

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	4.99584	±50	PASS
			2440	-3.68853	±50	PASS
			2480	9.67742	±50	PASS
	BLE_2M	Ant1	2402	4.99584	±50	PASS
			2440	-8.60656	±50	PASS
			2480	-8.46774	±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	5.83	3.8282	≤10	PASS
		2440	5.87	3.8637	≤10	PASS
		2480	4.68	2.9376	≤10	PASS
BLE_2M	Ant1	2402	5.81	3.8107	≤10	PASS
		2440	5.83	3.8282	≤10	PASS
		2480	4.65	2.9174	≤10	PASS

Test Mode	Antenna	Freq (MHz)	Power (mW)	RatedPower (mW)	Result (%)	Limit (%)	Verdict
BLE_1M	Ant1	2402	3.8282	10	-61.72	+20	PASS
		2440	3.8637	10	-61.36	+20	PASS
		2480	2.9376	10	-70.62	+20	PASS
BLE_2M	Ant1	2402	3.8107	10	-61.89	+20	PASS
		2440	3.8282	10	-61.72	+20	PASS
		2480	2.9174	10	-70.83	+20	PASS

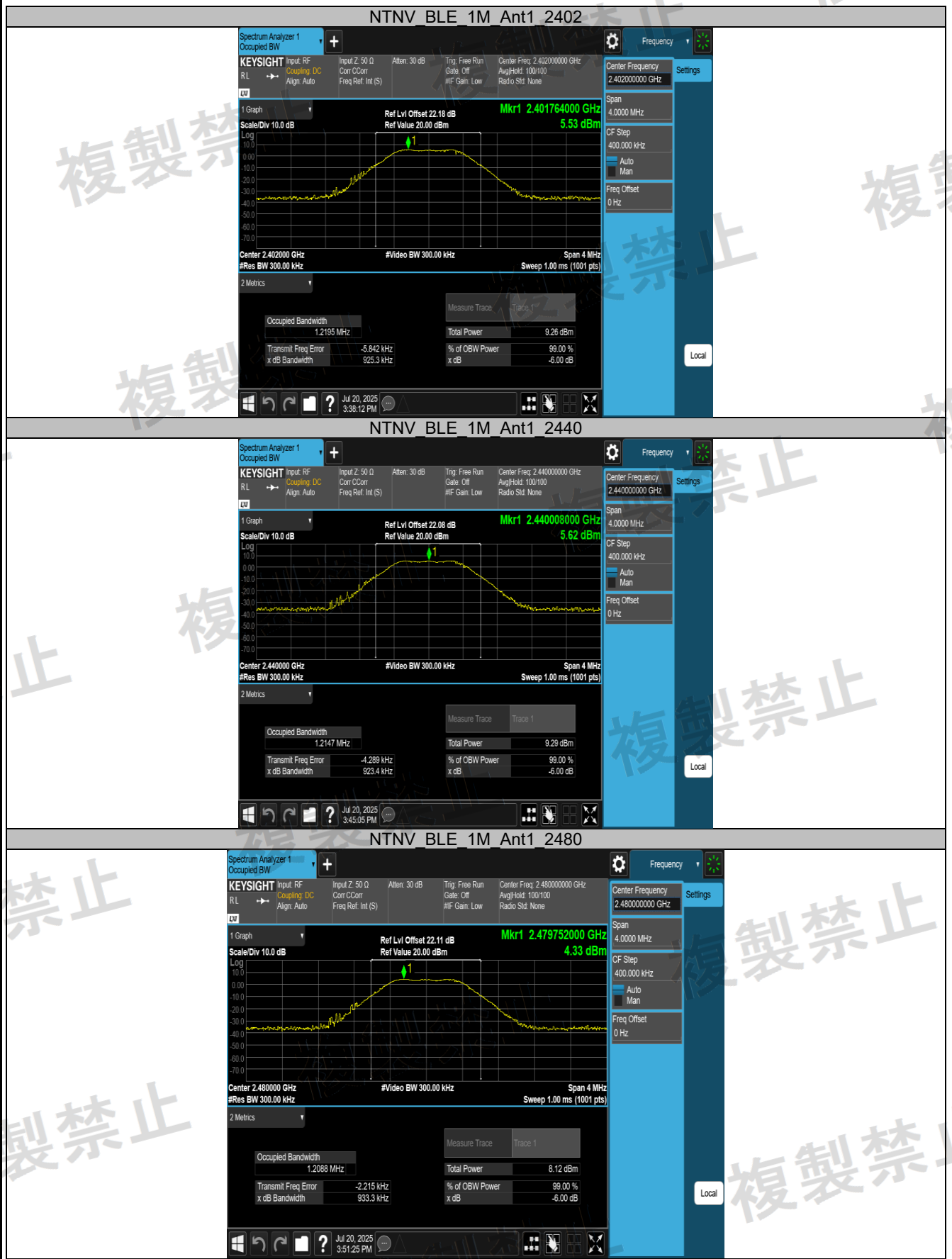
TestMode	Antenna	Freq (MHz)	Power (dBm)	EIRP(dBm)	Limit(dBm)	Verdict
BLE_1M	Ant1	2402	5.83	8.83	≤12.14	PASS
		2440	5.87	8.87	≤12.14	PASS
		2480	4.68	7.68	≤12.14	PASS
BLE_2M	Ant1	2402	5.81	8.81	≤12.14	PASS
		2440	5.83	8.83	≤12.14	PASS
		2480	4.65	7.65	≤12.14	PASS

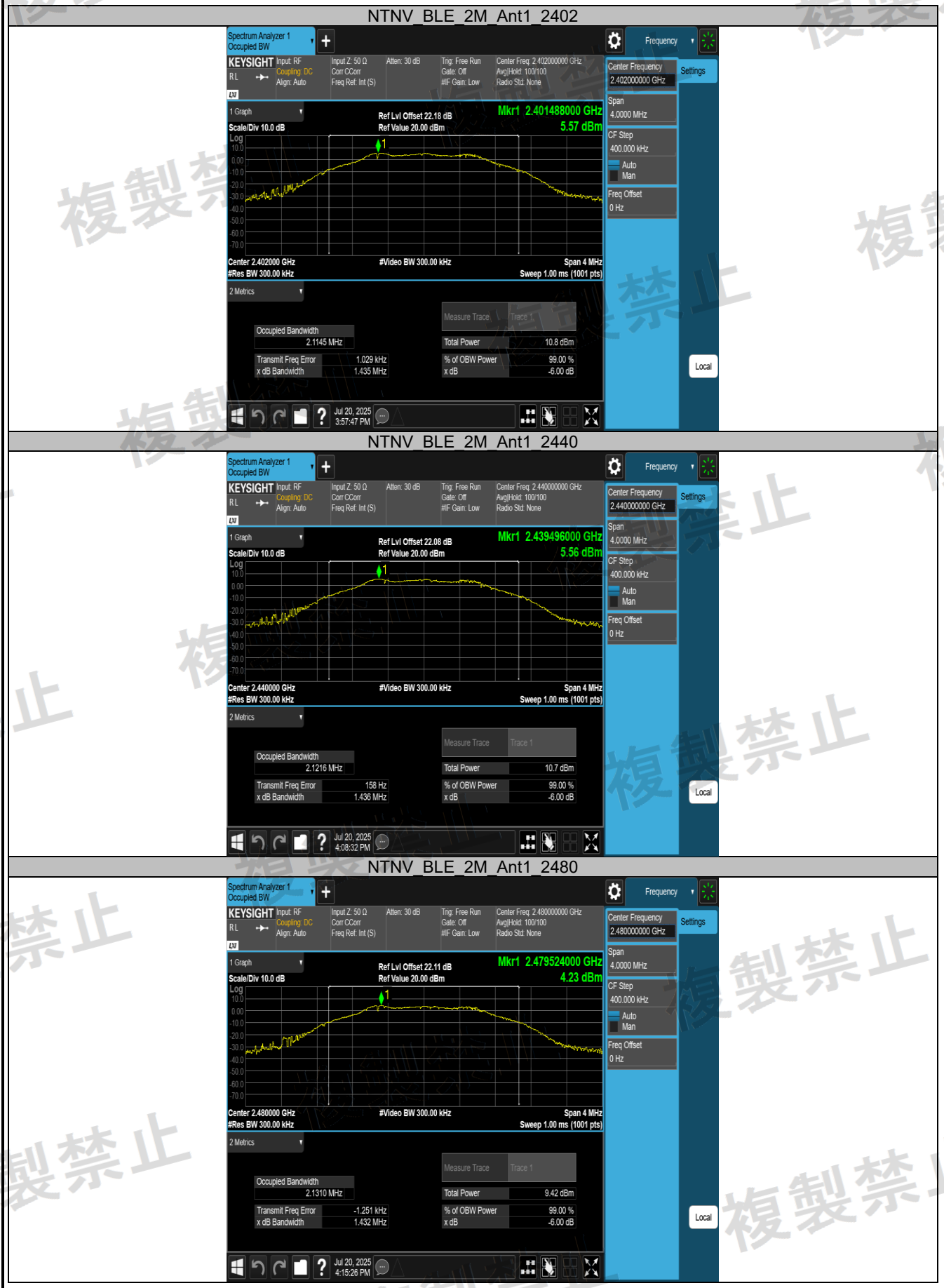
Appendix A.3: Test Results of Occupied Channel Bandwidth (99%)

Test Result

TestCondition	TestMode	Antenna	Freq(MHz)	Result [MHz]	Limit [MHz]	Verdict
NTNV	BLE_1M	Ant1	2402	1.220	≤26	PASS
			2440	1.215	≤26	PASS
			2480	1.209	≤26	PASS
	BLE_2M	Ant1	2402	2.115	≤26	PASS
			2440	2.122	≤26	PASS
			2480	2.131	≤26	PASS

Test Graphs



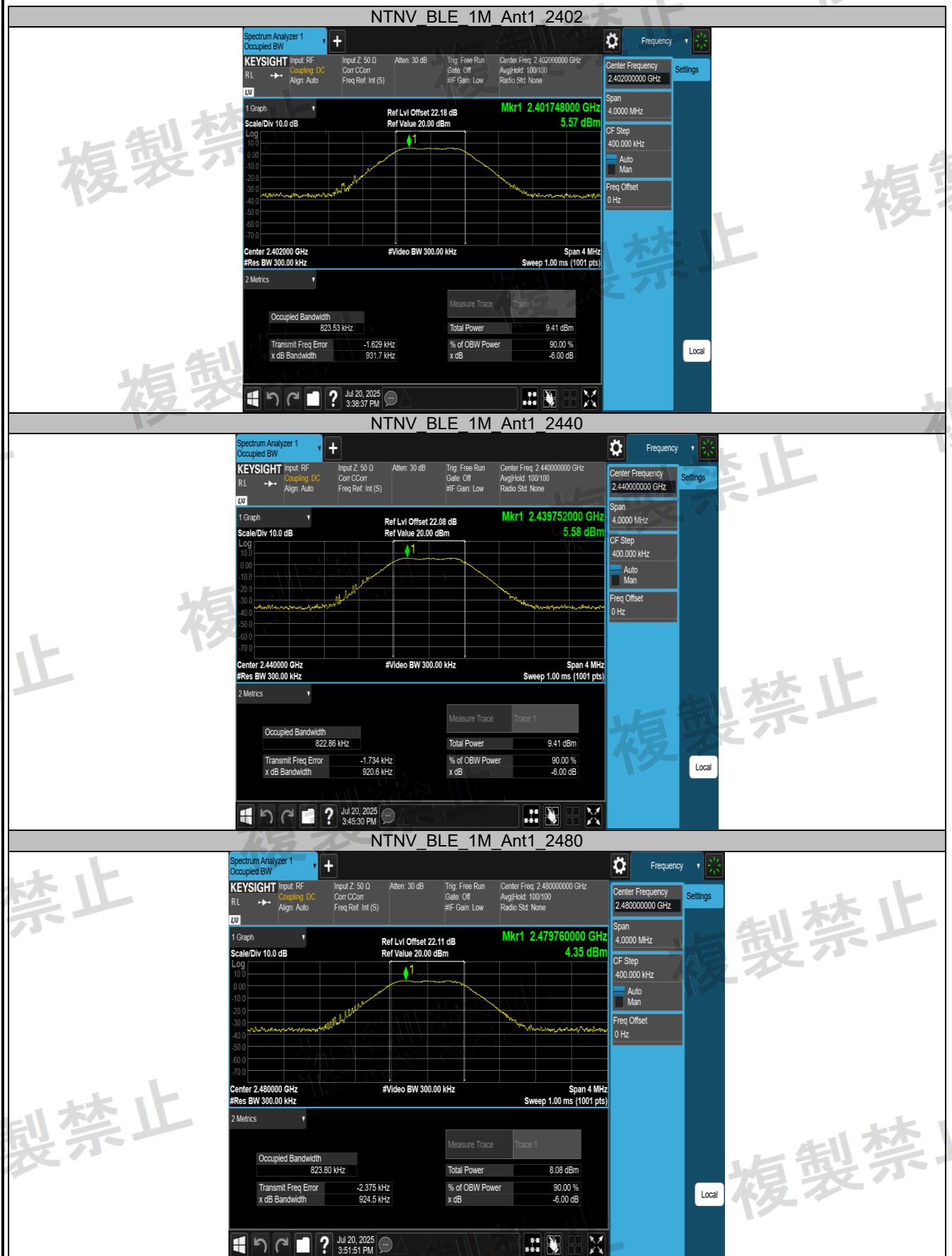


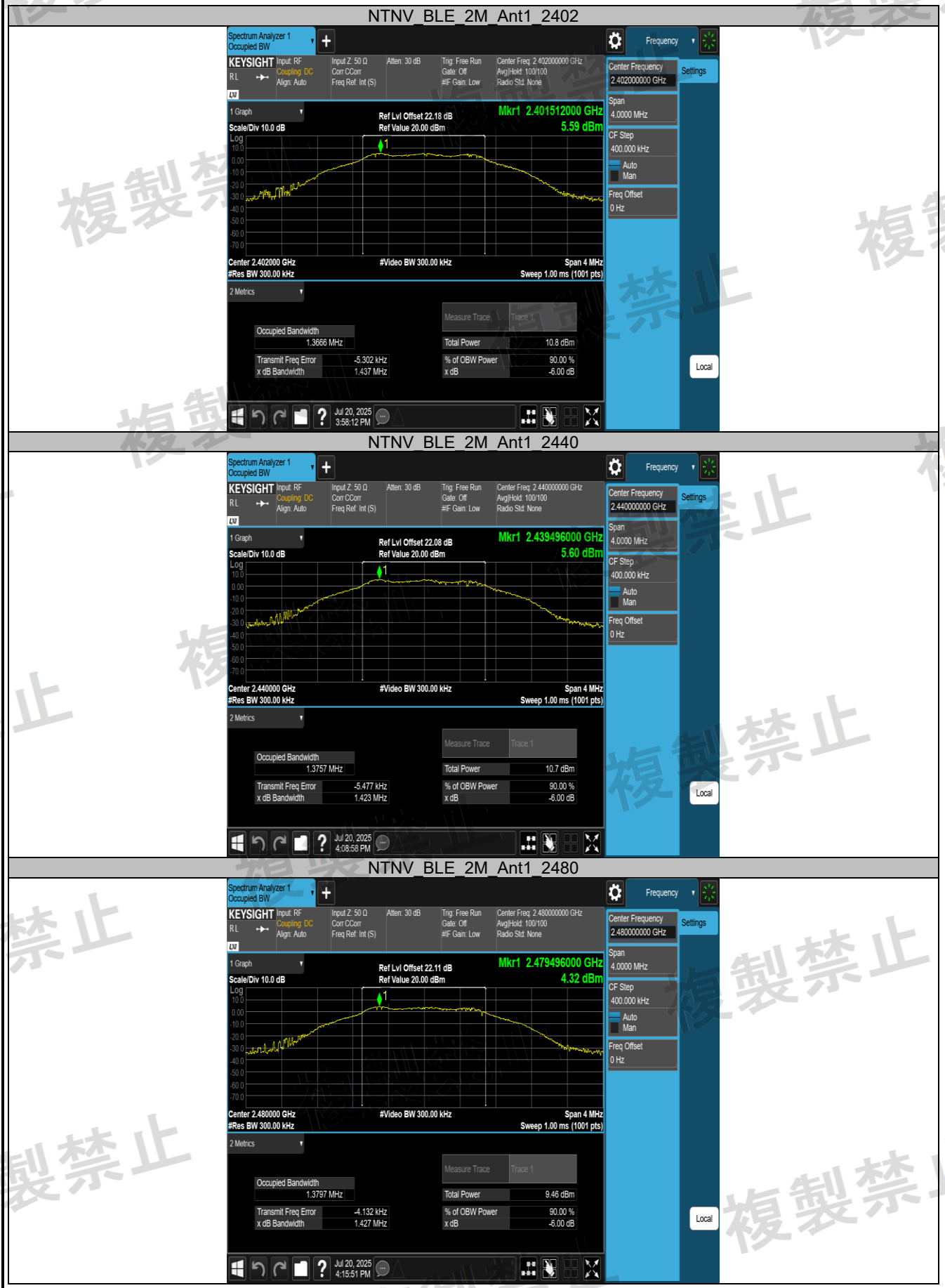
Appendix A.4: Test Results of Spread Bandwidth (90%)

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	1.367	≥0.5	PASS
			2440	1.376	≥0.5	PASS
			2480	1.380	≥0.5	PASS

Test Graphs





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

Test Result

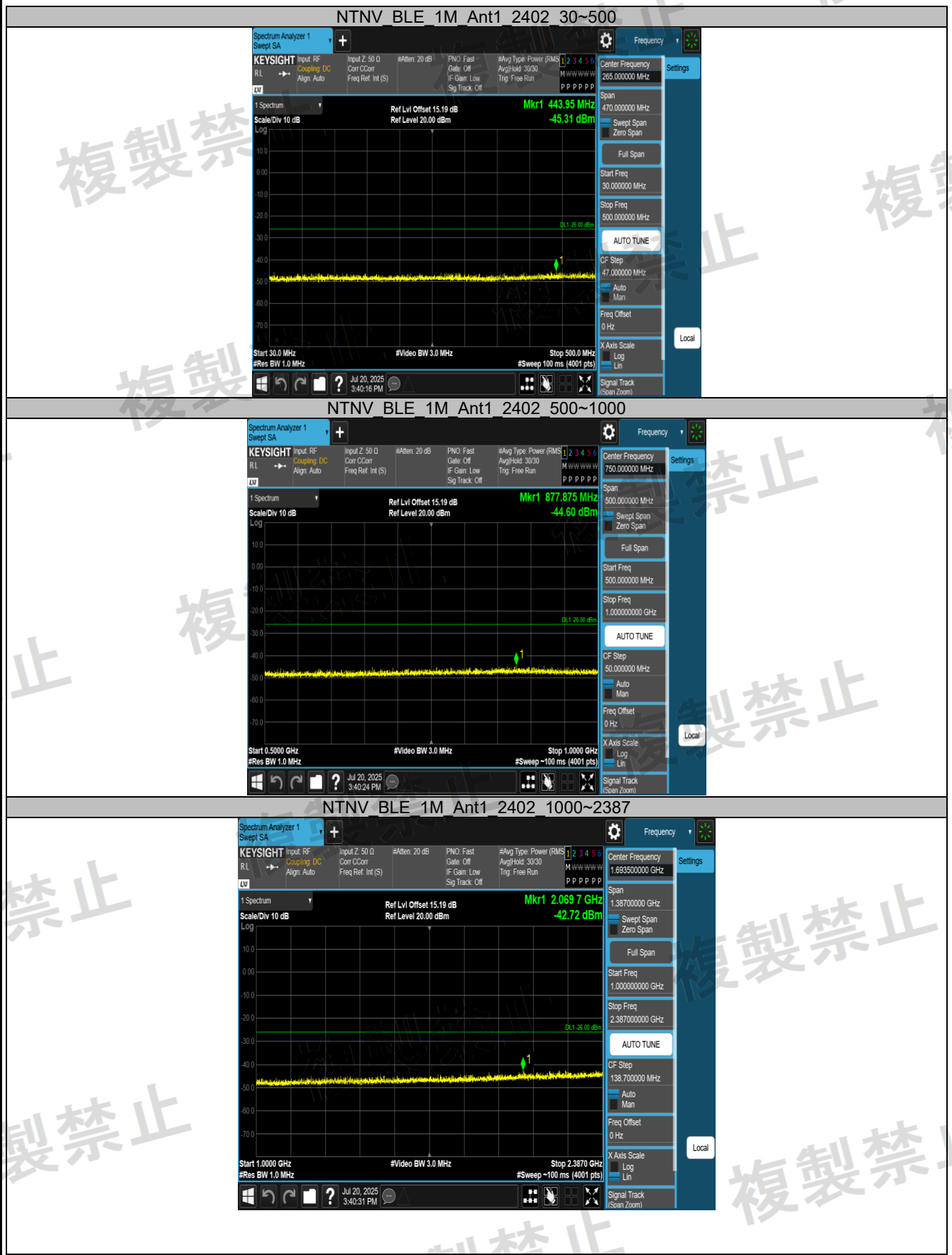
Test Condition	Test Mode	Antenna	Freq (MHz)	Freq.Range [MHz]	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [μW]	Limit [μW]	Verdict
NTNV	BLE_1M	Ant1	2402	30~500	443.95	-45.31	≤-26	0.02944	≤2.5	PASS
				500~1000	877.88	-44.60	≤-26	0.03467	≤2.5	PASS
				1000~2387	2069.72	-42.72	≤-26	0.05346	≤2.5	PASS
				2387~2400	2400.00	-27.23	≤-16	1.89234	≤25	PASS
				2483.5~2496.5	2491.27	-32.07	≤-16	0.62087	≤25	PASS
				2496.5~13000	3819.42	-38.22	≤-26	0.15066	≤2.5	PASS
			2440	30~500	472.15	-44.53	≤-26	0.03524	≤2.5	PASS
				500~1000	875.88	-44.78	≤-26	0.03327	≤2.5	PASS
				1000~2387	2305.51	-41.74	≤-26	0.06699	≤2.5	PASS
				2387~2400	2399.38	-32.72	≤-16	0.53456	≤25	PASS
				2483.5~2496.5	2493.27	-32.19	≤-16	0.60395	≤25	PASS
				2496.5~13000	3793.16	-38.46	≤-26	0.14256	≤2.5	PASS
			2480	30~500	495.30	-44.19	≤-26	0.03811	≤2.5	PASS
				500~1000	900.63	-44.44	≤-26	0.03597	≤2.5	PASS
				1000~2387	2312.80	-42.00	≤-26	0.06310	≤2.5	PASS
				2387~2400	2389.46	-32.56	≤-16	0.55463	≤25	PASS
				2483.5~2496.5	2494.00	-32.20	≤-16	0.60256	≤25	PASS
				2496.5~13000	3801.56	-38.88	≤-26	0.12942	≤2.5	PASS
	BLE_2M	Ant1	2402	30~500	288.85	-45.45	≤-26	0.02851	≤2.5	PASS
				500~1000	773.88	-45.08	≤-26	0.03105	≤2.5	PASS
				1000~2387	2234.78	-42.28	≤-26	0.05916	≤2.5	PASS
				2387~2400	2400	-13.37	≤-16	46.02566	≤25	See table below
				2483.5~2496.5	2495.46	-31.77	≤-16	0.66527	≤25	PASS
				2496.5~13000	3845.67	-38.68	≤-26	0.13552	≤2.5	PASS
			2440	30~500	477.32	-45.38	≤-26	0.02897	≤2.5	PASS
				500~1000	910.88	-44.04	≤-26	0.03945	≤2.5	PASS
				1000~2387	2360.30	-42.33	≤-26	0.05848	≤2.5	PASS
				2387~2400	2389.18	-32.70	≤-16	0.53703	≤25	PASS
				2483.5~2496.5	2493.43	-32.06	≤-16	0.62230	≤25	PASS
				2496.5~13000	3783.70	-38.53	≤-26	0.14028	≤2.5	PASS
			2480	30~500	463.34	-45.12	≤-26	0.03076	≤2.5	PASS
				500~1000	777.00	-44.39	≤-26	0.03639	≤2.5	PASS
				1000~2387	2346.78	-42.47	≤-26	0.05662	≤2.5	PASS
				2387~2400	2394.12	-32.22	≤-16	0.59979	≤25	PASS
				2483.5~2496.5	2490.31	-31.48	≤-16	0.71121	≤25	PASS
				2496.5~13000	3896.09	-39.04	≤-26	0.12474	≤2.5	PASS



Test Result_Step2

TestCondition	TestMode	Antenna	Freq (MHz)	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [μW]	Limit [μW]	Verdict
NTNV	BLE_2M	Ant1	2402	2400.00	-47.94	≤-16	0.01607	≤25	PASS
NTLV	BLE_2M	Ant1	2402	2400.00	-47.97	≤-16	0.01596	≤25	PASS
NTHV	BLE_2M	Ant1	2402	2400.00	-47.94	≤-16	0.01607	≤25	PASS

Test Graphs

















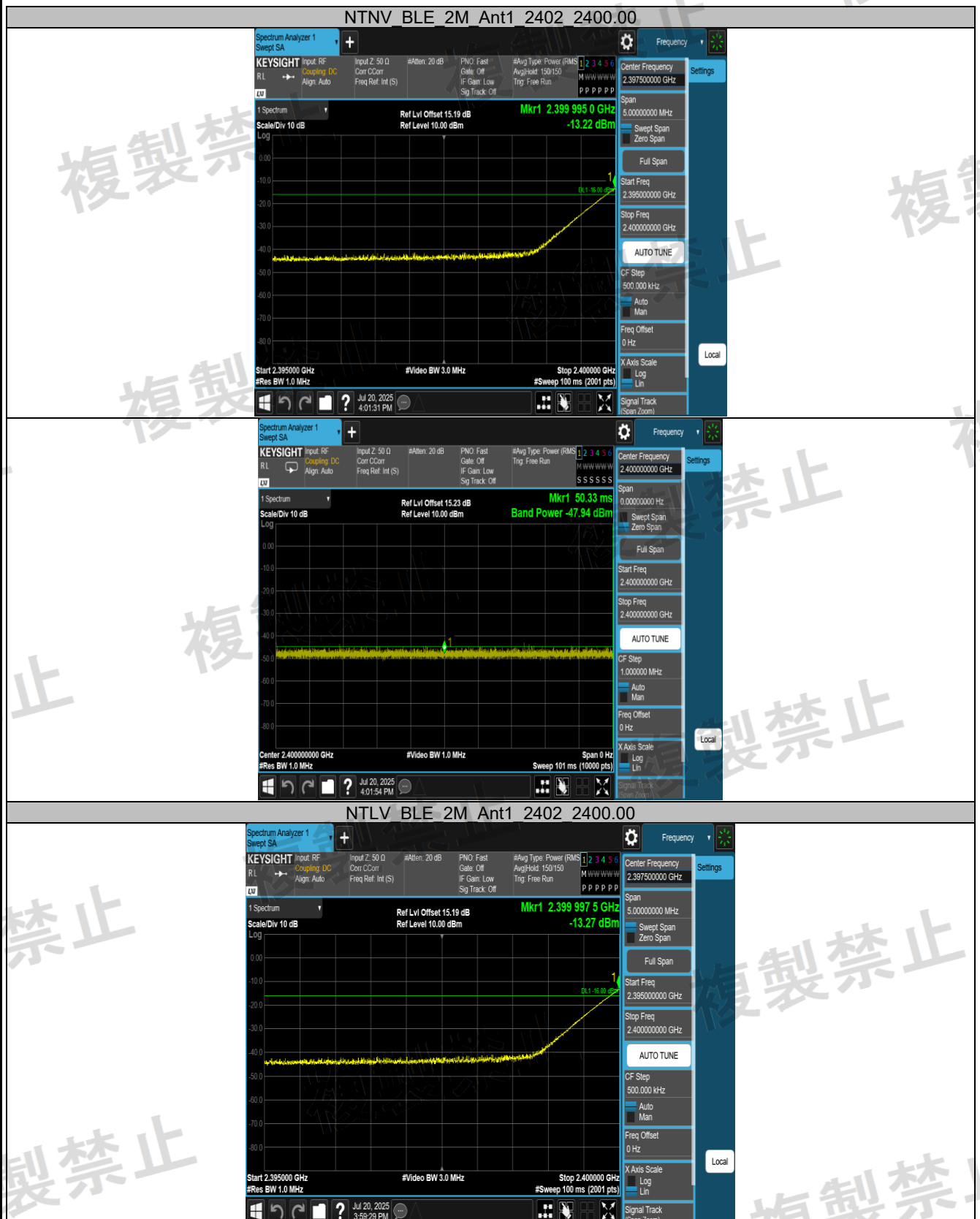


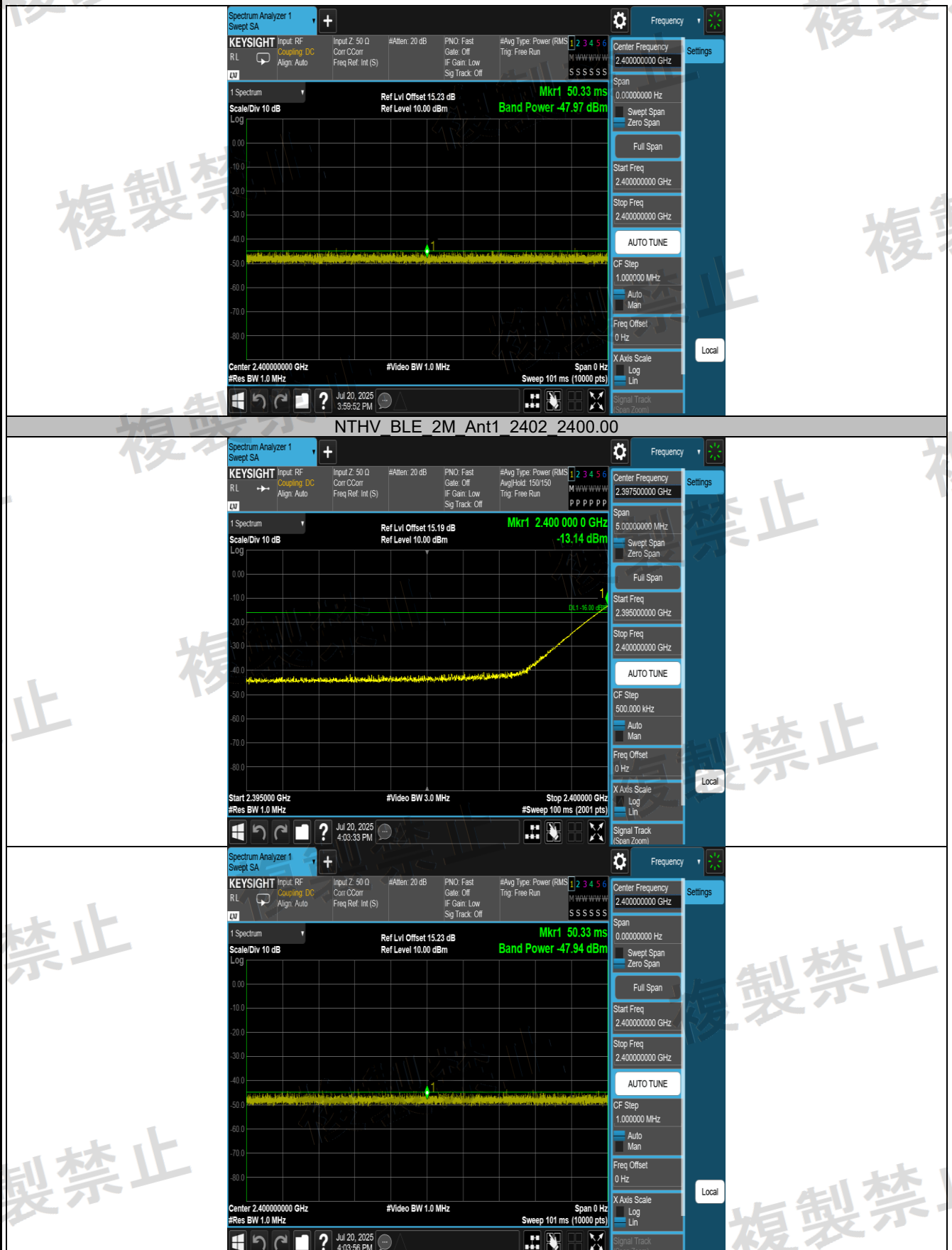






Test Graphs_Step2





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	306.36	-83.04	≤-54	0.00497	≤4	PASS
				500~1000	996.75	-81.49	≤-54	0.00710	≤4	PASS
				1000~12500	3825.55	-63.81	≤-47	0.41591	≤20	PASS
			2440	30~500	466.16	-82.64	≤-54	0.00545	≤4	PASS
				500~1000	824.50	-80.95	≤-54	0.00804	≤4	PASS
				1000~12500	4980.15	-64.17	≤-47	0.38282	≤20	PASS
			2480	30~500	259.36	-82.73	≤-54	0.00533	≤4	PASS
				500~1000	885.75	-80.74	≤-54	0.00843	≤4	PASS
				1000~12500	3727.23	-64.04	≤-47	0.39446	≤20	PASS
	BLE_2M	Ant1	2402	30~500	482.85	-83.05	≤-54	0.00495	≤4	PASS
				500~1000	806.25	-81.64	≤-54	0.00685	≤4	PASS
				1000~12500	3776.10	-64.29	≤-47	0.37239	≤20	PASS
			2440	30~500	480.26	-82.02	≤-54	0.00628	≤4	PASS
				500~1000	880.75	-81.62	≤-54	0.00689	≤4	PASS
				1000~12500	3806.00	-63.83	≤-47	0.41400	≤20	PASS
			2480	30~500	485.67	-82.17	≤-54	0.00607	≤4	PASS
				500~1000	900.75	-81.55	≤-54	0.00700	≤4	PASS
				1000~12500	3885.93	-63.41	≤-47	0.45604	≤20	PASS

Test Graphs

