

Appendix A: Test Results of Bluetooth LE

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Appendix A.1: Test Results of Frequency Tolerance

Test Result

TestCondition	TestMode	Antenna	Freq(MHz)	Result[ppm]	Limit[ppm]	Verdict
NTNV	BLE_1M	Ant1	2402	-1.74854	±50	PASS
			2440	-1.84426	±50	PASS
			2480	-1.93548	±50	PASS
	BLE_2M	Ant1	2402	-1.74854	±50	PASS
			2440	-1.72131	±50	PASS
			2480	-2.41936	±50	PASS

Appendix A.2: Test Results of Antenna Power

Test Result

TestMode	Antenna	Freq (MHz)	Result(dBm)	Result(mW)	Limit(mW)	Verdict
BLE_1M	Ant1	2402	-1.07	0.7816	≤10	PASS
		2440	-2.16	0.6081	≤10	PASS
		2480	-3.88	0.4093	≤10	PASS
BLE_2M	Ant1	2402	-1.08	0.7798	≤10	PASS
		2440	-2.16	0.6081	≤10	PASS
		2480	-3.88	0.4093	≤10	PASS

Test Mode	Antenna	Freq (MHz)	Power (mW)	RatedPower (mW)	Result (%)	Limit (%)	Verdict
BLE_1M	Ant1	2402	0.7816	5	-84.37	+20	PASS
		2440	0.6081	5	-87.84	+20	PASS
		2480	0.4093	5	-91.81	+20	PASS
BLE_2M	Ant1	2402	0.7798	5	-84.40	+20	PASS
		2440	0.6081	5	-87.84	+20	PASS
		2480	0.4093	5	-91.81	+20	PASS

TestMode	Antenna	Freq (MHz)	Power (dBm)	EIRP(dBm)	Limit(dBm)	Verdict
BLE_1M	Ant1	2402	-1.07	0.43	≤12.14	PASS
		2440	-2.16	-0.66	≤12.14	PASS
		2480	-3.88	-2.38	≤12.14	PASS
BLE_2M	Ant1	2402	-1.08	0.42	≤12.14	PASS
		2440	-2.16	-0.66	≤12.14	PASS
		2480	-3.88	-2.38	≤12.14	PASS

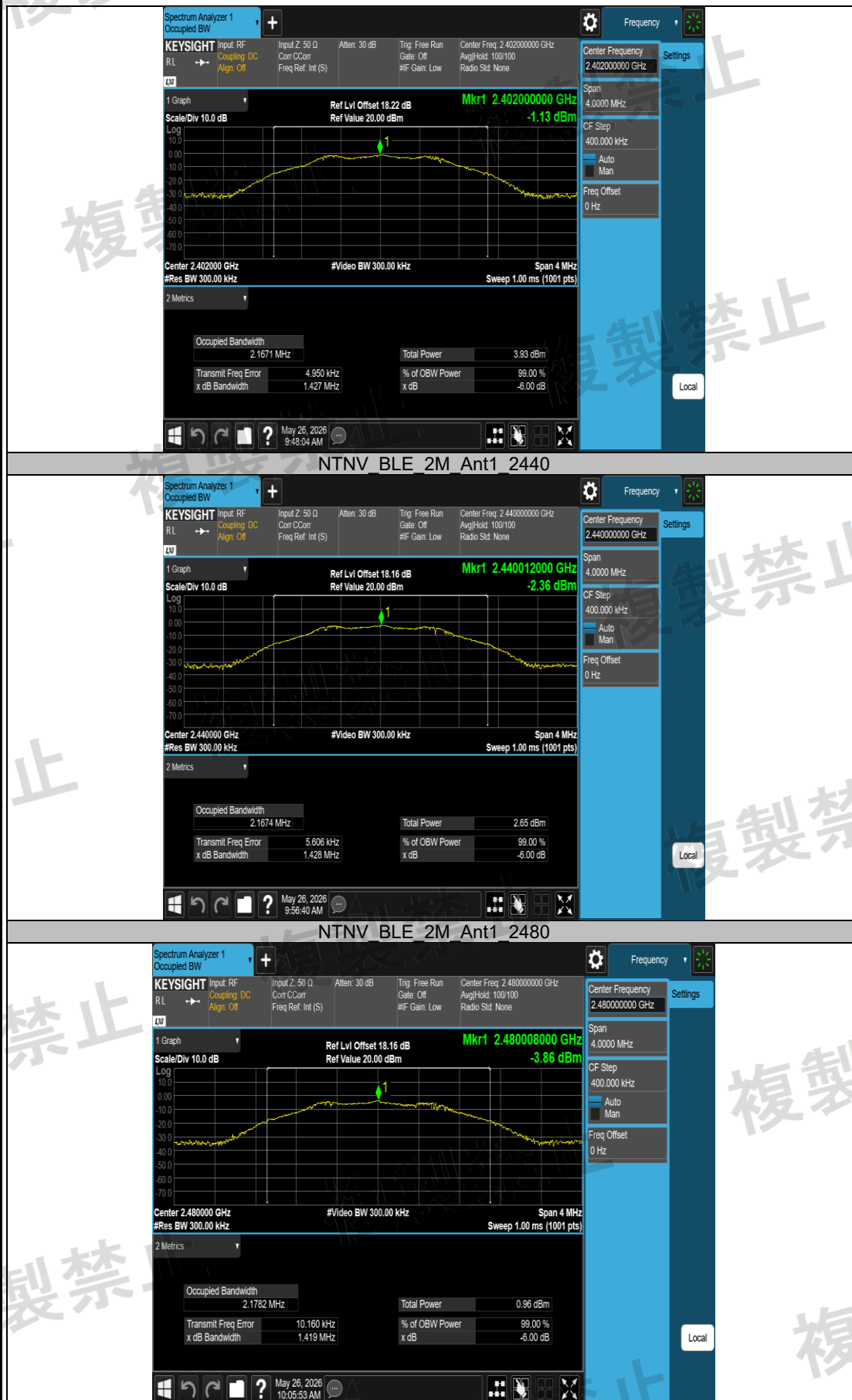
Appendix A.3: Test Results of Occupied Channel Bandwidth (99%)

Test Result

TestCondition	TestMode	Antenna	Freq(MHz)	Result [MHz]	Limit [MHz]	Verdict
NTNV	BLE_1M	Ant1	2402	1.245	≤26	PASS
			2440	1.246	≤26	PASS
			2480	1.264	≤26	PASS
	BLE_2M	Ant1	2402	2.167	≤26	PASS
			2440	2.167	≤26	PASS
			2480	2.178	≤26	PASS

Test Graphs





Appendix A.4: Test Results of Spread Bandwidth (90%)

Test Result

TestCondition	TestMode	Antenna	Freq(MHz)	Result [MHz]	Limit [MHz]	Verdict
NTNV	BLE_1M	Ant1	2402	0.824	≥0.5	PASS
			2440	0.823	≥0.5	PASS
			2480	0.824	≥0.5	PASS
	BLE_2M	Ant1	2402	1.383	≥0.5	PASS
			2440	1.382	≥0.5	PASS
			2480	1.388	≥0.5	PASS

Test Graphs





Appendix A.5: Test Results of Spurious Emissions for Transmitter

Test Result

Test Condition	Test Mode	Antenna	Freq(MHz)	Freq.Range [MHz]	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [μW]	Limit [μW]	Verdict
NTNV	BLE_1M	Ant1	2402	30~500	182.52	-48.48	≤-26	0.01419	≤2.5	PASS
				500~1000	800.63	-50.57	≤-26	0.00877	≤2.5	PASS
				1000~2387	1715.00	-36.93	≤-26	0.20277	≤2.5	PASS
				2387~2400	2400.00	-35.67	≤-16	0.27102	≤25	PASS
				2483.5~2496.5	2494.34	-43.50	≤-16	0.04467	≤25	PASS
			2440	2496.5~13000	3803.66	-54.07	≤-26	0.00392	≤2.5	PASS
				30~500	198.03	-48.26	≤-26	0.01493	≤2.5	PASS
				500~1000	813.25	-50.04	≤-26	0.00991	≤2.5	PASS
				1000~2387	2106.13	-42.75	≤-26	0.05309	≤2.5	PASS
				2387~2400	2389.57	-43.53	≤-16	0.04436	≤25	PASS
				2483.5~2496.5	2487.26	-43.77	≤-16	0.04198	≤25	PASS
				2496.5~13000	3805.24	-54.09	≤-26	0.00390	≤2.5	PASS
			2480	30~500	192.39	-47.83	≤-26	0.01648	≤2.5	PASS
				500~1000	826.63	-50.71	≤-26	0.00849	≤2.5	PASS
				1000~2387	2045.10	-42.82	≤-26	0.05224	≤2.5	PASS
				2387~2400	2397.97	-43.52	≤-16	0.04446	≤25	PASS
				2483.5~2496.5	2490.16	-43.82	≤-16	0.04150	≤25	PASS
				2496.5~13000	3772.68	-53.44	≤-26	0.00453	≤2.5	PASS
	BLE_2M	Ant1	2402	30~500	223.99	-48.22	≤-26	0.01507	≤2.5	PASS
				500~1000	800.38	-51.04	≤-26	0.00787	≤2.5	PASS
				1000~2387	2039.90	-42.83	≤-26	0.05212	≤2.5	PASS
				2387~2400	2400.00	-22.72	≤-16	5.34564	≤25	PASS
				2483.5~2496.5	2492.02	-43.59	≤-16	0.04375	≤25	PASS
			2440	2496.5~13000	3821.52	-53.50	≤-26	0.00447	≤2.5	PASS
				30~500	196.50	-48.12	≤-26	0.01542	≤2.5	PASS
				500~1000	813.38	-50.45	≤-26	0.00902	≤2.5	PASS
				1000~2387	1984.77	-43.25	≤-26	0.04732	≤2.5	PASS
				2387~2400	2389.25	-43.26	≤-16	0.04721	≤25	PASS
				2483.5~2496.5	2486.02	-43.88	≤-16	0.04093	≤25	PASS
				2496.5~13000	3519.54	-37.39	≤-26	0.18239	≤2.5	PASS
			2480	30~500	182.52	-48.12	≤-26	0.01542	≤2.5	PASS
				500~1000	826.75	-50.20	≤-26	0.00955	≤2.5	PASS
				1000~2387	2040.60	-42.85	≤-26	0.05188	≤2.5	PASS
				2387~2400	2388.78	-42.99	≤-16	0.05023	≤25	PASS
				2483.5~2496.5	2495.57	-43.74	≤-16	0.04227	≤25	PASS
				2496.5~13000	2510.68	-53.72	≤-26	0.00425	≤2.5	PASS

Test Graphs

























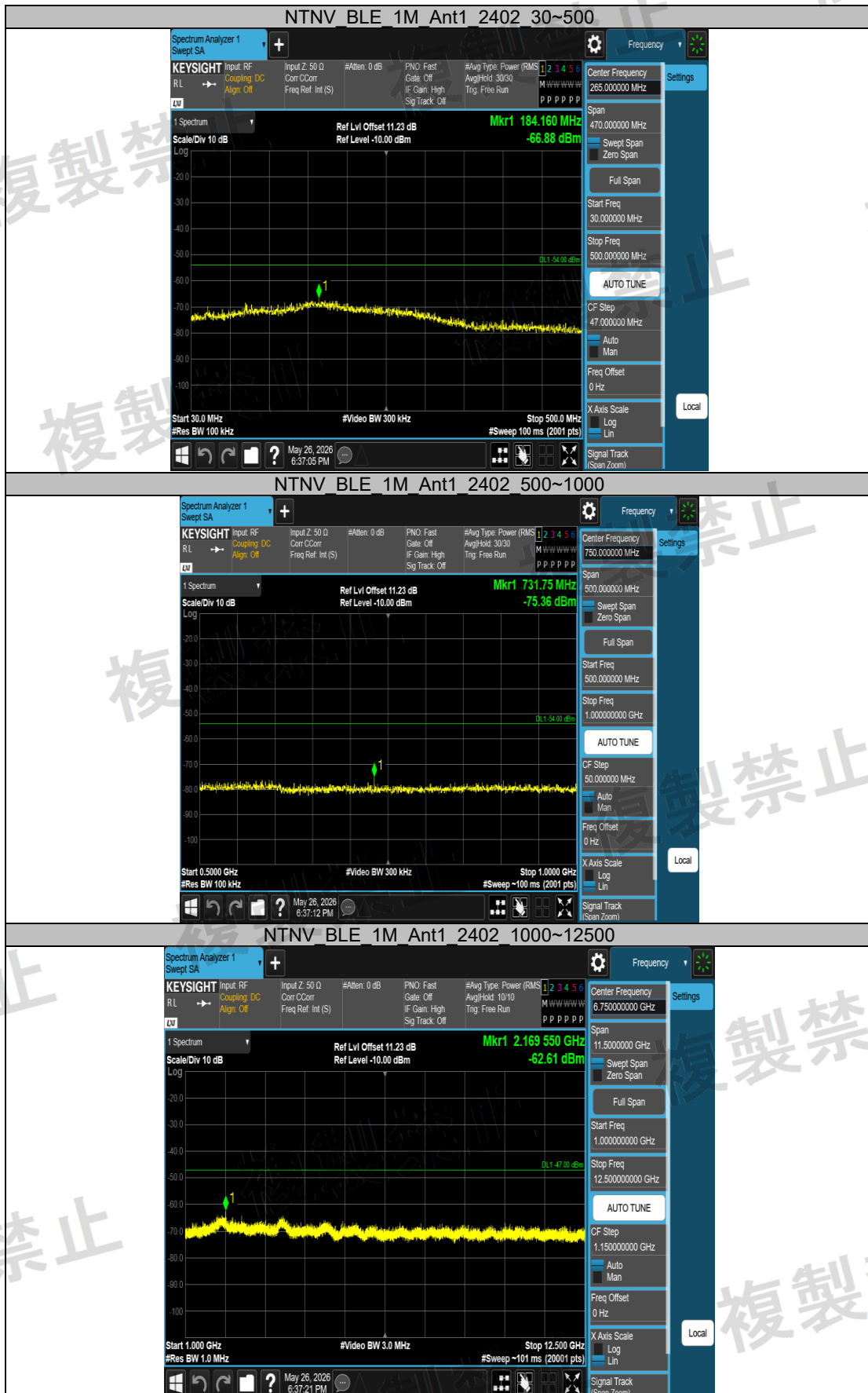
Appendix A.6: Test Results of Spurious Emissions for Receiver

Test Result

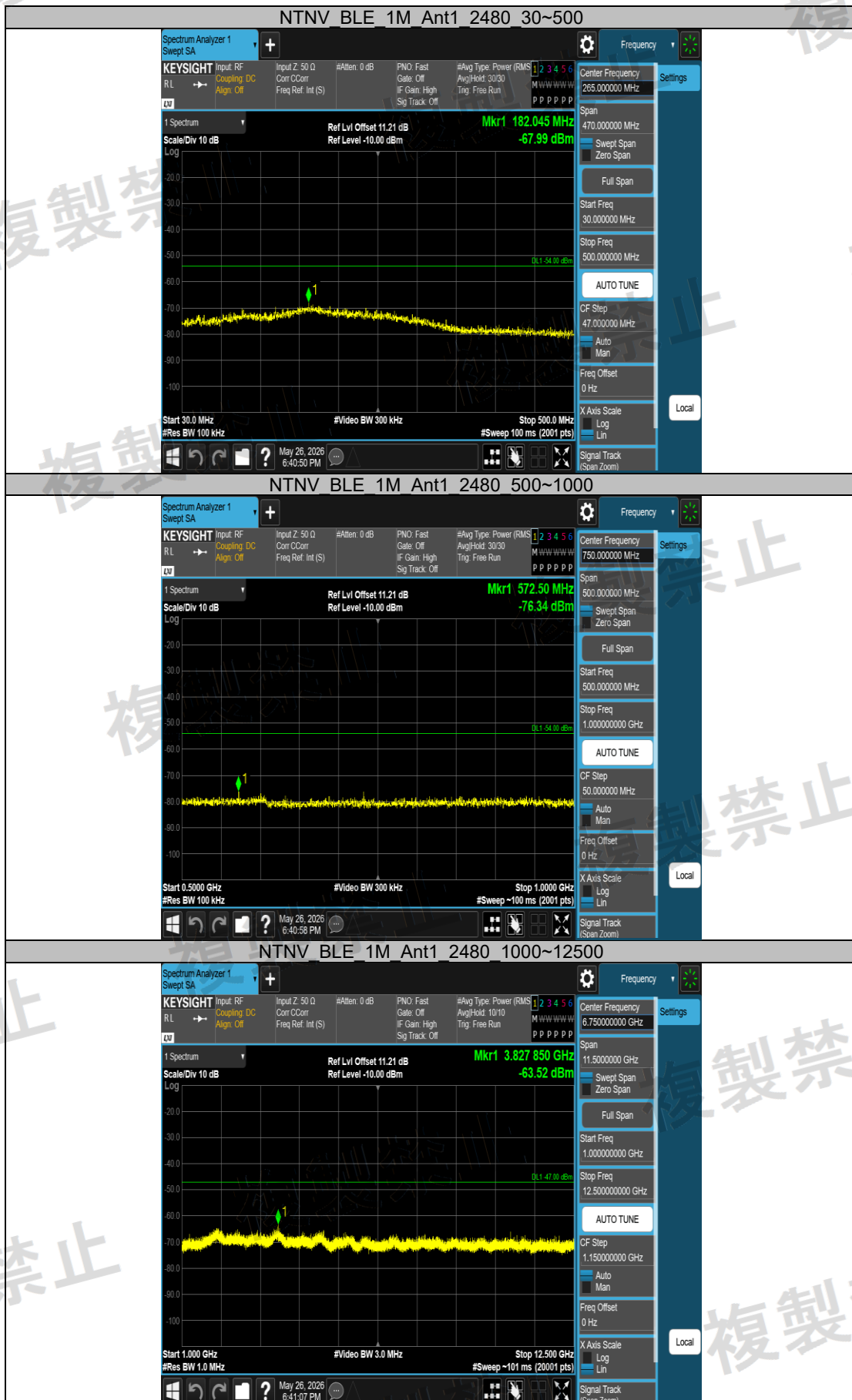
Test Condition	Test Mode	Antenna	Freq (MHz)	Freq.Range [MHz]	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [nW]	Limit [nW]	Verdict
NTNV	BLE_1M	Ant1	2402	30~500	184.16	-66.88	≤-54	0.20512	≤4	PASS
				500~1000	731.75	-75.36	≤-54	0.02911	≤4	PASS
				1000~12500	2169.55	-62.61	≤-47	0.54828	≤20	PASS
			2440	30~500	187.45	-67.93	≤-54	0.16106	≤4	PASS
				500~1000	731.75	-76.19	≤-54	0.02404	≤4	PASS
				1000~12500	3806.00	-64.19	≤-47	0.38107	≤20	PASS
			2480	30~500	182.05	-67.99	≤-54	0.15885	≤4	PASS
				500~1000	572.50	-76.34	≤-54	0.02323	≤4	PASS
				1000~12500	3827.85	-63.52	≤-47	0.44463	≤20	PASS
	BLE_2M	Ant1	2402	30~500	209.31	-68.32	≤-54	0.14723	≤4	PASS
				500~1000	731.75	-75.41	≤-54	0.02877	≤4	PASS
				1000~12500	3794.50	-63.64	≤-47	0.43251	≤20	PASS
			2440	30~500	185.34	-68.34	≤-54	0.14655	≤4	PASS
				500~1000	731.75	-76.05	≤-54	0.02483	≤4	PASS
				1000~12500	3829.00	-64.03	≤-47	0.39537	≤20	PASS
			2480	30~500	183.22	-68.01	≤-54	0.15812	≤4	PASS
				500~1000	731.75	-74.03	≤-54	0.03954	≤4	PASS
				1000~12500	3747.93	-64.11	≤-47	0.38815	≤20	PASS

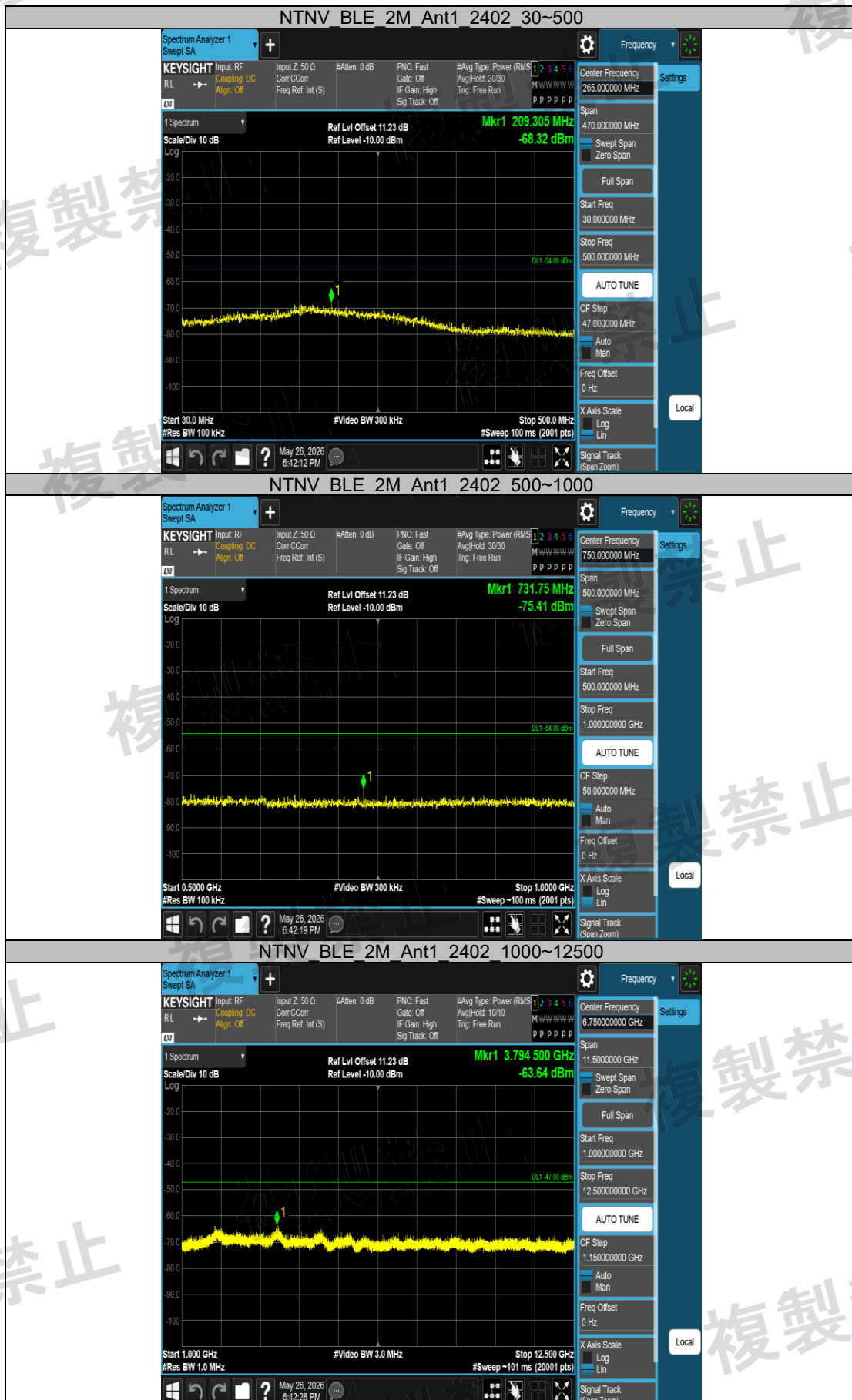


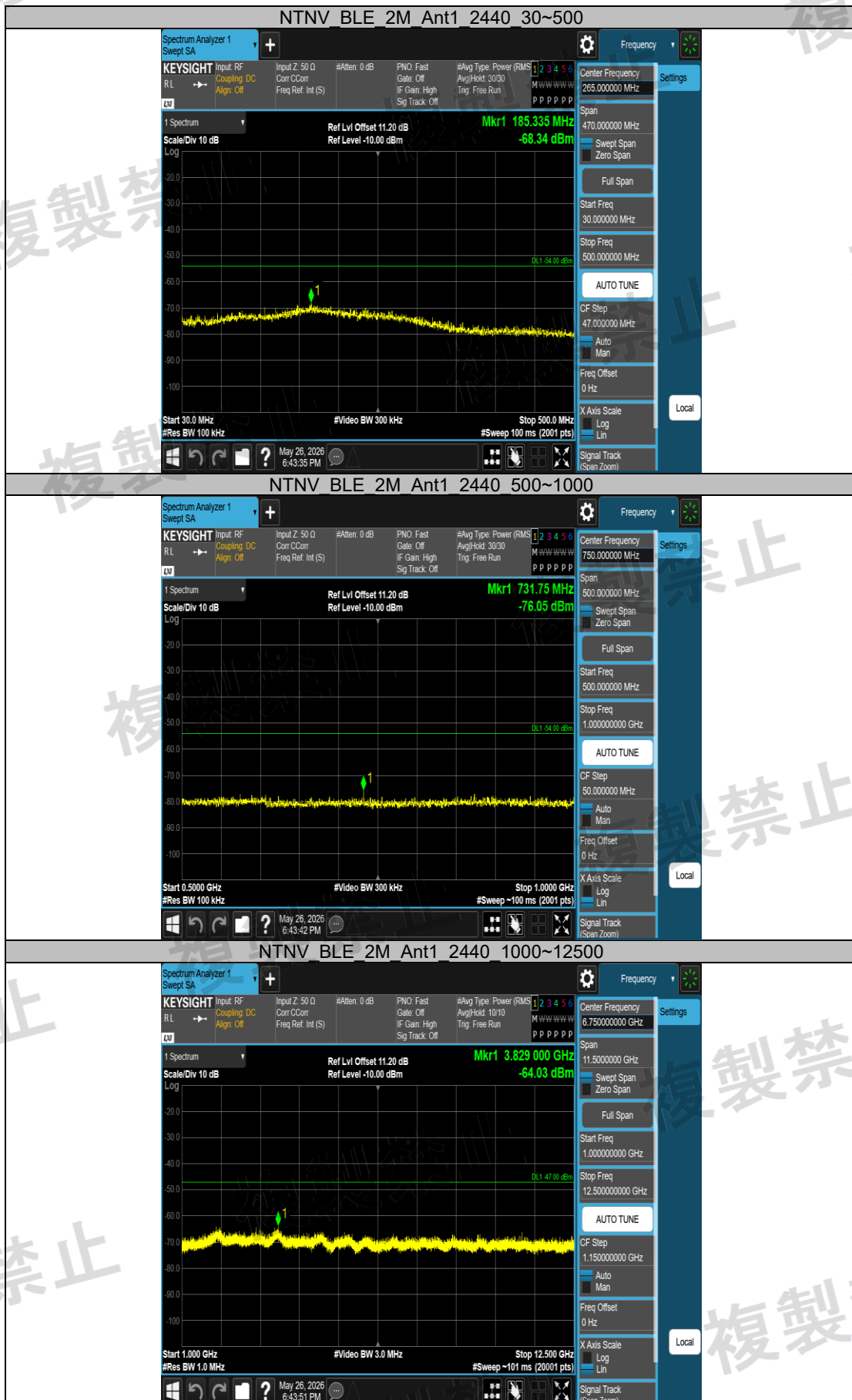
Test Graphs

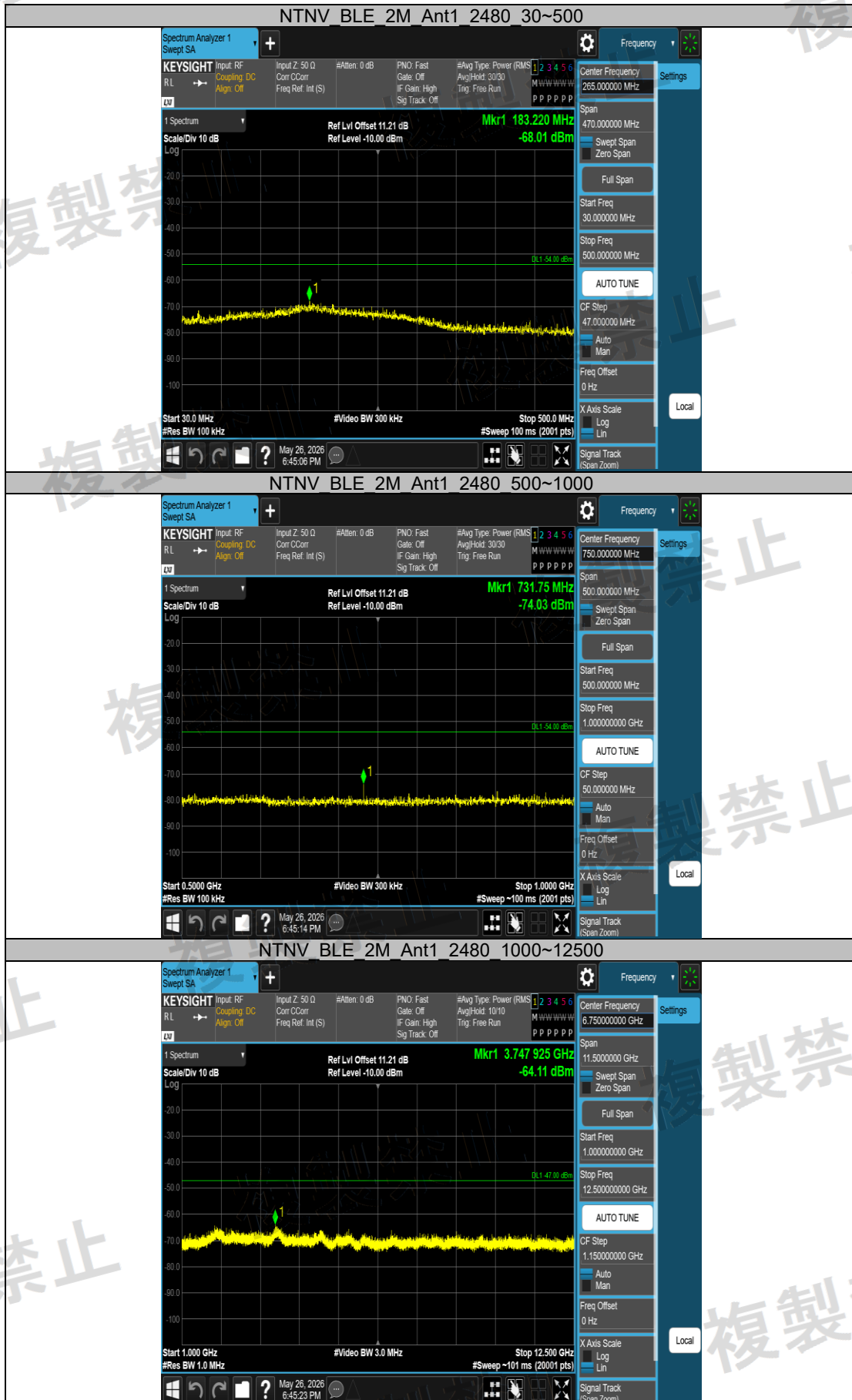












Appendix A.7: Test Results of Interference Prevention Function

Temperature:	24°C	Humidity:	56%RH
MAC address:	94BA06F337A6	Test result:	Conform