



Appendix A

RF Test Data for 2.4G WIFI (Conducted Measurement)

Product Name: SMART Wifi LIGHTS CONTROLLER

Trade Mark: N/A

Test Model: CCWIFIRGB

Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	100.0 kPa
Test Engineer:	Kay Hu
Supervised by:	Li huan



Appendix A.1: 6dB Bandwidth

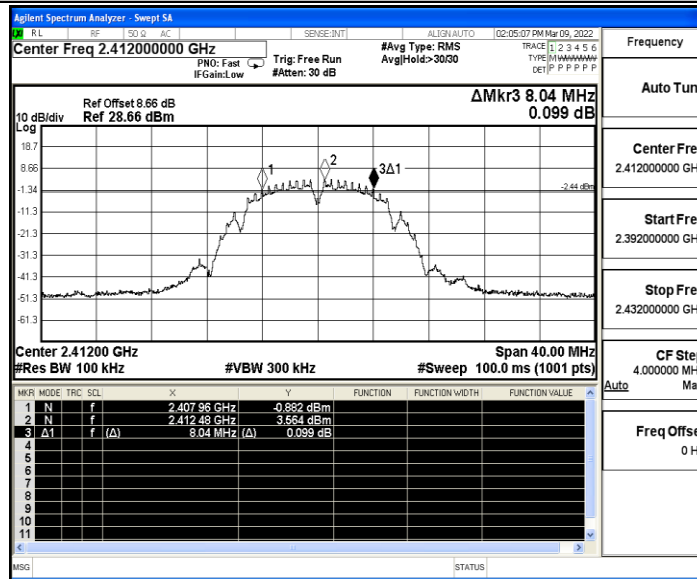
Test Result

TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	8.040	2407.960	2416.000	0.5	PASS
		2437	8.040	2432.960	2441.000	0.5	PASS
		2462	8.040	2457.960	2466.000	0.5	PASS
11G	Ant1	2412	16.320	2403.840	2420.160	0.5	PASS
		2437	16.320	2428.840	2445.160	0.5	PASS
		2462	16.360	2453.800	2470.160	0.5	PASS
11N20SISO	Ant1	2412	17.040	2403.440	2420.480	0.5	PASS
		2437	17.040	2428.440	2445.480	0.5	PASS
		2462	17.040	2453.440	2470.480	0.5	PASS

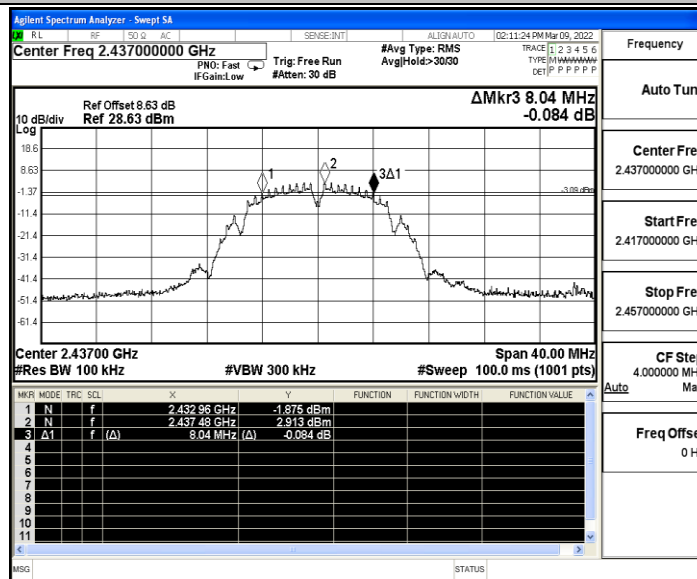


Test Graphs

11B_Ant1_2412

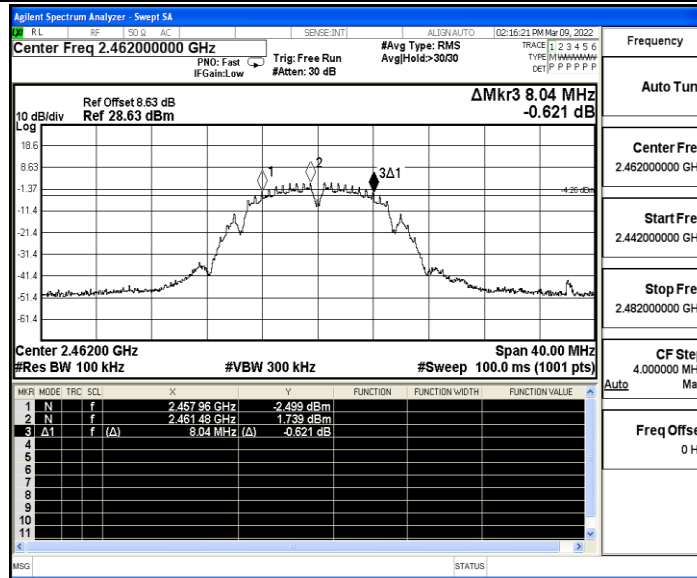


11B_Ant1_2437

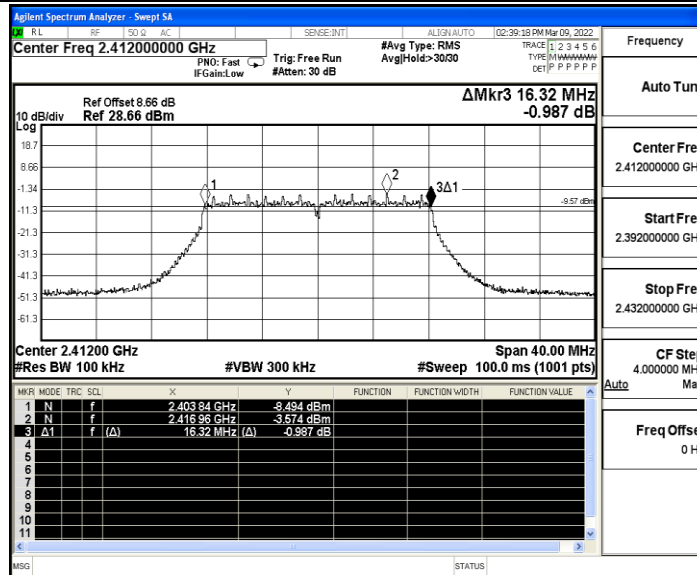




11B_Ant1_2462

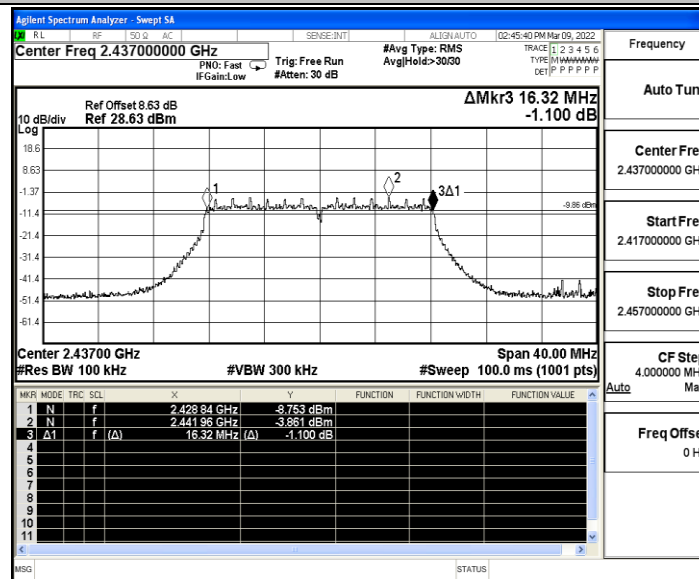


11G_Ant1_2412

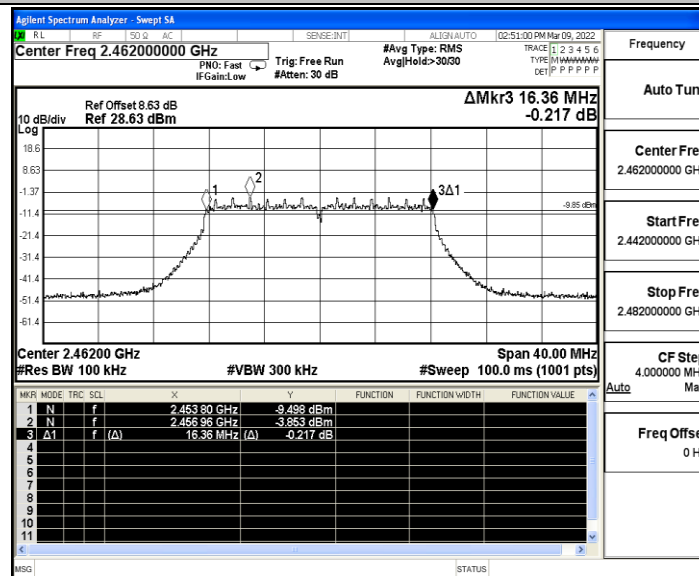




11G_Ant1_2437

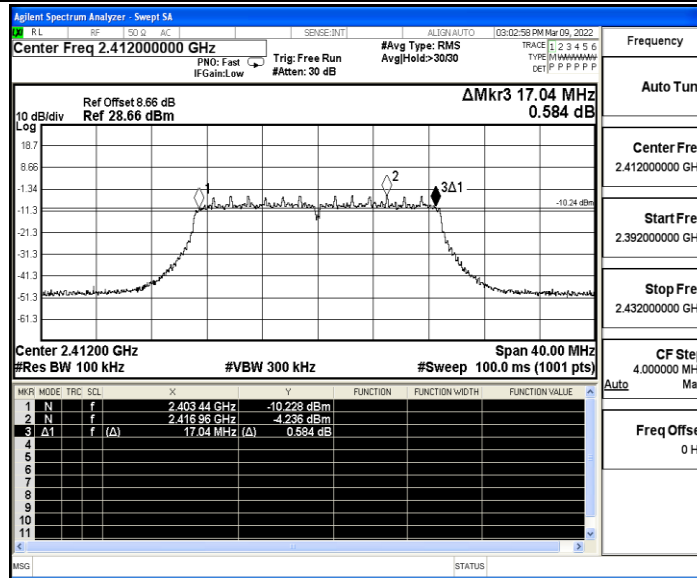


11G_Ant1_2462

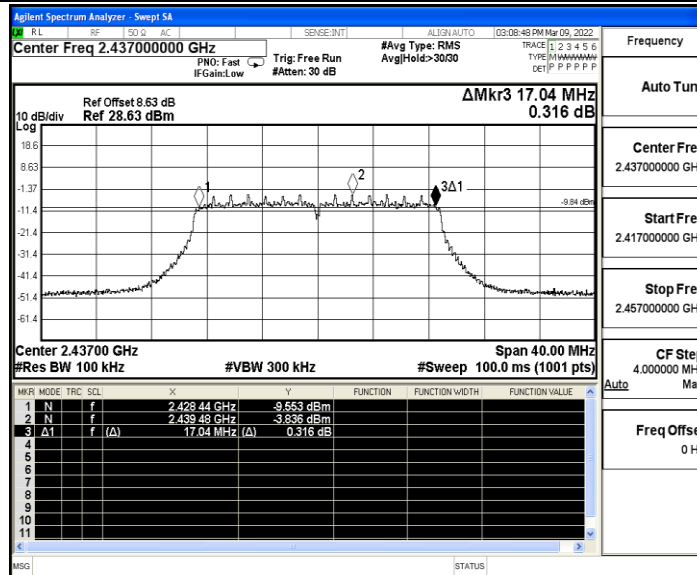




11N20SISO_Ant1_2412

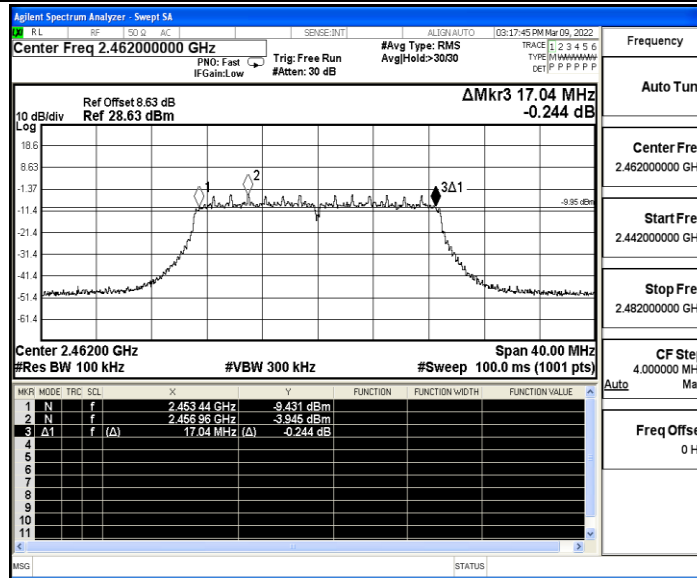


11N20SISO_Ant1_2437





11N20SISO_Ant1_2462





Appendix A.2: Occupied Channel Bandwidth

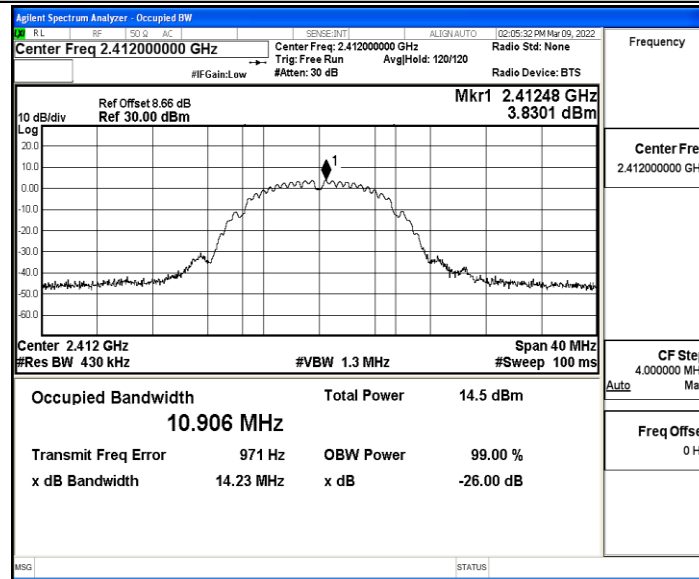
Test Result

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	10.906	2406.548	2417.454	---	---
		2437	10.994	2431.490	2442.484	---	---
		2462	11.023	2456.448	2467.471	---	---
11G	Ant1	2412	16.761	2403.632	2420.393	---	---
		2437	16.750	2428.587	2445.337	---	---
		2462	16.761	2453.587	2470.348	---	---
11N20SISO	Ant1	2412	17.662	2403.148	2420.810	---	---
		2437	17.653	2428.151	2445.804	---	---
		2462	17.660	2453.119	2470.779	---	---

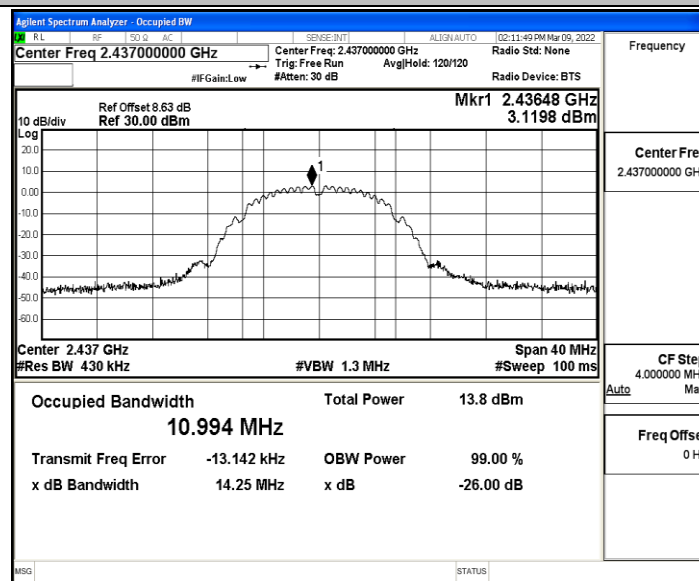


Test Graphs

11B_Ant1_2412

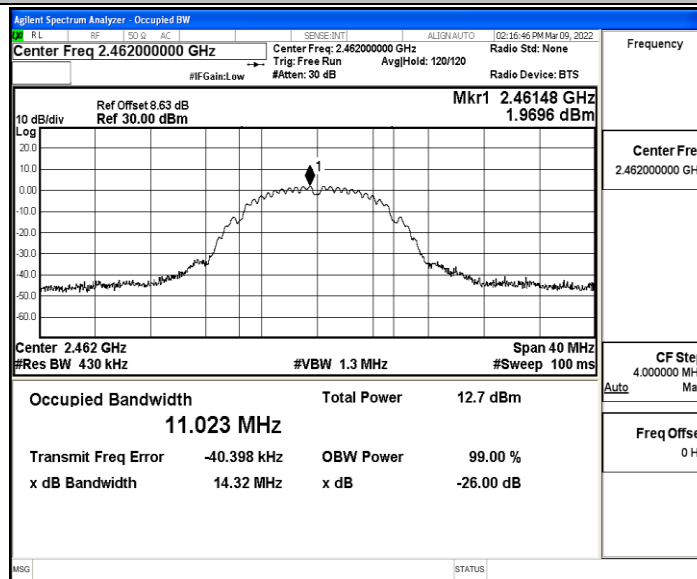


11B_Ant1_2437

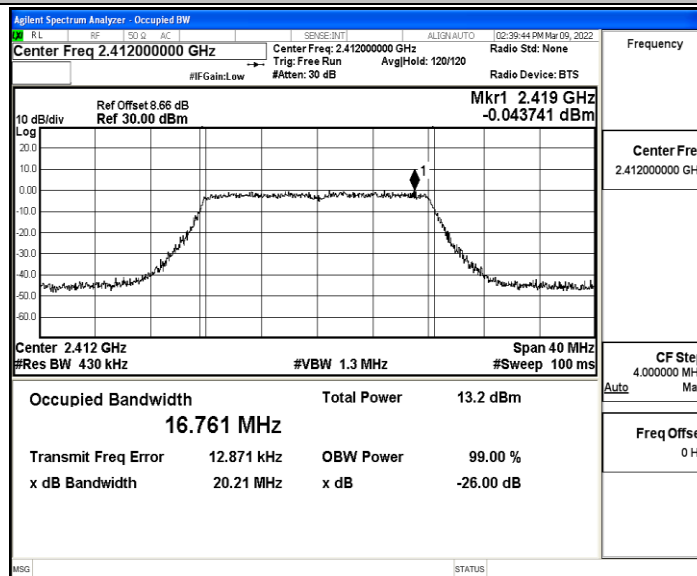




11B_Ant1_2462

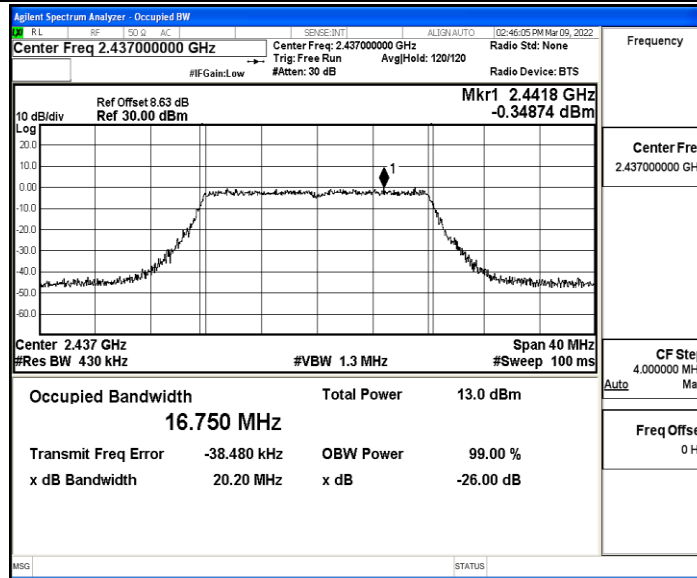


11G_Ant1_2412

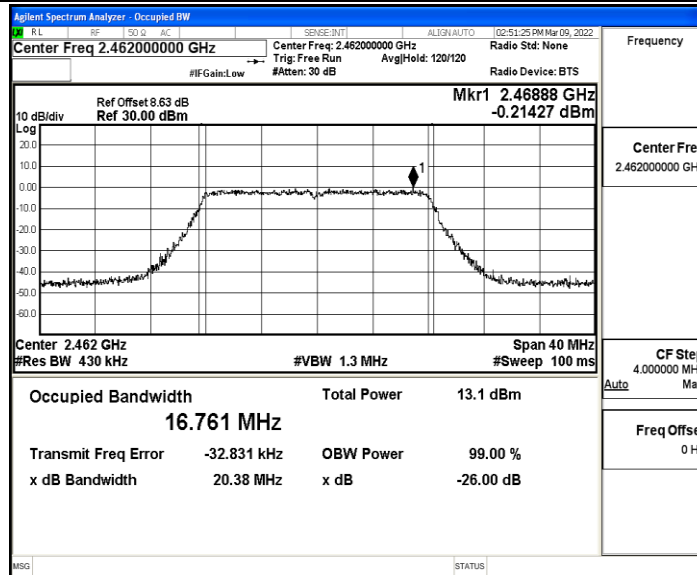




11G_Ant1_2437

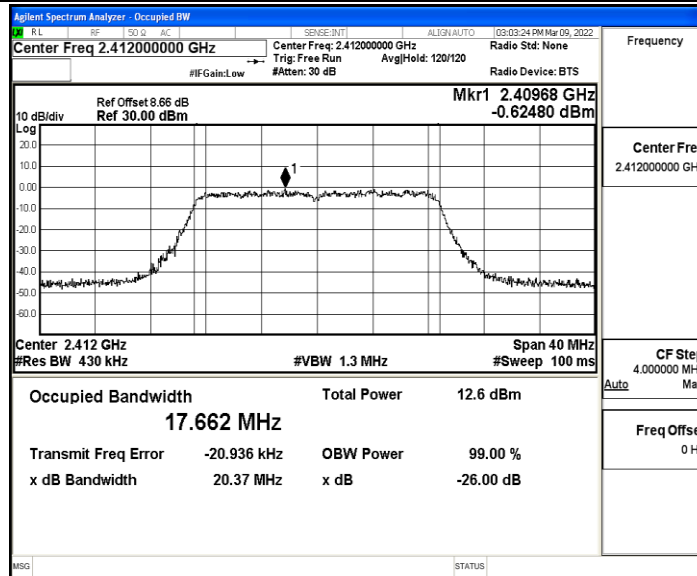


11G_Ant1_2462

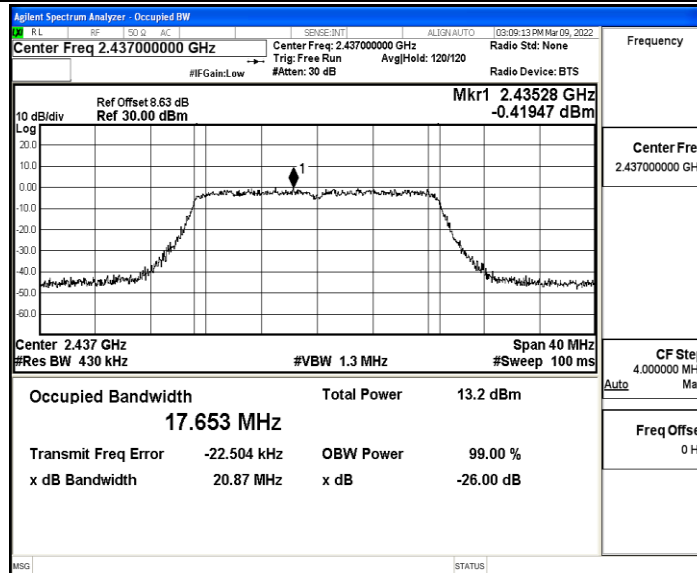




11N20SISO_Ant1_2412

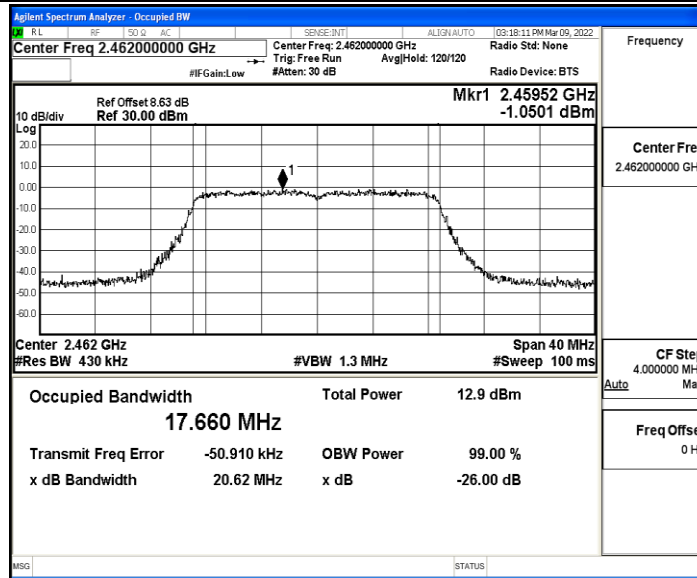


11N20SISO_Ant1_2437





11N20SISO_Ant1_2462





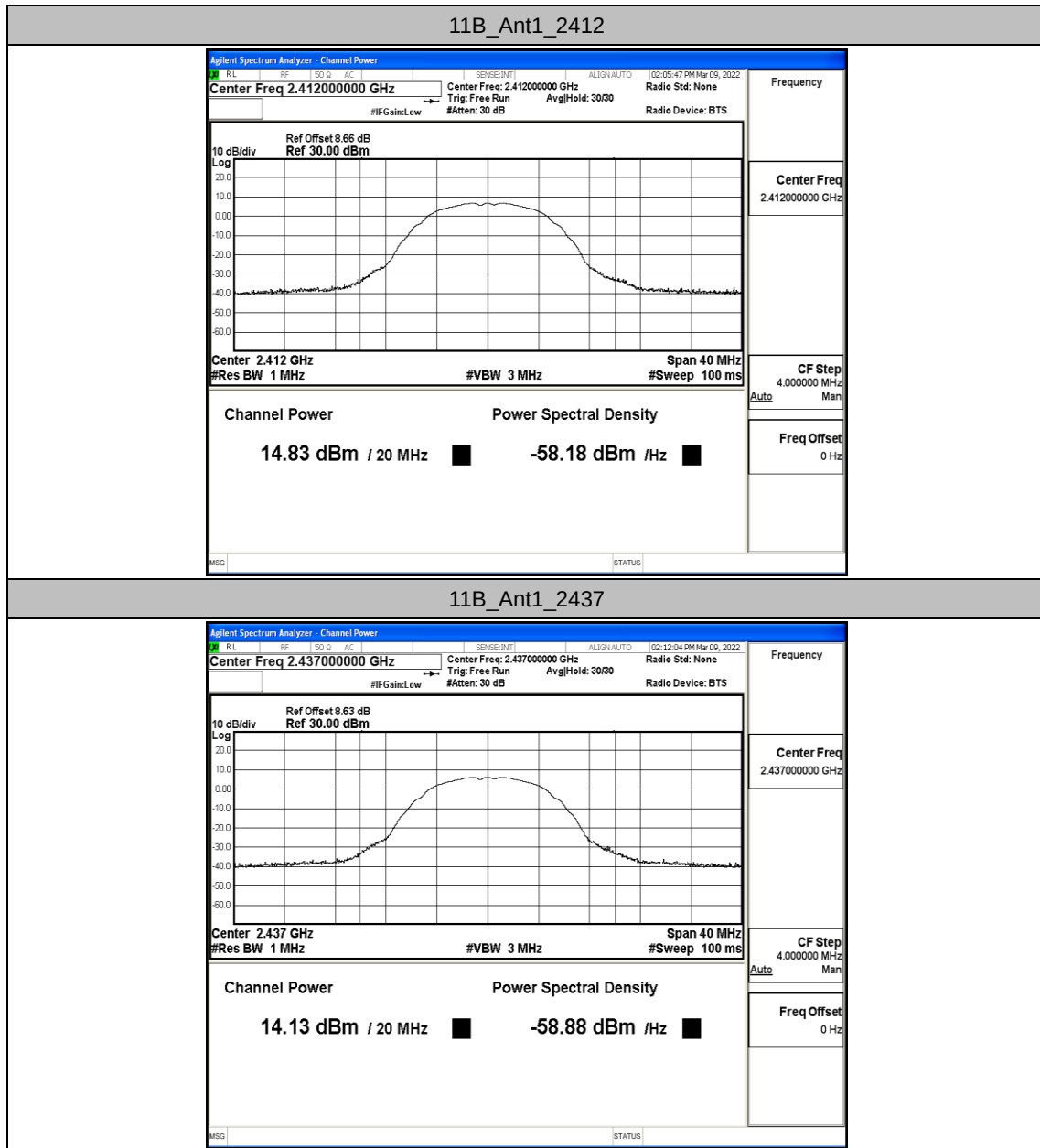
Appendix A.3: Maximum conducted output power

Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	2412	14.83	≤30.00	PASS
		2437	14.13	≤30.00	PASS
		2462	13.04	≤30.00	PASS
11G	Ant1	2412	15.50	≤30.00	PASS
		2437	15.50	≤30.00	PASS
		2462	15.52	≤30.00	PASS
11N20SISO	Ant1	2412	15.07	≤30.00	PASS
		2437	15.62	≤30.00	PASS
		2462	15.37	≤30.00	PASS

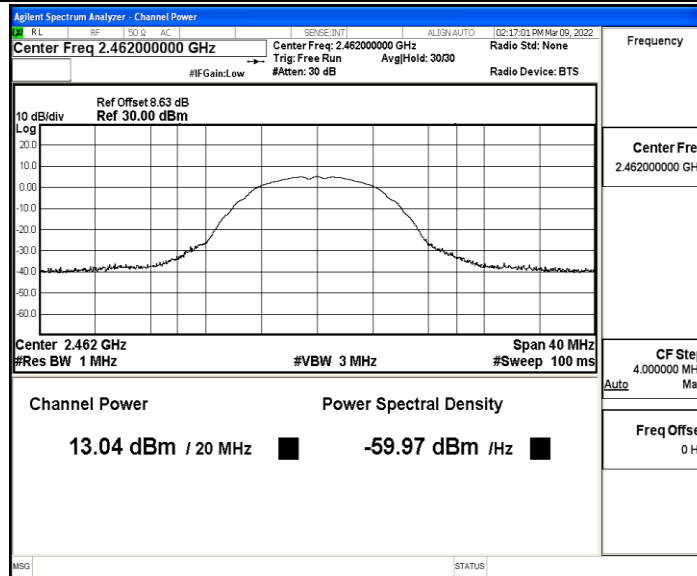


Test Graphs

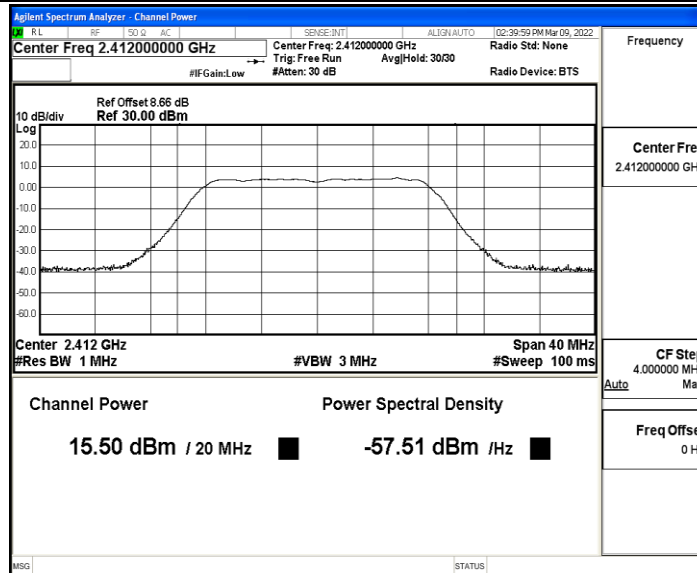




11B_Ant1_2462

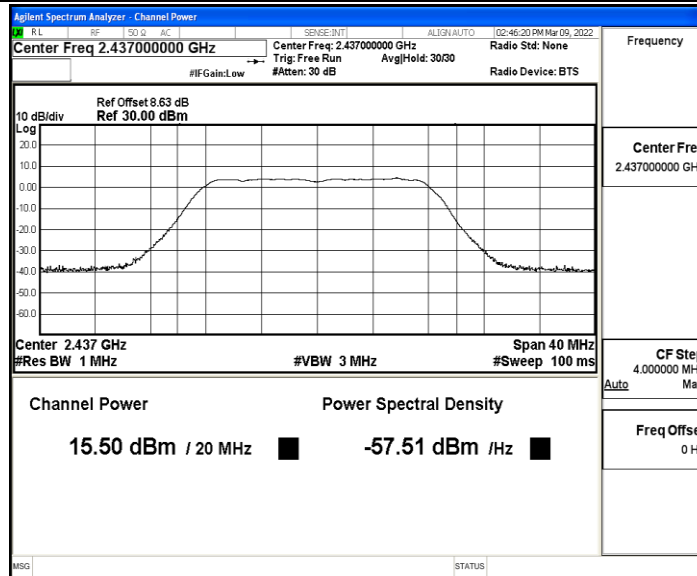


11G_Ant1_2412

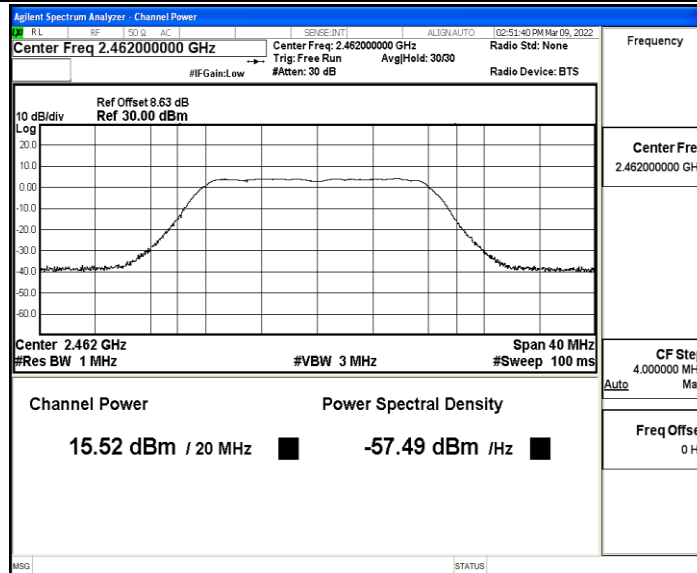




11G_Ant1_2437

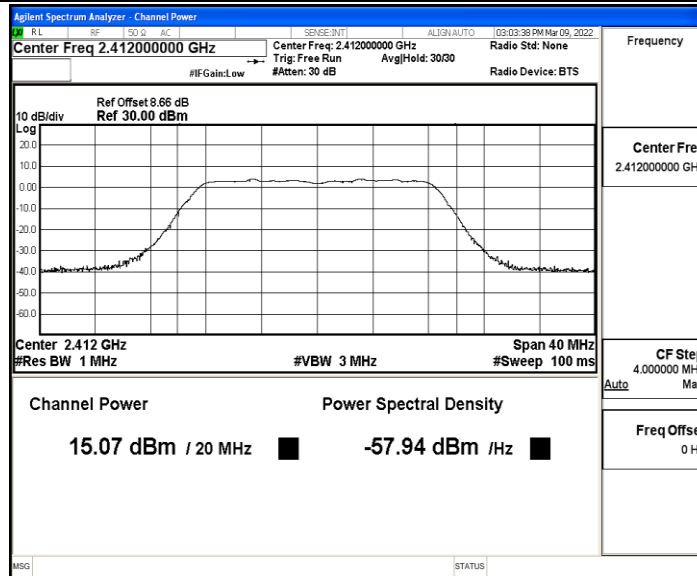


11G_Ant1_2462

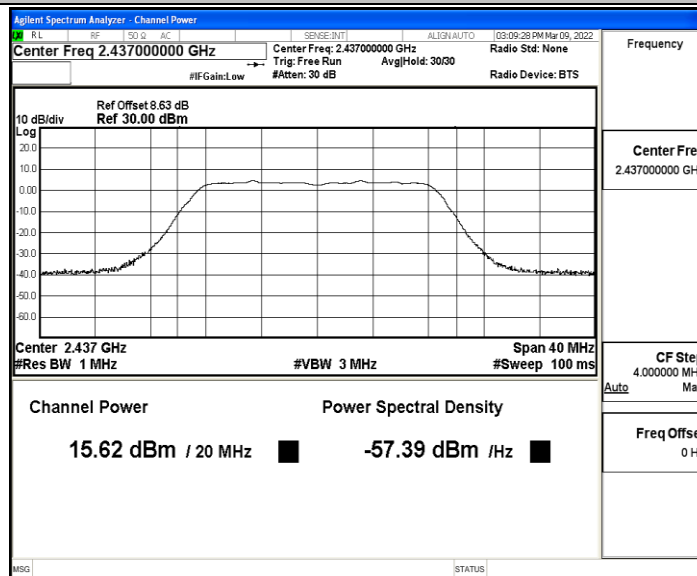




11N20SISO_Ant1_2412

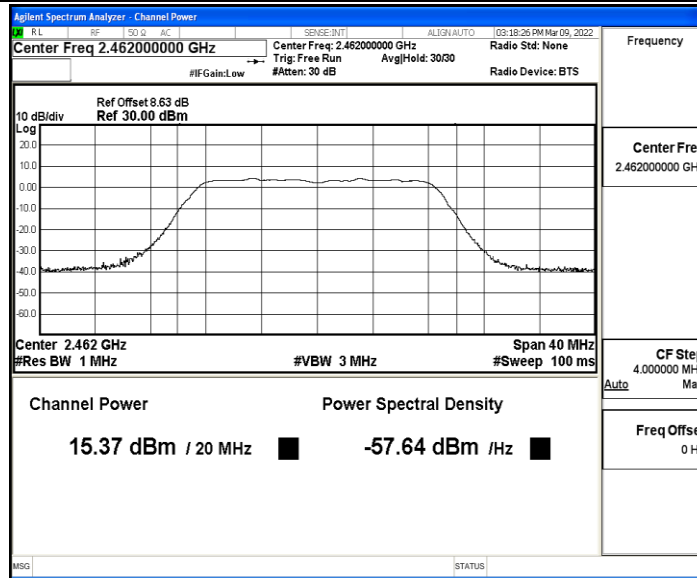


11N20SISO_Ant1_2437





11N20SISO_Ant1_2462





Appendix A.4: Maximum power spectral density

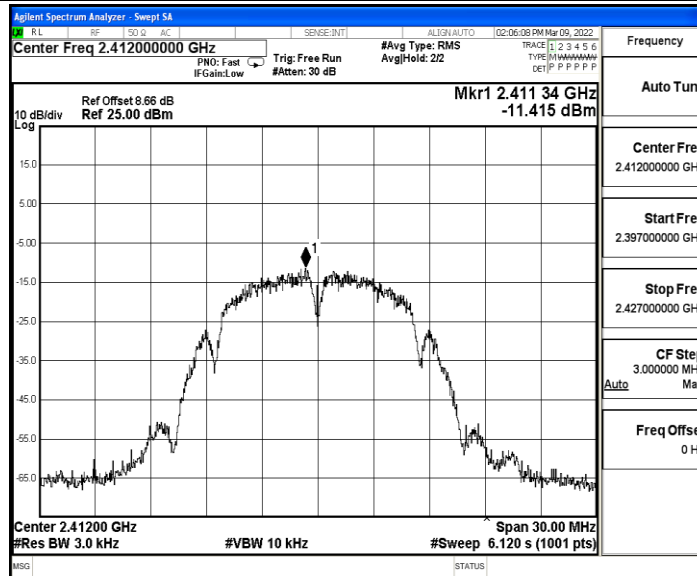
Test Result

TestMode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-11.42	≤8.00	PASS
		2437	-12.3	≤8.00	PASS
		2462	-13.42	≤8.00	PASS
11G	Ant1	2412	-17.71	≤8.00	PASS
		2437	-17.48	≤8.00	PASS
		2462	-17.8	≤8.00	PASS
11N20SISO	Ant1	2412	-18.5	≤8.00	PASS
		2437	-17.7	≤8.00	PASS
		2462	-18.18	≤8.00	PASS

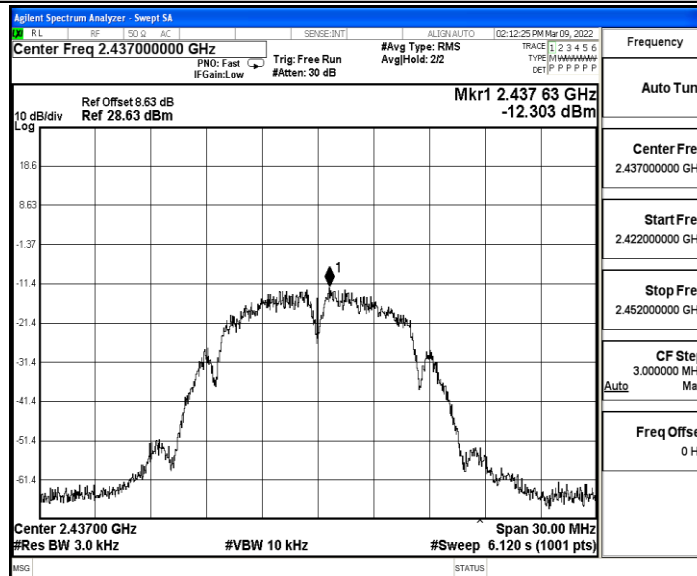


Test Graphs

11B_Ant1_2412

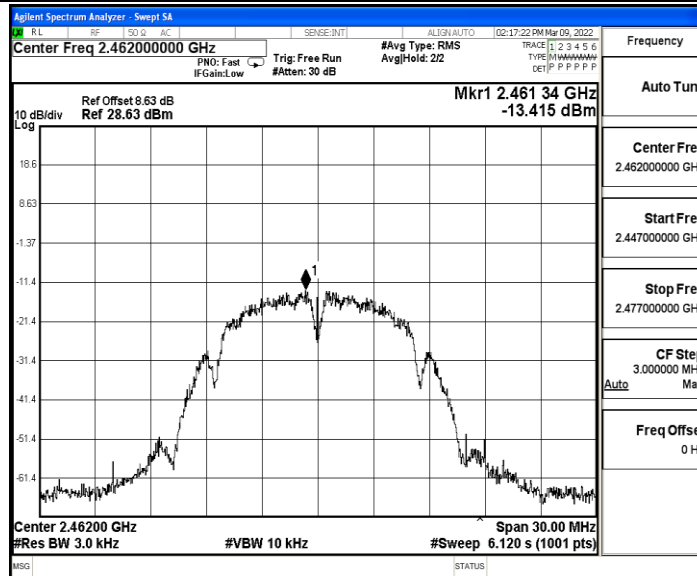


11B_Ant1_2437

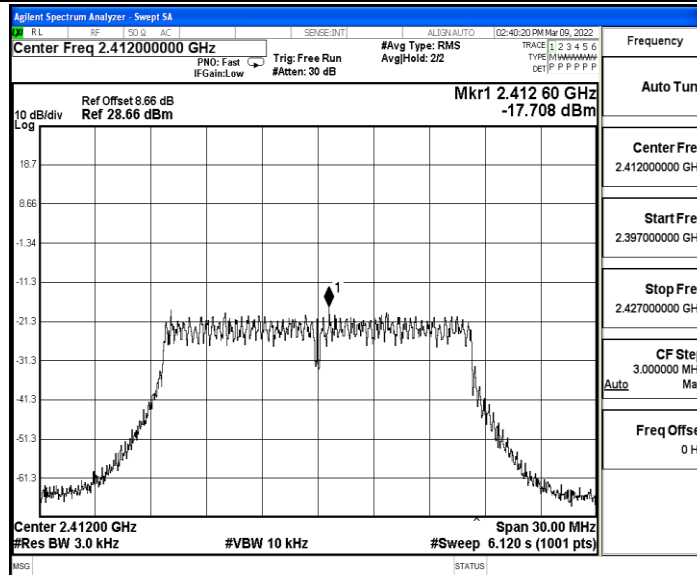




11B_Ant1_2462

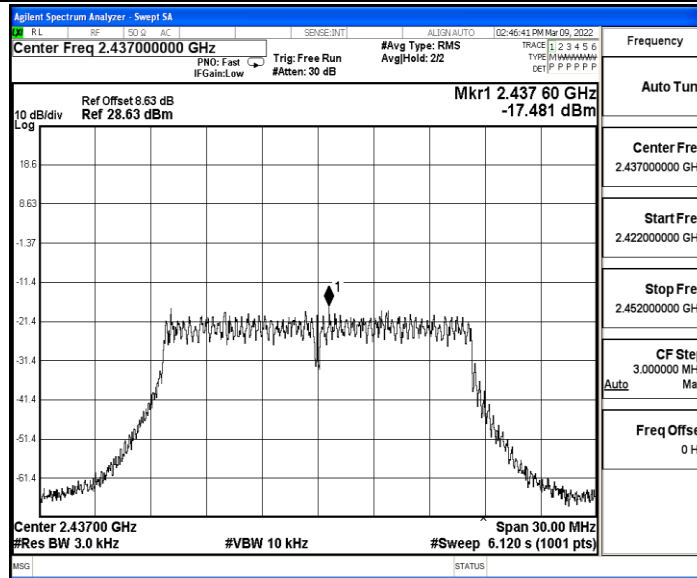


11G_Ant1_2412

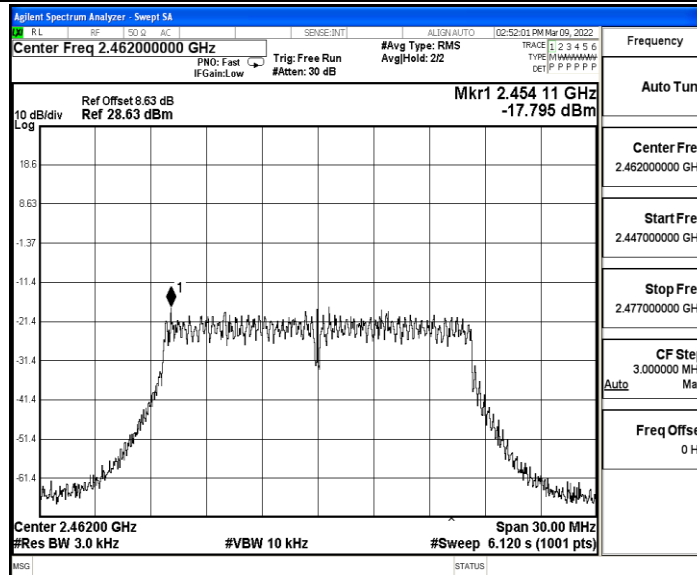




11G_Ant1_2437

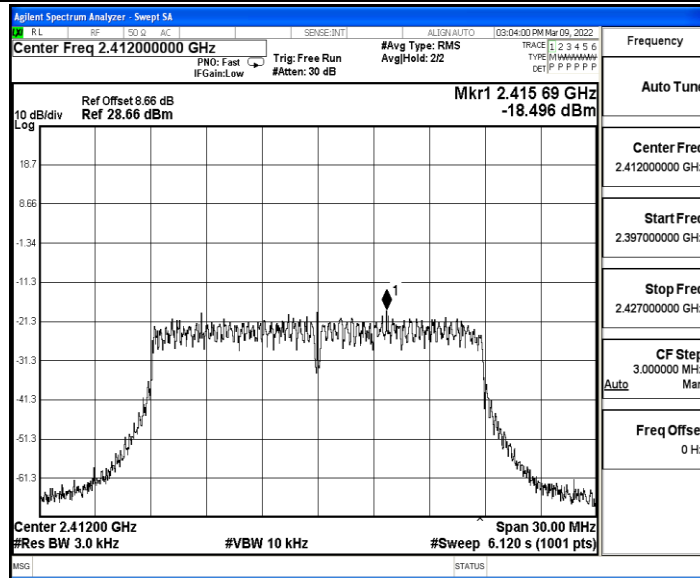


11G_Ant1_2462

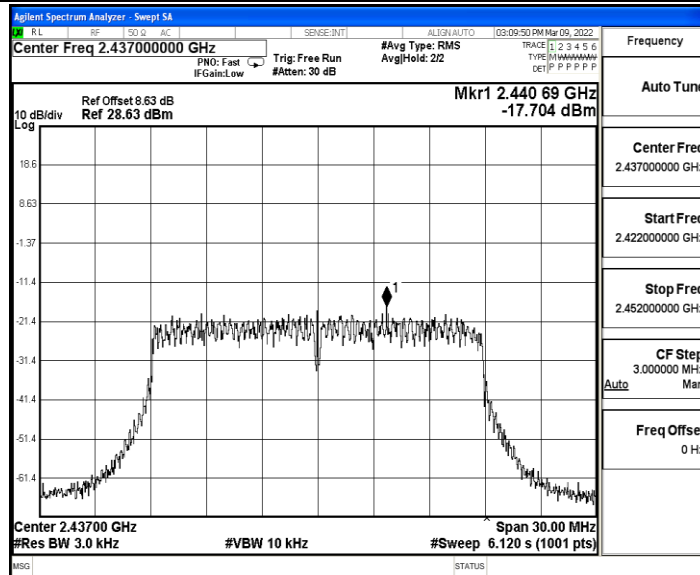




11N20SISO_Ant1_2412

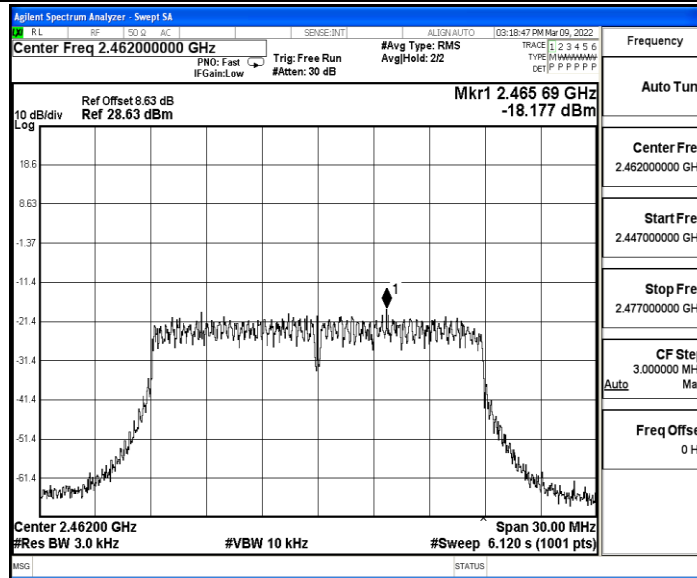


11N20SISO_Ant1_2437





11N20SISO_Ant1_2462





Appendix A.5: Band edge measurements

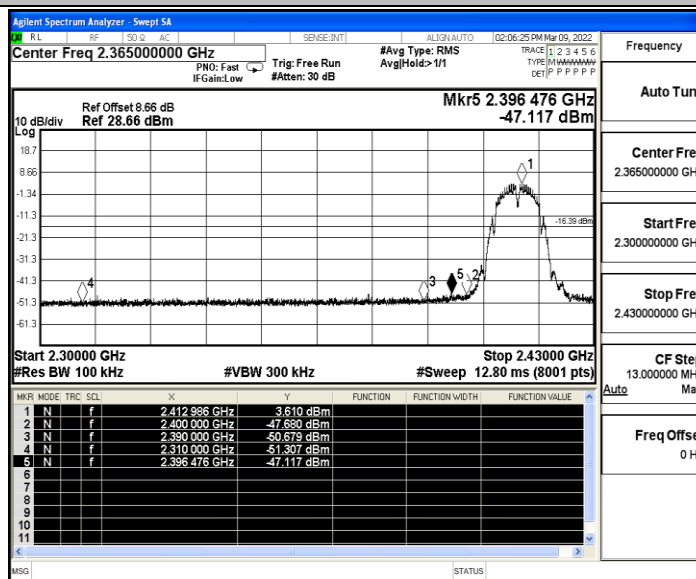
Test Result

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	3.61	-47.12	≤ -16.39	PASS
		High	2462	1.71	-47.34	≤ -18.29	PASS
11G	Ant1	Low	2412	-3.87	-44.64	≤ -23.87	PASS
		High	2462	-3.51	-46.9	≤ -23.51	PASS
11N20SISO	Ant1	Low	2412	-3.97	-43.77	≤ -23.97	PASS
		High	2462	-3.82	-46.66	≤ -23.82	PASS

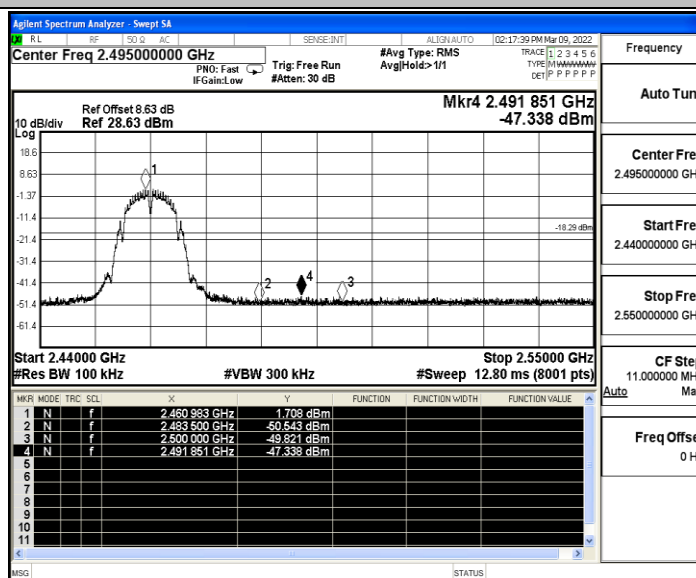


Test Graphs

11B_Ant1_Low_2412

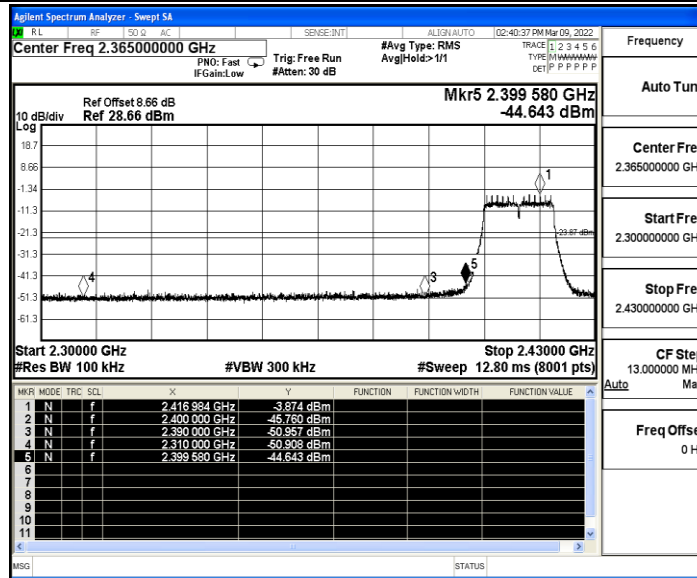


11B_Ant1_High_2462

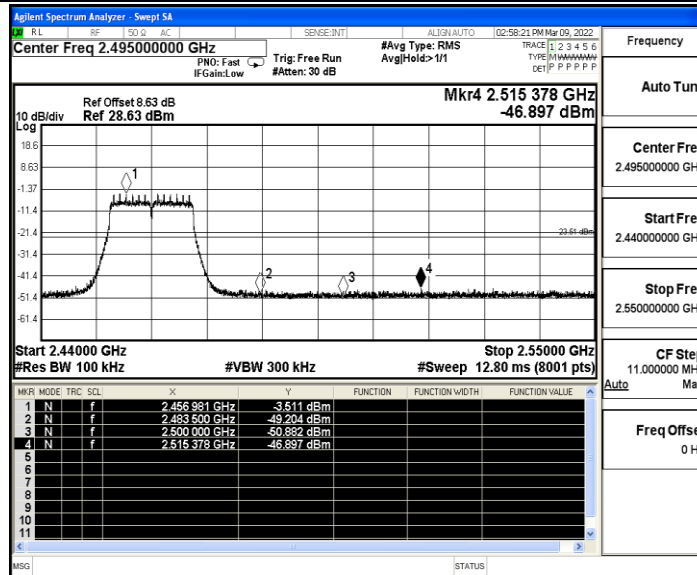




11G_Ant1_Low_2412

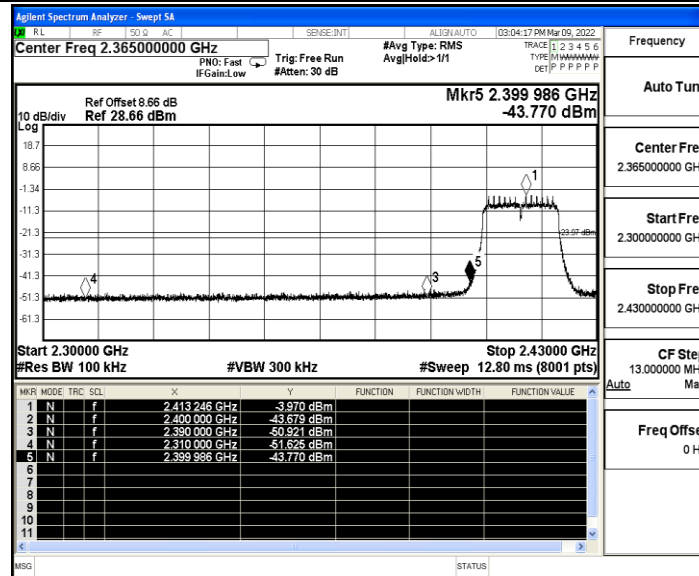


11G_Ant1_High_2462

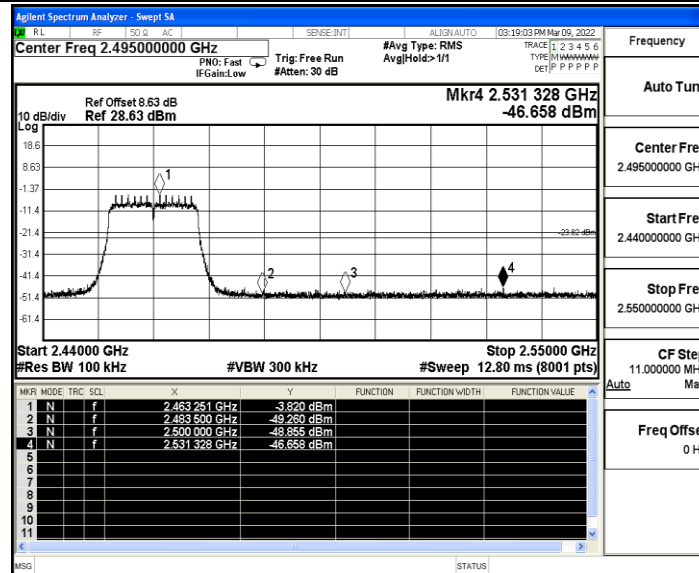




11N20SISO_Ant1_Low_2412



11N20SISO_Ant1_High_2462





Appendix A.6: Conducted Spurious Emission

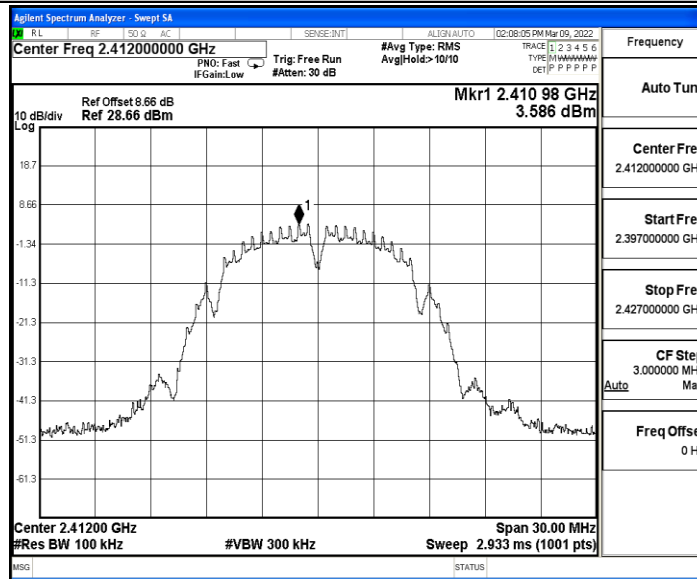
Test Result

TestMode	Antenna	Channel	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	Reference	3.59	3.59	---	PASS
			30~1000	3.59	-60.32	≤-16.41	PASS
			1000~26500	3.59	-45.96	≤-16.41	PASS
		2437	Reference	2.82	2.82	---	PASS
			30~1000	2.82	-60.71	≤-17.18	PASS
			1000~26500	2.82	-46.26	≤-17.18	PASS
		2462	Reference	1.49	1.49	---	PASS
			30~1000	1.49	-60.85	≤-18.51	PASS
			1000~26500	1.49	-46.15	≤-18.51	PASS
11G	Ant1	2412	Reference	-3.75	-3.75	---	PASS
			30~1000	-3.75	-48.49	≤-23.75	PASS
			1000~26500	-3.75	-46.21	≤-23.75	PASS
		2437	Reference	-3.79	-3.79	---	PASS
			30~1000	-3.79	-60.56	≤-23.79	PASS
			1000~26500	-3.79	-46.51	≤-23.79	PASS
		2462	Reference	-3.45	-3.45	---	PASS
			30~1000	-3.45	-60.47	≤-23.45	PASS
			1000~26500	-3.45	-45.38	≤-23.45	PASS
11N20SISO	Ant1	2412	Reference	-3.98	-3.98	---	PASS
			30~1000	-3.98	-54.79	≤-23.98	PASS
			1000~26500	-3.98	-45.66	≤-23.98	PASS
		2437	Reference	-3.43	-3.43	---	PASS
			30~1000	-3.43	-60.44	≤-23.43	PASS
			1000~26500	-3.43	-44.45	≤-23.43	PASS
		2462	Reference	-3.66	-3.66	---	PASS
			30~1000	-3.66	-45.53	≤-23.66	PASS
			1000~26500	-3.66	-45.56	≤-23.66	PASS

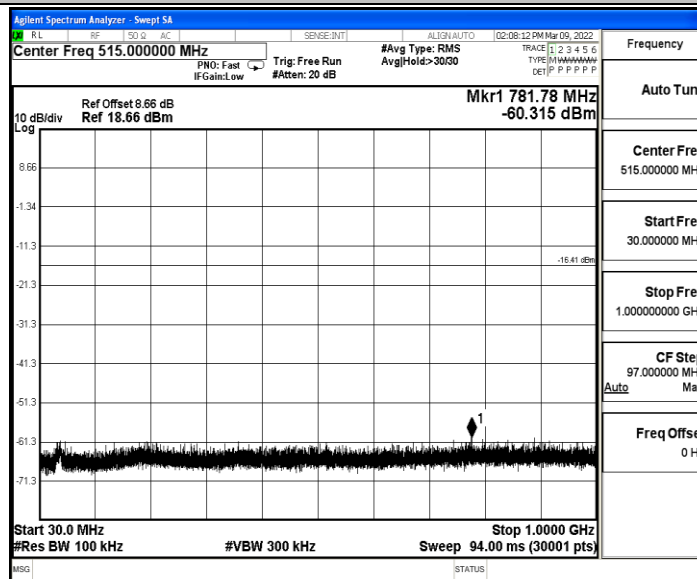


Test Graphs

11B_Ant1_2412_0~Reference

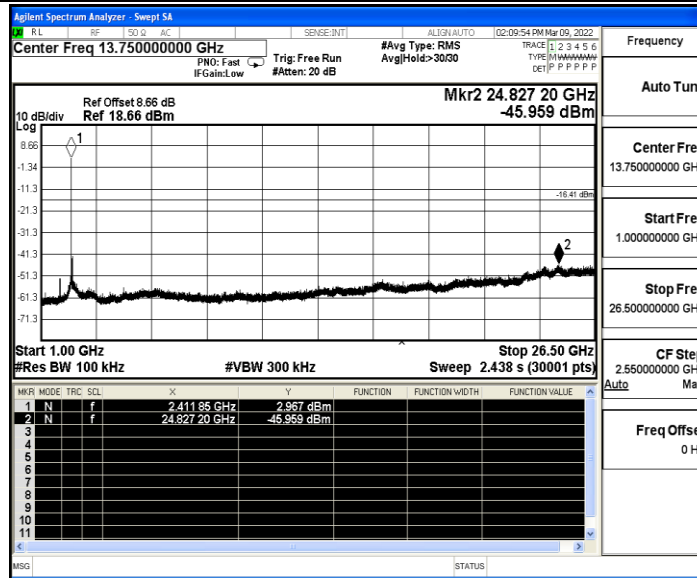


11B_Ant1_2412_30~1000

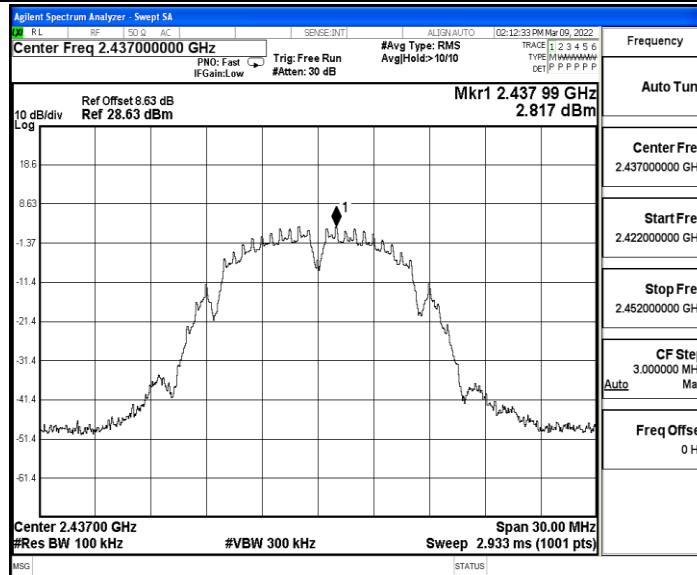




11B_Ant1_2412_1000~26500

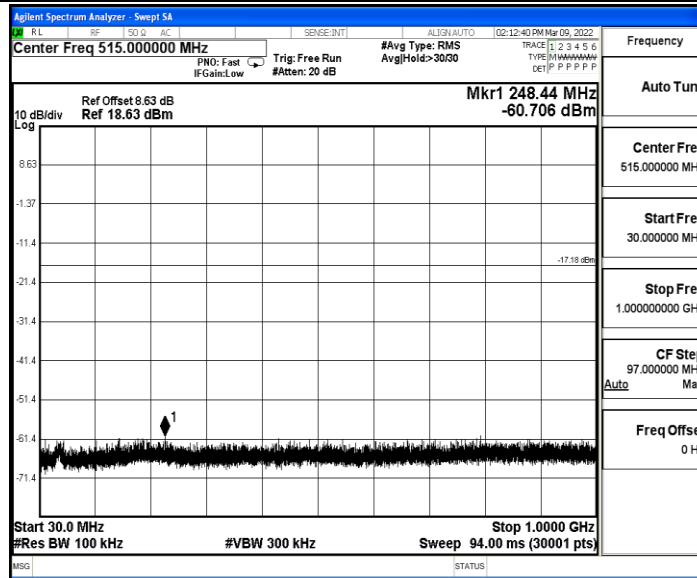


11B_Ant1_2437_0~Reference

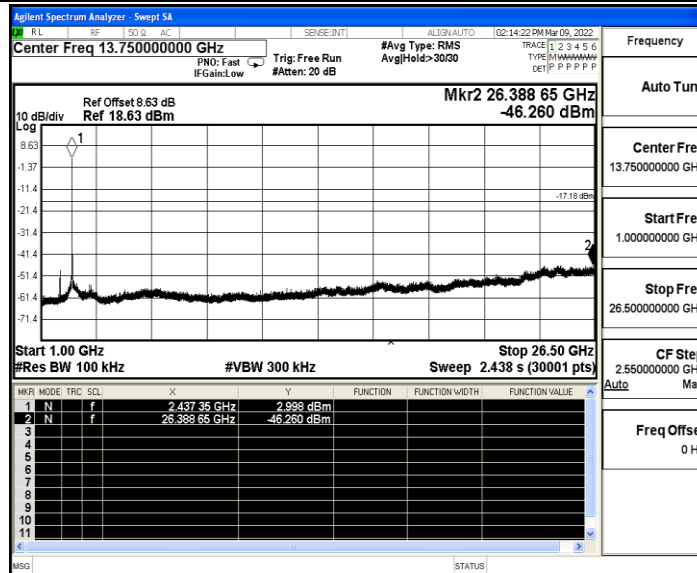




11B_Ant1_2437_30~1000

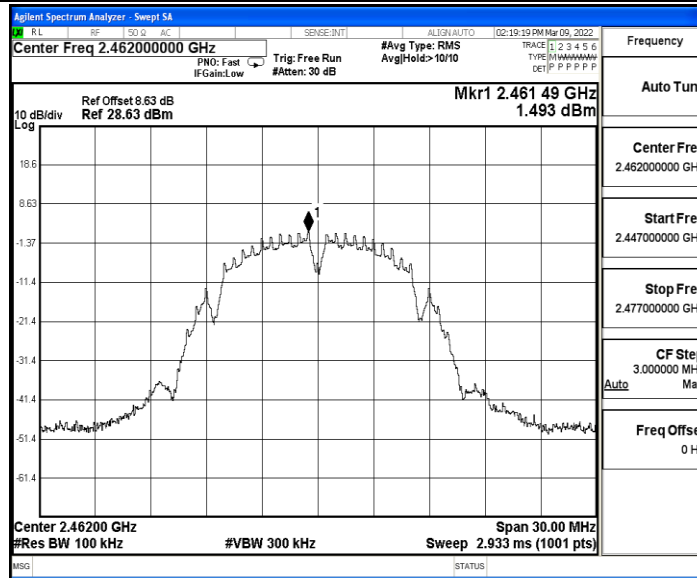


11B_Ant1_2437_1000~26500

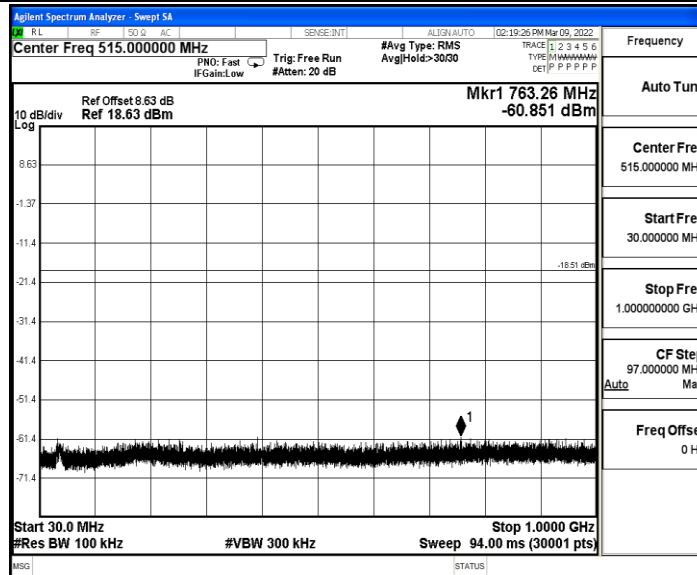




11B_Ant1_2462_0~Reference

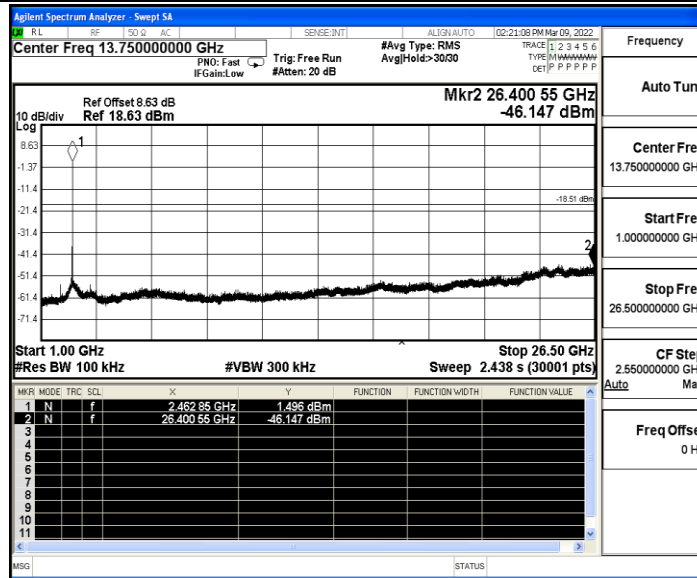


11B_Ant1_2462_30~1000

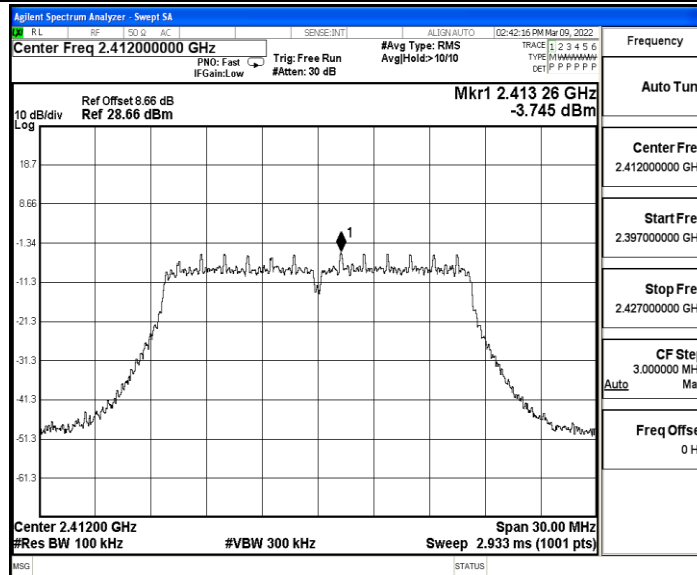




11B_Ant1_2462_1000~26500

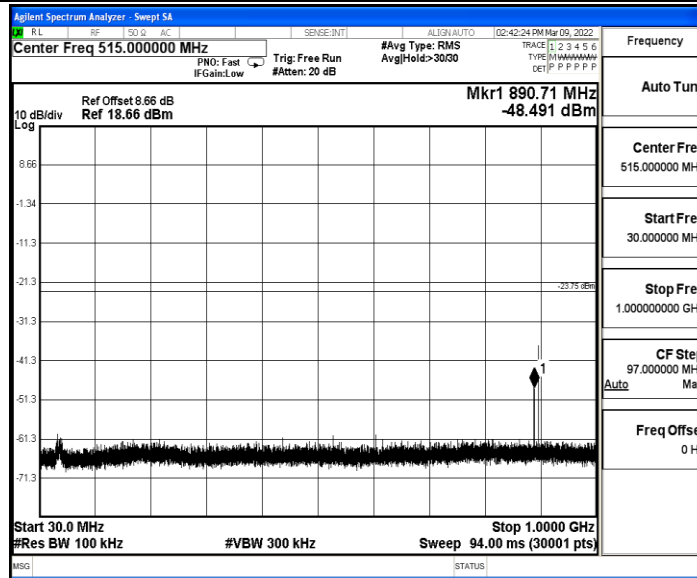


11G_Ant1_2412_0~Reference

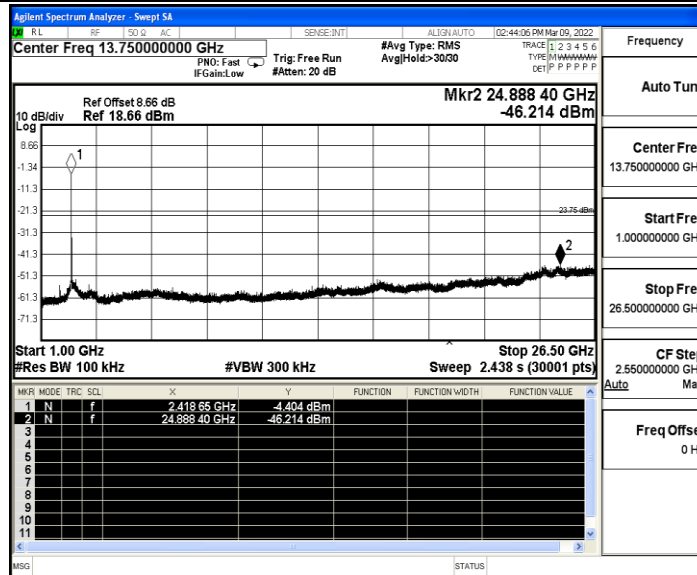




11G_Ant1_2412_30~1000

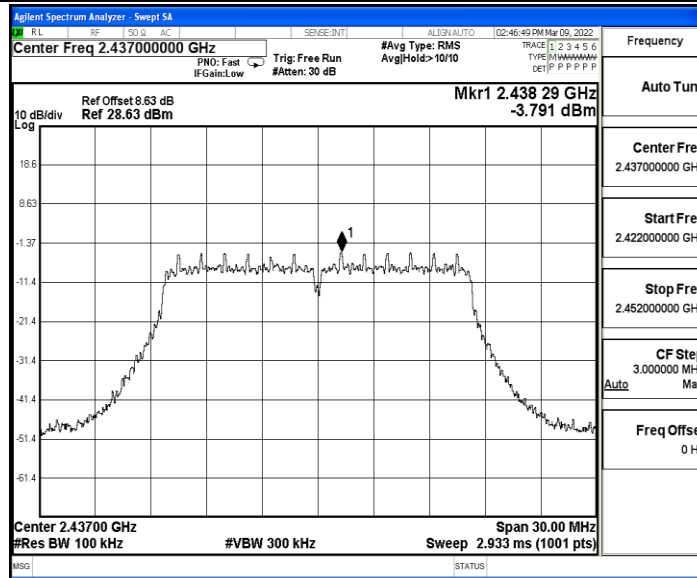


11G_Ant1_2412_1000~26500

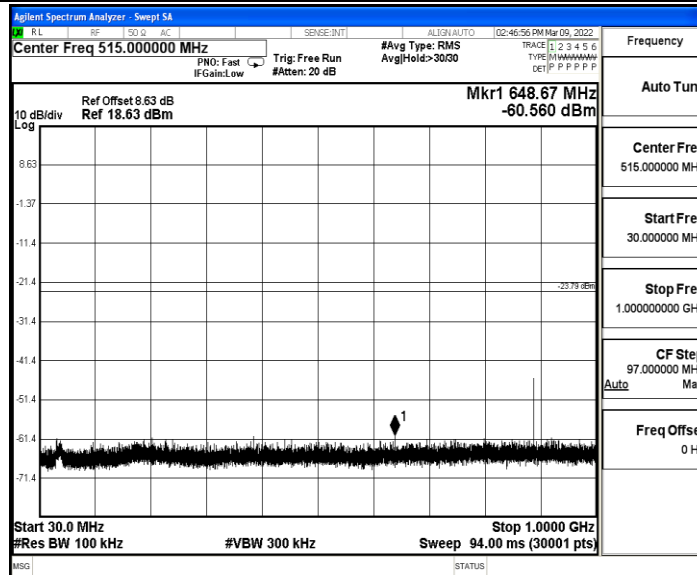




11G_Ant1_2437_0~Reference

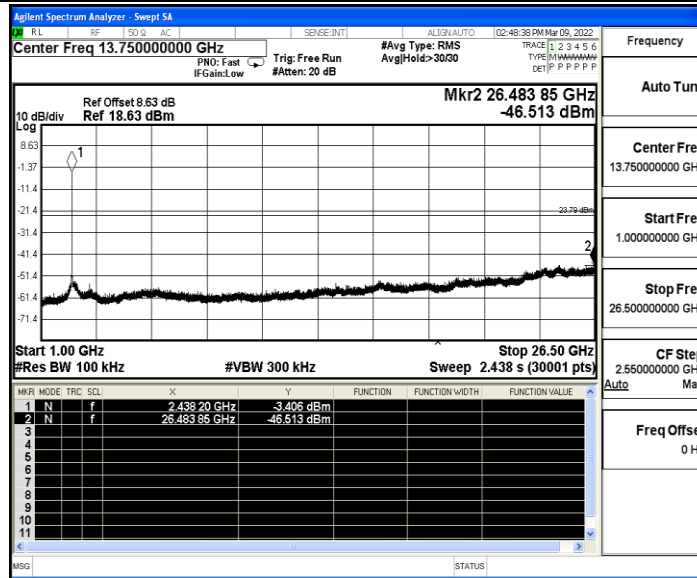


11G_Ant1_2437_30~1000

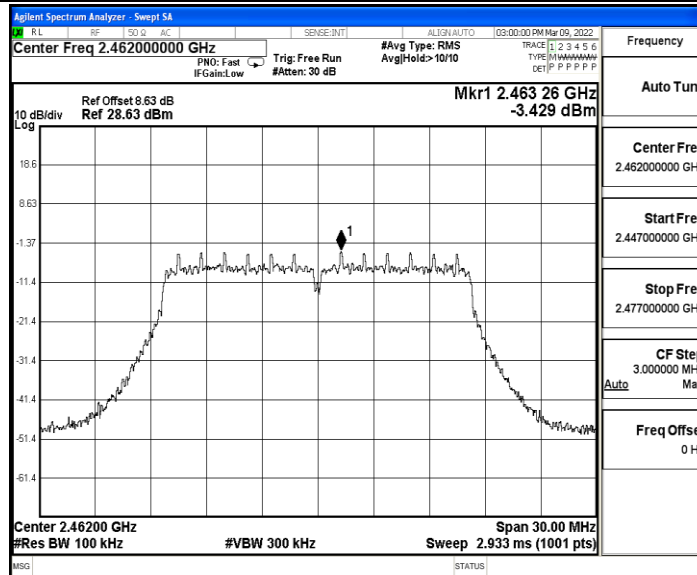




11G_Ant1_2437_1000~26500

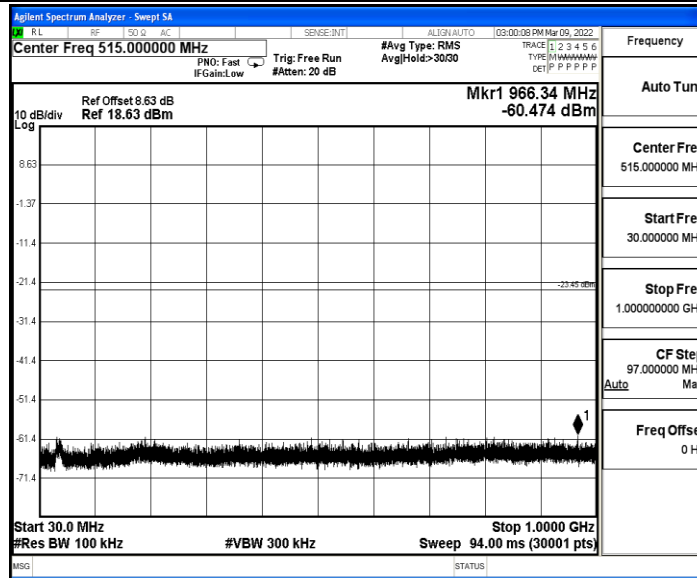


11G_Ant1_2462_0~Reference

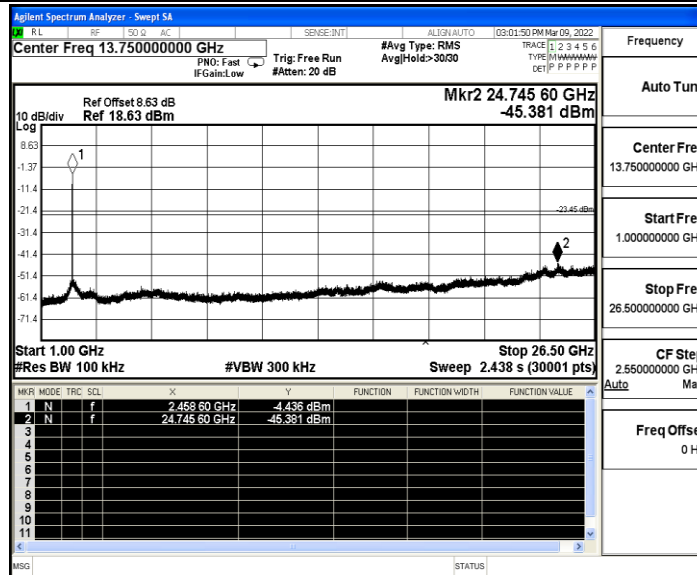




11G_Ant1_2462_30~1000

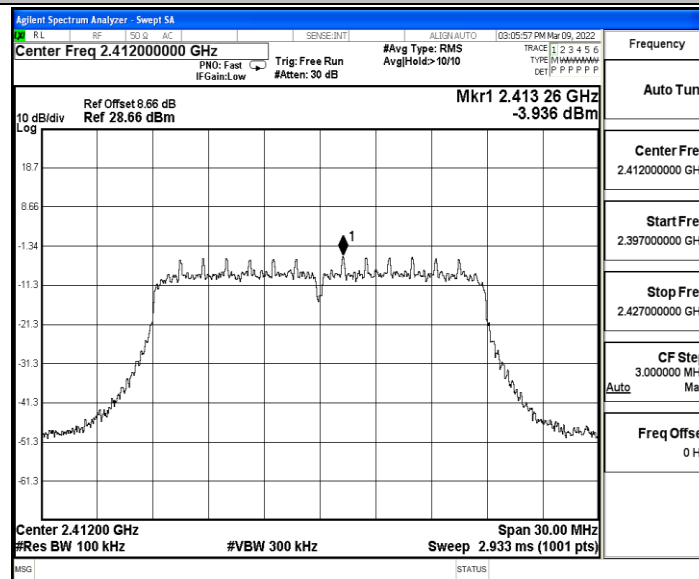


11G_Ant1_2462_1000~26500

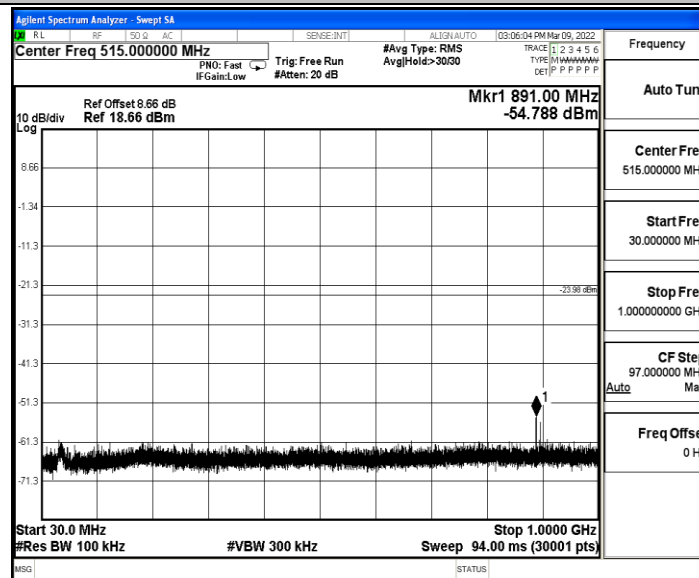




11N20SISO_Ant1_2412_0~Reference

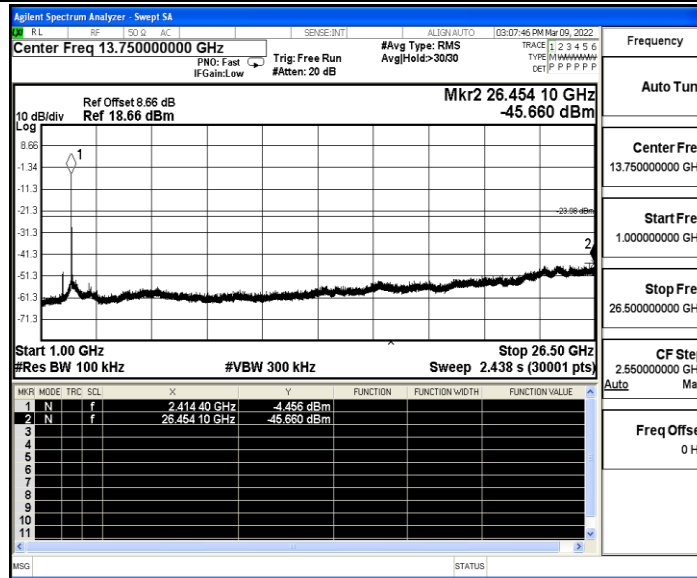


11N20SISO_Ant1_2412_30~1000

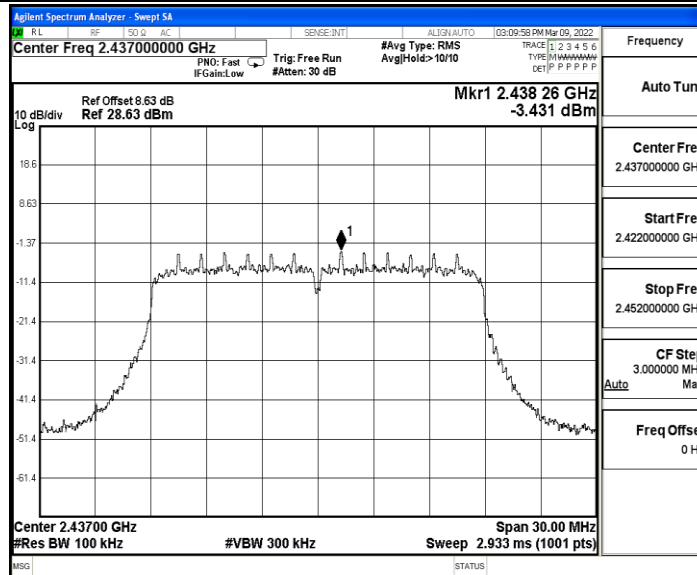




11N20SISO_Ant1_2412_1000~26500

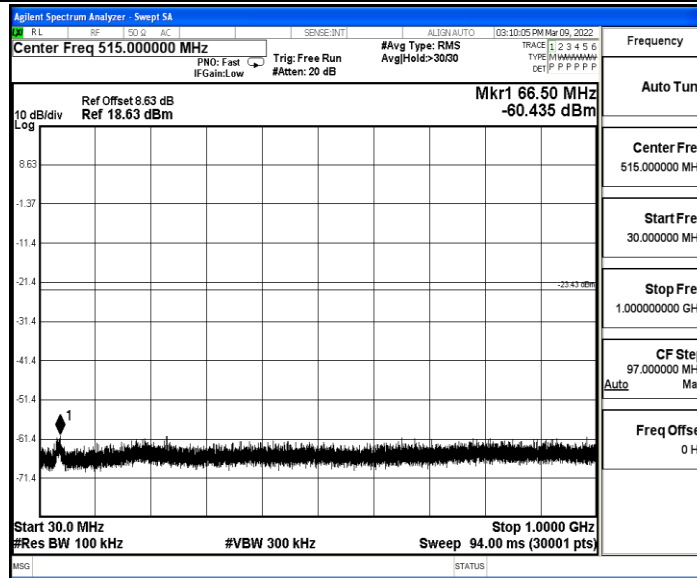


11N20SISO_Ant1_2437_0~Reference

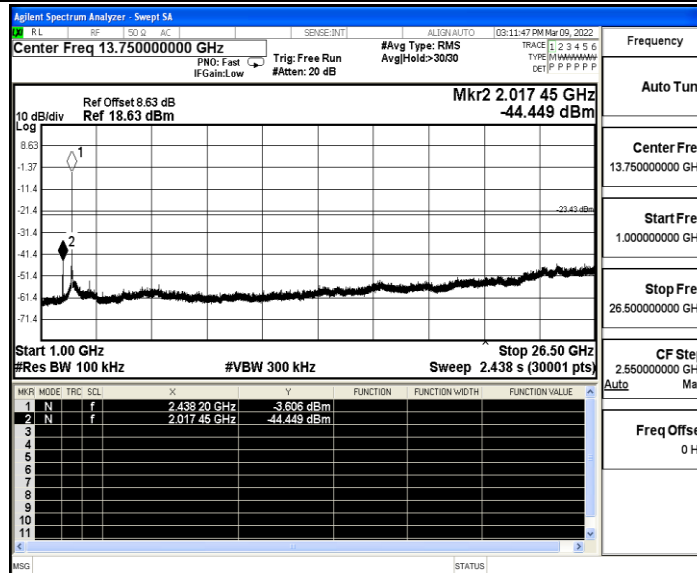




11N20SISO_Ant1_2437_30~1000

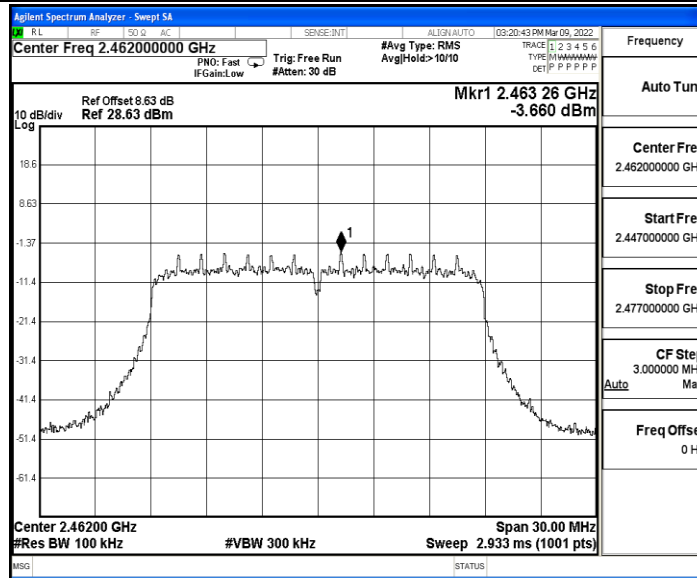


11N20SISO_Ant1_2437_1000~26500

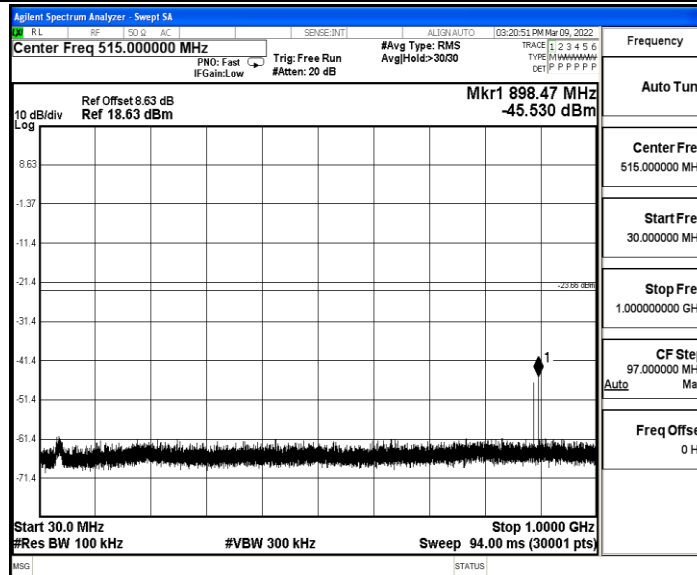




11N20SISO_Ant1_2462_0~Reference

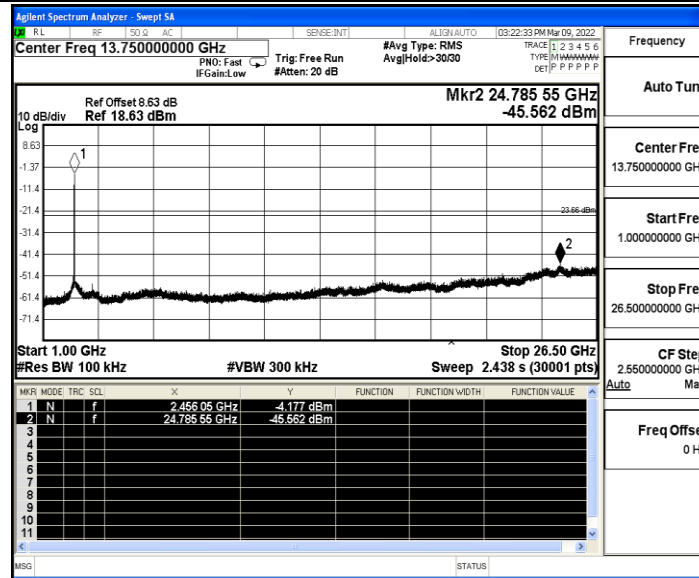


11N20SISO_Ant1_2462_30~1000





11N20SISO_Ant1_2462_1000~26500





Appendix A.7: Duty Cycle

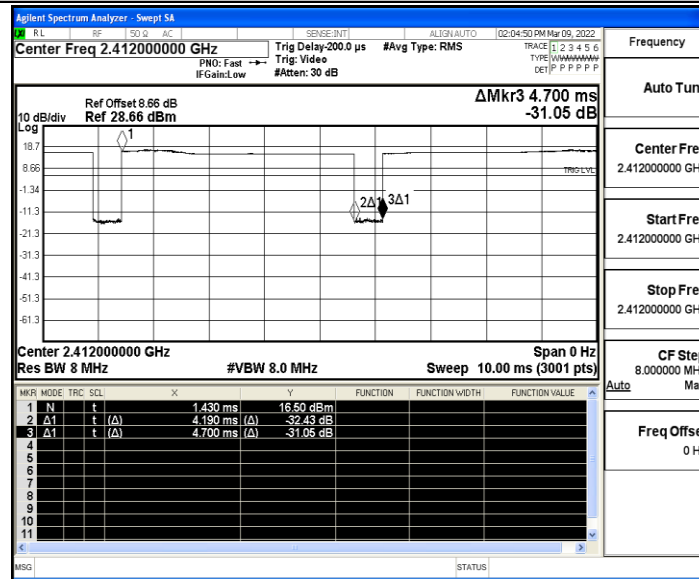
Test Result

TestMode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Limit	Verdict
11B	Ant1	2412	4.19	4.70	89.15	---	---
		2437	4.19	4.71	88.96	---	---
		2462	4.20	4.72	88.98	---	---
11G	Ant1	2412	0.70	0.80	87.50	---	---
		2437	0.69	0.80	86.25	---	---
		2462	0.70	0.80	87.50	---	---
11N20SISO	Ant1	2412	0.65	0.76	85.53	---	---
		2437	0.65	0.76	85.53	---	---
		2462	0.66	0.76	86.84	---	---

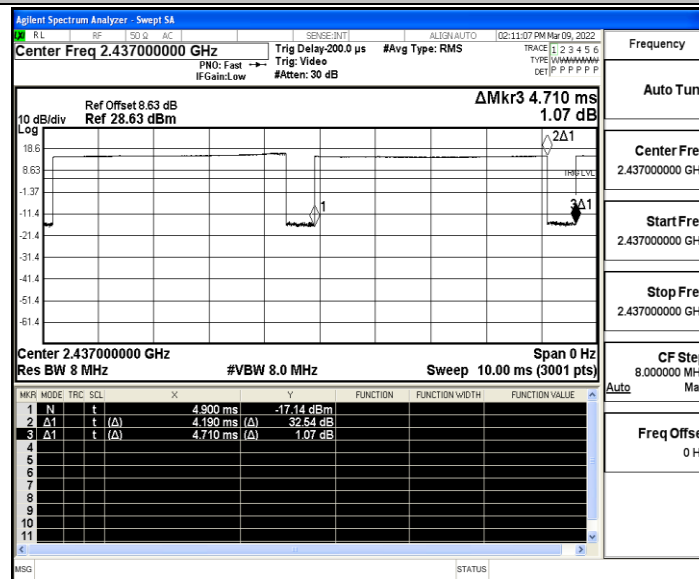


Test Graphs

11B_Ant1_2412

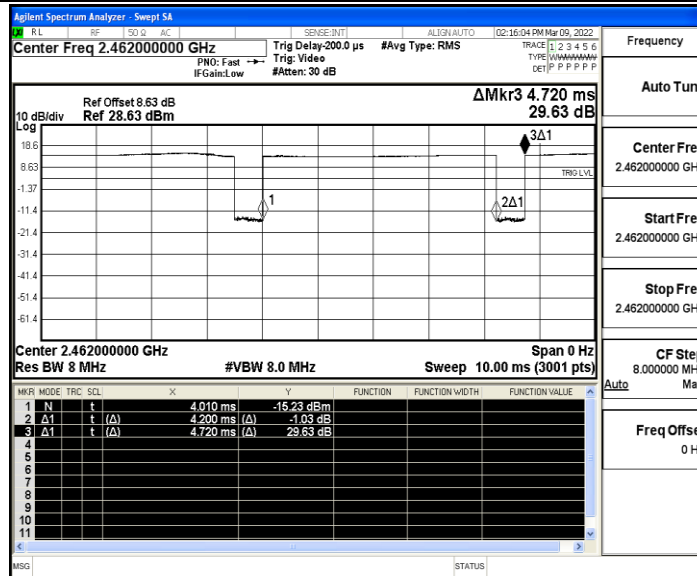


11B_Ant1_2437

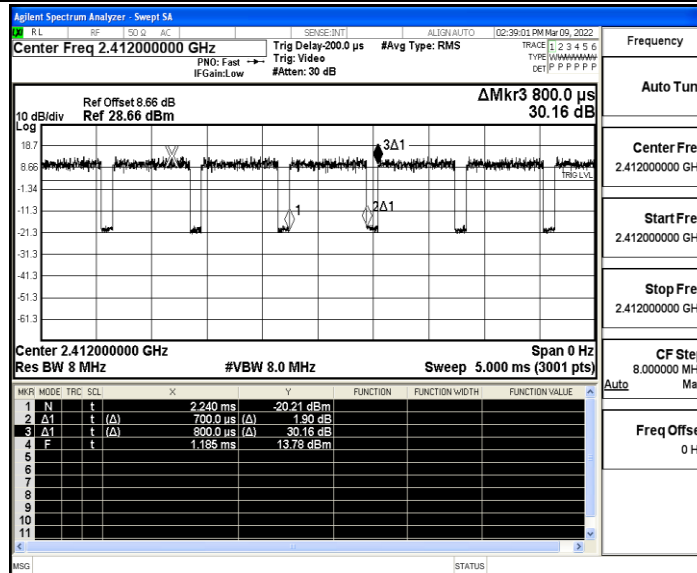




11B_Ant1_2462

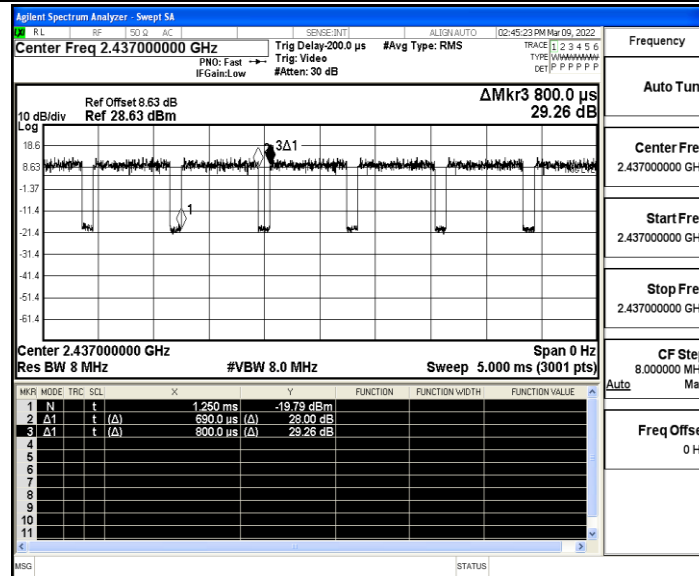


11G_Ant1_2412

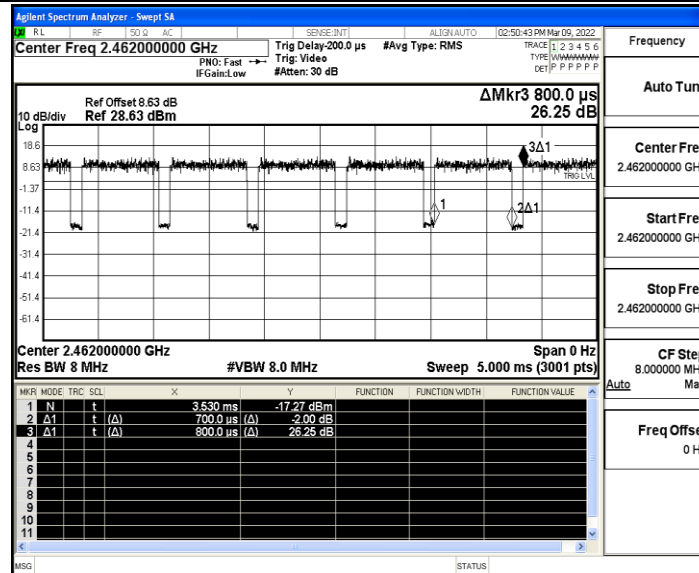




11G_Ant1_2437

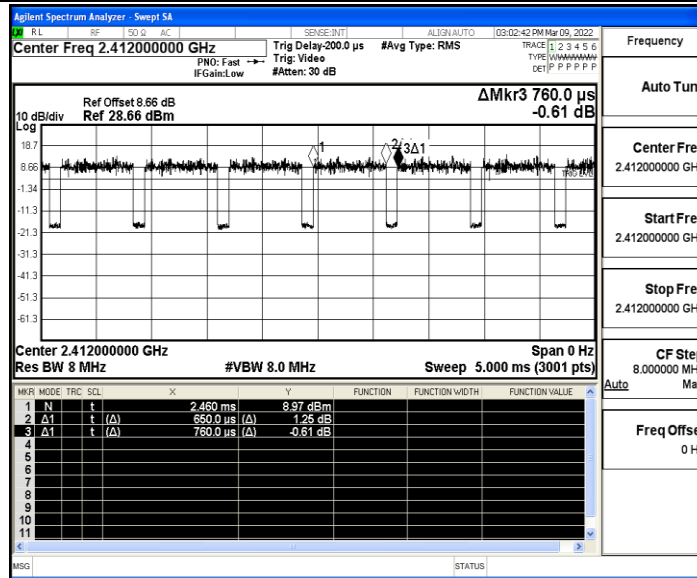


11G_Ant1_2462

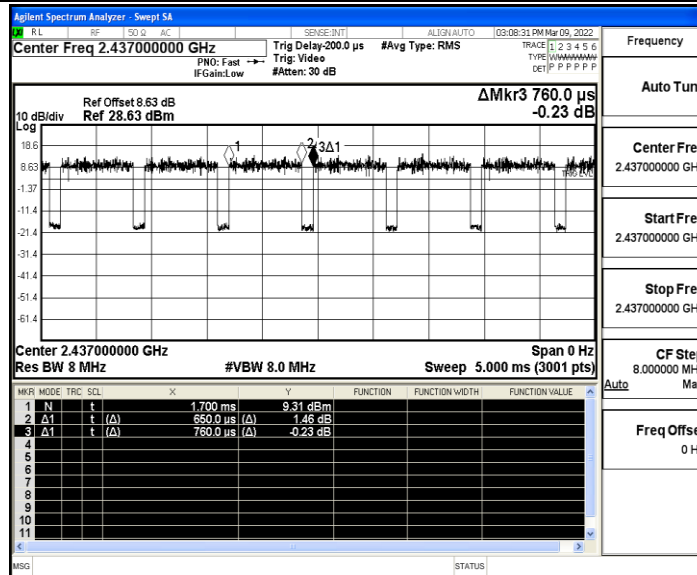


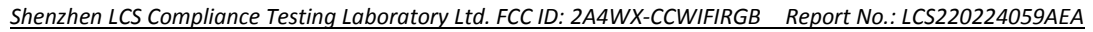


11N20SISO_Ant1_2412



11N20SISO_Ant1_2437





11N20SISO_An1_2462

Agilent Spectrum Analyzer - Swept SA

RL RF 50 Ω AC SENSE:INT ALIGN:AUTO 03:17:29 PM Mar 09, 2022

Center Freq 2.462000000 GHz Trg Delay: 200.0 μs #Avg Type: RMS TRACE 1 2 3 4 5 6
 PNO: Fast Trg: Video TYPE: WWWWWWWW
 IF Gain: Low #Atten: 30 dB DET: P P P P P P

Ref Offset 8.63 dB ΔMkr3 760.0 μs
Ref 28.63 dBm 29.13 dB

10 dB/div Log

Center 2.462000000 GHz Span 0 Hz
 Res BW 8 MHz #VBW 8.0 MHz Sweep 5.000 ms (3001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	TV	t	(Δ)	3.080 ms	-19.55 dBm			
2	A1	t	(Δ)	680.0 μs (Δ)	0.21 dB			
3	Δ1	t	(Δ)	760.0 μs (Δ)	29.13 dB			
4								
5								
6								
7								
8								
9								
10								
11								

MSG STATUS

Frequency
 Auto Tune
 Center Freq 2.462000000 GHz
 Start Freq 2.462000000 GHz
 Stop Freq 2.462000000 GHz
 CF Step 8.000000 MHz
 Auto Man
 Freq Offset 0 Hz



Appendix A.8: Emissions in Restricted Bands

Test Result

TestMode	Antenna	ChName	Channel	Detector	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
11B	Ant1	Low	2412	AV	2310.000	-55.01	≤-41.20	40.19	≤54	PASS
				AV	2389.830	-51.61	≤-41.20	43.59	≤54	PASS
				AV	2390.000	-51.63	≤-41.20	43.57	≤54	PASS
				Peak	2310.000	-44.44	≤-21.20	50.76	≤74	PASS
				Peak	2389.960	-40.36	≤-21.20	54.84	≤74	PASS
				Peak	2390.000	-40.36	≤-21.20	54.84	≤74	PASS
		High	2462	AV	2483.500	-51.59	≤-41.20	43.61	≤54	PASS
				AV	2483.560	-51.64	≤-41.20	43.56	≤54	PASS
				AV	2500.000	-52.19	≤-41.20	43.01	≤54	PASS
				Peak	2483.500	-41.23	≤-21.20	53.97	≤74	PASS
				Peak	2493.900	-39.32	≤-21.20	55.88	≤74	PASS
				Peak	2500.000	-41.92	≤-21.20	53.28	≤74	PASS
11G	Ant1	Low	2412	AV	2310.000	-54.66	≤-41.20	40.54	≤54	PASS
				AV	2389.960	-50.99	≤-41.20	44.21	≤54	PASS
				AV	2390.000	-50.99	≤-41.20	44.21	≤54	PASS
				Peak	2310.000	-44.12	≤-21.20	51.08	≤74	PASS
				Peak	2387.880	-40.4	≤-21.20	54.80	≤74	PASS
				Peak	2390.000	-41.45	≤-21.20	53.75	≤74	PASS
		High	2462	AV	2483.500	-50.74	≤-41.20	44.46	≤54	PASS
				AV	2484.220	-50.6	≤-41.20	44.60	≤54	PASS
				AV	2500.000	-51.61	≤-41.20	43.59	≤54	PASS
				Peak	2483.500	-40.71	≤-21.20	54.49	≤74	PASS
				Peak	2486.200	-39.64	≤-21.20	55.56	≤74	PASS
				Peak	2500.000	-42.18	≤-21.20	53.02	≤74	PASS
11N20SISO	Ant1	Low	2412	AV	2310.000	-54.53	≤-41.20	40.67	≤54	PASS
				AV	2389.960	-51.04	≤-41.20	44.16	≤54	PASS
				AV	2390.000	-51.04	≤-41.20	44.16	≤54	PASS
				Peak	2310.000	-44.68	≤-21.20	50.52	≤74	PASS
				Peak	2389.700	-38.84	≤-21.20	56.36	≤74	PASS
				Peak	2390.000	-40.57	≤-21.20	54.63	≤74	PASS
		High	2462	AV	2483.500	-50.76	≤-41.20	44.44	≤54	PASS
				AV	2483.780	-50.55	≤-41.20	44.65	≤54	PASS
				AV	2500.000	-51.42	≤-41.20	43.78	≤54	PASS
				Peak	2483.500	-40.97	≤-21.20	54.23	≤74	PASS
				Peak	2485.540	-39.84	≤-21.20	55.36	≤74	PASS
				Peak	2500.000	-42.3	≤-21.20	52.90	≤74	PASS



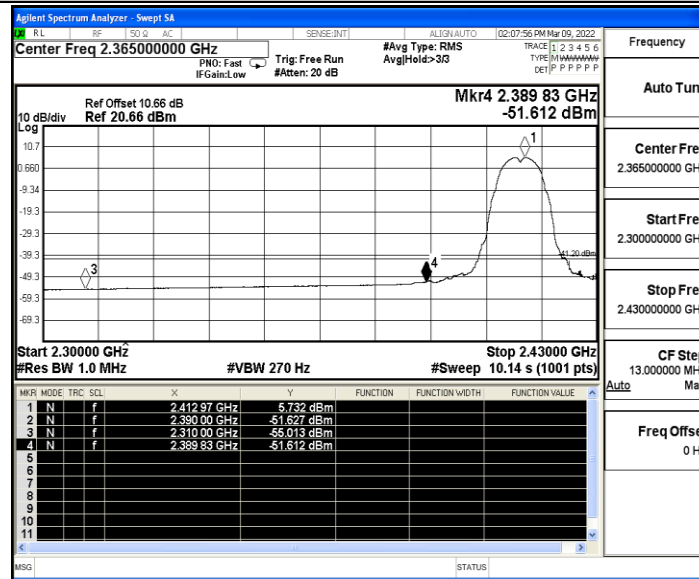
Note:

1. The Antenna Gain is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

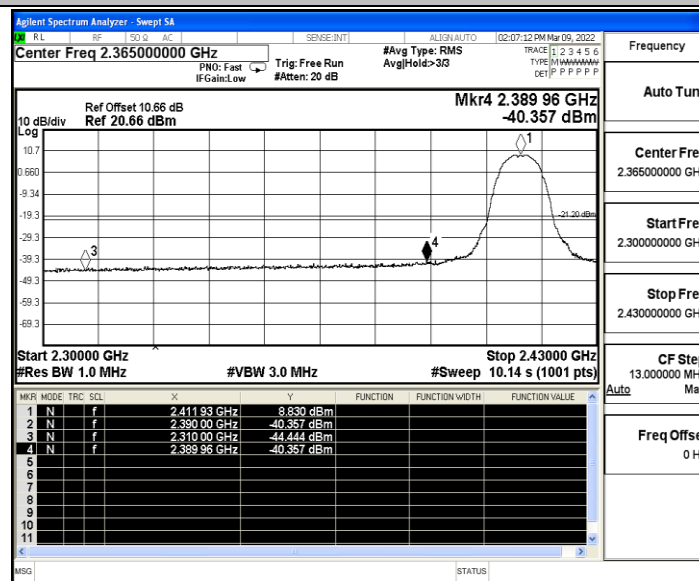


Test Graphs

11B_Ant1_Low_2412_AV

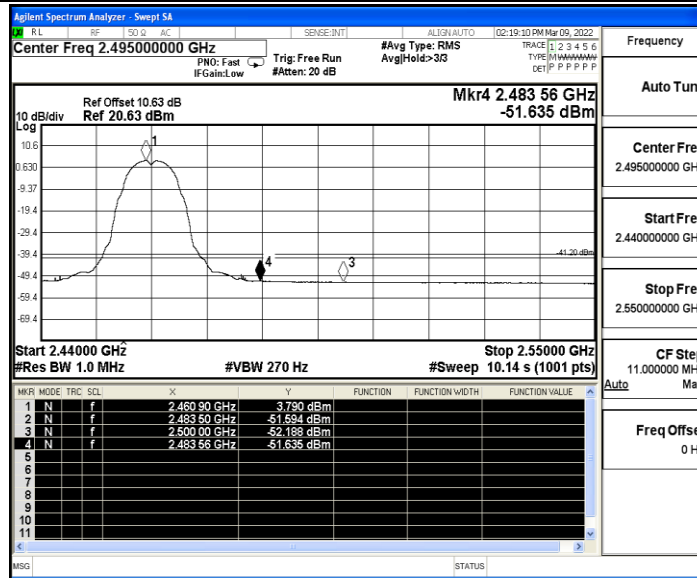


11B_Ant1_Low_2412_Peak

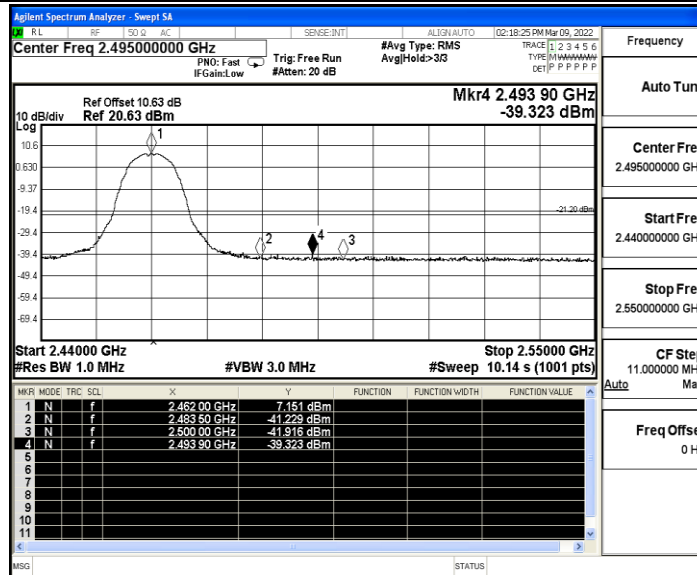




11B_Ant1_High_2462_AV

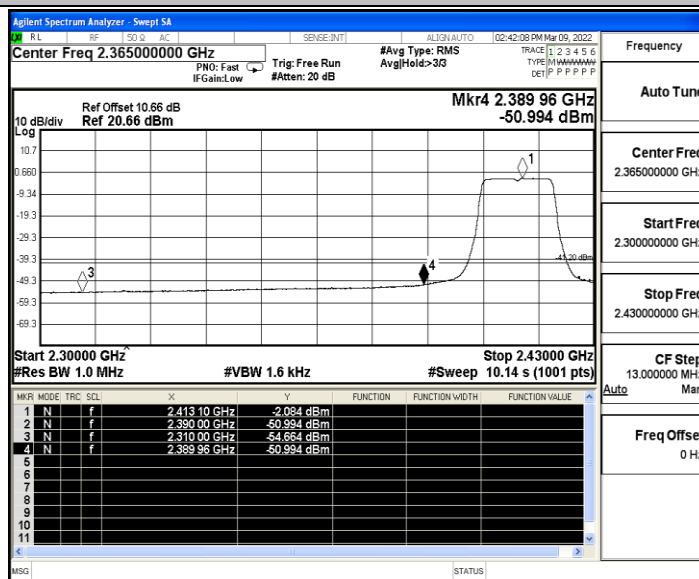


11B_Ant1_High_2462_Peak

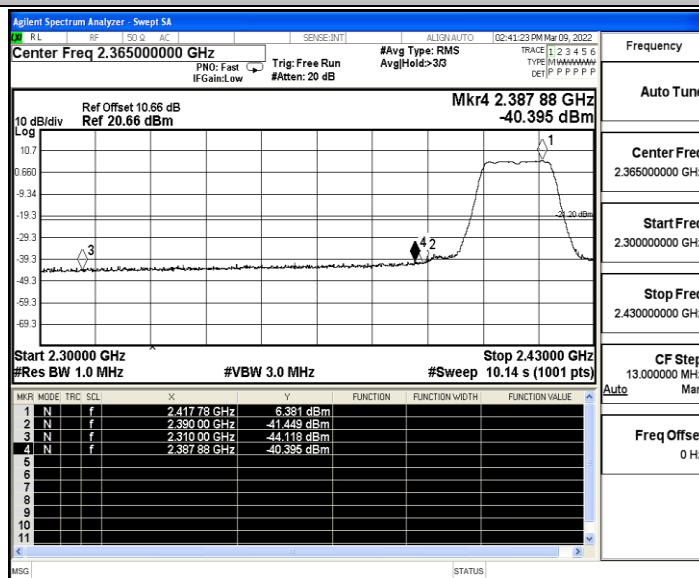




11G_Ant1_Low_2412_AV

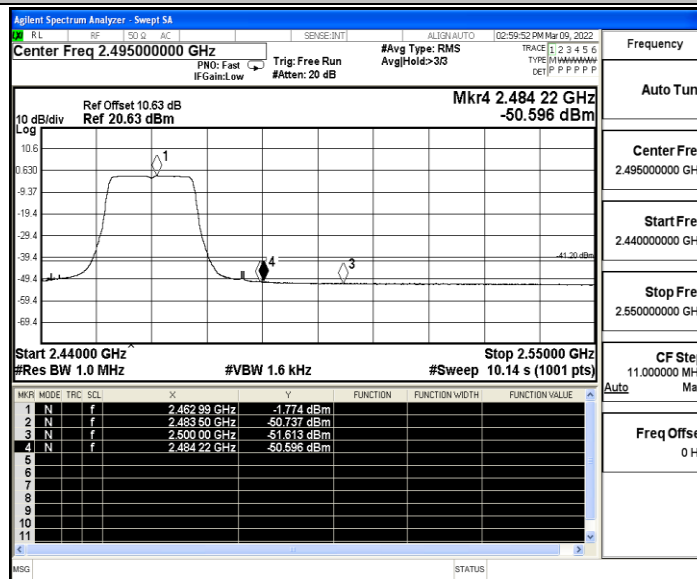


11G_Ant1_Low_2412_Peak

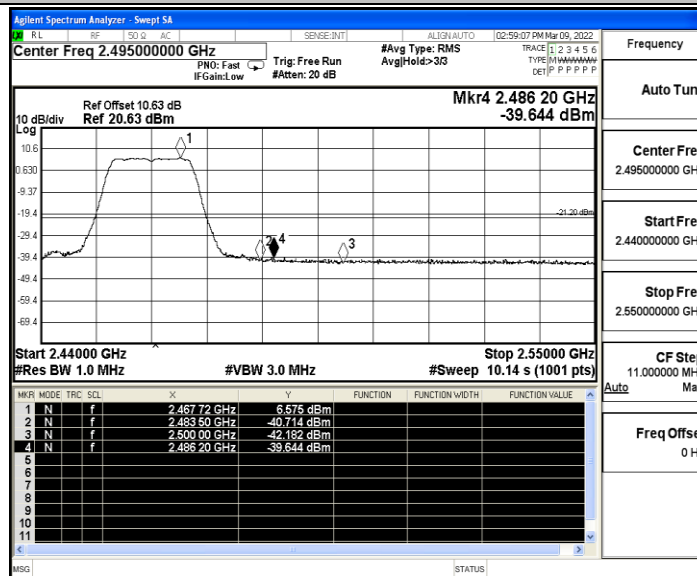




11G_Ant1_High_2462_AV

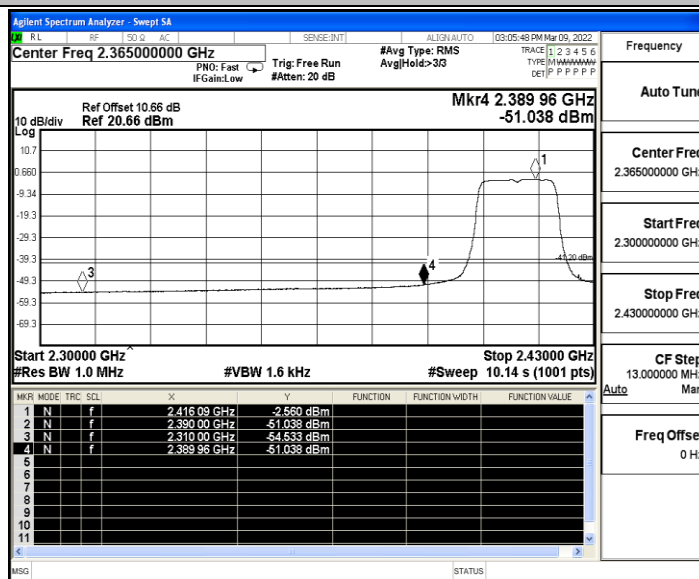


11G_Ant1_High_2462_Peak

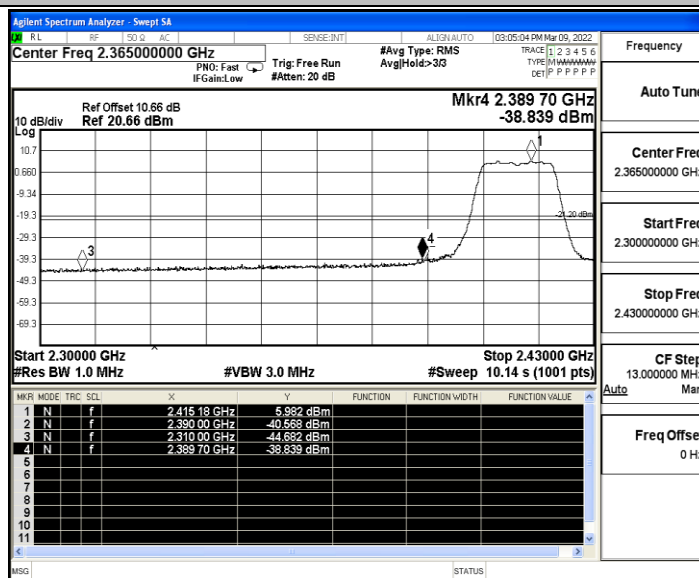




11N20SISO_Ant1_Low_2412_AV

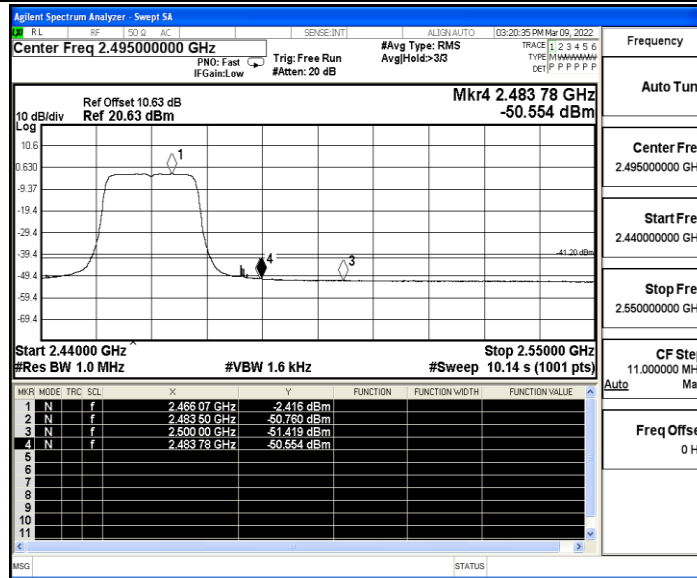


11N20SISO_Ant1_Low_2412_Peak





11N20SISO_Ant1_High_2462_AV



11N20SISO_Ant1_High_2462_Peak

