



Appendix A for BT Test Data

Product Name: Car Diagnostic Instrument

Test Model: OBD2-DEI

Environmental Conditions

Temperature:	23.4°C
Relative Humidity:	52.6%
ATM Pressure:	100.0 kPa
Test Engineer:	Jerry Chu
Supervised by:	Can Kun





A.1 Frequency Error

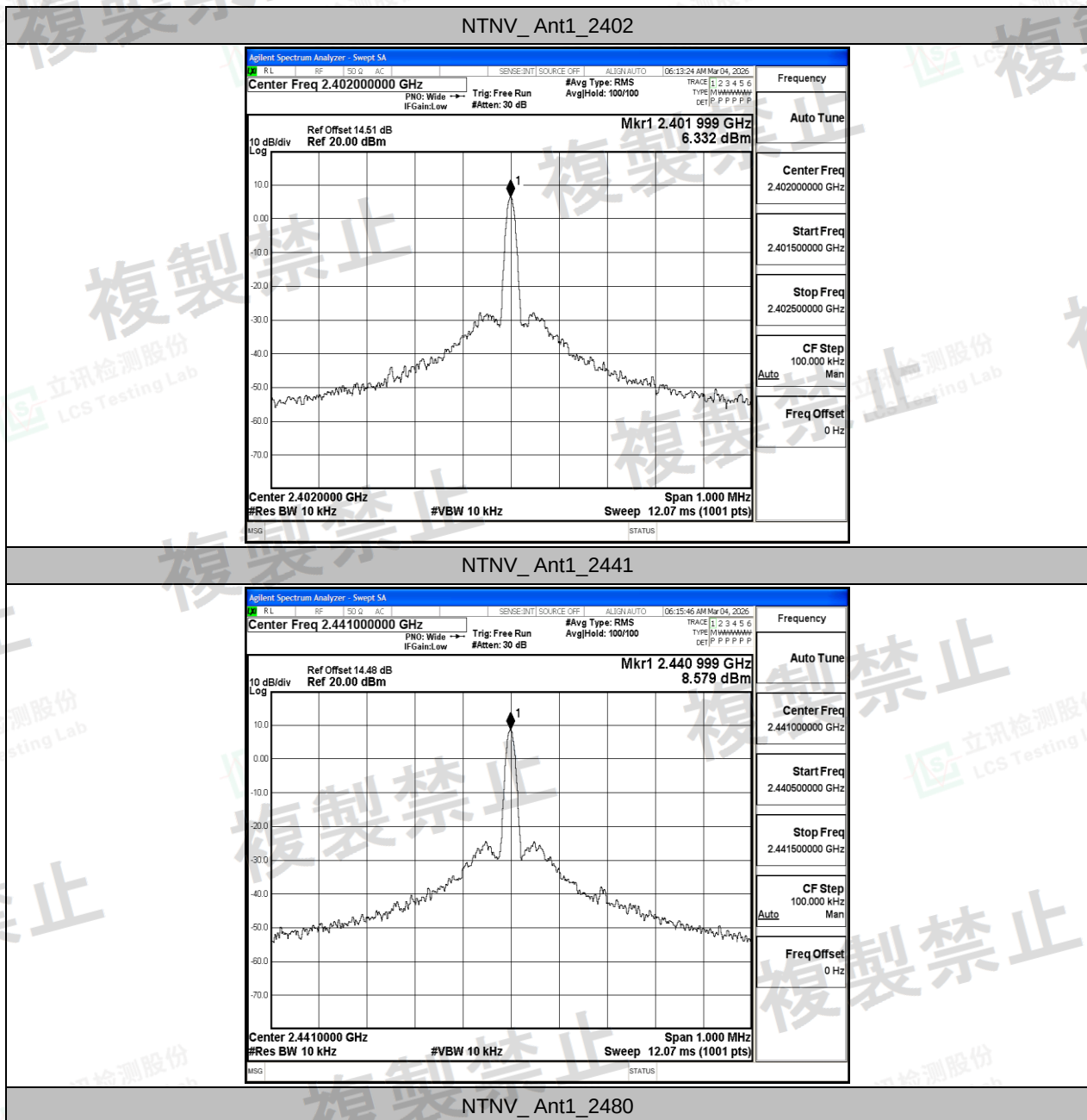
Test Result

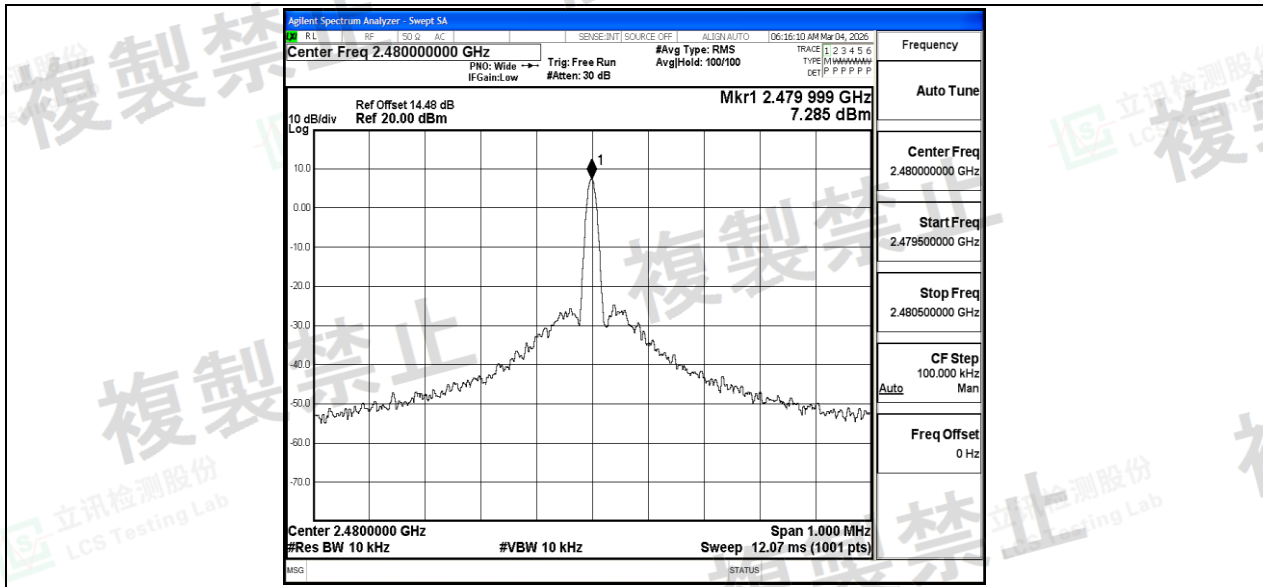
TestCondition	TestMode	Antenna	Frequency[MHz]	Result[ppm]	Limit[ppm]	Verdict
NTNV	Frequency Error	Ant1	2402	-0.41632	±50	PASS
			2441	-0.40967	±50	PASS
			2480	-0.40323	±50	PASS





Test Graphs







A.2 Antenna Power

Test Result

Test Voltage				Normal Voltage			
Mode	Declared power	Average Result	Average Result	Result	Limit	Tolerance	Limit
	(mW/MHz)	(dBm)	(mW)	(mW/MHz)	(mW/MHz)	/	/
Hopping-Tx (1Mbps)	0.03	1.70	1.4791	0.027	3	-10.00%	+20%
Hopping-Tx (2Mbps)	0.03	1.30	1.3490	0.025	3	-16.67%	+20%
Hopping-Tx (3Mbps)	0.03	1.18	1.3122	0.024	3	-20.00%	+20%
Conclusion: PASS							

Result power= Average value / (Duty Cycle * Spreading bandwidth)

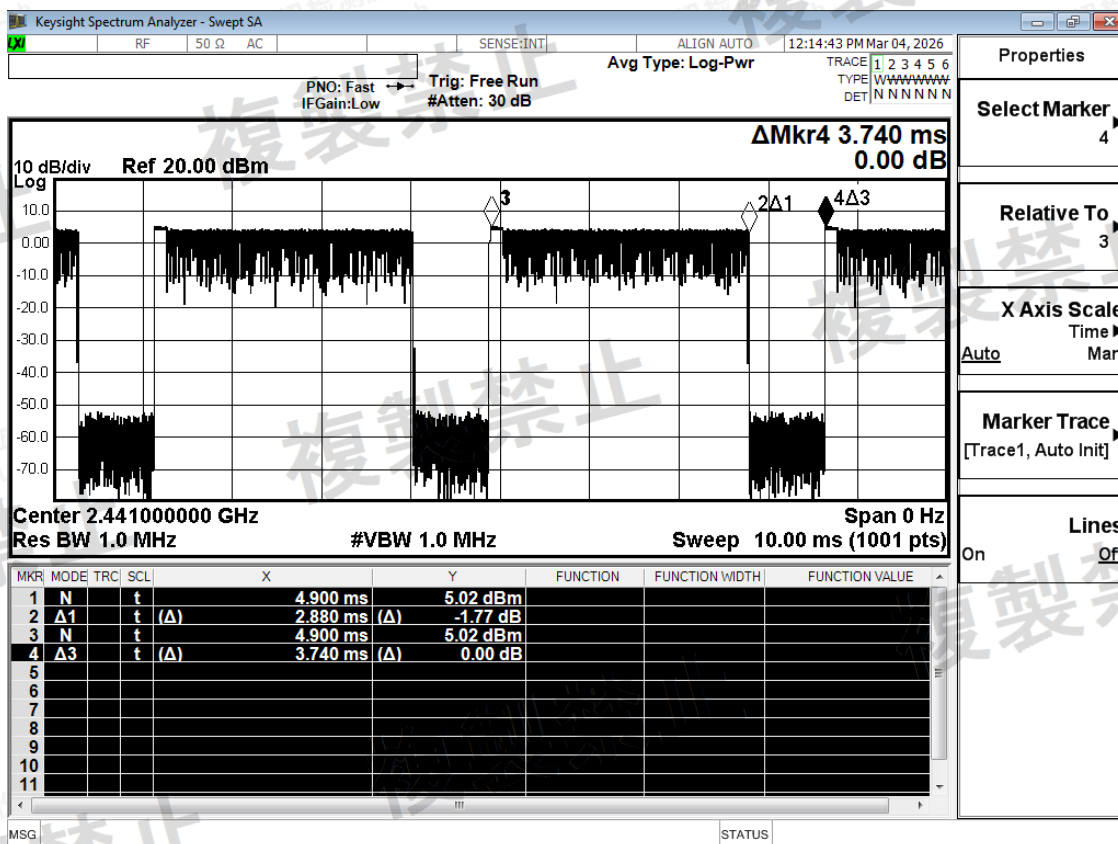
Antenna power Result = Measured Power / Spreading bandwidth

Spread Bandwidth (DH5) = 69.951MHz, Spread Bandwidth (2DH5) = 70.026MHz,

Spread Bandwidth (3DH5) = 70.046MHz

Duty cycle=77.01%

Duty cycle= [Ton/ (Ton+Toff)]*100%=2.880/3.740*100%=77.01%





A.3 Occupied Bandwidth

Test Result

TestCondition	TestMode	Antenna	Frequency[MHz]	Result [MHz]	Limit [MHz]	Verdict
NTNV	DH5	Ant1	2402	0.878	≤83.5	PASS
			2441	0.862	≤83.5	PASS
			2480	0.863	≤83.5	PASS
	2DH5	Ant1	2402	1.183	≤83.5	PASS
			2441	1.184	≤83.5	PASS
			2480	1.190	≤83.5	PASS
	3DH5	Ant1	2402	1.185	≤83.5	PASS
			2441	1.184	≤83.5	PASS
			2480	1.186	≤83.5	PASS

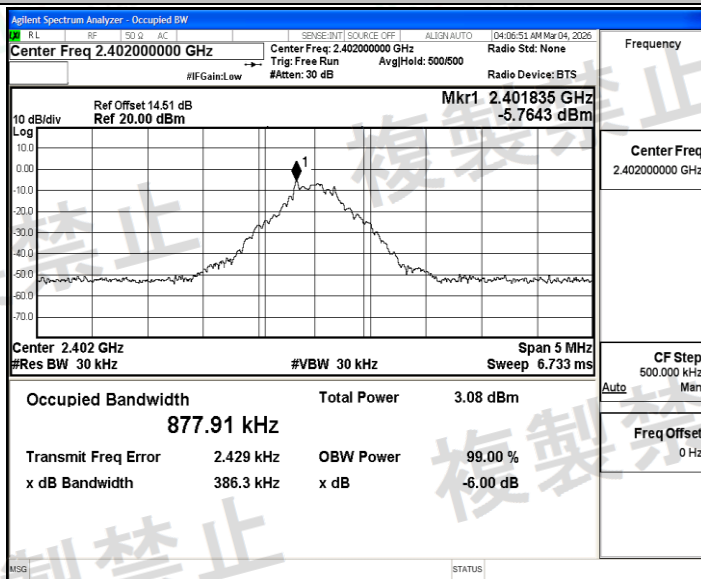
TestCondition	TestMode	Antenna	Frequency[MHz]	Result [MHz]	Limit [MHz]	Verdict
NTNV	DH5	Ant1	Hop	78.520	≤83.5	PASS
	2DH5	Ant1	Hop	78.652	≤83.5	PASS
	3DH5	Ant1	Hop	78.602	≤83.5	PASS



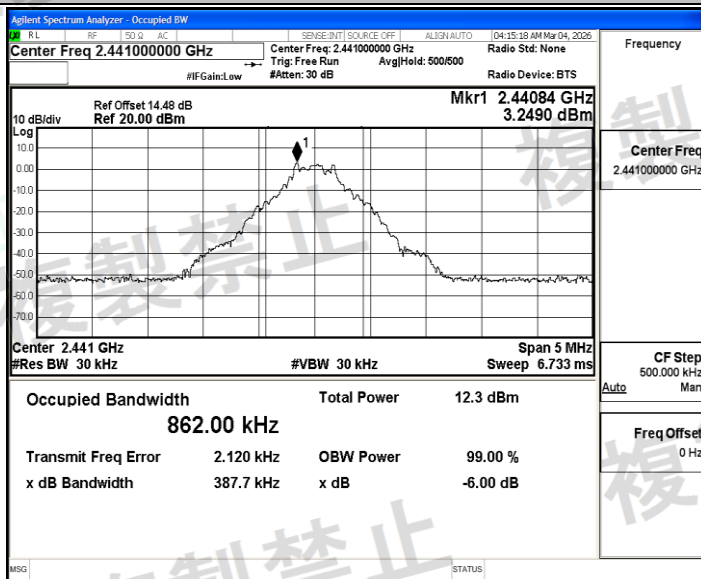


Test Graphs

NTNV_DH5_Ant1_2402

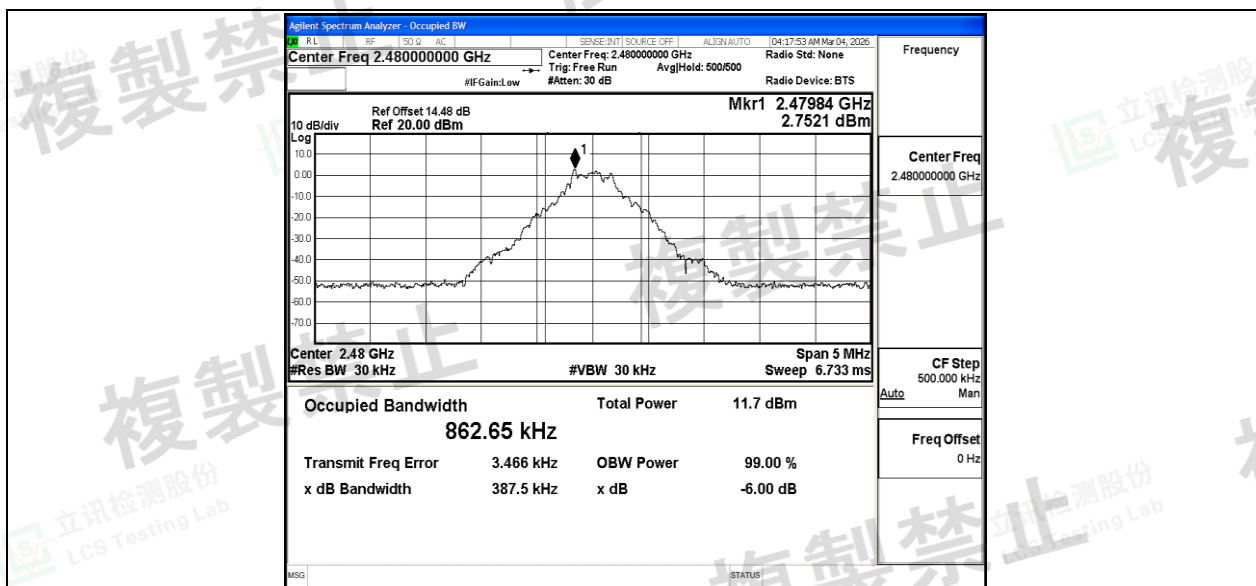


NTNV_DH5_Ant1_2441

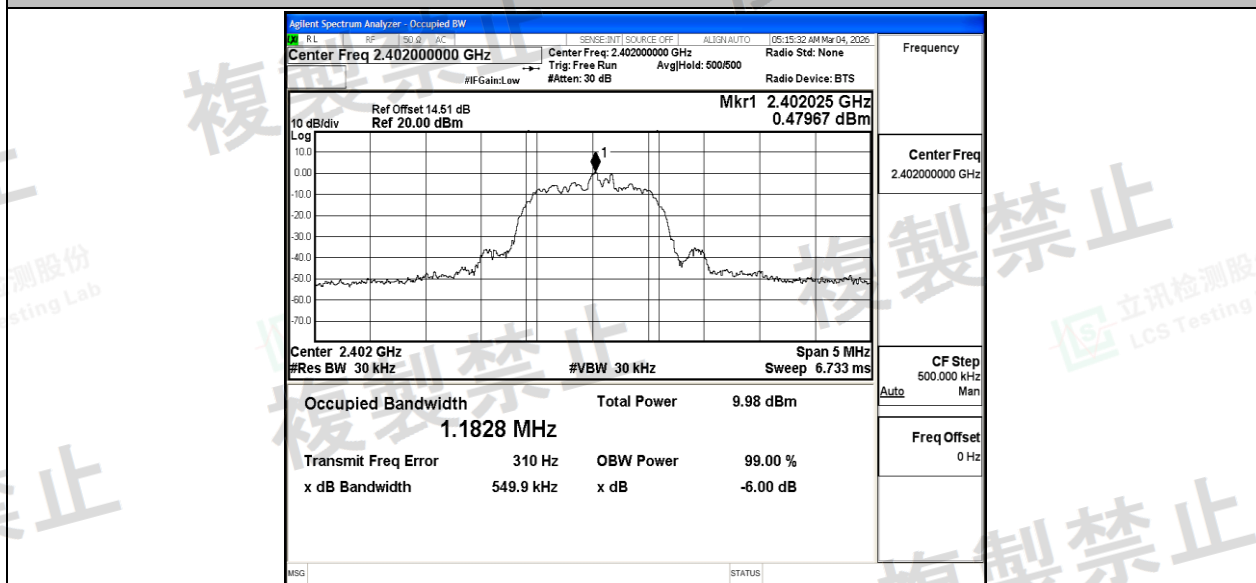


NTNV_DH5_Ant1_2480

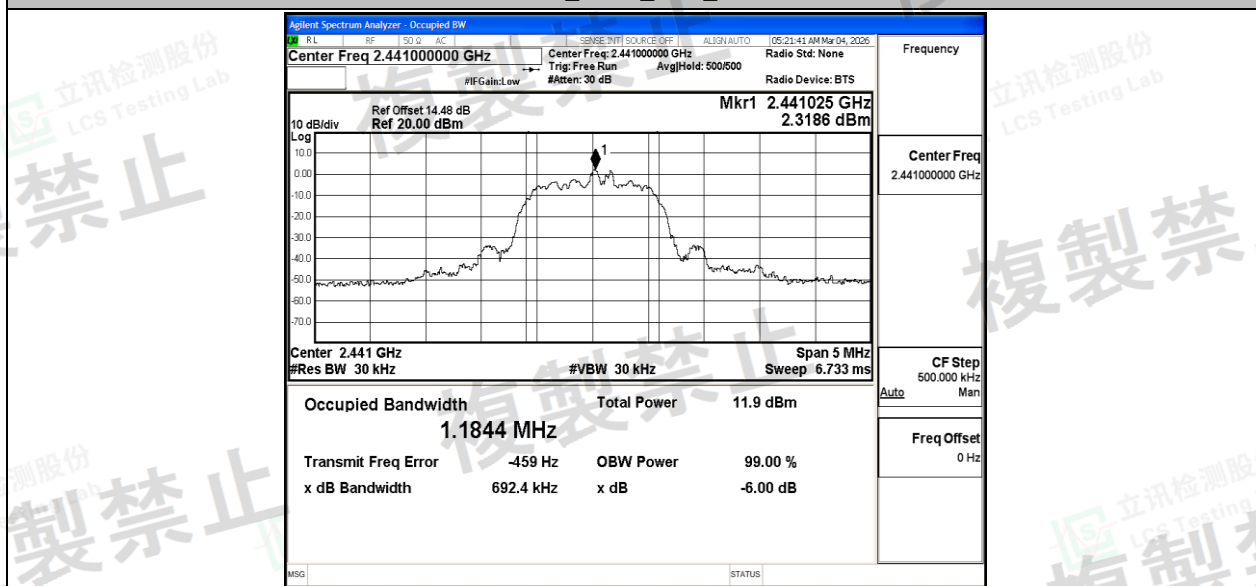




NTNV_2DH5_Ant1_2402

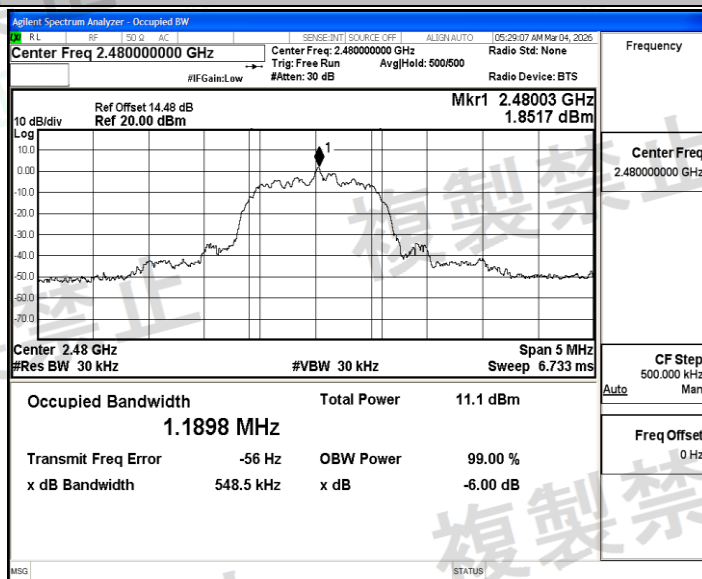


NTNV_2DH5_Ant1_2441

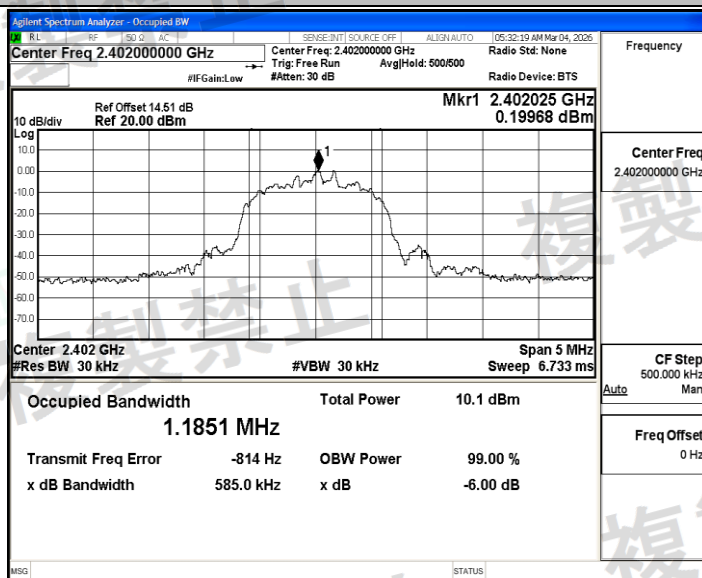




NTNV_2DH5_Ant1_2480

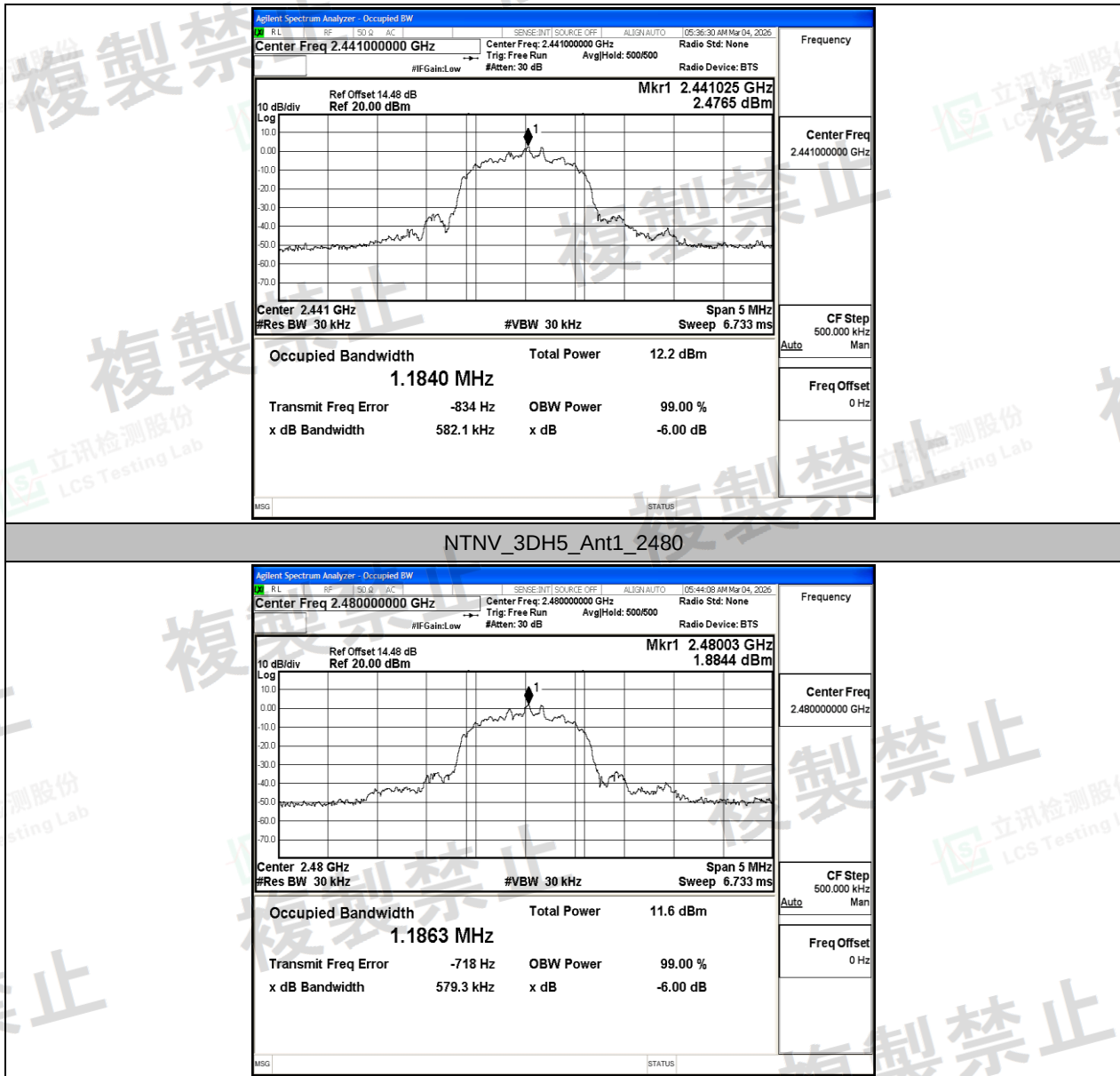


NTNV_3DH5_Ant1_2402



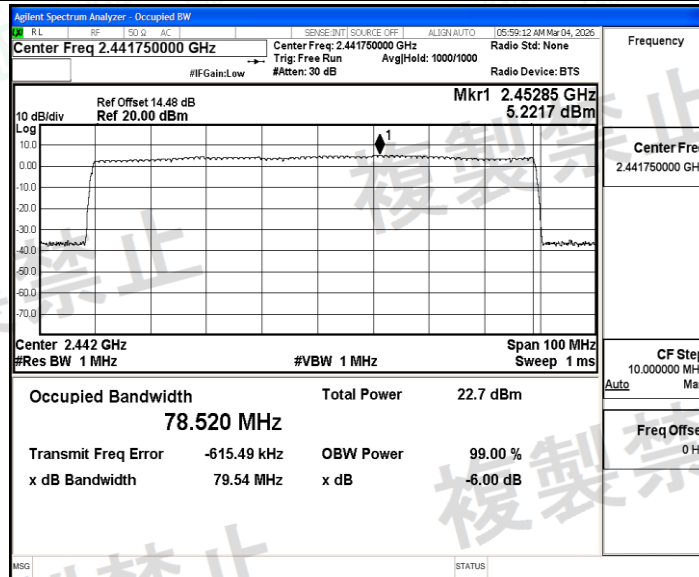
NTNV_3DH5_Ant1_2441



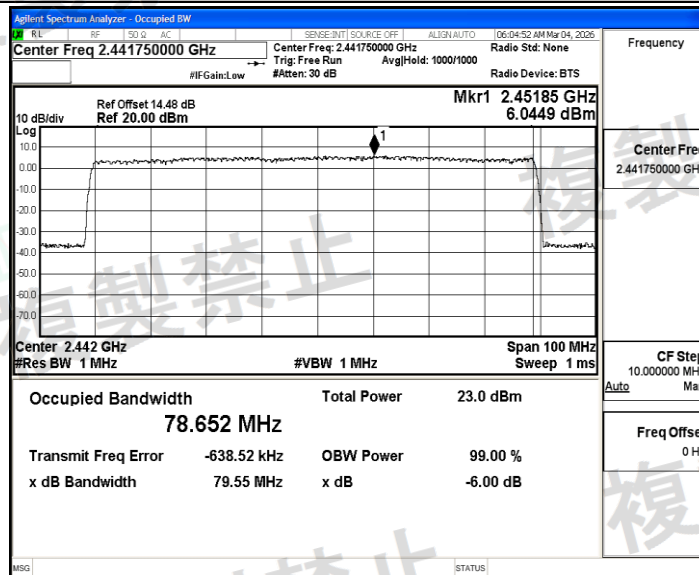




NTNV_DH5_Ant1_Hop

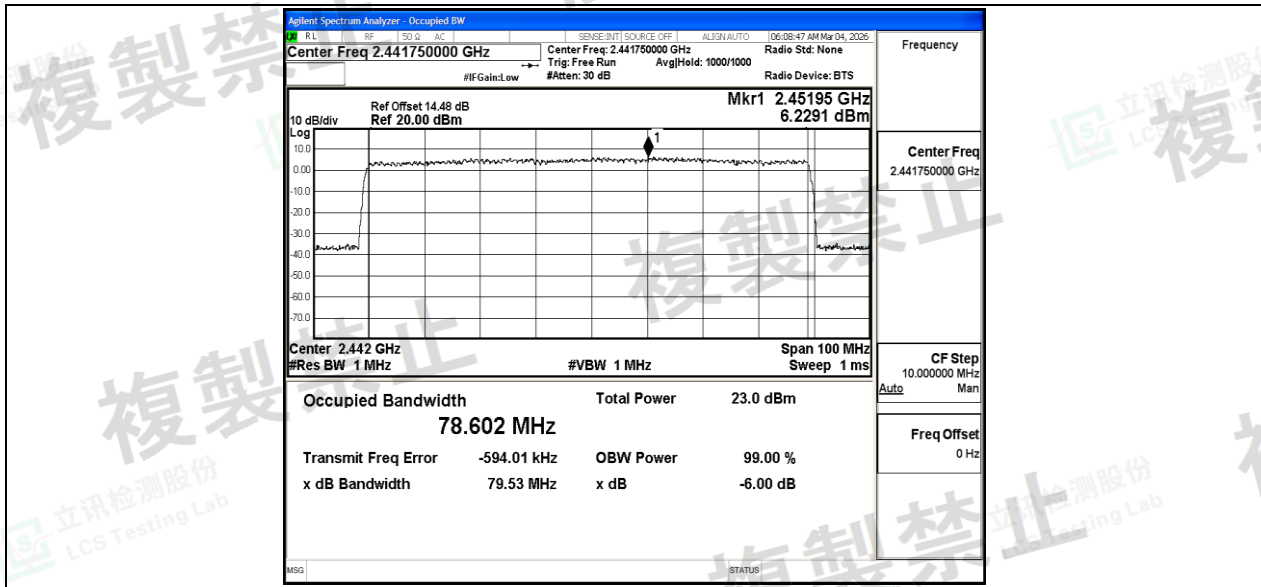


NTNV_2DH5_Ant1_Hop



NTNV_3DH5_Ant1_Hop







A.4 Spread Bandwidth

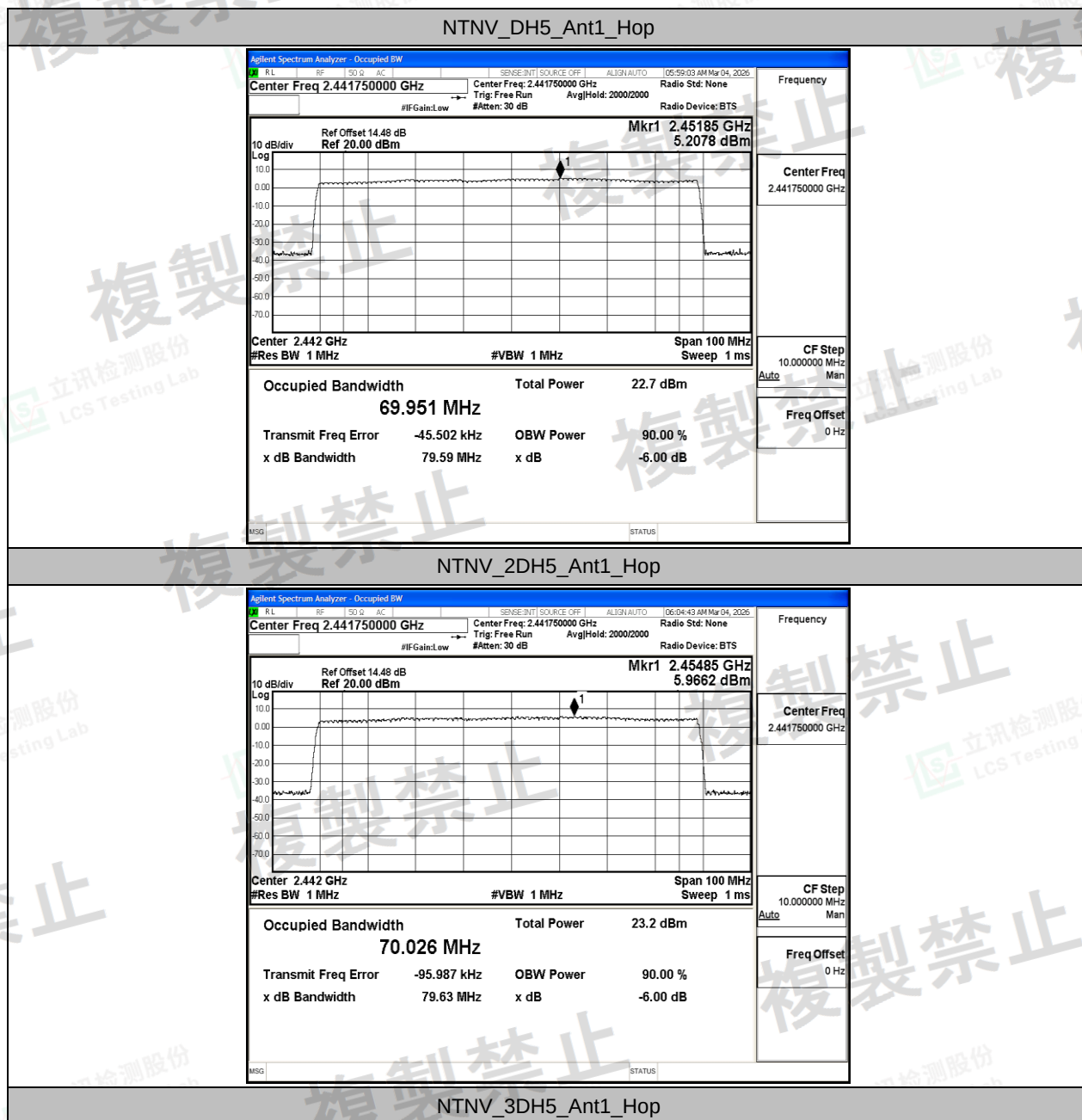
Test Result

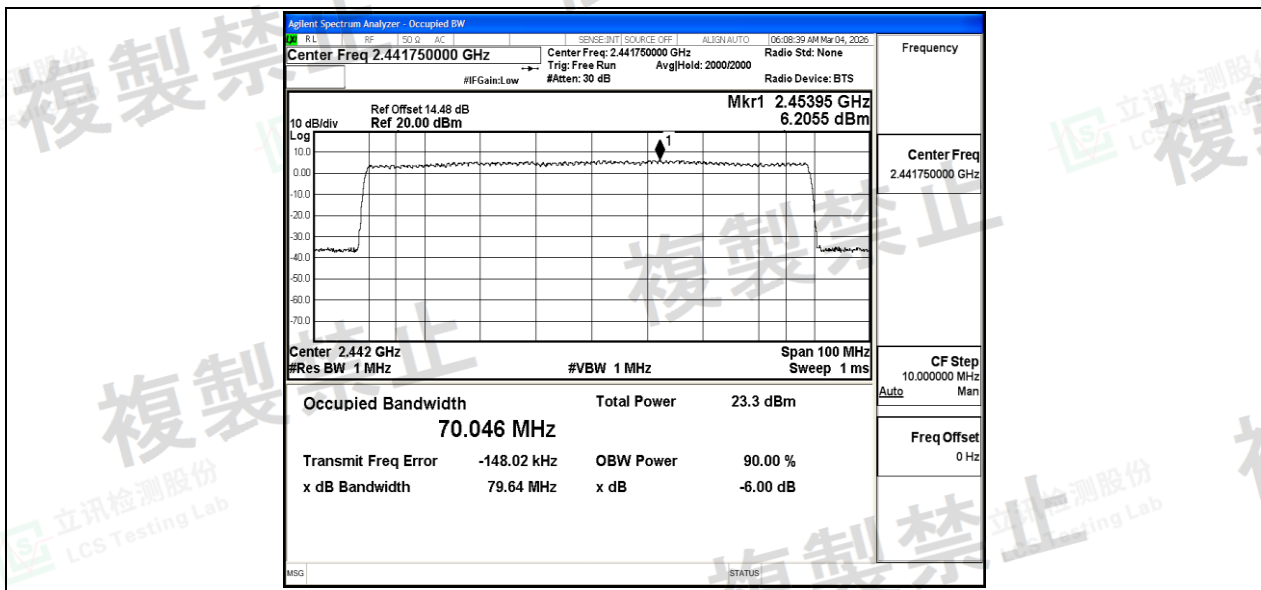
TestCondition	TestMode	Antenna	Frequency[MHz]	Result [MHz]	Limit [MHz]	Verdict
NTNV	DH5	Ant1	Hop	69.951	---	PASS
	2DH5	Ant1	Hop	70.026	---	PASS
	3DH5	Ant1	Hop	70.046	---	PASS





Test Graphs







A.5 Spurious Emission of TX

Test Result

TestCondition	TestMode	Antenna	Frequency[MHz]	Freq.Range [MHz]	Result [dBm]	Limit [dBm]	Result [μW]	Limit [μW]	Verdict
NTNV	DH5	Ant1	2402	30~1000	-54.08	≤-26	0.00391	≤2.5	PASS
				1000~2387	-52.57	≤-26	0.00553	≤2.5	PASS
				2387~2400	-41.82	≤-16	0.06577	≤25	PASS
				2483.5~2496.5	-43.22	≤-16	0.04764	≤25	PASS
				2496.5~13000	-45.19	≤-26	0.03027	≤2.5	PASS
			2441	30~1000	-53.49	≤-26	0.00448	≤2.5	PASS
				1000~2387	-52.94	≤-26	0.00508	≤2.5	PASS
				2387~2400	-43.45	≤-16	0.04519	≤25	PASS
				2483.5~2496.5	-43.39	≤-16	0.04581	≤25	PASS
				2496.5~13000	-45.65	≤-26	0.02723	≤2.5	PASS
			2480	30~1000	-53.75	≤-26	0.00422	≤2.5	PASS
				1000~2387	-52.48	≤-26	0.00565	≤2.5	PASS
				2387~2400	-43.27	≤-16	0.04710	≤25	PASS
				2483.5~2496.5	-43.12	≤-16	0.04875	≤25	PASS
				2496.5~13000	-45.23	≤-26	0.02999	≤2.5	PASS
	2DH5	Ant1	2402	30~1000	-53.55	≤-26	0.00442	≤2.5	PASS
				1000~2387	-52.67	≤-26	0.00541	≤2.5	PASS
				2387~2400	-34.59	≤-16	0.34754	≤25	PASS
				2483.5~2496.5	-43.32	≤-16	0.04656	≤25	PASS
				2496.5~13000	-45.15	≤-26	0.03055	≤2.5	PASS
			2441	30~1000	-53.84	≤-26	0.00413	≤2.5	PASS
				1000~2387	-48.22	≤-26	0.01507	≤2.5	PASS
				2387~2400	-43.51	≤-16	0.04457	≤25	PASS
				2483.5~2496.5	-43.30	≤-16	0.04677	≤25	PASS
				2496.5~13000	-45.56	≤-26	0.02780	≤2.5	PASS
			2480	30~1000	-54.05	≤-26	0.00394	≤2.5	PASS
				1000~2387	-52.82	≤-26	0.00522	≤2.5	PASS
				2387~2400	-43.40	≤-16	0.04571	≤25	PASS
				2483.5~2496.5	-43.42	≤-16	0.04550	≤25	PASS
				2496.5~13000	-45.61	≤-26	0.02748	≤2.5	PASS
	3DH5	Ant1	2402	30~1000	-53.87	≤-26	0.00410	≤2.5	PASS
				1000~2387	-52.81	≤-26	0.00524	≤2.5	PASS
				2387~2400	-35.00	≤-16	0.31623	≤25	PASS
				2483.5~2496.5	-43.40	≤-16	0.04571	≤25	PASS
				2496.5~13000	-45.87	≤-26	0.02588	≤2.5	PASS





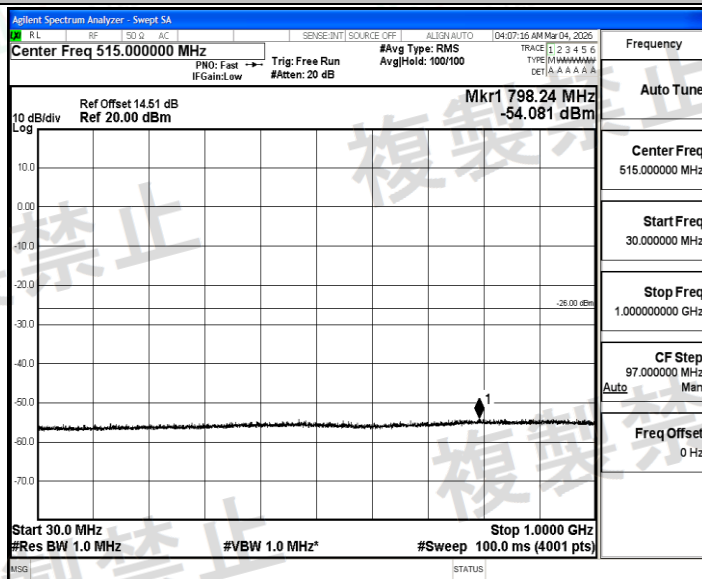
		2441	30~1000	-53.93	≤-26	0.00405	≤2.5	PASS
			1000~2387	-52.53	≤-26	0.00558	≤2.5	PASS
			2387~2400	-43.44	≤-16	0.04529	≤25	PASS
			2483.5~2496.5	-43.35	≤-16	0.04624	≤25	PASS
			2496.5~13000	-44.83	≤-26	0.03289	≤2.5	PASS
		2480	30~1000	-54.01	≤-26	0.00397	≤2.5	PASS
			1000~2387	-52.79	≤-26	0.00526	≤2.5	PASS
			2387~2400	-43.47	≤-16	0.04498	≤25	PASS
			2483.5~2496.5	-42.95	≤-16	0.05070	≤25	PASS
			2496.5~13000	-45.92	≤-26	0.02559	≤2.5	PASS



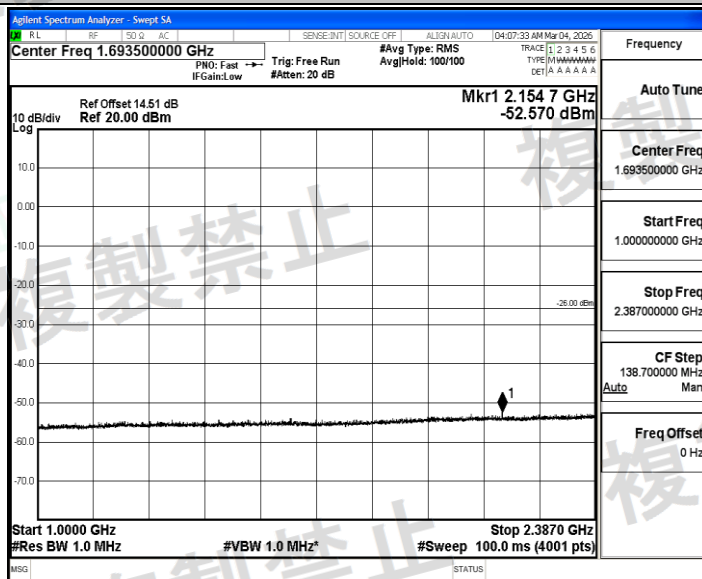


Test Graphs

NTNV_DH5_Ant1_2402_30~1000

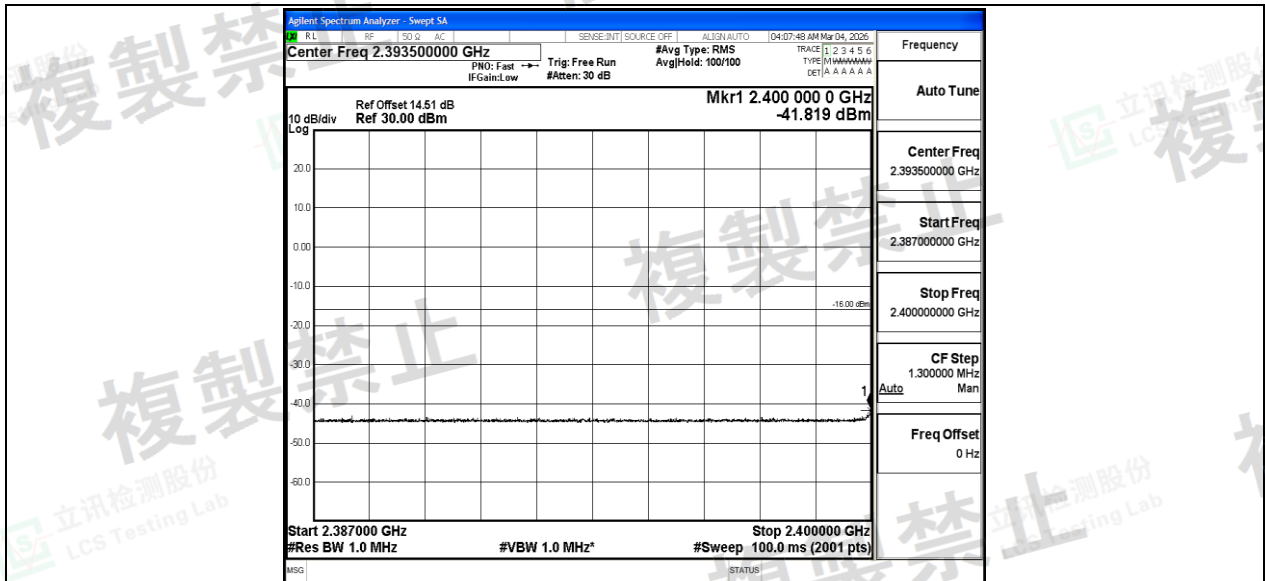


NTNV_DH5_Ant1_2402_1000~2387

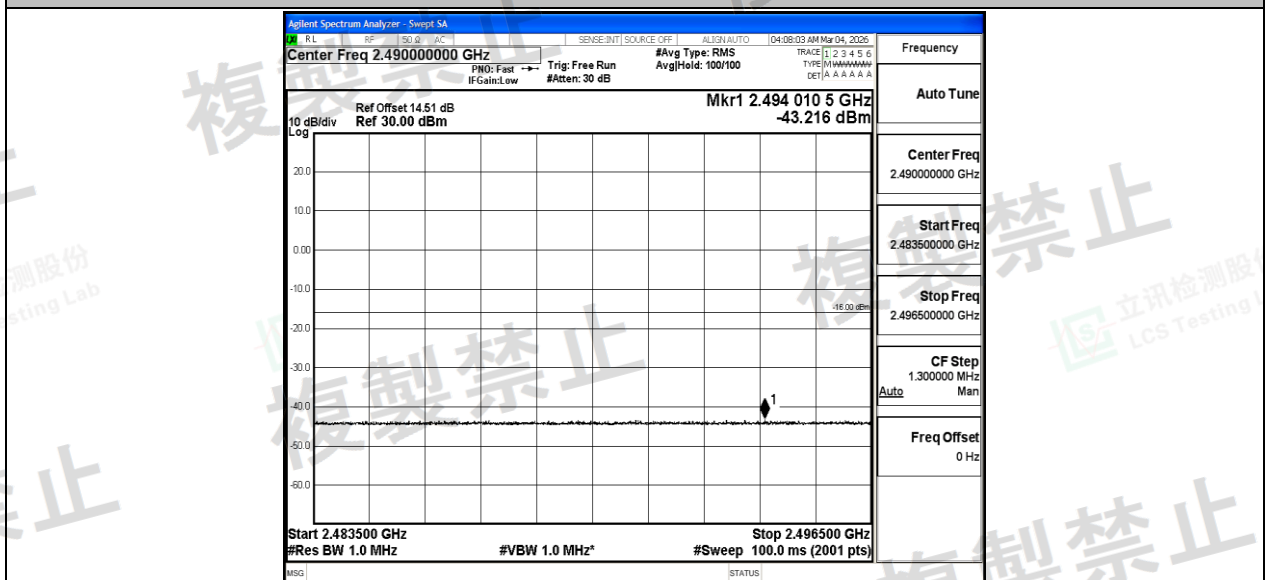


NTNV_DH5_Ant1_2402_2387~2400

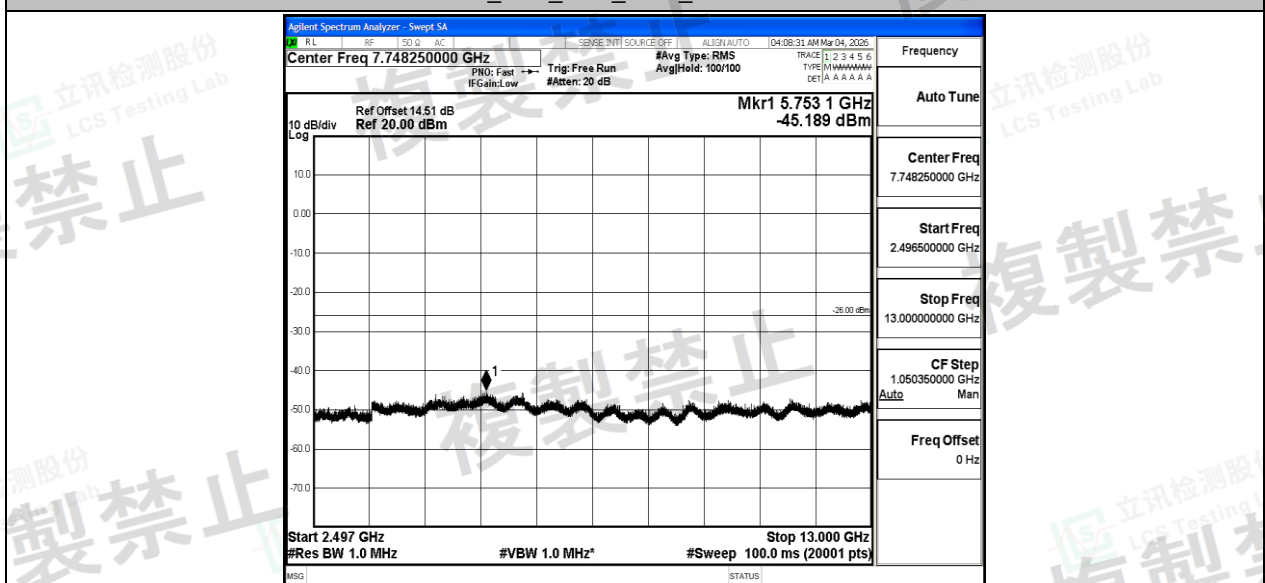




NTNV_DH5_Ant1_2402_2483.5~2496.5

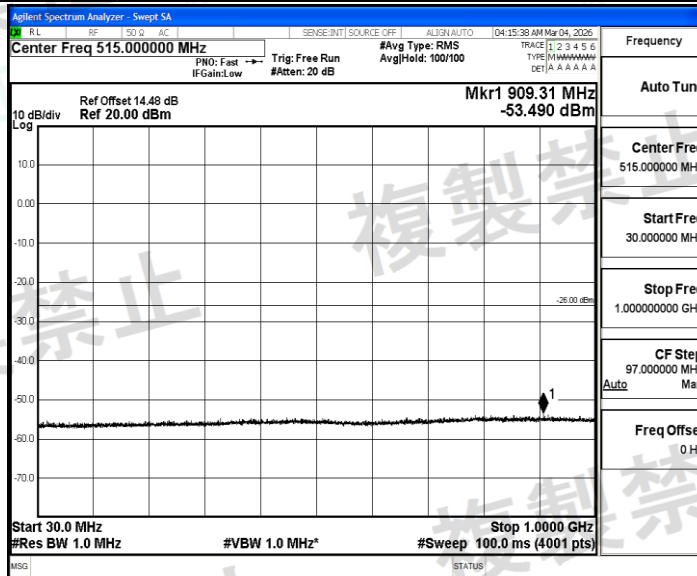


NTNV_DH5_Ant1_2402_2496.5~13000

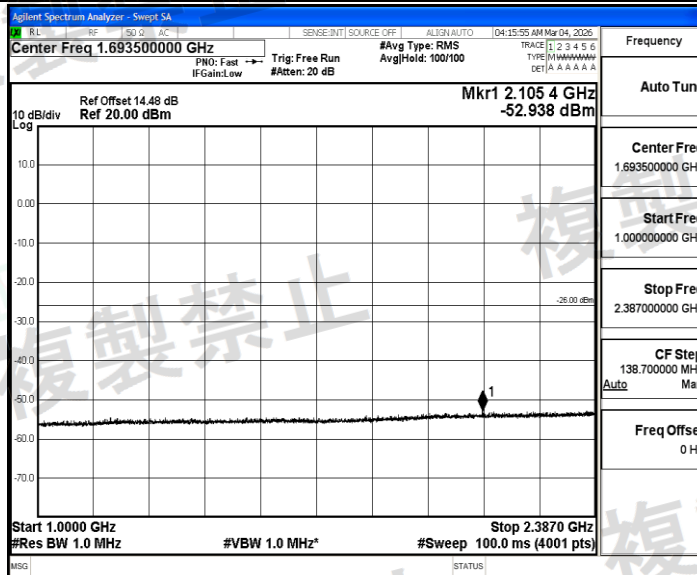




NTNV_DH5_Ant1_2441_30~1000

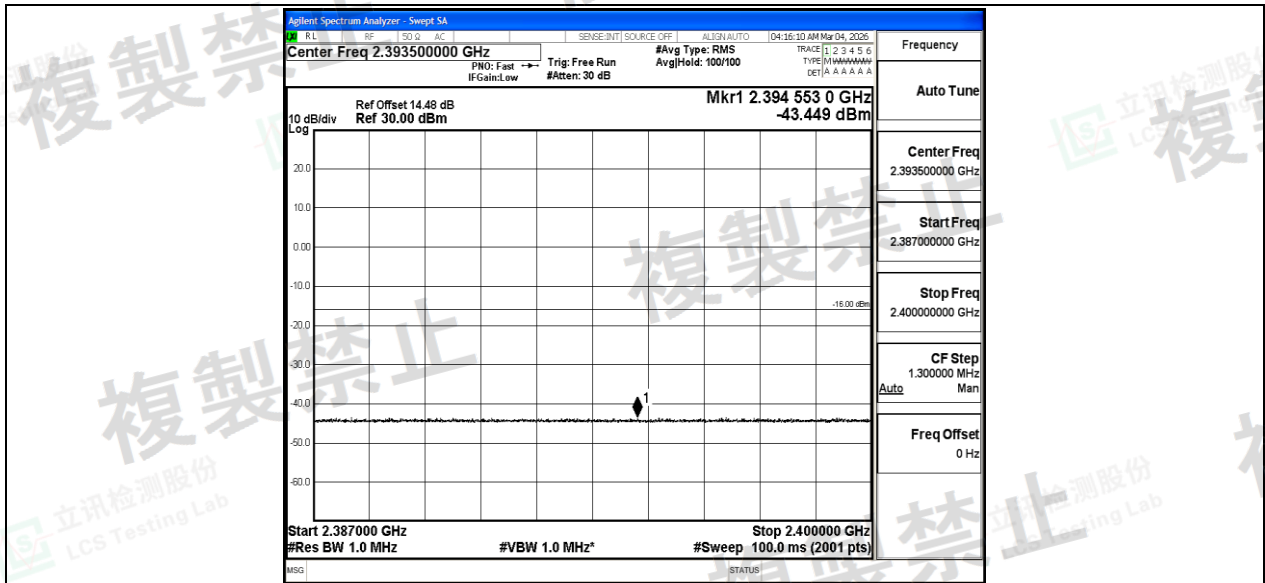


NTNV_DH5_Ant1_2441_1000~2387

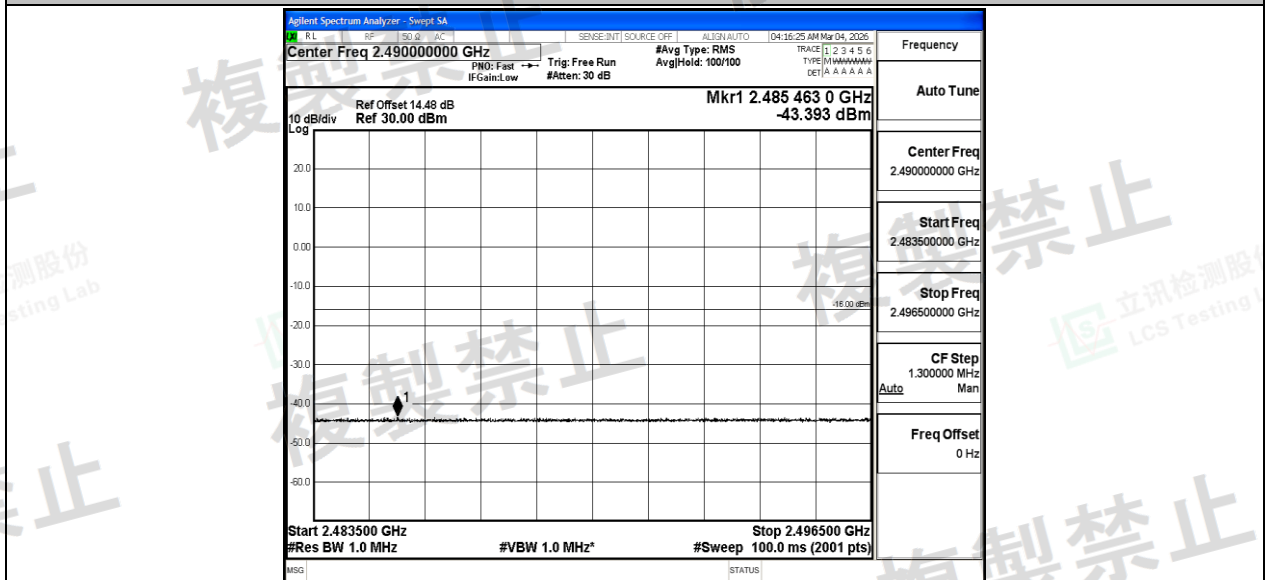


NTNV_DH5_Ant1_2441_2387~2400

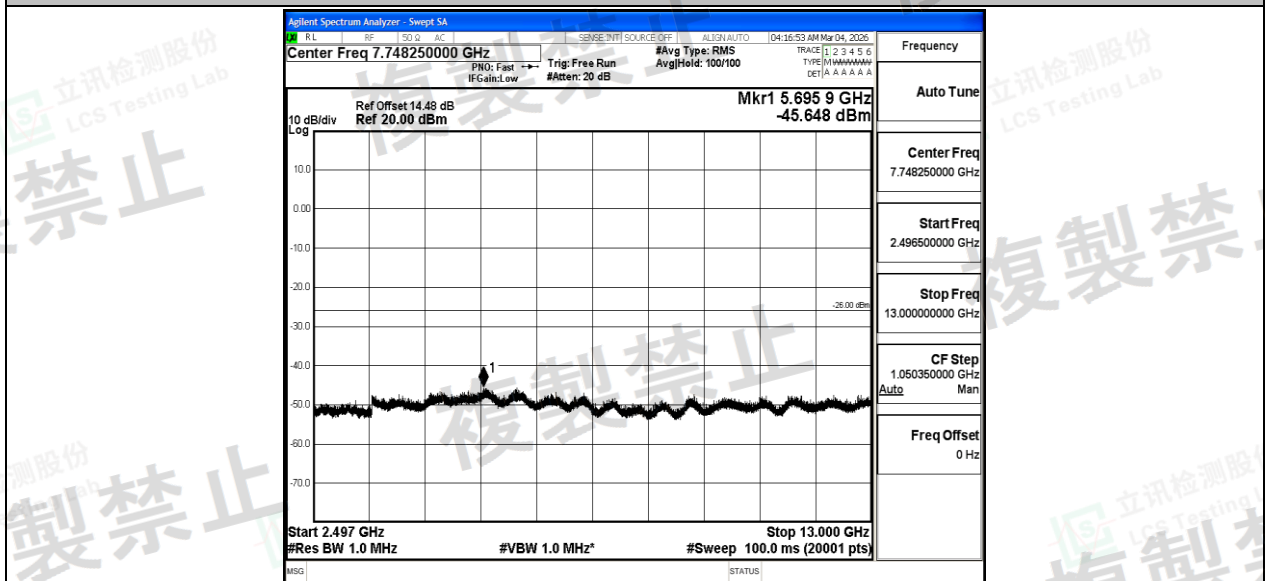




NTNV_DH5_Ant1_2441_2483.5~2496.5

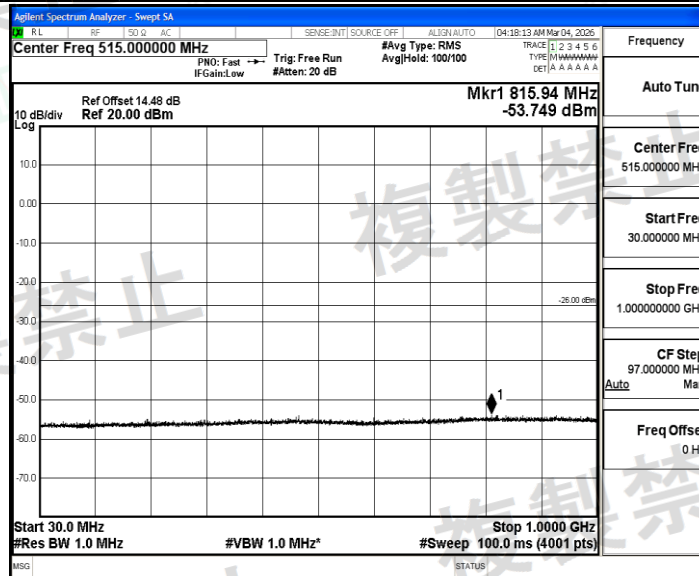


NTNV_DH5_Ant1_2441_2496.5~13000

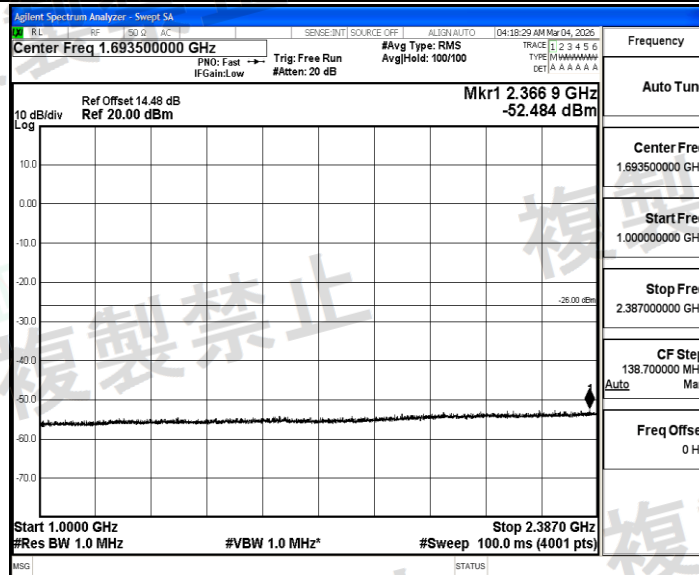




NTNV_DH5_Ant1_2480_30~1000

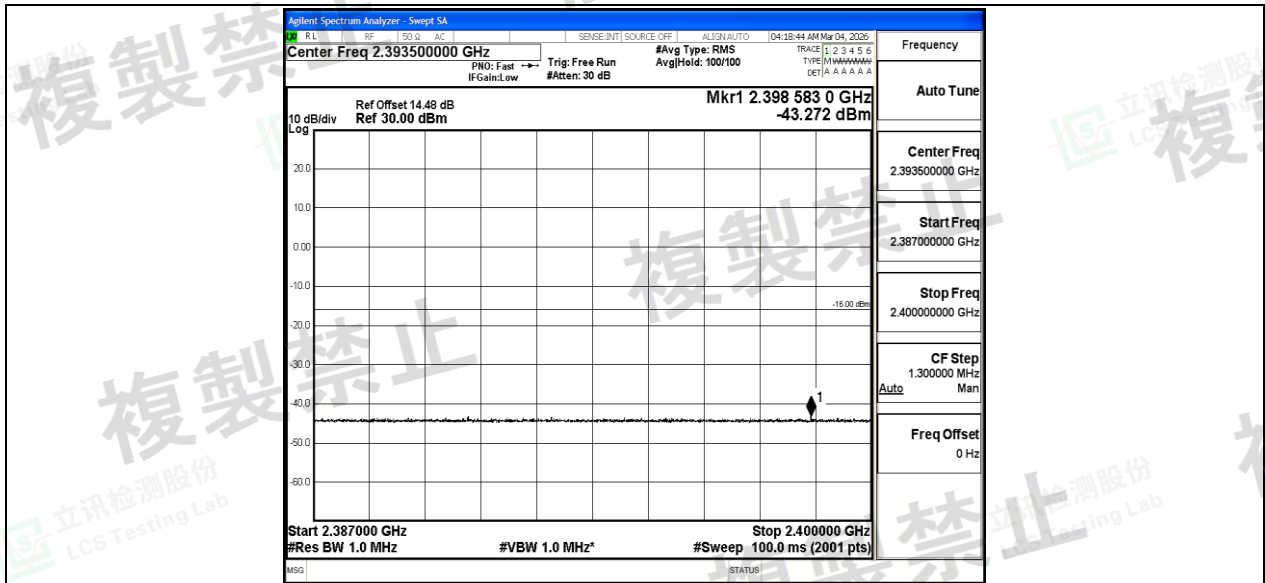


NTNV_DH5_Ant1_2480_1000~2387

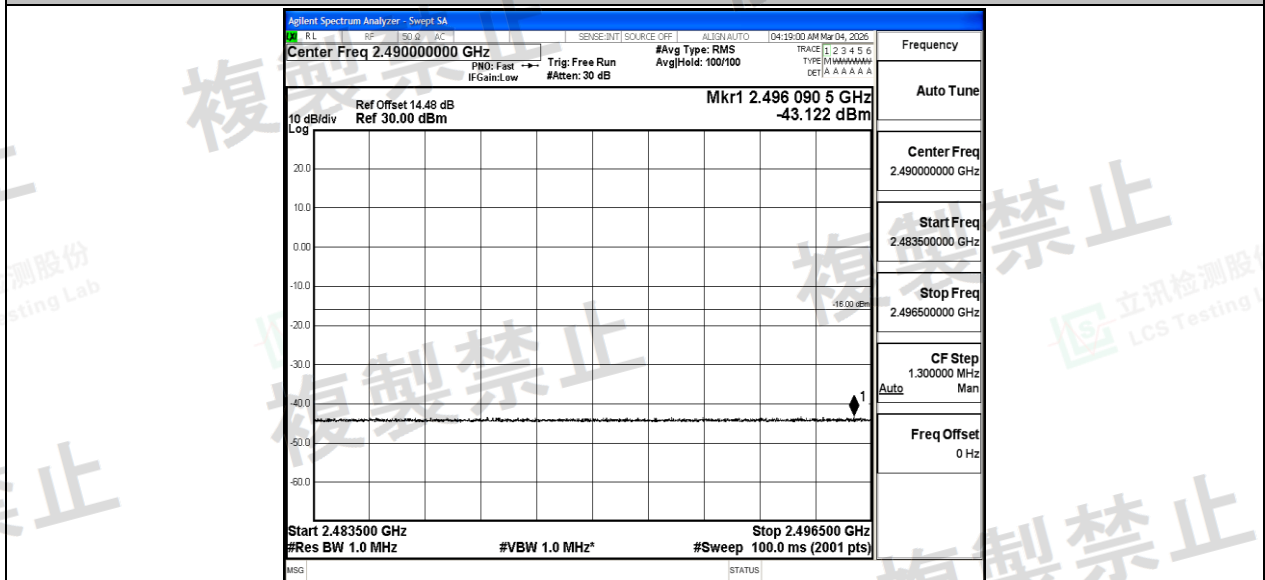


NTNV_DH5_Ant1_2480_2387~2400

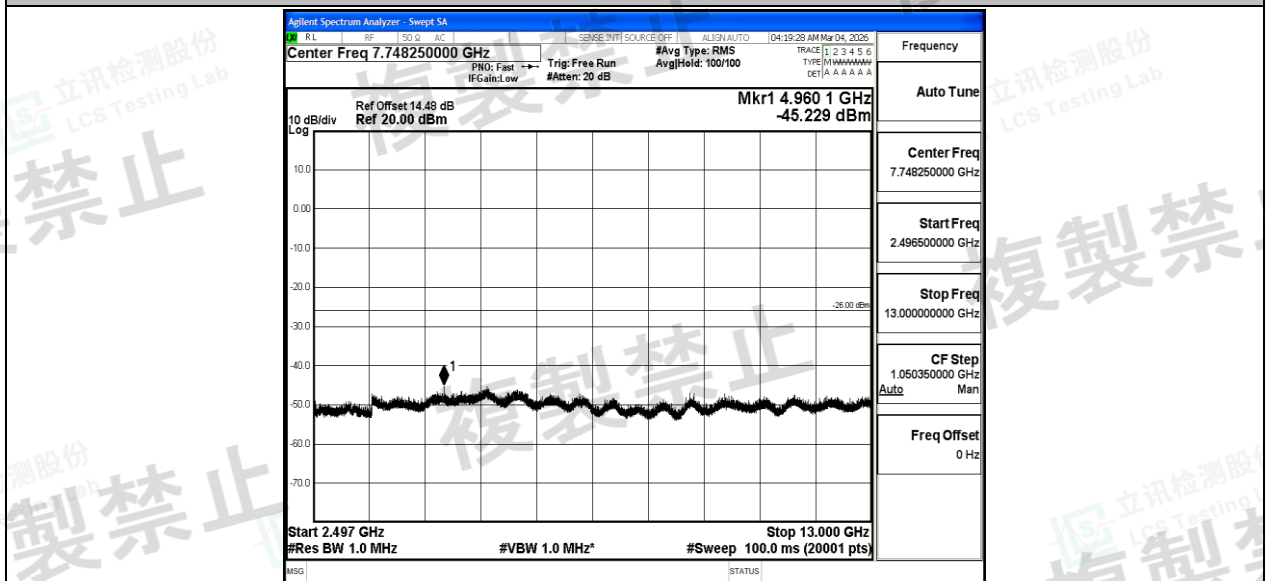




NTNV_DH5_Ant1_2480_2483.5~2496.5

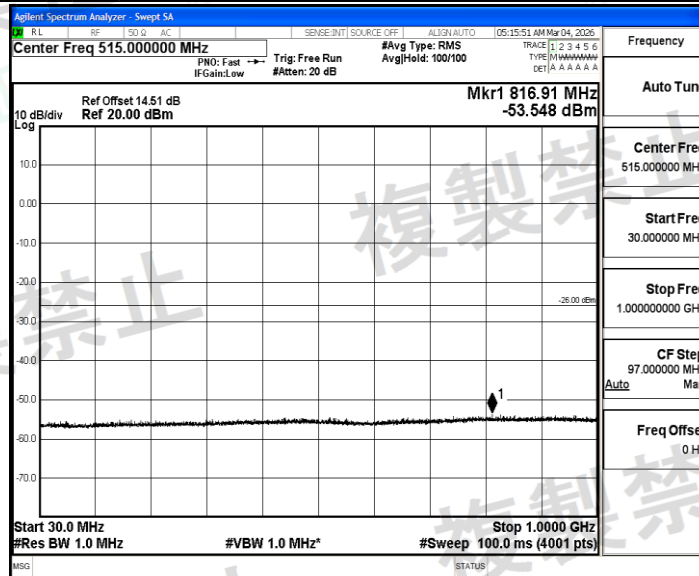


NTNV_DH5_Ant1_2480_2496.5~13000

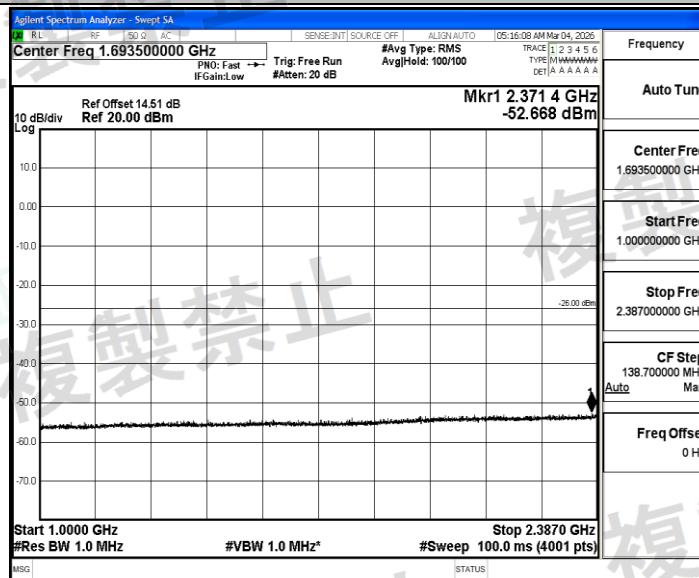




NTNV_2DH5_Ant1_2402_30~1000

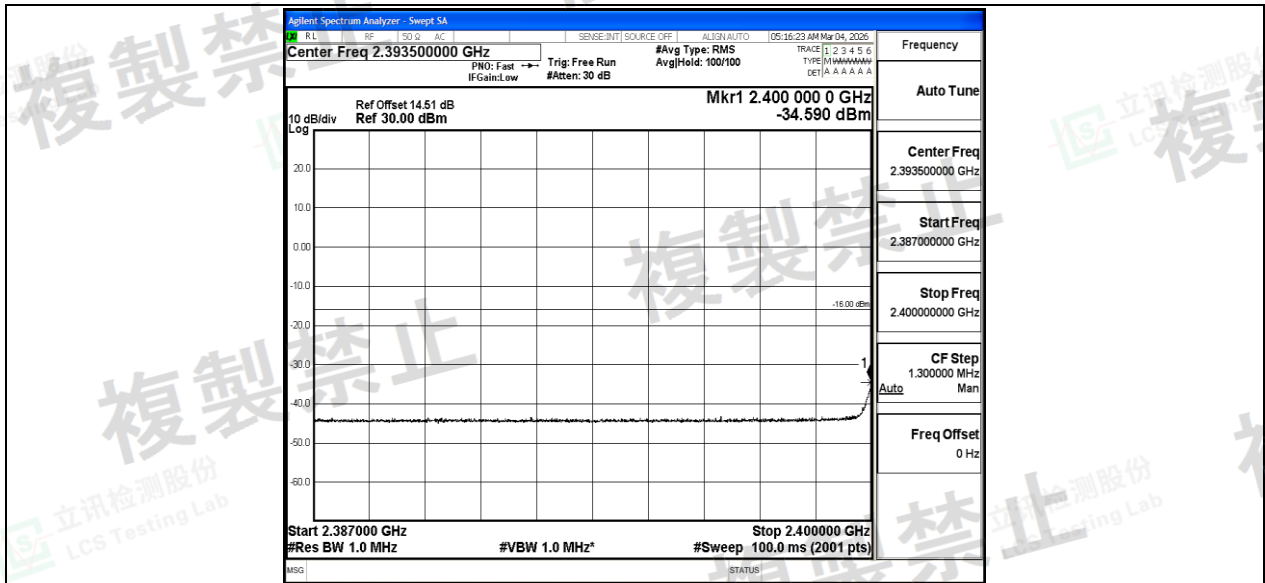


NTNV_2DH5_Ant1_2402_1000~2387

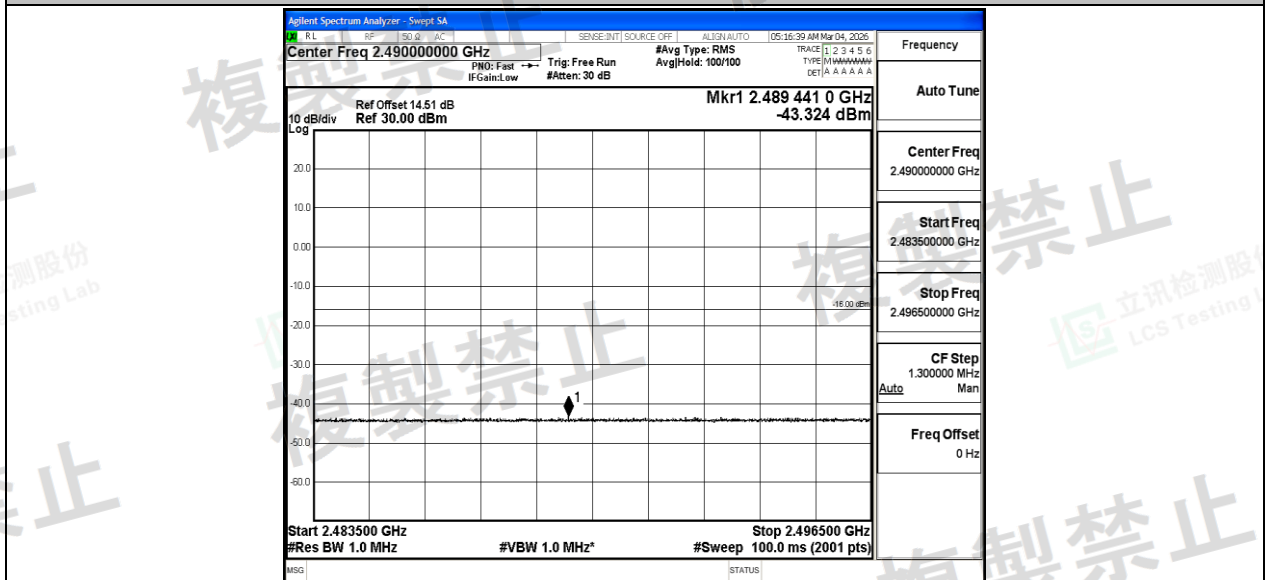


NTNV_2DH5_Ant1_2402_2387~2400

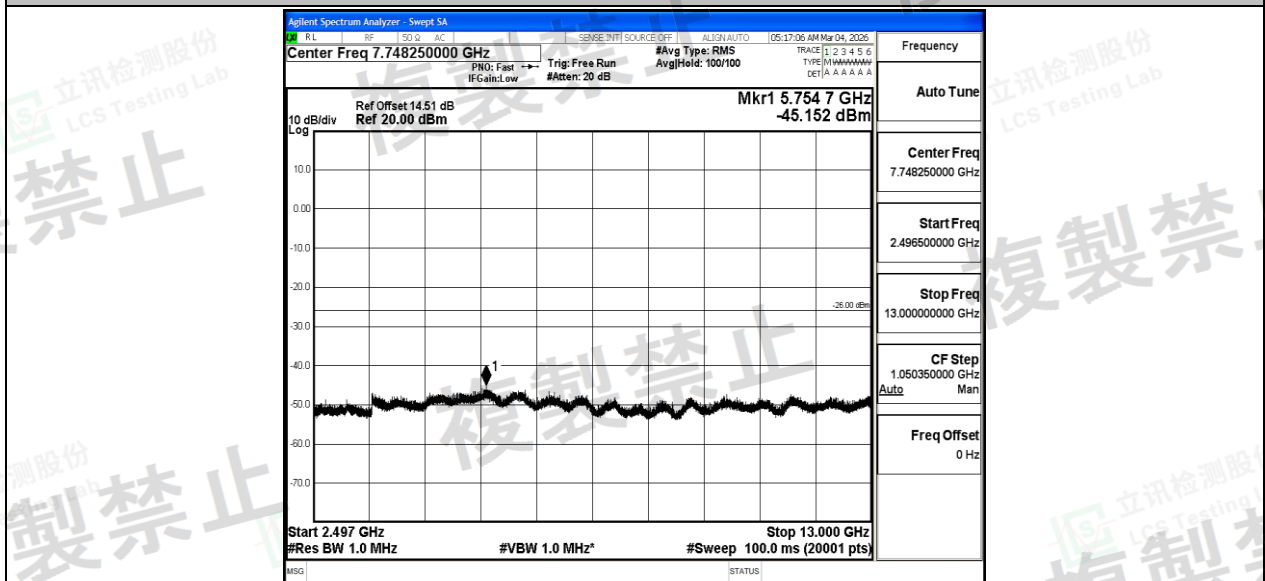




NTNV_2DH5_Ant1_2402_2483.5~2496.5

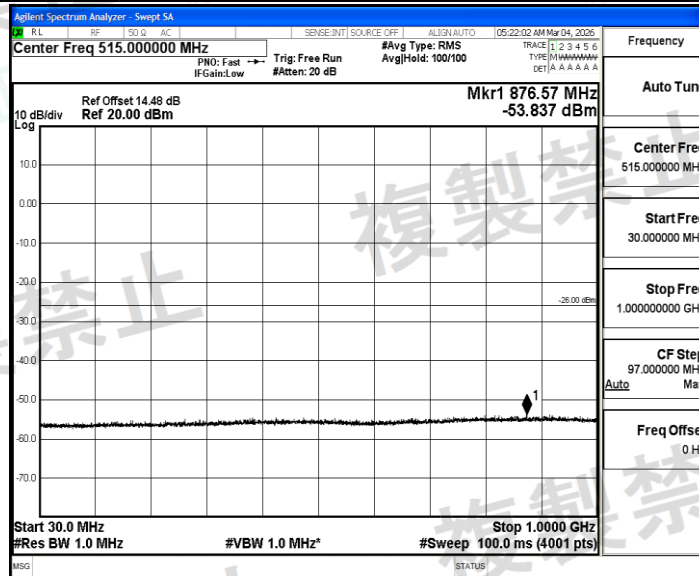


NTNV_2DH5_Ant1_2402_2496.5~13000

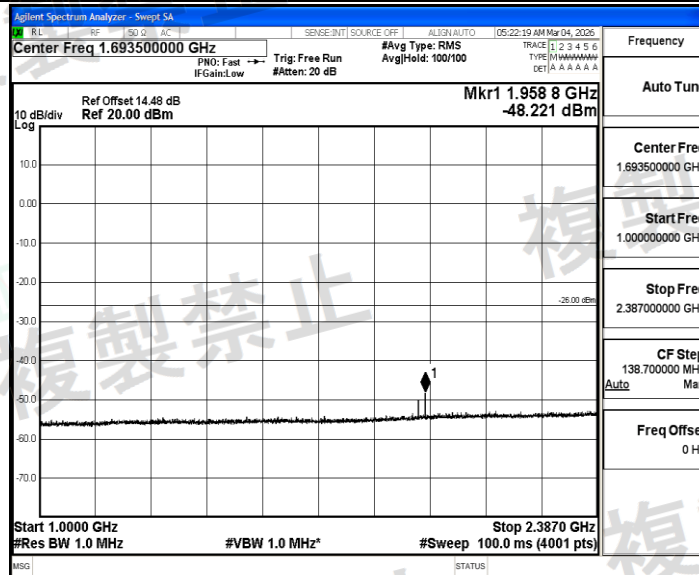




NTNV_2DH5_Ant1_2441_30~1000

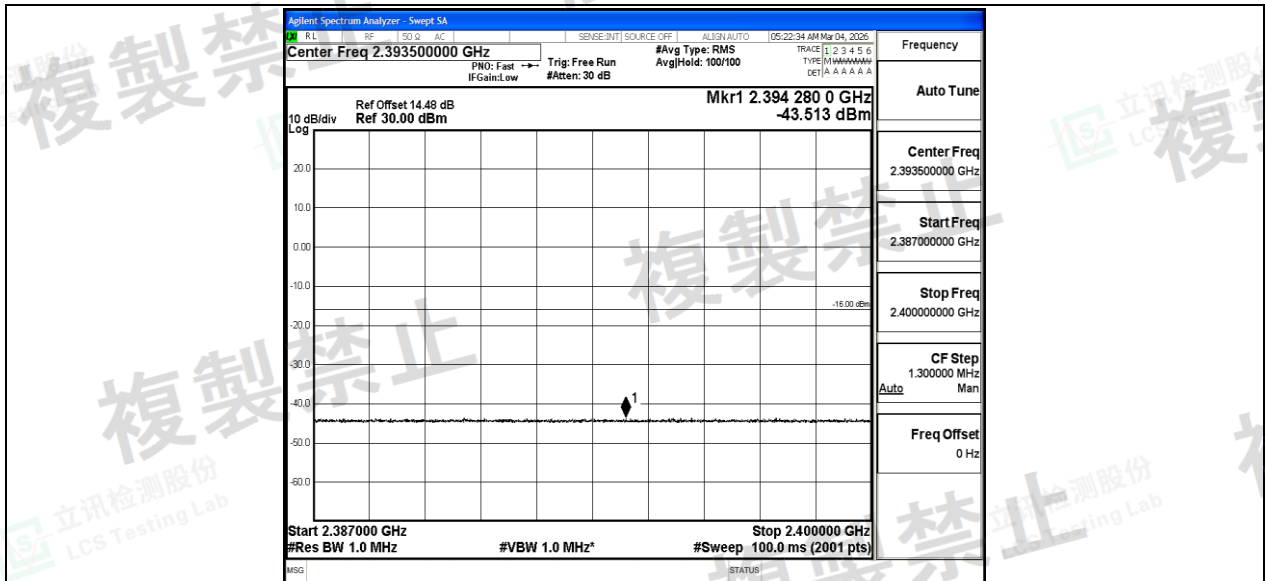


NTNV_2DH5_Ant1_2441_1000~2387

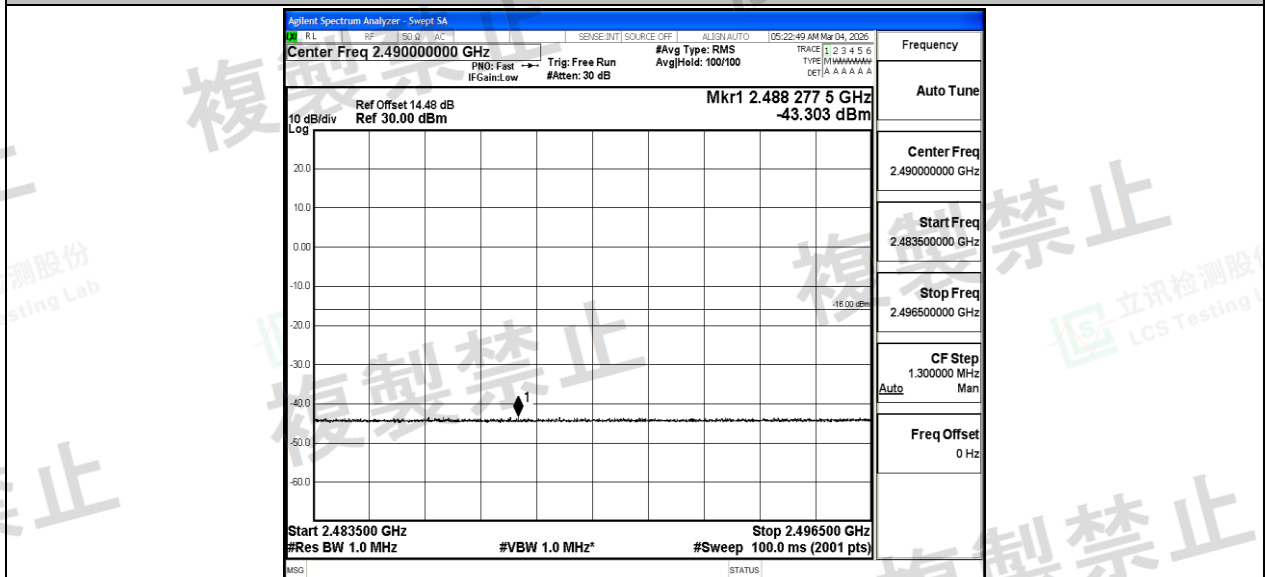


NTNV_2DH5_Ant1_2441_2387~2400

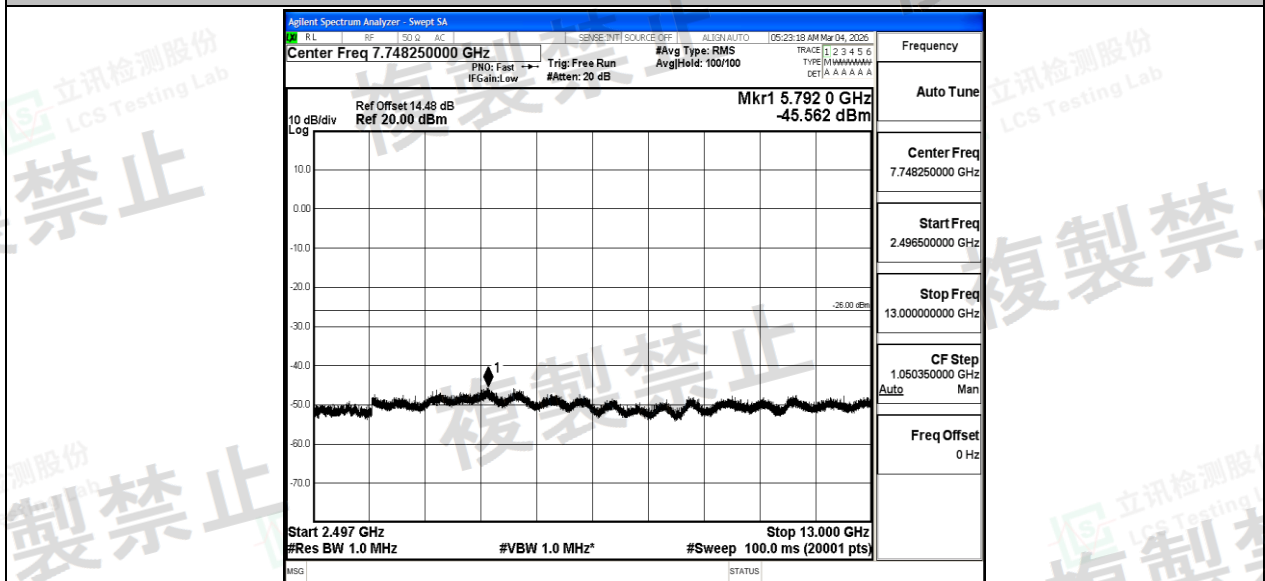




NTNV_2DH5_Ant1_2441_2483.5~2496.5

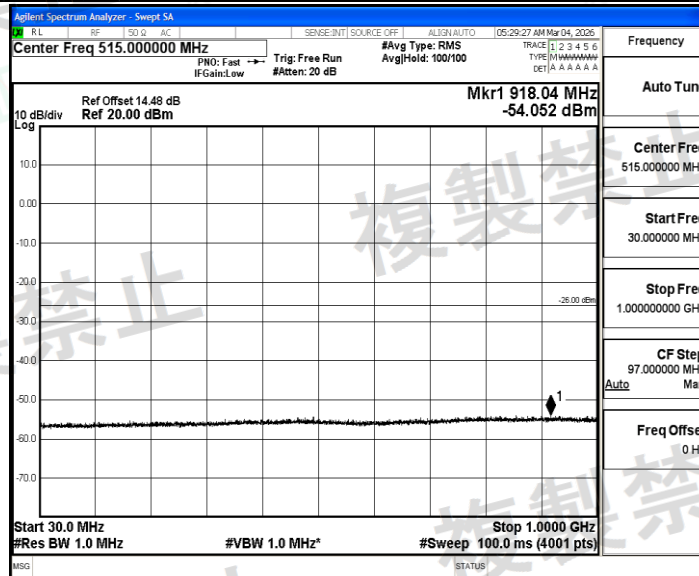


NTNV_2DH5_Ant1_2441_2496.5~13000

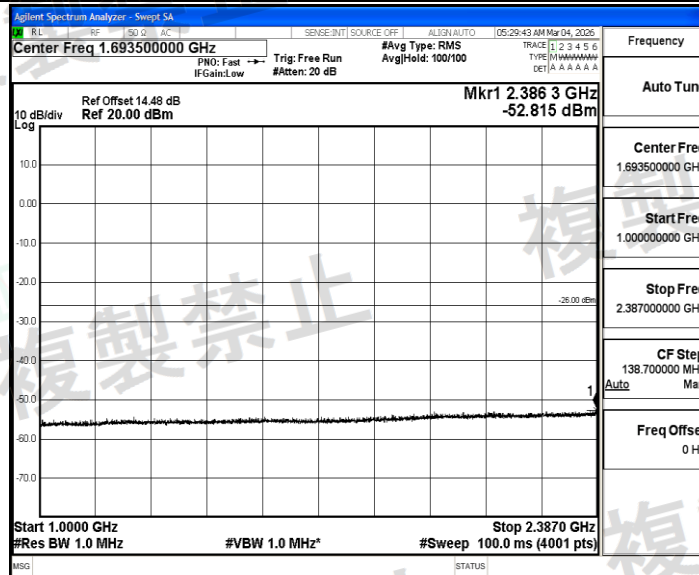




NTNV_2DH5_Ant1_2480_30~1000

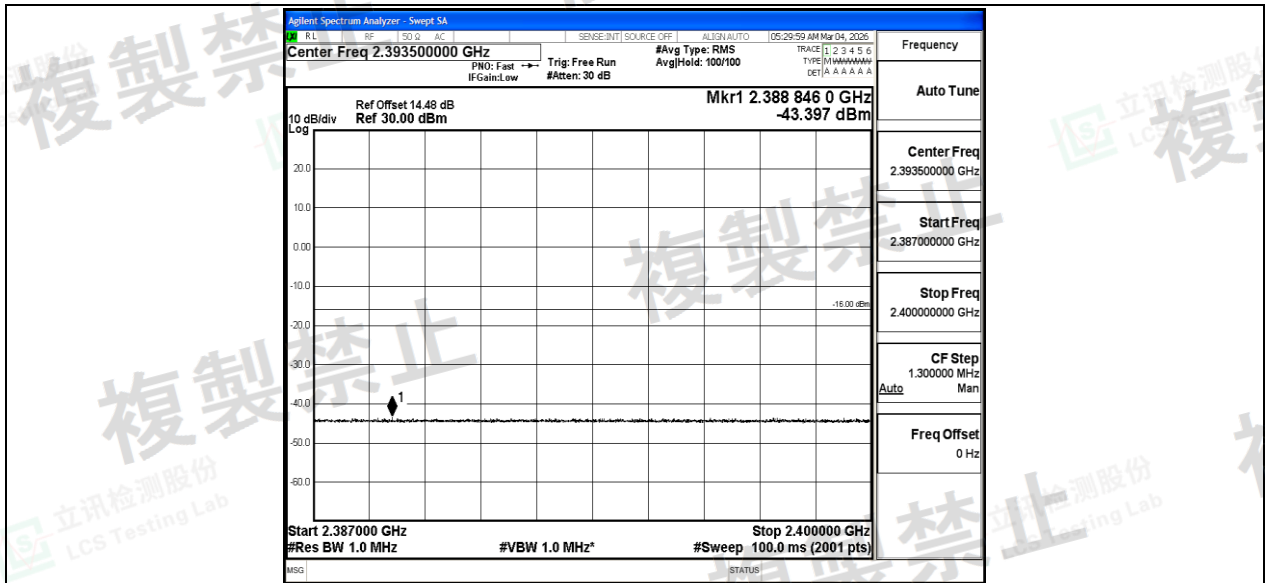


NTNV_2DH5_Ant1_2480_1000~2387

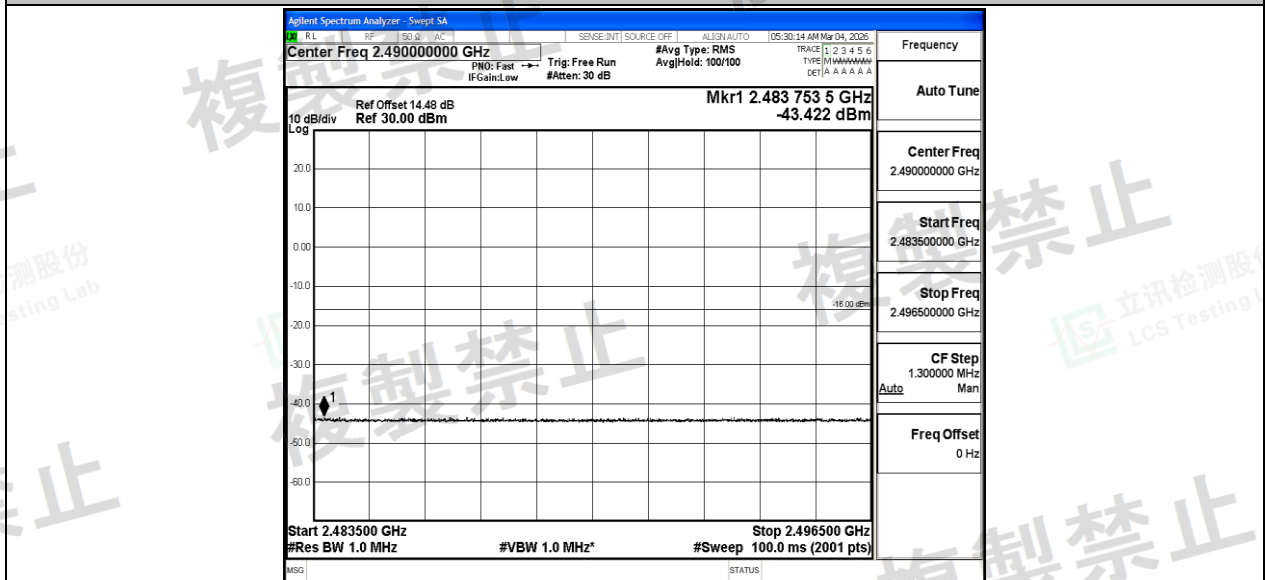


NTNV_2DH5_Ant1_2480_2387~2400

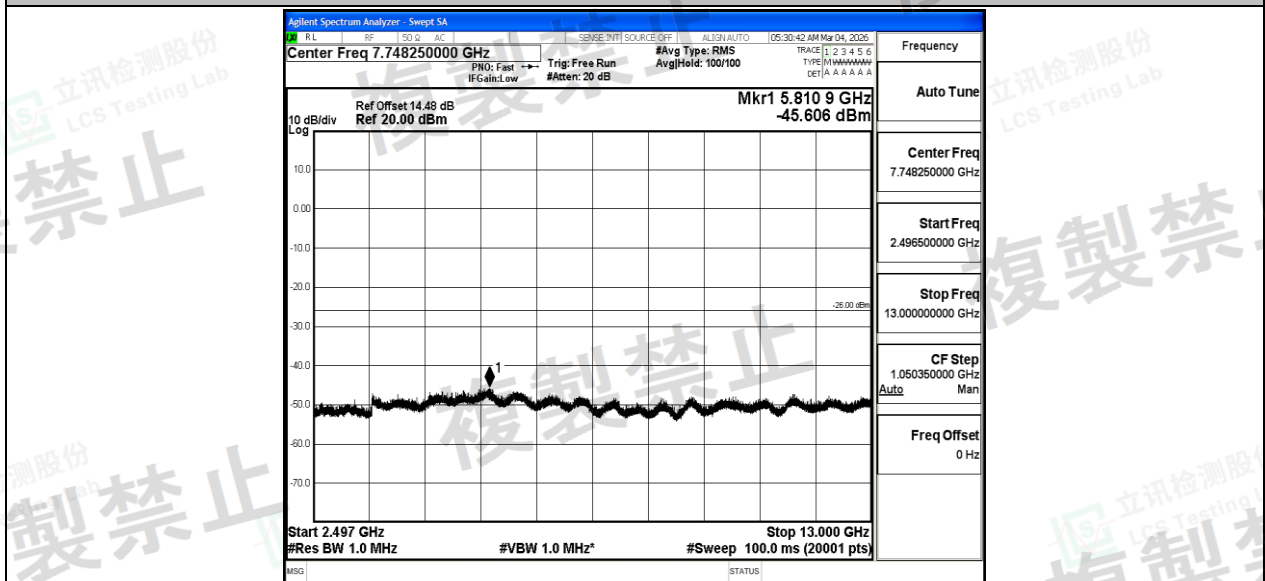




NTNV_2DH5_Ant1_2480_2483.5~2496.5

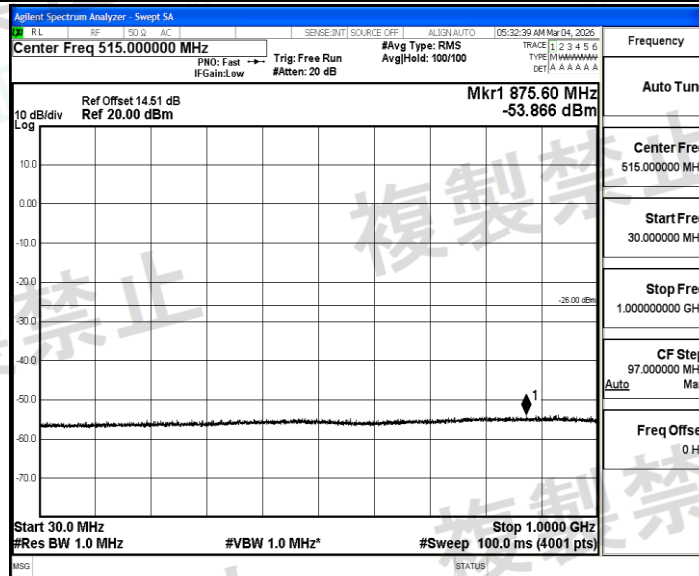


NTNV_2DH5_Ant1_2480_2496.5~13000

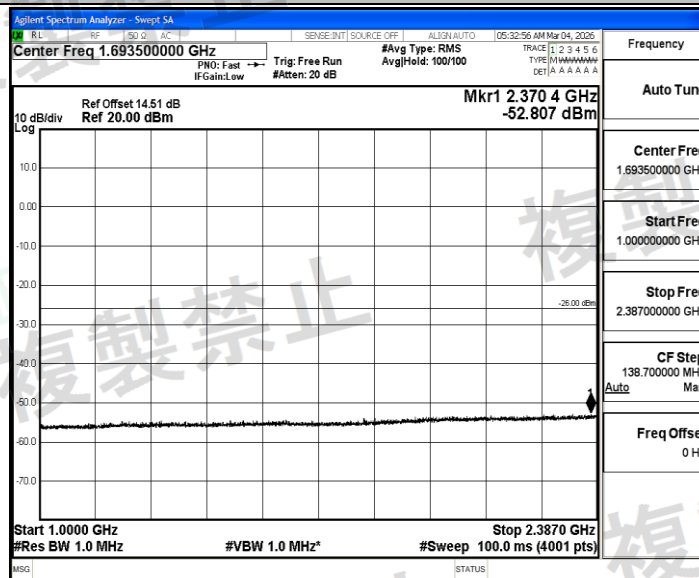




NTNV_3DH5_Ant1_2402_30~1000

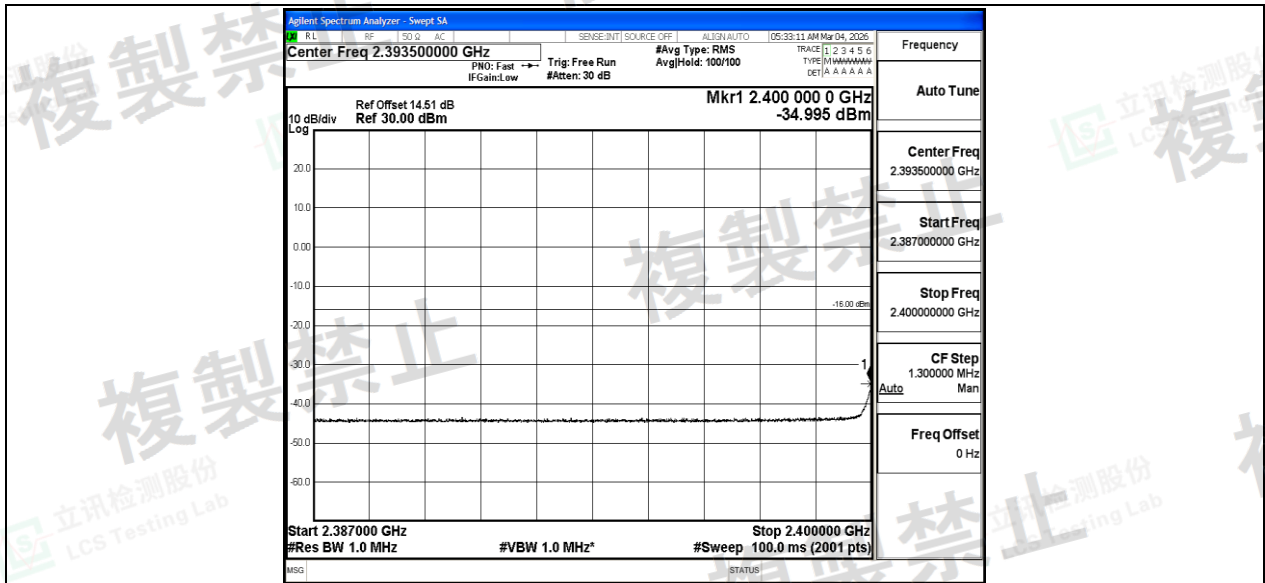


NTNV_3DH5_Ant1_2402_1000~2387

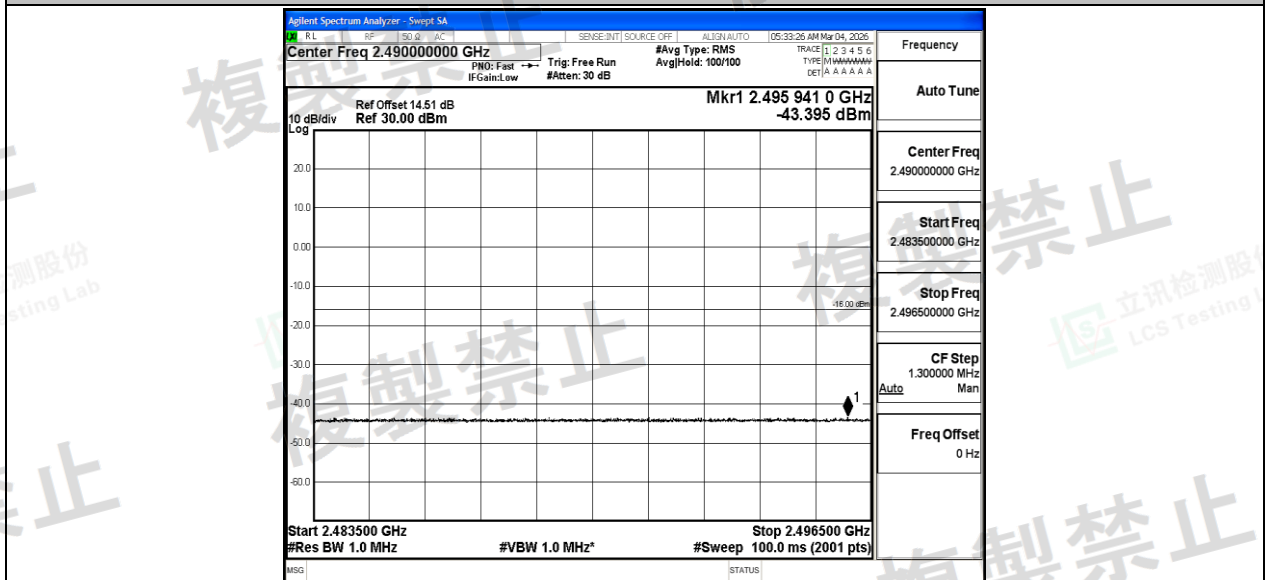


NTNV_3DH5_Ant1_2402_2387~2400

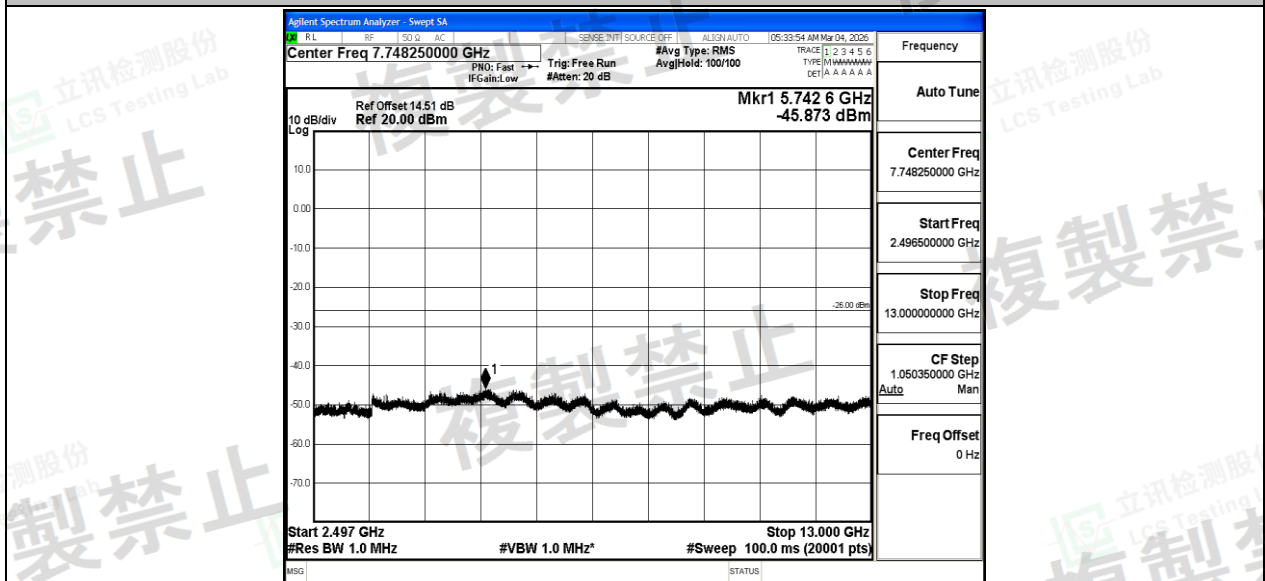




NTNV_3DH5_Ant1_2402_2483.5~2496.5

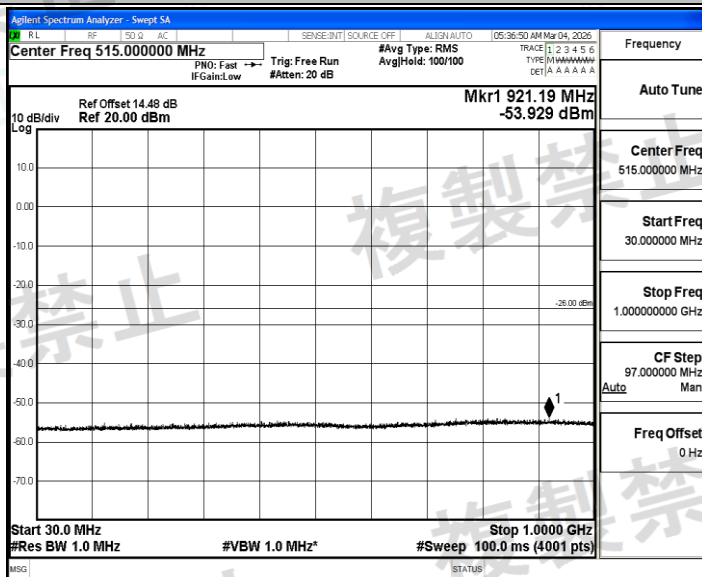


NTNV_3DH5_Ant1_2402_2496.5~13000

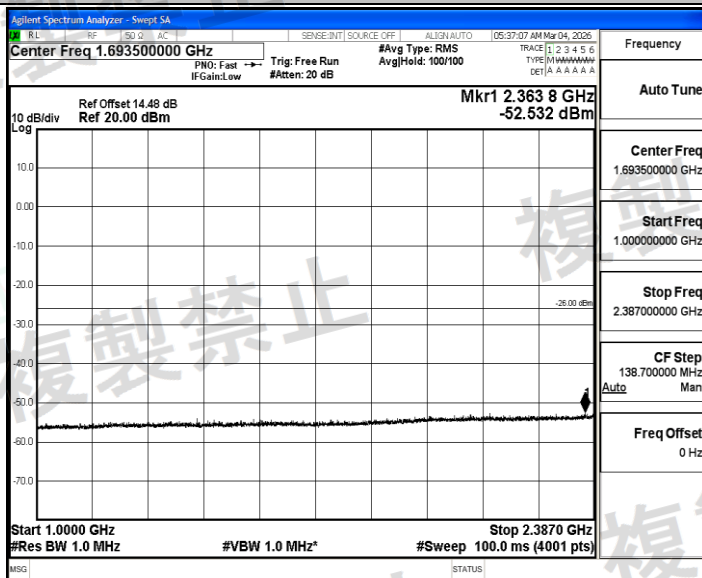




NTNV_3DH5_Ant1_2441_30~1000

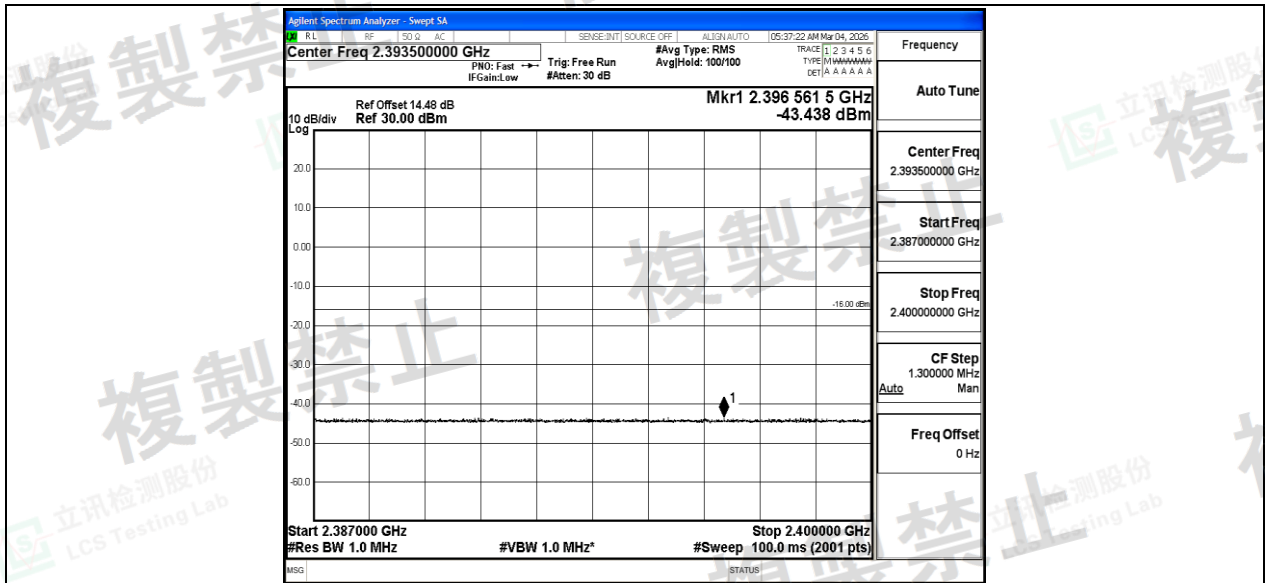


NTNV_3DH5_Ant1_2441_1000~2387

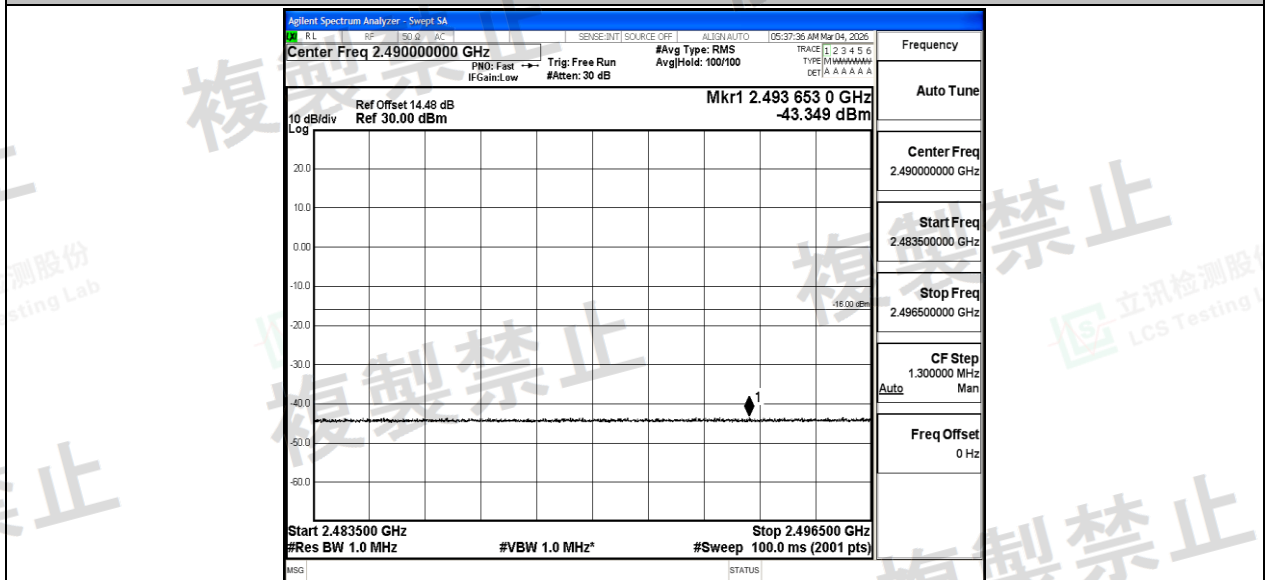


NTNV_3DH5_Ant1_2441_2387~2400

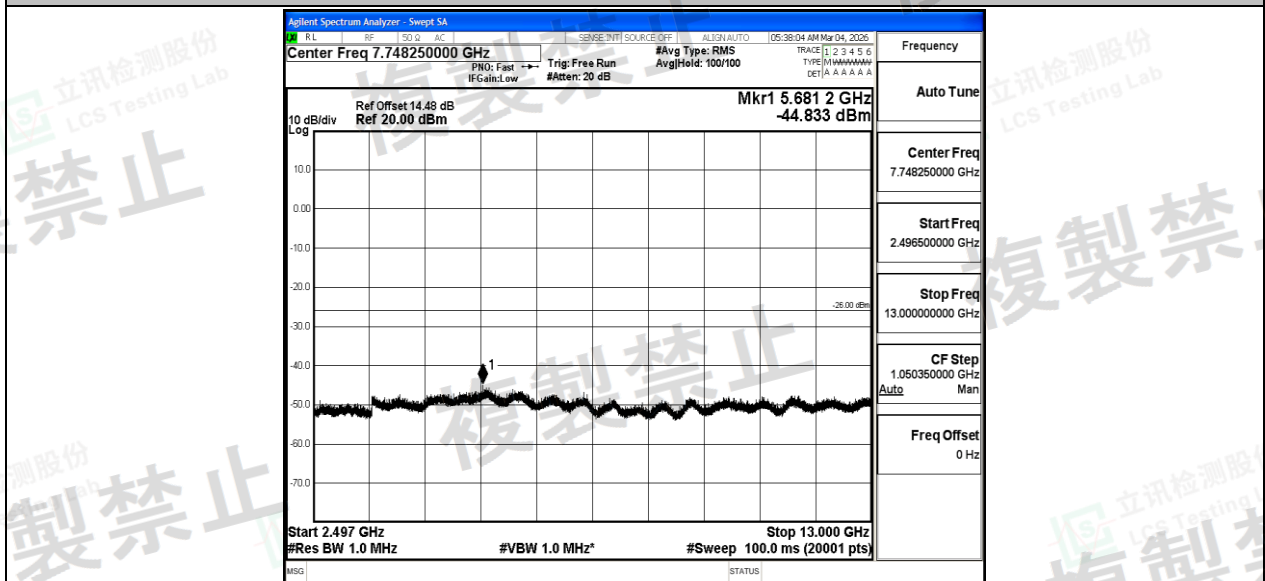




NTNV_3DH5_Ant1_2441_2483.5~2496.5

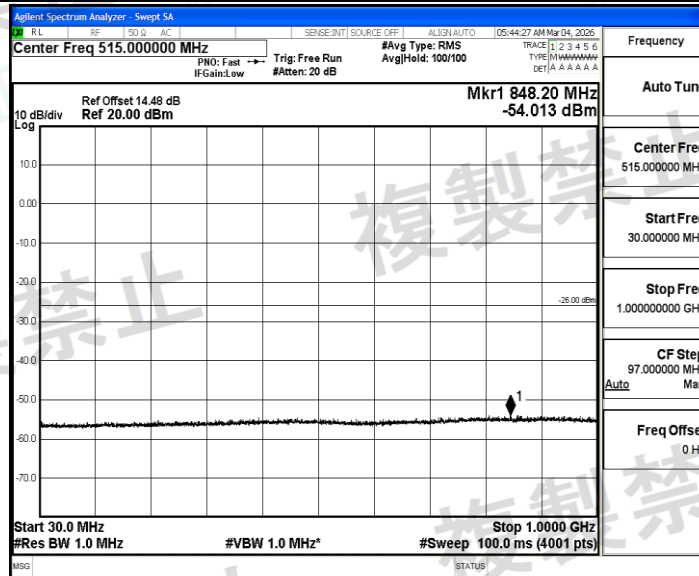


NTNV_3DH5_Ant1_2441_2496.5~13000

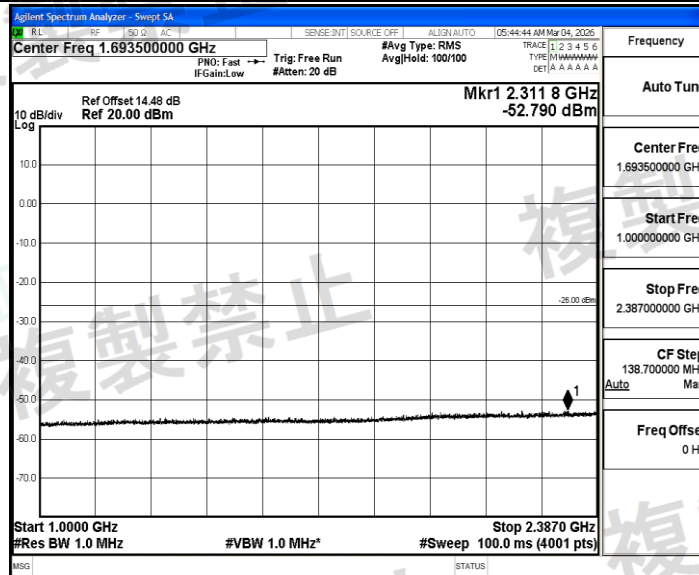




NTNV_3DH5_Ant1_2480_30~1000

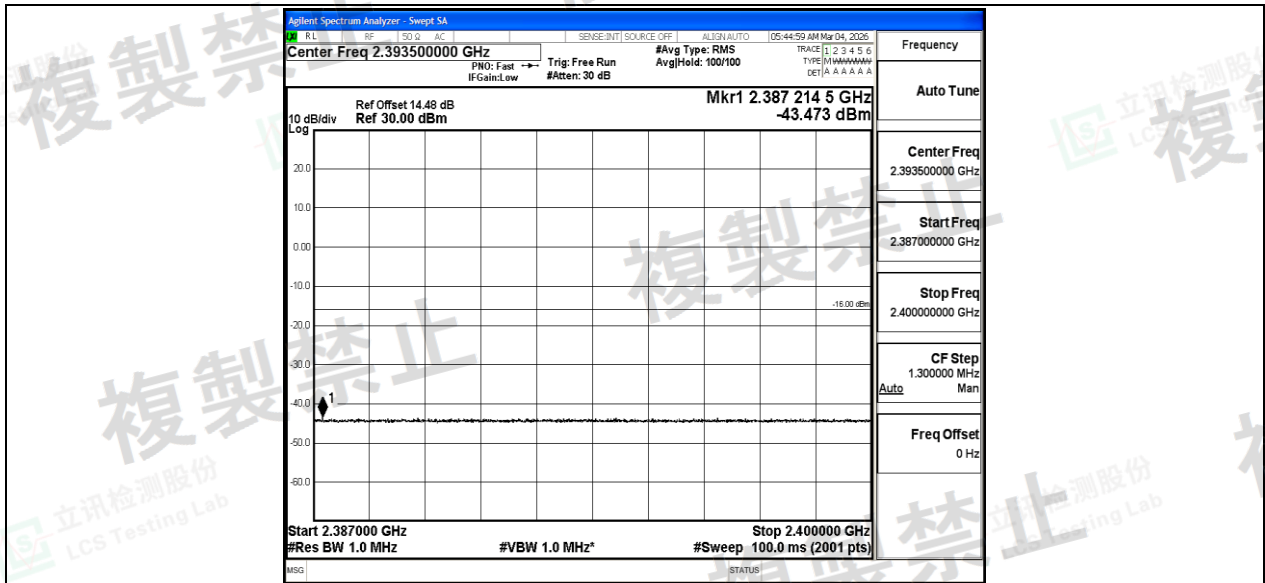


NTNV_3DH5_Ant1_2480_1000~2387

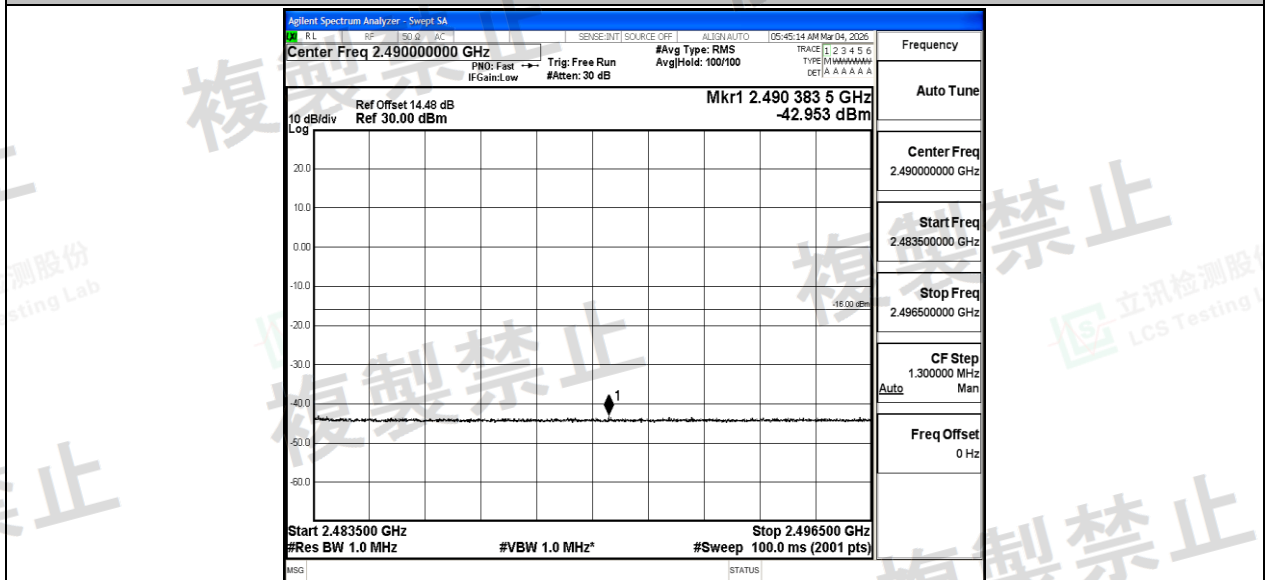


NTNV_3DH5_Ant1_2480_2387~2400

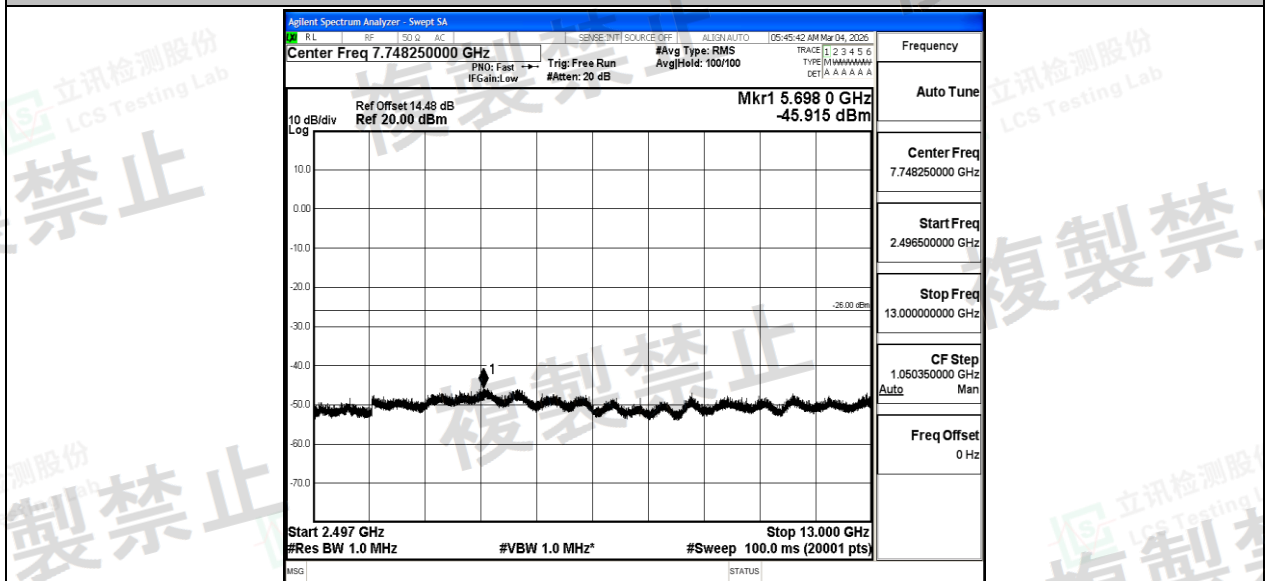




NTNV_3DH5_Ant1_2480_2483.5~2496.5



NTNV_3DH5_Ant1_2480_2496.5~13000





A.6 Spurious Emission of RX

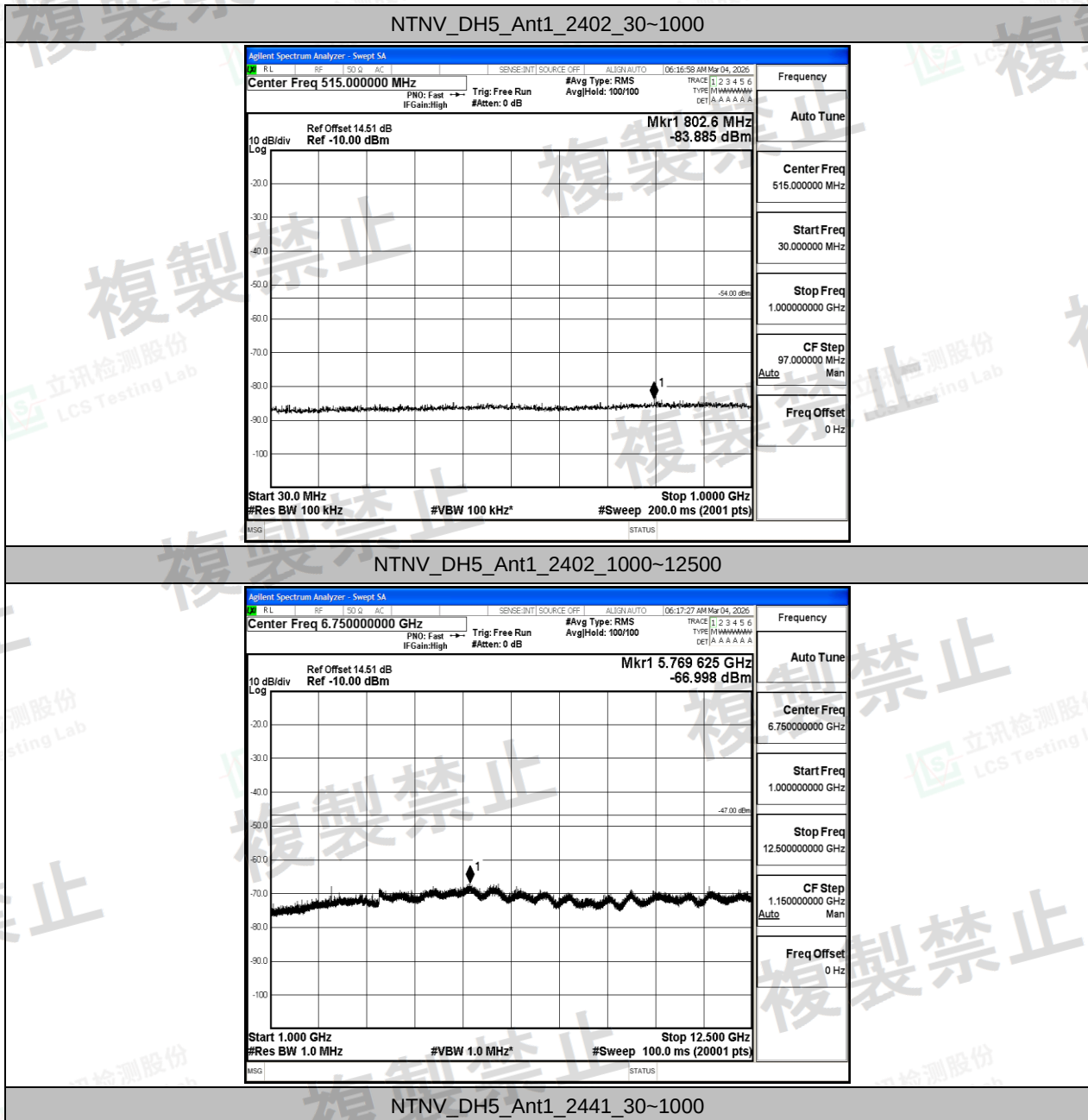
Test Result

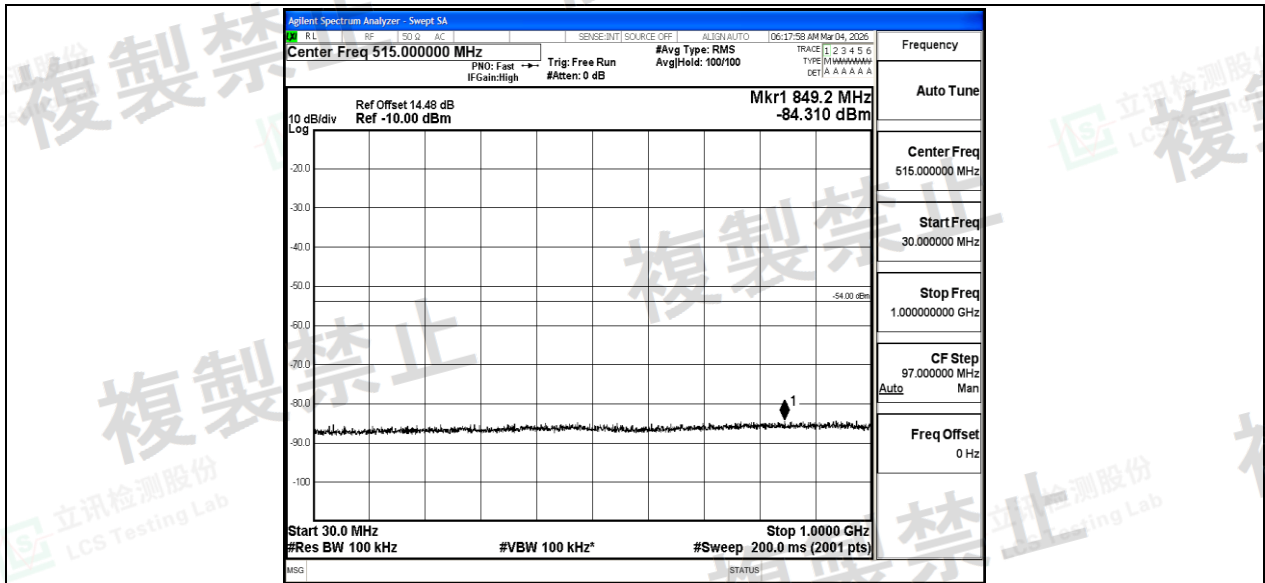
TestCondition	TestMode	Antenna	Frequency[MHz]	Freq.Range [MHz]	Result [dBm]	Limit [dBm]	Result [nW]	Limit [nW]	Verdict
NTNV	DH5	Ant1	2402	30~1000	-83.89	≤-54	0.00408	≤4	PASS
				1000~12500	-67	≤-47	0.19953	≤20	PASS
			2441	30~1000	-84.31	≤-54	0.00371	≤4	PASS
				1000~12500	-65.37	≤-47	0.29040	≤20	PASS
			2480	30~1000	-84.26	≤-54	0.00375	≤4	PASS
				1000~12500	-63.86	≤-47	0.41115	≤20	PASS
	2DH5	Ant1	2402	30~1000	-84.21	≤-54	0.00379	≤4	PASS
				1000~12500	-65.38	≤-47	0.28973	≤20	PASS
			2441	30~1000	-84.25	≤-54	0.00376	≤4	PASS
				1000~12500	-60.49	≤-47	0.89331	≤20	PASS
			2480	30~1000	-84.18	≤-54	0.00382	≤4	PASS
				1000~12500	-62.85	≤-47	0.51880	≤20	PASS
	3DH5	Ant1	2402	30~1000	-83.93	≤-54	0.00405	≤4	PASS
				1000~12500	-65.75	≤-47	0.26607	≤20	PASS
			2441	30~1000	-84.44	≤-54	0.00360	≤4	PASS
				1000~12500	-58.81	≤-47	1.31522	≤20	PASS
			2480	30~1000	-83.97	≤-54	0.00401	≤4	PASS
				1000~12500	-64.05	≤-47	0.39355	≤20	PASS



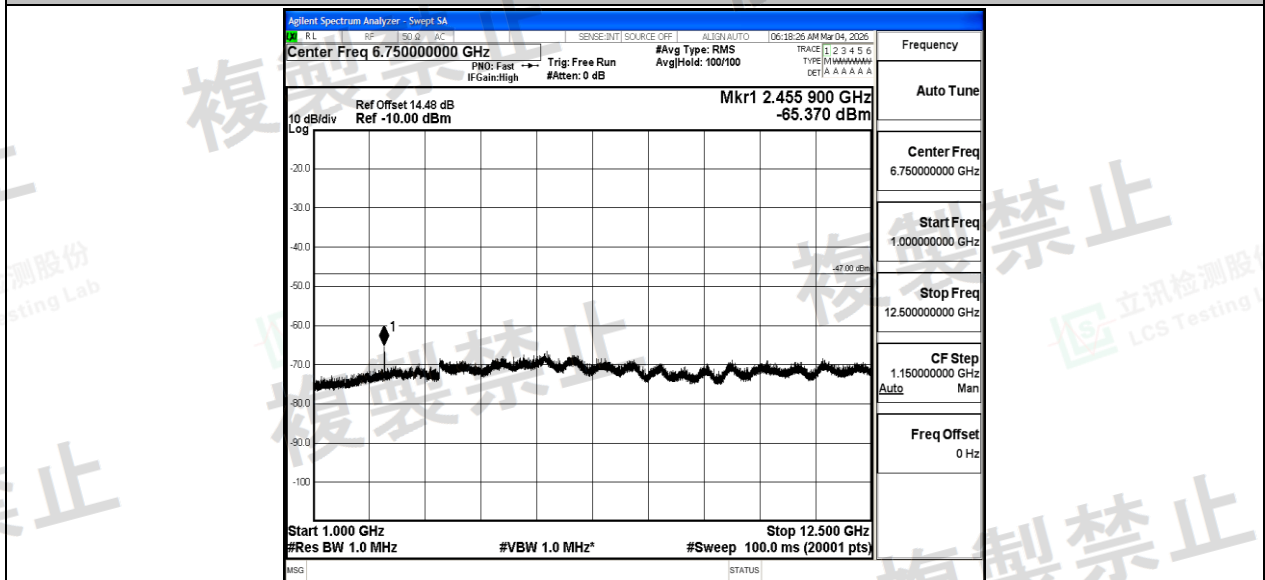


Test Graphs

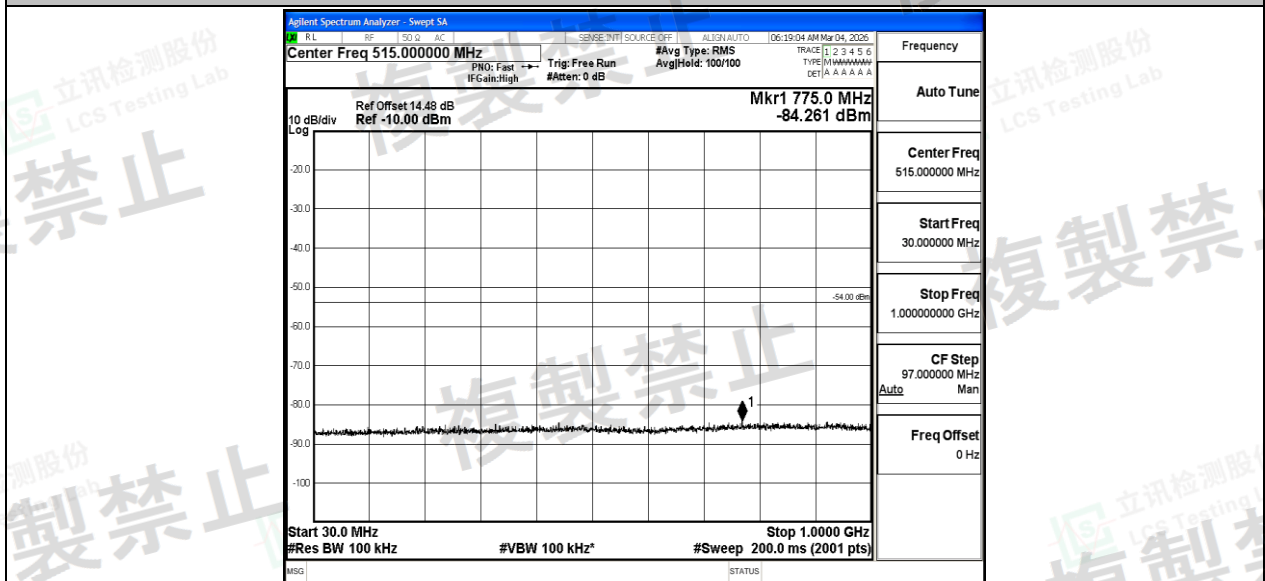




NTNV_DH5_Ant1_2441_1000~12500

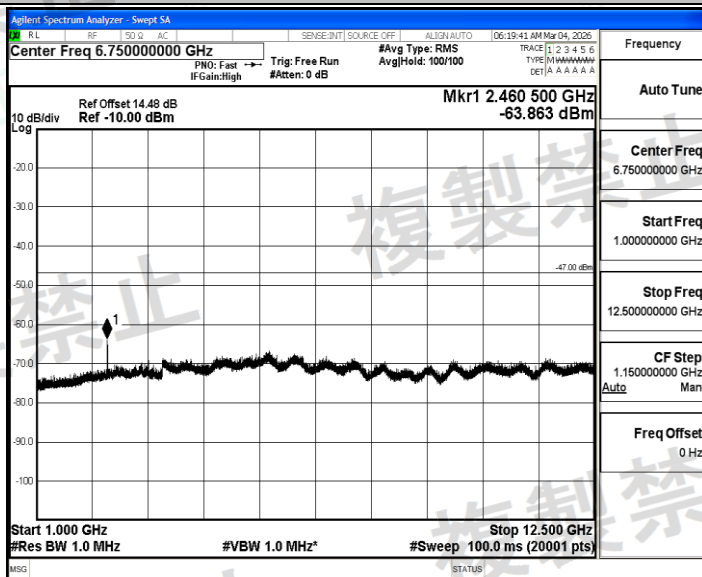


NTNV_DH5_Ant1_2480_30~1000

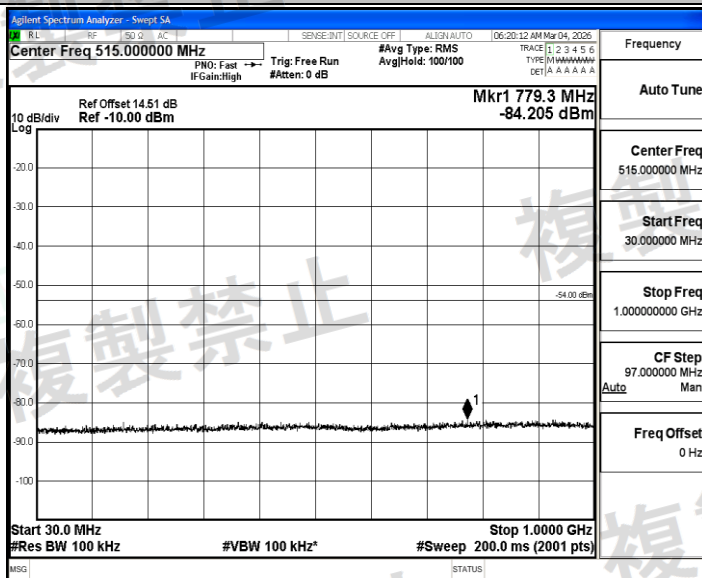




NTNV_DH5_Ant1_2480_1000~12500

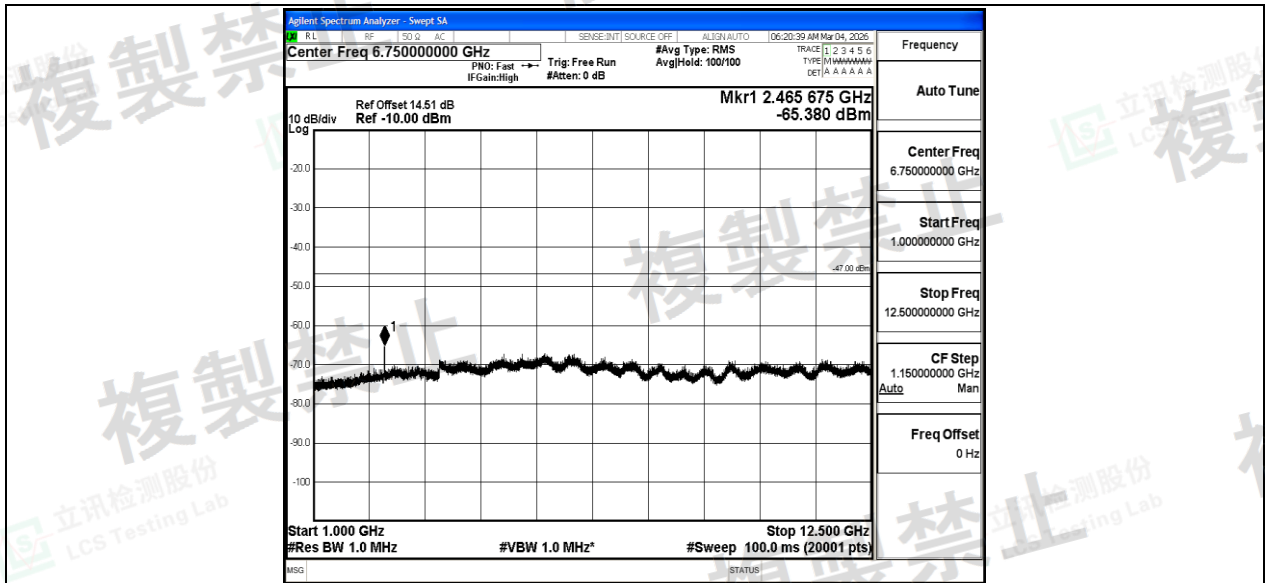


NTNV_2DH5_Ant1_2402_30~1000

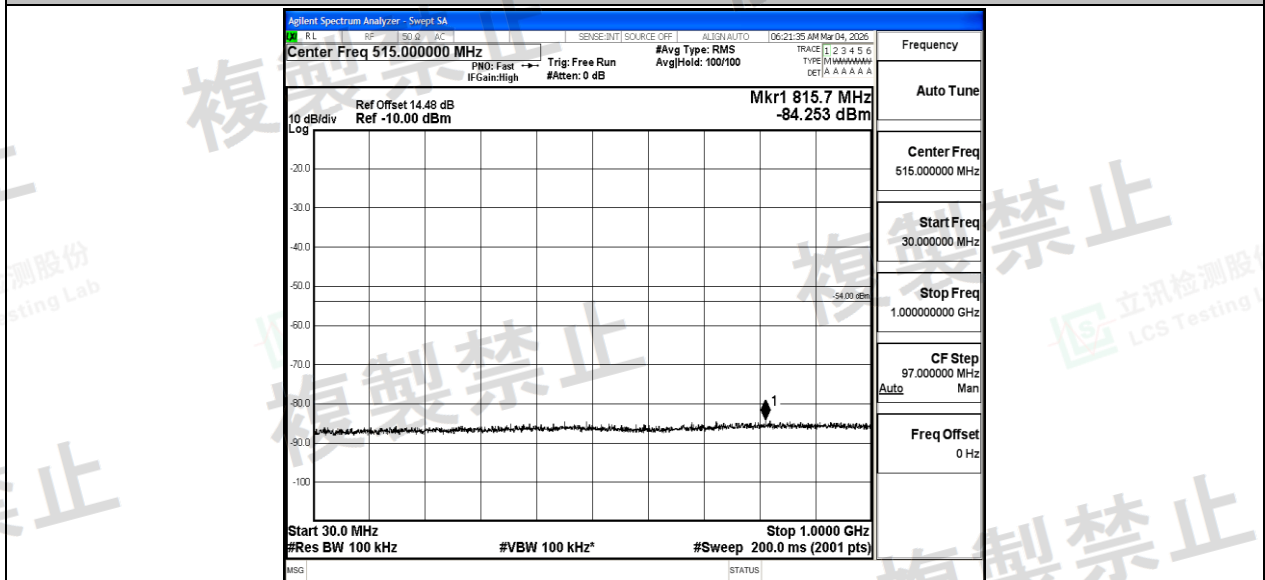


NTNV_2DH5_Ant1_2402_1000~12500

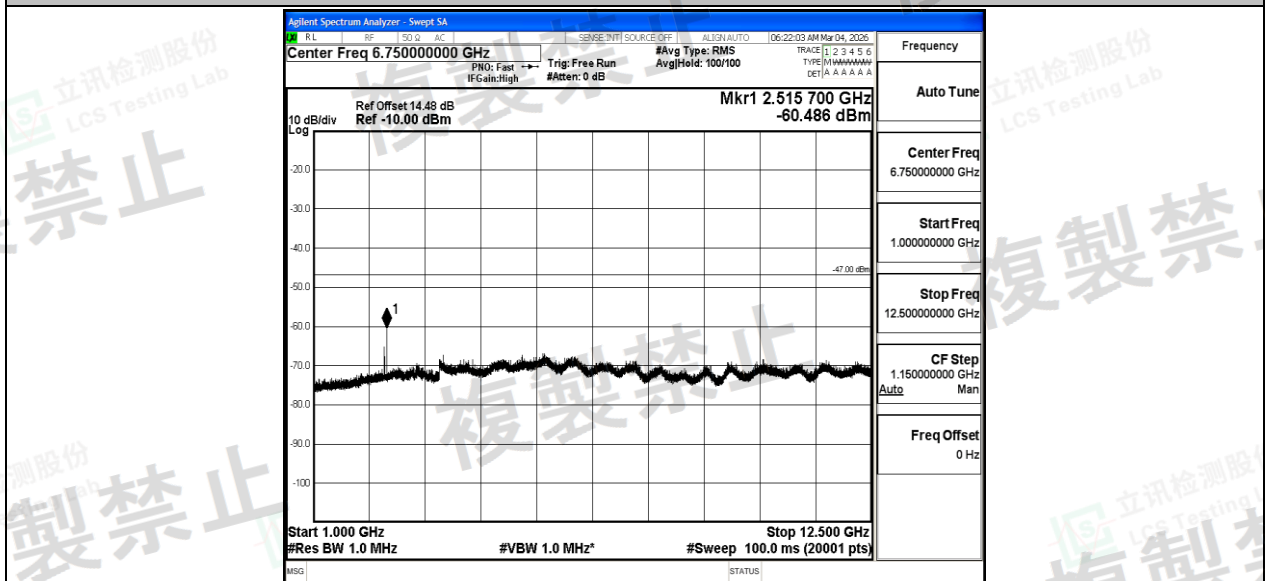




NTNV_2DH5_Ant1_2441_30~1000

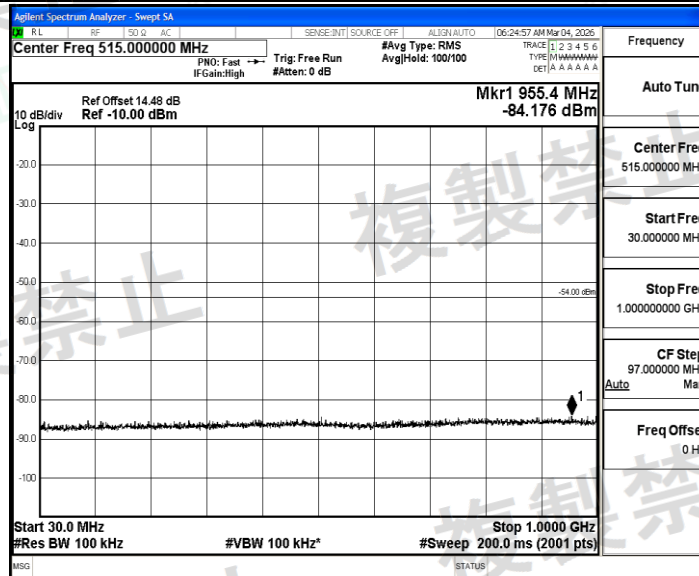


NTNV_2DH5_Ant1_2441_1000~12500

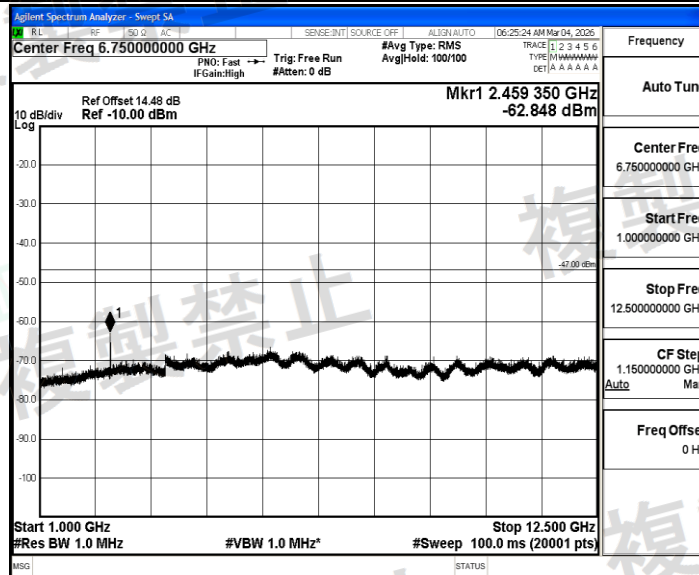




NTNV_2DH5_Ant1_2480_30~1000

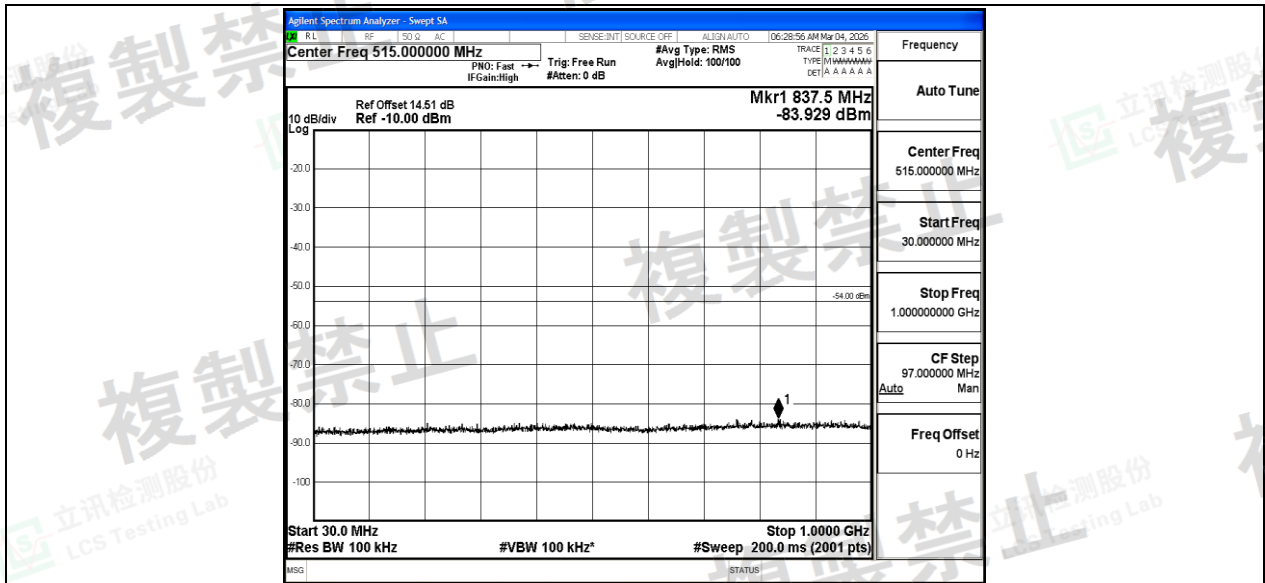


NTNV_2DH5_Ant1_2480_1000~12500

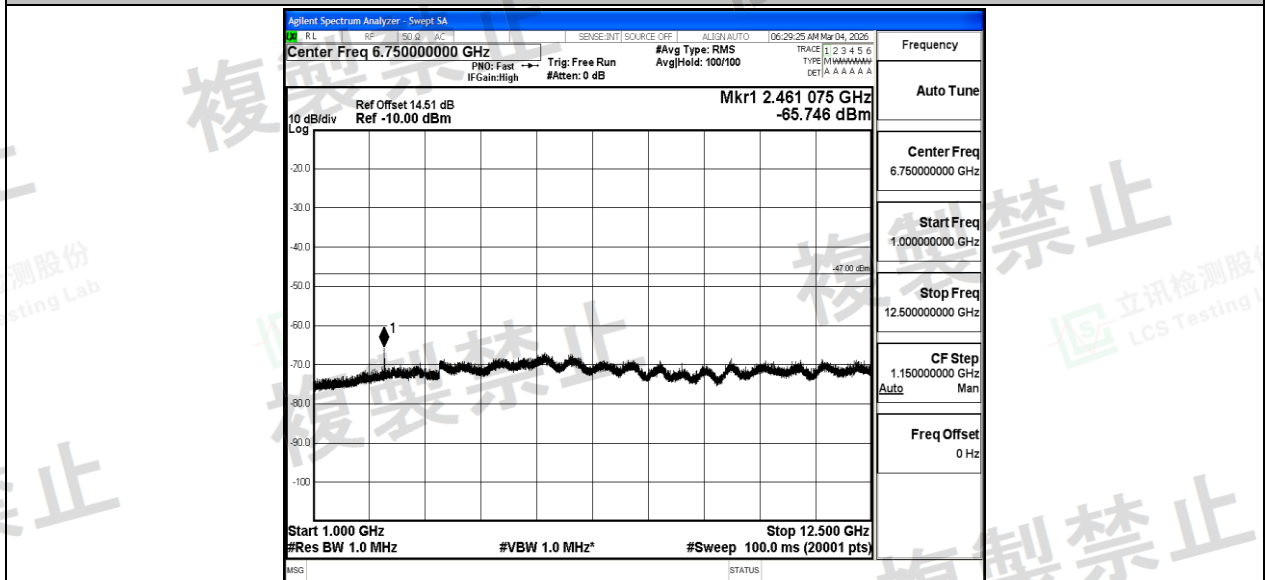


NTNV_3DH5_Ant1_2402_30~1000

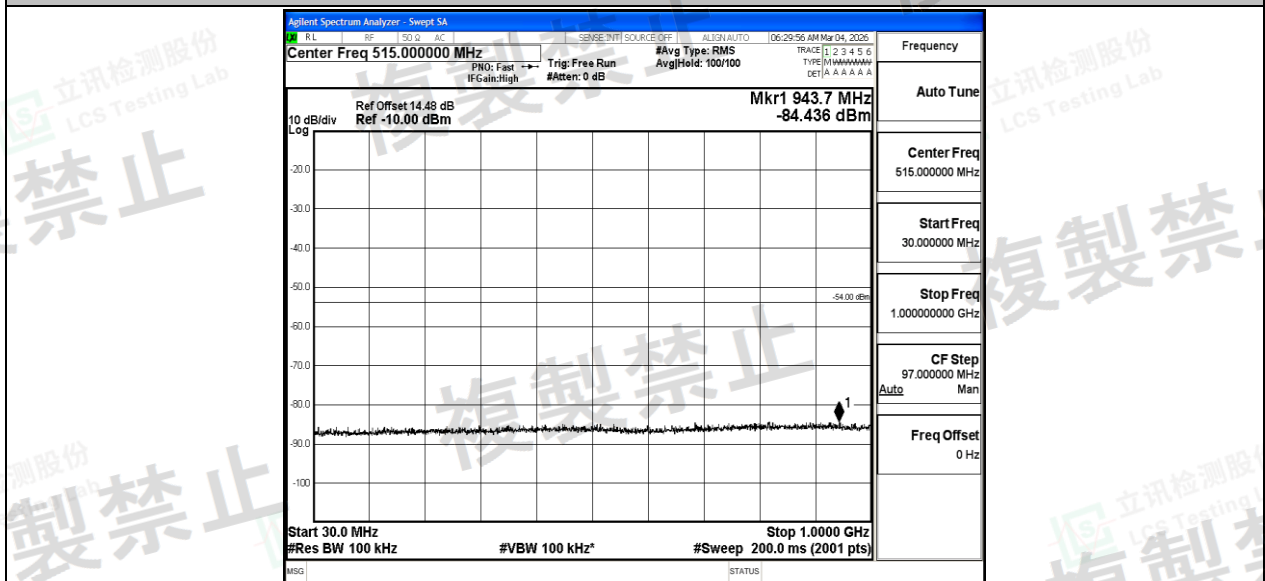




NTNV_3DH5_Ant1_2402_1000~12500

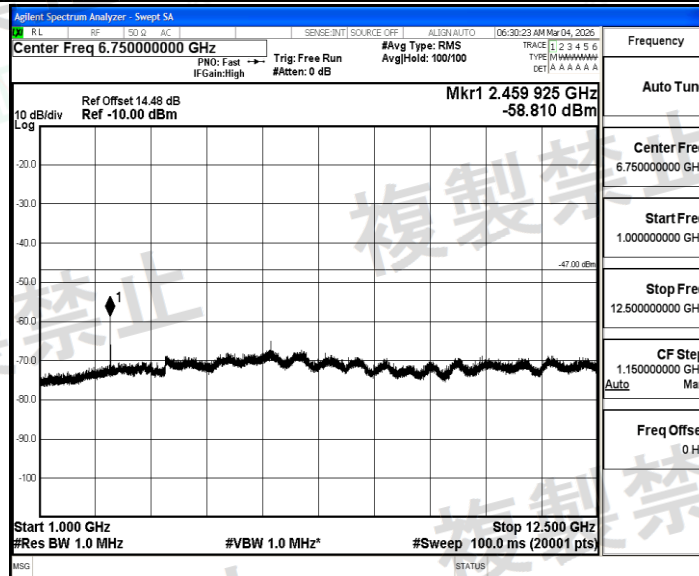


NTNV_3DH5_Ant1_2441_30~1000

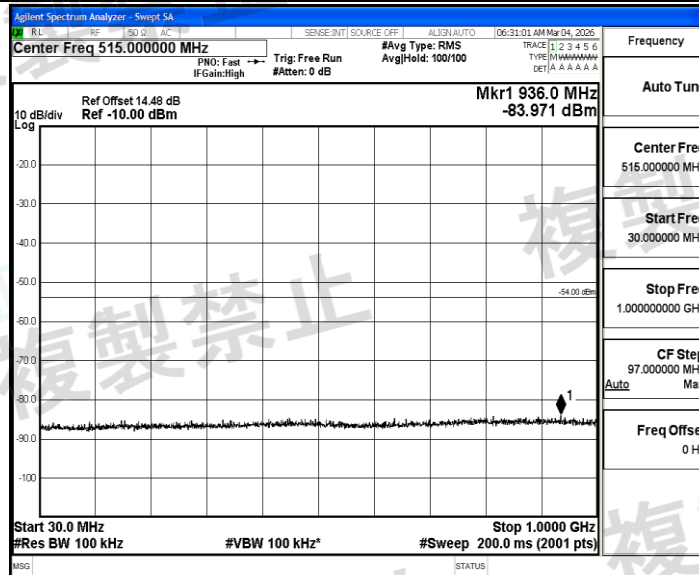




NTNV_3DH5_Ant1_2441_1000~12500

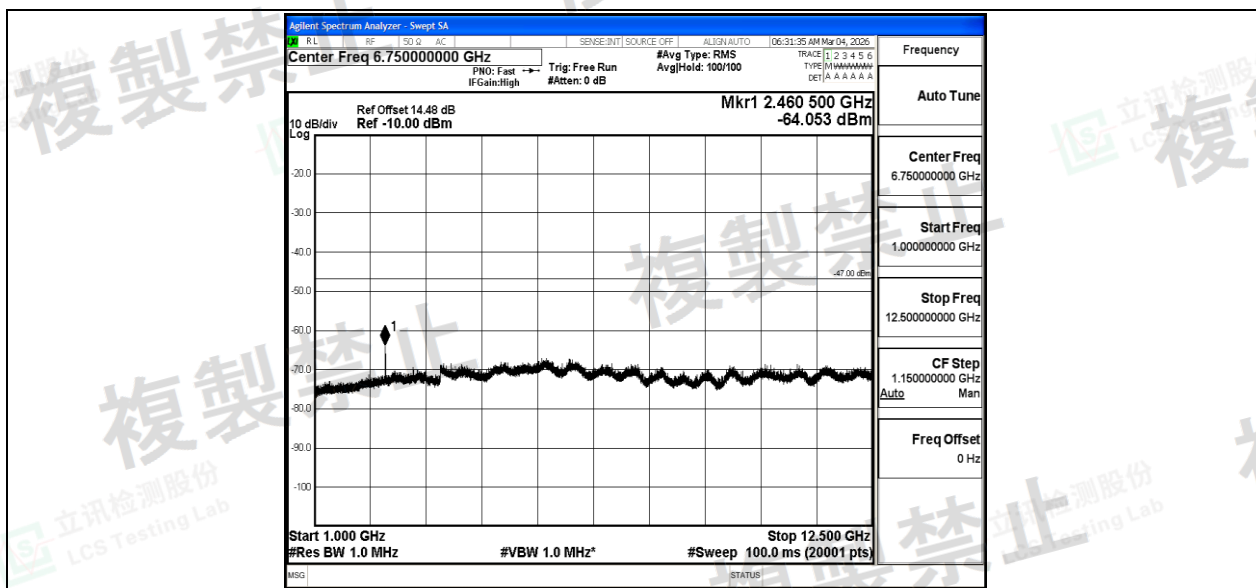


NTNV_3DH5_Ant1_2480_30~1000



NTNV_3DH5_Ant1_2480_1000~12500







A.7 Dwell Time

Test Result

TestCondition	TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit [s]	Verdict
NTNV	DH5	Ant1	Hop	2.91	100	0.291	≤0.4	PASS
	2DH5	Ant1	Hop	2.90	120	0.348	≤0.4	PASS
	3DH5	Ant1	Hop	2.90	110	0.319	≤0.4	PASS





Test Graphs

