

Appendix B

RF Test Data for BT LE (Conducted Measurement)

Product Name: Marmax TWS

Test Model: ETWS-CE-TJX

Environmental Conditions

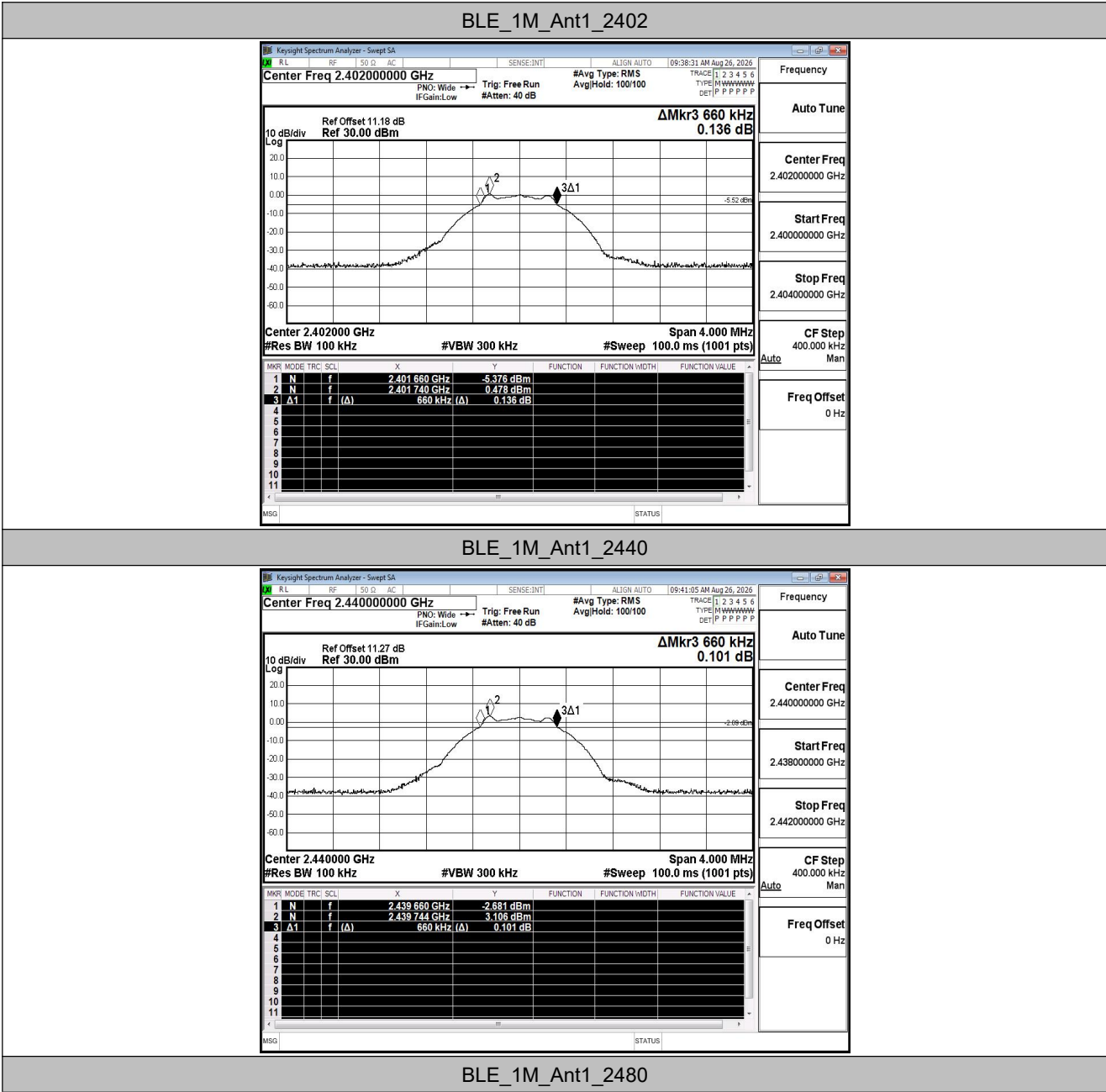
Temperature:	24.5°C
Relative Humidity:	53.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Zhang hai
Supervised by:	Fengliu Tang

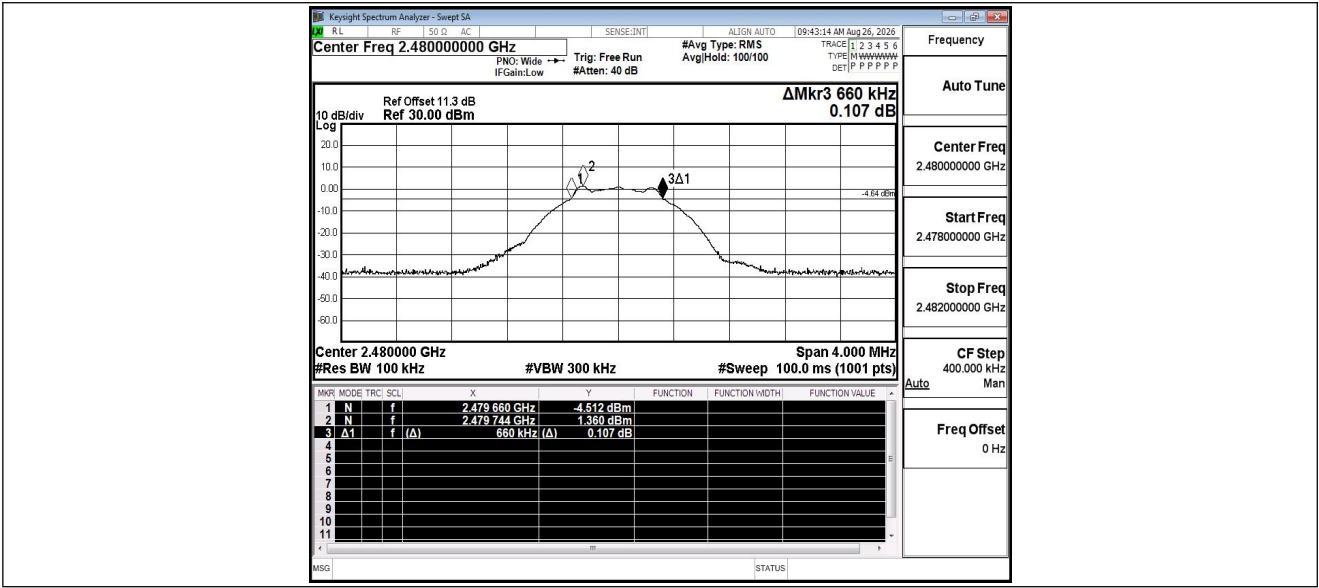
B.1 DTS Bandwidth

Test Result

TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.660	2401.660	2402.320	0.5	PASS
		2440	0.660	2439.660	2440.320	0.5	PASS
		2480	0.660	2479.660	2480.320	0.5	PASS

Test Graphs





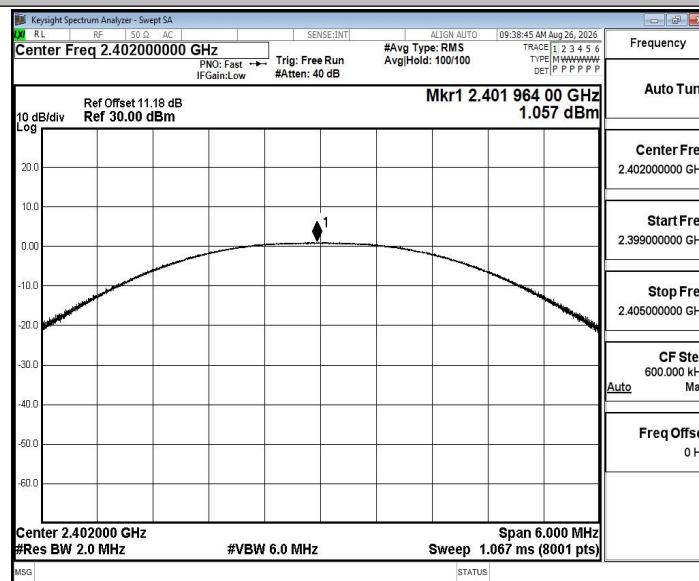
B.2 Maximum Peak conducted output power

Test Result Peak

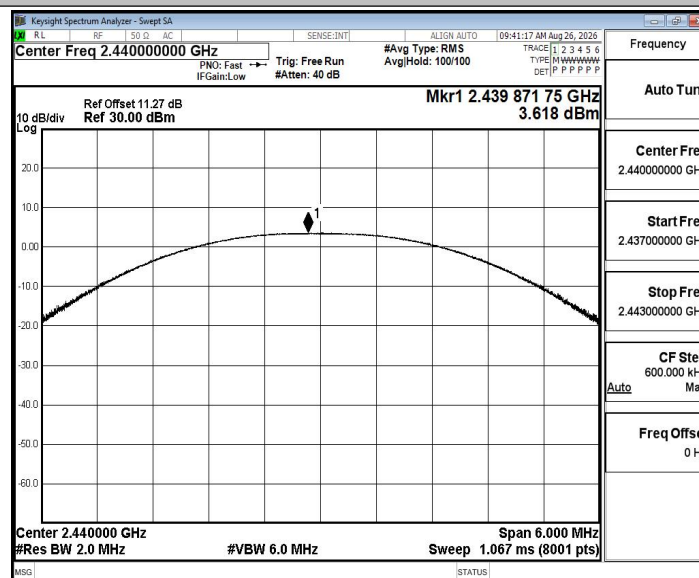
TestMode	Antenna	Freq(MHz)	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant1	2402	1.06	≤30	PASS
		2440	3.62	≤30	PASS
		2480	1.89	≤30	PASS

Test Graphs Peak

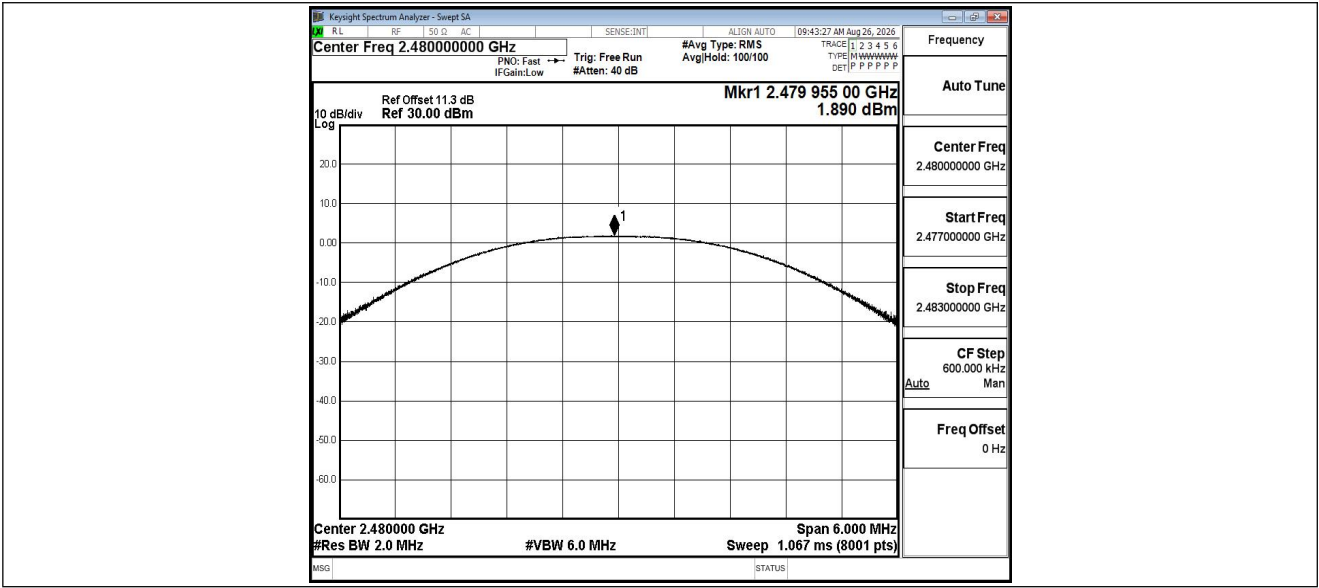
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



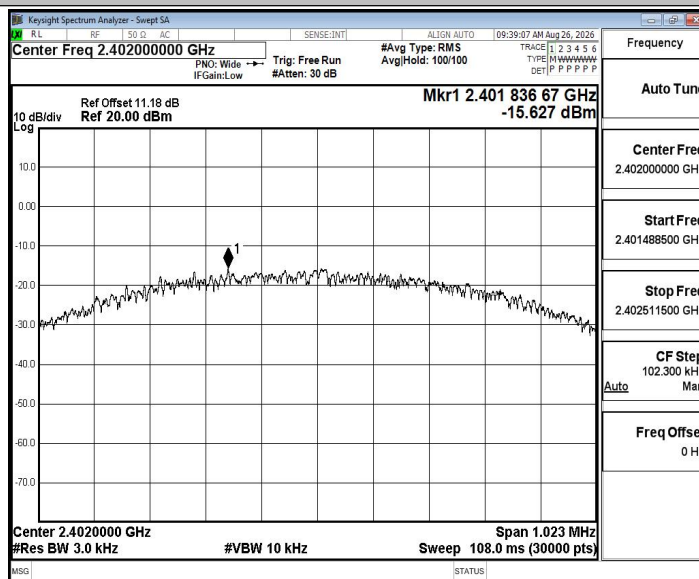
B.3 Maximum power spectral density

Test Result

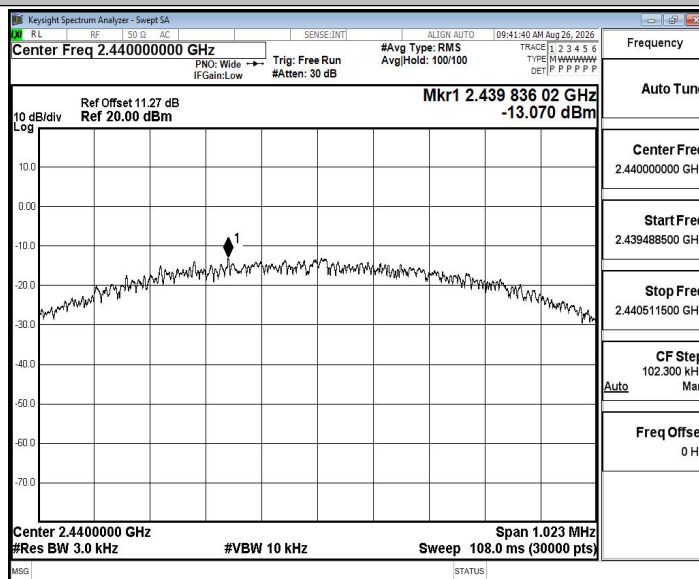
TestMode	Antenna	Freq(MHz)	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-15.63	≤8.00	PASS
		2440	-13.07	≤8.00	PASS
		2480	-14.74	≤8.00	PASS

Test Graphs

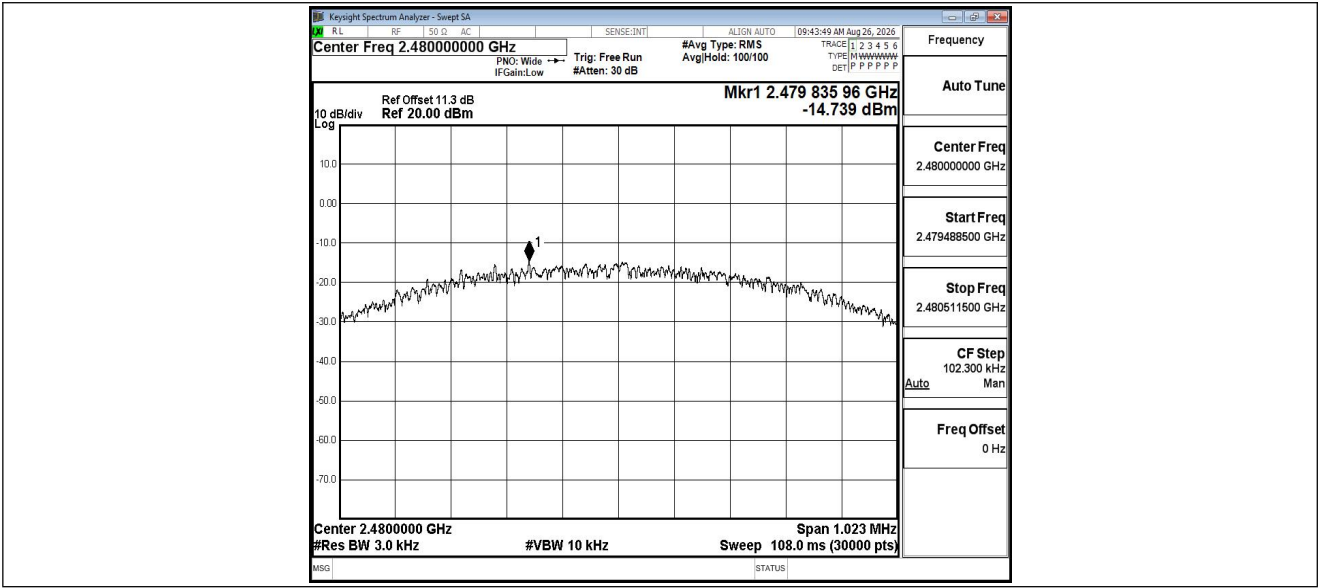
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480

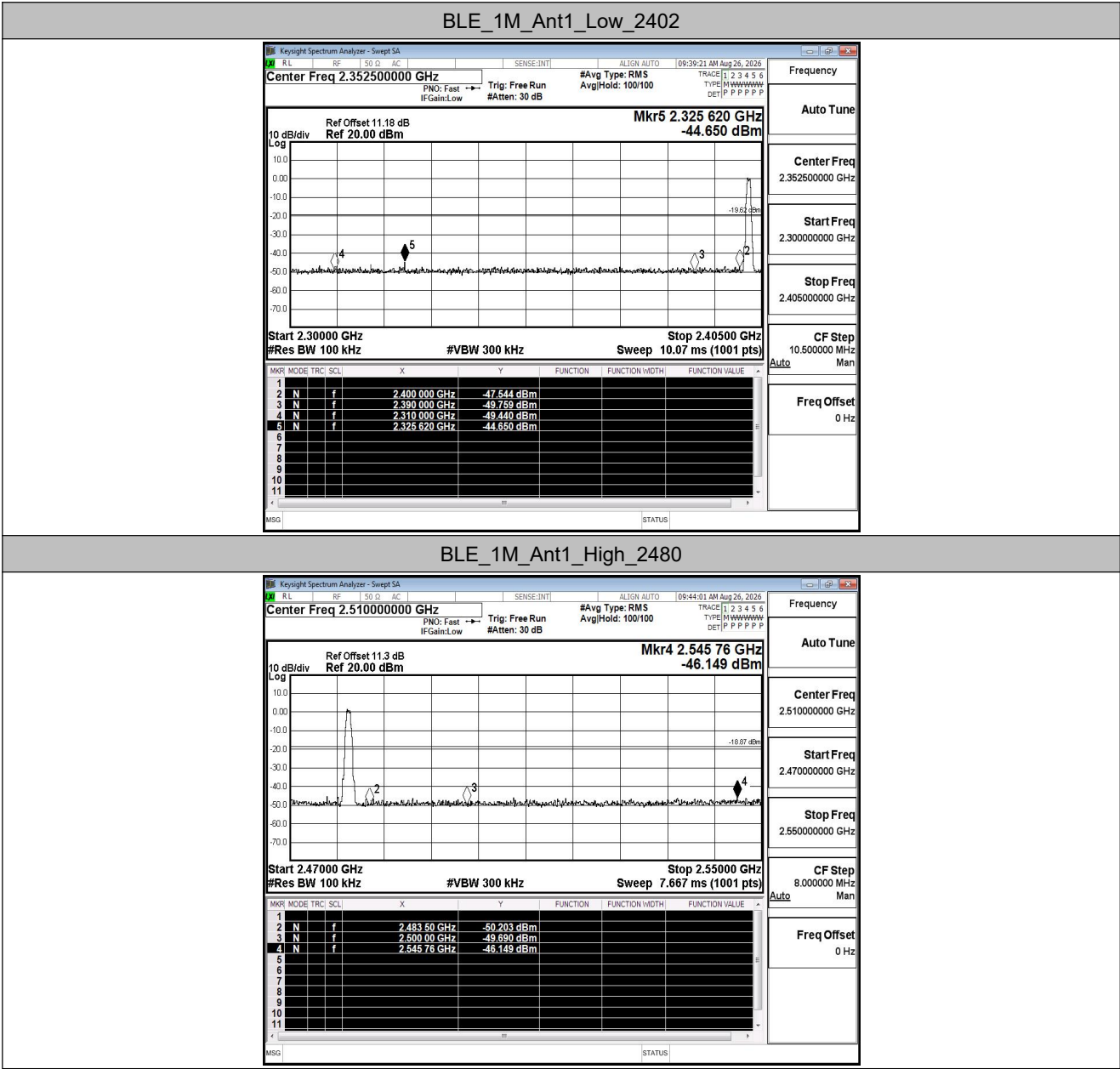


B.4 Band edge measurements

Test Result

TestMode	Antenna	ChName	Freq(MHz)	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	0.38	-44.65	≤-19.62	PASS
		High	2480	1.13	-46.15	≤-18.87	PASS

Test Graphs



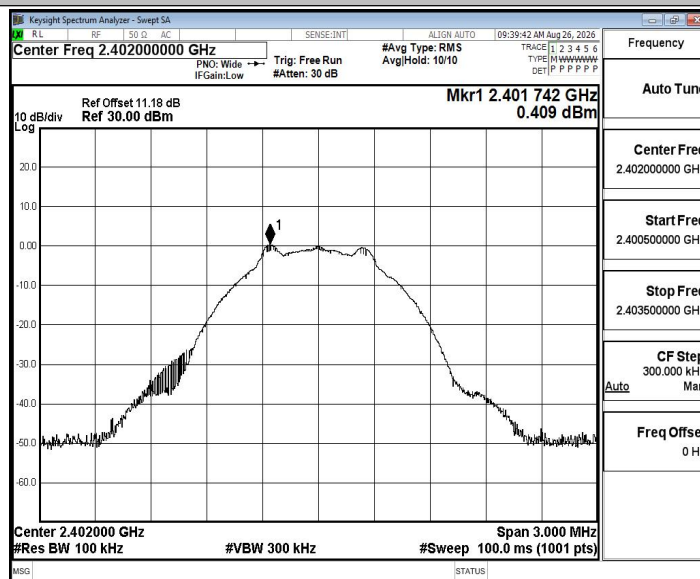
B.5 Conducted Spurious Emission

Test Result

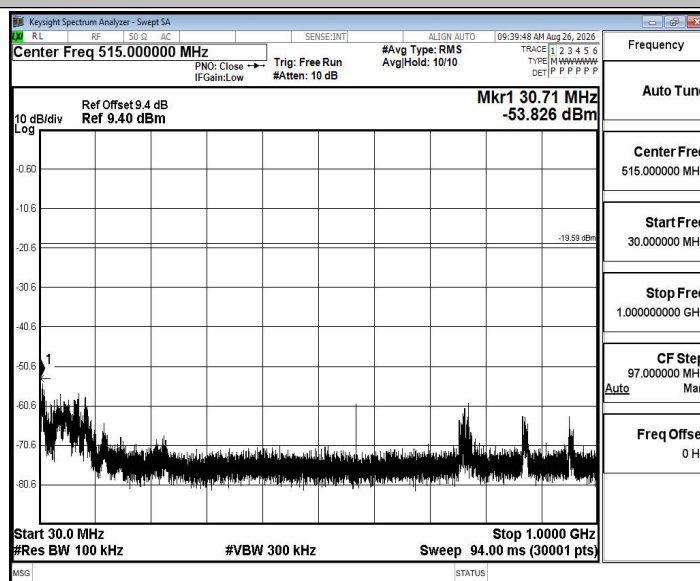
TestMode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	0.41	0.41	---	PASS
			30~1000	0.41	-53.83	≤-19.59	PASS
			1000~26500	0.41	-44.36	≤-19.59	PASS
		2440	Reference	3.02	3.02	---	PASS
			30~1000	3.02	-53.4	≤-16.98	PASS
			1000~26500	3.02	-45.05	≤-16.98	PASS
		2480	Reference	1.26	1.26	---	PASS
			30~1000	1.26	-54.52	≤-18.74	PASS
			1000~26500	1.26	-44.59	≤-18.74	PASS

Test Graphs

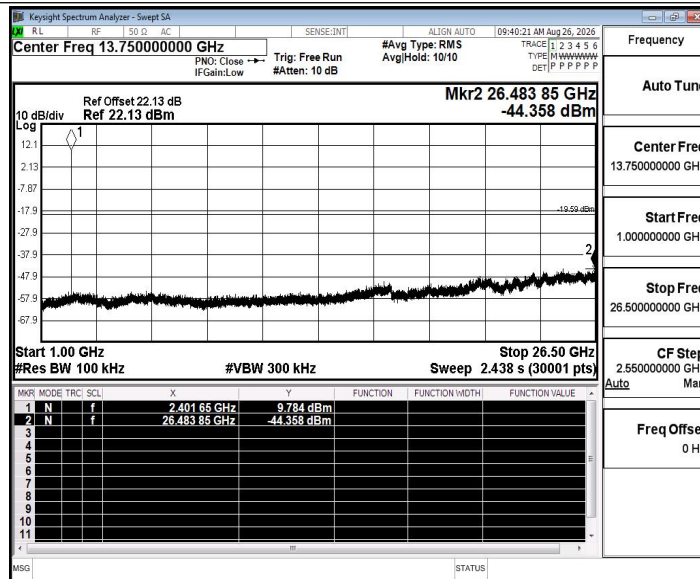
BLE_1M_Ant1_2402_0~Reference



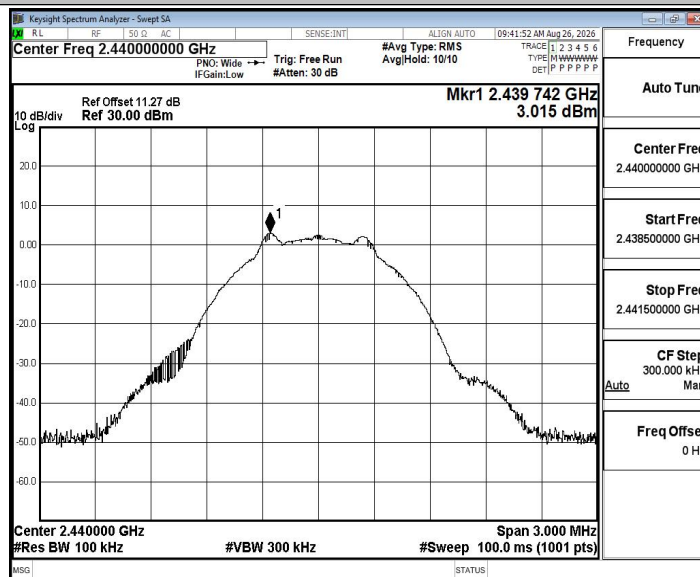
BLE_1M_Ant1_2402_30~1000



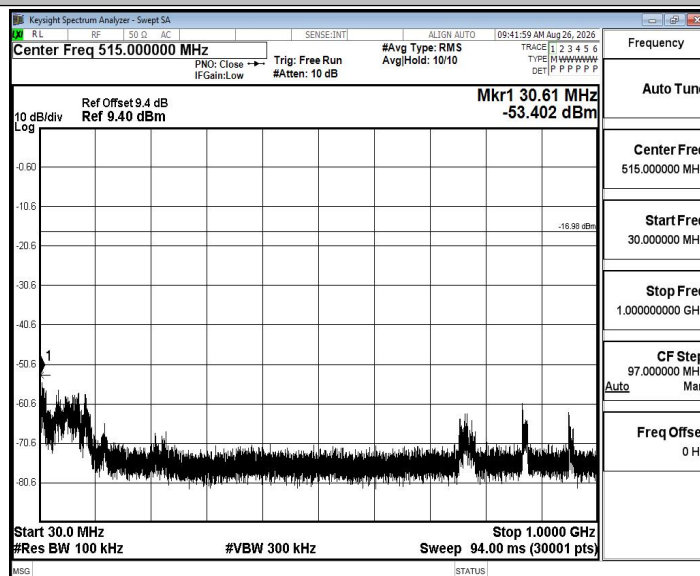
BLE_1M_Ant1_2402_1000~26500



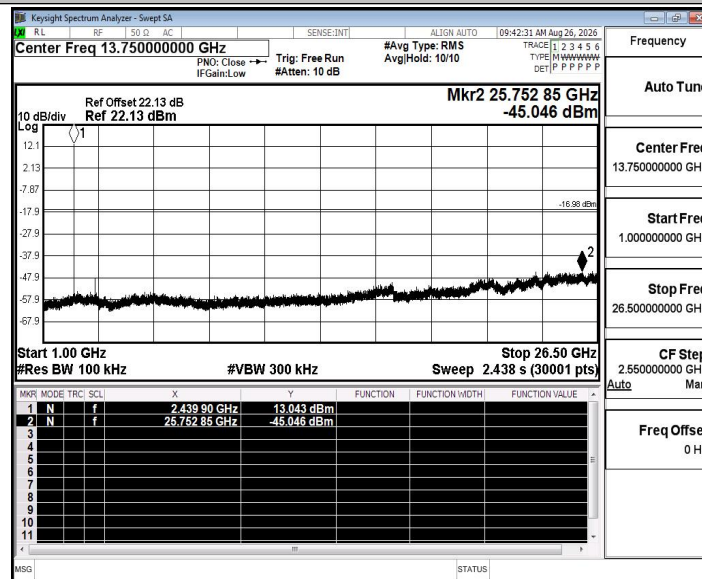
BLE_1M_Ant1_2440_0~Reference



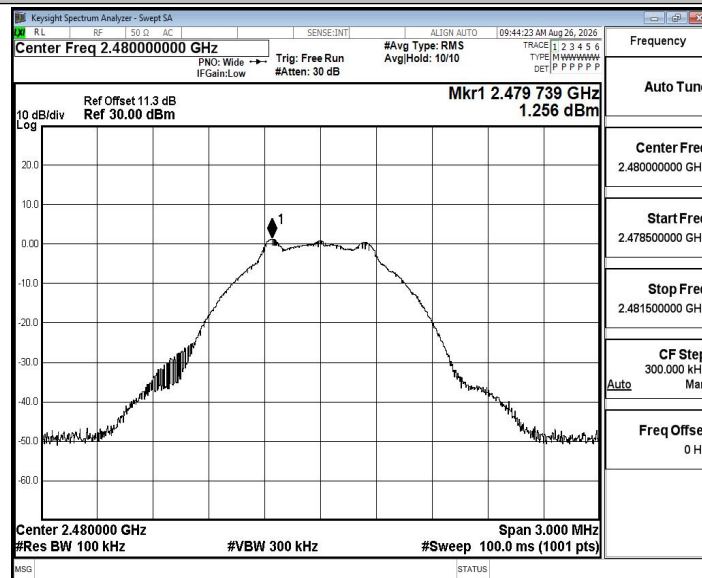
BLE_1M_Ant1_2440_30~1000



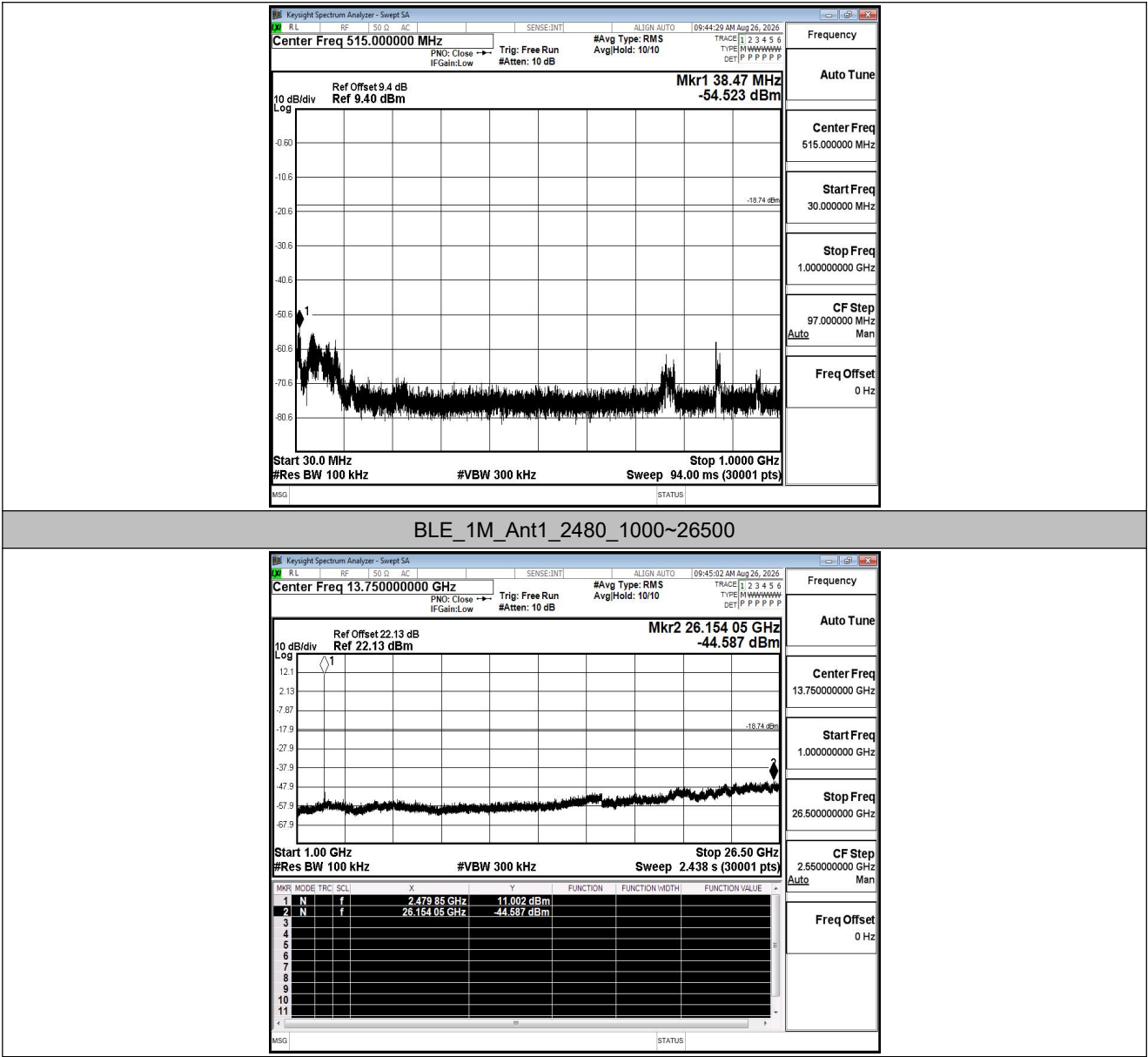
BLE_1M_Ant1_2440_1000~26500



BLE_1M_Ant1_2480_0~Reference



BLE_1M_Ant1_2480_30~1000



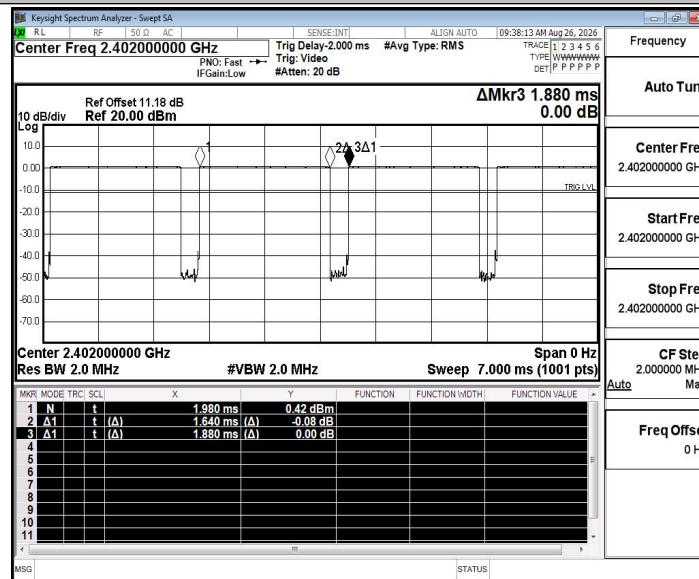
B.6 Duty Cycle

Test Result

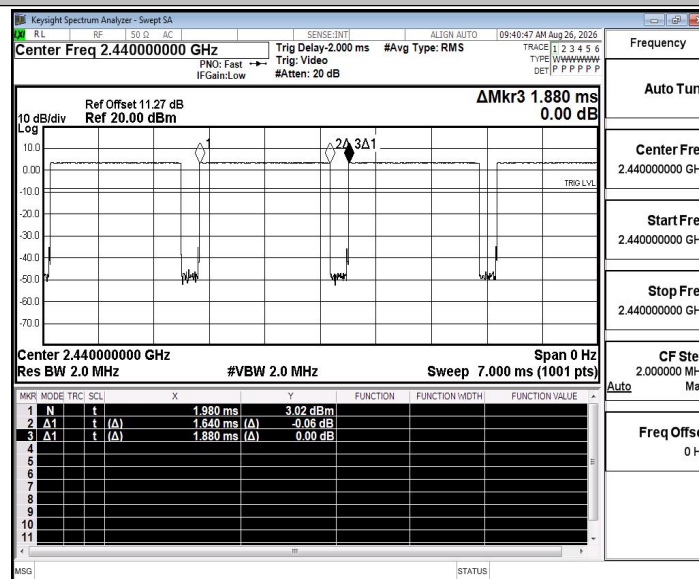
TestMode	Antenna	Freq(MHz)	ON Time [ms]	Period [ms]	X	DC [%]	xFactor	Limit	Verdict
BLE_1M	Ant1	2402	1.64	1.88	0.8723	87.23	0.59	---	---
		2440	1.64	1.88	0.8723	87.23	0.59	---	---
		2480	1.64	1.88	0.8723	87.23	0.59	---	---

Test Graphs

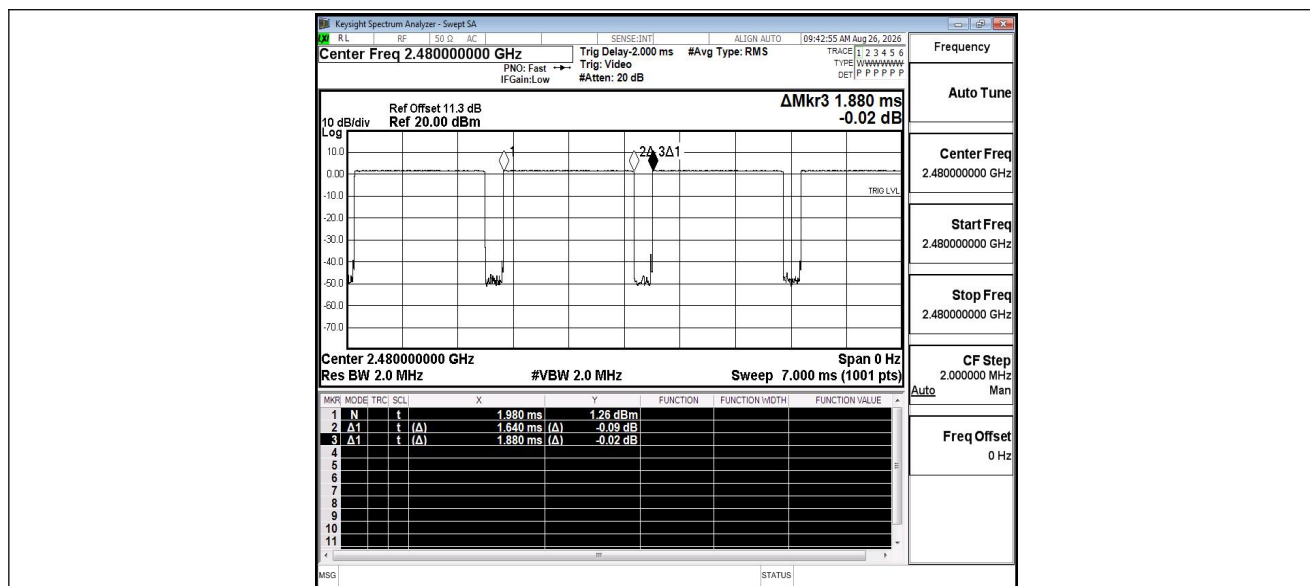
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



B.7 Emissions in Restricted Bands

Test Result

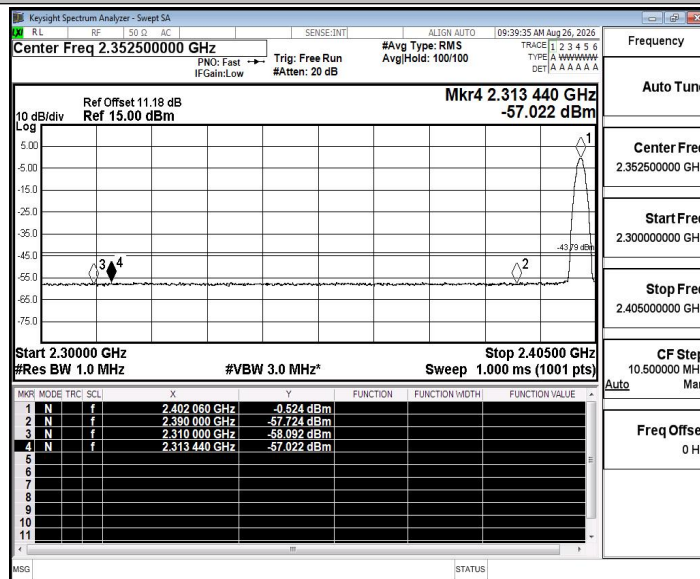
TestM ode	Anten na	ChNa me	Freq(MHz)	Detect or	Freq [MHz]	Result [dBm]	Limit [dBm]	Gain [dBi]	DC Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
BLE_ 1M	Ant1	Low	2402	AV	2310.000	-58.09	≤-43.79	2.00	0.59	39.70	≤54	PASS
				AV	2313.440	-57.02	≤-43.79	2.00	0.59	40.77	≤54	PASS
				AV	2390.000	-57.72	≤-43.79	2.00	0.59	40.07	≤54	PASS
				Peak	2310.000	-49.01	≤-23.20	2.00	0.00	48.19	≤74	PASS
				Peak	2367.410	-47.11	≤-23.20	2.00	0.00	50.09	≤74	PASS
				Peak	2390.000	-50.3	≤-23.20	2.00	0.00	46.90	≤74	PASS
		High	2480	AV	2483.500	-57.01	≤-43.79	2.00	0.59	40.78	≤54	PASS
				AV	2483.600	-56.58	≤-43.79	2.00	0.59	41.21	≤54	PASS
				AV	2500.000	-57.77	≤-43.79	2.00	0.59	40.02	≤54	PASS
				Peak	2483.500	-49.01	≤-23.20	2.00	0.00	48.19	≤74	PASS
				Peak	2484.160	-42.22	≤-23.20	2.00	0.00	54.98	≤74	PASS
				Peak	2500.000	-49.21	≤-23.20	2.00	0.00	47.99	≤74	PASS

Note:

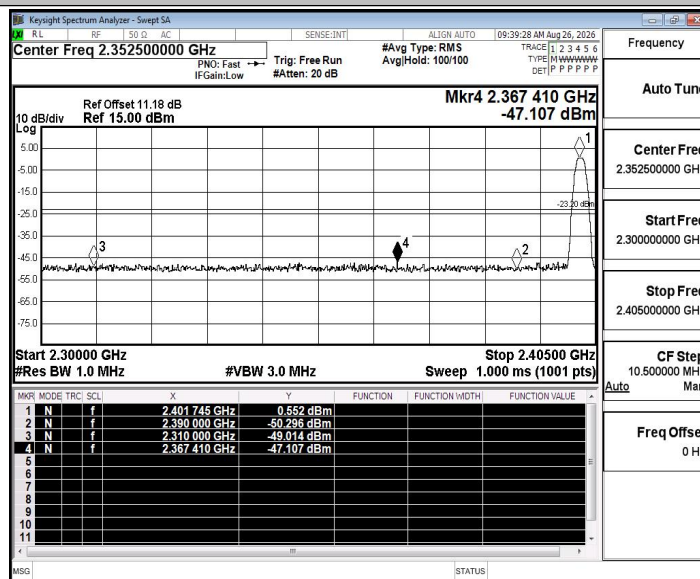
1. The Antenna Gain is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

Test Graphs

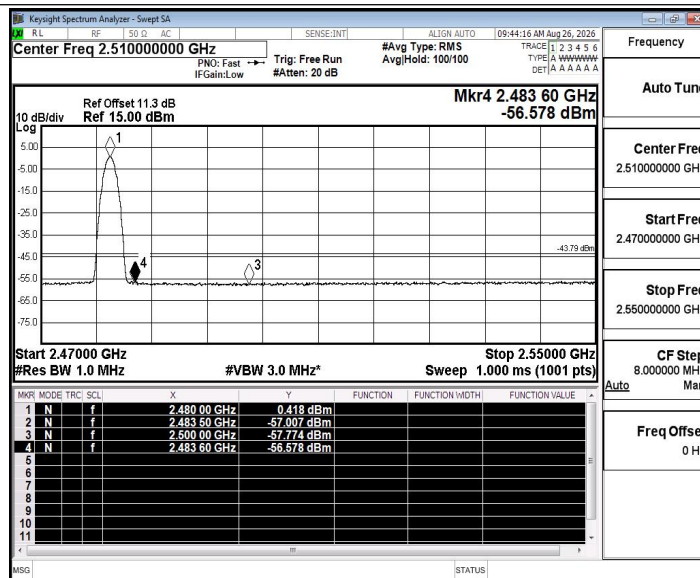
BLE_1M_Ant1_Low_2402_AV



BLE_1M_Ant1_Low_2402_Peak



BLE_1M_Ant1_High_2480_AV



BLE_1M_Ant1_High_2480_Peak

