



Appendix A for BT Test Data

Product Name: POWER UNIT CONTROLLER

Test Model: Omnibase

Environmental Conditions

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



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A.1 Frequency Error

Test Result

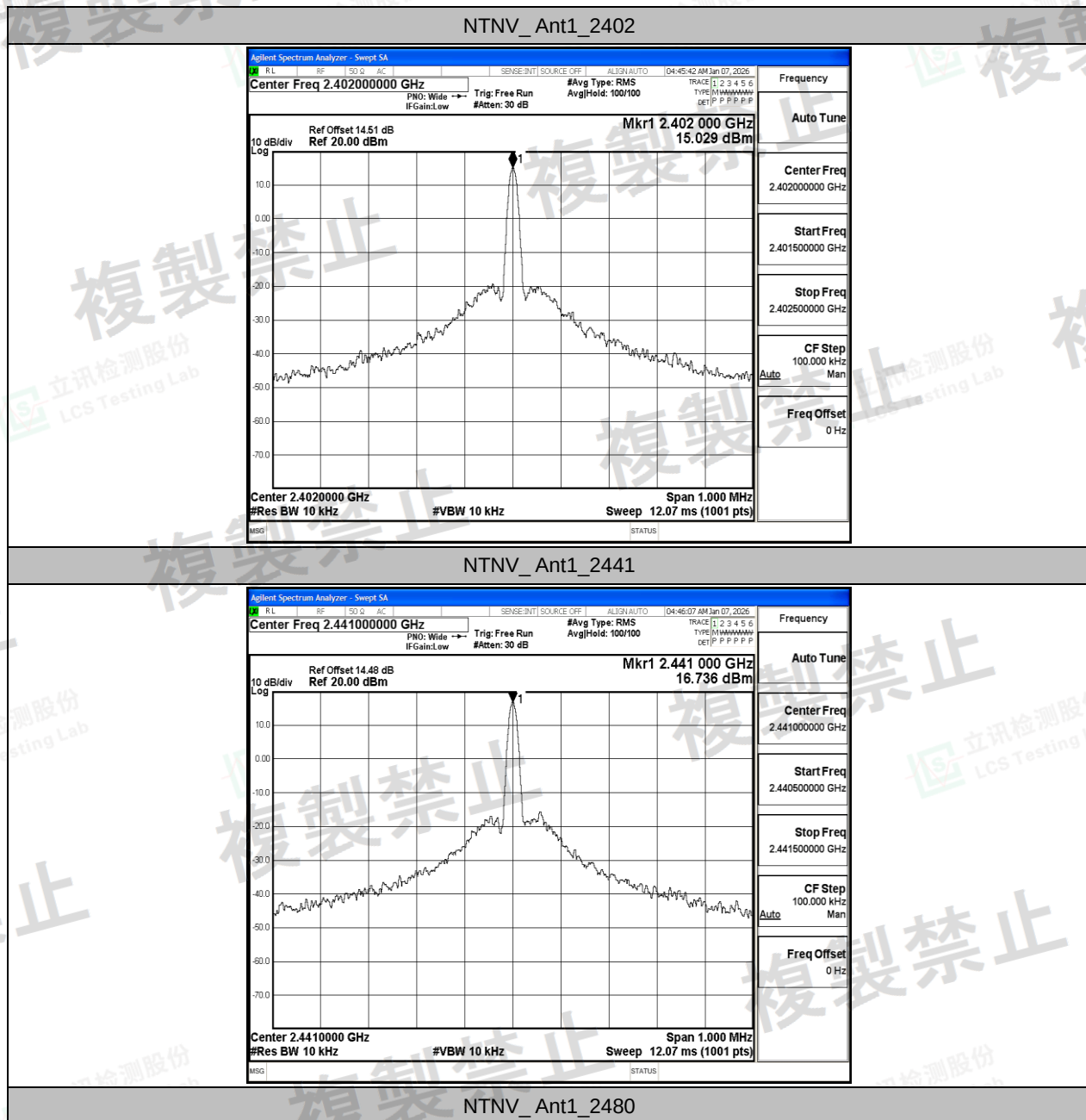
TestCondition	TestMode	Antenna	Frequency[MHz]	Result[ppm]	Limit[ppm]	Verdict
NTNV	Frequency Error	Ant1	2402	0.00000	±50	PASS
			2441	0.00000	±50	PASS
			2480	0.00000	±50	PASS

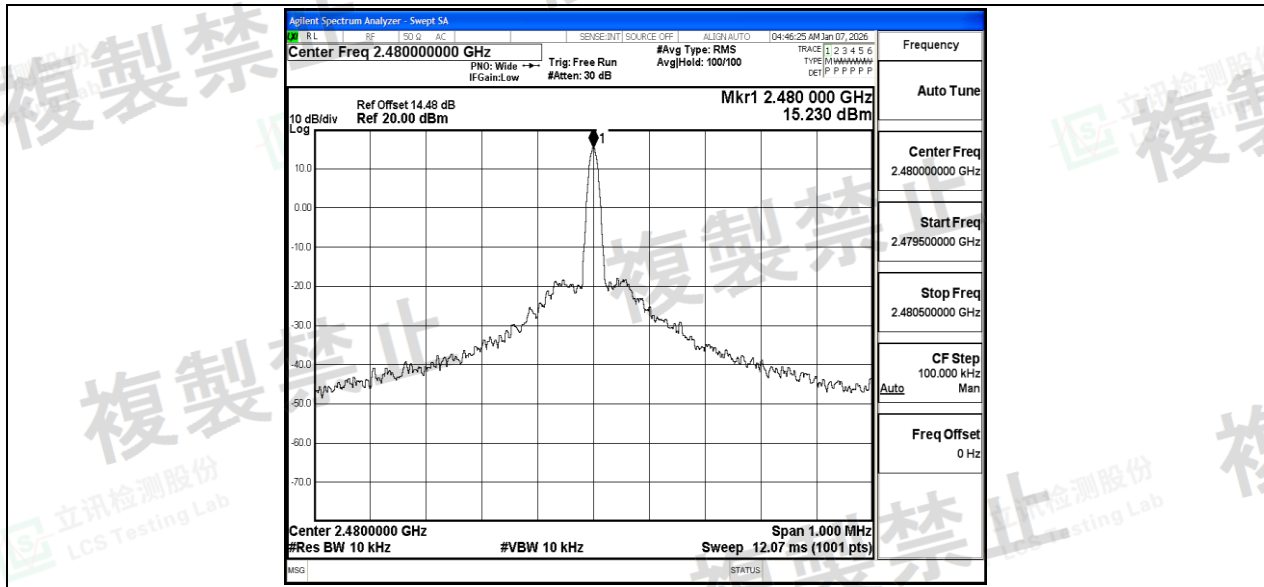


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Test Graphs





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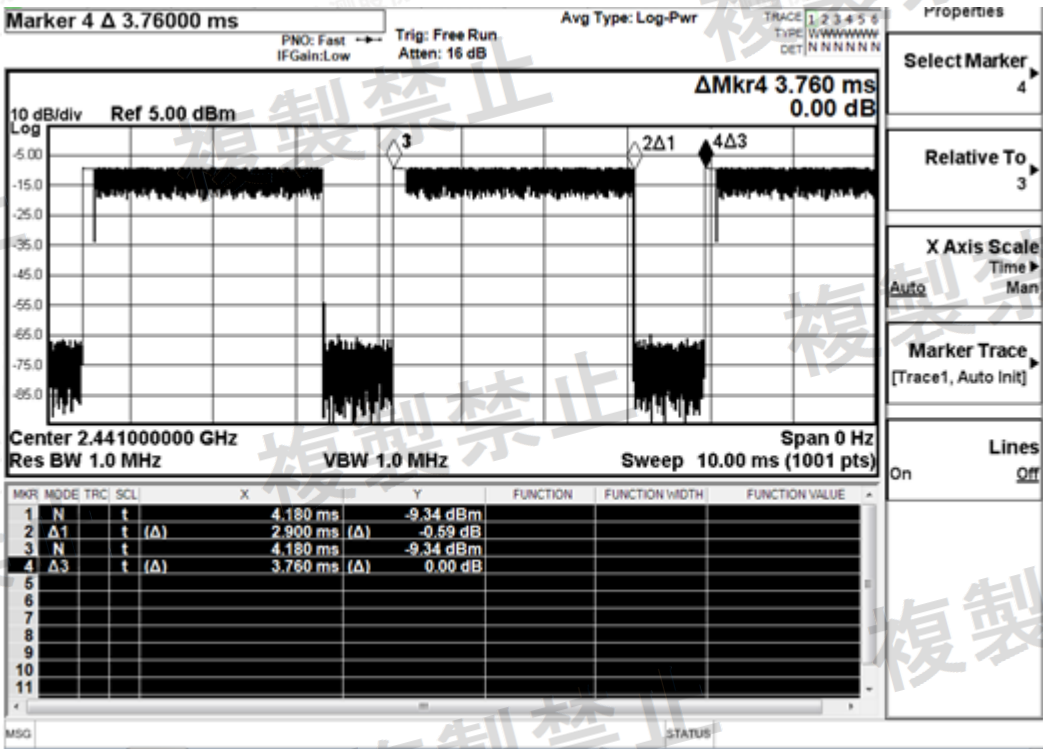


A.2 Antenna Power

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)	/	/
Hoping-Tx (1Mbps)	0.03	1.61	1.449	0.027	3	-10.00%	+20%
Hoping-Tx (2Mbps)	0.03	1.22	1.324	0.025	3	-16.67%	+20%
Hoping-Tx (3Mbps)	0.03	1.09	1.285	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) = 68.874MHz, Spread Bandwidth (2DH5) = 68.963MHz,
Spread Bandwidth (3DH5) = 68.967MHz
Duty cycle=77.1%
Duty cycle= [Ton/ (Ton+Toff)]*100%=2.900/3.760*100%=77.1%





A.3 Occupied Bandwidth

Test Result

TestCondition	TestMode	Antenna	Frequency[MHz]	Result [MHz]	Limit [MHz]	Verdict
NTNV	DH5	Ant1	2402	0.864	≤83.5	PASS
			2441	0.862	≤83.5	PASS
			2480	0.873	≤83.5	PASS
	2DH5	Ant1	2402	1.181	≤83.5	PASS
			2441	1.181	≤83.5	PASS
			2480	1.188	≤83.5	PASS
	3DH5	Ant1	2402	1.191	≤83.5	PASS
			2441	1.186	≤83.5	PASS
			2480	1.184	≤83.5	PASS

TestCondition	TestMode	Antenna	Frequency[MHz]	Result [MHz]	Limit [MHz]	Verdict
NTNV	DH5	Ant1	Hop	78.425	≤83.5	PASS
	2DH5	Ant1	Hop	78.367	≤83.5	PASS
	3DH5	Ant1	Hop	78.479	≤83.5	PASS

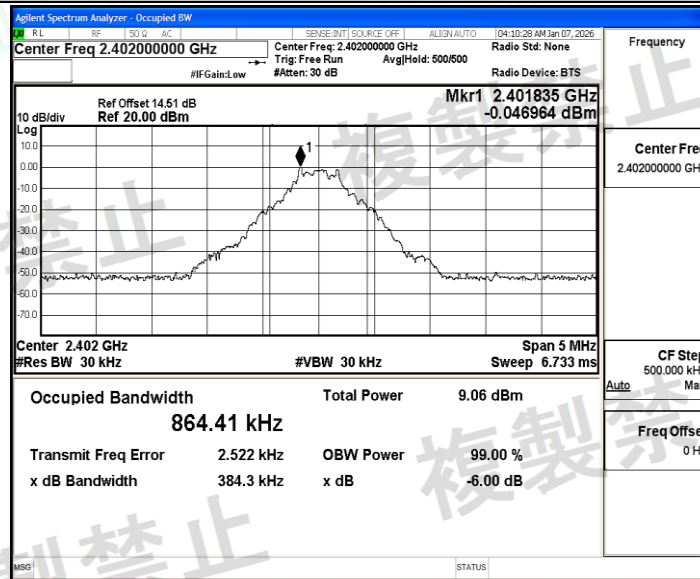


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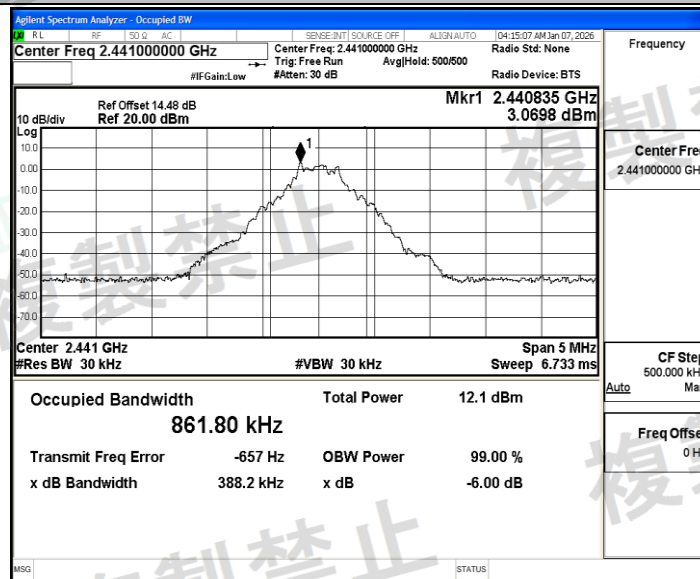


Test Graphs

NTNV_DH5_Ant1_2402



NTNV_DH5_Ant1_2441



NTNV_DH5_Ant1_2480

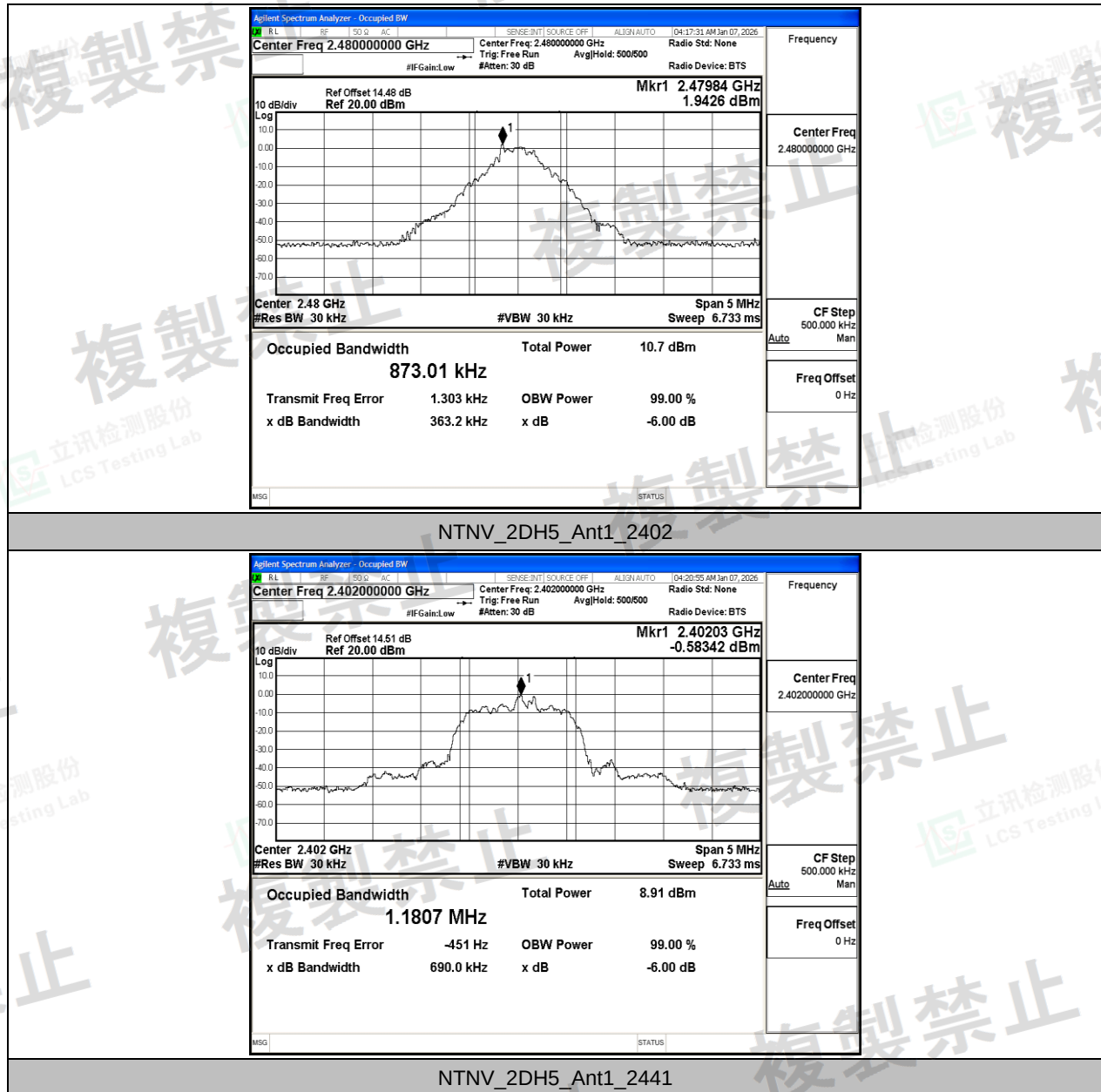


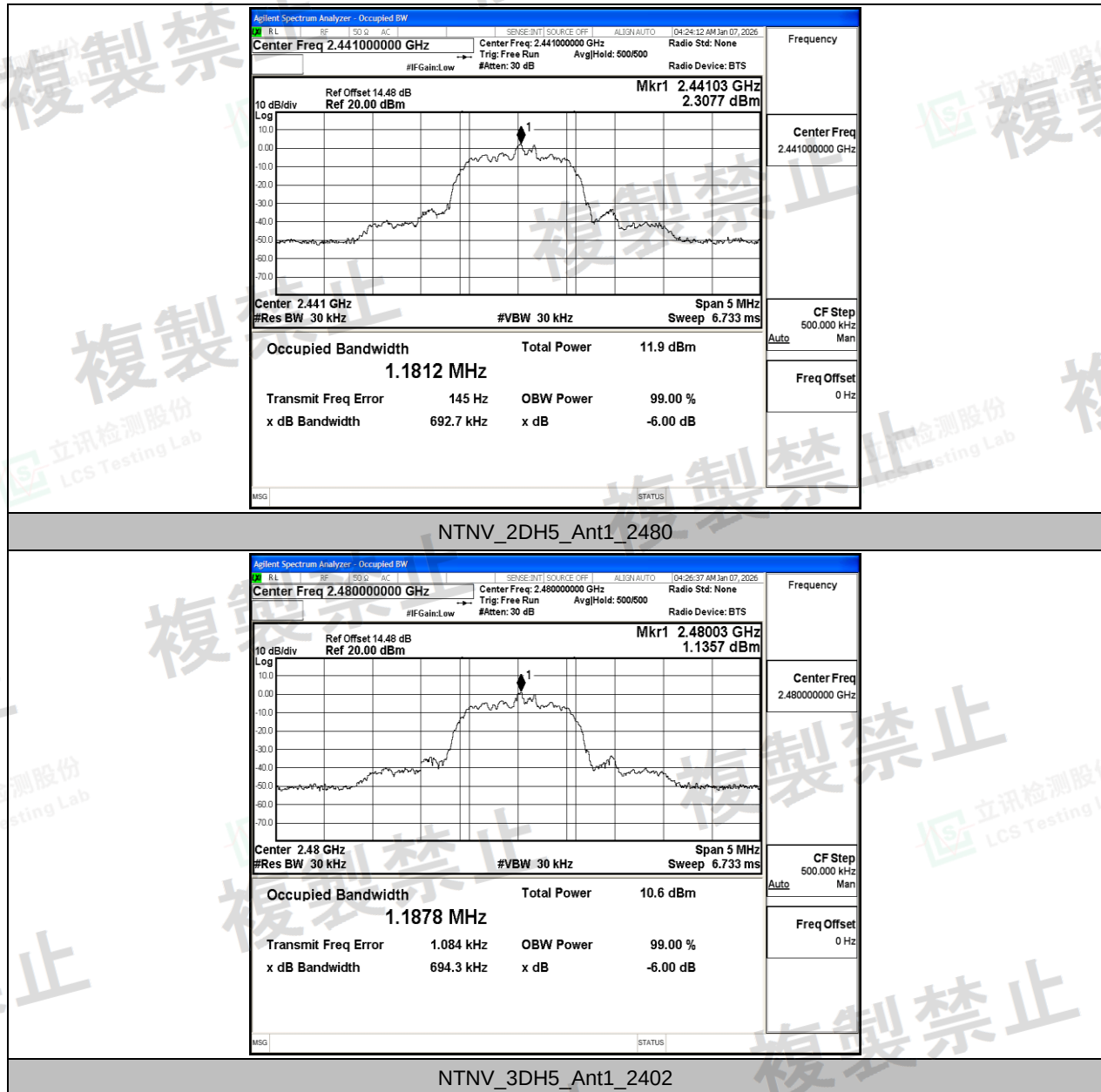
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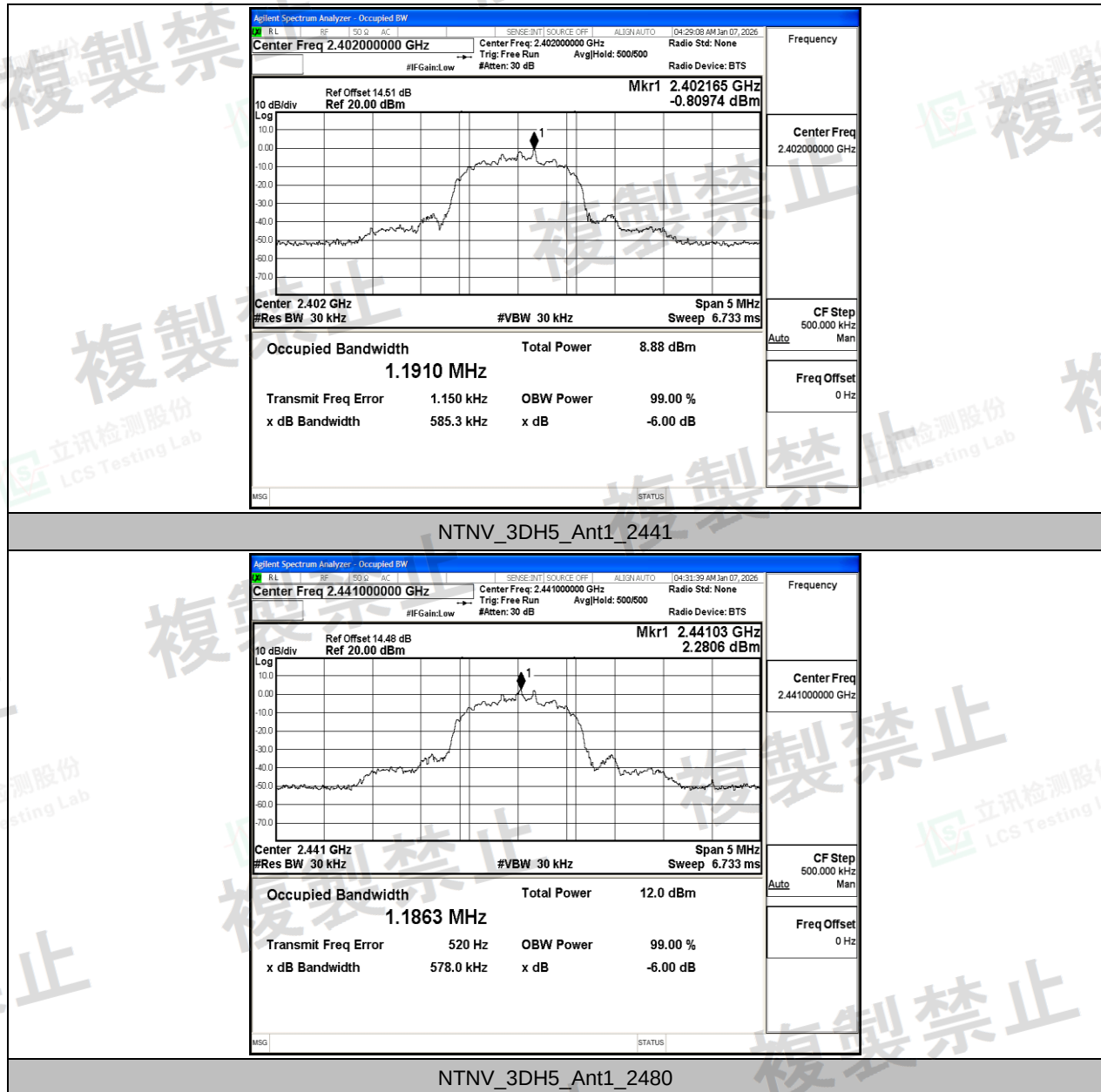
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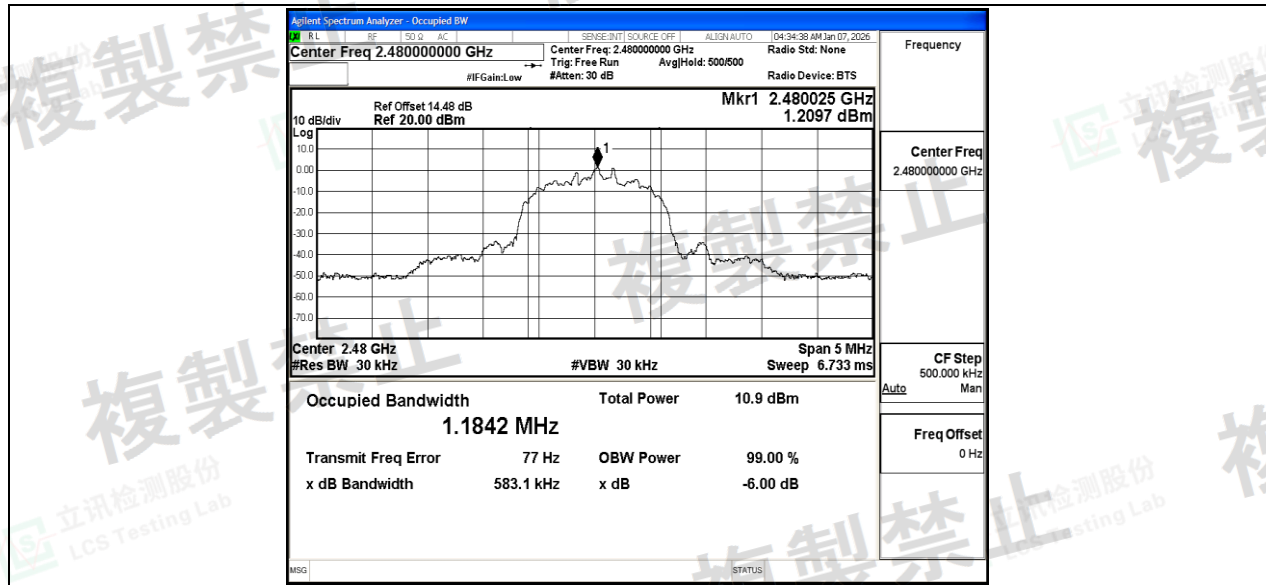
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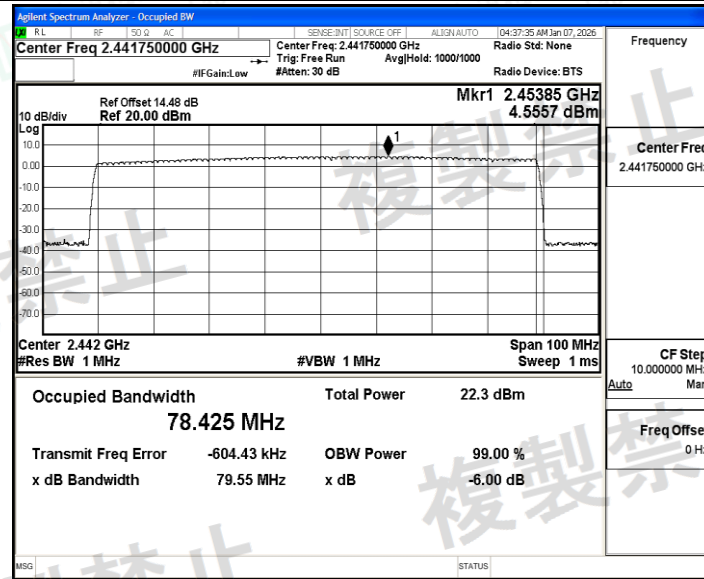




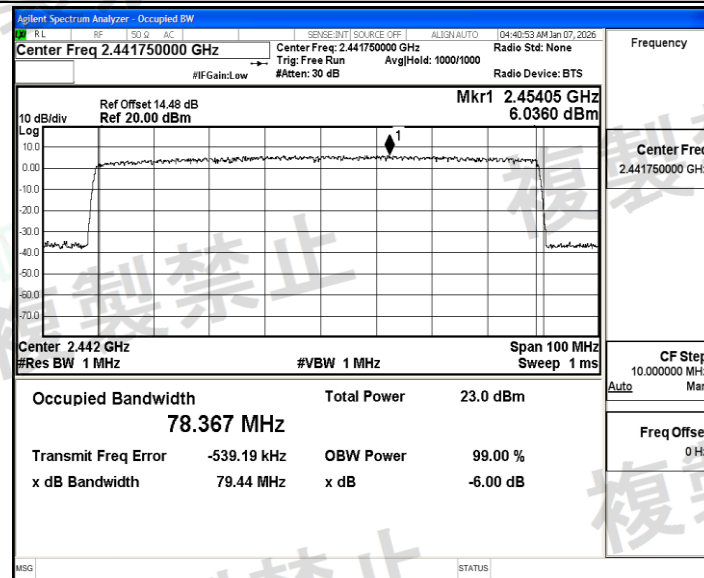




NTNV_DH5_Ant1_Hop



NTNV_2DH5_Ant1_Hop



NTNV_3DH5_Ant1_Hop

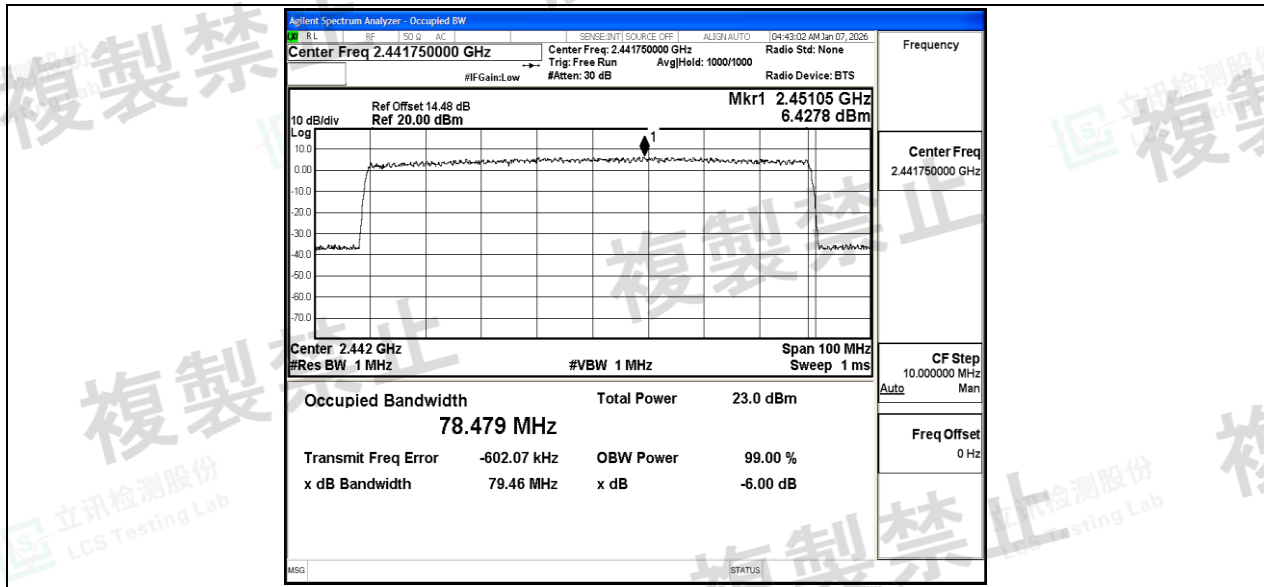


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A.4 Spread Bandwidth

Test Result

TestCondition	TestMode	Antenna	Frequency[MHz]	Result [MHz]	Limit [MHz]	Verdict
NTNV	DH5	Ant1	Hop	68.874	---	PASS
	2DH5	Ant1	Hop	68.963	---	PASS
	3DH5	Ant1	Hop	68.967	---	PASS



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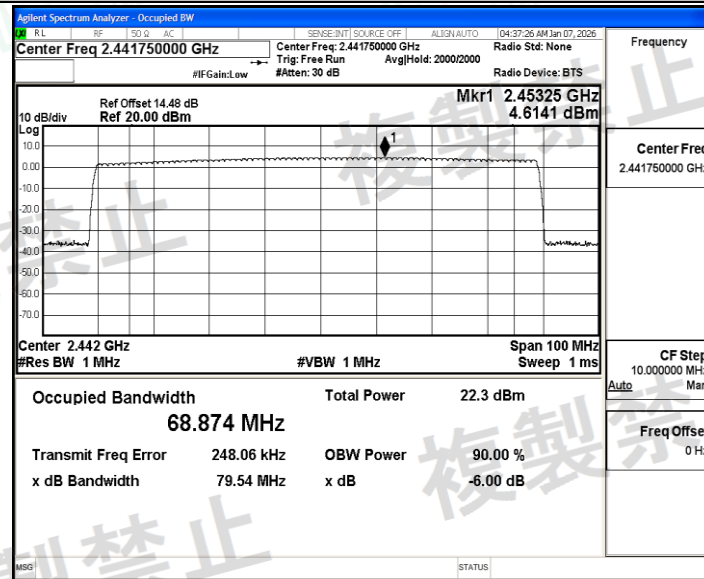
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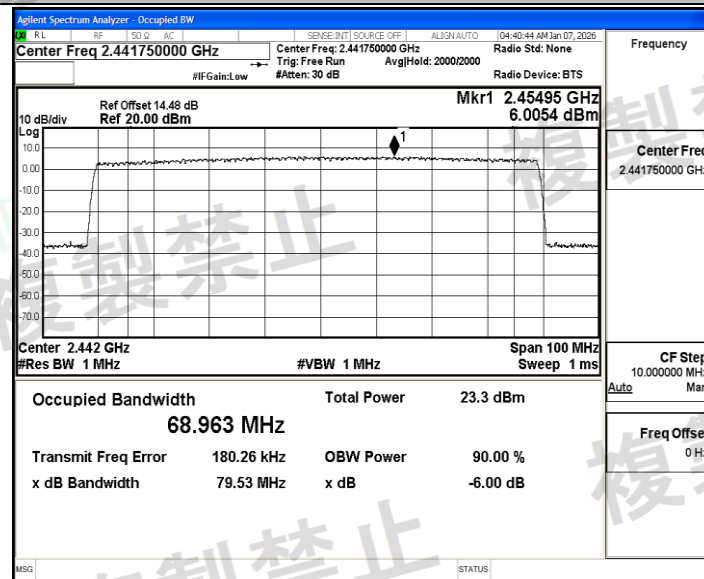


Test Graphs

NTNV_DH5_Ant1_Hop



NTNV_2DH5_Ant1_Hop



NTNV_3DH5_Ant1_Hop

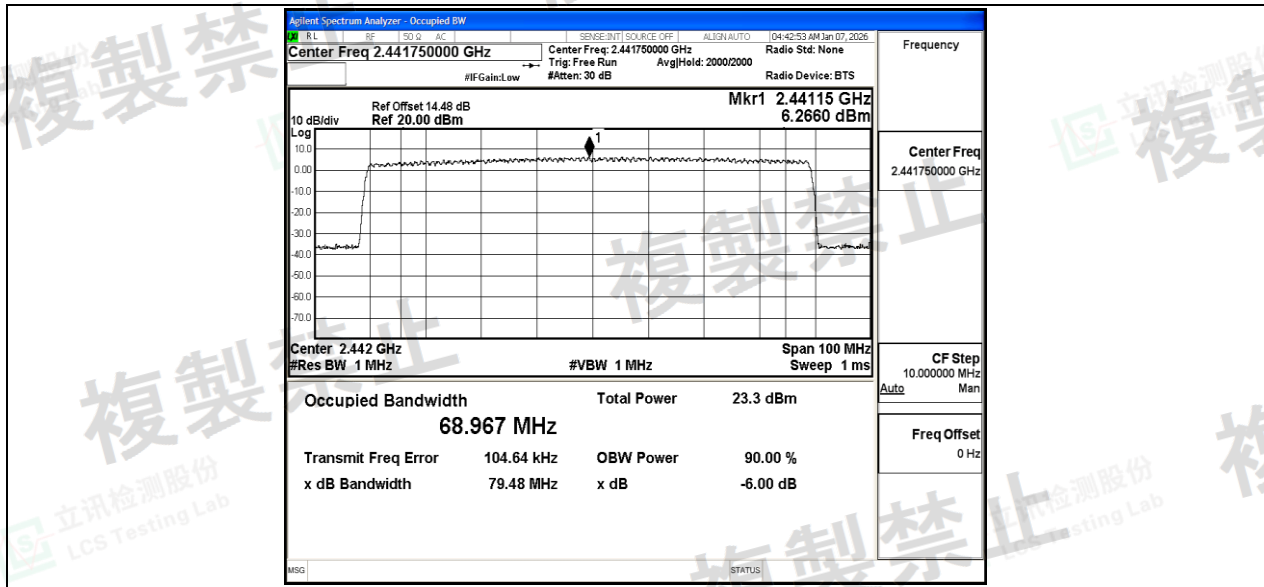


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A.5 Spurious Emission of TX

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	-53.89	≤-26	0.00408	≤2.5	PASS
				1000~2387	-52.83	≤-26	0.00521	≤2.5	PASS
				2387~2400	-42.03	≤-16	0.06266	≤25	PASS
				2483.5~2496.5	-43.39	≤-16	0.04581	≤25	PASS
				2496.5~13000	-45.58	≤-26	0.02767	≤2.5	PASS
			2441	30~1000	-53.57	≤-26	0.00440	≤2.5	PASS
				1000~2387	-52.61	≤-26	0.00548	≤2.5	PASS
				2387~2400	-43.45	≤-16	0.04519	≤25	PASS
				2483.5~2496.5	-43.34	≤-16	0.04634	≤25	PASS
				2496.5~13000	-42.52	≤-26	0.05598	≤2.5	PASS
			2480	30~1000	-53.80	≤-26	0.00417	≤2.5	PASS
				1000~2387	-52.68	≤-26	0.00540	≤2.5	PASS
				2387~2400	-43.50	≤-16	0.04467	≤25	PASS
				2483.5~2496.5	-43.29	≤-16	0.04688	≤25	PASS
				2496.5~13000	-44.81	≤-26	0.03304	≤2.5	PASS
	2DH5	Ant1	2402	30~1000	-53.75	≤-26	0.00422	≤2.5	PASS
				1000~2387	-52.38	≤-26	0.00578	≤2.5	PASS
				2387~2400	-35.09	≤-16	0.30974	≤25	PASS
				2483.5~2496.5	-43.24	≤-16	0.04742	≤25	PASS
				2496.5~13000	-37.45	≤-26	0.17989	≤2.5	PASS
			2441	30~1000	-53.84	≤-26	0.00413	≤2.5	PASS
				1000~2387	-52.91	≤-26	0.00512	≤2.5	PASS
				2387~2400	-43.42	≤-16	0.04550	≤25	PASS
				2483.5~2496.5	-43.41	≤-16	0.04560	≤25	PASS
				2496.5~13000	-44.97	≤-26	0.03184	≤2.5	PASS
			2480	30~1000	-54.15	≤-26	0.00385	≤2.5	PASS
				1000~2387	-52.27	≤-26	0.00593	≤2.5	PASS
				2387~2400	-43.41	≤-16	0.04560	≤25	PASS
				2483.5~2496.5	-43.33	≤-16	0.04645	≤25	PASS
				2496.5~13000	-35.57	≤-26	0.27733	≤2.5	PASS
	3DH5	Ant1	2402	30~1000	-53.96	≤-26	0.00402	≤2.5	PASS
				1000~2387	-52.59	≤-26	0.00551	≤2.5	PASS
				2387~2400	-35.36	≤-16	0.29107	≤25	PASS
				2483.5~2496.5	-43.49	≤-16	0.04477	≤25	PASS
				2496.5~13000	-43.72	≤-26	0.04246	≤2.5	PASS
			2441	30~1000	-53.82	≤-26	0.00415	≤2.5	PASS



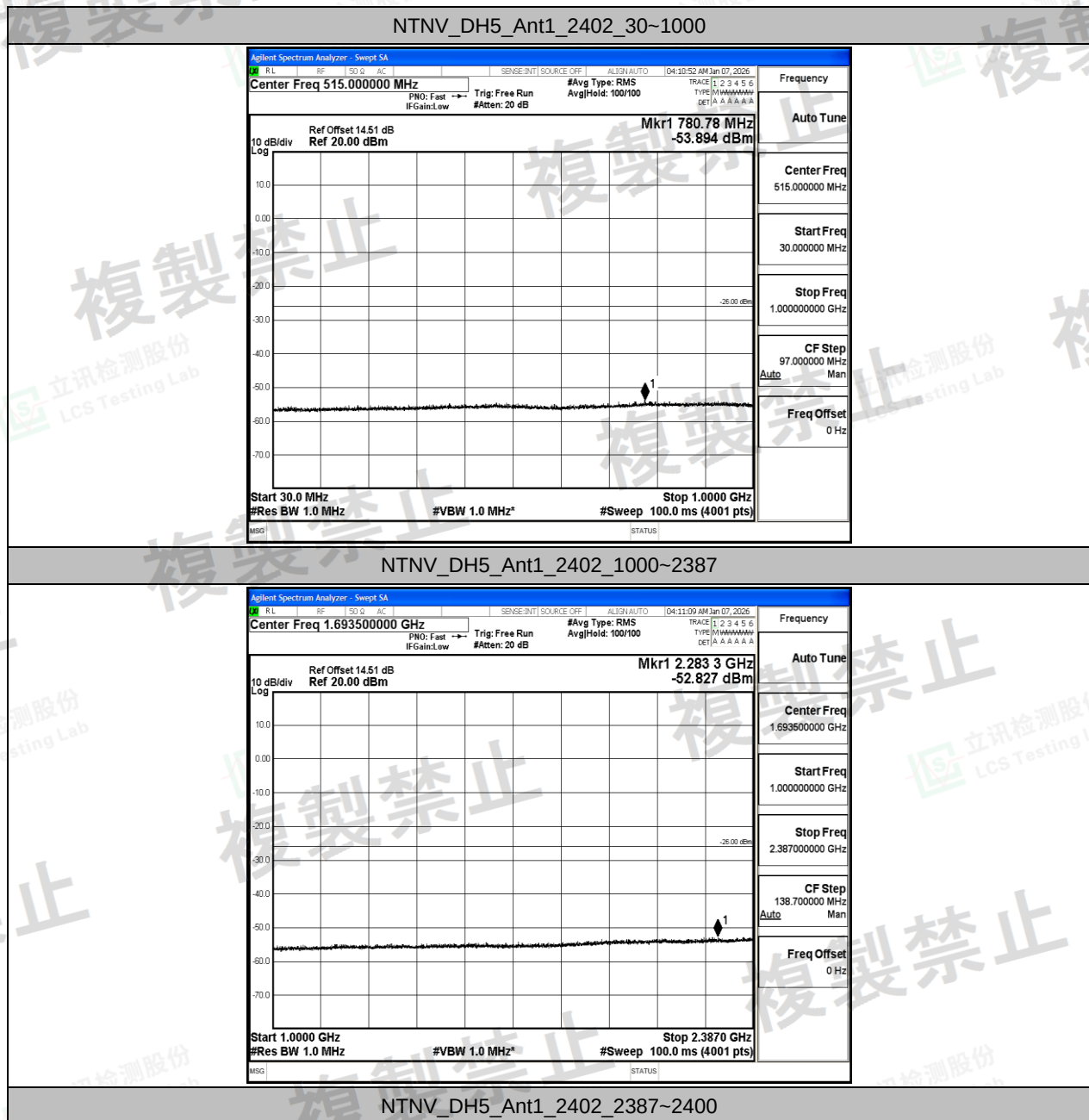


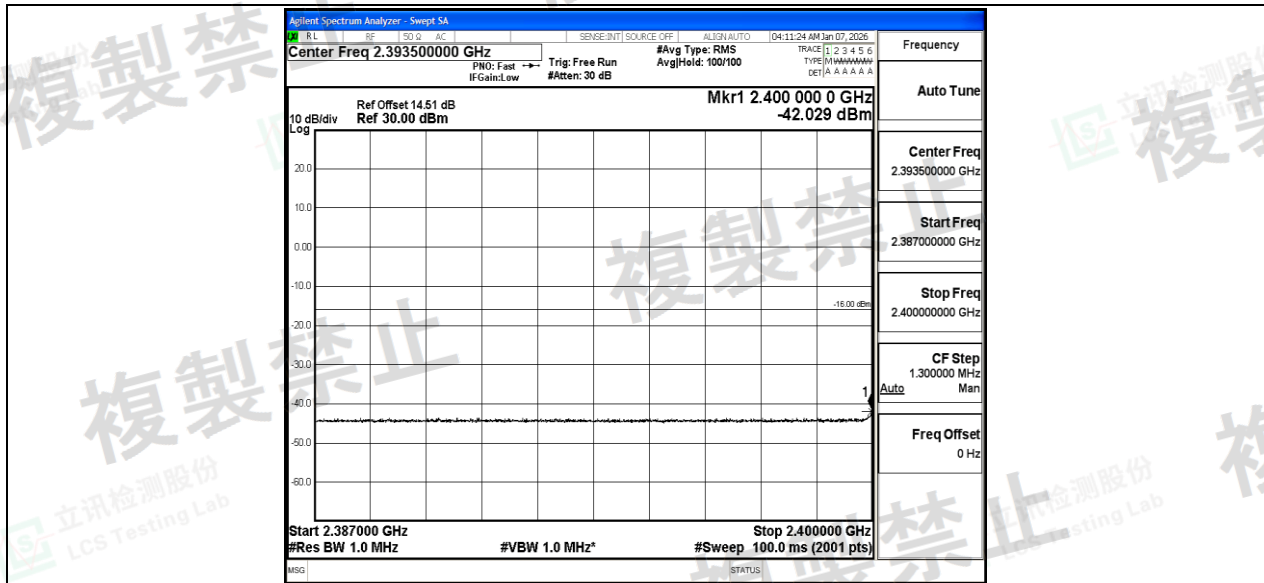
				1000~2387	-52.98	≤ -26	0.00504	≤ 2.5	PASS
				2387~2400	-43.35	≤ -16	0.04624	≤ 25	PASS
				2483.5~2496.5	-43.05	≤ -16	0.04955	≤ 25	PASS
				2496.5~13000	-44.89	≤ -26	0.03243	≤ 2.5	PASS
			2480	30~1000	-53.52	≤ -26	0.00445	≤ 2.5	PASS
				1000~2387	-52.88	≤ -26	0.00515	≤ 2.5	PASS
				2387~2400	-43.35	≤ -16	0.04624	≤ 25	PASS
				2483.5~2496.5	-43.30	≤ -16	0.04677	≤ 25	PASS
				2496.5~13000	-45.14	≤ -26	0.03062	≤ 2.5	PASS



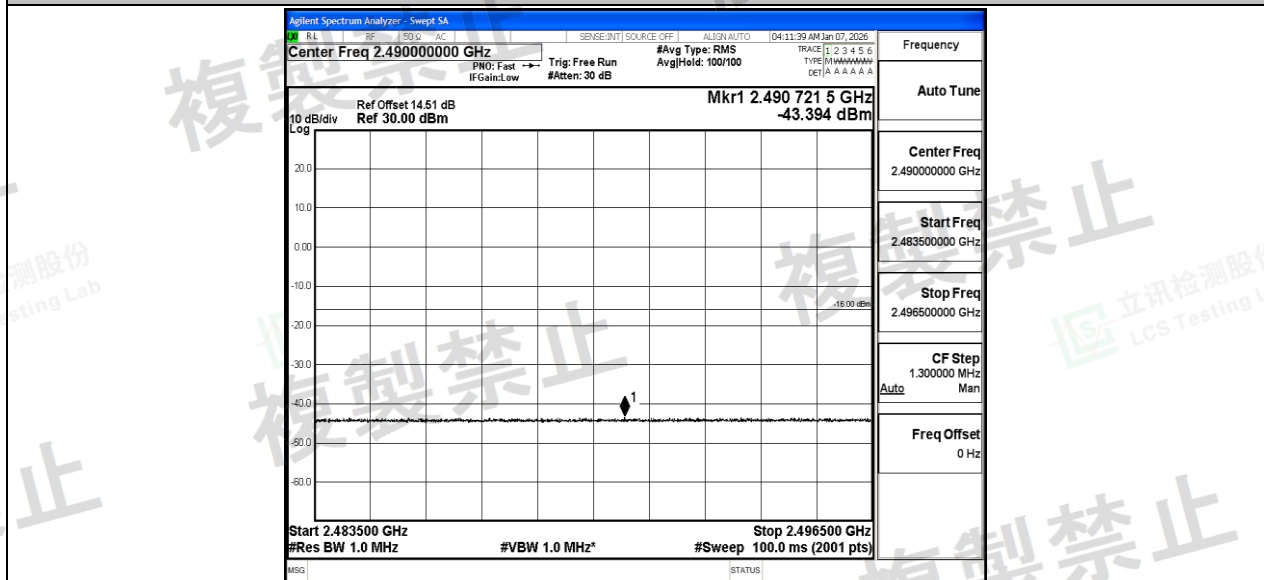


Test Graphs



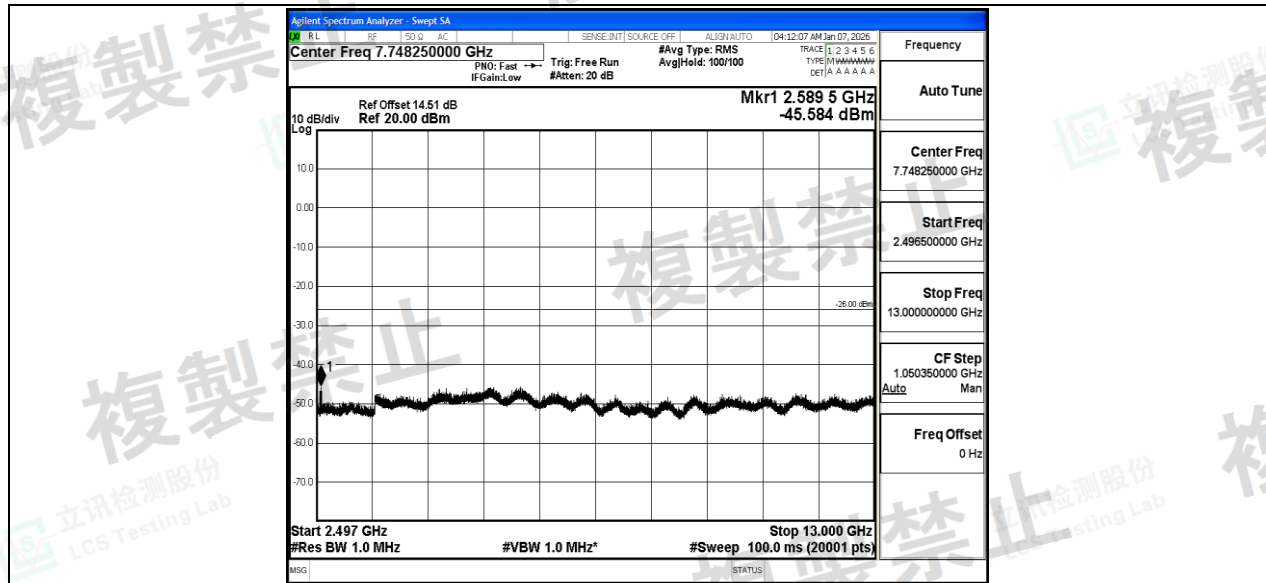


NTNV_DH5_Ant1_2402_2483.5~2496.5

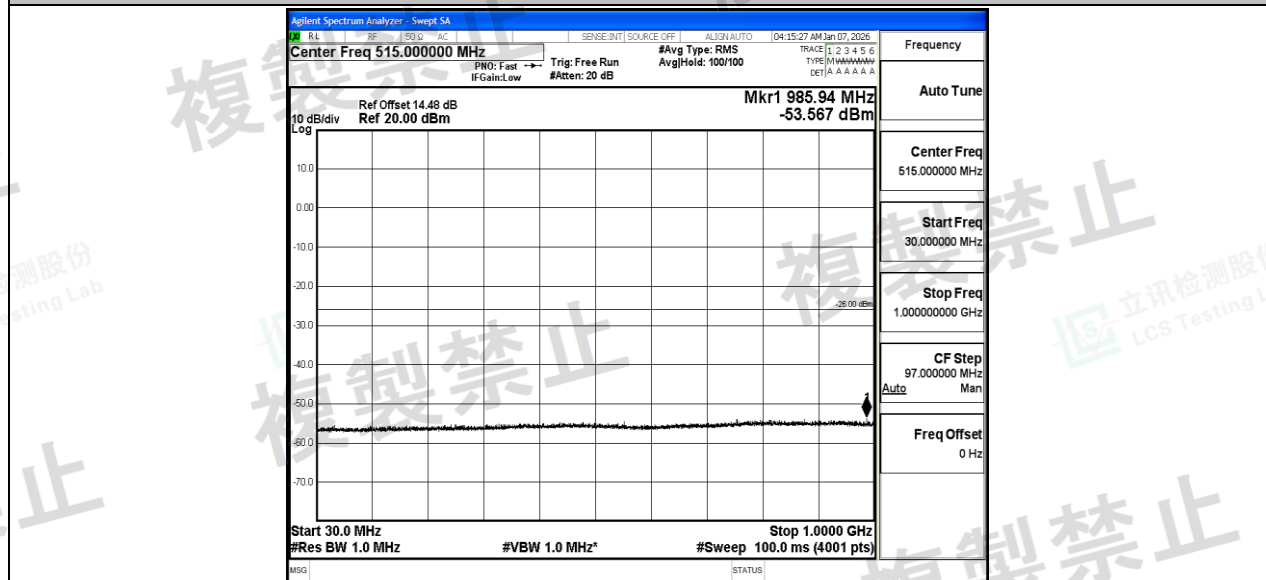


NTNV_DH5_Ant1_2402_2496.5~13000



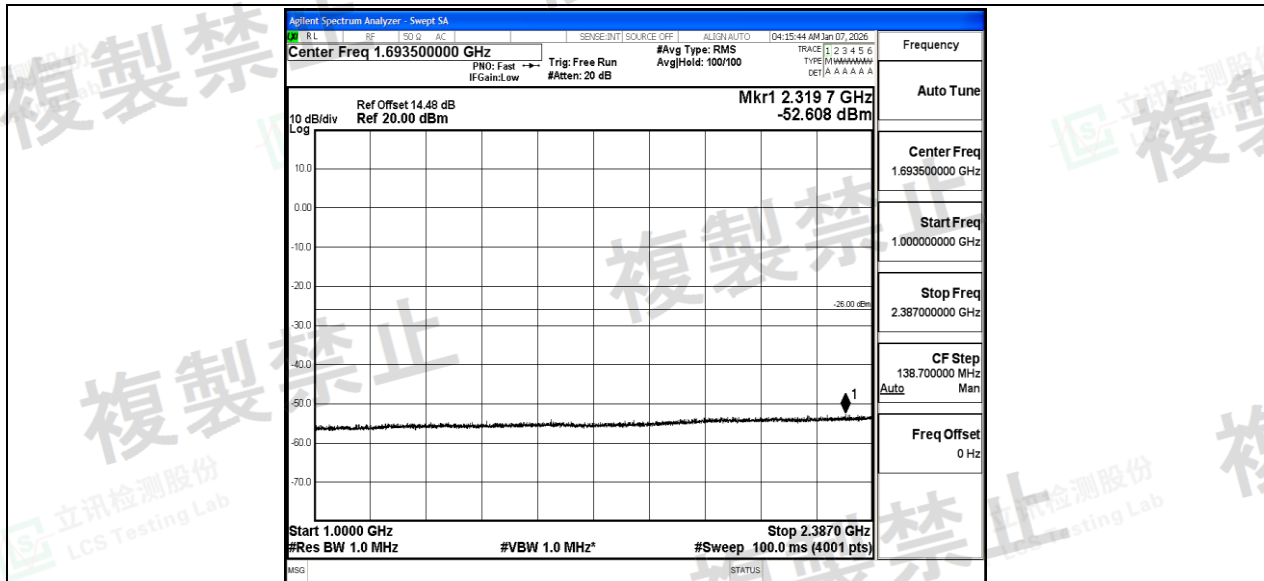
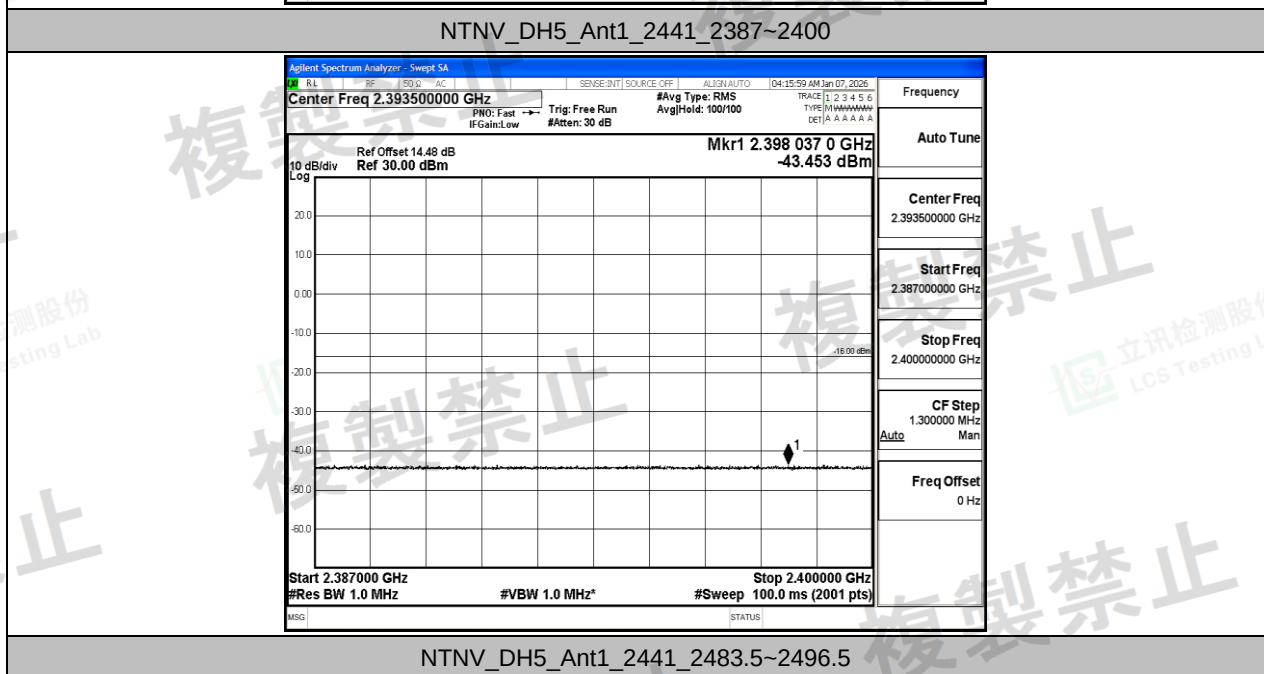


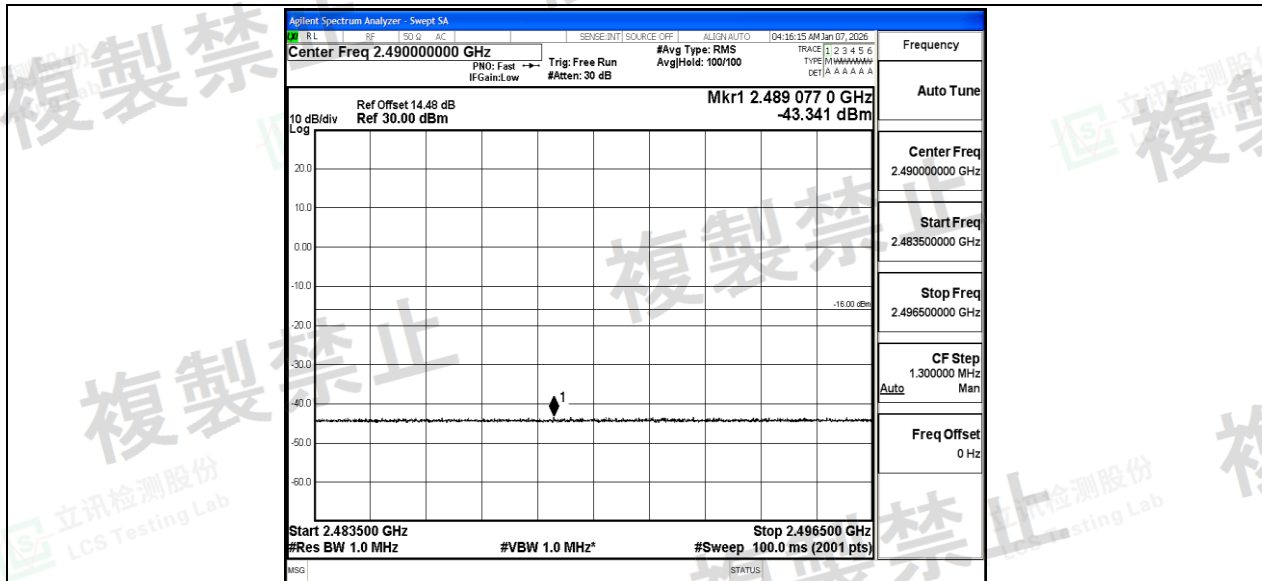
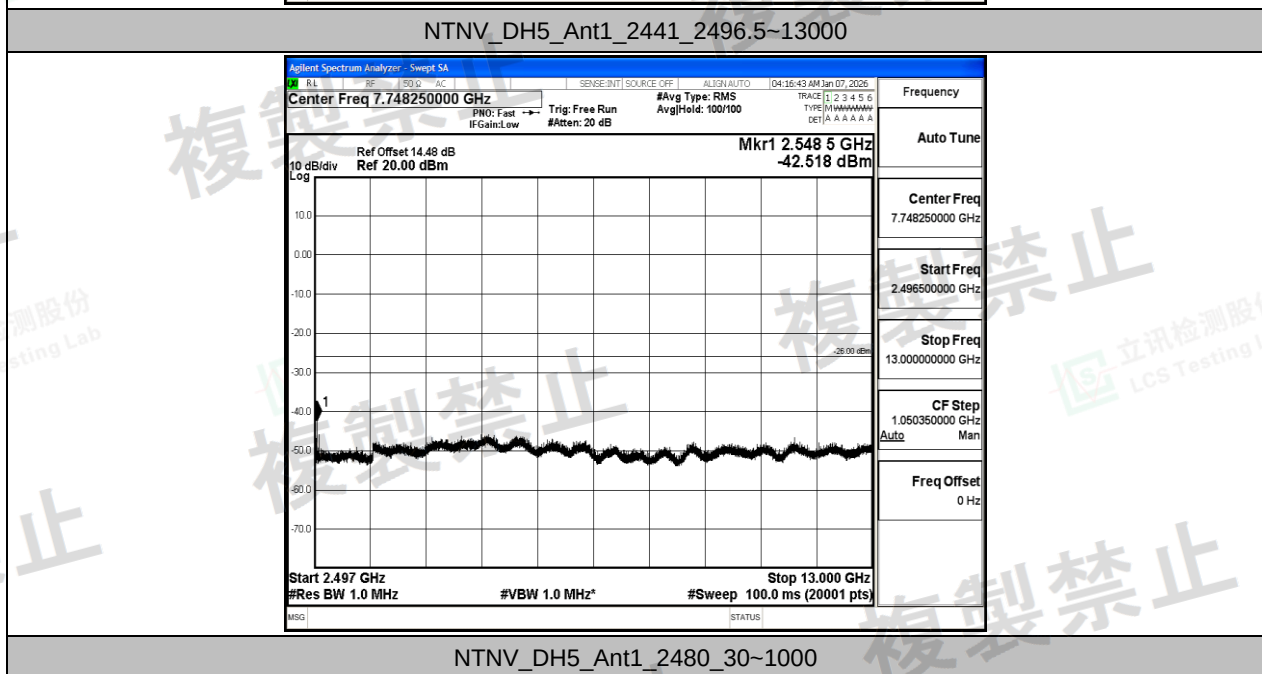
NTNV_DH5_Ant1_2441_30~1000



NTNV_DH5_Ant1_2441_1000~2387





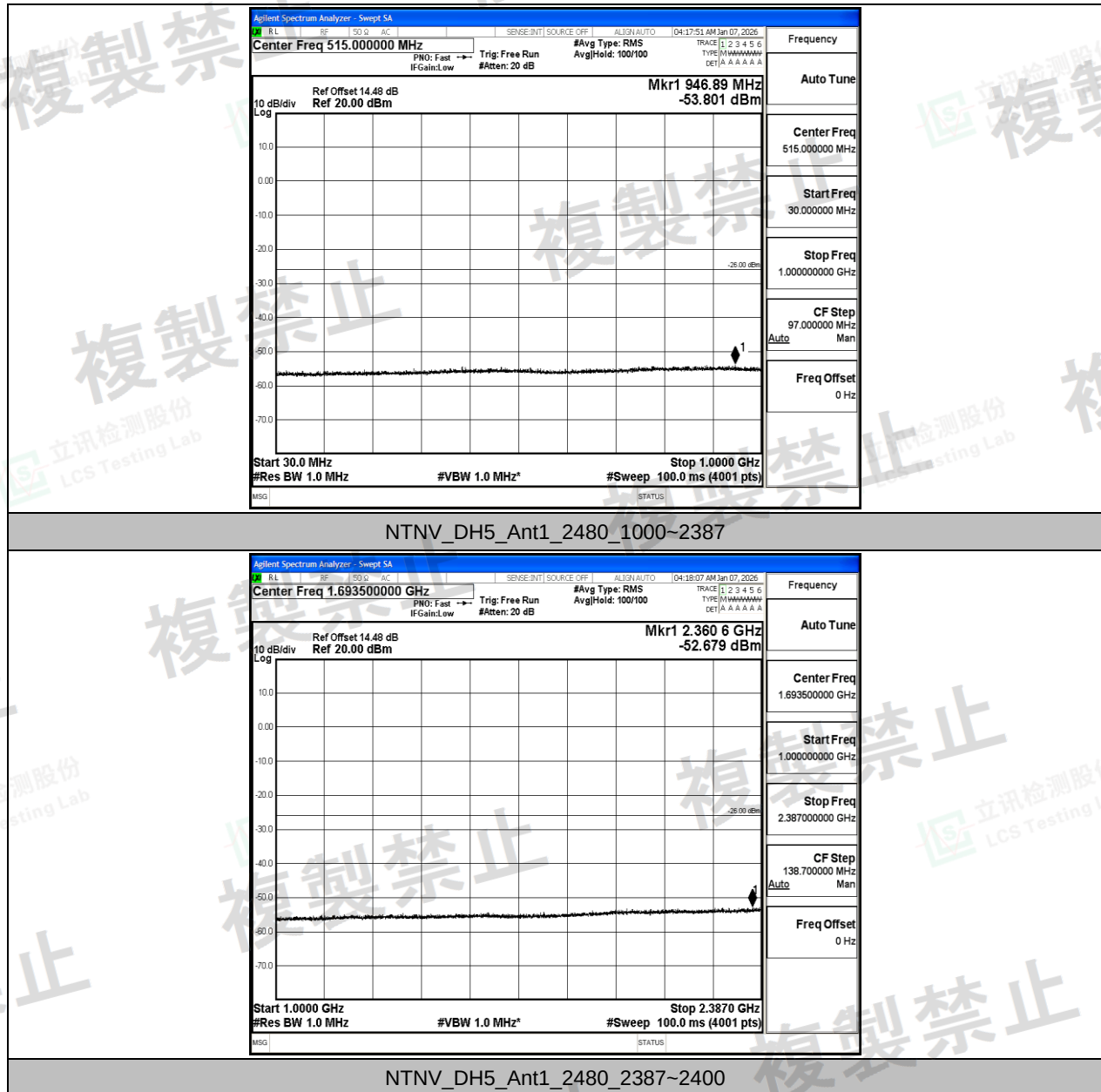


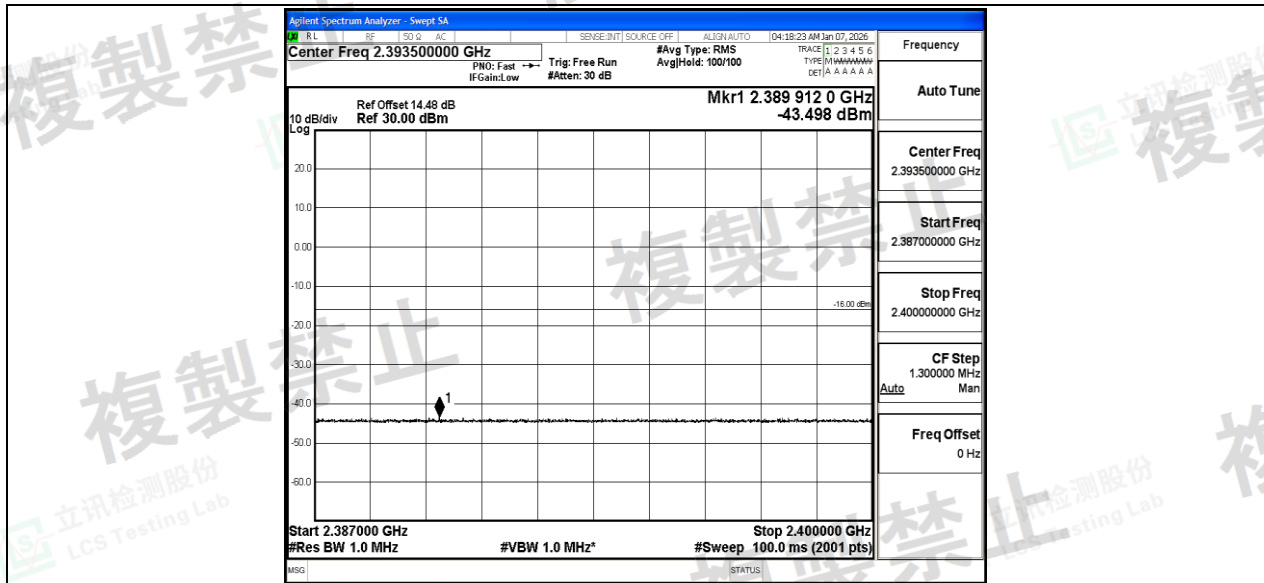
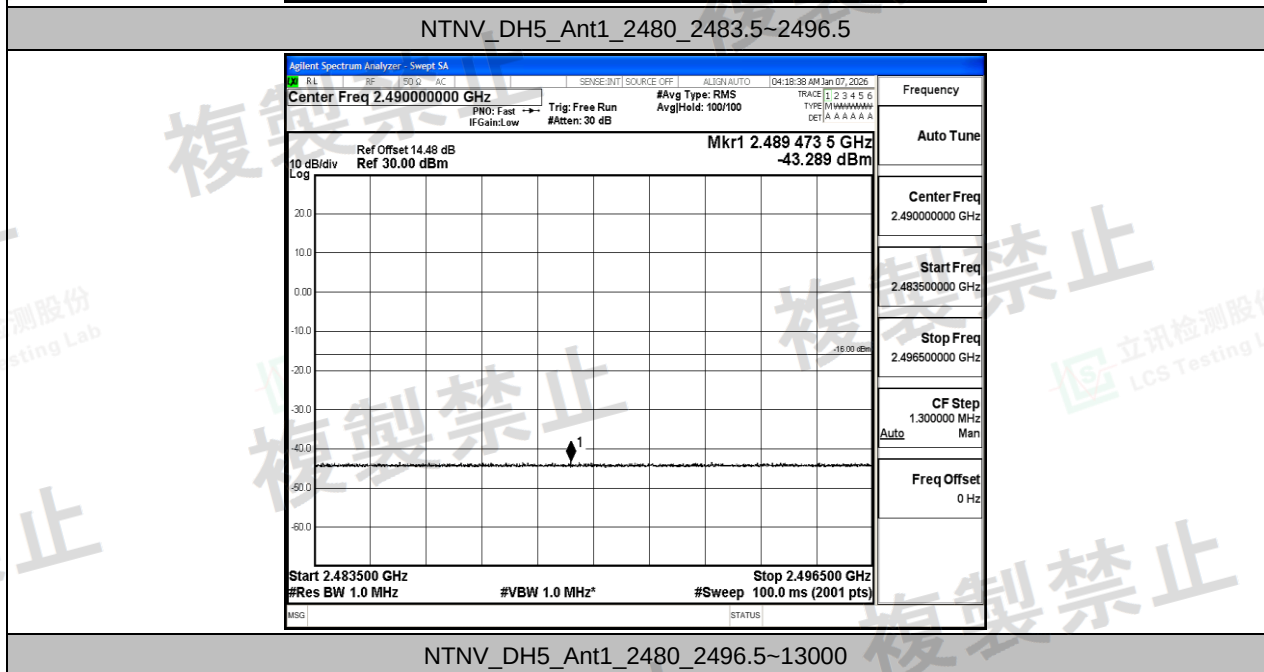
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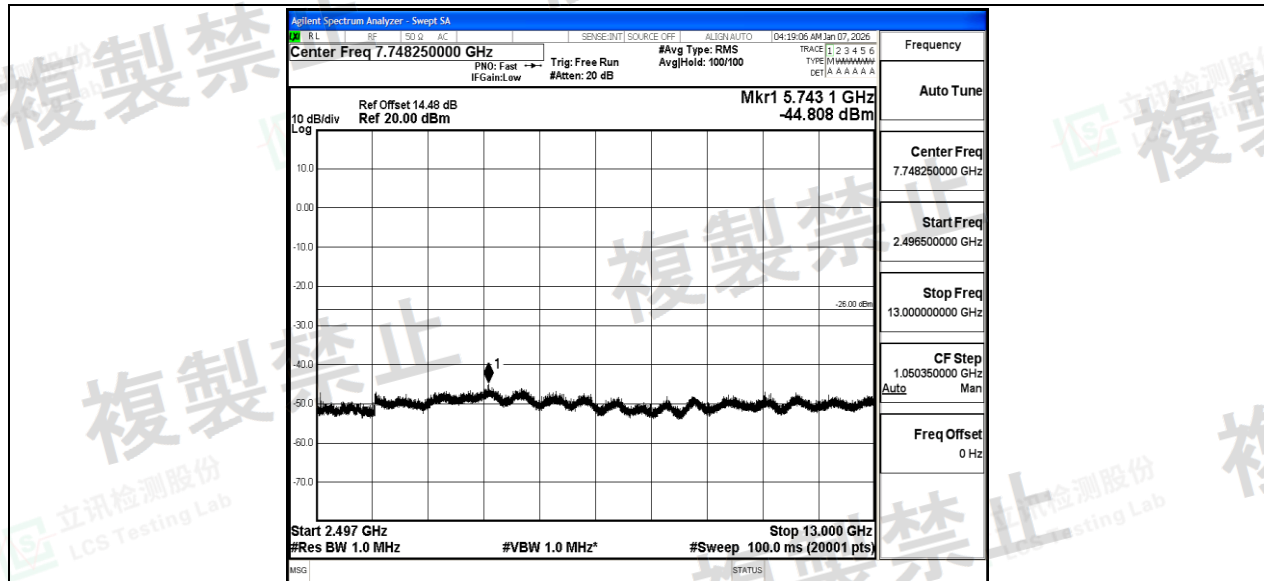
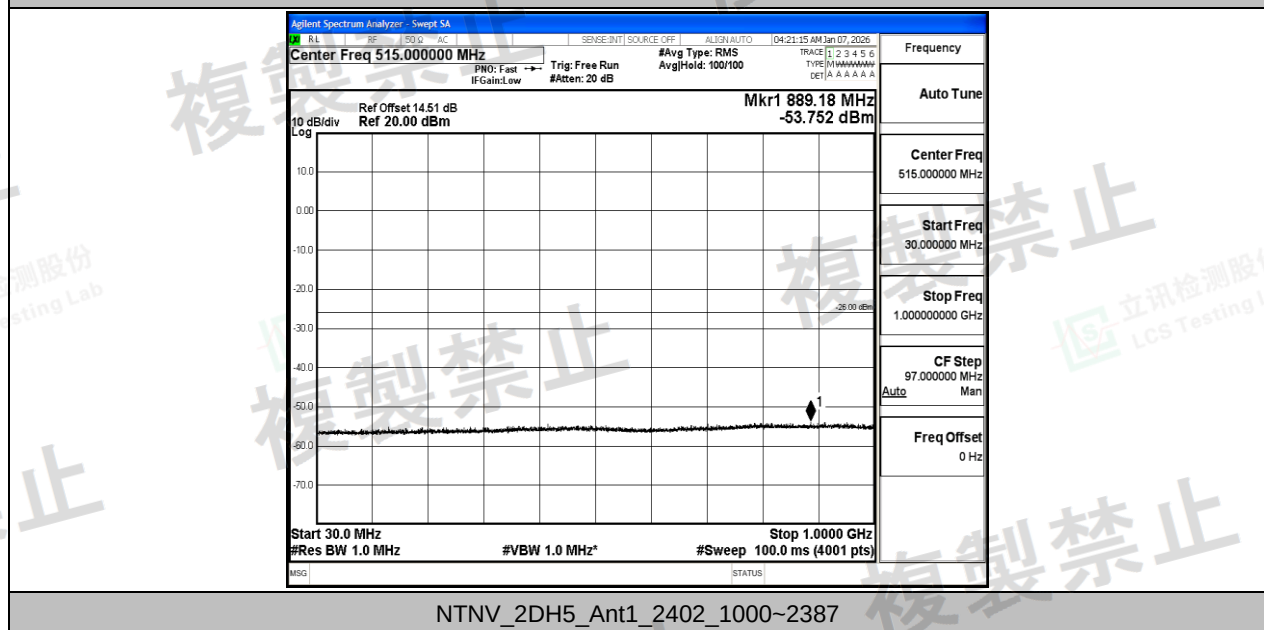
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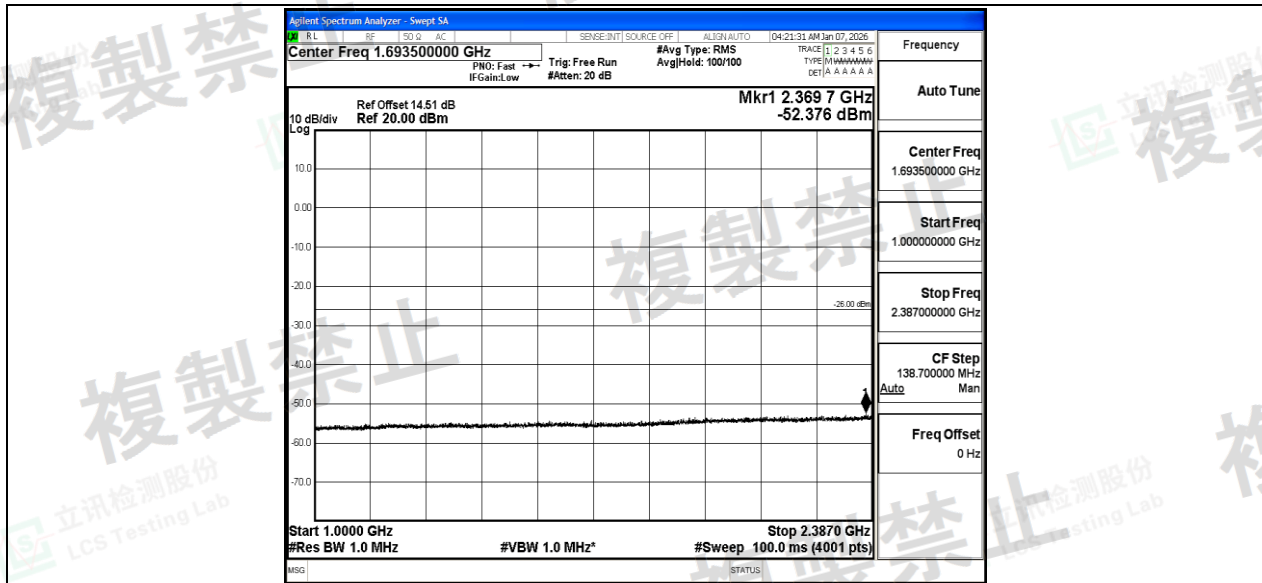
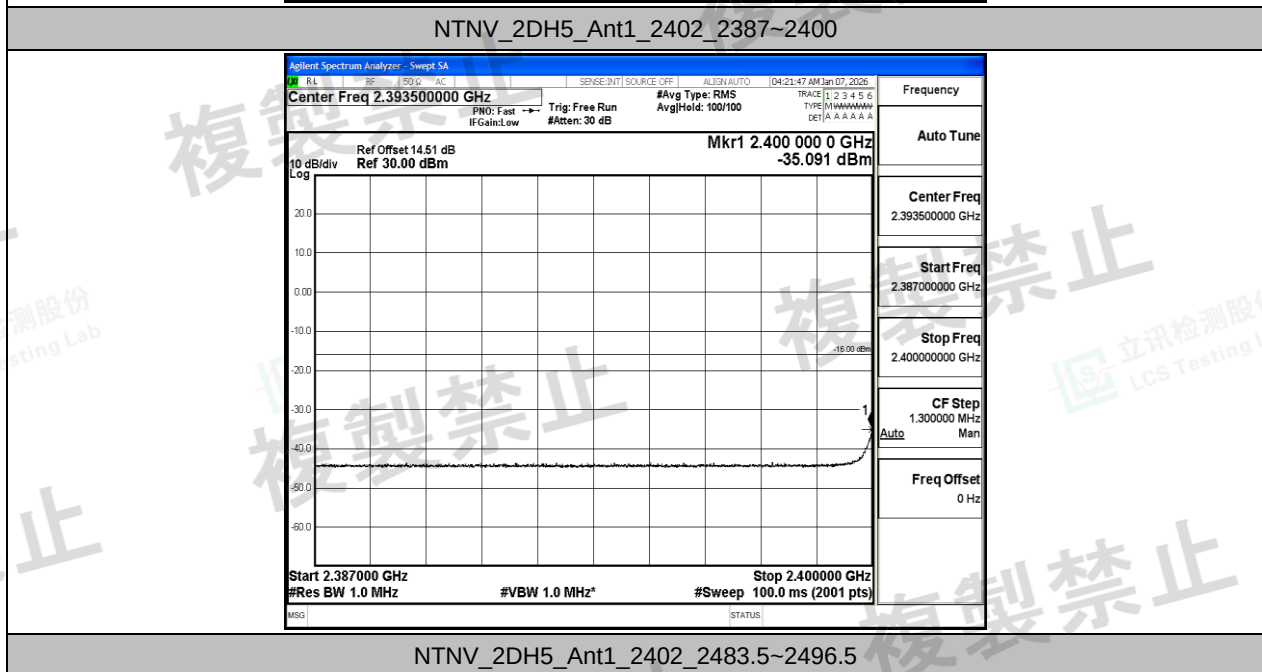
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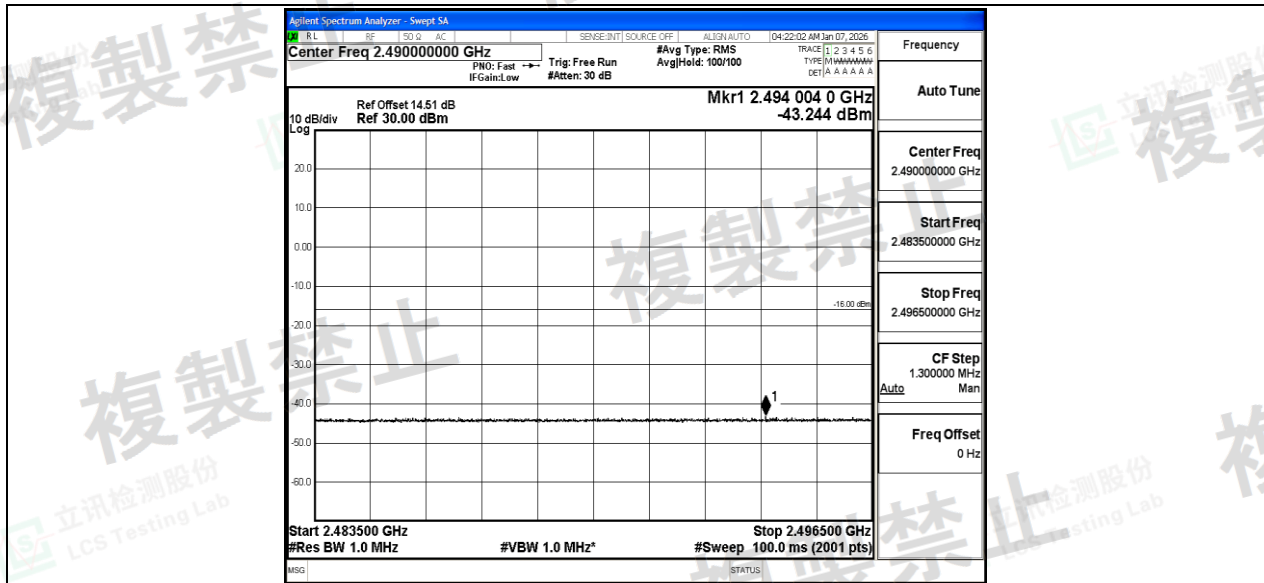
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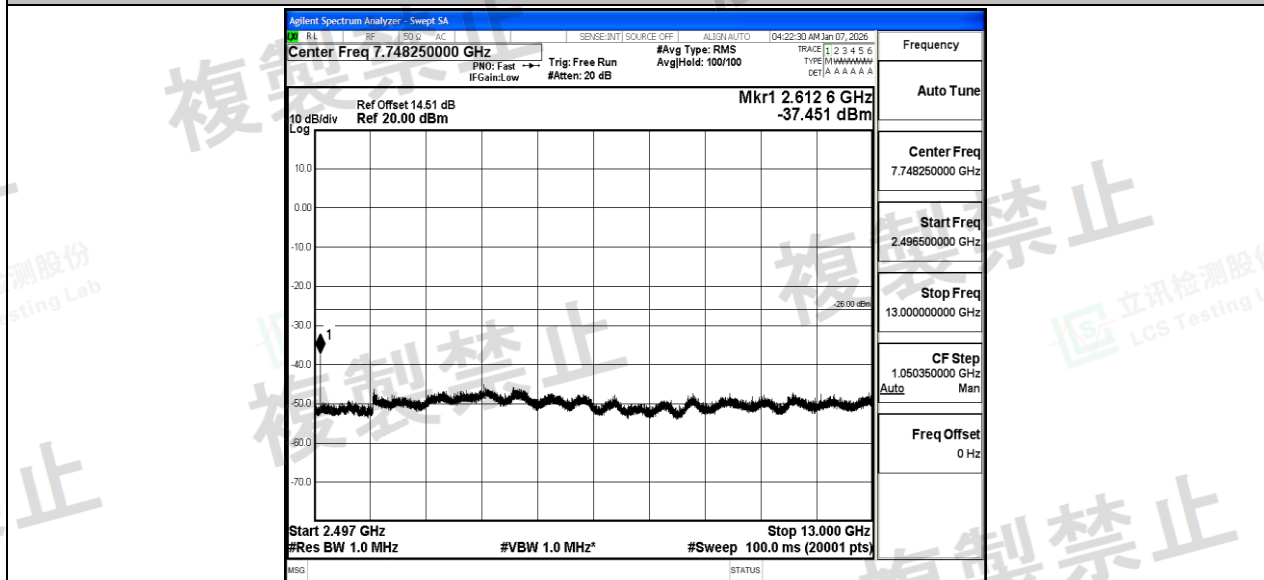








NTNV_2DH5_Ant1_2402_2496.5~13000



NTNV_2DH5_Ant1_2441_30~1000

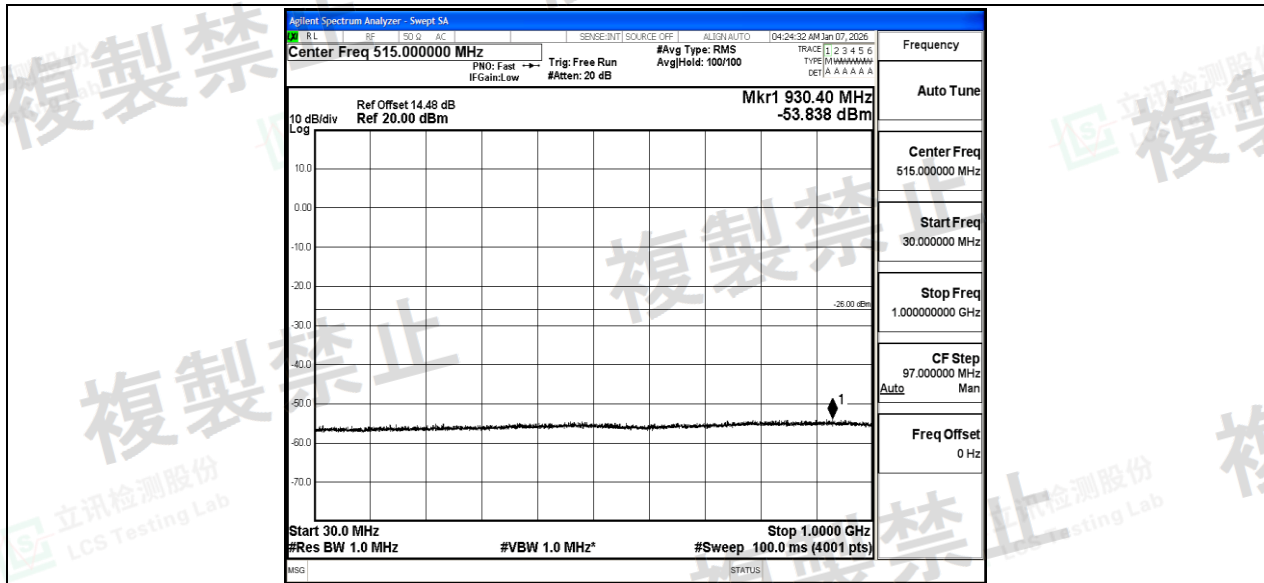


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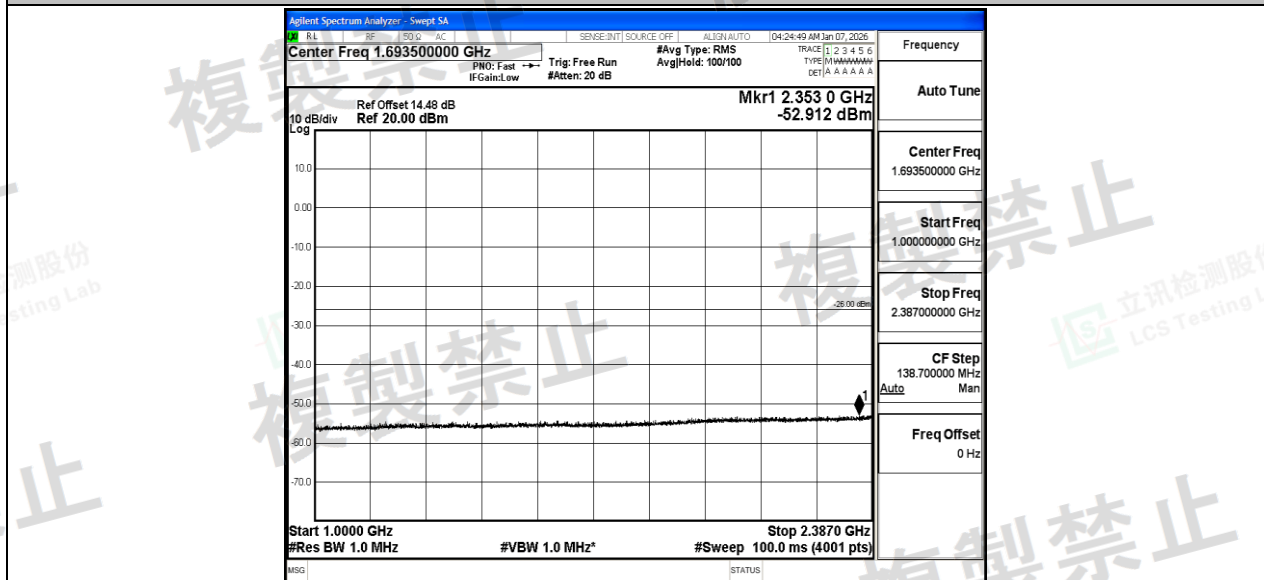
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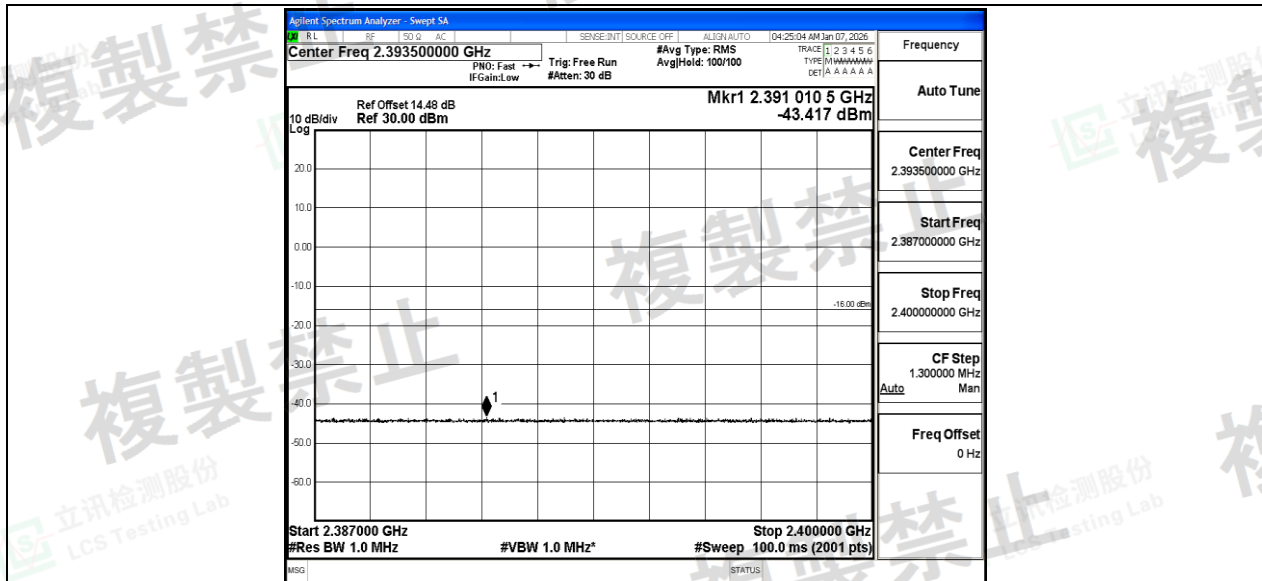


NTNV_2DH5_Ant1_2441_1000~2387

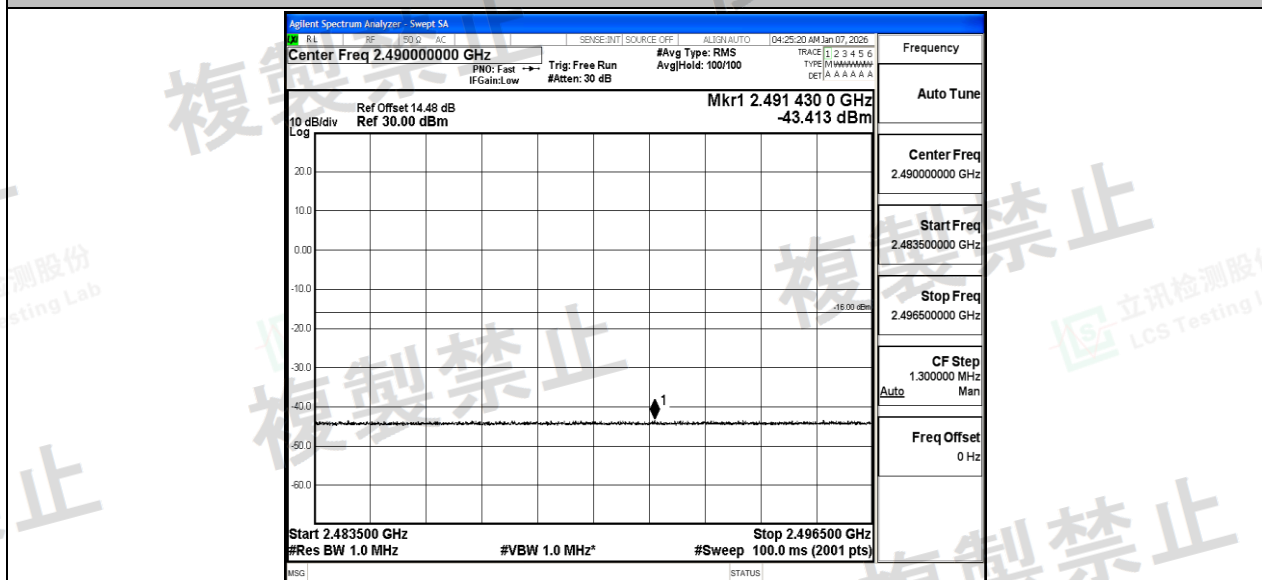


NTNV_2DH5_Ant1_2441_2387~2400





NTNV_2DH5_Ant1_2441_2483.5~2496.5



NTNV_2DH5_Ant1_2441_2496.5~13000

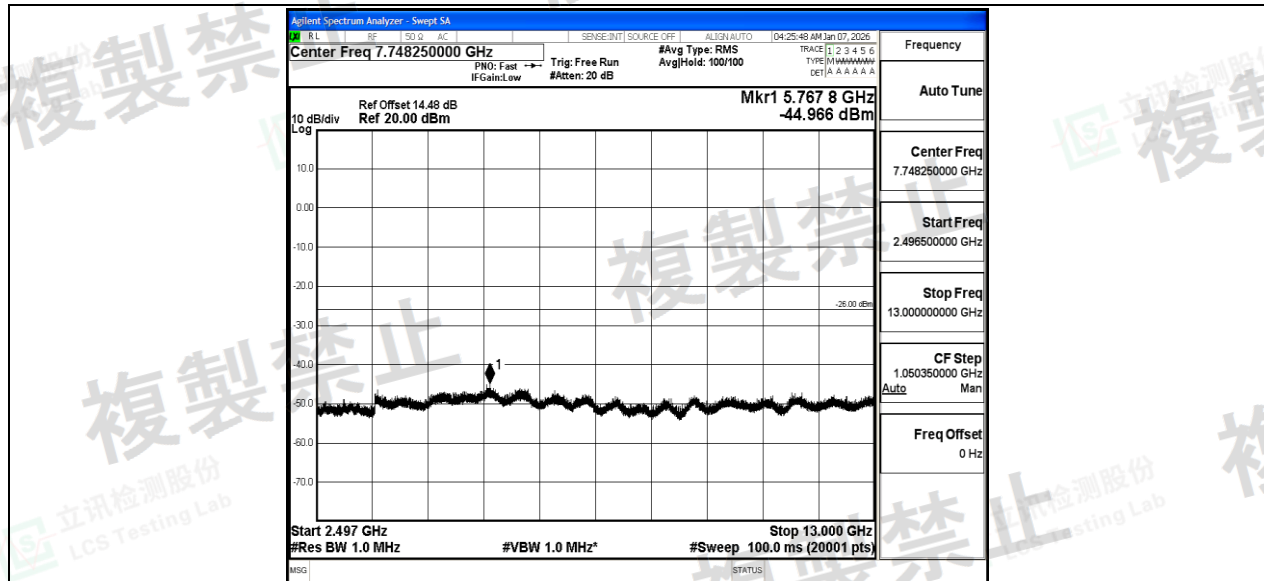
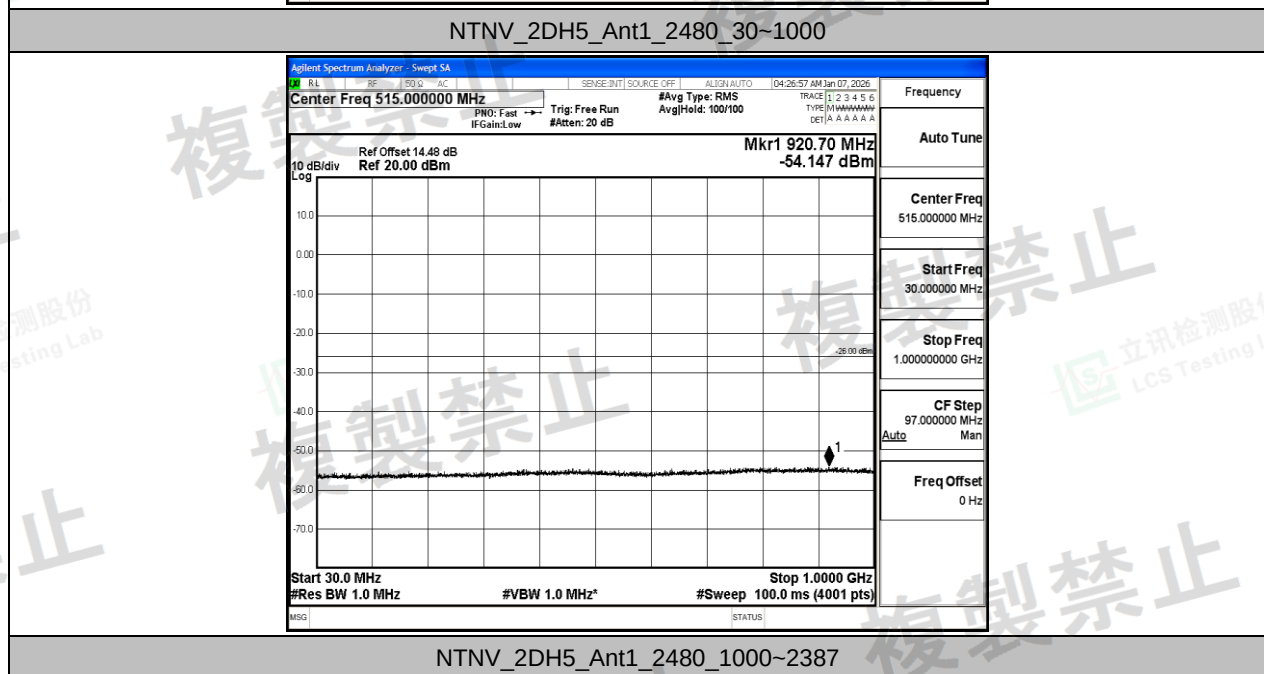


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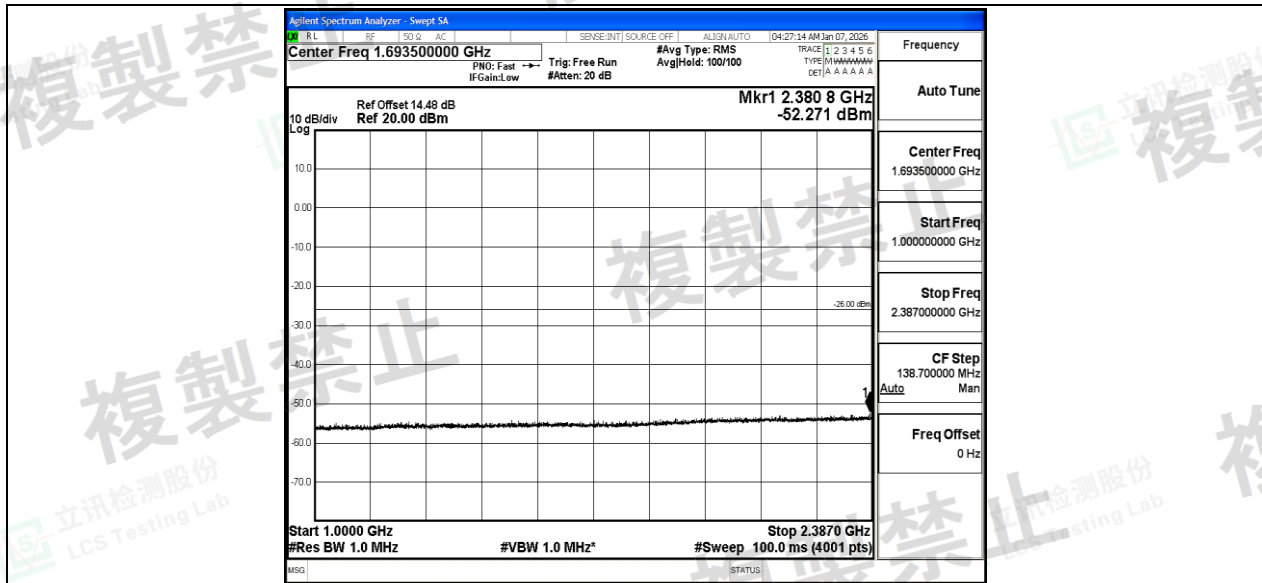
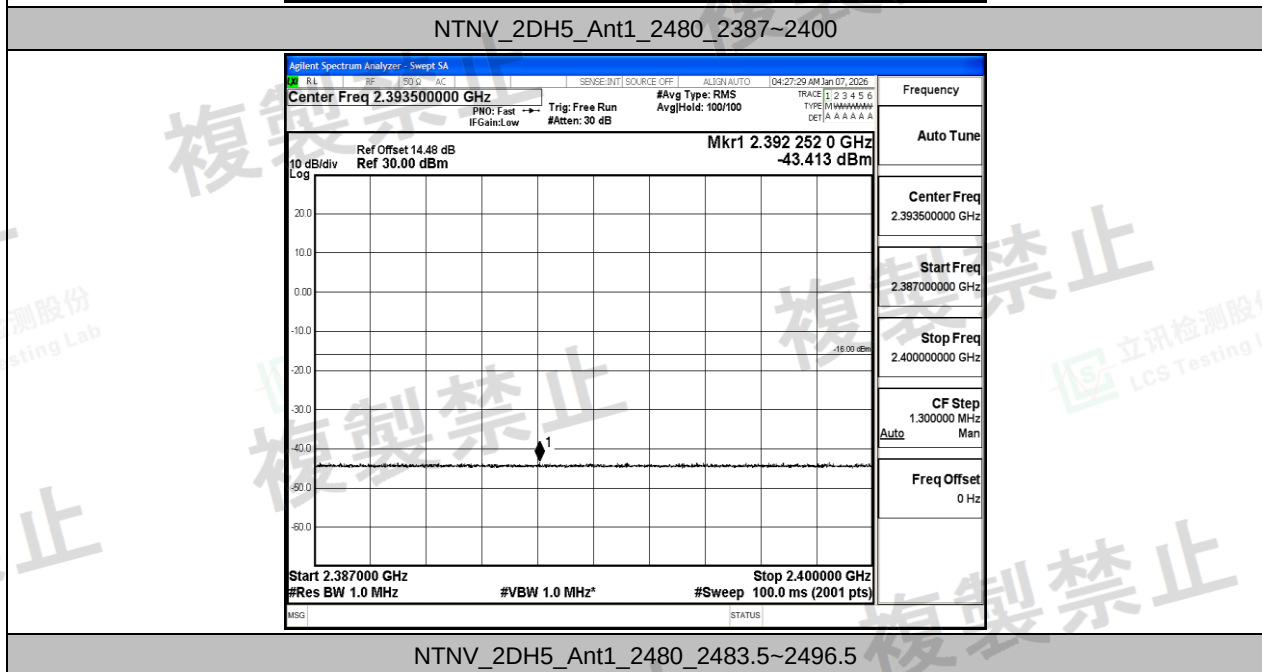


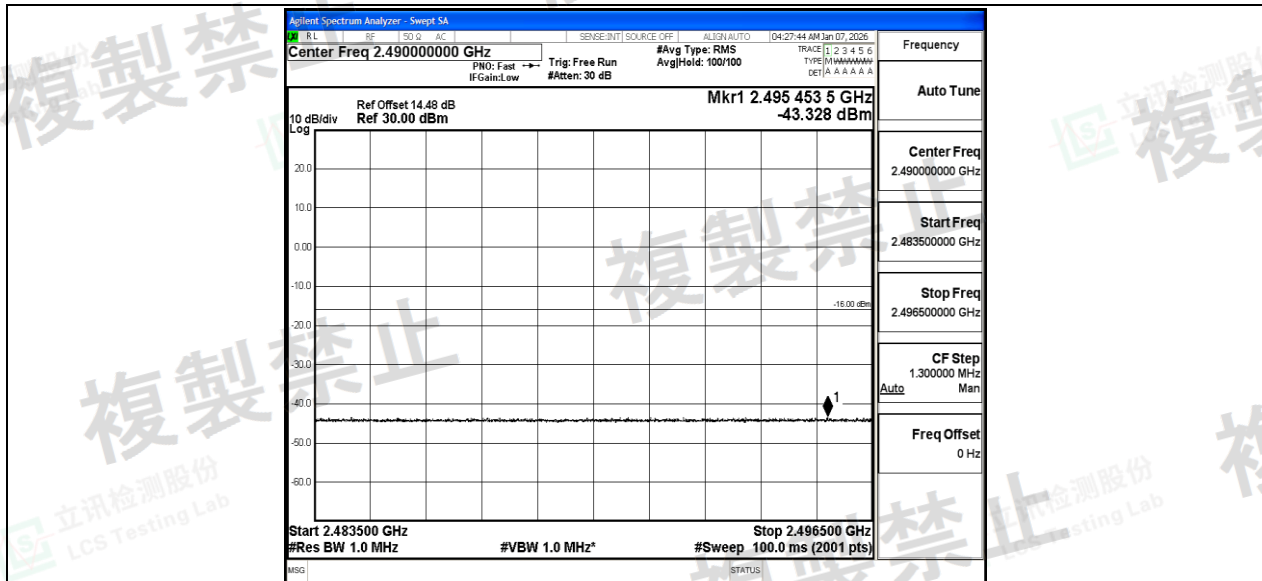
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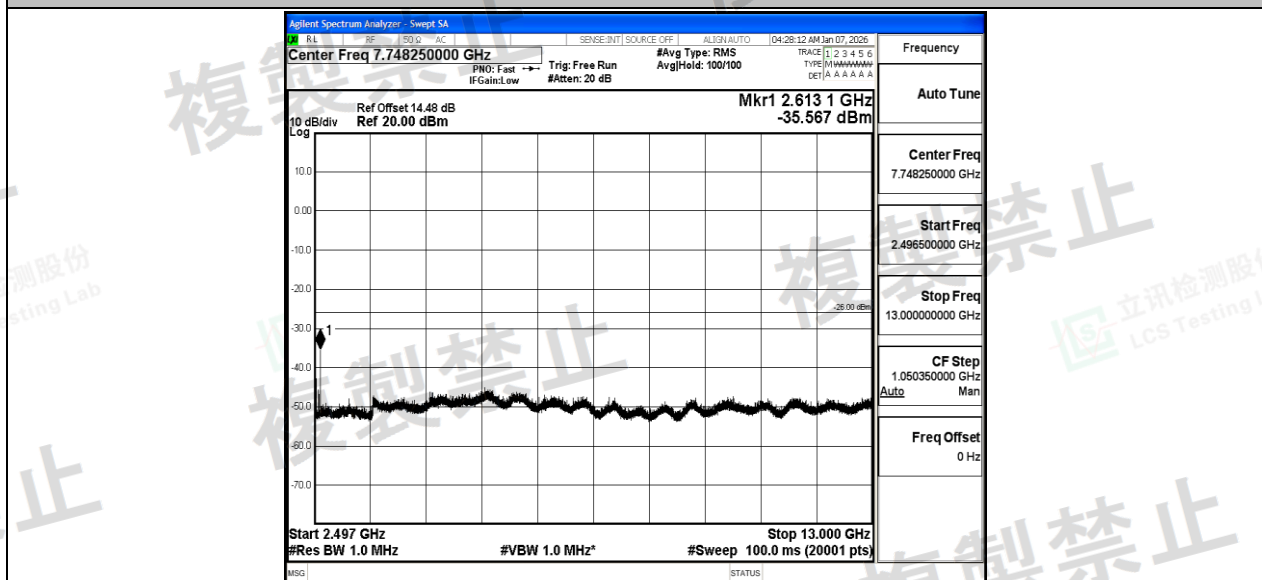
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NTNV_2DH5_Ant1_2480_2496.5~13000



NTNV_3DH5_Ant1_2402_30~1000

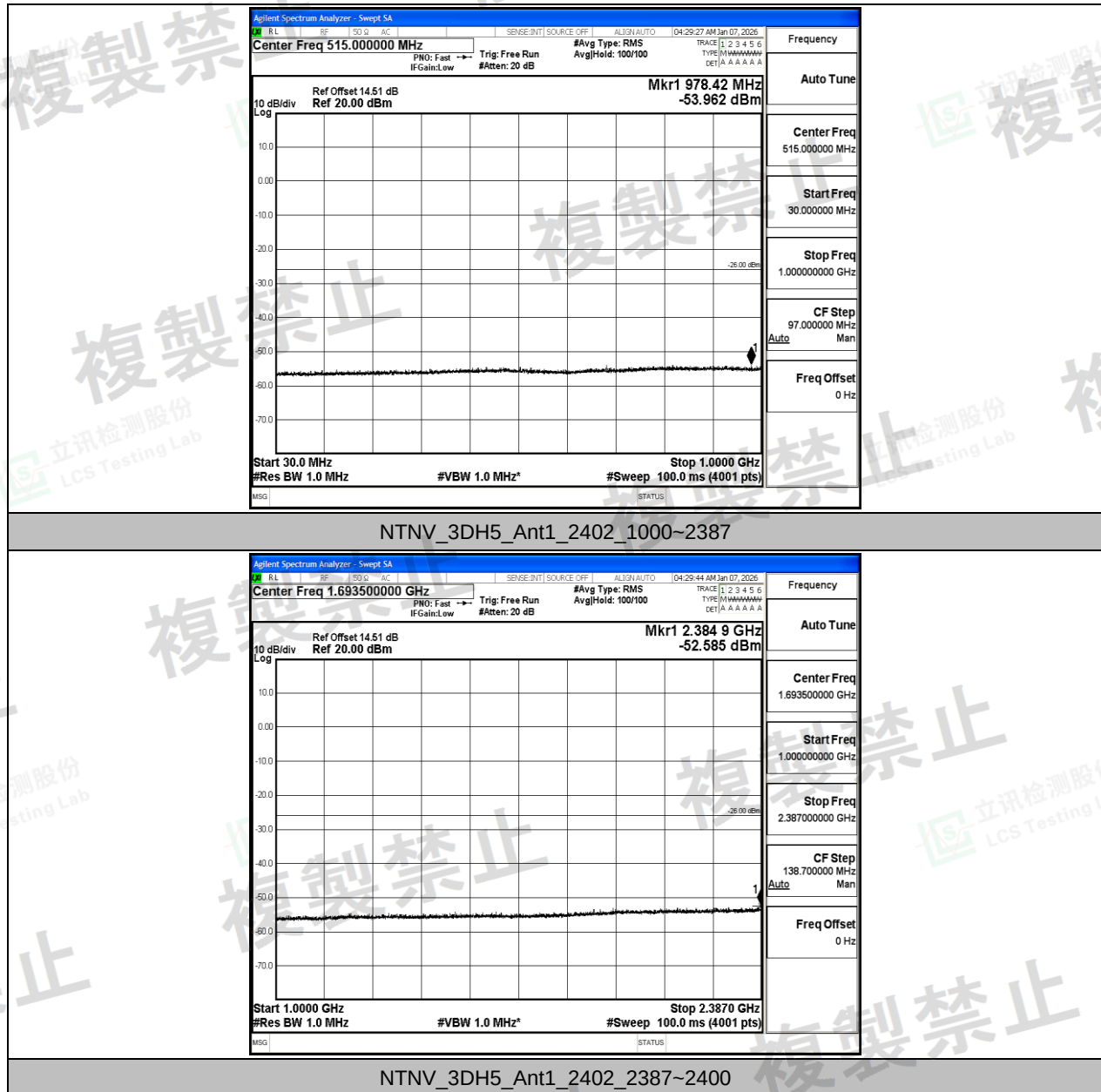


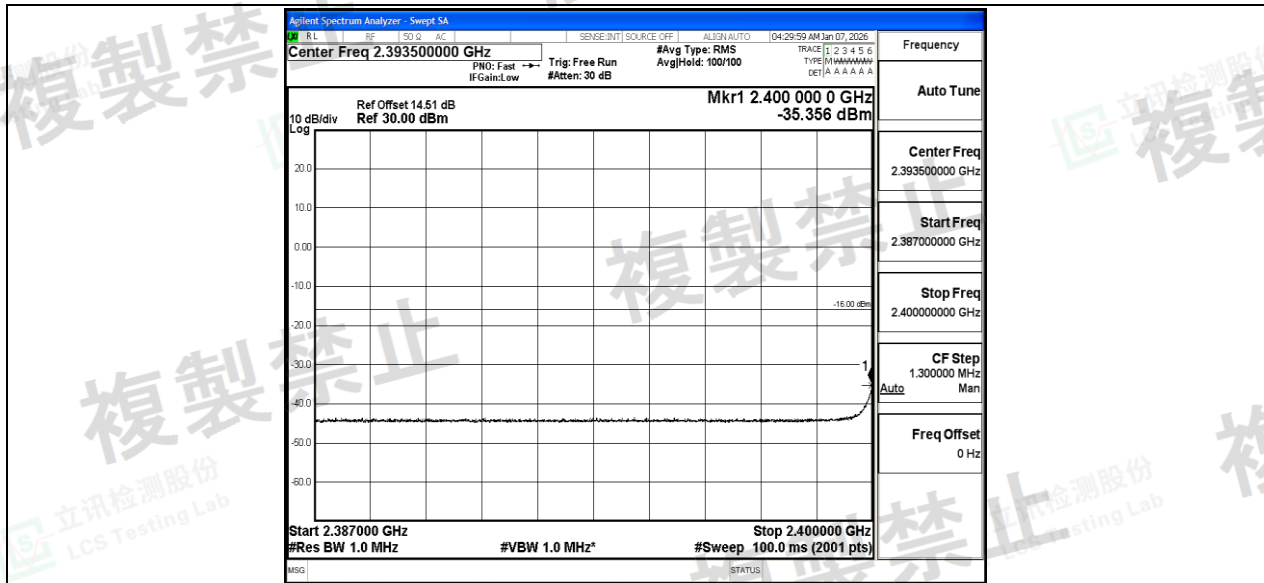
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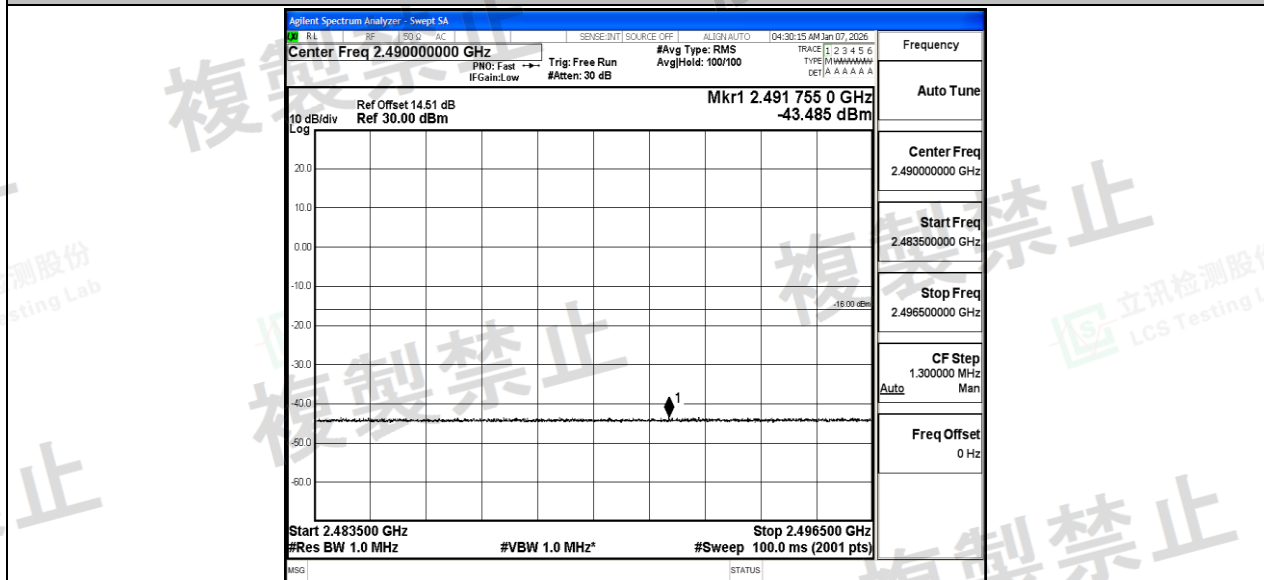
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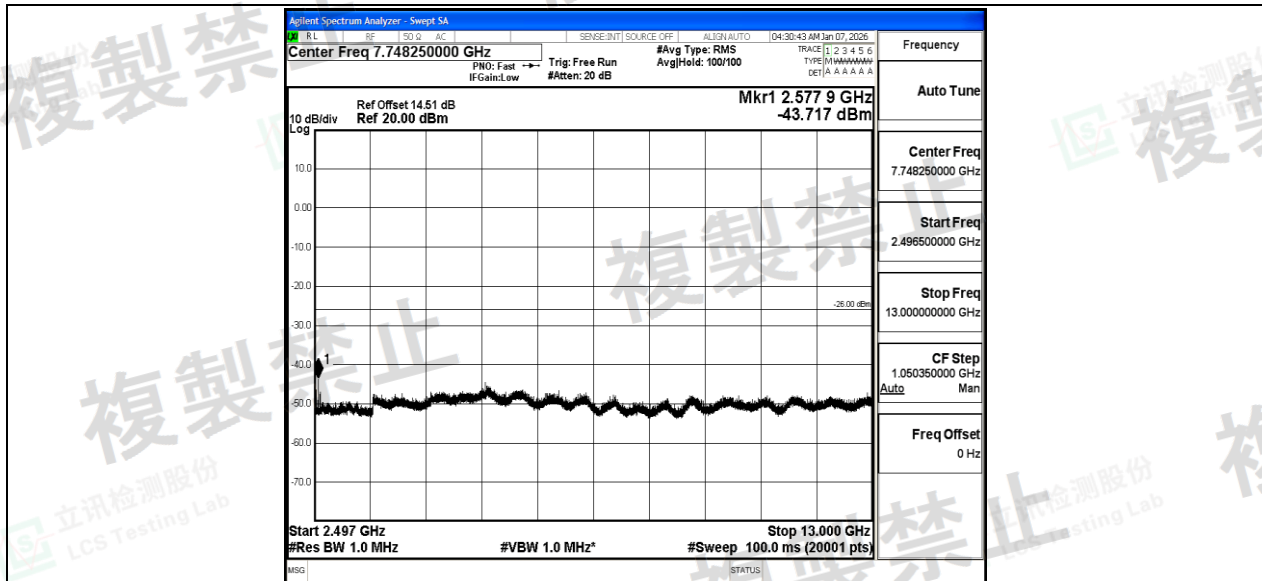


NTNV_3DH5_Ant1_2402_2483.5~2496.5

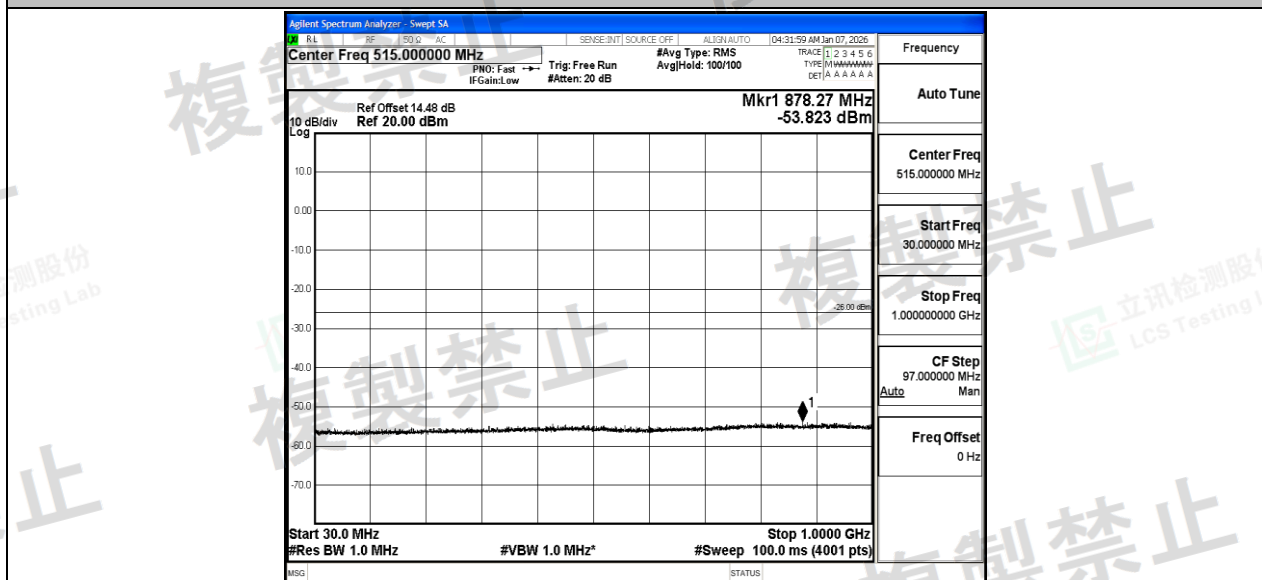


NTNV_3DH5_Ant1_2402_2496.5~13000



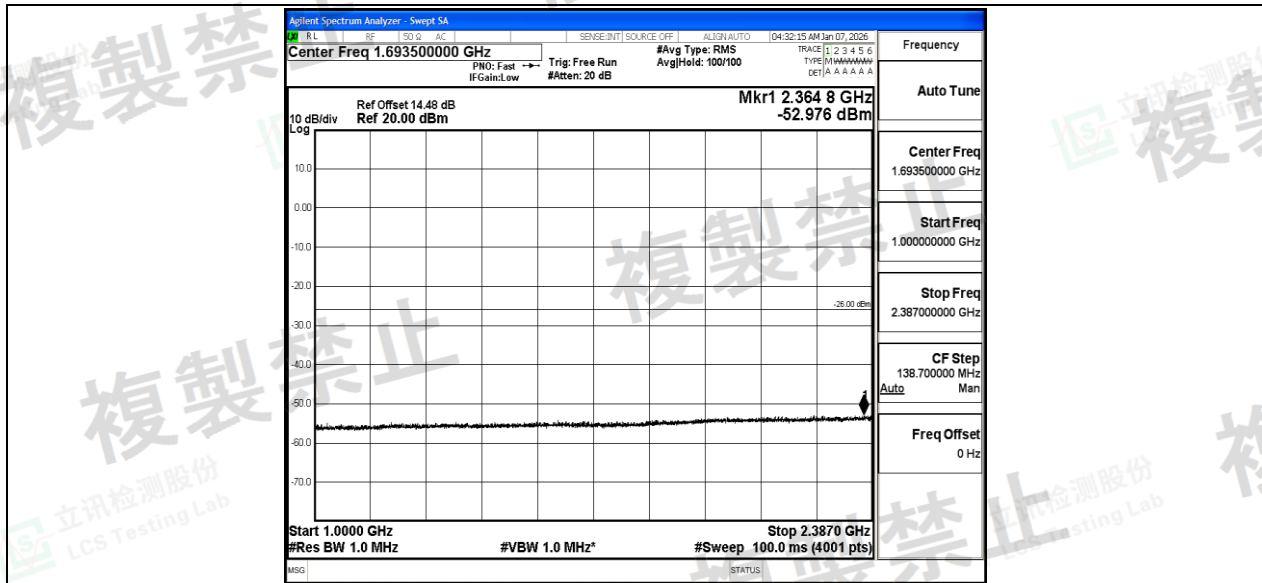
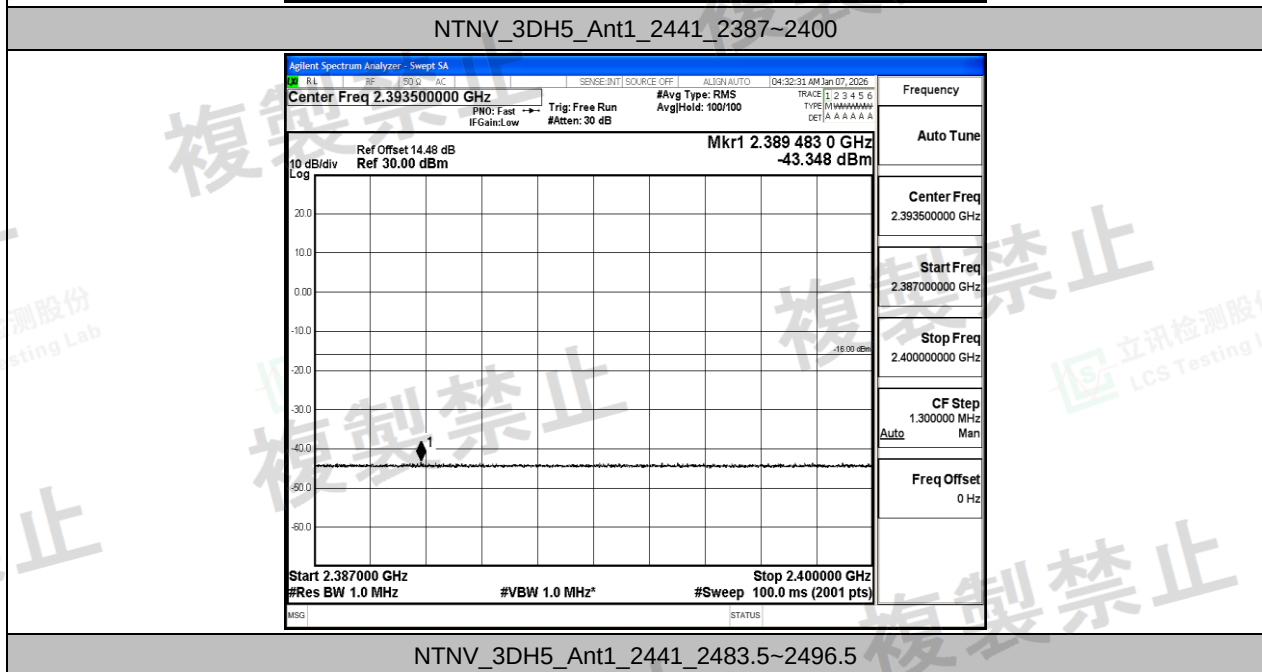


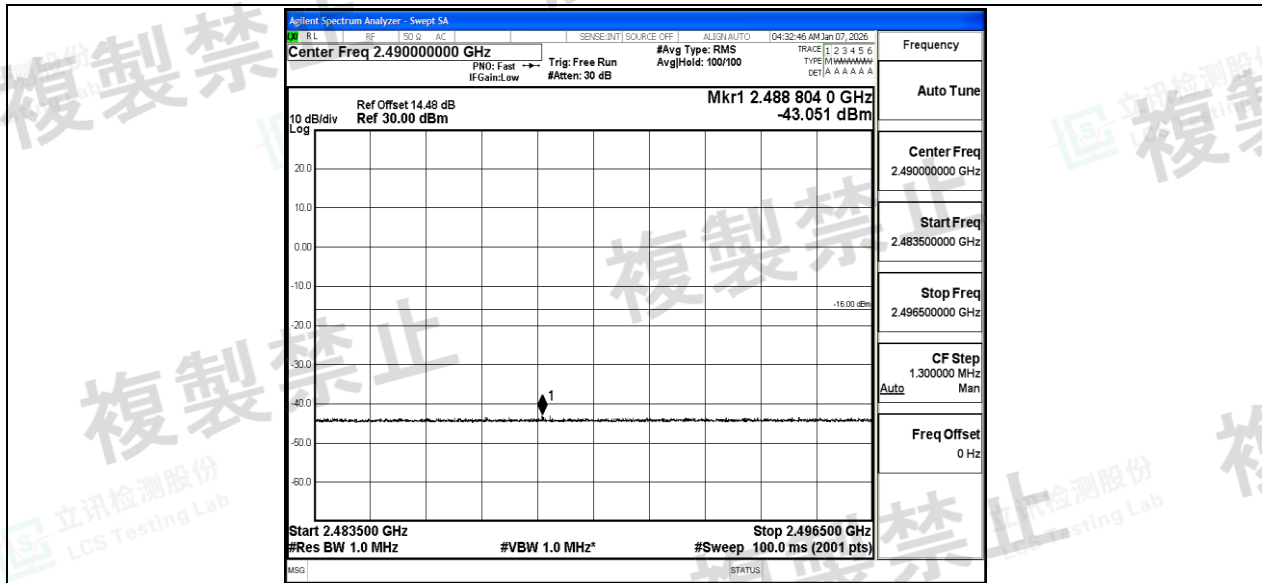
NTNV_3DH5_Ant1_2441_30~1000



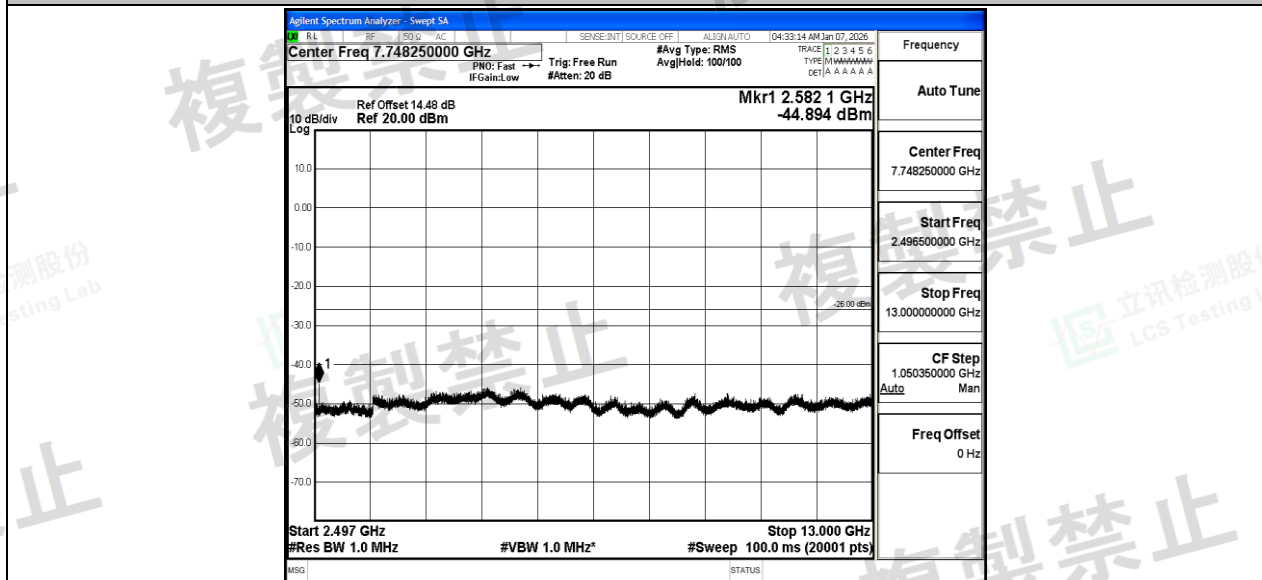
NTNV_3DH5_Ant1_2441_1000~2387





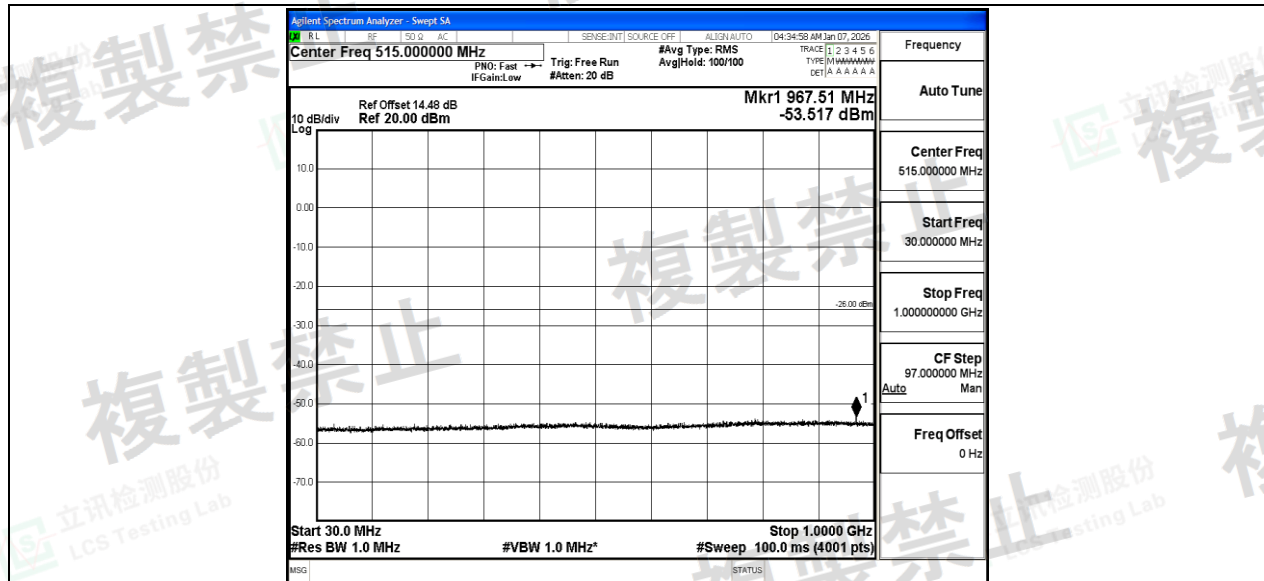
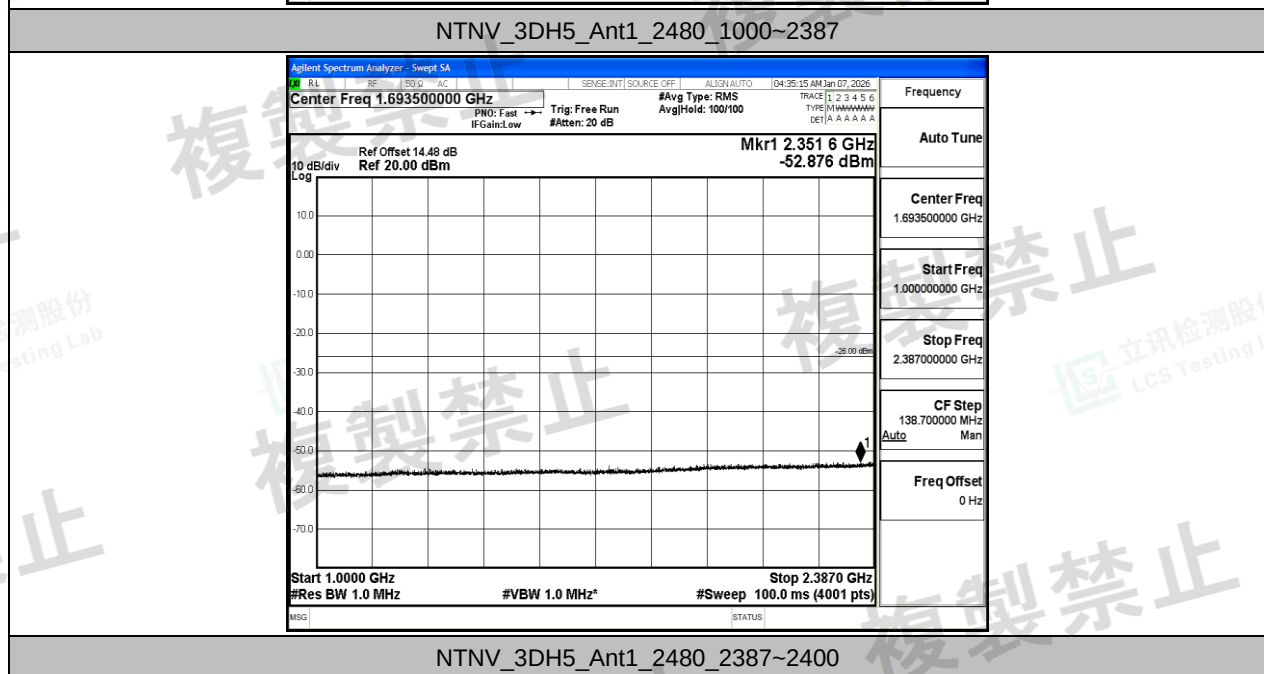


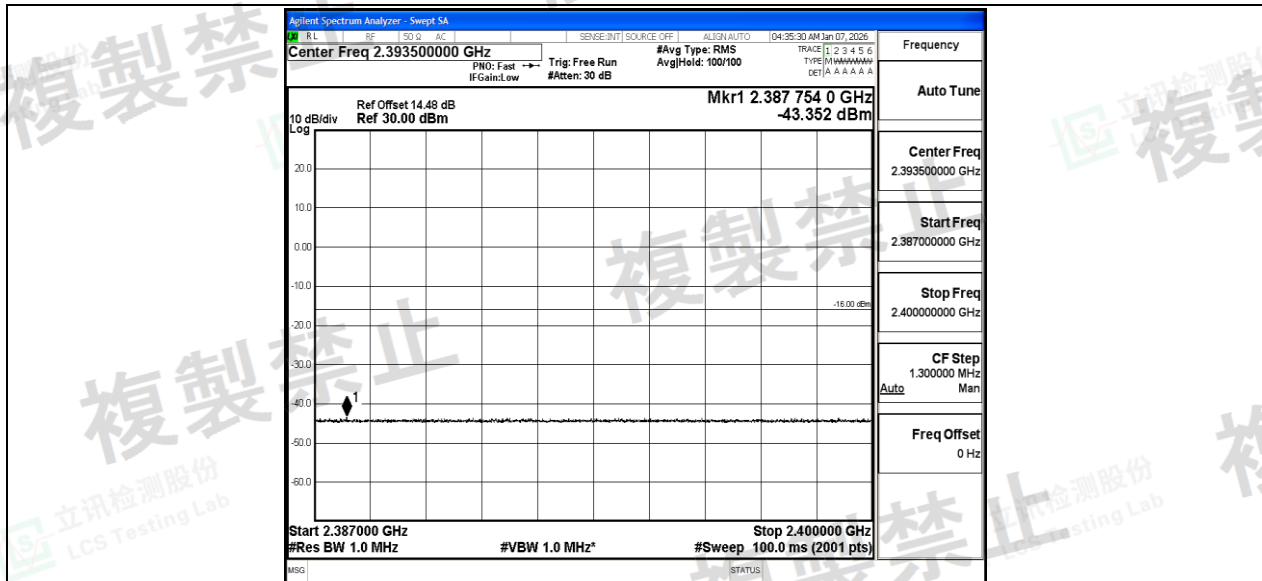
NTNV_3DH5_Ant1_2441_2496.5~13000



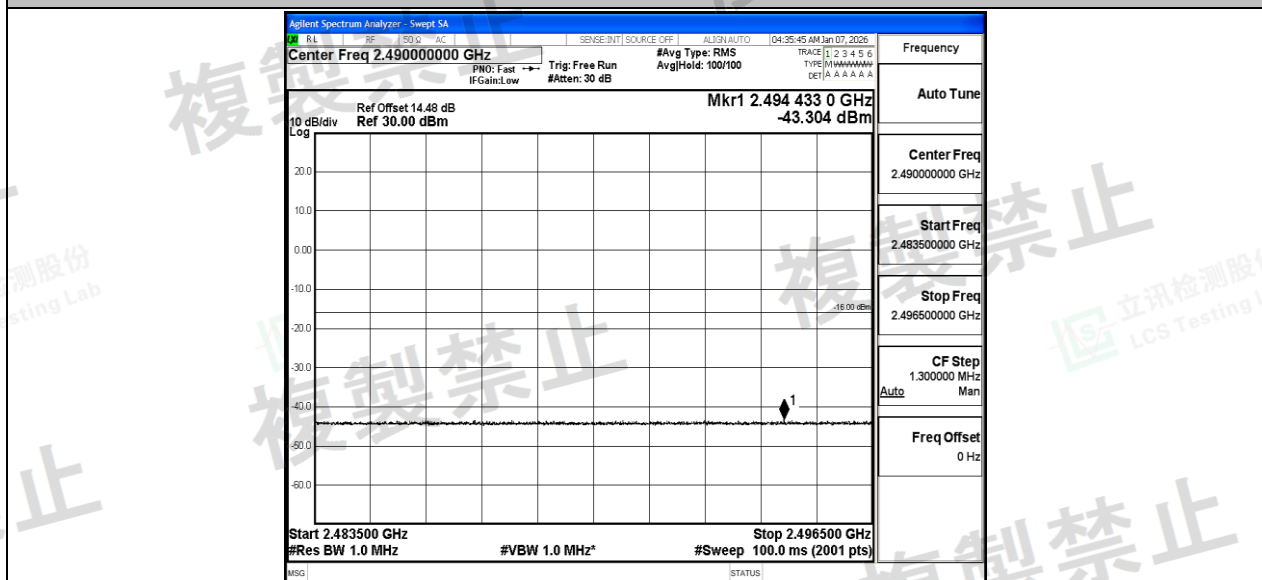
NTNV_3DH5_Ant1_2480_30~1000





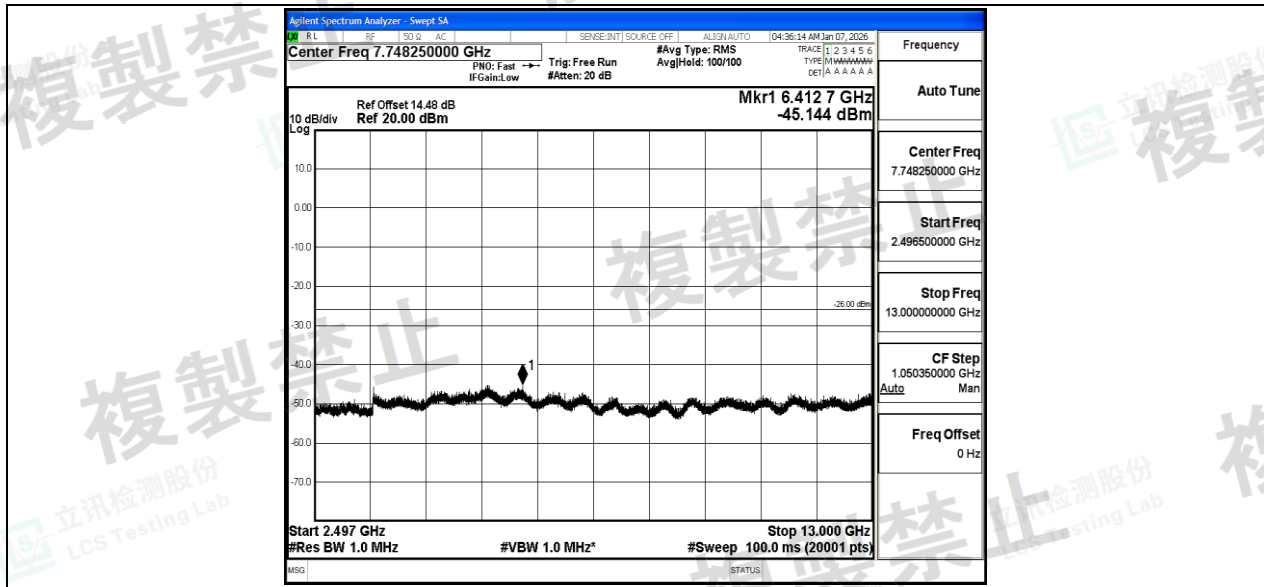


NTNV_3DH5_Ant1_2480_2483.5~2496.5



NTNV_3DH5_Ant1_2480_2496.5~13000







A.6 Spurious Emission of RX

Test Result

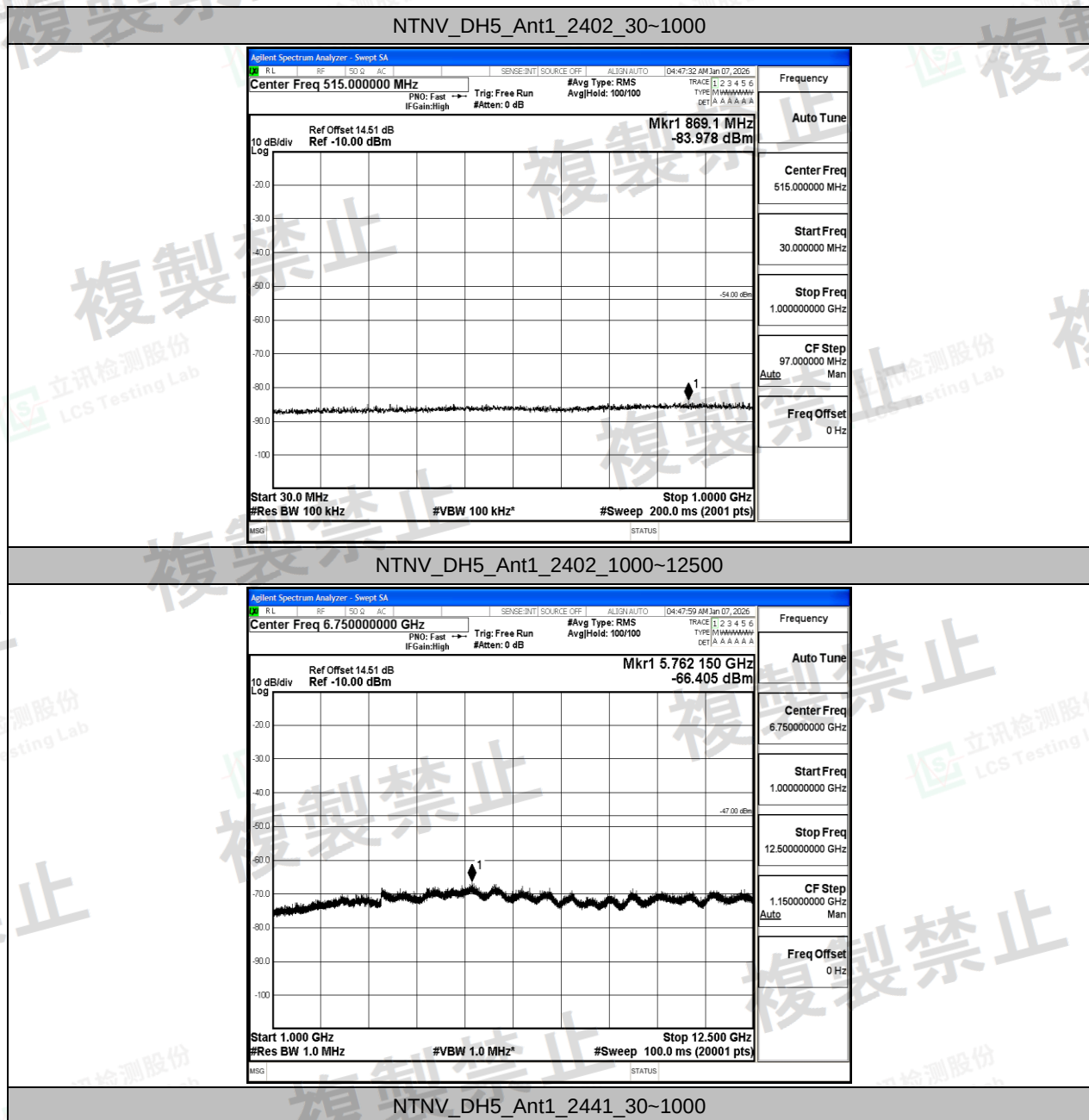
TestCondition	TestMode	Antenna	Frequency[MHz]	Freq.Range [MHz]	Result [dBm]	Limit [dBm]	Result [nW]	Limit [nW]	Verdict
NTNV	DH5	Ant1	2402	30~1000	-83.98	≤-54	0.00400	≤4	PASS
				1000~12500	-66.41	≤-47	0.22856	≤20	PASS
			2441	30~1000	-84.01	≤-54	0.00397	≤4	PASS
				1000~12500	-66.8	≤-47	0.20893	≤20	PASS
			2480	30~1000	-83.84	≤-54	0.00413	≤4	PASS
				1000~12500	-67.08	≤-47	0.19588	≤20	PASS
	2DH5	Ant1	2402	30~1000	-84.07	≤-54	0.00392	≤4	PASS
				1000~12500	-66.95	≤-47	0.20184	≤20	PASS
			2441	30~1000	-84.19	≤-54	0.00381	≤4	PASS
				1000~12500	-66.89	≤-47	0.20464	≤20	PASS
			2480	30~1000	-83.7	≤-54	0.00427	≤4	PASS
				1000~12500	-66.29	≤-47	0.23496	≤20	PASS
	3DH5	Ant1	2402	30~1000	-83.92	≤-54	0.00406	≤4	PASS
				1000~12500	-66.85	≤-47	0.20654	≤20	PASS
			2441	30~1000	-84.07	≤-54	0.00392	≤4	PASS
				1000~12500	-66.98	≤-47	0.20045	≤20	PASS
			2480	30~1000	-83.88	≤-54	0.00409	≤4	PASS
				1000~12500	-67.1	≤-47	0.19498	≤20	PASS

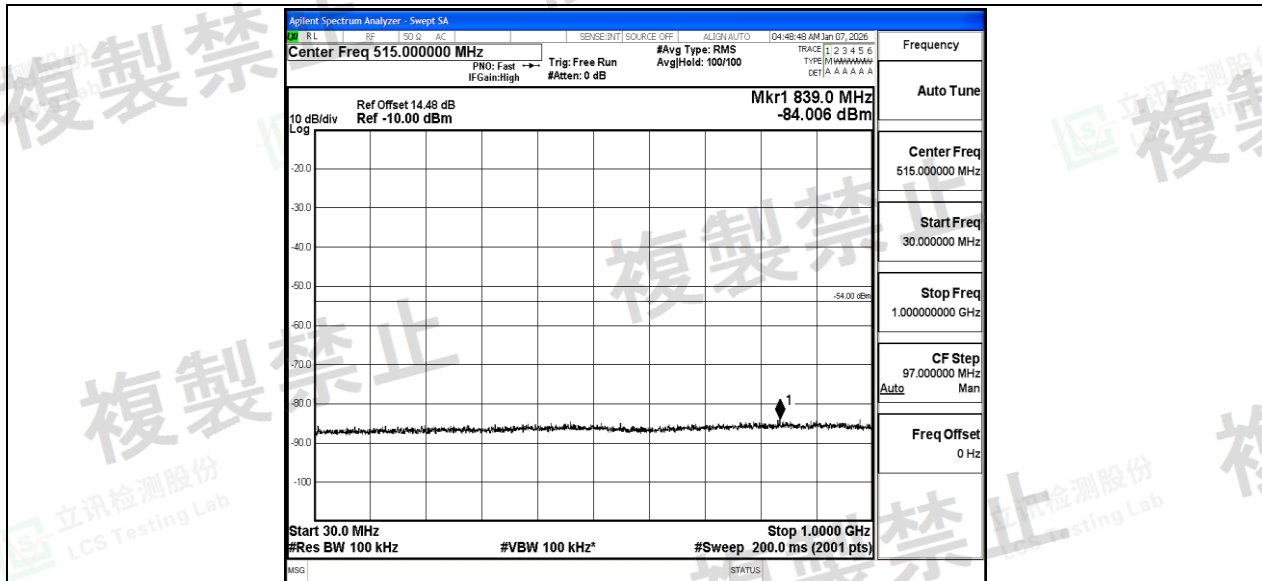
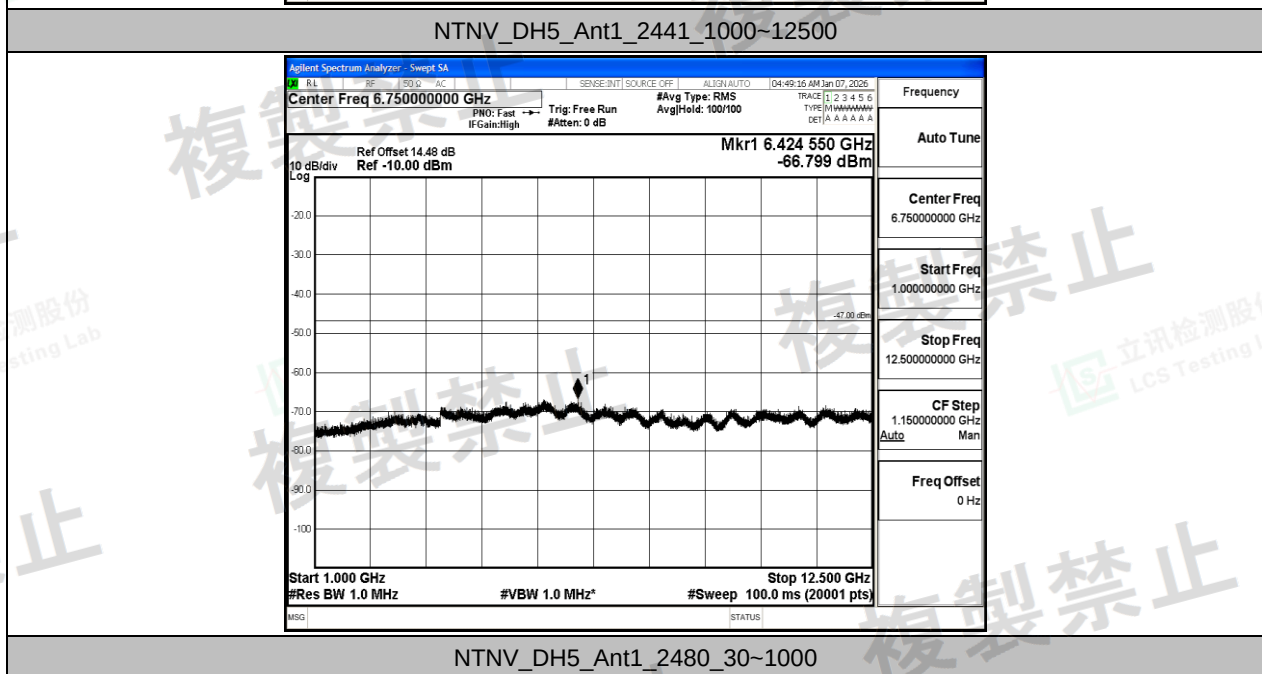


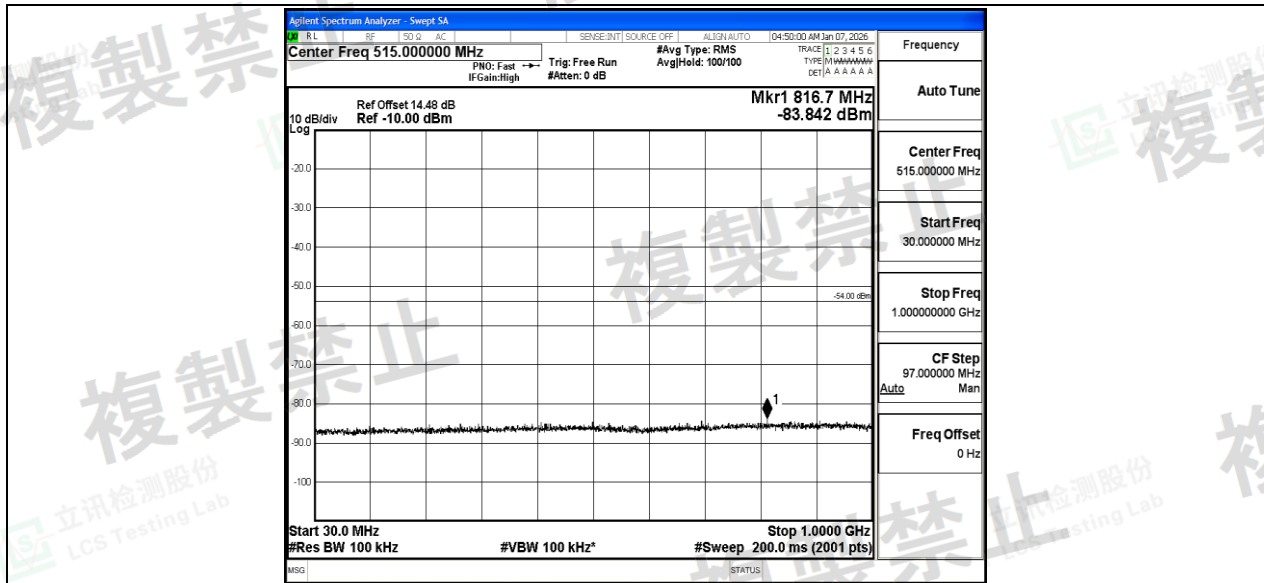
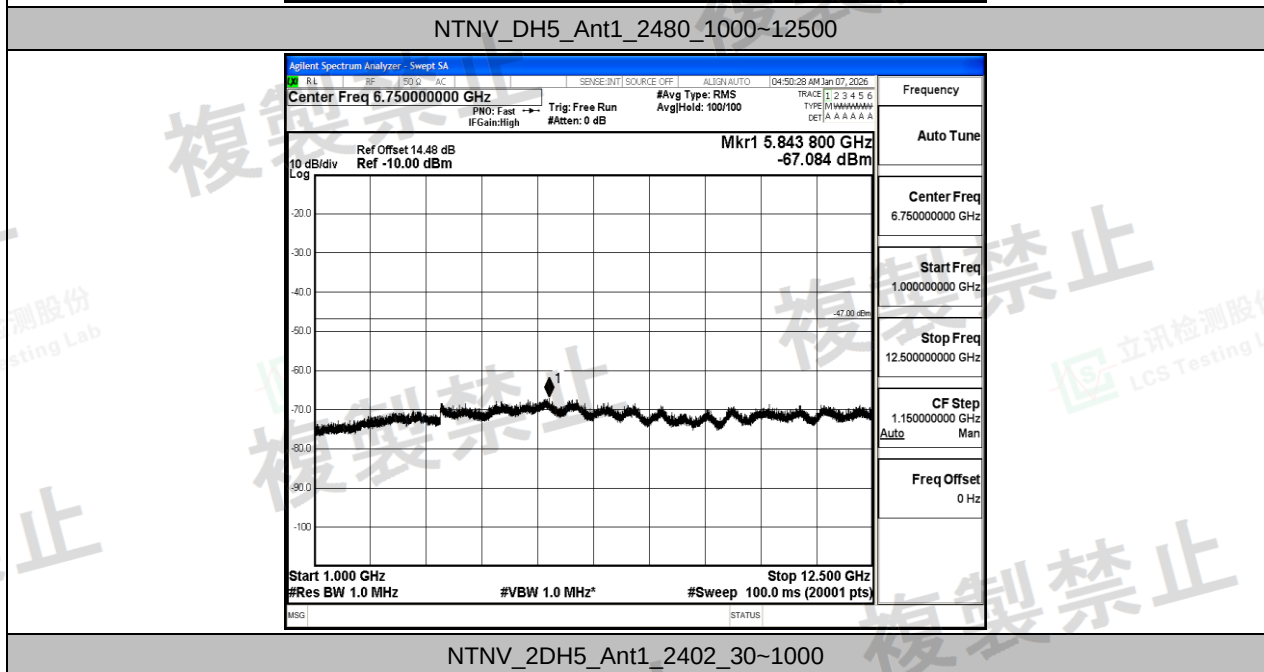
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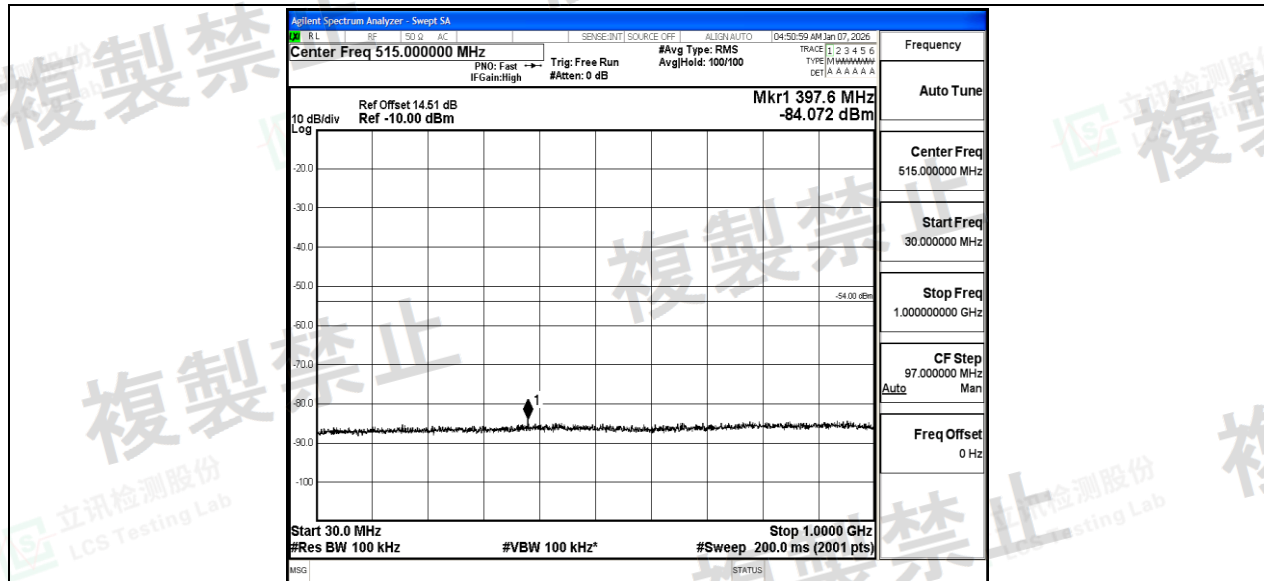
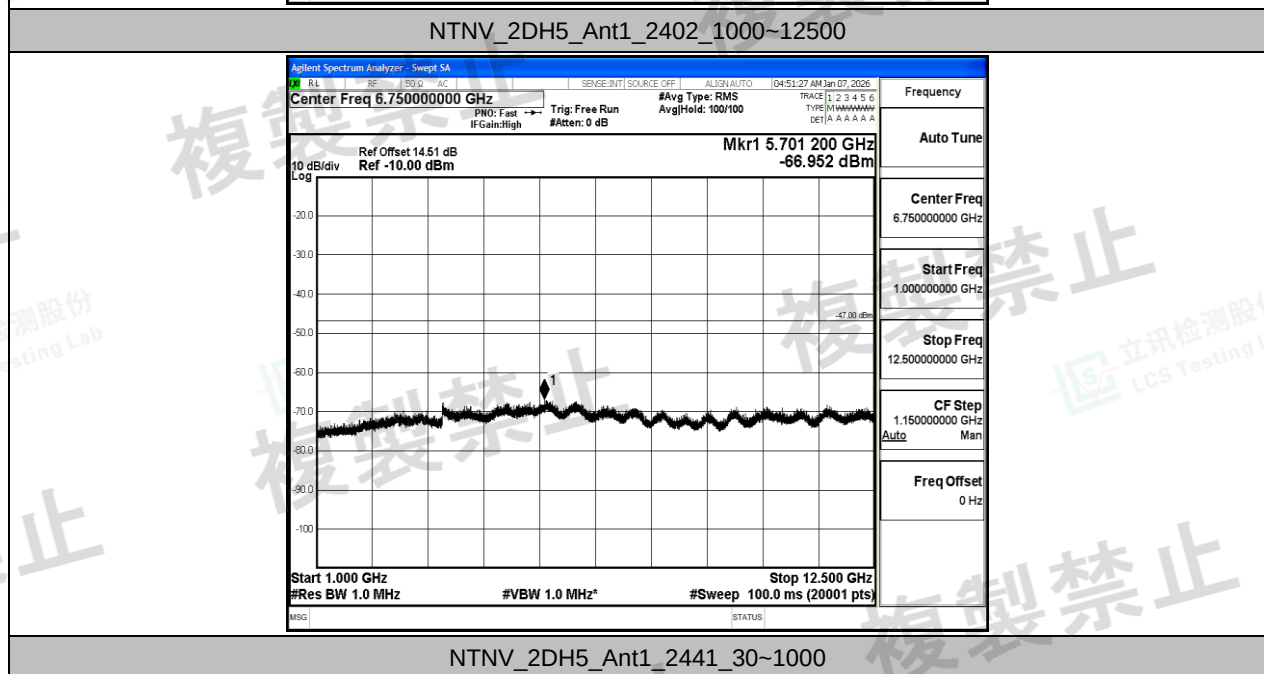


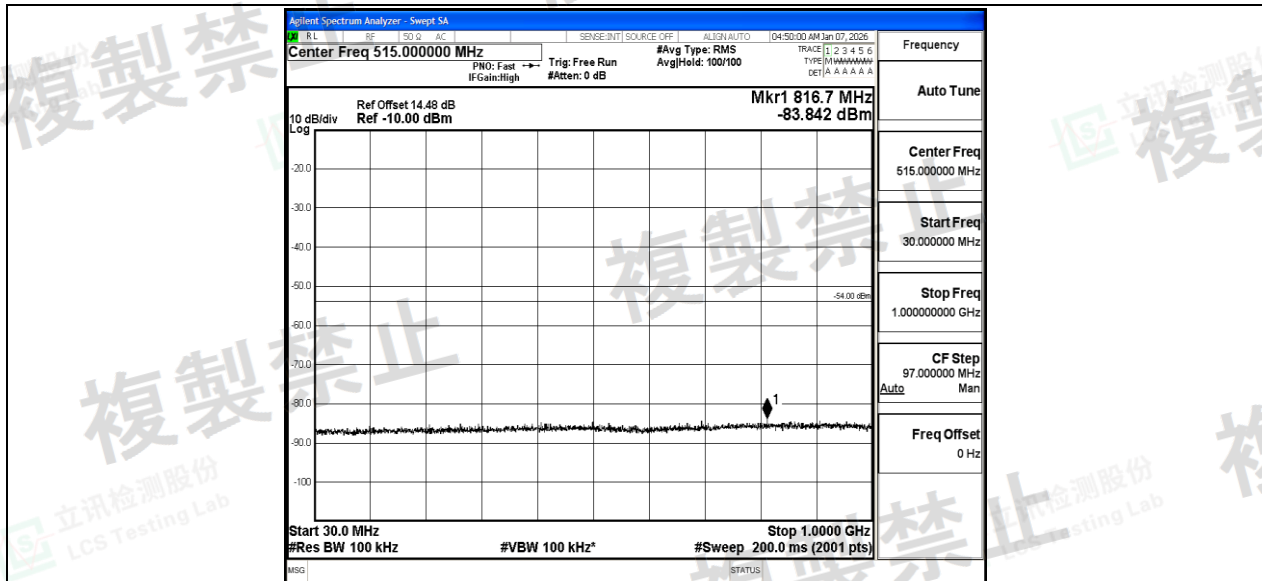
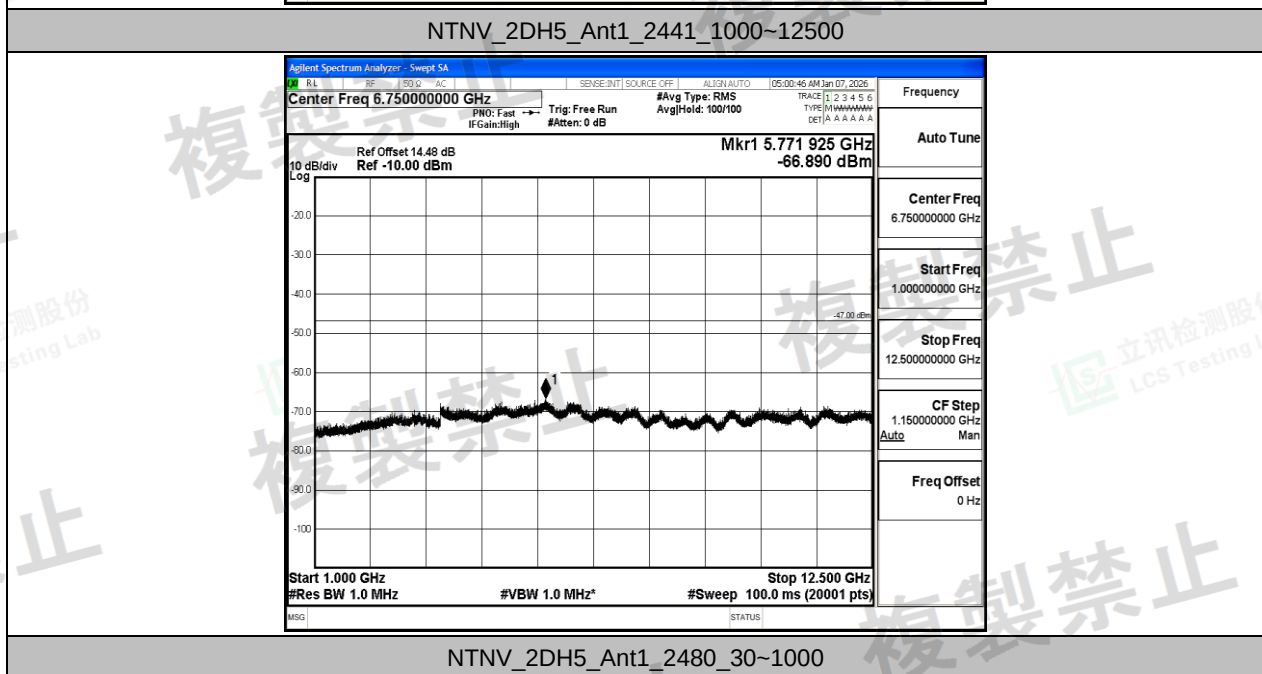
Test Graphs

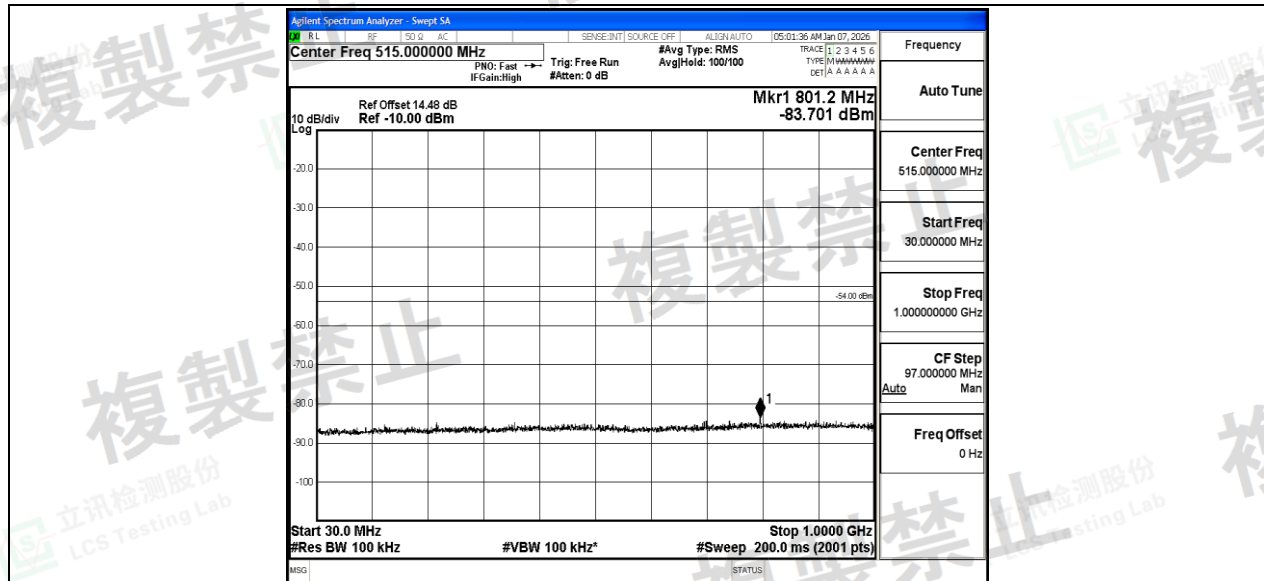
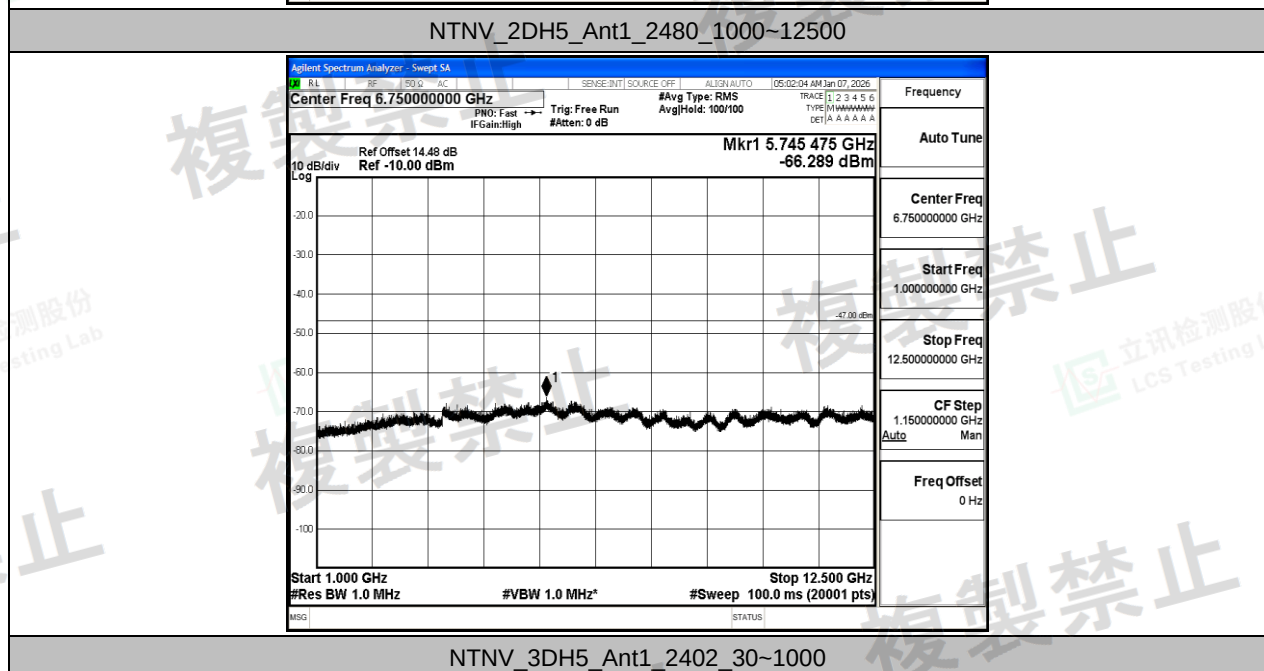


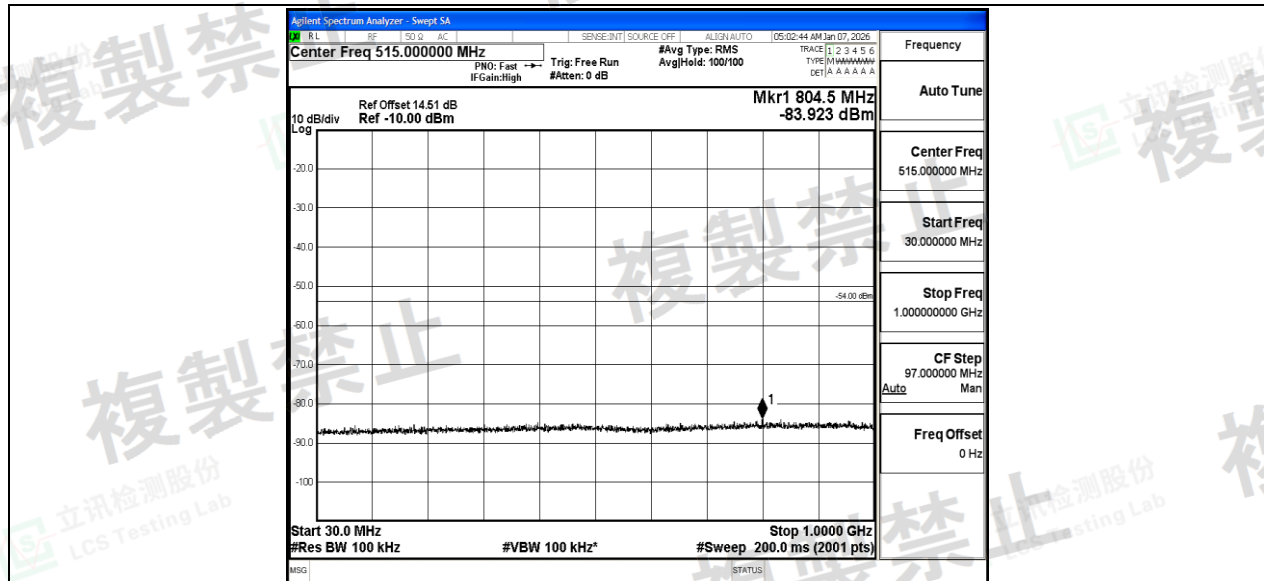
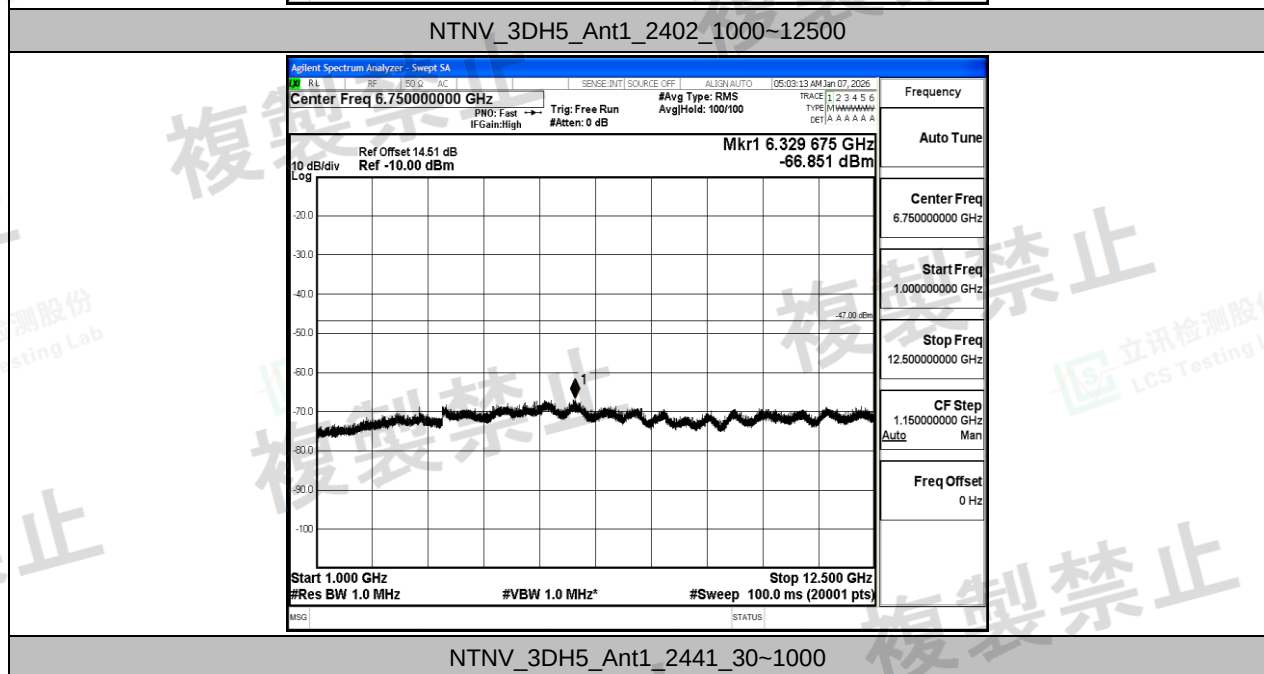


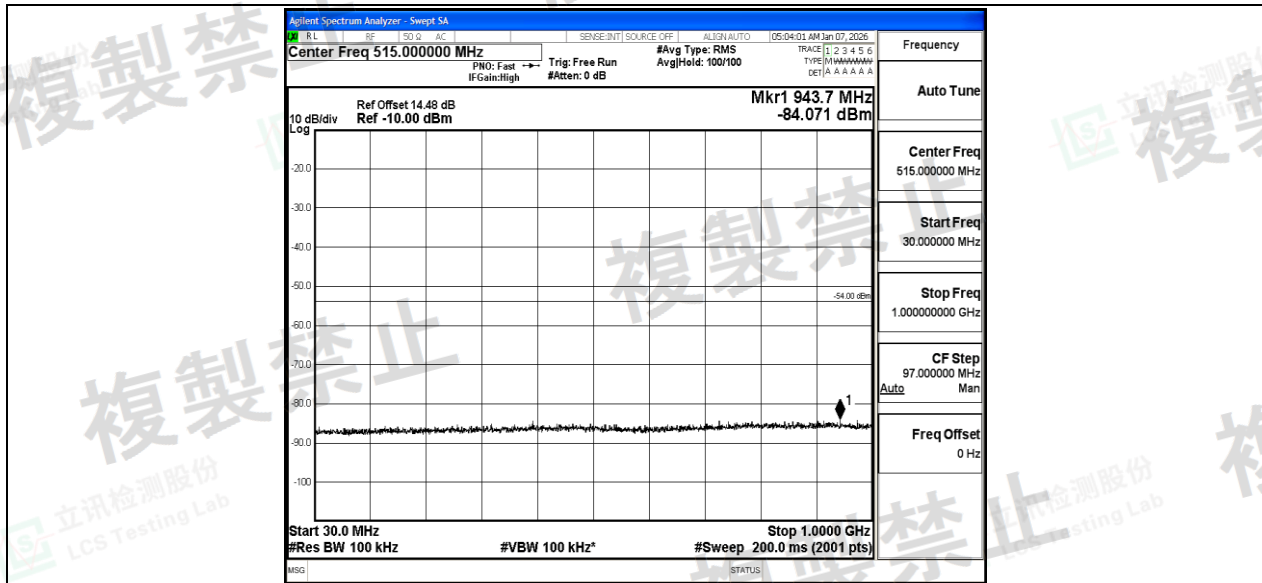
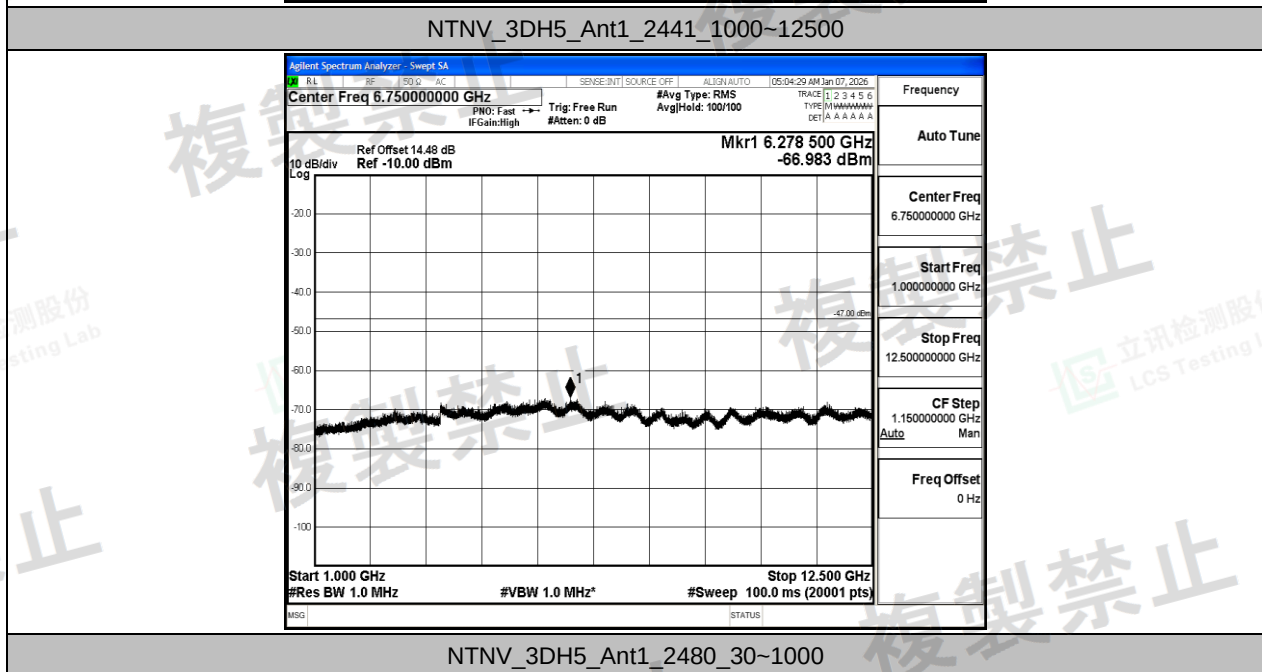


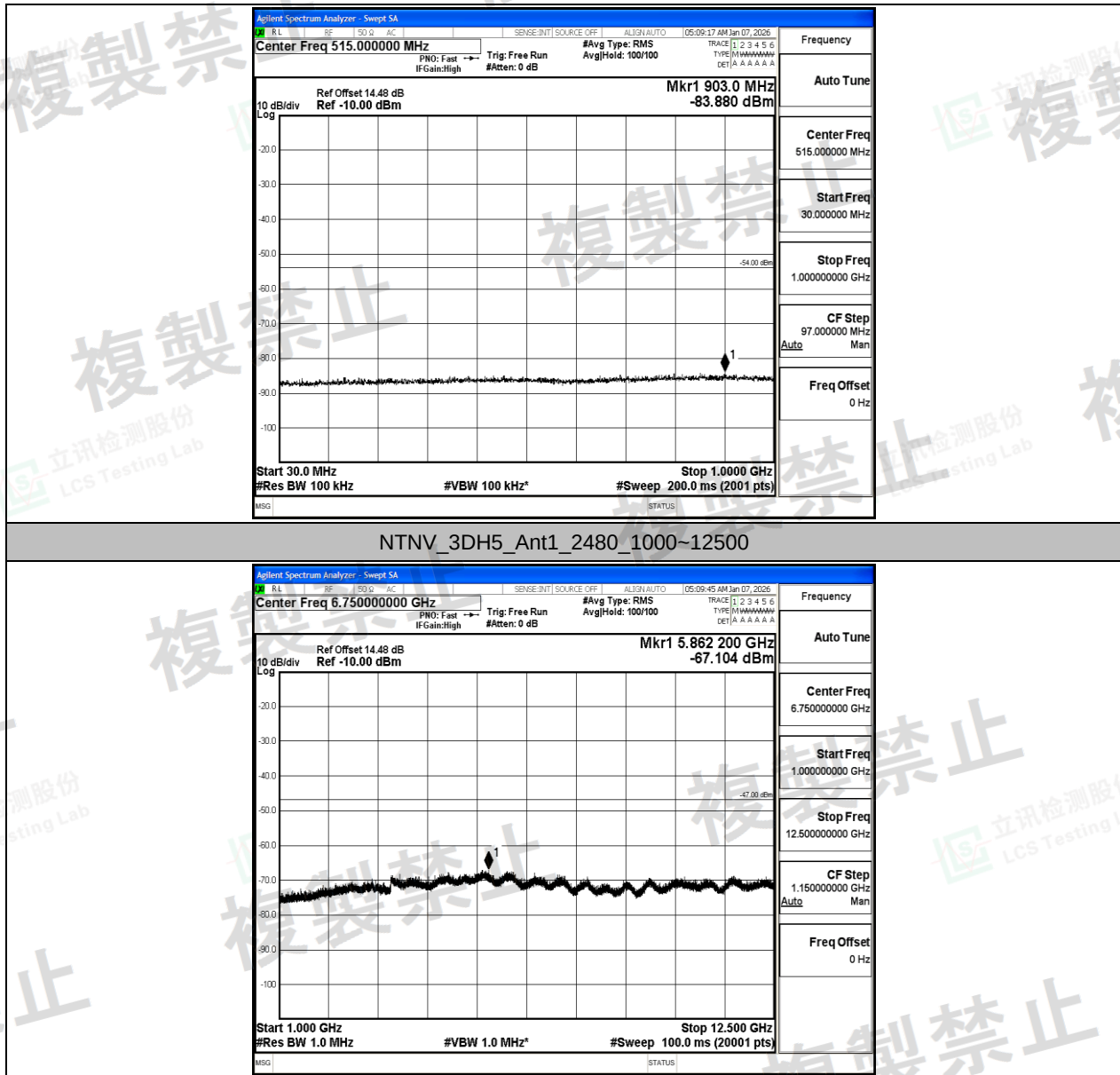














A.7 Dwell Time

Test Result

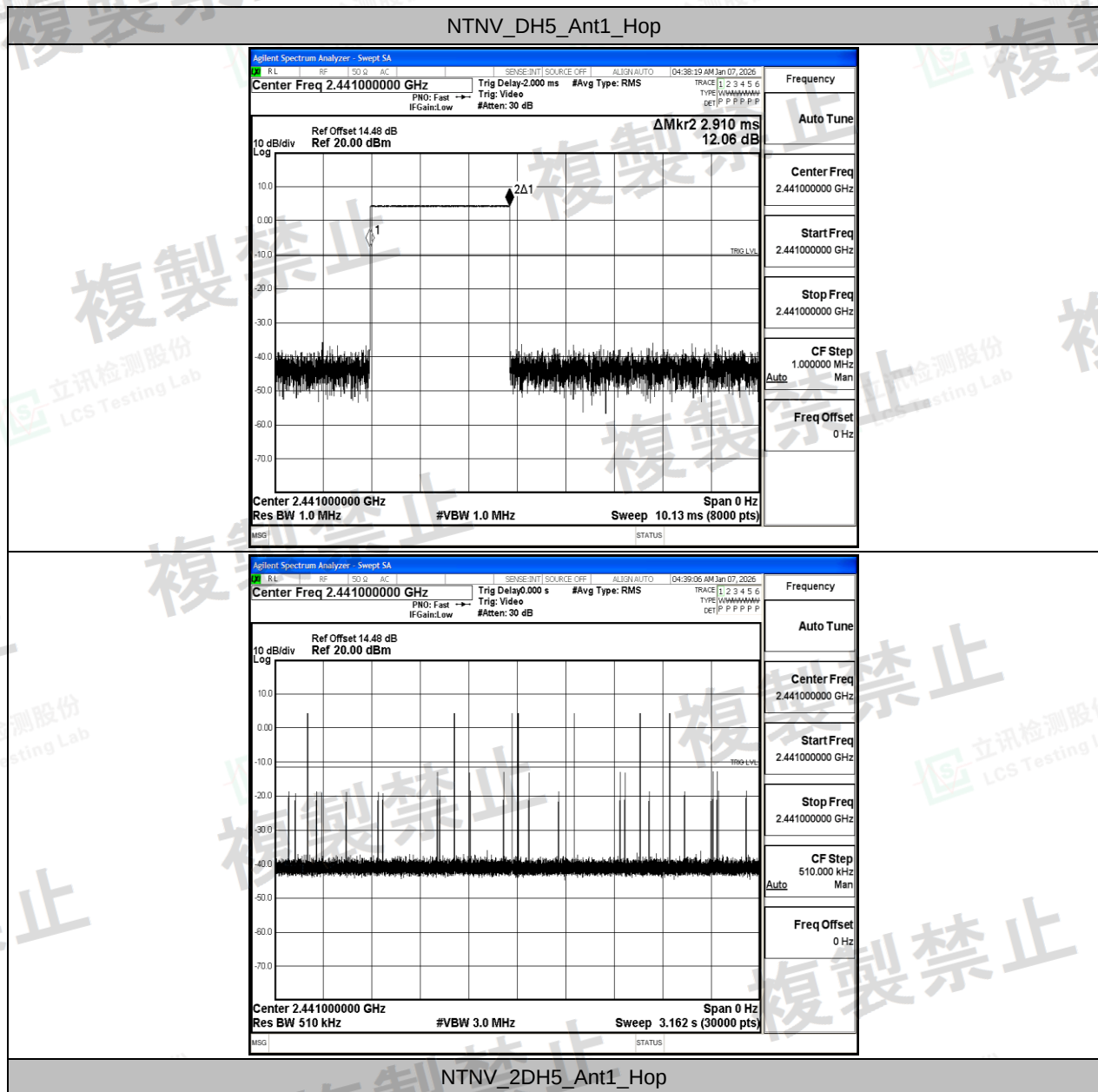
TestCondition	TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit [s]	Verdict
NTNV	DH5	Ant1	Hop	2.91	98	0.285	≤0.4	PASS
	2DH5	Ant1	Hop	2.90	120	0.348	≤0.4	PASS
	3DH5	Ant1	Hop	2.90	100	0.29	≤0.4	PASS



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Test Graphs

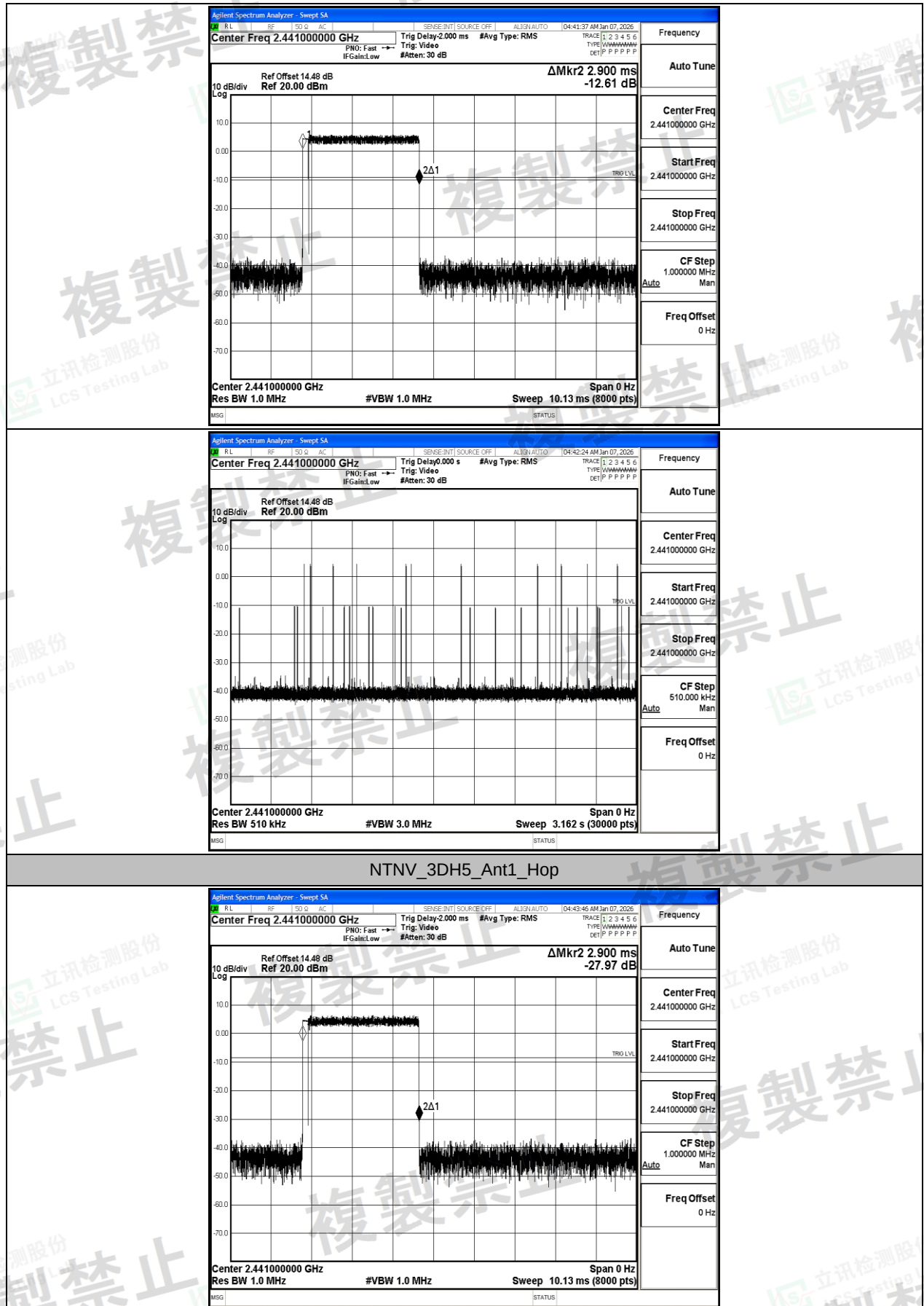


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