



Appendix A

RF Test Data for 2.4G WIFI (Conducted Measurement)

Product Name: Astronomy Camera

Test Model: SC311

Environmental Conditions

Temperature:	23.8° C
Relative Humidity:	52.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Jack Cheng
	<i>Jack Cheng</i>
Supervised by:	Ling Zhu
	<i>Ling Zhu</i>





A.1 DTS Bandwidth

Test Result

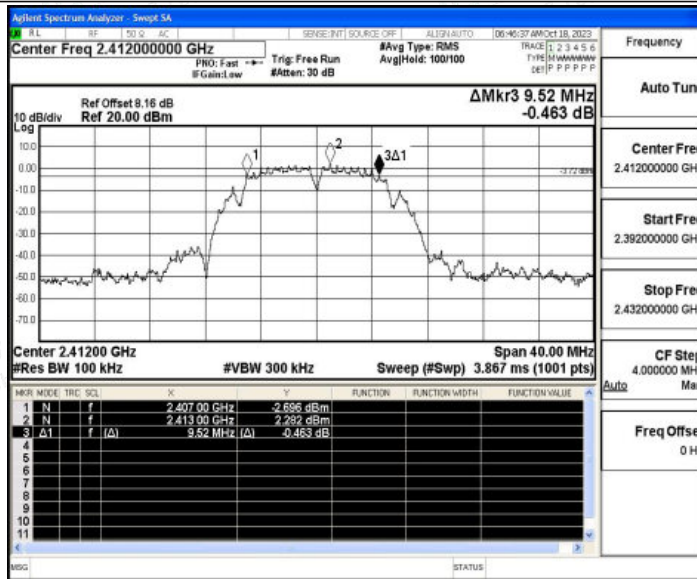
TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	9.520	2407.000	2416.520	0.5	PASS
		2437	10.040	2432.000	2442.040	0.5	PASS
		2462	9.600	2456.960	2466.560	0.5	PASS
11G	Ant1	2412	14.480	2405.680	2420.160	0.5	PASS
		2437	15.680	2428.840	2444.520	0.5	PASS
		2462	16.320	2453.840	2470.160	0.5	PASS
11N20SISO	Ant1	2412	14.840	2405.680	2420.520	0.5	PASS
		2437	16.400	2428.360	2444.760	0.5	PASS
		2462	16.880	2453.760	2470.640	0.5	PASS
11N40SISO	Ant1	2422	35.120	2404.480	2439.600	0.5	PASS
		2437	35.520	2419.000	2454.520	0.5	PASS
		2452	35.680	2434.080	2469.760	0.5	PASS



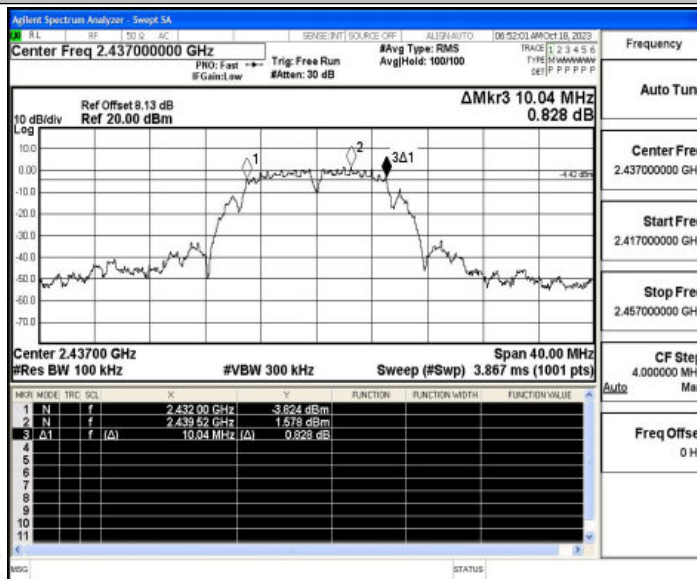


Test Graphs

11B_Ant1_2412

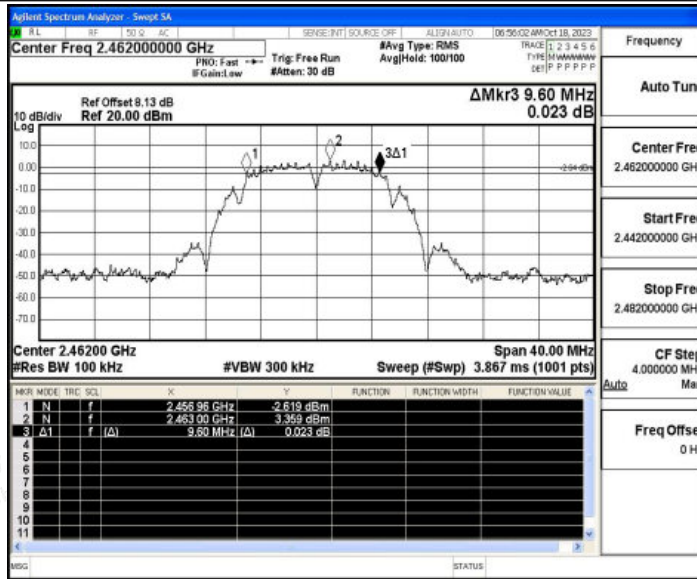


11B_Ant1_2437

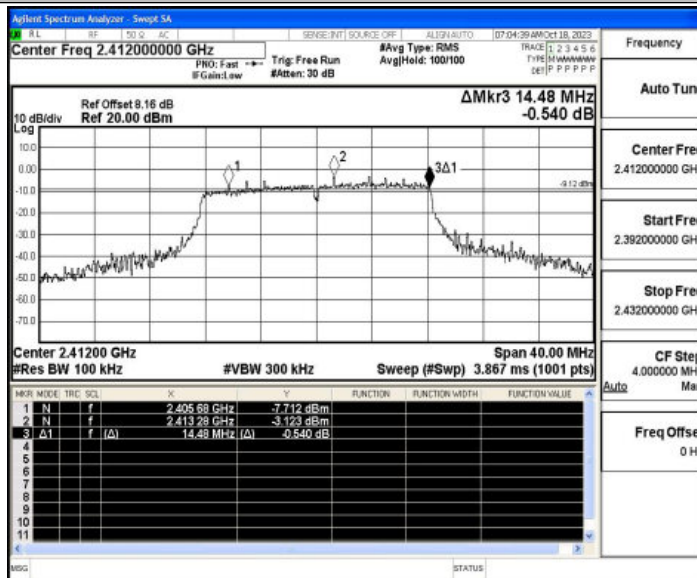


11B_Ant1_2462

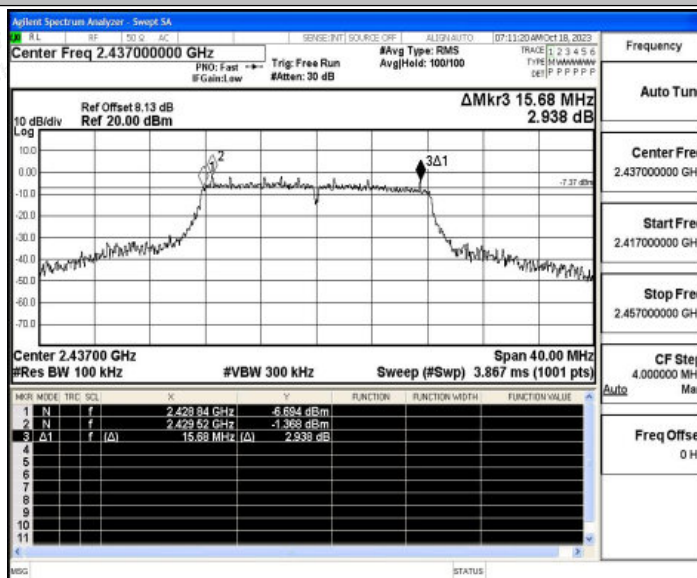




11G_Ant1_2412

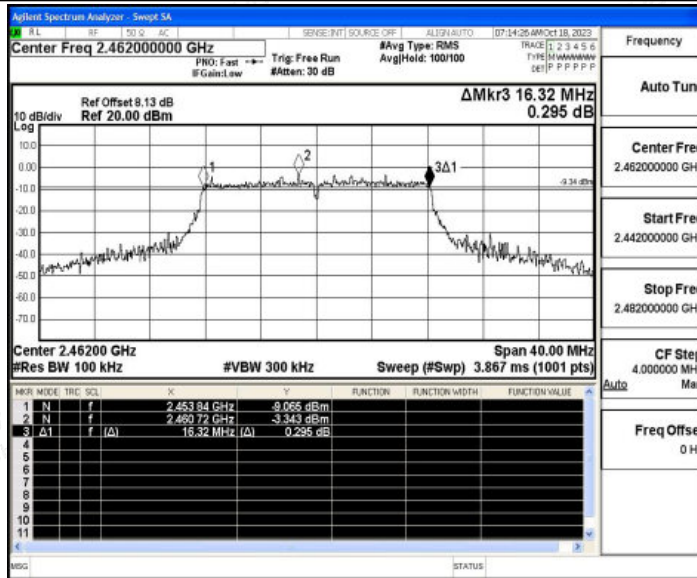


11G_Ant1_2437

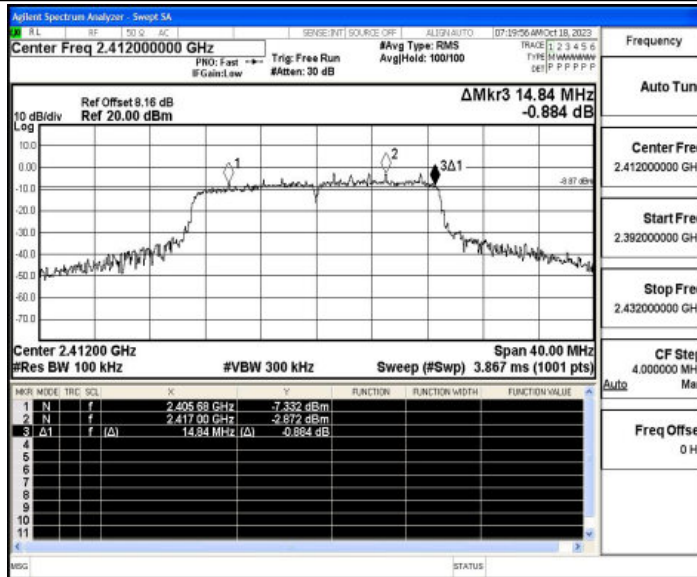




11G_Ant1_2462

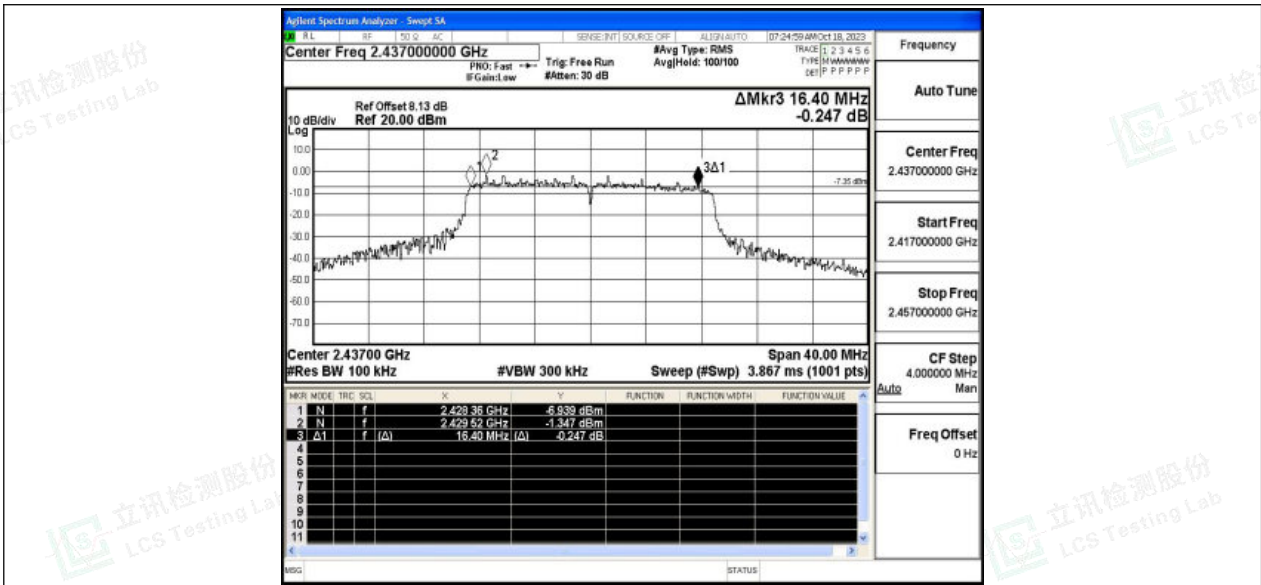


11N20SISO_Ant1_2412

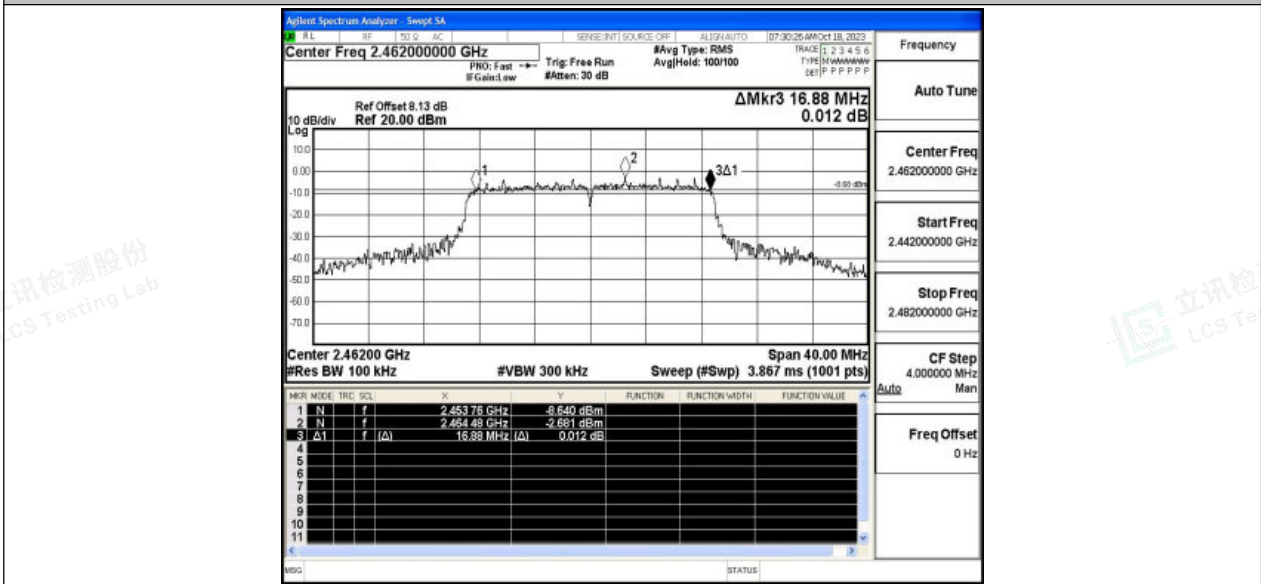


11N20SISO_Ant1_2437

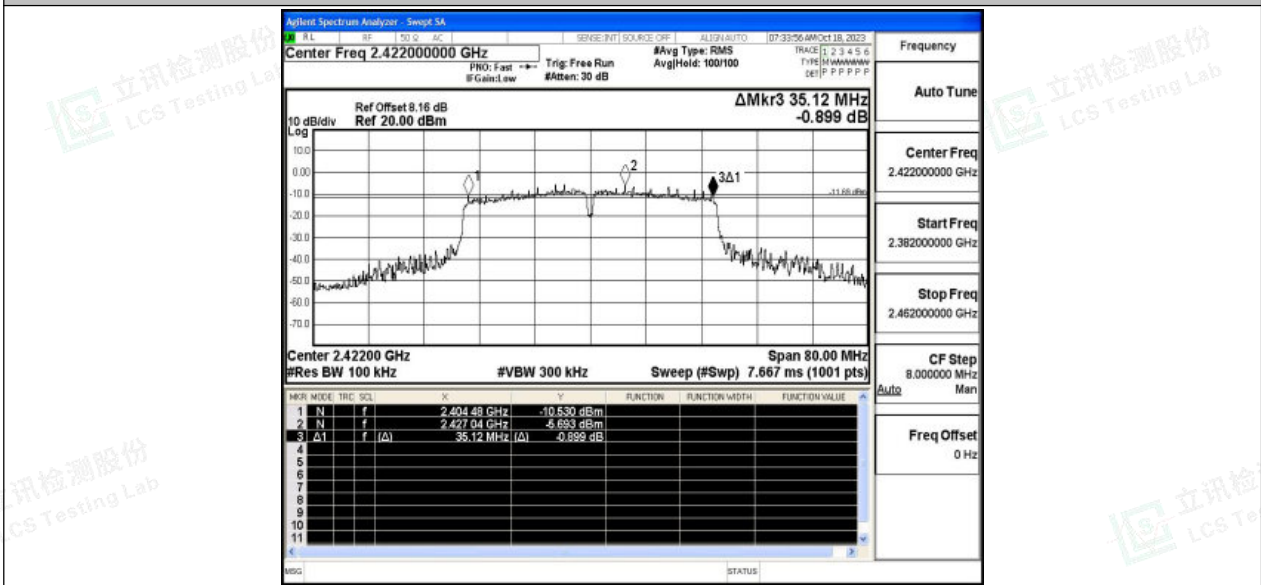




11N20SISO_Ant1_2462

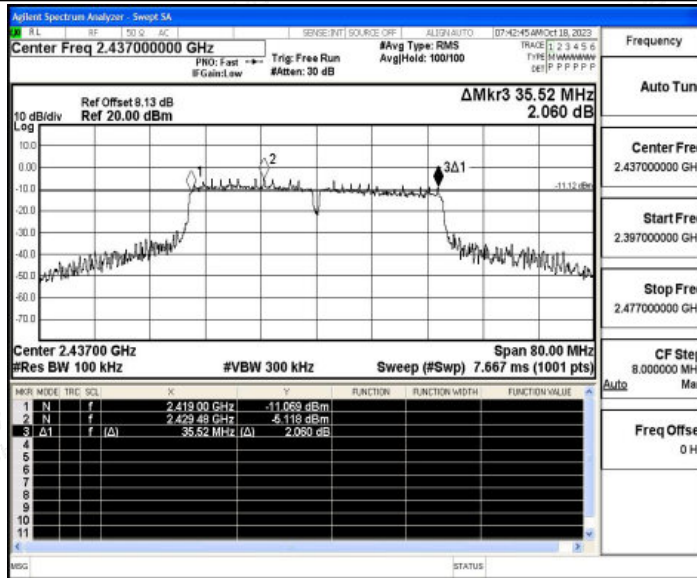


11N40SISO_Ant1_2422

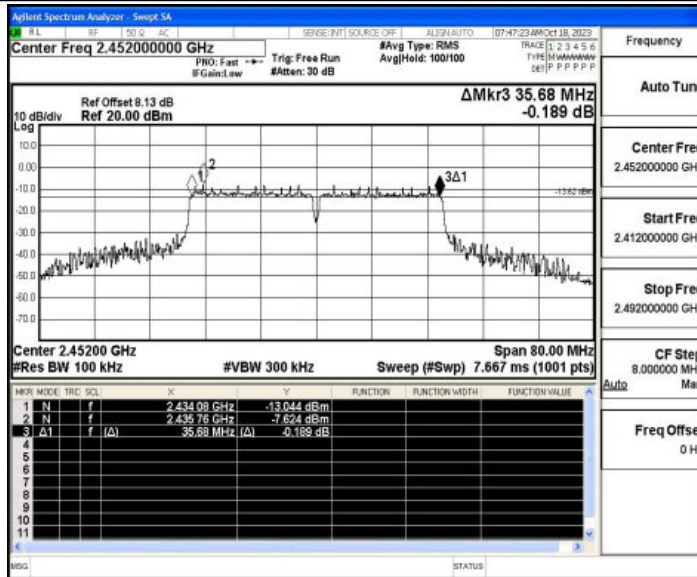




11N40SISO_Ant1_2437



11N40SISO_Ant1_2452





A.2 Maximum conducted output power

Test Result Peak

TestMode	Antenna	Freq(MHz)	Peak Power[dBm]	Conducted Limit[dBm]	Verdict
11B	Ant1	2412	14.38	≤30.00	PASS
		2437	13.96	≤30.00	PASS
		2462	15.26	≤30.00	PASS
11G	Ant1	2412	13.74	≤30.00	PASS
		2437	15.58	≤30.00	PASS
		2462	14.48	≤30.00	PASS
11N20SISO	Ant1	2412	13.98	≤30.00	PASS
		2437	15.60	≤30.00	PASS
		2462	14.67	≤30.00	PASS
11N40SISO	Ant1	2422	14.14	≤30.00	PASS
		2437	14.37	≤30.00	PASS
		2452	12.45	≤30.00	PASS





A.3 Maximum power spectral density

Test Result

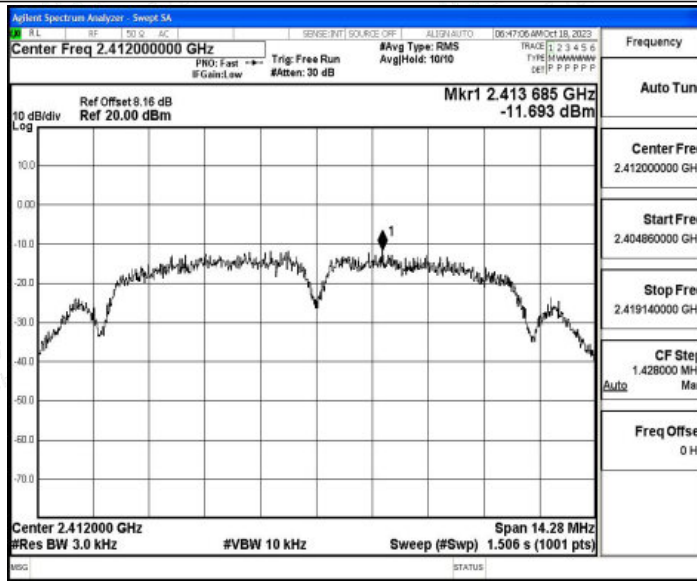
TestMode	Antenna	Freq(MHz)	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
11B	Ant1	2412	-11.69	≤8.00	PASS
		2437	-11.65	≤8.00	PASS
		2462	-7.61	≤8.00	PASS
11G	Ant1	2412	-17.67	≤8.00	PASS
		2437	-16.4	≤8.00	PASS
		2462	-16.83	≤8.00	PASS
11N20SISO	Ant1	2412	-17.24	≤8.00	PASS
		2437	-16.35	≤8.00	PASS
		2462	-16.63	≤8.00	PASS
11N40SISO	Ant1	2422	-20.05	≤8.00	PASS
		2437	-20.22	≤8.00	PASS
		2452	-20.56	≤8.00	PASS



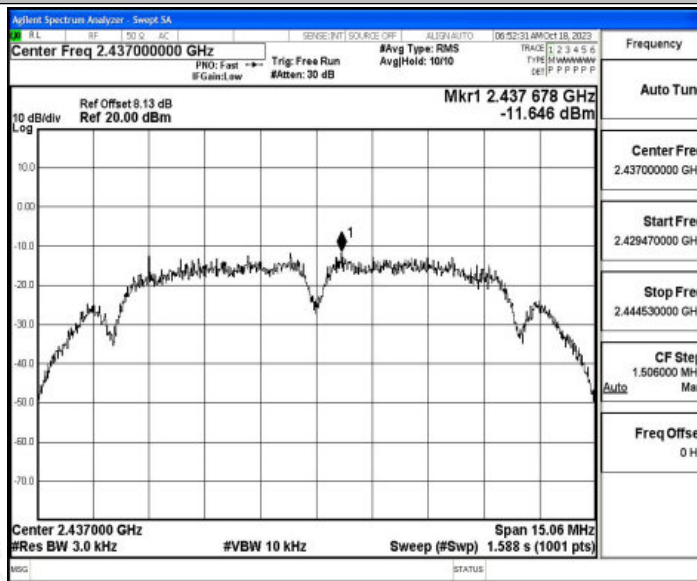


Test Graphs

11B_Ant1_2412

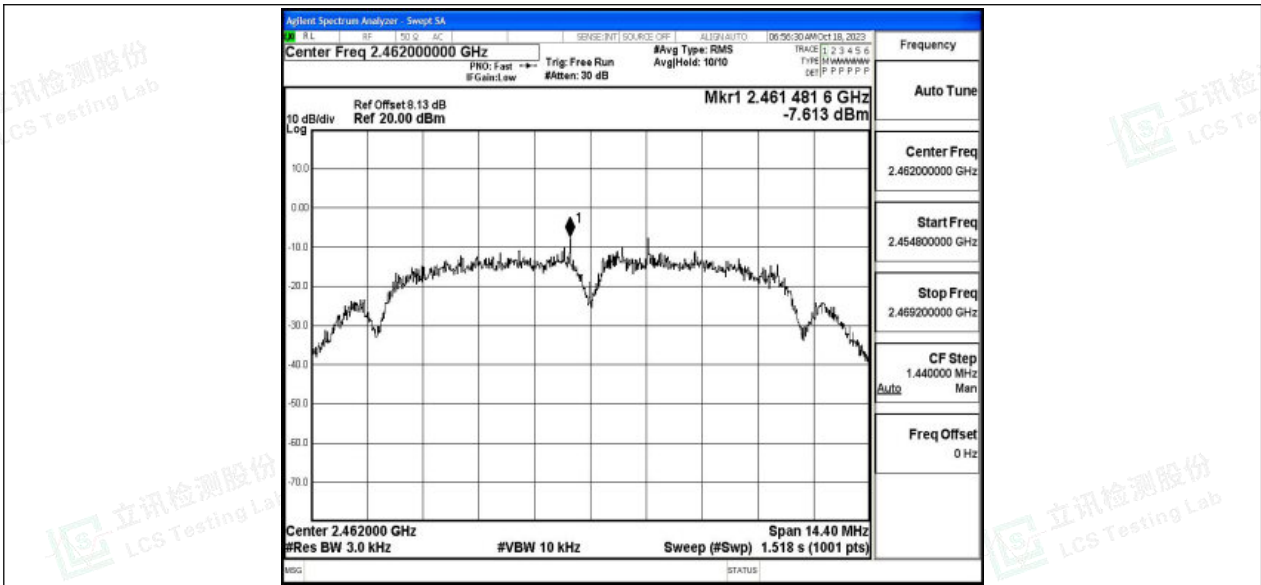


11B_Ant1_2437

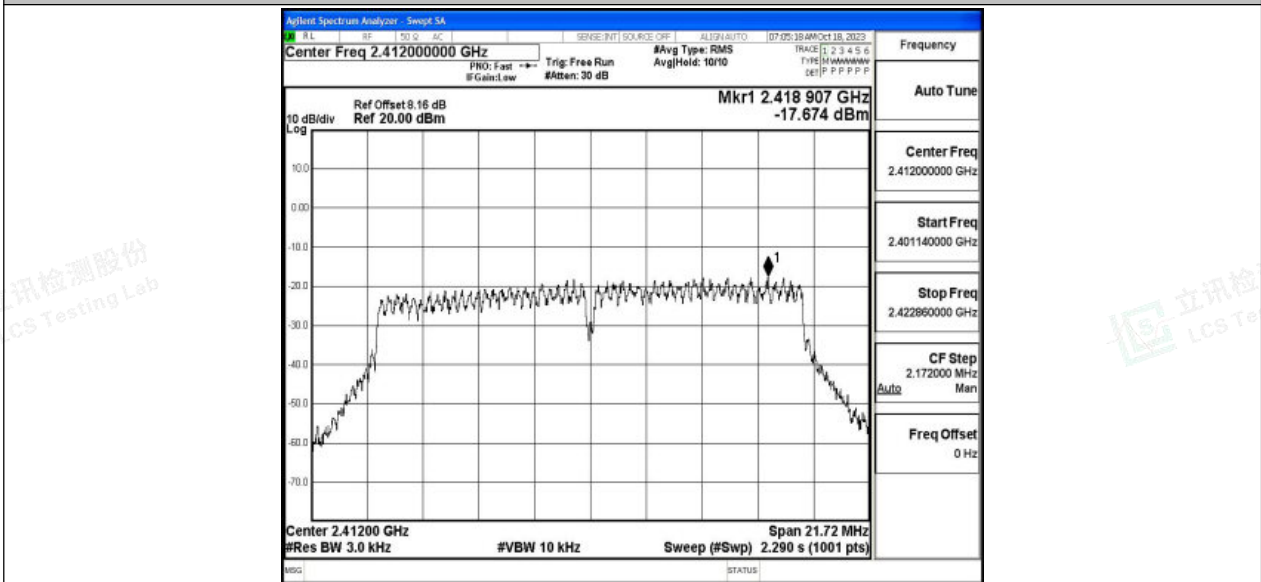


11B_Ant1_2462

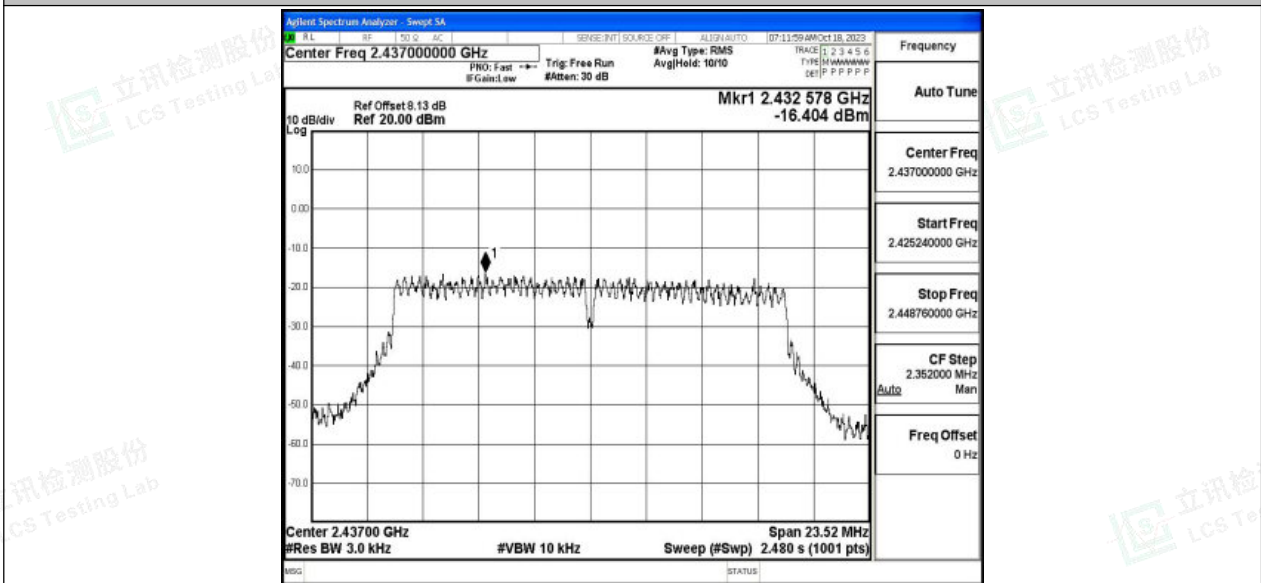




11G_Ant1_2412

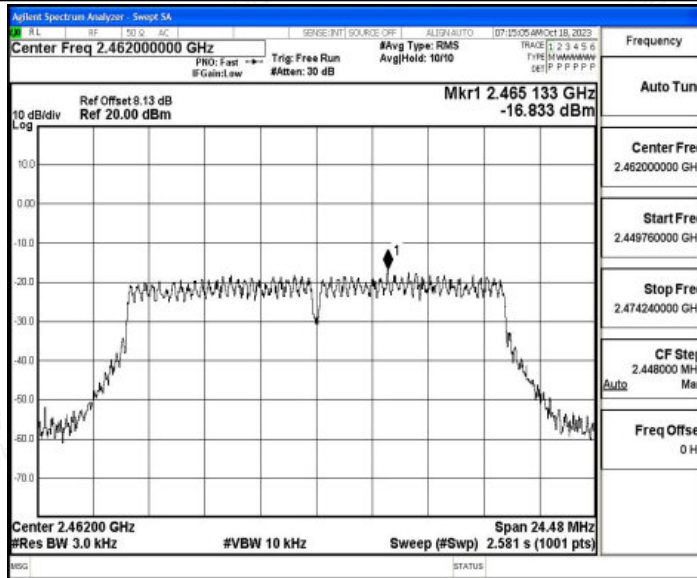


11G_Ant1_2437

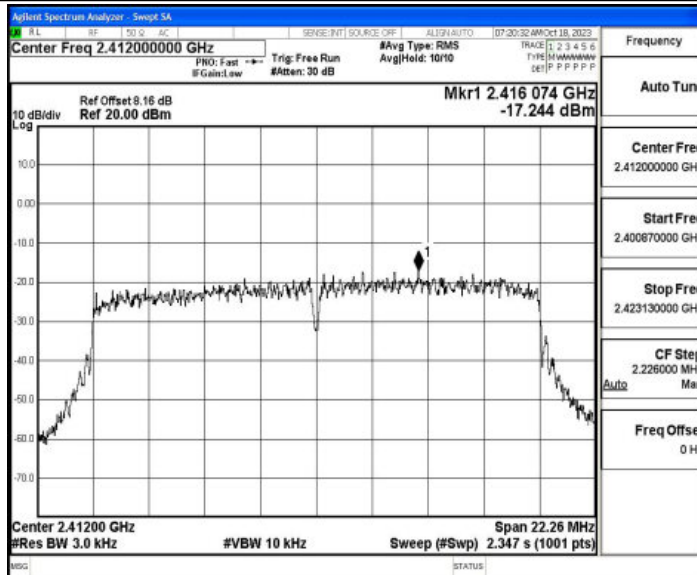




11G_Ant1_2462

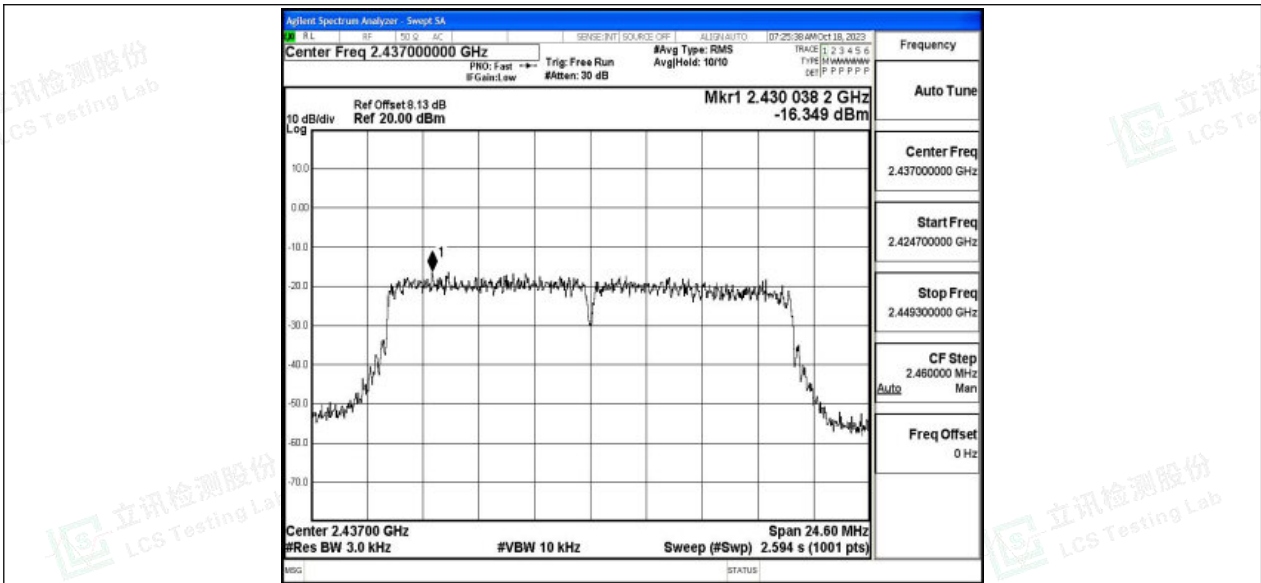


11N20SISO_Ant1_2412

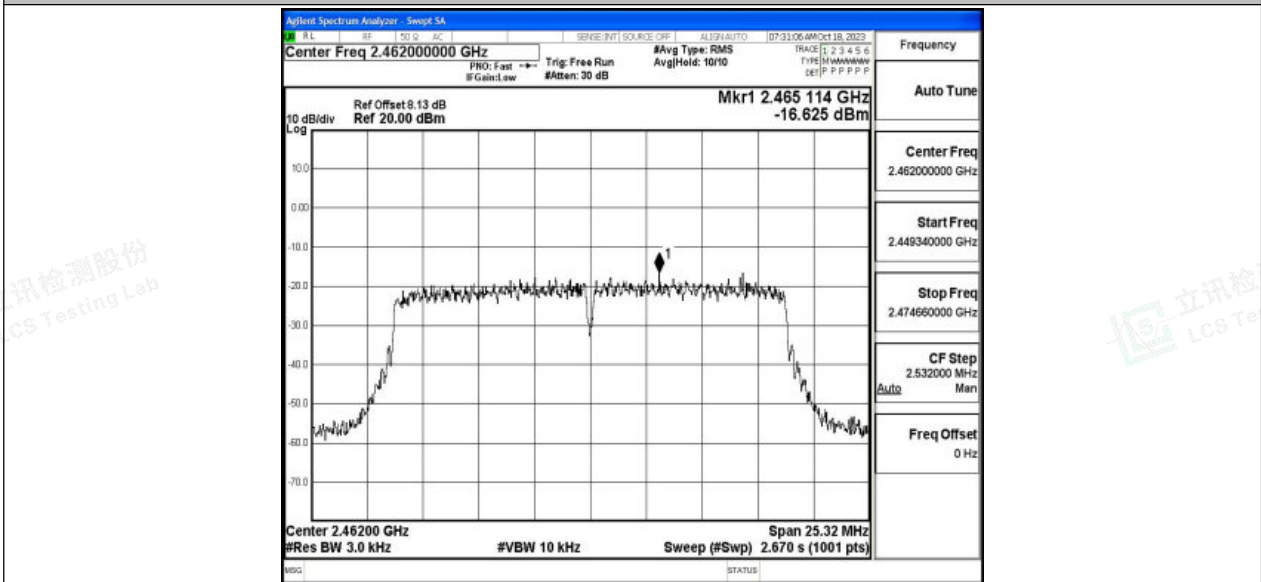


11N20SISO_Ant1_2437

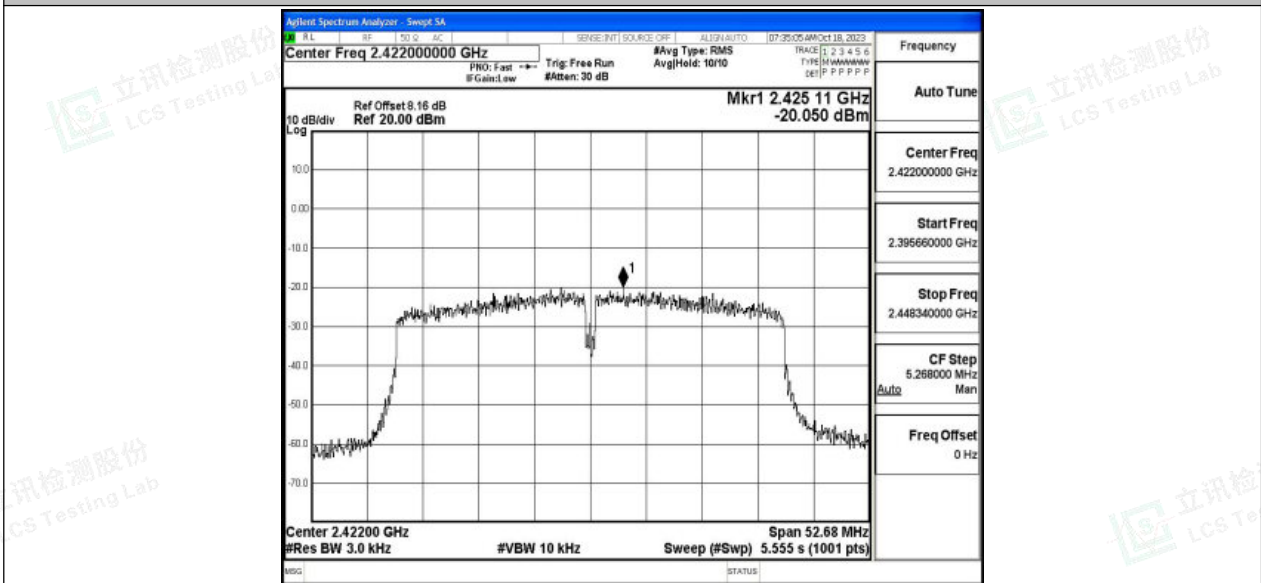




11N20SISO_Ant1_2462

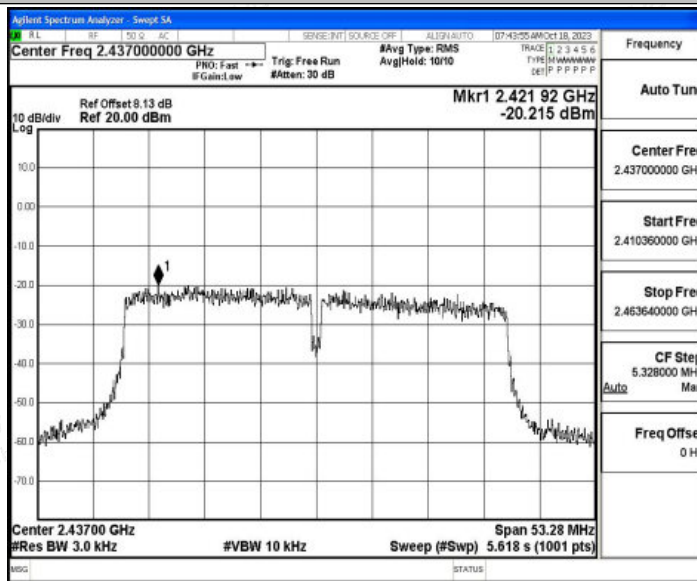


11N40SISO_Ant1_2422

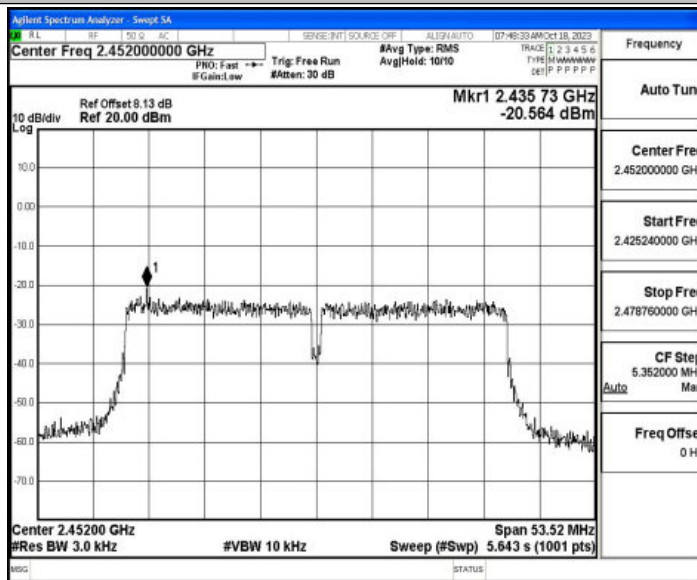




11N40SISO_Ant1_2437



11N40SISO_Ant1_2452





A.4 Band edge measurements

Test Result

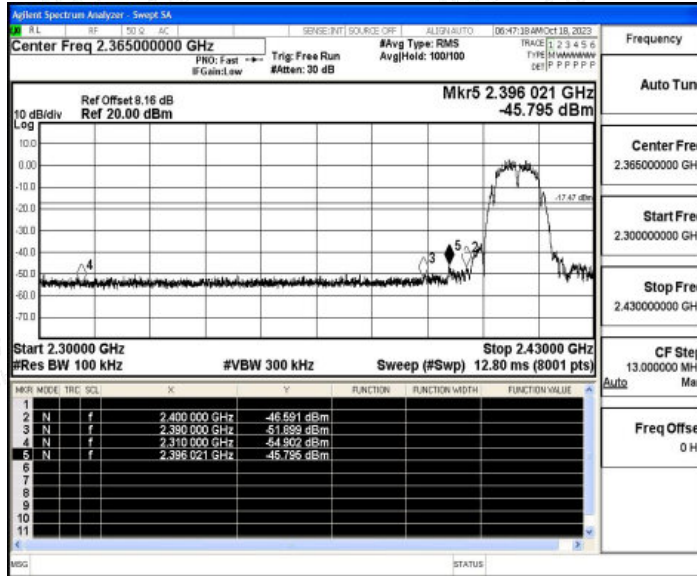
TestMode	Antenna	ChName	Freq(MHz)	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	2.53	-45.8	≤-17.47	PASS
		High	2462	3.31	-49.97	≤-16.69	PASS
11G	Ant1	Low	2412	-3.26	-37.82	≤-23.26	PASS
		High	2462	-3.00	-48.95	≤-23	PASS
11N20SISO	Ant1	Low	2412	-3.47	-36.5	≤-23.47	PASS
		High	2462	-2.42	-47.71	≤-22.42	PASS
11N40SISO	Ant1	Low	2422	-5.12	-36.4	≤-25.12	PASS
		High	2452	-8.13	-41.36	≤-28.13	PASS



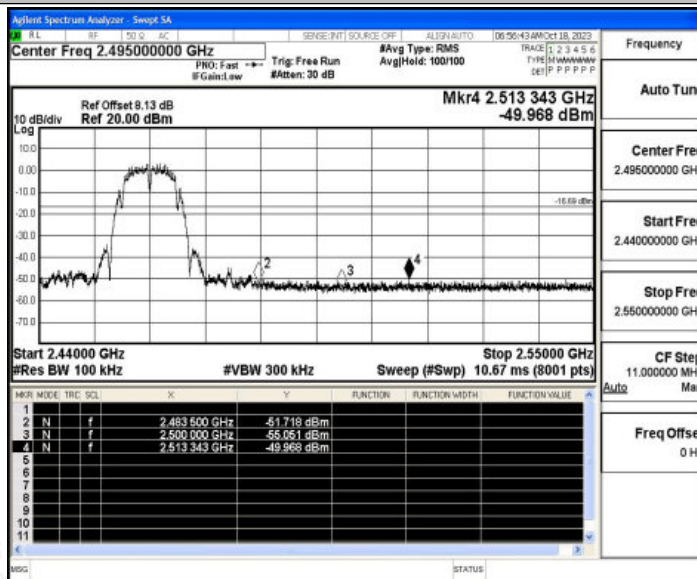


Test Graphs

11B_Ant1_Low_2412

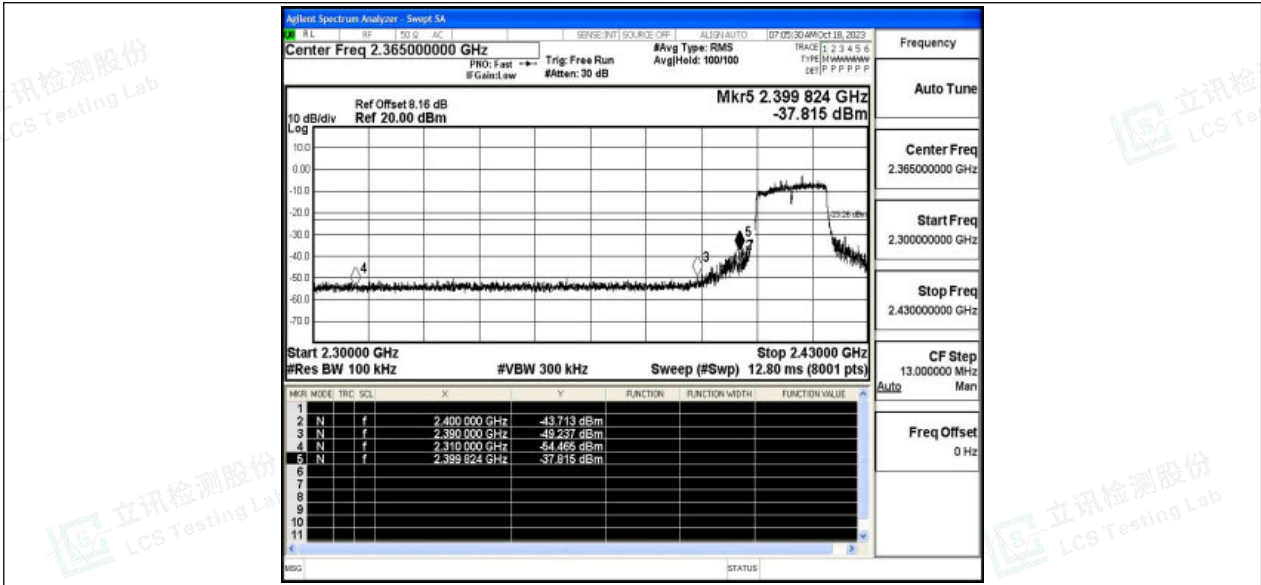


11B_Ant1_High_2462

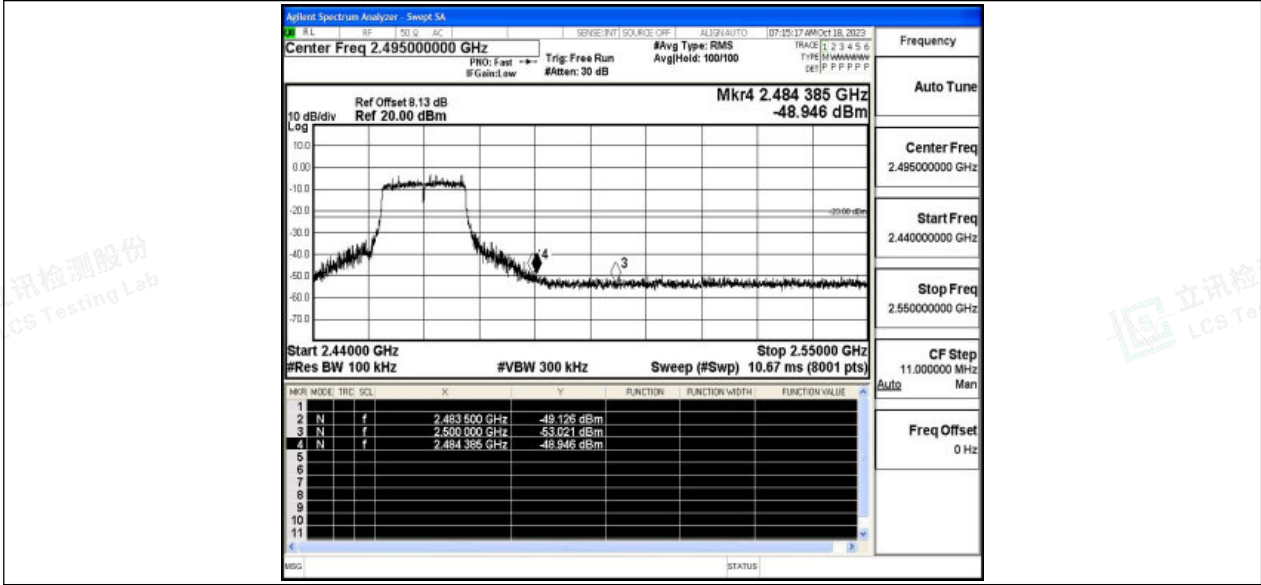


11G_Ant1_Low_2412

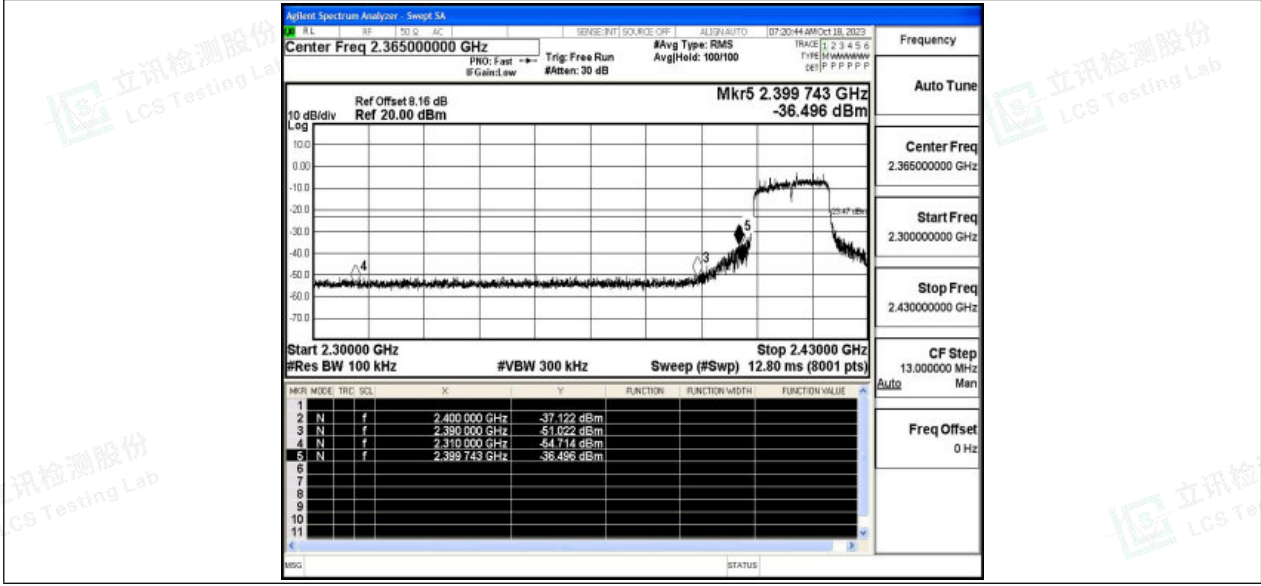




11G_Ant1_High_2462

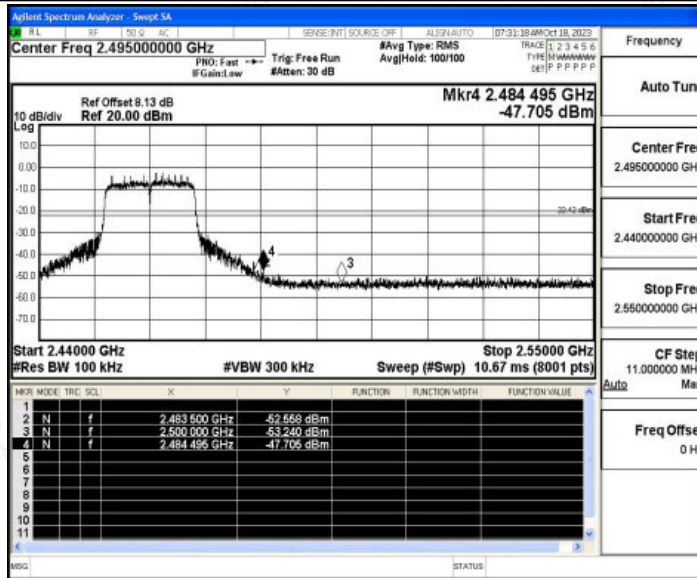


11N20SISO_Ant1_Low_2412

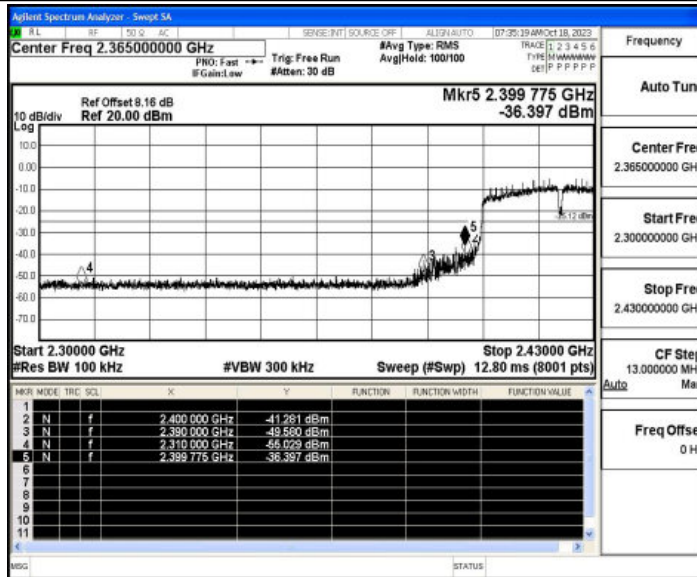




11N20SISO_Ant1_High_2462

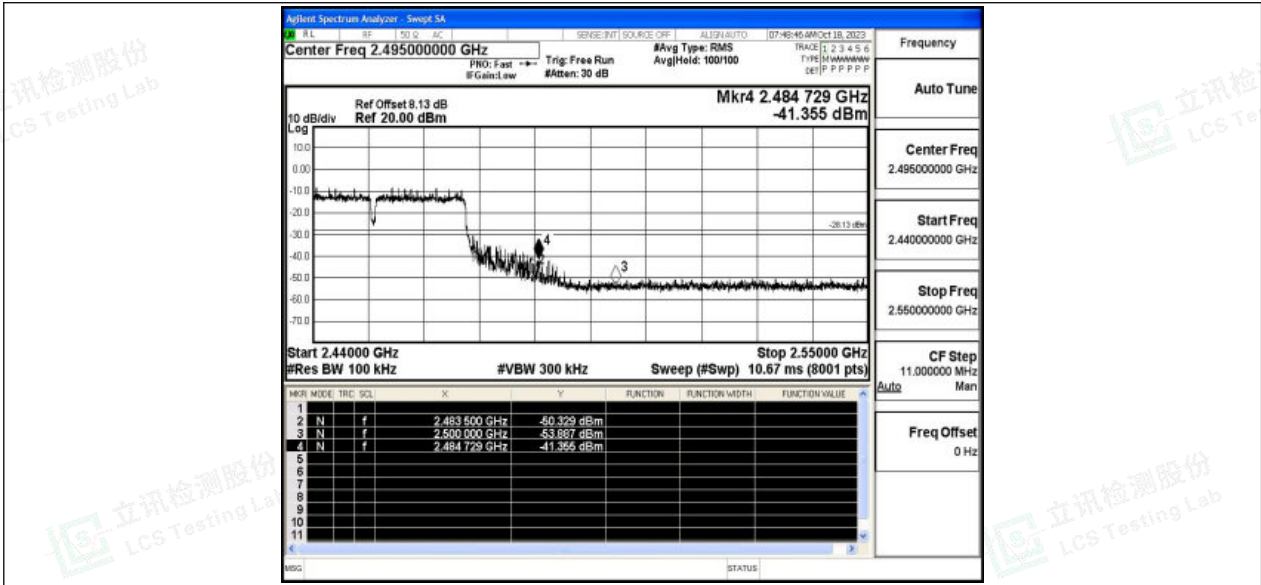


11N40SISO_Ant1_Low_2422



11N40SISO_Ant1_High_2452







A.5 Conducted Spurious Emission

Test Result

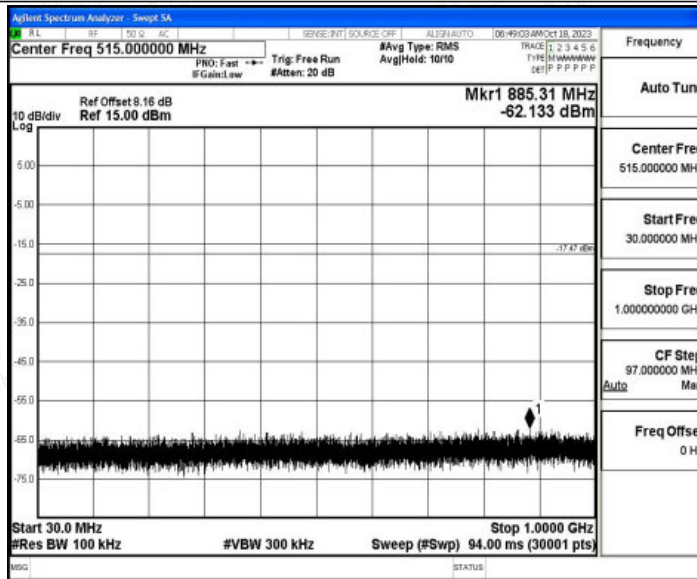
TestMode	Antenna	Freq(MHz)	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	30~1000	2.53	-62.13	≤-17.47	PASS
			1000~26500	2.53	-42.75	≤-17.47	PASS
		2437	30~1000	2.13	-61.34	≤-17.87	PASS
			1000~26500	2.13	-44.43	≤-17.87	PASS
		2462	30~1000	3.31	-61.66	≤-16.69	PASS
			1000~26500	3.31	-40.35	≤-16.69	PASS
11G	Ant1	2412	30~1000	-3.26	-61.84	≤-23.26	PASS
			1000~26500	-3.26	-48.95	≤-23.26	PASS
		2437	30~1000	-1.59	-61.25	≤-21.59	PASS
			1000~26500	-1.59	-48.86	≤-21.59	PASS
		2462	30~1000	-3.00	-61.92	≤-23	PASS
			1000~26500	-3.00	-49.36	≤-23	PASS
11N20SISO	Ant1	2412	30~1000	-3.47	-61.09	≤-23.47	PASS
			1000~26500	-3.47	-49.26	≤-23.47	PASS
		2437	30~1000	-1.45	-61.58	≤-21.45	PASS
			1000~26500	-1.45	-49.32	≤-21.45	PASS
		2462	30~1000	-2.42	-61.46	≤-22.42	PASS
			1000~26500	-2.42	-48.97	≤-22.42	PASS
11N40SISO	Ant1	2422	30~1000	-5.12	-61.77	≤-25.12	PASS
			1000~26500	-5.12	-49.27	≤-25.12	PASS
		2437	30~1000	-5.33	-61.31	≤-25.33	PASS
			1000~26500	-5.33	-48.71	≤-25.33	PASS
		2452	30~1000	-8.13	-61.26	≤-28.13	PASS
			1000~26500	-8.13	-49.42	≤-28.13	PASS



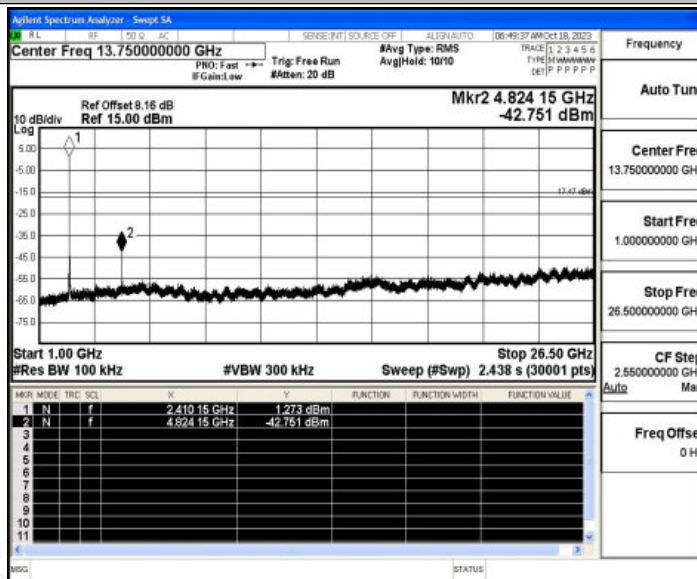


Test Graphs

11B_Ant1_2412_30~1000

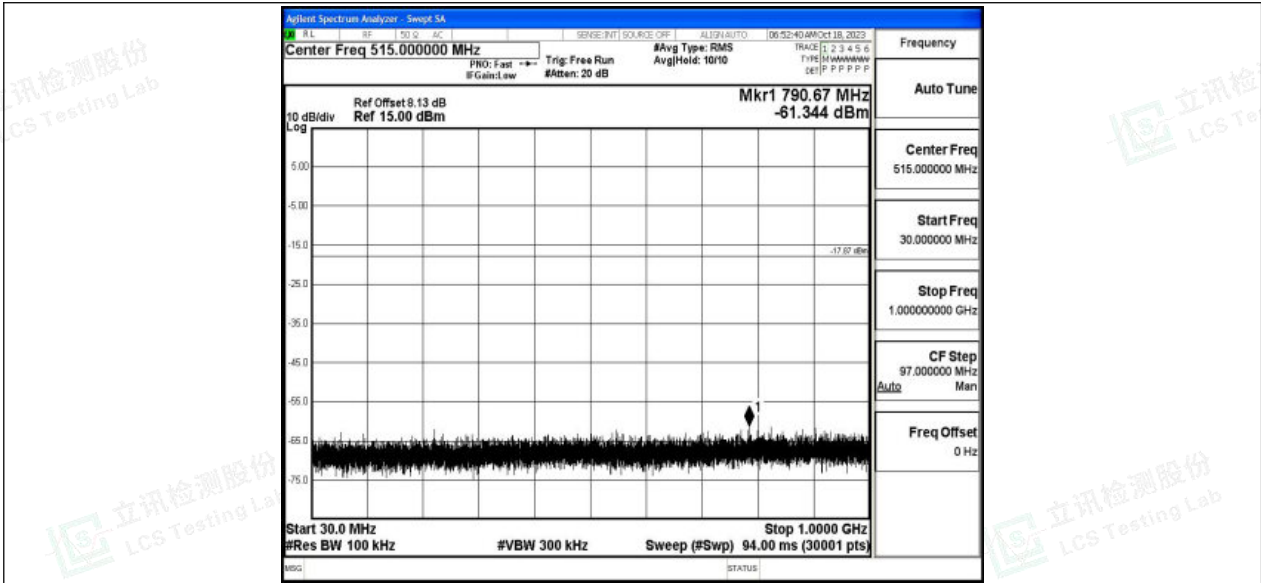


11B_Ant1_2412_1000~26500

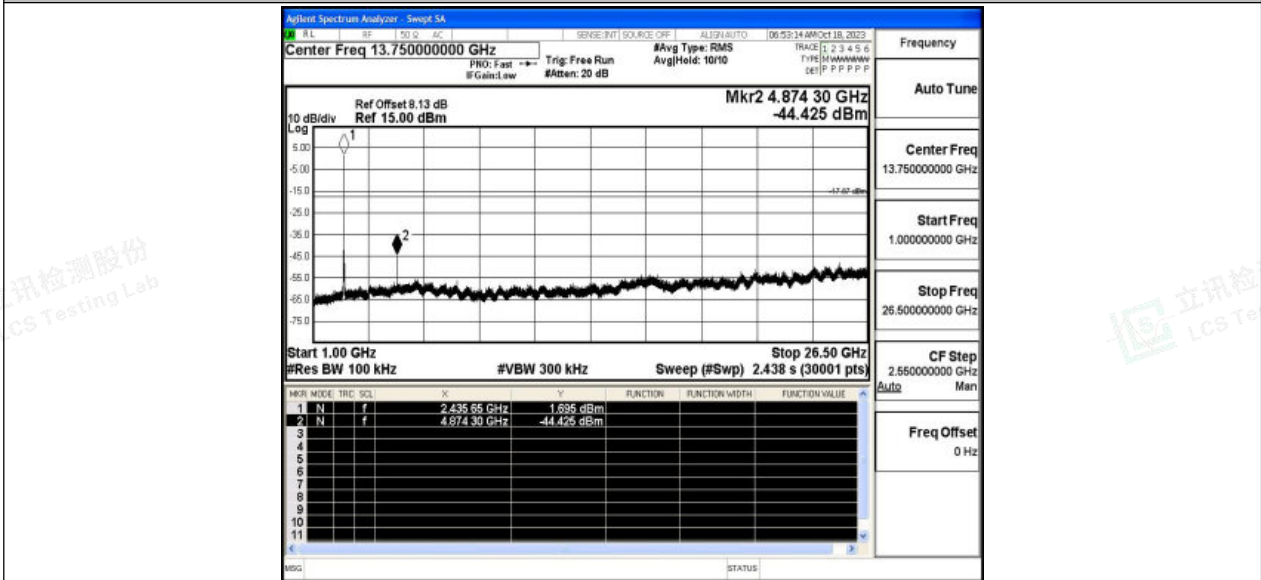


11B_Ant1_2437_30~1000

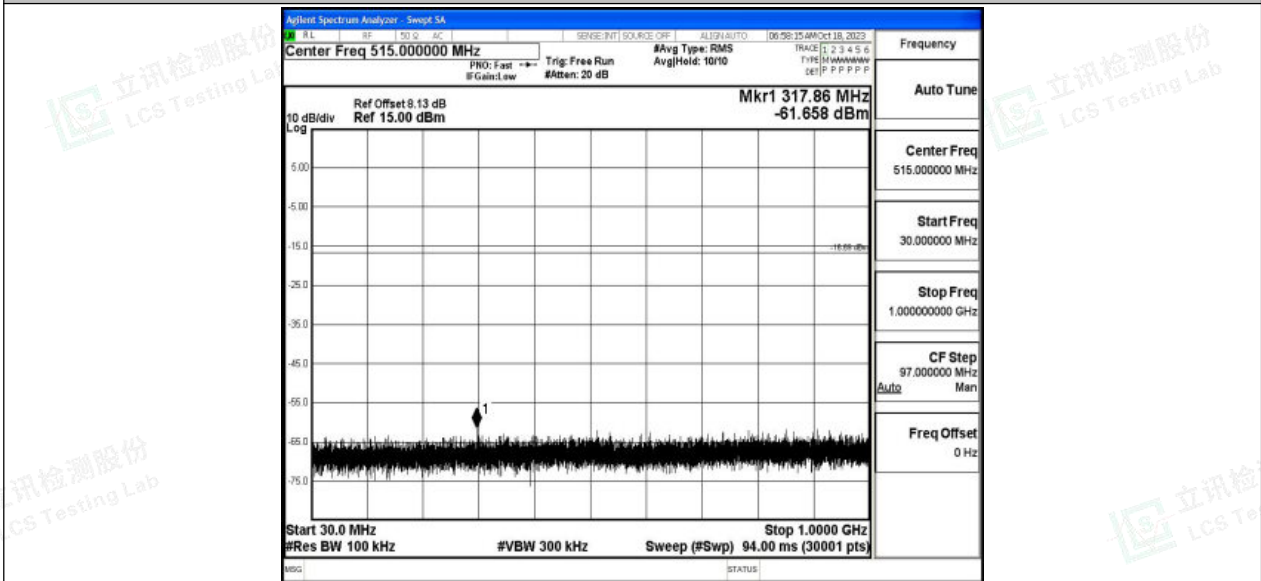




11B_Ant1_2437_1000~26500

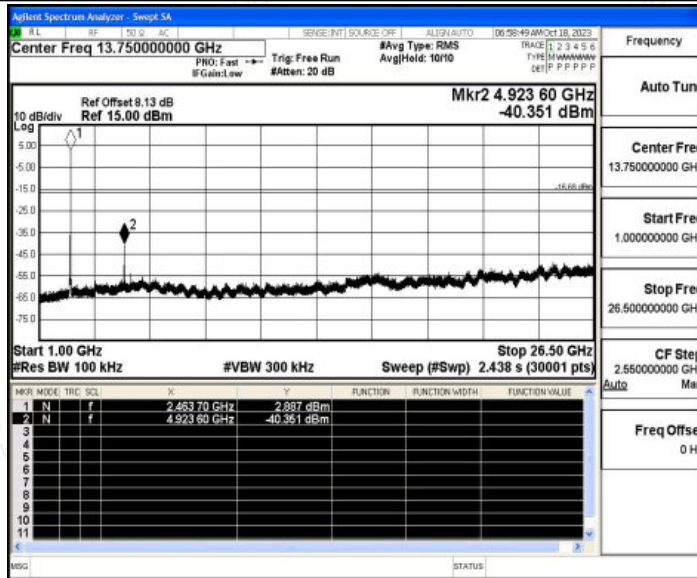


11B_Ant1_2462_30~1000

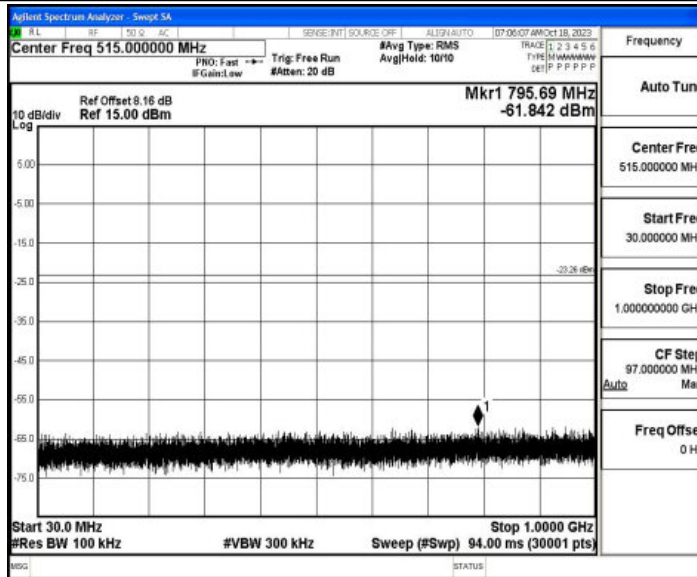




11B_Ant1_2462_1000~26500

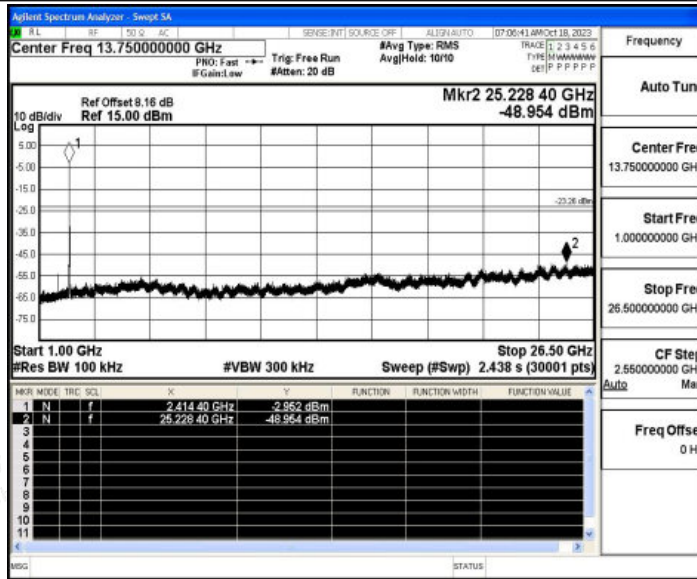


11G_Ant1_2412_30~1000

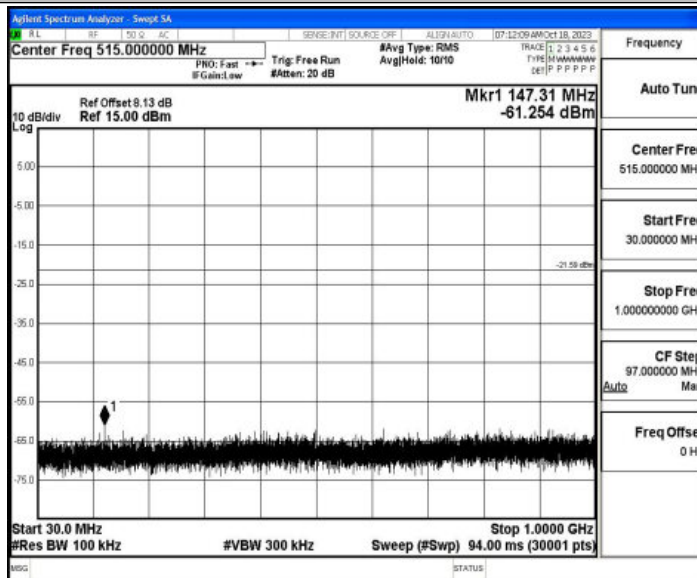


11G_Ant1_2412_1000~26500

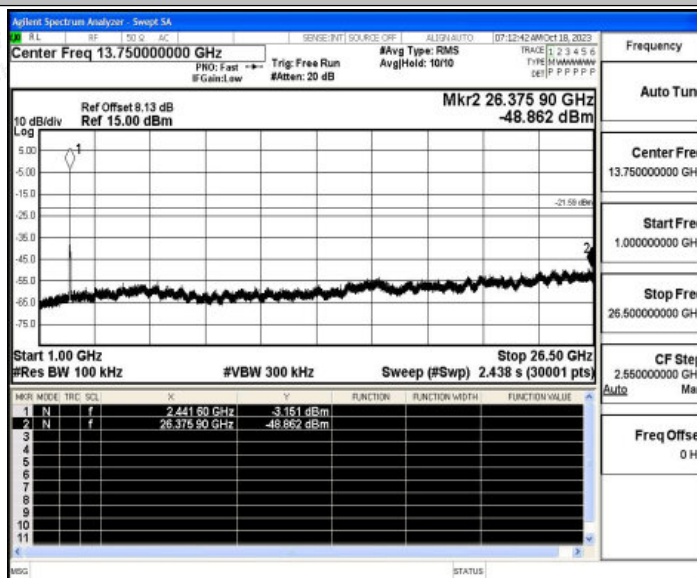




11G_Ant1_2437_30~1000

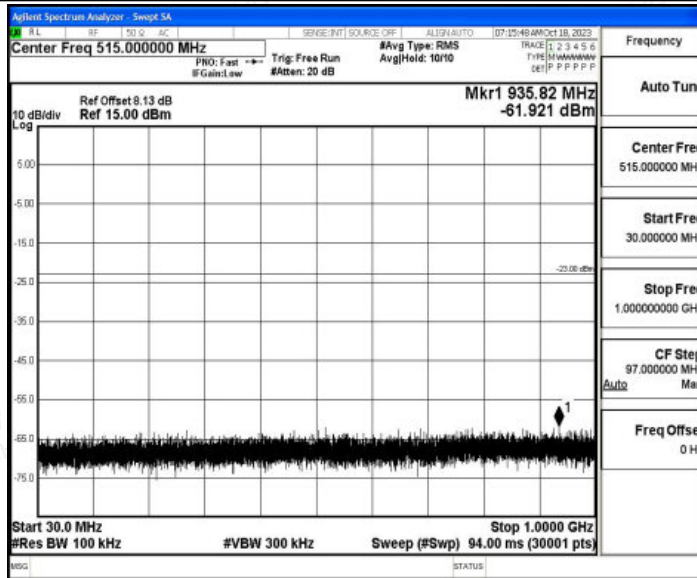


11G_Ant1_2437_1000~26500

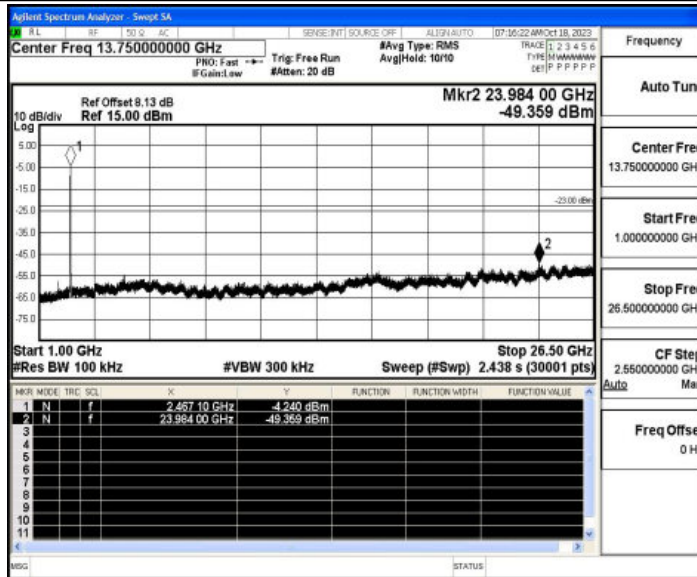




11G_Ant1_2462_30~1000

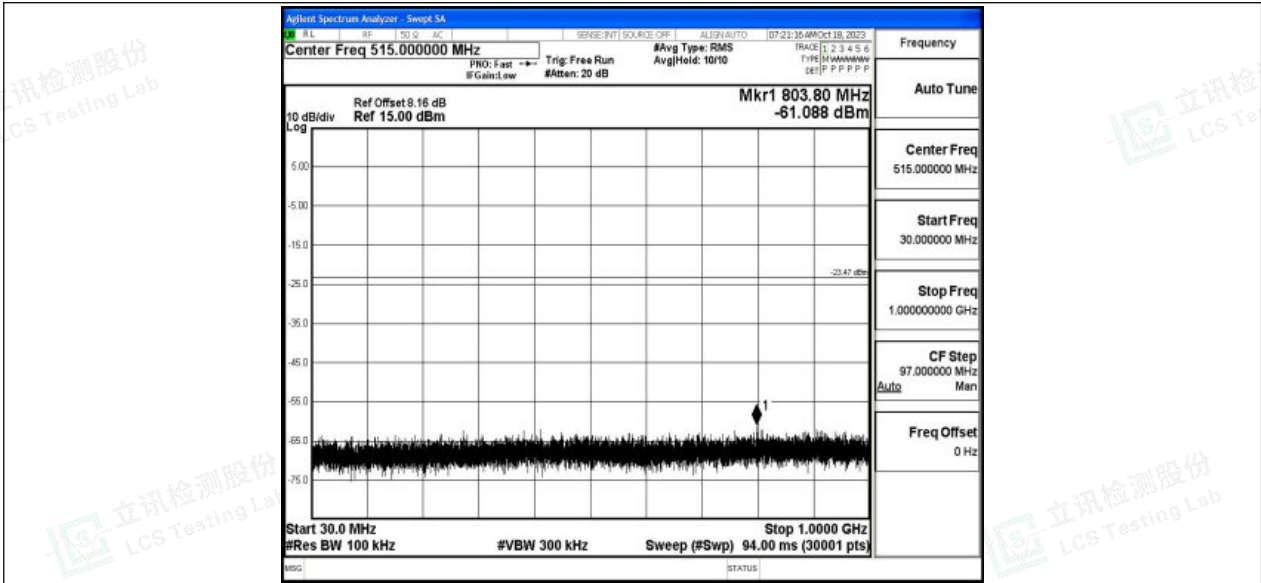


11G_Ant1_2462_1000~26500

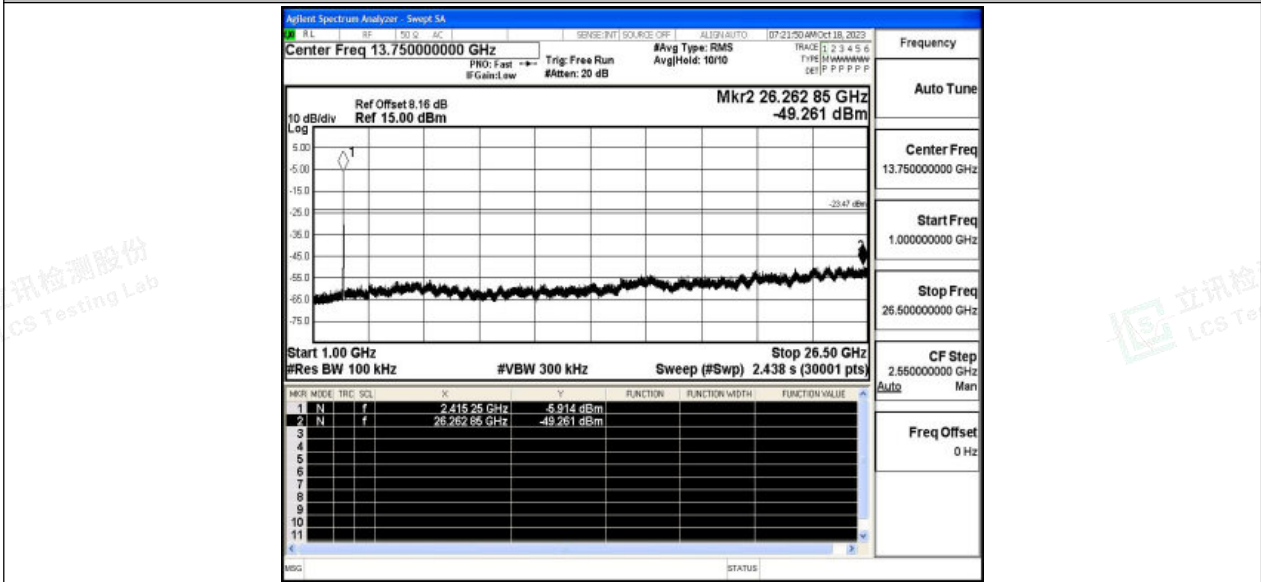


11N20SISO_Ant1_2412_30~1000

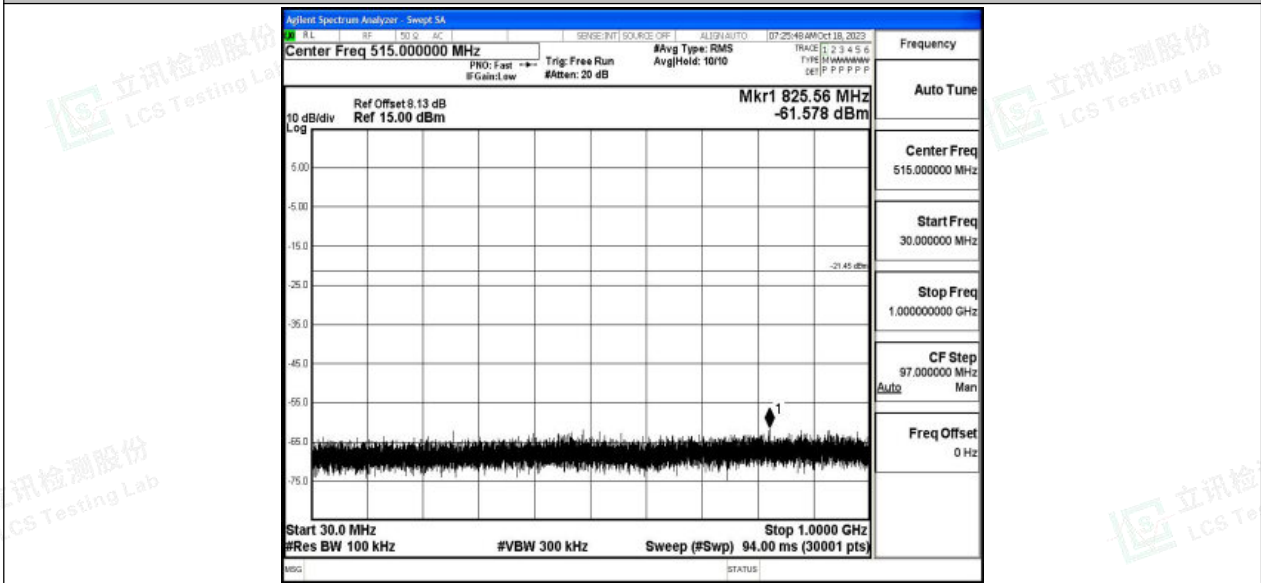




11N20SISO_Ant1_2412_1000~26500

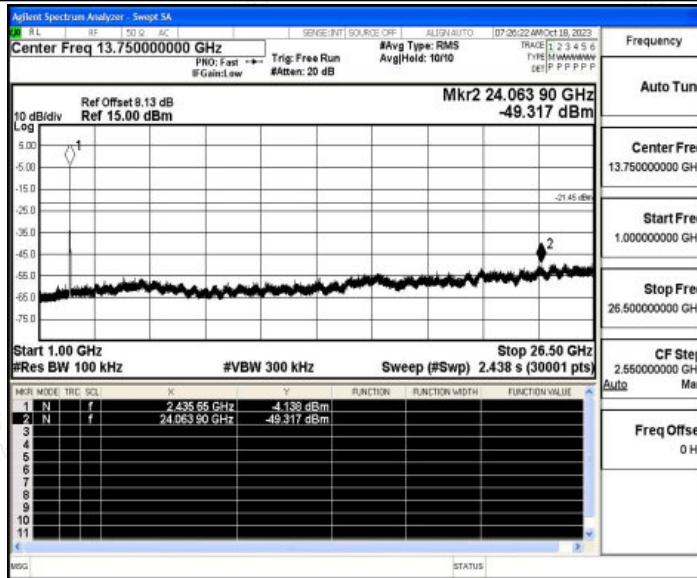


11N20SISO_Ant1_2437_30~1000

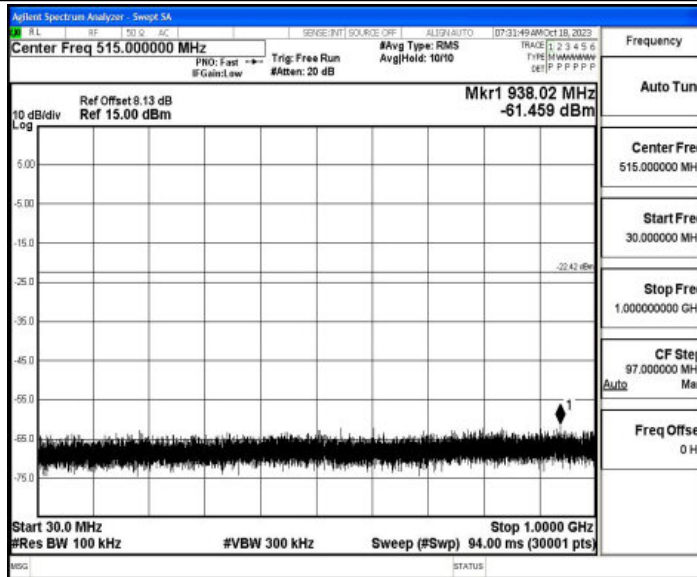




11N20SISO_Ant1_2437_1000~26500

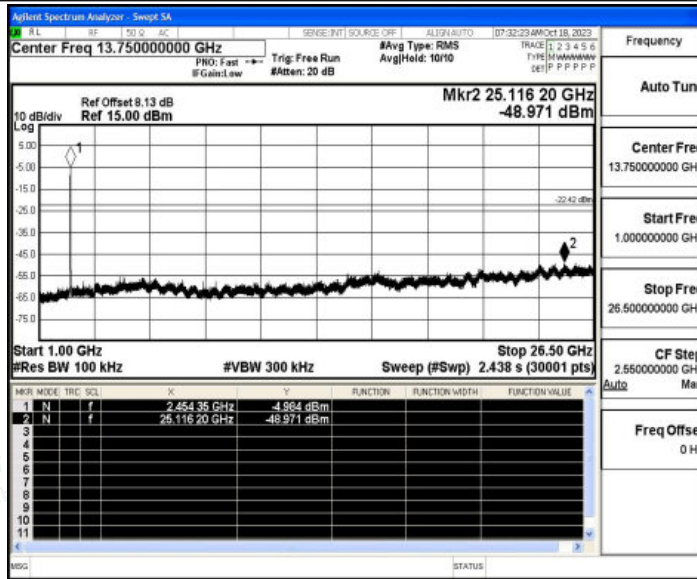


11N20SISO_Ant1_2462_30~1000

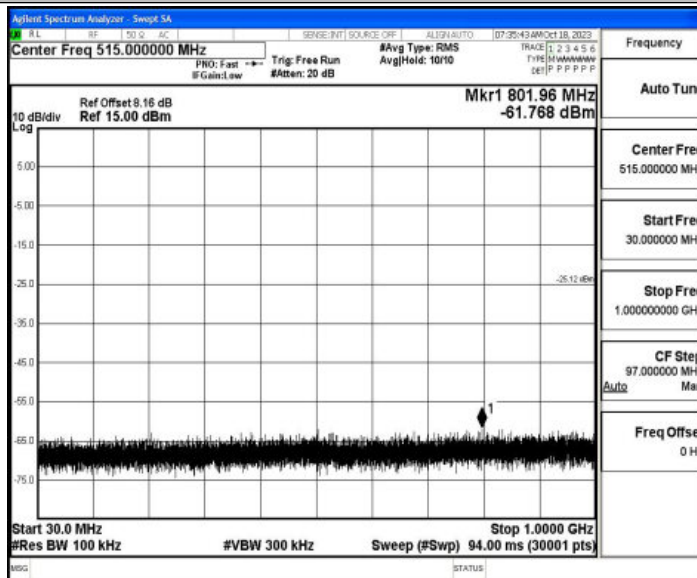


11N20SISO_Ant1_2462_1000~26500

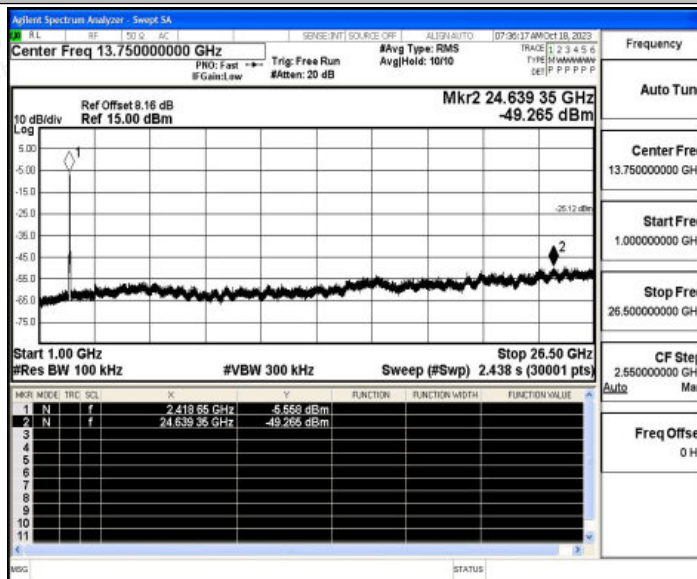




11N40SISO_Ant1_2422_30~1000

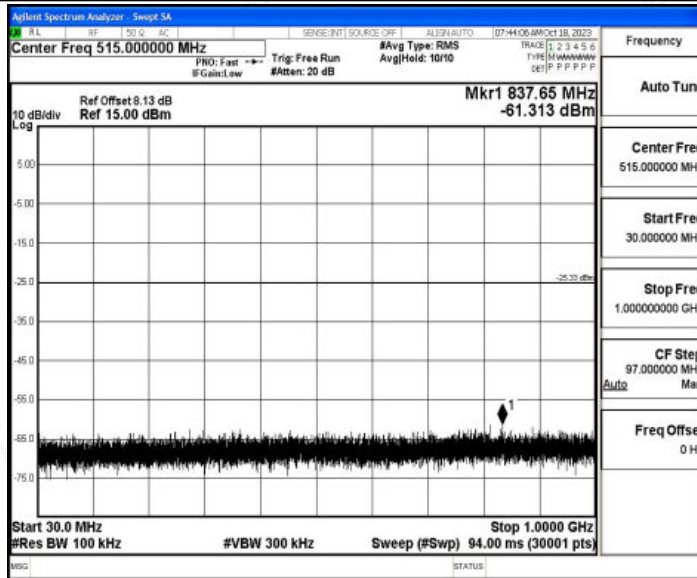


11N40SISO_Ant1_2422_1000~26500

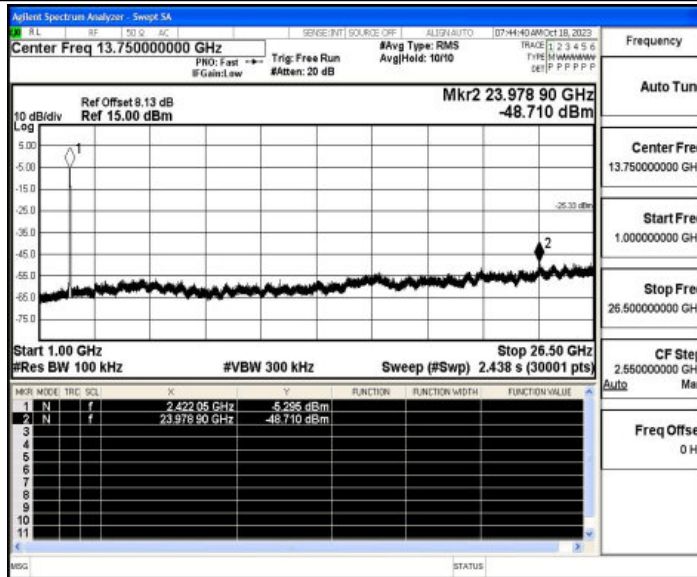




11N40SISO_Ant1_2437_30~1000

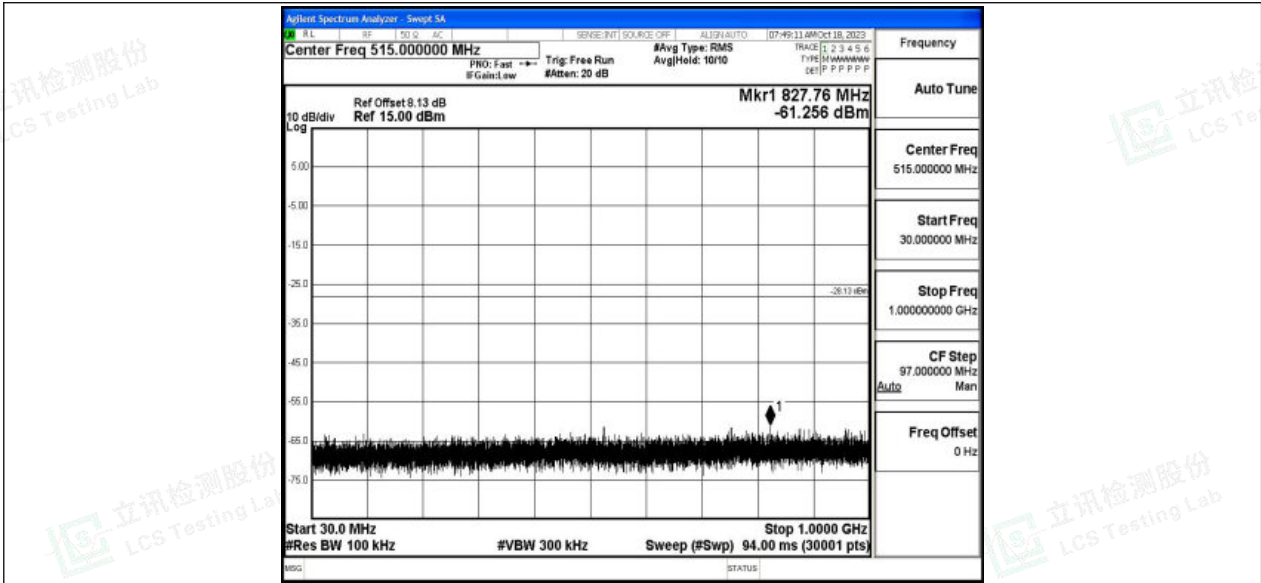


11N40SISO_Ant1_2437_1000~26500

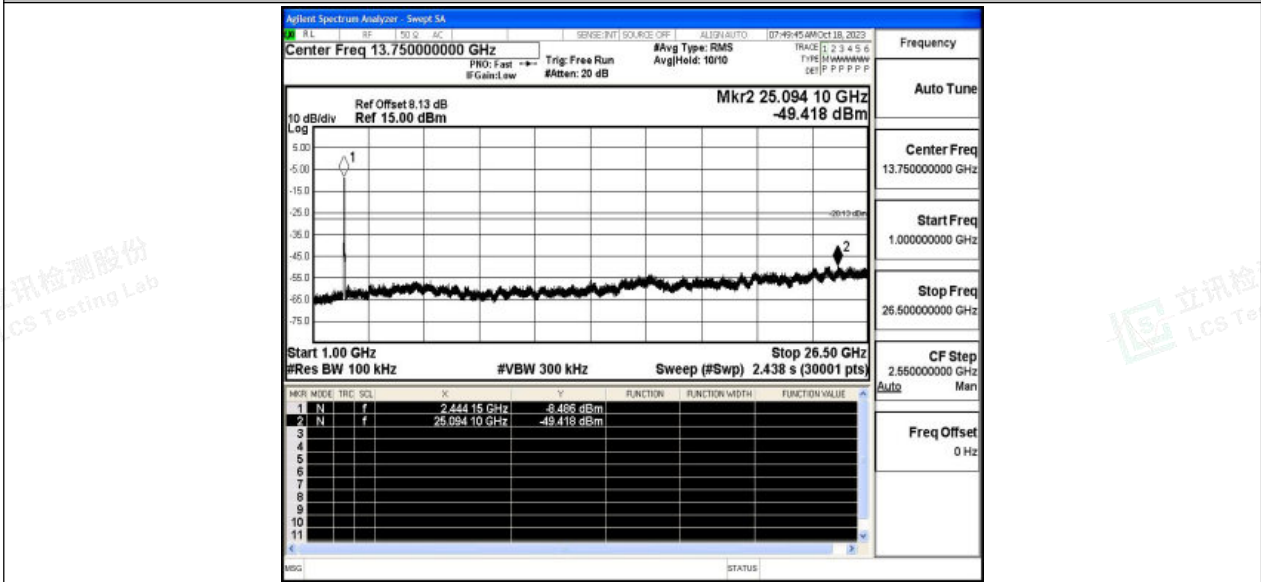


11N40SISO_Ant1_2452_30~1000





11N40SISO_Ant1_2452_1000~26500





A.6 Duty Cycle

Test Result

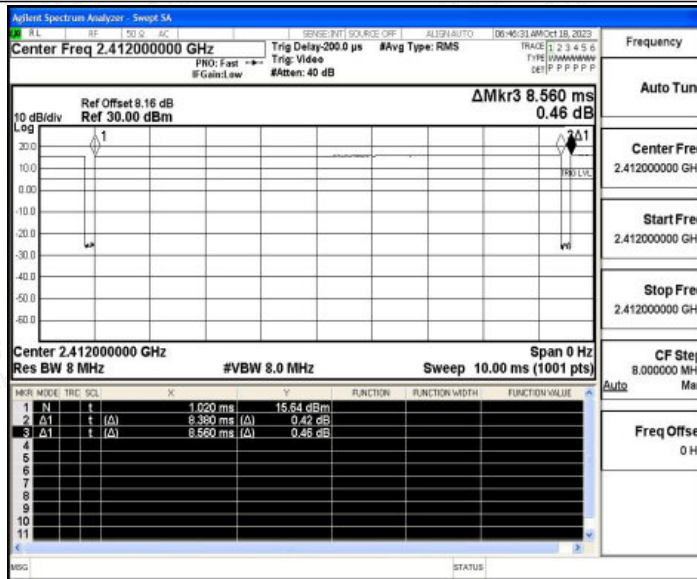
TestMode	Antenna	Freq(MHz)	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Factor	Verdict
11B	Ant1	2412	8.38	8.56	97.90	0.09	---
		2437	8.38	8.55	98.01	0.09	---
		2462	8.38	8.57	97.78	0.10	---
11G	Ant1	2412	1.39	1.65	84.24	0.74	---
		2437	1.39	1.56	89.10	0.50	---
		2462	1.39	1.64	84.76	0.72	---
11N20SISO	Ant1	2412	1.17	1.34	87.31	0.59	---
		2437	1.17	1.37	85.40	0.69	---
		2462	1.17	1.42	82.39	0.84	---
11N40SISO	Ant1	2422	0.59	0.83	71.08	1.48	---
		2437	0.59	0.85	69.41	1.59	---
		2452	0.59	0.83	71.08	1.48	---



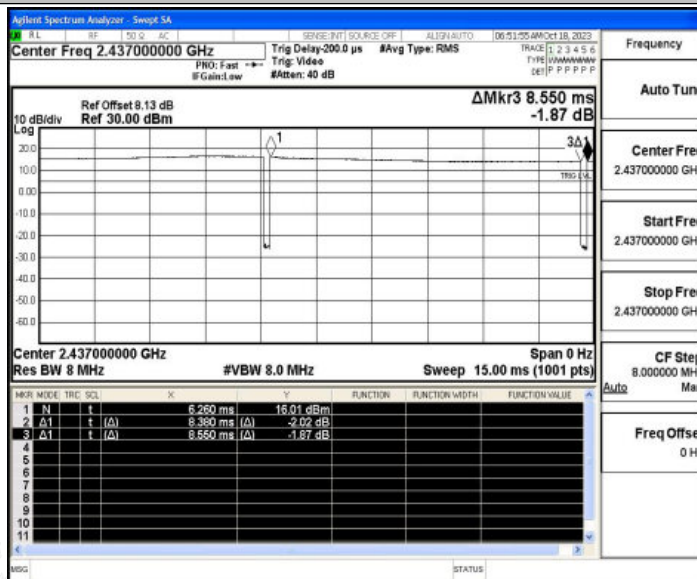


Test Graphs

11B_Ant1_2412

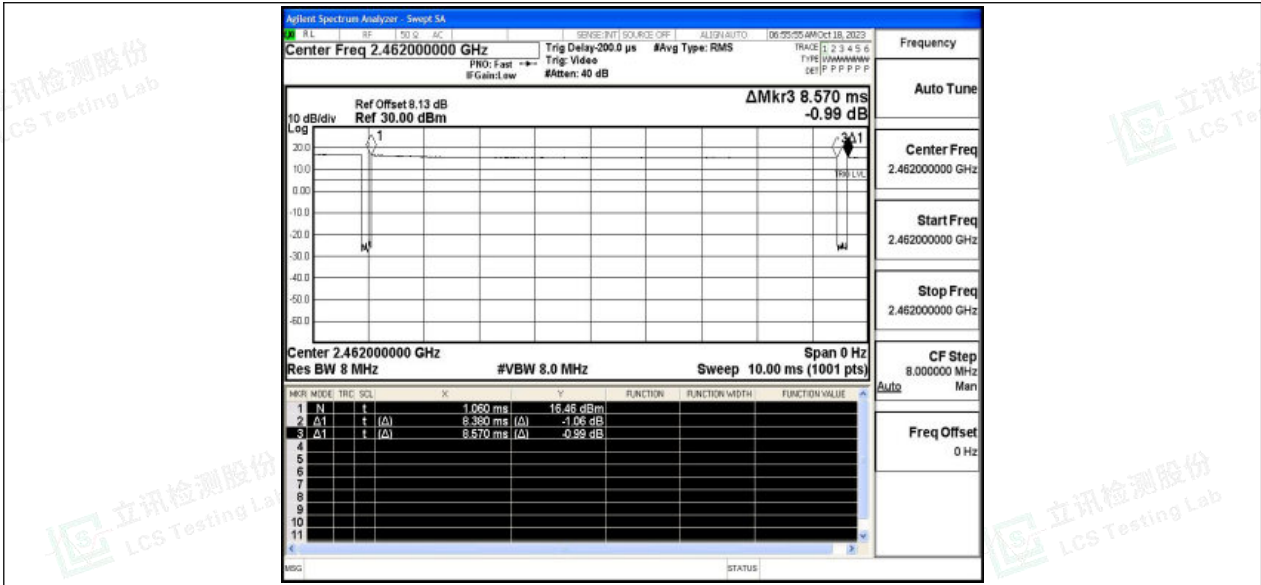


11B_Ant1_2437

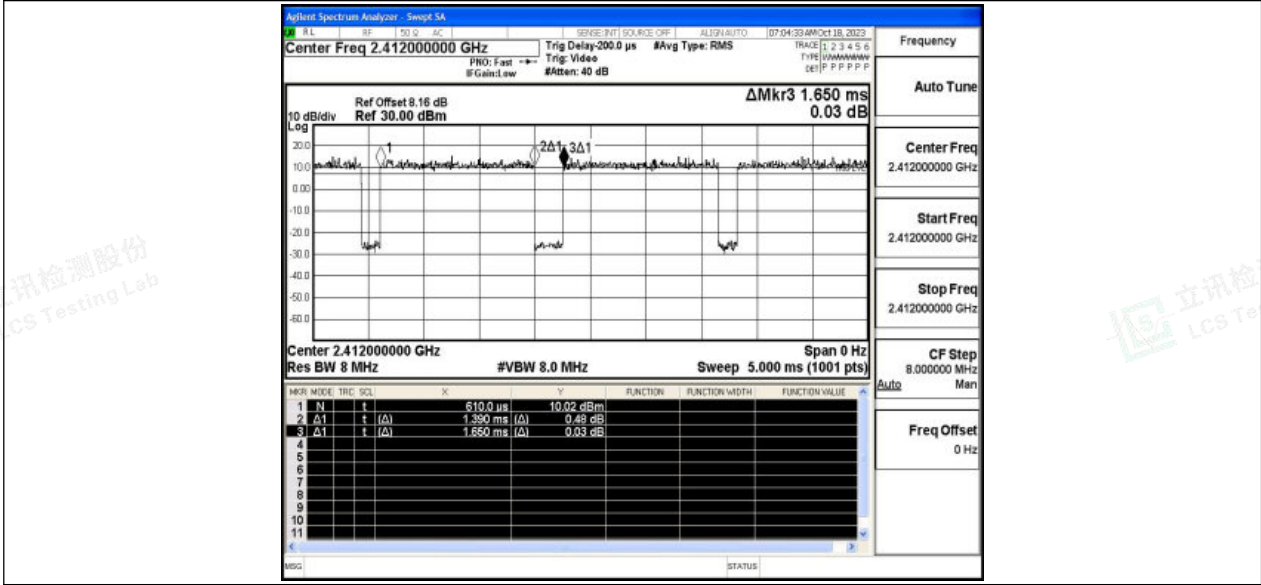


11B_Ant1_2462

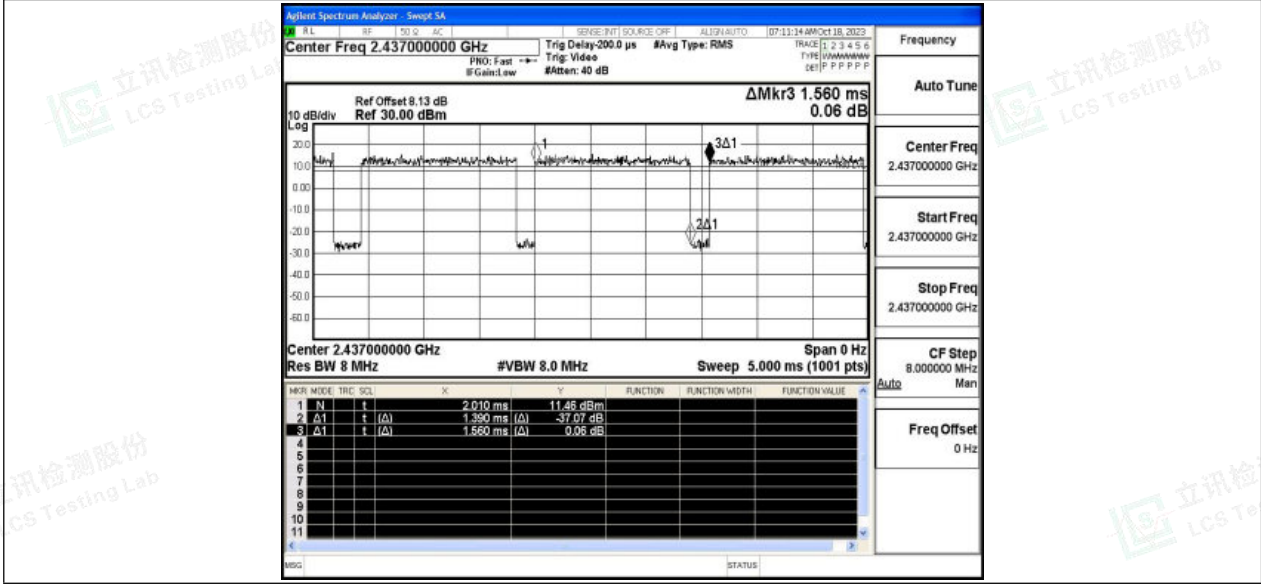




11G_Ant1_2412

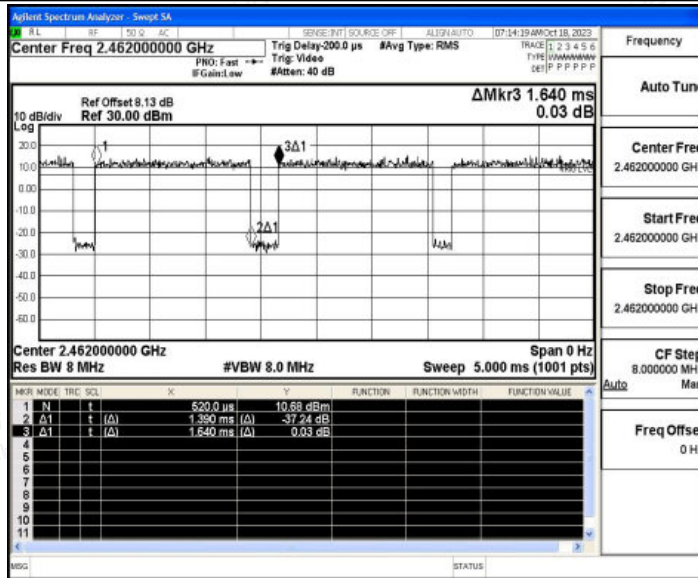


11G_Ant1_2437

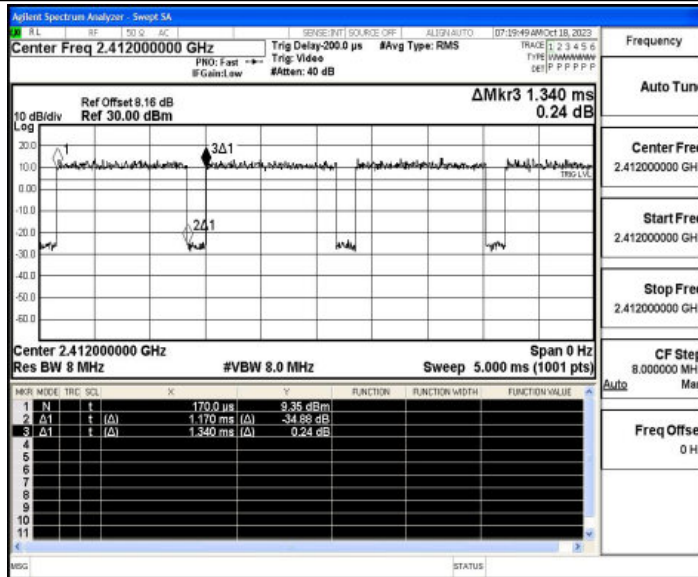




11G_Ant1_2462

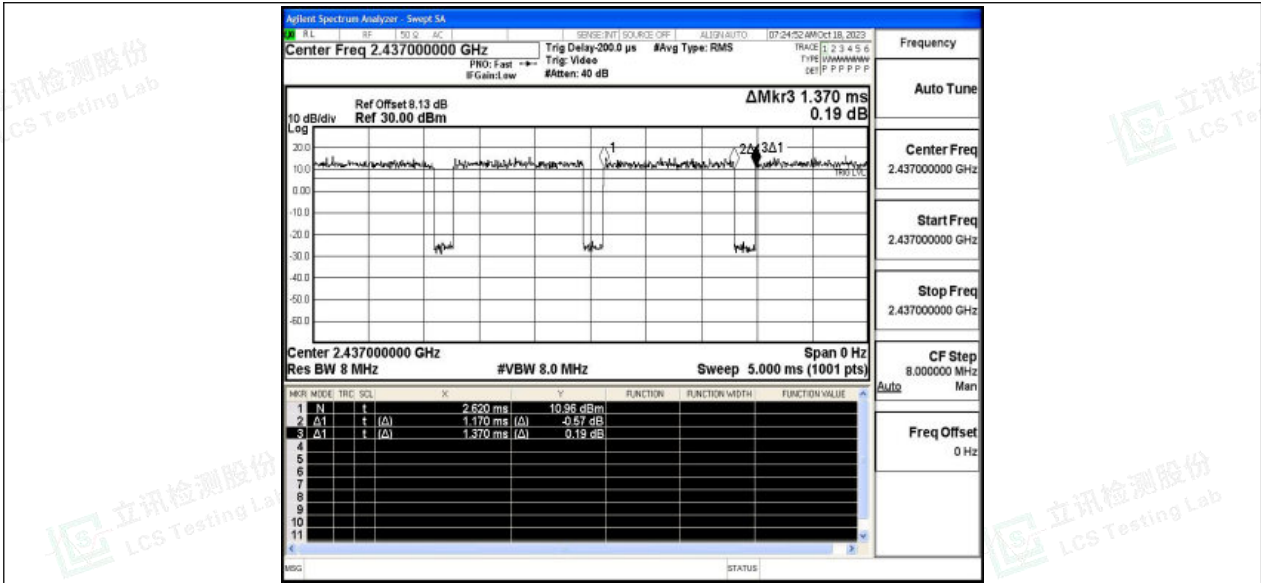


11N20SISO_Ant1_2412

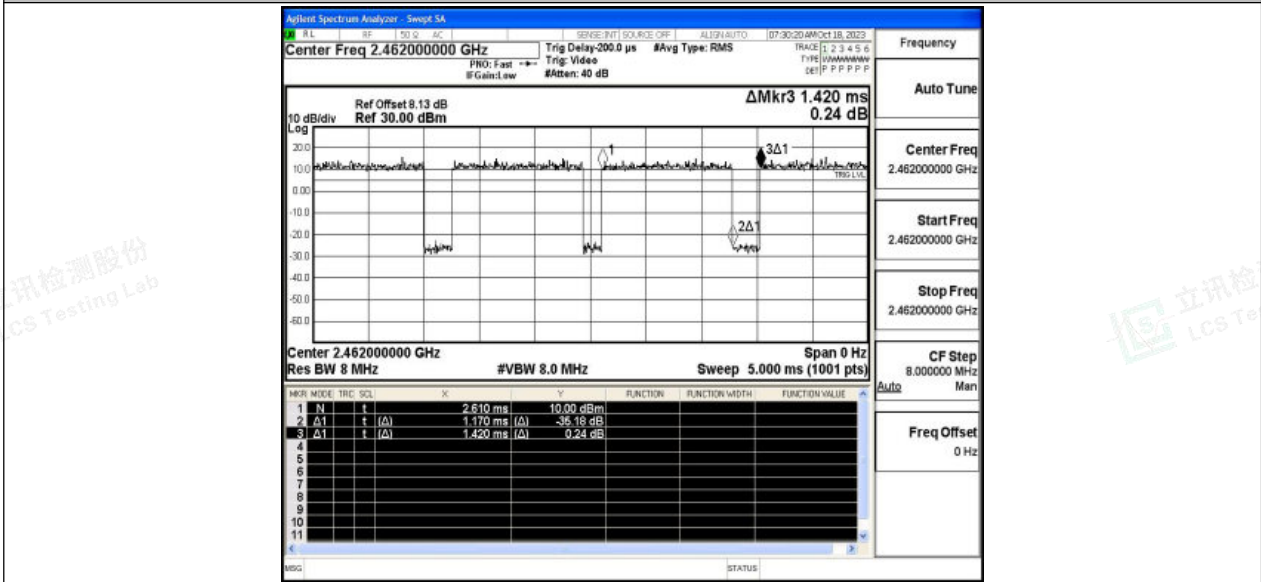


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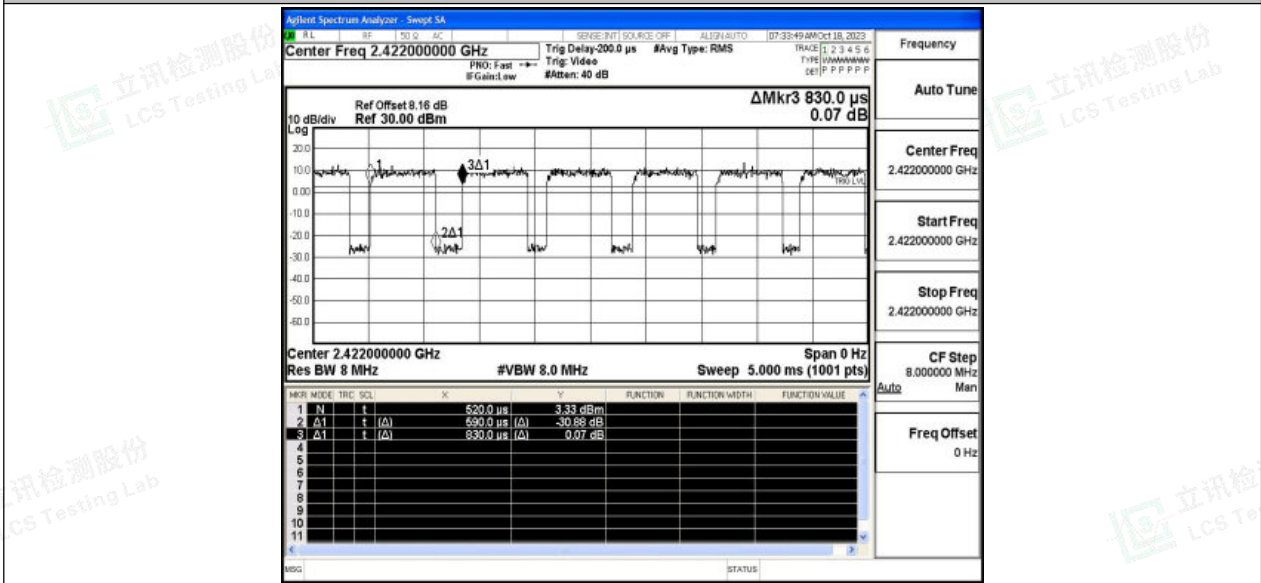




11N20SISO_Ant1_2462

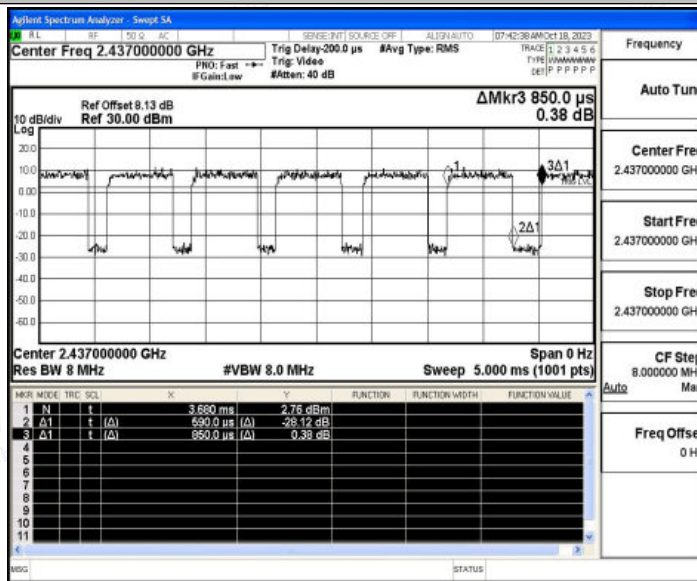


11N40SISO_Ant1_2422

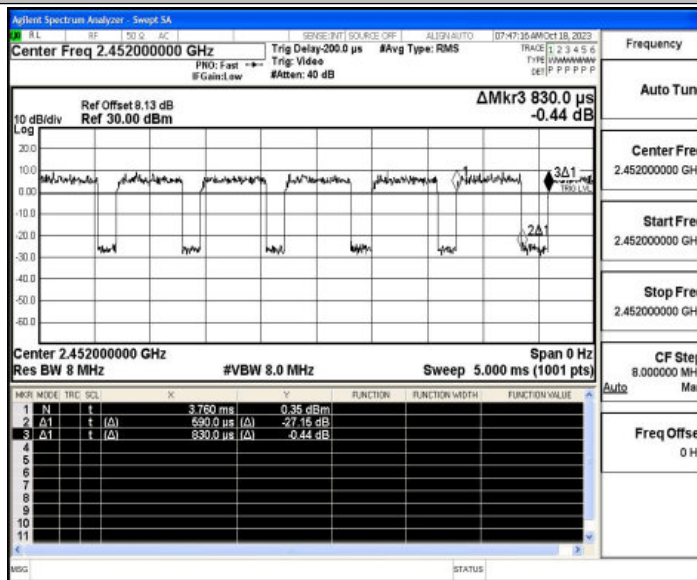




11N40SISO_Ant1_2437



11N40SISO_Ant1_2452





A.7 Emissions in Restricted Bands

Test Result

TestMode	Antenna	Channel Name	Freq(MHz)	Detector	Freq [MHz]	Result [dBm]	Limit [dBm]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
11B	Ant1	Low	2412	AV	2310.000	-49.26	≤-41.20	45.94	≤54	PASS
				AV	2389.960	-47.11	≤-41.20	48.09	≤54	PASS
				AV	2390.000	-47.11	≤-41.20	48.09	≤54	PASS
				Peak	2310.000	-41.84	≤-21.20	53.36	≤74	PASS
				Peak	2386.840	-38.93	≤-21.20	56.27	≤74	PASS
				Peak	2390.000	-41.56	≤-21.20	53.64	≤74	PASS
		High	2462	AV	2483.500	-47.63	≤-41.20	47.57	≤54	PASS
				AV	2484.330	-47.51	≤-41.20	47.69	≤54	PASS
				AV	2500.000	-48.82	≤-41.20	46.38	≤54	PASS
				Peak	2483.500	-42.7	≤-21.20	52.50	≤74	PASS
				Peak	2496.650	-39.69	≤-21.20	55.51	≤74	PASS
				Peak	2500.000	-42.03	≤-21.20	53.17	≤74	PASS
11G	Ant1	Low	2412	AV	2310.000	-48.91	≤-41.20	46.29	≤54	PASS
				AV	2389.960	-47.42	≤-41.20	47.78	≤54	PASS
				AV	2390.000	-47.42	≤-41.20	47.78	≤54	PASS
				Peak	2310.000	-42.47	≤-21.20	52.73	≤74	PASS
				Peak	2389.960	-35.03	≤-21.20	60.17	≤74	PASS
				Peak	2390.000	-35.03	≤-21.20	60.17	≤74	PASS
		High	2462	AV	2483.500	-45.58	≤-41.20	49.62	≤54	PASS
				AV	2483.560	-45.75	≤-41.20	49.45	≤54	PASS
				AV	2500.000	-48.46	≤-41.20	46.74	≤54	PASS
				Peak	2483.500	-41.41	≤-21.20	53.79	≤74	PASS
				Peak	2483.560	-37.01	≤-21.20	58.19	≤74	PASS
				Peak	2500.000	-43.22	≤-21.20	51.98	≤74	PASS
11N20SI SO	Ant1	Low	2412	AV	2310.000	-48.66	≤-41.20	46.54	≤54	PASS
				AV	2389.960	-47.23	≤-41.20	47.97	≤54	PASS
				AV	2390.000	-47.23	≤-41.20	47.97	≤54	PASS
				Peak	2310.000	-43.57	≤-21.20	51.63	≤74	PASS
				Peak	2361.880	-39.49	≤-21.20	55.71	≤74	PASS
				Peak	2390.000	-43.51	≤-21.20	51.69	≤74	PASS
		High	2462	AV	2483.500	-45.08	≤-41.20	50.12	≤54	PASS
				AV	2483.560	-45.05	≤-41.20	50.15	≤54	PASS
				AV	2500.000	-48.33	≤-41.20	46.87	≤54	PASS
				Peak	2483.500	-32.39	≤-21.20	62.81	≤74	PASS
				Peak	2484.110	-30.73	≤-21.20	64.47	≤74	PASS
				Peak	2500.000	-41.33	≤-21.20	53.87	≤74	PASS





11N40SI SO	Ant1	Low	2422	AV	2310.000	-48.46	≤-41.20	46.74	≤54	PASS
				AV	2389.700	-43.77	≤-41.20	51.43	≤54	PASS
				AV	2390.000	-43.85	≤-41.20	51.35	≤54	PASS
				Peak	2310.000	-43.9	≤-21.20	51.30	≤74	PASS
				Peak	2385.930	-35.1	≤-21.20	60.10	≤74	PASS
				Peak	2390.000	-41.06	≤-21.20	54.14	≤74	PASS
	High	2452	AV	2483.500	-41.95	≤-41.20	53.25	≤54	PASS	
			AV	2483.560	-41.59	≤-41.20	53.61	≤54	PASS	
			AV	2500.000	-47.99	≤-41.20	47.21	≤54	PASS	
			Peak	2483.500	-26.53	≤-21.20	68.67	≤74	PASS	
			Peak	2483.560	-25.16	≤-21.20	70.04	≤74	PASS	
			Peak	2500.000	-42.5	≤-21.20	52.70	≤74	PASS	

Note:

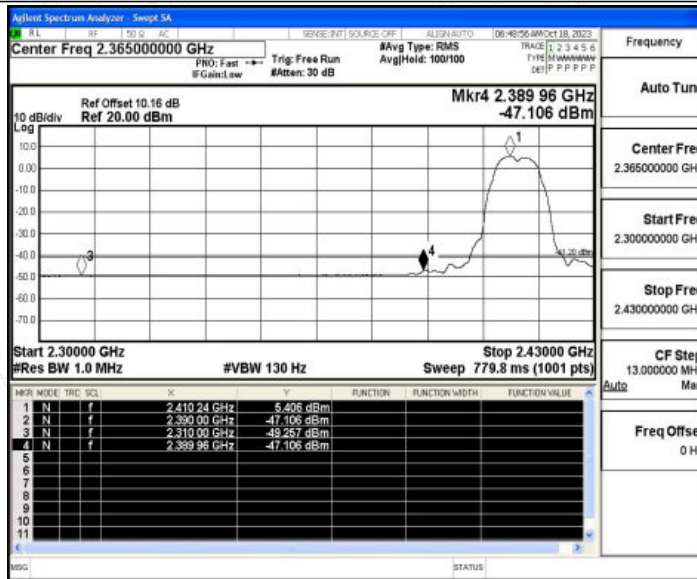
1. The Antenna Gain is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.



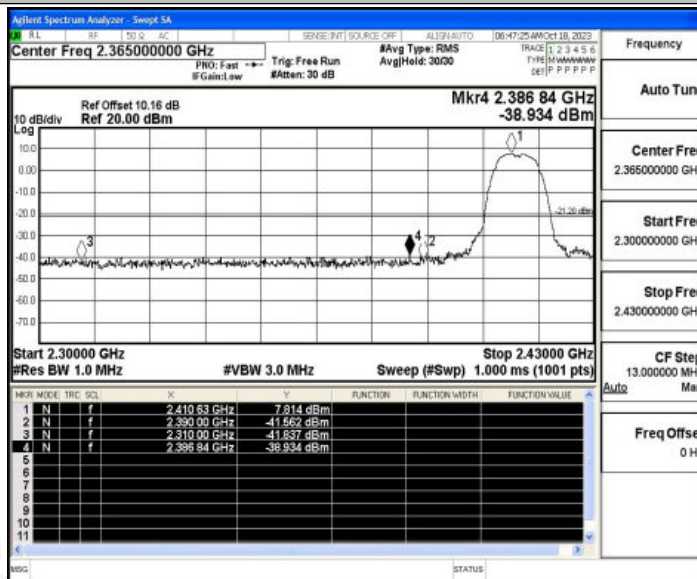


Test Graphs

11B_Ant1_Low_2412_AV

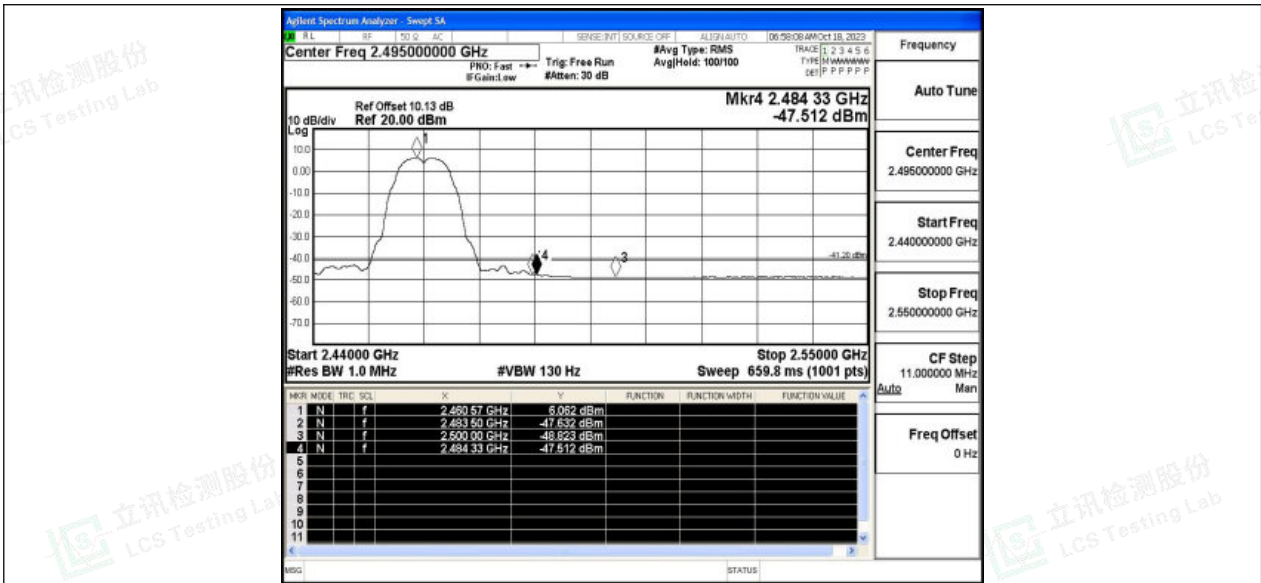


11B_Ant1_Low_2412_Peak

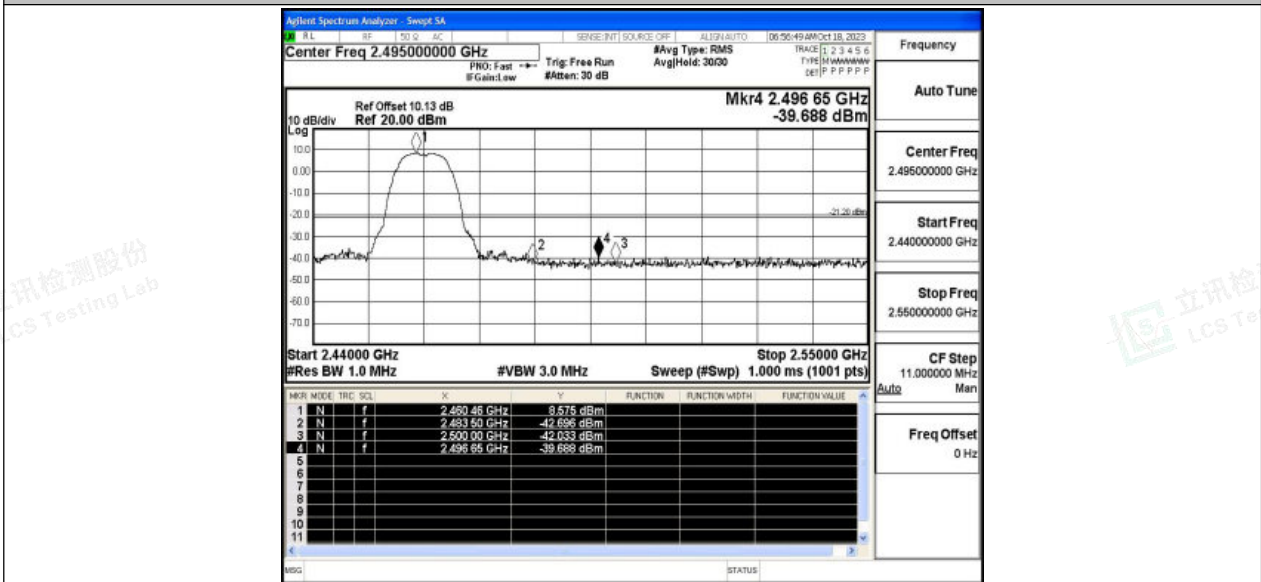


11B_Ant1_High_2462_AV

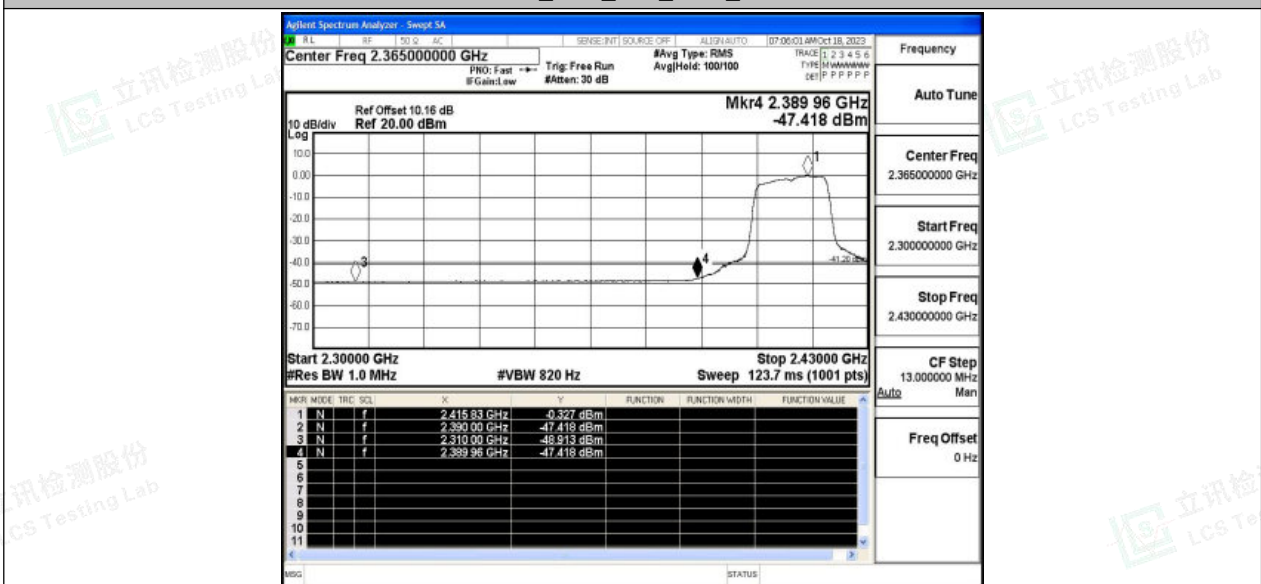




11B_Ant1_High_2462_Peak

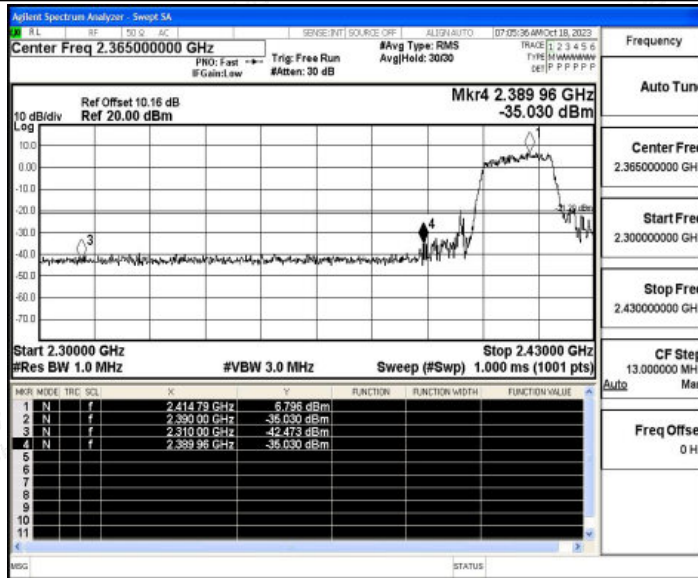


11G_Ant1_Low_2412_AV

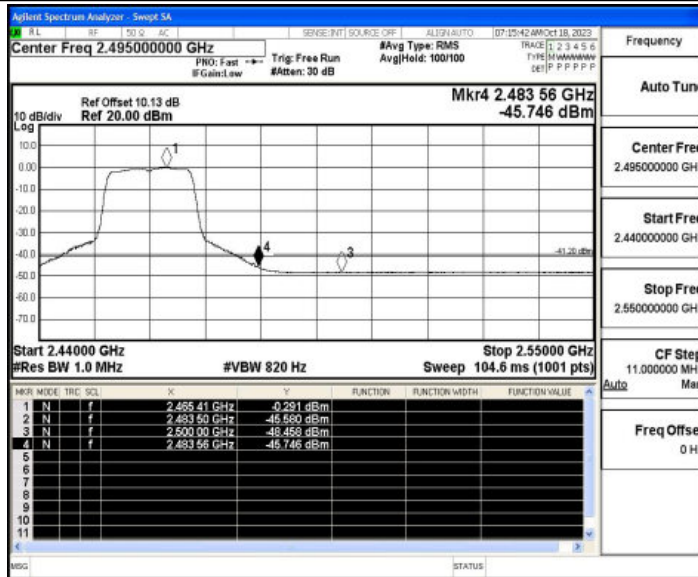




11G_Ant1_Low_2412_Peak

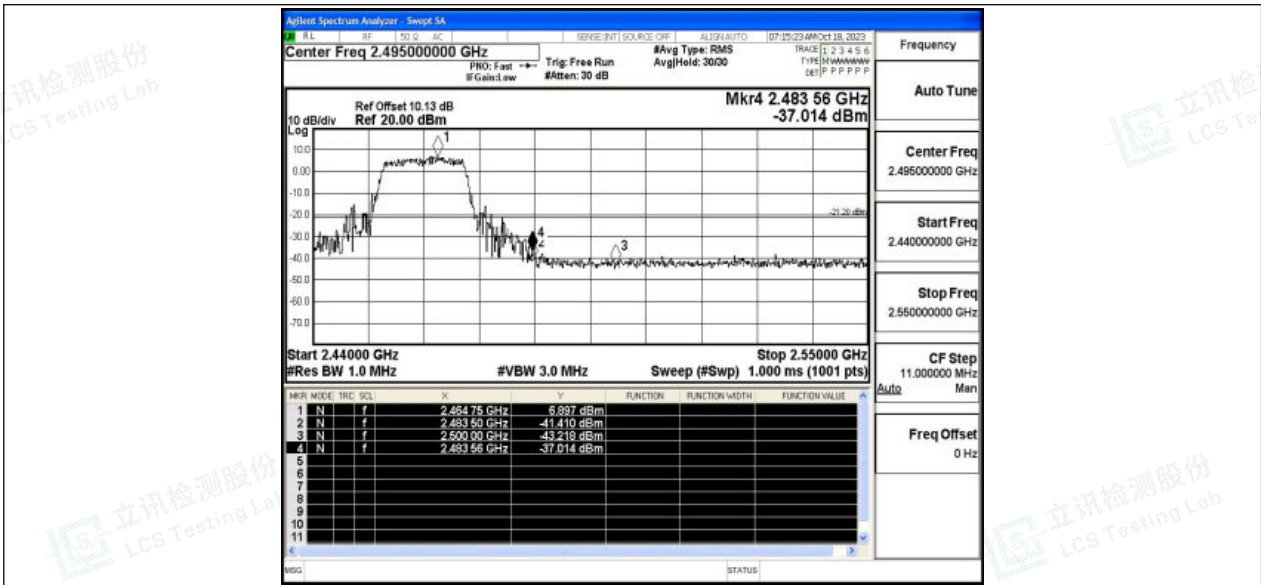


11G_Ant1_High_2462_AV

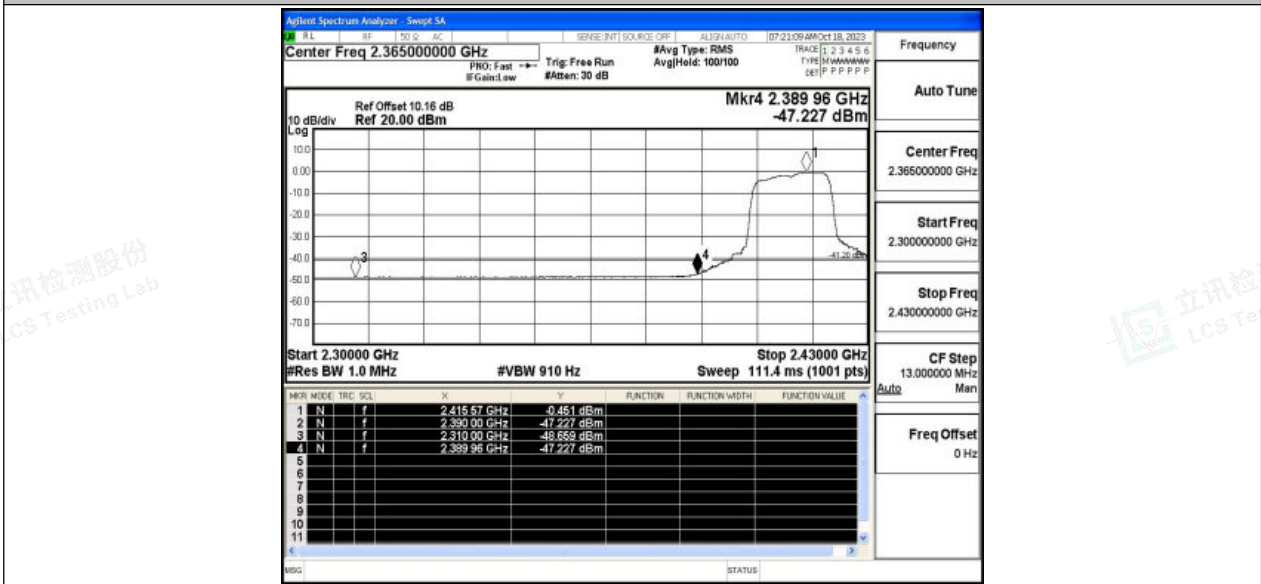


11G_Ant1_High_2462_Peak

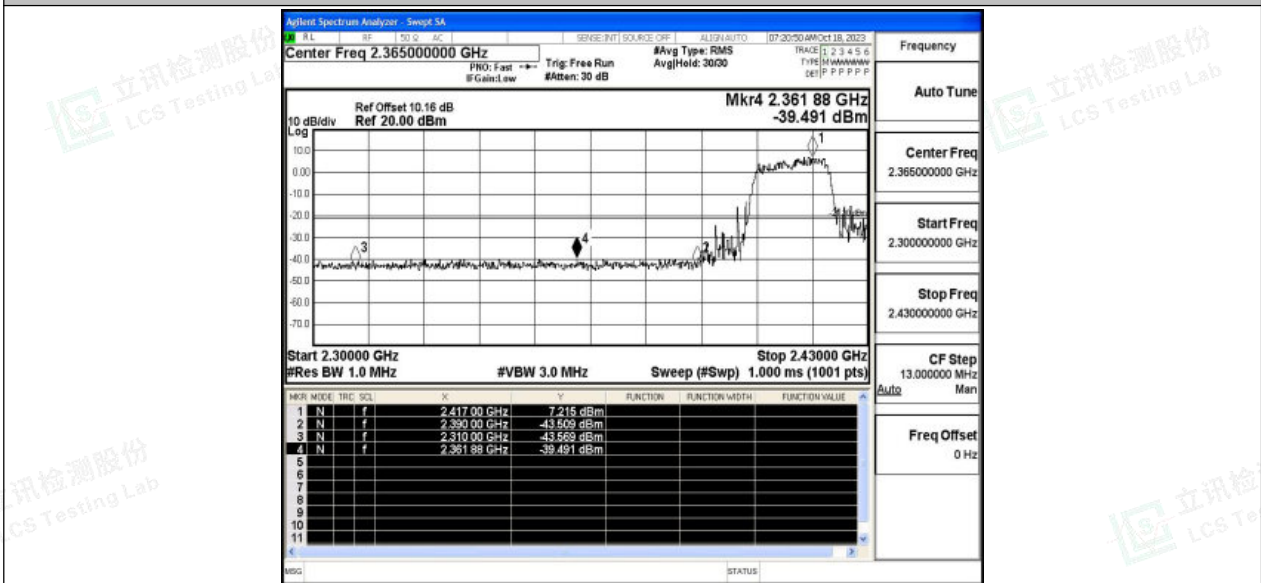




11N20SISO_Ant1_Low_2412_AV

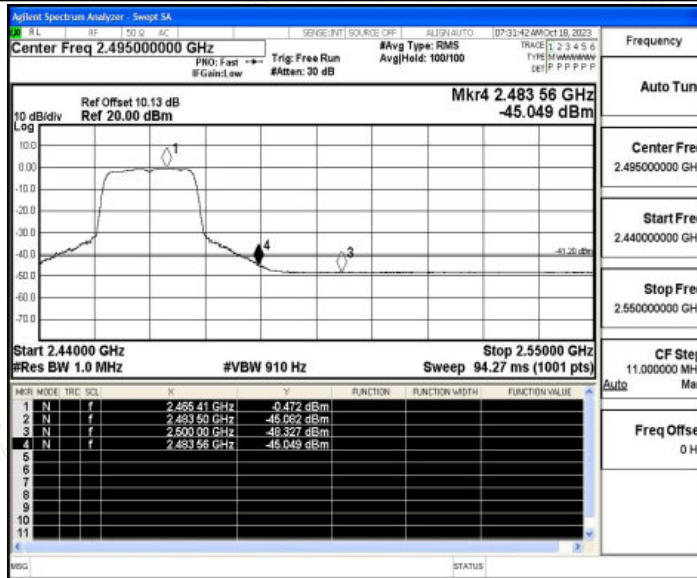


11N20SISO_Ant1_Low_2412_Peak

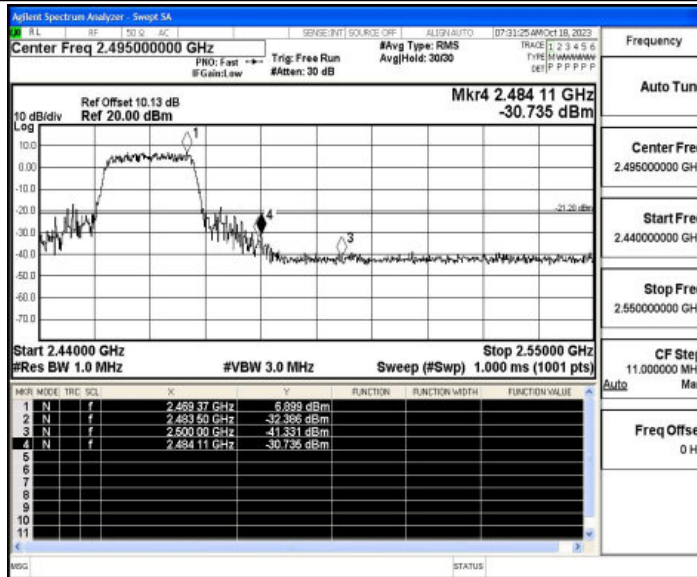




11N20SISO_Ant1_High_2462_AV

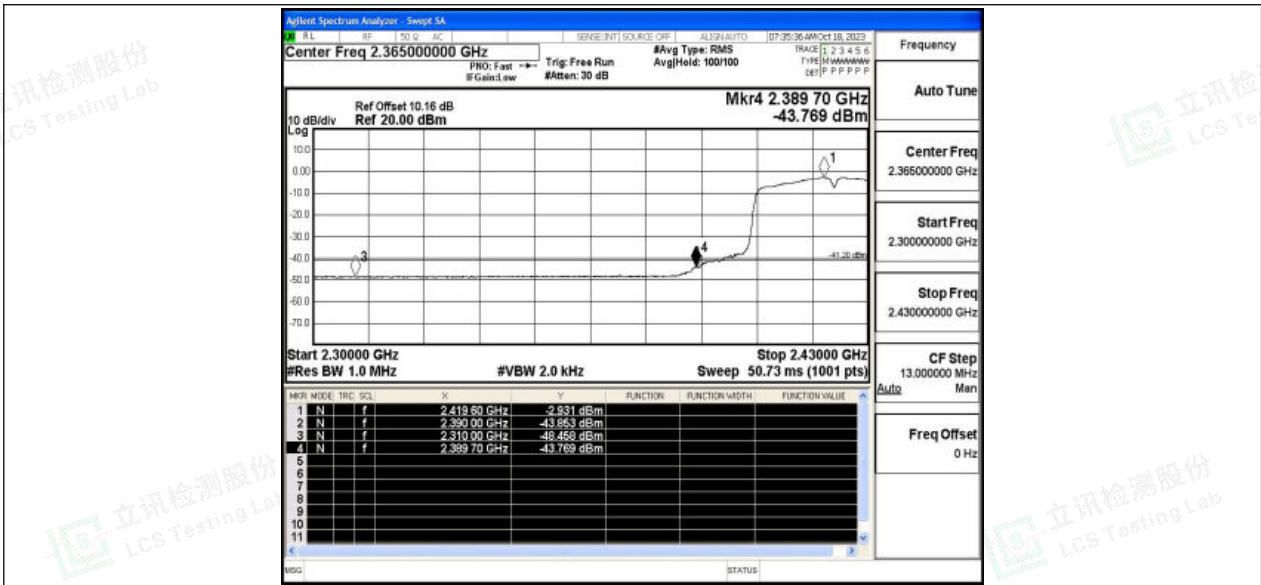


11N20SISO_Ant1_High_2462_Peak

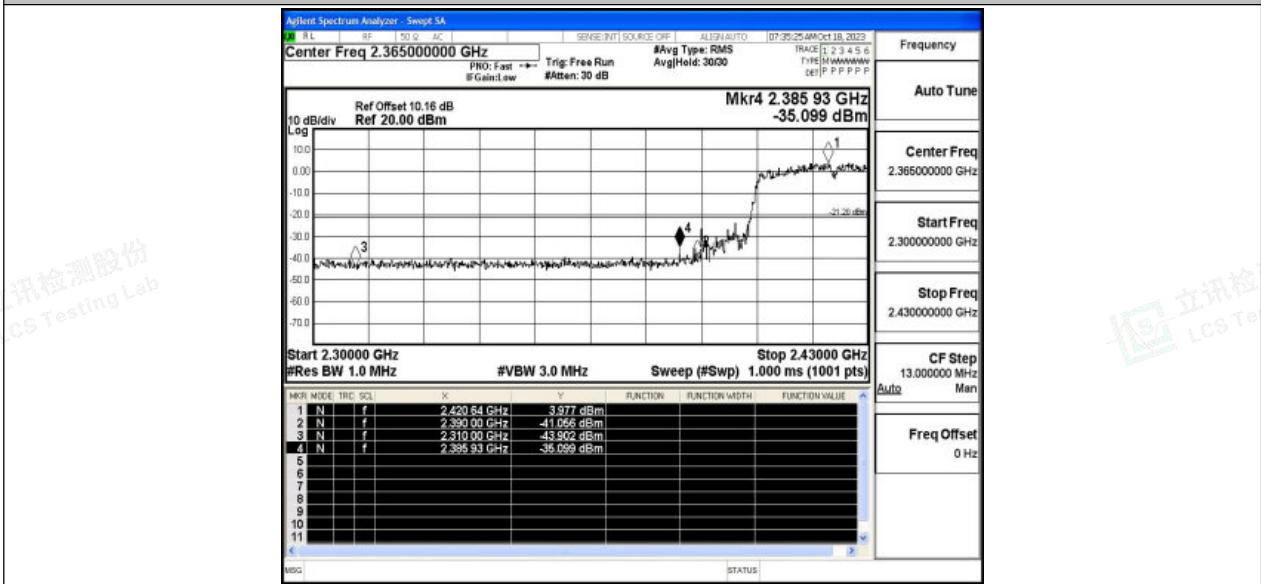


11N40SISO_Ant1_Low_2422_AV

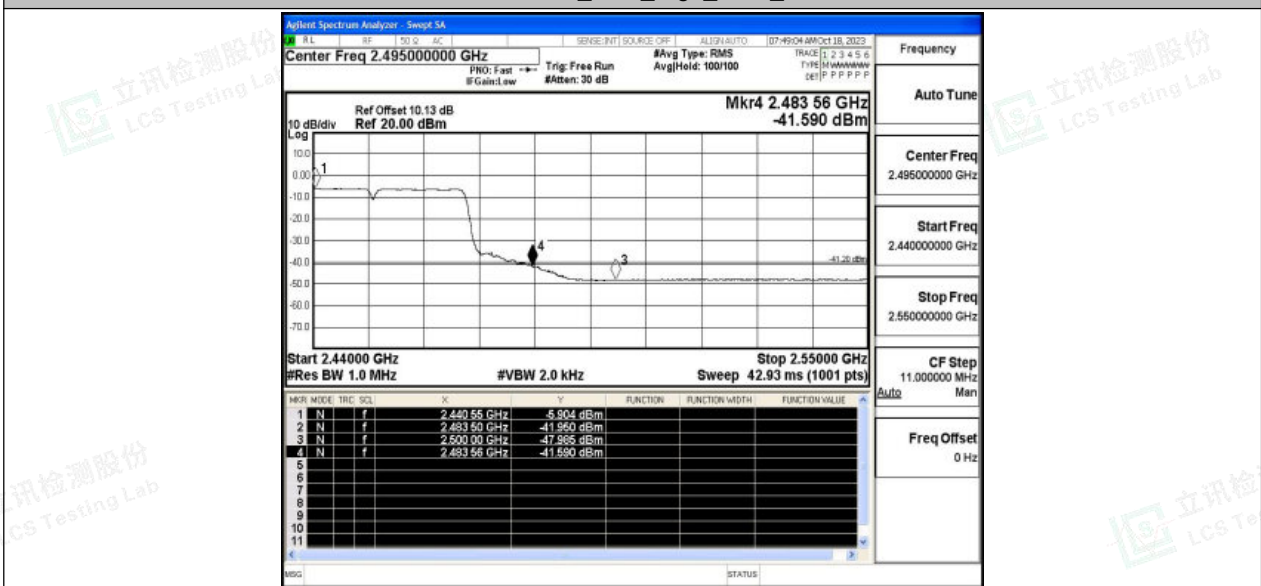




11N40SISO_Ant1_Low_2422_Peak



11N40SISO_Ant1_High_2452_AV





11N40SISO_Ant1_High_2452_Peak

