



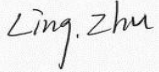
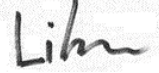
Appendix A

RF Test Data for BT LE (Conducted Measurement)

Product Name: H7 Helmet Beacon

Test Model: H7-PNCAX-NFC

Environmental Conditions

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



A.1 DTS Bandwidth

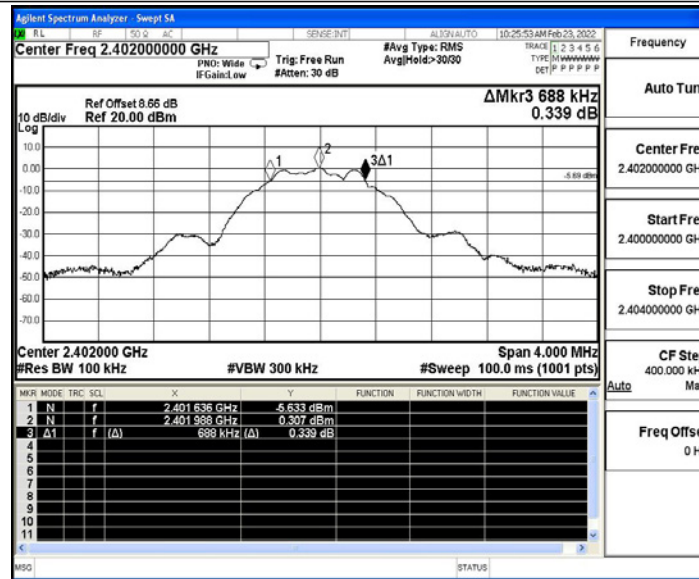
Test Result

TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.688	2401.636	2402.324	0.5	PASS
		2440	0.688	2439.636	2440.324	0.5	PASS
		2480	0.684	2479.640	2480.324	0.5	PASS
BLE_2M	Ant1	2402	1.188	2401.364	2402.552	0.5	PASS
		2440	1.184	2439.364	2440.548	0.5	PASS
		2480	1.184	2479.364	2480.548	0.5	PASS

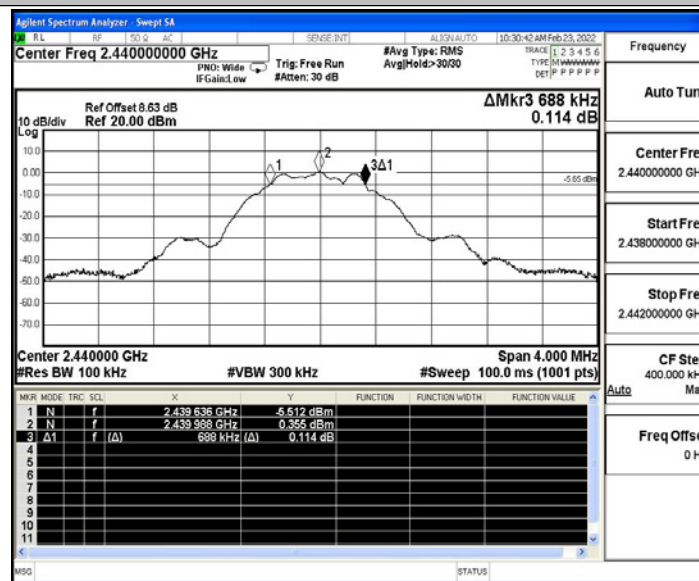


Test Graphs

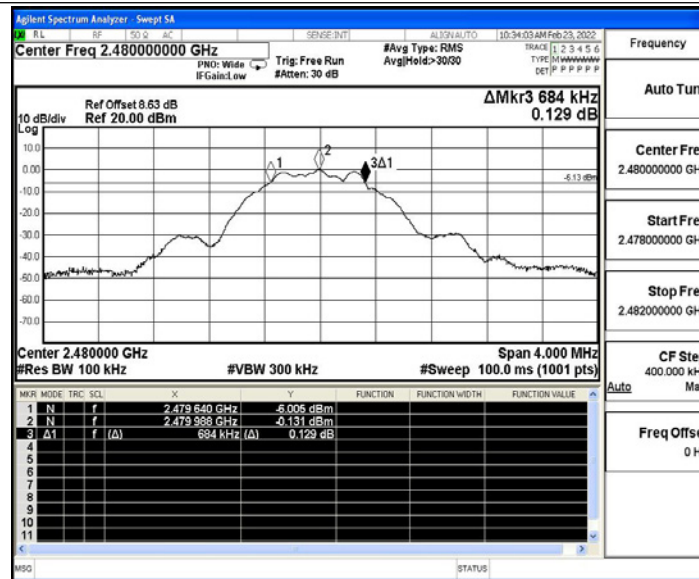
BLE_1M_Ant1_2402



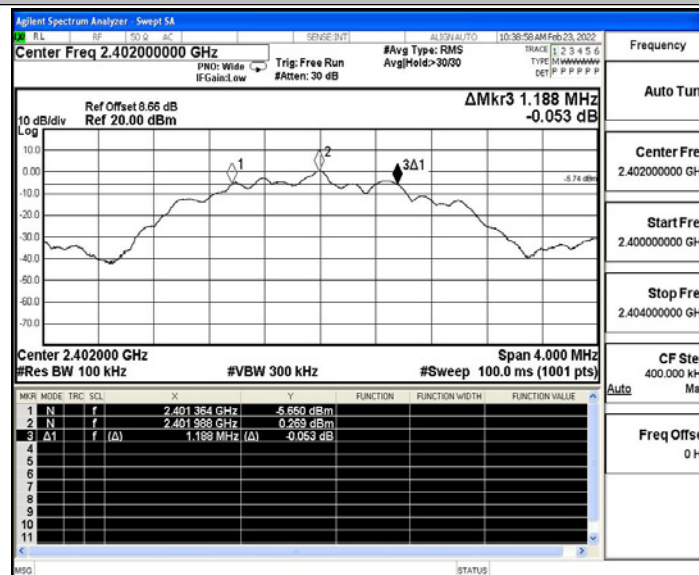
BLE_1M_Ant1_2440



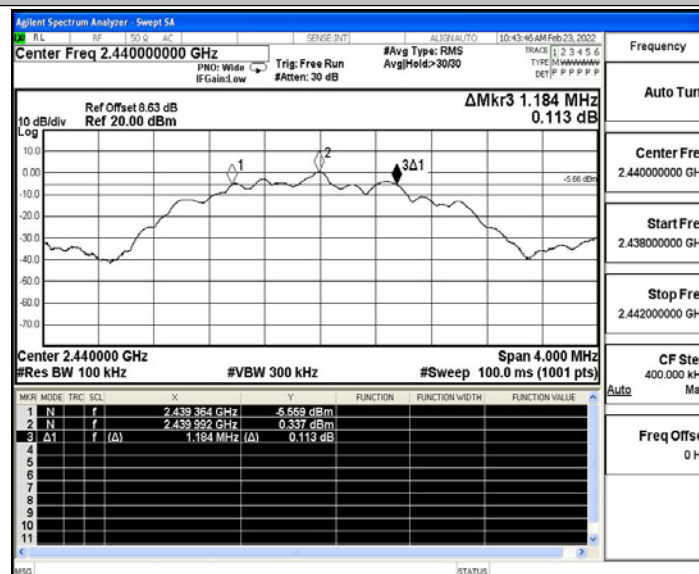
BLE_1M_Ant1_2480



BLE_2M_Ant1_2402

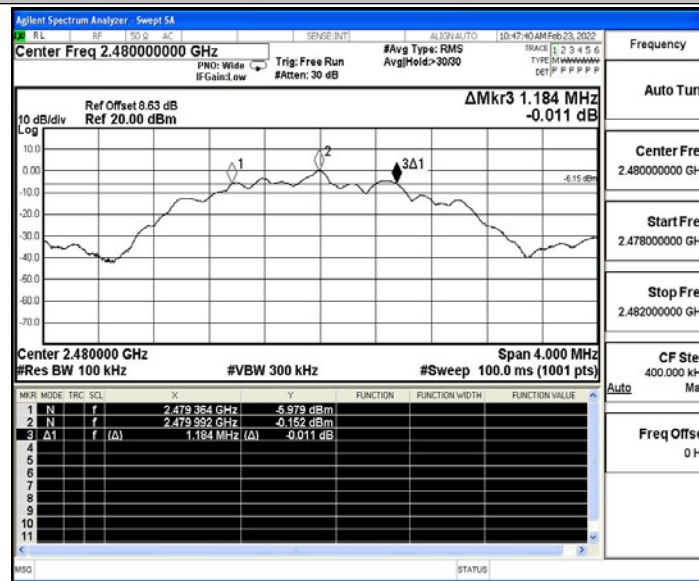


BLE_2M_Ant1_2440





BLE_2M_Ant1_2480





A.2 Maximum conducted output power

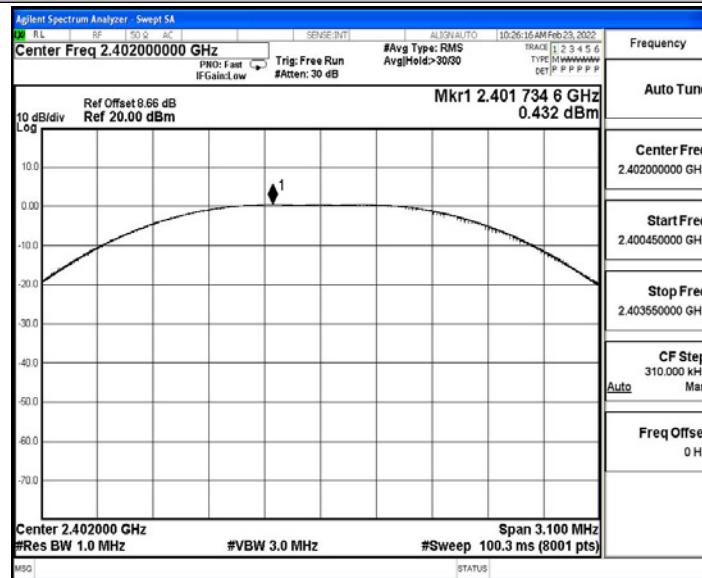
Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	0.43	≤ 30	PASS
		2440	0.49	≤ 30	PASS
		2480	-0.02	≤ 30	PASS
BLE_2M	Ant1	2402	0.45	≤ 30	PASS
		2440	0.51	≤ 30	PASS
		2480	0.04	≤ 30	PASS

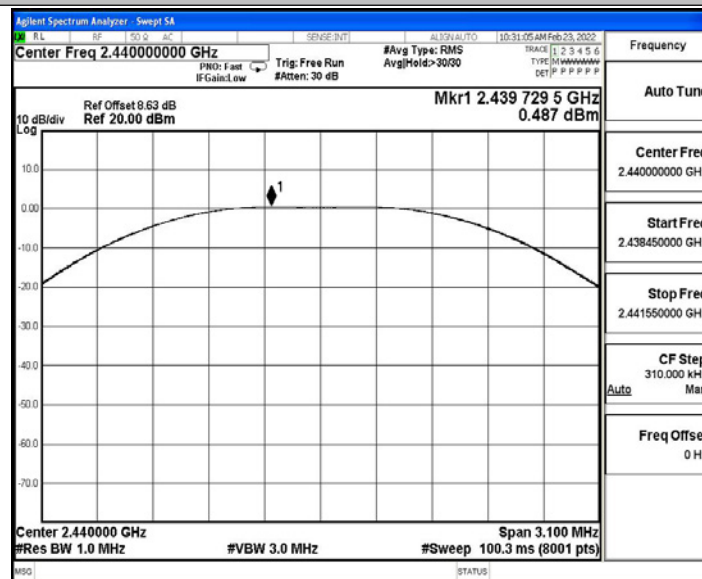


Test Graphs

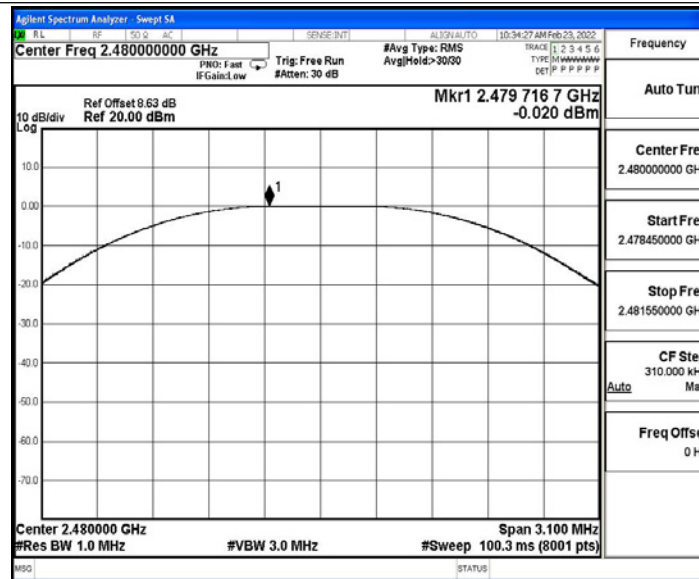
BLE_1M_Ant1_2402



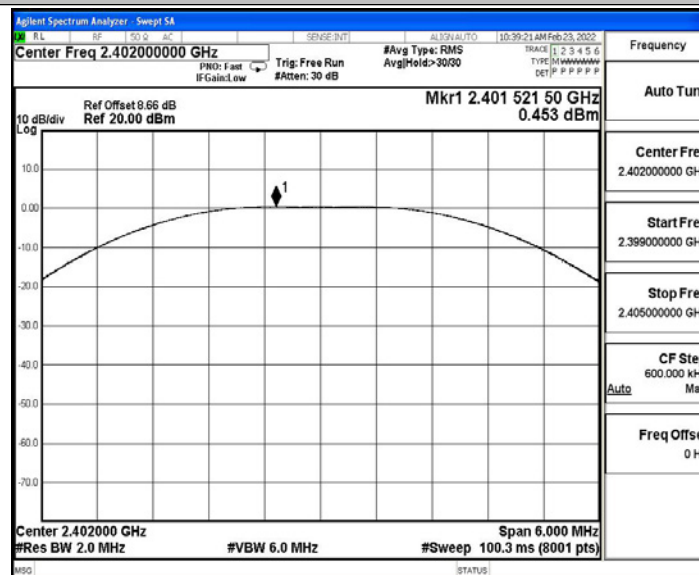
BLE_1M_Ant1_2440



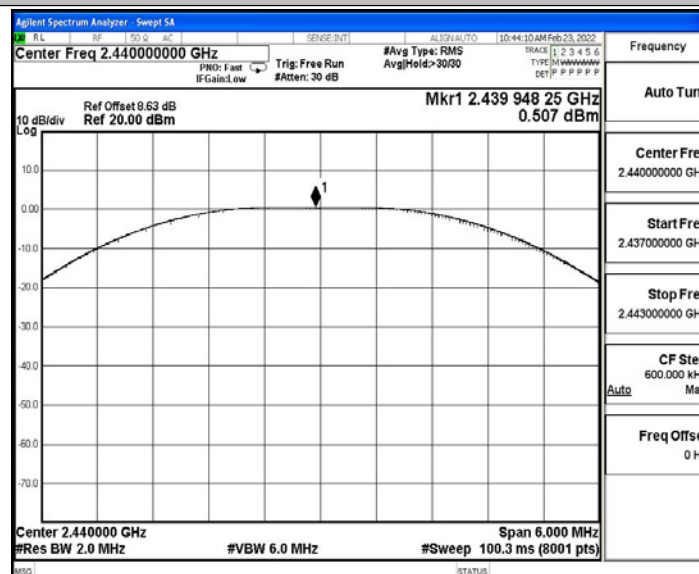
BLE_1M_Ant1_2480



BLE_2M_Ant1_2402

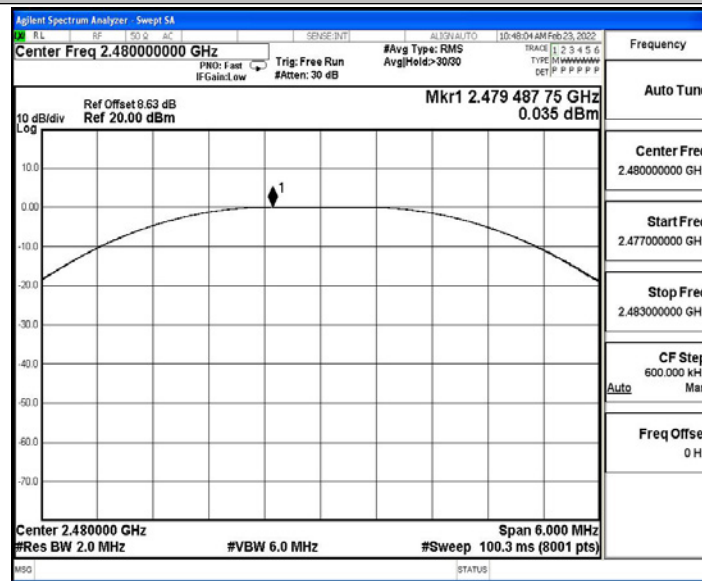


BLE_2M_Ant1_2440





BLE_2M_Ant1_2480





A.3 Maximum power spectral density

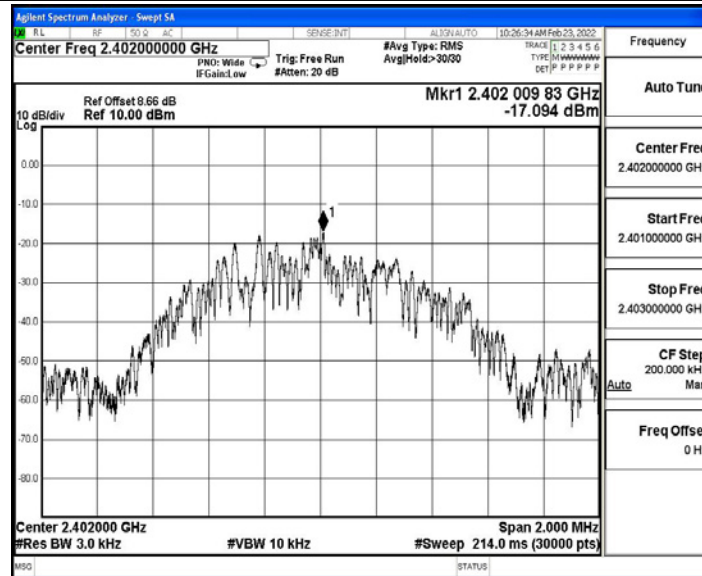
Test Result

TestMode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-17.09	≤8.00	PASS
		2440	-17.1	≤8.00	PASS
		2480	-17.55	≤8.00	PASS
BLE_2M	Ant1	2402	-19.17	≤8.00	PASS
		2440	-19.14	≤8.00	PASS
		2480	-19.68	≤8.00	PASS

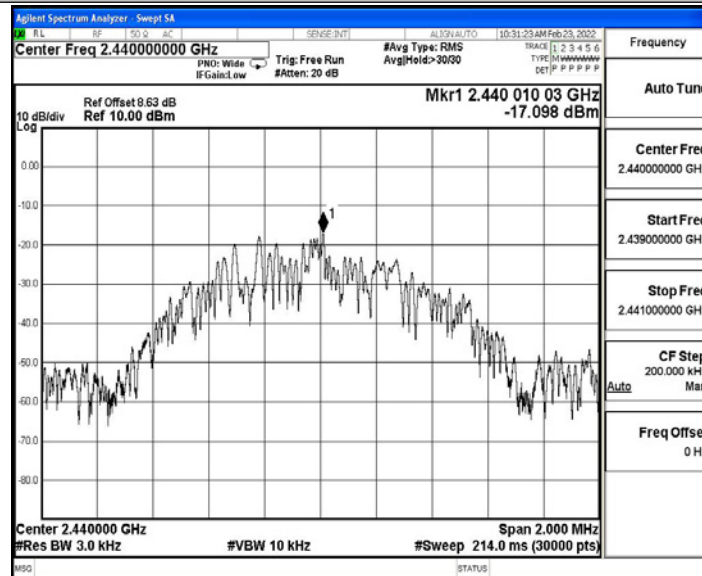


Test Graphs

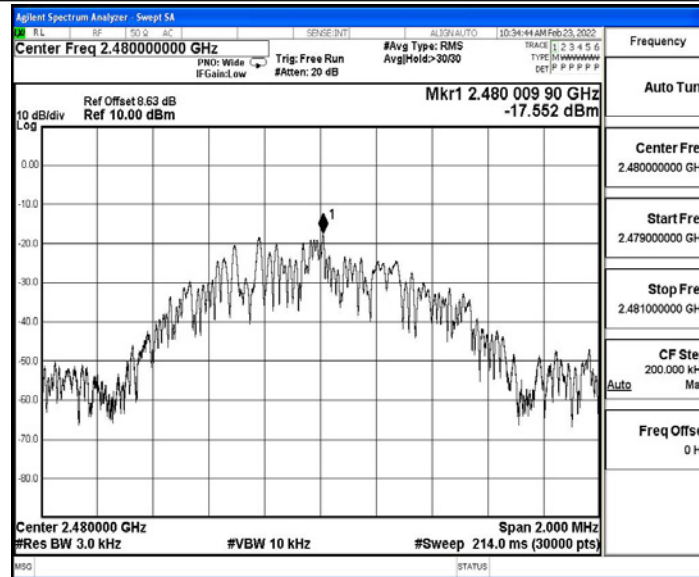
BLE_1M_Ant1_2402



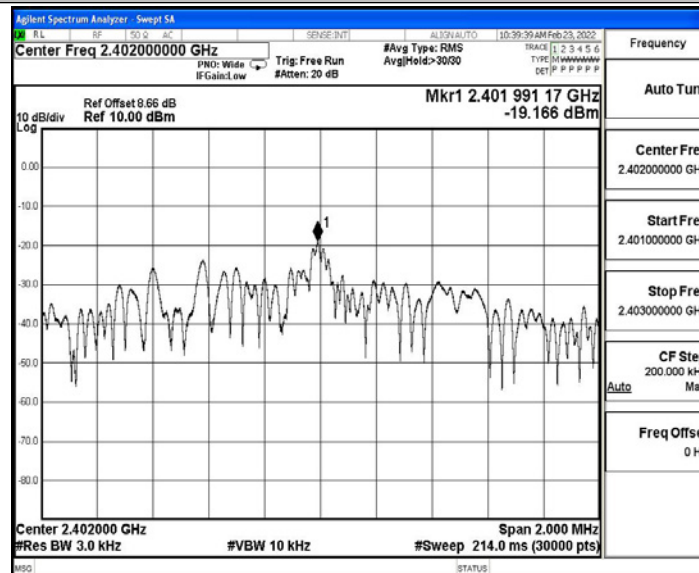
BLE_1M_Ant1_2440



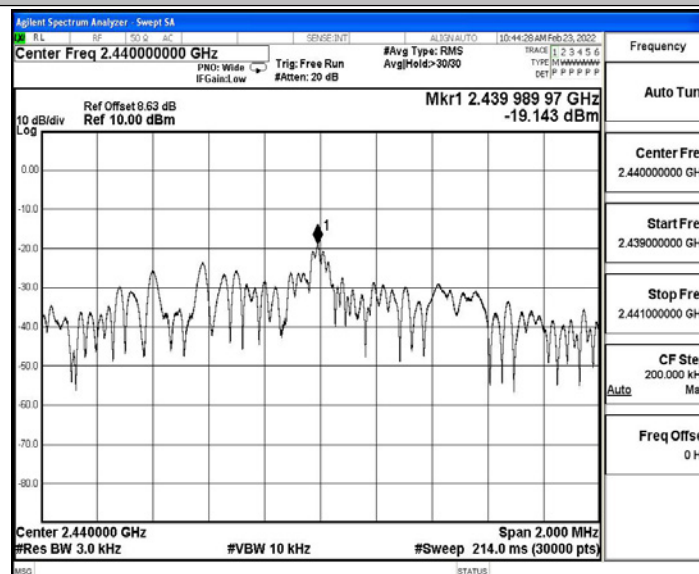
BLE_1M_Ant1_2480



BLE_2M_Ant1_2402

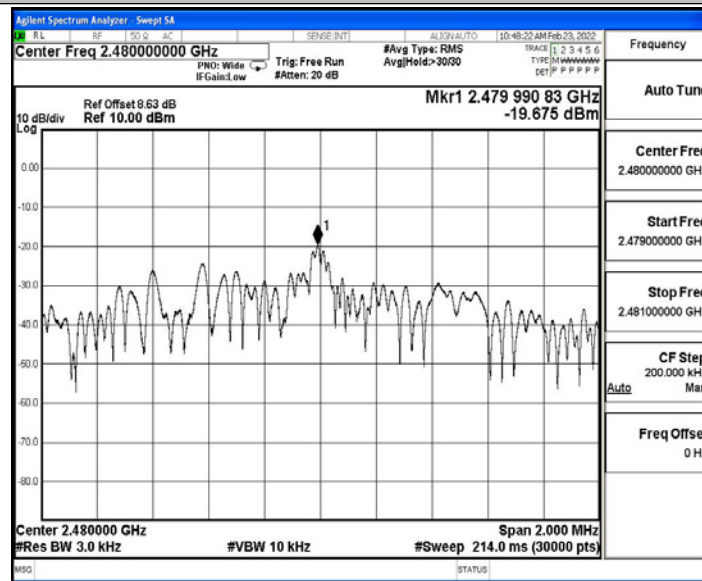


BLE_2M_Ant1_2440





BLE_2M_Ant1_2480





A.4 Band edge measurements

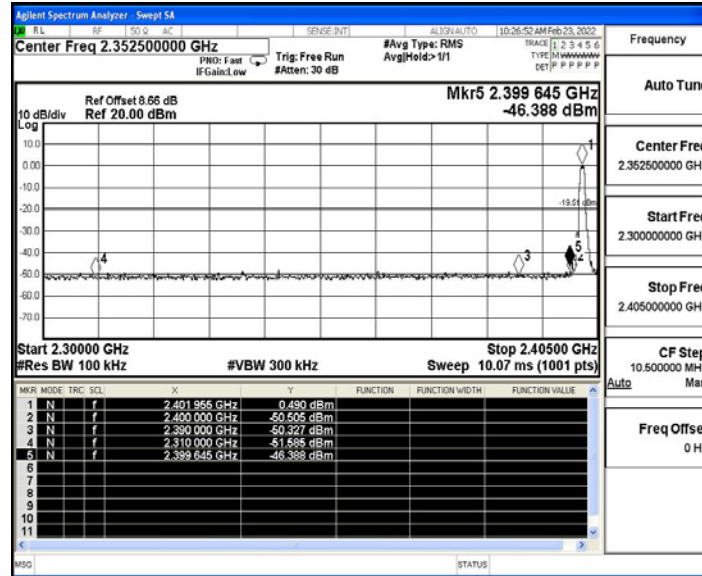
Test Result

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	0.49	-46.39	≤ -19.51	PASS
		High	2480	0.02	-47.85	≤ -19.98	PASS
BLE_2M	Ant1	Low	2402	0.40	-31.66	≤ -19.6	PASS
		High	2480	0.03	-47.53	≤ -19.97	PASS

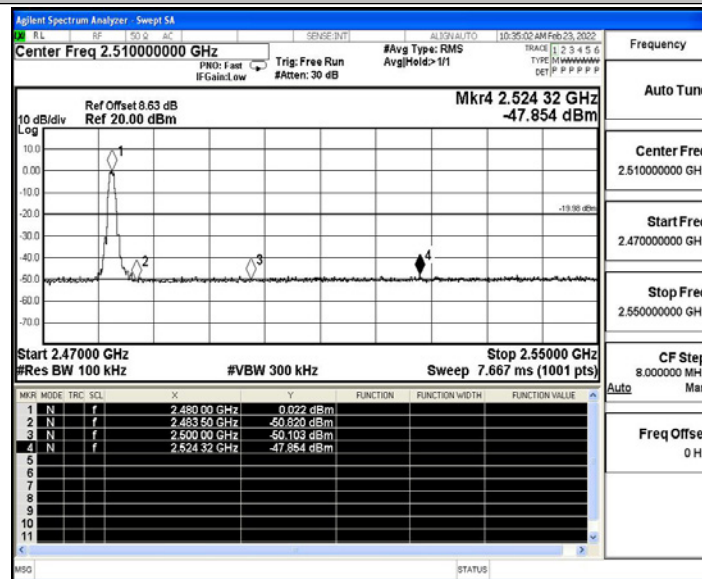


Test Graphs

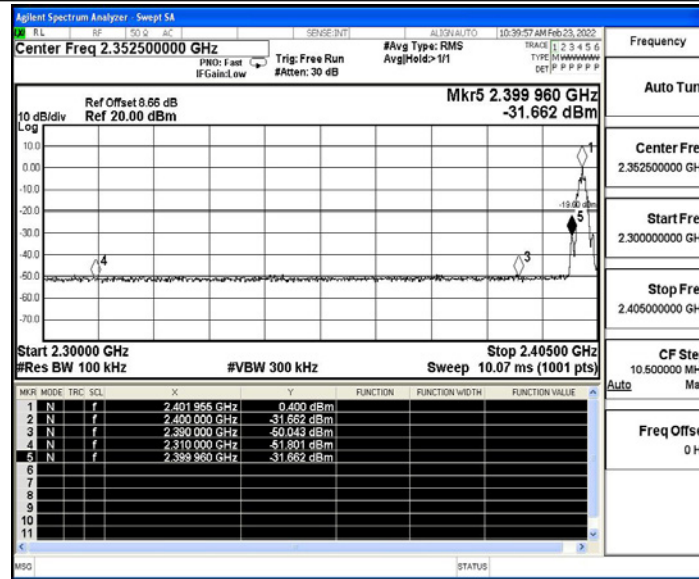
BLE_1M_Ant1_Low_2402



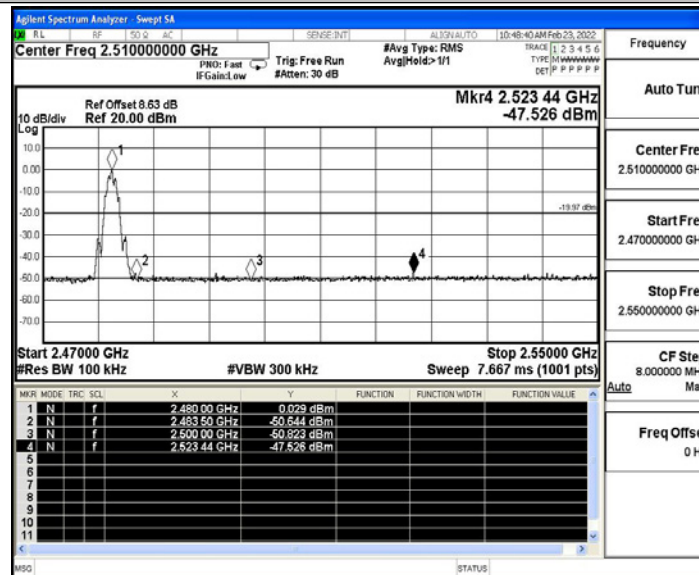
BLE_1M_Ant1_High_2480



BLE_2M_Ant1_Low_2402



BLE_2M_Ant1_High_2480





A.5 Conducted Spurious Emission

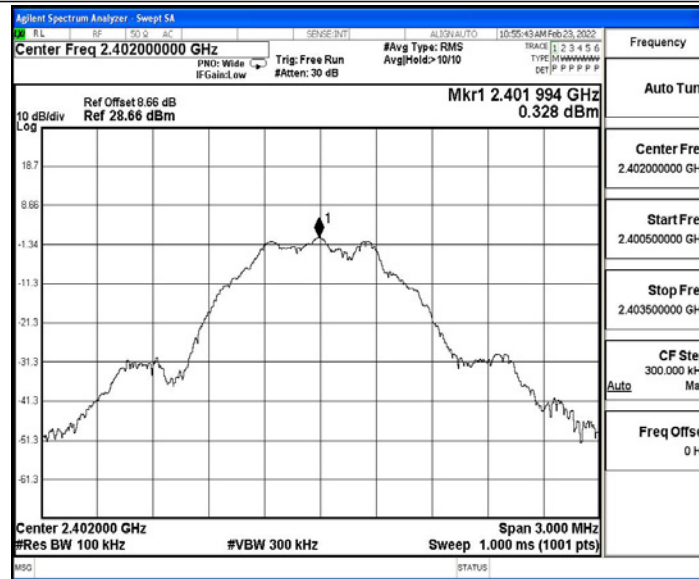
Test Result

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	0.33	0.33	---	PASS
			30~1000	0.33	-60.09	≤ -19.67	PASS
			1000~26500	0.33	-46.22	≤ -19.67	PASS
		2440	Reference	0.36	0.36	---	PASS
			30~1000	0.36	-60.71	≤ -19.64	PASS
			1000~26500	0.36	-45.78	≤ -19.64	PASS
		2480	Reference	-0.11	-0.11	---	PASS
			30~1000	-0.11	-60.78	≤ -20.11	PASS
			1000~26500	-0.11	-45.63	≤ -20.11	PASS
BLE_2M	Ant1	2402	Reference	0.29	0.29	---	PASS
			30~1000	0.29	-60.92	≤ -19.71	PASS
			1000~26500	0.29	-46.13	≤ -19.71	PASS
		2440	Reference	0.37	0.37	---	PASS
			30~1000	0.37	-59.33	≤ -19.63	PASS
			1000~26500	0.37	-46.03	≤ -19.63	PASS
		2480	Reference	-0.12	-0.12	---	PASS
			30~1000	-0.12	-61.34	≤ -20.12	PASS
			1000~26500	-0.12	-45.94	≤ -20.12	PASS

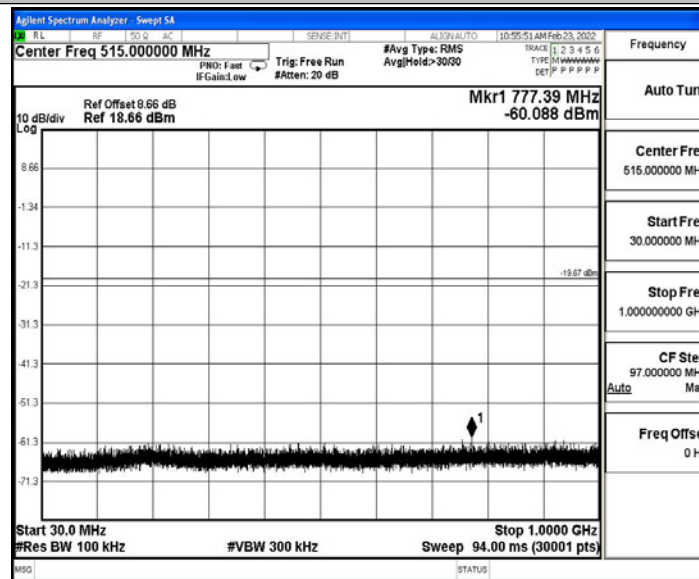


Test Graphs

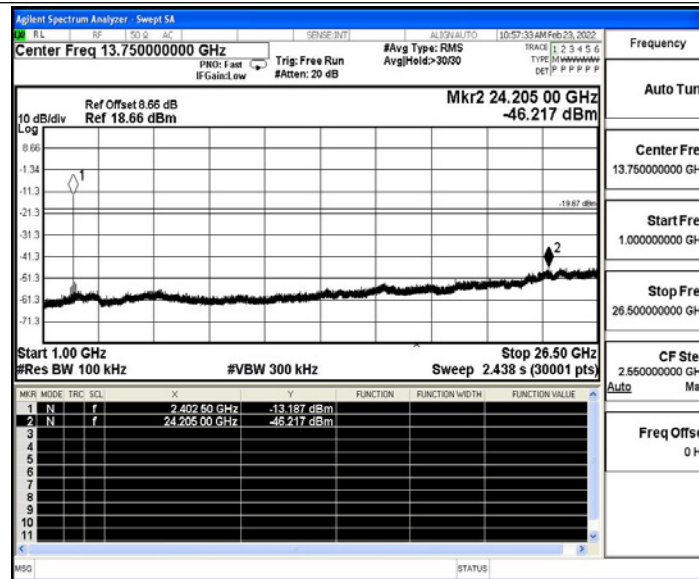
BLE_1M_Ant1_2402_0~Reference



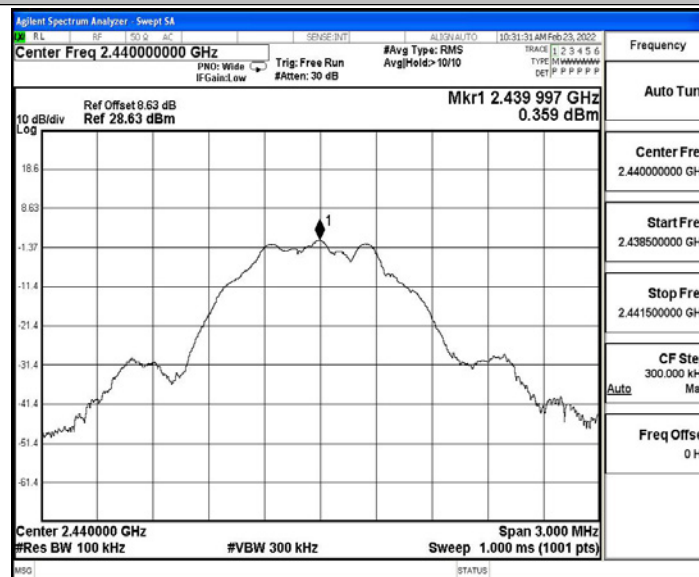
BLE_1M_Ant1_2402_30~1000



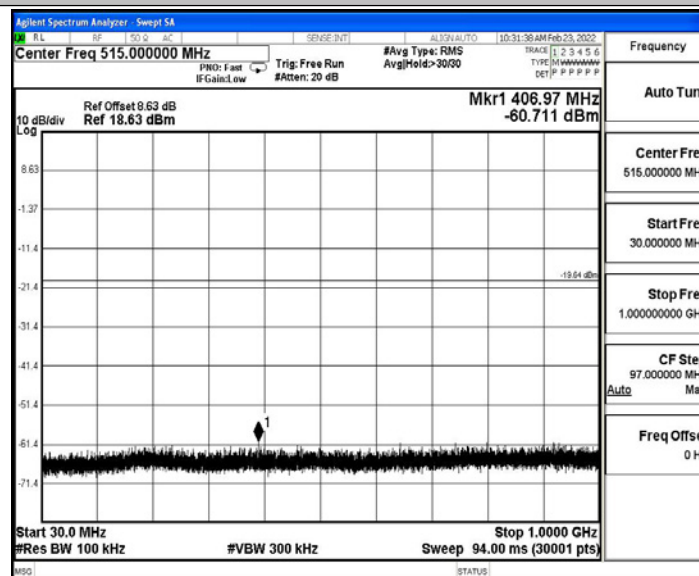
BLE_1M_Ant1_2402_1000~26500

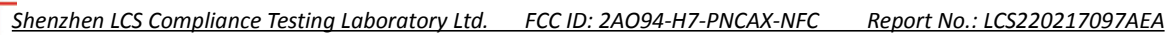


BLE_1M_Ant1_2440_0~Reference



BLE_1M_Ant1_2440_30~1000





Agilent Spectrum Analyzer - Swept SA

RL RF TO G AC SENSE INT ALN/AUTO 10-33-20 AM Feb 23, 2002

Center Freq 13.750000000 GHz Trig: Free Run #Atten: 20 dB
PNO: Fast IF GainLow

#Avg Type: RMS Avg/Hold: 30/30 TYPE [W] WWWWWW DET [P] P P P P P

Mkr2 24.732 00 GHz
-45.782 dBm

Ref Offset 8.63 dB
Ref 18.63 dBm

10 dB/div Log

Start 1.00 GHz Stop 26.50 GHz
#Res BW 100 kHz #VBW 300 kHz Sweep 2.438 s (30001 pts)

MKR	MODE	FREQ	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	2.439 90 GHz	f	-0.222 dBm				
2	N	24.732 00 GHz	f	-45.782 dBm				

Agilent Spectrum Analyzer - Swept SA

Center Freq 2.480000000 GHz

Ref Offset 8.63 dB
Ref 28.63 dBm

Trig: Free Run
#Atten: 30 dB

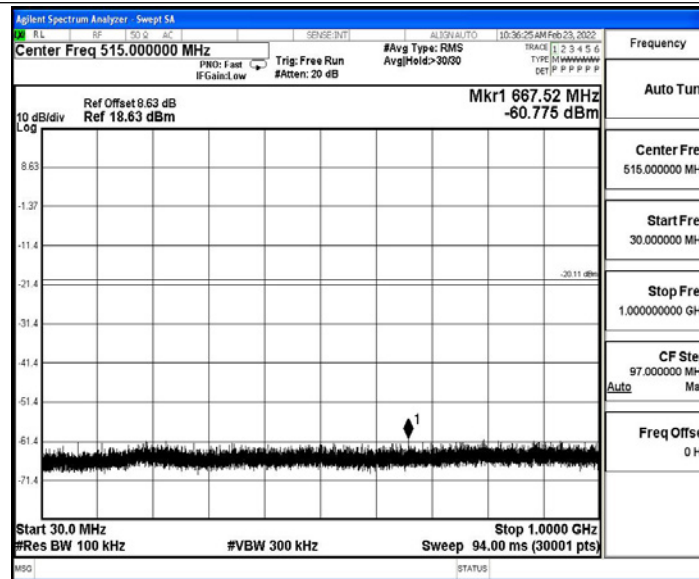
#Avg Type: RMS
Avg/Hold: 10/10

Mkr1 2.479 991 GHz
-0.111 dBm

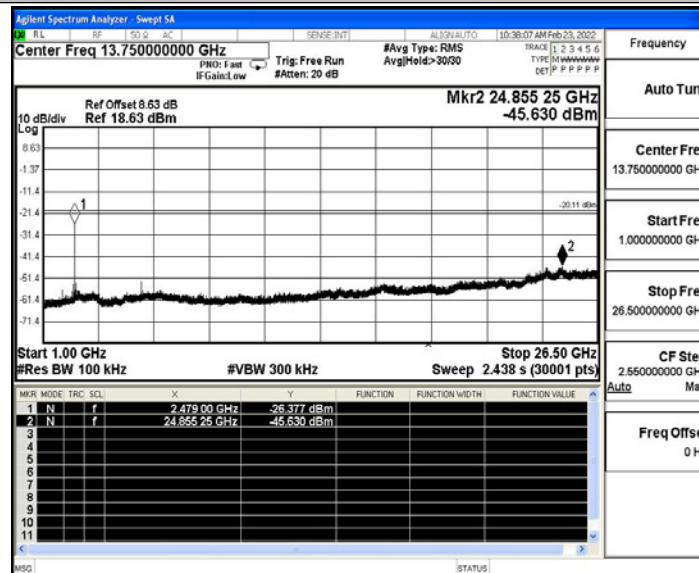
10 dB/div
Log

Center 2.480000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)

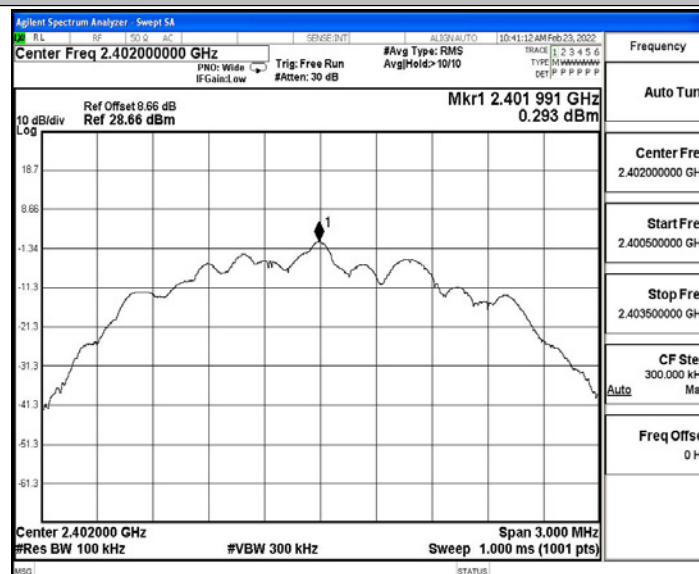
20 / 34



BLE_1M_Ant1_2480_1000~26500

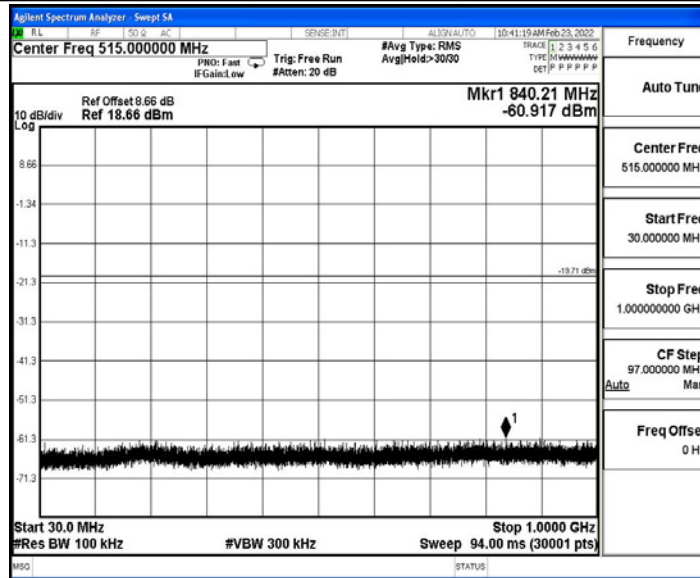


BLE_2M_Ant1_2402_0~Reference

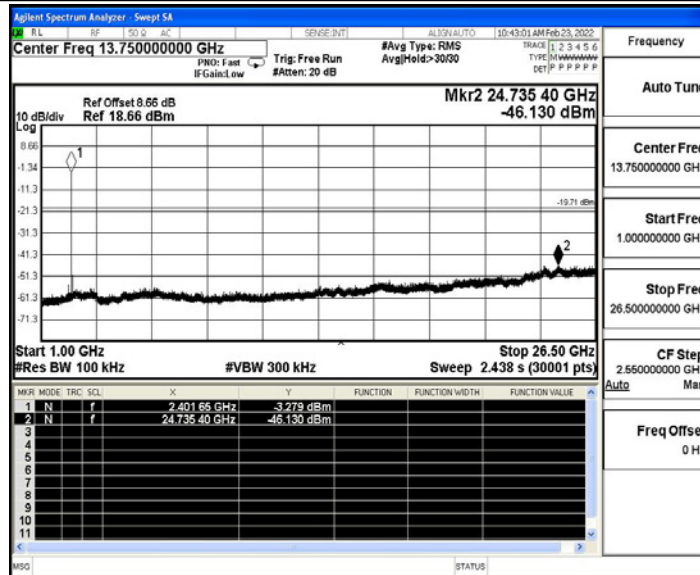




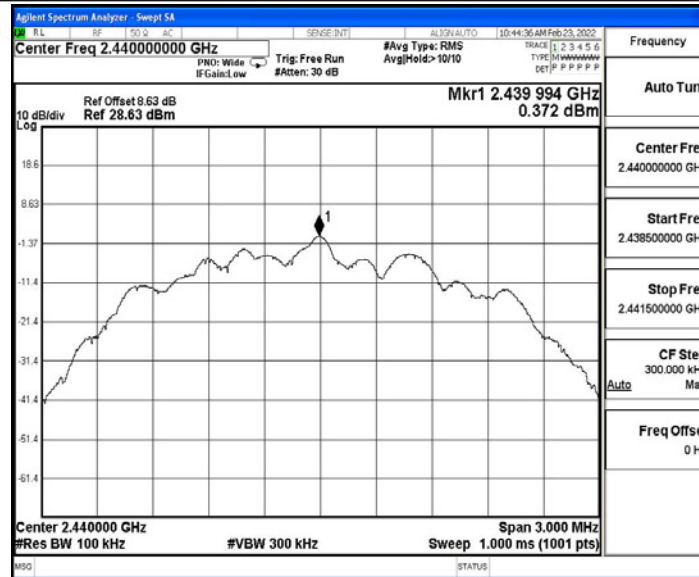
BLE_2M_Ant1_2402_30~1000



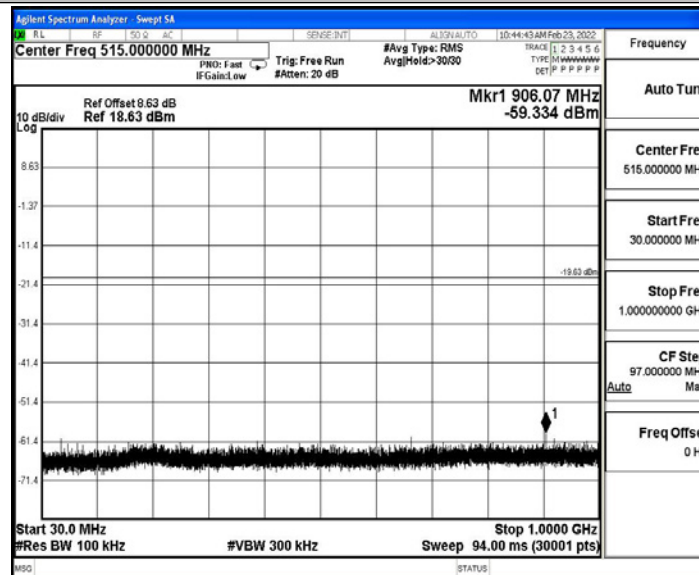
BLE_2M_Ant1_2402_1000~26500



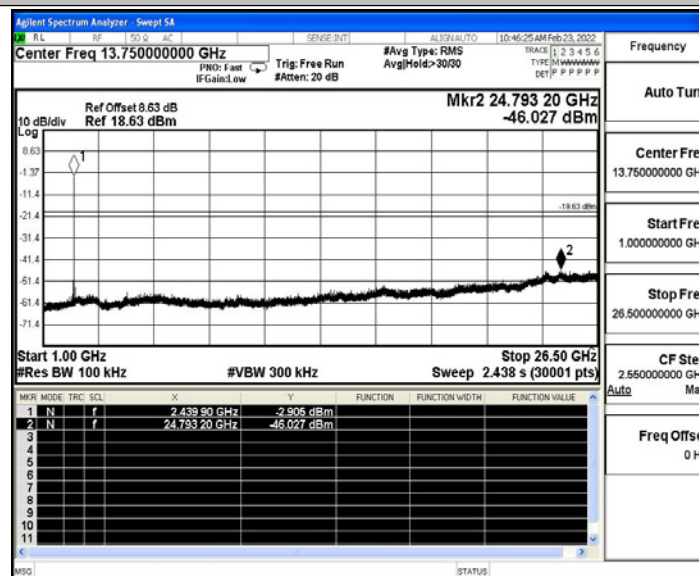
BLE_2M_Ant1_2440_0~Reference



BLE_2M_Ant1_2440_30~1000

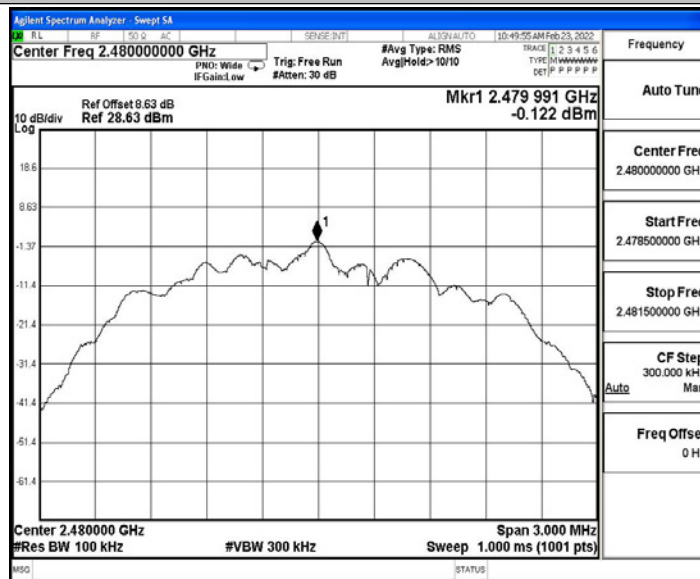


BLE_2M_Ant1_2440_1000~26500

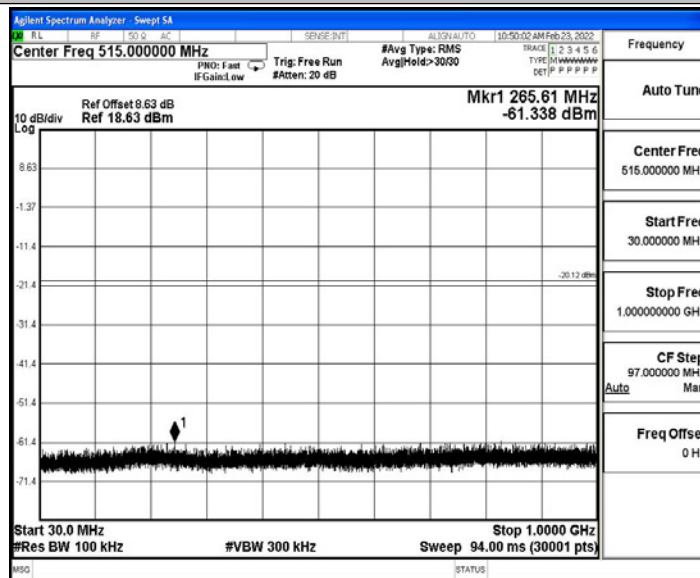




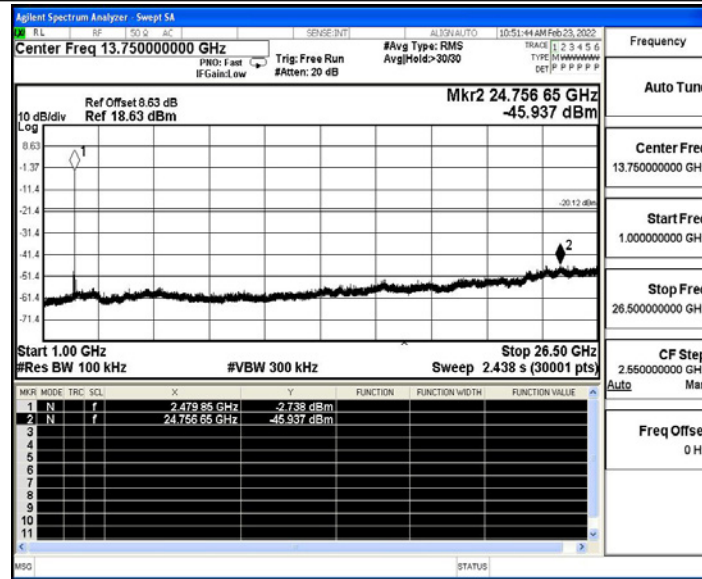
BLE_2M_Ant1_2480_0~Reference



BLE_2M_Ant1_2480_30~1000



BLE_2M_Ant1_2480_1000~26500

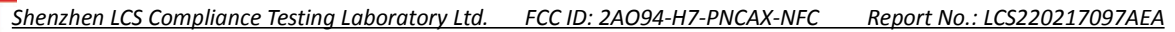




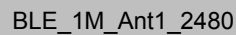
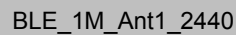
A.6 Duty Cycle

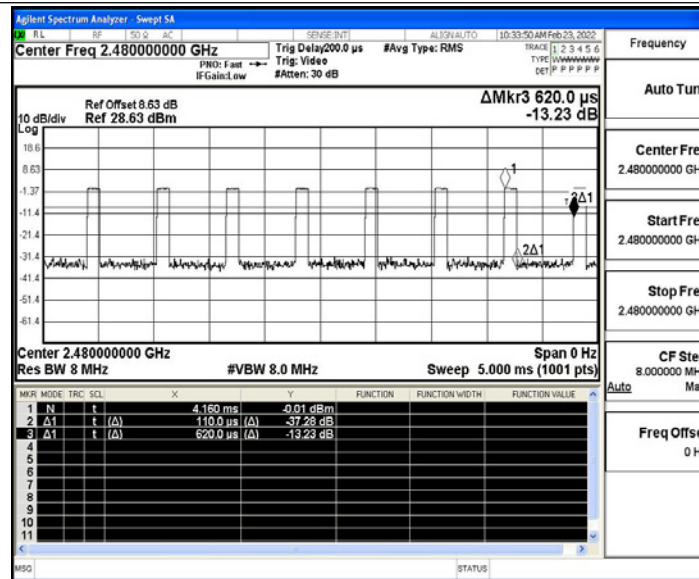
Test Result

TestMode	Antenna	Channel	ON Time [ms]	Period [ms]	X	DC [%]	xFactor	1/T[kHz]
BLE_1M	Ant1	2402	0.11	0.63	0.1746	17.46	7.58	9.1
		2440	0.11	0.62	0.1774	17.74	7.51	9.1
		2480	0.11	0.62	0.1774	17.74	7.51	9.1
BLE_2M	Ant1	2402	0.06	0.62	0.0968	9.68	10.14	16.7
		2440	0.06	0.62	0.0968	9.68	10.14	16.7
		2480	0.06	0.62	0.0968	9.68	10.14	16.7

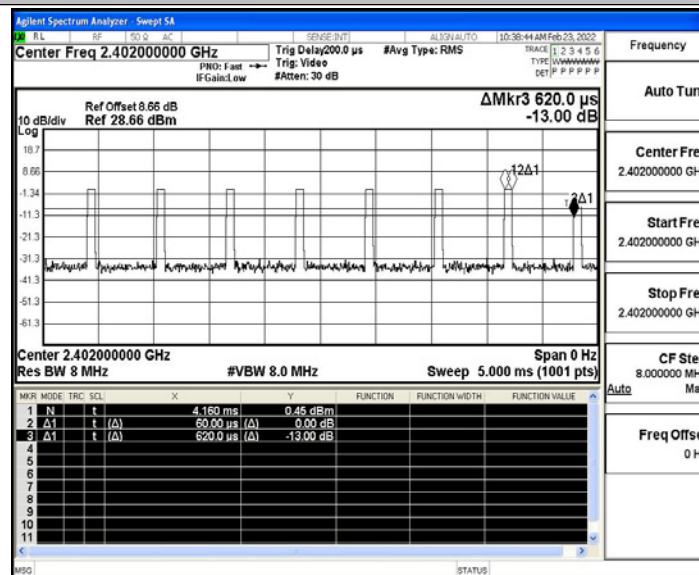


BLE_1M_Ant1_2402

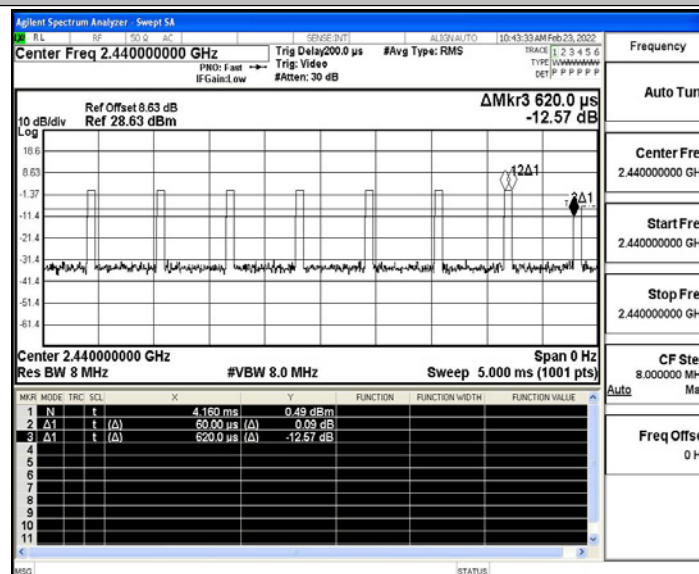




BLE_2M_Ant1_2402

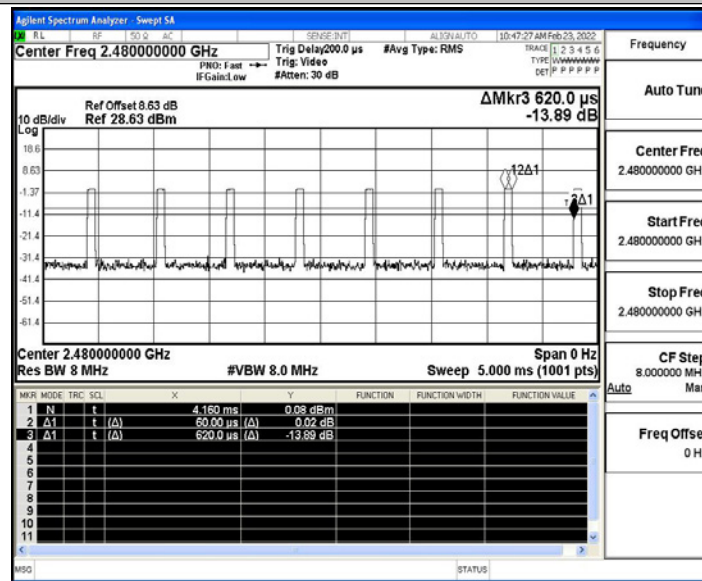


BLE_2M_Ant1_2440





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	-46.79	≤-41.20	48.41	≤54	PASS
				AV	2338.115	-44.9	≤-41.20	50.30	≤54	PASS
				AV	2390.000	-46.15	≤-41.20	49.05	≤54	PASS
				Peak	2310.000	-37.45	≤-21.20	57.75	≤74	PASS
				Peak	2370.770	-36.89	≤-21.20	58.31	≤74	PASS
				Peak	2390.000	-38.49	≤-21.20	56.71	≤74	PASS
		High	2480	AV	2483.500	-44.54	≤-41.20	50.66	≤54	PASS
				AV	2483.680	-44.1	≤-41.20	51.10	≤54	PASS
				AV	2500.000	-45.75	≤-41.20	49.45	≤54	PASS
				Peak	2483.500	-33.53	≤-21.20	61.67	≤74	PASS
				Peak	2483.600	-33.02	≤-21.20	62.18	≤74	PASS
				Peak	2500.000	-37.31	≤-21.20	57.89	≤74	PASS
BLE_2M	Ant1	Low	2402	AV	2310.000	-45.88	≤-41.20	49.32	≤54	PASS
				AV	2338.010	-44.17	≤-41.20	51.03	≤54	PASS
				AV	2390.000	-45.73	≤-41.20	49.47	≤54	PASS
				Peak	2310.000	-38.48	≤-21.20	56.72	≤74	PASS
				Peak	2320.475	-37.27	≤-21.20	57.93	≤74	PASS
				Peak	2390.000	-39.43	≤-21.20	55.77	≤74	PASS
		High	2480	AV	2483.500	-43.36	≤-41.20	51.84	≤54	PASS
				AV	2484.080	-43.07	≤-41.20	52.13	≤54	PASS
				AV	2500.000	-44.82	≤-41.20	50.38	≤54	PASS
				Peak	2483.500	-33.24	≤-21.20	61.96	≤74	PASS
				Peak	2483.600	-32.82	≤-21.20	62.38	≤74	PASS
				Peak	2500.000	-36.36	≤-21.20	58.84	≤74	PASS

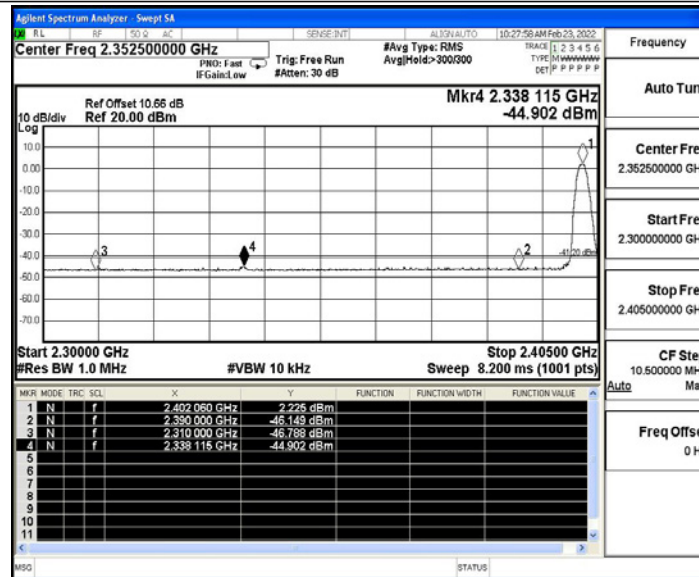
Note:

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.

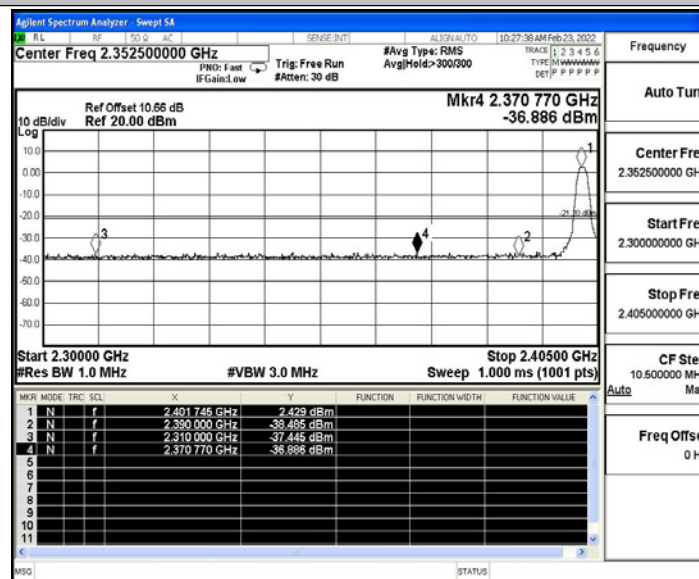


Test Graphs

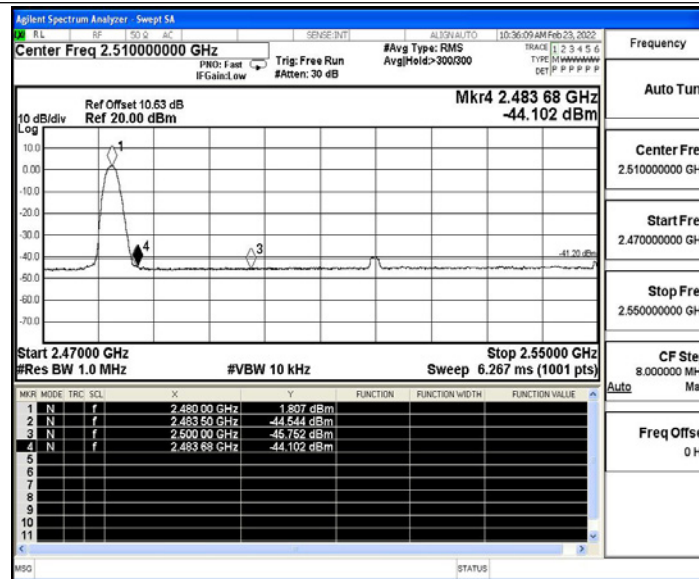
BLE_1M_Ant1_Low_2402_AV



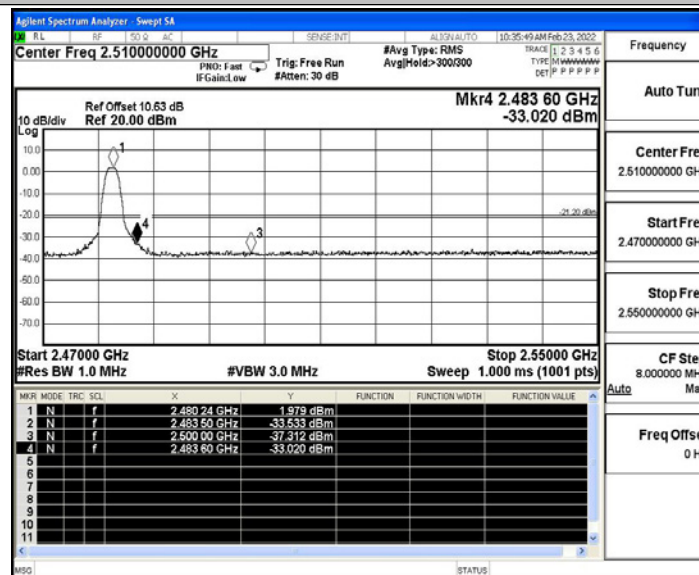
BLE_1M_Ant1_Low_2402_Peak



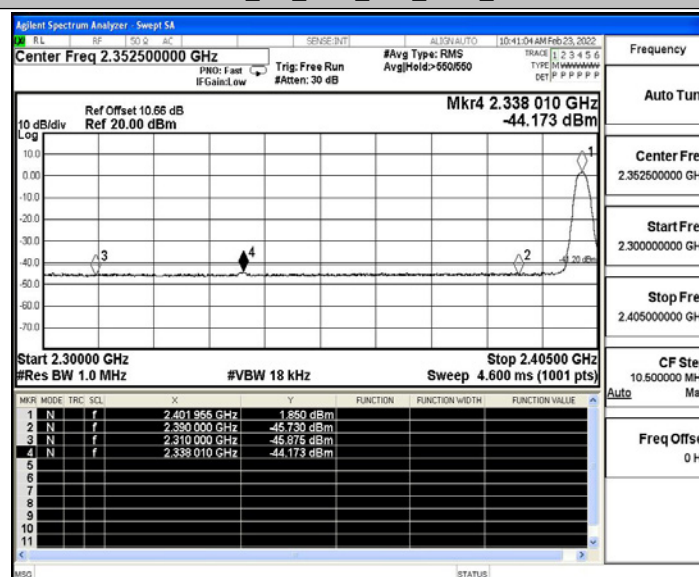
BLE_1M_Ant1_High_2480_AV



BLE_1M_Ant1_High_2480_Peak

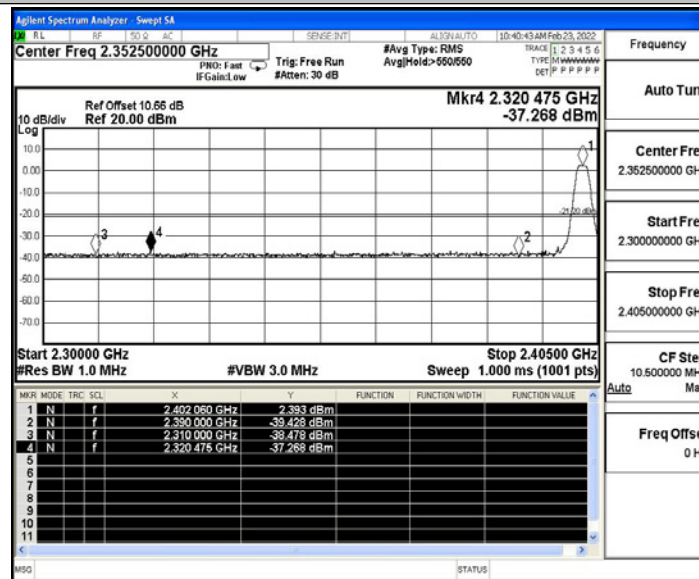


BLE_2M_Ant1_Low_2402_AV

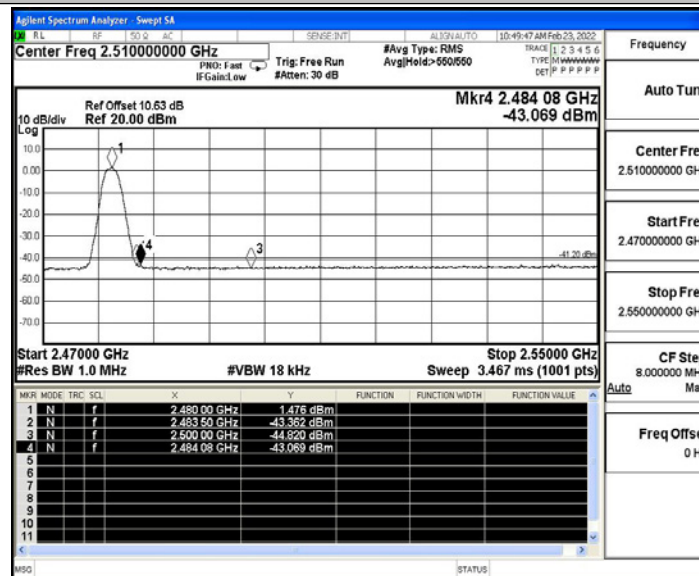




BLE_2M_Ant1_Low_2402_Peak



BLE_2M_Ant1_High_2480_AV



BLE_2M_Ant1_High_2480_Peak

