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Annex for Bluetooth Low Energy

Test Report No.: CTL2601202046-MIC01

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1. Frequency Error

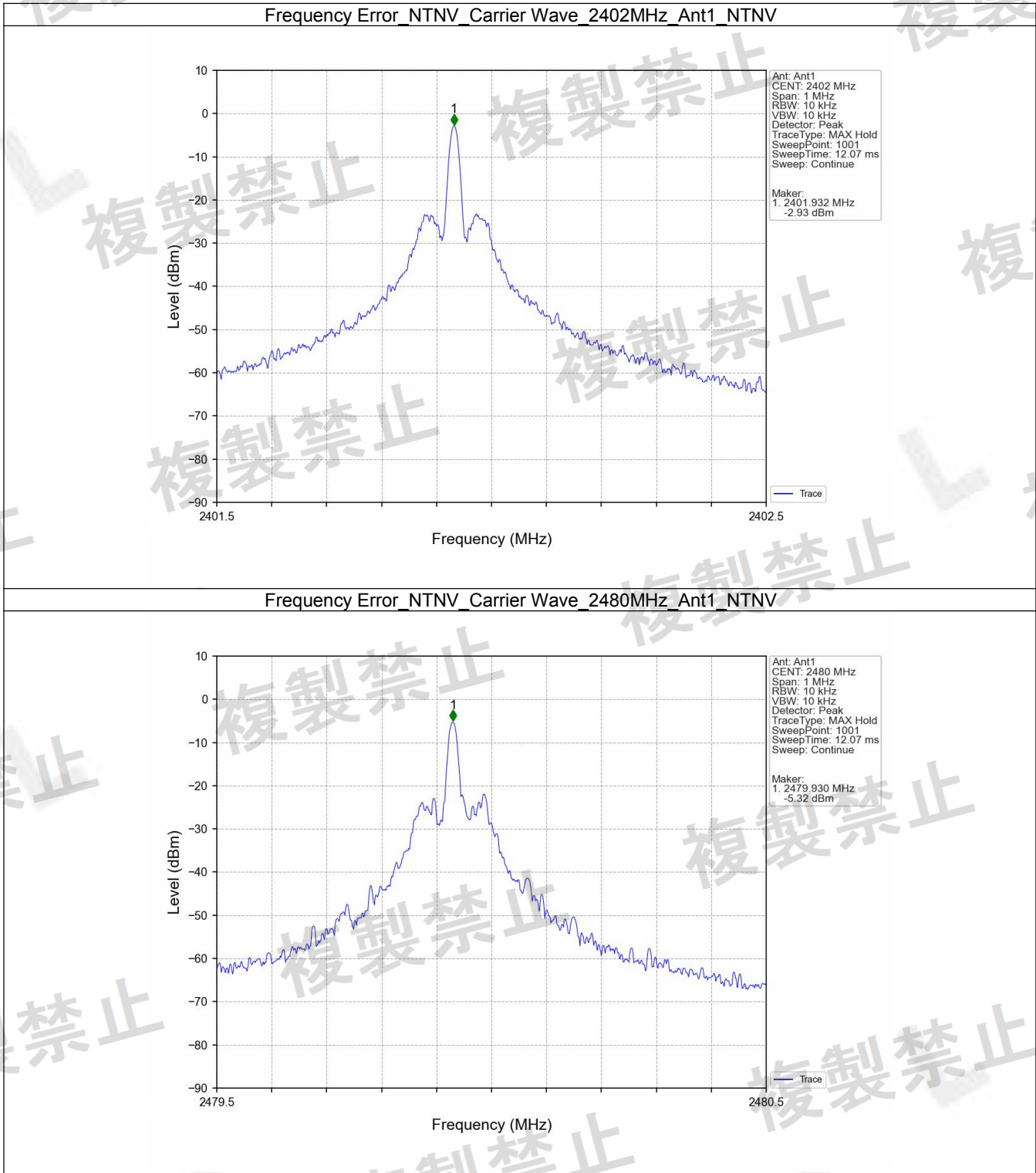
1.1 Test Result

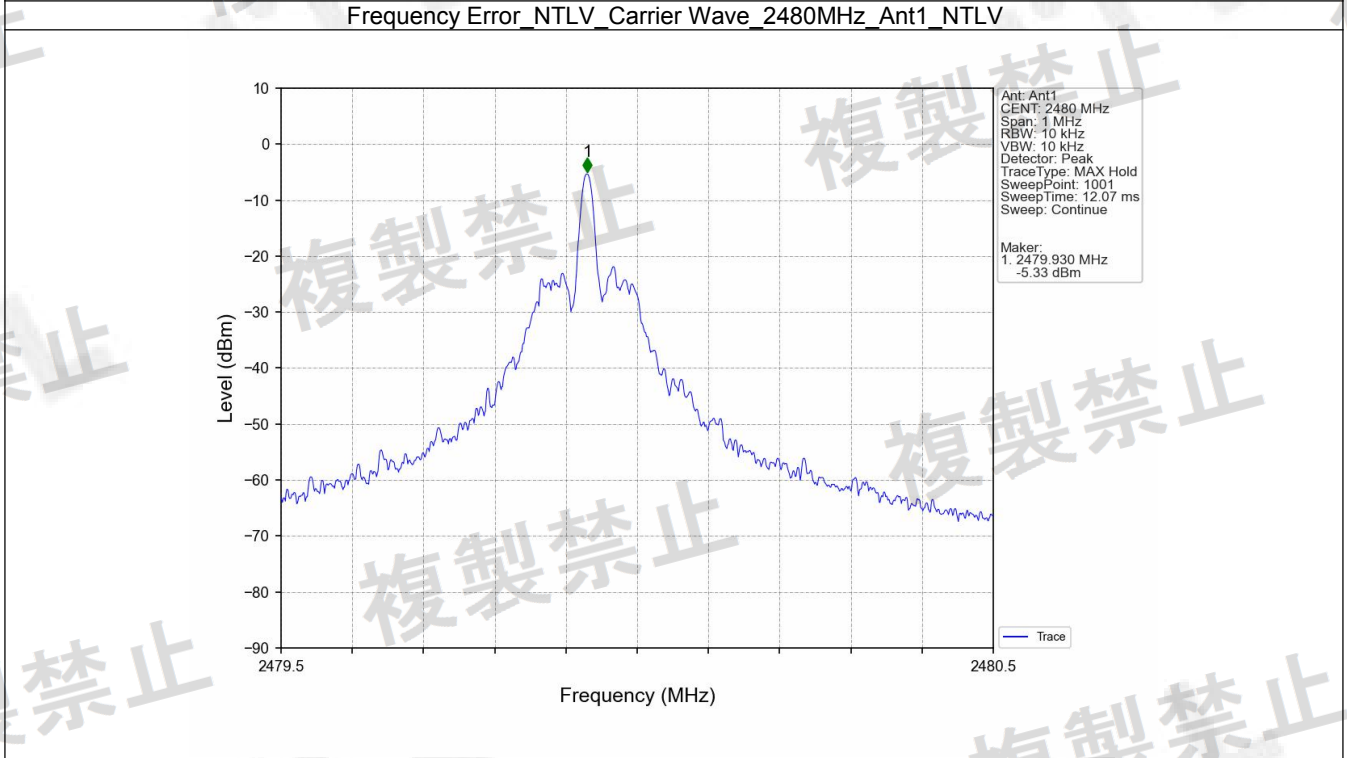
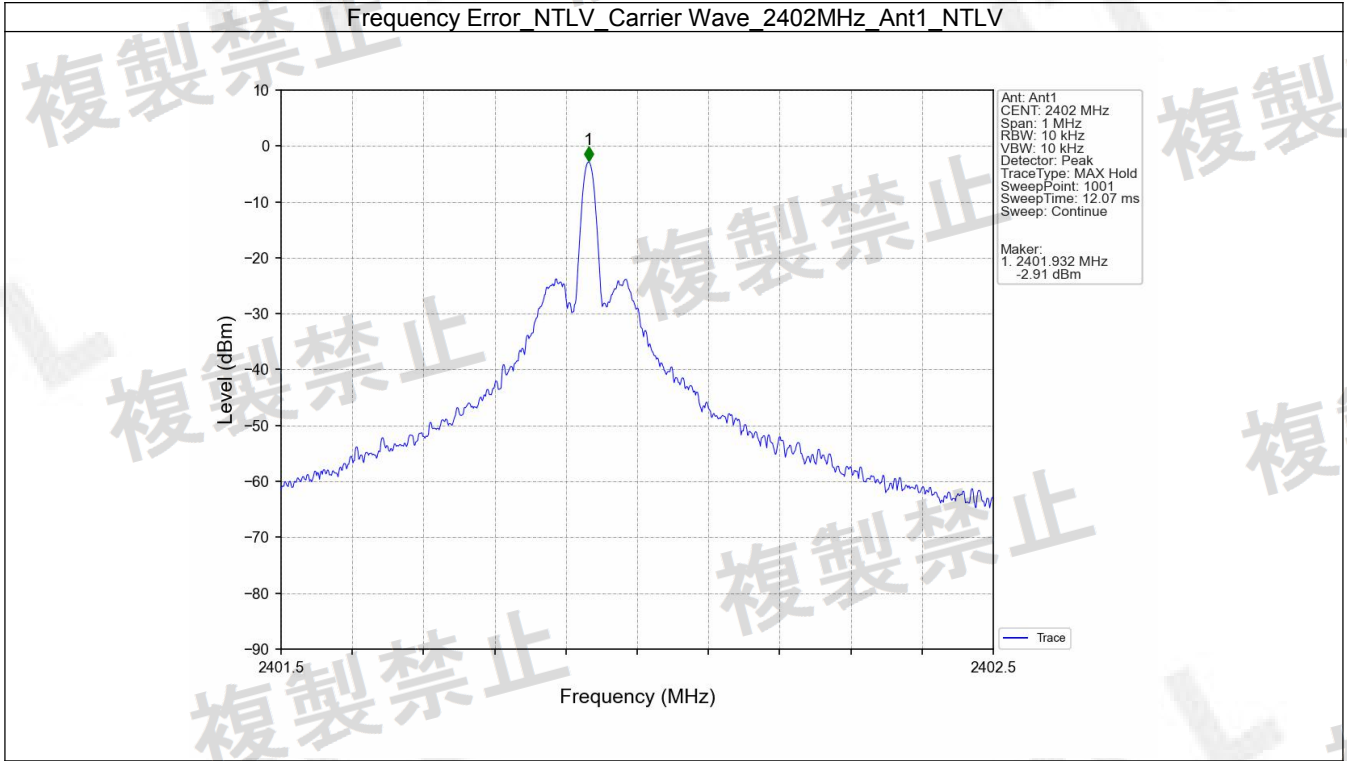
1.1.1 Ant1

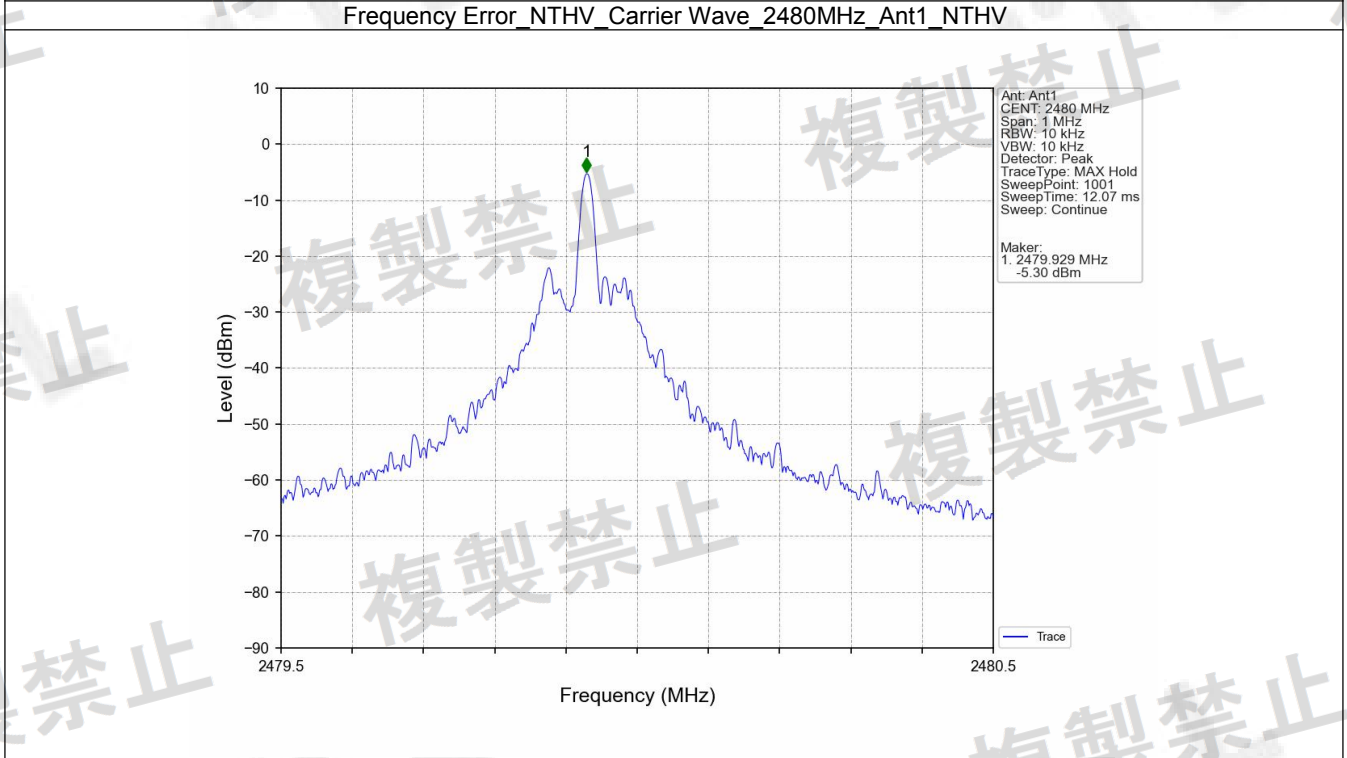
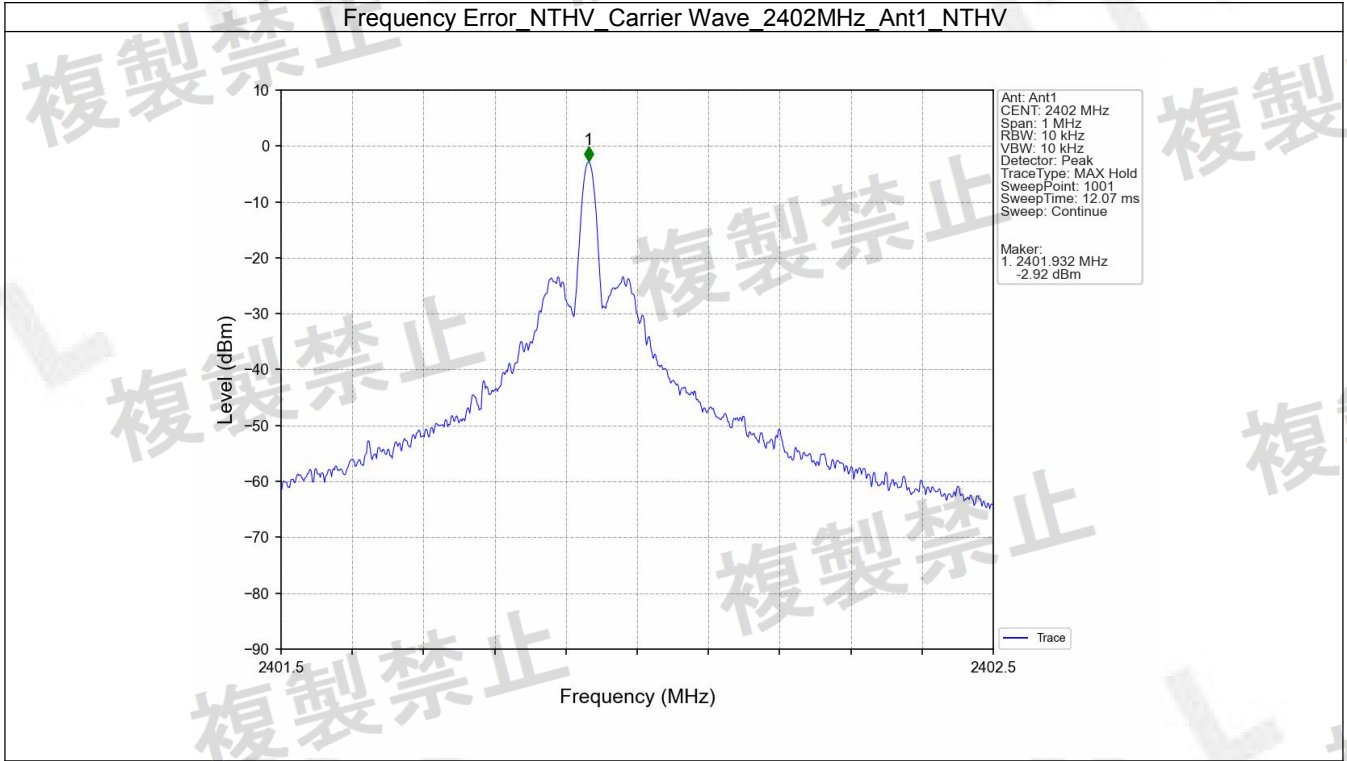
Ant1							
ENV	Mode	TX Type	Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)		Verdict
					Result	Limit	
NTNV	Carrier Wave	SISO	2402	2401.932	-28.31	-50 to 50	Pass
			2480	2479.930	-28.23	-50 to 50	Pass
NTLV	Carrier Wave	SISO	2402	2401.932	-28.31	-50 to 50	Pass
			2480	2479.930	-28.23	-50 to 50	Pass
NTHV	Carrier Wave	SISO	2402	2401.932	-28.31	-50 to 50	Pass
			2480	2479.929	-28.63	-50 to 50	Pass

1.2 Test Graph

1.2.1 Ant1







2. Occupied Bandwidth

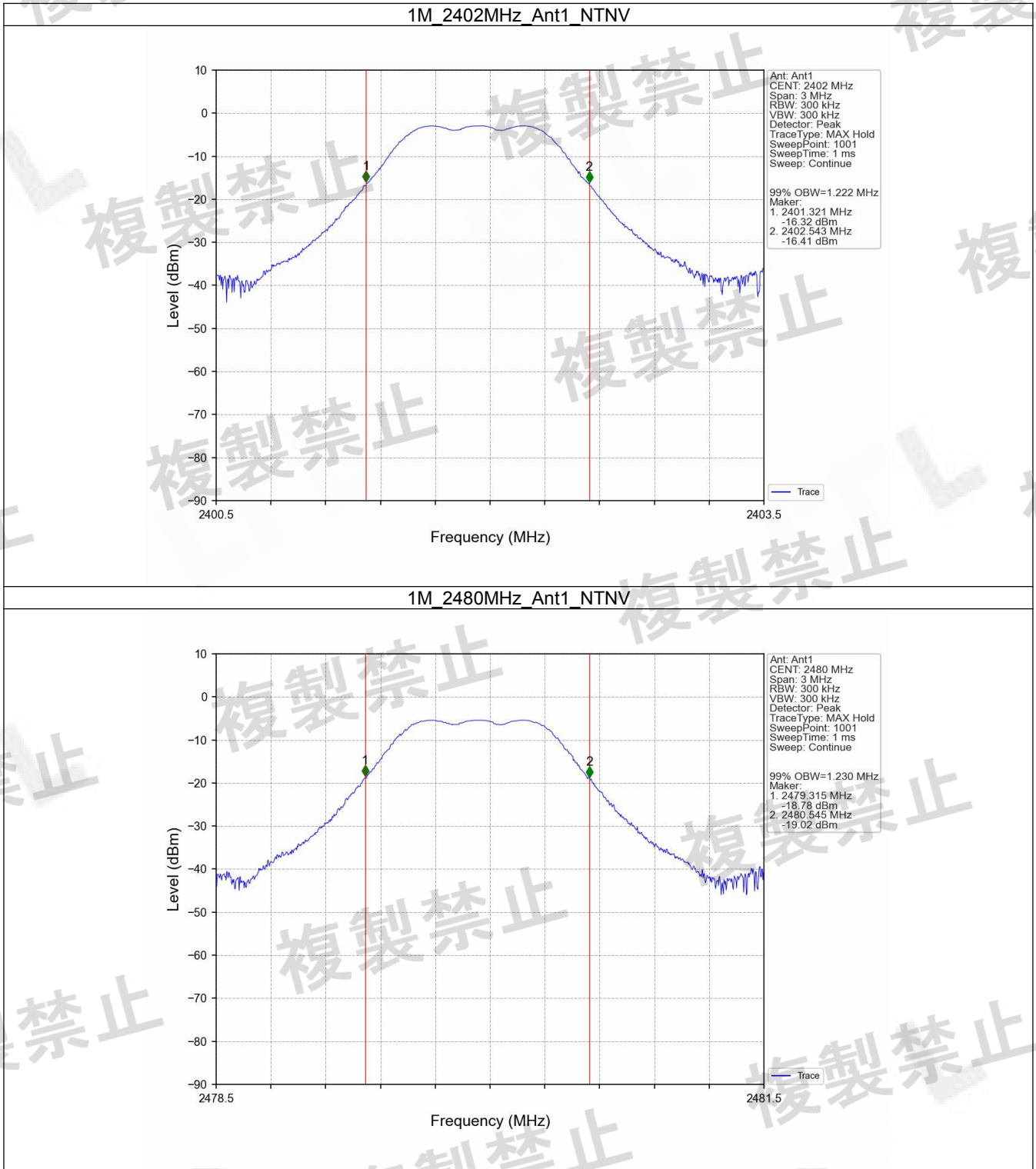
2.1 Test Result

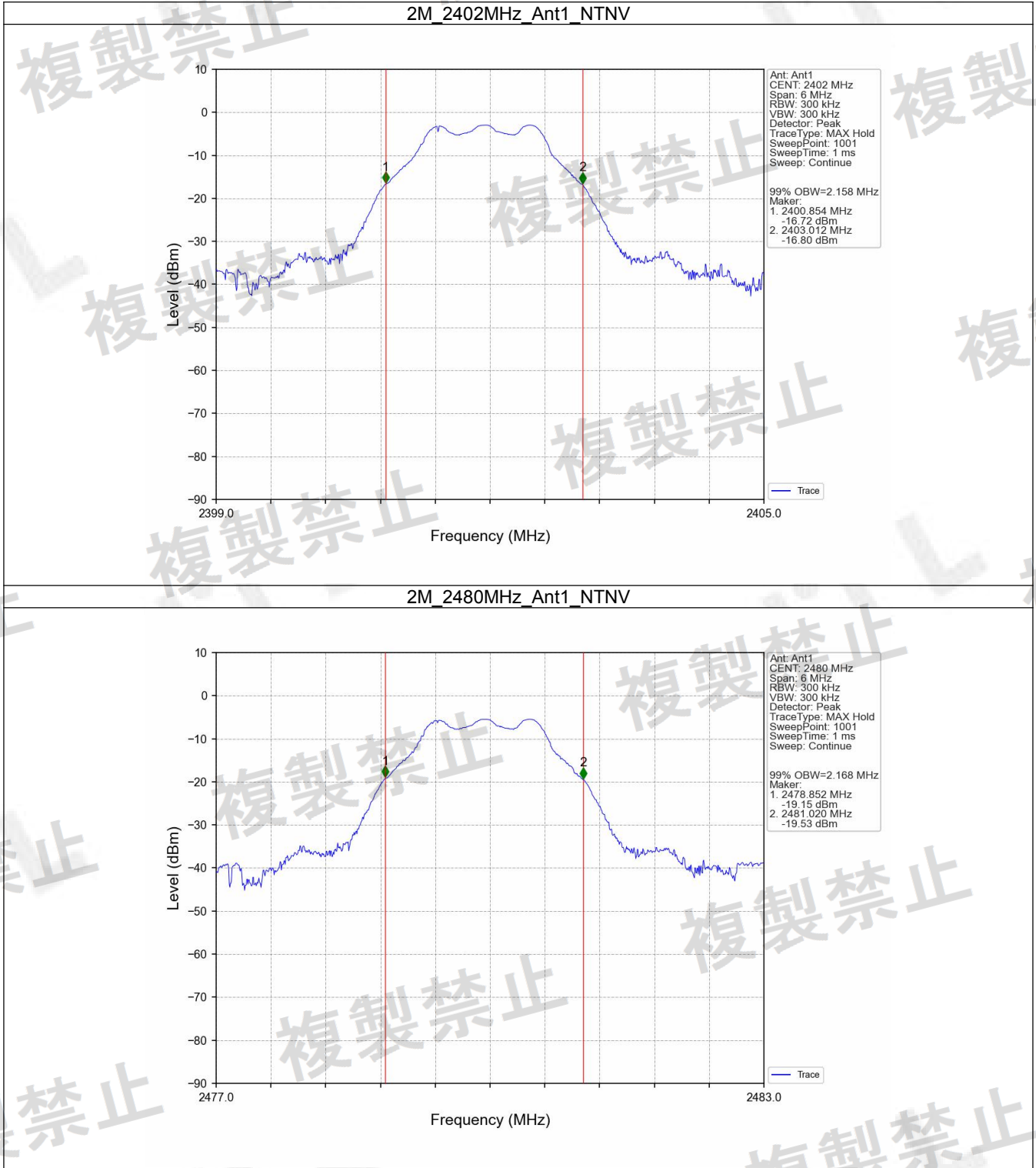
2.1.1 OBW

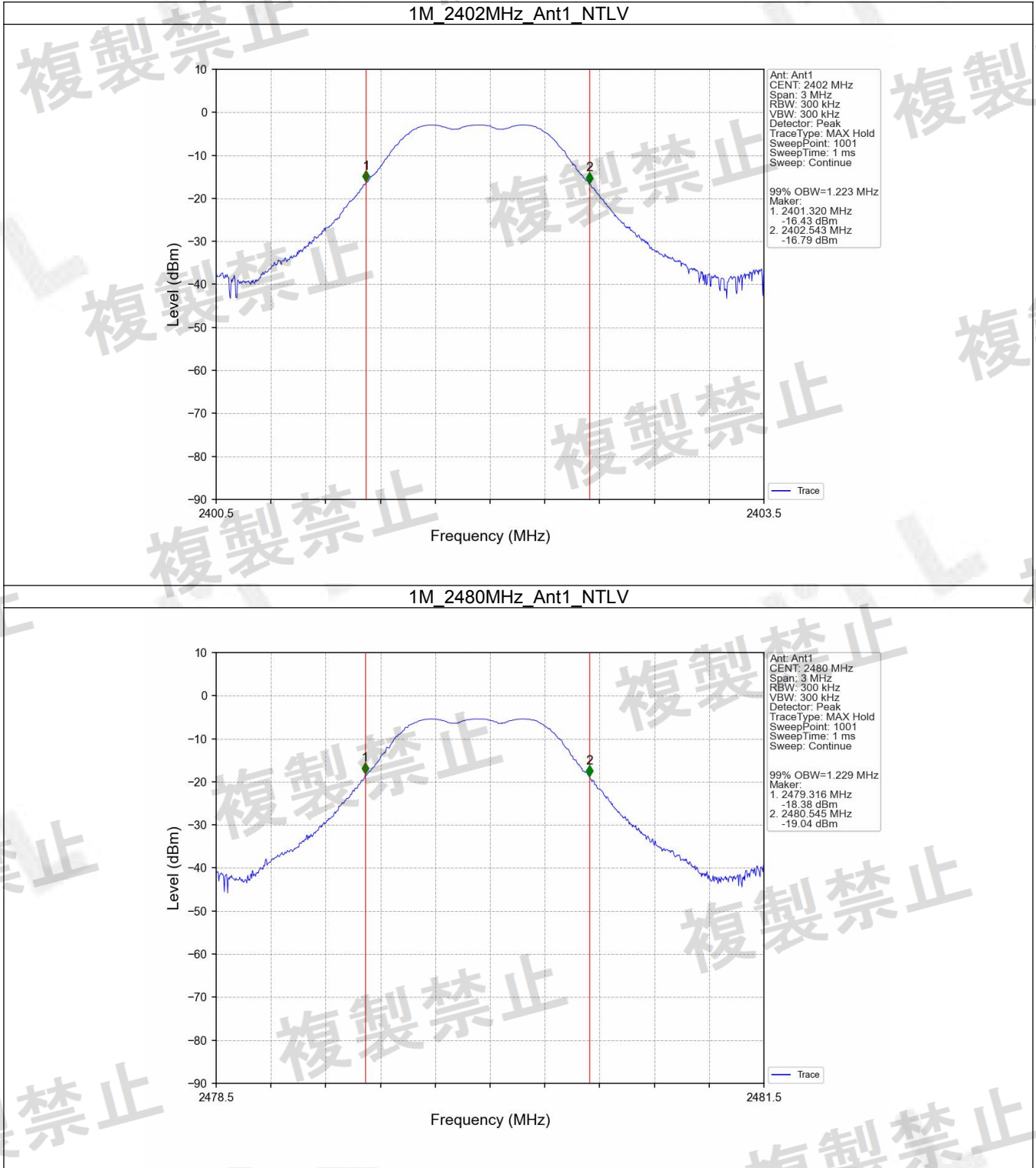
ENV	Mode	TX Type	Frequency (MHz)	99% Occupied Bandwidth (MHz)		Verdict
				ANT1	Limit	
NTNV	1M	SISO	2402	1.222	<=26	Pass
			2480	1.230	<=26	Pass
	2M	SISO	2402	2.158	<=26	Pass
			2480	2.168	<=26	Pass
NTLV	1M	SISO	2402	1.223	<=26	Pass
			2480	1.229	<=26	Pass
	2M	SISO	2402	2.158	<=26	Pass
			2480	2.167	<=26	Pass
NTHV	1M	SISO	2402	1.223	<=26	Pass
			2480	1.228	<=26	Pass
	2M	SISO	2402	2.159	<=26	Pass
			2480	2.162	<=26	Pass

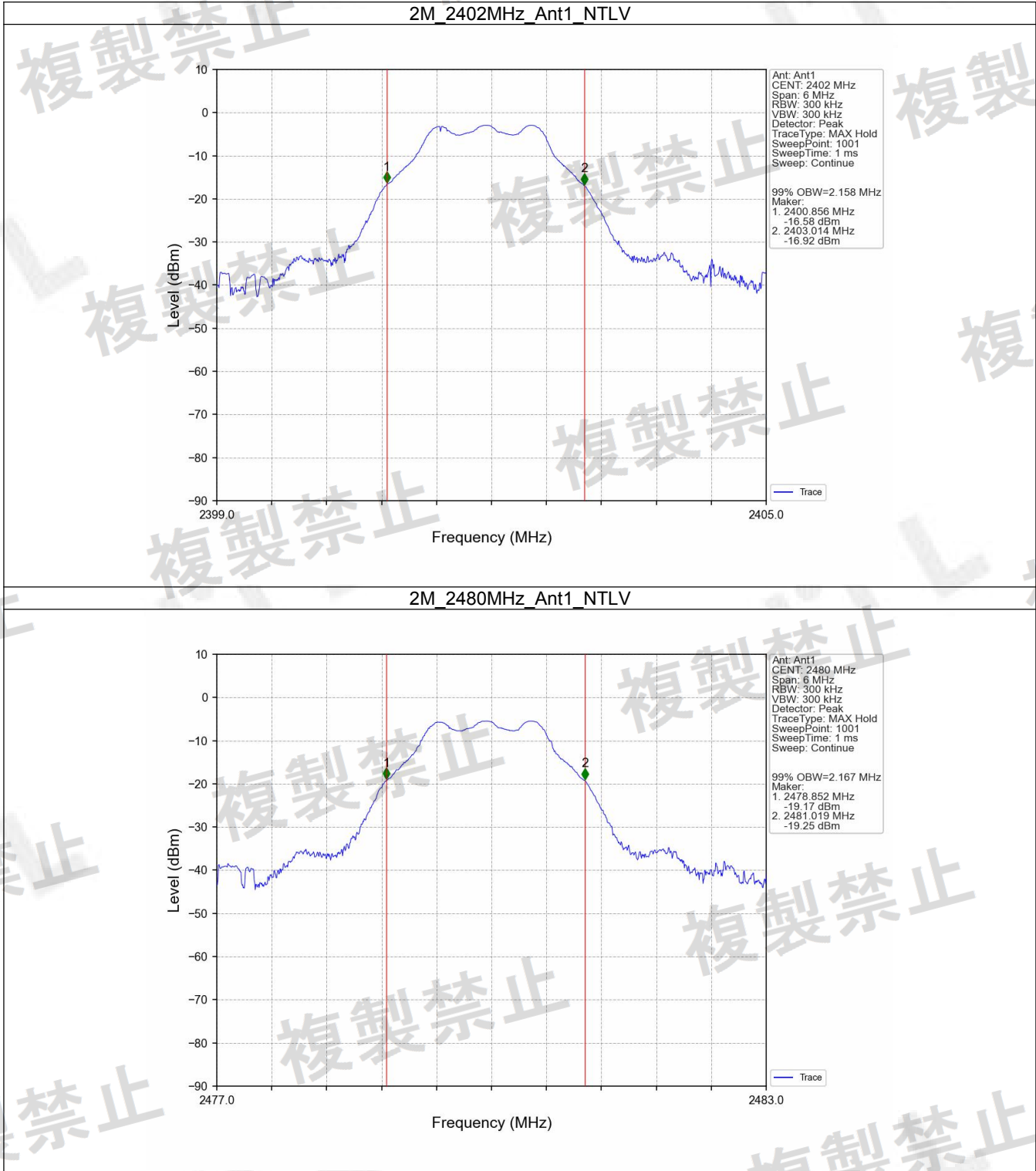
2.2 Test Graph

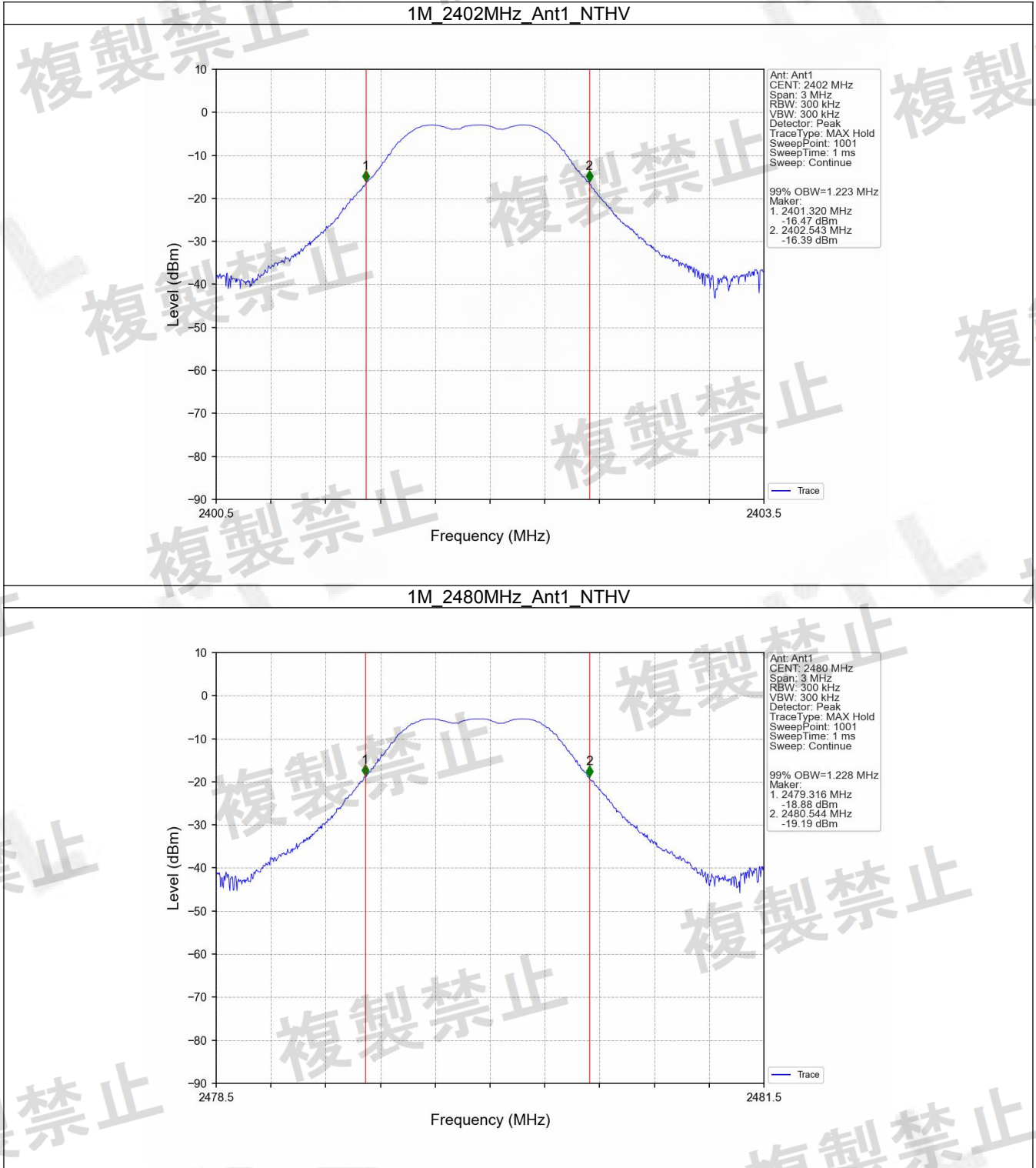
2.2.1 OBW

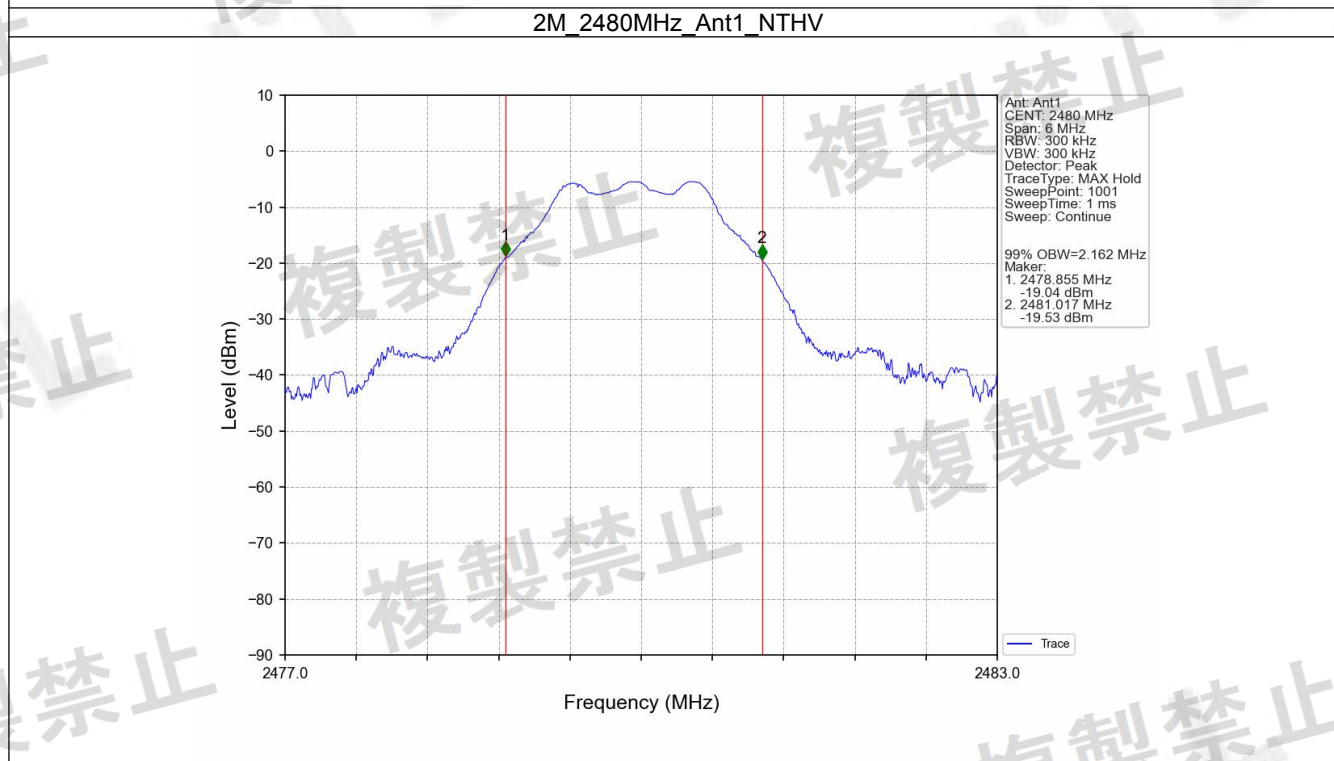
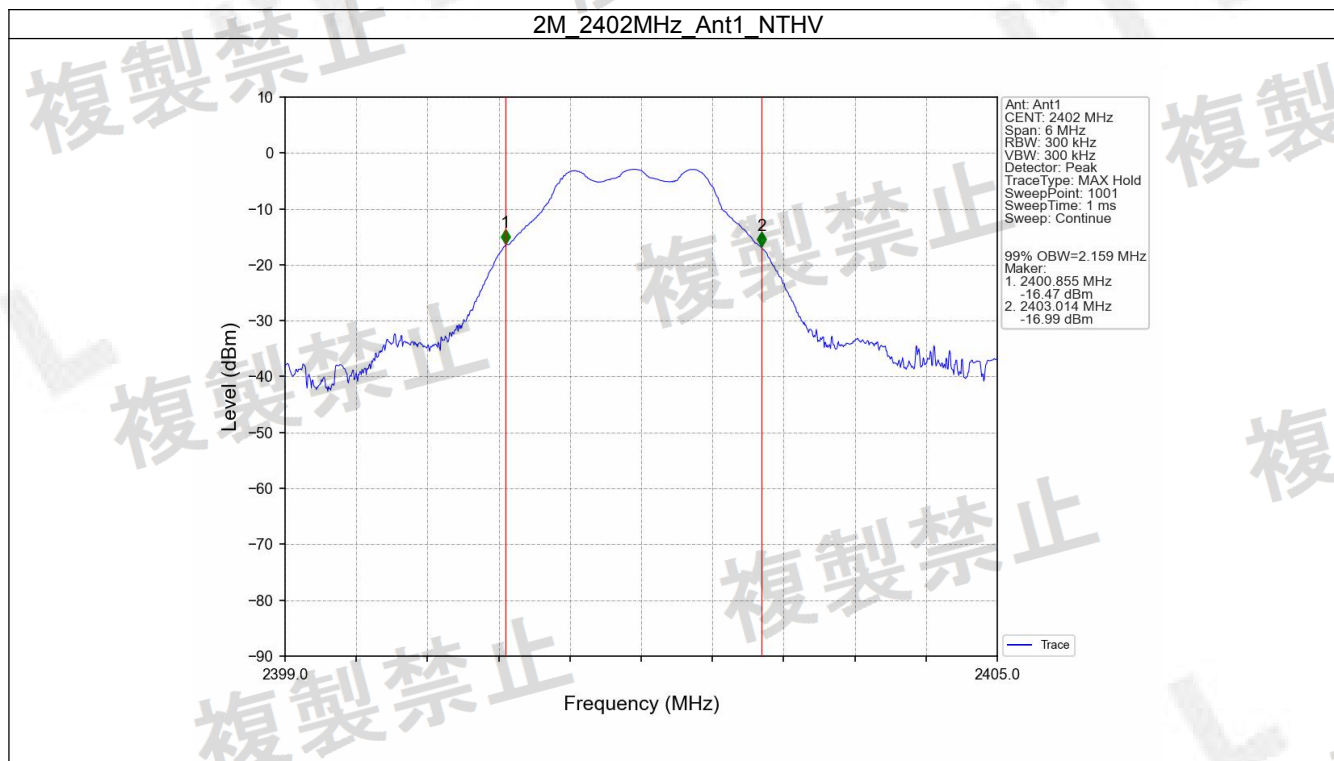












3. Antenna Power

3.1 Test Result

3.1.1 Power

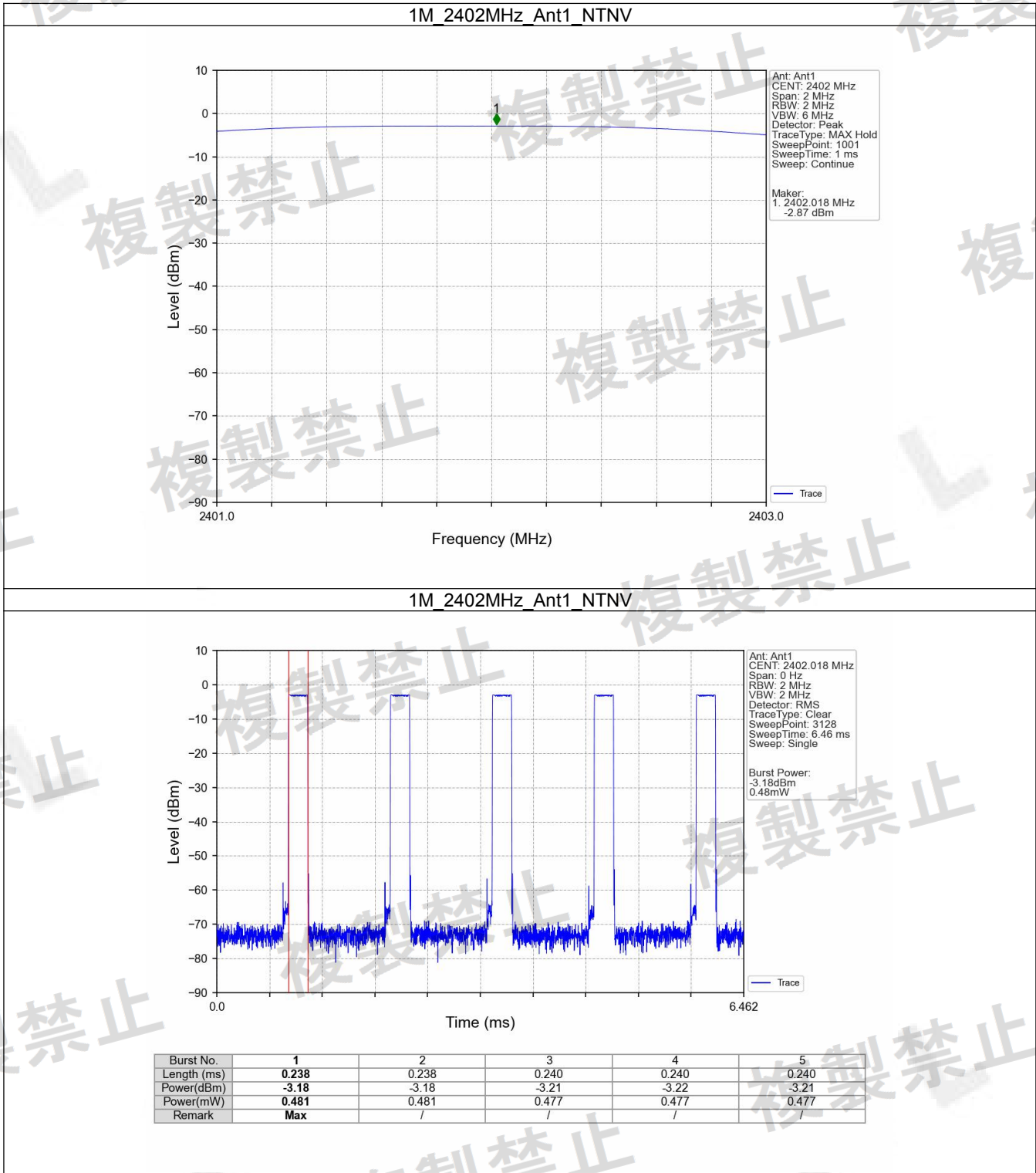
ENV	Mode	TX Type	Frequency (MHz)	ANT	Antenna Power (mW)		Nominal Power (mW)	Tolerance (%)		Verdict
					Measured	Limit		Measured	Limit	
NTNV	1M	SISO	2402	1	0.481	<=10.00	0.480	0.21	<=20	Pass
			2480	1	0.272	<=10.00	0.480	-43.33	<=20	Pass
	2M	SISO	2402	1	0.409	<=10.00	0.480	-14.79	<=20	Pass
			2480	1	0.244	<=10.00	0.480	-49.17	<=20	Pass
NTLV	1M	SISO	2402	1	0.470	<=10.00	0.480	-2.08	<=20	Pass
			2480	1	0.237	<=10.00	0.480	-50.63	<=20	Pass
	2M	SISO	2402	1	0.430	<=10.00	0.480	-10.42	<=20	Pass
			2480	1	0.265	<=10.00	0.480	-44.79	<=20	Pass
NTHV	1M	SISO	2402	1	0.453	<=10.00	0.480	-5.62	<=20	Pass
			2480	1	0.281	<=10.00	0.480	-41.46	<=20	Pass
	2M	SISO	2402	1	0.456	<=10.00	0.480	-5.00	<=20	Pass
			2480	1	0.235	<=10.00	0.480	-51.04	<=20	Pass

3.1.2 EIRP

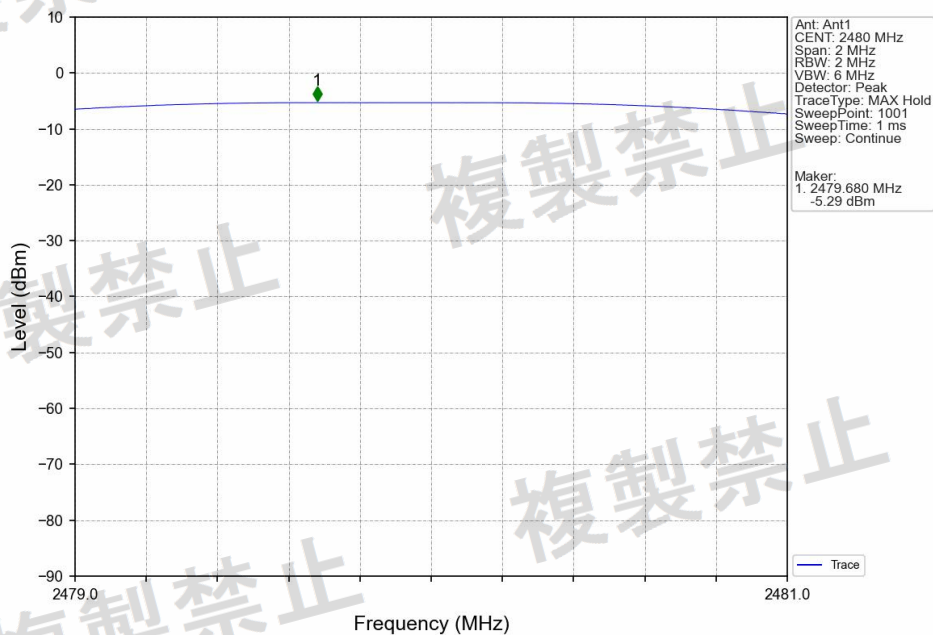
ENV	Mode	TX Type	Frequency (MHz)	ANT	Gain (dBi)	EIRP (dBm)		Verdict
						Result	Limit	
NTNV	1M	SISO	2402	1	5.15	1.97	<=12.14	Pass
			2480	1	5.15	-0.50	<=12.14	Pass
	2M	SISO	2402	1	5.15	1.26	<=12.14	Pass
			2480	1	5.15	-0.98	<=12.14	Pass
NTLV	1M	SISO	2402	1	5.15	1.87	<=12.14	Pass
			2480	1	5.15	-1.10	<=12.14	Pass
	2M	SISO	2402	1	5.15	1.49	<=12.14	Pass
			2480	1	5.15	-0.62	<=12.14	Pass
NTHV	1M	SISO	2402	1	5.15	1.71	<=12.14	Pass
			2480	1	5.15	-0.37	<=12.14	Pass
	2M	SISO	2402	1	5.15	1.74	<=12.14	Pass
			2480	1	5.15	-1.14	<=12.14	Pass

3.2 Test Graph

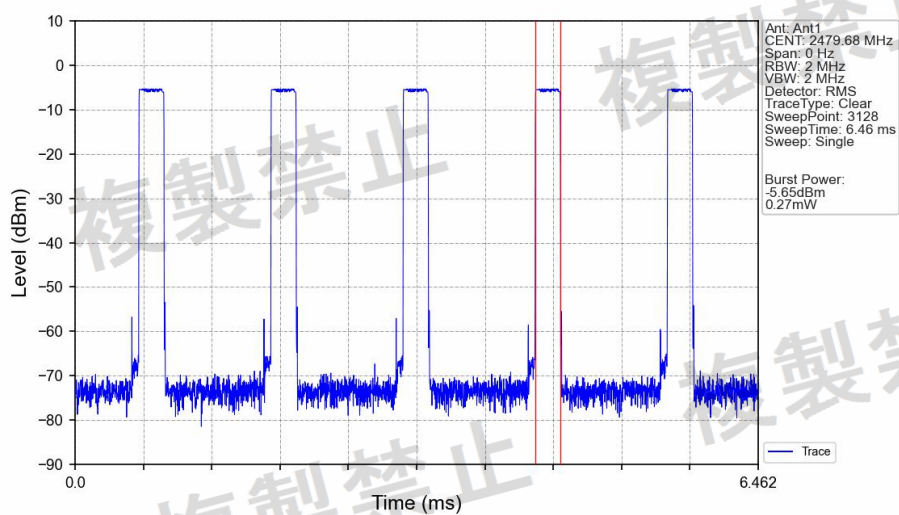
3.2.1 Power



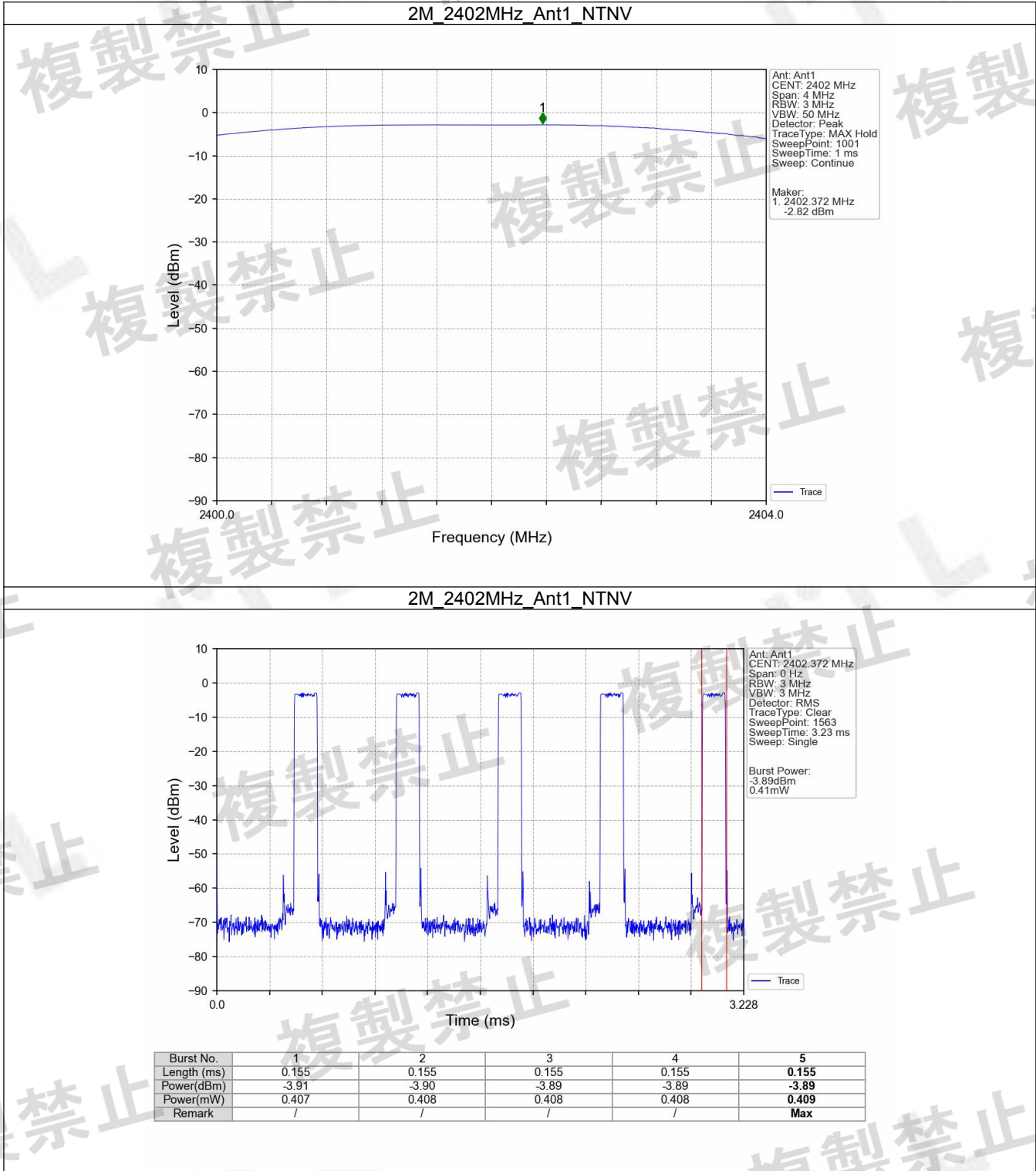
1M_2480MHz_Ant1_NTNV

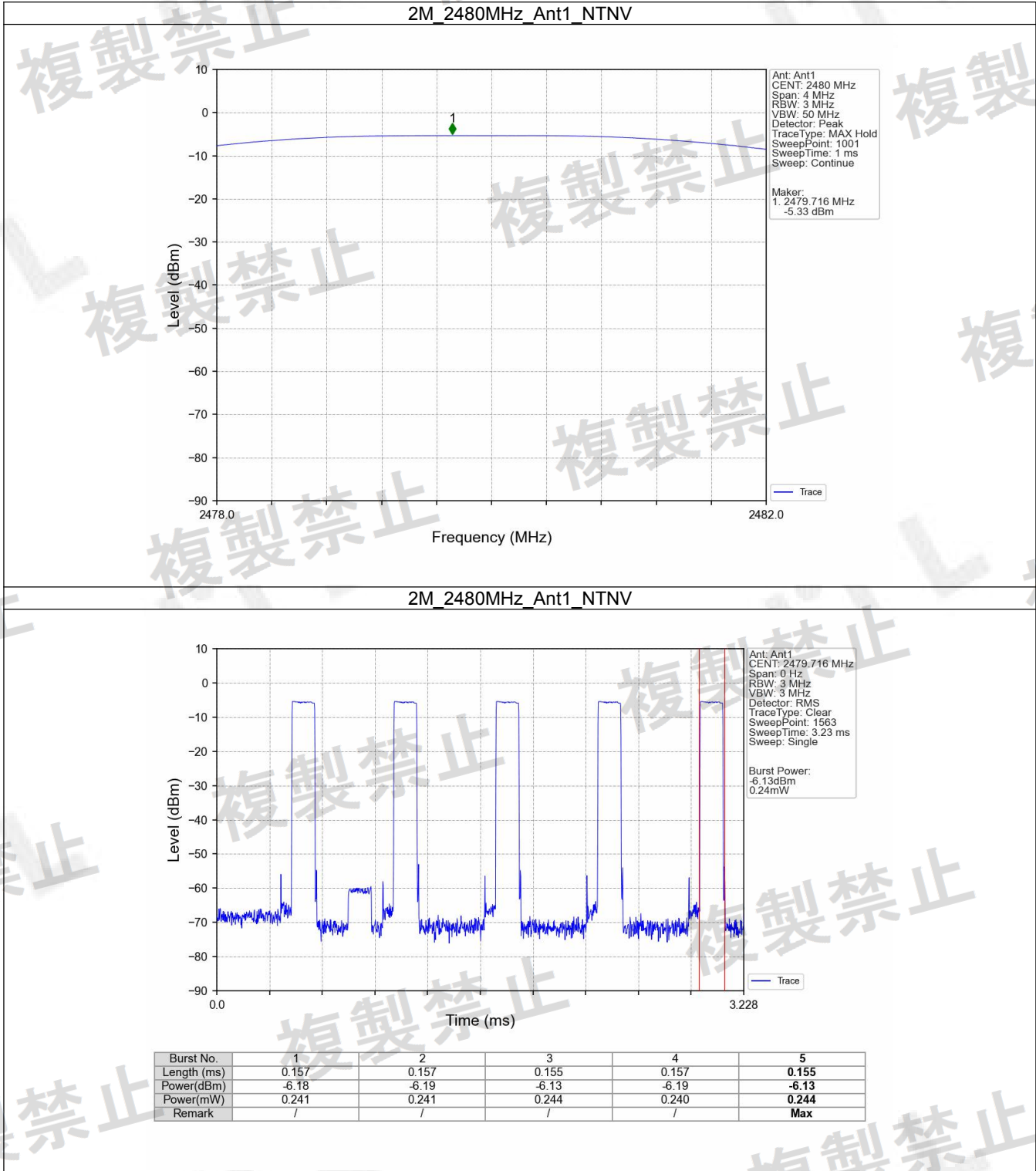


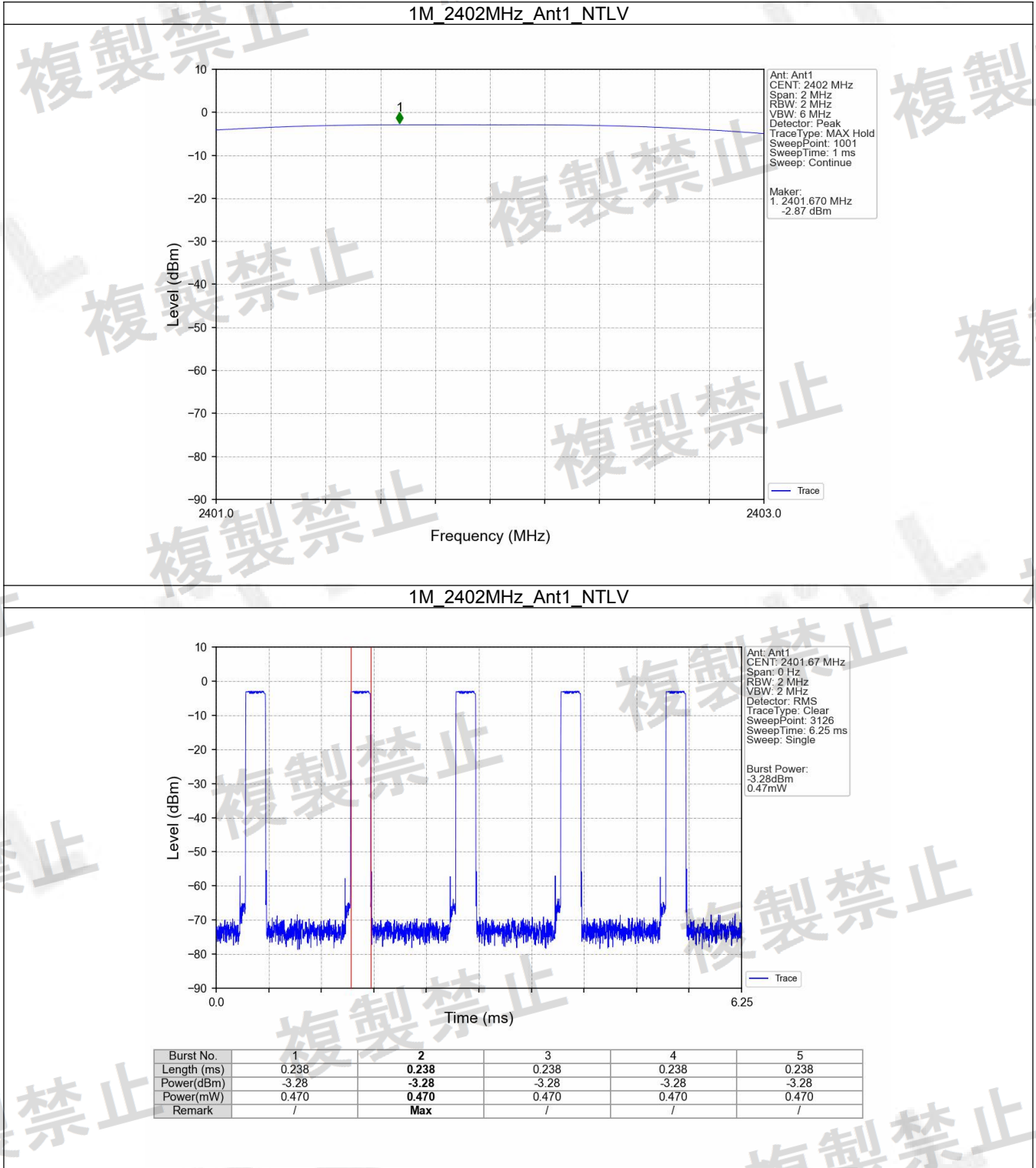
1M_2480MHz_Ant1_NTNV

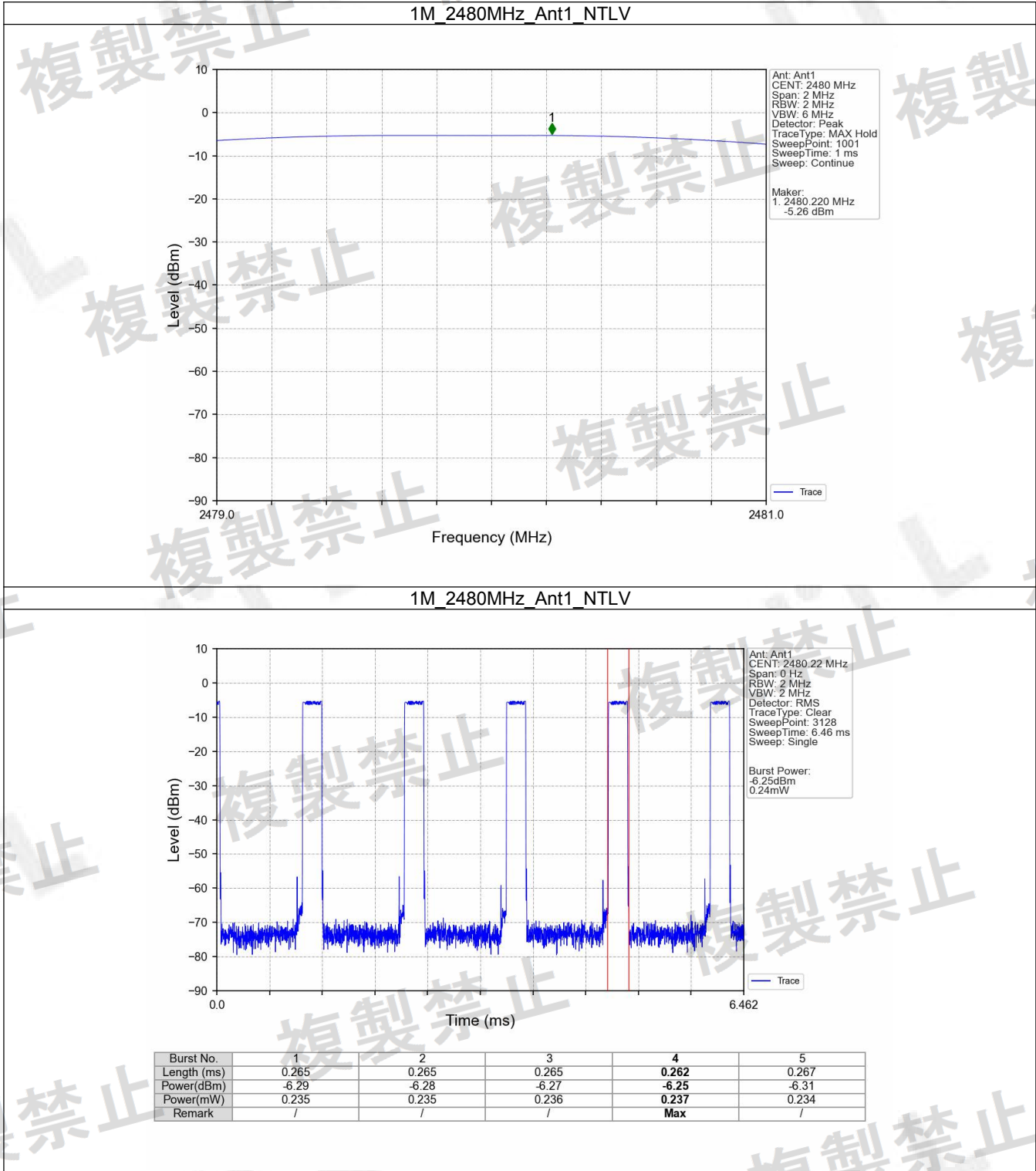


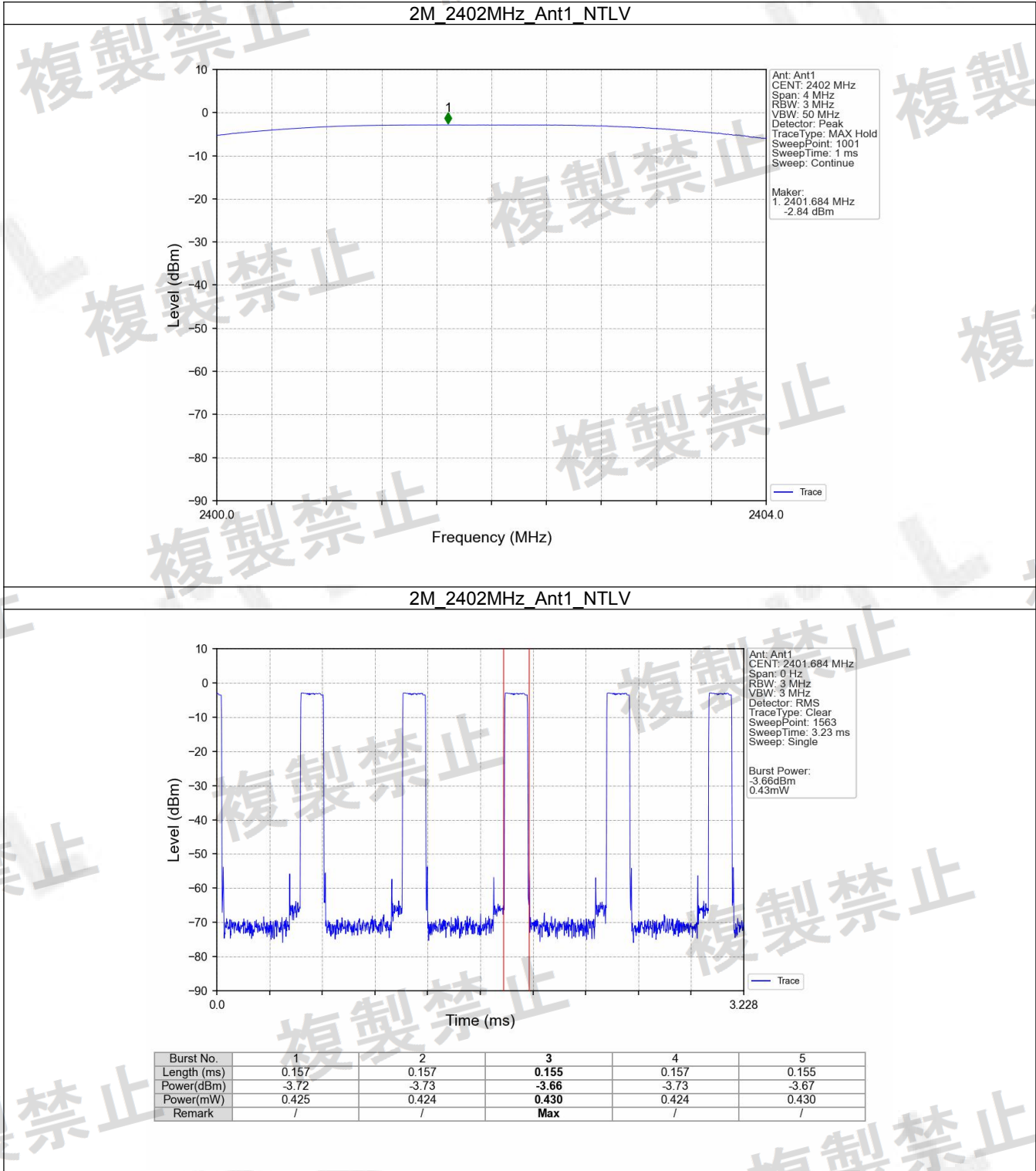
Burst No.	1	2	3	4	5
Length (ms)	0.240	0.238	0.238	0.238	0.240
Power(dBm)	-5.70	-5.67	-5.66	-5.65	-5.70
Power(mW)	0.269	0.271	0.272	0.272	0.269
Remark	/	/	/	Max	/

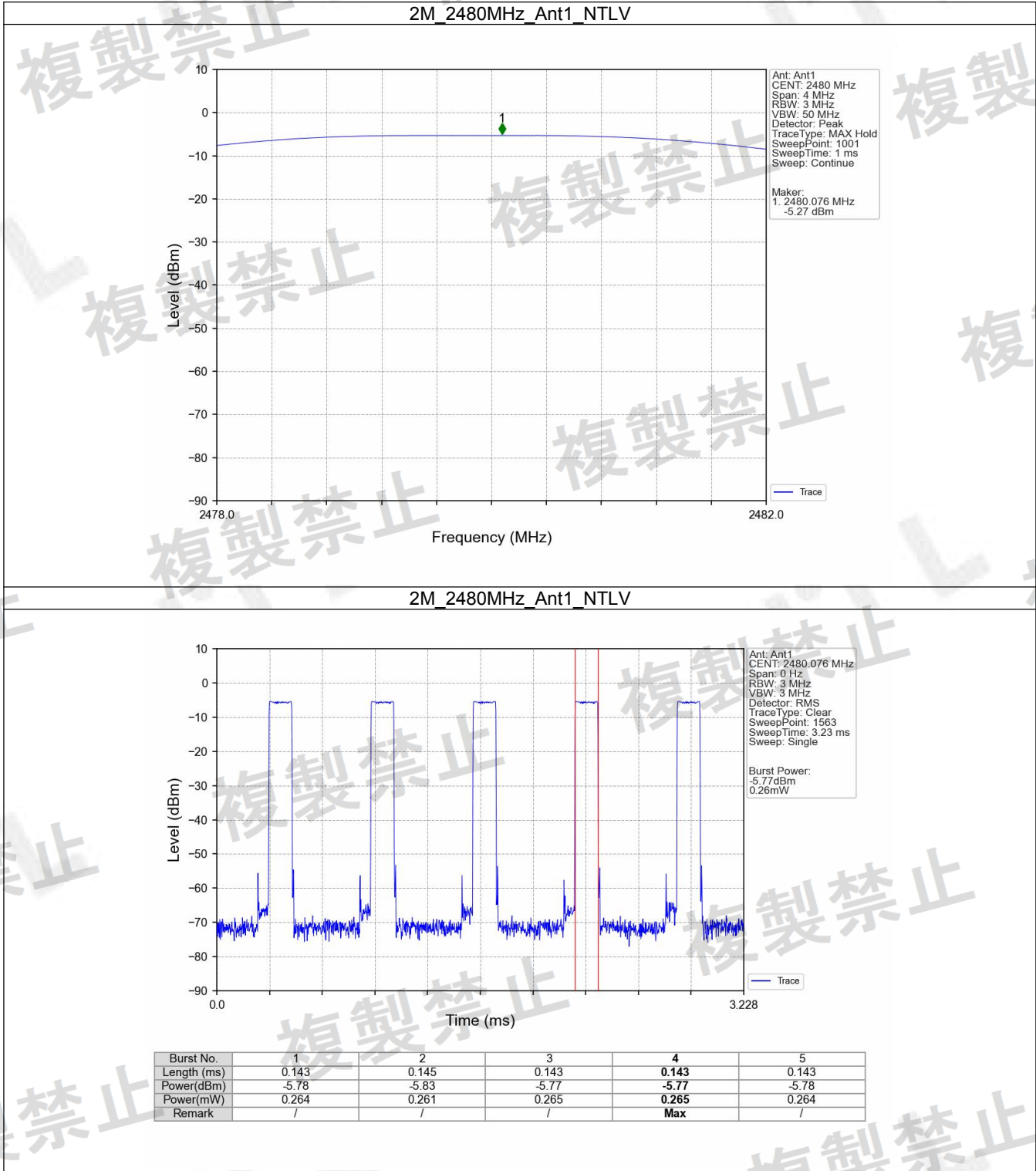


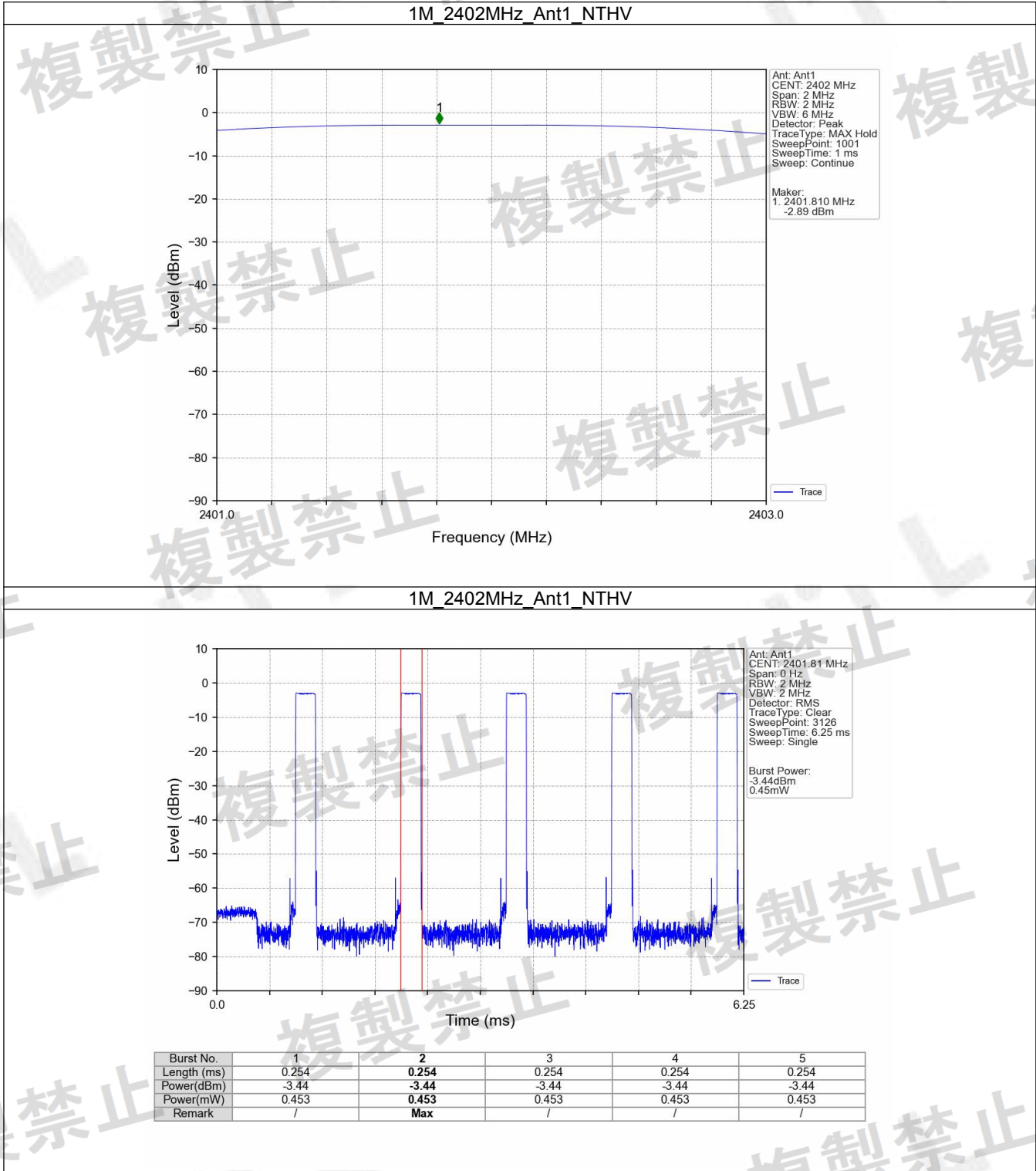


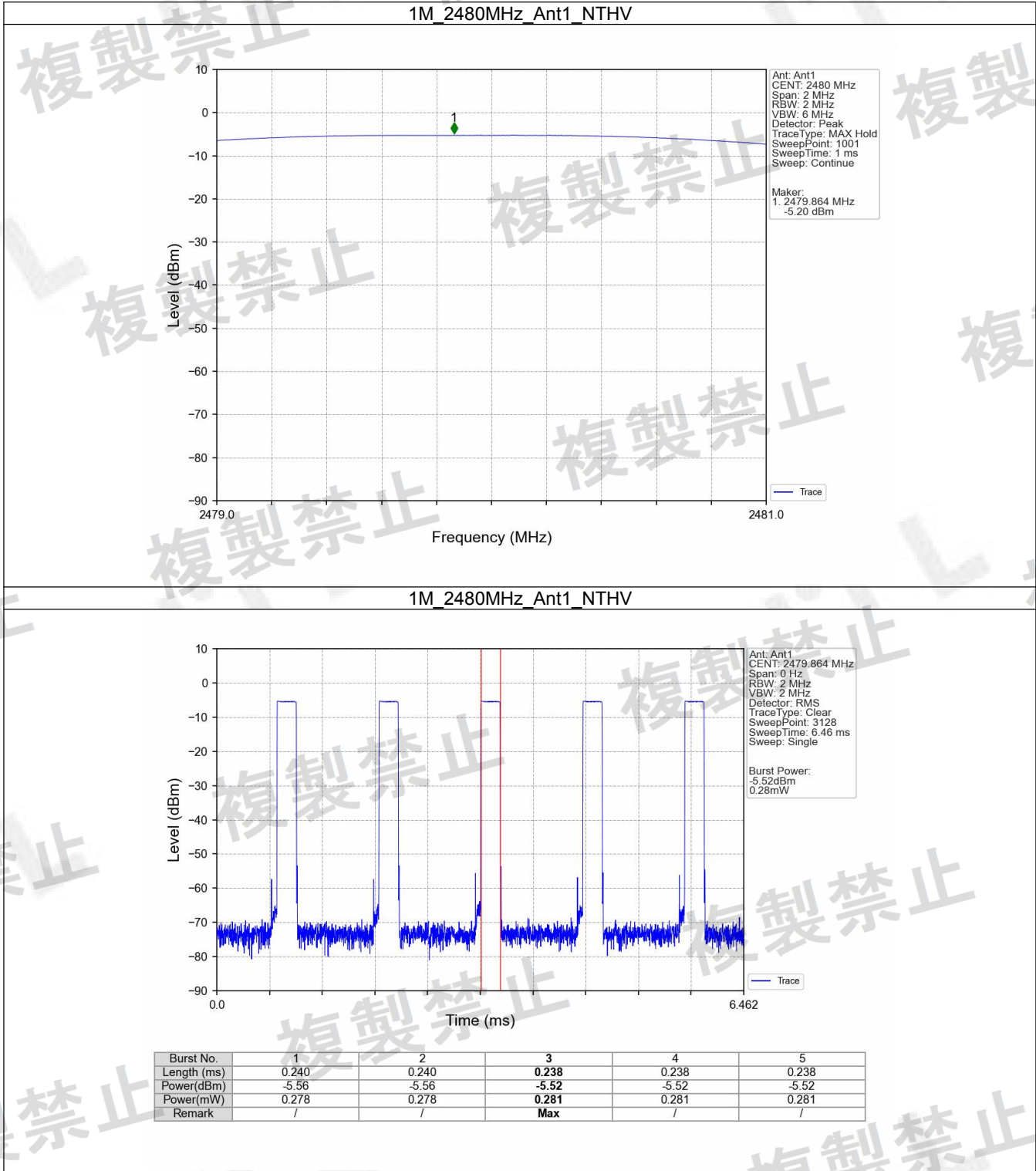


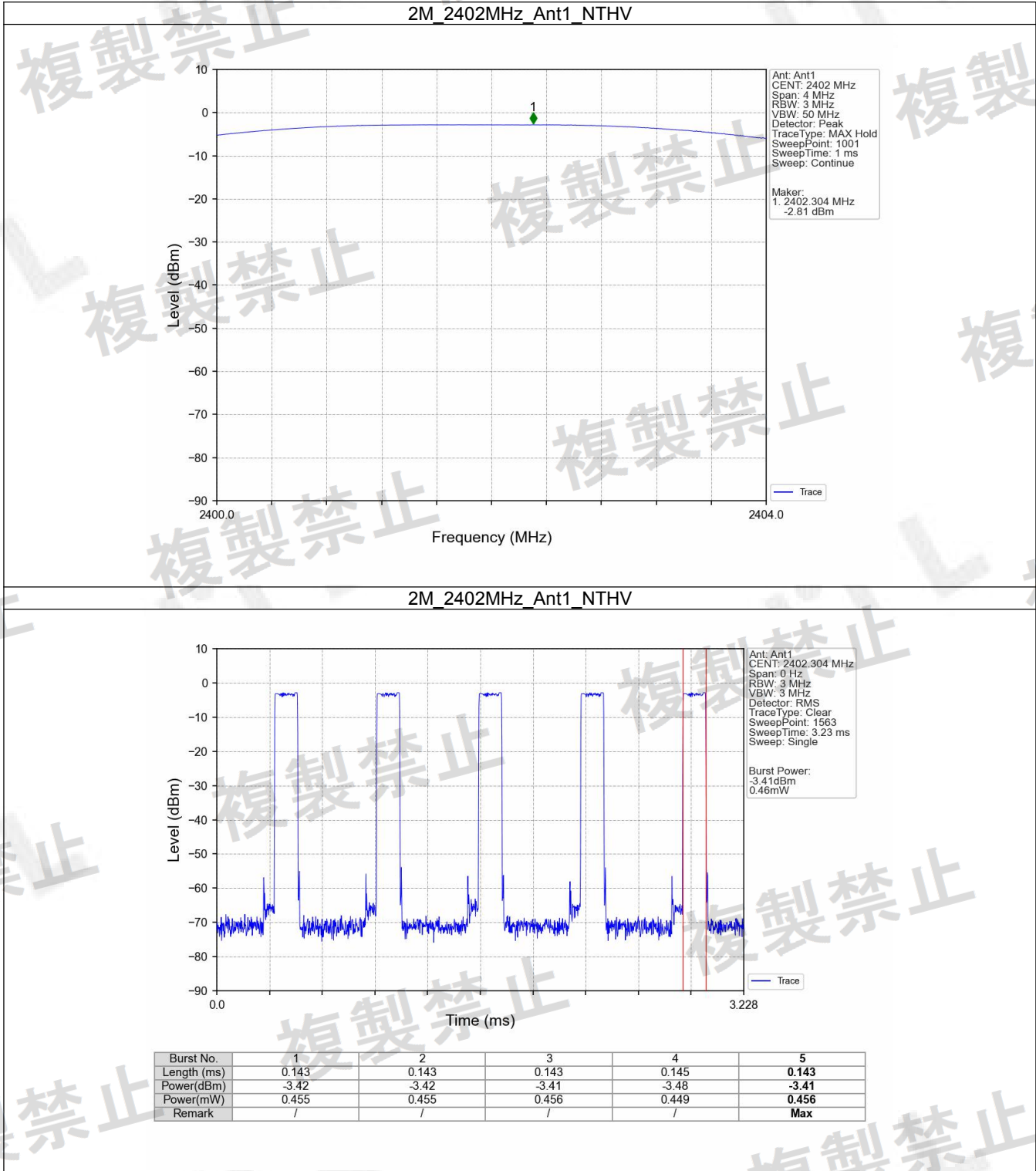


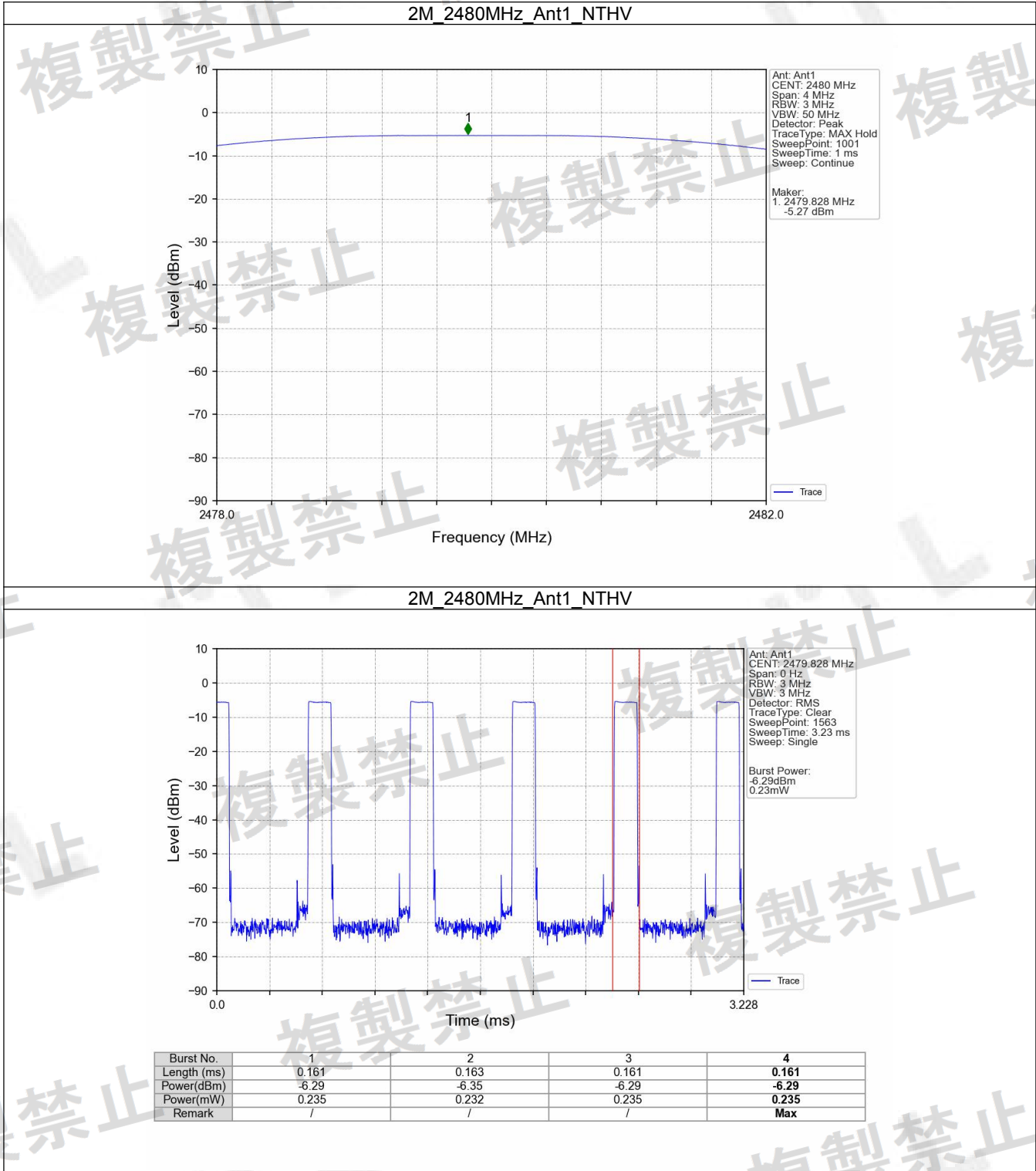












4. Spurious Emission Intensity

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	722.5	-35.87	0.259	/	/	2.5	Pass
				2387	2400	2397.998	-30.28	0.938	/	/	25	Pass
				2483.5	2496.5	2490.923	-49.65	0.011	/	/	25	Pass
				2496.5	12500	5766	-47.77	0.017	/	/	2.5	Pass
		2480	1	30	2387	893.5	-32.24	0.597	/	/	2.5	Pass
				2387	2400	2390.458	-46.68	0.021	/	/	25	Pass
				2483.5	2496.5	2483.721	-33.38	0.459	/	/	25	Pass
				2496.5	12500	4961	-43.64	0.043	/	/	2.5	Pass
2M	SISO	2402	1	30	2387	2386.5	-37.84	0.164	/	/	2.5	Pass
				2387	2400	2399.987	-24.06	3.926	/	/	25	Pass
				2483.5	2496.5	2487.231	-49.68	0.011	/	/	25	Pass
				2496.5	12500	5747	-48.31	0.015	/	/	2.5	Pass
		2480	1	30	2387	30	-44.37	0.037	/	/	2.5	Pass
				2387	2400	2390.666	-46.51	0.022	/	/	25	Pass
				2483.5	2496.5	2483.994	-32.57	0.553	/	/	25	Pass
				2496.5	12500	4961.5	-42.02	0.063	/	/	2.5	Pass

4.1.2 TxSe_NTLV

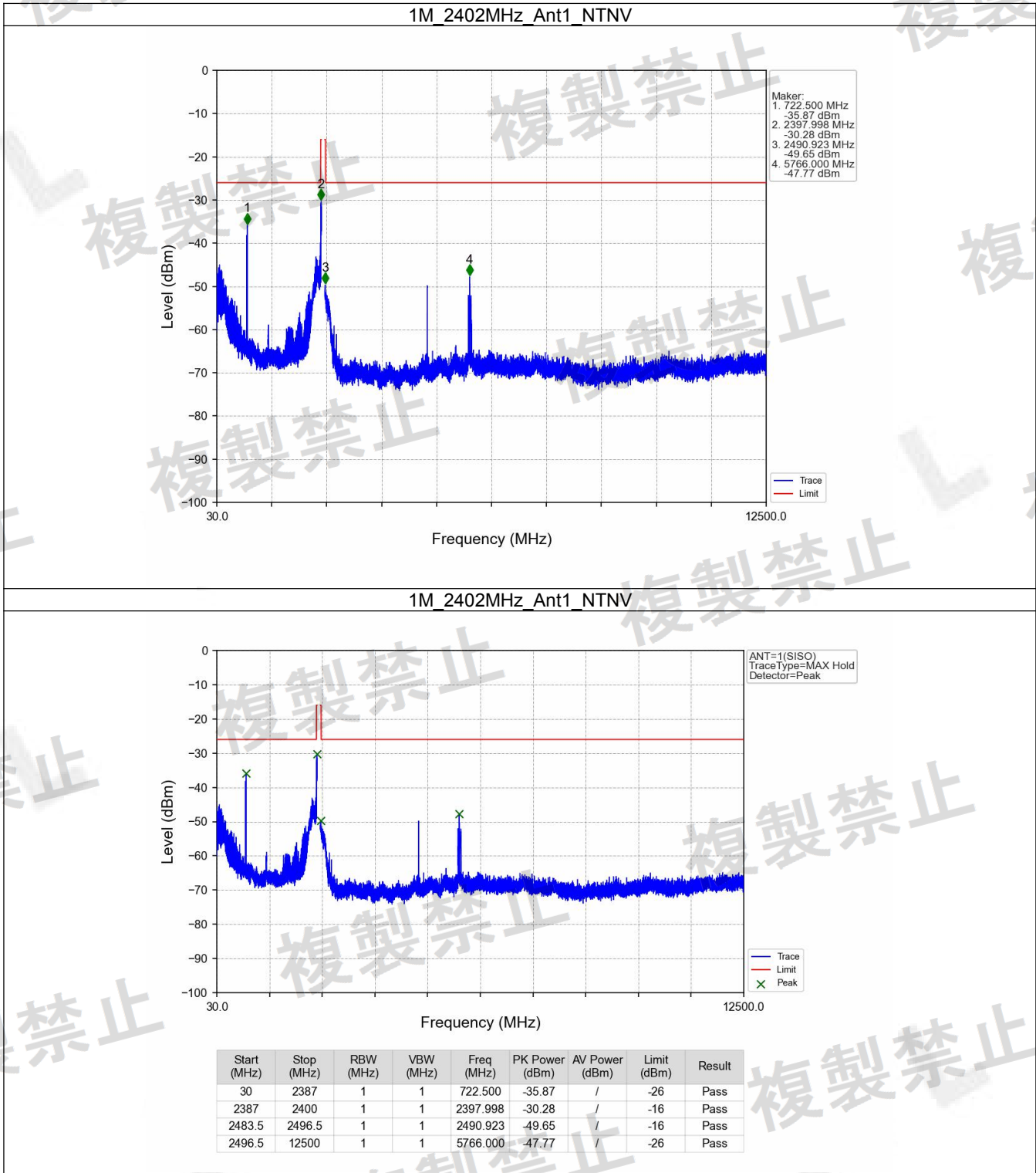
NTLV												
Mode	TX Type	Freq. (MHz)	ANT	Freq. Range		Marker					Limit (uW /MHz)	Verdict
				Start (MHz)	Stop (MHz)	Freq. (MHz)	PK Power (dBm /MHz)	PK Power (uW /MHz)	AV Power (dBm /MHz)	AV Power (uW /MHz)		
1M	SISO	2402	1	30	2387	2338.5	-44.20	0.038	/	/	2.5	Pass
				2387	2400	2399.987	-38.09	0.155	/	/	25	Pass
				2483.5	2496.5	2493.939	-58.27	0.001	/	/	25	Pass
				2496.5	12500	7206	-36.13	0.244	/	/	2.5	Pass
		2480	1	30	2387	2353	-55.90	0.003	/	/	2.5	Pass
				2387	2400	2399.467	-58.96	0.001	/	/	25	Pass
				2483.5	2496.5	2495.72	-60.31	0.001	/	/	25	Pass
				2496.5	12500	5758	-43.00	0.050	/	/	2.5	Pass
2M	SISO	2402	1	30	2387	2338.5	-44.20	0.038	/	/	2.5	Pass
				30	2387	2386.5	-37.22	0.190	/	/	2.5	Pass
				2387	2400	2399.974	-24.02	3.963	/	/	25	Pass
				2483.5	2496.5	2494.602	-49.81	0.010	/	/	25	Pass
		2480	1	2496.5	12500	4804.5	-49.78	0.011	/	/	2.5	Pass
				30	2387	98	-44.57	0.035	/	/	2.5	Pass
				2387	2400	2387.156	-46.38	0.023	/	/	25	Pass
				2483.5	2496.5	2487.998	-32.97	0.505	/	/	25	Pass
				2496.5	12500	4961.5	-41.90	0.065	/	/	2.5	Pass

4.1.3 TxSe_NTHV

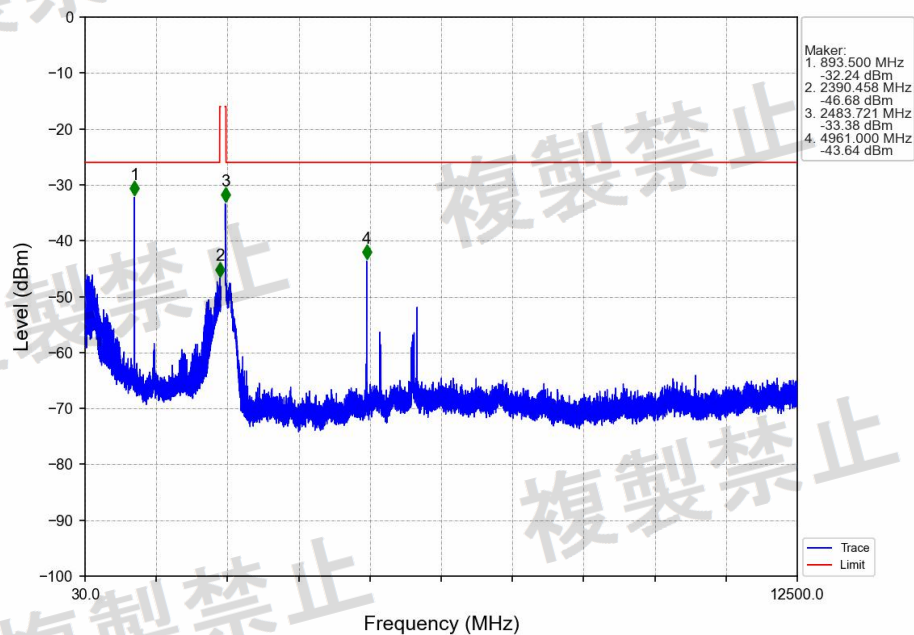
NTHV												
Mode	TX Type	Freq. (MHz)	ANT	Freq. Range		Marker				Limit (uW /MHz)	Verdict	
				Start (MHz)	Stop (MHz)	Freq. (MHz)	PK Power (dBm /MHz)	PK Power (uW /MHz)	AV Power (dBm /MHz)			AV Power (uW /MHz)
1M	SISO	2402	1	30	2387	2339	-43.91	0.041	/	/	2.5	Pass
				2387	2400	2399.987	-38.09	0.155	/	/	25	Pass
				2483.5	2496.5	2487.582	-58.59	0.001	/	/	25	Pass
				2496.5	12500	7206	-36.16	0.242	/	/	2.5	Pass
		2480	1	30	2387	1943.5	-33.26	0.472	/	/	2.5	Pass
				2387	2400	2399.558	-58.95	0.001	/	/	25	Pass
				2483.5	2496.5	2495.863	-60.06	0.001	/	/	25	Pass
				2496.5	12500	2544.5	-46.32	0.023	/	/	2.5	Pass
2M	SISO	2402	1	30	2387	2386.5	-36.91	0.204	/	/	2.5	Pass
				2387	2400	2399.987	-24.09	3.899	/	/	25	Pass
				2483.5	2496.5	2494.745	-49.59	0.011	/	/	25	Pass
				2496.5	12500	4804.5	-49.20	0.012	/	/	2.5	Pass
		2480	1	30	2387	1952	-29.10	1.230	/	/	2.5	Pass
				2387	2400	2391.316	-46.60	0.022	/	/	25	Pass
				2483.5	2496.5	2484.215	-32.57	0.553	/	/	25	Pass
				2496.5	12500	2500.5	-43.01	0.050	/	/	2.5	Pass

4.2 Test Graph

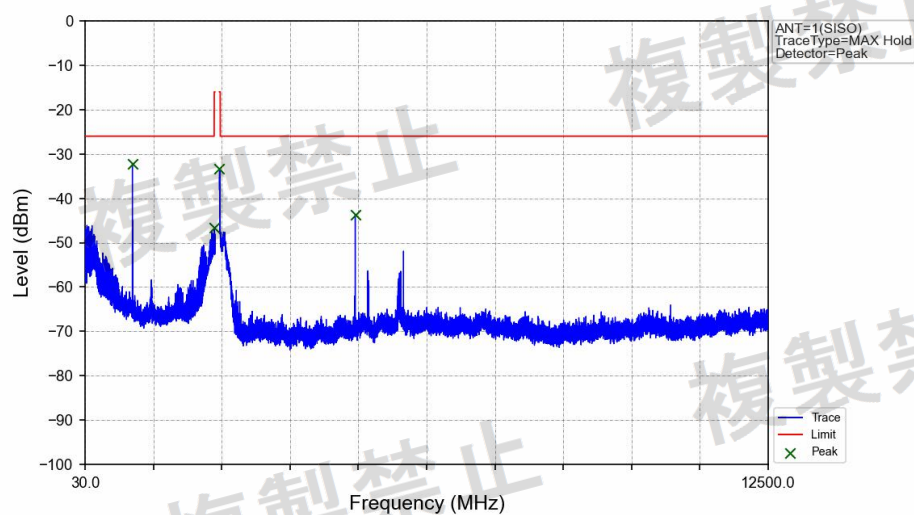
4.2.1 TxSe_NTNV



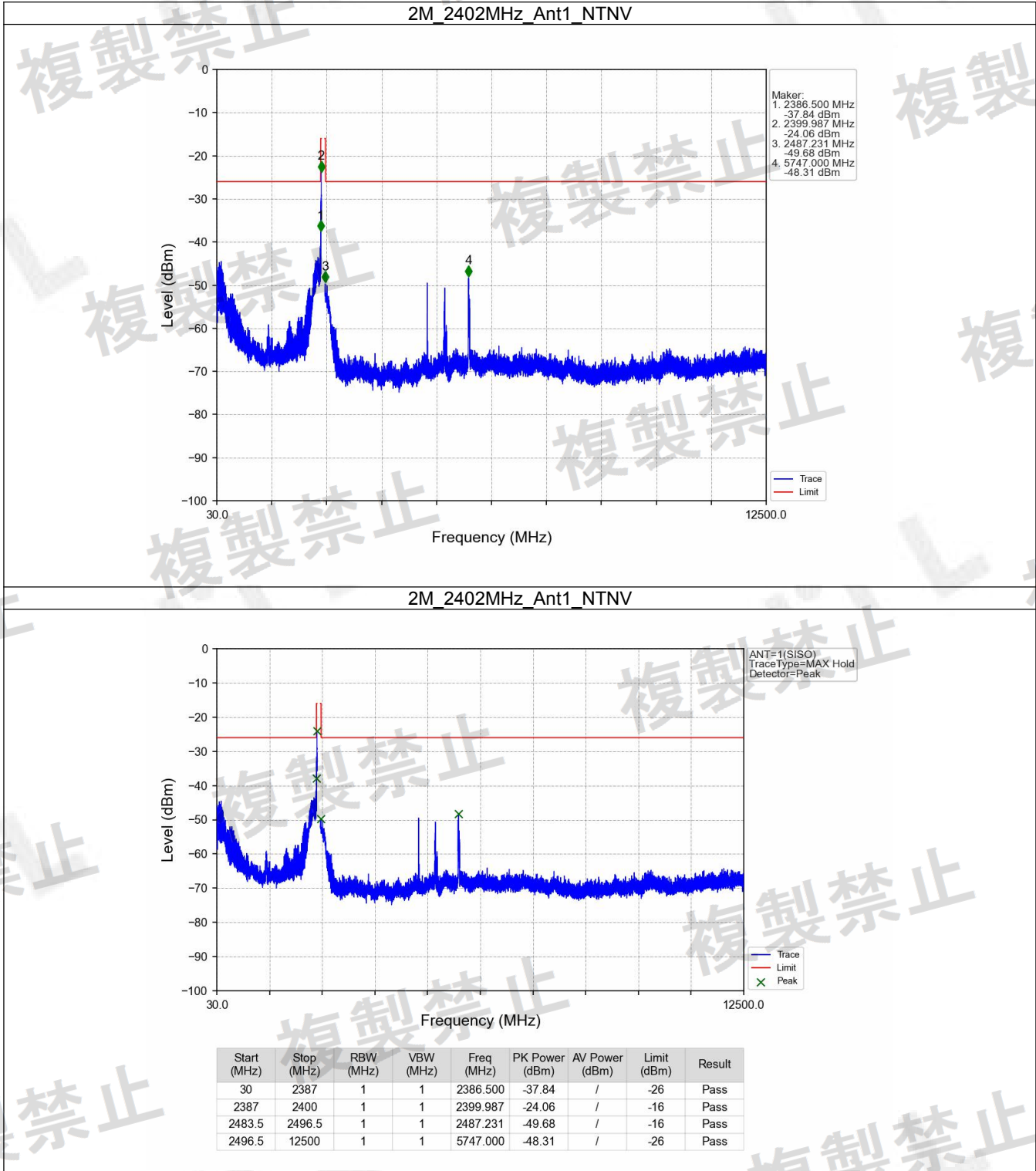
1M_2480MHz_Ant1_NTNV



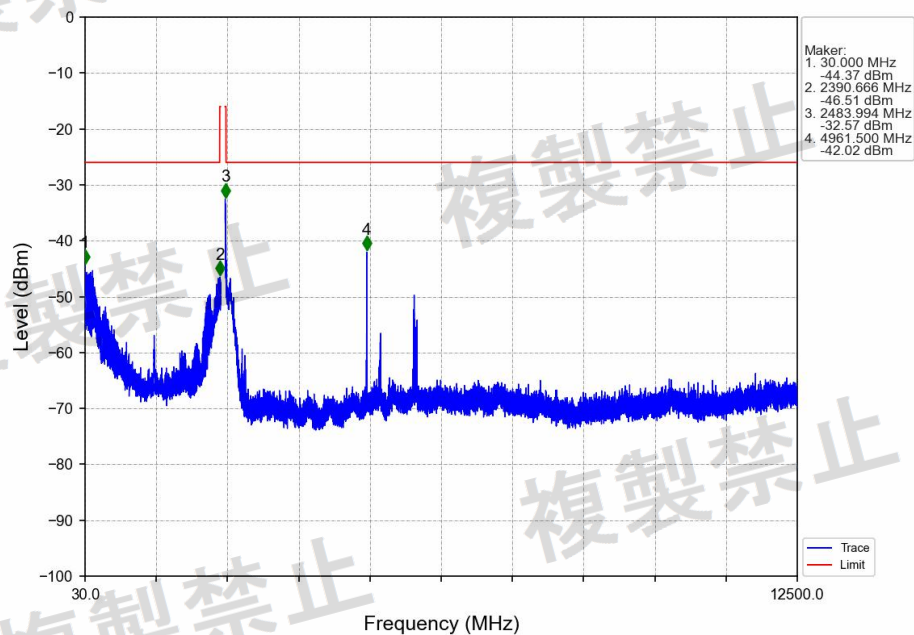
1M_2480MHz_Ant1_NTNV



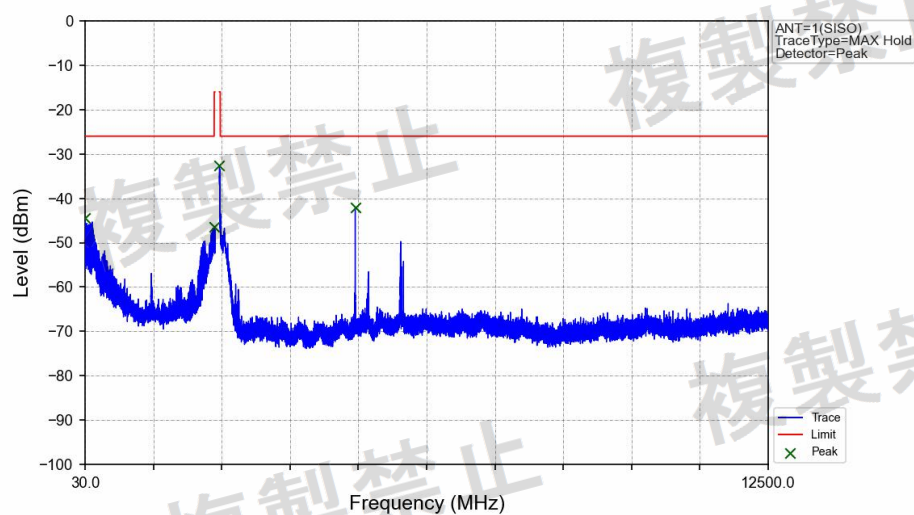
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	2387	1	1	893.500	-32.24	/	-26	Pass
2387	2400	1	1	2390.458	-46.68	/	-16	Pass
2483.5	2496.5	1	1	2483.721	-33.38	/	-16	Pass
2496.5	12500	1	1	4961.000	-43.64	/	-26	Pass



2M_2480MHz_Ant1_NTNV

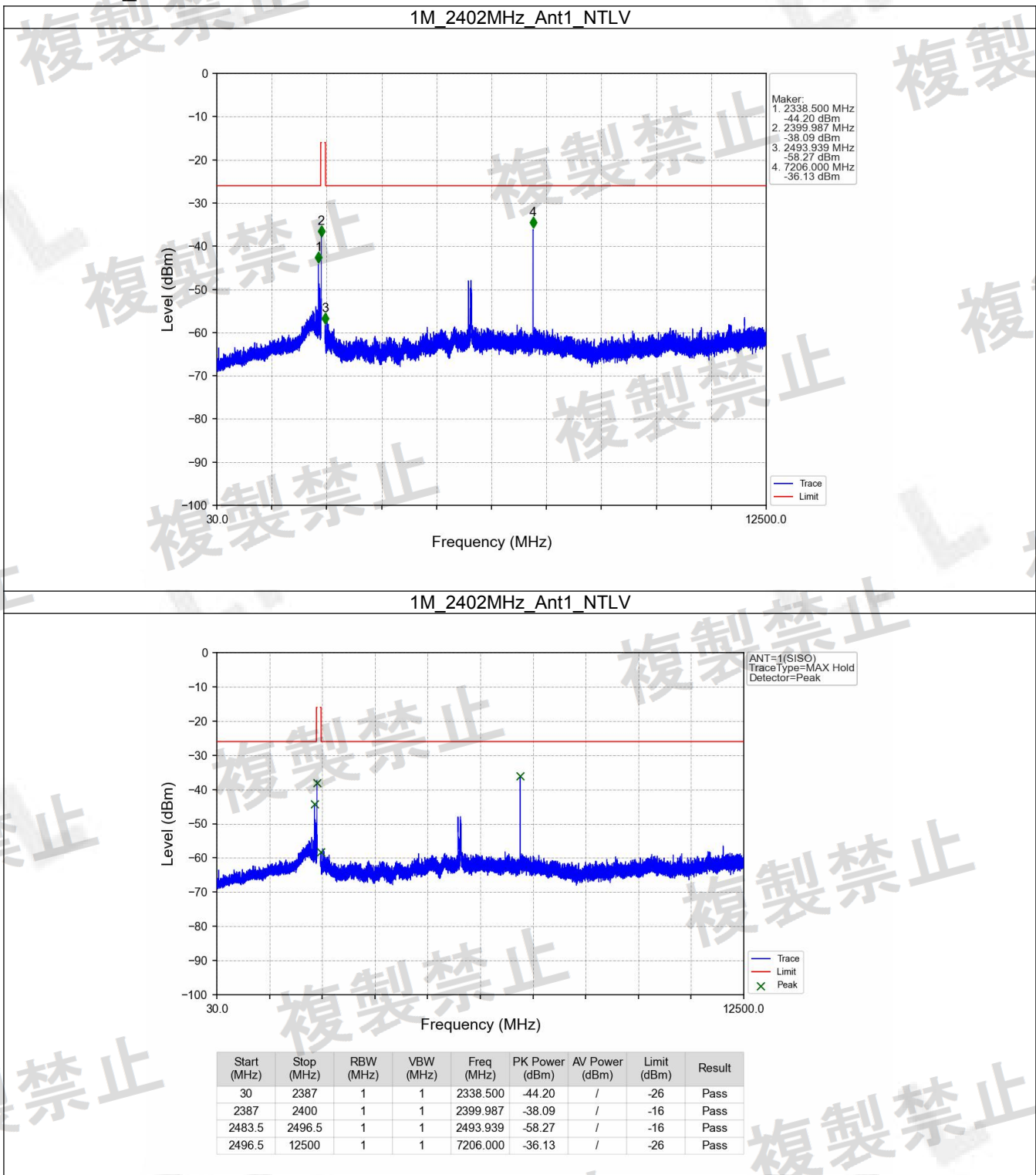


2M_2480MHz_Ant1_NTNV

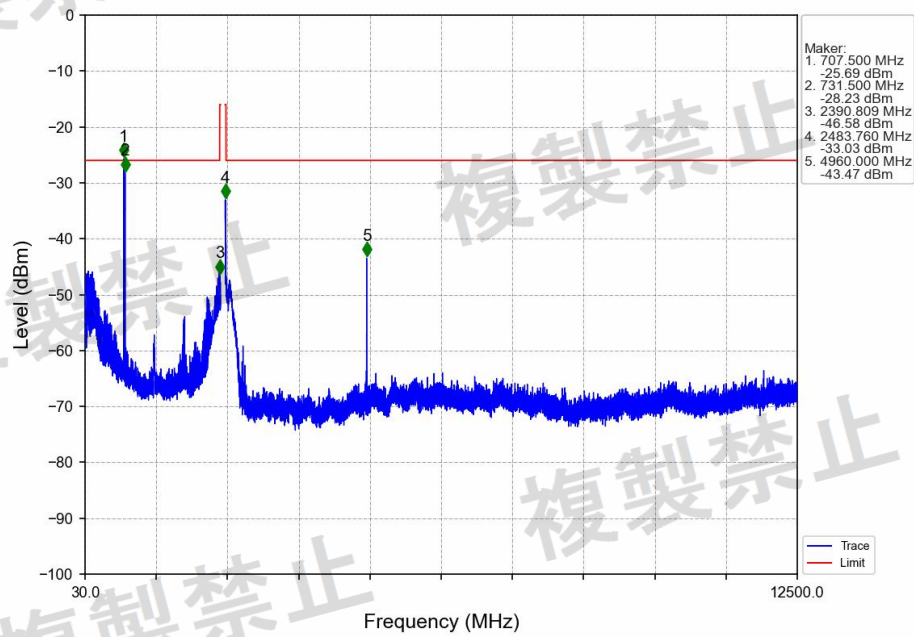


Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	2387	1	1	30.000	-44.37	/	-26	Pass
2387	2400	1	1	2390.666	-46.51	/	-16	Pass
2483.5	2496.5	1	1	2483.994	-32.57	/	-16	Pass
2496.5	12500	1	1	4961.500	-42.02	/	-26	Pass

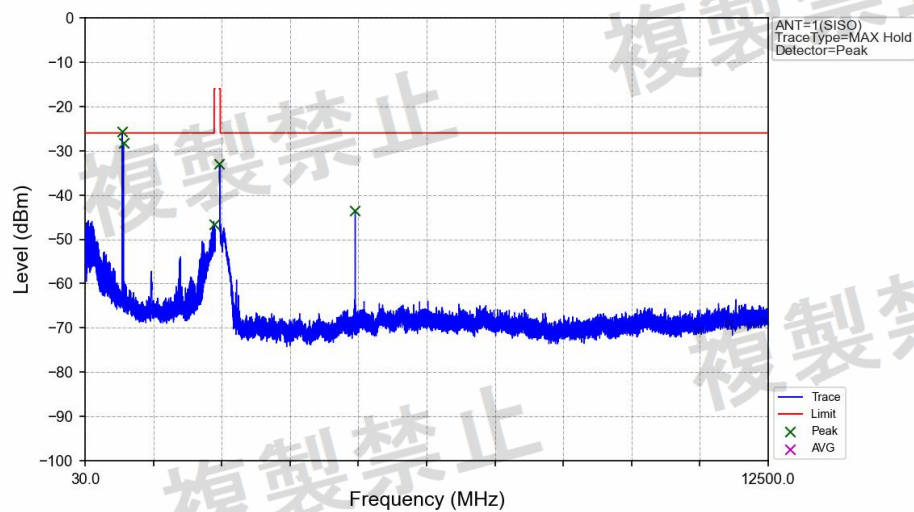
4.2.2 TxSe_NTLV



1M_2480MHz_Ant1_NTLV

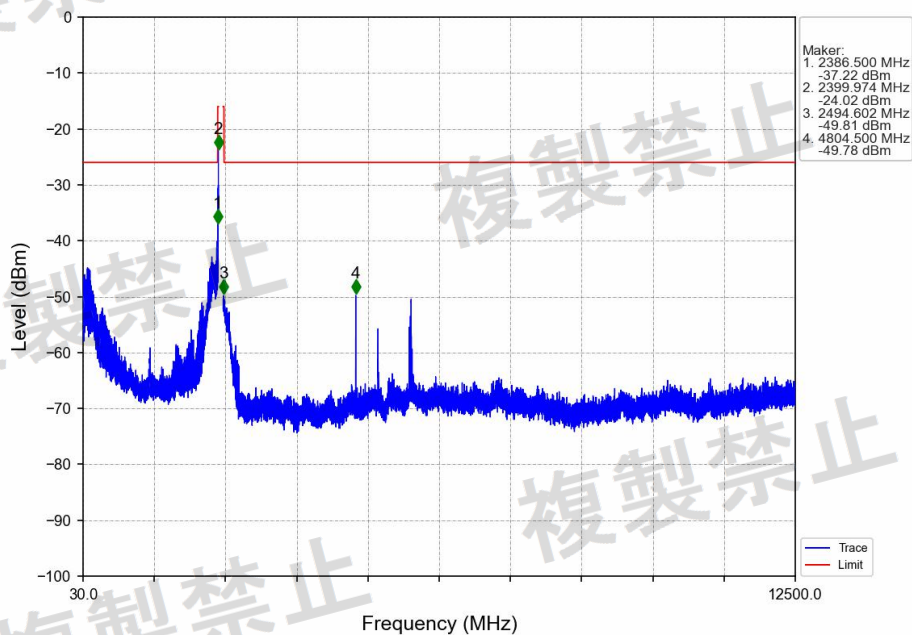


1M_2480MHz_Ant1_NTLV

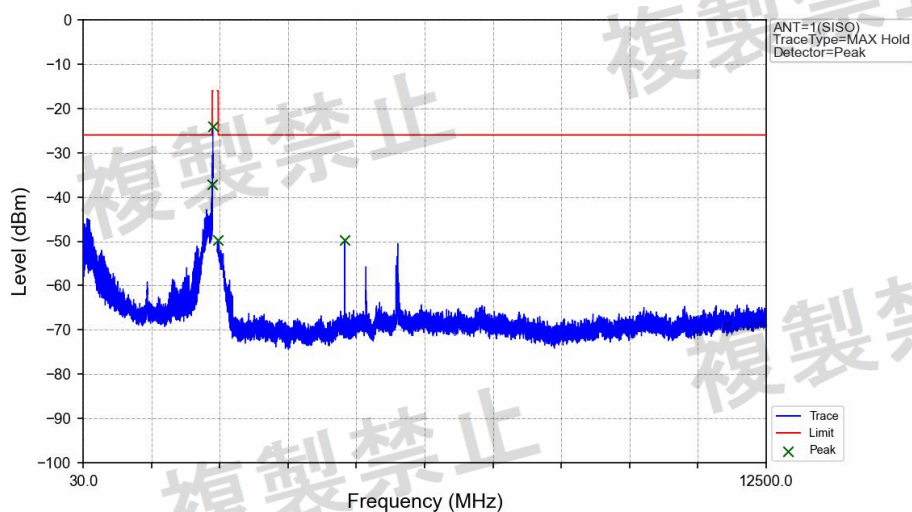


Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	2387	1	1	707.500	-25.69	-149.21	-26	Pass
30	2387	1	1	731.500	-28.23	-149.21	-26	Pass
2387	2400	1	1	2390.809	-46.58	/	-16	Pass
2483.5	2496.5	1	1	2483.760	-33.03	/	-16	Pass
2496.5	12500	1	1	4960.000	-43.47	/	-26	Pass

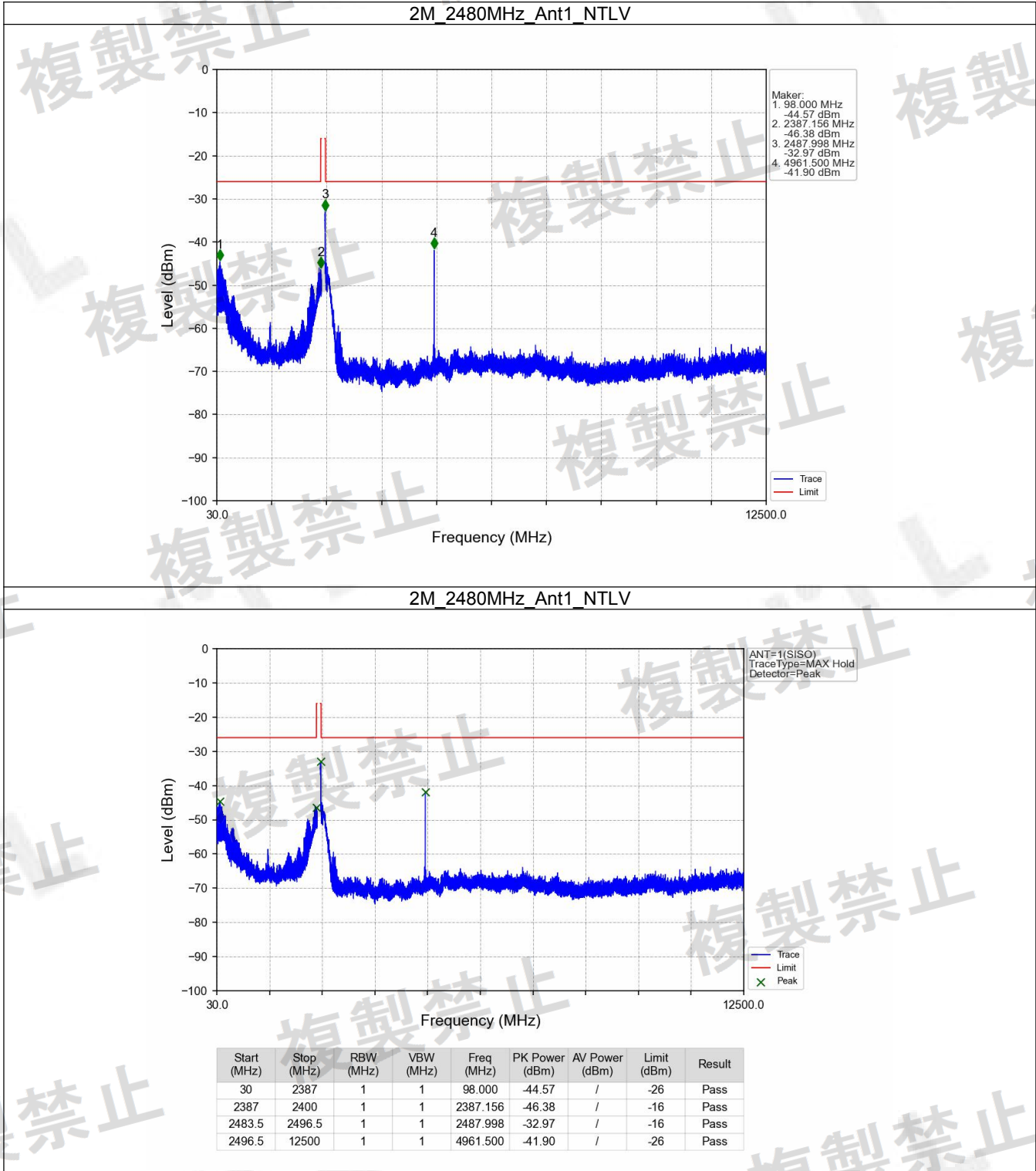
2M_2402MHz_Ant1_NTLV



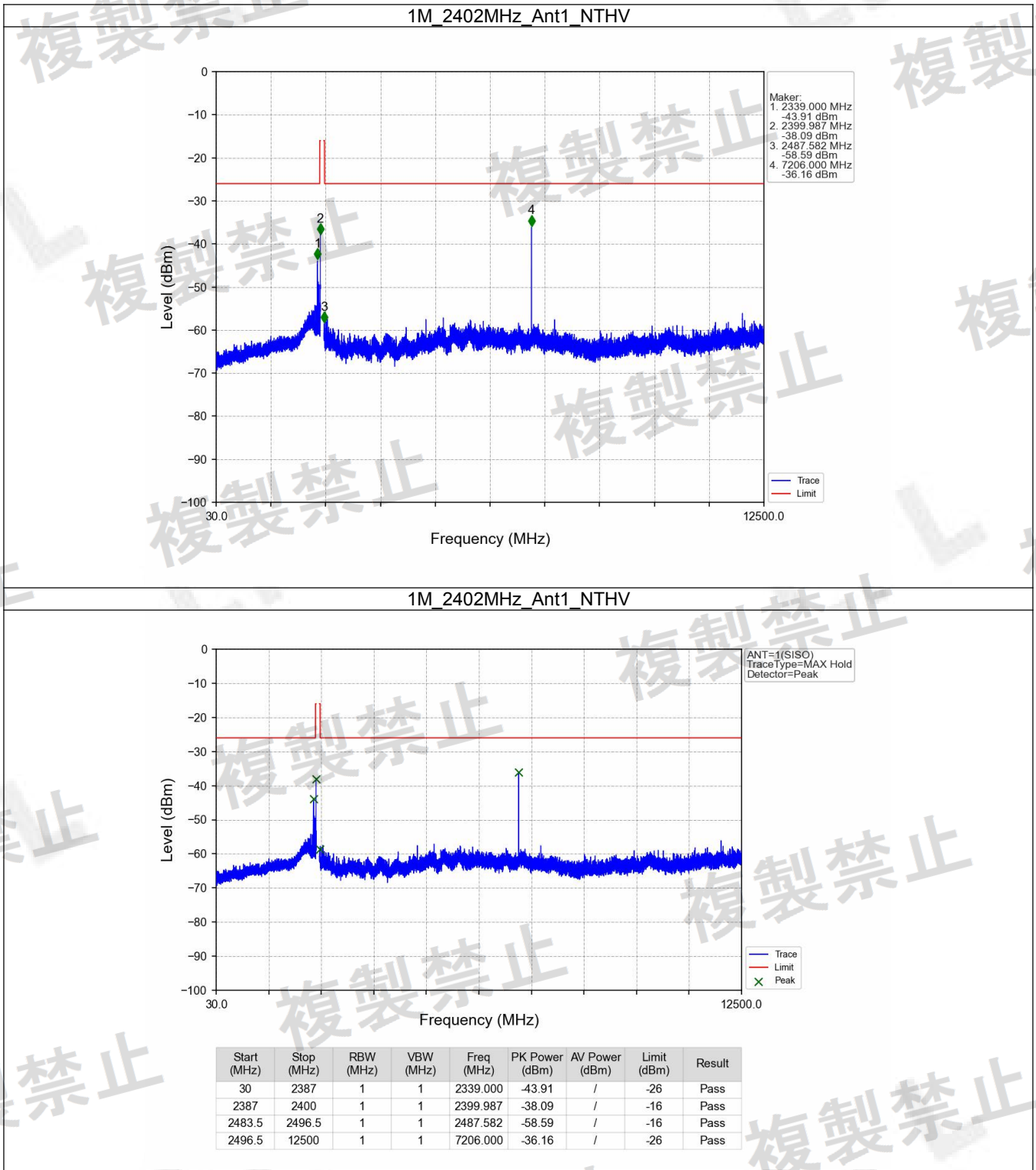
2M_2402MHz_Ant1_NTLV

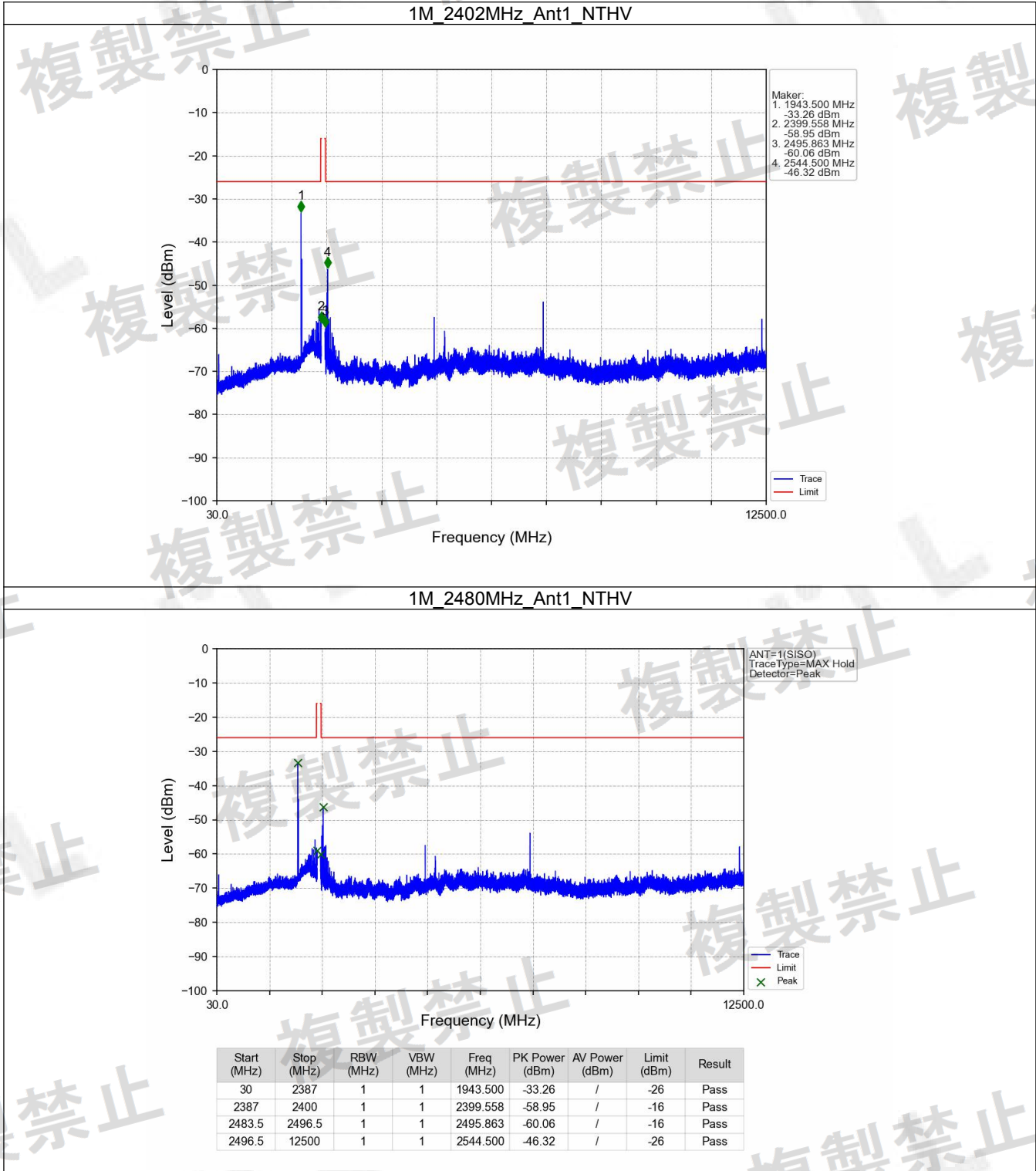


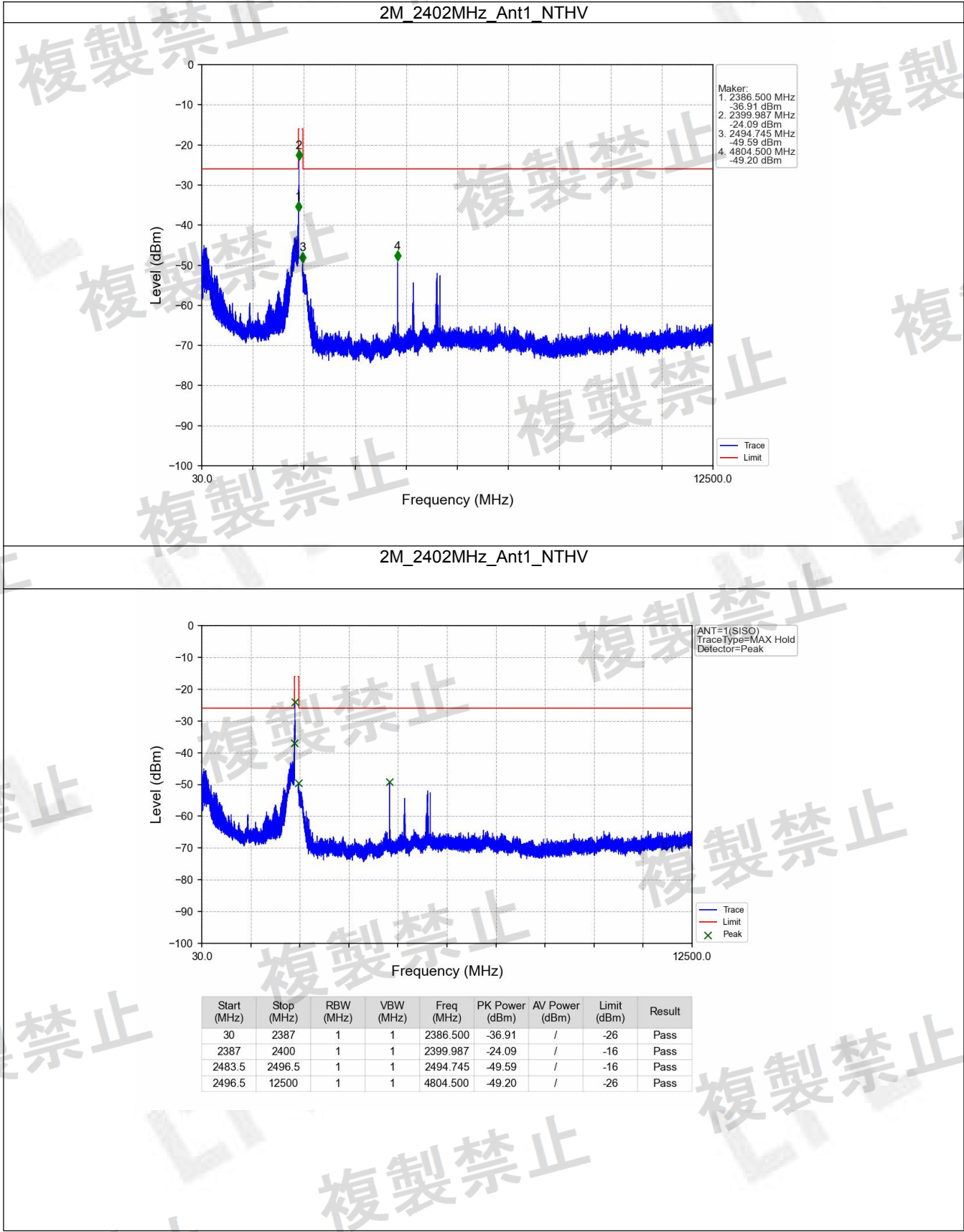
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	2387	1	1	2386.500	-37.22	/	-26	Pass
2387	2400	1	1	2399.974	-24.02	/	-16	Pass
2483.5	2496.5	1	1	2494.602	-49.81	/	-16	Pass
2496.5	12500	1	1	4804.500	-49.78	/	-26	Pass

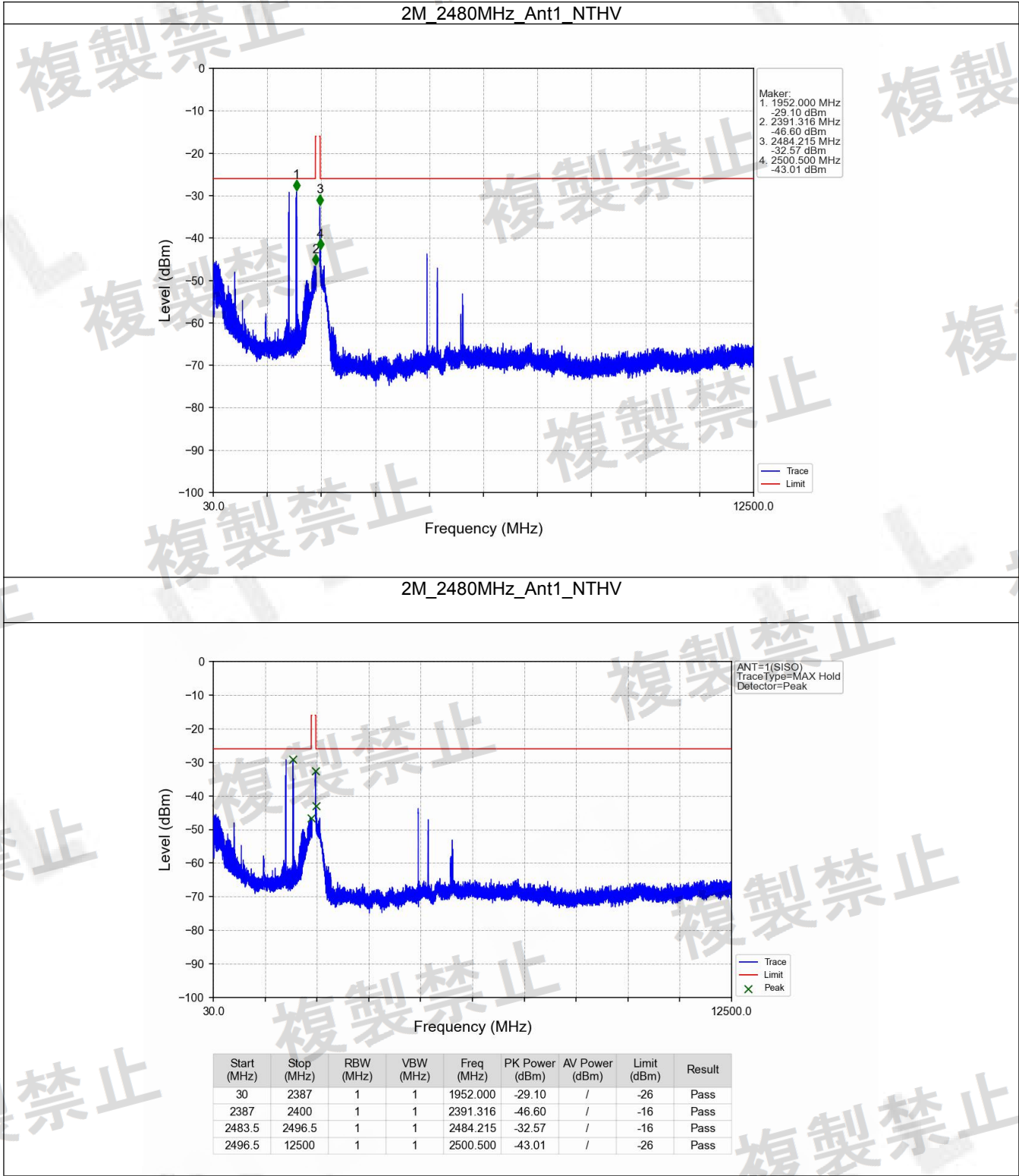


4.2.3 TxSe_NTHV









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	981.75	-77.72	0.017	/	/	4	Pass
				1000	12500	2414	-61.10	0.776	/	/	20	Pass
		2480	1	30	1000	916.05	-78.44	0.014	/	/	4	Pass
				1000	12500	2414	-62.32	0.586	/	/	20	Pass
2M	SISO	2402	1	30	1000	883.6	-78.33	0.015	/	/	4	Pass
				1000	12500	2110.5	-63.47	0.450	/	/	20	Pass
		2480	1	30	1000	723.1	-77.56	0.018	/	/	4	Pass
				1000	12500	2138.5	-63.33	0.465	/	/	20	Pass

5.1.2 RxSe_NTLV

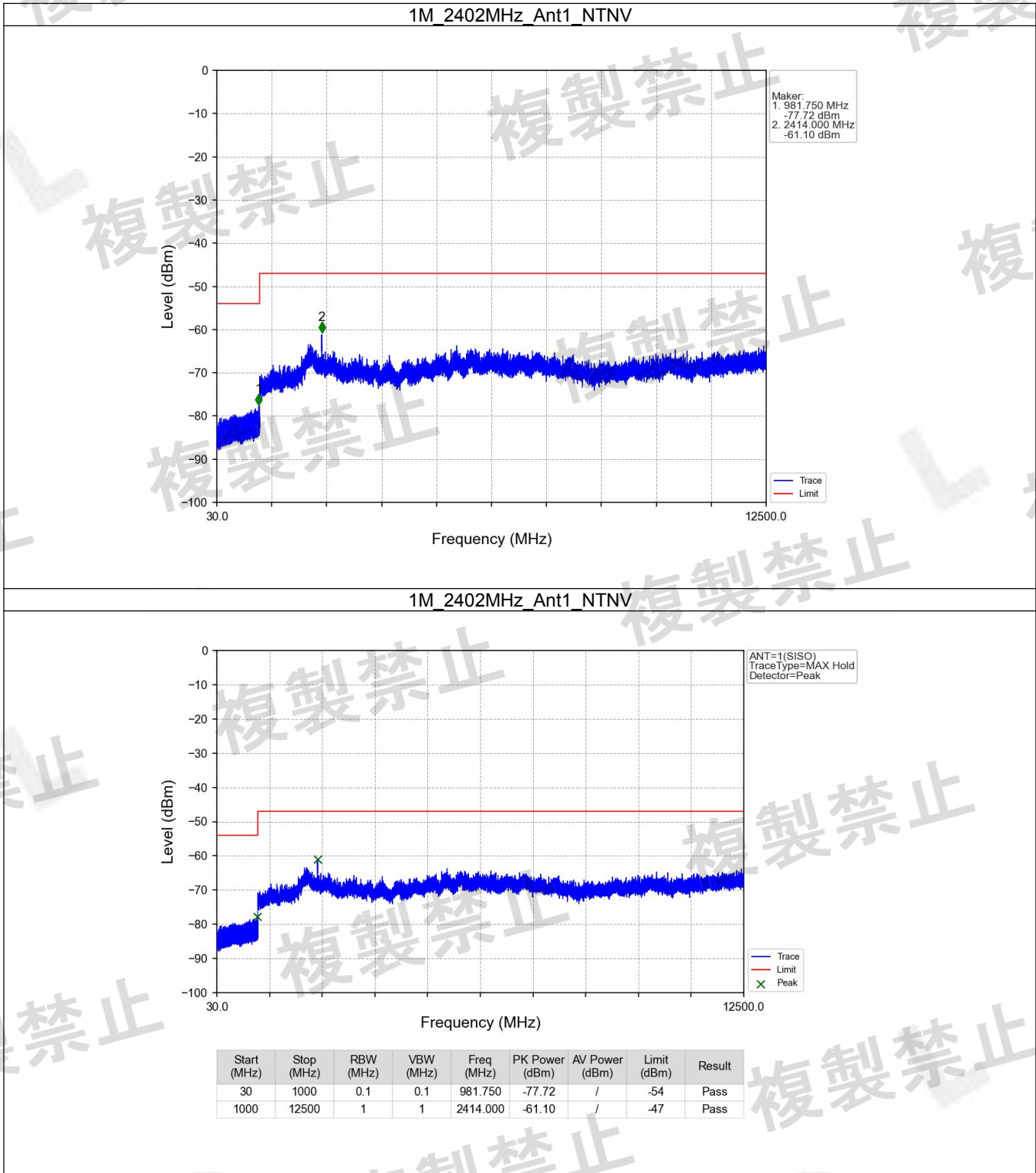
NTLV												
Mode	TX Type	Freq. (MHz)	ANT	Freq. Range		Marker					Limit (nW)	Verdict
				Start (MHz)	Stop (MHz)	Freq. (MHz)	PK Power (dBm)	PK Power (nW)	AV Power (dBm)	AV Power (nW)		
1M	SISO	2402	1	30	1000	988.2	-78.06	0.016	/	/	4	Pass
				1000	12500	2414	-61.94	0.640	/	/	20	Pass
		2480	1	30	1000	780.9	-78.51	0.014	/	/	4	Pass
				1000	12500	2414.5	-59.81	1.045	/	/	20	Pass
2M	SISO	2402	1	30	1000	988.75	-78.26	0.015	/	/	4	Pass
				1000	12500	2409	-62.96	0.506	/	/	20	Pass
		2480	1	30	1000	919.65	-78.10	0.015	/	/	4	Pass
				1000	12500	2219	-62.86	0.518	/	/	20	Pass

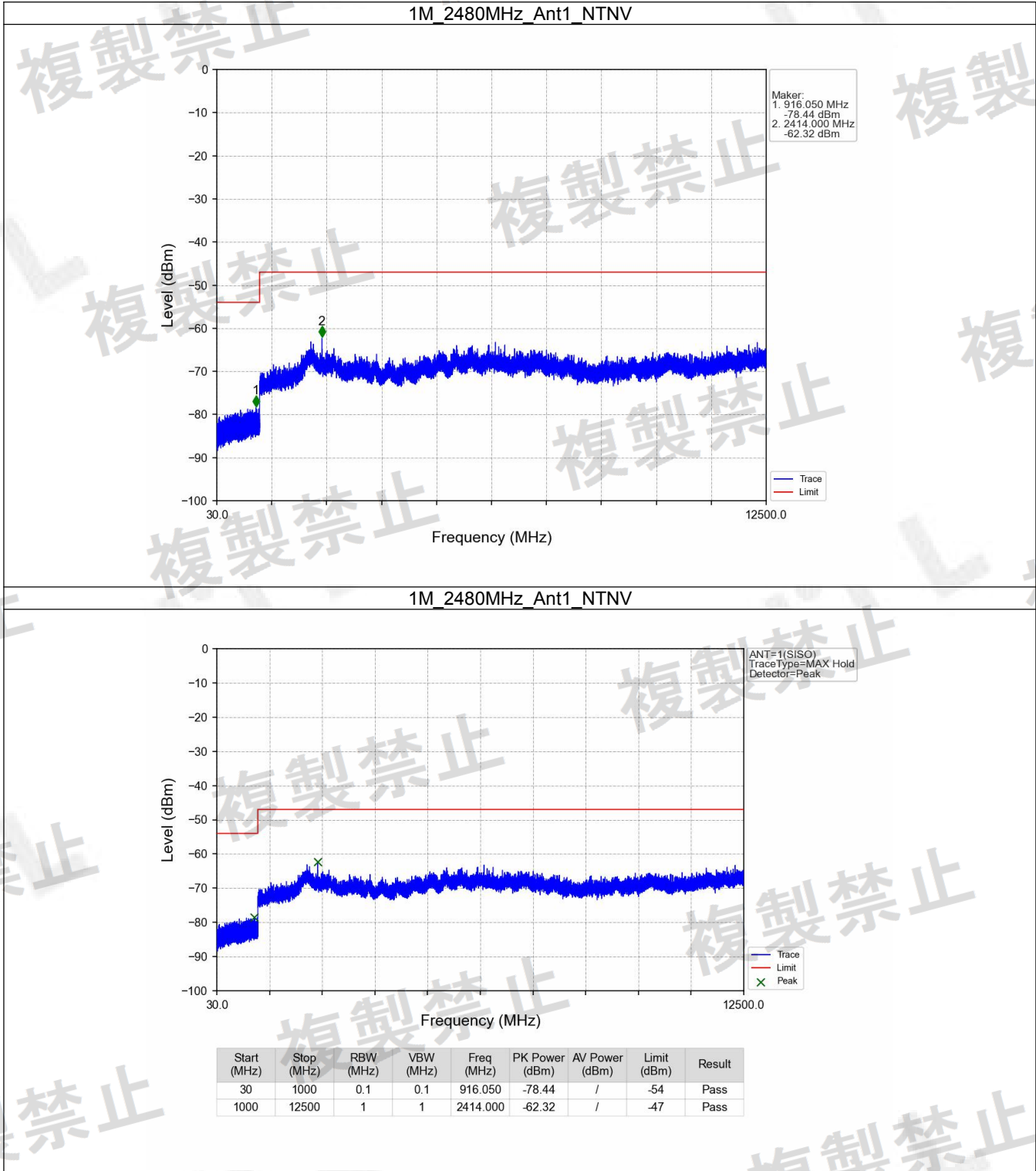
5.1.3 RxSe_NTHV

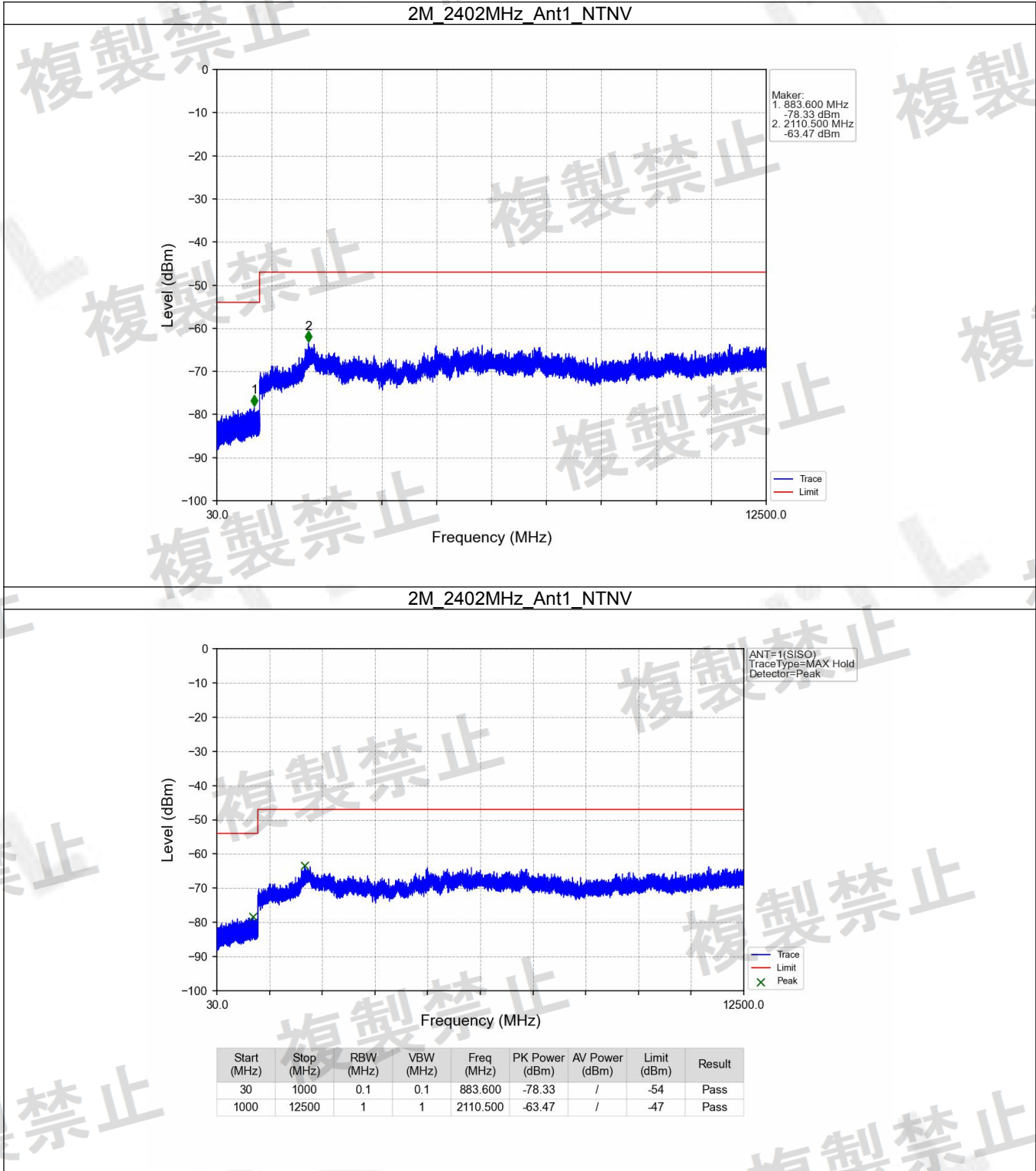
NTHV												
Mode	TX Type	Freq. (MHz)	ANT	Freq. Range		Marker					Limit (nW)	Verdict
				Start (MHz)	Stop (MHz)	Freq. (MHz)	PK Power (dBm)	PK Power (nW)	AV Power (dBm)	AV Power (nW)		
1M	SISO	2402	1	30	1000	983.95	-77.78	0.017	/	/	4	Pass
				1000	12500	2414	-61.79	0.662	/	/	20	Pass
		2480	1	30	1000	901.55	-77.86	0.016	/	/	4	Pass
				1000	12500	2238.5	-63.21	0.478	/	/	20	Pass
2M	SISO	2402	1	30	1000	925.9	-77.86	0.016	/	/	4	Pass
				1000	12500	2157.5	-63.91	0.406	/	/	20	Pass
		2480	1	30	1000	777.75	-77.48	0.018	/	/	4	Pass
				1000	12500	12440.5	-63.31	0.467	/	/	20	Pass

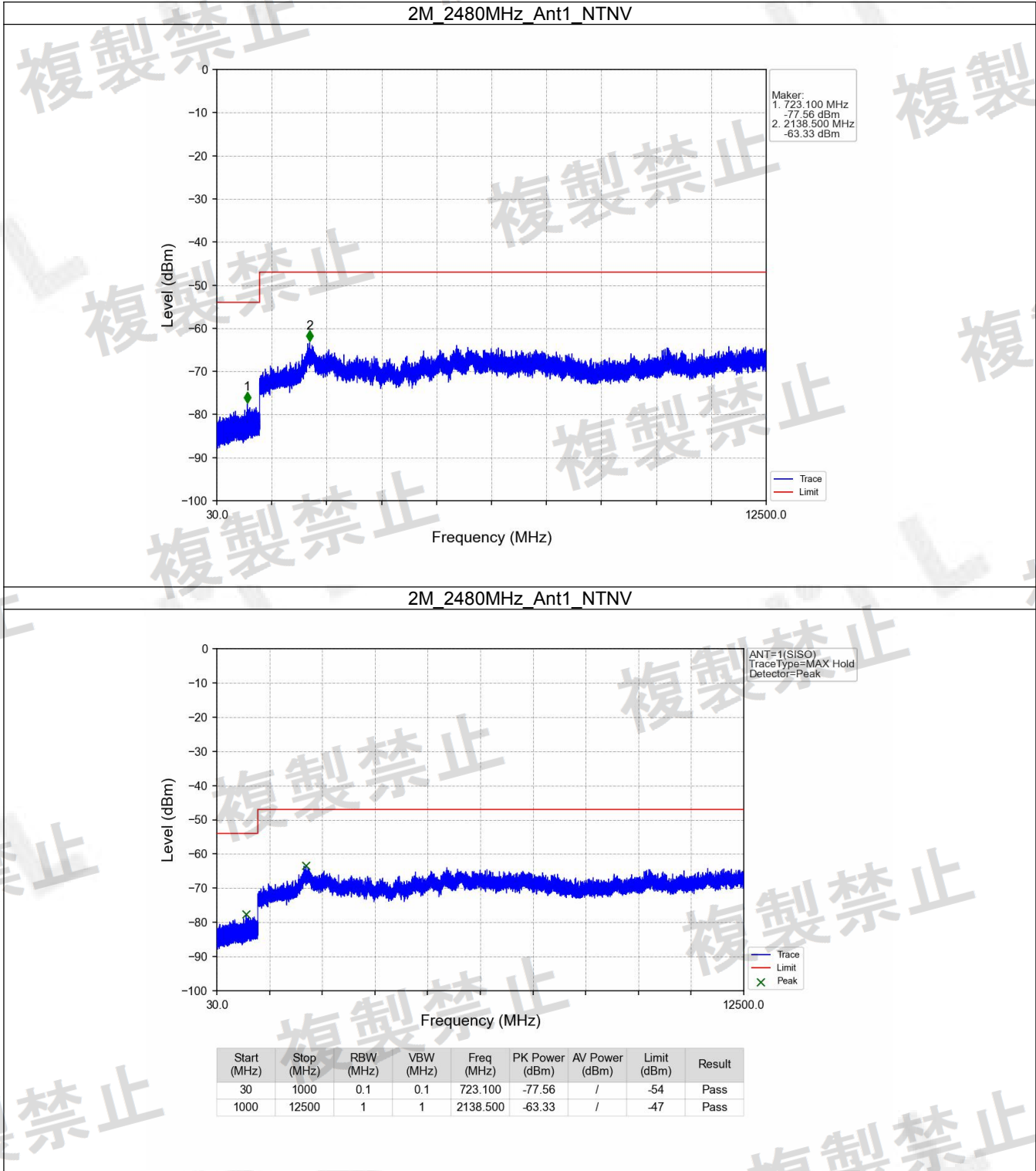
5.2 Test Graph

5.2.1 RxSe_NTNV

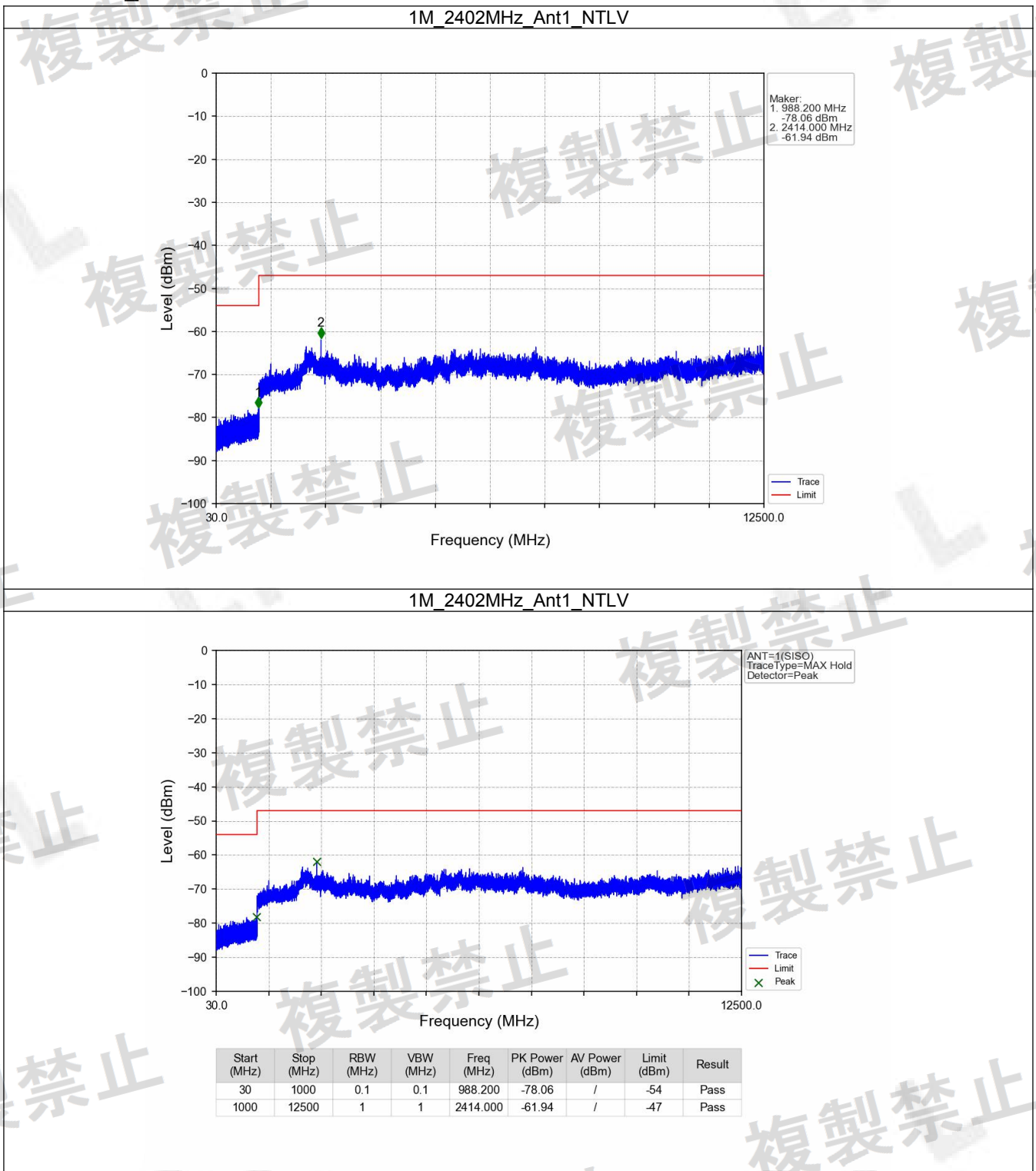


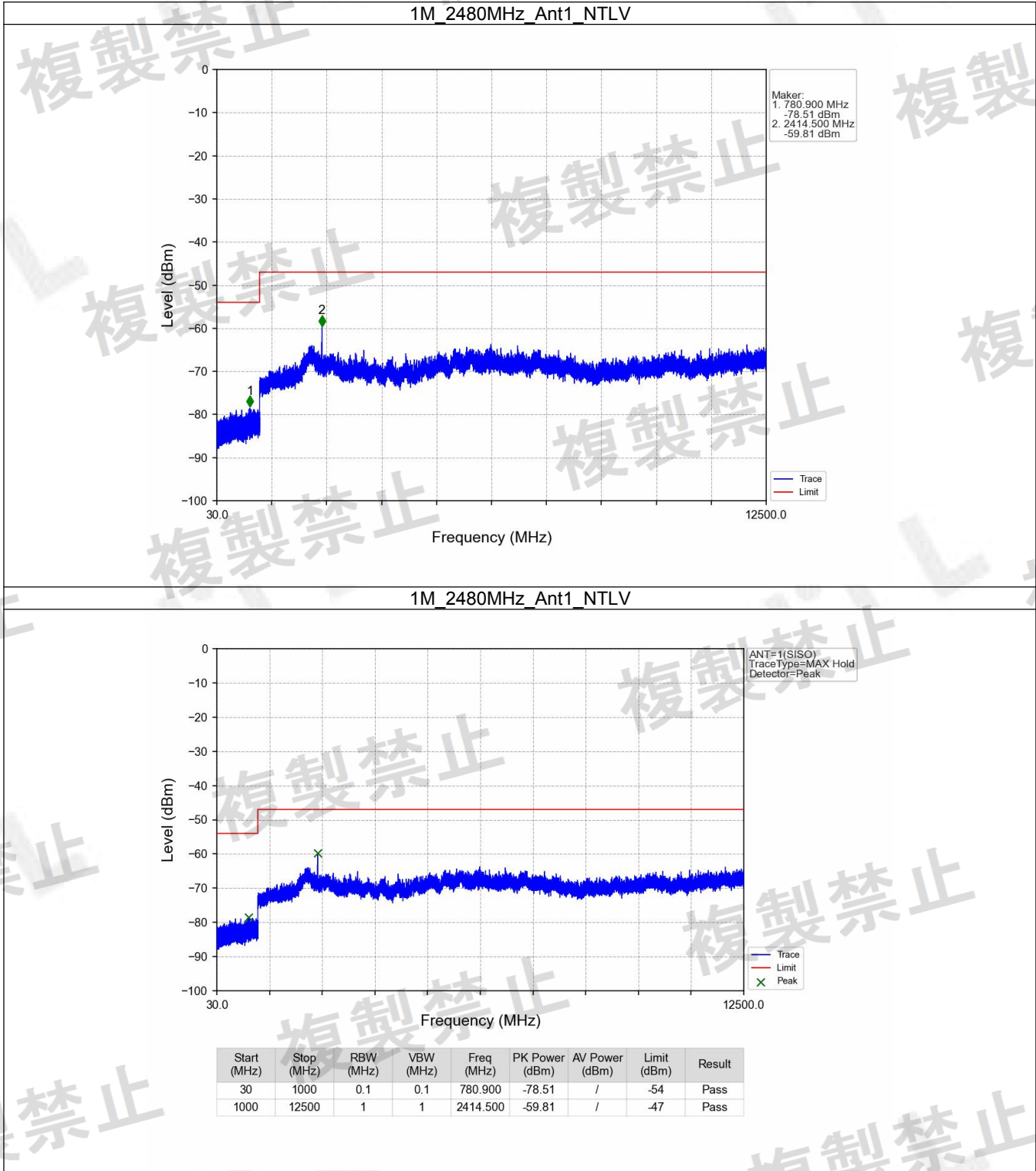


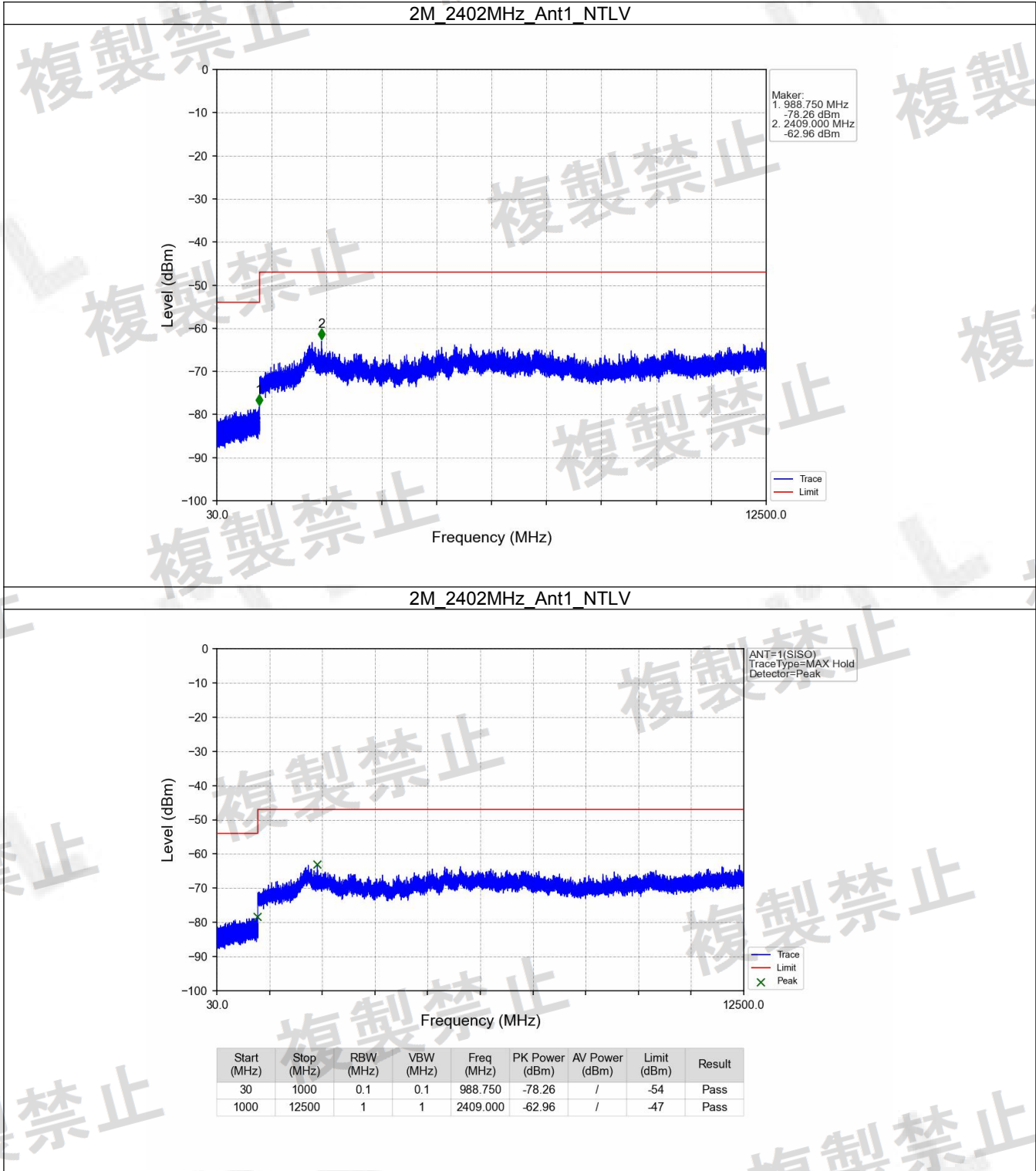


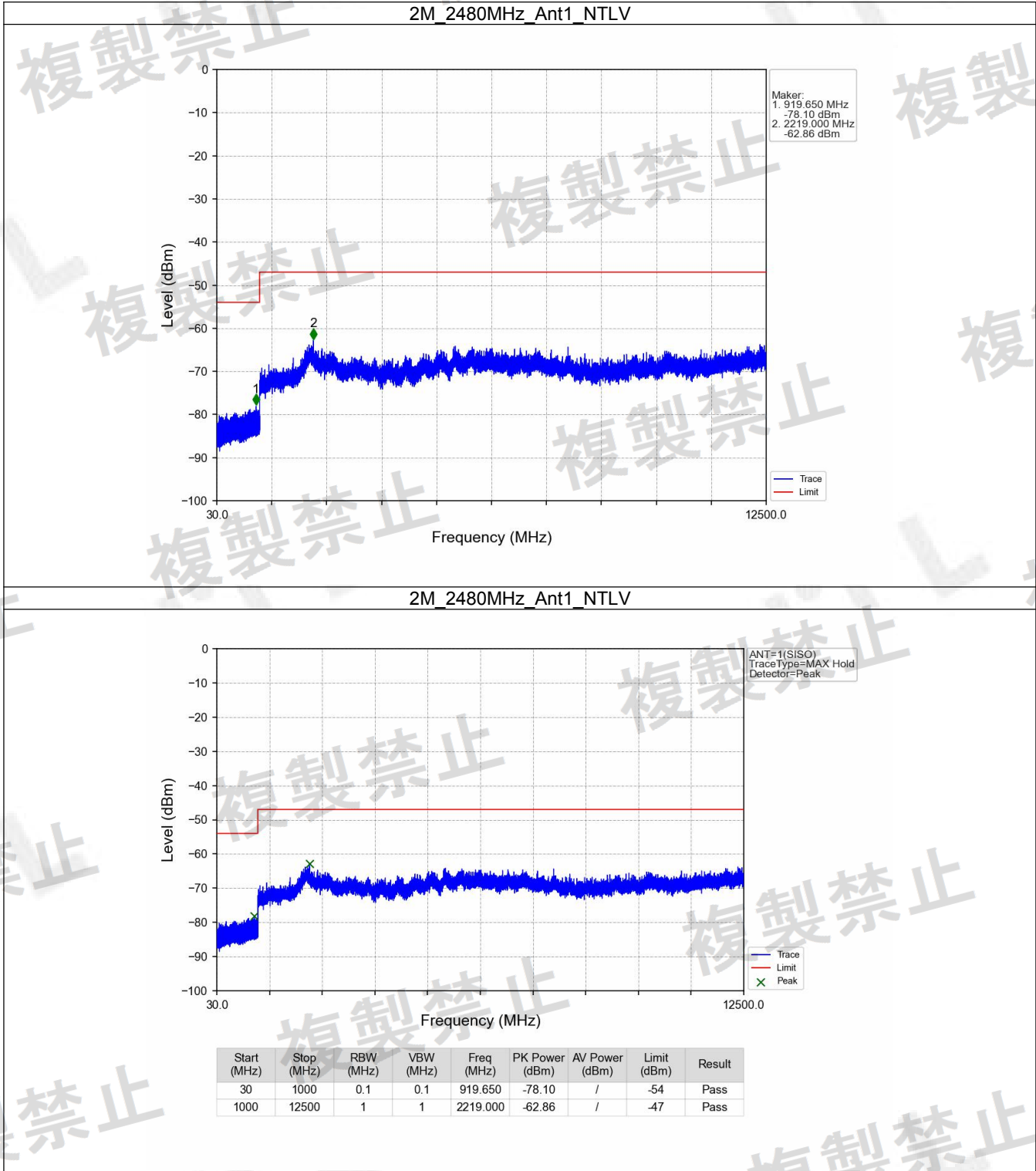


5.2.2 RxSe_NTLV









5.2.3 RxSe_NTHV

