



Appendix A

RF Test Data for BT LE (Conducted Measurement)

Product Name: LED Controller

Test Model: SP630E

Environmental Conditions

Temperature:	23.5 °C
Relative Humidity:	52.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Ling Zhu
Supervised by:	Li Huan





A.1 DTS Bandwidth

Test Result

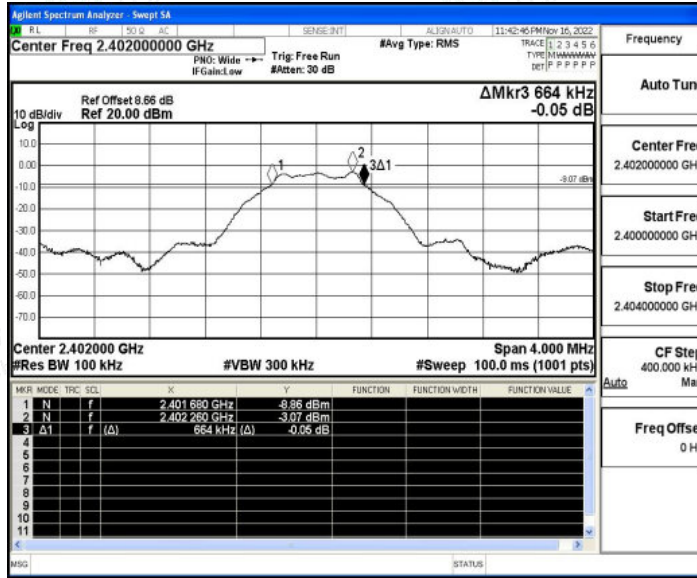
TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.664	2401.680	2402.344	0.5	PASS
		2440	0.656	2439.672	2440.328	0.5	PASS
		2480	0.656	2479.668	2480.324	0.5	PASS
BLE_2M	Ant1	2402	1.156	2401.424	2402.580	0.5	PASS
		2440	1.168	2439.416	2440.584	0.5	PASS
		2480	1.172	2479.412	2480.584	0.5	PASS



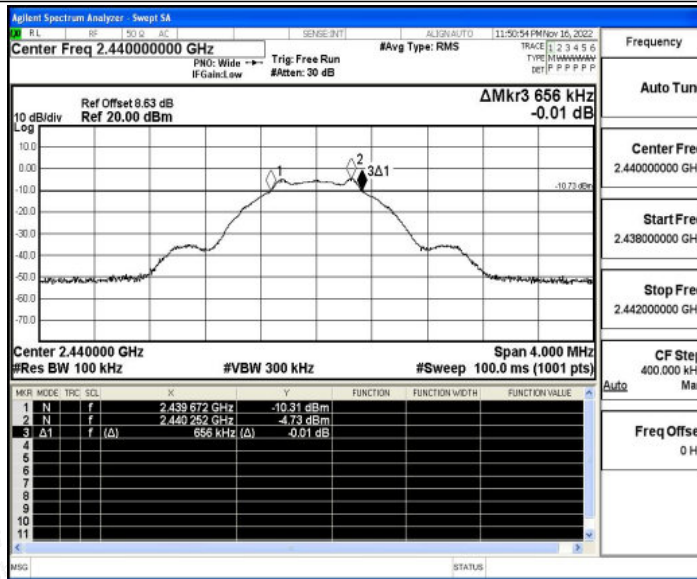


Test Graphs

BLE_1M_Ant1_2402

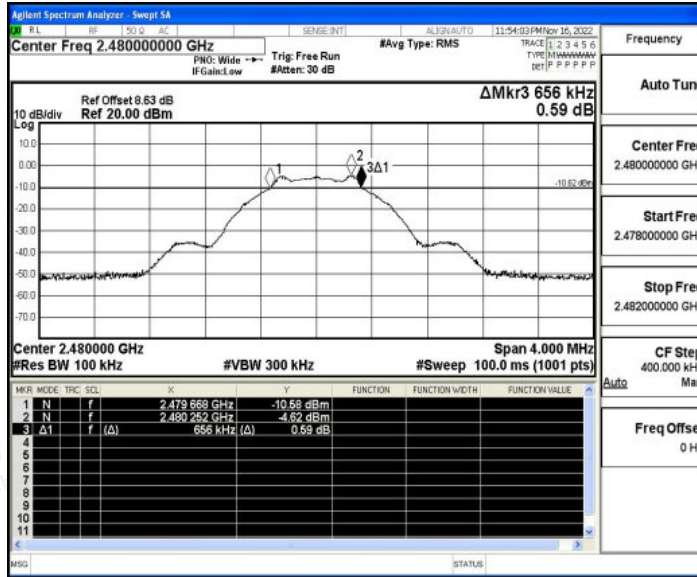


BLE_1M_Ant1_2440

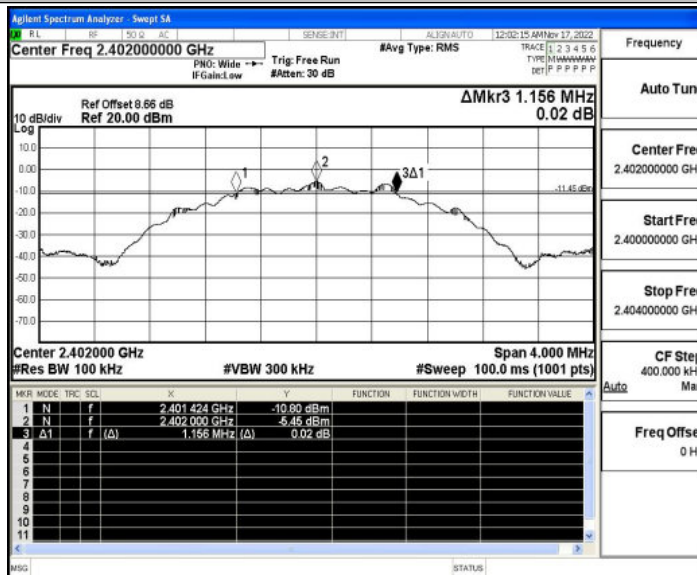


BLE_1M_Ant1_2480



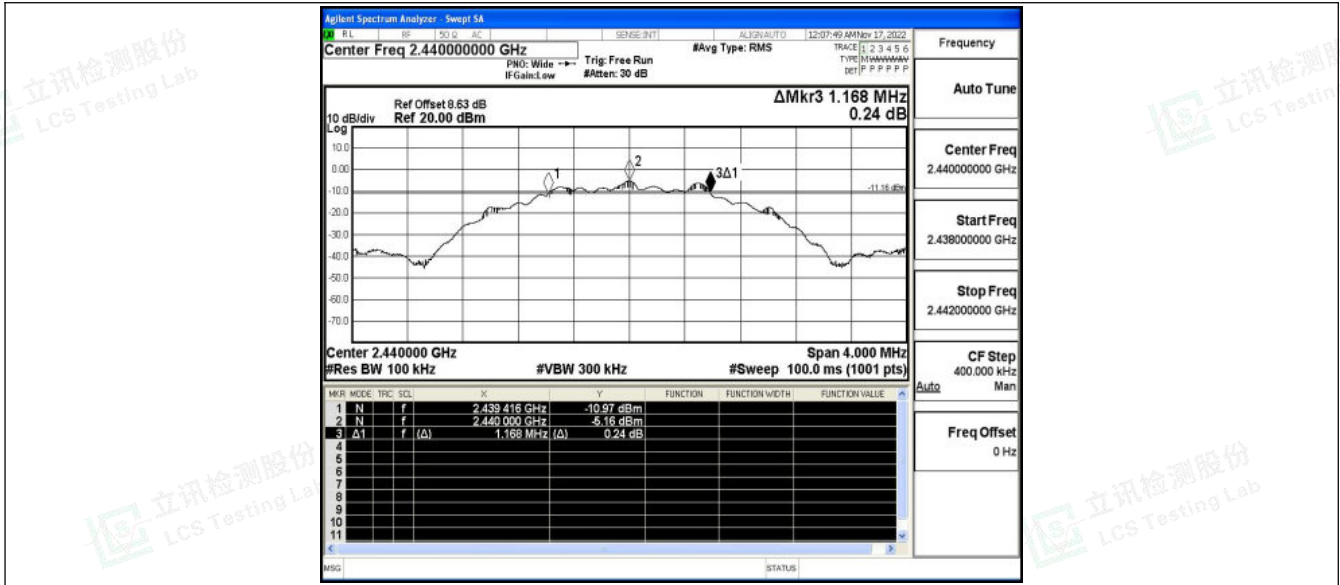


BLE_2M_Ant1_2402

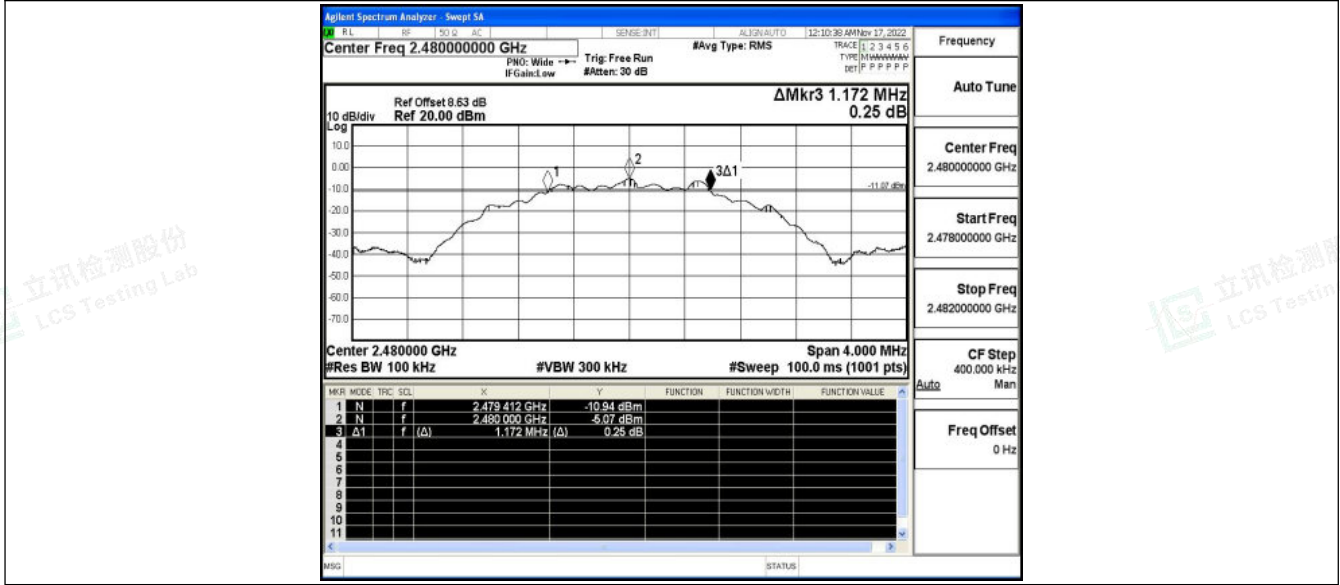


BLE_2M_Ant1_2440





BLE_2M_Ant1_2480





A.2 Maximum conducted output power

Test Result

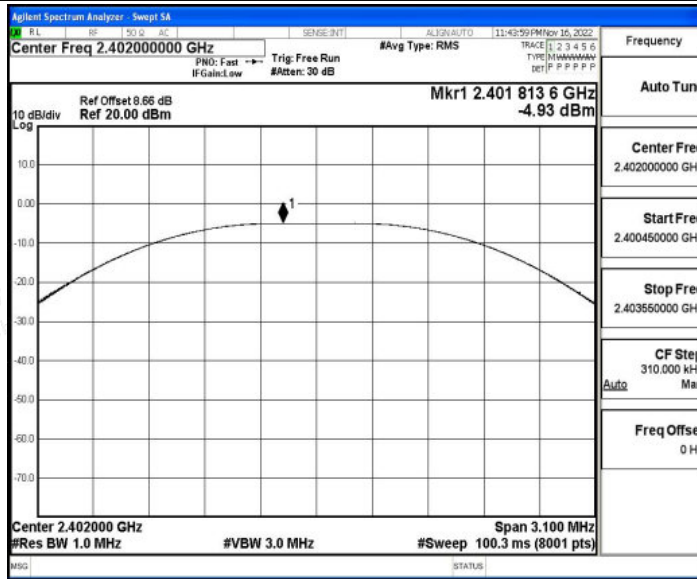
TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	-4.94	≤30	PASS
		2440	-4.51	≤30	PASS
		2480	-4.4	≤30	PASS
BLE_2M	Ant1	2402	-4.67	≤30	PASS
		2440	-4.38	≤30	PASS
		2480	-4.32	≤30	PASS



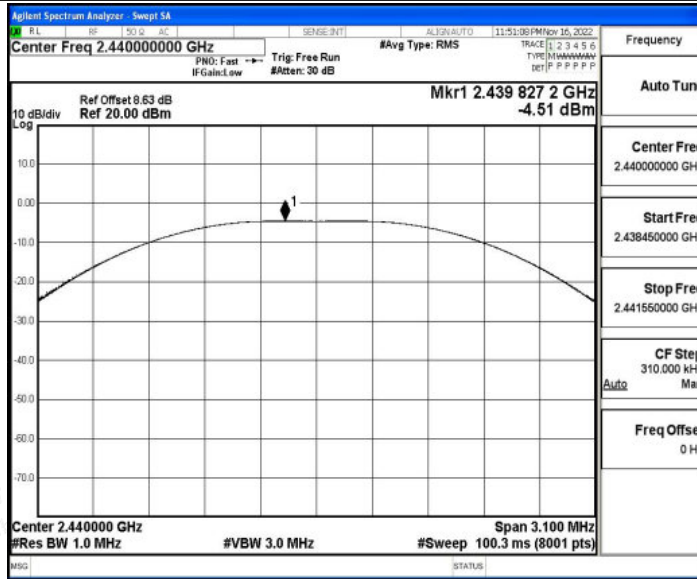


Test Graphs

BLE_1M_Ant1_2402

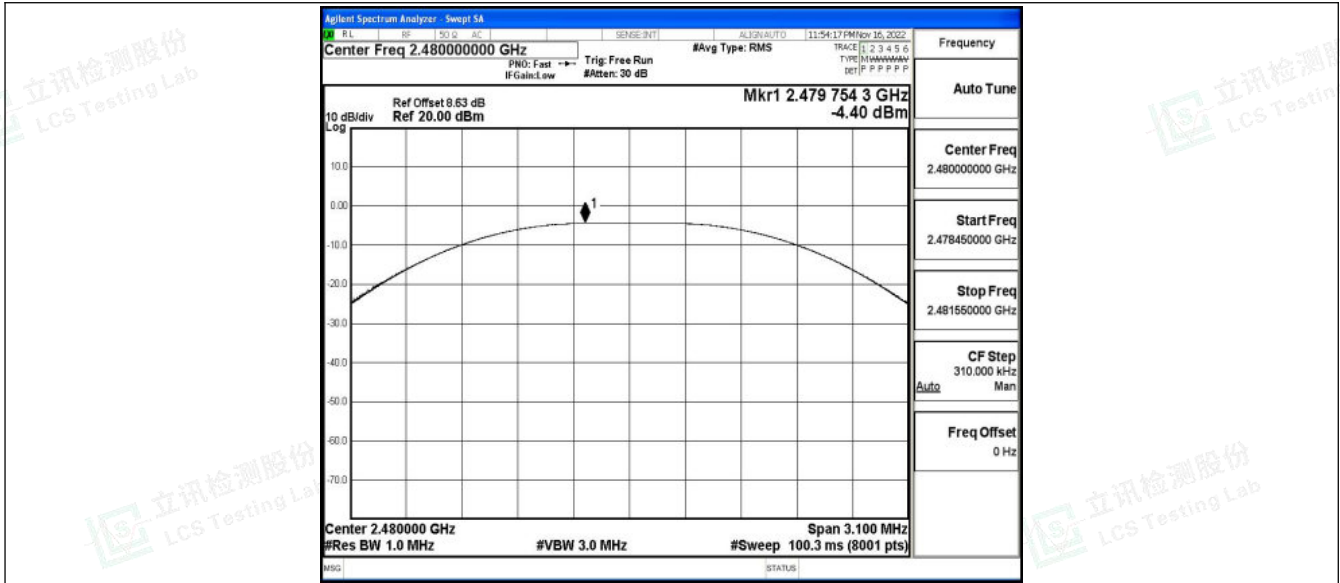


BLE_1M_Ant1_2440

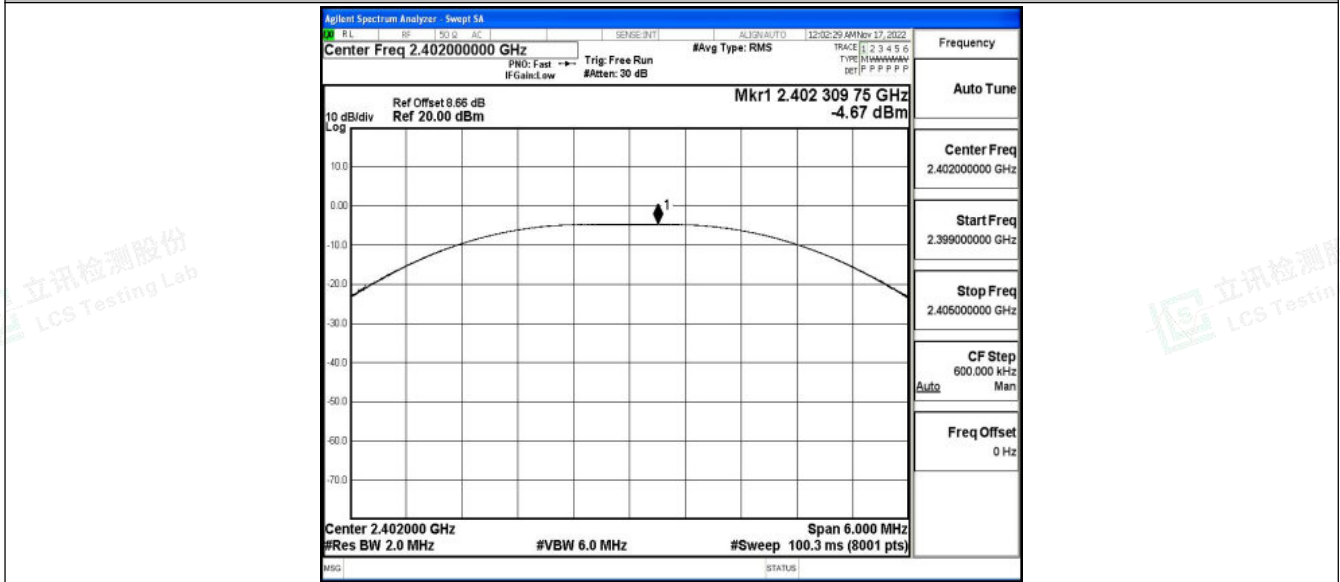


BLE_1M_Ant1_2480



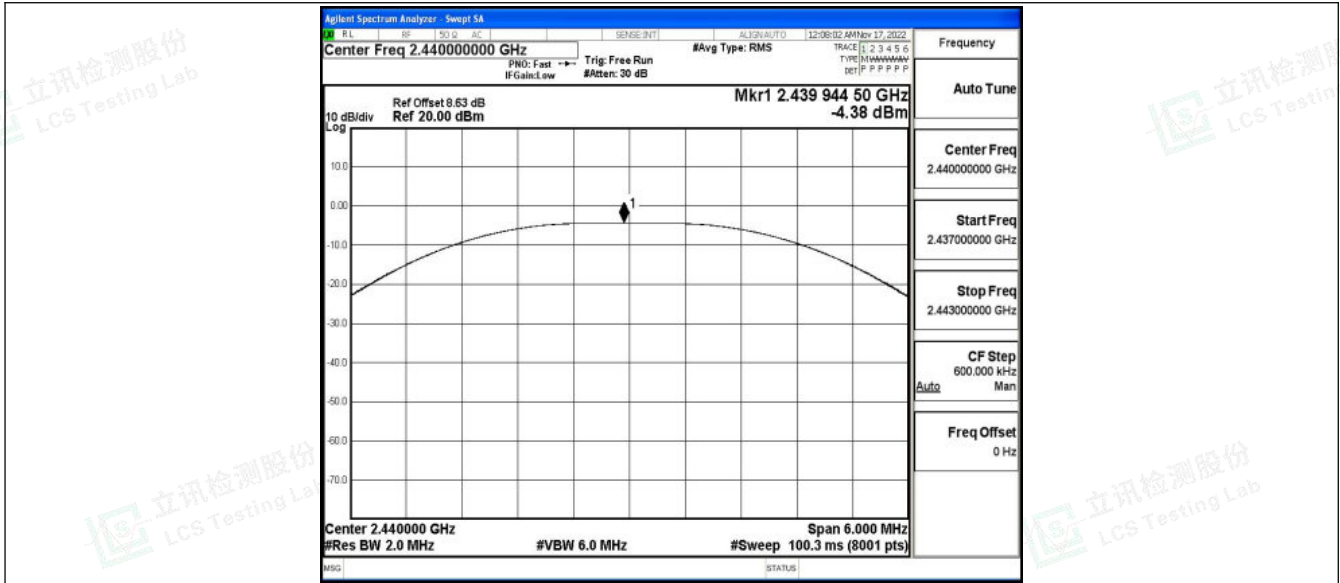


BLE_2M_Ant1_2402

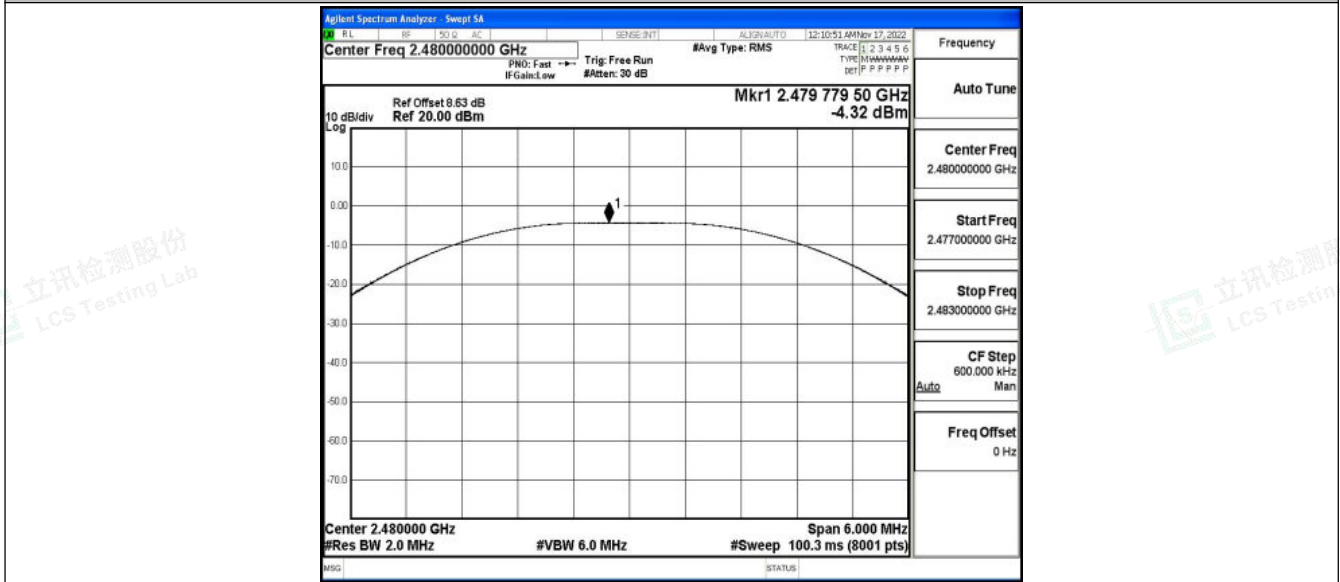


BLE_2M_Ant1_2440





BLE_2M_Ant1_2480





A.3 Maximum power spectral density

Test Result

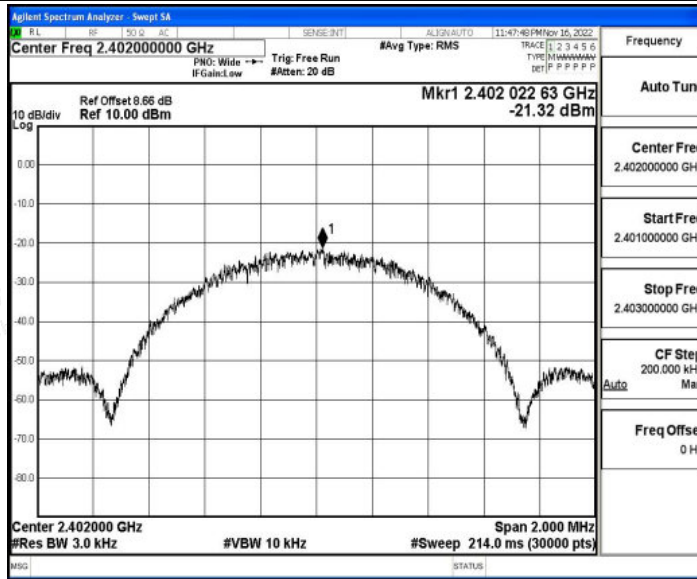
TestMode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-21.32	≤8.00	PASS
		2440	-20.97	≤8.00	PASS
		2480	-20.76	≤8.00	PASS
BLE_2M	Ant1	2402	-24	≤8.00	PASS
		2440	-23.64	≤8.00	PASS
		2480	-23.55	≤8.00	PASS



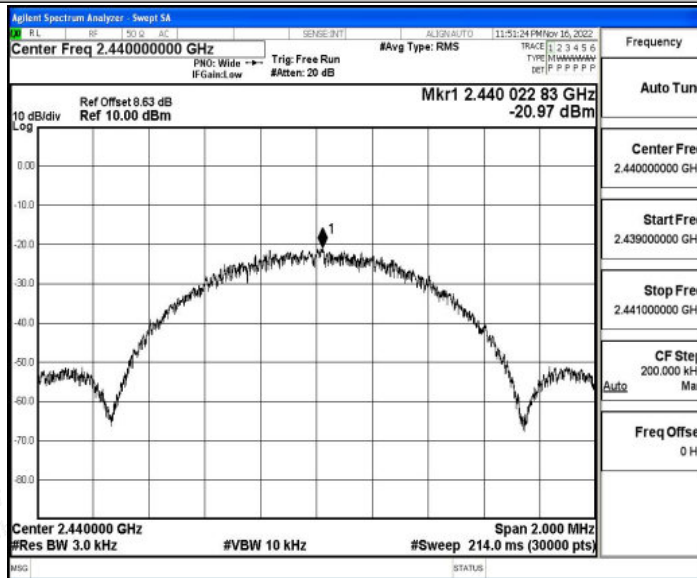


Test Graphs

BLE_1M_Ant1_2402

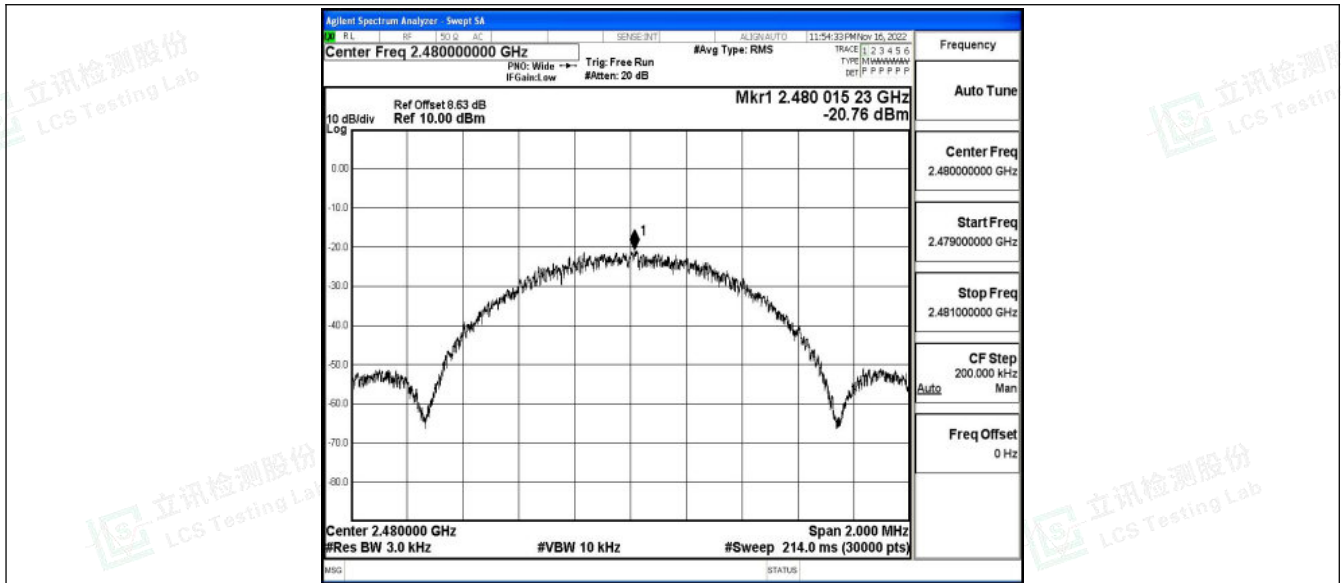


BLE_1M_Ant1_2440

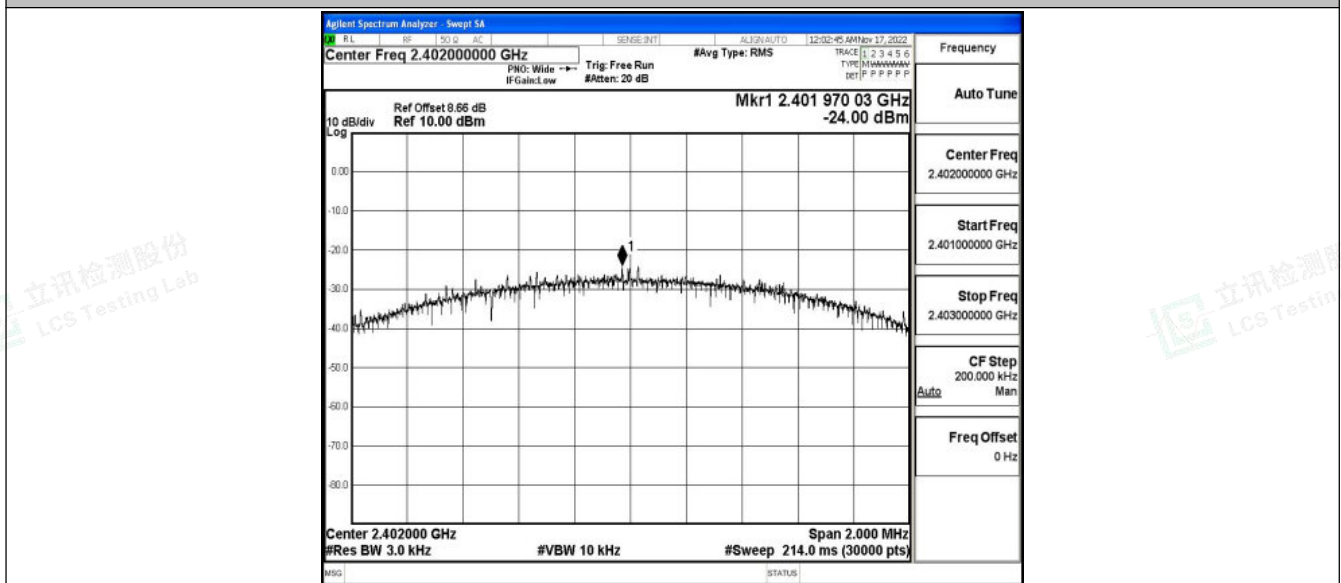


BLE_1M_Ant1_2480



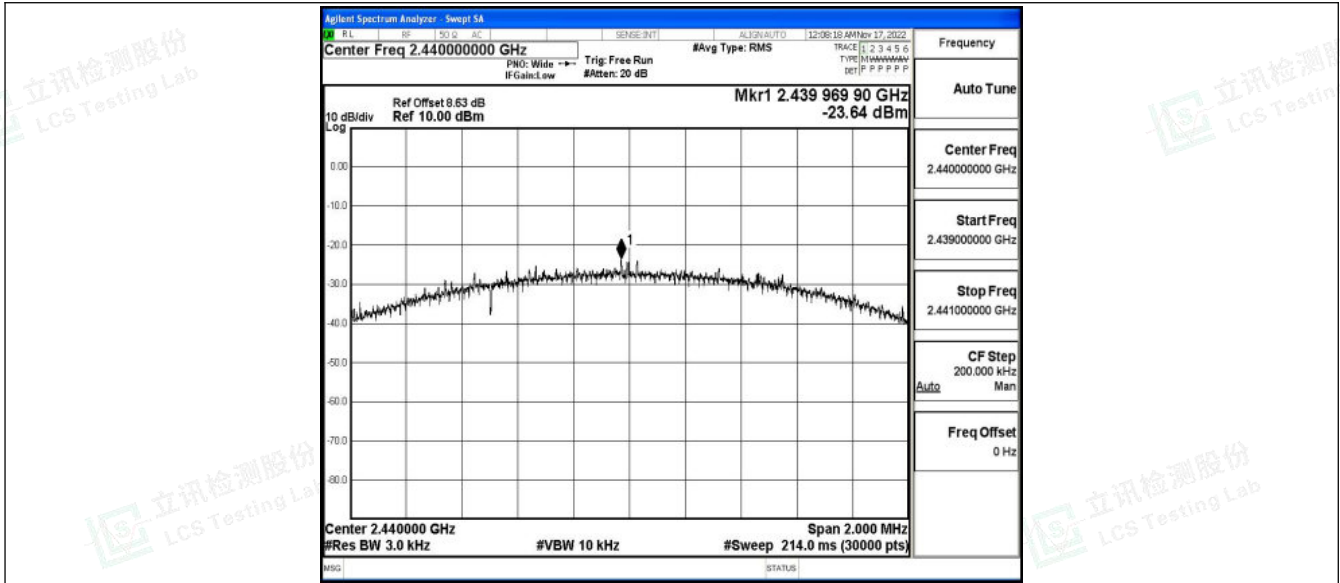


BLE_2M_Ant1_2402

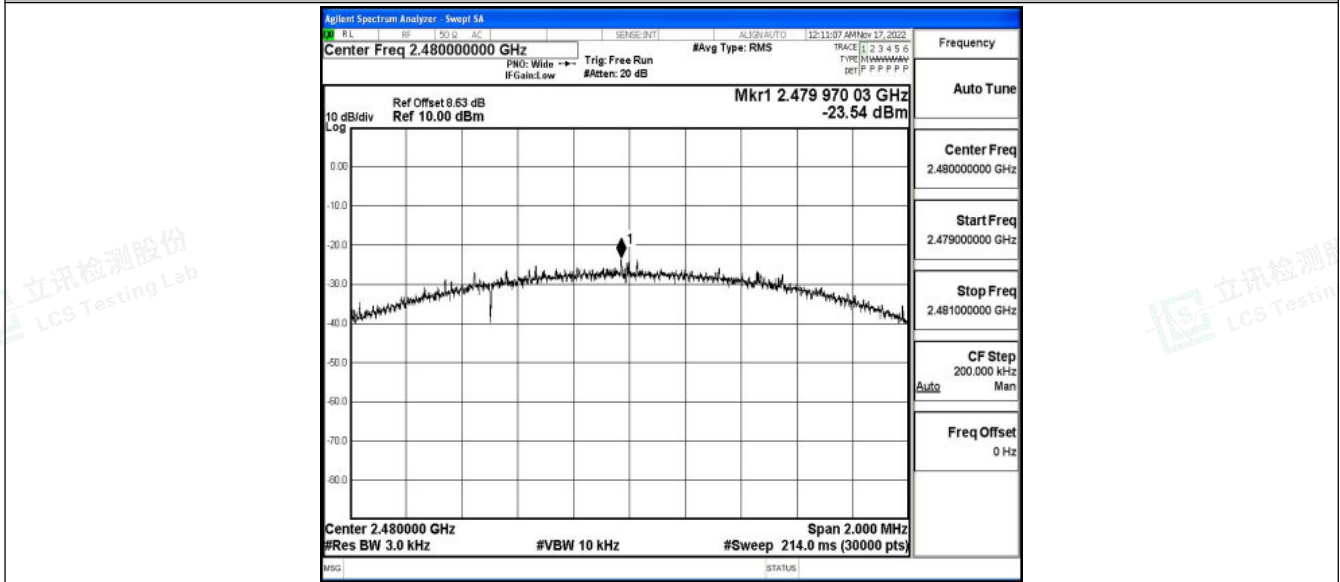


BLE_2M_Ant1_2440





BLE_2M_Ant1_2480





A.4 Band edge measurements

Test Result

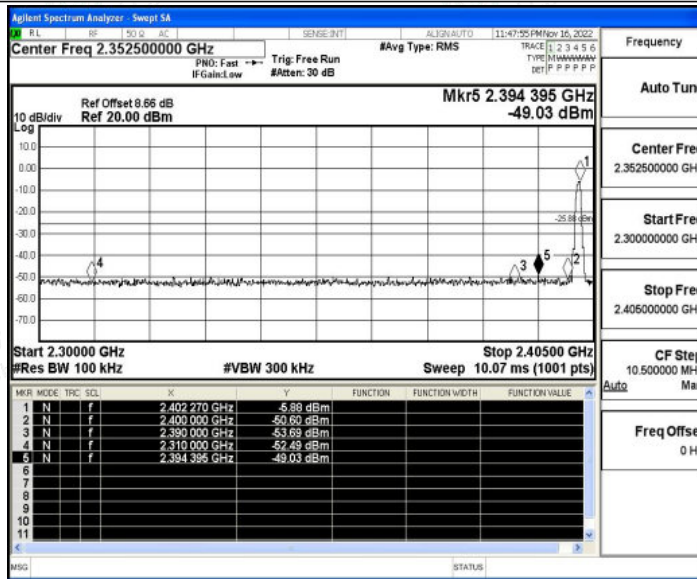
TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	-5.88	-49.03	≤-25.88	PASS
		High	2480	-5.25	-48.71	≤-25.25	PASS
BLE_2M	Ant1	Low	2402	-5.83	-36.93	≤-25.83	PASS
		High	2480	-7.22	-48.65	≤-27.22	PASS



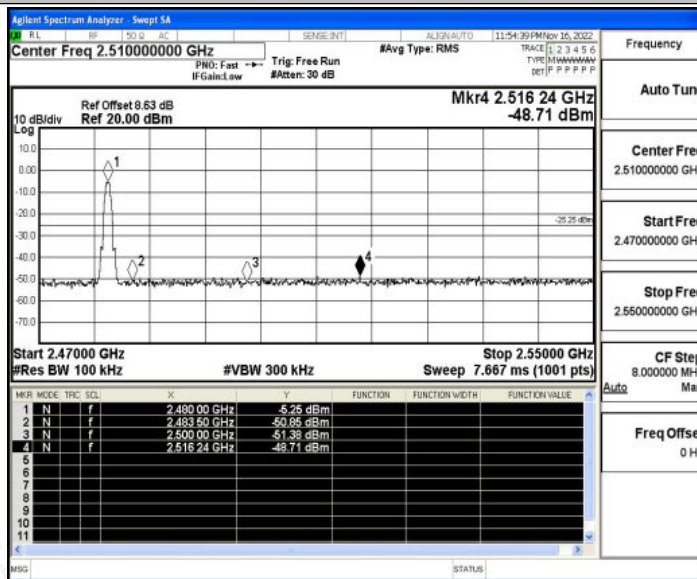


Test Graphs

BLE_1M_Ant1_Low_2402

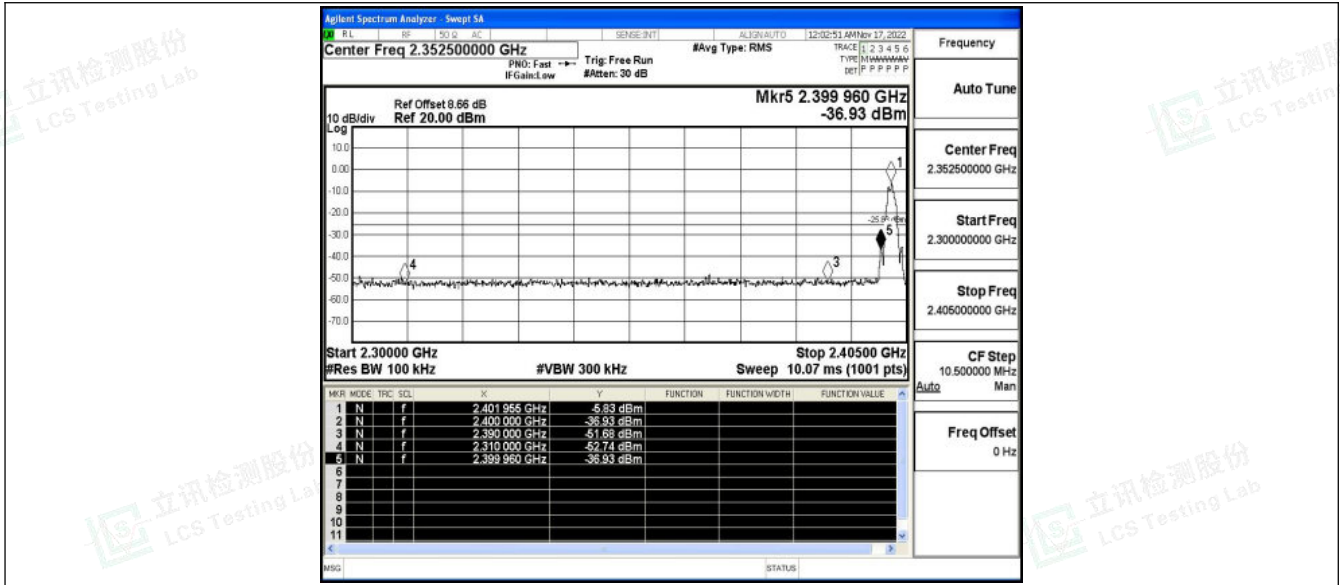


BLE_1M_Ant1_High_2480

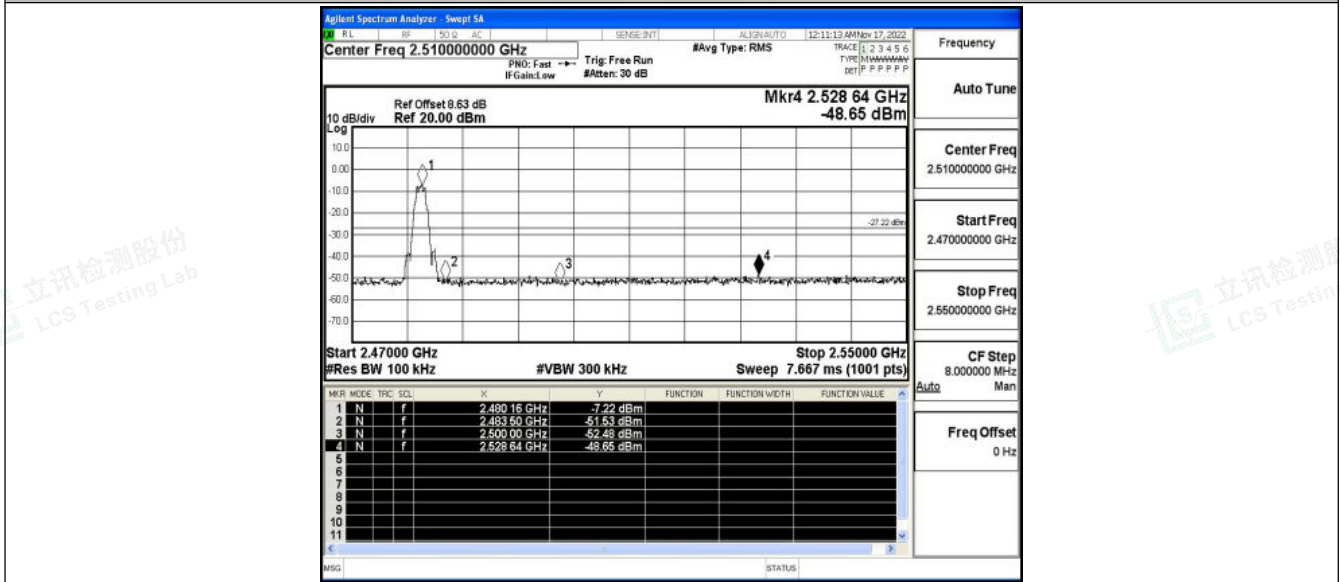


BLE_2M_Ant1_Low_2402





BLE_2M_Ant1_High_2480





A.5 Conducted Spurious Emission

Test Result

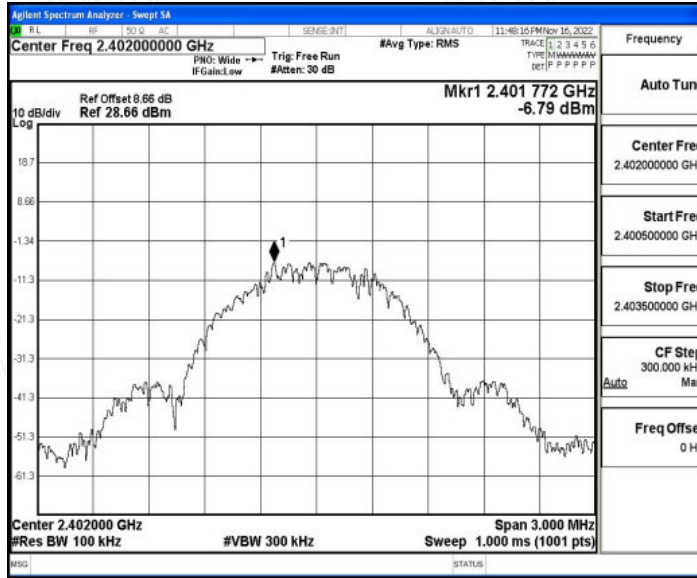
TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	-6.79	-6.79	---	PASS
			30~1000	-6.79	-59.86	≤-26.79	PASS
			1000~26500	-6.79	-45.53	≤-26.79	PASS
		2440	Reference	-5.51	-5.51	---	PASS
			30~1000	-5.51	-59.57	≤-25.51	PASS
			1000~26500	-5.51	-46.04	≤-25.51	PASS
		2480	Reference	-6.51	-6.51	---	PASS
			30~1000	-6.51	-60.63	≤-26.51	PASS
			1000~26500	-6.51	-45.97	≤-26.51	PASS
BLE_2M	Ant1	2402	Reference	-5.47	-5.47	---	PASS
			30~1000	-5.47	-60.55	≤-25.47	PASS
			1000~26500	-5.47	-46.35	≤-25.47	PASS
		2440	Reference	-8.00	-8.00	---	PASS
			30~1000	-8.00	-60.94	≤-28	PASS
			1000~26500	-8.00	-46.51	≤-28	PASS
		2480	Reference	-8.72	-8.72	---	PASS
			30~1000	-8.72	-60.95	≤-28.72	PASS
			1000~26500	-8.72	-46.04	≤-28.72	PASS



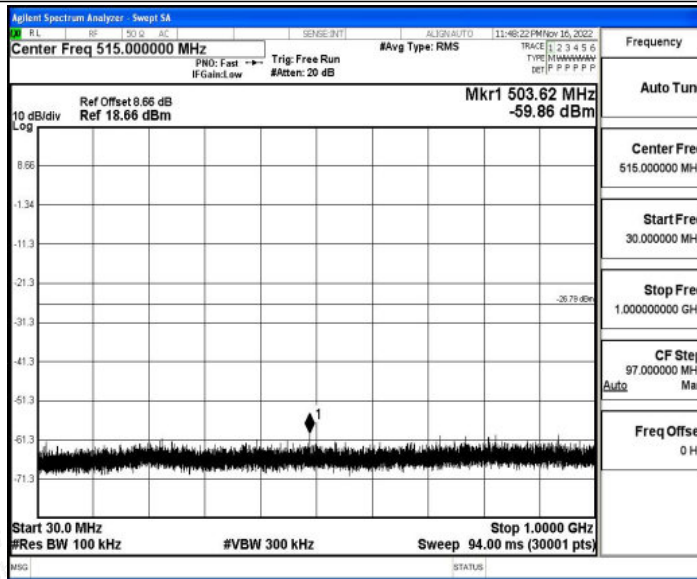


Test Graphs

BLE_1M_Ant1_2402_0~Reference

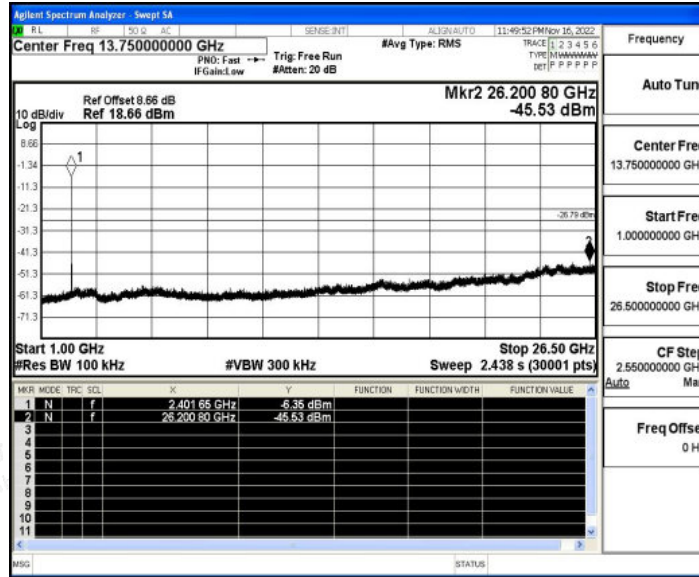


BLE_1M_Ant1_2402_30~1000

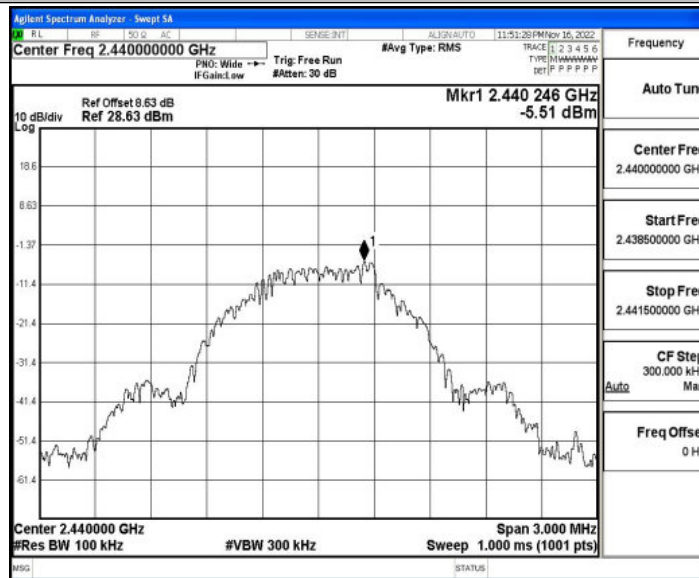


BLE_1M_Ant1_2402_1000~26500



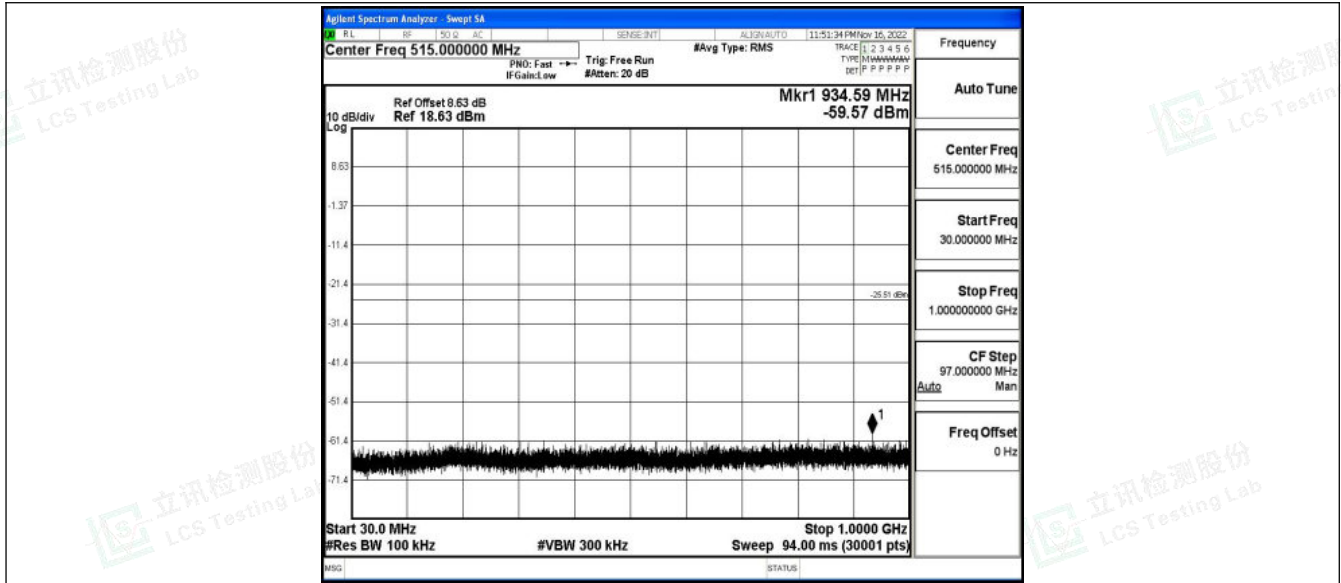


BLE_1M_Ant1_2440_0~Reference

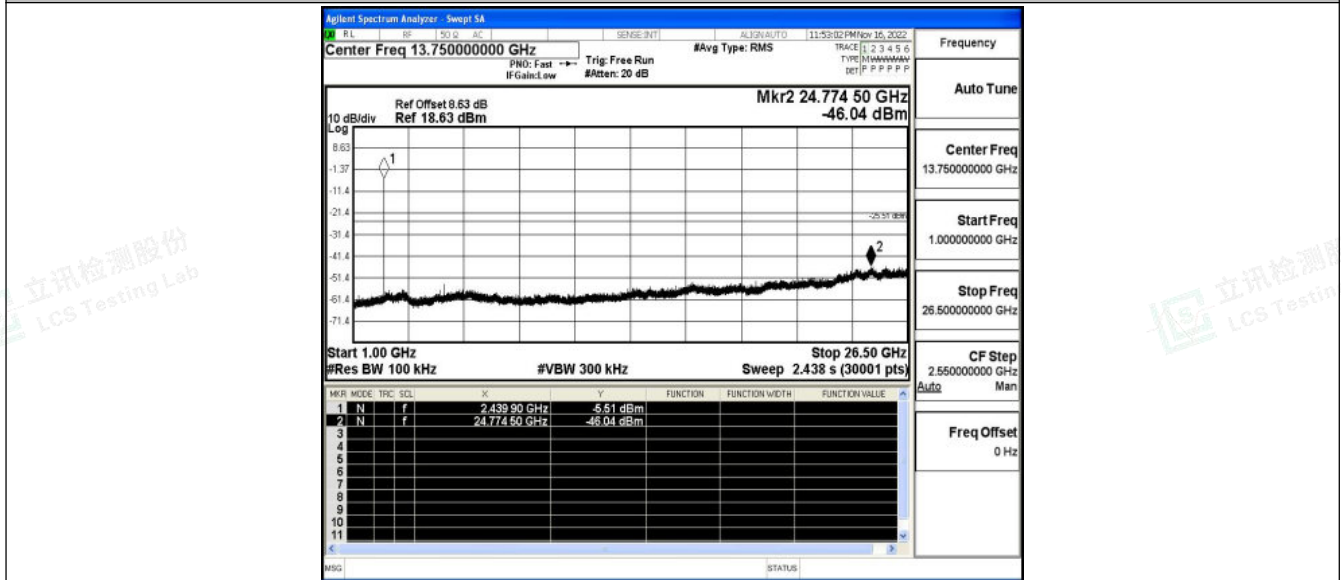


BLE_1M_Ant1_2440_30~1000





BLE_1M_Ant1_2440_1000~26500

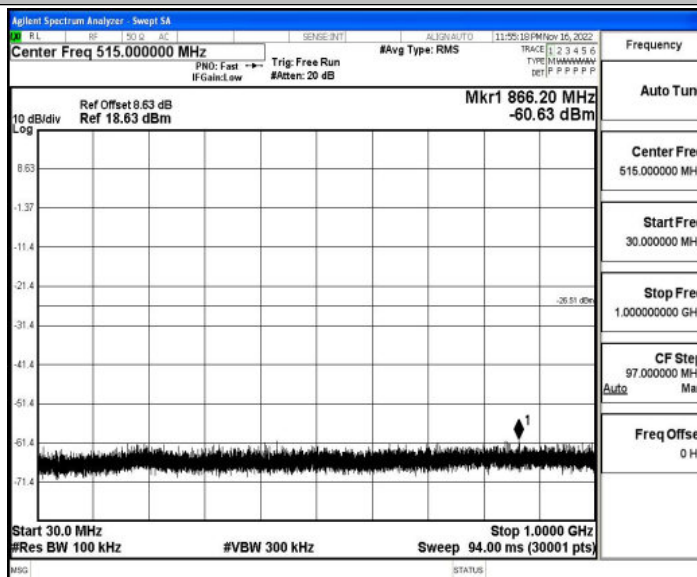


BLE_1M_Ant1_2480_0~Reference



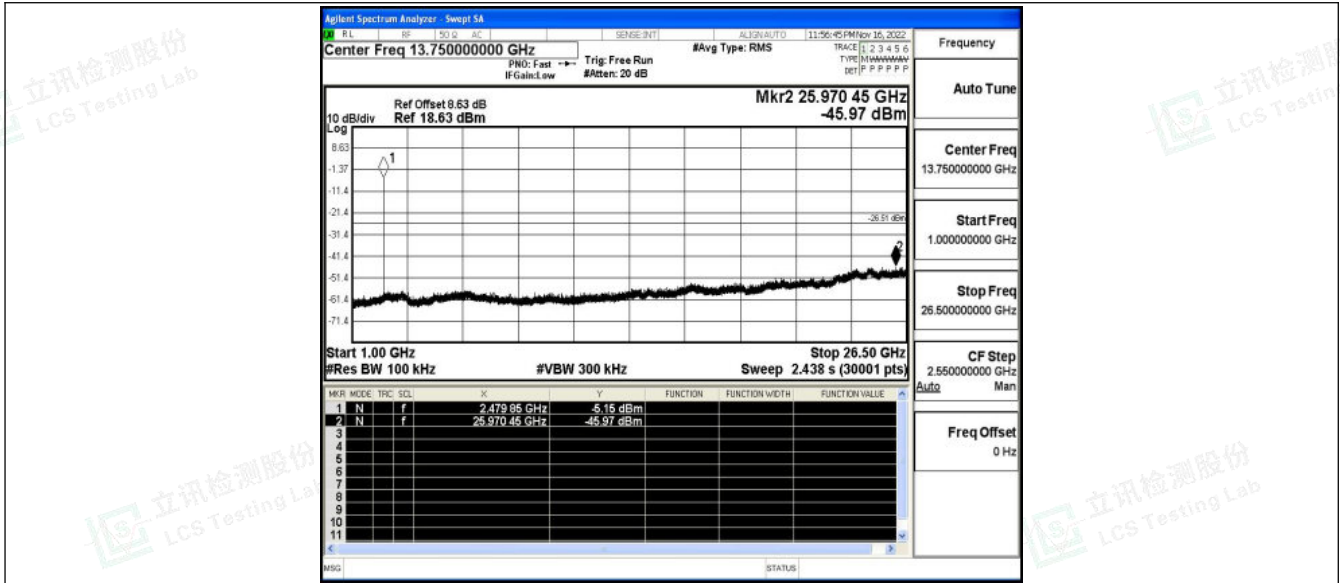


BLE_1M_Ant1_2480_30~1000

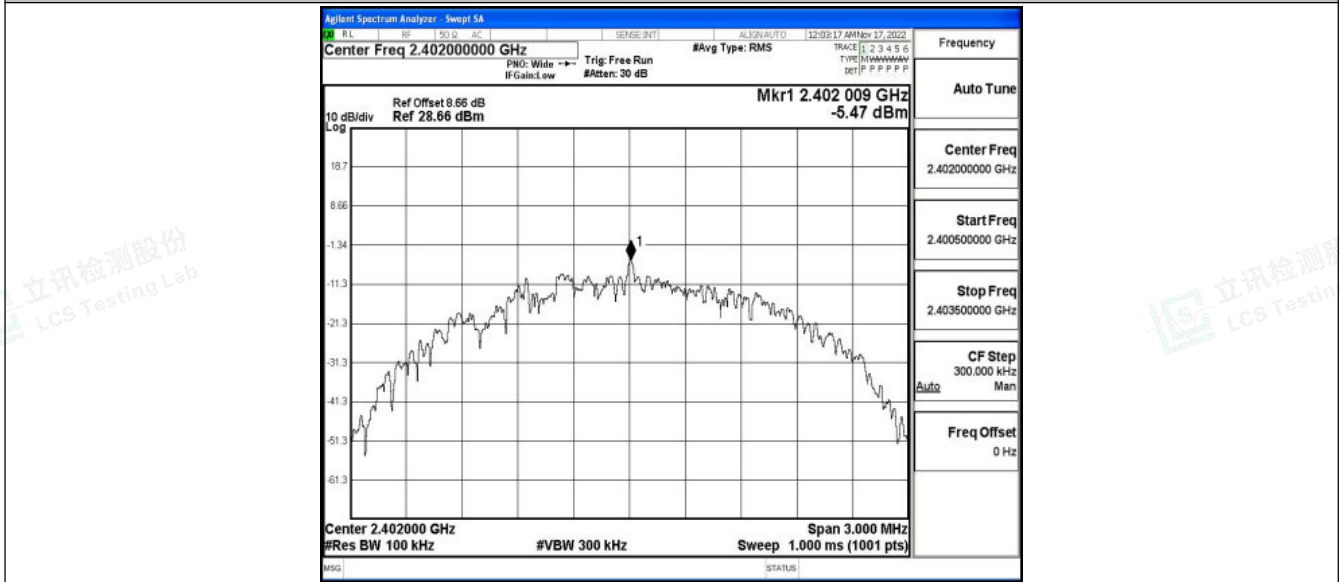


BLE_1M_Ant1_2480_1000~26500



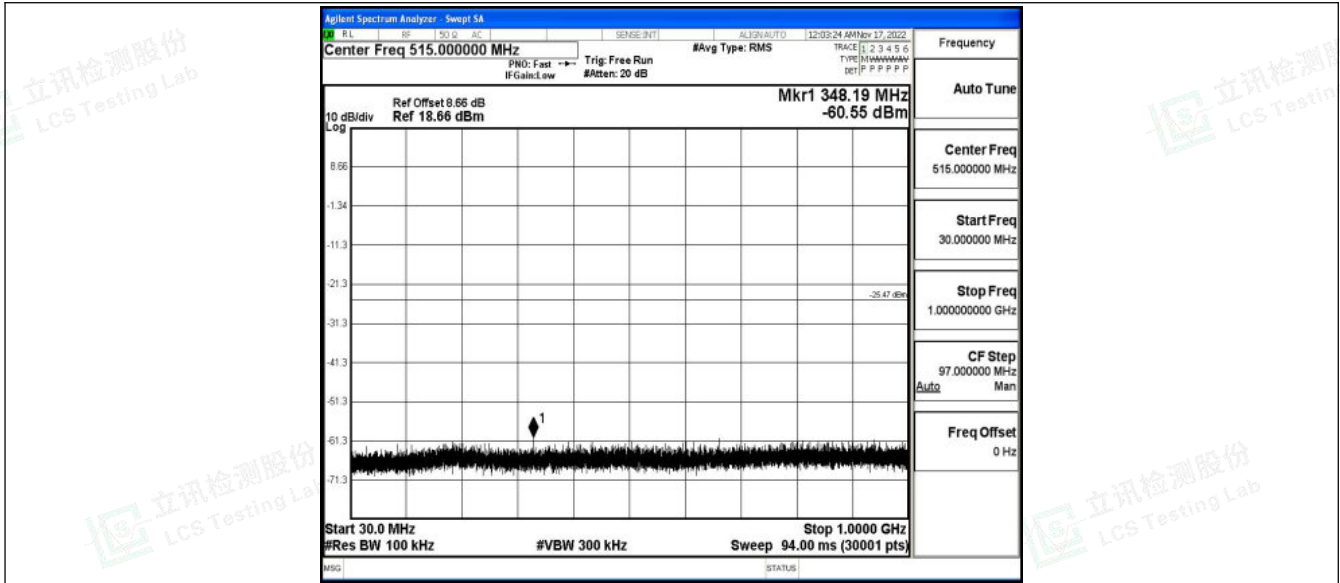


BLE_2M_Ant1_2402_0~Reference

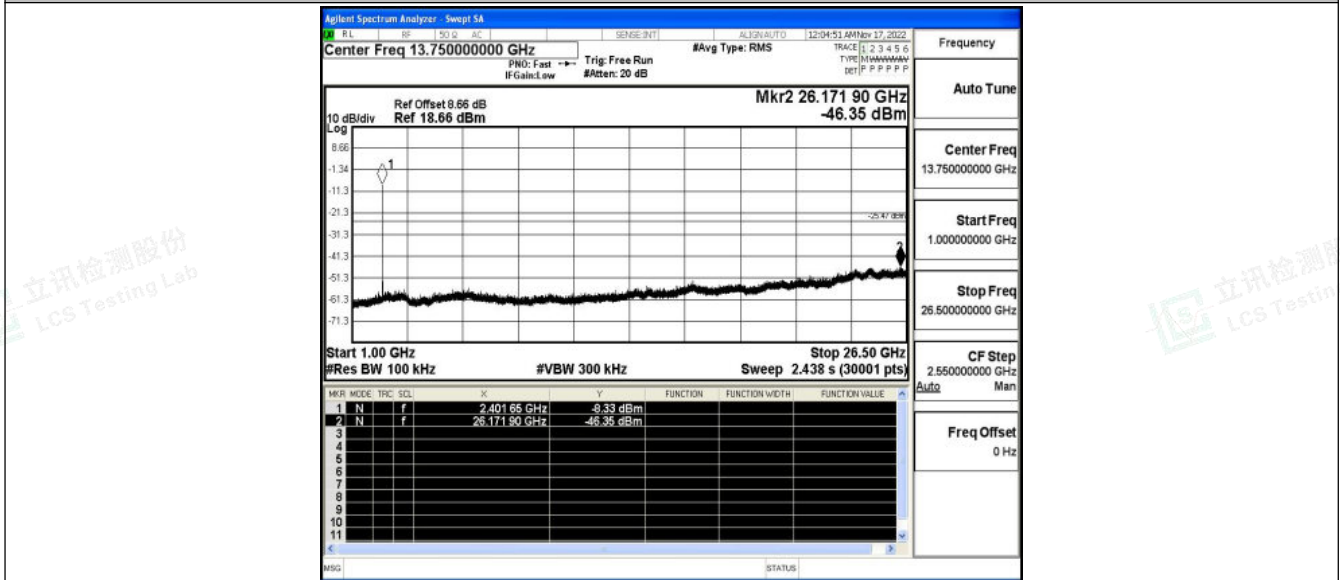


BLE_2M_Ant1_2402_30~1000



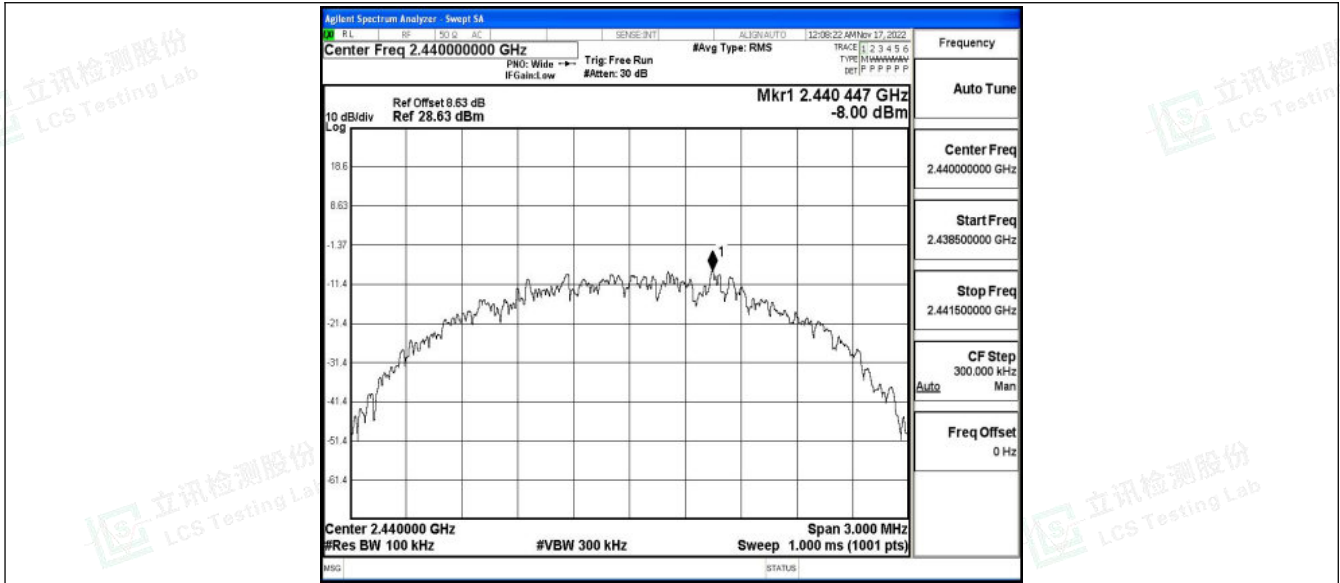


BLE_2M_Ant1_2402_1000~26500

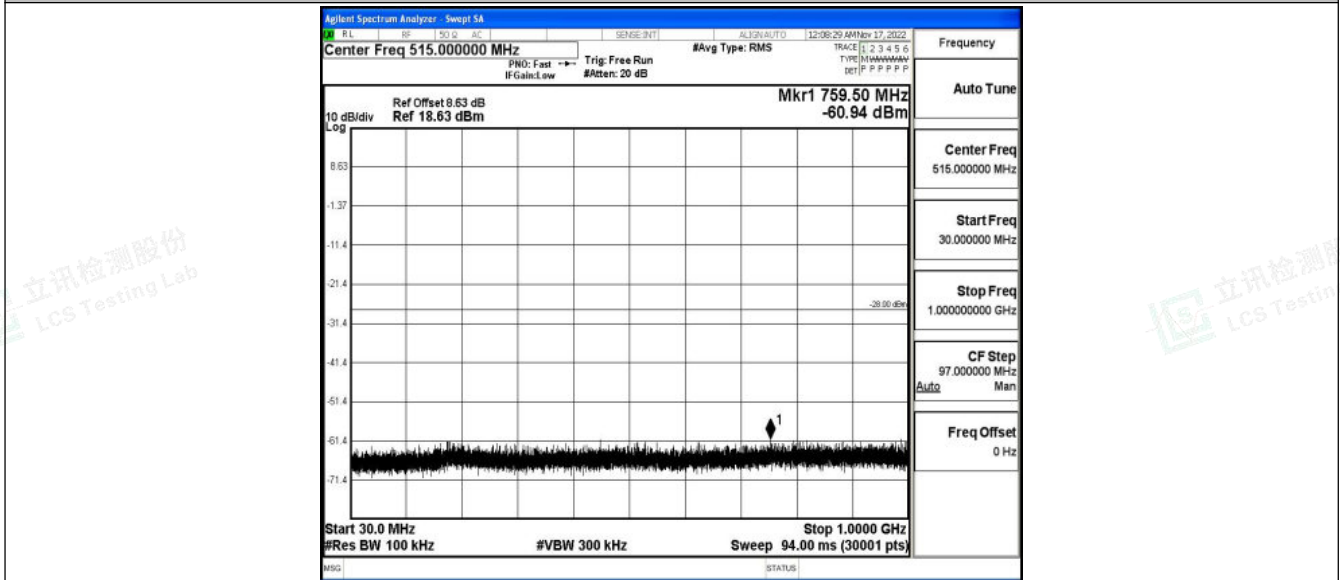


BLE_2M_Ant1_2440_0~Reference



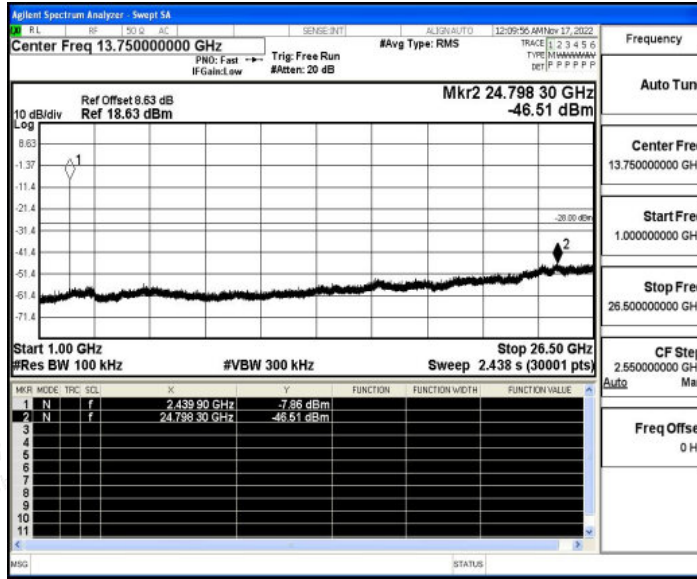


BLE_2M_Ant1_2440_30~1000

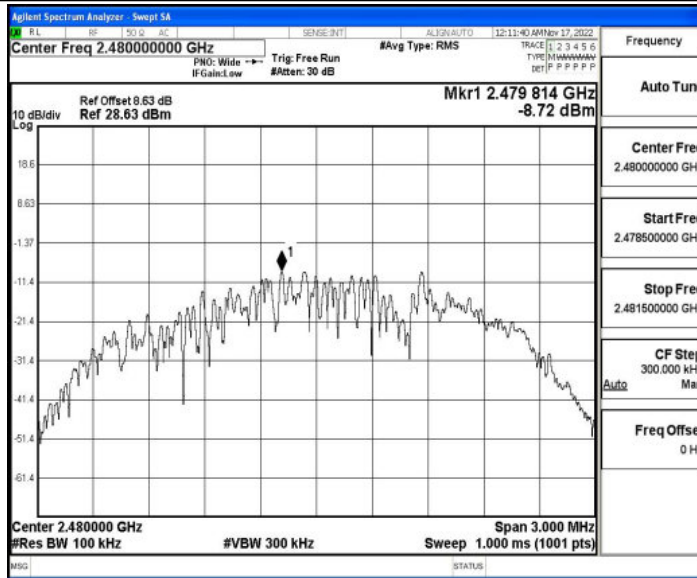


BLE_2M_Ant1_2440_1000~26500



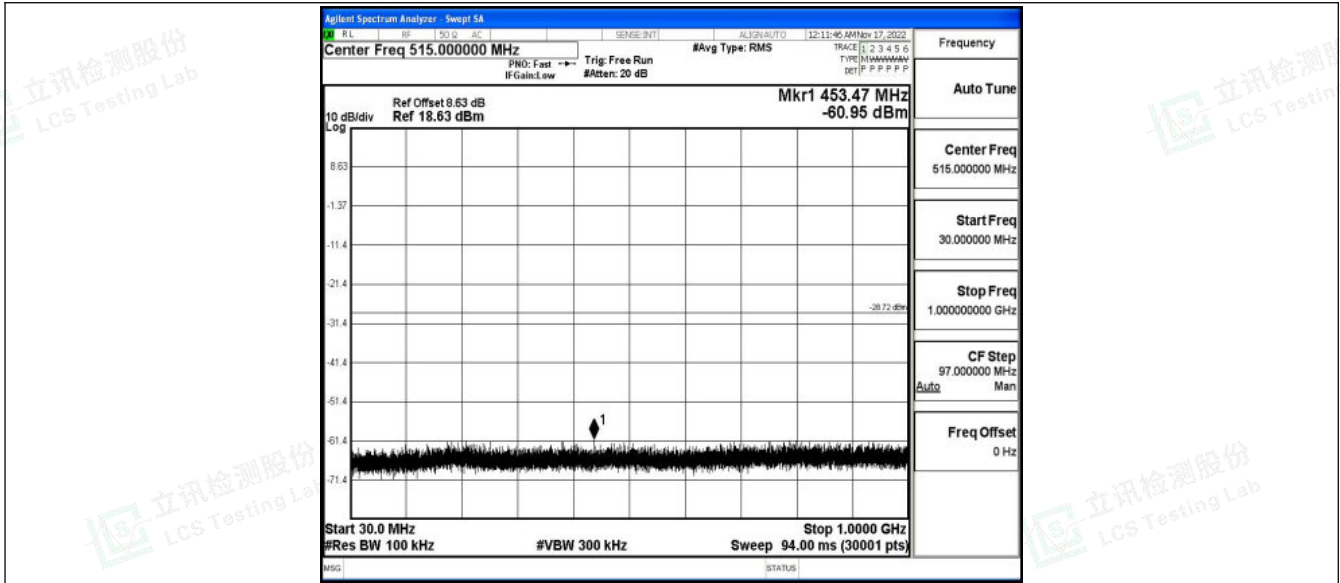


BLE_2M_Ant1_2480_0~Reference

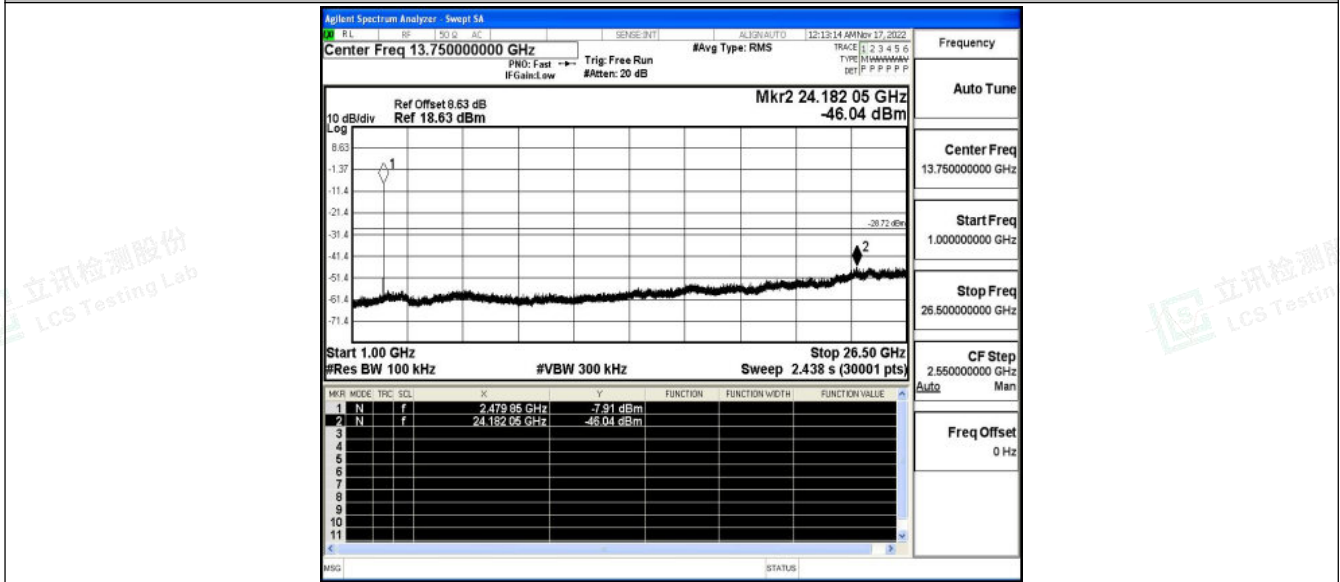


BLE_2M_Ant1_2480_30~1000





BLE_2M_Ant1_2480_1000~26500





A.6 Duty Cycle

Test Result

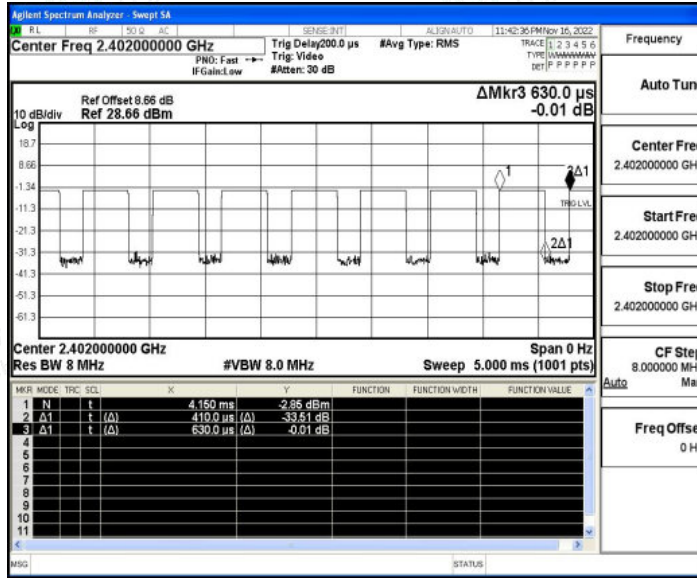
TestMode	Antenna	Channel	ON Time [ms]	Period [ms]	X	DC [%]	xFactor	1/T
BLE_1M	Ant1	2402	0.41	0.63	0.6508	65.08	1.87	2.44
		2440	2.11	2.50	0.8440	84.40	0.74	0.47
		2480	2.11	2.50	0.8440	84.40	0.74	0.47
BLE_2M	Ant1	2402	1.06	1.87	0.5668	56.68	2.47	0.94
		2440	1.06	1.87	0.5668	56.68	2.47	0.94
		2480	1.06	1.87	0.5668	56.68	2.47	0.94



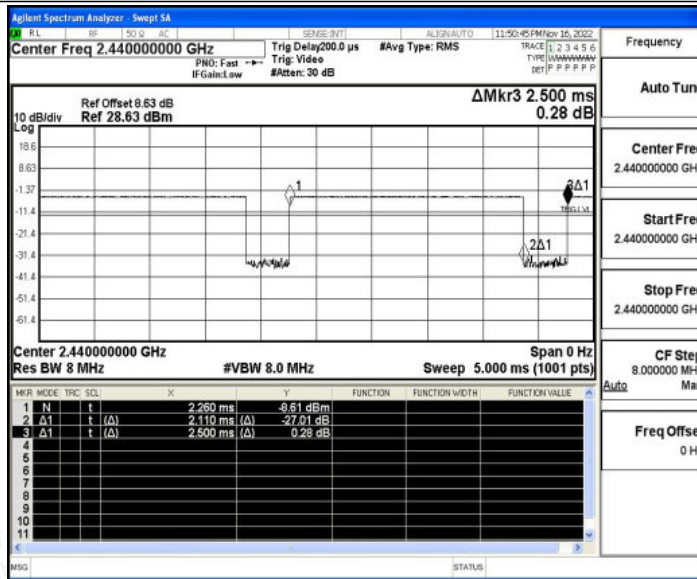


Test Graphs

BLE_1M_Ant1_2402

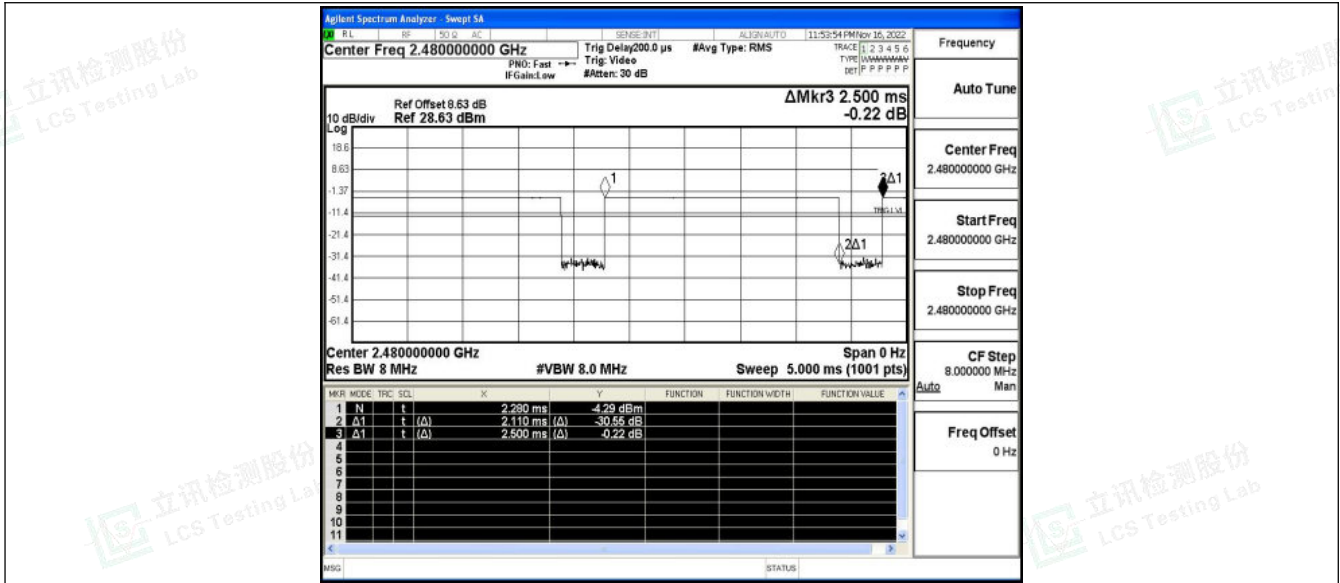


BLE_1M_Ant1_2440

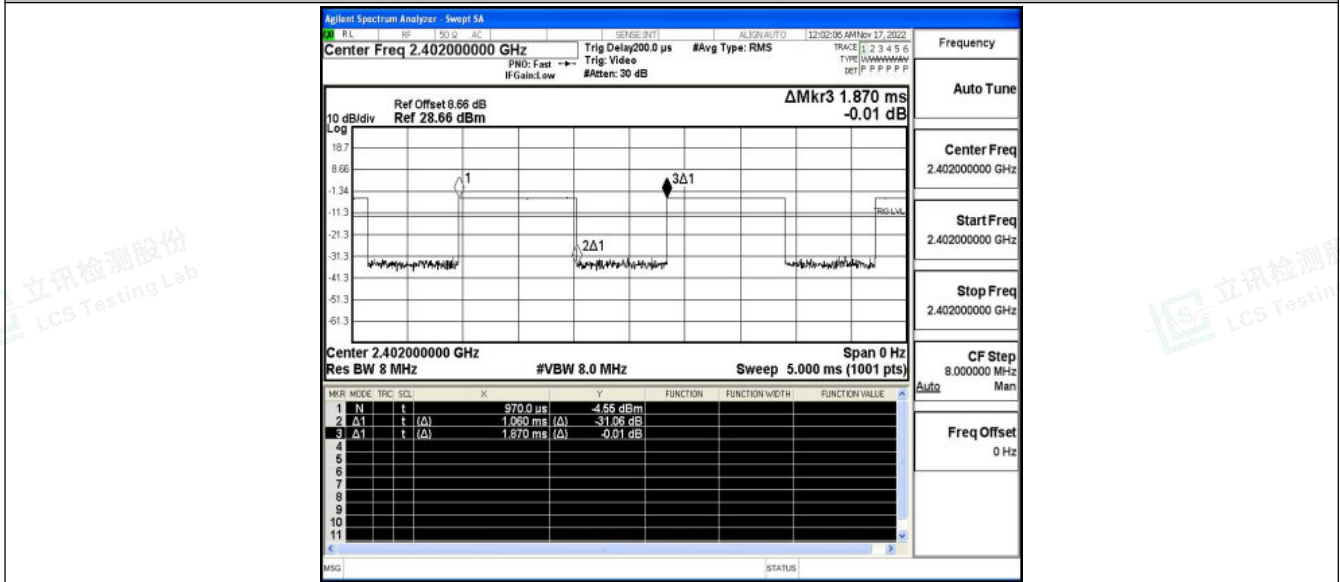


BLE_1M_Ant1_2480



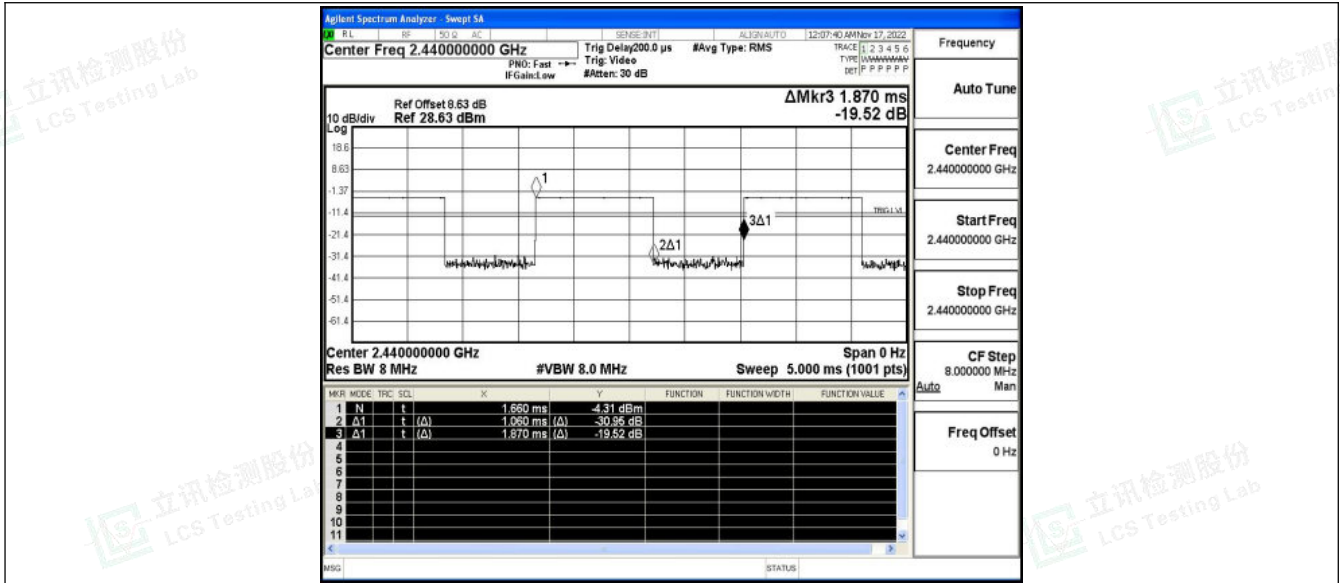


BLE_2M_Ant1_2402

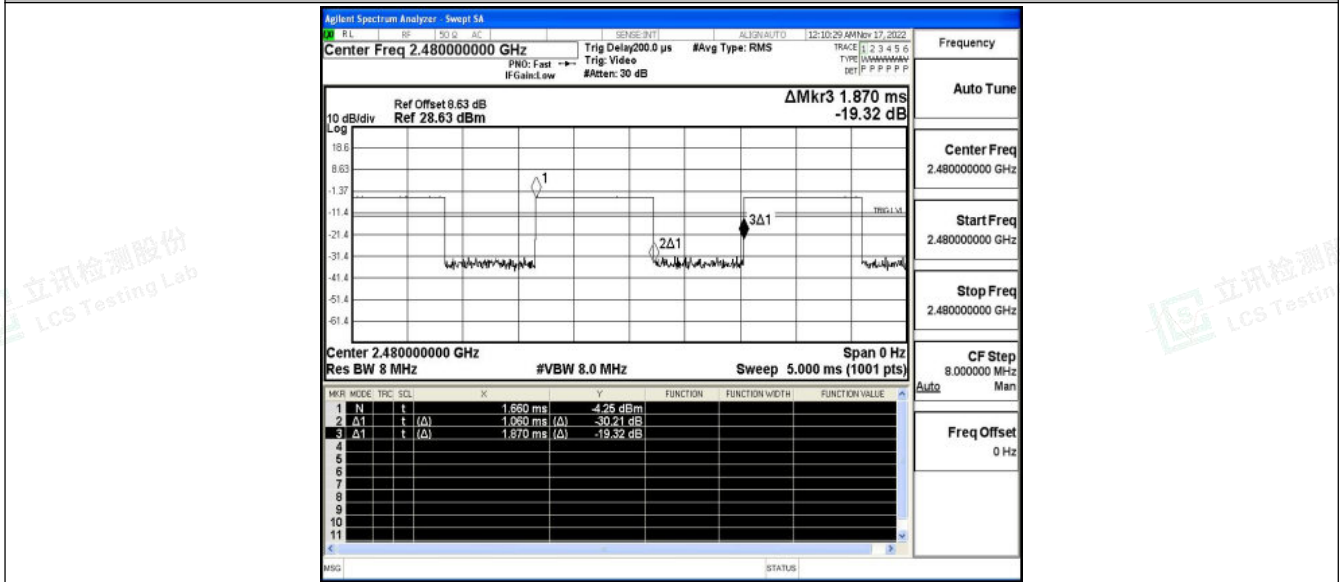


BLE_2M_Ant1_2440





BLE_2M_Ant1_2480





A.7 Emissions in Restricted Bands

Test Result

TestMode	Antenna	ChName	Channel	Detector	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
BLE_1M	Ant1	Low	2402	AV	2310.000	-47.95	≤-41.20	47.25	≤54	PASS
				AV	2377.595	-46.84	≤-41.20	48.36	≤54	PASS
				AV	2390.000	-47.35	≤-41.20	47.85	≤54	PASS
				Peak	2310.000	-40.72	≤-21.20	54.48	≤74	PASS
				Peak	2323.100	-38.69	≤-21.20	56.51	≤74	PASS
				Peak	2390.000	-39.91	≤-21.20	55.29	≤74	PASS
		High	2480	AV	2483.500	-47.35	≤-41.20	47.85	≤54	PASS
				AV	2494.240	-47.01	≤-41.20	48.19	≤54	PASS
				AV	2500.000	-47.27	≤-41.20	47.93	≤54	PASS
				Peak	2483.500	-41.49	≤-21.20	53.71	≤74	PASS
				Peak	2497.280	-37.9	≤-21.20	57.30	≤74	PASS
				Peak	2500.000	-40	≤-21.20	55.20	≤74	PASS
BLE_2M	Ant1	Low	2402	AV	2310.000	-47.87	≤-41.20	47.33	≤54	PASS
				AV	2379.905	-47.4	≤-41.20	47.80	≤54	PASS
				AV	2390.000	-47.63	≤-41.20	47.57	≤54	PASS
				Peak	2310.000	-40.11	≤-21.20	55.09	≤74	PASS
				Peak	2376.755	-38.07	≤-21.20	57.13	≤74	PASS
				Peak	2390.000	-40.9	≤-21.20	54.30	≤74	PASS
		High	2480	AV	2483.500	-46.8	≤-41.20	48.40	≤54	PASS
				AV	2483.520	-46.8	≤-41.20	48.40	≤54	PASS
				AV	2500.000	-47.16	≤-41.20	48.04	≤54	PASS
				Peak	2483.500	-40.41	≤-21.20	54.79	≤74	PASS
				Peak	2491.600	-38.16	≤-21.20	57.04	≤74	PASS
				Peak	2500.000	-39.69	≤-21.20	55.51	≤74	PASS

Note:

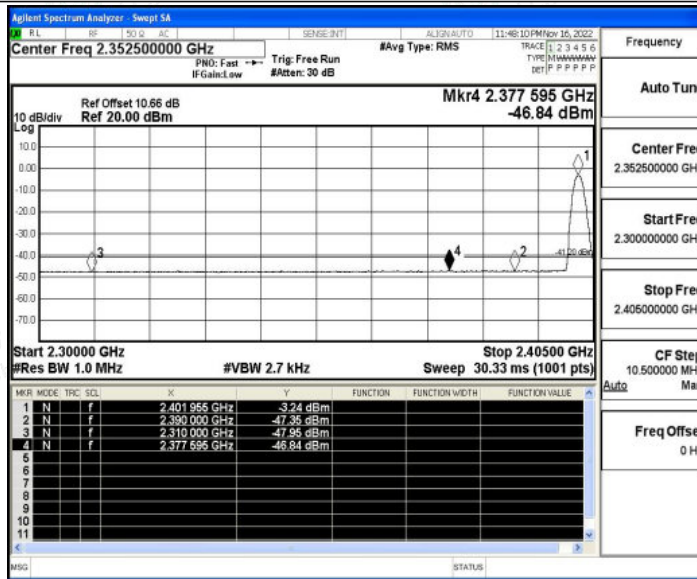
- The Antenna Gain is compensated in the graph.
- The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.



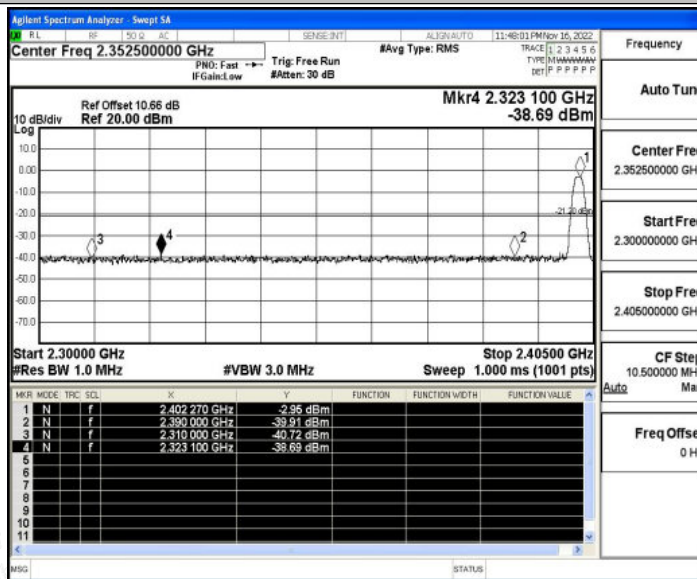


Test Graphs

BLE_1M_Ant1_Low_2402_AV

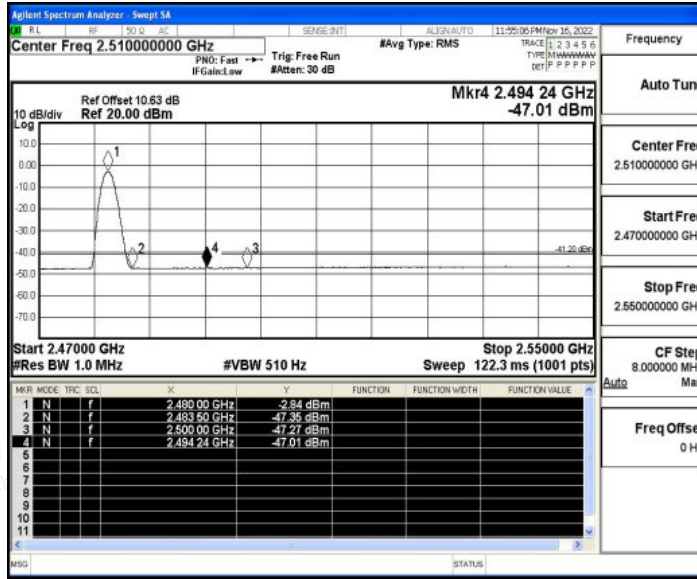


BLE_1M_Ant1_Low_2402_Peak

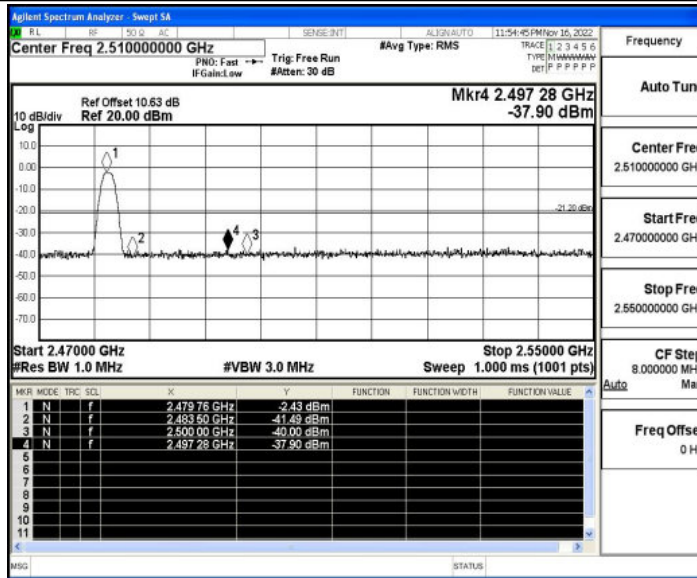


BLE_1M_Ant1_High_2480_AV



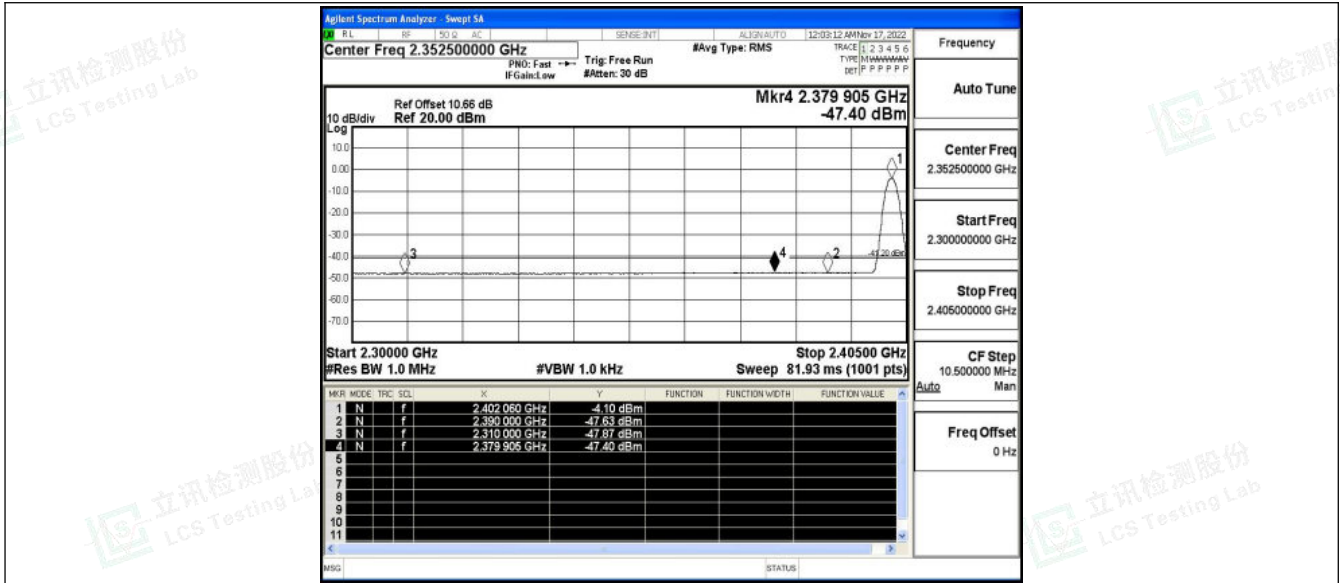


BLE_1M_Ant1_High_2480_Peak

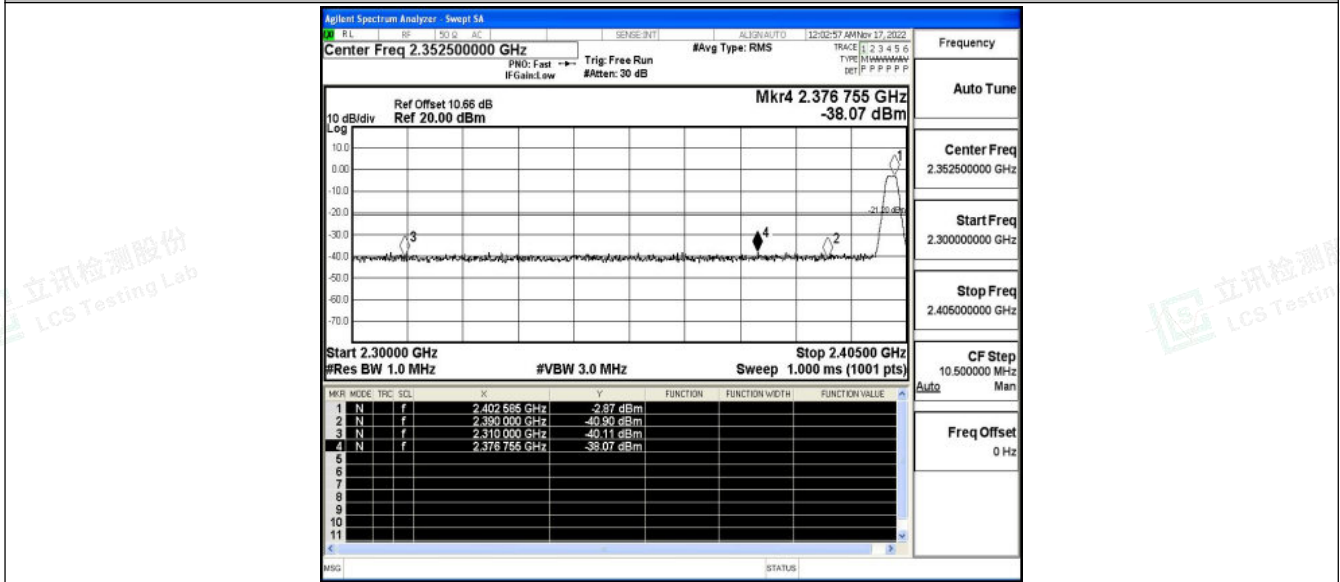


BLE_2M_Ant1_Low_2402_AV



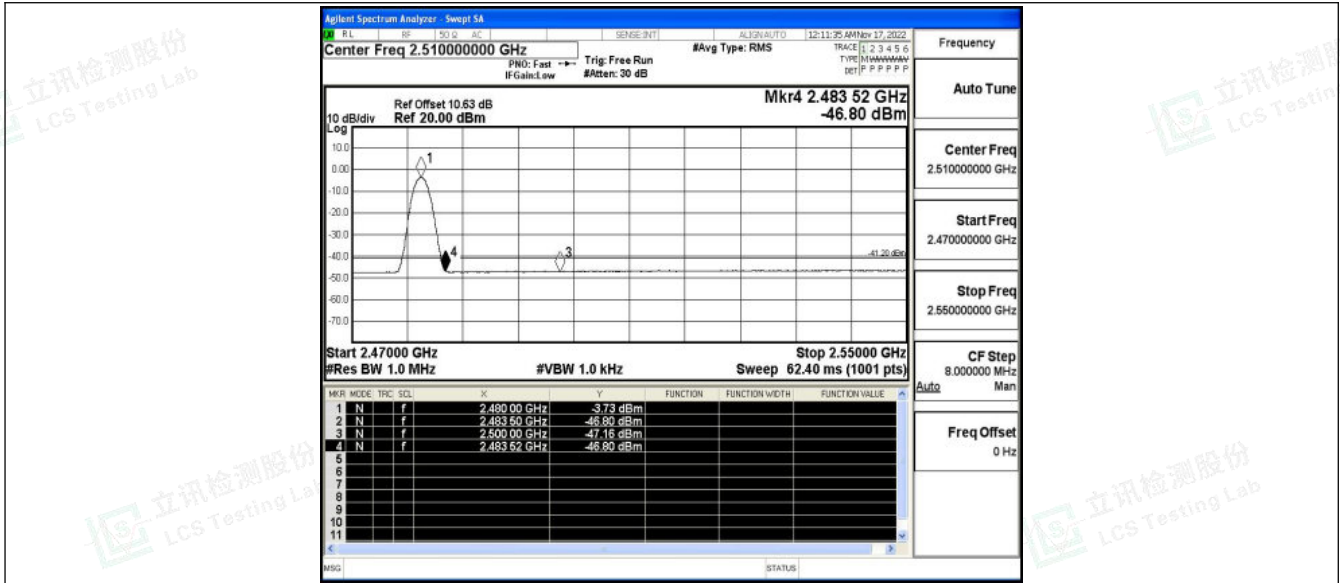


BLE_2M_Ant1_Low_2402_Peak



BLE_2M_Ant1_High_2480_AV





BLE_2M_Ant1_High_2480_Peak

