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Annex for Bluetooth Low Energy

Test Report No.: CTL2510102071-MIC01

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1. Frequency Error

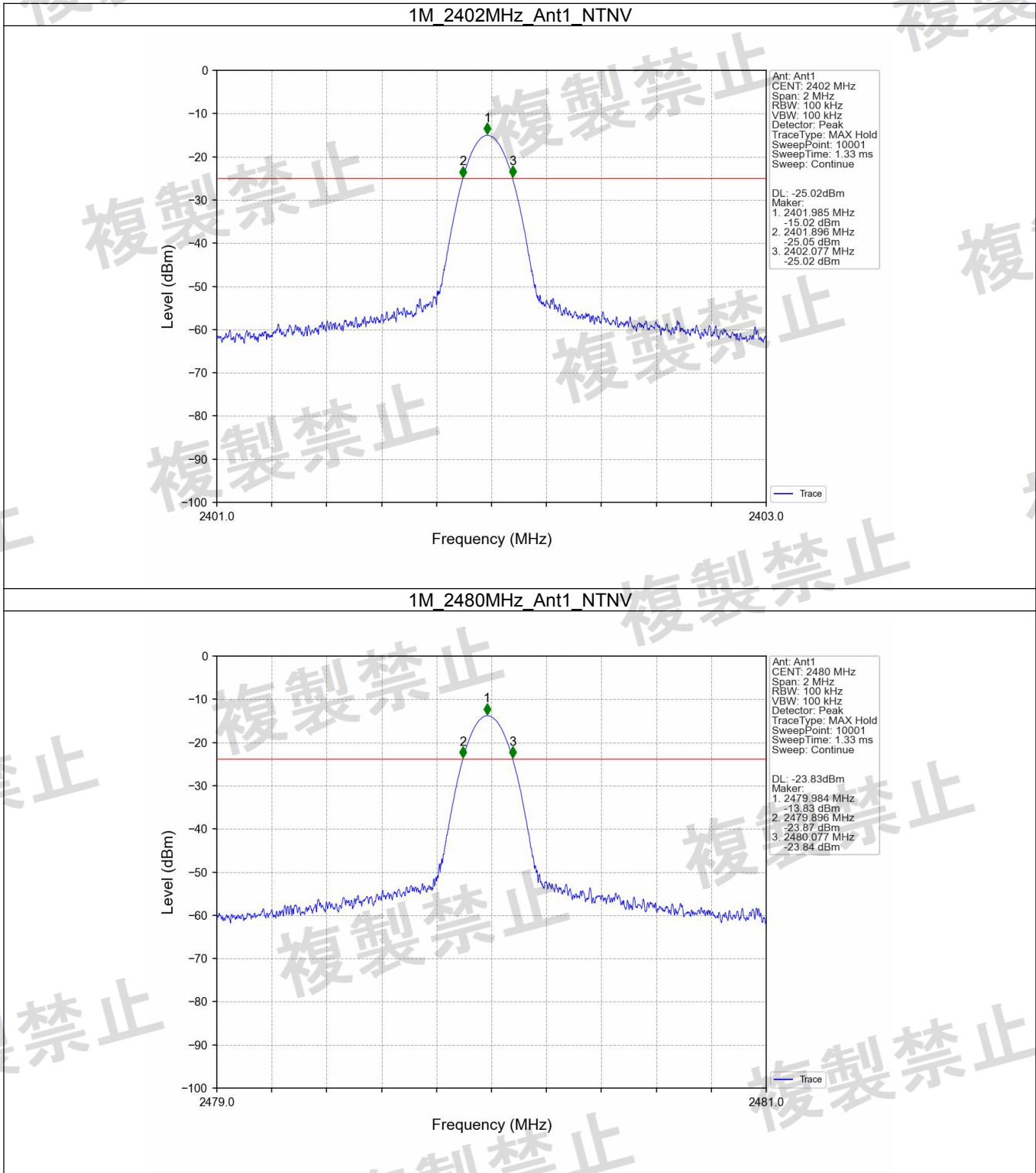
1.1 Test Result

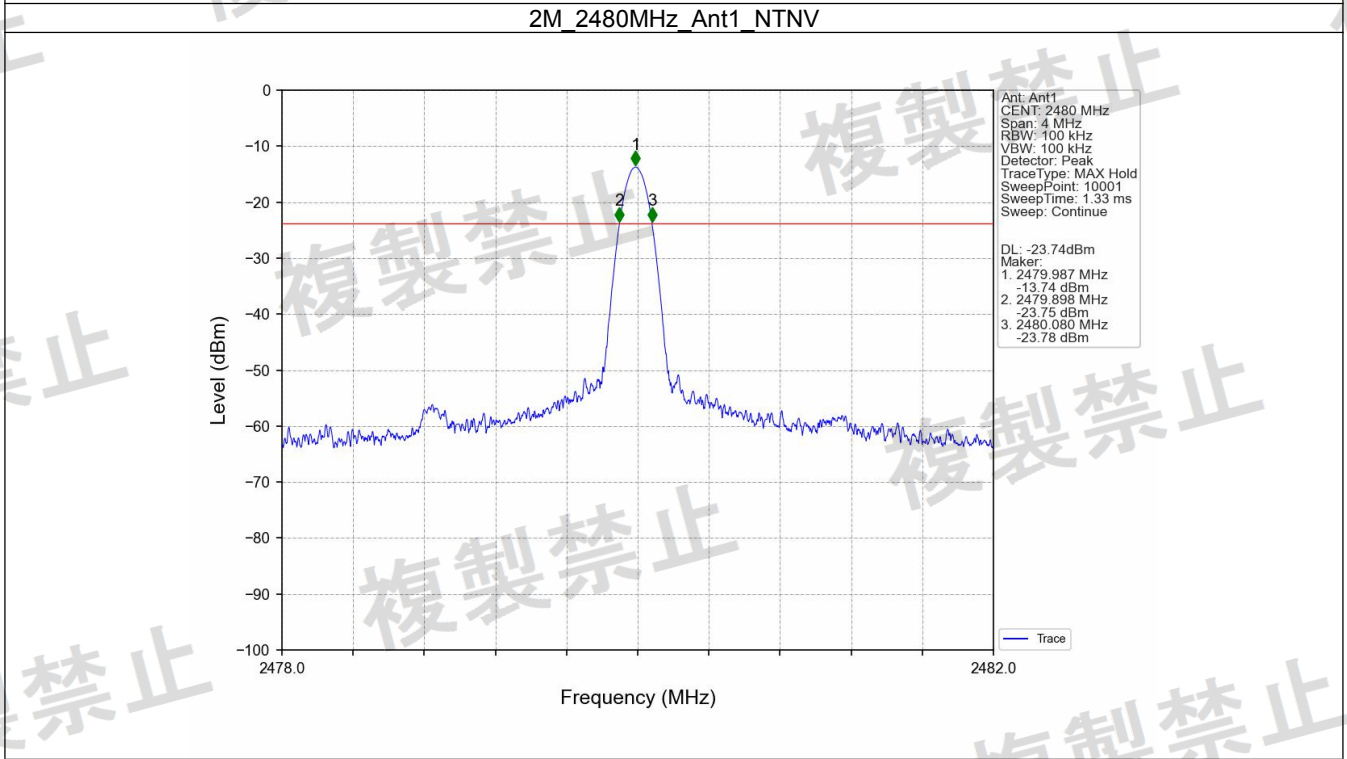
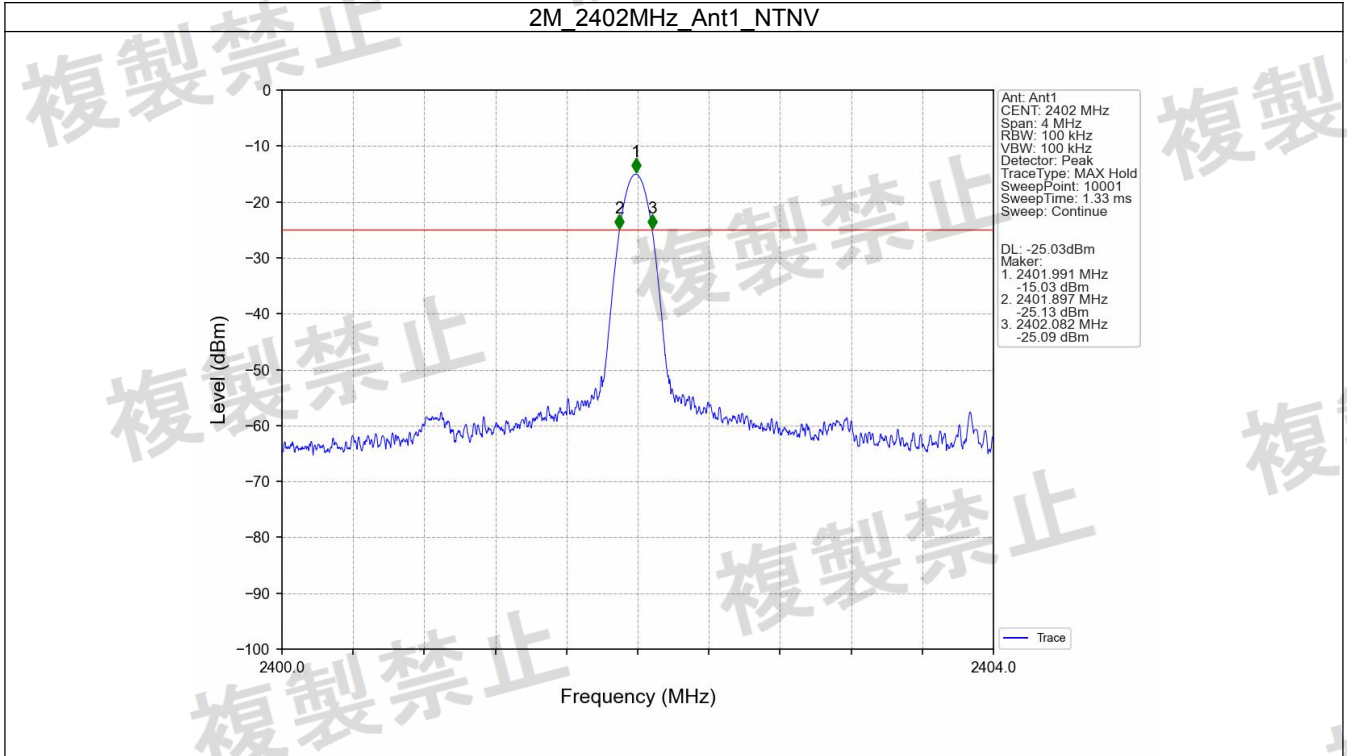
1.1.1 Ant1

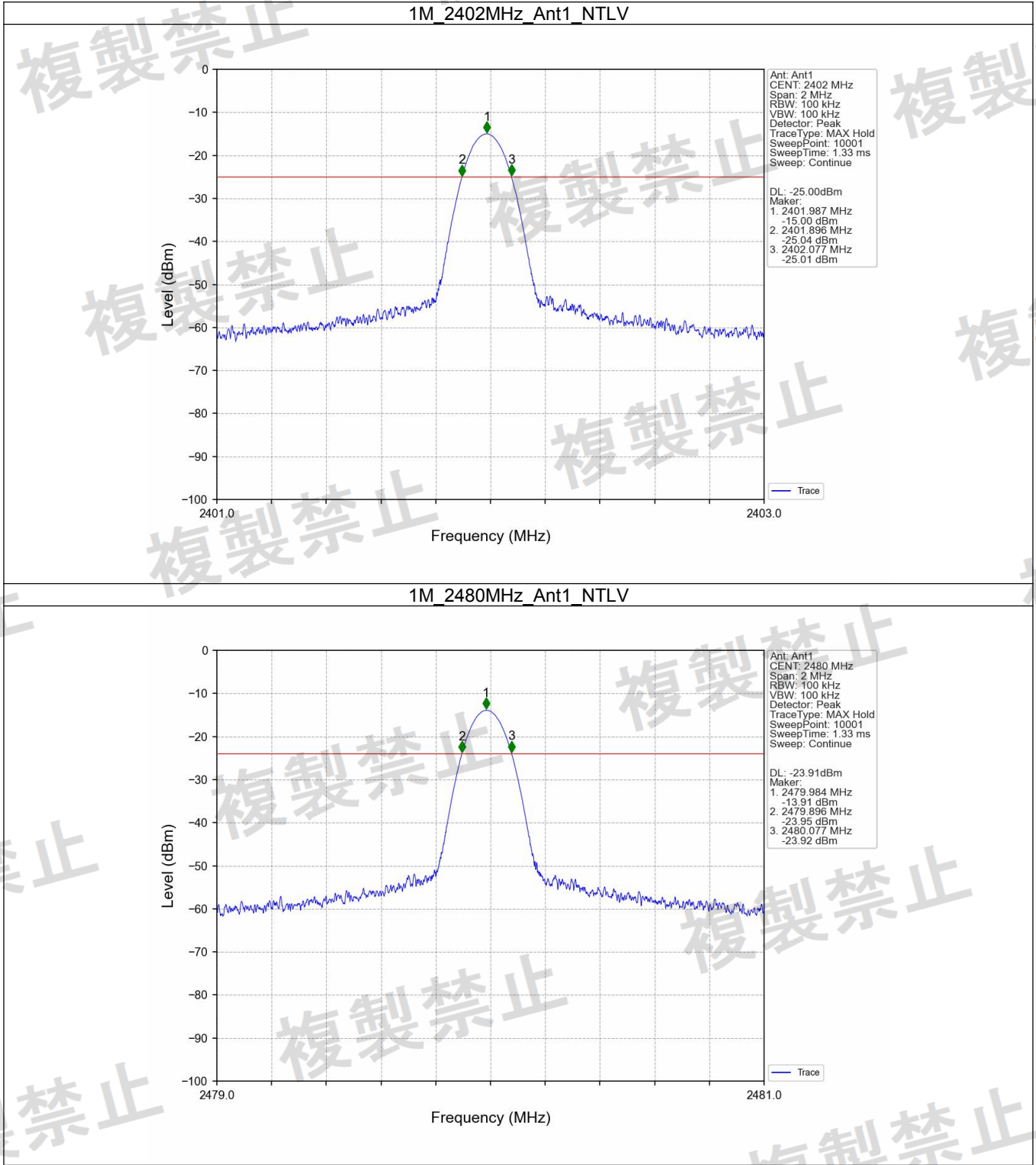
Ant1							
ENV	Mode	TX Type	Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)		Verdict
					Result	Limit	
NTNV	1M	SISO	2402	2401.986	-5.70	-50 to 50	Pass
			2480	2479.986	-5.44	-50 to 50	Pass
	2M	SISO	2402	2401.989	-4.50	-50 to 50	Pass
			2480	2479.989	-4.44	-50 to 50	Pass
NTLV	1M	SISO	2402	2401.986	-5.75	-50 to 50	Pass
			2480	2479.986	-5.52	-50 to 50	Pass
	2M	SISO	2402	2401.989	-4.41	-50 to 50	Pass
			2480	2479.989	-4.52	-50 to 50	Pass
NTHV	1M	SISO	2402	2401.986	-5.62	-50 to 50	Pass
			2480	2479.986	-5.44	-50 to 50	Pass
	2M	SISO	2402	2401.989	-4.50	-50 to 50	Pass
			2480	2479.989	-4.44	-50 to 50	Pass

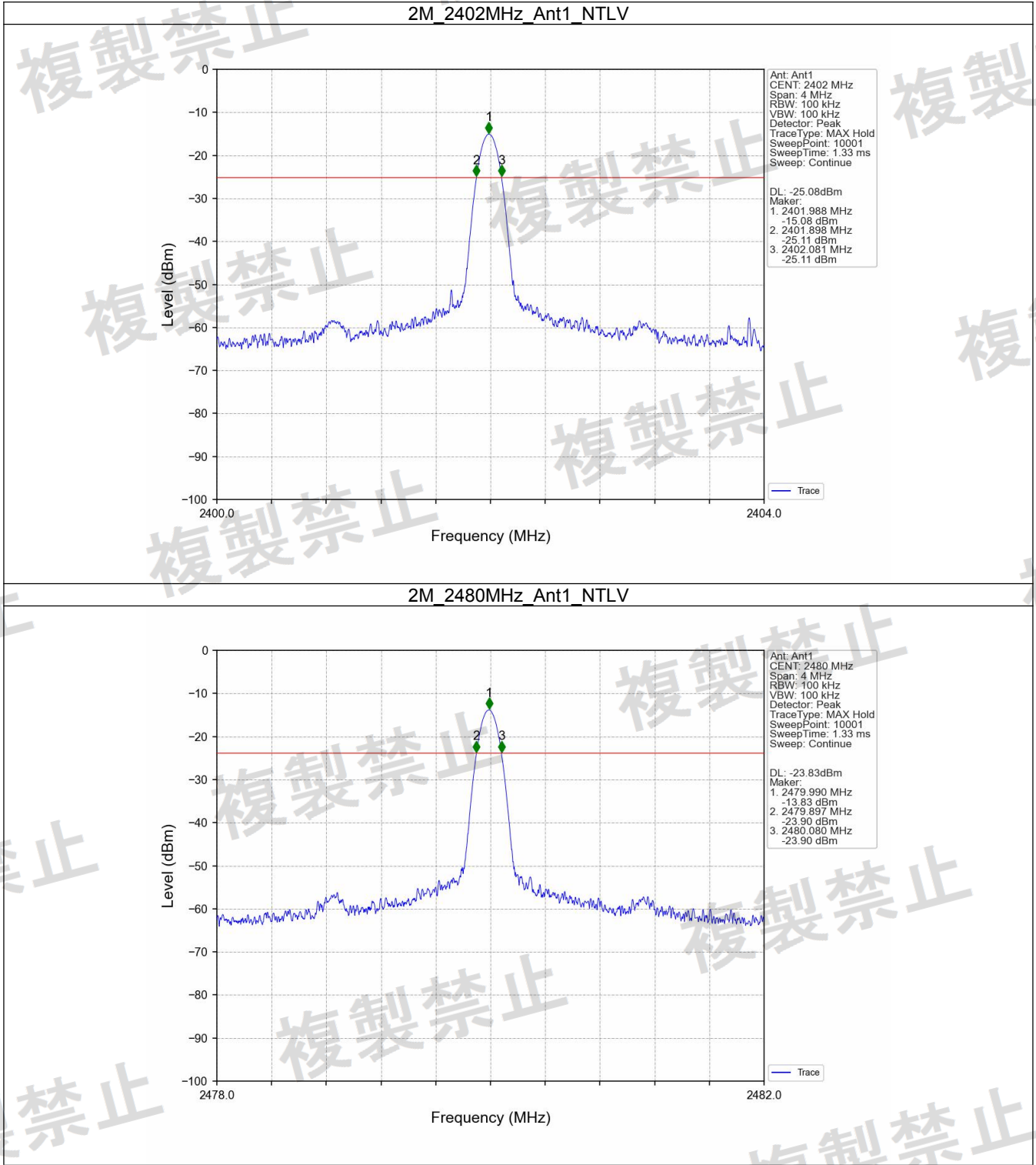
1.2 Test Graph

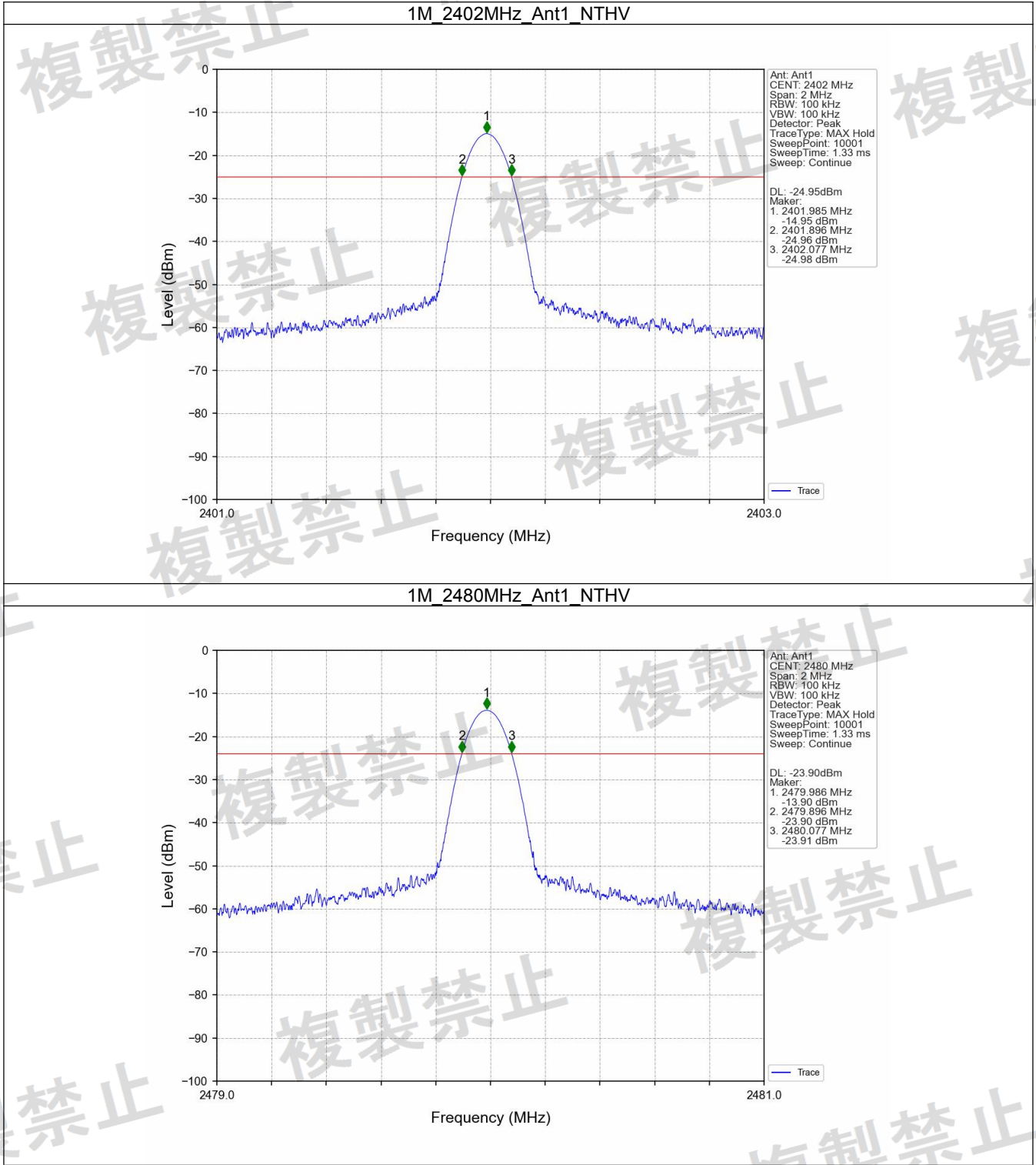
1.2.1 Ant1

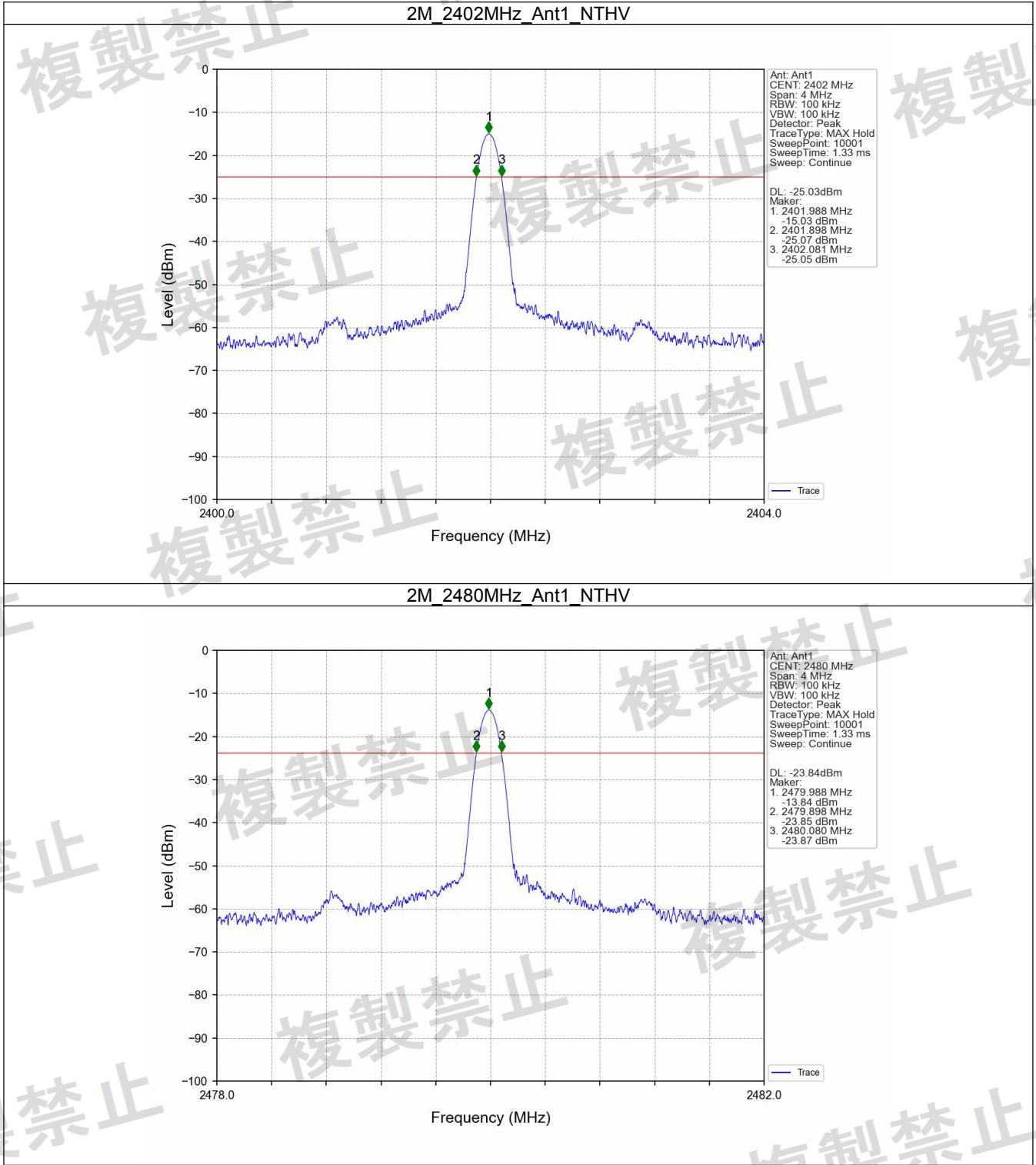












2. Occupied Bandwidth

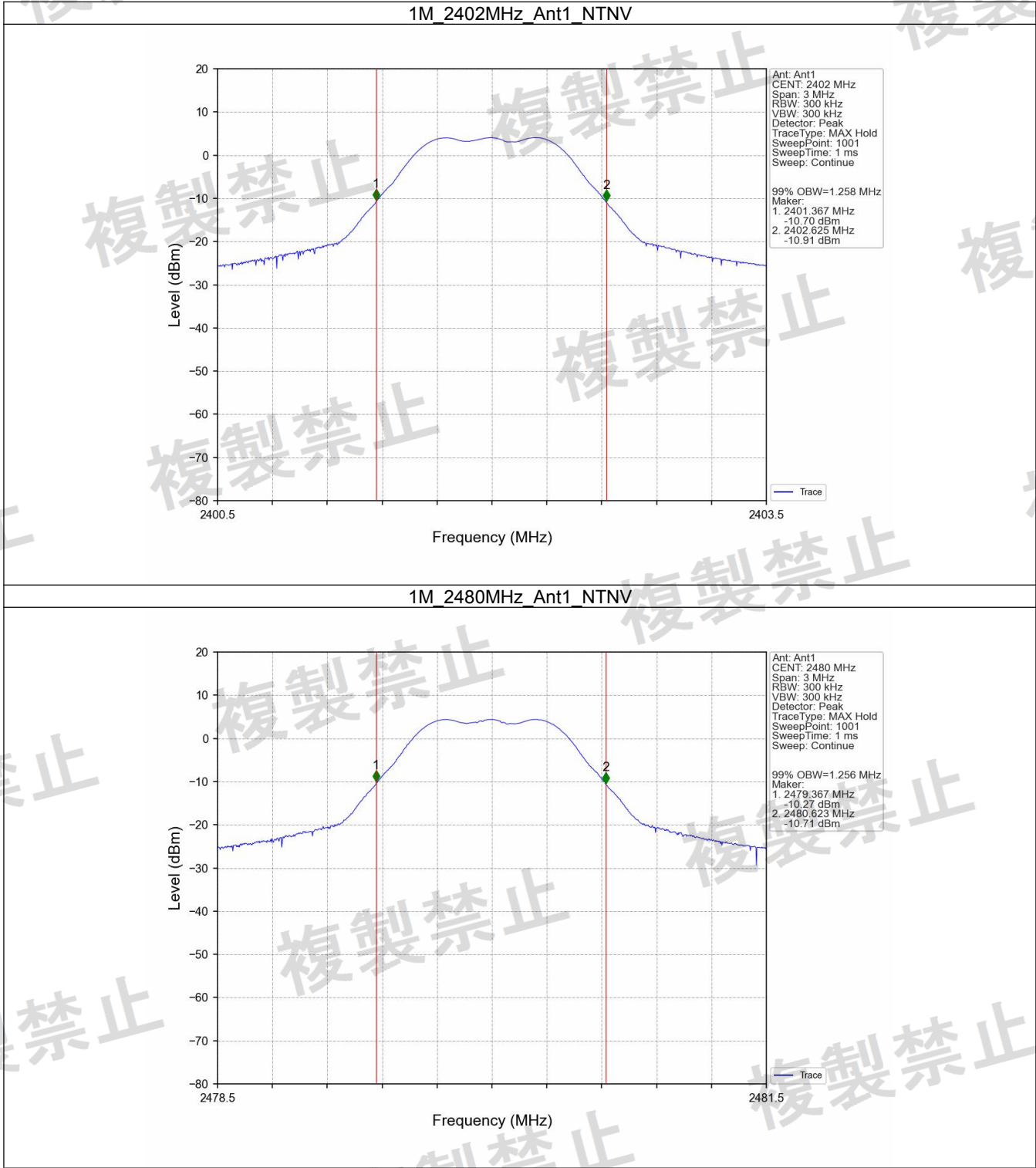
2.1 Test Result

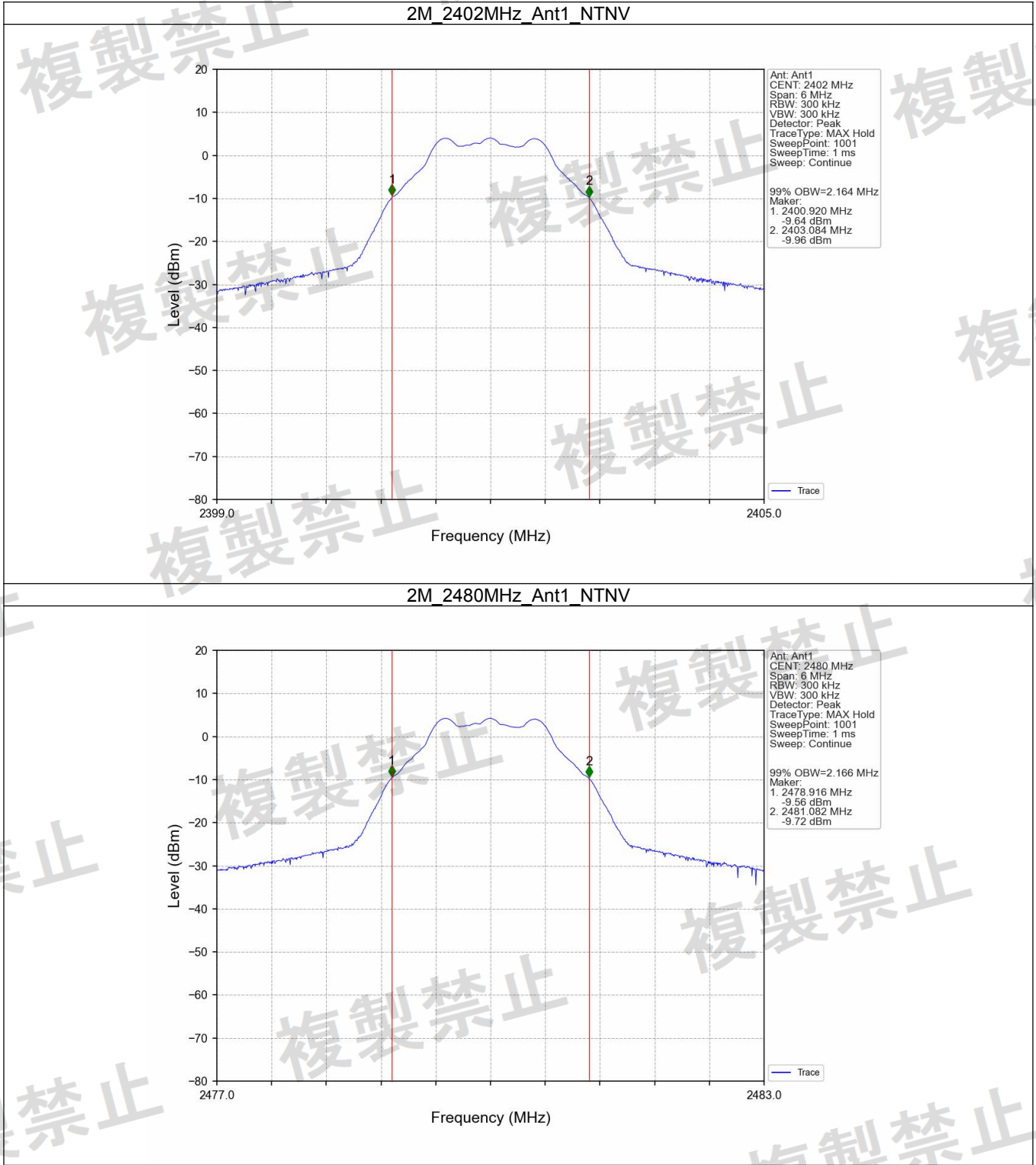
2.1.1 OBW

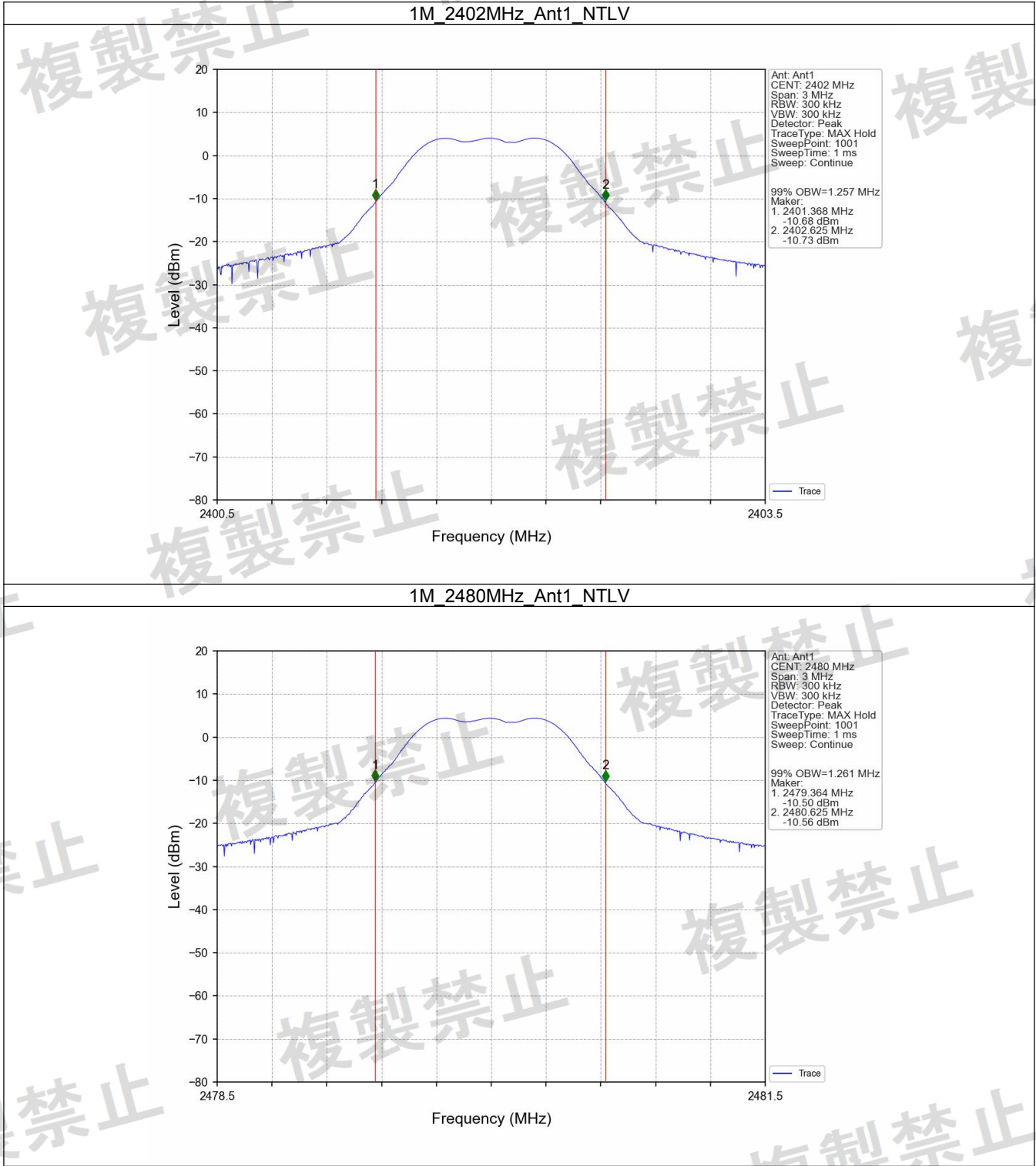
ENV	Mode	TX Type	Frequency (MHz)	99% Occupied Bandwidth (MHz)		Verdict
				ANT1	Limit	
NTNV	1M	SISO	2402	1.258	<=26	Pass
			2480	1.256	<=26	Pass
	2M	SISO	2402	2.164	<=26	Pass
			2480	2.166	<=26	Pass
NTLV	1M	SISO	2402	1.257	<=26	Pass
			2480	1.261	<=26	Pass
	2M	SISO	2402	2.166	<=26	Pass
			2480	2.165	<=26	Pass
NTHV	1M	SISO	2402	1.259	<=26	Pass
			2480	1.260	<=26	Pass
	2M	SISO	2402	2.166	<=26	Pass
			2480	2.164	<=26	Pass

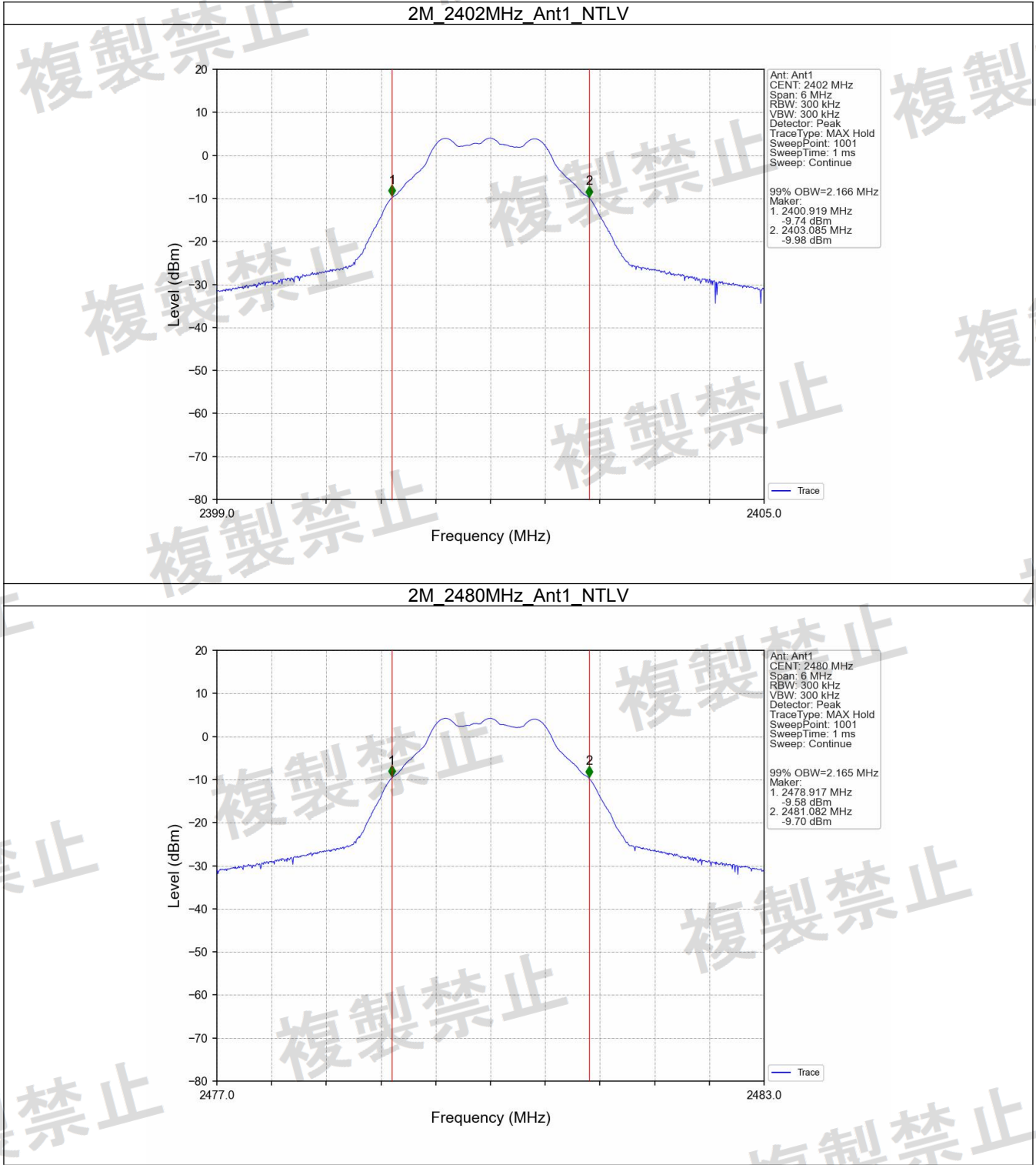
2.2 Test Graph

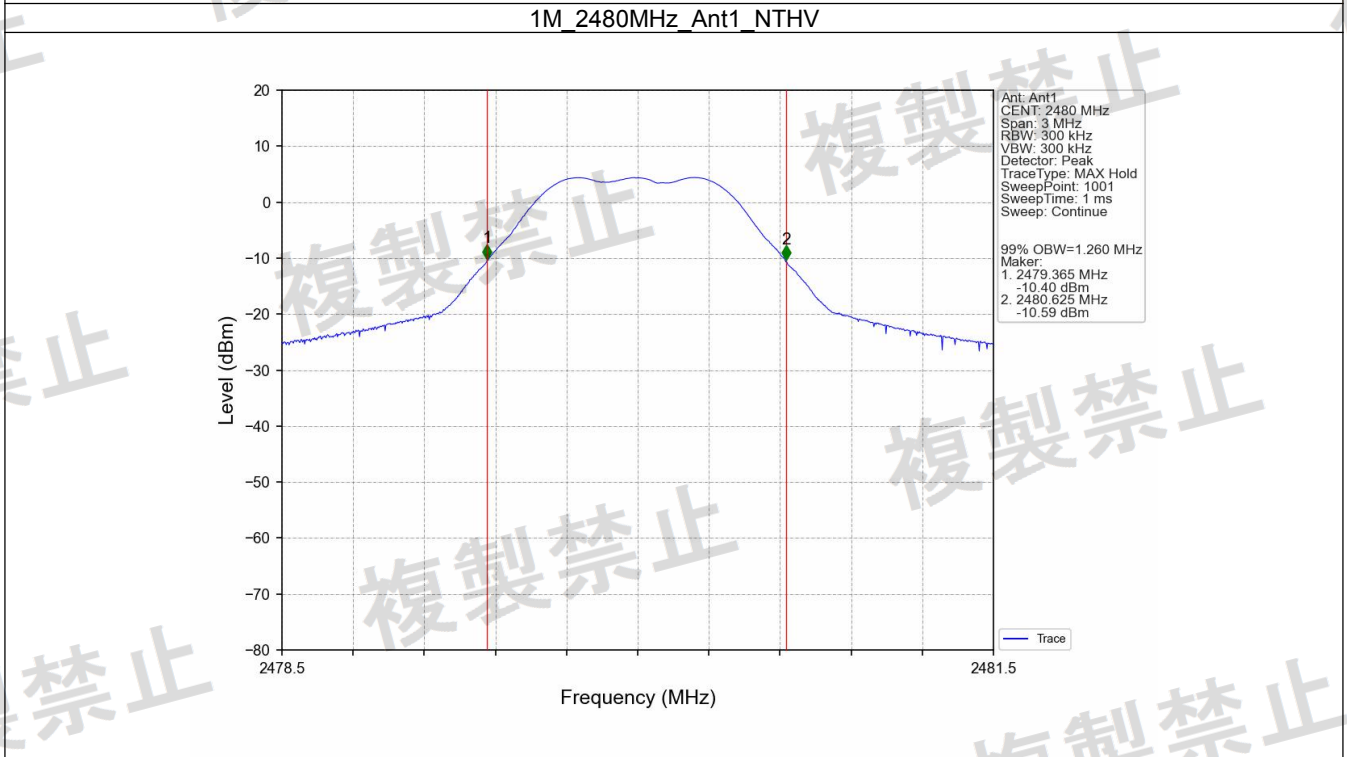
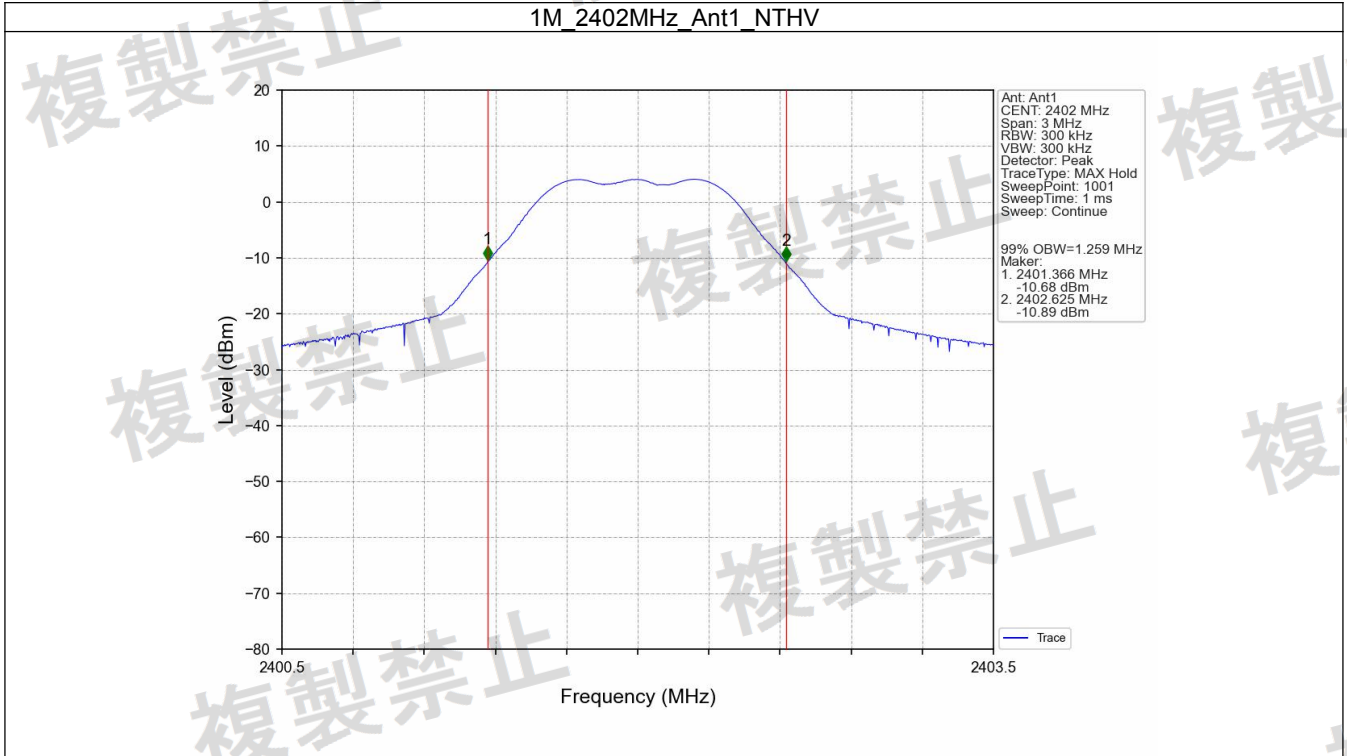
2.2.1 OBW

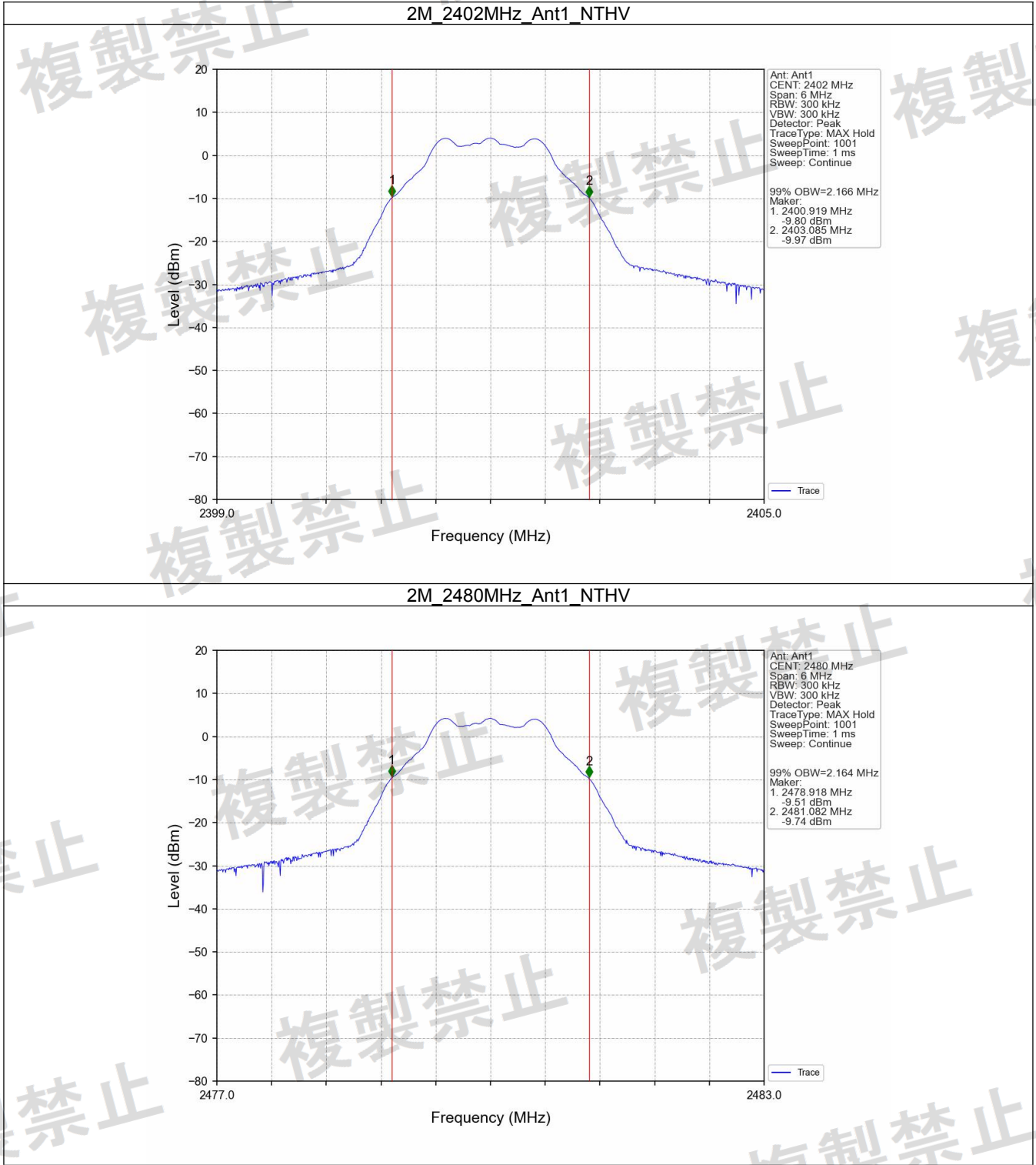












3. Antenna Power

3.1 Test Result

3.1.1 Power

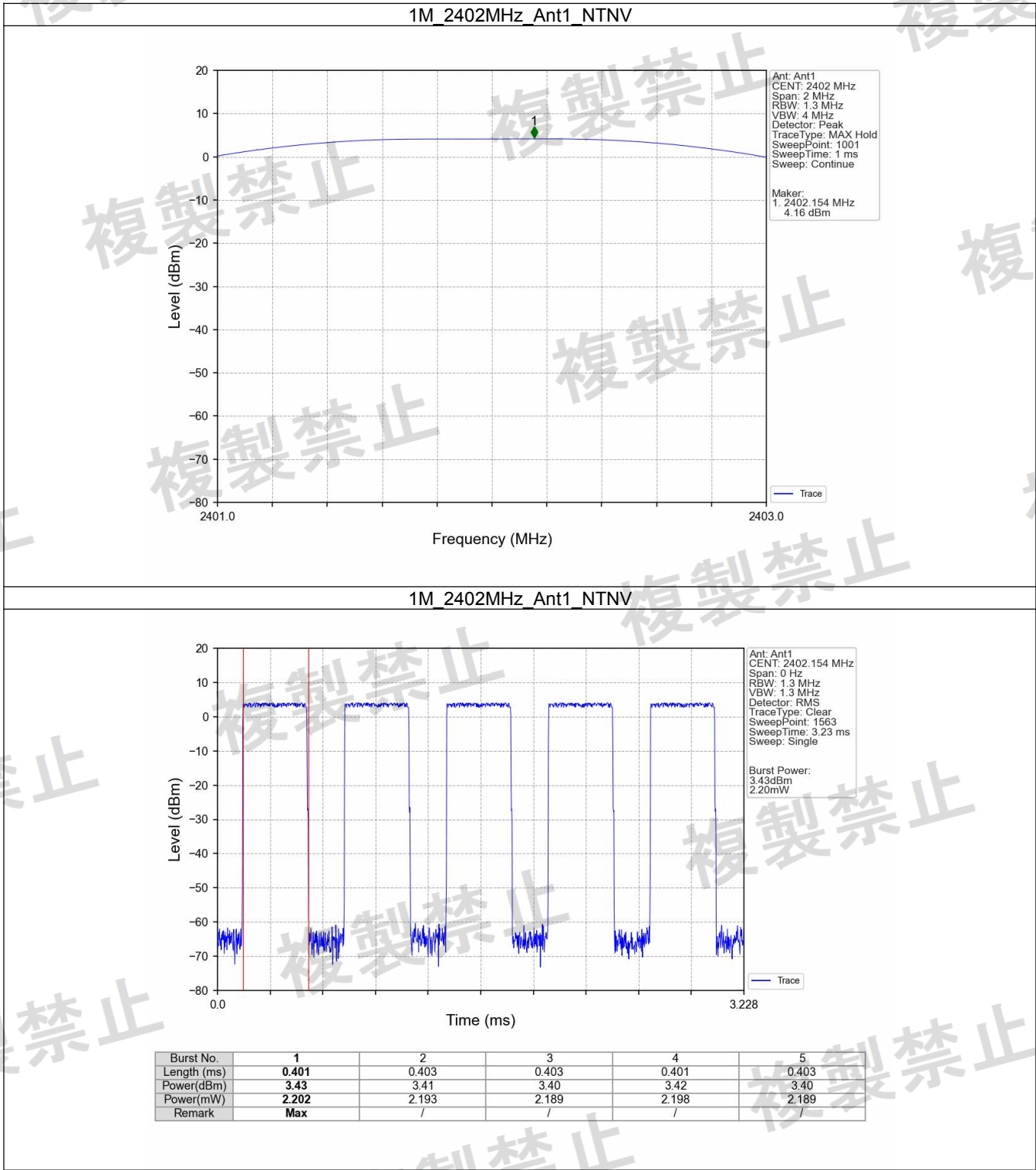
ENV	Mode	TX Type	Frequency (MHz)	ANT	Antenna Power (mW)		Nominal Power (mW)	Tolerance (%)		Verdict
					Measured	Limit		Measured	Limit	
NTNV	1M	SISO	2402	1	2.202	≤ 10.00	2.300	-4.26	≤ 20	Pass
			2480	1	2.287	≤ 10.00	2.300	-0.57	≤ 20	Pass
	2M	SISO	2402	1	1.889	≤ 10.00	2.300	-17.87	≤ 20	Pass
			2480	1	2.100	≤ 10.00	2.300	-8.70	≤ 20	Pass
NTLV	1M	SISO	2402	1	2.089	≤ 10.00	2.300	-9.17	≤ 20	Pass
			2480	1	2.237	≤ 10.00	2.300	-2.74	≤ 20	Pass
	2M	SISO	2402	1	1.900	≤ 10.00	2.300	-17.39	≤ 20	Pass
			2480	1	2.185	≤ 10.00	2.300	-5.00	≤ 20	Pass
NTHV	1M	SISO	2402	1	2.073	≤ 10.00	2.300	-9.87	≤ 20	Pass
			2480	1	2.304	≤ 10.00	2.300	0.17	≤ 20	Pass
	2M	SISO	2402	1	1.979	≤ 10.00	2.300	-13.96	≤ 20	Pass
			2480	1	2.055	≤ 10.00	2.300	-10.65	≤ 20	Pass

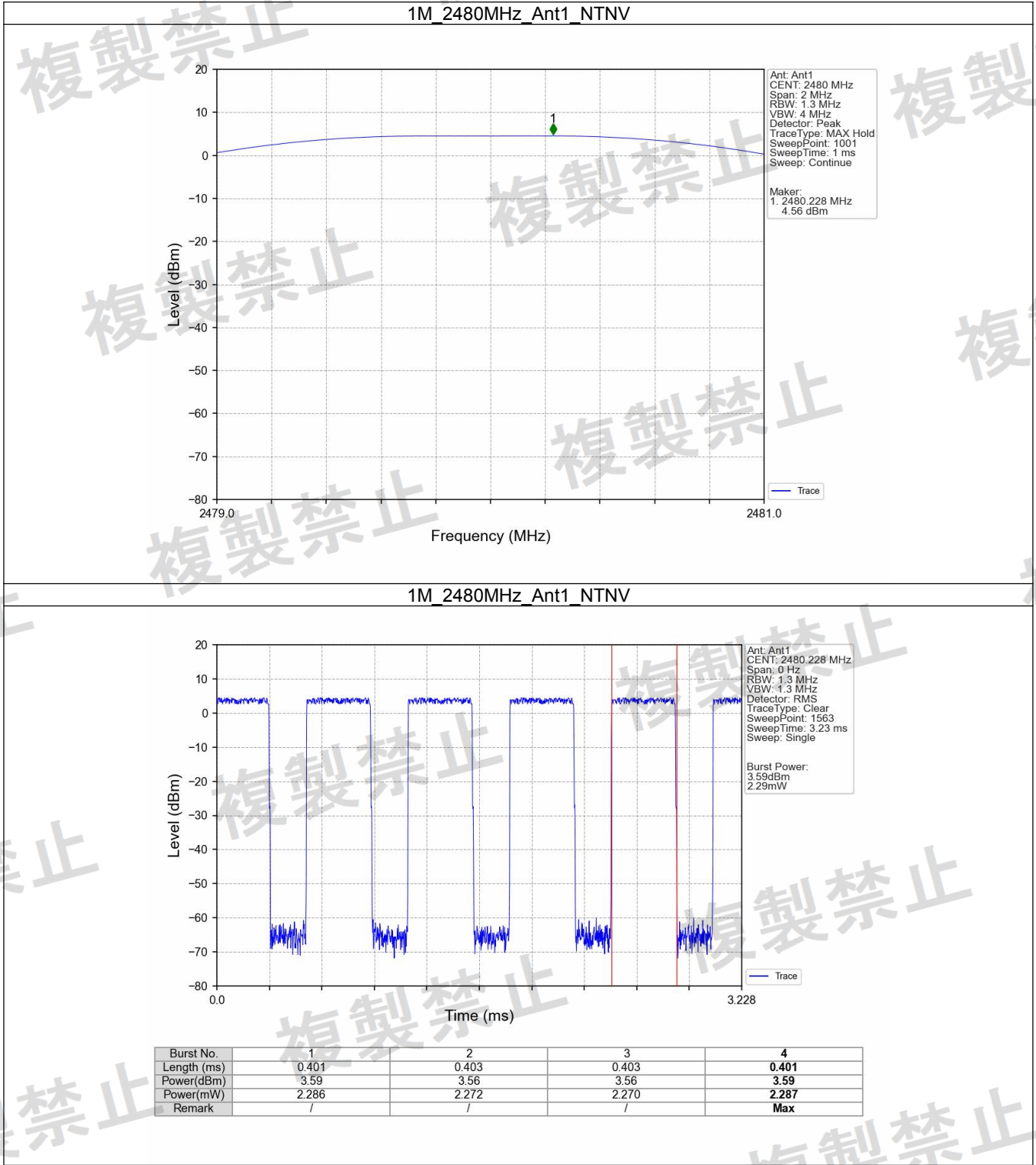
3.1.2 EIRP

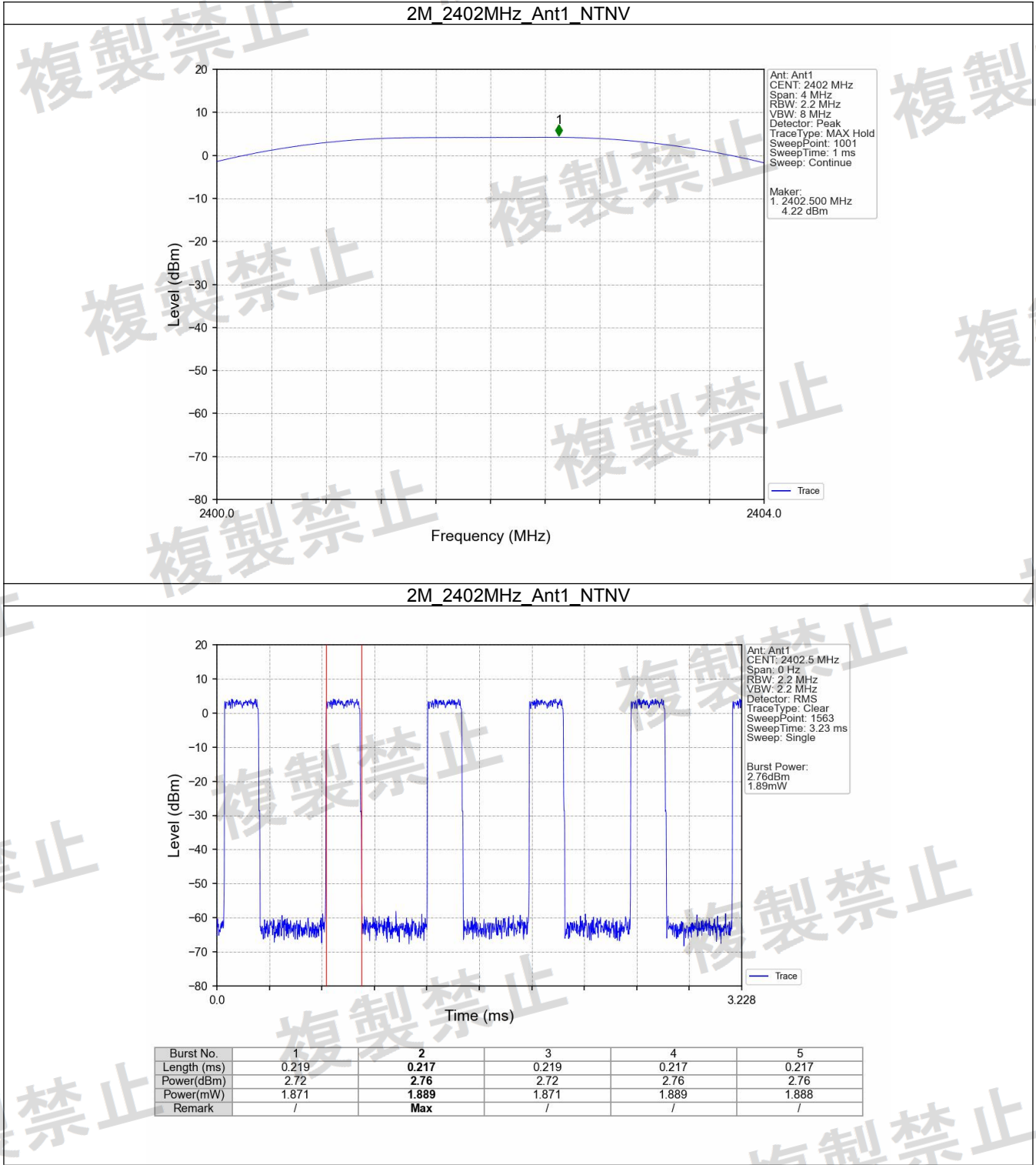
ENV	Mode	TX Type	Frequency (MHz)	ANT	Gain (dBi)	EIRP (dBm)		Verdict
						Result	Limit	
NTNV	1M	SISO	2402	1	2.71	6.14	≤ 12.14	Pass
			2480	1	2.71	6.30	≤ 12.14	Pass
	2M	SISO	2402	1	2.71	5.47	≤ 12.14	Pass
			2480	1	2.71	5.93	≤ 12.14	Pass
NTLV	1M	SISO	2402	1	2.71	5.91	≤ 12.14	Pass
			2480	1	2.71	6.21	≤ 12.14	Pass
	2M	SISO	2402	1	2.71	5.50	≤ 12.14	Pass
			2480	1	2.71	6.10	≤ 12.14	Pass
NTHV	1M	SISO	2402	1	2.71	5.88	≤ 12.14	Pass
			2480	1	2.71	6.33	≤ 12.14	Pass
	2M	SISO	2402	1	2.71	5.67	≤ 12.14	Pass
			2480	1	2.71	5.84	≤ 12.14	Pass

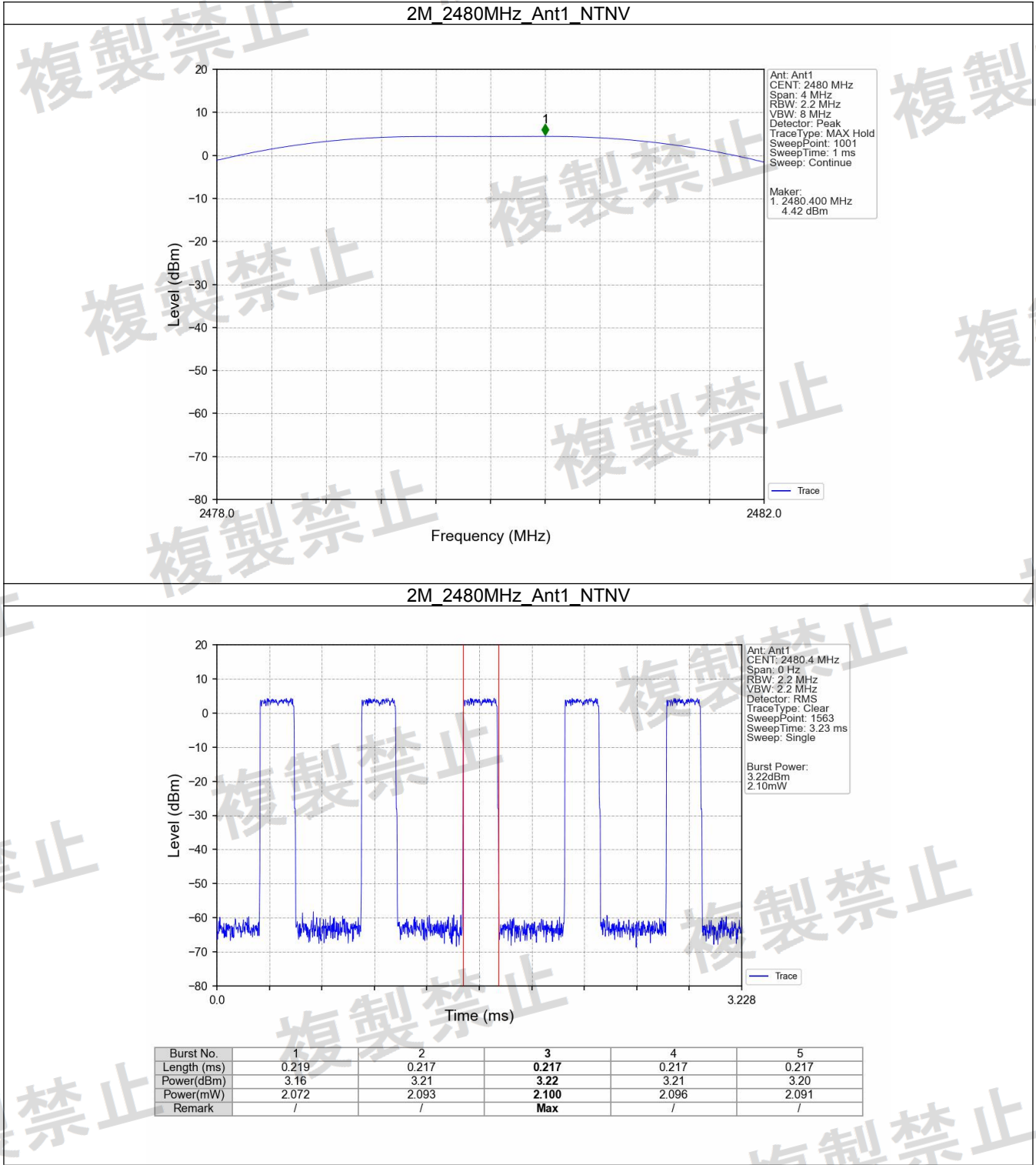
3.2 Test Graph

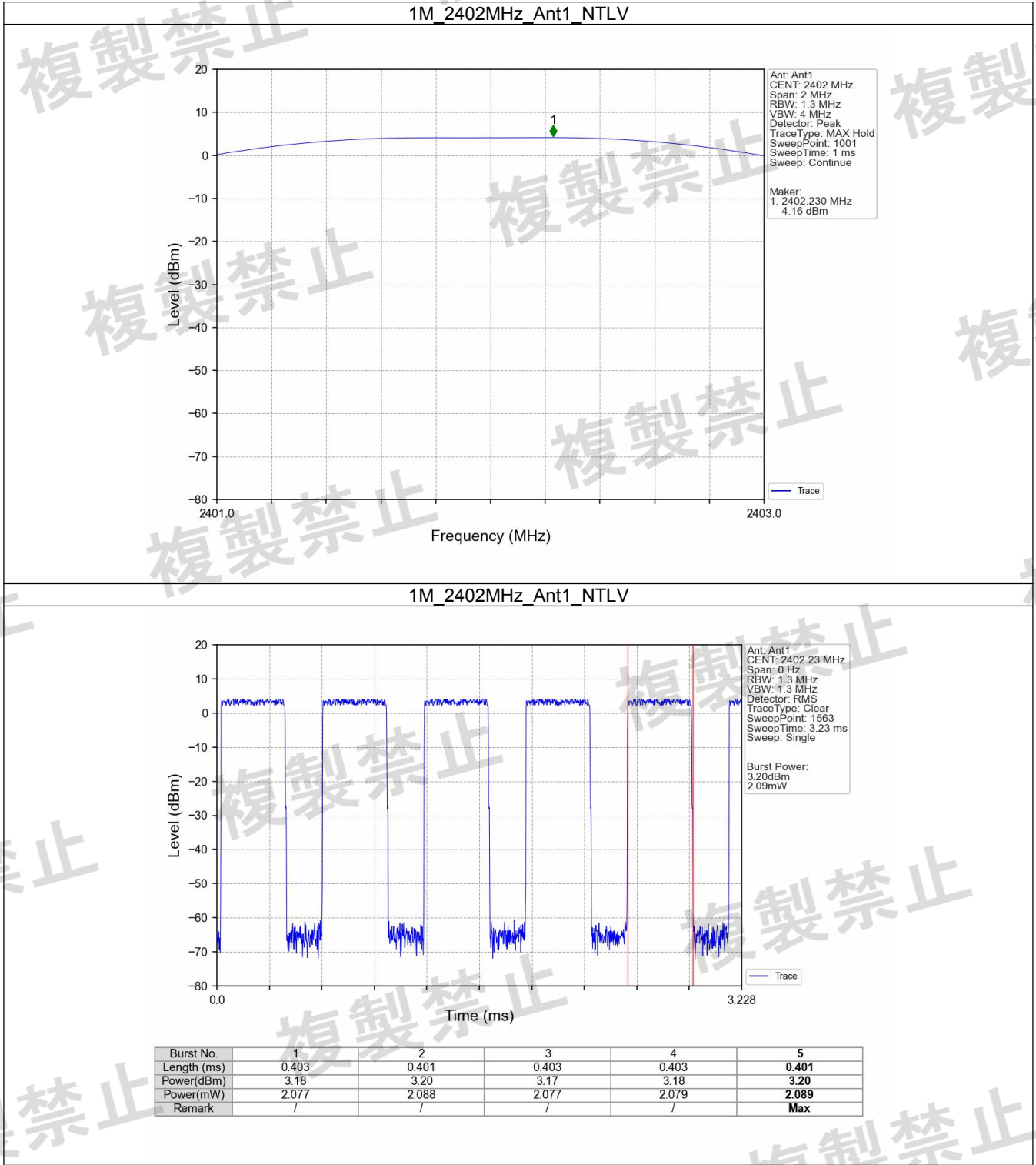
3.2.1 Power

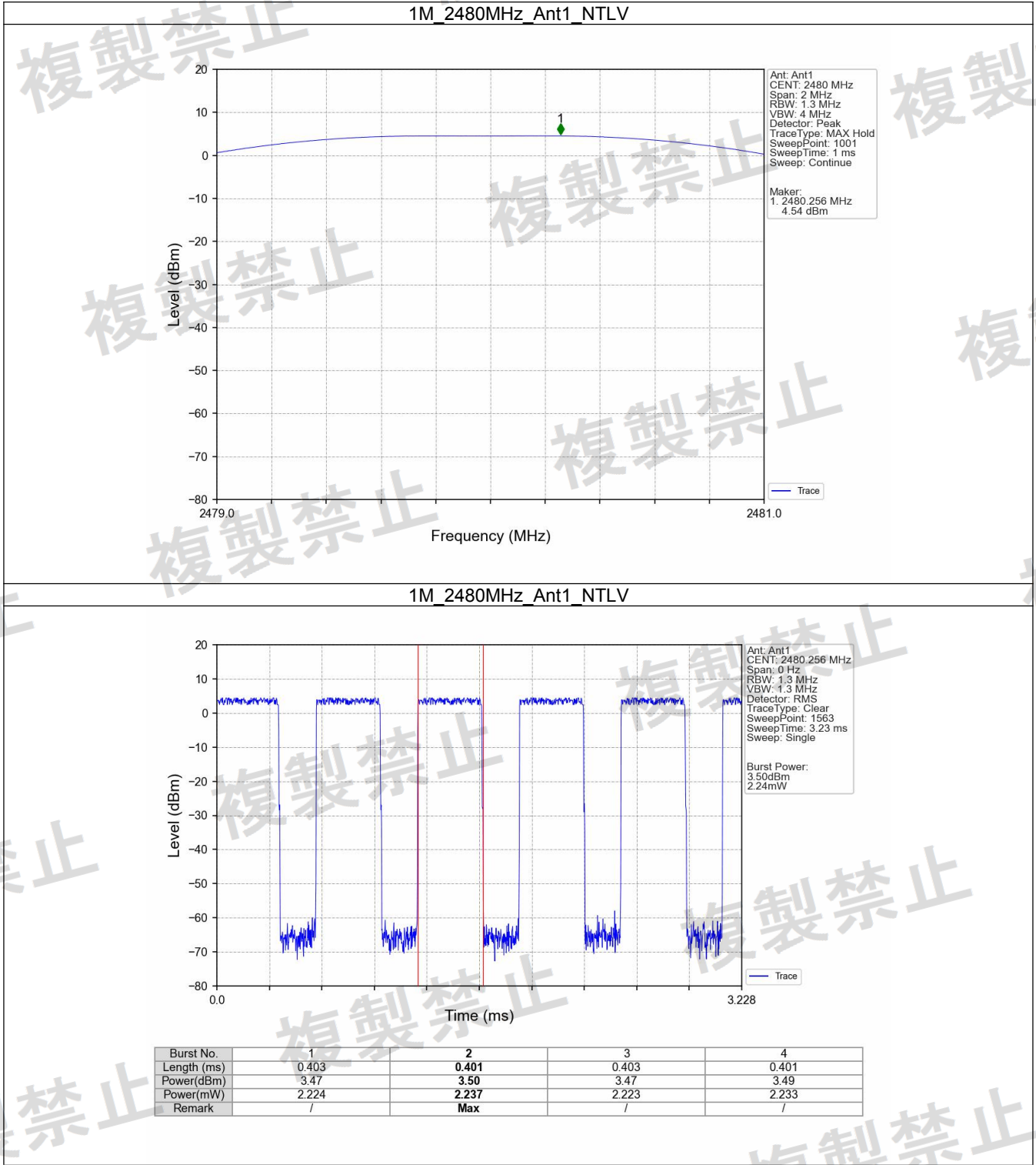


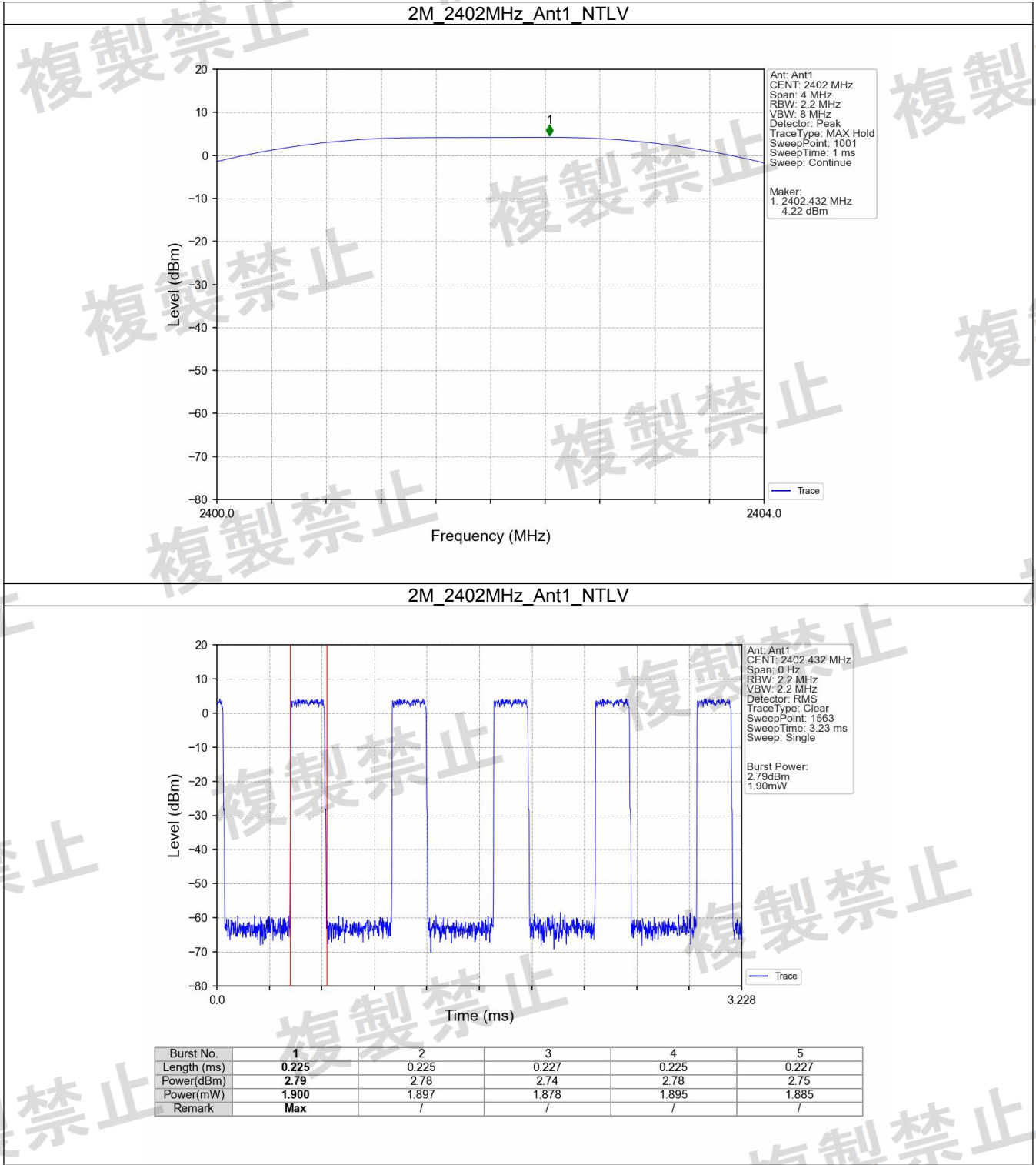


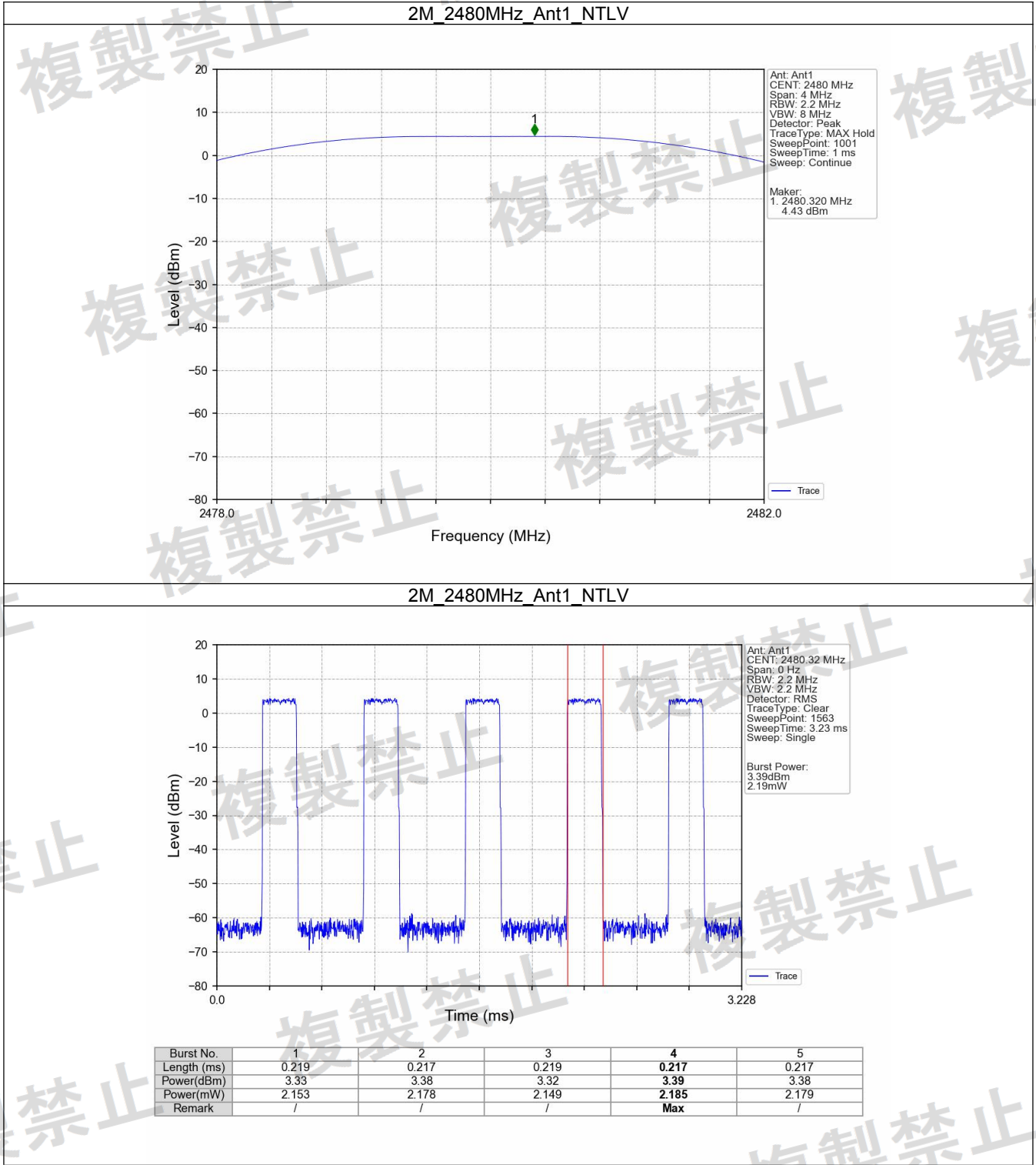


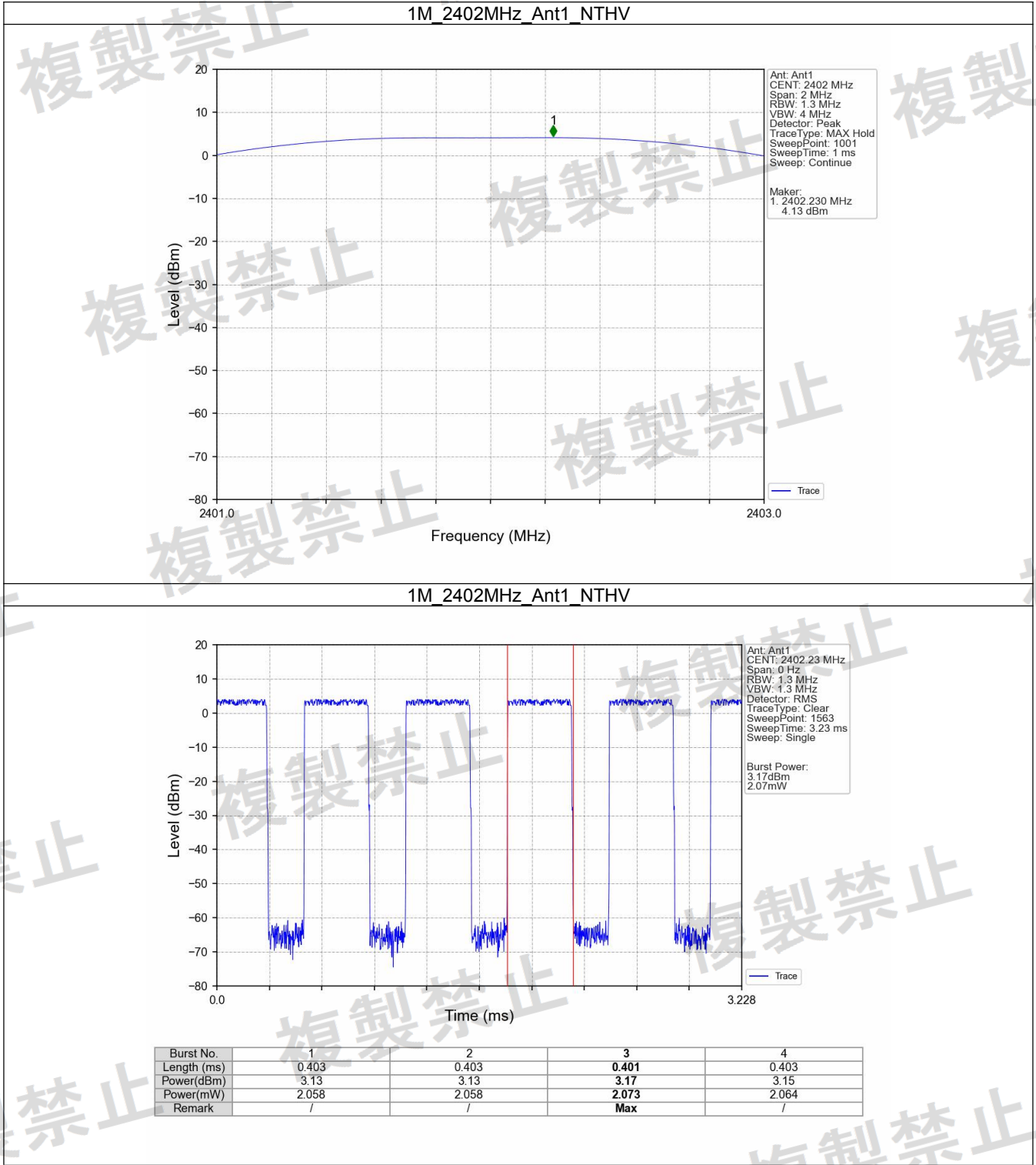


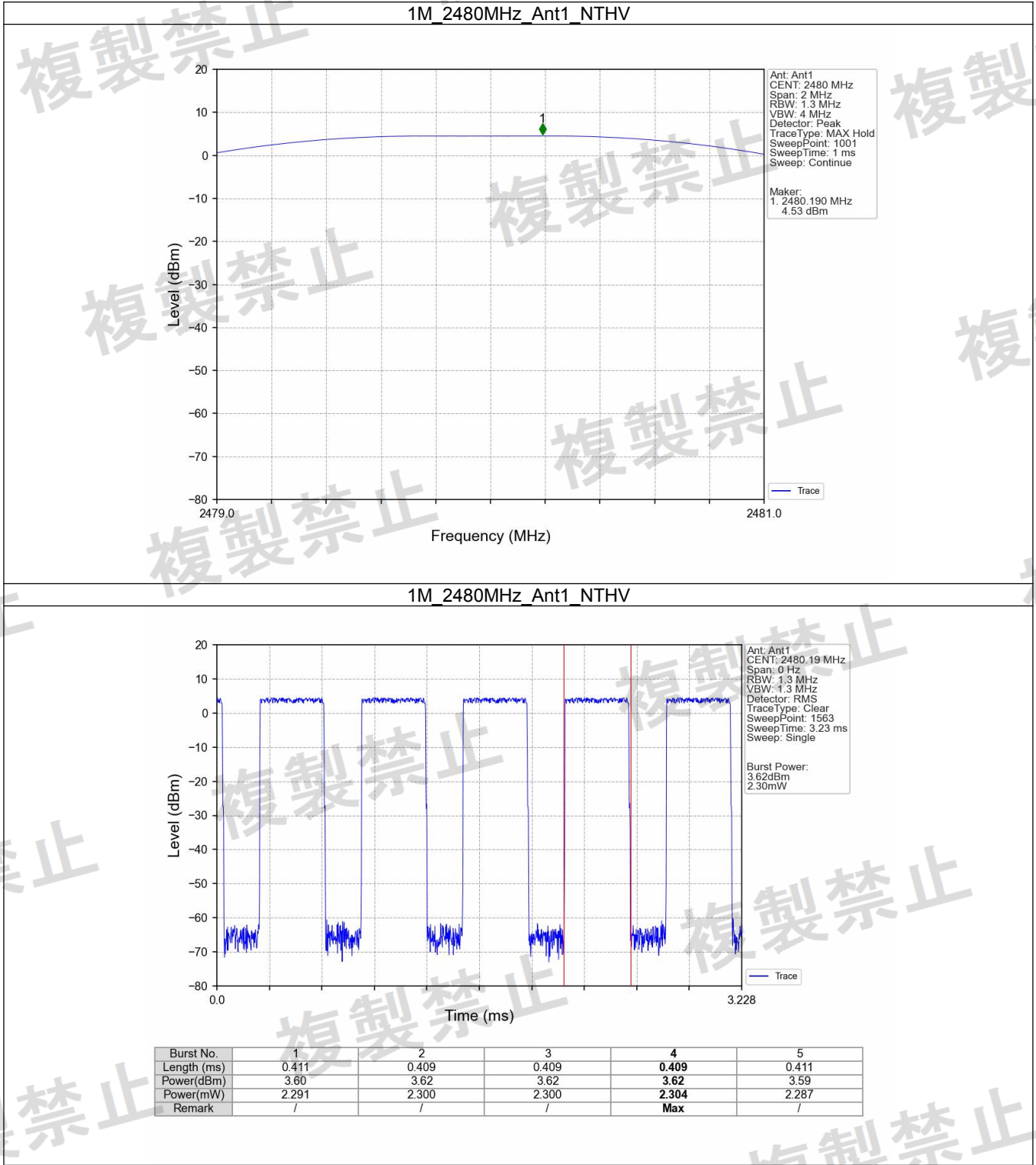


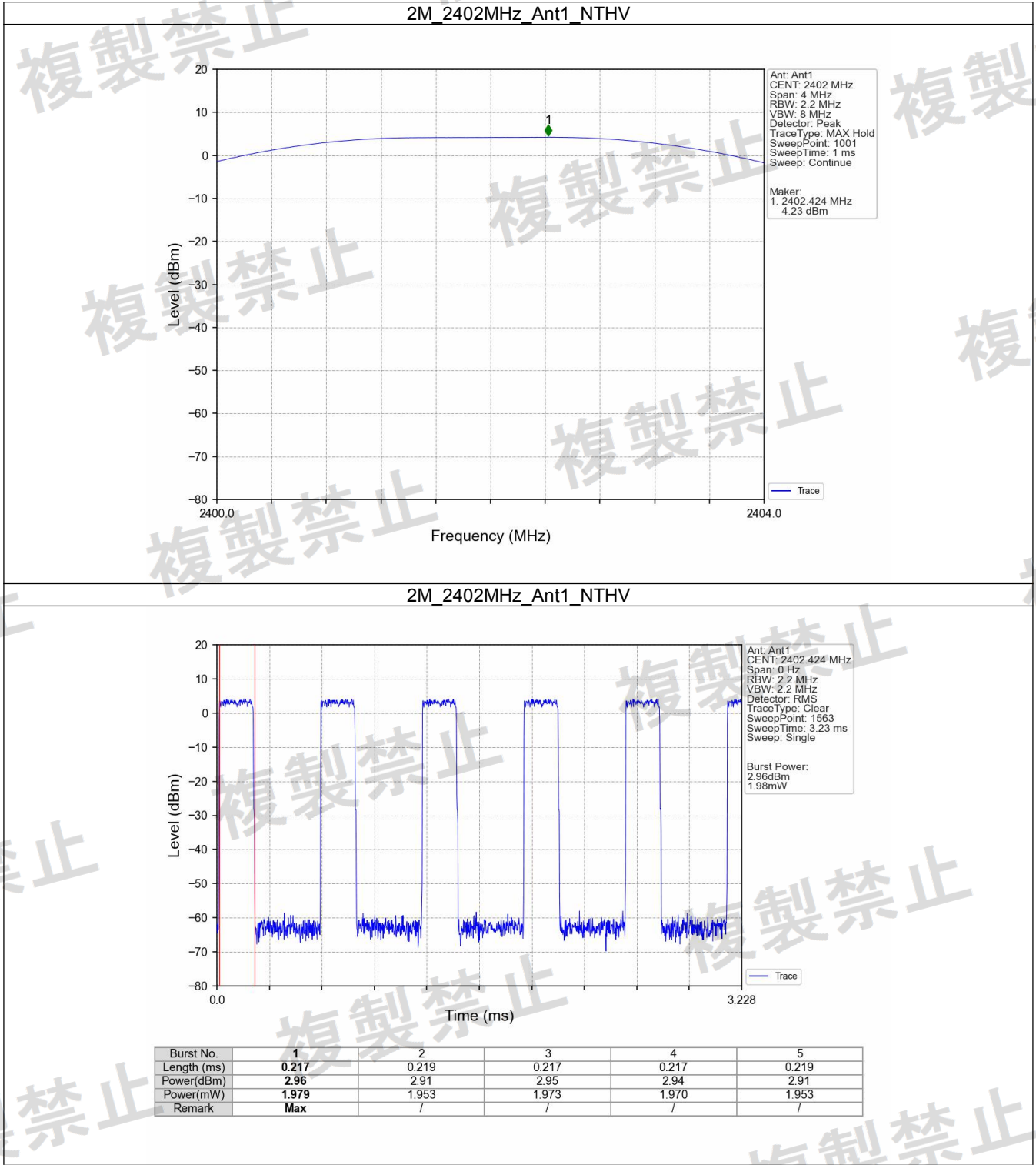


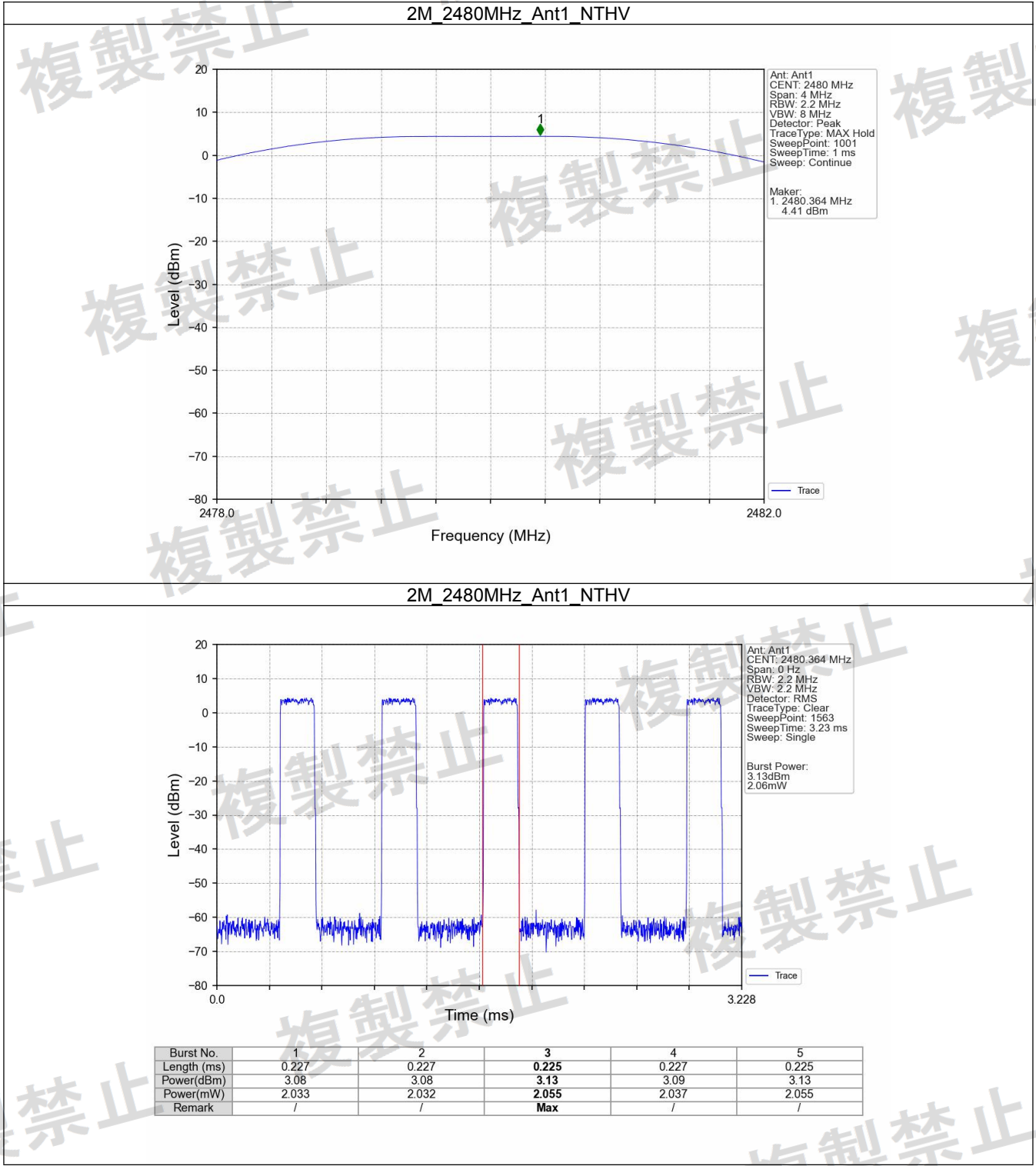












4. Spurious Emission Intensity

4.1 Test Result

4.1.1 TxSe_NTNV

NTNV												
Mode	TX Type	Freq. (MHz)	ANT	Freq. Range		Marker				Limit (uW /MHz)	Verdict	
				Start (MHz)	Stop (MHz)	Freq. (MHz)	PK Power (dBm /MHz)	PK Power (uW /MHz)	AV Power (dBm /MHz)			AV Power (uW /MHz)
1M	SISO	2402	1	30	2387	2386.5	-35.76	0.265	/	/	2.5	Pass
				2387	2400	2399.974	-16.93	20.277	-38.15	0.153	25	Pass
				2483.5	2496.5	2488.141	-46.96	0.020	/	/	25	Pass
				2496.5	12500	3257	-50.96	0.008	/	/	2.5	Pass
		2480	1	30	2387	2373	-49.37	0.012	/	/	2.5	Pass
				2387	2400	2397.166	-47.38	0.018	/	/	25	Pass
				2483.5	2496.5	2483.552	-22.02	6.281	/	/	25	Pass
				2496.5	12500	2501.5	-37.69	0.170	/	/	2.5	Pass
2M	SISO	2402	1	30	2387	2382.5	-37.73	0.169	/	/	2.5	Pass
				2387	2400	2399.987	-16.74	21.184	-23.75	4.217	25	Pass
				2483.5	2496.5	2487.998	-46.08	0.025	/	/	25	Pass
				2496.5	12500	2500	-49.08	0.012	/	/	2.5	Pass
		2480	1	30	2387	2368.5	-49.74	0.011	/	/	2.5	Pass
				2387	2400	2399.337	-47.35	0.018	/	/	25	Pass
				2483.5	2496.5	2483.552	-21.71	6.745	/	/	25	Pass
				2496.5	12500	2503.5	-38.19	0.152	/	/	2.5	Pass

4.1.2 TxSe_NTLV

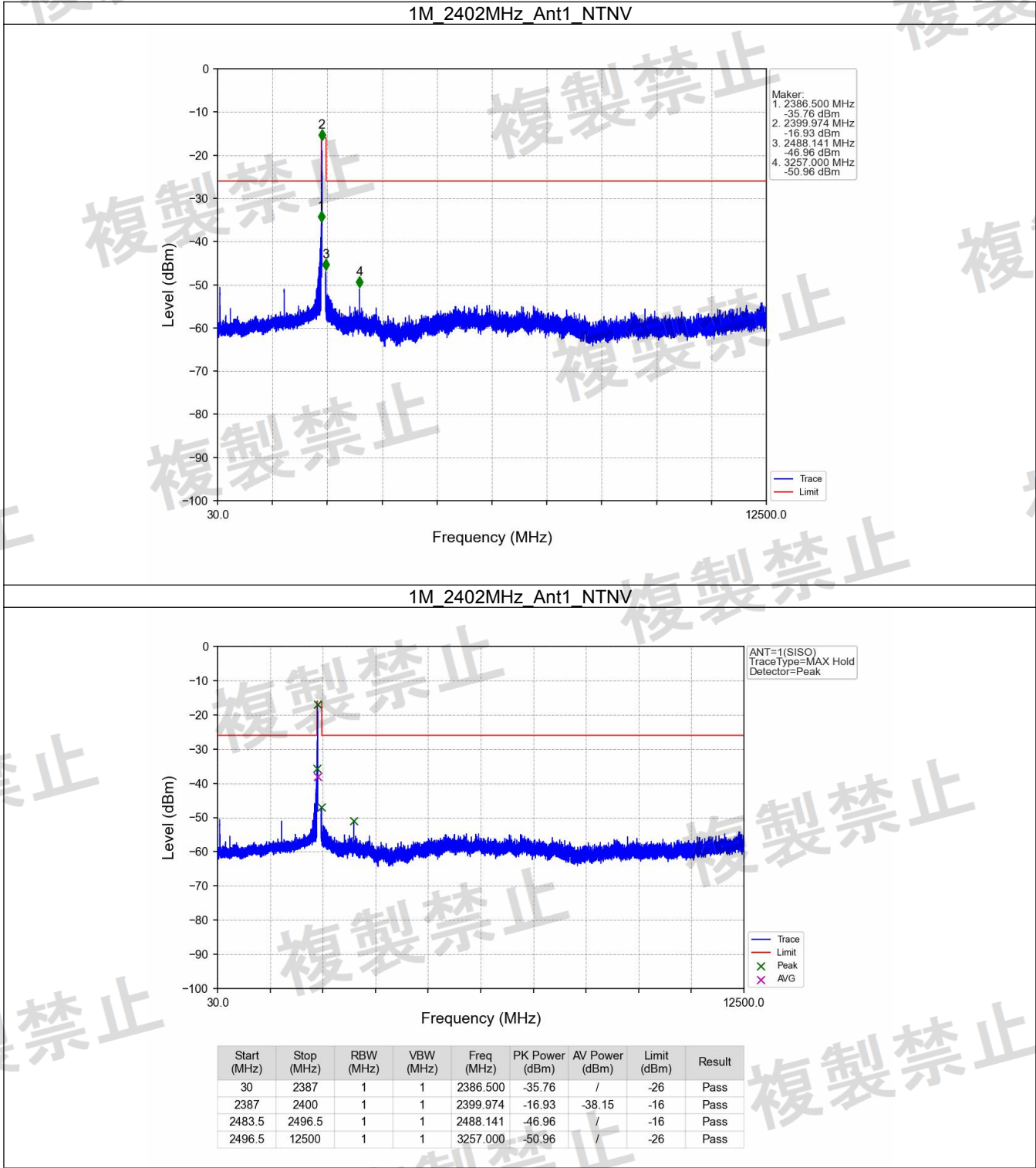
NTLV												
Mode	TX Type	Freq. (MHz)	ANT	Freq. Range		Marker					Limit (uW /MHz)	Verdict
				Start (MHz)	Stop (MHz)	Freq. (MHz)	PK Power (dBm /MHz)	PK Power (uW /MHz)	AV Power (dBm /MHz)	AV Power (uW /MHz)		
1M	SISO	2402	1	30	2387	2384	-37.16	0.192	/	/	2.5	Pass
				2387	2400	2399.987	-16.92	20.324	-37.77	0.167	25	Pass
				2483.5	2496.5	2486.62	-46.34	0.023	/	/	25	Pass
				2496.5	12500	2501	-48.94	0.013	/	/	2.5	Pass
		2480	1	30	2387	2383	-50.19	0.010	/	/	2.5	Pass
				2387	2400	2398.57	-47.38	0.018	/	/	25	Pass
				2483.5	2496.5	2483.552	-21.97	6.353	/	/	25	Pass
				2496.5	12500	2497	-34.47	0.357	/	/	2.5	Pass
2M	SISO	2402	1	30	2387	2386.5	-35.82	0.262	/	/	2.5	Pass
				2387	2400	2399.974	-16.69	21.429	-24.09	3.899	25	Pass
				2483.5	2496.5	2484.033	-46.54	0.022	/	/	25	Pass
				2496.5	12500	2499.5	-49.71	0.011	/	/	2.5	Pass
		2480	1	30	2387	2376	-49.37	0.012	/	/	2.5	Pass
				2387	2400	2399.012	-46.95	0.020	/	/	25	Pass
				2483.5	2496.5	2483.552	-21.70	6.761	/	/	25	Pass
				2496.5	12500	2499	-35.80	0.263	/	/	2.5	Pass

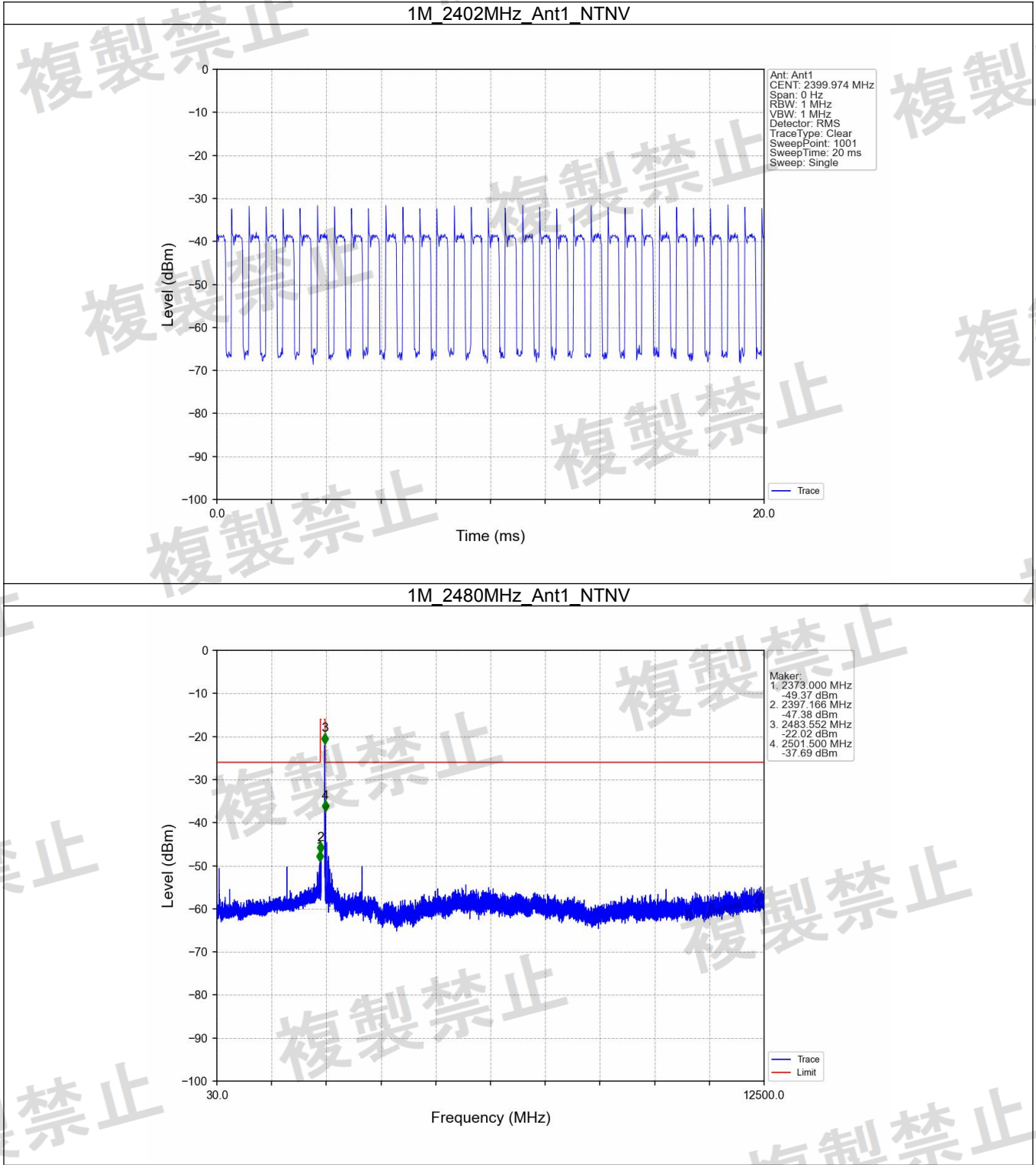
4.1.3 TxSe_NTHV

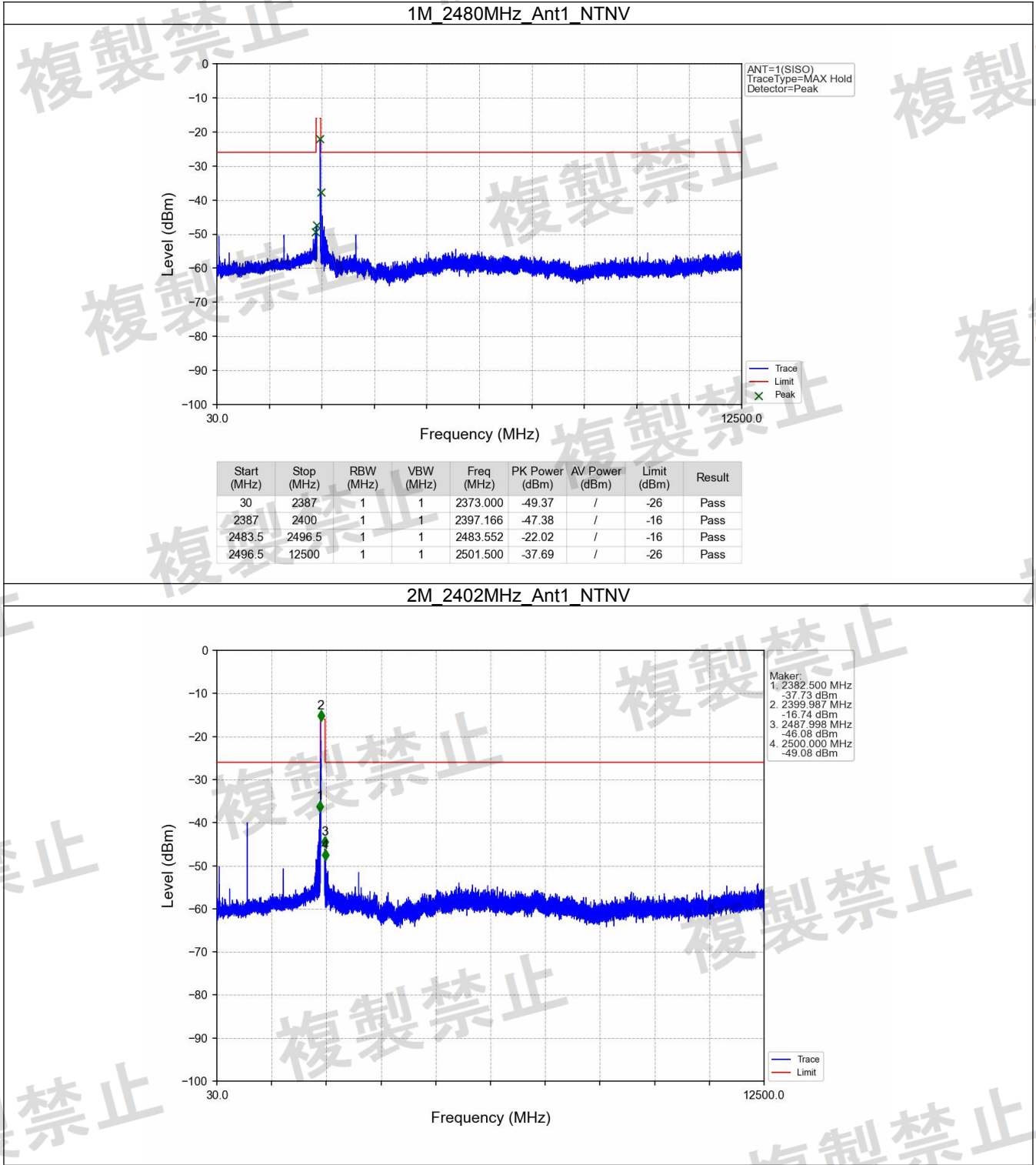
NTHV												
Mode	TX Type	Freq. (MHz)	ANT	Freq. Range		Marker					Limit (uW /MHz)	Verdict
				Start (MHz)	Stop (MHz)	Freq. (MHz)	PK Power (dBm /MHz)	PK Power (uW /MHz)	AV Power (dBm /MHz)	AV Power (uW /MHz)		
1M	SISO	2402	1	30	2387	2386	-35.82	0.262	/	/	2.5	Pass
				2387	2400	2399.961	-16.88	20.512	-38.51	0.141	25	Pass
				2483.5	2496.5	2487.673	-46.84	0.021	/	/	25	Pass
				2496.5	12500	3258.5	-49.78	0.011	/	/	2.5	Pass
		2480	1	30	2387	1625	-49.80	0.010	/	/	2.5	Pass
				2387	2400	2398.973	-46.68	0.021	/	/	25	Pass
				2483.5	2496.5	2483.526	-21.96	6.368	/	/	25	Pass
				2496.5	12500	2522.5	-43.16	0.048	/	/	2.5	Pass
2M	SISO	2402	1	30	2387	706	-32.25	0.596	/	/	2.5	Pass
				2387	2400	2399.987	-16.83	20.749	-23.73	4.236	25	Pass
				2483.5	2496.5	2483.63	-46.26	0.024	/	/	25	Pass
				2496.5	12500	2505.5	-50.03	0.010	/	/	2.5	Pass
		2480	1	30	2387	2383.5	-49.46	0.011	/	/	2.5	Pass
				2387	2400	2399.116	-47.12	0.019	/	/	25	Pass
				2483.5	2496.5	2483.513	-21.64	6.855	/	/	25	Pass
				2496.5	12500	2524.5	-43.31	0.047	/	/	2.5	Pass

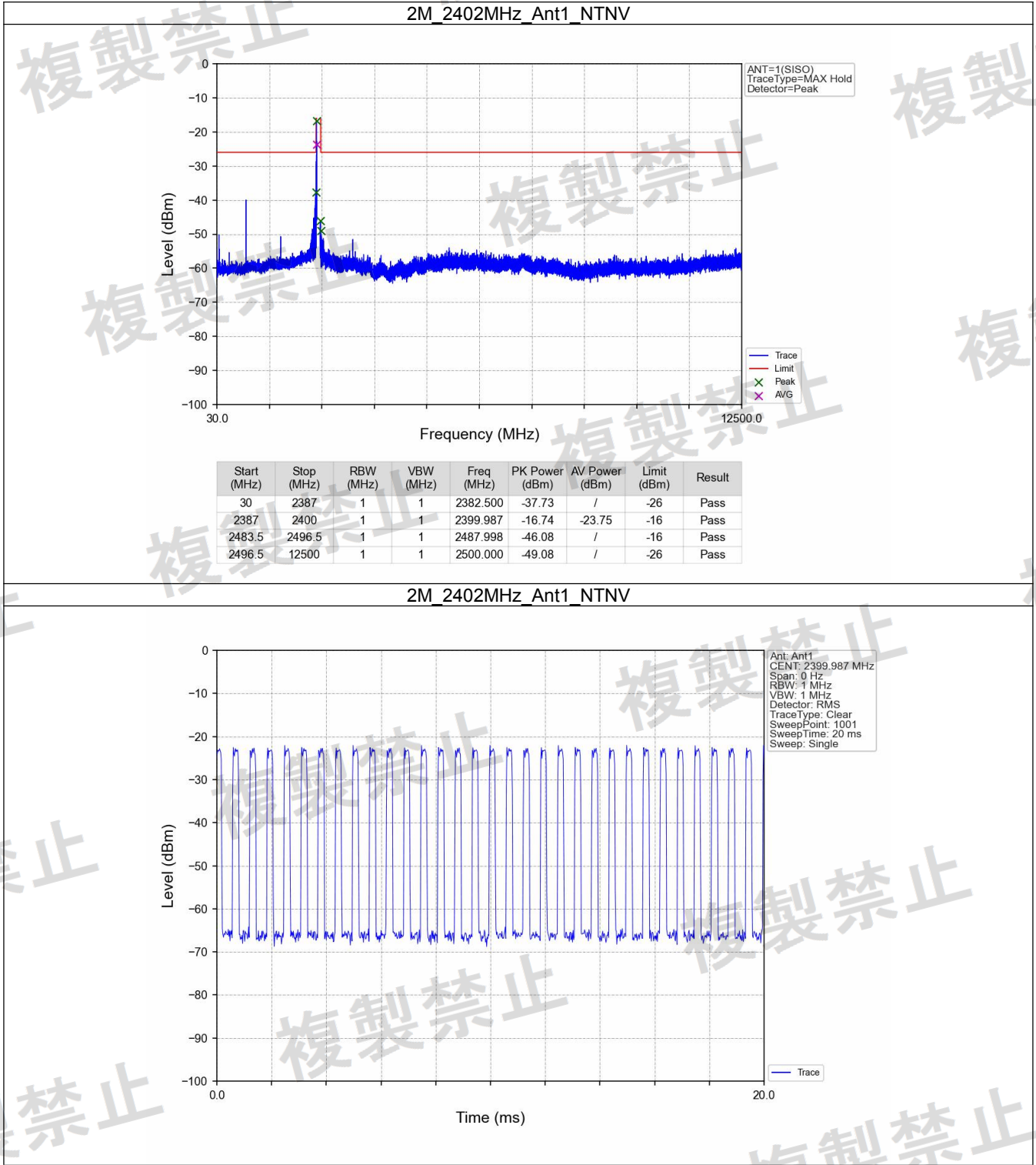
4.2 Test Graph

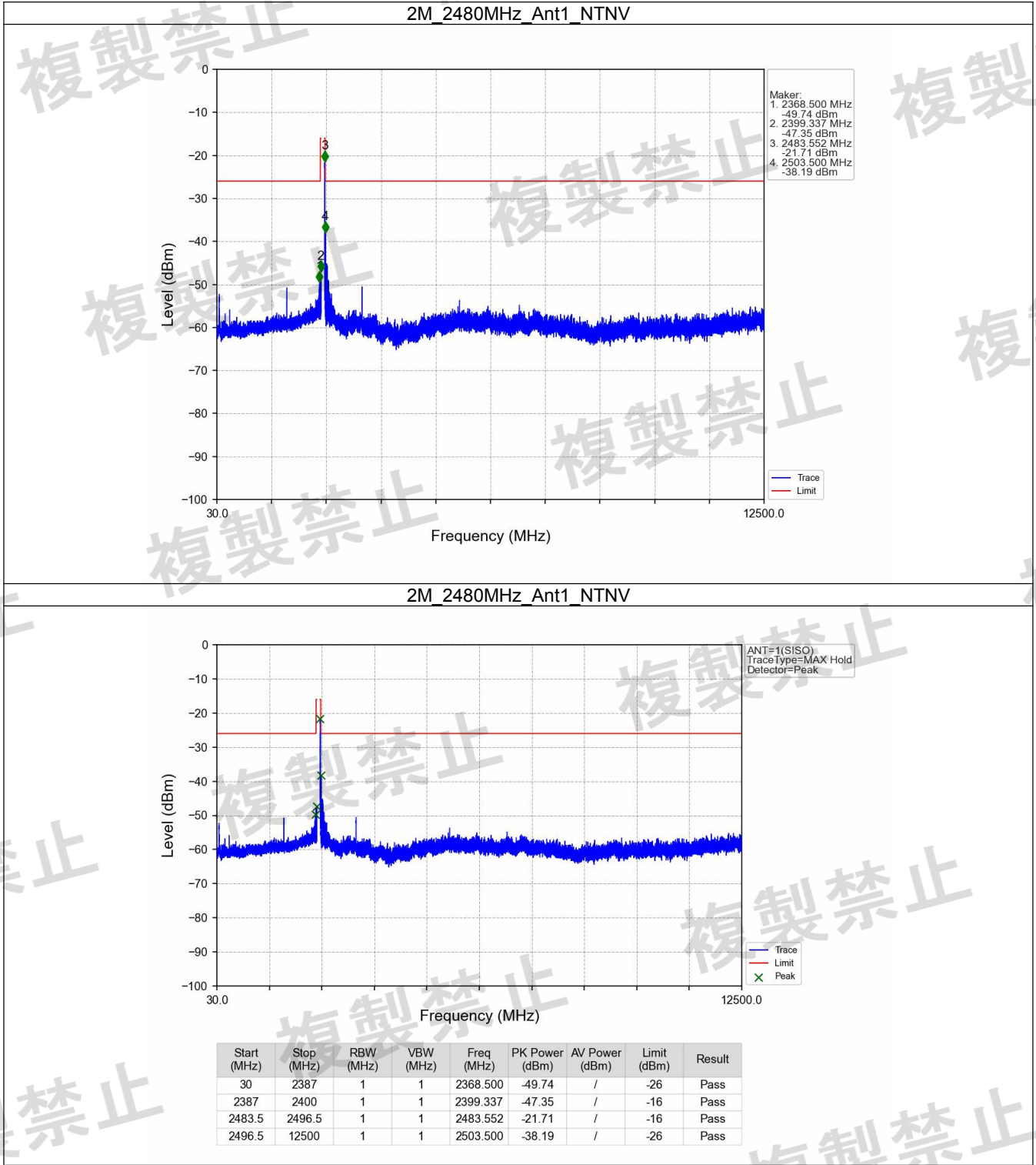
4.2.1 TxSe_NTNV



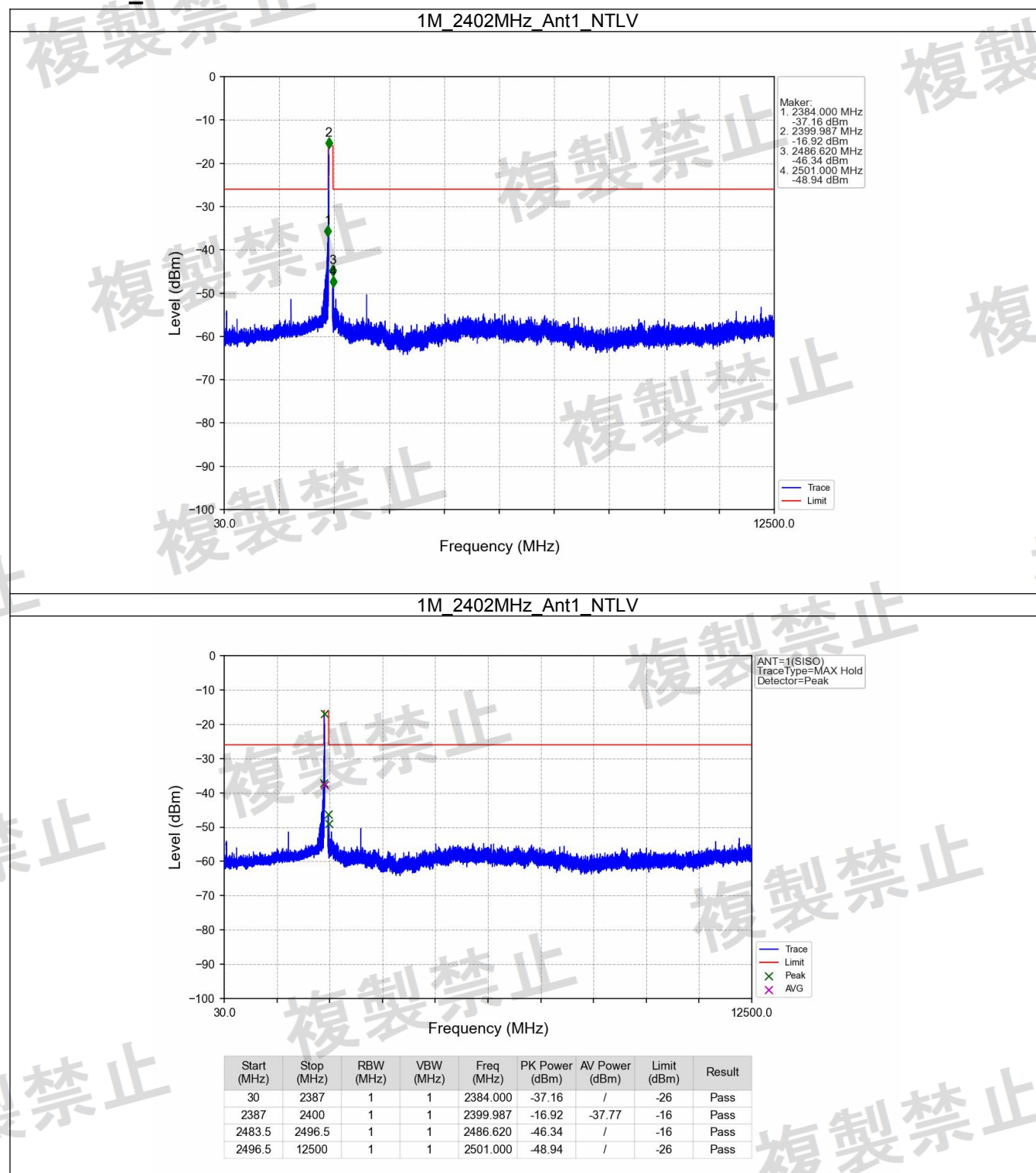


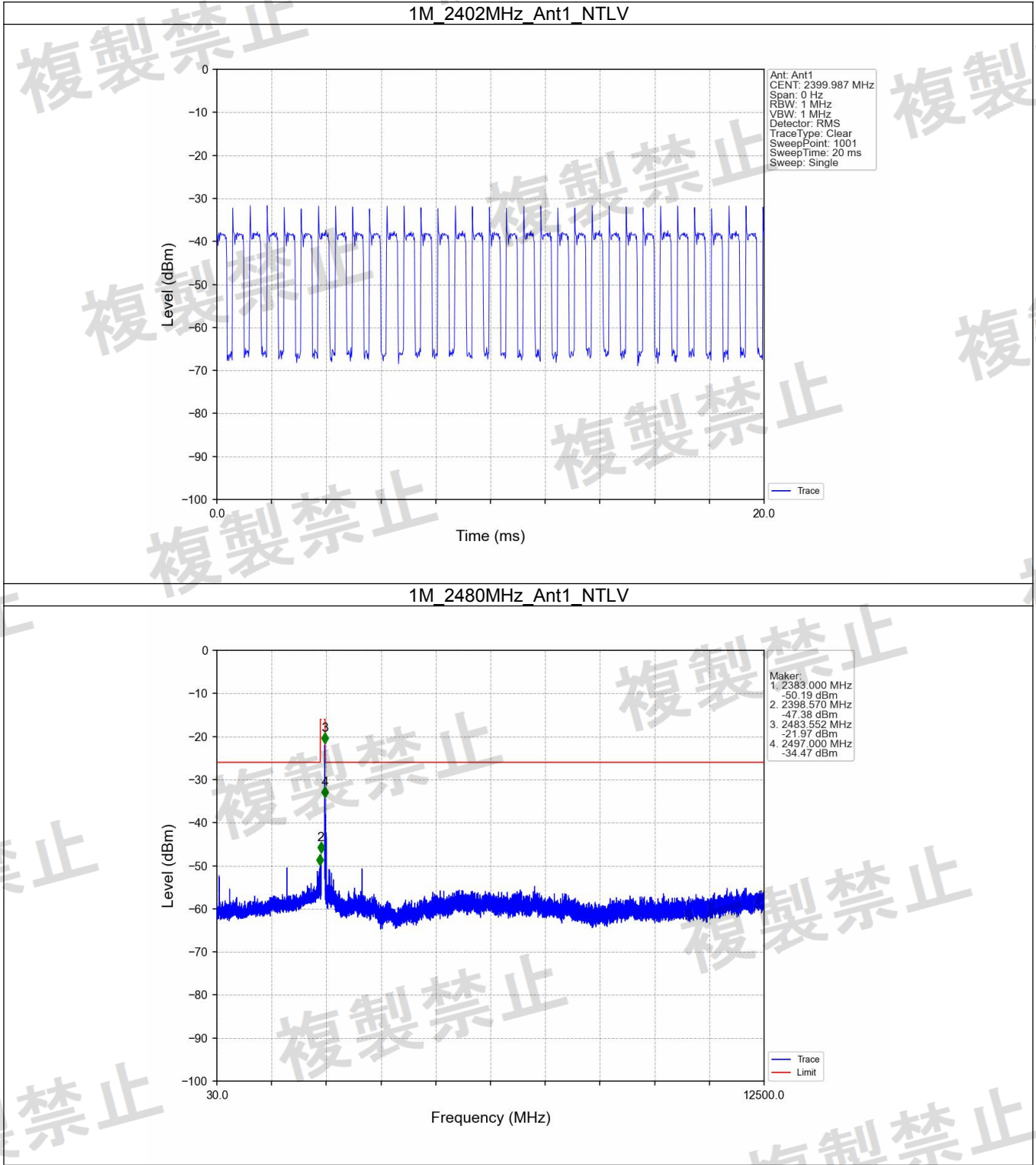


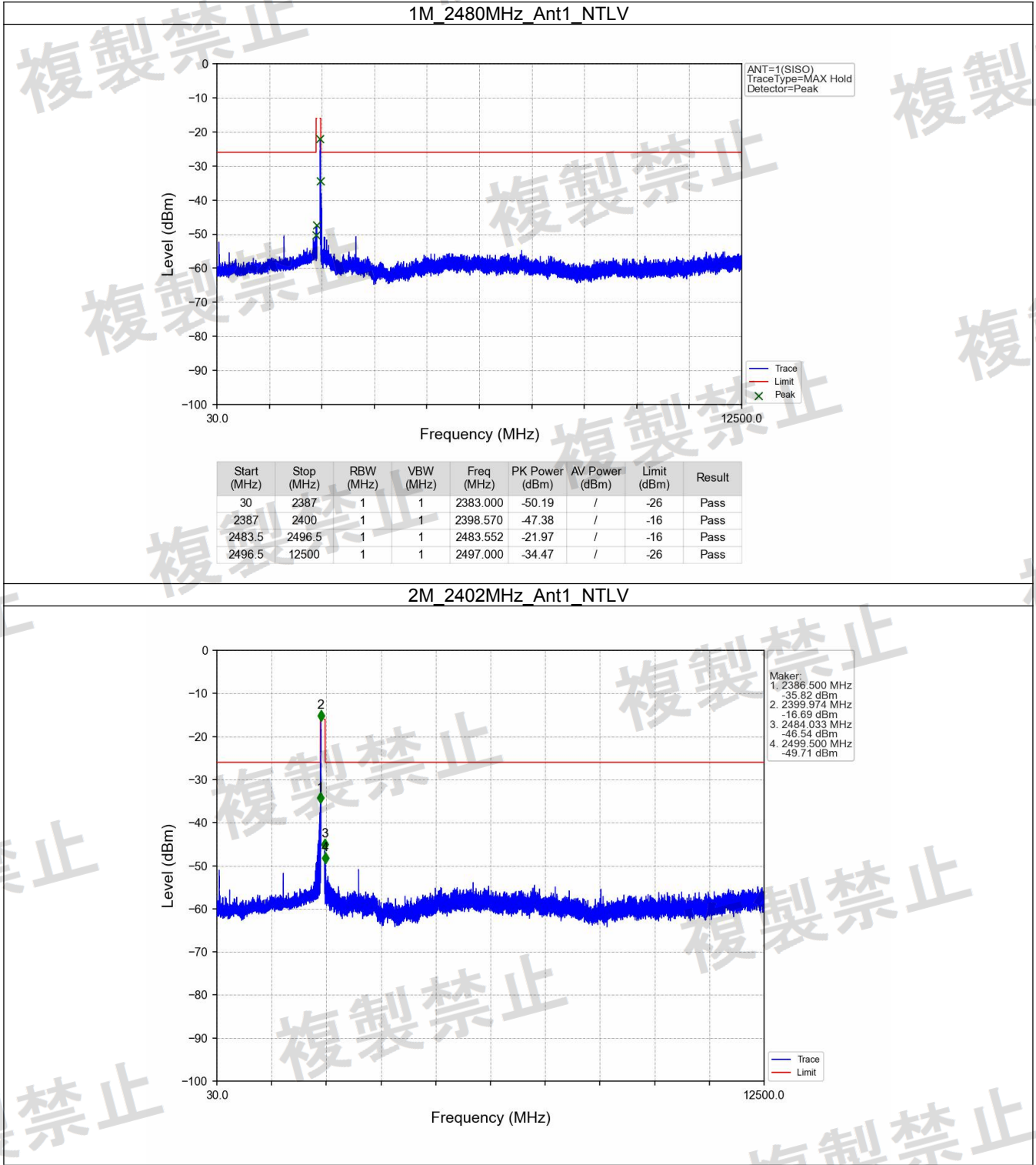


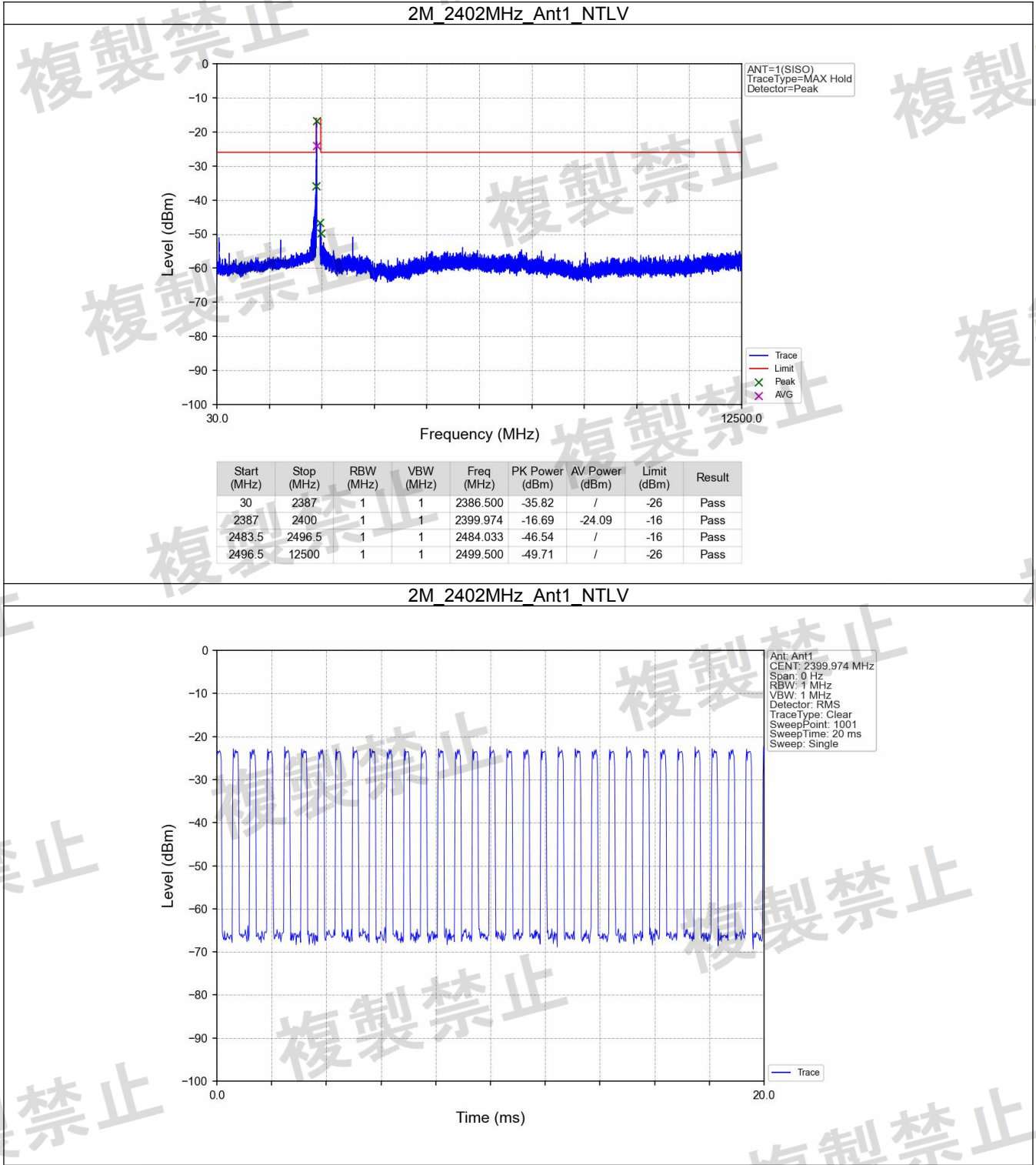


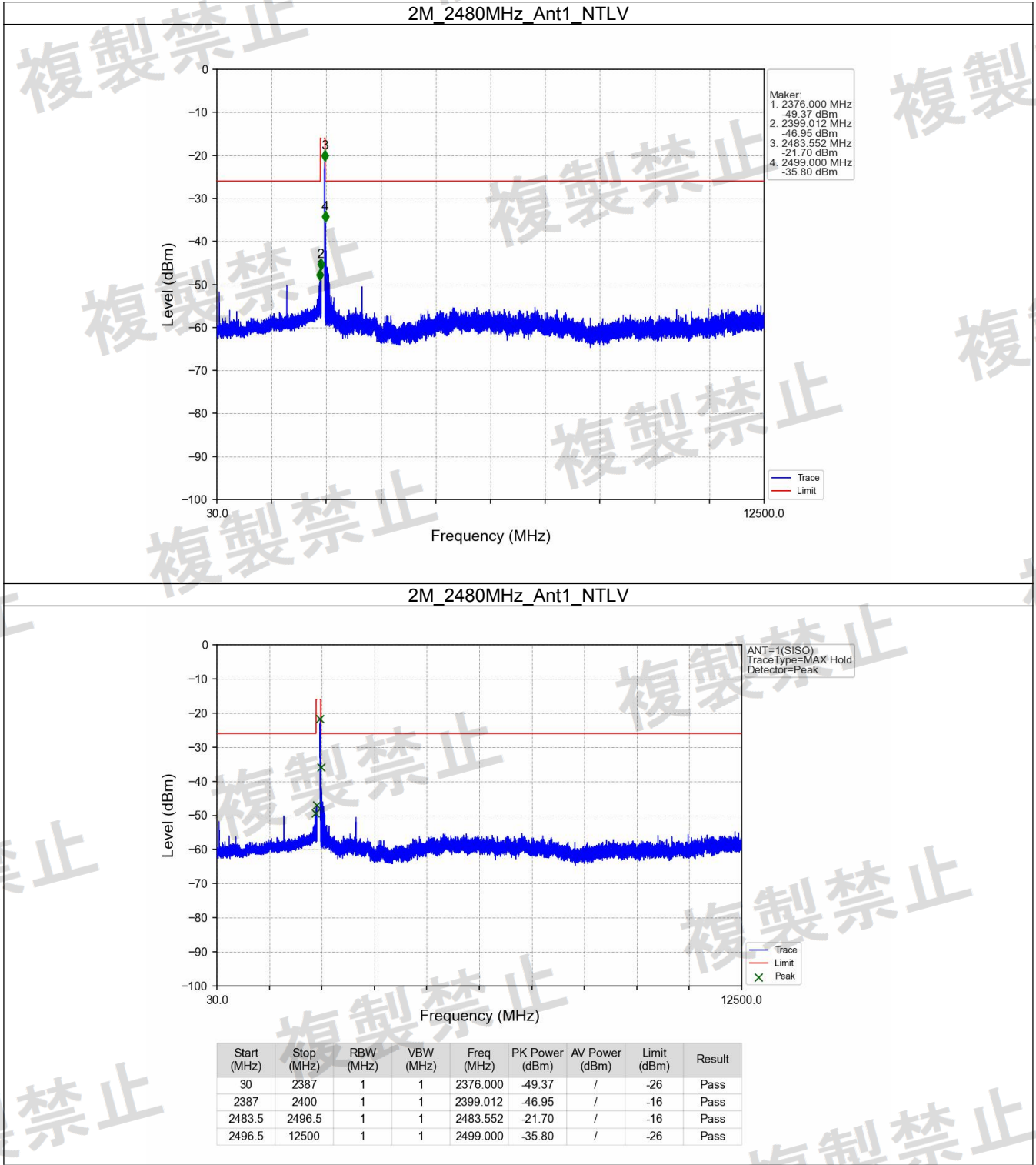
4.2.2 TxSe_NTLV



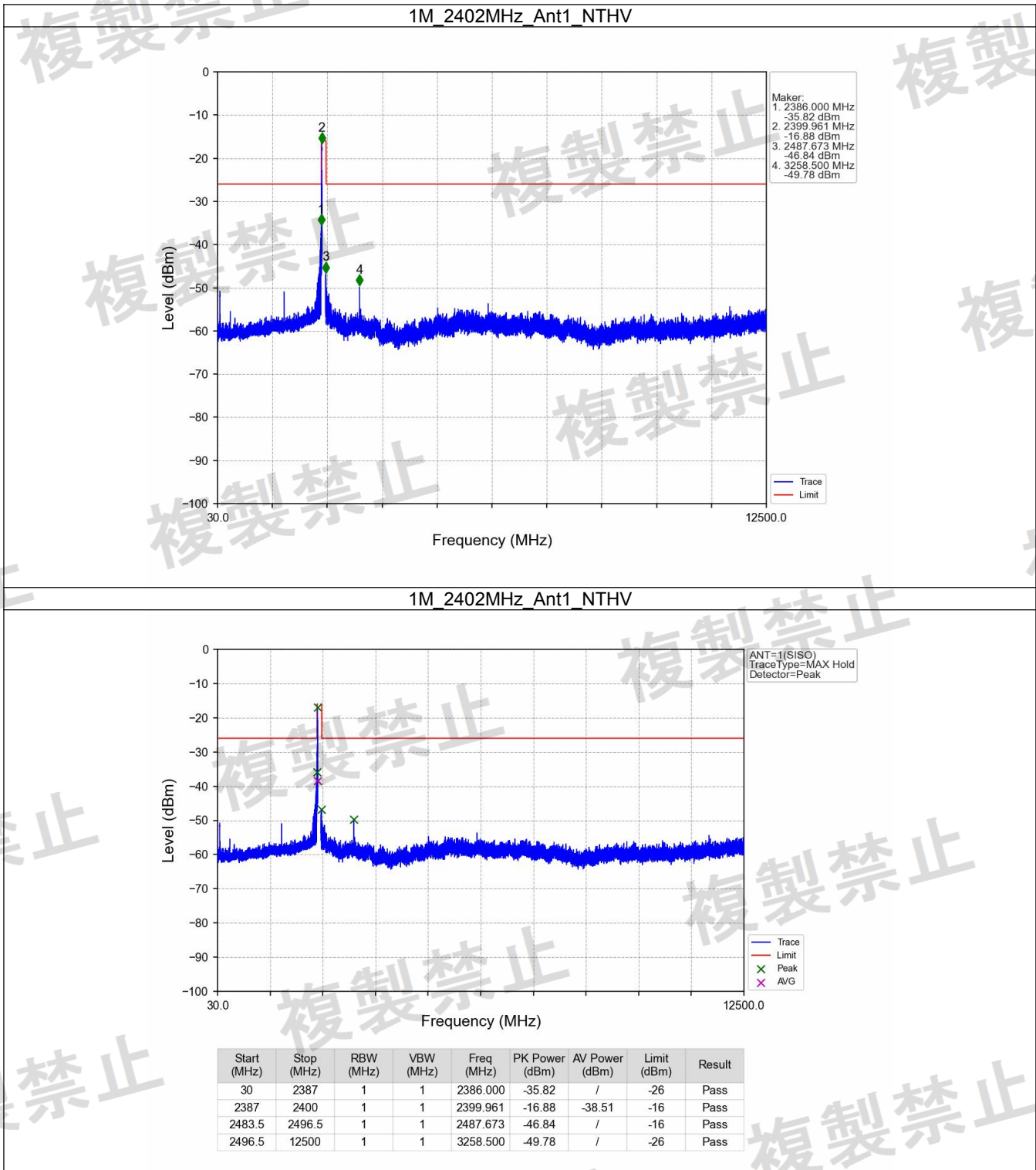


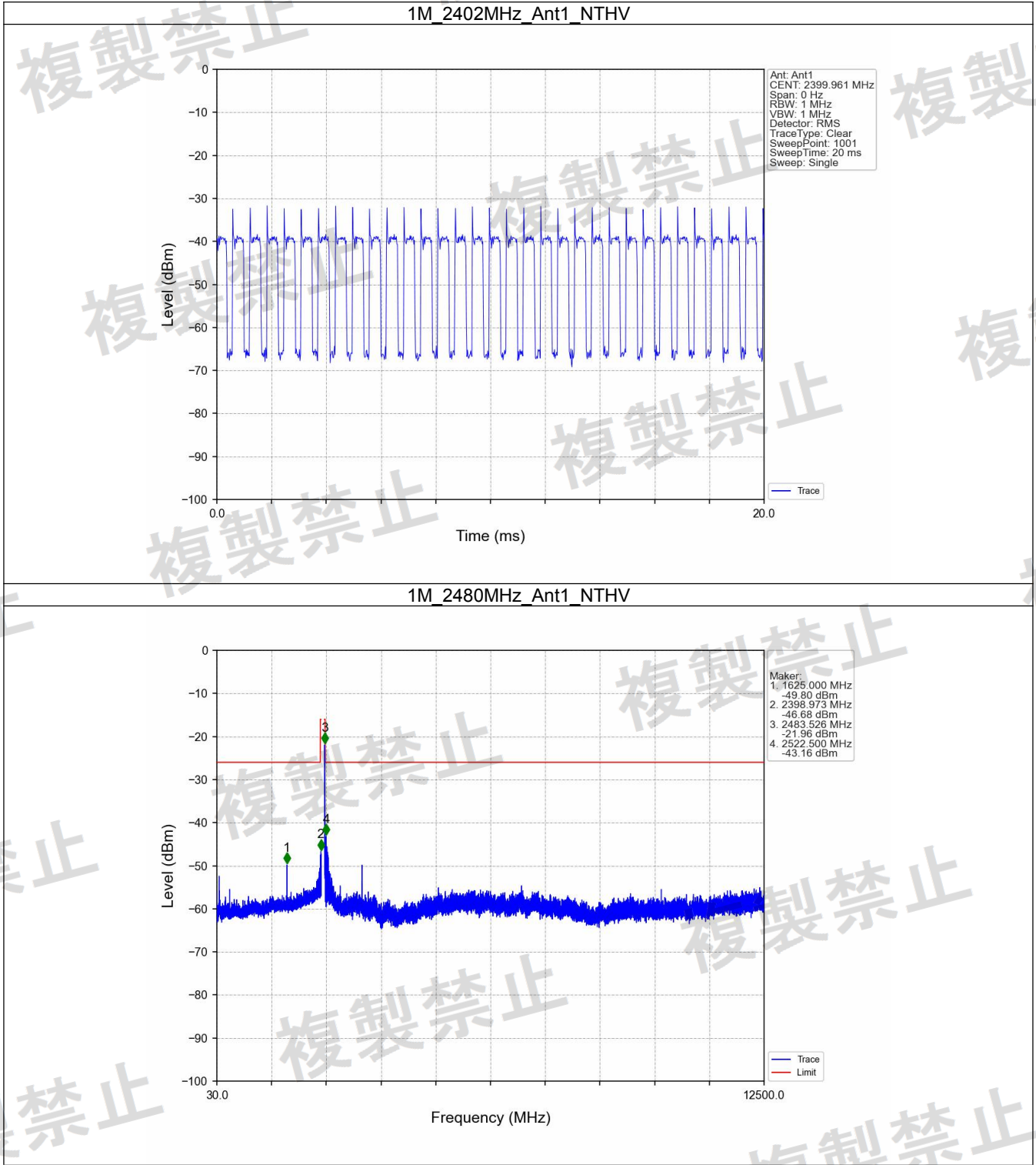


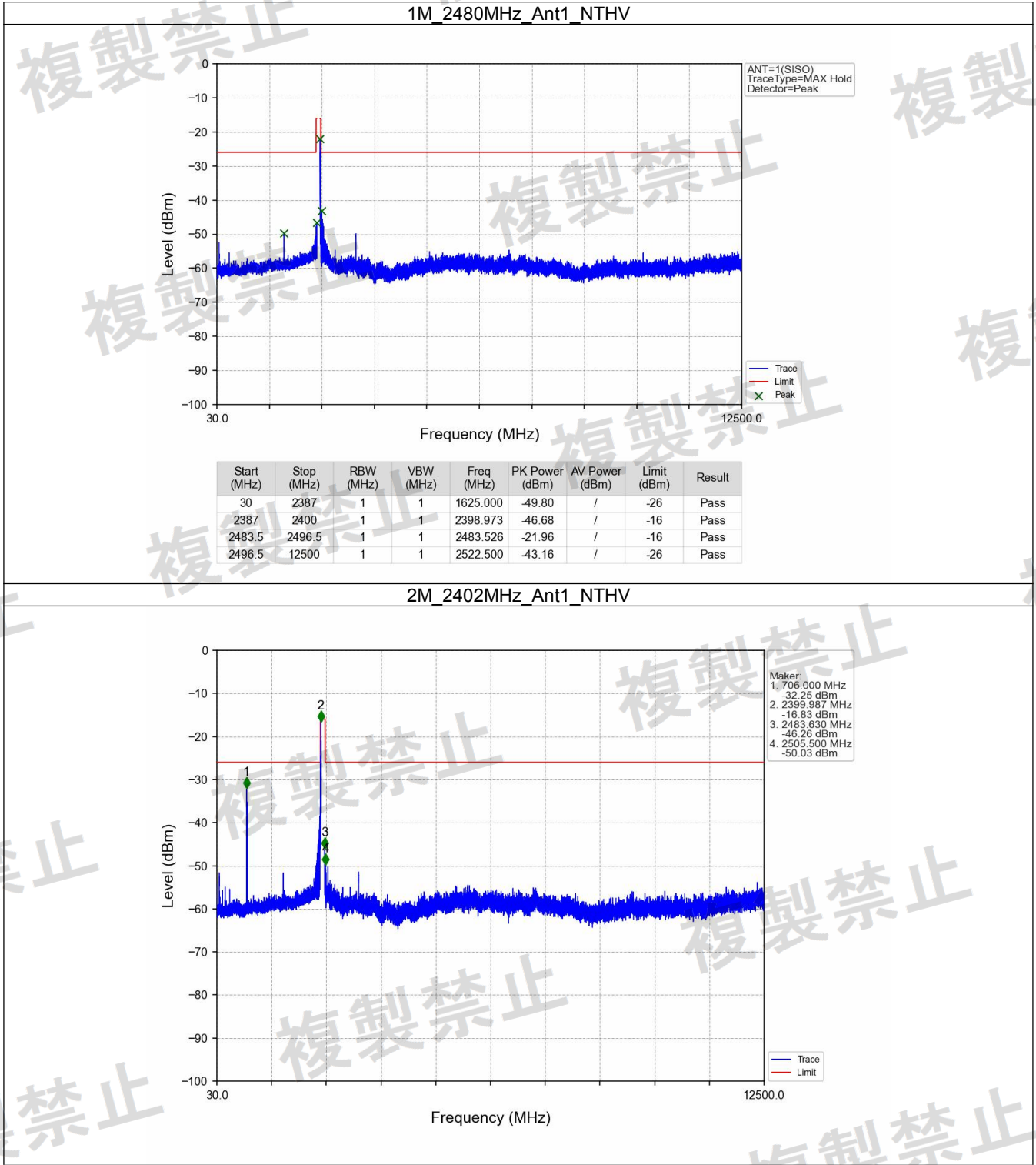


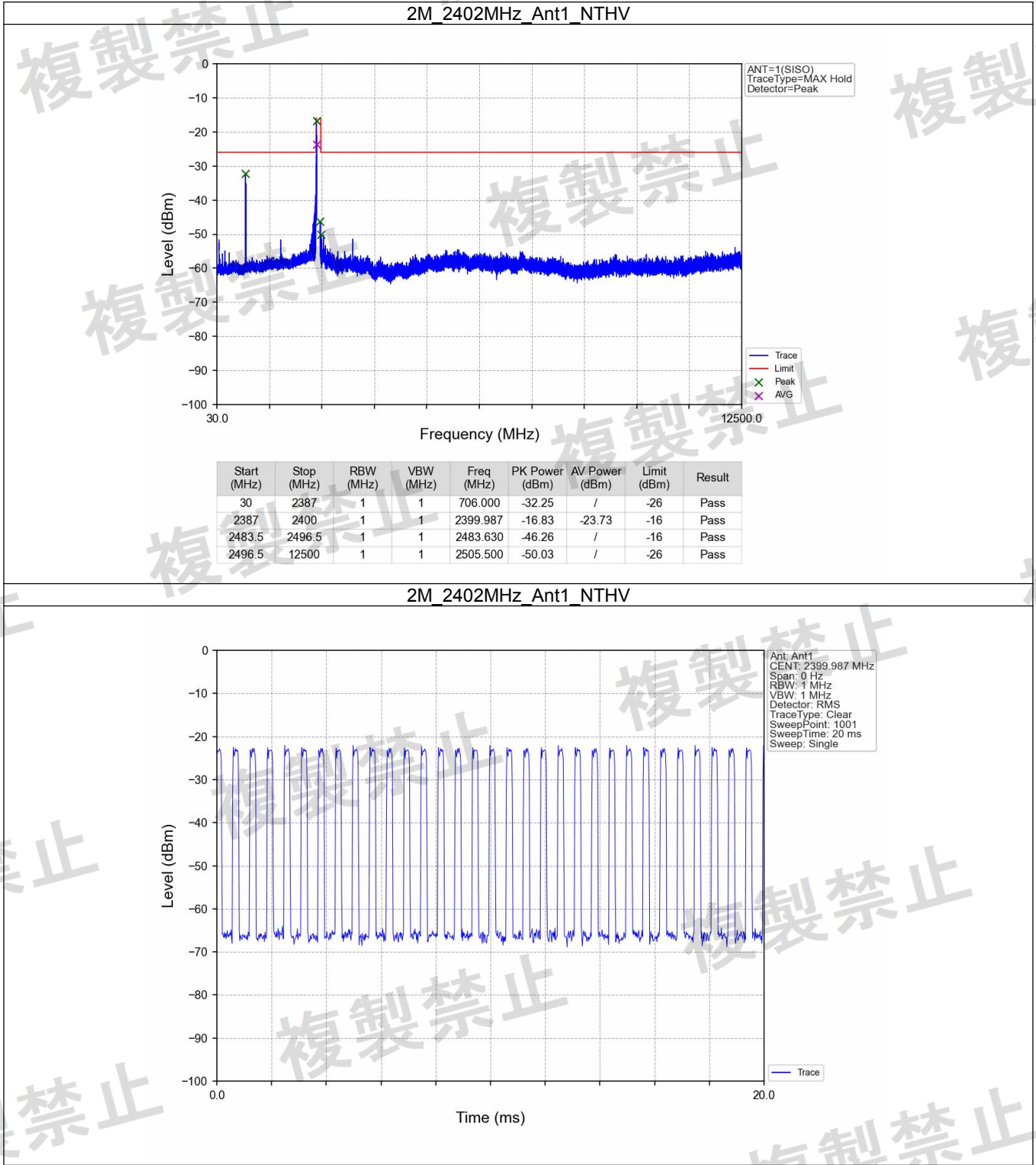


4.2.3 TxSe_NTHV

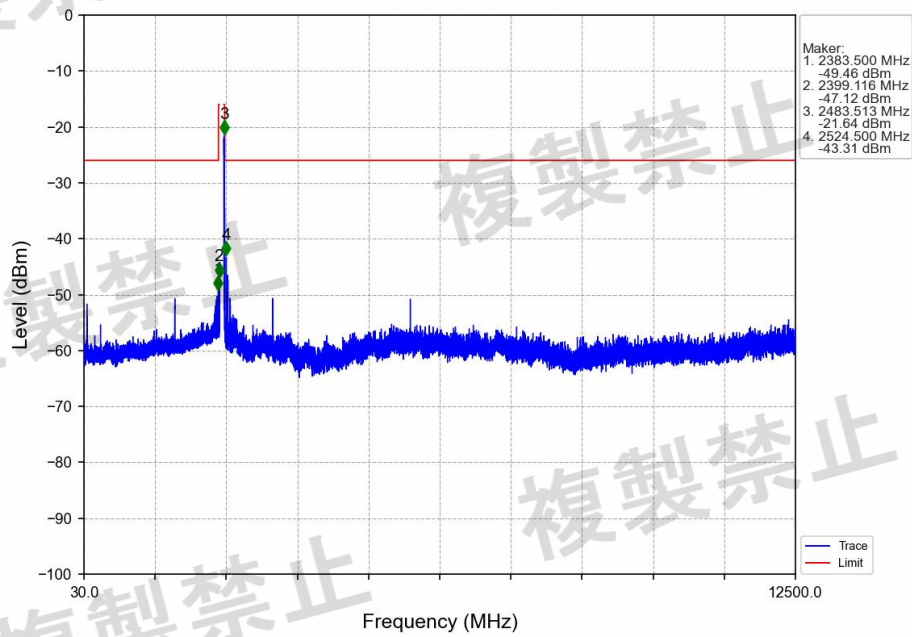




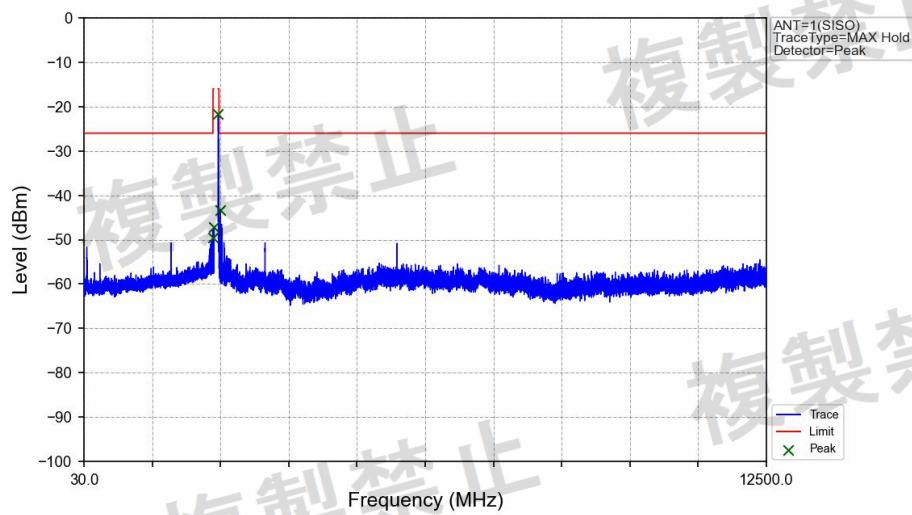




2M_2480MHz_Ant1_NTHV



2M_2480MHz_Ant1_NTHV



Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	2387	1	1	2383.500	-49.46	/	-26	Pass
2387	2400	1	1	2399.116	-47.12	/	-16	Pass
2483.5	2496.5	1	1	2483.513	-21.64	/	-16	Pass
2496.5	12500	1	1	2524.500	-43.31	/	-26	Pass

5. Secondary Radiated Emission

5.1 Test Result

5.1.1 RxSe_NTNV

NTNV												
Mode	TX Type	Freq. (MHz)	ANT	Freq. Range		Marker					Limit (nW)	Verdict
				Start (MHz)	Stop (MHz)	Freq. (MHz)	PK Power (dBm)	PK Power (nW)	AV Power (dBm)	AV Power (nW)		
1M	SISO	2402	1	30	1000	100	-58.66	1.361	-61.85	0.653	4	Pass
						160	-58.52	1.406	-62.47	0.566	4	Pass
						500	-58.00	1.585	-60.24	0.946	4	Pass
				1000	12500	2408.5	-45.62	27.416	-51.03	7.889	20	Pass
						2411.5	-47.57	17.498	-51.56	6.982	20	Pass
						2414.5	-48.96	12.706	-54.56	3.499	20	Pass
		2480	1	30	1000	100	-59.31	1.172	-62.28	0.592	4	Pass
						160	-59.77	1.054	-62.86	0.518	4	Pass
						500	-58.89	1.291	-60.71	0.849	4	Pass
				1000	12500	2408.5	-47.40	18.197	-76.83	0.021	20	Pass
						2411.5	-46.45	22.646	-76.54	0.022	20	Pass
						2414.5	-49.23	11.940	-76.34	0.023	20	Pass
2M	SISO	2402	1	30	1000	100	-58.54	1.400	-61.92	0.643	4	Pass
						160	-59.14	1.219	-62.45	0.569	4	Pass
						500	-58.53	1.403	-60.25	0.944	4	Pass
				1000	12500	2409	-45.94	25.468	-76.31	0.023	20	Pass
						2415	-51.08	7.798	-54.44	3.597	20	Pass
						2421	-52.34	5.834	-76.12	0.024	20	Pass
		2480	1	30	1000	30.55	-63.14	0.485	-74.28	0.037	4	Pass
						100	-58.77	1.327	-62.35	0.582	4	Pass
						160	-59.54	1.112	-62.74	0.532	4	Pass
				1000	12500	220	-62.10	0.617	-63.08	0.492	4	Pass
						500	-59.15	1.216	-63.26	0.472	4	Pass
						2412	-44.99	31.696	-76.72	0.021	20	Pass

5.1.2 RxSe_NTLV

NTLV												
Mode	TX Type	Freq. (MHz)	ANT	Freq. Range		Marker					Limit (nW)	Verdict
				Start (MHz)	Stop (MHz)	Freq. (MHz)	PK Power (dBm)	PK Power (nW)	AV Power (dBm)	AV Power (nW)		
1M	SISO	2402	1	30	1000	100	-58.45	1.429	-61.84	0.655	4	Pass
						160	-58.98	1.265	-62.49	0.564	4	Pass
						500	-58.16	1.528	-60.35	0.923	4	Pass
				1000	12500	2409	-45.94	25.468	-48.29	14.825	20	Pass
						2412	-47.89	16.255	-69.09	0.123	20	Pass
						2415.5	-50.21	9.528	-54.84	3.281	20	Pass
		2480	1	30	1000	100	-58.99	1.262	-62.34	0.583	4	Pass
						160	-59.37	1.156	-62.91	0.512	4	Pass
						500	-59.30	1.175	-60.71	0.849	4	Pass
				1000	12500	2409	-46.59	21.928	-48.01	15.812	20	Pass
						2412	-47.04	19.770	-76.53	0.022	20	Pass
						2415	-51.48	7.112	-58.17	1.524	20	Pass
2M	SISO	2402	1	30	1000	100	-57.95	1.603	-61.78	0.664	4	Pass
						160	-59.15	1.216	-62.61	0.548	4	Pass
						220	-61.70	0.676	-62.65	0.543	4	Pass
						500	-58.57	1.390	-60.40	0.912	4	Pass
				1000	12500	2405.5	-56.71	2.133	-76.51	0.022	20	Pass

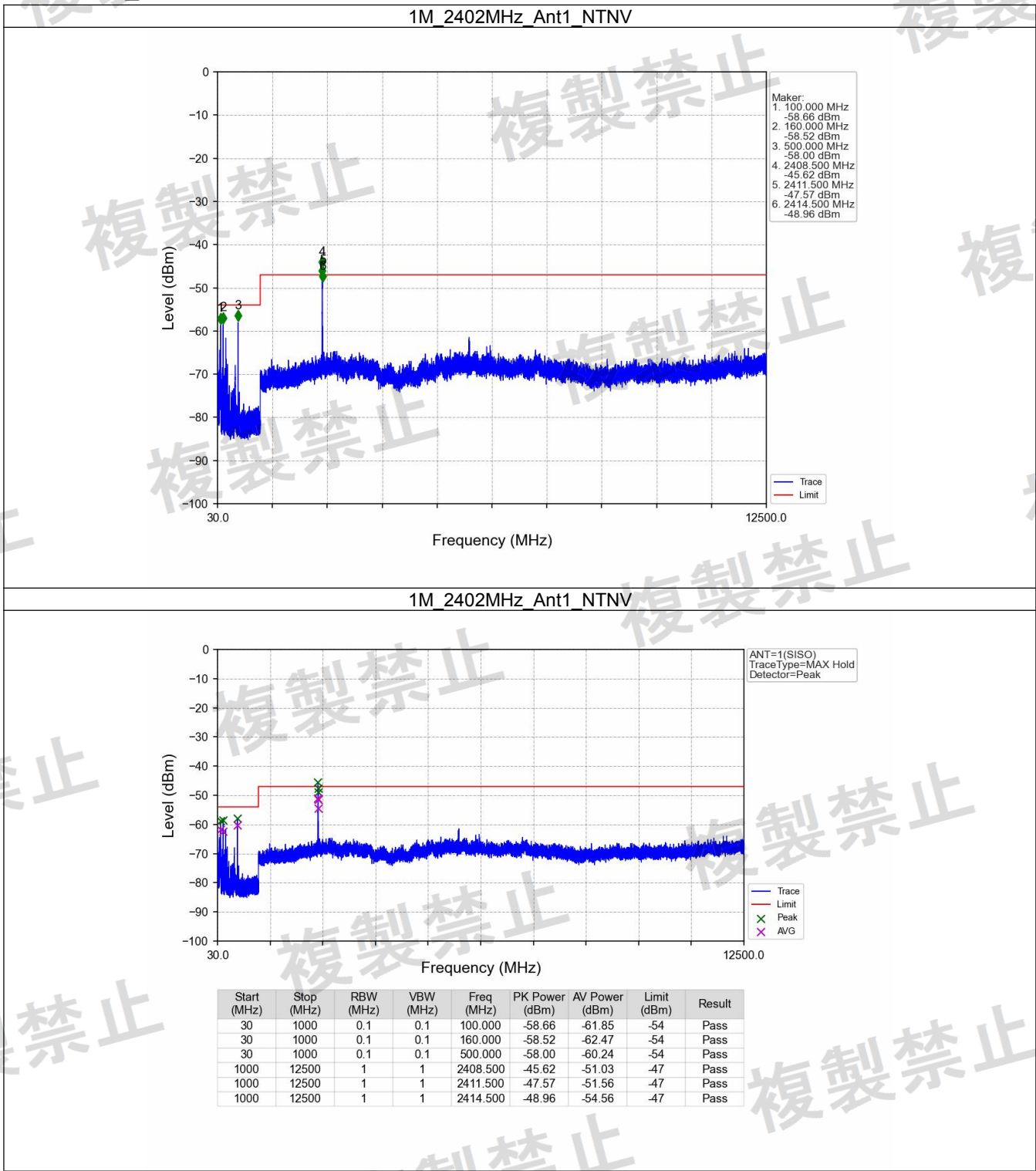
		2480	1	30	1000	2411.5	-45.17	30.409	-76.20	0.024	20	Pass
						100	-59.31	1.172	-62.19	0.604	4	Pass
						160	-59.19	1.205	-62.82	0.522	4	Pass
						220	-61.40	0.724	-63.09	0.491	4	Pass
						500	-59.06	1.242	-61.88	0.649	4	Pass
				1000	12500	2409	-46.61	21.827	-76.53	0.022	20	Pass
						2415	-50.56	8.790	-57.72	1.690	20	Pass

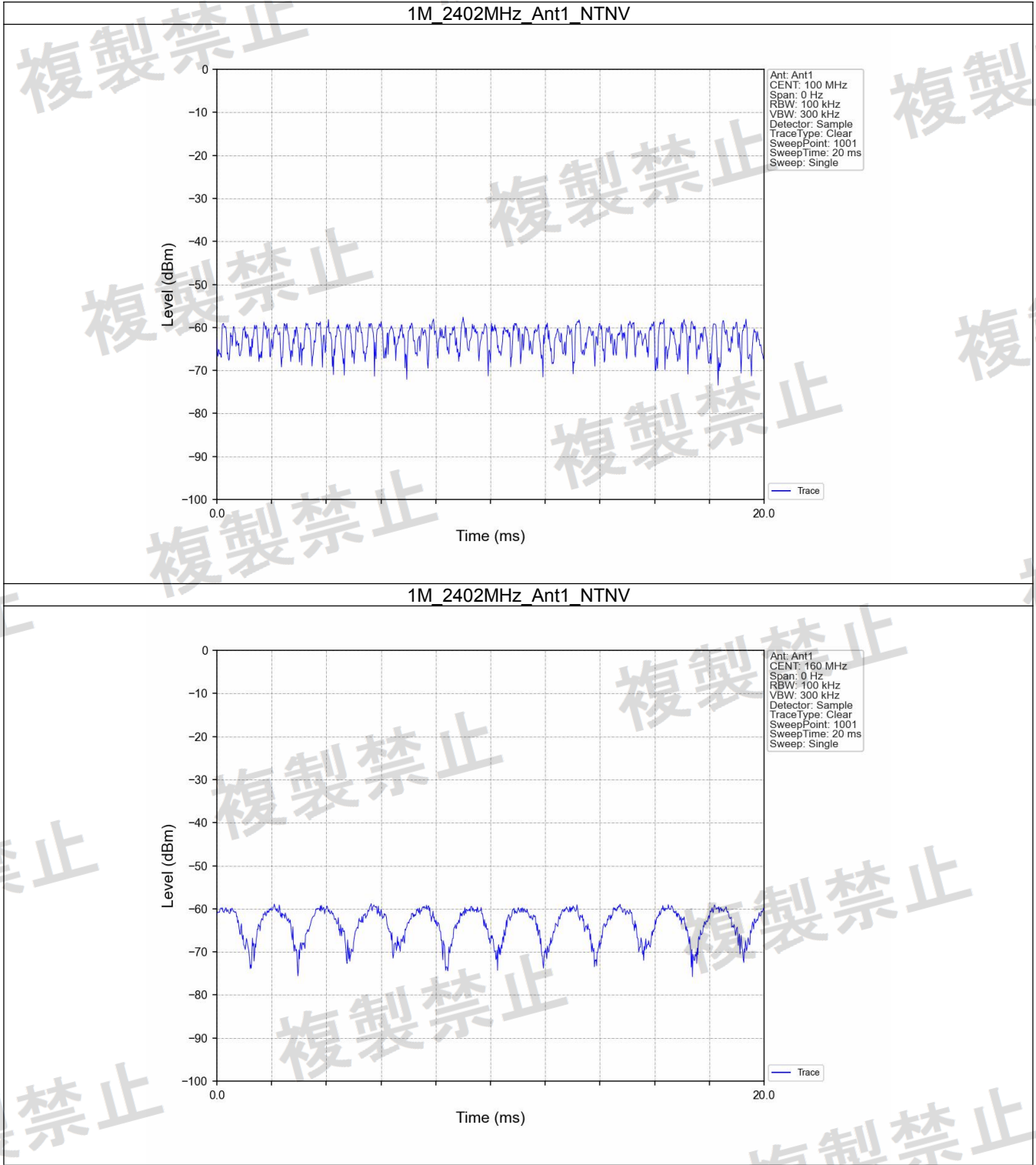
5.1.3 RxSe_NTHV

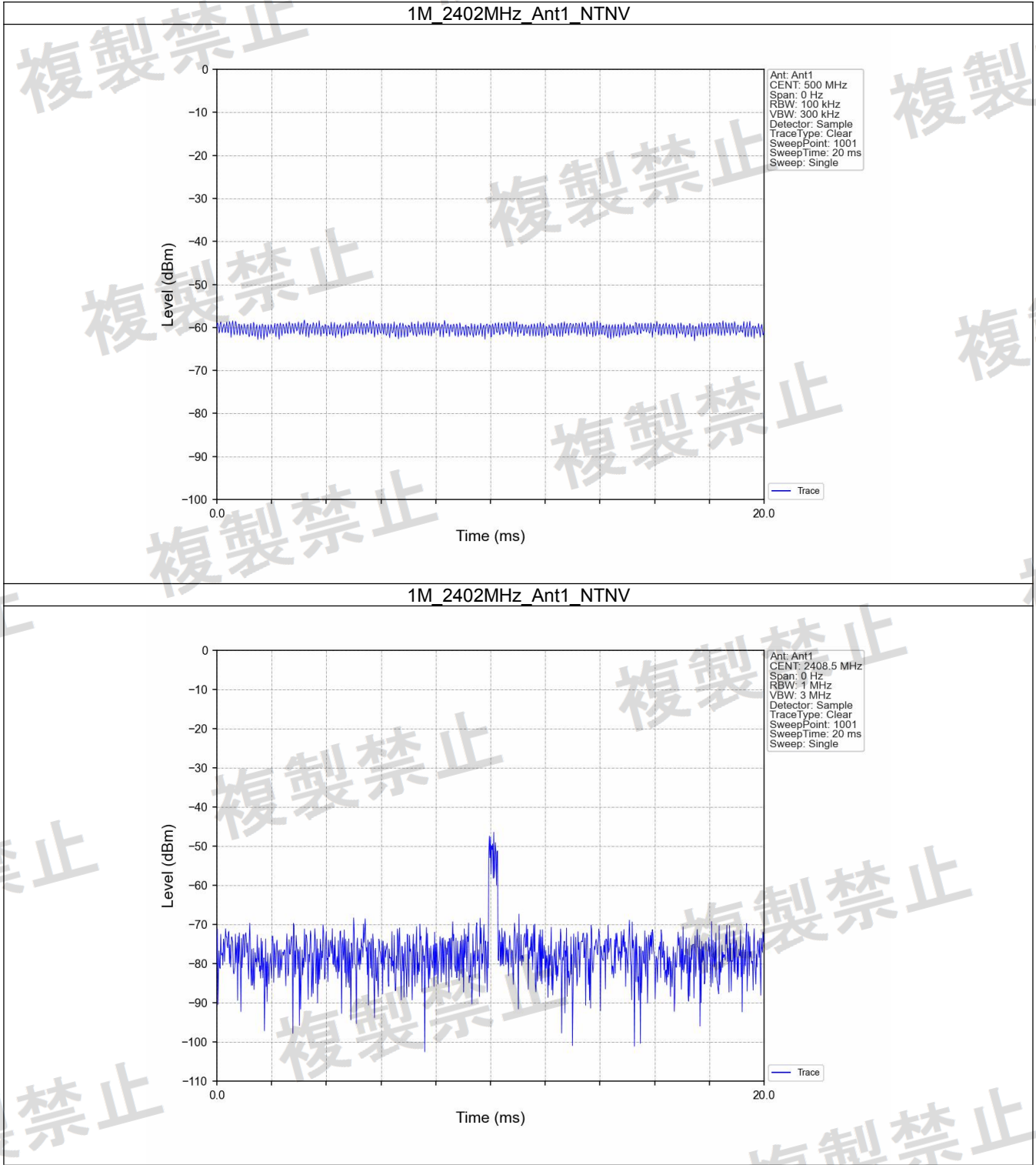
NTHV												
Mode	TX Type	Freq. (MHz)	ANT	Freq. Range		Marker					Limit (nW)	Verdict
				Start (MHz)	Stop (MHz)	Freq. (MHz)	PK Power (dBm)	PK Power (nW)	AV Power (dBm)	AV Power (nW)		
1M	SISO	2402	1	30	1000	100	-58.31	1.476	-61.90	0.646	4	Pass
				1000	12500	2405.5	-49.98	10.046	-76.30	0.023	20	Pass
						2408.5	-45.85	26.002	-76.18	0.024	20	Pass
						2411.5	-47.21	19.011	-76.36	0.023	20	Pass
						2414.5	-48.99	12.618	-76.16	0.024	20	Pass
						2419.5	-46.57	22.029	-76.03	0.025	20	Pass
		2480	1	30	1000	100	-59.22	1.197	-62.25	0.596	4	Pass
				1000	12500	160	-59.75	1.059	-62.87	0.516	4	Pass
						500	-59.02	1.253	-60.69	0.853	4	Pass
						2408.5	-47.61	17.338	-53.47	4.498	20	Pass
						2411.5	-46.43	22.751	-76.42	0.023	20	Pass
2M	SISO	2402	1	30	1000	2414.5	-49.44	11.376	-57.96	1.600	20	Pass
						30.6	-63.54	0.443	-72.38	0.058	4	Pass
						100	-58.55	1.396	-61.95	0.638	4	Pass
						160	-59.09	1.233	-62.43	0.571	4	Pass
						220	-61.62	0.689	-62.58	0.552	4	Pass
		2480	1	1000	12500	500	-58.96	1.271	-60.41	0.910	4	Pass
						2517.5	-55.99	2.518	-75.95	0.025	20	Pass
						100	-59.28	1.180	-62.26	0.594	4	Pass
						160	-59.43	1.140	-62.95	0.507	4	Pass
						500	-59.23	1.194	-60.98	0.798	4	Pass
						2409.5	-45.78	26.424	-76.52	0.022	20	Pass
						2416	-51.41	7.228	-76.61	0.022	20	Pass
						2436.5	-50.64	8.630	-76.54	0.022	20	Pass

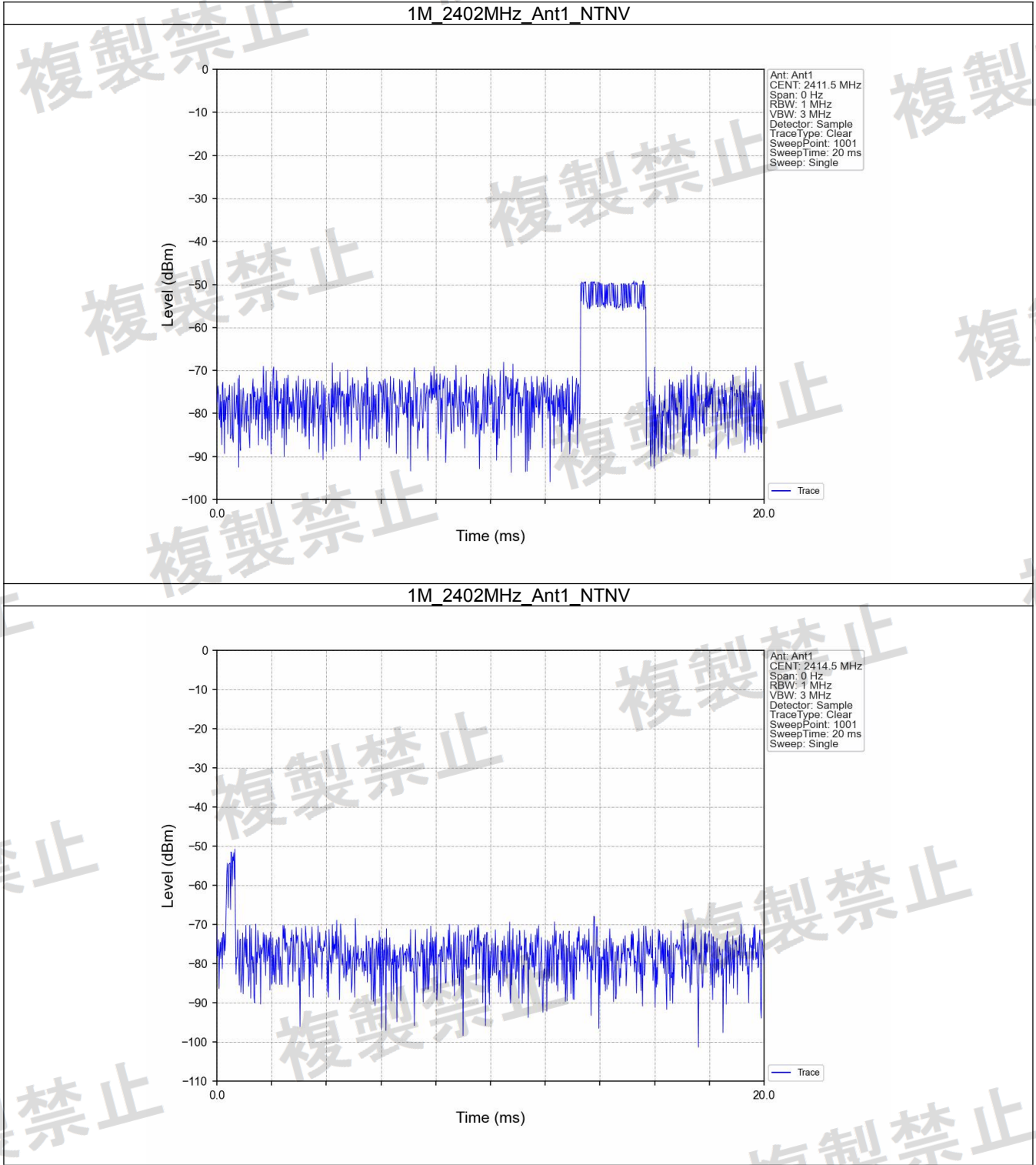
5.2 Test Graph

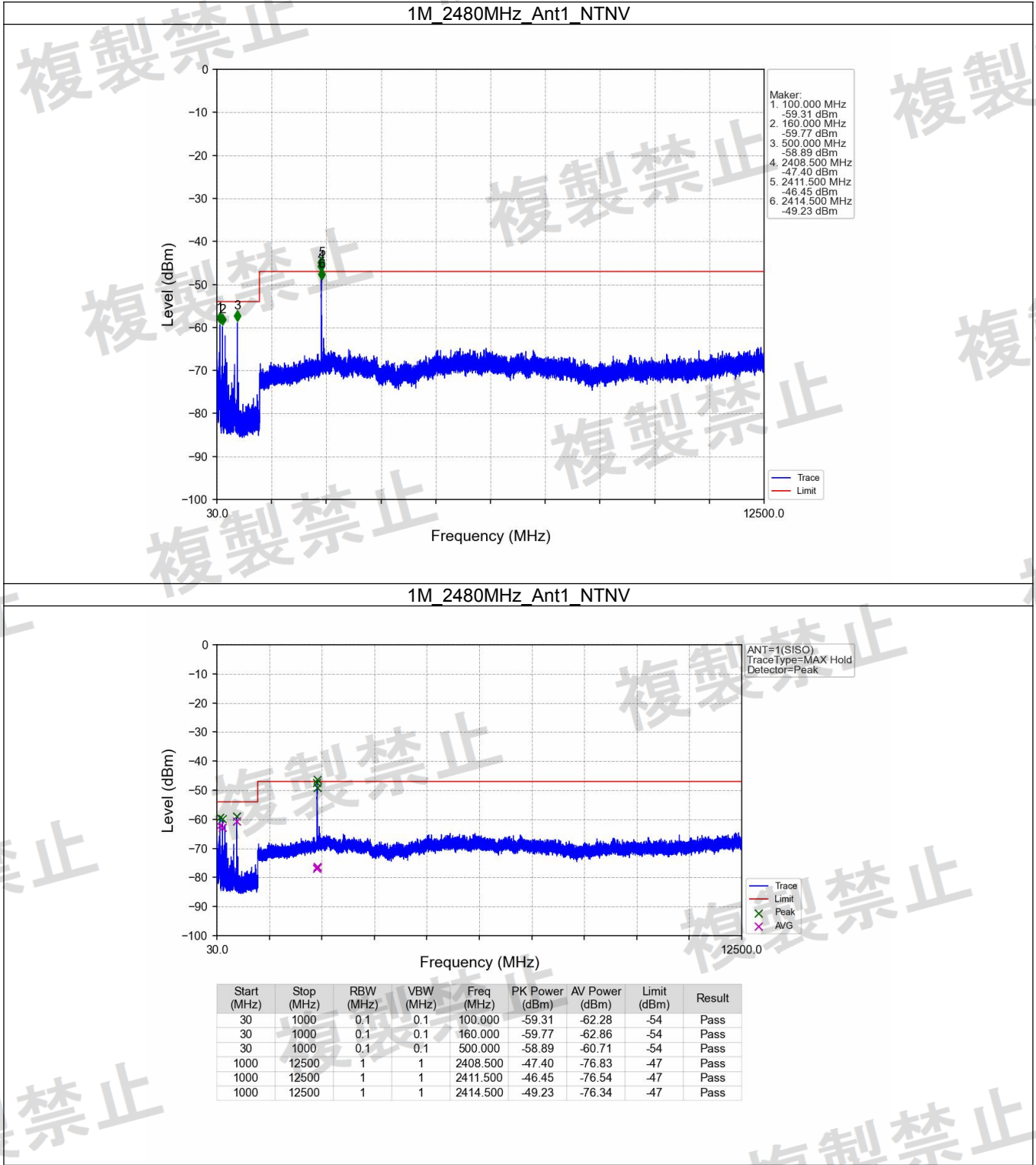
5.2.1 RxSe_NTNV

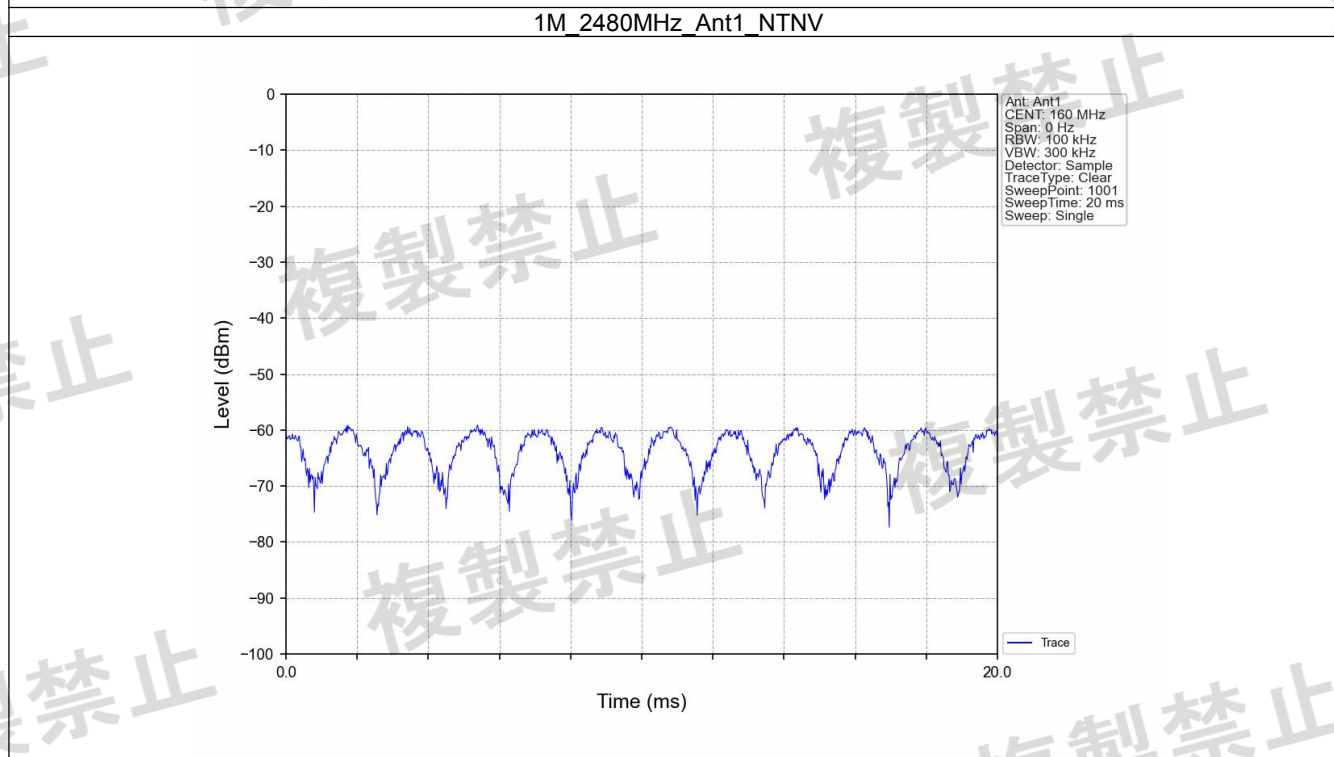
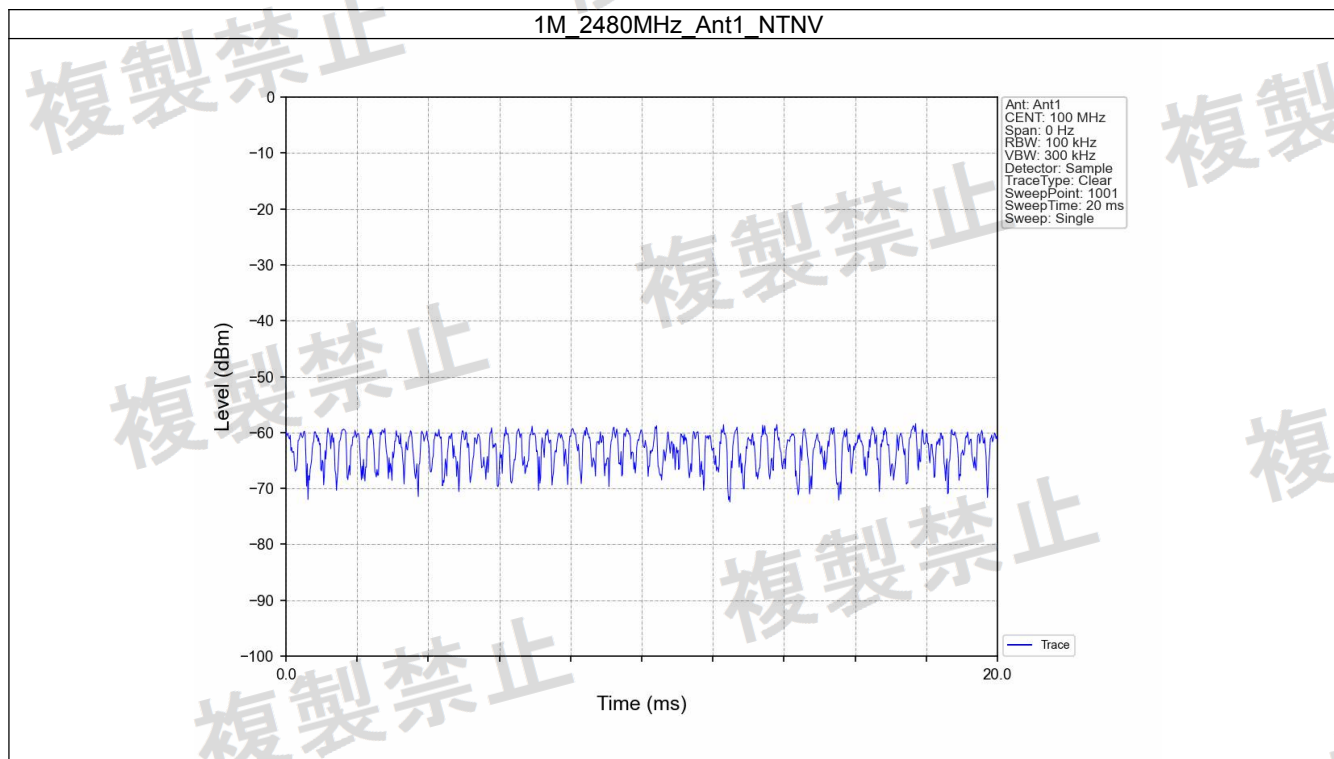


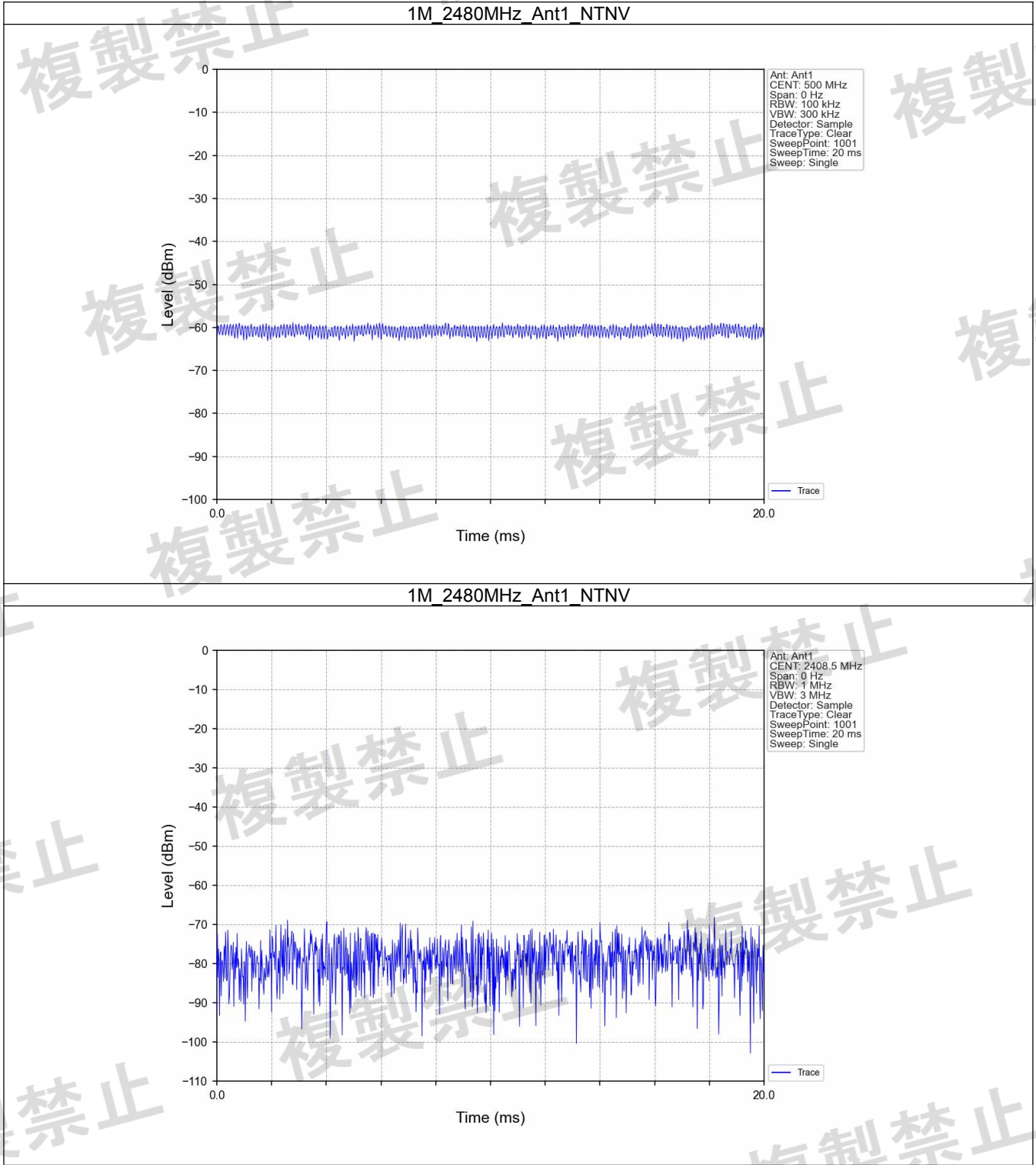


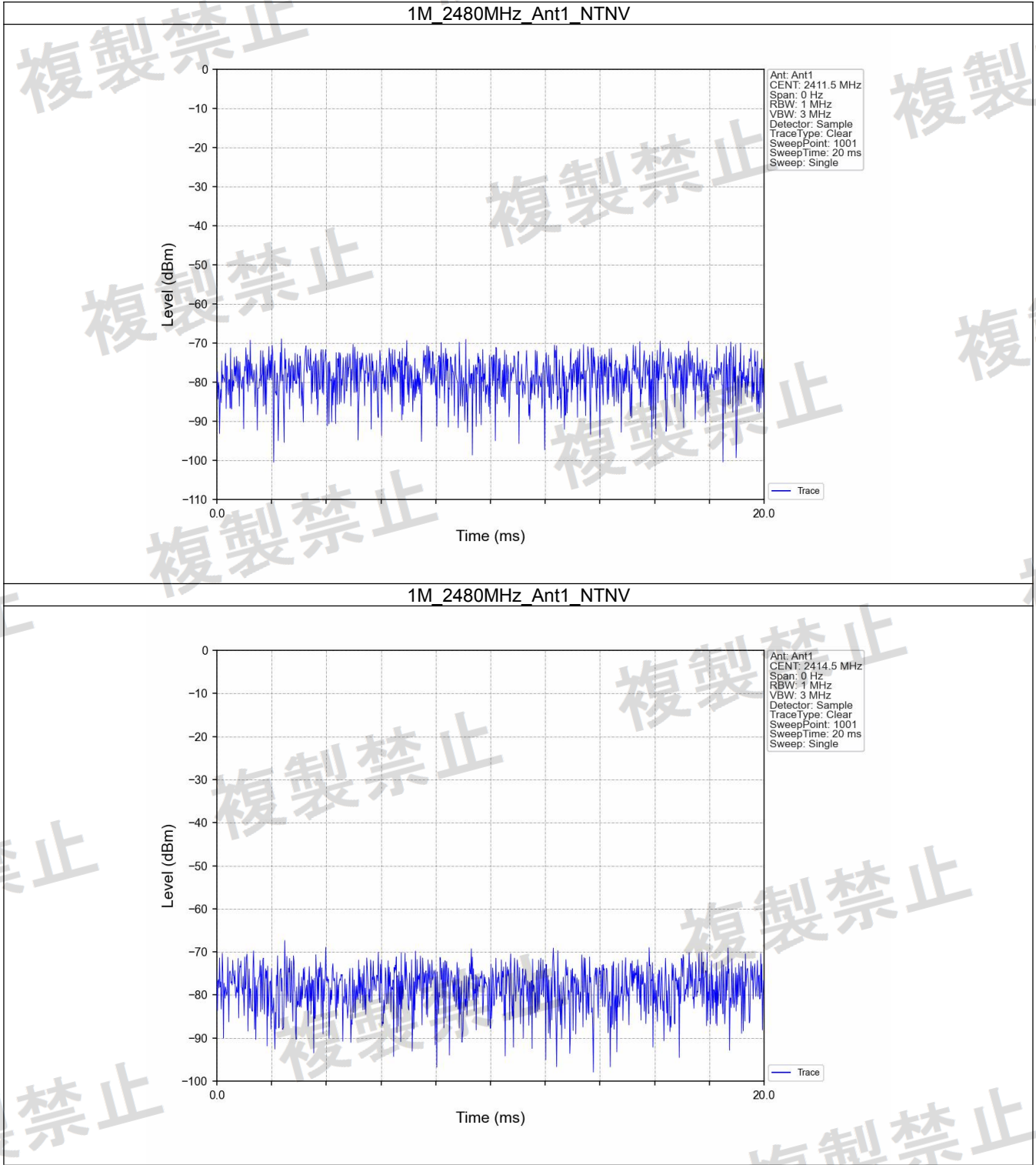




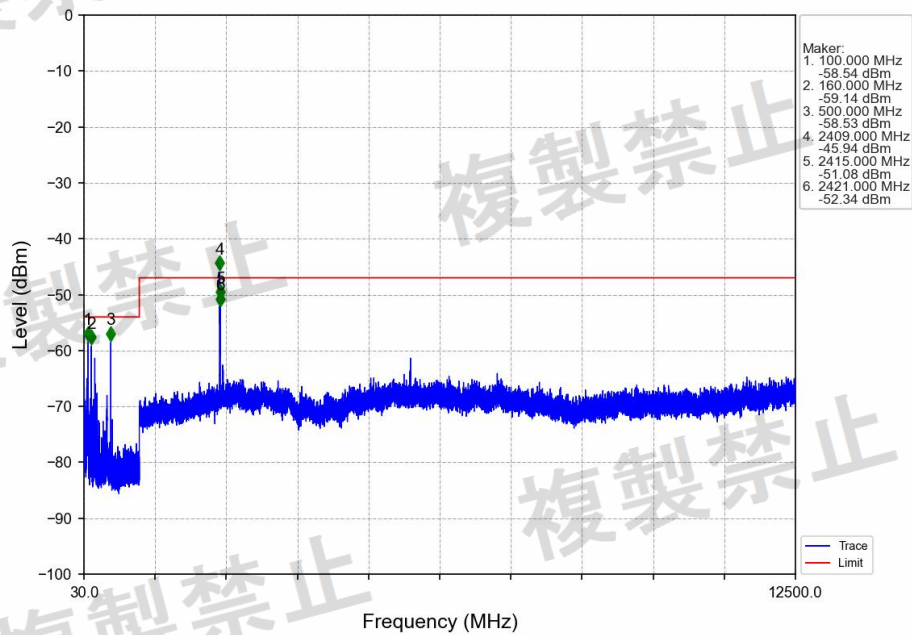




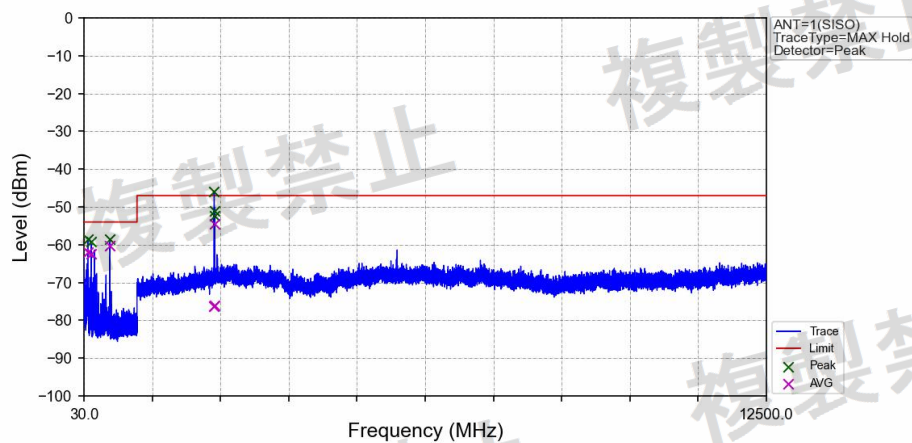




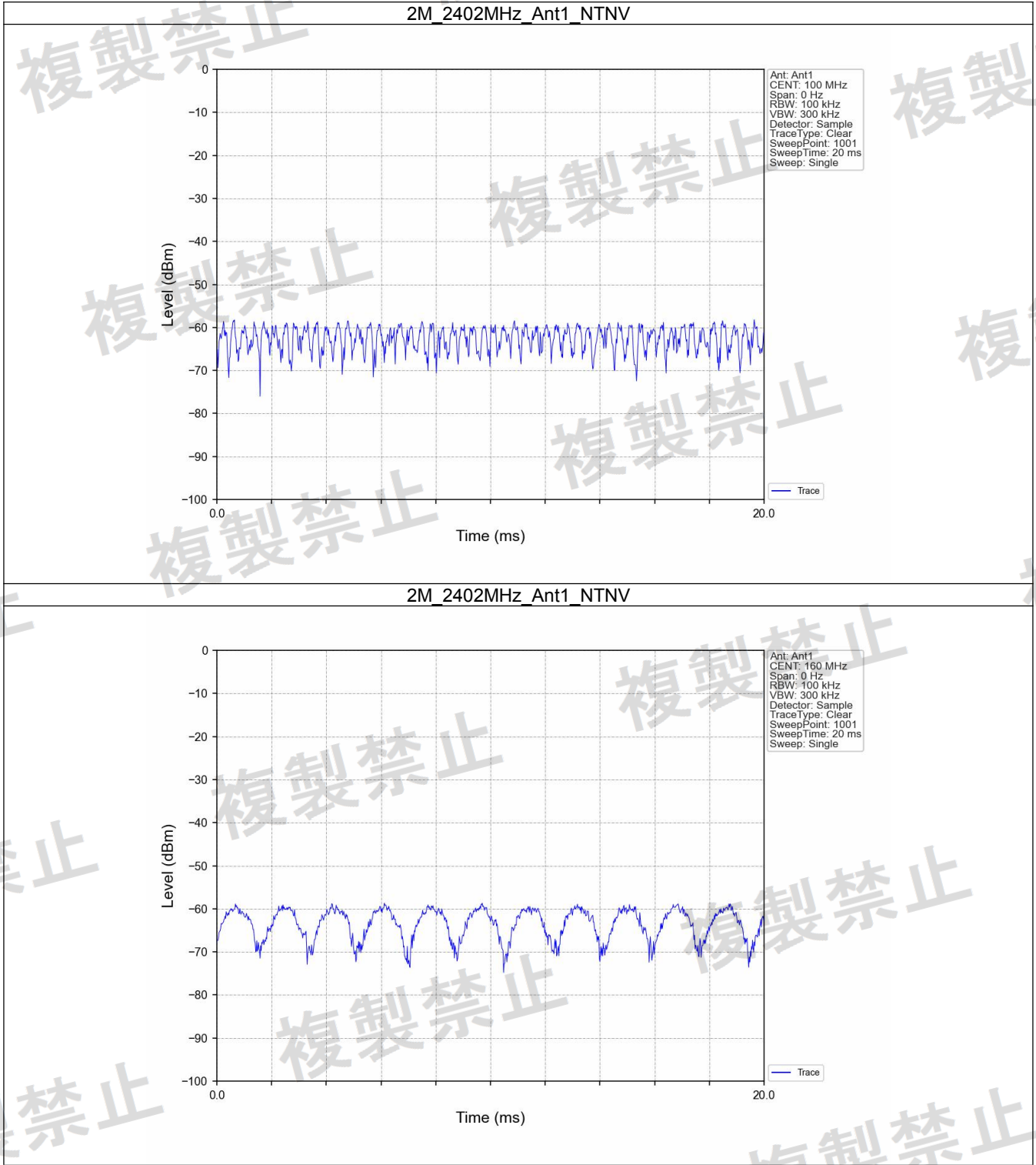
2M_2402MHz_Ant1_NTNV

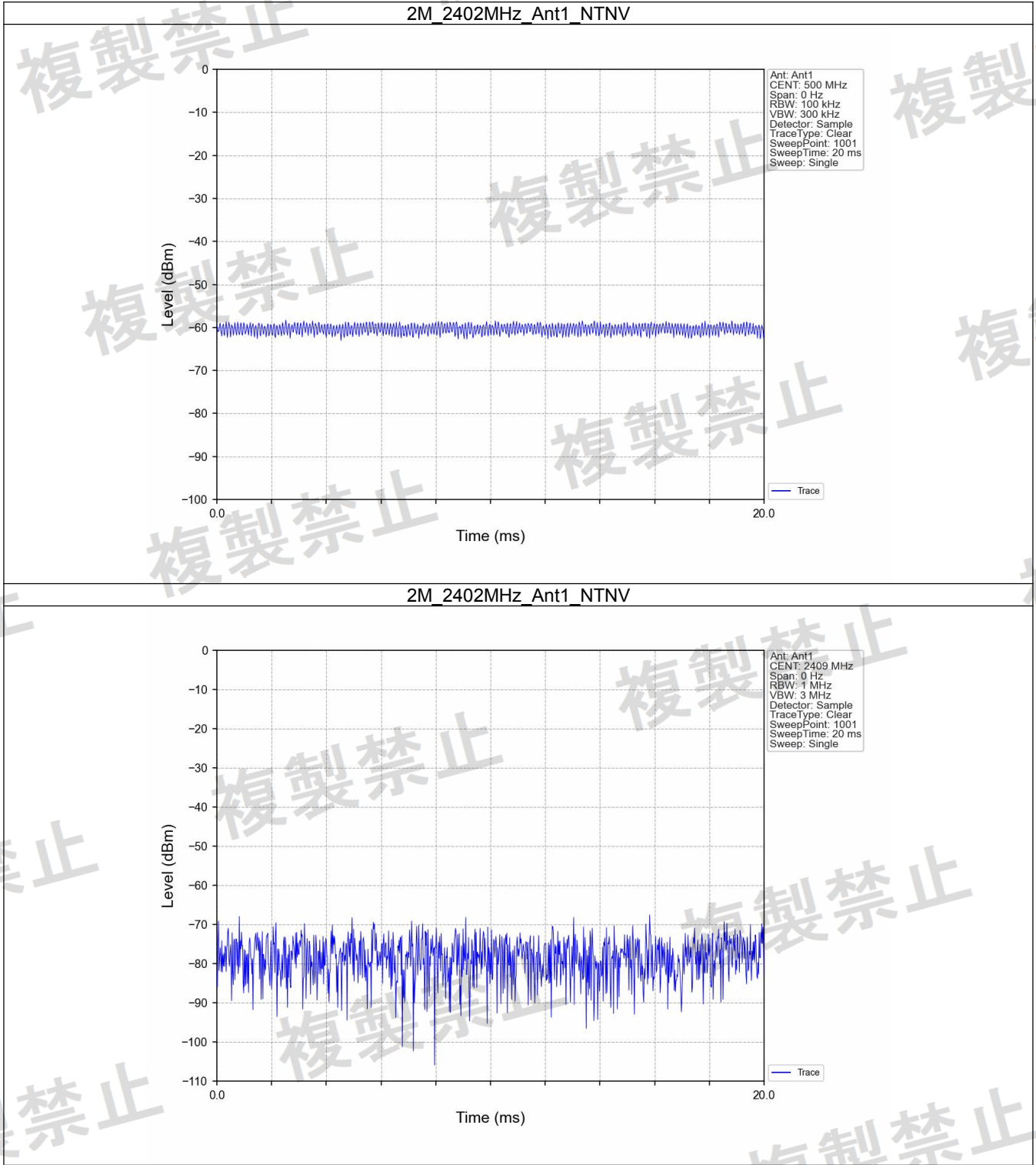


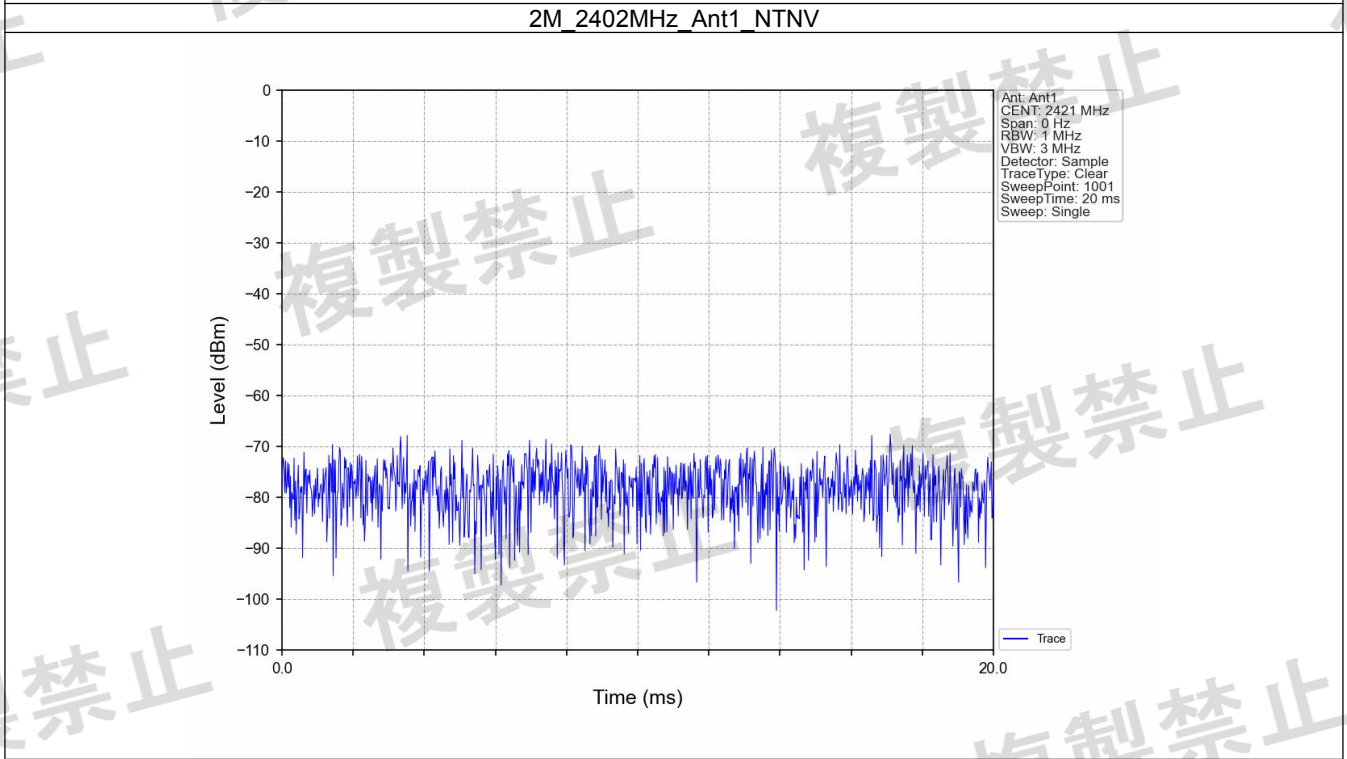
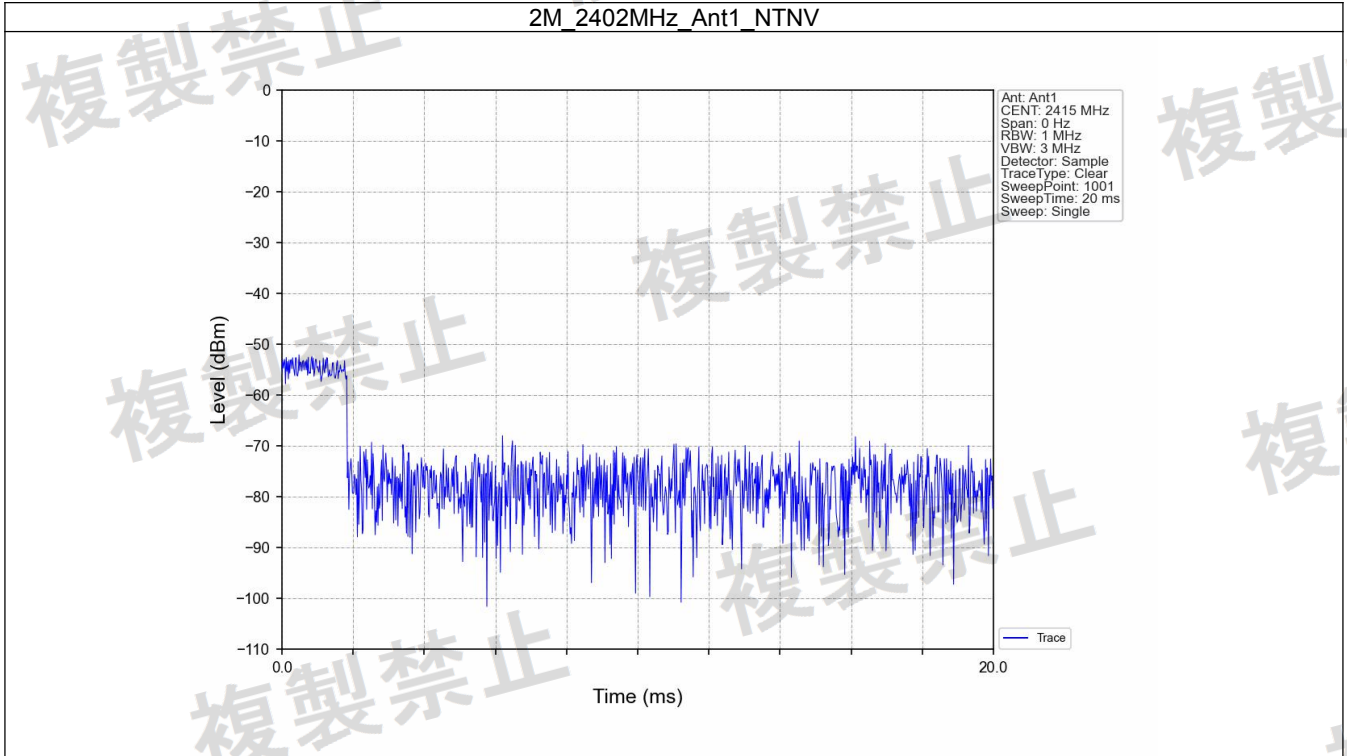
2M_2402MHz_Ant1_NTNV

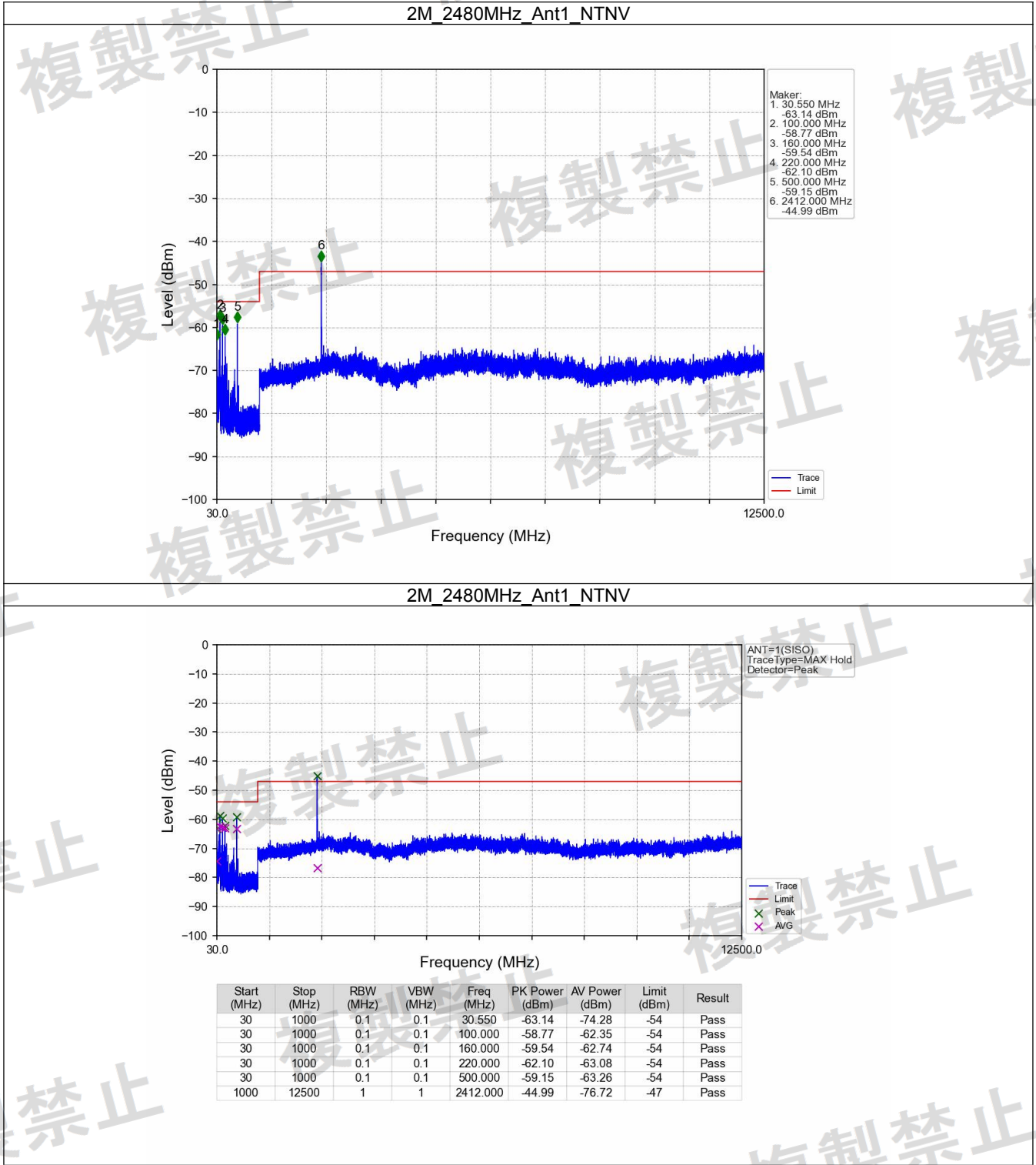


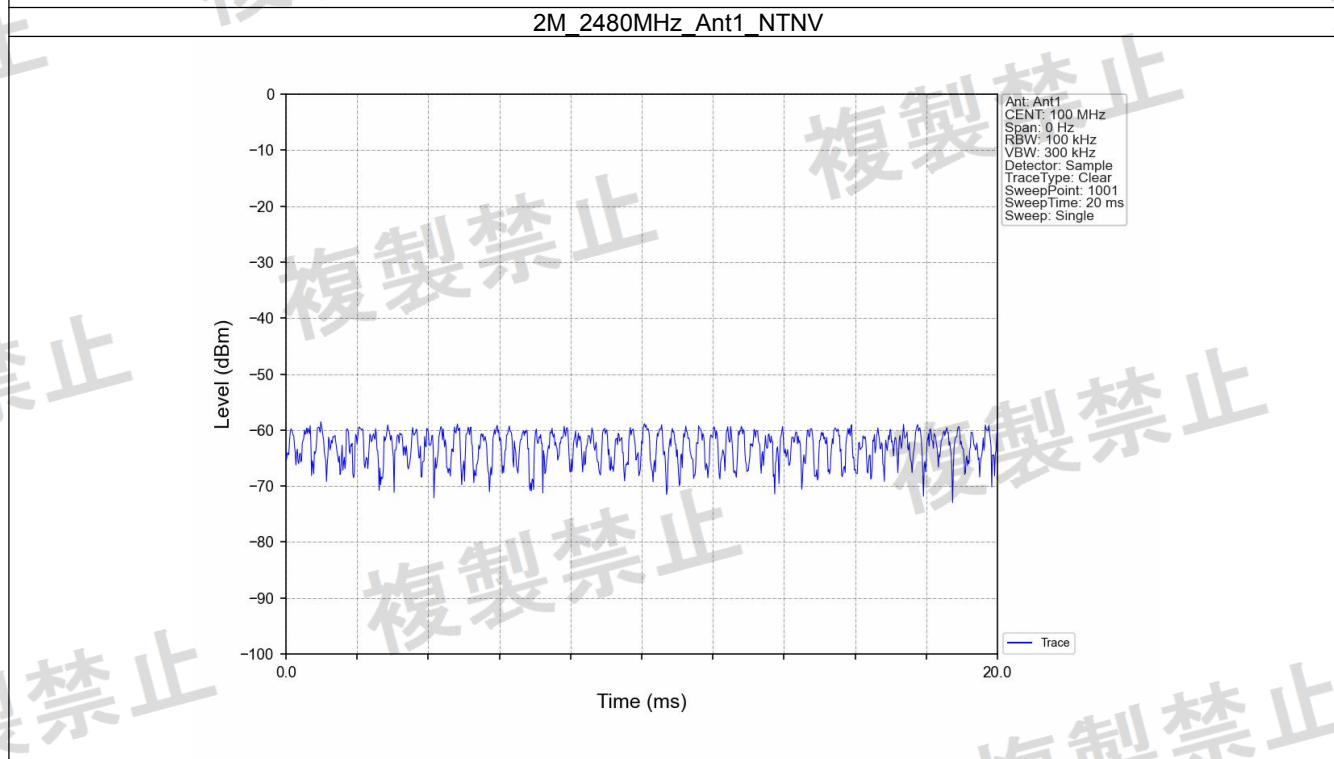
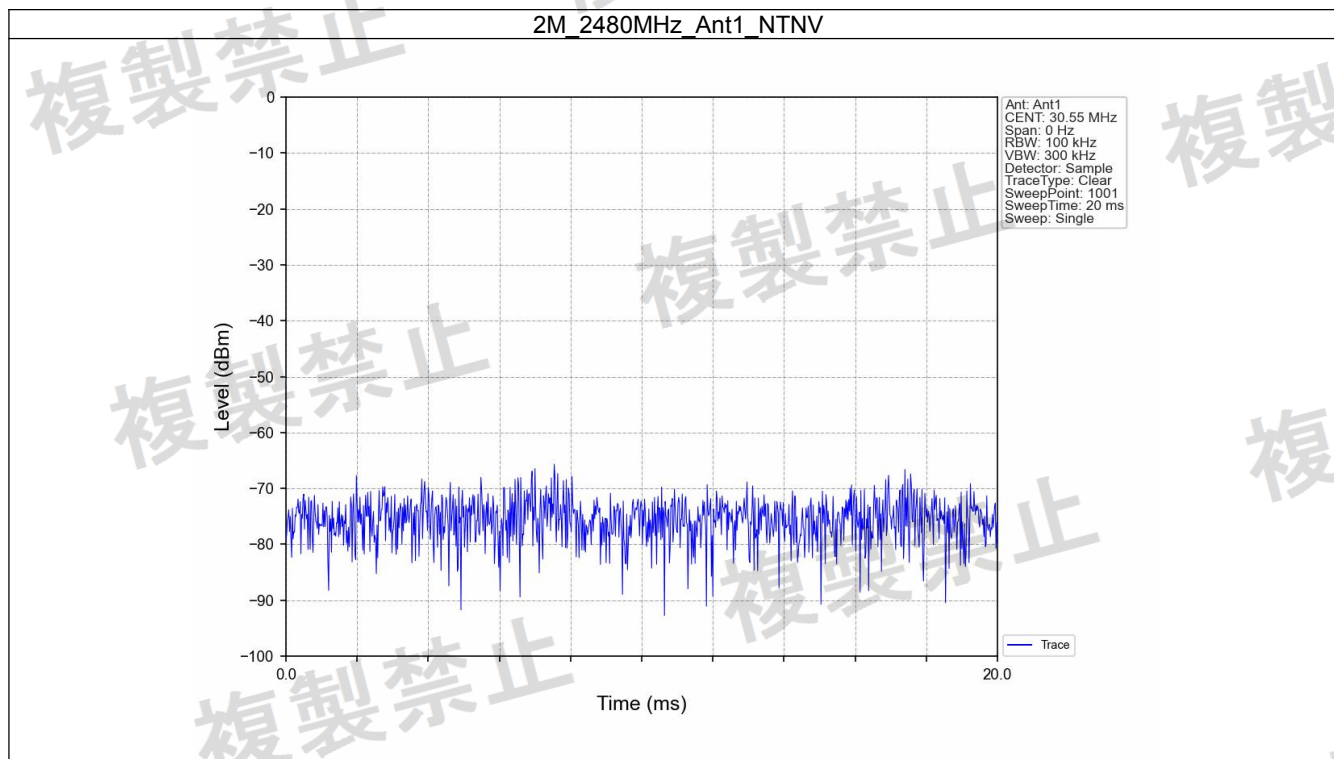
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.1	100.000	-58.54	-61.92	-54	Pass
30	1000	0.1	0.1	160.000	-59.14	-62.45	-54	Pass
30	1000	0.1	0.1	500.000	-58.53	-60.25	-54	Pass
1000	12500	1	1	2409.000	-45.94	-76.31	-47	Pass
1000	12500	1	1	2415.000	-51.08	-54.44	-47	Pass
1000	12500	1	1	2421.000	-52.34	-76.12	-47	Pass

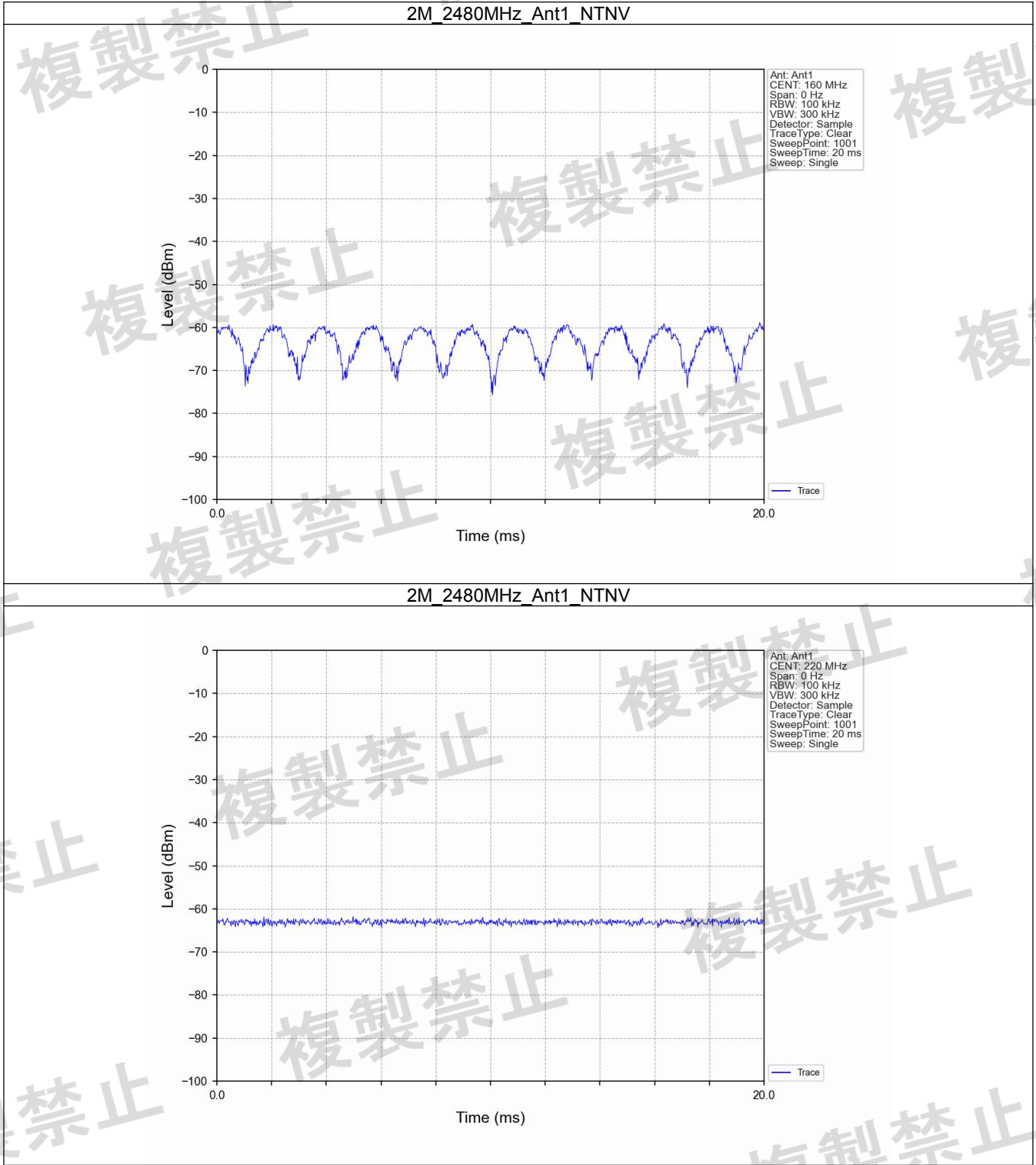


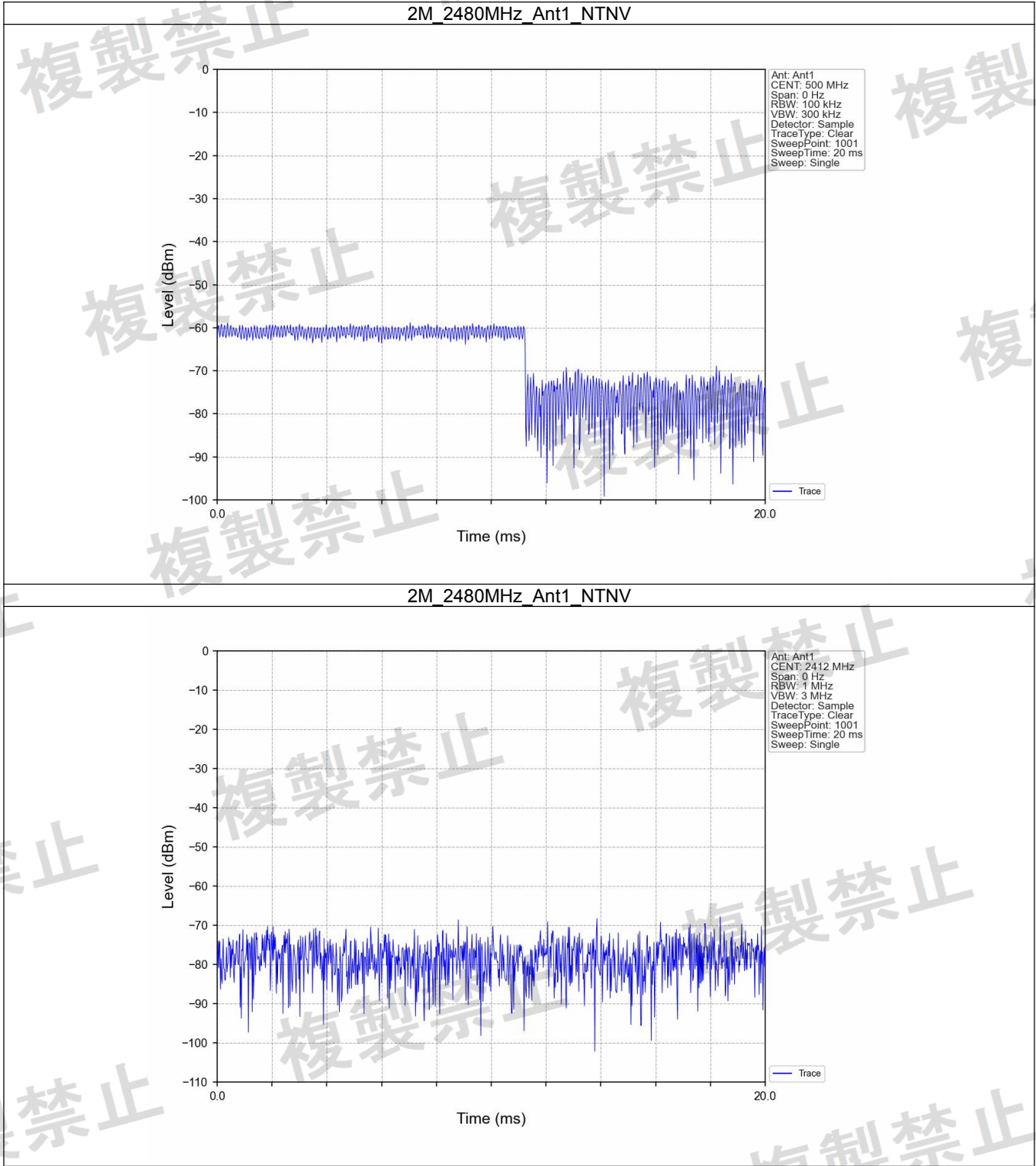




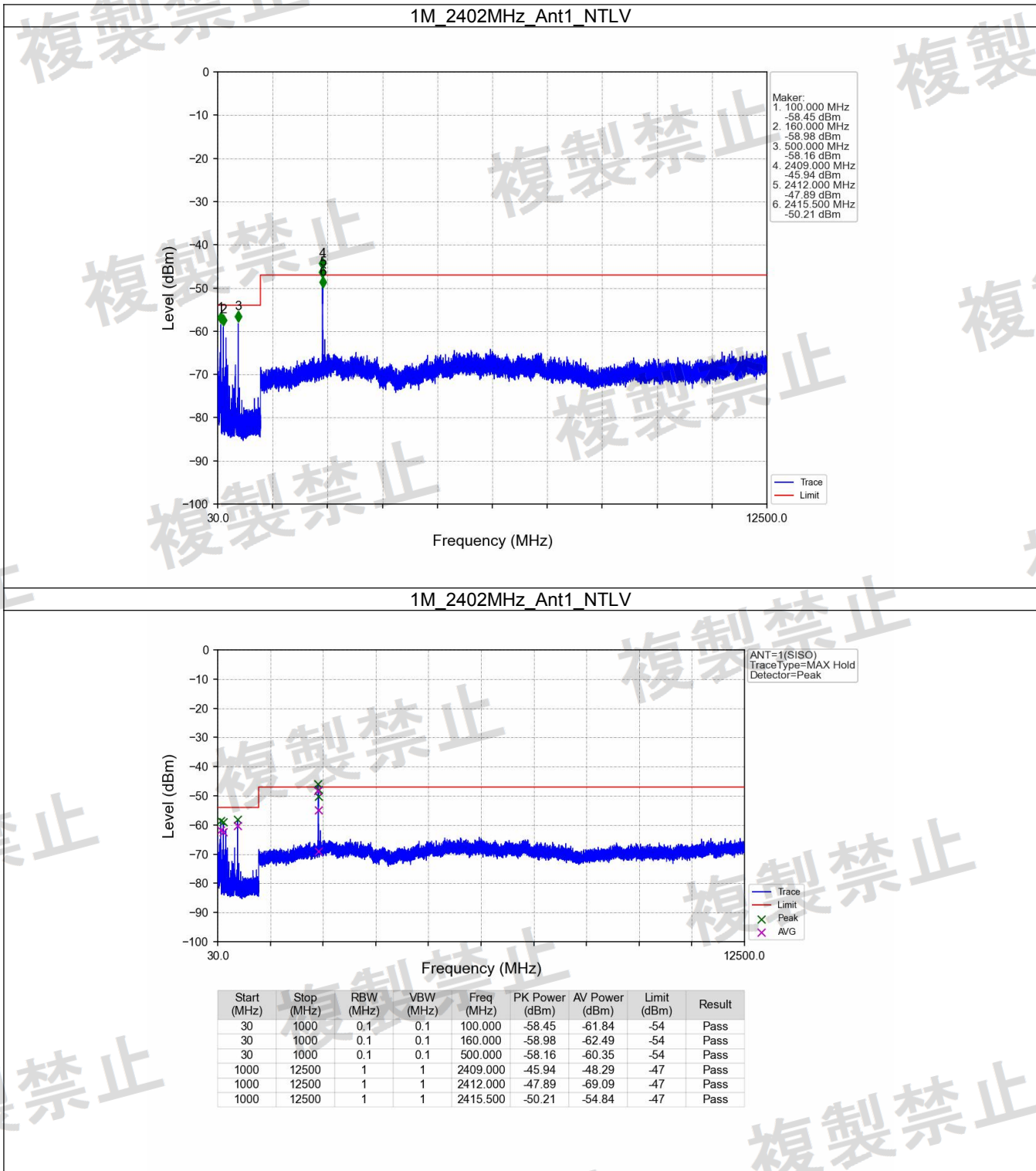


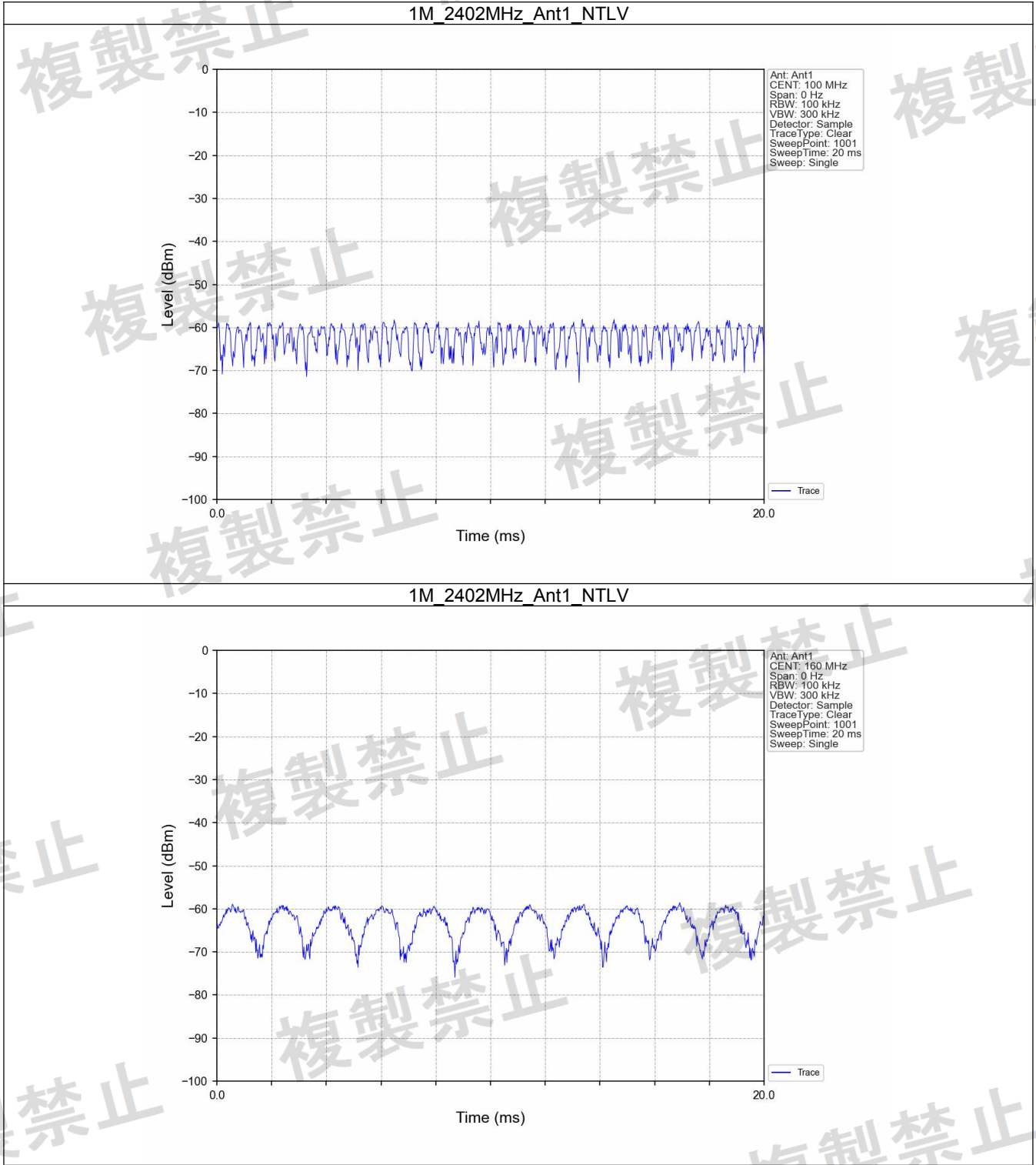


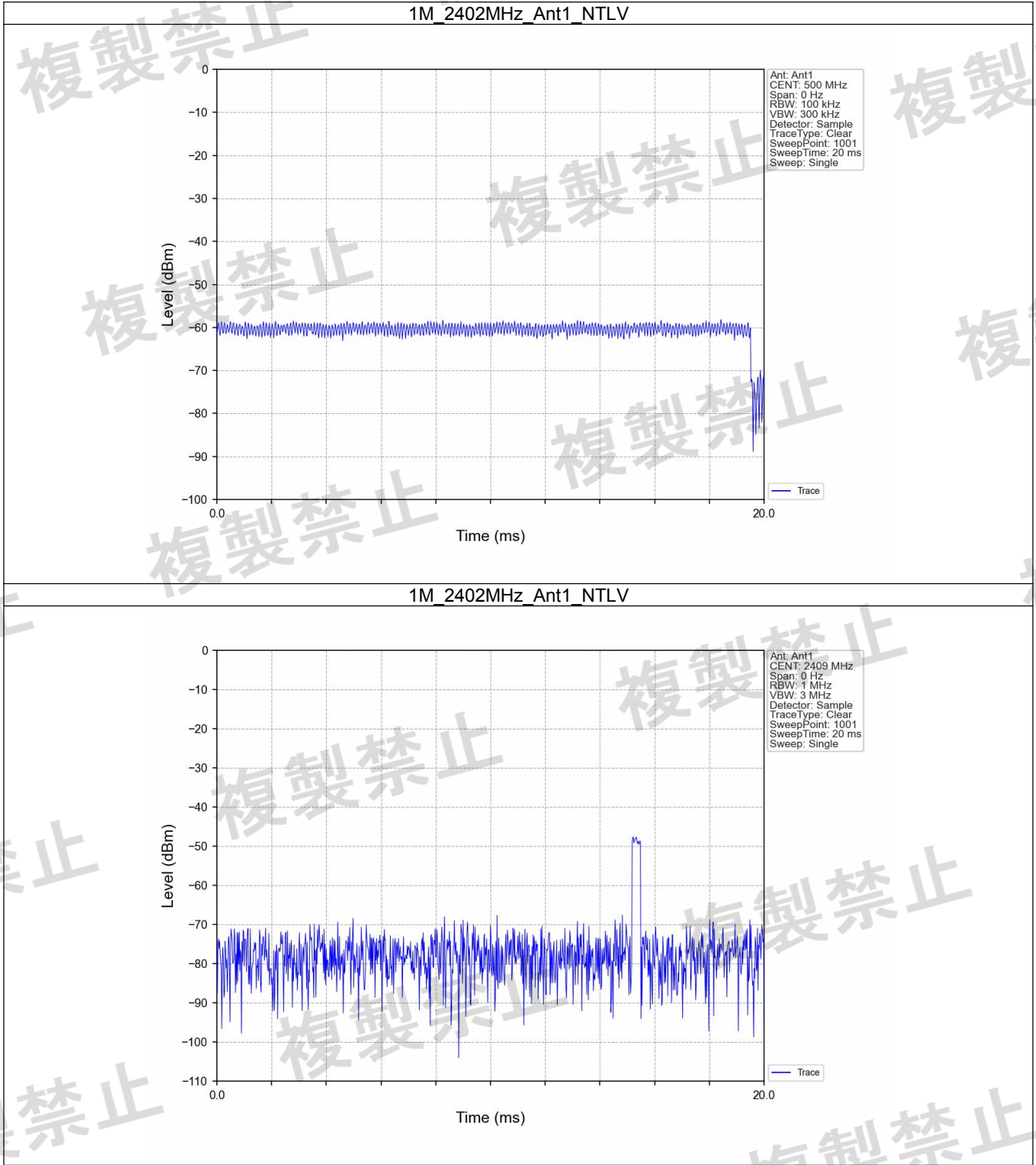


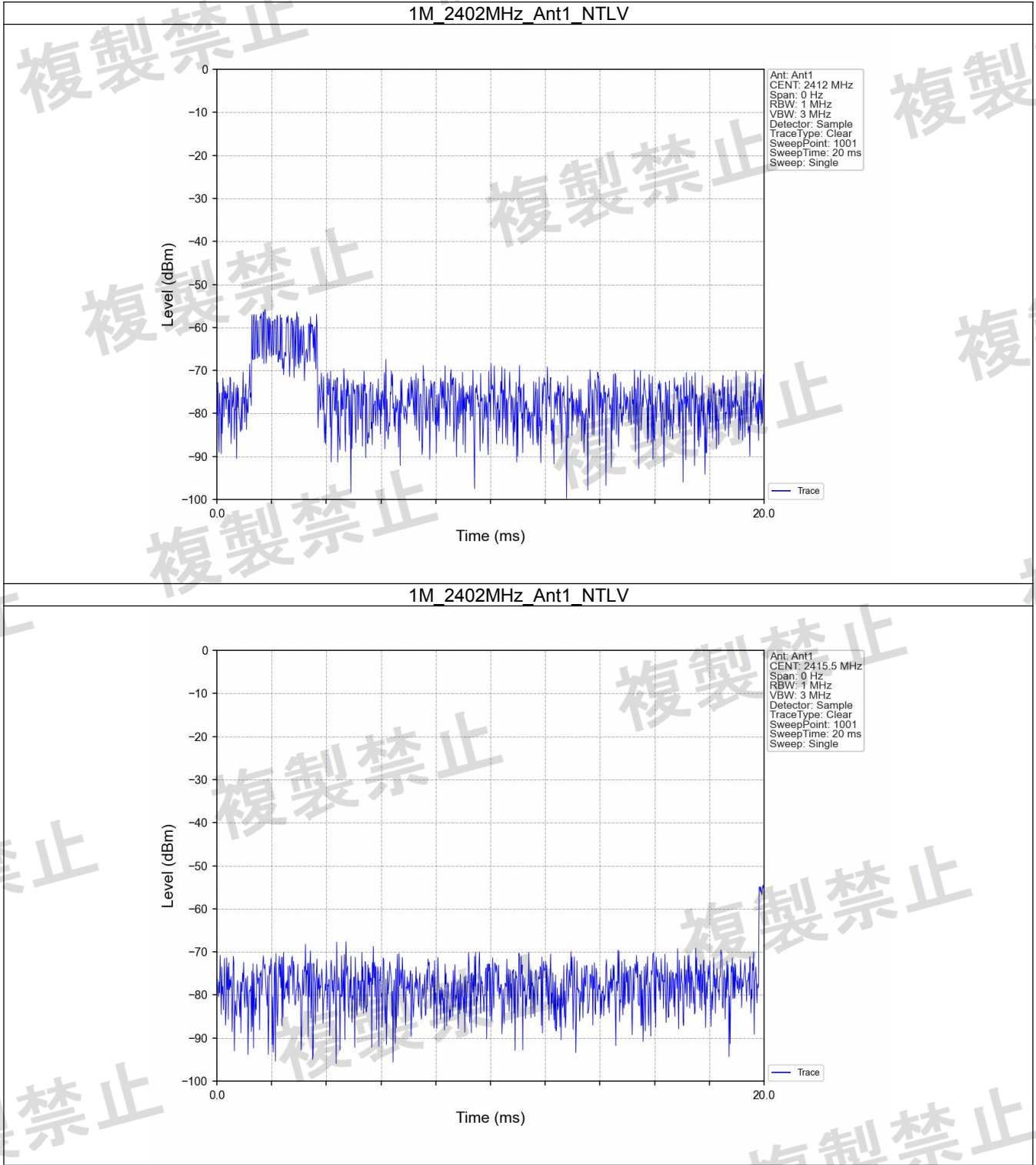


5.2.2 RxSe_NTLV

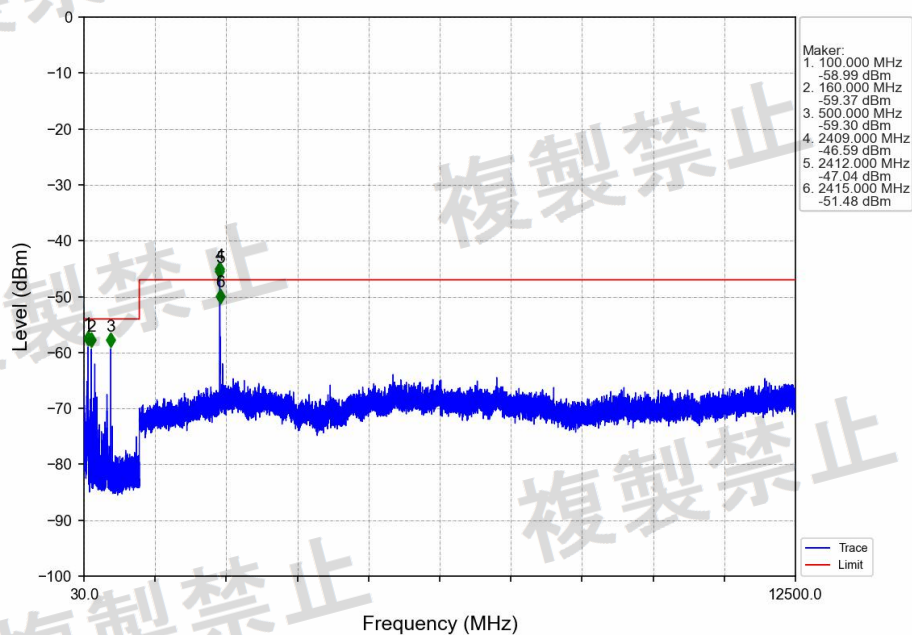




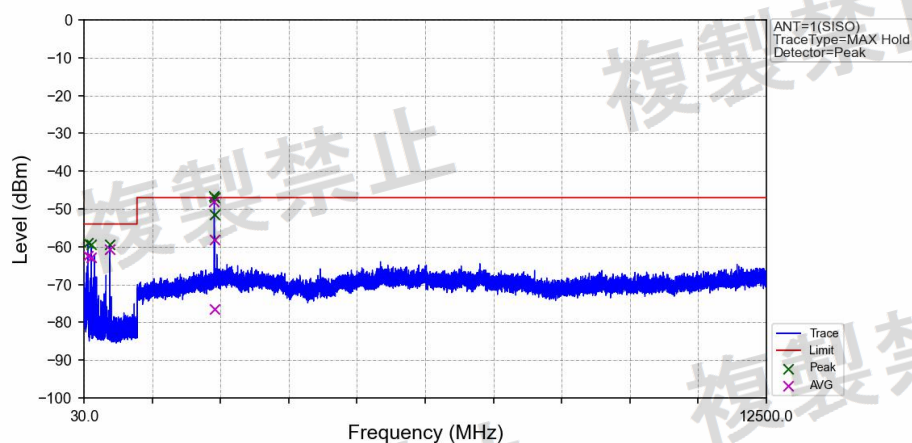




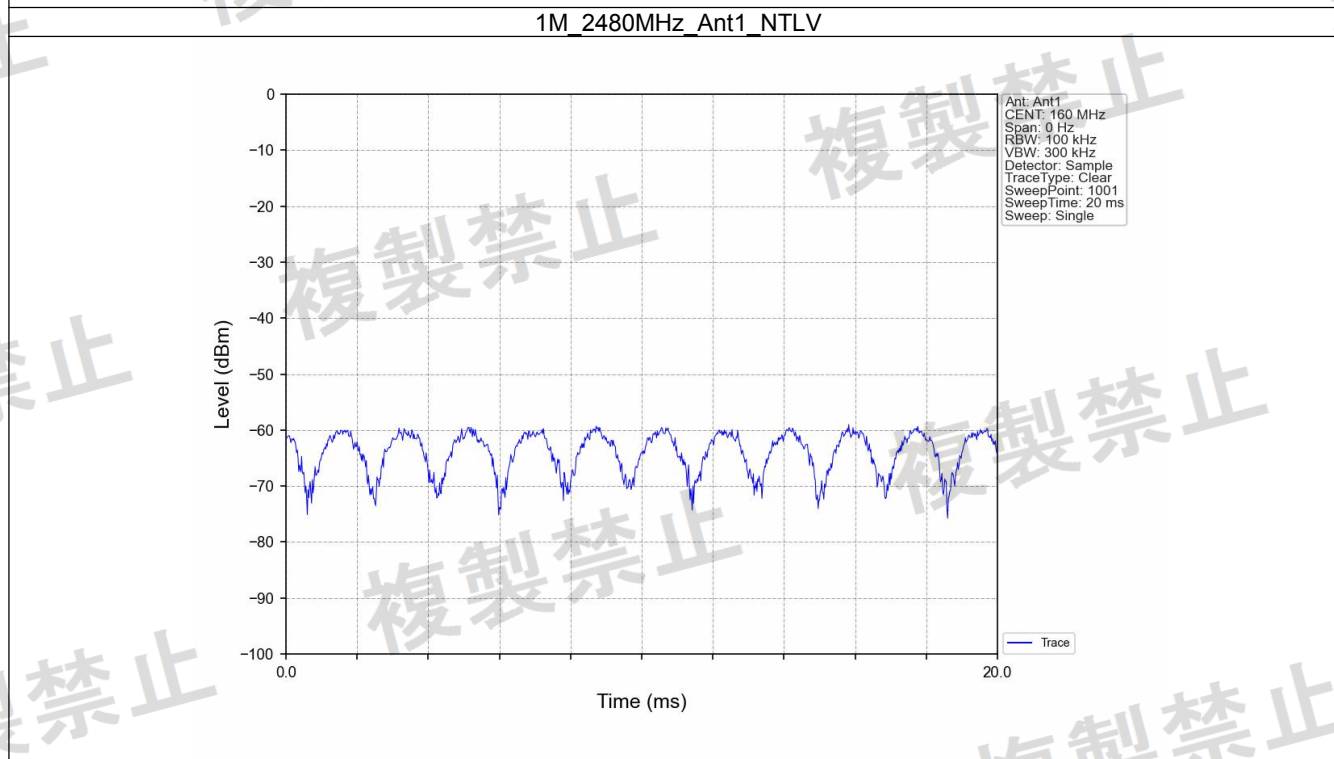
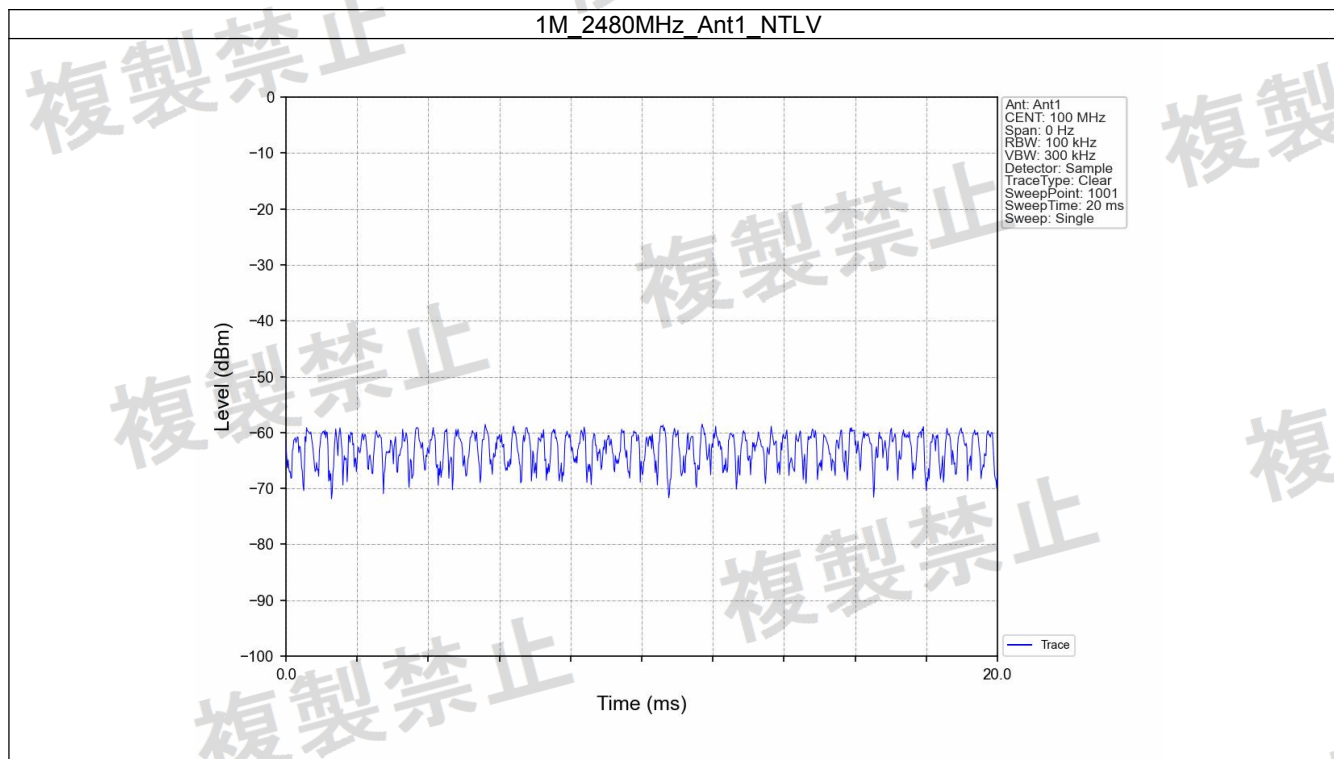
1M_2480MHz_Ant1_NTLV

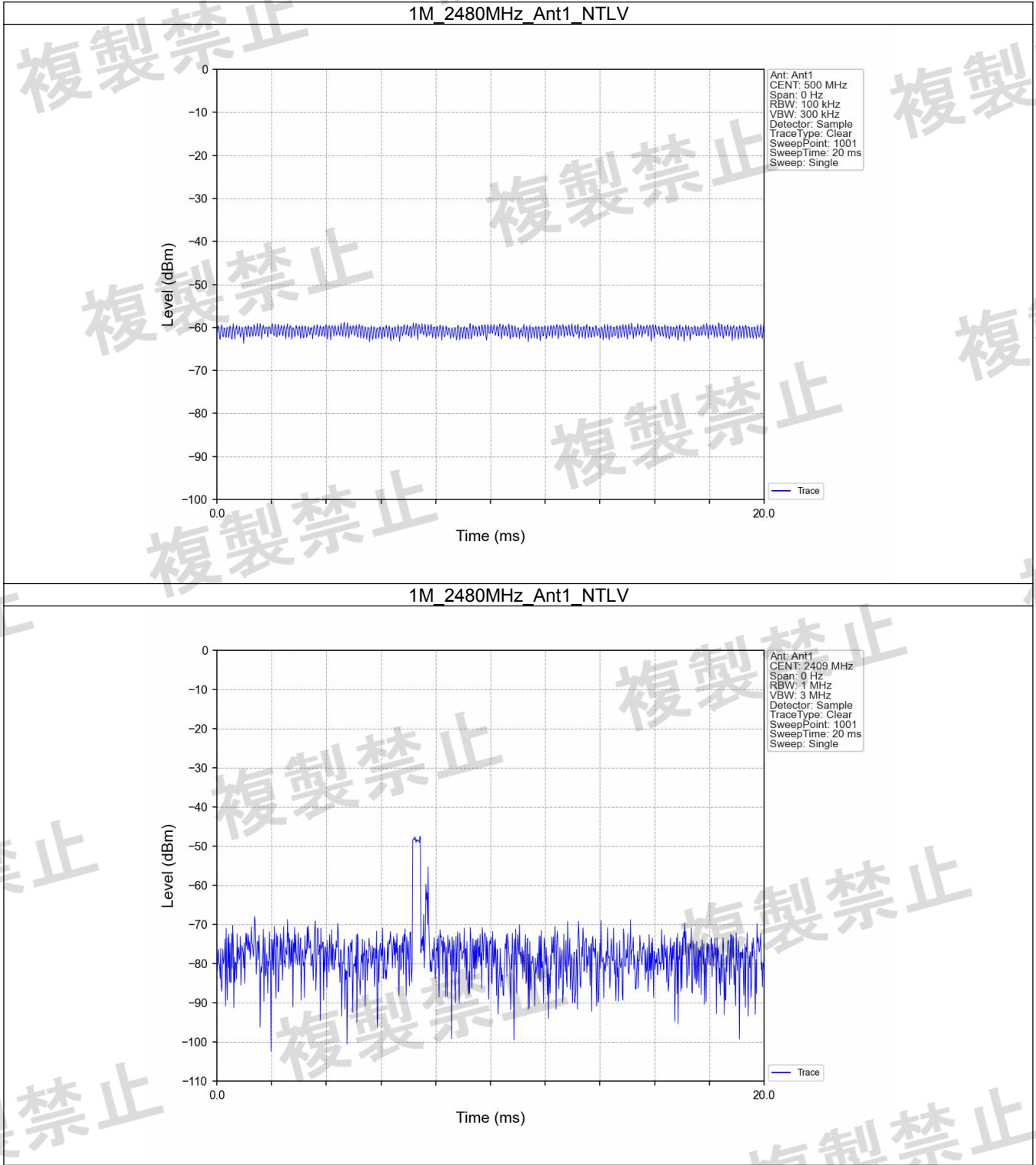


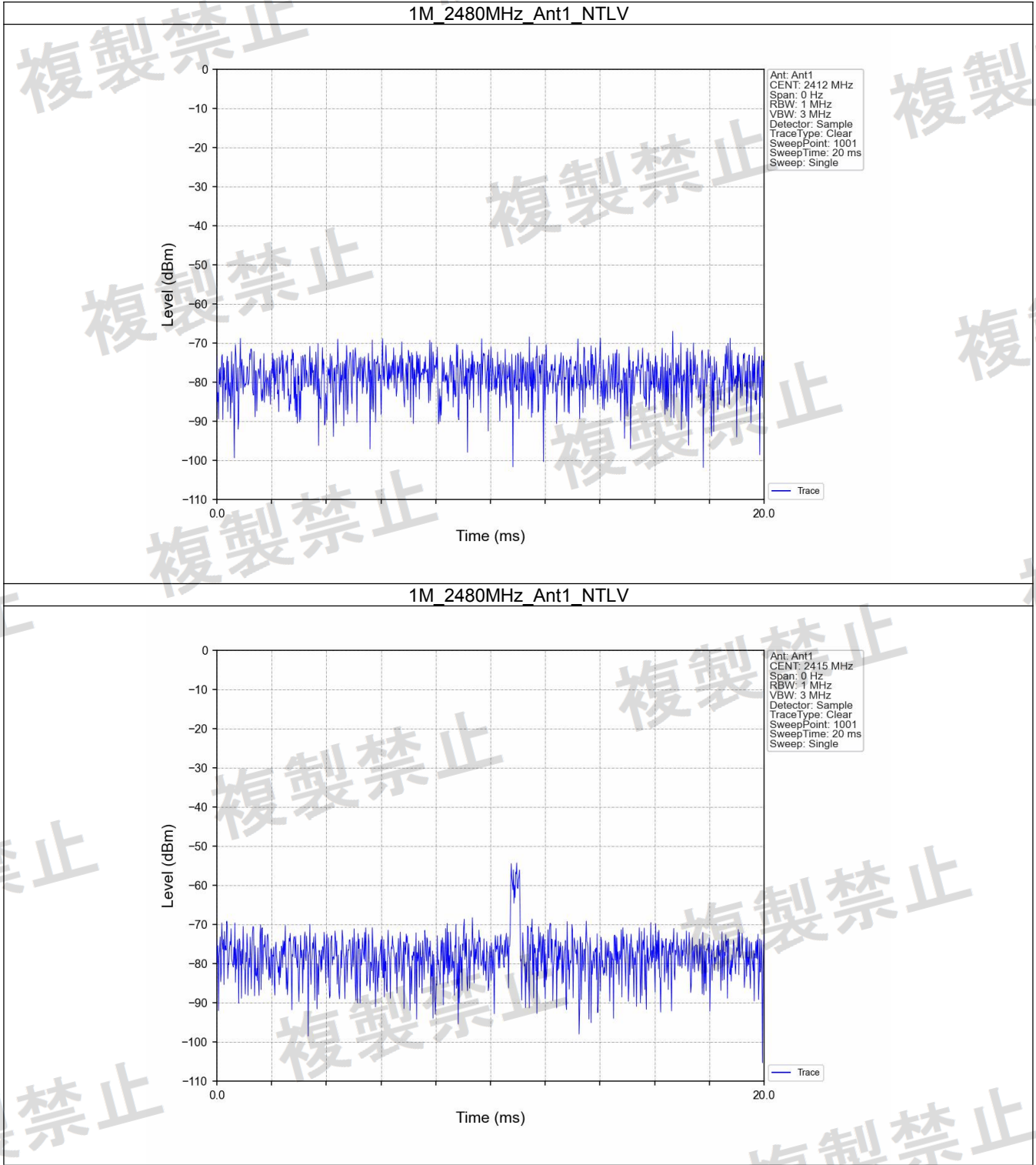
1M_2480MHz_Ant1_NTLV

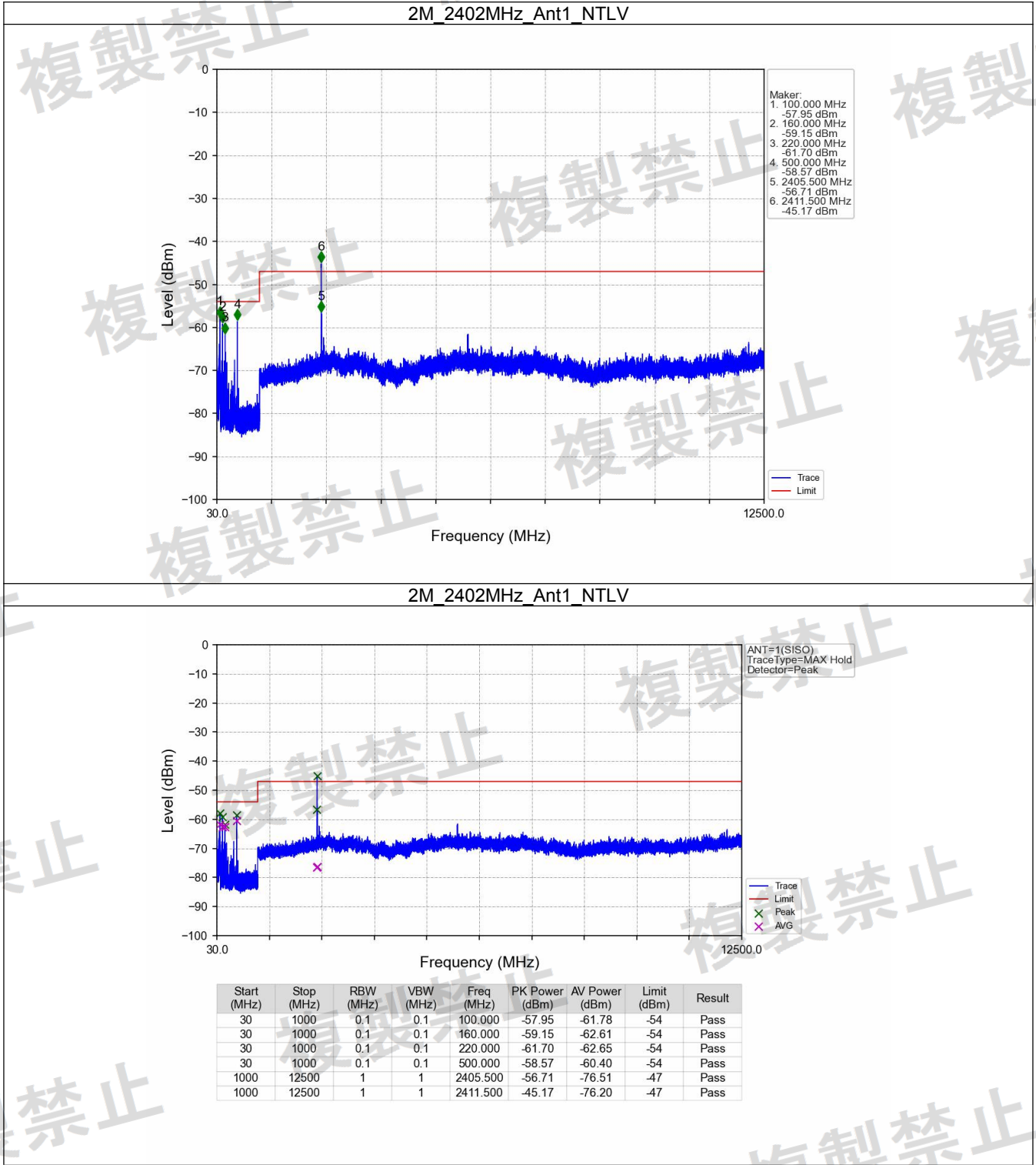


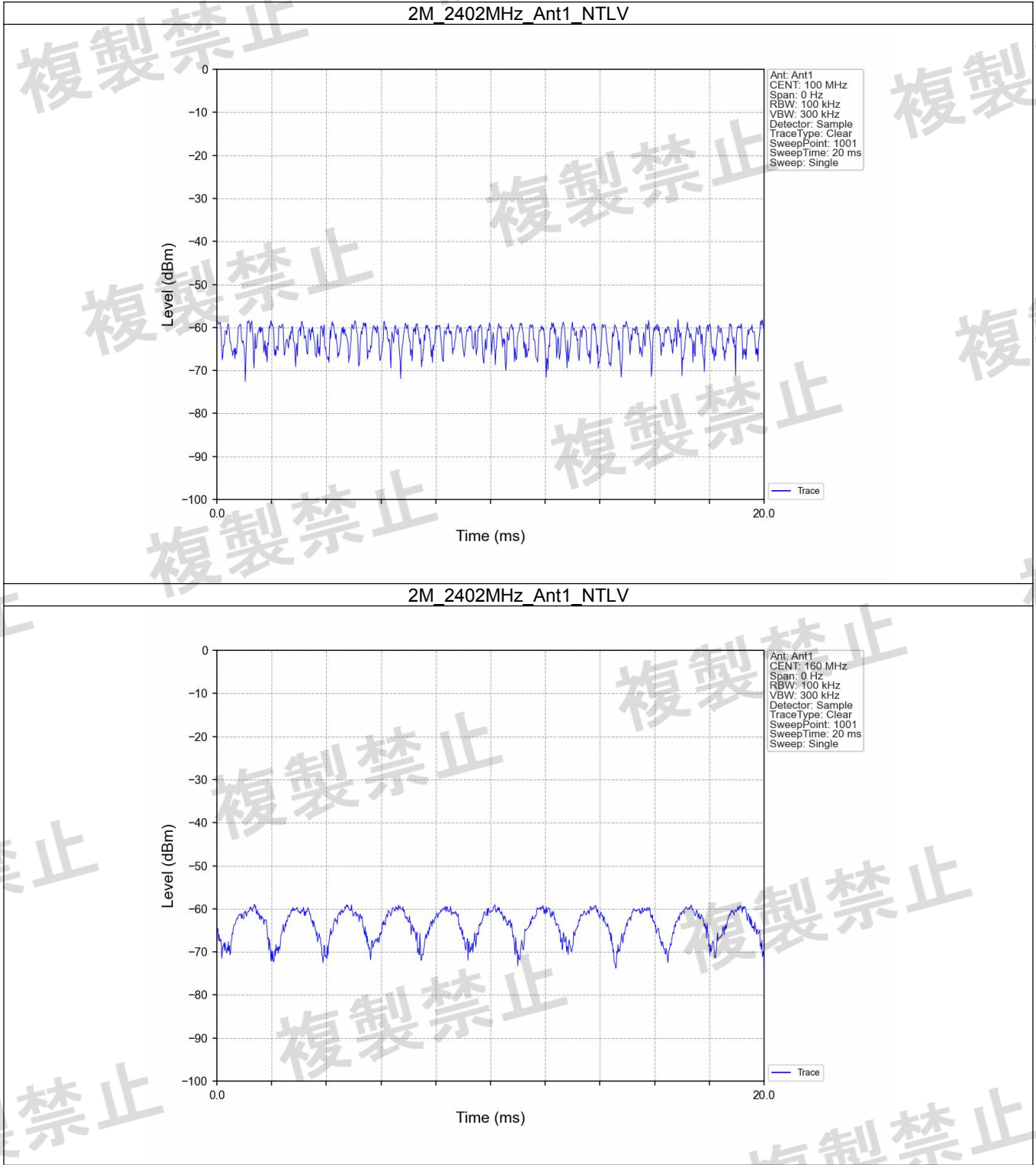
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.1	100.000	-58.99	-62.34	-54	Pass
30	1000	0.1	0.1	160.000	-59.37	-62.91	-54	Pass
30	1000	0.1	0.1	500.000	-59.30	-60.71	-54	Pass
1000	12500	1	1	2409.000	-46.59	-48.01	-47	Pass
1000	12500	1	1	2412.000	-47.04	-76.53	-47	Pass
1000	12500	1	1	2415.000	-51.48	-58.17	-47	Pass

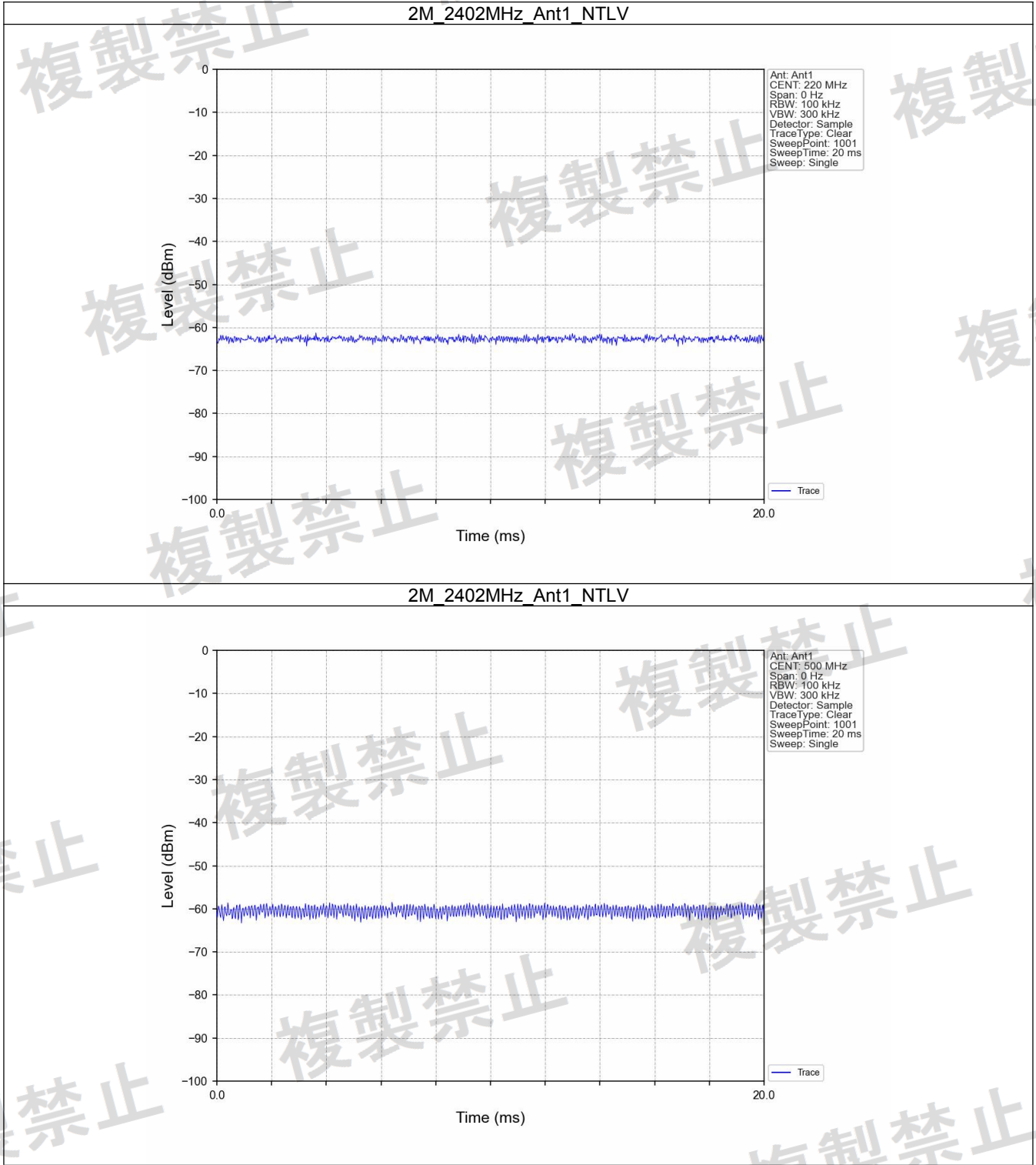


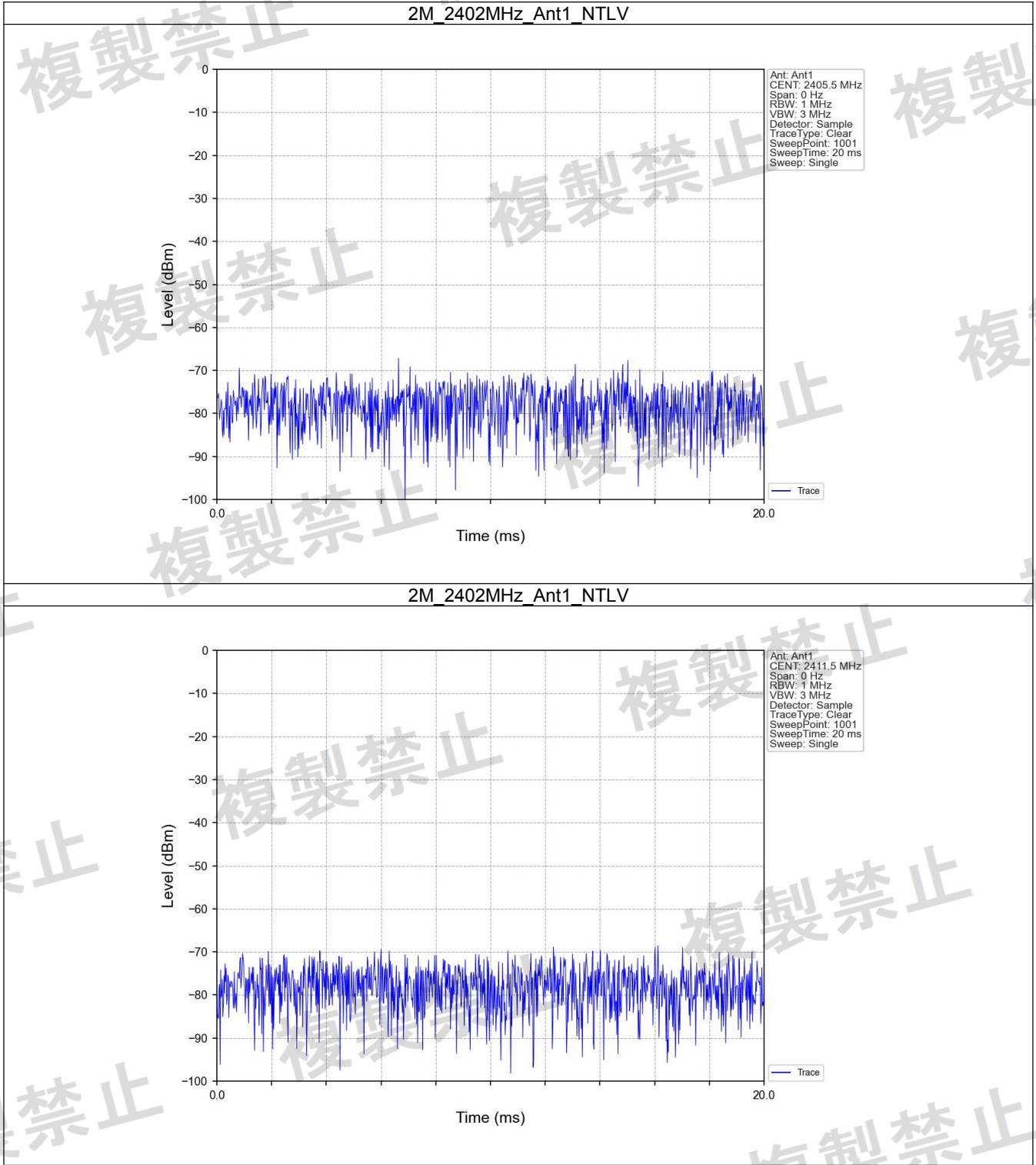


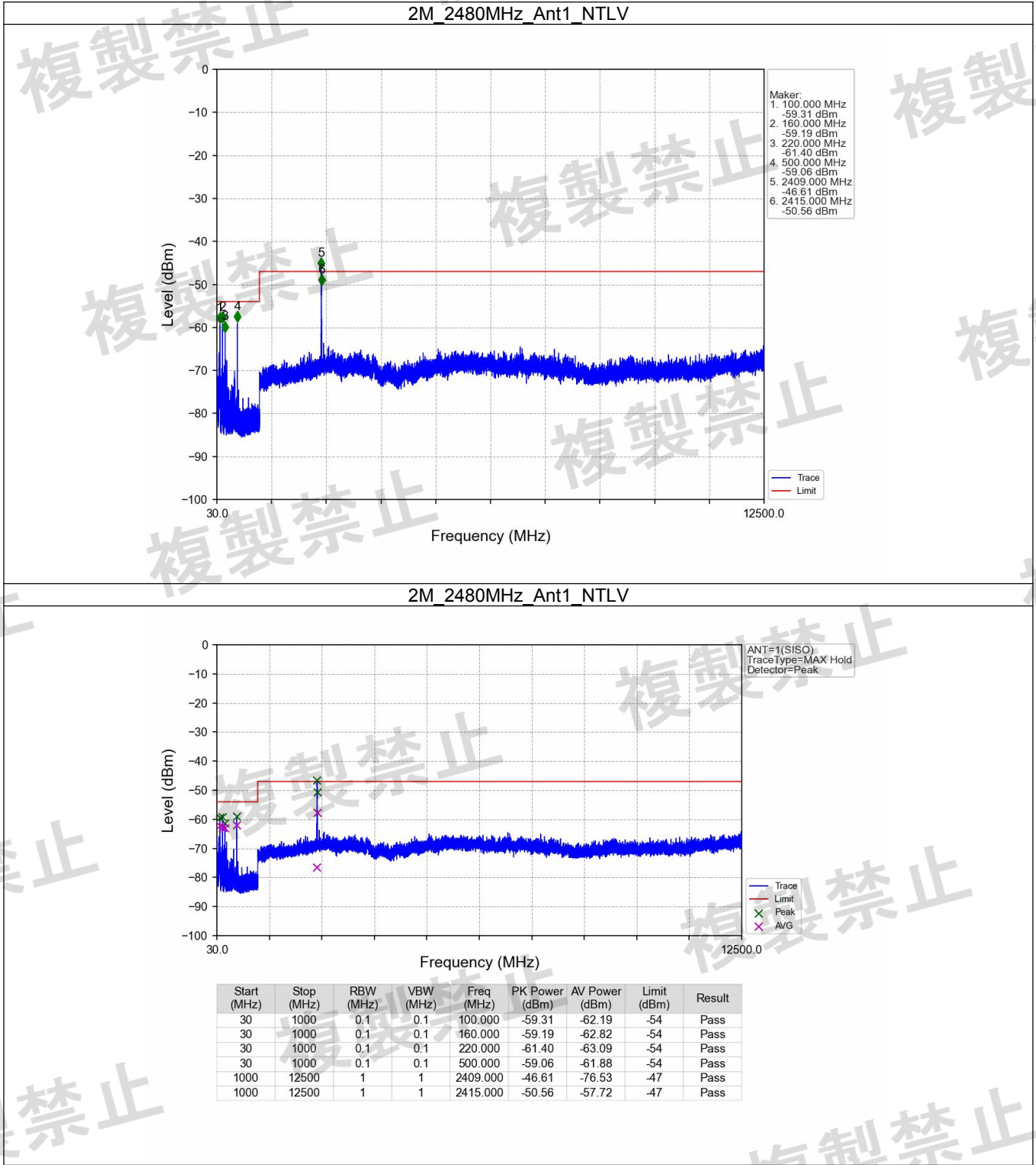




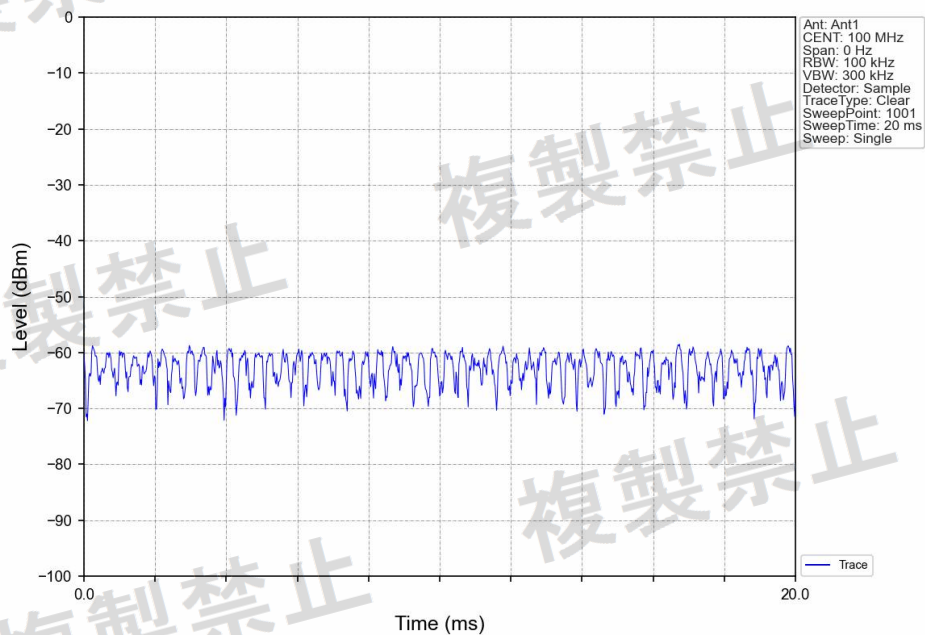




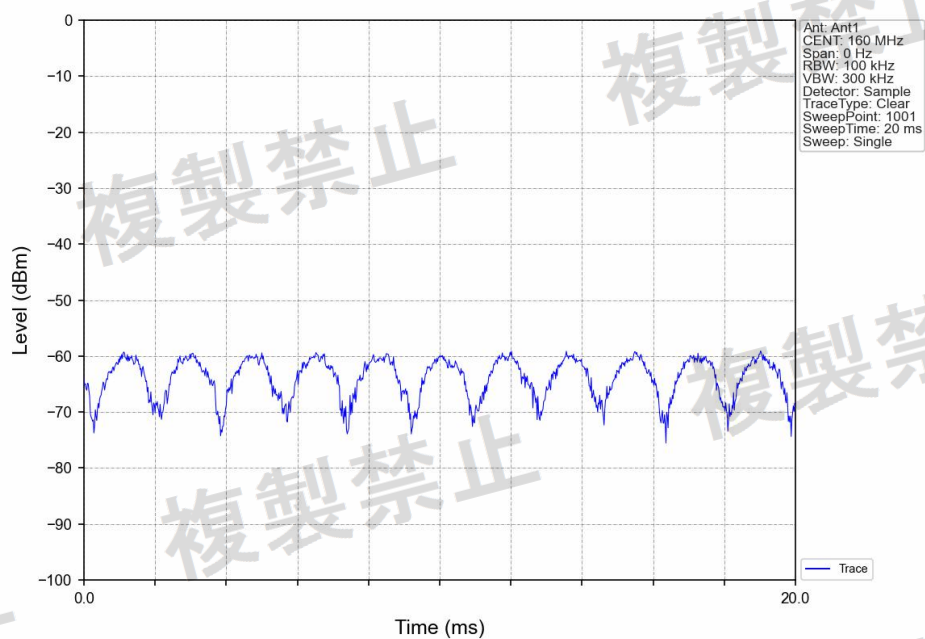


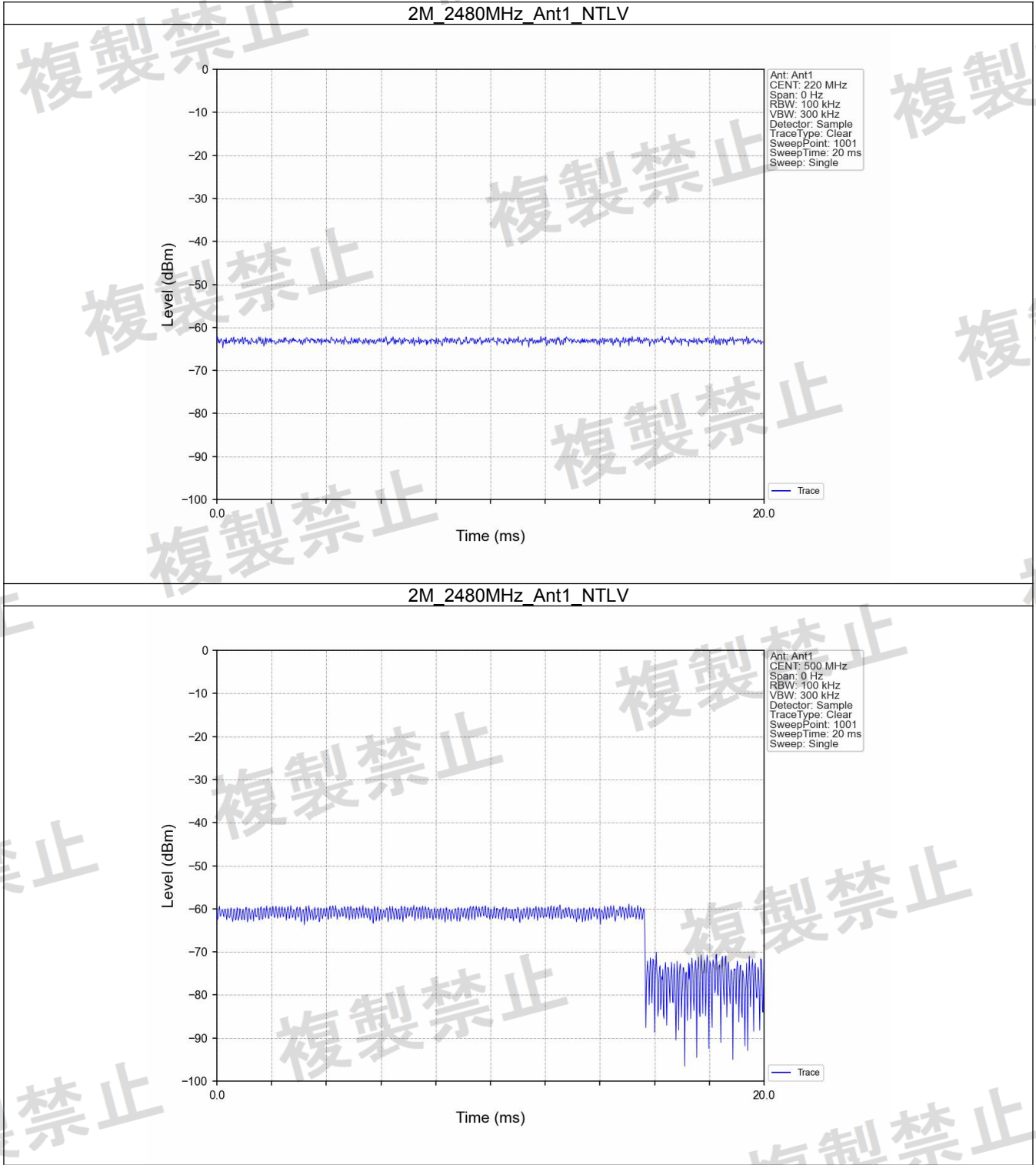


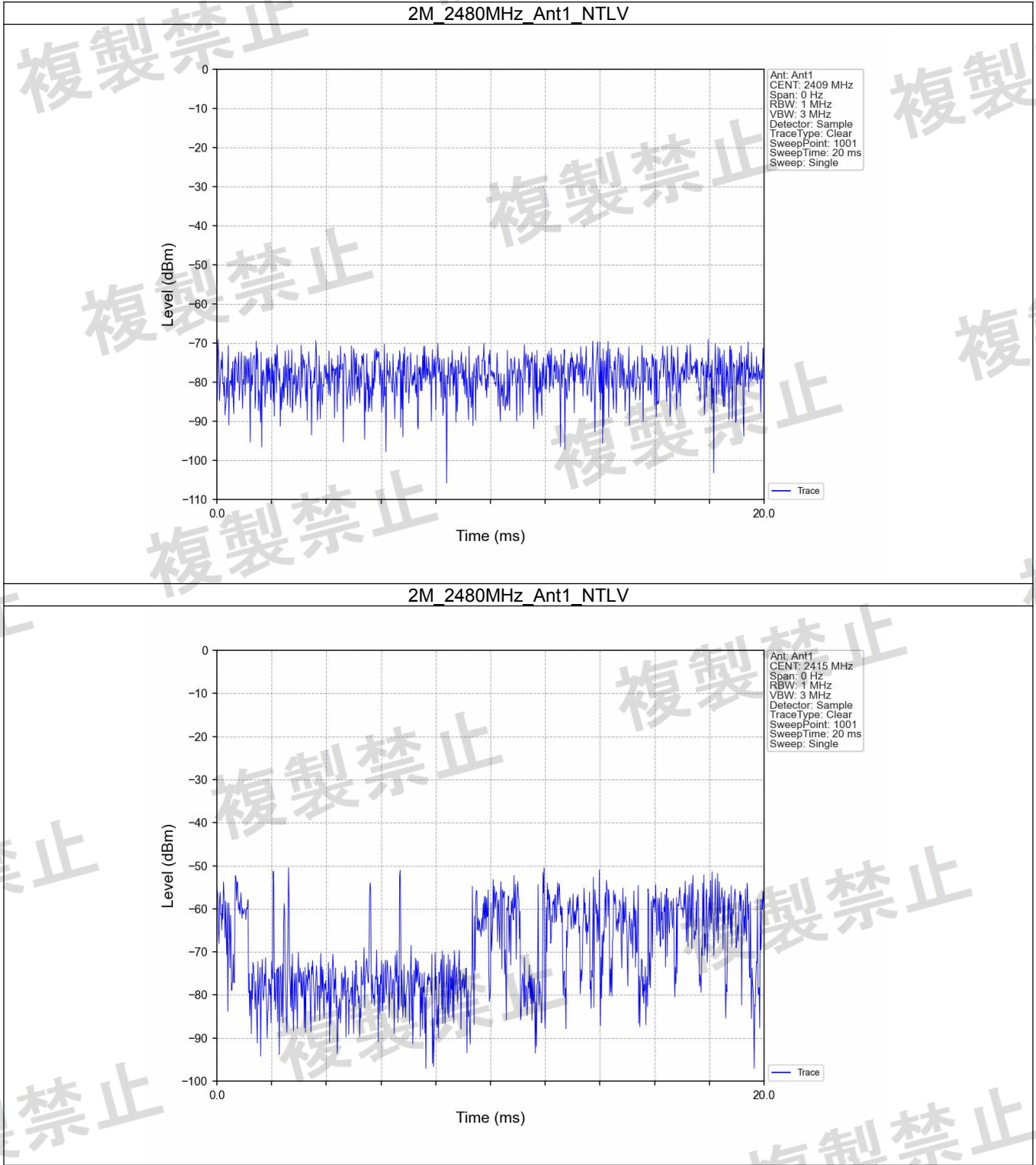
2M_2480MHz_Ant1_NTLV



2M_2480MHz_Ant1_NTLV







5.2.3 RxSe_NTHV

