



Appendix D

RF Test Data for 5.2G WIFI (Conducted Measurement)

Product Name: SmartHub

Test Model: SmartHub v2

Environmental Conditions

Temperature:	23.8° C
Relative Humidity:	52.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Ling Zhu
Supervised by:	Li Huan





D.1 Emission Bandwidth

Test Result

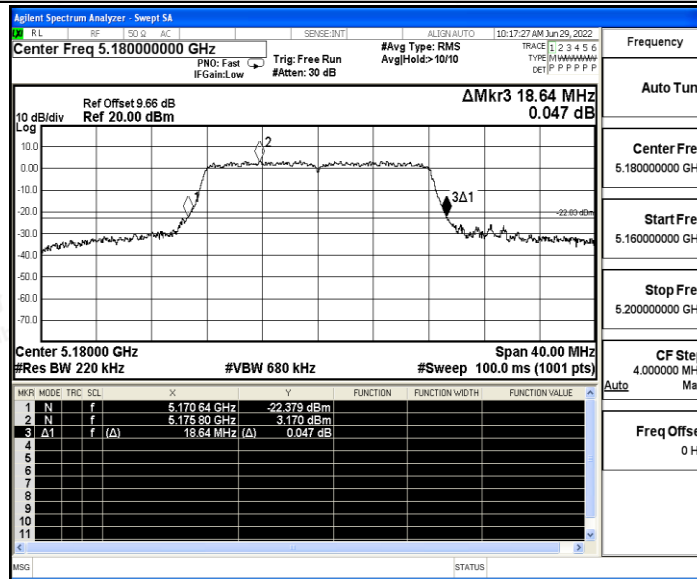
TestMode	Antenna	Channel	26db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	18.640	5170.640	5189.280	---	---
		5220	19.240	5210.760	5230.000	---	---
		5240	18.760	5230.640	5249.400	---	---
11N20SISO	Ant1	5180	19.440	5170.240	5189.680	---	---
		5220	19.440	5210.280	5229.720	---	---
		5240	20.120	5229.920	5250.040	---	---
11N40SISO	Ant1	5190	41.840	5168.960	5210.800	---	---
		5230	41.360	5209.360	5250.720	---	---
11AC20SISO	Ant1	5180	19.400	5170.280	5189.680	---	---
		5220	19.400	5210.320	5229.720	---	---
		5240	19.480	5230.200	5249.680	---	---
11AC40SISO	Ant1	5190	41.280	5169.280	5210.560	---	---
		5230	41.840	5209.120	5250.960	---	---
11AC80SISO	Ant1	5210	81.120	5169.520	5250.640	---	---



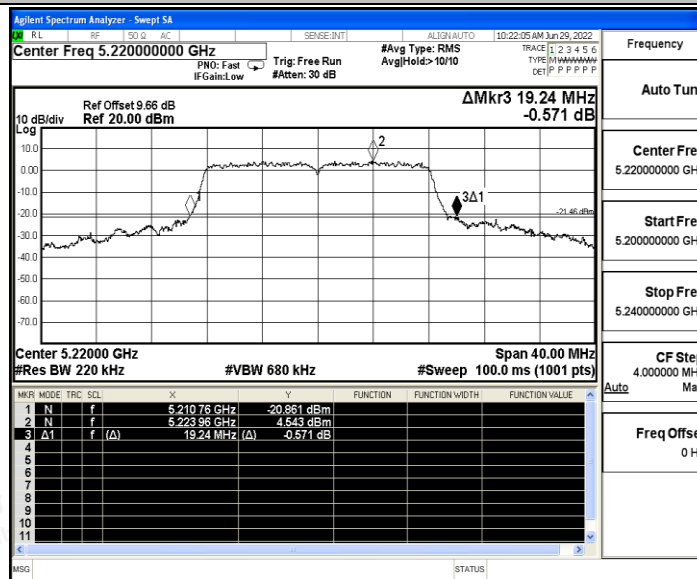


Test Graphs

11A_Ant1_5180

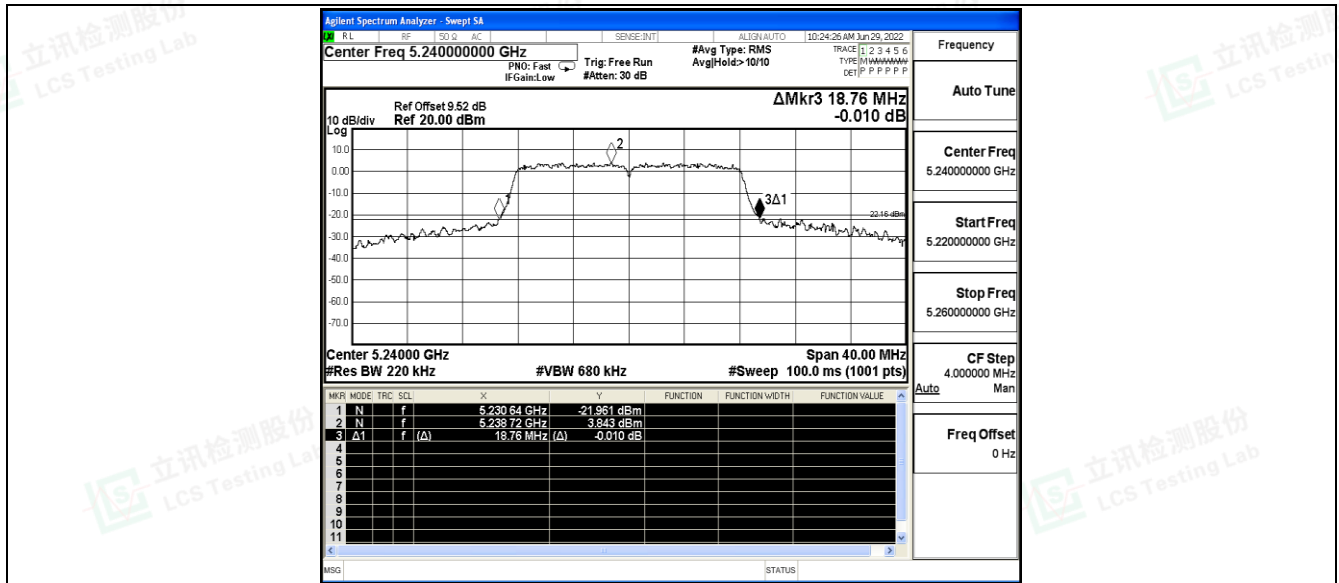


11A_Ant1_5220

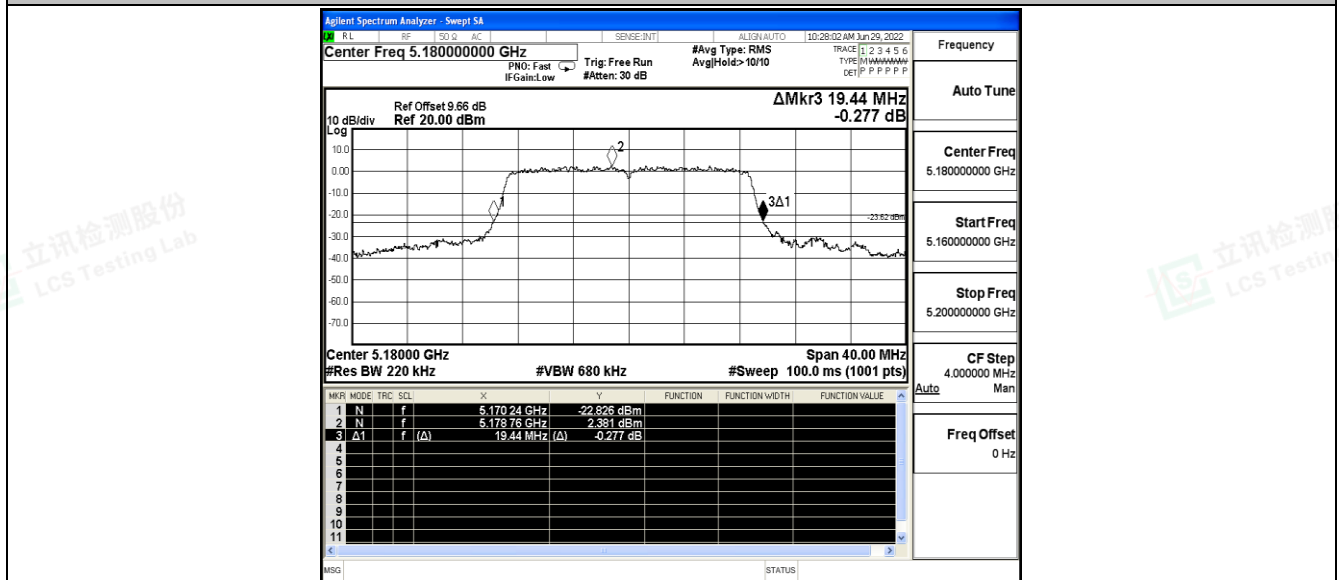


11A_Ant1_5240



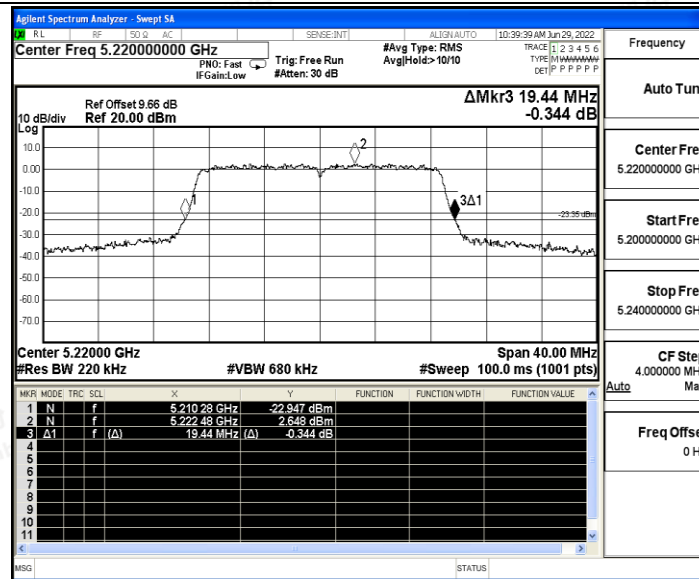


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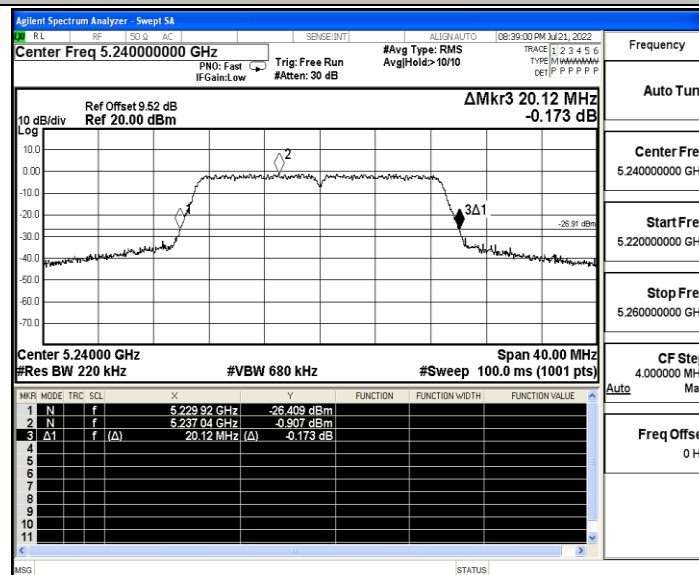


11N20SISO_Ant1_5220



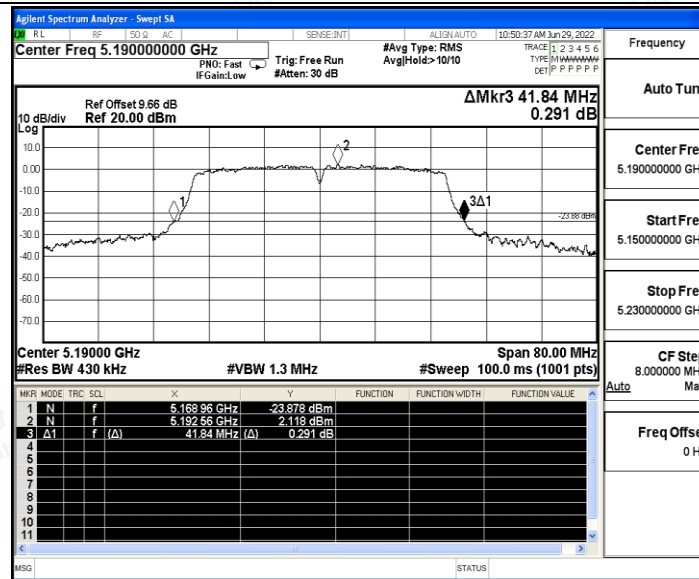


11N20SISO_Ant1_5240

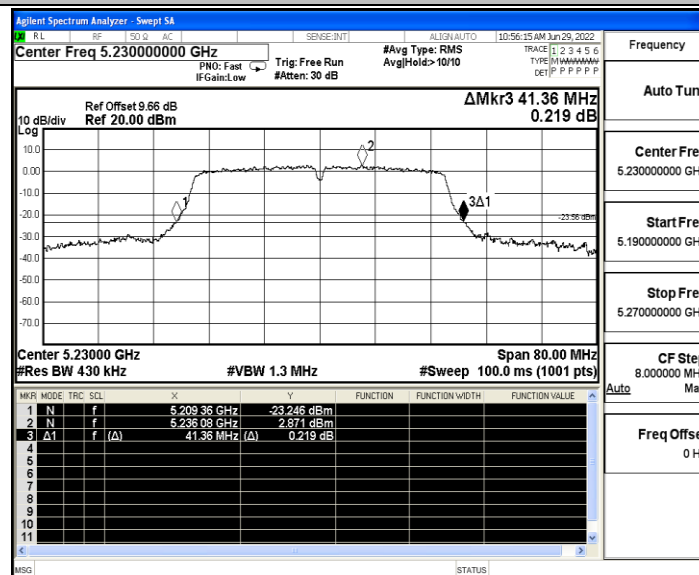


11N40SISO_Ant1_5190



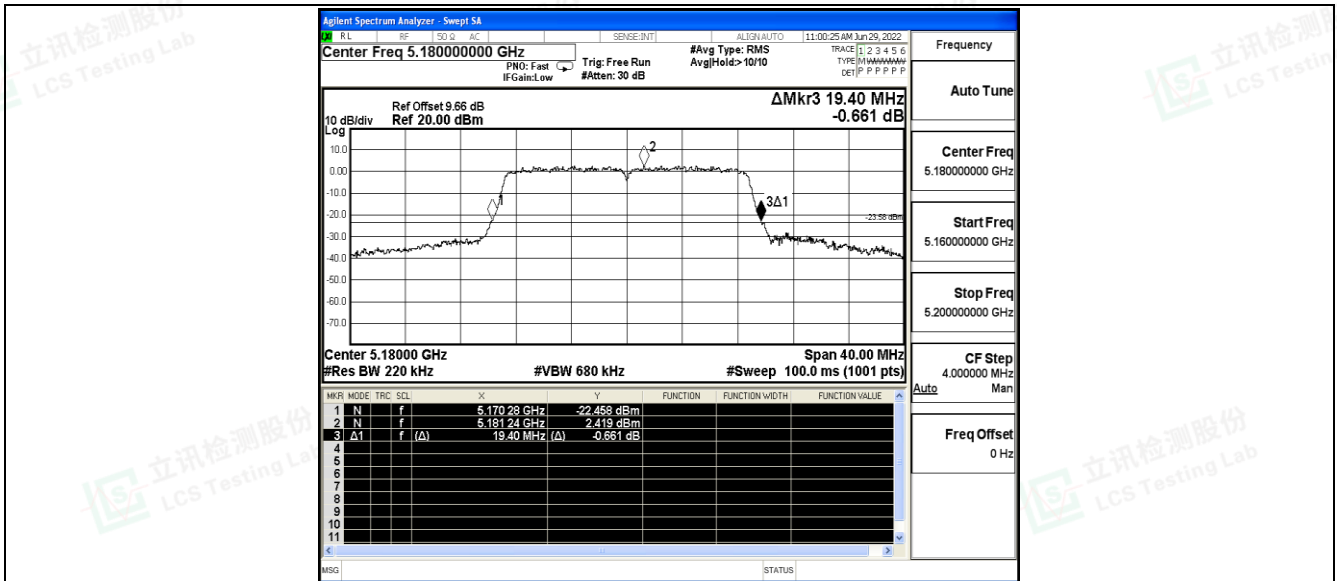


11N40SISO_Ant1_5230

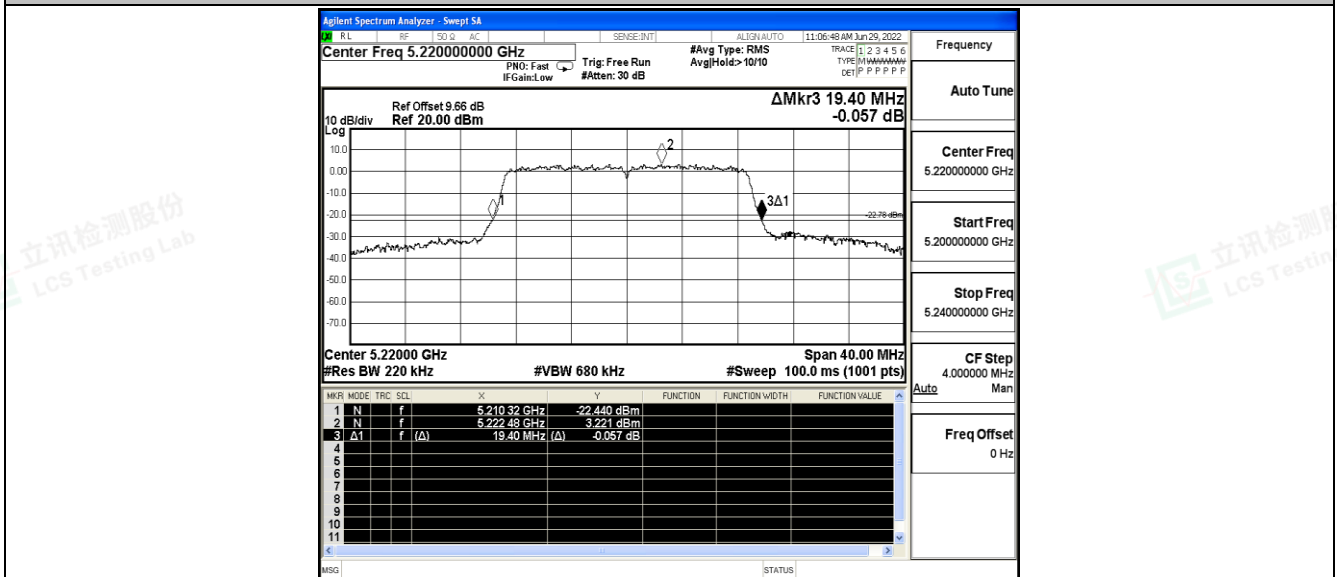


11AC20SISO_Ant1_5180



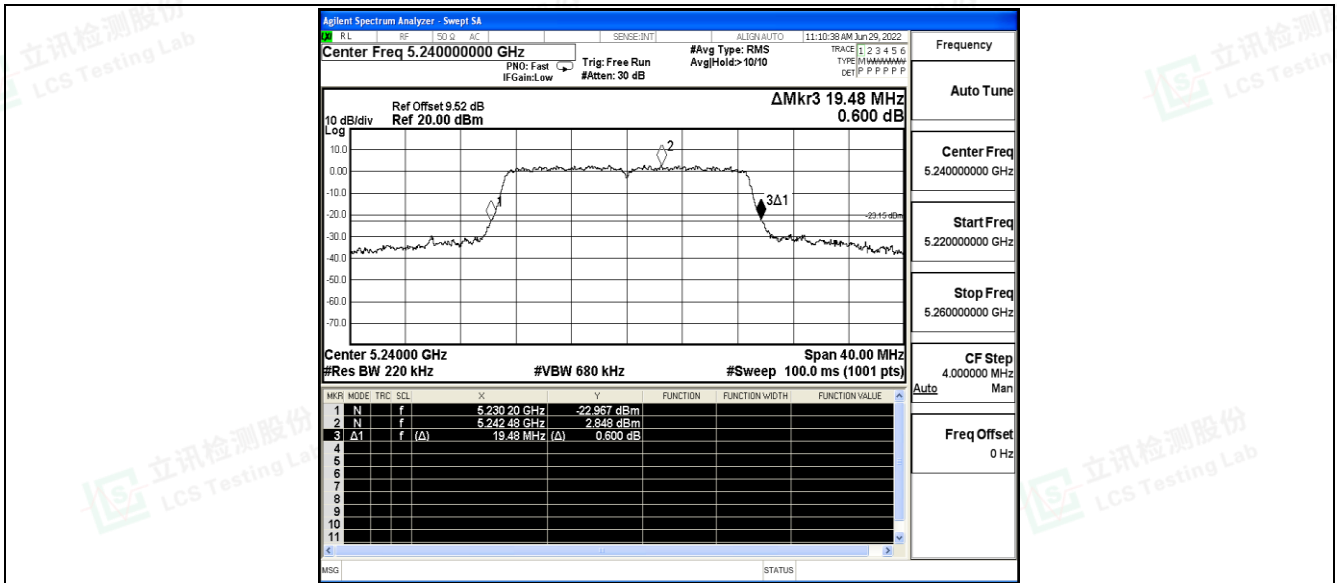


11AC20SISO_Ant1_5220

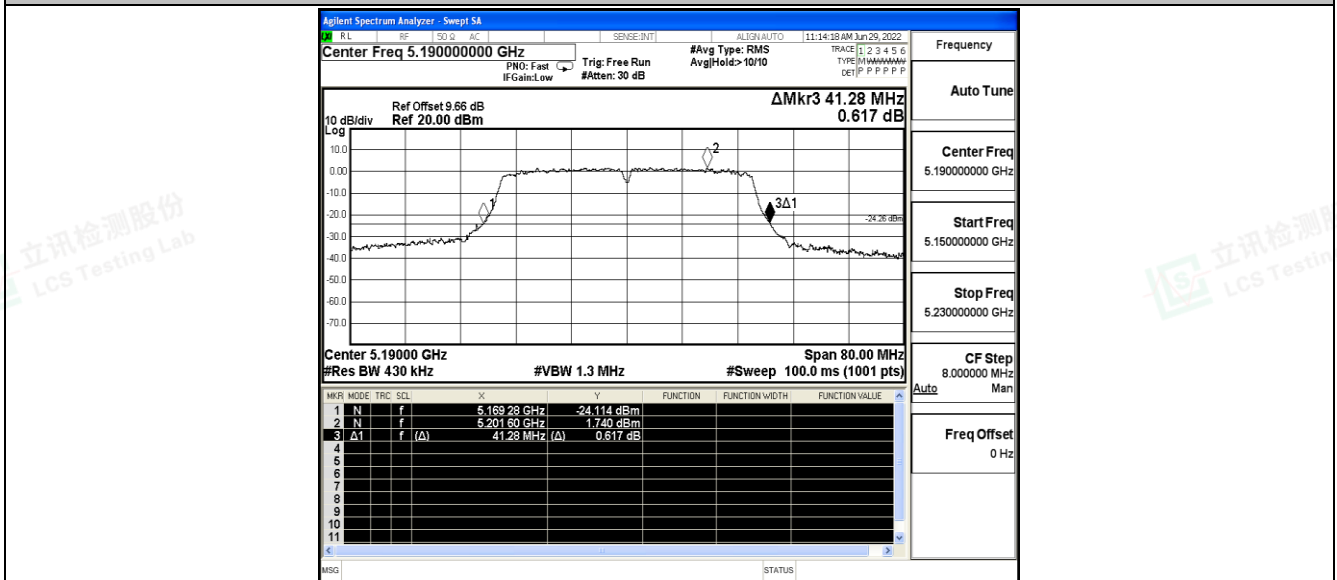


11AC20SISO_Ant1_5240





11AC40SISO_Ant1_5190



11AC40SISO_Ant1_5230







D.2 Maximum conducted output power

Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11A	Ant1	5180	13.48	≤30	PASS
		5220	14.52	≤30	PASS
		5240	14.38	≤30	PASS
11N20SISO	Ant1	5180	12.69	≤30	PASS
		5220	13.48	≤30	PASS
		5240	13.38	≤30	PASS
11N40SISO	Ant1	5190	13.81	≤30	PASS
		5230	13.55	≤30	PASS
11AC20SISO	Ant1	5180	13.19	≤30	PASS
		5220	13.64	≤30	PASS
		5240	13.70	≤30	PASS
11AC40SISO	Ant1	5190	13.06	≤30	PASS
		5230	13.30	≤30	PASS
11AC80SISO	Ant1	5210	12.81	≤30	PASS

Note: The Duty Cycle Factor is compensated in the graph.



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D.3 Maximum power spectral density

Test Result

TestMode	Antenna	Channel	Result [dBm/MHz]	Limit[dBm/MHz]	Verdict
11A	Ant1	5180	2.11	≤17.00	PASS
		5220	3.15	≤17.00	PASS
		5240	3.03	≤17.00	PASS
11N20SISO	Ant1	5180	1.41	≤17.00	PASS
		5220	1.97	≤17.00	PASS
		5240	1.77	≤17.00	PASS
11N40SISO	Ant1	5190	-0.07	≤17.00	PASS
		5230	-0.78	≤17.00	PASS
11AC20SISO	Ant1	5180	1.58	≤17.00	PASS
		5220	2.03	≤17.00	PASS
		5240	1.95	≤17.00	PASS
11AC40SISO	Ant1	5190	-1.01	≤17.00	PASS
		5230	-1.02	≤17.00	PASS
11AC80SISO	Ant1	5210	-3.96	≤17.00	PASS

Note: 1.The Result and Limit Unit is dBm/500 kHz in the band 5.725–5.85 GHz.

2.The Duty Cycle Factor and RBW Factor is compensated in the graph.

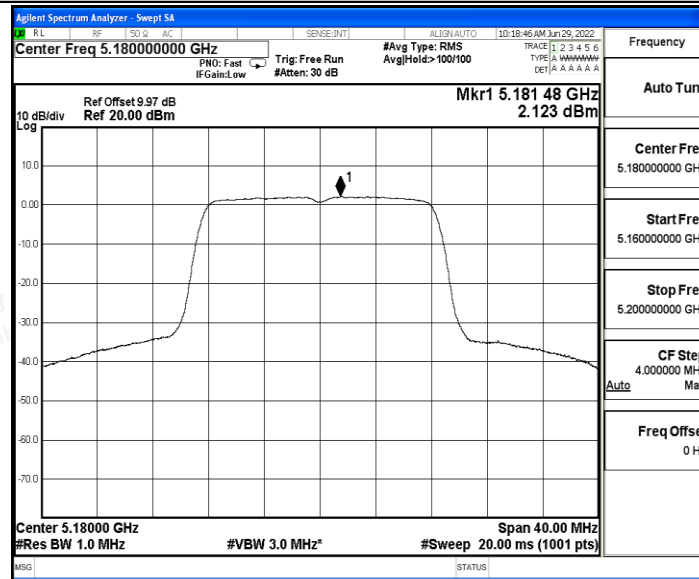


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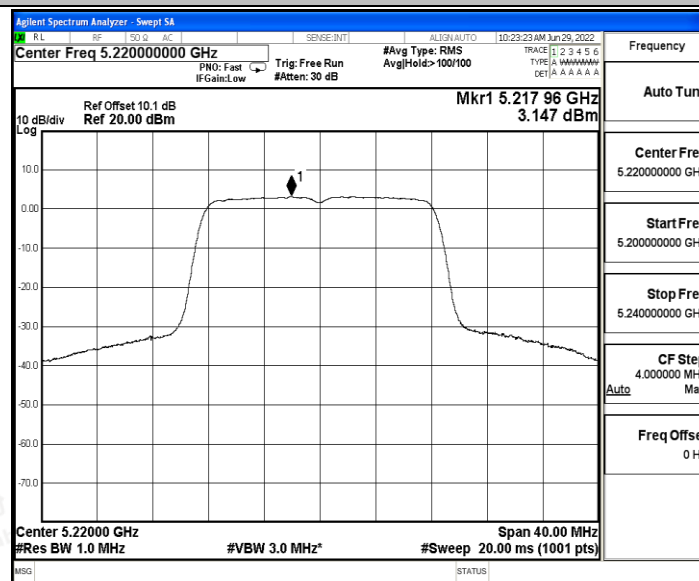


Test Graphs

11A_Ant1_5180

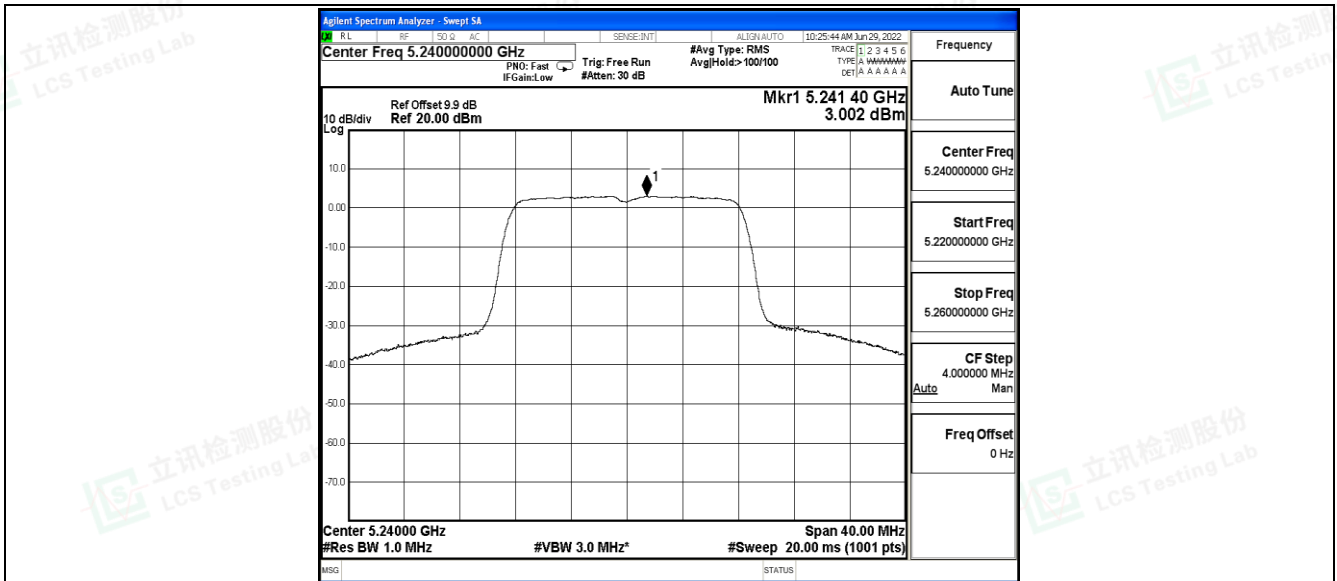


11A_Ant1_5220

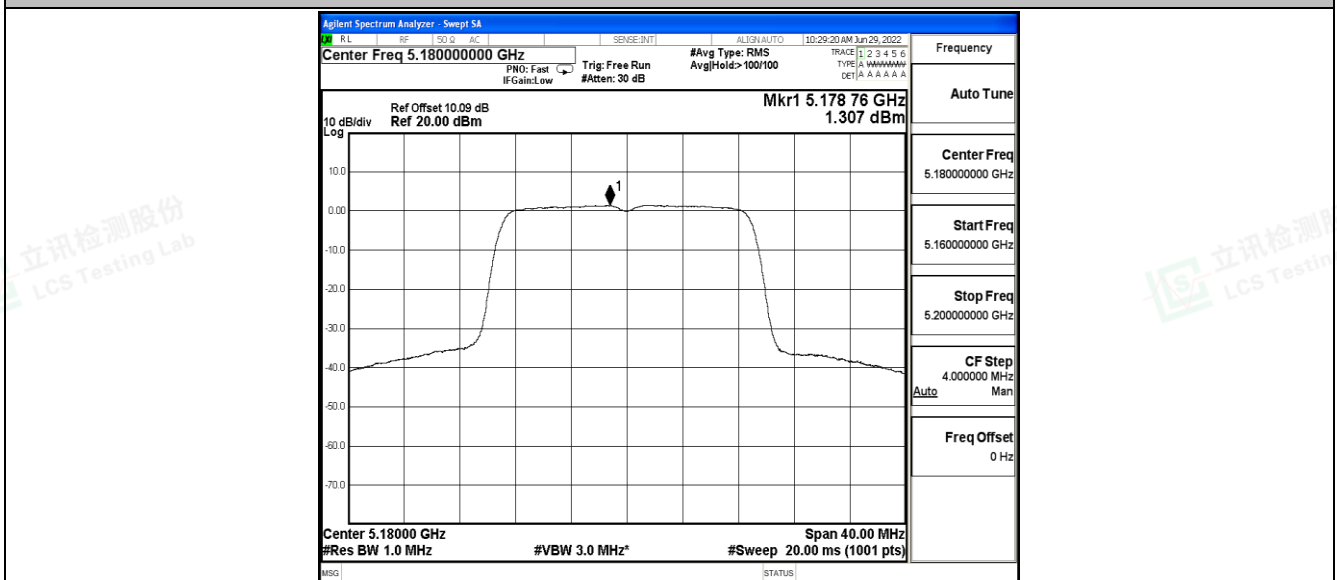


11A_Ant1_5240



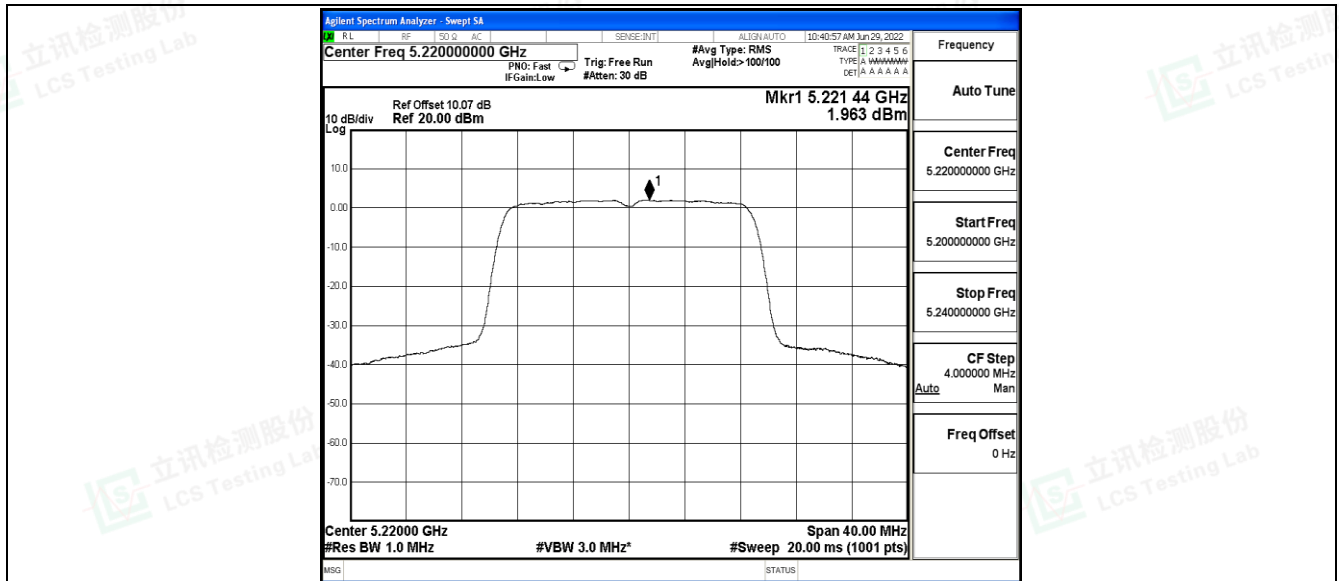


11N20SISO_Ant1_5180

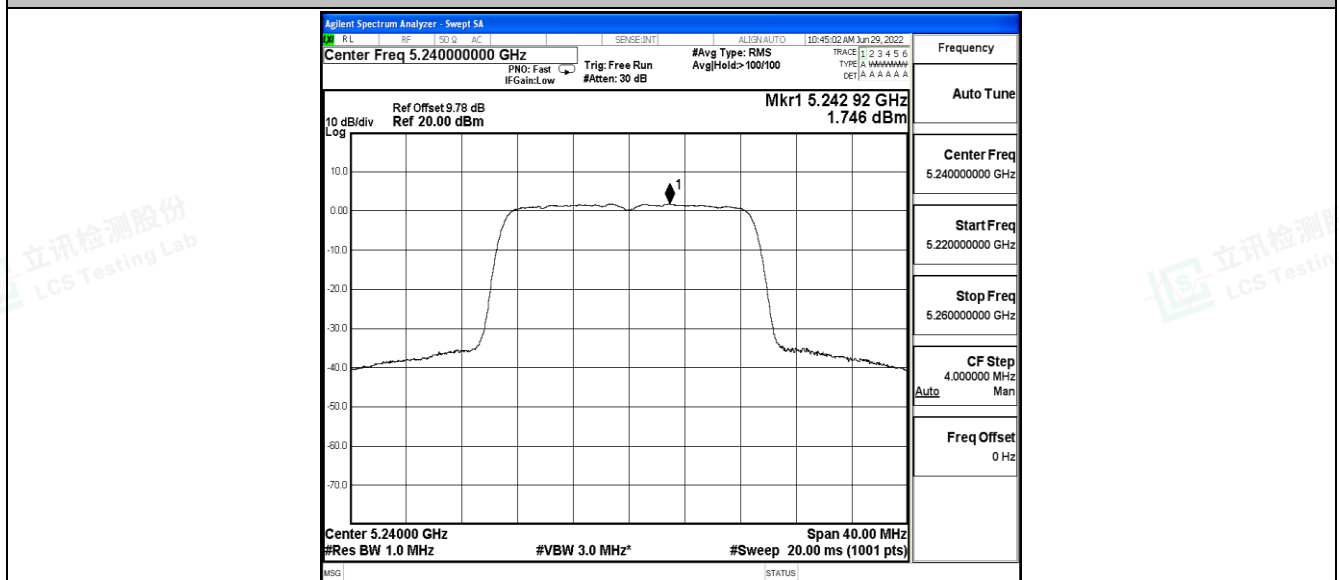


11N20SISO_Ant1_5220



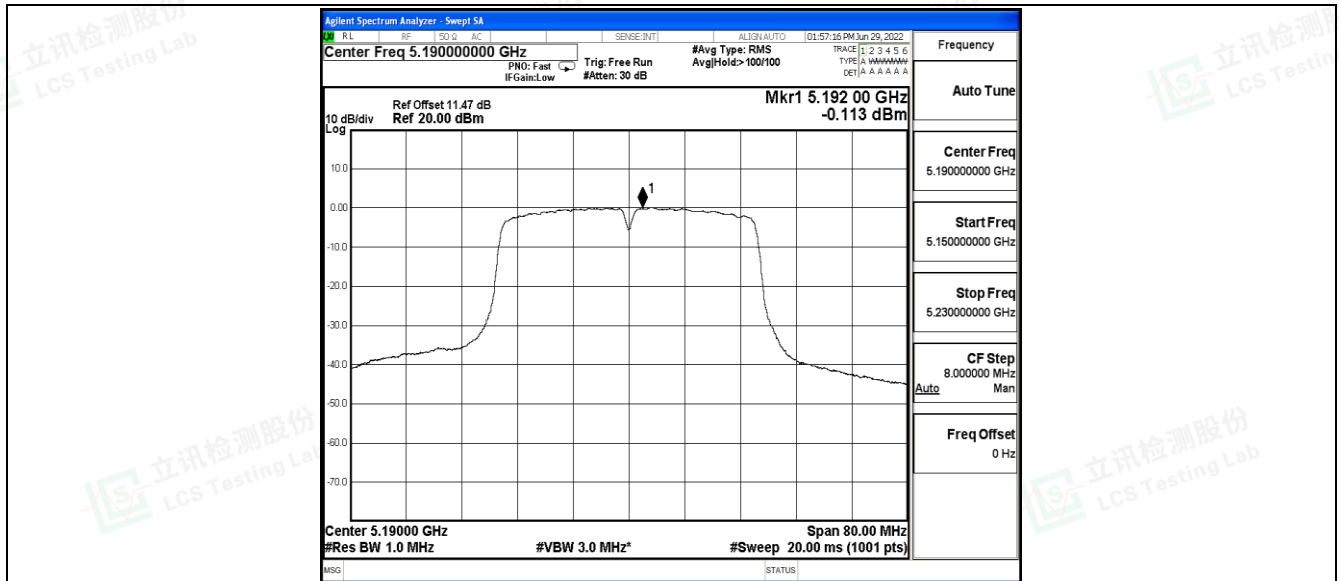


11N20SISO_Ant1_5240

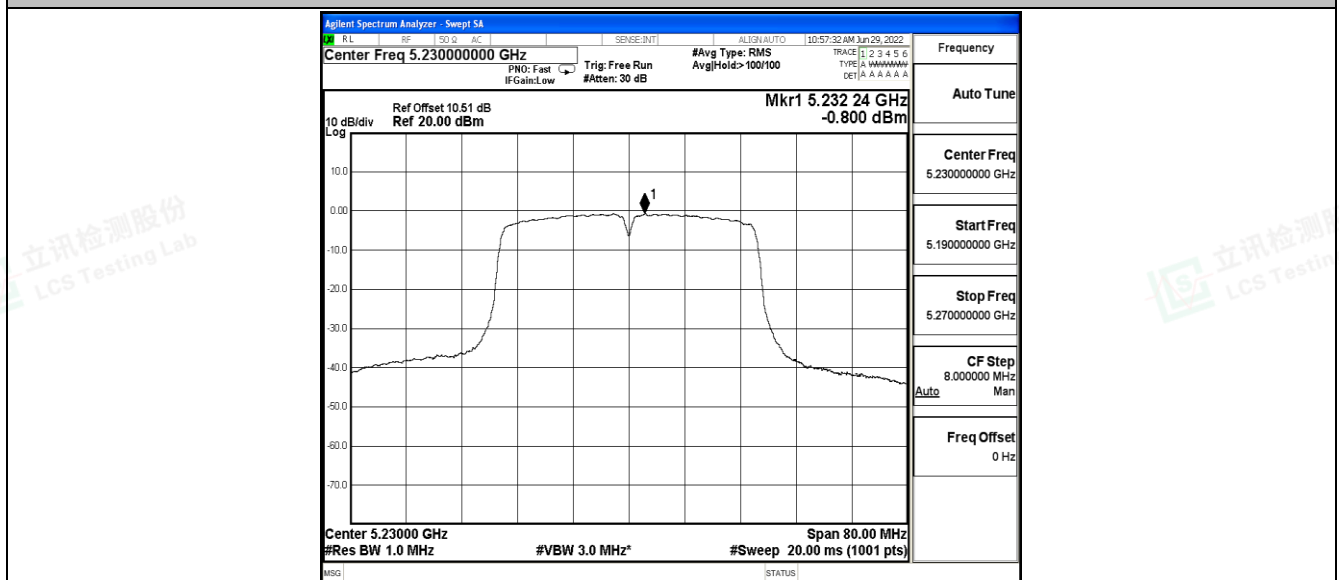


11N40SISO_Ant1_5190



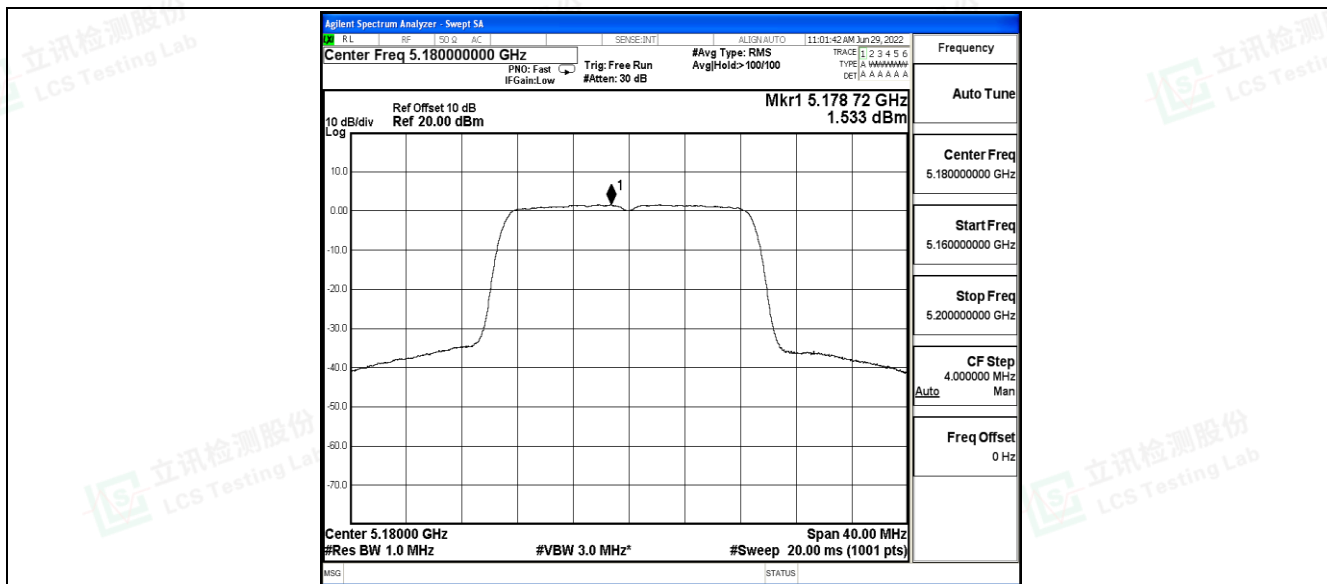


11N40SISO_Ant1_5230

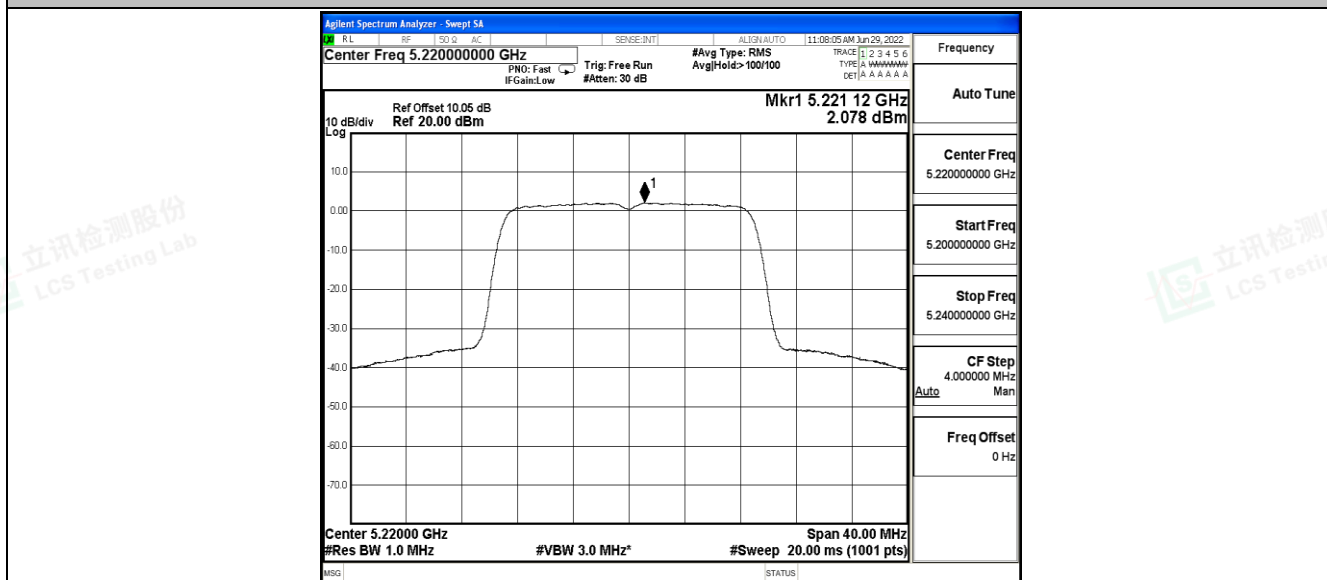


11AC20SISO_Ant1_5180



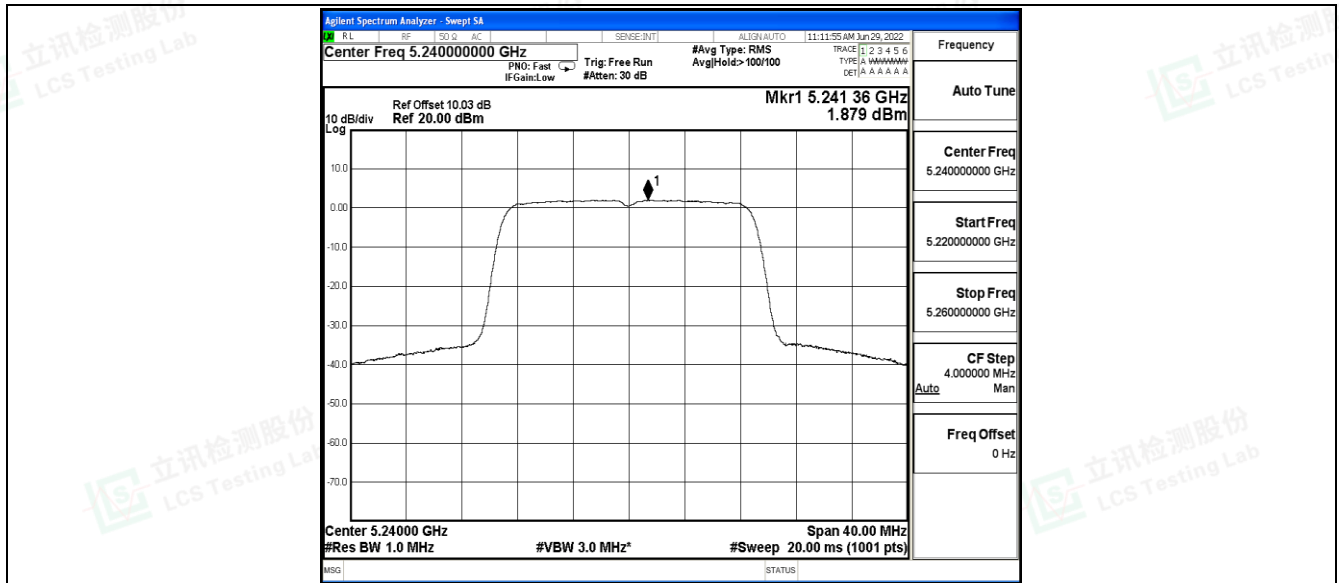


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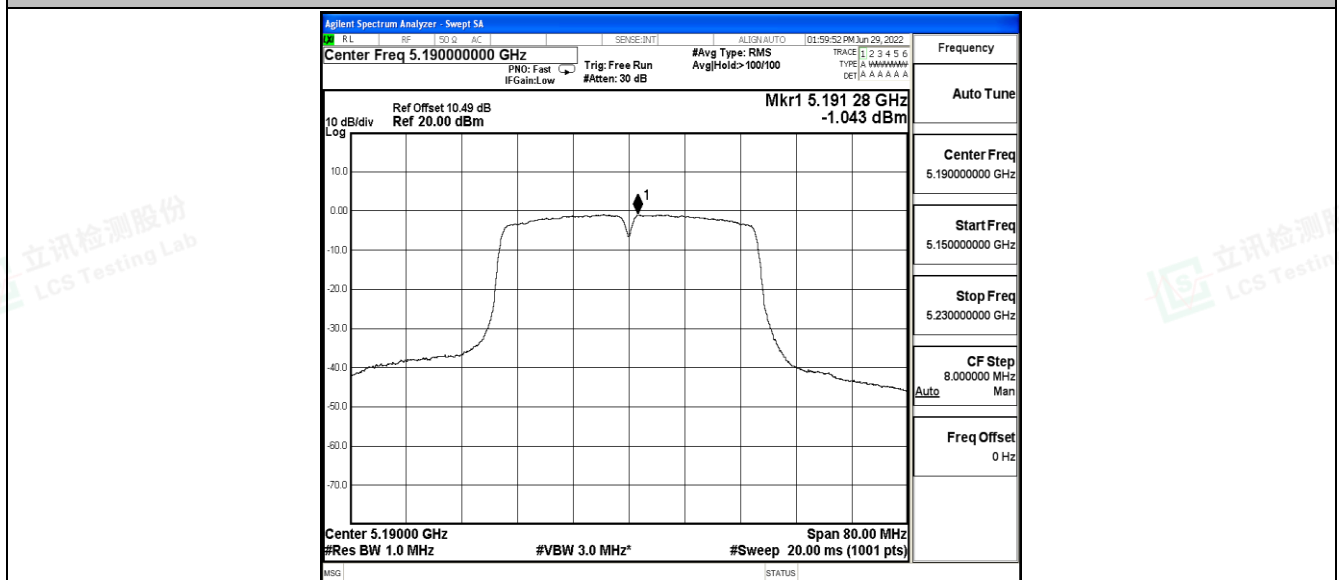


11AC20SISO_Ant1_5240



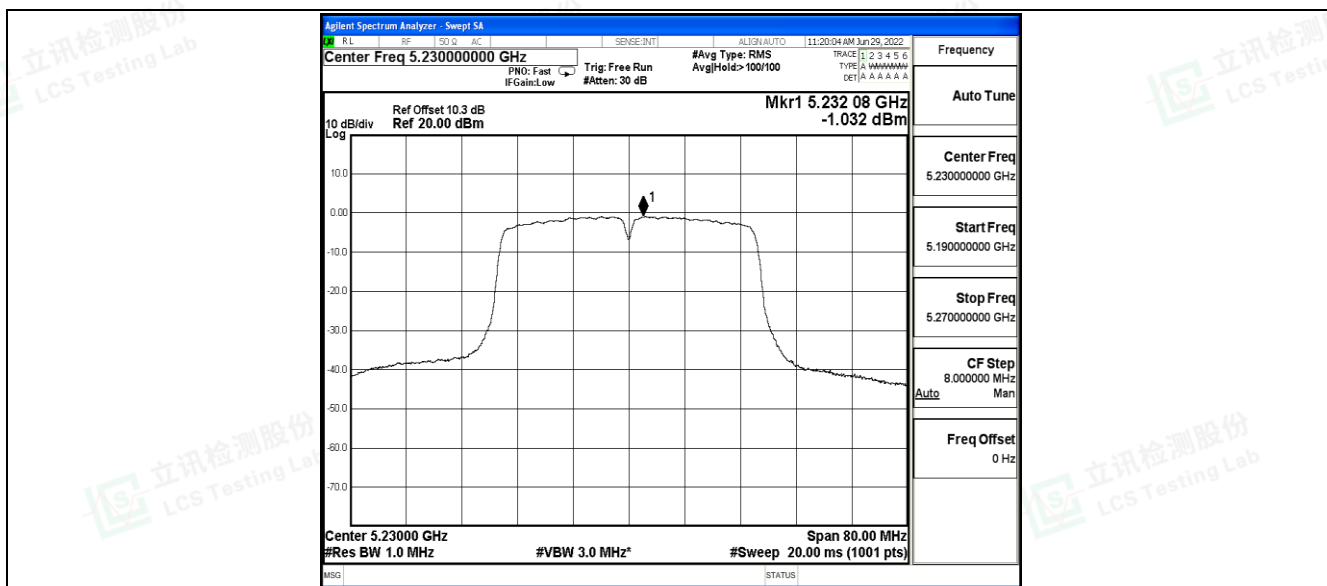


11AC40SiSO_Ant1_5190

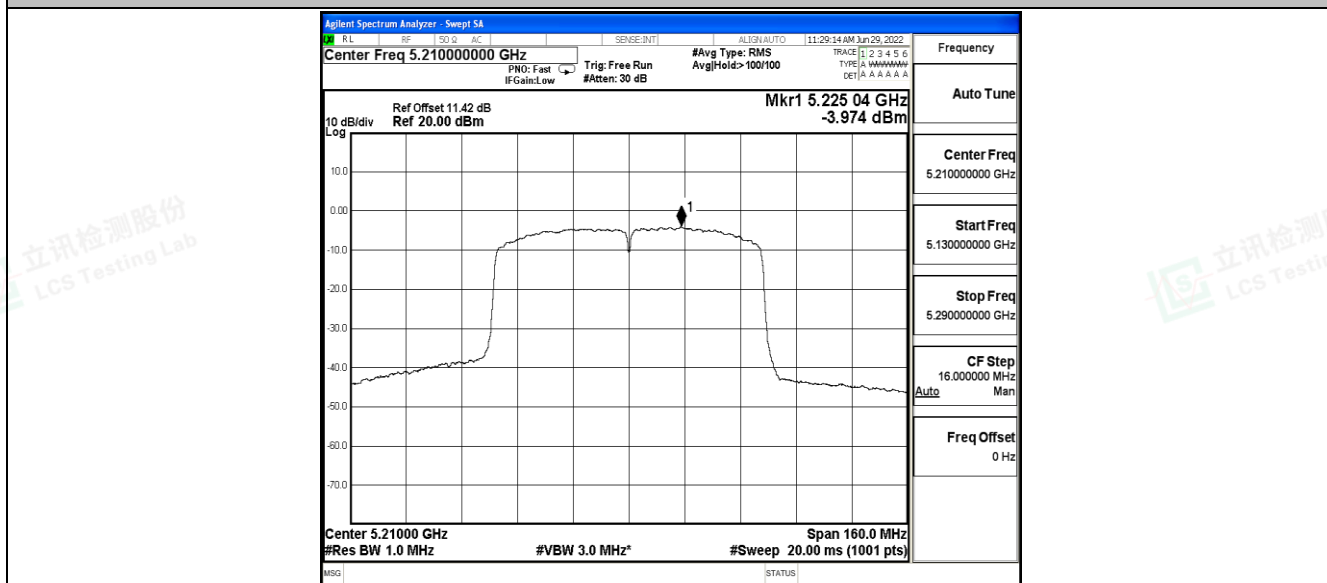


11AC40SiSO_Ant1_5230





11AC80SISO_Ant1_5210





D.4 Emissions in Restricted Bands

Test Result

TestMode	Antenna	ChName	Channel	Detector	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
11A	Ant1	Low	5180	AV	4500.000	-48.56	≤-41.20	46.64	≤54	PASS
				AV	5149.600	-45.06	≤-41.20	50.14	≤54	PASS
				AV	5150.000	-44.74	≤-41.20	50.46	≤54	PASS
				Peak	4500.000	-39.5	≤-21.20	55.70	≤74	PASS
				Peak	5149.600	-32.5	≤-21.20	62.70	≤74	PASS
				Peak	5150.000	-29.7	≤-21.20	65.50	≤74	PASS
		High	5240	AV	5350.000	-46.59	≤-41.20	48.61	≤54	PASS
				AV	5403.840	-45.95	≤-41.20	49.25	≤54	PASS
				AV	5460.000	-47.49	≤-41.20	47.71	≤54	PASS
				Peak	5350.000	-38.74	≤-21.20	56.46	≤74	PASS
				Peak	5351.040	-34.74	≤-21.20	60.46	≤74	PASS
				Peak	5460.000	-39.25	≤-21.20	55.95	≤74	PASS
11N20SIS O	Ant1	Low	5180	AV	4500.000	-48.7	≤-41.20	46.50	≤54	PASS
				AV	5149.600	-45.31	≤-41.20	49.89	≤54	PASS
				AV	5150.000	-45.29	≤-41.20	49.91	≤54	PASS
				Peak	4500.000	-39.62	≤-21.20	55.58	≤74	PASS
				Peak	5148.900	-33.02	≤-21.20	62.18	≤74	PASS
				Peak	5150.000	-34.28	≤-21.20	60.92	≤74	PASS
		High	5240	AV	5350.000	-46.94	≤-41.20	48.26	≤54	PASS
				AV	5398.320	-46.45	≤-41.20	48.75	≤54	PASS
				AV	5460.000	-47.52	≤-41.20	47.68	≤54	PASS
				Peak	5350.000	-38.86	≤-21.20	56.34	≤74	PASS
				Peak	5420.640	-35.83	≤-21.20	59.37	≤74	PASS
				Peak	5460.000	-39.58	≤-21.20	55.62	≤74	PASS
11N40SIS O	Ant1	Low	5190	AV	4500.000	-48.4	≤-41.20	46.80	≤54	PASS
				AV	5148.900	-46.06	≤-41.20	49.14	≤54	PASS
				AV	5150.000	-45.54	≤-41.20	49.66	≤54	PASS
				Peak	4500.000	-39.58	≤-21.20	55.62	≤74	PASS
				Peak	5148.900	-31.84	≤-21.20	63.36	≤74	PASS
				Peak	5150.000	-29.58	≤-21.20	65.62	≤74	PASS
		High	5230	AV	5350.000	-46.77	≤-41.20	48.43	≤54	PASS
				AV	5388.500	-46.14	≤-41.20	49.06	≤54	PASS
				AV	5460.000	-46.75	≤-41.20	48.45	≤54	PASS
				Peak	5350.000	-37.54	≤-21.20	57.66	≤74	PASS



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11AC20SI SO	Ant1	Low	5180	Peak	5378.880	-36.35	≤-21.20	58.85	≤74	PASS
				Peak	5460.000	-37.73	≤-21.20	57.47	≤74	PASS
				AV	4500.000	-48.68	≤-41.20	46.52	≤54	PASS
				AV	5149.600	-45.24	≤-41.20	49.96	≤54	PASS
				AV	5150.000	-45.04	≤-41.20	50.16	≤54	PASS
				Peak	4500.000	-40.36	≤-21.20	54.84	≤74	PASS
		High	5240	Peak	5149.600	-30.83	≤-21.20	64.37	≤74	PASS
				Peak	5150.000	-33.69	≤-21.20	61.51	≤74	PASS
				AV	5350.000	-46.83	≤-41.20	48.37	≤54	PASS
				AV	5403.360	-46.28	≤-41.20	48.92	≤54	PASS
				AV	5460.000	-47.51	≤-41.20	47.69	≤54	PASS
				Peak	5350.000	-38.69	≤-21.20	56.51	≤74	PASS
11AC40SI SO	Ant1	Low	5190	Peak	5450.640	-36.29	≤-21.20	58.91	≤74	PASS
				Peak	5460.000	-39.16	≤-21.20	56.04	≤74	PASS
				AV	4500.000	-48.46	≤-41.20	46.74	≤54	PASS
				AV	4889.200	-46.16	≤-41.20	49.04	≤54	PASS
				AV	5150.000	-46.09	≤-41.20	49.11	≤54	PASS
				Peak	4500.000	-40.09	≤-21.20	55.11	≤74	PASS
		High	5230	Peak	5149.600	-34.99	≤-21.20	60.21	≤74	PASS
				Peak	5150.000	-35.72	≤-21.20	59.48	≤74	PASS
				AV	5350.000	-46.72	≤-41.20	48.48	≤54	PASS
				AV	5378.100	-46.35	≤-41.20	48.85	≤54	PASS
				AV	5460.000	-46.76	≤-41.20	48.44	≤54	PASS
				Peak	5350.000	-38.54	≤-21.20	56.66	≤74	PASS
11AC80SI SO	Ant1	Low	5210	Peak	5392.660	-36.49	≤-21.20	58.71	≤74	PASS
				Peak	5460.000	-38.03	≤-21.20	57.17	≤74	PASS
				AV	4500.000	-48.31	≤-41.20	46.89	≤54	PASS
				AV	5148.750	-45.57	≤-41.20	49.63	≤54	PASS
				AV	5150.000	-45.26	≤-41.20	49.94	≤54	PASS
				Peak	4500.000	-40.19	≤-21.20	55.01	≤74	PASS
		High	5210	Peak	5144.250	-32.65	≤-21.20	62.55	≤74	PASS
				Peak	5150.000	-34.15	≤-21.20	61.05	≤74	PASS
				AV	5350.000	-46.43	≤-41.20	48.77	≤54	PASS
				AV	5430.880	-46.25	≤-41.20	48.95	≤54	PASS
				AV	5460.000	-46.79	≤-41.20	48.41	≤54	PASS
				Peak	5350.000	-37.53	≤-21.20	57.67	≤74	PASS



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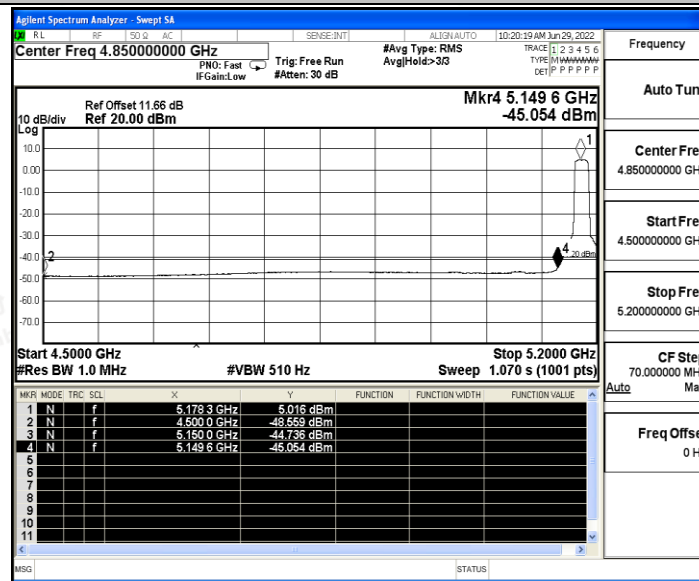
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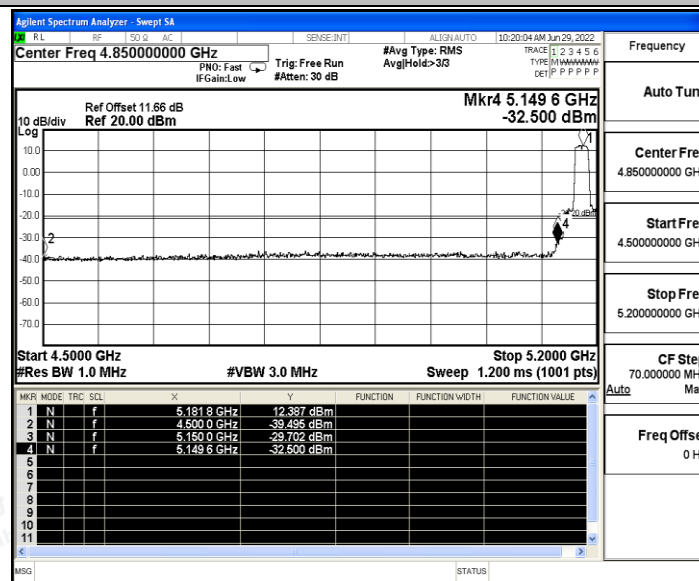


Test Graphs

11A_Ant1_Low_5180_AV

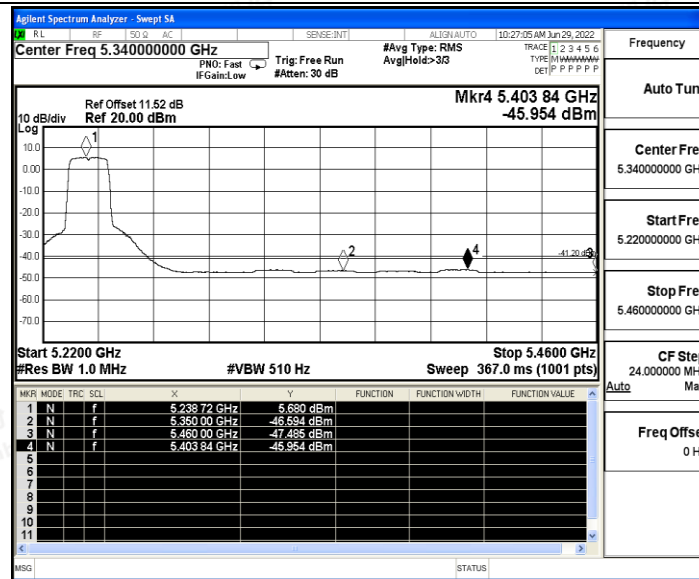


11A_Ant1_Low_5180_Peak

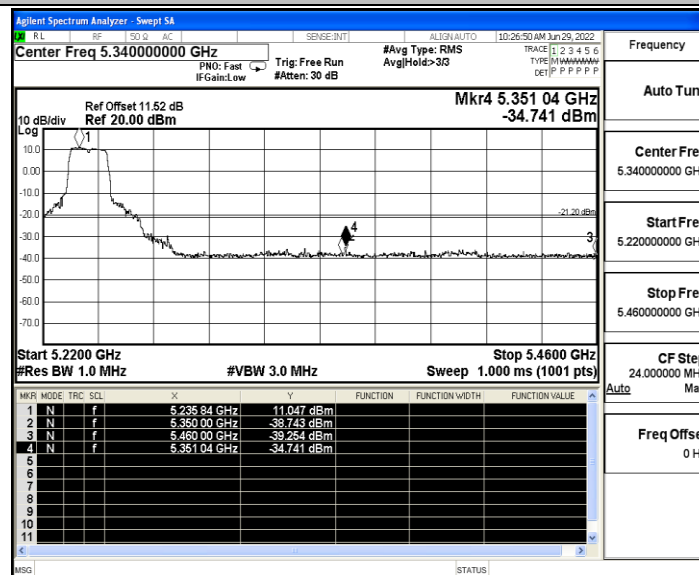


11A_Ant1_High_5240_AV



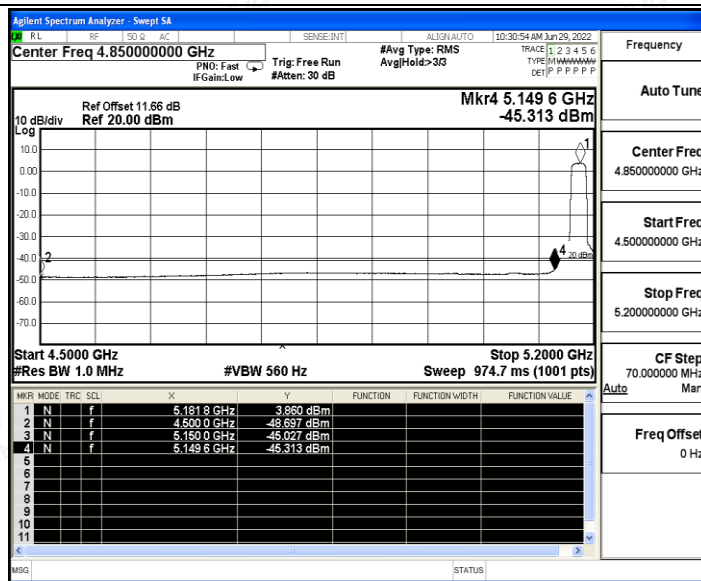


11A_Ant1_High_5240_Peak

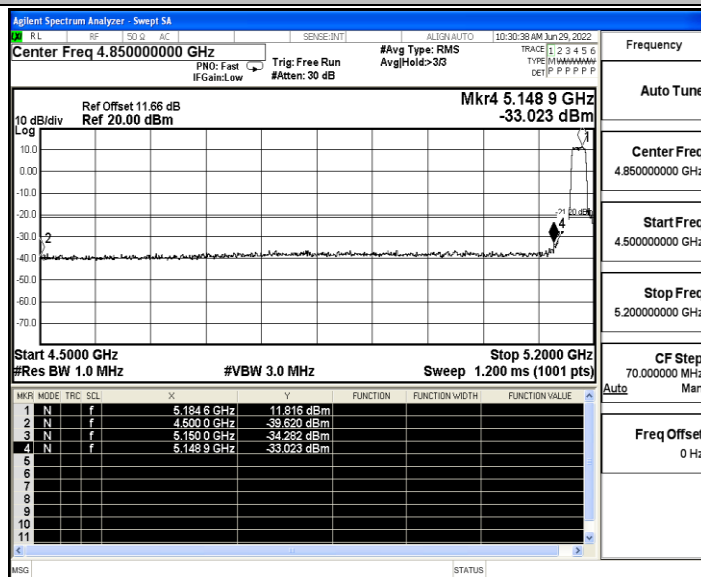


11N20SISO_Ant1_Low_5180_AV



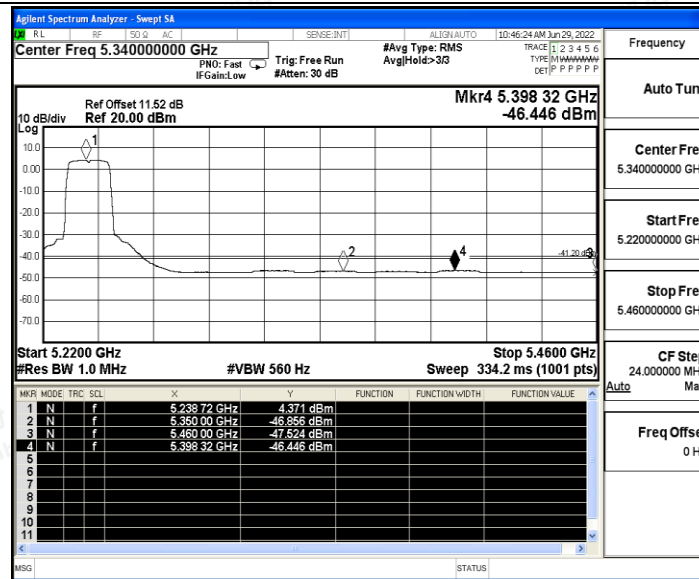


11N20SISO_Ant1_Low_5180_Peak

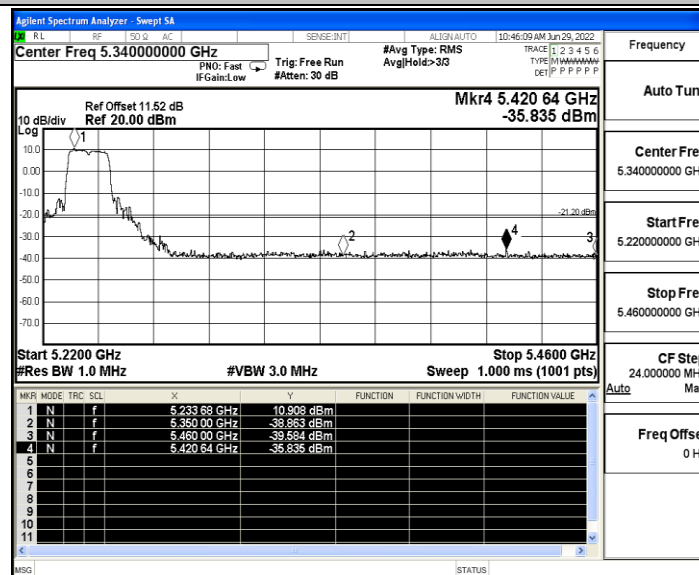


11N20SISO_Ant1_High_5240_AV



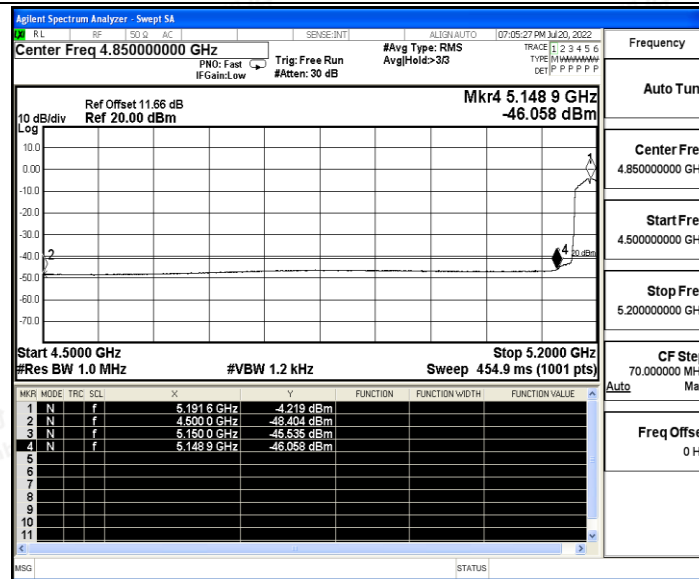


11N20SISO_Ant1_High_5240_Peak

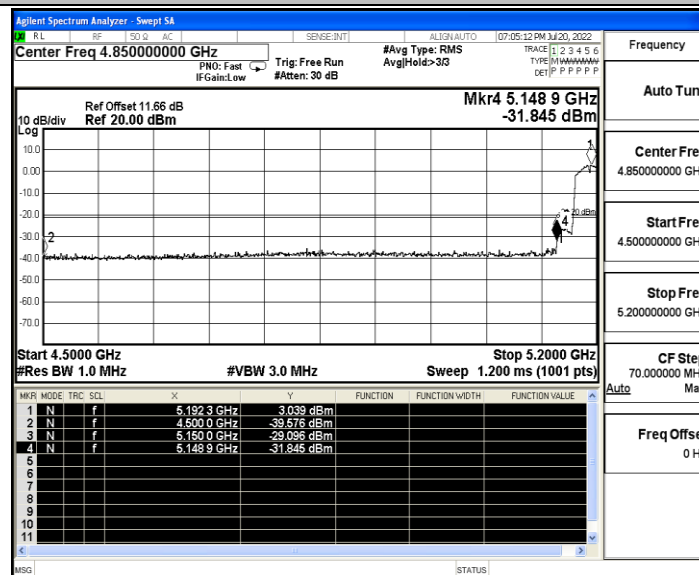


11N40SISO_Ant1_Low_5190_AV



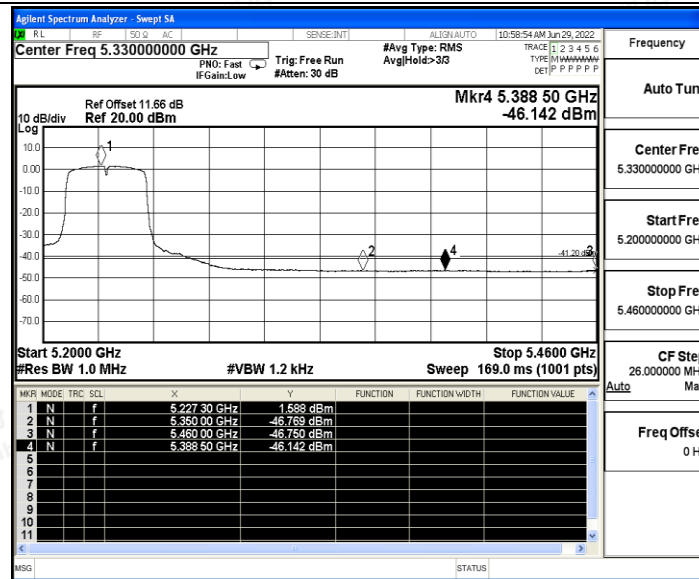


11N40SISO_Ant1_Low_5190_Peak

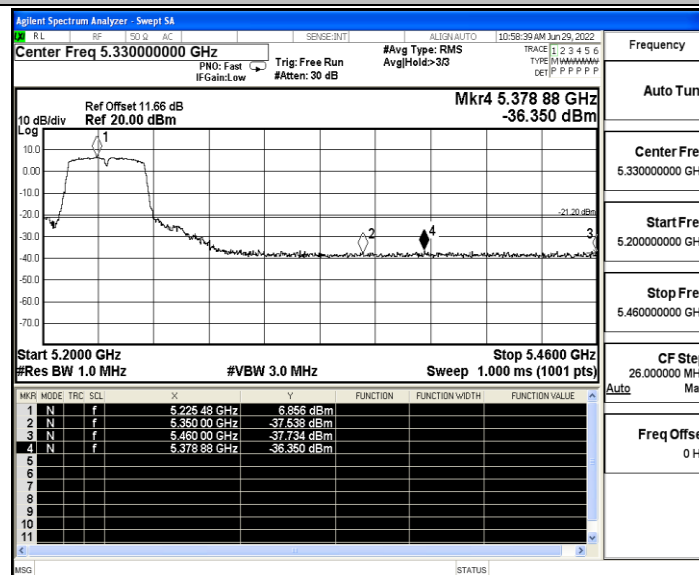


11N40SISO_Ant1_High_5230_AV



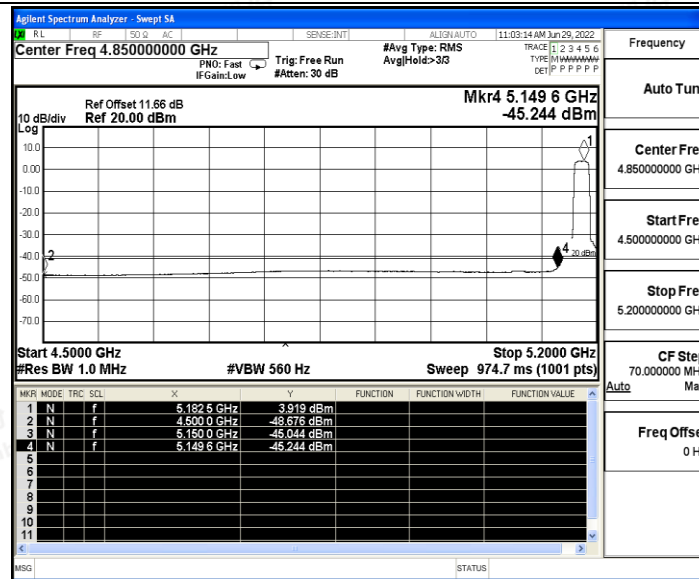


11N40SISO_Ant1_High_5230_Peak

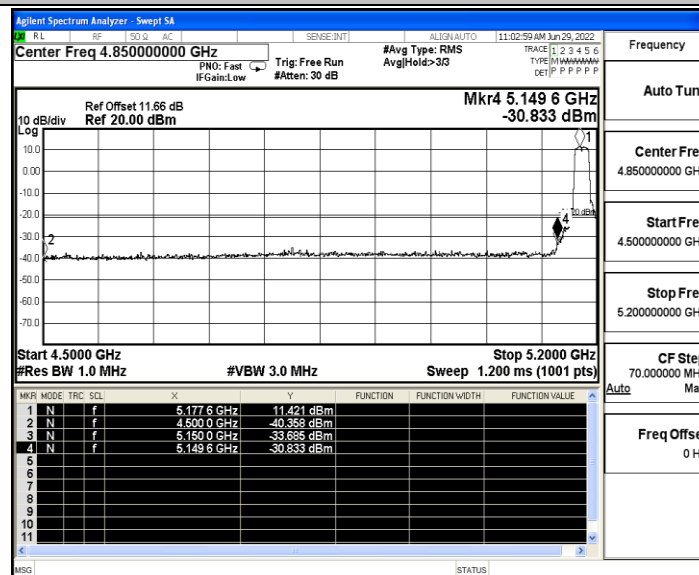


11AC20SISO_Ant1_Low_5180_AV



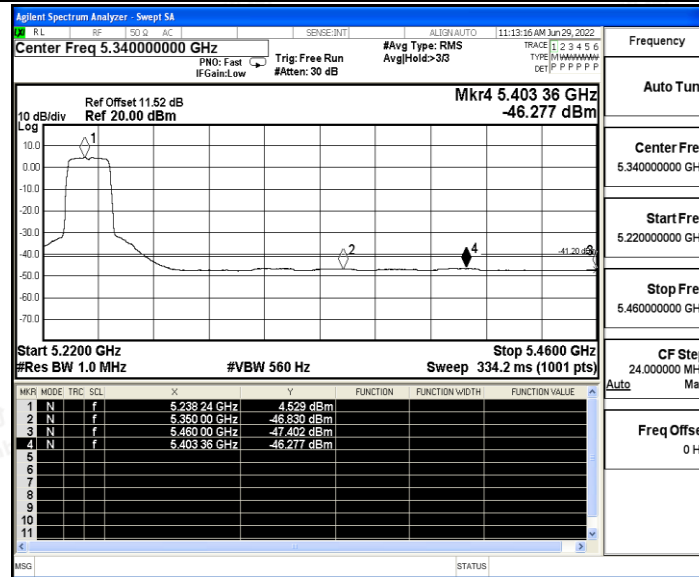


11AC20SISO_Ant1_Low_5180_Peak

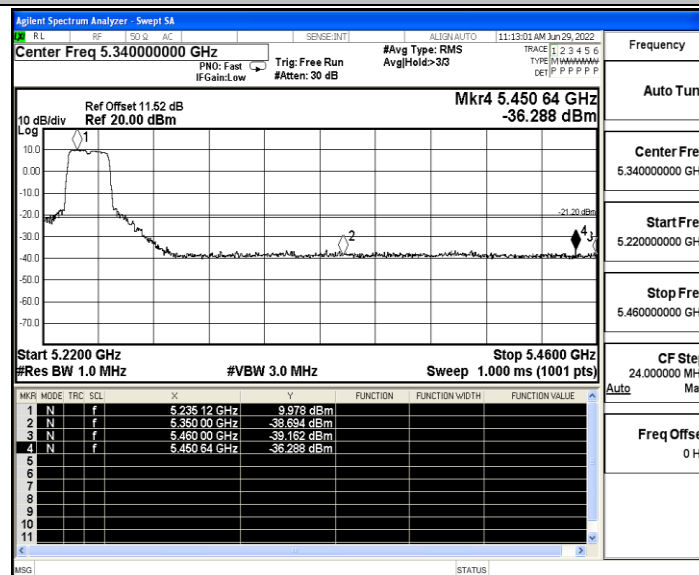


11AC20SISO_Ant1_High_5240_AV





11AC20SISO_Ant1_High_5240_Peak



11AC40SISO_Ant1_Low_5190_AV

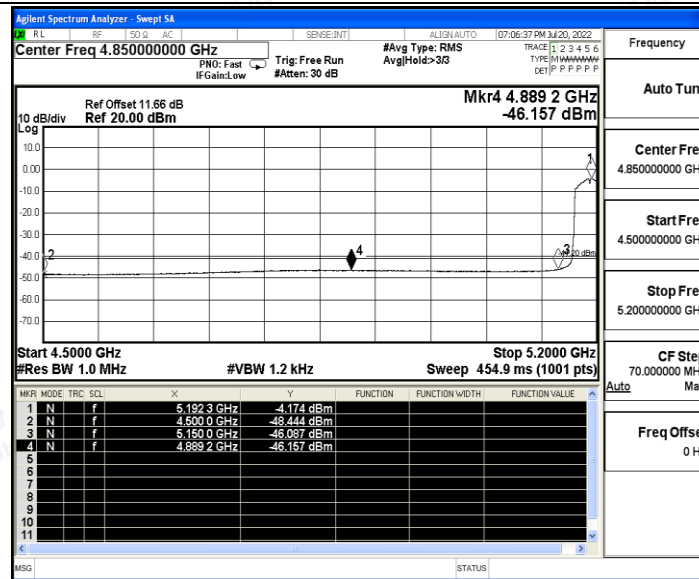


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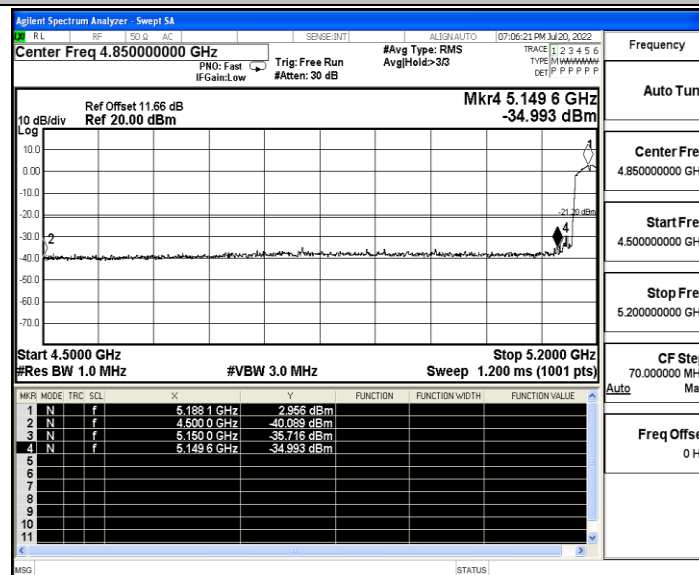
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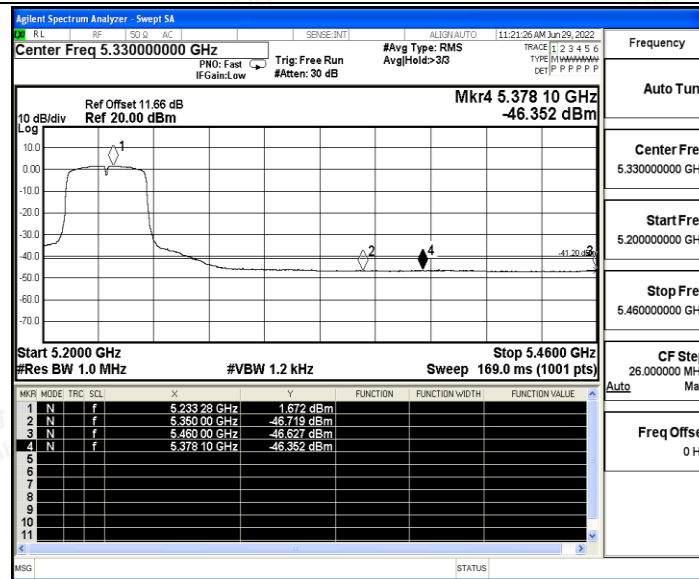


11AC40SISO_Ant1_Low_5190_Peak

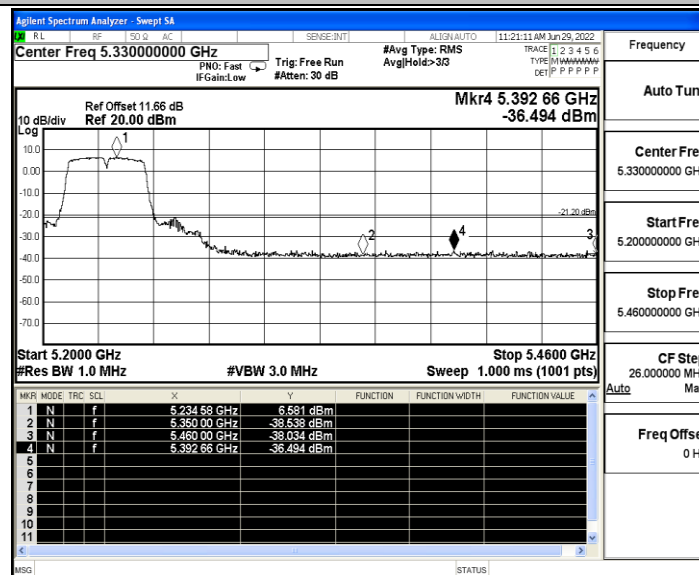


11AC40SISO_Ant1_High_5230_AV



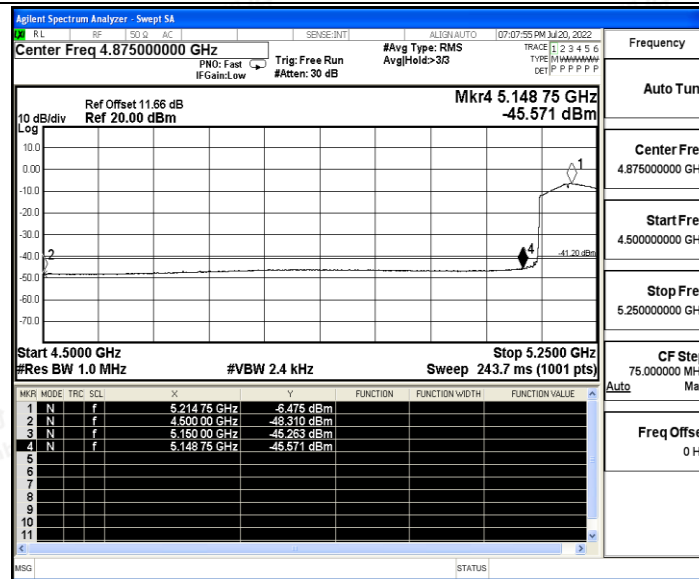


11AC40SISO_Ant1_High_5230_Peak

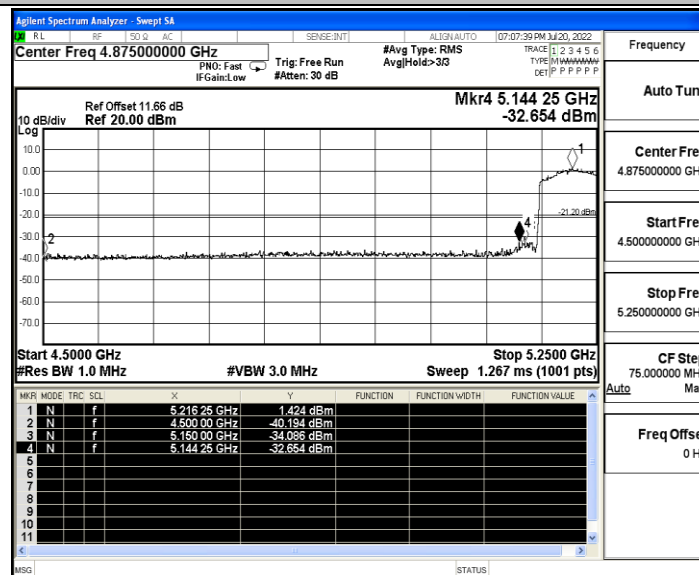


11AC80SISO_Ant1_Low_5210_AV



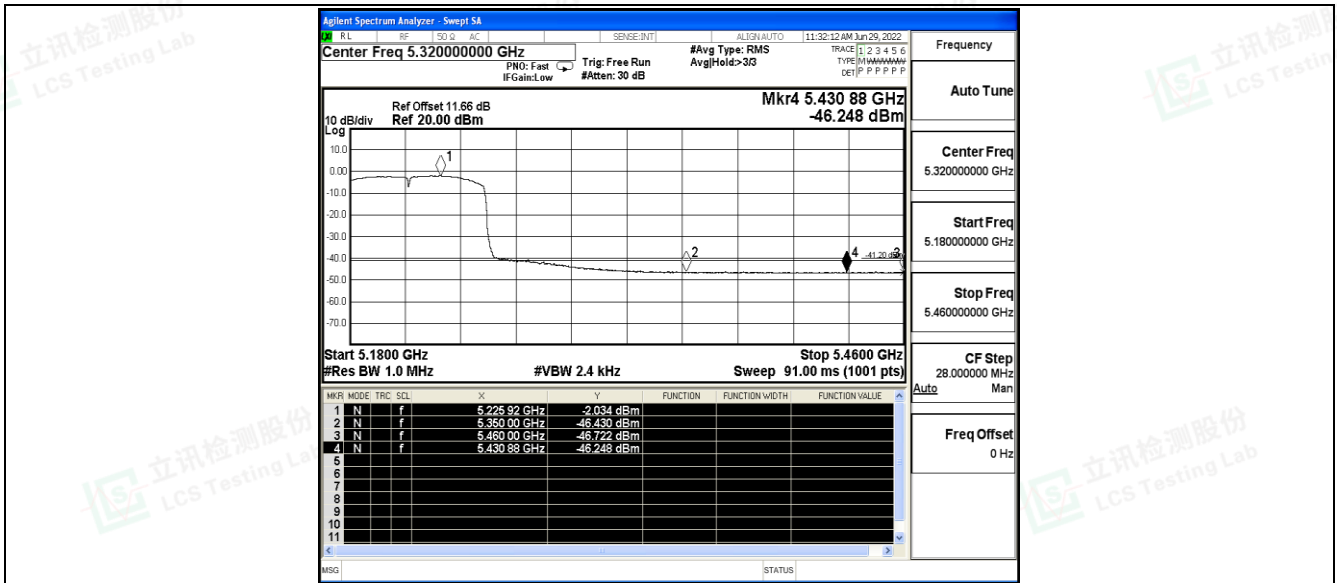


11AC80SISO_Ant1_Low_5210_Peak

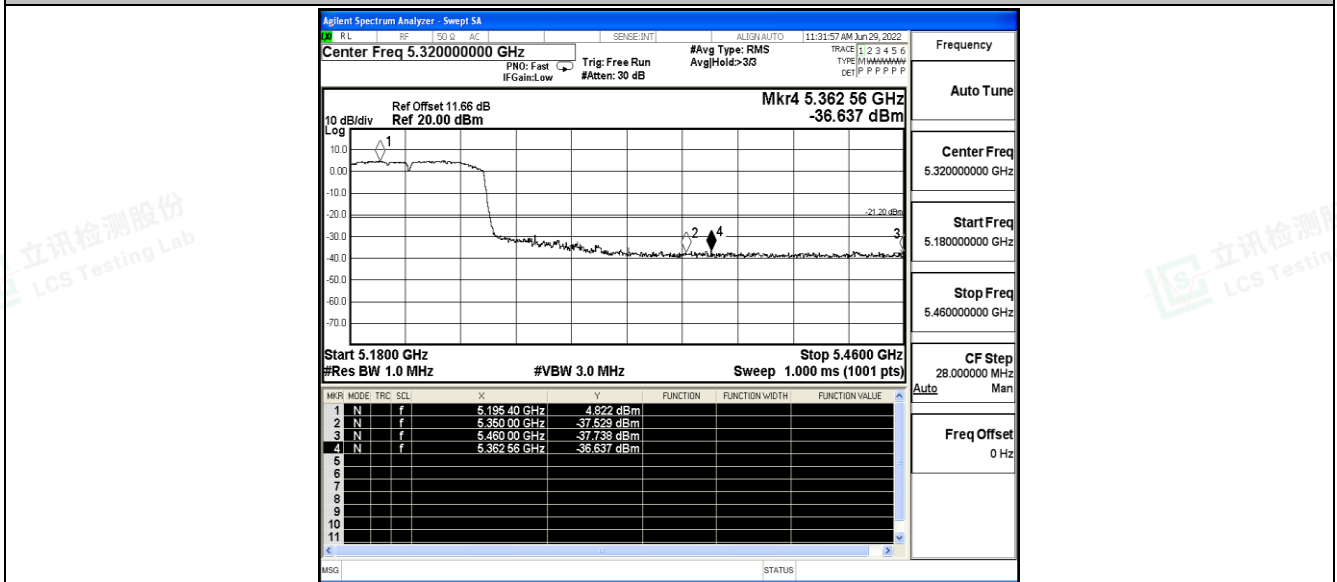


11AC80SISO_Ant1_High_5210_AV





11AC80SISO_Ant1_High_5210_Peak





D.5 Frequency Stability

Test Result

Voltage								
TestMode	Antenna	Channel	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
11AC20SIS O	Ant1	5180	NV	NT	0	0	20	PASS
			LV	NT	-20000	-3.861004	20	PASS
			HV	NT	-40000	-7.722008	20	PASS
		5220	NV	NT	-40000	-7.662835	20	PASS
			LV	NT	0	0	20	PASS
			HV	NT	0	0	20	PASS
		5240	NV	NT	0	0	20	PASS
			LV	NT	0	0	20	PASS
			HV	NT	-40000	-7.633588	20	PASS
11AC40SIS O	Ant1	5190	NV	NT	40000	7.707129	20	PASS
			LV	NT	-40000	-7.707129	20	PASS
			HV	NT	0	0	20	PASS
		5230	NV	NT	-40000	-7.648184	20	PASS
			LV	NT	0	0	20	PASS
			HV	NT	-40000	-7.648184	20	PASS
11AC80SIS O	Ant1	5210	NV	NT	0	0	20	PASS
			LV	NT	0	0	20	PASS
			HV	NT	0	0	20	PASS

Temperature								
TestMode	Antenna	Channel	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
11AC20SIS O	Ant1	5180	NV	-30	-20000	-3.861004	20	PASS
			NV	-20	0	0	20	PASS
			NV	-10	-20000	-3.861004	20	PASS
			NV	0	-20000	-3.861004	20	PASS
			NV	10	-20000	-3.861004	20	PASS
			NV	20	-20000	-3.861004	20	PASS
			NV	30	0	0	20	PASS
			NV	40	20000	3.861004	20	PASS
			NV	50	-20000	-3.861004	20	PASS
		5220	NV	-30	-20000	-3.831418	20	PASS
			NV	-20	-20000	-3.831418	20	PASS
			NV	-10	-20000	-3.831418	20	PASS



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			NV	20	-20000	-3.831418	20	PASS
			NV	30	-20000	-3.831418	20	PASS
			NV	40	0	0	20	PASS
			NV	50	0	0	20	PASS
			NV	-30	-20000	-3.816794	20	PASS
			NV	-20	-20000	-3.816794	20	PASS
		5240	NV	-10	-20000	-3.816794	20	PASS
			NV	0	0	0	20	PASS
			NV	10	-20000	-3.816794	20	PASS
			NV	20	-20000	-3.816794	20	PASS
			NV	30	0	0	20	PASS
			NV	40	0	0	20	PASS
			NV	50	-20000	-3.816794	20	PASS
			NV	-30	0	0	20	PASS
			NV	-20	0	0	20	PASS
11AC40SIS O	Ant1	5190	NV	-10	0	0	20	PASS
			NV	0	-40000	-7.707129	20	PASS
			NV	10	0	0	20	PASS
			NV	20	0	0	20	PASS
			NV	30	0	0	20	PASS
			NV	40	0	0	20	PASS
			NV	50	0	0	20	PASS
			NV	-30	-40000	-7.648184	20	PASS
			NV	-20	-40000	-7.648184	20	PASS
		5230	NV	-10	-40000	-7.648184	20	PASS
			NV	0	0	0	20	PASS
			NV	10	-40000	-7.648184	20	PASS
			NV	20	0	0	20	PASS
			NV	30	0	0	20	PASS
			NV	40	0	0	20	PASS
			NV	50	-40000	-7.648184	20	PASS
			NV	-30	0	0	20	PASS
			NV	-20	0	0	20	PASS
11AC80SIS O	Ant1	5210	NV	-10	0	0	20	PASS
			NV	0	0	0	20	PASS
			NV	10	0	0	20	PASS
			NV	20	0	0	20	PASS
			NV	30	0	0	20	PASS
			NV	40	0	0	20	PASS
			NV	50	0	0	20	PASS



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			NV	20	-20000	-3.831418	20	PASS
			NV	30	-20000	-3.831418	20	PASS



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D.6 Duty Cycle

Test Result

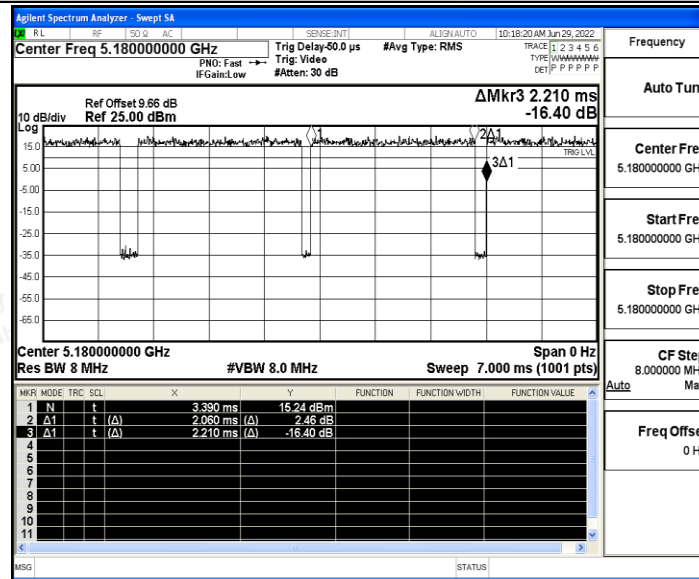
TestMode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Factor	1/T
11A	Ant1	5180	2.06	2.21	93.21	0.31	0.45
		5220	2.06	2.28	90.35	0.44	0.44
		5240	2.07	2.26	91.59	0.38	0.44
11N20SISO	Ant1	5180	1.92	2.12	90.57	0.43	0.47
		5220	1.92	2.11	91.00	0.41	0.47
		5240	1.92	2.04	94.12	0.26	0.49
11N40SISO	Ant1	5190	0.95	1.44	65.97	1.81	0.69
		5230	0.93	1.13	82.30	0.85	0.88
11AC20SISO	Ant1	5180	1.94	2.10	92.38	0.34	0.48
		5220	1.93	2.11	91.47	0.39	0.47
		5240	1.93	2.17	88.94	0.51	0.46
11AC40SISO	Ant1	5190	0.95	1.15	82.61	0.83	0.87
		5230	0.95	1.10	86.36	0.64	0.45
11AC80SISO	Ant1	5210	0.46	0.69	66.67	1.76	0.44



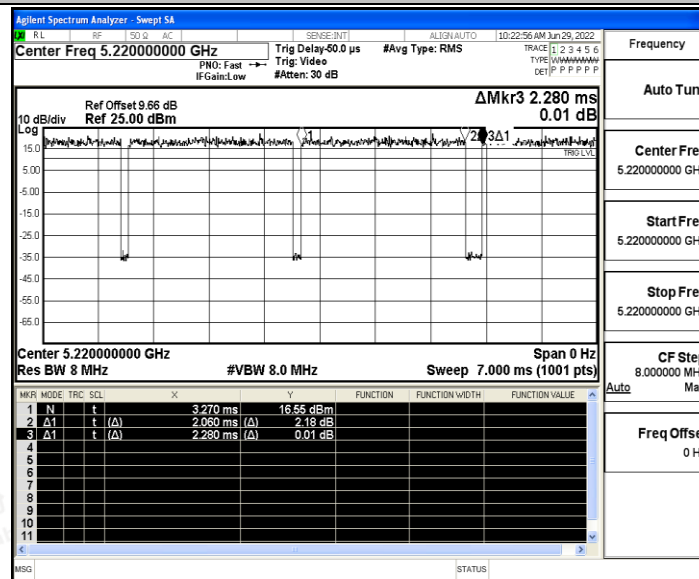


Test Graphs

11A_Ant1_5180

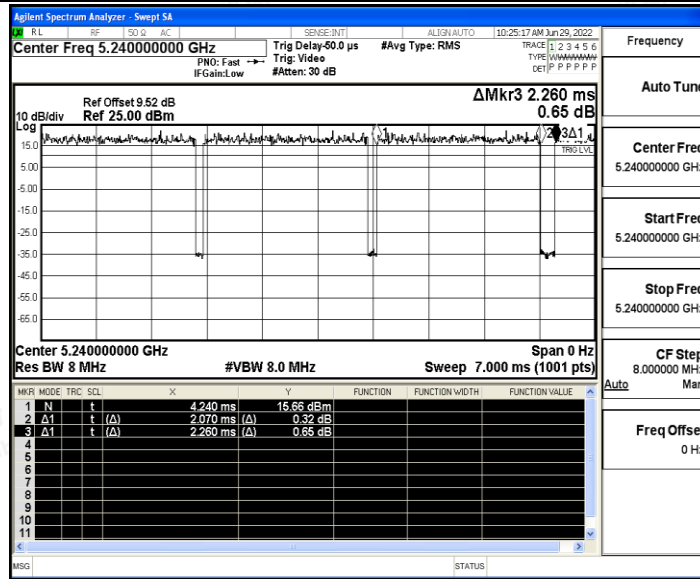


11A_Ant1_5220

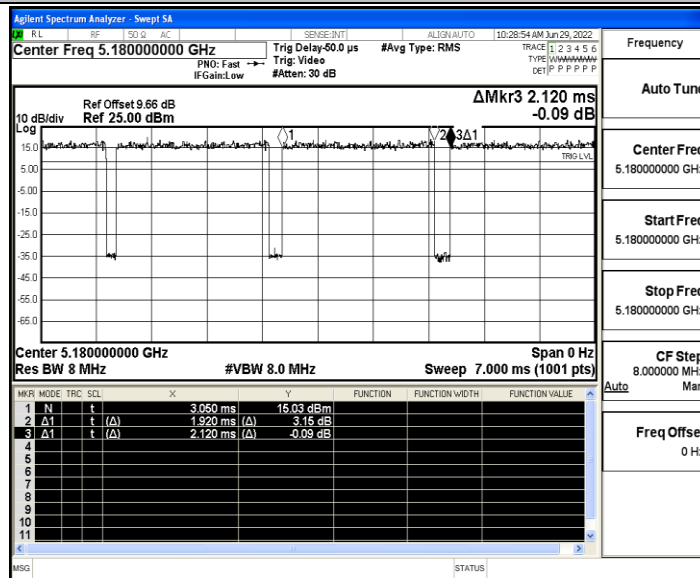


11A_Ant1_5240



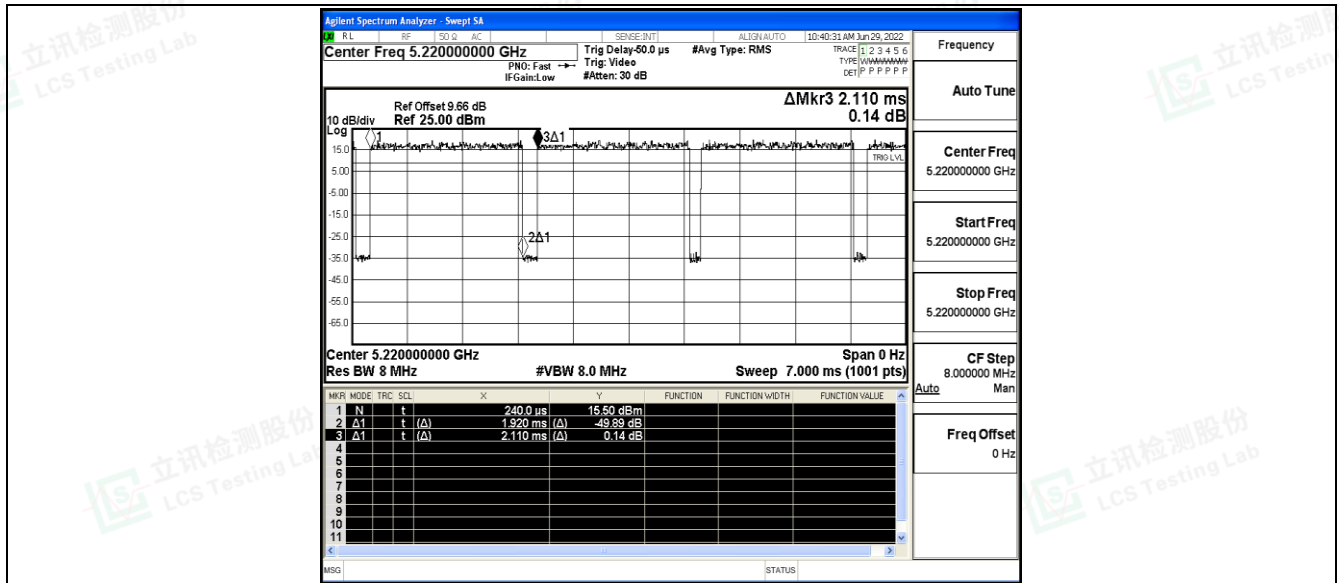


11N20SISO_Ant1_5180

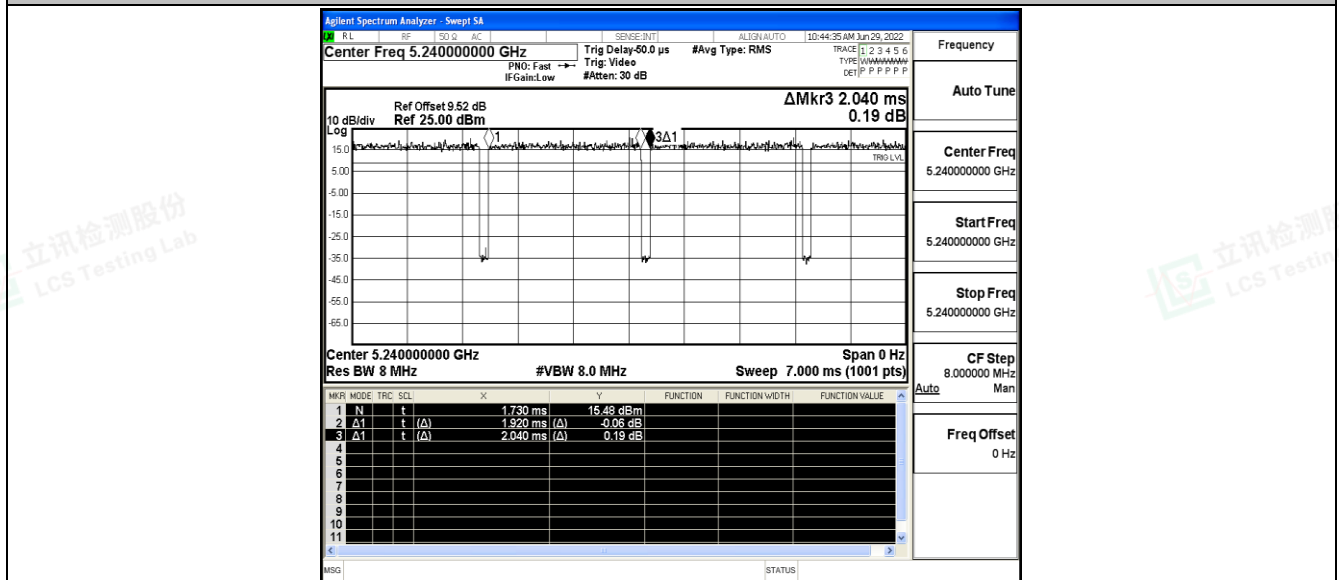


11N20SISO_Ant1_5220



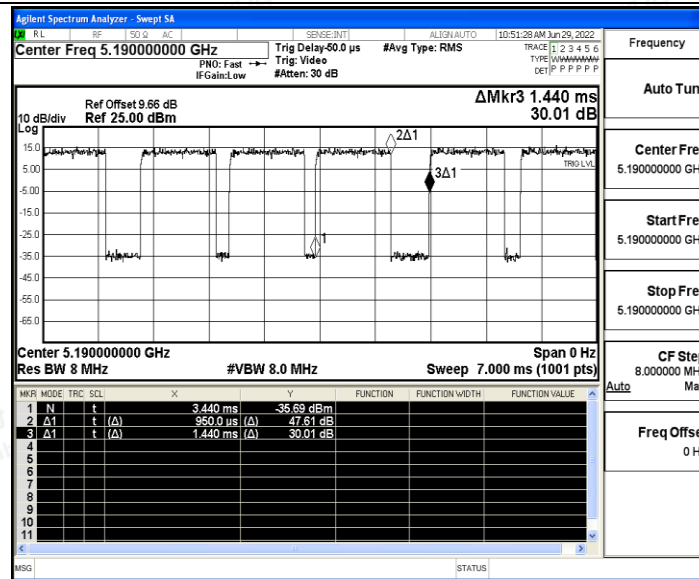


11N20SISO_Ant1_5240

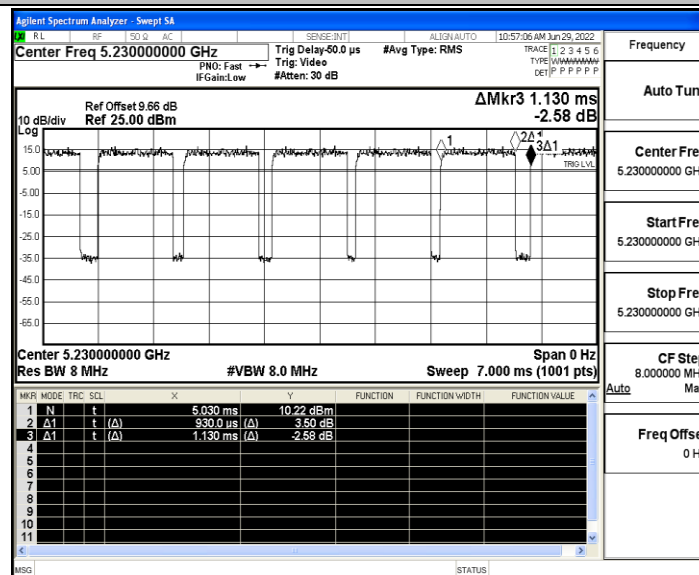


11N40SISO_Ant1_5190



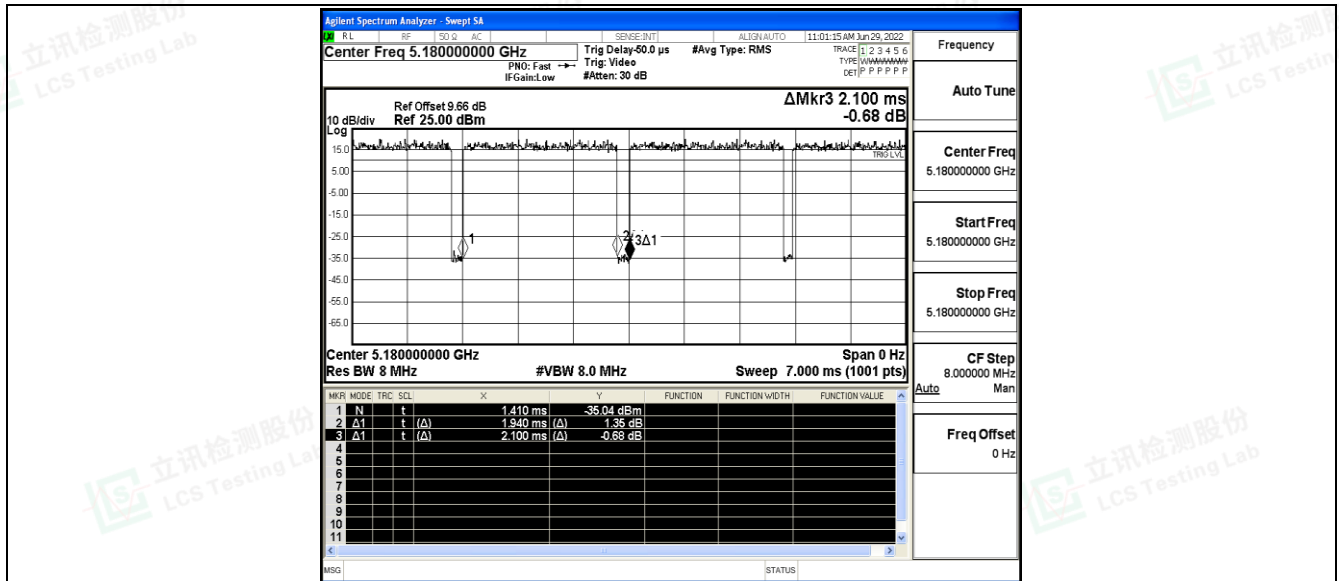


11N40SISO_Ant1_5230

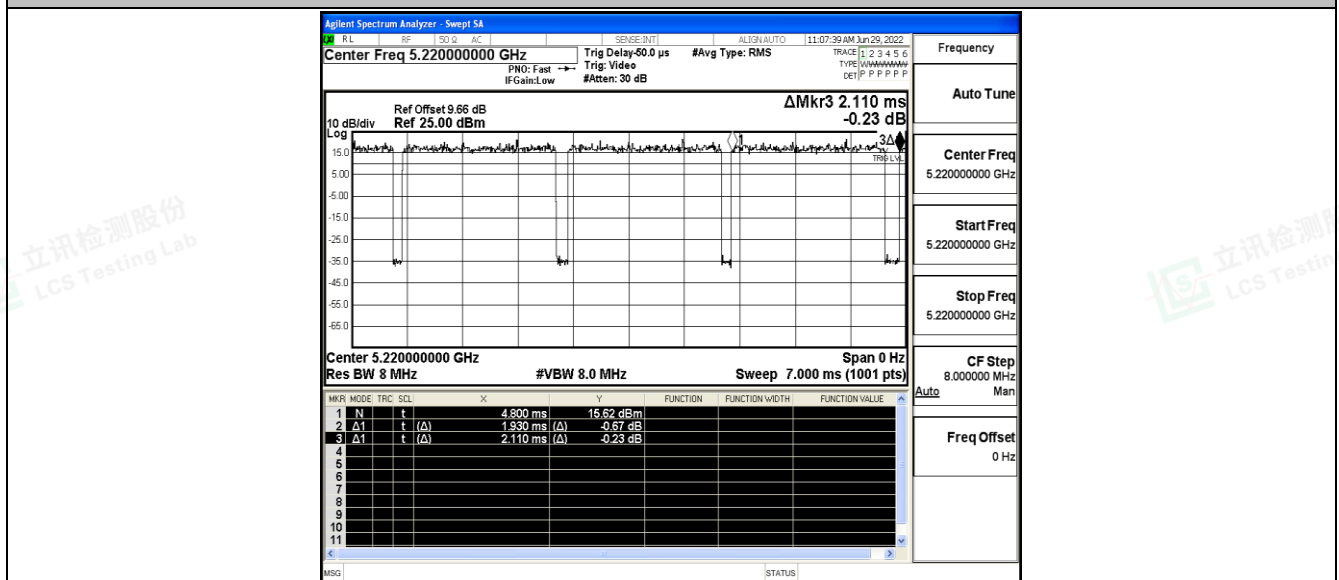


11AC20SISO_Ant1_5180





11AC20SISO_Ant1_5220



11AC20SISO_Ant1_5240



