



Shenzhen CTL Testing Technology Co., Ltd.

Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road,
Nanshan District, Shenzhen, China 518055
Tel: +86-755-89486194 E-mail: ctl@ctl-lab.com

Annex for Bluetooth low Energy

Test Report No.: CTL2505262131-MIC

TABLE OF CONTENTS

1. Frequency Error.....	2
2. Occupied Bandwidth.....	8
3. Antenna Power.....	14
4. Spurious Emission Intensity.....	24
5. Secondary Radiated Emission.....	35

MIC: 219-259410

1. Frequency Error

1.1 Test Result

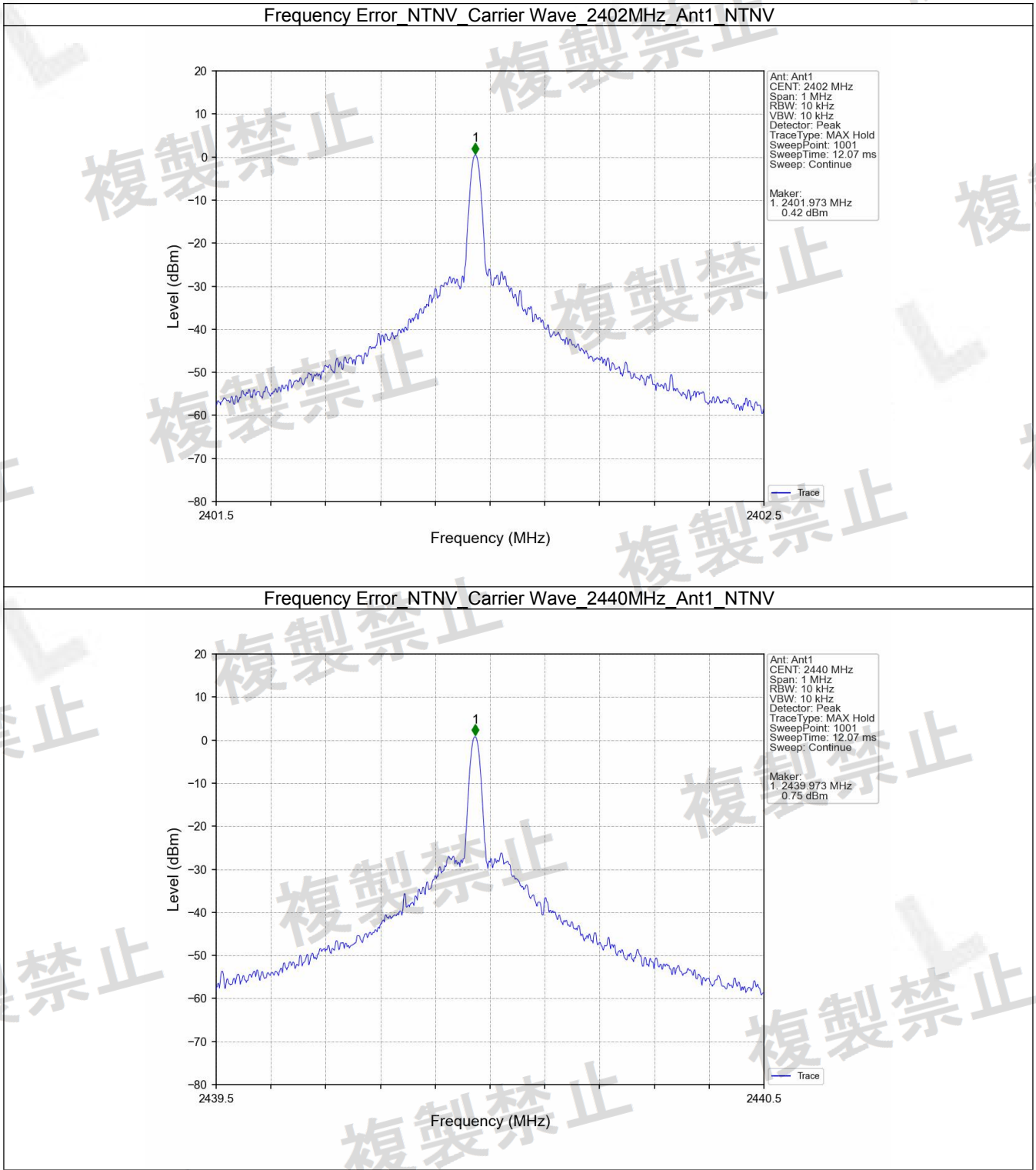
1.1.1 Ant1

Ant1							
ENV	Mode	TX Type	Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)		Verdict
					Result	Limit	
NTNV	Carrier Wave	SISO	2402	2401.973	-11.24	-50 to 50	Pass
			2440	2439.973	-11.07	-50 to 50	Pass
			2480	2479.972	-11.29	-50 to 50	Pass
NTLV	Carrier Wave	SISO	2402	2401.973	-11.24	-50 to 50	Pass
			2440	2439.972	-11.48	-50 to 50	Pass
			2480	2479.972	-11.29	-50 to 50	Pass
NTHV	Carrier Wave	SISO	2402	2401.973	-11.24	-50 to 50	Pass
			2440	2439.973	-11.07	-50 to 50	Pass
			2480	2479.972	-11.29	-50 to 50	Pass

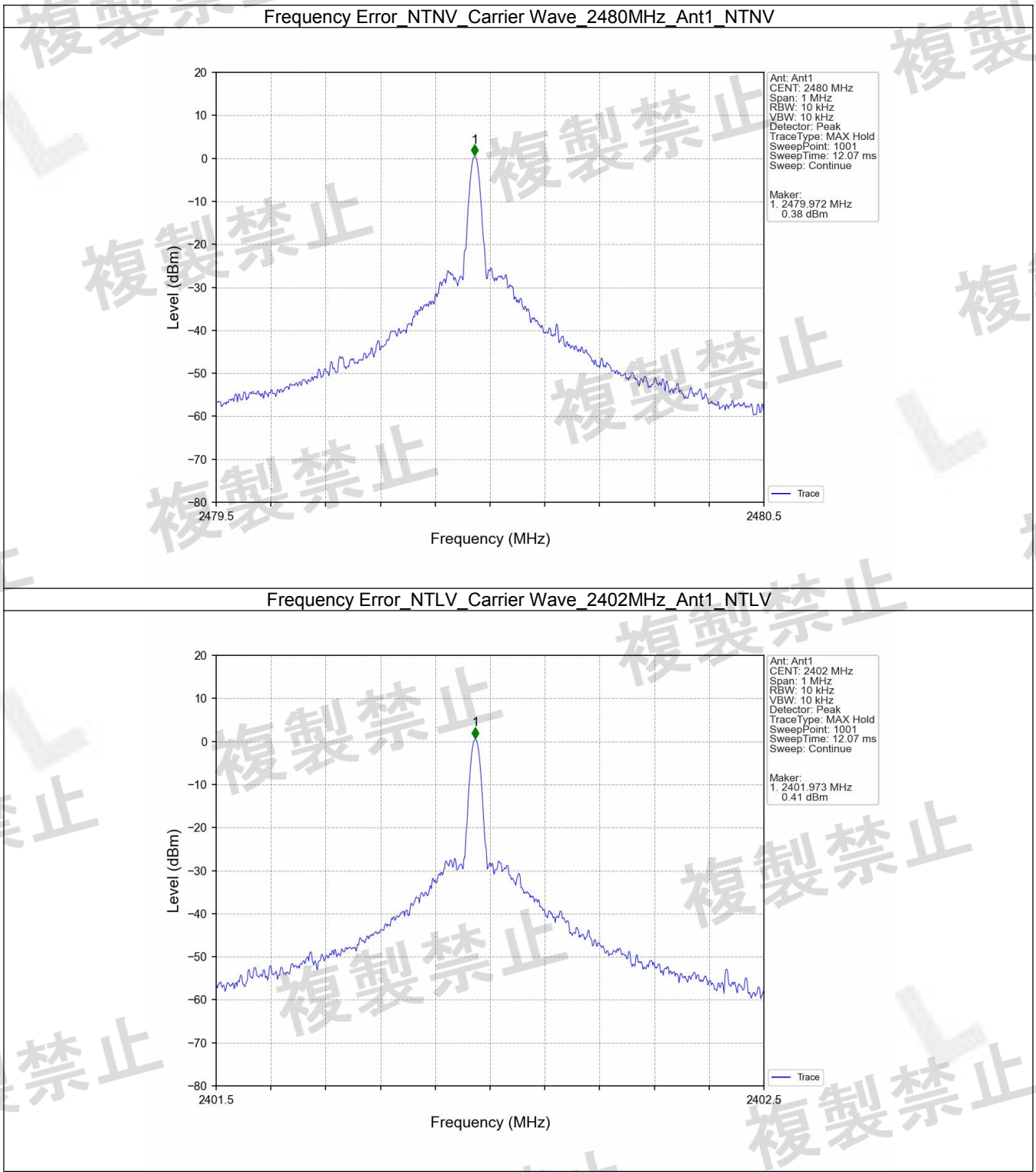
MIC: 219-259410

1.2 Test Graph

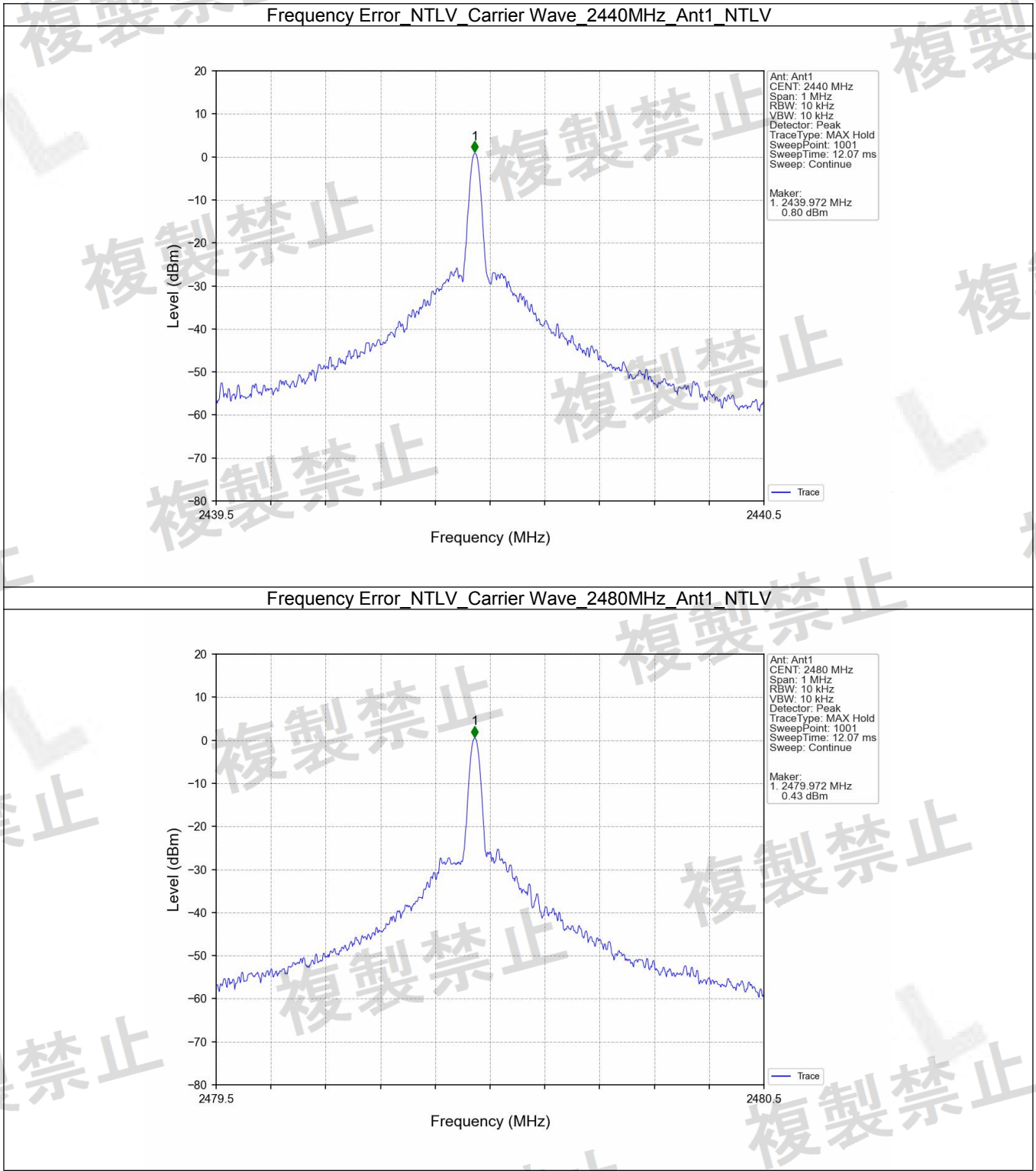
1.2.1 Ant1



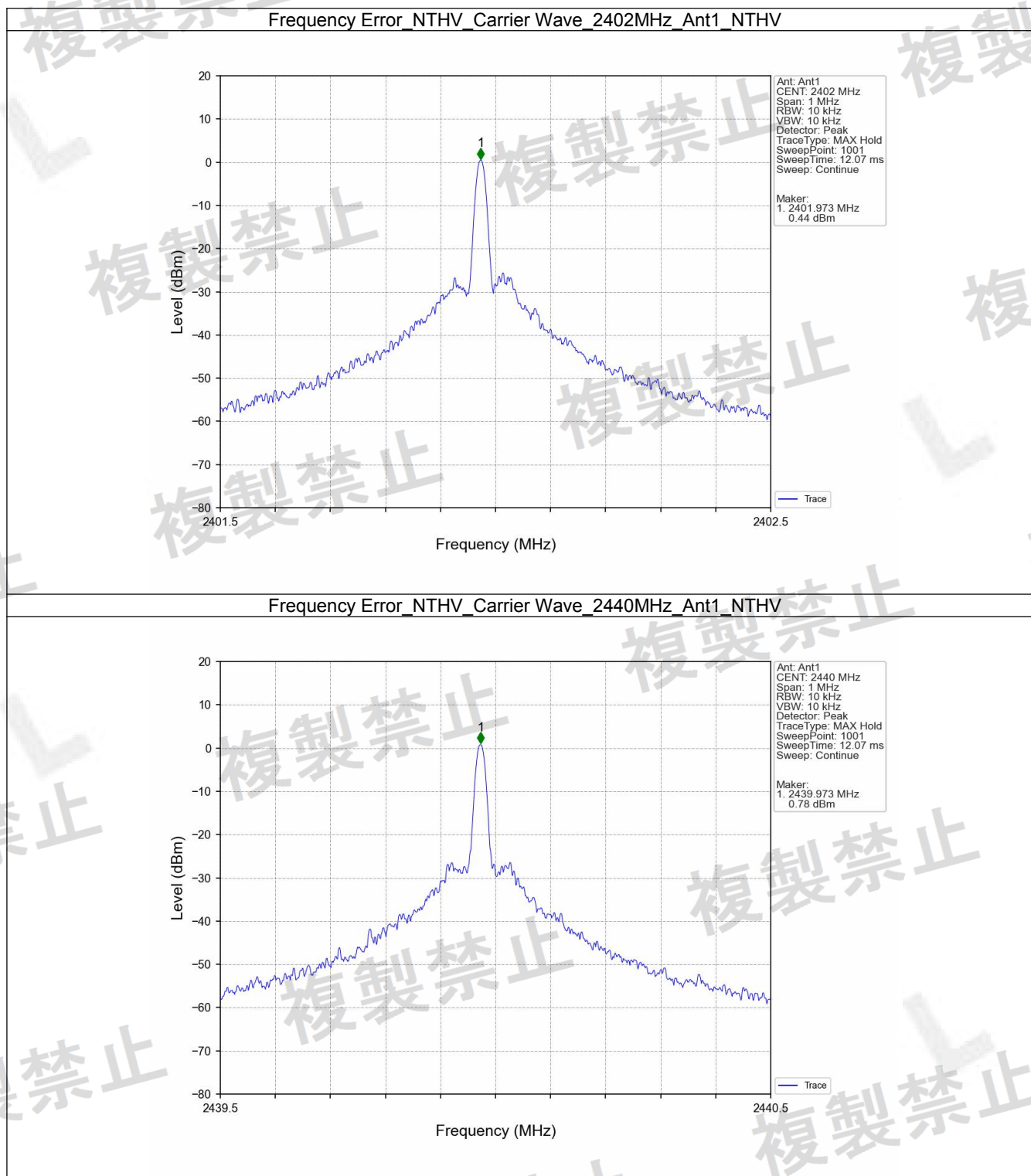
MIC: 219-259410



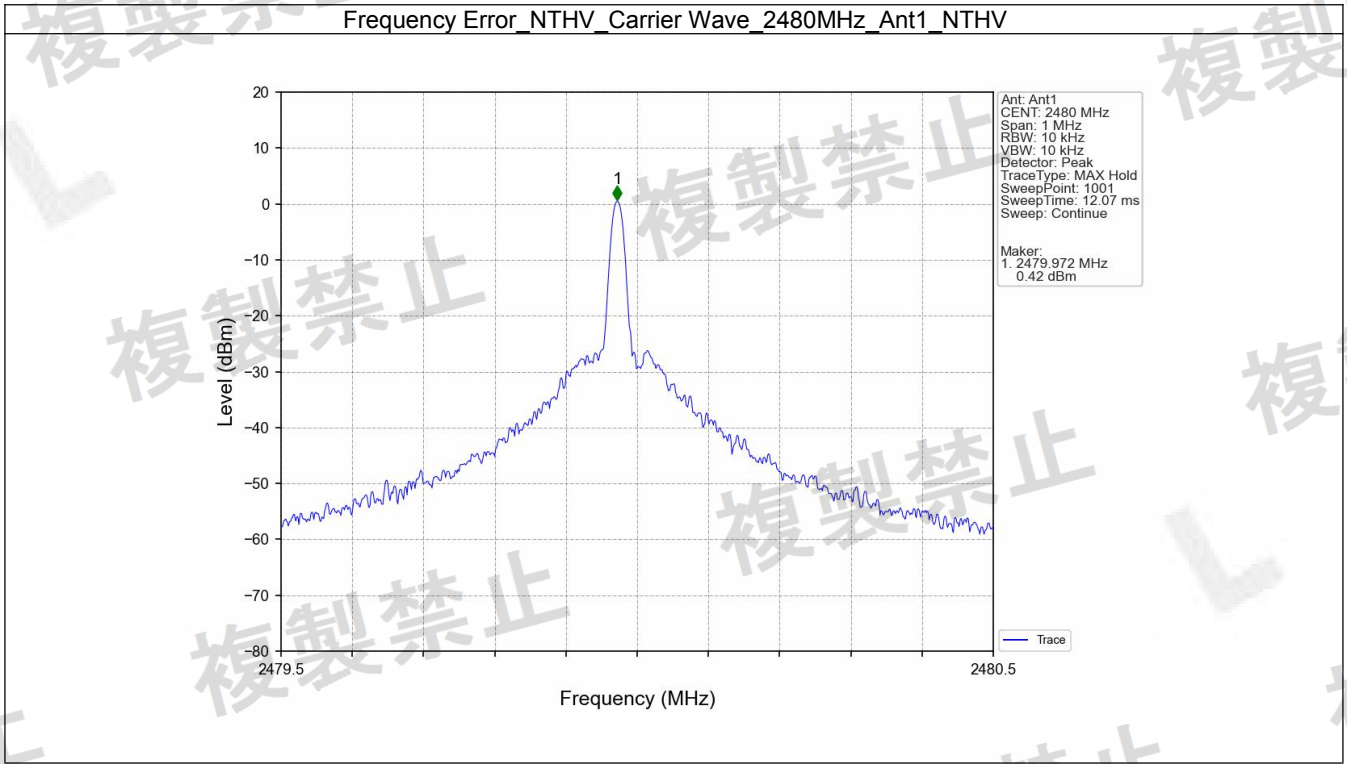
MIC: 219-259410



MIC: 219-259410



MIC: 219-259410



MIC: 219-259410

2. Occupied Bandwidth

2.1 Test Result

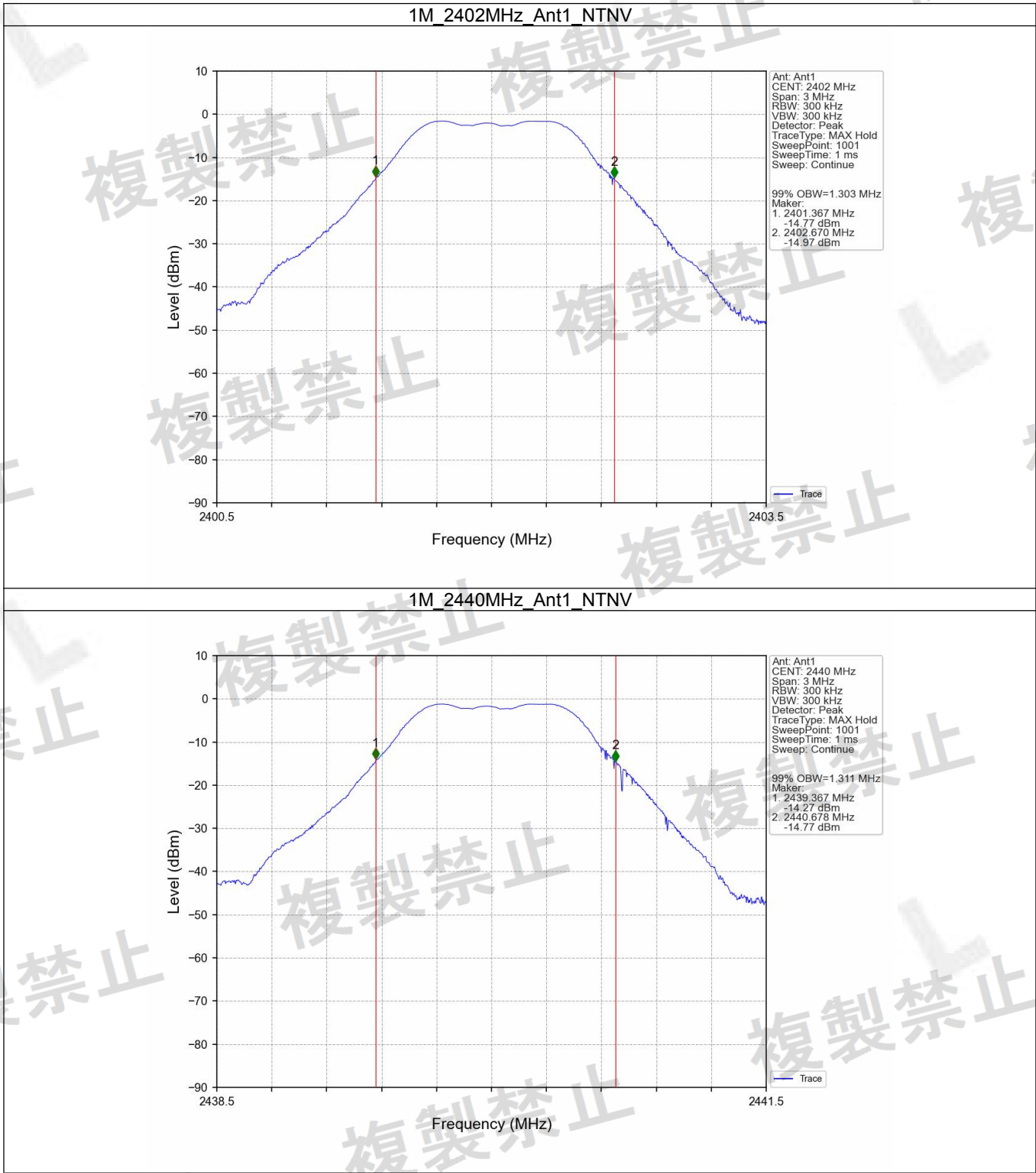
2.1.1 OBW

ENV	Mode	TX Type	Frequency (MHz)	99% Occupied Bandwidth (MHz)		Verdict
				ANT1	Limit	
NTNV	1M	SISO	2402	1.303	<=26	Pass
			2440	1.311	<=26	Pass
			2480	1.379	<=26	Pass
NTLV	1M	SISO	2402	1.303	<=26	Pass
			2440	1.317	<=26	Pass
			2480	1.379	<=26	Pass
NTHV	1M	SISO	2402	1.303	<=26	Pass
			2440	1.317	<=26	Pass
			2480	1.376	<=26	Pass

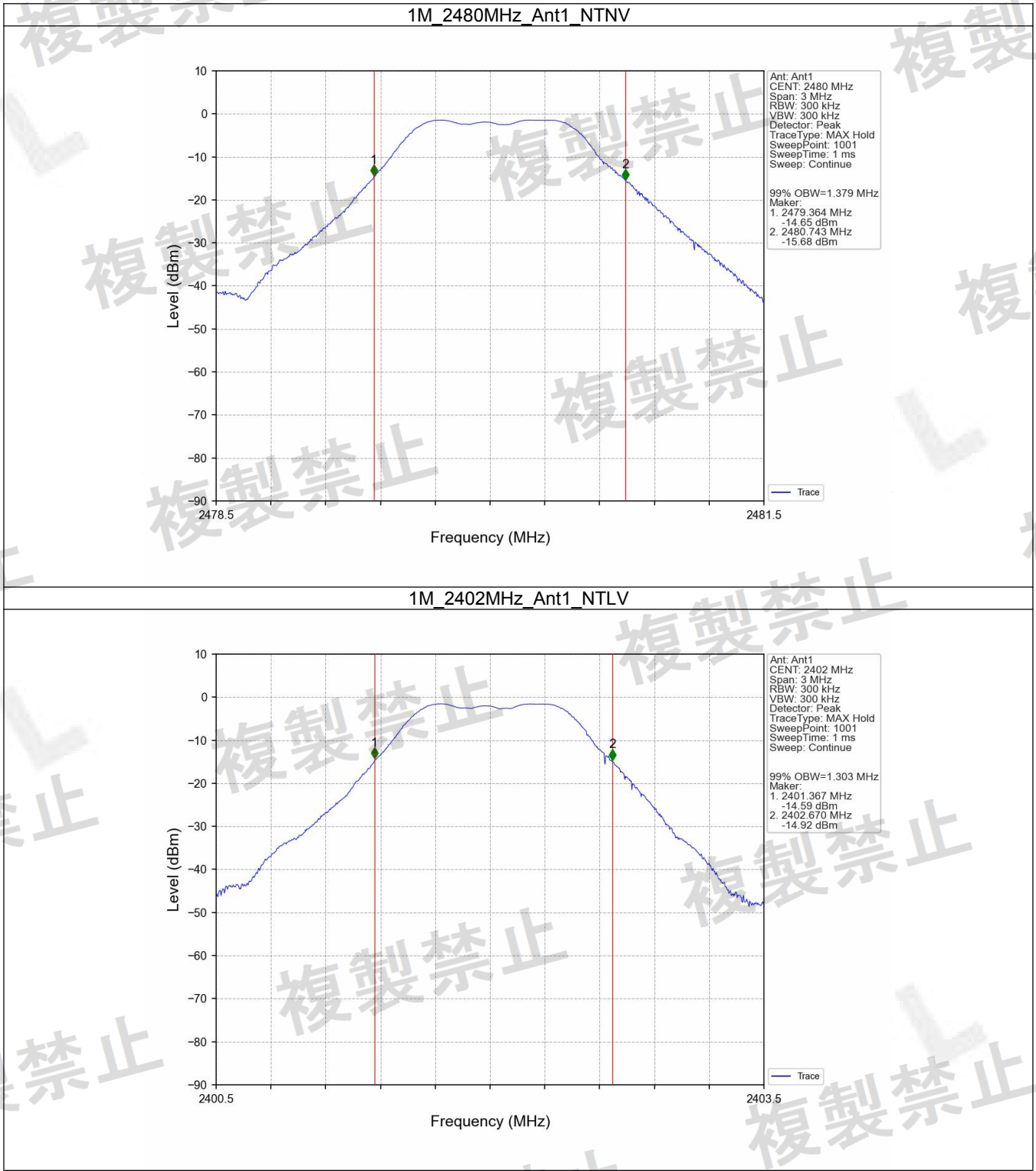
MIC: 219-259410

2.2 Test Graph

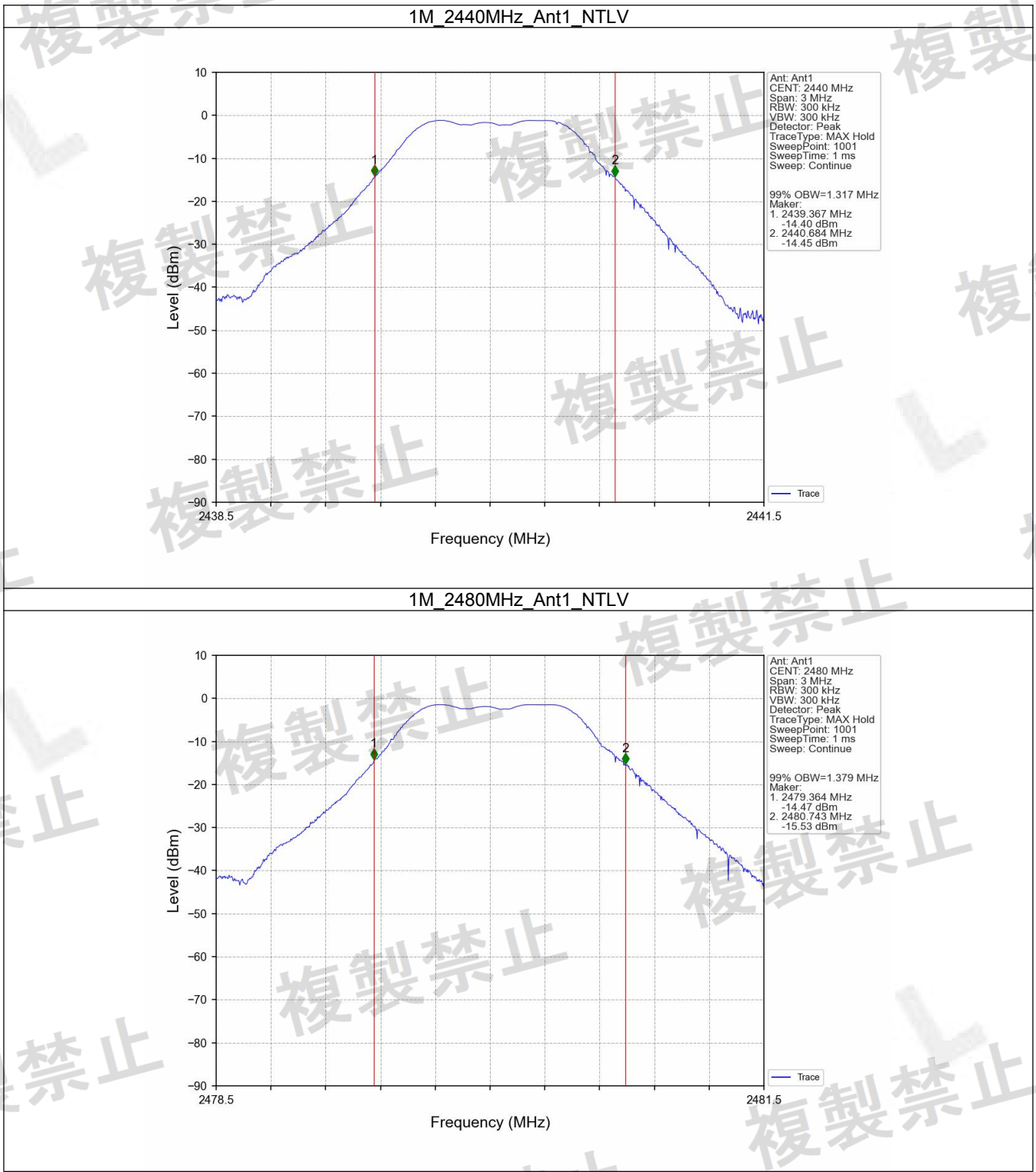
2.2.1 OBW



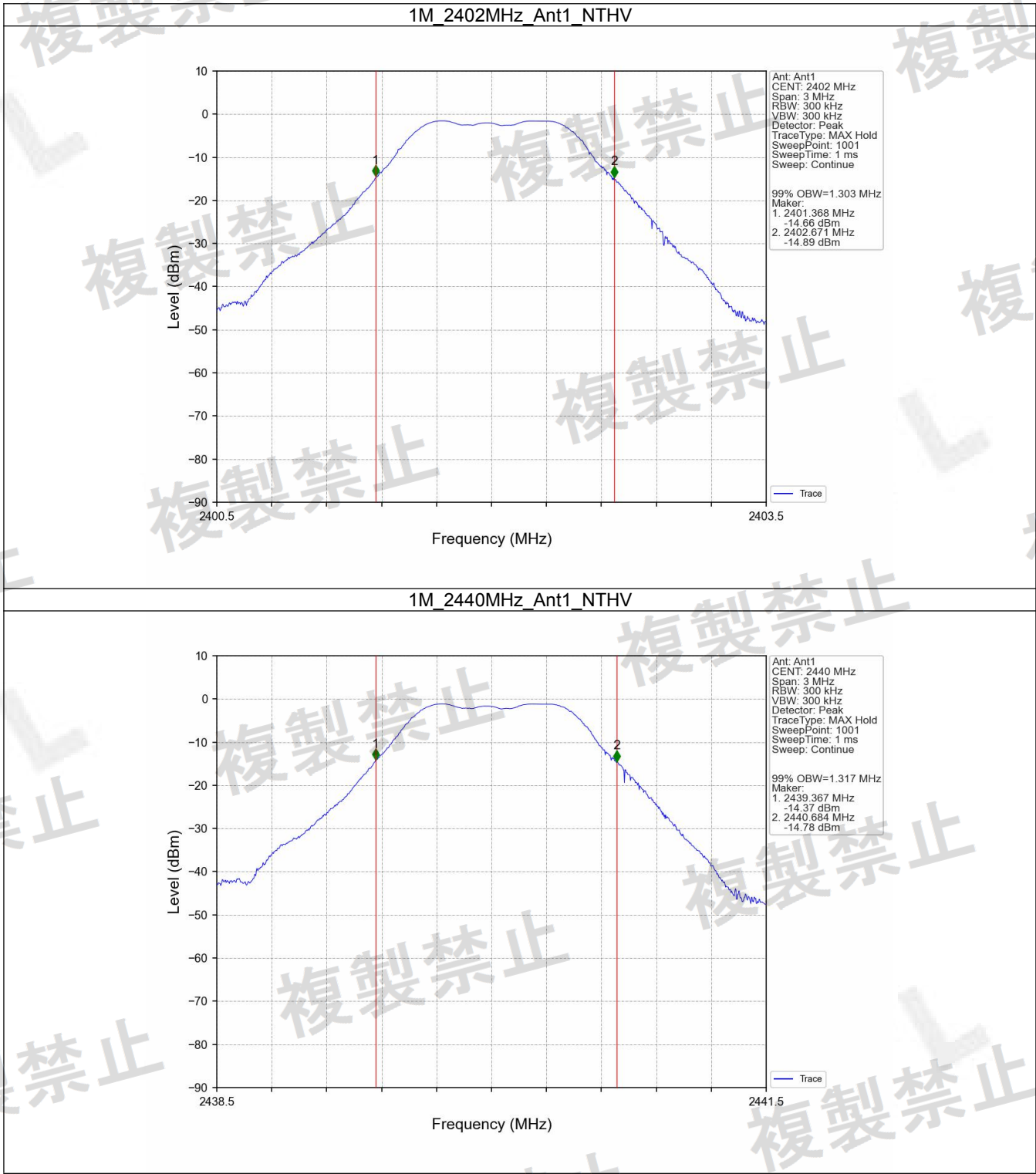
MIC: 219-259410



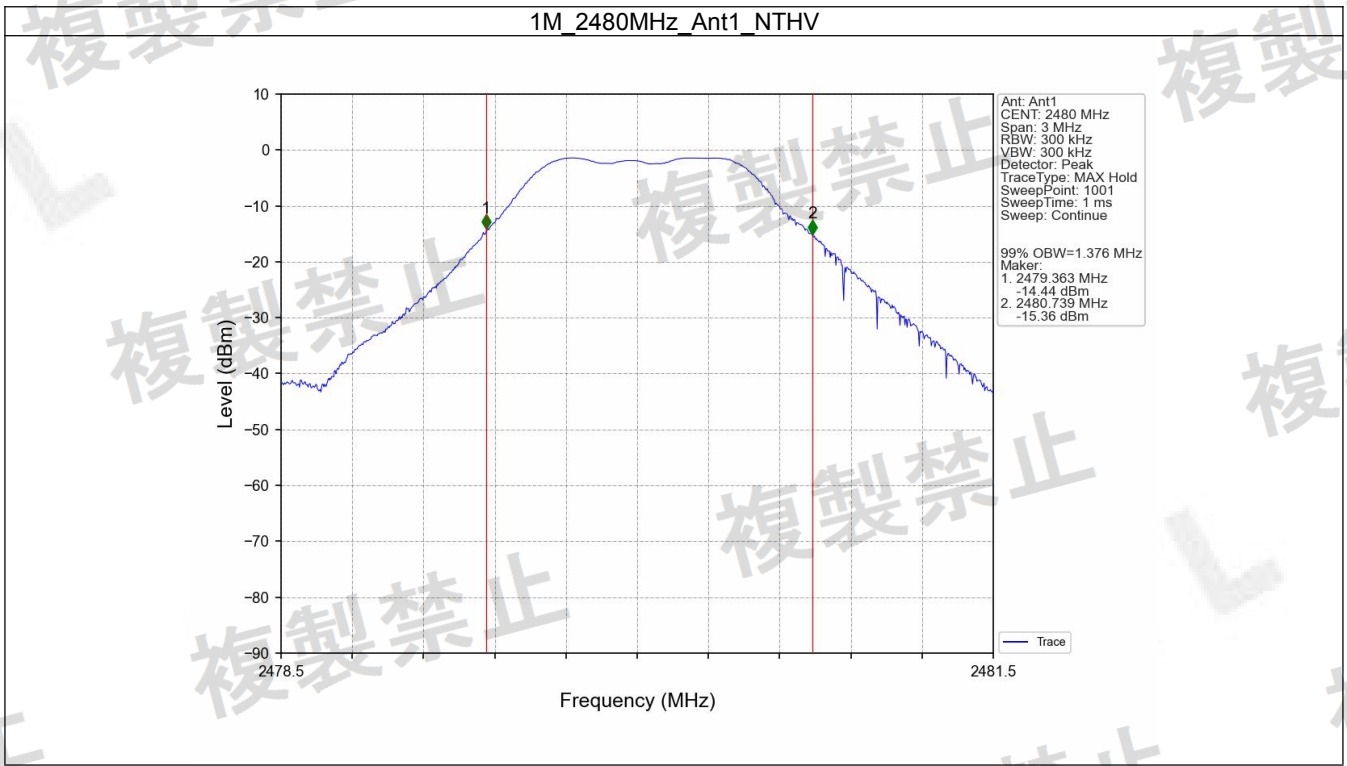
MIC: 219-259410



MIC: 219-259410



MIC: 219-259410



MIC: 219-259410

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	0.596	<=10.00	0.600	-0.67	<=20	Pass
			2440	1	0.655	<=10.00	0.600	9.17	<=20	Pass
			2480	1	0.610	<=10.00	0.600	1.67	<=20	Pass
NTLV	1M	SISO	2402	1	0.594	<=10.00	0.600	-1.00	<=20	Pass
			2440	1	0.674	<=10.00	0.600	12.33	<=20	Pass
			2480	1	0.609	<=10.00	0.600	1.50	<=20	Pass
NTHV	1M	SISO	2402	1	0.595	<=10.00	0.600	-0.83	<=20	Pass
			2440	1	0.668	<=10.00	0.600	11.33	<=20	Pass
			2480	1	0.637	<=10.00	0.600	6.17	<=20	Pass

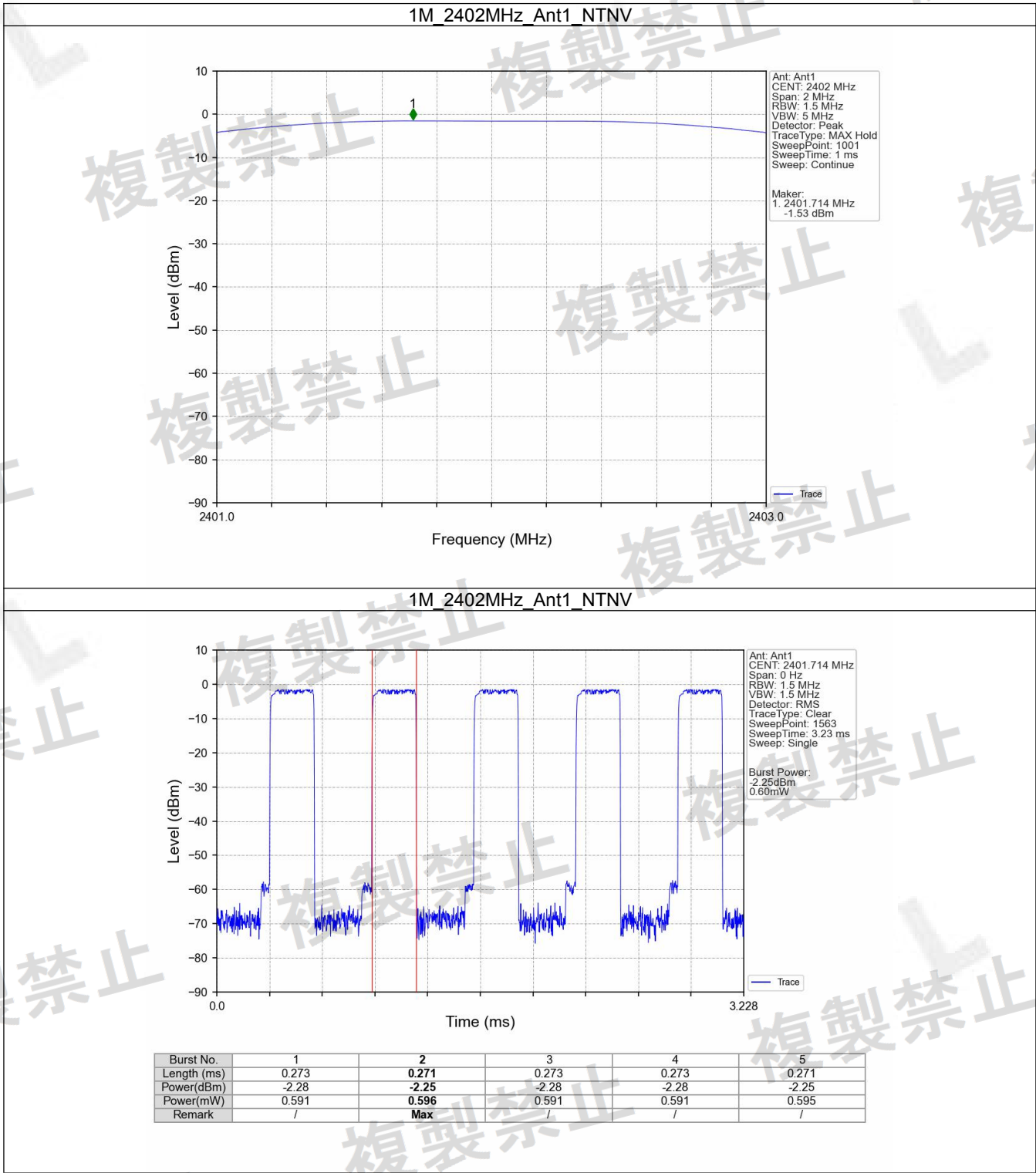
3.1.2 EIRP

ENV	Mode	TX Type	Frequency (MHz)	ANT	Gain (dBi)	EIRP (dBm)		Verdict
						Result	Limit	
NTNV	1M	SISO	2402	1	1.00	-1.25	<=12.14	Pass
			2440	1	1.00	-0.84	<=12.14	Pass
			2480	1	1.00	-1.15	<=12.14	Pass
NTLV	1M	SISO	2402	1	1.00	-1.26	<=12.14	Pass
			2440	1	1.00	-0.71	<=12.14	Pass
			2480	1	1.00	-1.15	<=12.14	Pass
NTHV	1M	SISO	2402	1	1.00	-1.25	<=12.14	Pass
			2440	1	1.00	-0.75	<=12.14	Pass
			2480	1	1.00	-0.96	<=12.14	Pass

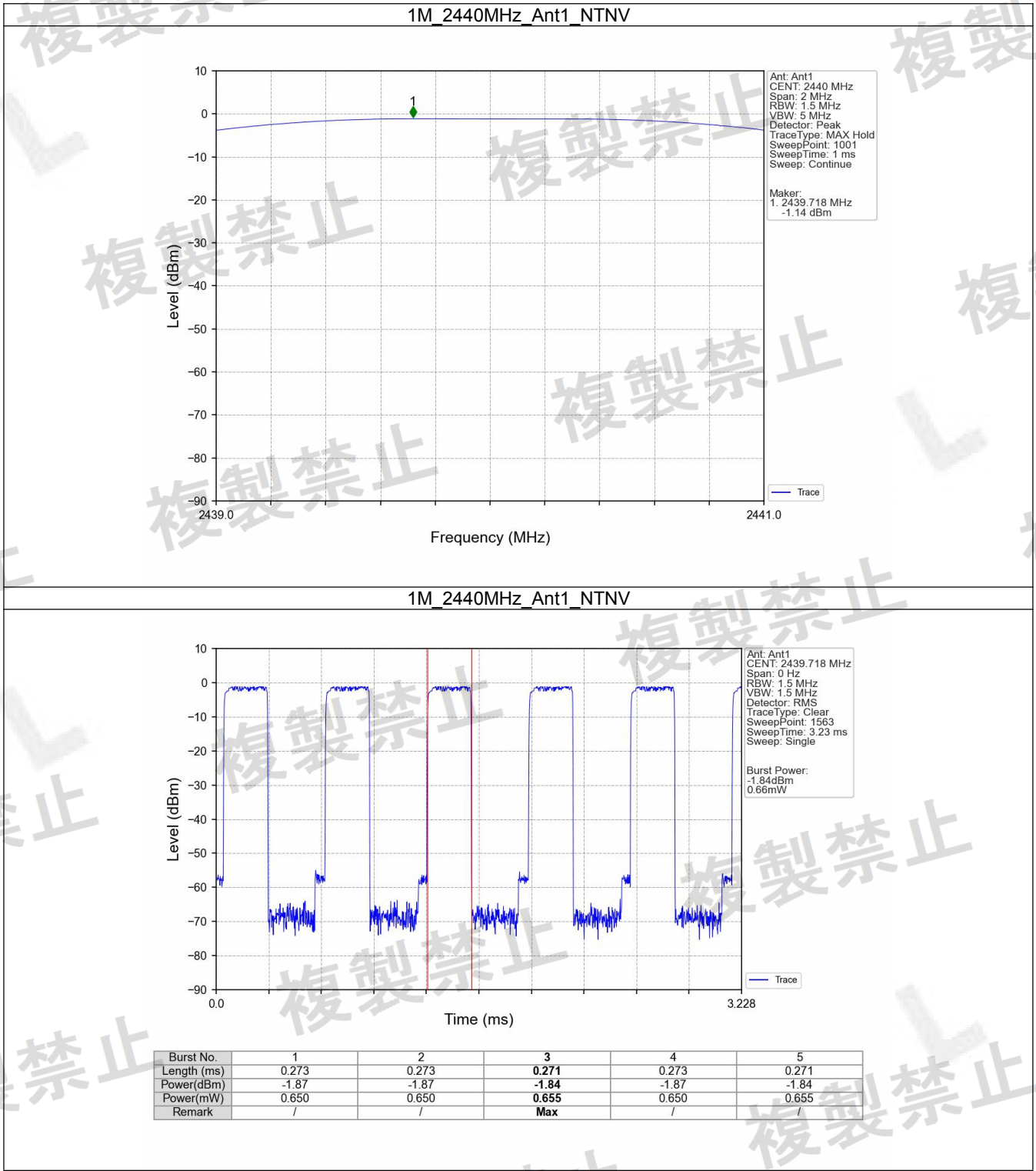
MIC: 219-259410

3.2 Test Graph

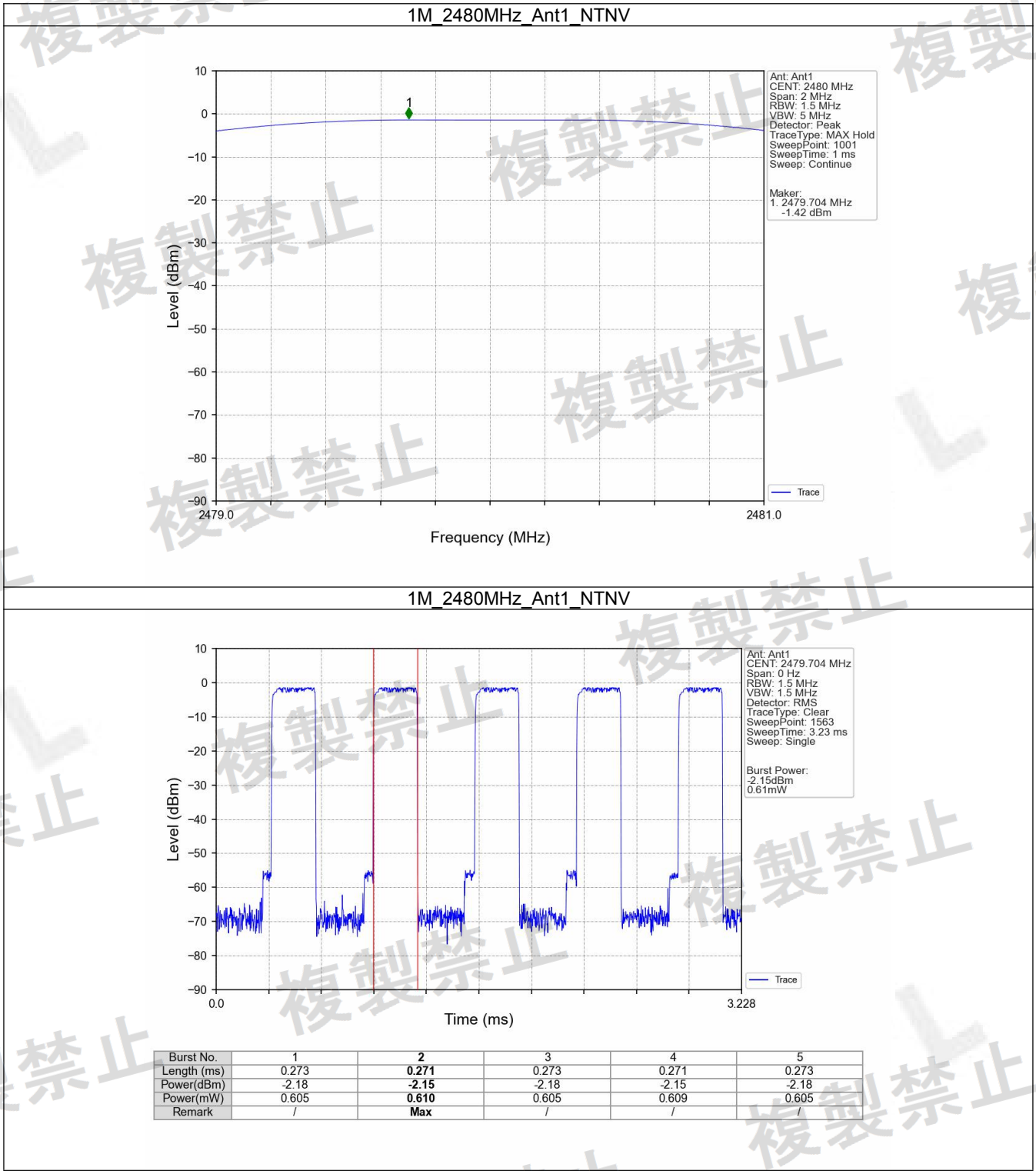
3.2.1 Power



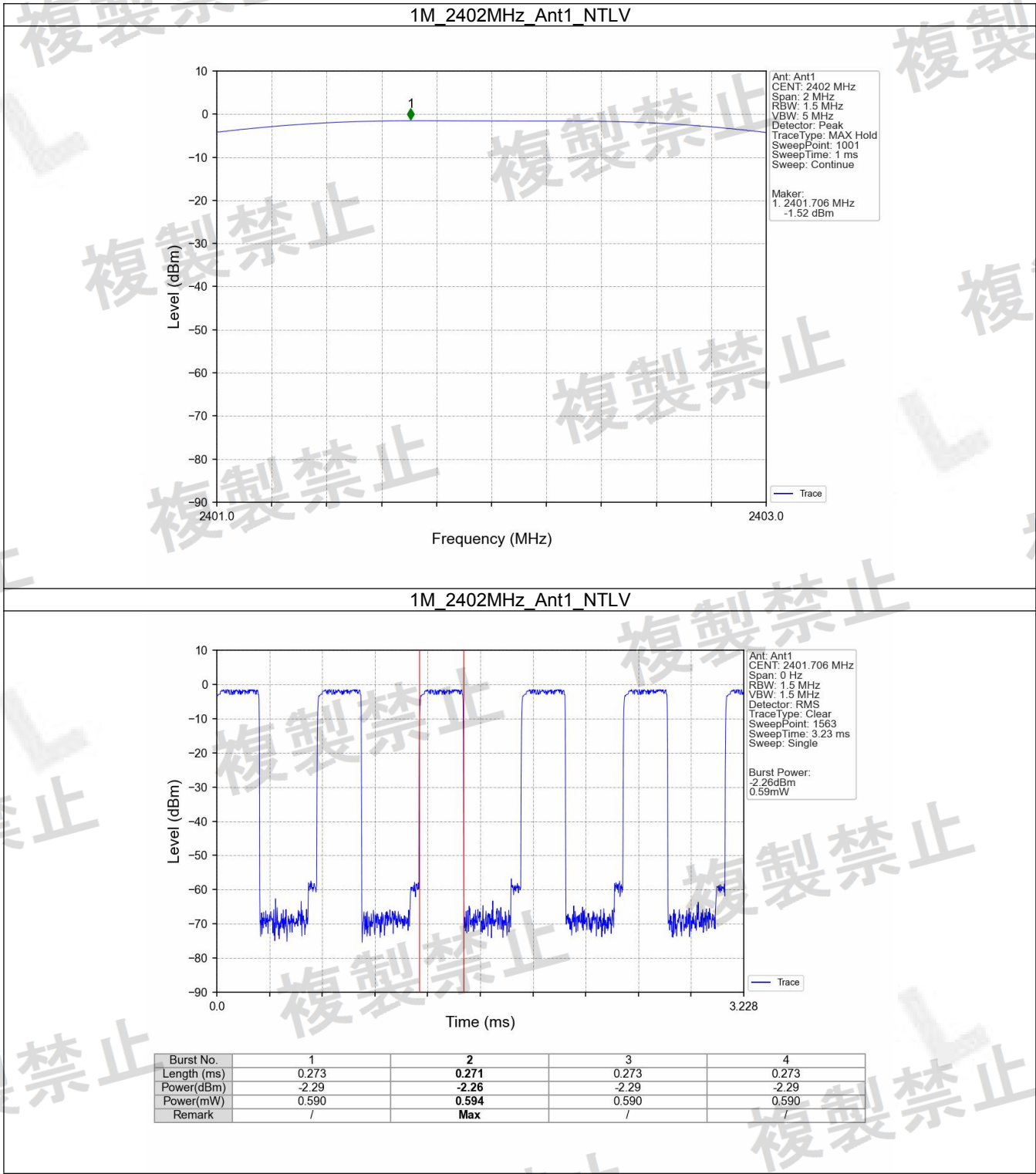
MIC: 219-259410



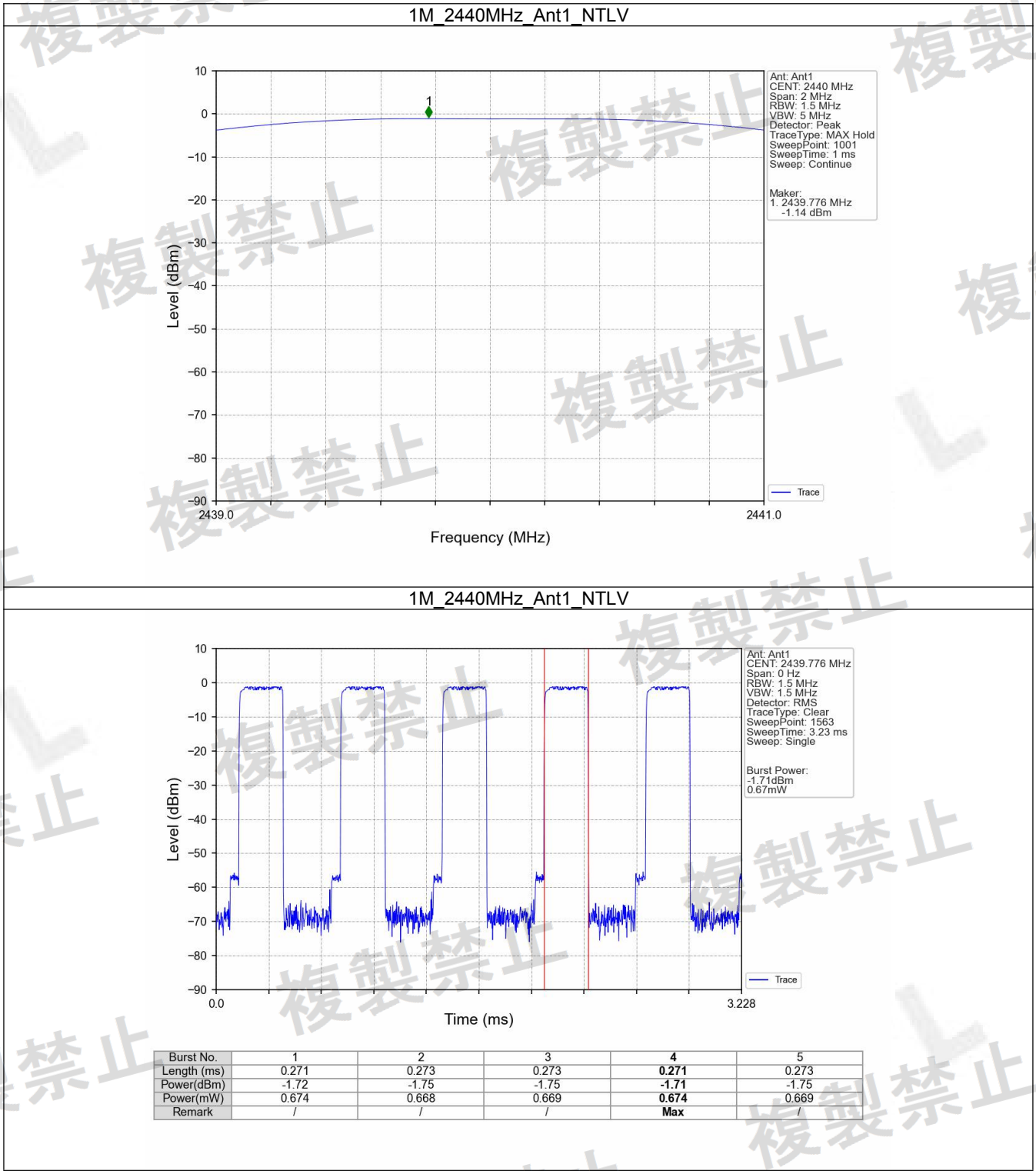
MIC: 219-259410



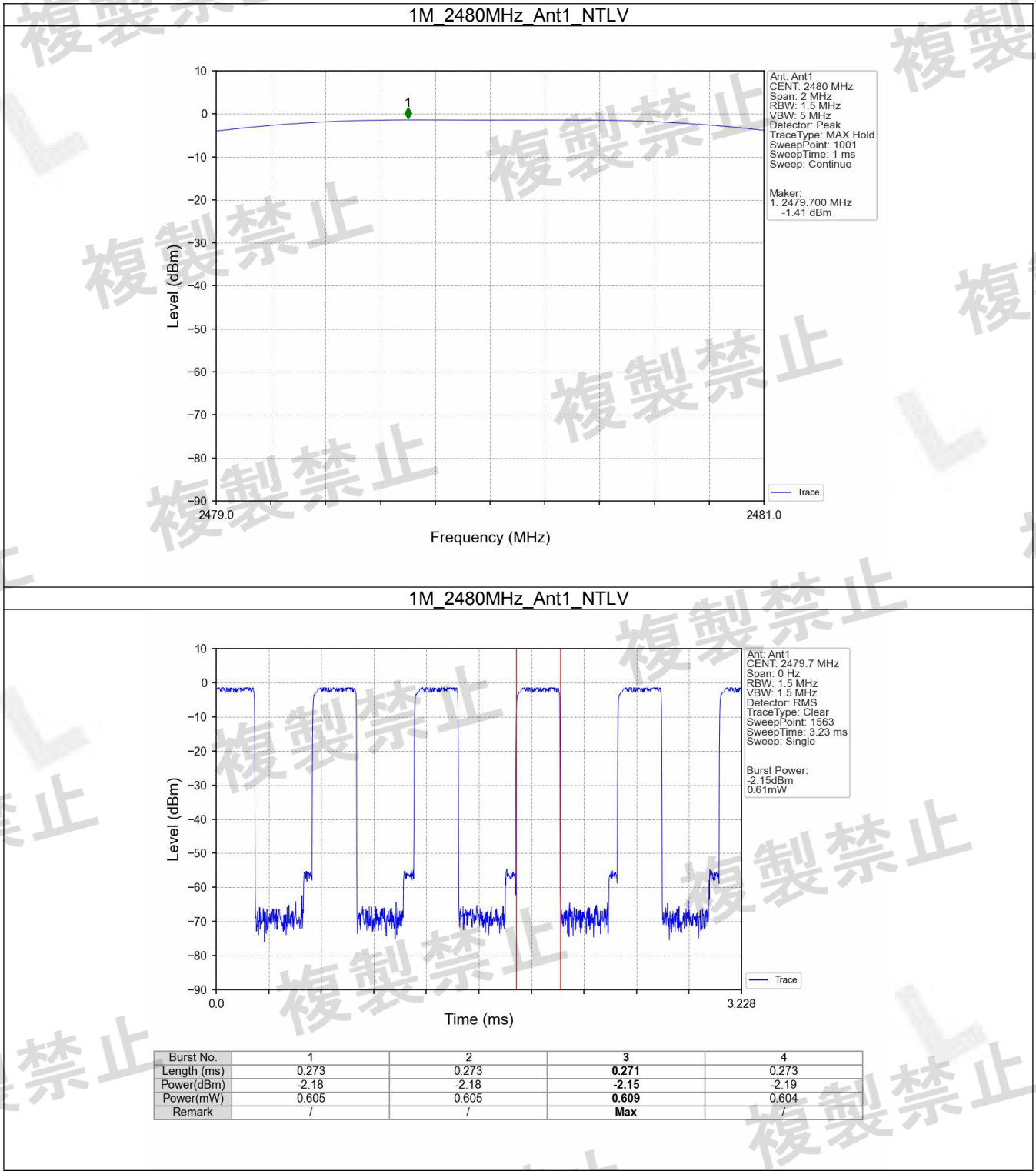
MIC: 219-259410



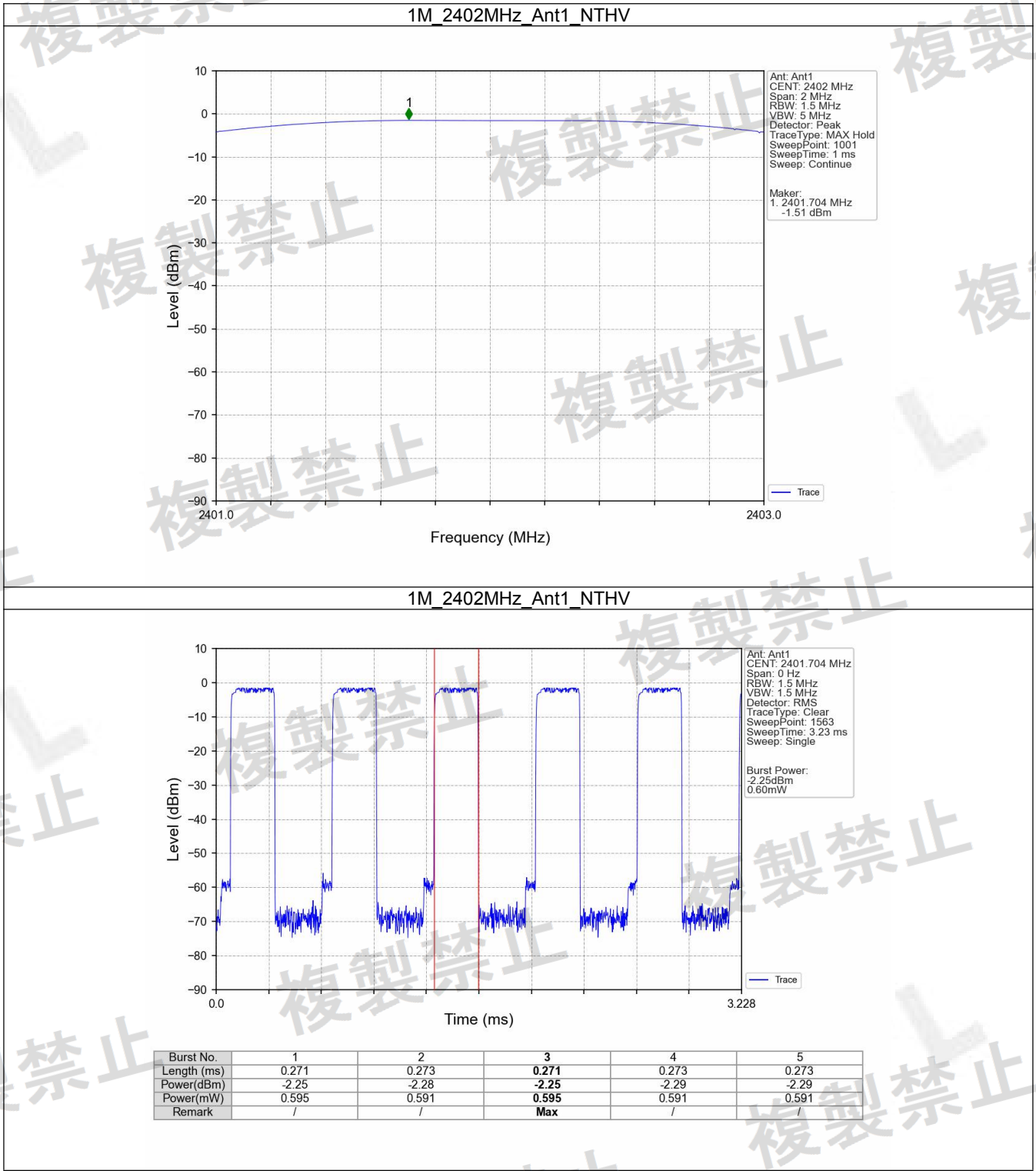
MIC: 219-259410



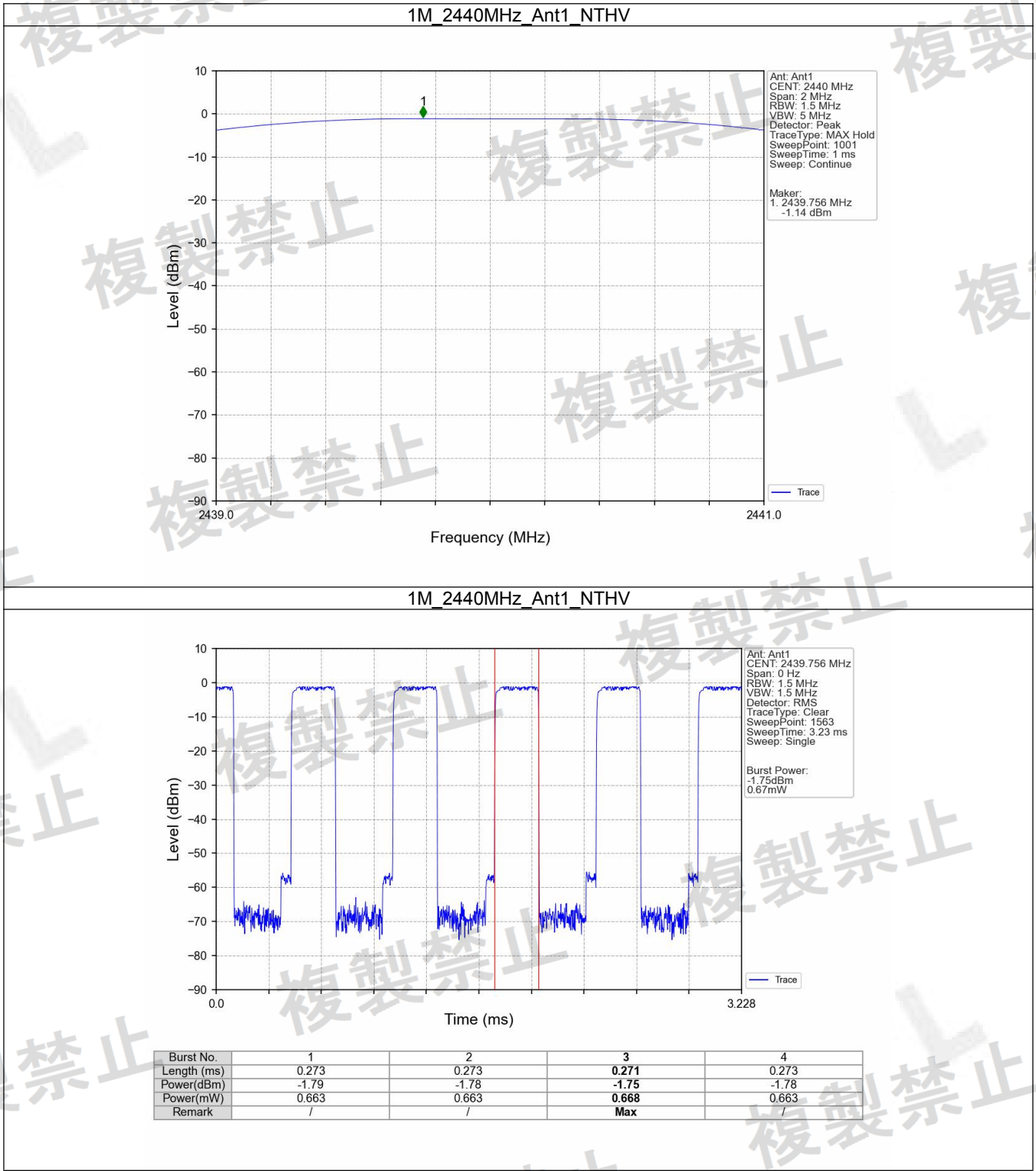
MIC: 219-259410



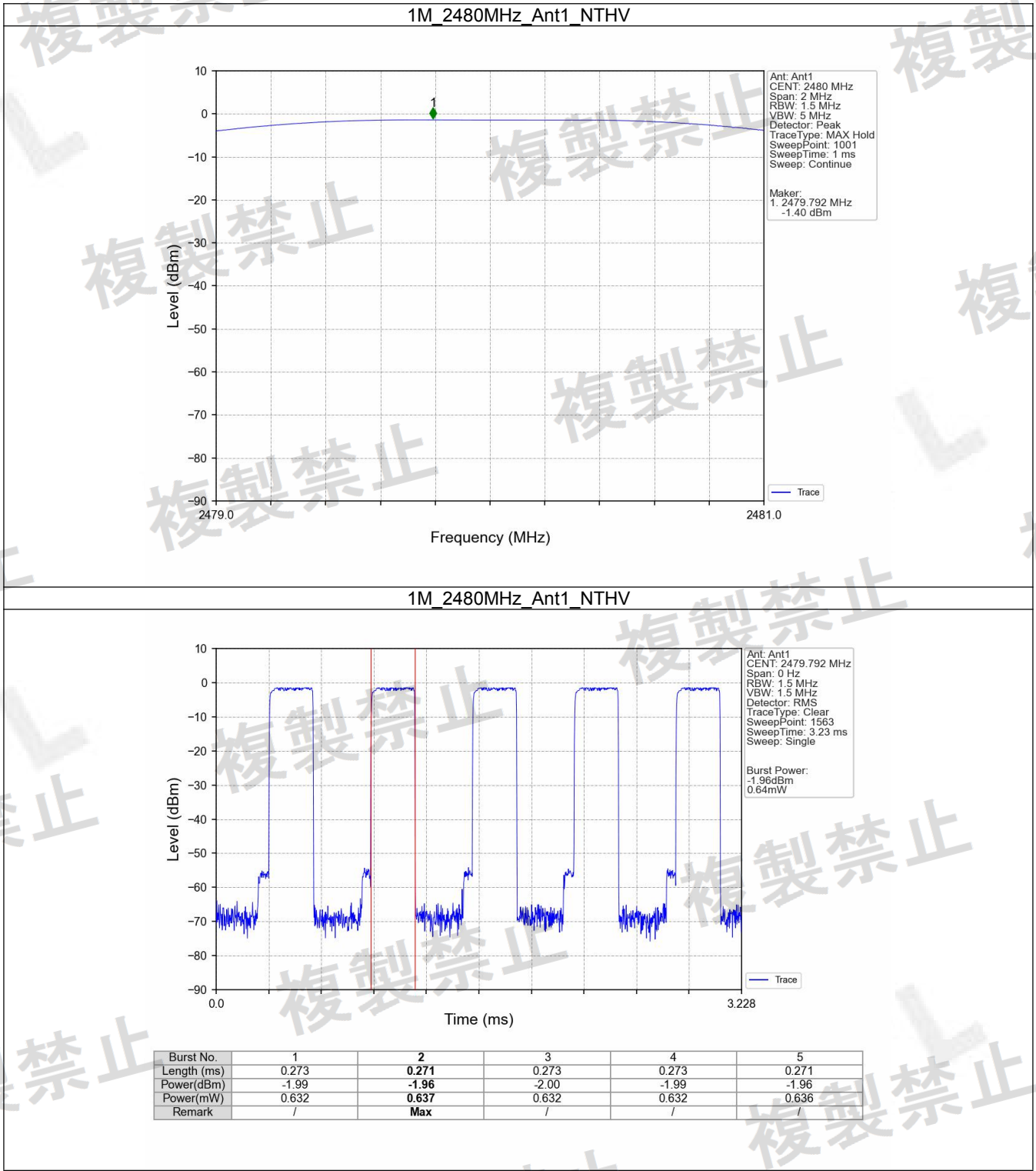
MIC: 219-259410



MIC: 219-259410



MIC: 219-259410



MIC: 219-259410

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	1748.5	-32.01	0.630	/	/	2.5	Pass
				2387	2400	2399.987	-37.73	0.169	/	/	25	Pass
				2483.5	2496.5	2483.591	-58.85	0.001	/	/	25	Pass
				2496.5	12500	5751.5	-52.48	0.006	/	/	2.5	Pass
		2440	1	30	2387	1748.5	-30.92	0.809	/	/	2.5	Pass
				2387	2400	2393.604	-59.12	0.001	/	/	25	Pass
				2483.5	2496.5	2483.786	-54.83	0.003	/	/	25	Pass
				2496.5	12500	2600	-56.05	0.002	/	/	2.5	Pass
		2480	1	30	2387	1748.5	-32.69	0.538	/	/	2.5	Pass
				2387	2400	2399.857	-56.90	0.002	/	/	25	Pass
				2483.5	2496.5	2483.591	-46.22	0.024	/	/	25	Pass
				2496.5	12500	2560.5	-55.85	0.003	/	/	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	1748.5	-33.45	0.452	/	/	2.5	Pass
				2387	2400	2399.987	-37.29	0.187	/	/	25	Pass
				2483.5	2496.5	2484.189	-59.14	0.001	/	/	25	Pass
				2496.5	12500	2562.5	-54.60	0.003	/	/	2.5	Pass
		2440	1	30	2387	1748.5	-33.50	0.447	/	/	2.5	Pass
				2387	2400	2390.081	-58.72	0.001	/	/	25	Pass
				2483.5	2496.5	2483.526	-54.49	0.004	/	/	25	Pass
				2496.5	12500	5752.5	-51.25	0.007	/	/	2.5	Pass
		2480	1	30	2387	1748.5	-34.35	0.367	/	/	2.5	Pass
				2387	2400	2399.935	-57.23	0.002	/	/	25	Pass
				2483.5	2496.5	2483.851	-46.34	0.023	/	/	25	Pass
				2496.5	12500	5753	-52.29	0.006	/	/	2.5	Pass

MIC: 219-259410

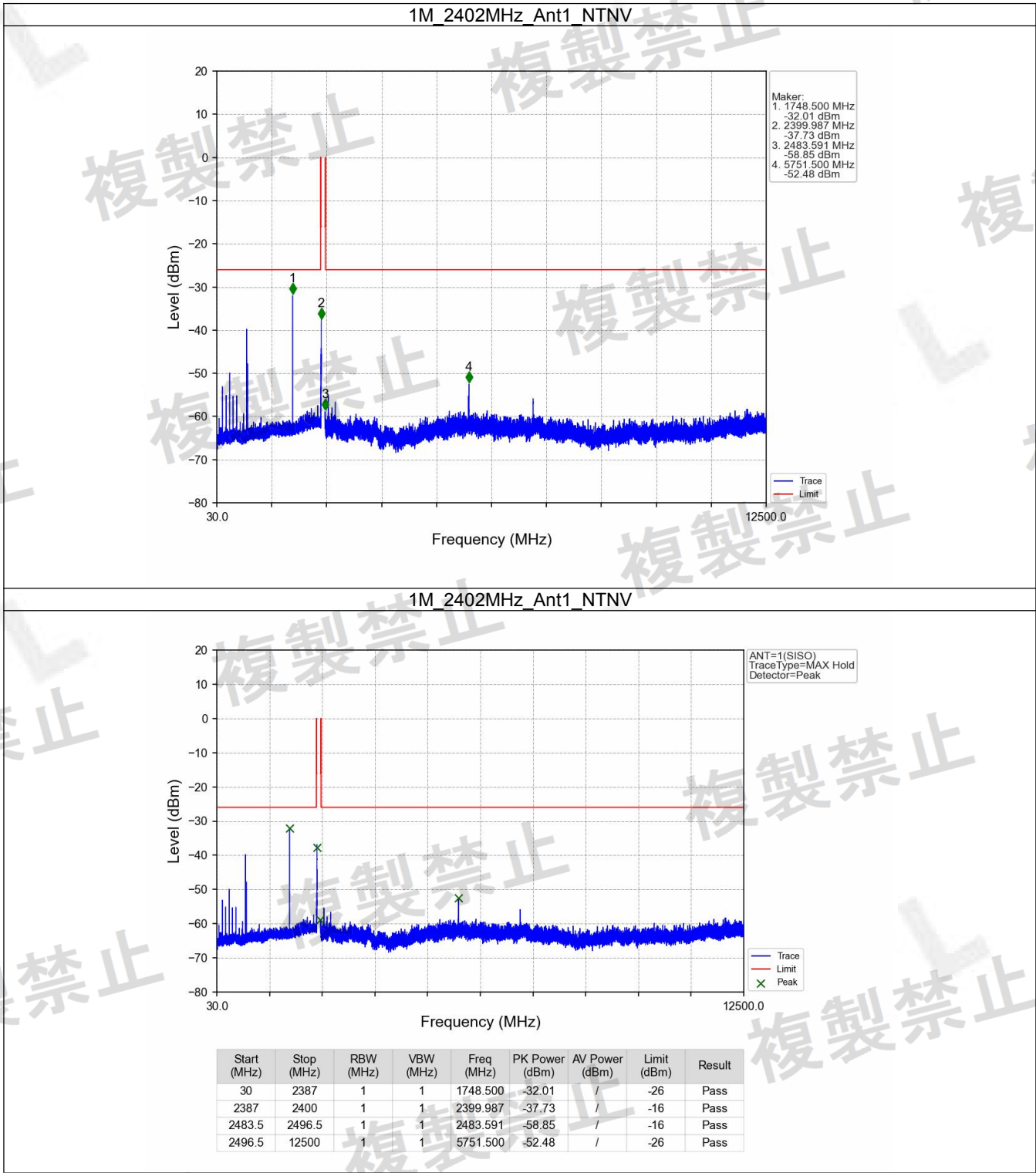
4.1.3 TxSe_NTHV

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	1748.5	-32.02	0.628	/	/	2.5	Pass
				2387	2400	2399.987	-37.53	0.177	/	/	25	Pass
				2483.5	2496.5	2487.465	-59.26	0.001	/	/	25	Pass
				2496.5	12500	5753	-50.66	0.009	/	/	2.5	Pass
		2440	1	30	2387	1748.5	-31.75	0.668	/	/	2.5	Pass
				2387	2400	2399.402	-58.66	0.001	/	/	25	Pass
				2483.5	2496.5	2485.034	-58.91	0.001	/	/	25	Pass
				2496.5	12500	5753	-54.56	0.003	/	/	2.5	Pass
		2480	1	30	2387	1748.5	-32.62	0.547	/	/	2.5	Pass
				2387	2400	2399.974	-56.33	0.002	/	/	25	Pass
				2483.5	2496.5	2483.565	-46.82	0.021	/	/	25	Pass
				2496.5	12500	2560.5	-55.68	0.003	/	/	2.5	Pass

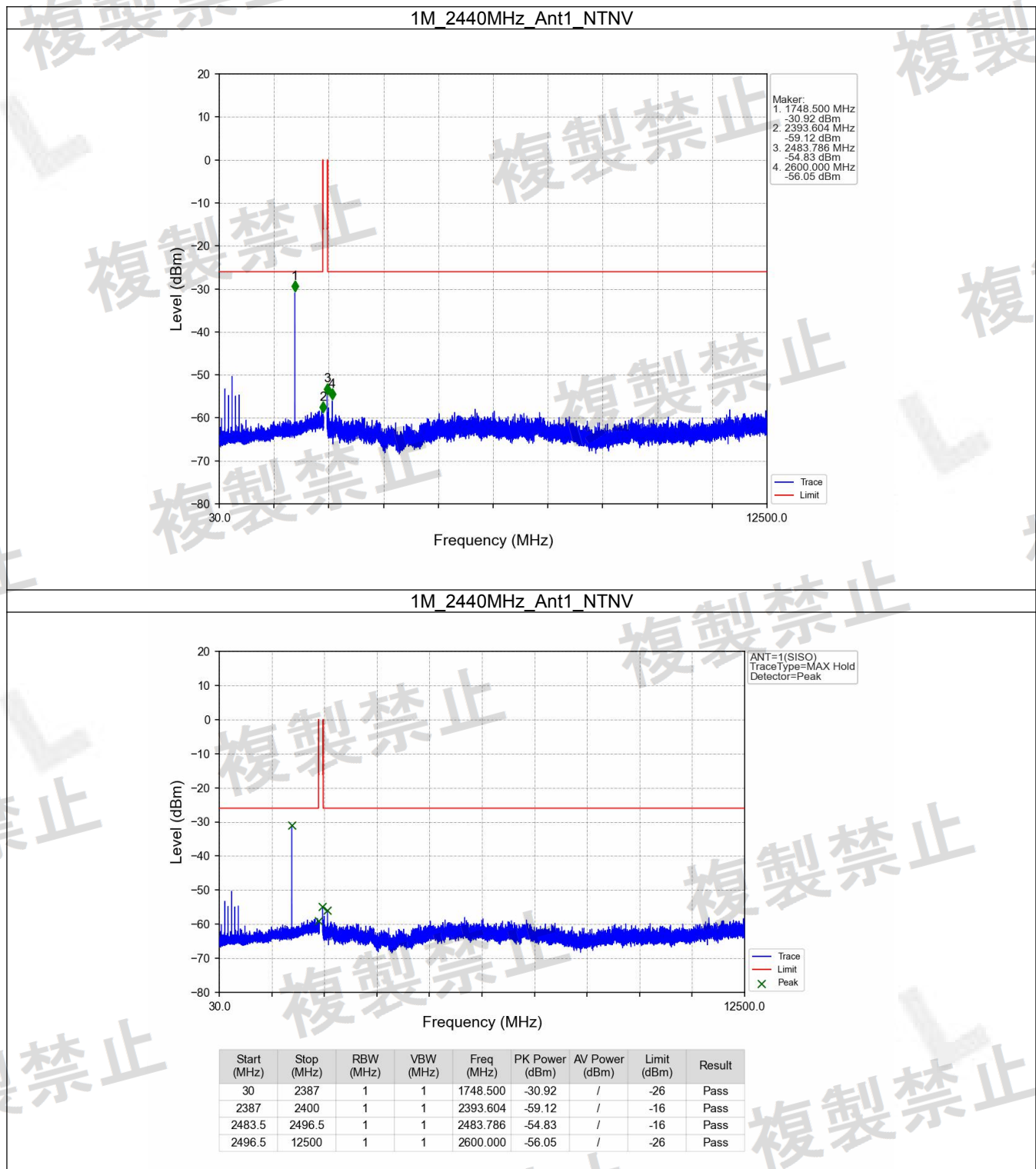
MIC: 219-259410

4.2 Test Graph

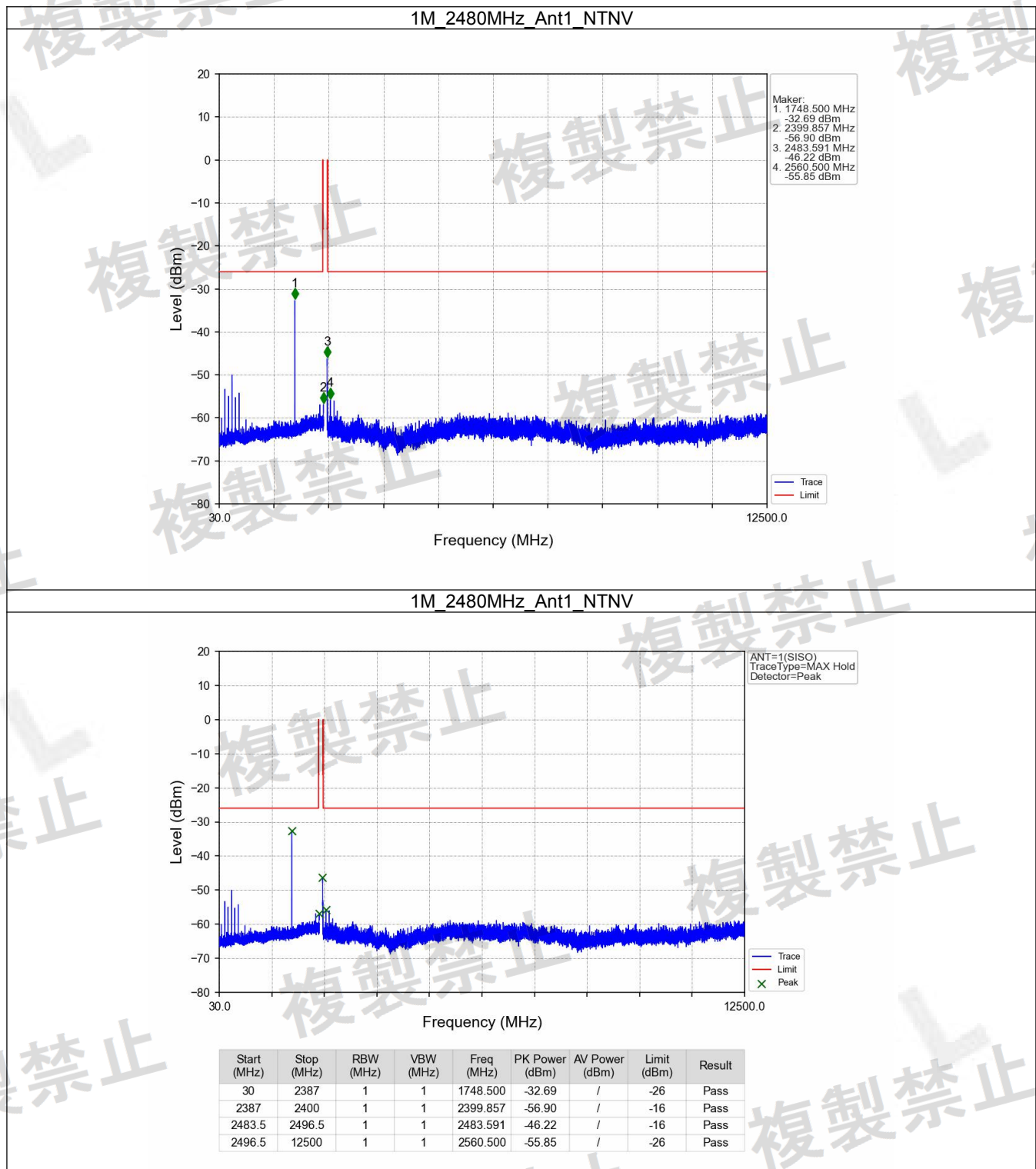
4.2.1 TxSe_NTNV



MIC: 219-259410

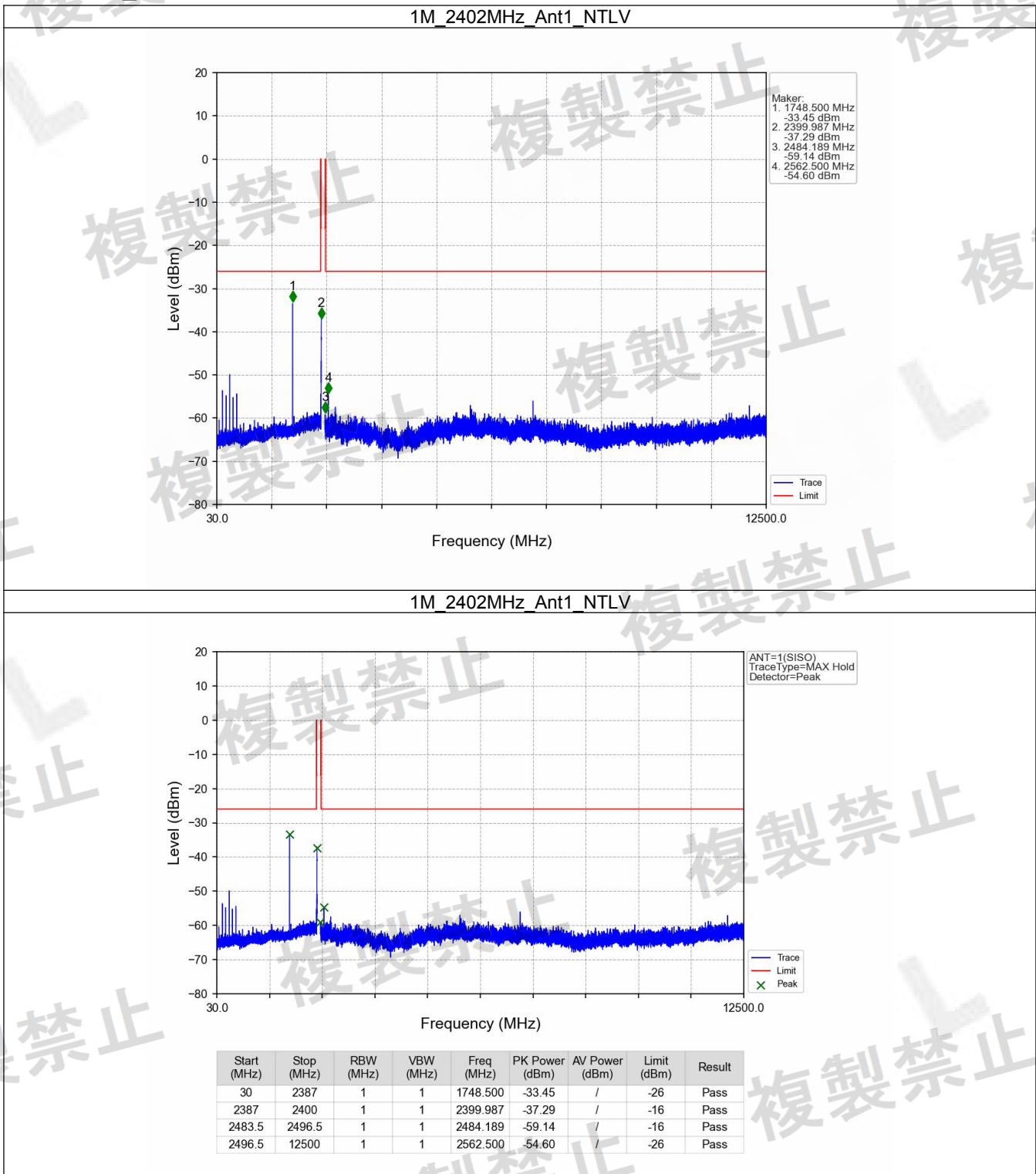


MIC: 219-259410

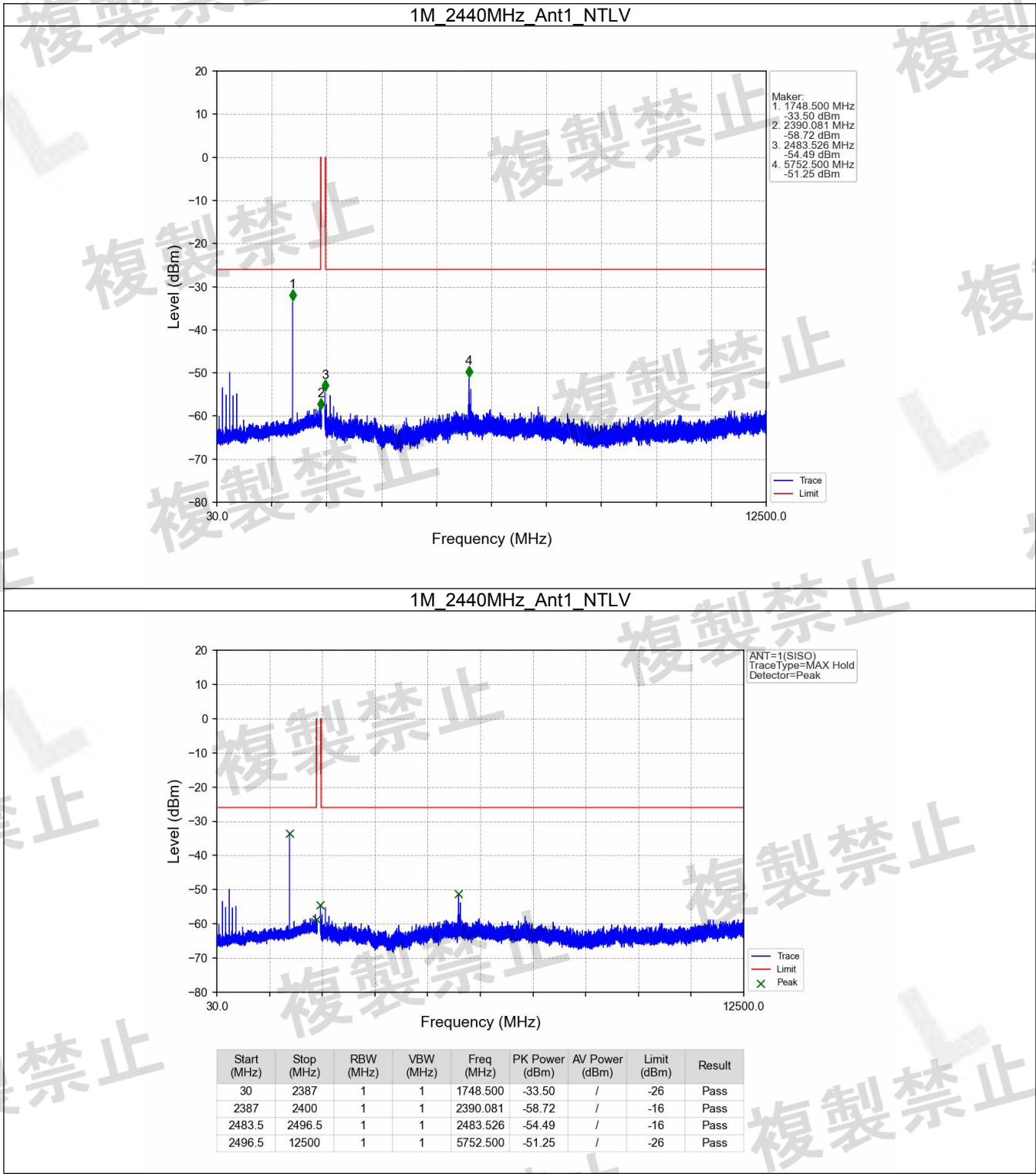


MIC: 219-259410

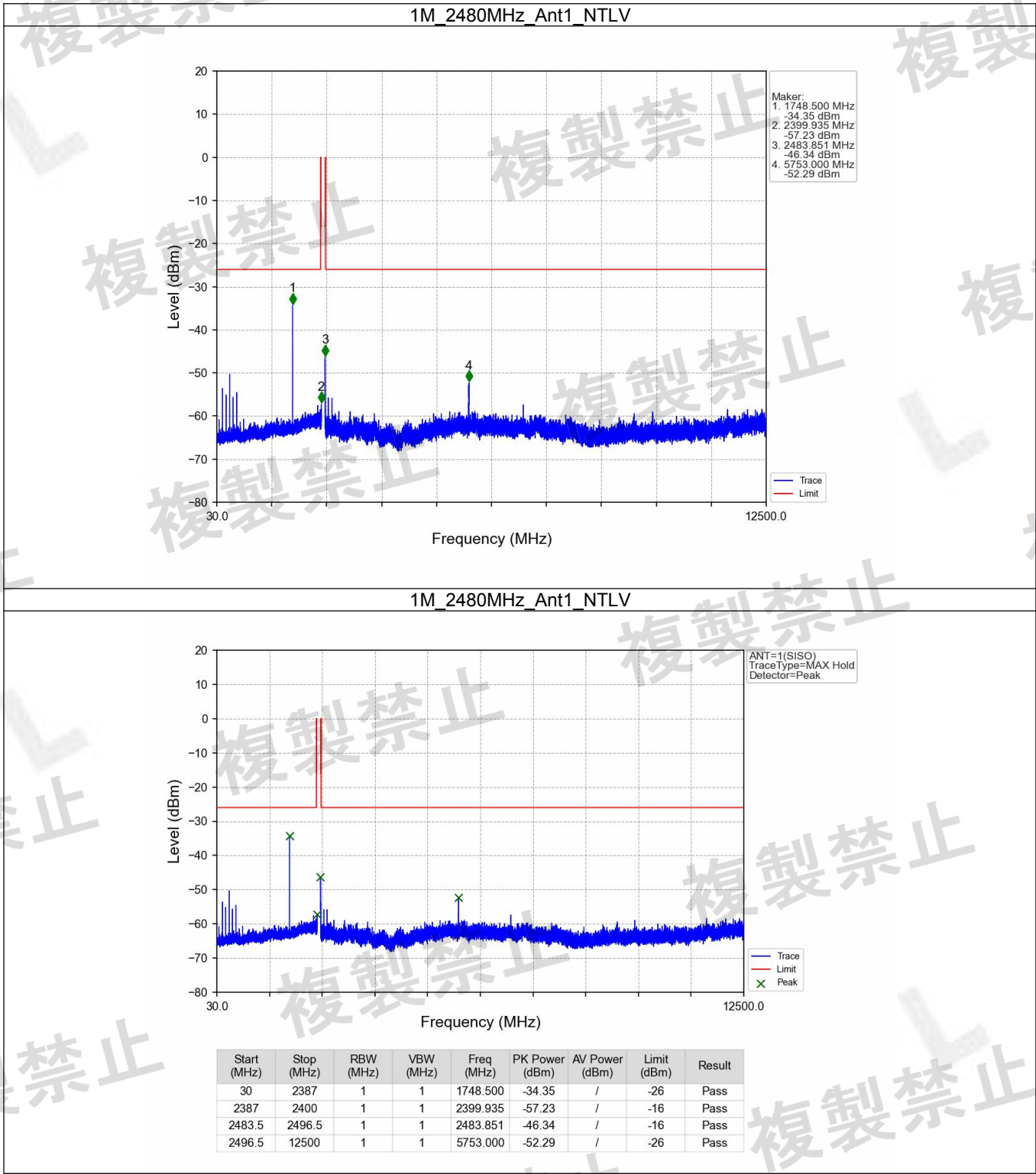
4.2.2 TxSe_NTLV



MIC: 219-259410

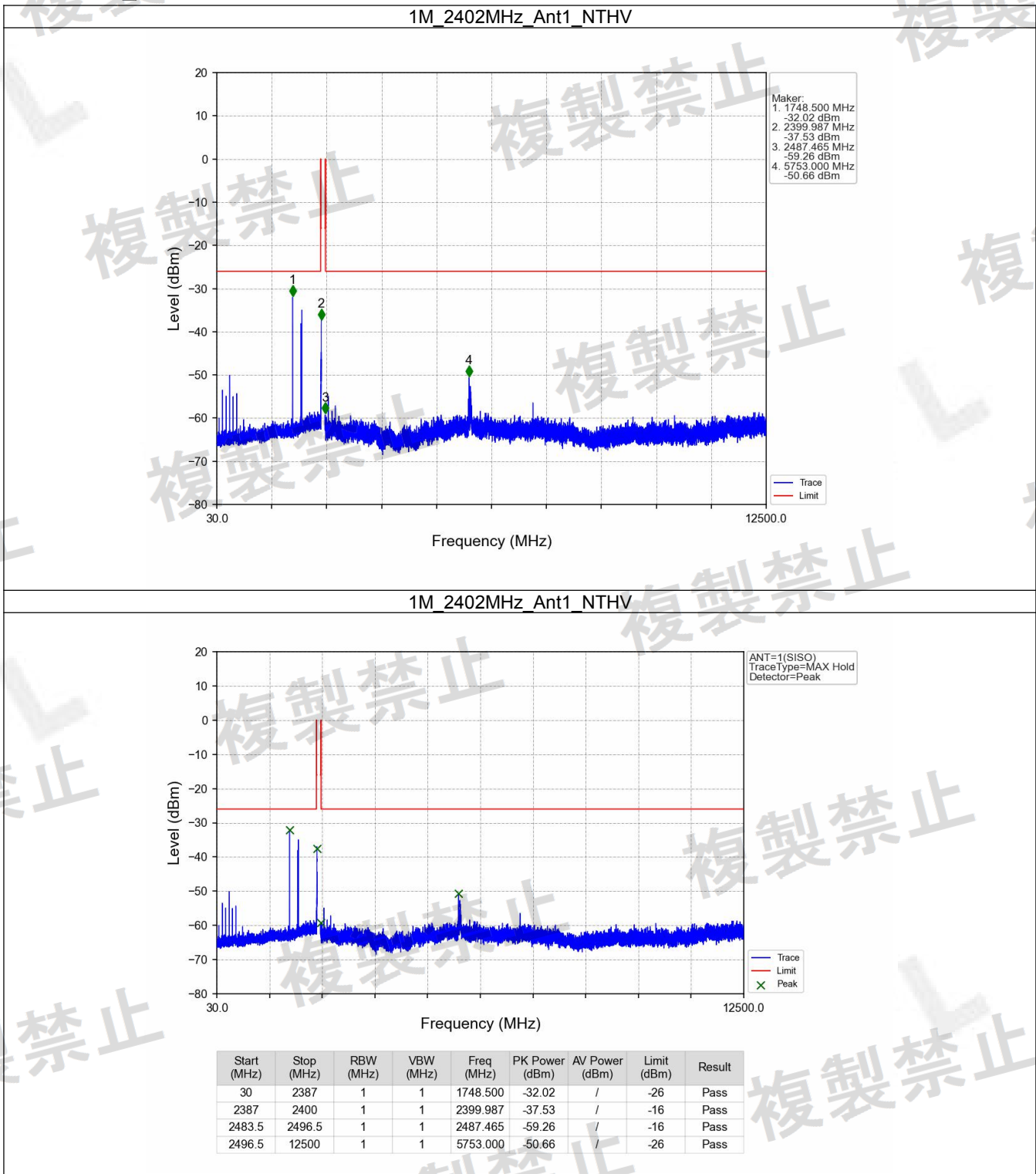


MIC: 219-259410

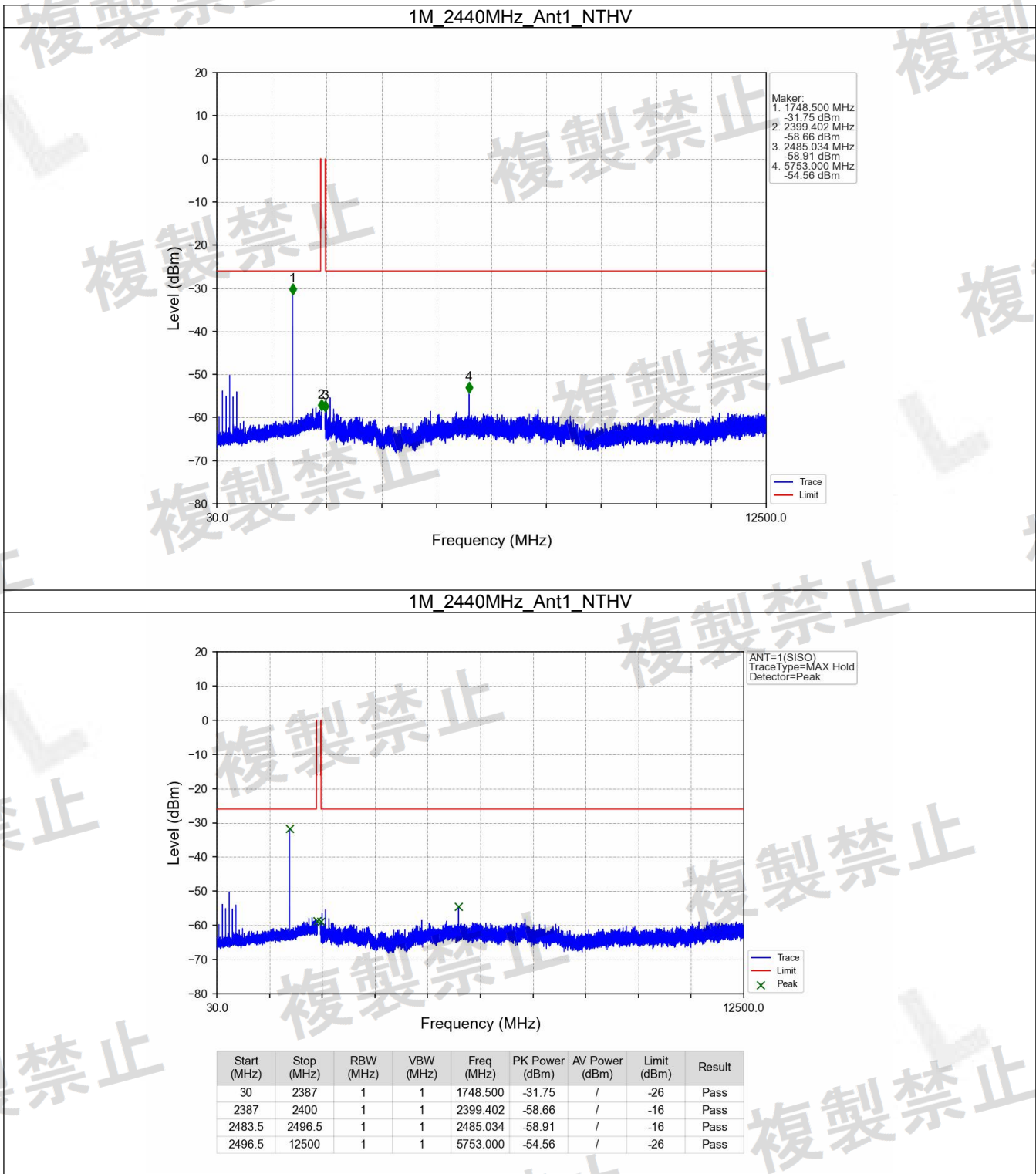


MIC: 219-259410

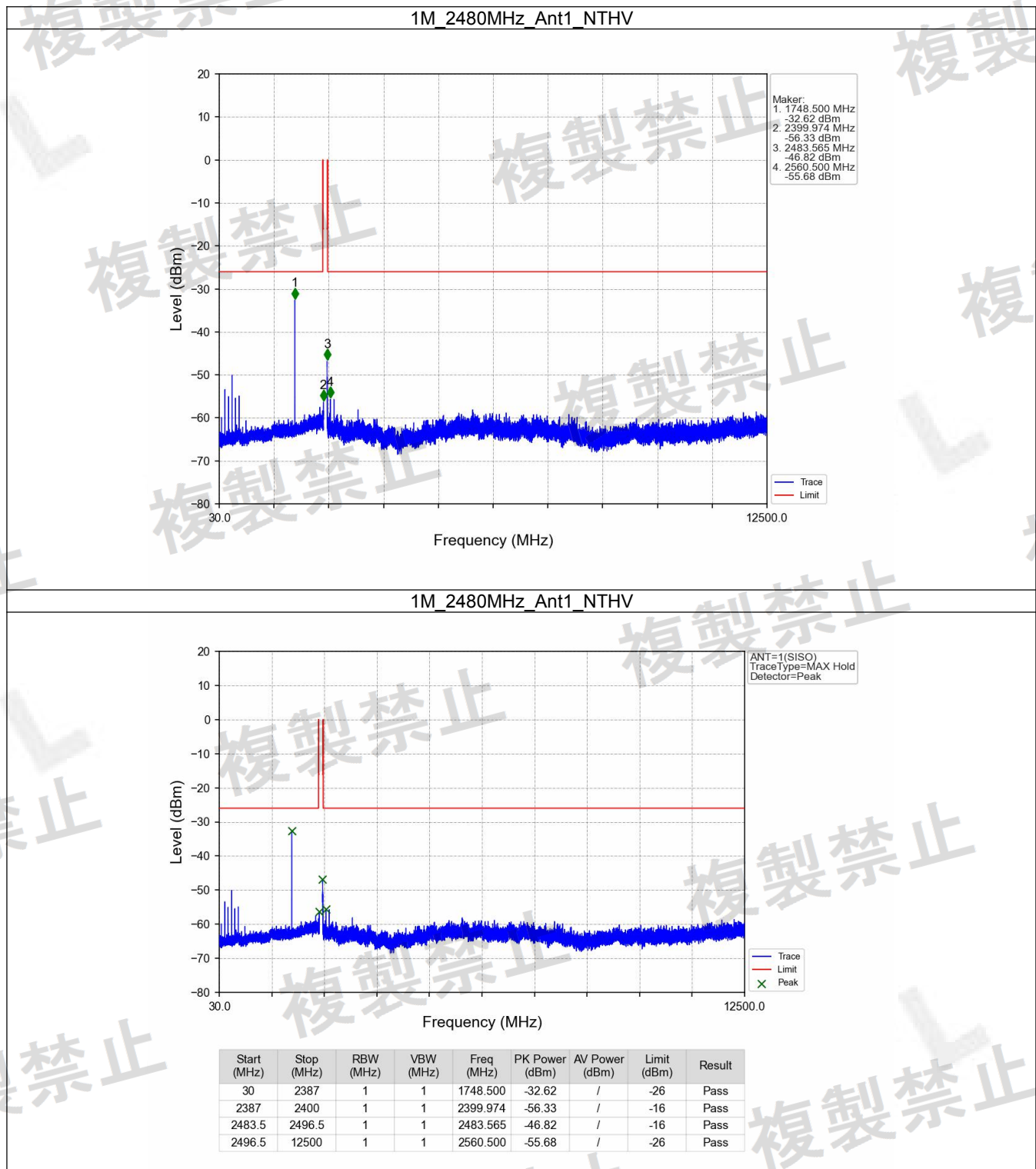
4.2.3 TxSe_NTHV



MIC: 219-259410



MIC: 219-259410



MIC: 219-259410

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	454.65	-77.13	0.019	/	/	4	Pass
				1000	12500	5626.5	-64.37	0.366	/	/	20	Pass
		2440	1	30	1000	911.65	-77.67	0.017	/	/	4	Pass
				1000	12500	5558.5	-63.55	0.442	/	/	20	Pass
		2480	1	30	1000	849.65	-77.05	0.020	/	/	4	Pass
				1000	12500	2695	-63.29	0.469	/	/	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	922	-77.43	0.018	/	/	4	Pass
				1000	12500	7308.5	-63.80	0.417	/	/	20	Pass
		2440	1	30	1000	897.05	-77.48	0.018	/	/	4	Pass
				1000	12500	5475.5	-63.51	0.446	/	/	20	Pass
		2480	1	30	1000	705.15	-62.17	0.607	/	/	4	Pass
				1000	12500	5727.5	-63.81	0.416	/	/	20	Pass

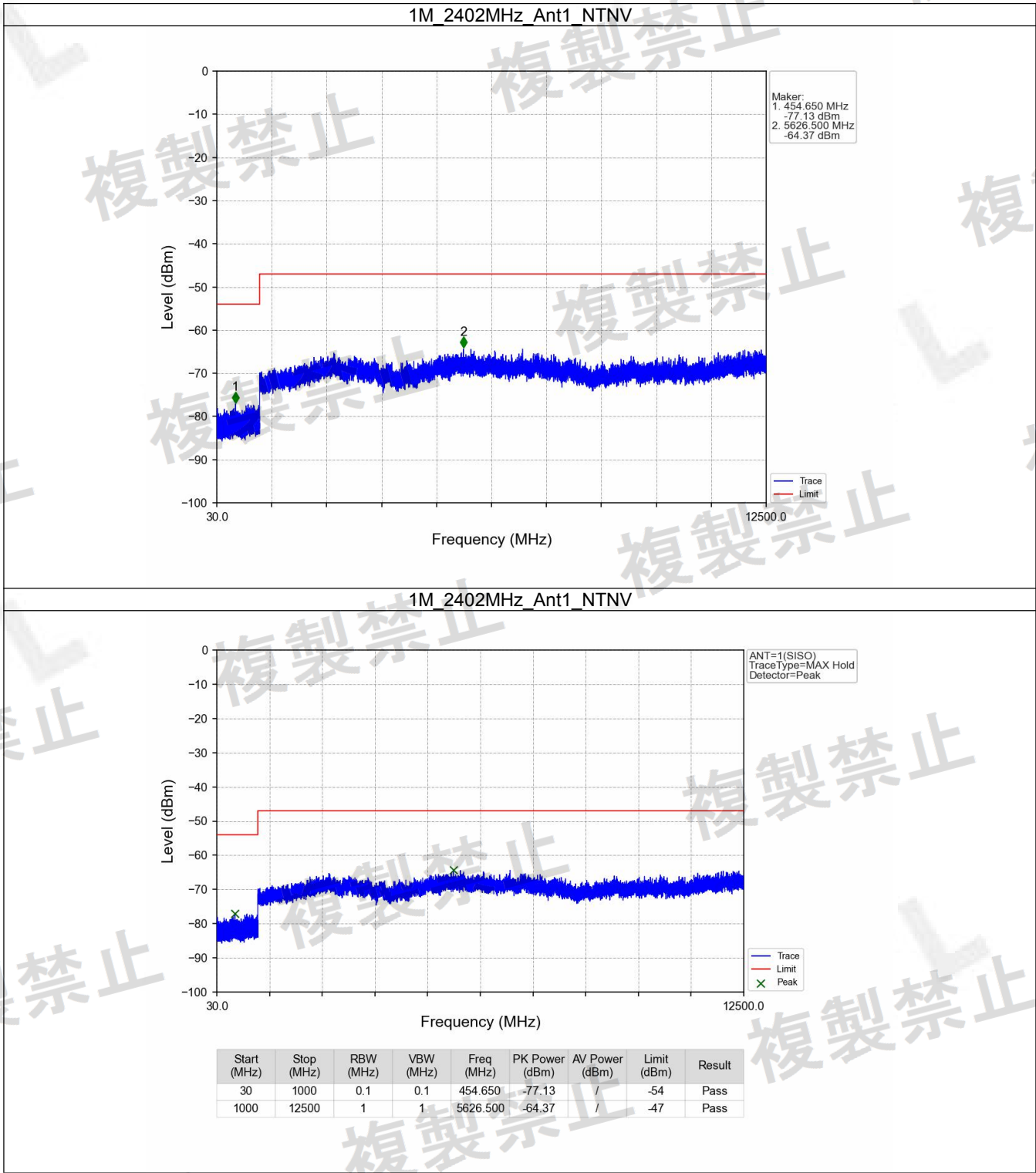
5.1.3 RxSe_NTHV

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	508.65	-77.16	0.019	/	/	4	Pass
				1000	12500	5869.5	-64.13	0.386	/	/	20	Pass
		2440	1	30	1000	411.5	-77.40	0.018	/	/	4	Pass
				1000	12500	5586.5	-64.05	0.394	/	/	20	Pass
		2480	1	30	1000	459.1	-76.86	0.021	/	/	4	Pass
				1000	12500	1767	-52.65	5.433	-78.23	0.015	20	Pass
				1000	12500	1779.5	-51.00	7.943	-79.17	0.012	20	Pass
				1000	12500	1779.5	-51.00	7.943	-79.17	0.012	20	Pass

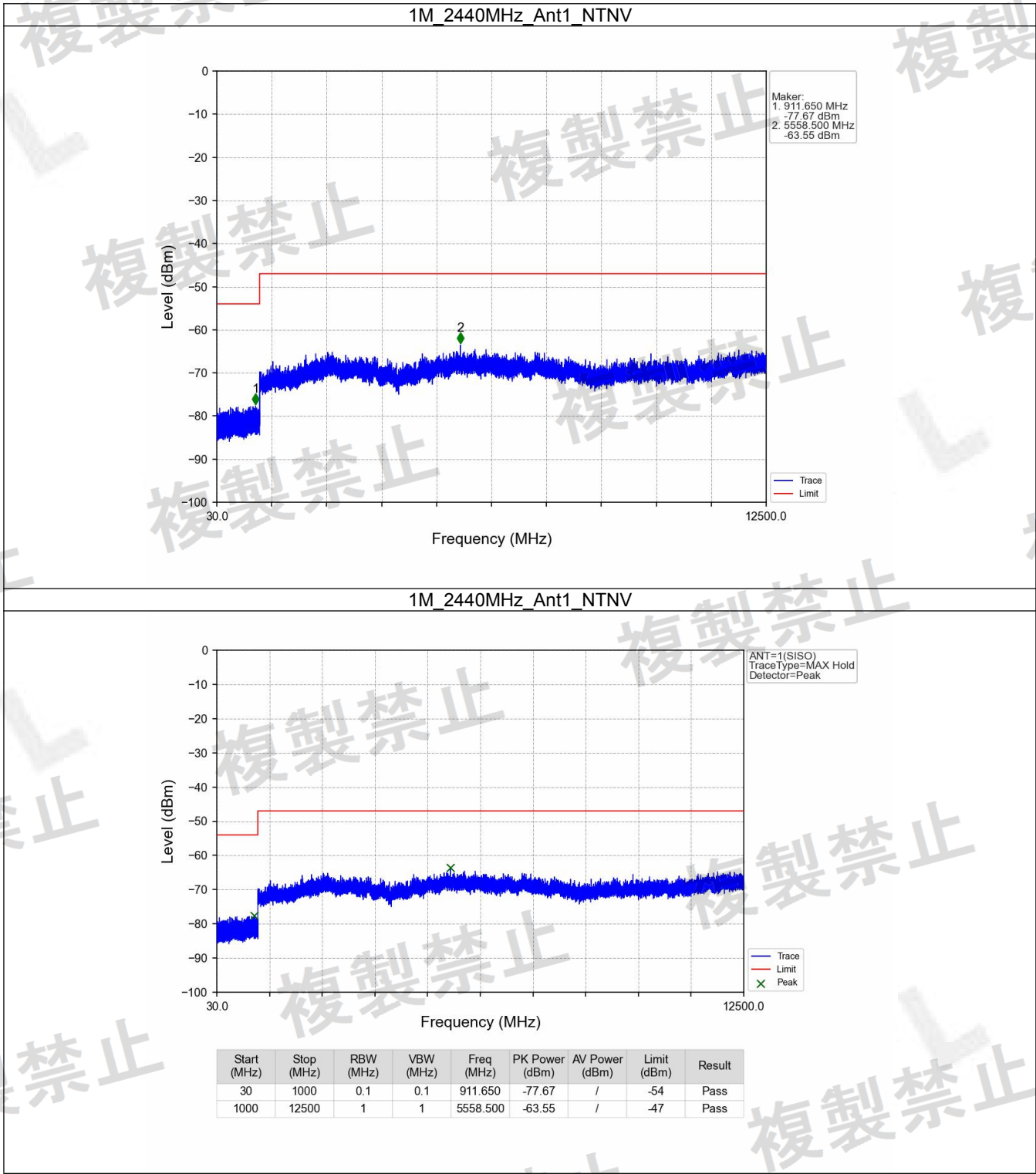
MIC: 219-259410

5.2 Test Graph

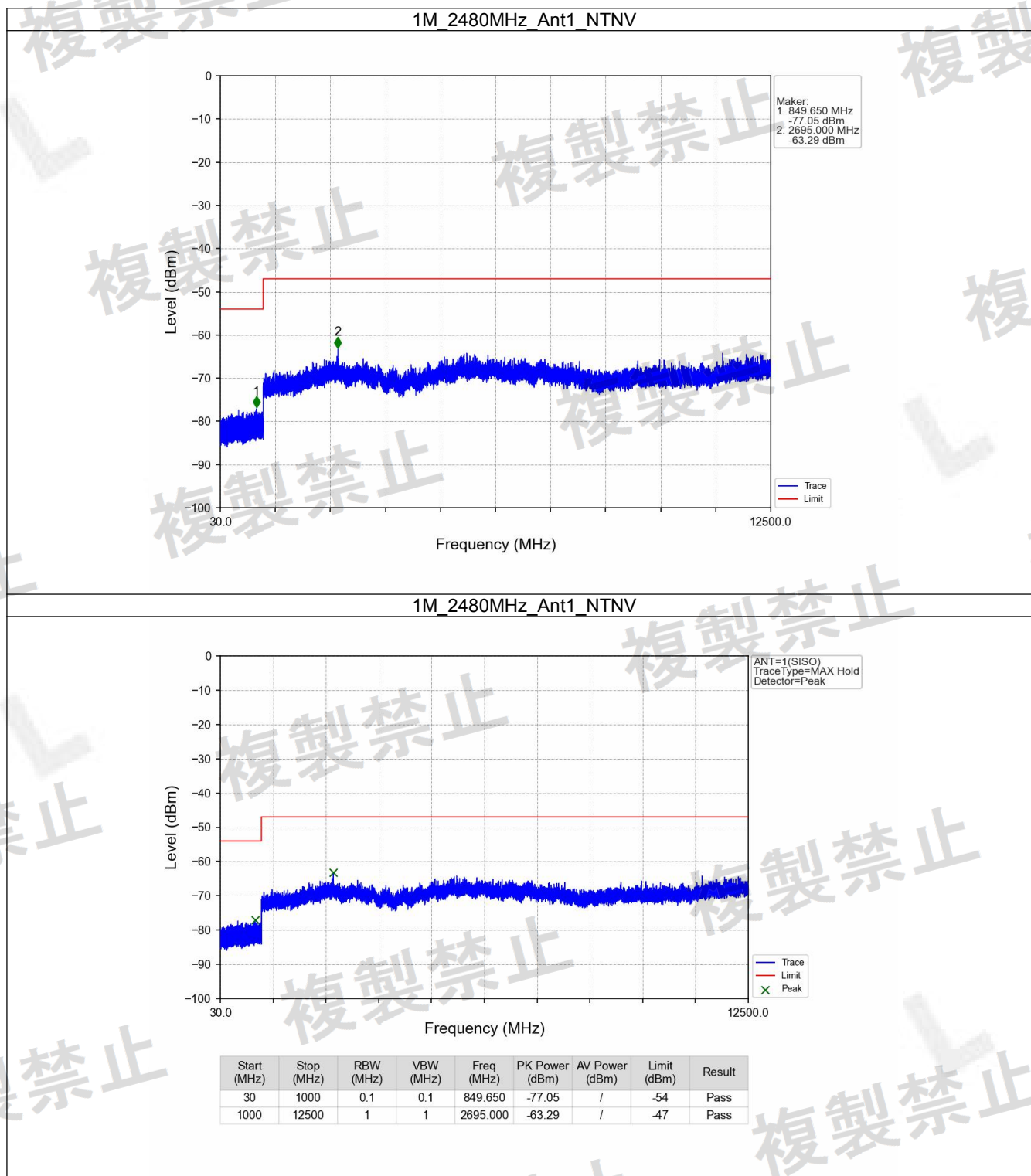
5.2.1 RxSe_NTNV



MIC: 219-259410

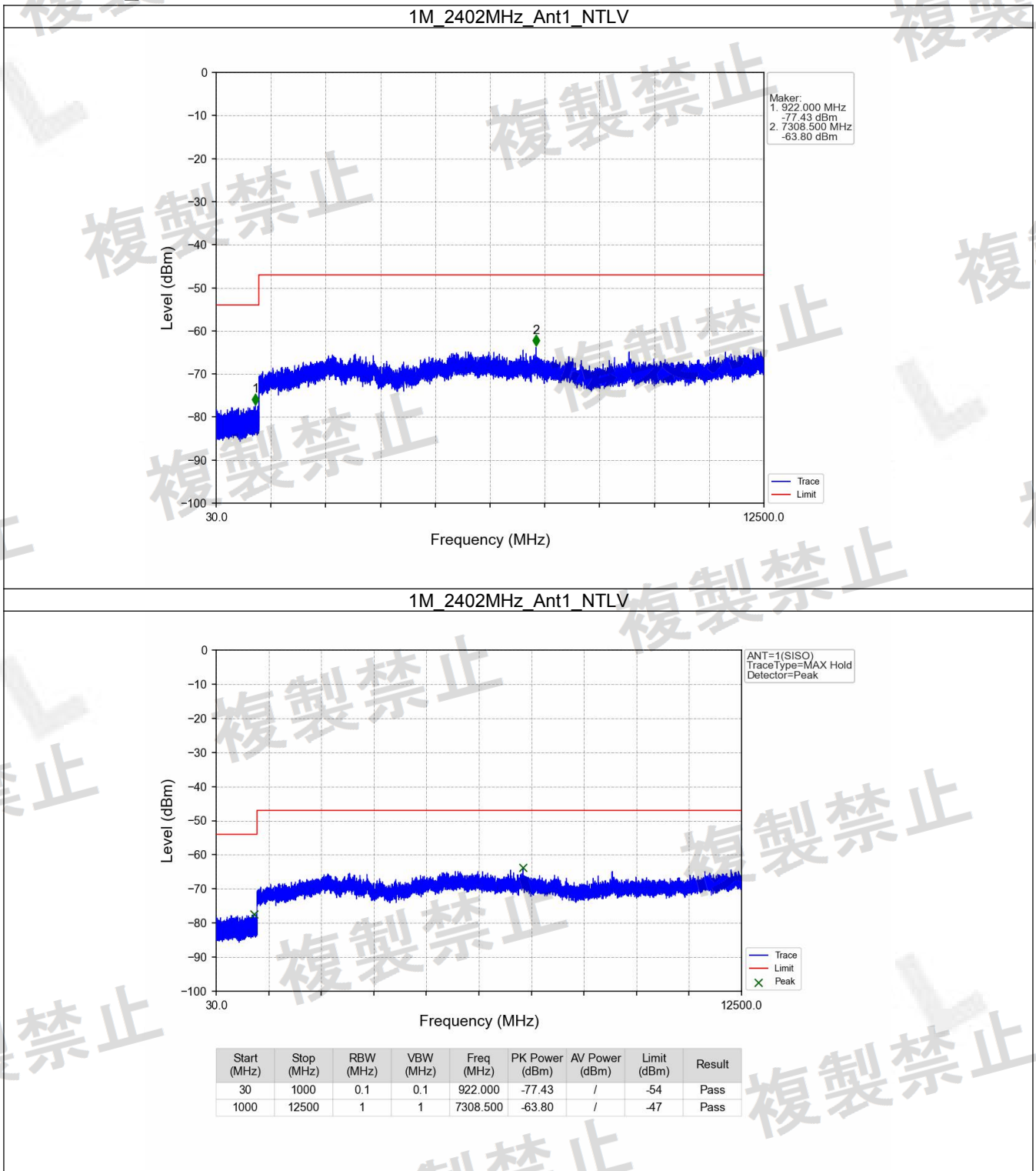


MIC: 219-259410

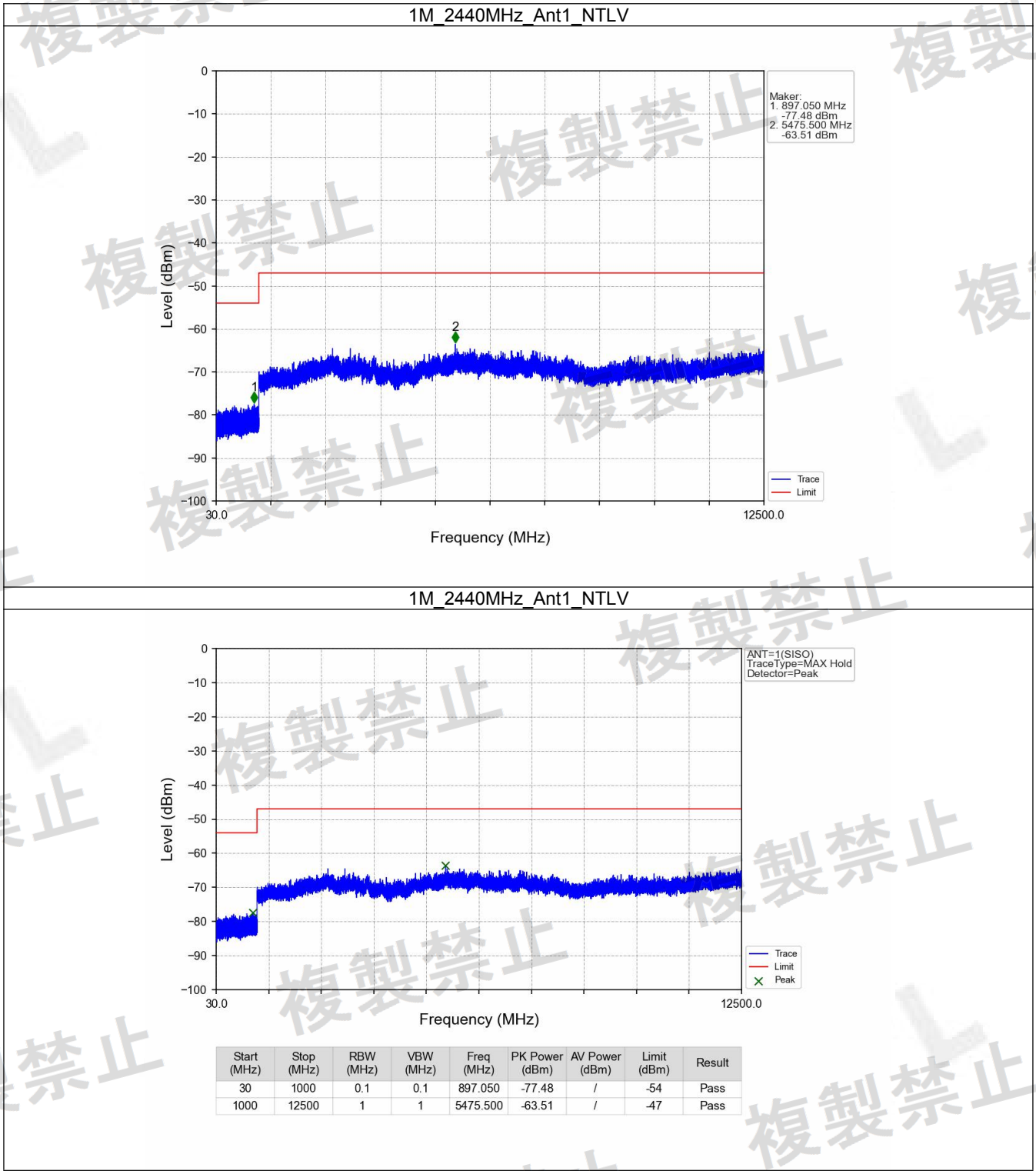


MIC: 219-259410

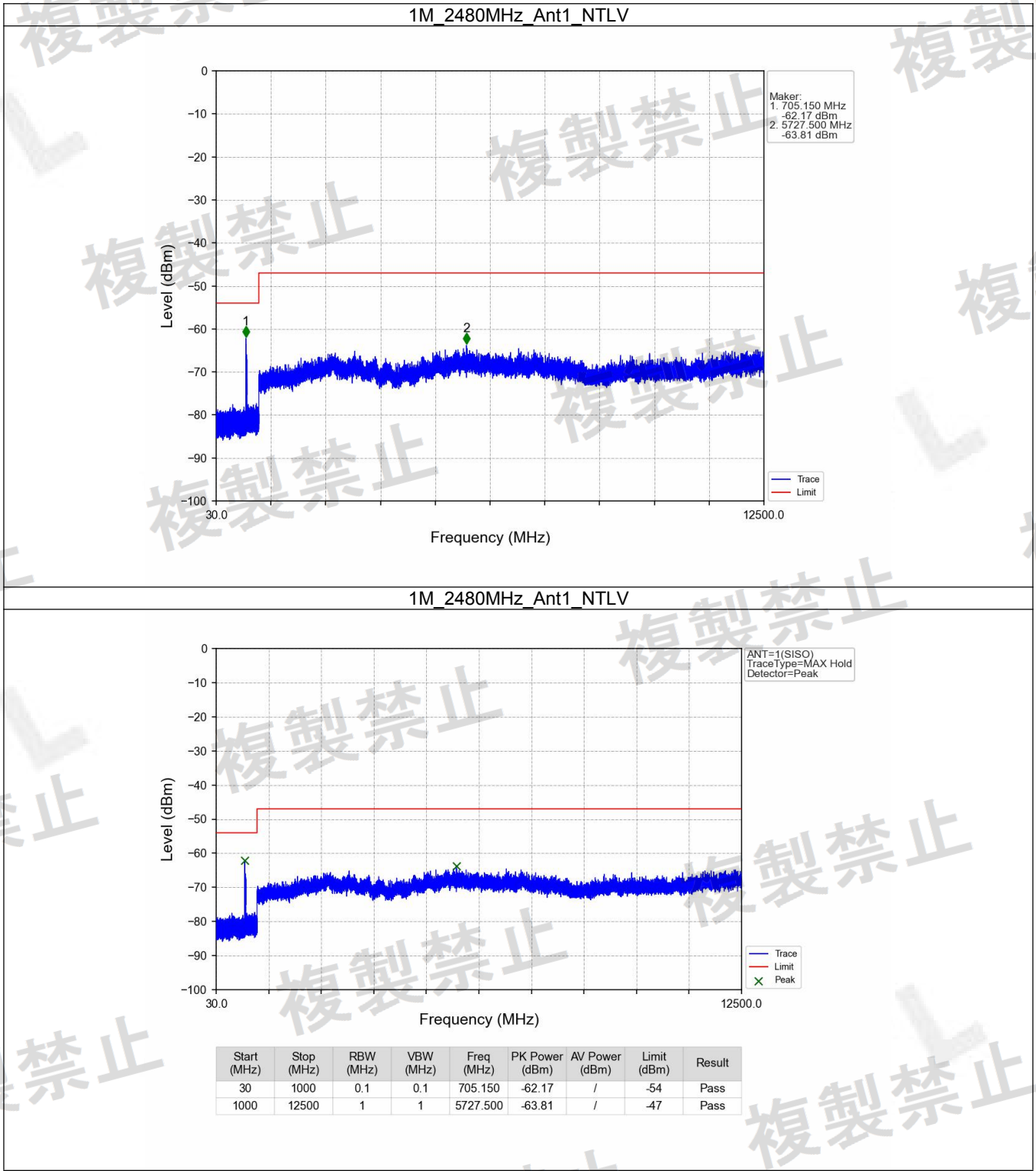
5.2.2 RxSe_NTLV



MIC: 219-259410

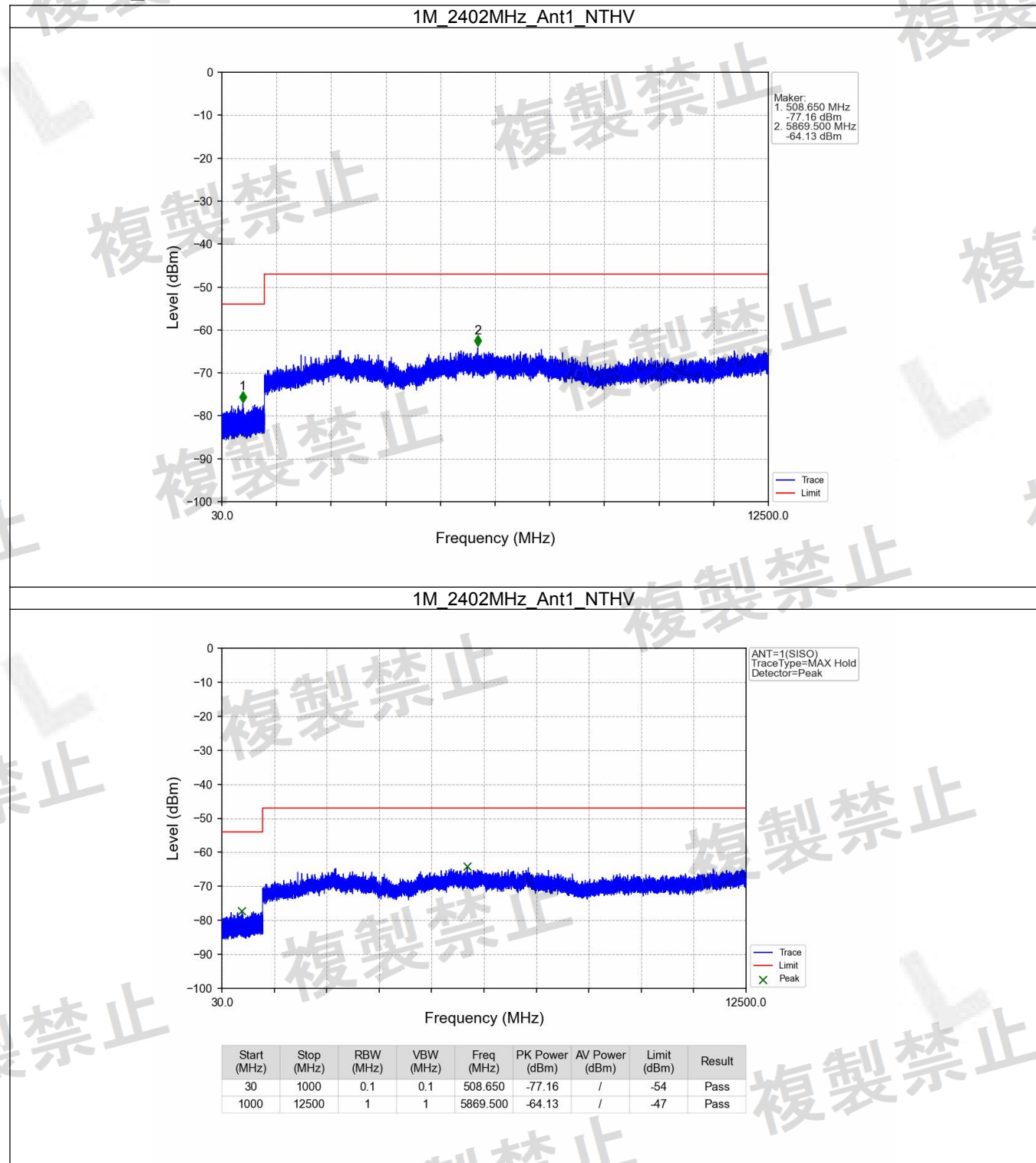


MIC: 219-259410

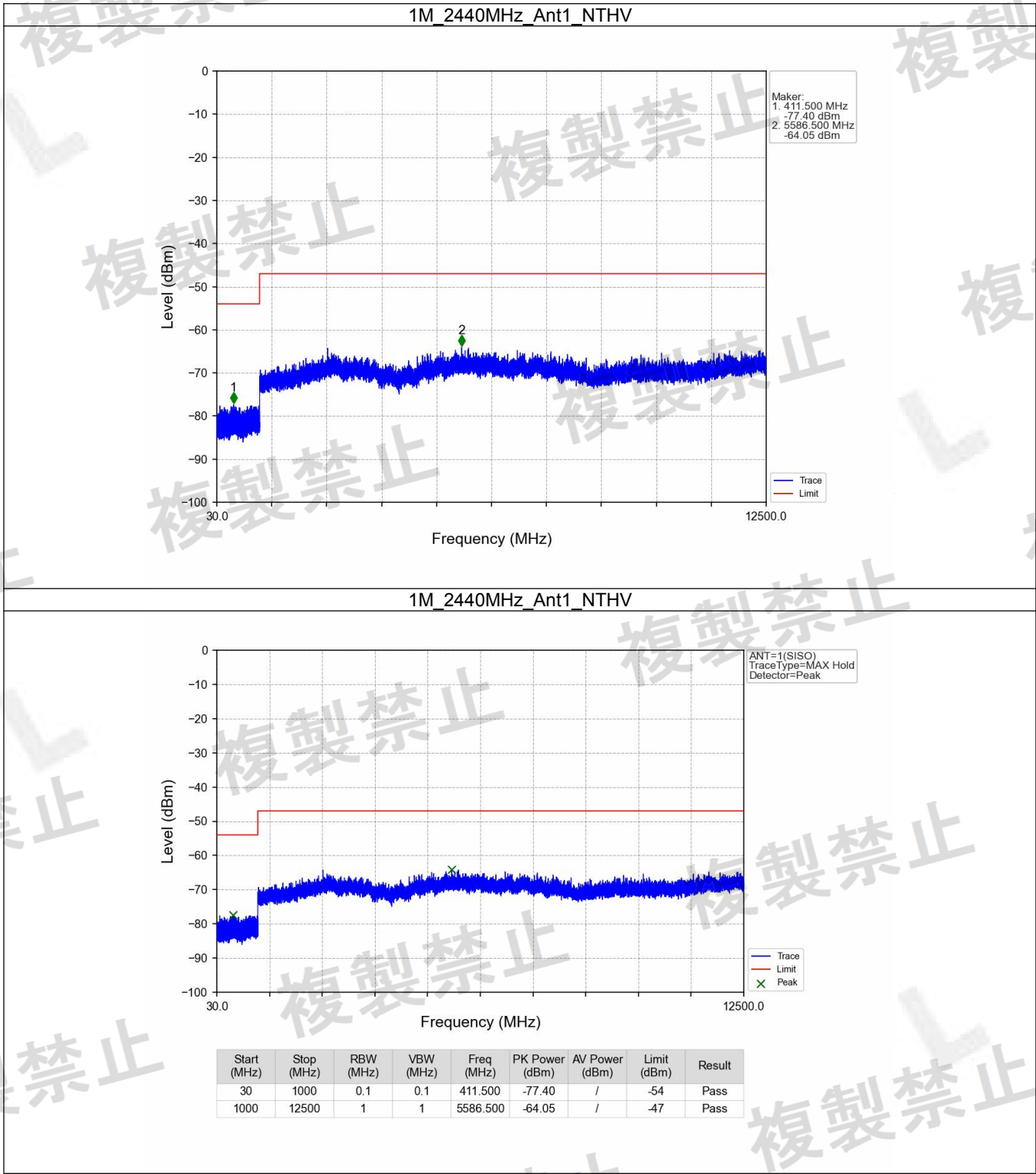


MIC: 219-259410

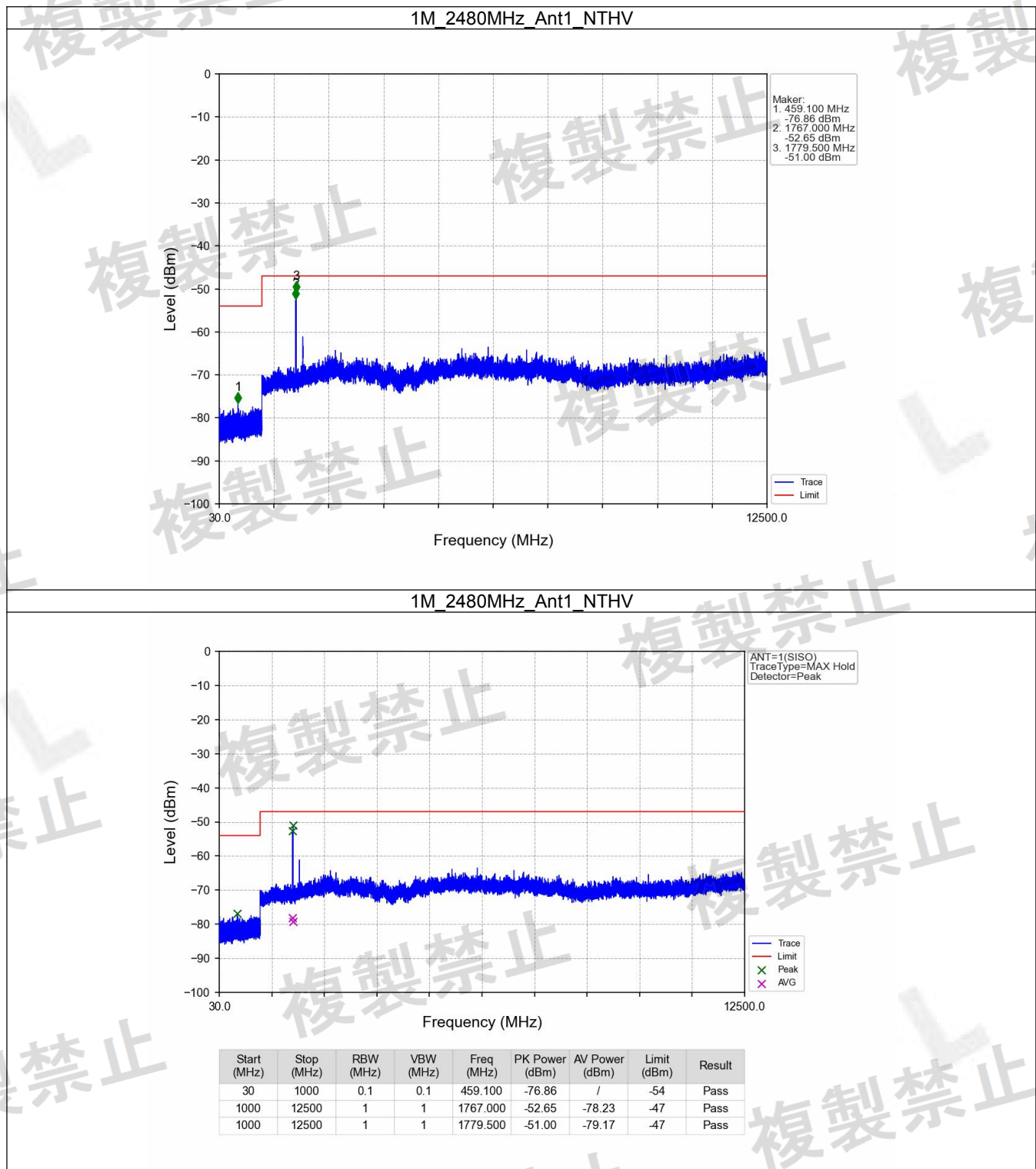
5.2.3 RxSe_NTHV



MIC: 219-259410



MIC: 219-259410



MIC: 219-259410

