Appendix A

RF Test Data for 2.4G WIFI (Conducted Measurement)

Product Name: Robotic Vacuum Cleaner

Test Model: A91+

Environmental Conditions

Temperature:	21.1° C
Relative Humidity:	52.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Mark Chen
Supervised by:	Lihu

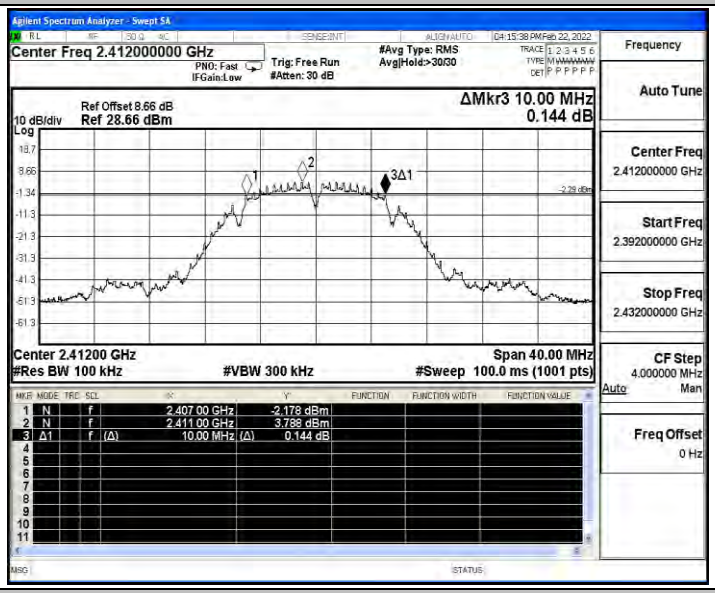
A.1 6dB Bandwidth

Test Result

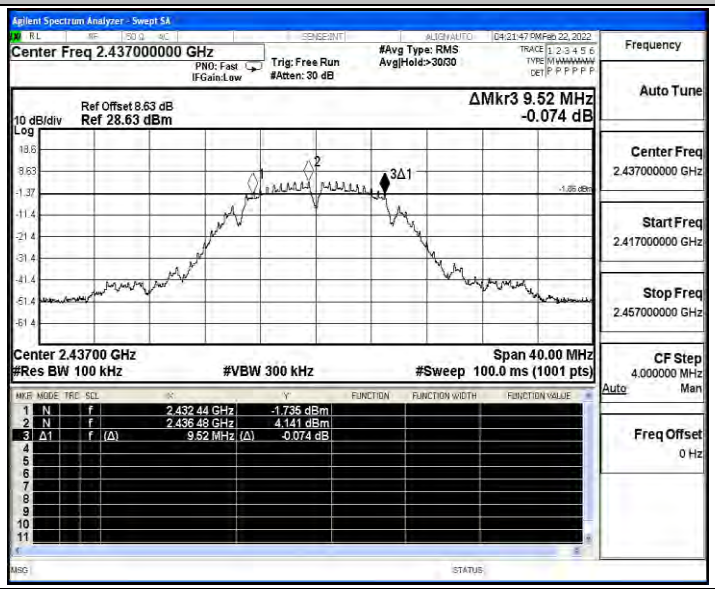
TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	10.000	2407.000	2417.000	0.5	PASS
		2437	9.520	2432.440	2441.960	0.5	PASS
		2462	9.080	2457.440	2466.520	0.5	PASS
11G	Ant1	2412	16.320	2403.840	2420.160	0.5	PASS
		2437	16.360	2428.800	2445.160	0.5	PASS
		2462	16.360	2453.800	2470.160	0.5	PASS
11N20SISO	Ant1	2412	17.600	2403.200	2420.800	0.5	PASS
		2437	17.560	2428.200	2445.760	0.5	PASS
		2462	17.560	2453.200	2470.760	0.5	PASS
11N40SISO	Ant1	2422	36.240	2403.920	2440.160	0.5	PASS
		2437	36.080	2419.080	2455.160	0.5	PASS
		2452	35.920	2434.000	2469.920	0.5	PASS

Test Graphs

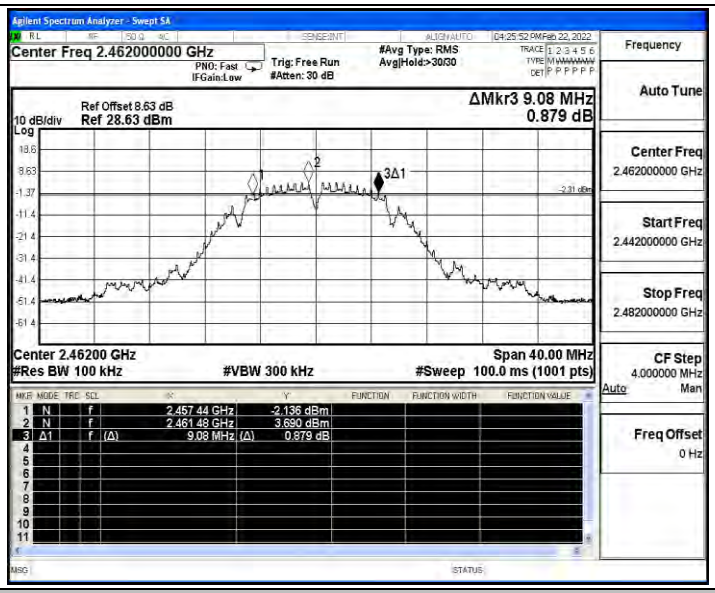
11B_Ant1_2412



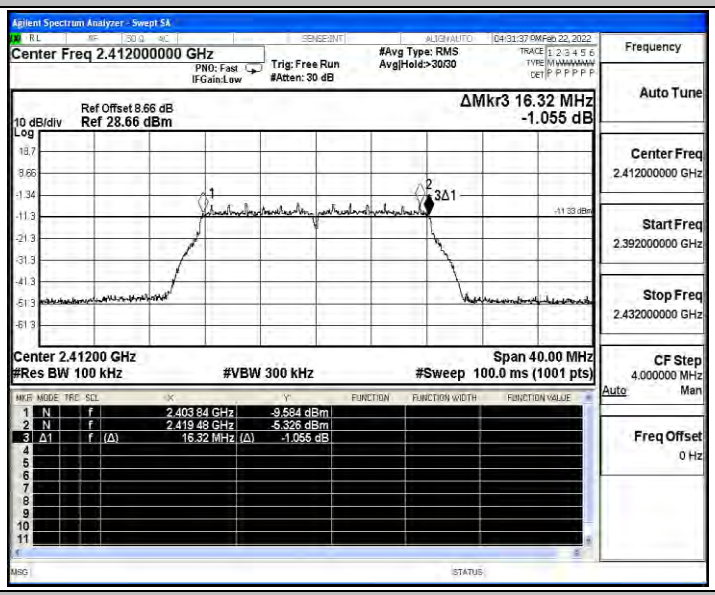
11B_Ant1_2437



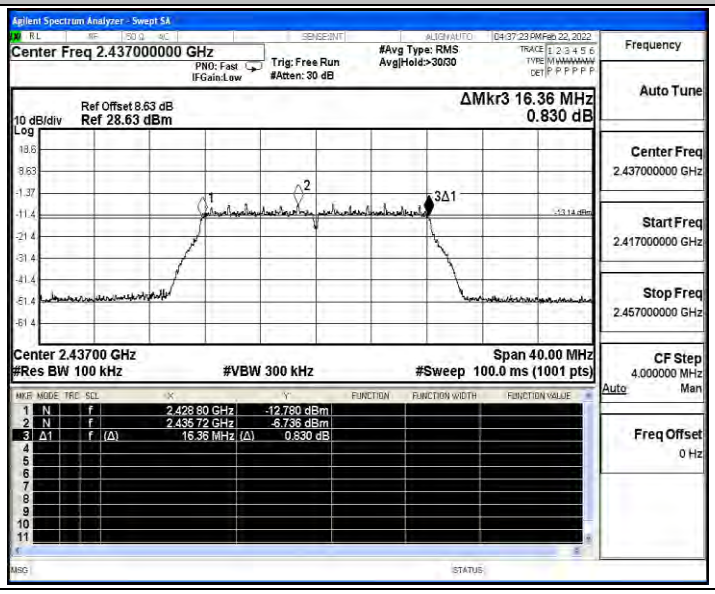
11B_Ant1_2462



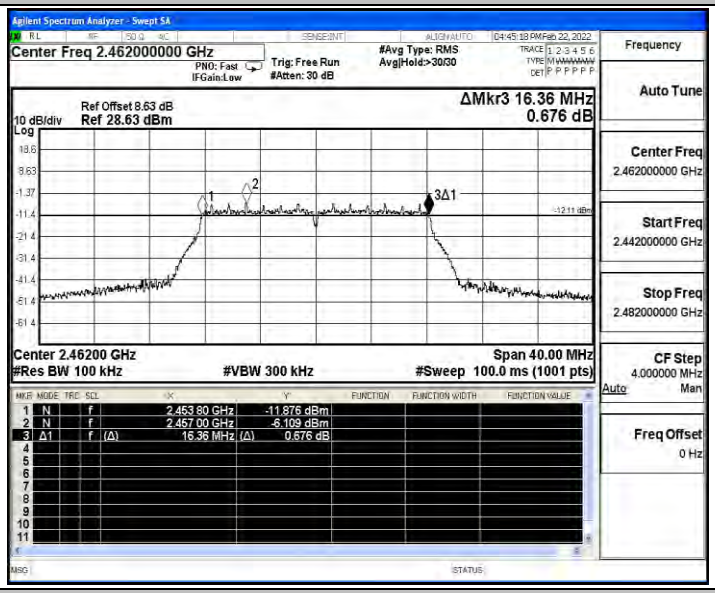
11G_Ant1_2412



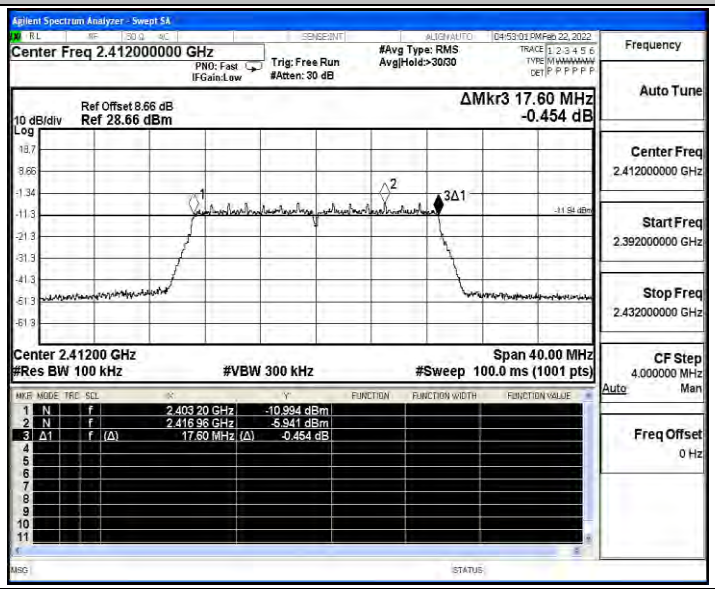
11G_Ant1_2437



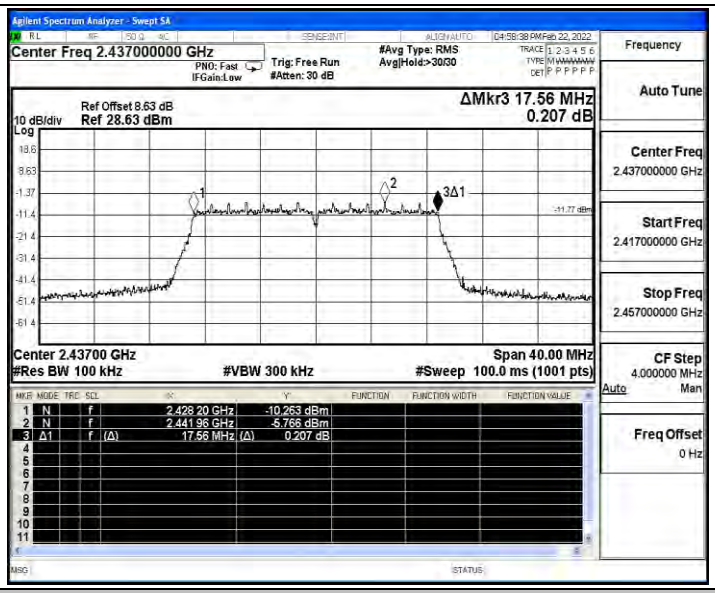
11G_Ant1_2462



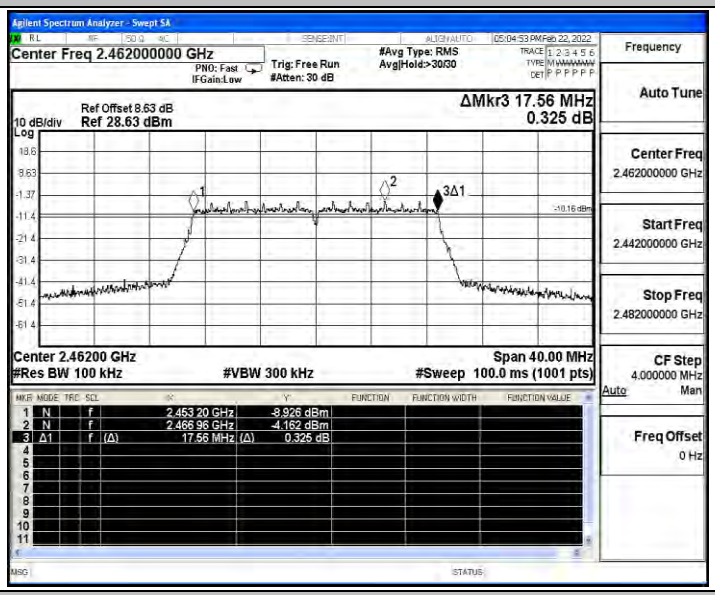
11N20SISO_Ant1_2412



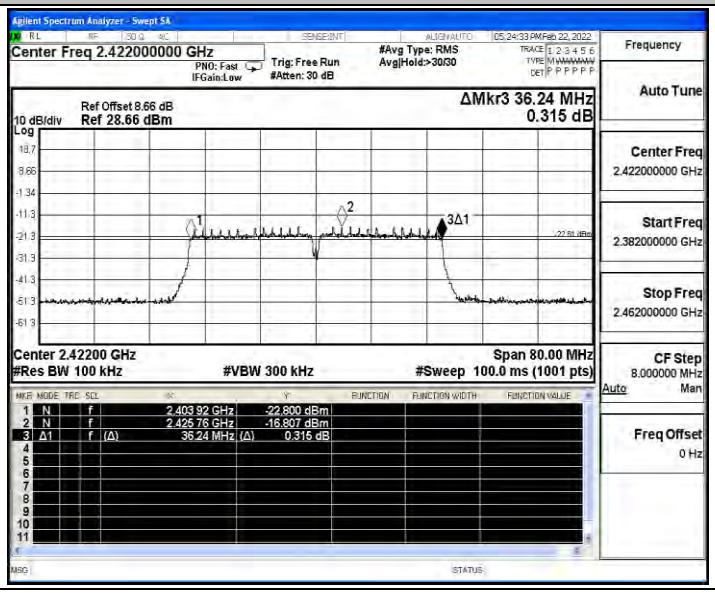
11N20SISO_Ant1_2437



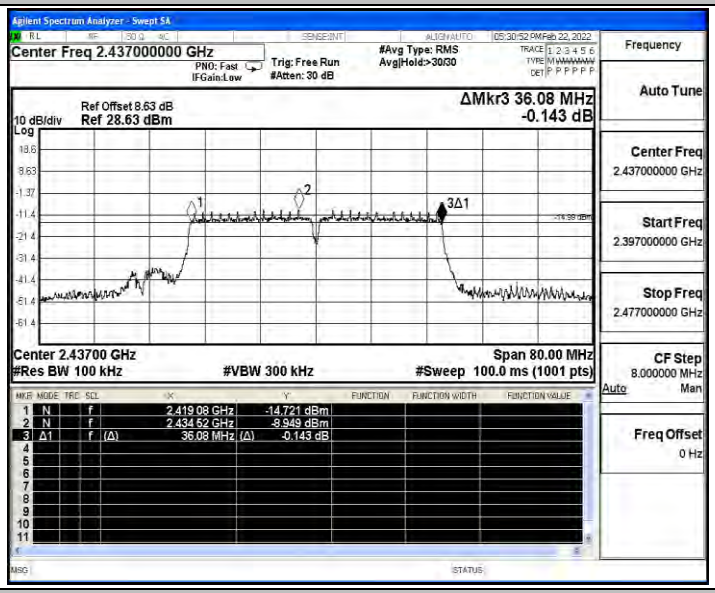
11N20SISO_Ant1_2462



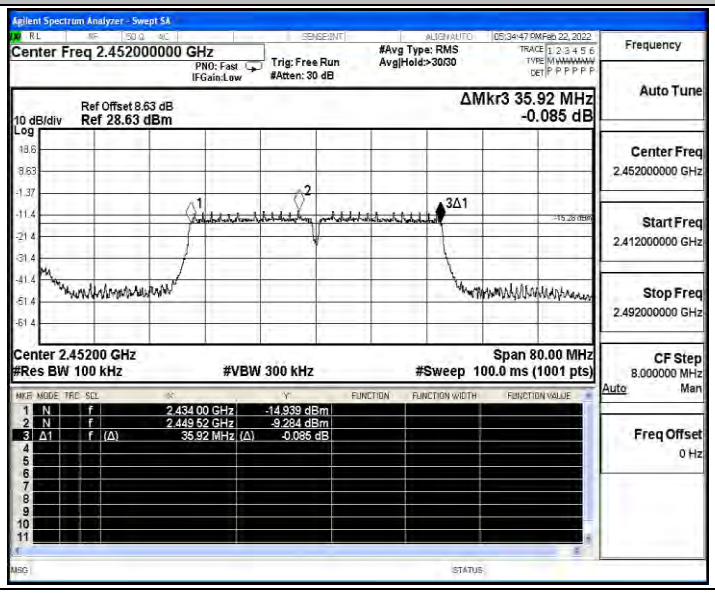
11N40SISO_Ant1_2422



11N40SISO_Ant1_2437



11N40SISO_Ant1_2452



A.2 Maximum conducted output power

Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	2412	15.67	≤30.00	PASS
		2437	15.77	≤30.00	PASS
		2462	15.21	≤30.00	PASS
11G	Ant1	2412	14.82	≤30.00	PASS
		2437	13.69	≤30.00	PASS
		2462	13.43	≤30.00	PASS
11N20SISO	Ant1	2412	13.66	≤30.00	PASS
		2437	13.85	≤30.00	PASS
		2462	13.93	≤30.00	PASS
11N40SISO	Ant1	2422	13.35	≤30.00	PASS
		2437	13.19	≤30.00	PASS
		2452	12.89	≤30.00	PASS

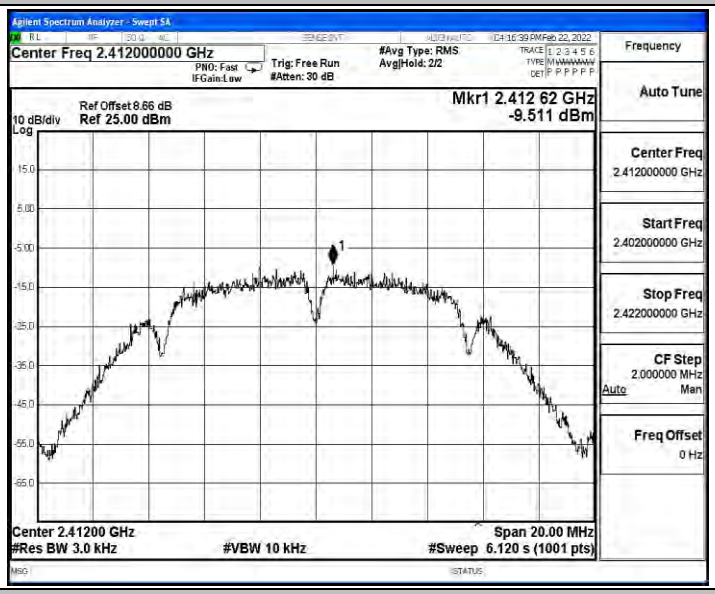
A.3 Maximum power spectral density

Test Result

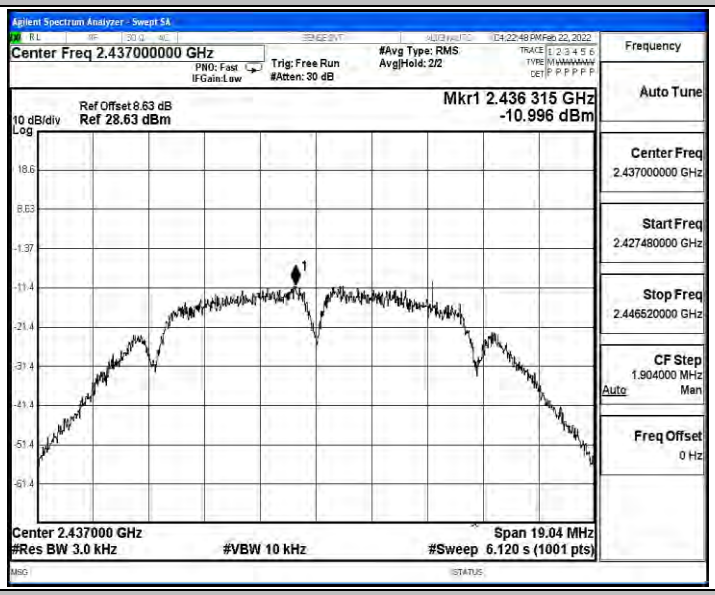
TestMode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-9.51	≤8.00	PASS
		2437	-11	≤8.00	PASS
		2462	-11.38	≤8.00	PASS
11G	Ant1	2412	-18.39	≤8.00	PASS
		2437	-20.12	≤8.00	PASS
		2462	-20.79	≤8.00	PASS
11N20SISO	Ant1	2412	-20.53	≤8.00	PASS
		2437	-19.86	≤8.00	PASS
		2462	-19.86	≤8.00	PASS
11N40SISO	Ant1	2422	-22.76	≤8.00	PASS
		2437	-22.58	≤8.00	PASS
		2452	-23.61	≤8.00	PASS

Test Graphs

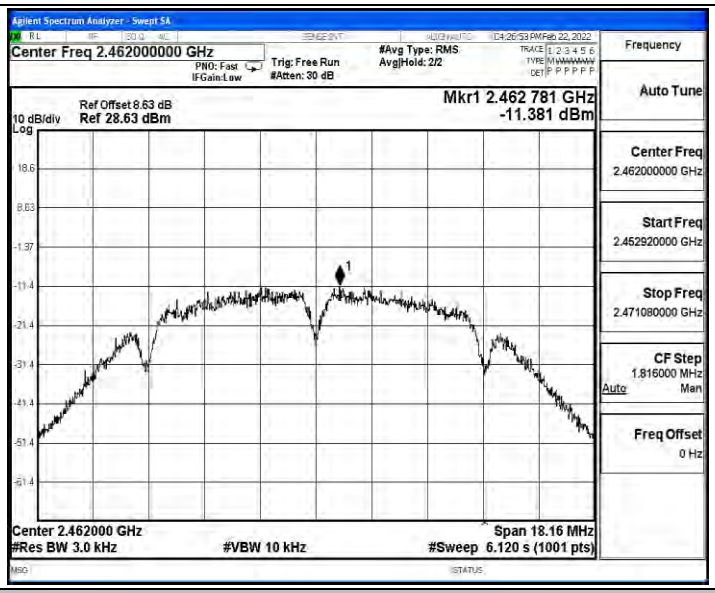
11B_Ant1_2412



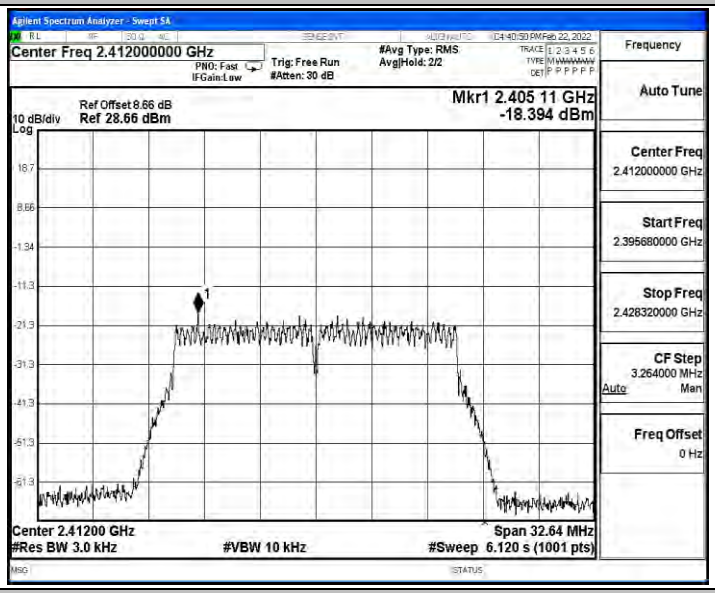
11B_Ant1_2437



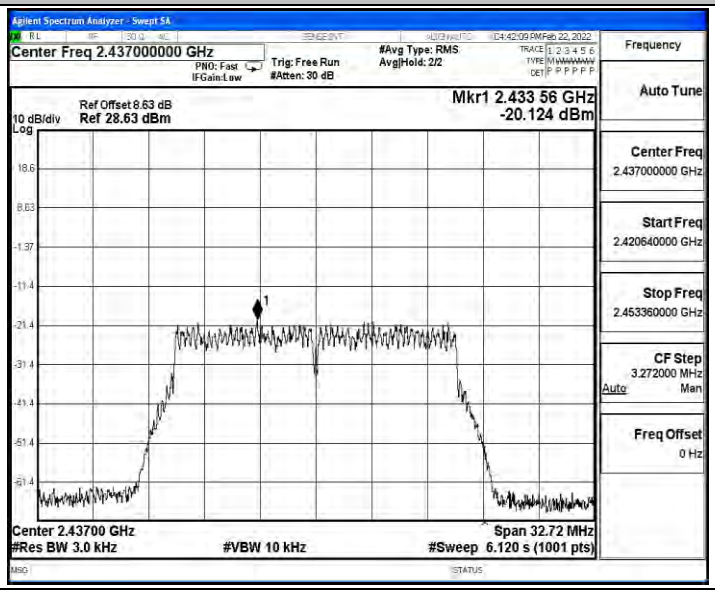
11B_Ant1_2462



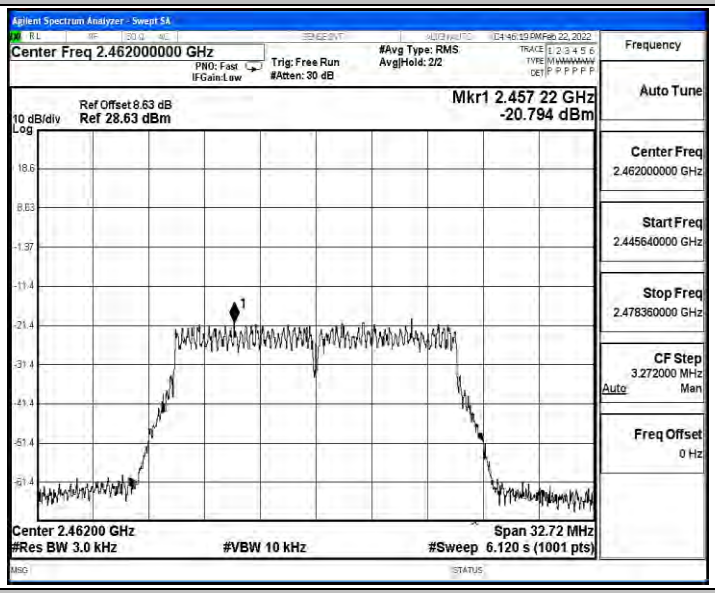
11G_Ant1_2412



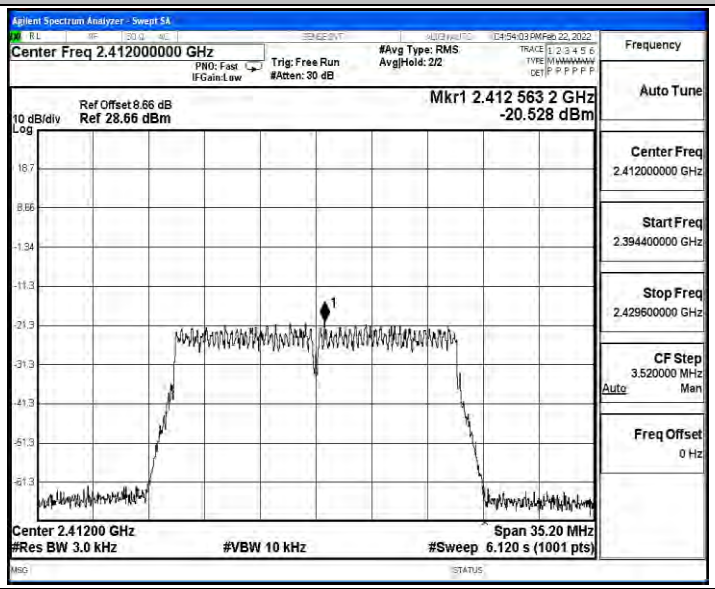
11G_Ant1_2437



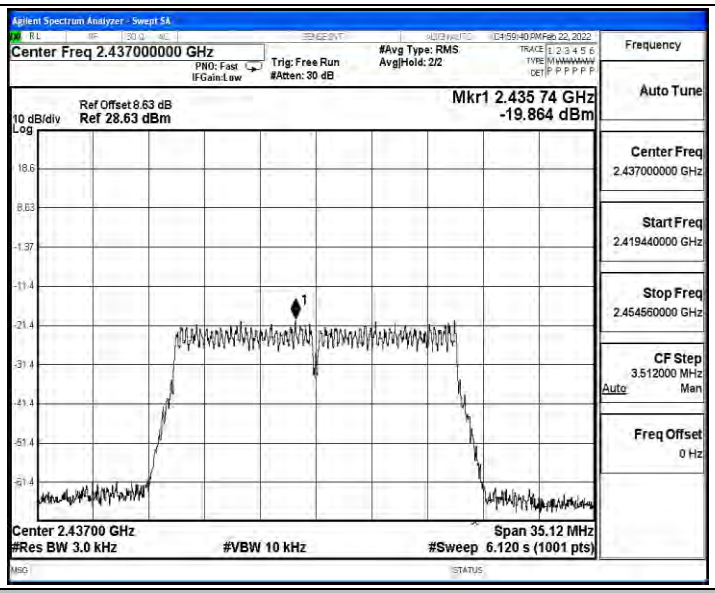
11G_Ant1_2462



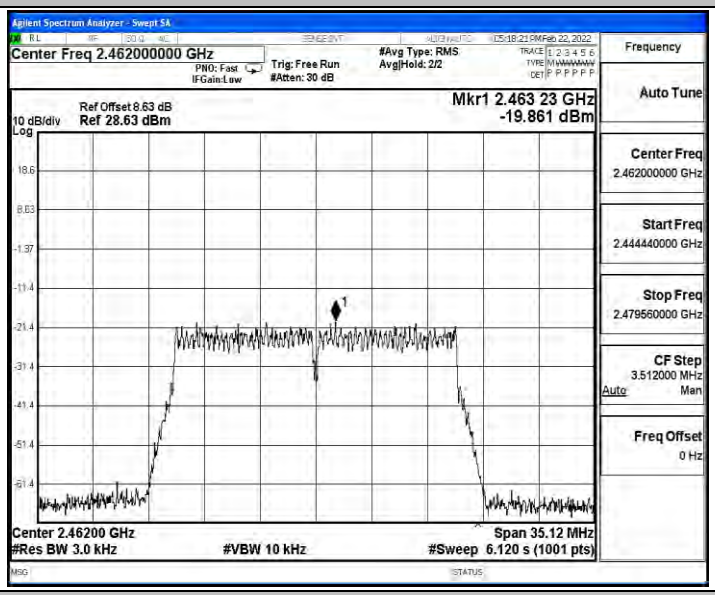
11N20SISO_Ant1_2412



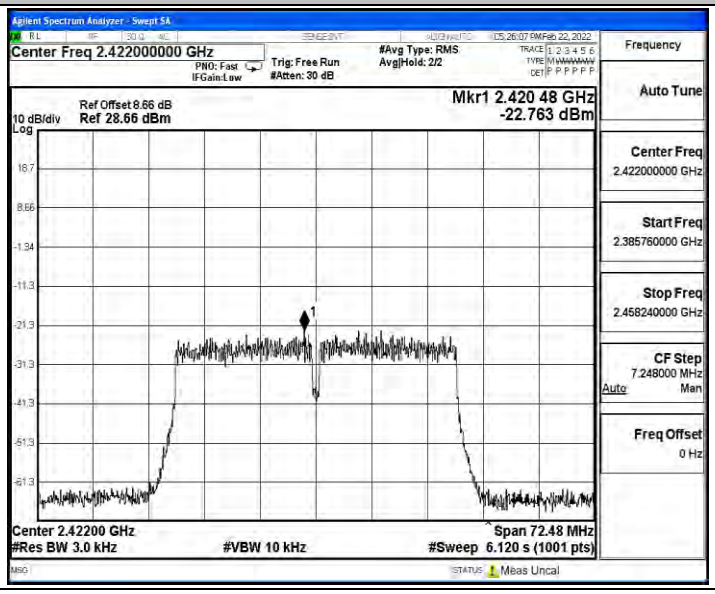
11N20SISO_Ant1_2437



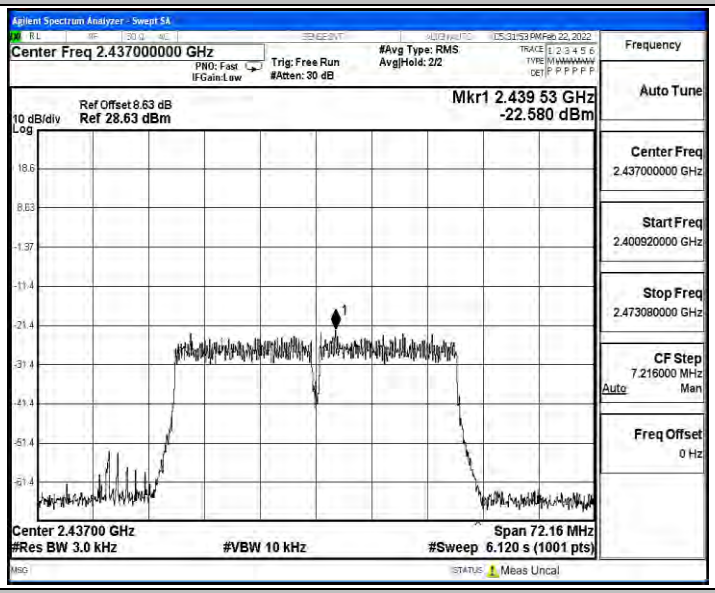
11N20SISO_Ant1_2462



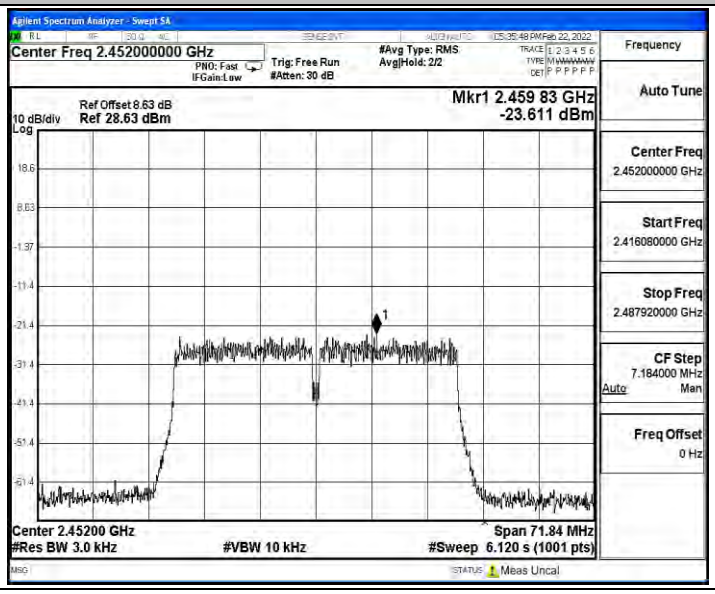
11N40SISO_Ant1_2422



11N40SISO_Ant1_2437



11N40SISO_Ant1_2452



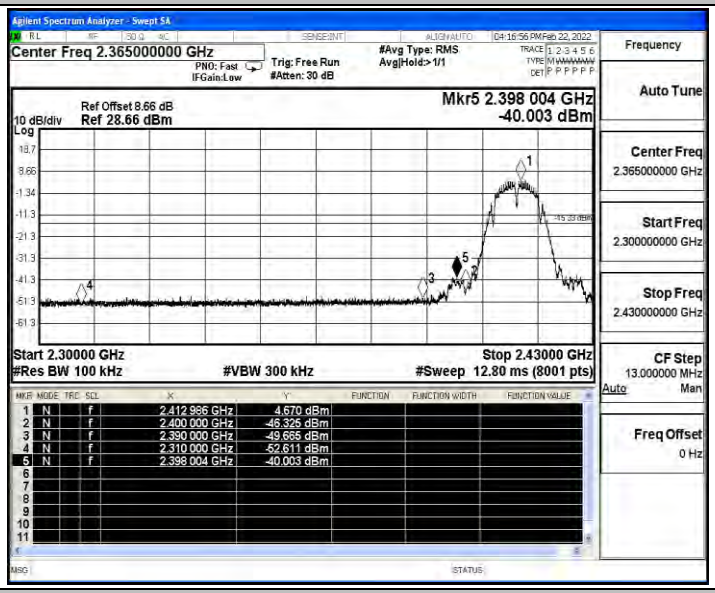
A.4 Band edge measurements

Test Result

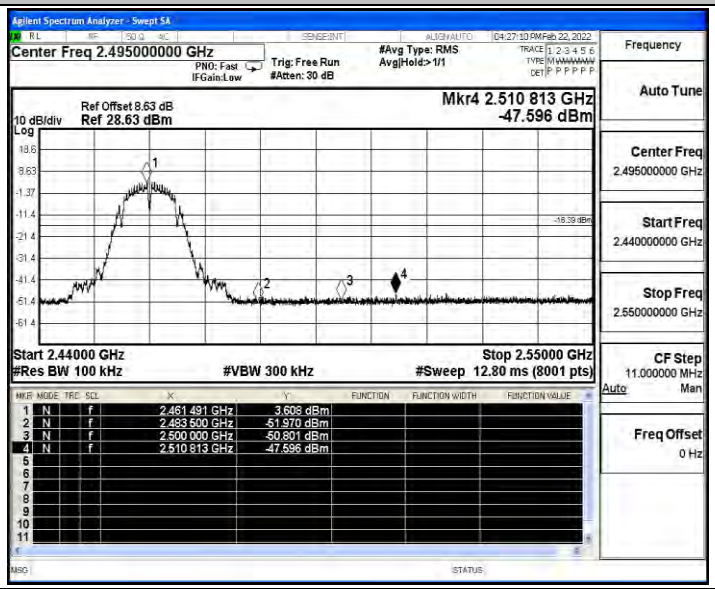
TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	4.67	-40	≤-15.33	PASS
		High	2462	3.61	-47.6	≤-16.39	PASS
11G	Ant1	Low	2412	-5.39	-48.21	≤-25.39	PASS
		High	2462	-6.05	-48.12	≤-26.05	PASS
11N20SISO	Ant1	Low	2412	-5.62	-45.2	≤-25.62	PASS
		High	2462	-3.81	-47.75	≤-23.81	PASS
11N40SISO	Ant1	Low	2422	-8.72	-43.99	≤-28.72	PASS
		High	2452	-9.25	-44.24	≤-29.25	PASS

Test Graphs

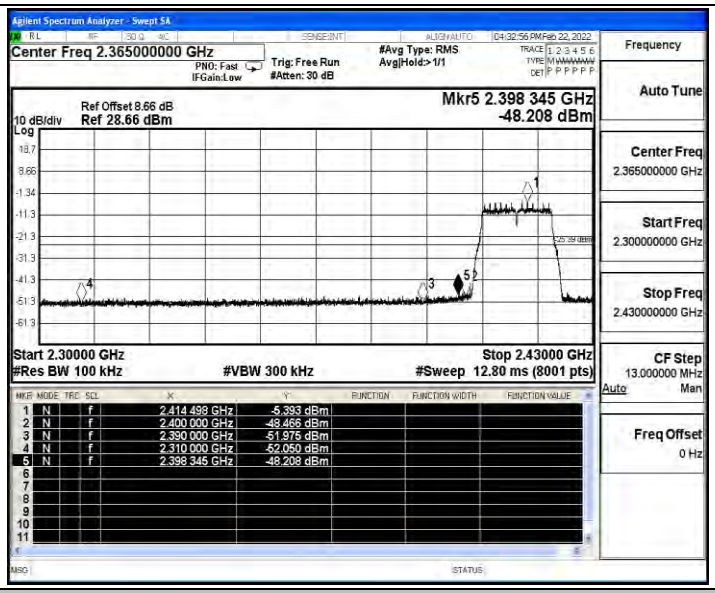
11B_Ant1_Low_2412



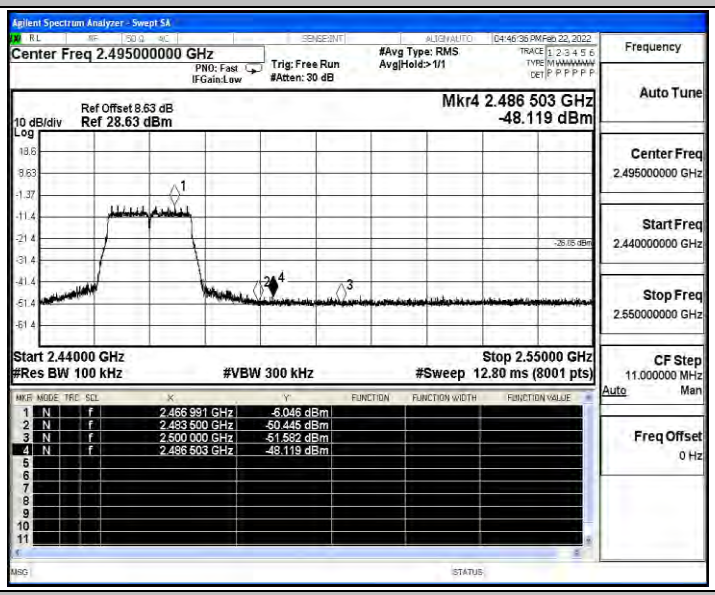
11B_Ant1_High_2462



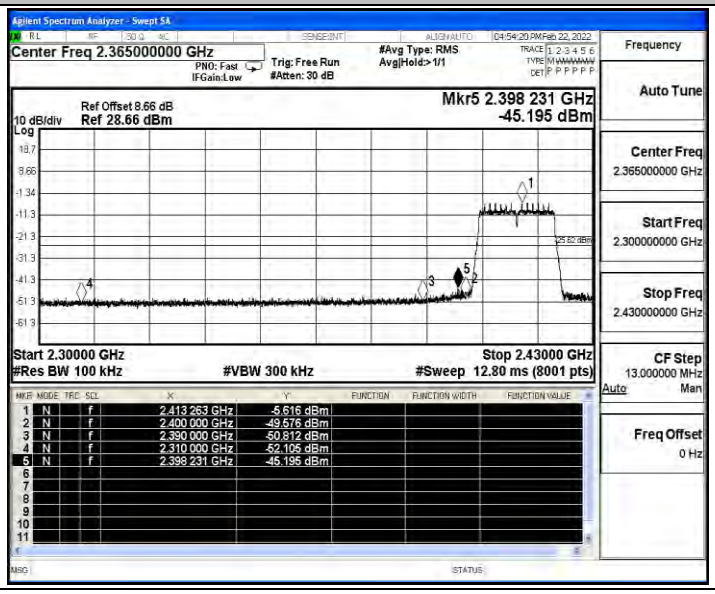
11G_Ant1_Low_2412



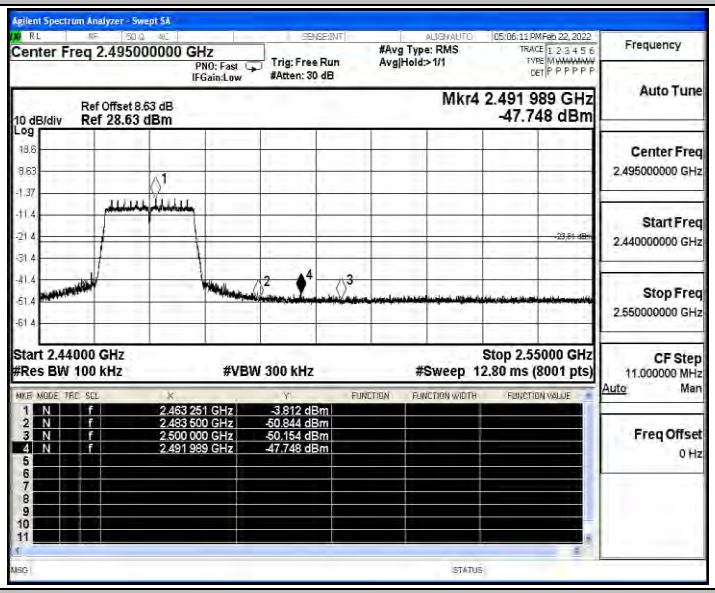
11G_Ant1_High_2462



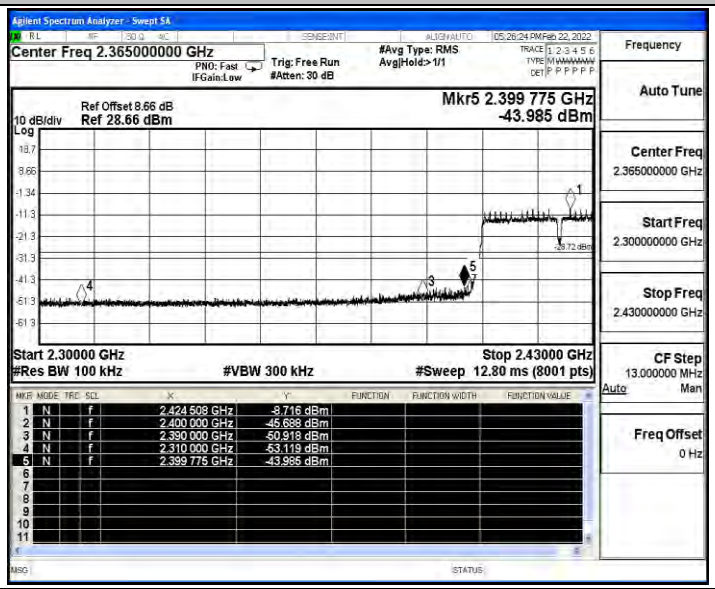
11N20SISO_Ant1_Low_2412



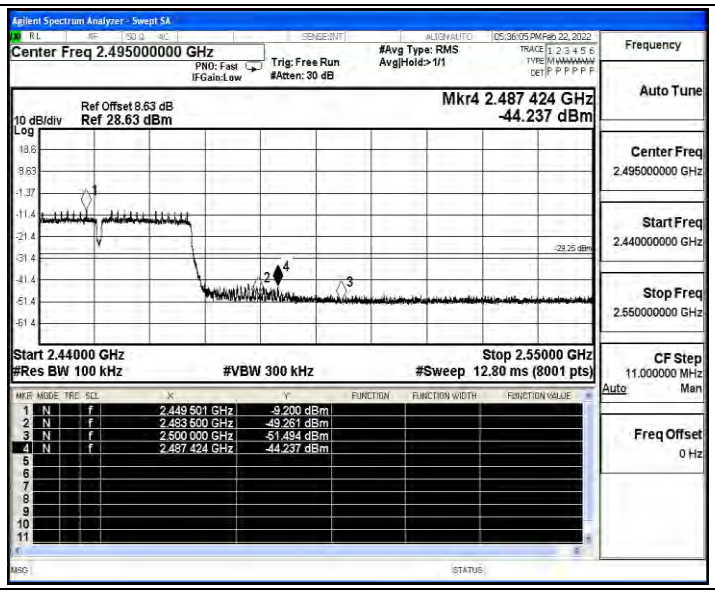
11N20SISO_Ant1_High_2462



11N40SISO_Ant1_Low_2422



11N40SISO_Ant1_High_2452


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.495000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold:>1/1
05:36:05 PM Feb 22, 2022
Frequency
Auto Tune
Ref Offset 8.63 dB
10 dB/div
Ref 28.63 dBm
Log
Mkr4 2.487 424 GHz
-44.237 dBm
Center Freq
2.495000000 GHz
Start Freq
2.440000000 GHz
Stop Freq
2.550000000 GHz
Start 2.44000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.55000 GHz
#Sweep 12.80 ms (8001 pts)
CF Step
11.000000 MHz
Auto
Man
Freq Offset
0 Hz
1 N f 2.449 501 GHz -9.200 dBm
2 N f 2.483 500 GHz -49.261 dBm
3 N f 2.500 000 GHz -51.494 dBm
4 N f 2.487 424 GHz -44.237 dBm

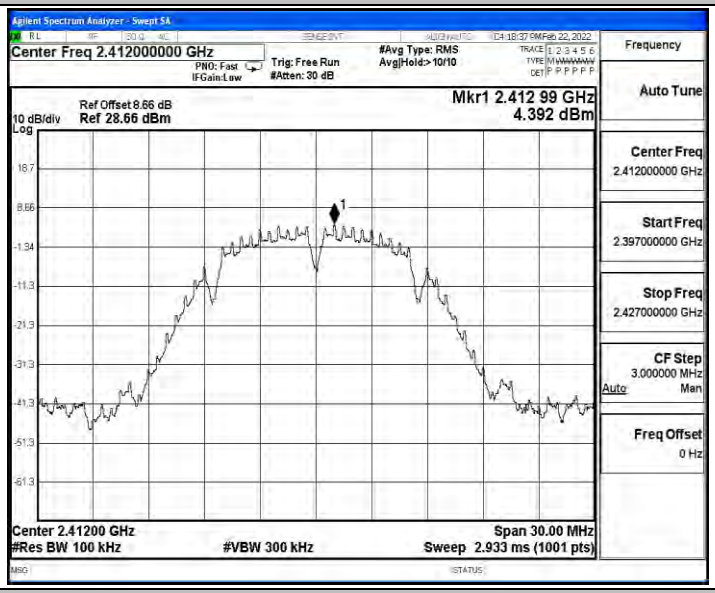
A.5 Conducted Spurious Emission

Test Result

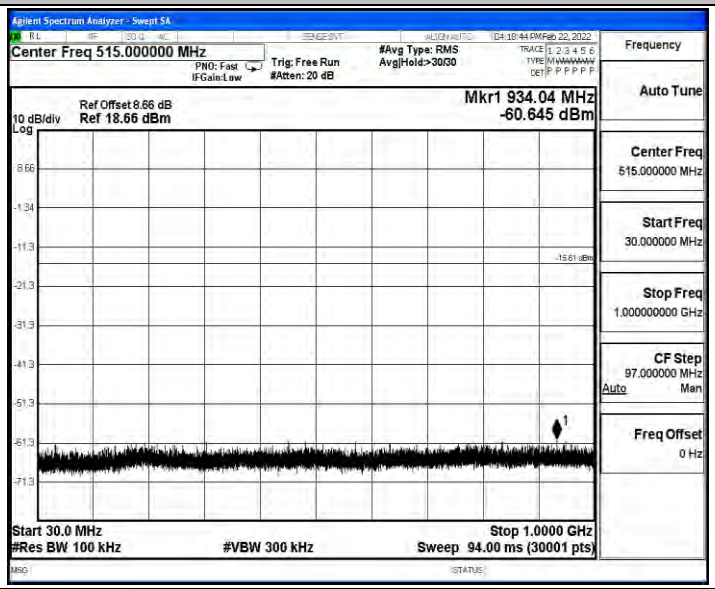
TestMode	Antenna	Channel	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	Reference	4.39	4.39	---	PASS
			30~1000	4.39	-60.65	≤-15.61	PASS
			1000~26500	4.39	-46.58	≤-15.61	PASS
		2437	Reference	3.93	3.93	---	PASS
			30~1000	3.93	-59.46	≤-16.07	PASS
			1000~26500	3.93	-46.26	≤-16.07	PASS
		2462	Reference	3.59	3.59	---	PASS
			30~1000	3.59	-60.57	≤-16.41	PASS
			1000~26500	3.59	-46.32	≤-16.41	PASS
11G	Ant1	2412	Reference	-5.18	-5.18	---	PASS
			30~1000	-5.18	-60.28	≤-25.18	PASS
			1000~26500	-5.18	-46.4	≤-25.18	PASS
		2437	Reference	-5.49	-5.49	---	PASS
			30~1000	-5.49	-59.69	≤-25.49	PASS
			1000~26500	-5.49	-42.92	≤-25.49	PASS
		2462	Reference	-5.63	-5.63	---	PASS
			30~1000	-5.63	-48.34	≤-25.63	PASS
			1000~26500	-5.63	-38.25	≤-25.63	PASS
11N20SISO	Ant1	2412	Reference	-5.43	-5.43	---	PASS
			30~1000	-5.43	-55.34	≤-25.43	PASS
			1000~26500	-5.43	-30.65	≤-25.43	PASS
		2437	Reference	-3.38	-3.38	---	PASS
			30~1000	-3.38	-61.07	≤-23.38	PASS
			1000~26500	-3.38	-39.88	≤-23.38	PASS
		2462	Reference	-3.64	-3.64	---	PASS
			30~1000	-3.64	-60.59	≤-23.64	PASS
			1000~26500	-3.64	-46.29	≤-23.64	PASS
11N40SISO	Ant1	2422	Reference	-8.64	-8.64	---	PASS
			30~1000	-8.64	-61.02	≤-28.64	PASS
			1000~26500	-8.64	-36.68	≤-28.64	PASS
		2437	Reference	-8.84	-8.84	---	PASS
			30~1000	-8.84	-60.71	≤-28.84	PASS
			1000~26500	-8.84	-46.28	≤-28.84	PASS
		2452	Reference	-9.23	-9.23	---	PASS
			30~1000	-9.23	-60.91	≤-29.23	PASS
			1000~26500	-9.23	-46.4	≤-29.23	PASS

Test Graphs

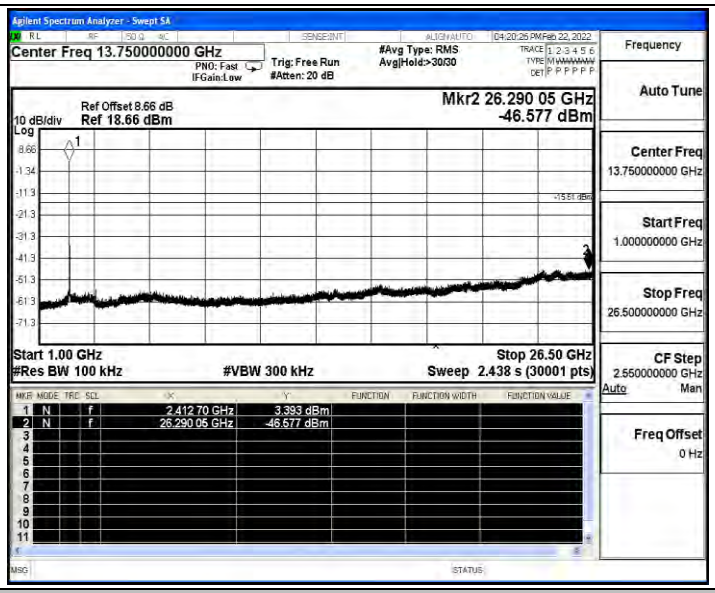
11B_Ant1_2412_0~Reference



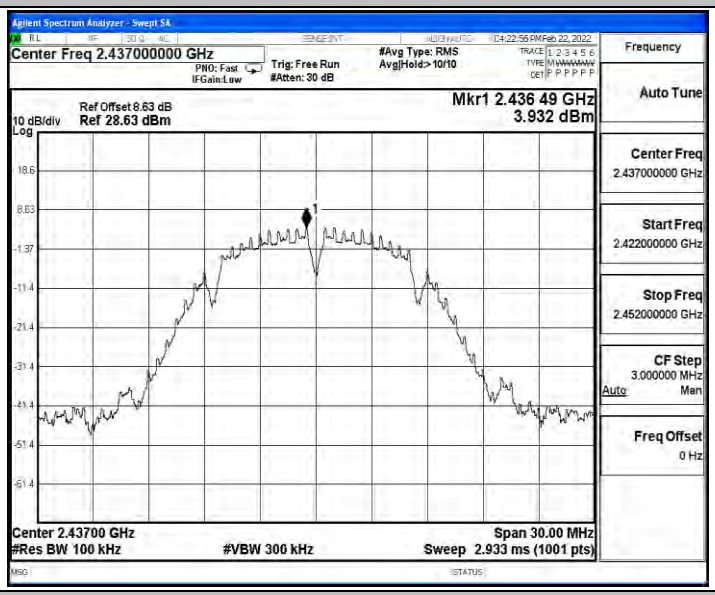
11B_Ant1_2412_30~1000



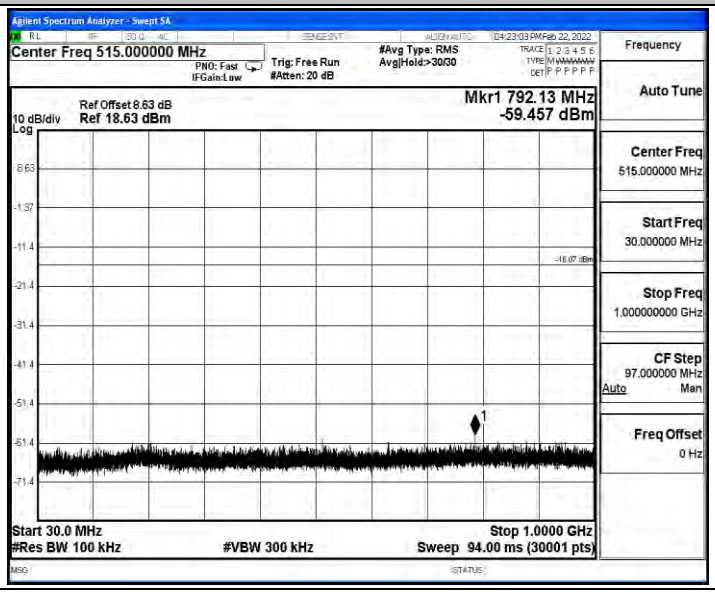
11B_Ant1_2412_1000~26500



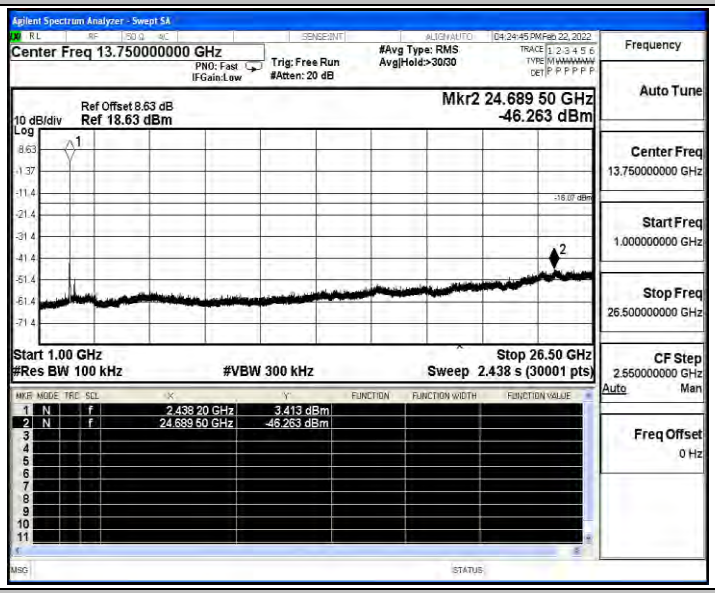
11B_Ant1_2437_0~Reference



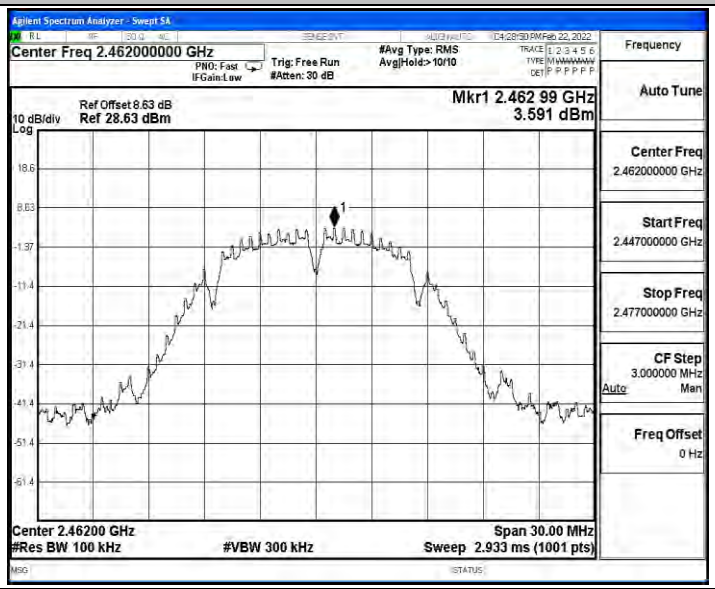
11B_Ant1_2437_30~1000



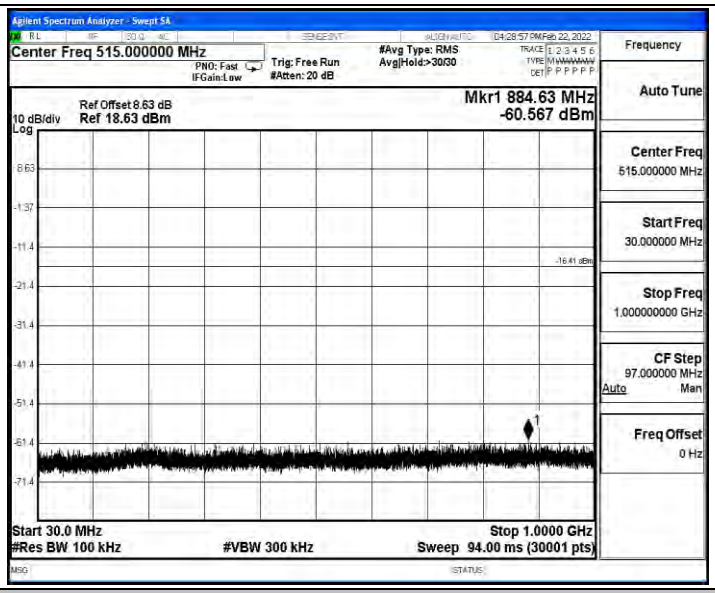
11B_Ant1_2437_1000~26500



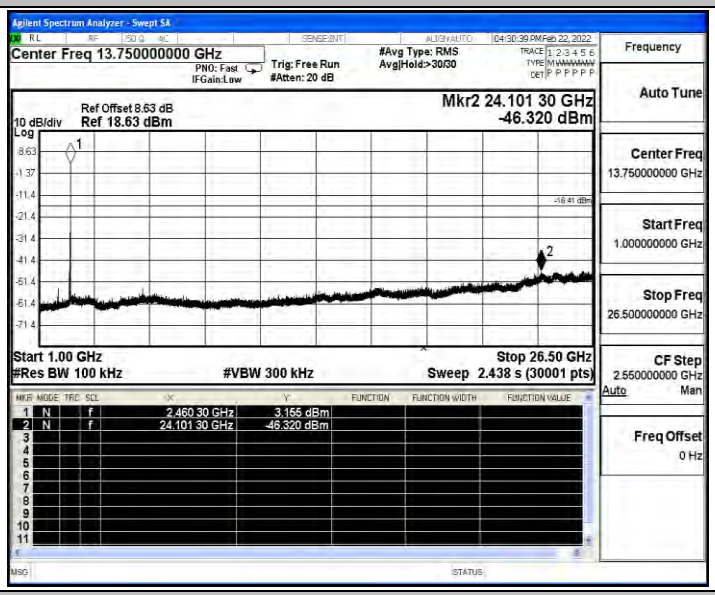
11B_Ant1_2462_0~Reference



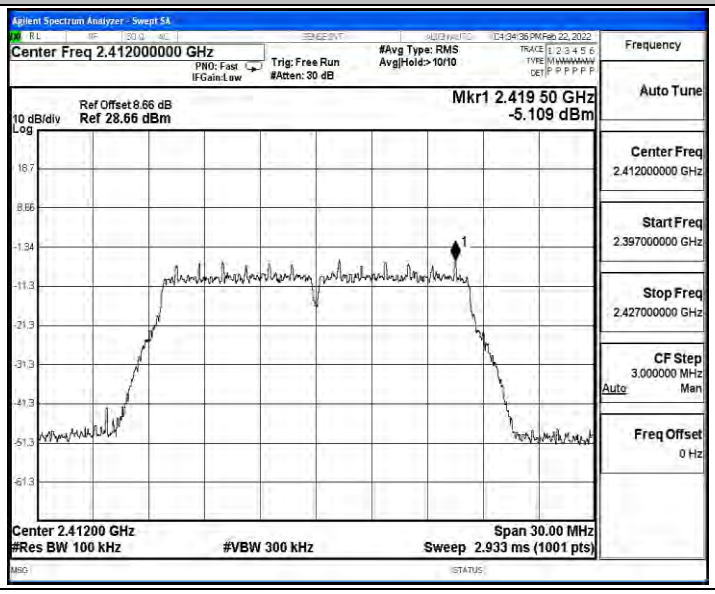
11B_Ant1_2462_30~1000



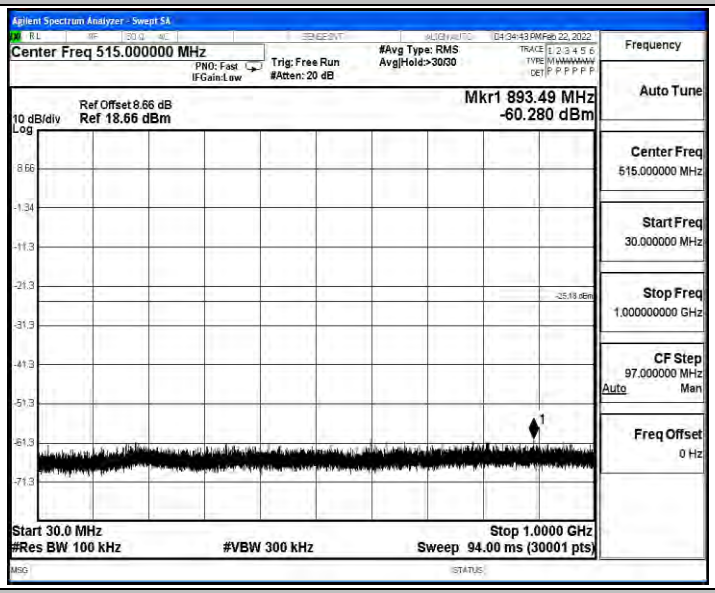
11B_Ant1_2462_1000~26500



11G_Ant1_2412_0~Reference



11G_Ant1_2412_30~1000



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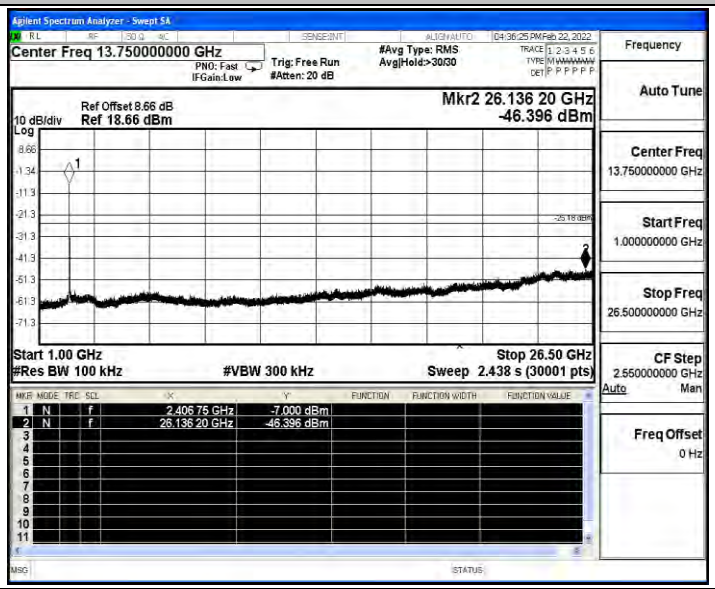
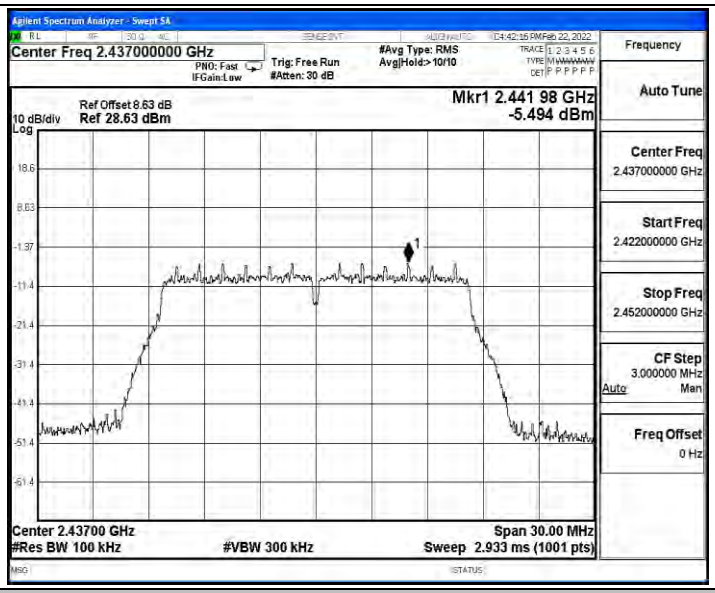
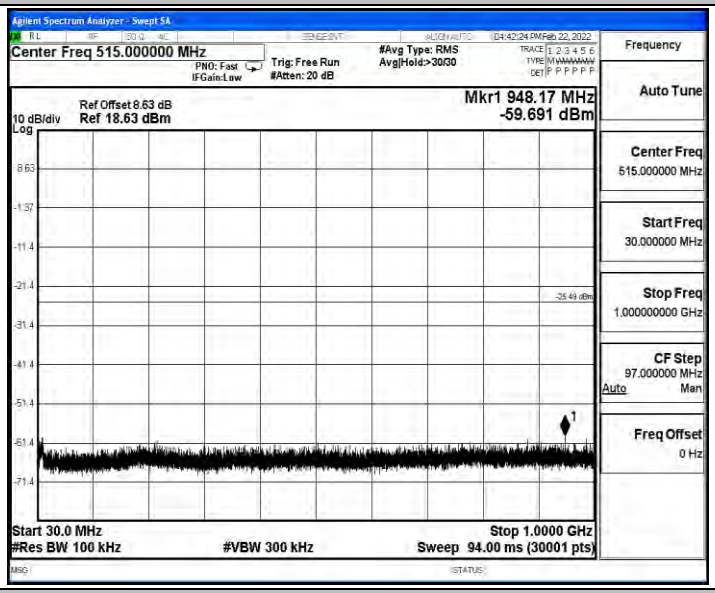


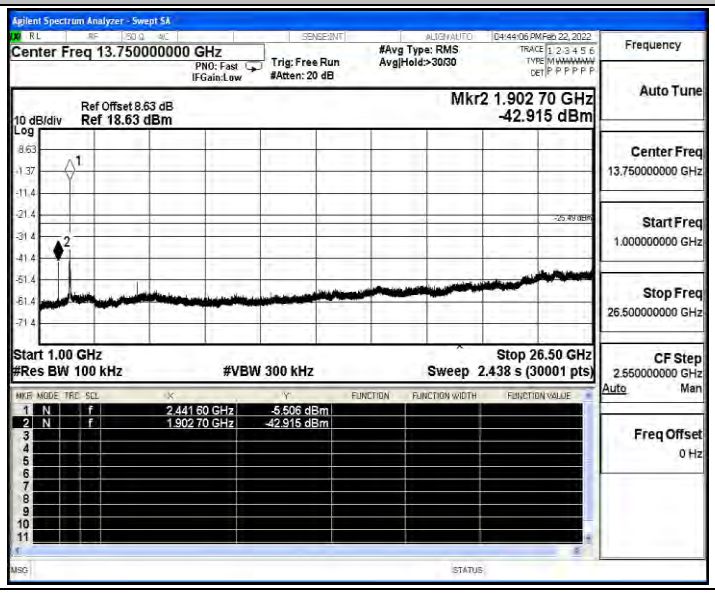
11G_Ant1_2437_0~Reference



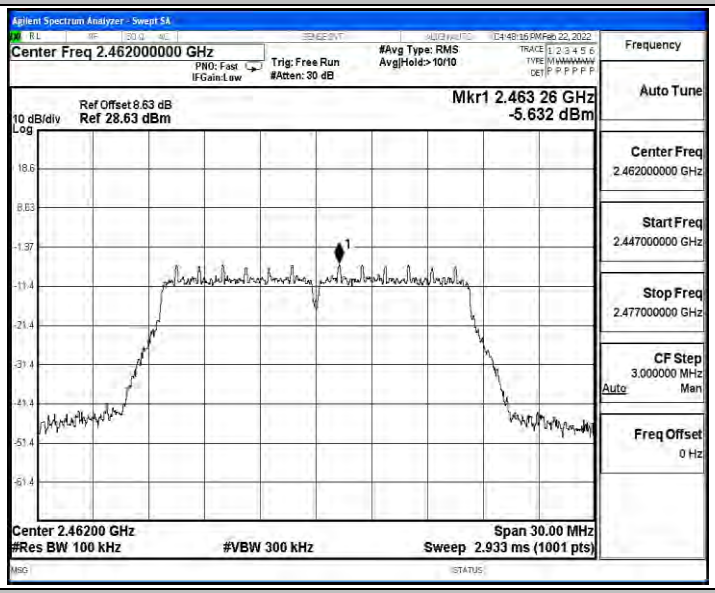
11G_Ant1_2437_30~1000



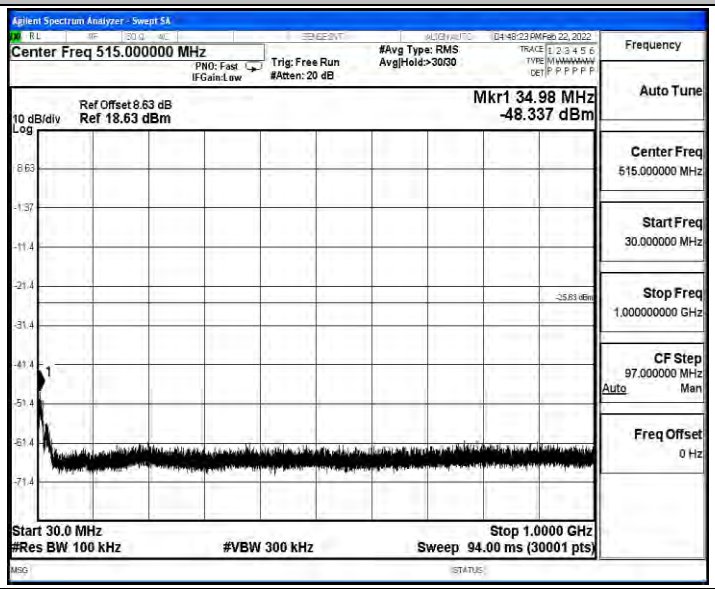
11G_Ant1_2437_1000~26500



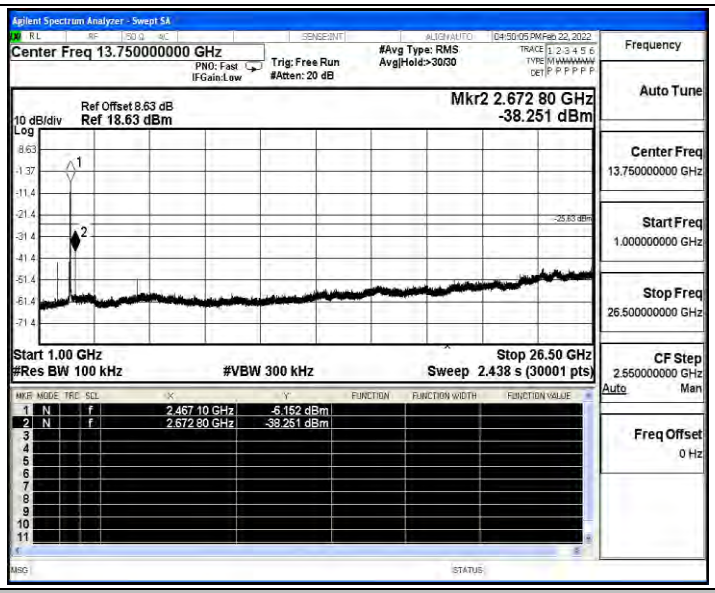
11G_Ant1_2462_0~Reference



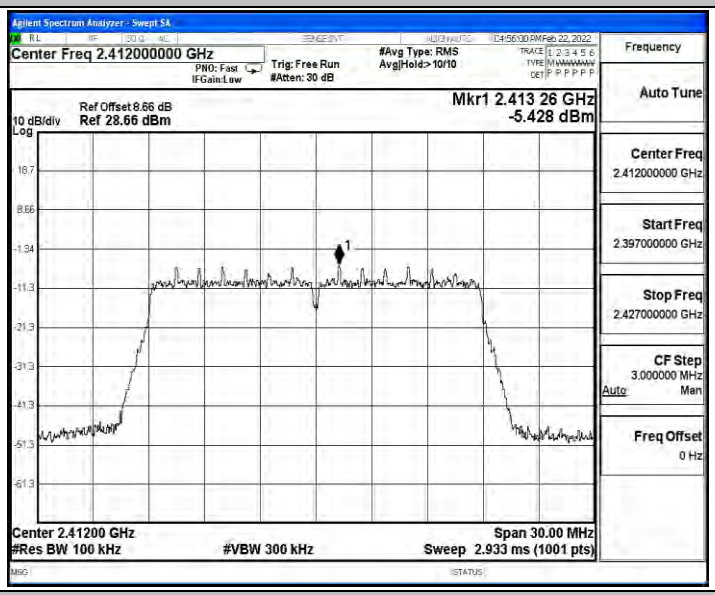
11G_Ant1_2462_30~1000



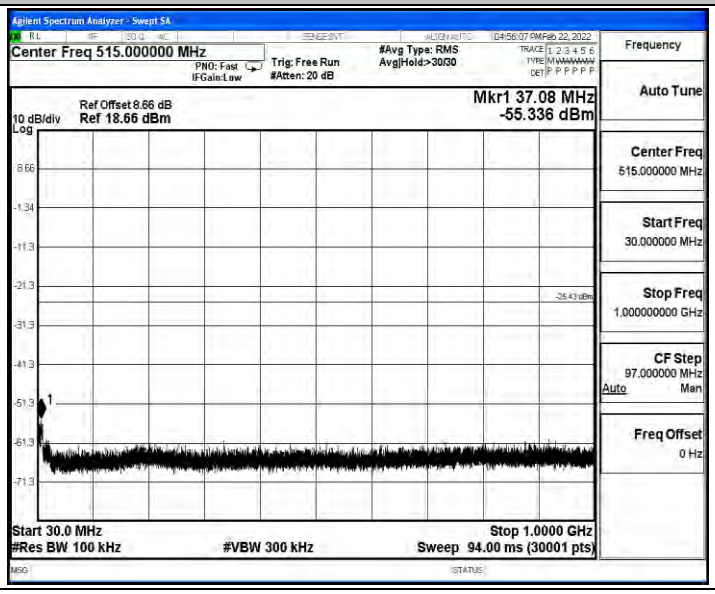
11G_Ant1_2462_1000~26500



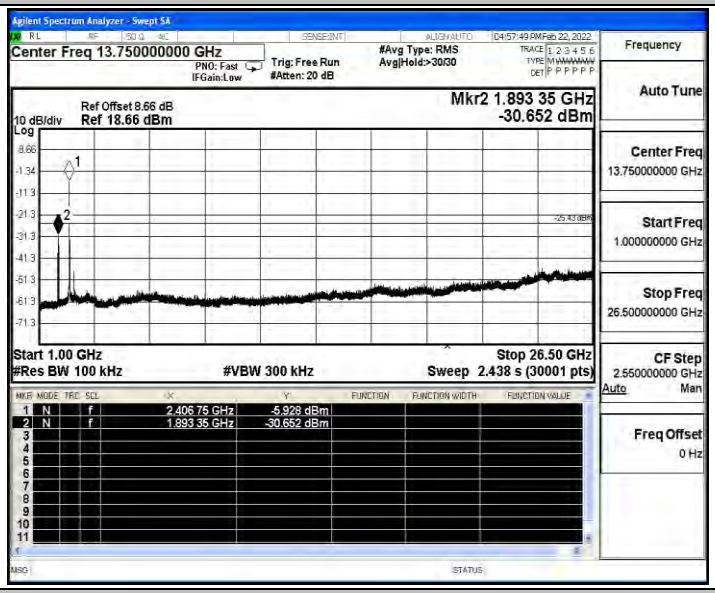
11N20SISO_Ant1_2412_0~Reference



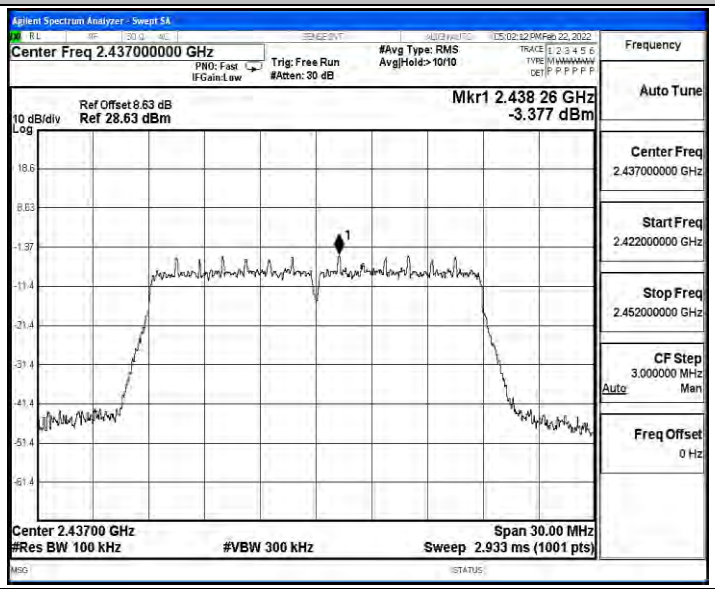
11N20SISO_Ant1_2412_30~1000



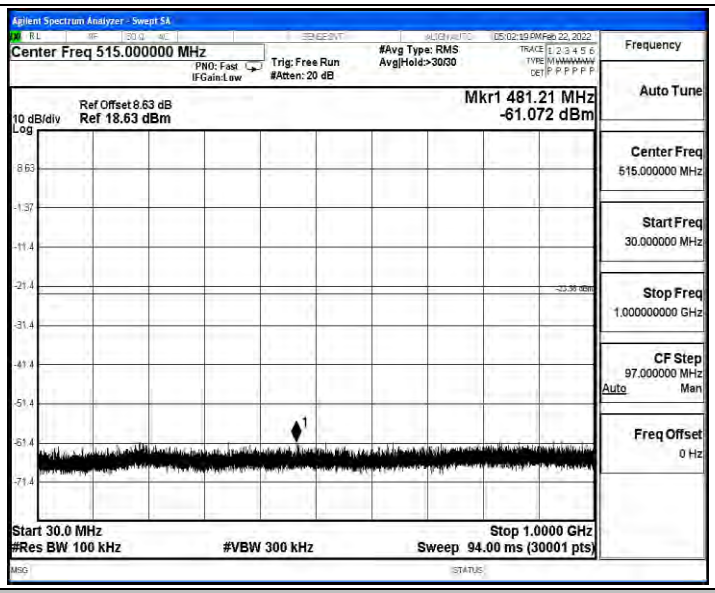
11N20SISO_Ant1_2412_1000~26500



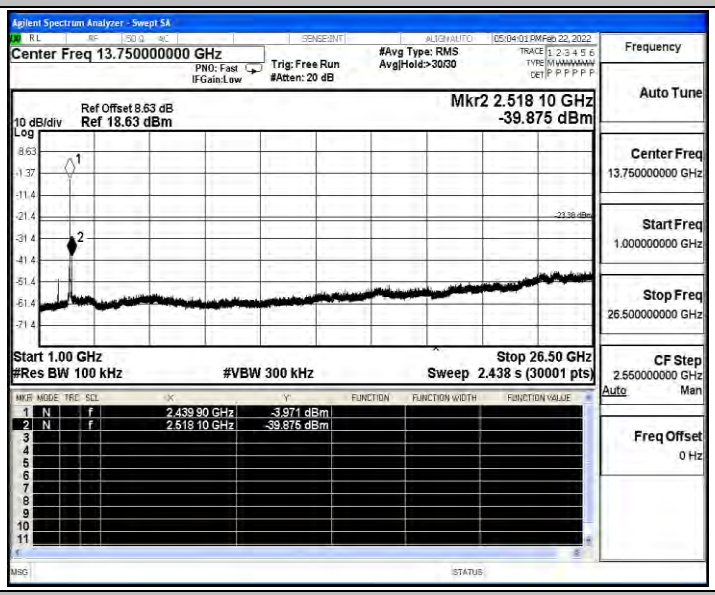
11N20SISO_Ant1_2437_0~Reference



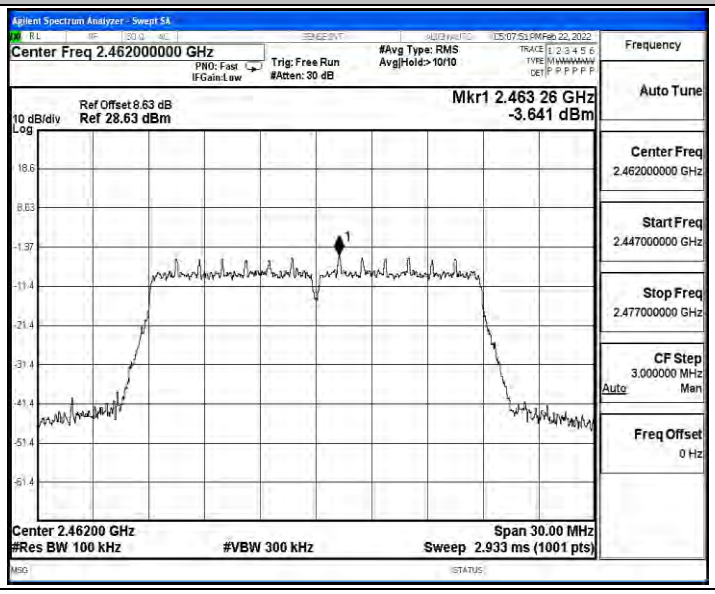
11N20SISO_Ant1_2437_30~1000



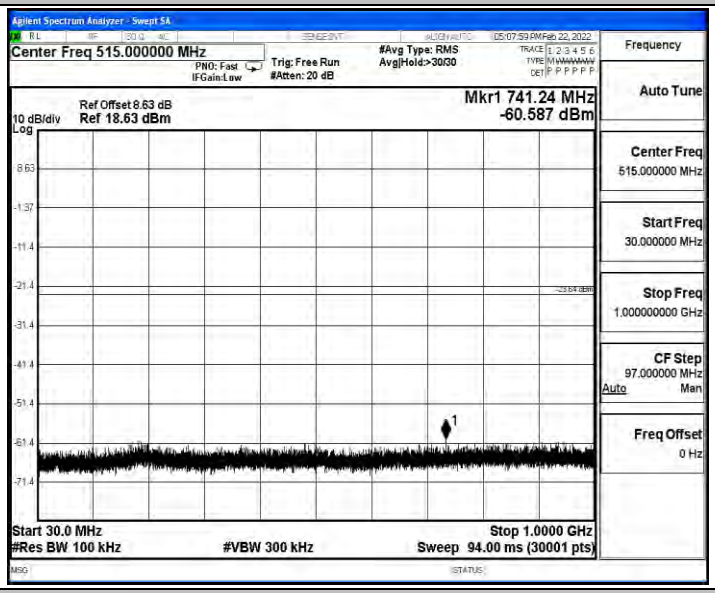
11N20SISO_Ant1_2437_1000~26500



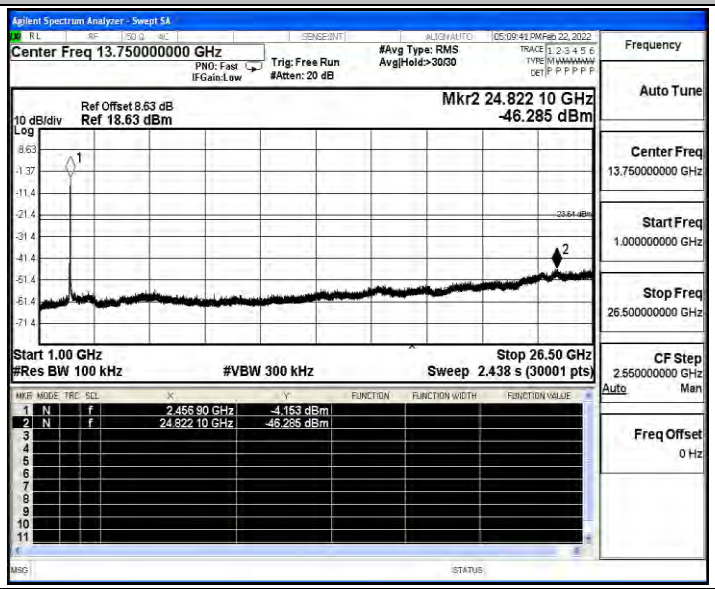
11N20SISO_Ant1_2462_0~Reference



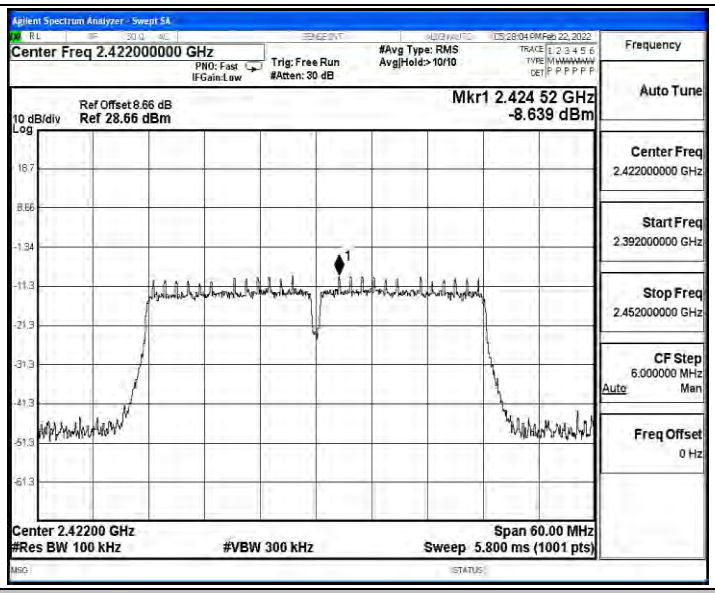
11N20SISO_Ant1_2462_30~1000



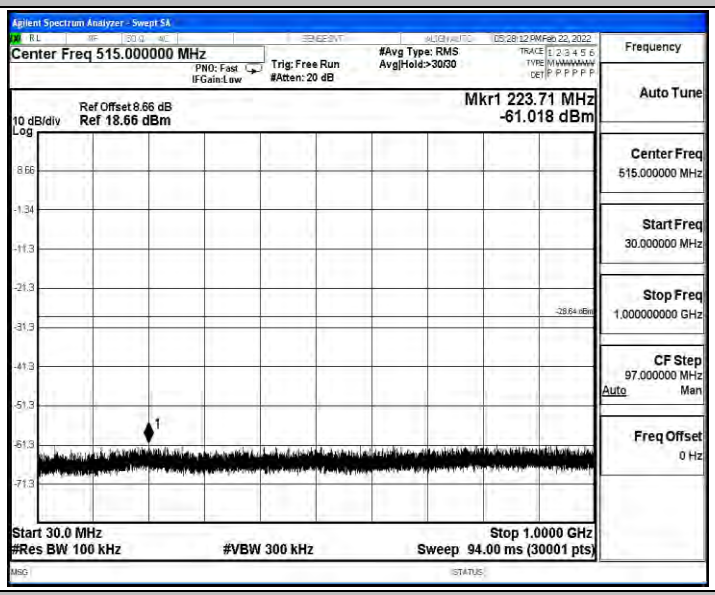
11N20SISO_Ant1_2462_1000~26500



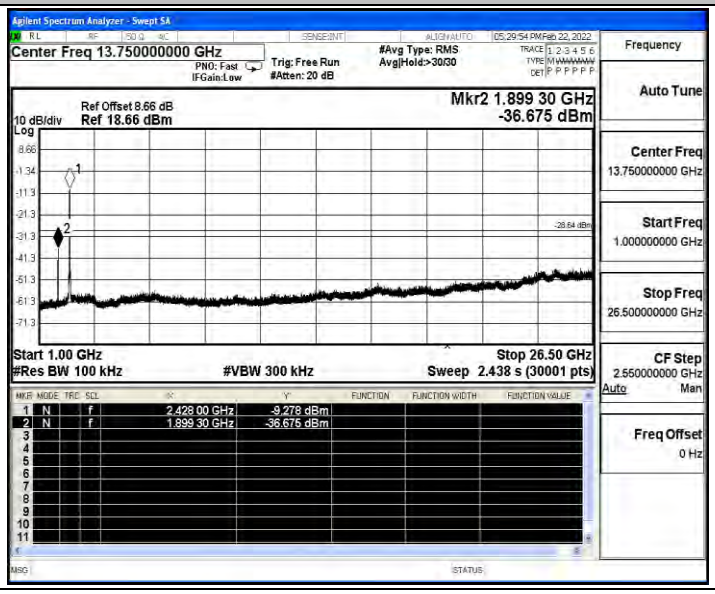
11N40SISO_Ant1_2422_0~Reference



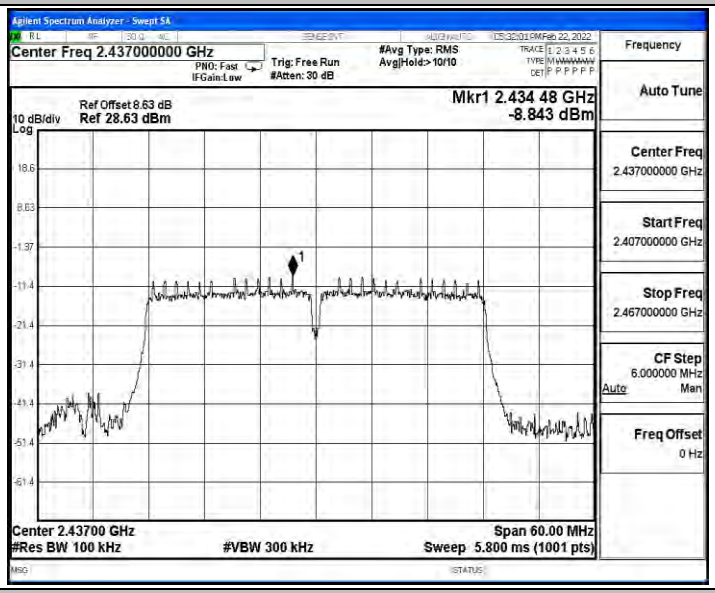
11N40SISO_Ant1_2422_30~1000



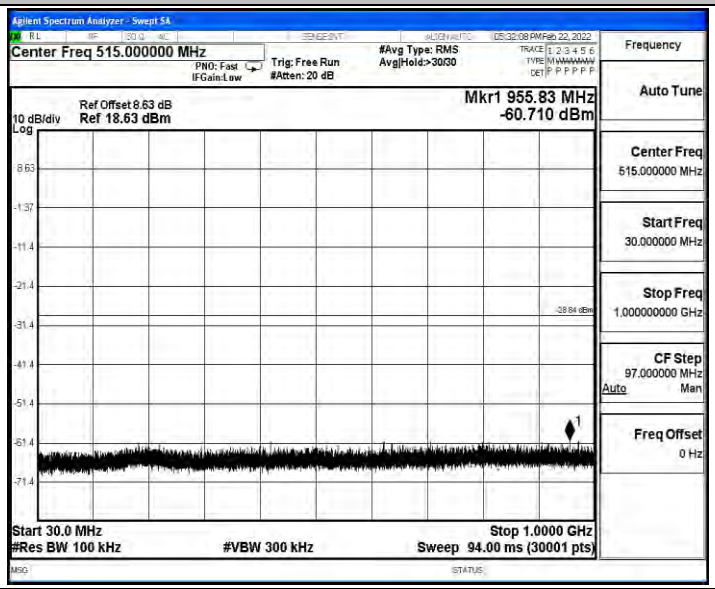
11N40SISO_Ant1_2422_1000~26500



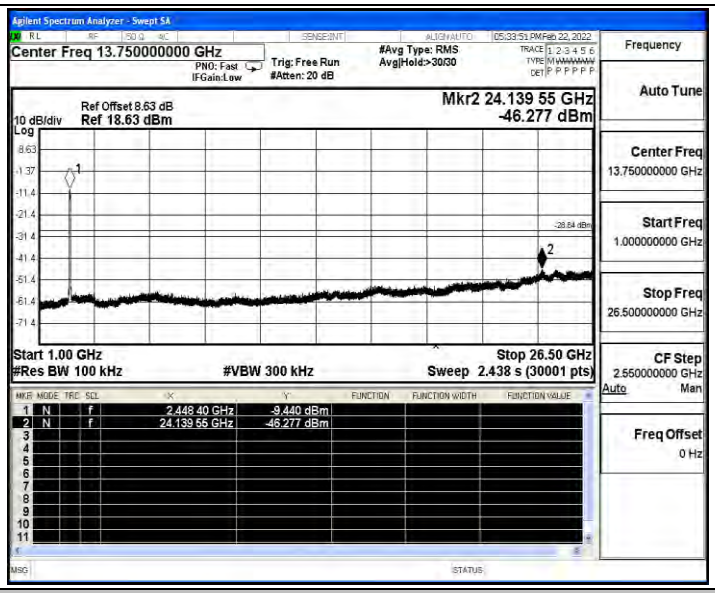
11N40SISO_Ant1_2437_0~Reference



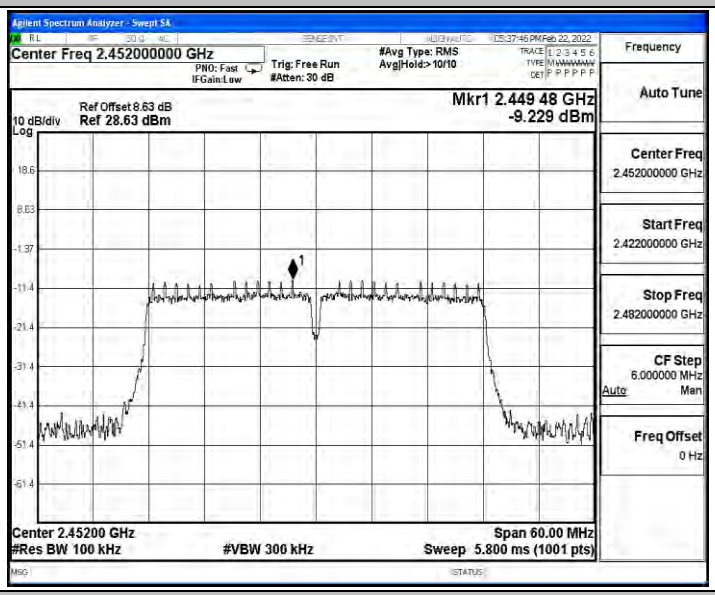
11N40SISO_Ant1_2437_30~1000



11N40SISO_Ant1_2437_1000~26500



11N40SISO_Ant1_2452_0~Reference



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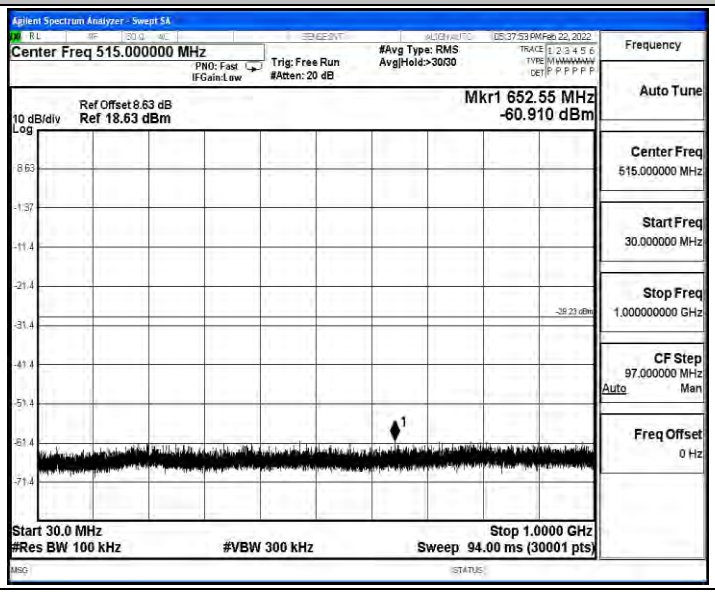
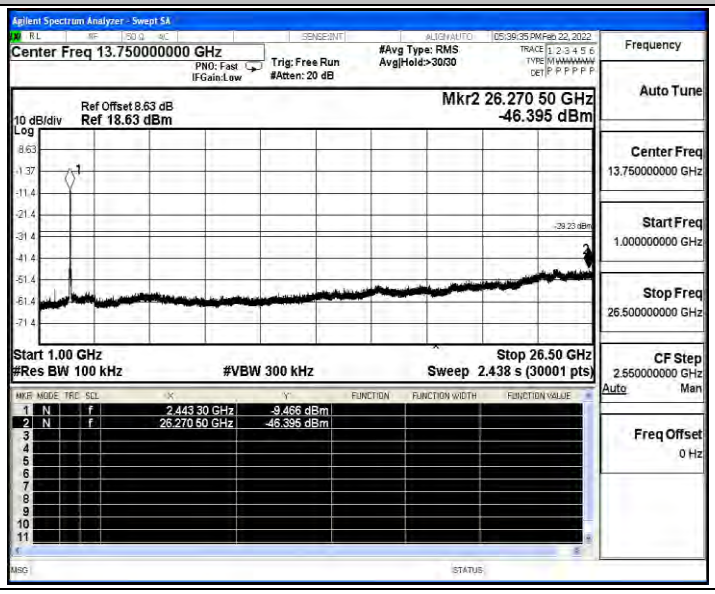


11N40SISO_Ant1_2452_1000~26500



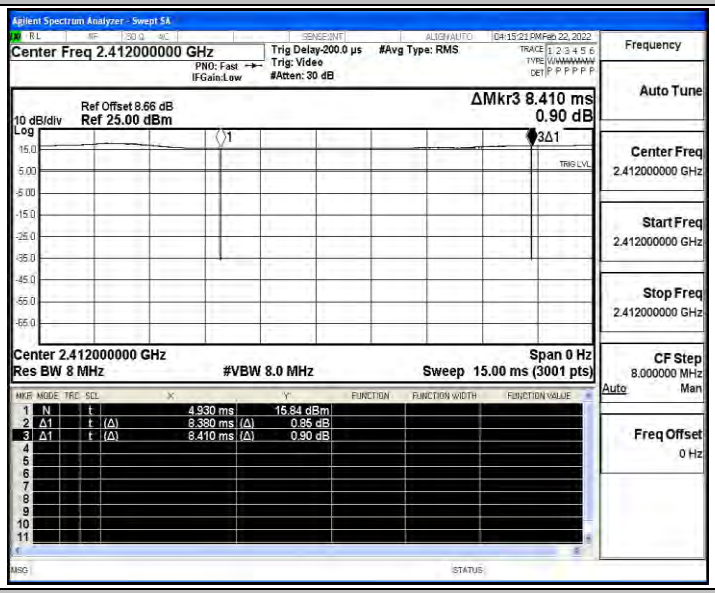
A.6 Duty Cycle

Test Result

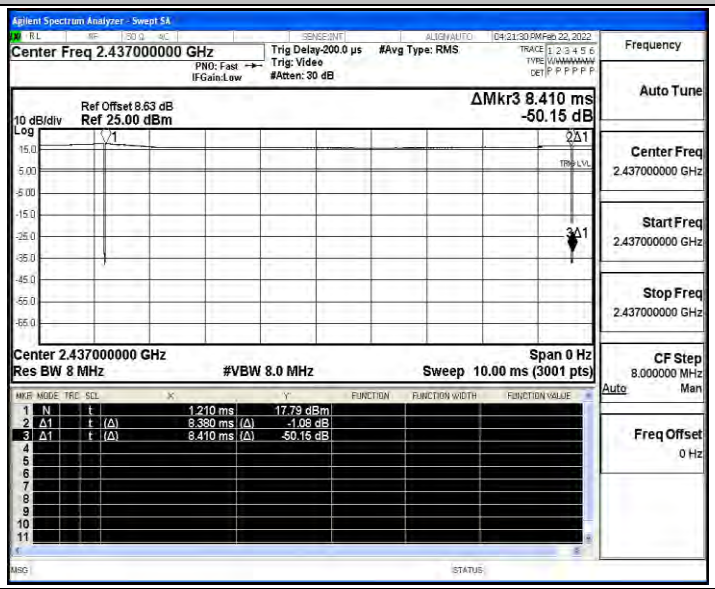
TestMode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Limit	Verdict
11B	Ant1	2412	8.38	8.41	99.64	---	---
		2437	8.38	8.41	99.64	---	---
		2462	8.38	8.41	99.64	---	---
11G	Ant1	2412	1.39	1.42	97.89	---	---
		2437	1.39	1.43	97.20	---	---
		2462	1.39	1.43	97.20	---	---
11N20SISO	Ant1	2412	1.30	1.34	97.01	---	---
		2437	1.30	1.34	97.01	---	---
		2462	1.30	1.33	97.74	---	---
11N40SISO	Ant1	2422	0.65	0.68	95.59	---	---
		2437	0.64	0.68	94.12	---	---
		2452	0.65	0.68	95.59	---	---

Test Graphs

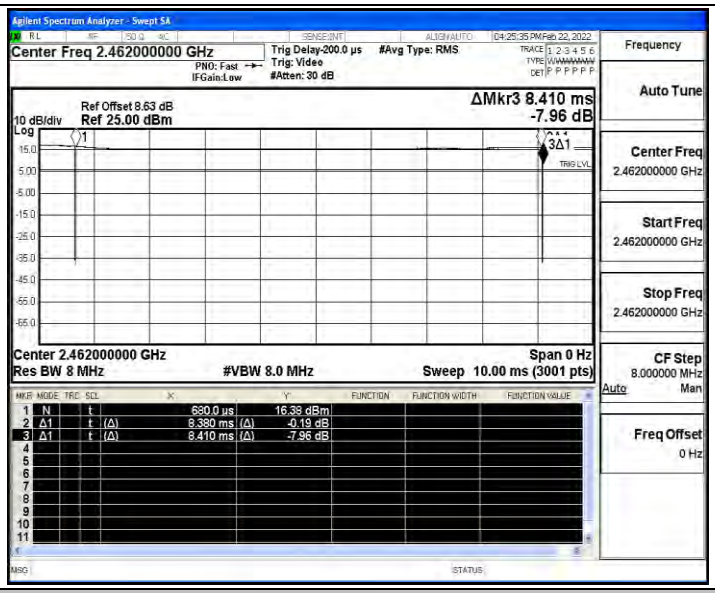
11B_Ant1_2412



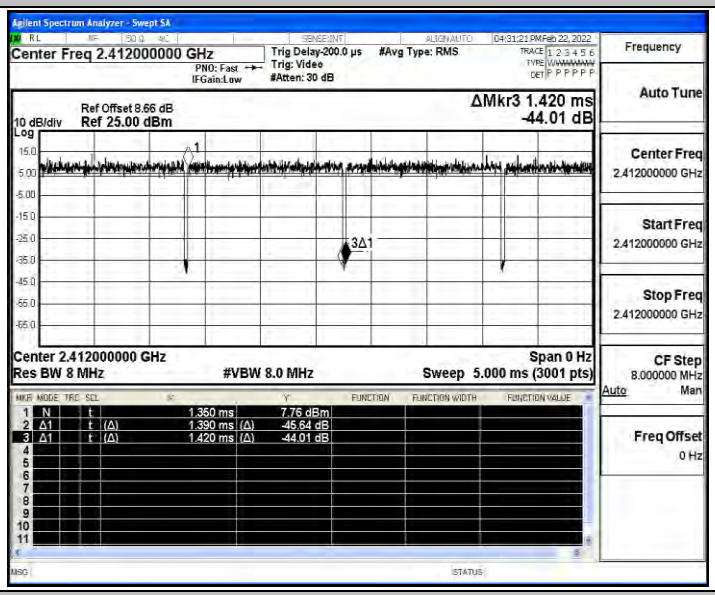
11B_Ant1_2437



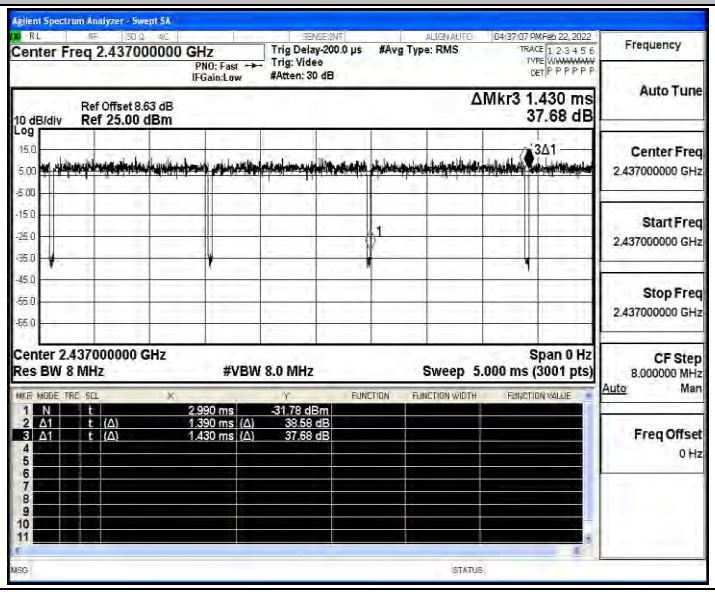
11B_Ant1_2462



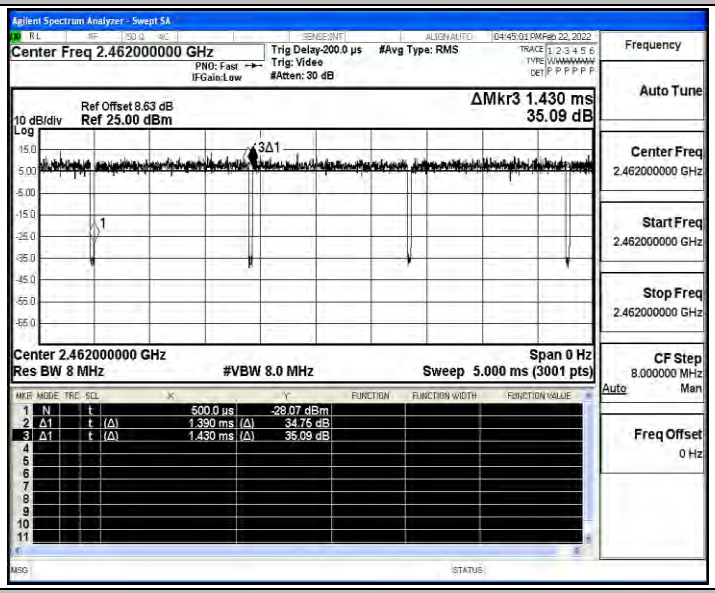
11G_Ant1_2412



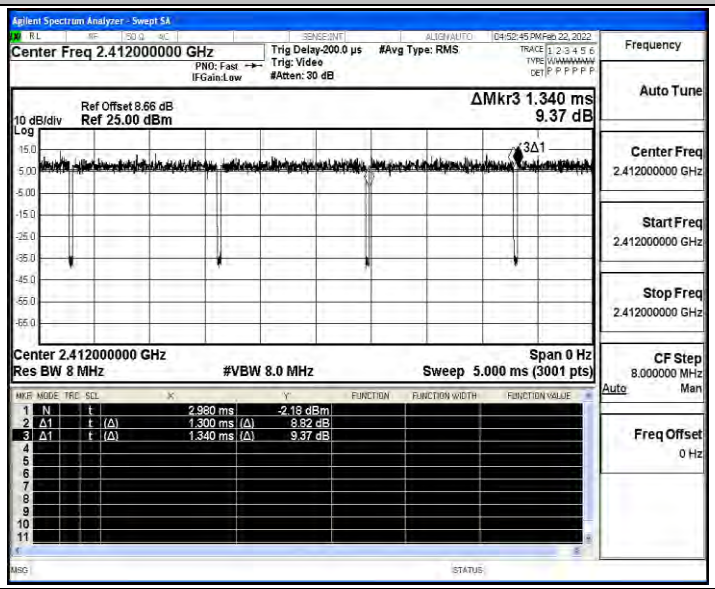
11G_Ant1_2437



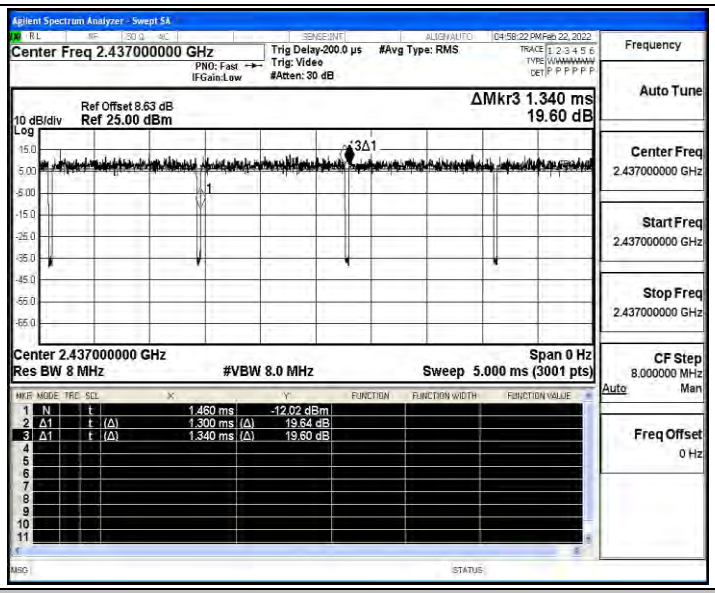
11G_Ant1_2462



11N20SISO_Ant1_2412



11N20SISO_Ant1_2437



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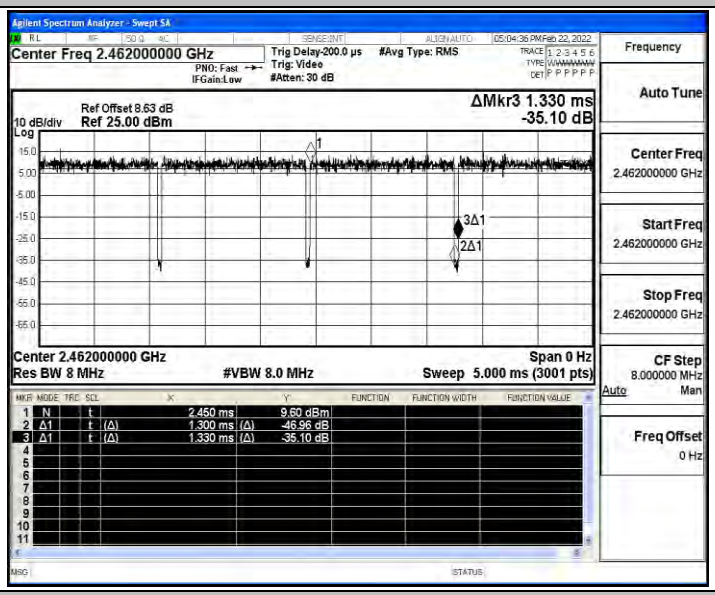
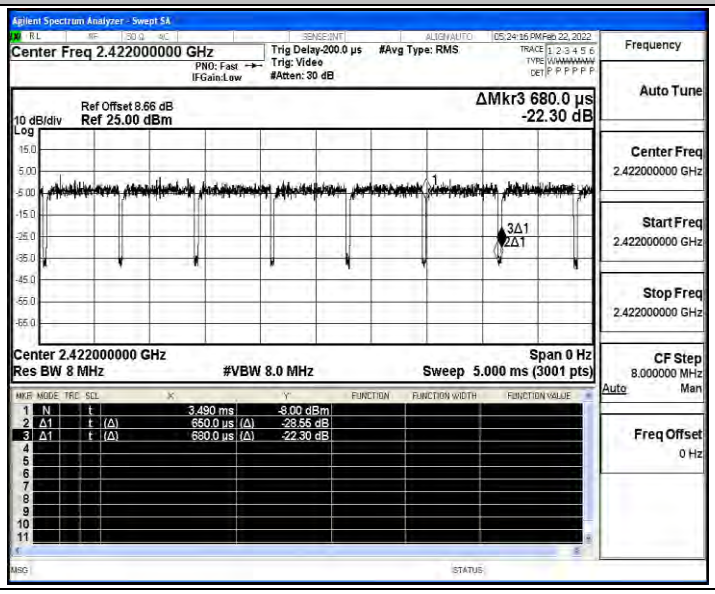
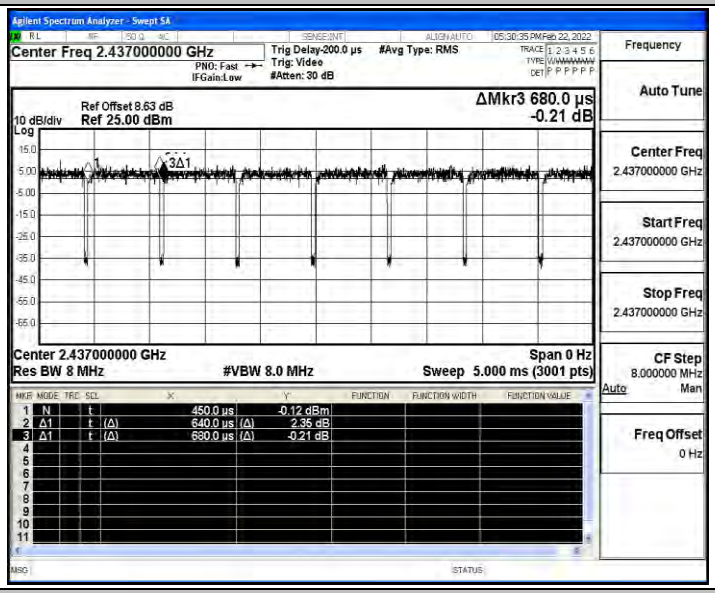


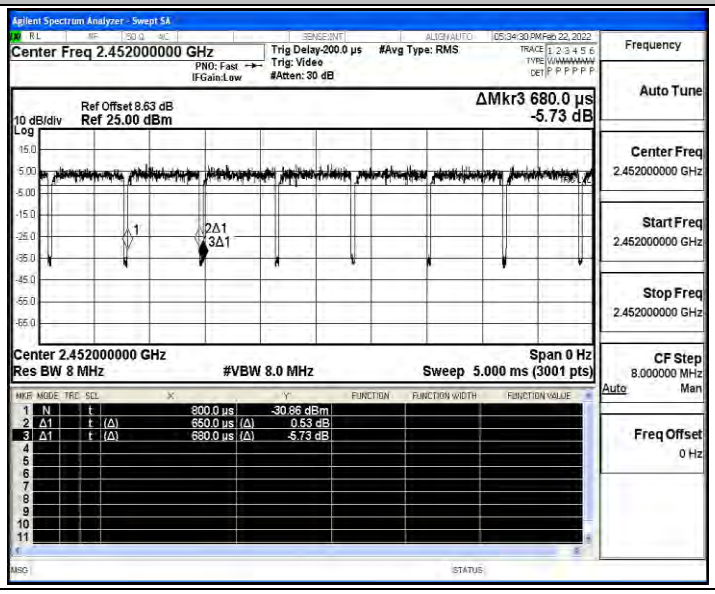
11N40SISO_Ant1_2422



11N40SISO_Ant1_2437



11N40SISO_Ant1_2452



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	≤-41.20	46.20	≤54	PASS
		AV	2388.920	-47.8	≤-41.20	47.40	≤54	PASS
		AV	2390.000	-47.86	≤-41.20	47.34	≤54	PASS
		Peak	2310.000	-39.05	≤-21.20	56.15	≤74	PASS
		Peak	2381.900	-35.87	≤-21.20	59.33	≤74	PASS
		Peak	2390.000	-37.29	≤-21.20	57.91	≤74	PASS
	2462	AV	2483.500	-47.89	≤-41.20	47.31	≤54	PASS
		AV	2487.300	-47.85	≤-41.20	47.35	≤54	PASS
		AV	2500.000	-47.99	≤-41.20	47.21	≤54	PASS
		Peak	2483.500	-37.53	≤-21.20	57.67	≤74	PASS
		Peak	2498.300	-36.1	≤-21.20	59.10	≤74	PASS
		Peak	2500.000	-36.72	≤-21.20	58.48	≤74	PASS
11G	2412	AV	2310.000	-48.39	≤-41.20	46.81	≤54	PASS
		AV	2389.440	-47.28	≤-41.20	47.92	≤54	PASS
		AV	2390.000	-47.31	≤-41.20	47.89	≤54	PASS
		Peak	2310.000	-37.91	≤-21.20	57.29	≤74	PASS
		Peak	2314.170	-35.86	≤-21.20	59.34	≤74	PASS
		Peak	2390.000	-37.89	≤-21.20	57.31	≤74	PASS
	2462	AV	2483.500	-46.87	≤-41.20	48.33	≤54	PASS
		AV	2483.890	-46.83	≤-41.20	48.37	≤54	PASS
		AV	2500.000	-47.24	≤-41.20	47.96	≤54	PASS
		Peak	2483.500	-36.05	≤-21.20	59.15	≤74	PASS
		Peak	2484.440	-34.62	≤-21.20	60.58	≤74	PASS
		Peak	2500.000	-37.24	≤-21.20	57.96	≤74	PASS
11N20SISO	2412	AV	2310.000	-48.52	≤-41.20	46.68	≤54	PASS
		AV	2389.830	-47.13	≤-41.20	48.07	≤54	PASS
		AV	2390.000	-47.23	≤-41.20	47.97	≤54	PASS
		Peak	2310.000	-37.75	≤-21.20	57.45	≤74	PASS
		Peak	2389.180	-35.43	≤-21.20	59.77	≤74	PASS
		Peak	2390.000	-36.66	≤-21.20	58.54	≤74	PASS
	2462	AV	2483.500	-46.28	≤-41.20	48.92	≤54	PASS
		AV	2483.670	-46.18	≤-41.20	49.02	≤54	PASS
		AV	2500.000	-46.99	≤-41.20	48.21	≤54	PASS
		Peak	2483.500	-30.1	≤-21.20	65.10	≤74	PASS
		Peak	2484.000	-31.63	≤-21.20	63.57	≤74	PASS
		Peak	2500.000	-36.24	≤-21.20	58.96	≤74	PASS
11N40SIS	2422	AV	2310.000	-48.37	≤-41.20	46.83	≤54	PASS

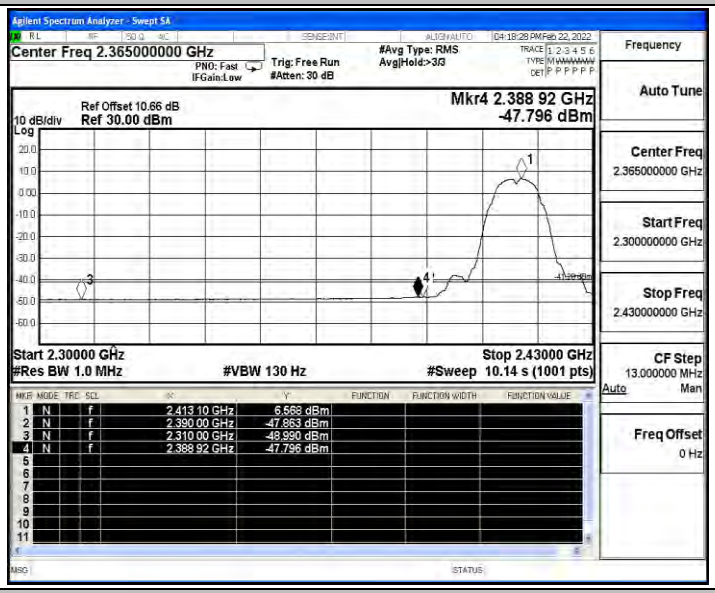
O		AV	2389.050	-45.16	≤-41.20	50.04	≤54	PASS
		AV	2390.000	-45.45	≤-41.20	49.75	≤54	PASS
		Peak	2310.000	-38.62	≤-21.20	56.58	≤74	PASS
		Peak	2389.050	-29.22	≤-21.20	65.98	≤74	PASS
		Peak	2390.000	-31.44	≤-21.20	63.76	≤74	PASS
	2452	AV	2483.500	-45.05	≤-41.20	50.15	≤54	PASS
		AV	2484.330	-44.85	≤-41.20	50.35	≤54	PASS
		AV	2500.000	-46.71	≤-41.20	48.49	≤54	PASS
		Peak	2483.500	-29	≤-21.20	66.20	≤74	PASS
		Peak	2484.880	-28.13	≤-21.20	67.07	≤74	PASS
		Peak	2500.000	-36.93	≤-21.20	58.27	≤74	PASS

Note：

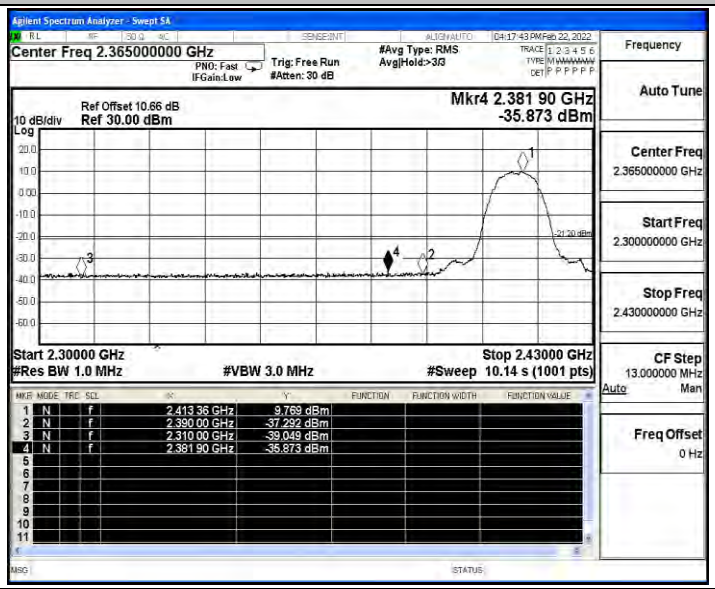
1. The Antenna Gain is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

Test Graphs

11B_Ant1_Low_2412_AV



11B_Ant1_Low_2412_Peak



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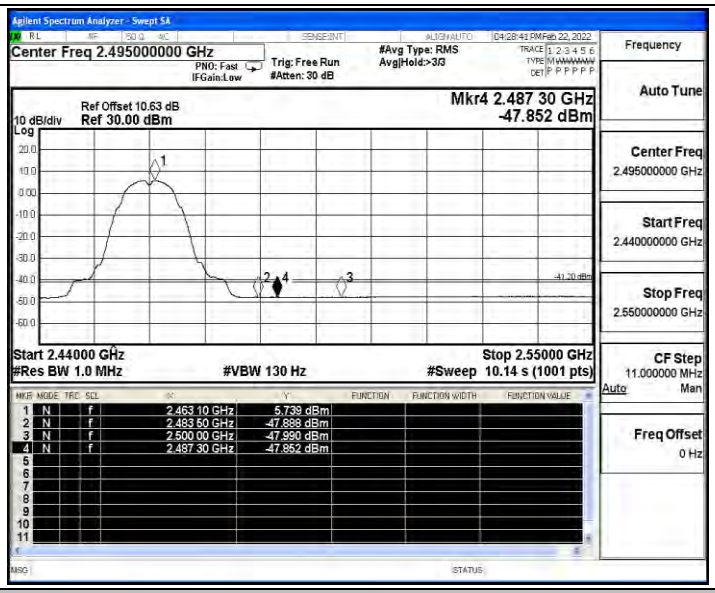

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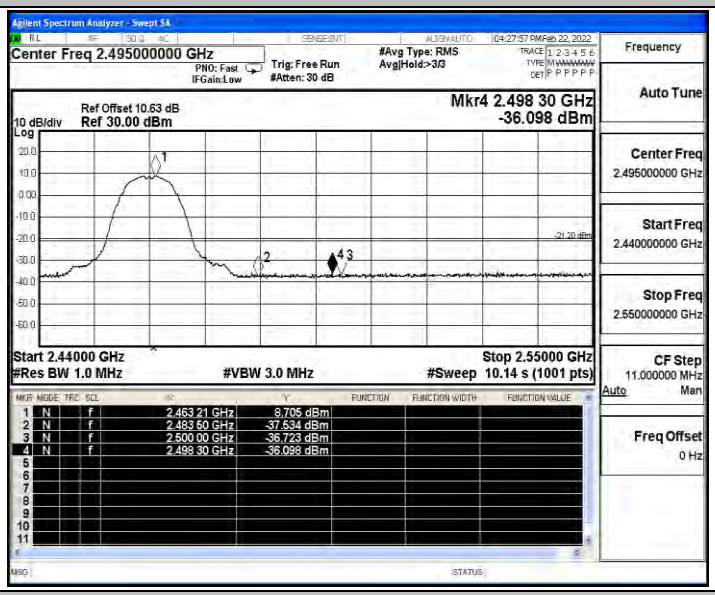

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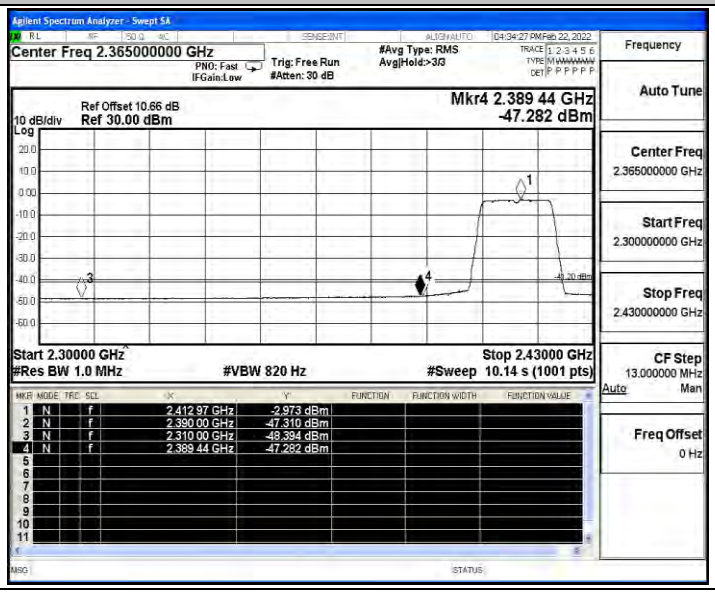

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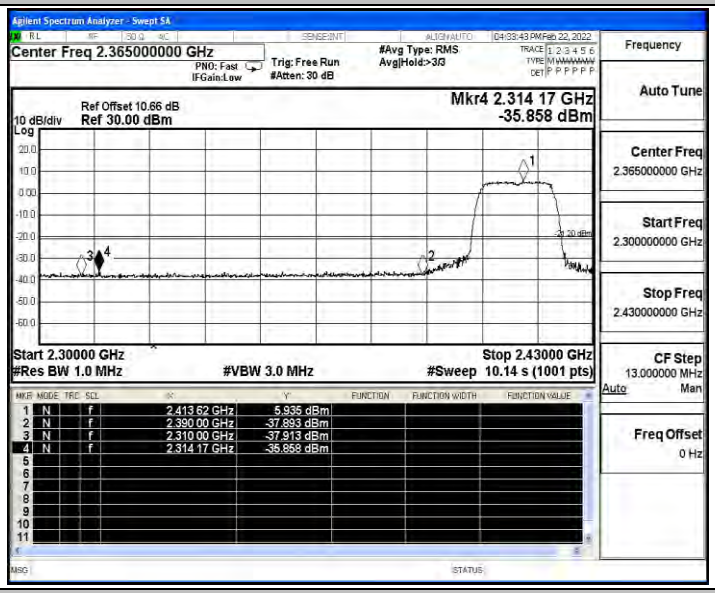

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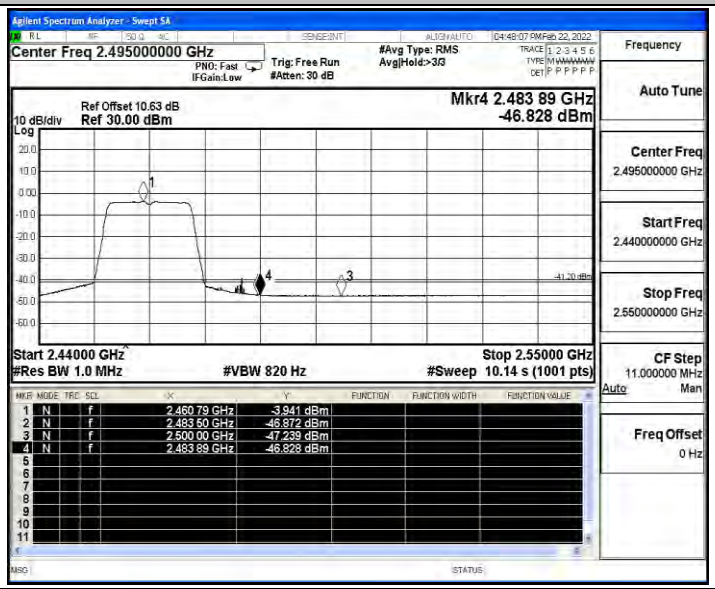

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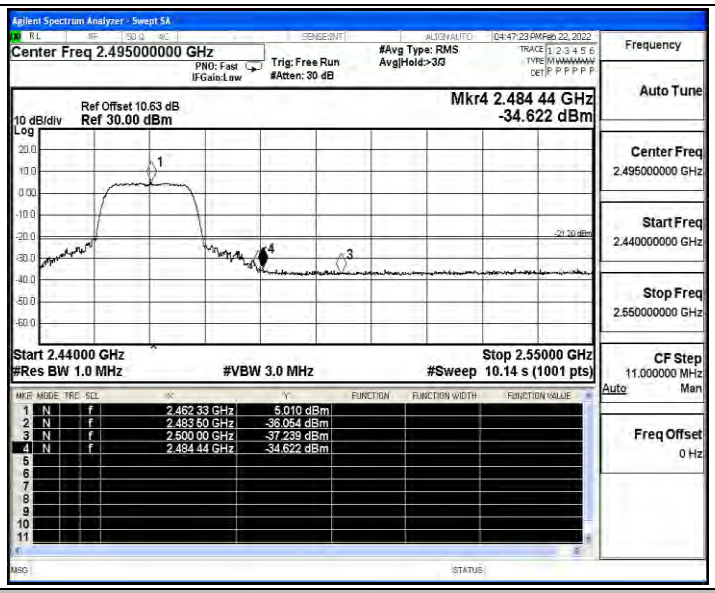

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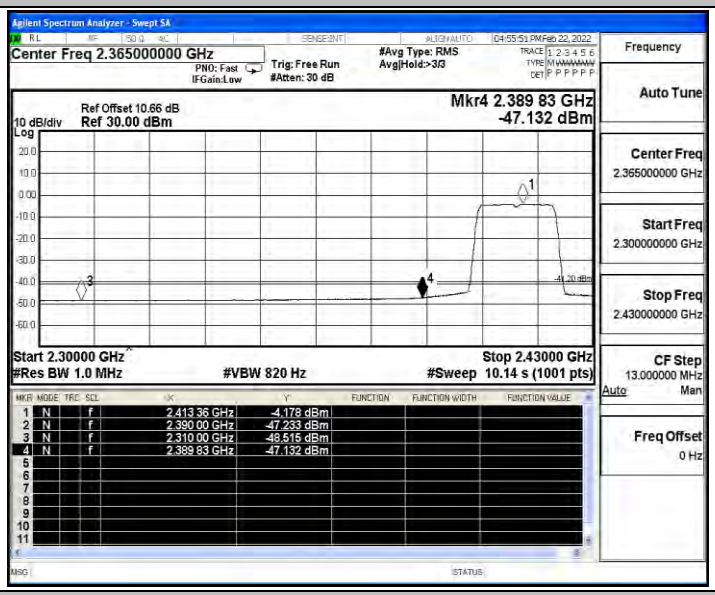

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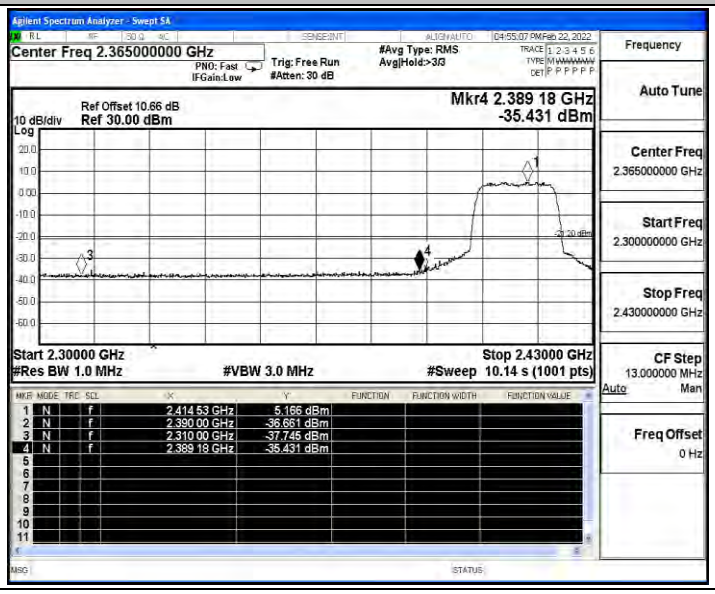

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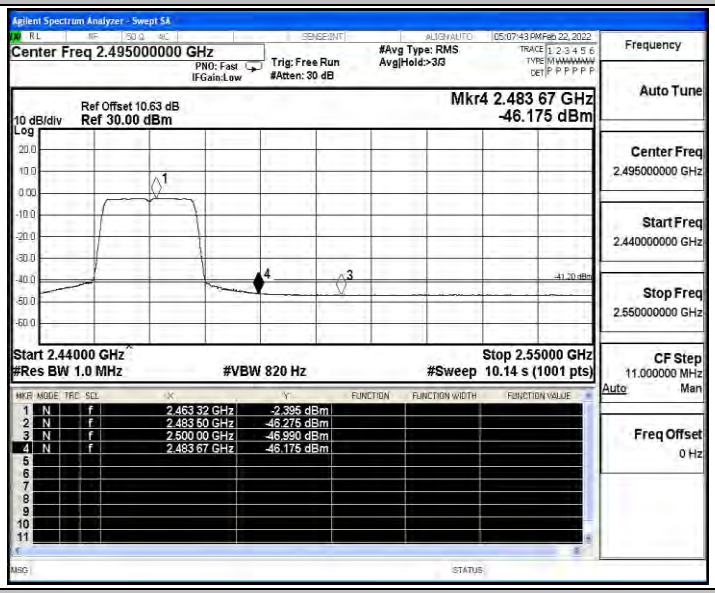

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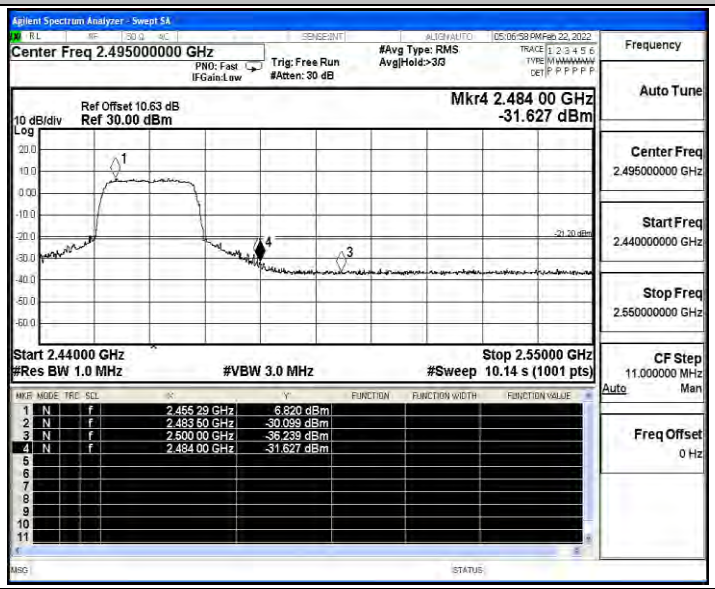

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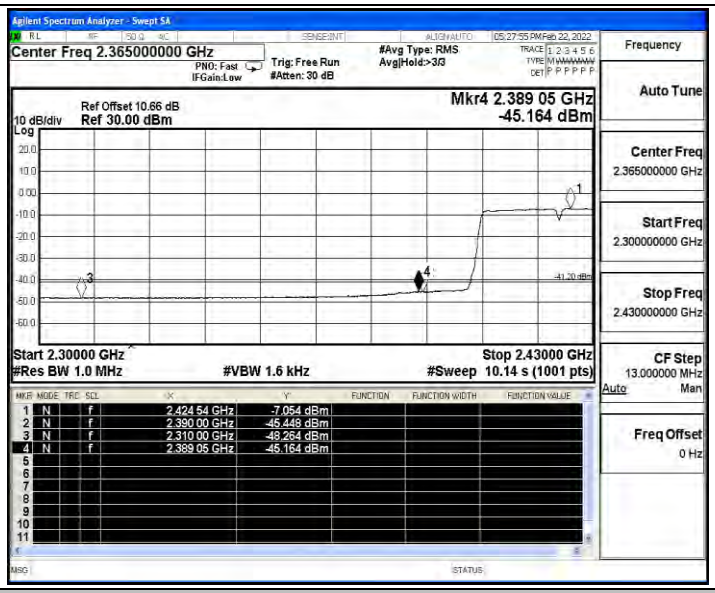

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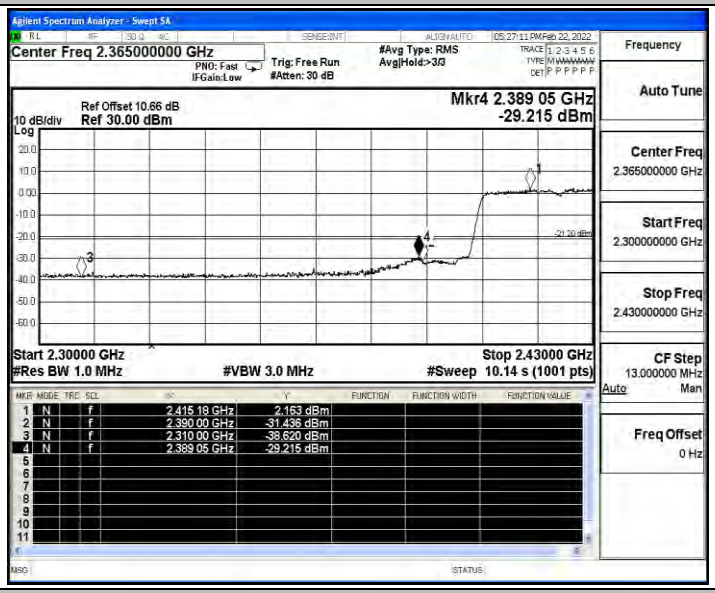

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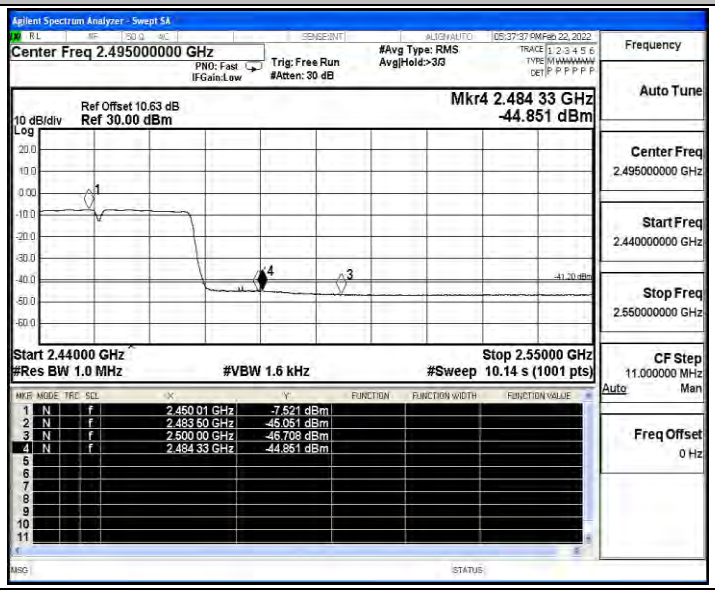
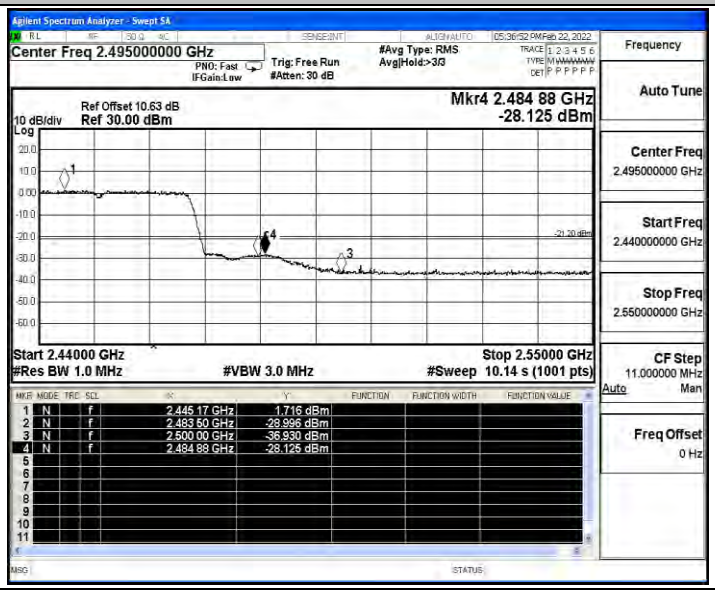
11N40SISO_Ant1_High_2452_Peak