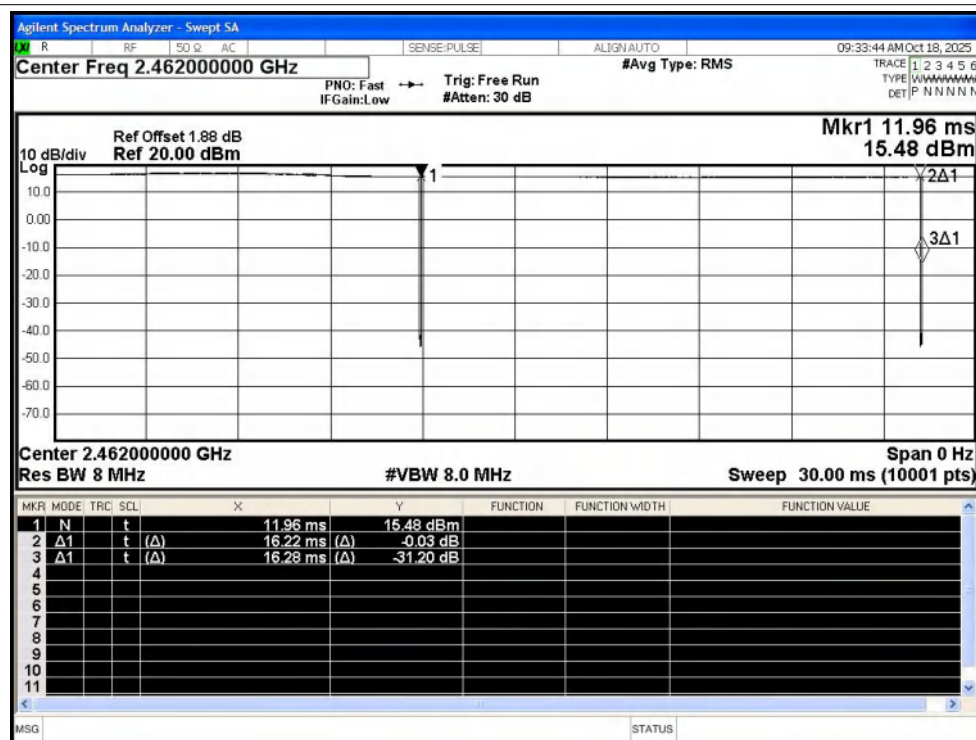
ESP32:

Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	b	2412	Ant2	99.65	0	0.06
NVNT	b	2437	Ant2	99.65	0	0.06
NVNT	b	2462	Ant2	99.65	0	0.06
NVNT	g	2412	Ant2	97.68	0.1	0.37
NVNT	g	2437	Ant2	97.68	0.1	0.37
NVNT	g	2462	Ant2	97.68	0.1	0.37
NVNT	n20	2412	Ant2	97.25	0.12	0.44
NVNT	n20	2437	Ant2	97.33	0.12	0.44
NVNT	n20	2462	Ant2	97.25	0.12	0.44
NVNT	n40	2422	Ant2	94.7	0.24	0.9
NVNT	n40	2437	Ant2	94.7	0.24	0.9
NVNT	n40	2452	Ant2	94.71	0.24	0.9

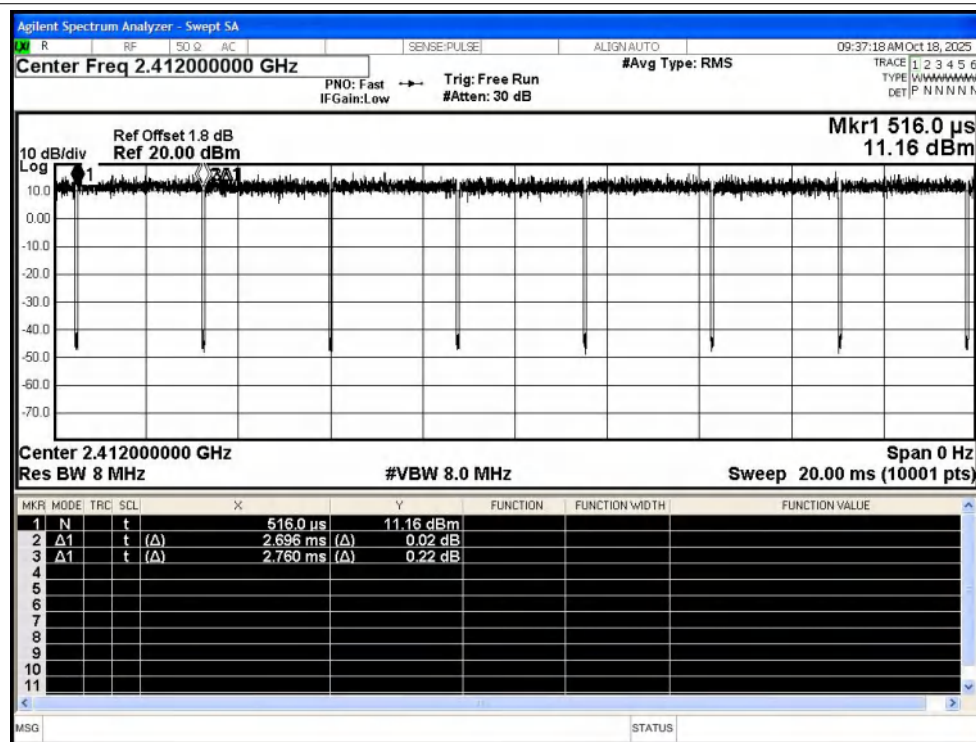
Duty Cycle NVNT b 2412MHz Ant2



Duty Cycle NVNT b 2462MHz Ant2



Duty Cycle NVNT g 2412MHz Ant2



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[illegible][illegible]

[illegible][illegible]

[illegible][illegible]

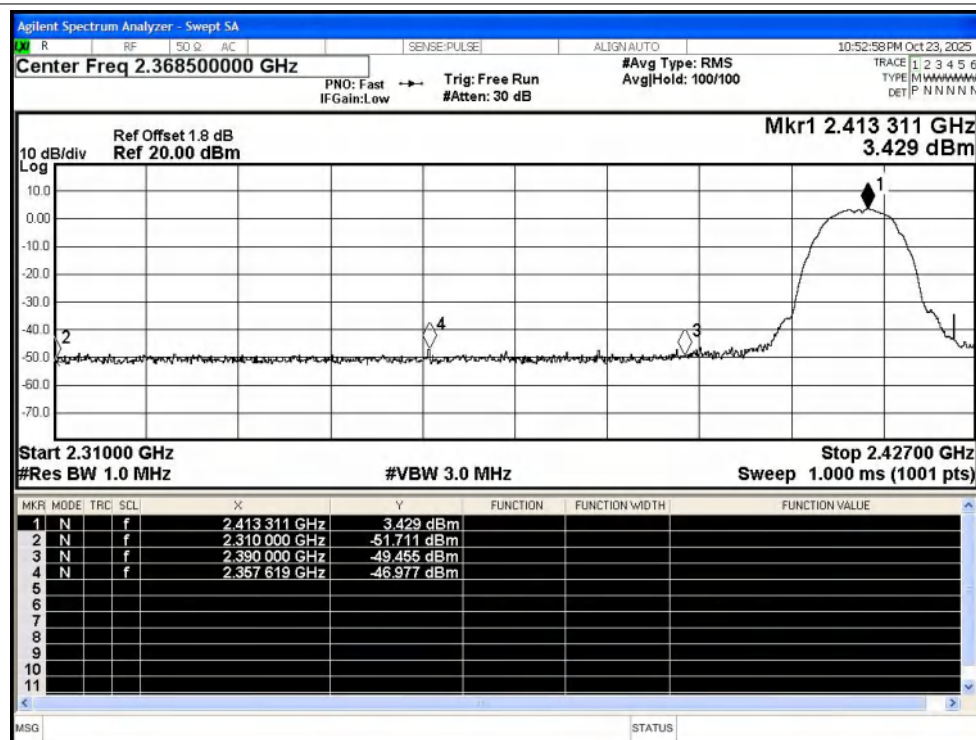
7. Restrict Band

RTL8821:

Condition	Mode	Frequency (MHz)	Antenna	Spur Freq (MHz)	Power (dBm)	Gain (dBi)	Duty Factor (dB)	E (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
NVNT	b	2412	Ant1	2310	-51.71	4.91	-	48.46	Peak	74	Pass
NVNT	b	2412	Ant1	2310	-59.16	4.91	0	41.01	Average	54	Pass
NVNT	b	2412	Ant1	2357.619	-46.98	4.91	-	53.19	Peak	74	Pass
NVNT	b	2412	Ant1	2389.56	-56.95	4.91	0	43.22	Average	54	Pass
NVNT	b	2412	Ant1	2390	-49.46	4.91	-	50.71	Peak	74	Pass
NVNT	b	2412	Ant1	2390	-57.72	4.91	0	42.45	Average	54	Pass
NVNT	b	2462	Ant1	2483.5	-48.48	4.91	-	51.69	Peak	74	Pass
NVNT	b	2462	Ant1	2483.5	-56.45	4.91	0	43.72	Average	54	Pass
NVNT	b	2462	Ant1	2486.644	-44.11	4.91	-	56.06	Peak	74	Pass
NVNT	b	2462	Ant1	2484.577	-55.59	4.91	0	44.58	Average	54	Pass
NVNT	b	2462	Ant1	2500	-49.3	4.91	-	50.87	Peak	74	Pass
NVNT	b	2462	Ant1	2500	-58.48	4.91	0	41.69	Average	54	Pass
NVNT	g	2412	Ant1	2310	-51.77	4.91	-	48.4	Peak	74	Pass
NVNT	g	2412	Ant1	2310	-58.72	4.91	0.19	41.64	Average	54	Pass
NVNT	g	2412	Ant1	2388.975	-40.33	4.91	-	59.84	Peak	74	Pass
NVNT	g	2412	Ant1	2389.911	-54.03	4.91	0.19	46.33	Average	54	Pass
NVNT	g	2412	Ant1	2390	-42.91	4.91	-	57.26	Peak	74	Pass
NVNT	g	2412	Ant1	2390	-53.46	4.91	0.19	46.9	Average	54	Pass
NVNT	g	2462	Ant1	2483.5	-37.94	4.91	-	62.23	Peak	74	Pass
NVNT	g	2462	Ant1	2483.5	-53.61	4.91	0.2	46.76	Average	54	Pass
NVNT	g	2462	Ant1	2484.365	-36.11	4.91	-	64.06	Peak	74	Pass
NVNT	g	2462	Ant1	2483.835	-52.58	4.91	0.2	47.79	Average	54	Pass
NVNT	g	2462	Ant1	2500	-50.5	4.91	-	49.67	Peak	74	Pass
NVNT	g	2462	Ant1	2500	-58.44	4.91	0.2	41.93	Average	54	Pass
NVNT	n20	2412	Ant1	2310	-52.28	4.91	-	47.89	Peak	74	Pass
NVNT	n20	2412	Ant1	2310	-58.81	4.91	0.23	41.59	Average	54	Pass
NVNT	n20	2412	Ant1	2389.911	-37.82	4.91	-	62.35	Peak	74	Pass
NVNT	n20	2412	Ant1	2389.326	-53.16	4.91	0.23	47.24	Average	54	Pass
NVNT	n20	2412	Ant1	2390	-38.04	4.91	-	62.13	Peak	74	Pass
NVNT	n20	2412	Ant1	2390	-52.69	4.91	0.23	47.71	Average	54	Pass
NVNT	n20	2462	Ant1	2483.5	-41.02	4.91	-	59.15	Peak	74	Pass
NVNT	n20	2462	Ant1	2483.5	-54.96	4.91	0.23	45.44	Average	54	Pass
NVNT	n20	2462	Ant1	2484.683	-36.34	4.91	-	63.83	Peak	74	Pass
NVNT	n20	2462	Ant1	2483.888	-53.34	4.91	0.23	47.06	Average	54	Pass
NVNT	n20	2462	Ant1	2500	-50.99	4.91	-	49.18	Peak	74	Pass
NVNT	n20	2462	Ant1	2500	-58.44	4.91	0.23	41.96	Average	54	Pass
NVNT	n40	2422	Ant1	2310	-50.59	4.91	-	49.58	Peak	74	Pass
NVNT	n40	2422	Ant1	2310	-58.93	4.91	0.46	41.7	Average	54	Pass

NVNT	n40	2422	Ant1	2389.378	-37.95	4.91	-	62.22	Peak	74	Pass
NVNT	n40	2422	Ant1	2389.946	-52.46	4.91	0.46	48.17	Average	54	Pass
NVNT	n40	2422	Ant1	2390	-41.07	4.91	-	59.1	Peak	74	Pass
NVNT	n40	2422	Ant1	2390	-52.46	4.91	0.46	48.17	Average	54	Pass
NVNT	n40	2452	Ant1	2483.5	-39.91	4.91	-	60.26	Peak	74	Pass
NVNT	n40	2452	Ant1	2483.5	-55.86	4.91	0.44	44.75	Average	54	Pass
NVNT	n40	2452	Ant1	2483.854	-34.96	4.91	-	65.21	Peak	74	Pass
NVNT	n40	2452	Ant1	2483.698	-55.24	4.91	0.44	45.37	Average	54	Pass
NVNT	n40	2452	Ant1	2500	-50.2	4.91	-	49.97	Peak	74	Pass
NVNT	n40	2452	Ant1	2500	-58.56	4.91	0.44	42.05	Average	54	Pass

Restrict Band NVNT b 2412MHz Ant1 Peak



Agilent Spectrum Analyzer - Swept SA

10:53:00 PM Oct 23, 2025

Center Freq 2.368500000 GHz

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

#Avg Type: RMS AvgHld: 100/100

TRACE 1 2 3 4 5
TYPE A W W W W W
DET A N N N N N

Ref Offset 1.8 dB
Ref 20.00 dBm

Mkr1 2.413 077 GHz
0.654 dBm

10 dB/div
Log

Start 2.31000 GHz
#Res BW 1.0 MHz

#VBW 3.0 MHz*
Stop 2.42700 GHz
Sweep 1.000 ms (1001 pts)

MRK	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	f		2.413 077 GHz	0.654 dBm			
2	N	f		2.310 000 GHz	-59.161 dBm			
3	N	f		2.390 000 GHz	-57.720 dBm			
4	N	f		2.389 560 GHz	-56.945 dBm			
5								
6								
7								
8								
9								
10								
11								

MSG STATUS

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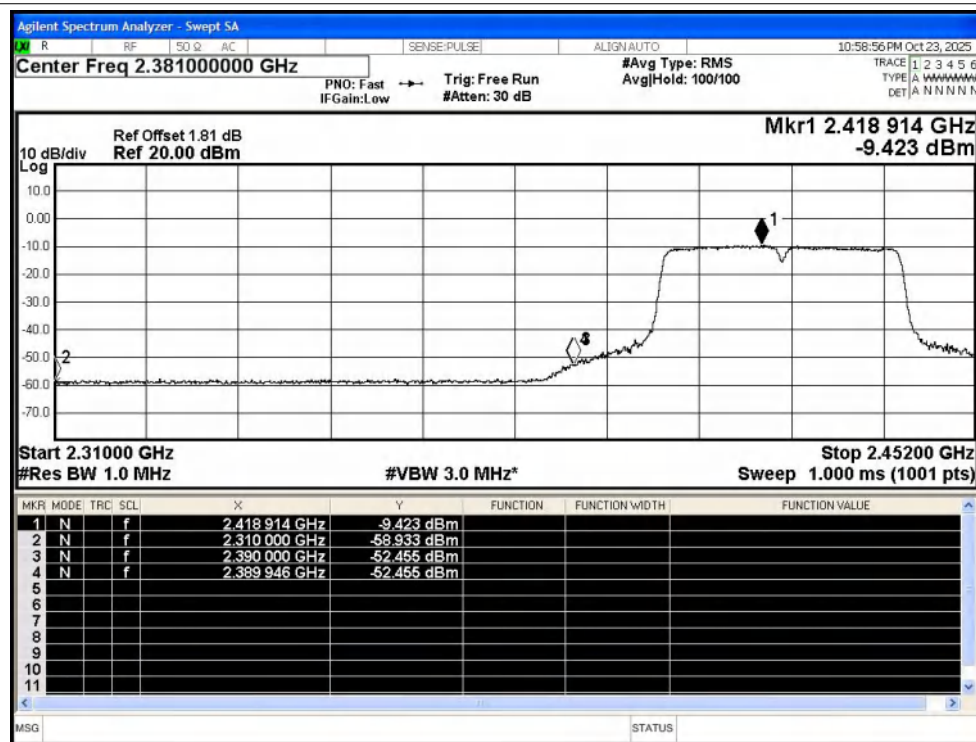
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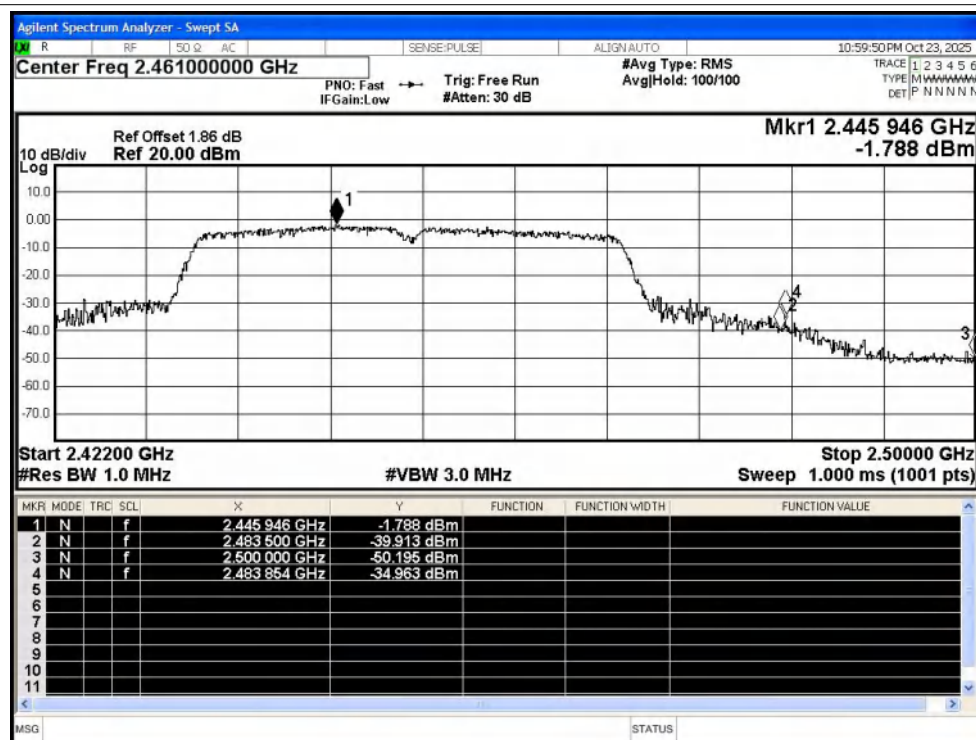
Restrict Band NVNT n40 2422MHz Ant1 Peak



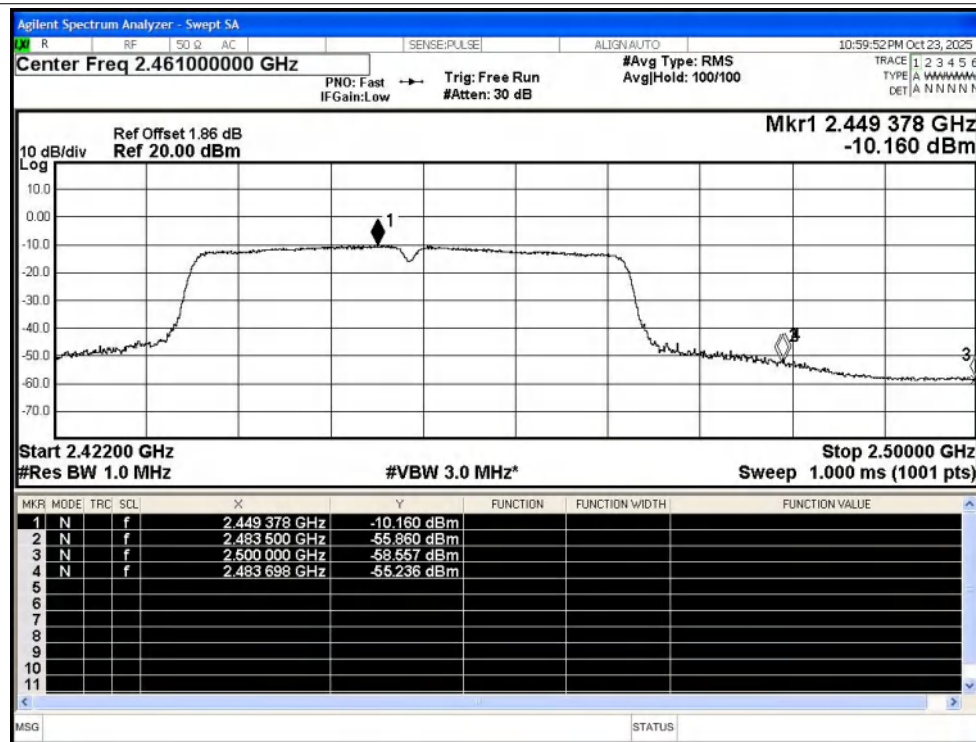
Restrict Band NVNT n40 2422MHz Ant1 Average



Restrict Band NVNT n40 2452MHz Ant1 Peak



Restrict Band NVNT n40 2452MHz Ant1 Average



ESP32:

Condition	Mode	Frequency (MHz)	Antenna	Spur Freq (MHz)	Power (dBm)	Gain (dBi)	Duty Factor (dB)	E (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
NVNT	b	2412	Ant2	2310	-51.04	4.48	-	48.7	Peak	74	Pass
NVNT	b	2412	Ant2	2310	-58.82	4.48	0	40.92	Average	54	Pass
NVNT	b	2412	Ant2	2366.043	-47.65	4.48	-	52.09	Peak	74	Pass
NVNT	b	2412	Ant2	2388.156	-57.17	4.48	0	42.57	Average	54	Pass
NVNT	b	2412	Ant2	2390	-47.79	4.48	-	51.95	Peak	74	Pass
NVNT	b	2412	Ant2	2390	-58.29	4.48	0	41.45	Average	54	Pass
NVNT	b	2462	Ant2	2483.5	-48.36	4.48	-	51.38	Peak	74	Pass
NVNT	b	2462	Ant2	2483.5	-56.41	4.48	0	43.33	Average	54	Pass
NVNT	b	2462	Ant2	2484.842	-46.14	4.48	-	53.6	Peak	74	Pass
NVNT	b	2462	Ant2	2484.418	-55.5	4.48	0	44.24	Average	54	Pass
NVNT	b	2462	Ant2	2500	-51.49	4.48	-	48.25	Peak	74	Pass
NVNT	b	2462	Ant2	2500	-57.92	4.48	0	41.82	Average	54	Pass
NVNT	g	2412	Ant2	2310	-49.53	4.48	-	50.21	Peak	74	Pass
NVNT	g	2412	Ant2	2310	-58.71	4.48	0.1	41.13	Average	54	Pass
NVNT	g	2412	Ant2	2389.911	-35.8	4.48	-	63.94	Peak	74	Pass
NVNT	g	2412	Ant2	2389.911	-54.42	4.48	0.1	45.42	Average	54	Pass
NVNT	g	2412	Ant2	2390	-42.53	4.48	-	57.21	Peak	74	Pass
NVNT	g	2412	Ant2	2390	-53.77	4.48	0.1	46.07	Average	54	Pass
NVNT	g	2462	Ant2	2483.5	-38.06	4.48	-	61.68	Peak	74	Pass
NVNT	g	2462	Ant2	2483.5	-52.97	4.48	0.1	46.87	Average	54	Pass
NVNT	g	2462	Ant2	2484.736	-36.28	4.48	-	63.46	Peak	74	Pass
NVNT	g	2462	Ant2	2483.517	-52.97	4.48	0.1	46.87	Average	54	Pass
NVNT	g	2462	Ant2	2500	-49.66	4.48	-	50.08	Peak	74	Pass
NVNT	g	2462	Ant2	2500	-58.1	4.48	0.1	41.74	Average	54	Pass
NVNT	n20	2412	Ant2	2310	-51.75	4.48	-	47.99	Peak	74	Pass
NVNT	n20	2412	Ant2	2310	-59.41	4.48	0.12	40.45	Average	54	Pass
NVNT	n20	2412	Ant2	2389.911	-39.57	4.48	-	60.17	Peak	74	Pass
NVNT	n20	2412	Ant2	2389.443	-53.78	4.48	0.12	46.08	Average	54	Pass
NVNT	n20	2412	Ant2	2390	-39.3	4.48	-	60.44	Peak	74	Pass
NVNT	n20	2412	Ant2	2390	-54.19	4.48	0.12	45.67	Average	54	Pass
NVNT	n20	2462	Ant2	2483.5	-40.94	4.48	-	58.8	Peak	74	Pass
NVNT	n20	2462	Ant2	2483.5	-56	4.48	0.12	43.86	Average	54	Pass
NVNT	n20	2462	Ant2	2484.206	-35.47	4.48	-	64.27	Peak	74	Pass
NVNT	n20	2462	Ant2	2483.729	-56.46	4.48	0.12	43.4	Average	54	Pass
NVNT	n20	2462	Ant2	2500	-49.78	4.48	-	49.96	Peak	74	Pass
NVNT	n20	2462	Ant2	2500	-58.34	4.48	0.12	41.52	Average	54	Pass
NVNT	n40	2422	Ant2	2310	-51.65	4.48	-	48.09	Peak	74	Pass
NVNT	n40	2422	Ant2	2310	-59	4.48	0.24	40.98	Average	54	Pass
NVNT	n40	2422	Ant2	2389.236	-33.64	4.48	-	66.1	Peak	74	Pass
NVNT	n40	2422	Ant2	2388.952	-52.84	4.48	0.24	47.14	Average	54	Pass

NVNT	n40	2422	Ant2	2390	-40.96	4.48	-	58.78	Peak	74	Pass
NVNT	n40	2422	Ant2	2390	-53.13	4.48	0.24	46.85	Average	54	Pass
NVNT	n40	2452	Ant2	2483.5	-37.65	4.48	-	62.09	Peak	74	Pass
NVNT	n40	2452	Ant2	2483.5	-55.13	4.48	0.24	44.85	Average	54	Pass
NVNT	n40	2452	Ant2	2483.62	-33.1	4.48	-	66.64	Peak	74	Pass
NVNT	n40	2452	Ant2	2483.62	-55.72	4.48	0.24	44.26	Average	54	Pass
NVNT	n40	2452	Ant2	2500	-48.94	4.48	-	50.8	Peak	74	Pass
NVNT	n40	2452	Ant2	2500	-58.17	4.48	0.24	41.81	Average	54	Pass

Restrict Band NVNT n20 2462MHz Ant2 Peak

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.473500000 GHz
Ref Offset 1.88 dB
Ref 20.00 dBm
Mkr1 2.464 543 GHz
2.387 dBm
Start 2.44700 GHz
#Res BW 1.0 MHz
Stop 2.50000 GHz
Sweep 1.000 ms (1001 pts)
#VBW 3.0 MHz

MKR	MODE	FREQ	PWR
1	N	2.464 543 GHz	-2.387 dBm
2	N	2.483 500 GHz	-40.936 dBm
3	N	2.500 000 GHz	-49.778 dBm
4	N	2.484 206 GHz	-35.473 dBm

Agilent Spectrum Analyzer - Swept SA

R RF SQ Q AC SENSE:PULSE ALIGN:AUTO 10:48:36 PM Oct 23, 2025
 TRACE [1] 2 3 4 5 6 TYPE A WWWWMMW DET A NNNN N N

Center Freq 2.473500000 GHz

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

Ref Offset 1.88 dB Ref 20.00 dBm Mkr1 2.458 395 GHz -5.734 dBm

MKR MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	f	2.458 395 GHz	-5.734 dBm			
2	N	f	2.483 500 GHz	-56.999 dBm			
3	N	f	2.500 000 GHz	-58.338 dBm			
4	N	f	2.483 729 GHz	-56.464 dBm			
5							
6							
7							
8							
9							
10							
11							

Start 2.44700 GHz Stop 2.50000 GHz
 #Res BW 1.0 MHz #VBW 3.0 MHz* Sweep 1.000 ms (1001 pts)

MSG STATUS

