



Appendix C

RF Test Data for 2.4G WIFI (Conducted Measurement)

Product Name: Laser Engraver

Trade Mark: N/A

Test Model: ZBT_3737O

Environmental Conditions

Temperature:	23.5° C
Relative Humidity:	52.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Wunder Wu
Supervised by:	Li Huan



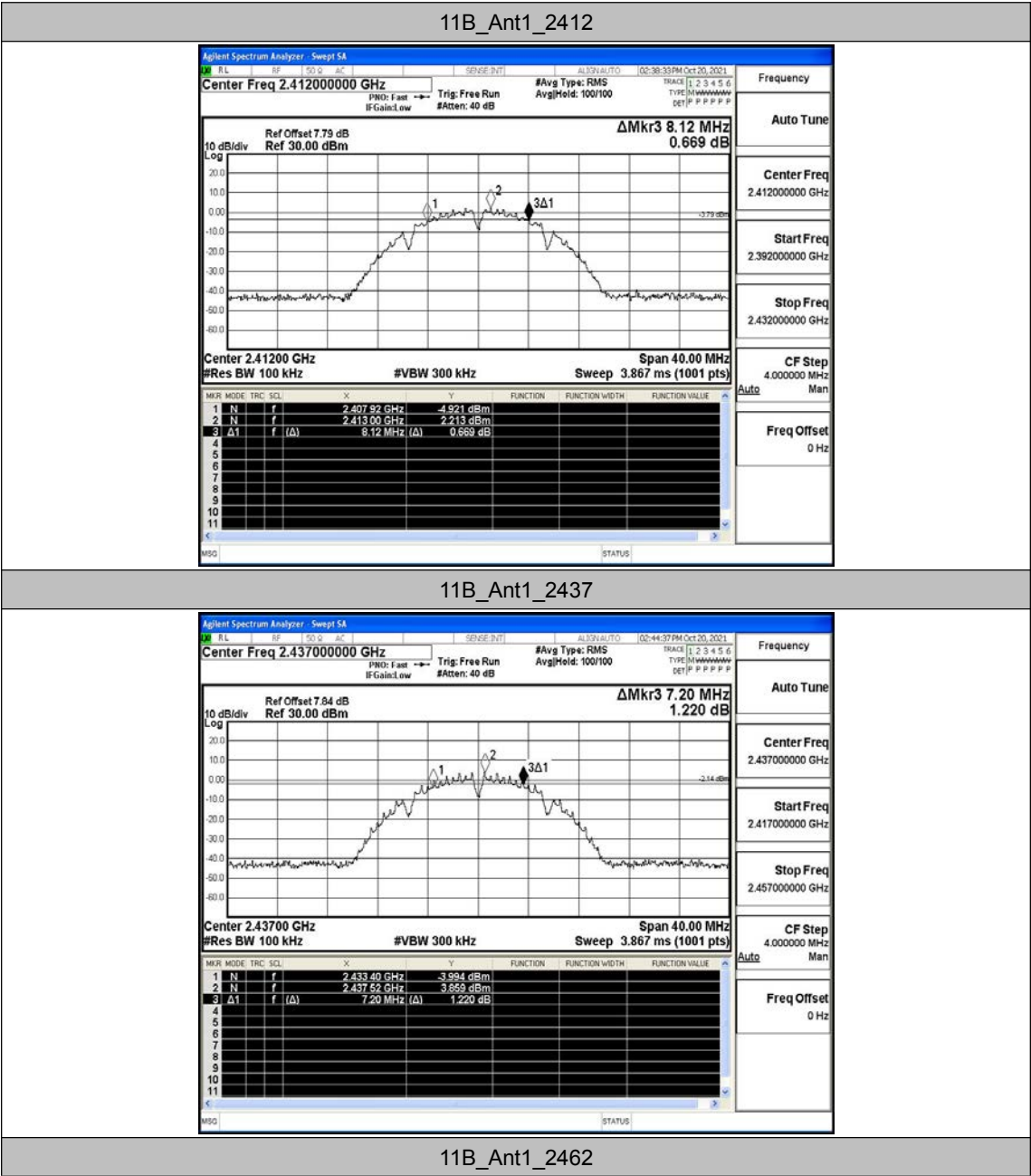
C.1 DTS Bandwidth

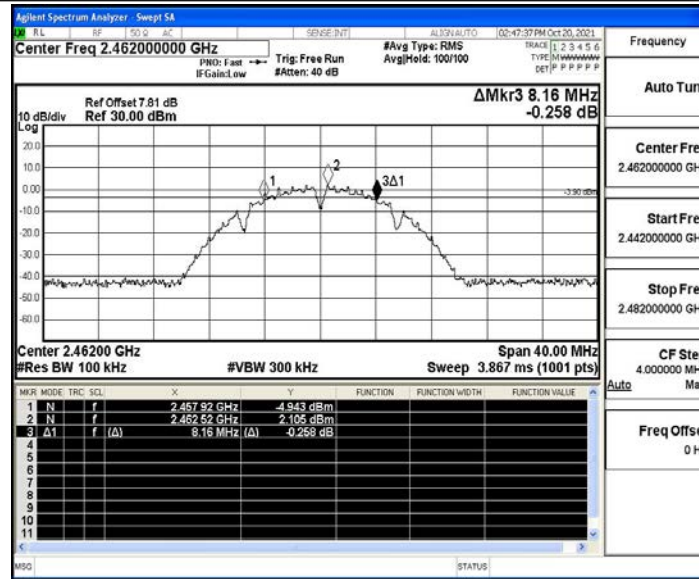
Test Result

TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	8.120	2407.920	2416.040	0.5	PASS
		2437	7.200	2433.400	2440.600	0.5	PASS
		2462	8.160	2457.920	2466.080	0.5	PASS
11G	Ant1	2412	16.000	2404.200	2420.200	0.5	PASS
		2437	15.160	2429.400	2444.560	0.5	PASS
		2462	15.720	2454.200	2469.920	0.5	PASS
11N20SISO	Ant1	2412	16.040	2404.400	2420.440	0.5	PASS
		2437	15.080	2429.520	2444.600	0.5	PASS
		2462	12.960	2455.720	2468.680	0.5	PASS
11N40SISO	Ant1	2422	35.200	2404.400	2439.600	0.5	PASS
		2437	34.000	2419.400	2453.400	0.5	PASS
		2452	35.200	2434.400	2469.600	0.5	PASS

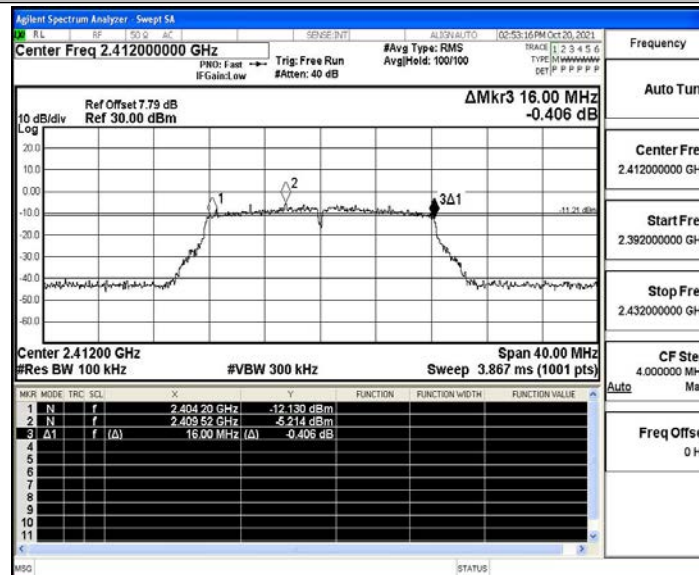


Test Graphs

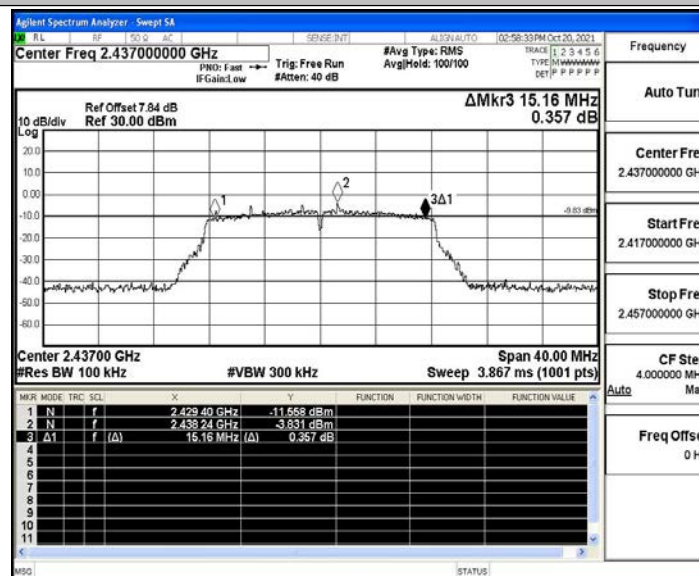




11G_Ant1_2412

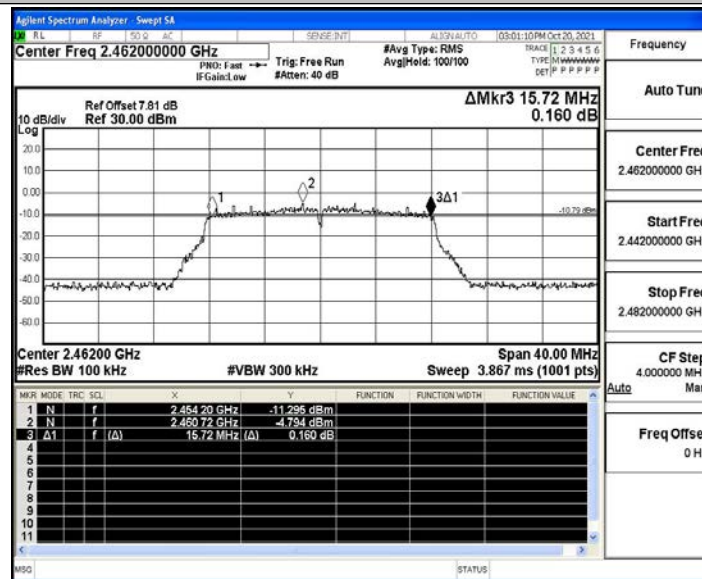


11G_Ant1_2437

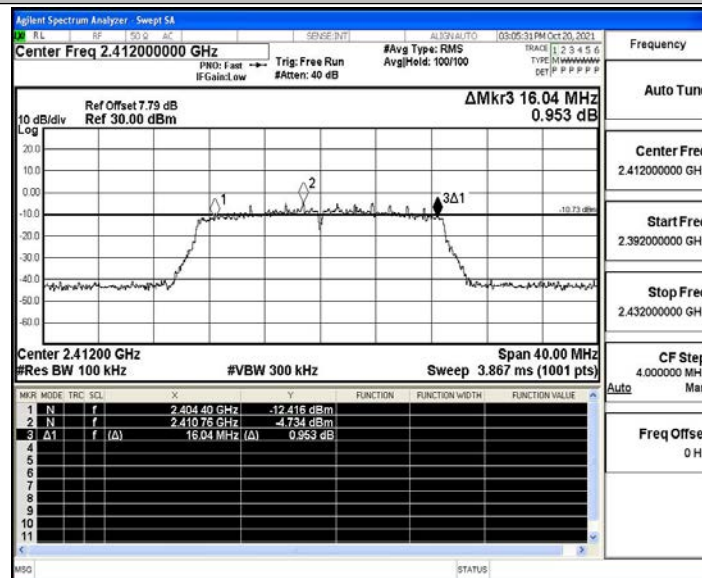




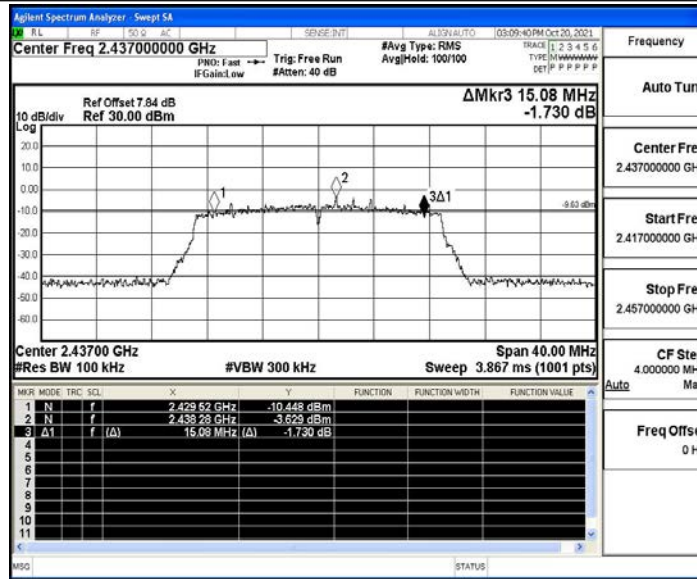
11G_Ant1_2462



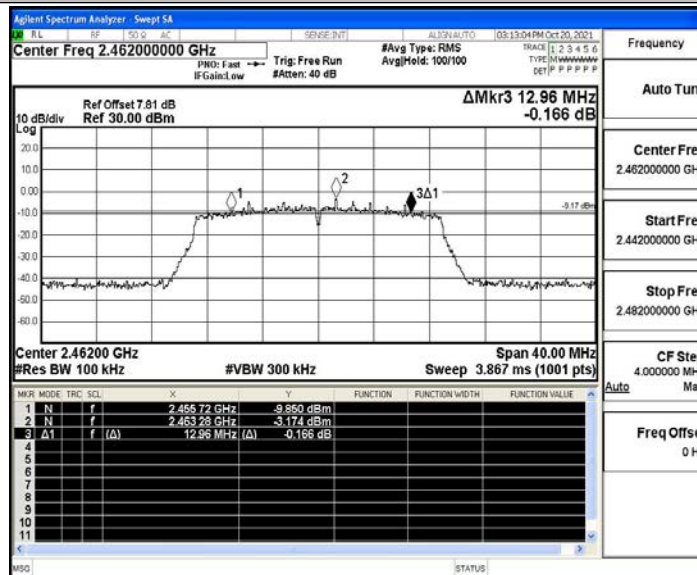
11N20SISO_Ant1_2412



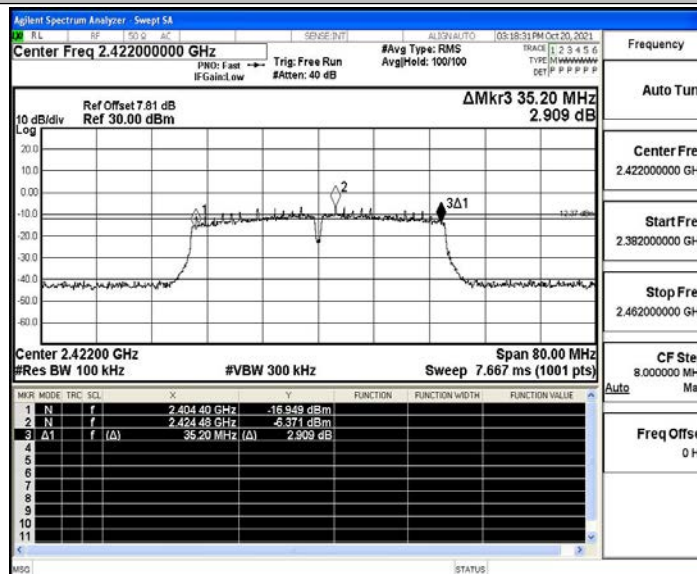
11N20SISO_Ant1_2437



11N20SISO_Ant1_2462

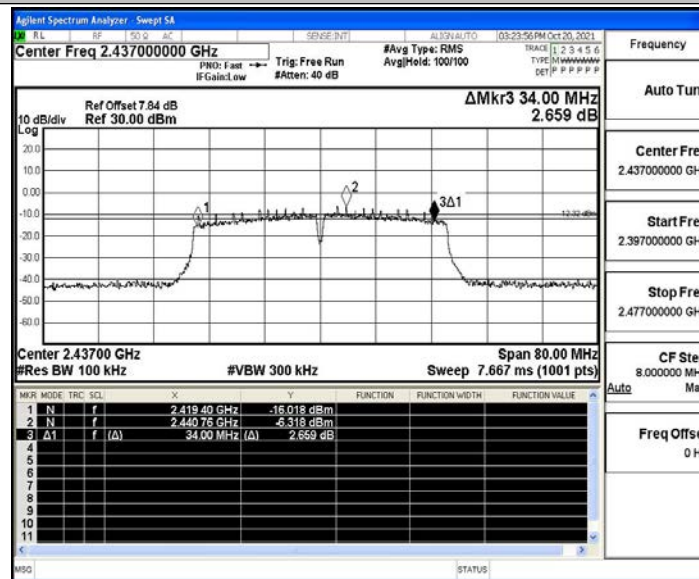


11N40SISO_Ant1_2422

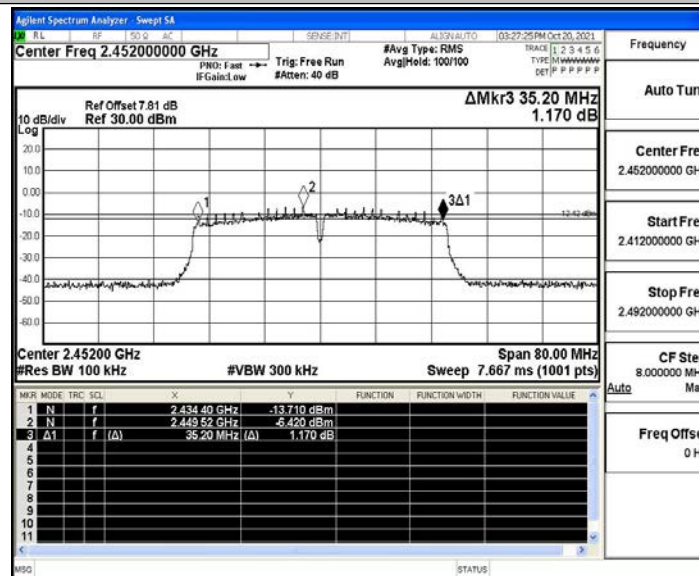




11N40SISO_Ant1_2437



11N40SISO_Ant1_2452





C.2 Maximum conducted output power

Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	2412	14.57	≤30	PASS
		2437	14.59	≤30	PASS
		2462	14.43	≤30	PASS
11G	Ant1	2412	13.72	≤30	PASS
		2437	13.82	≤30	PASS
		2462	13.85	≤30	PASS
11N20SISO	Ant1	2412	13.84	≤30	PASS
		2437	14.23	≤30	PASS
		2462	14.24	≤30	PASS
11N40SISO	Ant1	2422	13.99	≤30	PASS
		2437	14.09	≤30	PASS
		2452	13.99	≤30	PASS



C.3 Maximum power spectral density

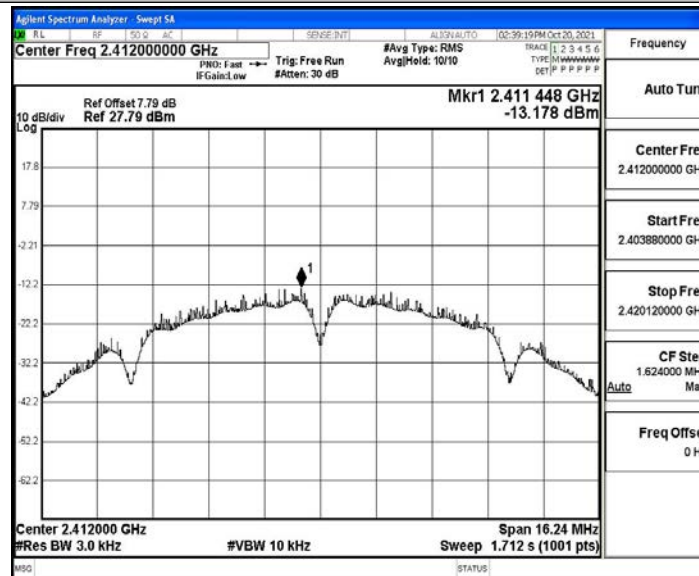
Test Result

TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-13.18	≤8	PASS
		2437	-13.43	≤8	PASS
		2462	-13.19	≤8	PASS
11G	Ant1	2412	-19.03	≤8	PASS
		2437	-19.37	≤8	PASS
		2462	-19.46	≤8	PASS
11N20SISO	Ant1	2412	-19.71	≤8	PASS
		2437	-16.87	≤8	PASS
		2462	-19.57	≤8	PASS
11N40SISO	Ant1	2422	-21.65	≤8	PASS
		2437	-21.49	≤8	PASS
		2452	-21.56	≤8	PASS

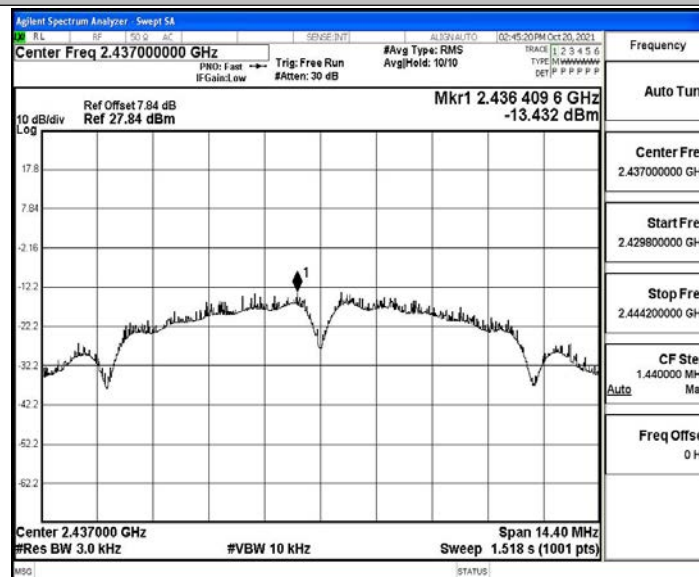


Test Graphs

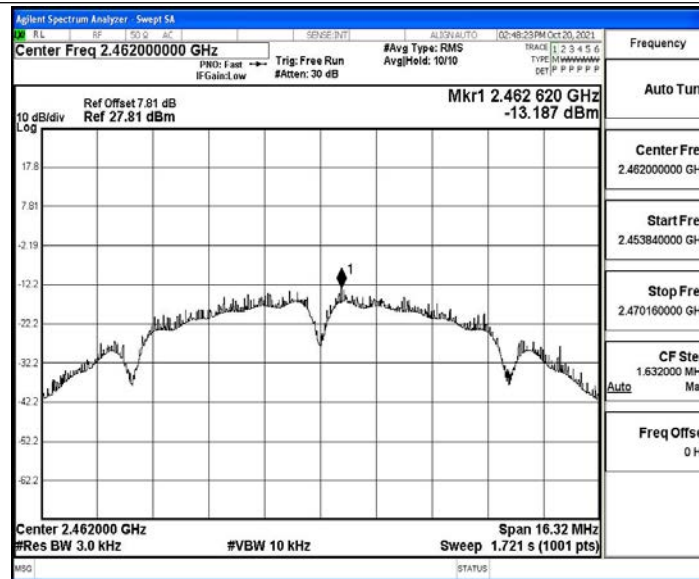
11B_Ant1_2412



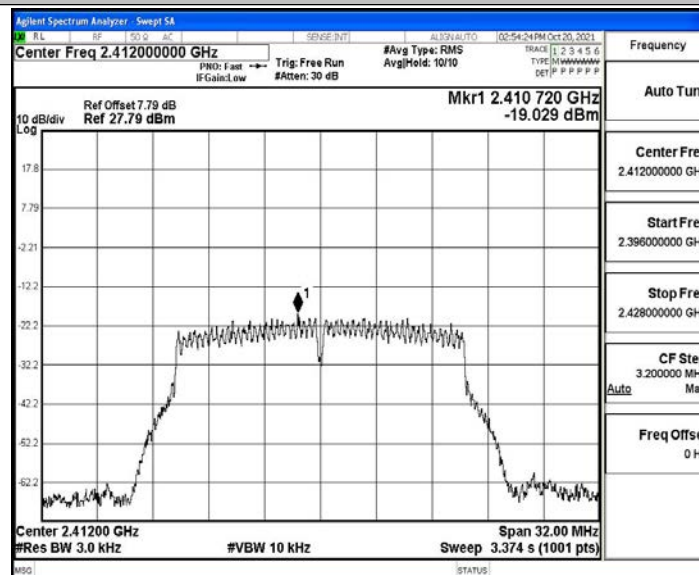
11B_Ant1_2437



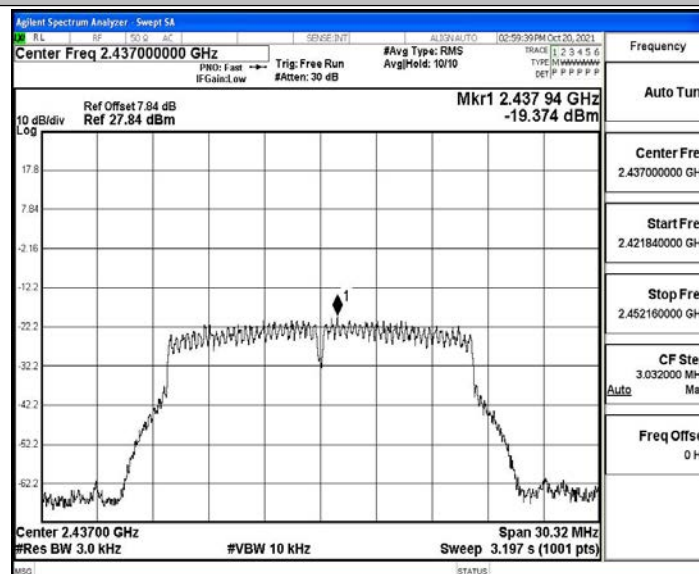
11B_Ant1_2462



11G_Ant1_2412

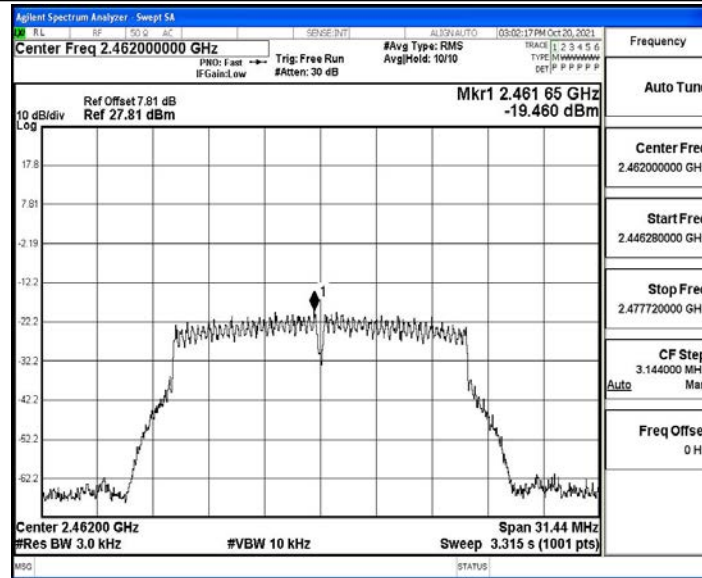


11G_Ant1_2437

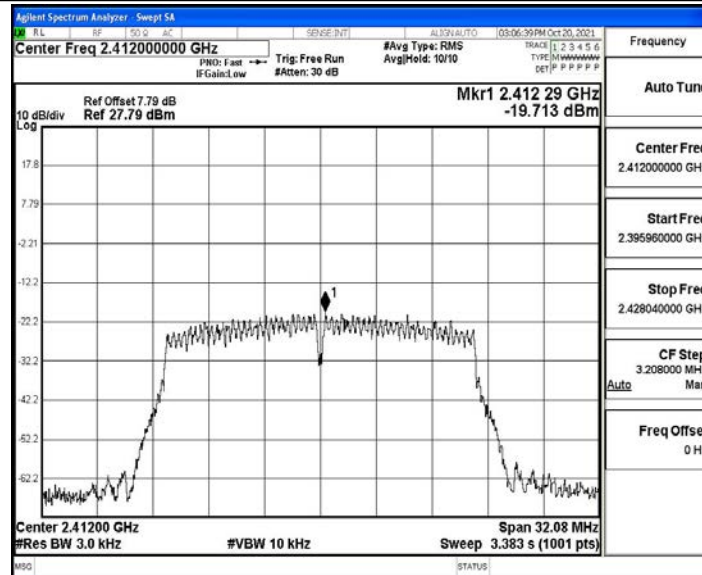




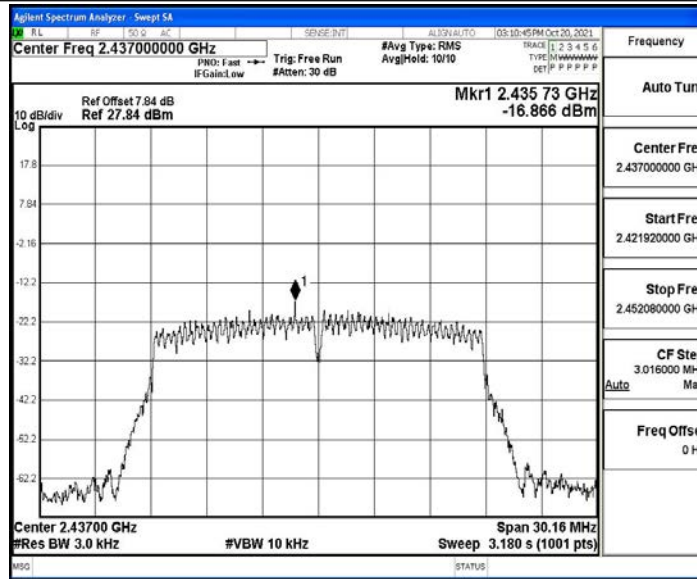
11G_Ant1_2462



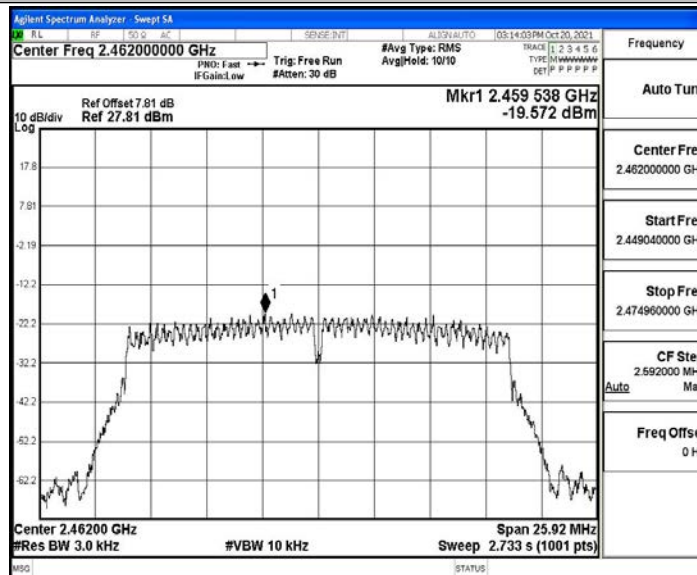
11N20SISO_Ant1_2412



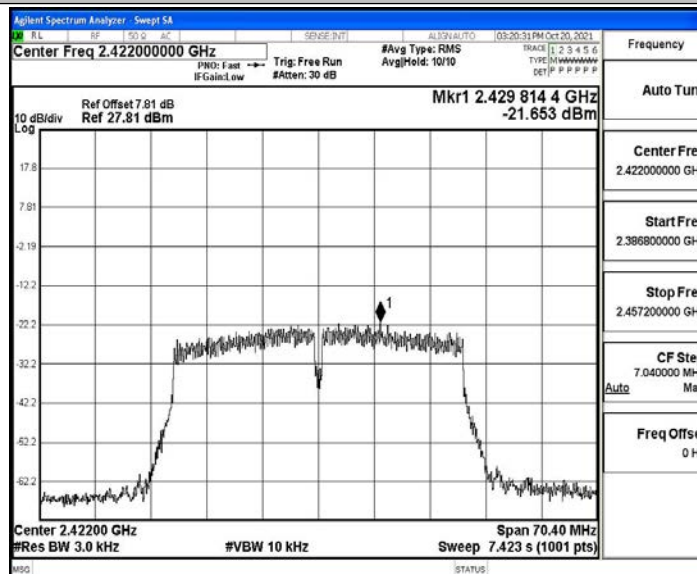
11N20SISO_Ant1_2437



11N20SISO_Ant1_2462

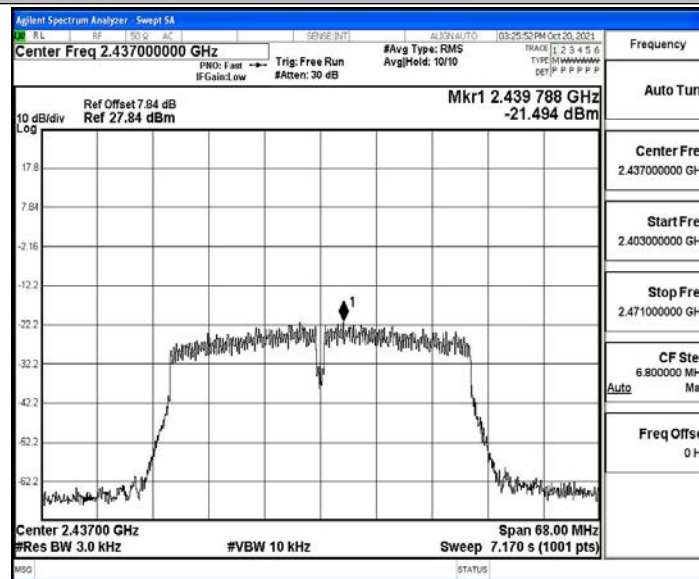


11N40SISO_Ant1_2422

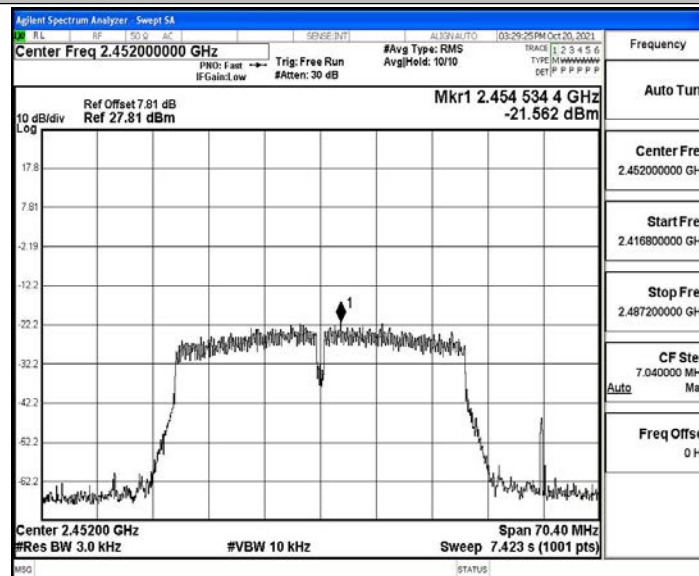




11N40SISO_Ant1_2437



11N40SISO_Ant1_2452





C.4 Band edge measurements

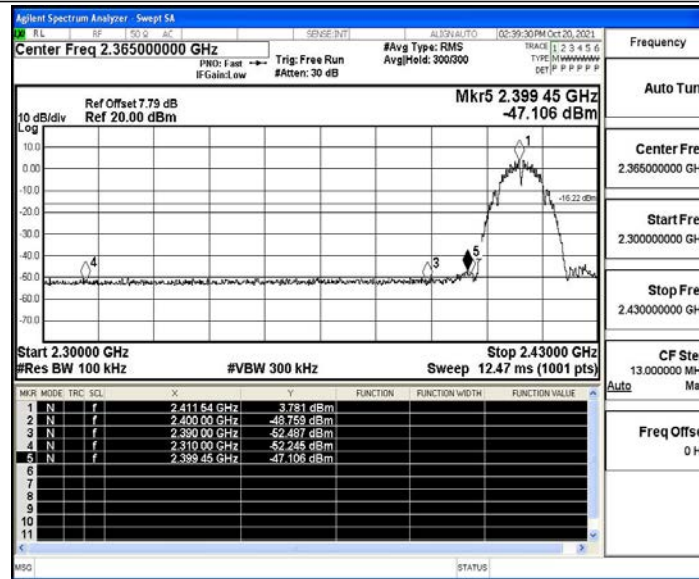
Test Result

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	3.78	-47.11	≤-16.22	PASS
		High	2462	3.64	-49.14	≤-16.36	PASS
11G	Ant1	Low	2412	-3.49	-47.56	≤-23.49	PASS
		High	2462	-3.94	-48.81	≤-23.94	PASS
11N20SISO	Ant1	Low	2412	-3.54	-47.66	≤-23.54	PASS
		High	2462	-3.08	-48.21	≤-23.08	PASS
11N40SISO	Ant1	Low	2422	-6.15	-43.93	≤-26.15	PASS
		High	2452	-6.16	-46.94	≤-26.16	PASS

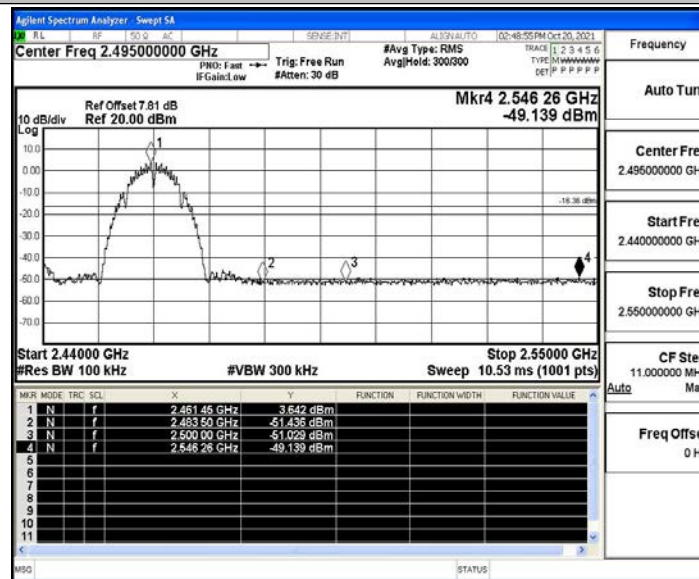


Test Graphs

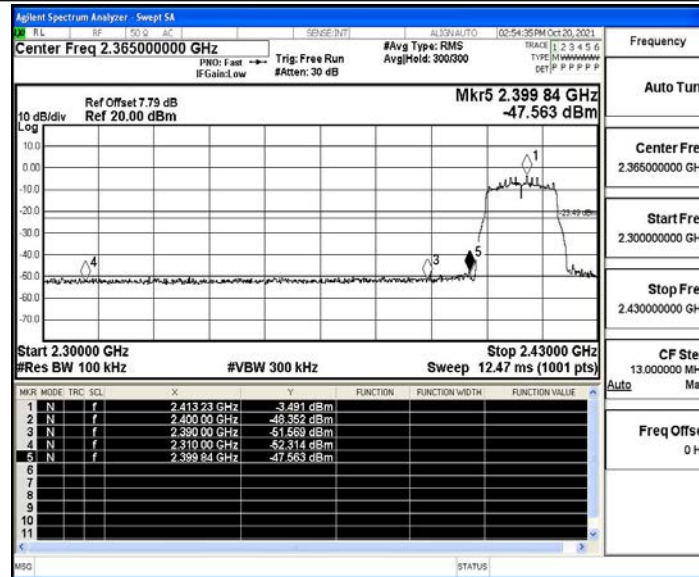
11B_Ant1_Low_2412



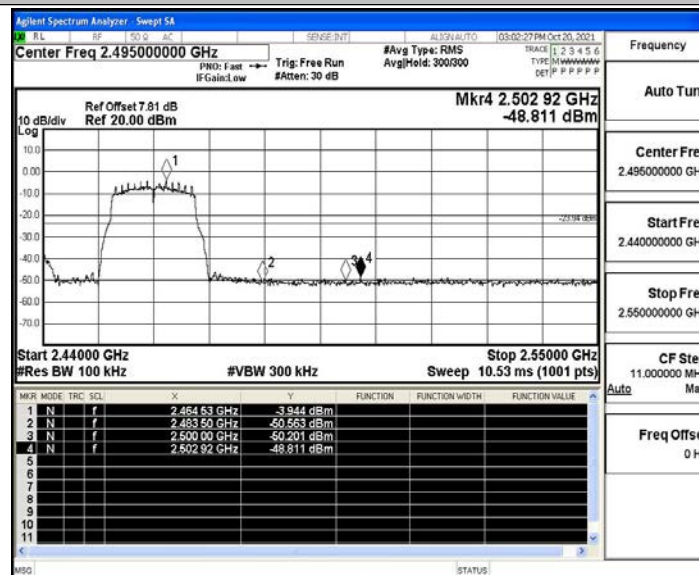
11B_Ant1_High_2462



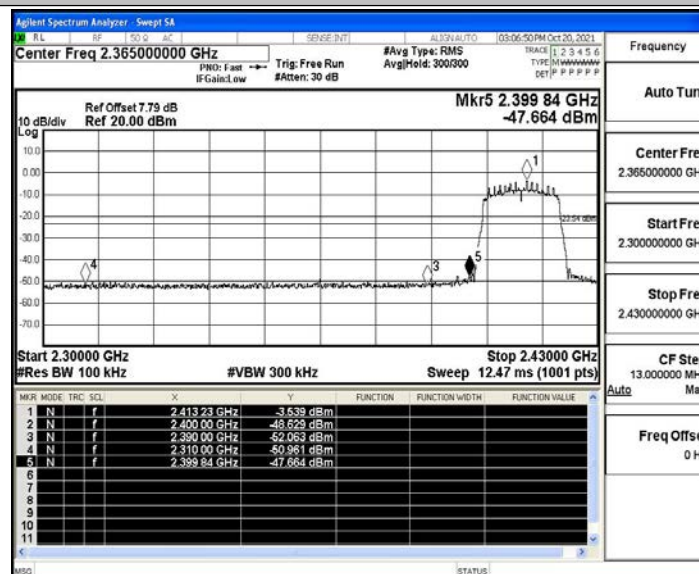
11G_Ant1_Low_2412



11G_Ant1_High_2462

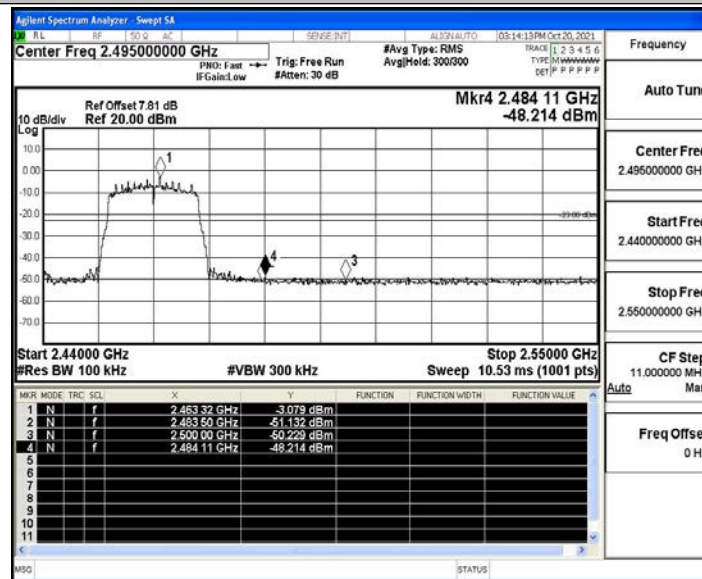


11N20SISO_Ant1_Low_2412

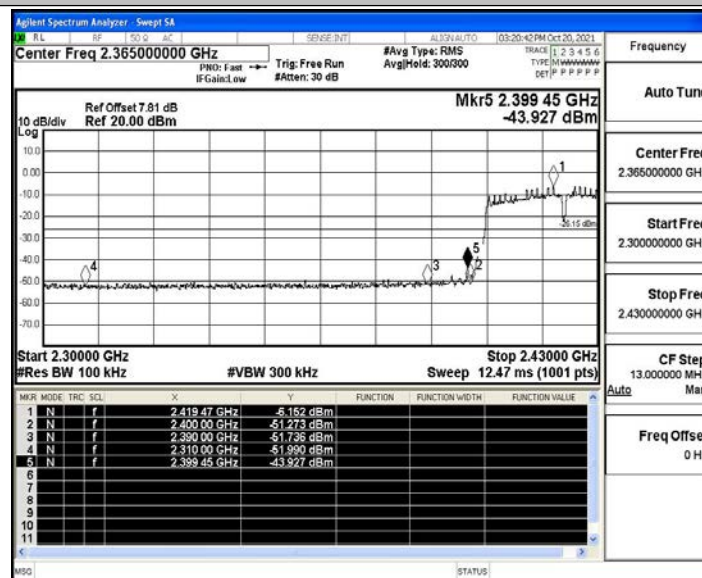




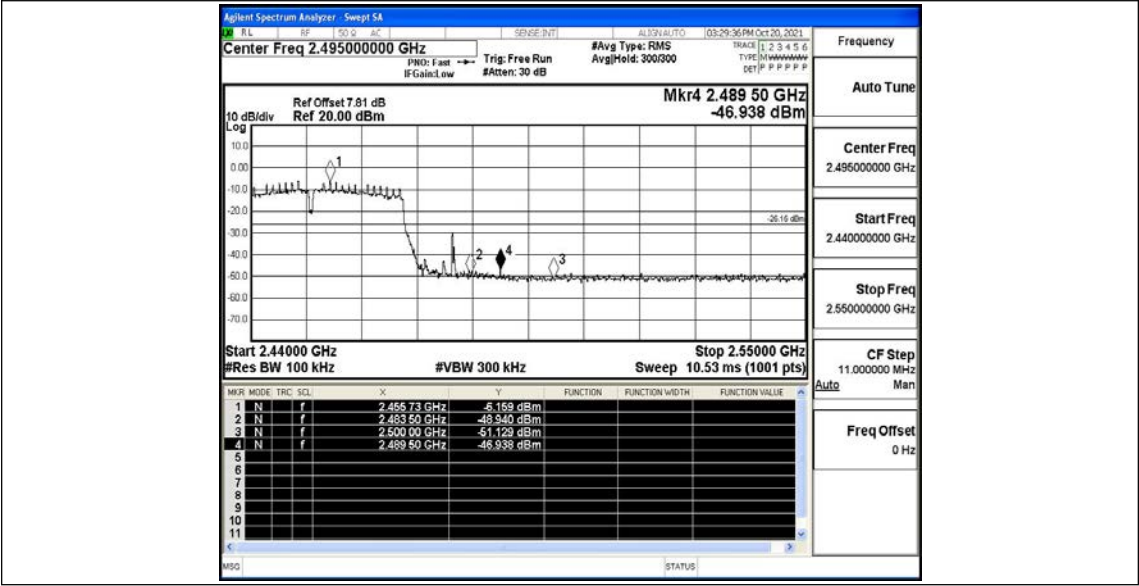
11N20SISO_Ant1_High_2462



11N40SISO_Ant1_Low_2422



11N40SISO_Ant1_High_2452





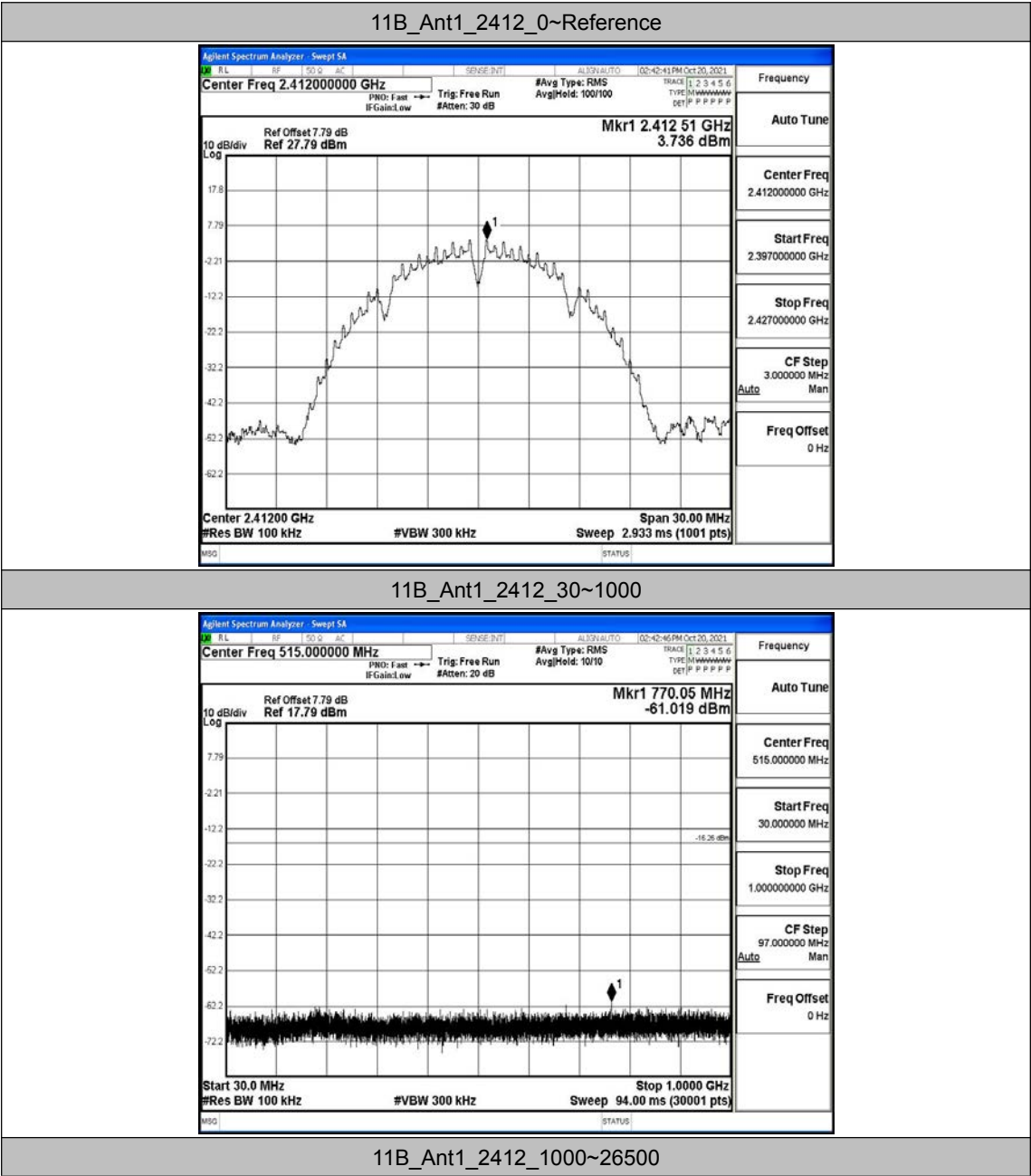
C.5 Conducted Spurious Emission

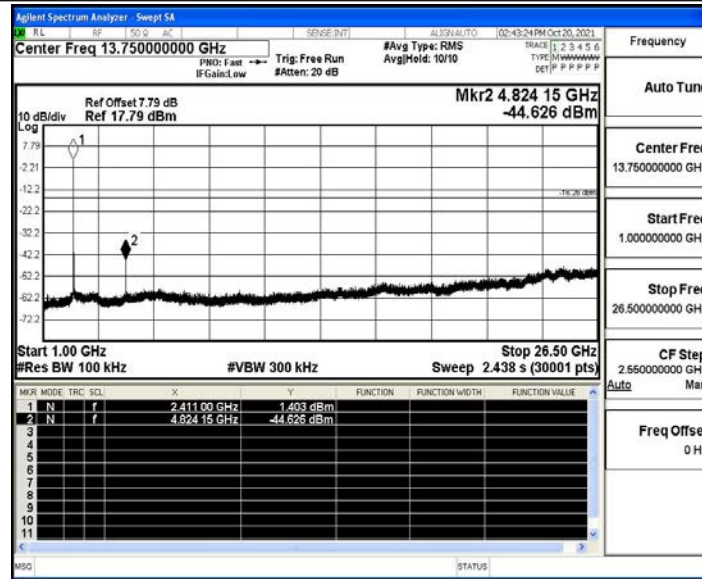
Test Result

TestMode	Antenna	Channel	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	Reference	3.74	3.74	---	PASS
			30~1000	3.74	-61.02	≤-16.26	PASS
			1000~26500	3.74	-44.63	≤-16.26	PASS
		2437	Reference	2.15	2.15	---	PASS
			30~1000	2.15	-61.79	≤-17.85	PASS
			1000~26500	2.15	-45.93	≤-17.85	PASS
		2462	Reference	2.16	2.16	---	PASS
			30~1000	2.16	-47.41	≤-17.84	PASS
			1000~26500	2.16	-45.32	≤-17.84	PASS
11G	Ant1	2412	Reference	-4.33	-4.33	---	PASS
			30~1000	-4.33	-61.6	≤-24.33	PASS
			1000~26500	-4.33	-47.53	≤-24.33	PASS
		2437	Reference	-4.53	-4.53	---	PASS
			30~1000	-4.53	-41.45	≤-24.53	PASS
			1000~26500	-4.53	-47.5	≤-24.53	PASS
		2462	Reference	-4.49	-4.49	---	PASS
			30~1000	-4.49	-62.15	≤-24.49	PASS
			1000~26500	-4.49	-47.38	≤-24.49	PASS
11N20SISO	Ant1	2412	Reference	-3.63	-3.63	---	PASS
			30~1000	-3.63	-50.09	≤-23.63	PASS
			1000~26500	-3.63	-47.81	≤-23.63	PASS
		2437	Reference	-3.25	-3.25	---	PASS
			30~1000	-3.25	-61.3	≤-23.25	PASS
			1000~26500	-3.25	-47.5	≤-23.25	PASS
		2462	Reference	-3.82	-3.82	---	PASS
			30~1000	-3.82	-61.53	≤-23.82	PASS
			1000~26500	-3.82	-47.27	≤-23.82	PASS
11N40SISO	Ant1	2422	Reference	-6.43	-6.43	---	PASS
			30~1000	-6.43	-61.63	≤-26.43	PASS
			1000~26500	-6.43	-47.11	≤-26.43	PASS
		2437	Reference	-6.22	-6.22	---	PASS
			30~1000	-6.22	-61.19	≤-26.22	PASS
			1000~26500	-6.22	-47.28	≤-26.22	PASS
		2452	Reference	-6.29	-6.29	---	PASS
			30~1000	-6.29	-61.75	≤-26.29	PASS
			1000~26500	-6.29	-41.08	≤-26.29	PASS

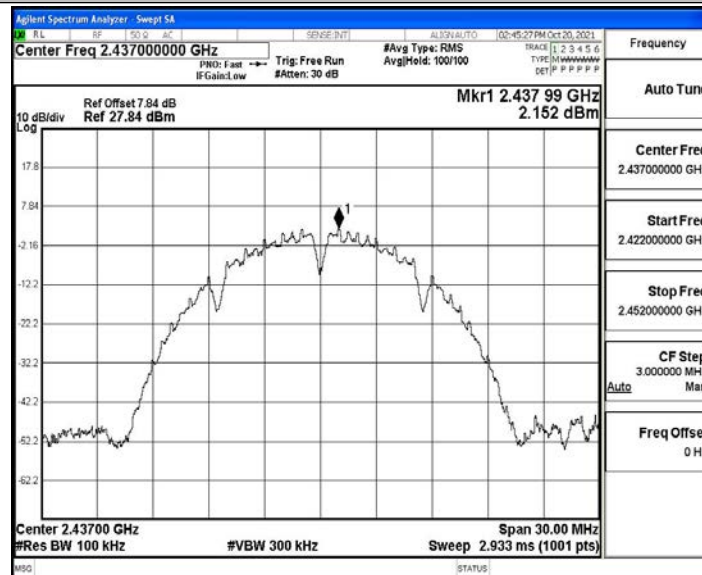


Test Graphs

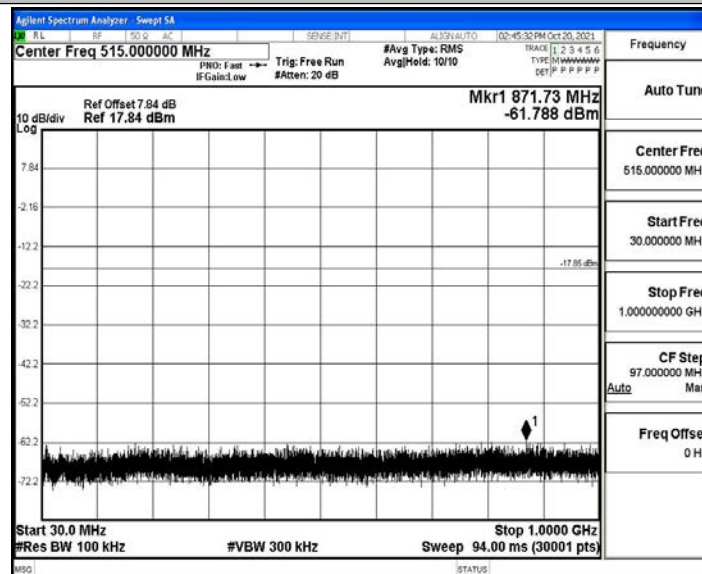




11B_Ant1_2437_0~Reference

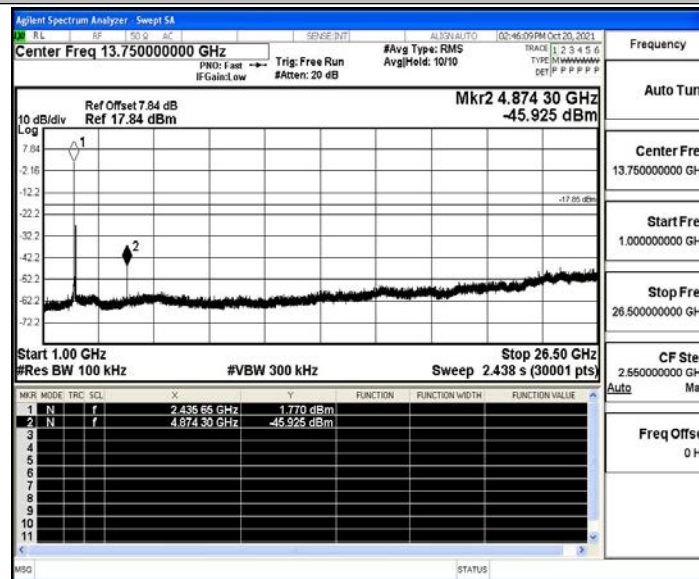


11B_Ant1_2437_30~1000

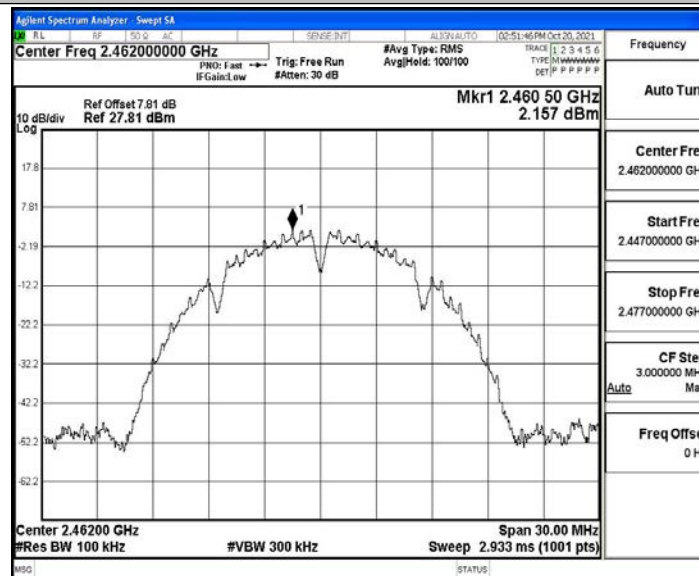




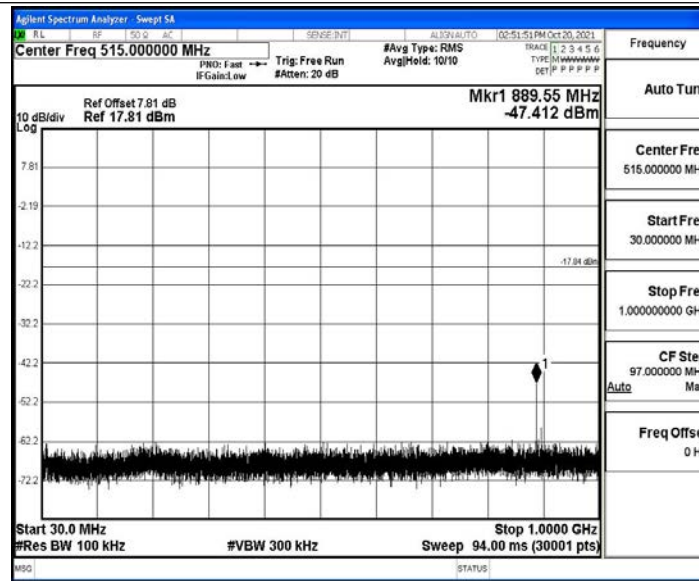
11B_Ant1_2437_1000~26500



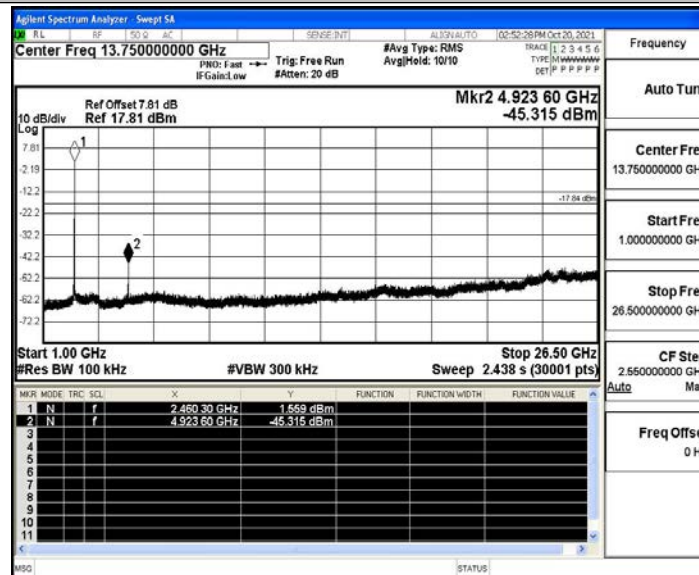
11B_Ant1_2462_0~Reference



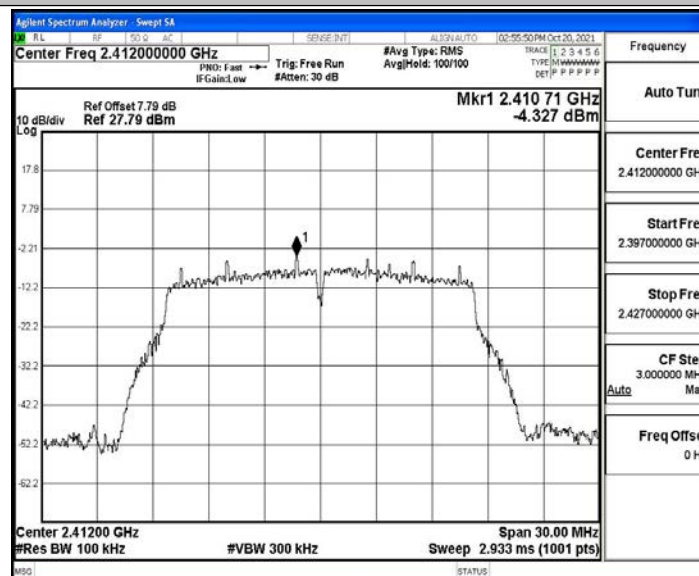
11B_Ant1_2462_30~1000



11B_Ant1_2462_1000~26500

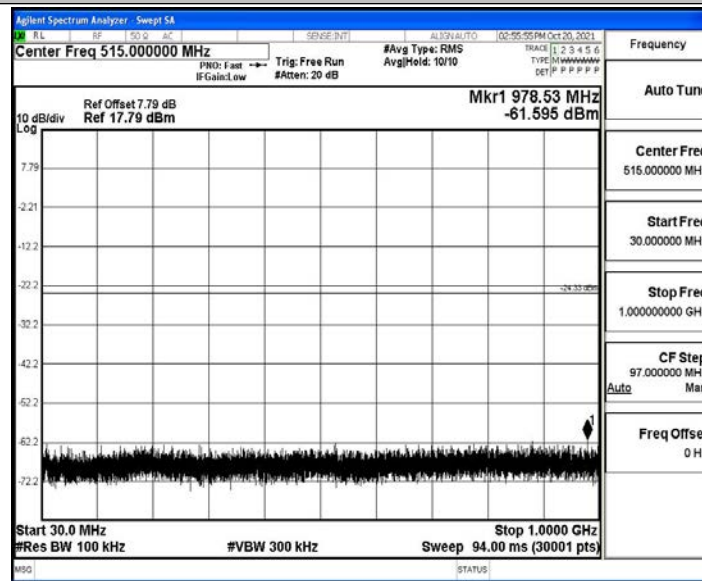


11G_Ant1_2412_0~Reference

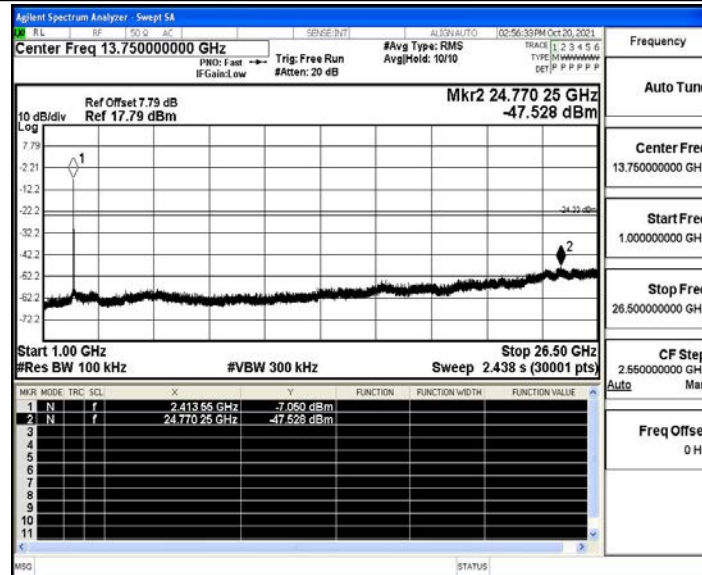




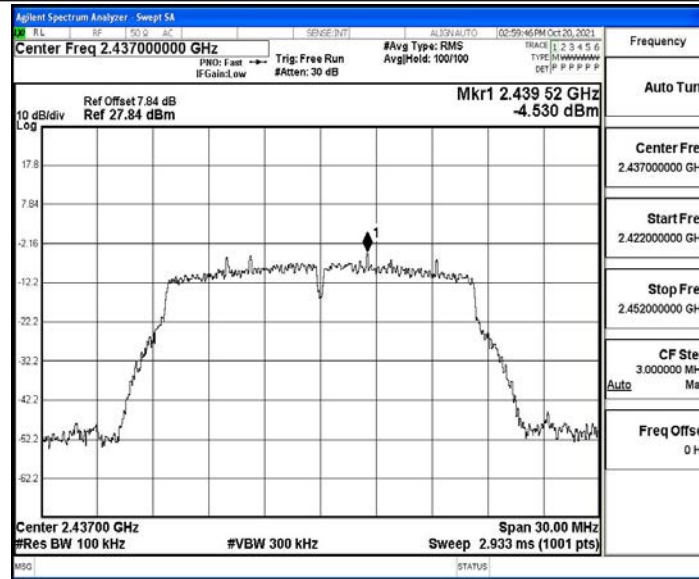
11G_Ant1_2412_30~1000



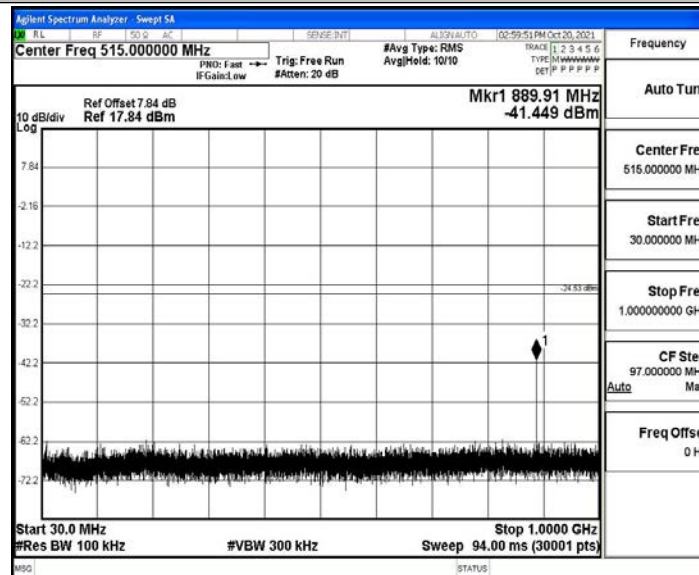
11G_Ant1_2412_1000~26500



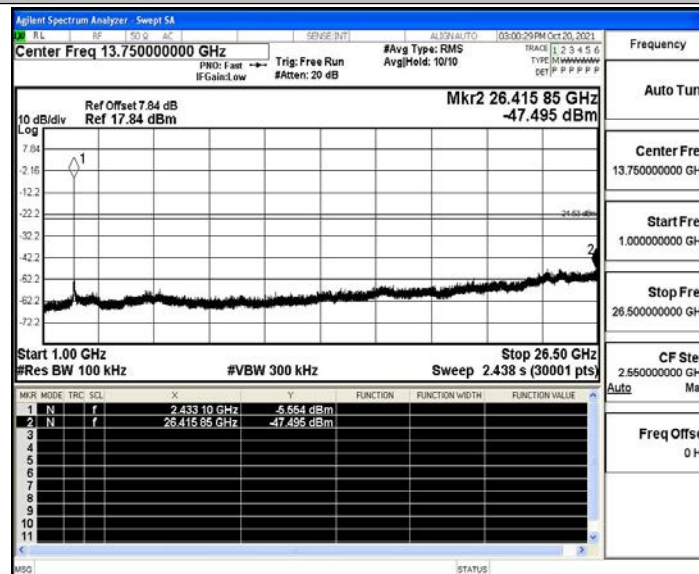
11G_Ant1_2437_0~Reference



11G_Ant1_2437_30~1000

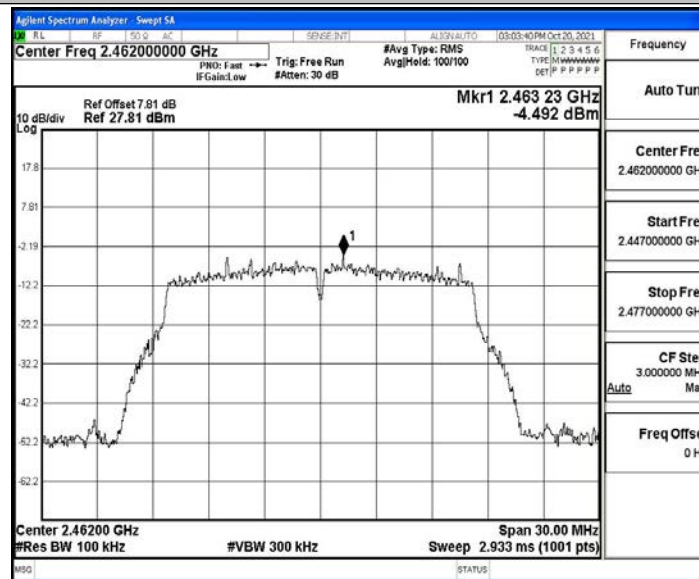


11G_Ant1_2437_1000~26500

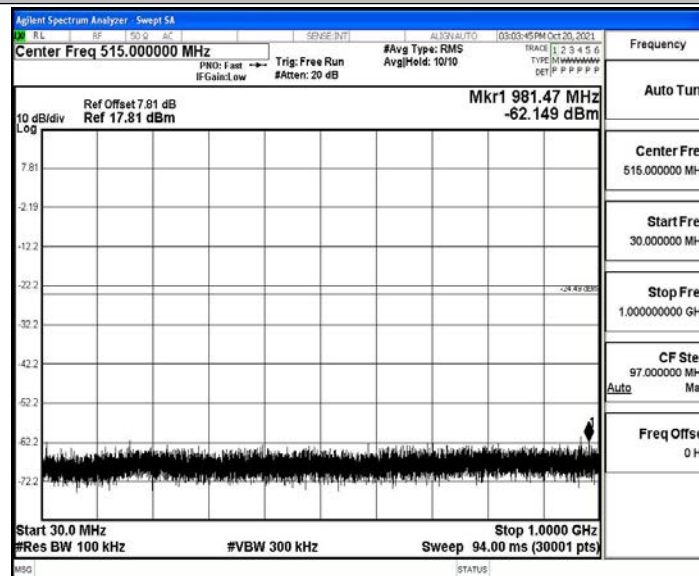




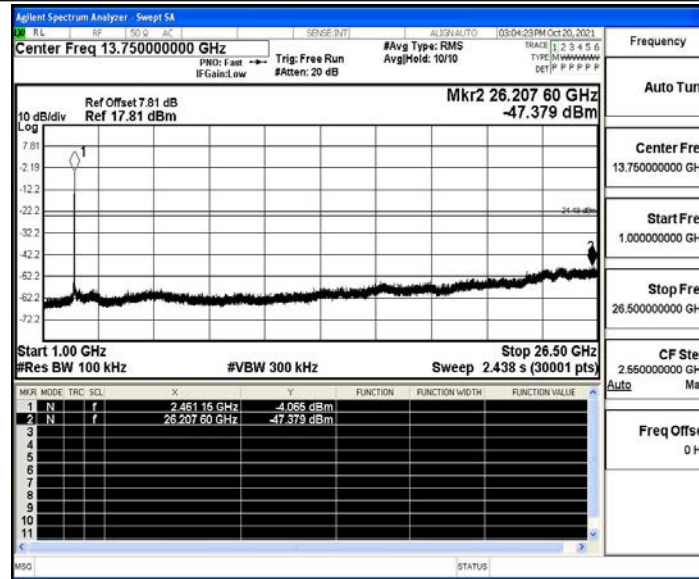
11G_Ant1_2462_0~Reference



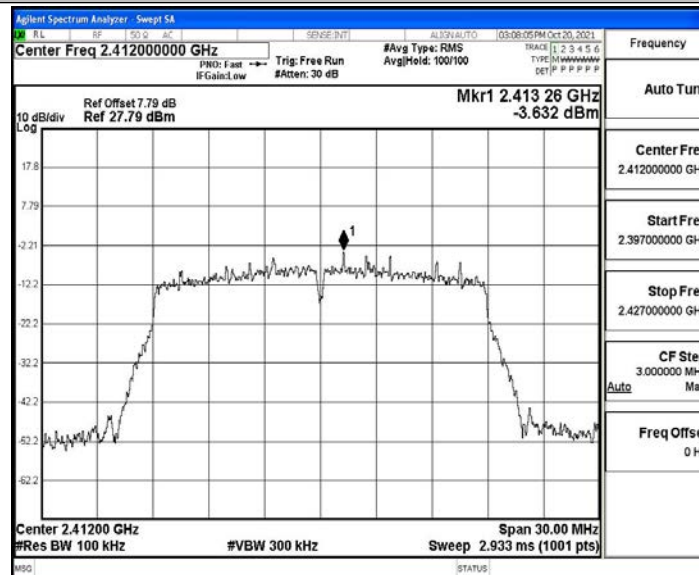
11G_Ant1_2462_30~1000



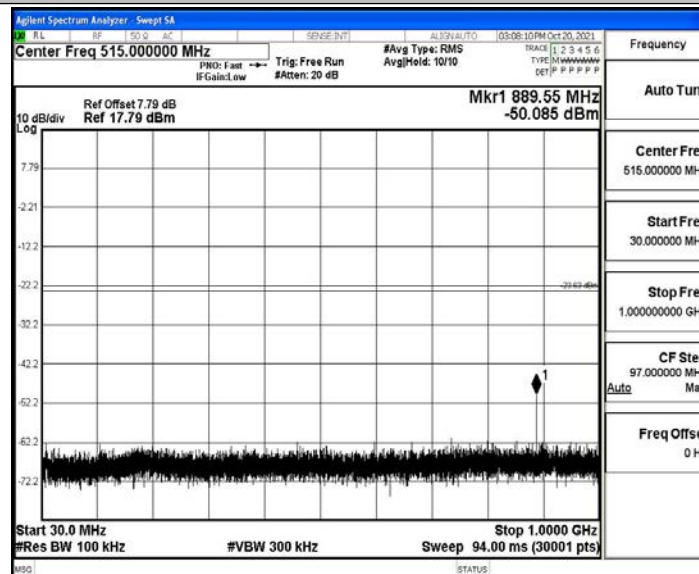
11G_Ant1_2462_1000~26500



11N20SISO_Ant1_2412_0~Reference

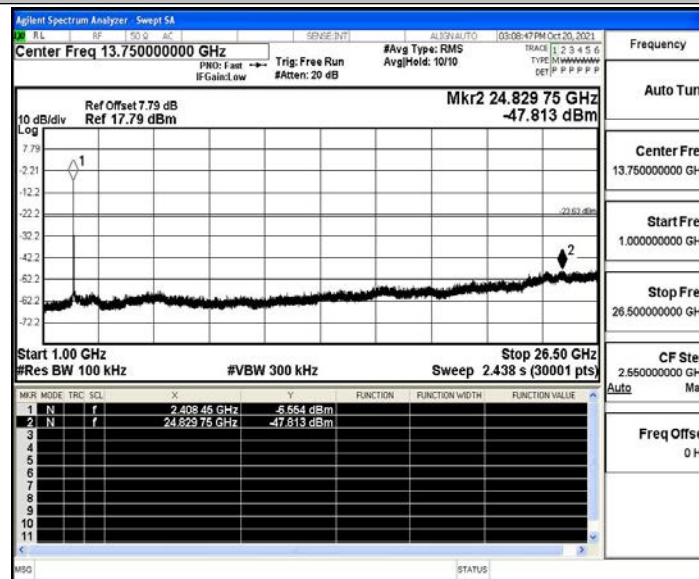


11N20SISO_Ant1_2412_30~1000

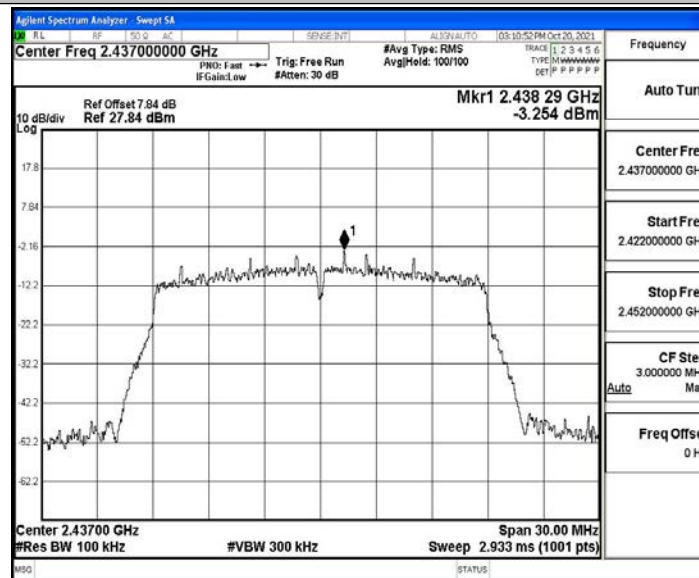




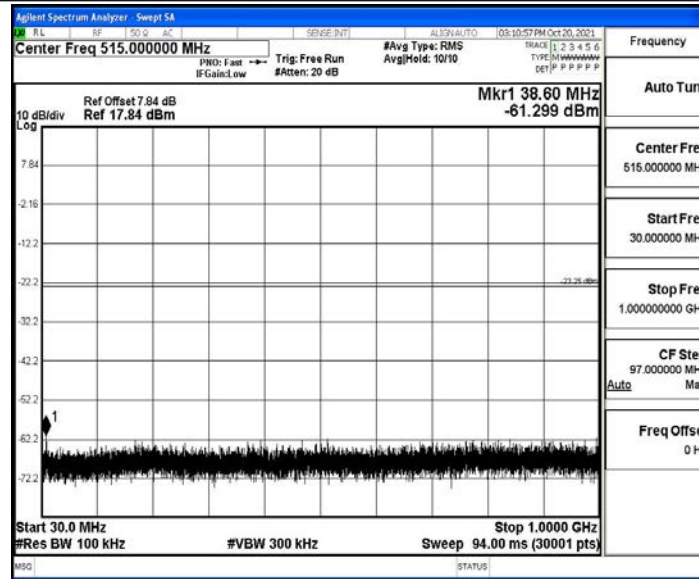
11N20SISO_Ant1_2412_1000~26500



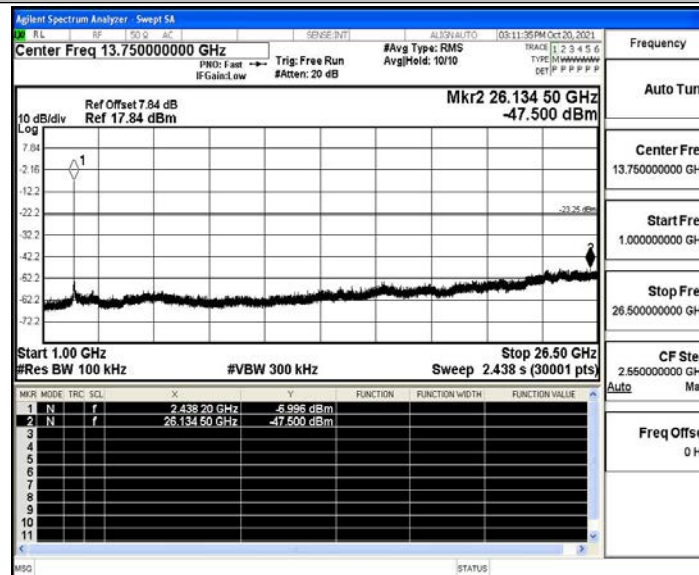
11N20SISO_Ant1_2437_0~Reference



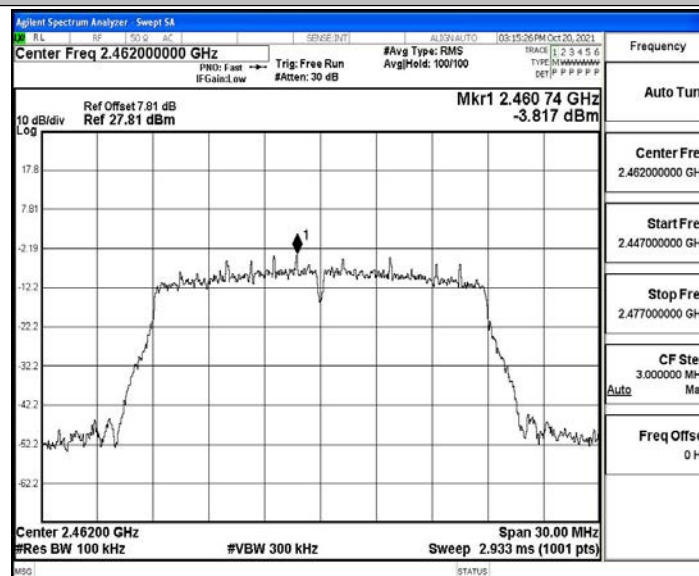
11N20SISO_Ant1_2437_30~1000



11N20SISO_Ant1_2437_1000~26500

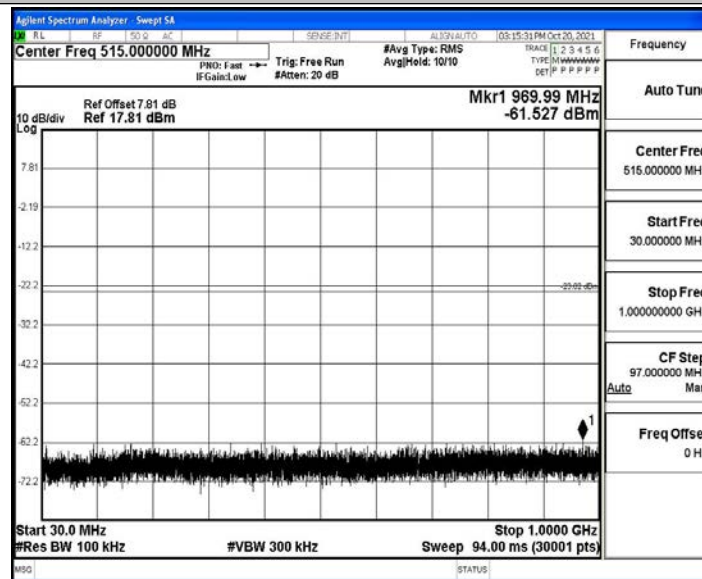


11N20SISO_Ant1_2462_0~Reference

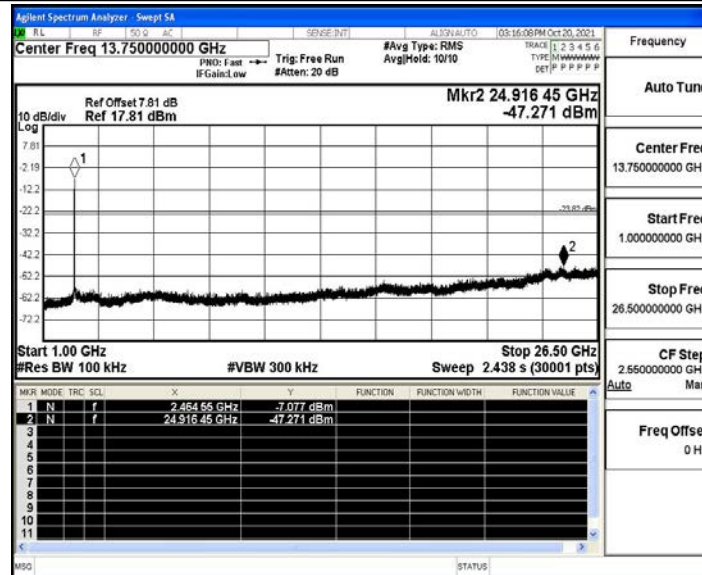




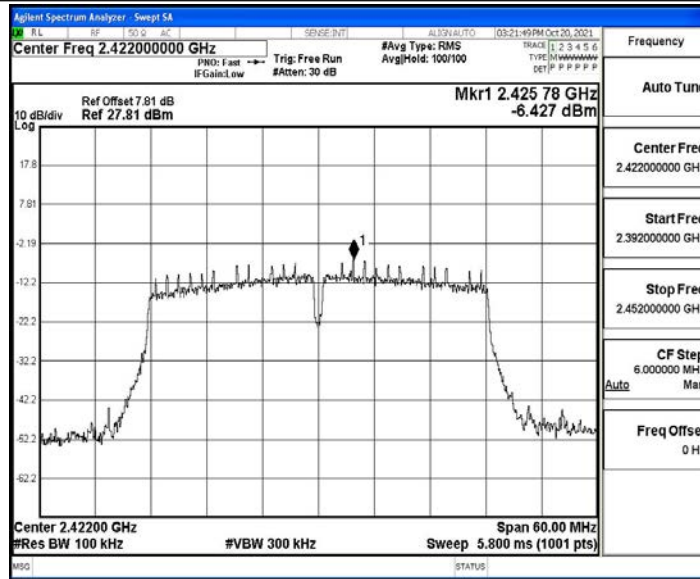
11N20SISO_Ant1_2462_30~1000



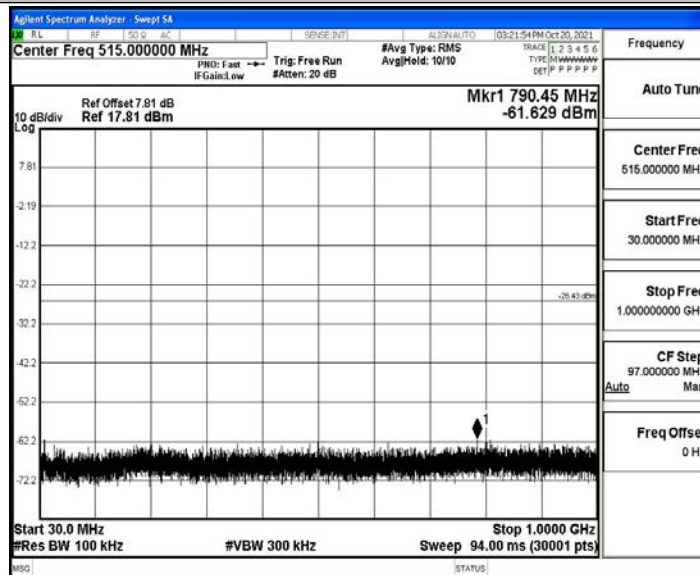
11N20SISO_Ant1_2462_1000~26500



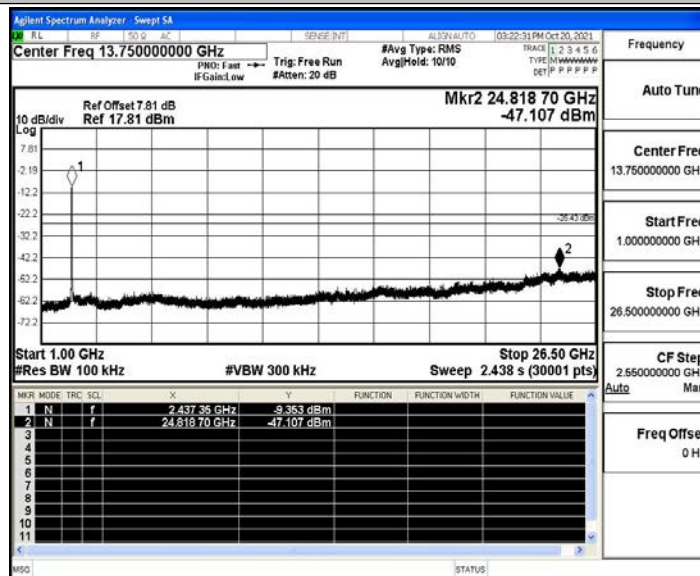
11N40SISO_Ant1_2422_0~Reference



11N40SISO_Ant1_2422_30~1000

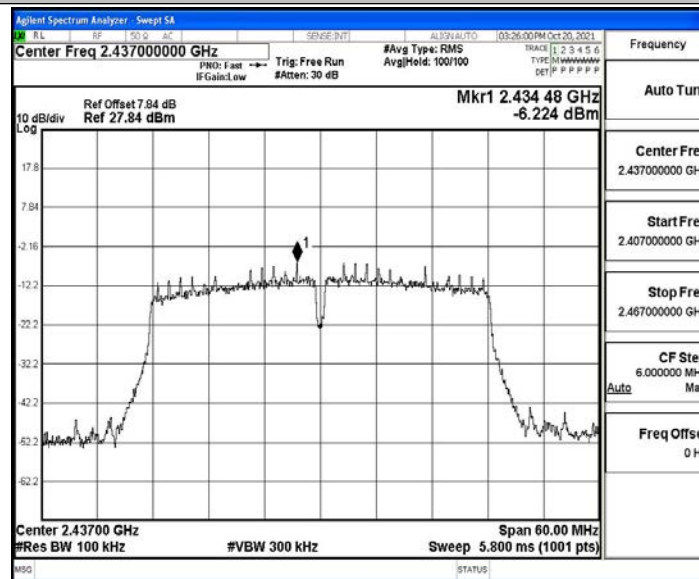


11N40SISO_Ant1_2422_1000~26500

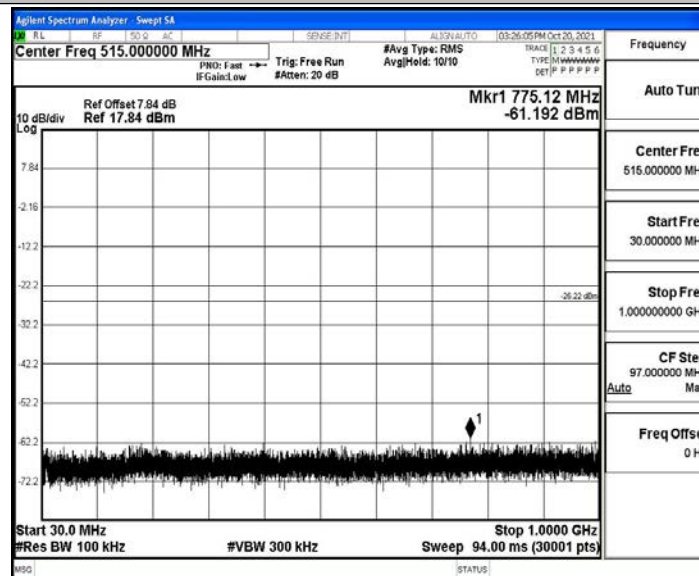




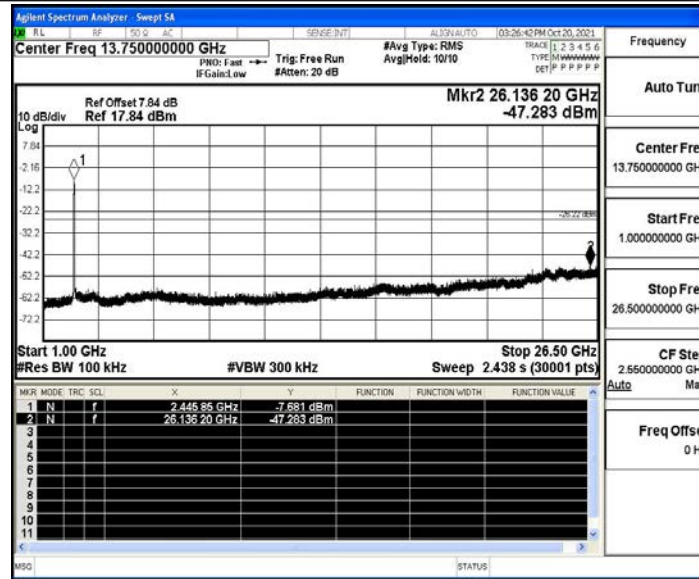
11N40SISO_Ant1_2437_0~Reference



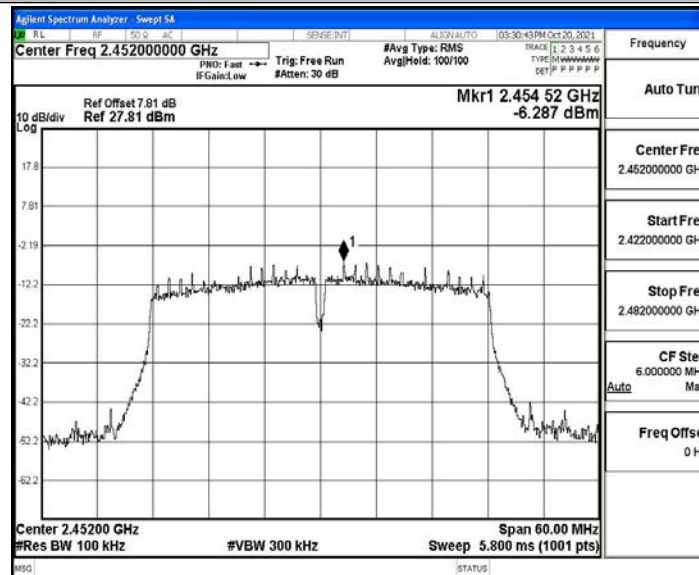
11N40SISO_Ant1_2437_30~1000



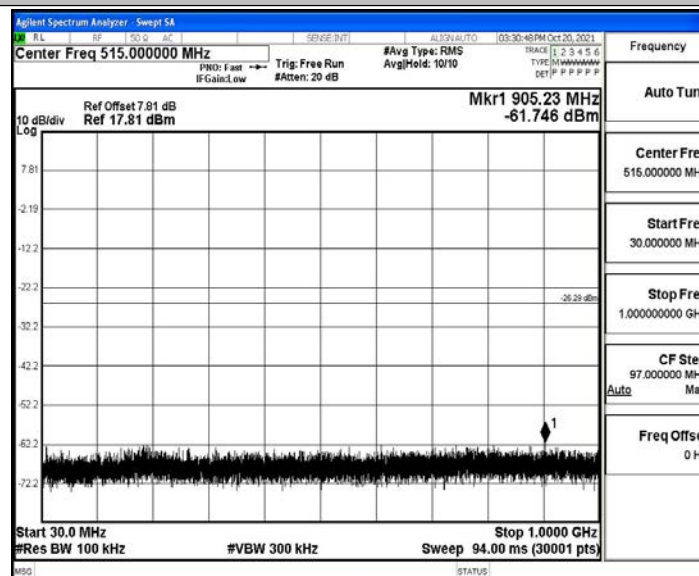
11N40SISO_Ant1_2437_1000~26500



11N40SISO_Ant1_2452_0~Reference

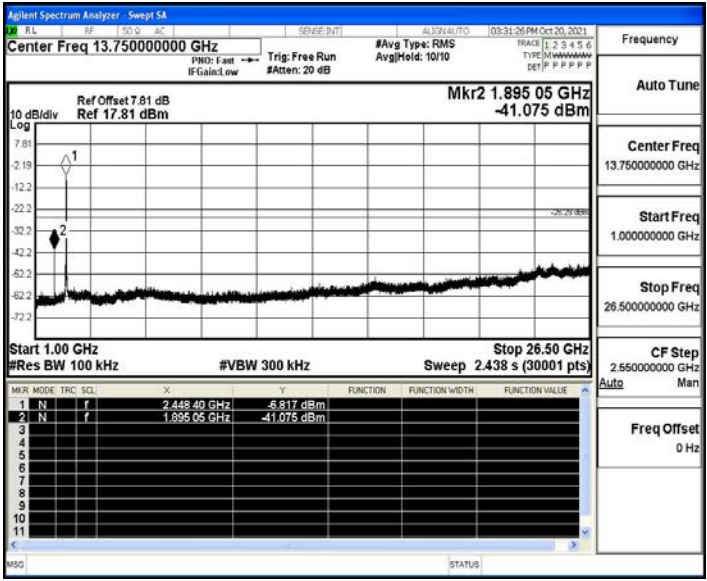


11N40SISO_Ant1_2452_30~1000





11N40SISO_Ant1_2452_1000~26500





C.6 Duty Cycle

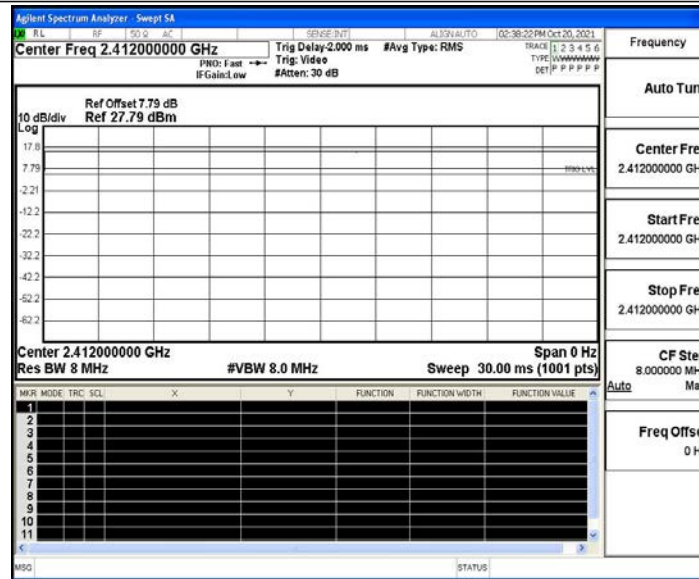
Test Result

TestMode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	1/T[KHz]
11B	Ant1	2412	30.00	30.00	100.00	/
		2437	30.00	30.00	100.00	/
		2462	30.00	30.00	100.00	/
11G	Ant1	2412	1.39	1.43	97.20	0.72
		2437	1.39	1.43	97.20	0.72
		2462	1.39	1.43	97.20	0.72
11N20SISO	Ant1	2412	1.30	1.34	97.01	0.77
		2437	1.30	1.34	97.01	0.77
		2462	1.30	1.34	97.01	0.77
11N40SISO	Ant1	2422	0.64	0.68	94.12	1.56
		2437	0.64	0.68	94.12	1.56
		2452	0.64	0.68	94.12	1.56

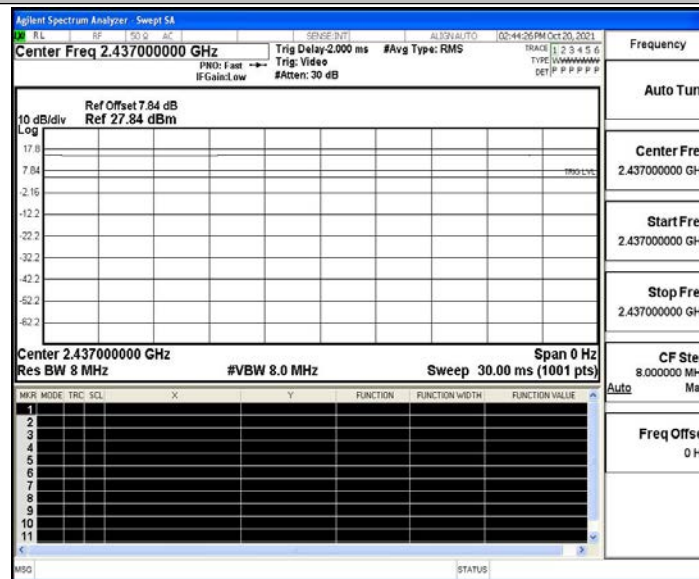


Test Graphs

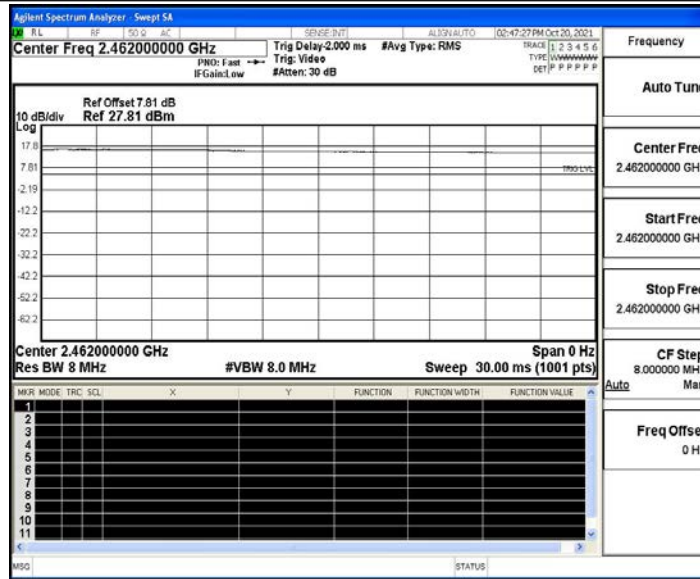
11B_Ant1_2412



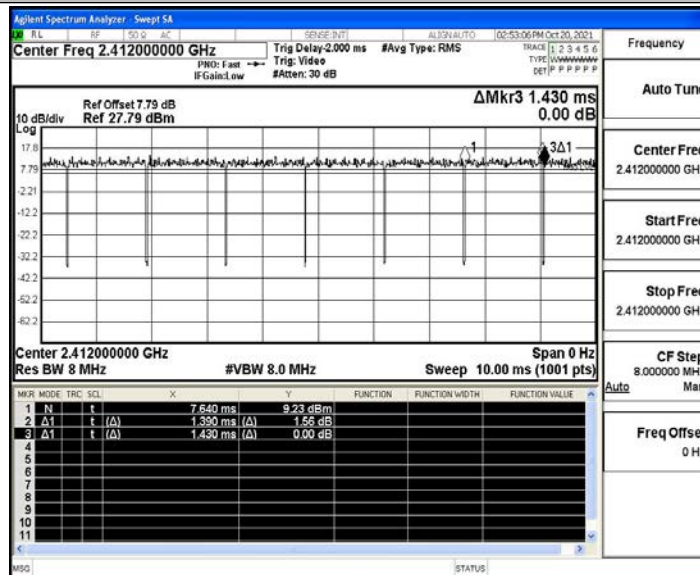
11B_Ant1_2437



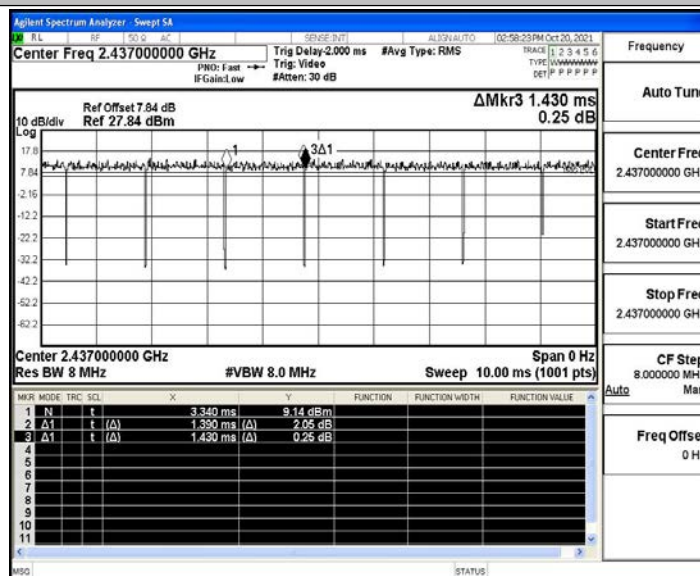
11B_Ant1_2462



11G_Ant1_2412



11G_Ant1_2437





Agilent Spectrum Analyzer - Sweep SA

IF BW: 100 kHz, RF: 2.462000000 GHz, Span: 8.0 MHz, Center Freq: 2.462000000 GHz, Res BW: 8.0 MHz, #VBW: 8.0 MHz, Sweep: 10.00 ms (1001 pts)

Trig Delay: 2.000 ms, #Avg Type: RMS, Trg: Video, #Atten: 30 dB, PNO: Fast, IF Gain: Low

AL33VLAUTO, 03:00:59 PM Oct 20, 2021, TRAC: 1 2 3 4 5 6, TYP: DMMANAL, DET: P P P P P

Ref Offset 7.81 dB, Ref 27.81 dBm, Δ Mkr3 1.430 ms, 0.79 dB

Center 2.462000000 GHz, Span 8.0 MHz, Res BW 8.0 MHz, #VBW 8.0 MHz, Sweep 10.00 ms (1001 pts)

MIR	MODE	TRG	SCN	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	t		7.640 ms	8.37 dBm			
2	Δ 1	t	(A)	1.390 ms (A)	1.73 dB			
3	Δ 1	t	(A)	1.430 ms (A)	0.79 dB			
4								
5								
6								
7								
8								
9								
10								
11								

Frequency: Auto, Center Freq: 2.462000000 GHz, Start Freq: 2.462000000 GHz, Stop Freq: 2.462000000 GHz, CF Step: 8.000000 MHz, Auto, Freq Offset: 0 Hz

Agilent Spectrum Analyzer - Sweep SA

Center Freq 2.412000000 GHz

Ref Offset 7.79 dB
Ref 27.79 dBm

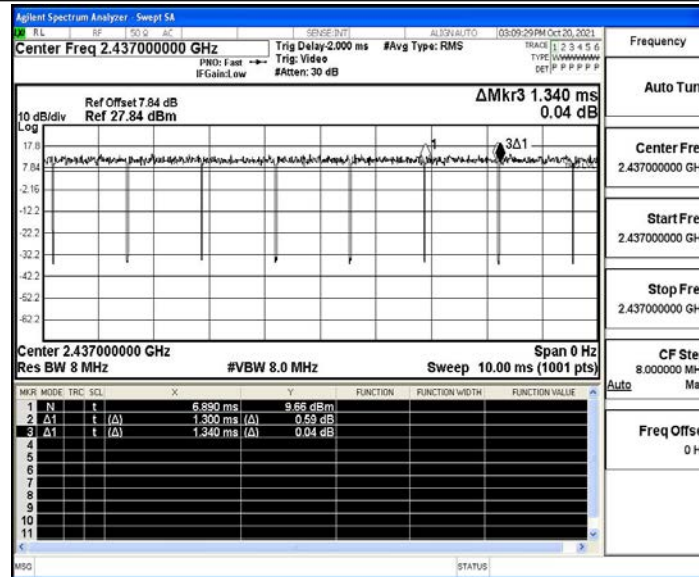
Trig Delay 2.000 ms
Trig Video
IF Gain Low
#Acten: 30 dB

ΔMkr 1.340 ms
0.08 dB

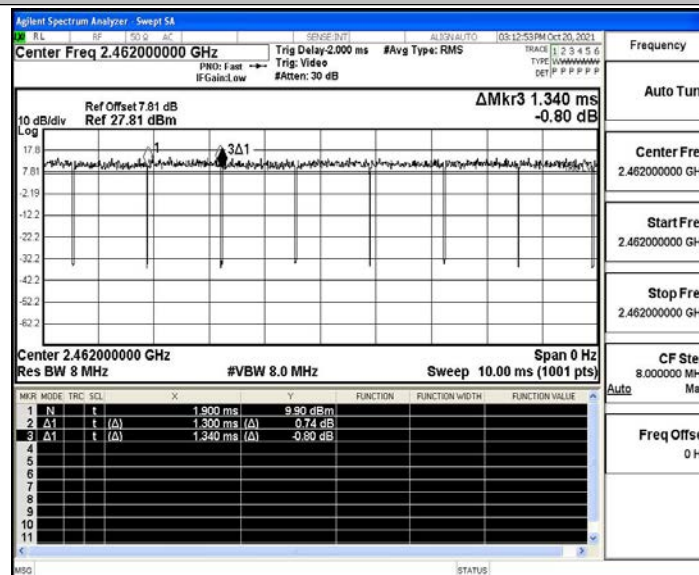
Center 2.412000000 GHz
Res BW 8 MHz
#VBW 8.0 MHz
Sweep 10.00 ms (1001 pts)
Span 0 Hz

MIR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	t		7.360 ms	8.93 dBm			
2	Δ1	t	(Δ)	1.300 ms (Δ)	0.69 dBm			
3	Δ1	t	(Δ)	1.340 ms (Δ)	0.08 dB			

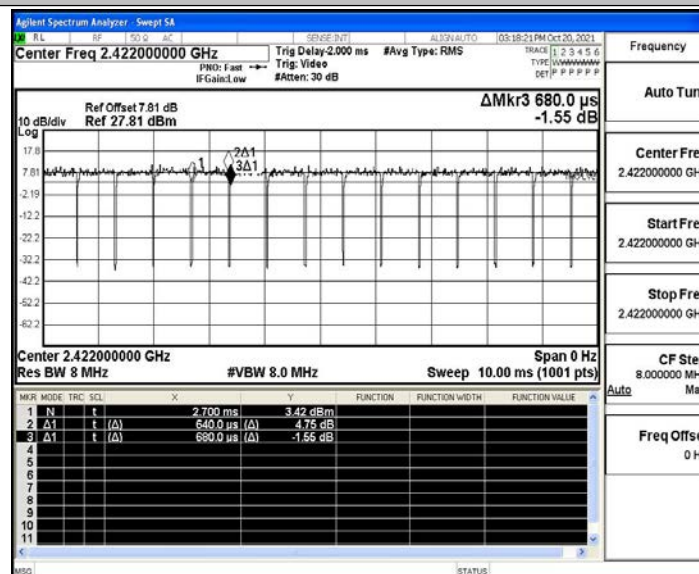
39/50



11N20SISO_Ant1_2462

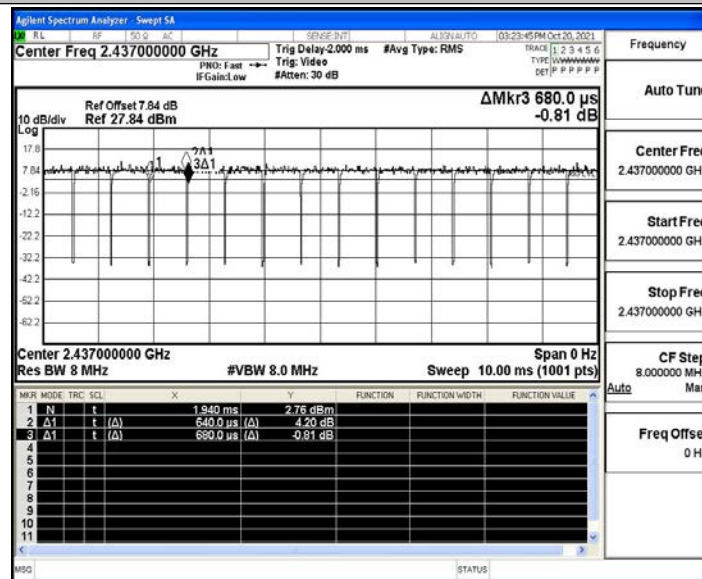


11N40SISO_Ant1_2422

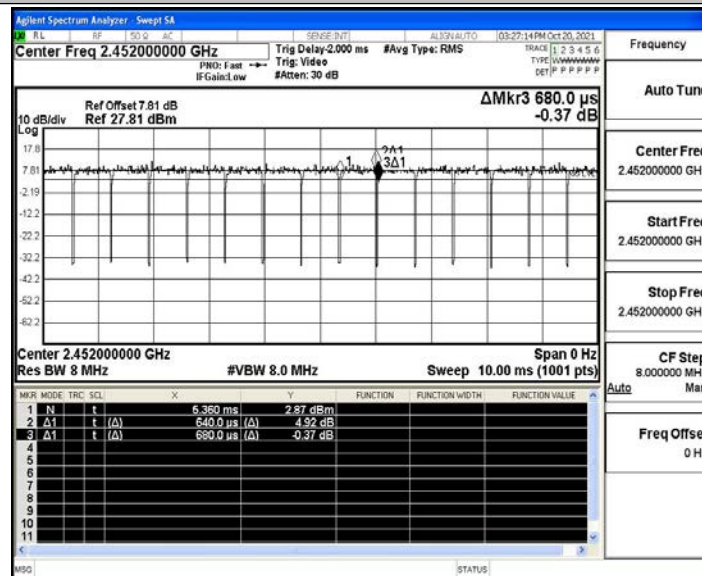




11N40SISO_Ant1_2437



11N40SISO_Ant1_2452





C.7 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	-49.27	≤-41.20	45.93	≤54	PASS
				AV	2387.230	-48.65	≤-41.20	46.55	≤54	PASS
				AV	2390.000	-48.72	≤-41.20	46.48	≤54	PASS
				Peak	2310.000	-44.76	≤-21.20	50.44	≤74	PASS
				Peak	2337.440	-39.39	≤-21.20	55.81	≤74	PASS
				Peak	2390.000	-41.56	≤-21.20	53.64	≤74	PASS
		High	2462	AV	2483.500	-48.15	≤-41.20	47.05	≤54	PASS
				AV	2498.630	-47.99	≤-41.20	47.21	≤54	PASS
				AV	2500.000	-48.02	≤-41.20	47.18	≤54	PASS
				Peak	2483.500	-43.27	≤-21.20	51.93	≤74	PASS
				Peak	2493.130	-37.49	≤-21.20	57.71	≤74	PASS
				Peak	2500.000	-41.34	≤-21.20	53.86	≤74	PASS
11G	Ant1	Low	2412	AV	2310.000	-48.68	≤-41.20	46.52	≤54	PASS
				AV	2388.790	-47.76	≤-41.20	47.44	≤54	PASS
				AV	2390.000	-47.78	≤-41.20	47.42	≤54	PASS
				Peak	2310.000	-41.78	≤-21.20	53.42	≤74	PASS
				Peak	2315.210	-38.81	≤-21.20	56.39	≤74	PASS
				Peak	2390.000	-41.04	≤-21.20	54.16	≤74	PASS
		High	2462	AV	2483.500	-47.31	≤-41.20	47.89	≤54	PASS
				AV	2485.320	-47.12	≤-41.20	48.08	≤54	PASS
				AV	2500.000	-47.31	≤-41.20	47.89	≤54	PASS
				Peak	2483.500	-38.26	≤-21.20	56.94	≤74	PASS
				Peak	2485.870	-38.28	≤-21.20	56.92	≤74	PASS
				Peak	2500.000	-40.27	≤-21.20	54.93	≤74	PASS
11N20SIS O	Ant1	Low	2412	AV	2310.000	-48.78	≤-41.20	46.42	≤54	PASS
				AV	2389.050	-47.88	≤-41.20	47.32	≤54	PASS
				AV	2390.000	-48.02	≤-41.20	47.18	≤54	PASS
				Peak	2310.000	-40.85	≤-21.20	54.35	≤74	PASS
				Peak	2373.060	-38.4	≤-21.20	56.80	≤74	PASS
				Peak	2390.000	-41.09	≤-21.20	54.11	≤74	PASS
		High	2462	AV	2483.500	-47.12	≤-41.20	48.08	≤54	PASS
				AV	2486.200	-47.1	≤-41.20	48.10	≤54	PASS
				AV	2500.000	-47.48	≤-41.20	47.72	≤54	PASS
				Peak	2483.500	-39.76	≤-21.20	55.44	≤74	PASS
				Peak	2484.000	-38	≤-21.20	57.20	≤74	PASS
				Peak	2500.000	-40.94	≤-21.20	54.26	≤74	PASS
11N40SIS	Ant1	Low	2422	AV	2310.000	-48.55	≤-41.20	46.65	≤54	PASS



O				AV	2389.830	-46.99	≤ -41.20	48.21	≤ 54	PASS
				AV	2390.000	-47.12	≤ -41.20	48.08	≤ 54	PASS
				Peak	2310.000	-41.45	≤ -21.20	53.75	≤ 74	PASS
				Peak	2386.450	-38.05	≤ -21.20	57.15	≤ 74	PASS
				Peak	2390.000	-41.18	≤ -21.20	54.02	≤ 74	PASS
		High	2452	AV	2483.500	-45.71	≤ -41.20	49.49	≤ 54	PASS
				AV	2483.560	-45.59	≤ -41.20	49.61	≤ 54	PASS
				AV	2500.000	-47.07	≤ -41.20	48.13	≤ 54	PASS
				Peak	2483.500	-37.47	≤ -21.20	57.73	≤ 74	PASS
				Peak	2489.830	-37.29	≤ -21.20	57.91	≤ 74	PASS
				Peak	2500.000	-40.79	≤ -21.20	54.41	≤ 74	PASS

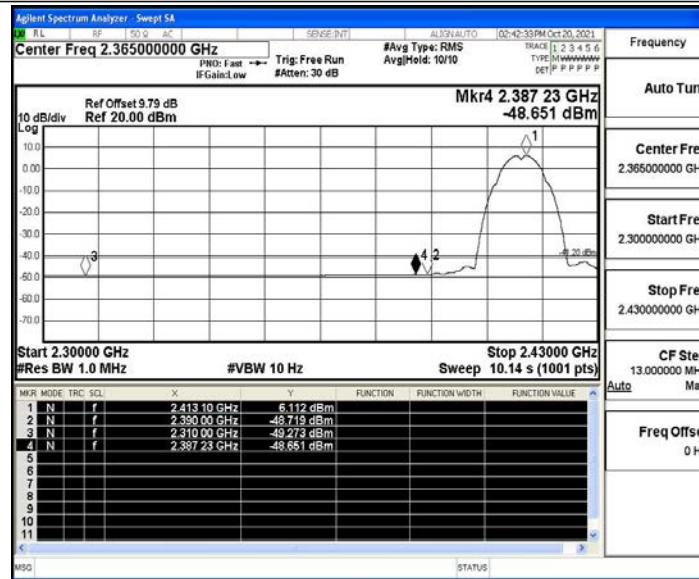
Note:

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.

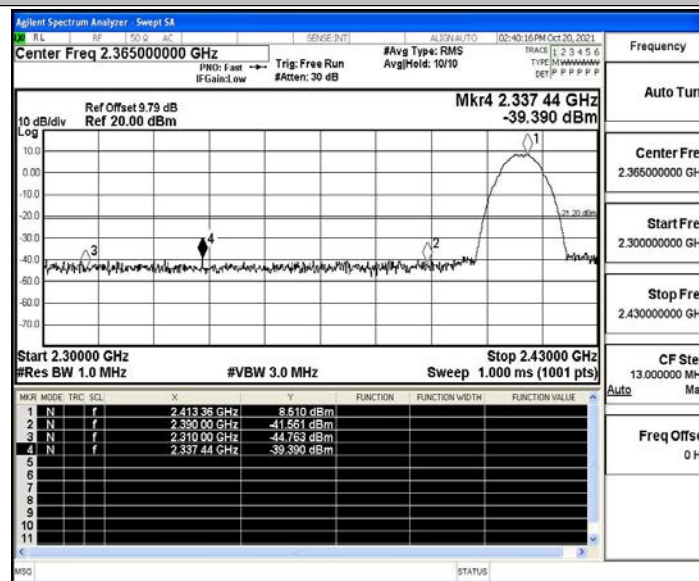


Test Graphs

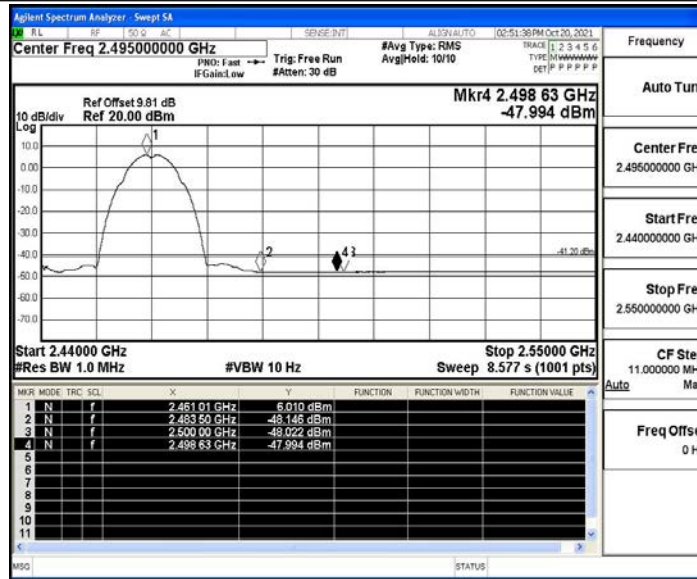
11B_Ant1_Low_2412_AV



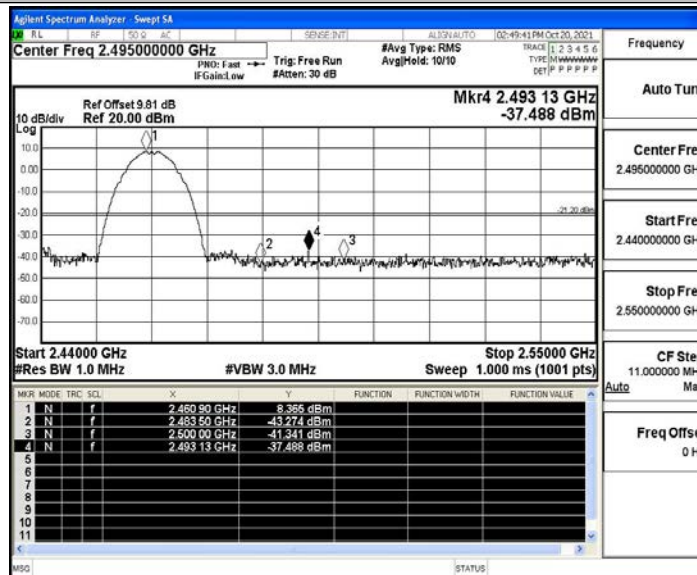
11B_Ant1_Low_2412_Peak



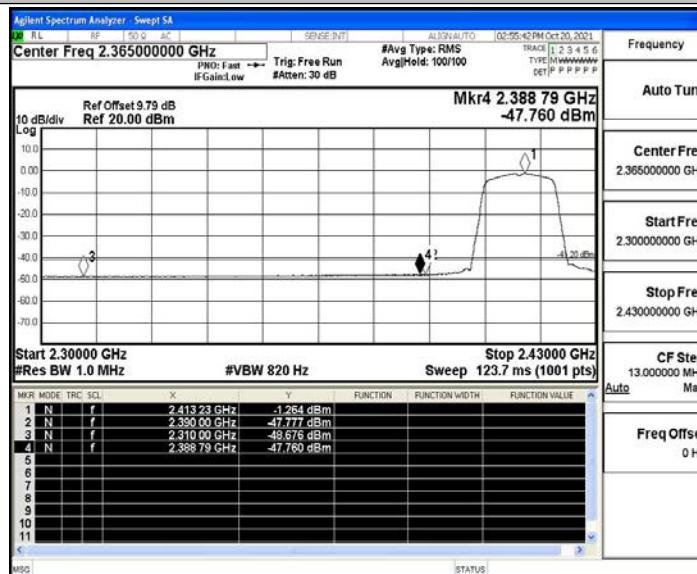
11B_Ant1_High_2462_AV



11B_Ant1_High_2462_Peak

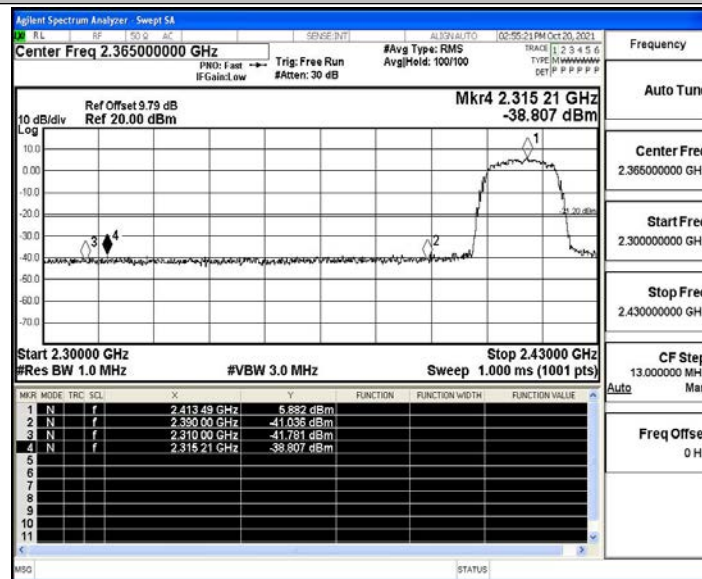


11G_Ant1_Low_2412_AV

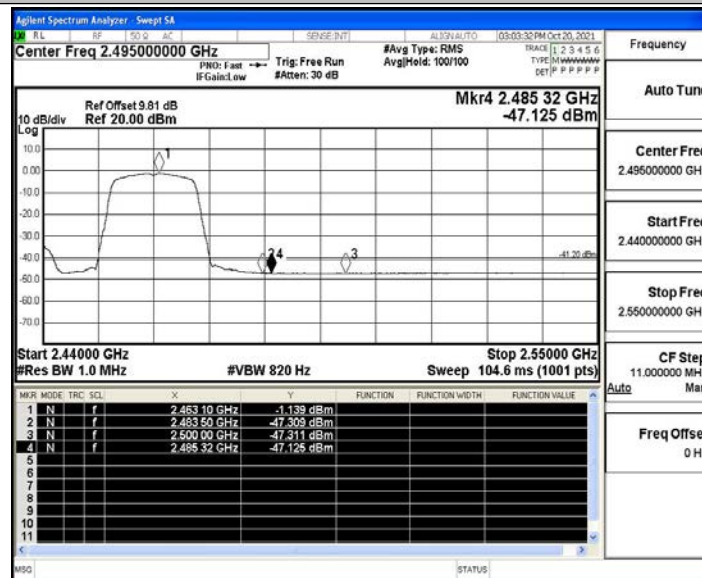




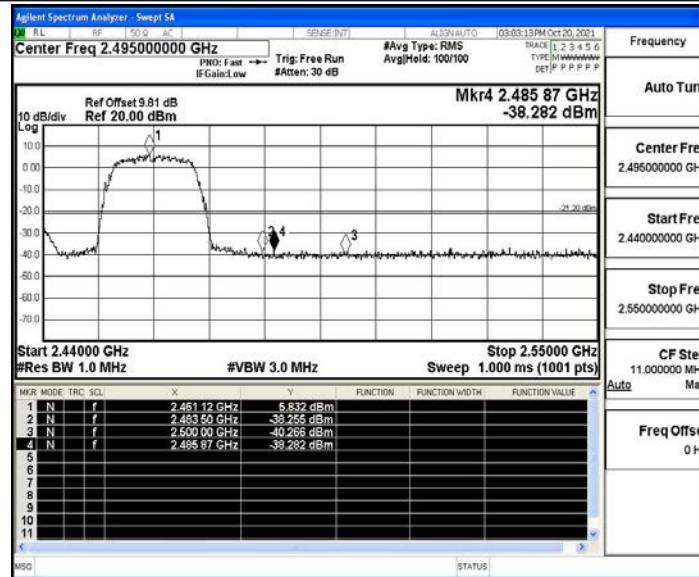
11G_Ant1_Low_2412_Peak



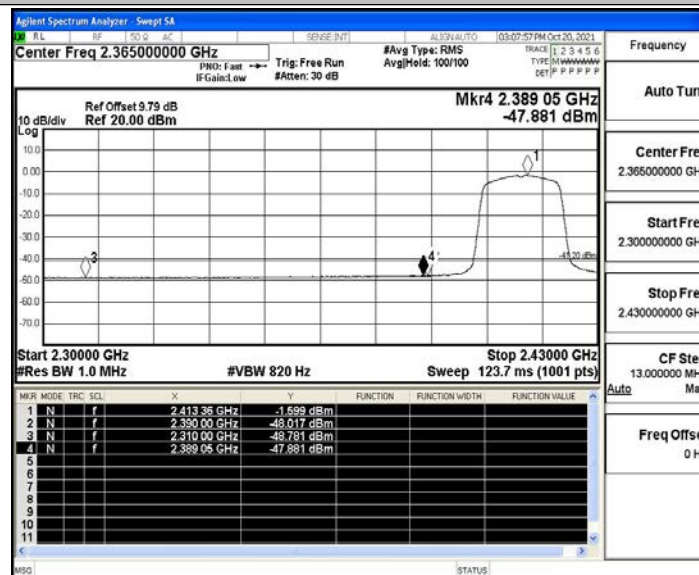
11G_Ant1_High_2462_AV



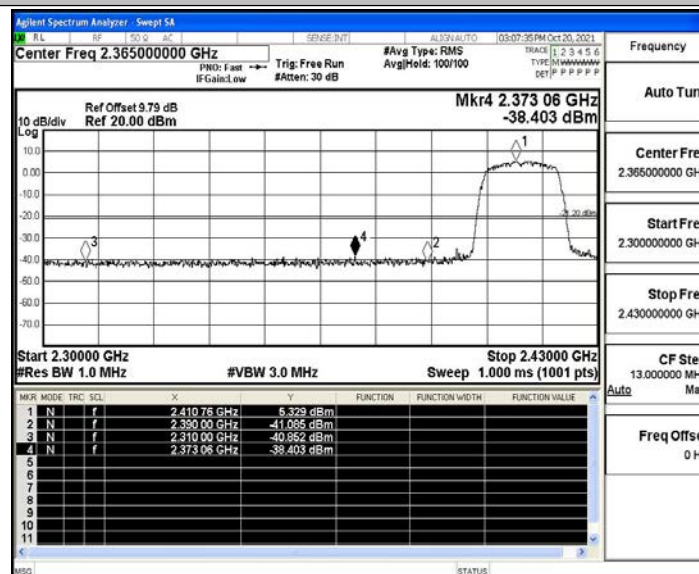
11G_Ant1_High_2462_Peak



11N20SISO_Ant1_Low_2412_AV

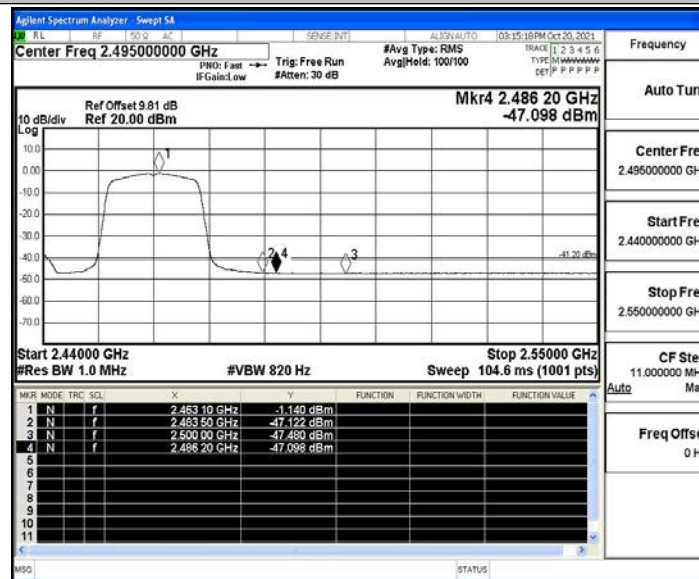


11N20SISO_Ant1_Low_2412_Peak

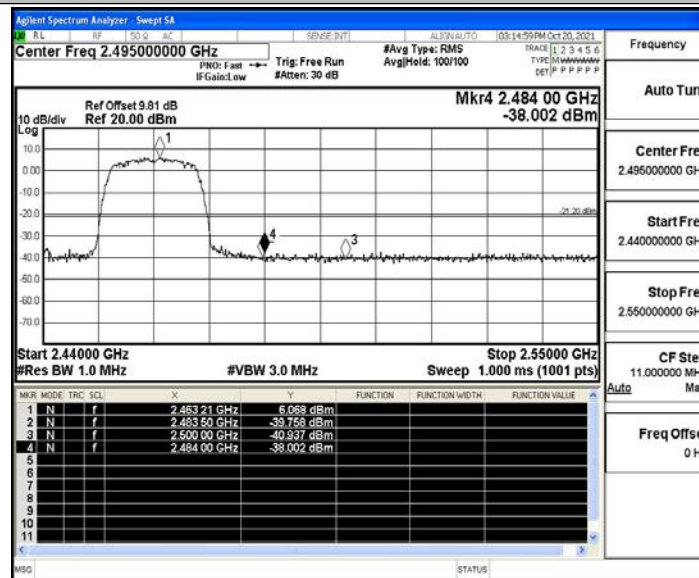




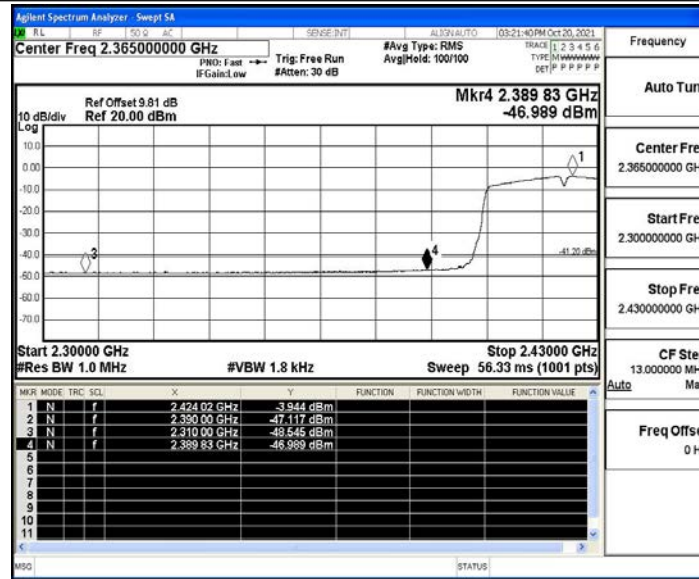
11N20SISO_Ant1_High_2462_AV



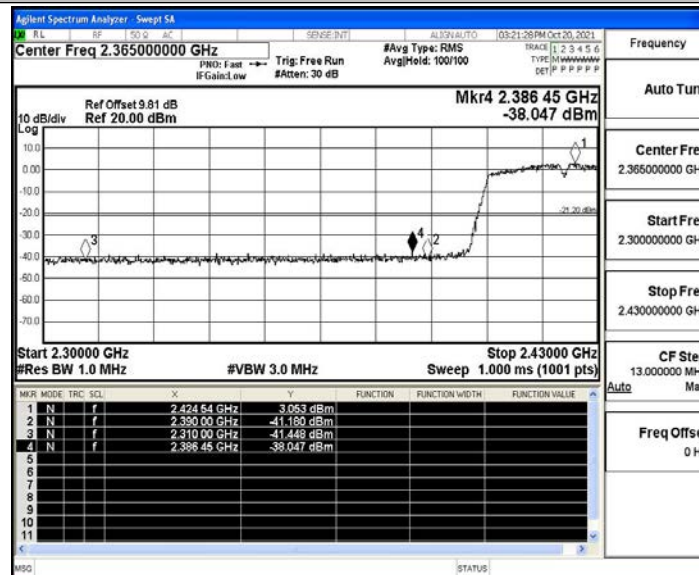
11N20SISO_Ant1_High_2462_Peak



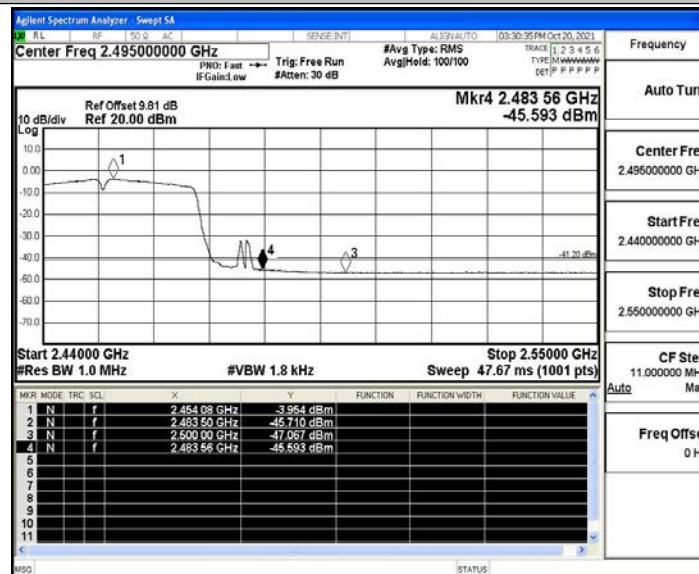
11N40SISO_Ant1_Low_2422_AV



11N40SISO_Ant1_Low_2422_Peak



11N40SISO_Ant1_High_2452_AV





11N40SISO_Ant1_High_2452_Peak

