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Appendix for 5G WIFI

Applicant: Matco Tools

Address: 4403 Allen Rd. Stow, OH 44224 USA

Product Name: Automotive Intelligent Diagnostic Tool

Model: MAXFLEXPRO

FCC ID: 2AUKMMAXFLEXPRO

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Appendix A1: Emission Bandwidth

Test Result

Test Mode	Channel	26db EBW [MHz]	FL[MHz]	FH[MHz]	Verdict
802.11a	5180	22.120	5168.440	5190.560	PASS
	5200	23.200	5188.560	5211.760	PASS
	5240	25.880	5227.440	5253.320	PASS
	5745	19.880	5735.080	5754.960	PASS
	5785	20.120	5775.000	5795.120	PASS
	5825	19.960	5815.160	5835.120	PASS
802.11n(HT20)	5180	23.680	5167.400	5191.080	PASS
	5200	23.760	5187.280	5211.040	PASS
	5240	25.200	5226.560	5251.760	PASS
	5745	23.320	5733.360	5756.680	PASS
	5785	24.920	5772.440	5797.360	PASS
	5825	21.760	5813.320	5835.080	PASS
802.11n(HT40)	5190	45.440	5169.200	5214.640	PASS
	5230	40.480	5209.680	5250.160	PASS
	5755	40.880	5734.520	5775.400	PASS
	5795	40.400	5774.840	5815.240	PASS
802.11ac(VHT20)	5180	20.240	5169.920	5190.160	PASS
	5200	20.360	5189.840	5210.200	PASS
	5240	20.480	5229.720	5250.200	PASS
	5745	22.120	5734.920	5757.040	PASS
	5785	23.160	5772.040	5795.200	PASS
	5825	22.720	5813.520	5836.240	PASS
802.11ac(VHT40)	5190	40.640	5170.000	5210.640	PASS
	5230	41.200	5209.680	5250.880	PASS
	5755	40.320	5735.000	5775.320	PASS
	5795	40.160	5774.920	5815.080	PASS
802.11ac(VHT80)	5210	87.680	5166.640	5254.320	PASS
	5775	80.320	5735.000	5815.320	PASS

Test Graphs

802.11a_5180



802.11a_5200



802.11a_5240



802.11a_5745



802.11a_5785



802.11a_5825



802.11n(HT20)_5180



802.11n(HT20)_5200



802.11n(HT20)_5240



802.11n(HT20)_5745



802.11n(HT20)_5785



802.11n(HT20)_5825



802.11n(HT40)_5190



802.11n(HT40)_5230



802.11n(HT40)_5755



802.11n(HT40)_5795



802.11ac(VHT20)_5180



802.11ac(VHT20)_5200



802.11ac(VHT20)_5240



802.11ac(VHT20)_5745



802.11ac(VHT20)_5785



802.11ac(VHT20)_5825



802.11ac(VHT40)_5190



802.11ac(VHT40)_5230



802.11ac(VHT40)_5755



802.11ac(VHT40)_5795



802.11ac(VHT80)_5210



802.11ac(VHT80)_5775



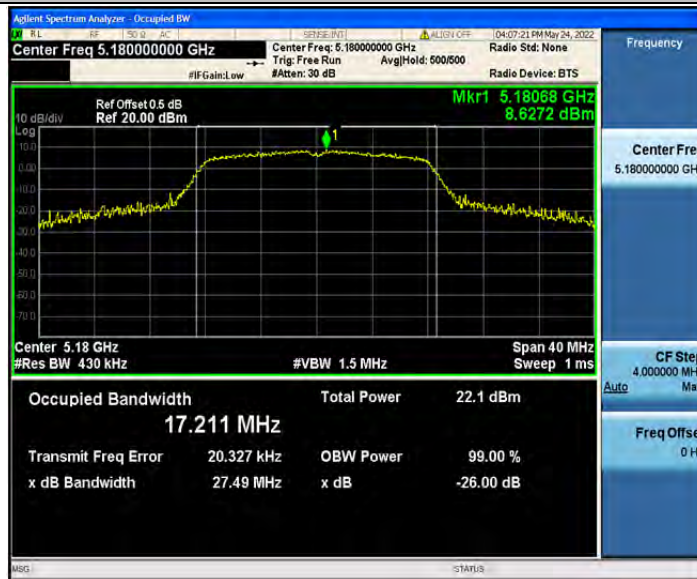
Appendix A2: Occupied channel bandwidth

Test Result

Test Mode	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
802.11a	5180	17.211	5171.415	5188.626	PASS
	5200	17.174	5191.447	5208.621	PASS
	5240	17.261	5231.362	5248.623	PASS
	5745	17.018	5736.505	5753.523	PASS
	5785	17.041	5776.518	5793.559	PASS
	5825	17.023	5816.491	5833.514	PASS
802.11n(HT20)	5180	18.095	5170.968	5189.063	PASS
	5200	18.090	5190.944	5209.034	PASS
	5240	17.838	5231.045	5248.883	PASS
	5745	18.122	5735.968	5754.090	PASS
	5785	18.121	5775.947	5794.068	PASS
	5825	18.124	5815.931	5834.055	PASS
802.11n(HT40)	5190	36.720	5171.657	5208.377	PASS
	5230	36.507	5211.711	5248.218	PASS
	5755	36.549	5736.820	5773.369	PASS
	5795	36.416	5776.781	5813.197	PASS
802.11ac(VHT20)	5180	17.947	5171.068	5189.015	PASS
	5200	17.957	5191.025	5208.982	PASS
	5240	17.940	5231.026	5248.966	PASS
	5745	17.969	5736.054	5754.023	PASS
	5785	17.973	5776.033	5794.006	PASS
	5825	17.966	5816.012	5833.978	PASS
802.11ac(VHT40)	5190	36.313	5171.889	5208.202	PASS
	5230	36.385	5211.739	5248.124	PASS
	5755	36.317	5736.931	5773.248	PASS
	5795	36.262	5776.889	5813.151	PASS
802.11ac(VHT80)	5210	75.479	5172.222	5247.701	PASS
	5775	75.286	5737.461	5812.747	PASS

Test Graphs

802.11a_5180



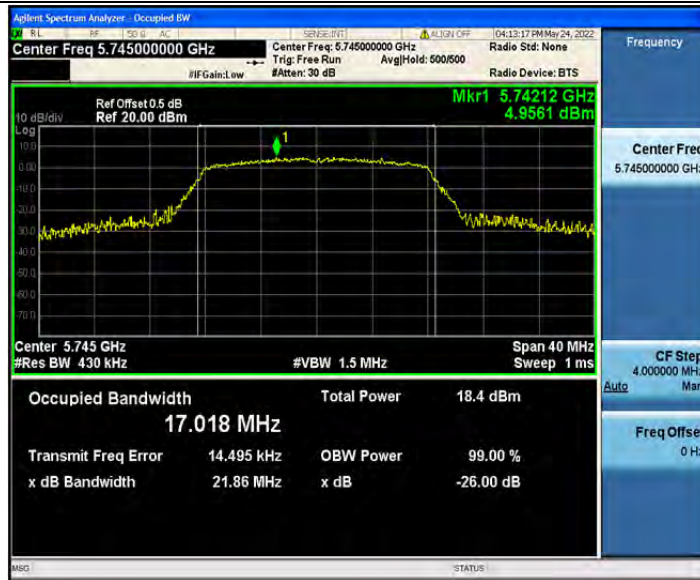
802.11a_5200



802.11a_5240



802.11a_5745



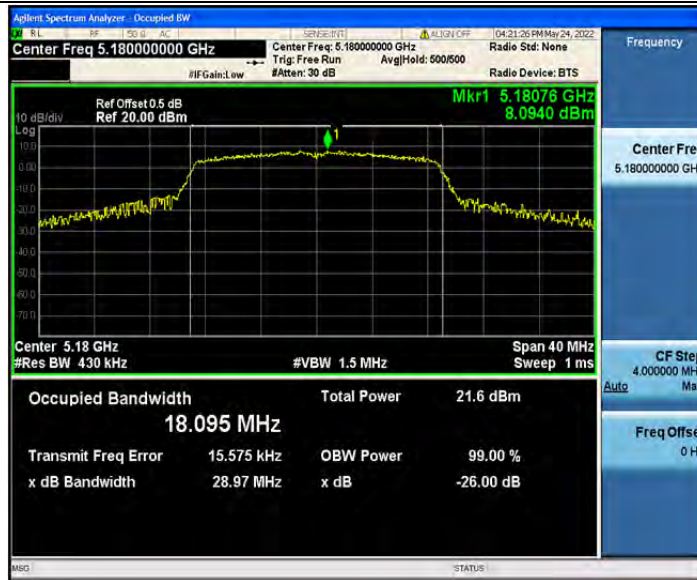
802.11a_5785



802.11a_5825



802.11n(HT20)_5180



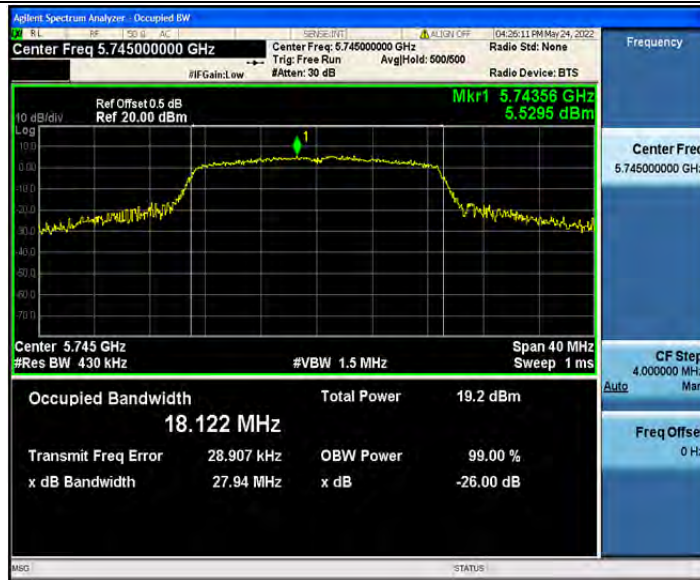
802.11n(HT20)_5200



802.11n(HT20)_5240



802.11n(HT20)_5745



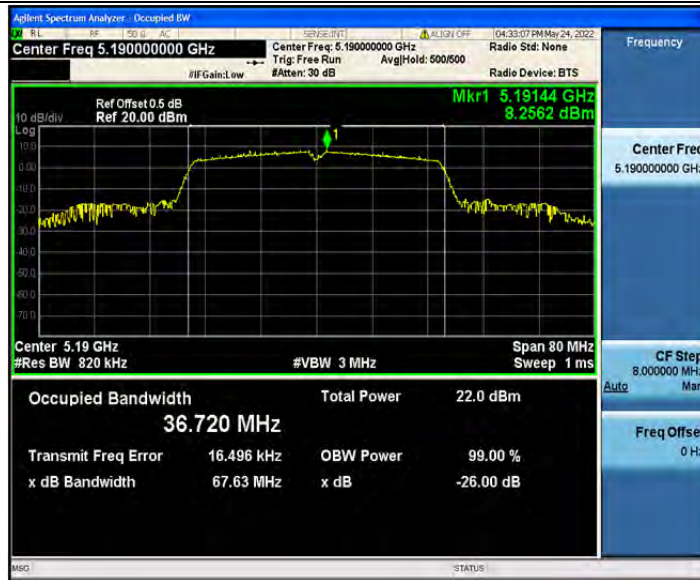
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802.11n(HT20)_5825



802.11n(HT40)_5190



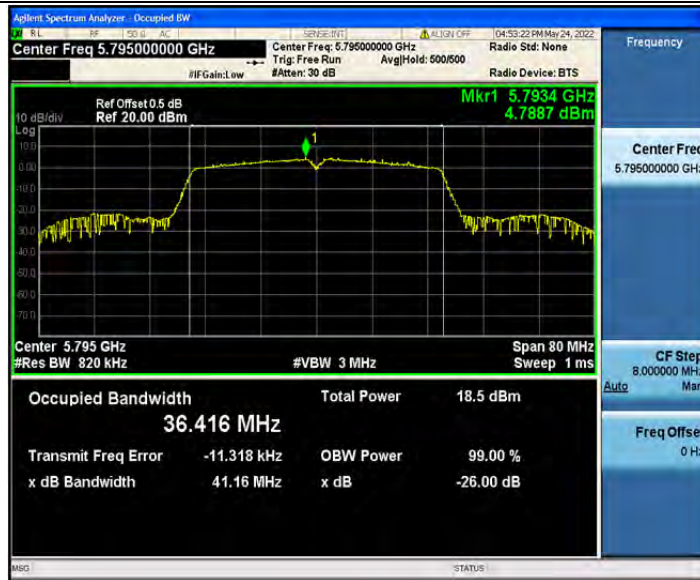
802.11n(HT40)_5230



802.11n(HT40)_5755



802.11n(HT40)_5795



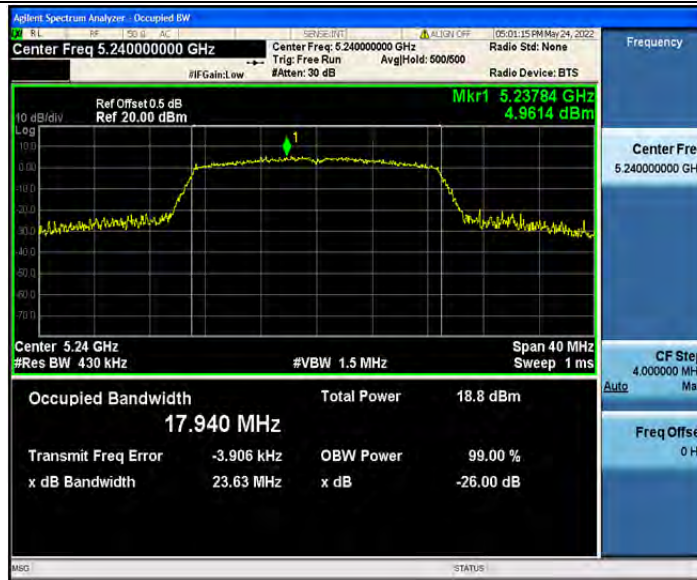
802.11ac(VHT20)_5180



802.11ac(VHT20)_5200



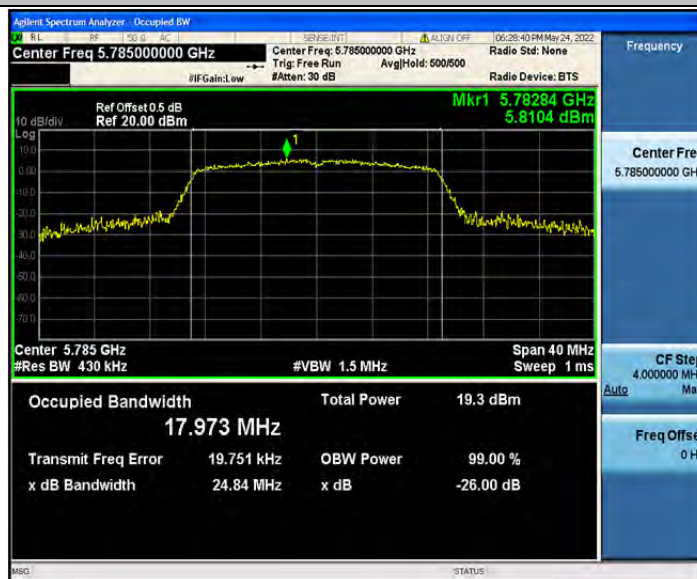
802.11ac(VHT20)_5240



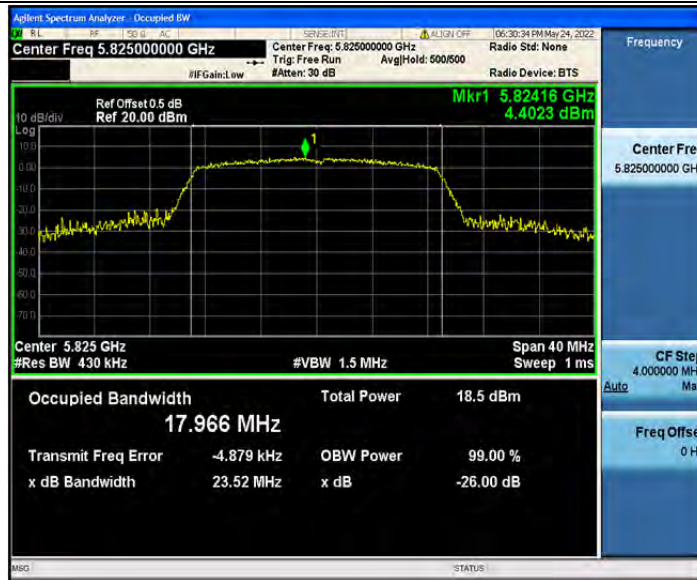
802.11ac(VHT20)_5745



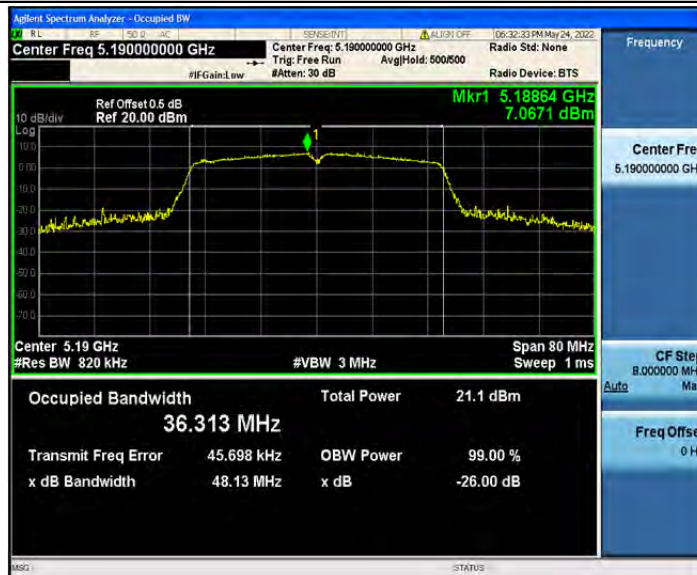
802.11ac(VHT20)_5785



802.11ac(VHT20)_5825



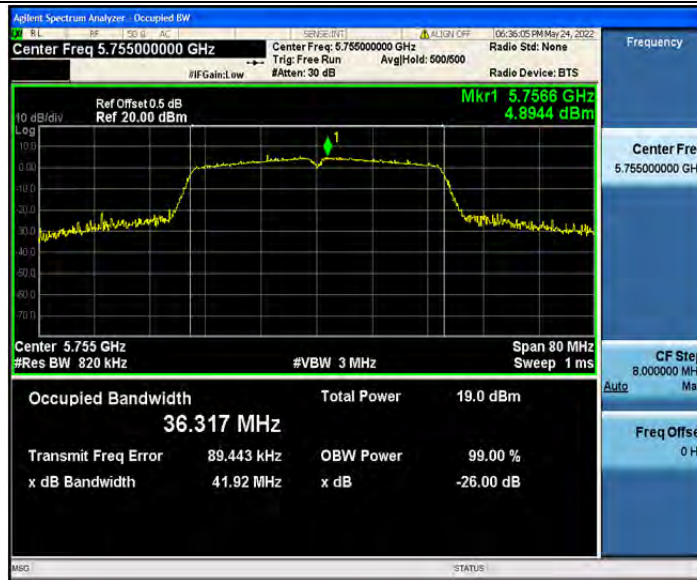
802.11ac(VHT40)_5190



802.11ac(VHT40)_5230



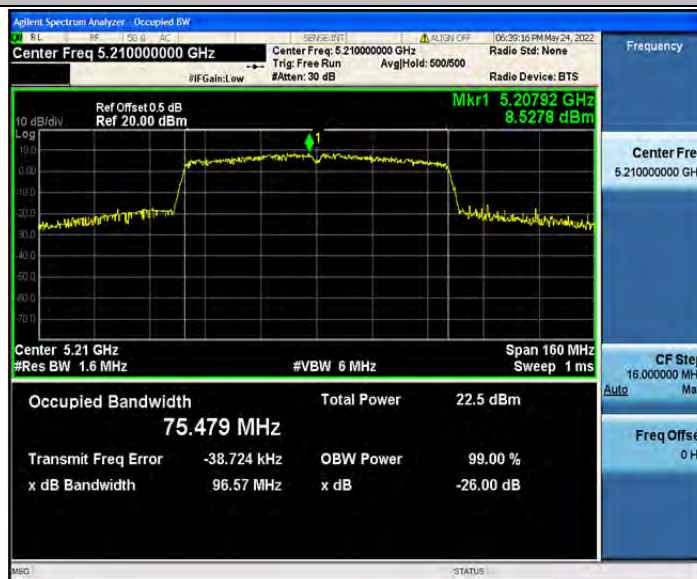
802.11ac(VHT40)_5755



802.11ac(VHT40)_5795



802.11ac(VHT80)_5210



802.11ac(VHT80)_5775



Appendix A3: Min emission bandwidth

Test Result

Test Mode	Channel	6db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
802.11a	5745	15.360	5737.440	5752.800	>0.5	PASS
	5785	15.520	5777.440	5792.960	>0.5	PASS
	5825	15.720	5817.080	5832.800	>0.5	PASS
802.11n(HT20)	5745	15.160	5737.440	5752.600	>0.5	PASS
	5785	15.160	5777.440	5792.600	>0.5	PASS
	5825	15.120	5817.440	5832.560	>0.5	PASS
802.11n(HT40)	5755	35.200	5737.400	5772.600	>0.5	PASS
	5795	35.200	5777.400	5812.600	>0.5	PASS
802.11ac(VHT20)	5745	15.440	5737.480	5752.920	>0.5	PASS
	5785	17.600	5776.200	5793.800	>0.5	PASS
	5825	15.200	5817.400	5832.600	>0.5	PASS
802.11ac(VHT40)	5755	35.280	5737.400	5772.680	>0.5	PASS
	5795	35.200	5777.400	5812.600	>0.5	PASS
802.11ac(VHT80)	5775	75.520	5737.240	5812.760	>0.5	PASS

Test Graphs

802.11a_5745



802.11a_5785



802.11a_5825



802.11n(HT20)_5745



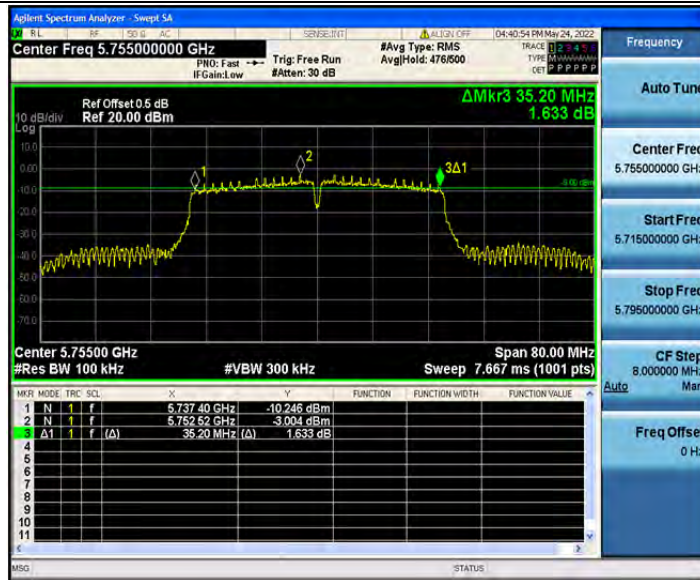
802.11n(HT20)_5785



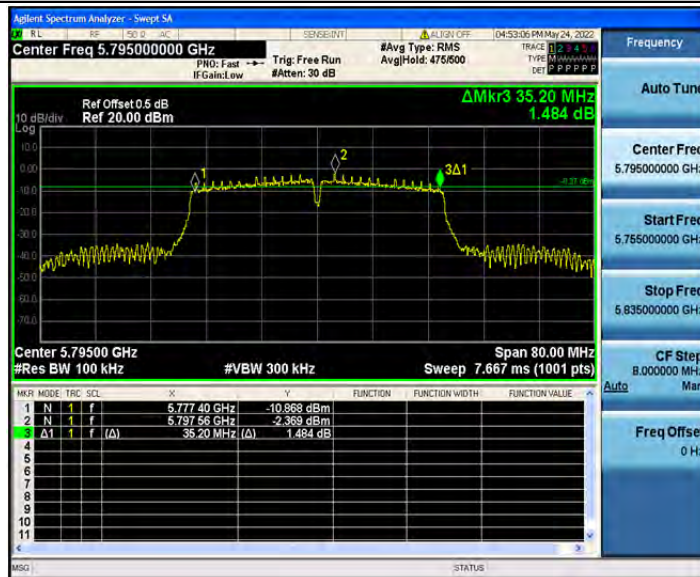
802.11n(HT20)_5825



802.11n(HT40)_5755



802.11n(HT40)_5795



802.11ac(VHT20)_5745



802.11ac(VHT20)_5785



802.11ac(VHT20)_5825



802.11ac(VHT40)_5755



802.11ac(VHT40)_5795



802.11ac(VHT80)_5775



Appendix B: Maximum conducted output power

Test Result

Test Mode	Channel	Result[dBm]	Limit[dBm]	Verdict
802.11a	5180	15.41	<=24	PASS
	5200	15.21	<=24	PASS
	5240	14.48	<=24	PASS
	5745	11.65	<=30	PASS
	5785	12.16	<=30	PASS
	5825	11.93	<=30	PASS
802.11n(HT20)	5180	14.77	<=24	PASS
	5200	14.63	<=24	PASS
	5240	13.97	<=24	PASS
	5745	12.56	<=30	PASS
	5785	13.04	<=30	PASS
	5825	13.00	<=30	PASS
802.11n(HT40)	5190	14.72	<=24	PASS
	5230	12.18	<=24	PASS
	5755	10.58	<=30	PASS
	5795	11.17	<=30	PASS
802.11ac(VHT20)	5180	13.87	<=24	PASS
	5200	13.76	<=24	PASS
	5240	12.02	<=24	PASS
	5745	11.87	<=30	PASS
	5785	12.56	<=30	PASS
	5825	11.77	<=30	PASS
802.11ac(VHT40)	5190	13.89	<=24	PASS
	5230	13.34	<=24	PASS
	5755	11.69	<=30	PASS
	5795	12.36	<=30	PASS
802.11ac(VHT80)	5210	13.66	<=24	PASS
	5775	12.26	<=30	PASS

Note: Test results increased RF cable loss by 0.5dB.

Appendix C: Maximum power spectral density

Test Result

Test Mode	Channel	Result [dBm/MHz]	Limit[dBm/MHz]	Verdict
802.11a	5180	5.31	<=11	PASS
	5200	5.11	<=11	PASS
	5240	4.67	<=11	PASS
	5745	-1.04	<=30	PASS
	5785	-0.91	<=30	PASS
	5825	-1.03	<=30	PASS
802.11n(HT20)	5180	4.61	<=11	PASS
	5200	4.30	<=11	PASS
	5240	3.58	<=11	PASS
	5745	-0.60	<=30	PASS
	5785	0.10	<=30	PASS
	5825	-0.01	<=30	PASS
802.11n(HT40)	5190	1.27	<=11	PASS
	5230	-0.92	<=11	PASS
	5755	-5.28	<=30	PASS
	5795	-4.87	<=30	PASS
802.11ac(VHT20)	5180	3.72	<=11	PASS
	5200	3.42	<=11	PASS
	5240	1.58	<=11	PASS
	5745	-0.94	<=30	PASS
	5785	-0.49	<=30	PASS
	5825	-1.17	<=30	PASS
802.11ac(VHT40)	5190	0.66	<=11	PASS
	5230	0.24	<=11	PASS
	5755	-4.36	<=30	PASS
	5795	-3.61	<=30	PASS
802.11ac(VHT80)	5210	-2.64	<=11	PASS
	5775	-6.69	<=30	PASS

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

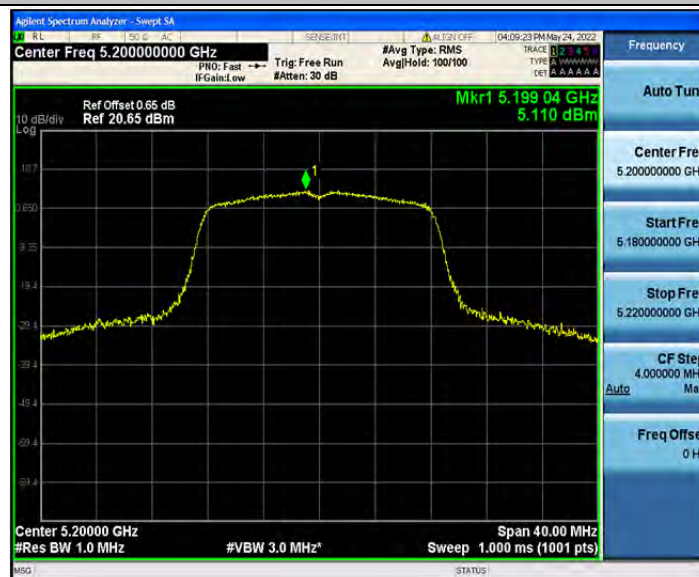
2. The Duty Cycle Factor and RBW Factor is compensated in the graph.

Test Graphs

802.11a_5180



802.11a_5200



802.11a_5240



802.11a_5745



802.11a_5785



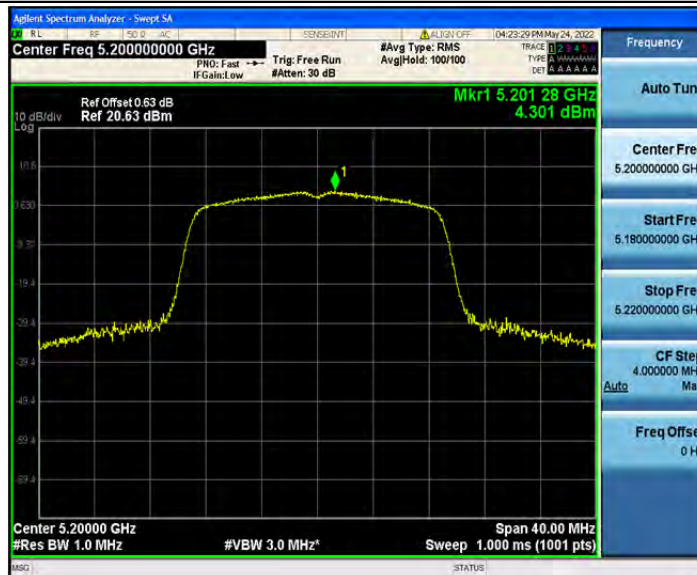
802.11a_5825



802.11n(HT20)_5180



802.11n(HT20)_5200



802.11n(HT20)_5240



802.11n(HT20)_5745



802.11n(HT20)_5785



802.11n(HT20)_5825



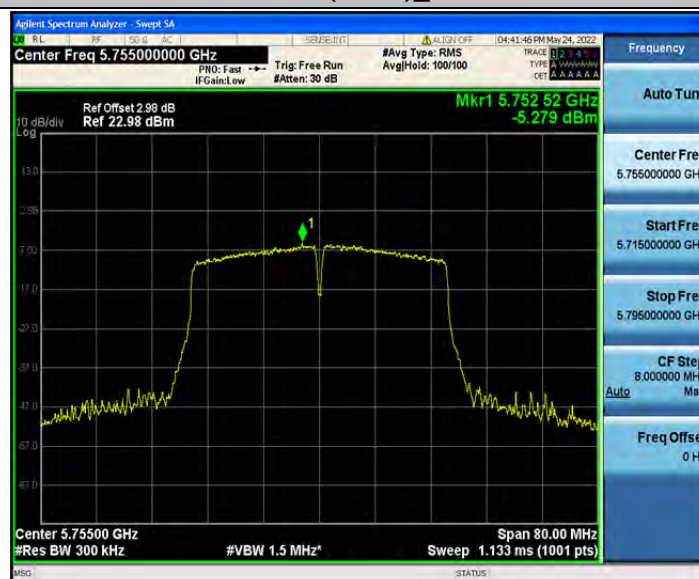
802.11n(HT40)_5190



802.11n(HT40)_5230



802.11n(HT40)_5755



802.11n(HT40)_5795



802.11ac(VHT20)_5180



802.11ac(VHT20)_5200



802.11ac(VHT20)_5240



802.11ac(VHT20)_5745



802.11ac(VHT20)_5785



802.11ac(VHT20)_5825



802.11ac(VHT40)_5190



802.11ac(VHT40)_5230



802.11ac(VHT40)_5755



802.11ac(VHT40)_5795



802.11ac(VHT80)_5210



802.11ac(VHT80)_5775



Appendix D: Frequency Stability

Test Result

Voltage							
Test Mode	Channel	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
20MHz	5180	NV	NT	1000	0.193050	20	PASS
		LV	NT	1000	0.193050	20	PASS
		HV	NT	1000	0.193050	20	PASS
	5200	NV	NT	1000	0.192308	20	PASS
		LV	NT	1000	0.192308	20	PASS
		HV	NT	1000	0.192308	20	PASS
	5240	NV	NT	1000	0.190840	20	PASS
		LV	NT	1000	0.190840	20	PASS
		HV	NT	1000	0.190840	20	PASS
	5745	NV	NT	1000	0.174064	20	PASS
		LV	NT	2000	0.348129	20	PASS
		HV	NT	2000	0.348129	20	PASS
	5785	NV	NT	1000	0.172861	20	PASS
		LV	NT	1000	0.172861	20	PASS
		HV	NT	1000	0.172861	20	PASS
	5825	NV	NT	1000	0.171674	20	PASS
		LV	NT	2000	0.343348	20	PASS
		HV	NT	1000	0.171674	20	PASS
40MHz	5190	NV	NT	1000	0.192678	20	PASS
		LV	NT	1000	0.192678	20	PASS
		HV	NT	1000	0.192678	20	PASS
	5230	NV	NT	1000	0.191205	20	PASS
		LV	NT	1000	0.191205	20	PASS
		HV	NT	1000	0.191205	20	PASS
	5755	NV	NT	1000	0.173762	20	PASS
		LV	NT	2000	0.347524	20	PASS
		HV	NT	2000	0.347524	20	PASS
80MHz	5210	NV	NT	1000	0.191939	20	PASS
		LV	NT	1000	0.191939	20	PASS
		HV	NT	1000	0.191939	20	PASS
	5775	NV	NT	1000	0.173160	20	PASS
		LV	NT	2000	0.346320	20	PASS
		HV	NT	2000	0.346320	20	PASS

Temperature							
Test Mode	Channel	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
20MHz	5180	NV	0	1000	0.193050	20	PASS
		NV	10	1000	0.193050	20	PASS
		NV	20	1000	0.193050	20	PASS
		NV	30	1000	0.193050	20	PASS
		NV	40	1000	0.193050	20	PASS
		NV	50	1000	0.193050	20	PASS
	5200	NV	0	1000	0.192308	20	PASS
		NV	10	1000	0.192308	20	PASS
		NV	20	1000	0.192308	20	PASS
		NV	30	1000	0.192308	20	PASS
		NV	40	1000	0.192308	20	PASS
		NV	50	1000	0.192308	20	PASS
	5240	NV	0	1000	0.19084	20	PASS
		NV	10	1000	0.19084	20	PASS
		NV	20	1000	0.19084	20	PASS
		NV	30	1000	0.19084	20	PASS
		NV	40	1000	0.19084	20	PASS
		NV	50	1000	0.19084	20	PASS
	5745	NV	0	1000	0.174064	20	PASS
		NV	10	2000	0.348129	20	PASS
		NV	20	1000	0.174064	20	PASS
		NV	30	2000	0.348129	20	PASS
		NV	40	2000	0.348129	20	PASS
		NV	50	-107000	-18.624891	20	PASS
	5785	NV	0	2000	0.345722	20	PASS
		NV	10	2000	0.345722	20	PASS
		NV	20	2000	0.345722	20	PASS
		NV	30	1000	0.172861	20	PASS
		NV	40	2000	0.345722	20	PASS
		NV	50	1000	0.172861	20	PASS
	5825	NV	0	2000	0.343348	20	PASS
		NV	10	1000	0.171674	20	PASS
		NV	20	2000	0.343348	20	PASS
		NV	30	2000	0.343348	20	PASS
		NV	40	1000	0.171674	20	PASS
		NV	50	1000	0.171674	20	PASS
40MHz	5190	NV	0	1000	0.192678	20	PASS
		NV	10	1000	0.192678	20	PASS
		NV	20	1000	0.192678	20	PASS
		NV	30	1000	0.192678	20	PASS
		NV	40	1000	0.192678	20	PASS
		NV	50	1000	0.192678	20	PASS
	5230	NV	0	1000	0.191205	20	PASS

		NV	10	1000	0.191205	20	PASS
		NV	20	1000	0.191205	20	PASS
		NV	30	1000	0.191205	20	PASS
		NV	40	1000	0.191205	20	PASS
		NV	50	1000	0.191205	20	PASS
	5755	NV	0	2000	0.347524	20	PASS
		NV	10	2000	0.347524	20	PASS
		NV	20	1000	0.173762	20	PASS
		NV	30	2000	0.347524	20	PASS
		NV	40	2000	0.347524	20	PASS
		NV	50	2000	0.347524	20	PASS
	5795	NV	0	2000	0.345125	20	PASS
		NV	10	2000	0.345125	20	PASS
		NV	20	1000	0.172563	20	PASS
		NV	30	2000	0.345125	20	PASS
		NV	40	1000	0.172563	20	PASS
		NV	50	1000	0.172563	20	PASS
80MHz	5210	NV	0	1000	0.191939	20	PASS
		NV	10	1000	0.191939	20	PASS
		NV	20	1000	0.191939	20	PASS
		NV	30	1000	0.191939	20	PASS
		NV	40	1000	0.191939	20	PASS
		NV	50	1000	0.191939	20	PASS
	5775	NV	0	2000	0.346320	20	PASS
		NV	10	2000	0.346320	20	PASS
		NV	20	2000	0.346320	20	PASS
		NV	30	2000	0.346320	20	PASS
		NV	40	2000	0.346320	20	PASS
		NV	50	2000	0.346320	20	PASS

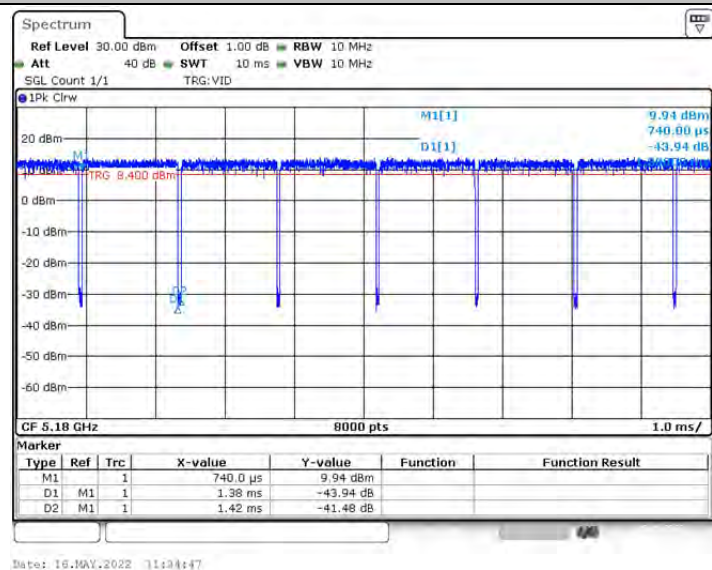
Appendix E: Duty Cycle

Test Result

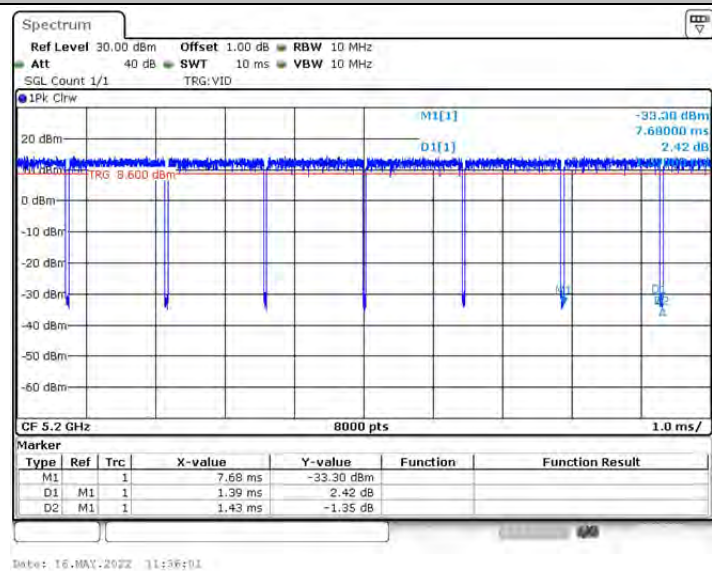
Test Mode	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
802.11a	5180	1.38	1.42	97.18	0.725	1
	5200	1.39	1.43	97.20	0.719	1
	5240	1.39	1.43	97.20	0.719	1
	5745	1.38	1.42	97.18	0.725	1
	5785	1.38	1.43	96.50	0.725	1
	5825	1.38	1.42	97.18	0.725	1
802.11n(HT20)	5180	1.29	1.34	96.27	0.775	1
	5200	1.29	1.34	96.27	0.775	1
	5240	1.29	1.34	96.27	0.775	1
	5745	1.29	1.33	96.99	0.775	1
	5785	1.29	1.33	96.99	0.775	1
	5825	1.29	1.33	96.99	0.775	1
802.11n(HT40)	5190	0.64	0.68	94.12	1.563	2
	5230	0.64	0.69	92.75	1.563	2
	5755	0.65	0.69	94.20	1.538	2
	5795	0.64	0.69	92.75	1.563	2
802.11ac(VHT20)	5180	1.31	1.35	97.04	0.763	1
	5200	1.31	1.35	97.04	0.763	1
	5240	1.30	1.35	96.30	0.769	1
	5745	1.31	1.35	97.04	0.763	1
	5785	1.30	1.35	96.30	0.769	1
	5825	1.30	1.35	96.30	0.769	1
802.11ac(VHT40)	5190	0.65	0.69	94.20	1.538	2
	5230	0.65	0.69	94.20	1.538	2
	5755	0.65	0.69	94.20	1.538	2
	5795	0.65	0.70	92.86	1.538	2
802.11ac(VHT80)	5210	0.32	0.36	88.89	3.125	5
	5775	0.32	0.36	88.89	3.125	5

Test Graphs

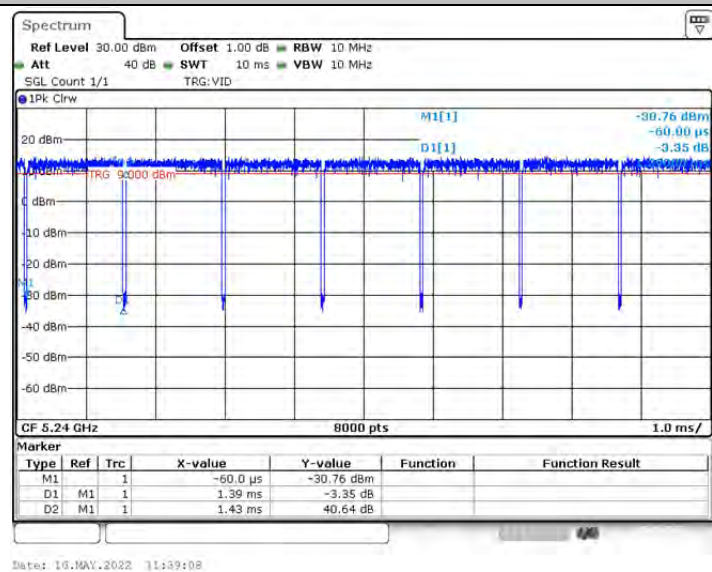
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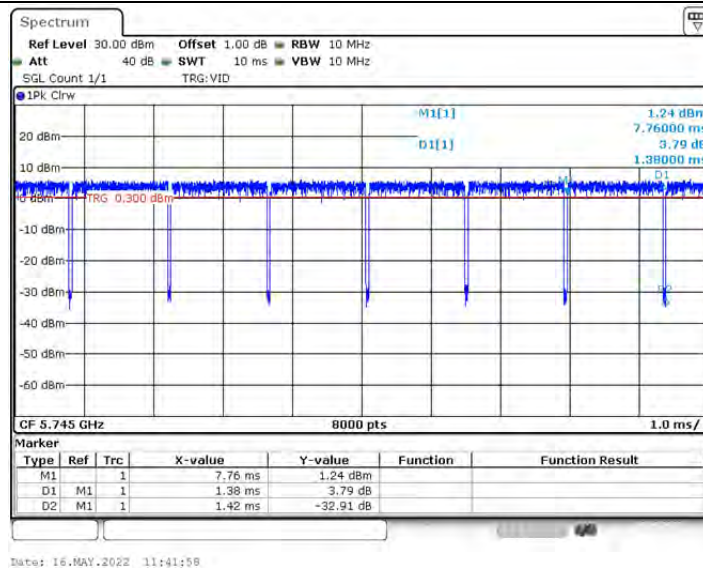
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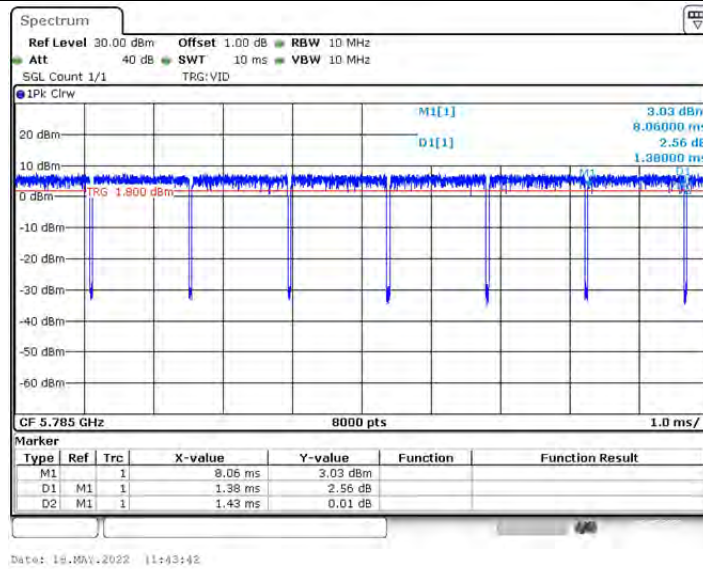
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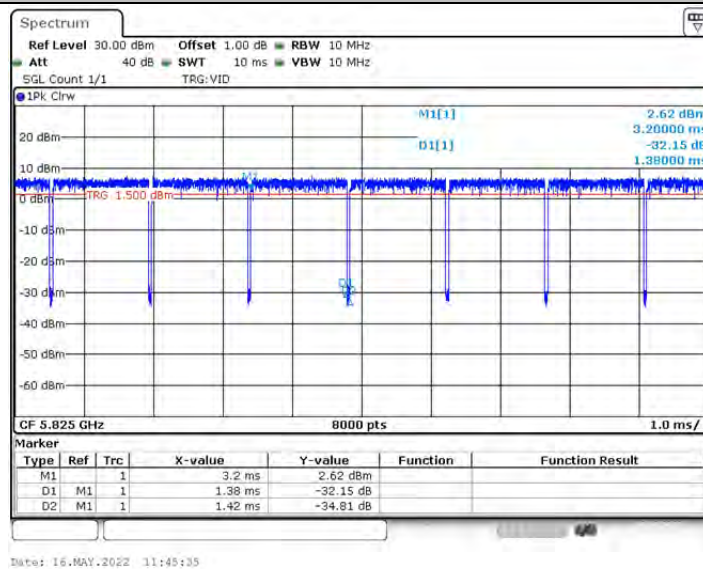
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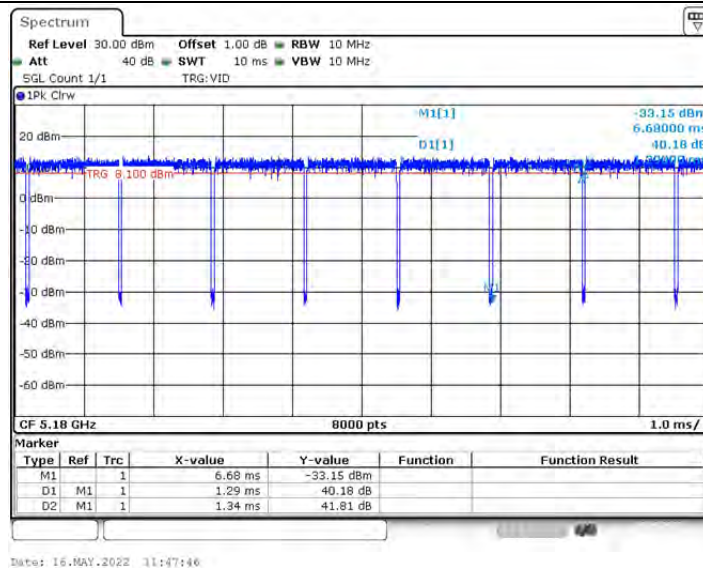
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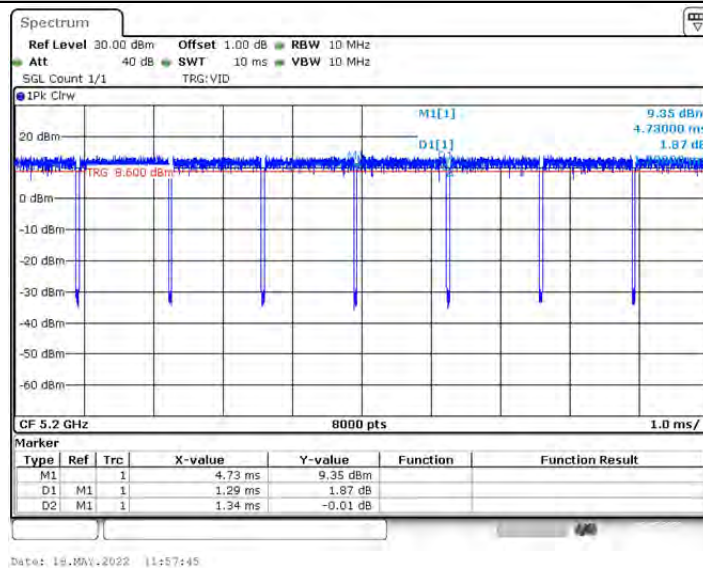
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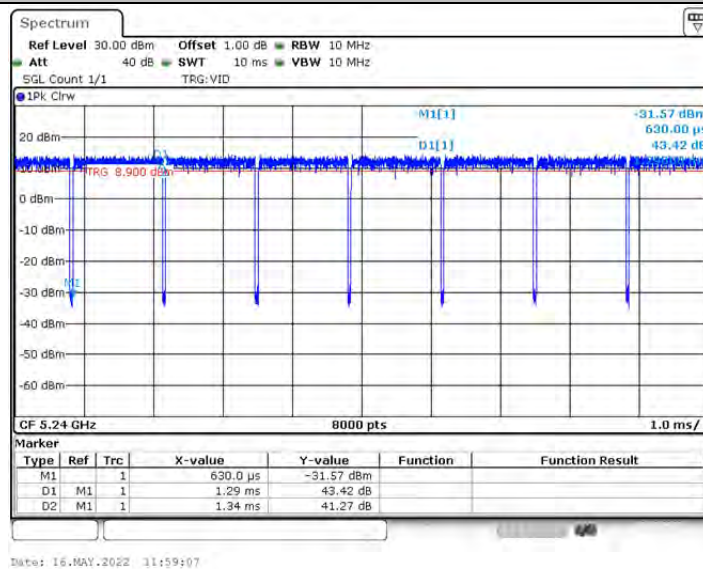
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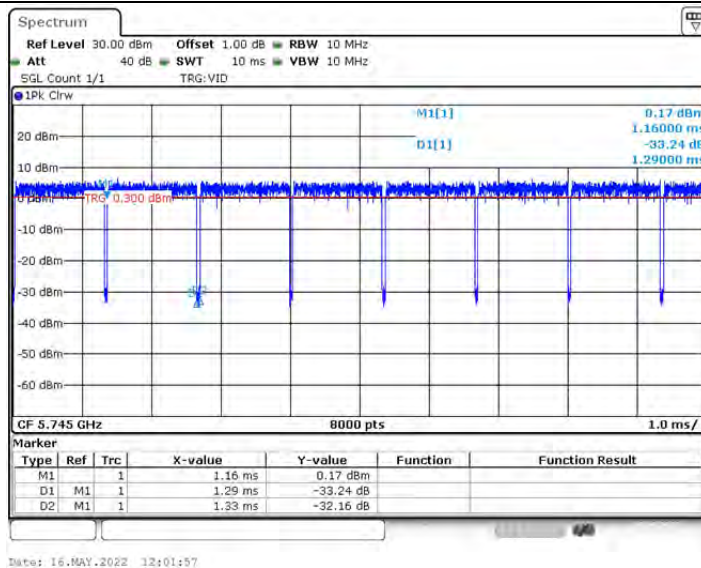
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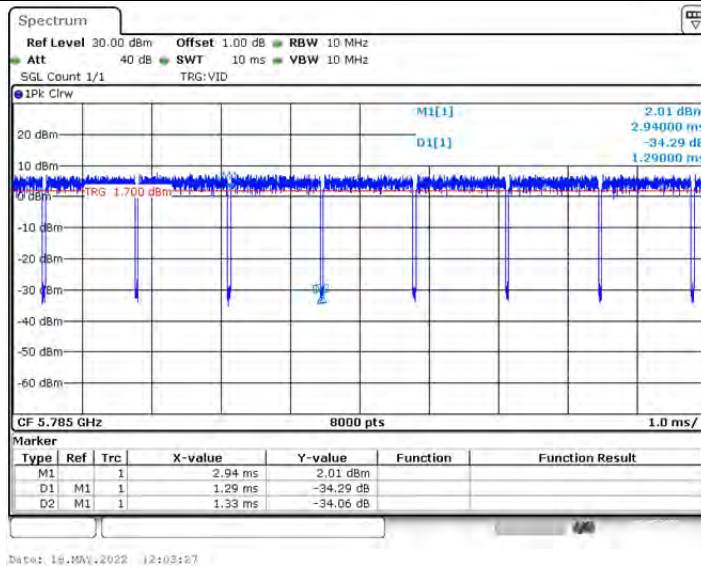
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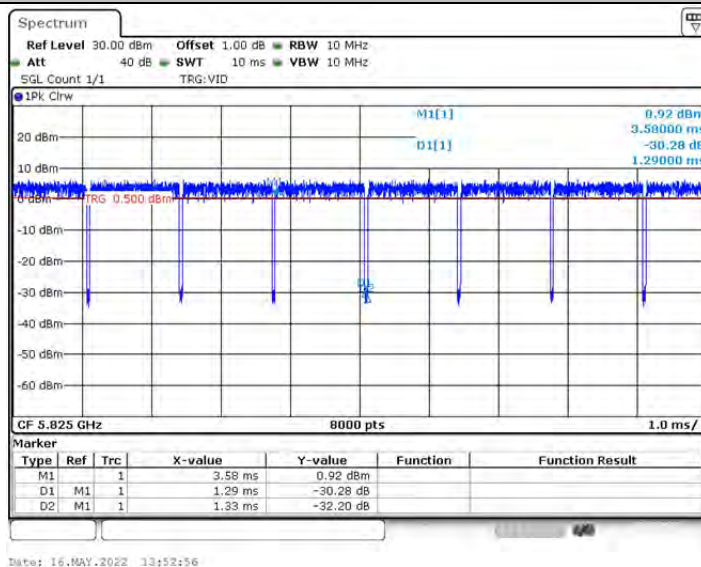
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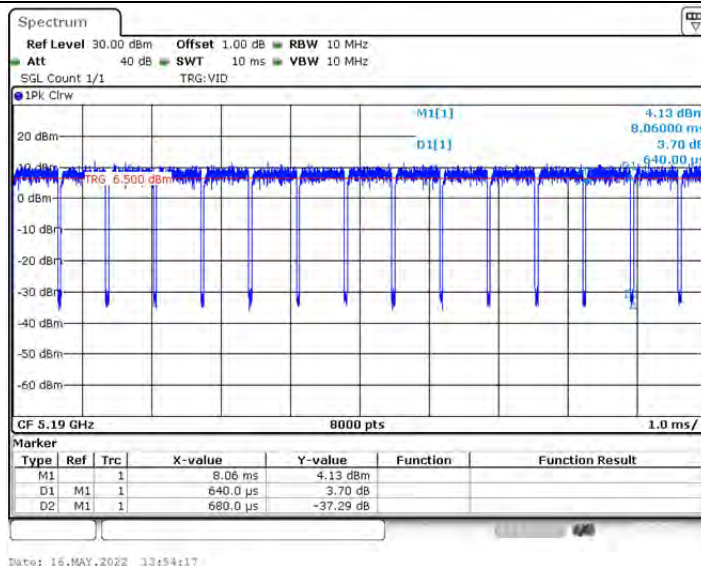
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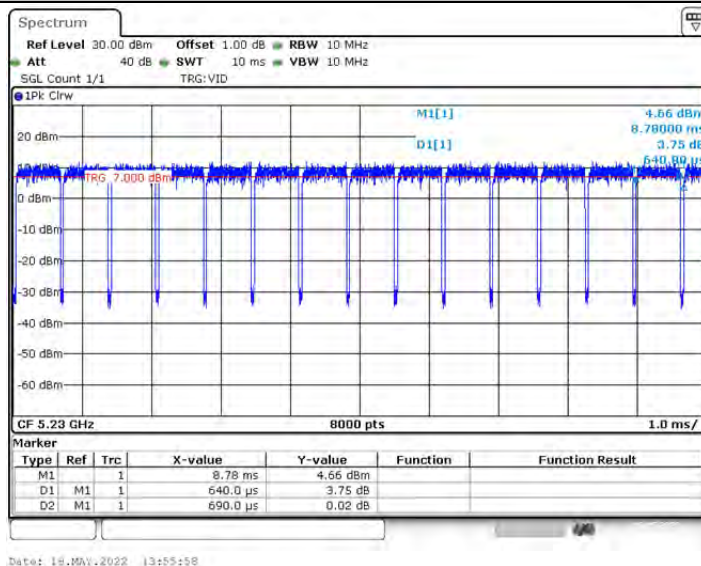
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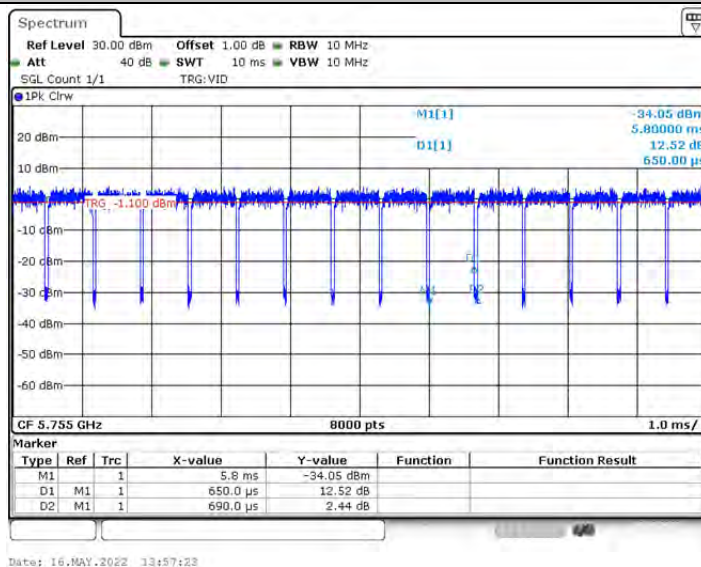
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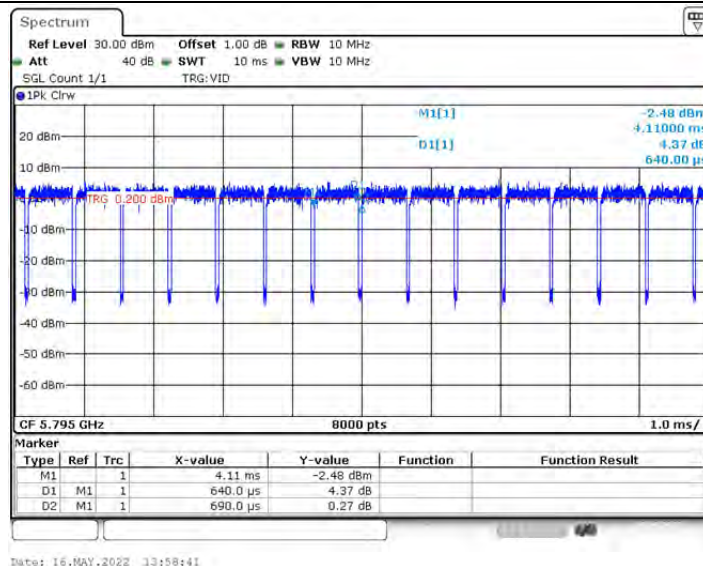
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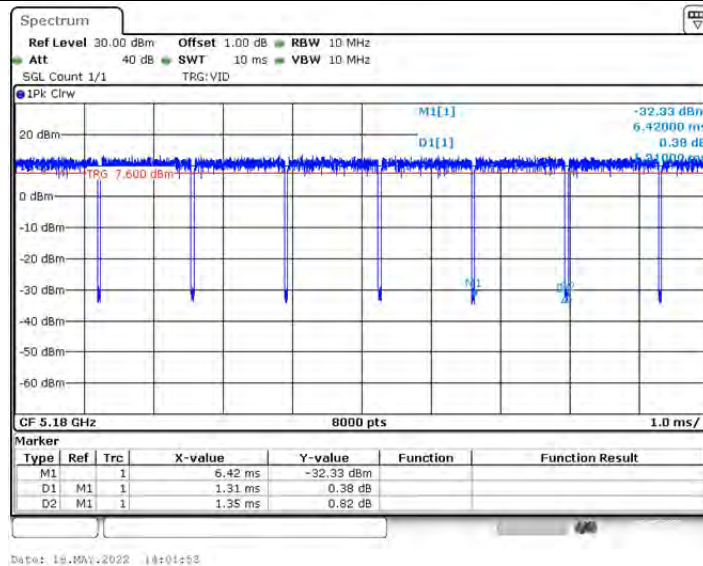
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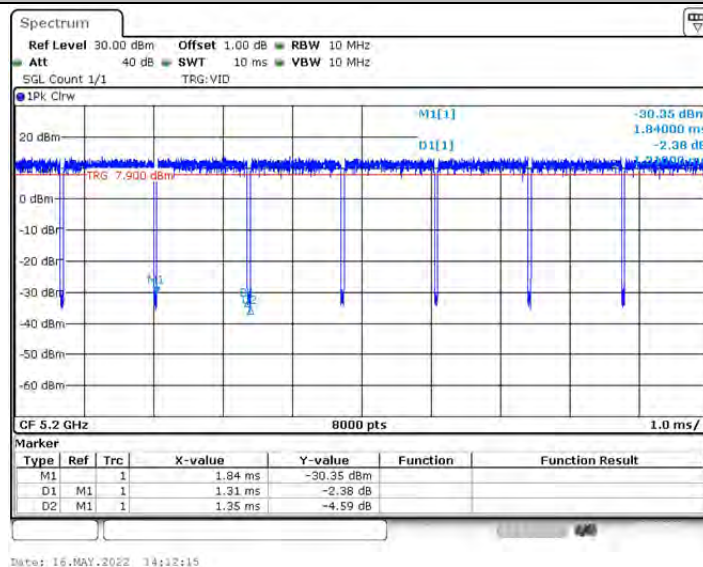
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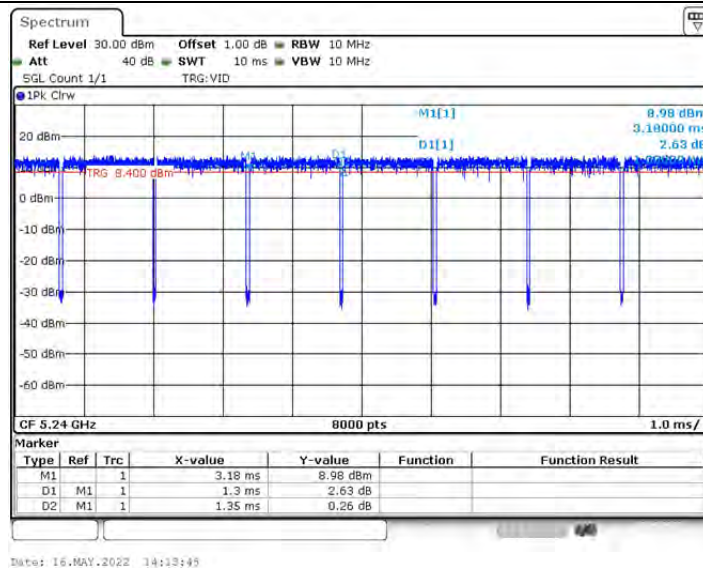
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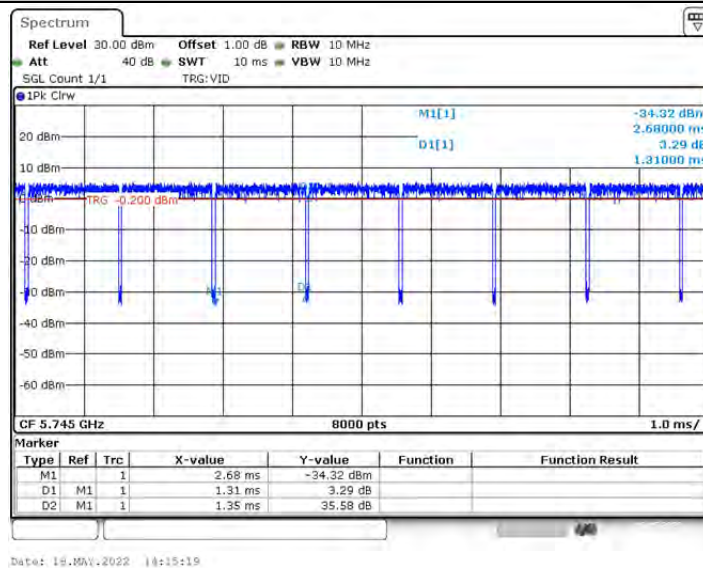
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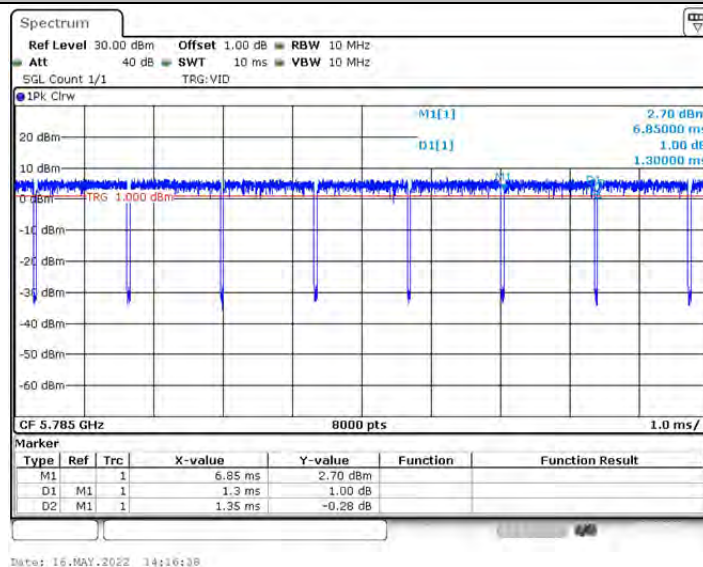
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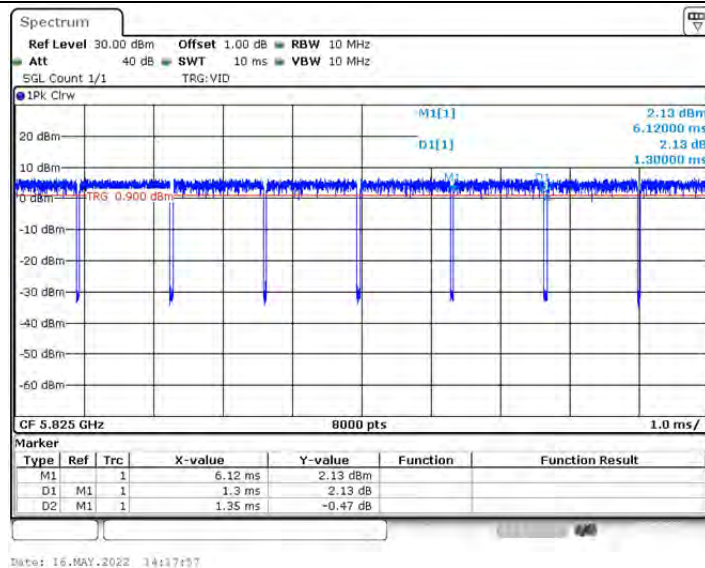
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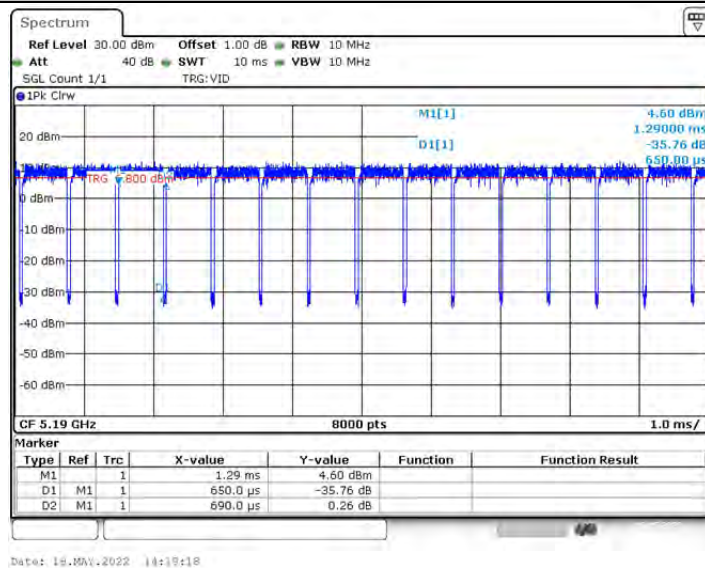
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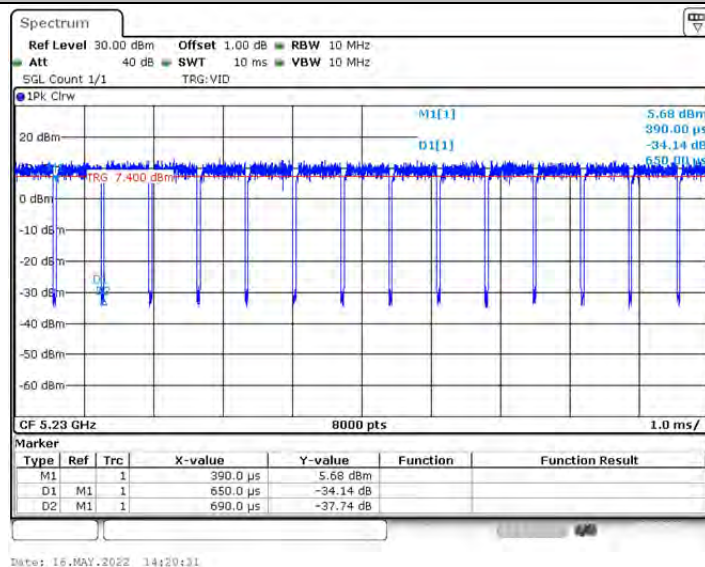
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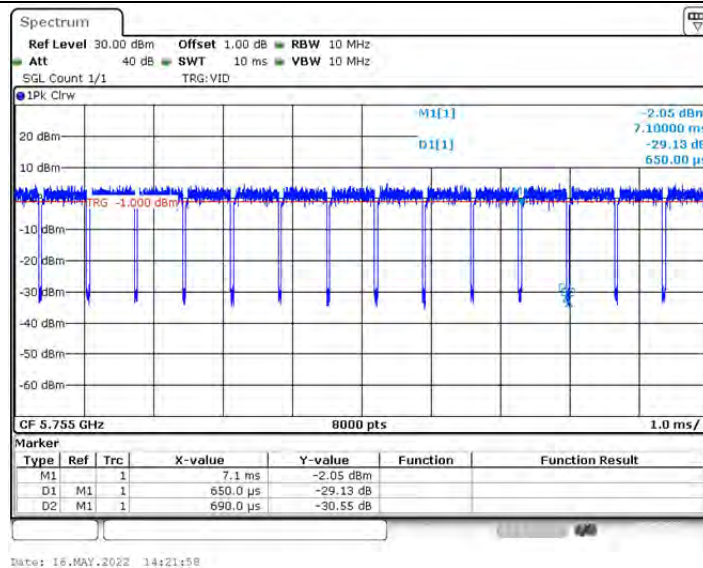
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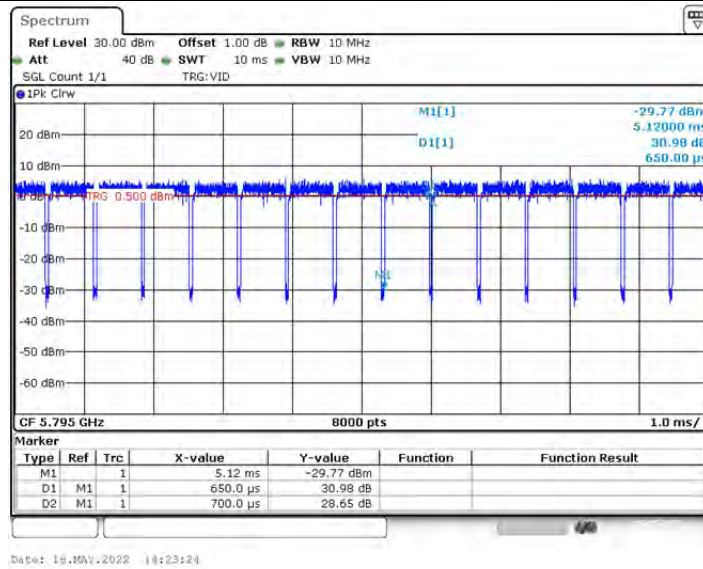
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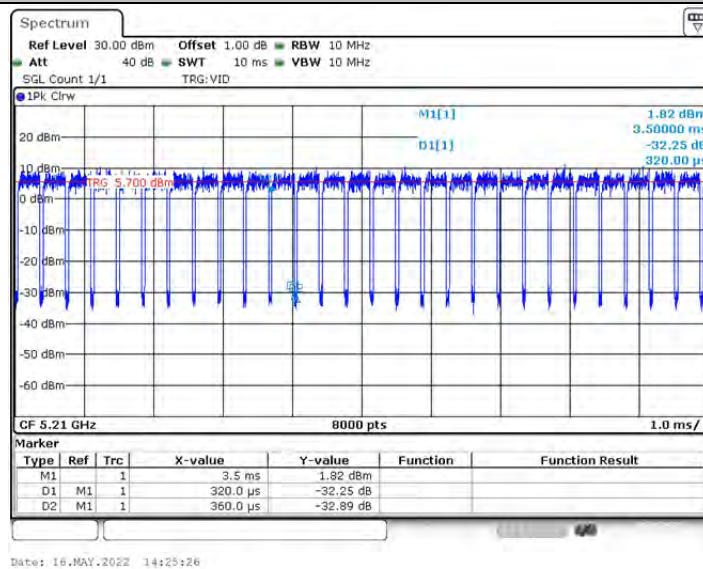
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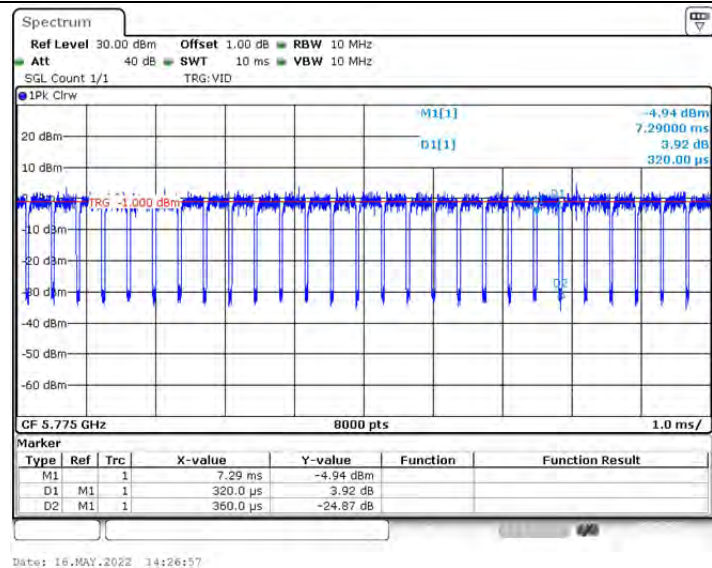
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802.11ac(VHT80)_5210



802.11ac(VHT80)_5775



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