

FCC Appendix RF Test Data for BLE

FCC ID : 2ARZ2-PIP226L

Company : Labpano Technology (Changzhou) Co., Ltd.

EUT : panox v5 lite

Model Number : PIP226L

Report No. : CTA26032602301

Reviewed By : Eric Wang

Appendix A: DTS Bandwidth

Test Result

TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.664	2401.720	2402.384	0.5	PASS
		2440	0.664	2439.716	2440.380	0.5	PASS
		2480	0.672	2479.708	2480.380	0.5	PASS
BLE_2M	Ant1	2402	1.160	2401.460	2402.620	0.5	PASS
		2440	1.084	2439.540	2440.624	0.5	PASS
		2480	1.364	2479.364	2480.728	0.5	PASS

Agilent Spectrum Analyzer - Sweep SA

Center Freq 2.402000000 GHz

Ref Offset 0.5 dB
Ref 30.00 dBm

Trig: Free Run
#Atten: 40 dB

#Avg Type: RMS
Avg/Hold: 100/100

Span 4.000 MHz
Sweep 1.000 ms (1001 pts)

ΔMkr3 664 kHz
-0.005 dB

10 dB/div
Log

Center 2.402000 GHz
#Res BW 100 kHz
#VBW 300 kHz

MNR	MODE	TRIG	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.401720 GHz	-0.162 dBm			
2	N	1	f	2.402052 GHz	5.778 dBm			
3	Δ	1	f (Δ)	664 kHz (Δ)	-0.005 dB			

Frequency

Auto Tune

Center Freq
2.402000000 GHz

Start Freq
2.400000000 GHz

Stop Freq
2.404000000 GHz

CF Step
400.000 kHz
Man

Freq Offset
0 Hz

BLE_1M_Ant1_2402

Agilent Spectrum Analyzer - Sweep SA

Center Freq 2.440000000 GHz

Ref Offset 0.5 dB
Ref 30.00 dBm

Trig: Free Run
#Atten: 40 dB

#Avg Type: RMS
Avg/Hold: 100/100

Span 4.000 MHz
Sweep 1.000 ms (1001 pts)

ΔMkr3 664 kHz
-0.083 dB

10 dB/div
Log

Center 2.440000 GHz
#Res BW 100 kHz
#VBW 300 kHz

MNR	MODE	TRIG	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.439716 GHz	0.551 dBm			
2	N	1	f	2.440040 GHz	6.446 dBm			
3	Δ	1	f (Δ)	664 kHz (Δ)	-0.083 dB			

Frequency

Auto Tune

Center Freq
2.440000000 GHz

Start Freq
2.438000000 GHz

Stop Freq
2.442000000 GHz

CF Step
400.000 kHz
Man

Freq Offset
0 Hz

BLE_1M_Ant1_2440



BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480

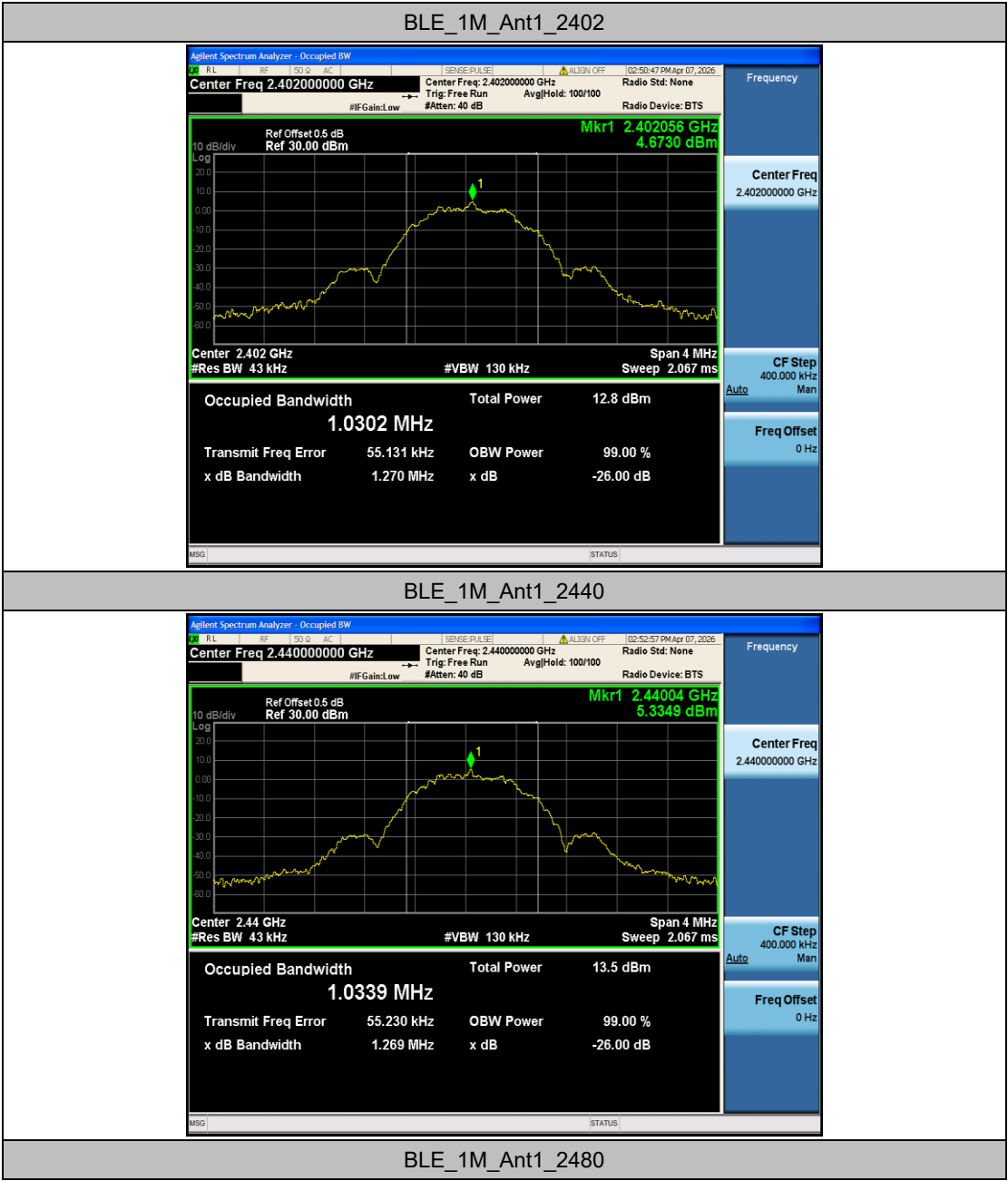


Appendix B: Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.0302	2401.5400	2402.5702	---	---
		2440	1.0339	2439.5383	2440.5722	---	---
		2480	1.0347	2479.5430	2480.5777	---	---
BLE_2M	Ant1	2402	2.0573	2401.0352	2403.0925	---	---
		2440	2.0570	2439.0359	2441.0929	---	---
		2480	2.0544	2479.0355	2481.0899	---	---

Test Graphs





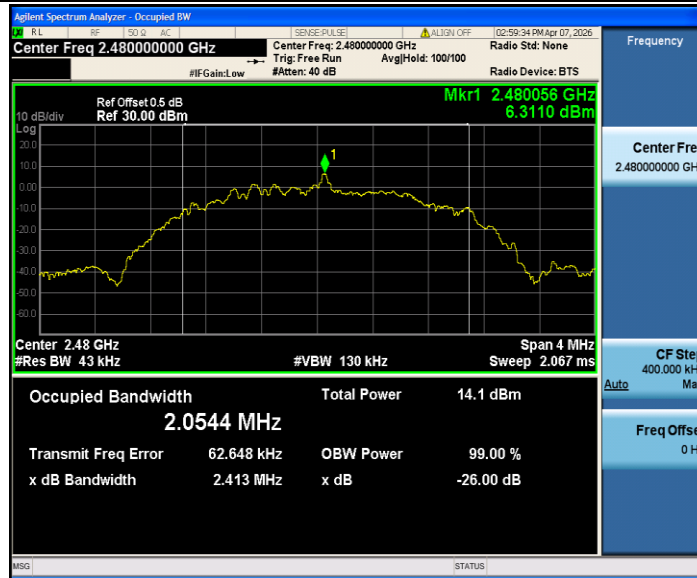
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



Appendix C: Maximum conducted output power

Test Result Peak

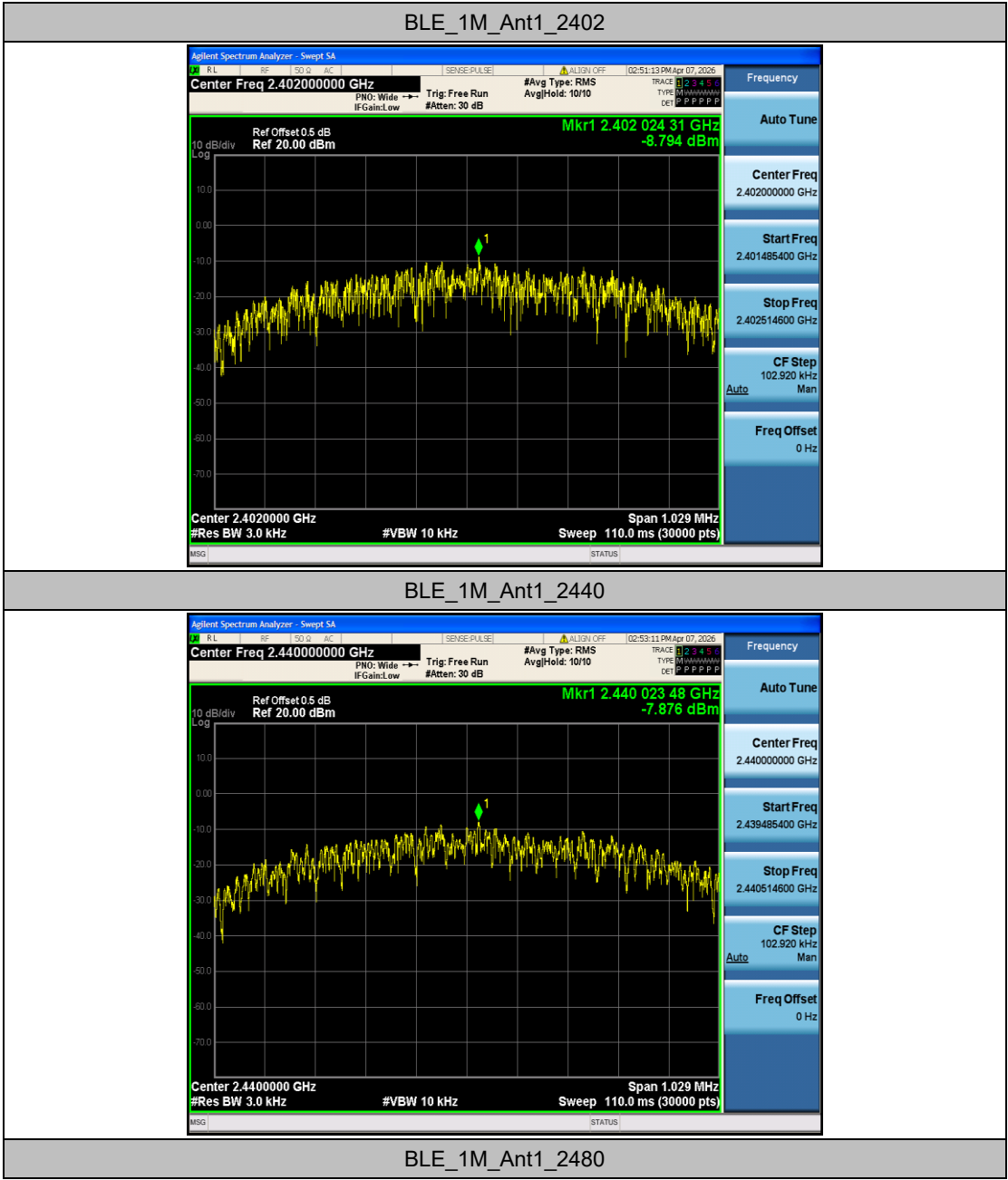
TestMode	Antenna	Freq(MHz)	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant1	2402	6.05	≤30	PASS
		2440	7.12	≤30	PASS
		2480	7.98	≤30	PASS
BLE_2M	Ant1	2402	6.03	≤30	PASS
		2440	7.16	≤30	PASS
		2480	8.07	≤30	PASS

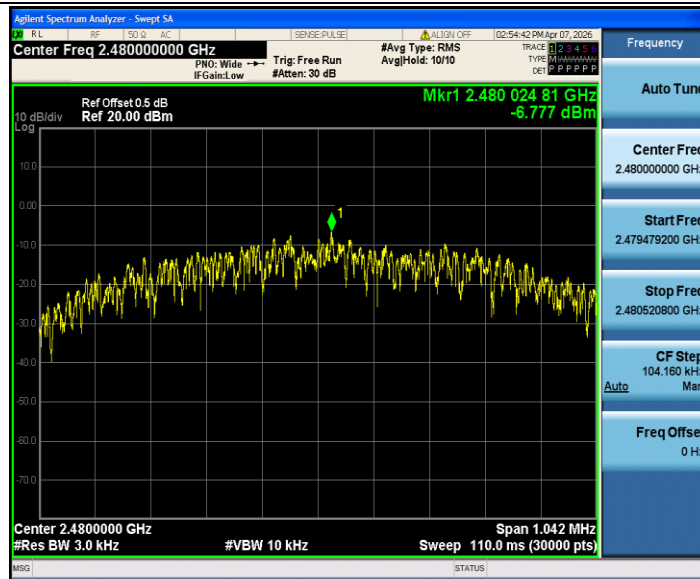
Appendix D: Maximum power spectral density

Test Result

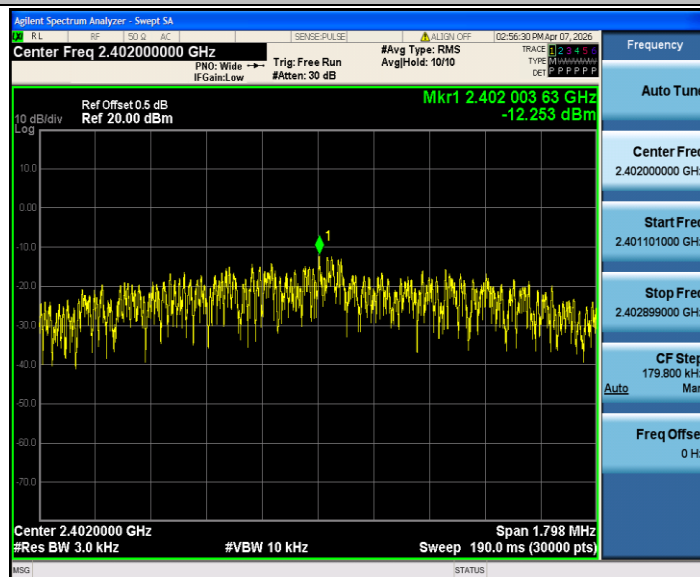
TestMode	Antenna	Freq(MHz)	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-8.79	≤8.00	PASS
		2440	-7.88	≤8.00	PASS
		2480	-6.78	≤8.00	PASS
BLE_2M	Ant1	2402	-12.25	≤8.00	PASS
		2440	-11.20	≤8.00	PASS
		2480	-10.30	≤8.00	PASS

Test Graphs

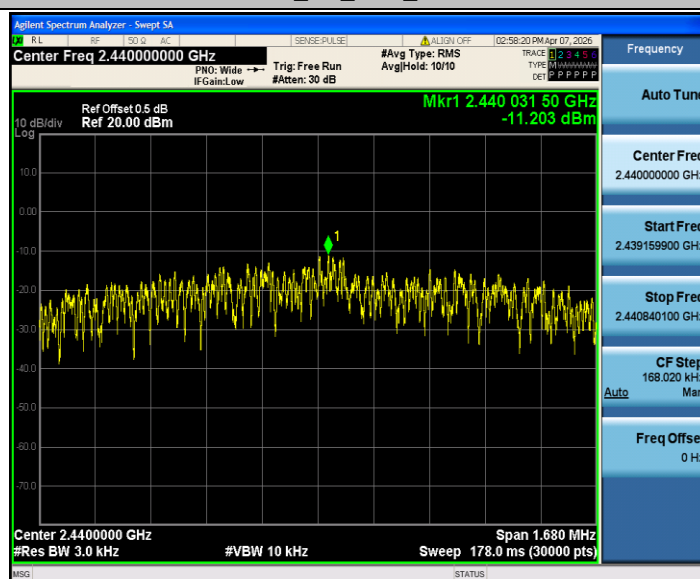




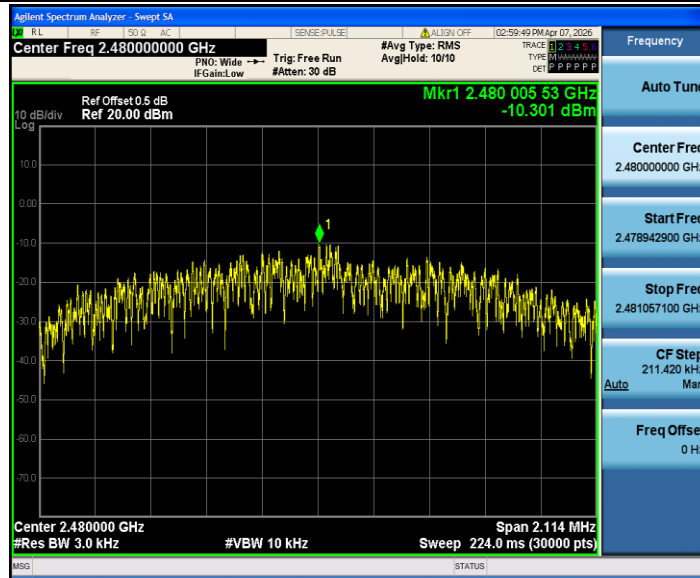
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480

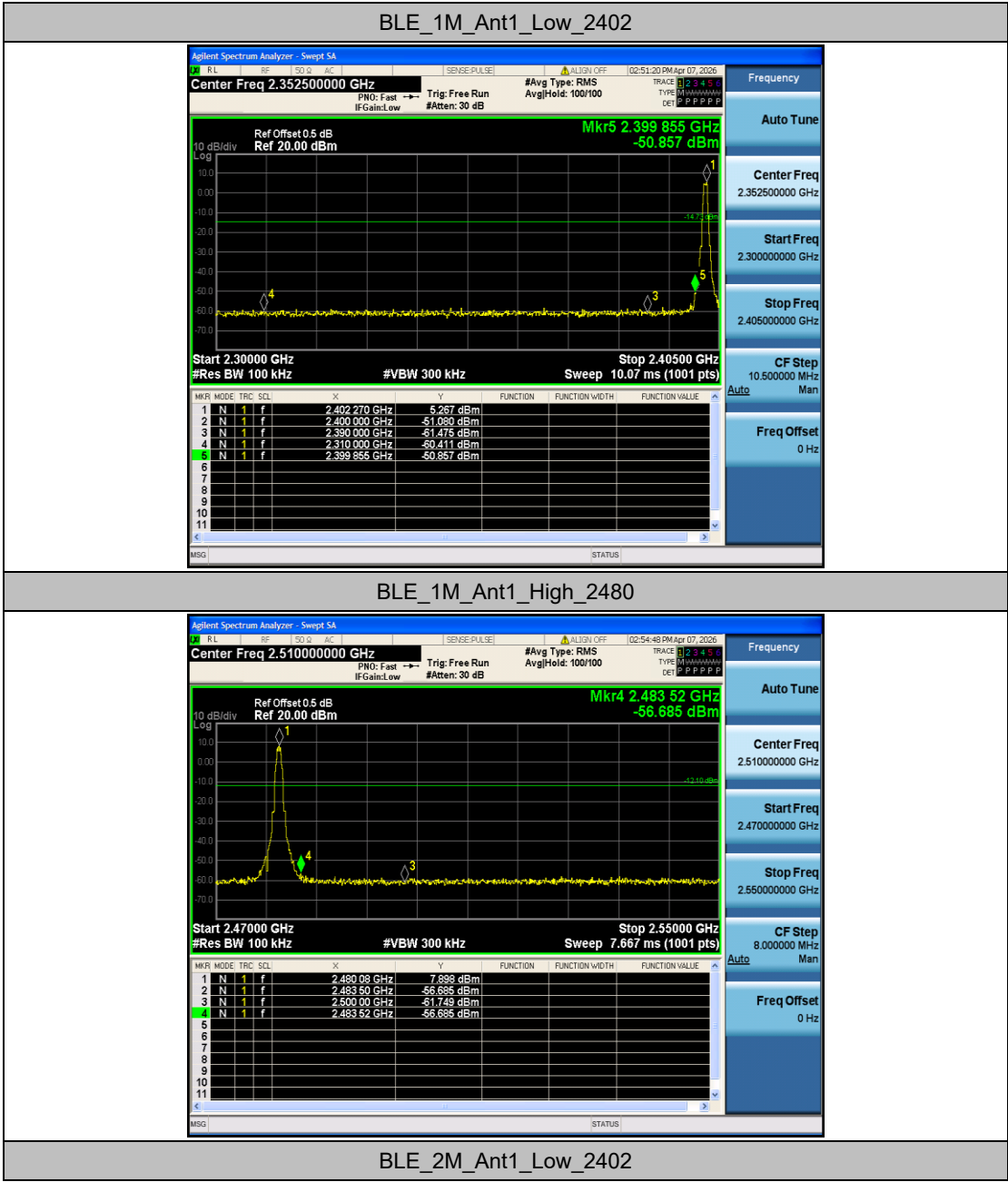


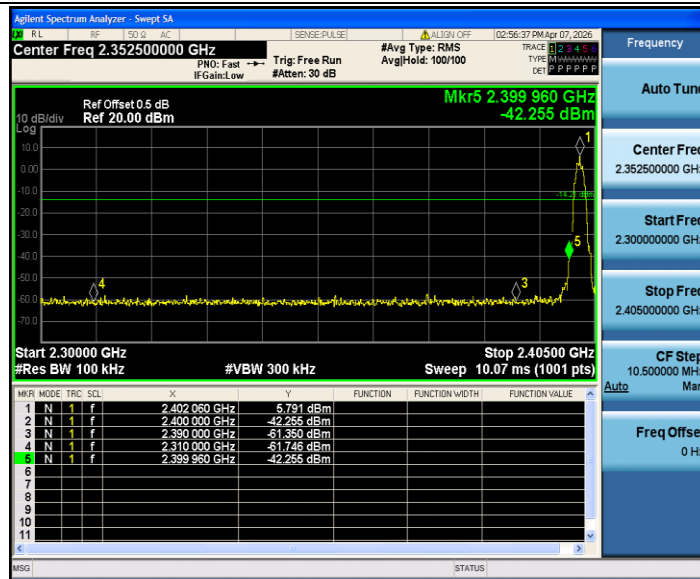
Appendix E: Band edge measurements

Test Result

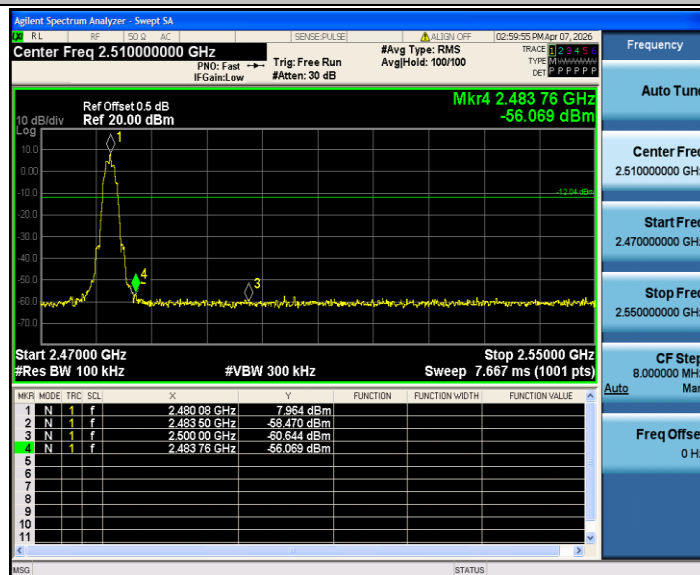
TestMode	Antenna	Channel	Freq(MHz)	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	5.27	-50.86	≤-14.73	PASS
		High	2480	7.90	-56.69	≤-12.1	PASS
BLE_2M	Ant1	Low	2402	5.79	-42.26	≤-14.21	PASS
		High	2480	7.96	-56.07	≤-12.04	PASS

Test Graphs





BLE_2M_Ant1_High_2480

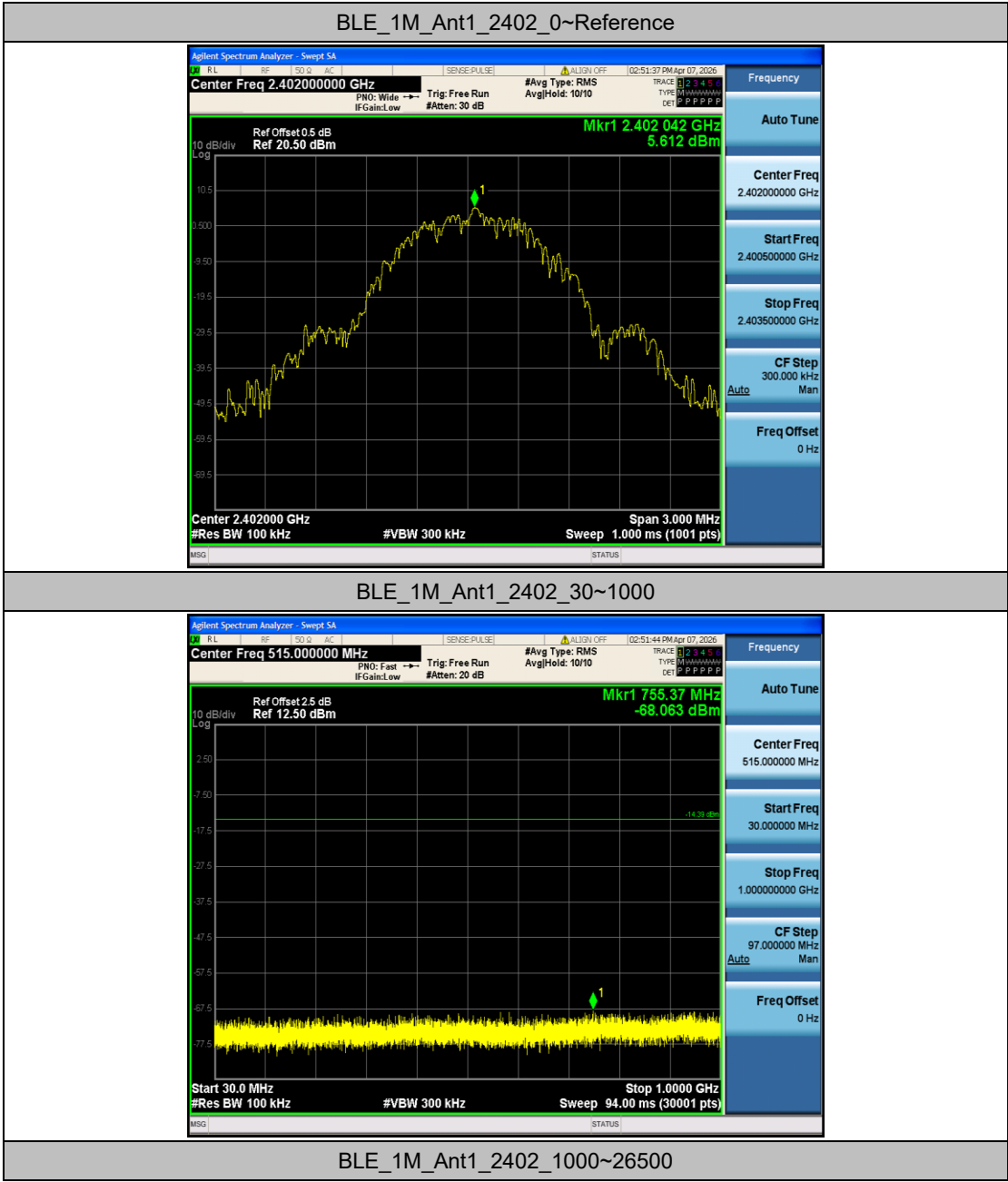


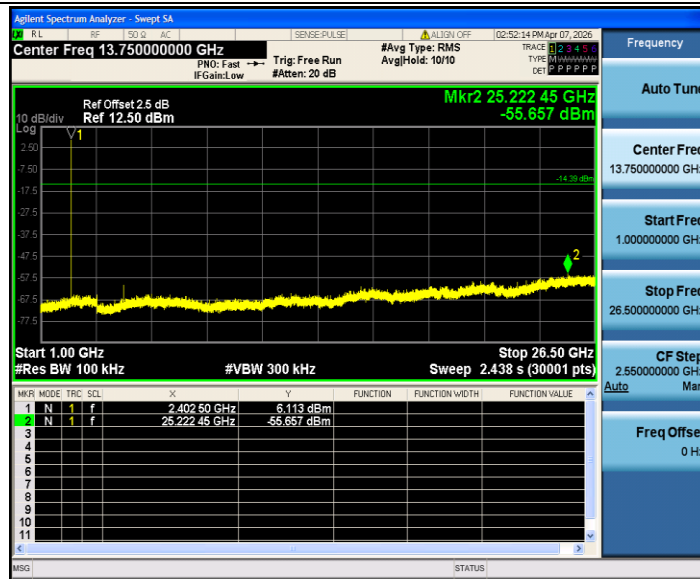
Appendix F: Conducted Spurious Emission

Test Result

TestMode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	5.61	5.61	---	PASS
			30~1000	5.61	-68.06	≤-14.39	PASS
			1000~26500	5.61	-55.66	≤-14.39	PASS
		2440	Reference	5.97	5.97	---	PASS
			30~1000	5.97	-67.75	≤-14.03	PASS
			1000~26500	5.97	-54.79	≤-14.03	PASS
		2480	Reference	6.90	6.90	---	PASS
			30~1000	6.90	-67.83	≤-13.1	PASS
			1000~26500	6.90	-55.68	≤-13.1	PASS
BLE_2M	Ant1	2402	Reference	2.00	2.00	---	PASS
			30~1000	2.00	-67.73	≤-18	PASS
			1000~26500	2.00	-55.83	≤-18	PASS
		2440	Reference	3.68	3.68	---	PASS
			30~1000	3.68	-67.23	≤-16.32	PASS
			1000~26500	3.68	-55.42	≤-16.32	PASS
		2480	Reference	7.59	7.59	---	PASS
			30~1000	7.59	-67.47	≤-12.41	PASS
			1000~26500	7.59	-55.62	≤-12.41	PASS

Test Graphs

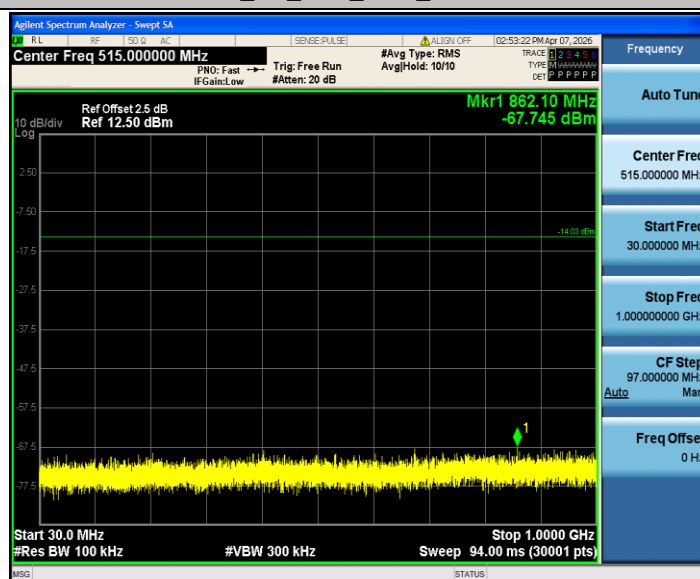




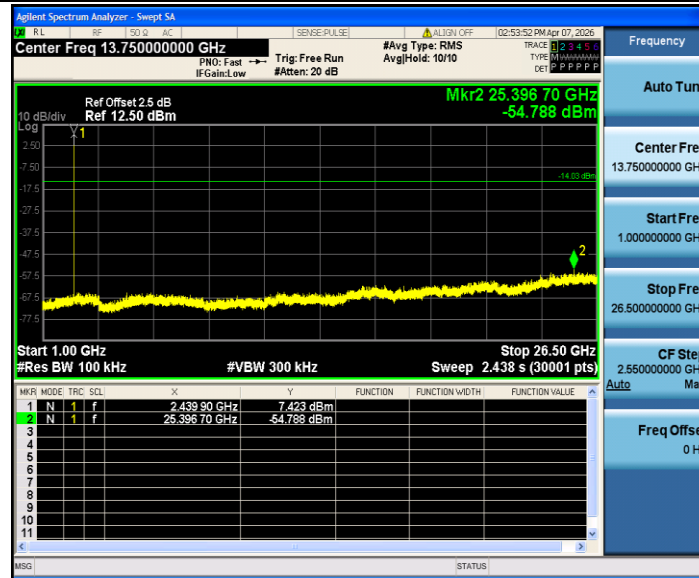
BLE_1M_Ant1_2440_0~Reference



BLE_1M_Ant1_2440_30~1000



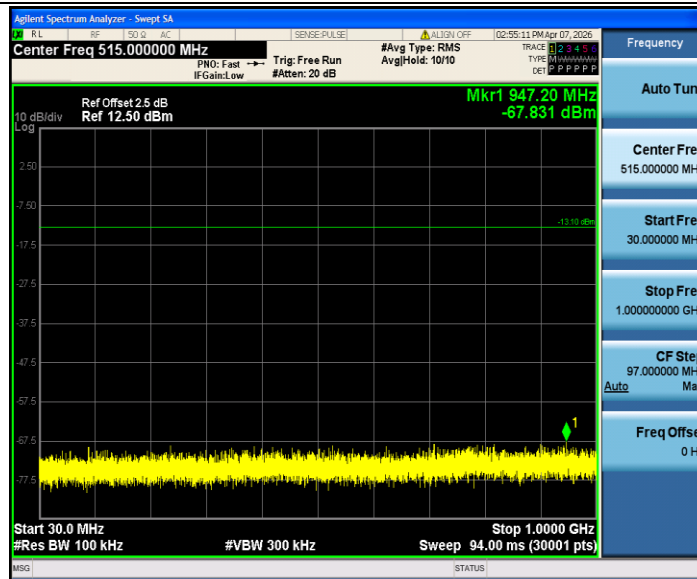
BLE_1M_Ant1_2440_1000~26500



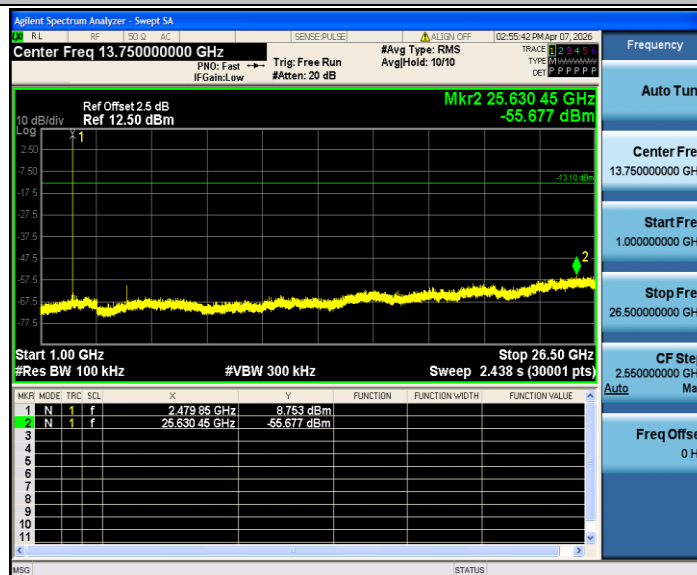
BLE_1M_Ant1_2480_0~Reference



BLE_1M_Ant1_2480_30~1000



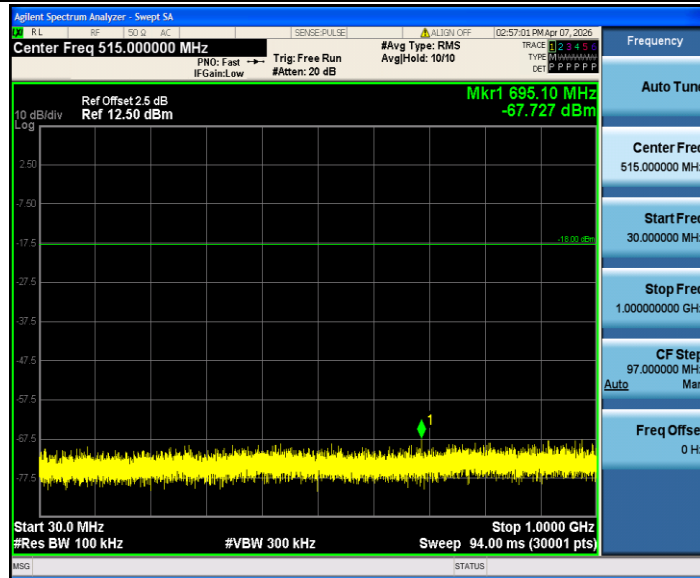
BLE_1M_Ant1_2480_1000~26500



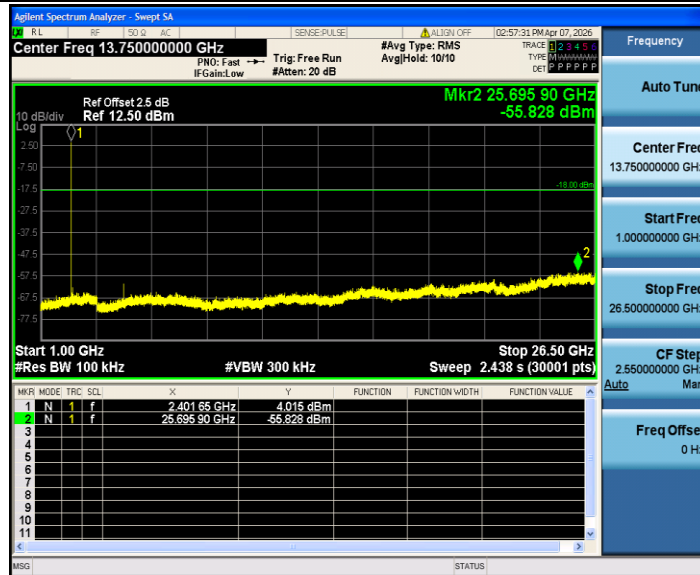
BLE_2M_Ant1_2402_0~Reference



BLE_2M_Ant1_2402_30~1000



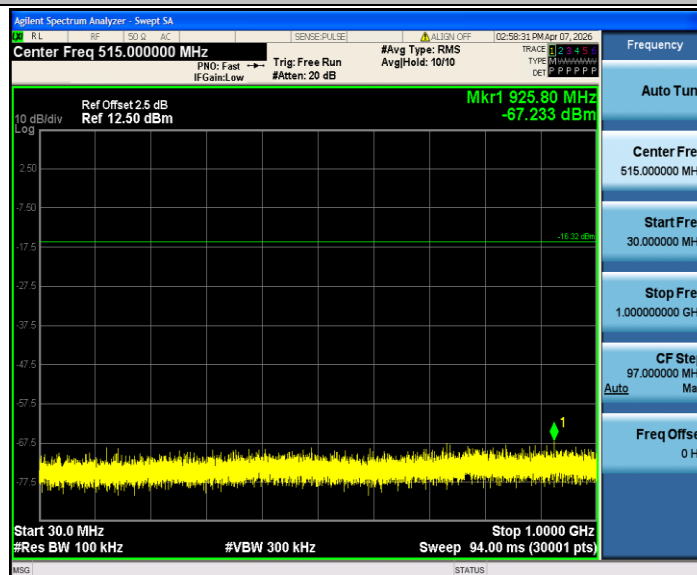
BLE_2M_Ant1_2402_1000~26500



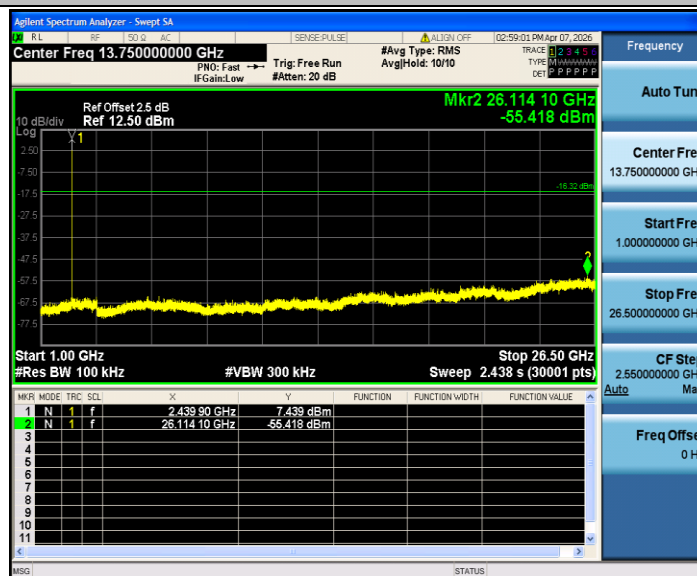
BLE_2M_Ant1_2440_0~Reference



BLE_2M_Ant1_2440_30~1000



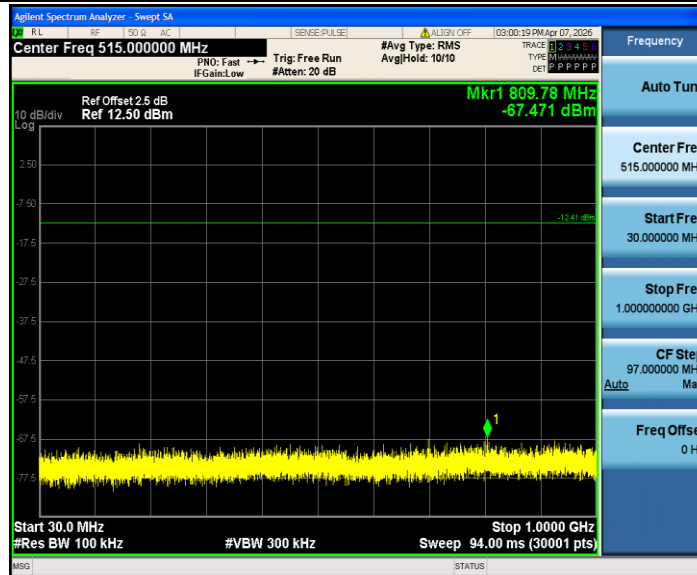
BLE_2M_Ant1_2440_1000~26500



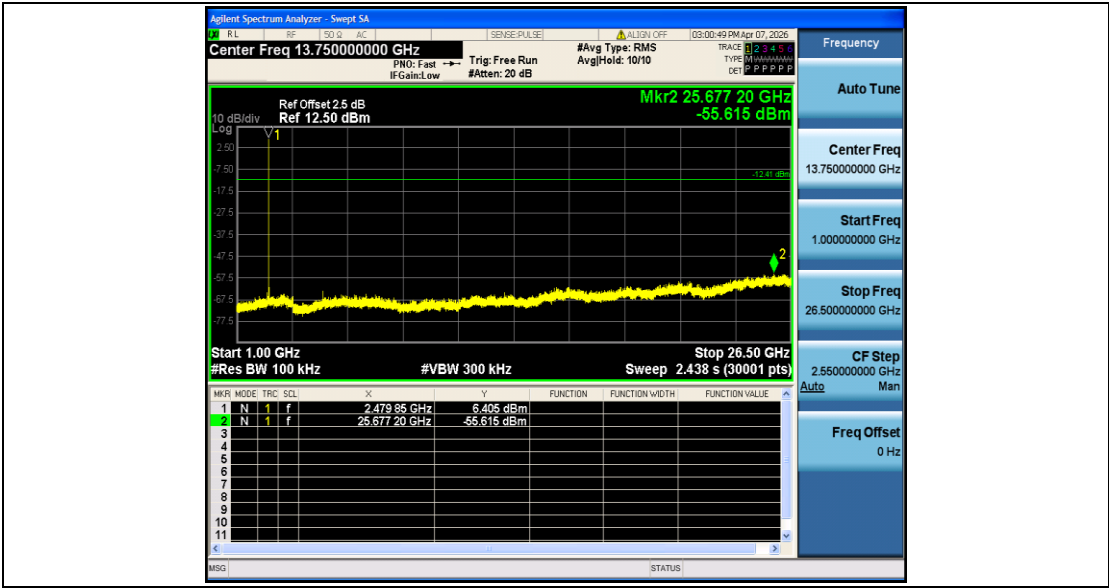
BLE_2M_Ant1_2480_0~Reference



BLE_2M_Ant1_2480_30~1000



BLE_2M_Ant1_2480_1000~26500

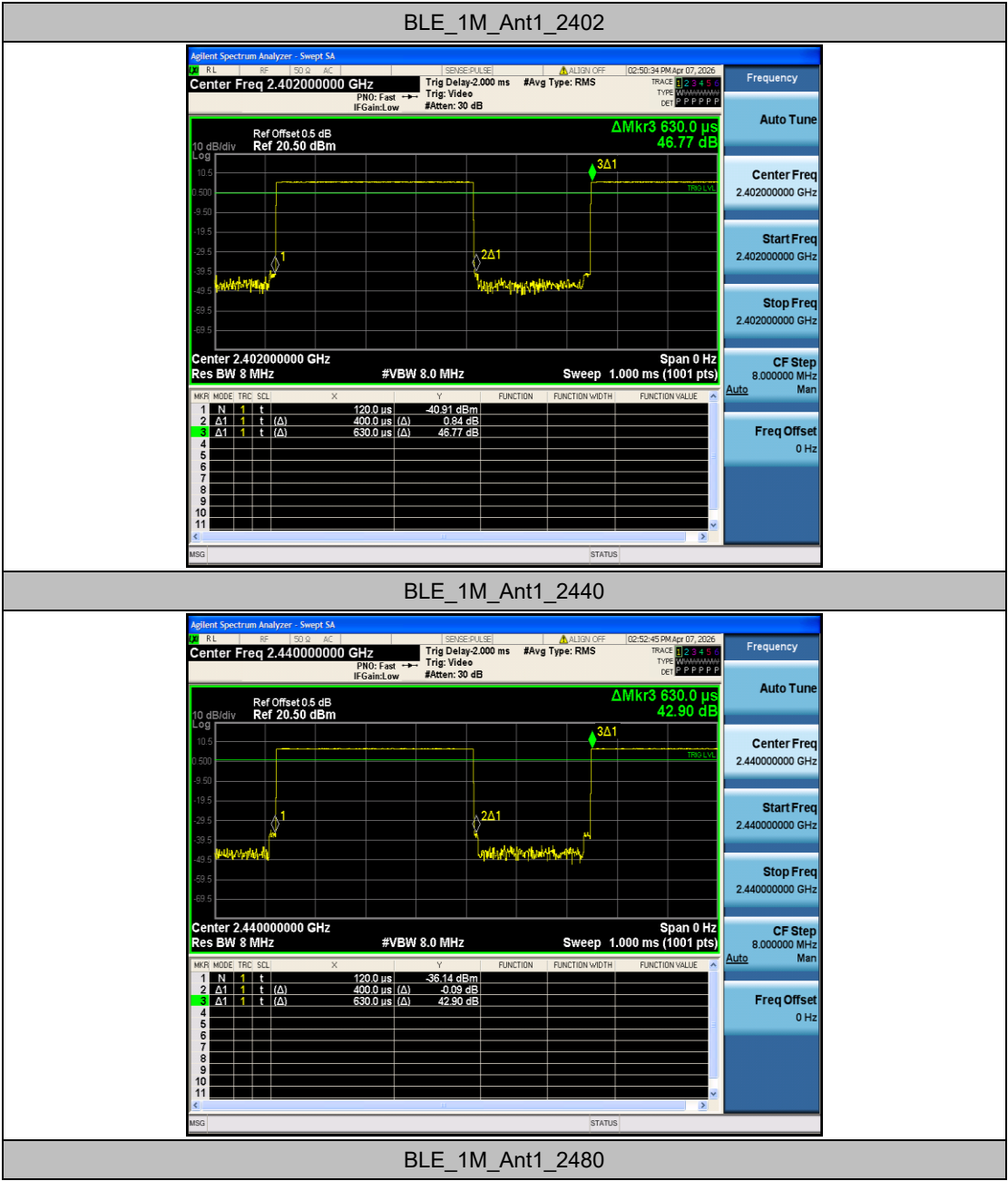


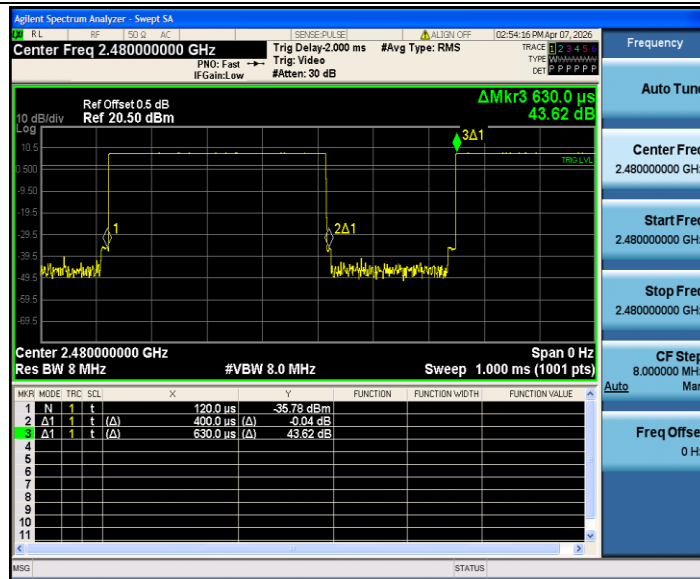
Appendix G: Duty Cycle

Test Result

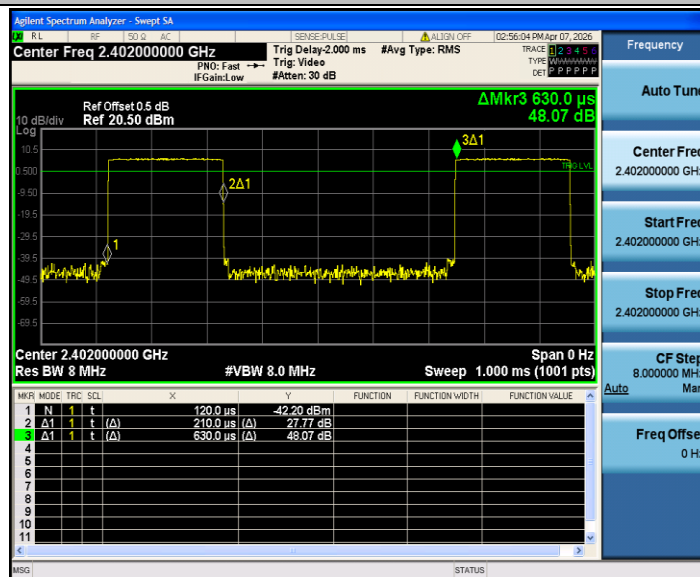
TestMode	Antenna	Freq(MHz)	ON Time [ms]	Period [ms]	X	DC [%]	xFactor	Limit	Verdict
BLE_1M	Ant1	2402	0.40	0.63	0.6349	63.49	1.97	---	---
		2440	0.40	0.63	0.6349	63.49	1.97	---	---
		2480	0.40	0.63	0.6349	63.49	1.97	---	---
BLE_2M	Ant1	2402	0.21	0.63	0.3333	33.33	4.77	---	---
		2440	0.21	0.63	0.3333	33.33	4.77	---	---
		2480	0.21	0.63	0.3333	33.33	4.77	---	---

Test Graphs

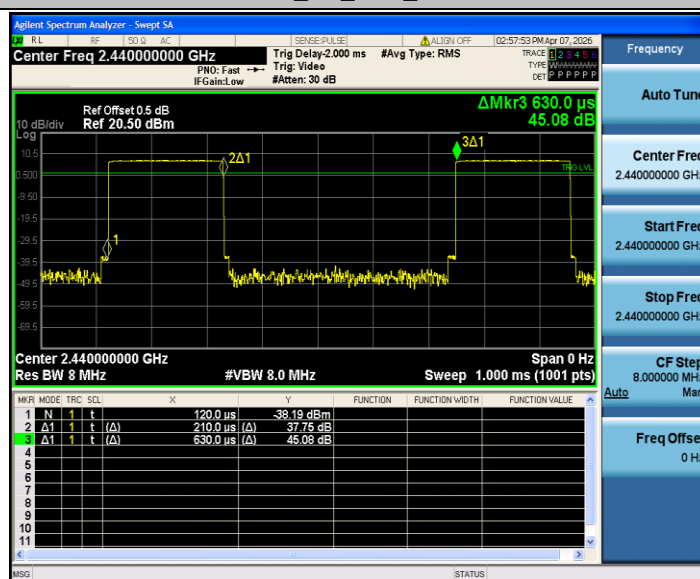




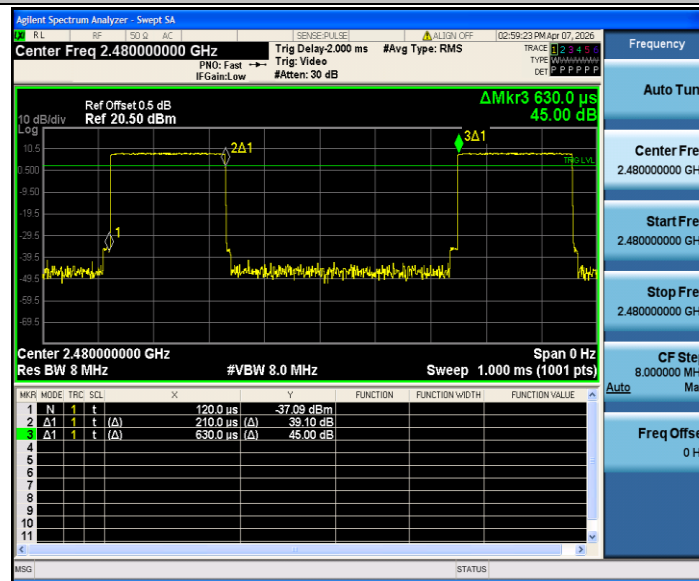
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



Appendix H: Emissions in Restricted Bands

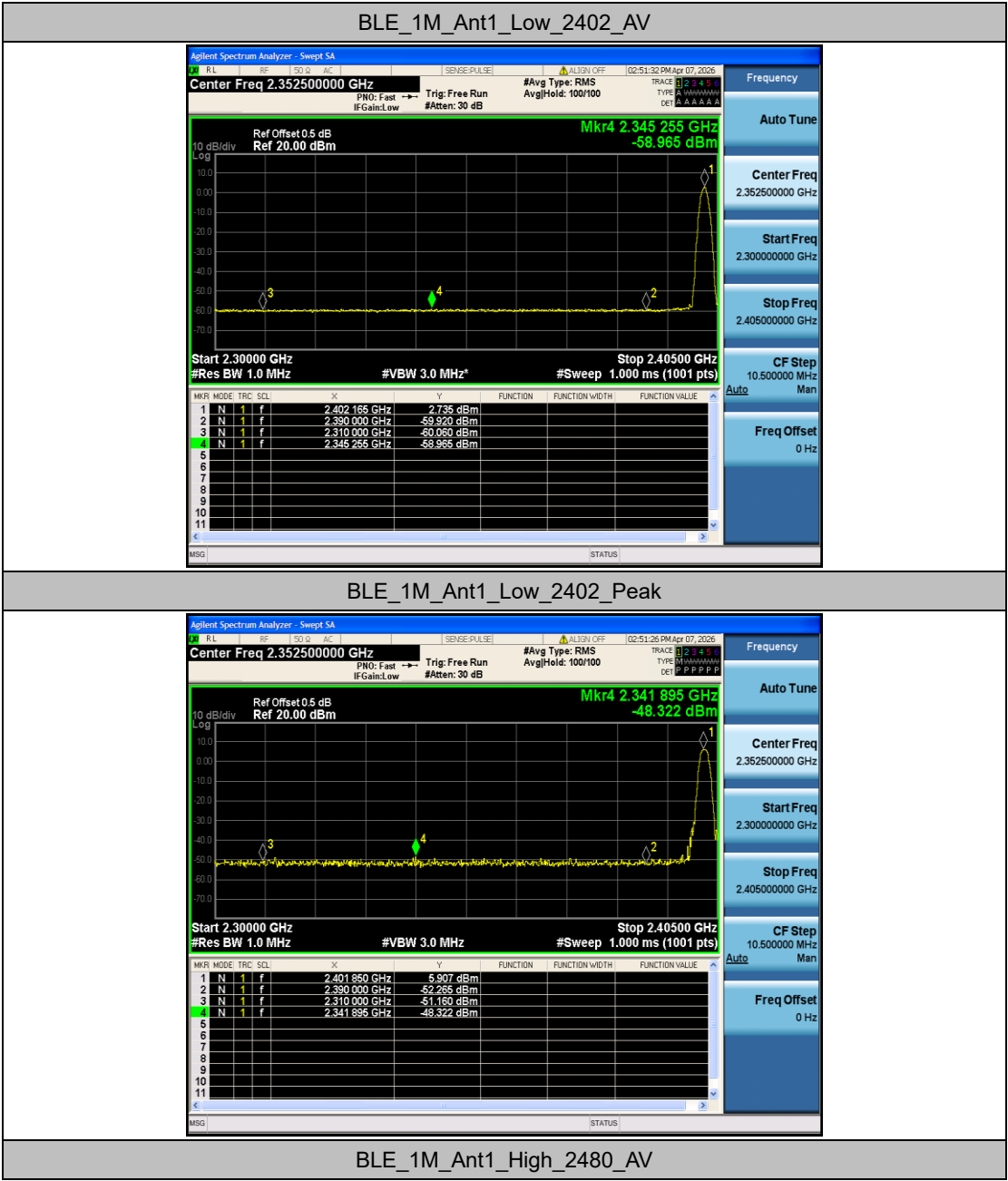
Test Result

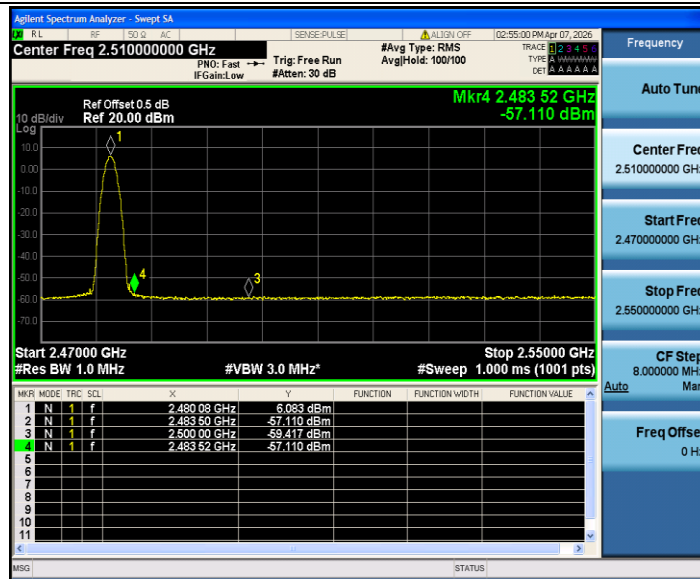
TestMode	Antenna	ChName	Freq(MHz)	Detector	Freq [MHz]	Result [dBm]	Gain [dB]	DC Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
BLE_1M	Ant1	Low	2402	AV	2310.000	-60.06	2.04	1.97	39.15	≤54	PASS
				AV	2345.255	-58.96	2.04	1.97	40.25	≤54	PASS
				AV	2390.000	-59.92	2.04	1.97	39.29	≤54	PASS
				Peak	2310.000	-51.16	2.04	0.00	46.08	≤74	PASS
				Peak	2341.895	-48.32	2.04	0.00	48.92	≤74	PASS
				Peak	2390.000	-52.27	2.04	0.00	44.97	≤74	PASS
		High	2480	AV	2483.500	-57.11	2.04	1.97	42.1	≤54	PASS
				AV	2483.520	-57.11	2.04	1.97	42.1	≤54	PASS
				AV	2500.000	-59.42	2.04	1.97	39.79	≤54	PASS
				Peak	2483.500	-48.11	2.04	0.00	49.13	≤74	PASS
				Peak	2483.840	-45.5	2.04	0.00	51.74	≤74	PASS
				Peak	2500.000	-50.39	2.04	0.00	46.85	≤74	PASS
BLE_2M	Ant1	Low	2402	AV	2310.000	-59.85	2.04	4.77	42.16	≤54	PASS
				AV	2361.215	-58.72	2.04	4.77	43.29	≤54	PASS
				AV	2390.000	-59.81	2.04	4.77	42.2	≤54	PASS
				Peak	2310.000	-51.17	2.04	0.00	46.07	≤74	PASS
				Peak	2358.065	-48.05	2.04	0.00	49.19	≤74	PASS
				Peak	2390.000	-52.54	2.04	0.00	44.7	≤74	PASS
		High	2480	AV	2483.500	-57.74	2.04	4.77	44.27	≤54	PASS
				AV	2483.760	-56.97	2.04	4.77	45.04	≤54	PASS
				AV	2500.000	-58.88	2.04	4.77	43.13	≤54	PASS
				Peak	2483.500	-47.4	2.04	0.00	49.84	≤74	PASS
				Peak	2484.080	-43.15	2.04	0.00	54.09	≤74	PASS
				Peak	2500.000	-50.98	2.04	0.00	46.26	≤74	PASS

Note:

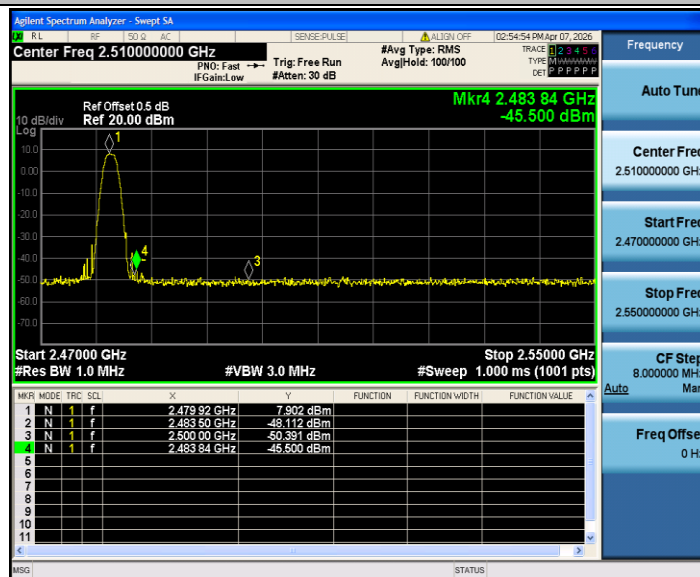
The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

Test Graphs

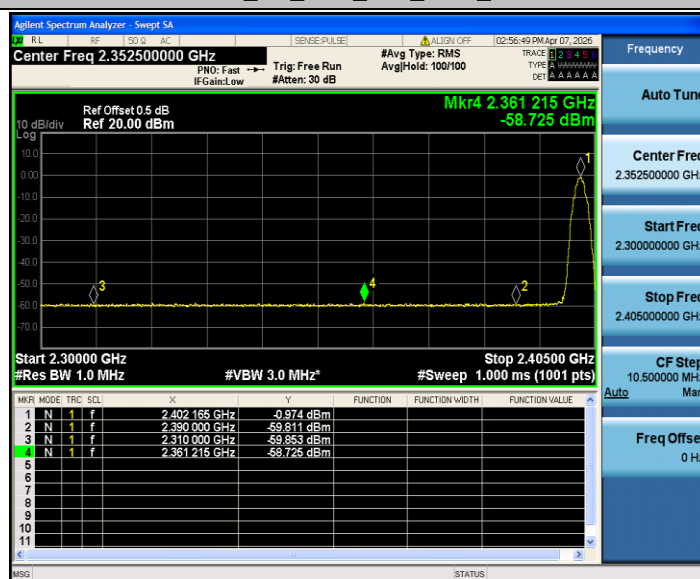




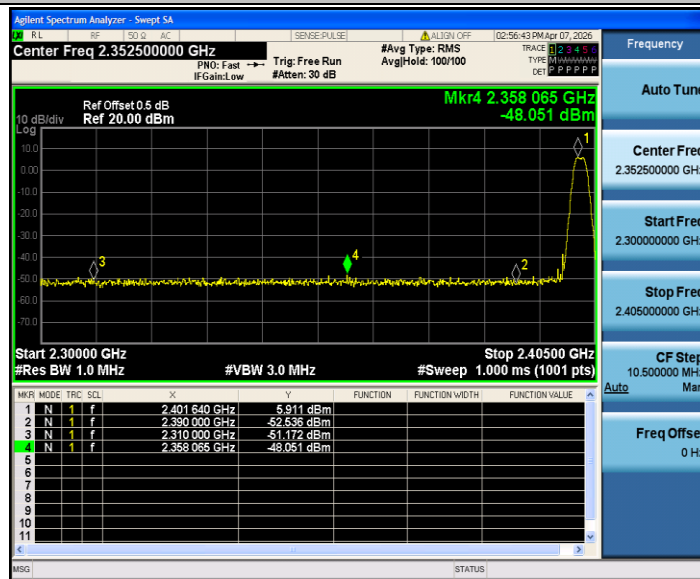
BLE_1M_Ant1_High_2480_Peak



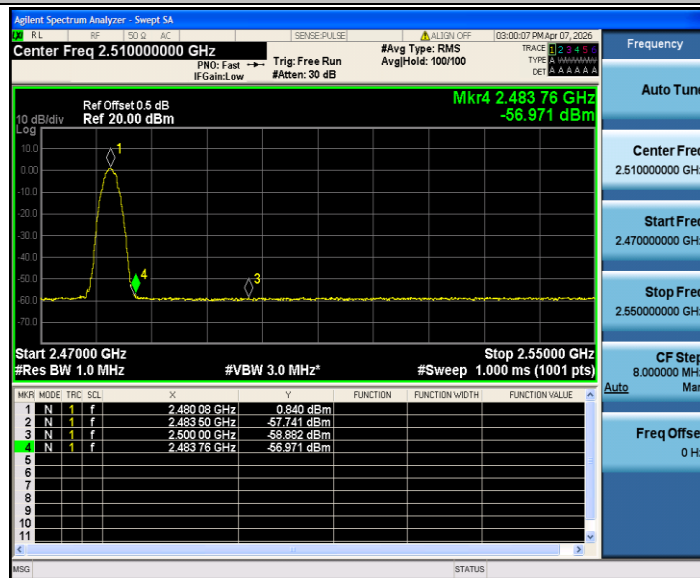
BLE_2M_Ant1_Low_2402_AV



BLE_2M_Ant1_Low_2402_Peak



BLE_2M_Ant1_High_2480_AV



BLE_2M_Ant1_High_2480_Peak

