

Appendix: Bluetooth Classic

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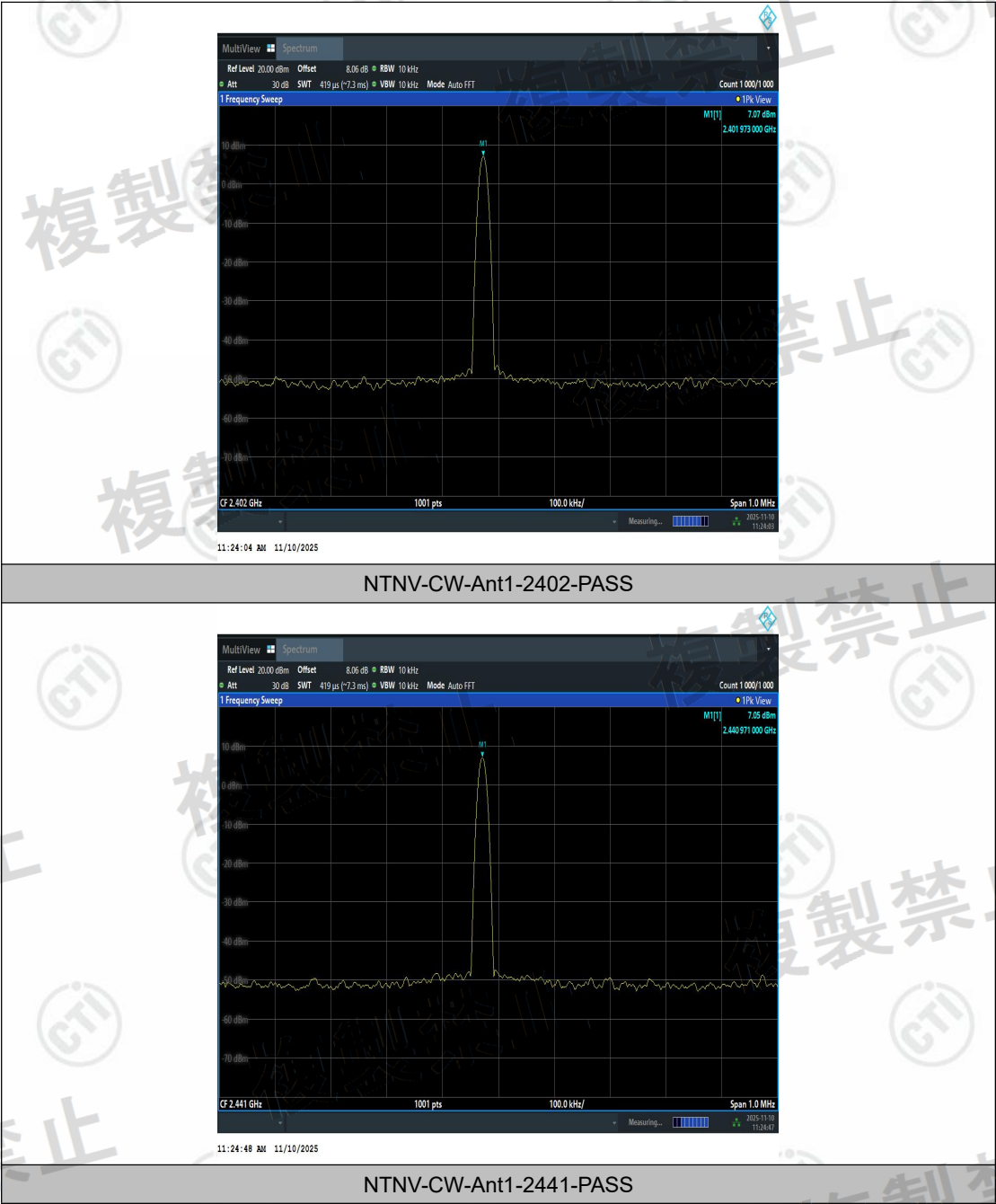
Appendix A: Frequency_Error

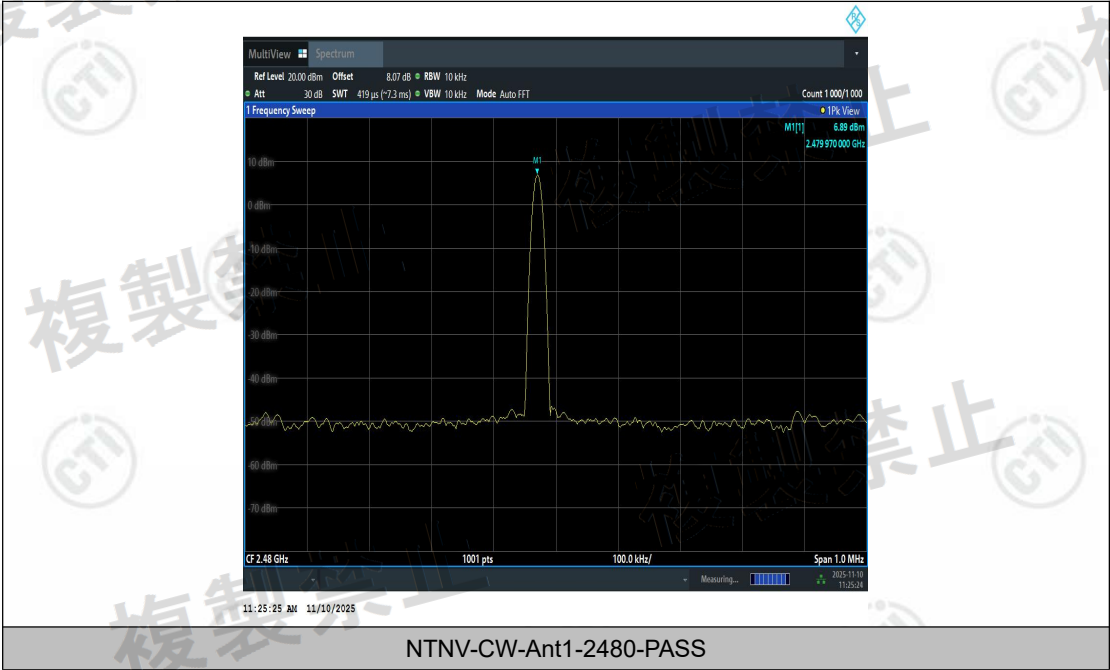
Test Result

Test Condition	Test Mode	Antenna	Frequency[MHz]	CenterFreq [MHz]	Result[ppm]	Limit[ppm]	Verdict
NTNV	CW	Ant1	2402	2401.973	-11.24063	±50	PASS
NTNV	CW	Ant1	2441	2440.971	-11.88038	±50	PASS
NTNV	CW	Ant1	2480	2479.97	-12.09677	±50	PASS

Note: Result[ppm]= (CenterFreq - Channel)/Channel*1000000

Test Graphs





Appendix B: Antenna Power

Test Result

Test	Test	Antenna	Frequency	Conducted Sensor power[dBm]	SpreadBW [mMHz]	Duty Cycle [%]	Result [mW/MHz]	Limit [mW/MHz]	Verdict
NTNV	DH5	Ant1	Hop	15.15	71.11	76.53	0.602	≤3	PASS
NTNV	2DH5	Ant1	Hop	10.83	71.087	76.8	0.222	≤3	PASS
NTHV	3DH5	Ant1	Hop	10.37	71.337	76.8	0.199	≤3	PASS

Test	Test	Antenna	Freq(MHz)	Power [mW/MHz]	RatedPower [mW/MHz]	Result (%)	Limit (%)	Verdict
NTNV	DH5	Ant1	Hop	0.602	0.6	0.250	NA, +20	PASS
NTNV	2DH5	Ant1	Hop	0.222	0.3	-26.086	NA, +20	PASS
NTNV	3DH5	Ant1	Hop	0.199	0.3	-33.747	NA, +20	PASS

Test Condition	Test Mode	Antenna	Freq (MHz)	Result(dBm/MHz)	Gain	EIRP(dBm/MHz)	Limit(dBm/MHz)	Verdict
NTNV	DH5	Ant1	Hop	-2.208	2.63	0.422	≤6.91	PASS
NTNV	2DH5	Ant1	Hop	-6.542	2.63	-3.912	≤6.91	PASS
NTNV	3DH5	Ant1	Hop	-7.017	2.63	-4.387	≤6.91	PASS

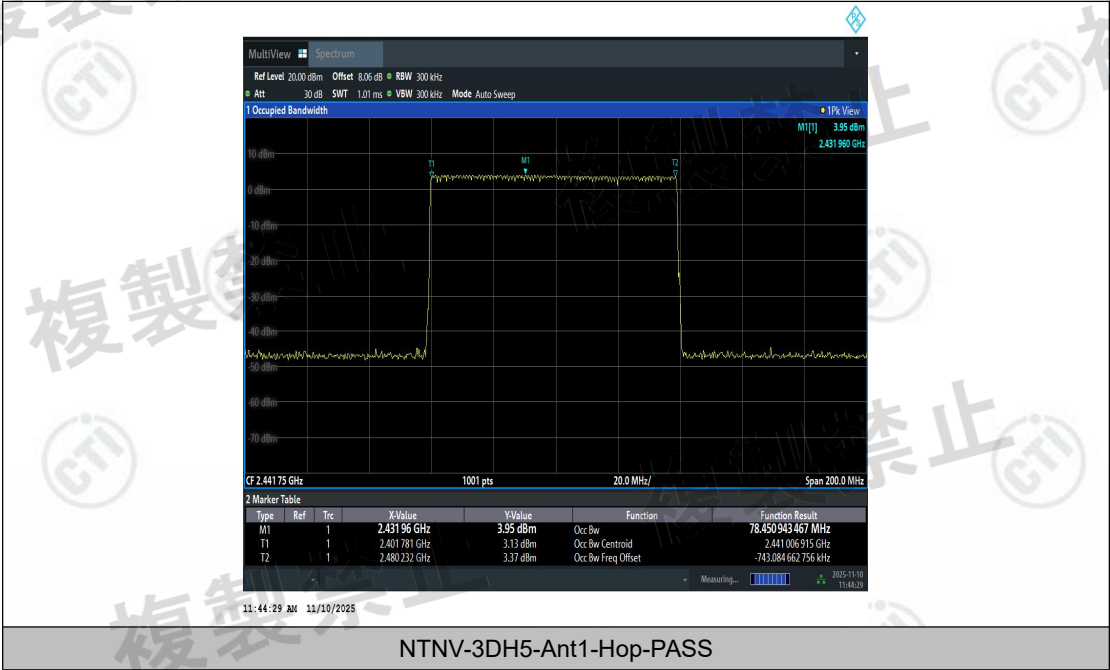
Appendix C: Occupied Bandwidth

Test Result

Test Condition	Test Mode	Antenna	Frequency[MHz]	Result [MHz]	Limit [MHz]	Verdict
NTNV	DH5	Ant1	Hop	78.188	≤83.5	PASS
NTNV	2DH5	Ant1	Hop	78.369	≤83.5	PASS
NTNV	3DH5	Ant1	Hop	78.451	≤83.5	PASS

Test Graphs



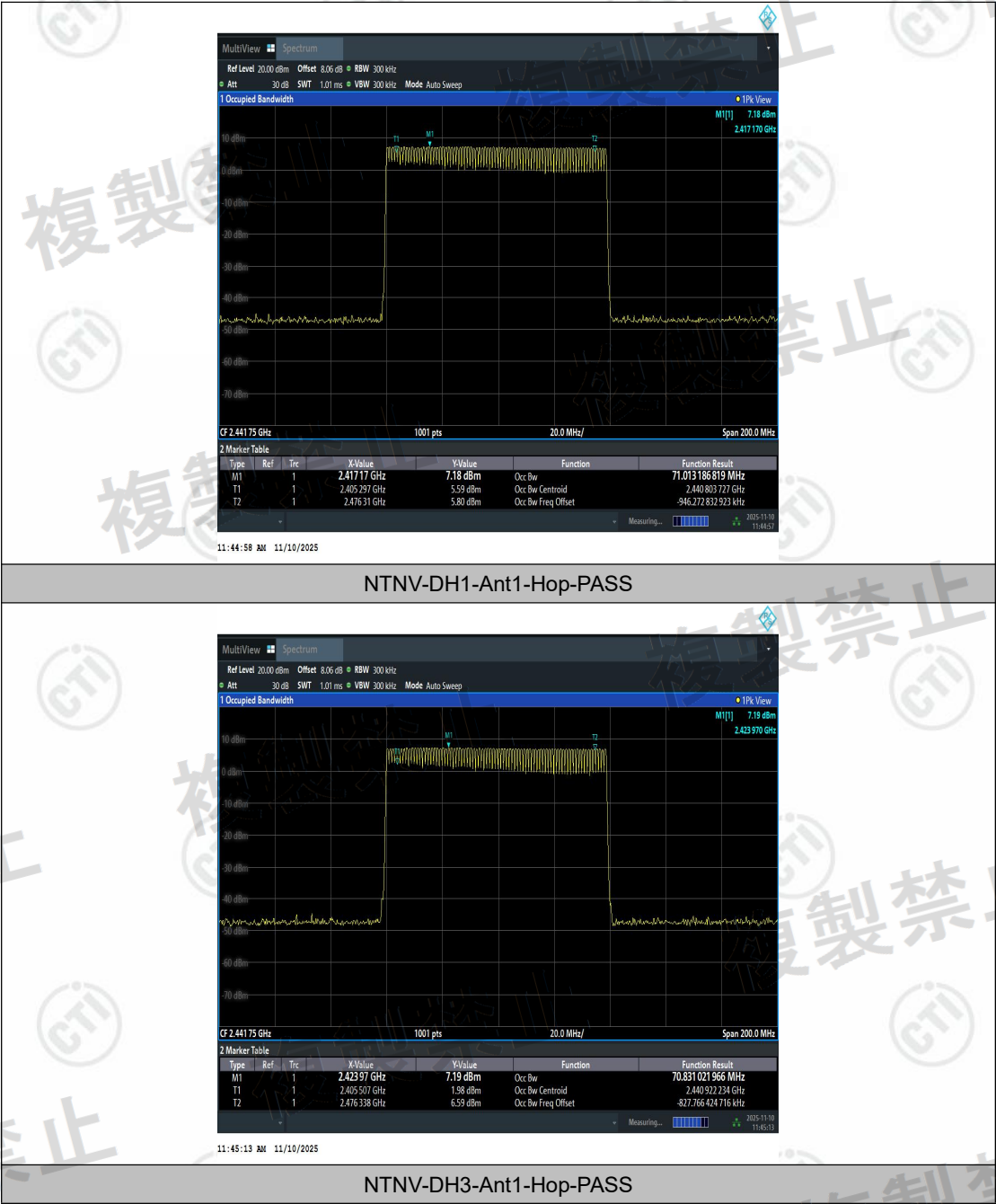


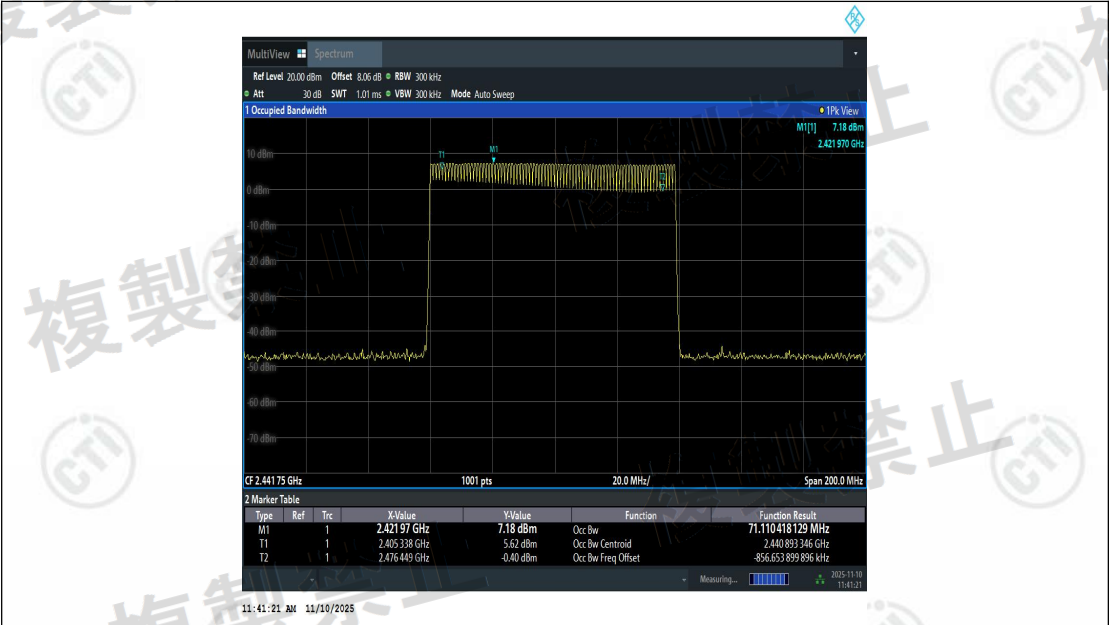
Appendix D: Spread Bandwidth

Test Result

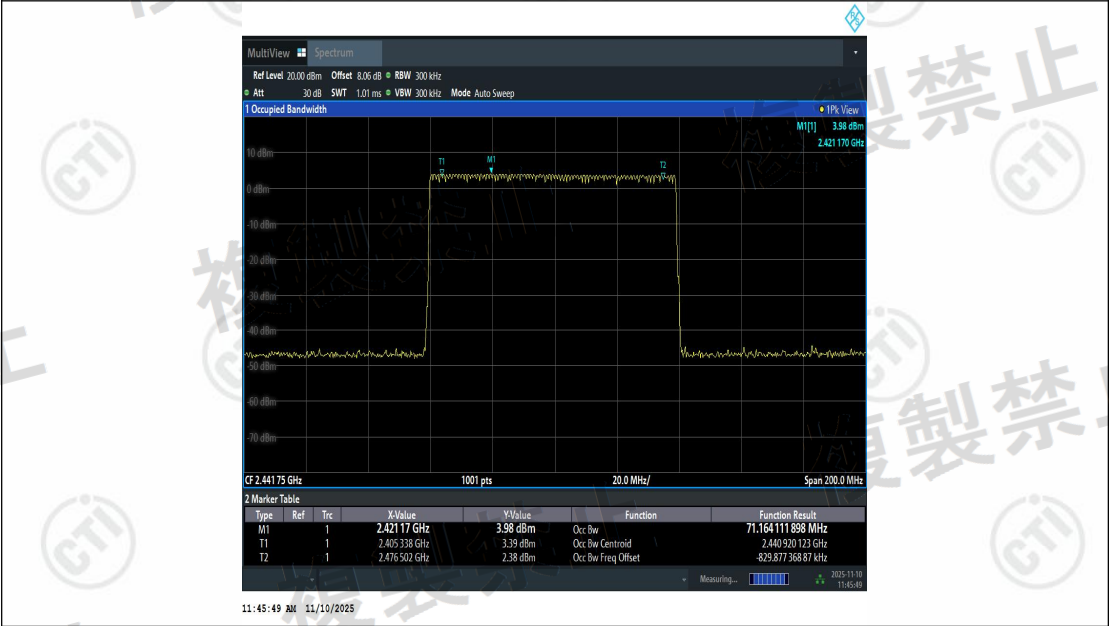
Test Condition	Test Mode	Antenna	Frequency[MHz]	Result [MHz]
NTNV	DH1	Ant1	Hop	71.013
NTNV	DH3	Ant1	Hop	70.831
NTNV	DH5	Ant1	Hop	71.110
NTNV	2DH1	Ant1	Hop	71.164
NTNV	2DH3	Ant1	Hop	71.224
NTNV	2DH5	Ant1	Hop	71.087
NTNV	3DH1	Ant1	Hop	71.283
NTNV	3DH3	Ant1	Hop	71.224
NTNV	3DH5	Ant1	Hop	71.337

Test Graphs





NTNV-DH5-Ant1-Hop-PASS



NTNV-2DH1-Ant1-Hop-PASS

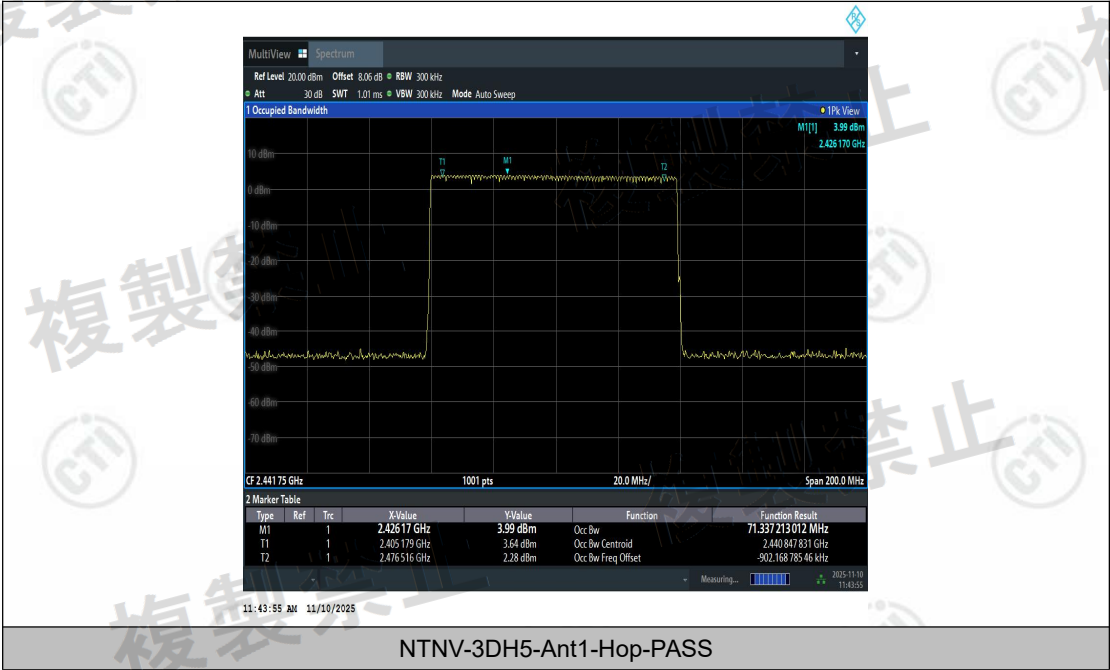


NTVN-2DH3-Ant1-Hop-PASS



NTVN-2DH5-Ant1-Hop-PASS





Appendix E: Unwanted Emission Strength

Test Result

Test Condition	Test Mode	Antenna	Frequency [MHz]	Freq.Range [MHz]	Freq [MHz]	Result [dBm/MHz]	Result [μ W/MHz]	Limit [μ W/MHz]	Verdict
NTNV	DH5	Ant1	2402	30~1000	800.67	-45.56	0.02780	≤ 2.5	PASS
NTNV	DH5	Ant1	2402	1000~2387	2306.55	-37.52	0.17701	≤ 2.5	PASS
NTNV	DH5	Ant1	2402	2387~2400	2399.99	-27.07	1.96336	≤ 25	PASS
NTNV	DH5	Ant1	2402	2483.5~2496.5	2483.59	-37.66	0.17140	≤ 25	PASS
NTNV	DH5	Ant1	2402	2496.5~13000	3202.34	-38.43	0.14355	≤ 2.5	PASS
NTNV	DH5	Ant1	2441	30~1000	813.76	-45.82	0.02618	≤ 2.5	PASS
NTNV	DH5	Ant1	2441	1000~2387	2375.21	-37.29	0.18664	≤ 2.5	PASS
NTNV	DH5	Ant1	2441	2387~2400	2397.71	-37.86	0.16368	≤ 25	PASS
NTNV	DH5	Ant1	2441	2483.5~2496.5	2492.70	-38.15	0.15311	≤ 25	PASS
NTNV	DH5	Ant1	2441	2496.5~13000	3254.85	-39.07	0.12388	≤ 2.5	PASS
NTNV	DH5	Ant1	2480	30~1000	826.61	-45.27	0.02972	≤ 2.5	PASS
NTNV	DH5	Ant1	2480	1000~2387	1653.28	-36.85	0.20654	≤ 2.5	PASS
NTNV	DH5	Ant1	2480	2387~2400	2388.66	-38.22	0.15066	≤ 25	PASS
NTNV	DH5	Ant1	2480	2483.5~2496.5	2485.58	-38.30	0.14791	≤ 25	PASS
NTNV	DH5	Ant1	2480	2496.5~13000	3306.32	-38.84	0.13062	≤ 2.5	PASS
NTNV	DH5	Ant1	Hop	30~1000	38.97	-66.24	0.00024	≤ 2.5	PASS
NTNV	DH5	Ant1	Hop	1000~2387	2283.32	-42.22	0.05998	≤ 2.5	PASS
NTNV	DH5	Ant1	Hop	2387~2400	2399.68	-41.80	0.06607	≤ 25	PASS
NTNV	DH5	Ant1	Hop	2483.5~2496.5	2486.45	-43.38	0.04592	≤ 25	PASS
NTNV	DH5	Ant1	Hop	2496.5~13000	4827.75	-49.93	0.01016	≤ 2.5	PASS
NTNV	2DH5	Ant1	2402	30~1000	800.67	-46.76	0.02109	≤ 2.5	PASS
NTNV	2DH5	Ant1	2402	1000~2387	2286.44	-37.70	0.16982	≤ 2.5	PASS
NTNV	2DH5	Ant1	2402	2387~2400	2399.99	-22.07	6.20869	≤ 25	See table below
NTNV	2DH5	Ant1	2402	2483.5~2496.5	2486.60	-38.20	0.15136	≤ 25	PASS
NTNV	2DH5	Ant1	2402	2496.5~13000	3202.34	-40.20	0.09550	≤ 2.5	PASS
NTNV	2DH5	Ant1	2441	30~1000	813.76	-46.77	0.02104	≤ 2.5	PASS
NTNV	2DH5	Ant1	2441	1000~2387	2142.89	-37.28	0.18707	≤ 2.5	PASS
NTNV	2DH5	Ant1	2441	2387~2400	2394.94	-37.87	0.16331	≤ 25	PASS
NTNV	2DH5	Ant1	2441	2483.5~2496.5	2486.84	-38.27	0.14894	≤ 25	PASS
NTNV	2DH5	Ant1	2441	2496.5~13000	3254.33	-40.30	0.09333	≤ 2.5	PASS
NTNV	2DH5	Ant1	2480	30~1000	826.61	-46.61	0.02183	≤ 2.5	PASS
NTNV	2DH5	Ant1	2480	1000~2387	2338.46	-37.36	0.18365	≤ 2.5	PASS

NTNV	2DH5	Ant1	2480	2387~2400	2393.10	-38.22	0.15066	≤25	PASS
NTNV	2DH5	Ant1	2480	2483.5~2496.5	2495.77	-38.39	0.14488	≤25	PASS
NTNV	2DH5	Ant1	2480	2496.5~13000	3306.32	-40.89	0.08147	≤2.5	PASS
NTNV	2DH5	Ant1	Hop	30~1000	42.37	-67.42	0.00018	≤2.5	PASS
NTNV	2DH5	Ant1	Hop	1000~2387	2154.33	-42.36	0.05808	≤2.5	PASS
NTNV	2DH5	Ant1	Hop	2387~2400	2399.99	-33.81	0.41591	≤25	PASS
NTNV	2DH5	Ant1	Hop	2483.5~2496.5	2486.15	-42.88	0.05152	≤25	PASS
NTNV	2DH5	Ant1	Hop	2496.5~13000	4833.53	-50.45	0.00902	≤2.5	PASS
NTNV	3DH5	Ant1	2402	30~1000	800.67	-46.51	0.02234	≤2.5	PASS
NTNV	3DH5	Ant1	2402	1000~2387	2270.15	-37.70	0.16982	≤2.5	PASS
NTNV	3DH5	Ant1	2402	2387~2400	2400	-22.03	6.26614	≤25	See table below
NTNV	3DH5	Ant1	2402	2483.5~2496.5	2493.57	-38.25	0.14962	≤25	PASS
NTNV	3DH5	Ant1	2402	2496.5~13000	3202.34	-40.45	0.09016	≤2.5	PASS
NTNV	3DH5	Ant1	2441	30~1000	813.76	-47.08	0.01959	≤2.5	PASS
NTNV	3DH5	Ant1	2441	1000~2387	1882.13	-37.79	0.16634	≤2.5	PASS
NTNV	3DH5	Ant1	2441	2387~2400	2396.30	-38.11	0.15453	≤25	PASS
NTNV	3DH5	Ant1	2441	2483.5~2496.5	2495.54	-38.17	0.15241	≤25	PASS
NTNV	3DH5	Ant1	2441	2496.5~13000	3254.33	-40.81	0.08299	≤2.5	PASS
NTNV	3DH5	Ant1	2480	30~1000	826.86	-47.12	0.01941	≤2.5	PASS
NTNV	3DH5	Ant1	2480	1000~2387	2198.02	-37.72	0.16904	≤2.5	PASS
NTNV	3DH5	Ant1	2480	2387~2400	2397.95	-38.28	0.14859	≤25	PASS
NTNV	3DH5	Ant1	2480	2483.5~2496.5	2483.72	-38.28	0.14859	≤25	PASS
NTNV	3DH5	Ant1	2480	2496.5~13000	3306.32	-40.39	0.09141	≤2.5	PASS
NTNV	3DH5	Ant1	Hop	30~1000	34.12	-66.08	0.00025	≤2.5	PASS
NTNV	3DH5	Ant1	Hop	1000~2387	2054.47	-42.27	0.05929	≤2.5	PASS
NTNV	3DH5	Ant1	Hop	2387~2400	2400.00	-34.09	0.38994	≤25	PASS
NTNV	3DH5	Ant1	Hop	2483.5~2496.5	2484.66	-42.99	0.05023	≤25	PASS
NTNV	3DH5	Ant1	Hop	2496.5~13000	4871.87	-50.51	0.00889	≤2.5	PASS

Test Result_Step2

Test Condition	Test Mode	Antenna	Frequency [MHz]	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [μW]	Limit [μW]	Verdict
NTNV	2DH5	Ant1	2402	2399.99	-30.54	≤-16	0.88308	≤25	PASS
NTNV	3DH5	Ant1	2402	2400.00	-30.67	≤-16	0.85704	≤25	PASS

Note:

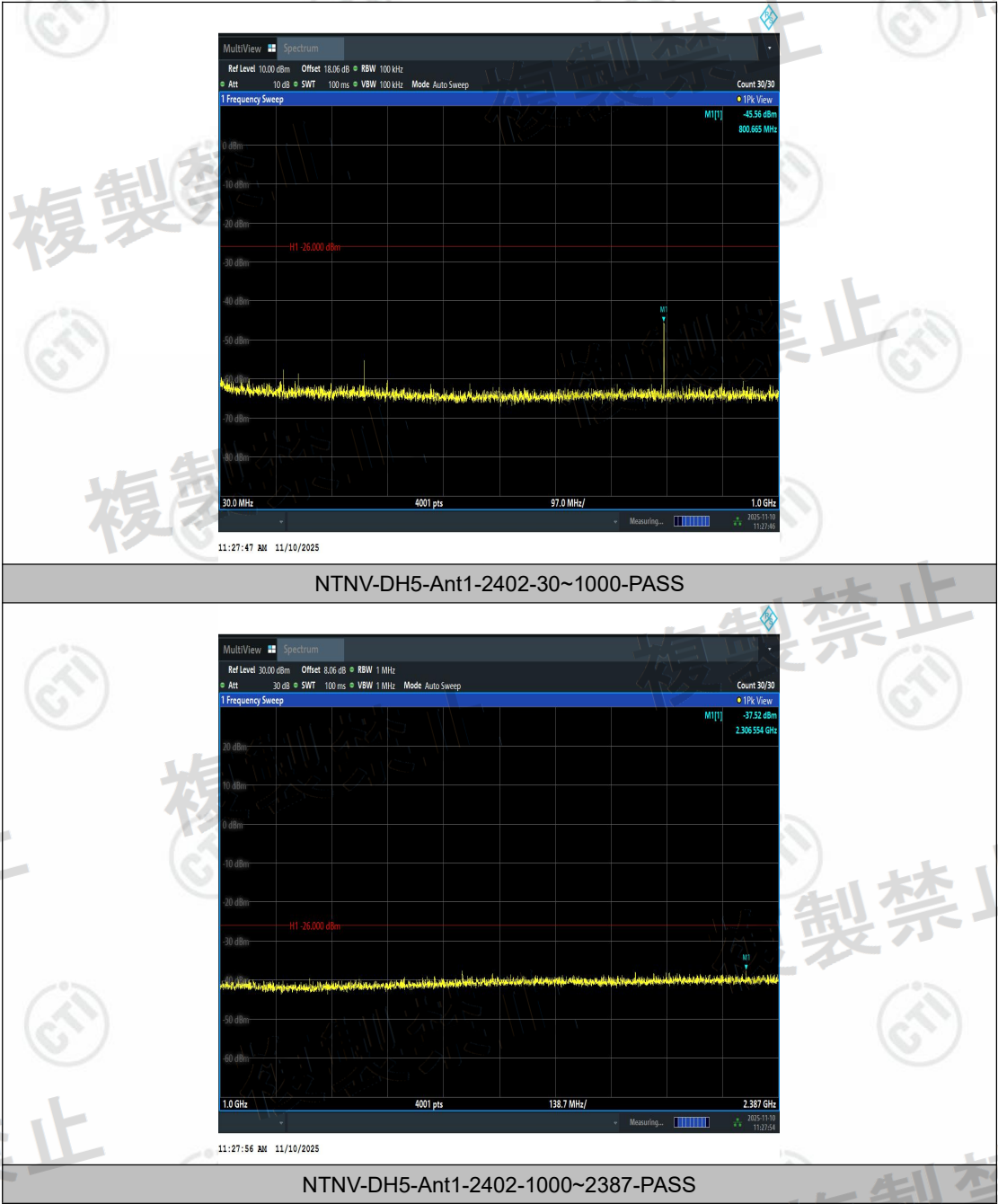
$\text{dBm}/1\text{MHz} = \text{dBm}/100\text{kHz} + 10 \times \log_{10} (1\text{MHz}/100\text{kHz})$

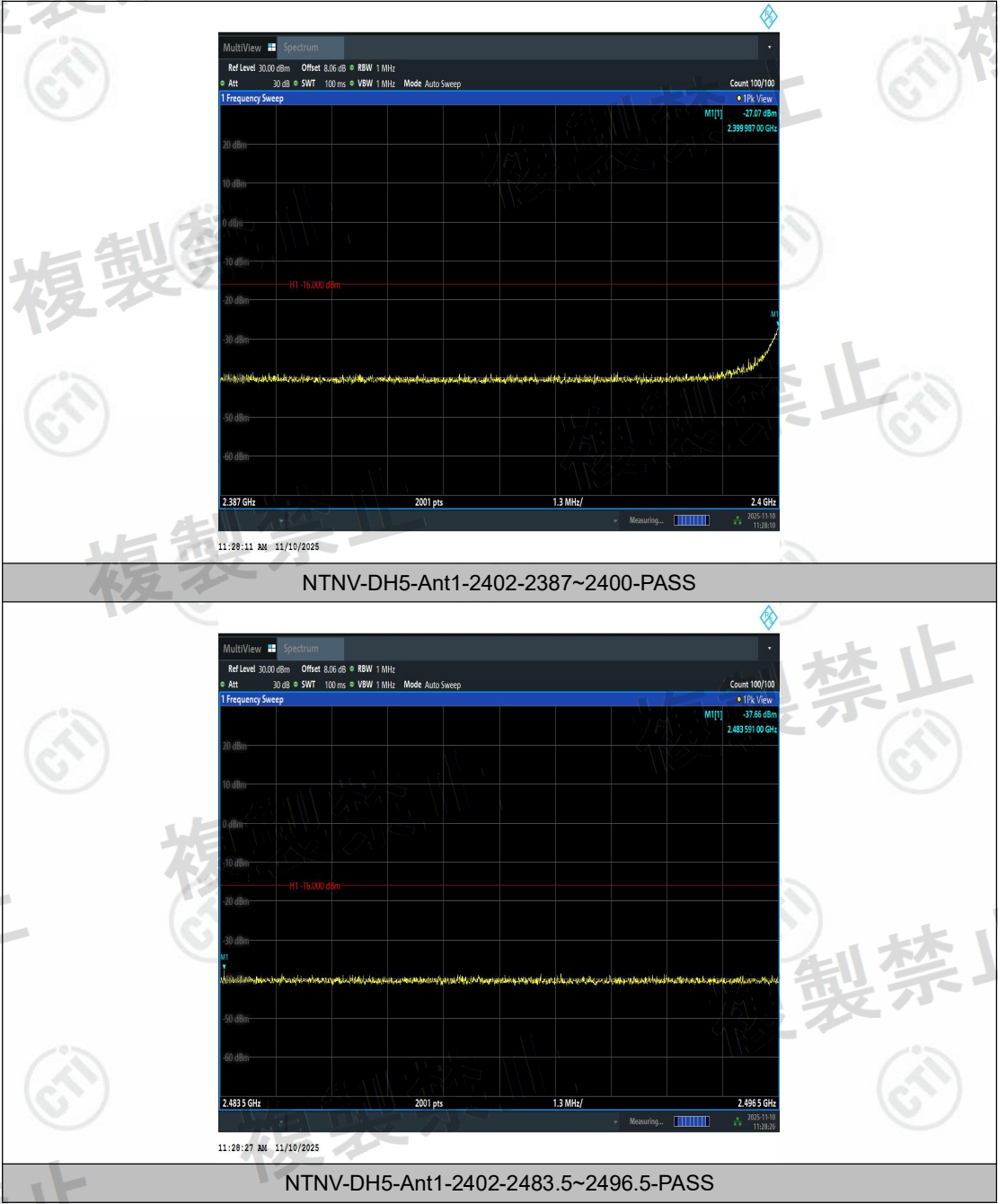
$\text{dBm}/1\text{MHz} = \text{dBm}/100\text{kHz} + 10$

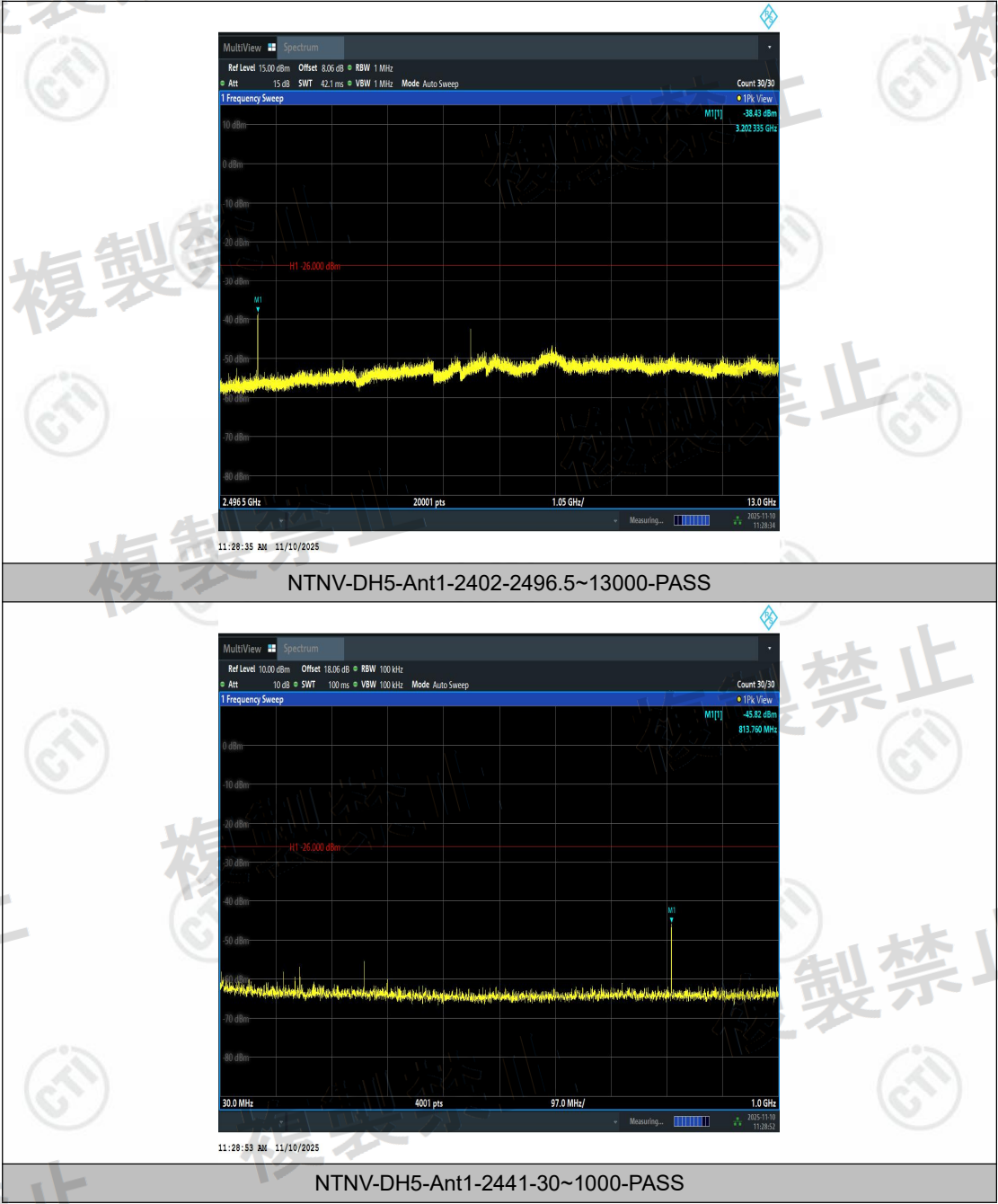
During the 30M-1000M testing process, a 10 dB factor was added for the test.

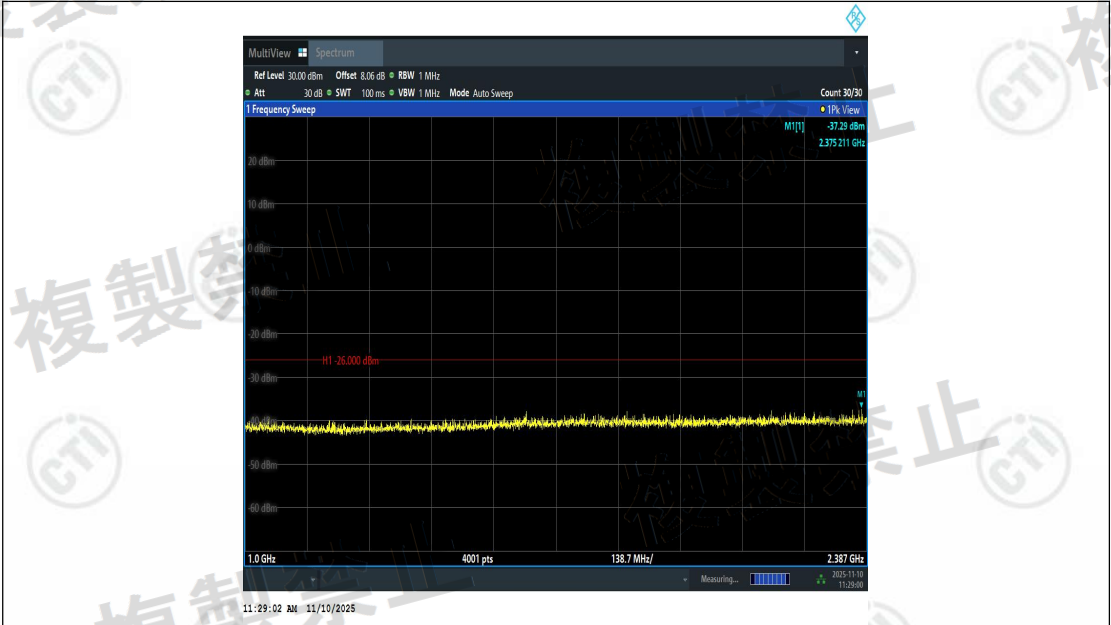
All tests have increased the Gain.

Test Graphs

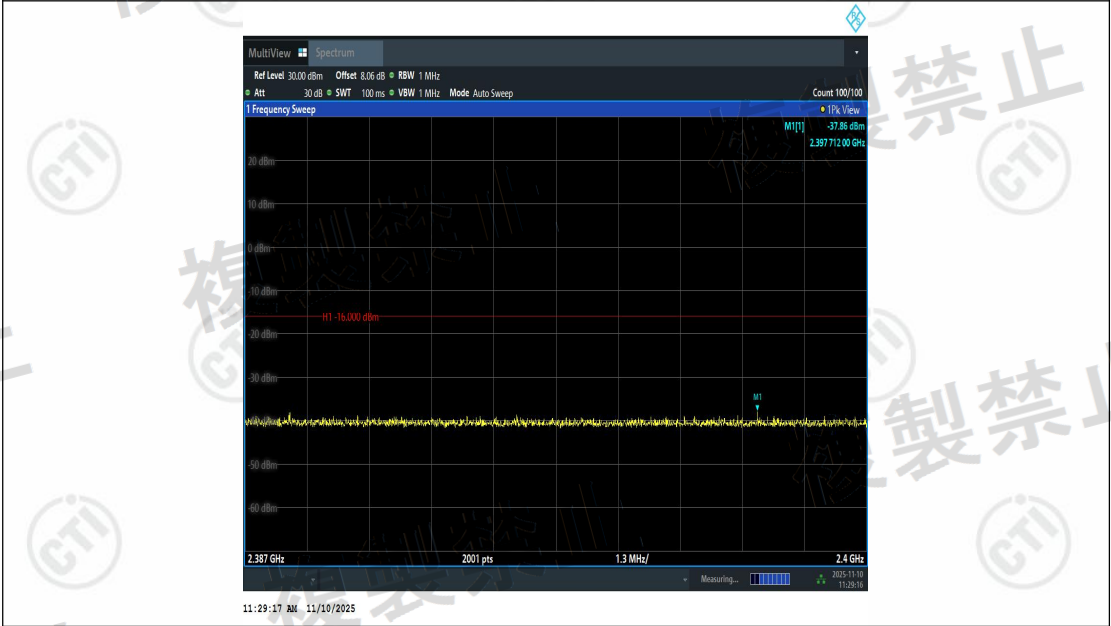




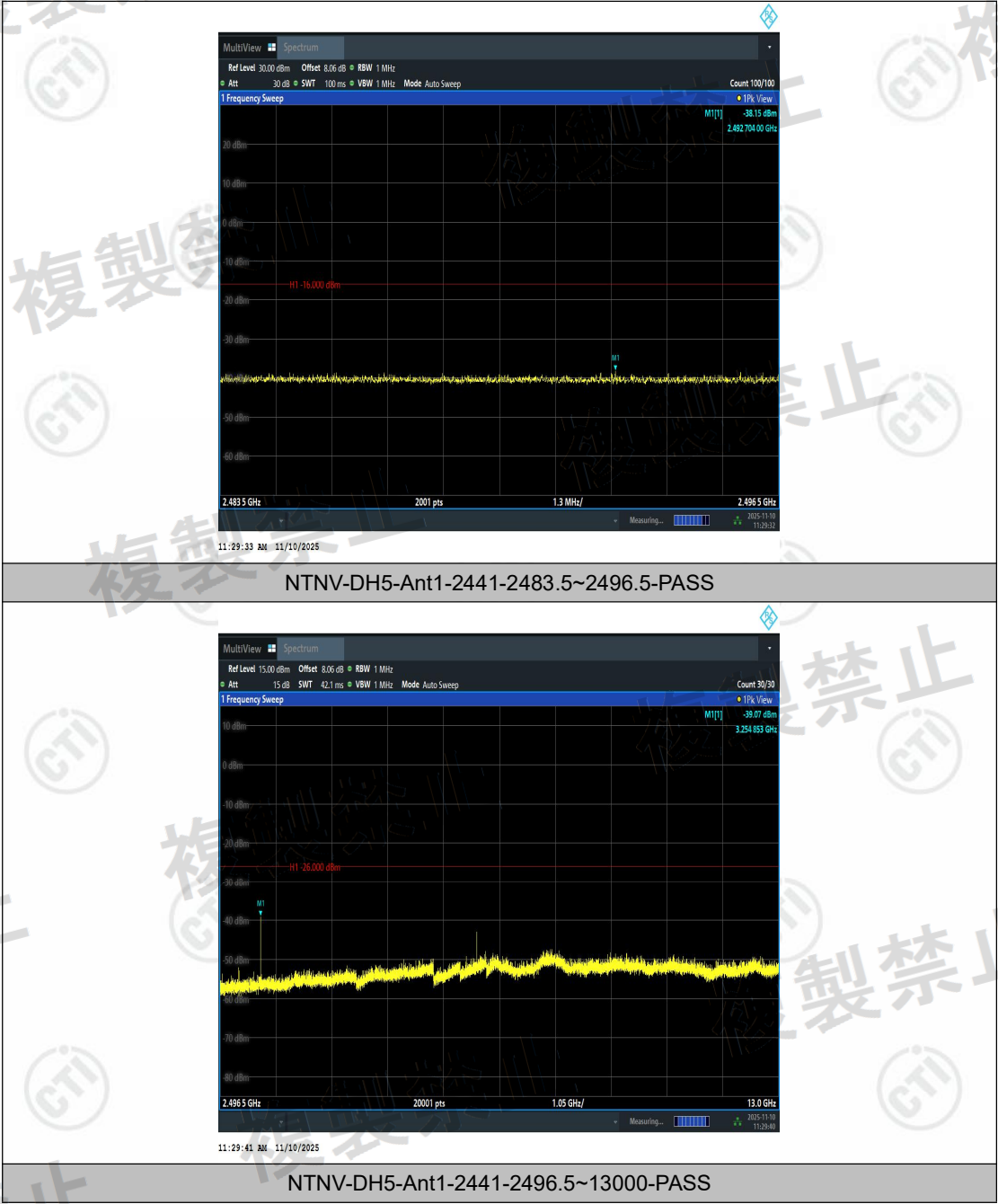


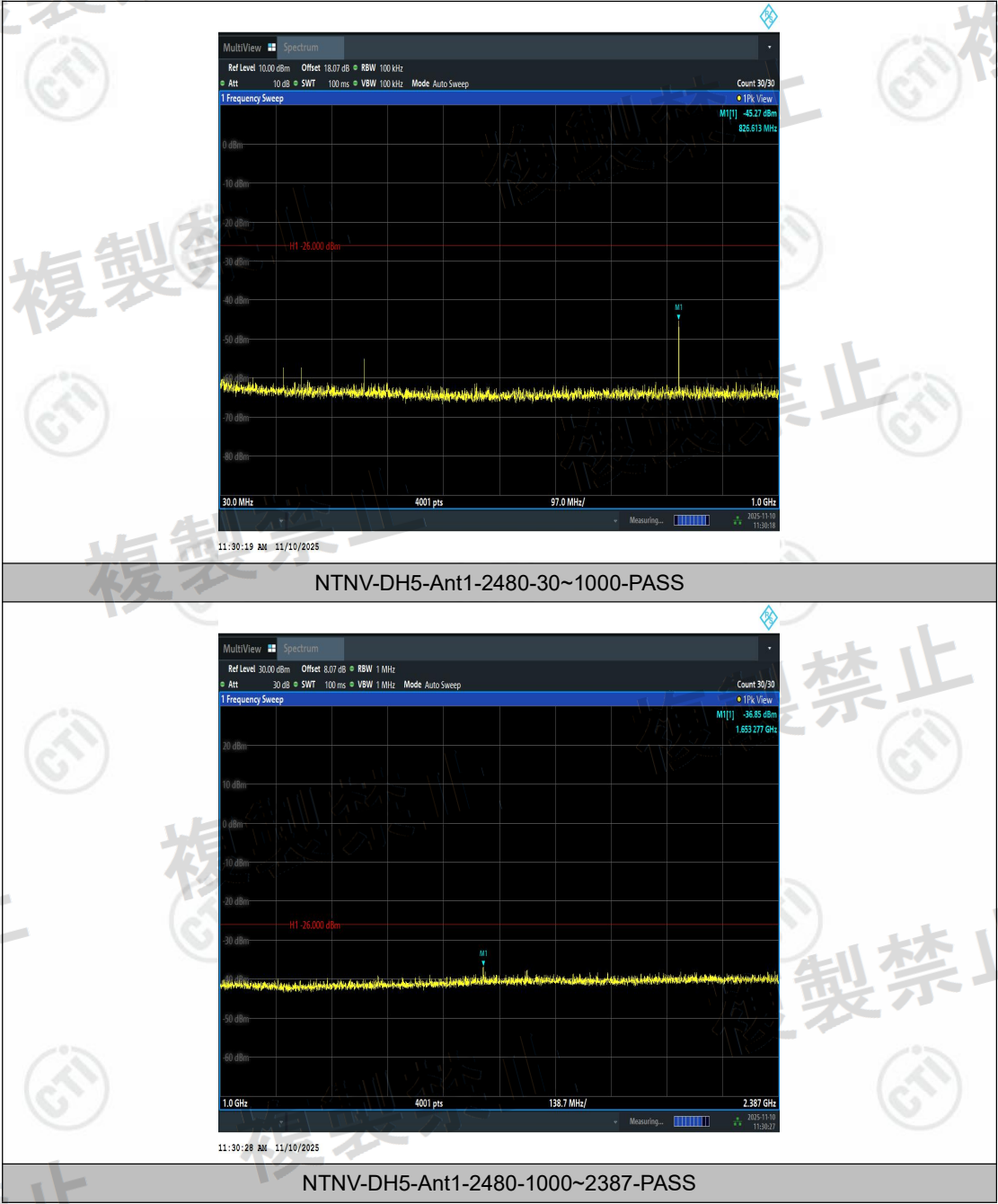


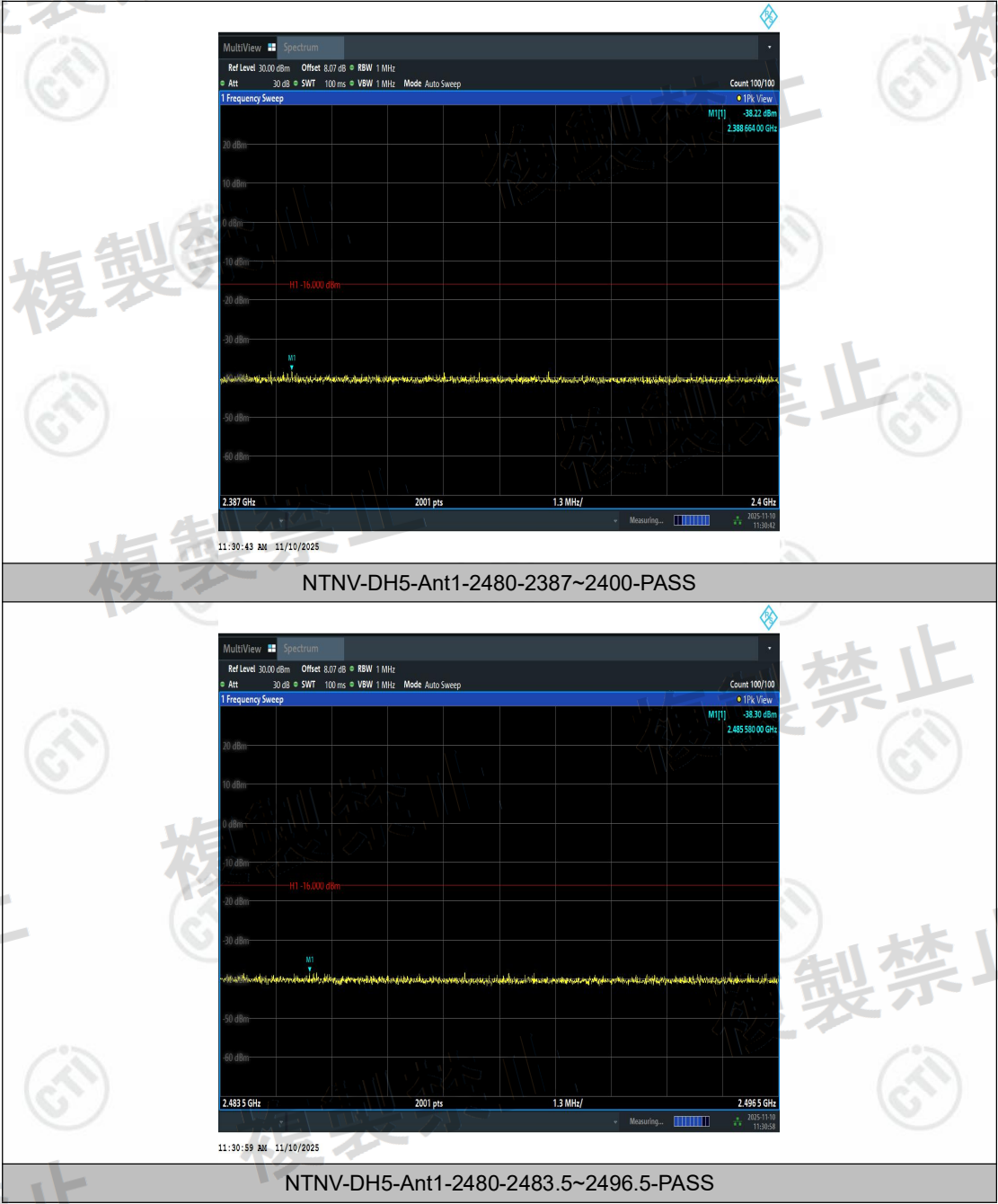
NTNV-DH5-Ant1-2441-1000~2387-PASS

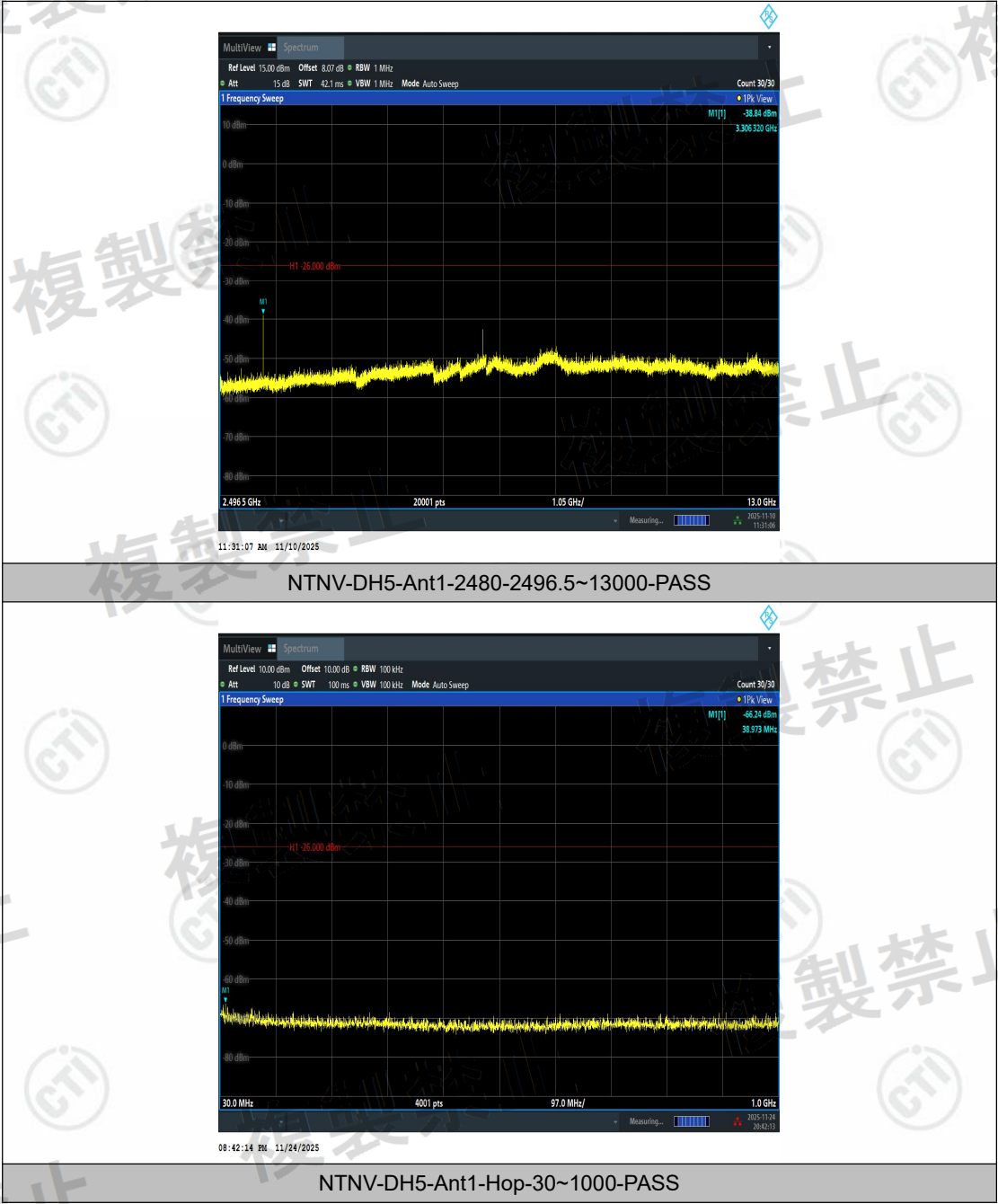


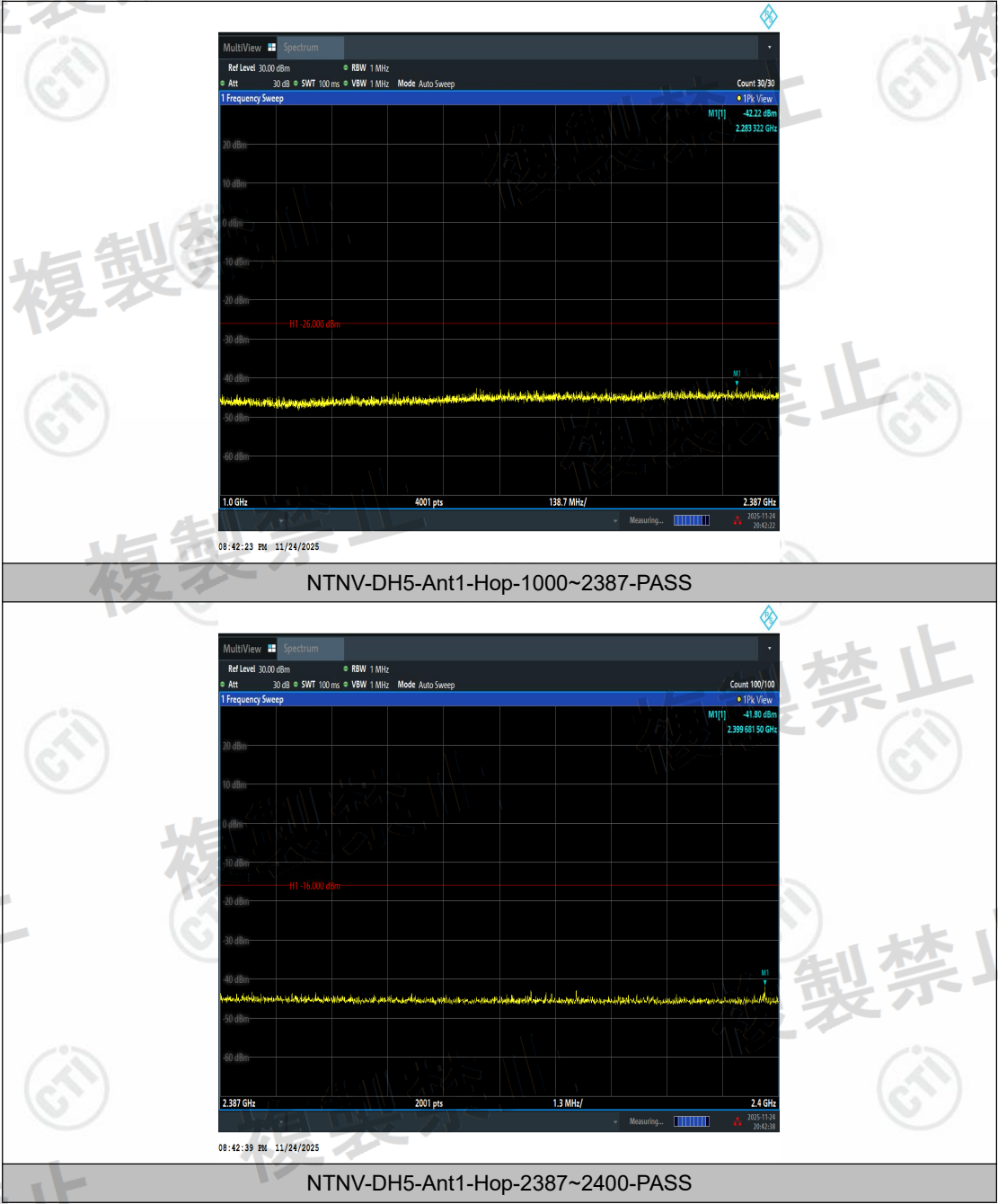
NTNV-DH5-Ant1-2441-2387~2400-PASS

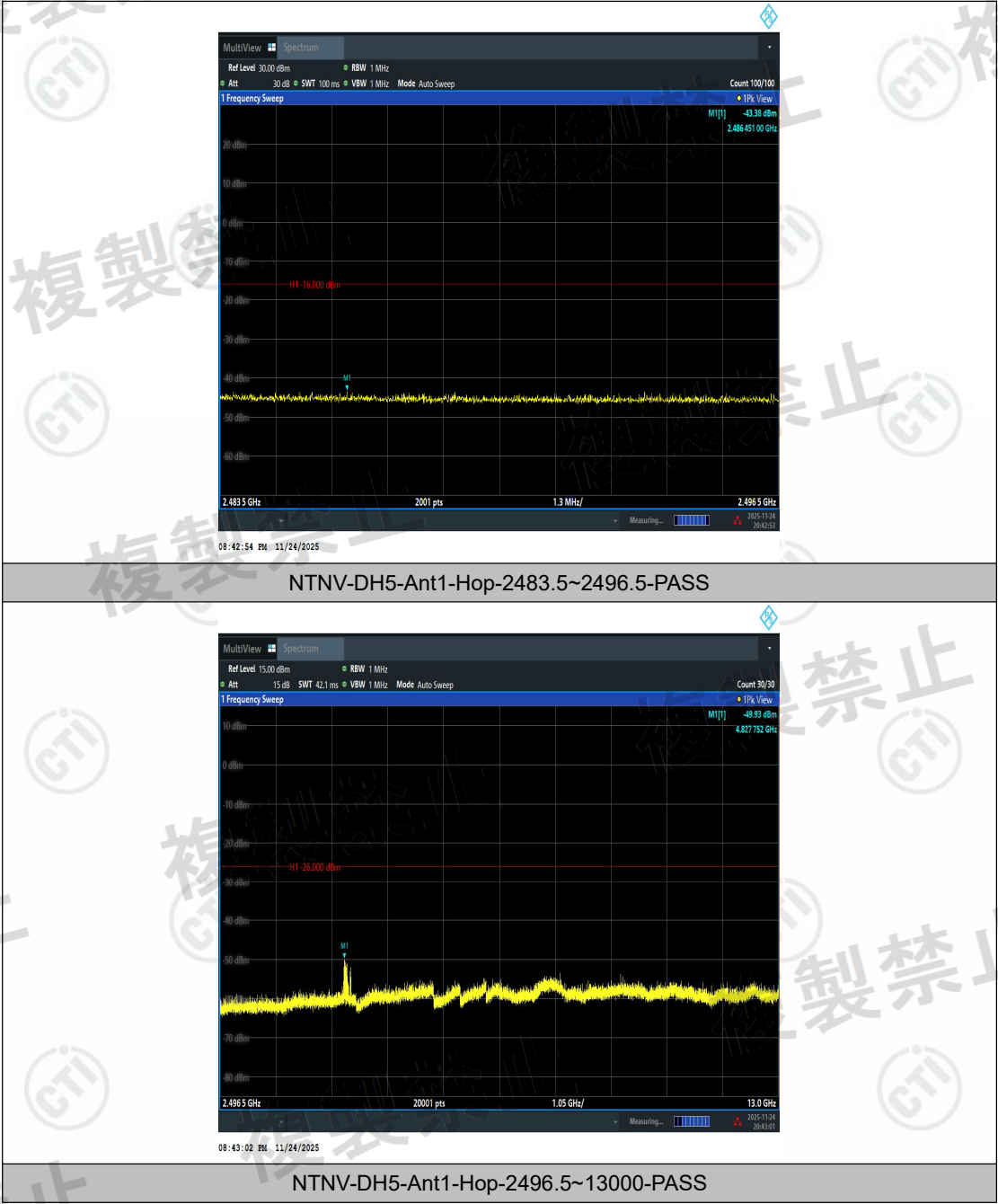


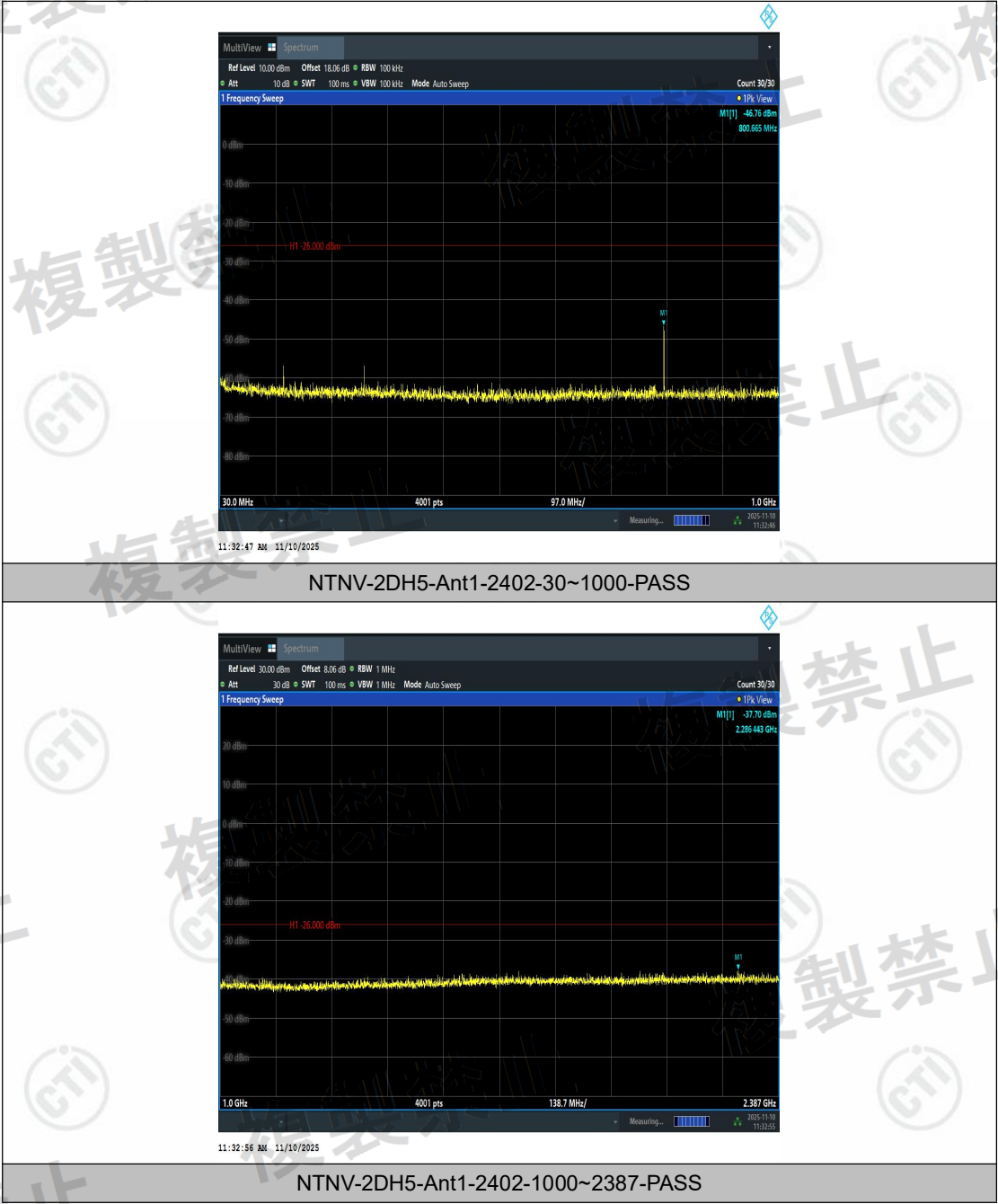


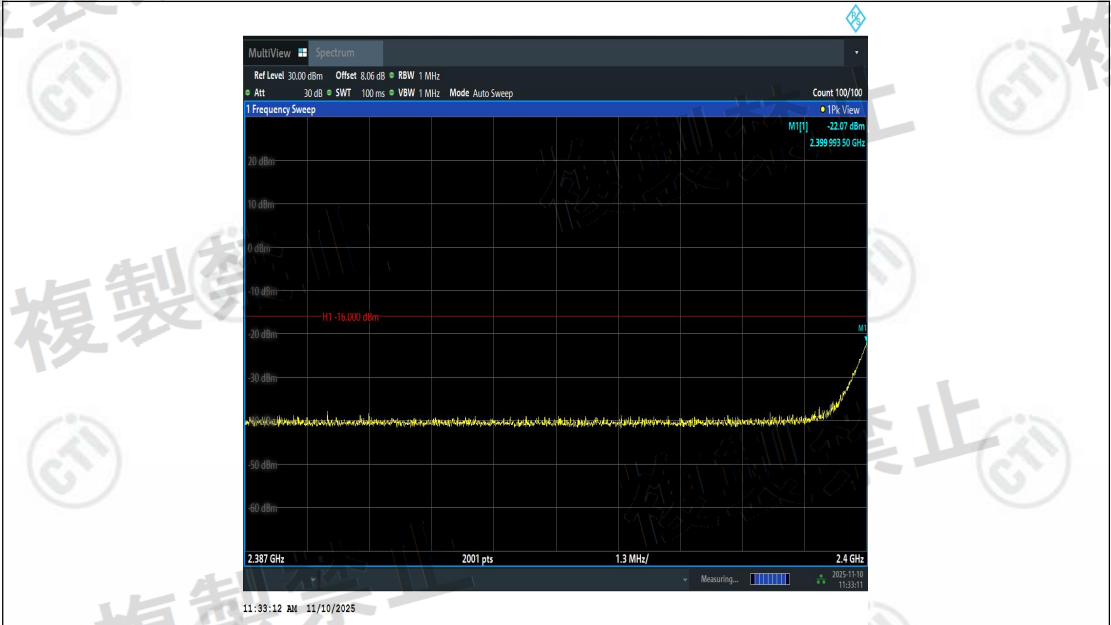




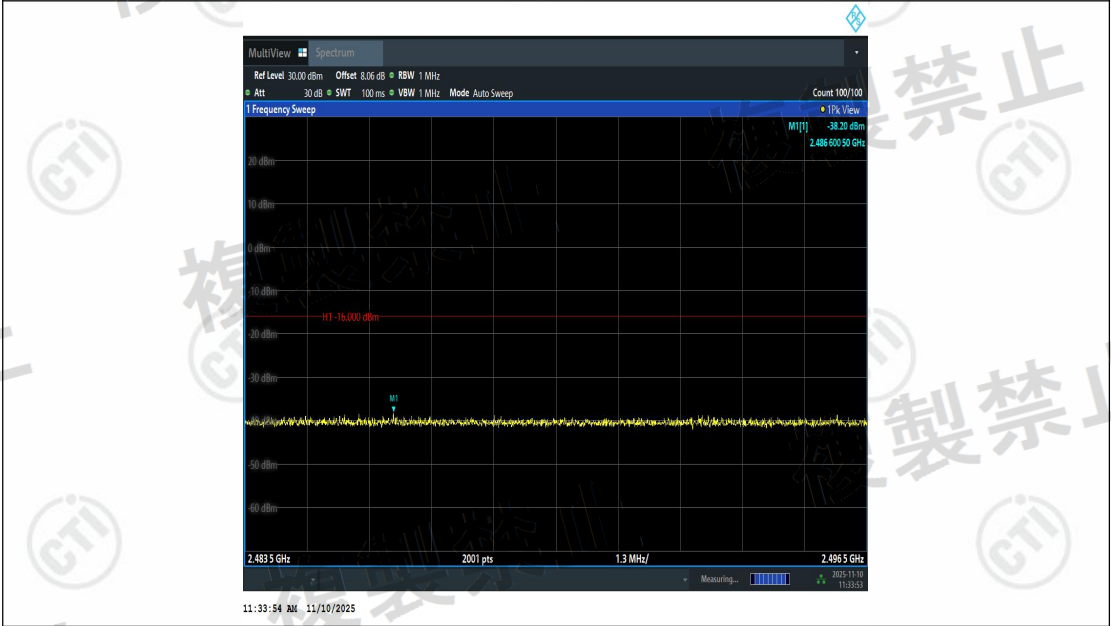




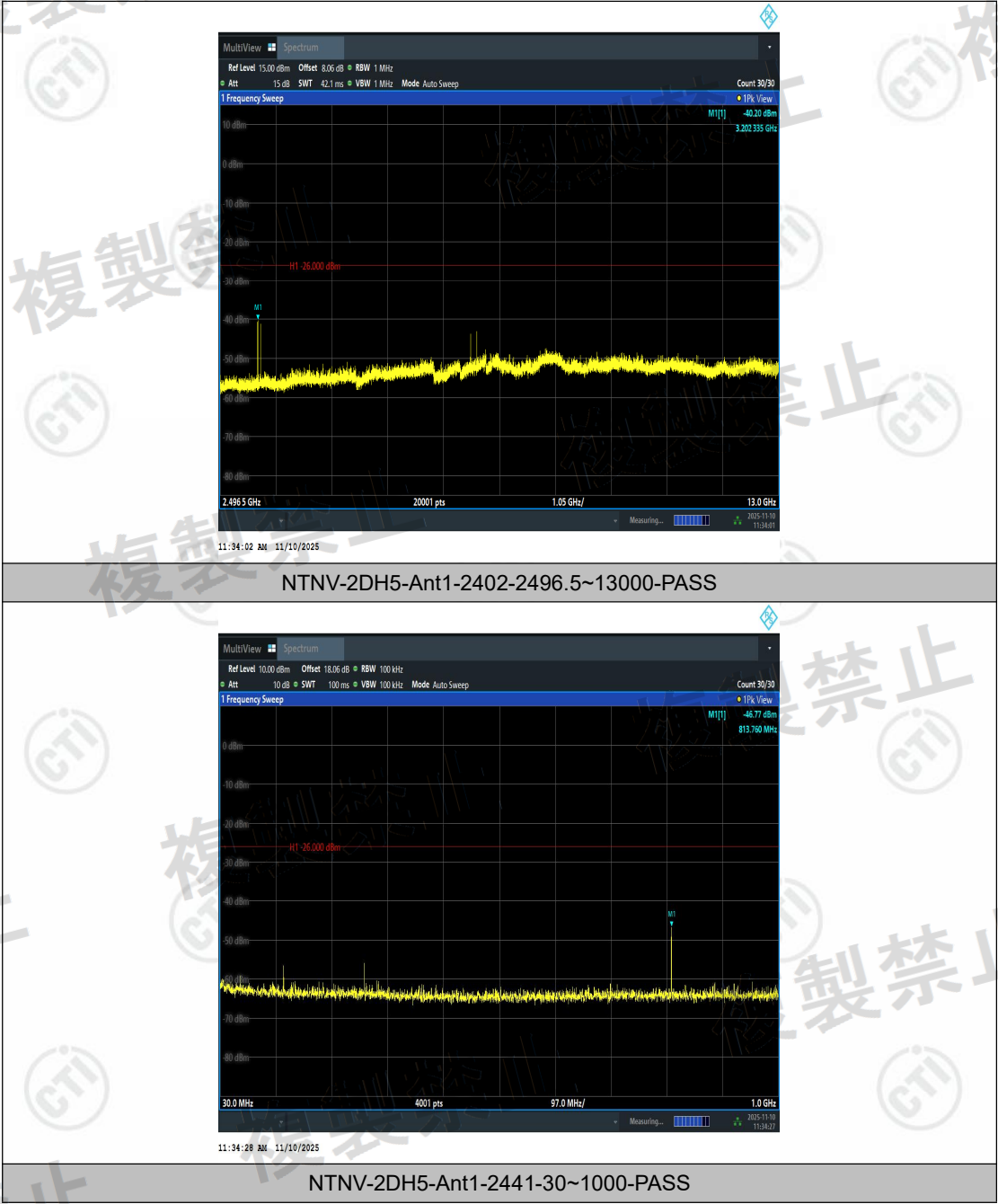


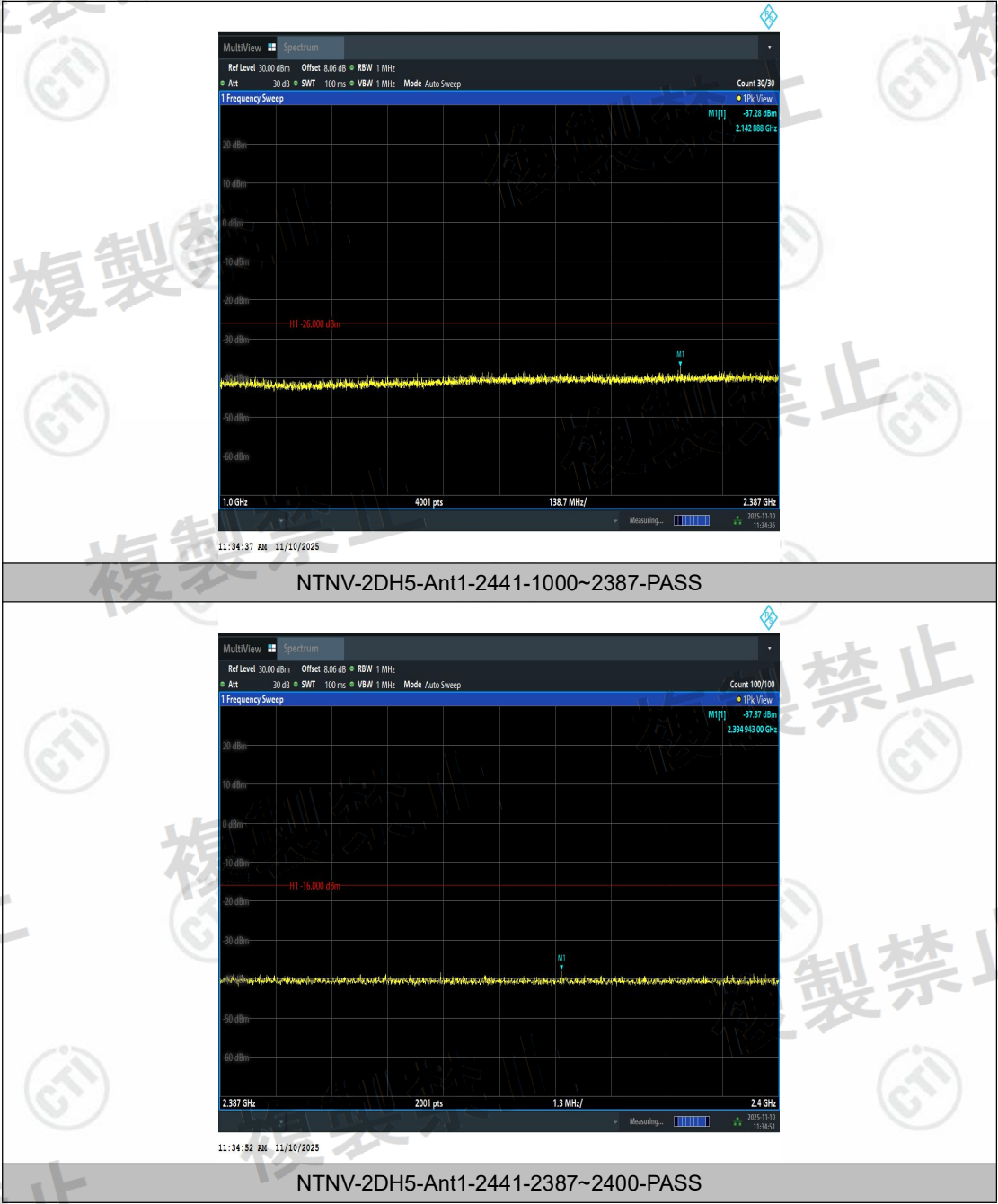


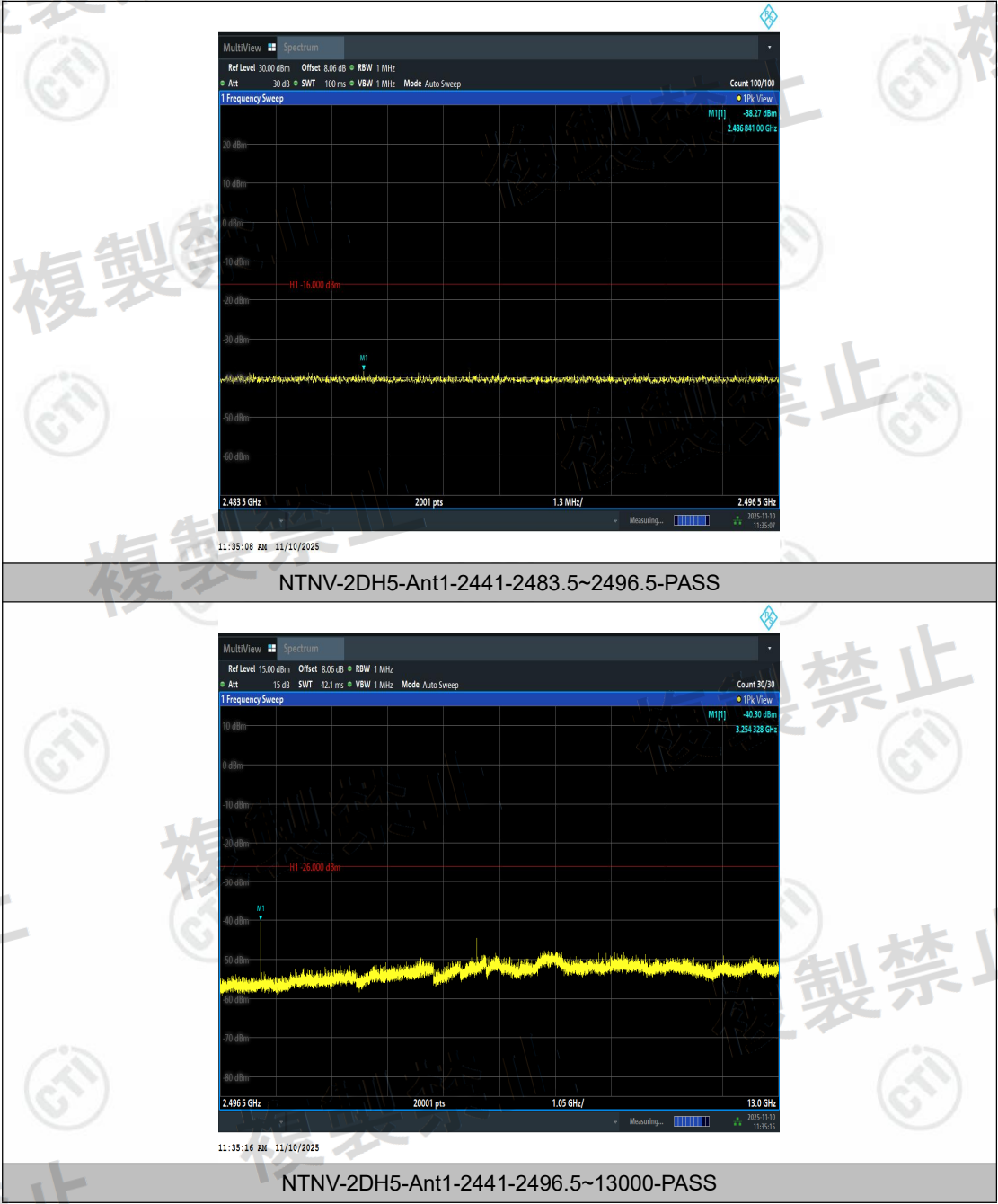
NTNV-2DH5-Ant1-2402-2387~2400-See table below

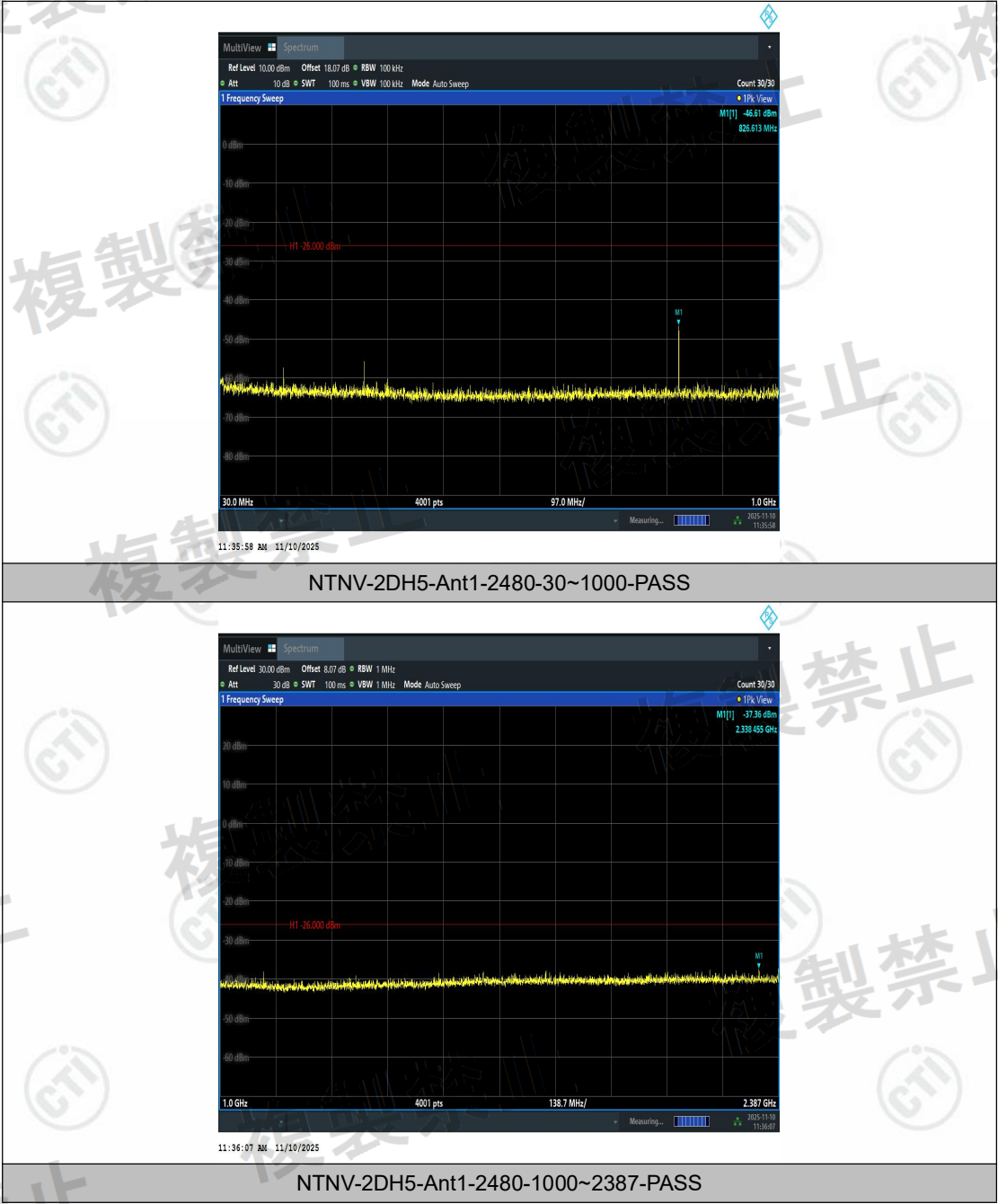


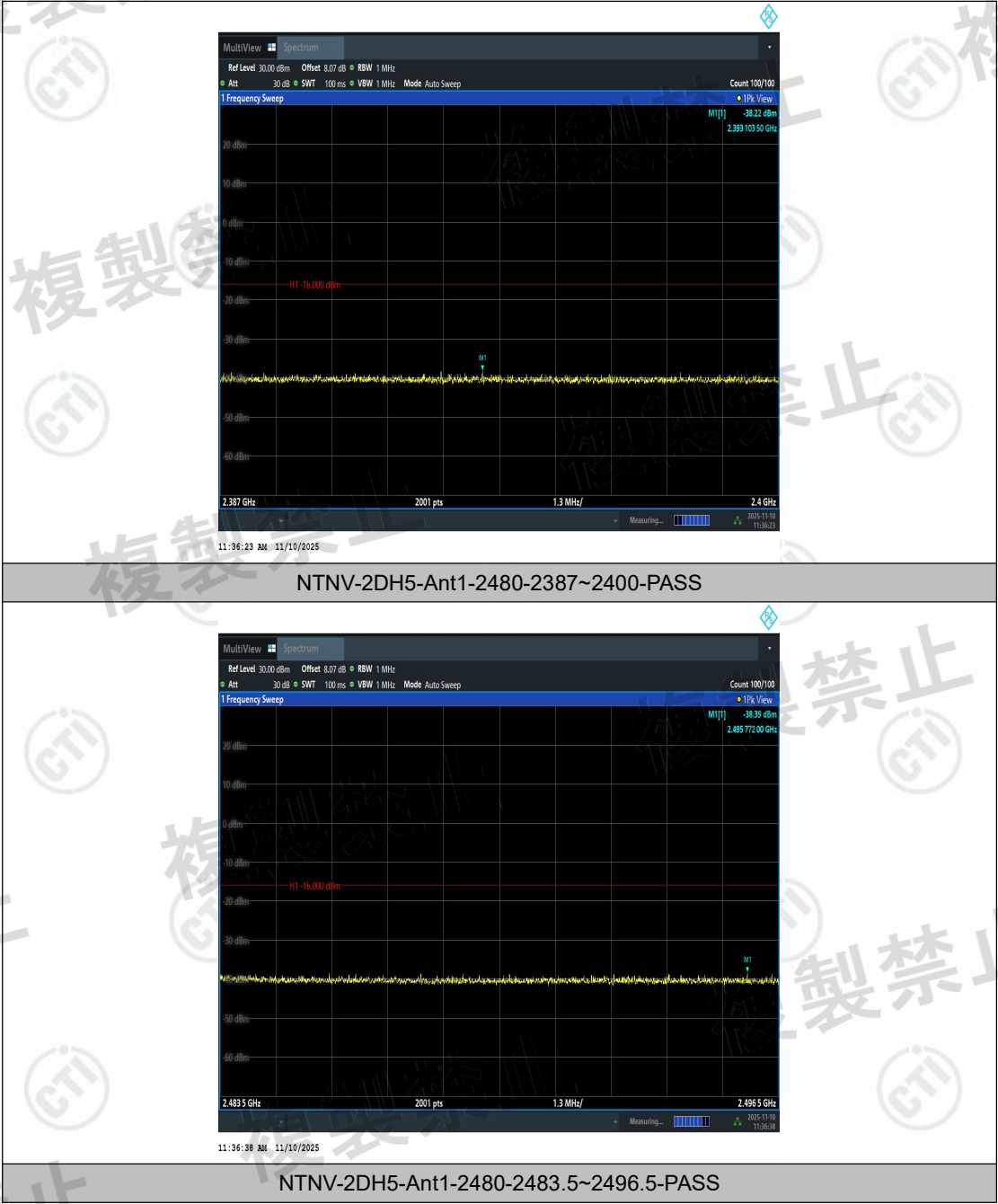
NTNV-2DH5-Ant1-2402-2483.5~2496.5-PASS

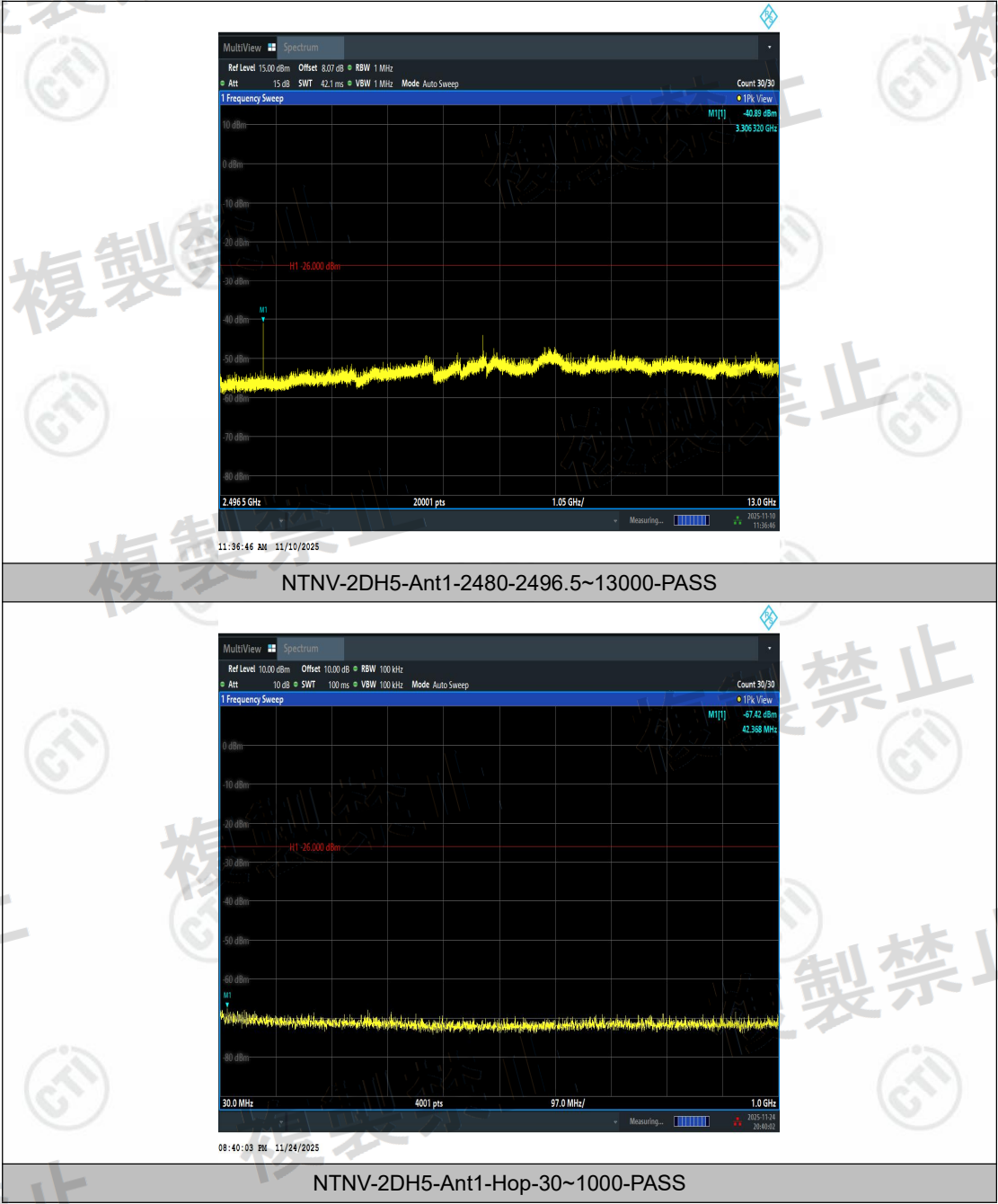


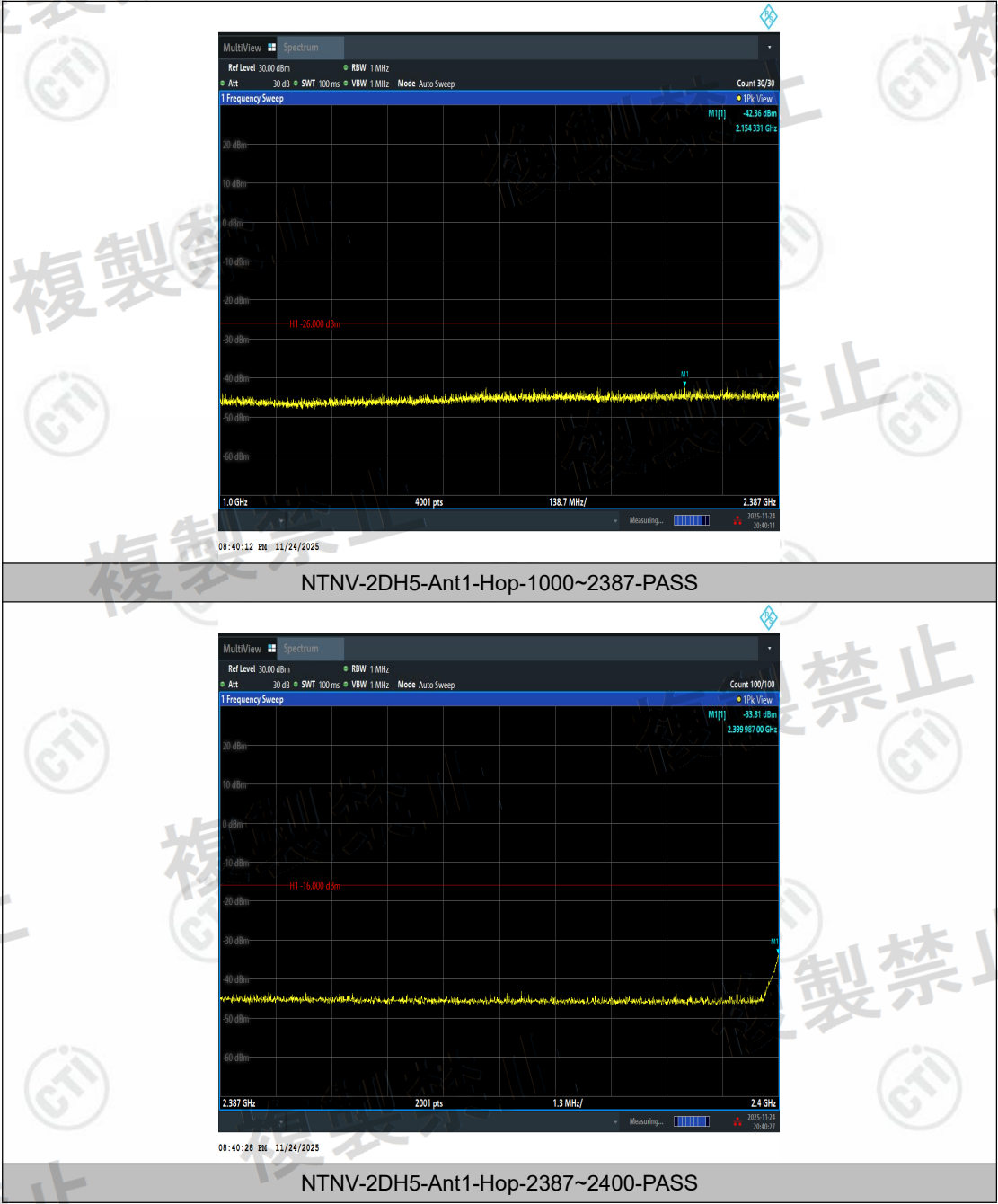


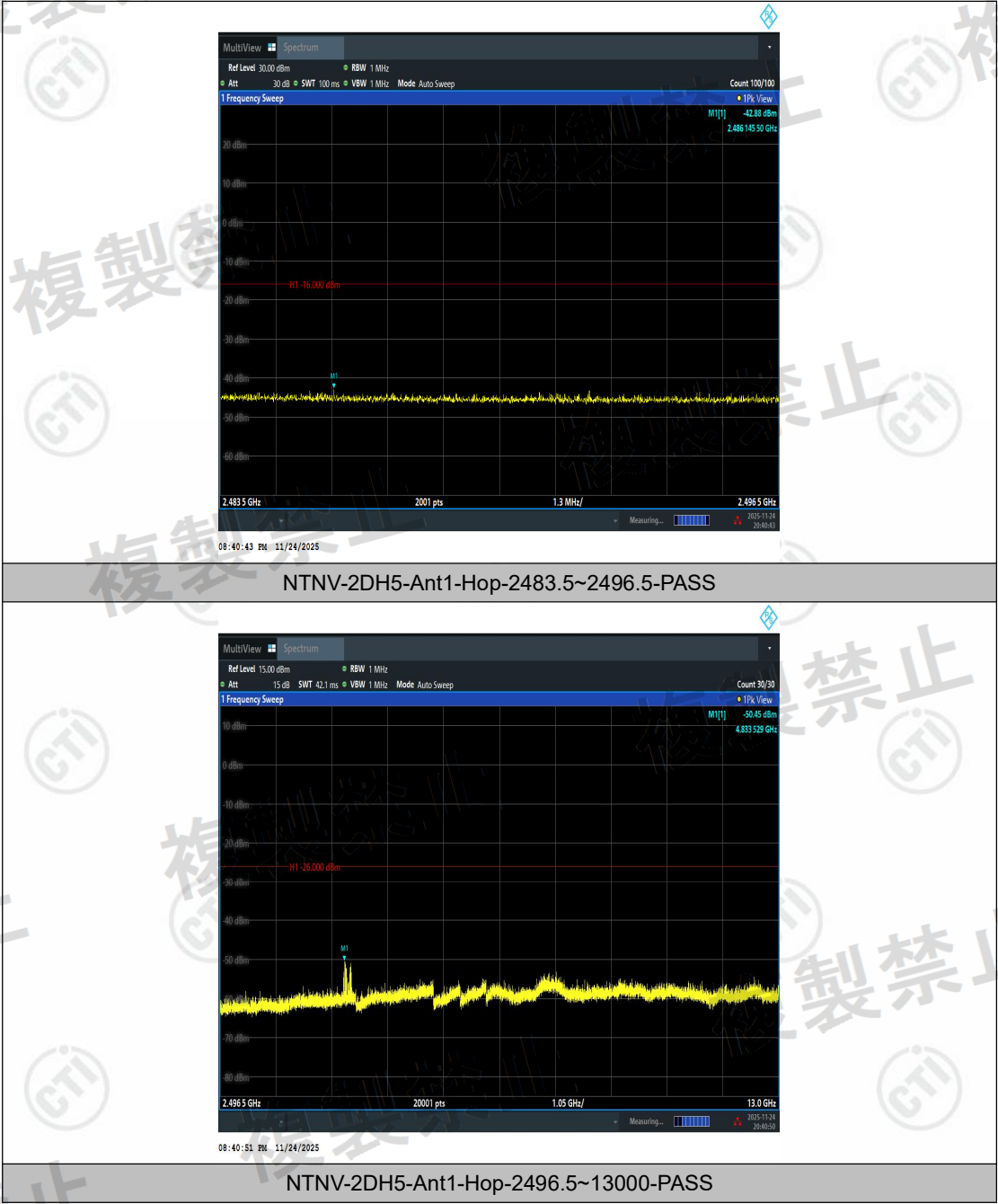


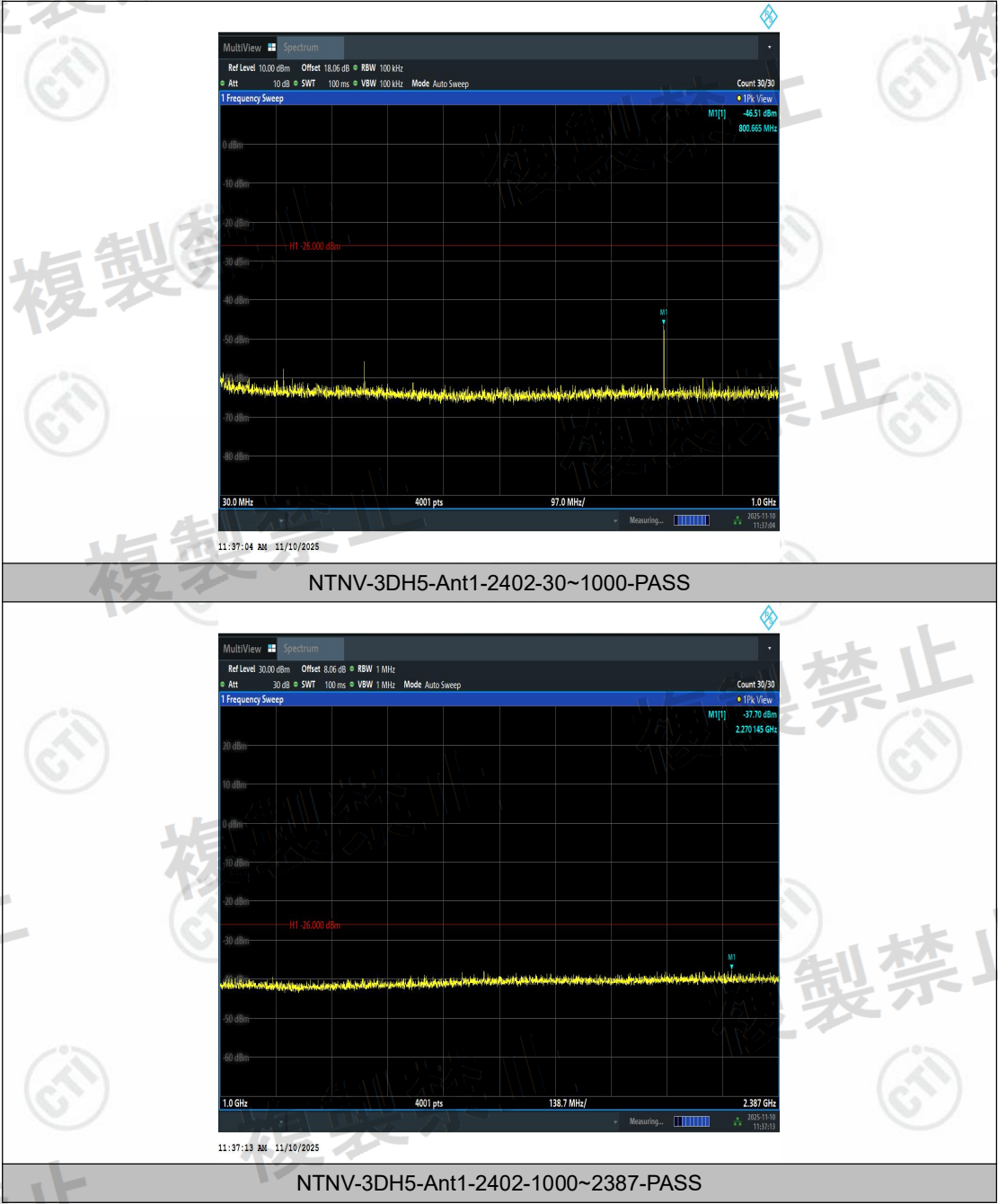


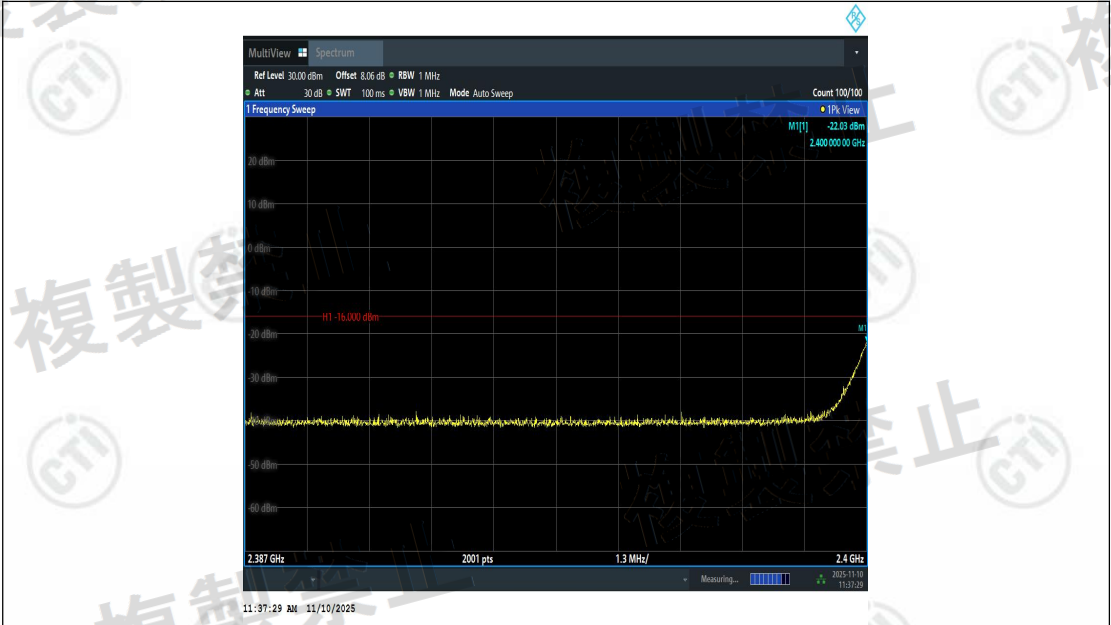




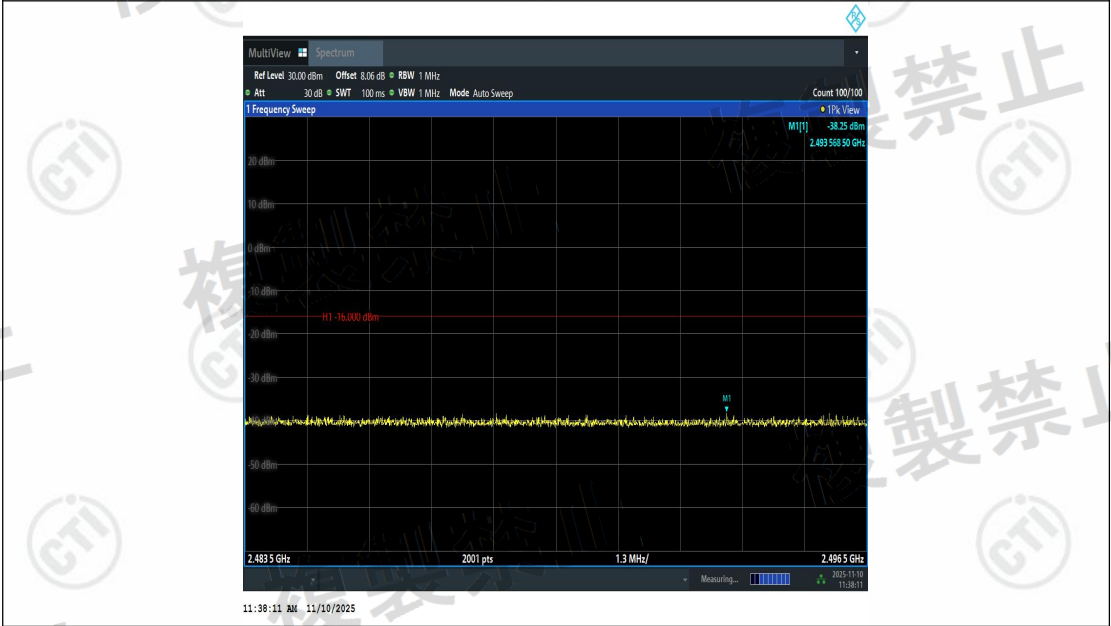




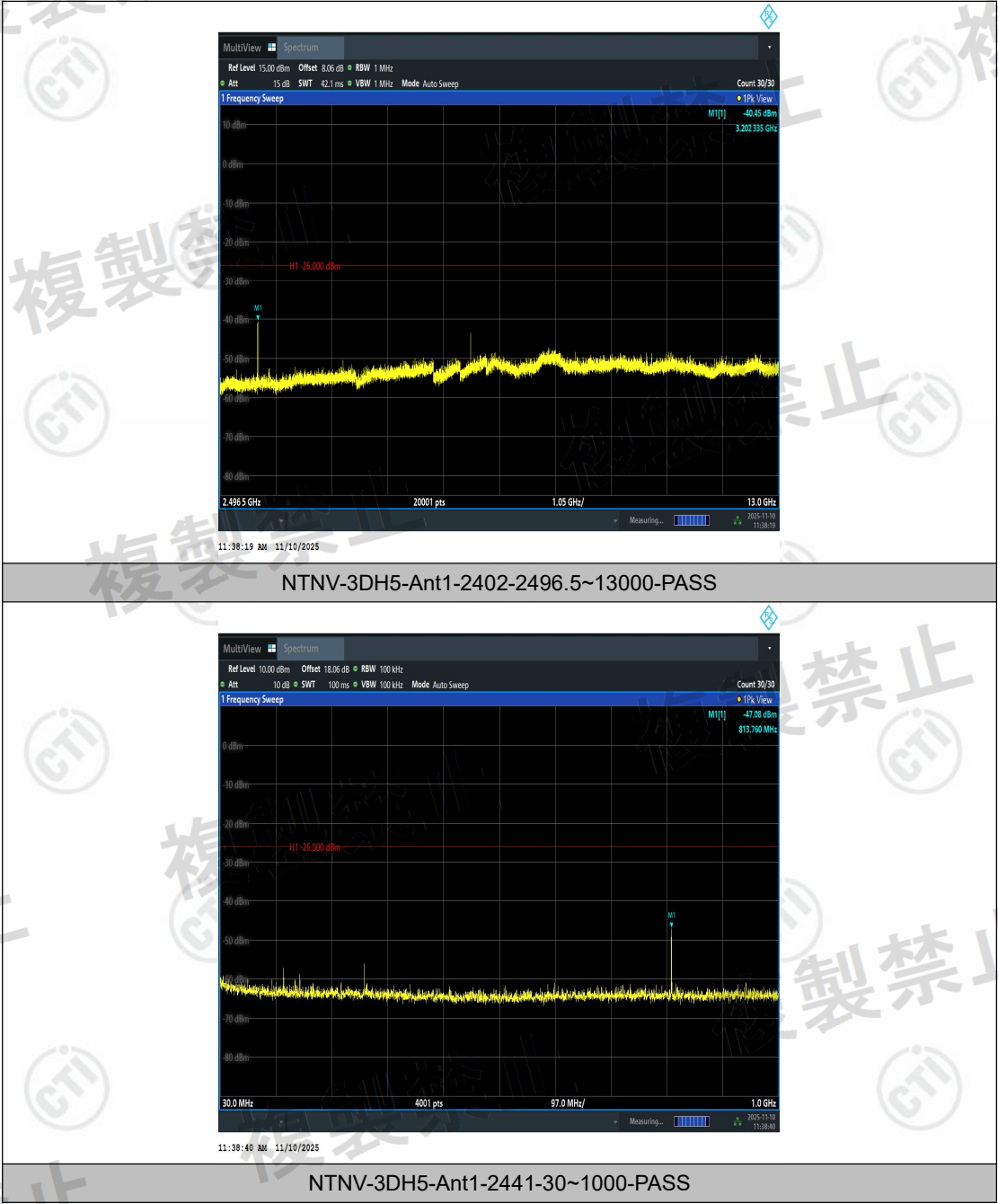


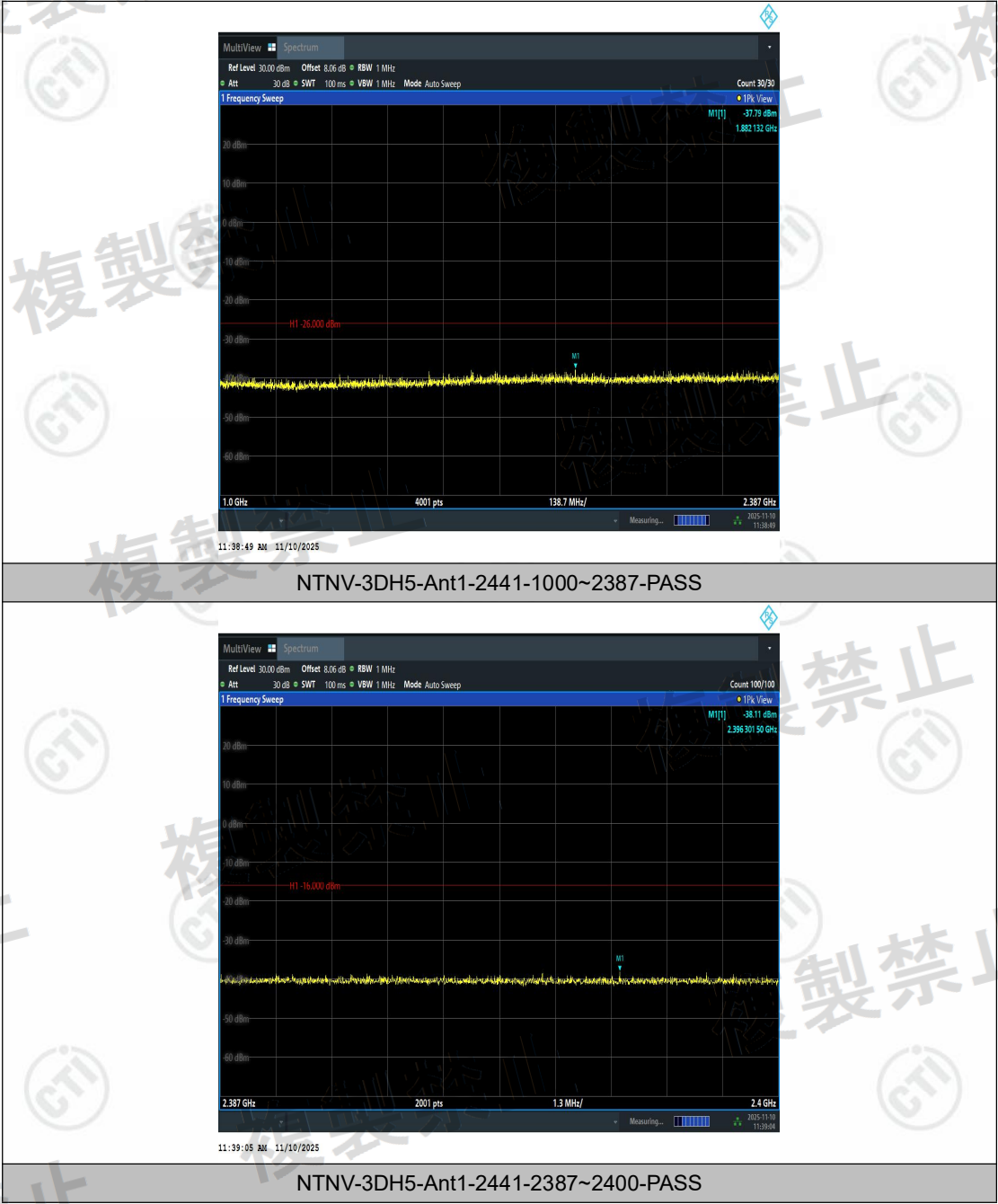


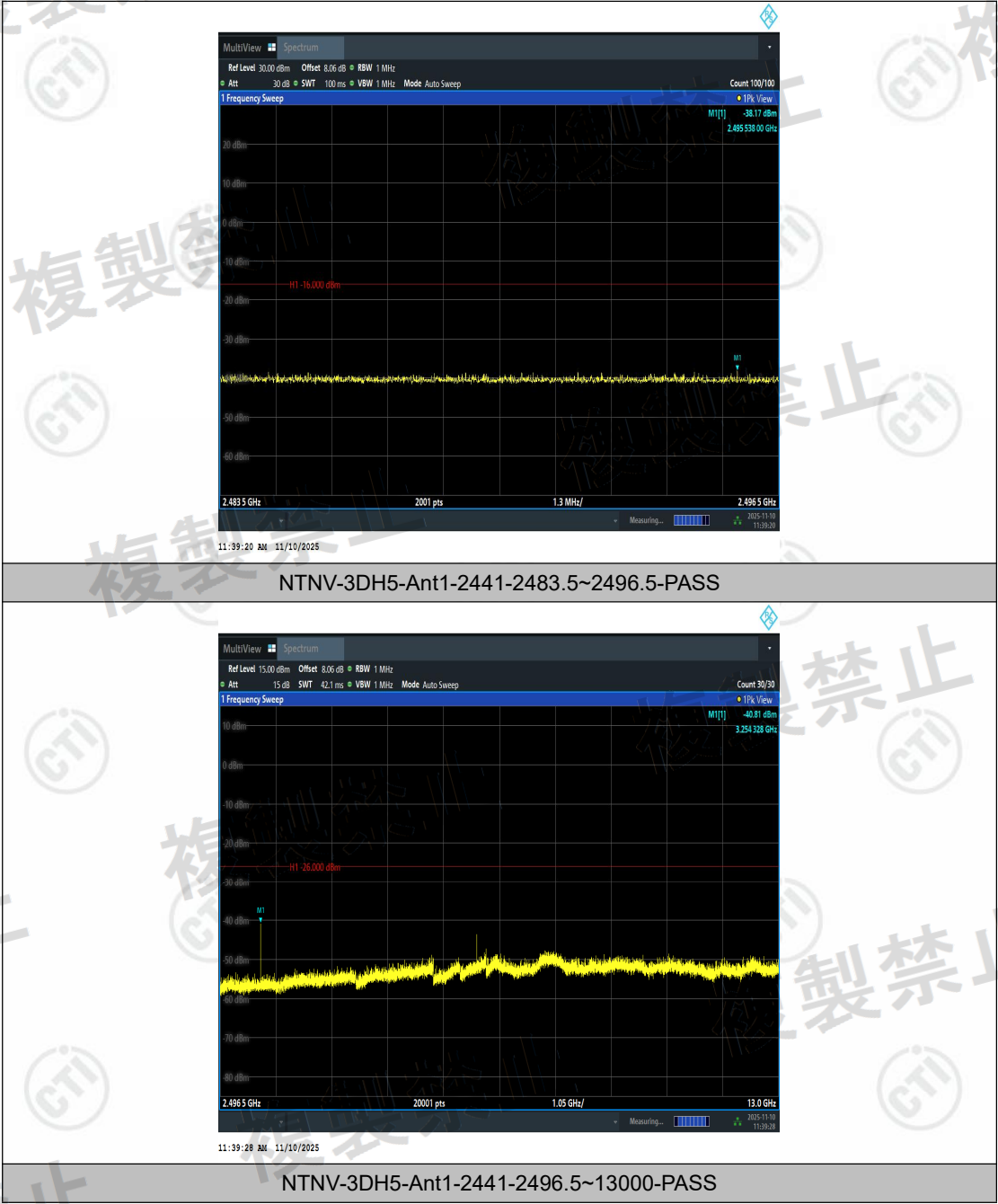
NTNV-3DH5-Ant1-2402-2387~2400-See table below

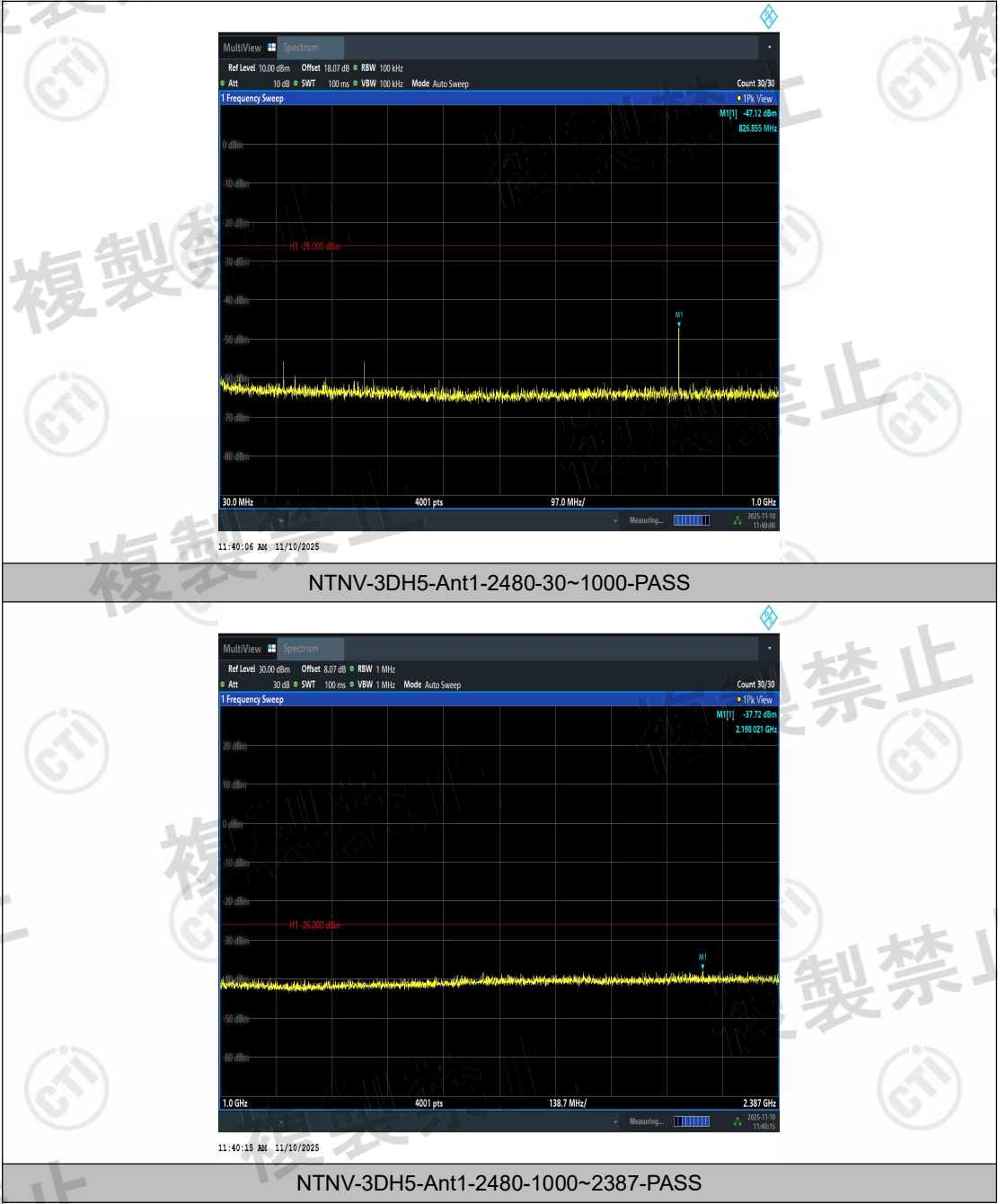


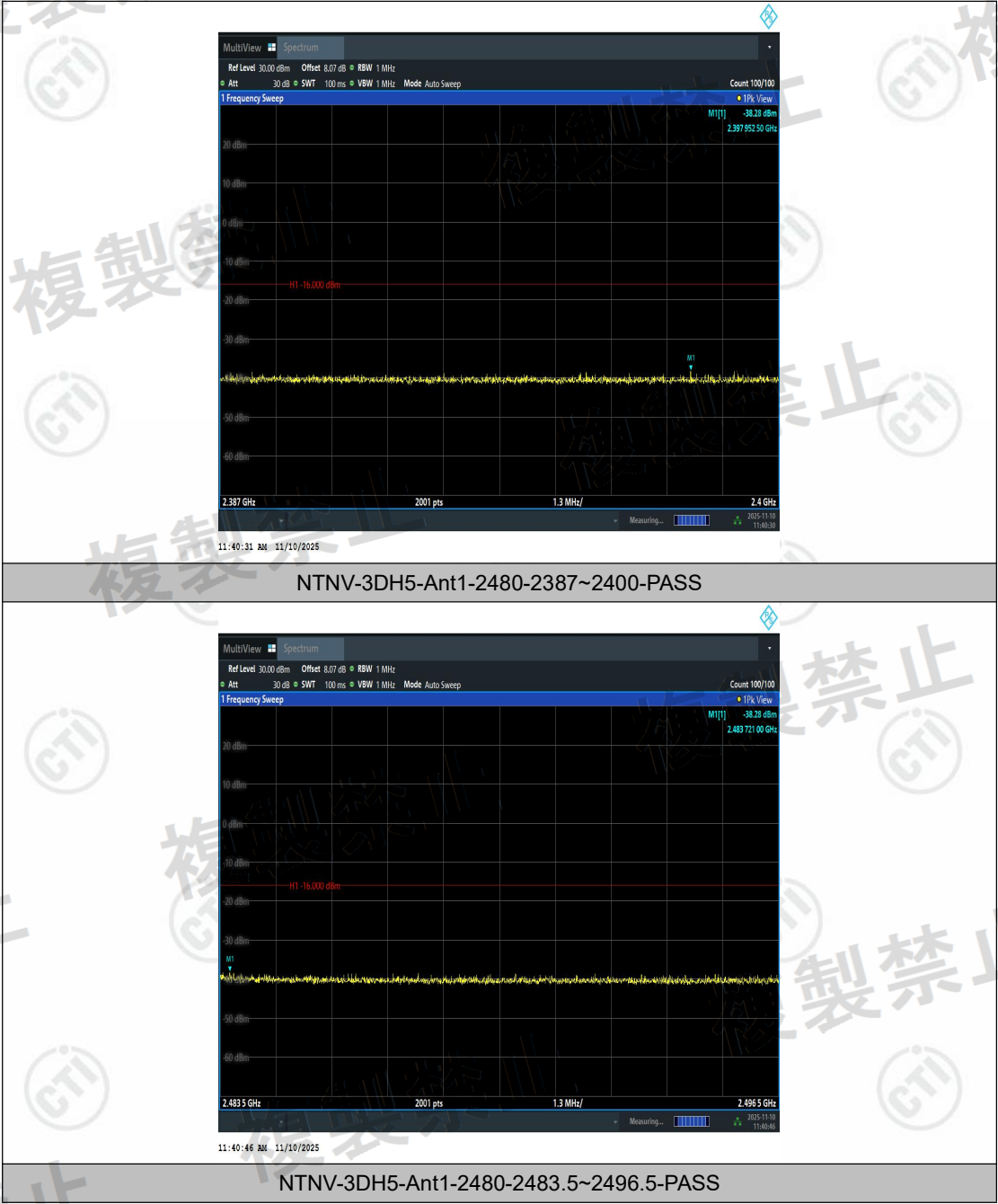
NTNV-3DH5-Ant1-2402-2483.5~2496.5-PASS

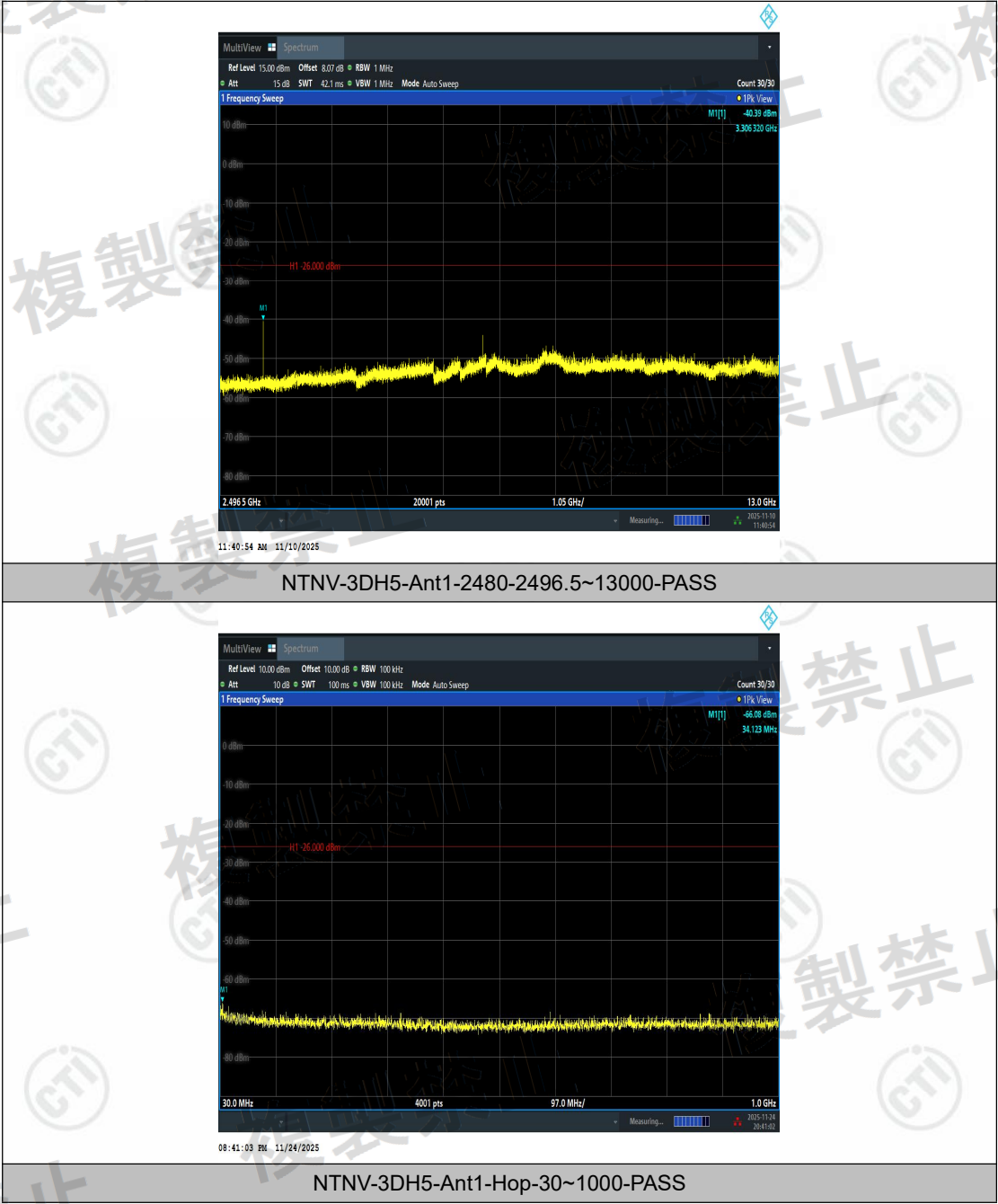


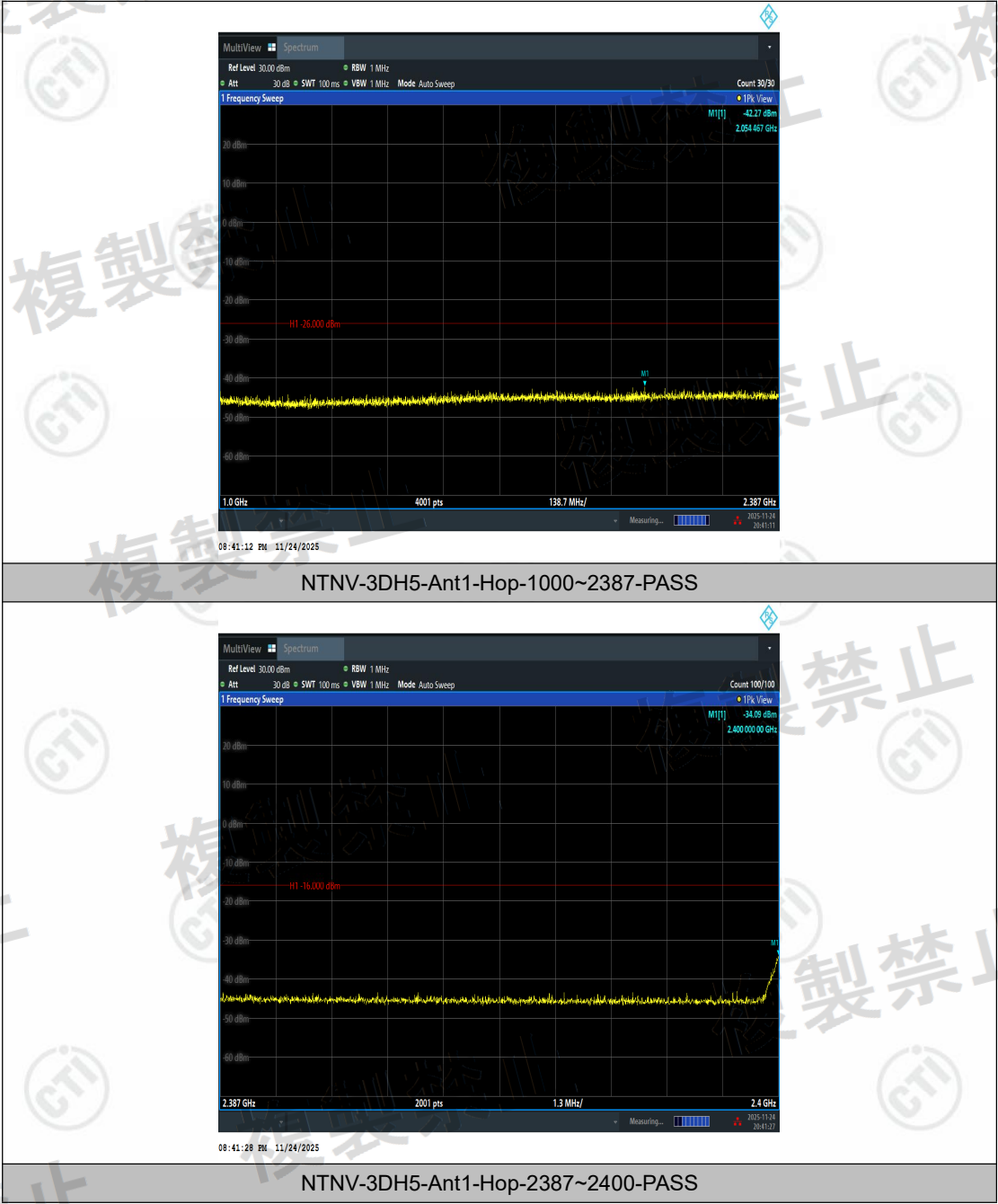


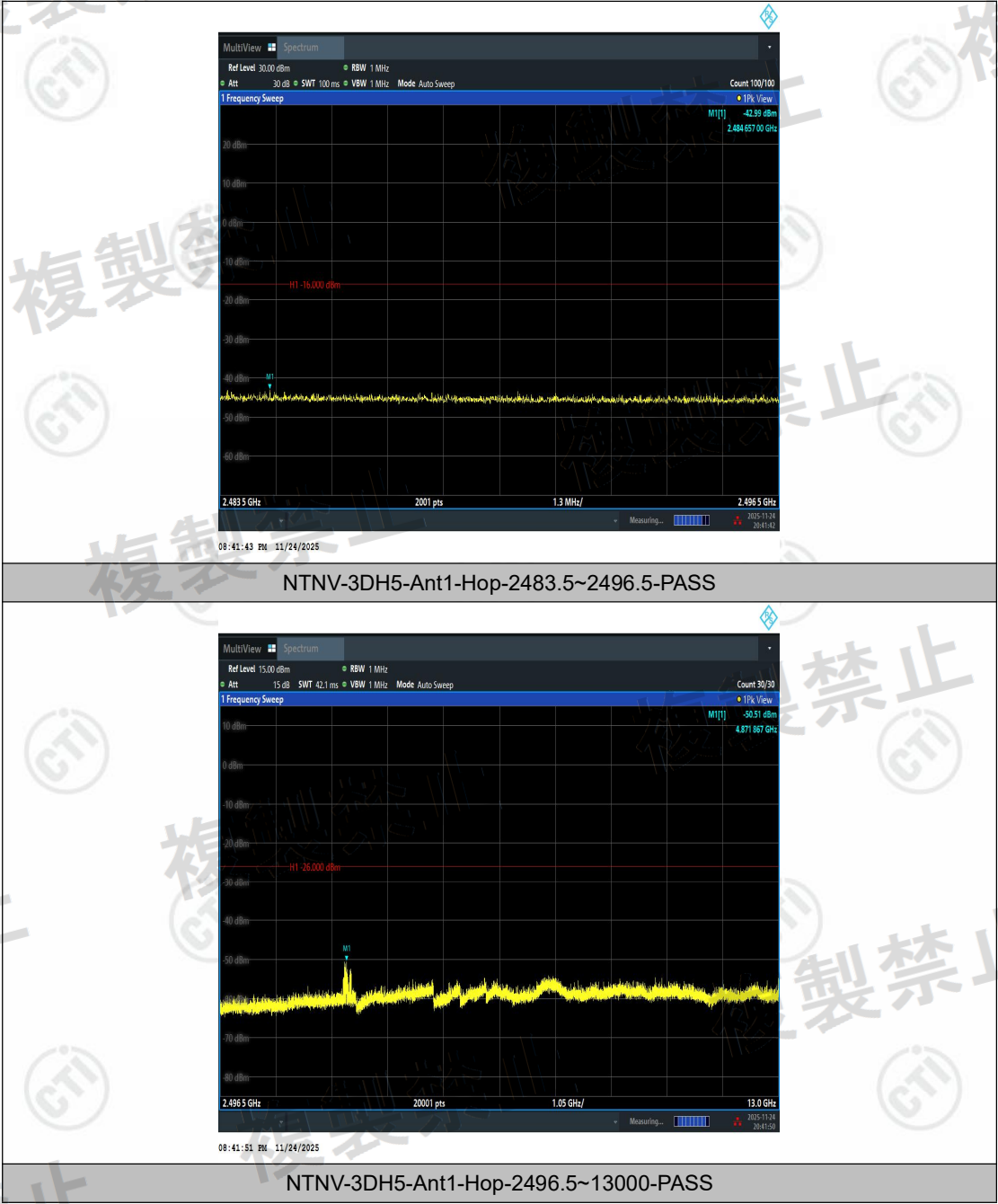




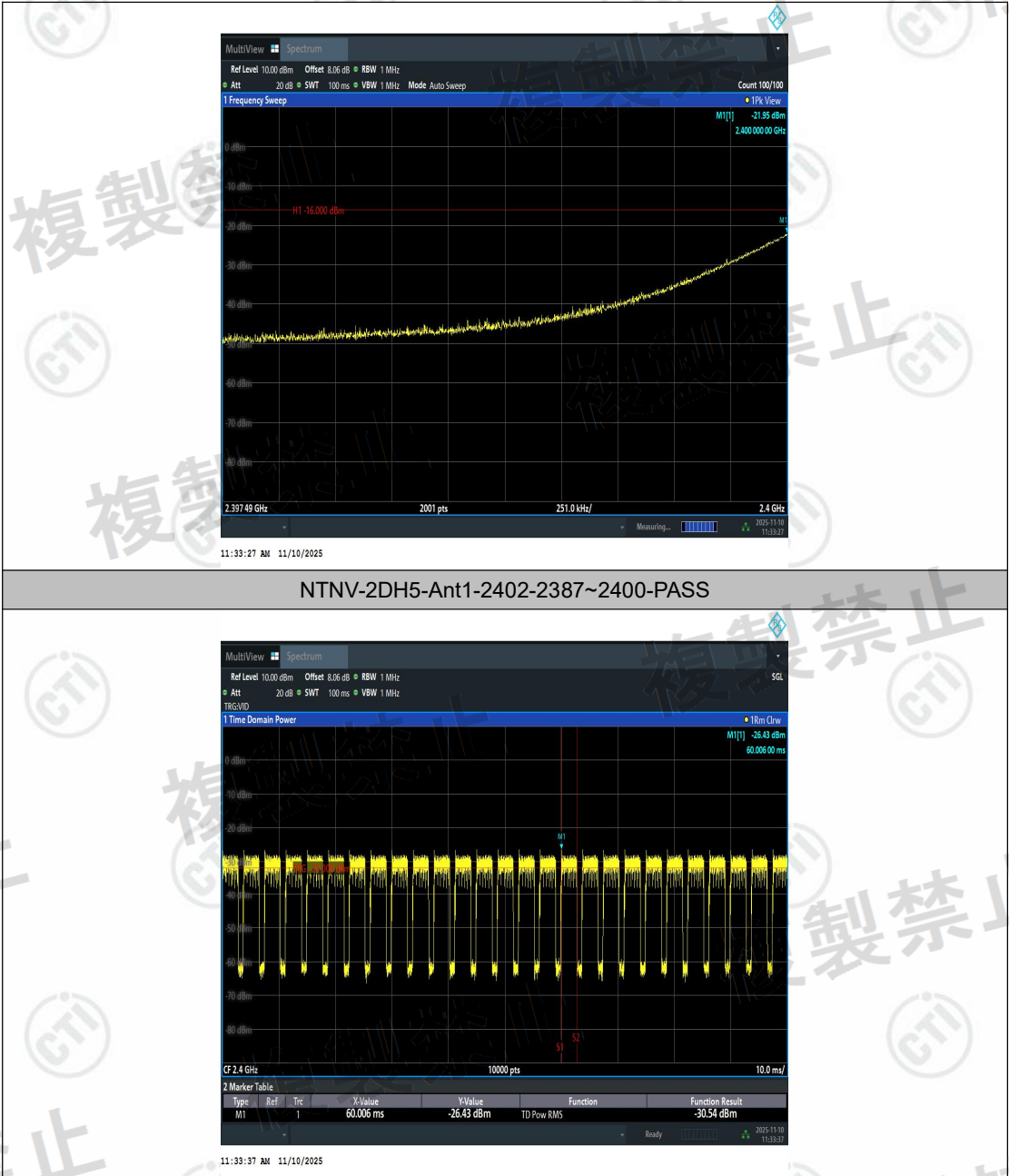


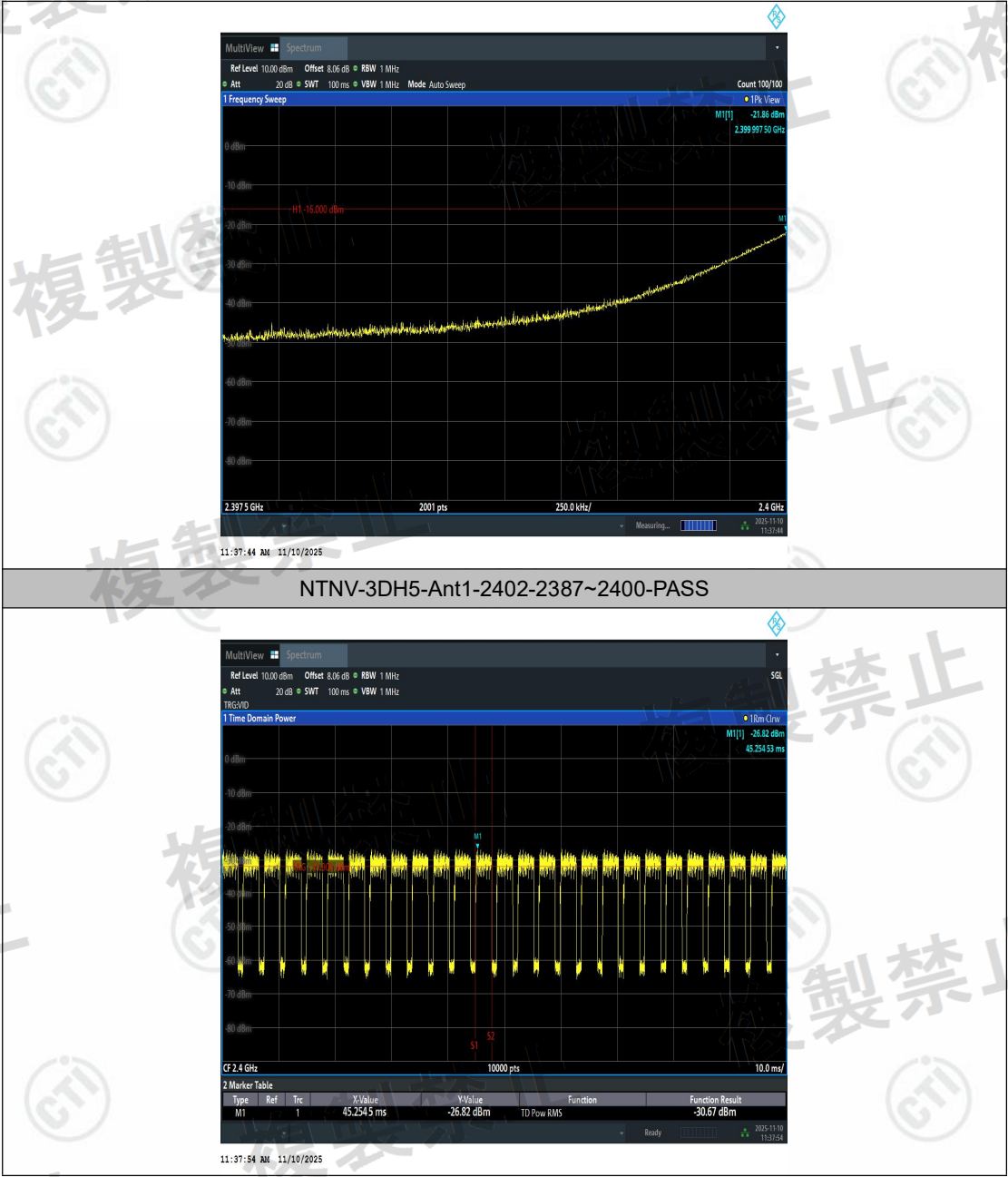






Test Graphs_Step2





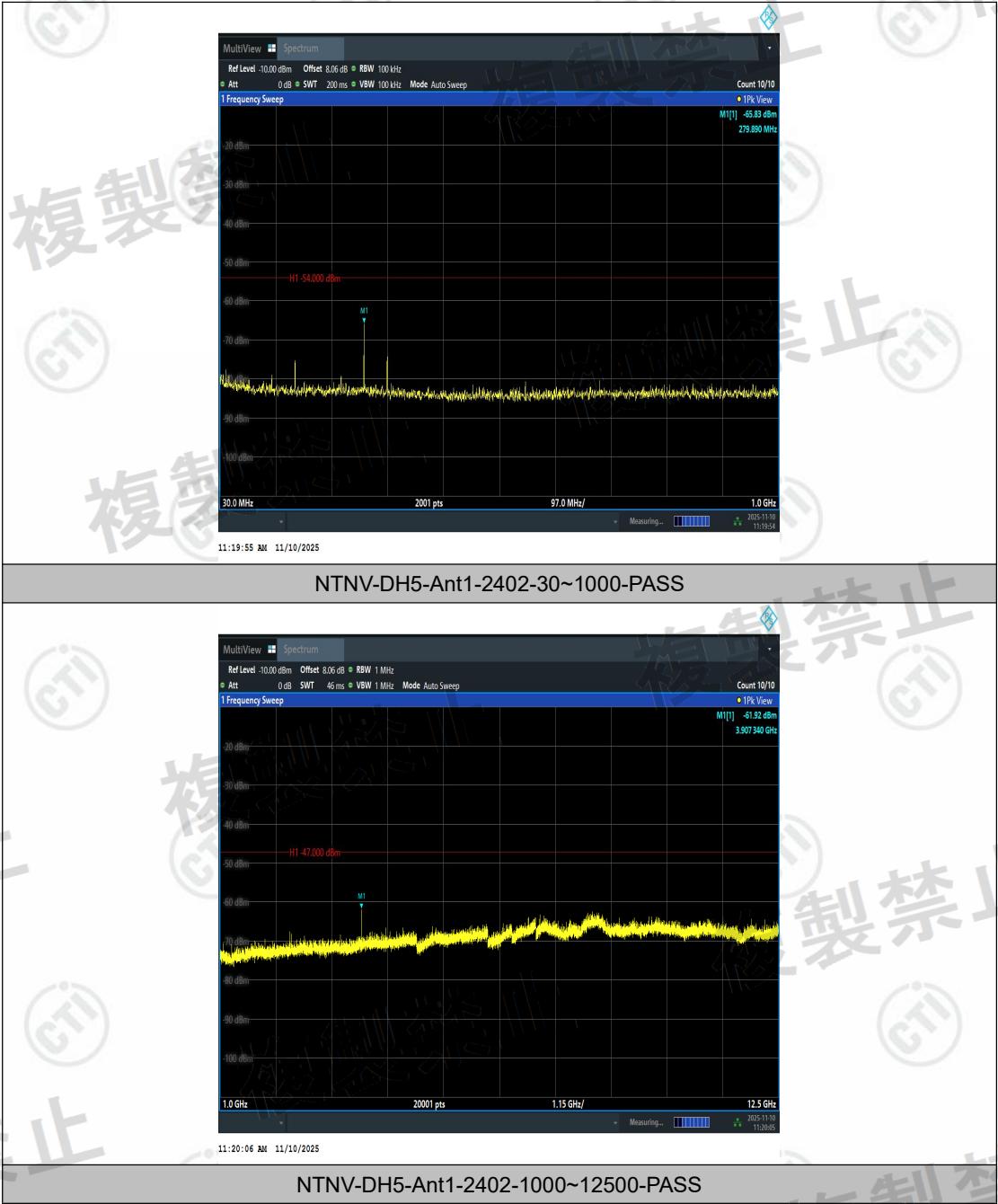
Appendix F: Secondary Radiated Emission Strength

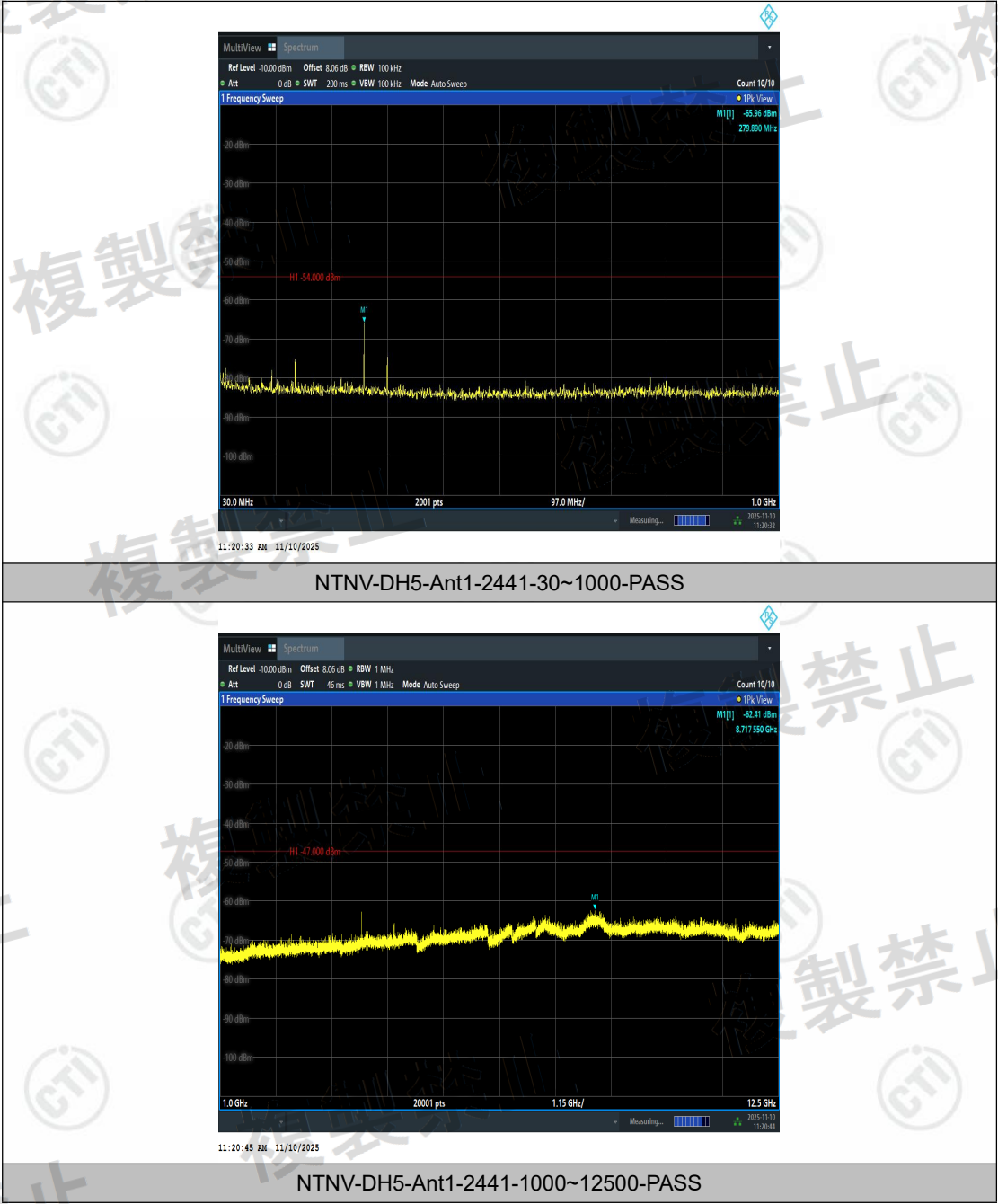
Test Result

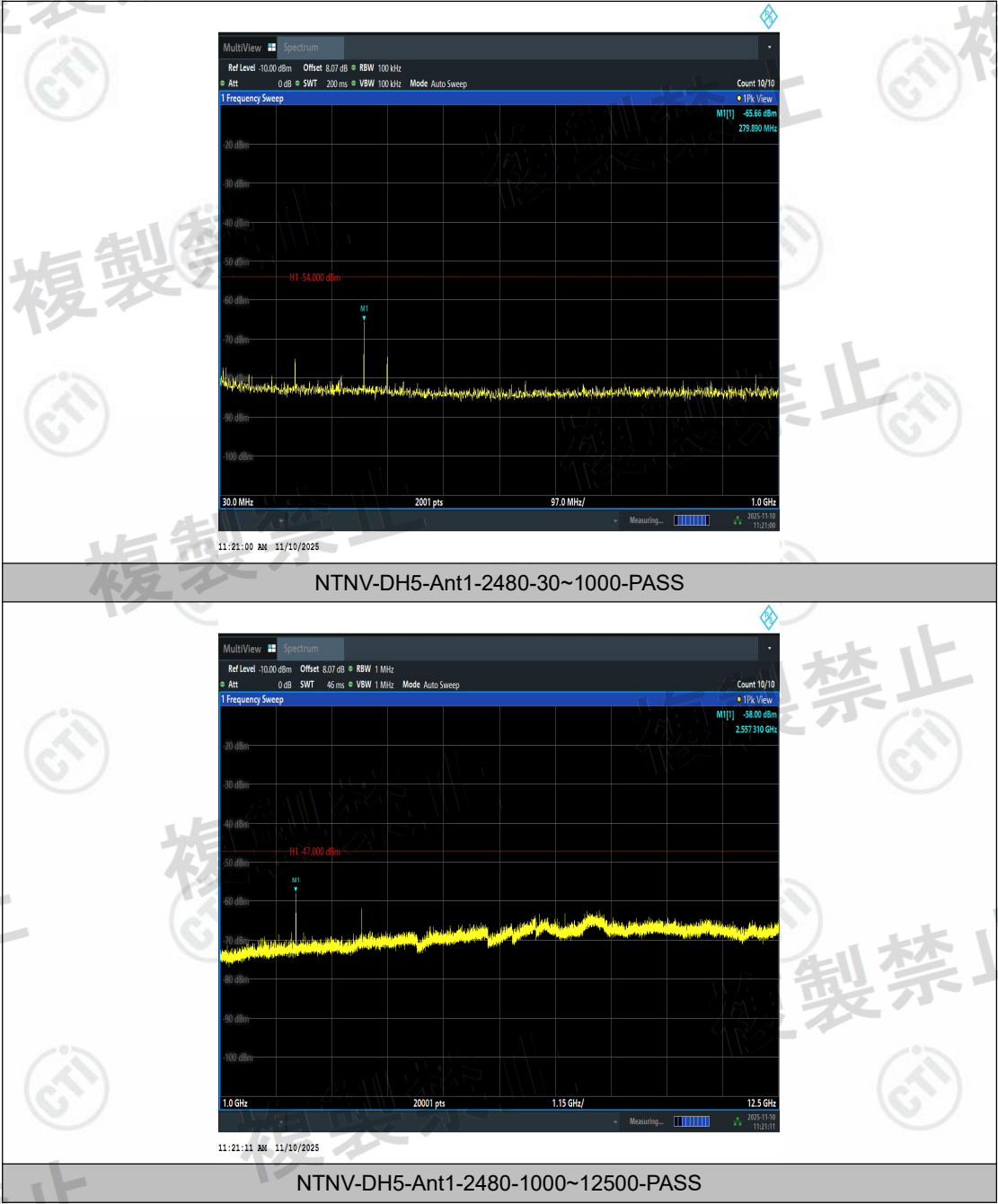
Test Condition	Test Mode	Antenna	Frequency [MHz]	Freq.Range [MHz]	Freq [MHz]	Result [dBm]	Result [μ W]	Limit [μ W]	Verdict
NTNV	DH5	Ant1	2402	30~1000	279.89	-65.83	0.2612 2	≤ 4	PASS
NTNV	DH5	Ant1	2402	1000~12500	3907.3 4	-61.92	0.6426 9	≤ 20	PASS
NTNV	DH5	Ant1	2441	30~1000	279.89	-65.96	0.2535 1	≤ 4	PASS
NTNV	DH5	Ant1	2441	1000~12500	8717.5 5	-62.41	0.5741 2	≤ 20	PASS
NTNV	DH5	Ant1	2480	30~1000	279.89	-65.66	0.2716 4	≤ 4	PASS
NTNV	DH5	Ant1	2480	1000~12500	2557.3 1	-58.00	1.5848 9	≤ 20	PASS
NTNV	DH5	Ant1	Hop	30~1000	39.45	-86.70	0.0021 4	≤ 4	PASS
NTNV	DH5	Ant1	Hop	1000~12500	7671.6 8	-69.75	0.1059 3	≤ 20	PASS
NTNV	2DH5	Ant1	2402	30~1000	279.89	-66.28	0.2355 0	≤ 4	PASS
NTNV	2DH5	Ant1	2402	1000~12500	3907.3 4	-61.65	0.6839 1	≤ 20	PASS
NTNV	2DH5	Ant1	2441	30~1000	279.89	-66.07	0.2471 7	≤ 4	PASS
NTNV	2DH5	Ant1	2441	1000~12500	8631.8 8	-62.21	0.60117	≤ 20	PASS
NTNV	2DH5	Ant1	2480	30~1000	279.89	-65.89	0.2576 3	≤ 4	PASS
NTNV	2DH5	Ant1	2480	1000~12500	3906.7 7	-62.30	0.5888 4	≤ 20	PASS
NTNV	2DH5	Ant1	Hop	30~1000	30.24	-87.44	0.0018 0	≤ 4	PASS
NTNV	2DH5	Ant1	Hop	1000~12500	8758.3 7	-69.89	0.1025 7	≤ 20	PASS
NTNV	3DH5	Ant1	2402	30~1000	279.89	-66.05	0.2483 1	≤ 4	PASS
NTNV	3DH5	Ant1	2402	1000~12500	8803.2 2	-62.42	0.5728 0	≤ 20	PASS

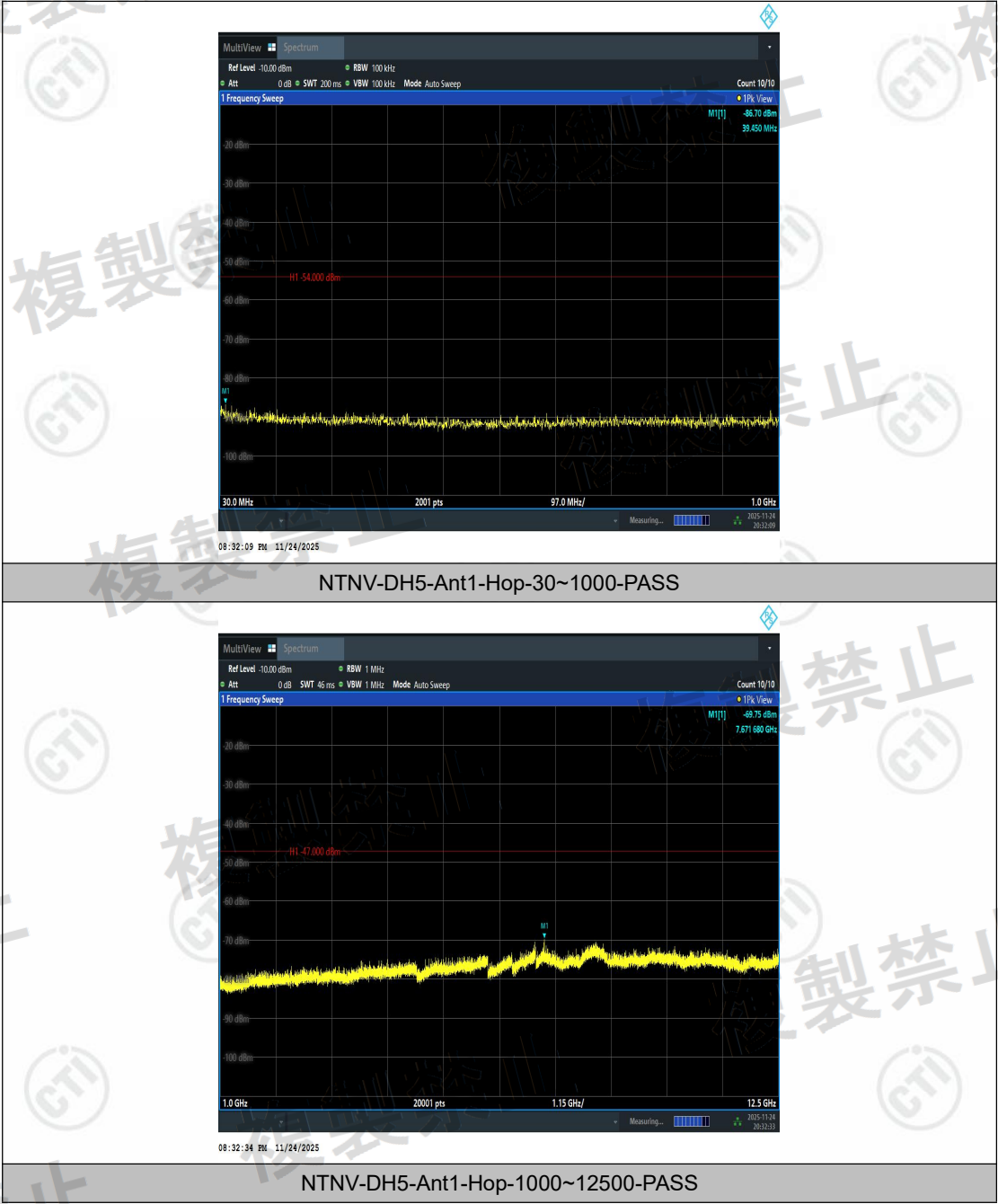
NTNV	3DH5	Ant1	2441	30~1000	279.89	-65.91	0.2564 5	≤4	PASS
NTNV	3DH5	Ant1	2441	1000~12500	8776.7 7	-61.47	0.7128 5	≤20	PASS
NTNV	3DH5	Ant1	2480	30~1000	279.89	-65.75	0.2660 7	≤4	PASS
NTNV	3DH5	Ant1	2480	1000~12500	8704.9 0	-62.02	0.6280 6	≤20	PASS
NTNV	3DH5	Ant1	Hop	30~1000	52.06	-87.55	0.0017 6	≤4	PASS
NTNV	3DH5	Ant1	Hop	1000~12500	8809.5 5	-69.63	0.1088 9	≤20	PASS

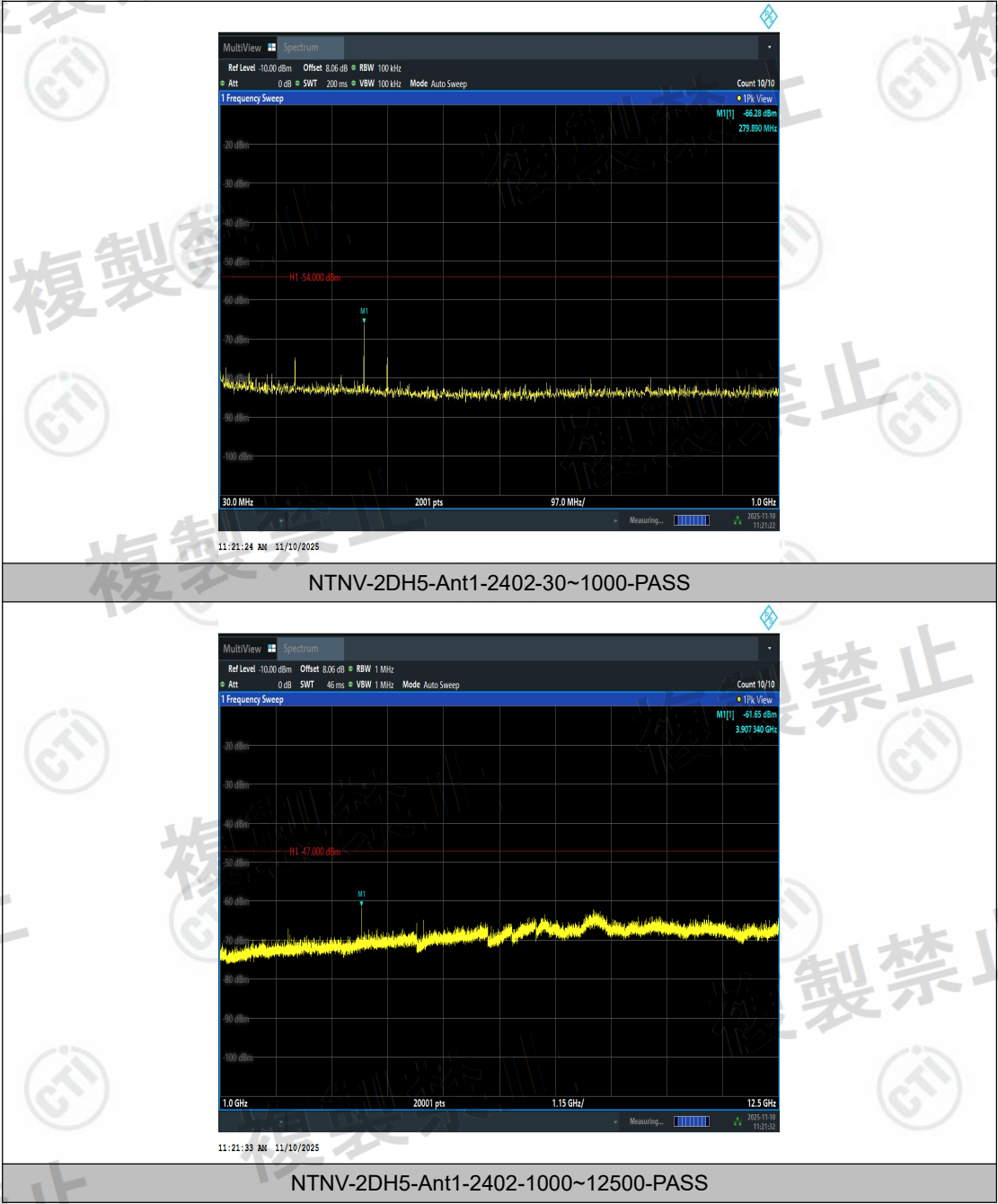
Test Graphs

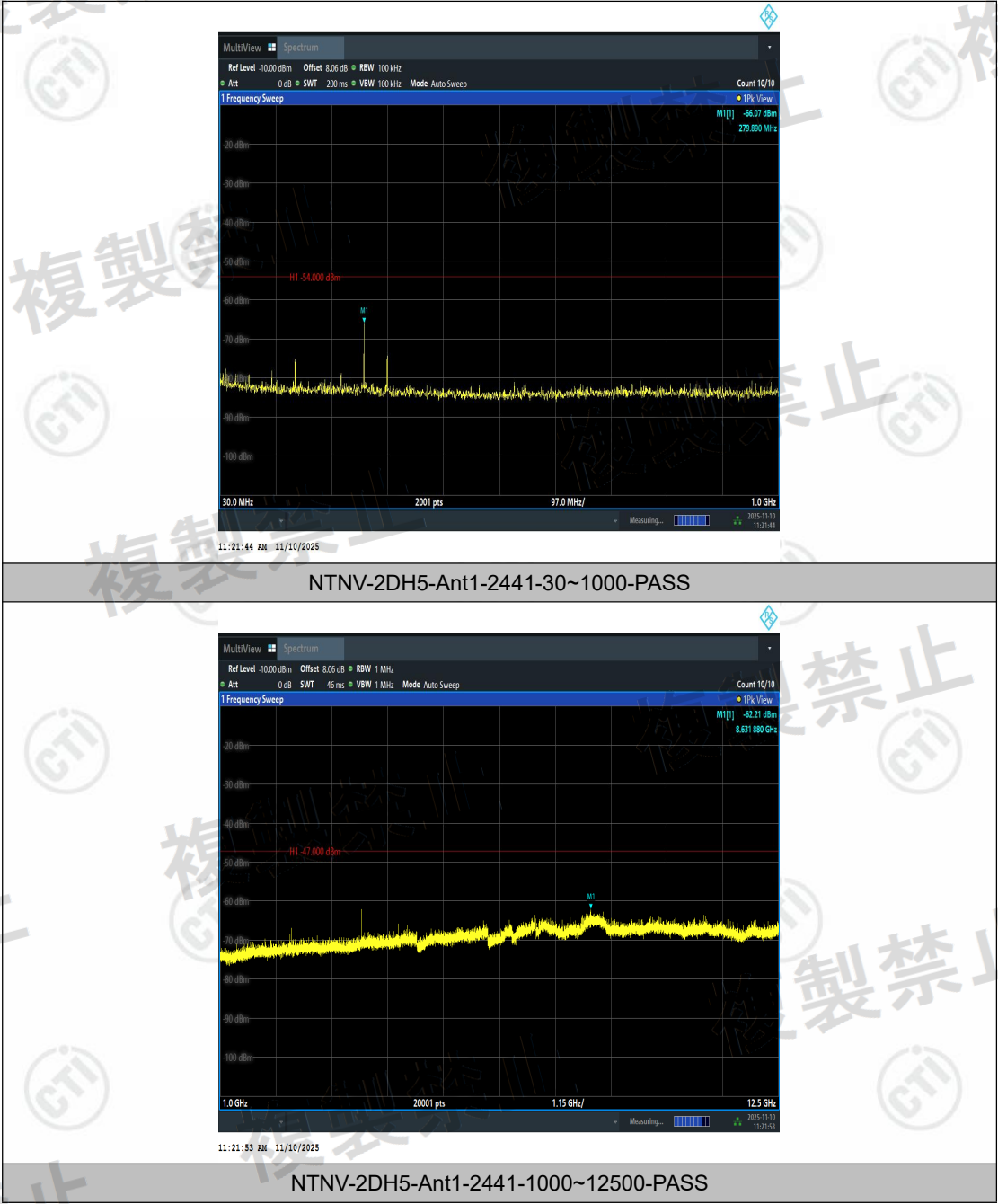


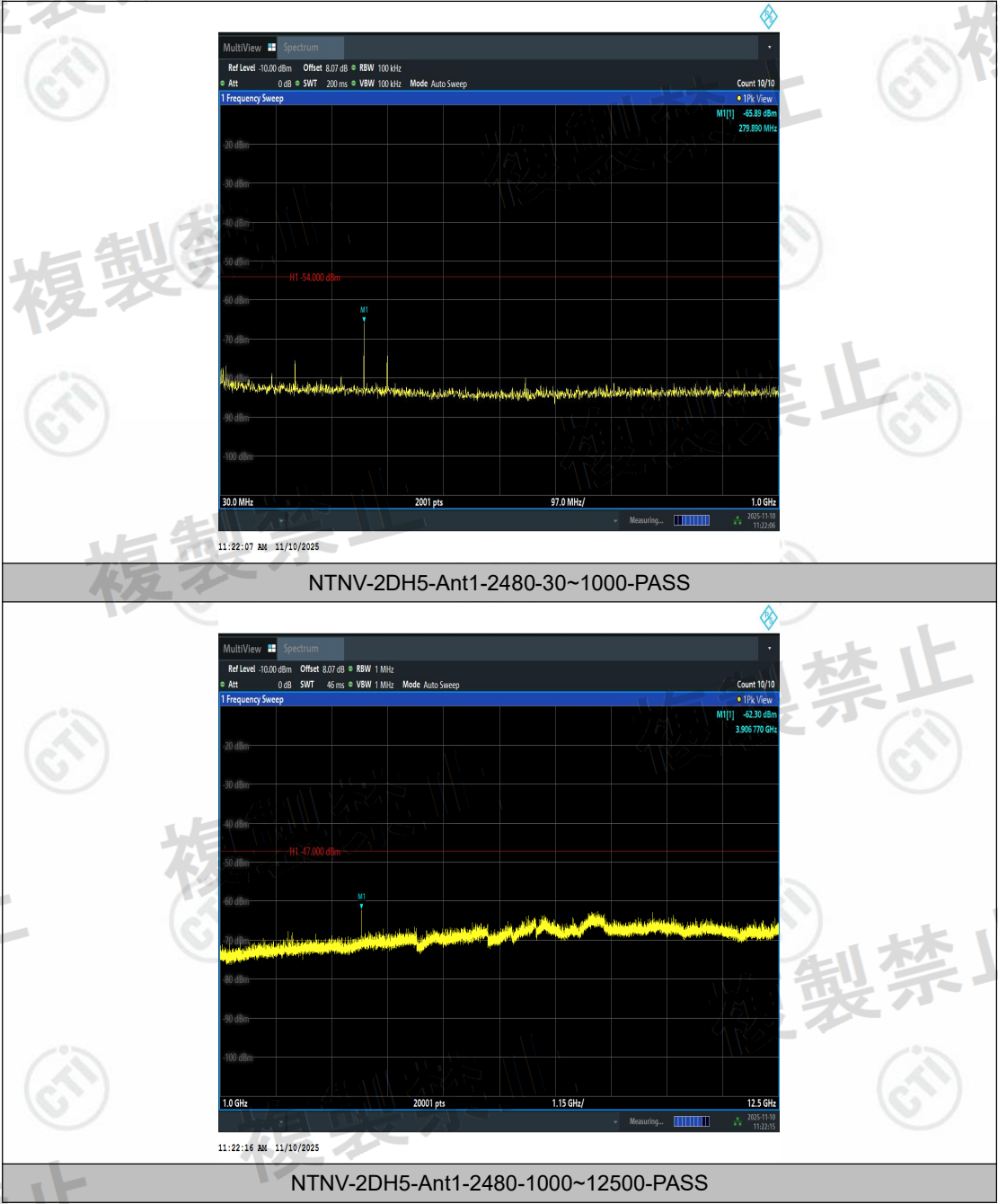


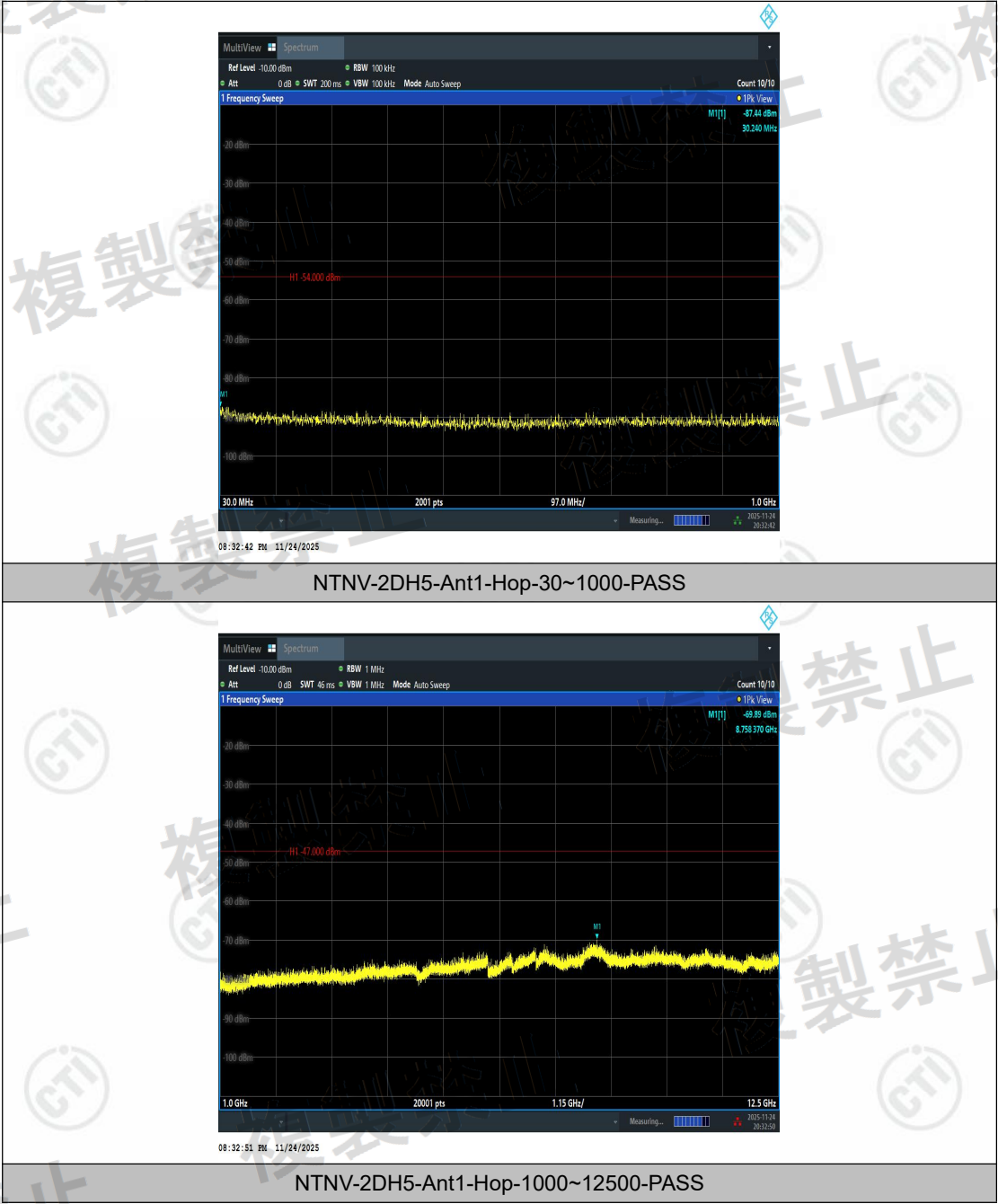


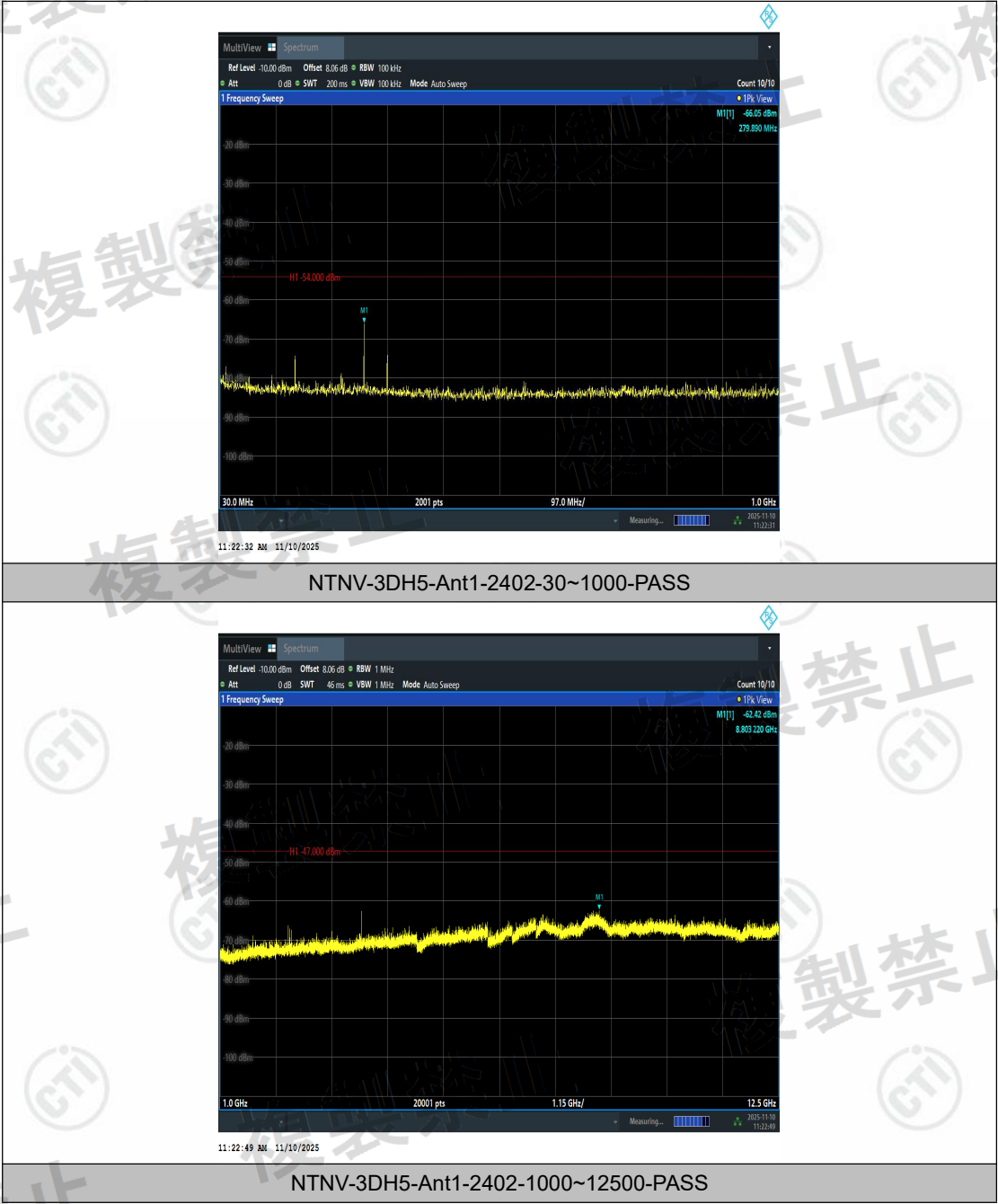


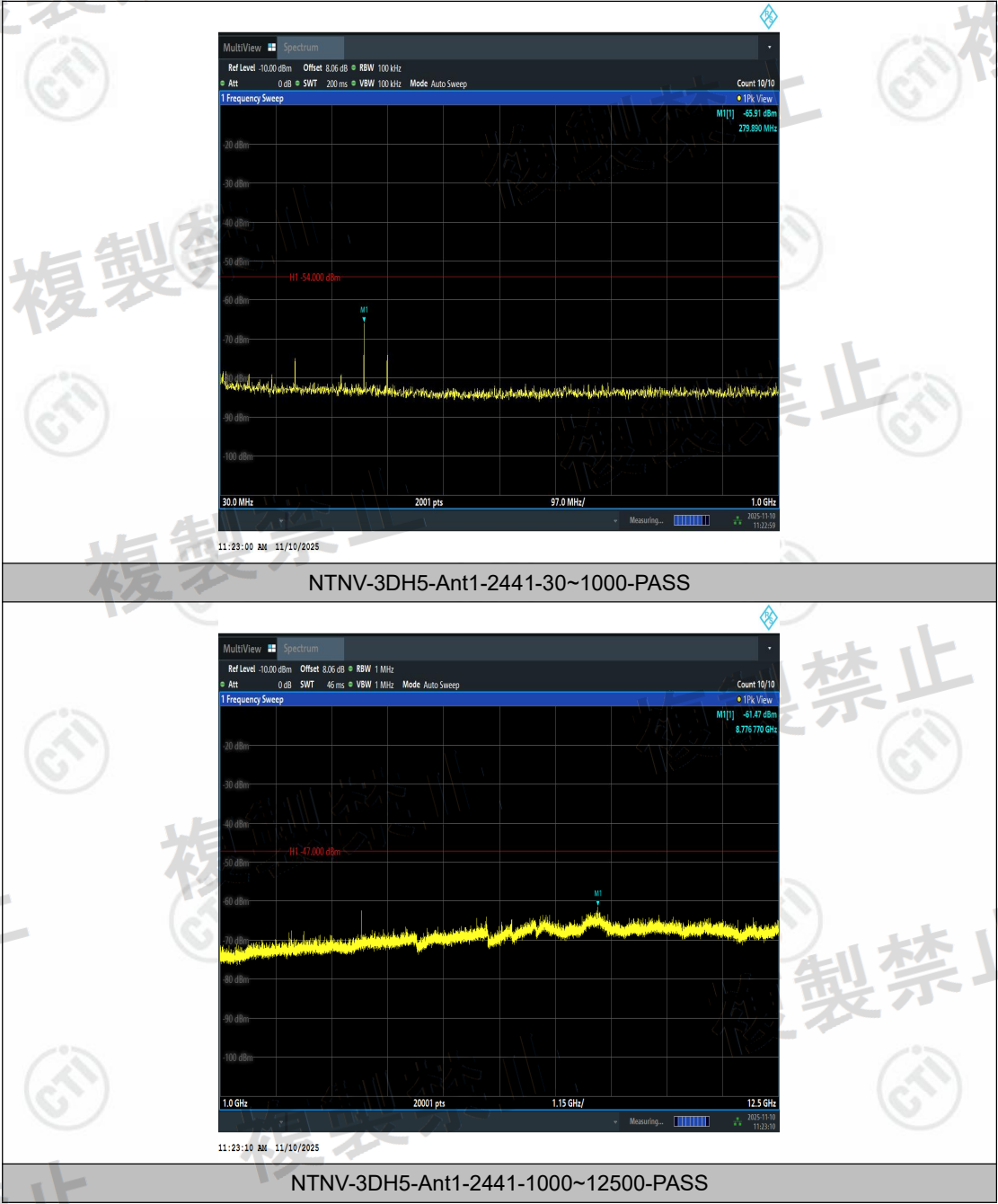


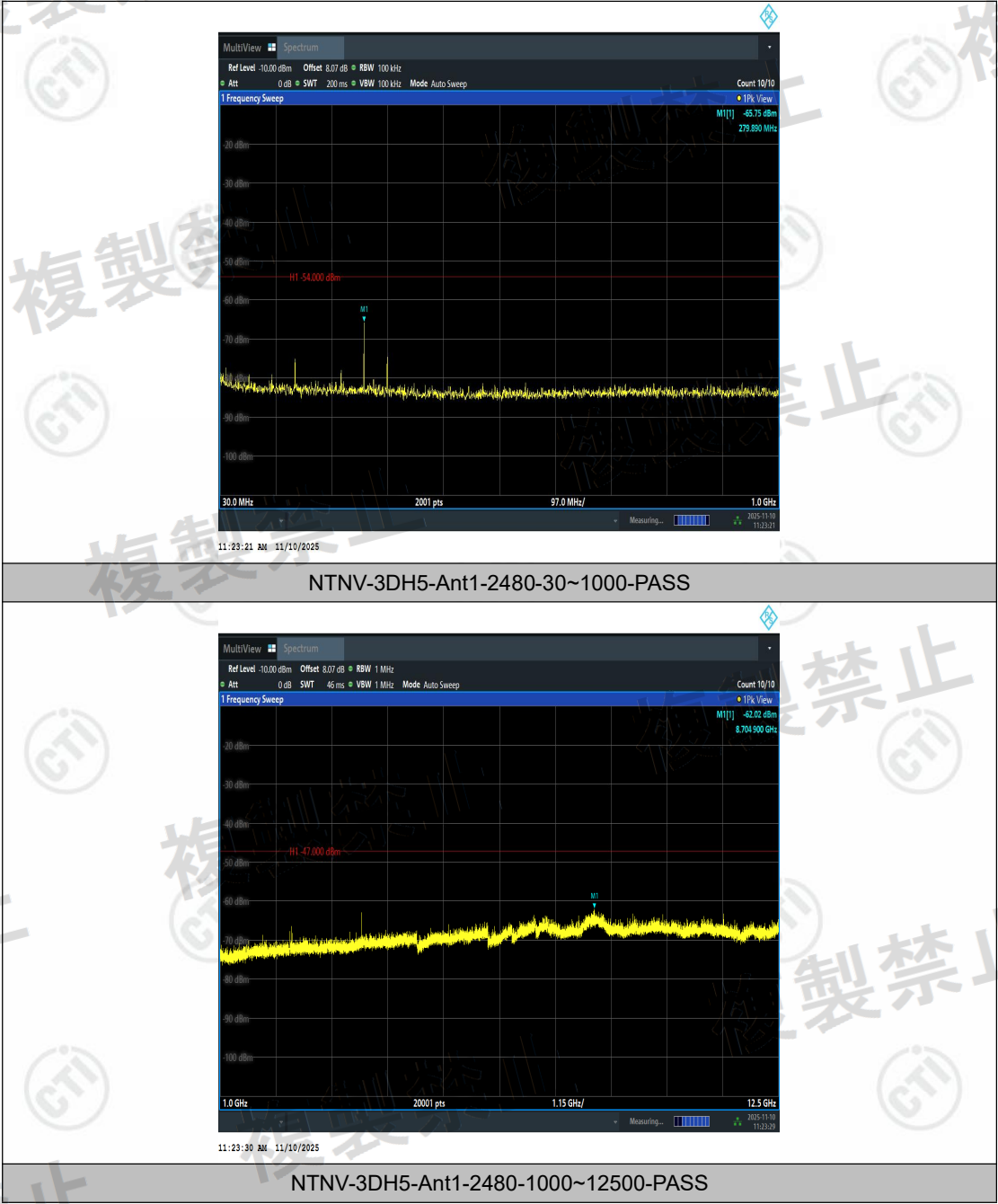


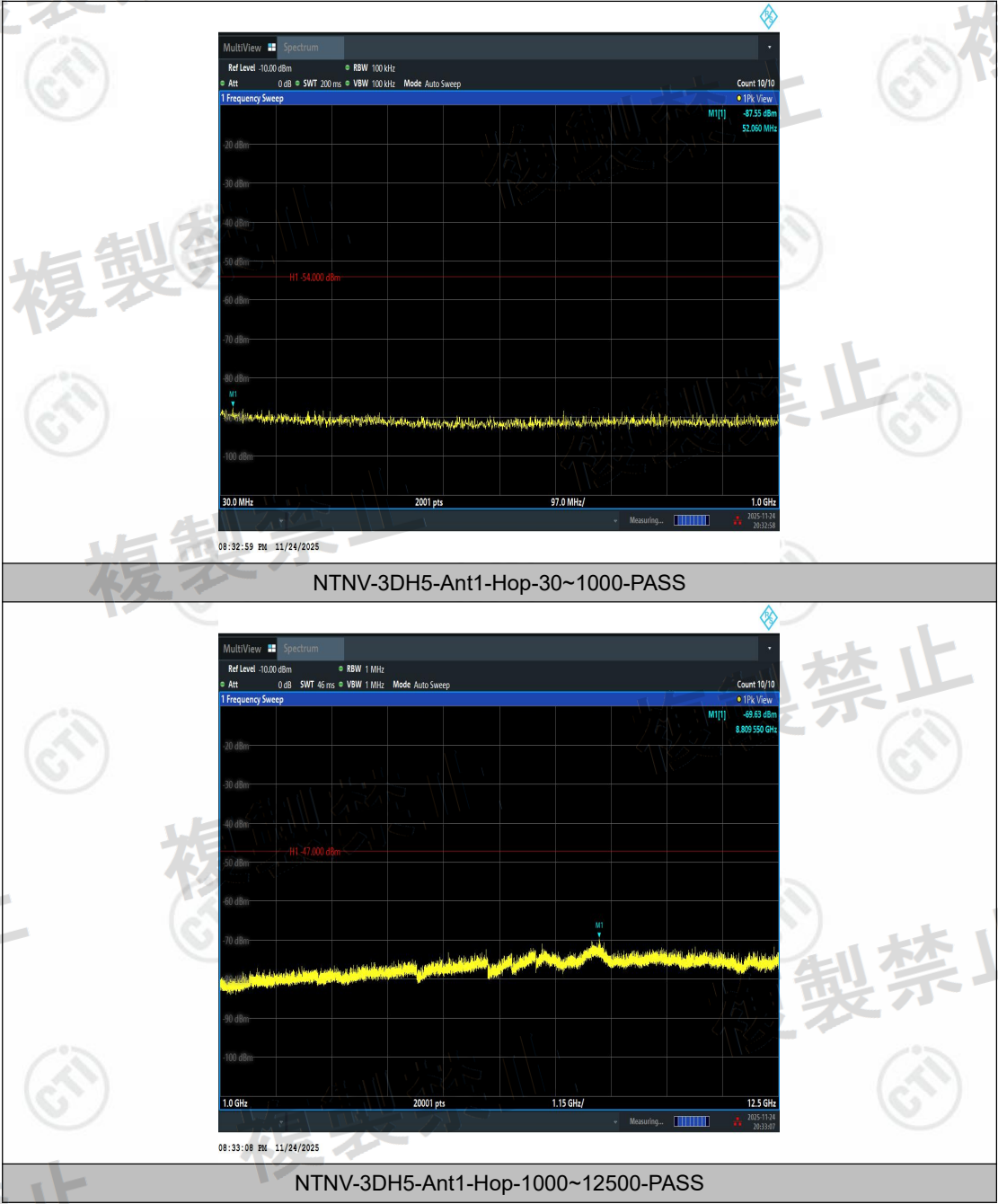












Appendix G: Dwell Time

Test Result

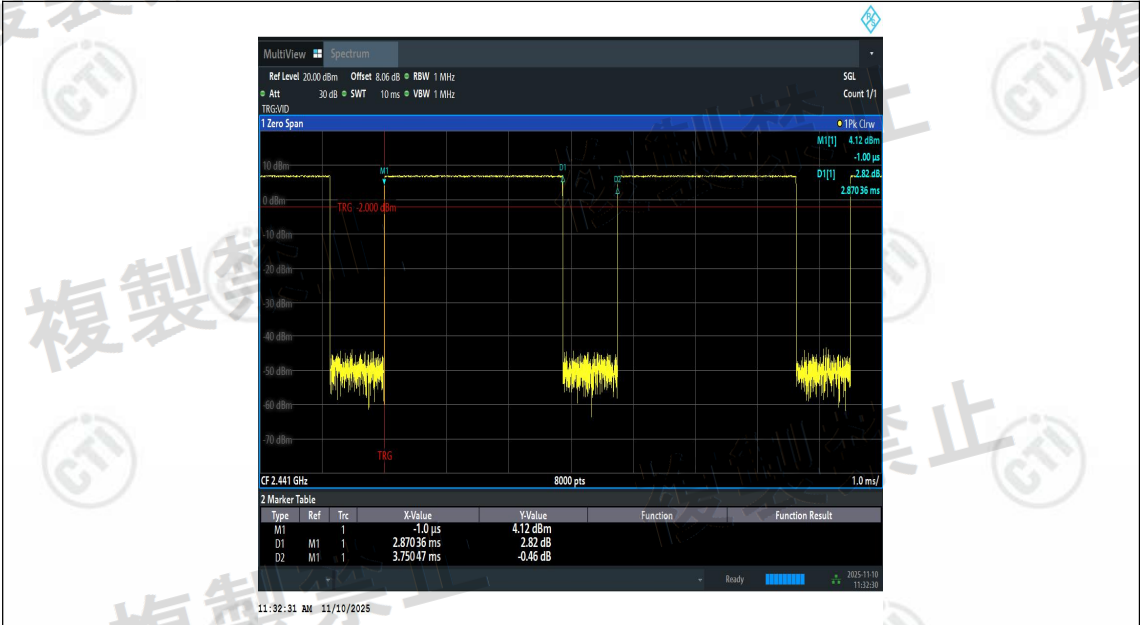
Condition	Mode	Frequency (MHz)	Antenna	T_on(ms)	Period(ms)	Spreading Rate	Hop Number	Dwell Time (ms)	Limit (ms)	Verdict
NTNV	DH1	Ant1	2441	0.37	1.25	71.013	79	106.43	400	Pass
NTNV	DH3	Ant1	2441	1.62	2.5	70.831	79	232.40	400	Pass
NTNV	DH5	Ant1	2441	2.87	3.75	71.11	79	275.56	400	Pass
NTNV	2DH1	Ant1	2441	0.38	1.25	71.164	79	109.54	400	Pass
NTNV	2DH3	Ant1	2441	1.63	2.5	71.224	79	235.13	400	Pass
NTNV	2DH5	Ant1	2441	2.88	3.75	71.087	79	276.43	400	Pass
NTNV	3DH1	Ant1	2441	0.38	1.25	71.283	79	109.72	400	Pass
NTNV	3DH3	Ant1	2441	1.63	2.5	71.224	79	235.13	400	Pass
NTNV	3DH5	Ant1	2441	2.88	3.75	71.337	79	277.40	400	Pass

Dwell time=(0.4(s)*[Spreading rate]*[Transmission time of 1 burst(s)])/([Burst cycle(s)]*[No. of hopping channel]);

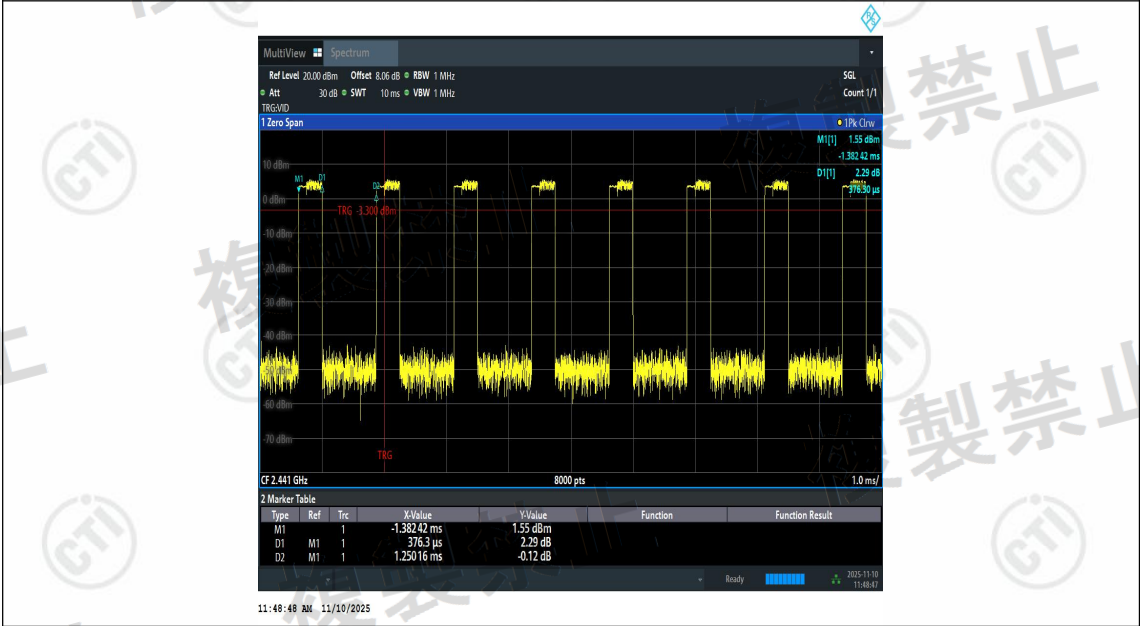
Note: Spreading rate=[Spread bandwidth(actual measurement value)]/[Transmission rate];

Test Graphs

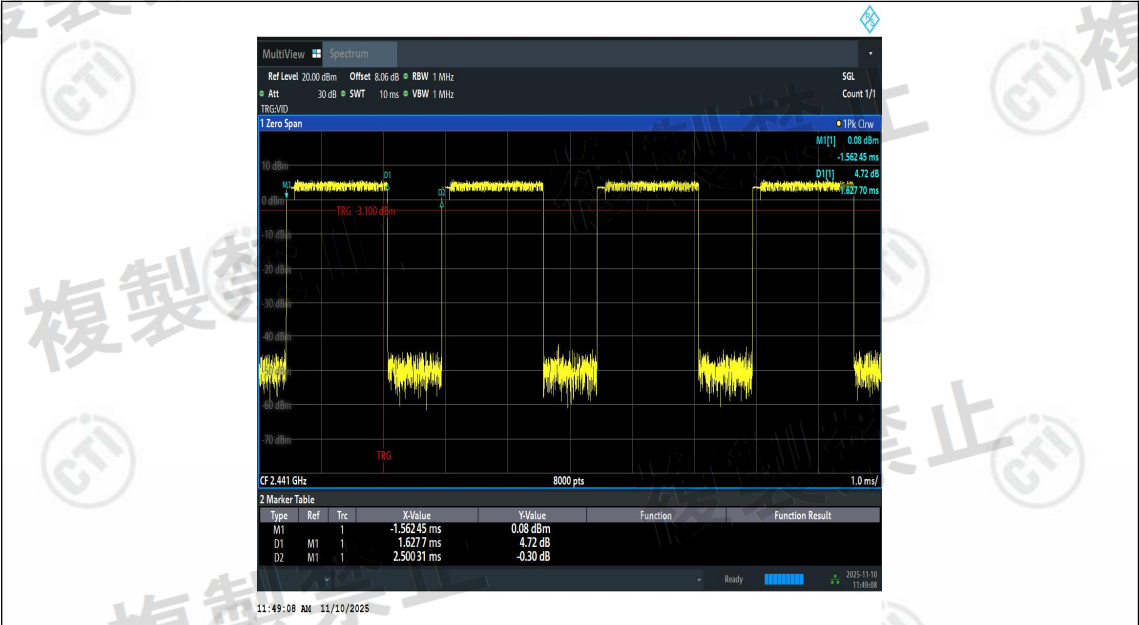




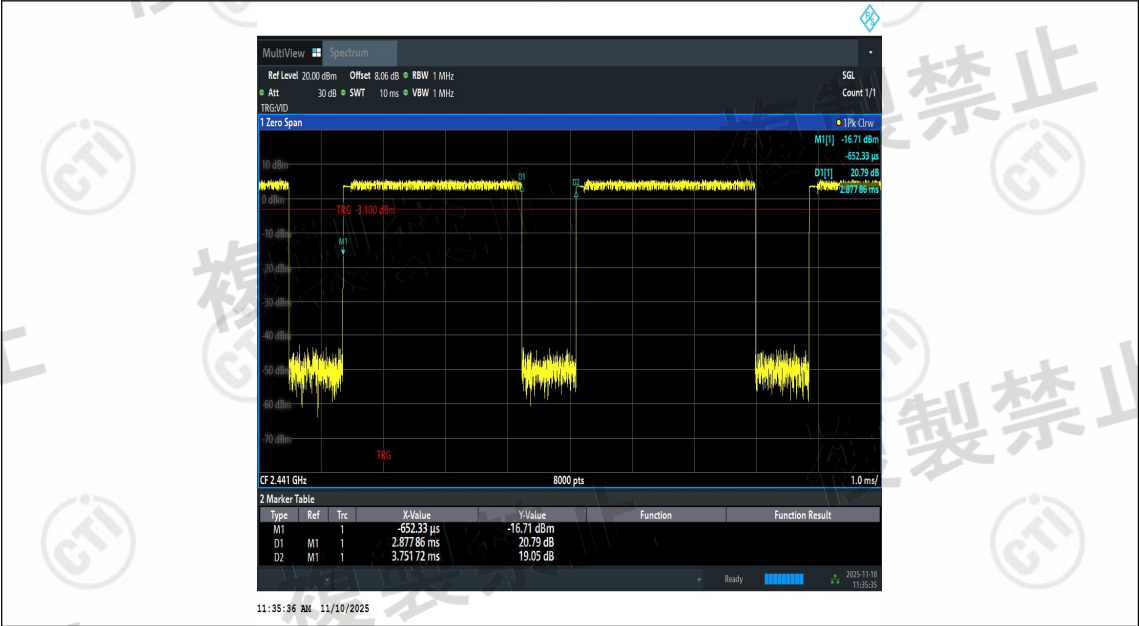
NTNV-DH5-Ant1-2441



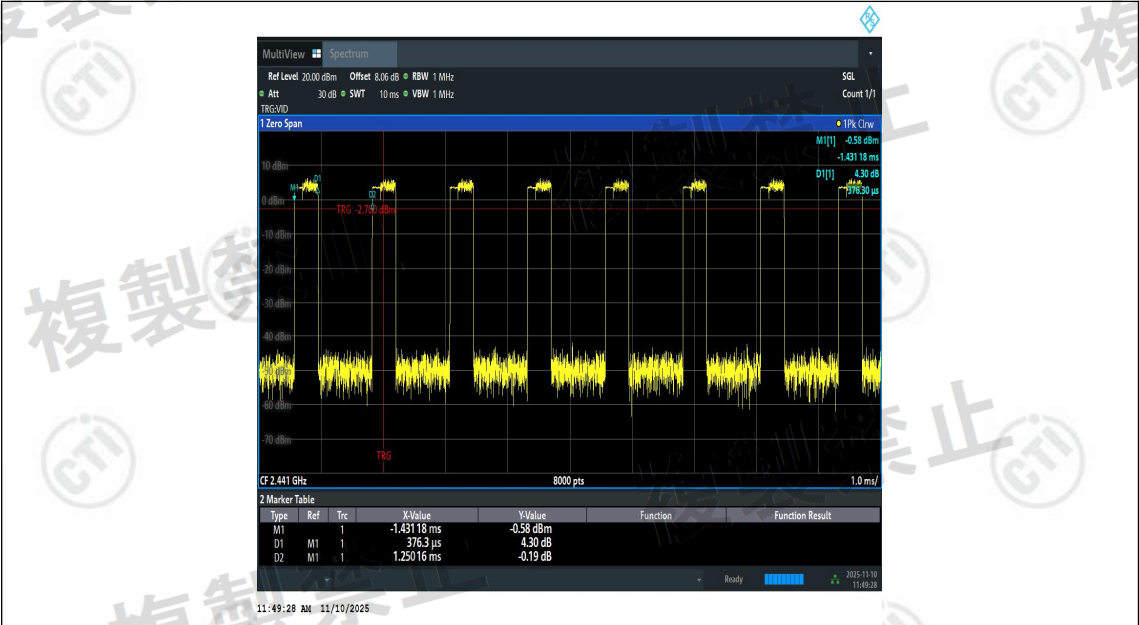
NTNV-2DH1-Ant1-2441



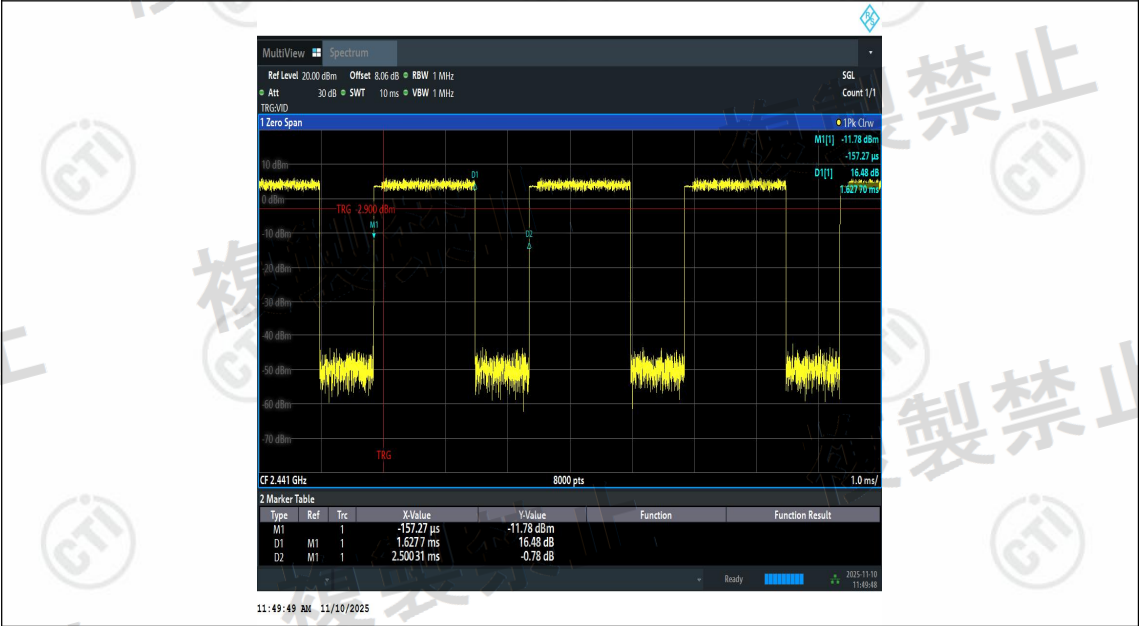
NTVN-2DH3-Ant1-2441



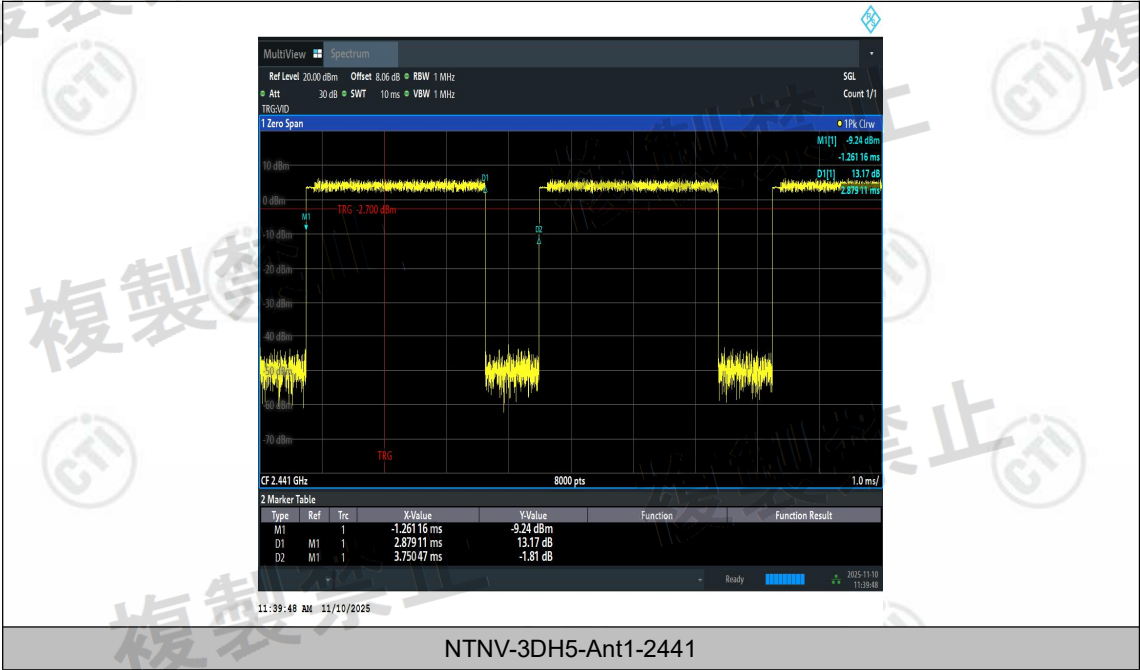
NTVN-2DH5-Ant1-2441



NTVN-3DH1-Ant1-2441



NTVN-3DH3-Ant1-2441



NTNV-3DH5-Ant1-2441

*** End of Report ***