

RF Test Data for 2.4G Wi-Fi (Conducted Measurements)

General Description of EUT	
Product Name:	Wi-Fi BT Module
Test Model:	CDW-N37663U-02
Sample ID:	HC-C-202403-0360-02-01
Environmental Conditions	
Temperature:	23.8°C
Relative Humidity:	49%
Test Voltage:	DC 3.3V
Test Engineer:	Mike Yan
Note: For a more detailed features description, please refer to the report TBR-C-202403-0360-72.	

Contents

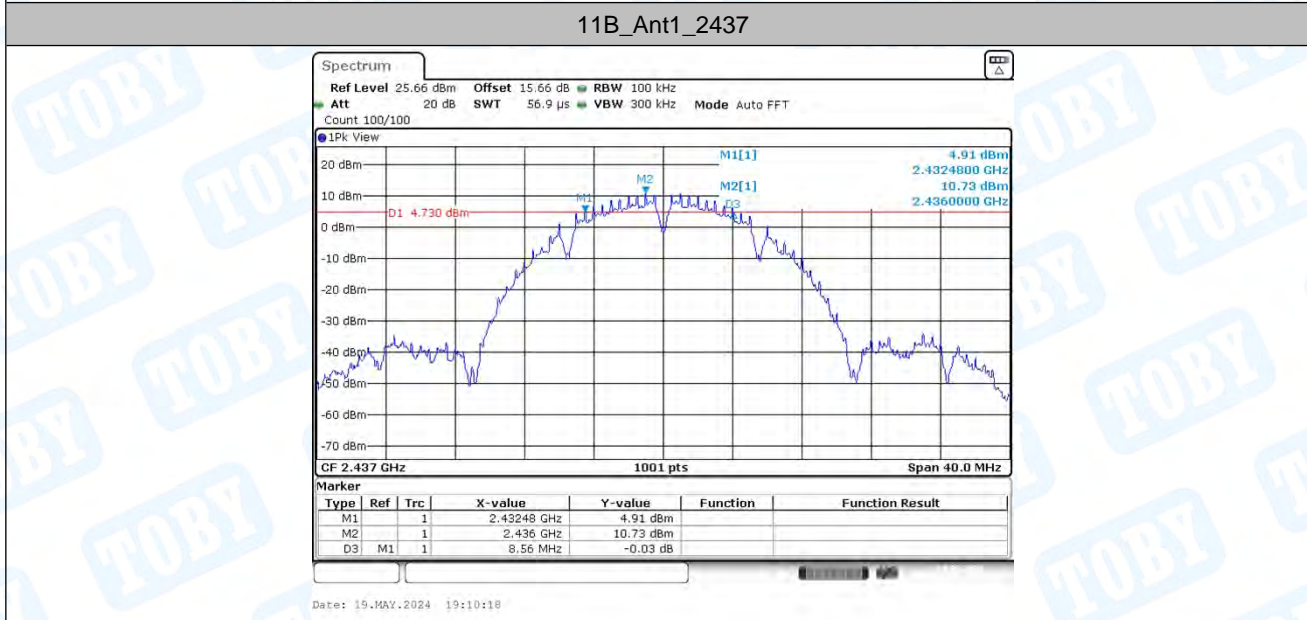
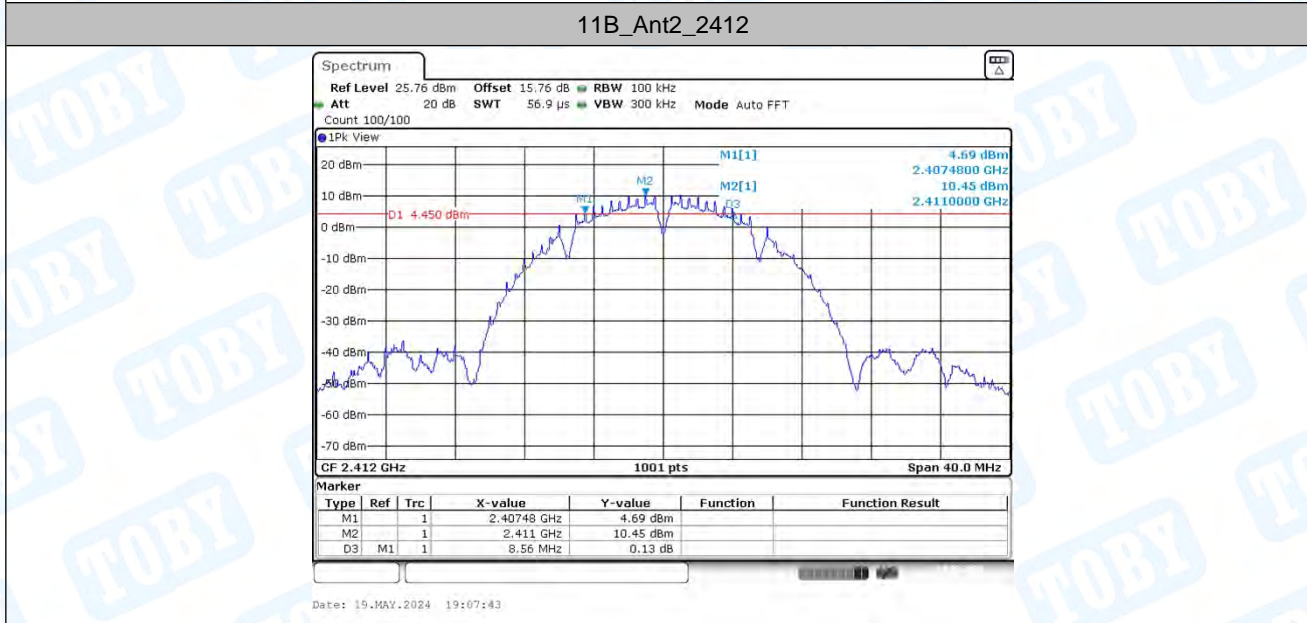
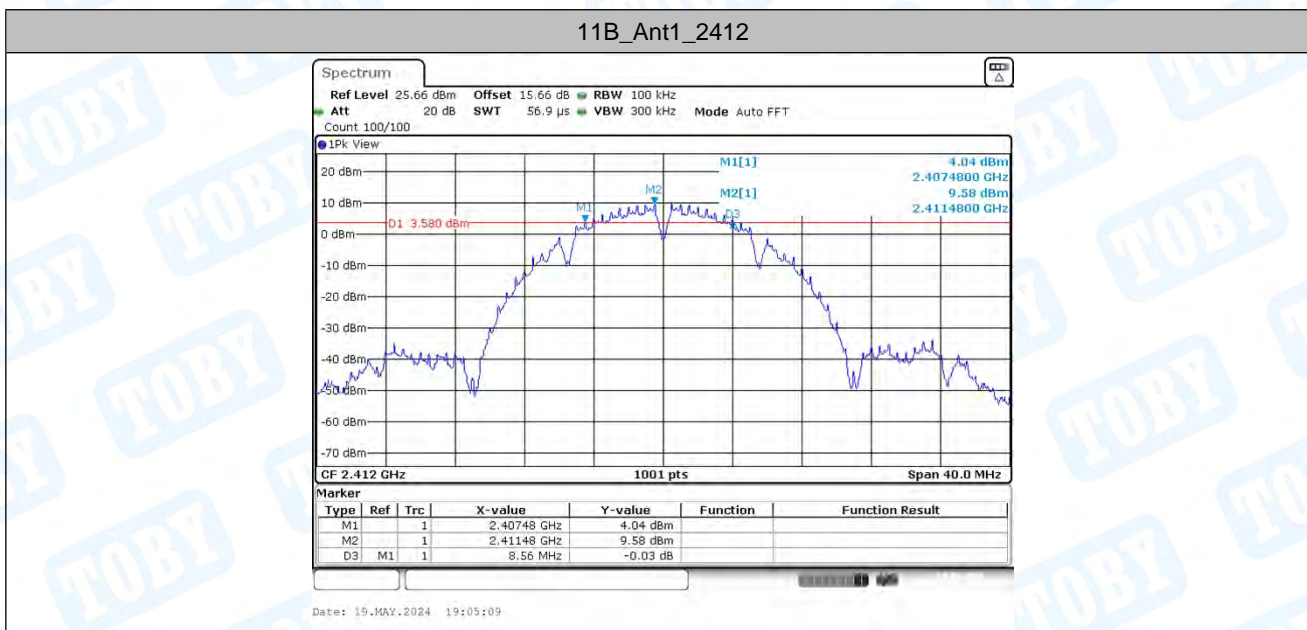
1. DTS Bandwidth.....	3
1.1. Test Result.....	3
1.2. Test Graphs.....	4
2. Occupied Channel Bandwidth.....	12
2.1. Test Result.....	12
2.2. Test Graphs.....	13
3. Maximum conducted output power.....	21
3.1. Test Result.....	21
4. Maximum power spectral density.....	22
4.1. Test Result.....	22
4.2. Test Graphs.....	23
5. Band edge measurements.....	31
5.1. Test Result.....	31
5.2. Test Graphs.....	32
6. Conducted Spurious Emission.....	38
6.1. Test Result.....	38
6.2. Test Graphs.....	40
7. Duty Cycle.....	64
7.1. Test Result.....	64
7.2. Test Graphs.....	65

1. DTS Bandwidth

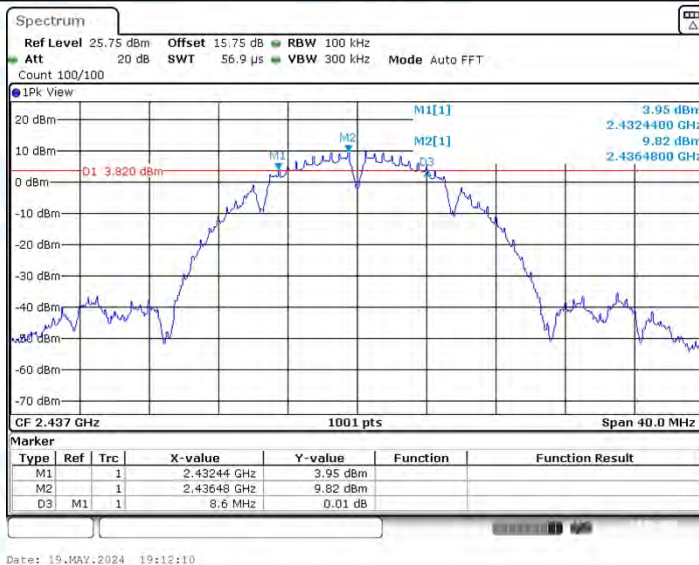
1.1. Test Result

TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	8.56	2407.48	2416.04	0.5	PASS
	Ant2	2412	8.56	2407.48	2416.04	0.5	PASS
	Ant1	2437	8.56	2432.48	2441.04	0.5	PASS
	Ant2	2437	8.60	2432.44	2441.04	0.5	PASS
	Ant1	2462	9.00	2457.48	2466.48	0.5	PASS
	Ant2	2462	9.08	2457.44	2466.52	0.5	PASS
11G	Ant1	2412	16.36	2403.80	2420.16	0.5	PASS
	Ant2	2412	15.08	2404.44	2419.52	0.5	PASS
	Ant1	2437	16.32	2428.84	2445.16	0.5	PASS
	Ant2	2437	15.44	2429.44	2444.88	0.5	PASS
	Ant1	2462	15.12	2454.44	2469.56	0.5	PASS
	Ant2	2462	15.68	2454.44	2470.12	0.5	PASS
11N20MIMO	Ant1	2412	13.88	2405.68	2419.56	0.5	PASS
	Ant2	2412	15.72	2403.84	2419.56	0.5	PASS
	Ant1	2437	15.04	2429.52	2444.56	0.5	PASS
	Ant2	2437	17.56	2428.20	2445.76	0.5	PASS
	Ant1	2462	14.84	2454.72	2469.56	0.5	PASS
	Ant2	2462	16.92	2453.84	2470.76	0.5	PASS
11N40MIMO	Ant1	2422	35.20	2404.40	2439.60	0.5	PASS
	Ant2	2422	35.12	2404.40	2439.52	0.5	PASS
	Ant1	2437	24.00	2425.48	2449.48	0.5	PASS
	Ant2	2437	35.12	2419.40	2454.52	0.5	PASS
	Ant1	2452	30.72	2434.40	2465.12	0.5	PASS
	Ant2	2452	35.12	2434.40	2469.52	0.5	PASS

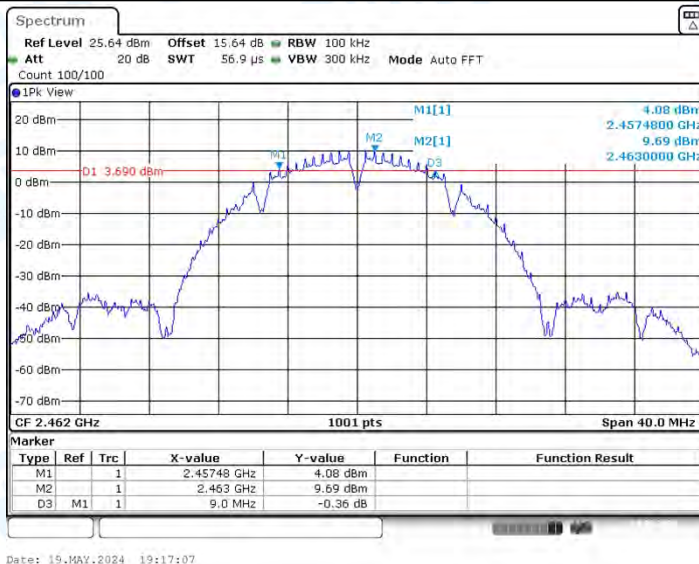
1.2. Test Graphs



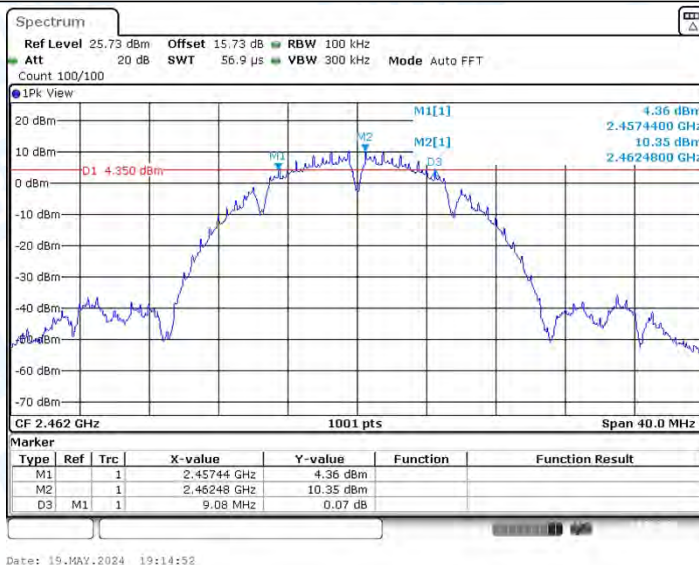
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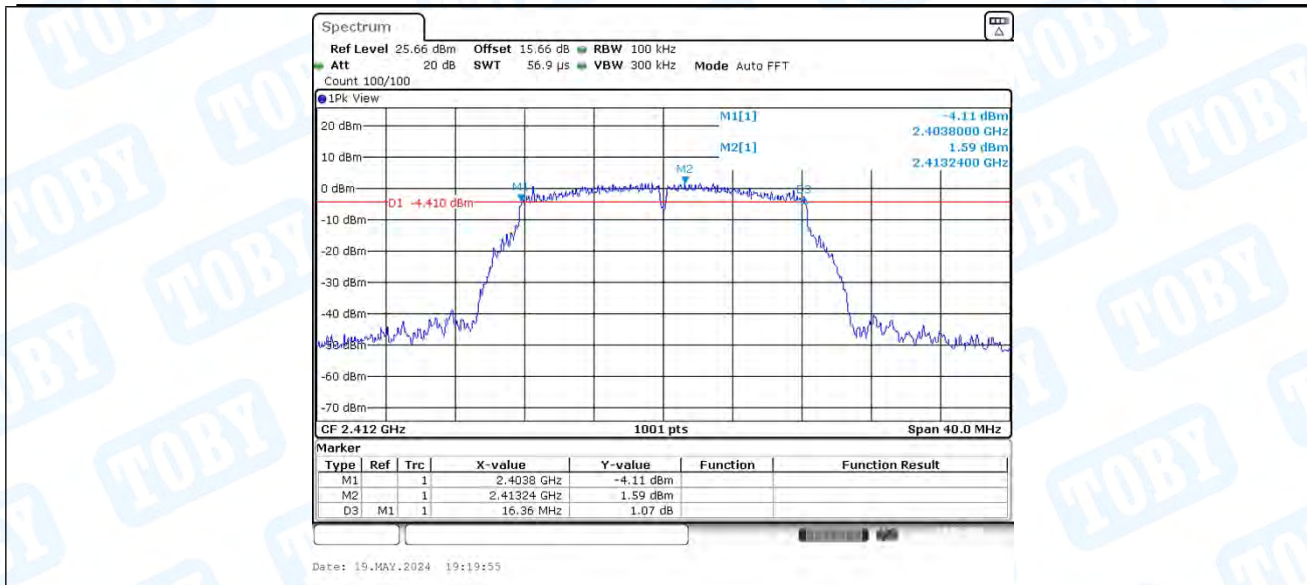
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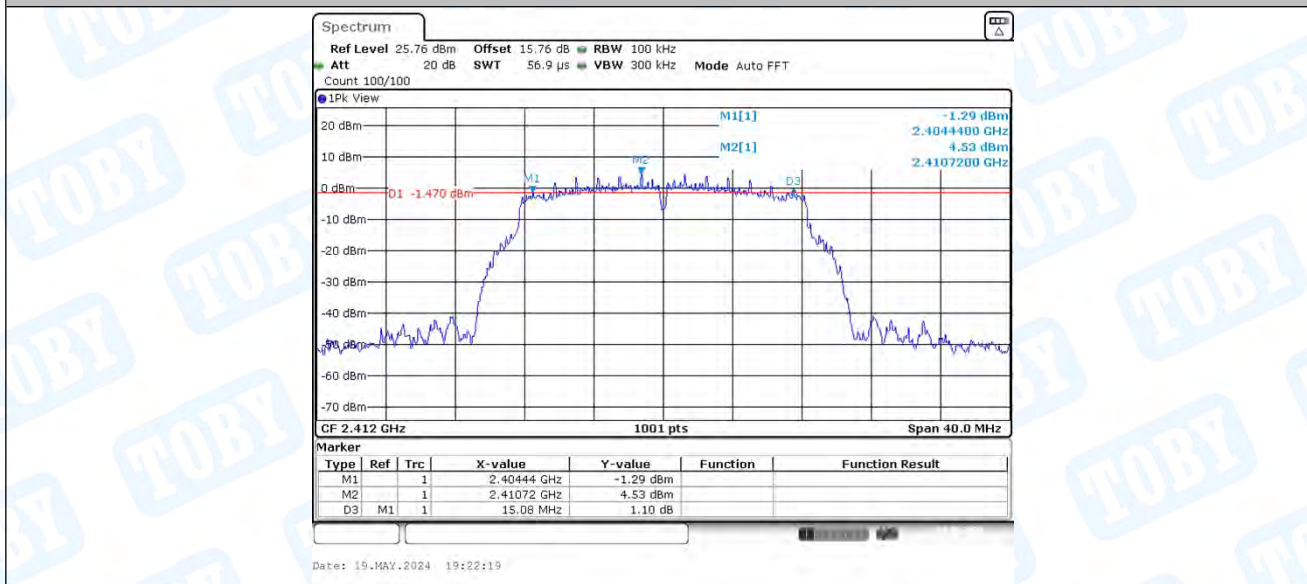
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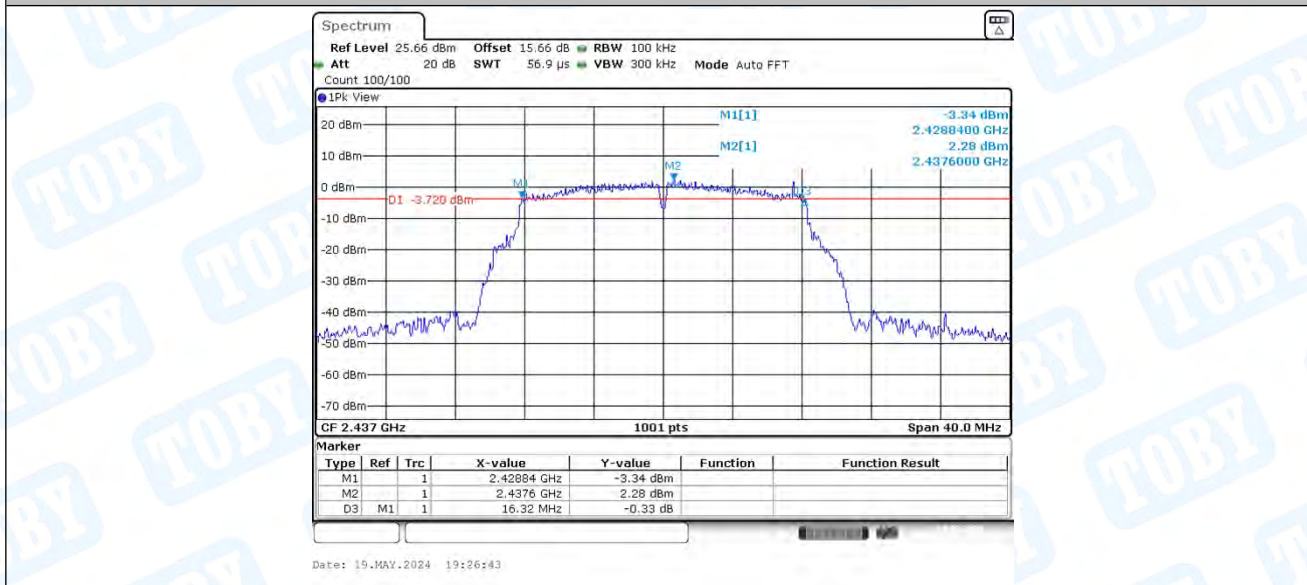
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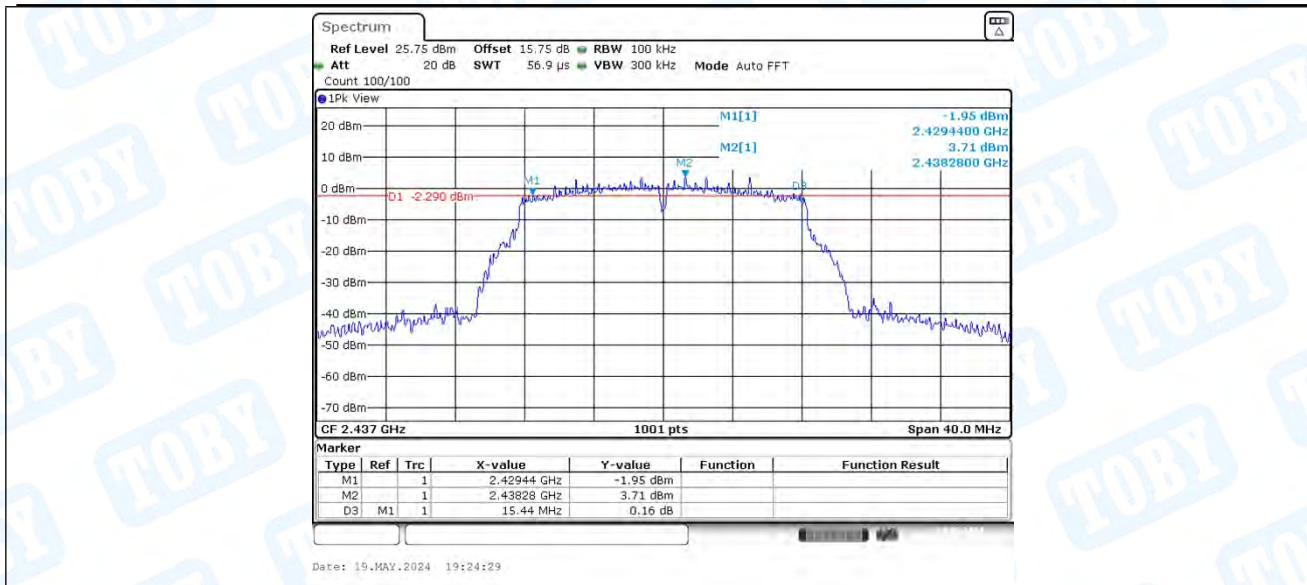
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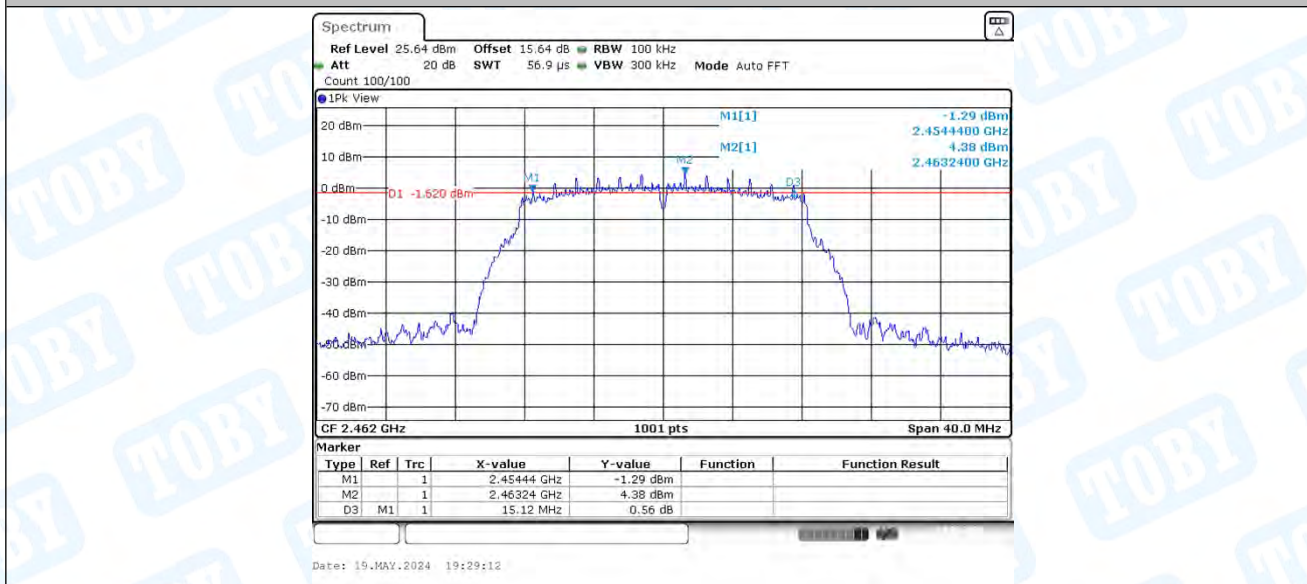
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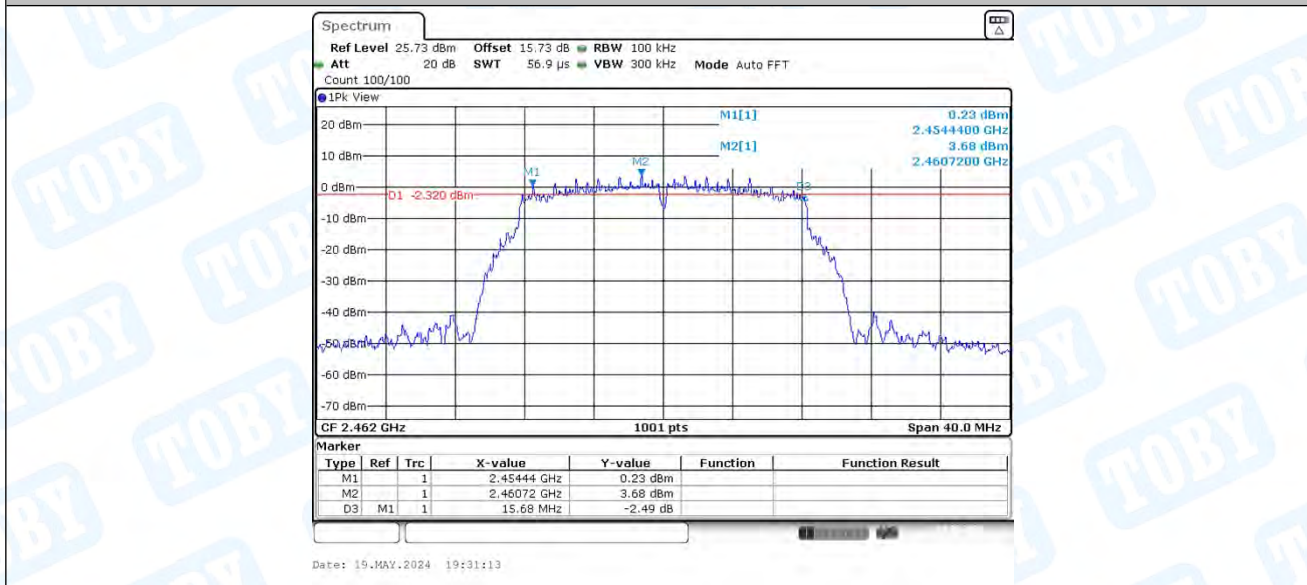
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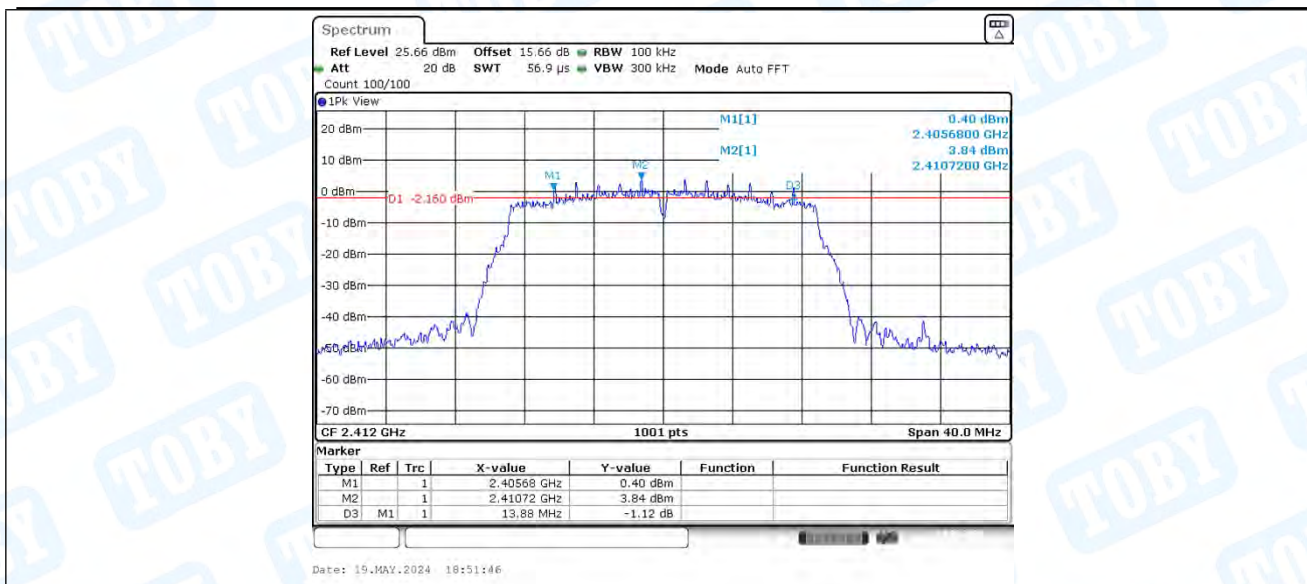
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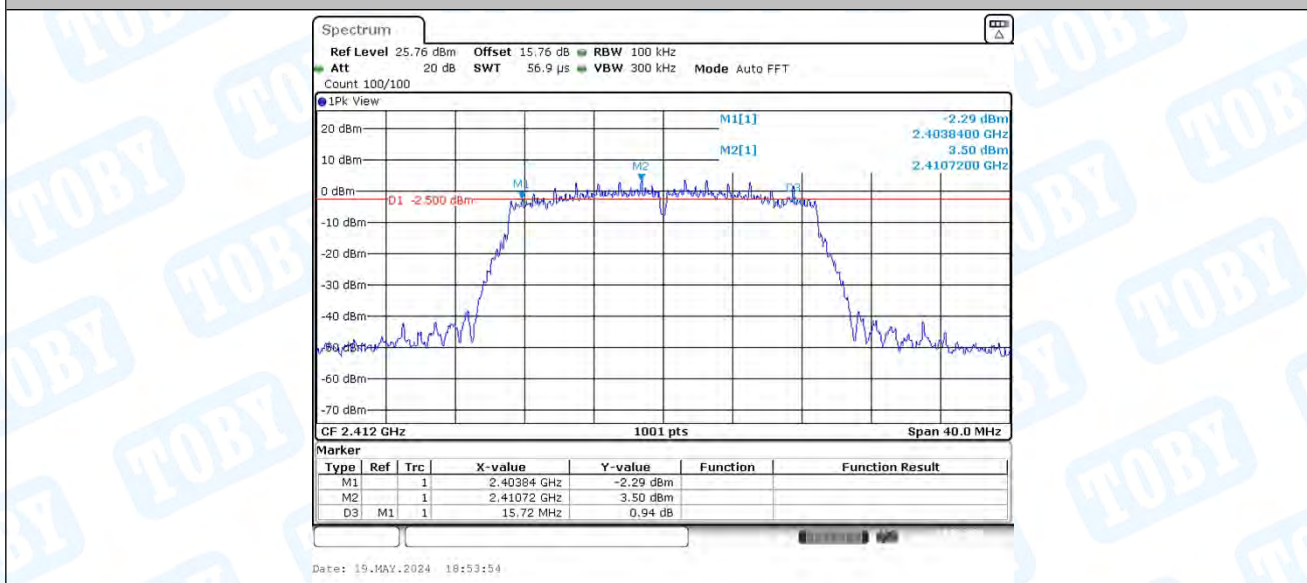
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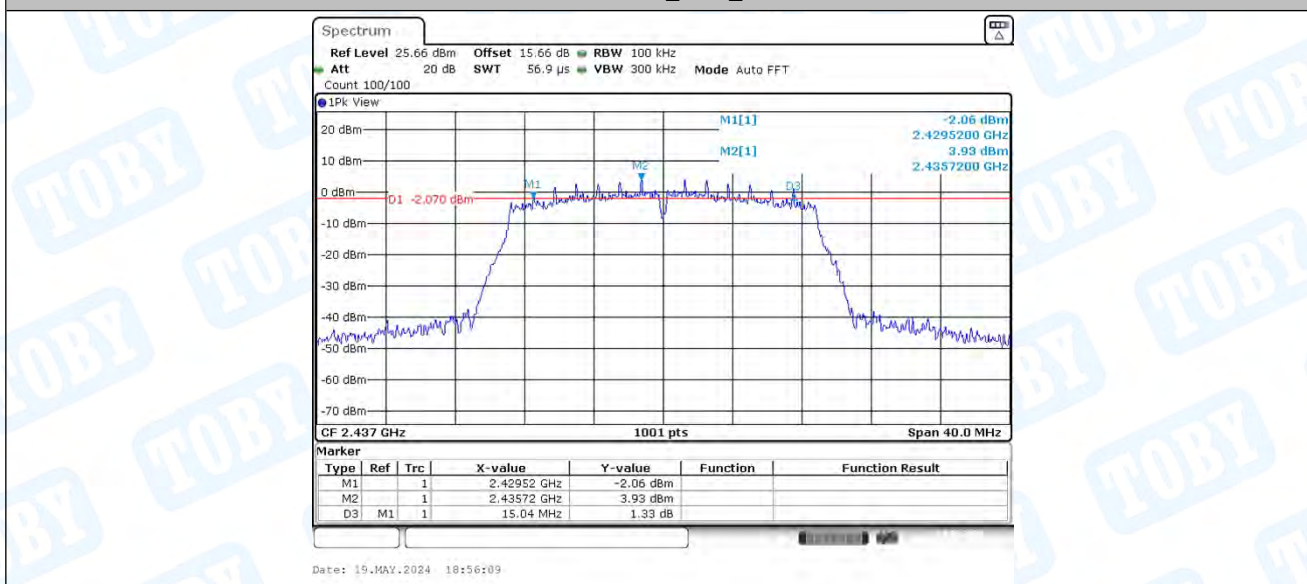
11N20MIMO_Ant1_2412



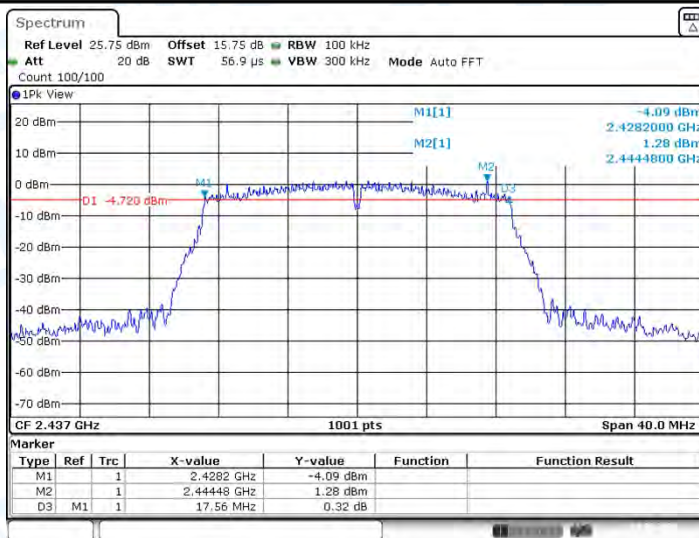
11N20MIMO_Ant2_2412



11N20MIMO_Ant1_2437

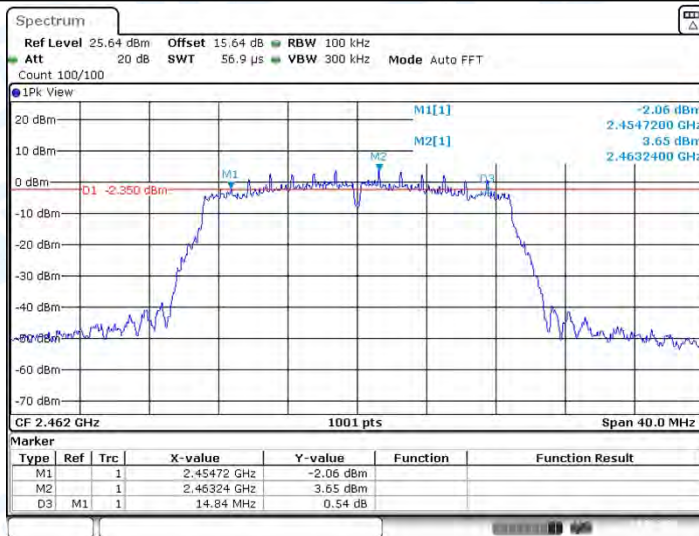


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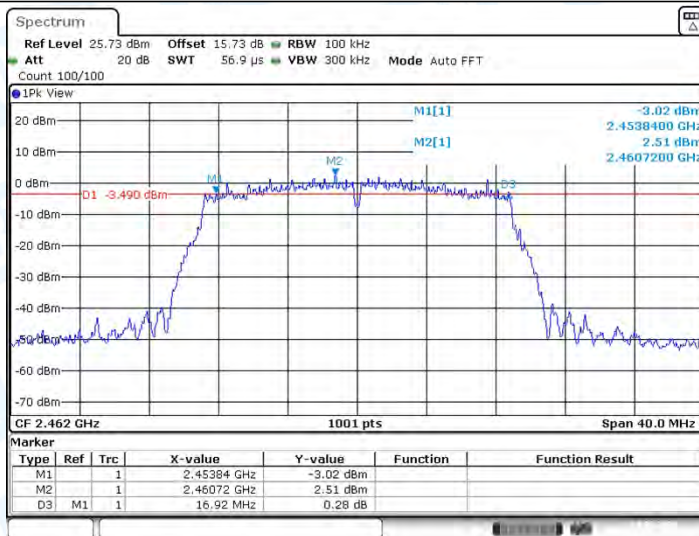
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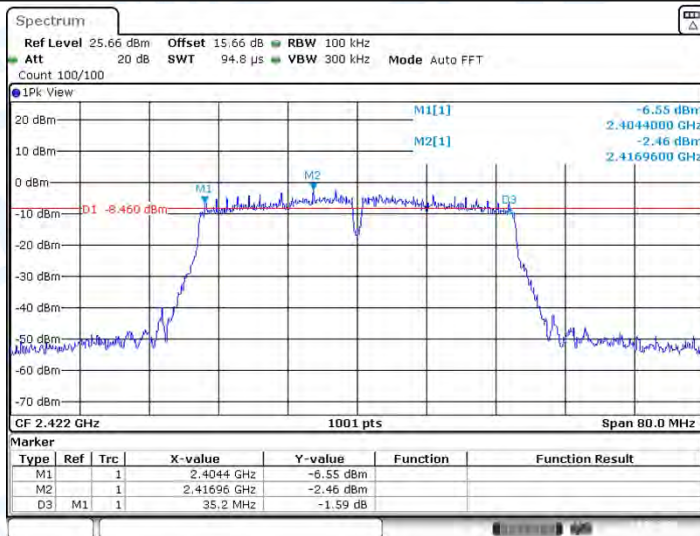
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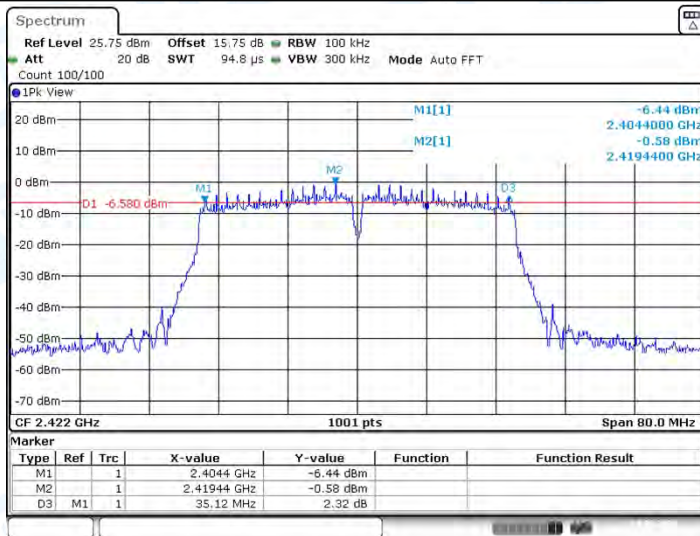
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11N40MIMO_Ant1_2422



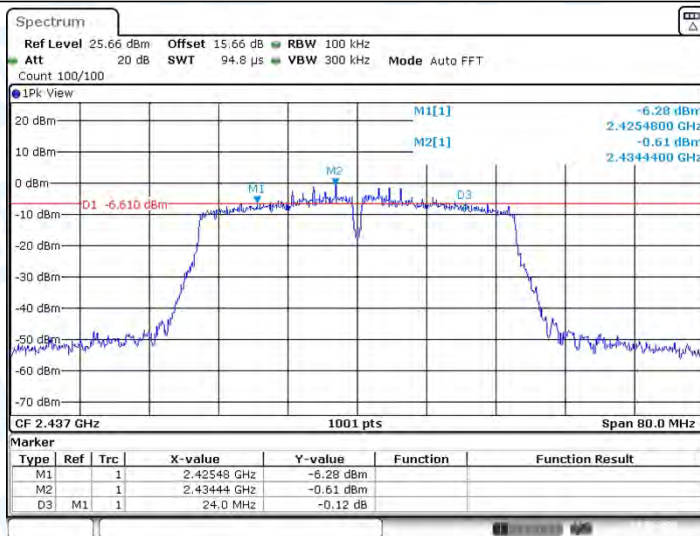
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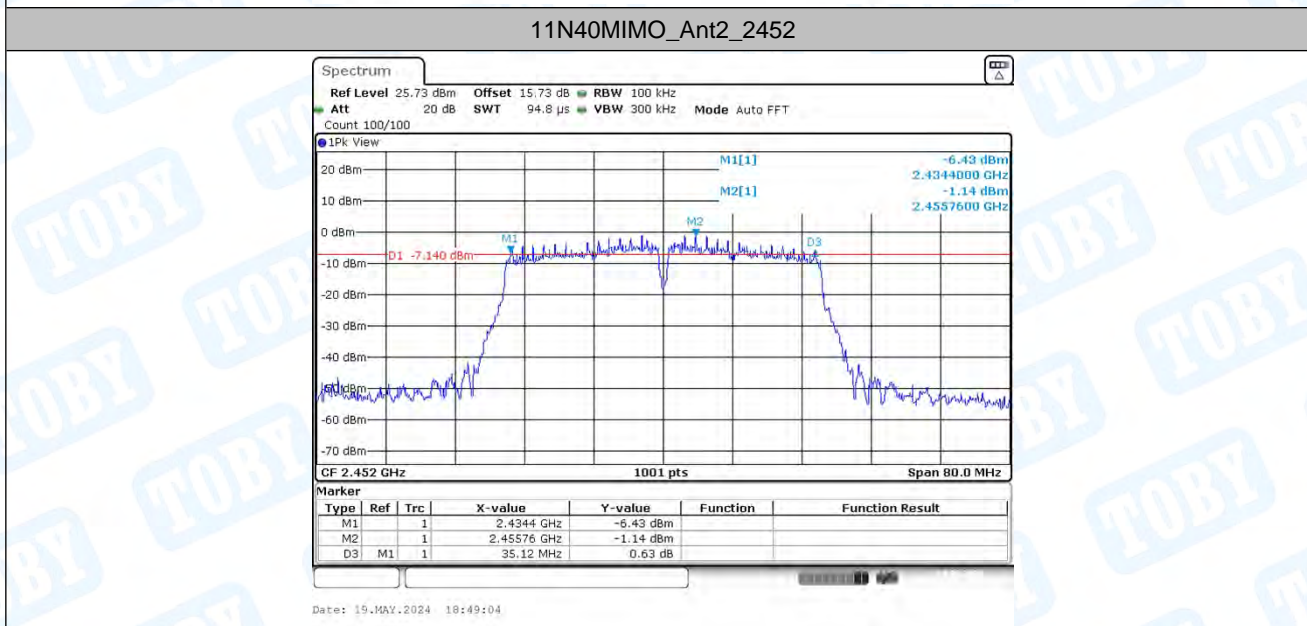
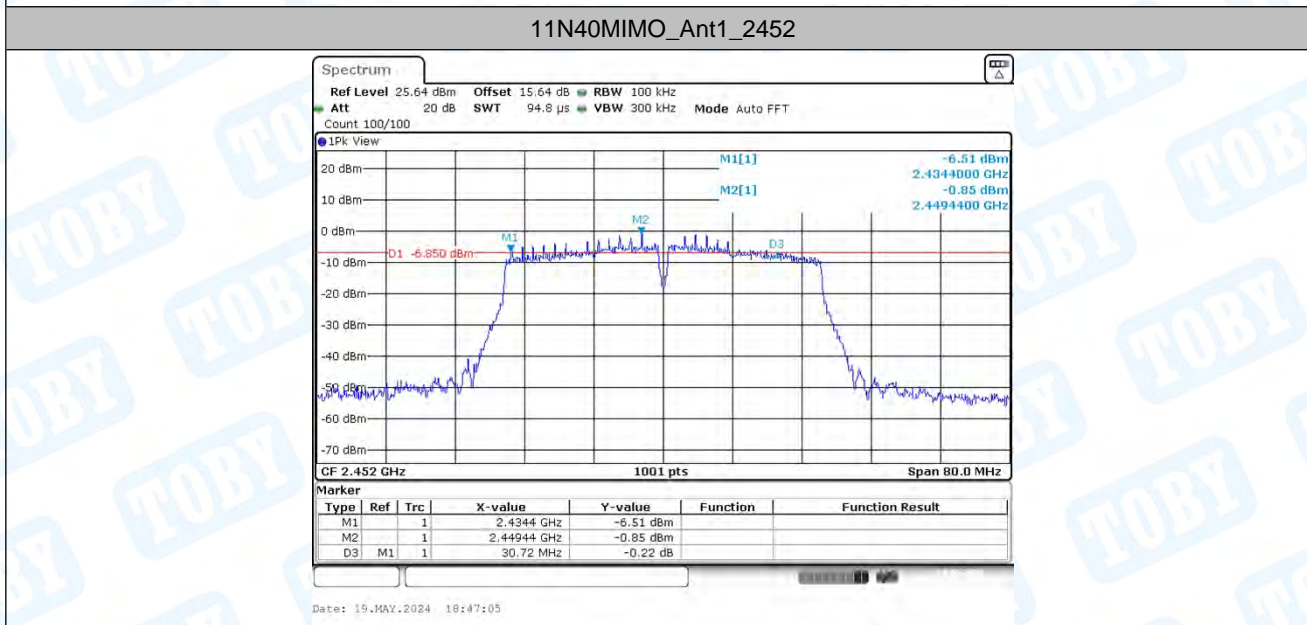
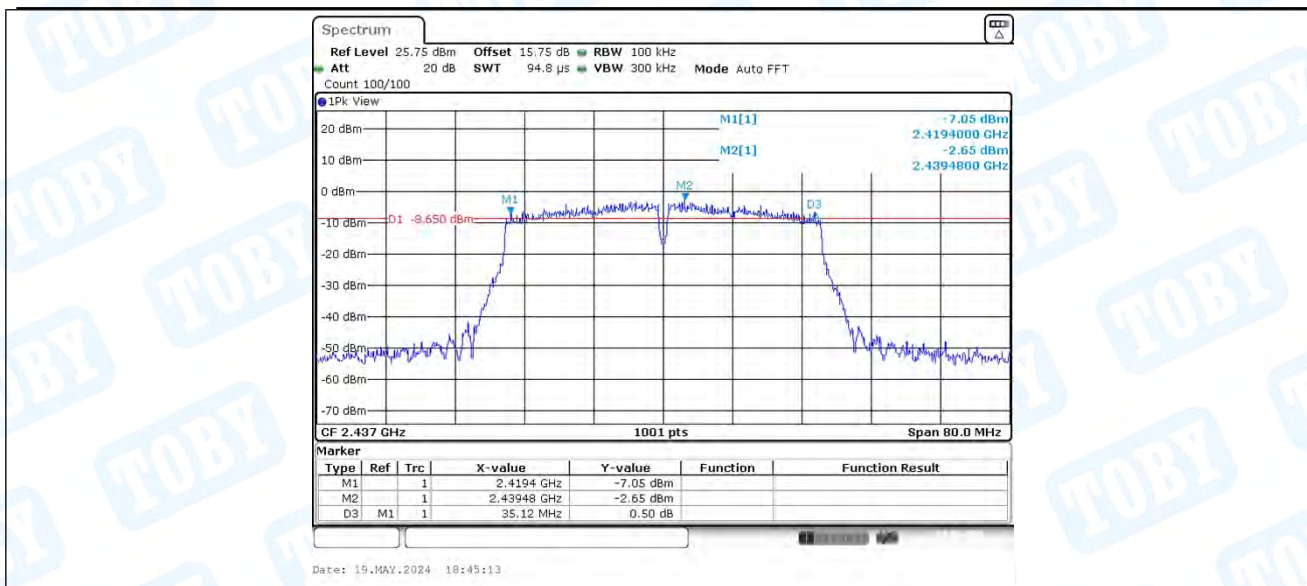
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11N40MIMO_Ant1_2437



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11N40MIMO_Ant2_2437

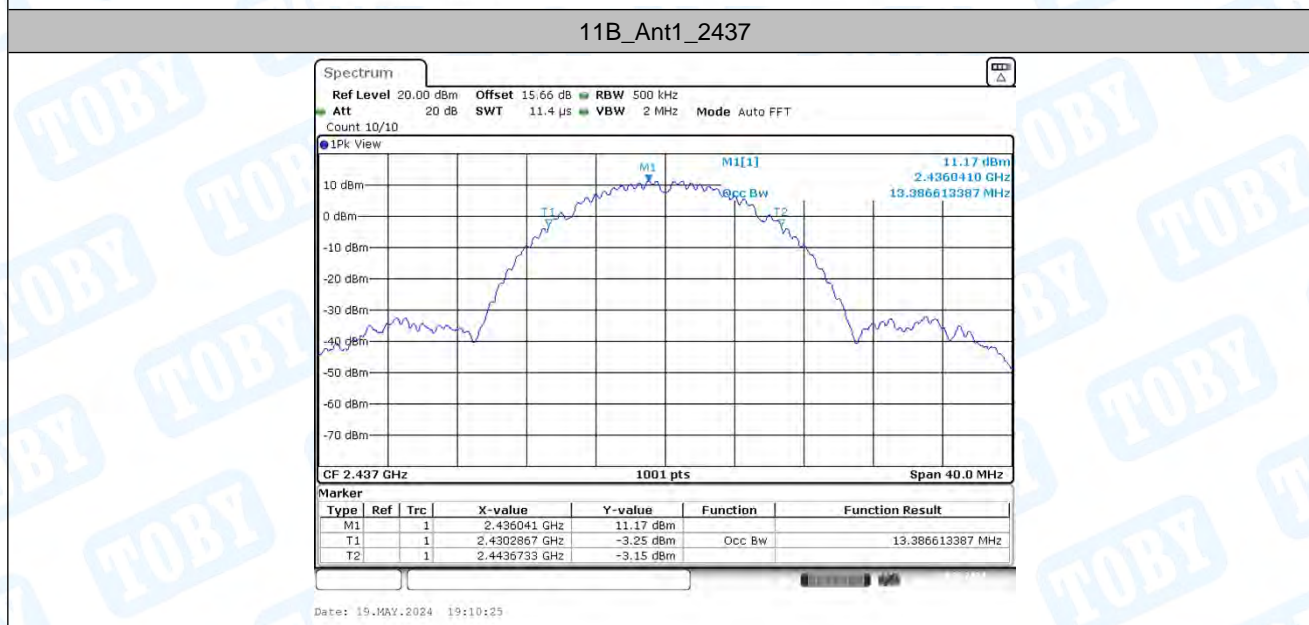
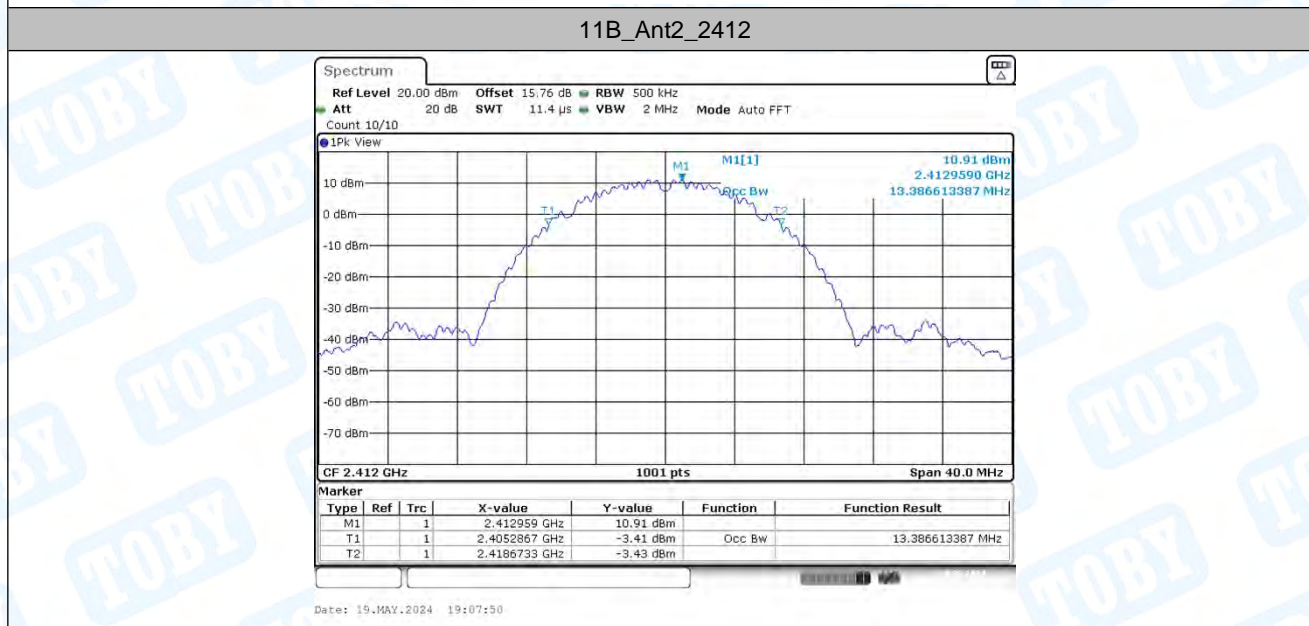
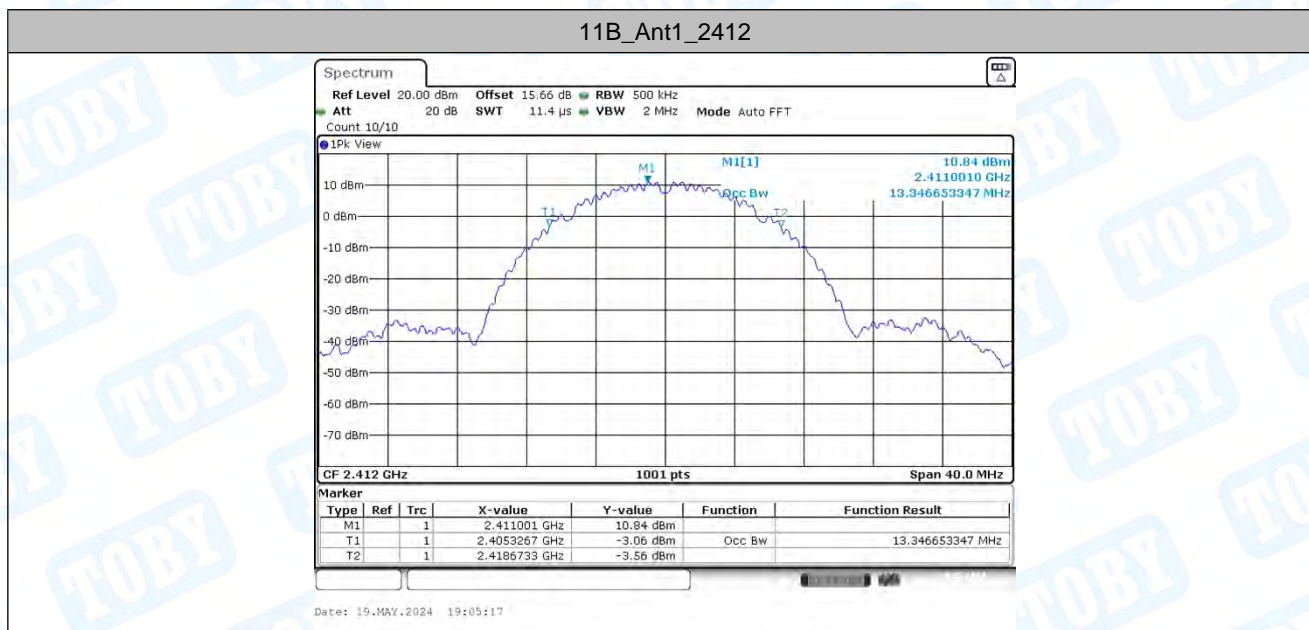


2. Occupied Channel Bandwidth

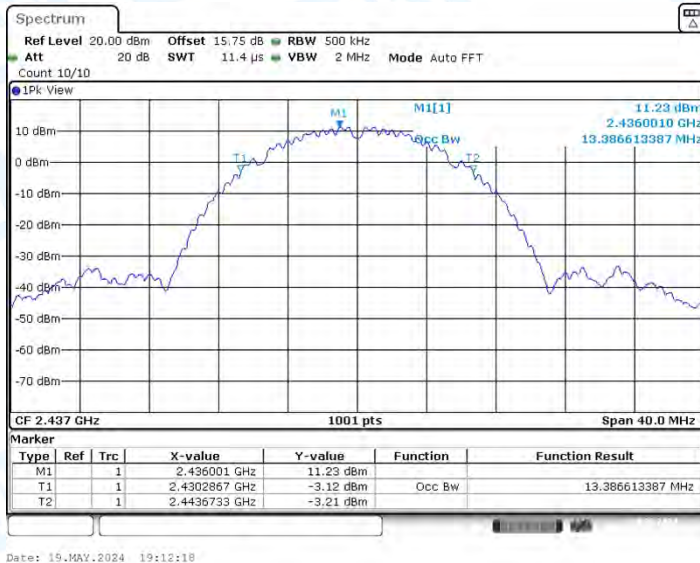
2.1. Test Result

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	13.347	2405.3267	2418.6733	---	---
	Ant2	2412	13.387	2405.2867	2418.6733	---	---
	Ant1	2437	13.387	2430.2867	2443.6733	---	---
	Ant2	2437	13.387	2430.2867	2443.6733	---	---
	Ant1	2462	13.506	2455.2468	2468.7532	---	---
	Ant2	2462	13.387	2455.2867	2468.6733	---	---
11G	Ant1	2412	16.783	2403.7283	2420.5115	---	---
	Ant2	2412	16.663	2403.6084	2420.2717	---	---
	Ant1	2437	16.823	2428.5684	2445.3916	---	---
	Ant2	2437	16.663	2428.6084	2445.2717	---	---
	Ant1	2462	16.903	2453.5684	2470.4715	---	---
	Ant2	2462	16.943	2453.4885	2470.4316	---	---
11N20MIMO	Ant1	2412	17.902	2402.9690	2420.8711	---	---
	Ant2	2412	17.702	2403.1688	2420.8711	---	---
	Ant1	2437	17.982	2428.0889	2446.0709	---	---
	Ant2	2437	17.782	2428.0490	2445.8312	---	---
	Ant1	2462	17.862	2453.0090	2470.8711	---	---
	Ant2	2462	17.822	2453.0490	2470.8711	---	---
11N40MIMO	Ant1	2422	36.284	2403.7782	2440.0619	---	---
	Ant2	2422	36.044	2403.9381	2439.9820	---	---
	Ant1	2437	36.044	2419.0979	2455.1419	---	---
	Ant2	2437	36.044	2418.8581	2454.9021	---	---
	Ant1	2452	36.124	2434.0180	2470.1419	---	---
	Ant2	2452	36.204	2433.8581	2470.0619	---	---

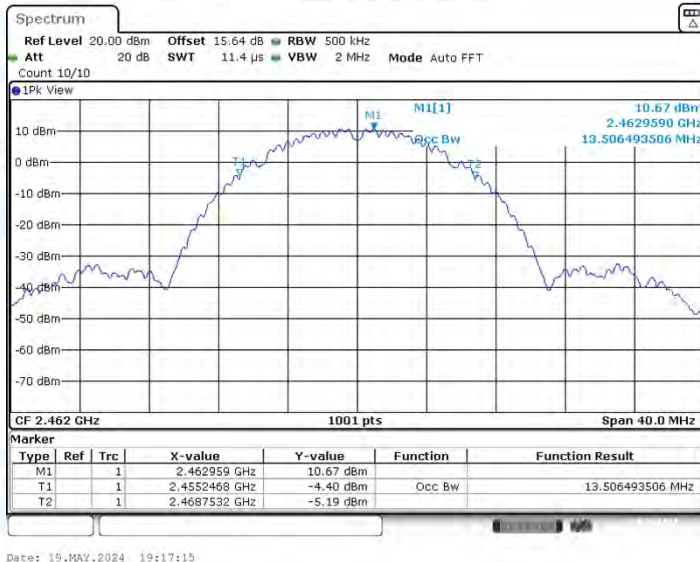
2.2. Test Graphs



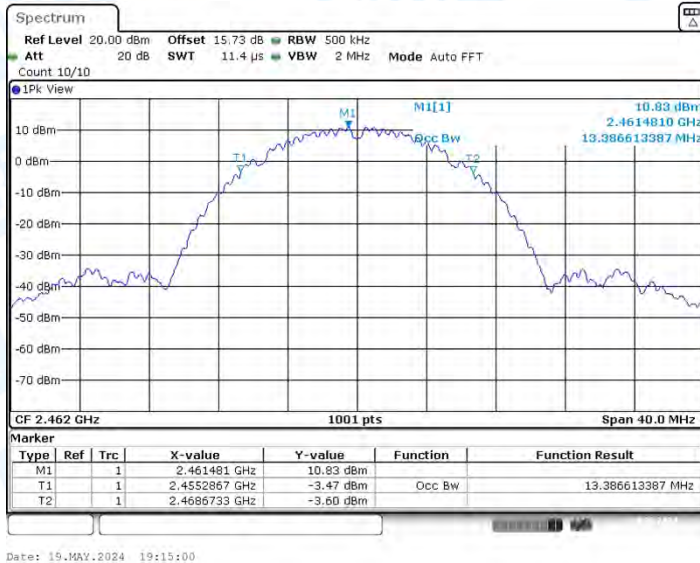
11B_Ant2_2437



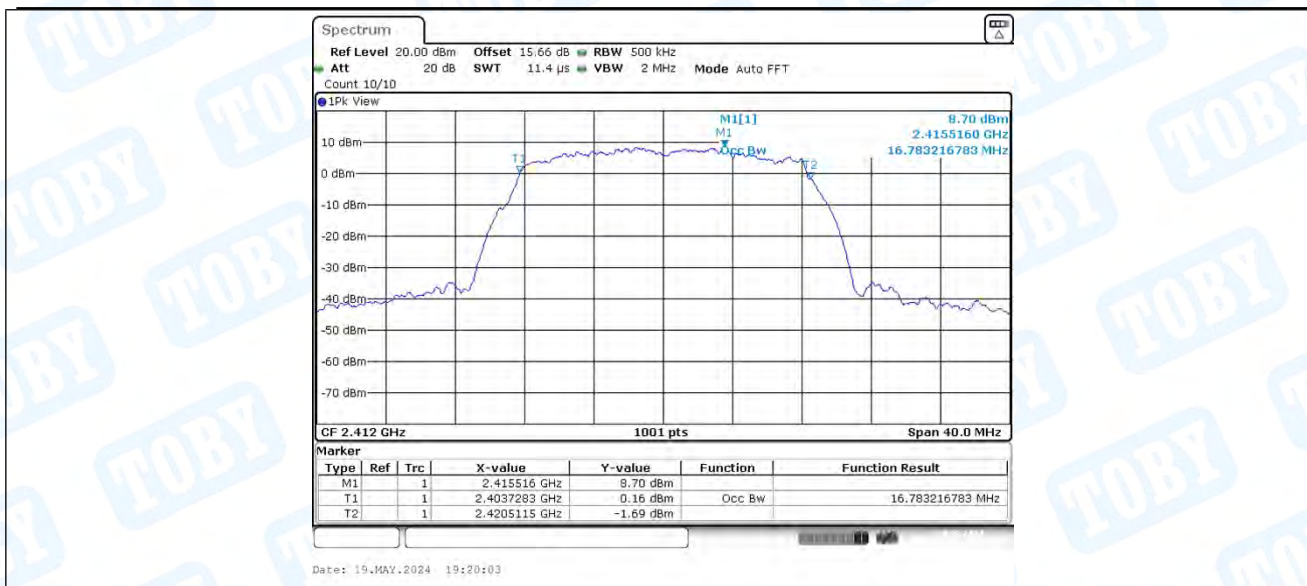
11B_Ant1_2462



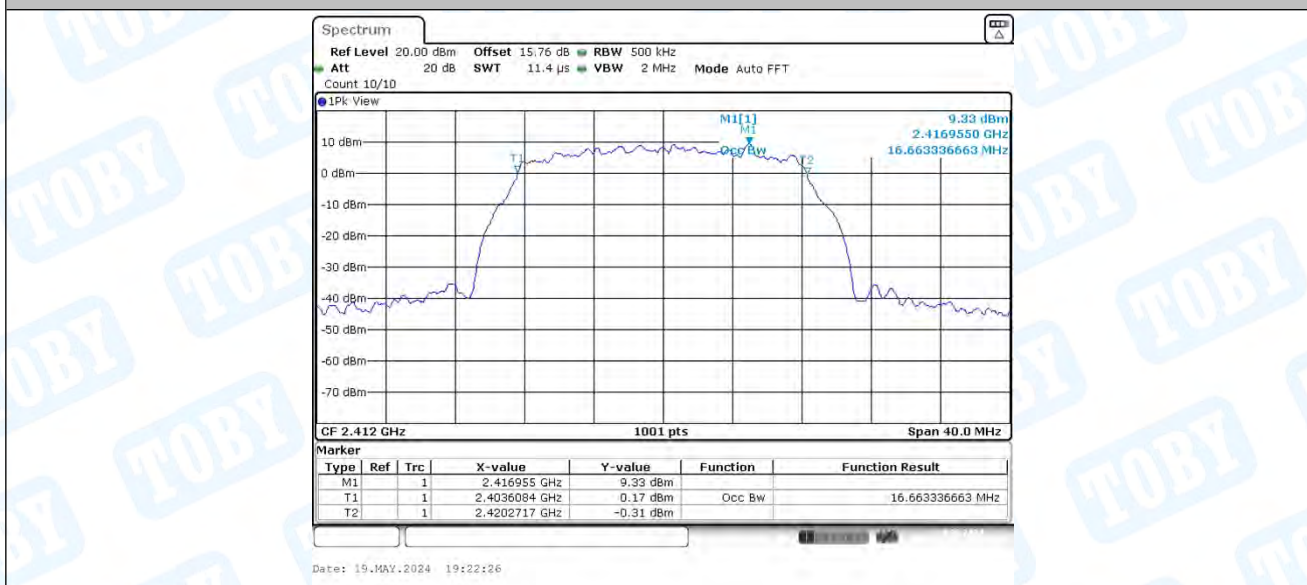
11B_Ant2_2462



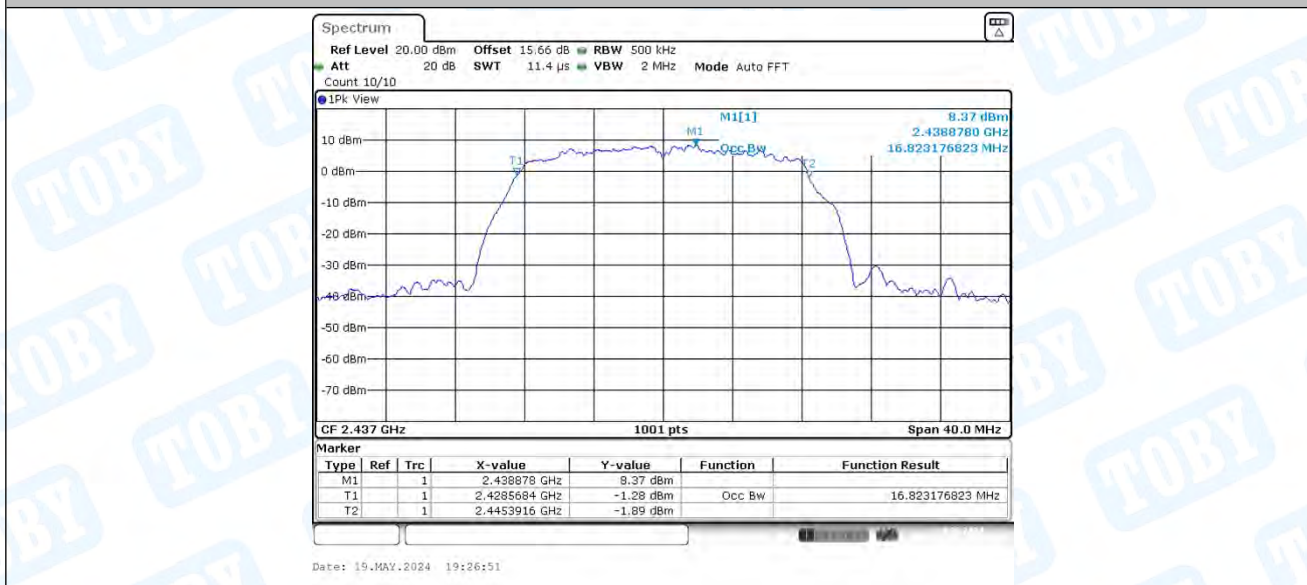
11G_Ant1_2412



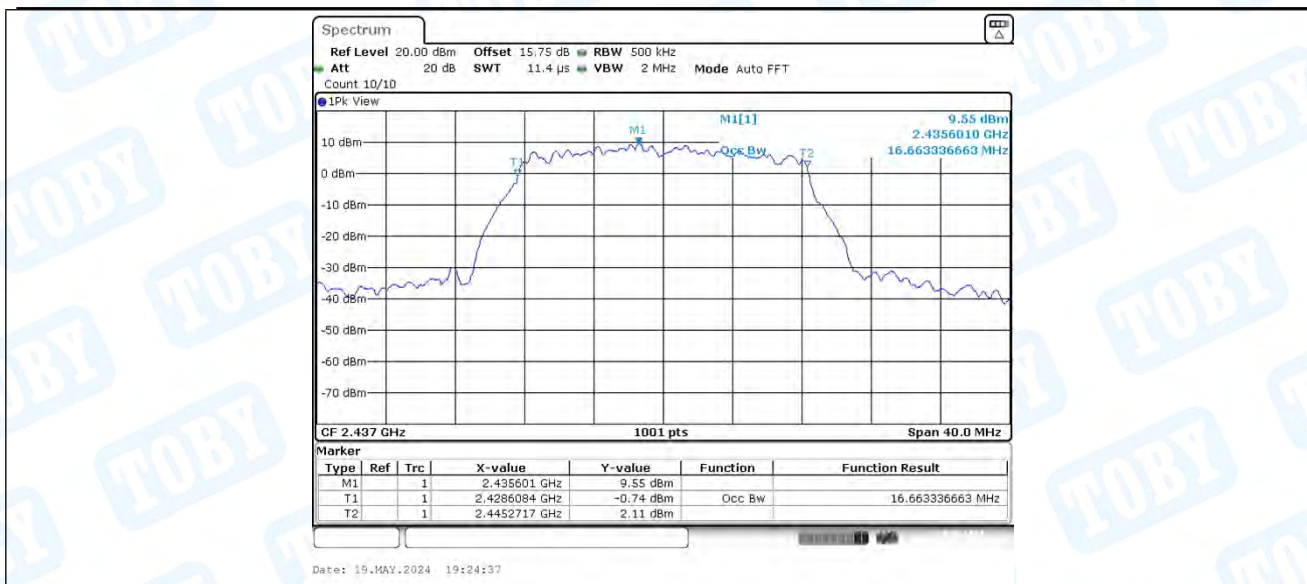
11G_Ant2_2412



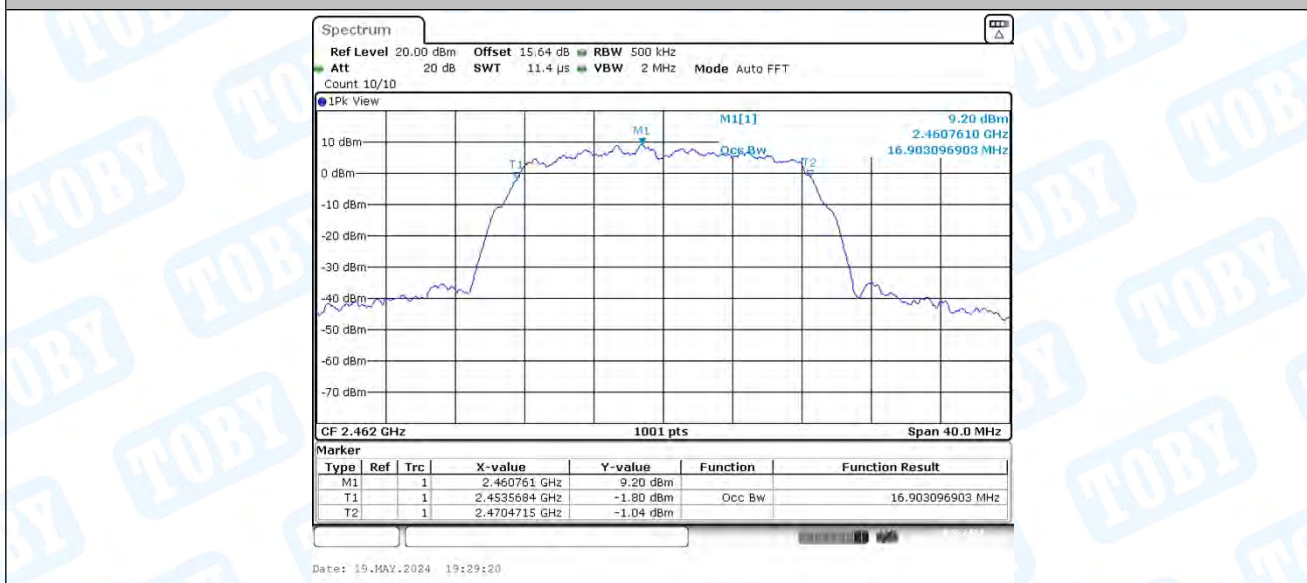
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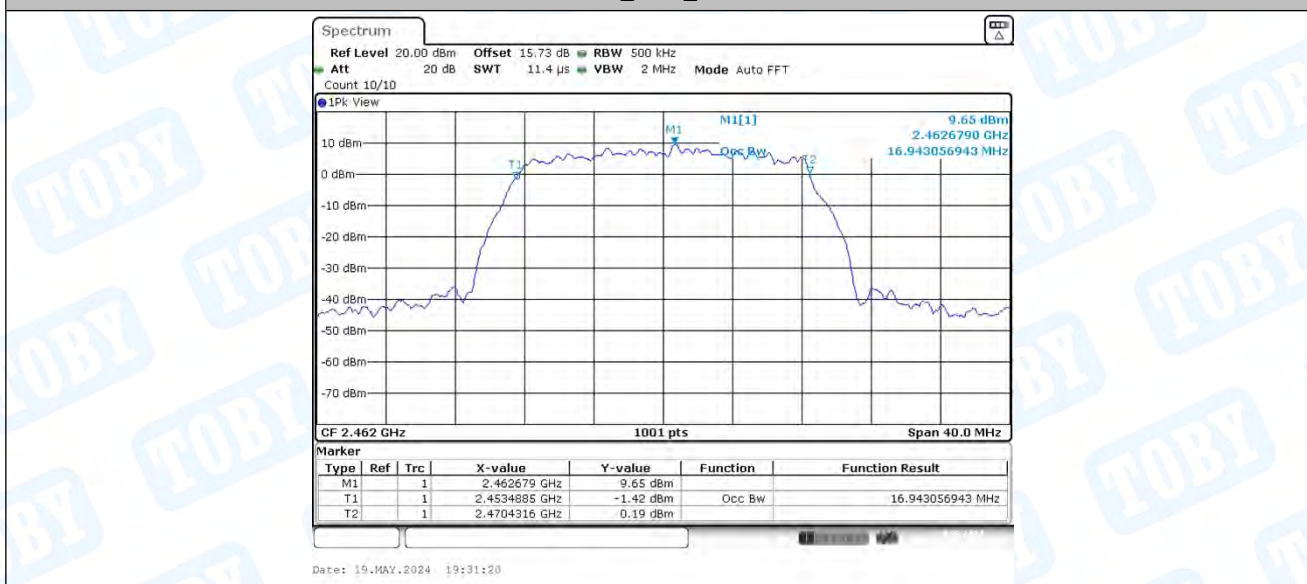
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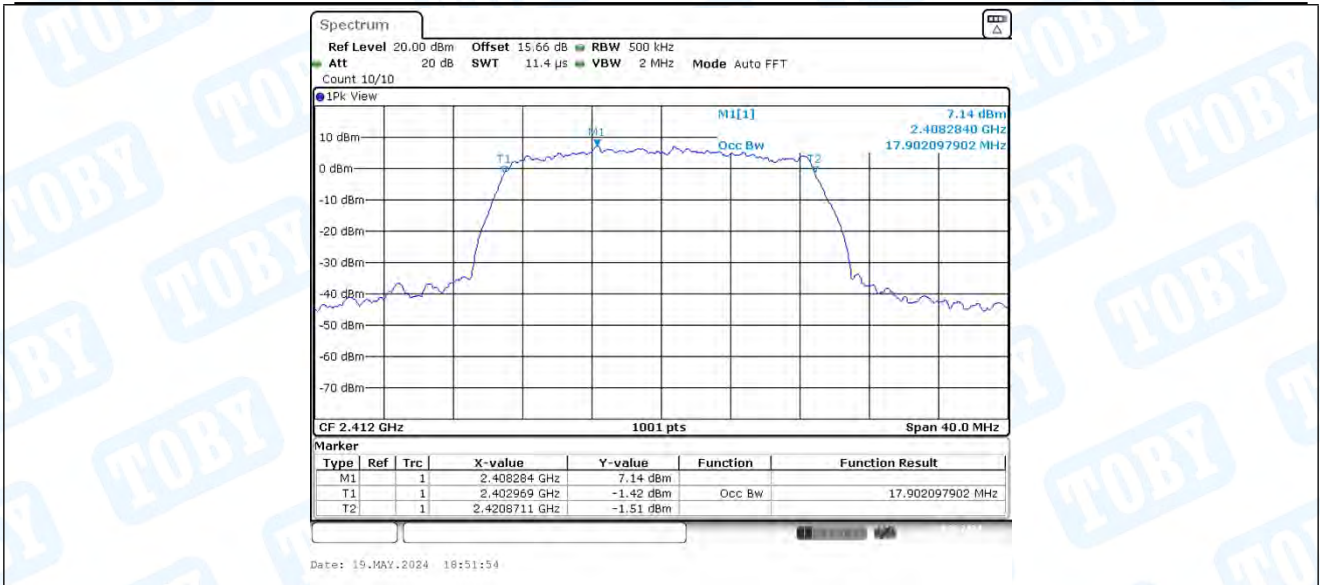
11G_Ant1_2462



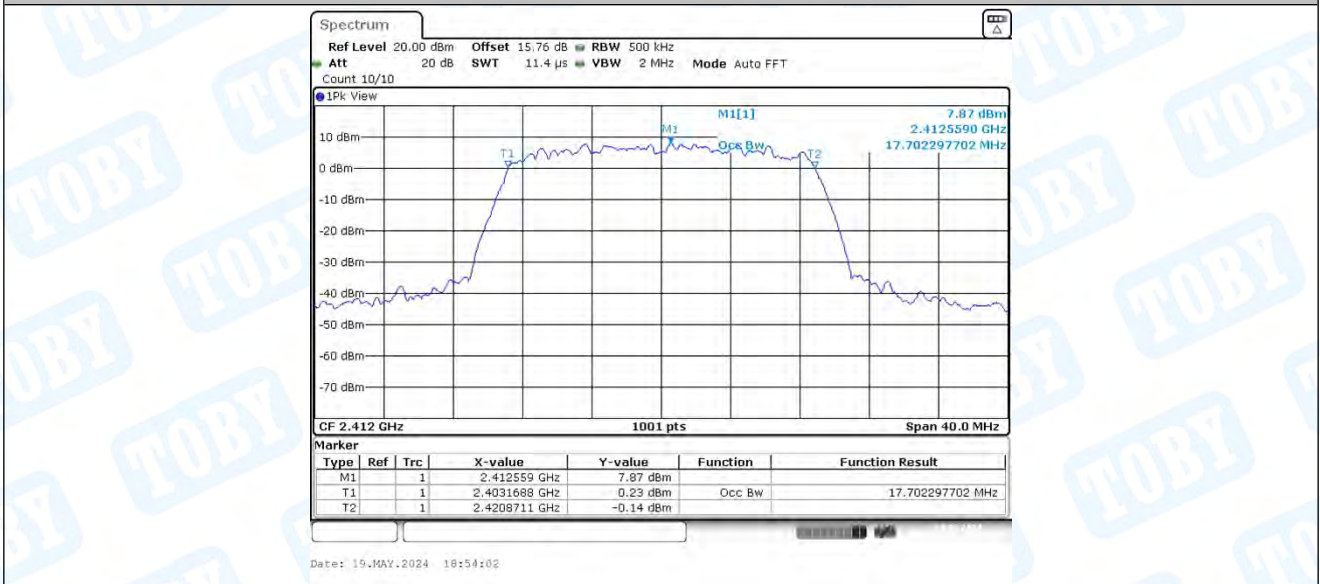
11G_Ant2_2462



11N20MIMO_Ant1_2412



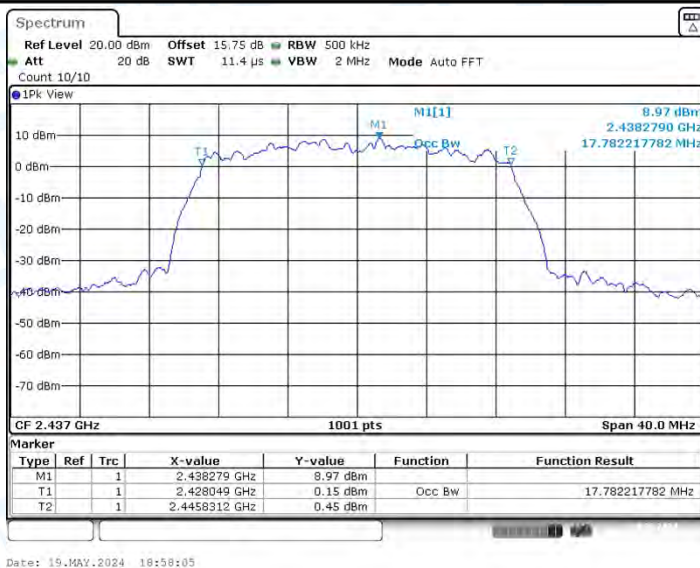
11N20MIMO_Ant2_2412



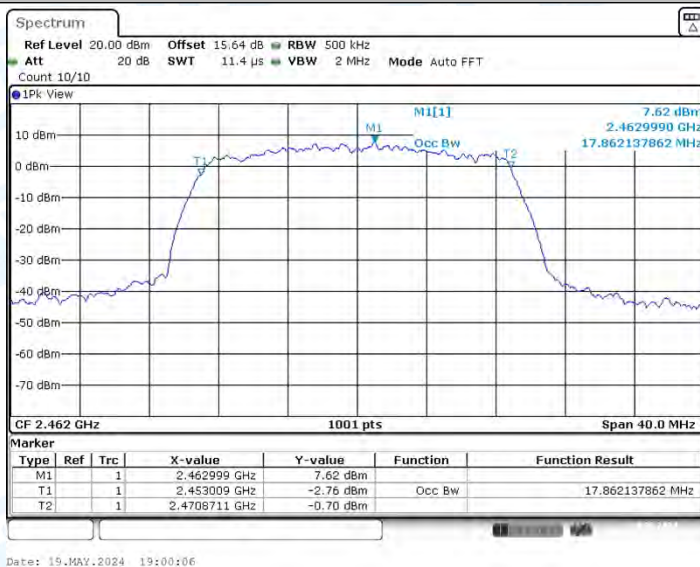
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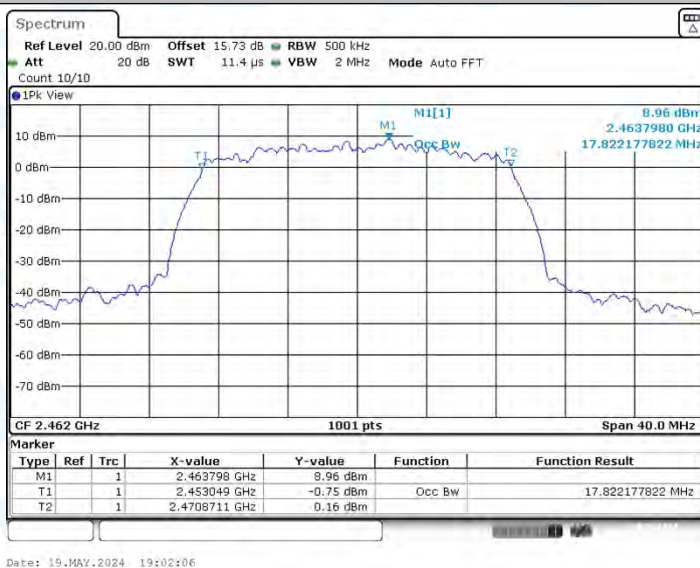
11N20MIMO_Ant2_2437



11N20MIMO_Ant1_2462



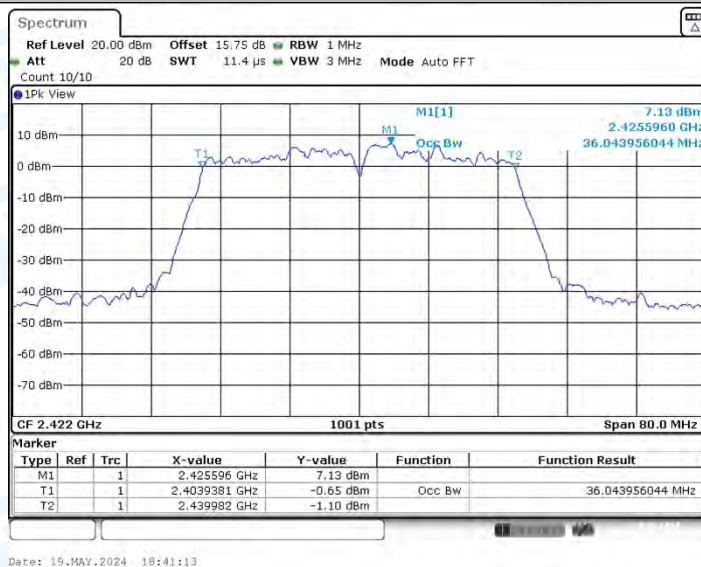
11N20MIMO_Ant2_2462



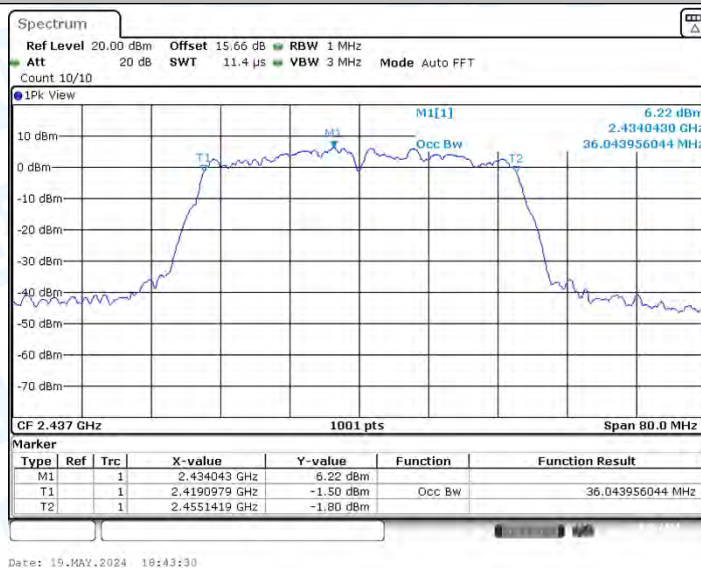
11N40MIMO_Ant1_2422



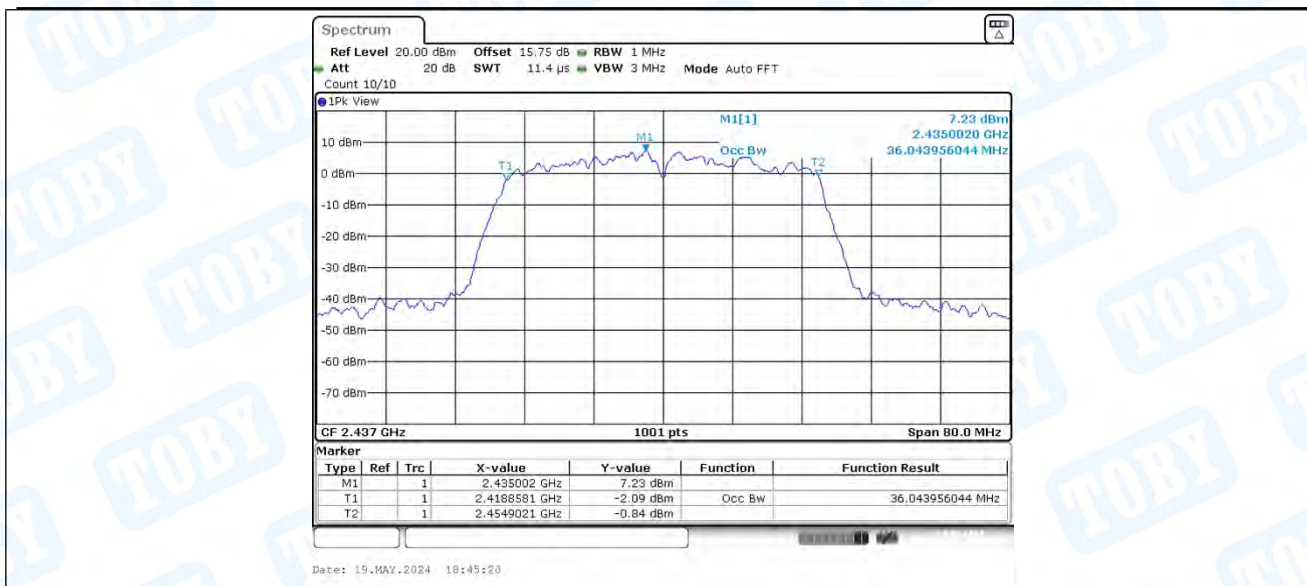
11N40MIMO_Ant2_2422



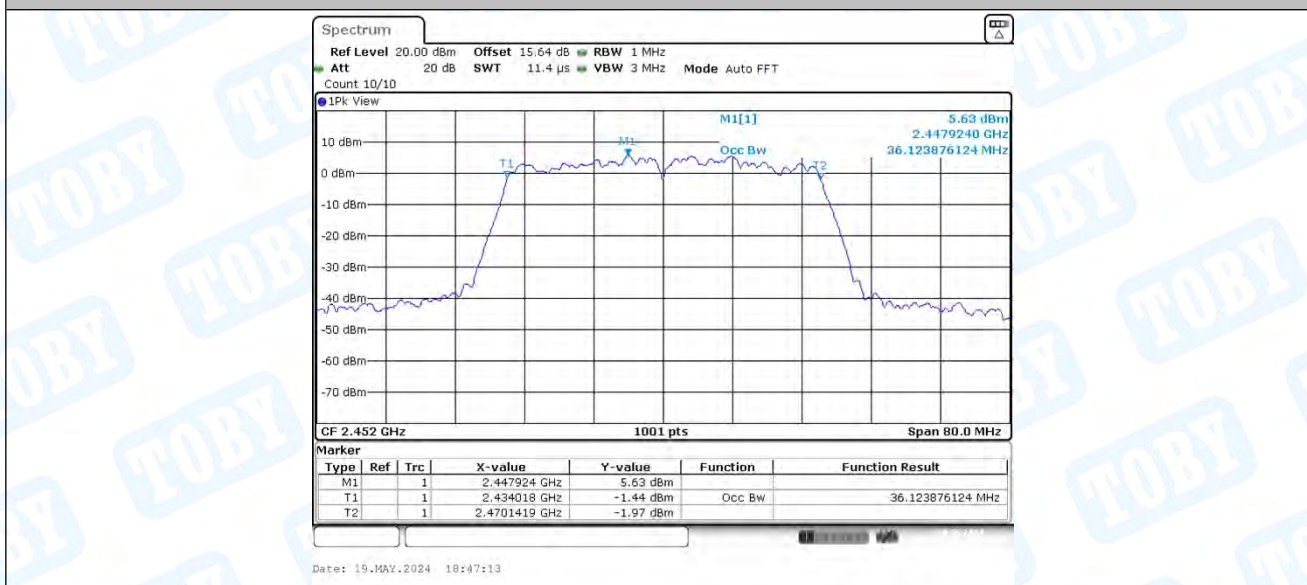
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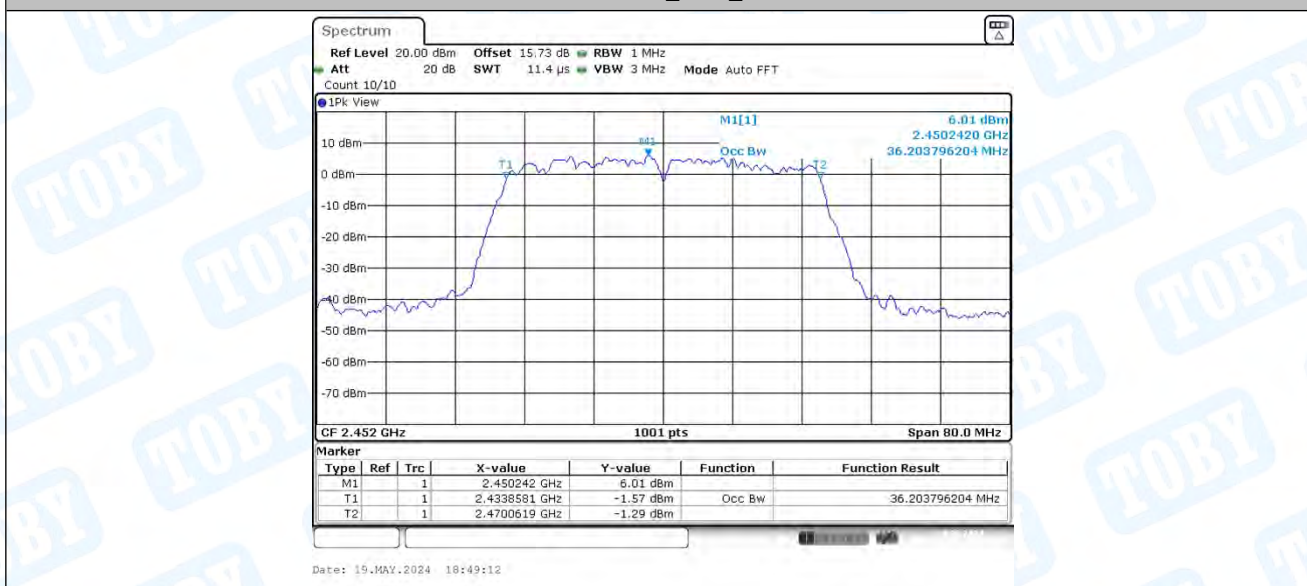
11N40MIMO_Ant2_2437



11N40MIMO_Ant1_2452



11N40MIMO_Ant2_2452



3. Maximum conducted output power

3.1. Test Result

TestMode	Antenna	Channel	Power [dBm]	Limit [dBm]	EIRP [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	17.85	≤30.00	21.65	≤36.00	PASS
	Ant2	2412	17.96	≤30.00	21.63	≤36.00	PASS
	Ant1	2437	18.18	≤30.00	21.98	≤36.00	PASS
	Ant2	2437	17.37	≤30.00	21.04	≤36.00	PASS
	Ant1	2462	17.89	≤30.00	21.69	≤36.00	PASS
	Ant2	2462	17.97	≤30.00	21.64	≤36.00	PASS
11G	Ant1	2412	14.56	≤30.00	18.36	≤36.00	PASS
	Ant2	2412	14.13	≤30.00	17.80	≤36.00	PASS
	Ant1	2437	14.88	≤30.00	18.68	≤36.00	PASS
	Ant2	2437	14.08	≤30.00	17.75	≤36.00	PASS
	Ant1	2462	14.66	≤30.00	18.46	≤36.00	PASS
	Ant2	2462	14.83	≤30.00	18.50	≤36.00	PASS
11N20MIMO	Ant1	2412	13.56	≤30.00	17.36	≤36.00	PASS
	Ant2	2412	13.36	≤30.00	17.03	≤36.00	PASS
	total	2412	16.47	≤29.25	20.27	≤36.00	PASS
	Ant1	2437	13.77	≤30.00	17.57	≤36.00	PASS
	Ant2	2437	13.45	≤30.00	17.12	≤36.00	PASS
	total	2437	16.62	≤29.25	20.42	≤36.00	PASS
	Ant1	2462	13.63	≤30.00	17.43	≤36.00	PASS
	Ant2	2462	13.71	≤30.00	17.38	≤36.00	PASS
total	2462	16.68	≤29.25	20.48	≤36.00	PASS	
11N40MIMO	Ant1	2422	11.54	≤30.00	15.34	≤36.00	PASS
	Ant2	2422	11.95	≤30.00	15.62	≤36.00	PASS
	total	2422	14.76	≤29.25	18.56	≤36.00	PASS
	Ant1	2437	11.63	≤30.00	15.43	≤36.00	PASS
	Ant2	2437	11.91	≤30.00	15.58	≤36.00	PASS
	total	2437	14.78	≤29.25	18.58	≤36.00	PASS
	Ant1	2452	11.63	≤30.00	15.43	≤36.00	PASS
	Ant2	2452	11.84	≤30.00	15.51	≤36.00	PASS
total	2452	14.75	≤29.25	18.55	≤36.00	PASS	

Note: 1, This module will use two different WiFi antennas, and only the one with the larger antenna gain (**Antenna1: 3.80dBi; Antenna2: 3.67dBi**) will be used for conducted test.

2, For MIMO Mode, Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 6.75\text{dBi}$; $G_{ANT1} = 3.80\text{dBi}$; $G_{ANT2} = 3.67\text{dBi}$; and the Directional gain > 6dBi, So the $P_{limit} = P_{limit} - (6.75 - 6) = 29.25\text{dBm}$.

3. The Duty Cycle Factor is compensated in the graph.

4. Maximum power spectral density

4.1. Test Result

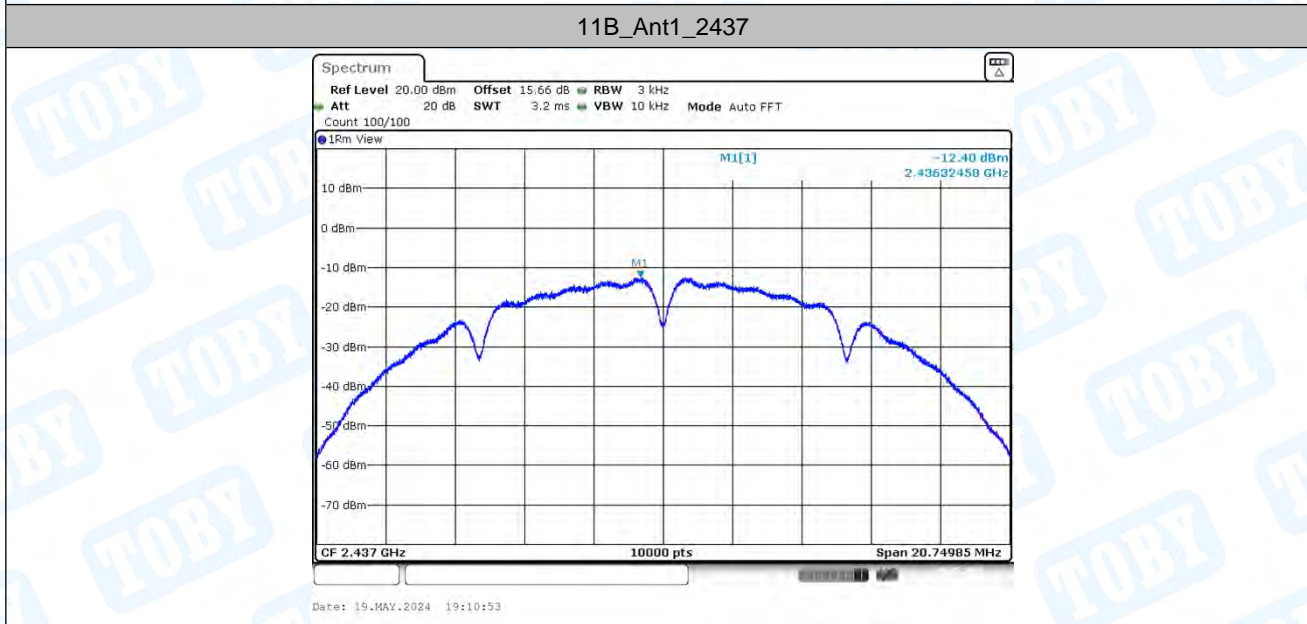
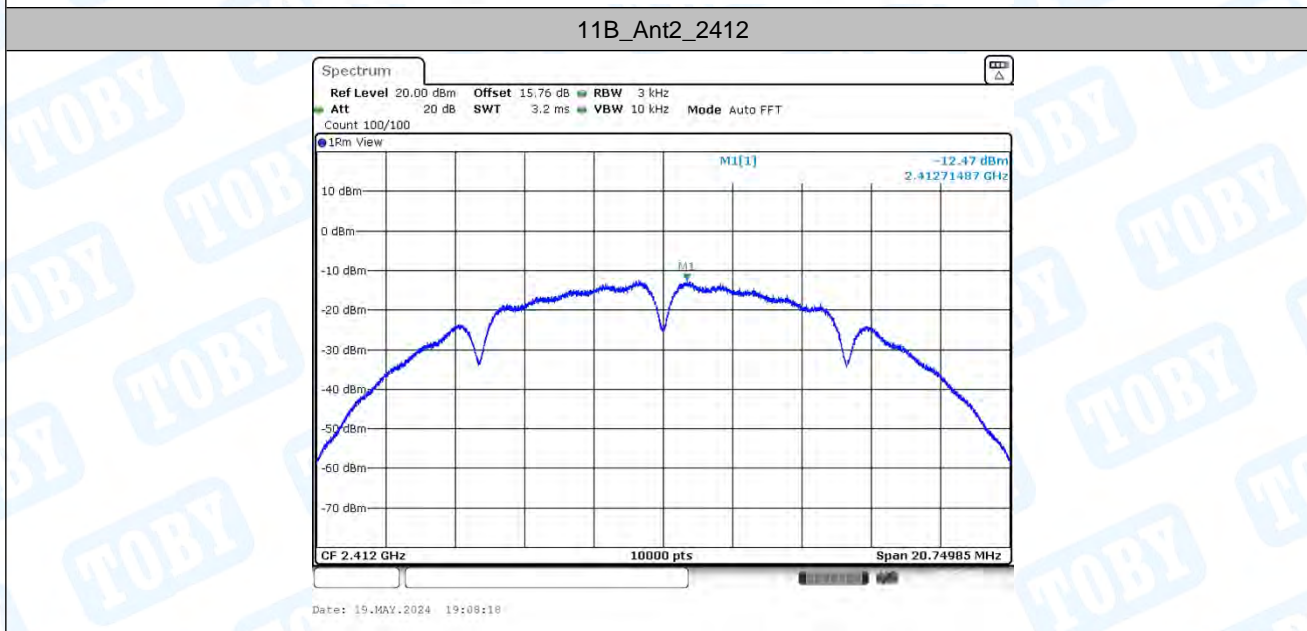
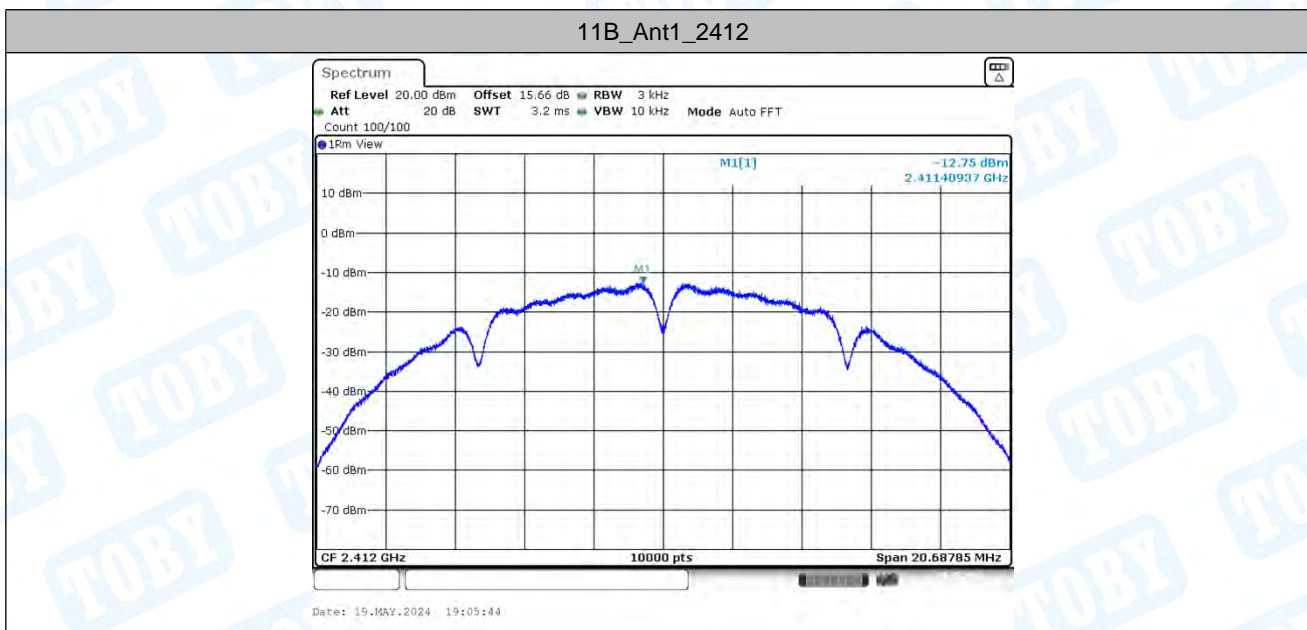
TestMode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-12.71	≤8.00	PASS
	Ant2	2412	-12.44	≤8.00	PASS
	Ant1	2437	-12.36	≤8.00	PASS
	Ant2	2437	-12.25	≤8.00	PASS
	Ant1	2462	-13.02	≤8.00	PASS
	Ant2	2462	-12.86	≤8.00	PASS
11G	Ant1	2412	-18.46	≤8.00	PASS
	Ant2	2412	-18.15	≤8.00	PASS
	Ant1	2437	-18.17	≤8.00	PASS
	Ant2	2437	-18.27	≤8.00	PASS
	Ant1	2462	-18.55	≤8.00	PASS
	Ant2	2462	-18.33	≤8.00	PASS
11N20MIMO	Ant1	2412	-19.14	≤8.00	PASS
	Ant2	2412	-18.43	≤8.00	PASS
	total	2412	-15.76	≤7.25	PASS
	Ant1	2437	-19.02	≤8.00	PASS
	Ant2	2437	-18.74	≤8.00	PASS
	total	2437	-15.87	≤7.25	PASS
	Ant1	2462	-19.57	≤8.00	PASS
	Ant2	2462	-18.48	≤8.00	PASS
total	2462	-15.98	≤7.25	PASS	
11N40MIMO	Ant1	2422	-22.57	≤8.00	PASS
	Ant2	2422	-22.76	≤8.00	PASS
	total	2422	-19.65	≤7.25	PASS
	Ant1	2437	-22.38	≤8.00	PASS
	Ant2	2437	-22.07	≤8.00	PASS
	total	2437	-19.21	≤7.25	PASS
	Ant1	2452	-22.78	≤8.00	PASS
	Ant2	2452	-22.96	≤8.00	PASS
	total	2452	-19.86	≤7.25	PASS

Note: 1. This module will use two different WiFi antennas, and only the one with the larger antenna gain (**Antenna1: 3.80dBi; Antenna2: 3.67dBi**) will be used for conducted test.

2. For MIMO Mode, Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 6.75\text{dBi}$; $G_{ANT1} = 3.80\text{dBi}$; $G_{ANT2} = 3.67\text{dBi}$; and the Directional gain > 6dBi, So the $PSD_{limit} = PSD_{limit} - (6.75 - 6) = 7.25\text{dBm}/3\text{kHz}$.

3. The Duty Cycle Factor is compensated in the graph.

4.2. Test Graphs



11B_Ant2_2437



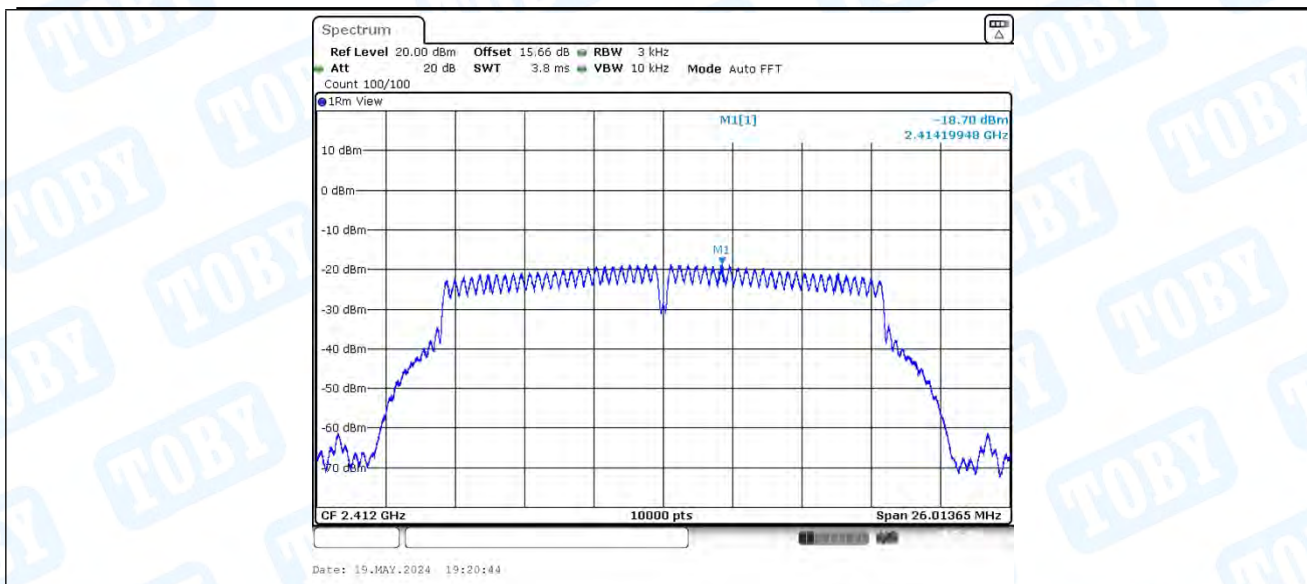
11B_Ant1_2462



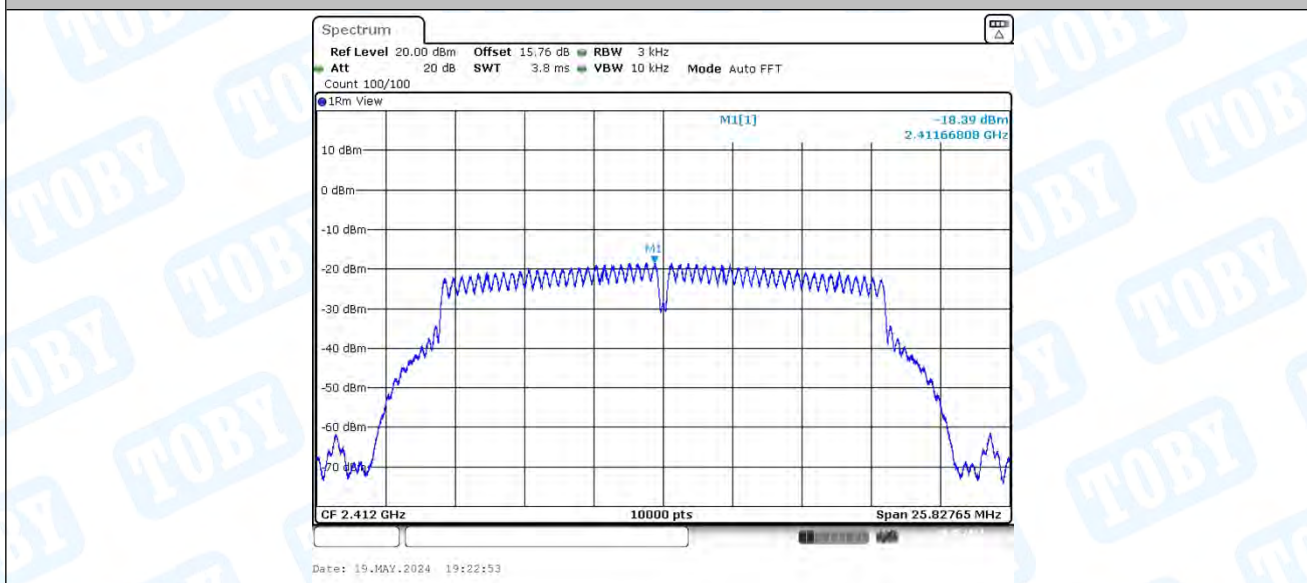
11B_Ant2_2462



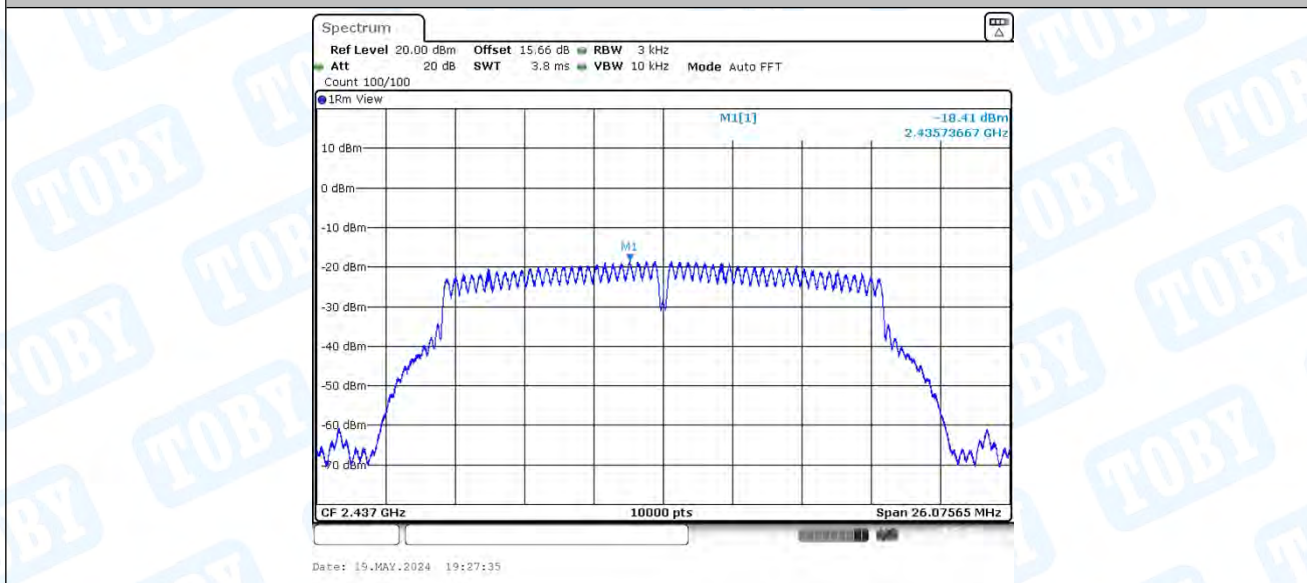
11G_Ant1_2412



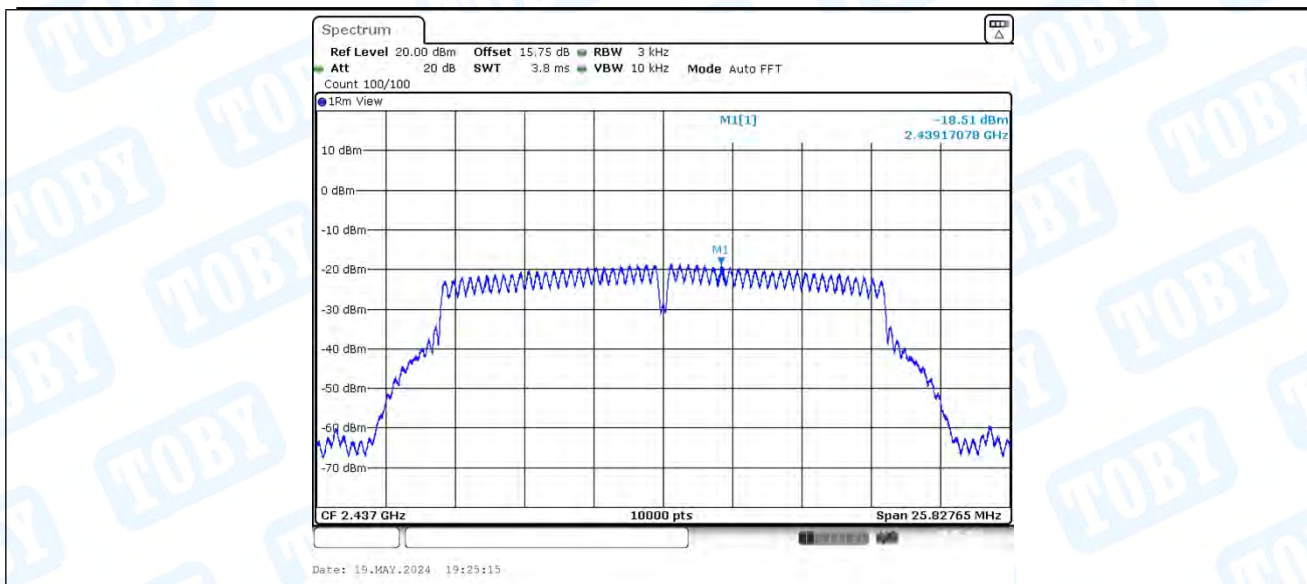
11G_Ant2_2412



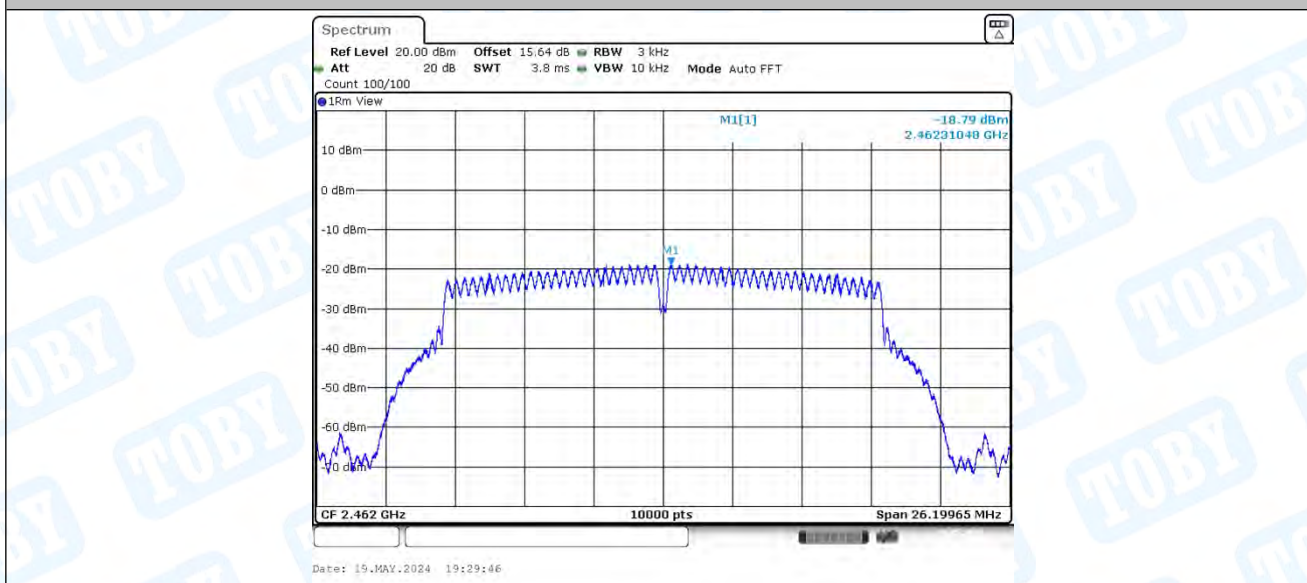
11G_Ant1_2437



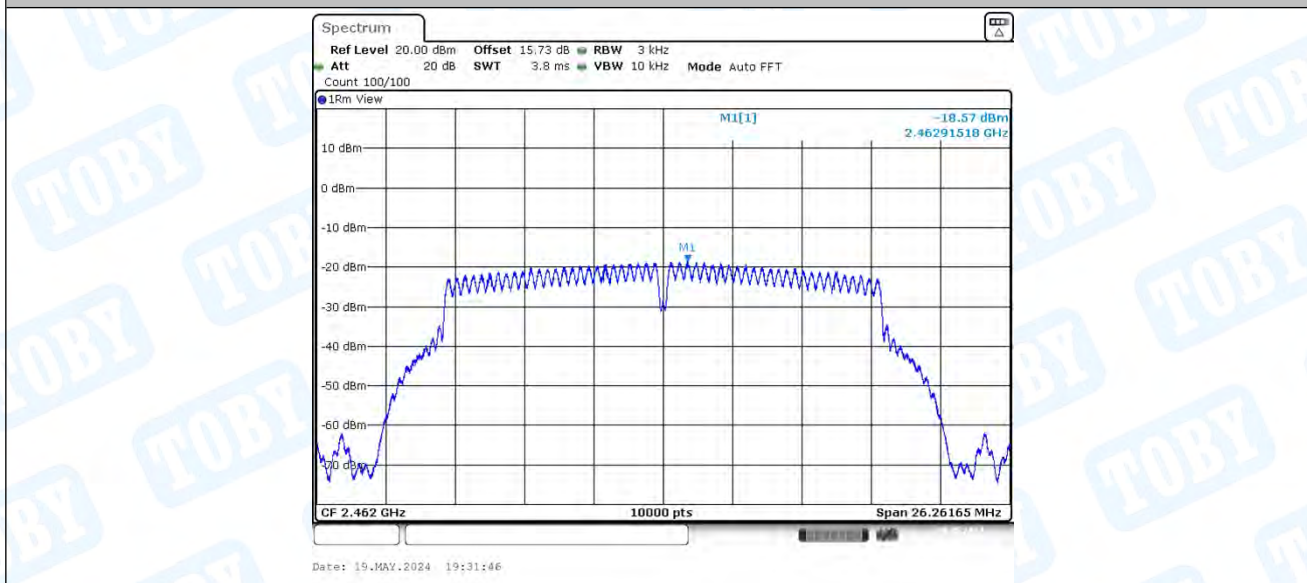
11G_Ant2_2437



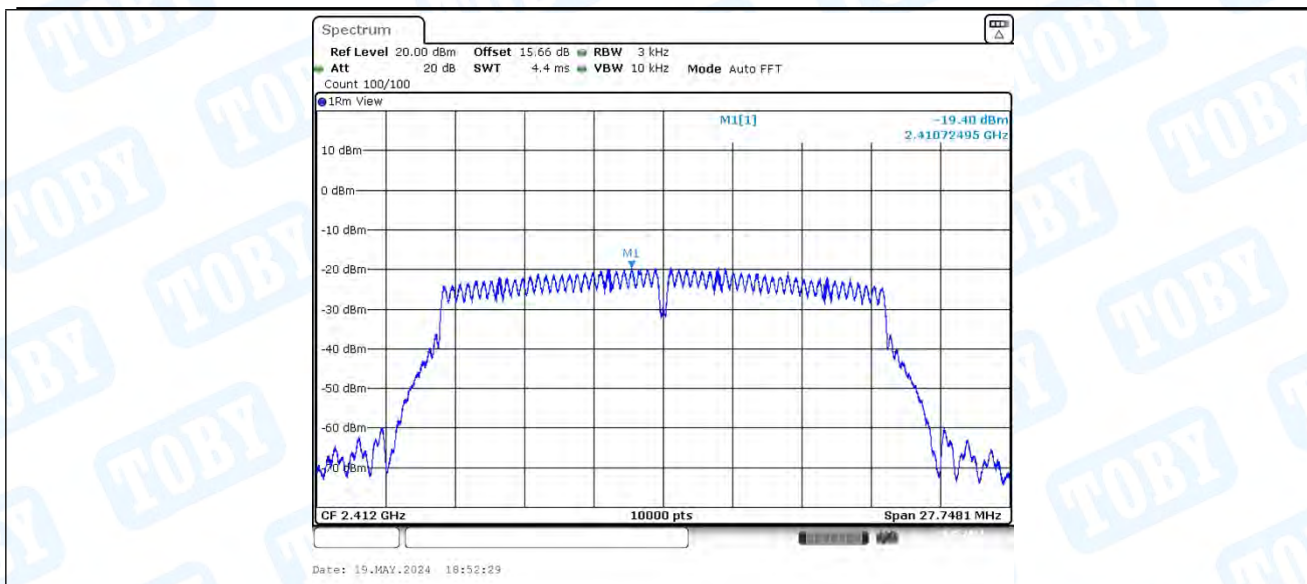
11G_Ant1_2462



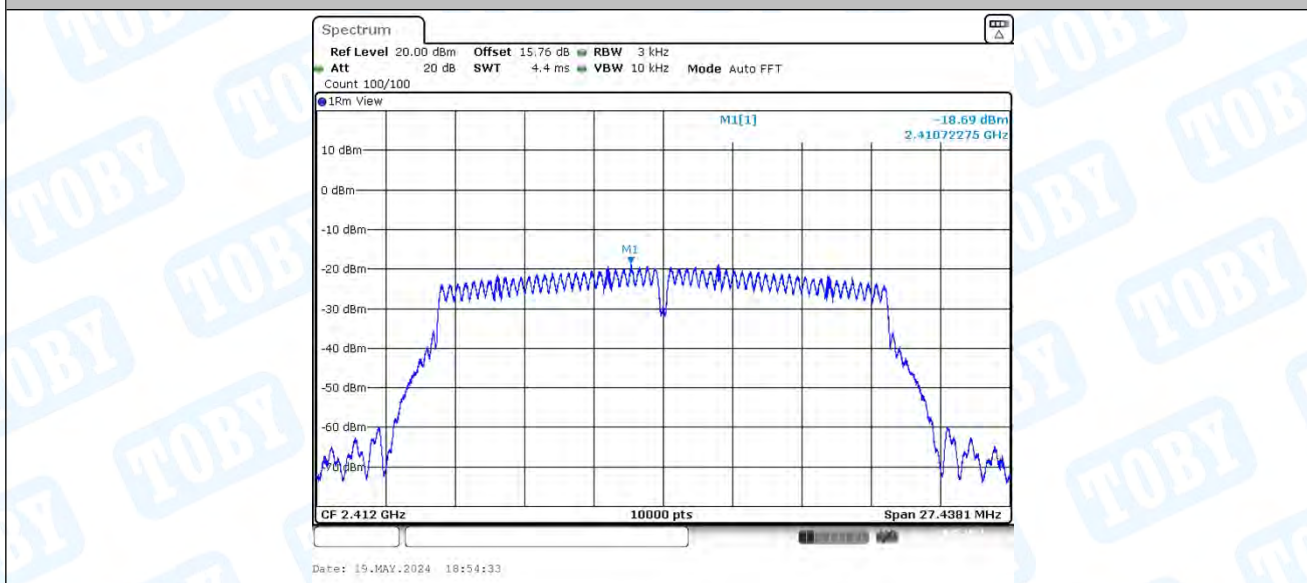
11G_Ant2_2462



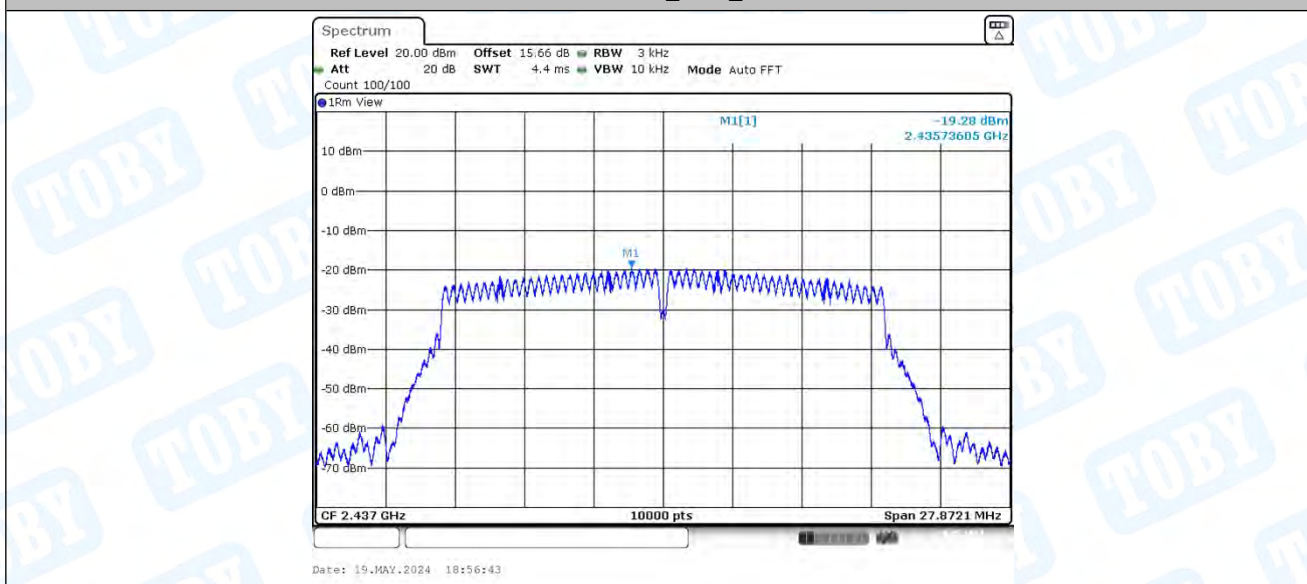
11N20MIMO_Ant1_2412



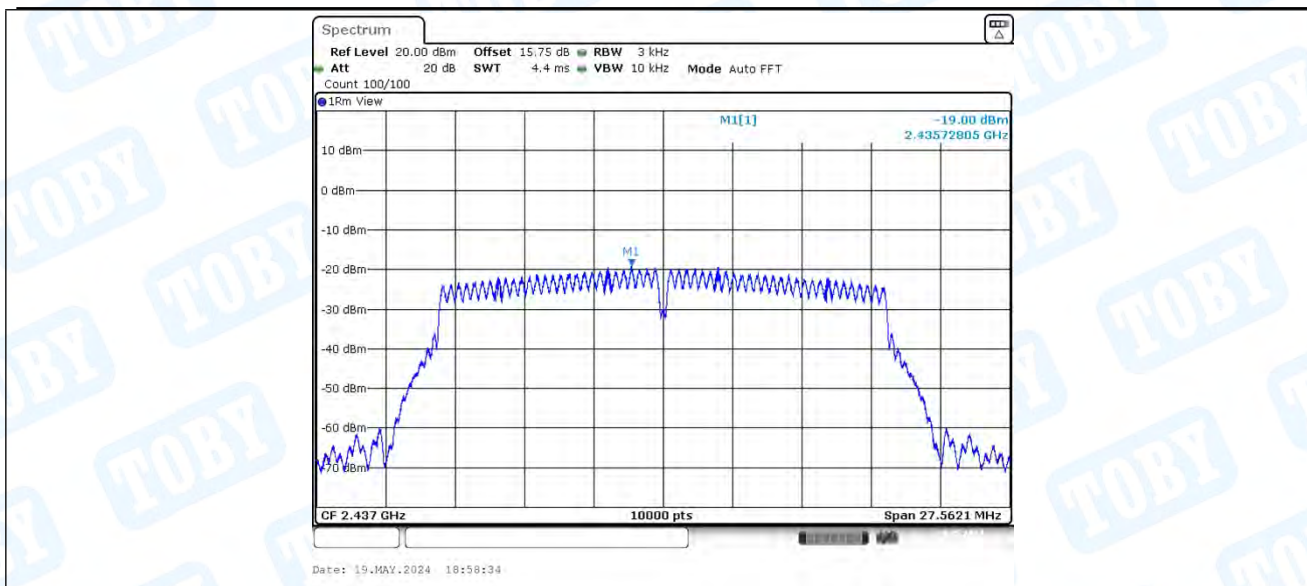
11N20MIMO_Ant2_2412



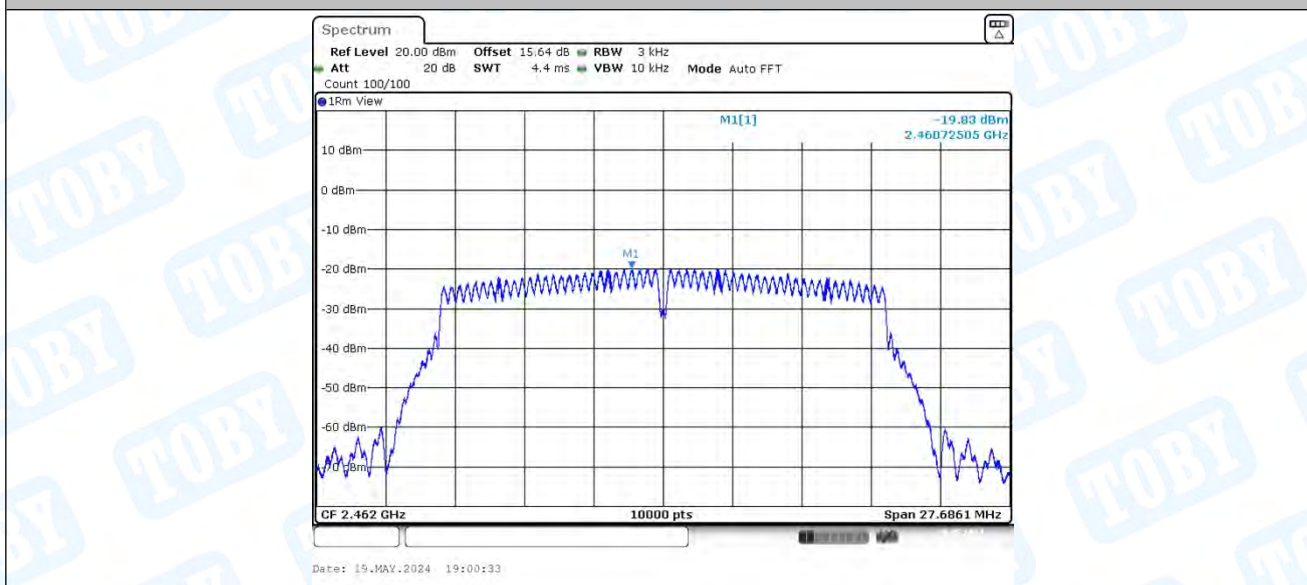
11N20MIMO_Ant1_2437



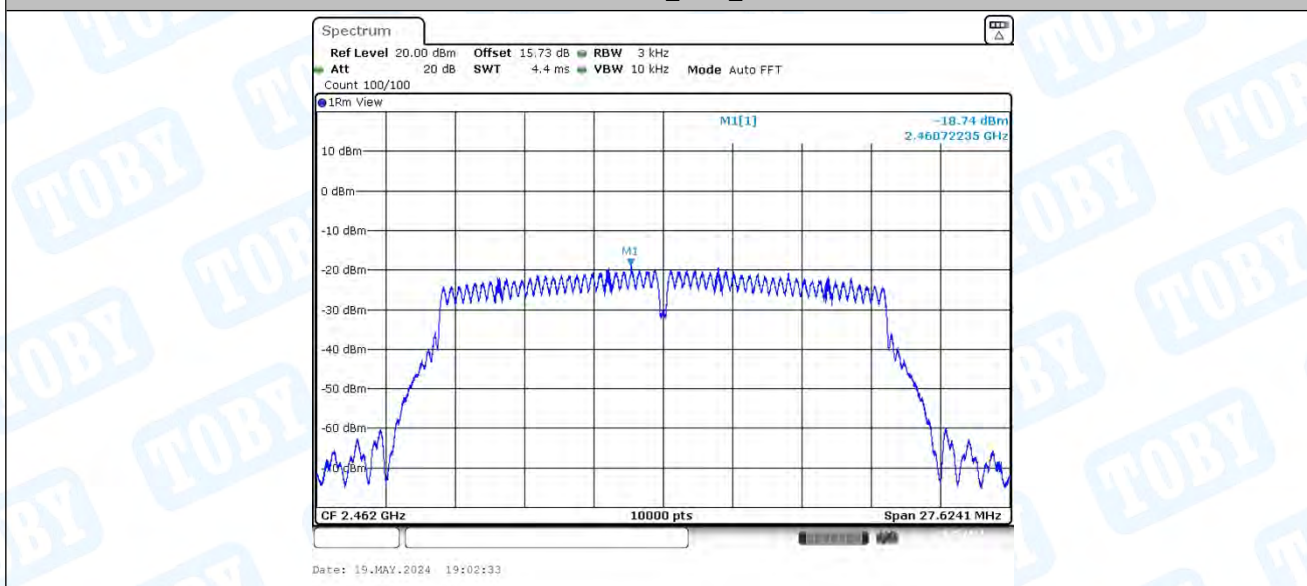
11N20MIMO_Ant2_2437



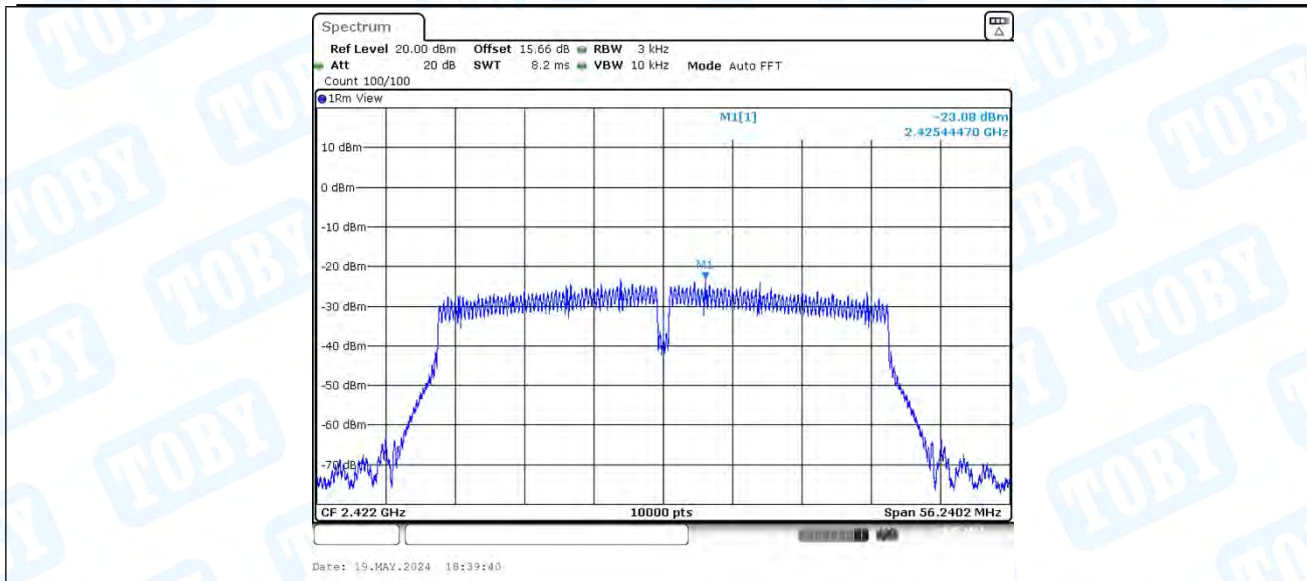
11N20MIMO_Ant1_2462



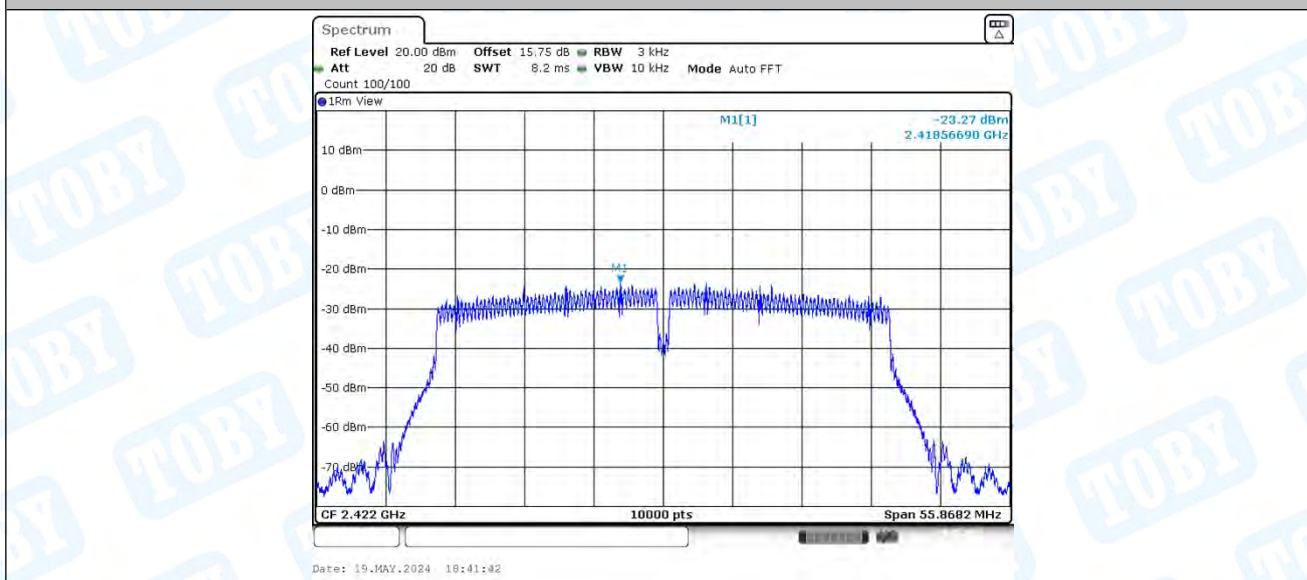
11N20MIMO_Ant2_2462



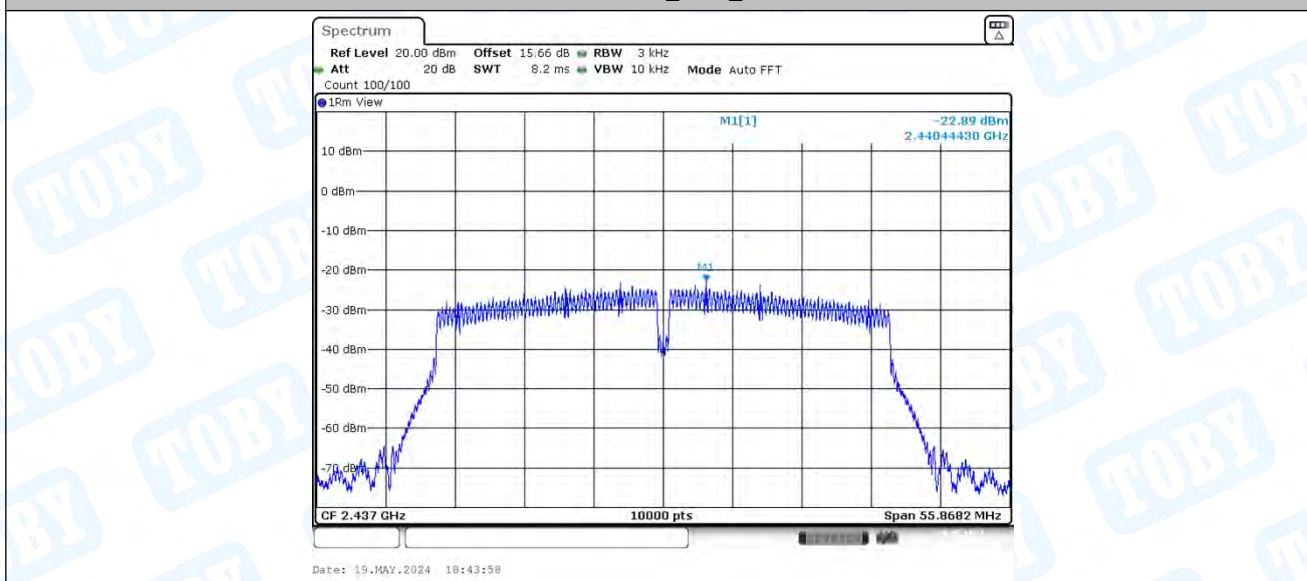
11N40MIMO_Ant1_2422



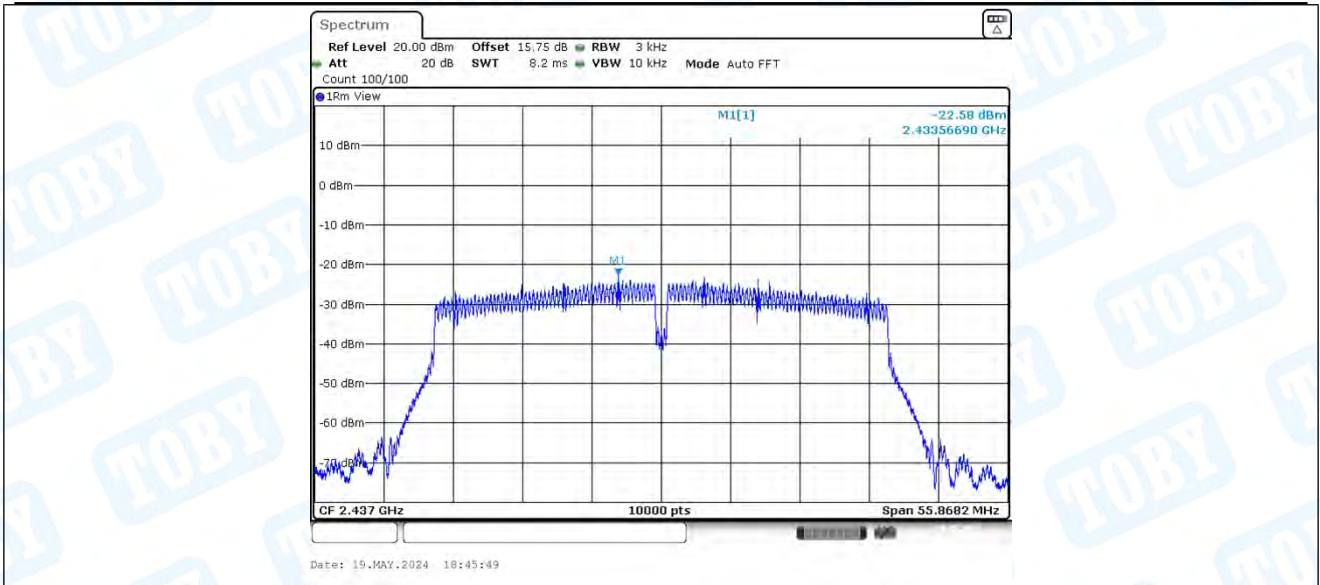
11N40MIMO_Ant2_2422



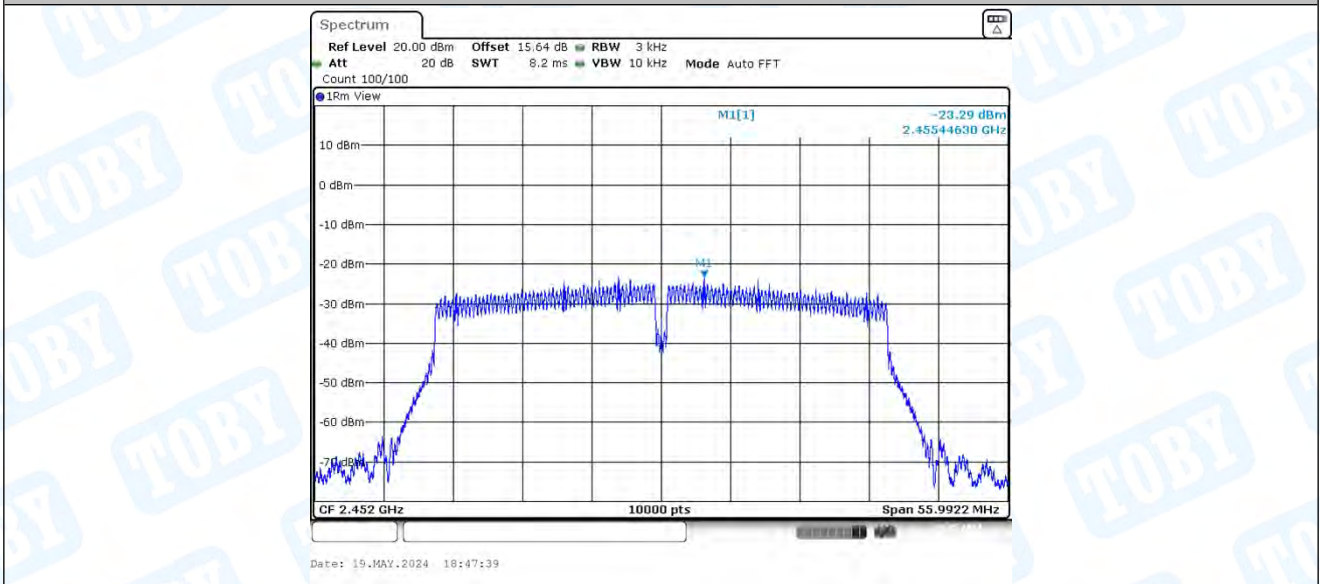
11N40MIMO_Ant1_2437



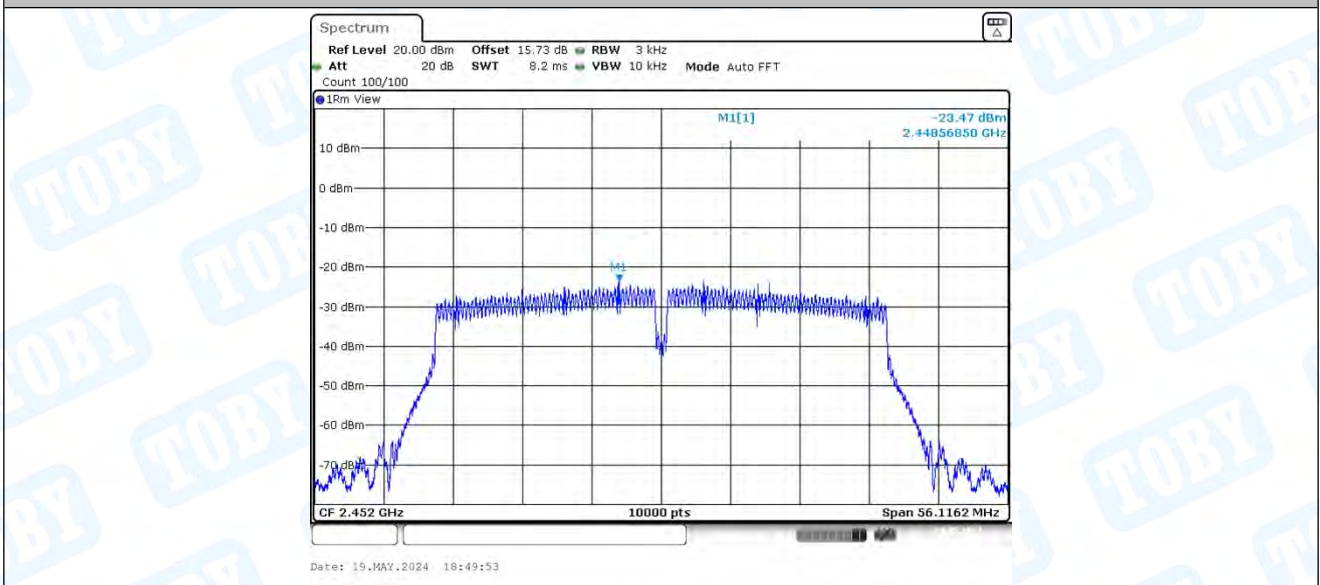
11N40MIMO_Ant2_2437



11N40MIMO_Ant1_2452



11N40MIMO_Ant2_2452

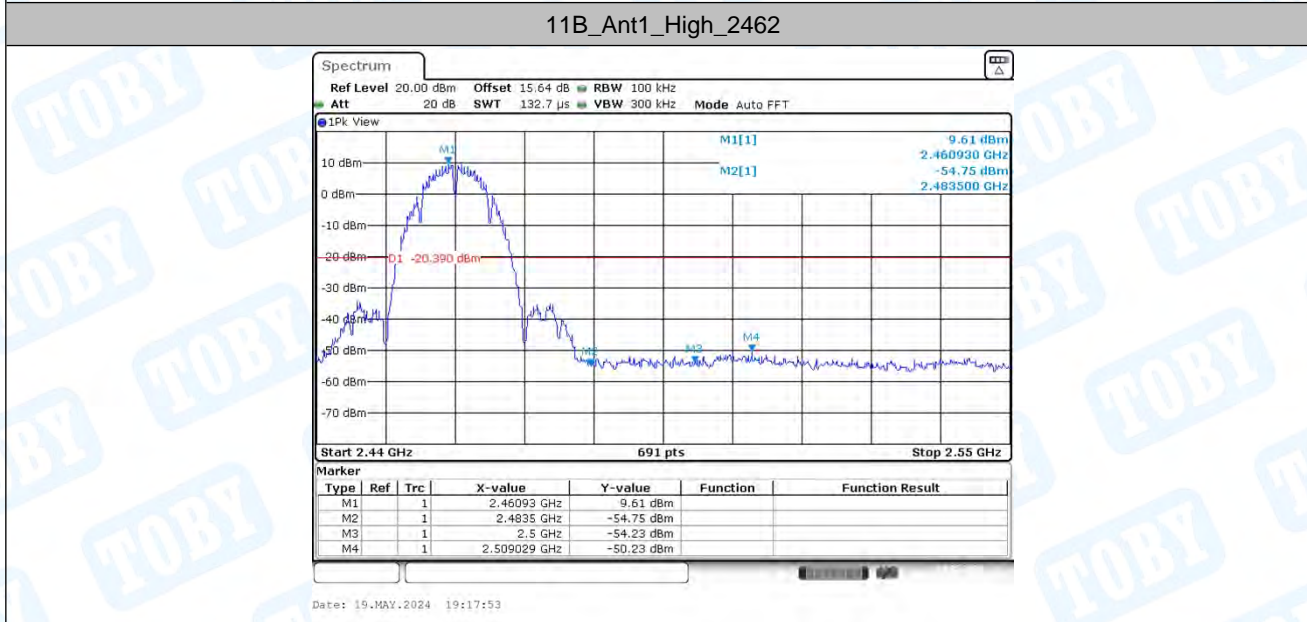
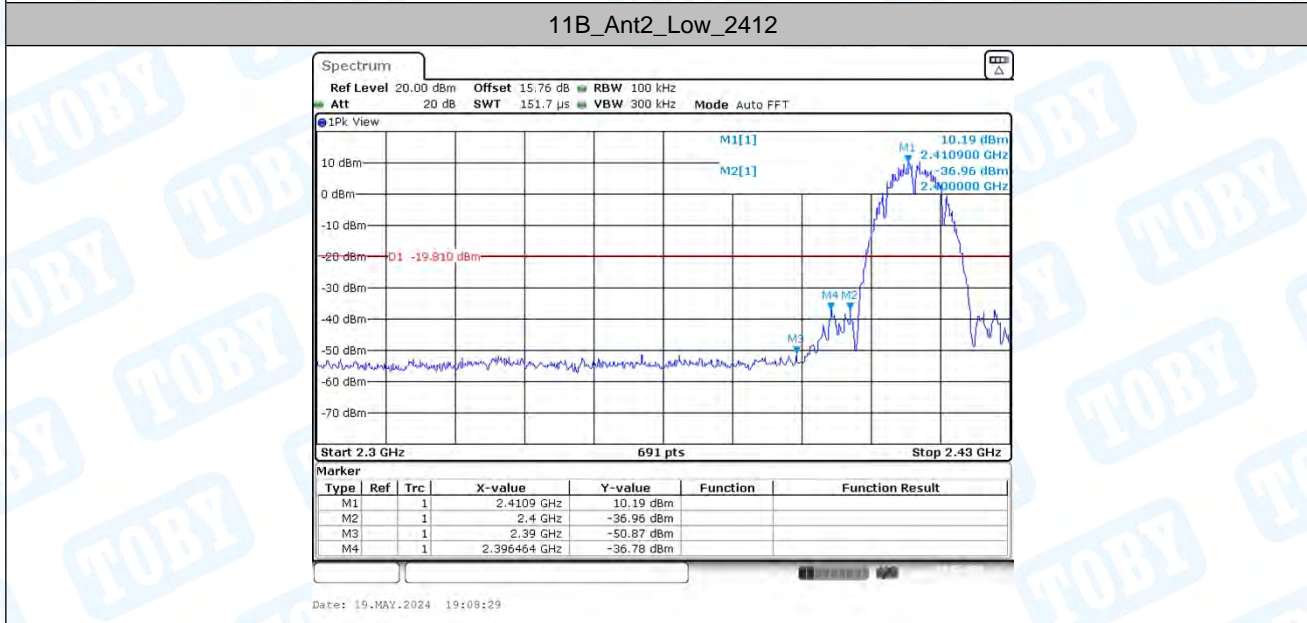
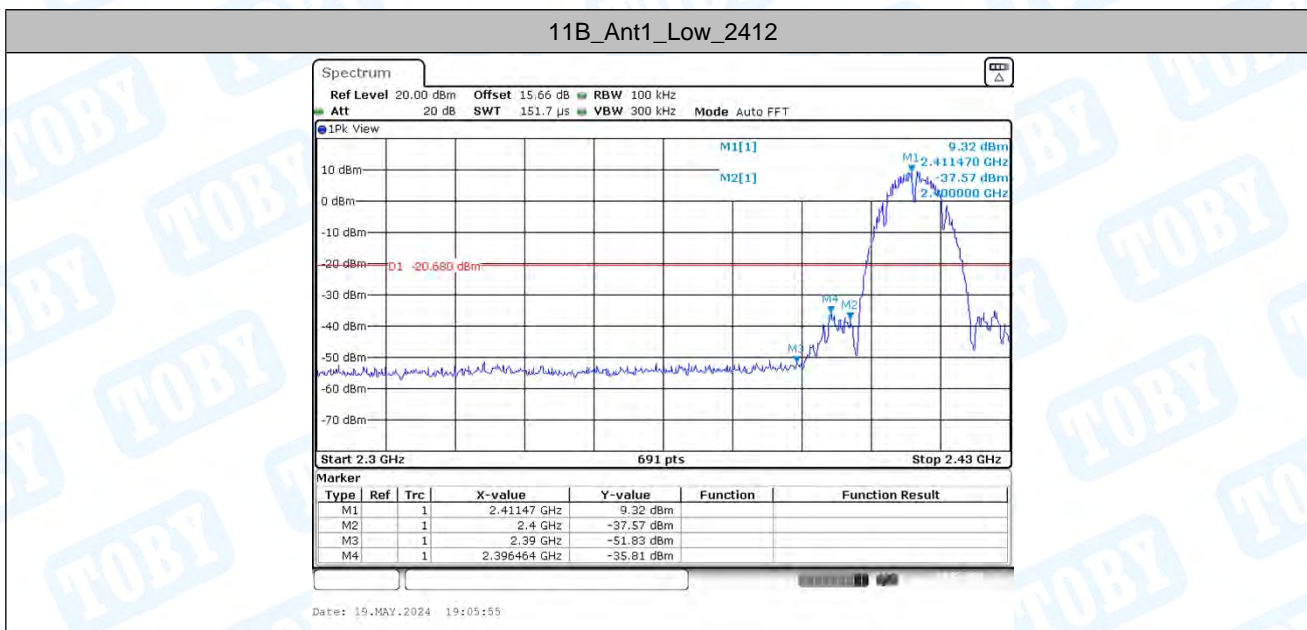


5. Band edge measurements

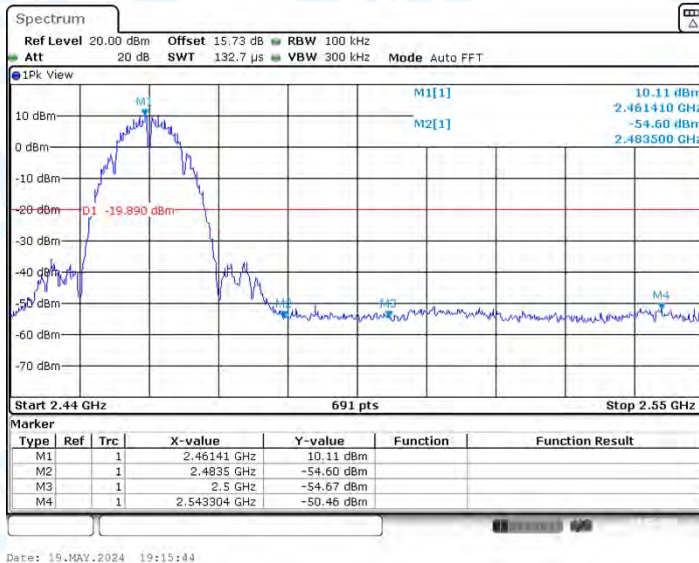
5.1. Test Result

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	9.32	-35.81	≤-20.68	PASS
	Ant2	Low	2412	10.19	-36.78	≤-19.81	PASS
	Ant1	High	2462	9.61	-50.23	≤-20.39	PASS
	Ant2	High	2462	10.11	-50.46	≤-19.89	PASS
11G	Ant1	Low	2412	1.48	-40.12	≤-28.52	PASS
	Ant2	Low	2412	3.96	-41.18	≤-26.04	PASS
	Ant1	High	2462	2.97	-50.44	≤-27.03	PASS
	Ant2	High	2462	2.66	-49.38	≤-27.34	PASS
11N20MIMO	Ant1	Low	2412	3.73	-39.43	≤-26.27	PASS
	Ant2	Low	2412	2.92	-39.5	≤-27.08	PASS
	Ant1	High	2462	1.27	-50.24	≤-28.73	PASS
	Ant2	High	2462	2.84	-49.2	≤-27.16	PASS
11N40MIMO	Ant1	Low	2422	-2.69	-38.05	≤-32.69	PASS
	Ant2	Low	2422	-0.61	-39.37	≤-30.61	PASS
	Ant1	High	2452	-0.85	-41.87	≤-30.85	PASS
	Ant2	High	2452	-0.68	-40.6	≤-30.68	PASS

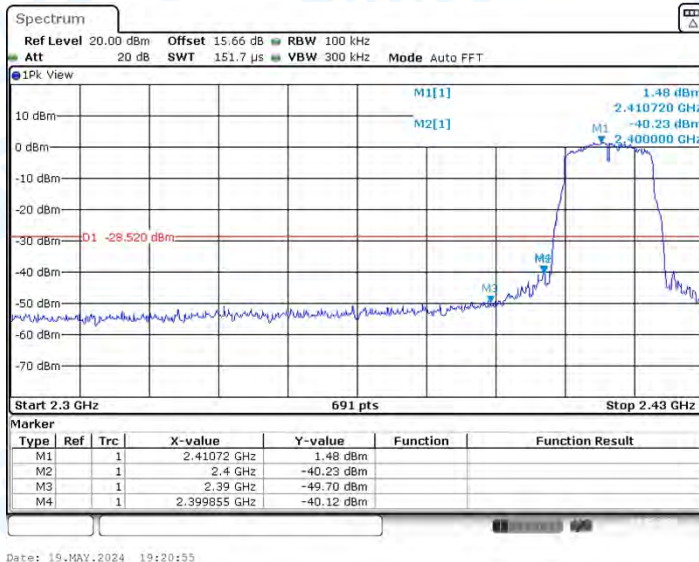
5.2. Test Graphs



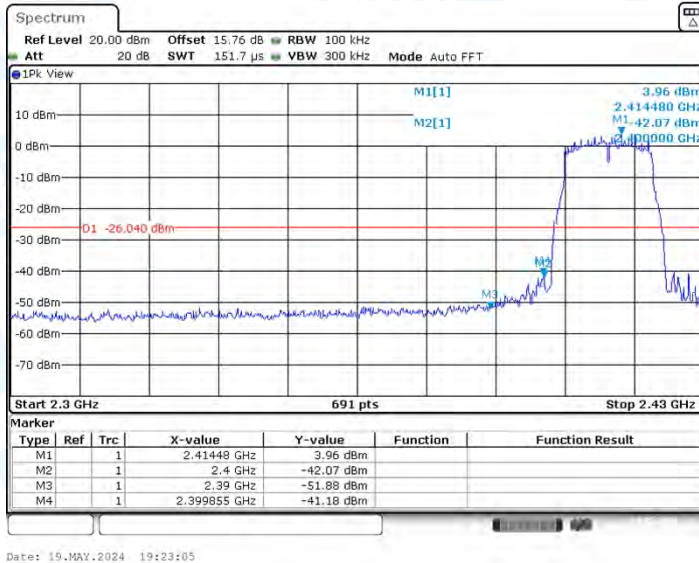
11B_Ant2_High_2462



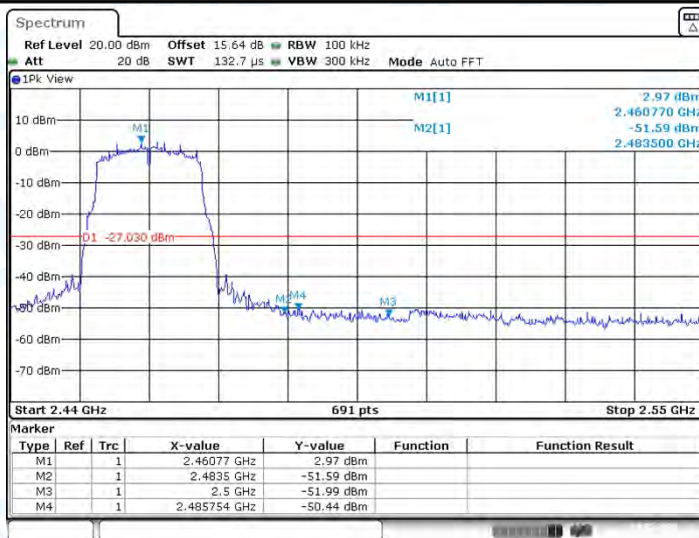
11G_Ant1_Low_2412



11G_Ant2_Low_2412

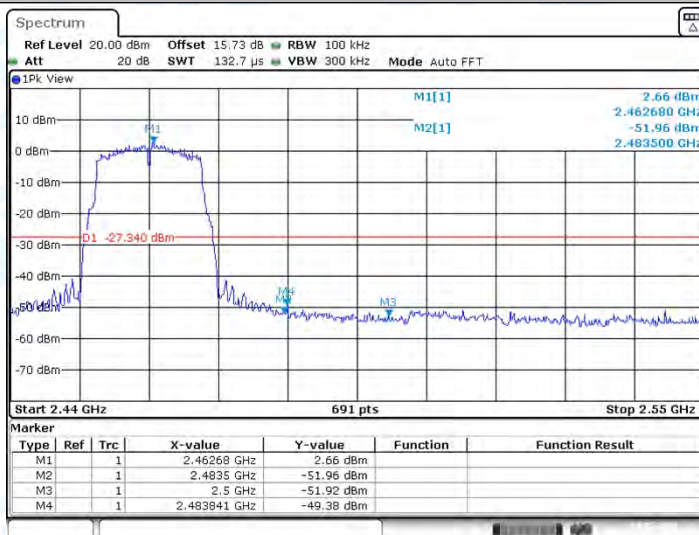


11G_Ant1_High_2462



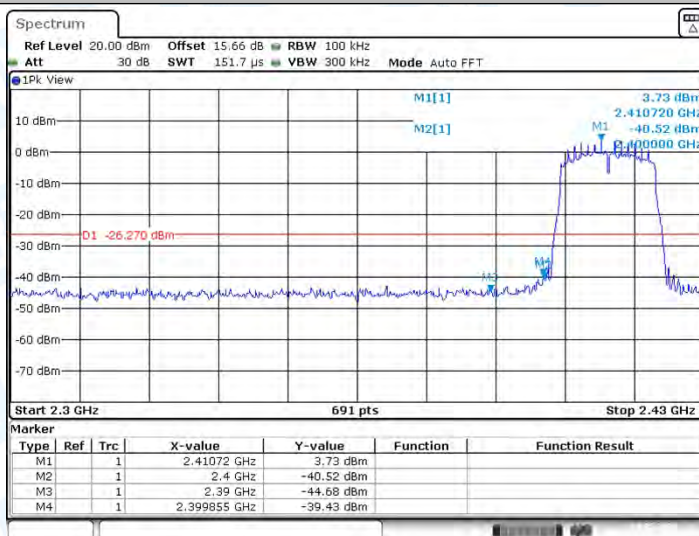
Date: 19.MAY.2024 19:29:57

11G_Ant2_High_2462



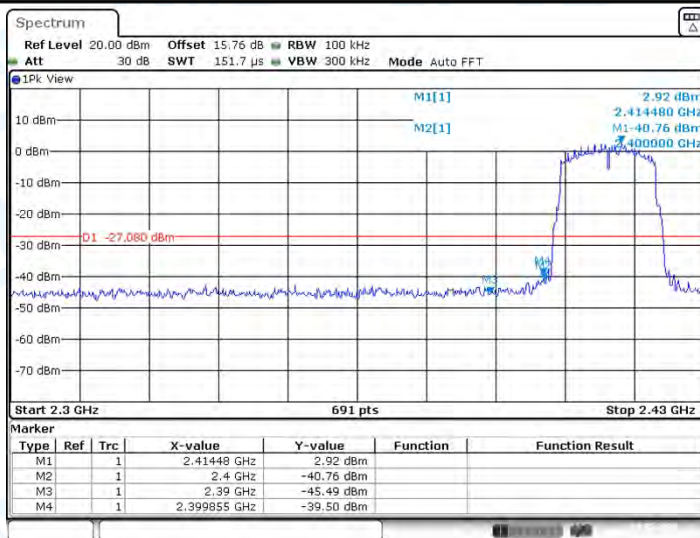
Date: 19.MAY.2024 19:31:57

11N20MIMO_Ant1_Low_2412



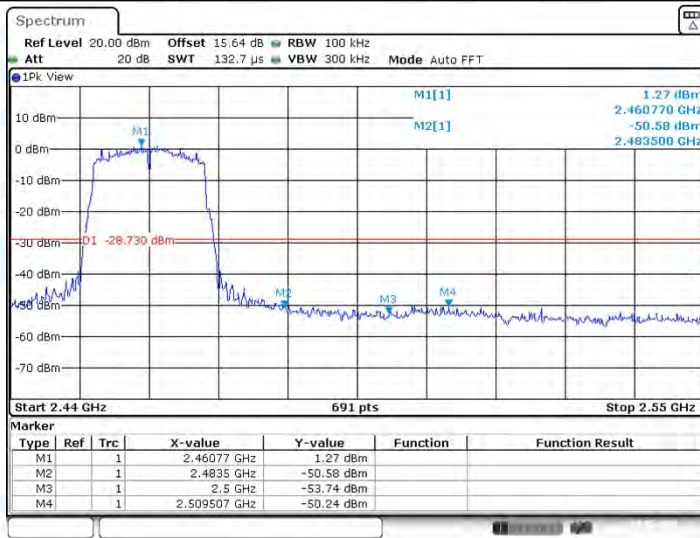
Date: 19.MAY.2024 18:52:40

11N20MIMO_Ant2_Low_2412



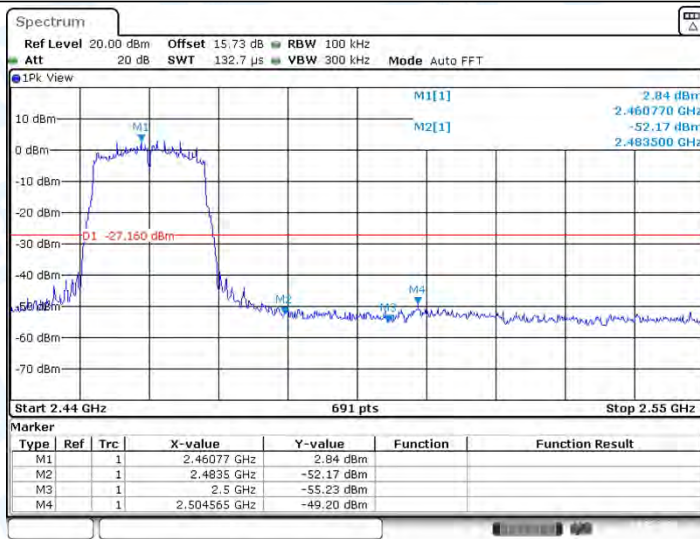
Date: 19.MAY.2024 18:54:44

11N20MIMO_Ant1_High_2462



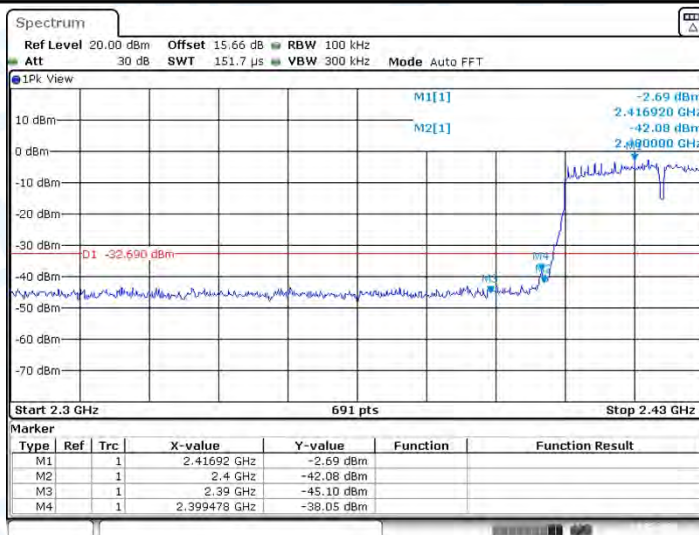
Date: 19.MAY.2024 19:00:44

11N20MIMO_Ant2_High_2462



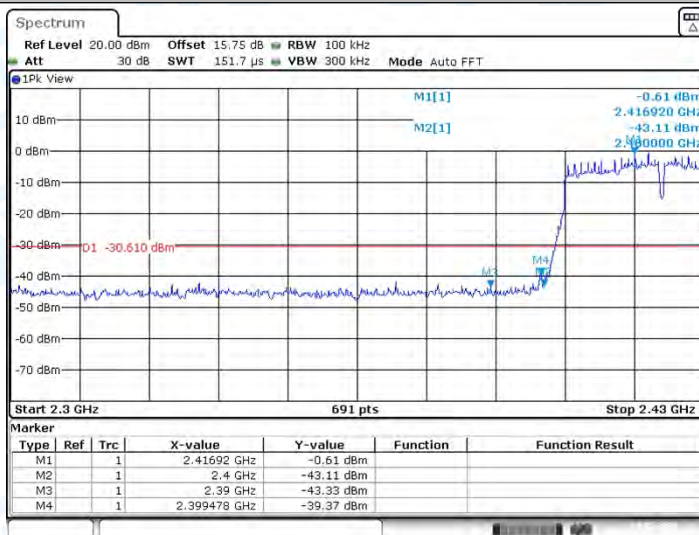
Date: 19.MAY.2024 19:02:44

11N40MIMO_Ant1_Low_2422



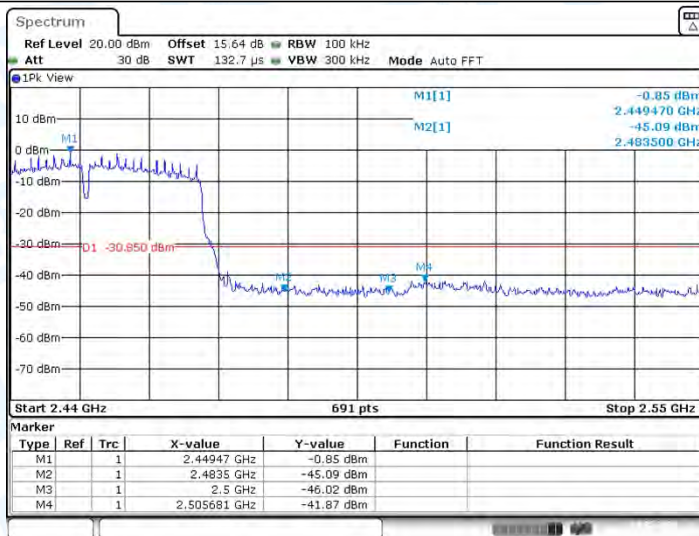
Date: 19.MAY.2024 18:39:50

11N40MIMO_Ant2_Low_2422



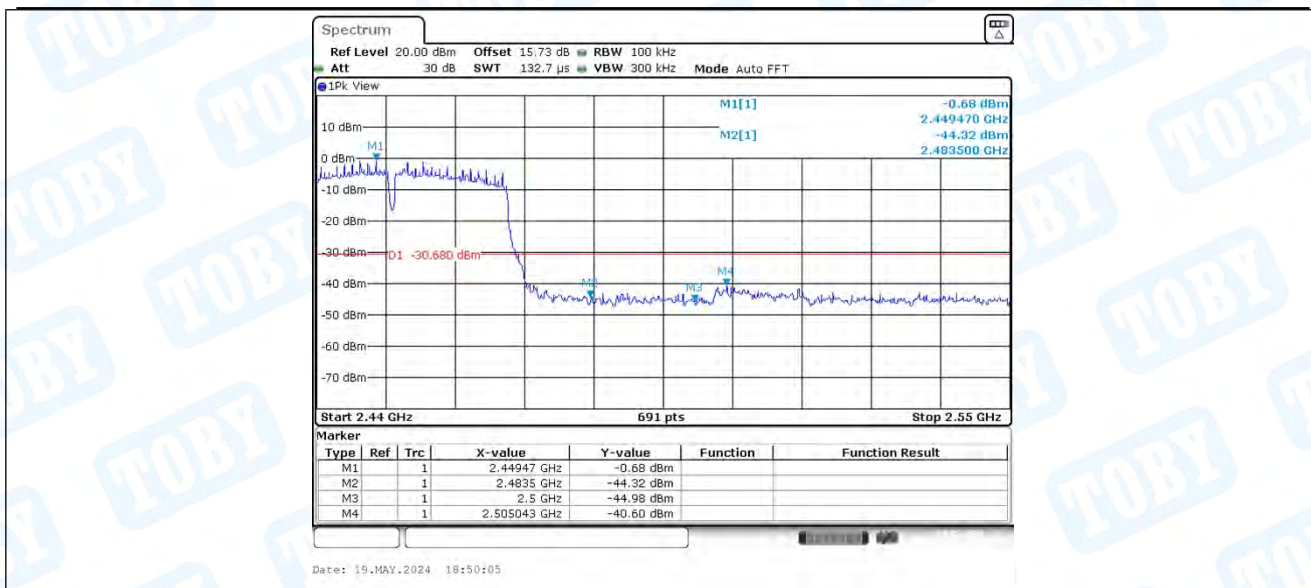
Date: 19.MAY.2024 18:41:53

11N40MIMO_Ant1_High_2452



Date: 19.MAY.2024 18:47:50

11N40MIMO_Ant2_High_2452



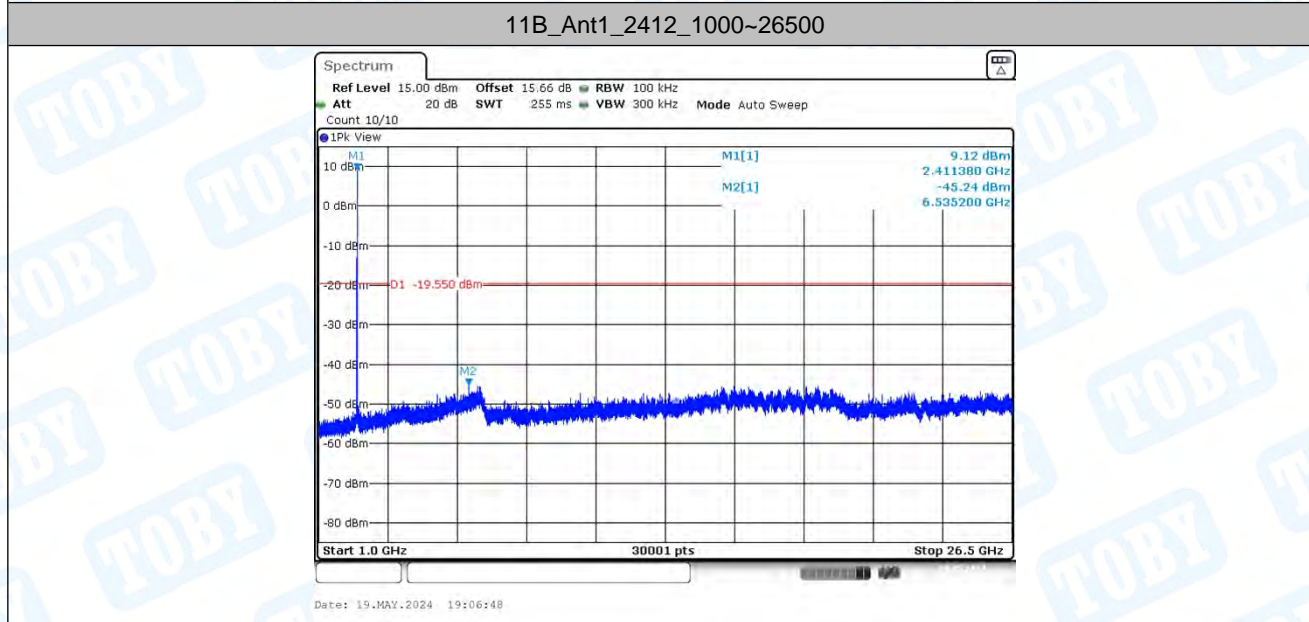
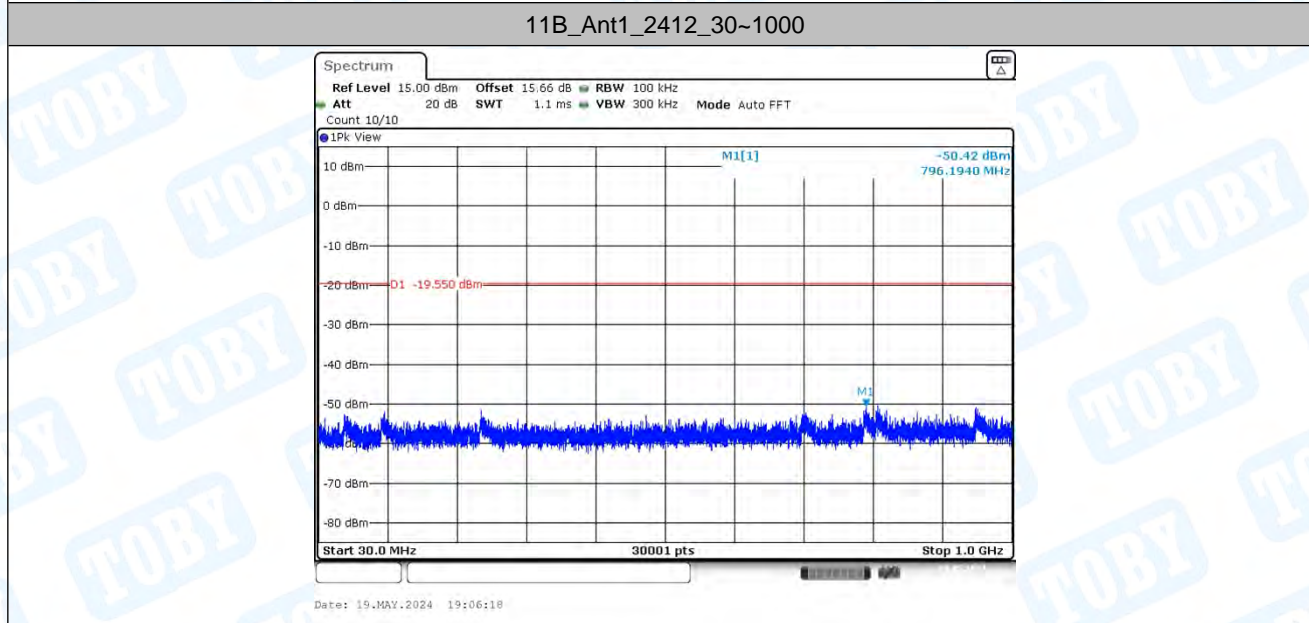
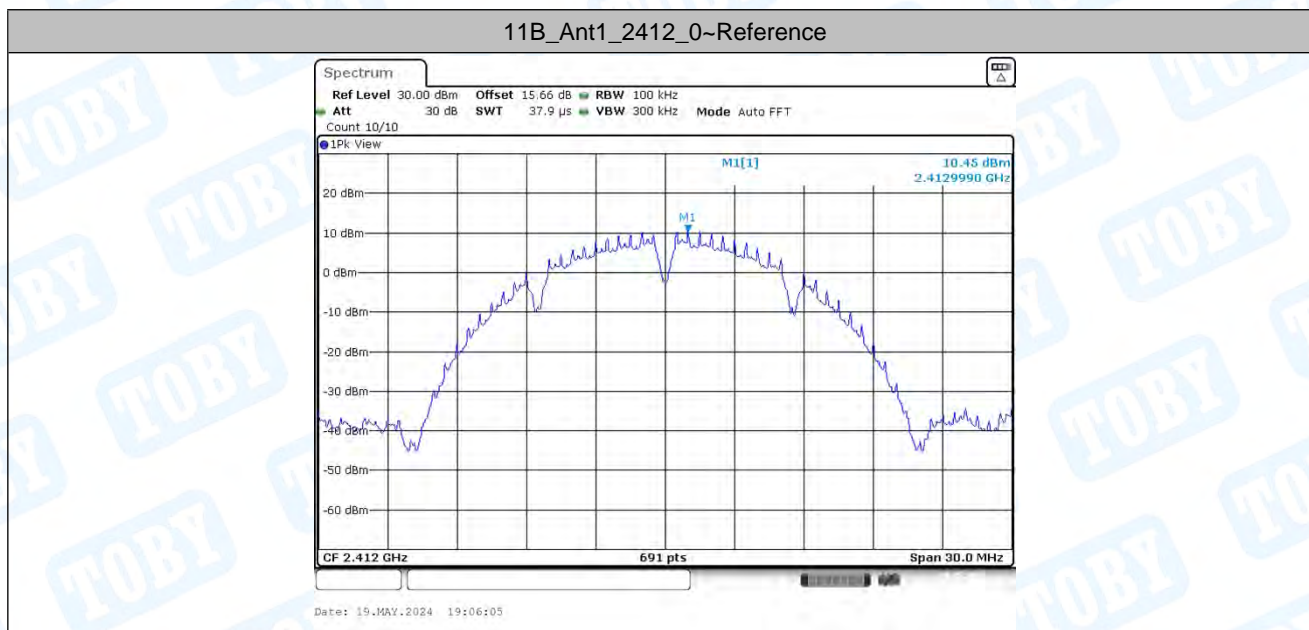
6. Conducted Spurious Emission

6.1. Test Result

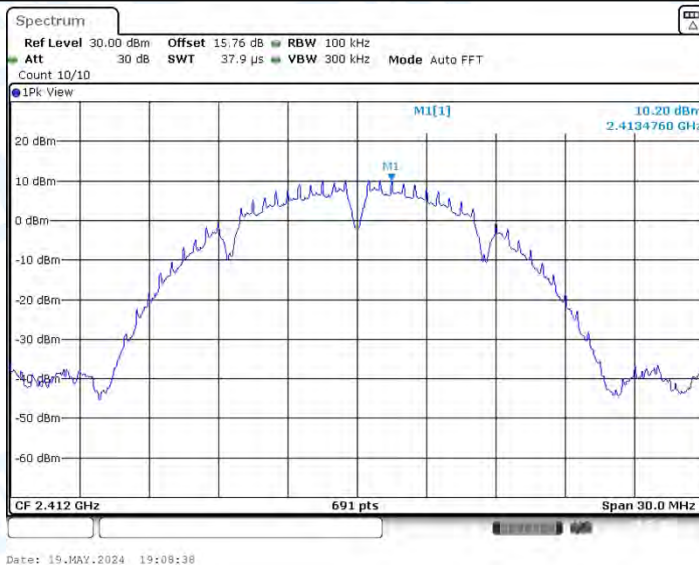
TestMode	Antenna	Channel	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict	
11B	Ant1	2412	Reference	10.45	10.45	---	PASS	
			30~1000	10.45	-50.42	≤-19.55	PASS	
			1000~26500	10.45	-45.24	≤-19.55	PASS	
	Ant2	2412	Reference	10.20	10.20	---	PASS	
			30~1000	10.20	-50.72	≤-19.8	PASS	
			1000~26500	10.20	-43.95	≤-19.8	PASS	
	Ant1	2437	Reference	10.69	10.69	---	PASS	
			30~1000	10.69	-49.63	≤-19.31	PASS	
			1000~26500	10.69	-45.25	≤-19.31	PASS	
	Ant2	2437	Reference	10.68	10.68	---	PASS	
			30~1000	10.68	-49.91	≤-19.32	PASS	
			1000~26500	10.68	-44.89	≤-19.32	PASS	
	Ant1	2462	Reference	10.37	10.37	---	PASS	
			30~1000	10.37	-50.79	≤-19.63	PASS	
			1000~26500	10.37	-45.57	≤-19.63	PASS	
	Ant2	2462	Reference	10.37	10.37	---	PASS	
			30~1000	10.37	-49.95	≤-19.63	PASS	
			1000~26500	10.37	-45.25	≤-19.63	PASS	
	11G	Ant1	2412	Reference	4.87	4.87	---	PASS
				30~1000	4.87	-50.27	≤-25.13	PASS
				1000~26500	4.87	-45.56	≤-25.13	PASS
		Ant2	2412	Reference	4.72	4.72	---	PASS
				30~1000	4.72	-50.11	≤-25.28	PASS
				1000~26500	4.72	-44.61	≤-25.28	PASS
Ant1		2437	Reference	3.40	3.40	---	PASS	
			30~1000	3.40	-49.77	≤-26.6	PASS	
			1000~26500	3.40	-44.46	≤-26.6	PASS	
Ant2		2437	Reference	4.49	4.49	---	PASS	
			30~1000	4.49	-49.3	≤-25.51	PASS	
			1000~26500	4.49	-45.15	≤-25.51	PASS	
Ant1		2462	Reference	4.63	4.63	---	PASS	
			30~1000	4.63	-49.23	≤-25.37	PASS	
			1000~26500	4.63	-45.03	≤-25.37	PASS	
Ant2		2462	Reference	4.72	4.72	---	PASS	
			30~1000	4.72	-50.21	≤-25.28	PASS	
			1000~26500	4.72	-45.1	≤-25.28	PASS	
11N20MIMO		Ant1	2412	Reference	3.86	3.86	---	PASS
				30~1000	3.86	-50.28	≤-26.14	PASS
				1000~26500	3.86	-45.07	≤-26.14	PASS
		Ant2	2412	Reference	3.32	3.32	---	PASS

			30~1000	3.32	-49.07	≤-26.68	PASS
			1000~26500	3.32	-44.6	≤-26.68	PASS
			Reference	4.04	4.04	---	PASS
	Ant1	2437	30~1000	4.04	-50.36	≤-25.96	PASS
			1000~26500	4.04	-44.79	≤-25.96	PASS
			Reference	3.55	3.55	---	PASS
	Ant2	2437	30~1000	3.55	-49.8	≤-26.45	PASS
			1000~26500	3.55	-44.87	≤-26.45	PASS
			Reference	3.98	3.98	---	PASS
	Ant1	2462	30~1000	3.98	-48.66	≤-26.02	PASS
			1000~26500	3.98	-45.16	≤-26.02	PASS
			Reference	3.78	3.78	---	PASS
	Ant2	2462	30~1000	3.78	-50.09	≤-26.22	PASS
			1000~26500	3.78	-44.48	≤-26.22	PASS
			Reference	-0.76	-0.76	---	PASS
11N40MIMO	Ant1	2422	30~1000	-0.76	-50.03	≤-30.76	PASS
			1000~26500	-0.76	-44.47	≤-30.76	PASS
			Reference	-0.52	-0.52	---	PASS
	Ant2	2422	30~1000	-0.52	-50.47	≤-30.52	PASS
			1000~26500	-0.52	-44.86	≤-30.52	PASS
			Reference	-0.49	-0.49	---	PASS
	Ant1	2437	30~1000	-0.49	-50.08	≤-30.49	PASS
			1000~26500	-0.49	-45.58	≤-30.49	PASS
			Reference	-0.34	-0.34	---	PASS
	Ant2	2437	30~1000	-0.34	-50.62	≤-30.34	PASS
			1000~26500	-0.34	-45.19	≤-30.34	PASS
			Reference	-0.91	-0.91	---	PASS
	Ant1	2452	30~1000	-0.91	-50.31	≤-30.91	PASS
			1000~26500	-0.91	-45.07	≤-30.91	PASS
			Reference	-0.66	-0.66	---	PASS
Ant2	2452	30~1000	-0.66	-48.78	≤-30.66	PASS	
		1000~26500	-0.66	-45.02	≤-30.66	PASS	
		Reference					

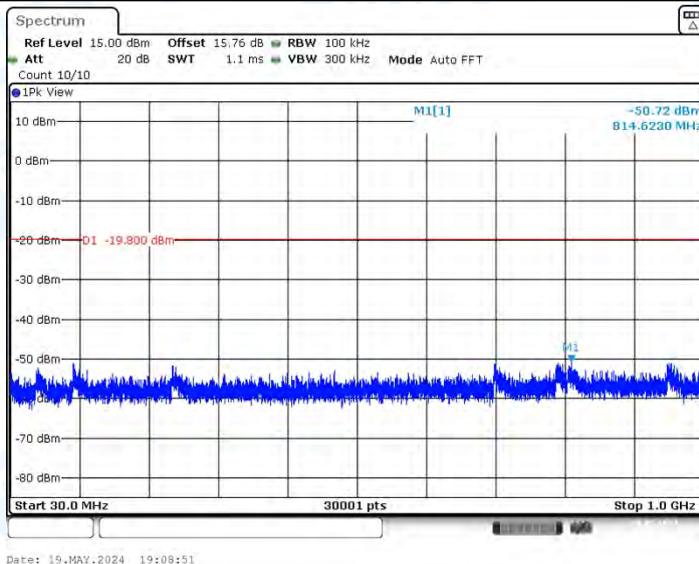
6.2. Test Graphs



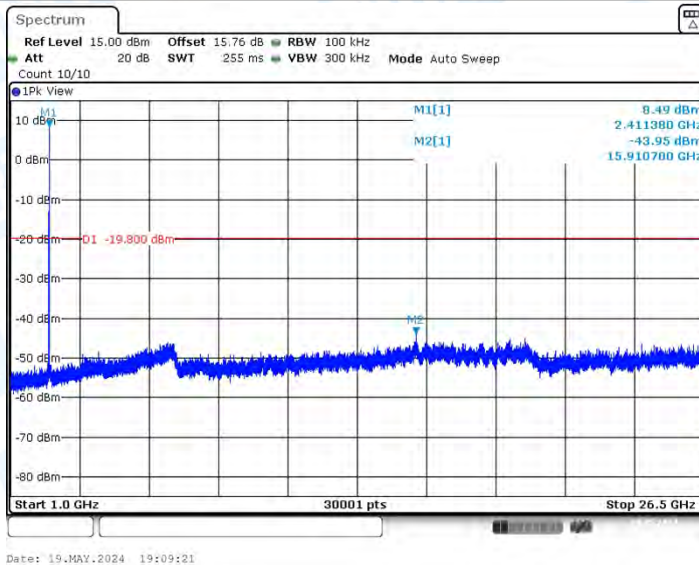
11B_Ant2_2412_0~Reference



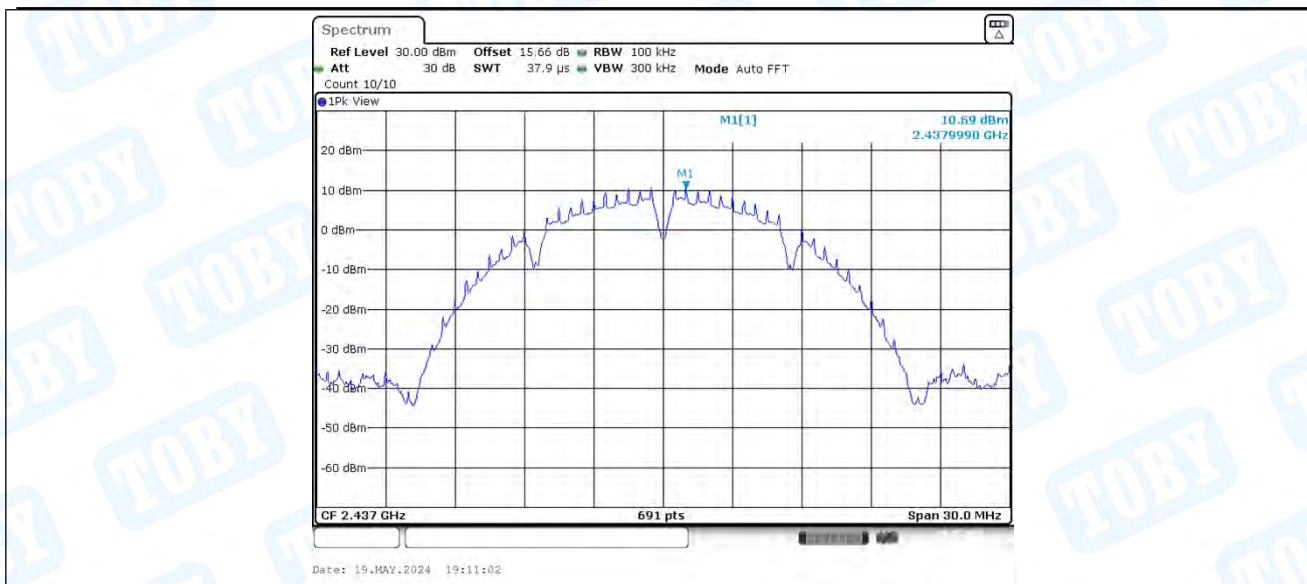
11B_Ant2_2412_30~1000



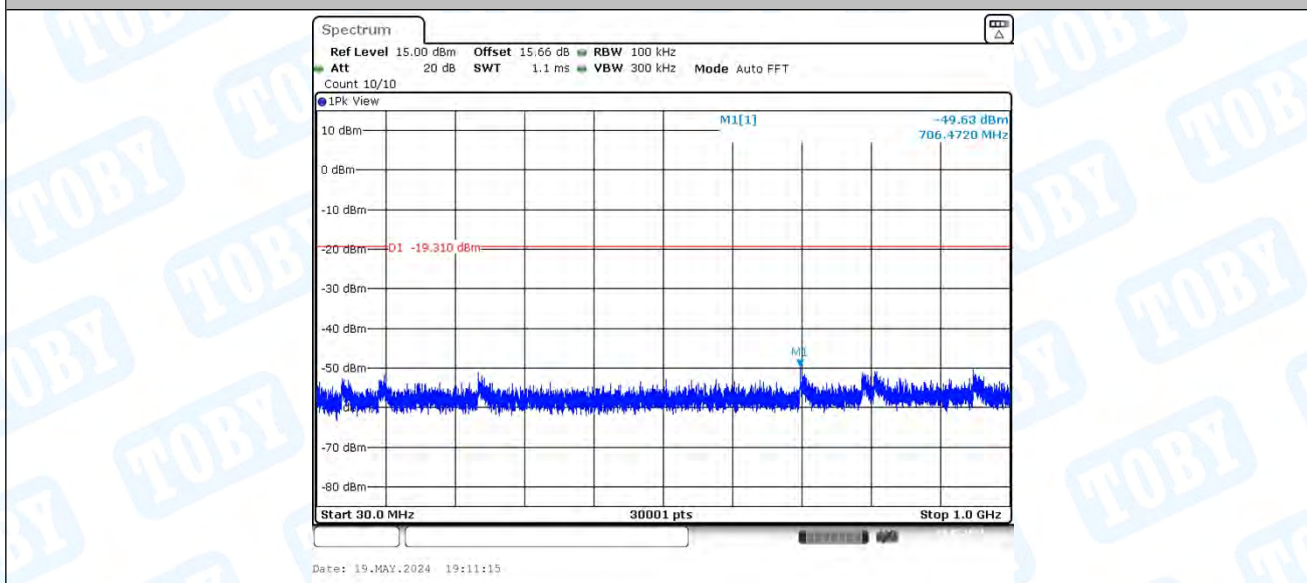
11B_Ant2_2412_1000~26500



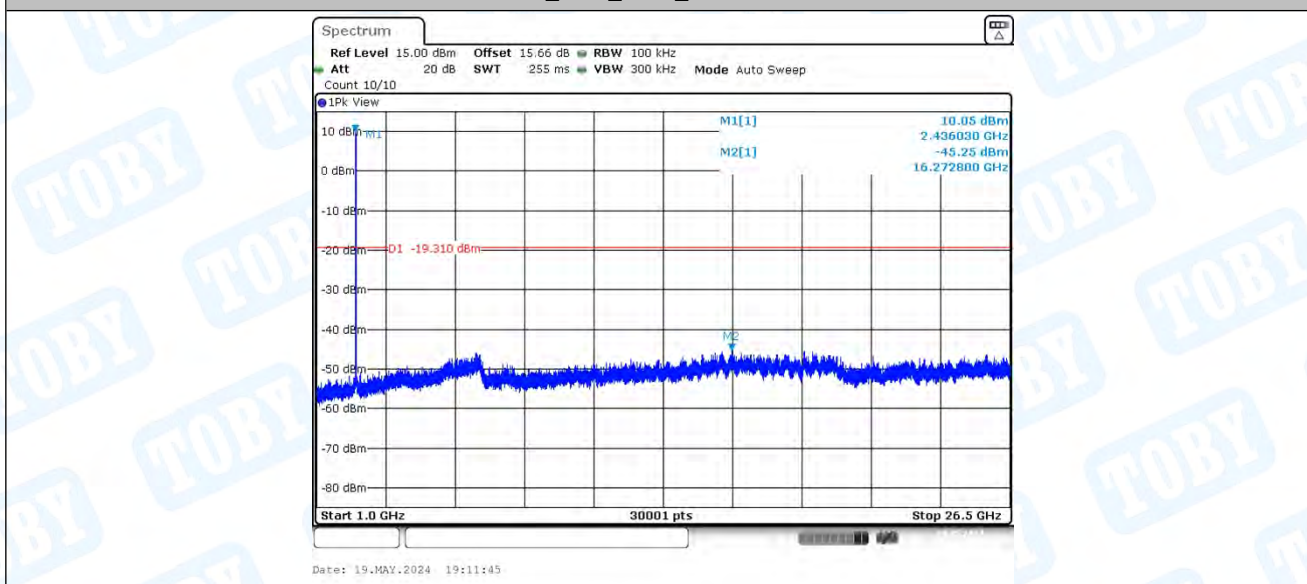
11B_Ant1_2437_0~Reference



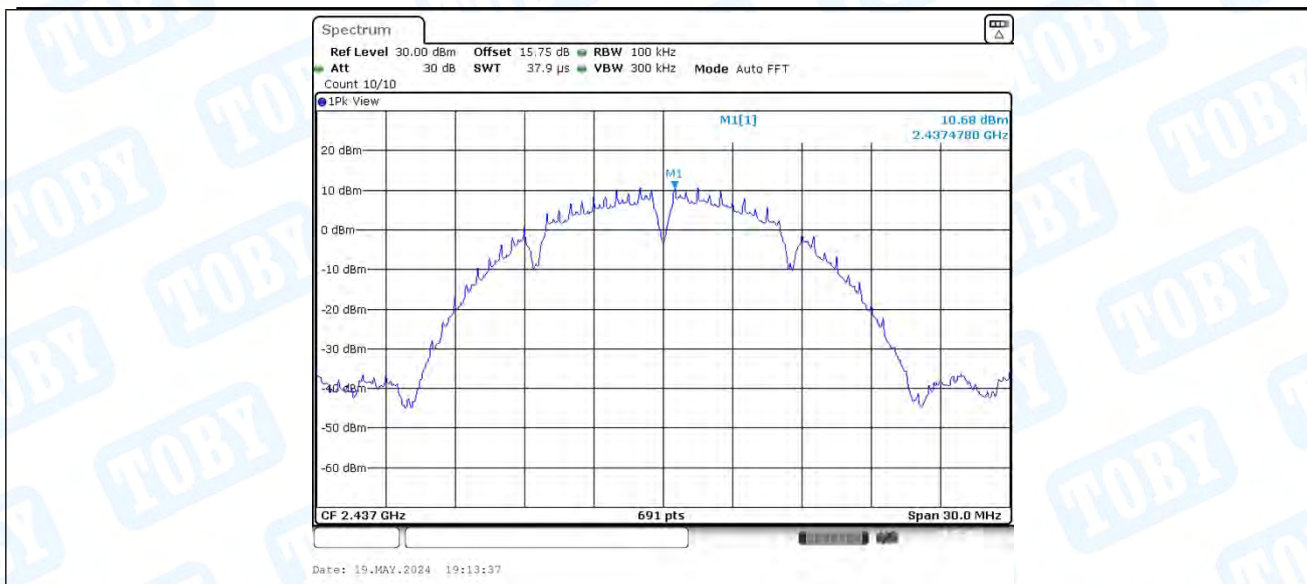
11B_Ant1_2437_30~1000



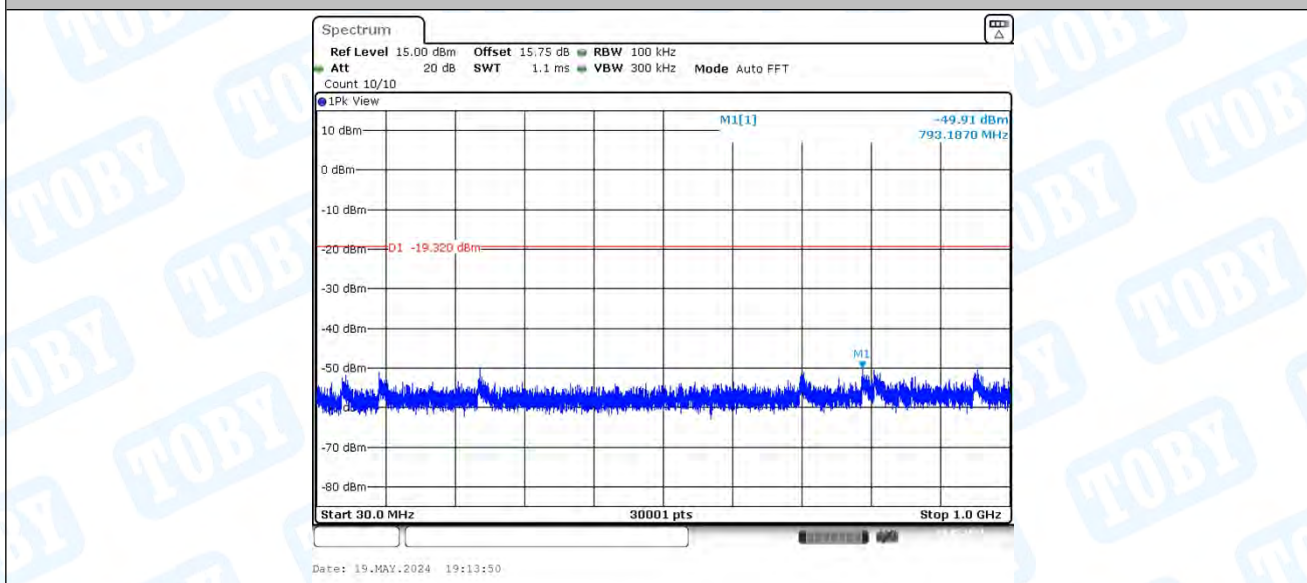
11B_Ant1_2437_1000~26500



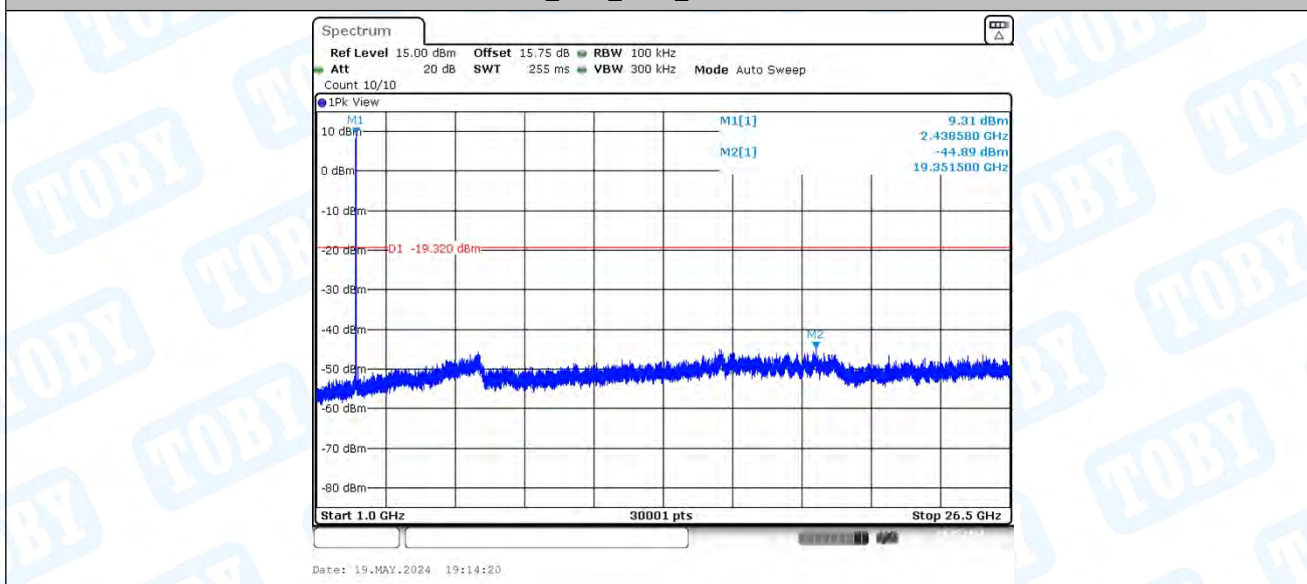
11B_Ant2_2437_0~Reference



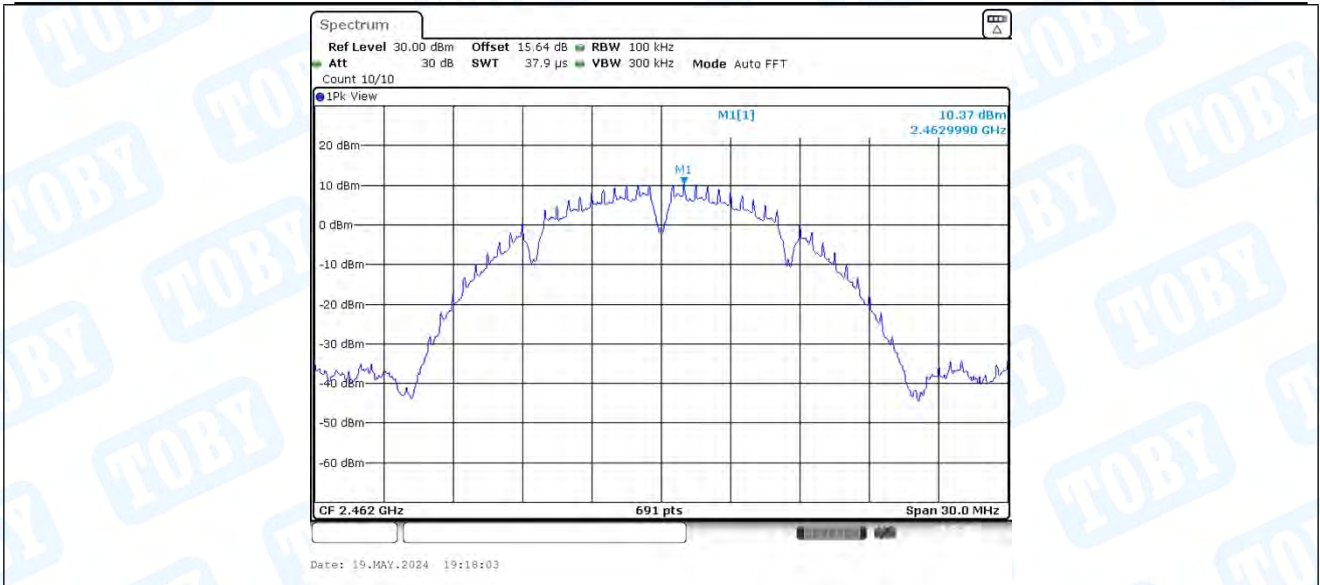
11B_Ant2_2437_30~1000



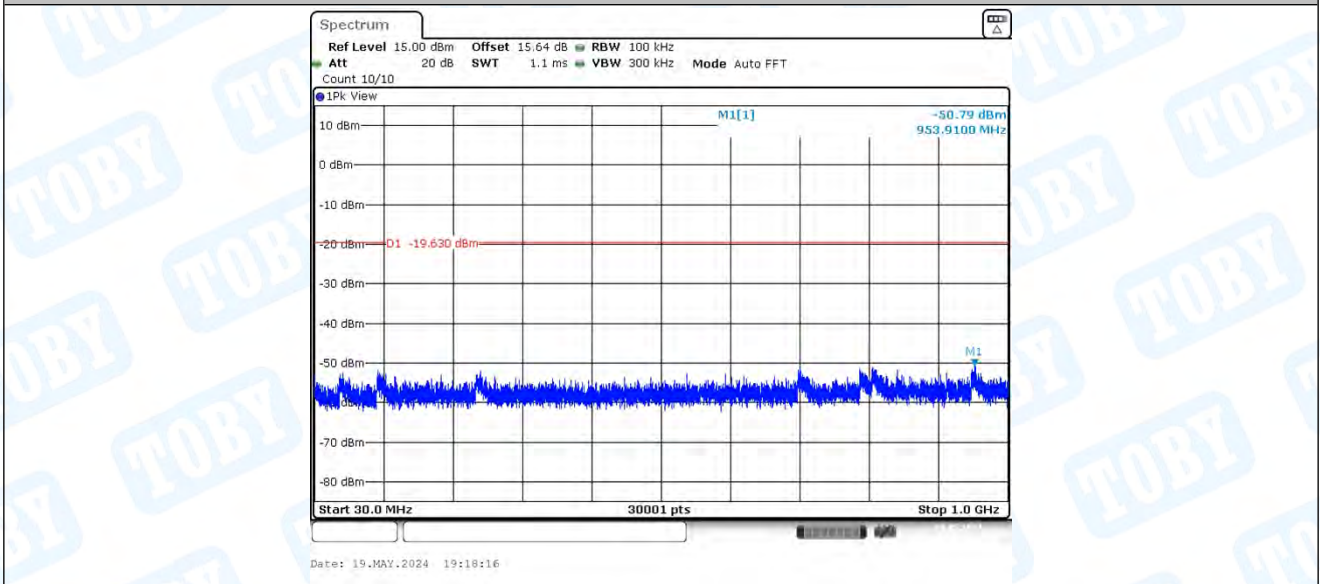
11B_Ant2_2437_1000~26500



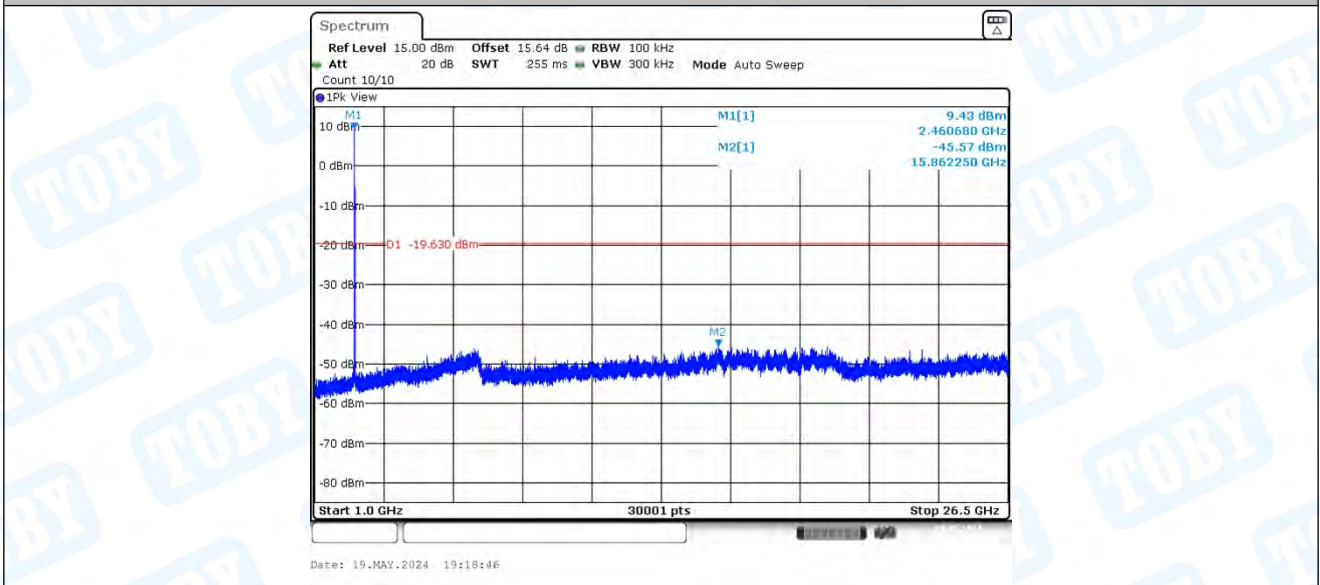
11B_Ant1_2462_0~Reference



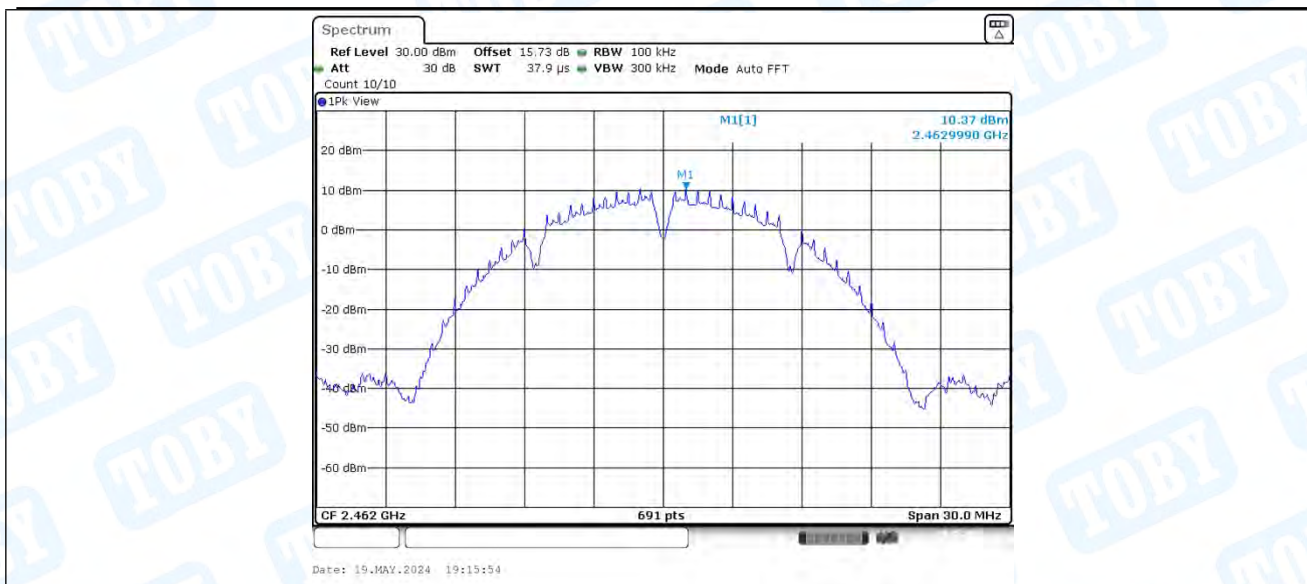
11B_Ant1_2462_30~1000



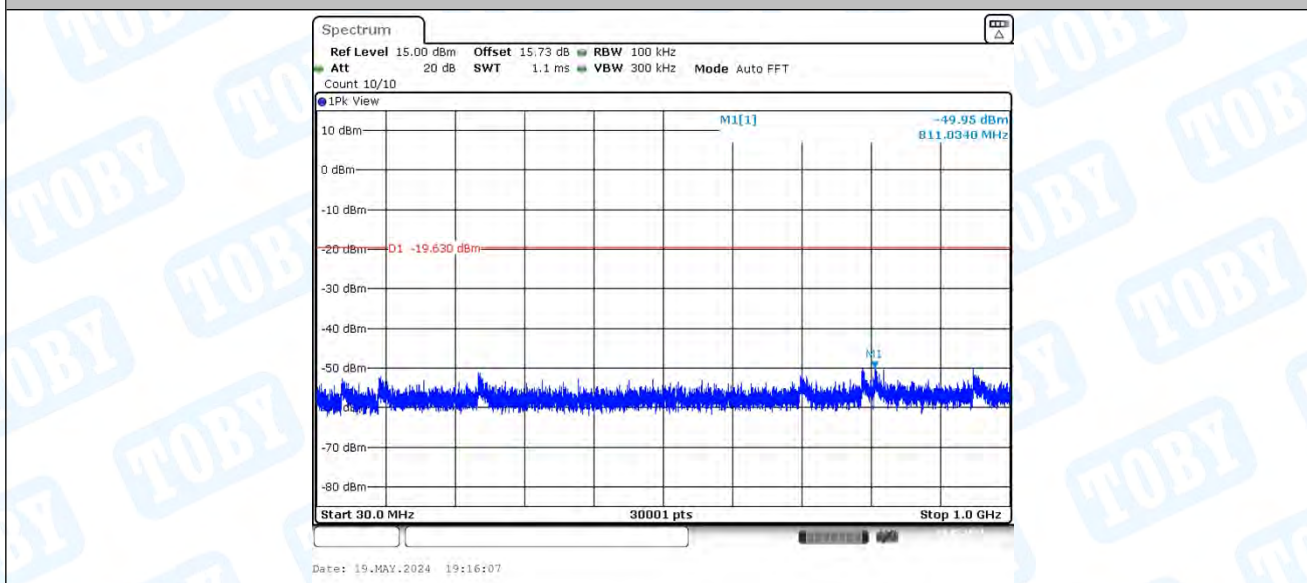
11B_Ant1_2462_1000~26500



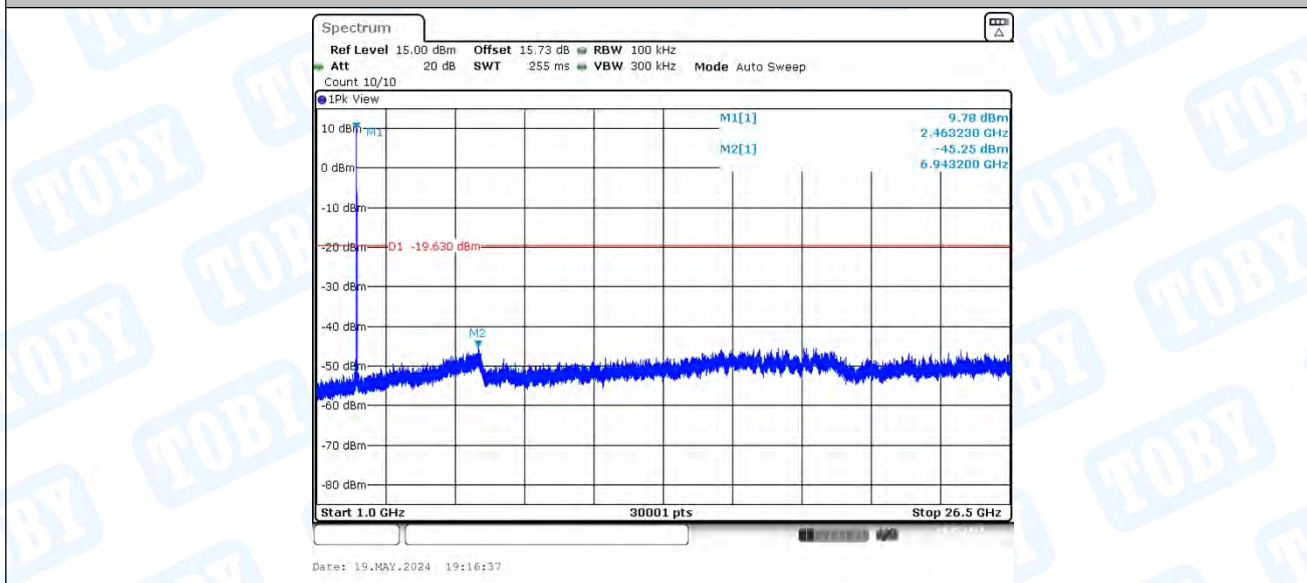
11B_Ant2_2462_0~Reference



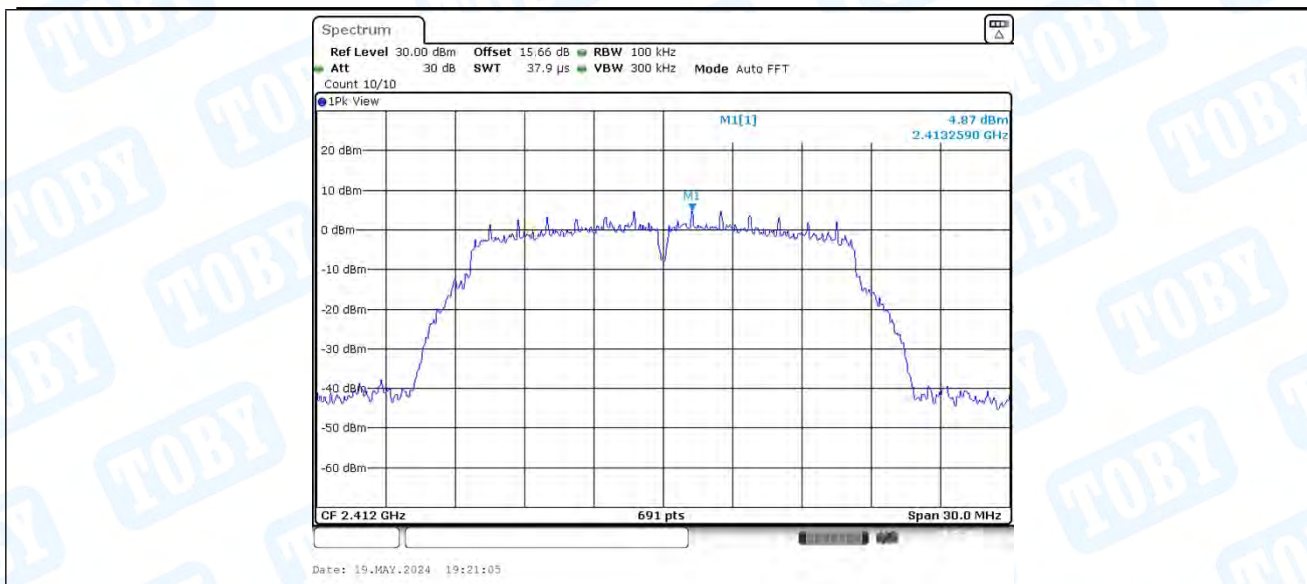
11B_Ant2_2462_30~1000



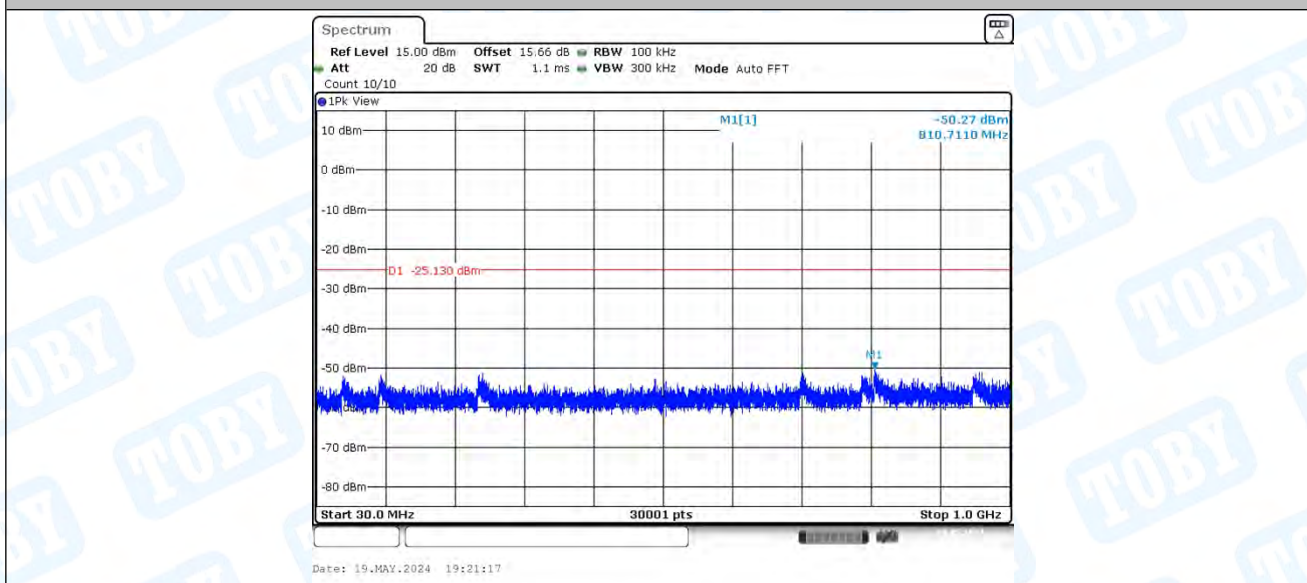
11B_Ant2_2462_1000~26500



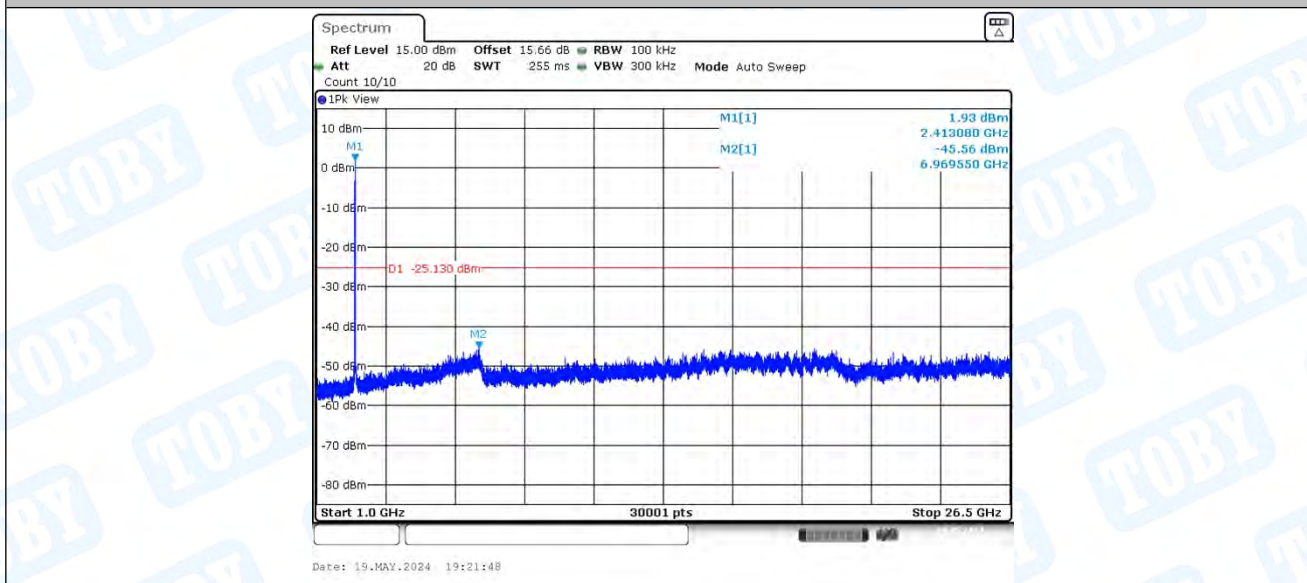
11G_Ant1_2412_0~Reference



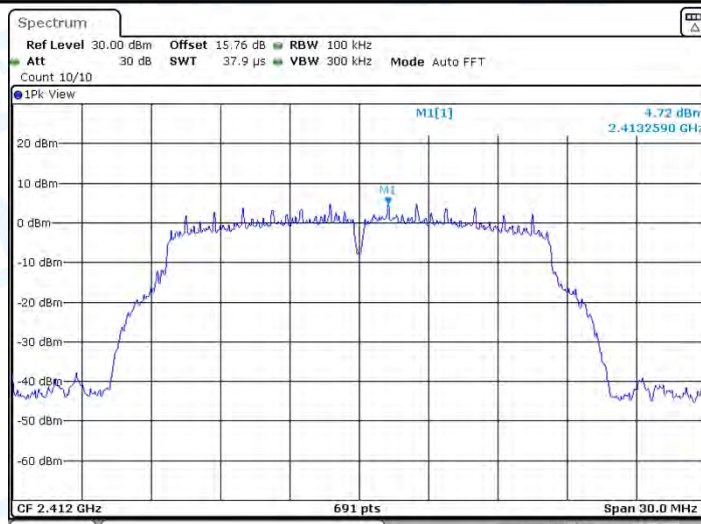
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11G_Ant1_2412_1000~26500

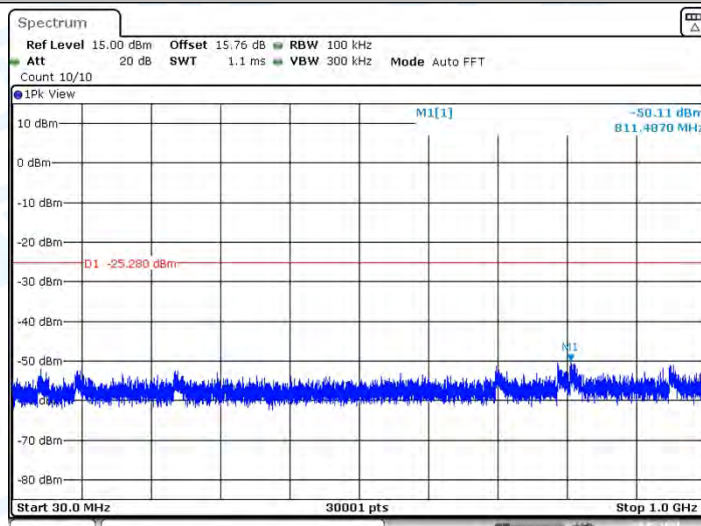


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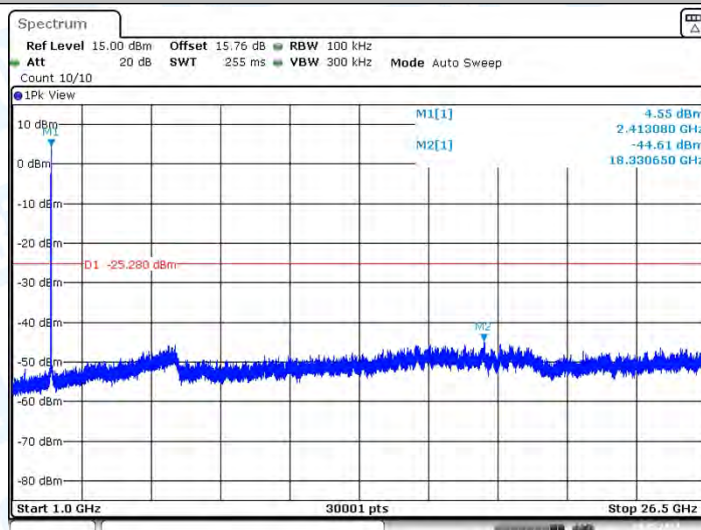
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11G_Ant2_2412_30~1000



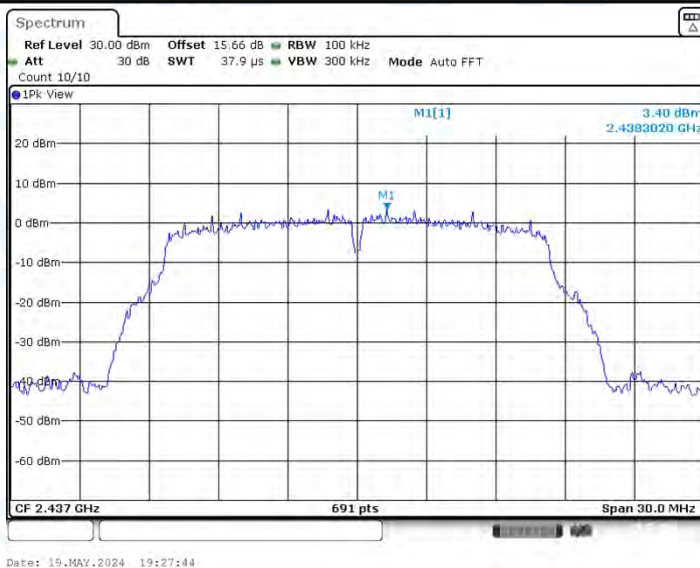
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11G_Ant2_2412_1000~26500

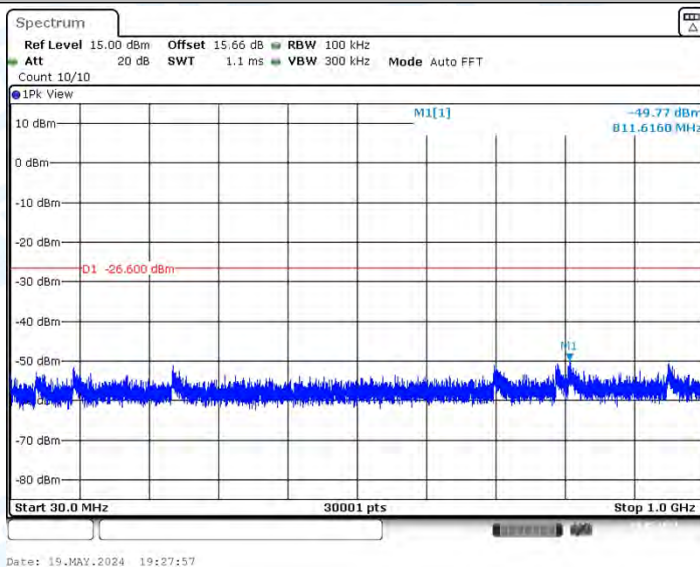


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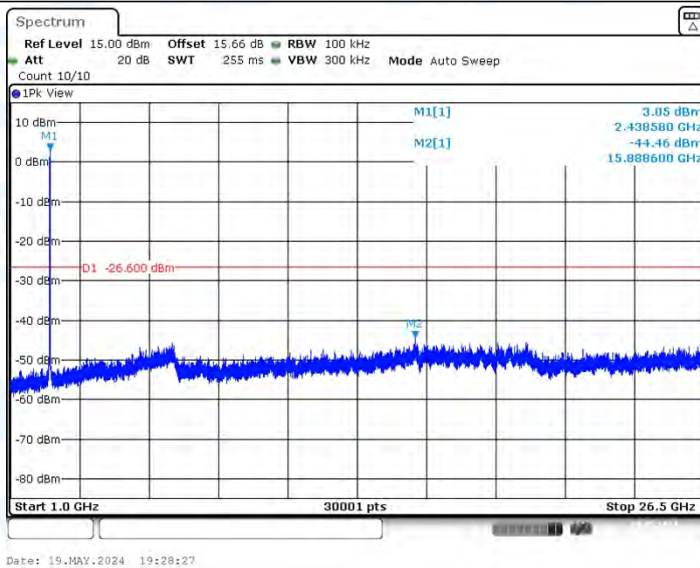
11G_Ant1_2437_0~Reference



11G_Ant1_2437_30~1000



11G_Ant1_2437_1000~26500



11G_Ant2_2437_0~Reference