



Appendix A

RF Test Data for 2.4G WIFI (Conducted Measurement)

Product Name: Car DVR

Test Model: AEC12-2

Environmental Conditions

Temperature:	21.2° C
Relative Humidity:	52.4%
ATM Pressure:	100.0 kPa
Test Engineer:	Jay Li
Supervised by:	Li Huan



A.1 6dB Bandwidth

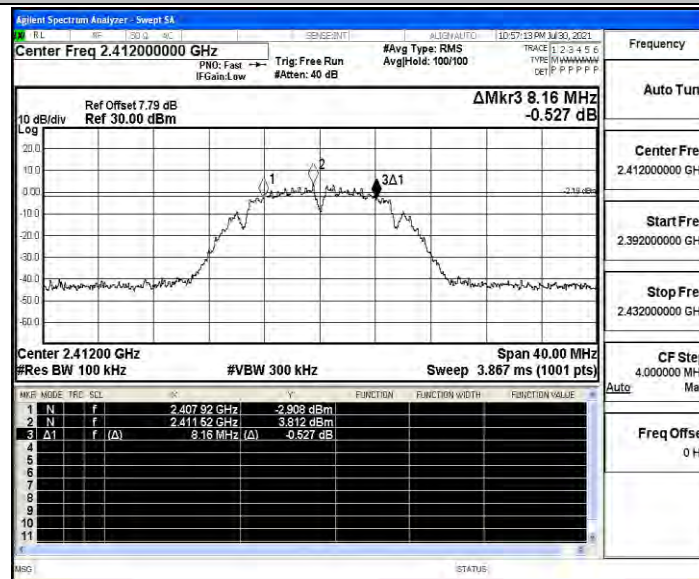
Test Result

TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	8.160	2407.920	2416.080	0.5	PASS
		2437	8.240	2433.360	2441.600	0.5	PASS
		2462	8.640	2457.440	2466.080	0.5	PASS
11G	Ant1	2412	14.800	2404.480	2419.280	0.5	PASS
		2437	15.320	2429.480	2444.800	0.5	PASS
		2462	15.800	2453.800	2469.600	0.5	PASS
11N20SISO	Ant1	2412	17.600	2403.200	2420.800	0.5	PASS
		2437	15.080	2430.720	2445.800	0.5	PASS
		2462	16.400	2453.160	2469.560	0.5	PASS
11N40SISO	Ant1	2422	34.240	2405.600	2439.840	0.5	PASS
		2437	35.280	2419.400	2454.680	0.5	PASS
		2452	35.120	2434.480	2469.600	0.5	PASS

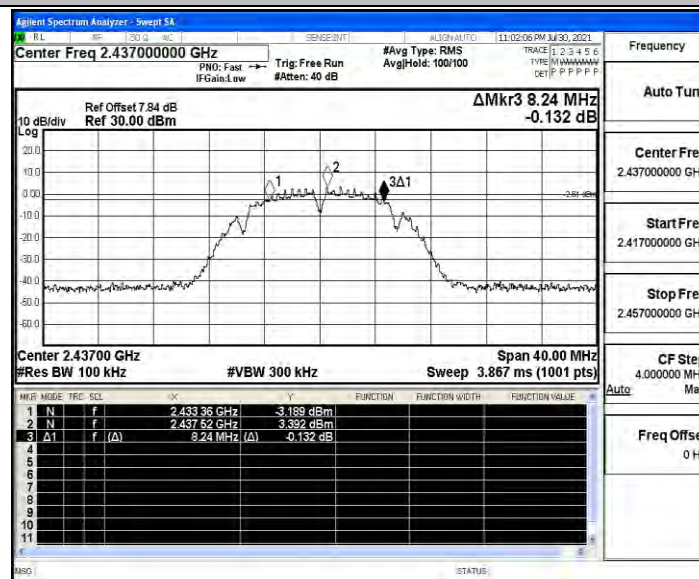


Test Graphs

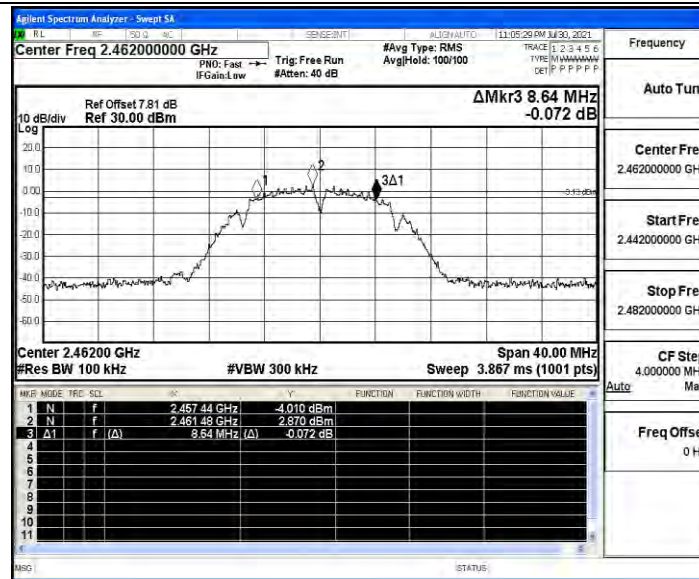
11B_Ant1_2412



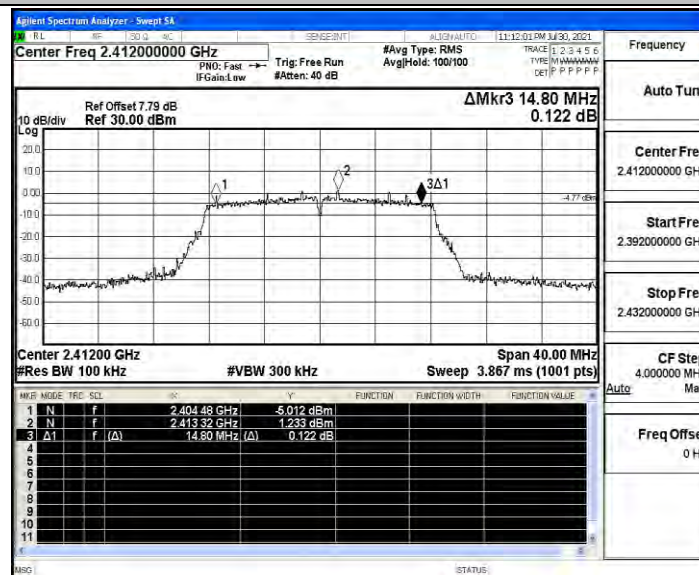
11B_Ant1_2437



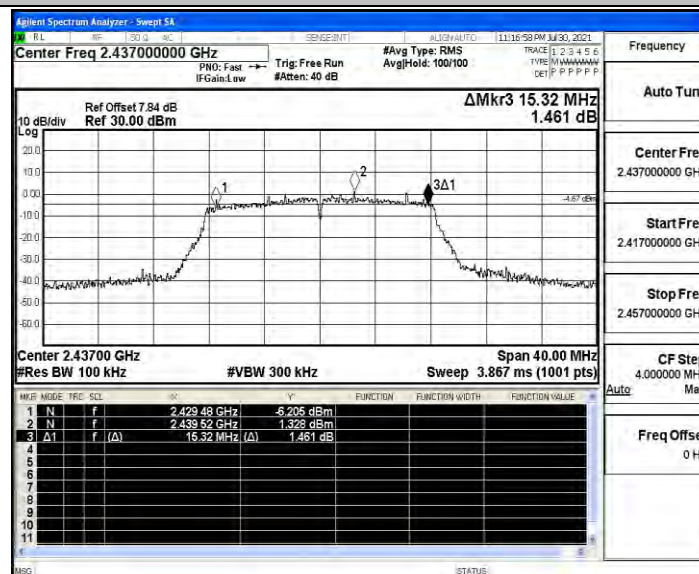
11B_Ant1_2462



11G_Ant1_2412

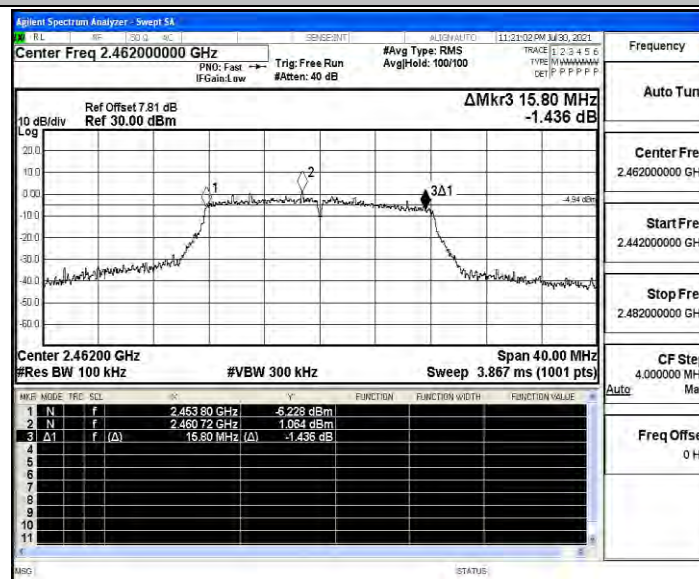


11G_Ant1_2437

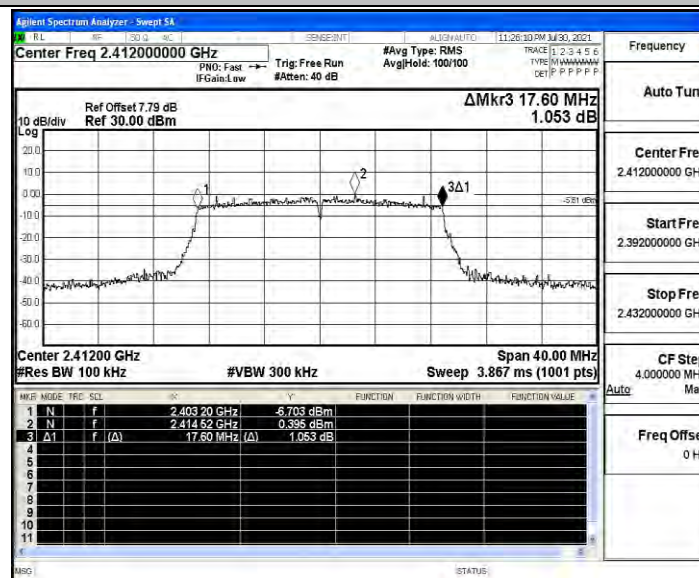




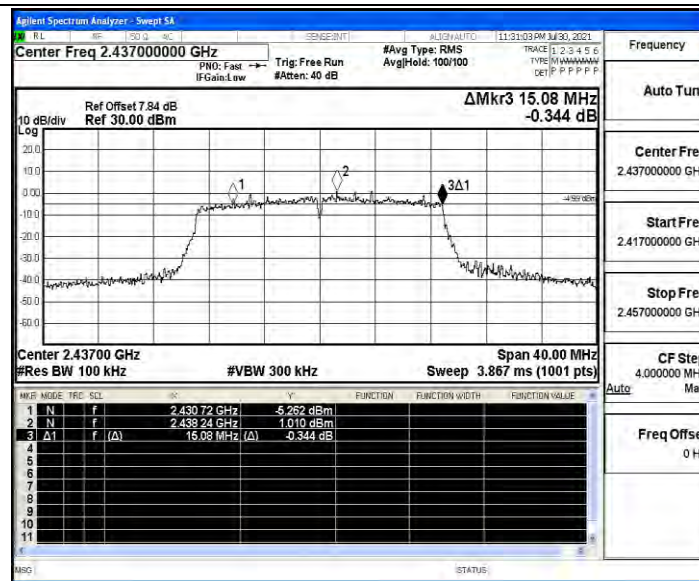
11G_Ant1_2462



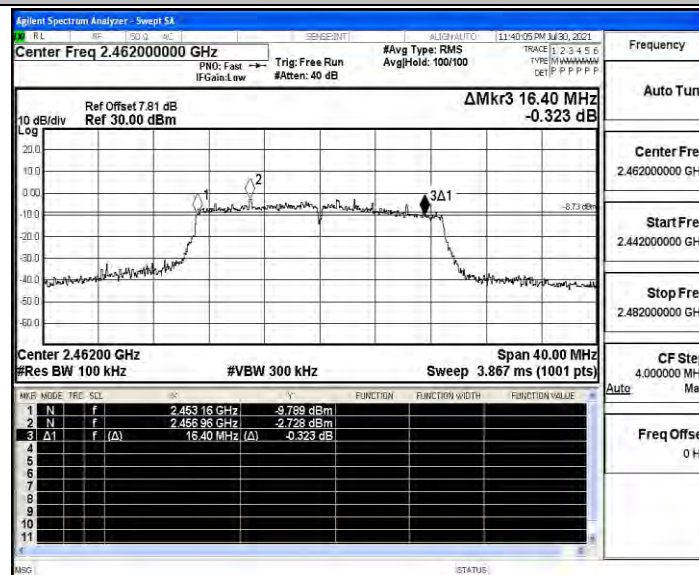
11N20SISO_Ant1_2412



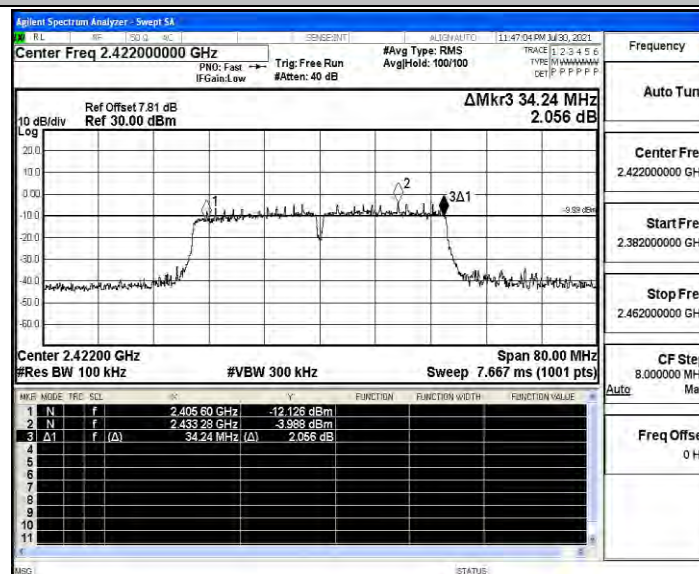
11N20SISO_Ant1_2437



11N20SISO_Ant1_2462

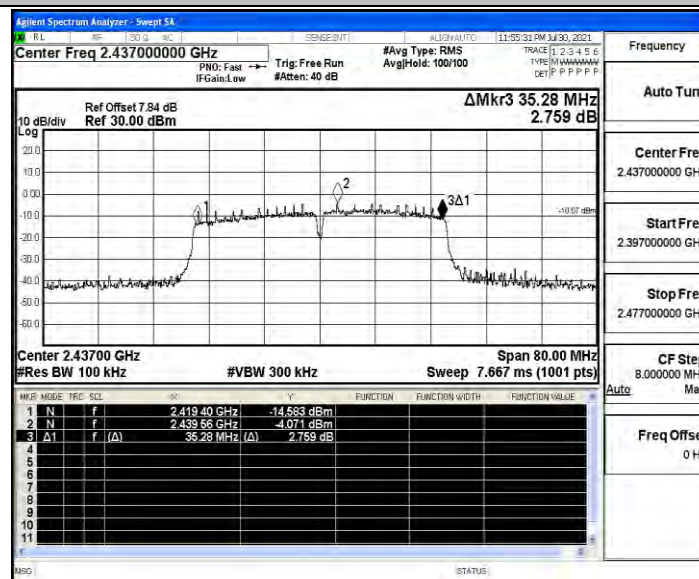


11N40SISO_Ant1_2422

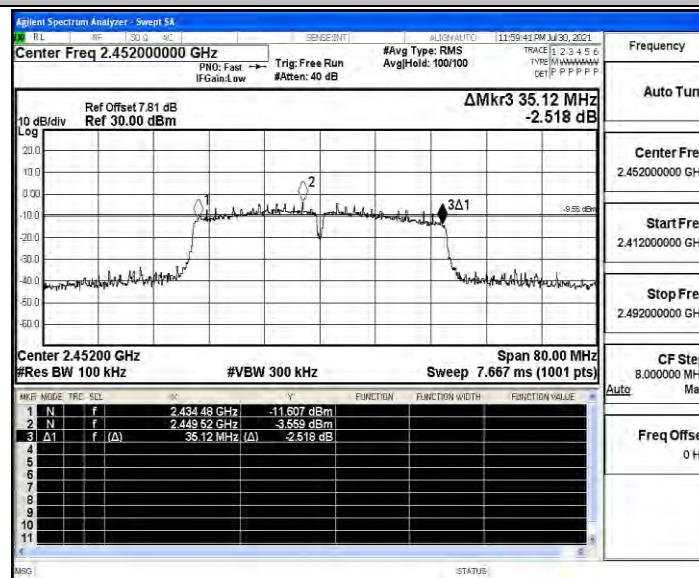




11N40SISO_Ant1_2437



11N40SISO_Ant1_2452





A.2 Maximum Peak conducted output power

Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	2412	16.67	≤30	PASS
		2437	16.27	≤30	PASS
		2462	16.09	≤30	PASS
11G	Ant1	2412	15.89	≤30	PASS
		2437	15.99	≤30	PASS
		2462	15.55	≤30	PASS
11N20SISO	Ant1	2412	16.30	≤30	PASS
		2437	15.89	≤30	PASS
		2462	15.90	≤30	PASS
11N40SISO	Ant1	2422	14.51	≤30	PASS
		2437	14.34	≤30	PASS
		2452	14.32	≤30	PASS



A.3 Maximum power spectral density

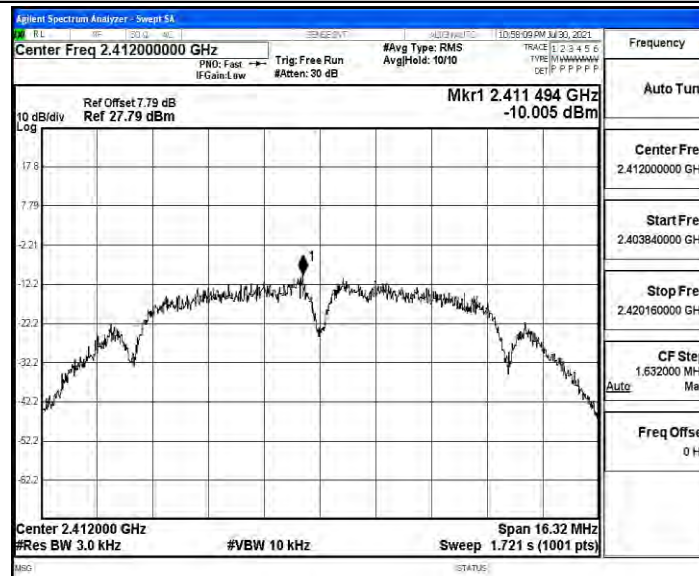
Test Result

TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-10.01	≤8	PASS
		2437	-9.73	≤8	PASS
		2462	-10.58	≤8	PASS
11G	Ant1	2412	-12.18	≤8	PASS
		2437	-12.11	≤8	PASS
		2462	-12.81	≤8	PASS
11N20SISO	Ant1	2412	-12.66	≤8	PASS
		2437	-11.56	≤8	PASS
		2462	-16.37	≤8	PASS
11N40SISO	Ant1	2422	-18.86	≤8	PASS
		2437	-18.11	≤8	PASS
		2452	-18.41	≤8	PASS

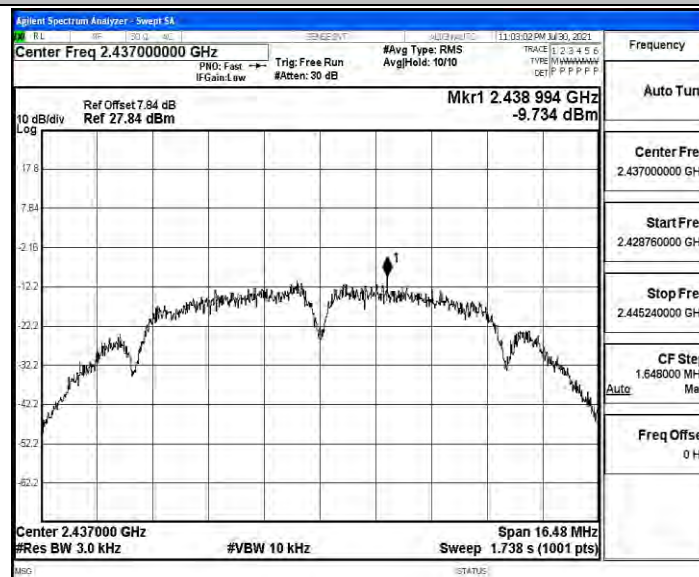


Test Graphs

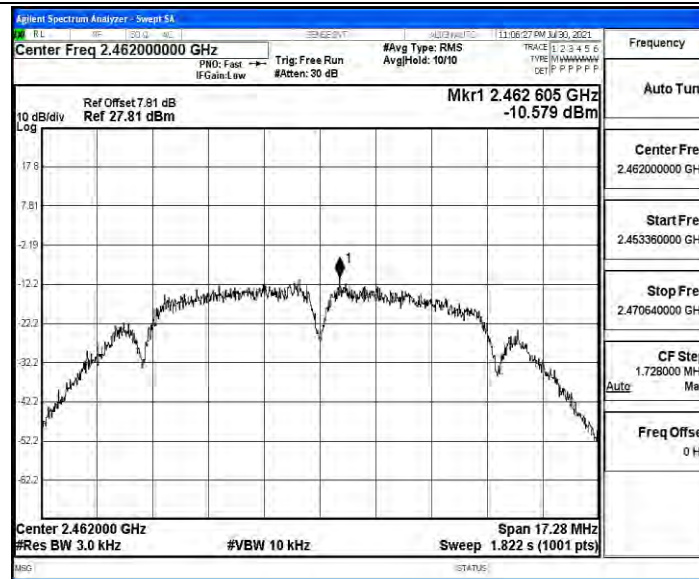
11B_Ant1_2412



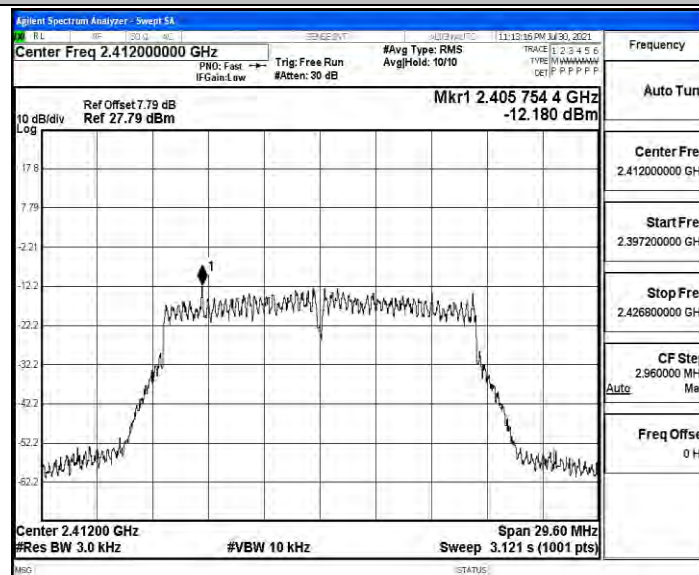
11B_Ant1_2437



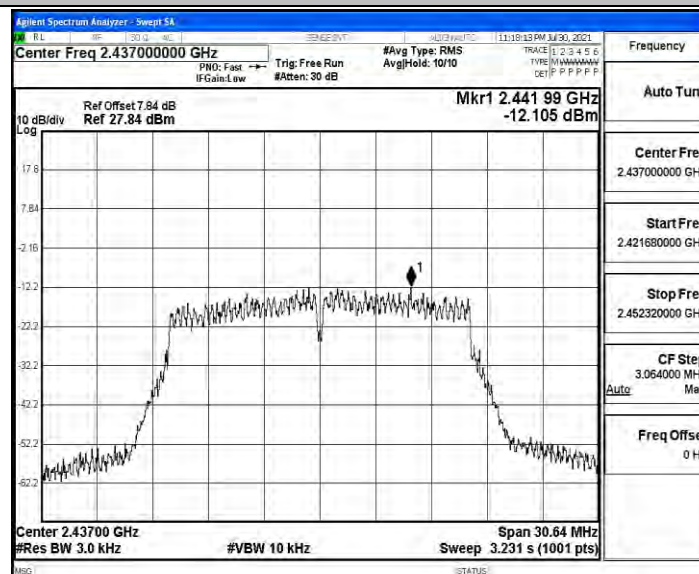
11B_Ant1_2462



11G_Ant1_2412

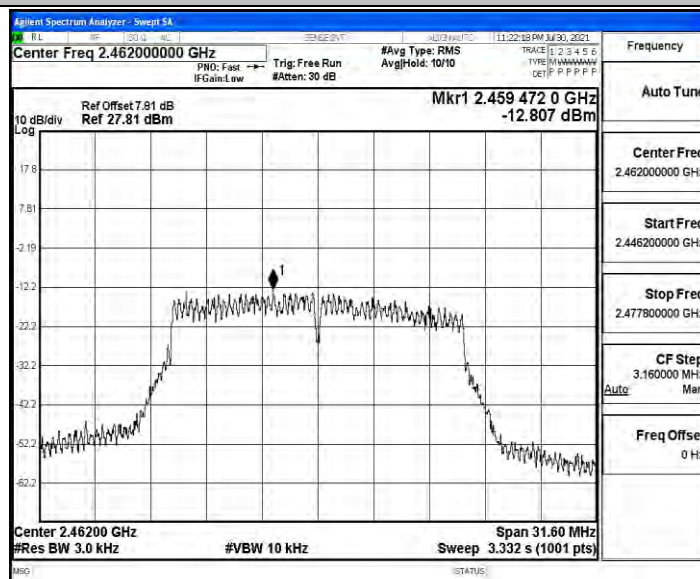


11G_Ant1_2437

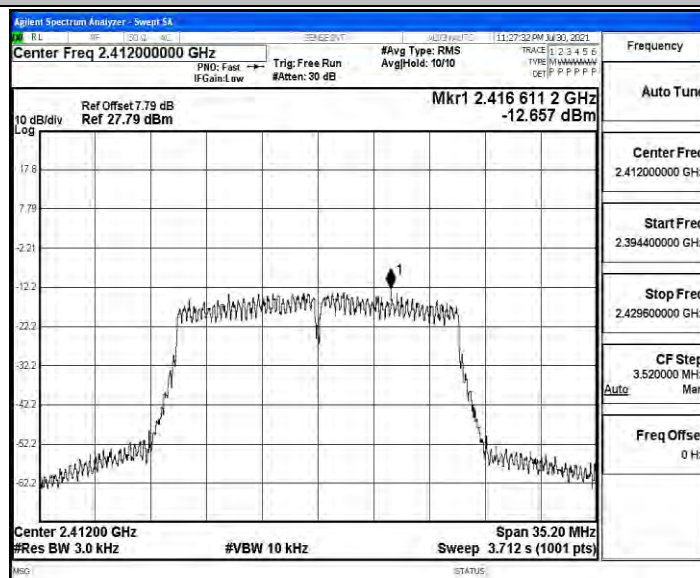




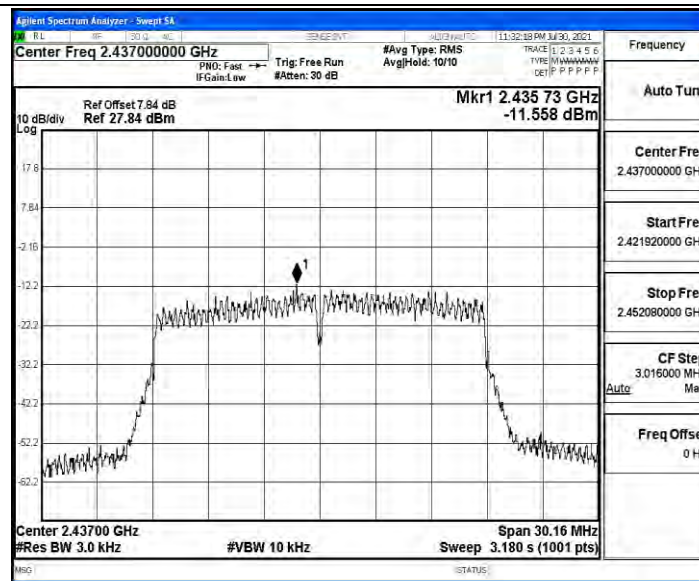
11G_Ant1_2462



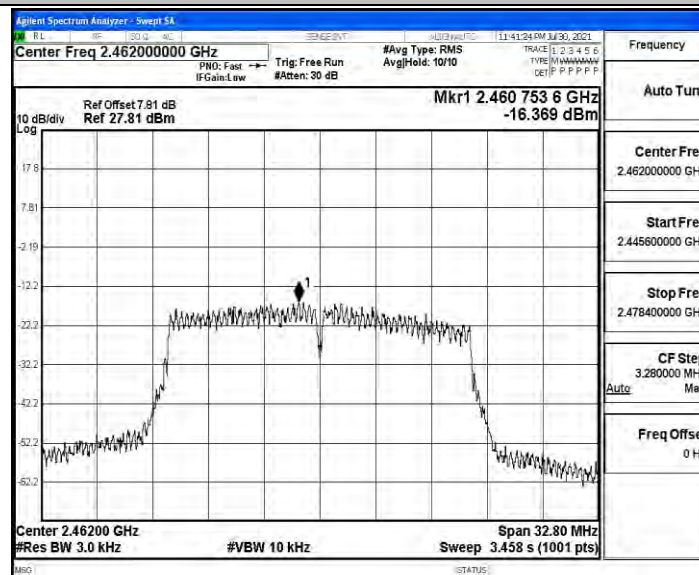
11N20SISO_Ant1_2412



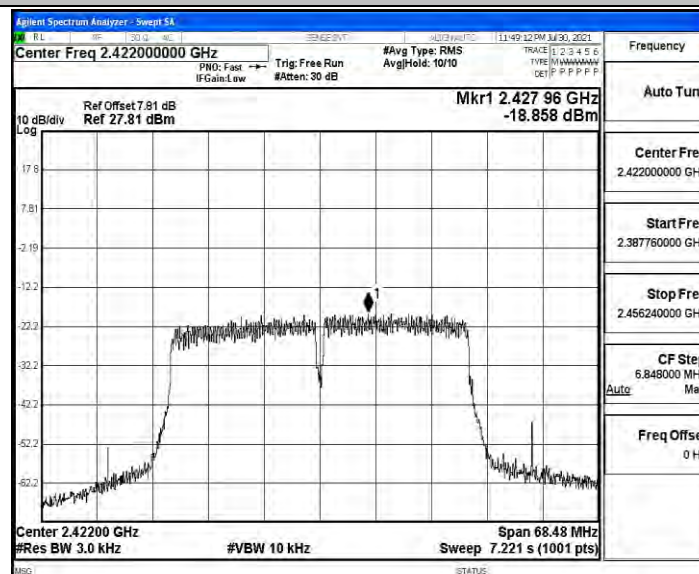
11N20SISO_Ant1_2437



11N20SISO_Ant1_2462

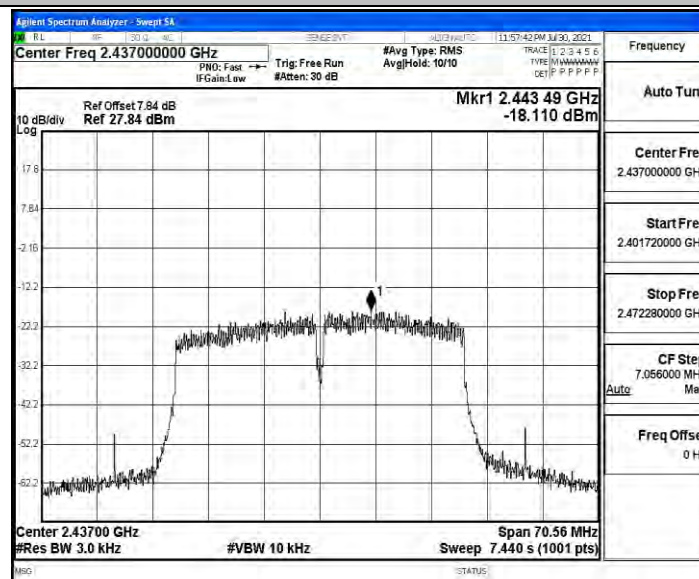


11N40SISO_Ant1_2422

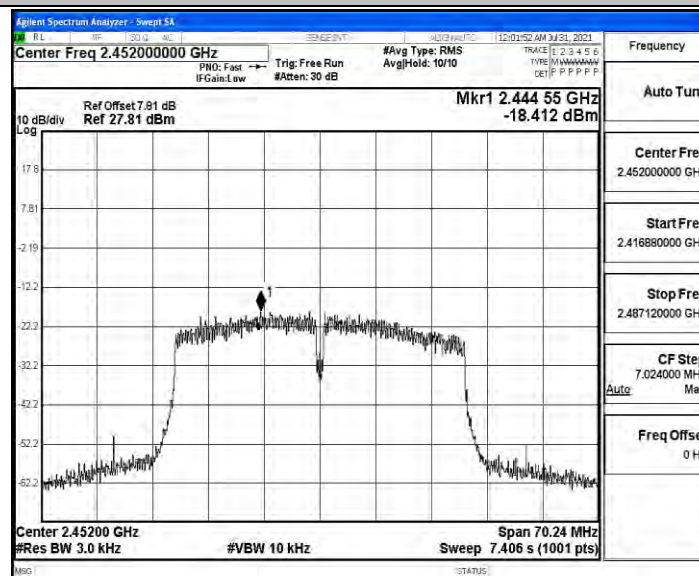




11N40SISO_Ant1_2437



11N40SISO_Ant1_2452





A.4 Band edge measurements

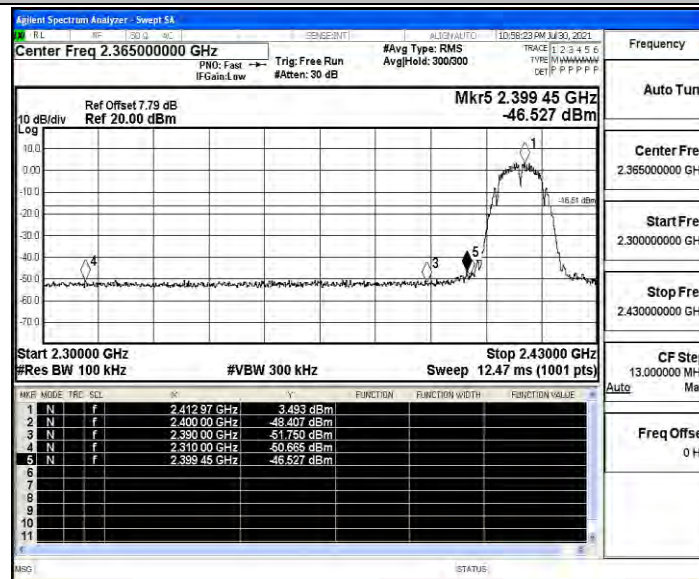
Test Result

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	3.49	-46.53	≤ -16.51	PASS
		High	2462	3.14	-47.75	≤ -16.86	PASS
11G	Ant1	Low	2412	2.04	-34.56	≤ -17.96	PASS
		High	2462	1.32	-43.2	≤ -18.68	PASS
11N20SISO	Ant1	Low	2412	1.41	-34.27	≤ -18.59	PASS
		High	2462	-2.14	-44.83	≤ -22.14	PASS
11N40SISO	Ant1	Low	2422	-4.23	-37.35	≤ -24.23	PASS
		High	2452	-3.95	-37.82	≤ -23.95	PASS

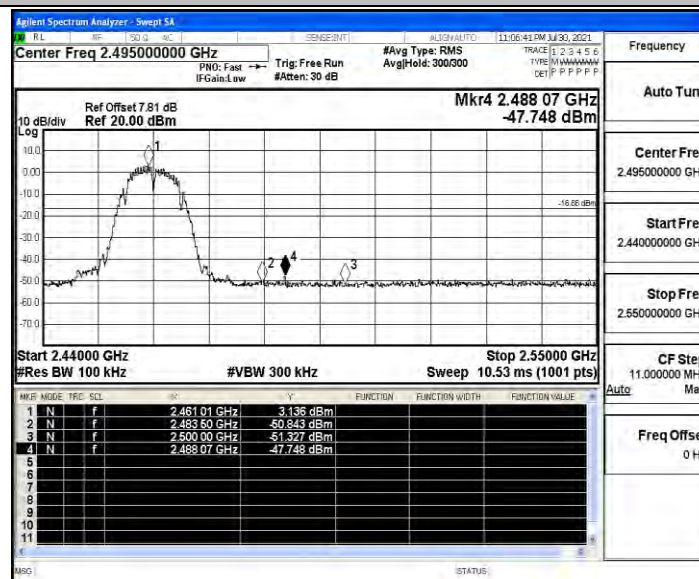


Test Graphs

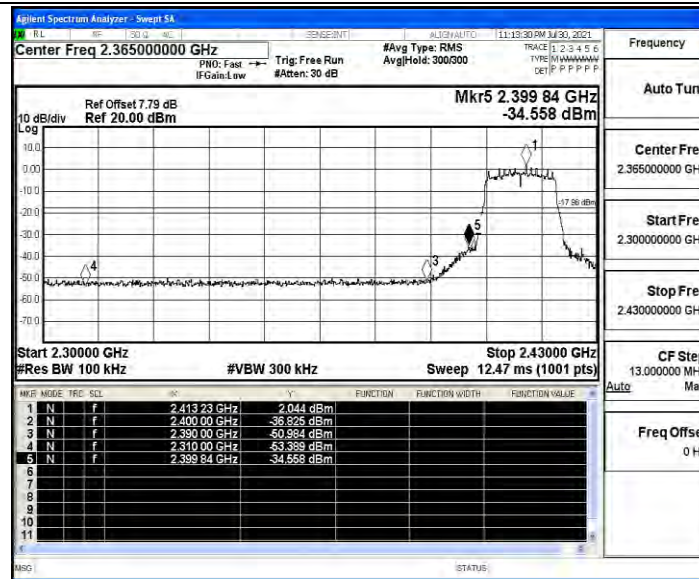
11B_Ant1_Low_2412



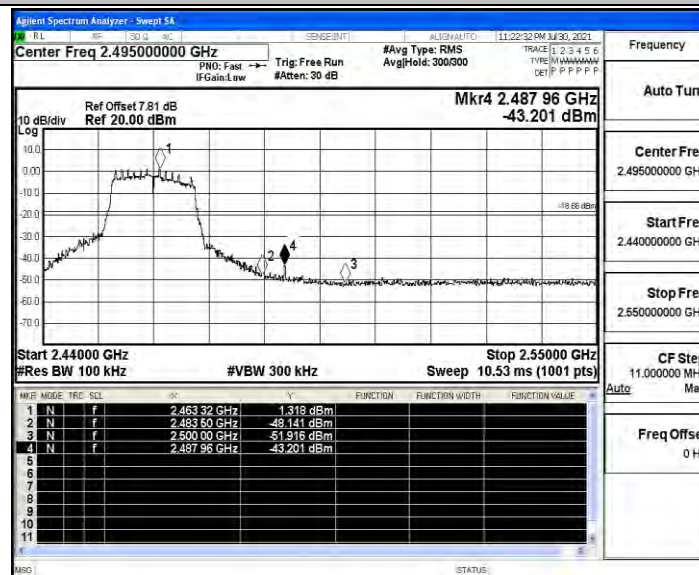
11B_Ant1_High_2462



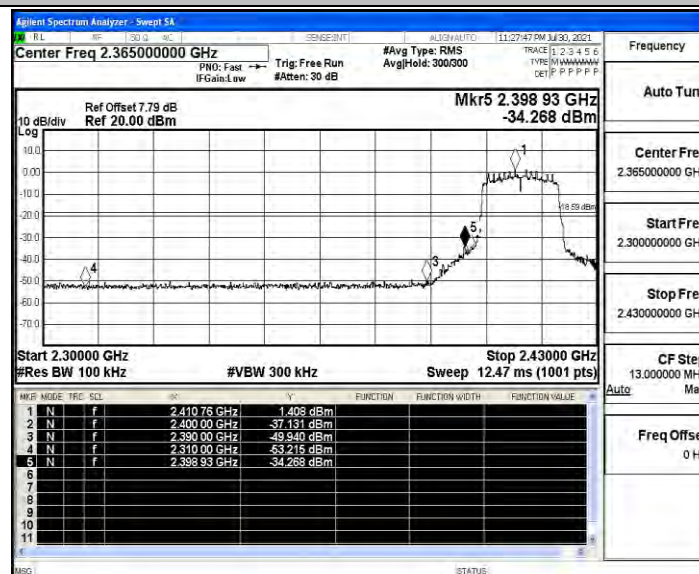
11G_Ant1_Low_2412



11G_Ant1_High_2462

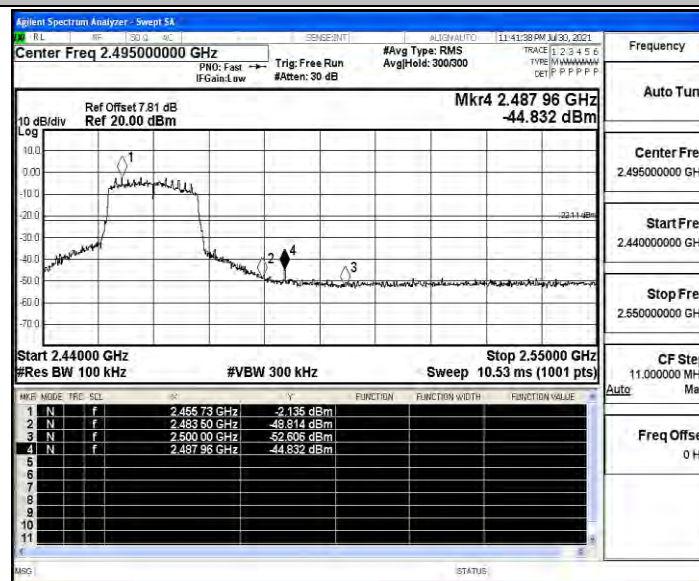


11N20SISO_Ant1_Low_2412

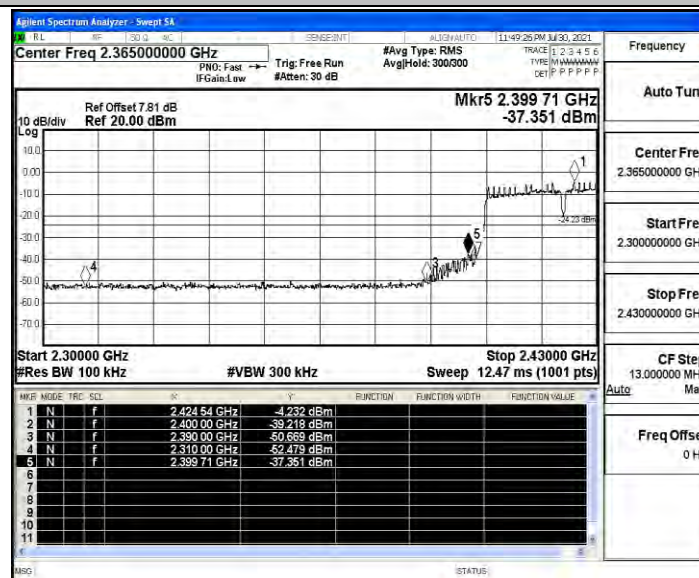




11N20SISO_Ant1_High_2462



11N40SISO_Ant1_Low_2422



11N40SISO_Ant1_High_2452



A.5 Conducted Spurious Emission

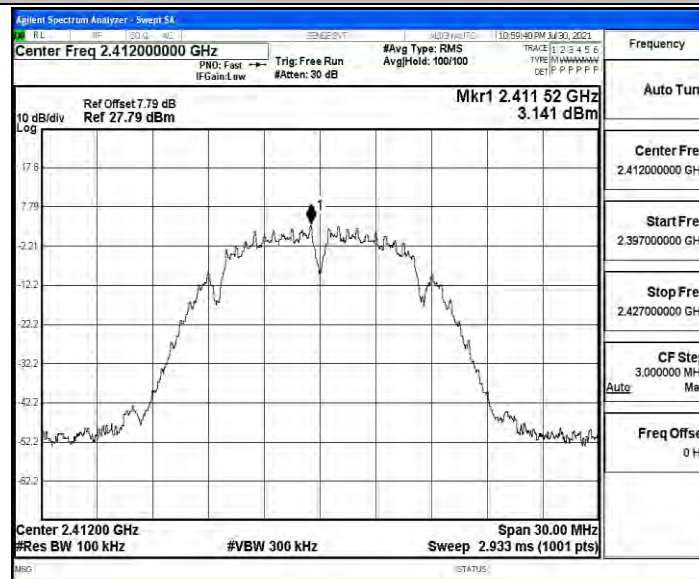
Test Result

TestMode	Antenna	Channel	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	Reference	3.14	3.14	---	PASS
			30~1000	3.14	-59.35	≤-16.86	PASS
			1000~26500	3.14	-47.19	≤-16.86	PASS
		2437	Reference	2.87	2.87	---	PASS
			30~1000	2.87	-58.19	≤-17.13	PASS
			1000~26500	2.87	-47.79	≤-17.13	PASS
		2462	Reference	2.27	2.27	---	PASS
			30~1000	2.27	-57.09	≤-17.73	PASS
			1000~26500	2.27	-47.7	≤-17.73	PASS
11G	Ant1	2412	Reference	0.95	0.95	---	PASS
			30~1000	0.95	-57.41	≤-19.05	PASS
			1000~26500	0.95	-47.6	≤-19.05	PASS
		2437	Reference	2.23	2.23	---	PASS
			30~1000	2.23	-57.11	≤-17.77	PASS
			1000~26500	2.23	-47.5	≤-17.77	PASS
		2462	Reference	1.09	1.09	---	PASS
			30~1000	1.09	-58.04	≤-18.91	PASS
			1000~26500	1.09	-46.29	≤-18.91	PASS
11N20SISO	Ant1	2412	Reference	2.10	2.10	---	PASS
			30~1000	2.10	-58.37	≤-17.9	PASS
			1000~26500	2.10	-48.08	≤-17.9	PASS
		2437	Reference	0.87	0.87	---	PASS
			30~1000	0.87	-58.64	≤-19.13	PASS
			1000~26500	0.87	-47.35	≤-19.13	PASS
		2462	Reference	-1.30	-1.30	---	PASS
			30~1000	-1.30	-61.01	≤-21.3	PASS
			1000~26500	-1.30	-46.54	≤-21.3	PASS
11N40SISO	Ant1	2422	Reference	-3.97	-3.97	---	PASS
			30~1000	-3.97	-61.67	≤-23.97	PASS
			1000~26500	-3.97	-47.1	≤-23.97	PASS
		2437	Reference	-3.85	-3.85	---	PASS
			30~1000	-3.85	-59.58	≤-23.85	PASS
			1000~26500	-3.85	-47.03	≤-23.85	PASS
		2452	Reference	-4.13	-4.13	---	PASS
			30~1000	-4.13	-61.29	≤-24.13	PASS
			1000~26500	-4.13	-47.71	≤-24.13	PASS

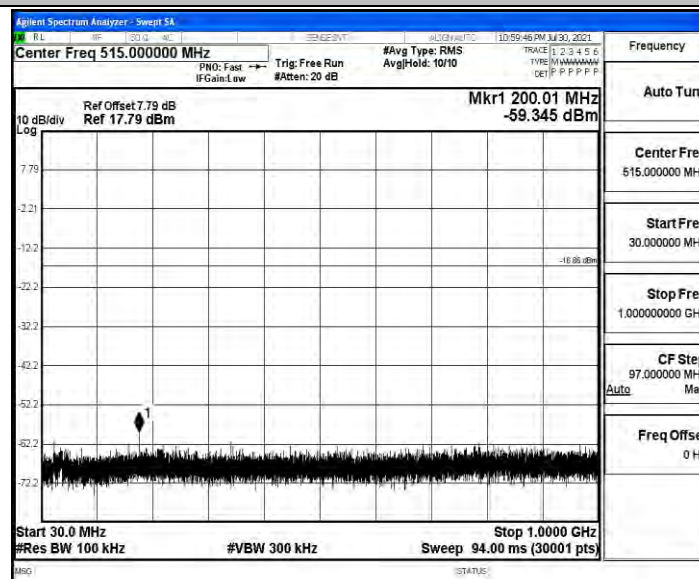


Test Graphs

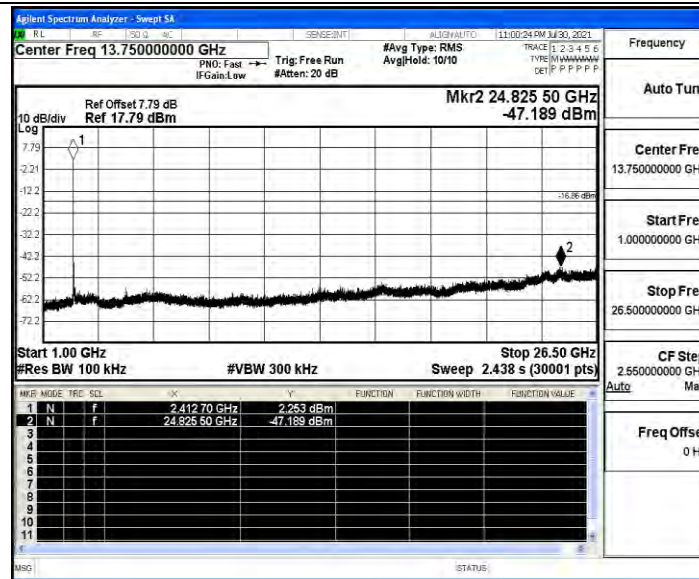
11B_Ant1_2412_0~Reference



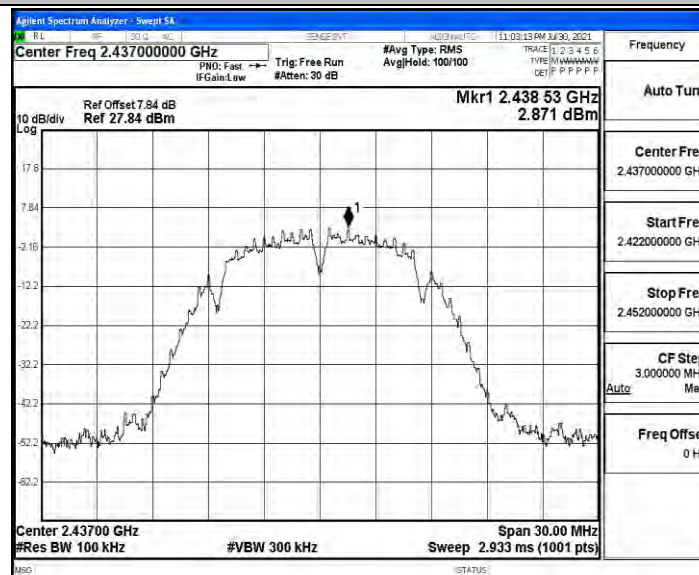
11B_Ant1_2412_30~1000



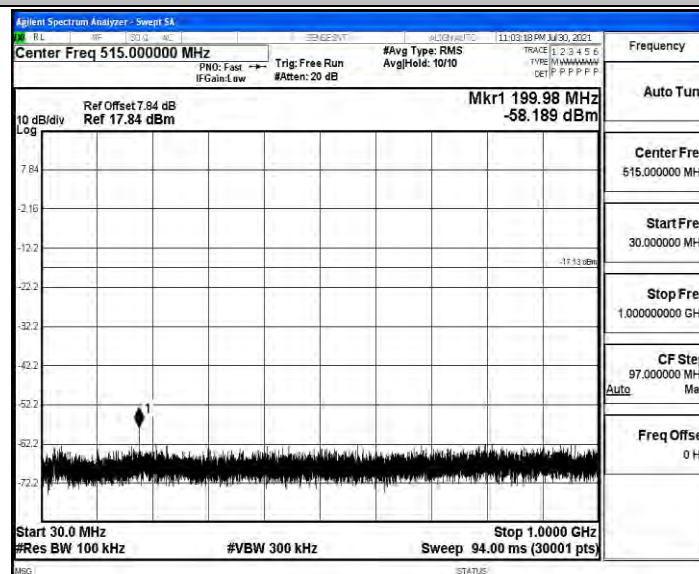
11B_Ant1_2412_1000~26500



11B_Ant1_2437_0~Reference

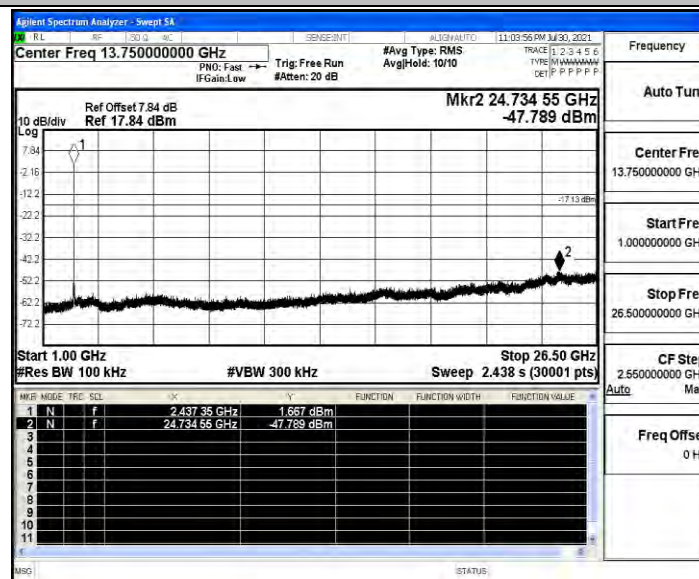


11B_Ant1_2437_30~1000

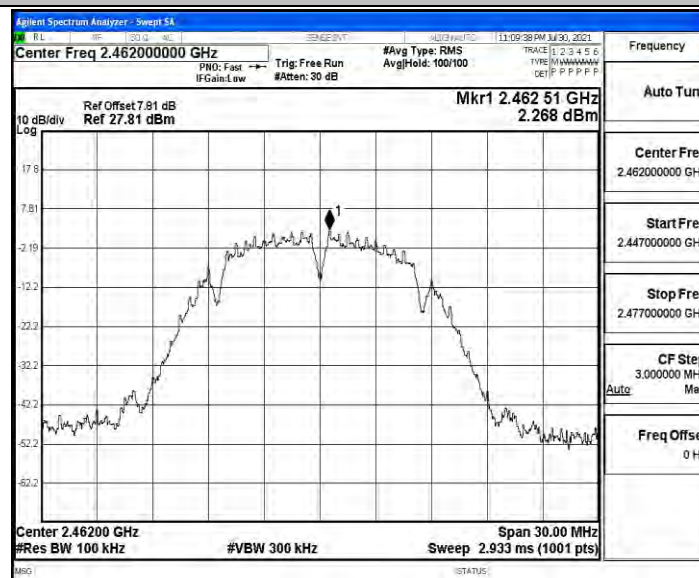




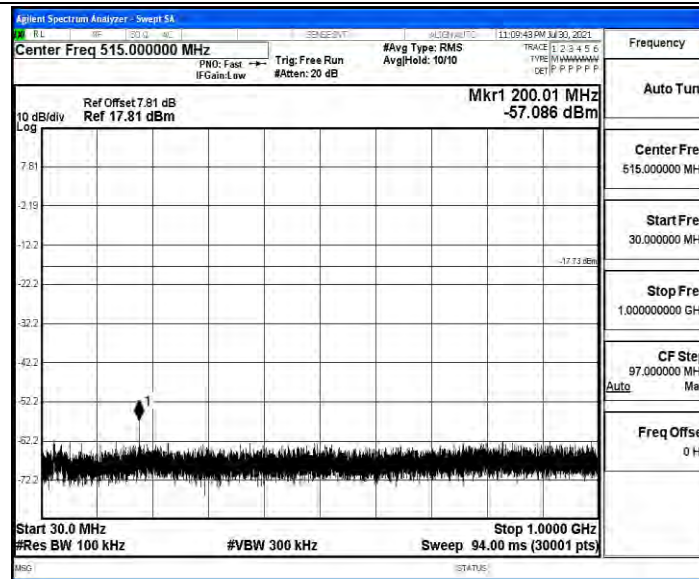
11B_Ant1_2437_1000~26500



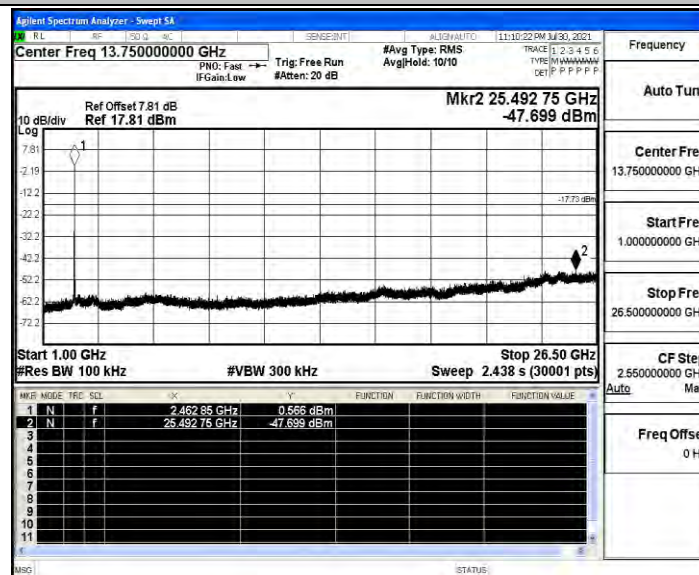
11B_Ant1_2462_0~Reference



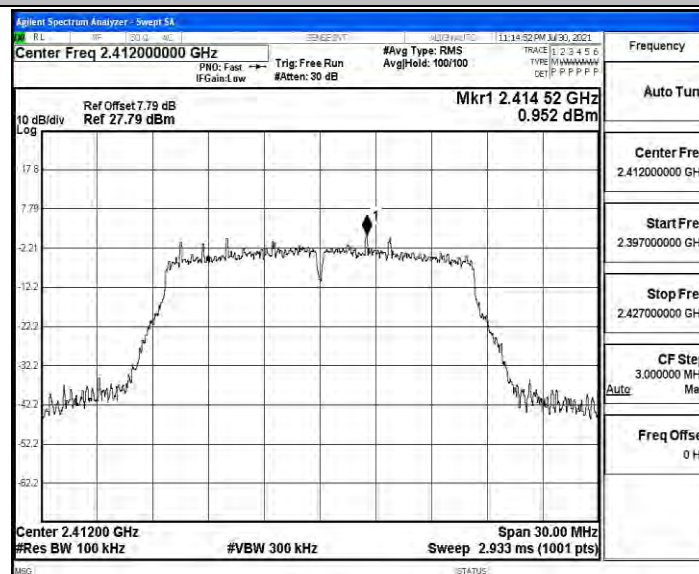
11B_Ant1_2462_30~1000



11B_Ant1_2462_1000~26500

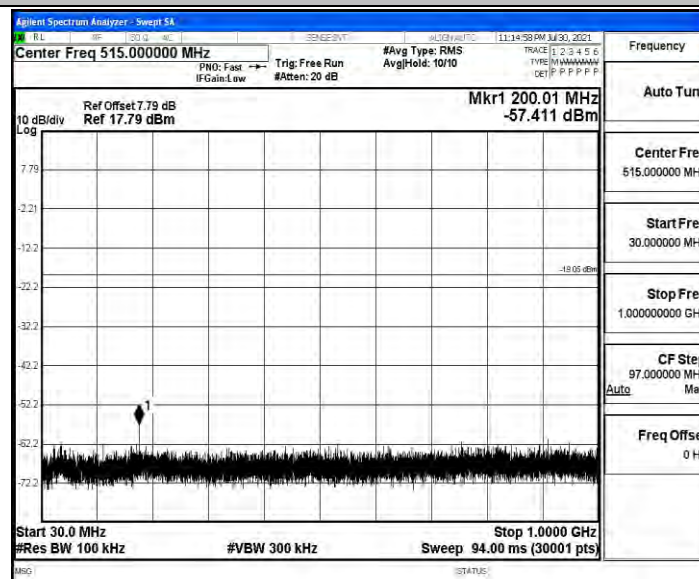


11G_Ant1_2412_0~Reference

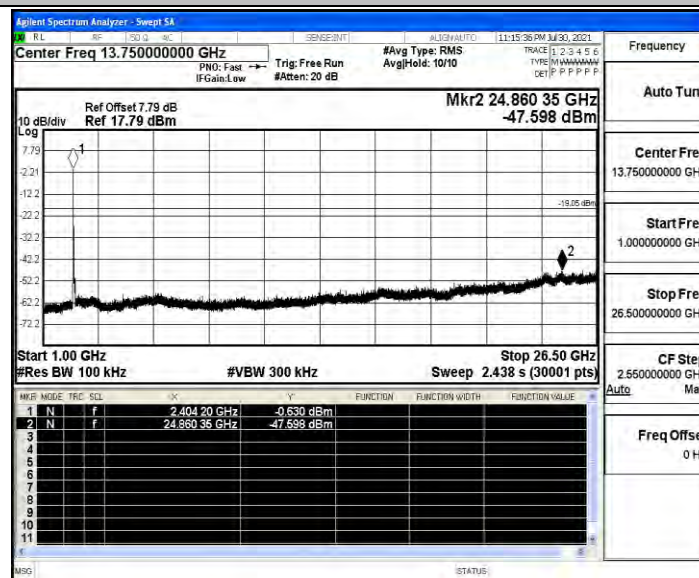




11G_Ant1_2412_30~1000



11G_Ant1_2412_1000~26500



11G_Ant1_2437_0~Reference

Agilent Spectrum Analyzer - Sweep SA

RL RF 30.0 MC GEN:INT ALG:AVG AUTO 11:19:07 PM 3/3/2011

Center Freq 13.75000000 GHz PNO: Fast IF Gain Low Trig: Free Run #Att: 20 dB #Avg Type: RMS Avg Hold: 10/10 TYPE: N/A WAVEFORM DEPTH: P P P P P

Mkr2 24.756 65 GHz -47.495 dBm

Ref Offset 7.84 dB
Ref 17.84 dBm

Log

10 dB/div

-12.2

-22.2

-32.2

-42.2

-52.2

-62.2

-72.2

Start 1.00 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.438 s (30001 pts) Stop 26.50 GHz

MKR	NBEG	TREQ	SOL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	F		2.444 15 GHz	-0.017 dBm			
2	N	F		24.756 65 GHz	-47.495 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								

Auto Ma

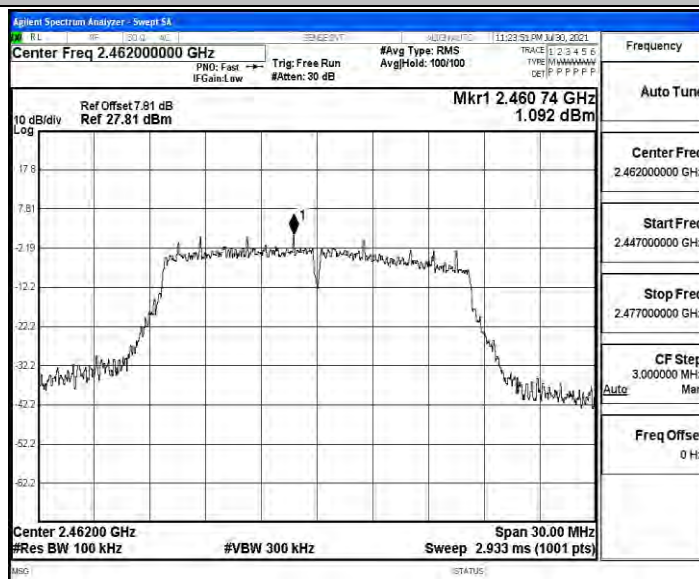
Freq Offset

0 Hz

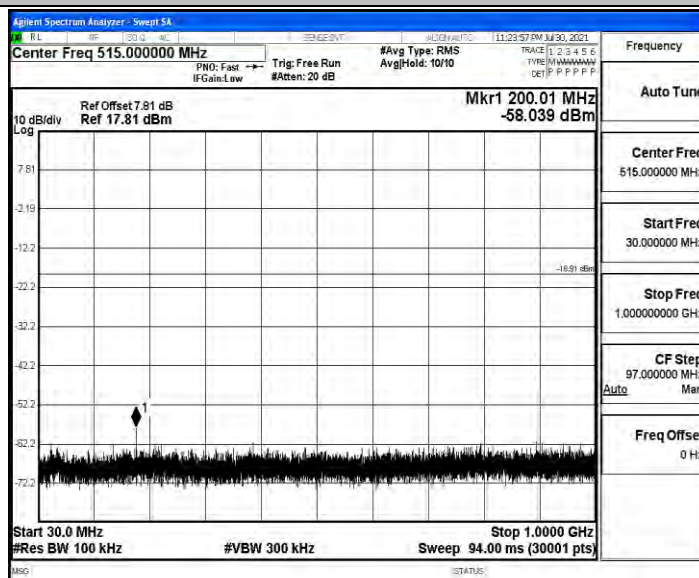
[illegible]



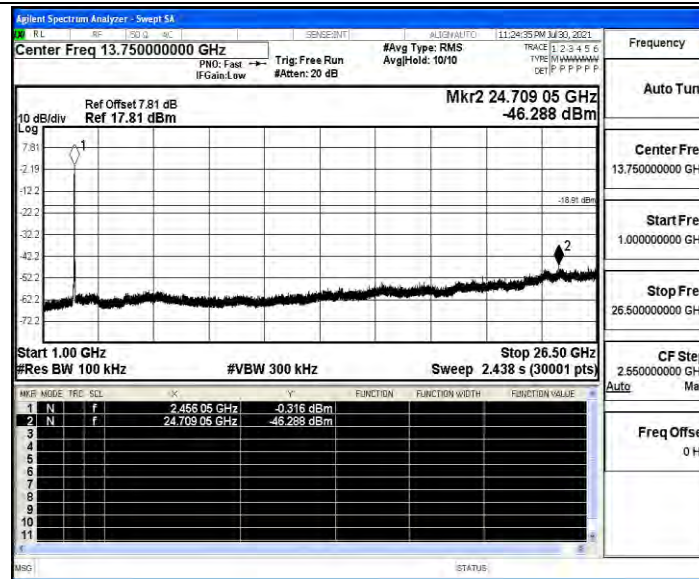
11G_Ant1_2462_0~Reference



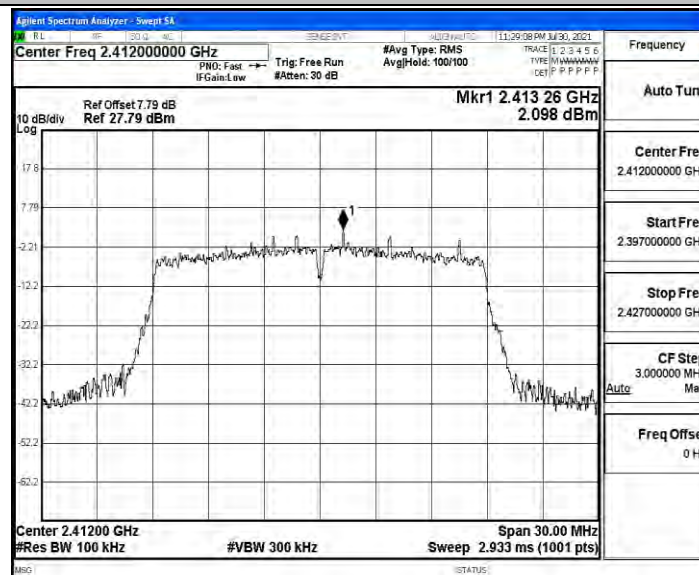
11G_Ant1_2462_30~1000



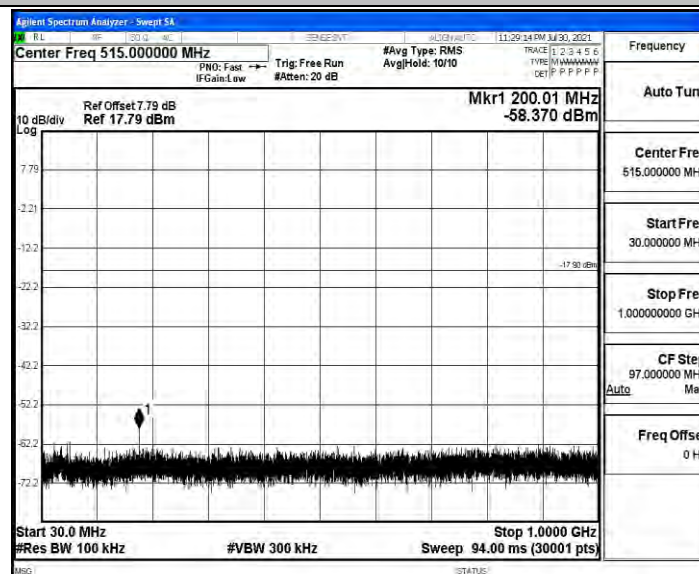
11G_Ant1_2462_1000~26500



11N20SISO_Ant1_2412_0~Reference

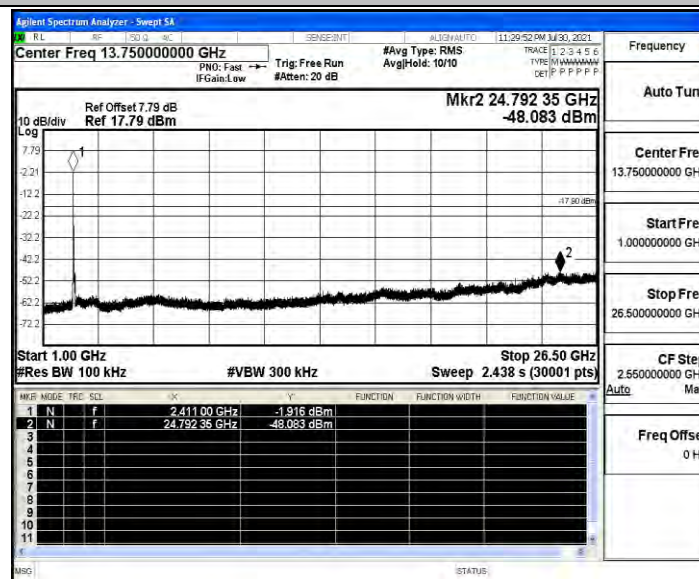


11N20SISO_Ant1_2412_30~1000

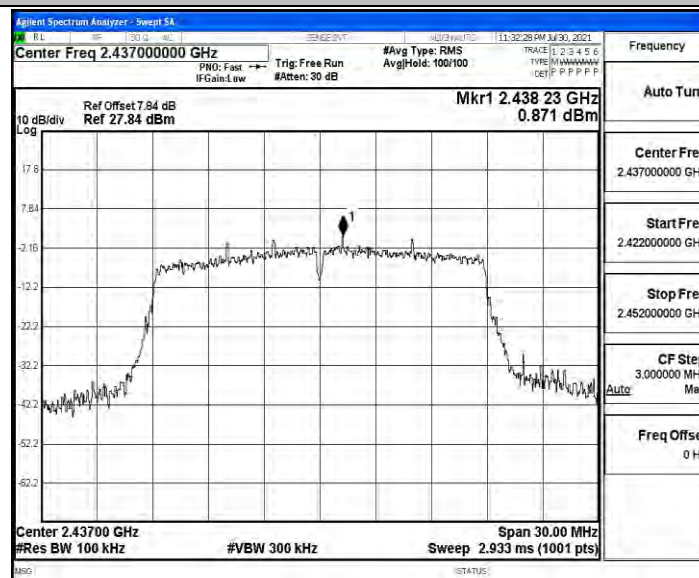




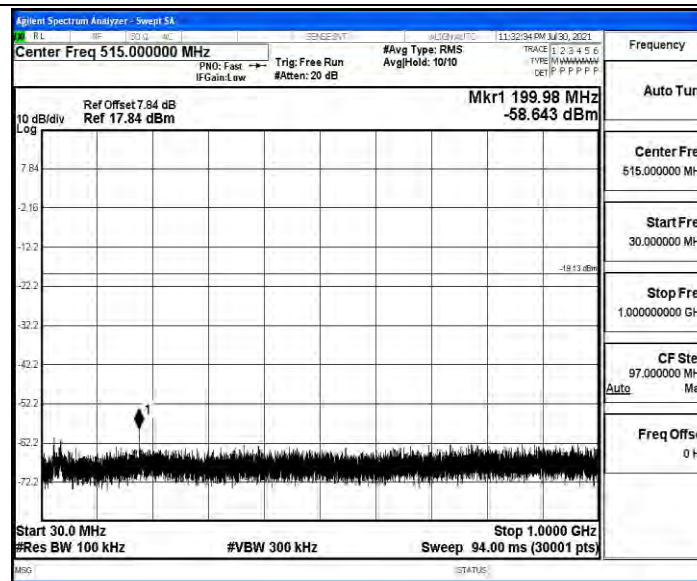
11N20SISO_Ant1_2412_1000~26500



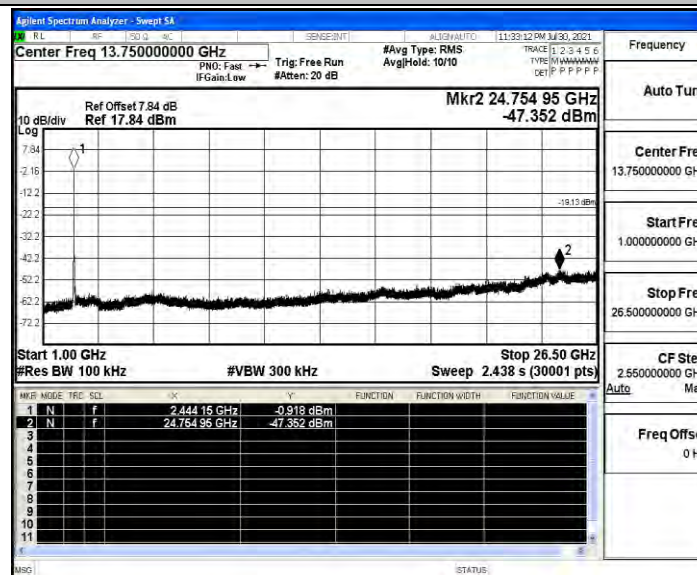
11N20SISO_Ant1_2437_0~Reference



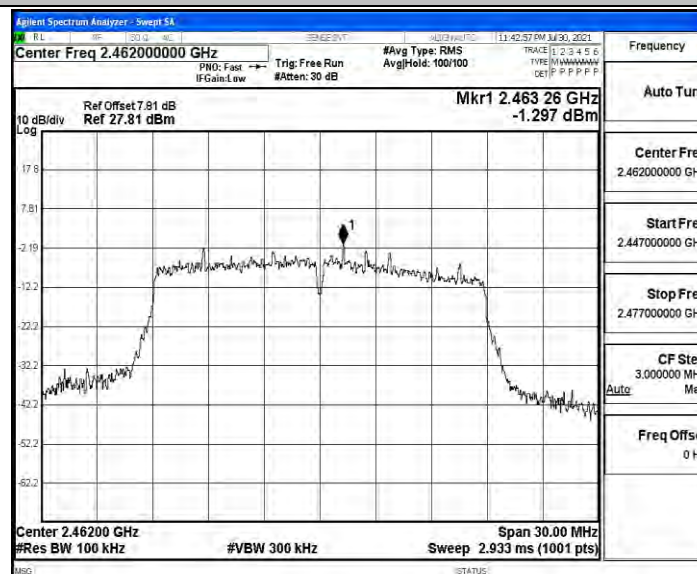
11N20SISO_Ant1_2437_30~1000



11N20SISO_Ant1_2437_1000~26500

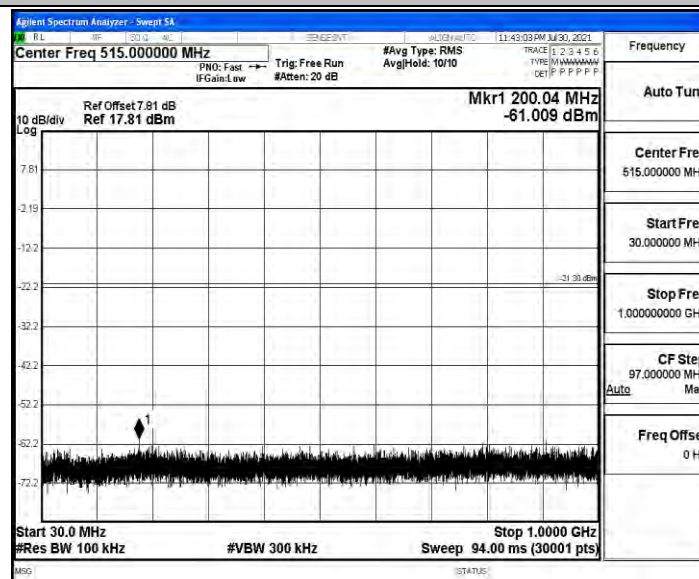


11N20SISO_Ant1_2462_0~Reference

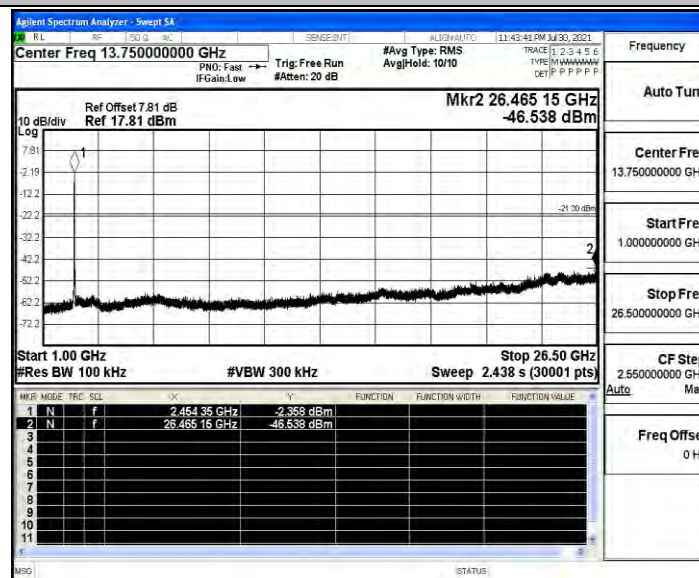




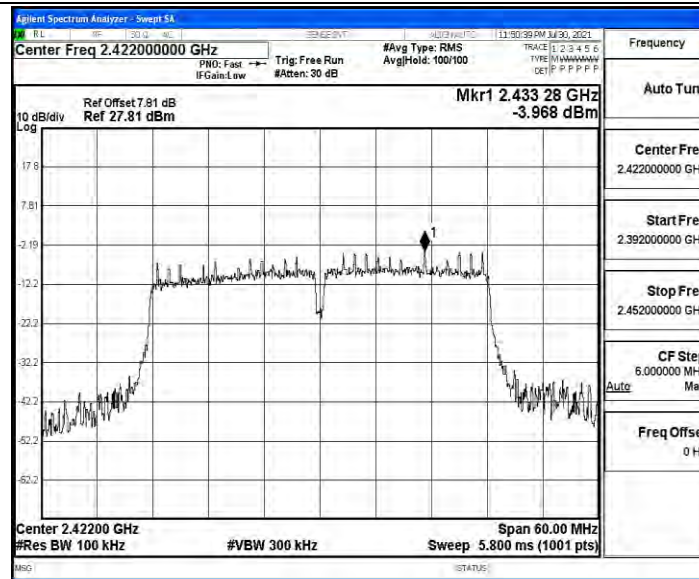
11N20SISO_Ant1_2462_30~1000



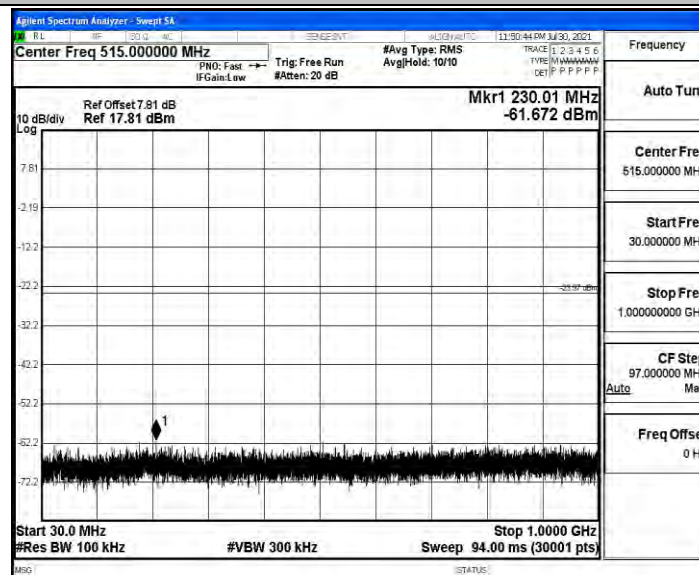
11N20SISO_Ant1_2462_1000~26500



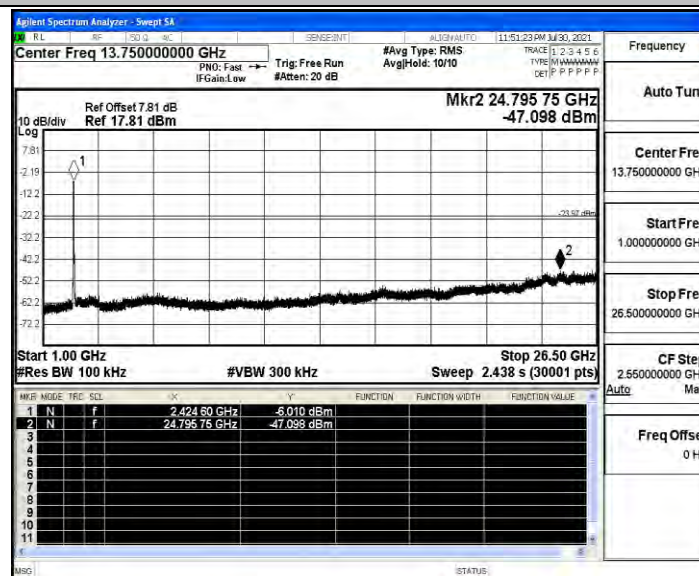
11N40SISO_Ant1_2422_0~Reference



11N40SISO_Ant1_2422_30~1000

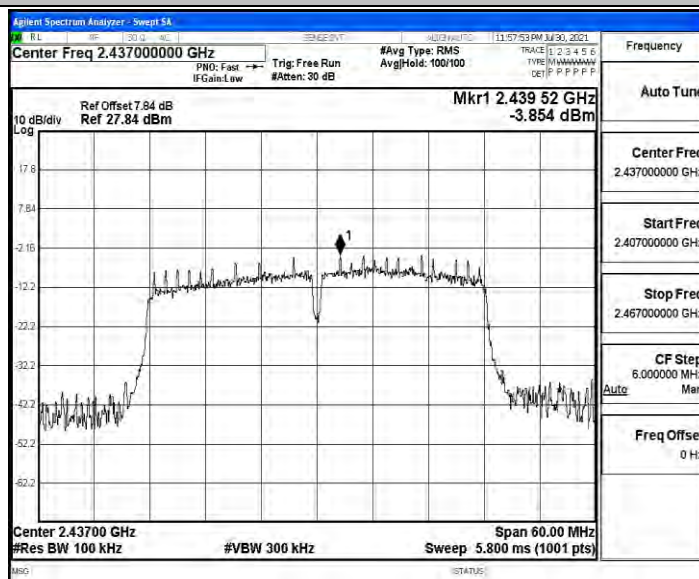


11N40SISO_Ant1_2422_1000~26500

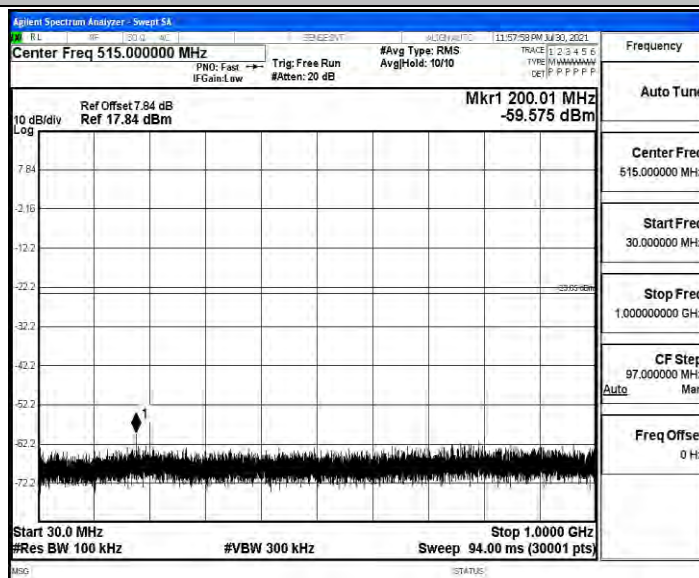




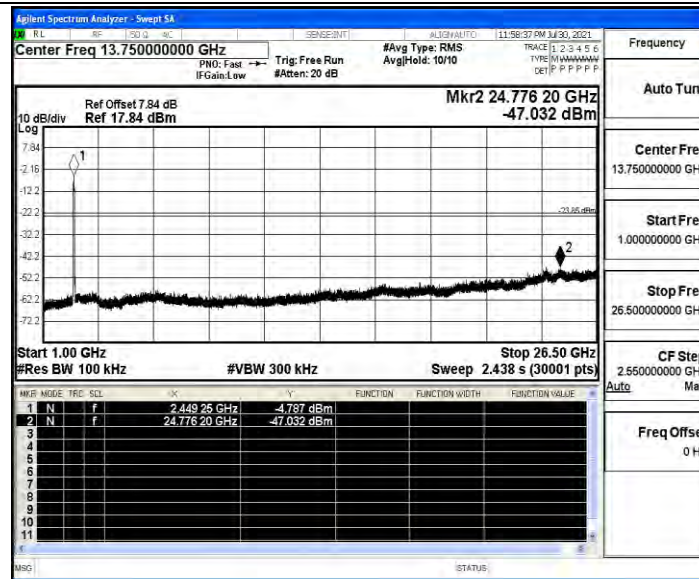
11N40SISO_Ant1_2437_0~Reference



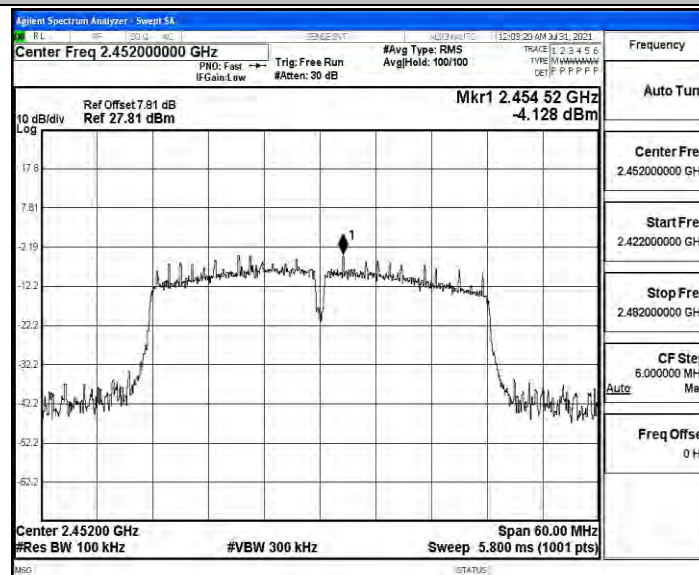
11N40SISO_Ant1_2437_30~1000



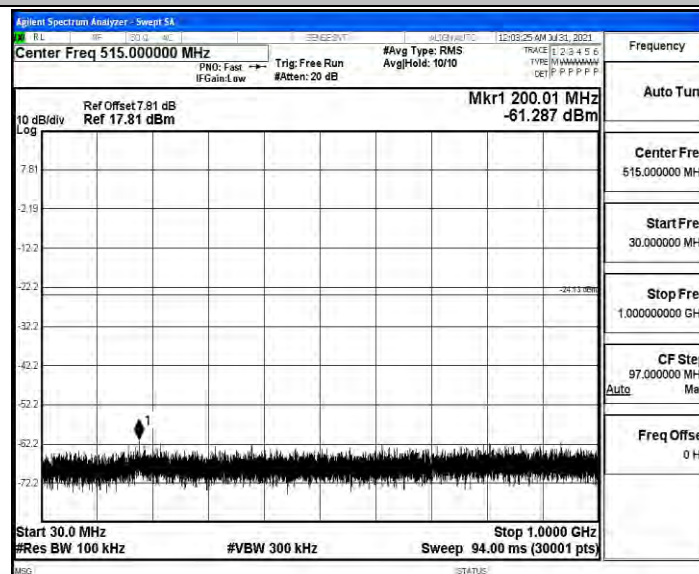
11N40SISO_Ant1_2437_1000~26500

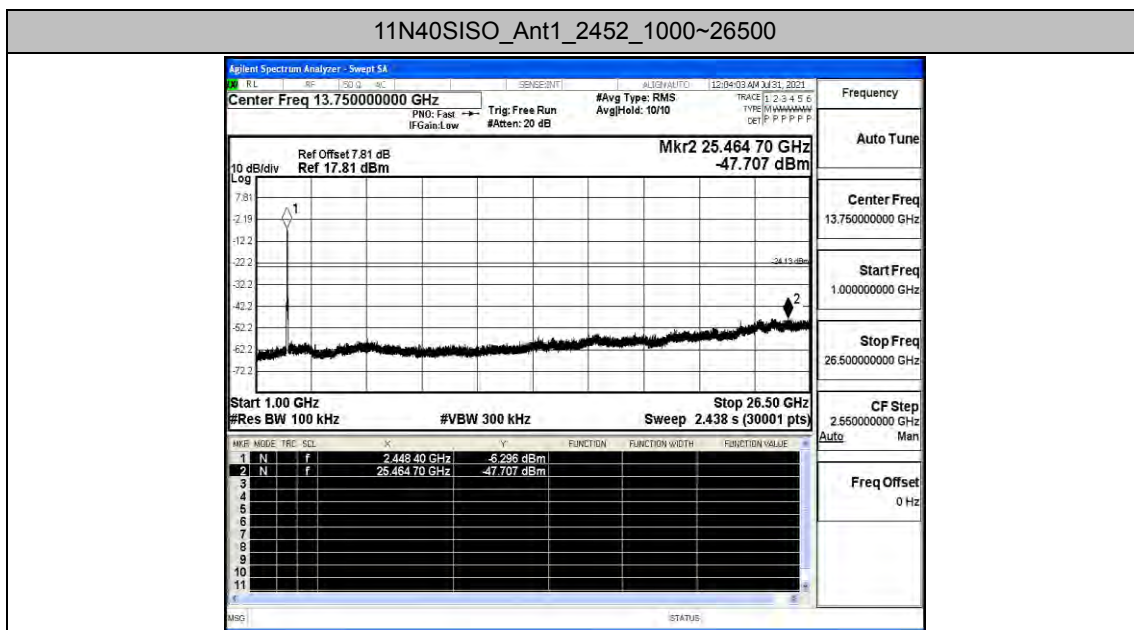


11N40SISO_Ant1_2452_0~Reference



11N40SISO_Ant1_2452_30~1000







A.6 Duty Cycle

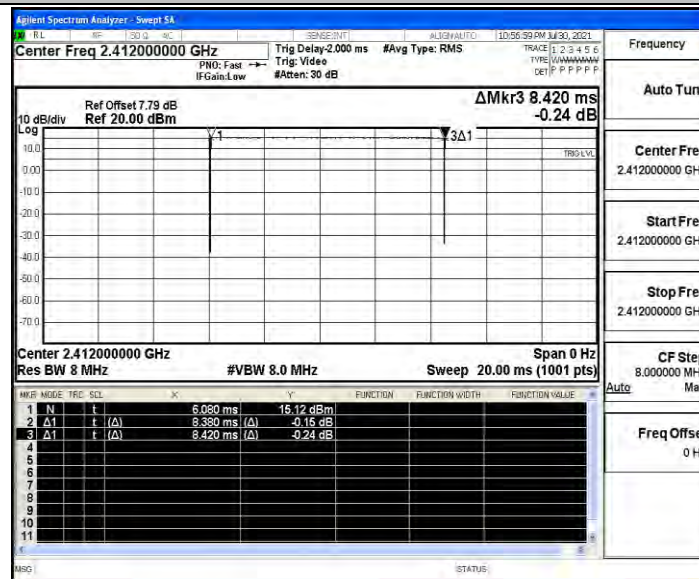
Test Result

TestMode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Limit	Verdict
11B	Ant1	2412	8.38	8.42	99.52	---	PASS
		2437	30.00	30.00	100.00	---	PASS
		2462	30.00	30.00	100.00	---	PASS
11G	Ant1	2412	1.39	1.43	97.20	---	PASS
		2437	1.39	1.43	97.20	---	PASS
		2462	1.39	1.43	97.20	---	PASS
11N20SISO	Ant1	2412	1.30	1.34	97.01	---	PASS
		2437	1.30	1.34	97.01	---	PASS
		2462	1.30	1.34	97.01	---	PASS
11N40SISO	Ant1	2422	0.64	0.68	94.12	---	PASS
		2437	0.64	0.68	94.12	---	PASS
		2452	0.64	0.68	94.12	---	PASS

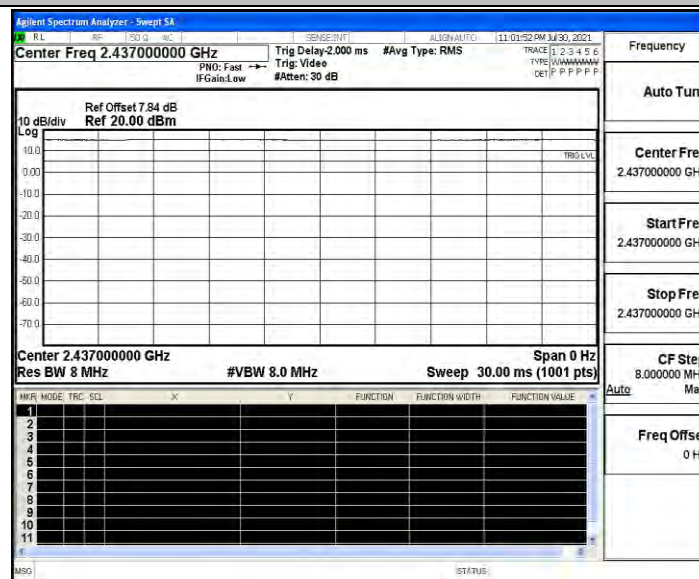


Test Graphs

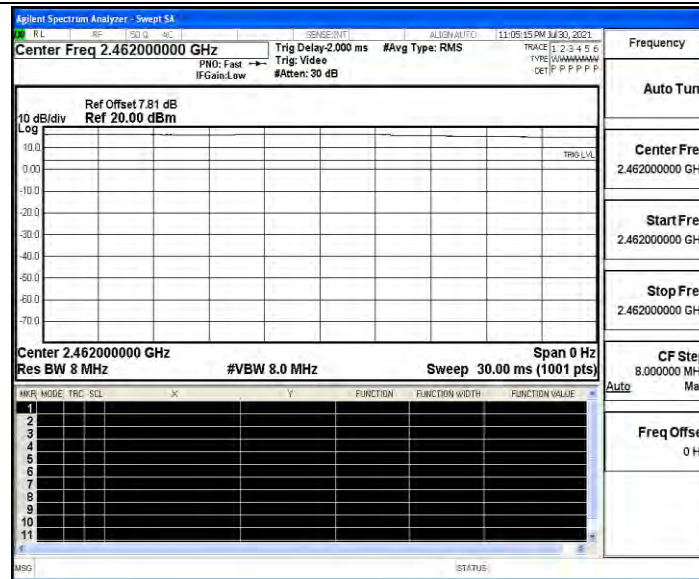
11B_Ant1_2412



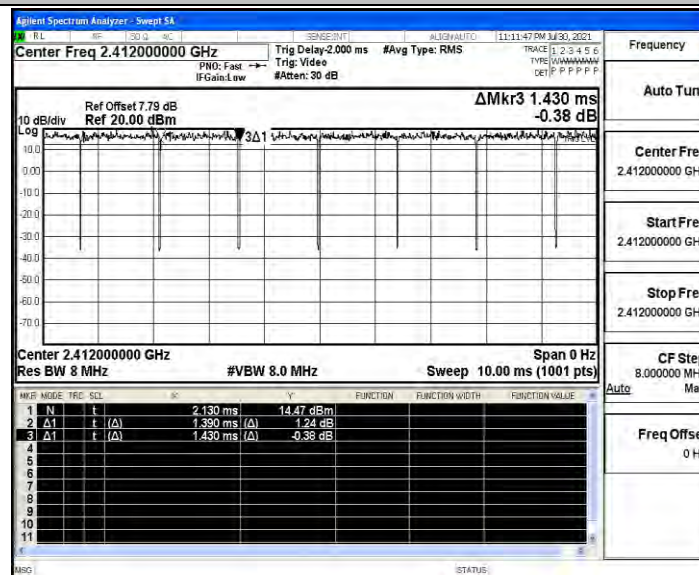
11B_Ant1_2437



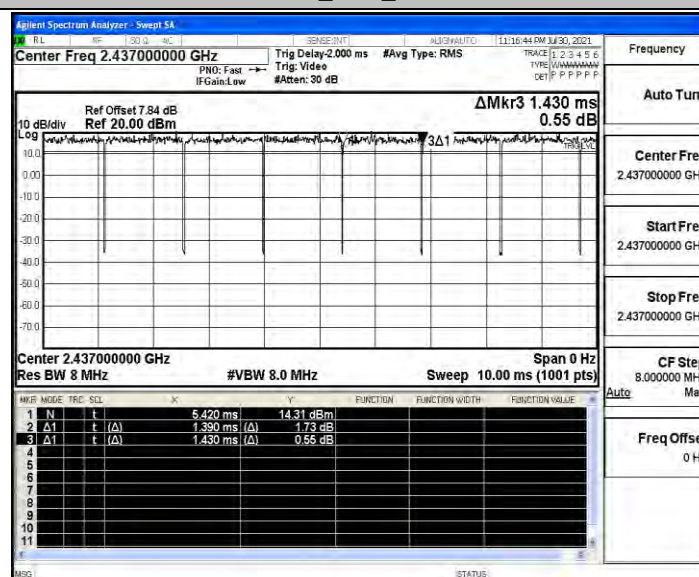
11B_Ant1_2462



11G_Ant1_2412

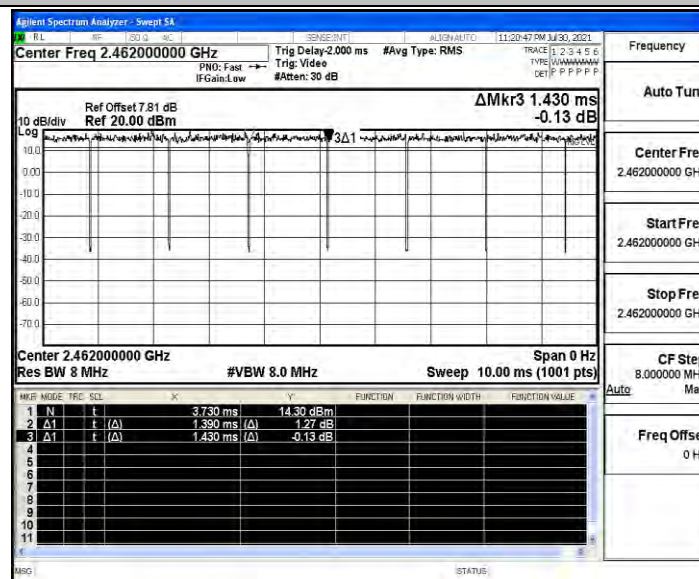


11G_Ant1_2437

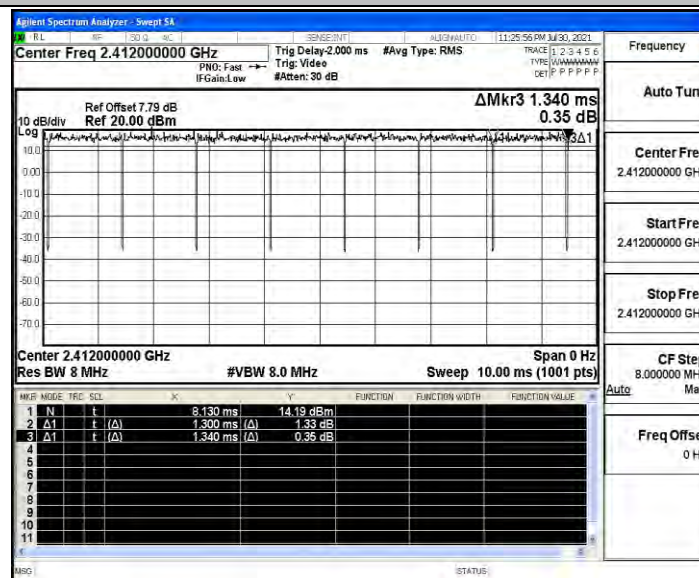




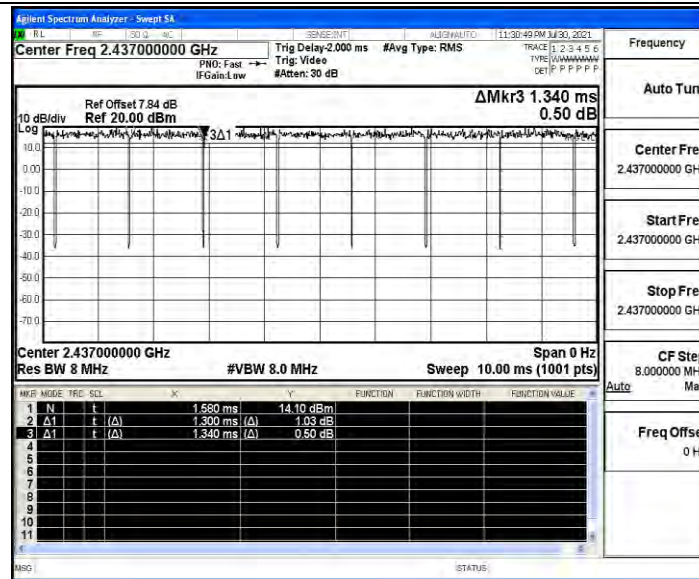
11G_Ant1_2462



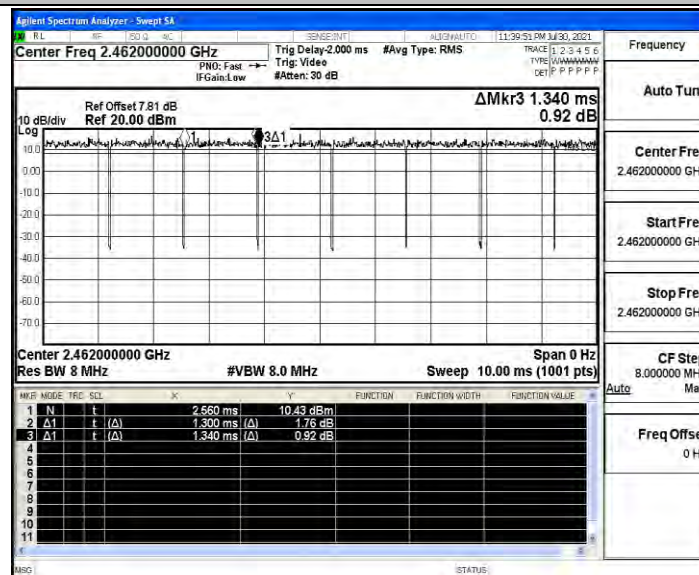
11N20SISO_Ant1_2412



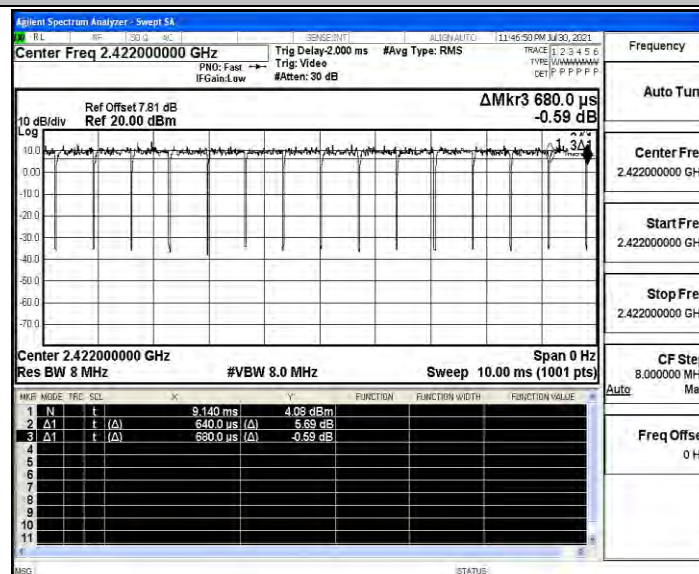
11N20SISO_Ant1_2437



11N20SISO_Ant1_2462



11N40SISO_Ant1_2422





A.7 Emissions in Restricted Bands

Test Result

TestMode	Channel	Detector	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
11B	2412	AV	2310.000	-49.36	≤-41.20	45.84	≤54	PASS
		AV	2389.180	-48.83	≤-41.20	46.37	≤54	PASS
		AV	2390.000	-48.9	≤-41.20	46.30	≤54	PASS
		Peak	2310.000	-44.39	≤-21.20	50.81	≤74	PASS
		Peak	2377.350	-39.03	≤-21.20	56.17	≤74	PASS
		Peak	2390.000	-43.92	≤-21.20	51.28	≤74	PASS
	2462	AV	2483.500	-48.11	≤-41.20	47.09	≤54	PASS
		AV	2487.850	-46.89	≤-41.20	48.31	≤54	PASS
		AV	2500.000	-48.43	≤-41.20	46.77	≤54	PASS
		Peak	2483.500	-43.25	≤-21.20	51.95	≤74	PASS
		Peak	2488.510	-36.4	≤-21.20	58.80	≤74	PASS
		Peak	2500.000	-43.65	≤-21.20	51.55	≤74	PASS
11G	2412	AV	2310.000	-48.86	≤-41.20	46.34	≤54	PASS
		AV	2389.830	-47.85	≤-41.20	47.35	≤54	PASS
		AV	2390.000	-47.95	≤-41.20	47.25	≤54	PASS
		Peak	2310.000	-41.28	≤-21.20	53.92	≤74	PASS
		Peak	2358.630	-38.84	≤-21.20	56.36	≤74	PASS
		Peak	2390.000	-40.34	≤-21.20	54.86	≤74	PASS
	2462	AV	2483.500	-44.12	≤-41.20	51.08	≤54	PASS
		AV	2488.070	-41.88	≤-41.20	53.32	≤54	PASS
		AV	2500.000	-47.9	≤-41.20	47.30	≤54	PASS
		Peak	2483.500	-35.47	≤-21.20	59.73	≤74	PASS
		Peak	2488.180	-35.53	≤-21.20	59.67	≤74	PASS
		Peak	2500.000	-41.82	≤-21.20	53.38	≤74	PASS
11N20SIS O	2412	AV	2310.000	-48.93	≤-41.20	46.27	≤54	PASS
		AV	2389.830	-47.55	≤-41.20	47.65	≤54	PASS
		AV	2390.000	-47.64	≤-41.20	47.56	≤54	PASS
		Peak	2310.000	-42.11	≤-21.20	53.09	≤74	PASS
		Peak	2341.470	-38.48	≤-21.20	56.72	≤74	PASS
		Peak	2390.000	-38.48	≤-21.20	56.72	≤74	PASS
	2462	AV	2483.500	-44.84	≤-41.20	50.36	≤54	PASS
		AV	2487.960	-43.99	≤-41.20	51.21	≤54	PASS
		AV	2500.000	-47.92	≤-41.20	47.28	≤54	PASS
		Peak	2483.500	-35.86	≤-21.20	59.34	≤74	PASS
		Peak	2483.670	-35.29	≤-21.20	59.91	≤74	PASS
		Peak	2500.000	-41.01	≤-21.20	54.19	≤74	PASS
11N40SIS	2422	AV	2310.000	-48.55	≤-41.20	46.65	≤54	PASS



O		AV	2389.180	-46.46	≤ -41.20	48.74	≤ 54	PASS
		AV	2390.000	-46.49	≤ -41.20	48.71	≤ 54	PASS
		Peak	2310.000	-43.14	≤ -21.20	52.06	≤ 74	PASS
		Peak	2387.360	-35.52	≤ -21.20	59.68	≤ 74	PASS
		Peak	2390.000	-41.48	≤ -21.20	53.72	≤ 74	PASS
	2452	AV	2483.500	-43.97	≤ -41.20	51.23	≤ 54	PASS
		AV	2483.670	-43.61	≤ -41.20	51.59	≤ 54	PASS
		AV	2500.000	-47.36	≤ -41.20	47.84	≤ 54	PASS
		Peak	2483.500	-32.32	≤ -21.20	62.88	≤ 74	PASS
		Peak	2483.560	-27.46	≤ -21.20	67.74	≤ 74	PASS
		Peak	2500.000	-39.42	≤ -21.20	55.78	≤ 74	PASS

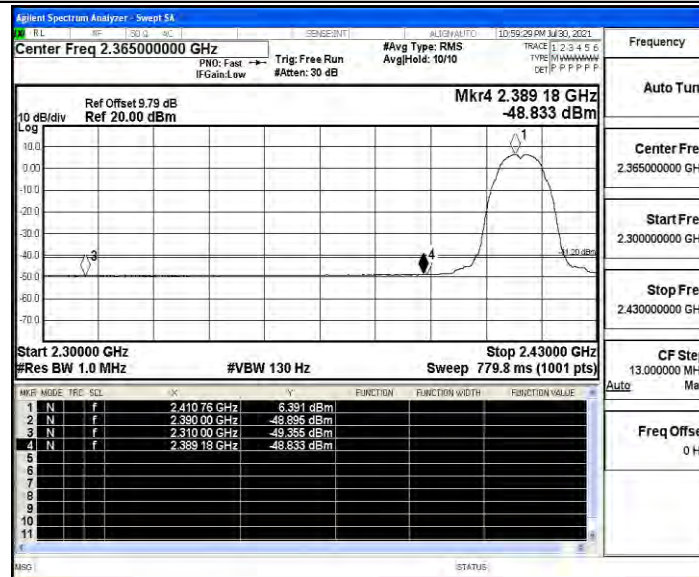
Note:

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.

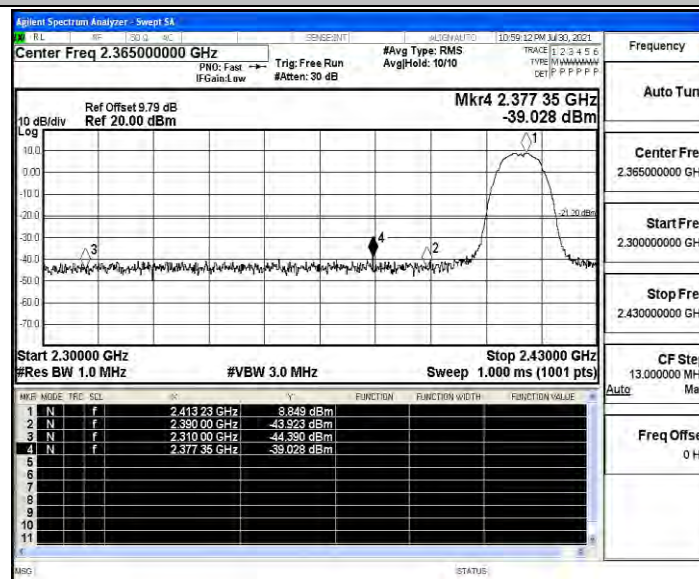


Test Graphs

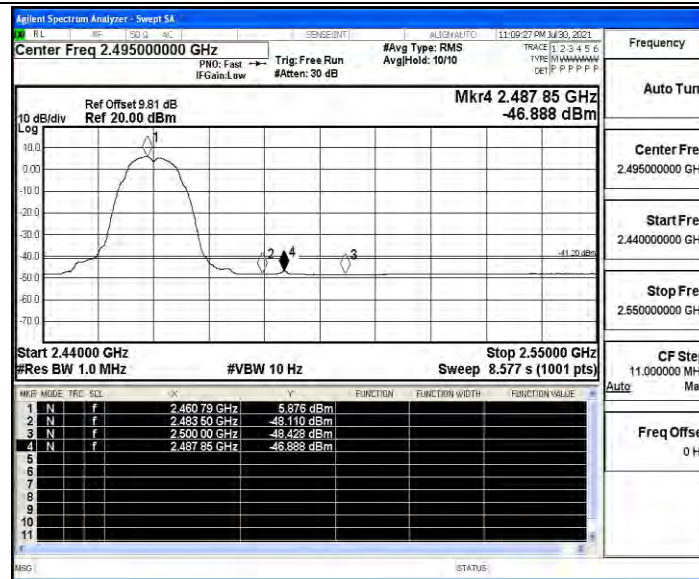
11B_Ant1_Low_2412_AV



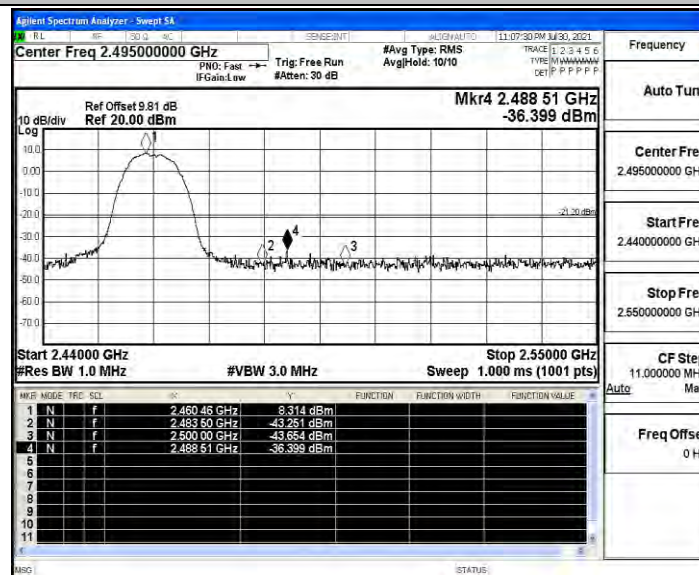
11B_Ant1_Low_2412_Peak



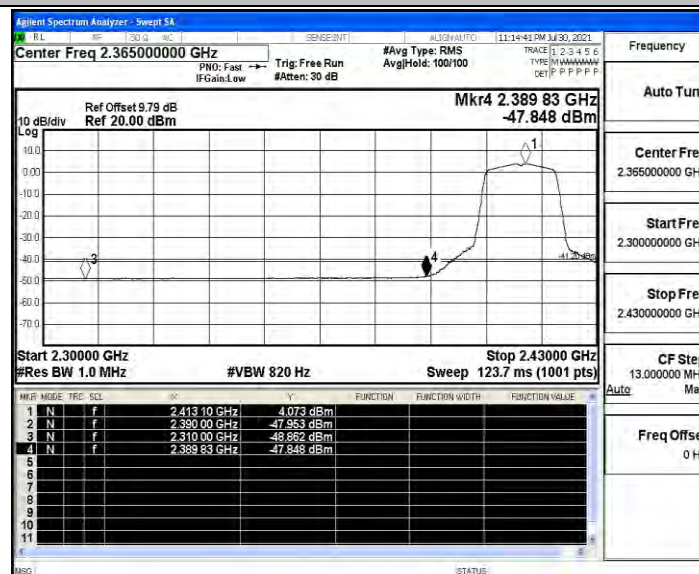
11B_Ant1_High_2462_AV



11B_Ant1_High_2462_Peak

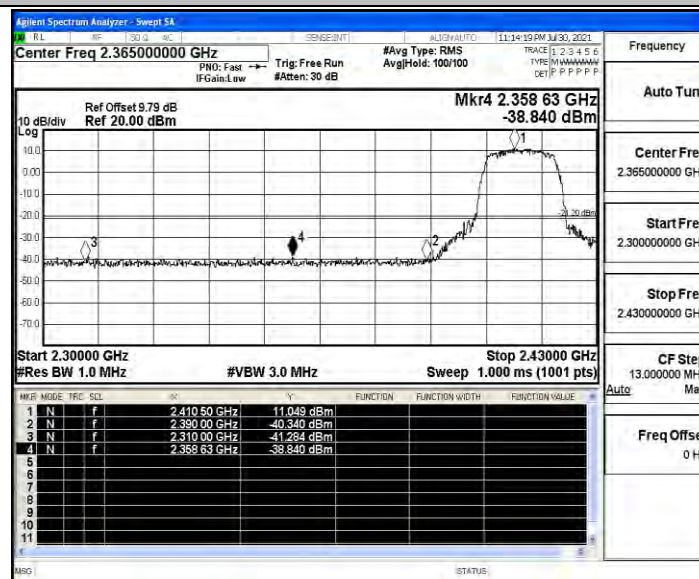


11G_Ant1_Low_2412_AV

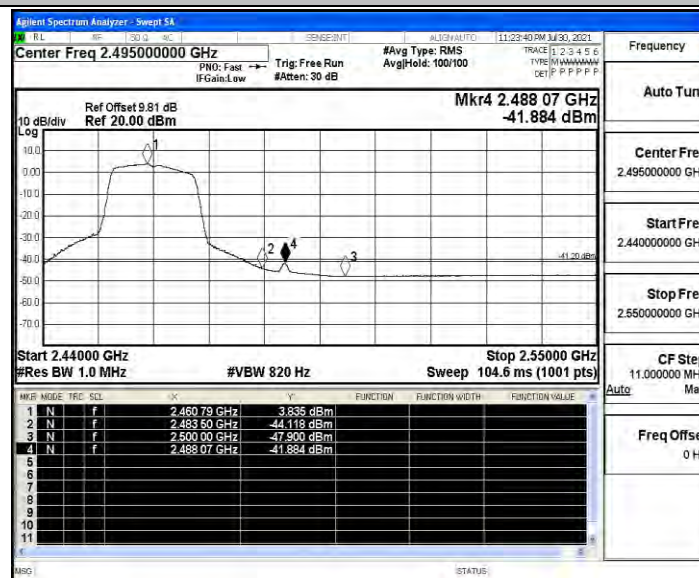




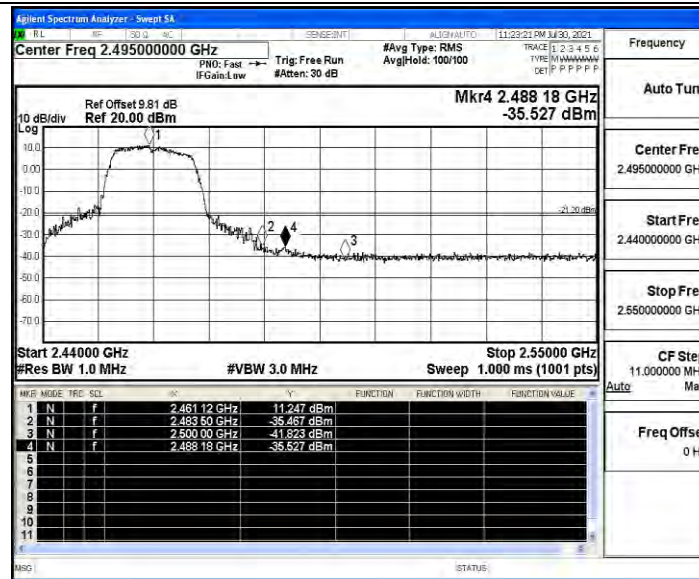
11G_Ant1_Low_2412_Peak



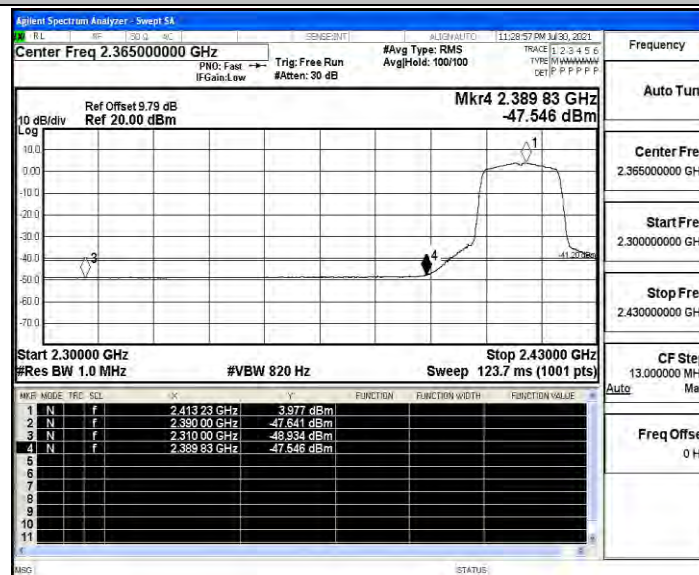
11G_Ant1_High_2462_AV



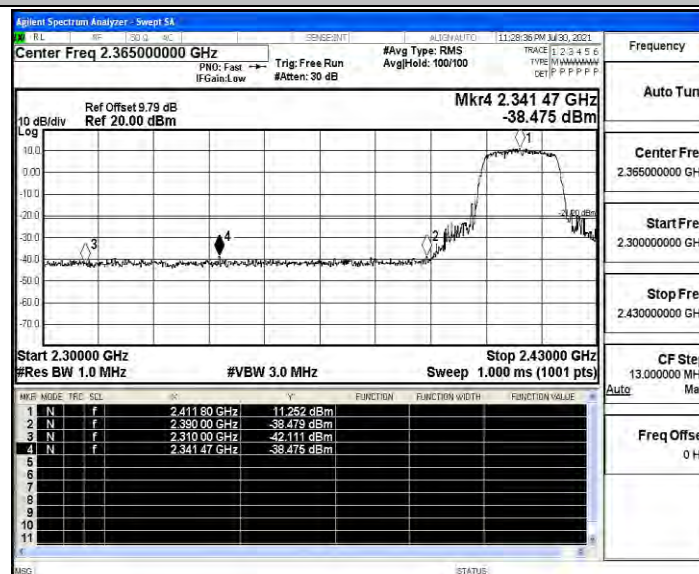
11G_Ant1_High_2462_Peak



11N20SISO_Ant1_Low_2412_AV

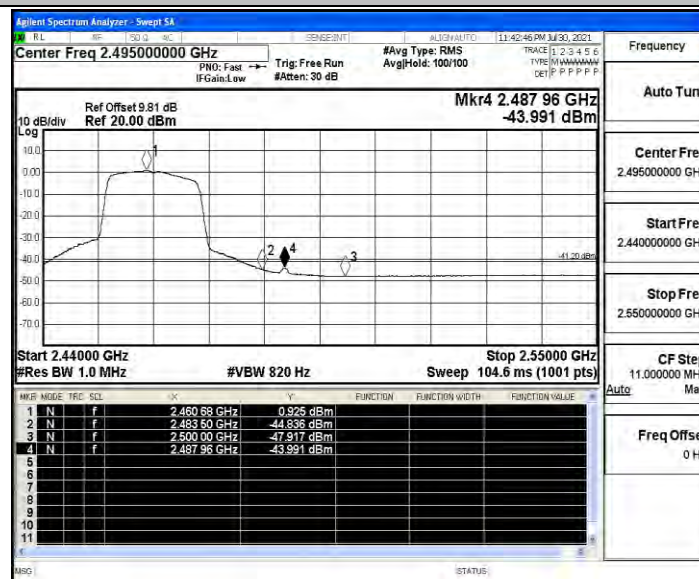


11N20SISO_Ant1_Low_2412_Peak

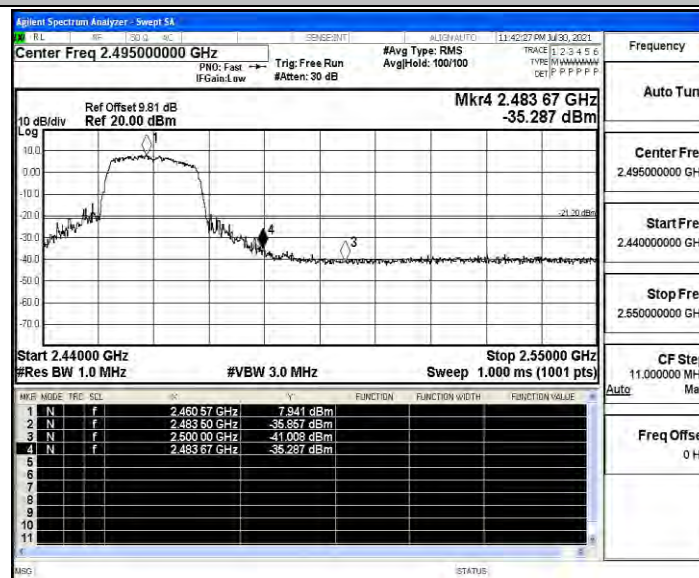




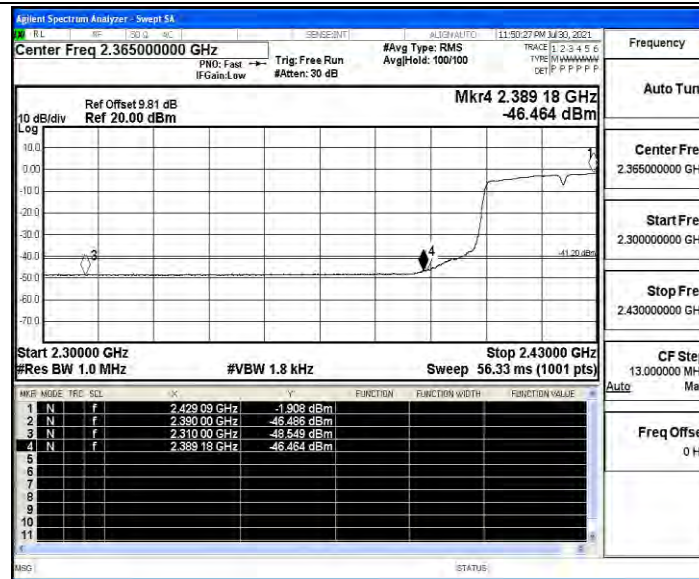
11N20SISO_Ant1_High_2462_AV



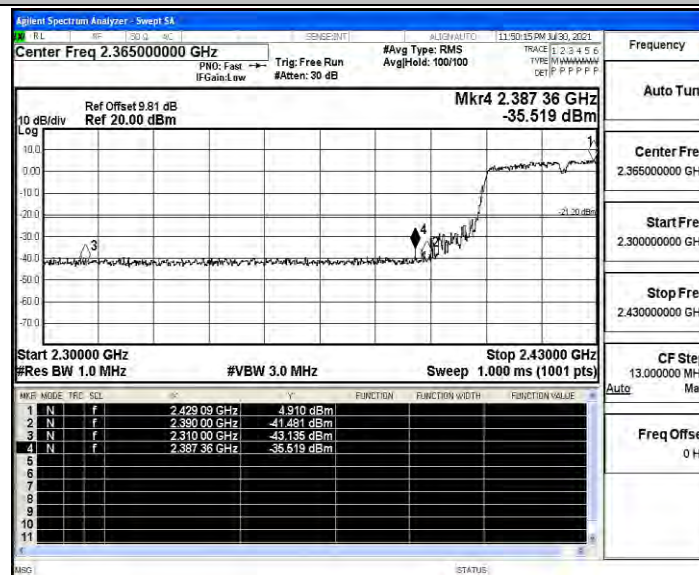
11N20SISO_Ant1_High_2462_Peak



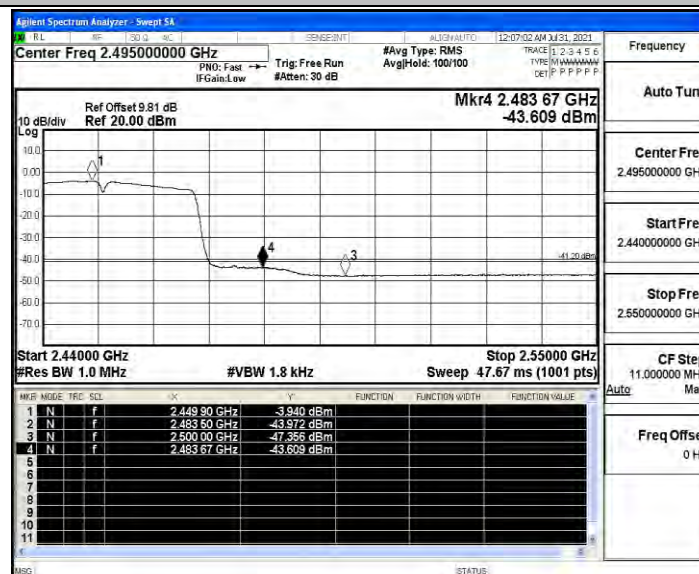
11N40SISO_Ant1_Low_2422_AV



11N40SISO_Ant1_Low_2422_Peak



11N40SISO_Ant1_High_2452_AV



Agilent Spectrum Analyzer - Sweep SA

RL REF CO G NC SENSE IN AUTO ALGN AUTO 12:06:49 AM J31, 2021
Center Freq 2.49500000 GHz #Avg Ticks: RMS Trace [1 2 3 4 5 6]
 PNO: Fast IF Gain Low Avg Hold: 100/100 TYPE: NORMAN DET: PPPPP

Ref Offset 9.81 dB
 Ref 20.00 dBm
 Mkr4 2.483 56 GHz
 -27.456 dBm

Start 2.44000 GHz
 Res BW 1.0 MHz
 Stop 2.55000 GHz
 VBW 3.0 MHz
 Sweep 1.000 ms (1001 pts)

MKR	FREQ	SCL	ISO	V	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	f		2.444 73 GHz	-3.202 dBm		
2	N	f		2.483 50 GHz	-32.315 dBm		
3	N	f		2.500 00 GHz	-39.424 dBm		
4	N	f		2.483 56 GHz	-27.456 dBm		