

Appendix: Bluetooth LE

Contents

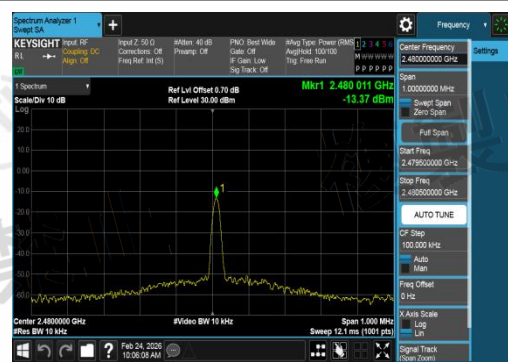
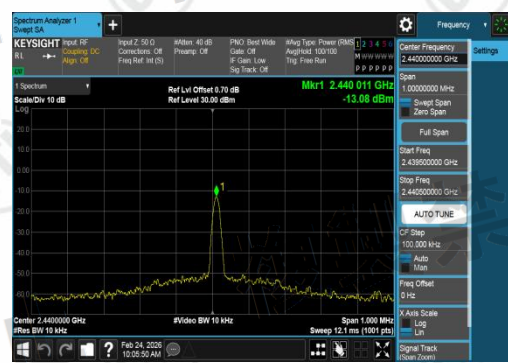
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Appendix A: Frequency Error

Test Result

TestCondition	TestMode	Antenna	Freq(MHz)	CenterFreq [MHz]	Result[ppm]	Limit[ppm]	Verdict
NTLV	CW	Ant1	2402	2402.013	5.41216	±50	PASS
NTNV	CW	Ant1	2402	2402.012	4.99584	±50	PASS
NTHV	CW	Ant1	2402	2402.012	4.99584	±50	PASS
NTLV	CW	Ant1	2440	2440.011	4.50820	±50	PASS
NTNV	CW	Ant1	2440	2440.011	4.50820	±50	PASS
NTHV	CW	Ant1	2440	2440.011	4.50820	±50	PASS
NTLV	CW	Ant1	2480	2480.011	4.43548	±50	PASS
NTNV	CW	Ant1	2480	2480.011	4.43548	±50	PASS
NTHV	CW	Ant1	2480	2480.011	4.43548	±50	PASS

Test Graphs





Appendix B: Antenna Power

Test Result

TestCondition	TestMode	Antenna	Freq(MHz)	Result(dBm)	Result(mW)	Limit(mW)	Verdict
NTLV	BLE_1M	Ant1	2402	-1.50	0.7079	≤10	PASS
NTNV	BLE_1M	Ant1	2402	-1.48	0.7112	≤10	PASS
NTHV	BLE_1M	Ant1	2402	-1.52	0.7047	≤10	PASS
NTLV	BLE_1M	Ant1	2440	-2.35	0.5821	≤10	PASS
NTNV	BLE_1M	Ant1	2440	-2.31	0.5875	≤10	PASS
NTHV	BLE_1M	Ant1	2440	-2.29	0.5902	≤10	PASS
NTLV	BLE_1M	Ant1	2480	-2.16	0.6081	≤10	PASS
NTNV	BLE_1M	Ant1	2480	-2.22	0.5998	≤10	PASS
NTHV	BLE_1M	Ant1	2480	-2.18	0.6053	≤10	PASS
NTLV	BLE_2M	Ant1	2402	0.08	1.0186	≤10	PASS

Test Condition	Test Mode	Antenna	Freq(MHz)	Power (mW)	Rated Power (mW)	Result (%)	Limit (%)	Verdict
NTLV	BLE_1M	Ant1	2402	0.7079	1	-29.21	+20	PASS
NTNV	BLE_1M	Ant1	2402	0.7112	1	-28.88	+20	PASS
NTHV	BLE_1M	Ant1	2402	0.7047	1	-29.53	+20	PASS
NTLV	BLE_1M	Ant1	2440	0.5821	1	-41.79	+20	PASS
NTNV	BLE_1M	Ant1	2440	0.5875	1	-41.25	+20	PASS
NTHV	BLE_1M	Ant1	2440	0.5902	1	-40.98	+20	PASS
NTLV	BLE_1M	Ant1	2480	0.6081	1	-39.19	+20	PASS
NTNV	BLE_1M	Ant1	2480	0.5998	1	-40.02	+20	PASS
NTHV	BLE_1M	Ant1	2480	0.6053	1	-39.47	+20	PASS

TestCondition	TestMode	Antenna	Freq(MHz)	Result(dBm)	EIRP(dBm)	Limit(dBm)	Verdict
NTLV	BLE_1M	Ant1	2402	-1.50	1.50	≤12.14	PASS
NTNV	BLE_1M	Ant1	2402	-1.48	1.52	≤12.14	PASS
NTHV	BLE_1M	Ant1	2402	-1.52	1.48	≤12.14	PASS
NTLV	BLE_1M	Ant1	2440	-2.35	0.65	≤12.14	PASS
NTNV	BLE_1M	Ant1	2440	-2.31	0.69	≤12.14	PASS
NTHV	BLE_1M	Ant1	2440	-2.29	0.71	≤12.14	PASS
NTLV	BLE_1M	Ant1	2480	-2.16	0.84	≤12.14	PASS
NTNV	BLE_1M	Ant1	2480	-2.22	0.78	≤12.14	PASS
NTHV	BLE_1M	Ant1	2480	-2.18	0.82	≤12.14	PASS

Test Graphs



NTLV-BLE_1M-Ant1-2402-PASS



NTLV-BLE_1M-Ant1-2402-PASS



NTNV-BLE_1M-Ant1-2402-PASS



NTNV-BLE_1M-Ant1-2402-PASS



NTHV-BLE_1M-Ant1-2402-PASS



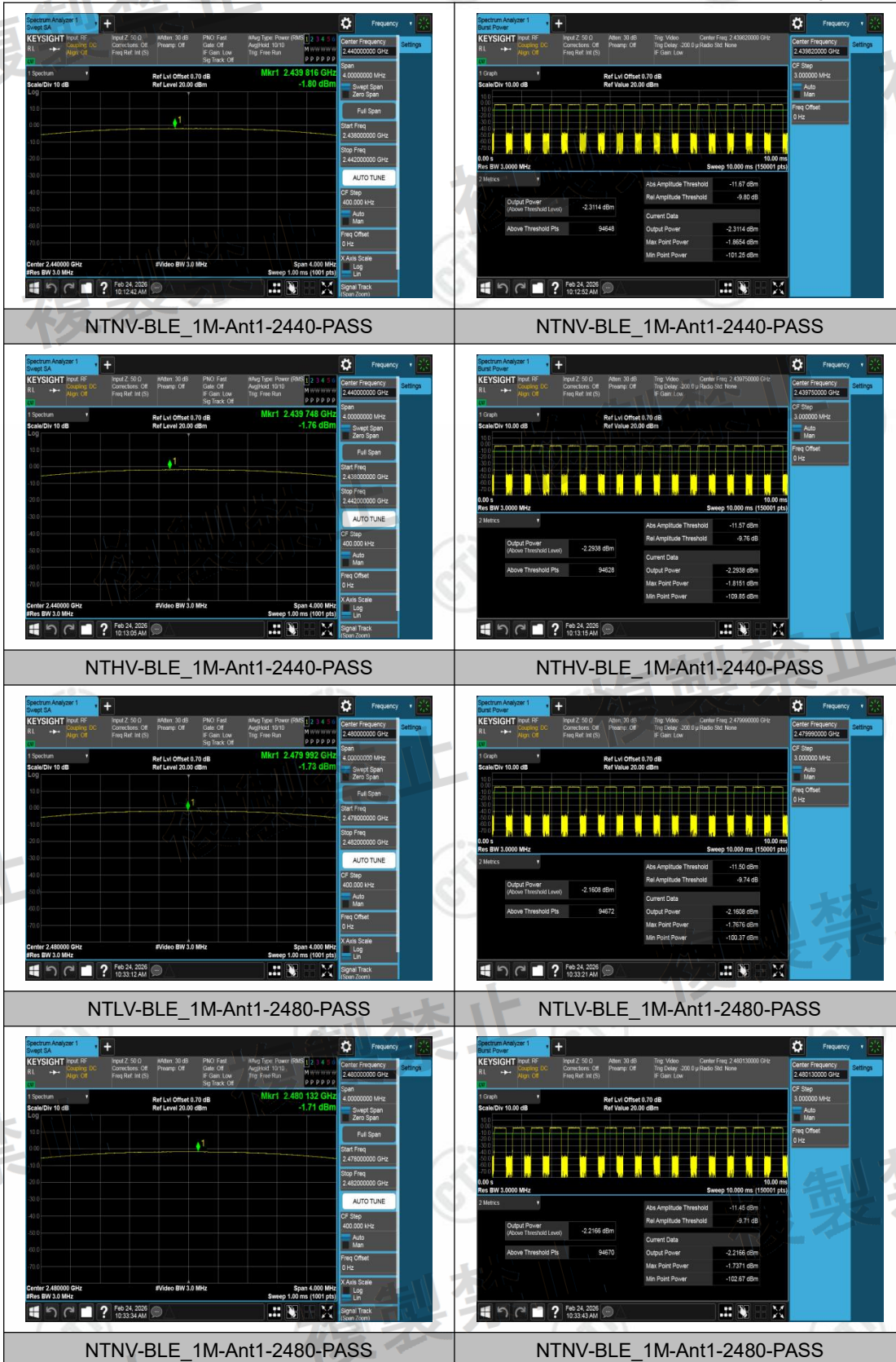
NTHV-BLE_1M-Ant1-2402-PASS

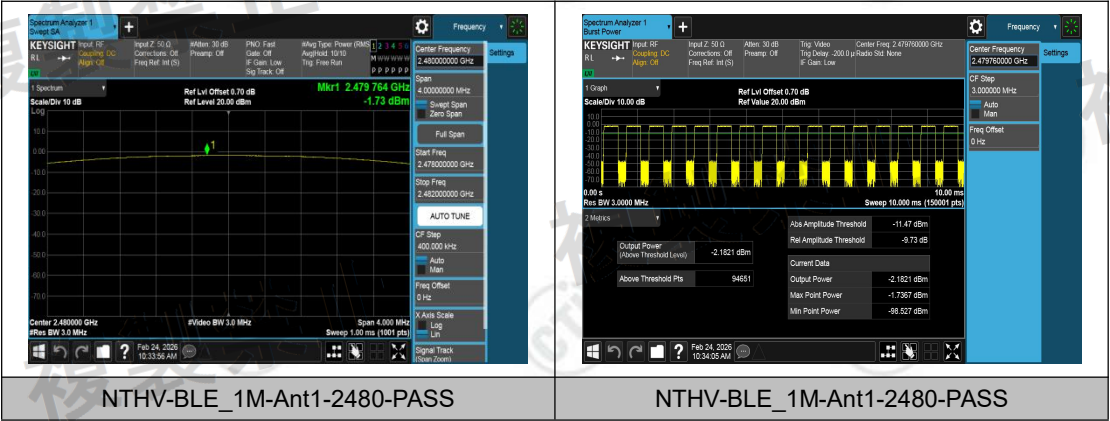


NTLV-BLE_1M-Ant1-2440-PASS



NTLV-BLE_1M-Ant1-2440-PASS





Appendix C: Occupied Bandwidth

Test Result

TestCondition	TestMode	Antenna	Freq(MHz)	Result [MHz]	Limit [MHz]	Verdict
NTLV	BLE_1M	Ant1	2402	1.354	≤26	PASS
NTNV	BLE_1M	Ant1	2402	1.362	≤26	PASS
NTHV	BLE_1M	Ant1	2402	1.365	≤26	PASS
NTLV	BLE_1M	Ant1	2440	1.377	≤26	PASS
NTNV	BLE_1M	Ant1	2440	1.365	≤26	PASS
NTHV	BLE_1M	Ant1	2440	1.364	≤26	PASS
NTLV	BLE_1M	Ant1	2480	1.373	≤26	PASS
NTNV	BLE_1M	Ant1	2480	1.372	≤26	PASS
NTHV	BLE_1M	Ant1	2480	1.368	≤26	PASS

Test Graphs



NTLV-BLE_1M-Ant1-2402-PASS



NTNV-BLE_1M-Ant1-2402-PASS



NTHV-BLE_1M-Ant1-2402-PASS



NTLV-BLE_1M-Ant1-2440-PASS



NTNV-BLE_1M-Ant1-2440-PASS



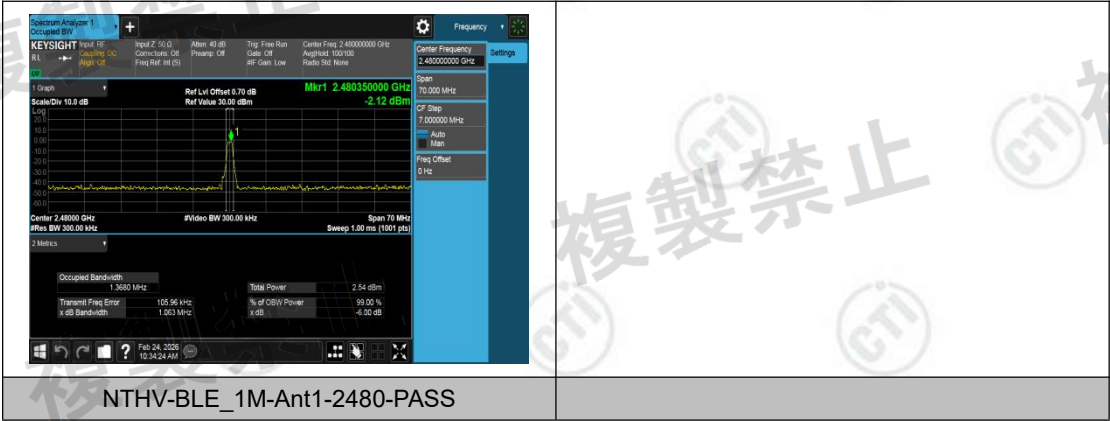
NTHV-BLE_1M-Ant1-2440-PASS



NTLV-BLE_1M-Ant1-2480-PASS



NTNV-BLE_1M-Ant1-2480-PASS



Appendix D: Spread Bandwidth

Test Result

TestCondition	TestMode	Antenna	Freq(MHz)	Result [MHz]
NTLV	BLE_1M	Ant1	2402	0.932
NTNV	BLE_1M	Ant1	2402	0.929
NTHV	BLE_1M	Ant1	2402	0.932
NTLV	BLE_1M	Ant1	2440	0.928
NTNV	BLE_1M	Ant1	2440	0.926
NTHV	BLE_1M	Ant1	2440	0.932
NTLV	BLE_1M	Ant1	2480	0.931
NTNV	BLE_1M	Ant1	2480	0.933
NTHV	BLE_1M	Ant1	2480	0.931

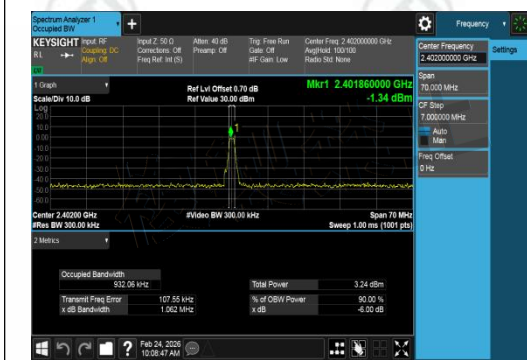
Test Graphs



NTLV-BLE_1M-Ant1-2402-PASS



NTNV-BLE_1M-Ant1-2402-PASS



NTHV-BLE_1M-Ant1-2402-PASS



NTLV-BLE_1M-Ant1-2440-PASS



NTNV-BLE_1M-Ant1-2440-PASS



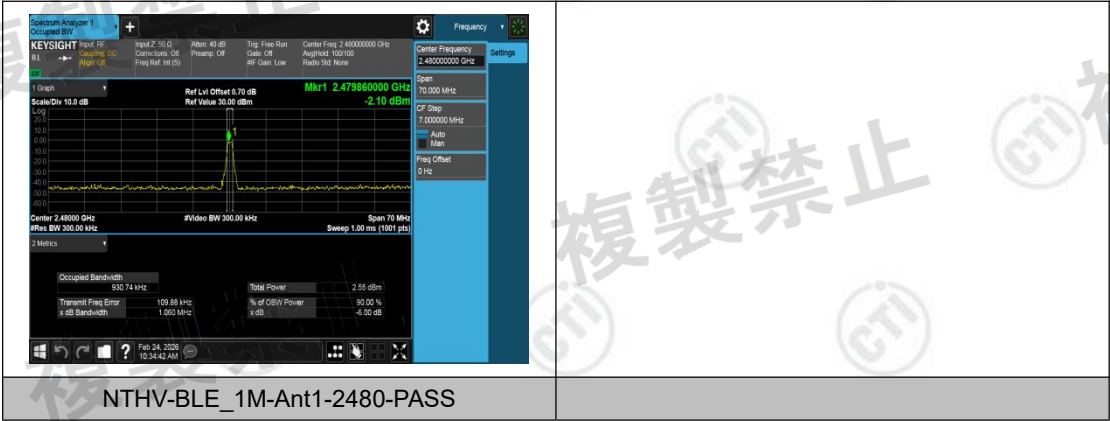
NTHV-BLE_1M-Ant1-2440-PASS



NTLV-BLE_1M-Ant1-2480-PASS



NTNV-BLE_1M-Ant1-2480-PASS



Appendix E: Unwanted Emission Strength

Test Result

TestCondition	TestMode	Antenna	Freq(MHz)	Freq.Range [MHz]	ResultFreq (MHz)	Result [dBm/MHz]	Result [μW/MHz]	Limit [μW/MHz]	Verdict
NTLV	BLE_1M	Ant1	2402	30~1000	868.08	-68.01	0.00016	≤2.5	PASS
NTNV	BLE_1M	Ant1	2402	30~1000	834.62	-67.98	0.00016	≤2.5	PASS
NTHV	BLE_1M	Ant1	2402	30~1000	861.05	-67.82	0.00017	≤2.5	PASS
NTLV	BLE_1M	Ant1	2402	1000~2387	2376.60	-54.66	0.00342	≤2.5	PASS
NTNV	BLE_1M	Ant1	2402	1000~2387	2386.65	-55.40	0.00288	≤2.5	PASS
NTHV	BLE_1M	Ant1	2402	1000~2387	2375.90	-54.48	0.00356	≤2.5	PASS
NTLV	BLE_1M	Ant1	2402	2387~2400	2399.99	-26.96	2.01372	≤25	PASS
NTNV	BLE_1M	Ant1	2402	2387~2400	2400.00	-27.10	1.94984	≤25	PASS
NTHV	BLE_1M	Ant1	2402	2387~2400	2400.00	-26.97	2.00909	≤25	PASS
NTLV	BLE_1M	Ant1	2402	2483.5~2496.5	2495.92	-46.23	0.02382	≤25	PASS
NTNV	BLE_1M	Ant1	2402	2483.5~2496.5	2488.67	-46.16	0.02421	≤25	PASS
NTHV	BLE_1M	Ant1	2402	2483.5~2496.5	2492.07	-46.56	0.02208	≤25	PASS
NTLV	BLE_1M	Ant1	2402	2496.5~13000	9608.42	-45.36	0.02911	≤2.5	PASS
NTNV	BLE_1M	Ant1	2402	2496.5~13000	9608.42	-44.79	0.03319	≤2.5	PASS
NTHV	BLE_1M	Ant1	2402	2496.5~13000	9608.95	-45.55	0.02786	≤2.5	PASS
NTLV	BLE_1M	Ant1	2440	30~1000	855.47	-68.40	0.00014	≤2.5	PASS
NTNV	BLE_1M	Ant1	2440	30~1000	836.31	-67.57	0.00017	≤2.5	PASS
NTHV	BLE_1M	Ant1	2440	30~1000	957.08	-68.66	0.00014	≤2.5	PASS
NTLV	BLE_1M	Ant1	2440	1000~2387	2382.84	-55.26	0.00298	≤2.5	PASS
NTNV	BLE_1M	Ant1	2440	1000~2387	2111.68	-55.56	0.00278	≤2.5	PASS
NTHV	BLE_1M	Ant1	2440	1000~2387	2096.77	-56.05	0.00248	≤2.5	PASS
NTLV	BLE_1M	Ant1	2440	2387~2400	2392.16	-45.68	0.02704	≤25	PASS
NTNV	BLE_1M	Ant1	2440	2387~2400	2399.75	-45.77	0.02649	≤25	PASS
NTHV	BLE_1M	Ant1	2440	2387~2400	2387.99	-45.99	0.02518	≤25	PASS
NTLV	BLE_1M	Ant1	2440	2483.5~2496.5	2492.78	-46.10	0.02455	≤25	PASS
NTNV	BLE_1M	Ant1	2440	2483.5~2496.5	2486.65	-46.54	0.02218	≤25	PASS
NTHV	BLE_1M	Ant1	2440	2483.5~2496.5	2486.93	-46.55	0.02213	≤25	PASS
NTLV	BLE_1M	Ant1	2440	2496.5~13000	9760.72	-48.12	0.01542	≤2.5	PASS
NTNV	BLE_1M	Ant1	2440	2496.5~13000	9760.72	-48.31	0.01476	≤2.5	PASS
NTHV	BLE_1M	Ant1	2440	2496.5~13000	9760.72	-47.92	0.01614	≤2.5	PASS
NTLV	BLE_1M	Ant1	2480	30~1000	843.10	-67.99	0.00016	≤2.5	PASS
NTNV	BLE_1M	Ant1	2480	30~1000	852.80	-67.77	0.00017	≤2.5	PASS
NTHV	BLE_1M	Ant1	2480	30~1000	857.41	-67.81	0.00017	≤2.5	PASS
NTLV	BLE_1M	Ant1	2480	1000~2387	2383.88	-56.10	0.00245	≤2.5	PASS
NTNV	BLE_1M	Ant1	2480	1000~2387	2252.81	-56.21	0.00239	≤2.5	PASS

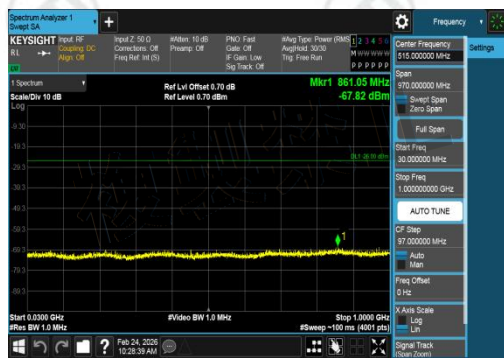
NTHV	BLE_1M	Ant1	2480	1000~2387	2279.51	-55.15	0.00305	≤2.5	PASS
NTLV	BLE_1M	Ant1	2480	2387~2400	2394.04	-45.90	0.02570	≤25	PASS
NTNV	BLE_1M	Ant1	2480	2387~2400	2397.23	-46.20	0.02399	≤25	PASS
NTHV	BLE_1M	Ant1	2480	2387~2400	2396.58	-45.90	0.02570	≤25	PASS
NTLV	BLE_1M	Ant1	2480	2483.5~2496.5	2483.50	-45.31	0.02944	≤25	PASS
NTNV	BLE_1M	Ant1	2480	2483.5~2496.5	2483.53	-45.82	0.02618	≤25	PASS
NTHV	BLE_1M	Ant1	2480	2483.5~2496.5	2483.68	-45.27	0.02972	≤25	PASS
NTLV	BLE_1M	Ant1	2480	2496.5~13000	9920.90	-52.42	0.00573	≤2.5	PASS
NTNV	BLE_1M	Ant1	2480	2496.5~13000	9920.90	-52.00	0.00631	≤2.5	PASS
NTHV	BLE_1M	Ant1	2480	2496.5~13000	9920.90	-52.58	0.00552	≤2.5	PASS

Test Graphs



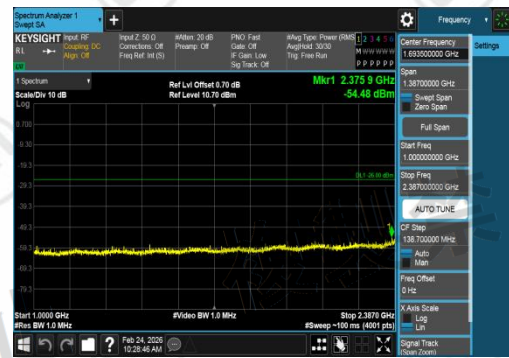
NTLV-BLE_1M-Ant1-2402-30~1000-PASS

NTNV-BLE_1M-Ant1-2402-30~1000-PASS



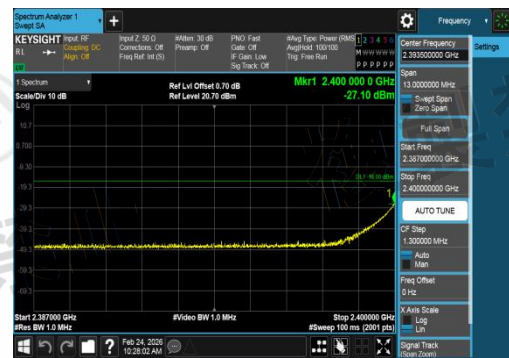
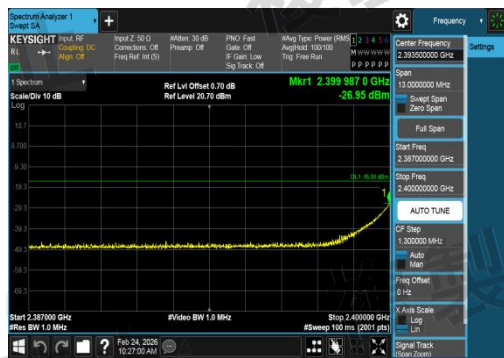
NTHV-BLE_1M-Ant1-2402-30~1000-PASS

NTLV-BLE_1M-Ant1-2402-1000~2387-PASS



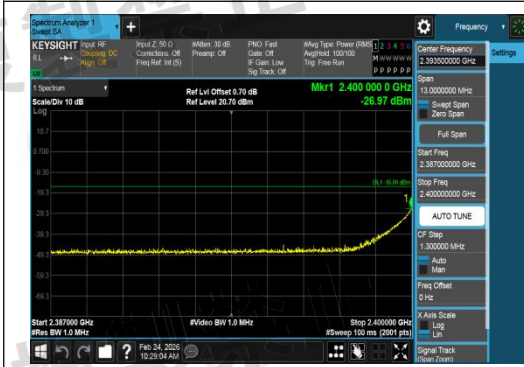
NTNV-BLE_1M-Ant1-2402-1000~2387-PASS

NTHV-BLE_1M-Ant1-2402-1000~2387-PASS



NTLV-BLE_1M-Ant1-2402-2387~2400-PASS

NTNV-BLE_1M-Ant1-2402-2387~2400-PASS



NTHV-BLE_1M-Ant1-2402-2387~2400-PASS



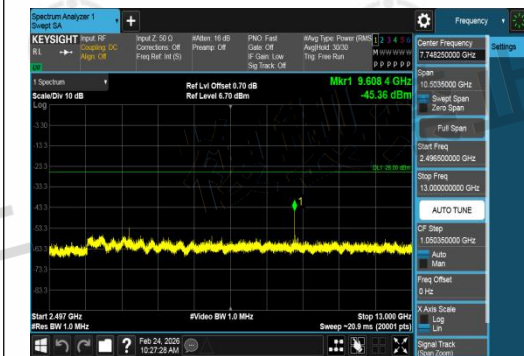
NTLV-BLE_1M-Ant1-2402-2483.5~2496.5-PASS



NNTV-BLE_1M-Ant1-2402-2483.5~2496.5-PASS



NTHV-BLE_1M-Ant1-2402-2483.5~2496.5-PASS



NTLV-BLE_1M-Ant1-2402-2496.5~13000-PASS



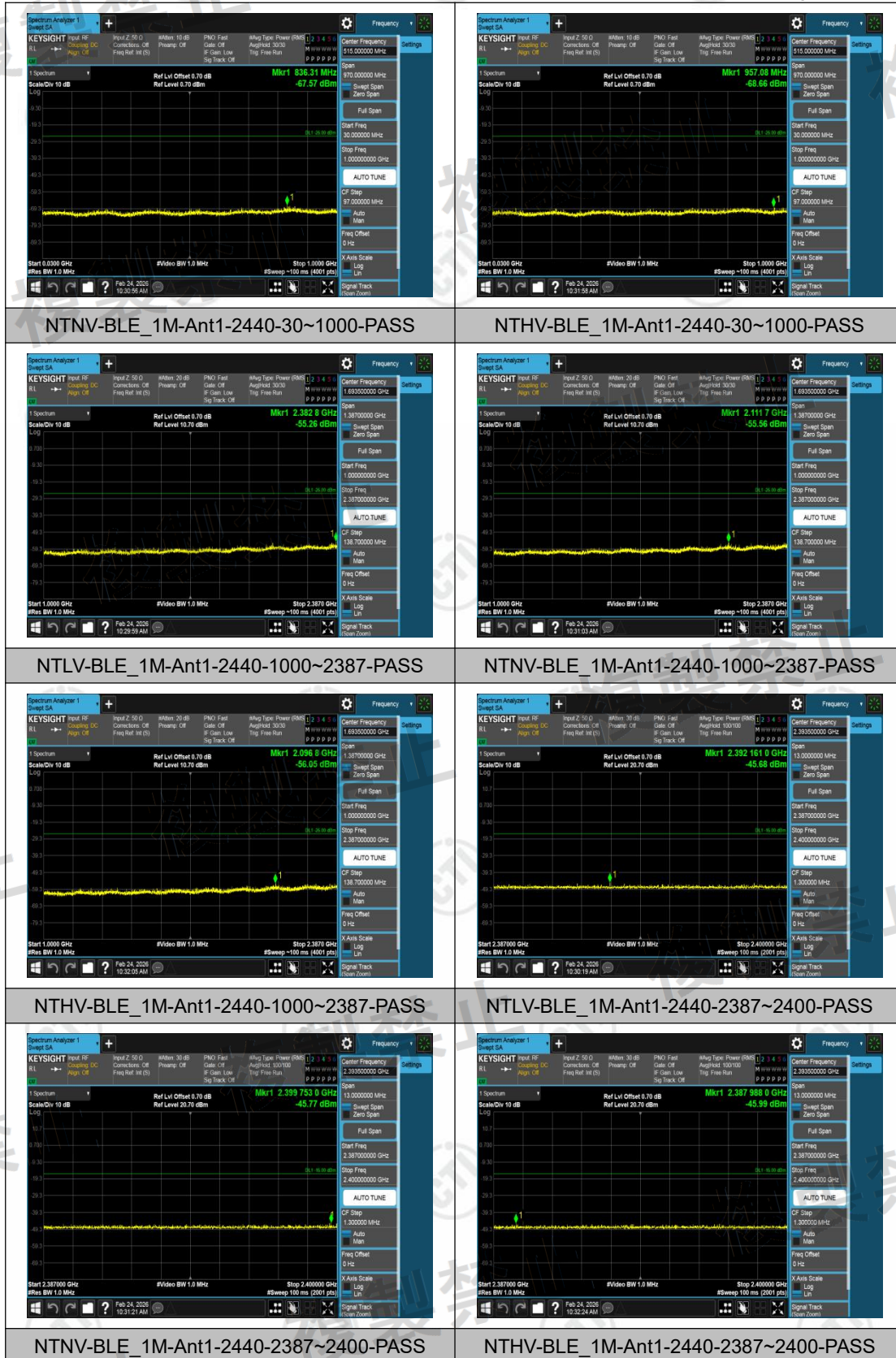
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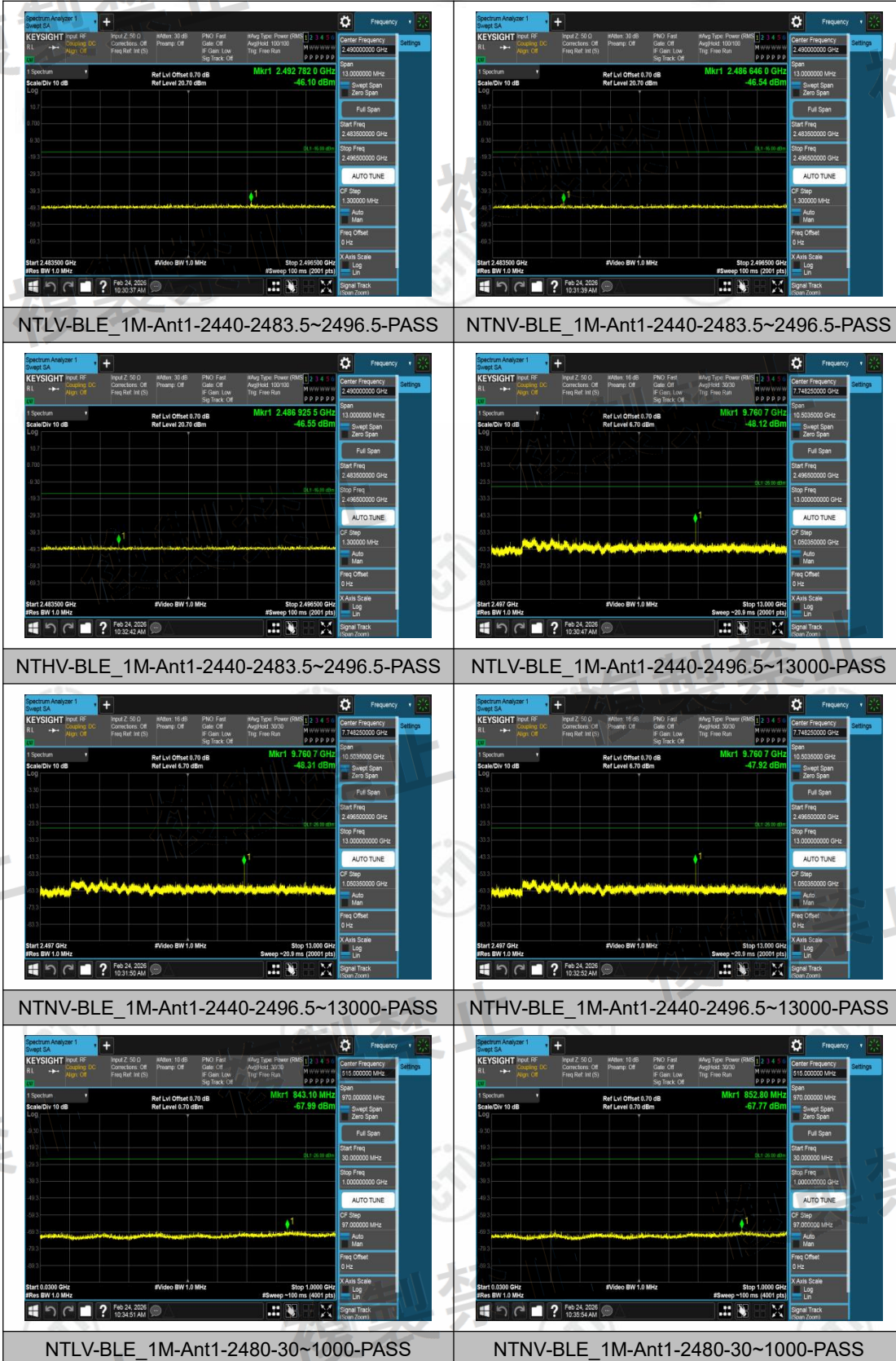


NTHV-BLE_1M-Ant1-2402-2496.5~13000-PASS

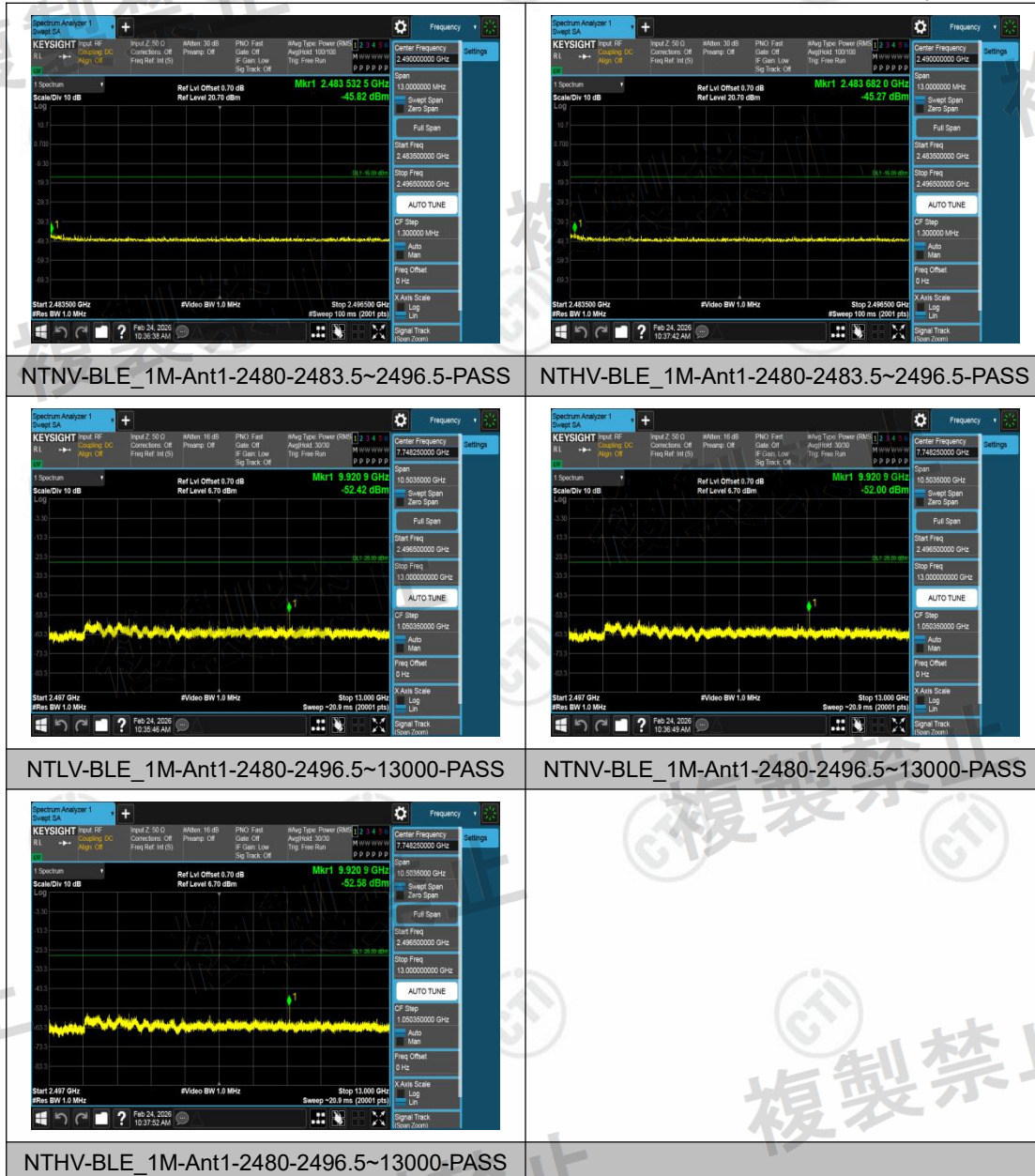


NTLV-BLE_1M-Ant1-2440-30~1000-PASS







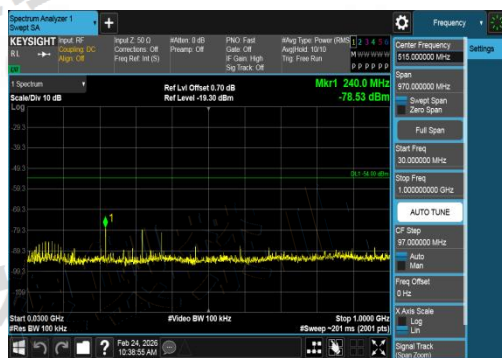


Appendix F: Secondary Radiated Emission Strength

Test Result

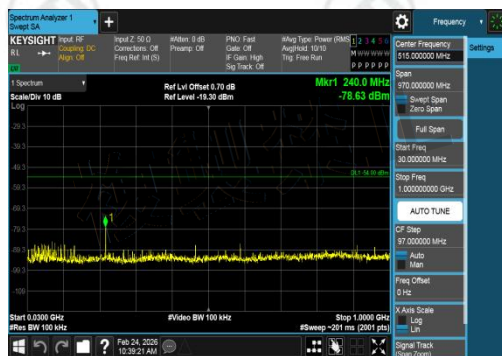
TestCondition	TestMode	Antenna	Freq(MHz)	Freq.Range [MHz]	ResultFreq (MHz)	Result [dBm]	Result [nW]	Limit [nW]	Verdict
NTLV	BLE_1M	Ant1	2402	30~1000	240.01	-78.53	0.01403	≤4	PASS
NTNV	BLE_1M	Ant1	2402	30~1000	240.01	-78.64	0.01368	≤4	PASS
NTHV	BLE_1M	Ant1	2402	30~1000	240.01	-78.63	0.01371	≤4	PASS
NTLV	BLE_1M	Ant1	2402	1000~12500	2415.65	-69.08	0.12359	≤20	PASS
NTNV	BLE_1M	Ant1	2402	1000~12500	2411.05	-66.96	0.20137	≤20	PASS
NTHV	BLE_1M	Ant1	2402	1000~12500	2419.10	-68.57	0.13900	≤20	PASS
NTLV	BLE_1M	Ant1	2440	30~1000	240.01	-79.02	0.01253	≤4	PASS
NTNV	BLE_1M	Ant1	2440	30~1000	311.79	-74.45	0.03589	≤4	PASS
NTHV	BLE_1M	Ant1	2440	30~1000	240.01	-79.05	0.01245	≤4	PASS
NTLV	BLE_1M	Ant1	2440	1000~12500	2412.78	-66.53	0.22233	≤20	PASS
NTNV	BLE_1M	Ant1	2440	1000~12500	5198.65	-67.90	0.16218	≤20	PASS
NTHV	BLE_1M	Ant1	2440	1000~12500	3998.05	-71.61	0.06902	≤20	PASS
NTLV	BLE_1M	Ant1	2480	30~1000	240.01	-78.86	0.01300	≤4	PASS
NTNV	BLE_1M	Ant1	2480	30~1000	240.01	-78.81	0.01315	≤4	PASS
NTHV	BLE_1M	Ant1	2480	30~1000	240.01	-78.82	0.01312	≤4	PASS
NTLV	BLE_1M	Ant1	2480	1000~12500	2411.63	-67.10	0.19498	≤20	PASS
NTNV	BLE_1M	Ant1	2480	1000~12500	4639.75	-72.86	0.05176	≤20	PASS
NTHV	BLE_1M	Ant1	2480	1000~12500	4666.78	-72.54	0.05572	≤20	PASS

Test Graphs



NTLV-BLE_1M-Ant1-2402-30~1000-PASS

NTNV-BLE_1M-Ant1-2402-30~1000-PASS



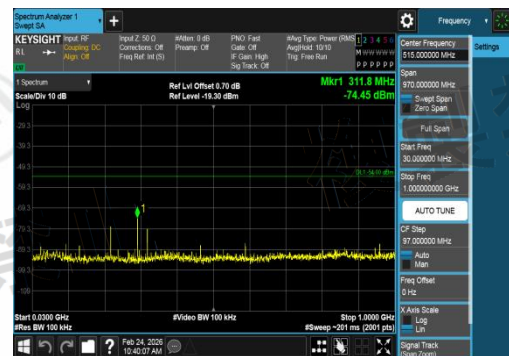
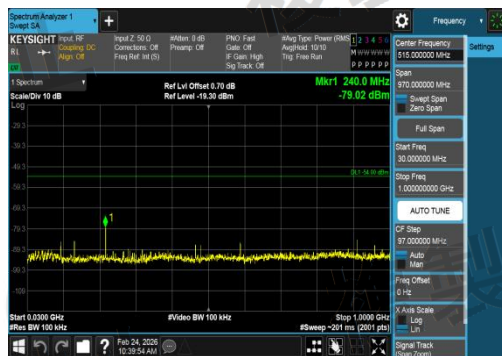
NTHV-BLE_1M-Ant1-2402-30~1000-PASS

NTLV-BLE_1M-Ant1-2402-1000~12500-PASS



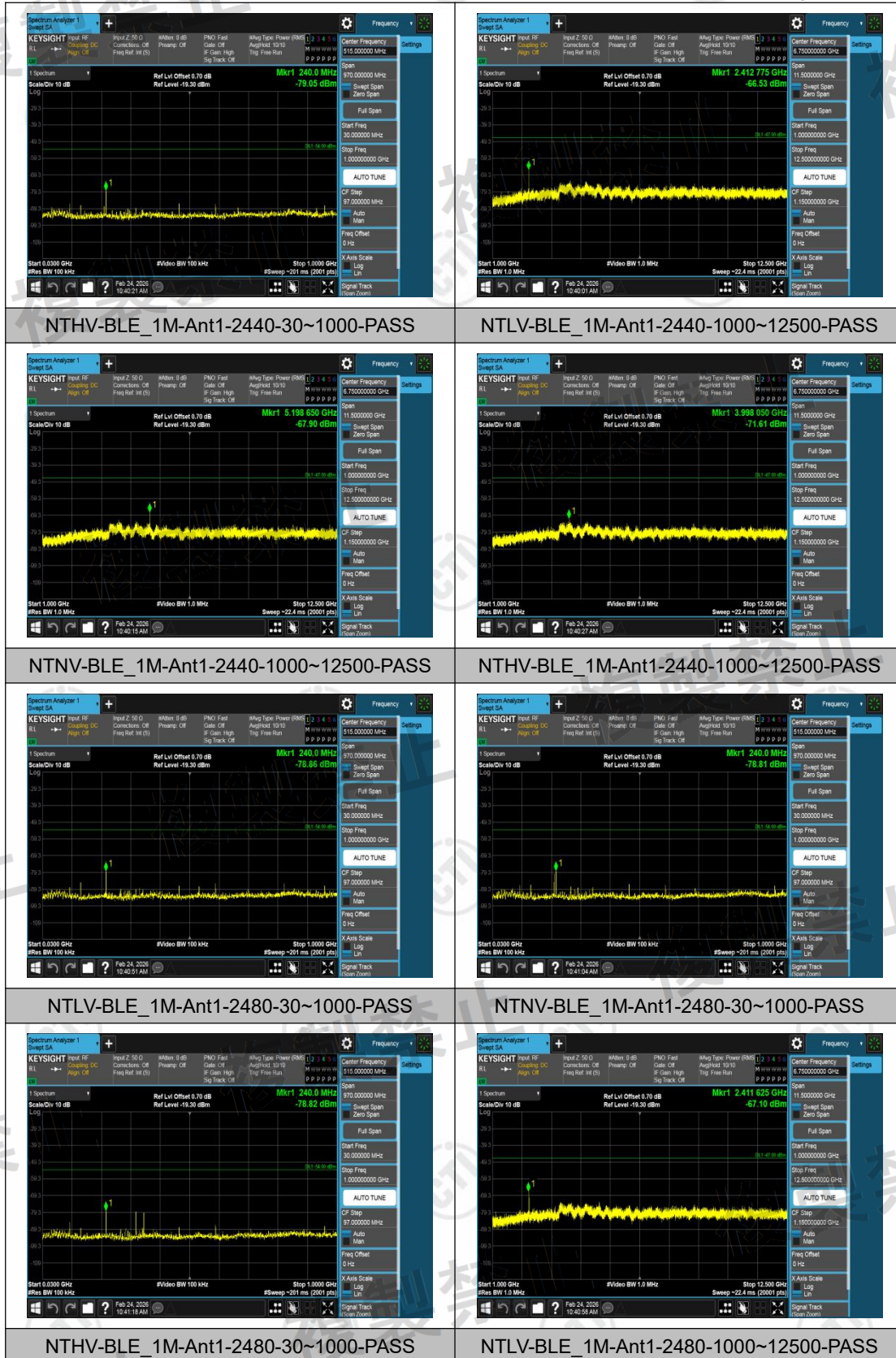
NTNV-BLE_1M-Ant1-2402-1000~12500-PASS

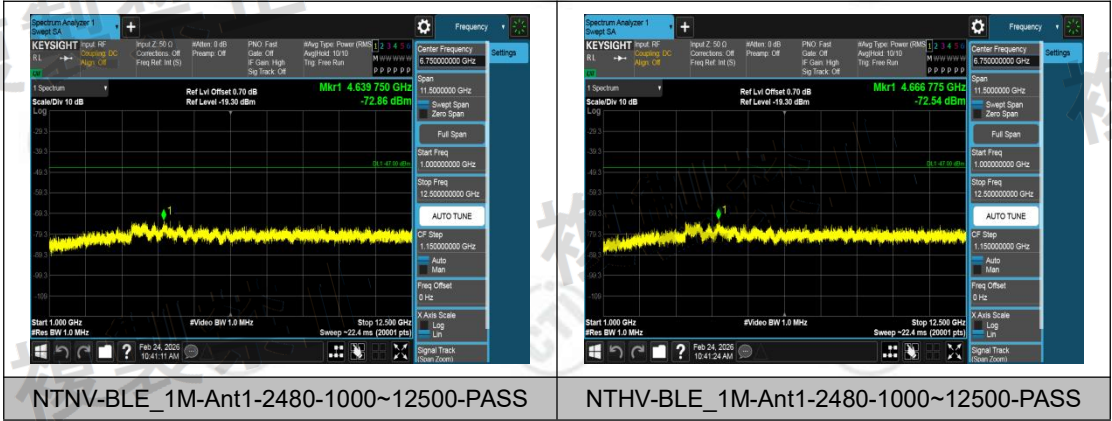
NTHV-BLE_1M-Ant1-2402-1000~12500-PASS



NTLV-BLE_1M-Ant1-2440-30~1000-PASS

NTNV-BLE_1M-Ant1-2440-30~1000-PASS





*** End of Report ***