

FCC Appendix RF Test Data for BLE

FCC ID : 2BXND-HD-P16-3

Company : Shenzhen Hongju Industrial Development Co., Ltd.

EUT : tracker collar

Model Number : HD-P16-3

Report No. : CTA26080300401

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	0.648	2401.688	2402.336	0.5	PASS
		2440	0.636	2439.688	2440.324	0.5	PASS
		2480	0.644	2479.688	2480.332	0.5	PASS

Agilent Spectrum Analyzer - Swept SA

Center Freq 2.402000000 GHz

Ref Offset 0.3 dB
Ref 30.00 dBm

Trig: Free Run
#Atten: 40 dB

#Avg Type: RMS
AvgHold: 100/100

Span 4.000 MHz
Sweep 1.000 ms (1001 pts)

#Res BW 100 kHz
#VBW 300 kHz

ΔMkr3 648 kHz
0.095 dB

Log

10 dB/div

20.0

10.0

0.00

-10.0

-20.0

-30.0

-40.0

-50.0

-60.0

1

2

3Δ1

Center 2.402000 GHz

#Res BW 100 kHz

#VBW 300 kHz

Span 4.000 MHz

Sweep 1.000 ms (1001 pts)

MNR	MODE	TRIG	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.401 688 GHz	-6.144 dBm			
2	N	1	f	2.402 020 GHz	-0.206 dBm			
3	Δ1	1	f (Δ)	648 kHz (Δ)	0.095 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

MSO

STATUS

BLE_1M_Ant1_2402

Agilent Spectrum Analyzer - Swept SA

Center Freq 2.440000000 GHz

Ref Offset 0.3 dB
Ref 30.00 dBm

Trig: Free Run
#Atten: 40 dB

#Avg Type: RMS
AvgHold: 100/100

Span 4.000 MHz
Sweep 1.000 ms (1001 pts)

#Res BW 100 kHz
#VBW 300 kHz

ΔMkr3 636 kHz
0.169 dB

Log

10 dB/div

20.0

10.0

0.00

-10.0

-20.0

-30.0

-40.0

-50.0

-60.0

1

2

3Δ1

Center 2.440000 GHz

#Res BW 100 kHz

#VBW 300 kHz

Span 4.000 MHz

Sweep 1.000 ms (1001 pts)

MNR	MODE	TRIG	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.439 688 GHz	-6.263 dBm			
2	N	1	f	2.440 020 GHz	-0.340 dBm			
3	Δ1	1	f (Δ)	636 kHz (Δ)	0.169 dB			

Frequency

Auto Tune

Center Freq
2.440000000 GHz

Start Freq
2.438000000 GHz

Stop Freq
2.442000000 GHz

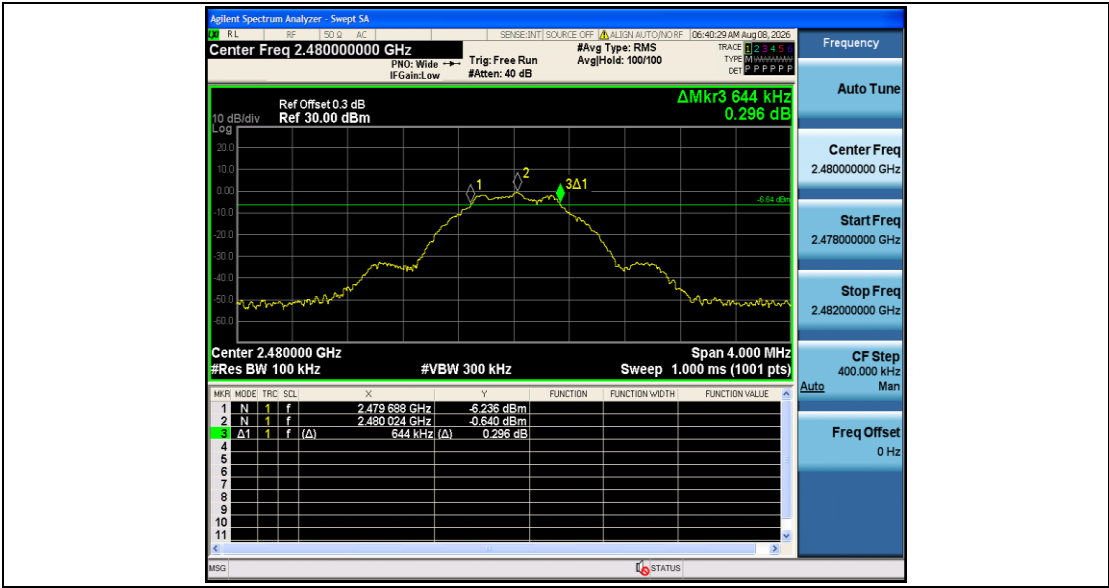
CF Step
400.000 kHz
Man

Freq Offset
0 Hz

MSO

STATUS

BLE_1M_Ant1_2440

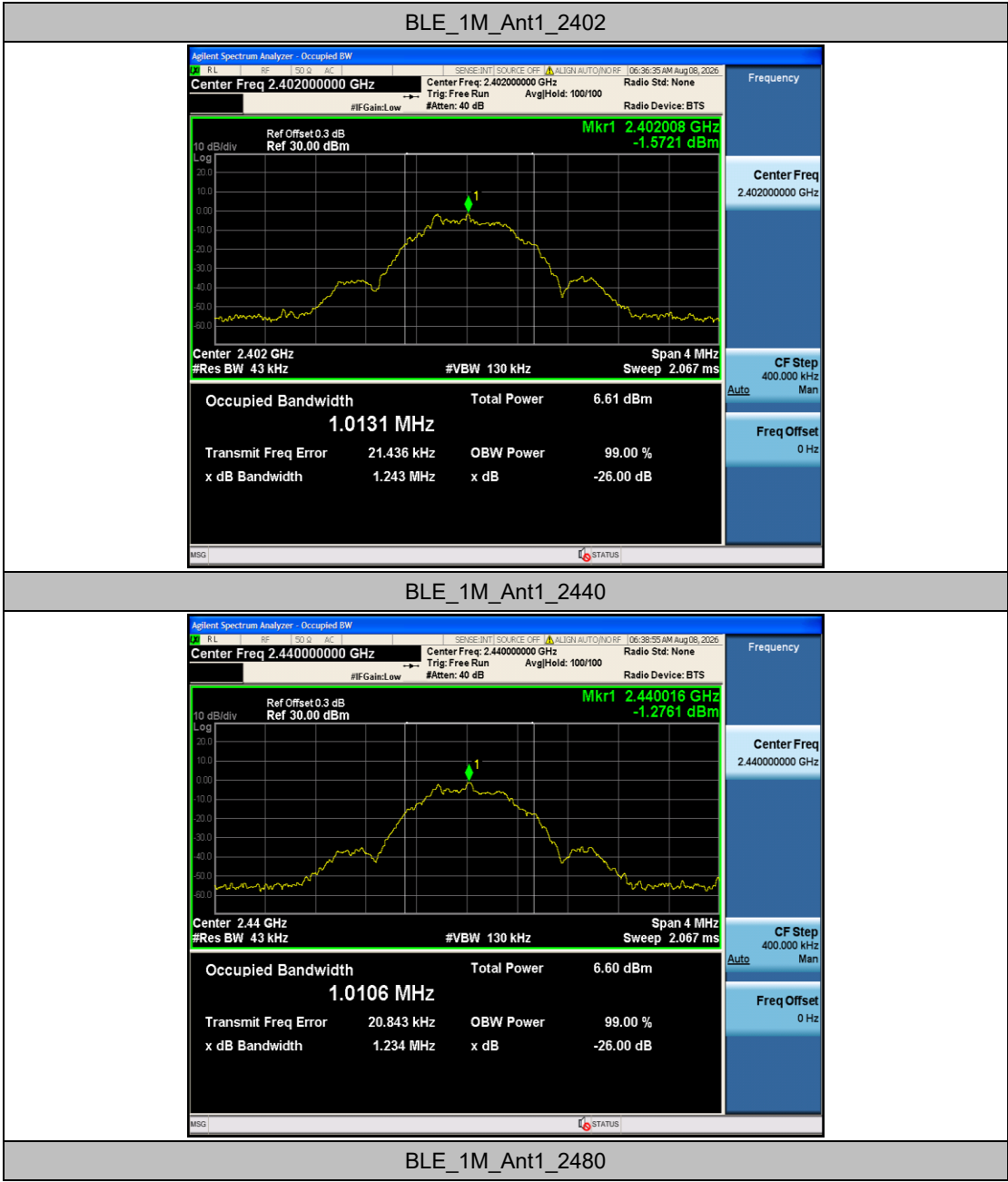


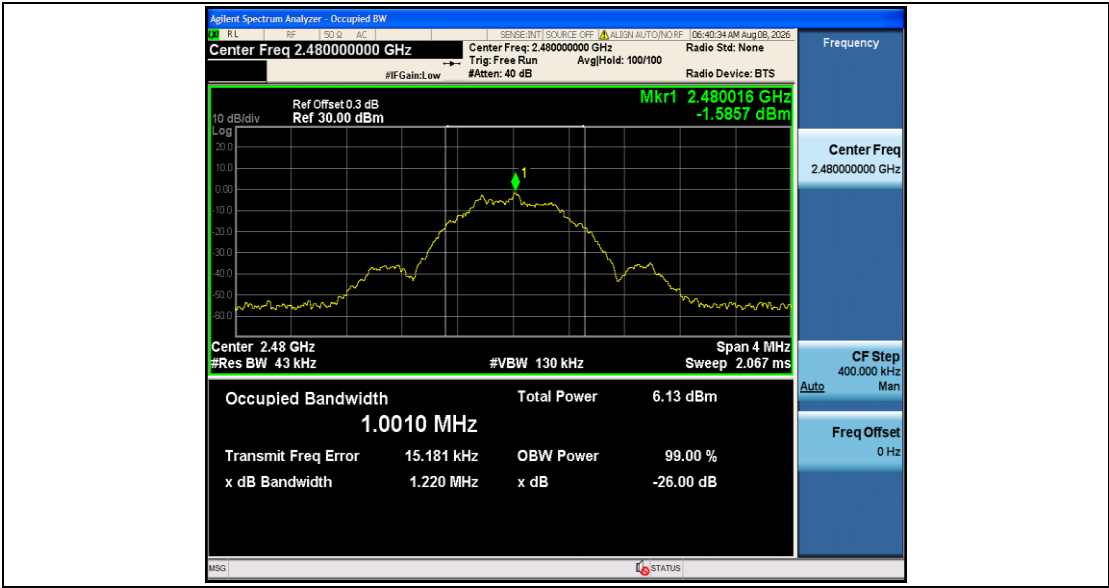
Appendix B: Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.0131	2401.5149	2402.5280	---	---
		2440	1.0106	2439.5155	2440.5261	---	---
		2480	1.0010	2479.5147	2480.5157	---	---

Test Graphs





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	-0.08	≤30	PASS
		2440	-0.19	≤30	PASS
		2480	-0.50	≤30	PASS

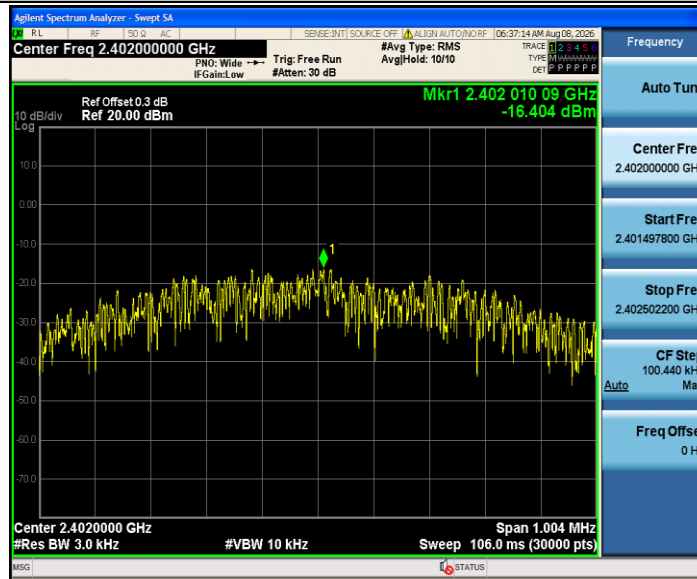
Appendix D: Maximum power spectral density

Test Result

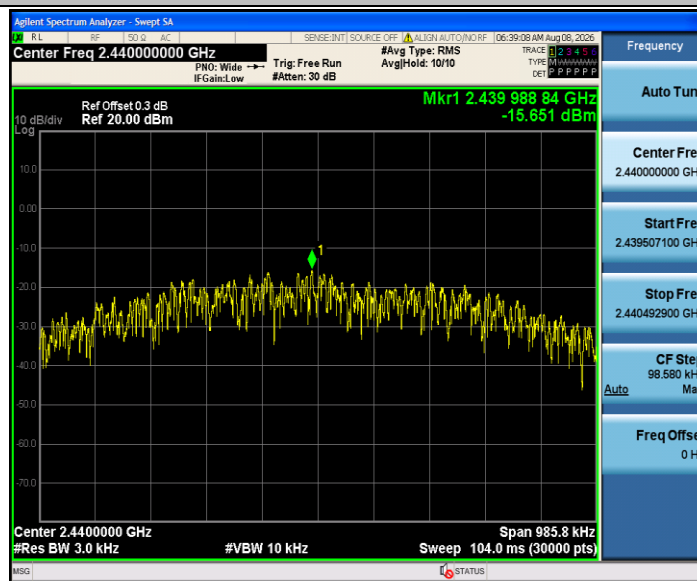
TestMode	Antenna	Freq(MHz)	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-16.40	≤8.00	PASS
		2440	-15.65	≤8.00	PASS
		2480	-15.99	≤8.00	PASS

Test Graphs

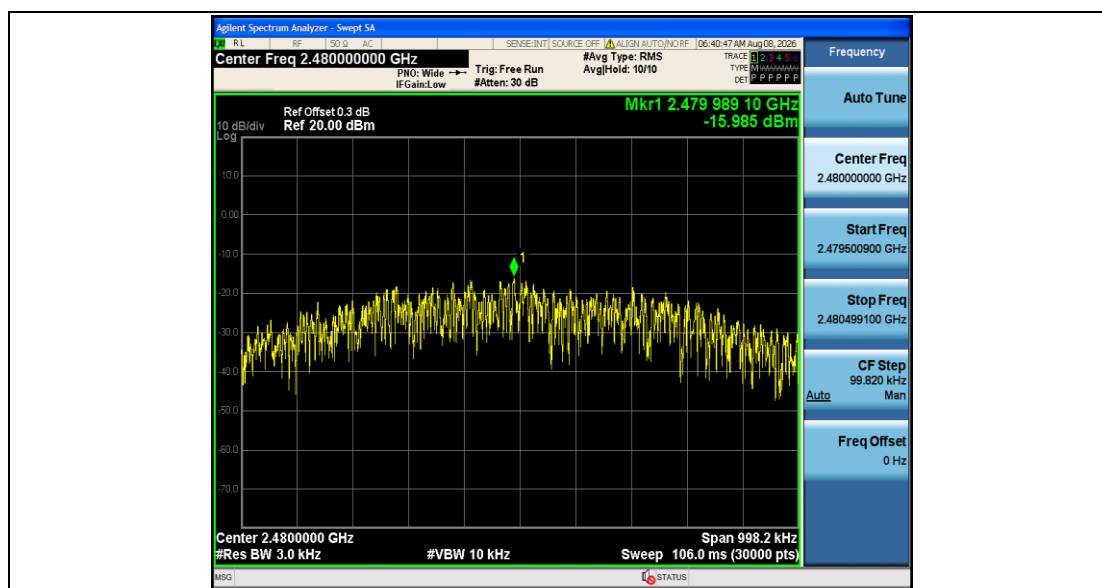
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480

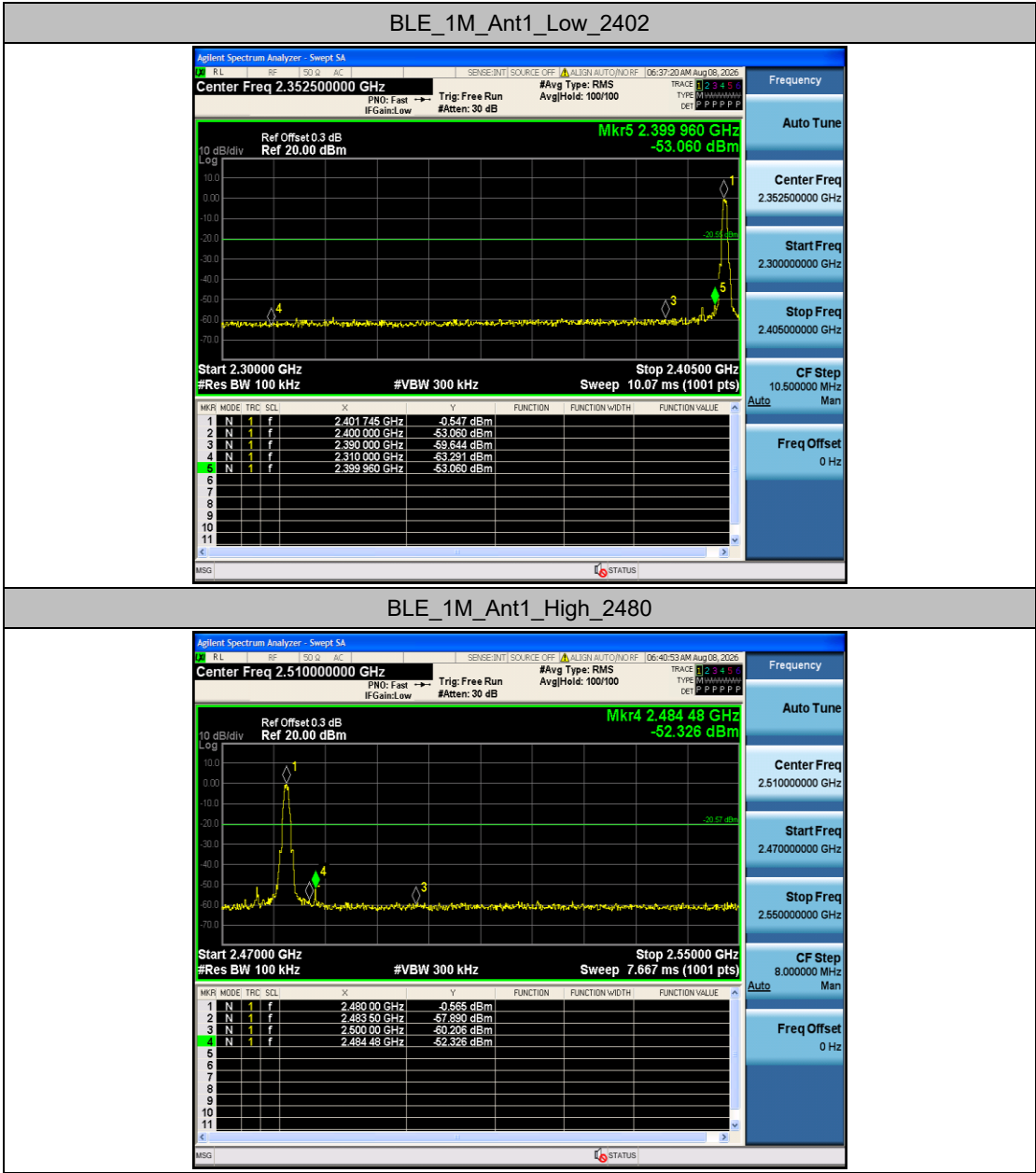


Appendix E: Band edge measurements

Test Result

TestMode	Antenna	Channel	Freq(MHz)	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	-0.55	-53.06	≤-20.55	PASS
		High	2480	-0.57	-52.33	≤-20.57	PASS

Test Graphs

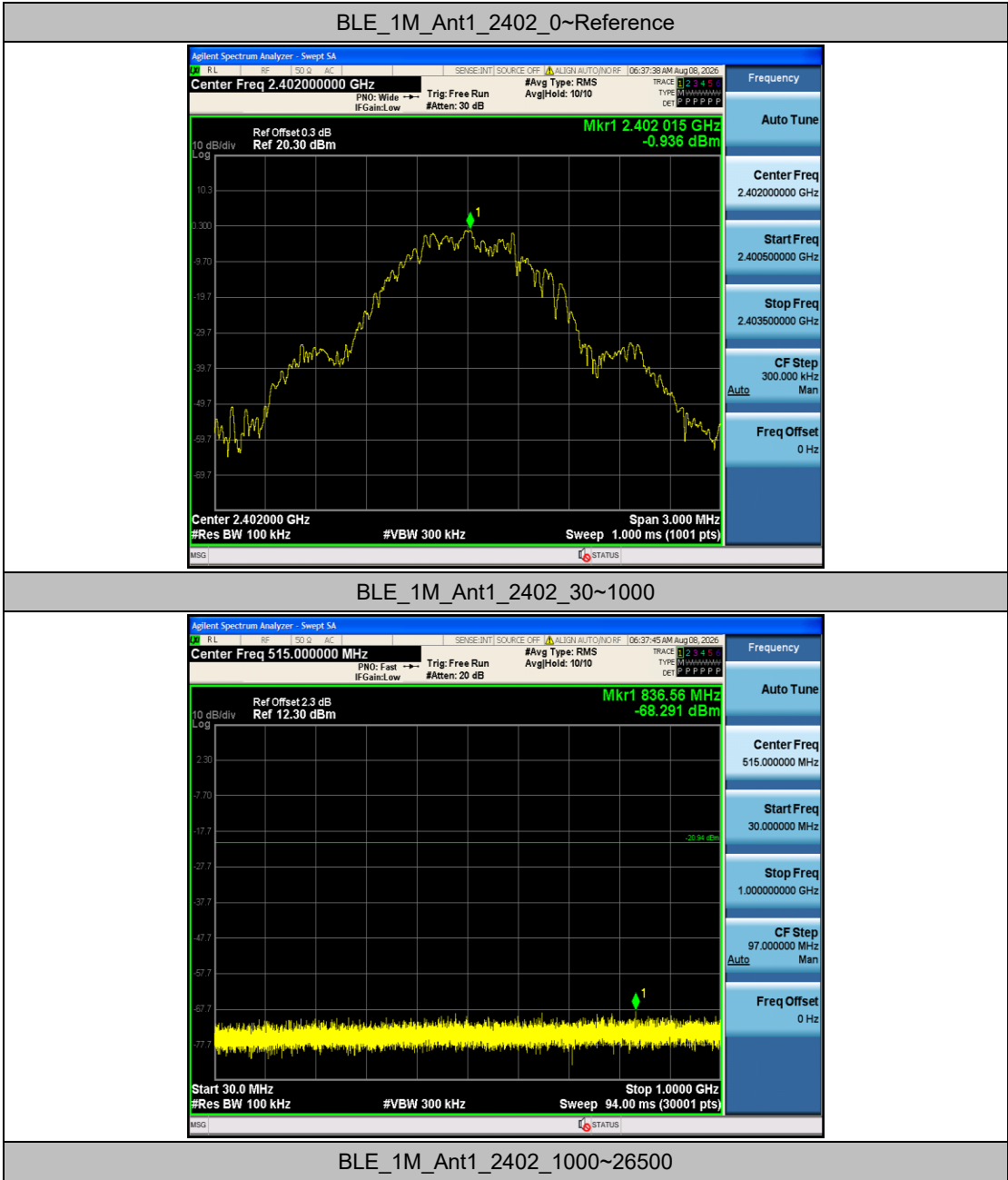


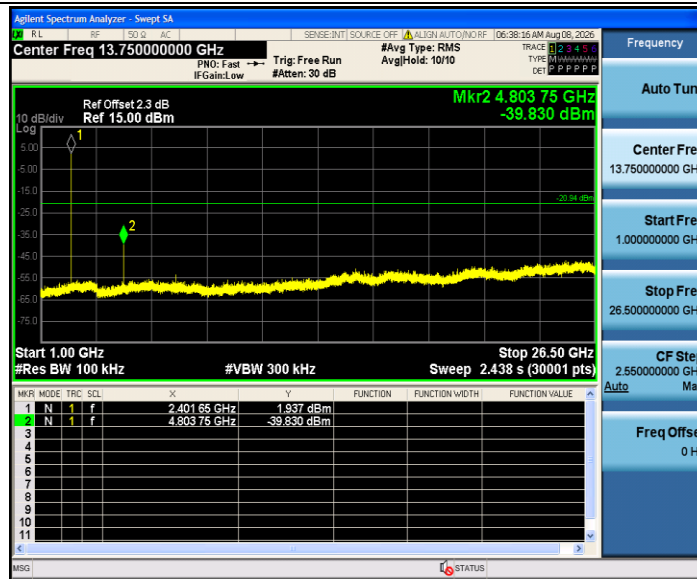
Appendix F: Conducted Spurious Emission

Test Result

TestMode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	-0.94	-0.94	---	PASS
			30~1000	-0.94	-68.29	≤-20.94	PASS
			1000~26500	-0.94	-39.83	≤-20.94	PASS
		2440	Reference	-0.69	-0.69	---	PASS
			30~1000	-0.69	-68.83	≤-20.69	PASS
			1000~26500	-0.69	-40.34	≤-20.69	PASS
		2480	Reference	-0.94	-0.94	---	PASS
			30~1000	-0.94	-69.03	≤-20.94	PASS
			1000~26500	-0.94	-41.65	≤-20.94	PASS

Test Graphs

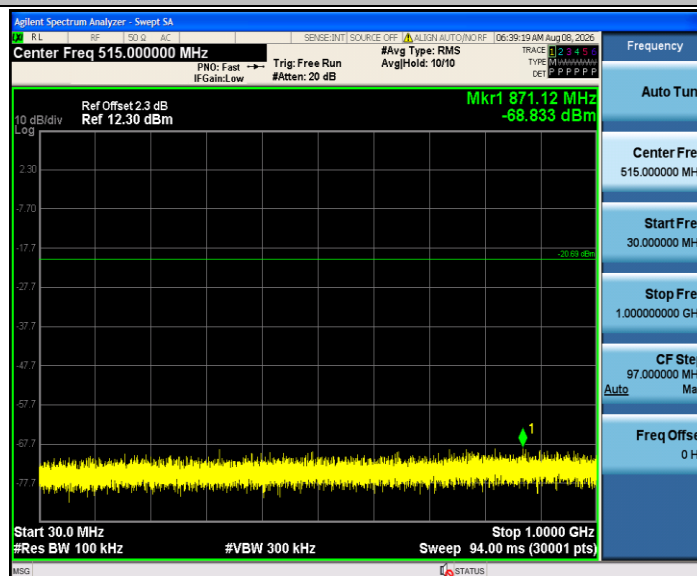




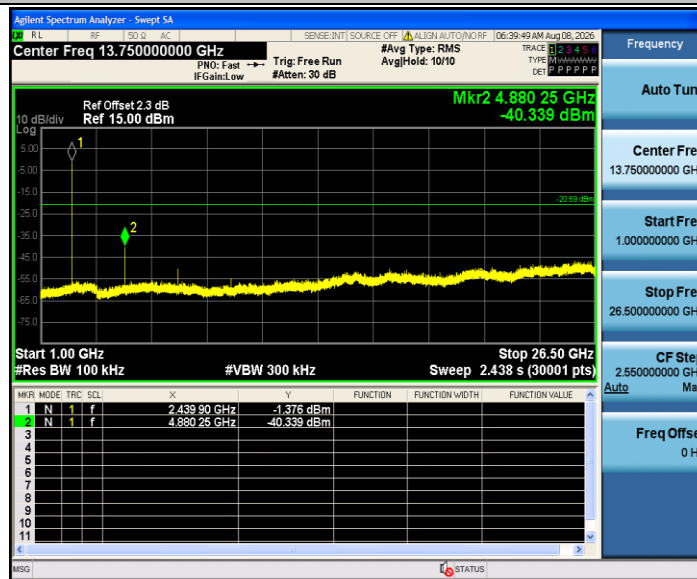
BLE_1M_Ant1_2440_0~Reference



BLE_1M_Ant1_2440_30~1000



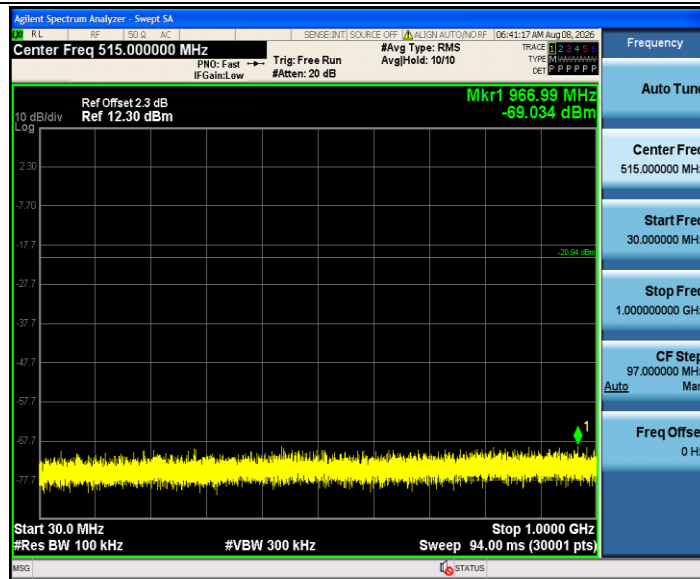
BLE_1M_Ant1_2440_1000~26500



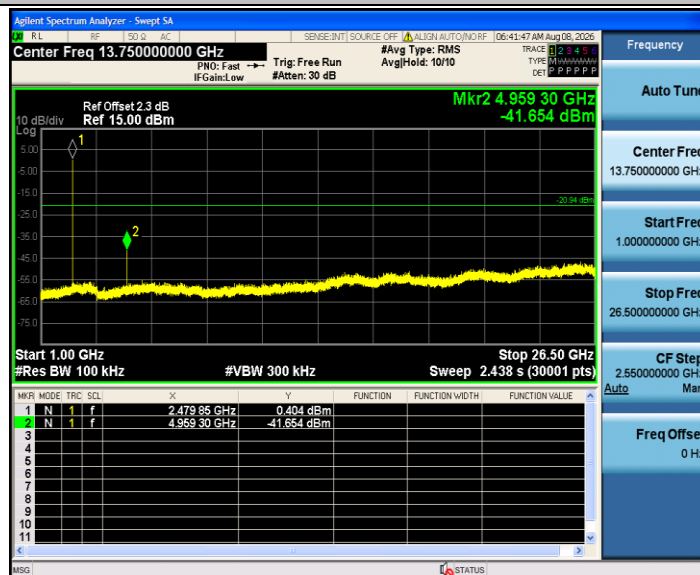
BLE_1M_Ant1_2480_0~Reference



BLE_1M_Ant1_2480_30~1000



BLE_1M_Ant1_2480_1000~26500

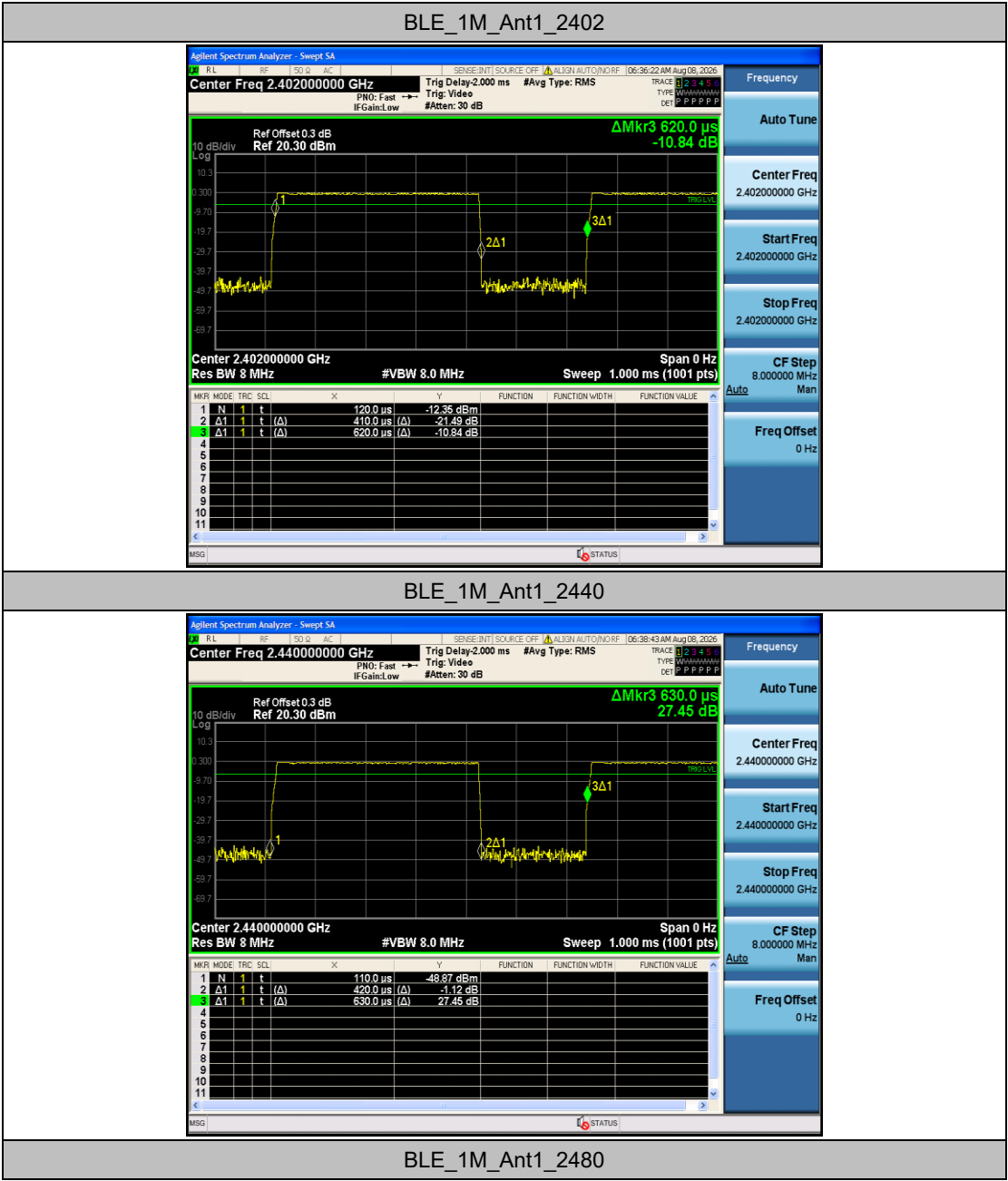


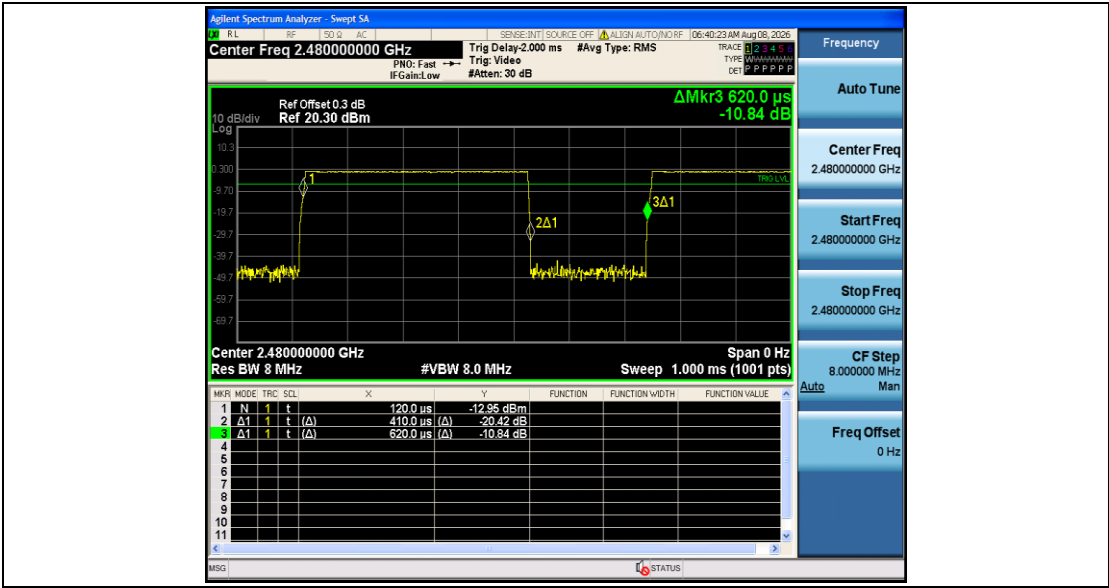
Appendix G: Duty Cycle

Test Result

TestMode	Antenna	Freq(MHz)	ON Time [ms]	Period [ms]	X	DC [%]	xFactor	Limit	Verdict
BLE_1M	Ant1	2402	0.41	0.62	0.6613	66.13	1.80	---	---
		2440	0.42	0.63	0.6667	66.67	1.76	---	---
		2480	0.41	0.62	0.6613	66.13	1.80	---	---

Test Graphs





Appendix H: Emissions in Restricted Bands

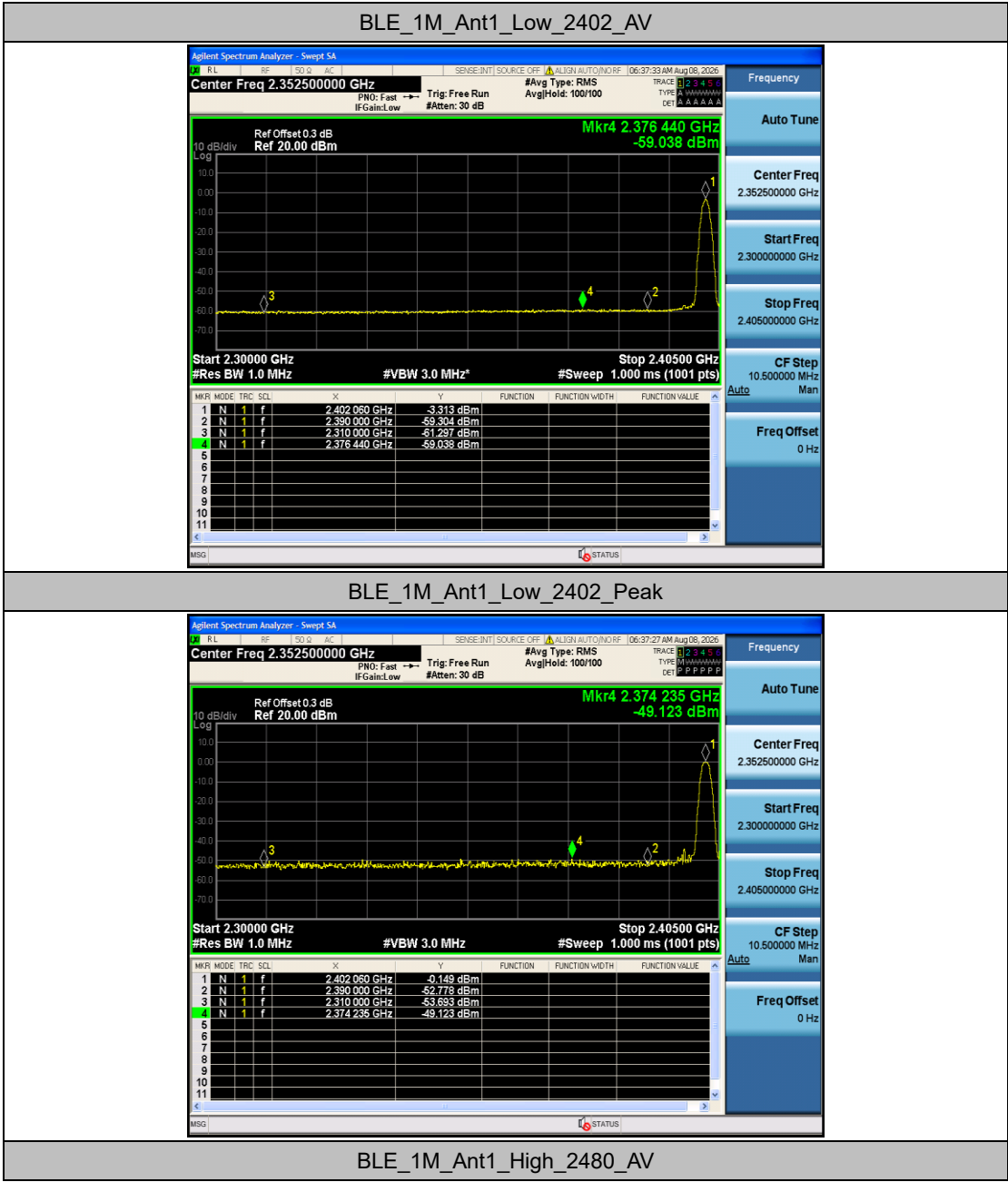
Test Result

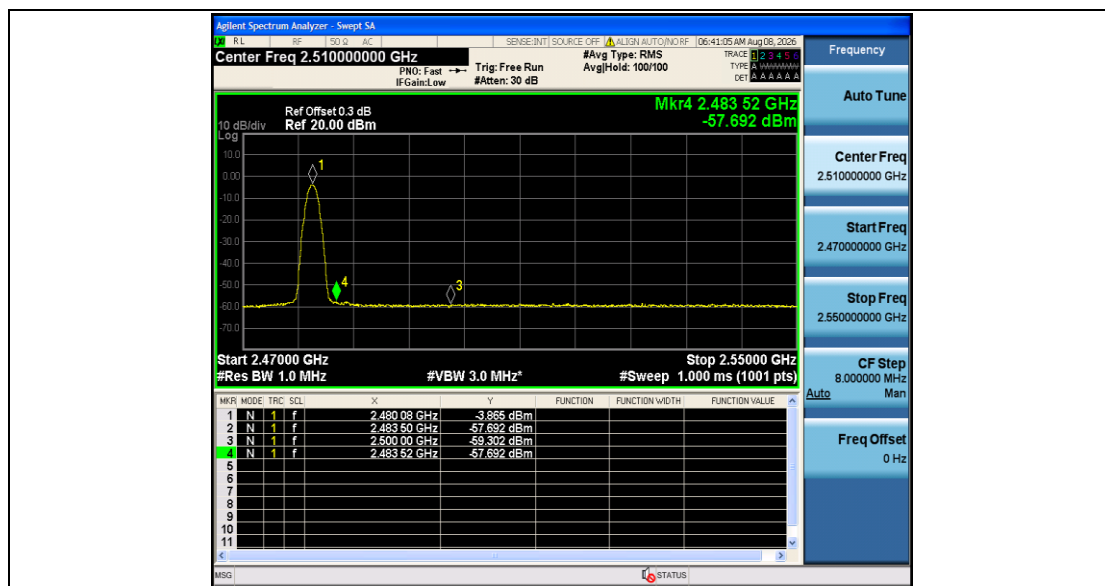
TestMode	Antenna	Channel	Freq(MHz)	Detector	Freq [MHz]	Result [dBm]	Gain [dB]	DC Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
BLE_1M	Ant1	Low	2402	AV	2310.000	-61.3	2.00	1.80	37.70	≤54	PASS
				AV	2376.440	-59.04	2.00	1.80	39.96	≤54	PASS
				AV	2390.000	-59.3	2.00	1.80	39.70	≤54	PASS
				Peak	2310.000	-53.69	2.00	0.00	43.51	≤74	PASS
				Peak	2374.235	-49.12	2.00	0.00	48.08	≤74	PASS
				Peak	2390.000	-52.78	2.00	0.00	44.42	≤74	PASS
		High	2480	AV	2483.500	-57.69	2.00	1.80	41.31	≤54	PASS
				AV	2483.520	-57.69	2.00	1.80	41.31	≤54	PASS
				AV	2500.000	-59.3	2.00	1.80	39.70	≤54	PASS
				Peak	2483.500	-47.31	2.00	0.00	49.89	≤74	PASS
				Peak	2484.800	-45.48	2.00	0.00	51.72	≤74	PASS
				Peak	2500.000	-52.32	2.00	0.00	44.88	≤74	PASS

Note:

1. 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

