

Appendix RF test data for BT-L

1. Frequency Error

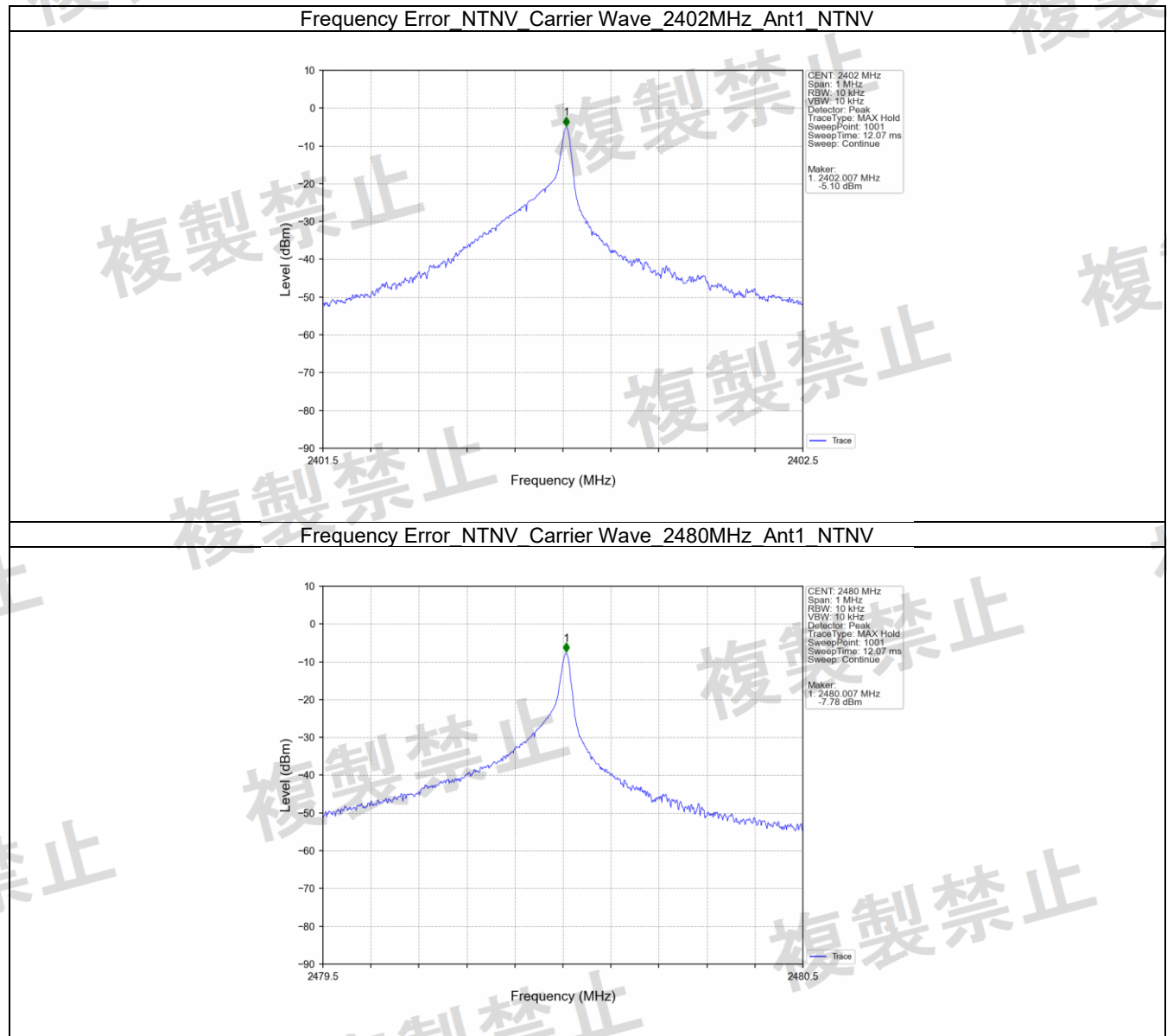
1.1 Test Result

1.1.1 Ant1

Ant1								
ENV	Mode	TX Type	Frequency (MHz)	Packet Type	Measured Frequency (MHz)	Tolerance (ppm)		Verdict
						Result	Limit	
NTNV	Carrier Wave	SISO	2402	DH5	2402.007	2.91	-50 to 50	Pass
			2480	DH5	2480.007	2.82	-50 to 50	Pass

1.2 Test Graph

1.2.1 Ant1



2. Occupied Bandwidth

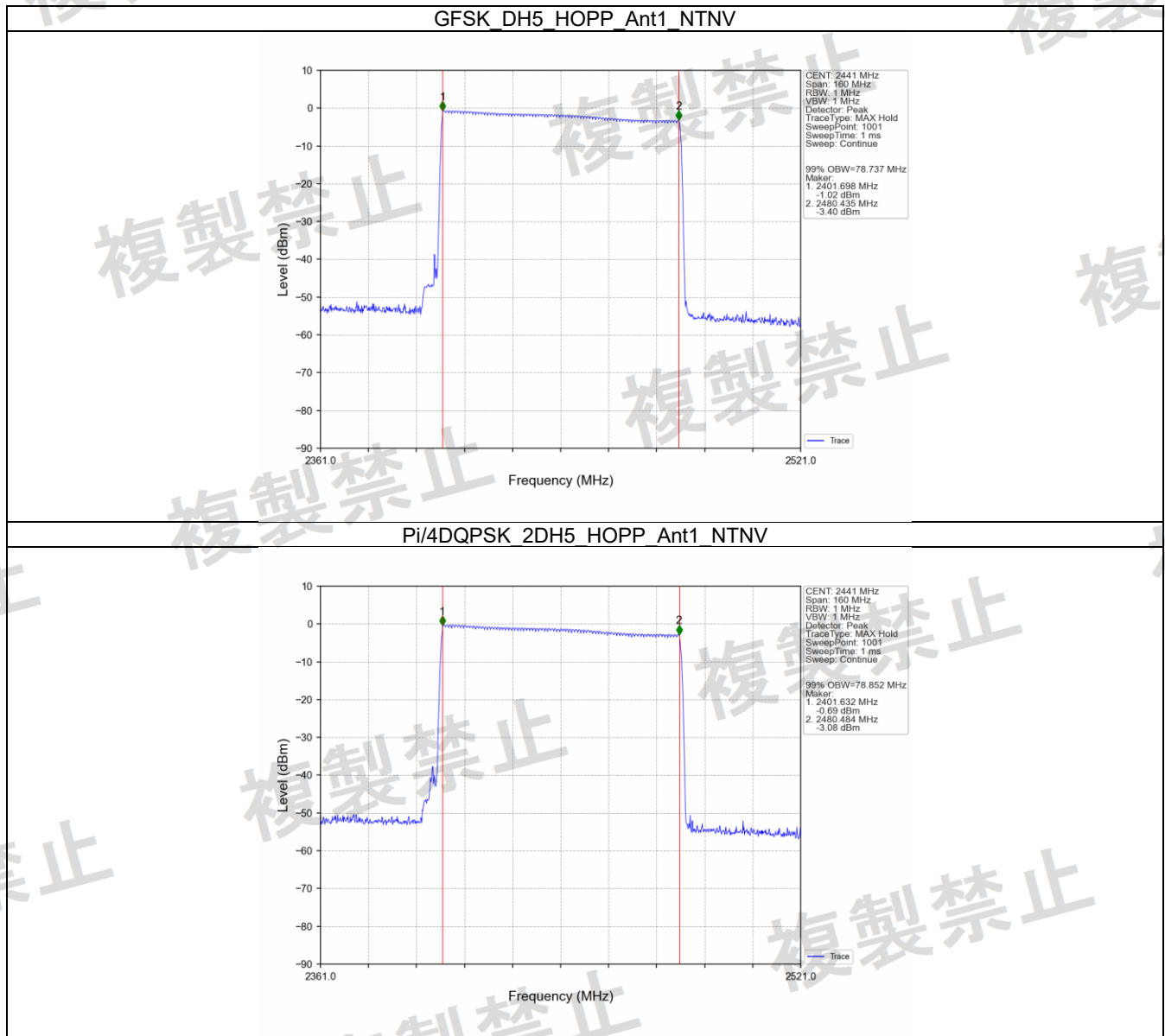
2.1 Test Result

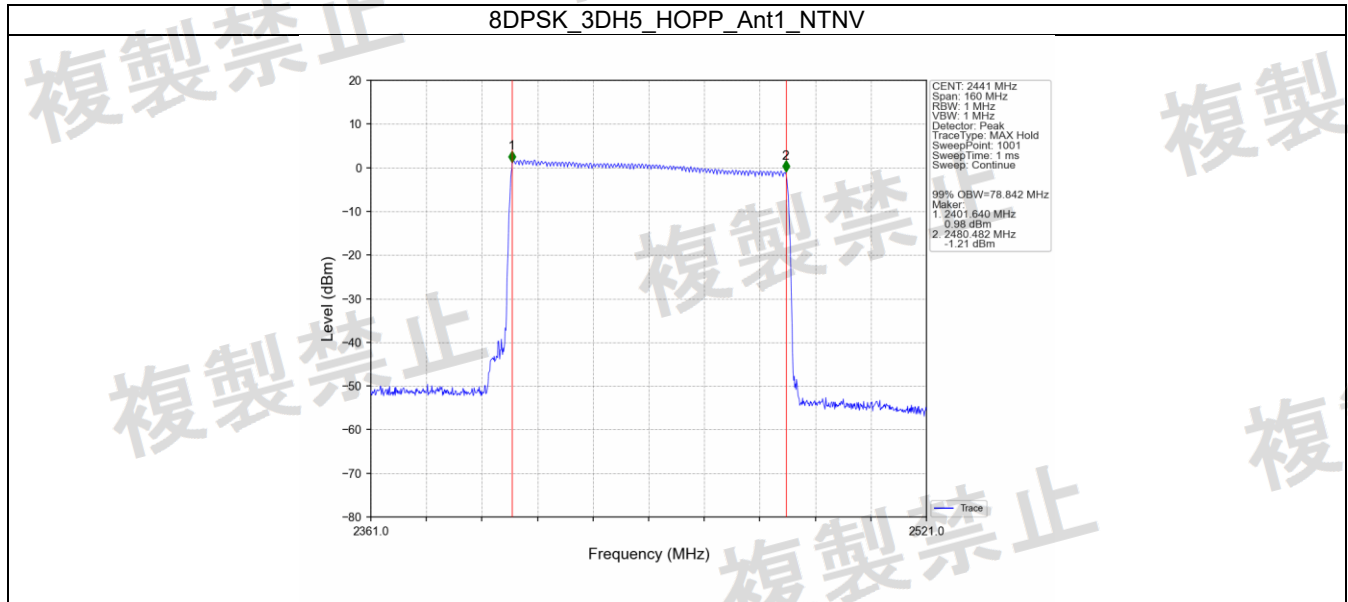
2.1.1 OBW

ENV	Mode	TX Type	Frequency (MHz)	Packet Type	99% Occupied Bandwidth (MHz)		Verdict
					ANT1	Limit	
NTNV	GFSK	SISO	HOPP	DH5	78.737	≤ 83.5	Pass
	Pi/4DQPSK	SISO	HOPP	2DH5	78.852	≤ 83.5	Pass
	8DPSK	SISO	HOPP	3DH5	78.842	≤ 83.5	Pass

2.2 Test Graph

2.2.1 OBW





3. Spread Bandwidth

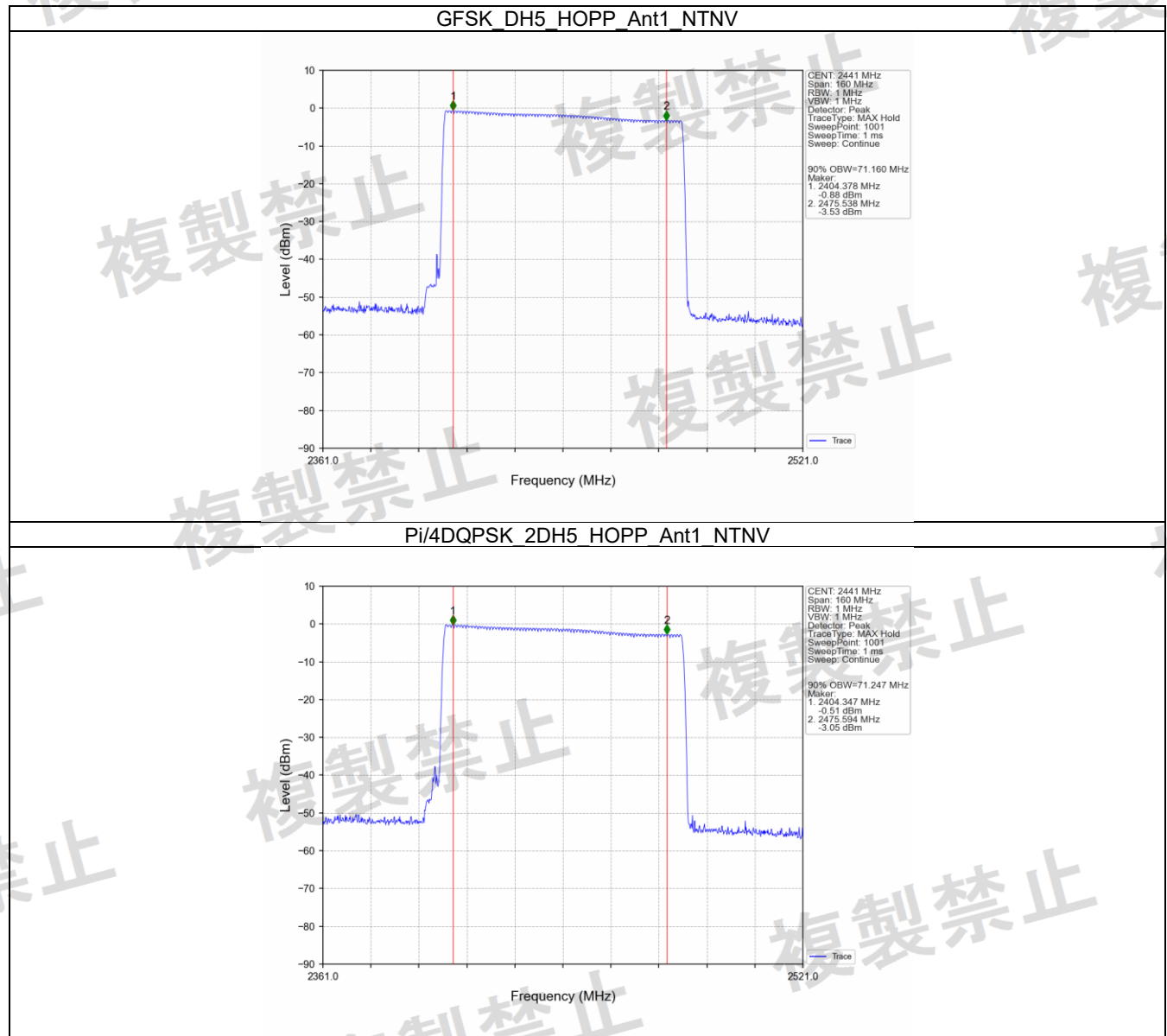
3.1 Test Result

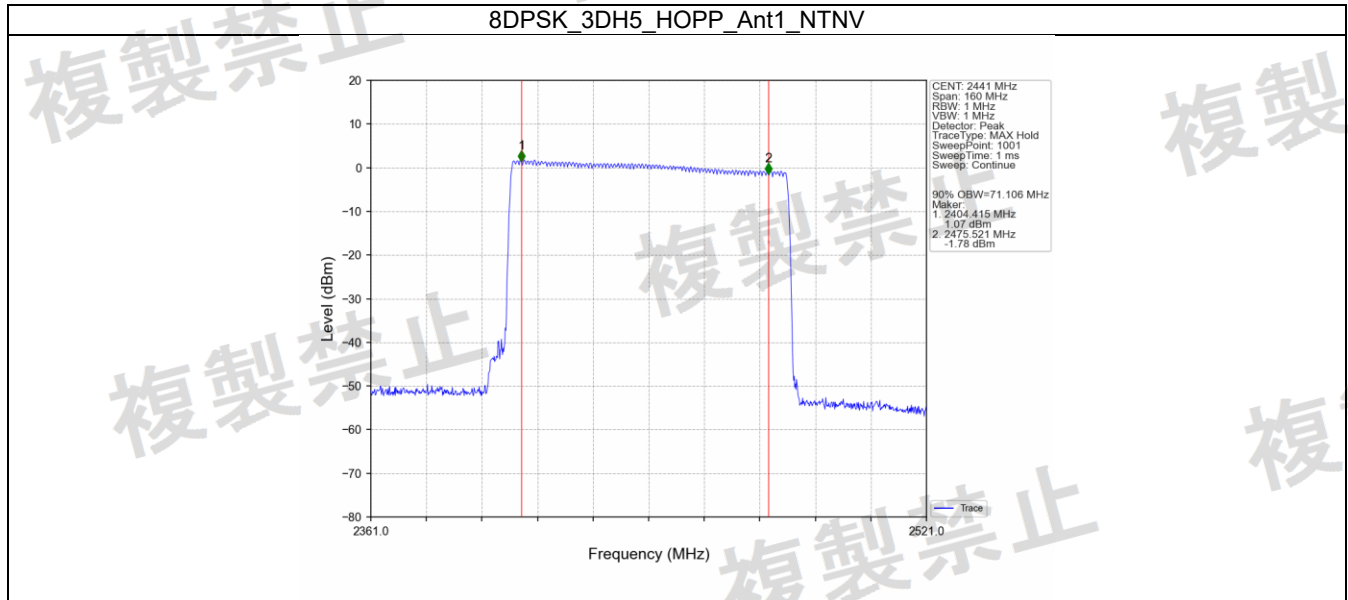
3.1.1 SPBW

ENV	Mode	TX Type	Frequency (MHz)	Packet Type	Spread Bandwidth (MHz)		Verdict
					ANT1	Limit	
NTNV	GFSK	SISO	HOPP	DH5	71.160	/	Only For Report
	Pi/4DQPSK	SISO	HOPP	2DH5	71.247	/	Only For Report
	8DPSK	SISO	HOPP	3DH5	71.106	/	Only For Report

3.2 Test Graph

3.2.1 SPBW





4. Antenna Power

4.1 Test Result

4.1.1 Power

ENV	Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Burst Power(dBm)	Antenna Power (mW/MHz)		Nominal Power (mW/MHz)	Tolerance (%)		Verdict
							Measured	Limit		Measured	Limit	
NTNV	GFSK	SISO	HOPP	DH5	1	-0.81	0.012	<=3.00	0.012	0.00	<=20	Pass
	Pi/4DQPSK	SISO	HOPP	2DH5	1	-2.12	0.009	<=3.00	0.012	-25.00	<=20	Pass
	8DPSK	SISO	HOPP	3DH5	1	-0.28	0.013	<=3.00	0.012	8.33	<=20	Pass

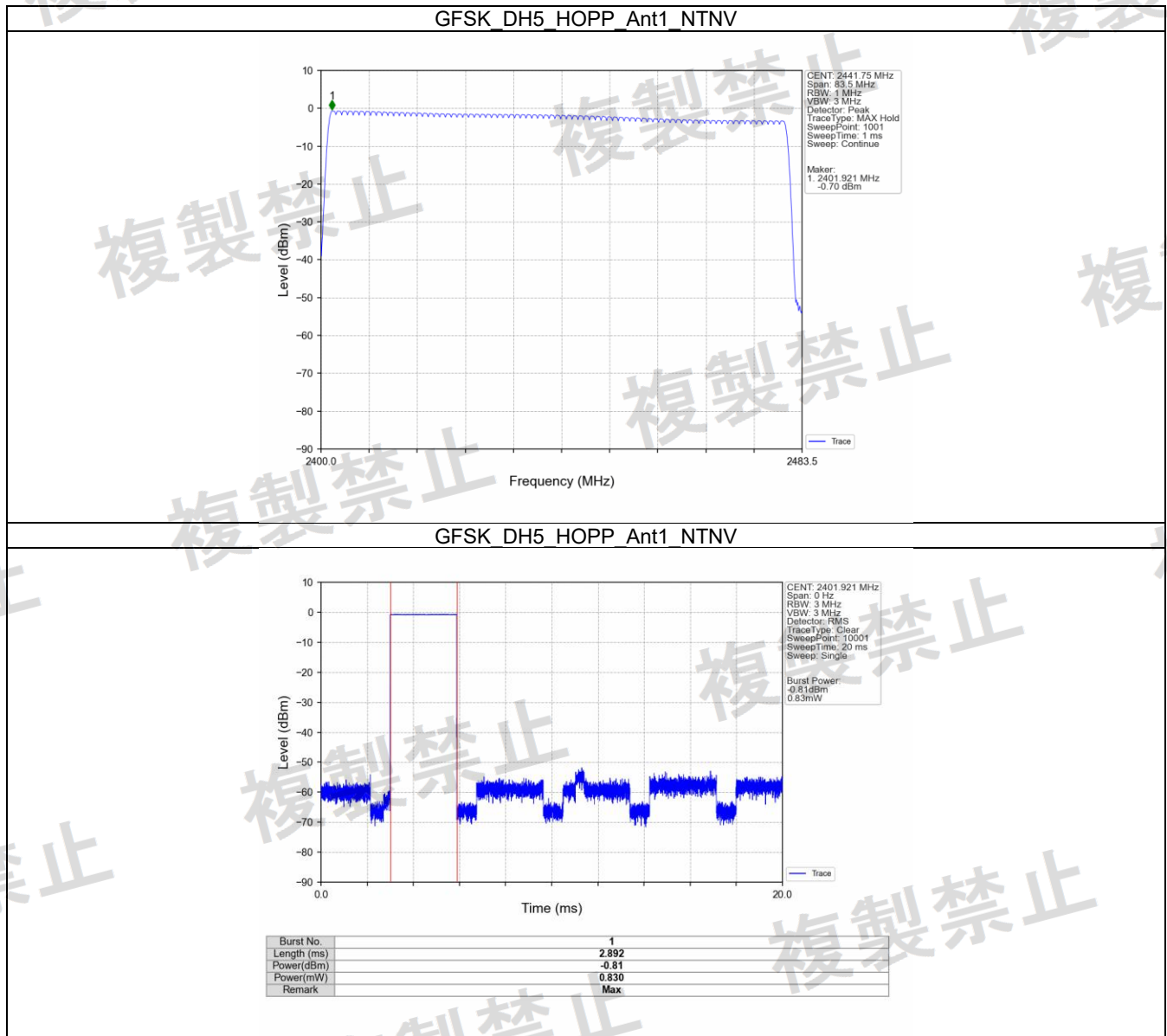
Note: Antenna Power=Burst Power to mW / Spread Bandwidth

4.1.2 EIRP

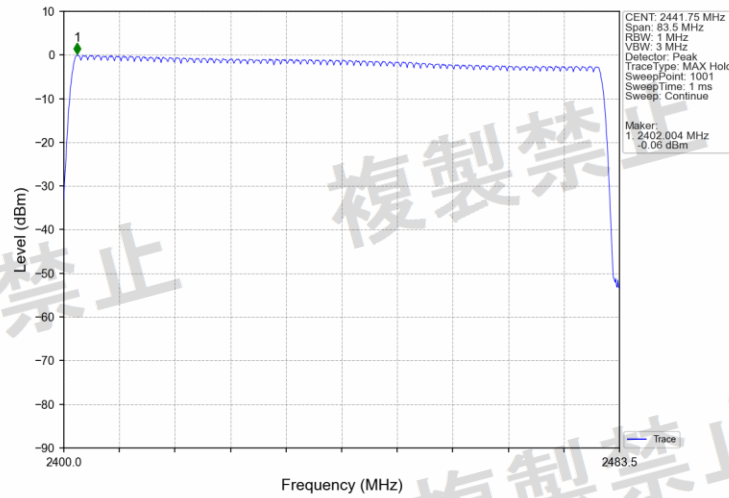
ENV	Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Antenna Power (dBm/MHz)	Gain (dBi)	EIRP (dBm)		Verdict
								Result	Limit	
NTNV	GFSK	SISO	HOPP	DH5	1	-19.33	1.70	-17.63	<=6.91	Pass
	Pi/4DQPSK	SISO	HOPP	2DH5	1	-20.65	1.70	-18.95	<=6.91	Pass
	8DPSK	SISO	HOPP	3DH5	1	-18.80	1.70	-17.10	<=6.91	Pass

4.2 Test Graph

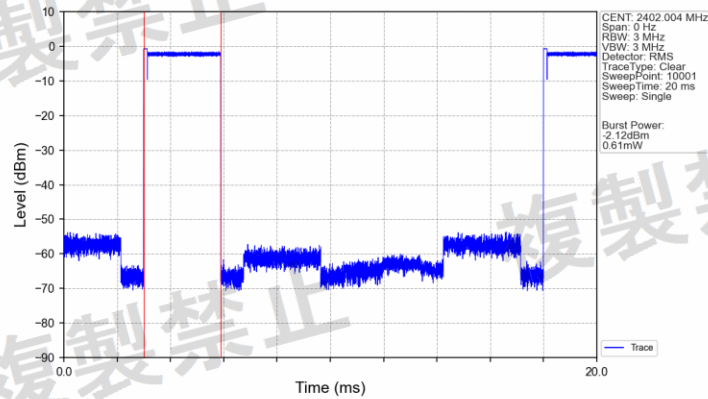
4.2.1 Power



Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV

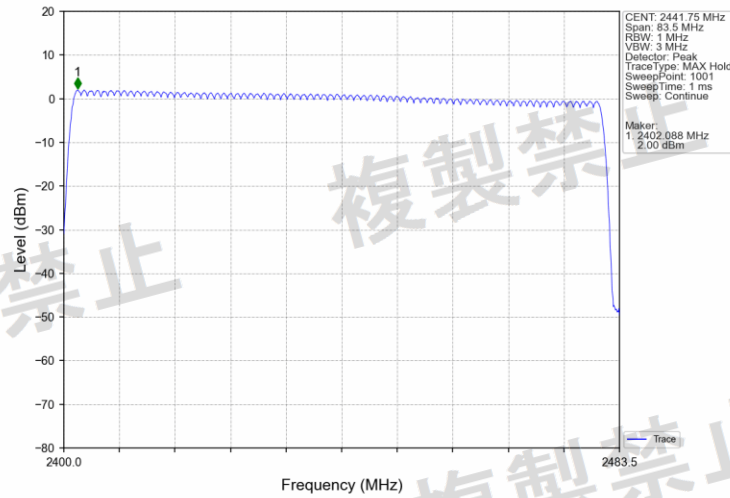


Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV

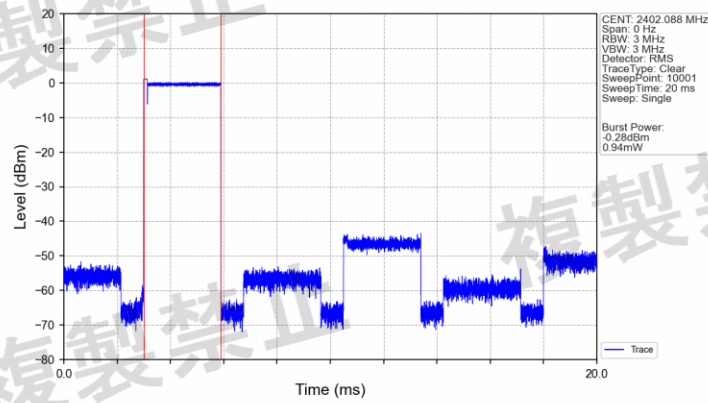


Burst No	1
Length (ms)	2.898
Power (dBm)	-2.12
Power (mW)	0.614
Remark	Max

8DPSK_3DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



Burst No.	1
Length (ms)	2.898
Power (dBm)	-0.28
Power (mW)	0.938
Remark	Max

5. Dwell Time

5.1 Test Result

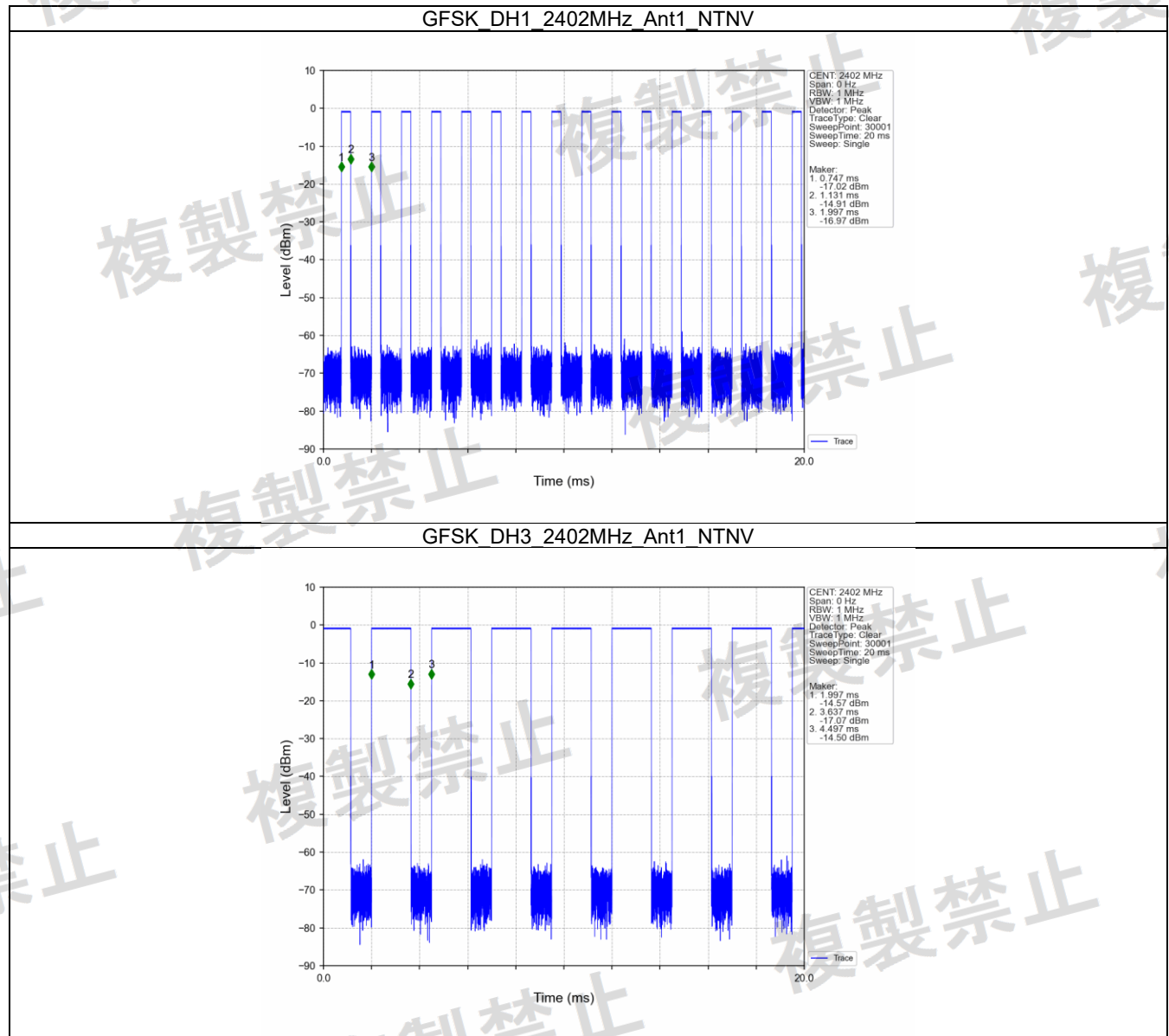
5.1.1 Ant1

Ant1											
ENV	Mode	TX Type	Frequency (MHz)	Packet Type	Spreading Rate	T_on (ms)	Period (ms)	Hopp Number	Dwell Time (ms)		Verdict
									Result	Limit	
NTNV	GFSK	SISO	2402	DH1	71.160	0.384	1.250	79	110.685	<=400	Pass
				DH3	71.160	1.640	2.500	79	236.359	<=400	Pass
				DH5	71.160	2.888	3.750	79	277.482	<=400	Pass
			2480	DH1	71.160	0.384	1.250	79	110.685	<=400	Pass
				DH3	71.160	1.639	2.500	79	236.215	<=400	Pass
				DH5	71.160	1.640	2.500	79	236.359	<=400	Pass
	Pi/4DQPSK	SISO	2402	2DH1	71.247	0.394	1.250	79	113.707	<=400	Pass
				2DH3	71.247	1.646	2.500	79	237.514	<=400	Pass
				2DH5	71.247	2.894	3.750	79	278.398	<=400	Pass
			2480	2DH1	71.247	0.394	1.250	79	113.707	<=400	Pass
				2DH3	71.247	1.645	2.500	79	237.370	<=400	Pass
				2DH5	71.247	2.893	3.750	79	278.302	<=400	Pass
	8DPSK	SISO	2402	3DH1	71.106	0.394	1.250	79	113.482	<=400	Pass
				3DH3	71.106	1.644	2.500	79	236.756	<=400	Pass
				3DH5	71.106	2.895	3.750	79	277.943	<=400	Pass
			2480	3DH1	71.106	0.393	1.250	79	113.194	<=400	Pass
				3DH3	71.106	1.644	2.500	79	236.756	<=400	Pass
				3DH5	71.106	2.895	3.750	79	277.943	<=400	Pass

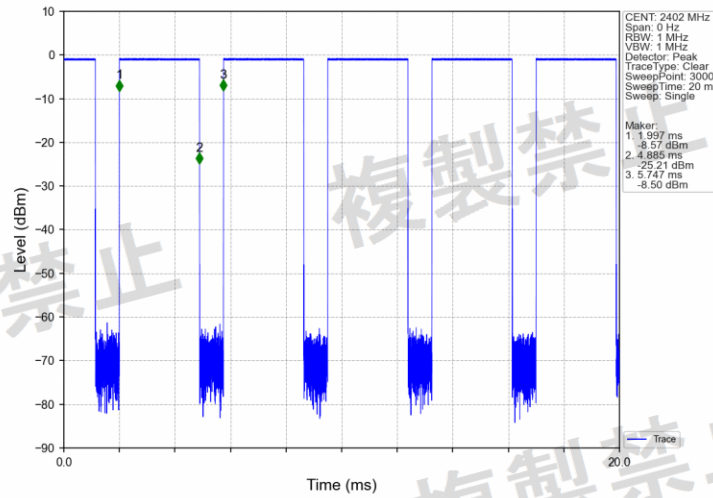
Note: Dwell Time = 90% spreading factor / total number of channels * duty cycle * 400ms

5.2 Test Graph

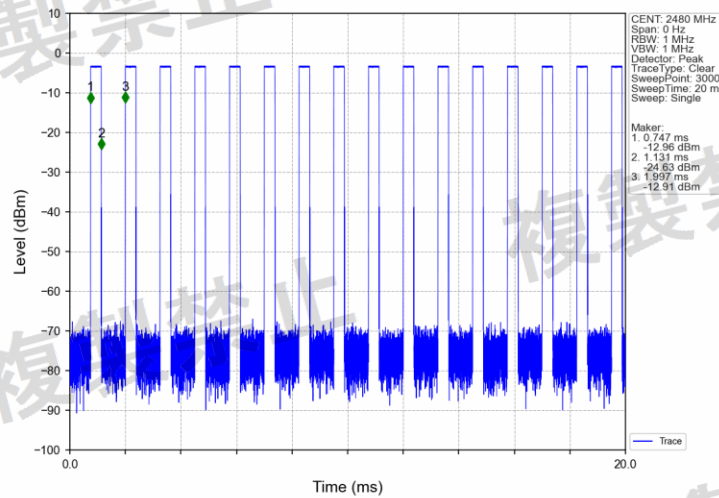
5.2.1 Ant1



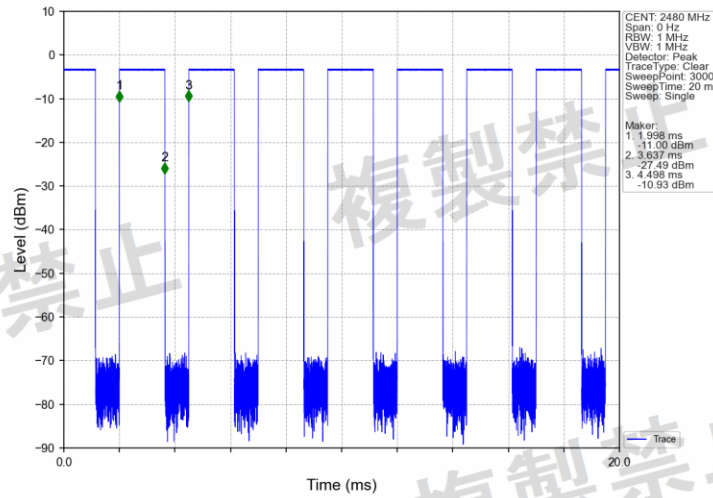
GFSK_DH5_2402MHz_Ant1_NTNV



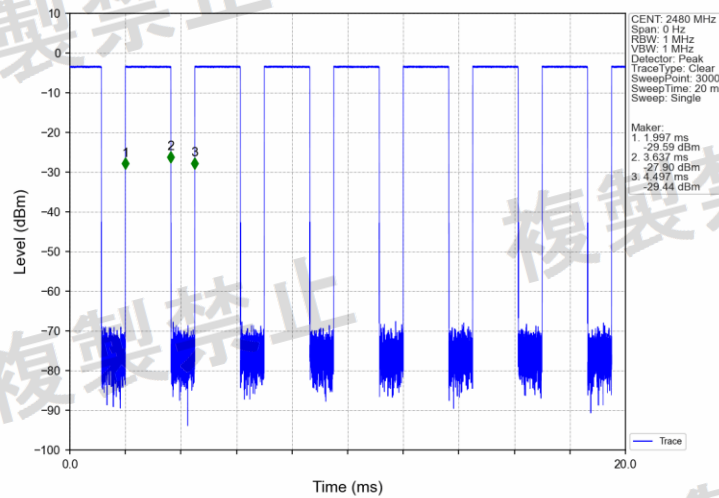
GFSK_DH1_2480MHz_Ant1_NTNV



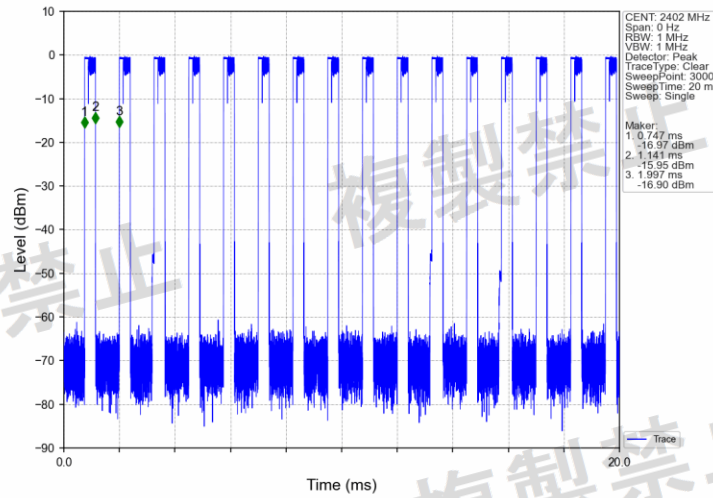
GFSK_DH3_2480MHz_Ant1_NTNV



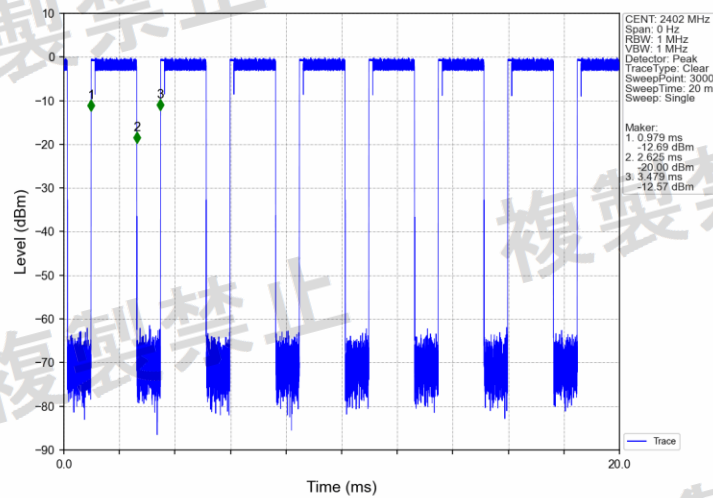
GFSK_DH5_2480MHz_Ant1_NTNV



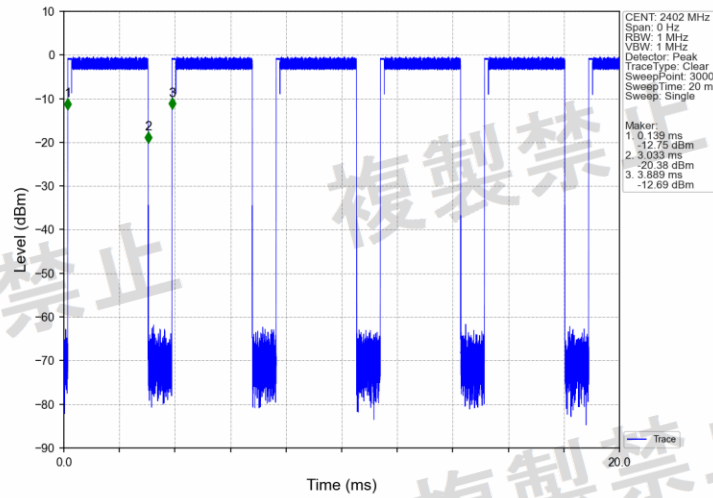
Pi/4DQPSK_2DH1_2402MHz_Ant1_NTNV



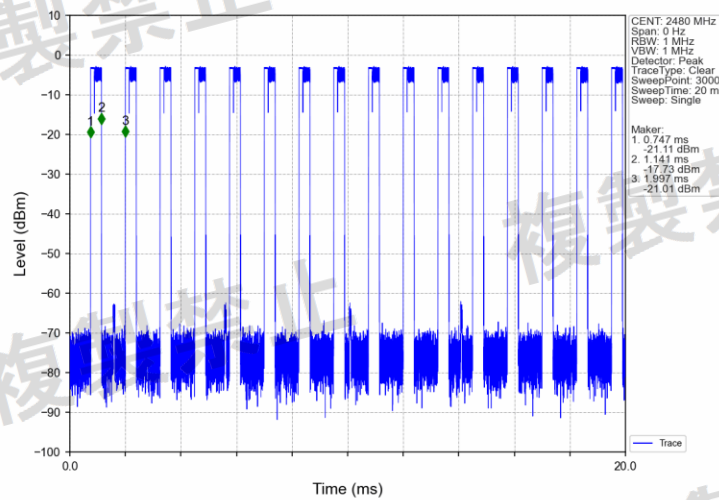
Pi/4DQPSK_2DH3_2402MHz_Ant1_NTNV



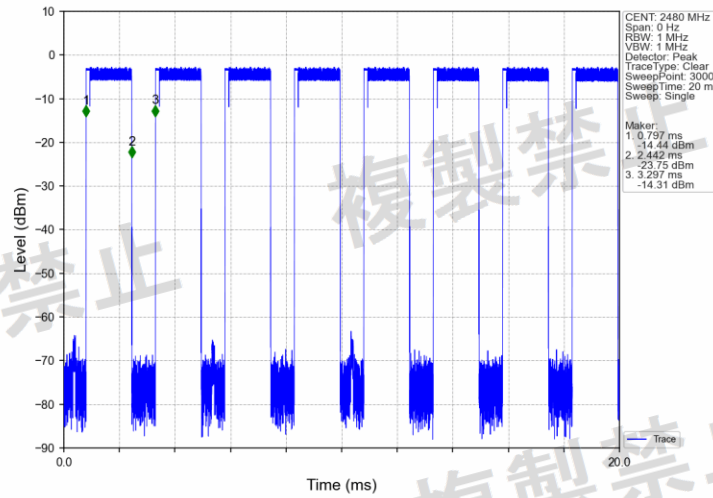
Pi/4DQPSK_2DH5_2402MHz_Ant1_NTNV



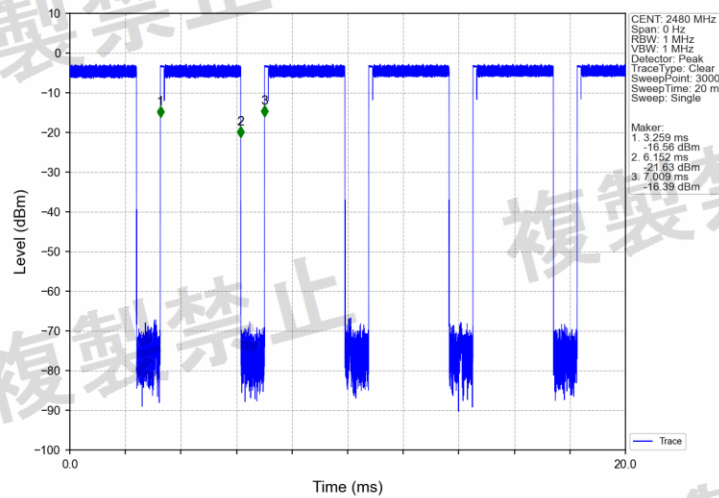
Pi/4DQPSK_2DH1_2480MHz_Ant1_NTNV



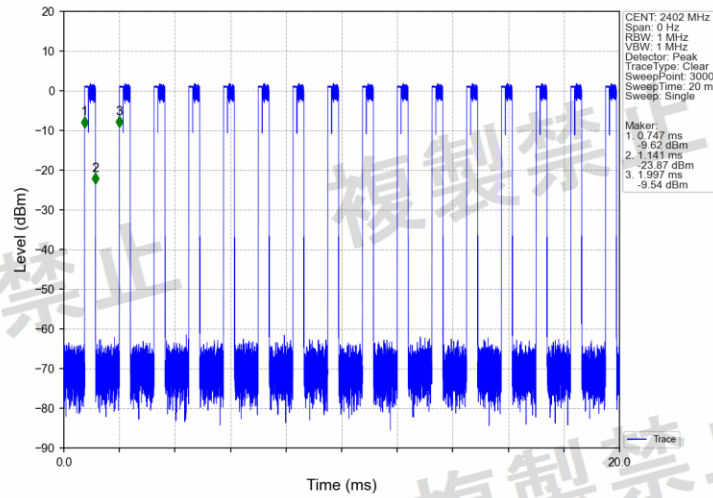
Pi/4DQPSK_2DH3_2480MHz_Ant1_NTNV



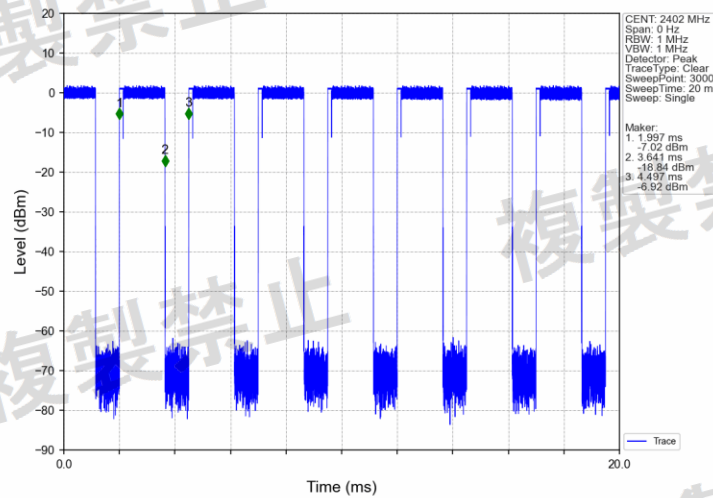
Pi/4DQPSK_2DH5_2480MHz_Ant1_NTNV



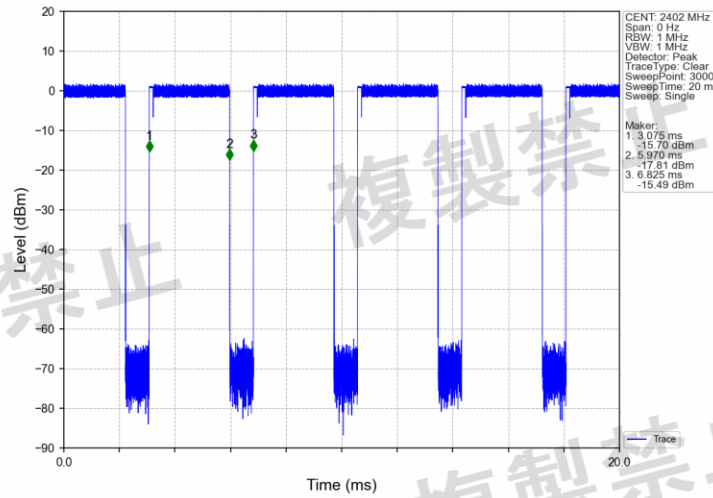
8DPSK_3DH1_2402MHz_Ant1_NTNV



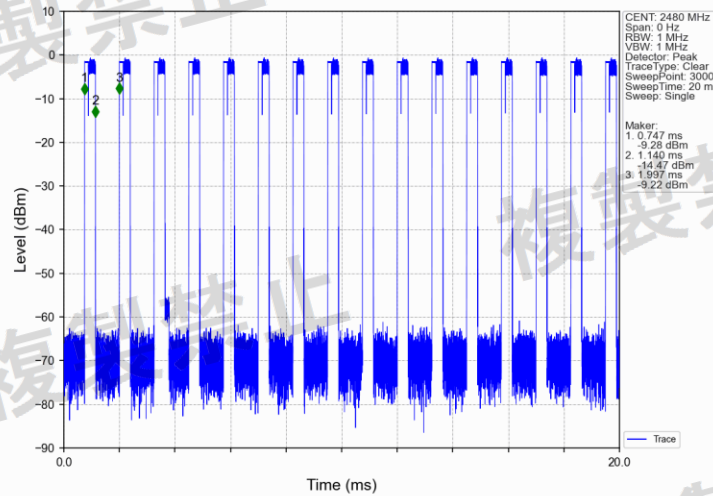
8DPSK_3DH3_2402MHz_Ant1_NTNV



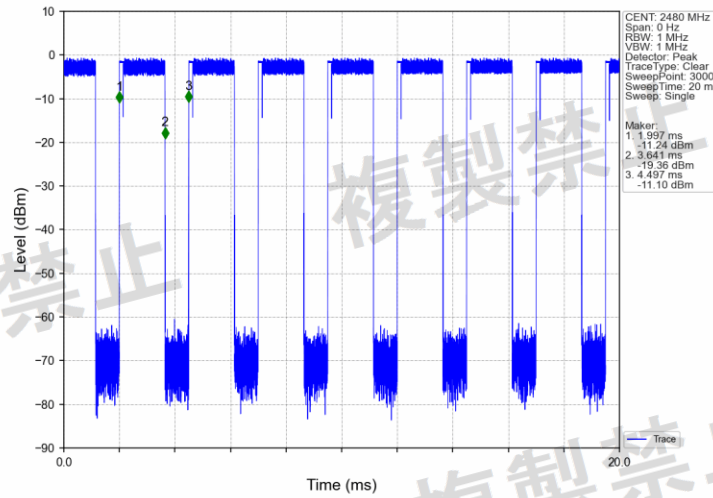
8DPSK_3DH5_2402MHz_Ant1_NTNV



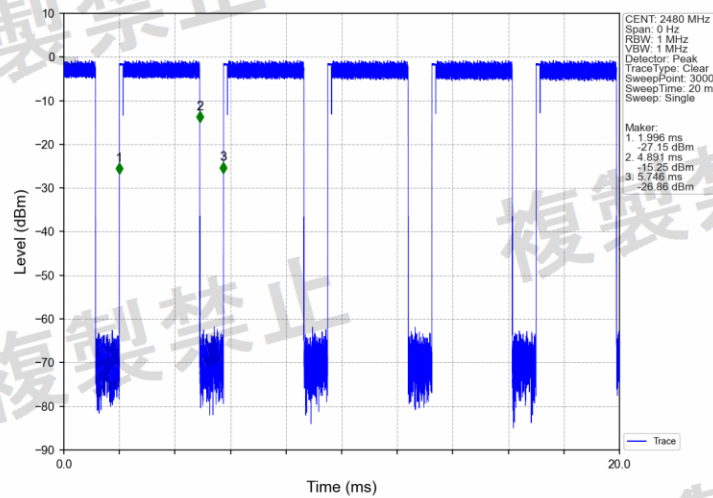
8DPSK_3DH1_2480MHz_Ant1_NTNV



8DPSK_3DH3_2480MHz_Ant1_NTNV



8DPSK_3DH5_2480MHz_Ant1_NTNV



6. Spurious Emission Intensity

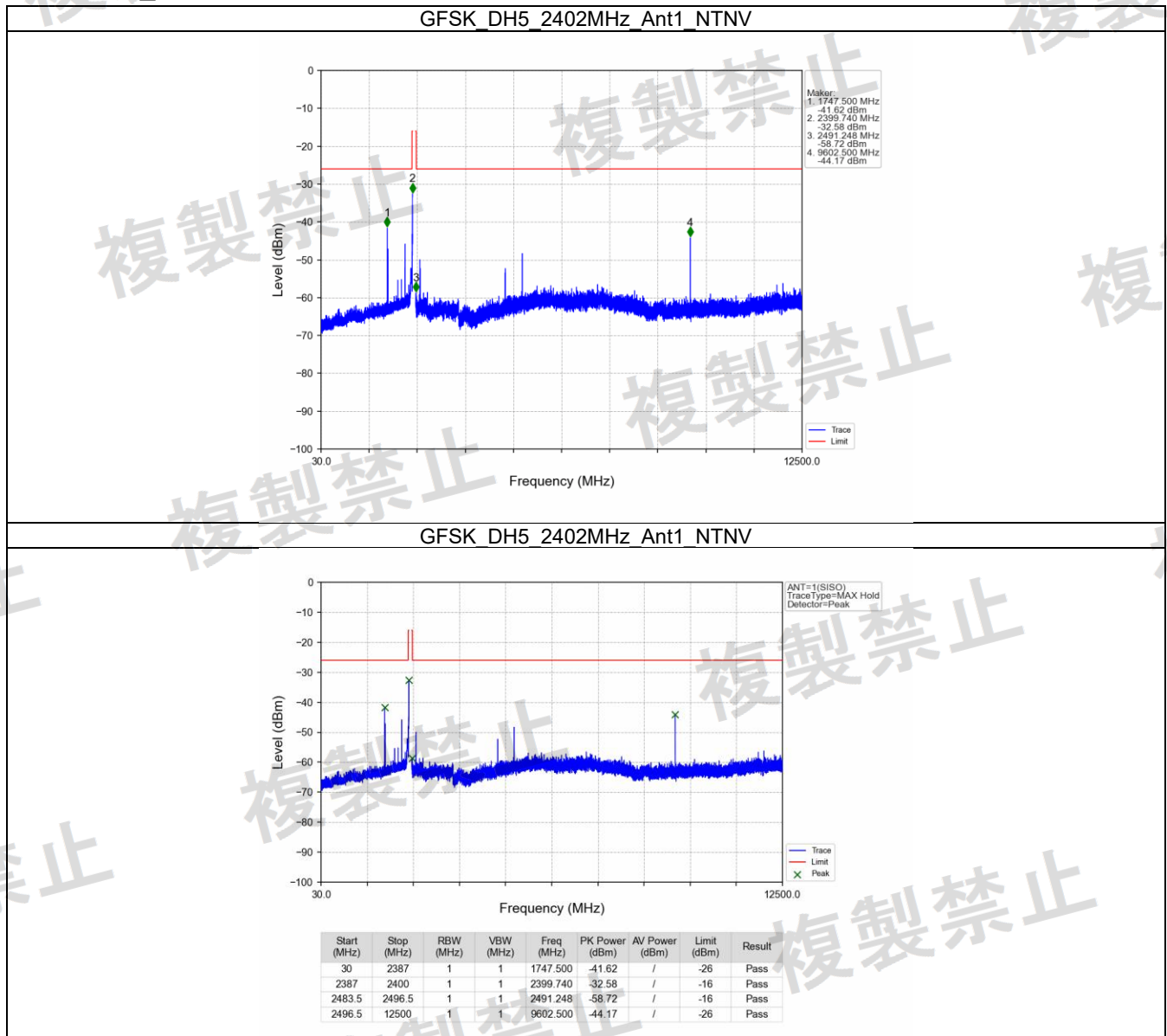
6.1 Test Result

6.1.1 TxSe_NTNV

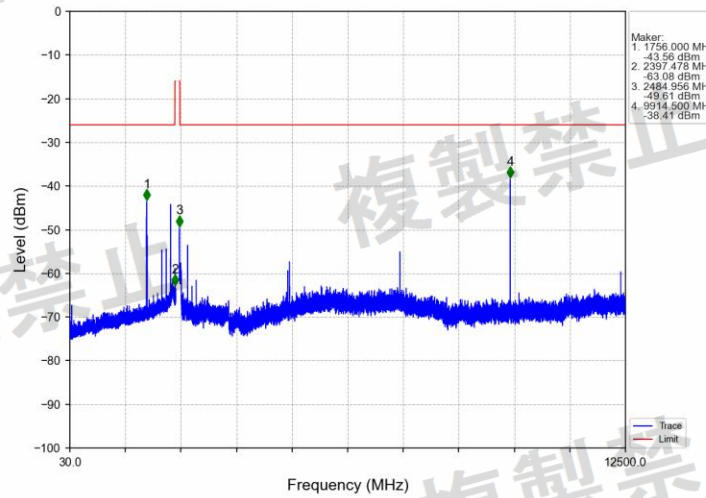
NTNV												
Mode	TX Type	Freq. (MHz)	ANT	Freq. Range		Marker					Limit (uW /MHz)	Verdict
				Start (MHz)	Stop (MHz)	Freq. (MHz)	PK Power (dBm /MHz)	PK Power (uW /MHz)	AV Power (dBm /MHz)	AV Power (uW /MHz)		
GFSK	SISO	2402	1	30	2387	1747.5	-41.62	0.069	/	/	2.5	Pass
				2387	2400	2399.74	-32.58	0.552	/	/	25	Pass
				2483.5	2496.5	2491.248	-58.72	0.001	/	/	25	Pass
				2496.5	12500	9602.5	-44.17	0.038	/	/	2.5	Pass
		2480	1	30	2387	1756	-43.56	0.044	/	/	2.5	Pass
				2387	2400	2397.478	-63.08	0.000	/	/	25	Pass
				2483.5	2496.5	2484.956	-49.61	0.011	/	/	25	Pass
				2496.5	12500	9914.5	-38.41	0.144	/	/	2.5	Pass
Pi/4DQPSK	SISO	2402	1	30	2387	1765	-39.42	0.114	/	/	2.5	Pass
				2387	2400	2399.987	-31.78	0.664	/	/	25	Pass
				2483.5	2496.5	2494.433	-58.86	0.001	/	/	25	Pass
				2496.5	12500	9602.5	-43.74	0.042	/	/	2.5	Pass
		2480	1	30	2387	1747.5	-41.54	0.070	/	/	2.5	Pass
				2387	2400	2389.223	-63.01	0.001	/	/	25	Pass
				2483.5	2496.5	2485.307	-50.33	0.009	/	/	25	Pass
				2496.5	12500	9914.5	-38.01	0.158	/	/	2.5	Pass
8DPSK	SISO	2402	1	30	2387	1748	-43.31	0.047	/	/	2.5	Pass
				2387	2400	2399.987	-28.81	1.315	/	/	25	Pass
				2483.5	2496.5	2490.663	-58.34	0.001	/	/	25	Pass
				2496.5	12500	9602.5	-46.59	0.022	/	/	2.5	Pass
		2480	1	30	2387	1763.5	-35.76	0.265	/	/	2.5	Pass
				2387	2400	2389.522	-59.19	0.001	/	/	25	Pass
				2483.5	2496.5	2483.526	-48.94	0.013	/	/	25	Pass
				2496.5	12500	9914.5	-41.78	0.066	/	/	2.5	Pass

6.2 Test Graph

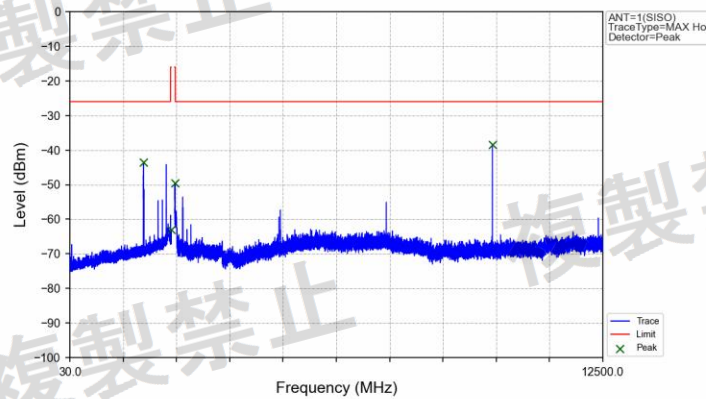
6.2.1 TxSe_NTNV



GFSK_DH5_2480MHz_Ant1_NTNV

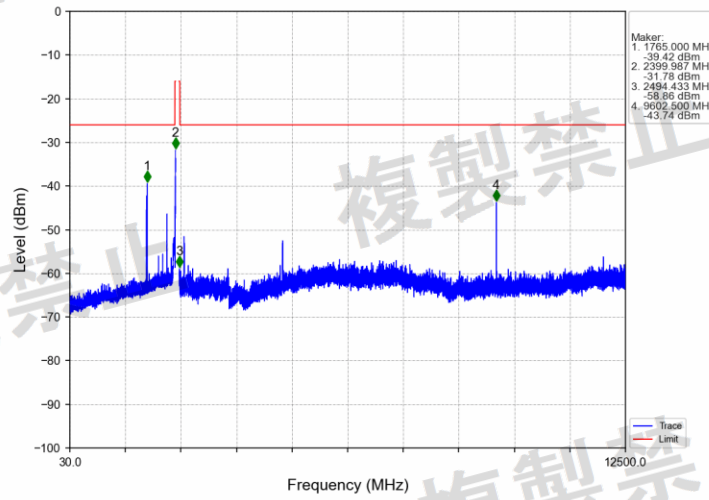


GFSK_DH5_2480MHz_Ant1_NTNV

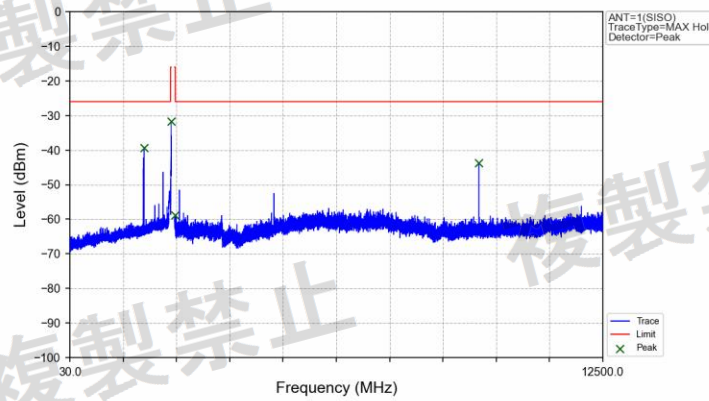


Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	2387	1	1	1756.000	-43.56	/	-26	Pass
2387	2400	1	1	2397.478	-63.08	/	-16	Pass
2483.5	2496.5	1	1	2484.956	-49.61	/	-16	Pass
2496.5	12500	1	1	9914.500	-38.41	/	-26	Pass

Pi/4DQPSK_2DH5_2402MHz_Ant1_NTNV

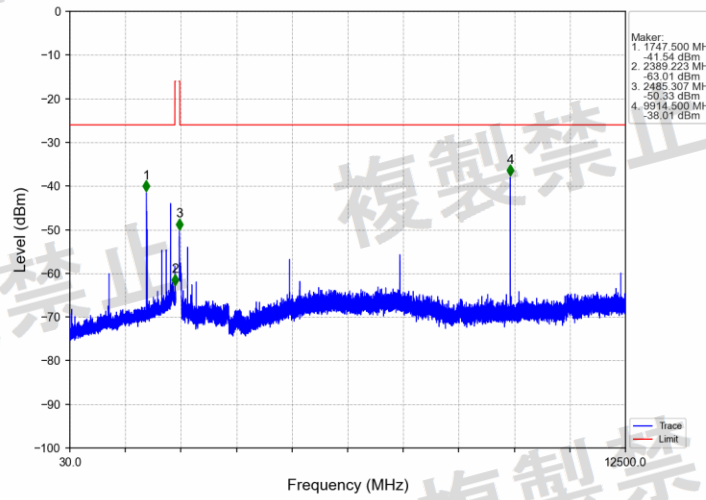


Pi/4DQPSK_2DH5_2402MHz_Ant1_NTNV

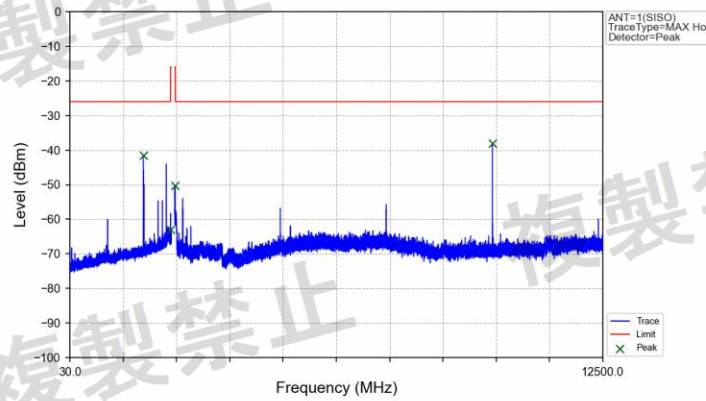


Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	2387	1	1	1765.000	-39.42	/	-26	Pass
2387	2400	1	1	2399.987	-31.78	/	-16	Pass
2483.5	2496.5	1	1	2494.433	-58.86	/	-16	Pass
2496.5	12500	1	1	9602.500	-43.74	/	-26	Pass

Pi/4DQPSK_2DH5_2480MHz_Ant1_NTNV

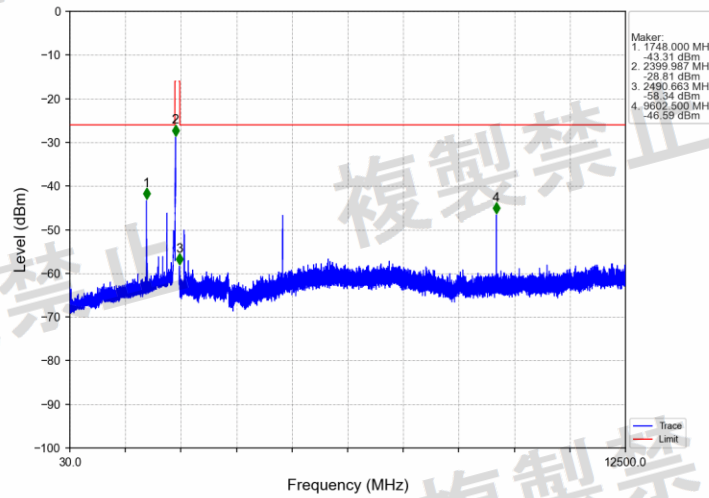


Pi/4DQPSK_2DH5_2480MHz_Ant1_NTNV

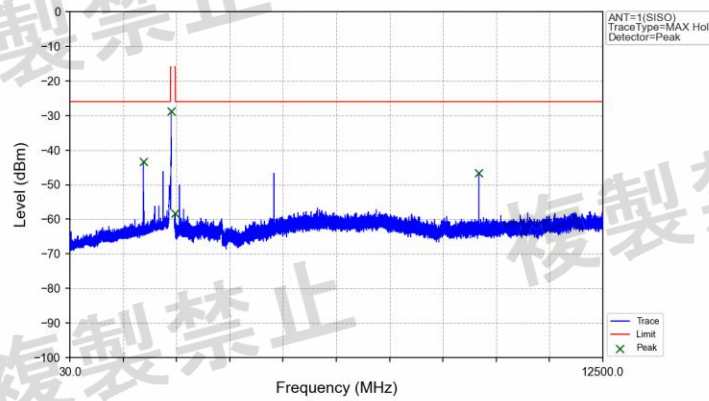


Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	2387	1	1	1747.500	-41.54	/	-26	Pass
2387	2400	1	1	2389.223	-63.01	/	-16	Pass
2483.5	2496.5	1	1	2485.307	-50.33	/	-16	Pass
2496.5	12500	1	1	9914.500	-38.01	/	-26	Pass

8DPSK_3DH5_2402MHz_Ant1_NTNV

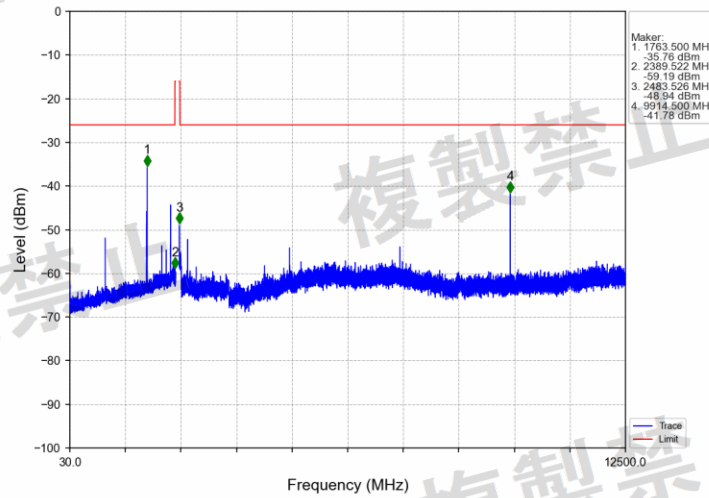


8DPSK_3DH5_2402MHz_Ant1_NTNV

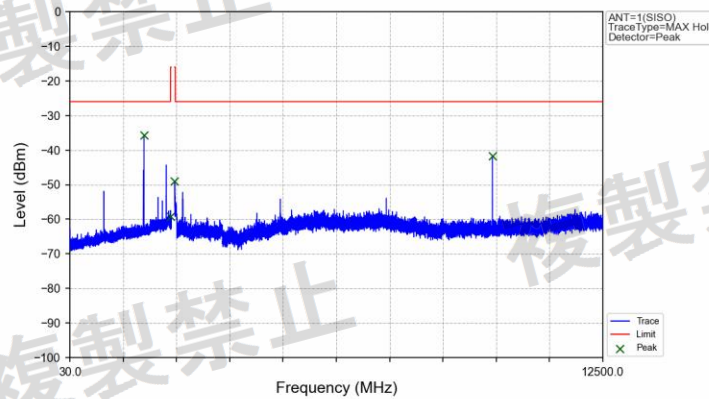


Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	2387	1	1	1748.000	-43.31	/	-26	Pass
2387	2400	1	1	2399.987	-28.81	/	-16	Pass
2483.5	2496.5	1	1	2490.663	-58.34	/	-16	Pass
2496.5	12500	1	1	9602.500	-46.59	/	-26	Pass

8DPSK_3DH5_2480MHz_Ant1_NTNV



8DPSK_3DH5_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	1763.500	-35.76	/	-26	Pass
2387	2400	1	1	2389.522	-59.19	/	-16	Pass
2483.5	2496.5	1	1	2483.528	-48.94	/	-16	Pass
2496.5	12500	1	1	9914.500	-41.78	/	-26	Pass

7. Secondary Radiated Emission

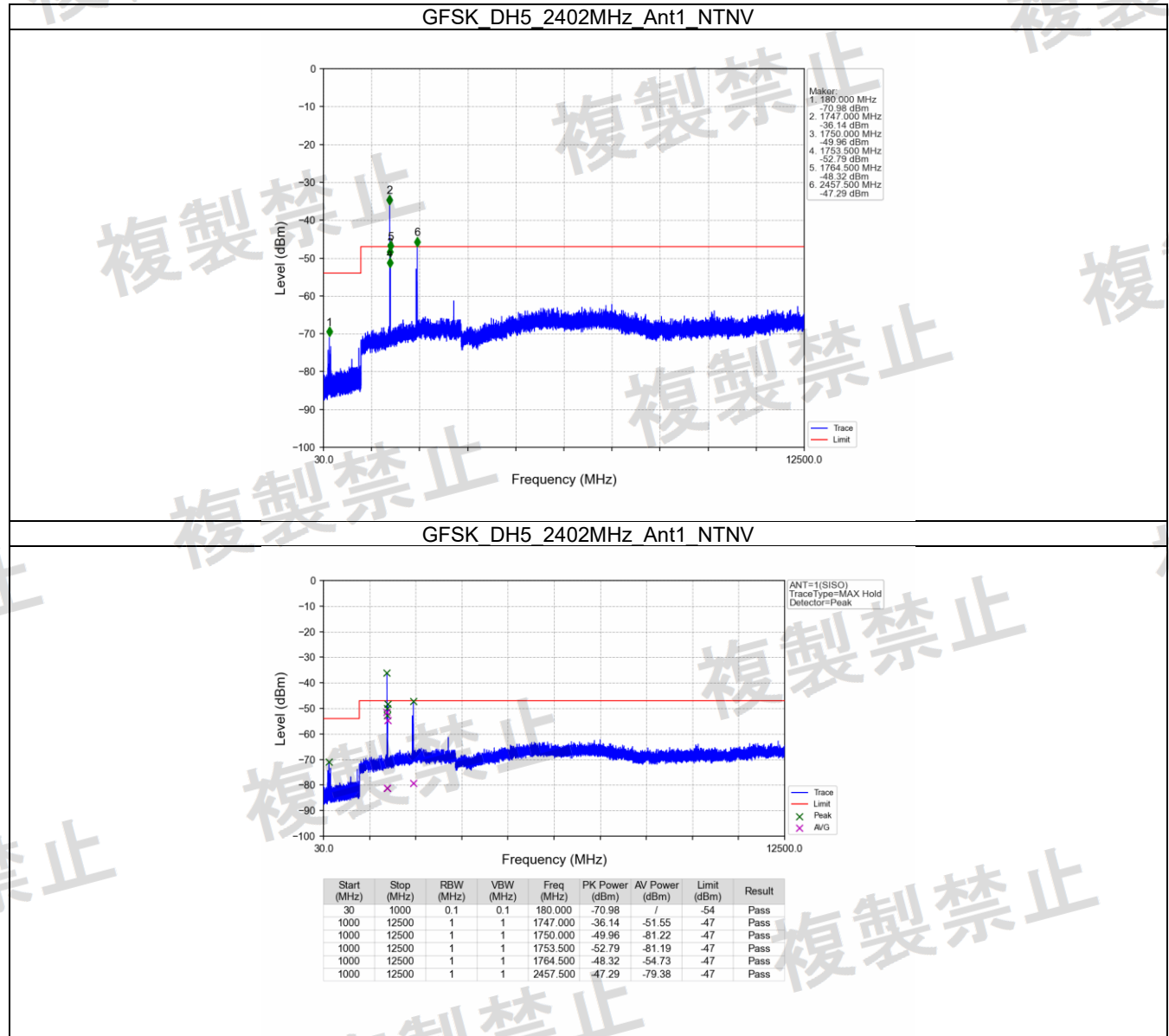
7.1 Test Result

7.1.1 RxSe_NTNV

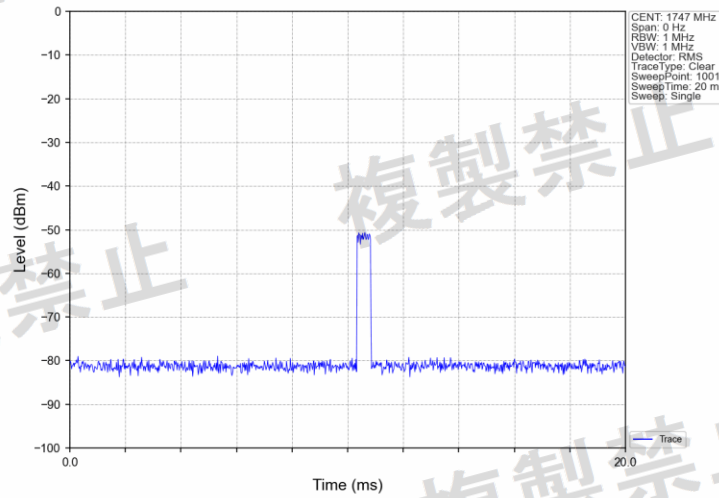
NTNV												
Mode	TX Type	Freq. (MHz)	ANT	Freq. Range		Marker					Limit (nW)	Verdict
				Start (MHz)	Stop (MHz)	Freq. (MHz)	PK Power (dBm)	PK Power (nW)	AV Power (dBm)	AV Power (nW)		
GFSK	SISO	2402	1	30	1000	180	-70.98	0.080	/	/	4	Pass
				1000	12500	1747	-36.14	243.220	-51.55	6.998	20	Pass
						1750	-49.96	10.093	-81.22	0.008	20	Pass
						1753.5	-52.79	5.260	-81.19	0.008	20	Pass
						1764.5	-48.32	14.723	-54.73	3.365	20	Pass
		2457.5	-47.29	18.664	-79.38	0.012	20	Pass				
		2480	1	30	1000	685.95	-78.14	0.015	/	/	4	Pass
				1000	12500	5893.5	-62.37	0.579	/	/	20	Pass
Pi/4DQPSK	SISO	2402	1	30	1000	831.2	-77.82	0.017	/	/	4	Pass
				1000	12500	6175.5	-62.63	0.546	/	/	20	Pass
		2480	1	30	1000	777.5	-78.41	0.014	/	/	4	Pass
				1000	12500	1747	-41.75	66.834	-72.02	0.063	20	Pass
						1753	-49.06	12.417	-81.17	0.008	20	Pass
						1757	-47.54	17.620	-81.18	0.008	20	Pass
						1764.5	-47.99	15.885	-54.73	3.365	20	Pass
						3499	-49.60	10.965	-73.90	0.041	20	Pass
8DPSK	SISO	2402	1	30	1000	180	-69.03	0.125	/	/	4	Pass
				1000	12500	1747	-56.70	2.138	-81.22	0.008	20	Pass
						1754	-55.08	3.105	-81.24	0.008	20	Pass
						1765	-50.14	9.683	-81.19	0.008	20	Pass
		2480	1	30	1000	928.8	-77.94	0.016	/	/	4	Pass
				1000	12500	5929.5	-62.80	0.525	/	/	20	Pass

7.2 Test Graph

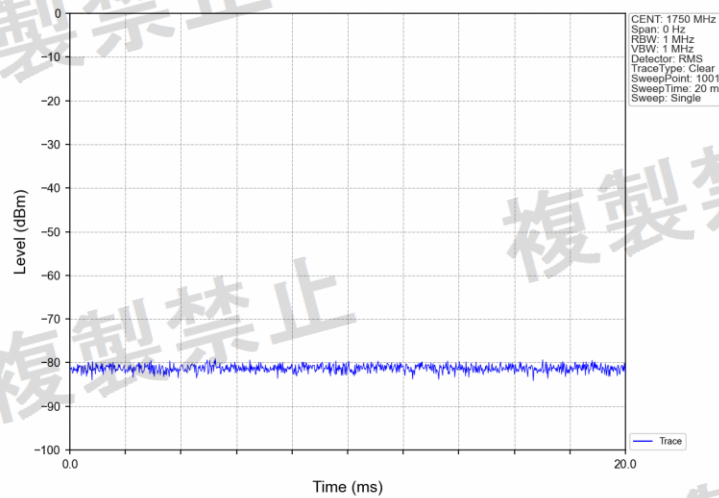
7.2.1 RxSe_NTNV



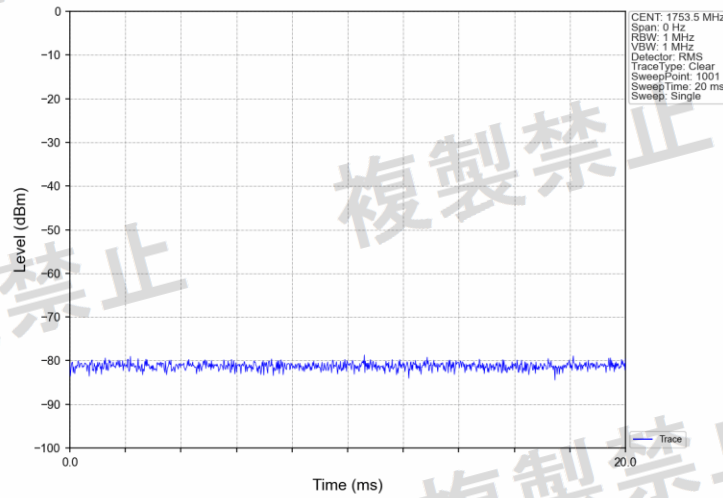
GFSK_DH5_2402MHz_Ant1_NTNV



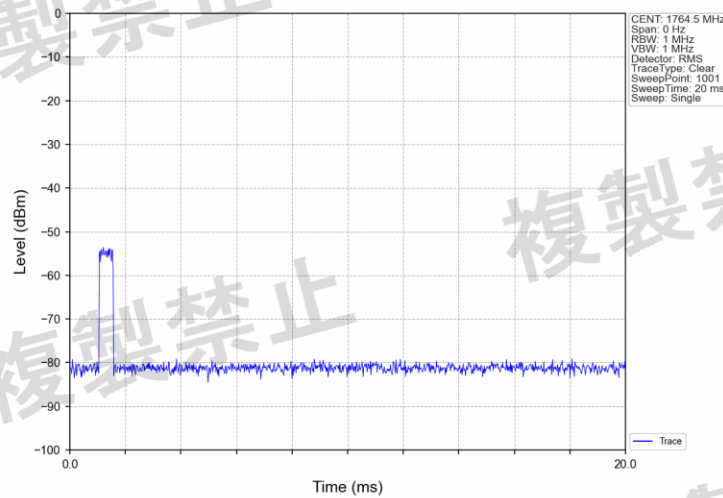
GFSK_DH5_2402MHz_Ant1_NTNV



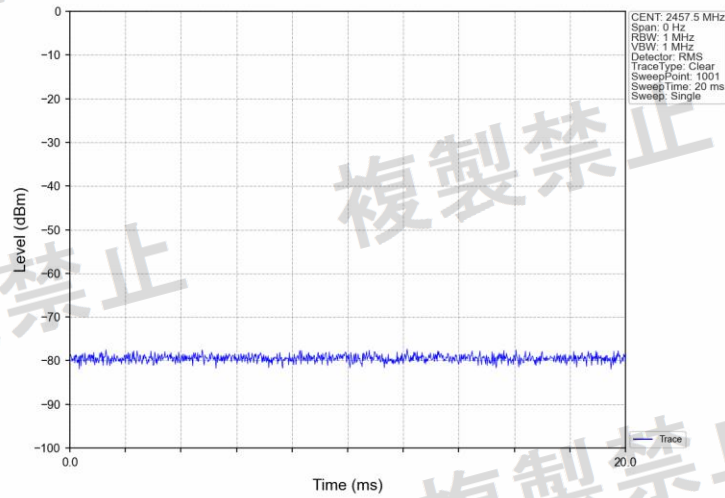
GFSK_DH5_2402MHz_Ant1_NTNV



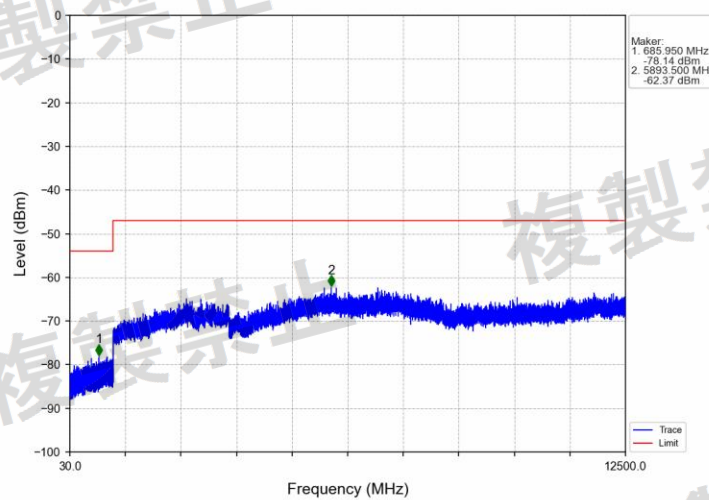
GFSK_DH5_2402MHz_Ant1_NTNV



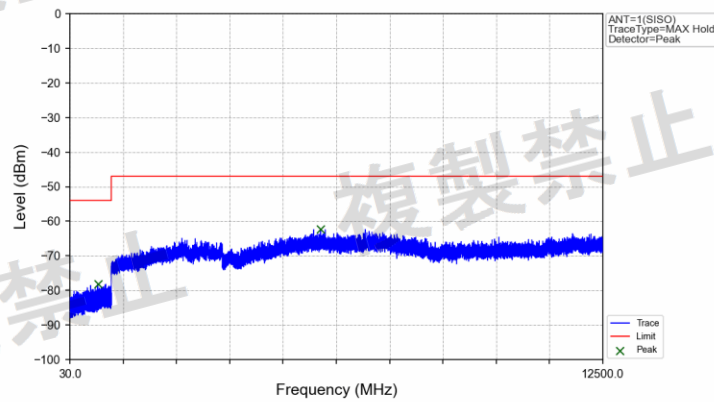
GFSK_DH5_2402MHz_Ant1_NTNV



GFSK DH5 2480MHz Ant1 NTN

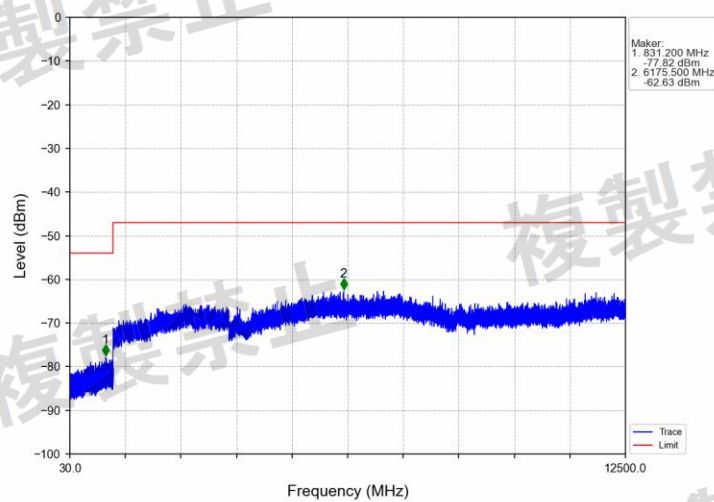


GFSK_DH5_2480MHz_Ant1_NTNV

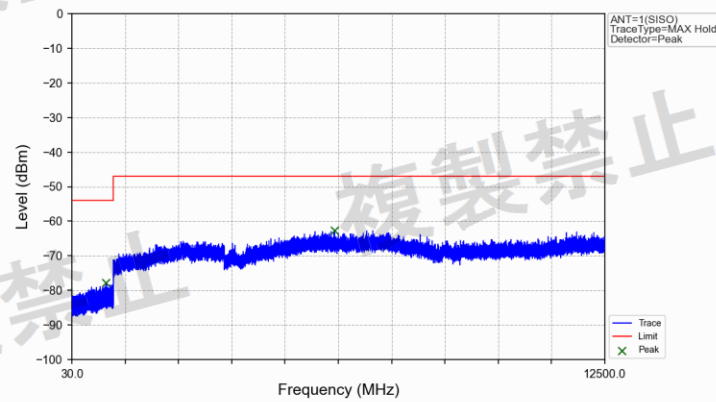


Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	A/V Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.1	685.950	-78.14	/	-54	Pass
1000	12500	1	1	5893.500	-62.37	/	-47	Pass

Pi/4DQPSK_2DH5_2402MHz_Ant1_NTNV

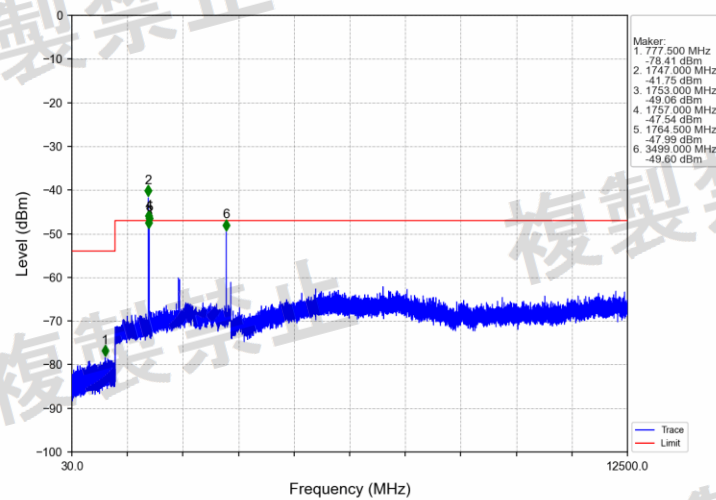


Pi/4DQPSK_2DH5_2402MHz_Ant1_NTNV

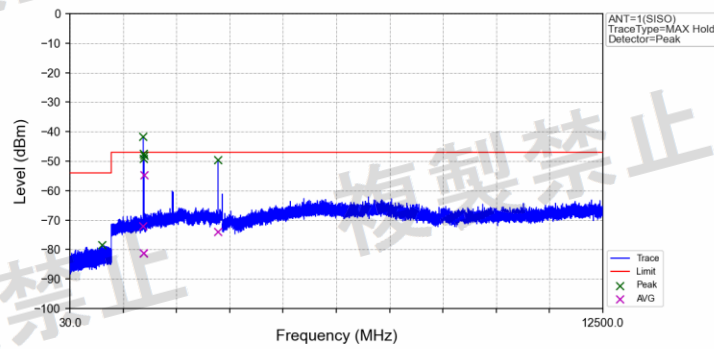


Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	A/V Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.1	831.200	-77.82	/	-54	Pass
1000	12500	1	1	6175.500	-62.63	/	-47	Pass

Pi/4DQPSK_2DH5_2480MHz_Ant1_NTNV

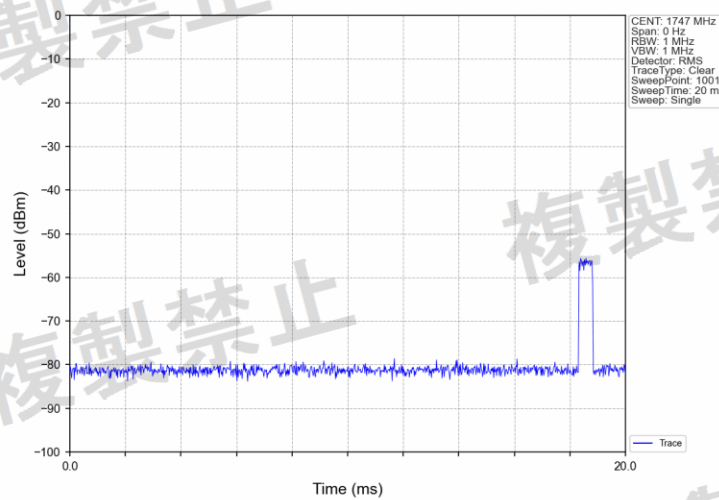


Pi/4DQPSK_2DH5_2480MHz_Ant1_NTNV

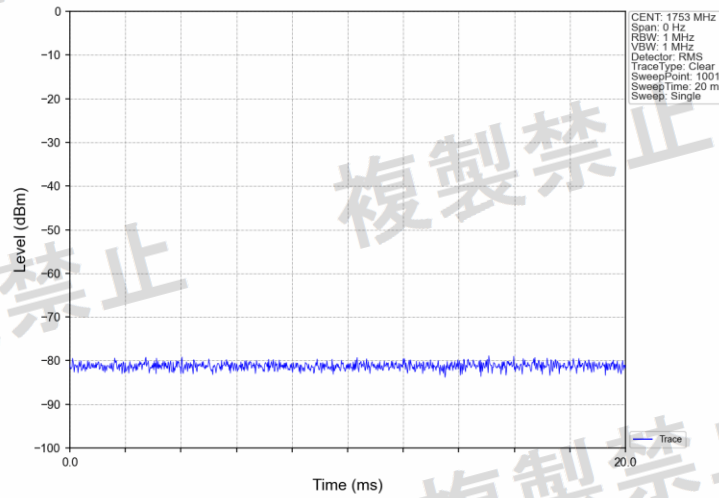


Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.1	777.500	-78.41	-	-54	Pass
1000	12500	1	1	1747.000	-41.75	-72.02	-47	Pass
1000	12500	1	1	1753.000	-49.06	-81.17	-47	Pass
1000	12500	1	1	1757.000	-47.54	-81.18	-47	Pass
1000	12500	1	1	1764.500	-47.99	-54.73	-47	Pass
1000	12500	1	1	3499.000	-49.60	-73.90	-47	Pass

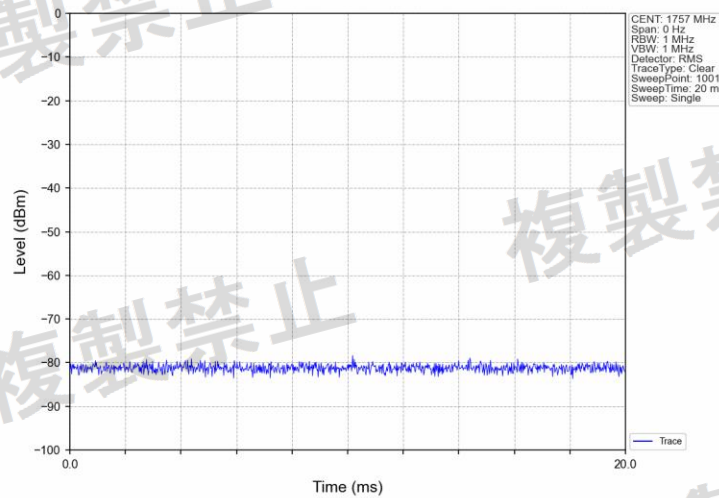
Pi/4DQPSK_2DH5_2480MHz_Ant1_NTNV



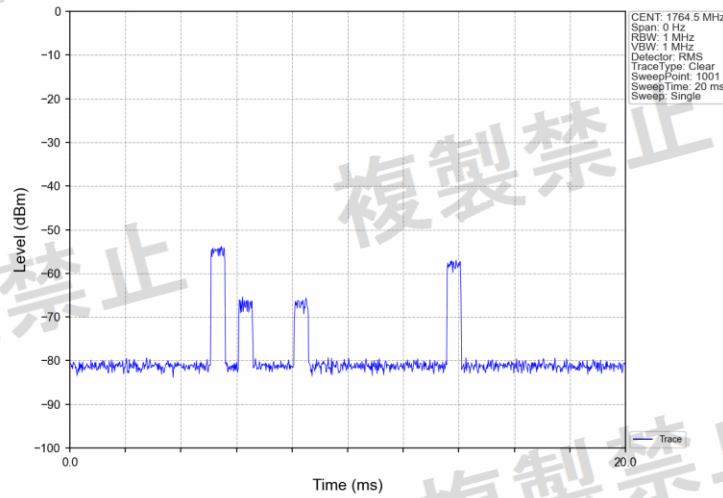
Pi/4DQPSK_2DH5_2480MHz_Ant1_NTNV



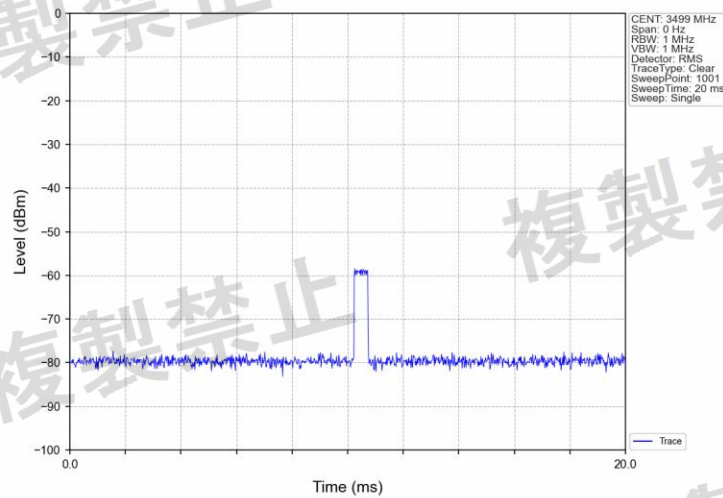
Pi/4DQPSK_2DH5_2480MHz_Ant1_NTNV



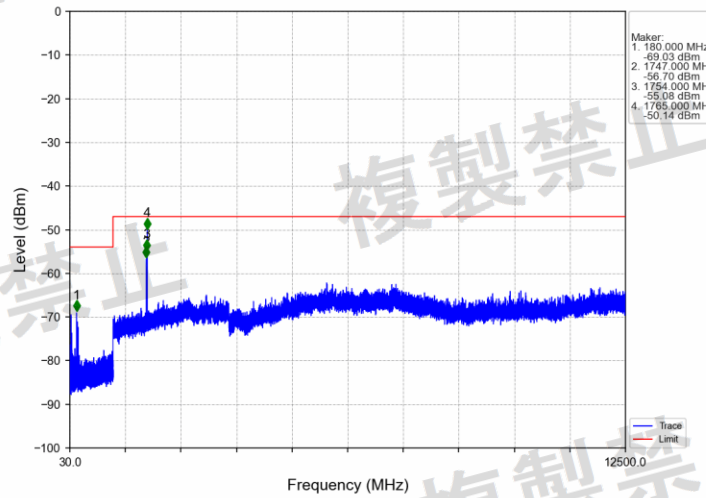
Pi/4DQPSK_2DH5_2480MHz_Ant1_NTNV



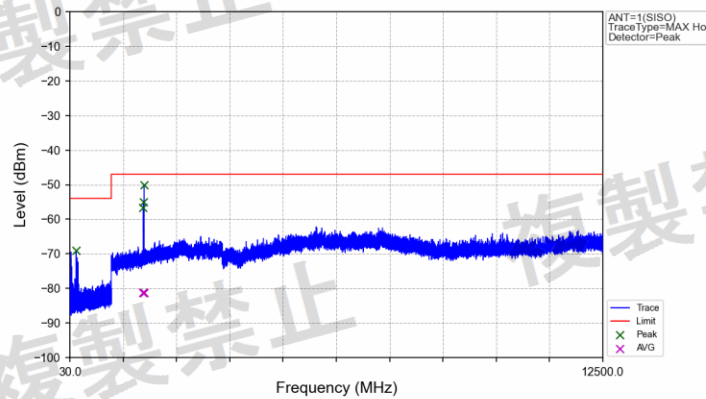
Pi/4DQPSK_2DH5_2480MHz_Ant1_NTNV



8DPSK_3DH5_2402MHz_Ant1_NTNV

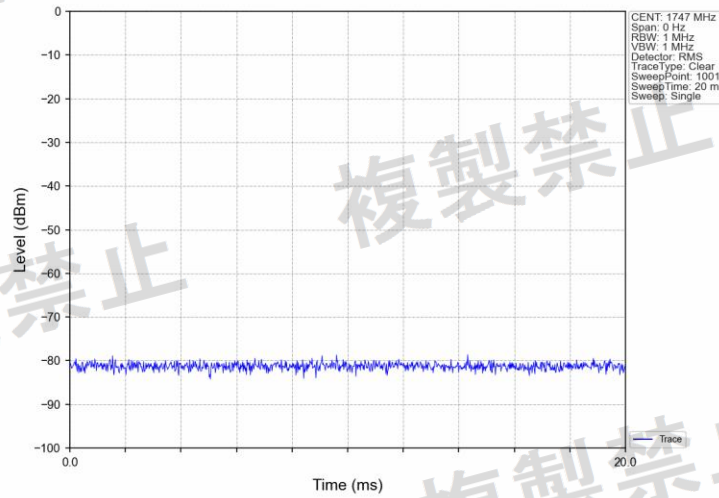


8DPSK_3DH5_2402MHz_Ant1_NTNV

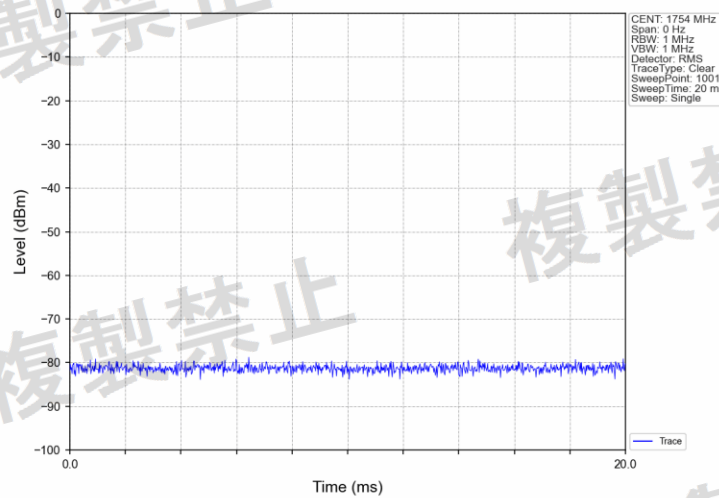


Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.1	180.000	-69.03	/	-54	Pass
1000	12500	1	1	1747.000	-56.70	-81.22	-47	Pass
1000	12500	1	1	1754.000	-55.08	-81.24	-47	Pass
1000	12500	1	1	1765.000	-50.14	-81.19	-47	Pass

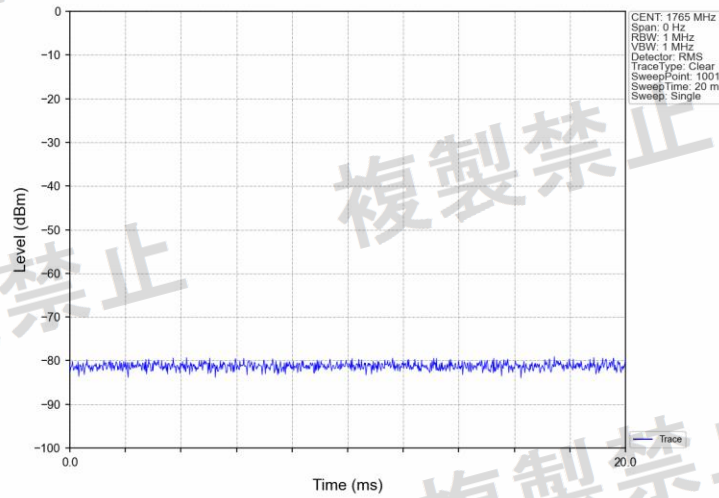
8DPSK_3DH5_2402MHz_Ant1_NTNV



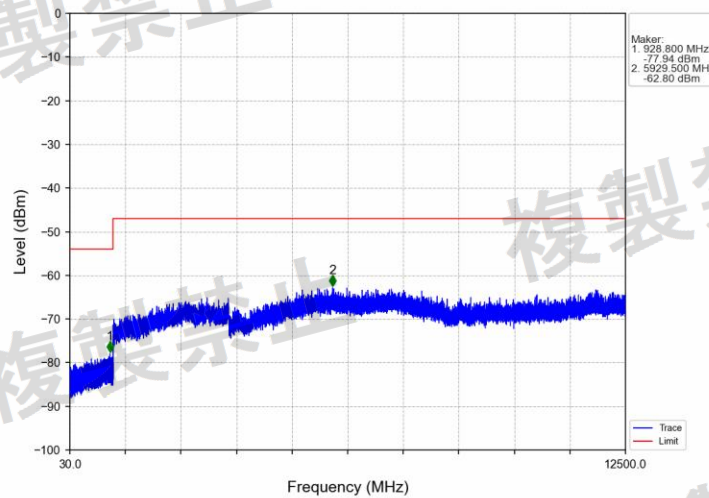
8DPSK_3DH5_2402MHz_Ant1_NTNV



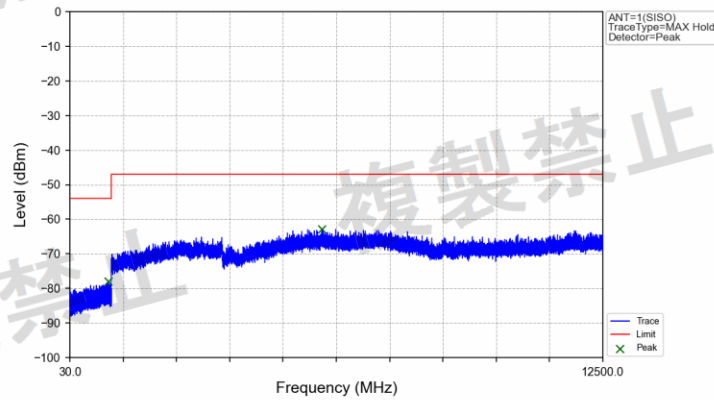
8DPSK_3DH5_2402MHz_Ant1_NTNV



8DPSK_3DH5_2480MHz_Ant1_NTNV



8DPSK_3DH5_2480MHz_Ant1_NTNV



Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	A/V Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.1	928.800	-77.94	/	-54	Pass
1000	12500	1	1	5929.500	-62.80	/	-47	Pass

***** End of Report *****