



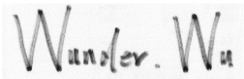
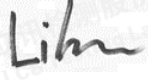
Appendix A

RF Test Data for BT LE (Conducted Measurement)

Product Name: SmartPair Beacon

Test Model: 77-S230

Environmental Conditions

Temperature:	23.8 ° C
Relative Humidity:	52.2%
ATM Pressure:	100.0 kPa
Test Engineer:	 Wunder Wu
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	Ant	2402	0.672	2401.644	2402.316	0.5	PASS
		2440	0.668	2439.644	2440.312	0.5	PASS
		2480	0.676	2479.644	2480.320	0.5	PASS
BLE_2M	Ant	2402	1.120	2401.420	2402.540	0.5	PASS
		2440	1.120	2439.420	2440.540	0.5	PASS
		2480	1.120	2479.420	2480.540	0.5	PASS

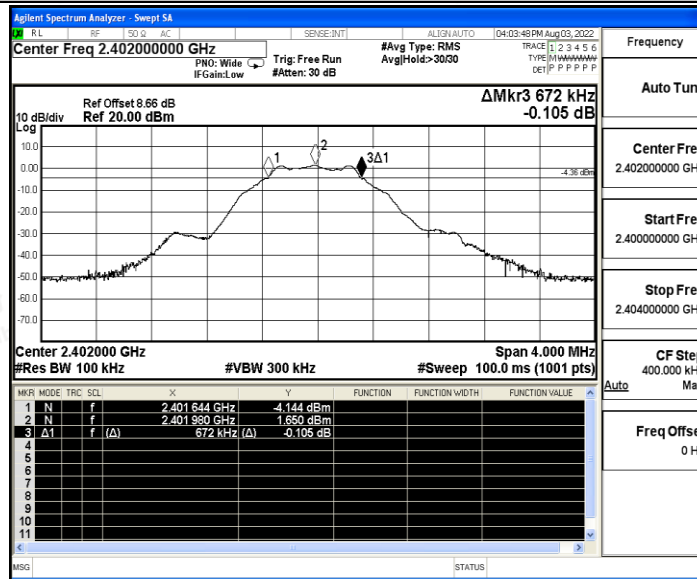


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Scan code to check authenticity

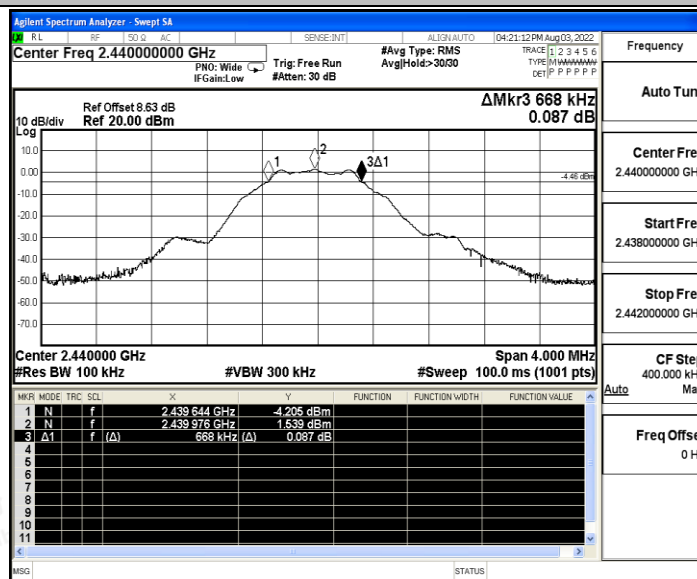


Test Graphs

BLE_1M_Ant_2402

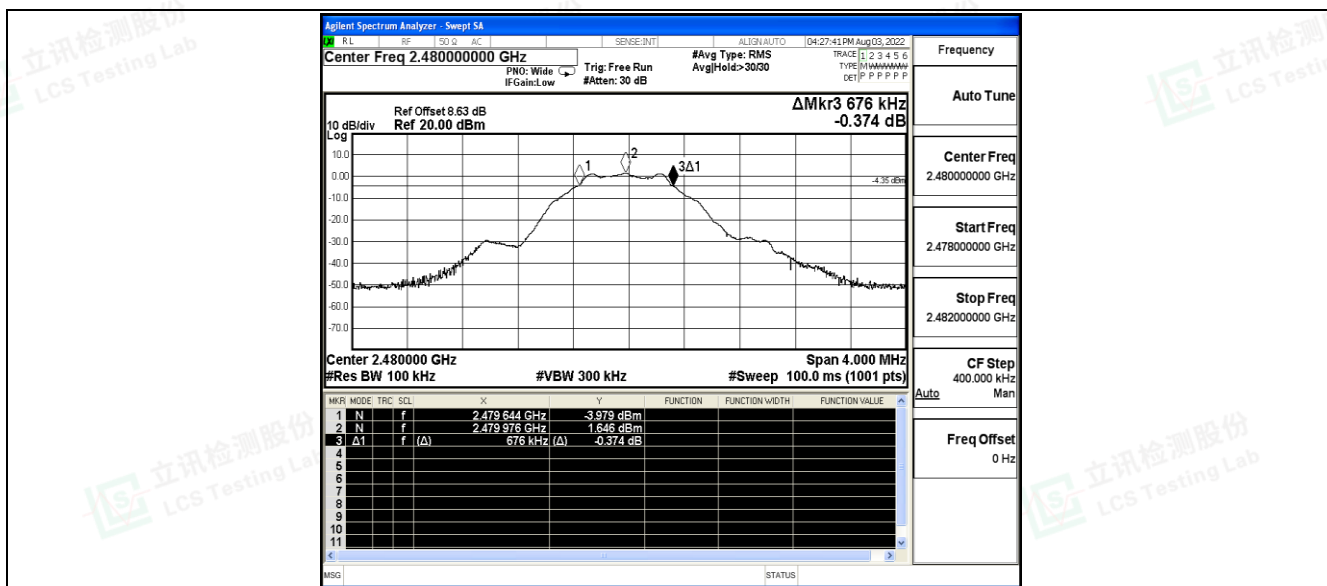


BLE_1M_Ant_2440

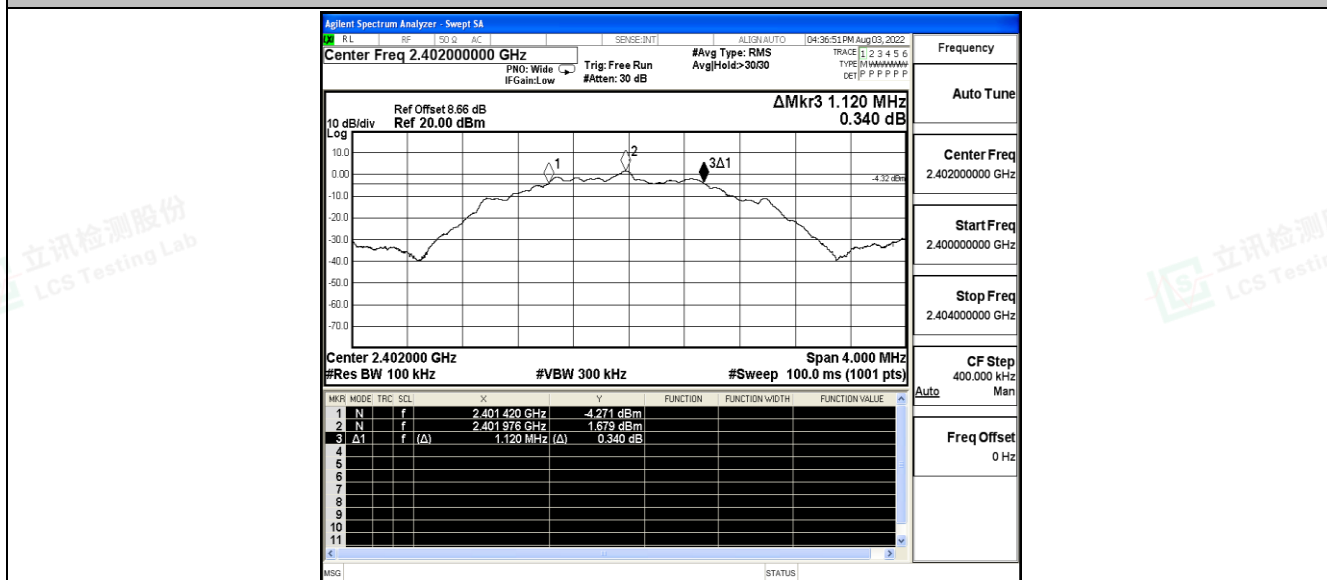


BLE_1M_Ant_2480



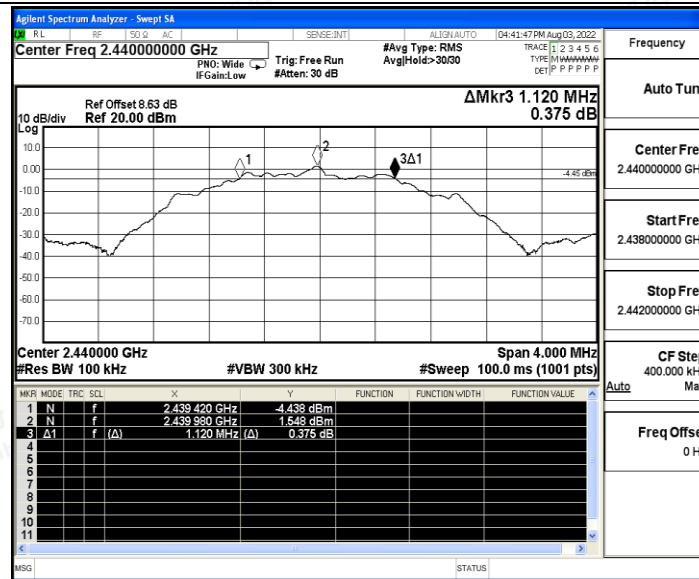


BLE_2M_Ant_2402

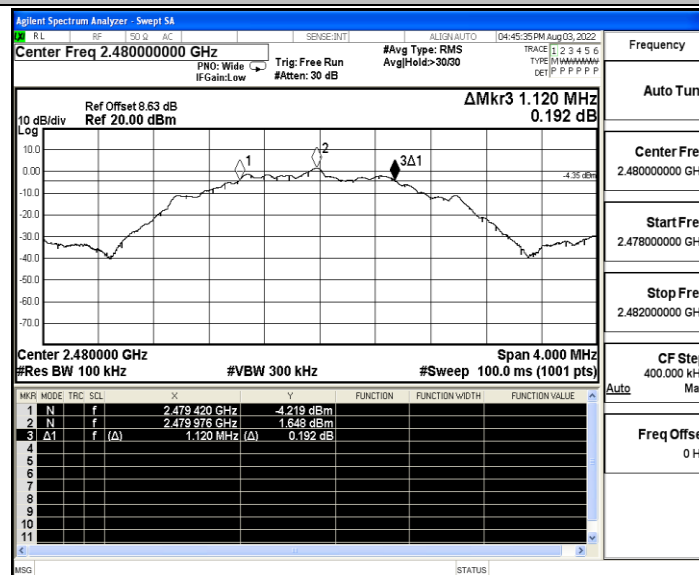


BLE_2M_Ant_2440





BLE_2M_Ant_2480





A.2 Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant	2402	1.0370	2401.463	2402.500	---	---
		2440	1.0315	2439.466	2440.498	---	---
		2480	1.0402	2479.459	2480.500	---	---
BLE_2M	Ant	2402	2.0387	2400.972	2403.010	---	---
		2440	2.0497	2438.981	2441.031	---	---
		2480	2.0525	2478.958	2481.010	---	---

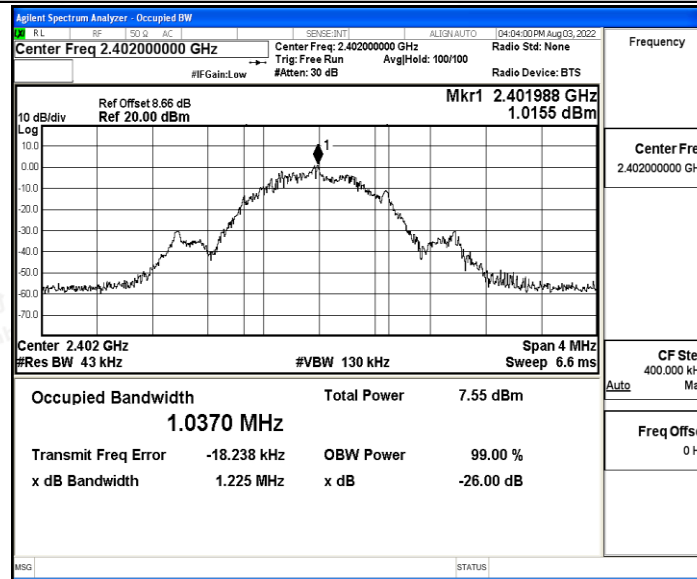


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Scan code to check authenticity

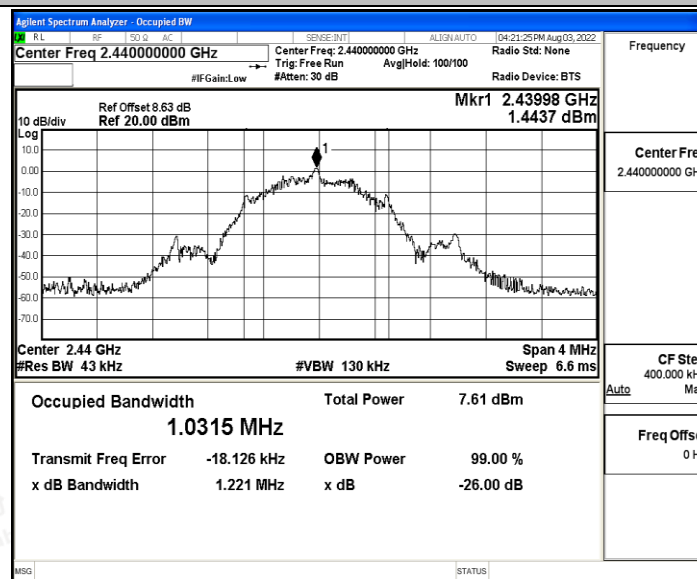


Test Graphs

BLE_1M_Ant_2402

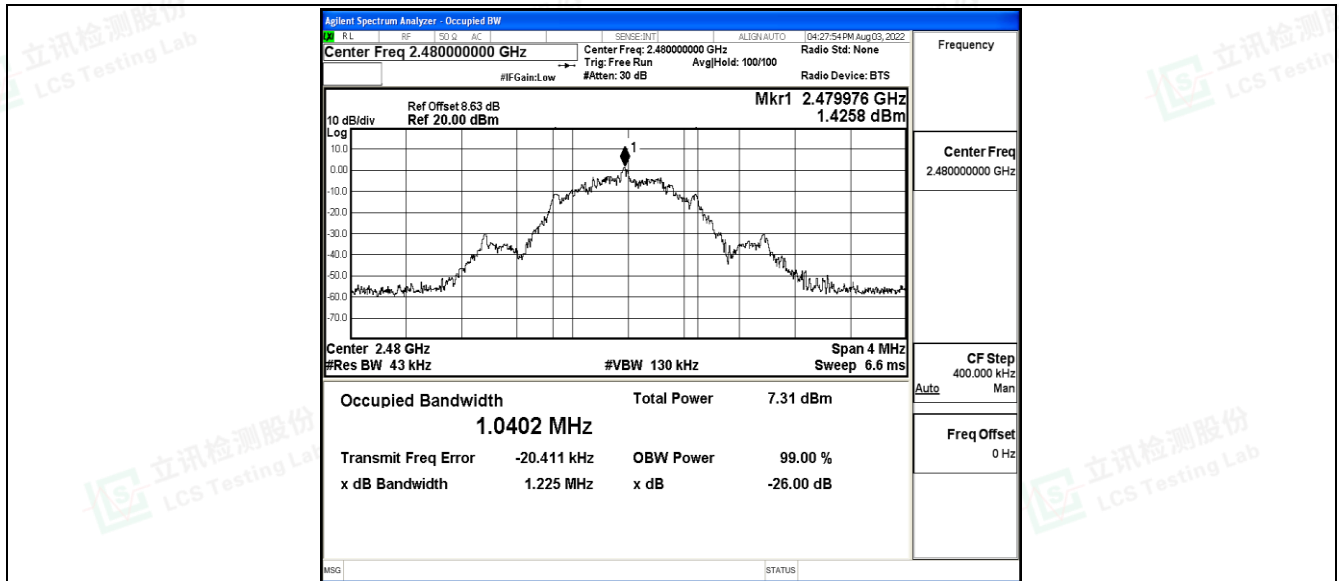


BLE_1M_Ant_2440

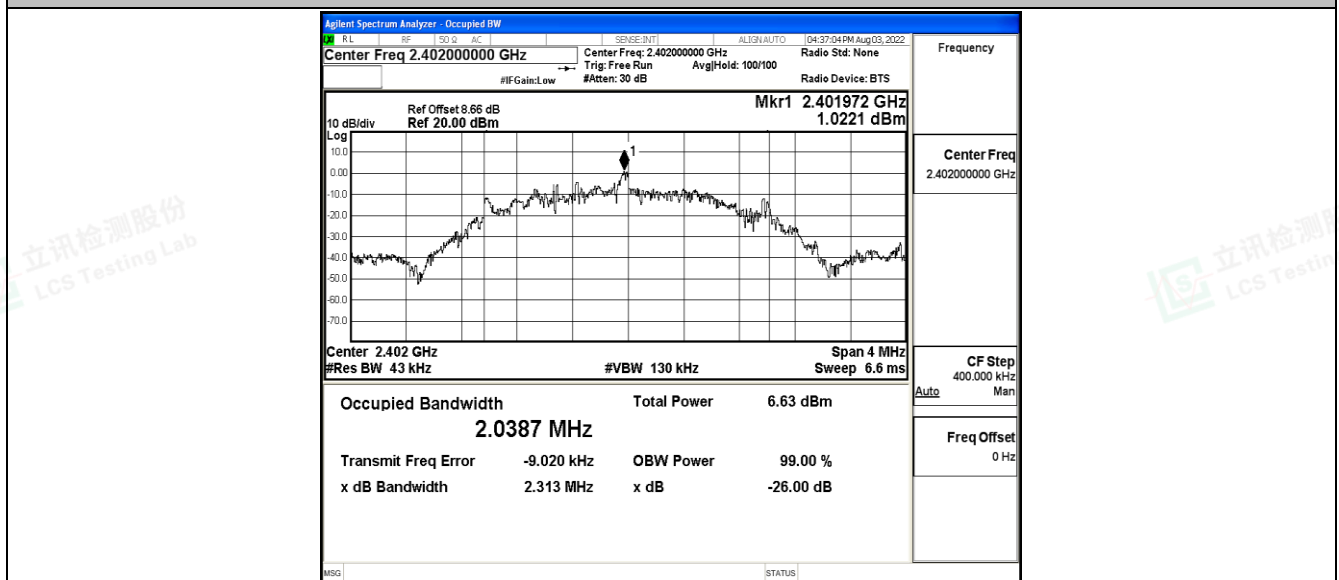


BLE_1M_Ant_2480



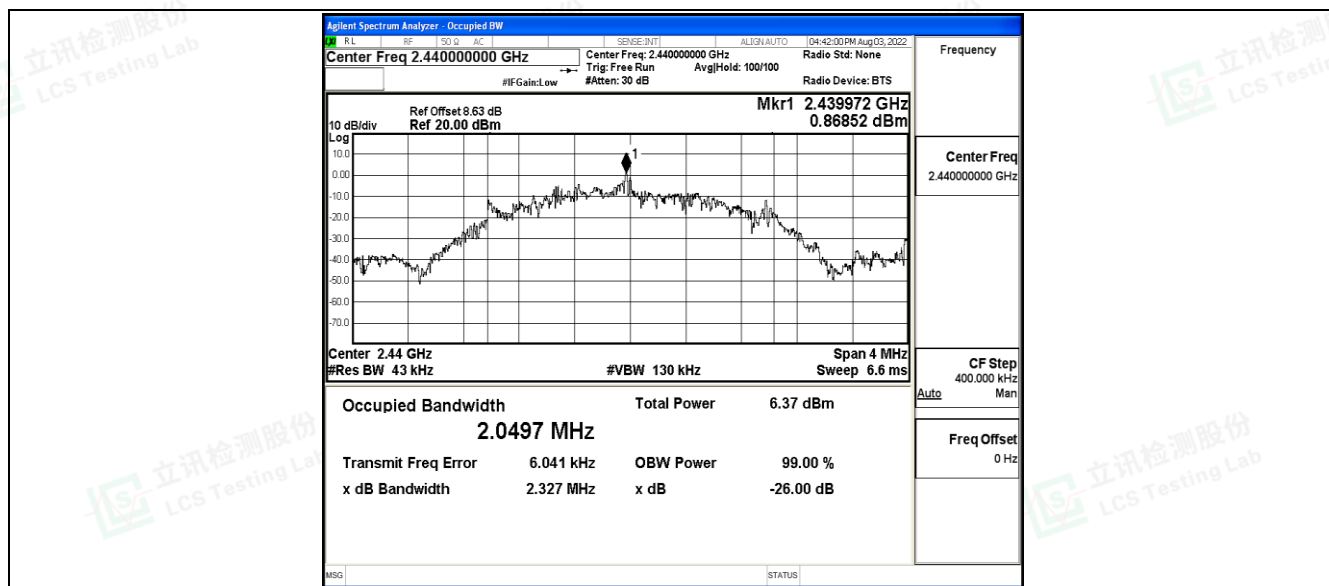


BLE_2M_Ant_2402

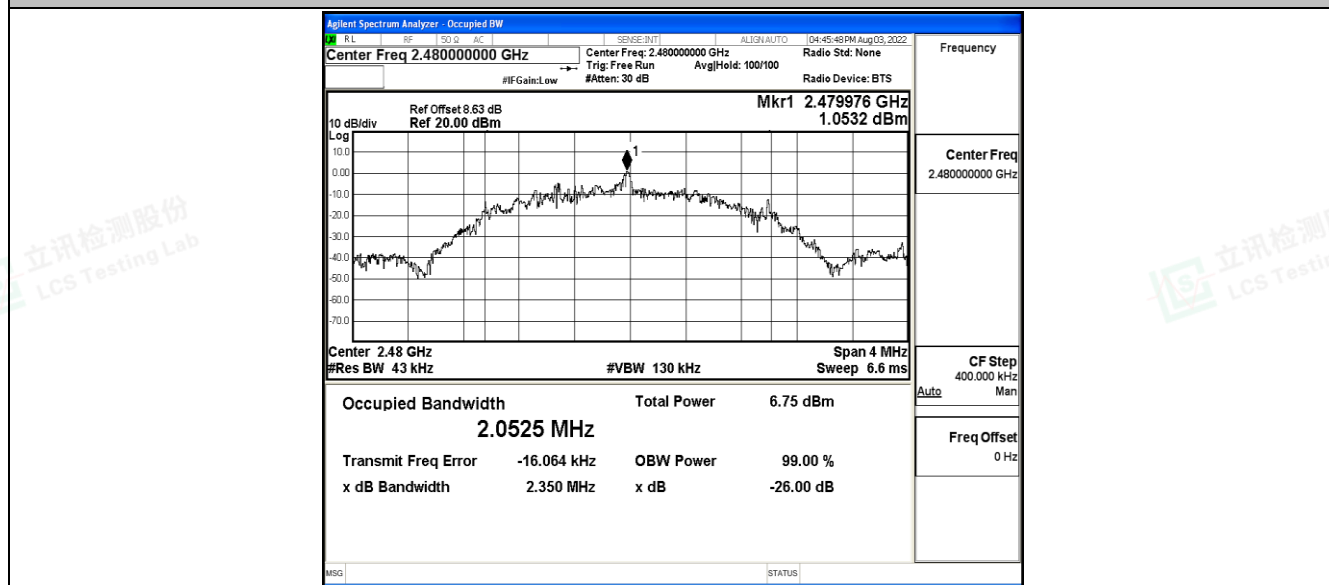


BLE_2M_Ant_2440





BLE_2M_Ant_2480





A.3 Maximum peak conducted output power

Test Result

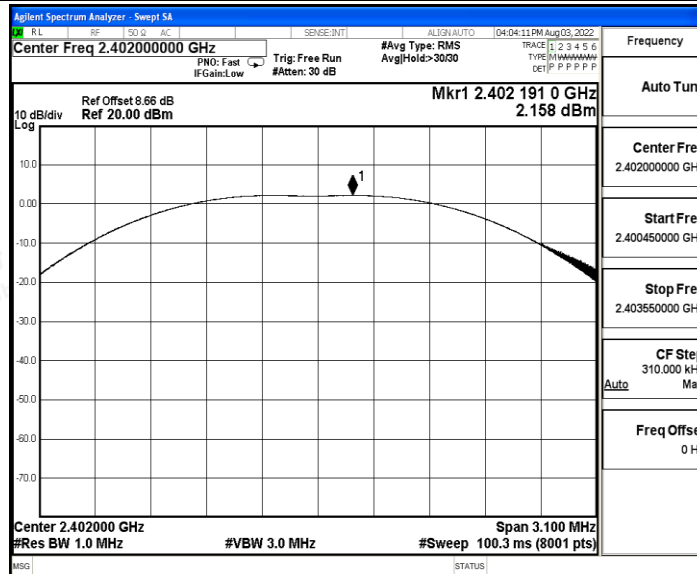
TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant	2402	2.16	≤30	PASS
		2440	2.04	≤30	PASS
		2480	2.16	≤30	PASS
BLE_2M	Ant	2402	2.23	≤30	PASS
		2440	2.13	≤30	PASS
		2480	2.20	≤30	PASS



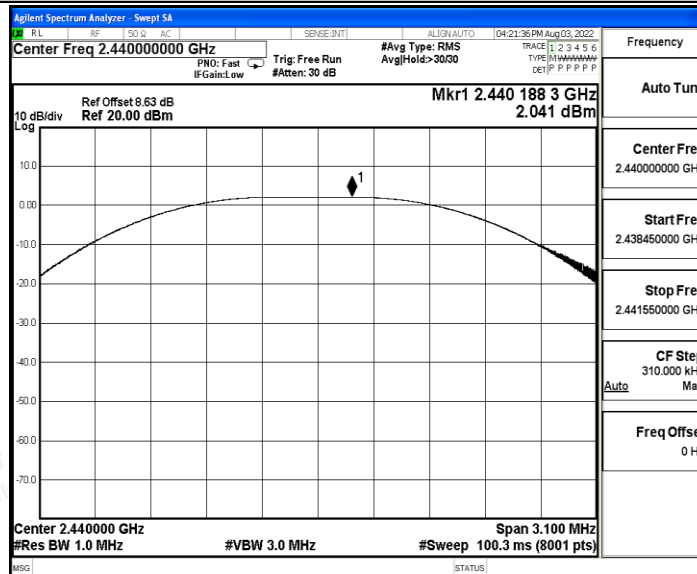


Test Graphs

BLE_1M_Ant_2402

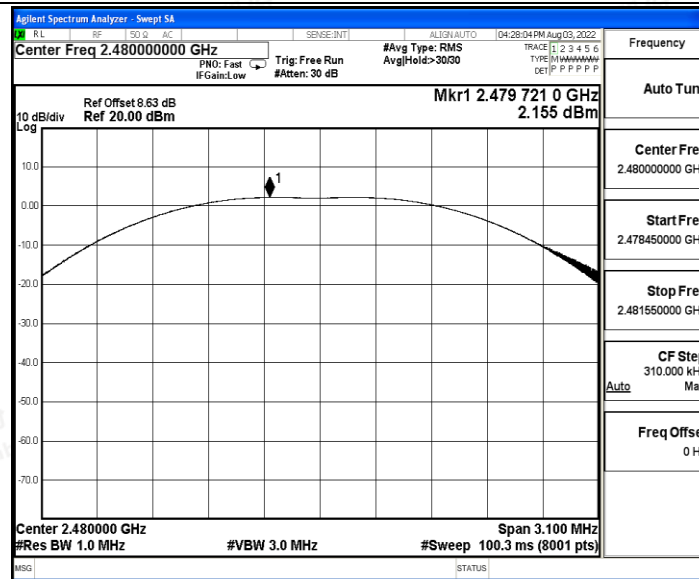


BLE_1M_Ant_2440

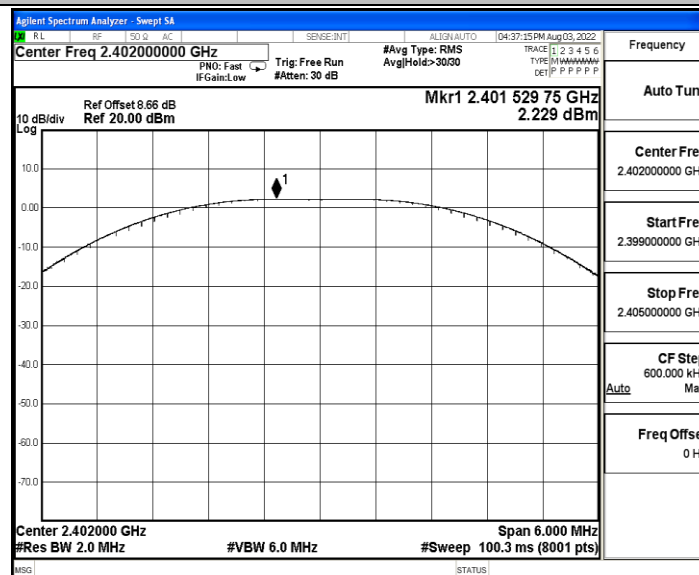


BLE_1M_Ant_2480



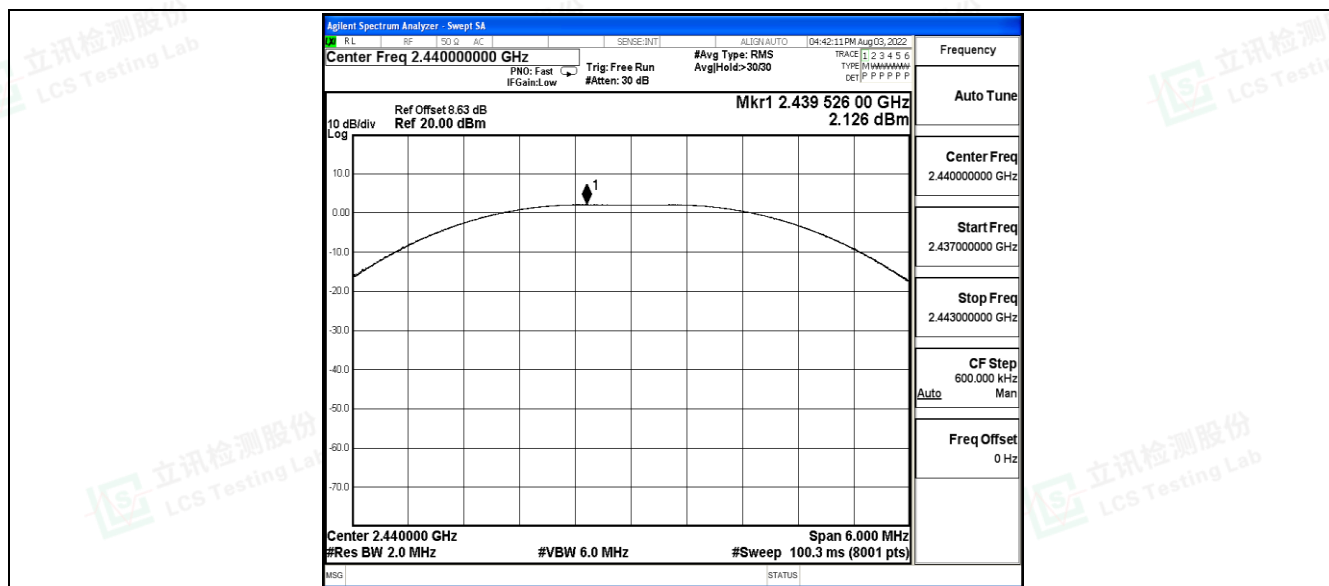


BLE_2M_Ant_2402

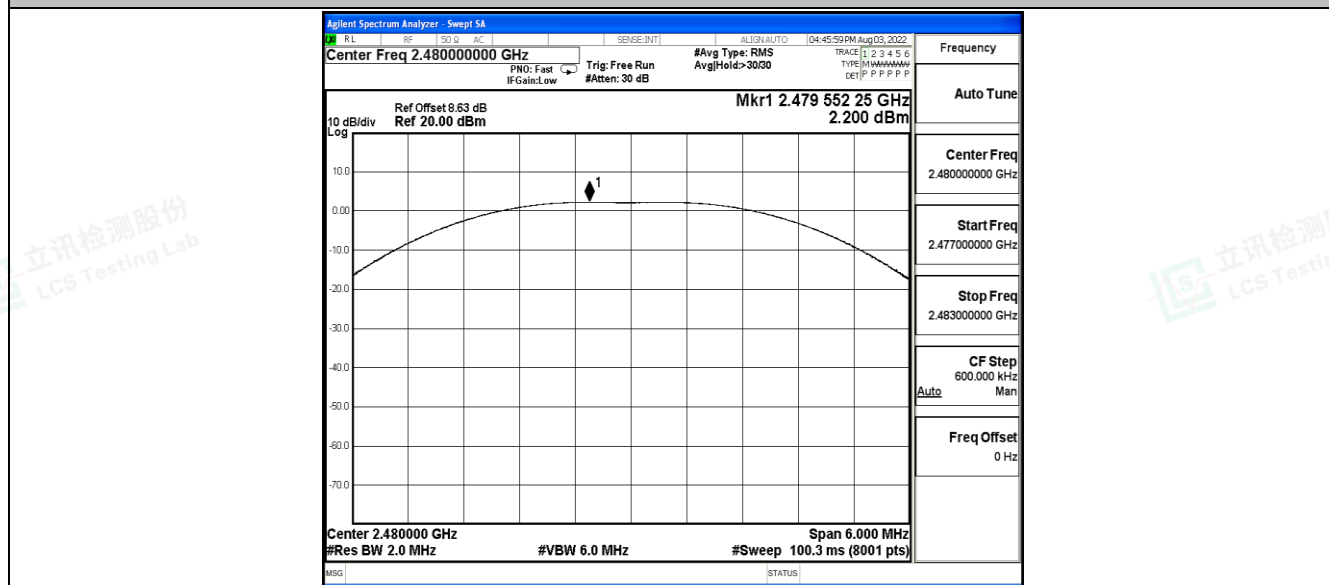


BLE_2M_Ant_2440





BLE_2M_Ant_2480





A.4 Maximum power spectral density

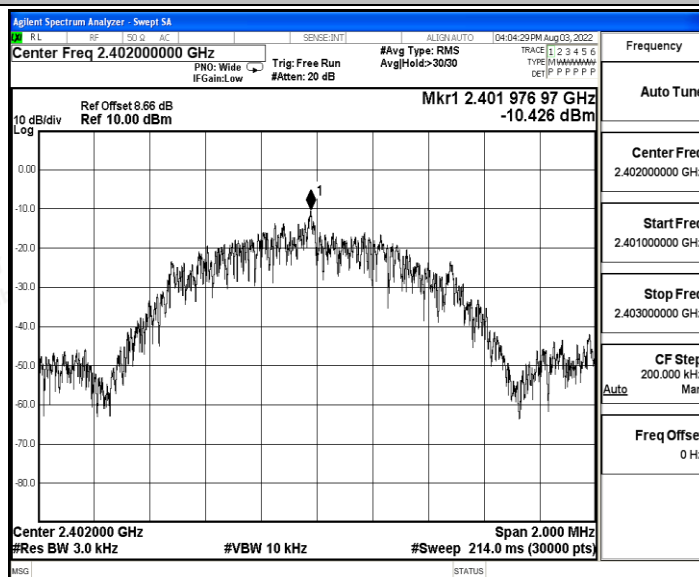
Test Result

TestMode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant	2402	-10.43	≤8.00	PASS
		2440	-10.54	≤8.00	PASS
		2480	-10.48	≤8.00	PASS
BLE_2M	Ant	2402	-14.28	≤8.00	PASS
		2440	-14.68	≤8.00	PASS
		2480	-14.45	≤8.00	PASS





Test Graphs



Agilent Spectrum Analyzer - Sweep SA

IF IL RF SO G AC SENSE:INT ALER/AUTO 04:21:54 PM Aug 03, 2022

Center Freq 2.440000000 GHz #Avg Type: RMS #Att: 20 dB

TRIG: Free Run

Trace 1: 2.3 + 5.6

TYPE: WWWWWW

DET: P P P P P P

Ref Offset 8.63 dB

Ref 10.00 dBm

Mkr1 2.439 977 50 GHz

-10.543 dBm

10 dB/div

Log

Center 2.4400000 GHz

#Res BW 3.0 kHz

#VBW 10 kHz

Span 2.000 MHz

#Sweep 214.0 ms (30000 pts)

Frequency

Auto Tun

Center Freq

2.440000000 GHz

Start Freq

2.439000000 GHz

Stop Freq

2.441000000 GHz

CF Step

20.000 kHz

Auto

Mar

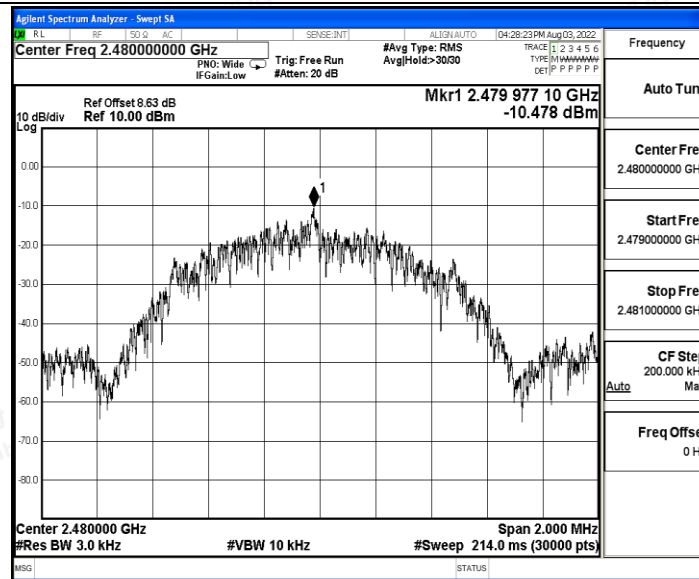
Freq Offset

0 Hz

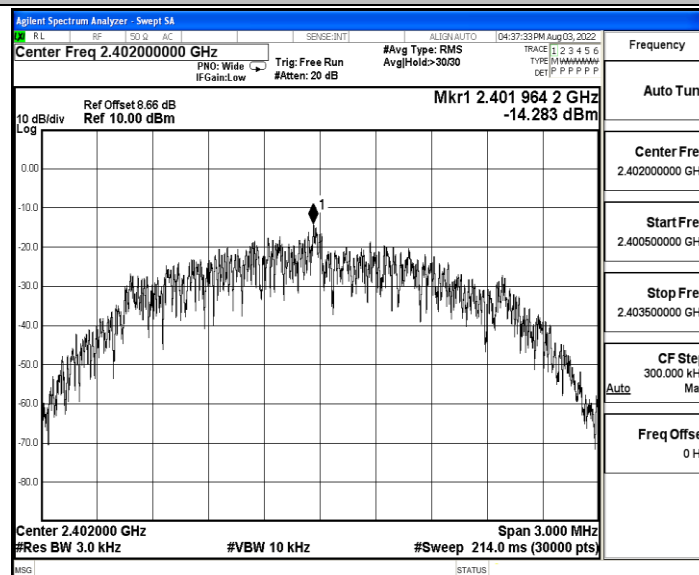
BLE 1M Ant 2480



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518000, China
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Scan code to check authenticity

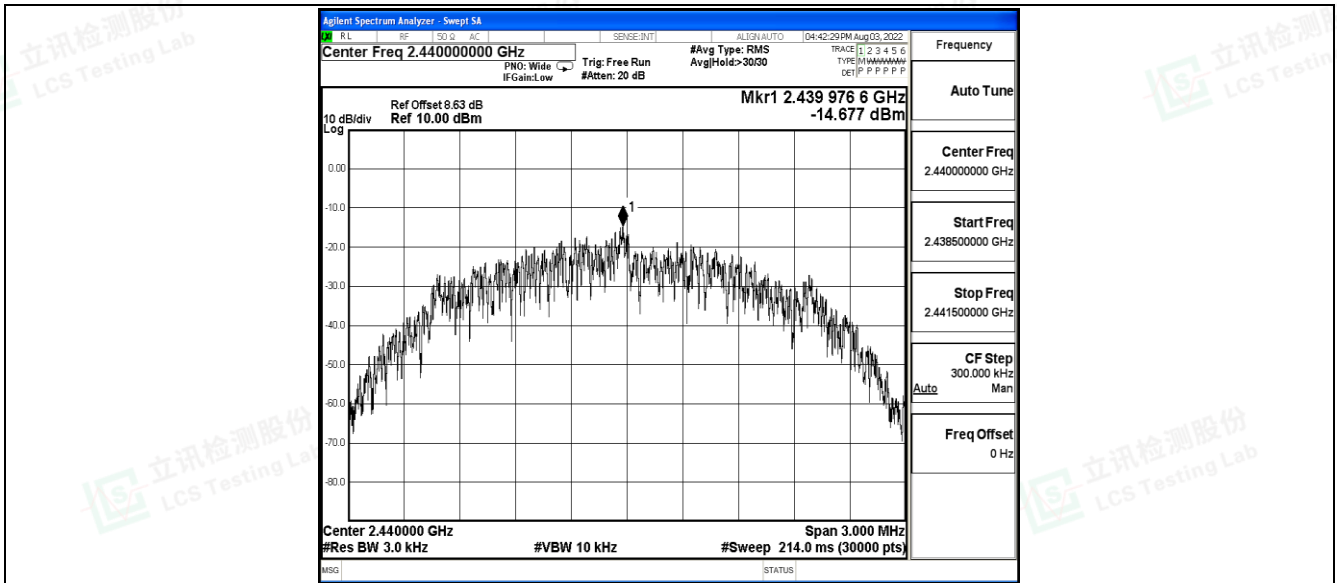


BLE_2M_Ant_2402

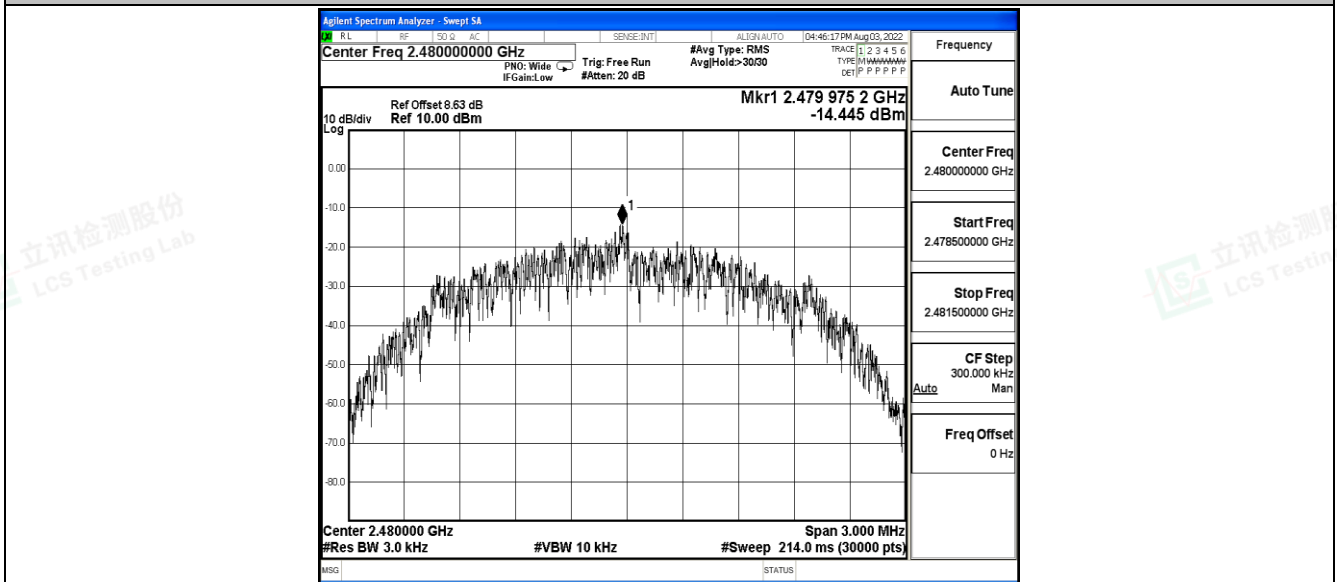


BLE_2M_Ant_2440





BLE_2M_Ant_2480





A.5 Band edge measurements

Test Result

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant	Low	2402	1.64	-43.13	≤ -18.36	PASS
		High	2480	1.67	-42.84	≤ -18.33	PASS
BLE_2M	Ant	Low	2402	1.69	-29.73	≤ -18.31	PASS
		High	2480	1.59	-43.5	≤ -18.41	PASS

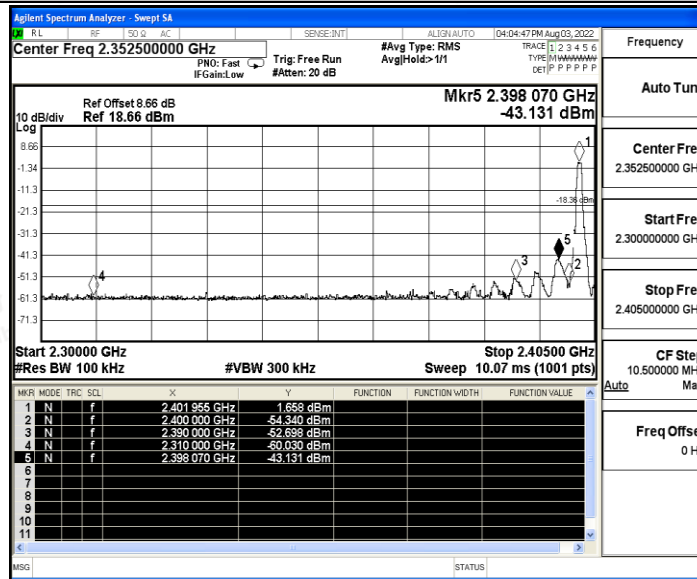


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Scan code to check authenticity

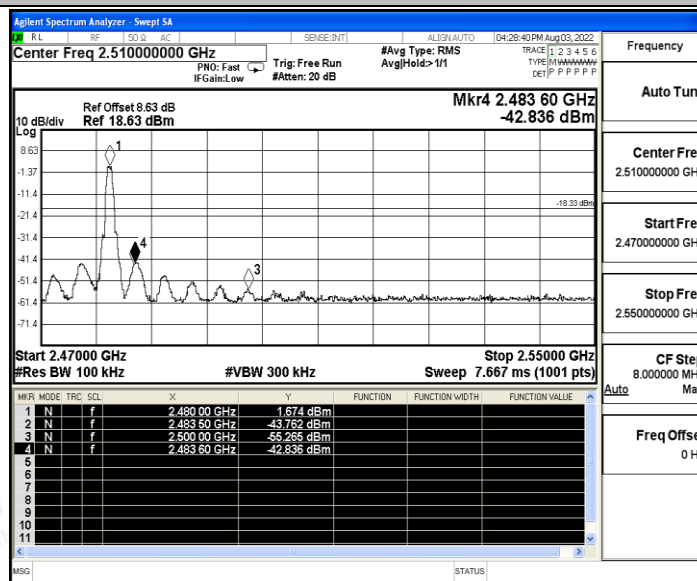


Test Graphs

BLE_1M_Ant_Low_2402

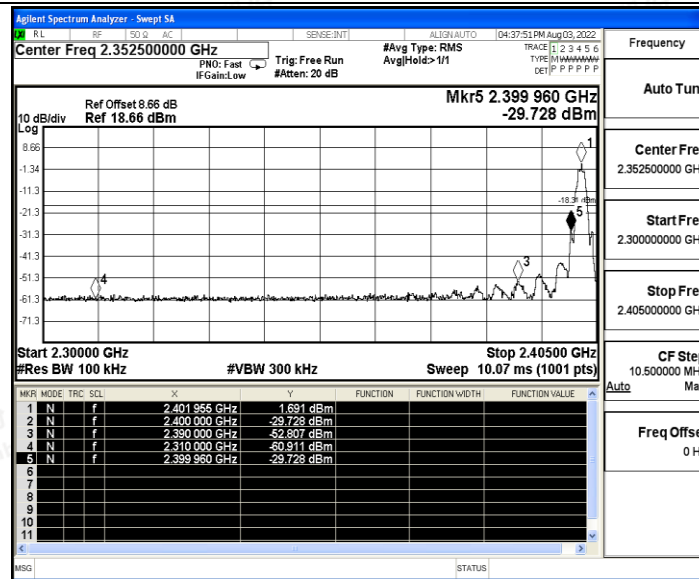


BLE_1M_Ant_High_2480

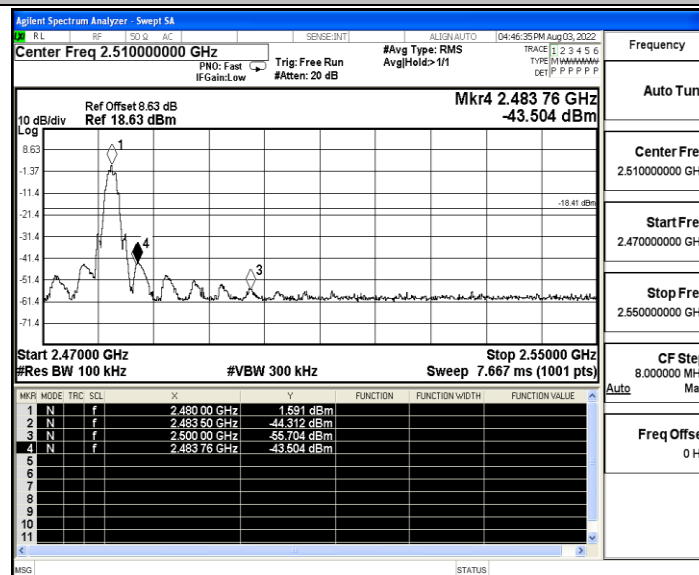


BLE_2M_Ant_Low_2402





BLE_2M_Ant_High_2480





A.6 Conducted Spurious Emission

Test Result

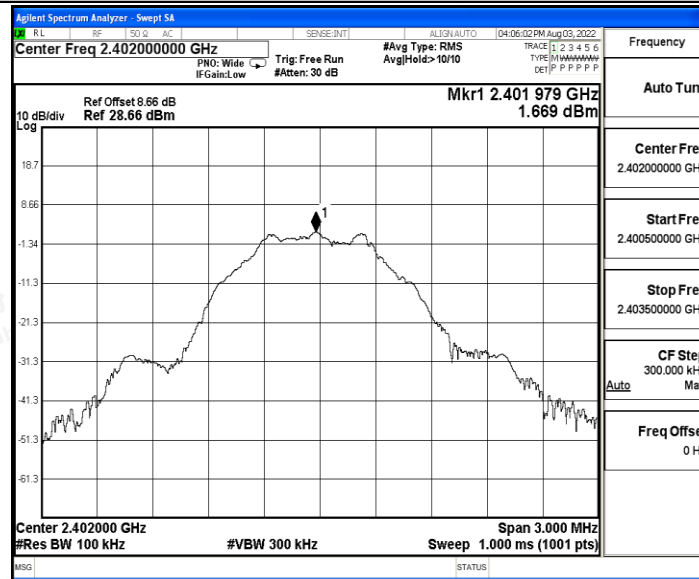
TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant	2402	Reference	1.67	1.67	---	PASS
			30~1000	1.67	-60.11	≤-18.33	PASS
			1000~26500	1.67	-44.91	≤-18.33	PASS
		2440	Reference	1.55	1.55	---	PASS
			30~1000	1.55	-60.51	≤-18.45	PASS
			1000~26500	1.55	-45.83	≤-18.45	PASS
		2480	Reference	1.66	1.66	---	PASS
			30~1000	1.66	-48.76	≤-18.34	PASS
			1000~26500	1.66	-45.66	≤-18.34	PASS
BLE_2M	Ant	2402	Reference	1.70	1.70	---	PASS
			30~1000	1.70	-60.68	≤-18.3	PASS
			1000~26500	1.70	-46.08	≤-18.3	PASS
		2440	Reference	1.27	1.27	---	PASS
			30~1000	1.27	-60.54	≤-18.73	PASS
			1000~26500	1.27	-45.54	≤-18.73	PASS
		2480	Reference	1.63	1.63	---	PASS
			30~1000	1.63	-59.7	≤-18.37	PASS
			1000~26500	1.63	-45.17	≤-18.37	PASS



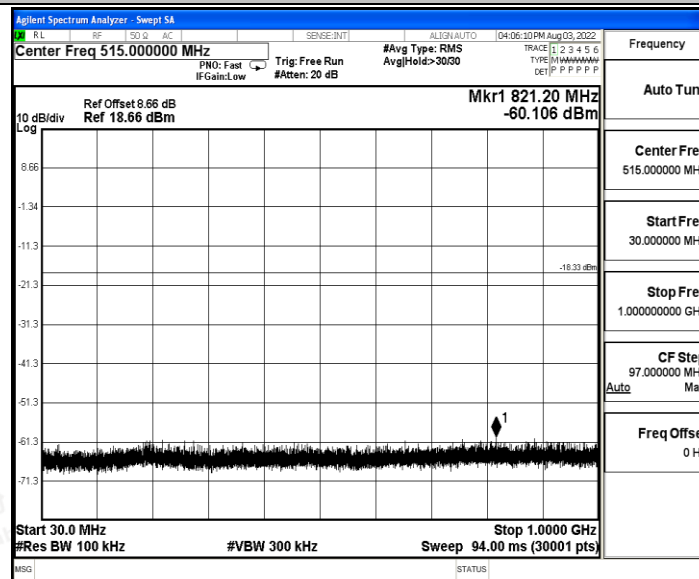


Test Graphs

BLE_1M_Ant_2402_0~Reference

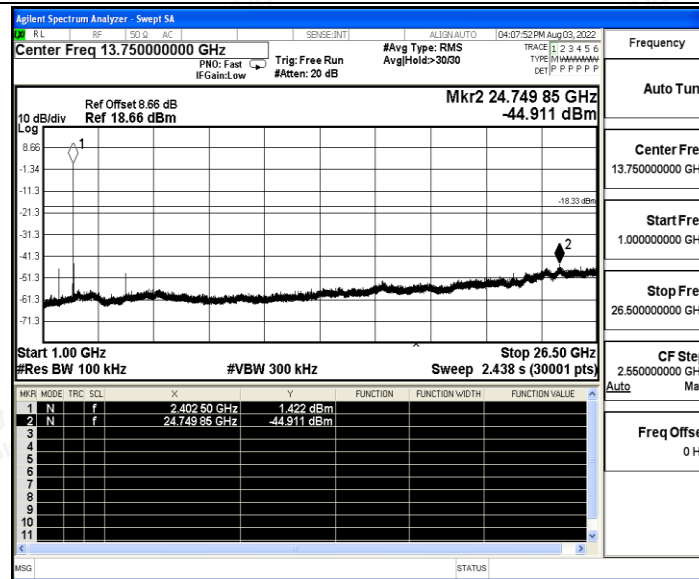


BLE_1M_Ant_2402_30~1000

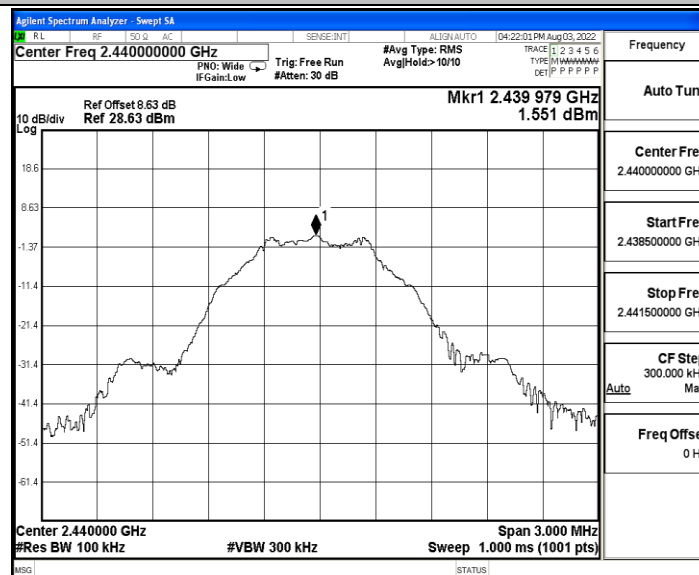


BLE_1M_Ant_2402_1000~26500



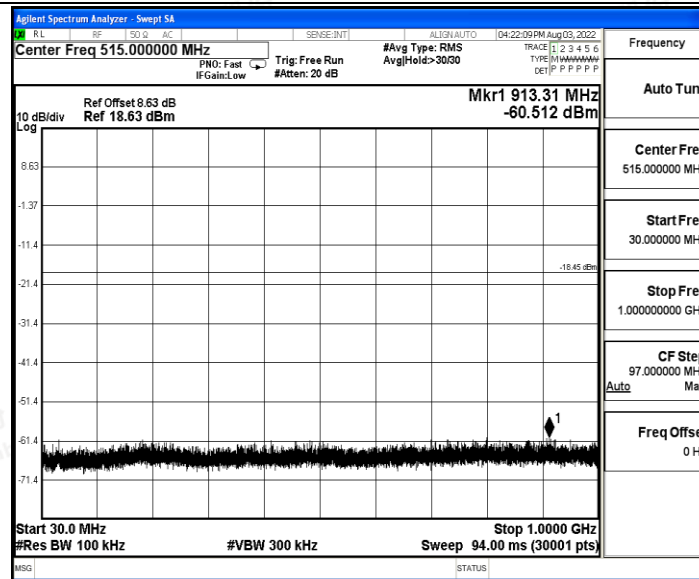


BLE_1M_Ant_2440_0~Reference

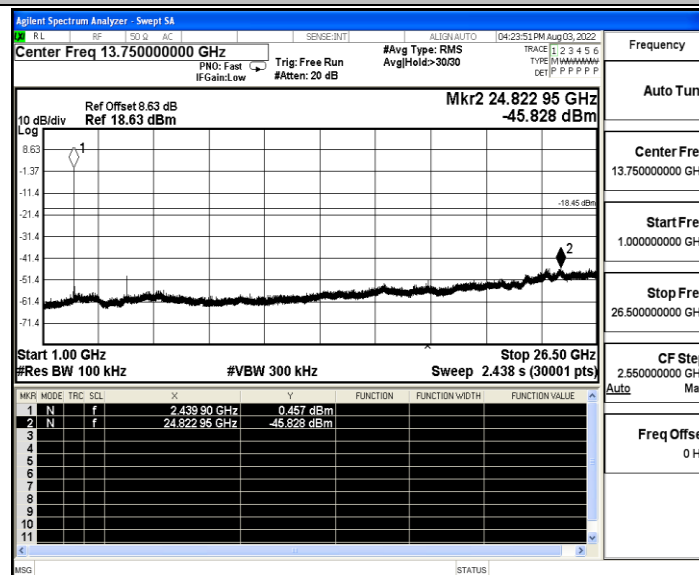


BLE_1M_Ant_2440_30~1000



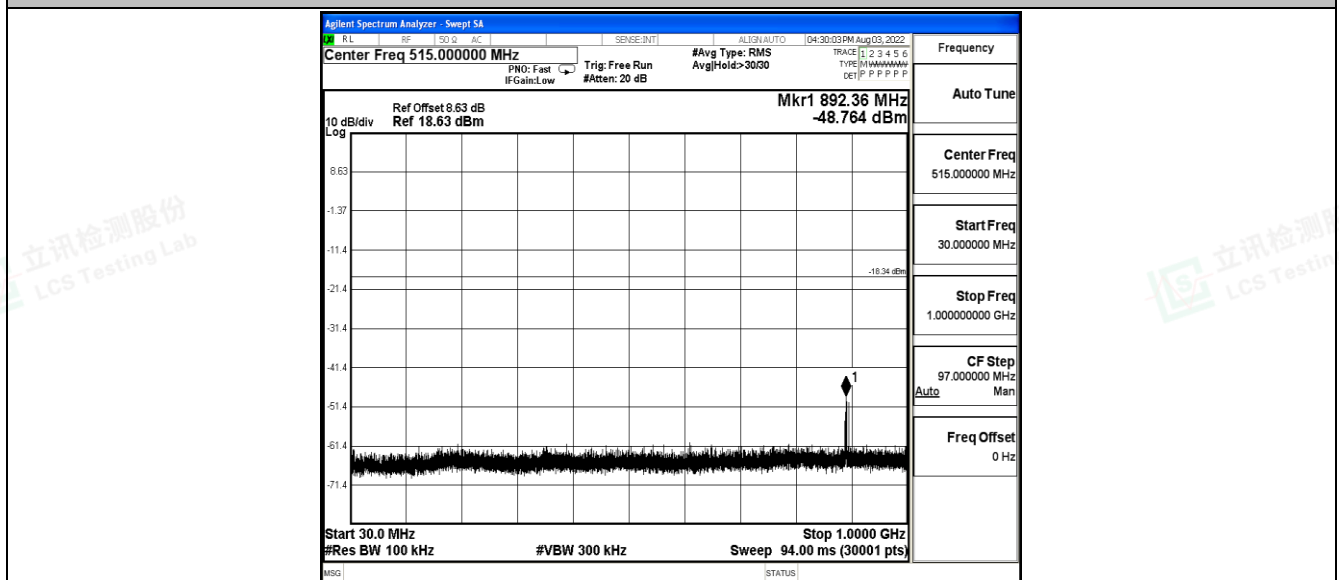
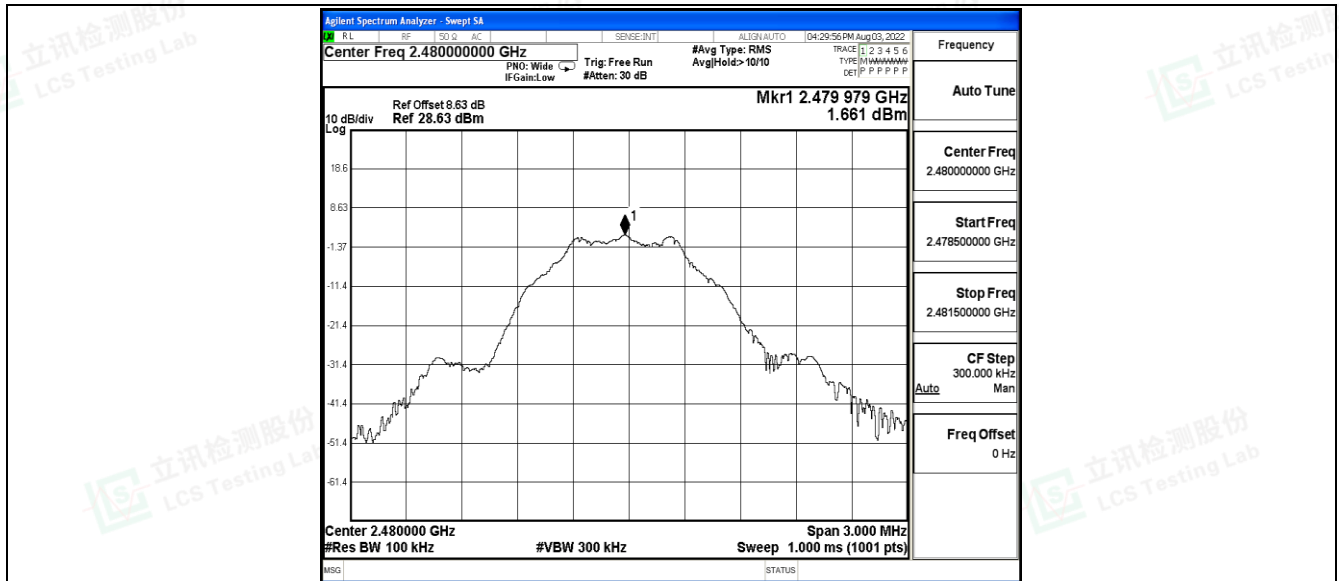


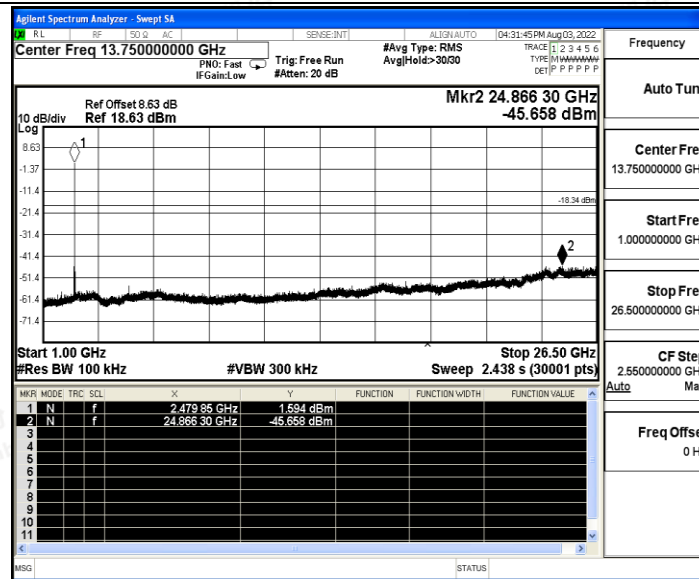
BLE_1M_Ant_2440_1000~26500



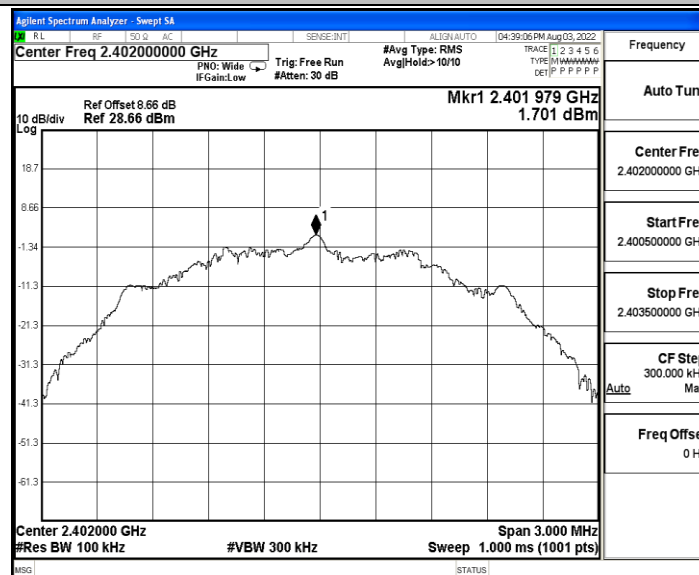
BLE_1M_Ant_2480_0-Reference





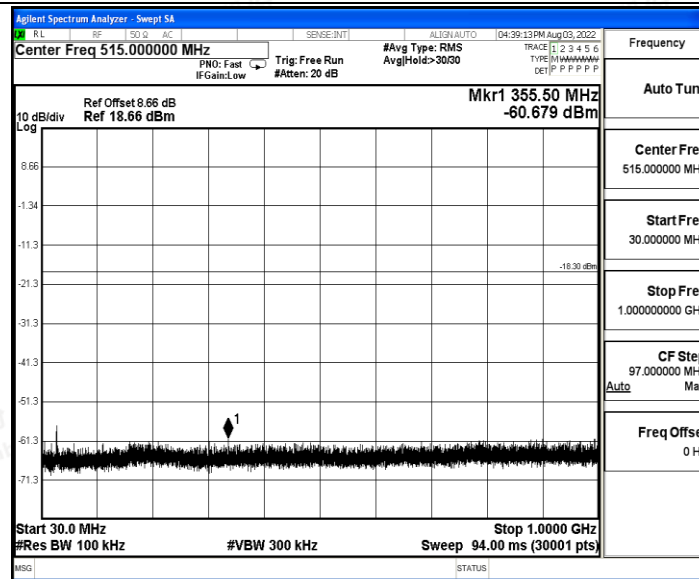


BLE_2M_Ant_2402_0~Reference

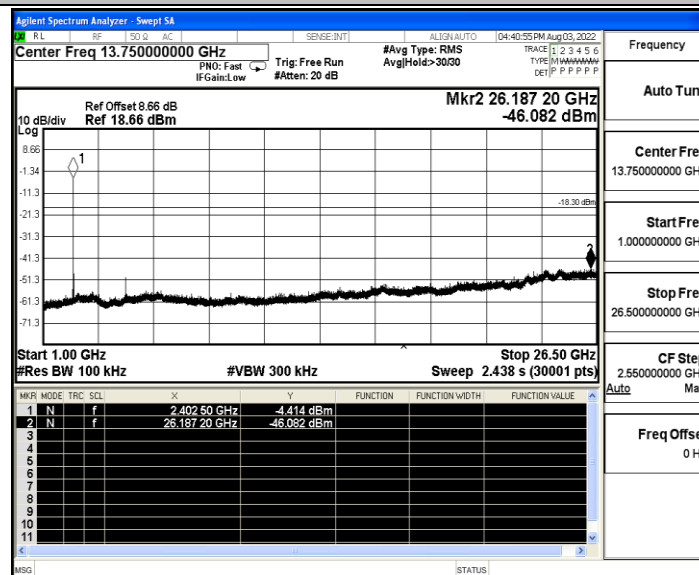


BLE_2M_Ant_2402_30~1000



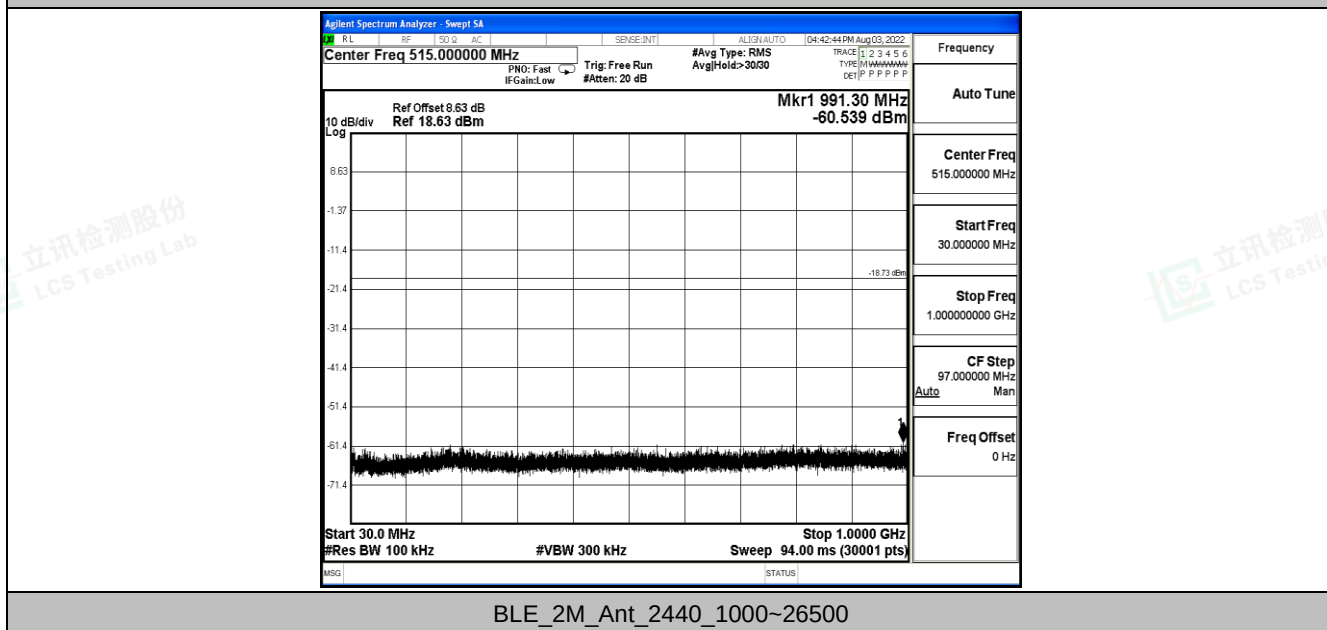
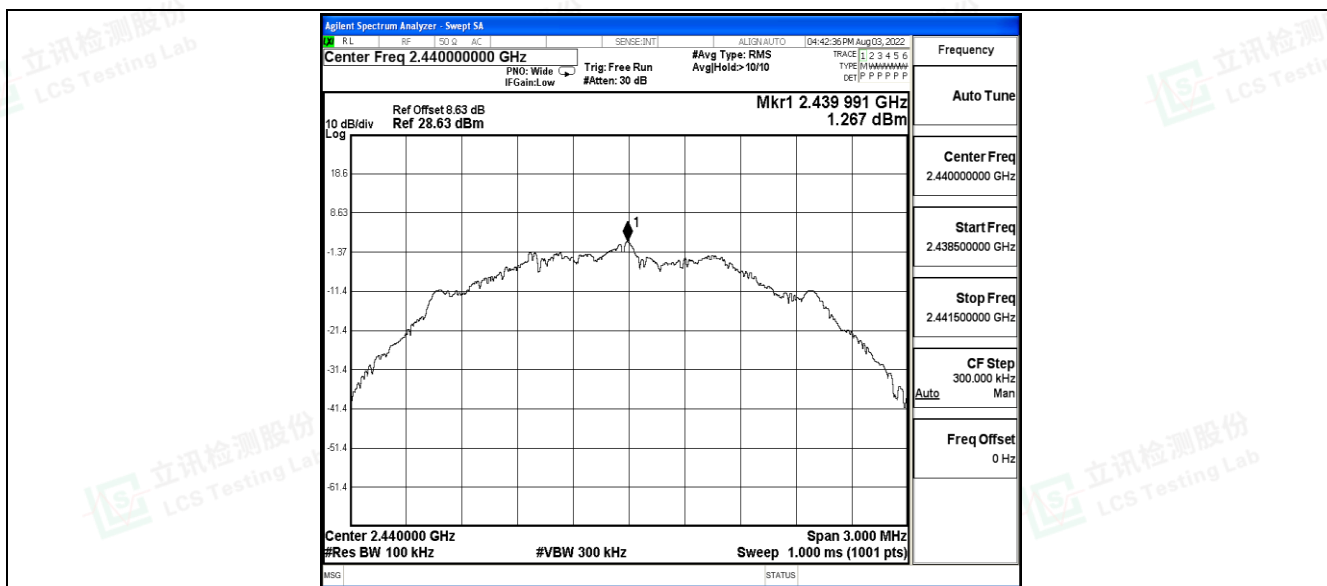


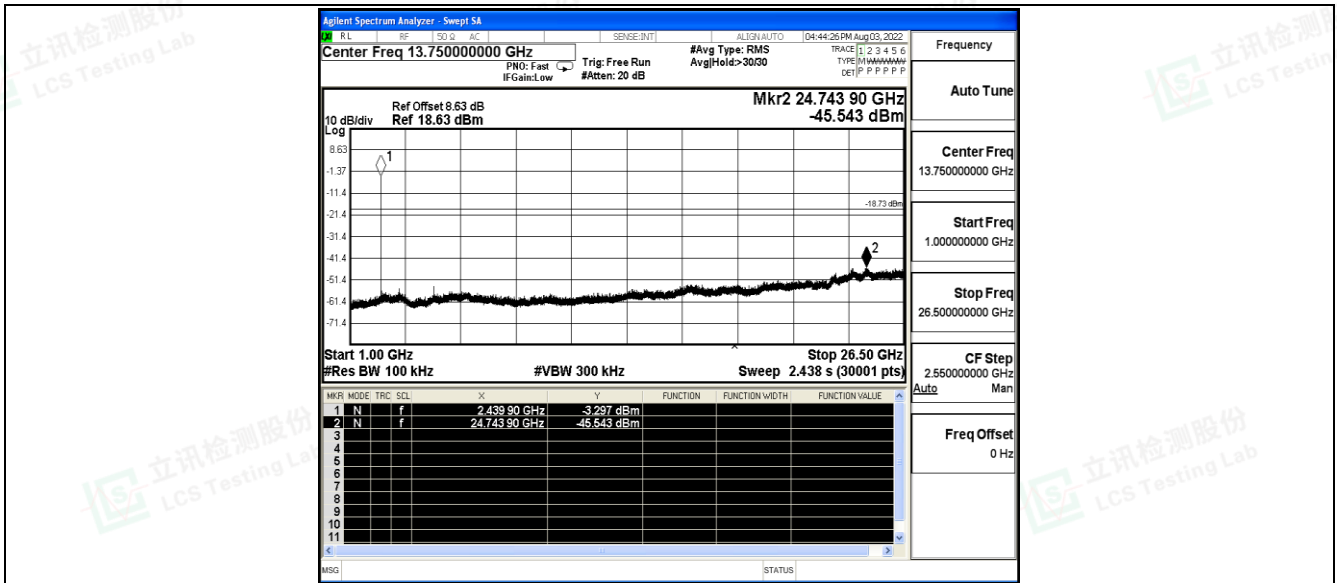
BLE_2M_Ant_2402_1000~26500



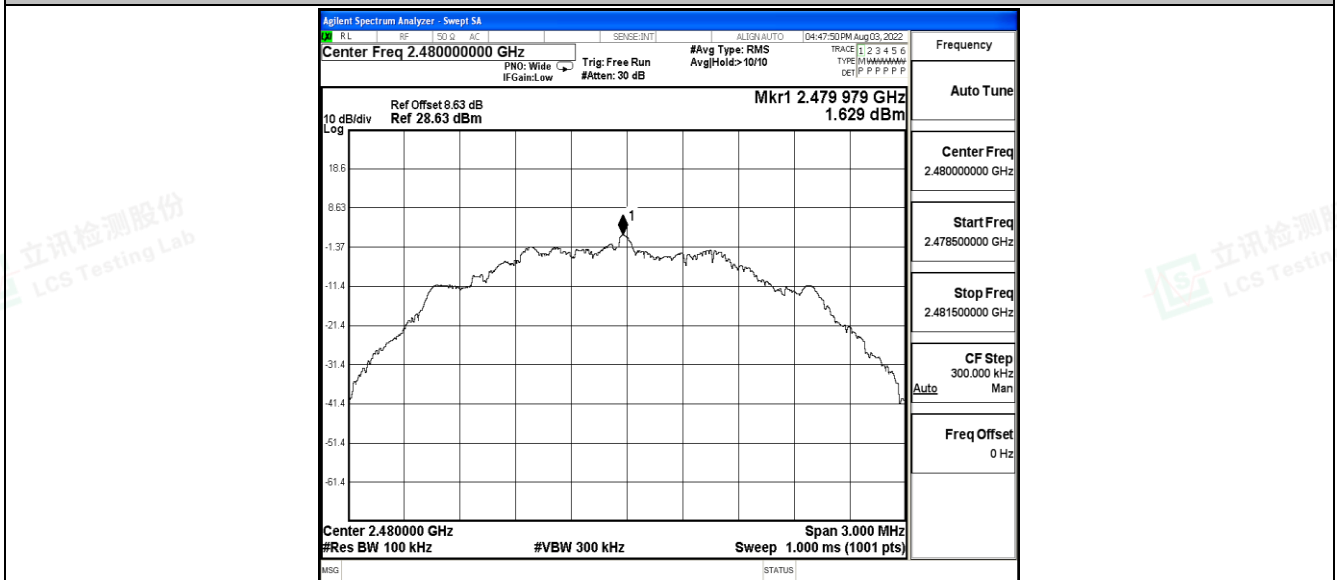
BLE_2M_Ant_2440_0~Reference





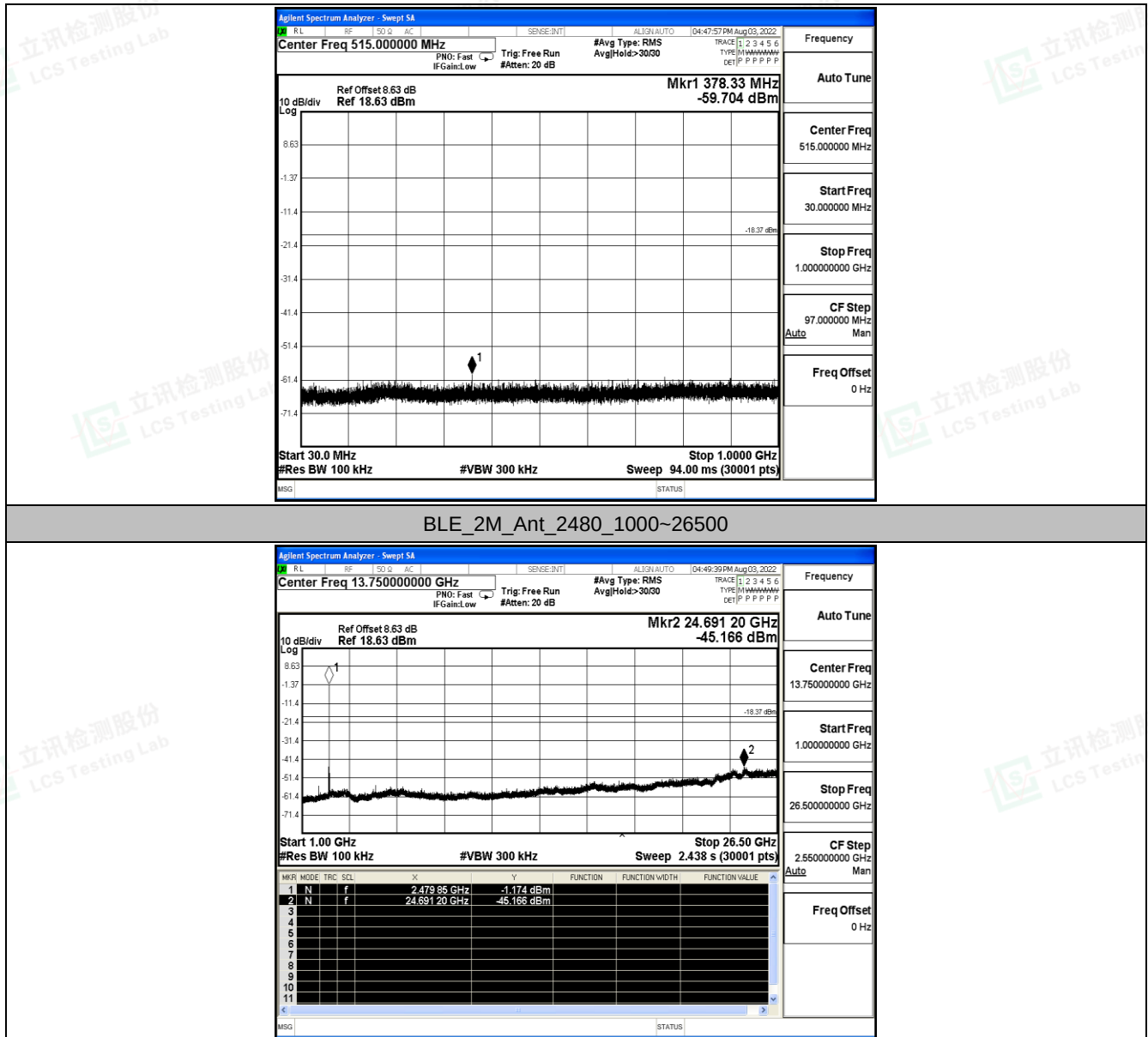


BLE_2M_Ant_2480_0~Reference



BLE_2M_Ant_2480_30~1000







A.7 Duty Cycle

Test Result

TestMode	Antenna	Channel	ON Time [ms]	Period [ms]	X	DC [%]	xFactor	1/T	Limit	Verdict
BLE_1M	Ant	2402	0.42	2.33	0.1803	18.03	7.44	2.38	---	---
		2440	0.42	2.33	0.1803	18.03	7.44	2.38	---	---
		2480	0.42	2.32	0.1810	18.10	7.42	2.38	---	---
BLE_2M	Ant	2402	0.21	2.32	0.0905	9.05	10.43	4.76	---	---
		2440	0.21	2.33	0.0901	9.01	10.45	4.76	---	---
		2480	0.21	2.31	0.0909	9.09	10.41	4.76	---	---

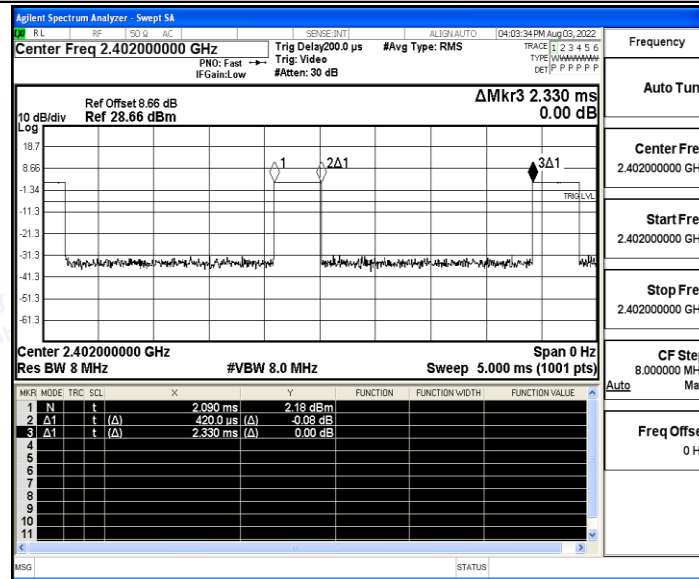


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Scan code to check authenticity

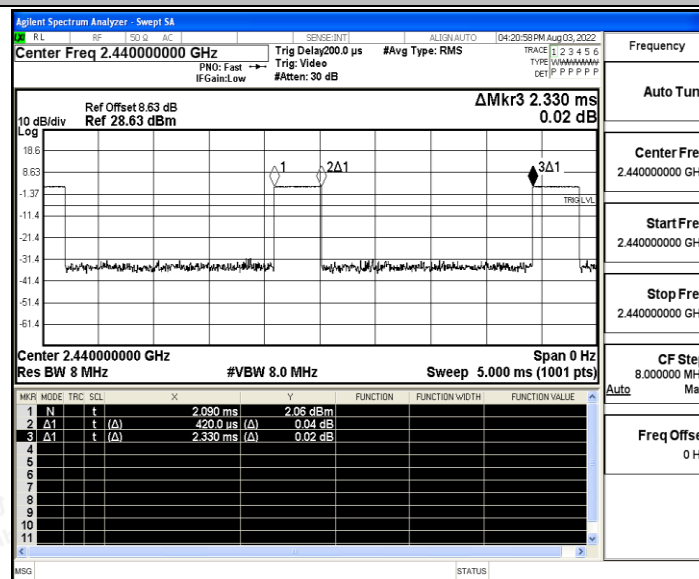


Test Graphs

BLE_1M_Ant_2402

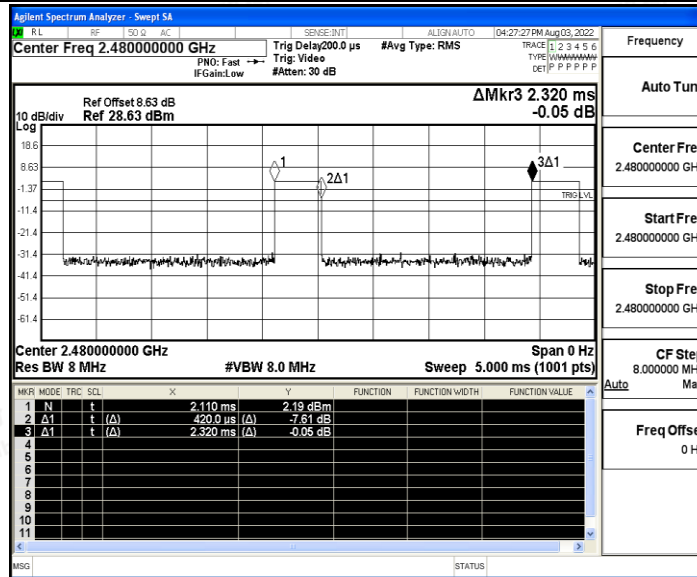


BLE_1M_Ant_2440

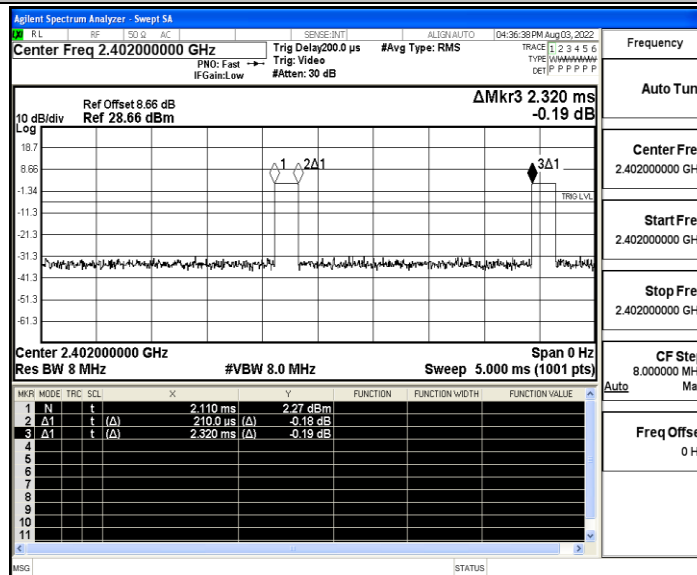


BLE_1M_Ant_2480



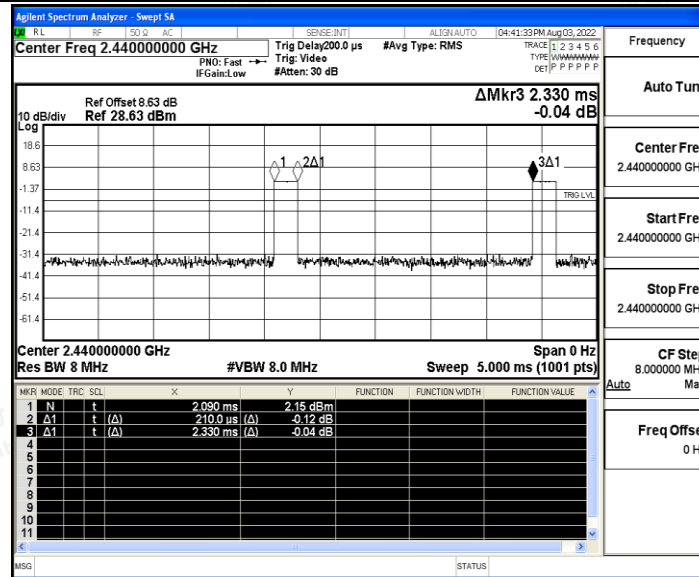


BLE_2M_Ant_2402

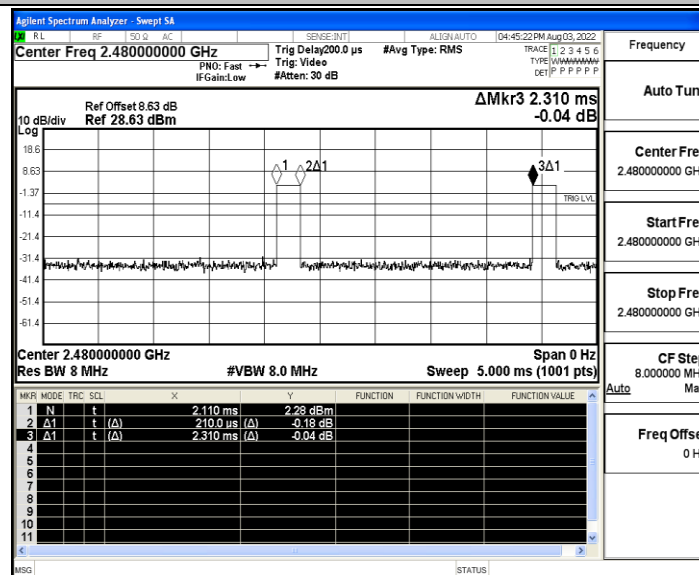


BLE_2M_Ant_2440





BLE_2M_Ant_2480





A.8 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	Ant	Low	2402	AV	2310.000	-57.23	≤-41.20	37.97	≤54	PASS
				AV	2389.880	-51.8	≤-41.20	43.40	≤54	PASS
				AV	2390.000	-51.86	≤-41.20	43.34	≤54	PASS
				Peak	2310.000	-48.4	≤-21.20	46.80	≤74	PASS
				Peak	2389.670	-34.64	≤-21.20	60.56	≤74	PASS
				Peak	2390.000	-34.82	≤-21.20	60.38	≤74	PASS
		High	2480	AV	2483.500	-43.6	≤-41.20	51.60	≤54	PASS
				AV	2483.840	-43.34	≤-41.20	51.86	≤54	PASS
				AV	2500.000	-54.35	≤-41.20	40.85	≤54	PASS
				Peak	2483.500	-25.28	≤-21.20	69.92	≤74	PASS
				Peak	2484.000	-24.8	≤-21.20	70.40	≤74	PASS
				Peak	2500.000	-38.82	≤-21.20	56.38	≤74	PASS
BLE_2M	Ant	Low	2402	AV	2310.000	-56.78	≤-41.20	38.42	≤54	PASS
				AV	2389.880	-50.22	≤-41.20	44.98	≤54	PASS
				AV	2390.000	-50.46	≤-41.20	44.74	≤54	PASS
				Peak	2310.000	-48.85	≤-21.20	46.35	≤74	PASS
				Peak	2389.880	-35.15	≤-21.20	60.05	≤74	PASS
				Peak	2390.000	-35.3	≤-21.20	59.90	≤74	PASS
		High	2480	AV	2483.500	-42.93	≤-41.20	52.27	≤54	PASS
				AV	2483.840	-42.72	≤-41.20	52.48	≤54	PASS
				AV	2500.000	-53.2	≤-41.20	42.00	≤54	PASS
				Peak	2483.500	-26.85	≤-21.20	68.35	≤74	PASS
				Peak	2483.600	-26.41	≤-21.20	68.79	≤74	PASS
				Peak	2500.000	-40.36	≤-21.20	54.84	≤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.

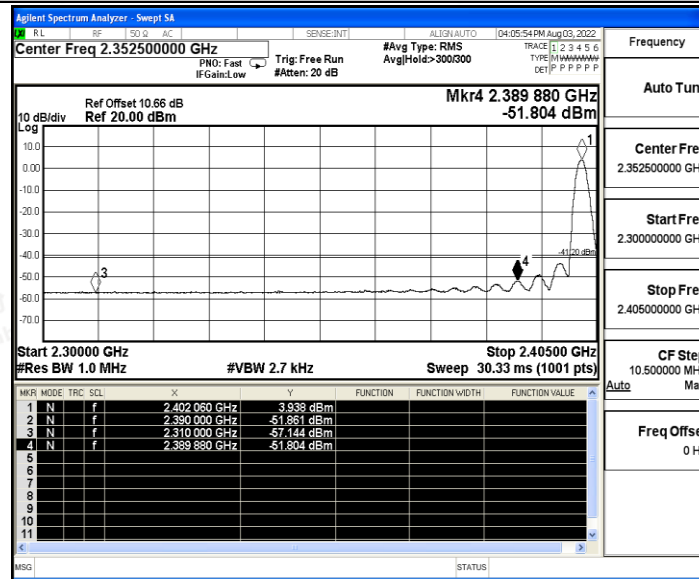


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Scan code to check authenticity

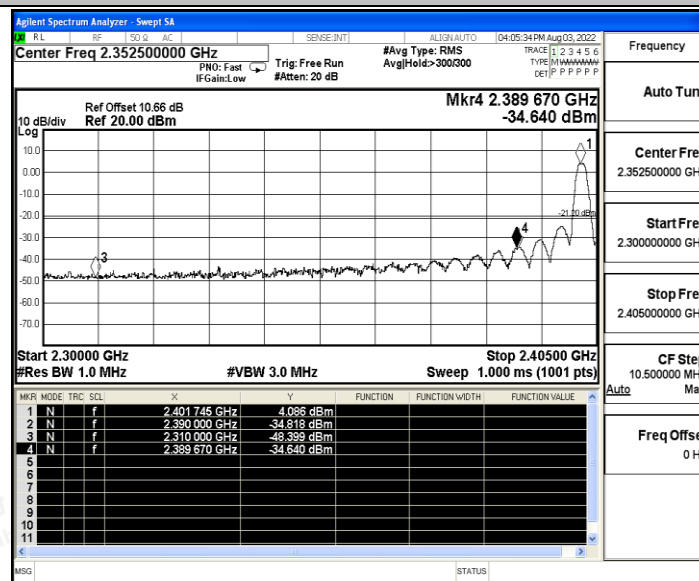


Test Graphs

BLE_1M_Ant_Low_2402_AV

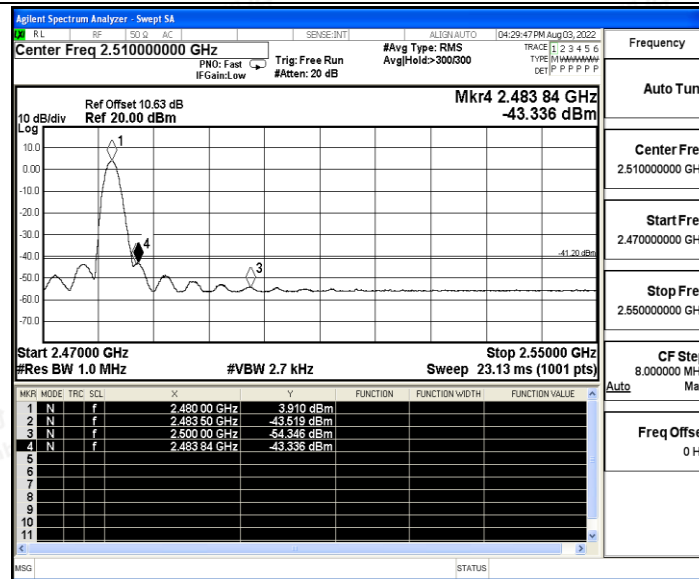


BLE_1M_Ant_Low_2402_Peak

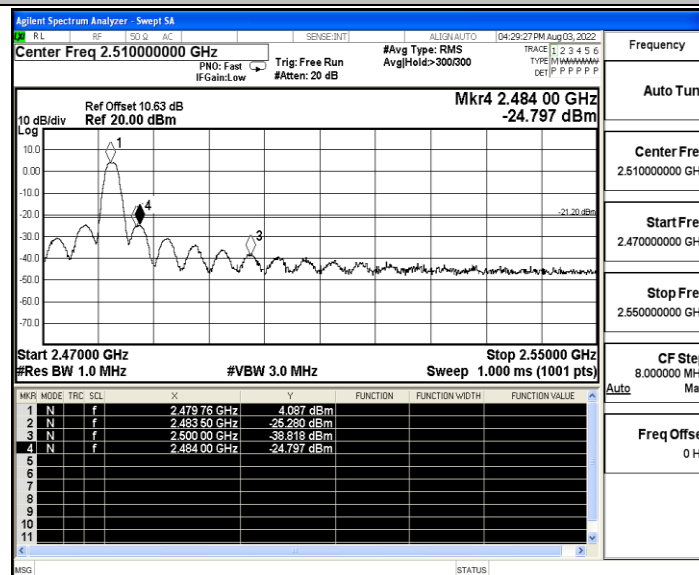


BLE_1M_Ant_High_2480_AV



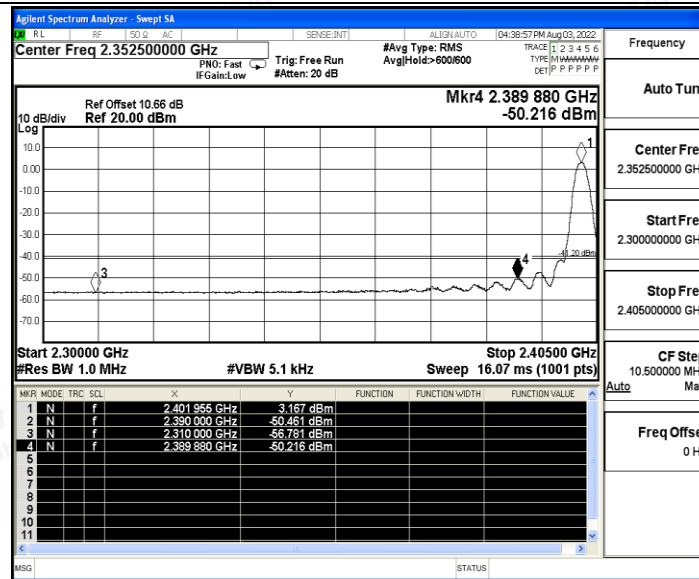


BLE_1M_Ant_High_2480_Peak

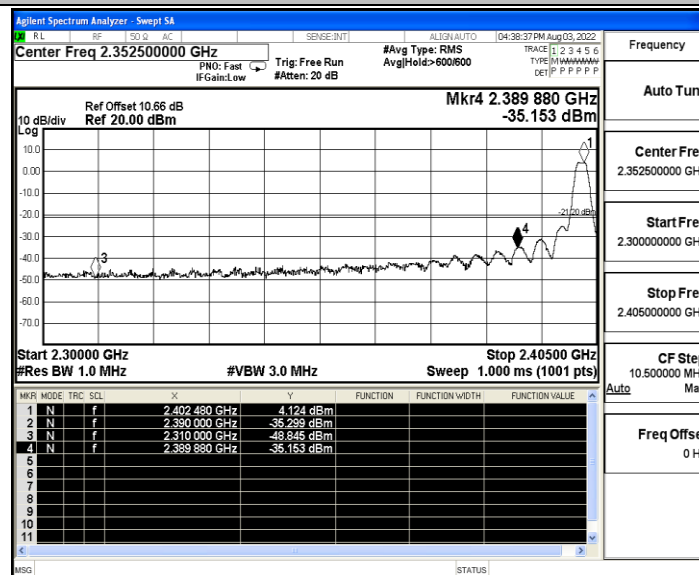


BLE_2M_Ant_Low_2402_AV



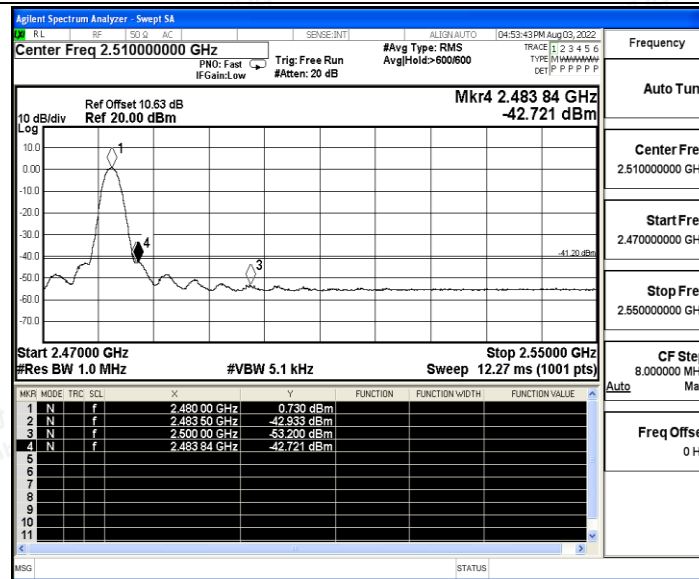


BLE_2M_Ant_Low_2402_Peak



BLE_2M_Ant_High_2480_AV





BLE_2M_Ant_High_2480_Peak

