

Appendix A

Report No.:	CISRR24082921501
FCC ID:	2BE3U-X1
Product Name:	Bonding Encoder
Model No.:	X1
Test Engineer:	Lucas Huang
Supervised by:	Rory Huang

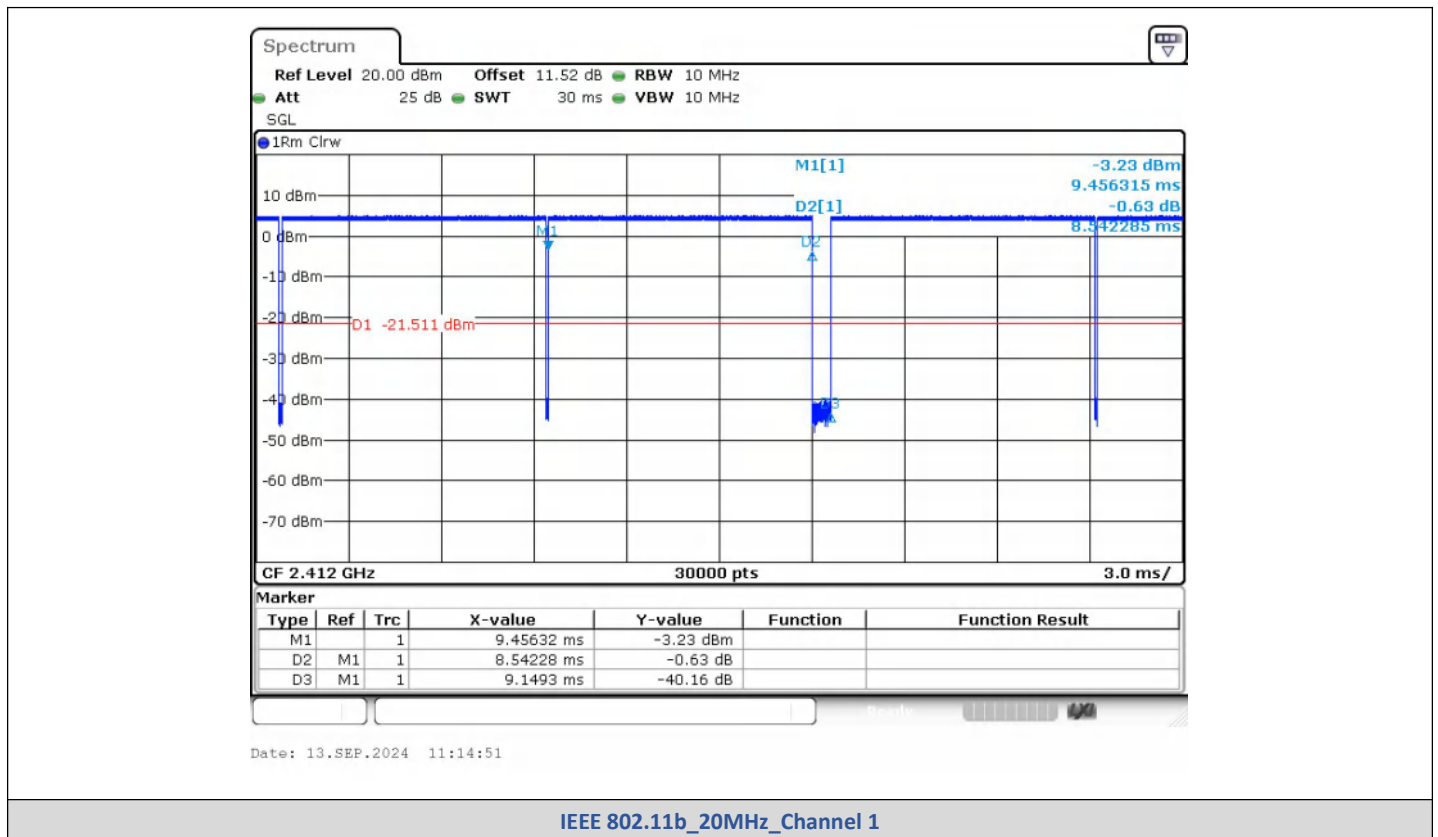
1) Duty Cycle

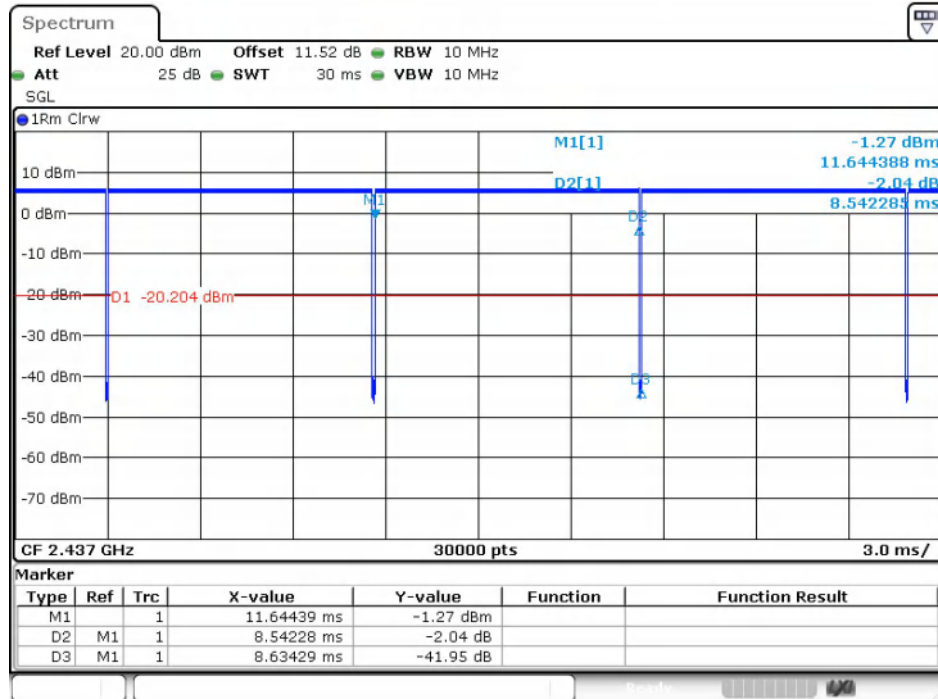
ANT1:

Test Result

Mode	Data rates	Channel	Antenna	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
IEEE 802.11b	1	1	1	8.542	9.149	93.37	0.9337	0.2979	0.12
		6		8.542	8.634	98.93	0.9893	0.0467	0.12
		11		8.564	8.655	98.94	0.9894	0.0463	0.12
IEEE 802.11g		1		1.431	1.528	93.65	0.9365	0.2849	0.70
		6		1.432	1.528	93.72	0.9372	0.2817	0.70
		11		1.431	1.528	93.65	0.9365	0.2849	0.70
IEEE 802.11n_20	MCS 0	1		0.169	0.268	62.93	0.6293	2.0114	5.92
		6		0.168	0.268	62.80	0.6280	2.0204	5.95
		11		0.168	0.268	62.80	0.6280	2.0204	5.95

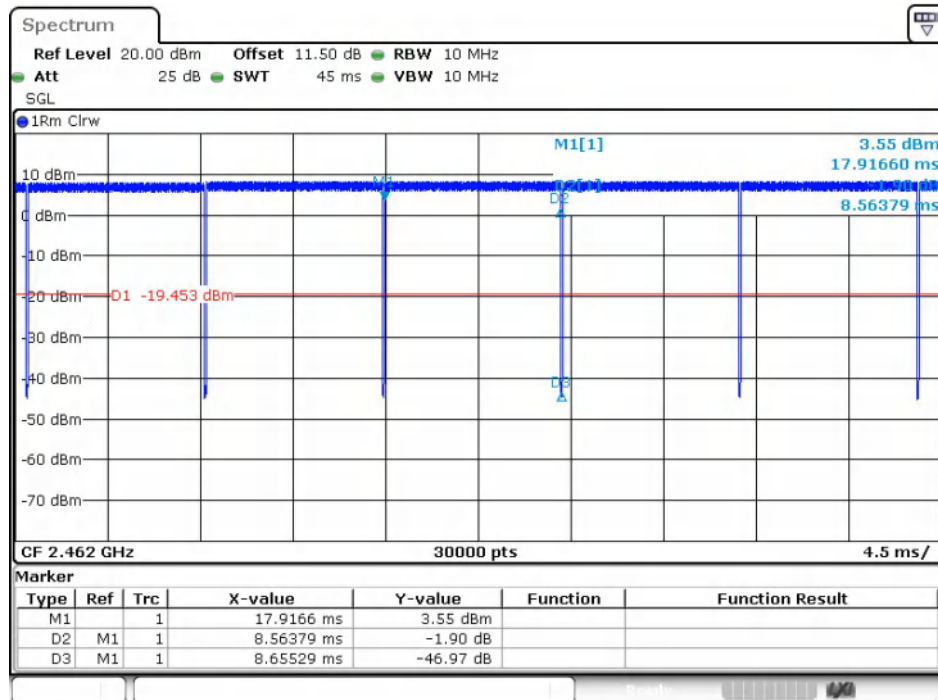
Test Graphs





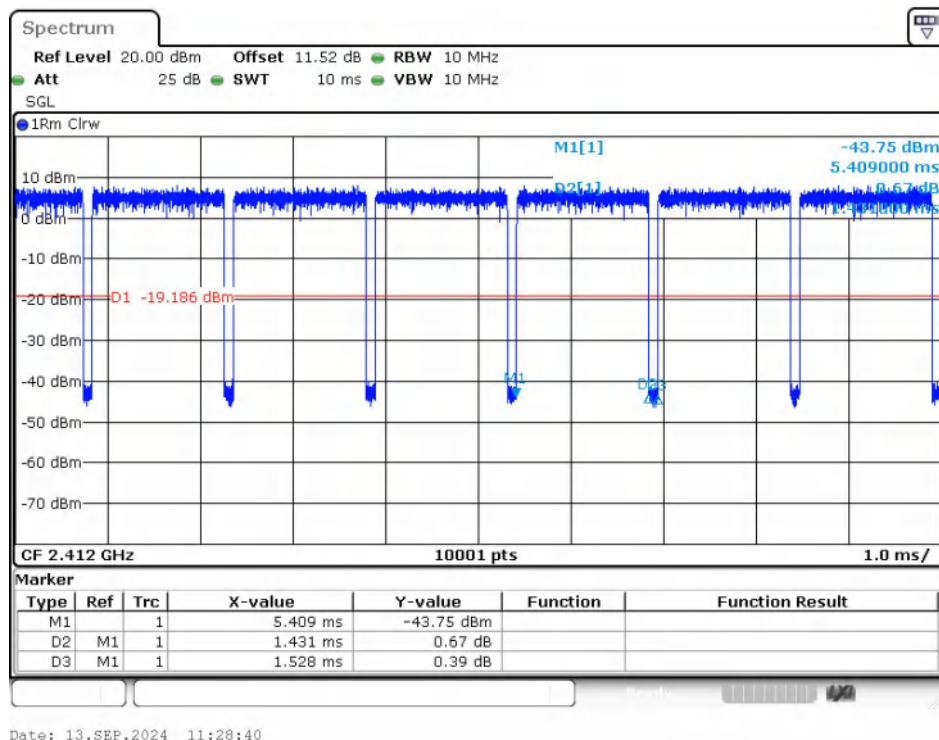
Date: 13.SEP.2024 11:20:51

IEEE 802.11b_20MHz_Channel 6

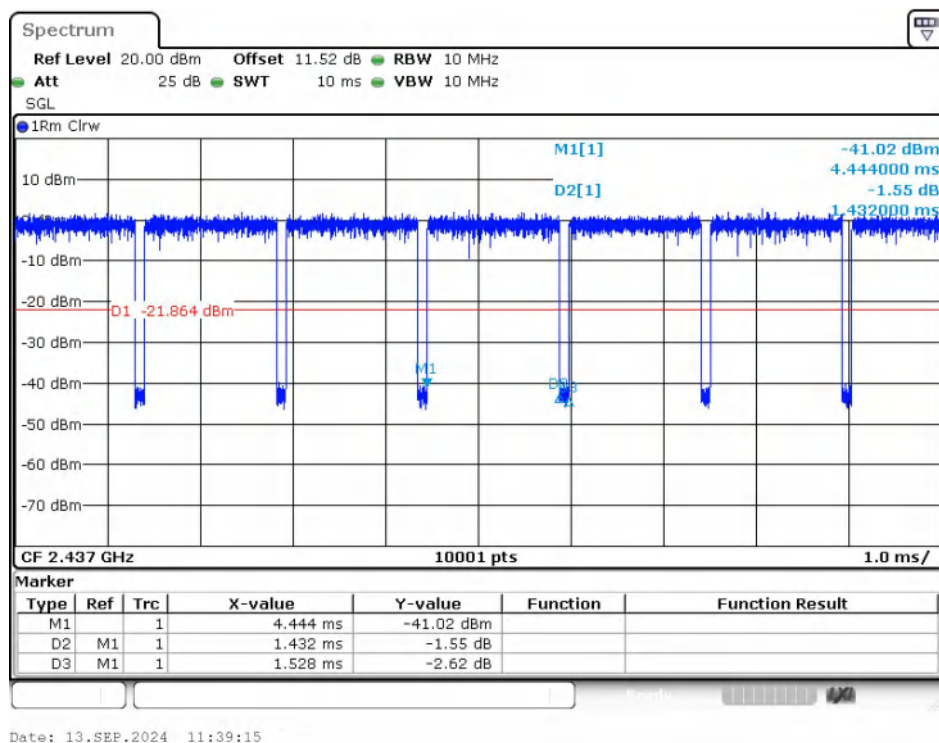


Date: 13.SEP.2024 11:24:30

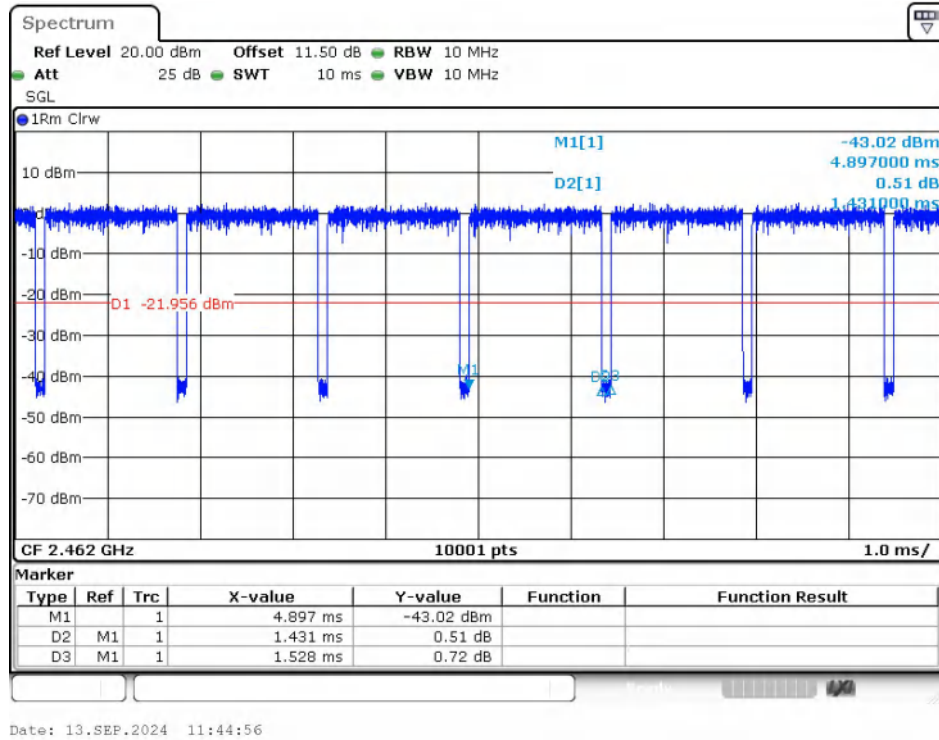
IEEE 802.11b_20MHz_Channel 11



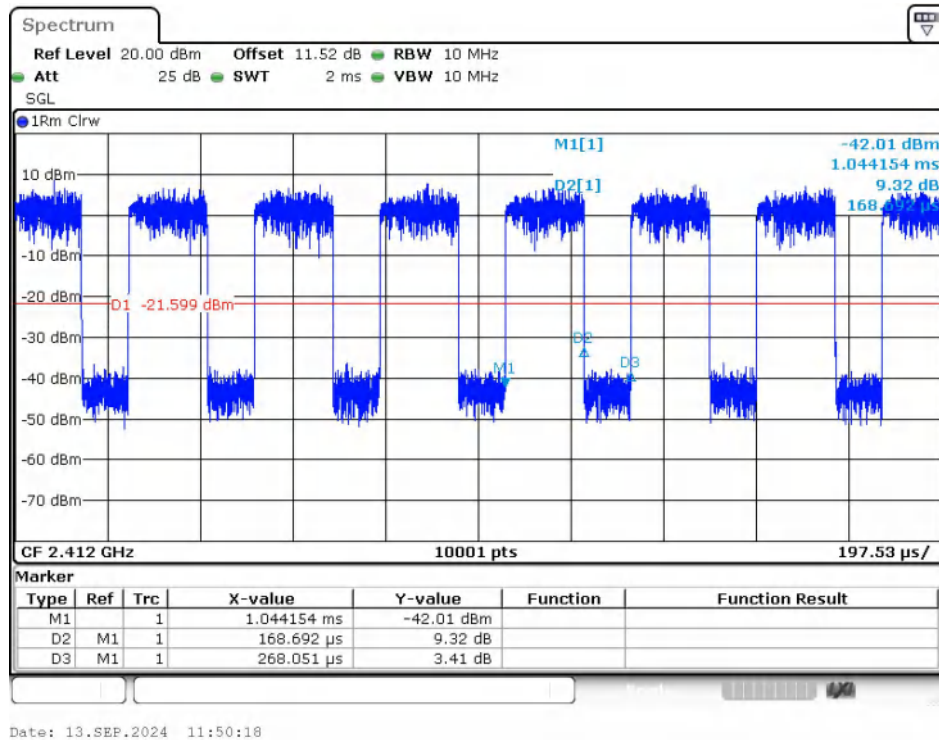
IEEE 802.11g_20MHz_Channel 1



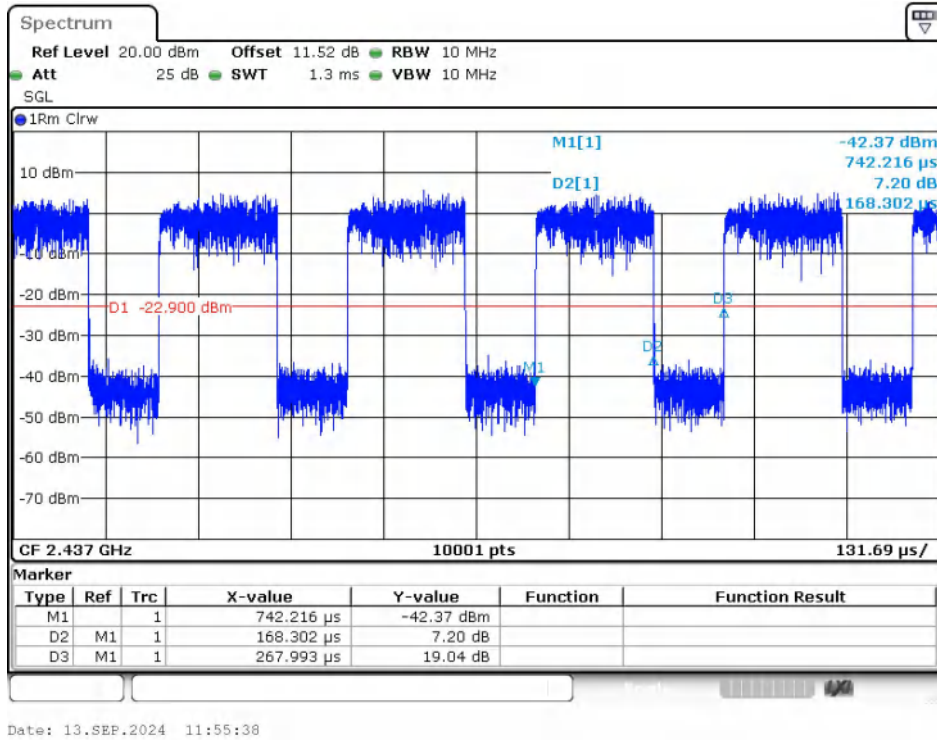
IEEE 802.11g_20MHz_Channel 6



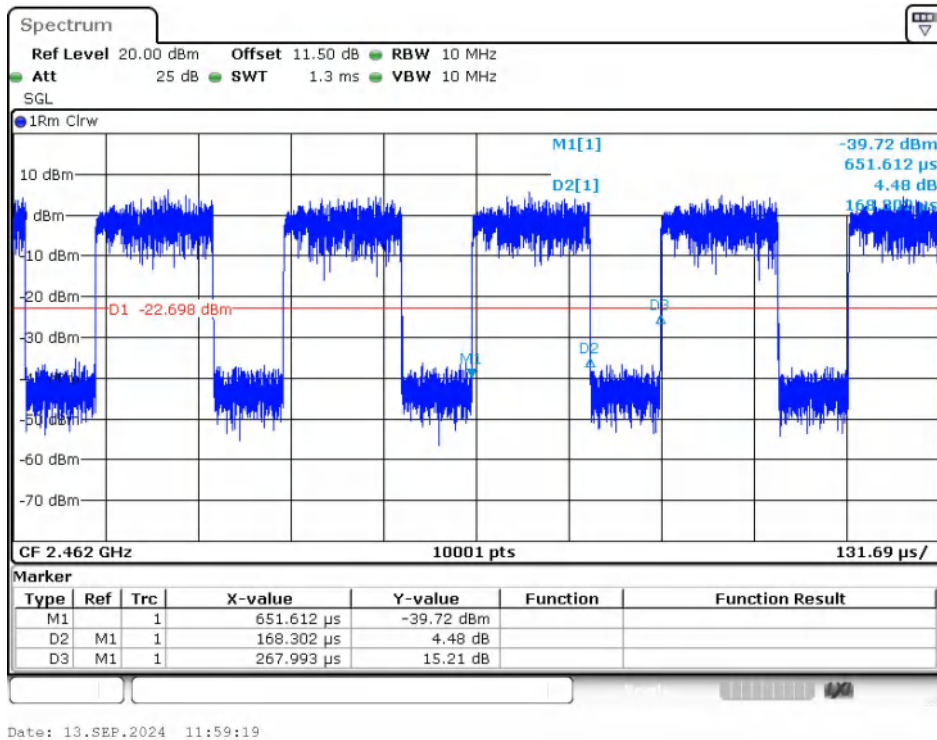
IEEE 802.11g_20MHz_Channel 11



IEEE 802.11n_20MHz_Channel 1



IEEE 802.11n_20MHz_Channel 6



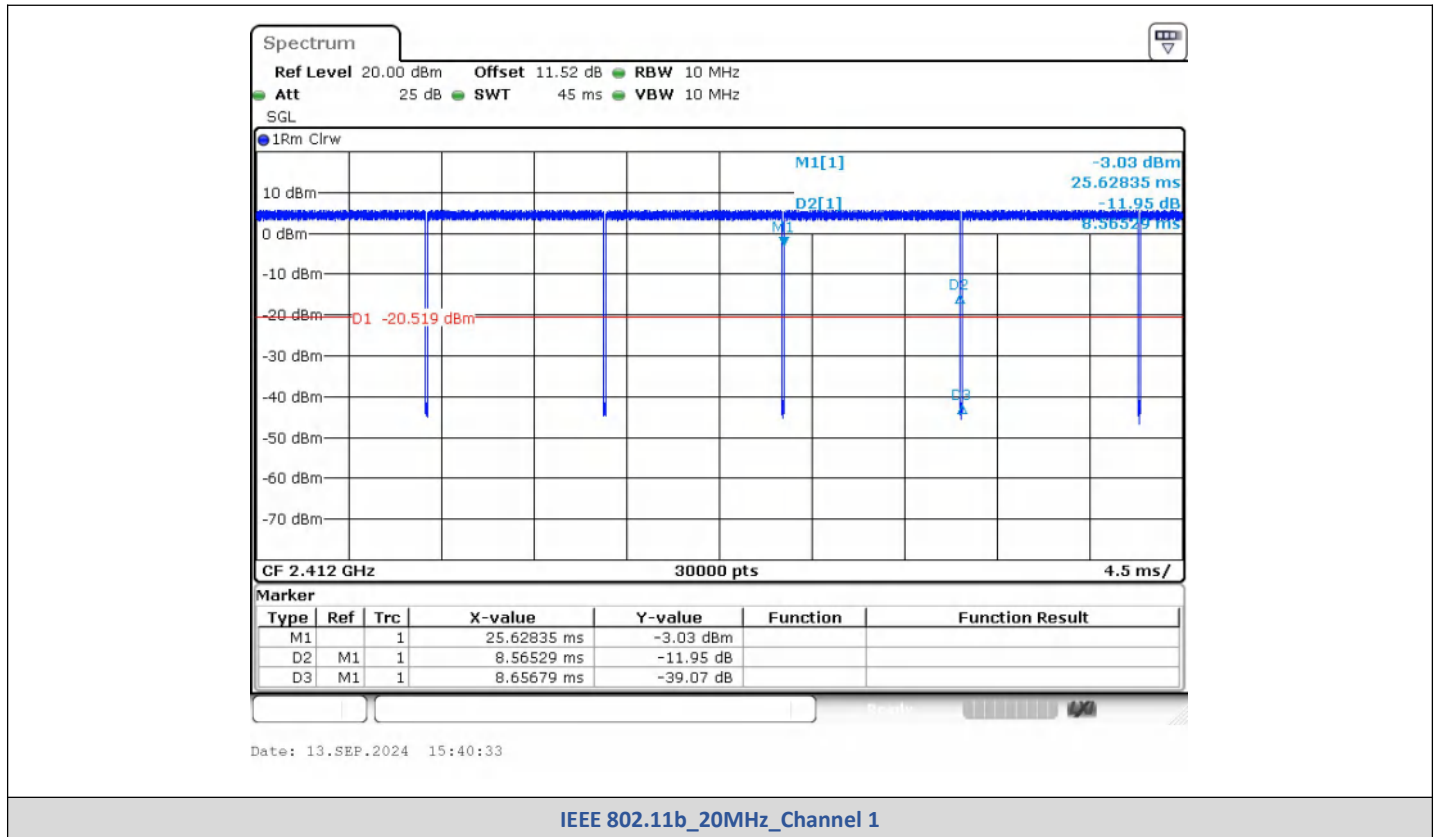
IEEE 802.11n_20MHz_Channel 11

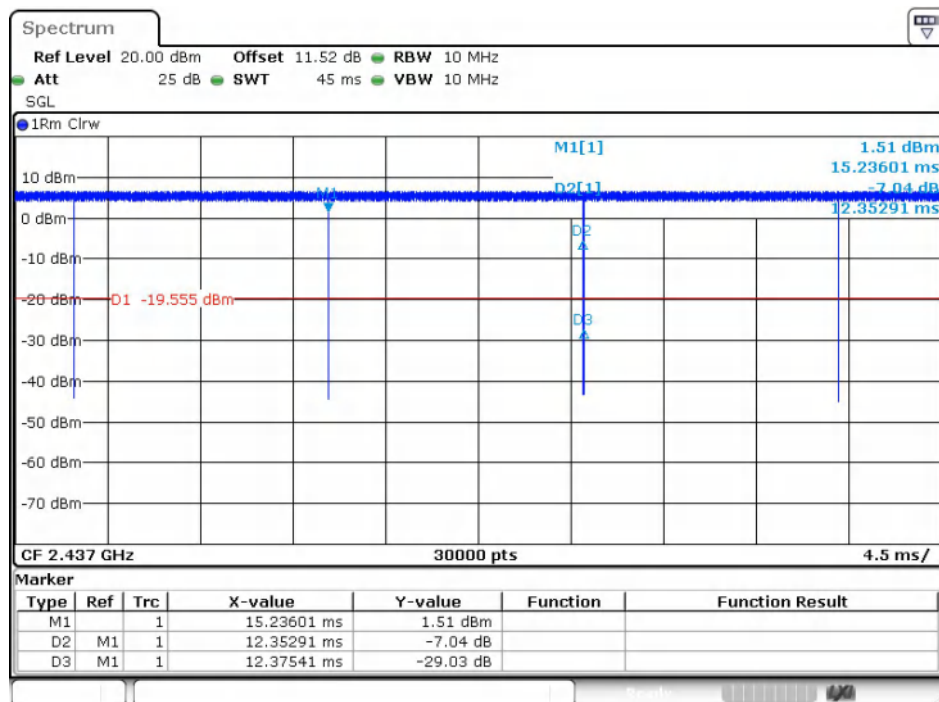
ANT2:

Test Result

Mode	Data rates	Channel	Antenna	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
IEEE 802.11b	1	1	2	8.565	8.657	98.94	0.9894	0.0463	0.12
		6		12.353	12.375	99.82	0.9982	0.0078	0.08
		11		12.375	12.396	99.84	0.9984	0.007	0.08
IEEE 802.11g		1		1.431	1.528	93.65	0.9365	0.2849	0.70
		6		1.431	1.528	93.65	0.9365	0.2849	0.70
		11		1.431	1.528	93.65	0.9365	0.2849	0.70
IEEE 802.11n_20	MCS 0	1		0.168	0.268	62.83	0.6283	2.0183	5.95
		6		0.168	0.268	62.83	0.6283	2.0183	5.95
		11		0.168	0.268	62.83	0.6283	2.0183	5.95

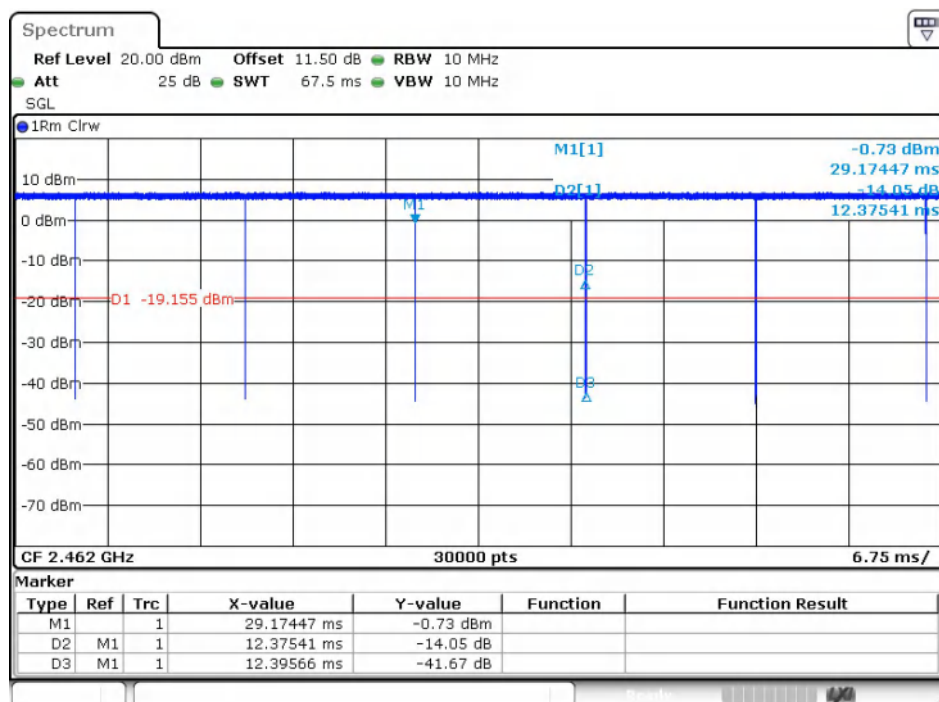
Test Graphs





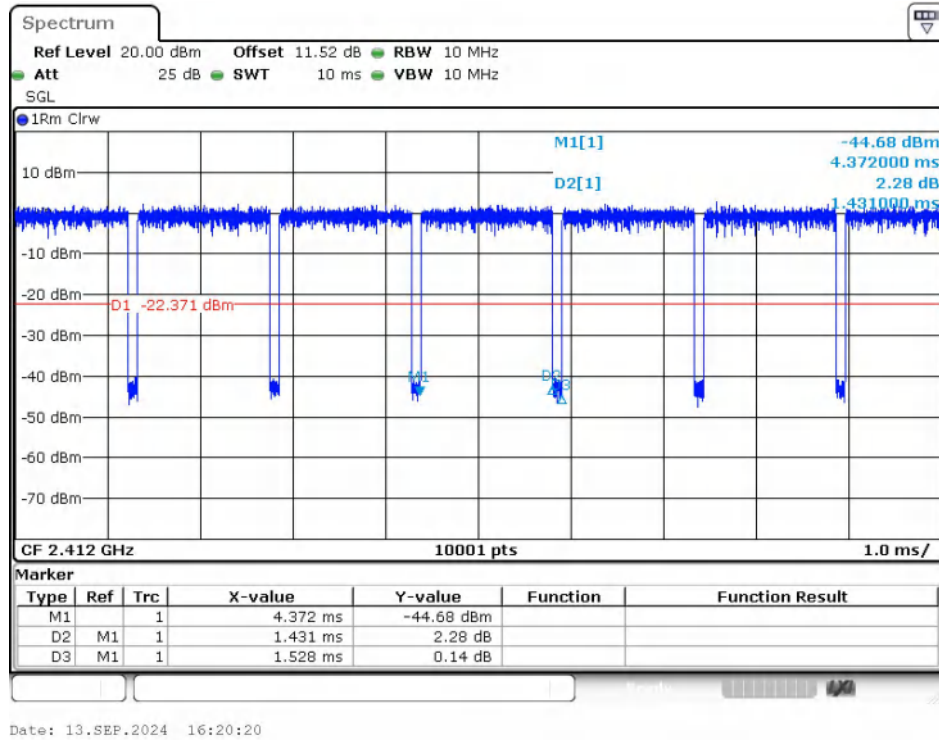
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IEEE 802.11b_20MHz_Channel 6

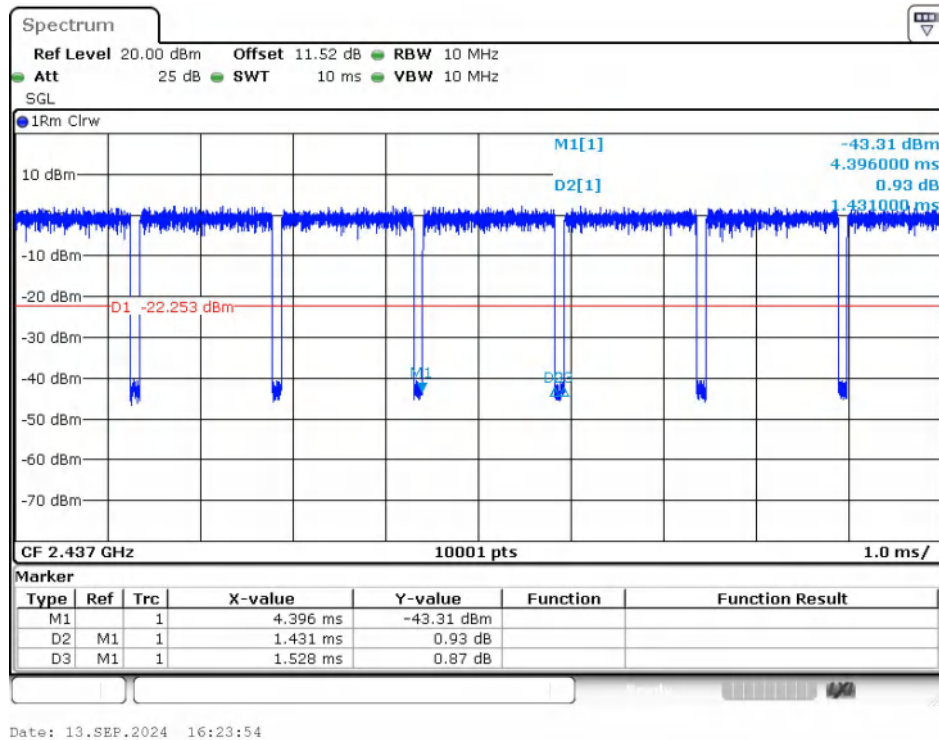


Date: 13.SEP.2024 16:16:27

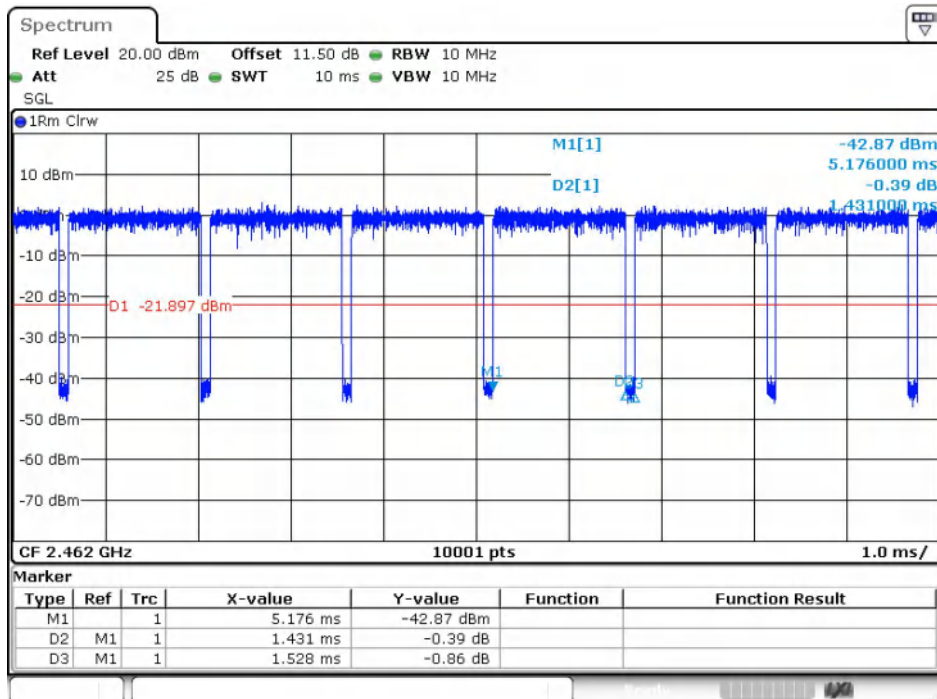
IEEE 802.11b_20MHz_Channel 11



IEEE 802.11g_20MHz_Channel 1

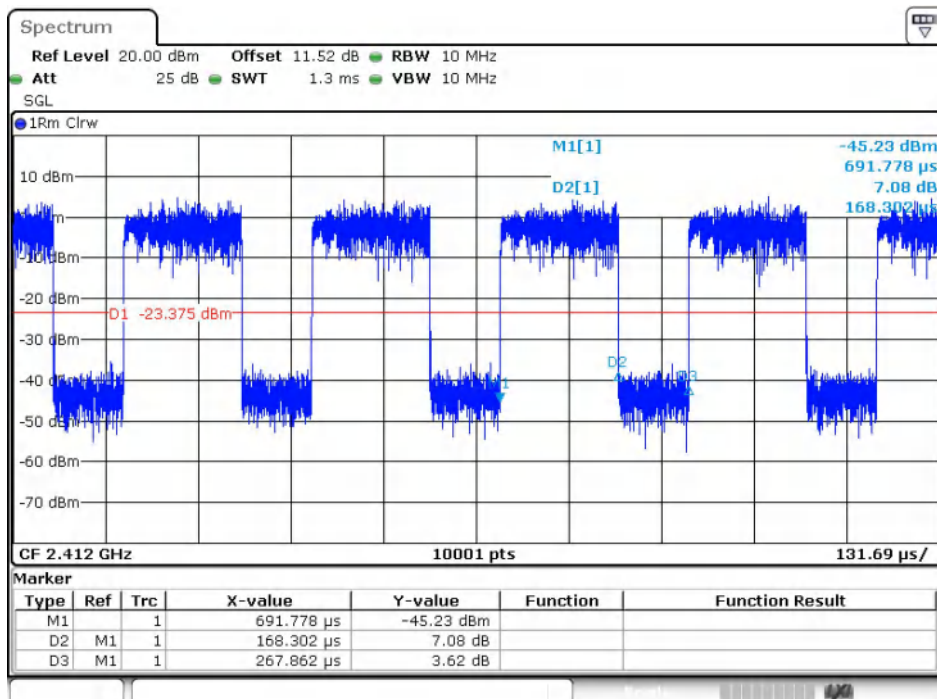


IEEE 802.11g_20MHz_Channel 6



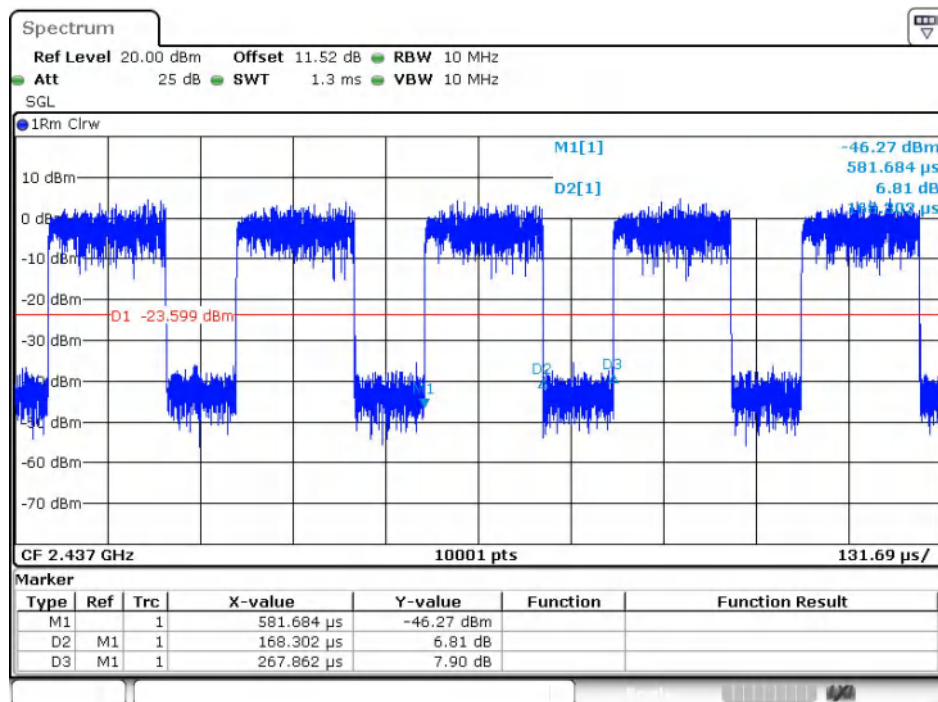
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IEEE 802.11g_20MHz_Channel 11



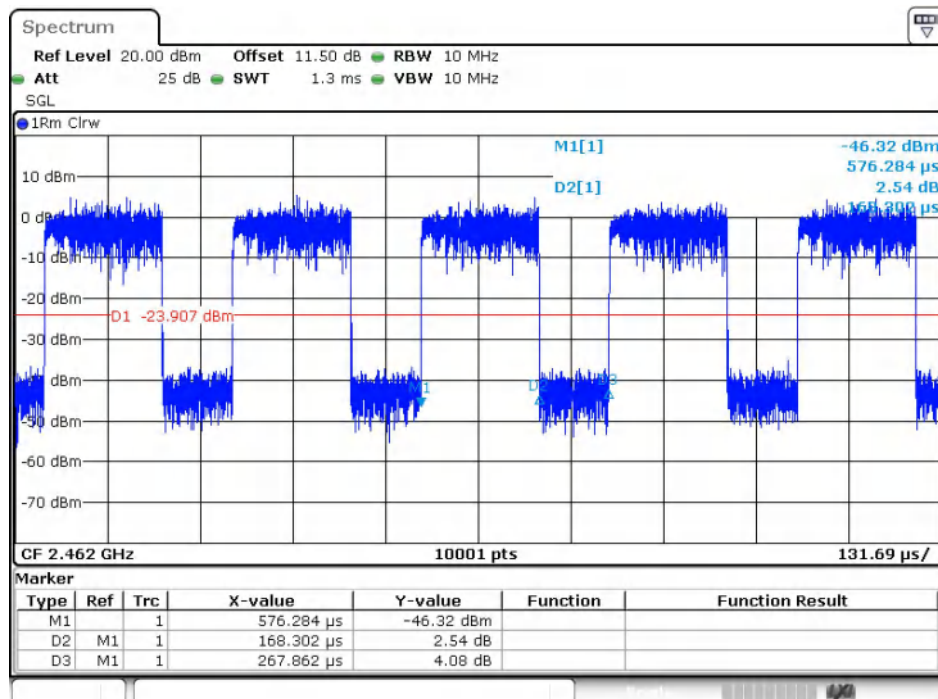
Date: 13.SEP.2024 16:32:24

IEEE 802.11n_20MHz_Channel 1



Date: 13.SEP.2024 16:35:55

IEEE 802.11n_20MHz_Channel 6



Date: 13.SEP.2024 16:39:06

IEEE 802.11n_20MHz_Channel 11

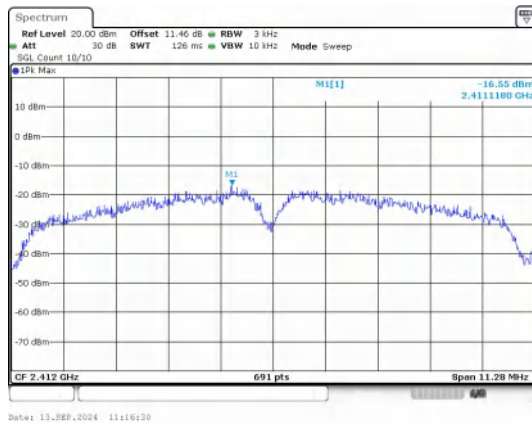
2) Power Spectral Density

ANT1:

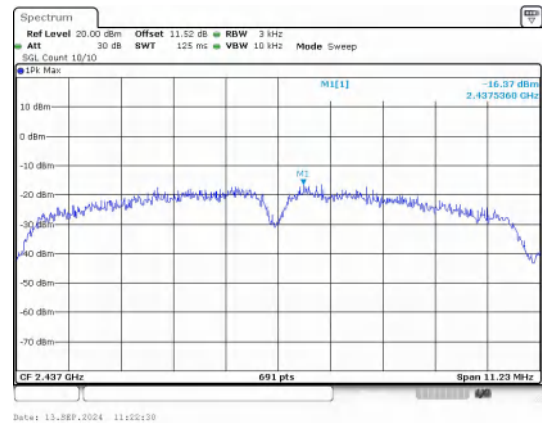
Test Result

Mode	Channel	PSD (dBm/3kHz) Ant. 1	Limit (dBm/3kHz)	Result
IEEE 802.11b	1	-16.554	≤8	PASS
	6	-16.369		PASS
	11	-12.369		PASS
IEEE 802.11g	1	-18.344		PASS
	6	-24.507		PASS
	11	-23.574		PASS
IEEE 802.11n_20	1	-23.168		PASS
	6	-26.033		PASS
	11	-25.636		PASS

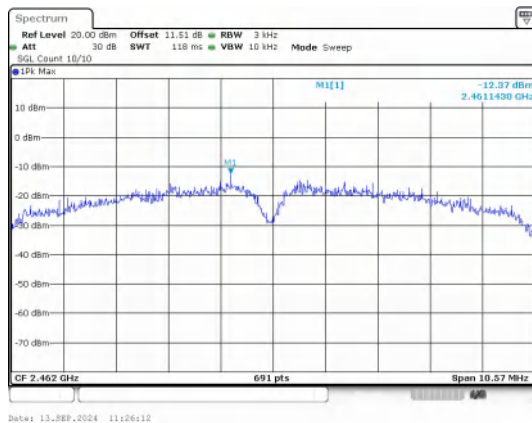
Test Graphs



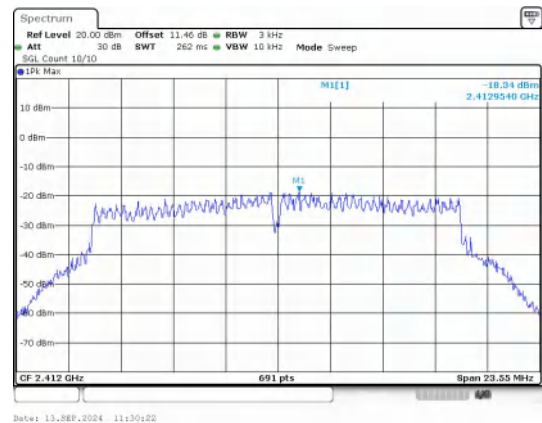
IEEE 802.11b_Channel 1_20MHz_Antenna1



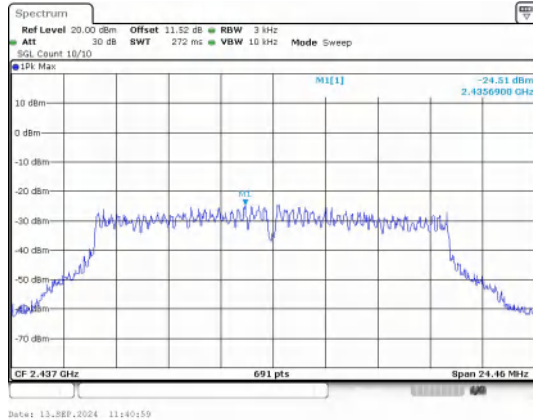
IEEE 802.11b_Channel 6_20MHz_Antenna 1



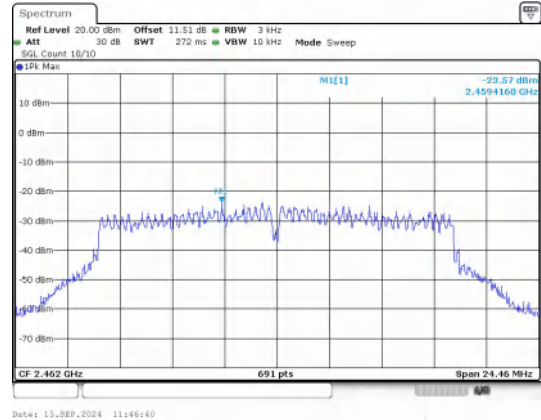
IEEE 802.11b_Channel 11_20MHz_Antenna 1



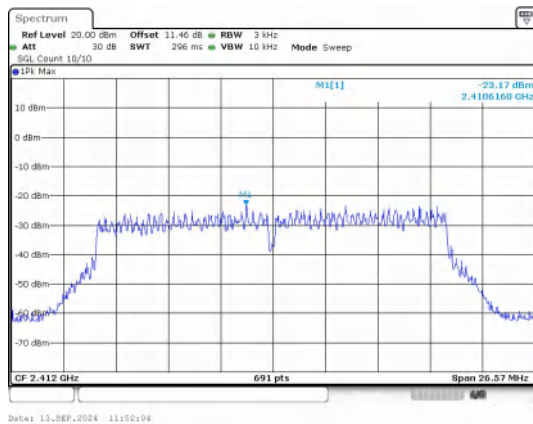
IEEE 802.11g_Channel 1_20MHz_Antenna 1



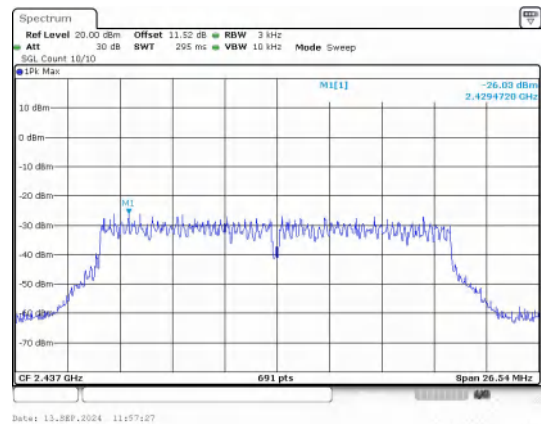
IEEE 802.11g_Channel 6_20MHz_Antenna 1



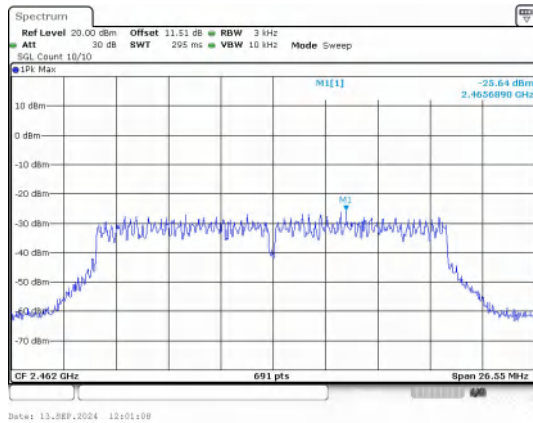
IEEE 802.11g_Channel 11_20MHz_Antenna 1



IEEE 802.11n_Channel 1_20MHz_Antenna 1



IEEE 802.11n_Channel 6_20MHz_Antenna 1



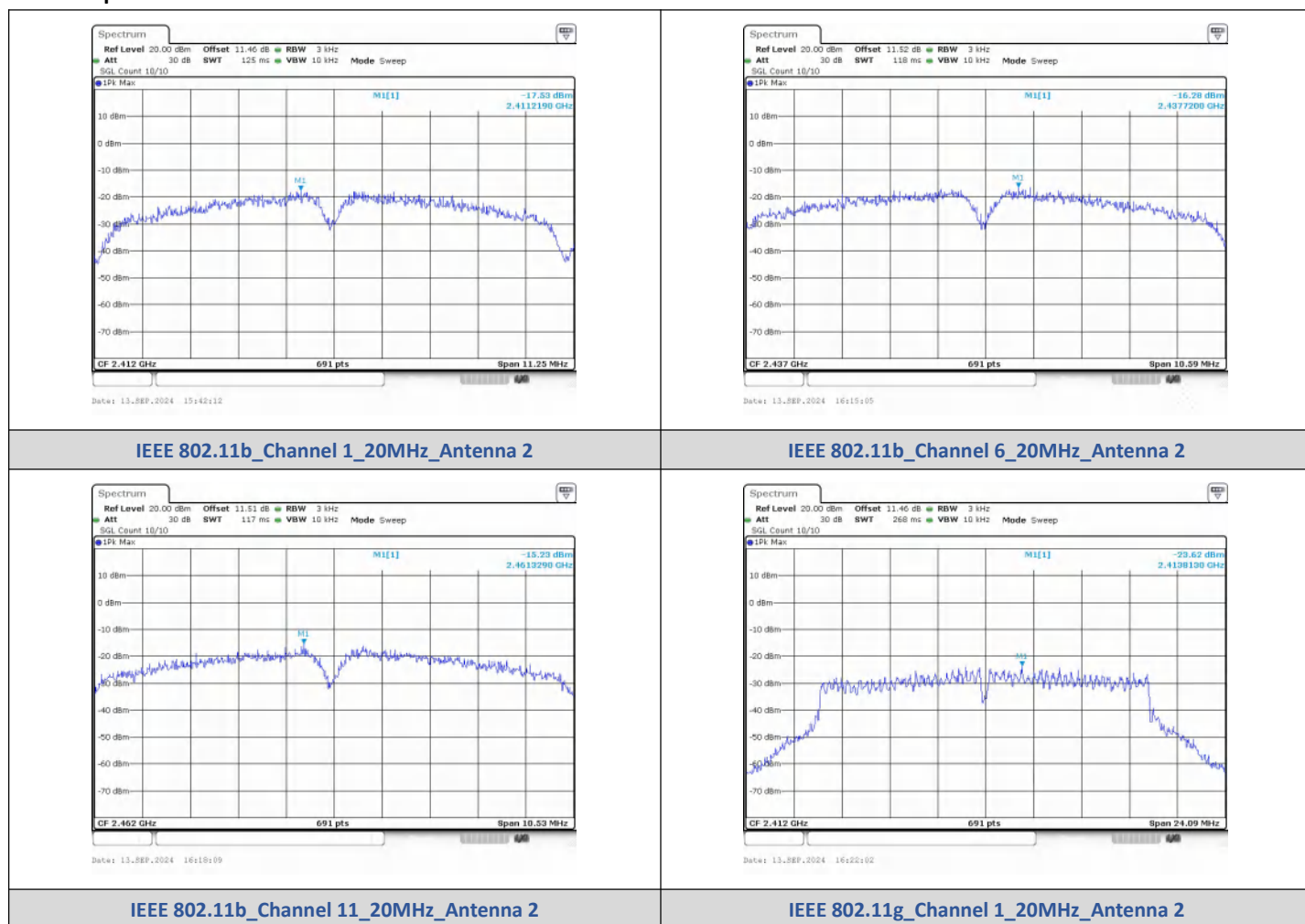
IEEE 802.11n_Channel 11_20MHz_Antenna 1

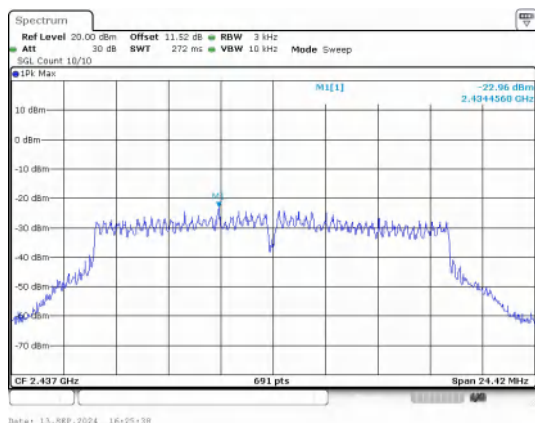
ANT2:

Test Result

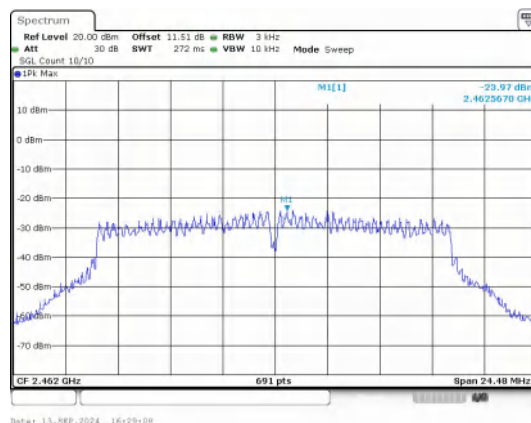
Mode	Channel	PSD (dBm/3kHz) Ant. 2	Limit (dBm/3kHz)	Result
IEEE 802.11b	1	-17.533	≤8	PASS
	6	-16.279		PASS
	11	-15.225		PASS
IEEE 802.11g	1	-23.623		PASS
	6	-22.957		PASS
	11	-23.967		PASS
IEEE 802.11n_20	1	-26.801		PASS
	6	-26.898		PASS
	11	-26.831		PASS

Test Graphs

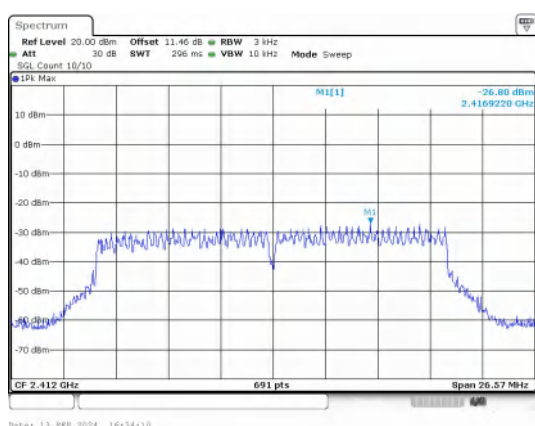




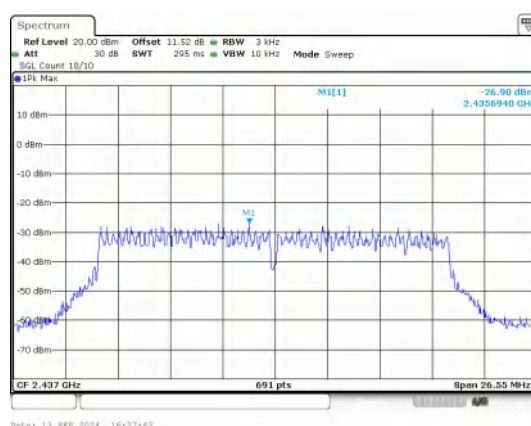
IEEE 802.11g_Channel 6_20MHz_Antenna 2



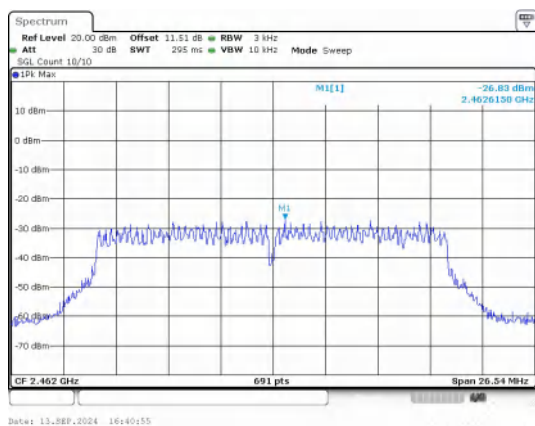
IEEE 802.11g_Channel 11_20MHz_Antenna 2



IEEE 802.11n_Channel 1_20MHz_Antenna 2



IEEE 802.11n_Channel 6_20MHz_Antenna 2



IEEE 802.11n_Channel 11_20MHz_Antenna 2

MIMO

Mode	Channel	PSD (dBm/3kHz) Ant. 1	PSD (dBm/3kHz) Ant. 2	PSD (dBm/3kHz) MIMO	Limit (dBm/3kHz)	Result
IEEE 802.11n_20	1	-23.168	-26.801	-21.60	≤8	PASS
	6	-26.033	-26.898	-23.43		PASS
	11	-25.636	-26.831	-23.18		PASS

3) Conducted Peak Output Power

ANT1:

Test Result

Conducted Output Power

Mode	Channel	Ant. 1 (dBm)	Limit (dBm)	Result
IEEE 802.11b	1	7.70	≤30	PASS
	6	8.69	≤30	PASS
	11	8.26	≤30	PASS
IEEE 802.11g	1	8.74	≤30	PASS
	6	8.56	≤30	PASS
	11	9.00	≤30	PASS
IEEE 802.11n_20	1	8.91	≤30	PASS
	6	7.93	≤30	PASS
	11	8.79	≤30	PASS

ANT2:

Test Result

Conducted Output Power

Mode	Channel	Ant. 2 (dBm)	Limit (dBm)	Result
IEEE 802.11b	1	7.92	≤30	PASS
	6	8.60	≤30	PASS
	11	8.92	≤30	PASS
IEEE 802.11g	1	8.94	≤30	PASS
	6	8.96	≤30	PASS
	11	8.93	≤30	PASS
IEEE 802.11n_20	1	8.29	≤30	PASS
	6	8.21	≤30	PASS
	11	8.19	≤30	PASS

MIMO

Mode	Channel	Ant. 1 (dBm)	Ant. 2 (dBm)	MIMO (dBm)	Limit (dBm)	Result
IEEE 802.11n_20	1	8.91	8.29	11.62	≤30	PASS
	6	7.93	8.21	11.08	≤30	PASS
	11	8.79	8.19	11.51	≤30	PASS

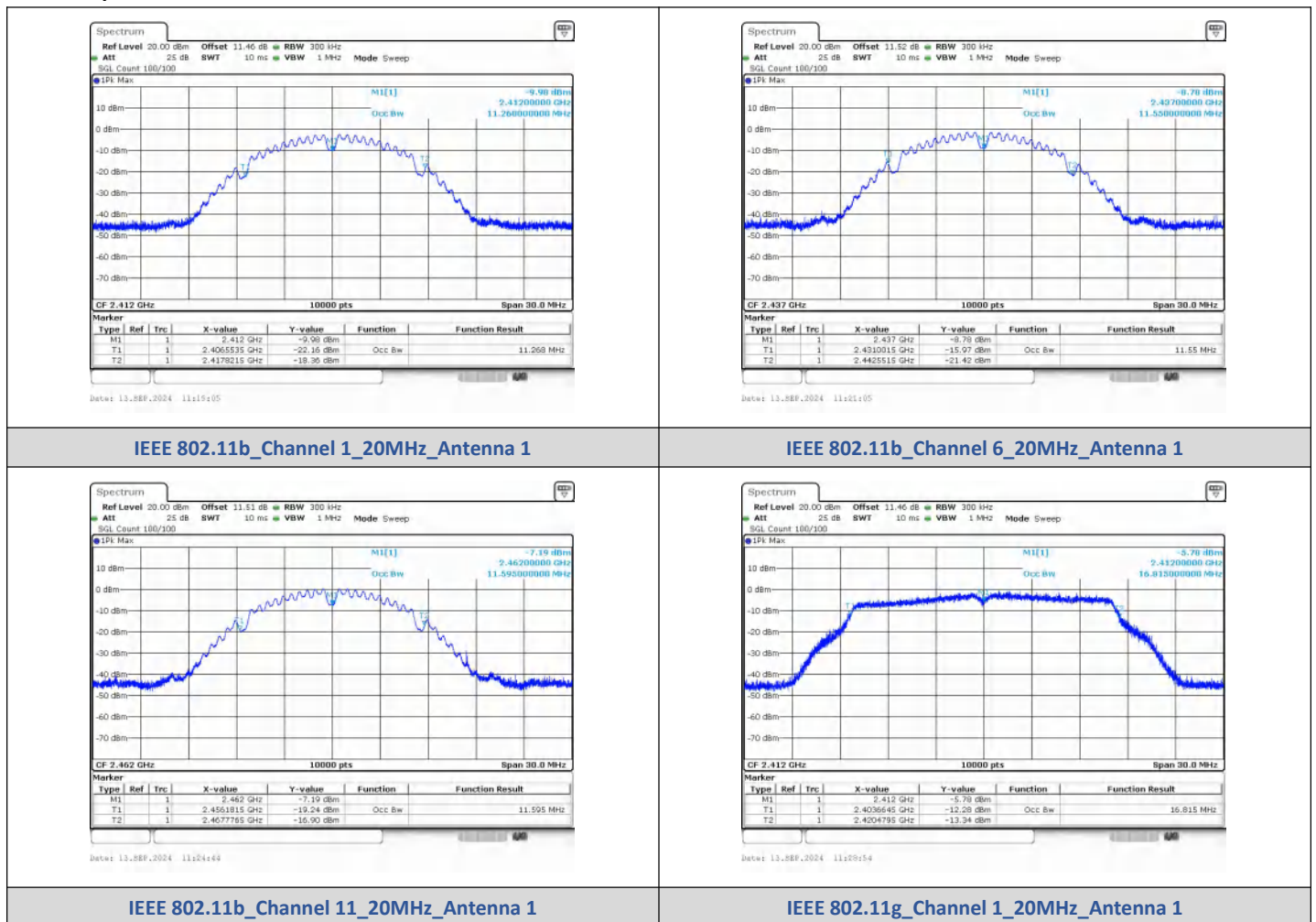
4) 99% Bandwidth

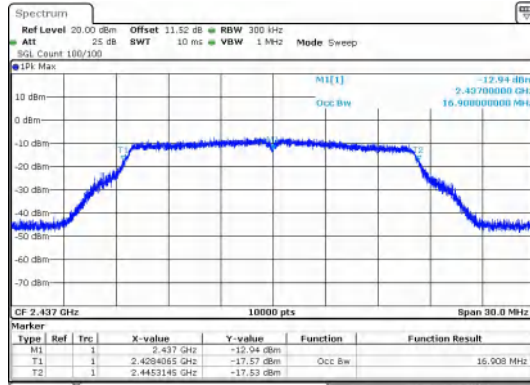
ANT1:

Test Result

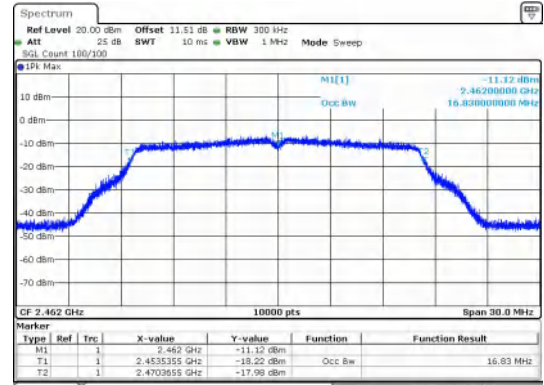
Mode	Channel	Ant.	Center Frequency (MHz)	99% BW (MHz)
IEEE 802.11b	1	1	2412	11.268
	6		2437	11.550
	11		2462	11.595
IEEE 802.11g	1		2412	16.815
	6		2437	16.908
	11		2462	16.830
IEEE 802.11n_20	1		2412	17.910
	6		2437	17.985
	11		2462	17.916

Test Graphs

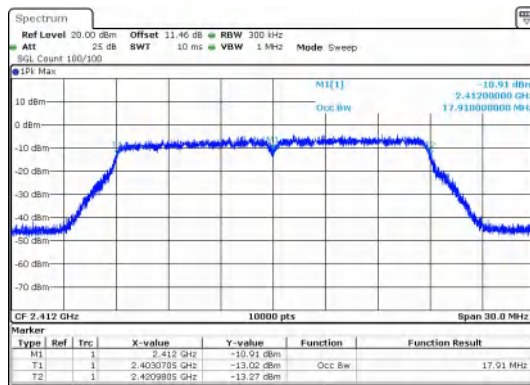




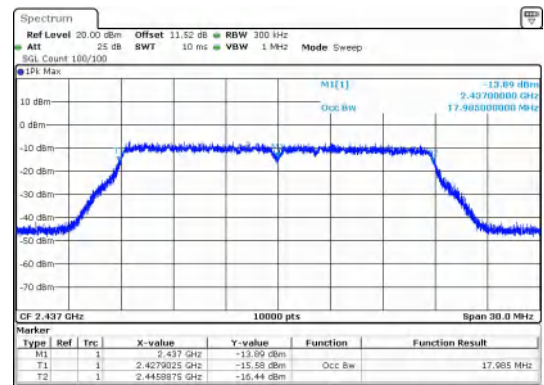
IEEE 802.11g_Channel 6_20MHz_Antenna 1



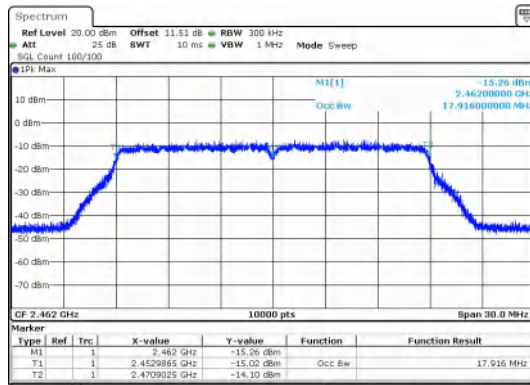
IEEE 802.11g_Channel 11_20MHz_Antenna 1



IEEE 802.11n_Channel 1_20MHz_Antenna 1



IEEE 802.11n_Channel 6_20MHz_Antenna 1



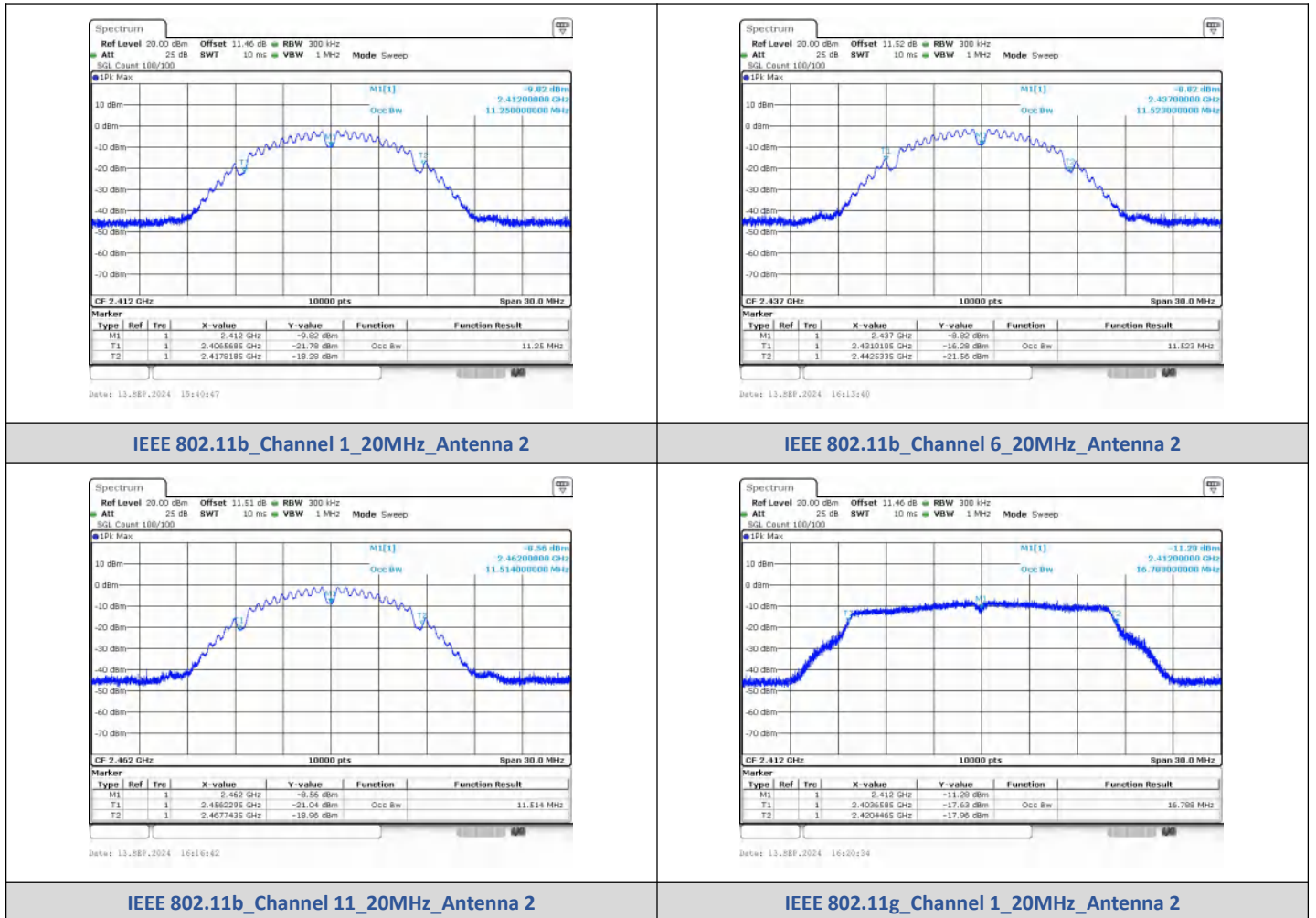
IEEE 802.11n_Channel 11_20MHz_Antenna 1

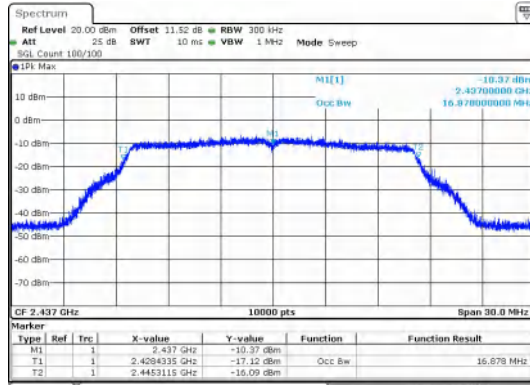
ANT2:

Test Result

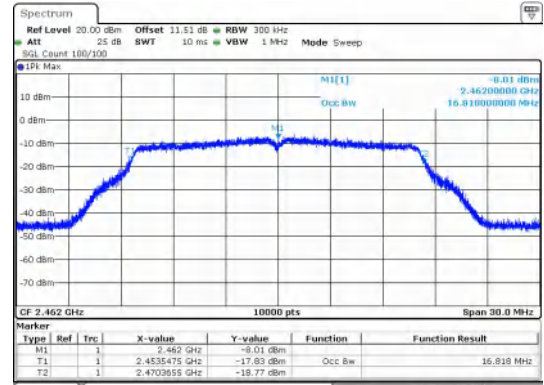
Mode	Channel	Ant.	Center Frequency (MHz)	99% BW (MHz)
IEEE 802.11b	1	2	2412	11.250
	6		2437	11.523
	11		2462	11.514
IEEE 802.11g	1		2412	16.788
	6		2437	16.879
	11		2462	16.818
IEEE 802.11n_20	1		2412	17.904
	6		2437	17.985
	11		2462	17.940

Test Graphs

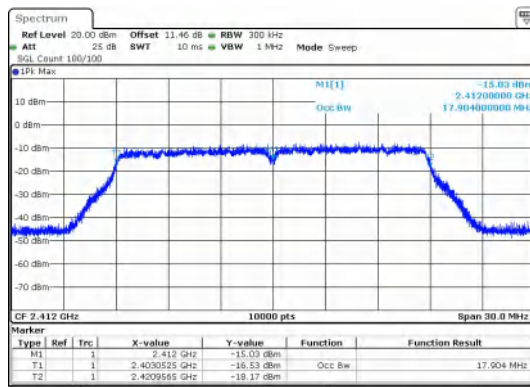




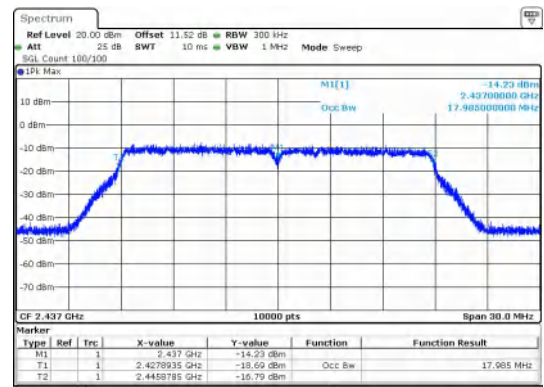
IEEE 802.11g_Channel 6_20MHz_Antenna 2



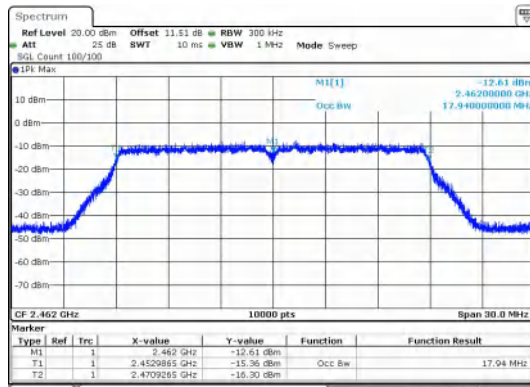
IEEE 802.11g_Channel 11_20MHz_Antenna 2



IEEE 802.11n_Channel 1_20MHz_Antenna 2



IEEE 802.11n_Channel 6_20MHz_Antenna 2



IEEE 802.11n_Channel 11_20MHz_Antenna 2

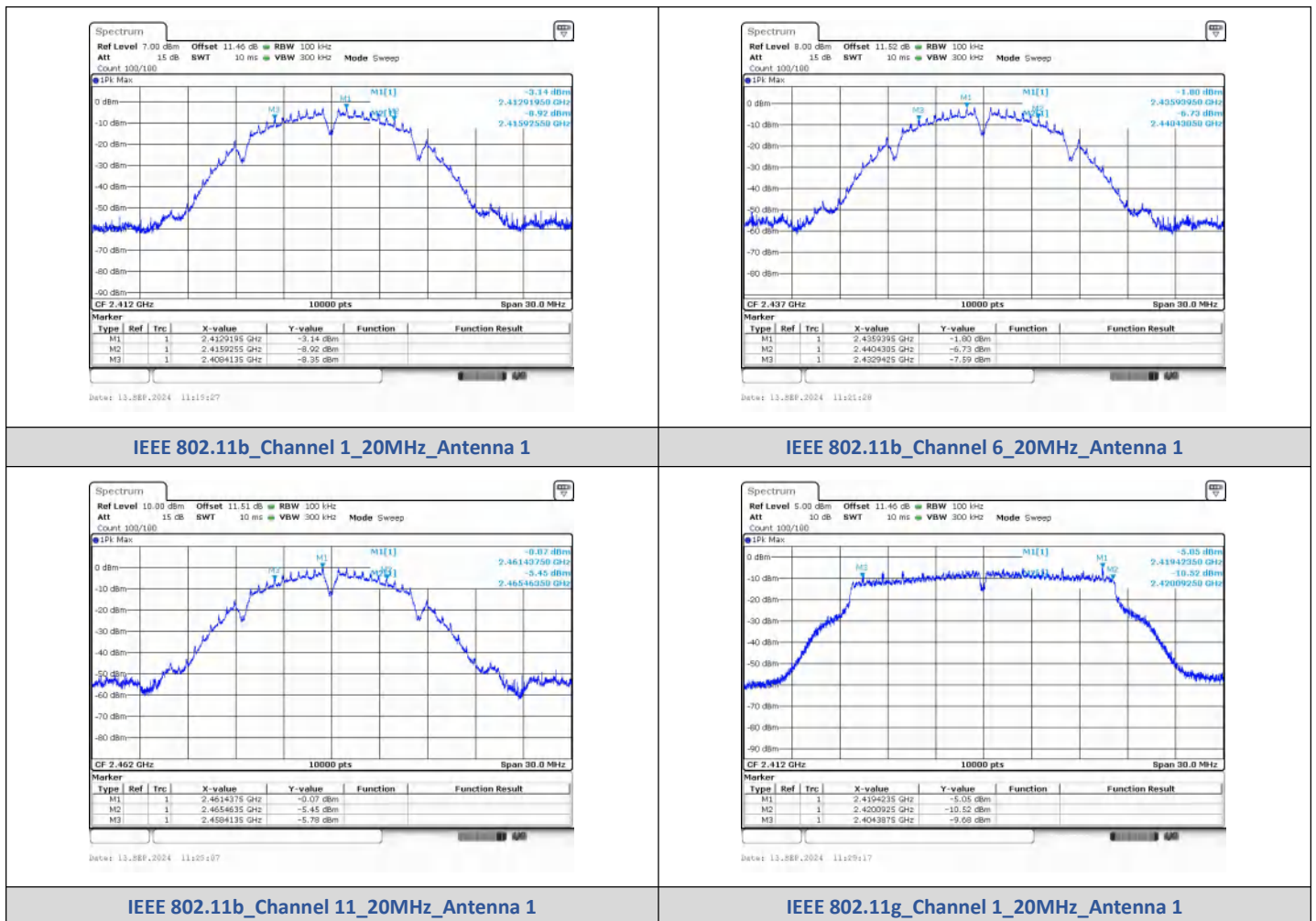
5) 6dB Bandwidth

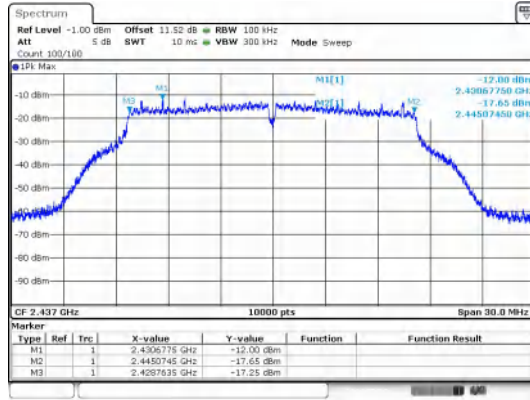
ANT1:

Test Result

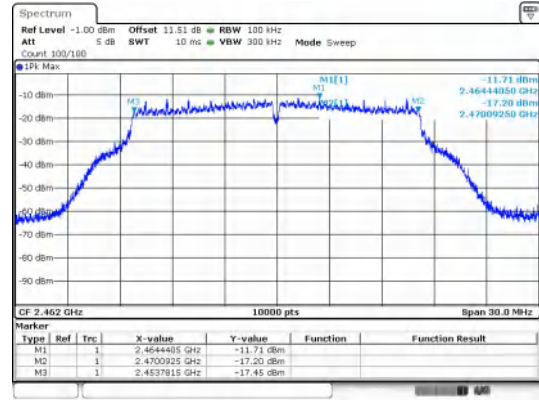
Mode	Channel	Ant.	Center Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
IEEE 802.11b	1	1	2412	7.520	≥0.5	PASS
	6		2437	7.490		PASS
	11		2462	7.050		PASS
IEEE 802.11g	1		2412	15.70		PASS
	6		2437	16.31		PASS
	11		2462	16.31		PASS
IEEE 802.11n_20	1		2412	17.71		PASS
	6		2437	17.69		PASS
	11		2462	17.70		PASS

Test Graphs

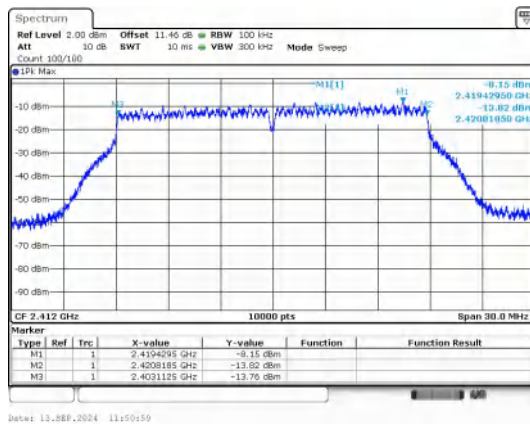




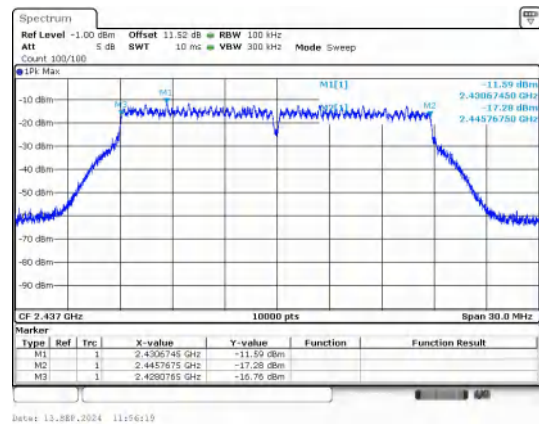
IEEE 802.11g_Channel 6_20MHz_Antenna 1



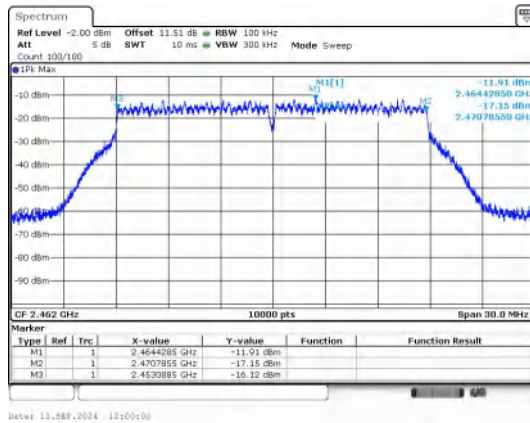
IEEE 802.11g_Channel 11_20MHz_Antenna 1



IEEE 802.11n_Channel 1_20MHz_Antenna 1



IEEE 802.11n_Channel 6_20MHz_Antenna 1



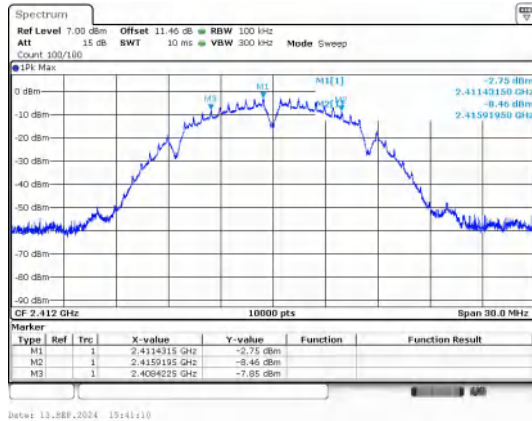
IEEE 802.11n_Channel 11_20MHz_Antenna 1

ANT2:

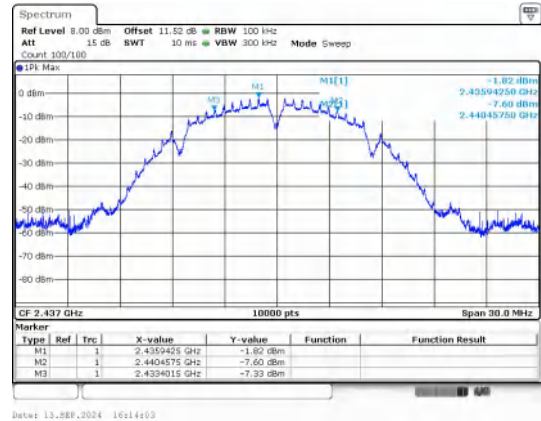
Test Result

Mode	Channel	Ant.	Center Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
IEEE 802.11b	1	2	2412	7.500	≥0.5	PASS
	6		2437	7.060		PASS
	11		2462	7.020		PASS
IEEE 802.11g	1		2412	16.06		PASS
	6		2437	16.28		PASS
	11		2462	16.32		PASS
IEEE 802.11n_20	1		2412	17.71		PASS
	6		2437	17.70		PASS
	11		2462	17.69		PASS

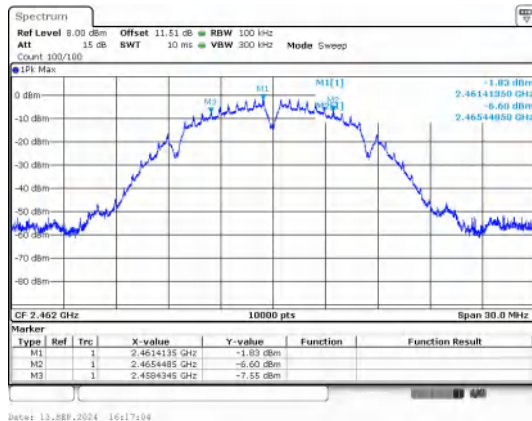
Test Graphs



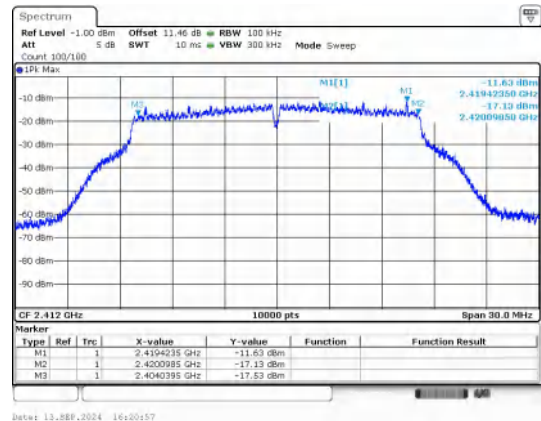
IEEE 802.11b_Channel 1_20MHz_Antenna 2



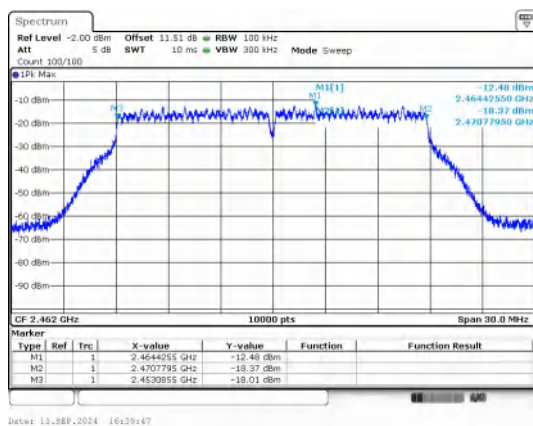
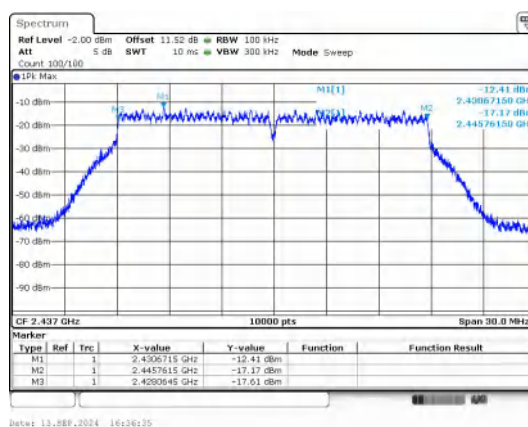
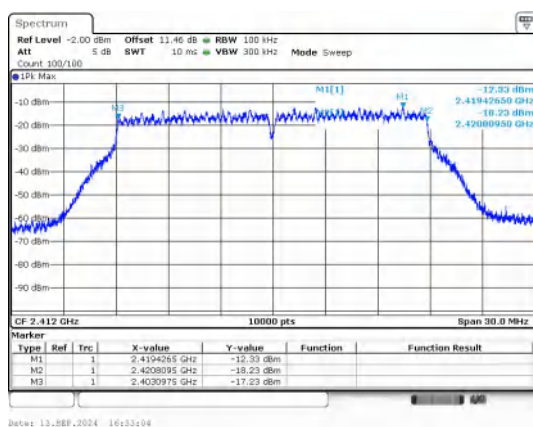
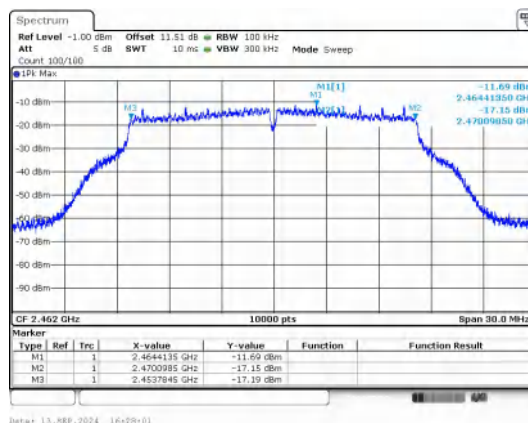
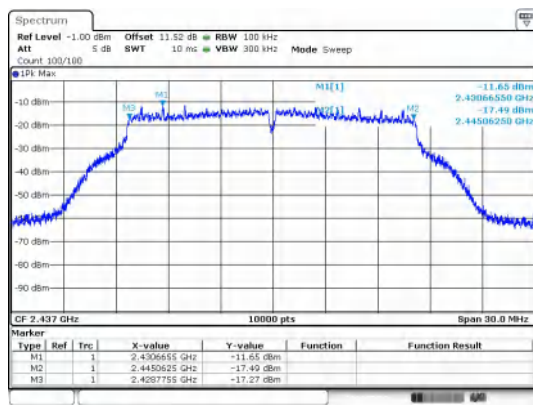
IEEE 802.11b_Channel 6_20MHz_Antenna 2



IEEE 802.11b_Channel 11_20MHz_Antenna 2



IEEE 802.11g_Channel 1_20MHz_Antenna 2



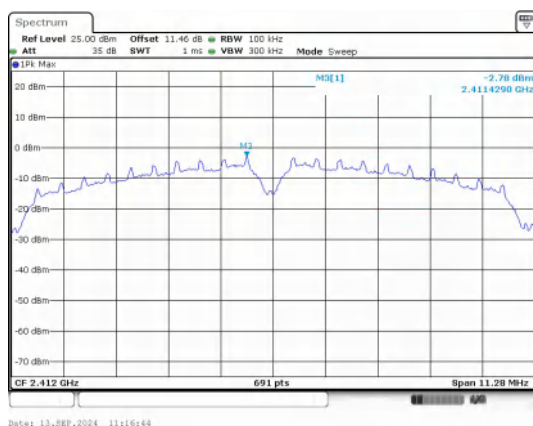
6) Conducted Out Of Band Emission

ANT1:

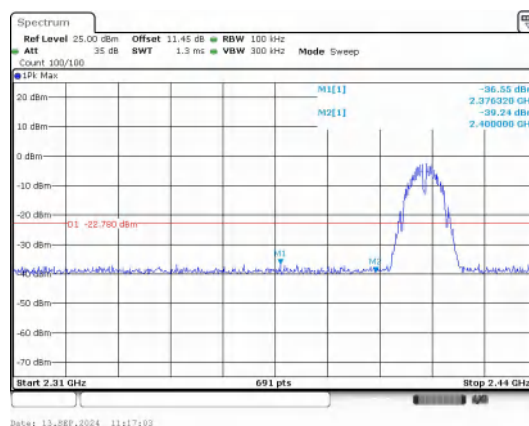
Test Result

Mode	Channel	Ant.	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
IEEE 802.11b	1	1	2376.32	-36.548	-22.78	-13.768	PASS
			2400.00	-39.239	-22.78	-16.459	PASS
			6893.80	-43.438	-22.78	-20.658	PASS
	6		6974.57	-43.302	-21.78	-21.522	PASS
	11		2483.50	-38.321	-20.08	-18.241	PASS
			6942.11	-42.619	-20.08	-22.539	PASS
IEEE 802.11g	1		2398.14	-36.225	-31.21	-5.015	PASS
			2400.00	-39.779	-31.21	-8.569	PASS
			6893.80	-42.650	-31.21	-11.440	PASS
	6		6929.63	-43.481	-31.21	-12.271	PASS
	11		2483.50	-38.737	-31.15	-7.587	PASS
			6782.30	-43.585	-31.15	-12.435	PASS
IEEE 802.11n_20	1		2388.55	-36.664	-28.08	-8.584	PASS
			2400.00	-38.515	-28.08	-10.435	PASS
			14551.3	-42.859	-28.08	-14.779	PASS
	6		6865.54	-43.494	-30.76	-12.734	PASS
	11		2483.50	-38.170	-31.5	-6.670	PASS
			6813.10	-43.567	-31.5	-12.067	PASS

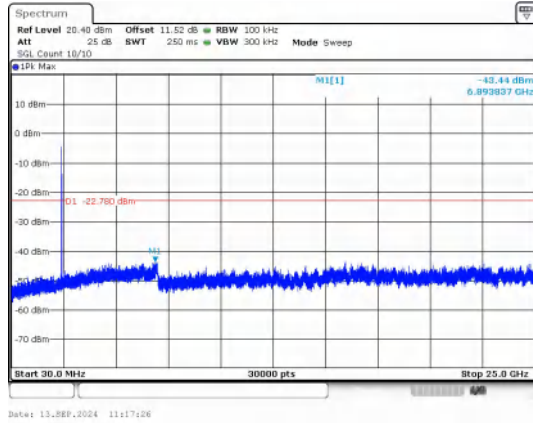
Test Graphs



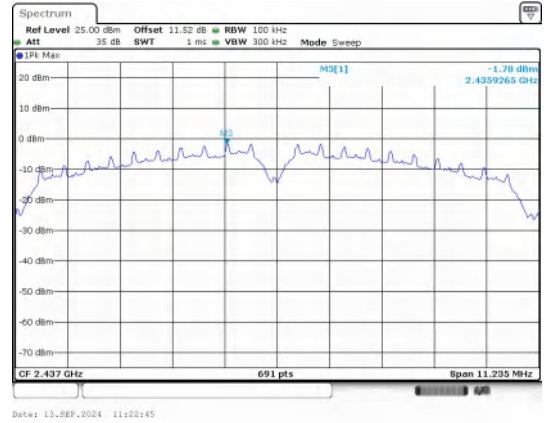
In-Band Reference Level
IEEE 802.11b_Channel 1_20MHz_Antenna 1



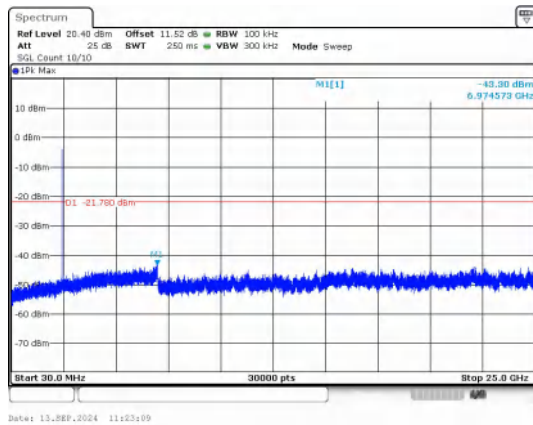
Out Of Band Emission
IEEE 802.11b_Channel 1_20MHz_Antenna 1



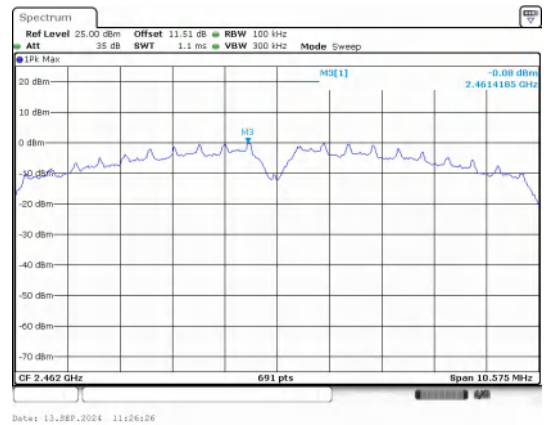
30.0 MHz - 25000.0 MHz
IEEE 802.11b_Channel 1_20MHz_Antenna 1



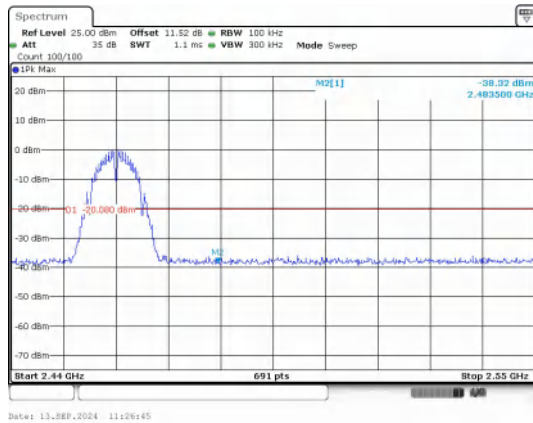
In-Band Reference Level
IEEE 802.11b_Channel 6_20MHz_Antenna 1



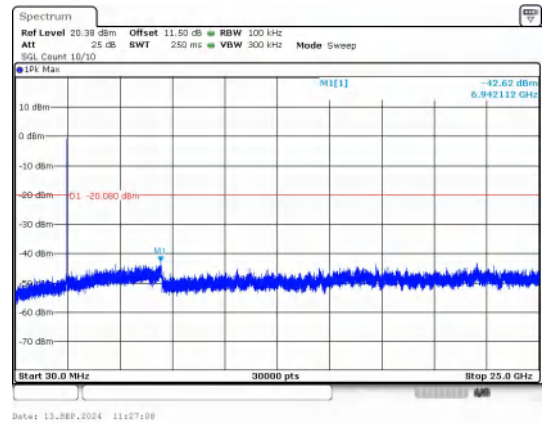
30.0 MHz - 25000.0 MHz
IEEE 802.11b_Channel 6_20MHz_Antenna 1



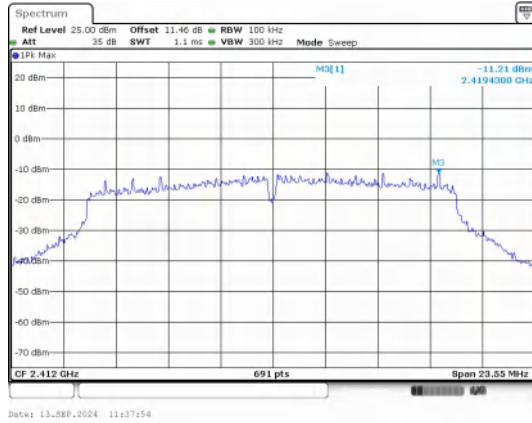
In-Band Reference Level
IEEE 802.11b_Channel 11_20MHz_Antenna 1



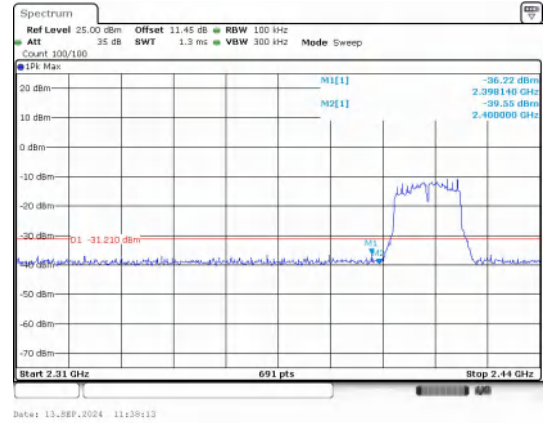
Out Of Band Emission
IEEE 802.11b_Channel 11_20MHz_Antenna 1



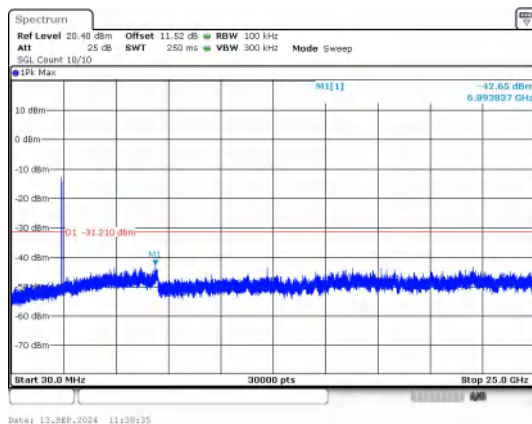
30.0 MHz - 25000.0 MHz
IEEE 802.11b_Channel 11_20MHz_Antenna 1



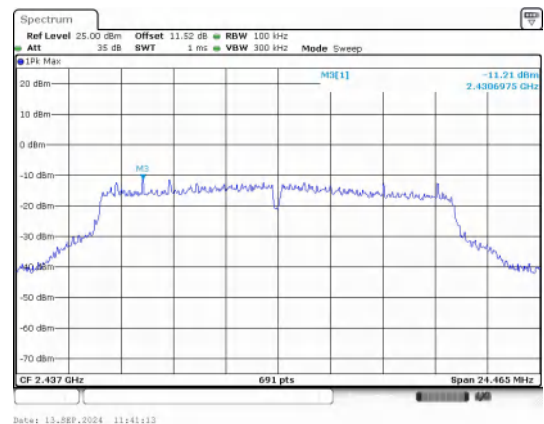
In-Band Reference Level
IEEE 802.11g_Channel 1_20MHz_Antenna 1



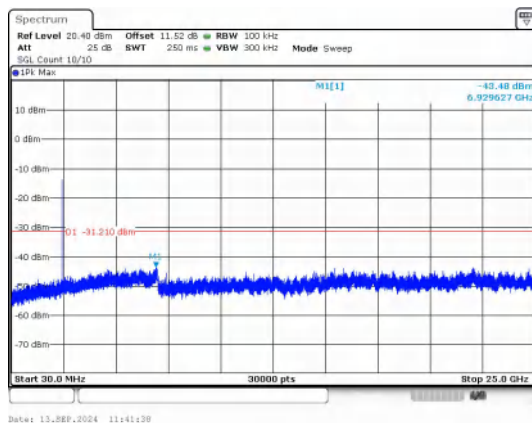
Out Of Band Emission
IEEE 802.11g_Channel 1_20MHz_Antenna 1



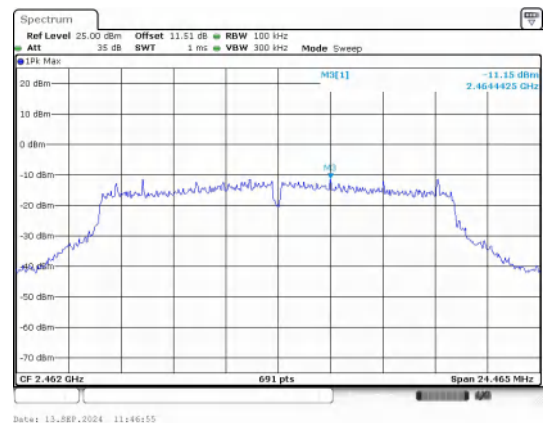
30.0 MHz - 25000.0 MHz
IEEE 802.11g_Channel 1_20MHz_Antenna 1



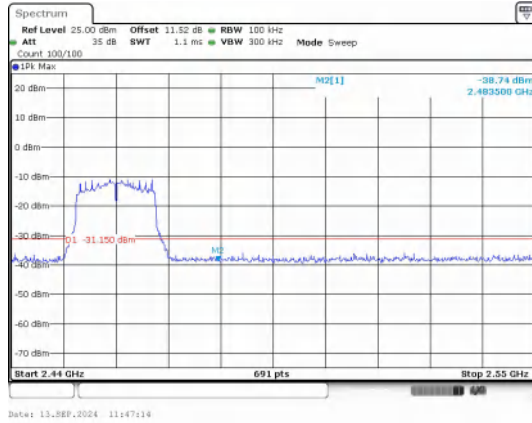
In-Band Reference Level
IEEE 802.11g_Channel 6_20MHz_Antenna 1



30.0 MHz - 25000.0 MHz
IEEE 802.11g_Channel 6_20MHz_Antenna 1

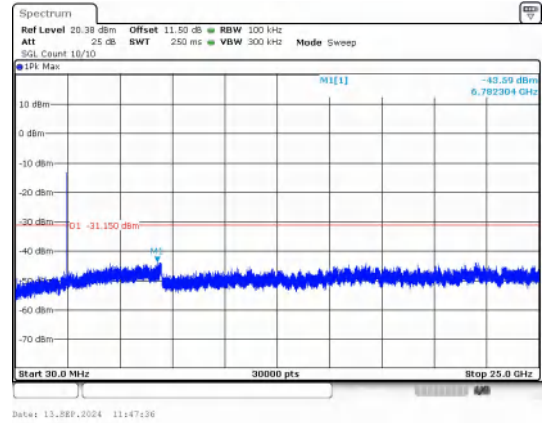


In-Band Reference Level
IEEE 802.11g_Channel 11_20MHz_Antenna 1



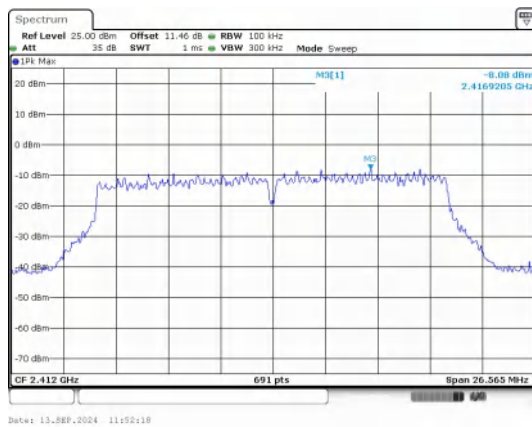
Out Of Band Emission

IEEE 802.11g_Channel 11_20MHz_Antenna 1



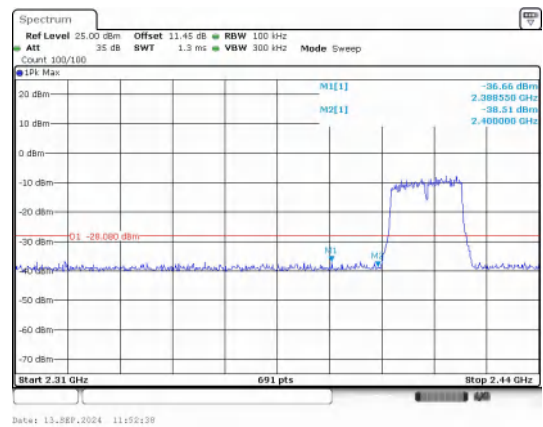
30.0 MHz - 25000.0 MHz

IEEE 802.11g_Channel 11_20MHz_Antenna 1



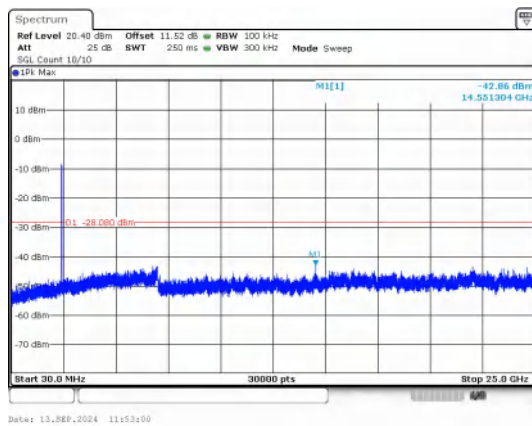
In-Band Reference Level

IEEE 802.11n_Channel 1_20MHz_Antenna 1



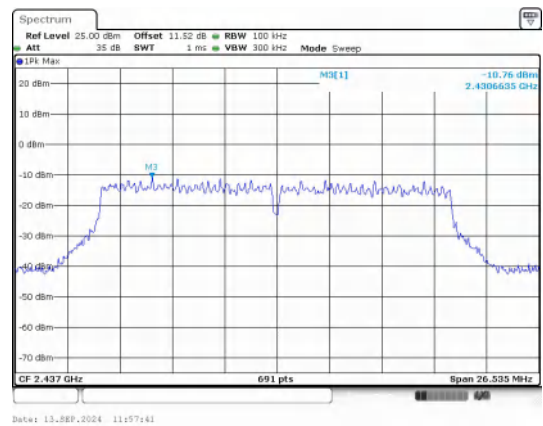
Out Of Band Emission

IEEE 802.11n_Channel 1_20MHz_Antenna 1



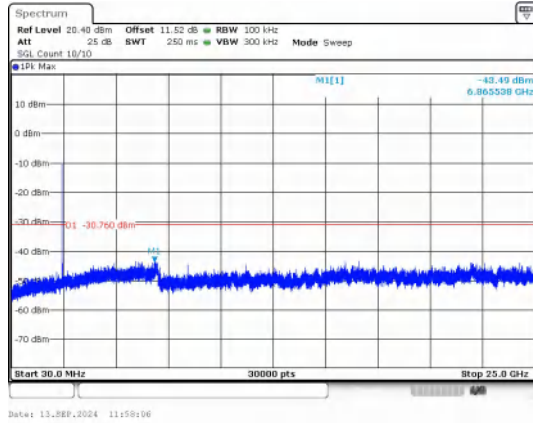
30.0 MHz - 25000.0 MHz

IEEE 802.11n_Channel 1_20MHz_Antenna 1

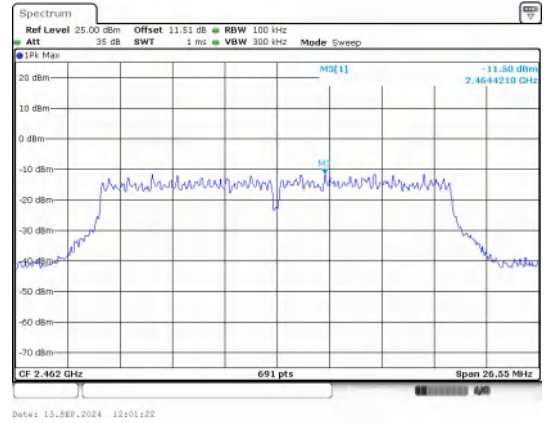


In-Band Reference Level

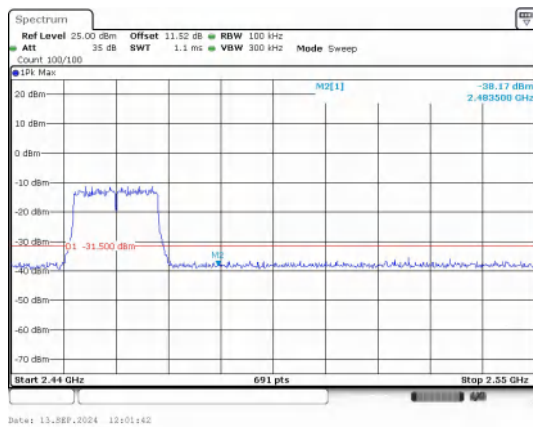
IEEE 802.11n_Channel 6_20MHz_Antenna 1



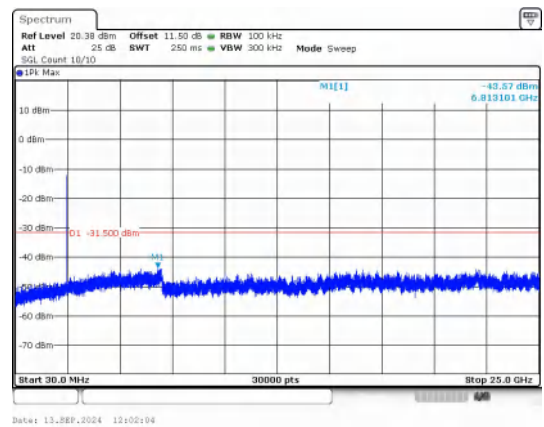
30.0 MHz - 25000.0 MHz
IEEE 802.11n_Channel 6_20MHz_Antenna 1



In-Band Reference Level
IEEE 802.11n_Channel 11_20MHz_Antenna 1



Out Of Band Emission
IEEE 802.11n_Channel 11_20MHz_Antenna 1



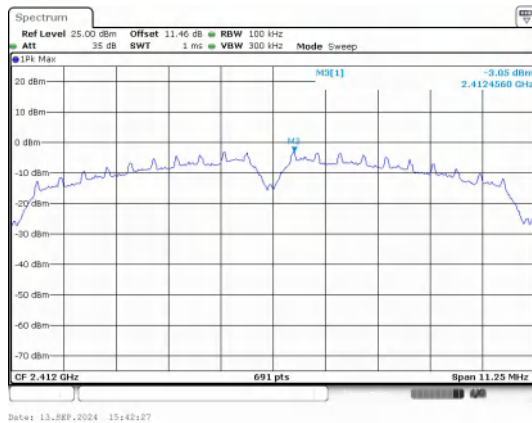
30.0 MHz - 25000.0 MHz
IEEE 802.11n_Channel 11_20MHz_Antenna 1

ANT2:

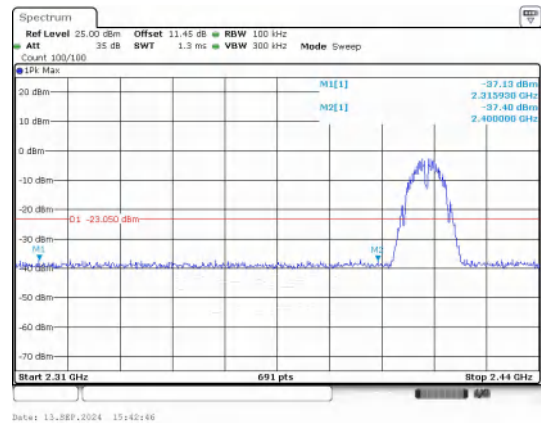
Test Result

Mode	Channel	Ant.	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	
IEEE 802.11b	1	2	2315.93	-37.128	-23.05	-14.078	PASS	
			2400.00	-39.157	-23.05	-16.107	PASS	
	6		22004.8	-43.478	-23.05	-20.428	PASS	
			11	16323.3	-43.354	-21.57	-21.784	PASS
				2483.50	-37.616	-21.55	-16.066	PASS
			22563.3	-43.469	-21.55	-21.919	PASS	
IEEE 802.11g	1		2397.39	-36.649	-30.94	-5.709	PASS	
			2400.00	-38.257	-30.94	-7.317	PASS	
	6		16270.9	-42.950	-30.94	-12.010	PASS	
			11	6937.95	-42.881	-30.86	-12.021	PASS
				2483.50	-37.550	-31.72	-5.830	PASS
			6979.57	-43.464	-31.72	-11.744	PASS	
IEEE 802.11n_20	1		2358.44	-36.601	-31.68	-4.921	PASS	
			2400.00	-38.200	-31.68	-6.520	PASS	
	6		6924.60	-42.162	-31.68	-10.482	PASS	
			11	23981.6	-43.345	-31.77	-11.575	PASS
				2483.50	-38.528	-32.09	-6.438	PASS
			6929.63	-43.206	-32.09	-11.116	PASS	

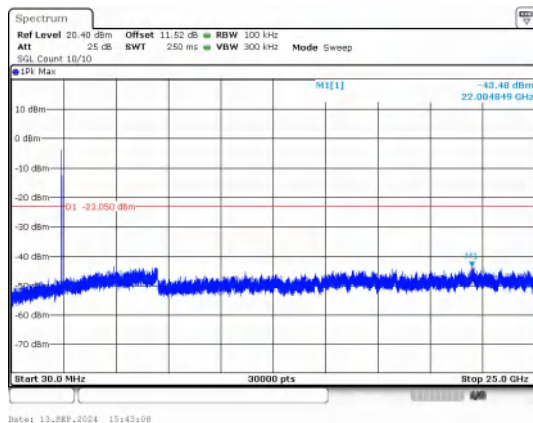
Test Graphs



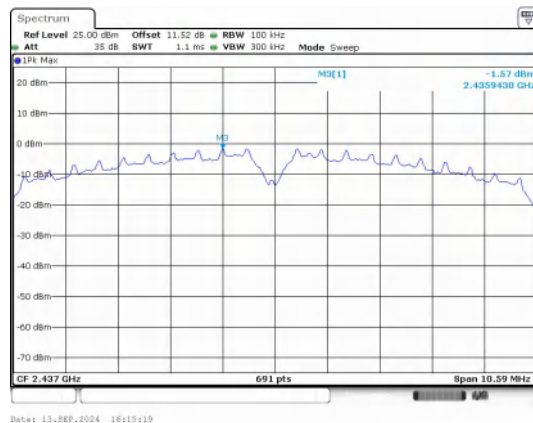
In-Band Reference Level
IEEE 802.11b_Channel 1_20MHz_Antenna 2



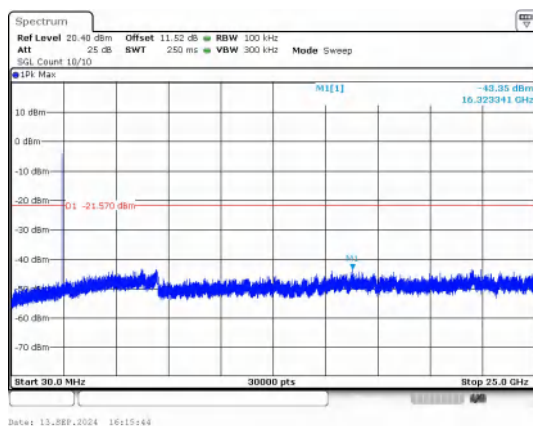
Out Of Band Emission
IEEE 802.11b_Channel 1_20MHz_Antenna 2



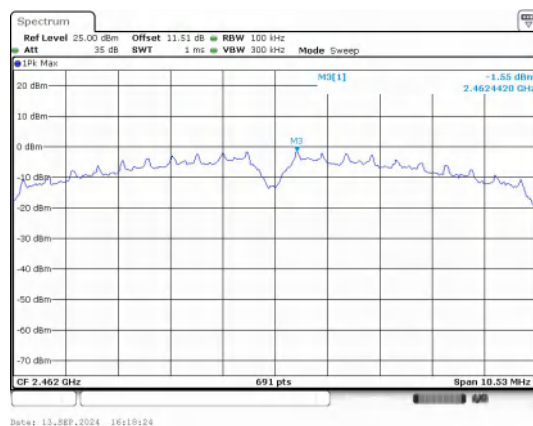
30.0 MHz - 25000.0 MHz
IEEE 802.11b_Channel 1_20MHz_Antenna 2



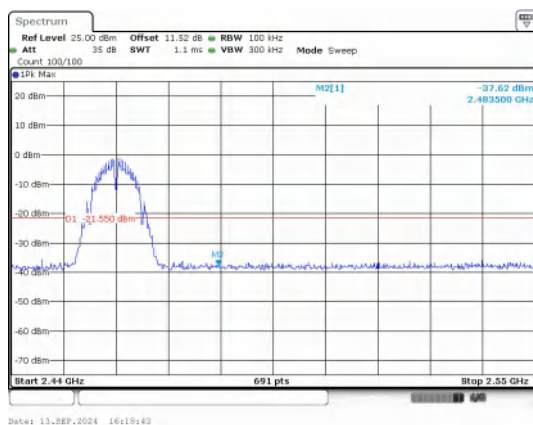
In-Band Reference Level
IEEE 802.11b_Channel 6_20MHz_Antenna 2



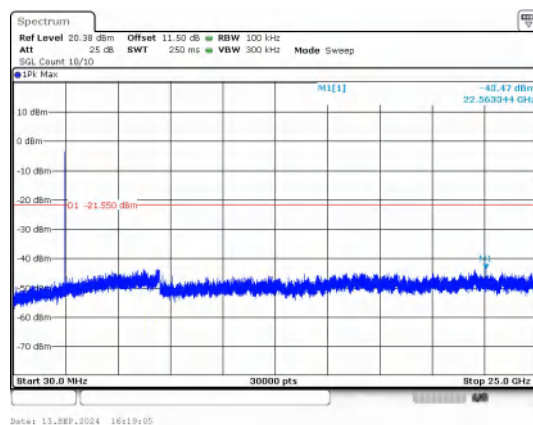
30.0 MHz - 25000.0 MHz
IEEE 802.11b_Channel 6_20MHz_Antenna 2



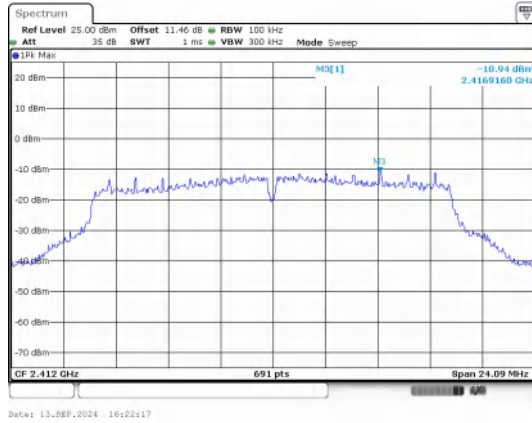
In-Band Reference Level
IEEE 802.11b_Channel 11_20MHz_Antenna 2



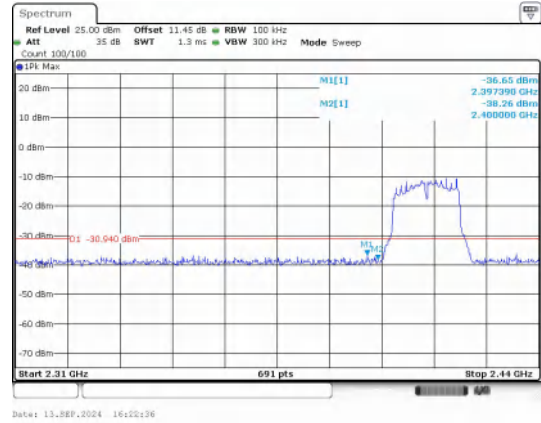
Out Of Band Emission
IEEE 802.11b_Channel 11_20MHz_Antenna 2



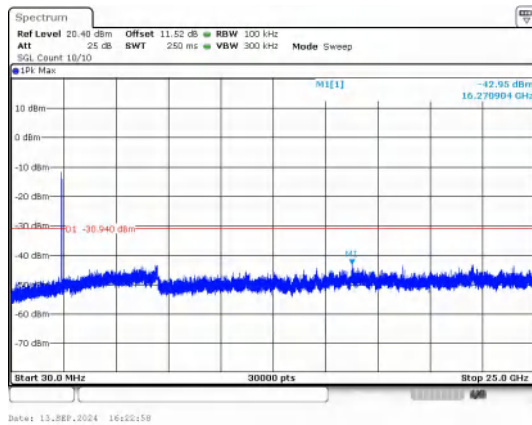
30.0 MHz - 25000.0 MHz
IEEE 802.11b_Channel 11_20MHz_Antenna 2



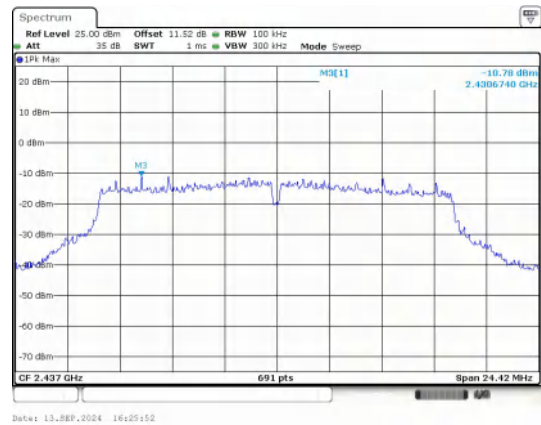
In-Band Reference Level
IEEE 802.11g_Channel 1_20MHz_Antenna 2



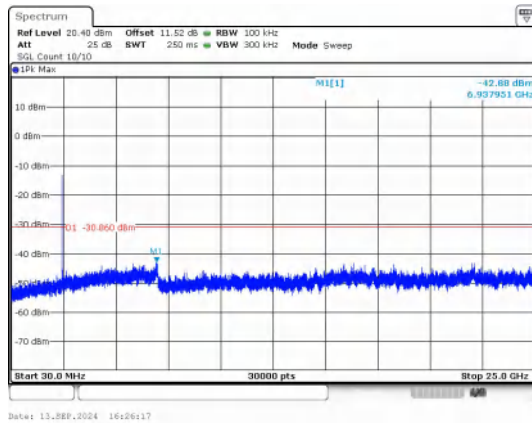
Out Of Band Emission
IEEE 802.11g_Channel 1_20MHz_Antenna 2



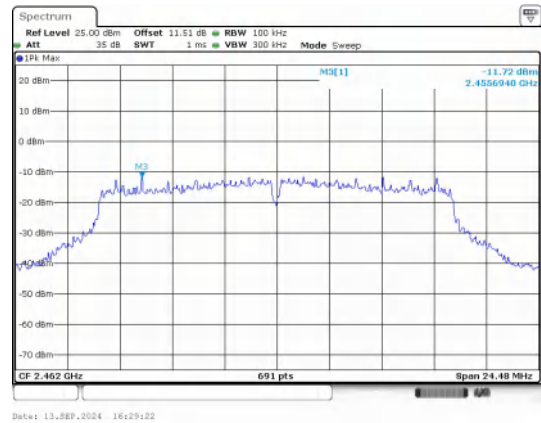
30.0 MHz - 25000.0 MHz
IEEE 802.11g_Channel 1_20MHz_Antenna 2



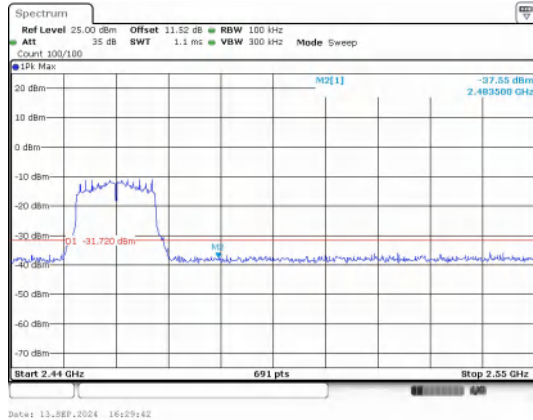
In-Band Reference Level
IEEE 802.11g_Channel 6_20MHz_Antenna 2



30.0 MHz - 25000.0 MHz
IEEE 802.11g_Channel 6_20MHz_Antenna 2

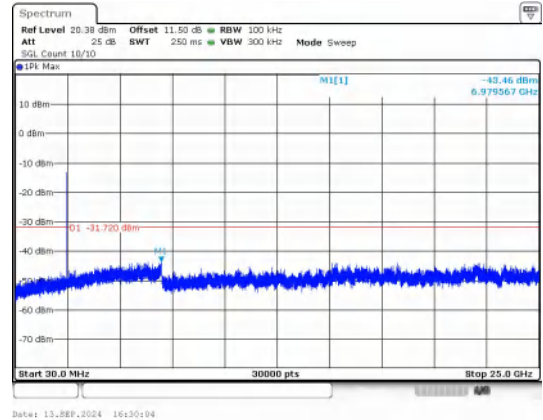


In-Band Reference Level
IEEE 802.11g_Channel 11_20MHz_Antenna 2



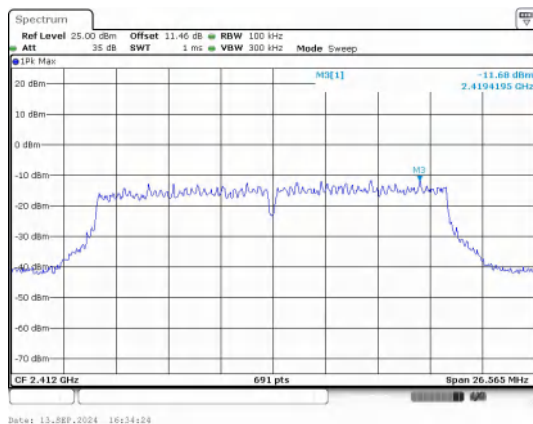
Out Of Band Emission

IEEE 802.11g_Channel 11_20MHz_Antenna 2



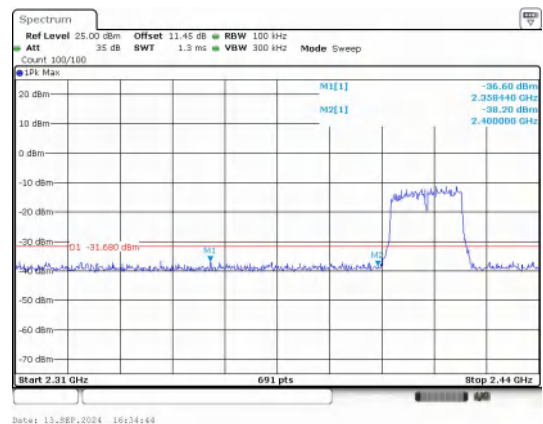
30.0 MHz - 25000.0 MHz

IEEE 802.11g_Channel 11_20MHz_Antenna 2



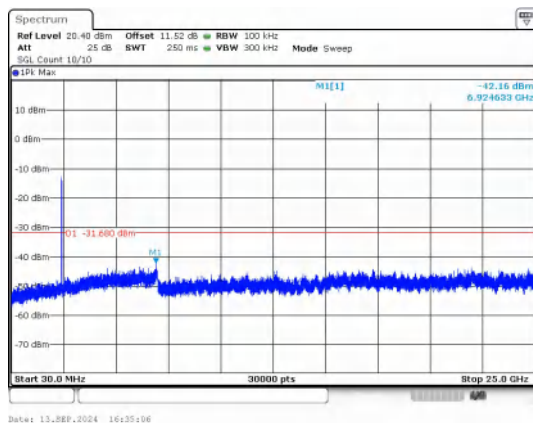
In-Band Reference Level

IEEE 802.11n_Channel 1_20MHz_Antenna 2



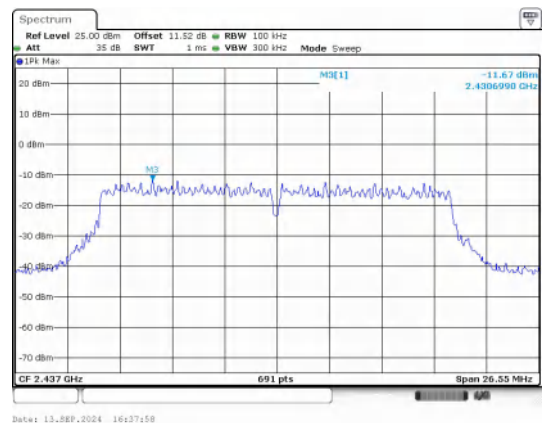
Out Of Band Emission

IEEE 802.11n_Channel 1_20MHz_Antenna 2



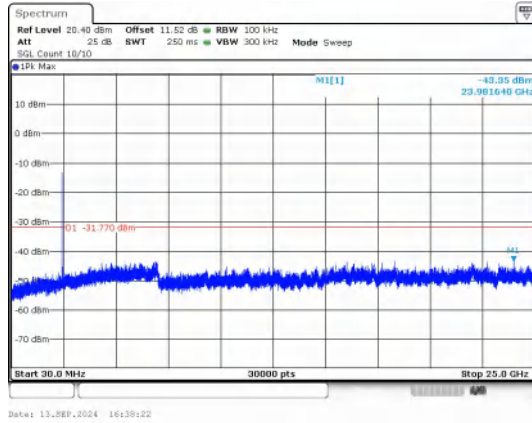
30.0 MHz - 25000.0 MHz

IEEE 802.11n_Channel 1_20MHz_Antenna 2

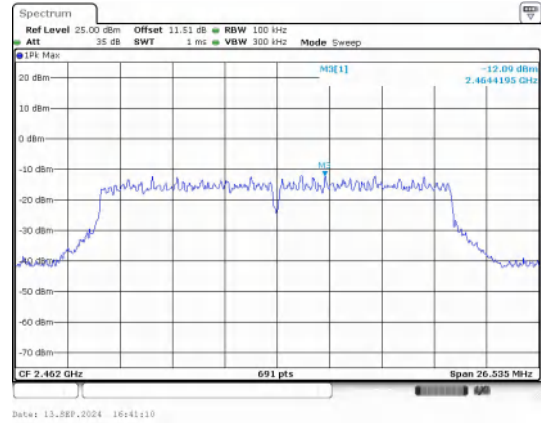


In-Band Reference Level

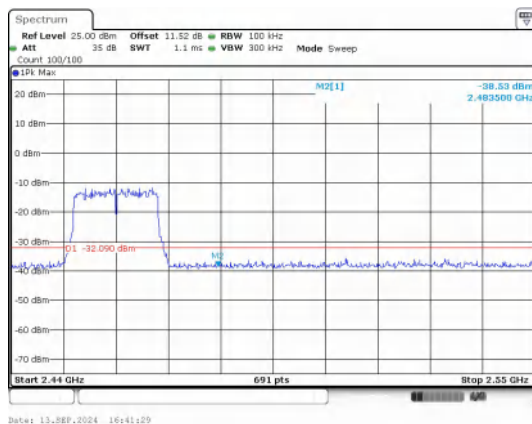
IEEE 802.11n_Channel 6_20MHz_Antenna 2



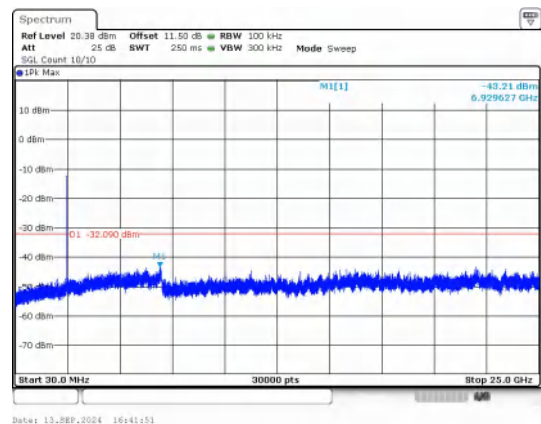
30.0 MHz - 25000.0 MHz
IEEE 802.11n_Channel 6_20MHz_Antenna 2



In-Band Reference Level
IEEE 802.11n_Channel 11_20MHz_Antenna 2



Out Of Band Emission
IEEE 802.11n_Channel 11_20MHz_Antenna 2



30.0 MHz - 25000.0 MHz
IEEE 802.11n_Channel 11_20MHz_Antenna 2

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