

Appendix A

RF Test Data for BT LE (Conducted Measurement)

Product Name: Hi-Speed USB MIDI HOST BT

Test Model: UMH-BT

Environmental Conditions

Temperature:	23.8°C
Relative Humidity:	52.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Zhao Xing Hai
Supervised by:	Fengliu Tang

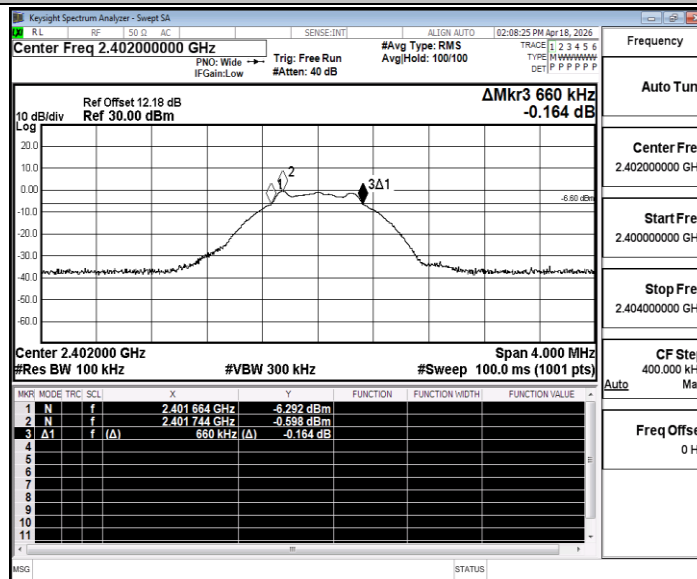
A.1 DTS Bandwidth

Test Result

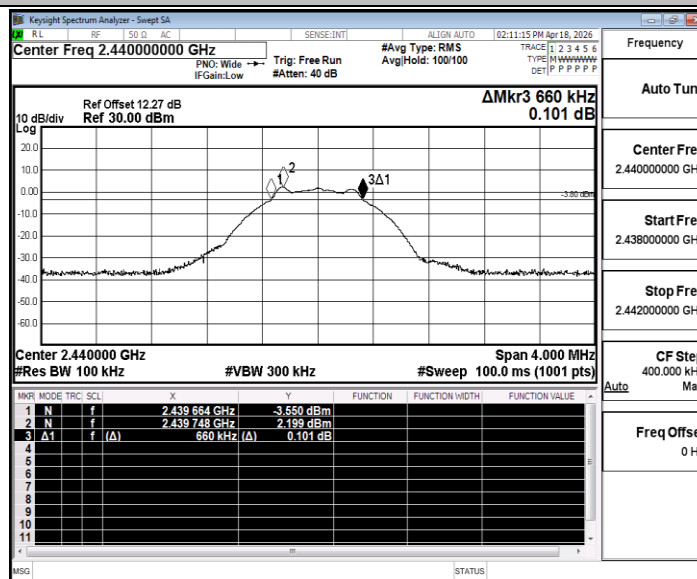
TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.660	2401.664	2402.324	0.5	PASS
		2440	0.660	2439.664	2440.324	0.5	PASS
		2480	0.660	2479.664	2480.324	0.5	PASS
BLE_2M	Ant1	2402	1.152	2401.408	2402.560	0.5	PASS
		2440	1.148	2439.408	2440.556	0.5	PASS
		2480	1.152	2479.404	2480.556	0.5	PASS

Test Graphs

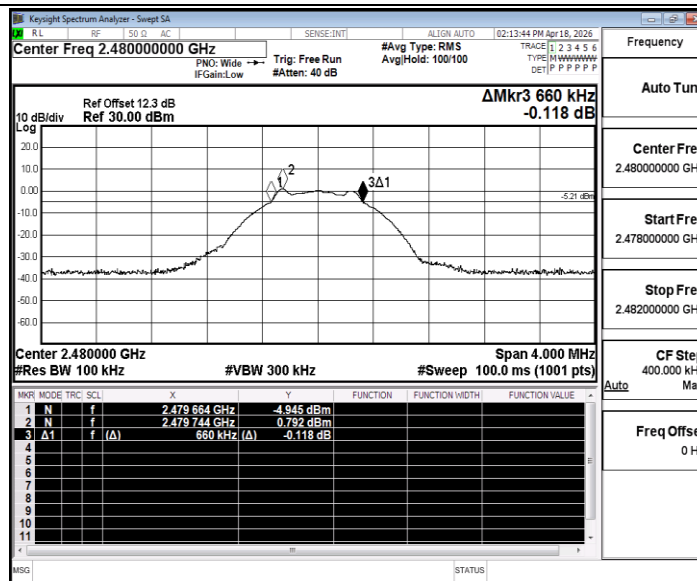
BLE_1M_Ant1_2402



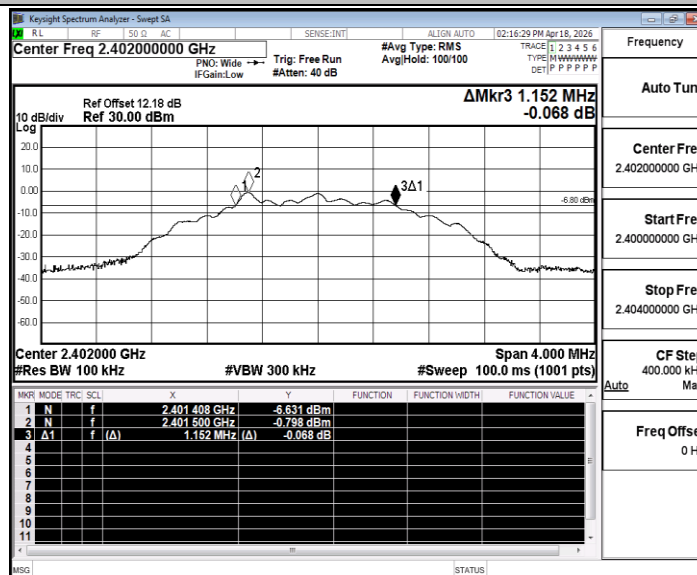
BLE_1M_Ant1_2440



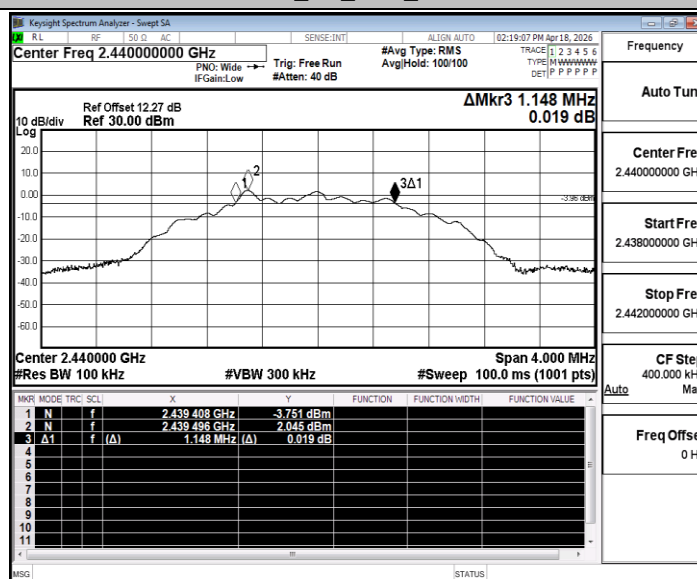
BLE_1M_Ant1_2480

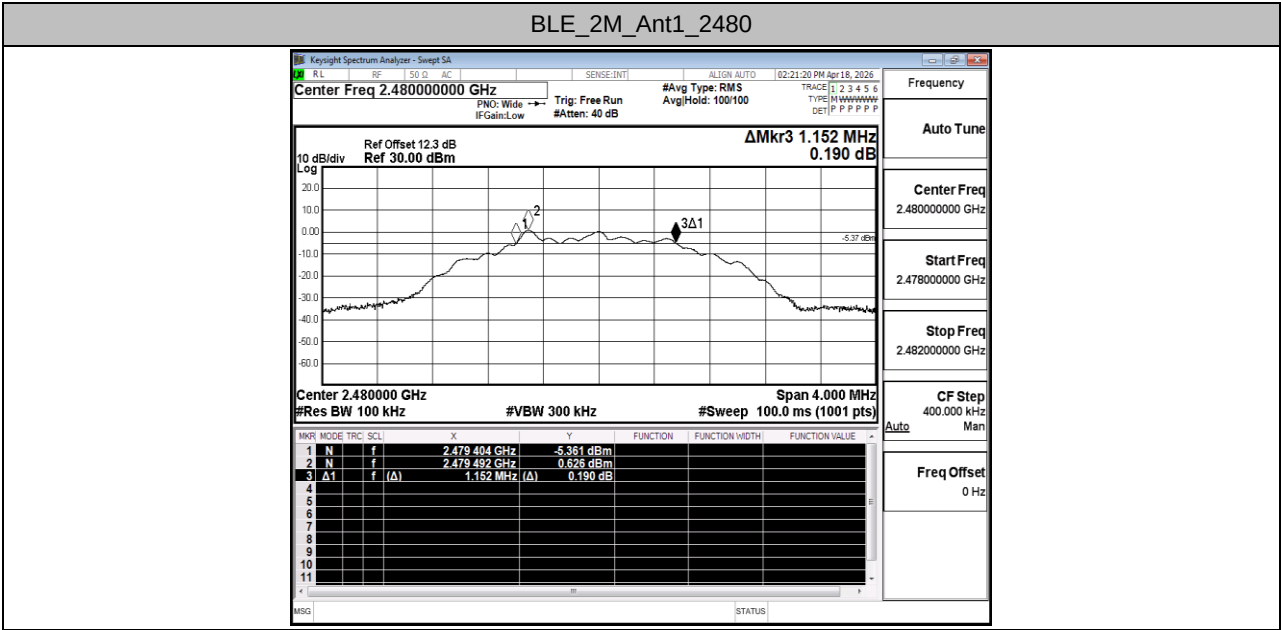


BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



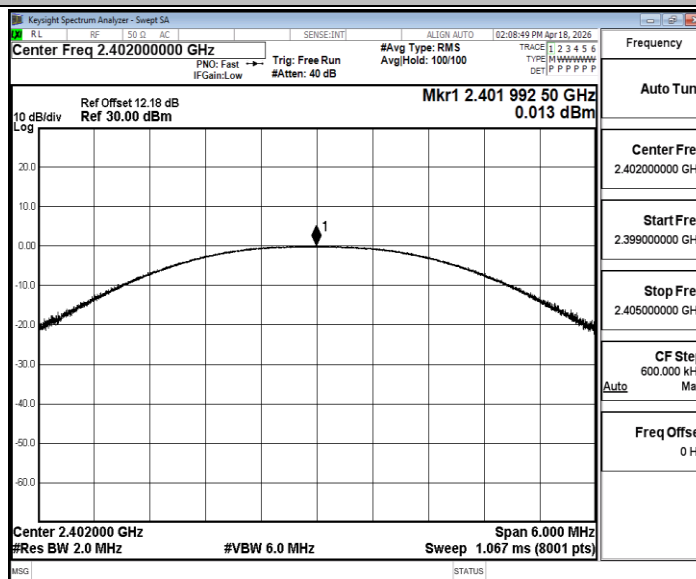


A.2 Maximum Peak conducted output power

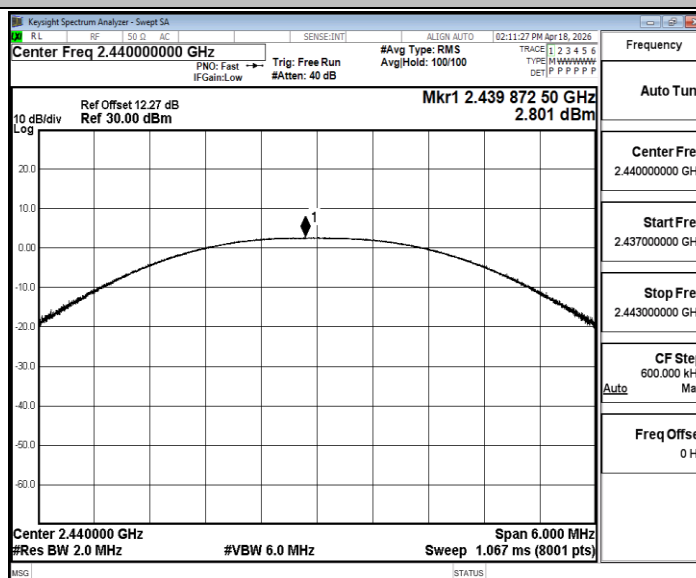
Test Result Peak

TestMode	Antenna	Freq(MHz)	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant1	2402	0.01	≤30	PASS
		2440	2.80	≤30	PASS
		2480	1.40	≤30	PASS
BLE_2M	Ant1	2402	0.03	≤30	PASS
		2440	2.67	≤30	PASS
		2480	1.32	≤30	PASS

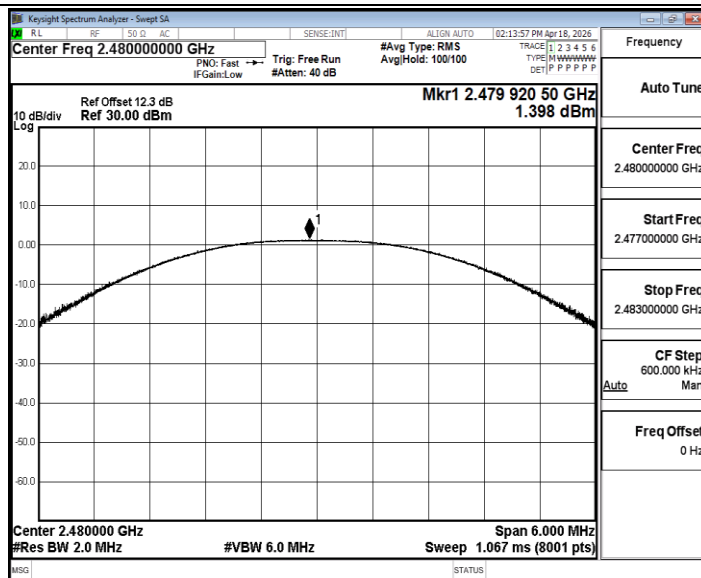
BLE 1M Ant1 2402



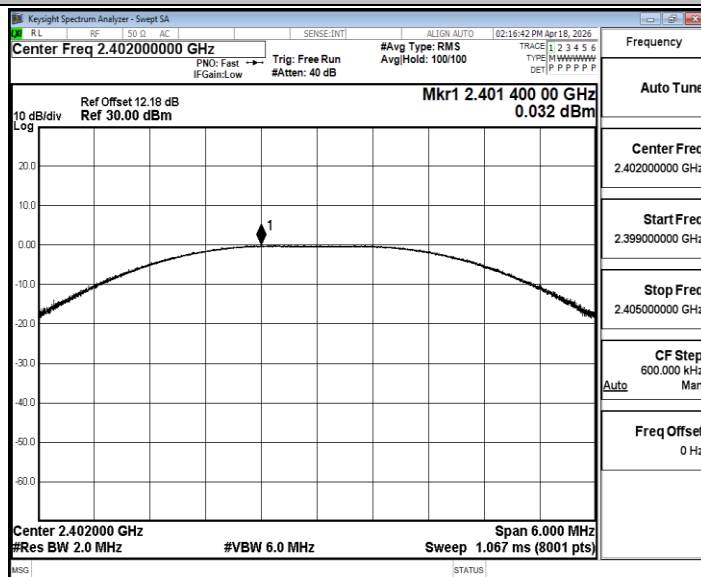
BLE 1M Ant1 2440



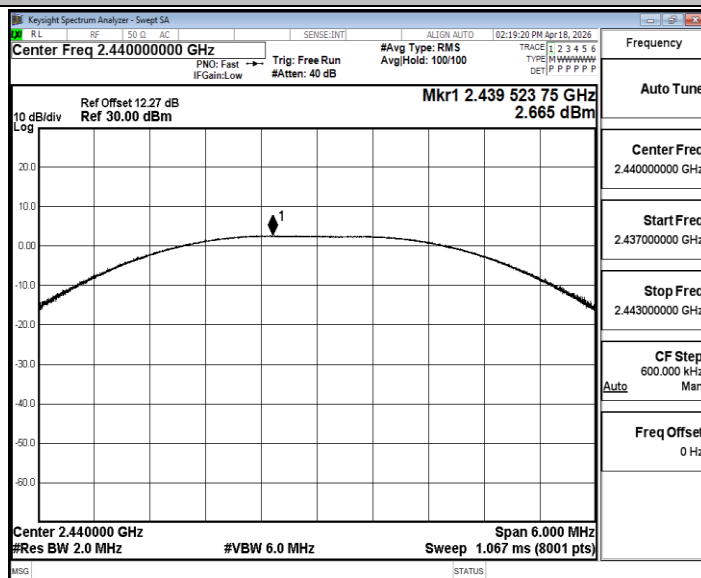
BLE 1M Ant1 2480

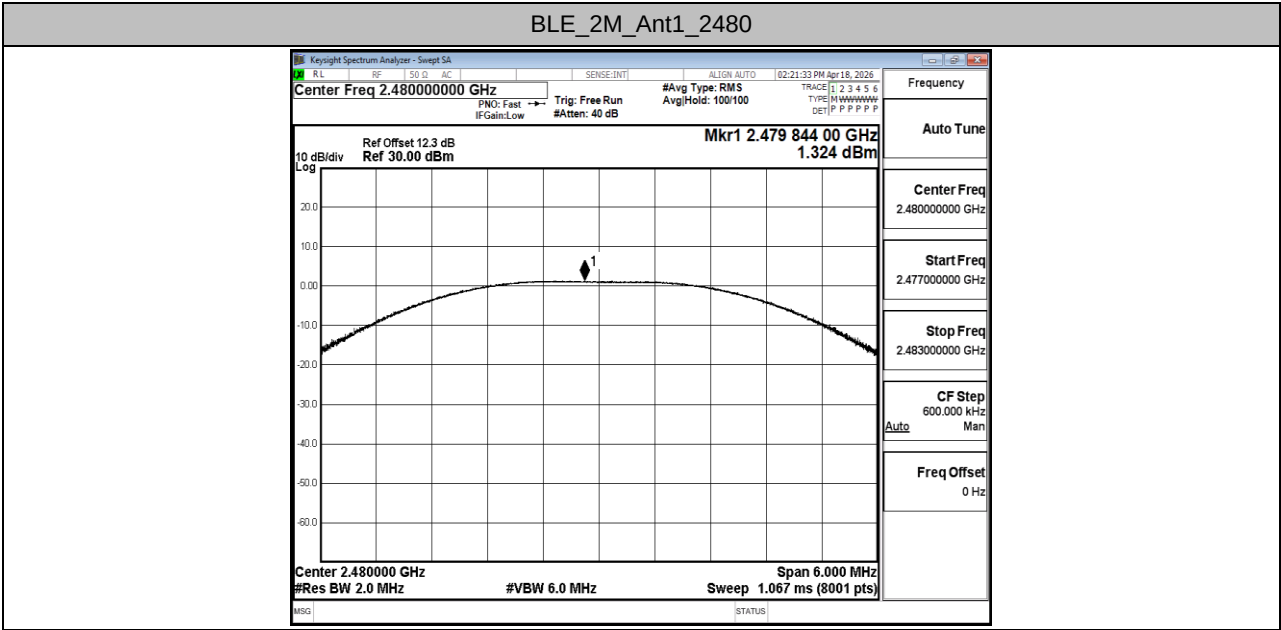


BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



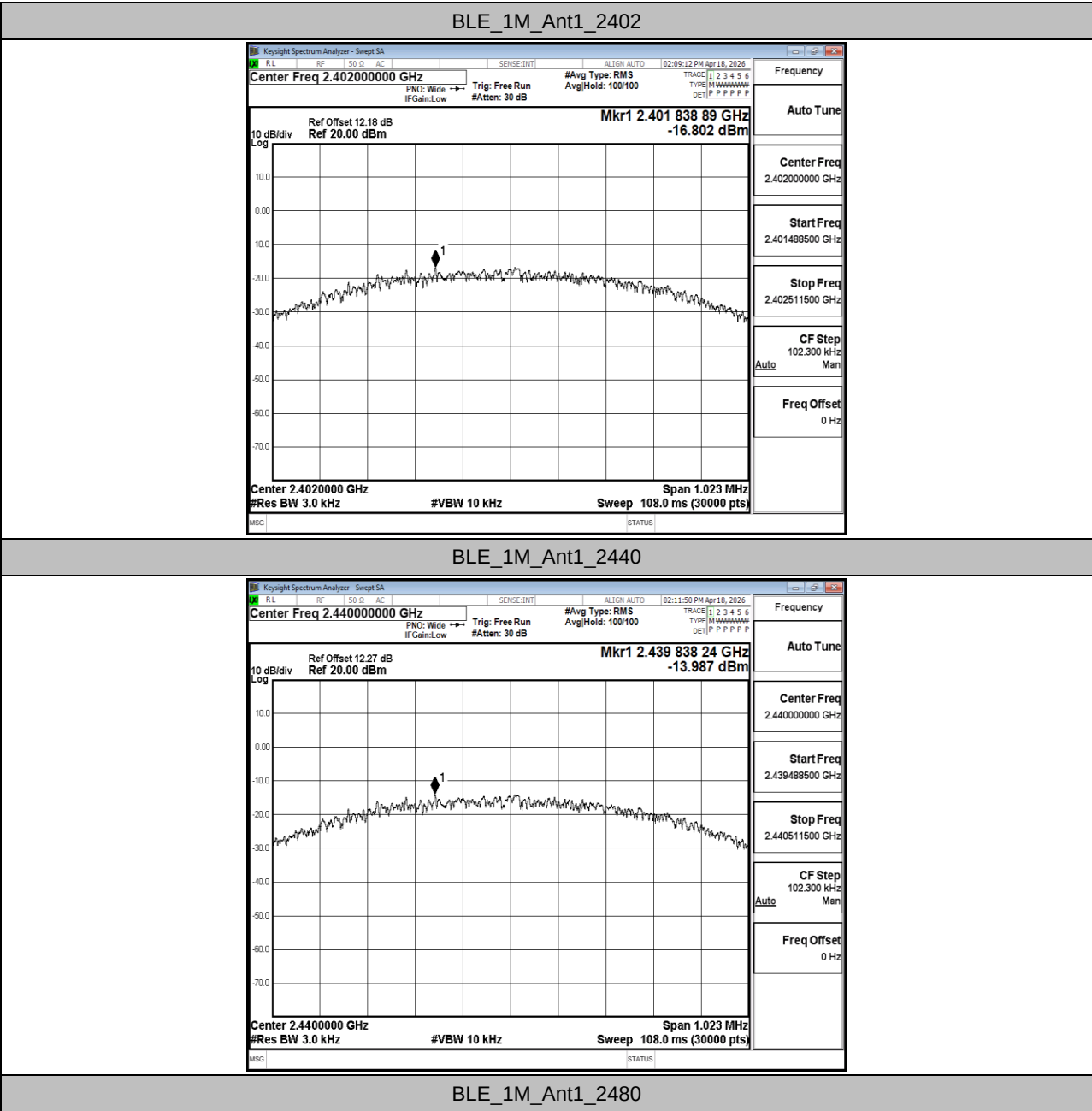


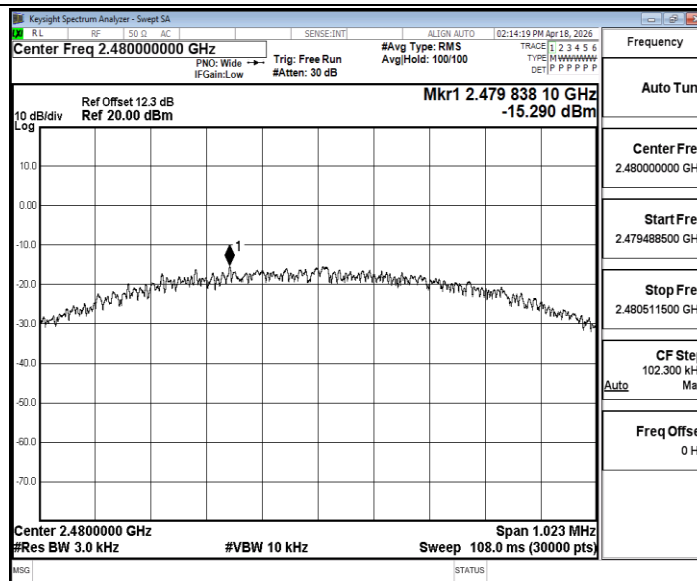
A.3 Maximum power spectral density

Test Result

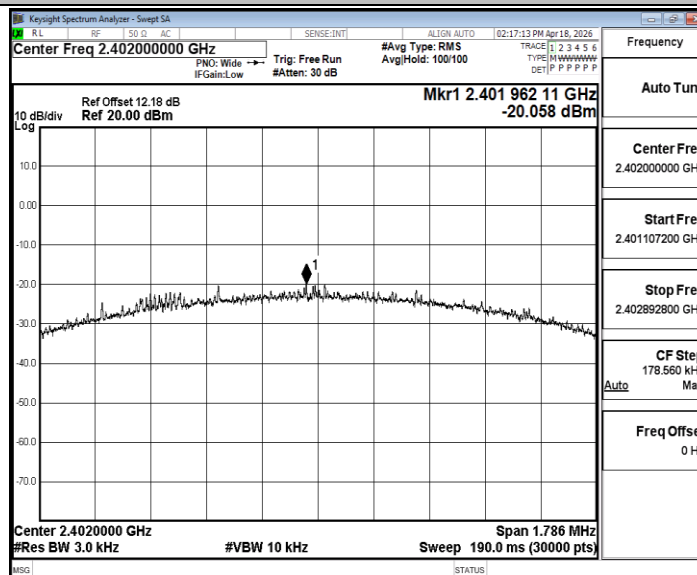
TestMode	Antenna	Freq(MHz)	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-16.80	≤8.00	PASS
		2440	-13.99	≤8.00	PASS
		2480	-15.29	≤8.00	PASS
BLE_2M	Ant1	2402	-20.06	≤8.00	PASS
		2440	-17.09	≤8.00	PASS
		2480	-18.51	≤8.00	PASS

Test Graphs

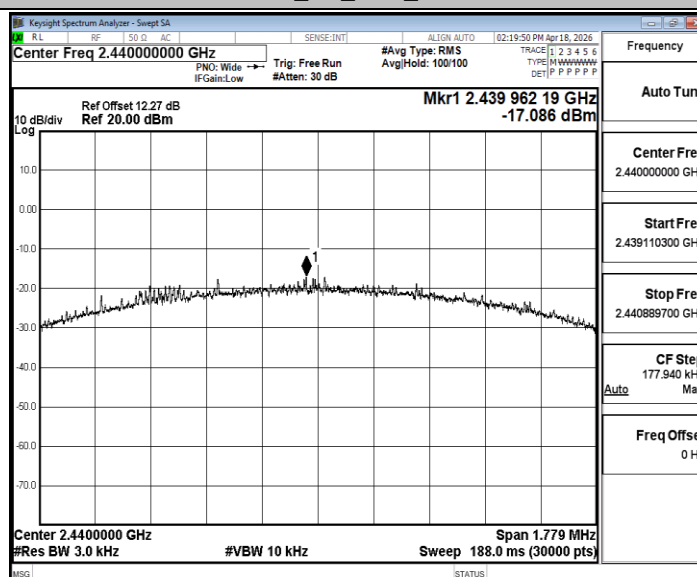


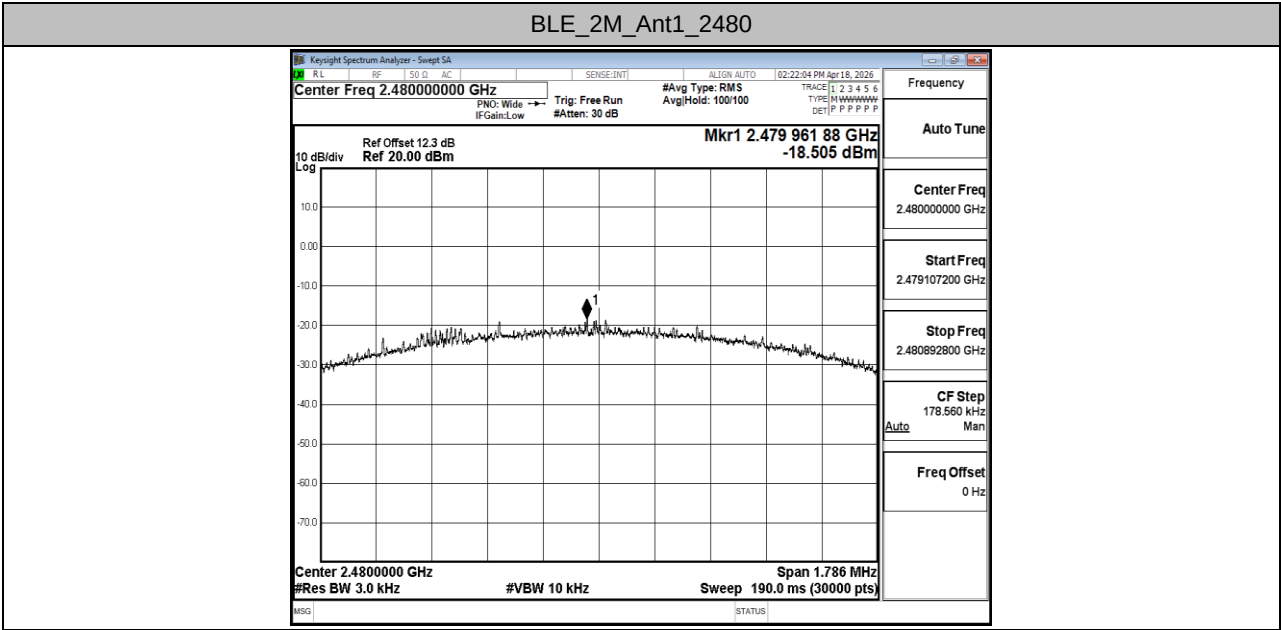


BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



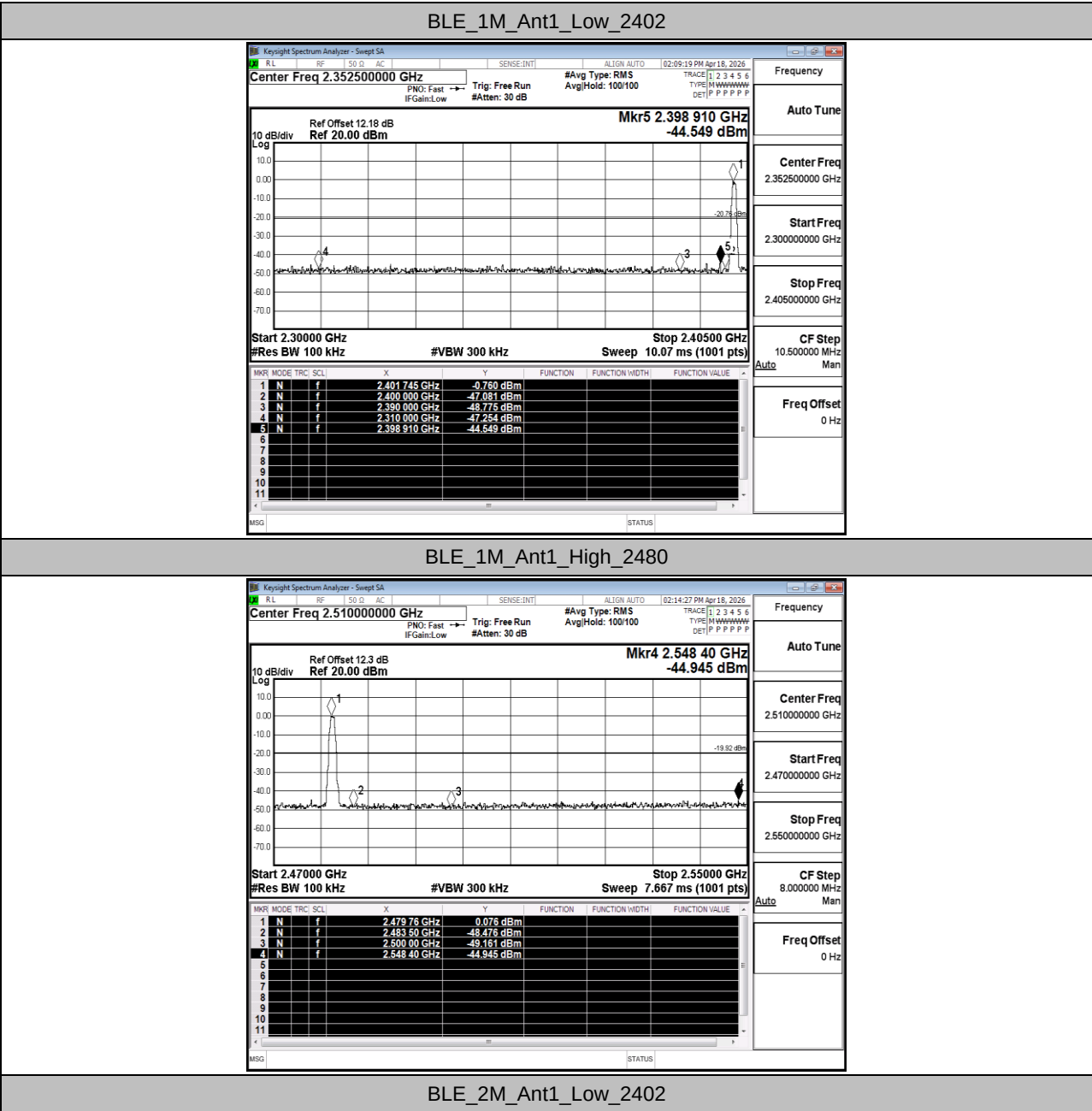


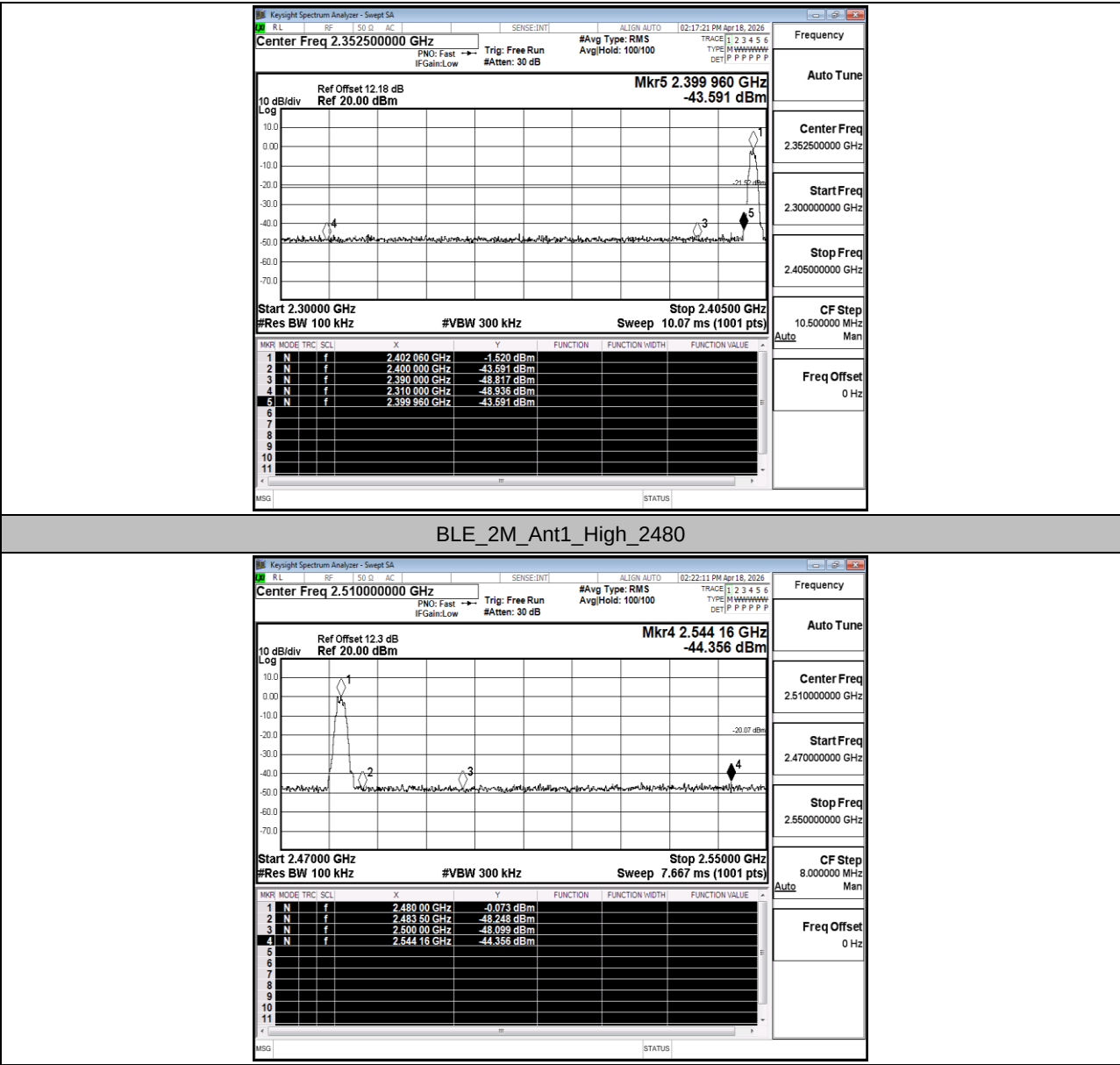
A.4 Band edge measurements

Test Result

TestMode	Antenna	ChName	Freq(MHz)	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	-0.76	-44.55	≤-20.76	PASS
		High	2480	0.08	-44.95	≤-19.92	PASS
BLE_2M	Ant1	Low	2402	-1.52	-43.59	≤-21.52	PASS
		High	2480	-0.07	-44.36	≤-20.07	PASS

Test Graphs





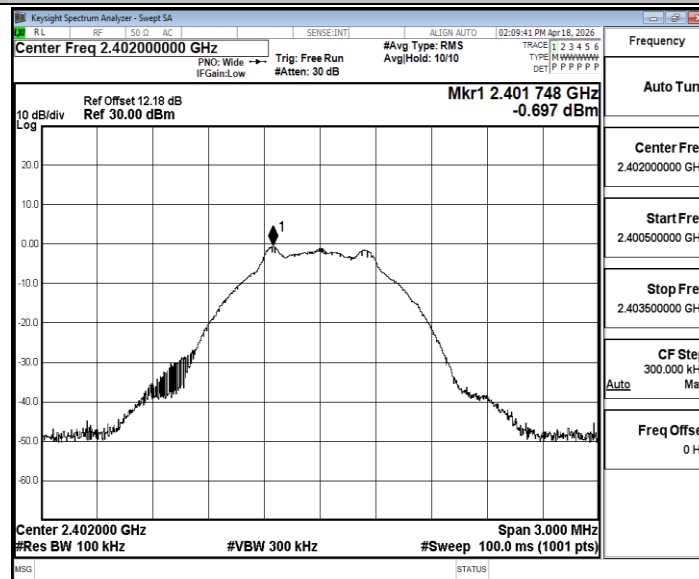
A.5 Conducted Spurious Emission

Test Result

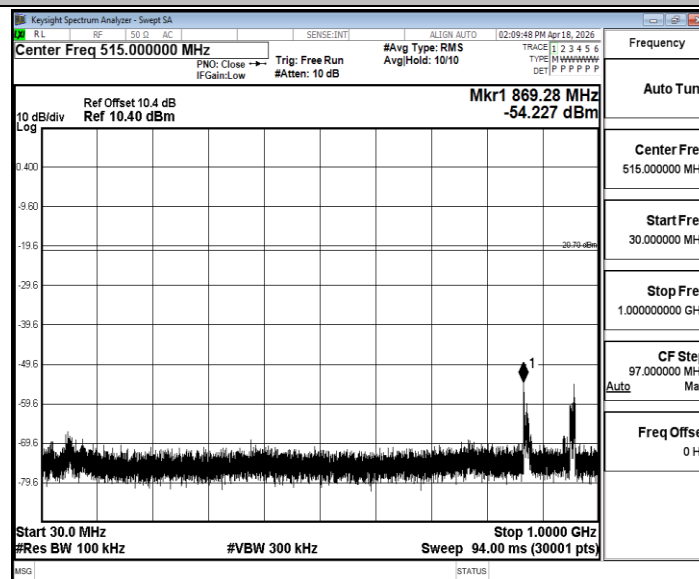
TestMode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	-0.70	-0.70	---	PASS
			30~1000	-0.70	-54.23	≤-20.7	PASS
			1000~26500	-0.70	-42.94	≤-20.7	PASS
		2440	Reference	2.08	2.08	---	PASS
			30~1000	2.08	-53.73	≤-17.92	PASS
			1000~26500	2.08	-42.99	≤-17.92	PASS
		2480	Reference	0.73	0.73	---	PASS
			30~1000	0.73	-54.01	≤-19.27	PASS
			1000~26500	0.73	-43.6	≤-19.27	PASS
BLE_2M	Ant1	2402	Reference	-0.87	-0.87	---	PASS
			30~1000	-0.87	-50.58	≤-20.87	PASS
			1000~26500	-0.87	-42.92	≤-20.87	PASS
		2440	Reference	1.96	1.96	---	PASS
			30~1000	1.96	-57.83	≤-18.04	PASS
			1000~26500	1.96	-43.01	≤-18.04	PASS
		2480	Reference	0.59	0.59	---	PASS
			30~1000	0.59	-54.92	≤-19.41	PASS
			1000~26500	0.59	-43.03	≤-19.41	PASS

Test Graphs

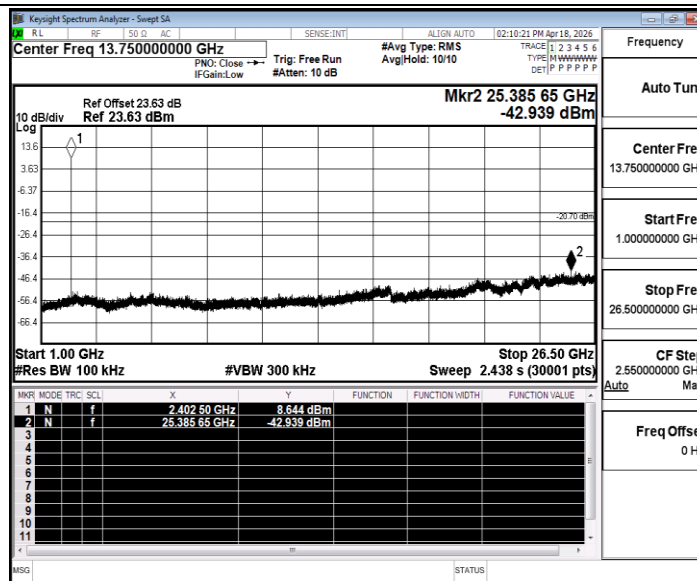
BLE_1M_Ant1_2402_0~Reference



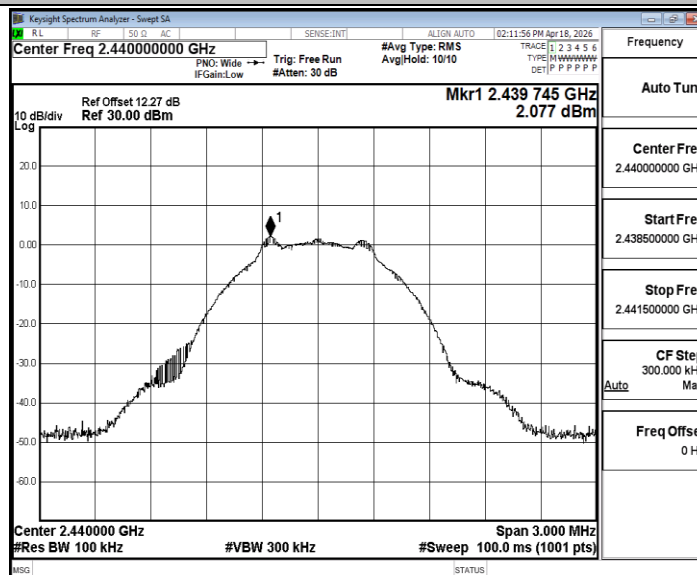
BLE_1M_Ant1_2402_30~1000



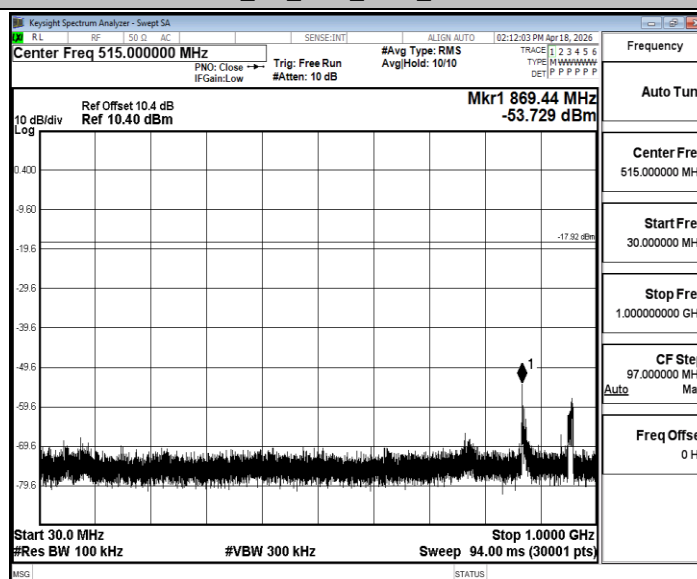
BLE_1M_Ant1_2402_1000~26500

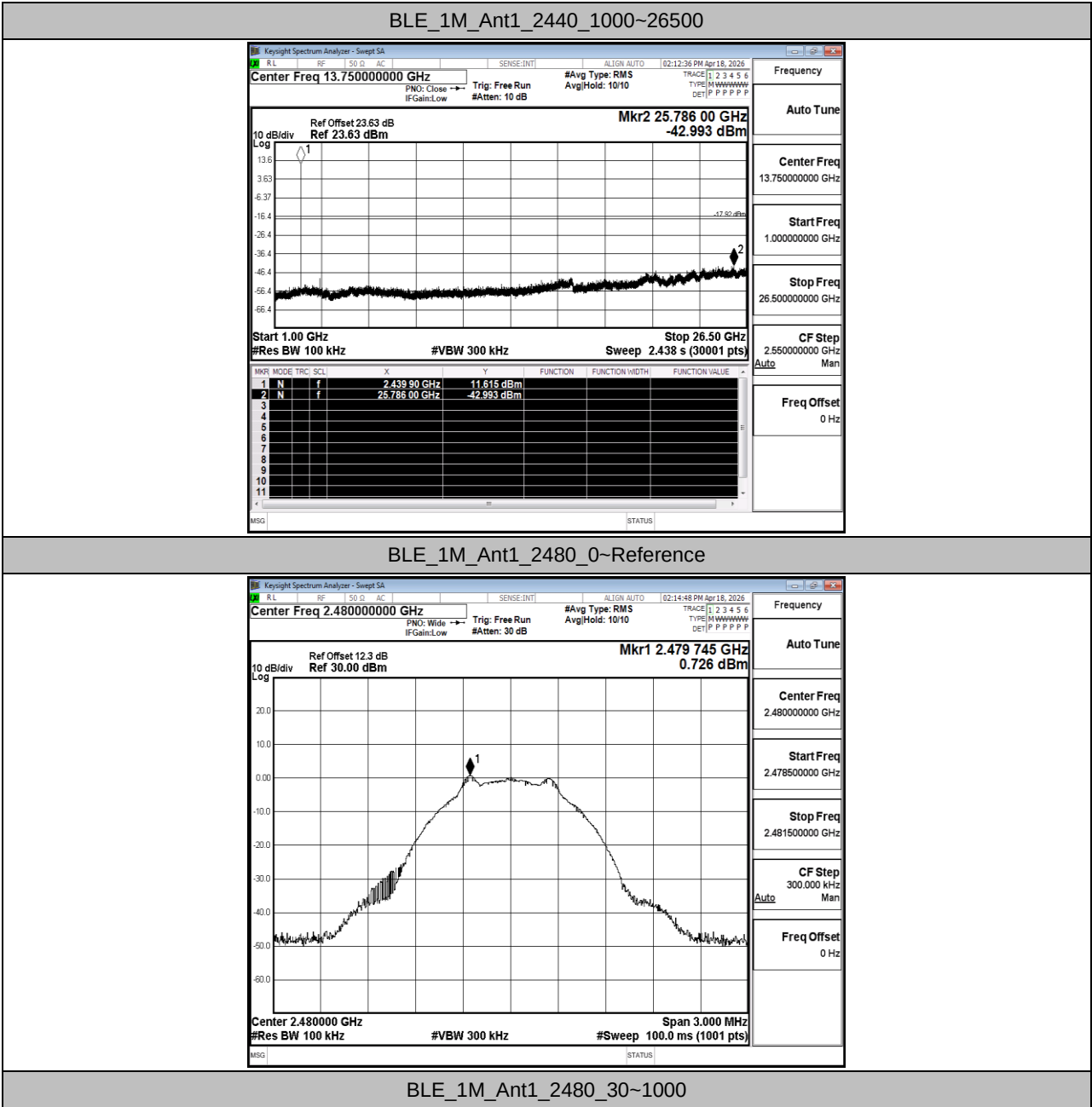


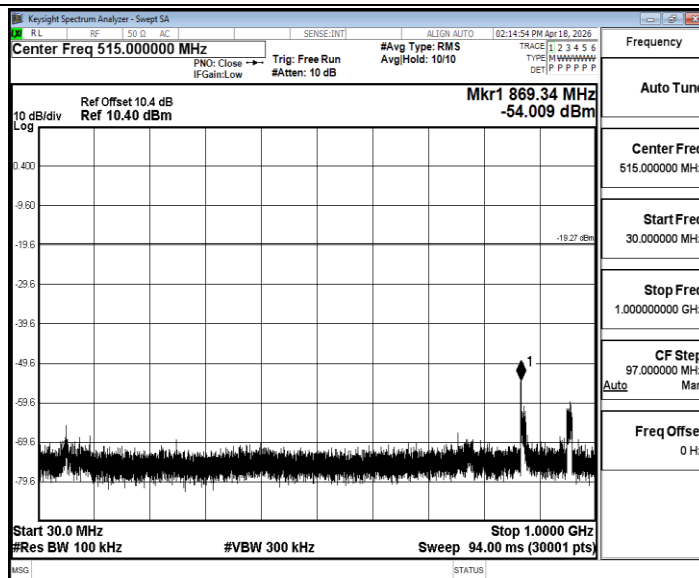
BLE_1M_Ant1_2440_0~Reference



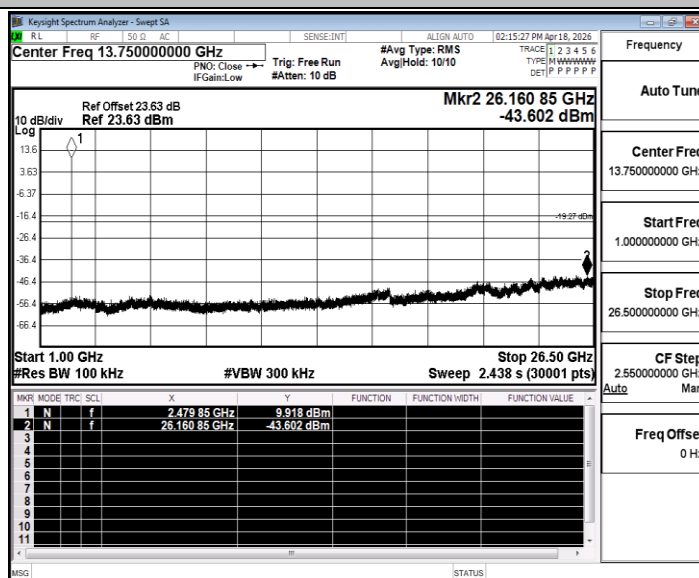
BLE_1M_Ant1_2440_30~1000



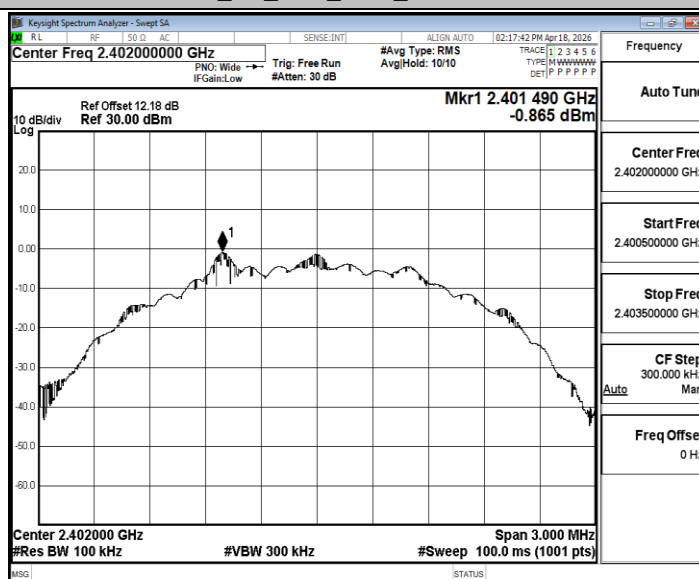


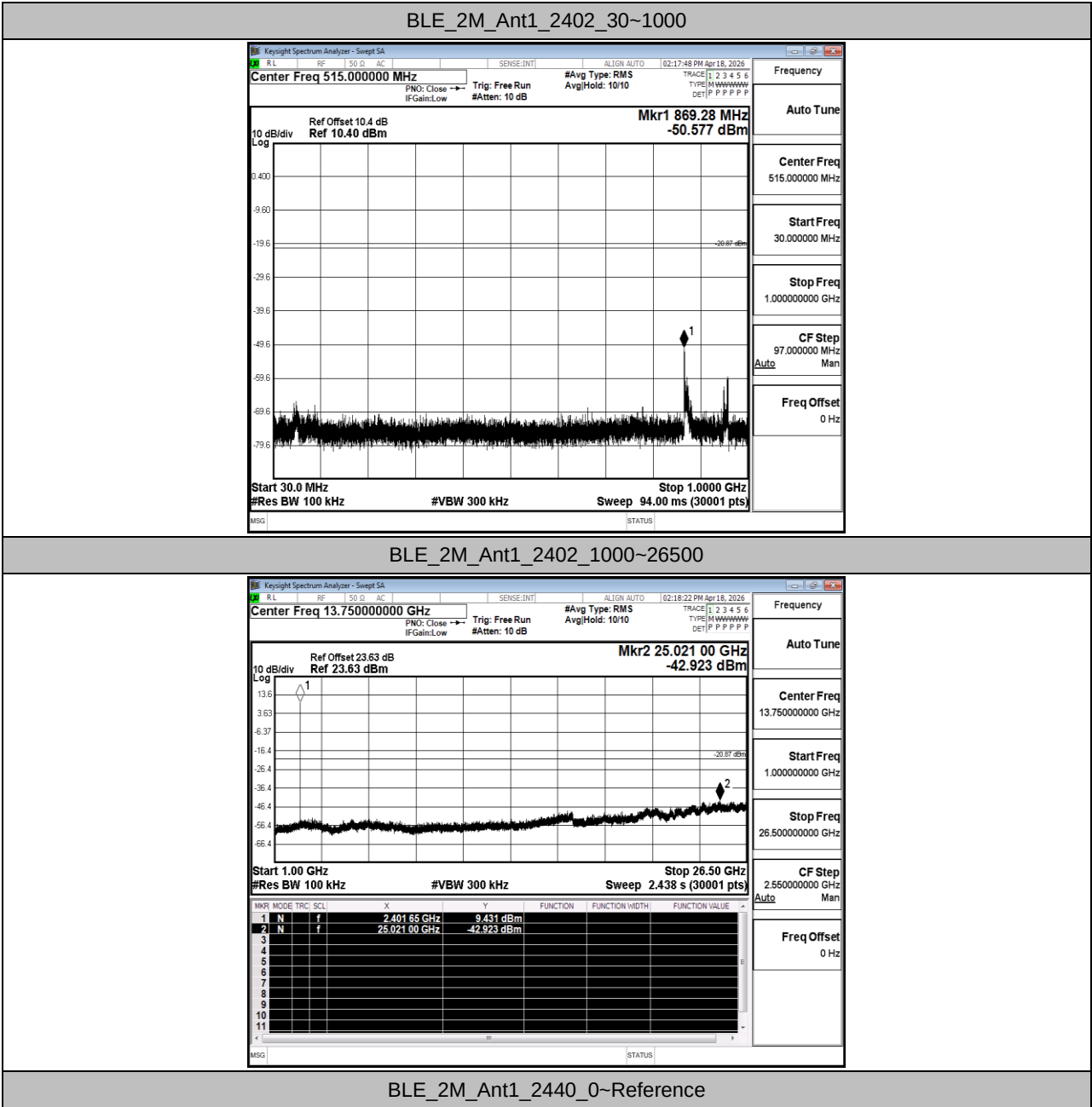


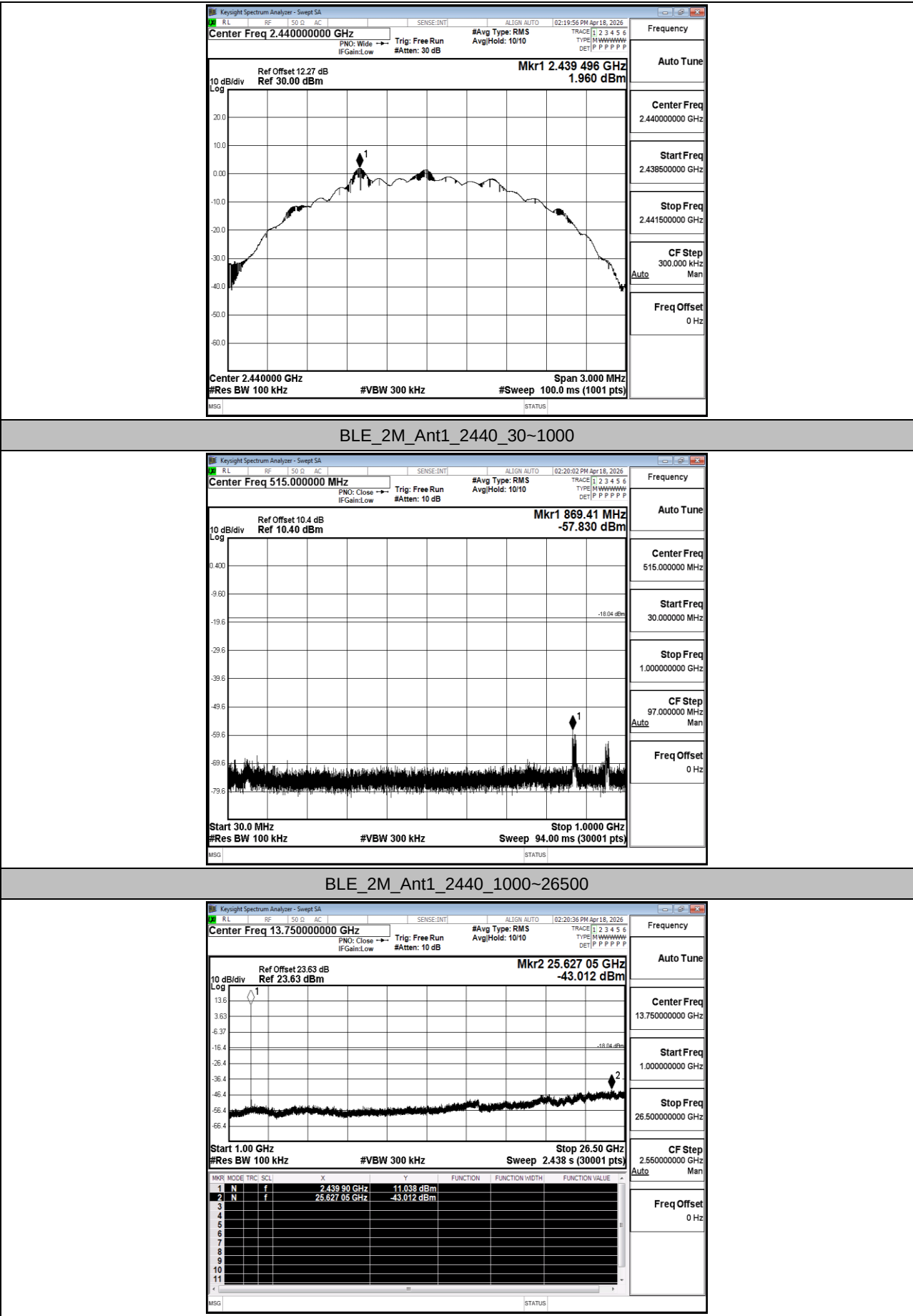
BLE_1M_Ant1_2480_1000-26500

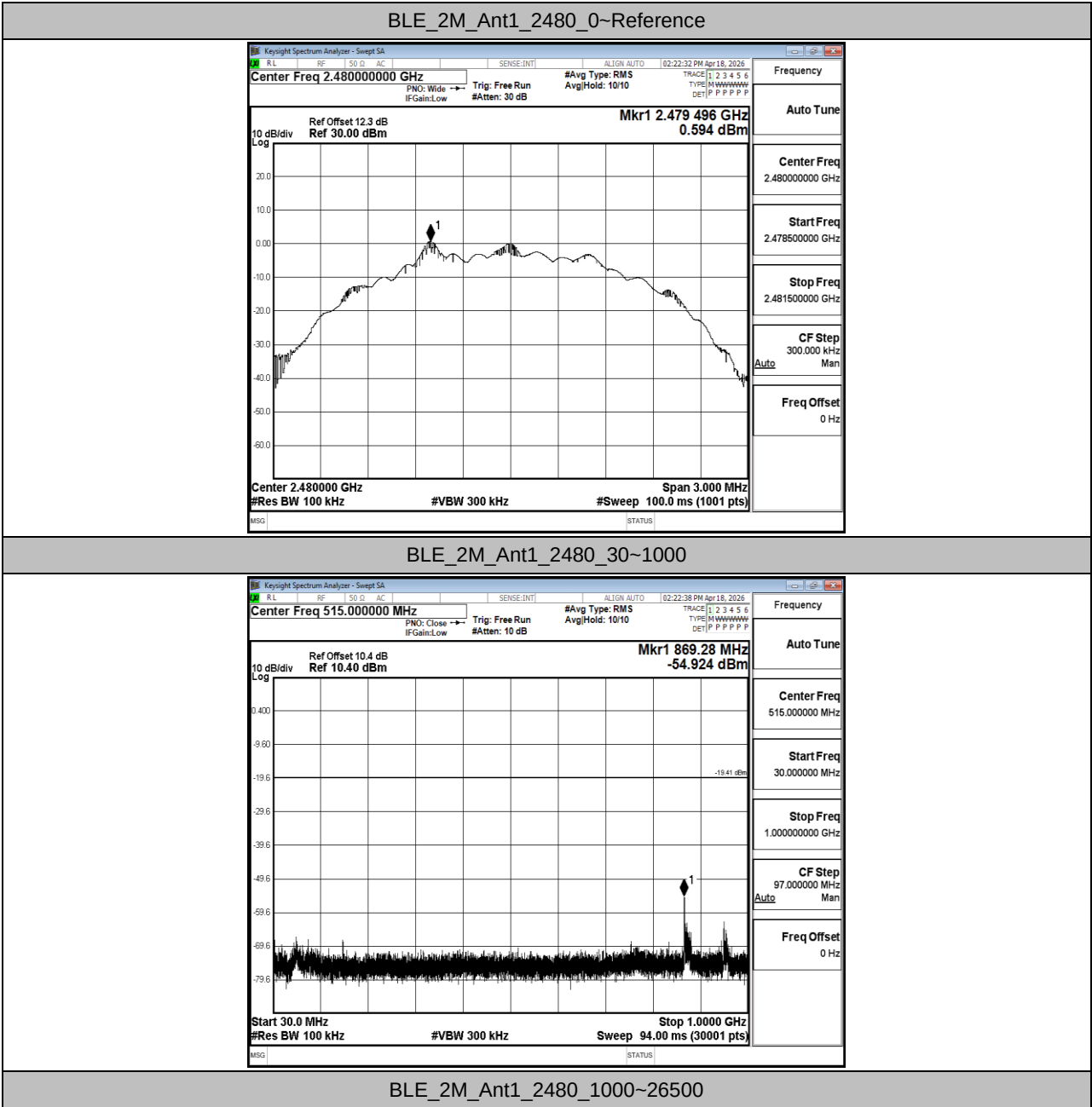


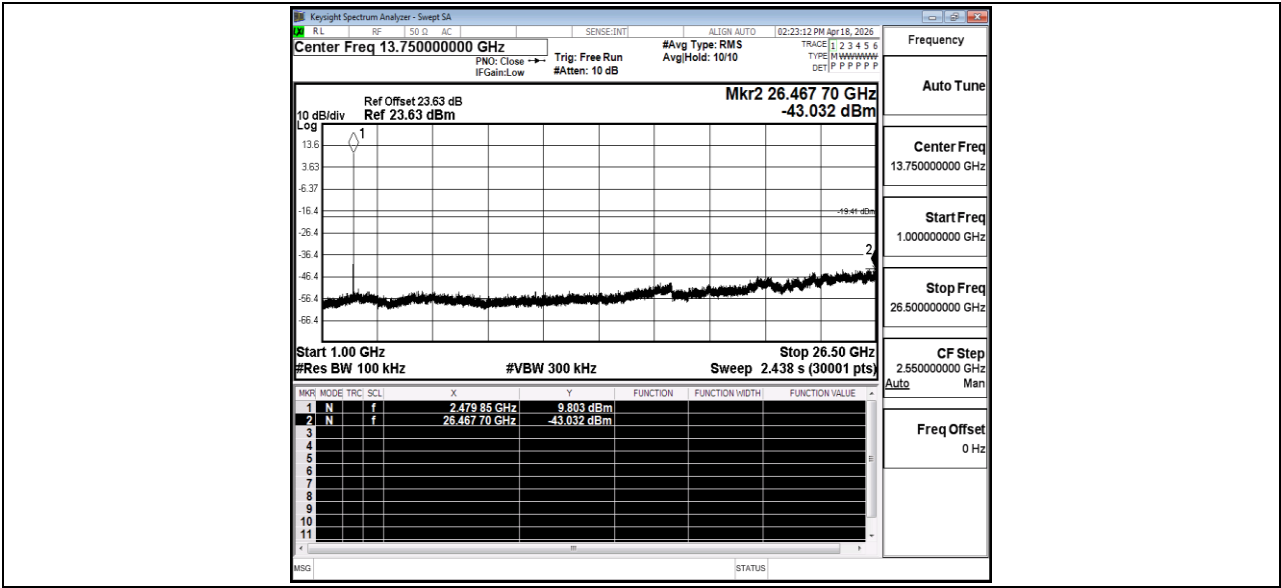
BLE_2M_Ant1_2402_0~Reference









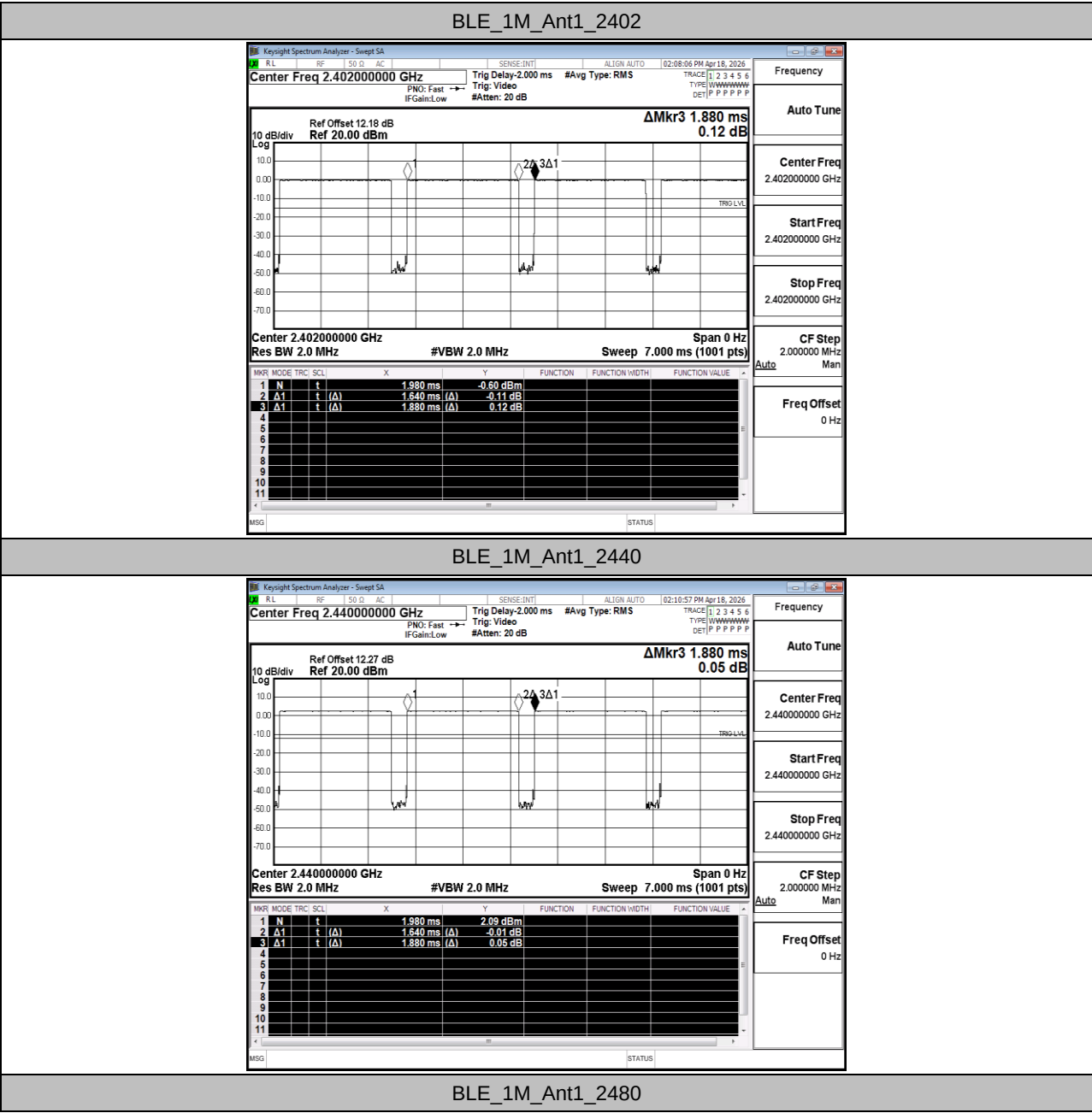


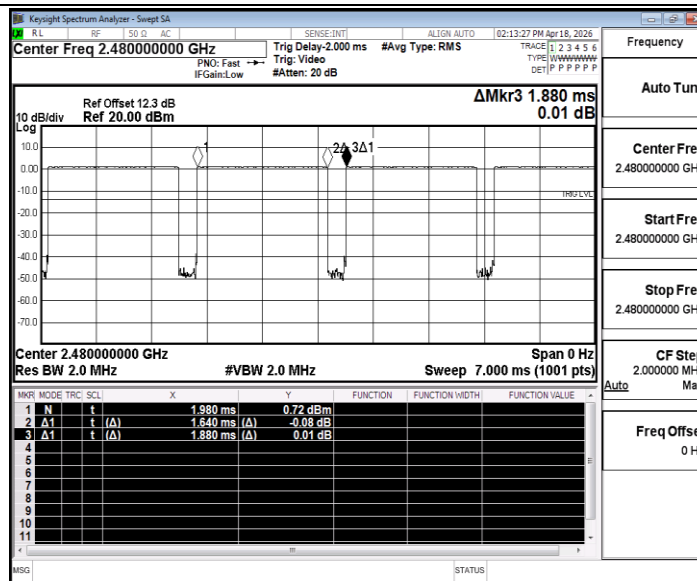
A.6 Duty Cycle

Test Result

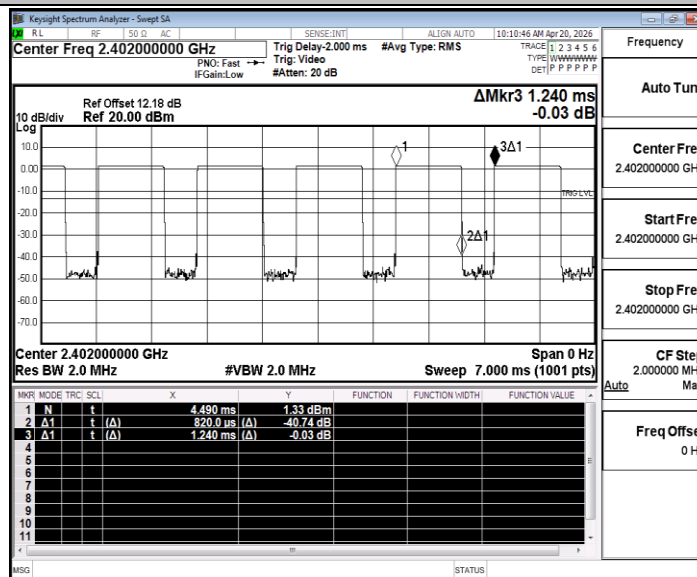
TestMode	Antenna	Freq(MHz)	ON Time [ms]	Period [ms]	X	DC [%]	xFactor	Limit	Verdict
BLE_1M	Ant1	2402	1.64	1.88	0.8723	87.23	0.59	---	---
		2440	1.64	1.88	0.8723	87.23	0.59	---	---
		2480	1.64	1.88	0.8723	87.23	0.59	---	---
BLE_2M	Ant1	2402	0.82	1.24	0.6613	66.13	1.80	---	---
		2440	0.82	1.25	0.6560	65.60	1.83	---	---
		2480	0.82	1.25	0.6560	65.60	1.83	---	---

Test Graphs

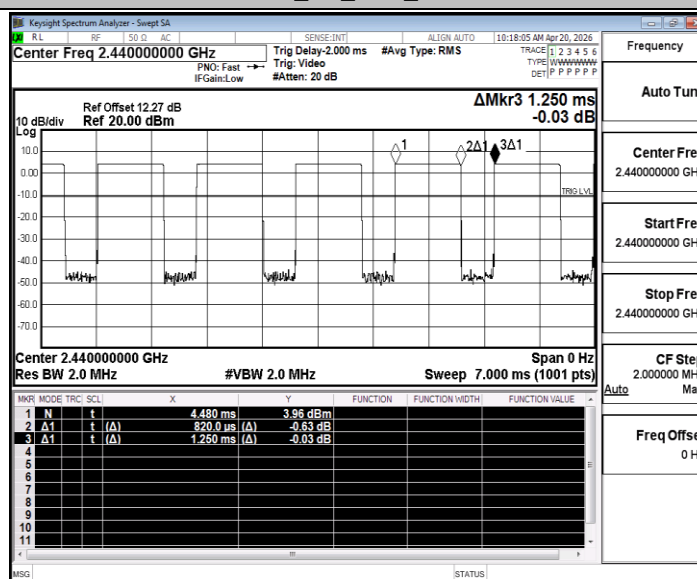


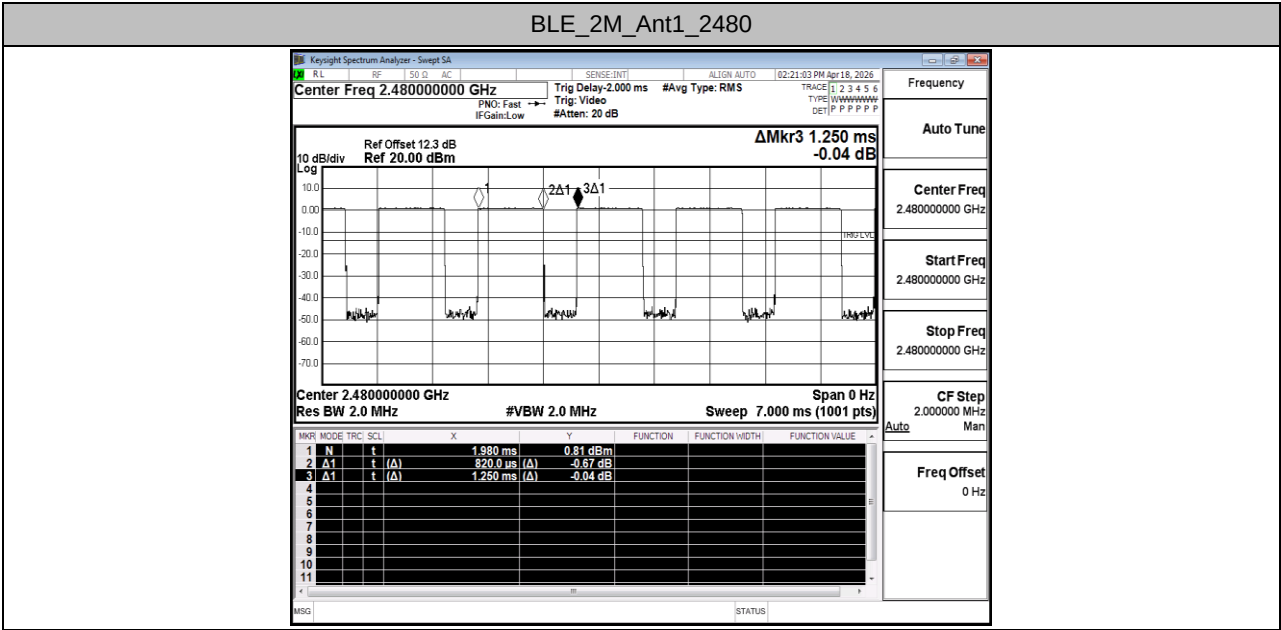


BLE_2M_Ant1_2402



BLE_2M_Ant1_2440





A.7 Emissions in Restricted Bands

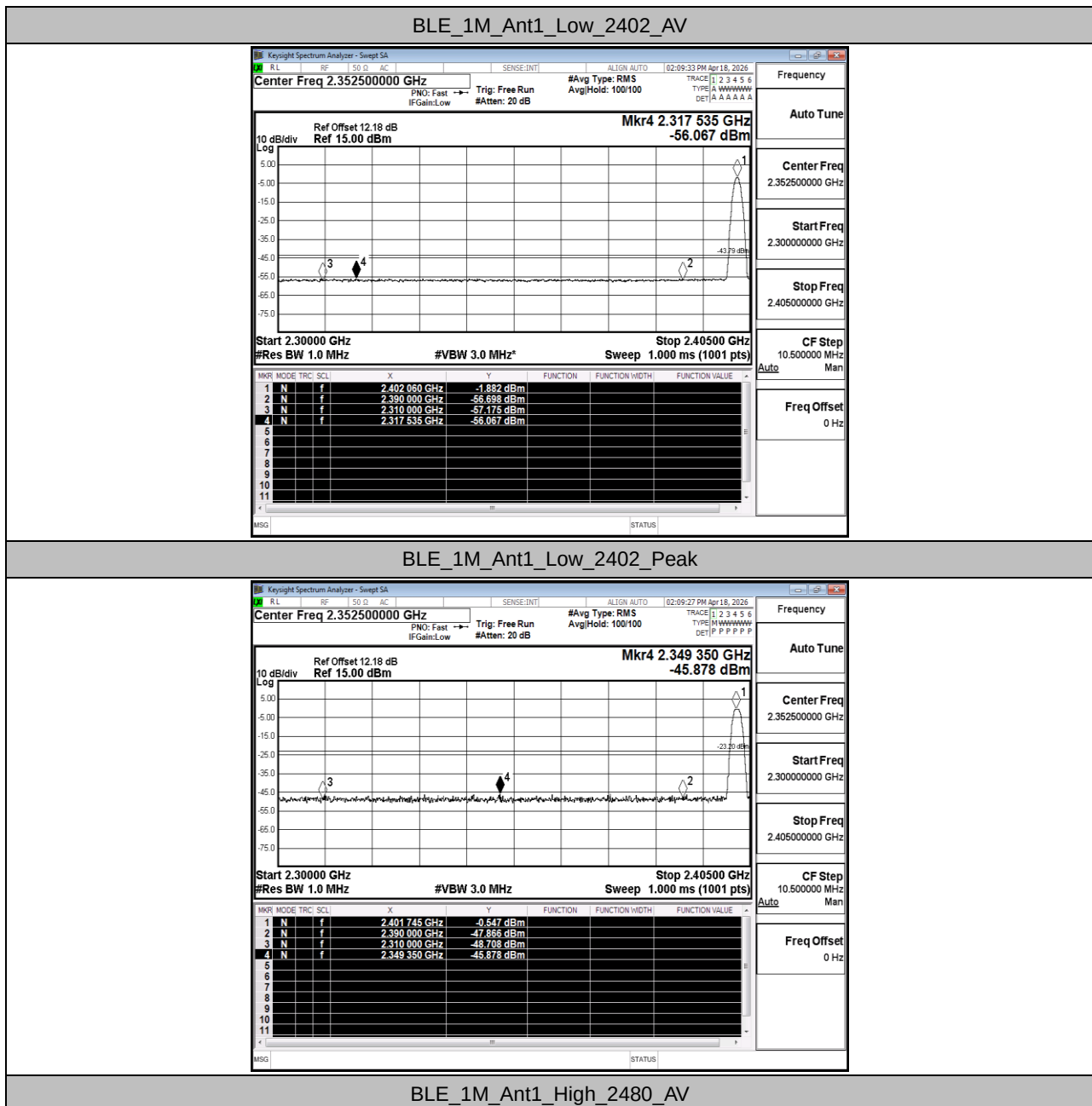
Test Result

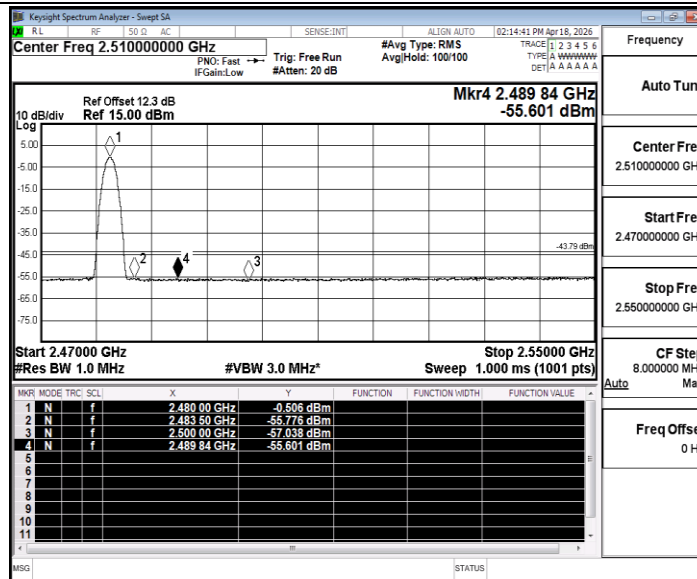
Test Mode	Antenna	Channel Name	Freq (MHz)	Detector	Freq [MHz]	Result [dBm]	Limit [dBm]	Gain [dBi]	DC Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
BLE_1M	Ant1	Low	2402	AV	2310.000	-57.18	≤-43.79	2.00	0.59	40.61	≤54	PASS
				AV	2317.535	-56.07	≤-43.79	2.00	0.59	41.72	≤54	PASS
				AV	2390.000	-56.7	≤-43.79	2.00	0.59	41.09	≤54	PASS
				Peak	2310.000	-48.71	≤-23.20	2.00	0.00	48.49	≤74	PASS
				Peak	2349.350	-45.88	≤-23.20	2.00	0.00	51.32	≤74	PASS
				Peak	2390.000	-47.87	≤-23.20	2.00	0.00	49.33	≤74	PASS
		High	2480	AV	2483.500	-55.78	≤-43.79	2.00	0.59	42.01	≤54	PASS
				AV	2489.840	-55.6	≤-43.79	2.00	0.59	42.19	≤54	PASS
				AV	2500.000	-57.04	≤-43.79	2.00	0.59	40.75	≤54	PASS
				Peak	2483.500	-47.26	≤-23.20	2.00	0.00	49.94	≤74	PASS
				Peak	2494.800	-46.24	≤-23.20	2.00	0.00	50.96	≤74	PASS
				Peak	2500.000	-47.41	≤-23.20	2.00	0.00	49.79	≤74	PASS
BLE_2M	Ant1	Low	2402	AV	2310.000	-56.68	≤-45.00	2.00	1.80	42.32	≤54	PASS
				AV	2342.630	-56	≤-45.00	2.00	1.80	43.00	≤54	PASS
				AV	2390.000	-56.97	≤-45.00	2.00	1.80	42.03	≤54	PASS
				Peak	2310.000	-48.81	≤-23.20	2.00	0.00	48.39	≤74	PASS
				Peak	2383.895	-45.68	≤-23.20	2.00	0.00	51.52	≤74	PASS
				Peak	2390.000	-49.4	≤-23.20	2.00	0.00	47.80	≤74	PASS
		High	2480	AV	2483.500	-55.94	≤-45.03	2.00	1.83	43.09	≤54	PASS
				AV	2495.840	-55.66	≤-45.03	2.00	1.83	43.37	≤54	PASS
				AV	2500.000	-56.25	≤-45.03	2.00	1.83	42.78	≤54	PASS
				Peak	2483.500	-48.1	≤-23.20	2.00	0.00	49.10	≤74	PASS
				Peak	2485.200	-43.89	≤-23.20	2.00	0.00	53.31	≤74	PASS
				Peak	2500.000	-46.98	≤-23.20	2.00	0.00	50.22	≤74	PASS

Note:

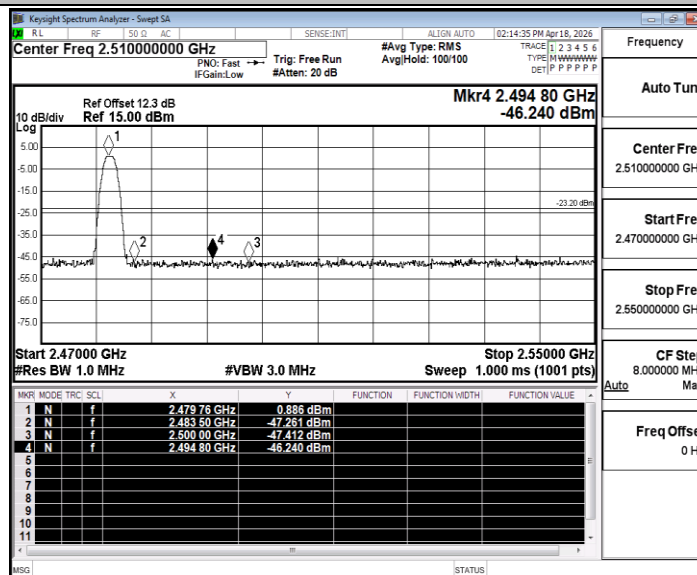
1. The Antenna Gain is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

Test Graphs





BLE_1M_Ant1_High_2480_Peak



BLE_2M_Ant1_Low_2402_AV

