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Annex for Bluetooth low Energy

Test Report No.: CTL2512242061-MIC01

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MIC: 219-269004

1. Frequency Error

1.1 Test Result

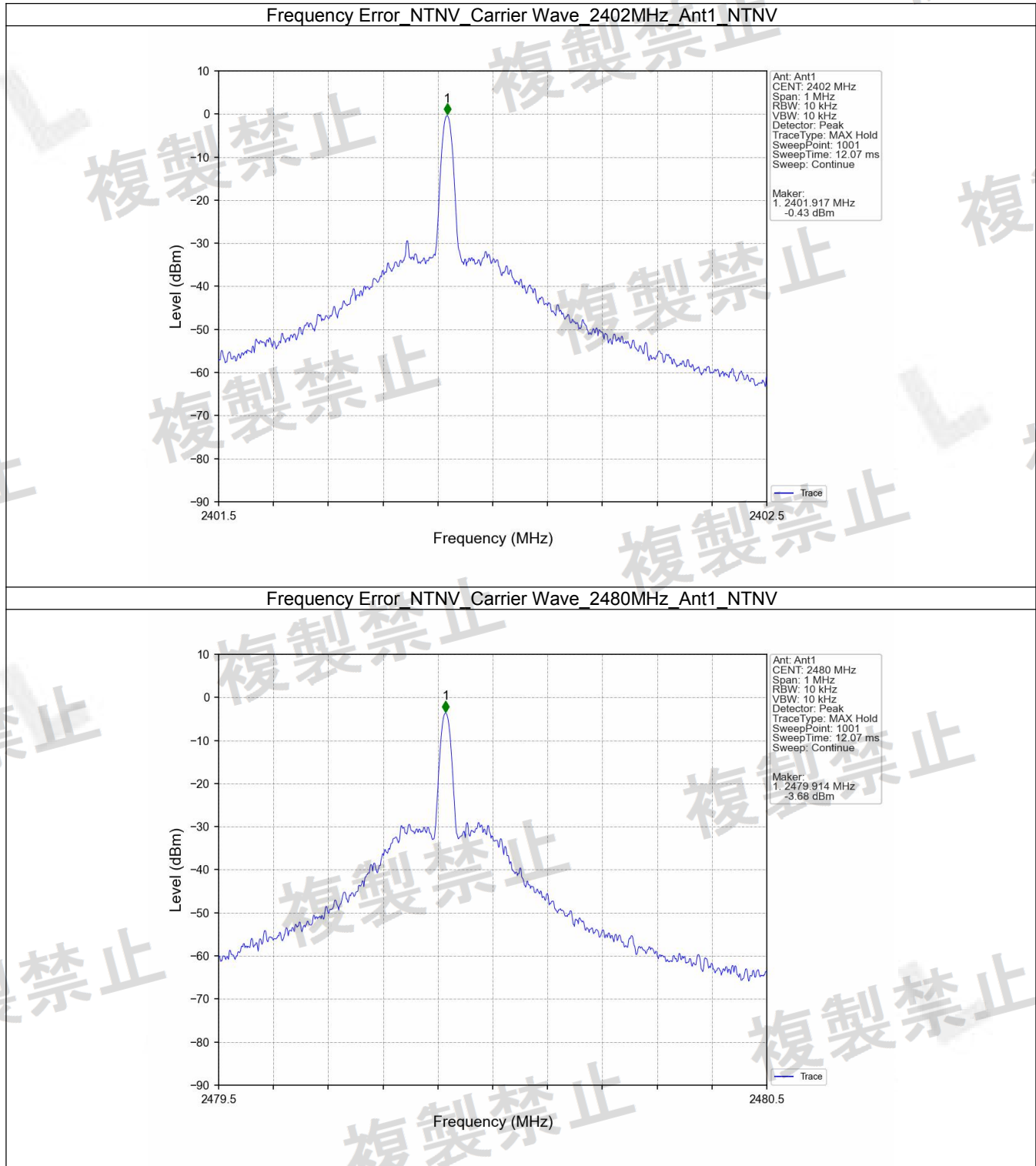
1.1.1 Ant1

Ant1							
ENV	Mode	TX Type	Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)		Verdict
					Result	Limit	
NTNV	Carrier Wave	SISO	2402	2401.917	-34.55	-50 to 50	Pass
			2480	2479.914	-34.68	-50 to 50	Pass
NTLV	Carrier Wave	SISO	2402	2401.917	-34.55	-50 to 50	Pass
			2480	2479.914	-34.68	-50 to 50	Pass
NTHV	Carrier Wave	SISO	2402	2401.917	-34.55	-50 to 50	Pass
			2480	2479.914	-34.68	-50 to 50	Pass

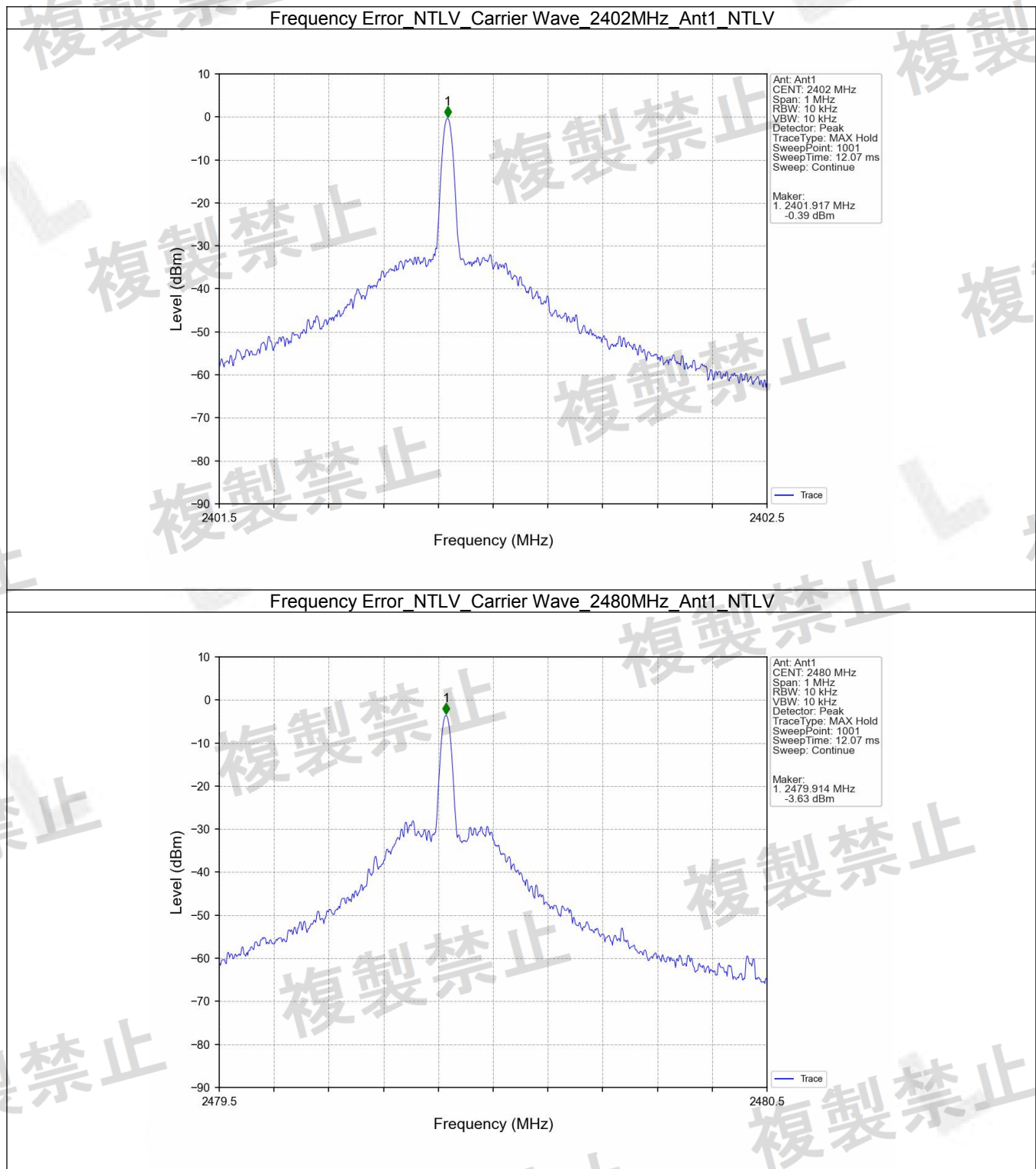
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1.2 Test Graph

1.2.1 Ant1

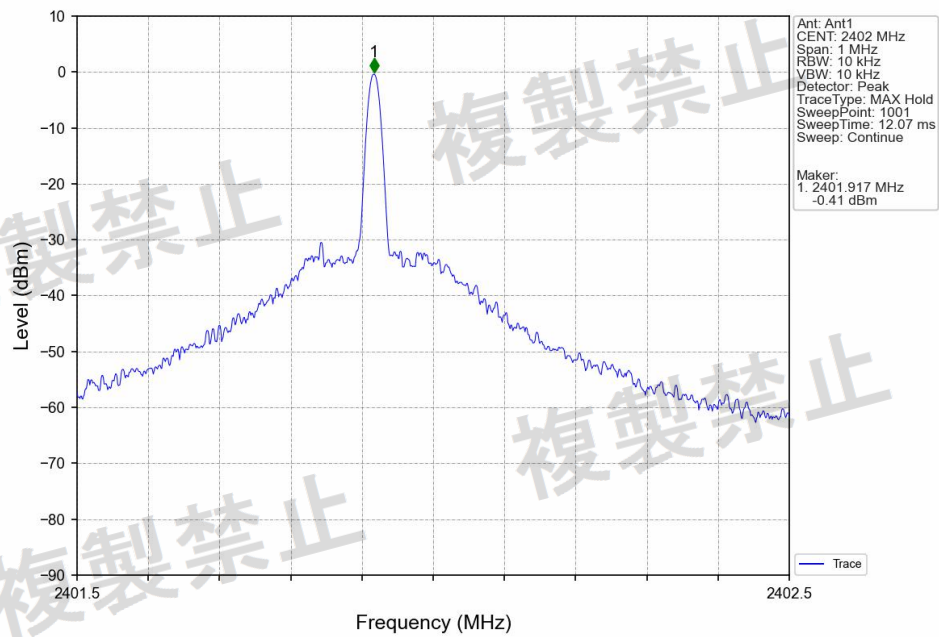


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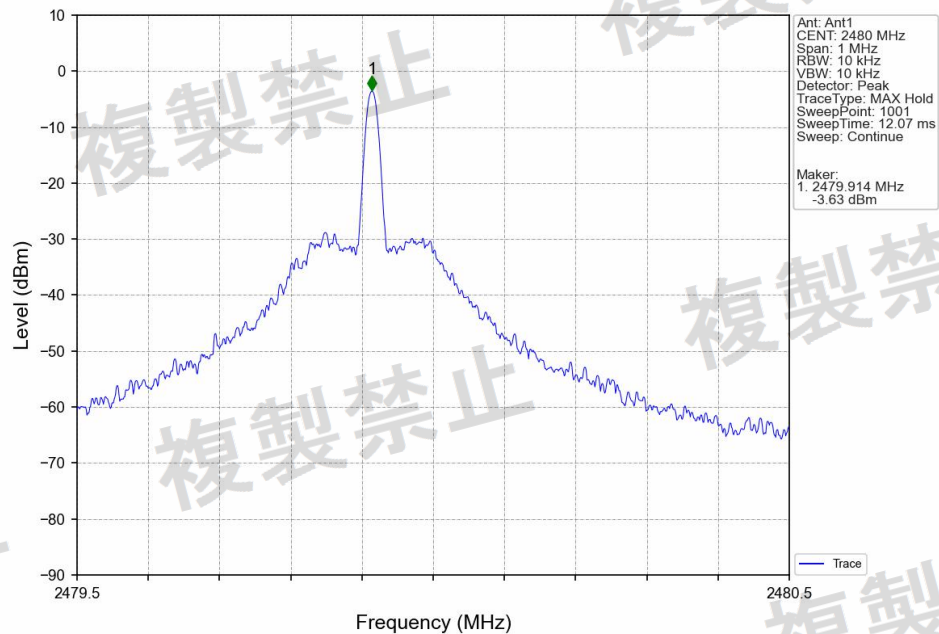


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Frequency Error_NTHV_Carrier Wave_2402MHz_Ant1_NTHV



Frequency Error_NTHV_Carrier Wave_2480MHz_Ant1_NTHV



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2. Occupied Bandwidth

2.1 Test Result

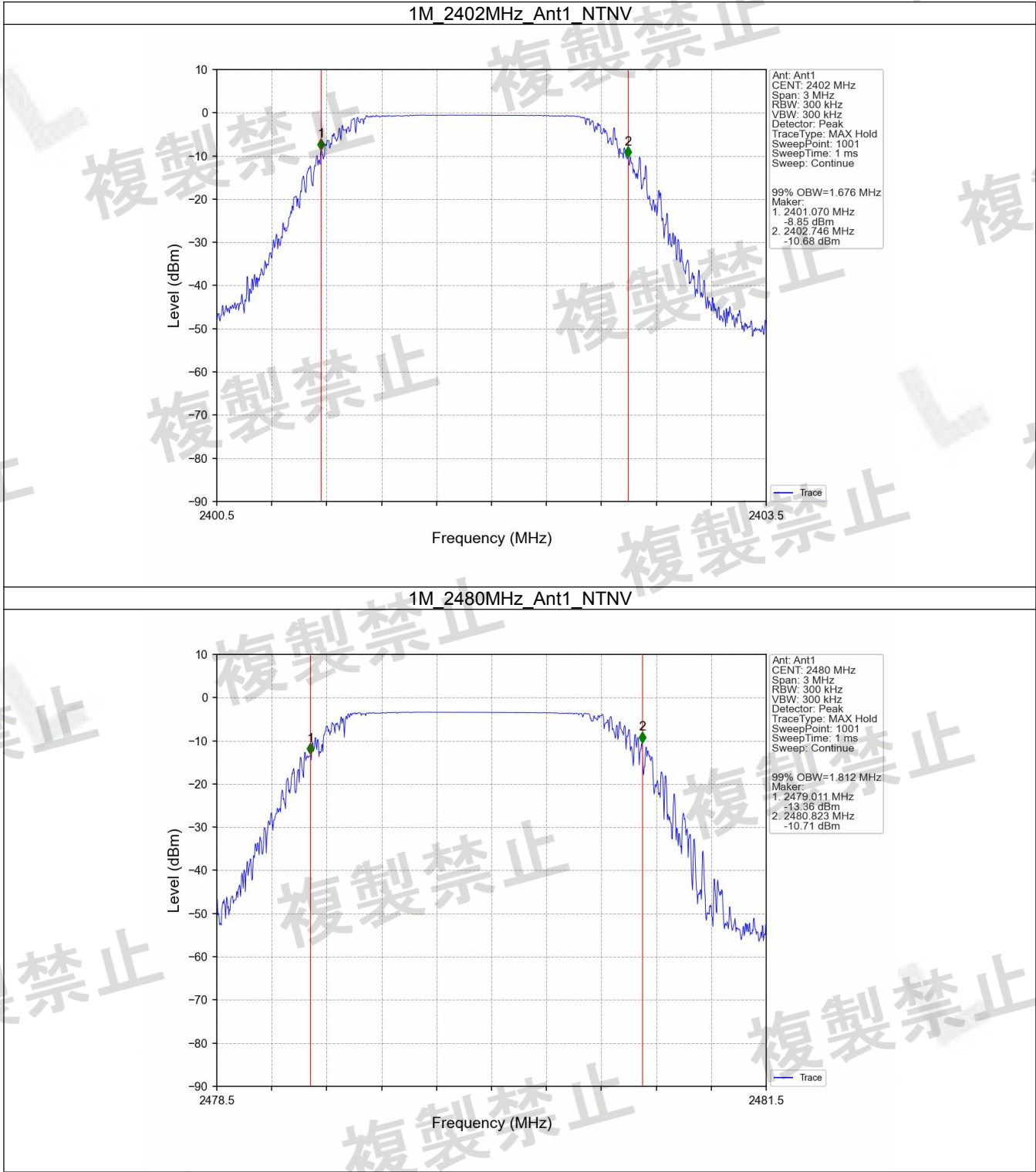
2.1.1 OBW

ENV	Mode	TX Type	Frequency (MHz)	99% Occupied Bandwidth (MHz)		Verdict
				ANT1	Limit	
NTNV	1M	SISO	2402	1.676	≤ 26	Pass
			2480	1.812	≤ 26	Pass
NTLV	1M	SISO	2402	1.654	≤ 26	Pass
			2480	1.820	≤ 26	Pass
NTHV	1M	SISO	2402	1.680	≤ 26	Pass
			2480	1.792	≤ 26	Pass

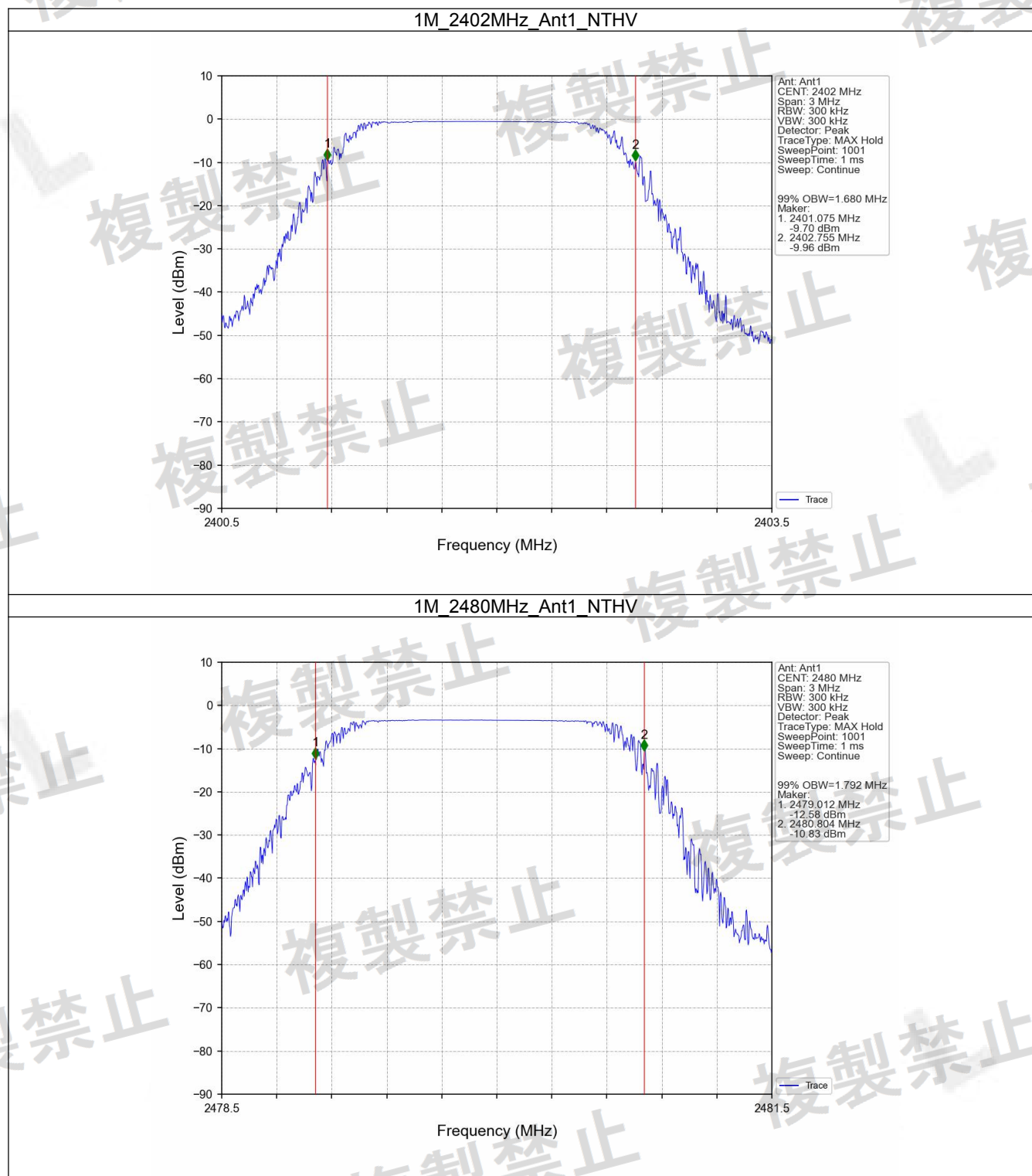
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2.2 Test Graph

2.2.1 OBW



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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	0.677	<=10.00	0.860	-21.28	<=20	Pass
			2480	1	0.363	<=10.00	0.860	-57.79	<=20	Pass
NTLV	1M	SISO	2402	1	0.860	<=10.00	0.860	0.00	<=20	Pass
			2480	1	0.381	<=10.00	0.860	-55.70	<=20	Pass
NTHV	1M	SISO	2402	1	0.730	<=10.00	0.860	-15.12	<=20	Pass
			2480	1	0.358	<=10.00	0.860	-58.37	<=20	Pass

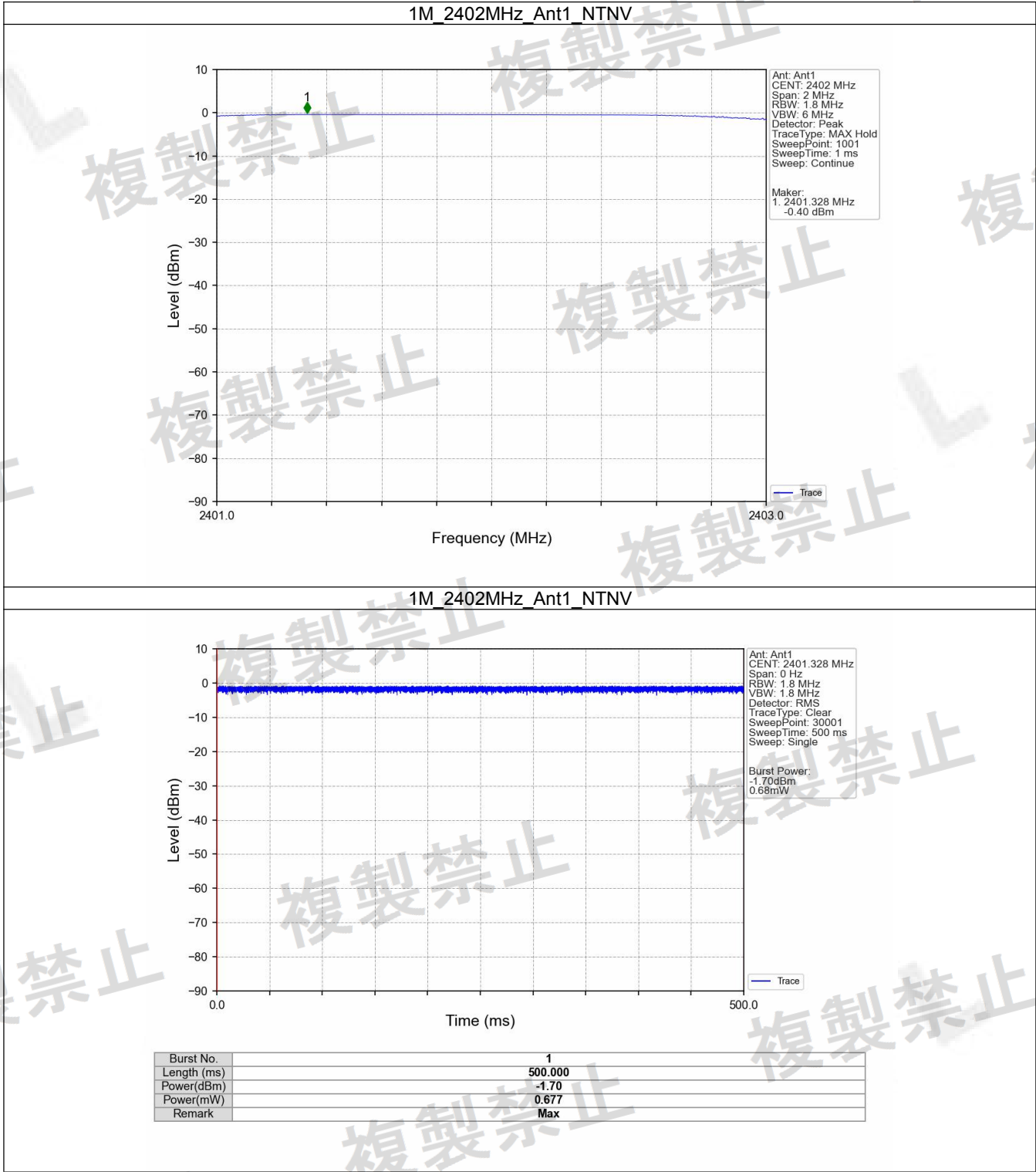
3.1.2 EIRP

ENV	Mode	TX Type	Frequency (MHz)	ANT	Gain (dBi)	EIRP (dBm)		Verdict
						Result	Limit	
NTNV	1M	SISO	2402	1	-0.51	-2.21	<=12.14	Pass
			2480	1	-0.51	-4.91	<=12.14	Pass
NTLV	1M	SISO	2402	1	-0.51	-1.16	<=12.14	Pass
			2480	1	-0.51	-4.70	<=12.14	Pass
NTHV	1M	SISO	2402	1	-0.51	-1.88	<=12.14	Pass
			2480	1	-0.51	-4.98	<=12.14	Pass

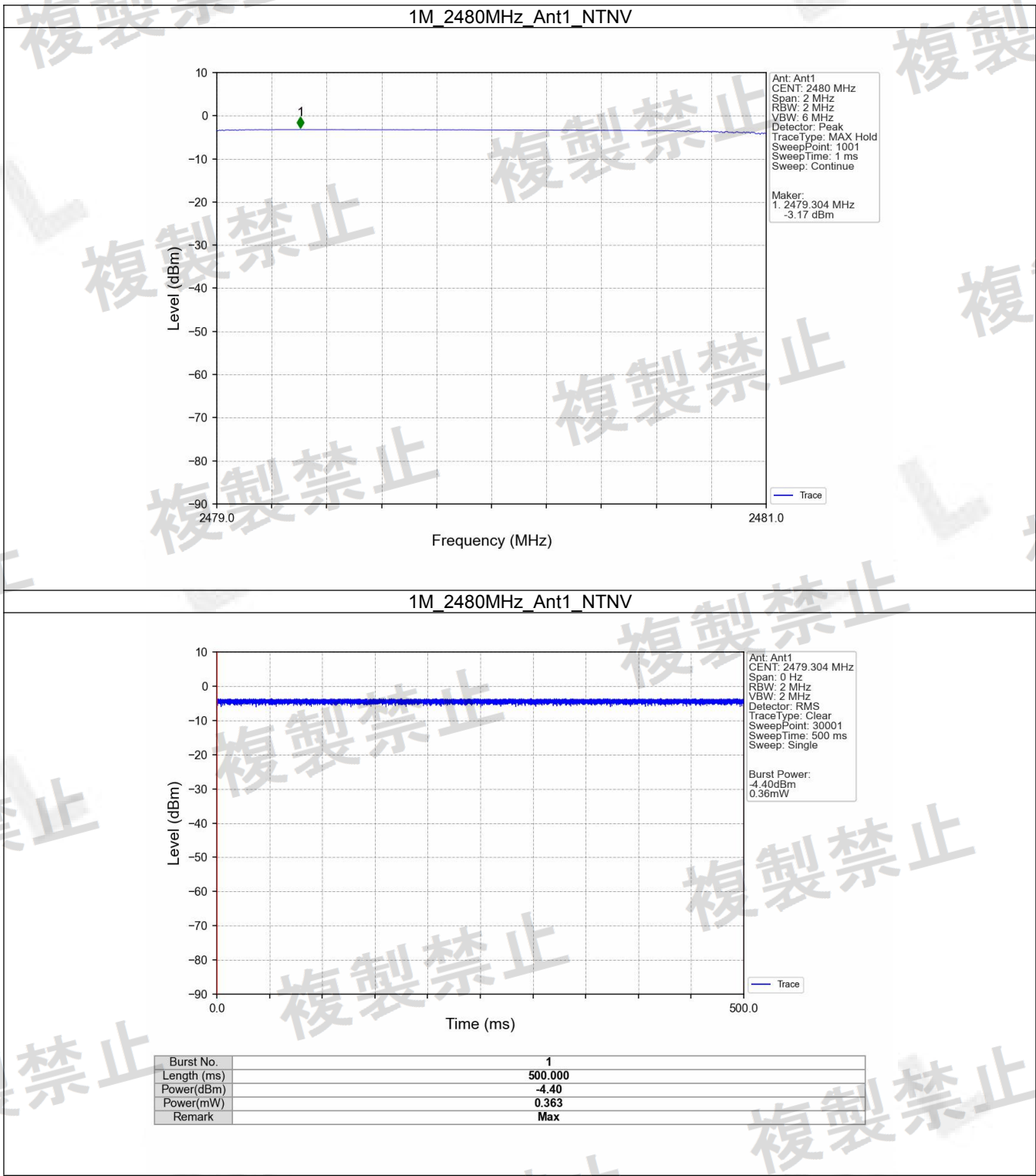
MIC: 219-269004

3.2 Test Graph

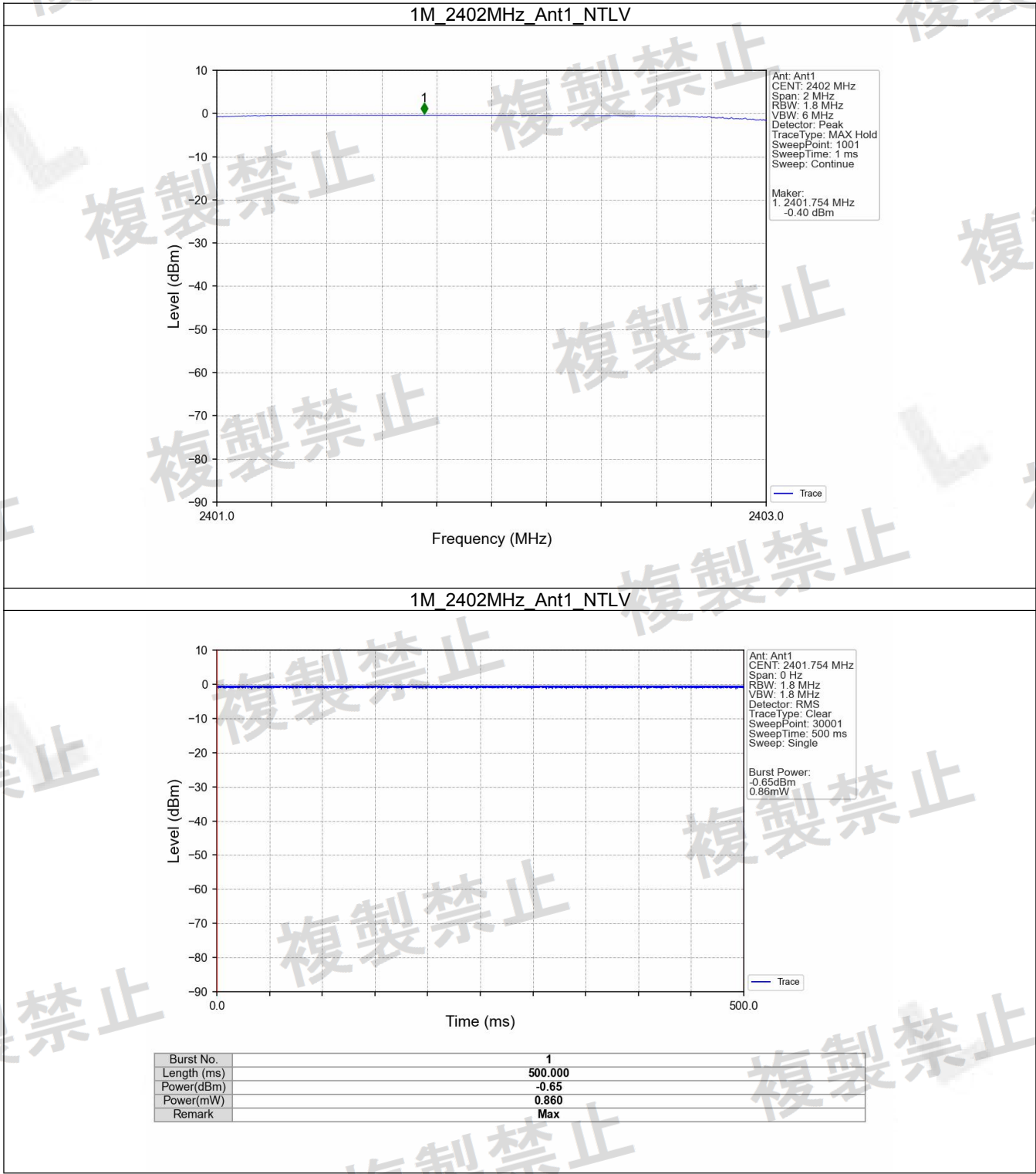
3.2.1 Power



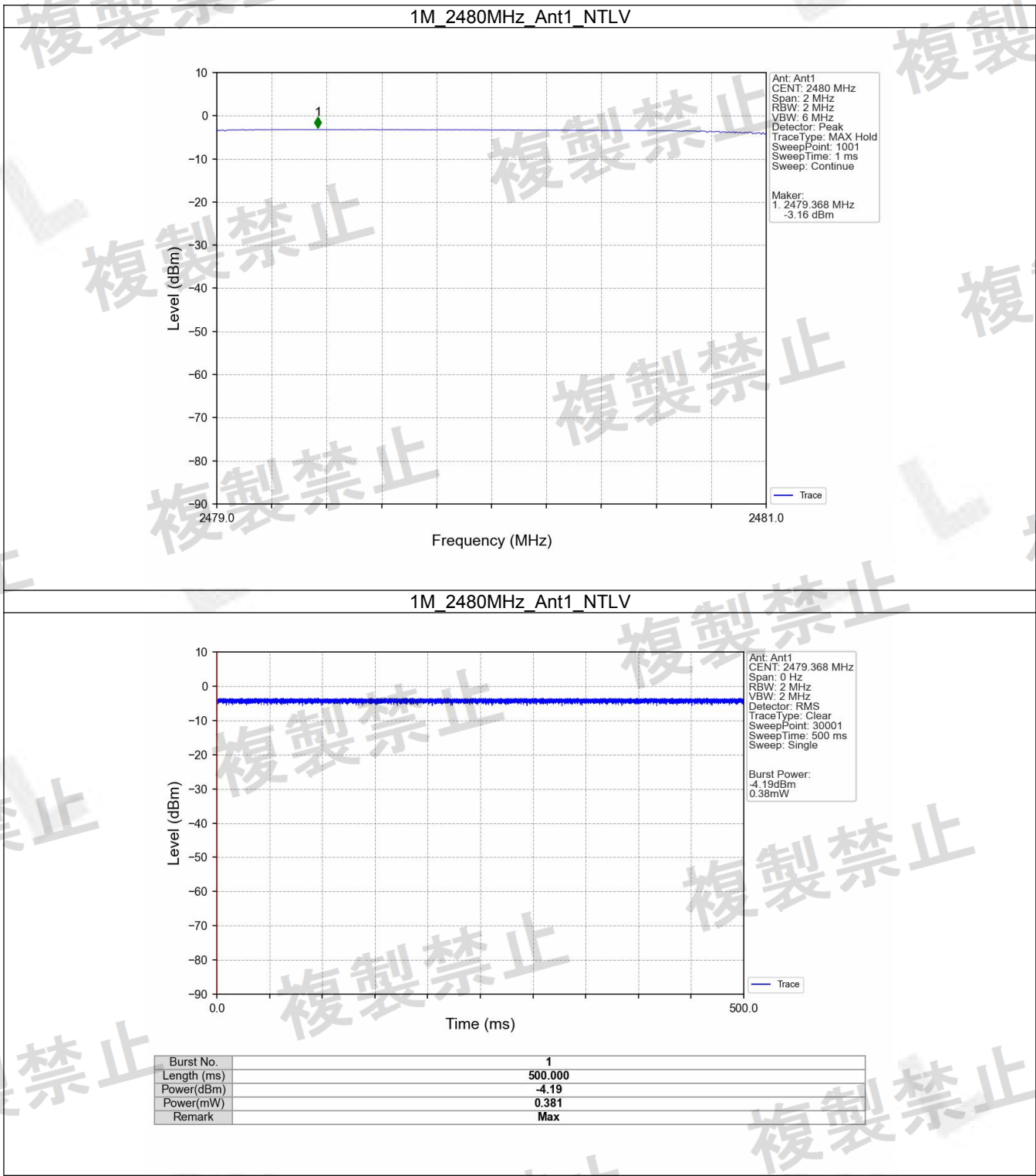
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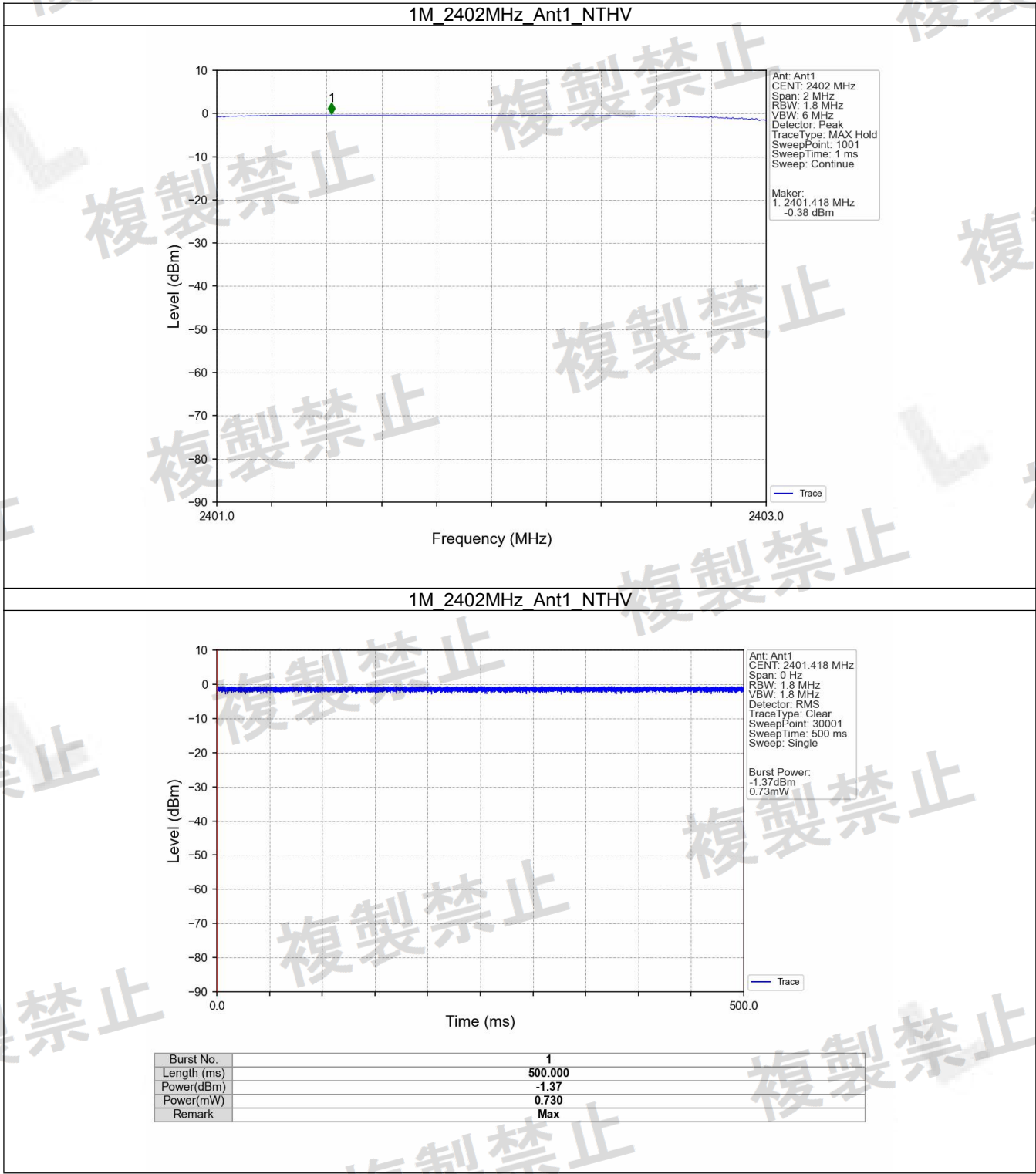
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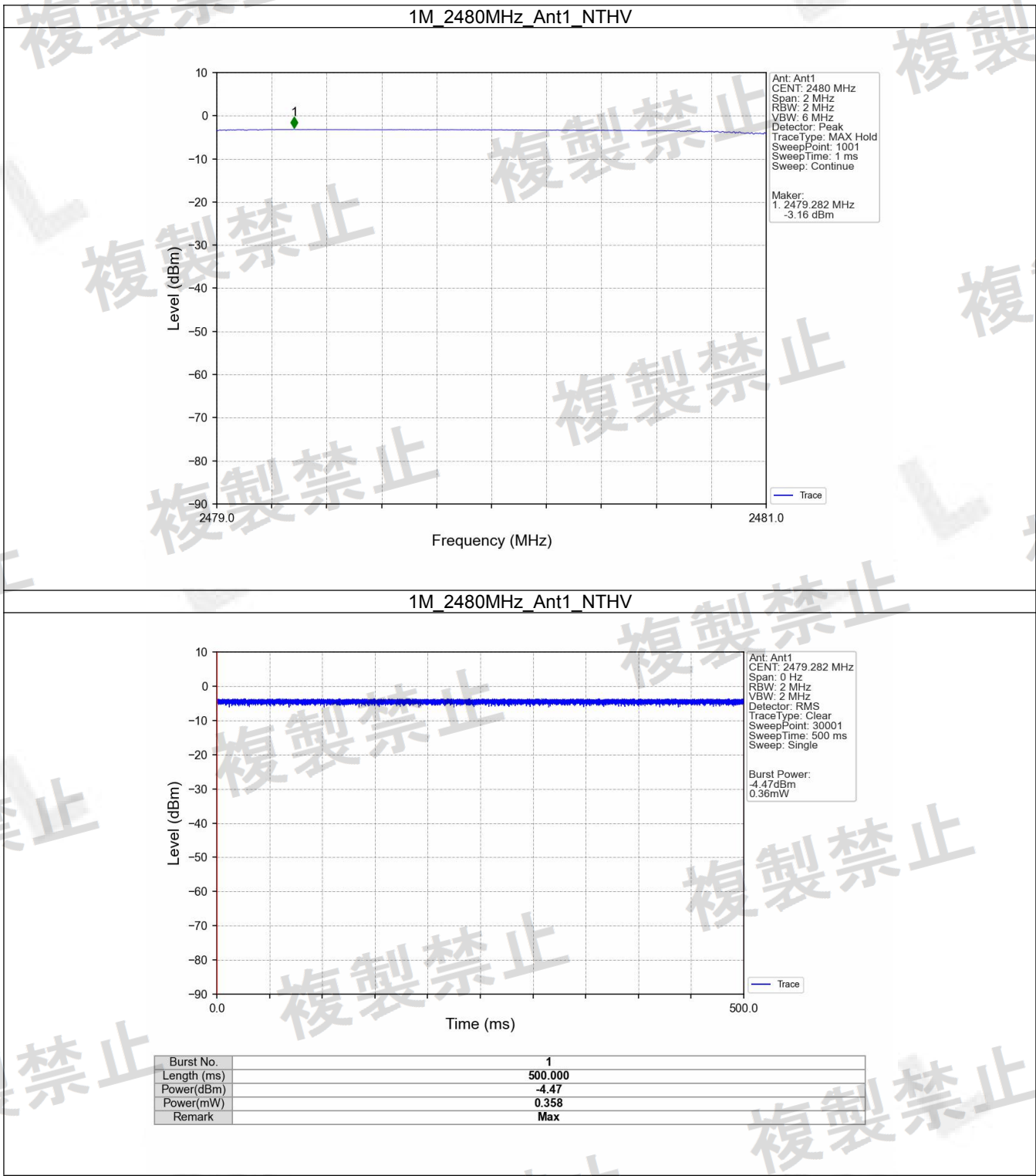
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4. Spurious Emission Intensity

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	30	-41.71	0.067	/	/	2.5	Pass
				2387	2400	2399.961	-25.86	2.594	/	/	25	Pass
				2483.5	2496.5	2484.995	-56.35	0.002	/	/	25	Pass
				2496.5	12500	4804	-40.51	0.089	/	/	2.5	Pass
		2480	1	30	2387	30	-43.02	0.050	/	/	2.5	Pass
				2387	2400	2397.894	-48.88	0.013	/	/	25	Pass
				2483.5	2496.5	2484.449	-34.63	0.344	/	/	25	Pass
				2496.5	12500	4960.5	-45.41	0.029	/	/	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	2371	-41.52	0.070	/	/	2.5	Pass
				2387	2400	2399.987	-24.27	3.741	/	/	25	Pass
				2483.5	2496.5	2484.683	-56.16	0.002	/	/	25	Pass
				2496.5	12500	4804.5	-40.35	0.092	/	/	2.5	Pass
		2480	1	30	2387	1771.5	-35.19	0.303	/	/	2.5	Pass
				2387	2400	2399.103	-51.02	0.008	/	/	25	Pass
				2483.5	2496.5	2484.436	-35.01	0.316	/	/	25	Pass
				2496.5	12500	4960.5	-45.34	0.029	/	/	2.5	Pass

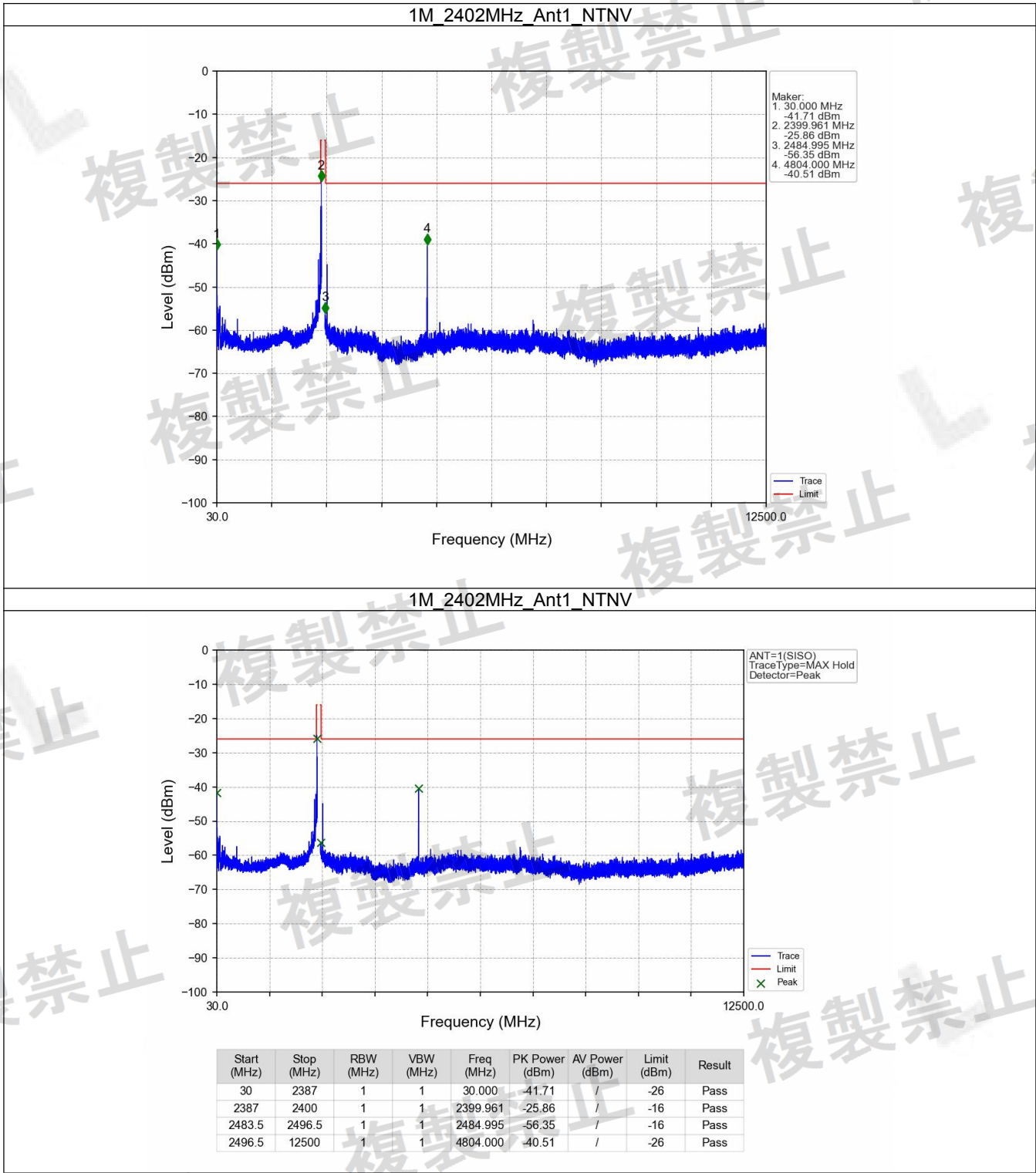
4.1.3 TxSe_NTHV

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	2370.5	-41.75	0.067	/	/	2.5	Pass
				2387	2400	2399.974	-24.13	3.864	/	/	25	Pass
				2483.5	2496.5	2493.913	-56.00	0.003	/	/	25	Pass
				2496.5	12500	4804	-40.57	0.088	/	/	2.5	Pass
		2480	1	30	2387	30	-43.24	0.047	/	/	2.5	Pass
				2387	2400	2398.141	-49.91	0.010	/	/	25	Pass
				2483.5	2496.5	2484.098	-34.87	0.326	/	/	25	Pass
				2496.5	12500	4961	-45.29	0.030	/	/	2.5	Pass

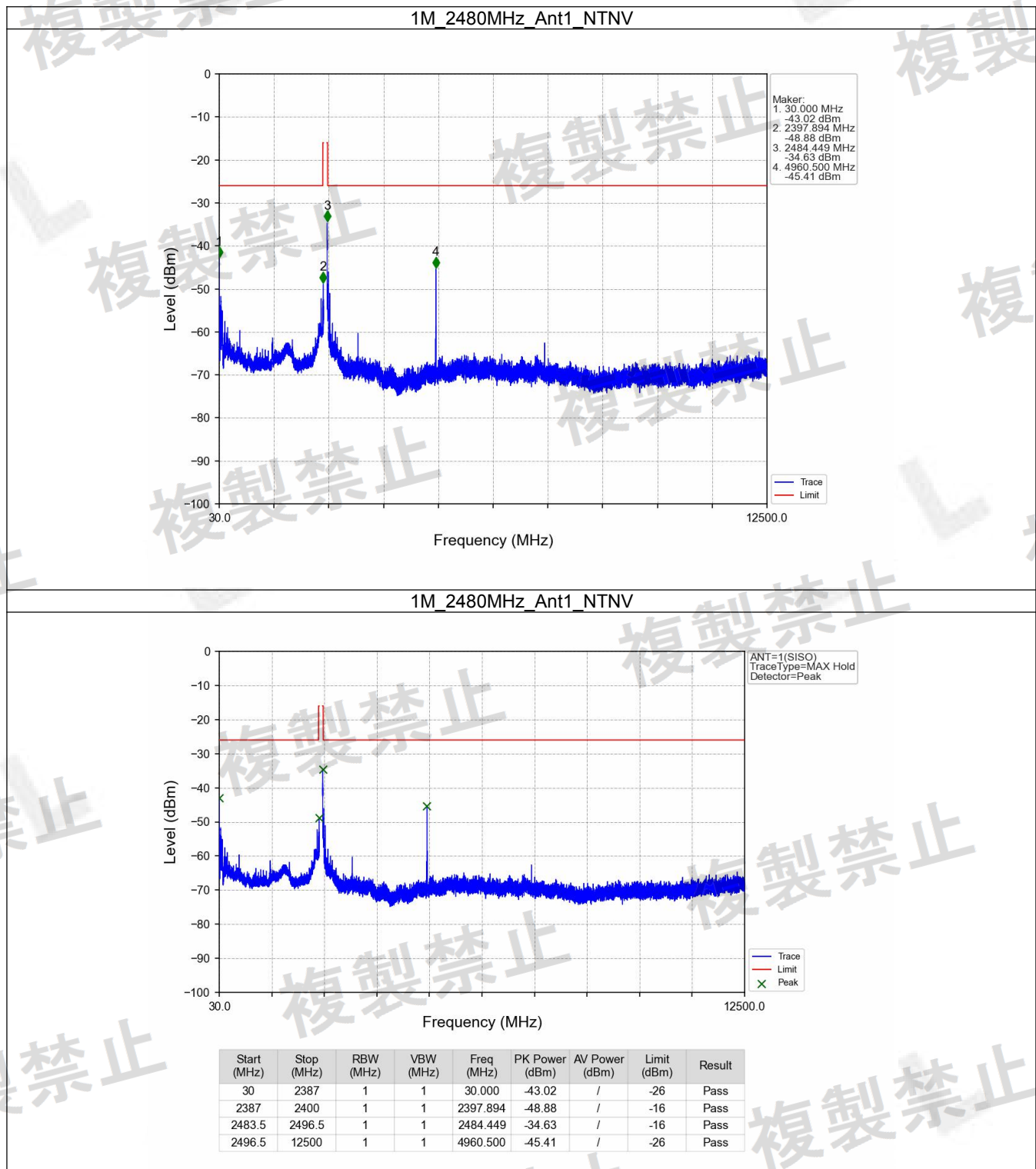
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4.2 Test Graph

4.2.1 TxSe_NTNV

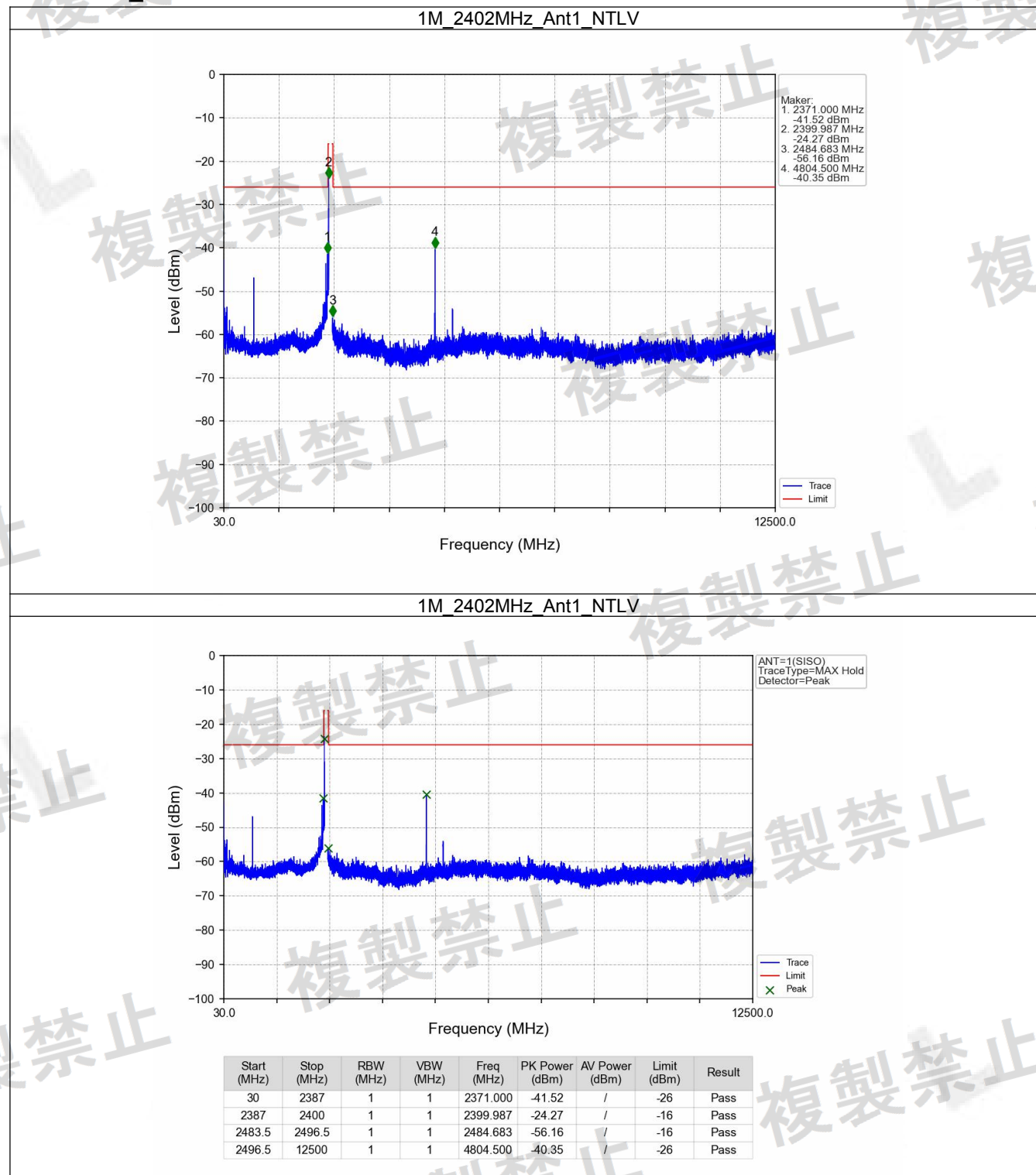


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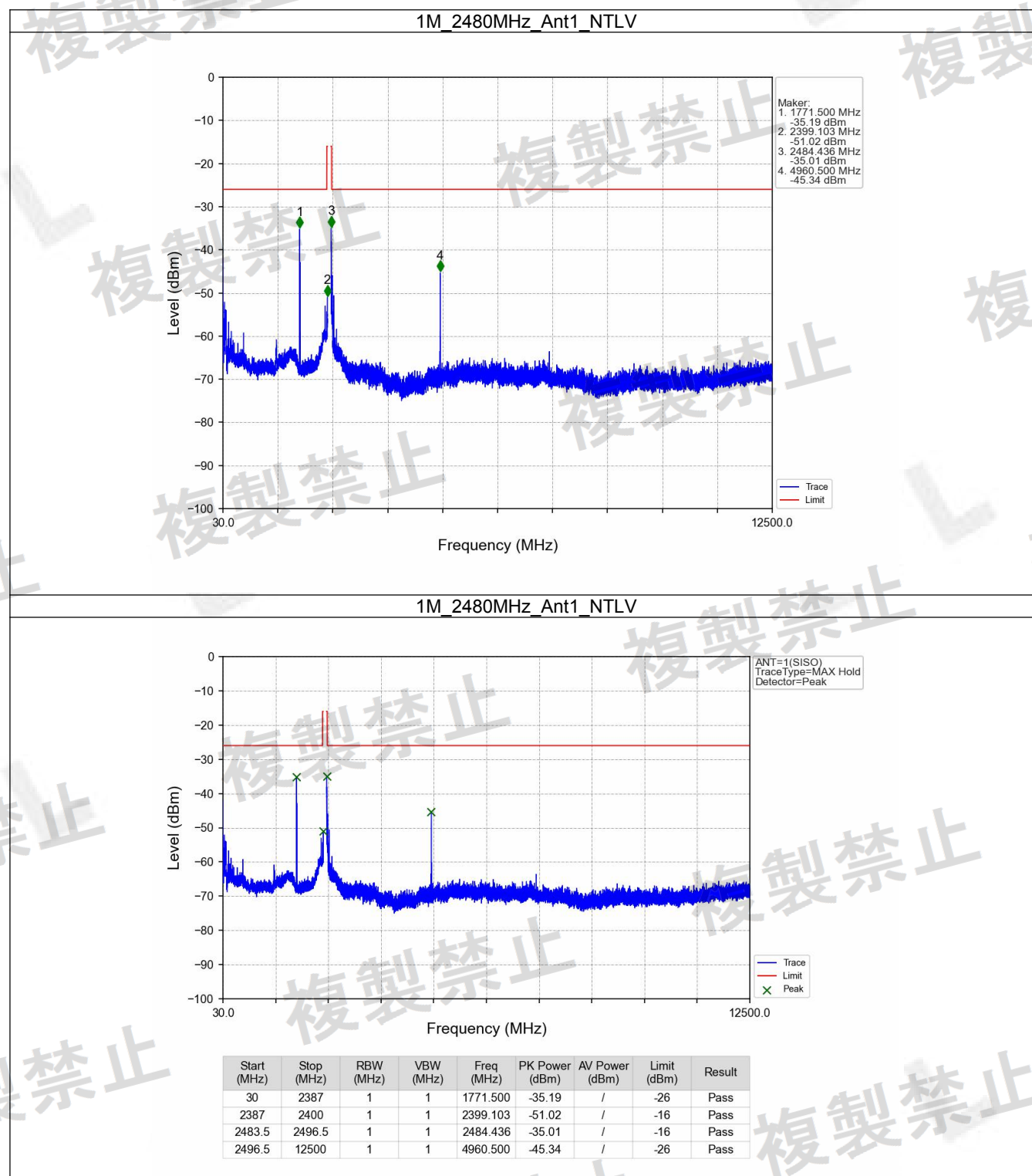


MIC: 219-269004

4.2.2 TxSe_NTLV

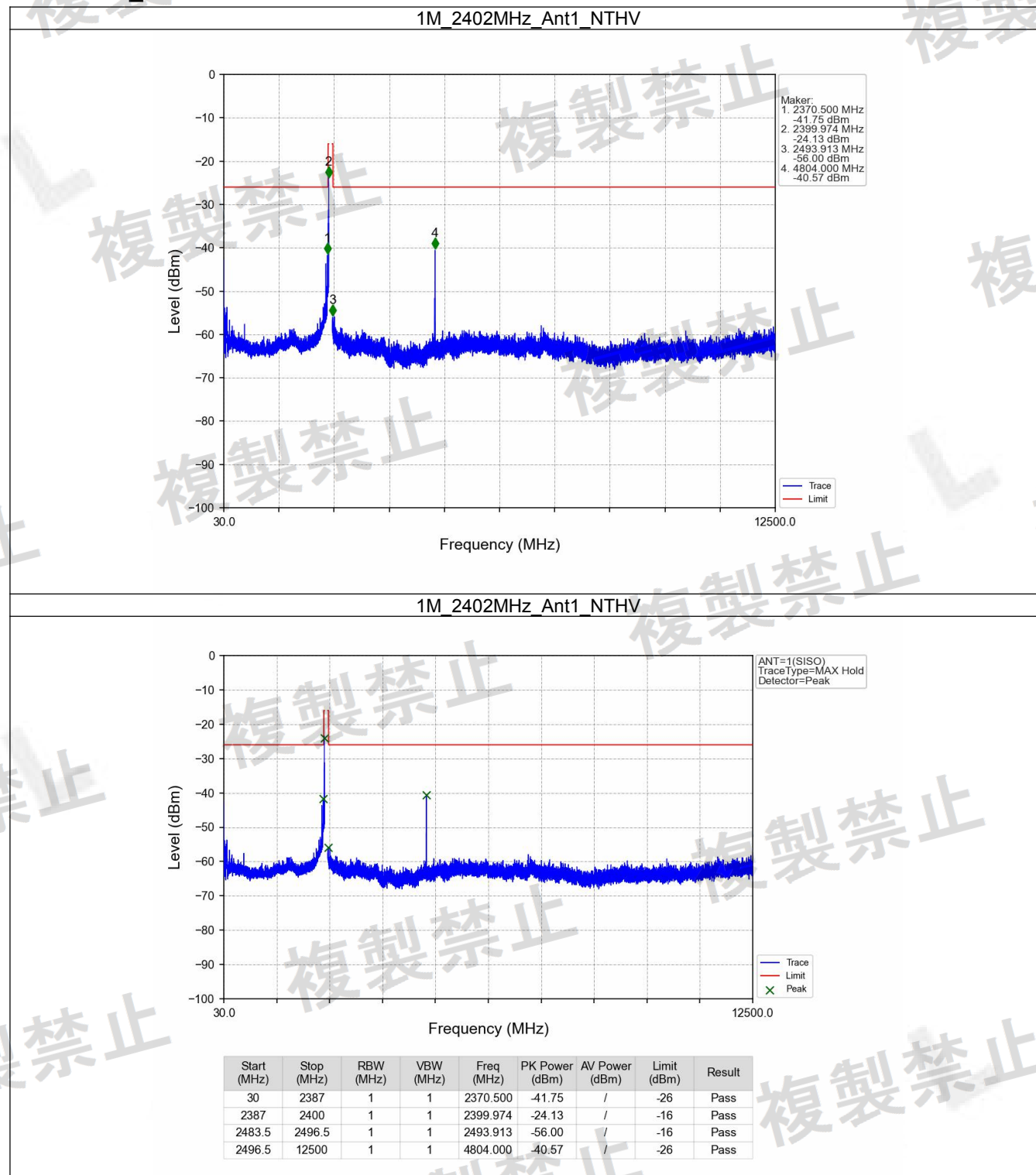


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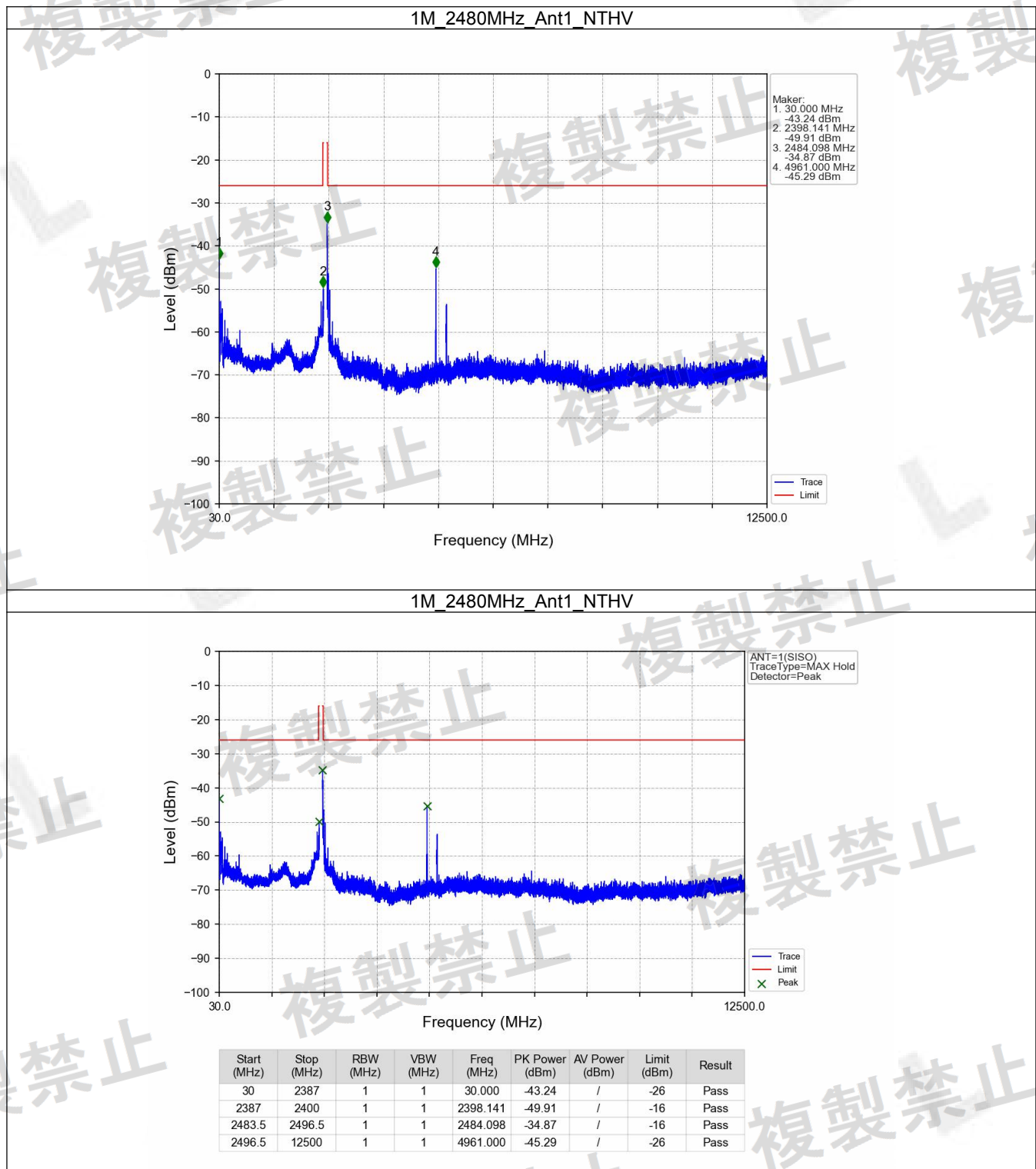


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4.2.3 TxSe_NTHV



MIC: 219-269004



MIC: 219-269004

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	-57.39	1.824	-61.87	0.650	4	Pass
						160	-59.22	1.197	-62.62	0.547	4	Pass
						220	-61.58	0.695	-62.62	0.547	4	Pass
						500	-59.04	1.247	-60.56	0.879	4	Pass
				1000	12500	2408	-47.61	17.338	-76.36	0.023	20	Pass
						2412	-49.25	11.885	-76.10	0.025	20	Pass
						100	-58.88	1.294	-62.28	0.592	4	Pass
						160	-59.80	1.047	-63.02	0.499	4	Pass
		2480	1	30	1000	500	-58.84	1.306	-75.00	0.032	4	Pass
						2408.5	-47.39	18.239	-50.94	8.054	20	Pass
						2412	-48.98	12.647	-76.74	0.021	20	Pass
						2419.5	-52.82	5.224	-72.03	0.063	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	-58.71	1.346	-61.77	0.665	4	Pass
						160	-59.13	1.222	-62.60	0.550	4	Pass
						500	-58.62	1.374	-60.61	0.869	4	Pass
				1000	12500	2408	-48.67	13.583	-76.38	0.023	20	Pass
						2411	-43.99	39.902	-75.98	0.025	20	Pass
						2414	-51.99	6.324	-76.10	0.025	20	Pass
		2480	1	30	1000	100	-59.27	1.183	-62.25	0.596	4	Pass
						160	-59.46	1.132	-63.01	0.500	4	Pass
						220	-61.92	0.643	-63.01	0.500	4	Pass
						500	-58.96	1.271	-60.90	0.813	4	Pass
		1000	12500	2461	-60.40	0.912	/	/	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	-58.70	1.349	-61.82	0.658	4	Pass
						160	-59.64	1.086	-62.55	0.556	4	Pass
						220	-61.67	0.681	-62.64	0.545	4	Pass
						500	-58.77	1.327	-60.51	0.889	4	Pass
				1000	12500	2408.5	-47.63	17.258	-55.79	2.636	20	Pass
						2411.5	-45.01	31.550	-76.39	0.023	20	Pass
		2480	1	30	1000	100	-59.18	1.208	-62.20	0.603	4	Pass
						160	-59.75	1.059	-63.11	0.489	4	Pass

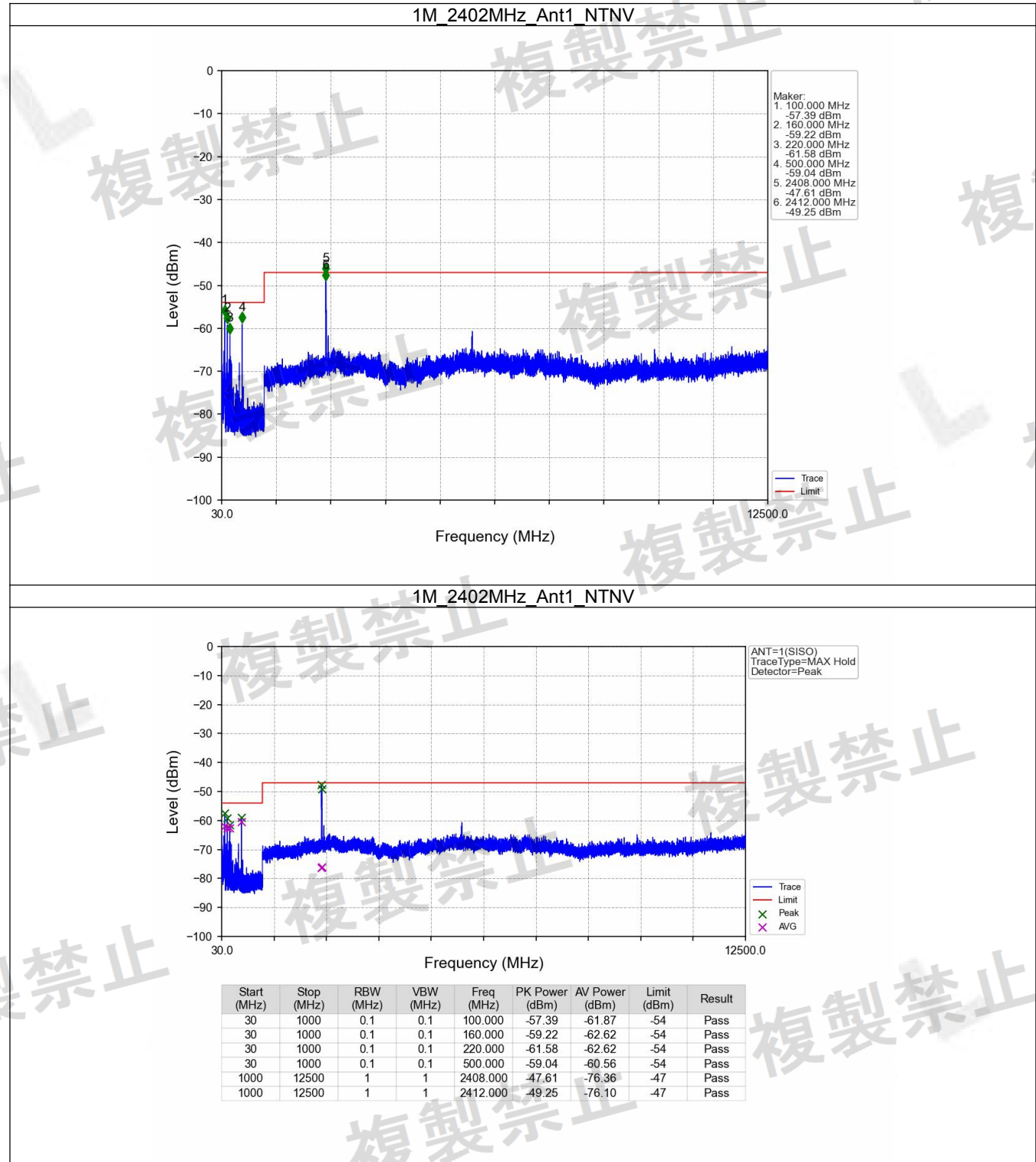
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					220	-62.00	0.631	-63.02	0.499	4	Pass
					500	-59.07	1.239	-60.94	0.805	4	Pass
					1000	12500	2402.5	-59.72	1.067	/	/

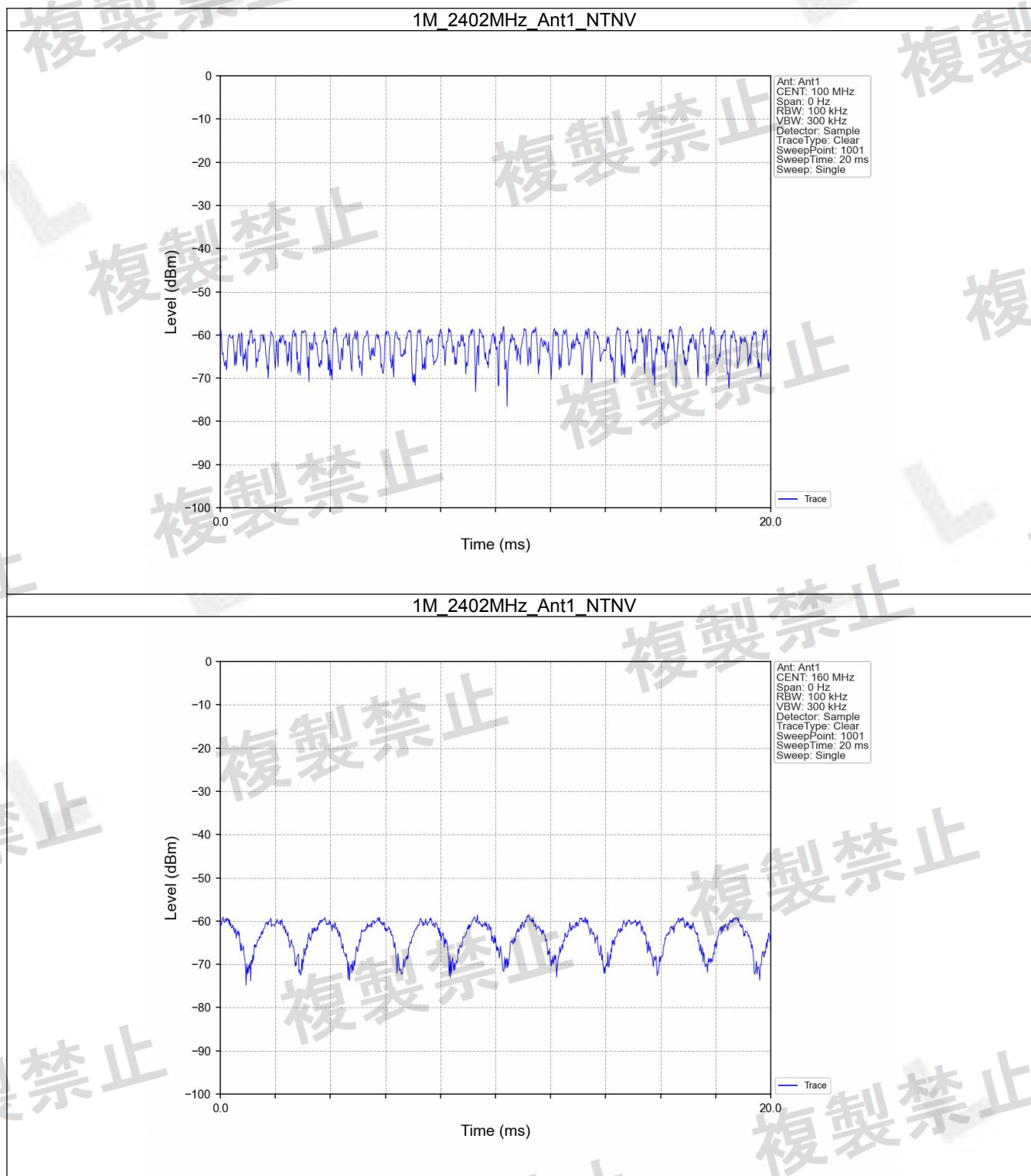
MIC: 219-269004

5.2 Test Graph

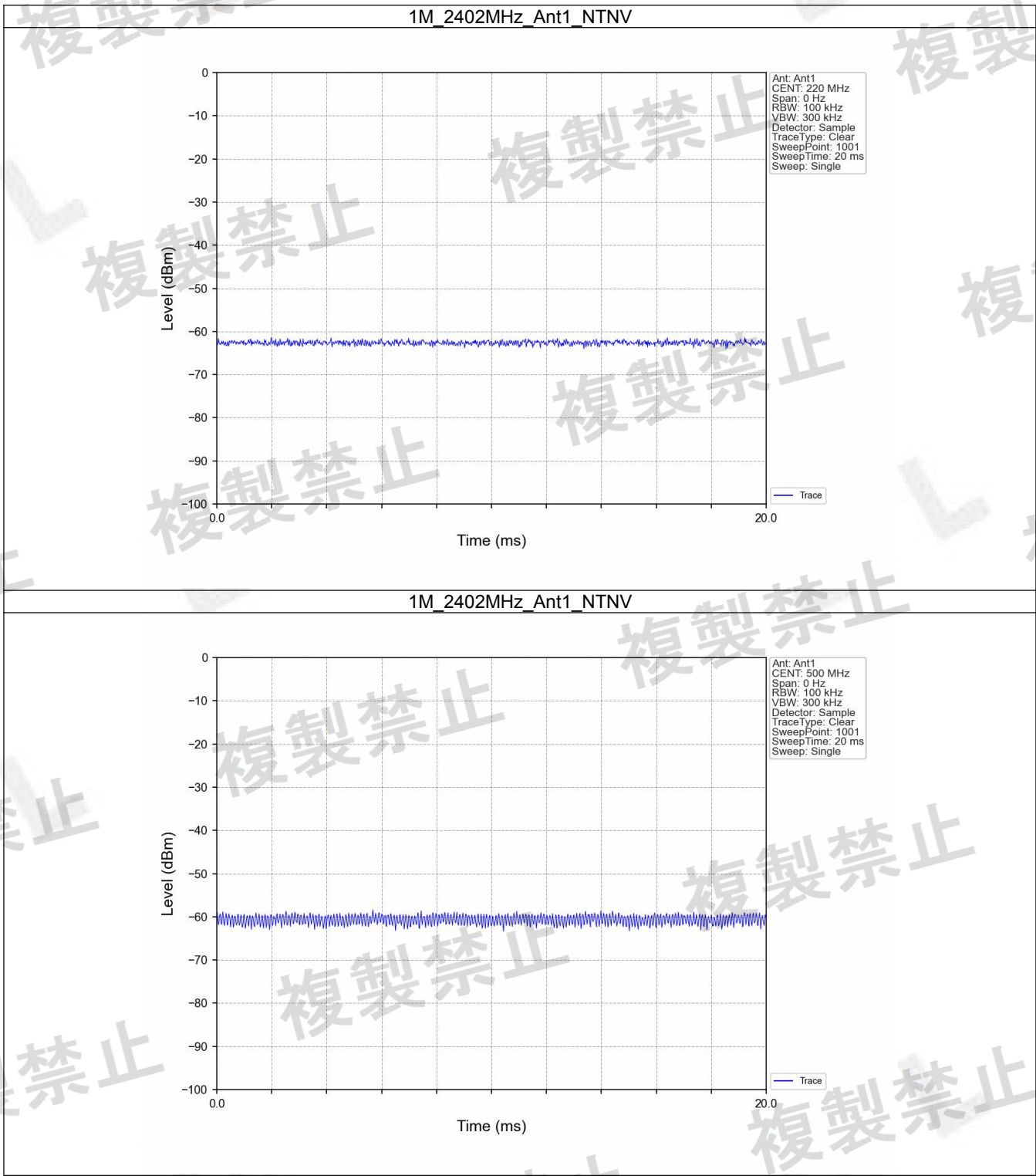
5.2.1 RxSe_NTNV



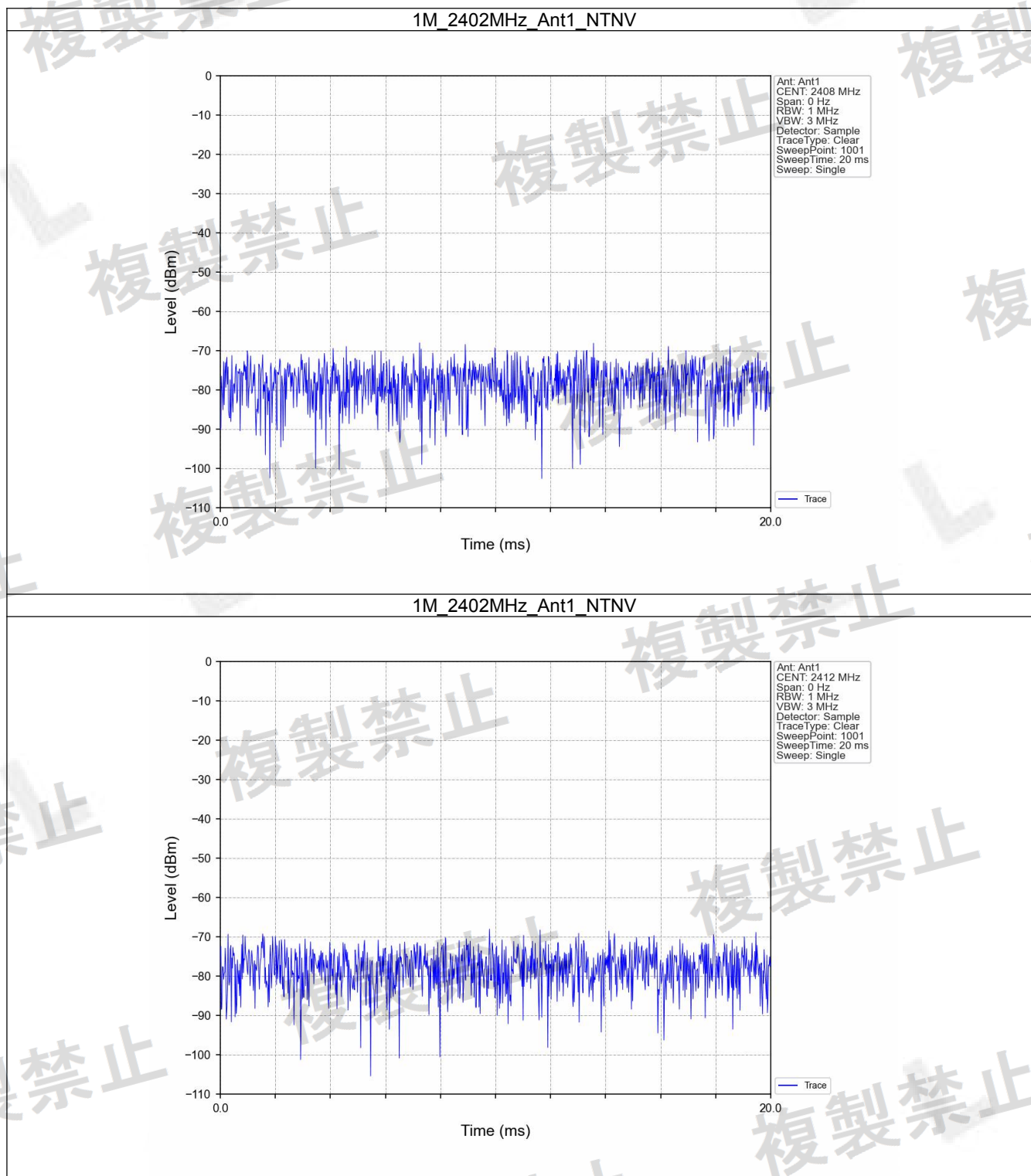
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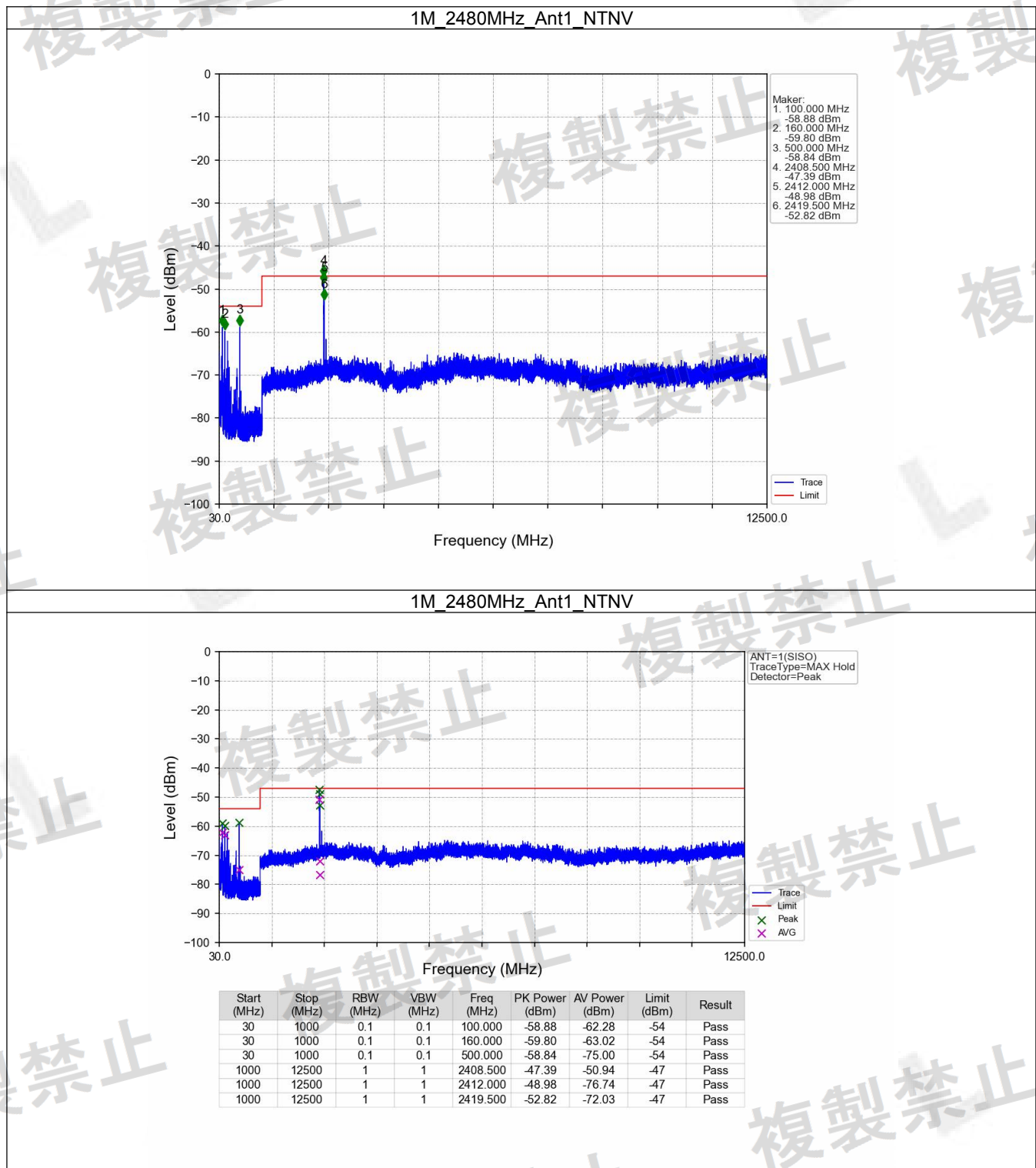
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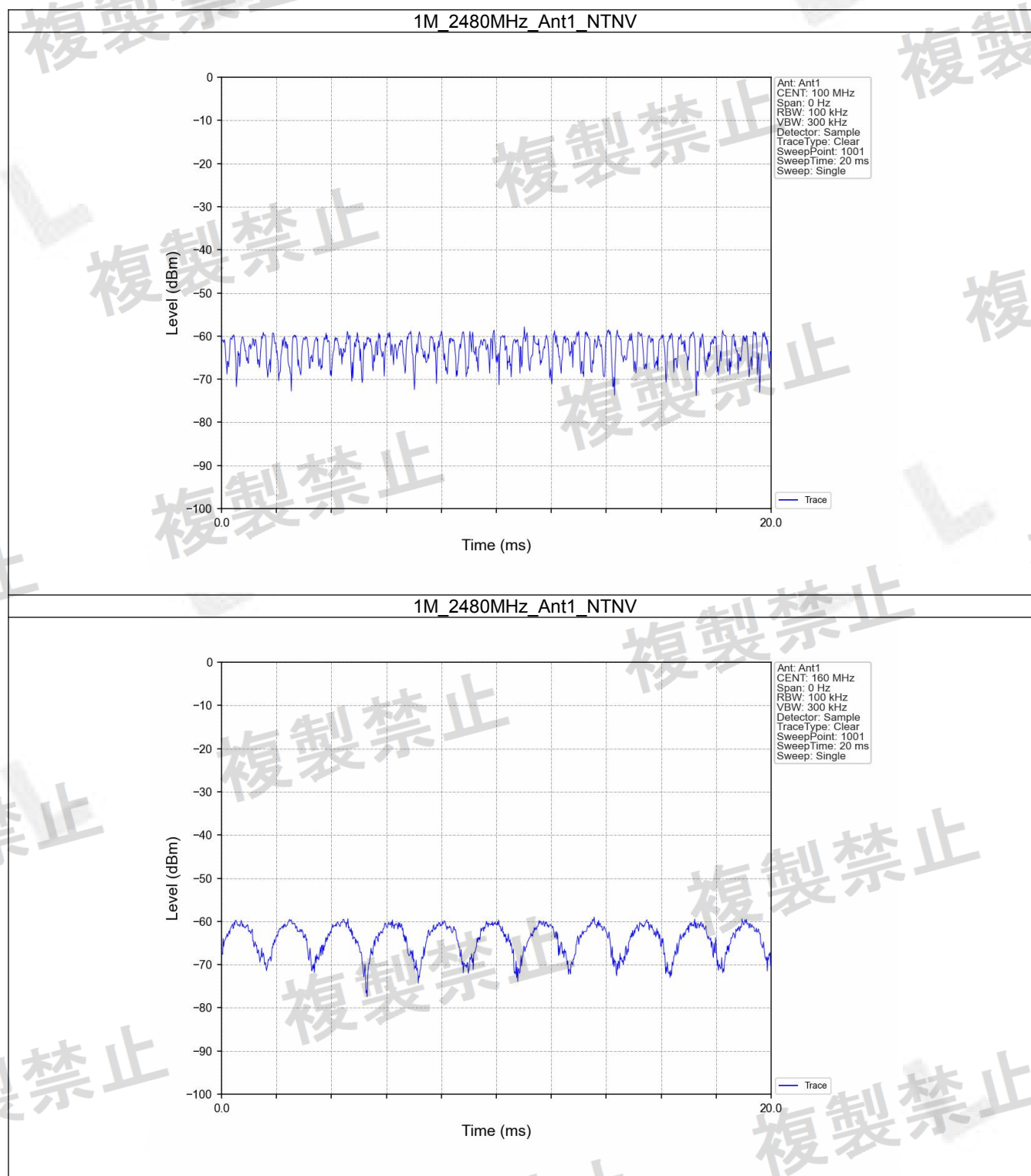
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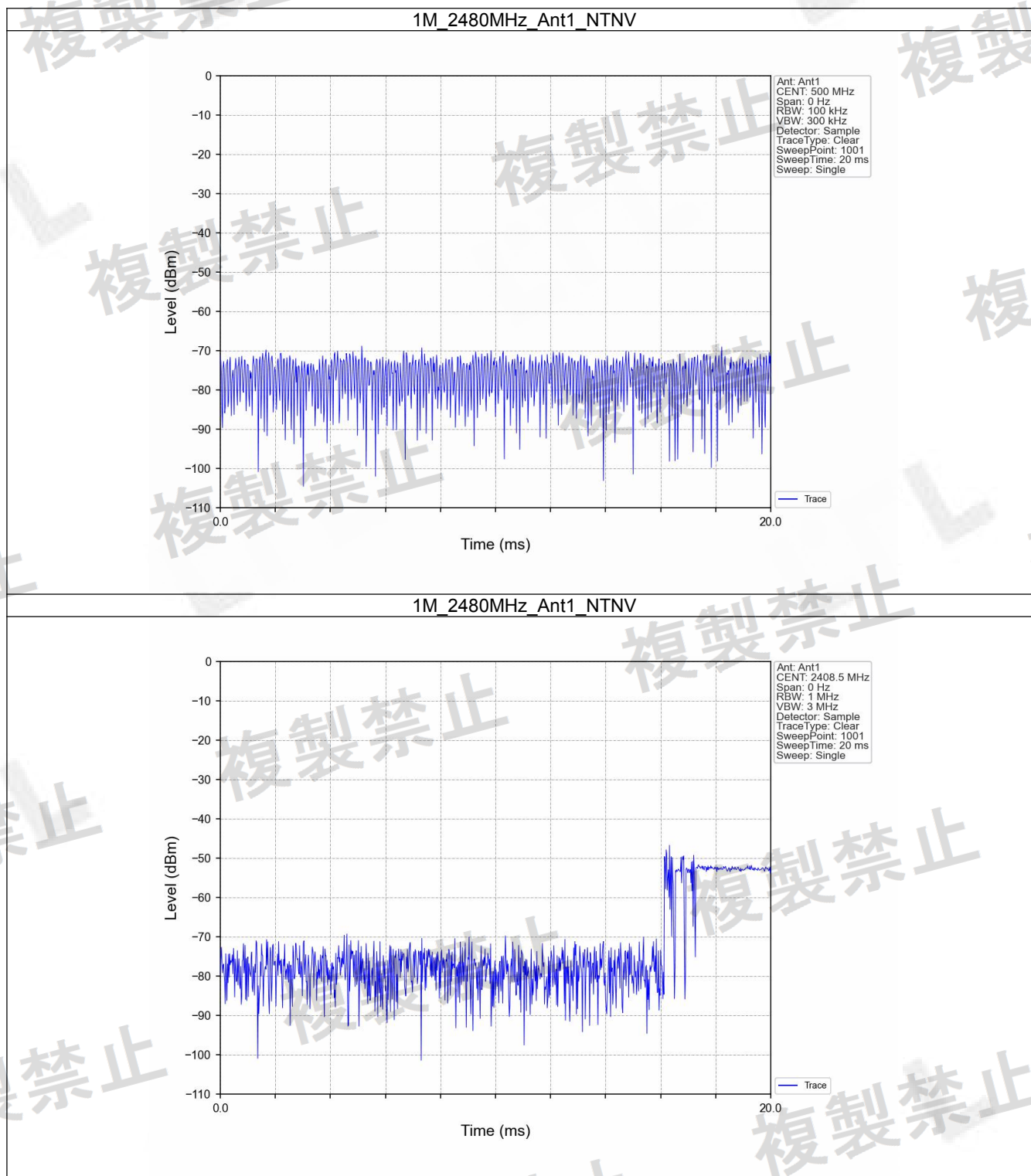
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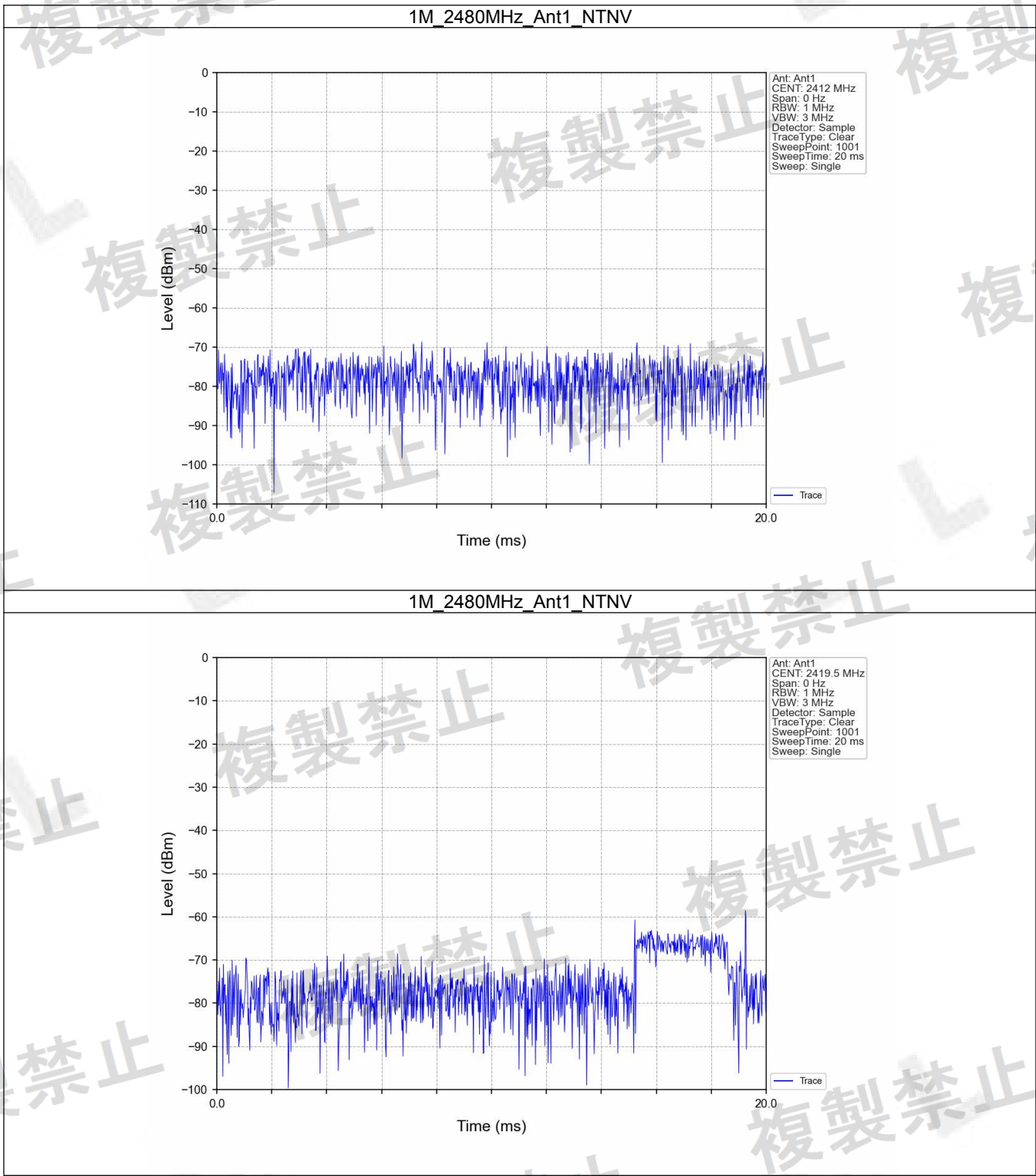
MIC: 219-269004



MIC: 219-269004

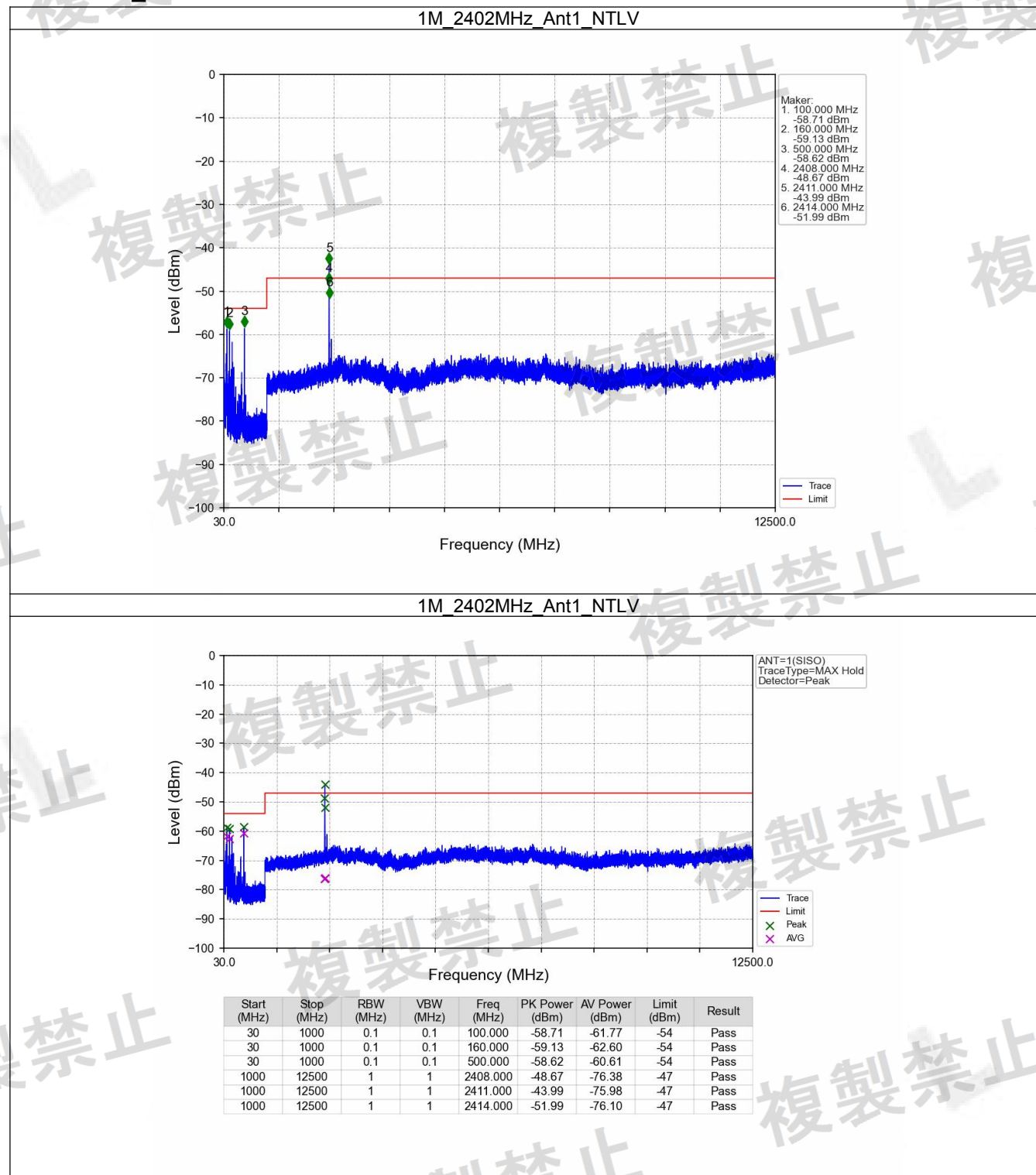


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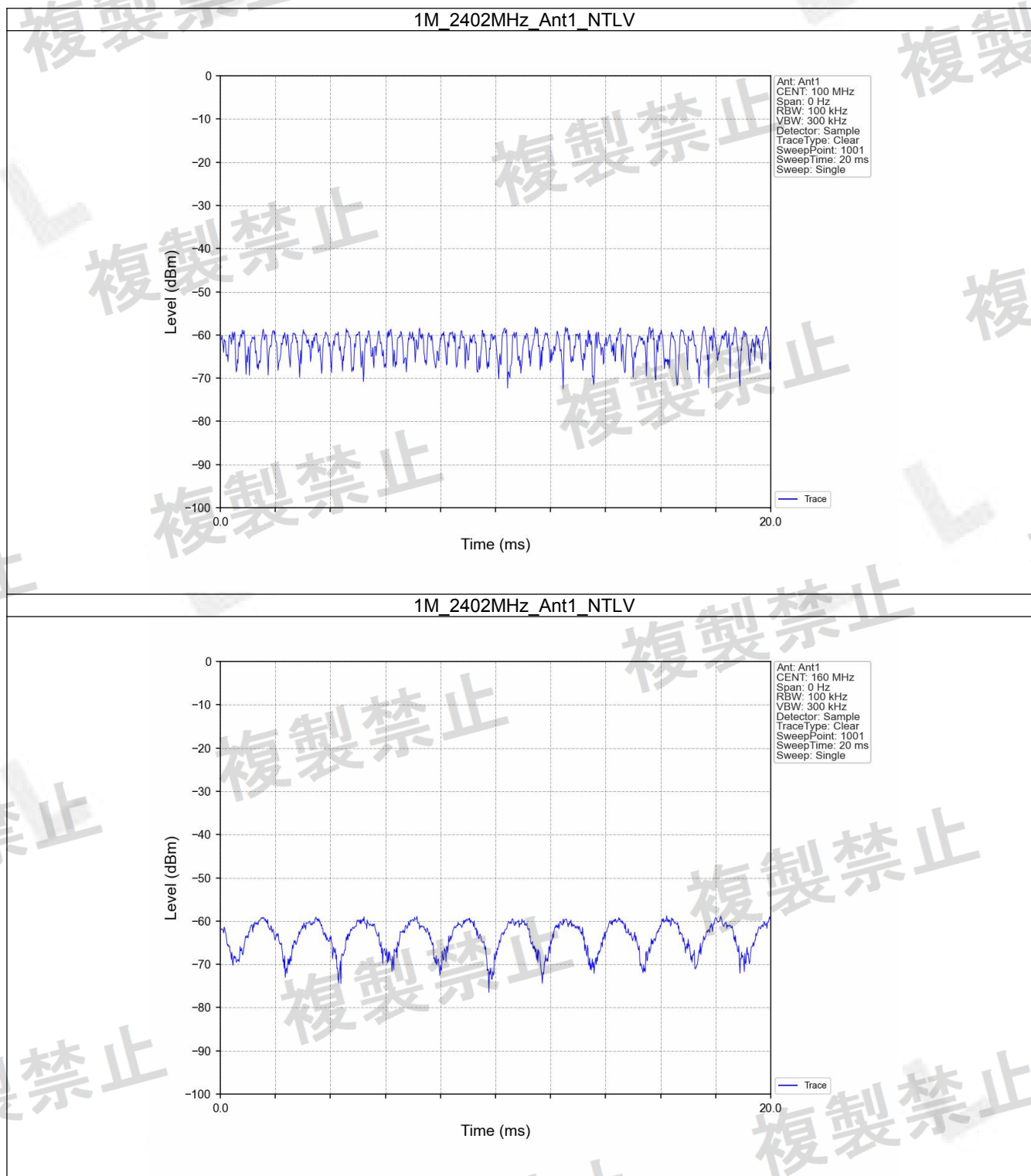


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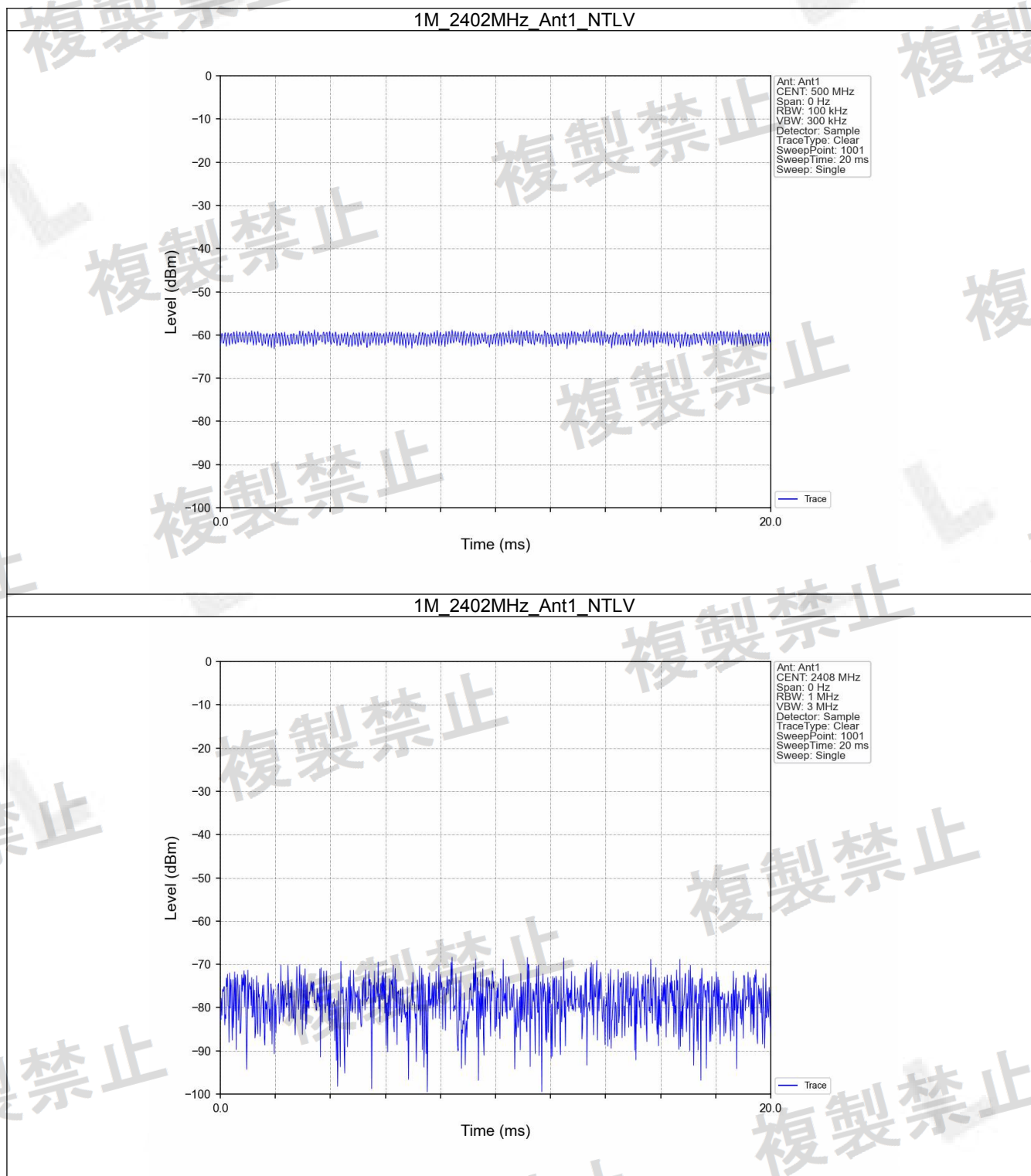
5.2.2 RxSe_NTLV



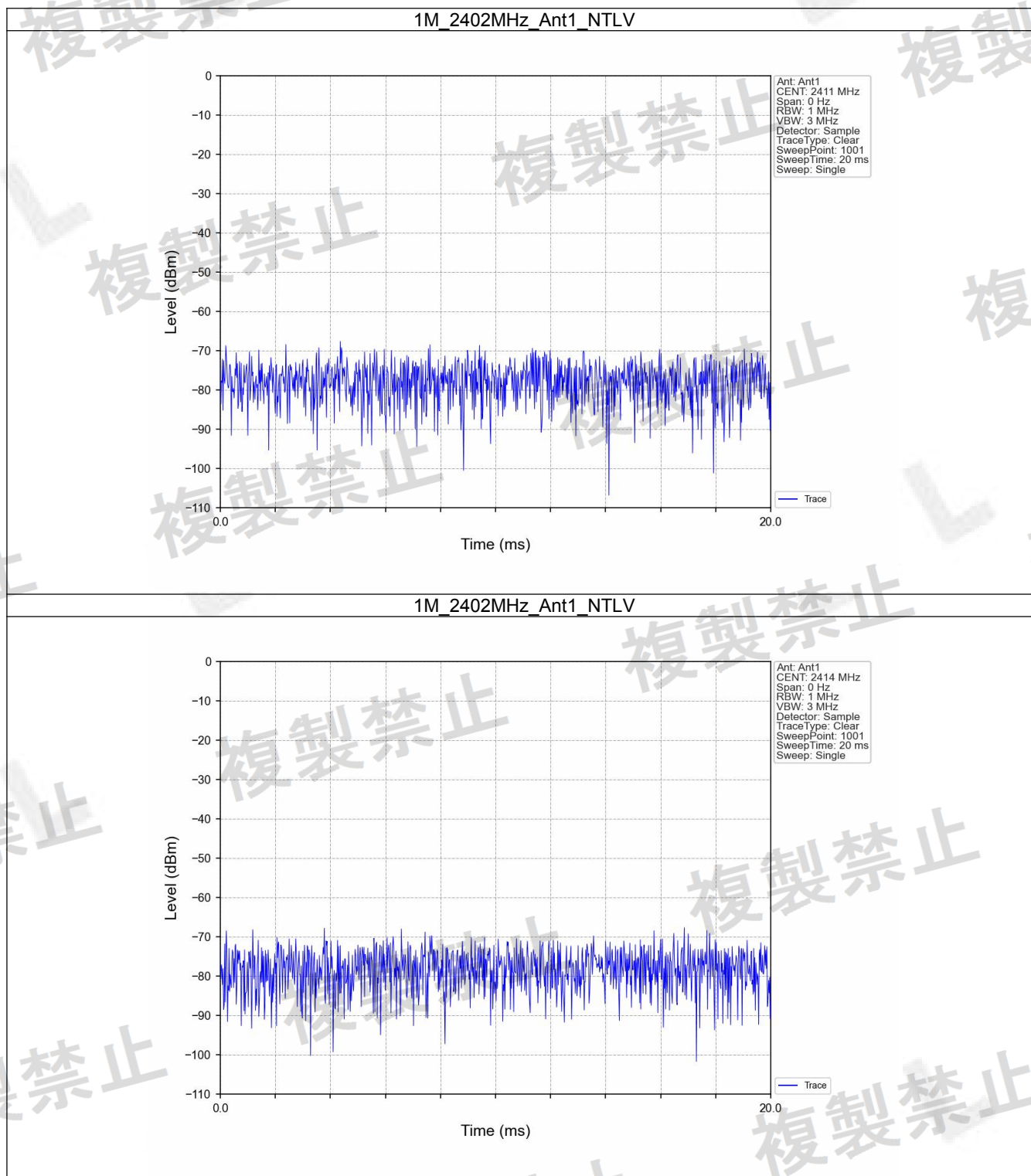
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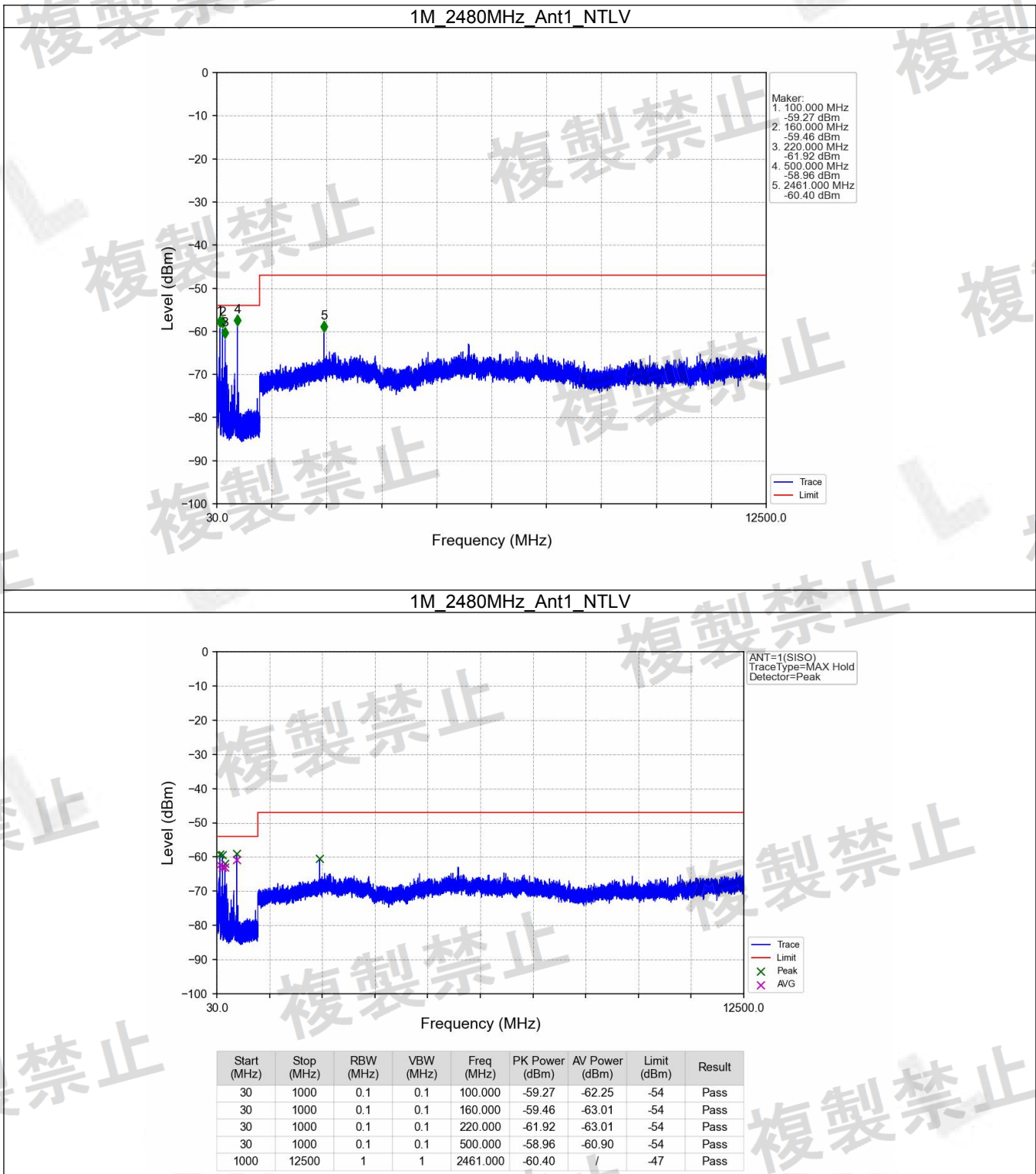
MIC: 219-269004



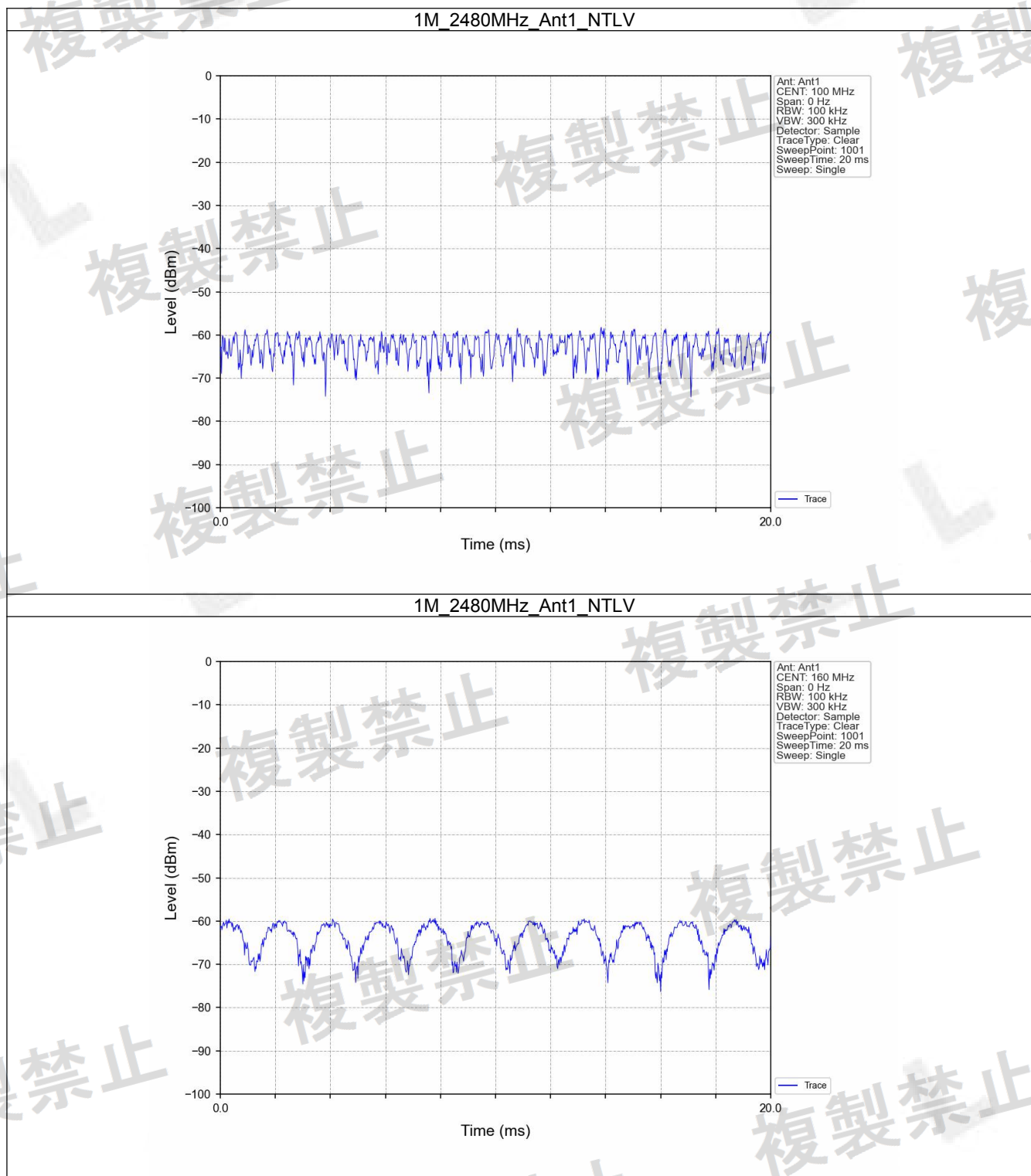
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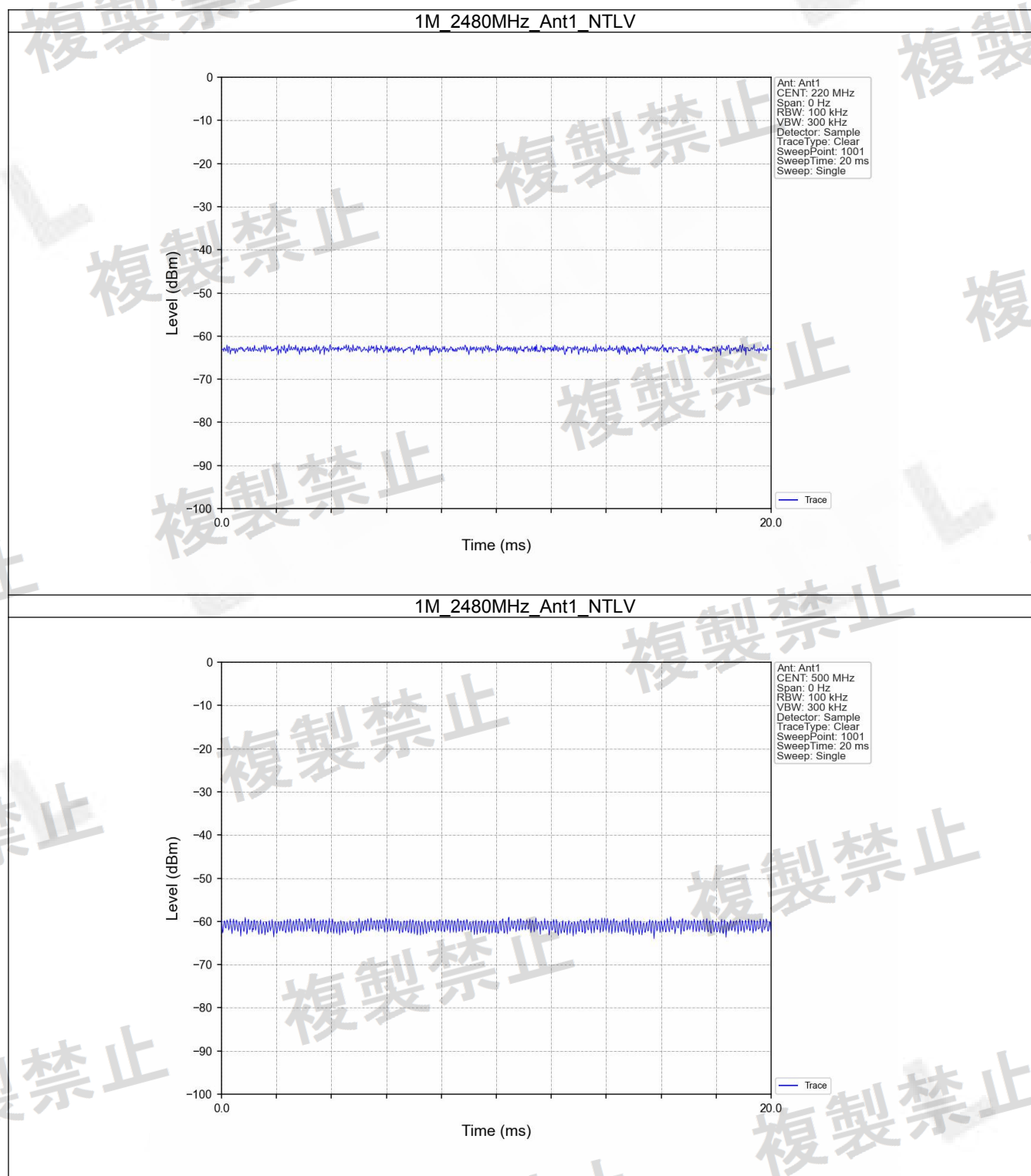
MIC: 219-269004



MIC: 219-269004

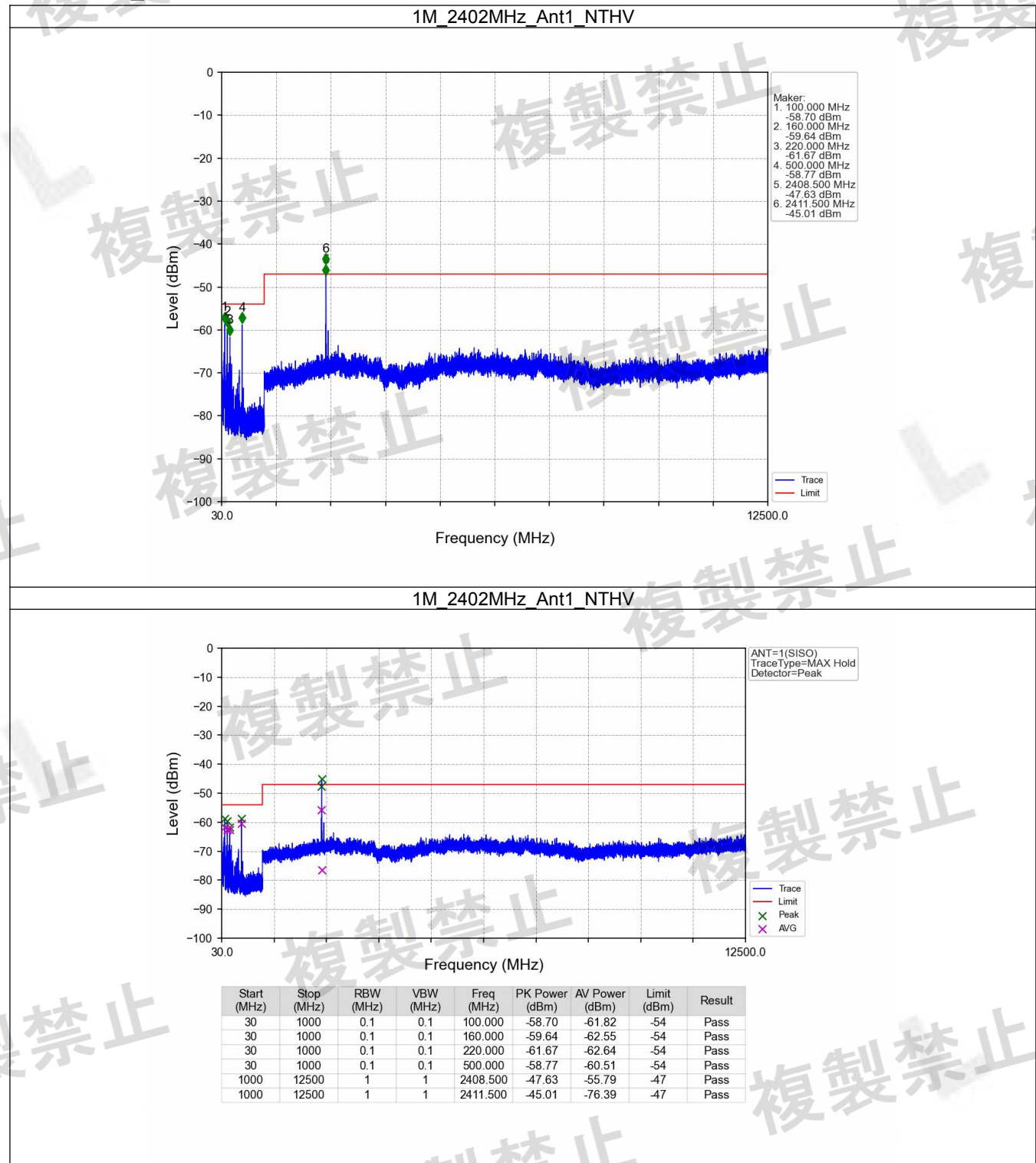


MIC: 219-269004

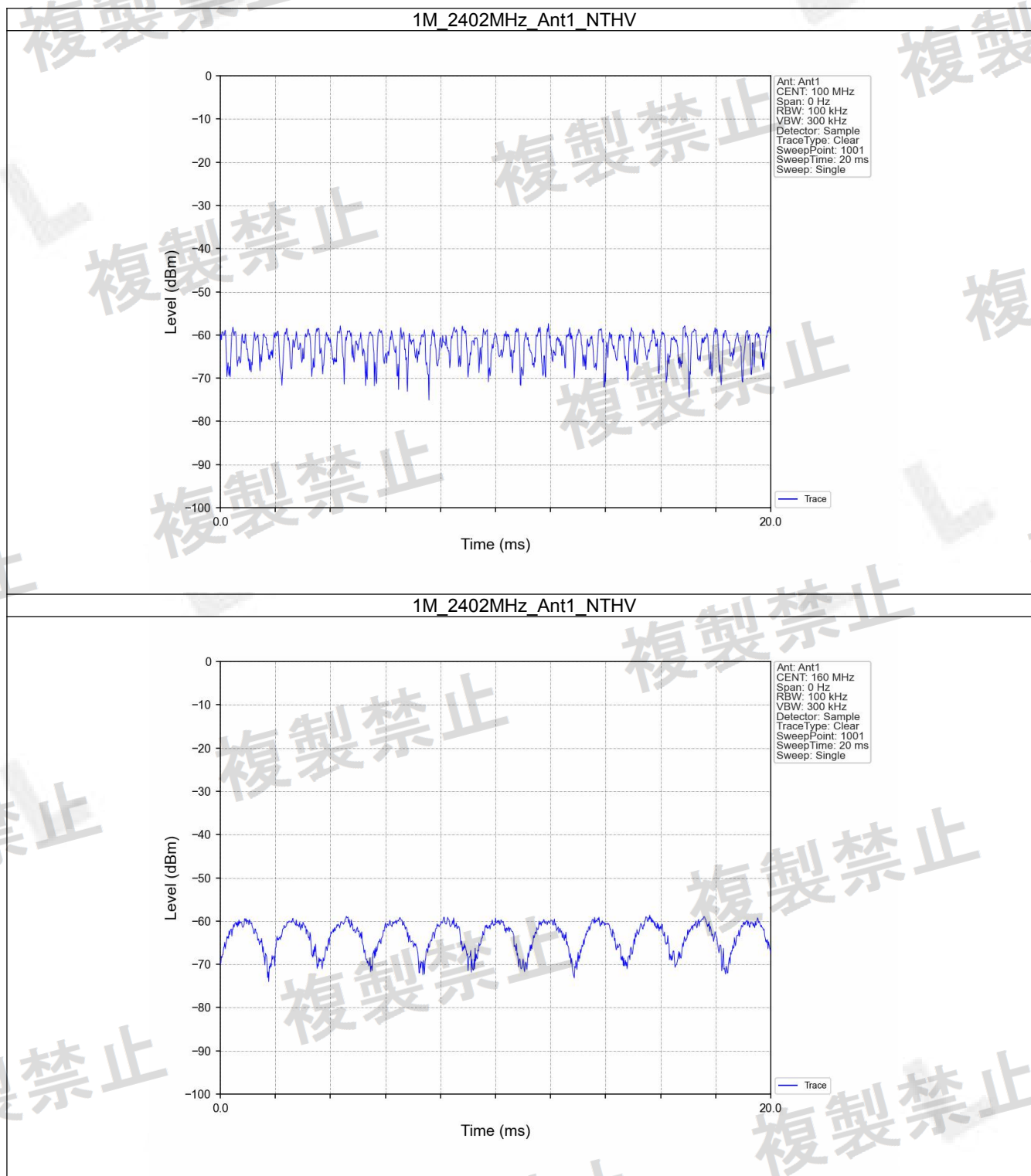


MIC: 219-269004

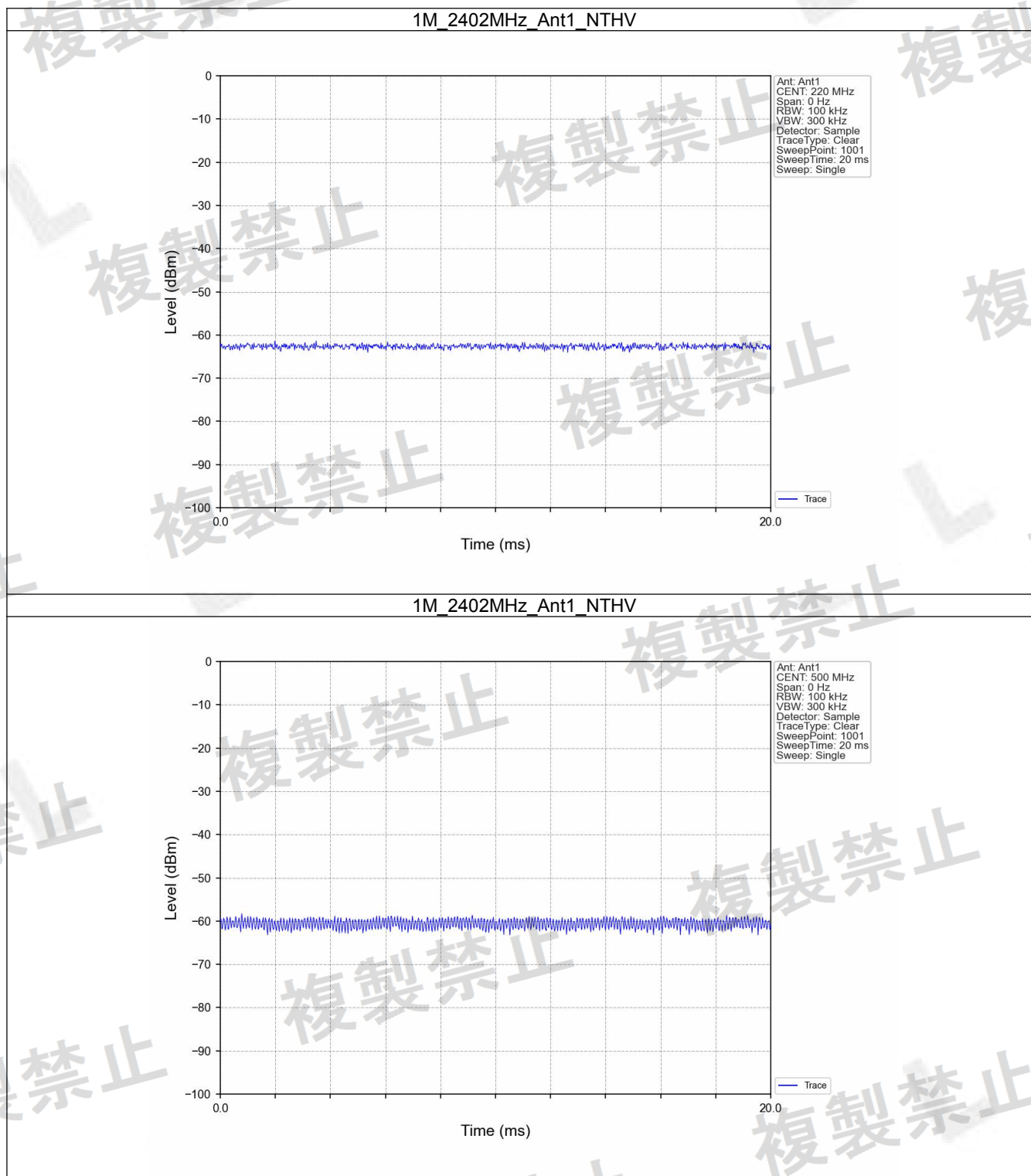
5.2.3 RxSe_NTHV



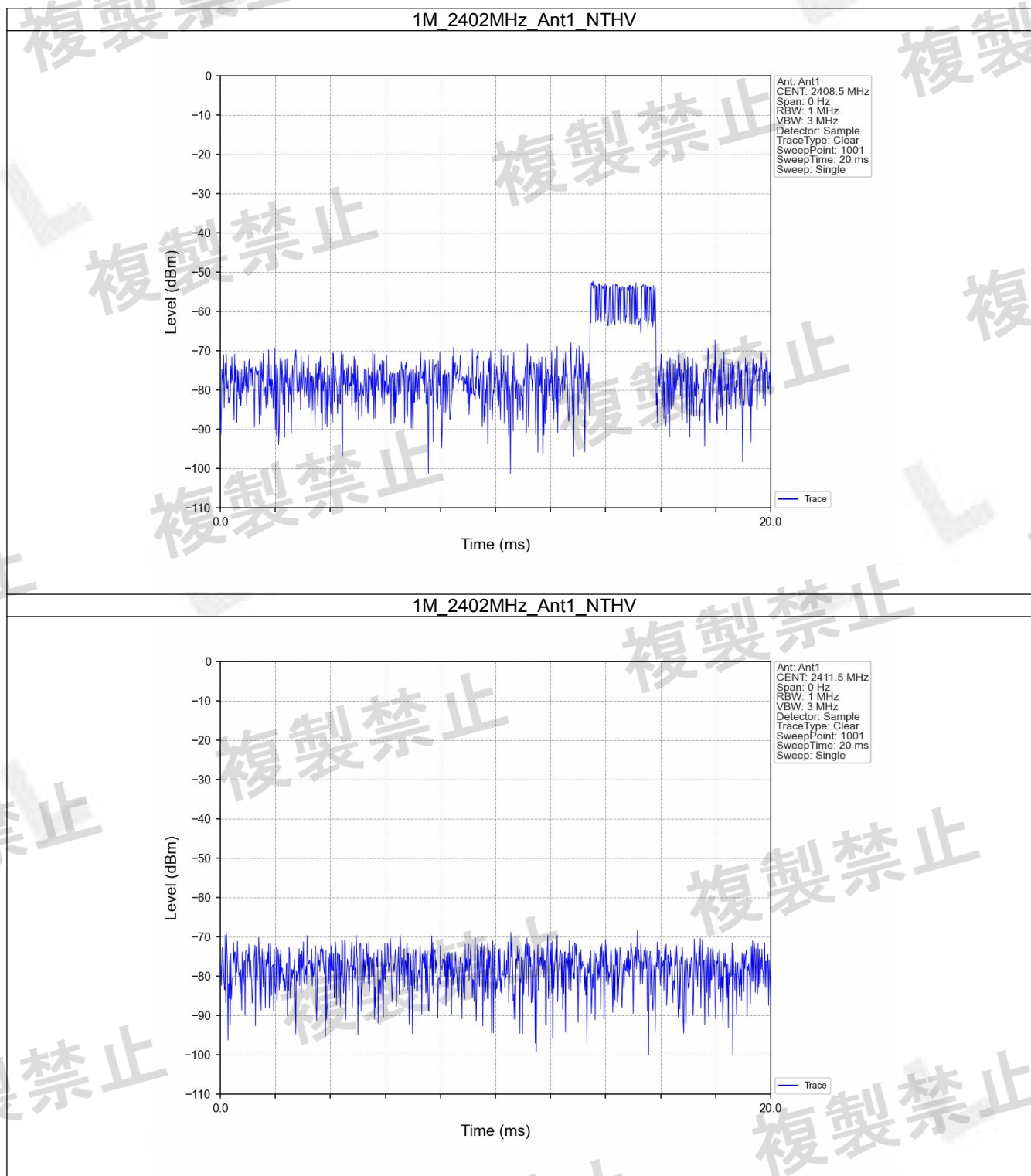
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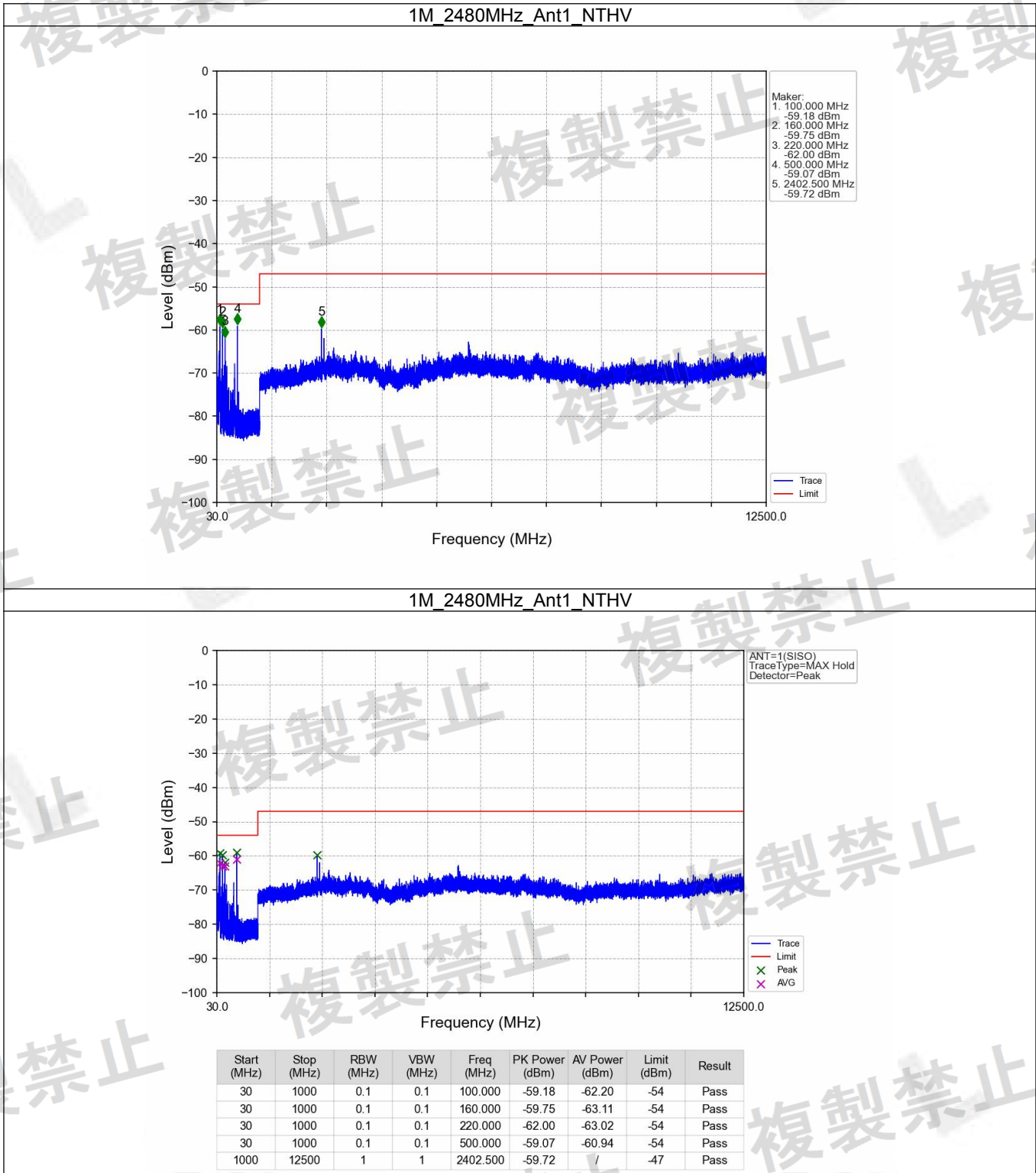
MIC: 219-269004



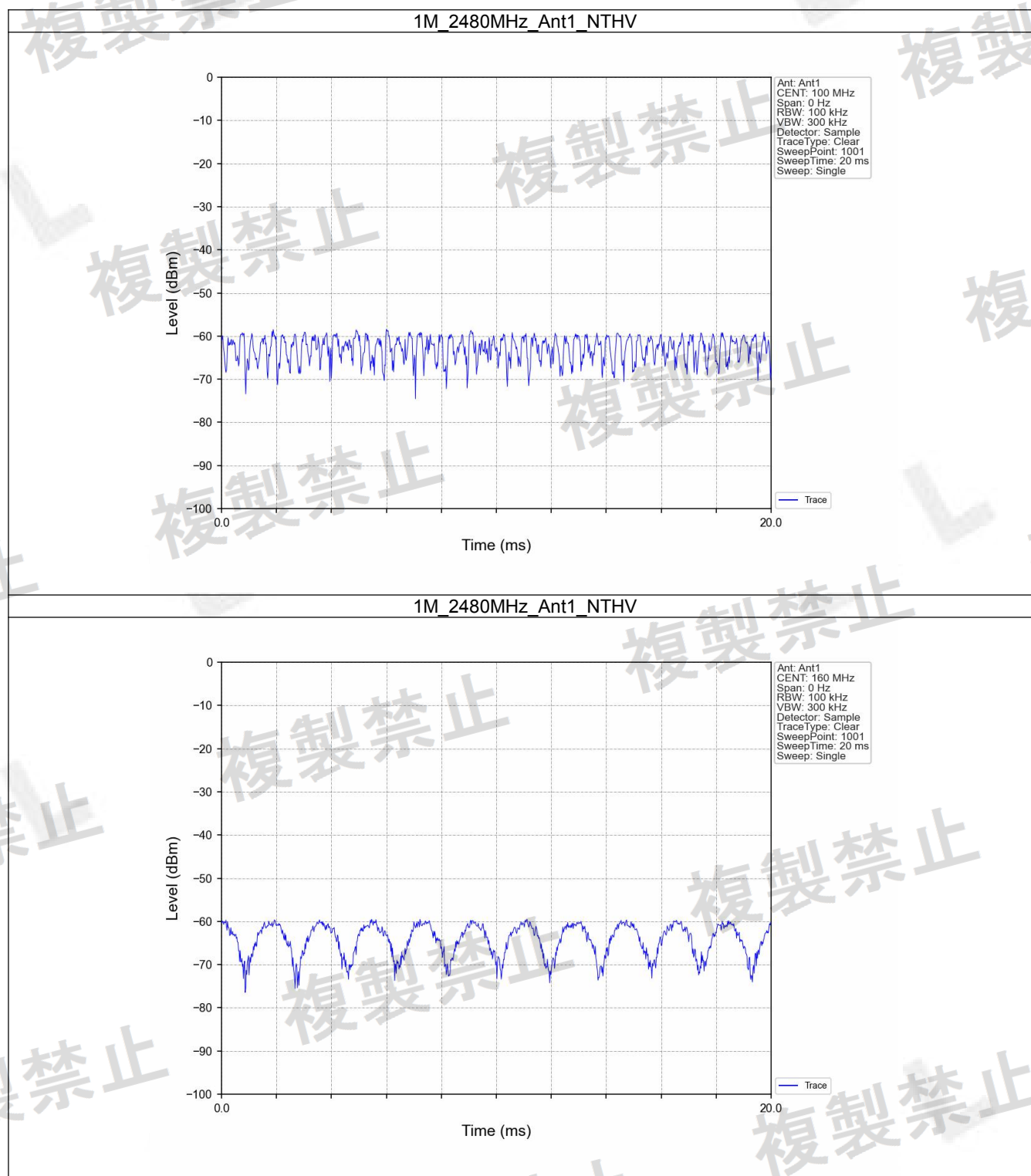
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