

SDM**802.11n HT20 Mode:**

Channel No.	Frequency (MHz)	Measured Channel Power (dBm)			Peak / AVG	Limit	Result
		antenna 1	antenna 2	total			
1	2412	18.53	18.66	21.60	AVG	30.00dBm	Pass
6	2437	18.73	18.62	21.68			Pass
11	2462	18.63	18.33	21.49			Pass

802.11n HT40 Mode:

Channel No.	Frequency (MHz)	Measured Channel Power (dBm)			Peak / AVG	Limit	Result
		antenna 1	antenna 2	total			
3	2422	17.26	17.29	20.28	AVG	30.00dBm	Pass
6	2437	17.40	17.07	20.25			Pass
9	2452	17.42	17.03	20.24			Pass

VHT20 Mode:

Channel No.	Frequency (MHz)	Measured Channel Power (dBm)			Peak / AVG	Limit	Result
		antenna 1	antenna 2	total			
1	2412	19.05	19.16	22.12	AVG	30.00dBm	Pass
6	2437	19.13	18.96	22.06			Pass
11	2462	18.95	18.74	21.86			Pass

VHT40 Mode:

Channel No.	Frequency (MHz)	Measured Channel Power (dBm)			Peak / AVG	Limit	Result
		antenna 1	antenna 2	total			
3	2422	16.12	16.12	19.13	AVG	30.00dBm	Pass
6	2437	16.27	16.05	19.17			Pass
9	2452	16.38	15.77	19.10			Pass

802.11ax HE20 Mode:

Channel No.	Frequency (MHz)	Measured Channel Power (dBm)			Peak / AVG	Limit	Result
		antenna 1	antenna 2	total			
1	2412	18.44	18.48	21.47	AVG	30.00dBm	Pass
6	2437	18.53	18.40	21.47			Pass
11	2462	18.58	18.15	21.38			Pass

802.11ax HE40 Mode:

Channel No.	Frequency (MHz)	Measured Channel Power (dBm)			Peak / AVG	Limit	Result
		antenna 1	antenna 2	total			
3	2422	16.56	16.38	19.48	AVG	30.00dBm	Pass
6	2437	16.72	16.26	19.51			Pass
9	2452	16.80	16.10	19.48			Pass

Note

- The measured results were corrected by duty cycle factor (section 2.8)
- This EUT supports MIMO 2X2, any transmit signals are correlated with each other, For power measurements on IEEE 802.11 devices.
- According to the calculation of SDM independent spatial stream formula, Directional gain = $G_{ANTMAX} + 10 \log(N_{ANT}/N_{SS})$ dBi, where $N_{SS}=2$, $N_{ANT}=2$, Directional gain = $3.97 + 10 \log(2/2)$ dBi = 3.97 dBi, So do not consider the limit rollback.

Beamforming**802.11n HT20 Mode:**

Channel No.	Frequency (MHz)	Measured Channel Power (dBm)			Peak / AVG	Limit	Result
		antenna 1	antenna 2	total			
1	2412	16.49	16.84	19.68	AVG	29.10dBm	Pass
6	2437	16.80	16.67	19.74			Pass
11	2462	16.82	16.42	19.63			Pass

802.11n HT40 Mode:

Channel No.	Frequency (MHz)	Measured Channel Power (dBm)			Peak / AVG	Limit	Result
		antenna 1	antenna 2	total			
3	2422	15.18	15.36	18.28	AVG	29.10dBm	Pass
6	2437	15.32	15.28	18.31			Pass
9	2452	15.36	15.05	18.22			Pass

VHT20 Mode:

Channel No.	Frequency (MHz)	Measured Channel Power (dBm)			Peak / AVG	Limit	Result
		antenna 1	antenna 2	total			
1	2412	17.04	17.46	20.27	AVG	29.10dBm	Pass
6	2437	17.17	17.14	20.17			Pass
11	2462	17.21	16.80	20.02			Pass

VHT40 Mode:

Channel No.	Frequency (MHz)	Measured Channel Power (dBm)			Peak / AVG	Limit	Result
		antenna 1	antenna 2	total			
3	2422	14.67	14.75	17.72	AVG	29.10dBm	Pass
6	2437	14.70	14.59	17.66			Pass
9	2452	14.85	14.72	17.80			Pass

802.11ax HE20 Mode:

Channel No.	Frequency (MHz)	Measured Channel Power (dBm)			Peak / AVG	Limit	Result
		antenna 1	antenna 2	total			
1	2412	16.37	16.72	19.56	AVG	29.10dBm	Pass
6	2437	16.46	16.46	19.47			Pass
11	2462	16.47	16.17	19.33			Pass

802.11ax HE40 Mode:

Channel No.	Frequency (MHz)	Measured Channel Power (dBm)			Peak / AVG	Limit	Result
		antenna 1	antenna 2	total			
3	2422	14.55	14.46	17.52	AVG	29.10dBm	Pass
6	2437	14.65	14.37	17.53			Pass
9	2452	14.82	14.22	17.54			Pass

Note

1. The measured results were corrected by duty cycle factor (section 2.8)
2. measurements on IEEE 802.11 devices. This EUT supports MIMO 2X2, any transmit signals are correlated with each other, So Directional gain = $10\log[(10^{3.97/20} + 10^{3.85/20})/2]$ dBi, that is Directional gain (dBi) = 6.9
3. Antenna gain is greater than 6, Output Power Limit = $30 - (6.9 - 6) = 29.10$ dBm

9. POWER SPECTRAL DENSITY

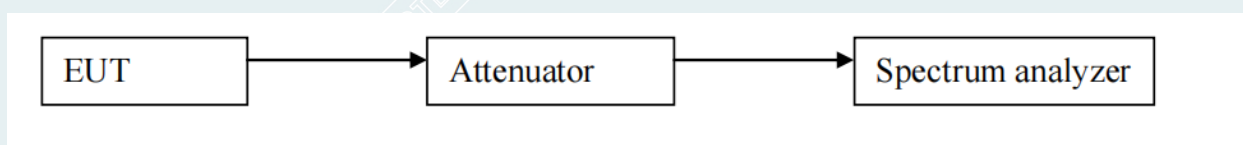
9.1. LIMITS

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

9.2. TEST PROCEDURES

- 1) Remove the antenna from the EUT, and then connect a low loss RF cable from antenna port to the spectrum analyzer.
- 2) Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- 3) The following procedure shall be used if maximum peak conducted output power was used to determine compliance, and it is optional if the maximum conducted (average) output power was used to determine compliance:
 - a) Set analyzer center frequency to DTS channel center frequency.
 - b) Set the span to 1.5 times the DTS bandwidth.
 - c) Set the RBW to $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
 - d) Set the VBW $\geq [3 \times \text{RBW}]$.
 - e) Detector = average
 - f) Sweep time = auto couple.
 - g) Trace mode = max hold.
 - h) Allow trace to fully stabilize.
 - i) Use the peak marker function to determine the maximum amplitude level within the RBW.
 - j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.
- 4) Repeat above procedures until all frequencies measured were complete.

9.3. TEST SETUP



9.4. TEST RESULTS

Environment: 22.5℃/54%RH/101.0kPa
Tested By: Huang Tianmei

Voltage:AC120V/60Hz
Date: 2023-05-18

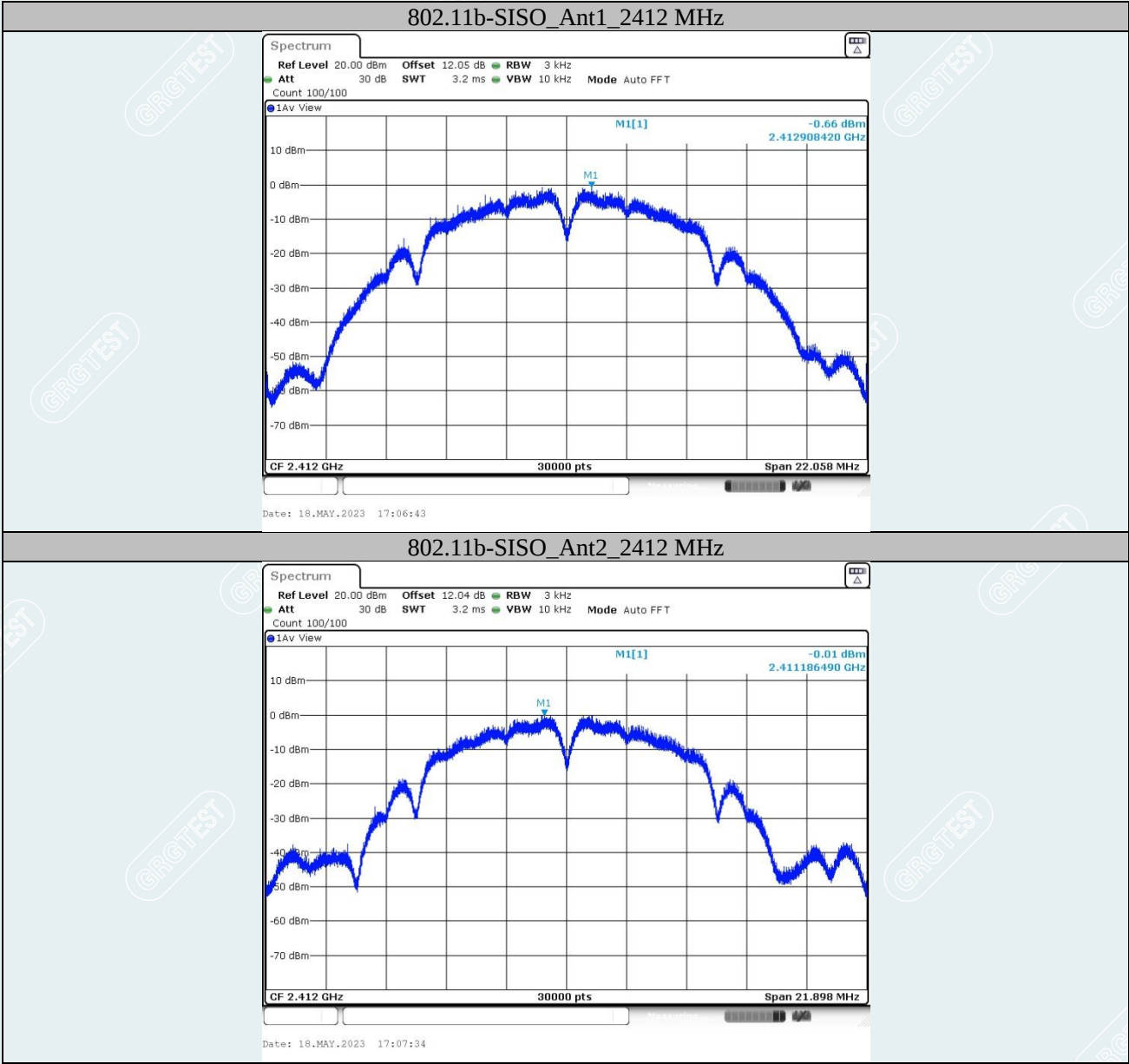
Non Beamforming

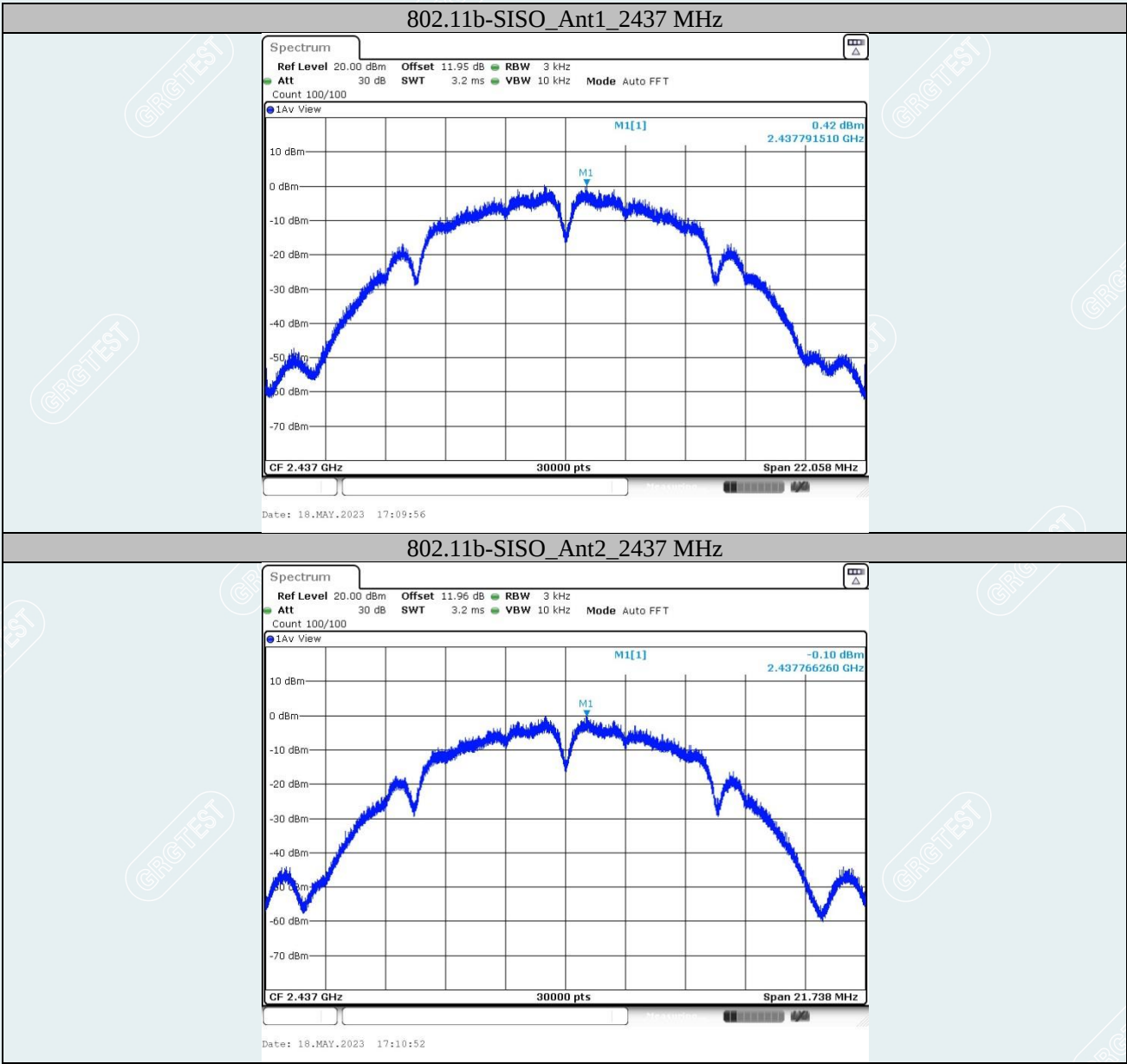
Test Mode	Antenna	Frequency [MHz]	PSD (dBm/3kHz)	Duty Factor	Total PSD with Duty Factor (dBm/3kHz)	Limit [dBm/3kHz]	Verdict
802.11b-SISO	Ant1	2412	-0.66	0.32	-0.34	≤8.00	PASS
	Ant2	2412	-0.01	0.32	0.31	≤8.00	PASS
	Ant1	2437	0.42	0.32	0.74	≤8.00	PASS
	Ant2	2437	-0.10	0.32	0.22	≤8.00	PASS
	Ant1	2462	0.20	0.32	0.52	≤8.00	PASS
	Ant2	2462	-0.68	0.32	-0.36	≤8.00	PASS
802.11g-SISO	Ant1	2412	-3.24	2.83	-0.41	≤8.00	PASS
	Ant2	2412	-3.16	2.83	-0.33	≤8.00	PASS
	Ant1	2437	-3.08	2.83	-0.25	≤8.00	PASS
	Ant2	2437	-3.45	2.83	-0.62	≤8.00	PASS
	Ant1	2462	-3.59	2.83	-0.76	≤8.00	PASS
	Ant2	2462	-3.86	2.83	-1.03	≤8.00	PASS

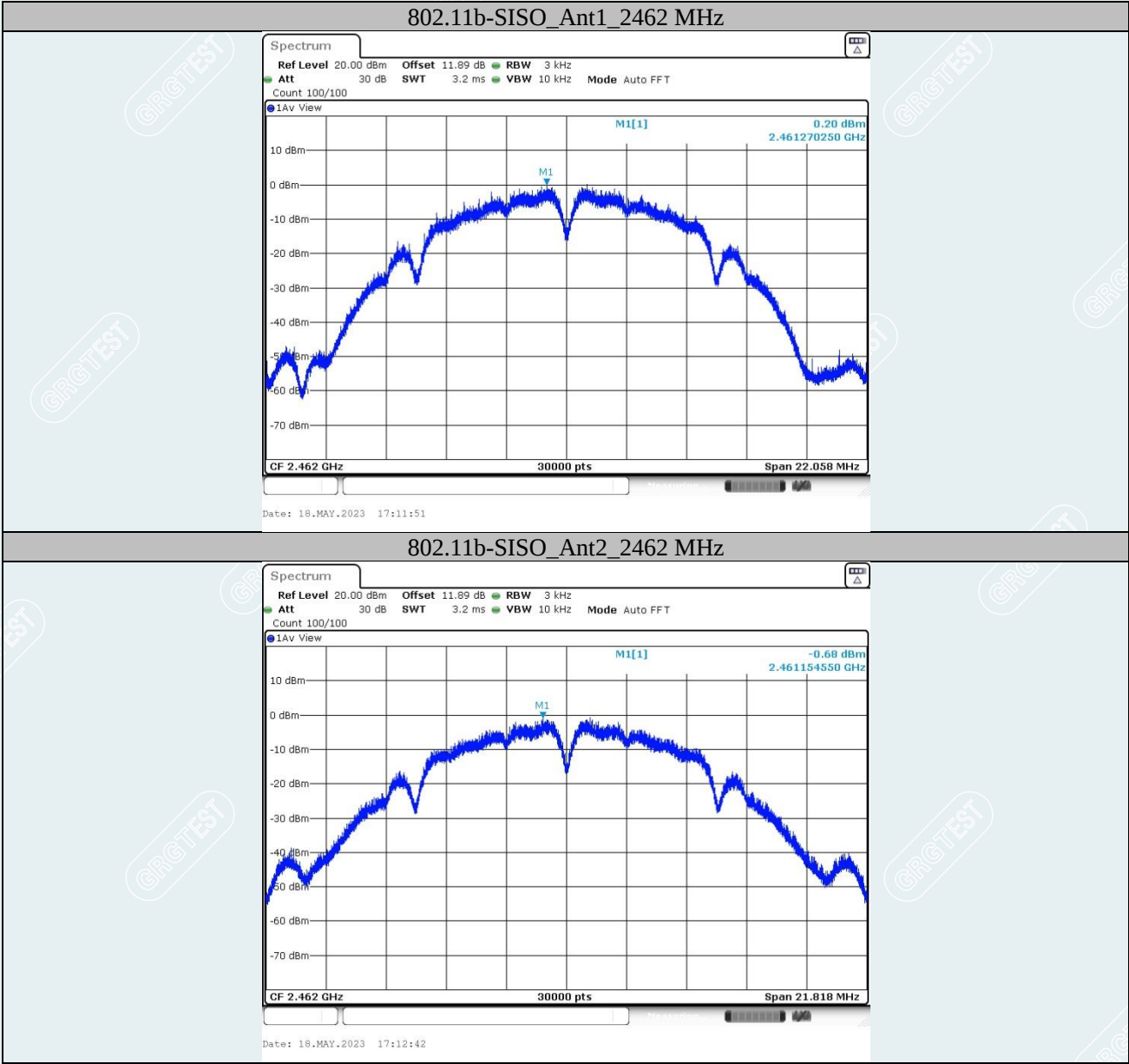
Note

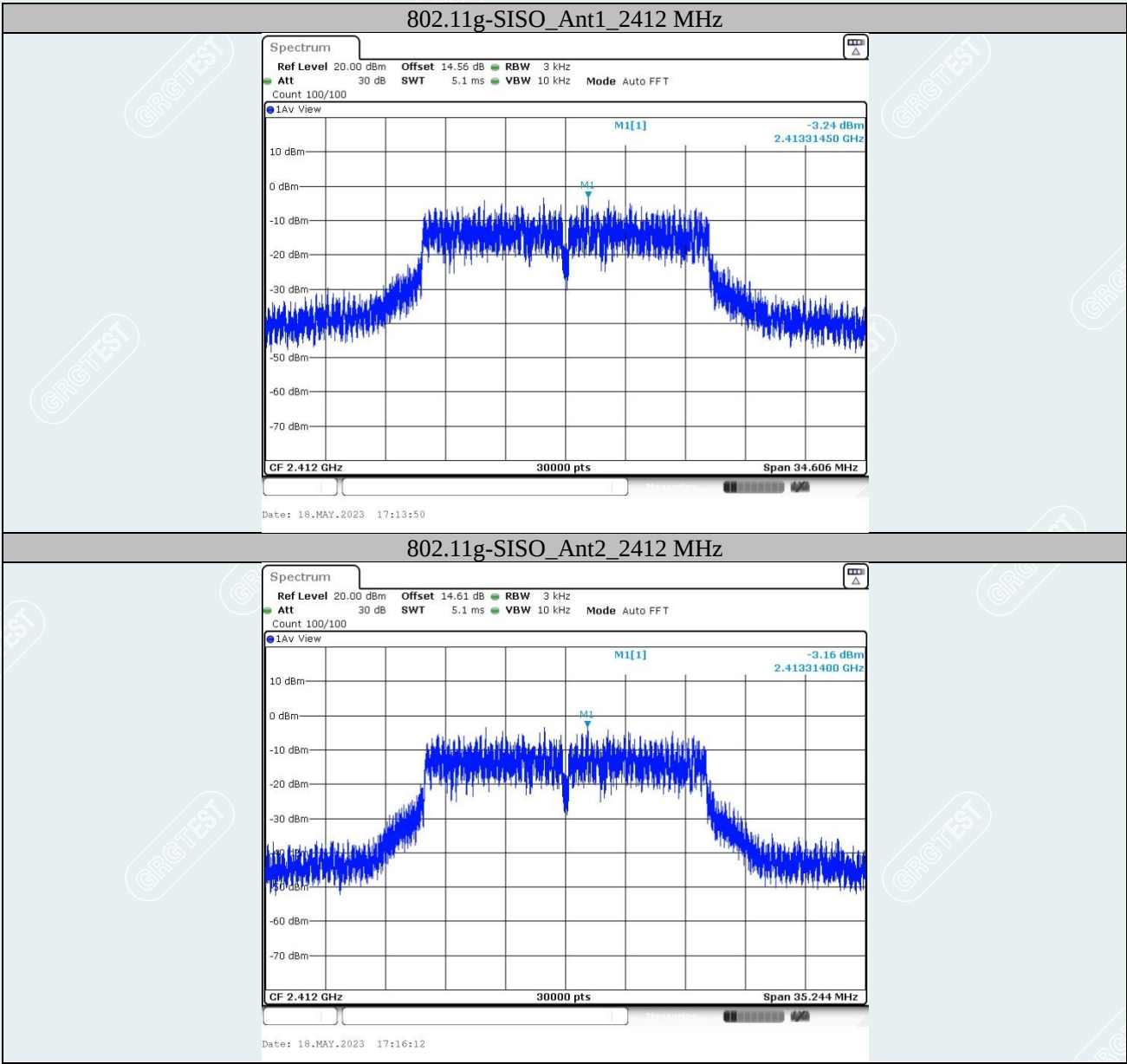
1. The measured results were corrected by duty cycle factor (section 2.8)

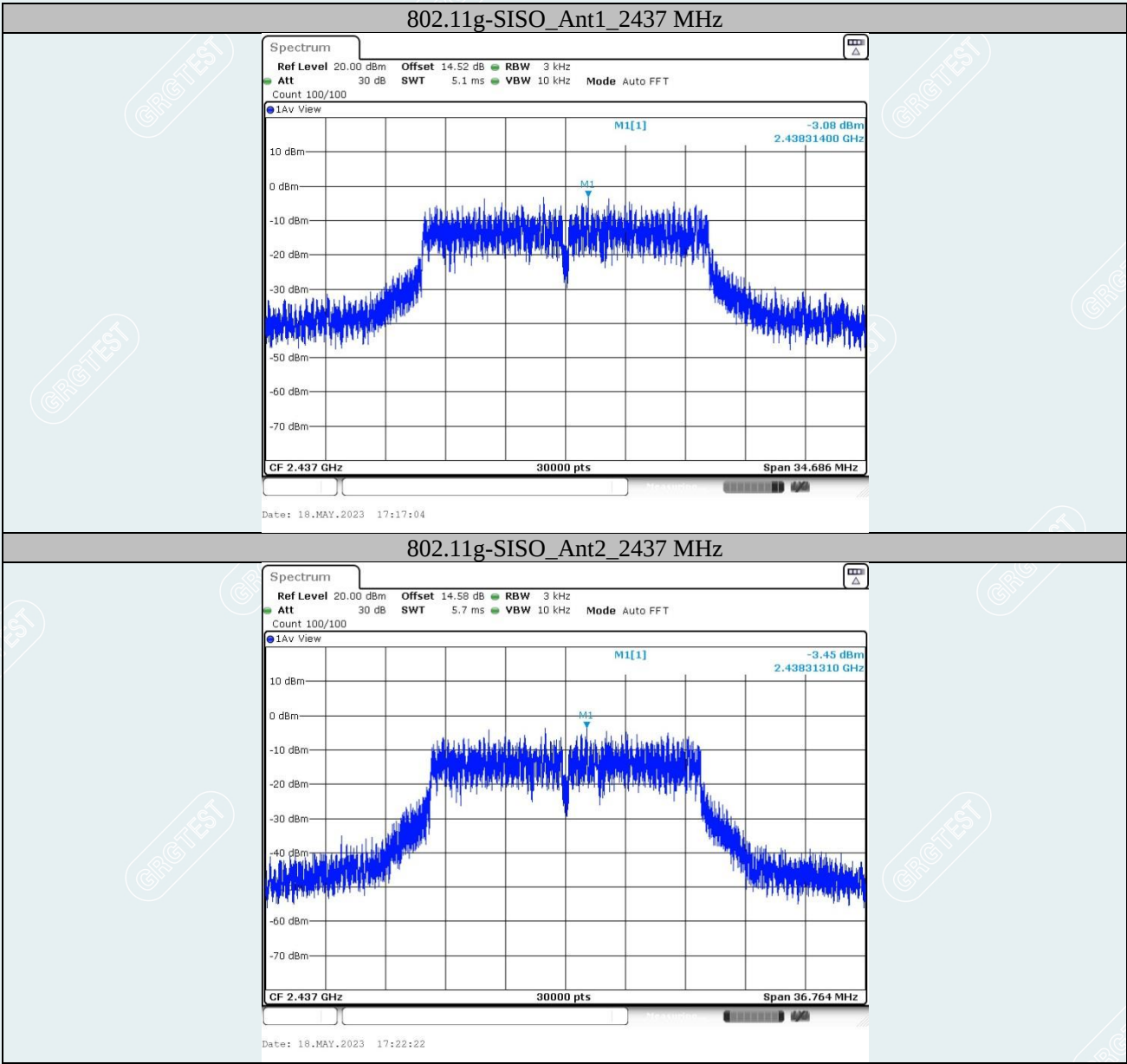
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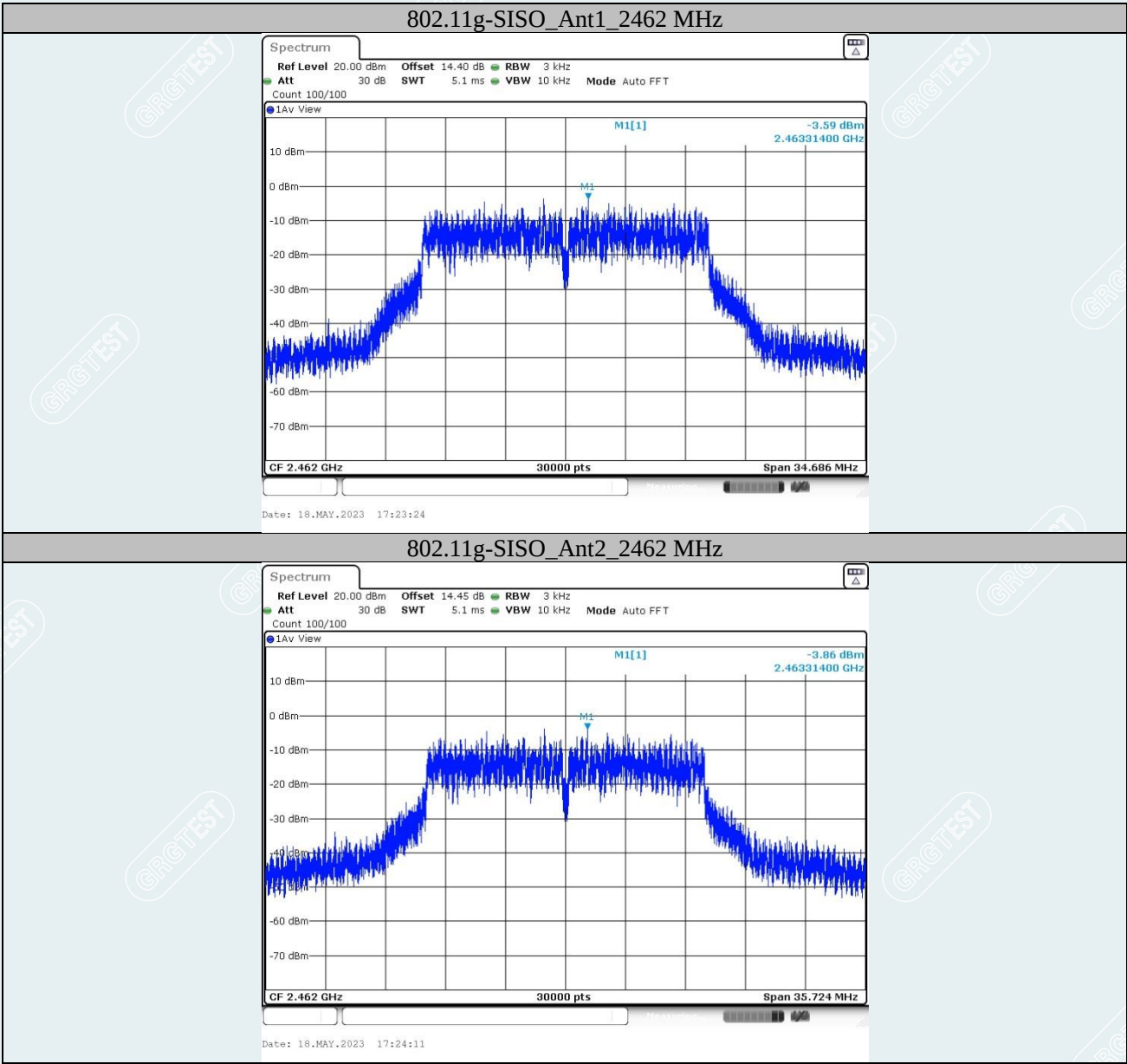












Environment: 22.5°C/54%RH/101.0kPa
 Tested By:Huang Tianmei
 Non Beamforming-CDD

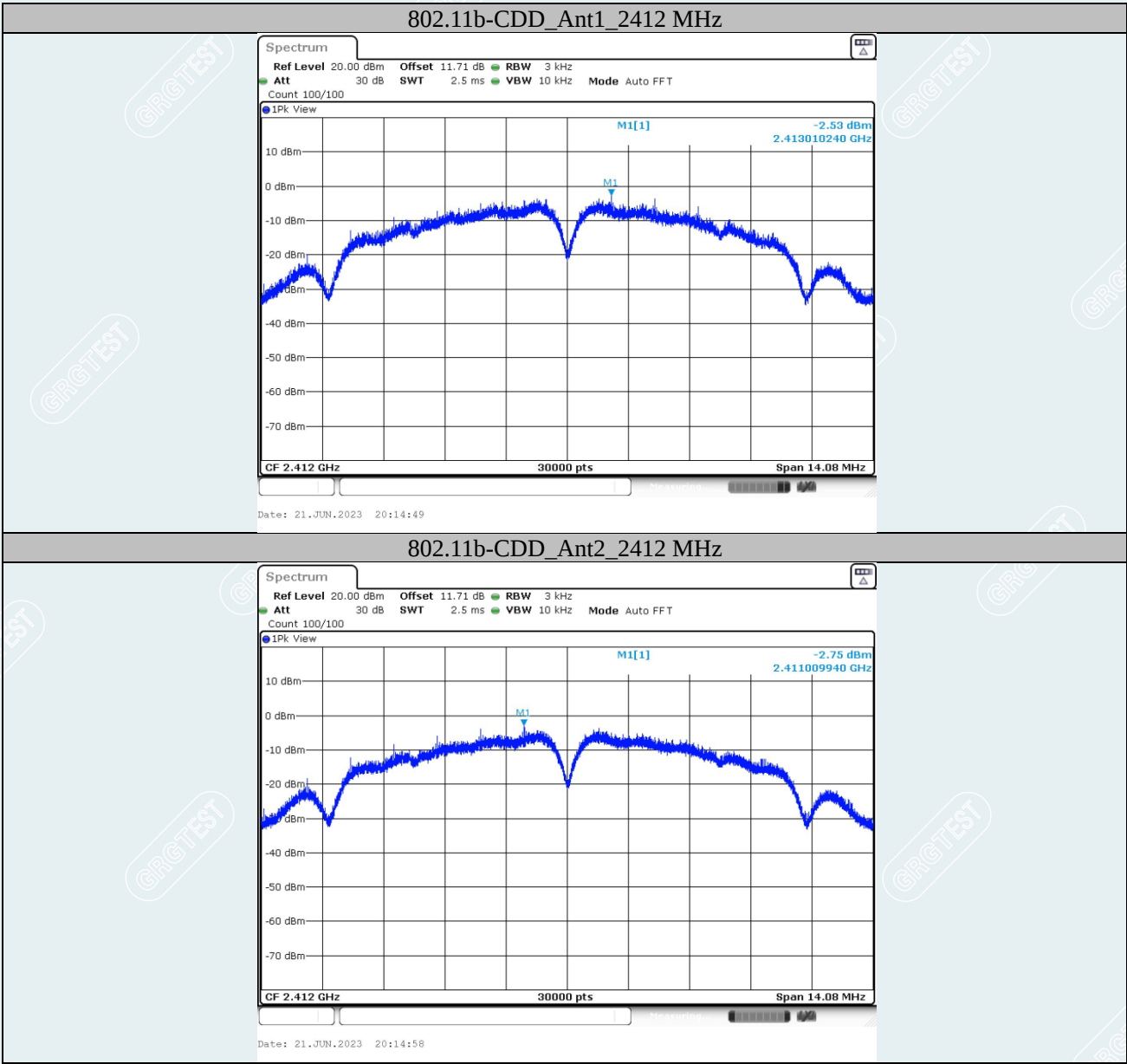
Voltage:AC120V/60Hz
 Date: 2023-05-18~2023-06-21

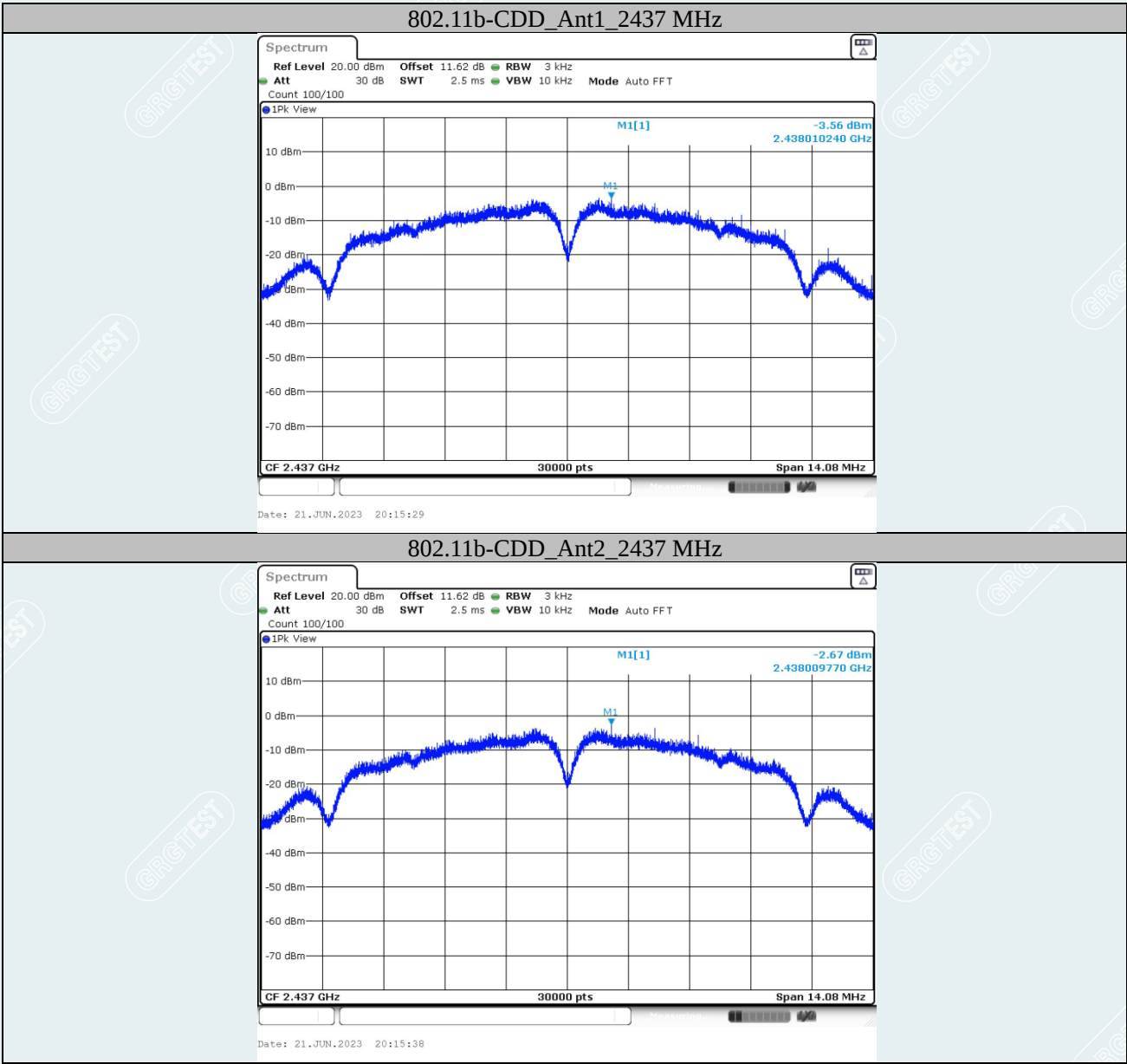
TestMode	Antenna	Frequency [MHz]	PSD (dBm/3kHz)	Duty Factor	Total PSD with Duty Factor (dBm/3kHz)	Limit [dBm/3kHz]	Verdict
802.11b	Ant1	2412	-2.85	0.32	-2.53	≤7.10	PASS
	Ant2	2412	-3.07	0.32	-2.75	≤7.10	PASS
	total	2412	0.05	0.32	0.37	≤7.10	PASS
	Ant1	2437	-3.88	0.32	-3.56	≤7.10	PASS
	Ant2	2437	-2.99	0.32	-2.67	≤7.10	PASS
	total	2437	-0.40	0.32	-0.08	≤7.10	PASS
	Ant1	2462	-2.56	0.32	-2.24	≤7.10	PASS
	Ant2	2462	-2.54	0.32	-2.22	≤7.10	PASS
	total	2462	-2.85	0.32	0.78	≤7.10	PASS
802.11g	Ant1	2412	-4.97	2.83	-2.14	≤7.10	PASS
	Ant2	2412	-4.71	2.83	-1.88	≤7.10	PASS
	total	2412	-1.83	2.83	1.00	≤7.10	PASS
	Ant1	2437	-4.72	2.83	-1.89	≤7.10	PASS
	Ant2	2437	-5.18	2.83	-2.35	≤7.10	PASS
	total	2437	-1.93	2.83	0.90	≤7.10	PASS
	Ant1	2462	-4.69	2.83	-1.86	≤7.10	PASS
	Ant2	2462	-5.50	2.83	-2.67	≤7.10	PASS
	total	2462	-2.07	2.83	0.76	≤7.10	PASS
802.11n HT20 MIMO	Ant1	2412	-11.32	2.48	-8.84	≤7.10	PASS
	Ant2	2412	-11.48	2.48	-9.00	≤7.10	PASS
	total	2412	-8.39	2.48	-5.91	≤7.10	PASS
	Ant1	2437	-10.43	2.48	-7.95	≤7.10	PASS
	Ant2	2437	-10.86	2.48	-8.38	≤7.10	PASS
	total	2437	-7.63	2.48	-5.15	≤7.10	PASS
	Ant1	2462	-10.97	2.48	-8.49	≤7.10	PASS
	Ant2	2462	-11.47	2.48	-8.99	≤7.10	PASS
	total	2462	-8.20	2.48	-5.72	≤7.10	PASS
802.11n HT40 MIMO	Ant1	2422	-9.67	2.81	-6.86	≤7.10	PASS
	Ant2	2422	-9.59	2.81	-6.78	≤7.10	PASS
	total	2422	-6.62	2.81	-3.81	≤7.10	PASS
	Ant1	2437	-9.54	2.81	-6.73	≤7.10	PASS
	Ant2	2437	-9.56	2.81	-6.75	≤7.10	PASS
	total	2437	-6.54	2.81	-3.73	≤7.10	PASS
	Ant1	2452	-9.55	2.81	-6.74	≤7.10	PASS
	Ant2	2452	-9.38	2.81	-6.57	≤7.10	PASS
	total	2452	-6.45	2.81	-3.64	≤7.10	PASS

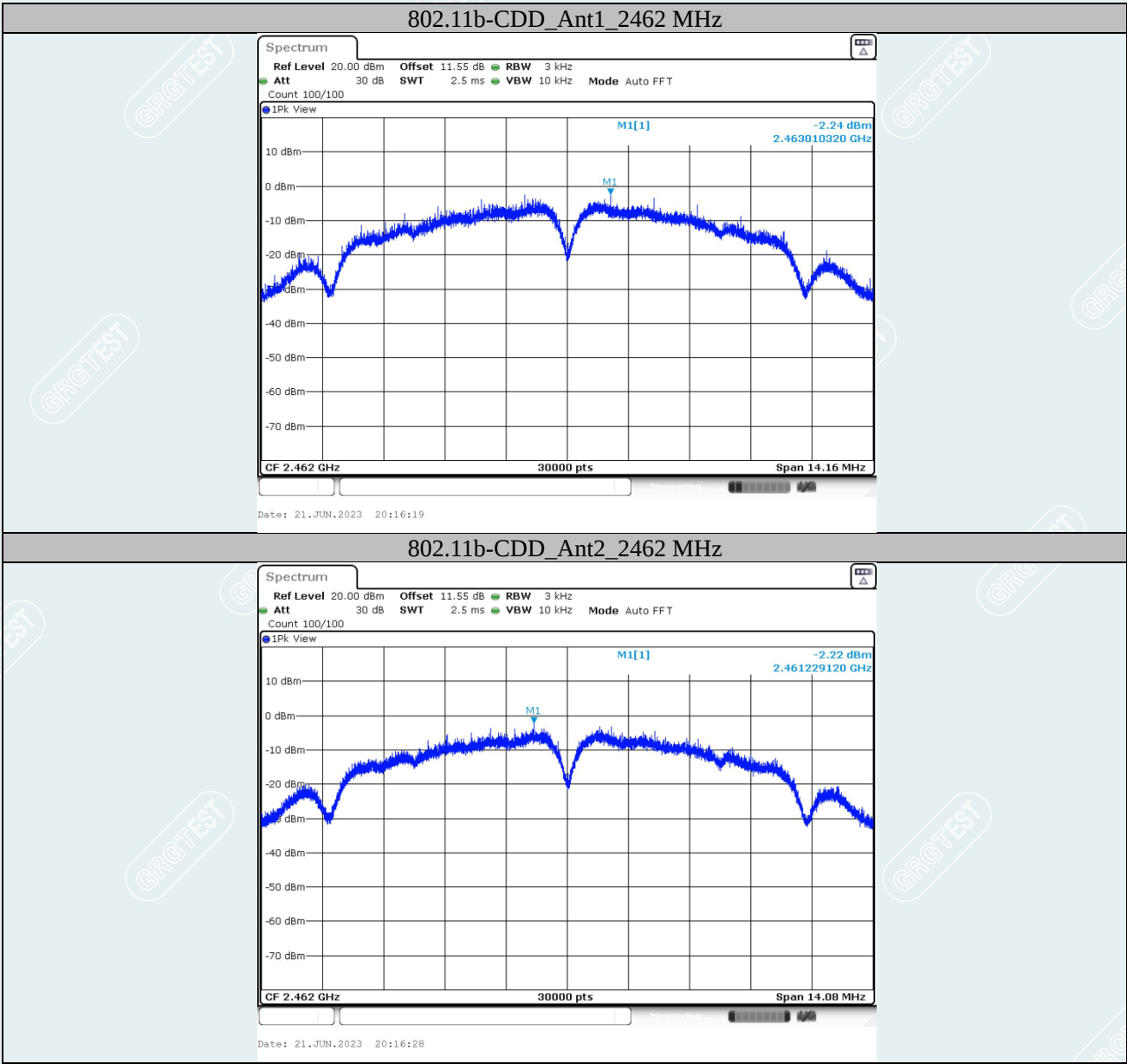
VHT20 MIMO	Ant1	2412	-4.62	0.79	-3.83	≤ 7.10	PASS
	Ant2	2412	-3.72	0.79	-2.93	≤ 7.10	PASS
	total	2412	-1.14	0.79	-0.35	≤ 7.10	PASS
	Ant1	2437	-3.91	0.79	-3.12	≤ 7.10	PASS
	Ant2	2437	-3.99	0.79	-3.2	≤ 7.10	PASS
	total	2437	-0.94	0.79	-0.15	≤ 7.10	PASS
	Ant1	2462	-3.79	0.79	-3.00	≤ 7.10	PASS
	Ant2	2462	-4.50	0.79	-3.71	≤ 7.10	PASS
	total	2462	-1.12	0.79	-0.33	≤ 7.10	PASS
AC40MIMO	Ant1	2422	-9.45	0.90	-8.55	≤ 7.10	PASS
	Ant2	2422	-9.48	0.90	-8.58	≤ 7.10	PASS
	total	2422	-6.45	0.90	-5.55	≤ 7.10	PASS
	Ant1	2437	-9.33	0.90	-8.43	≤ 7.10	PASS
	Ant2	2437	-9.85	0.90	-8.95	≤ 7.10	PASS
	total	2437	-6.57	0.90	-5.67	≤ 7.10	PASS
	Ant1	2452	-9.22	0.90	-8.32	≤ 7.10	PASS
	Ant2	2452	-10.06	0.90	-9.16	≤ 7.10	PASS
	total	2452	-6.61	0.90	-5.71	≤ 7.10	PASS
802.11ax HE20 MIMO	Ant1	2412	-9.99	0.39	-9.6	≤ 7.10	PASS
	Ant2	2412	-8.41	0.39	-8.02	≤ 7.10	PASS
	total	2412	-6.12	0.39	-5.73	≤ 7.10	PASS
	Ant1	2437	-9.50	0.39	-9.11	≤ 7.10	PASS
	Ant2	2437	-9.17	0.39	-8.78	≤ 7.10	PASS
	total	2437	-6.32	0.39	-5.93	≤ 7.10	PASS
	Ant1	2462	-10.00	0.39	-9.61	≤ 7.10	PASS
	Ant2	2462	-9.19	0.39	-8.80	≤ 7.10	PASS
	total	2462	-6.57	0.39	-6.18	≤ 7.10	PASS
802.11ax HE40 MIMO	Ant1	2422	-13.47	0.54	-12.93	≤ 7.10	PASS
	Ant2	2422	-12.77	0.54	-12.23	≤ 7.10	PASS
	total	2422	-10.10	0.54	-9.56	≤ 7.10	PASS
	Ant1	2437	-12.81	0.54	-12.27	≤ 7.10	PASS
	Ant2	2437	-12.68	0.54	-12.14	≤ 7.10	PASS
	total	2437	-9.73	0.54	-9.19	≤ 7.10	PASS
	Ant1	2452	-12.91	0.54	-12.37	≤ 7.10	PASS
	Ant2	2452	-13.14	0.54	-12.6	≤ 7.10	PASS
	total	2452	-10.01	0.54	-9.47	≤ 7.10	PASS

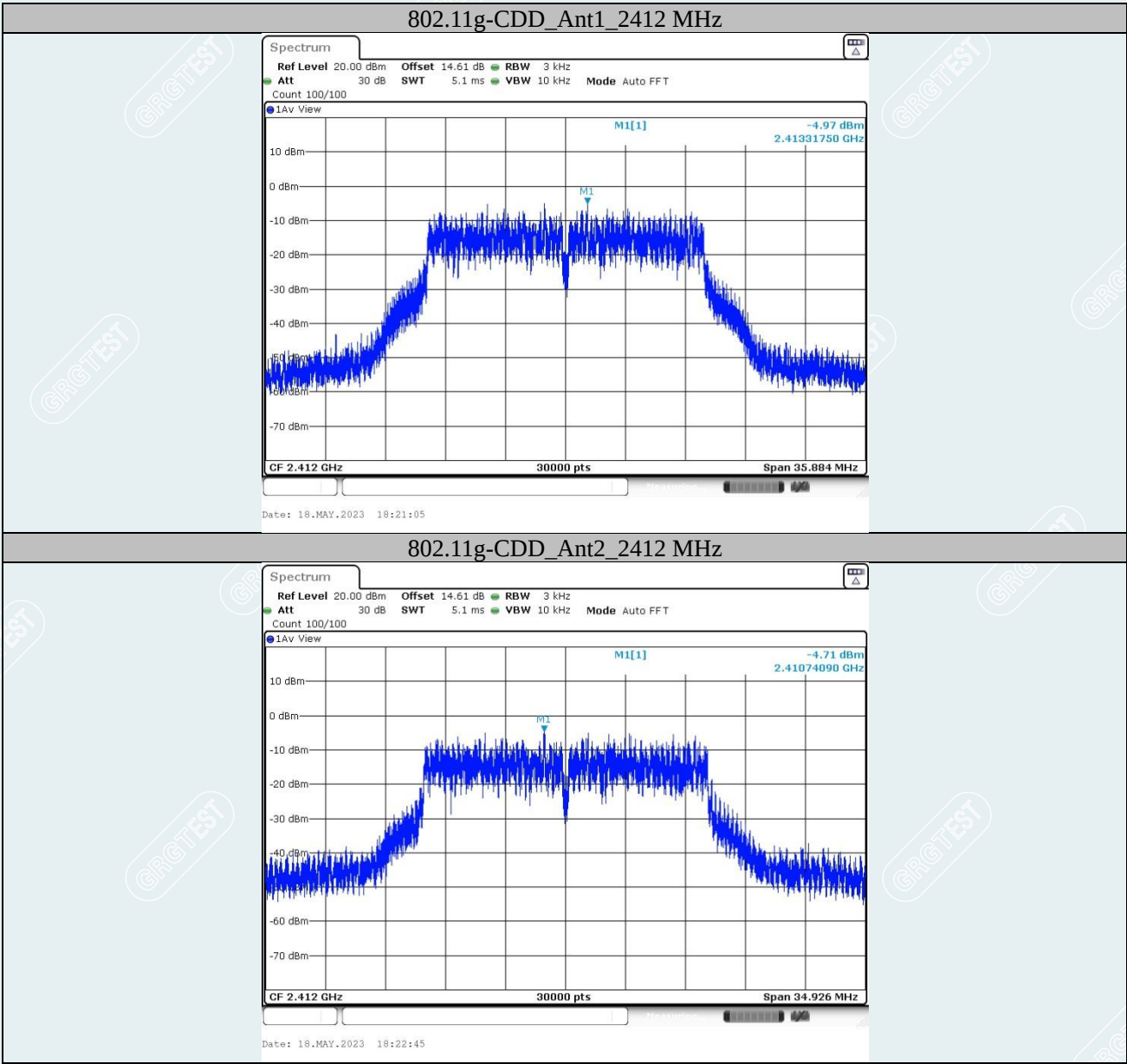
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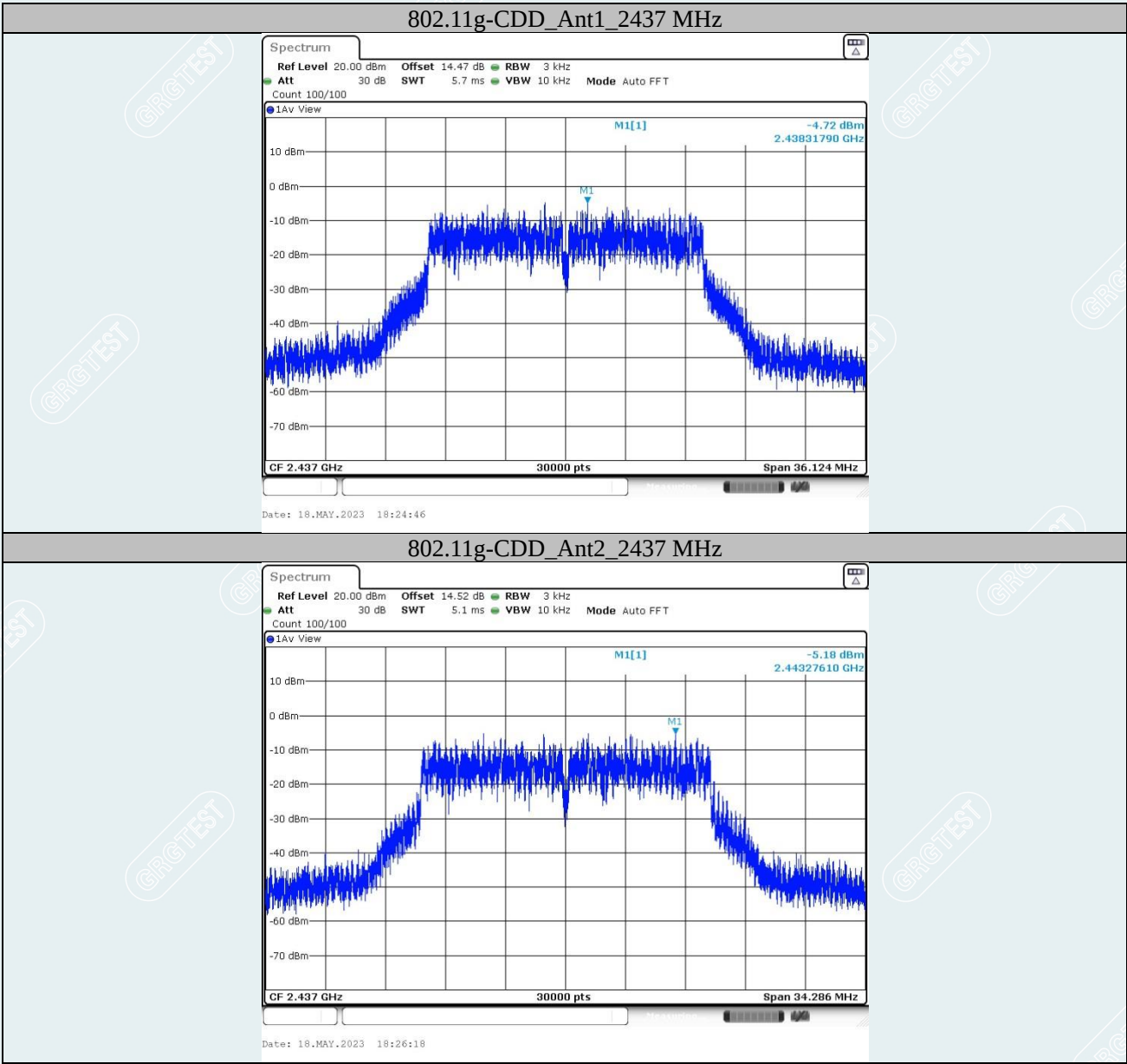
1. The measured results were corrected by duty cycle factor (section 2.8)
2. This EUT supports MIMO 2X2, any transmit signals are correlated with each other. for Power Spectral Density measurements on IEEE 802.11 devices. So Directional gain $= 10 \log[(10^{3.97/20} + 10^{3.85/20})/2]$ dBi, that is Directional gain (dBi) = 6.9, Antenna gain is greater than 6, Limit = $8 - (6.9 - 6) = 7.10$ dBm/3kHz.

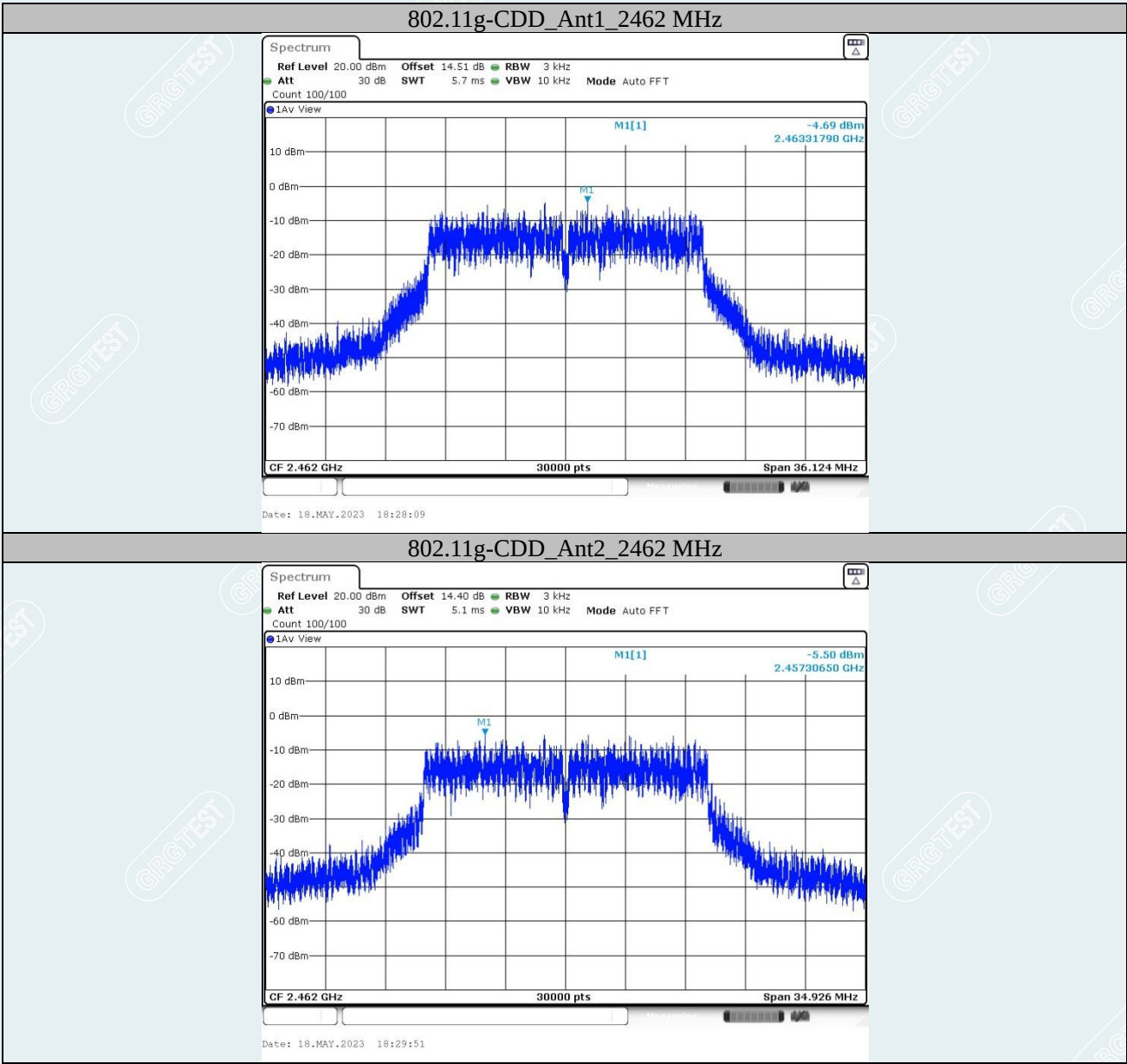


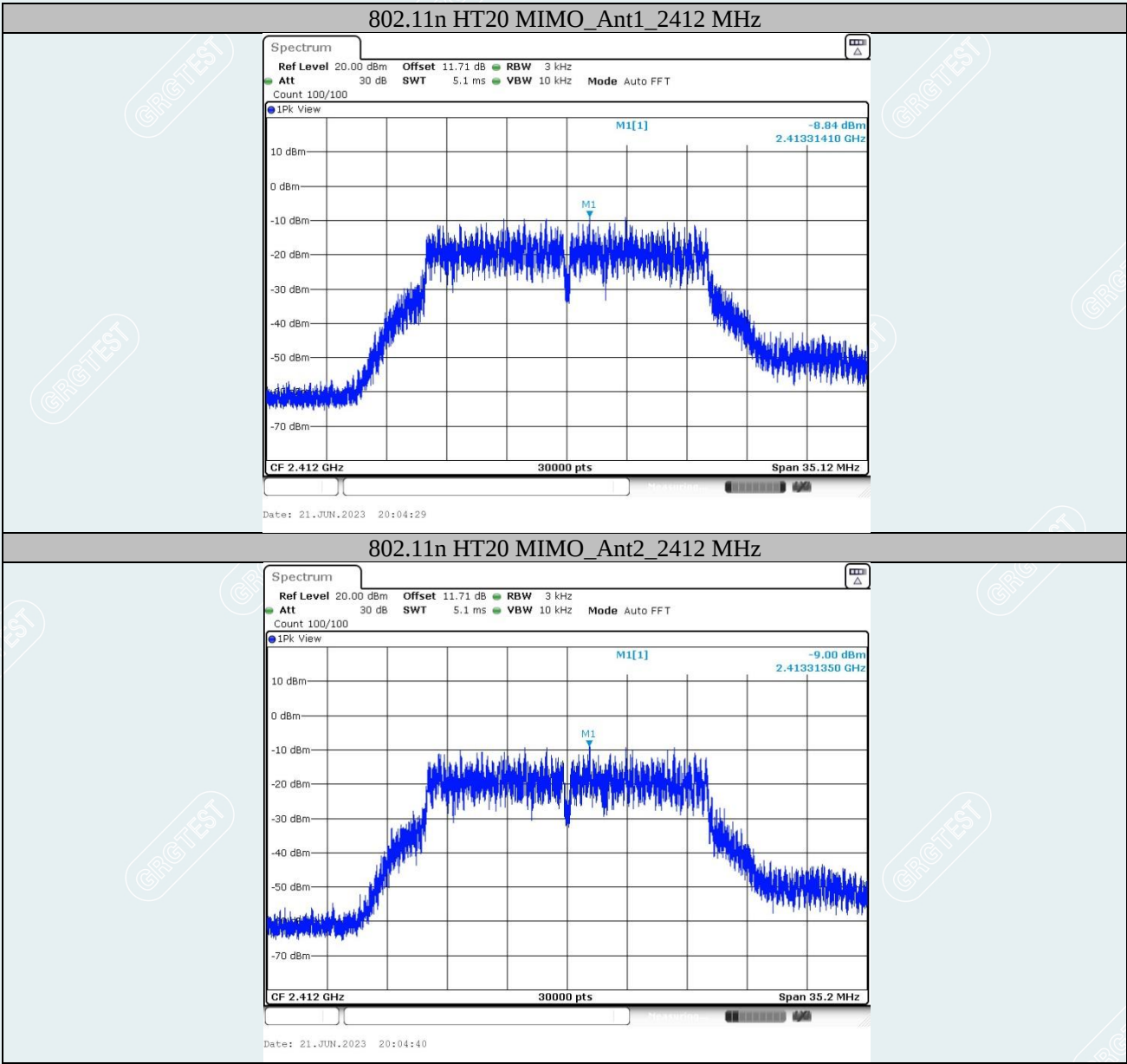


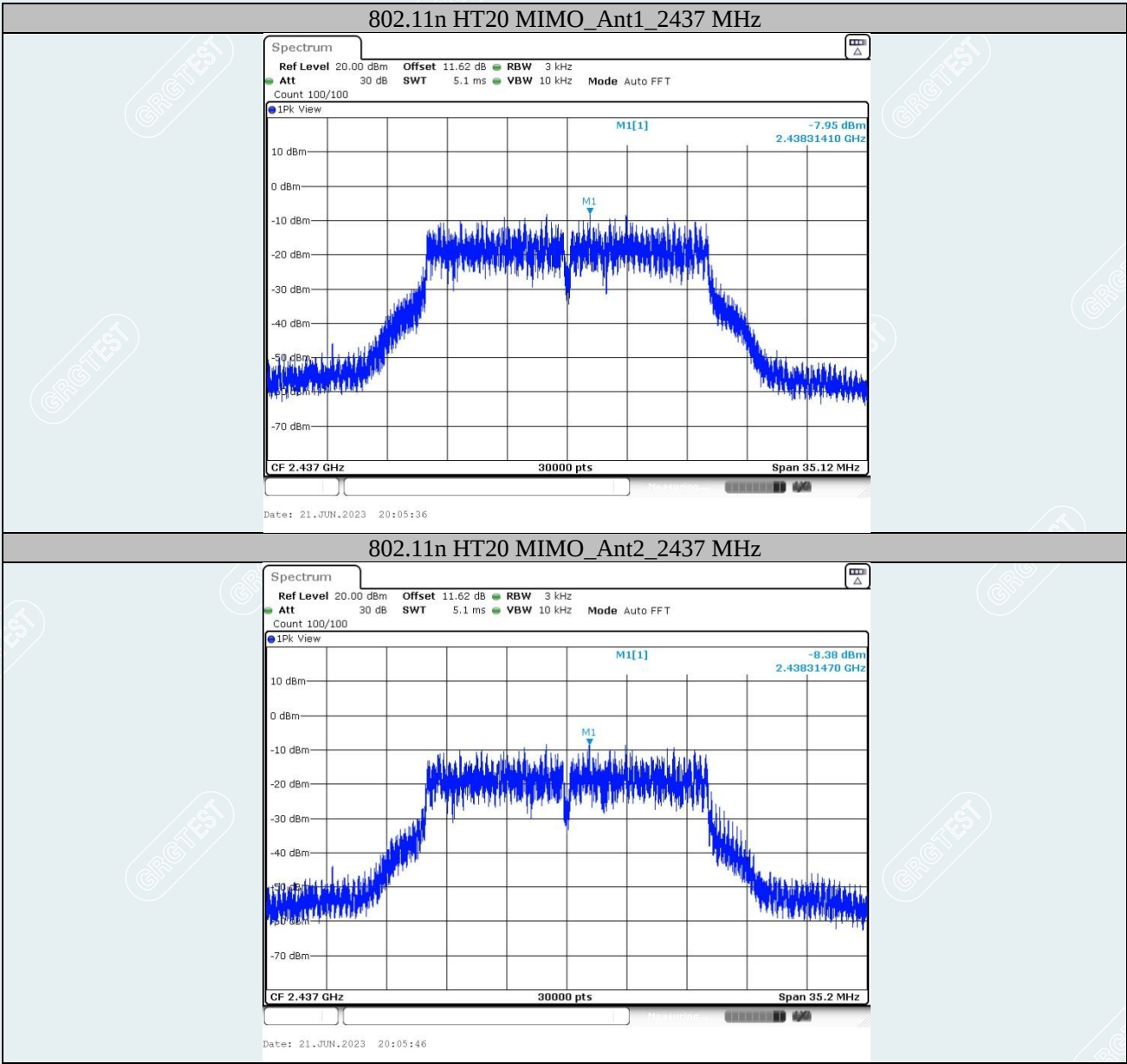


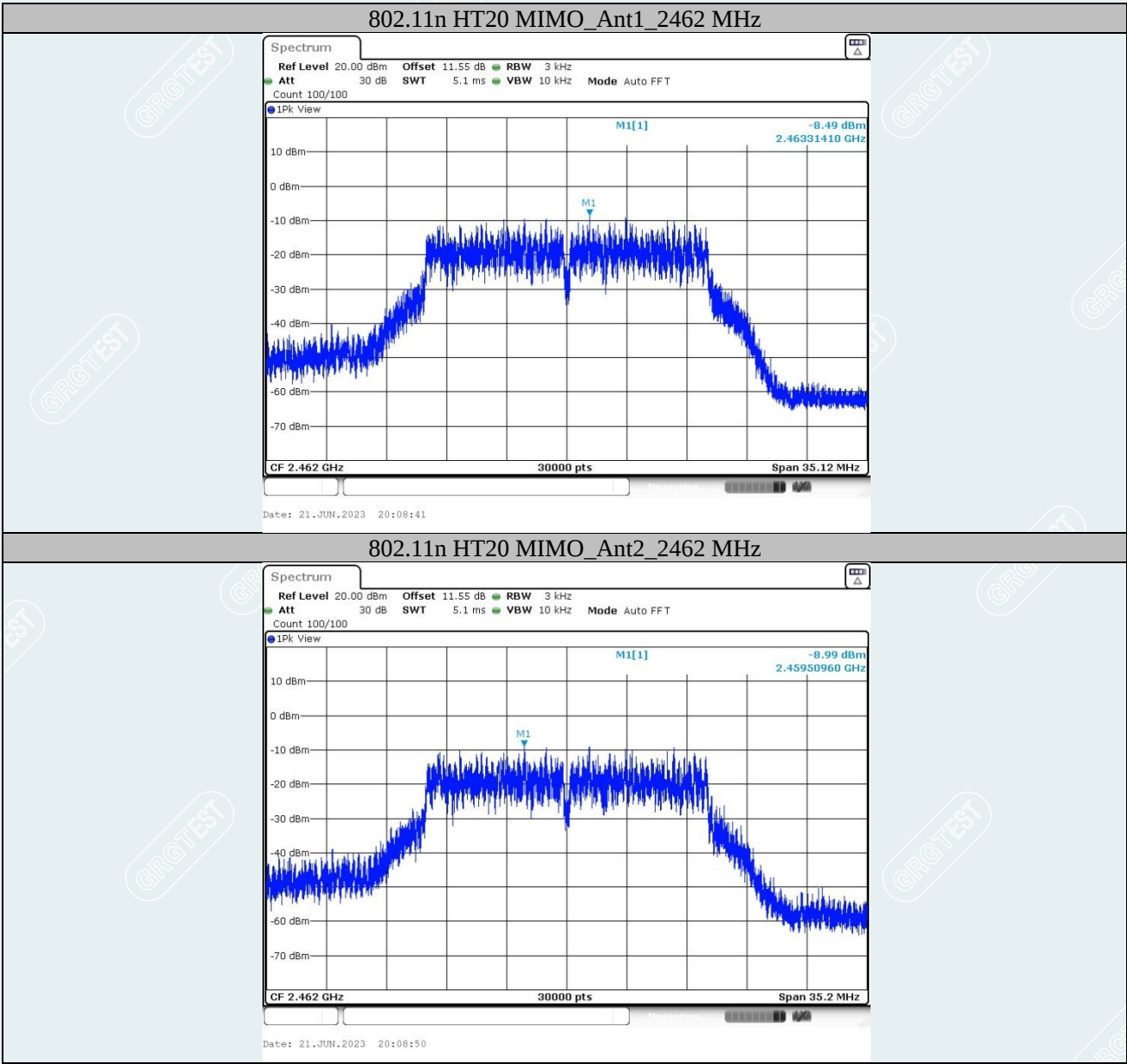


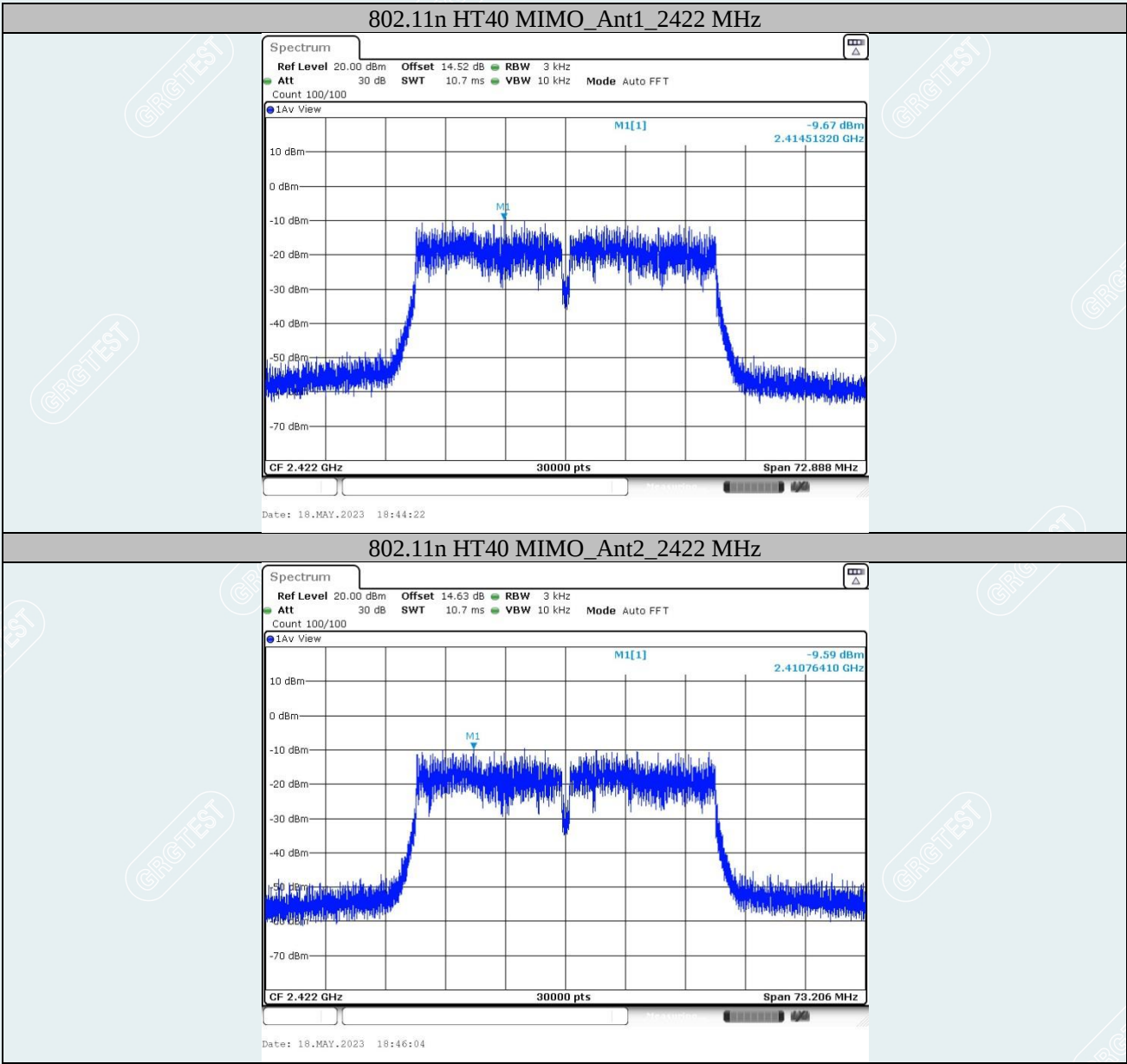


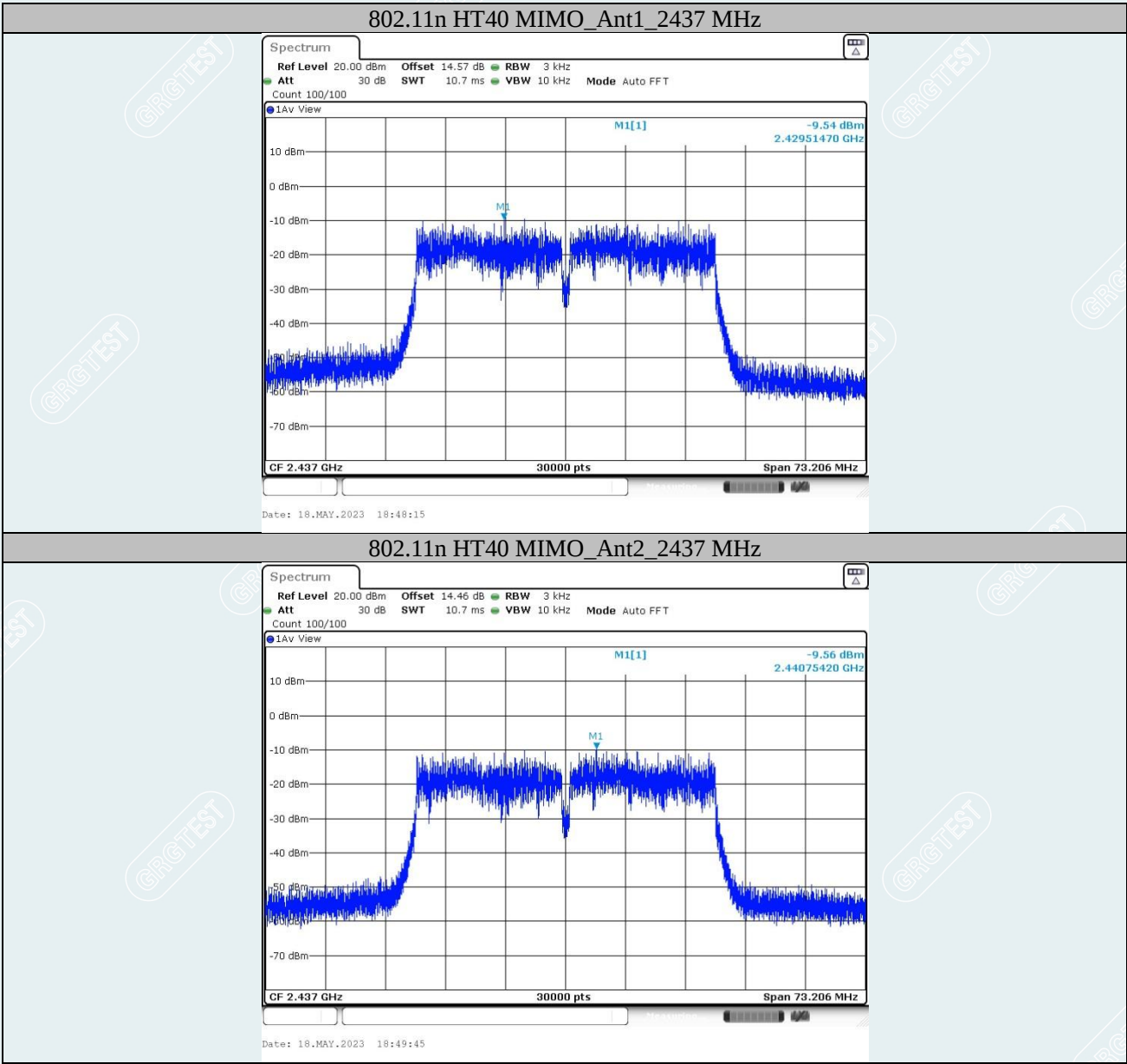


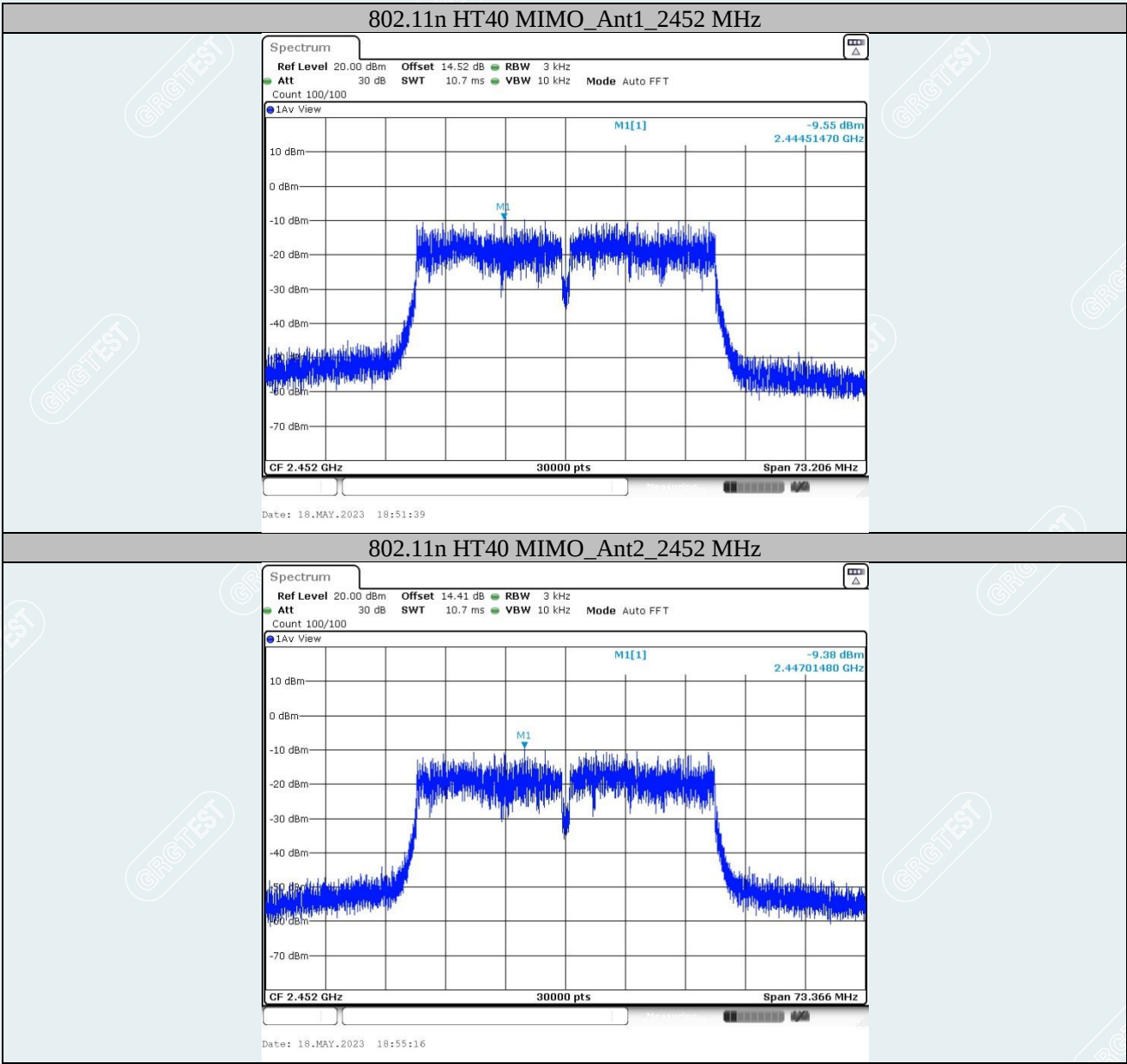


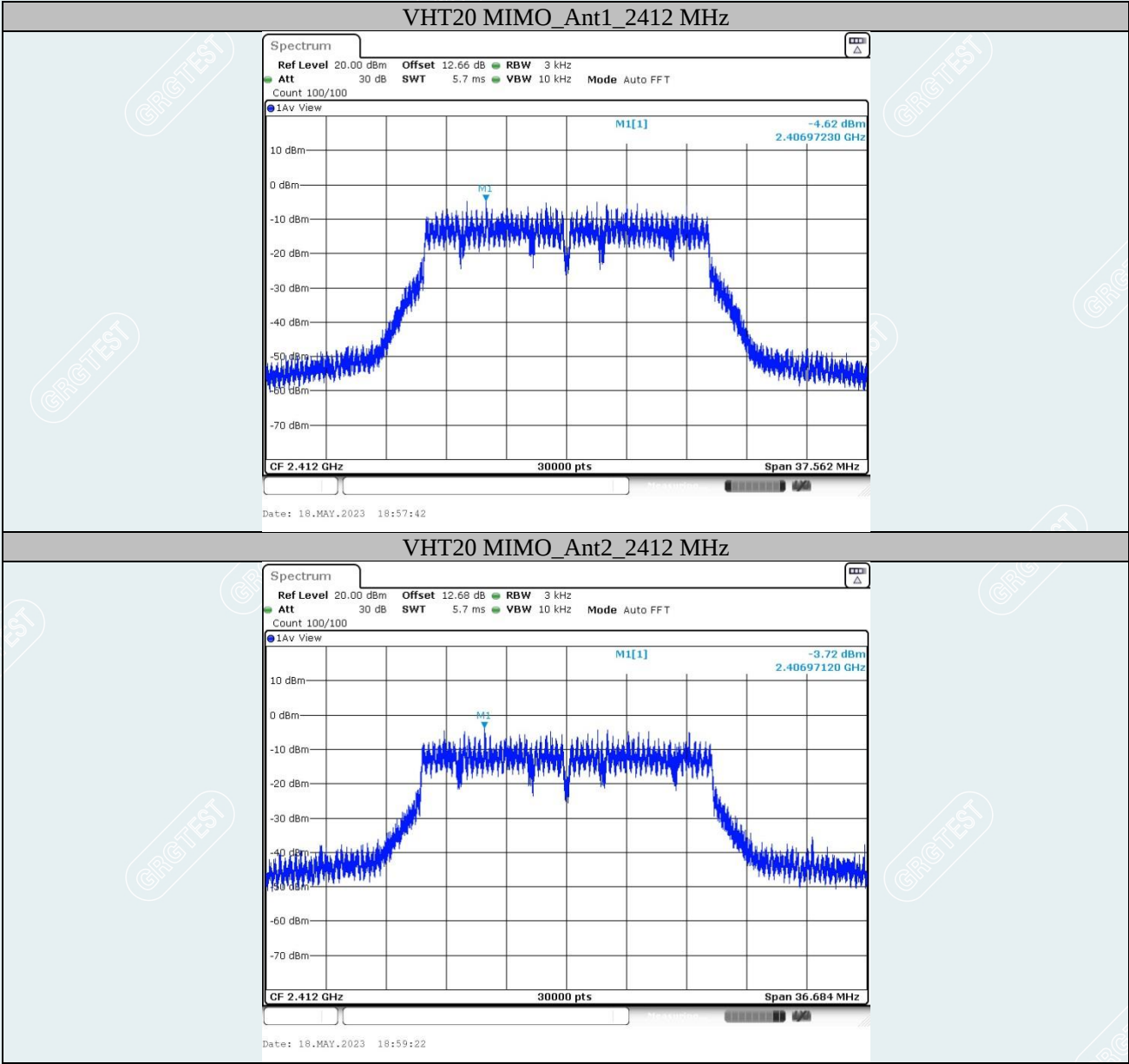


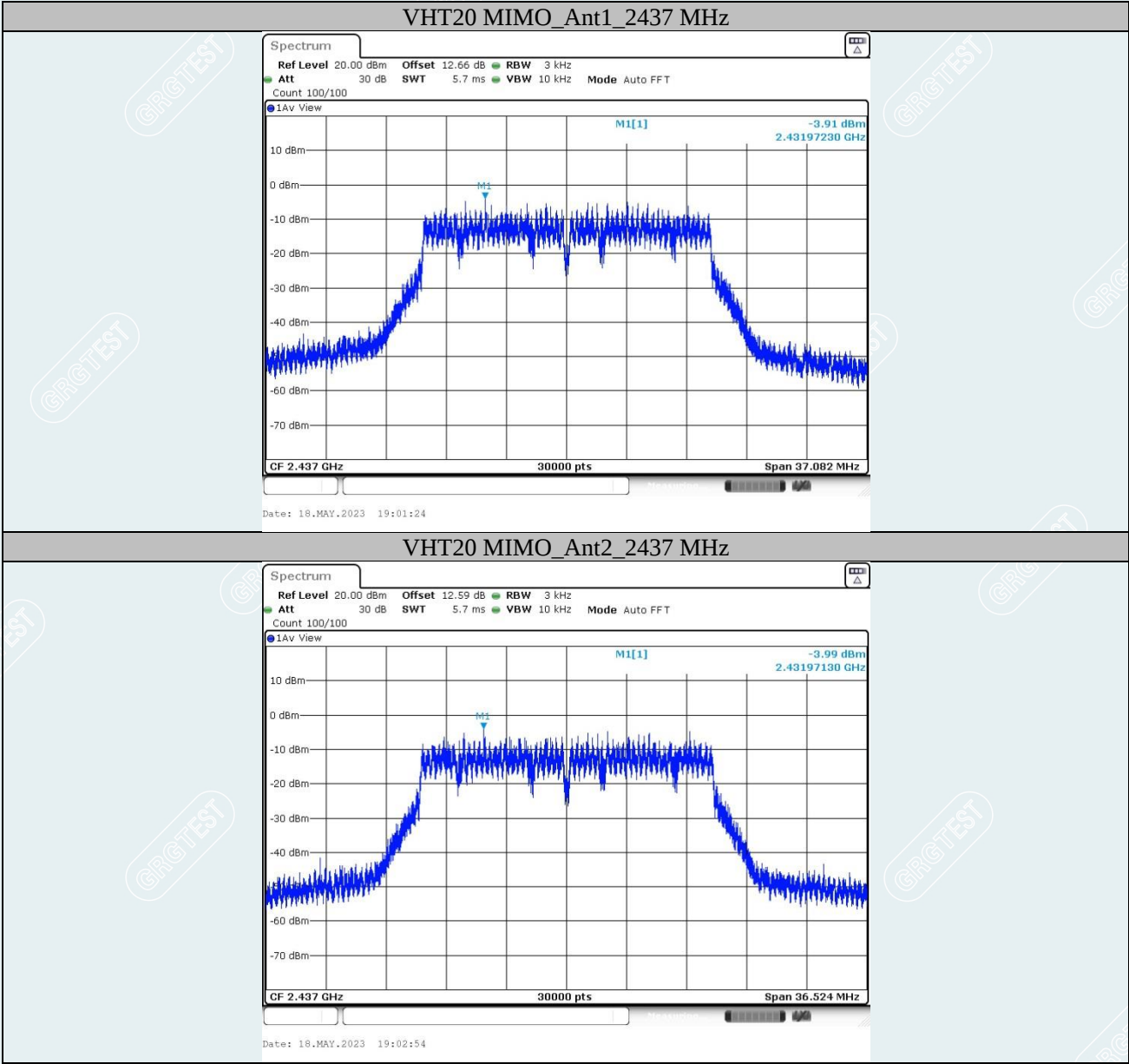


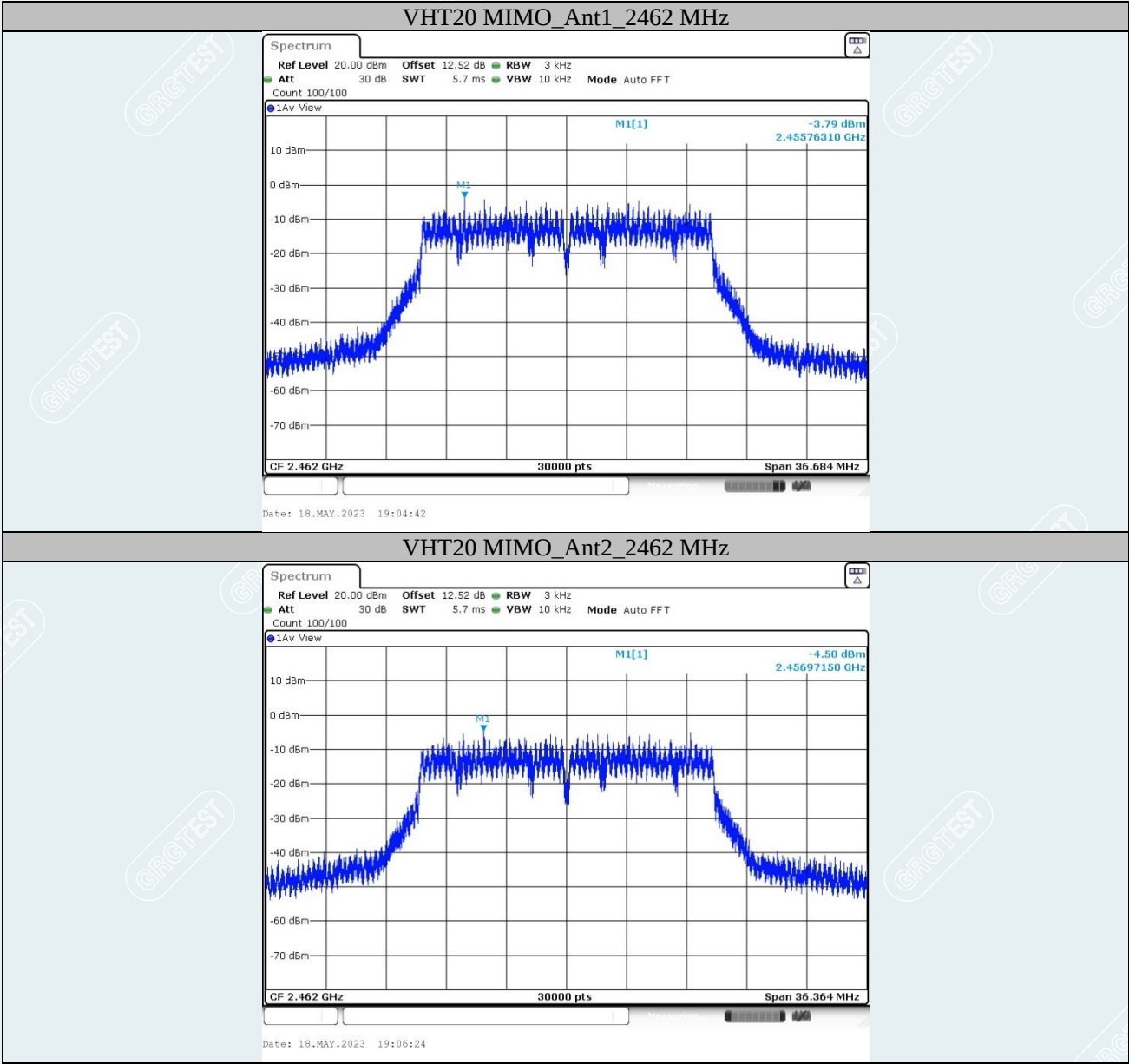


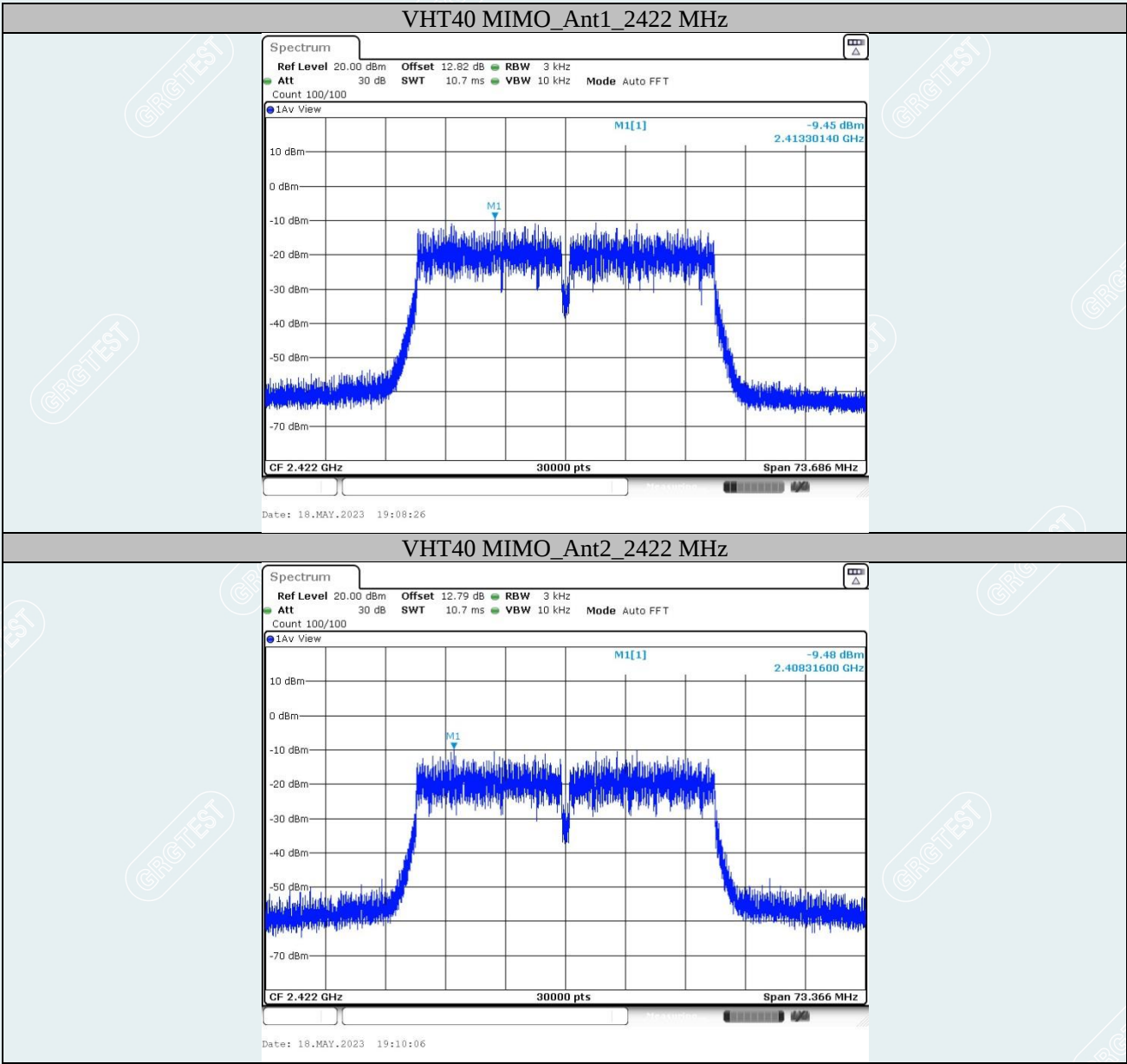


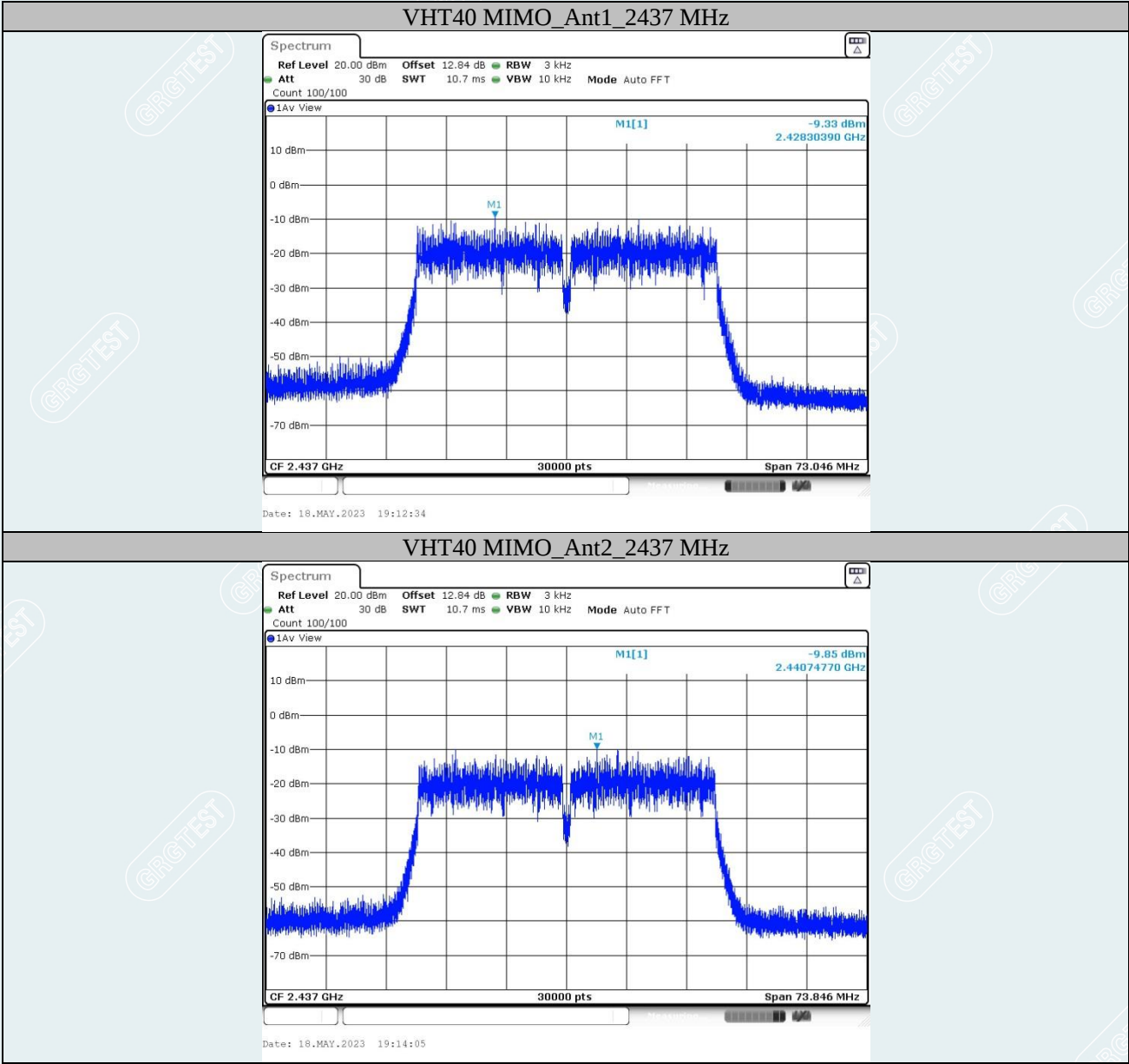


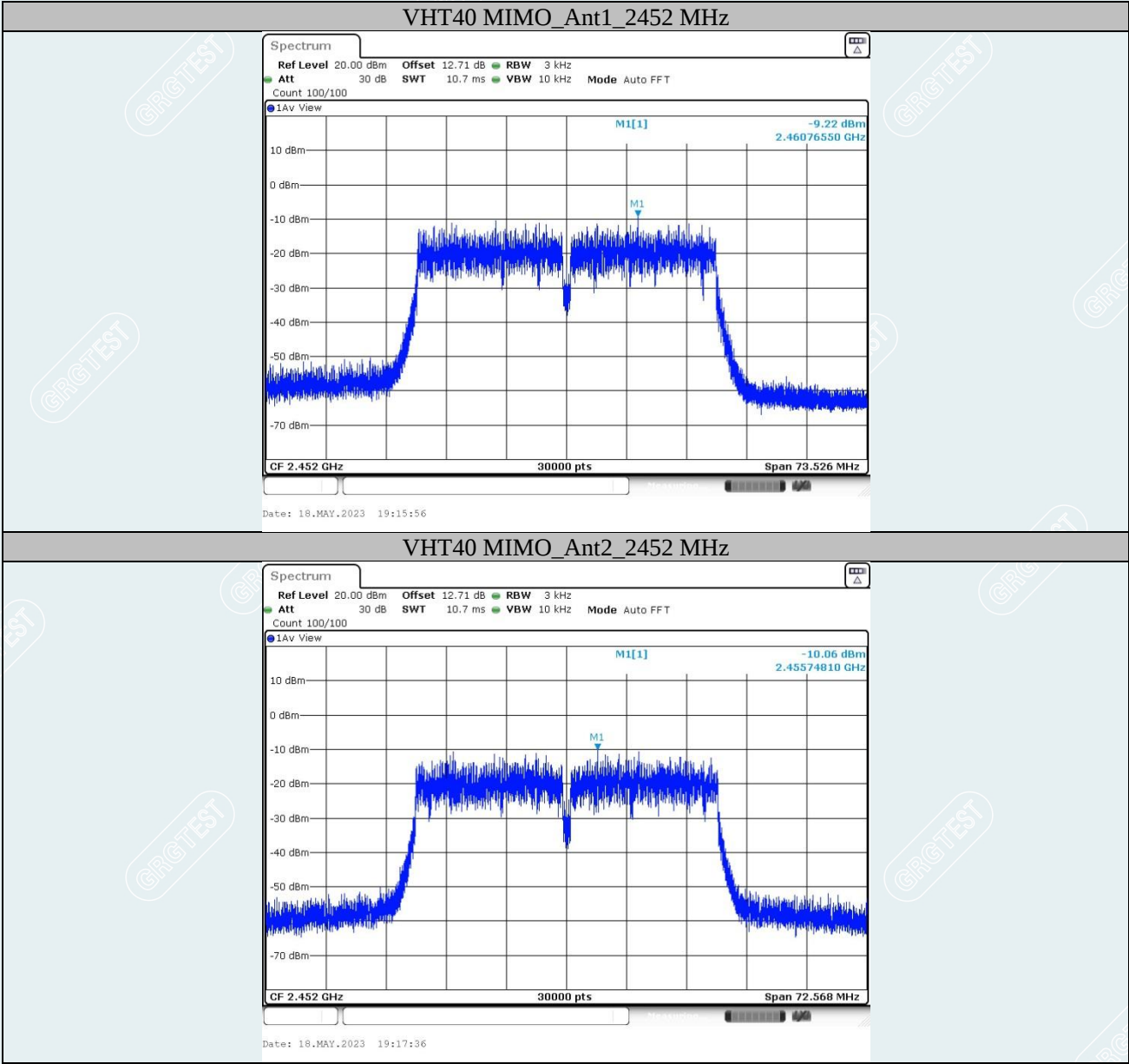


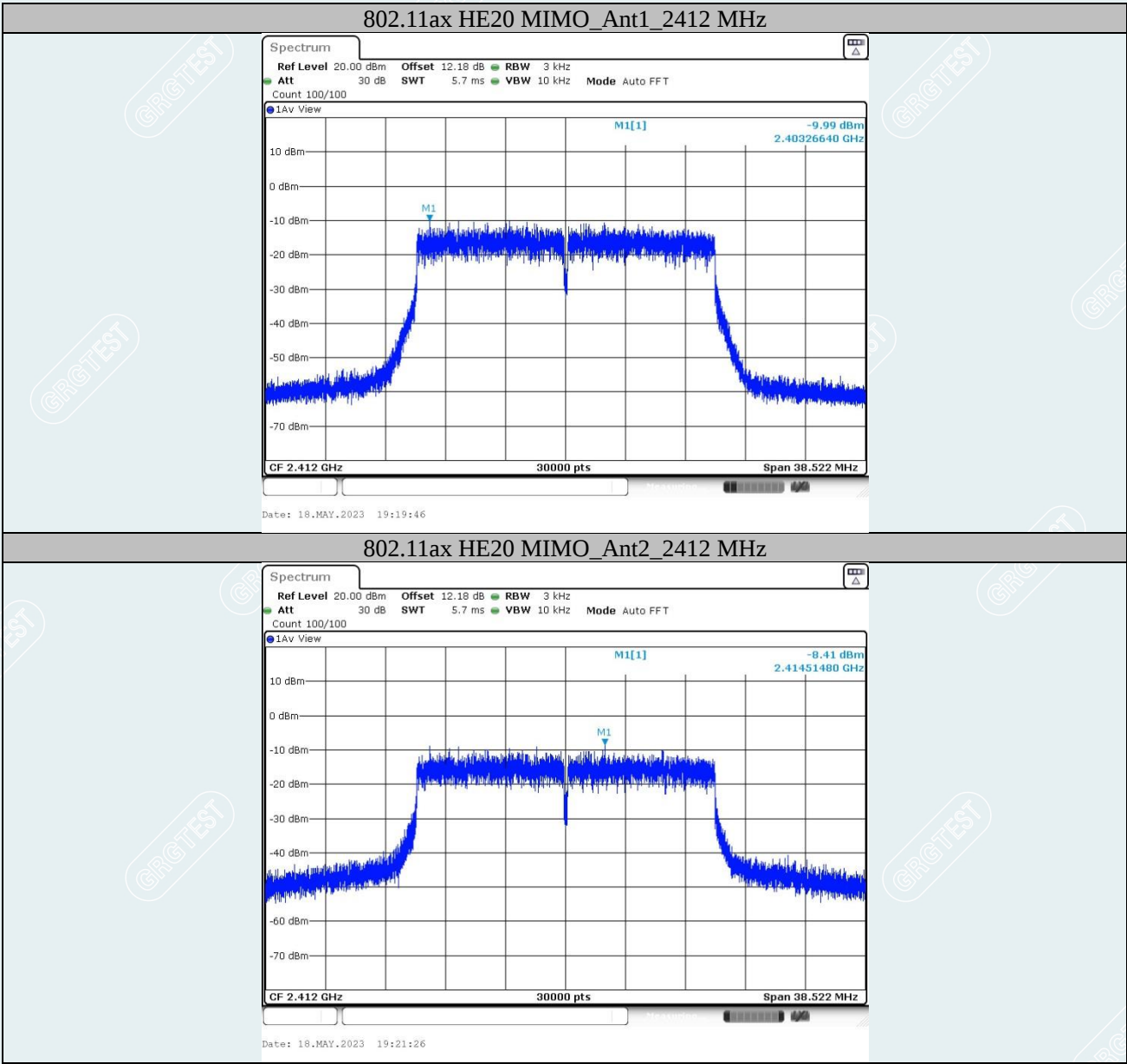


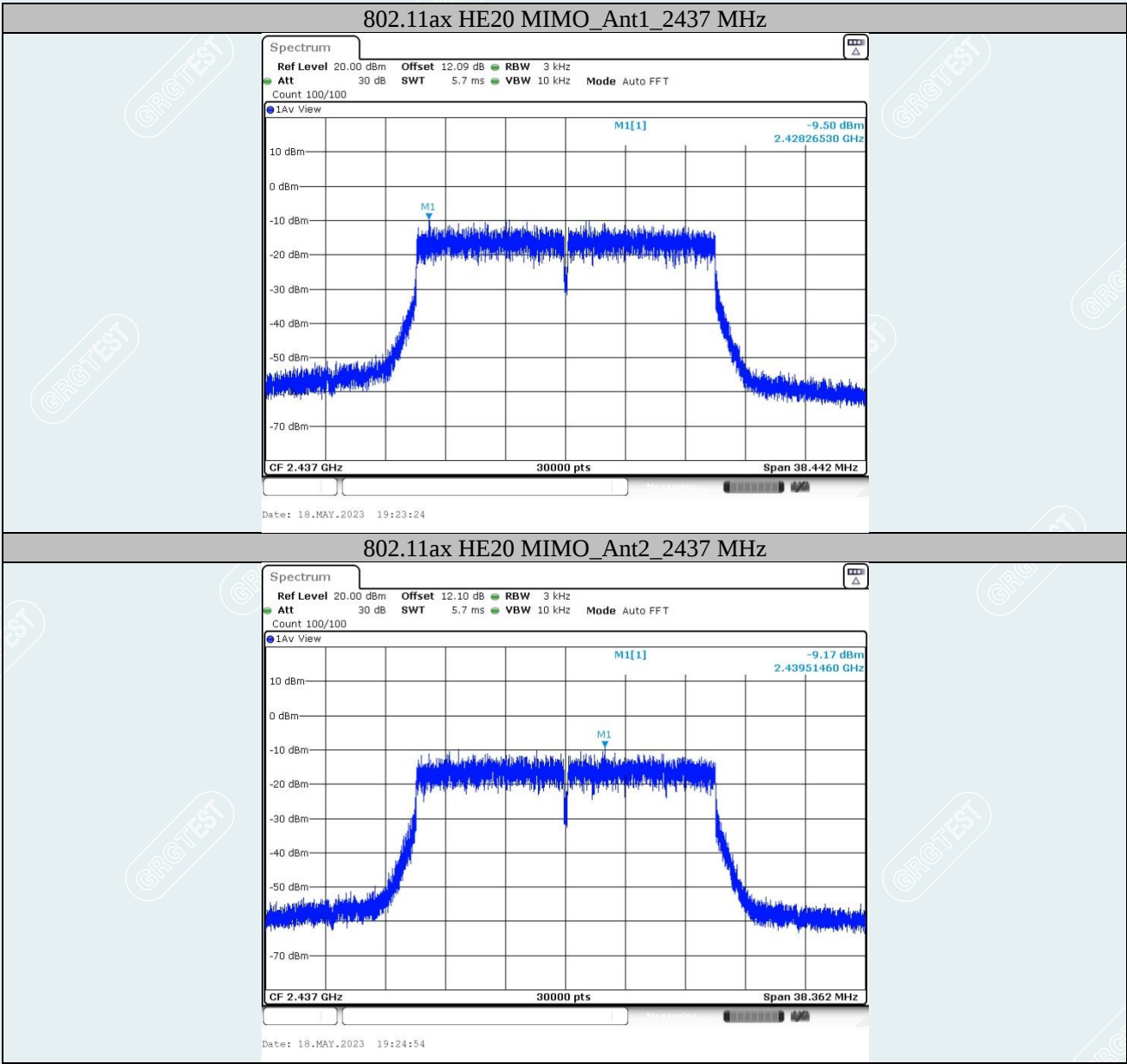


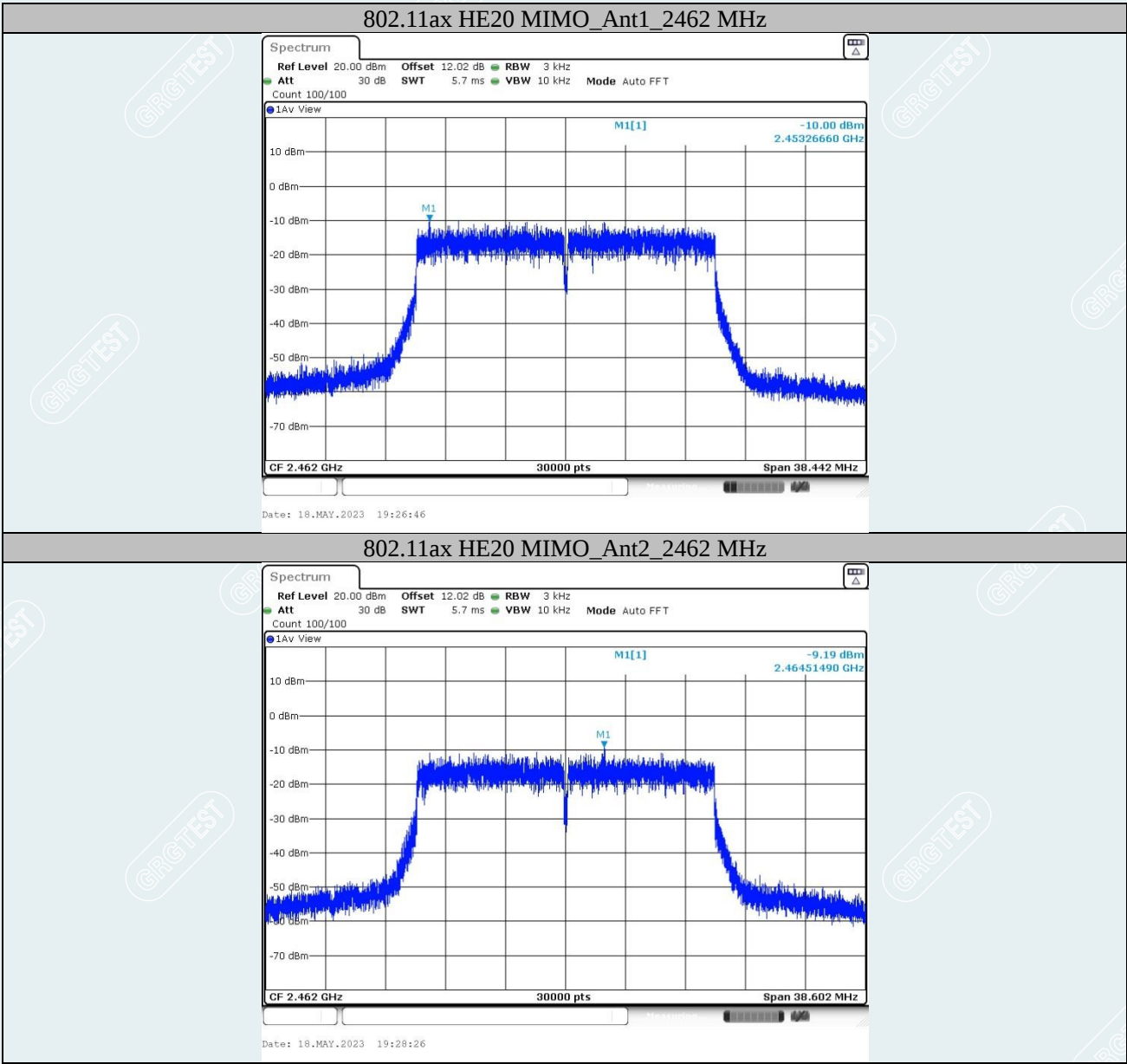


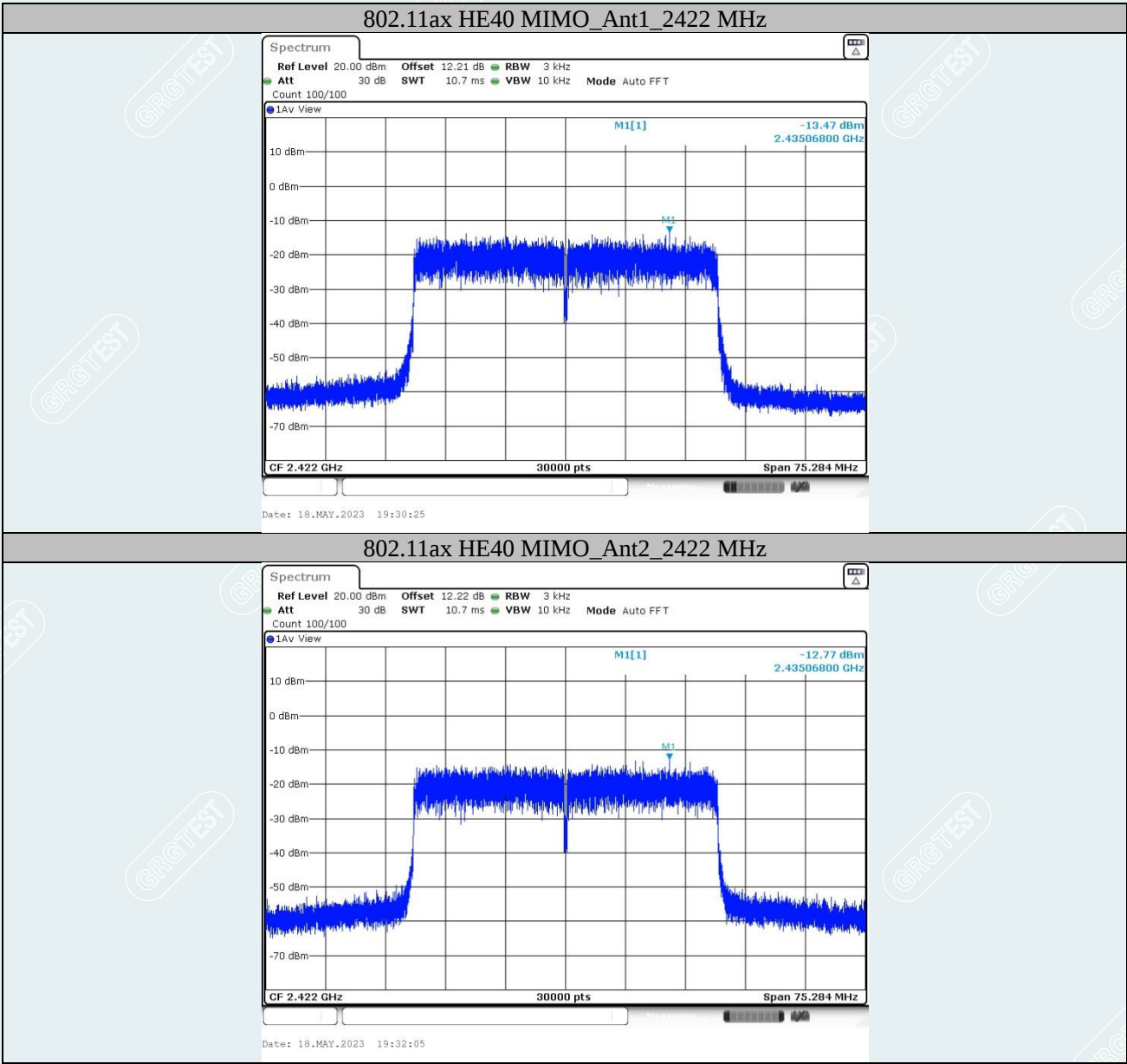


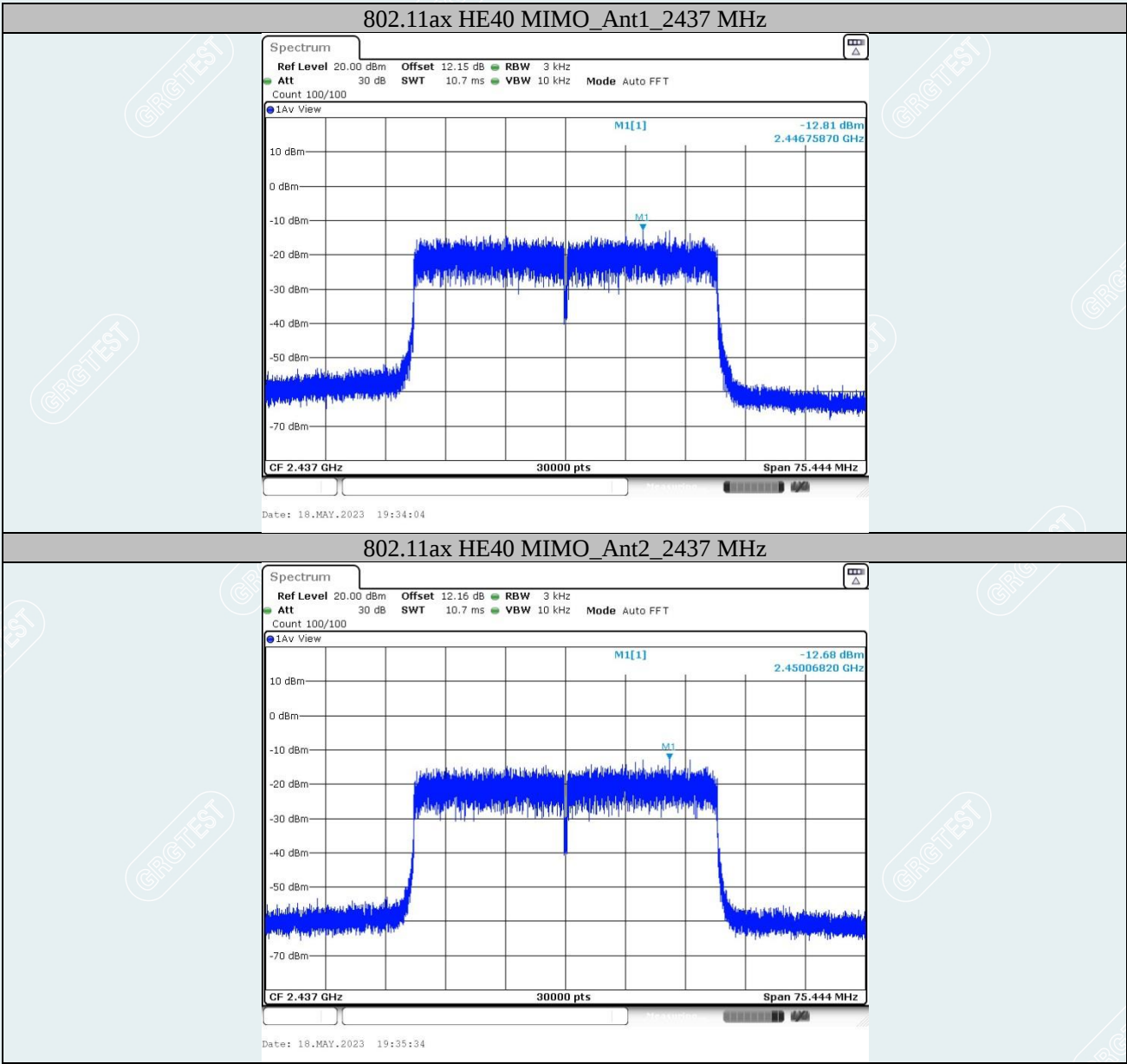


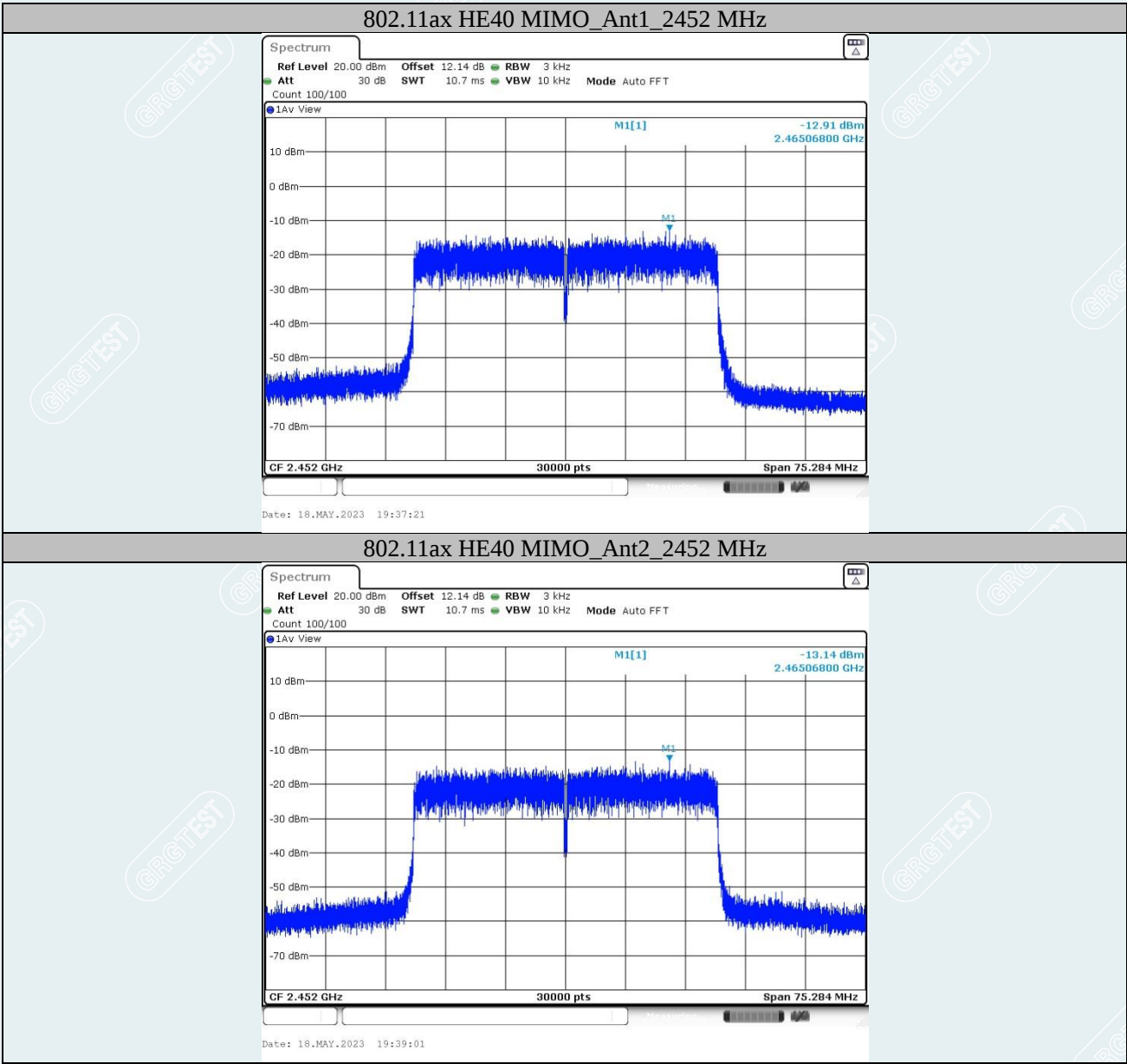












Environment: 22.5°C/54%RH/101.0kPa
 Tested By:Huang Tianmei
 Non Beamforming-SDM

Voltage:AC120V/60Hz
 Date: 2023-05-18

TestMode	Antenna	Frequency [MHz]	PSD (dBm/3kHz)	Duty Factor	Total PSD with Duty Factor (dBm/3kHz)	Limit[dBm/3kHz]	Verdict
802.11n HT20 MIMO	Ant1	2412	-6.12	2.48	-3.64	≤8.00	PASS
	Ant2	2412	-4.98	2.48	-2.50	≤8.00	PASS
	total	2412	-2.50	2.48	-0.02	≤8.00	PASS
	Ant1	2437	-5.70	2.48	-3.22	≤8.00	PASS
	Ant2	2437	-5.18	2.48	-2.70	≤8.00	PASS
	total	2437	-2.42	2.48	0.06	≤8.00	PASS
	Ant1	2462	-6.07	2.48	-3.59	≤8.00	PASS
	Ant2	2462	-5.16	2.48	-2.68	≤8.00	PASS
	total	2462	-2.58	2.48	-0.10	≤8.00	PASS
802.11n HT40 MIMO	Ant1	2422	-9.87	2.81	-7.06	≤8.00	PASS
	Ant2	2422	-9.23	2.81	-6.42	≤8.00	PASS
	total	2422	-6.53	2.81	-3.72	≤8.00	PASS
	Ant1	2437	-10.13	2.81	-7.32	≤8.00	PASS
	Ant2	2437	-9.15	2.81	-6.34	≤8.00	PASS
	total	2437	-6.60	2.81	-3.79	≤8.00	PASS
	Ant1	2452	-10.4	2.81	-7.59	≤8.00	PASS
	Ant2	2452	-10.17	2.81	-7.36	≤8.00	PASS
	total	2452	-7.27	2.81	-4.46	≤8.00	PASS
VHT20 MIMO	Ant1	2412	-4.47	0.79	-3.68	≤8.00	PASS
	Ant2	2412	-4.74	0.79	-3.95	≤8.00	PASS
	total	2412	-1.59	0.79	-0.80	≤8.00	PASS
	Ant1	2437	-3.38	0.79	-2.59	≤8.00	PASS
	Ant2	2437	-4.74	0.79	-3.95	≤8.00	PASS
	total	2437	-1.00	0.79	-0.21	≤8.00	PASS
	Ant1	2462	-4.52	0.79	-3.73	≤8.00	PASS
	Ant2	2462	-4.63	0.79	-3.84	≤8.00	PASS
	total	2462	-1.56	0.79	-0.77	≤8.00	PASS
VHT40 MIMO	Ant1	2422	-10.39	0.90	-9.49	≤8.00	PASS
	Ant2	2422	-10.12	0.90	-9.22	≤8.00	PASS
	total	2422	-7.24	0.90	-6.34	≤8.00	PASS
	Ant1	2437	-10.26	0.90	-9.36	≤8.00	PASS
	Ant2	2437	-10.52	0.90	-9.62	≤8.00	PASS
	total	2437	-7.38	0.90	-6.48	≤8.00	PASS
	Ant1	2452	-10.84	0.90	-9.94	≤8.00	PASS
	Ant2	2452	-10.42	0.90	-9.52	≤8.00	PASS
	total	2452	-7.61	0.90	-6.71	≤8.00	PASS

802.11ax HE20 MIMO	Ant1	2412	-7.34	0.39	-6.95	≤ 8.00	PASS
	Ant2	2412	-8.65	0.39	-8.26	≤ 8.00	PASS
	total	2412	-4.94	0.39	-4.55	≤ 8.00	PASS
	Ant1	2437	-6.89	0.39	-6.5	≤ 8.00	PASS
	Ant2	2437	-8.68	0.39	-8.29	≤ 8.00	PASS
	total	2437	-4.68	0.39	-4.29	≤ 8.00	PASS
	Ant1	2462	-7.96	0.39	-7.57	≤ 8.00	PASS
	Ant2	2462	-8.81	0.39	-8.42	≤ 8.00	PASS
	total	2462	-5.35	0.39	-4.96	≤ 8.00	PASS
802.11ax HE40 MIMO	Ant1	2422	-13.88	0.54	-13.34	≤ 8.00	PASS
	Ant2	2422	-13.35	0.54	-12.81	≤ 8.00	PASS
	total	2422	-10.60	0.54	-10.06	≤ 8.00	PASS
	Ant1	2437	-13.97	0.54	-13.43	≤ 8.00	PASS
	Ant2	2437	-13.3	0.54	-12.76	≤ 8.00	PASS
	total	2437	-10.61	0.54	-10.07	≤ 8.00	PASS
	Ant1	2452	-14.24	0.54	-13.70	≤ 8.00	PASS
	Ant2	2452	-13.17	0.54	-12.63	≤ 8.00	PASS
	total	2452	-10.66	0.54	-10.12	≤ 8.00	PASS

Note

1. The measured results were corrected by duty cycle factor (section 2.8)
2. This EUT supports MIMO 2X2, any transmit signals are correlated with each other. for Power Spectral Density measurements on IEEE 802.11 devices. According to the calculation of SDM independent spatial stream formula, Directional gain = $G_{ANTMAX} + 10 \log(N_{ANT}/N_{SS})$ dBi, where $N_{SS}=2$, $N_{ANT}=2$, Directional gain = $3.97 + 10 \log(2/2)$ dBi = 3.97 dBi, So do not consider the limit rollback.

----- The following blanks -----

