

FCC Appendix RF Test Data for BLE

FCC ID : 2BX8Z-GE003

Company : KIE ELECTRONICS LIMITED

EUT : Smart Digital Calendar

Model Number : GE003

Report No. : CTA26070201901

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	0.660	2401.680	2402.340	0.5	PASS
		2440	0.644	2439.692	2440.336	0.5	PASS
		2480	0.644	2479.692	2480.336	0.5	PASS

BLE_1M_Ant1_2402

Agilent Spectrum Analyzer - Swept 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)

#Res BW 300 kHz

MNR MODE TRG SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE

MNR	MODE	TRG	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.401680 GHz	-5.996 dBm			
2	N	1	f	2.402018 GHz	-0.016 dBm			
3	Δ	1	f (Δ)	2.402660 GHz (Δ)	0.121 dB			

Frequency

Auto Tune

Center Freq 2.402000000 GHz

Start Freq 2.400000000 GHz

Stop Freq 2.440000000 GHz

CF Step 400.000 kHz

Freq Offset 0 Hz

BLE_1M_Ant1_2440

Agilent Spectrum Analyzer - Swept 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)

#Res BW 100 kHz

MNR MODE TRG SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE

MNR	MODE	TRG	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.438692 GHz	-0.037 dBm			
2	N	1	f	2.440032 GHz	-0.148 dBm			
3	Δ	1	f (Δ)	2.440644 GHz (Δ)	-0.027 dB			

Frequency

Auto Tune

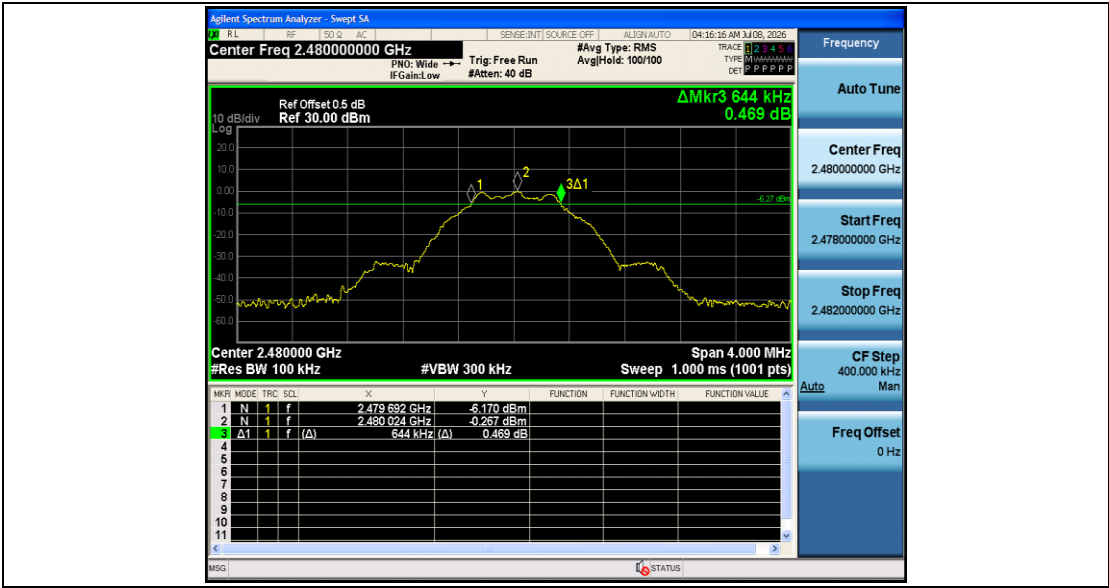
Center Freq 2.440000000 GHz

Start Freq 2.438000000 GHz

Stop Freq 2.442000000 GHz

CF Step 400.000 kHz

Freq Offset 0 Hz

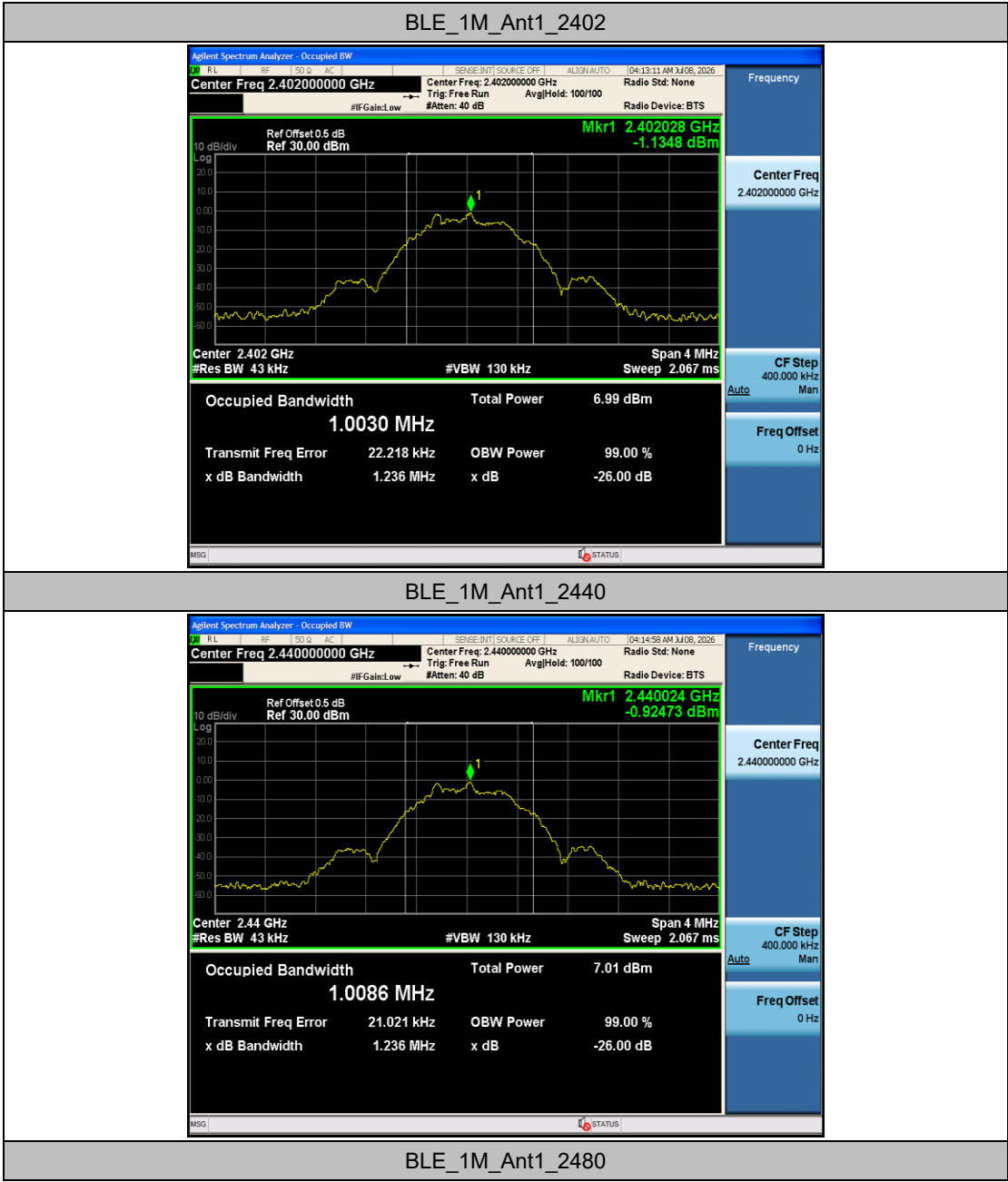


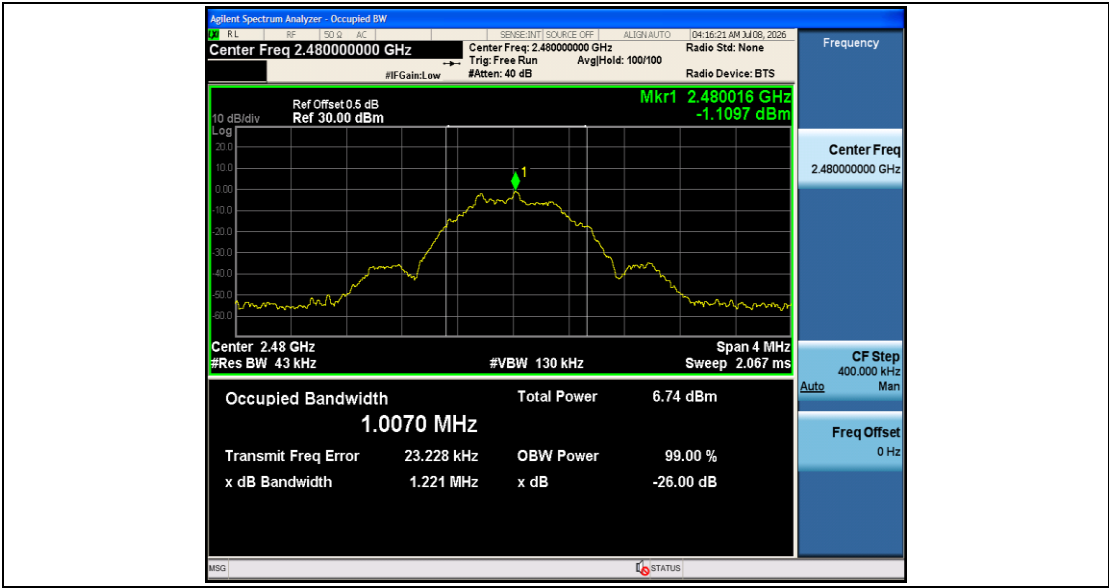
Appendix B: Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.0030	2401.5207	2402.5237	---	---
		2440	1.0086	2439.5167	2440.5253	---	---
		2480	1.0070	2479.5197	2480.5267	---	---

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	0.16	≤30	PASS
		2440	0.12	≤30	PASS
		2480	-0.10	≤30	PASS

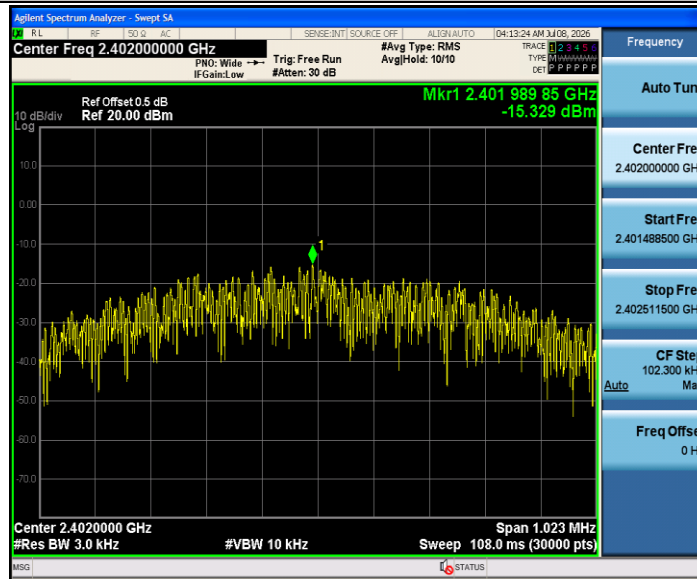
Appendix D: Maximum power spectral density

Test Result

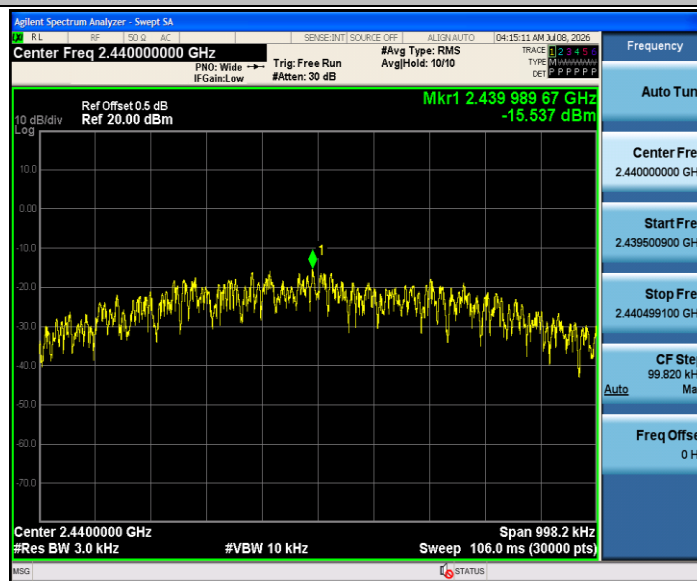
TestMode	Antenna	Freq(MHz)	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-15.33	≤8.00	PASS
		2440	-15.54	≤8.00	PASS
		2480	-16.06	≤8.00	PASS

Test Graphs

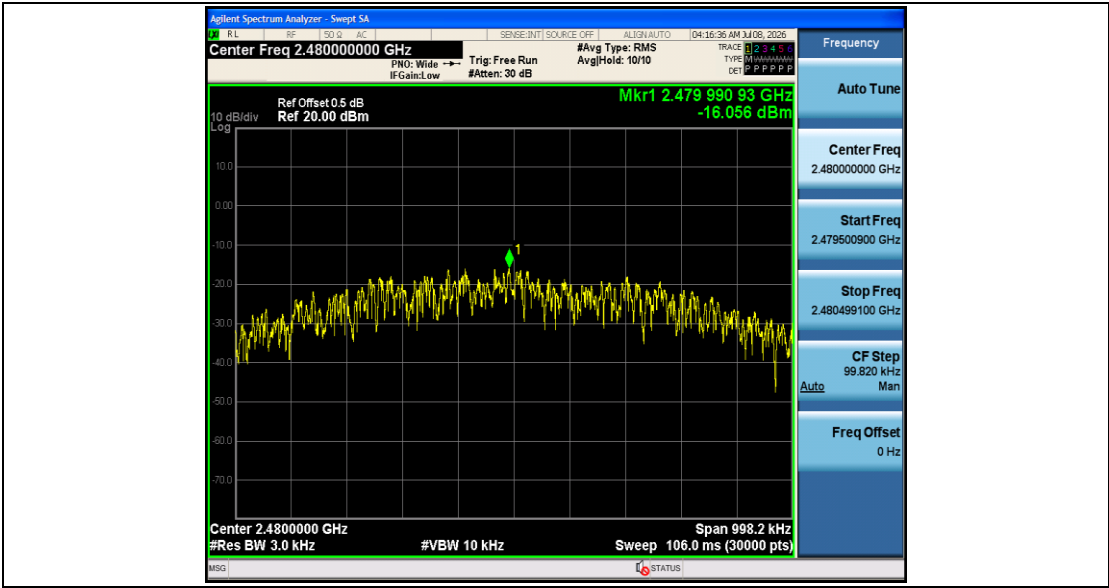
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480

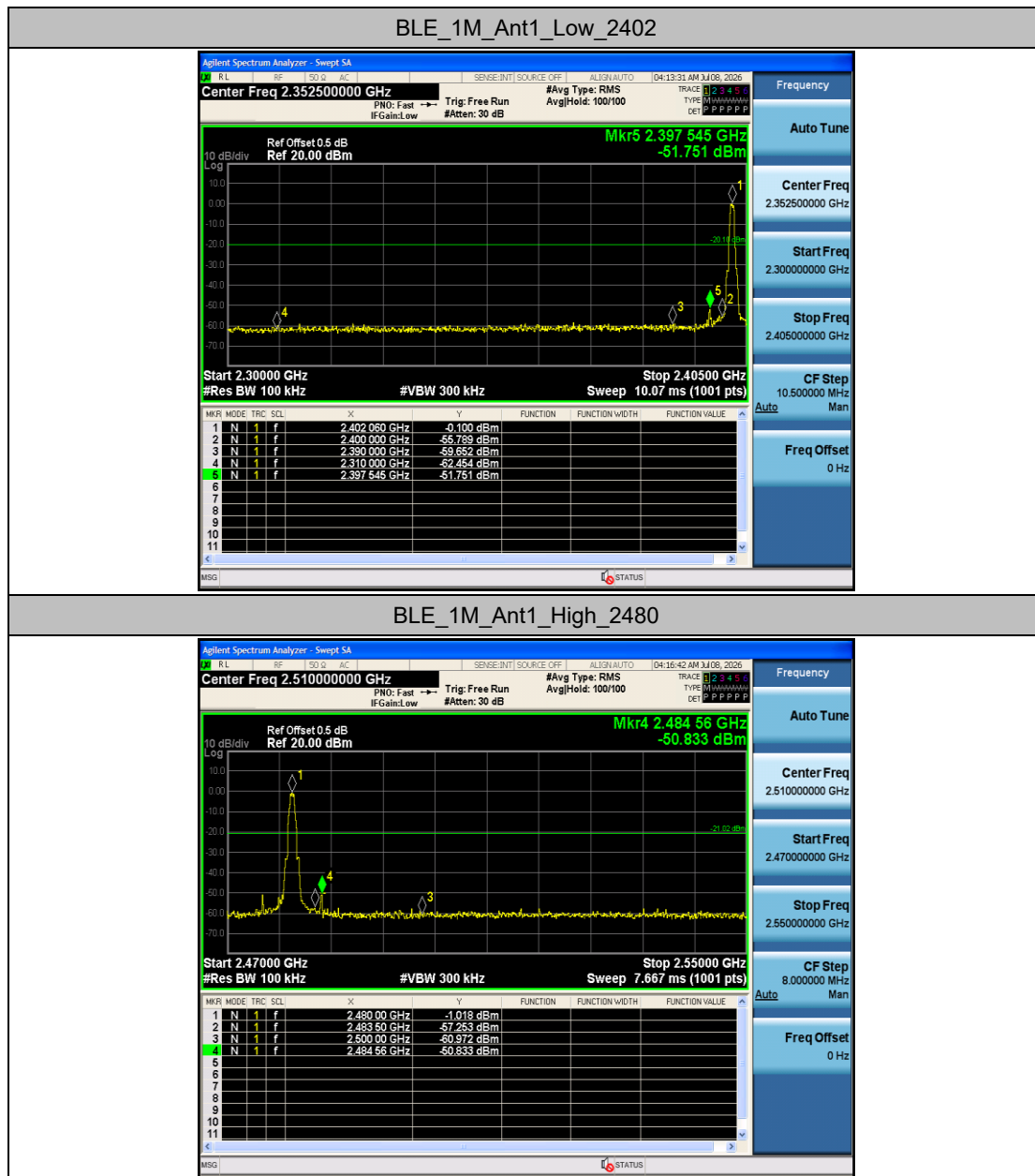


Appendix E: Band edge measurements

Test Result

TestMode	Antenna	ChName	Freq(MHz)	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	-0.10	-51.75	≤-20.1	PASS
		High	2480	-1.02	-50.83	≤-21.02	PASS

Test Graphs



Appendix F: Conducted Spurious Emission

Test Result

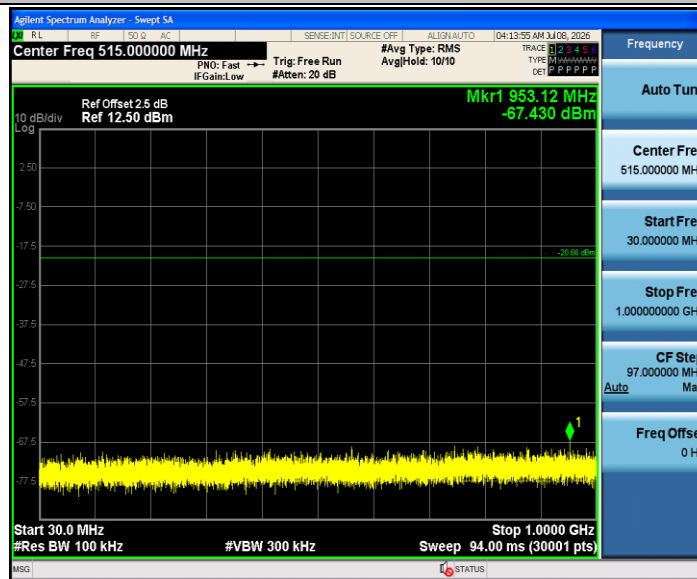
TestMode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	-0.66	-0.66	---	PASS
			30~1000	-0.66	-67.43	≤-20.66	PASS
			1000~26500	-0.66	-39.78	≤-20.66	PASS
		2440	Reference	-1.36	-1.36	---	PASS
			30~1000	-1.36	-62.97	≤-21.36	PASS
			1000~26500	-1.36	-41.01	≤-21.36	PASS
		2480	Reference	-0.26	-0.26	---	PASS
			30~1000	-0.26	-68.55	≤-20.26	PASS
			1000~26500	-0.26	-39.81	≤-20.26	PASS

Test Graphs

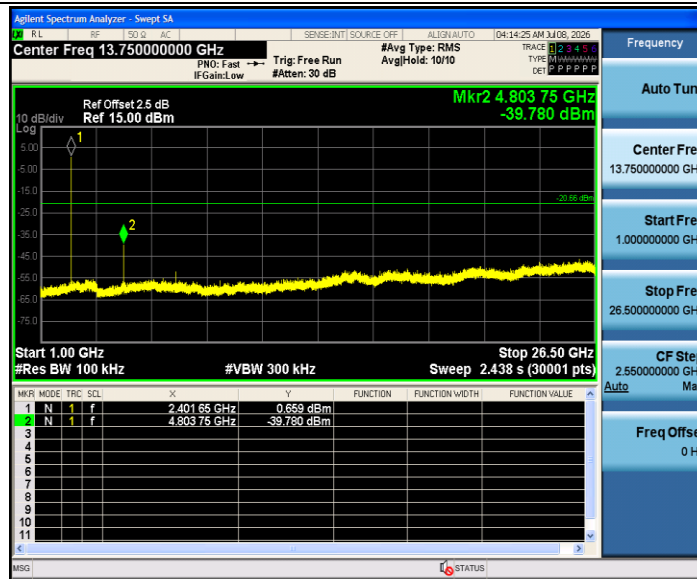
BLE_1M_Ant1_2402_0~Reference



BLE_1M_Ant1_2402_30~1000



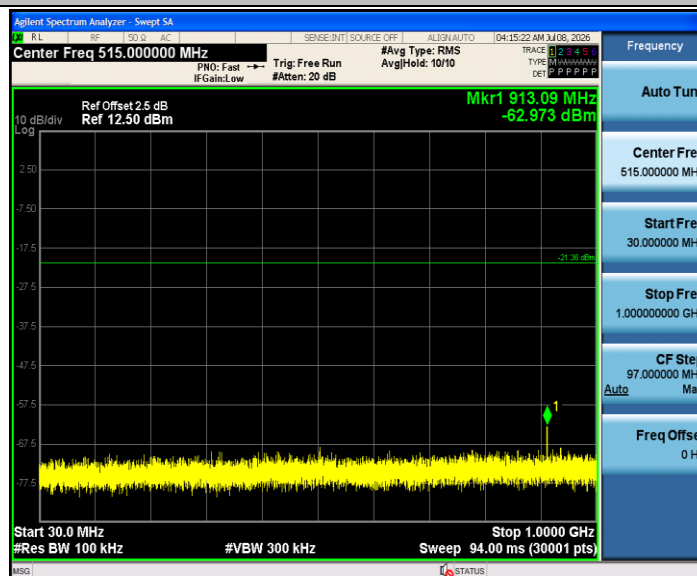
BLE_1M_Ant1_2402_1000~26500



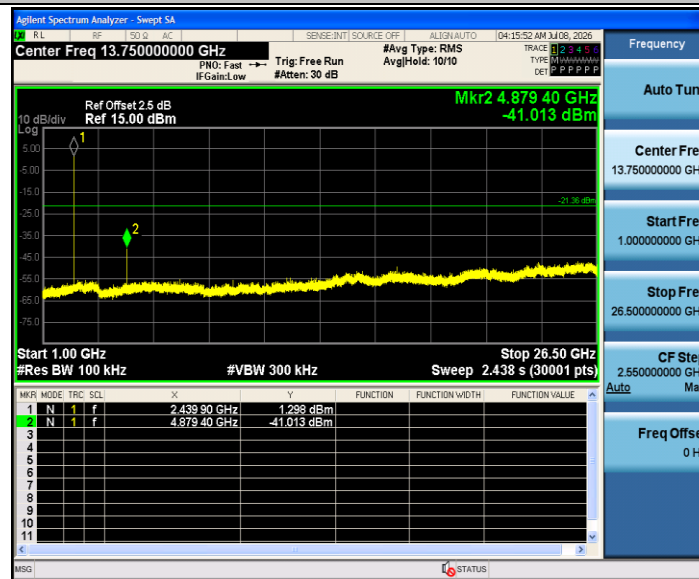
BLE_1M_Ant1_2440_0~Reference



BLE_1M_Ant1_2440_30~1000



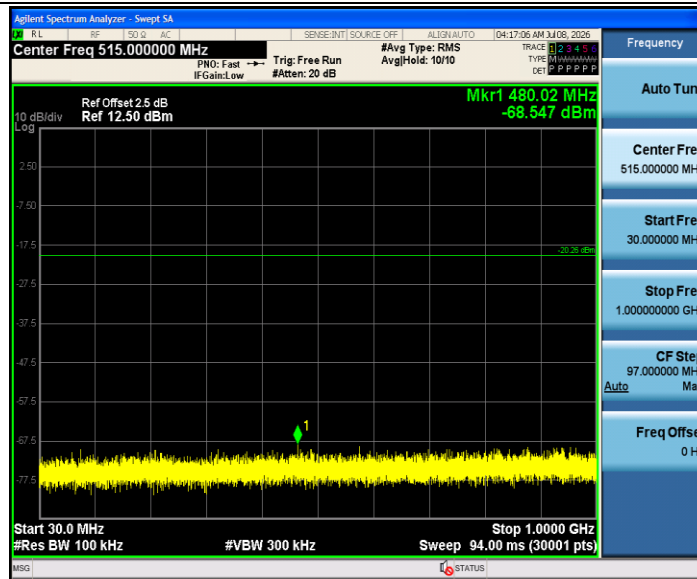
BLE_1M_Ant1_2440_1000~26500



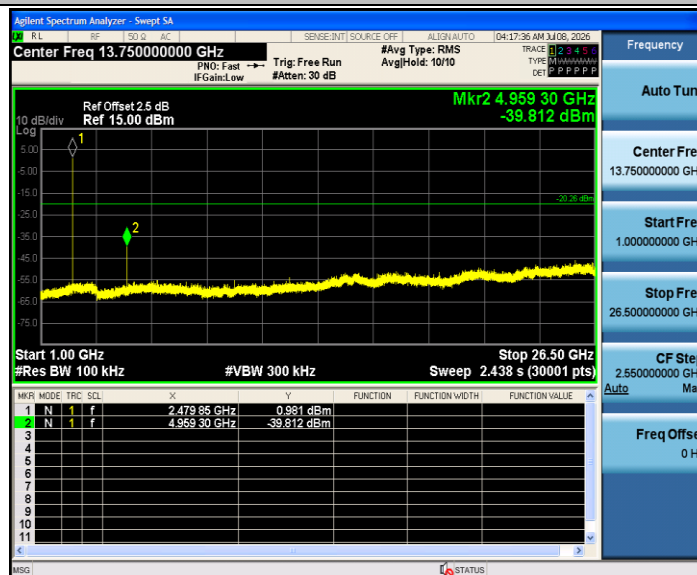
BLE_1M_Ant1_2480_0~Reference



BLE_1M_Ant1_2480_30~1000



BLE_1M_Ant1_2480_1000~26500



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	0.41	0.62	0.6613	66.13	1.80	---	---
		2480	0.42	0.63	0.6667	66.67	1.76	---	---

Agilent Spectrum Analyzer - Swept SA

Center Freq 2.402000000 GHz

Ref Offset 0.5 dB
Ref 20.50 dBm

Trig Delay: 2.000 ms
Trig: Video
#Atten: 30 dB

Span 0 Hz
Sweep 1.000 ms (1001 pts)

Res BW 8 MHz
#VBW 8.0 MHz

ΔMkr3 620.0 μs
-10.43 dB

2Δ1
3Δ1

MKR	MODE	TRIG	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t		120.0 μs			-11.03 dBm
2	Δ1	1	t	(Δ)	410.0 μs (Δ)			-38.89 dB
3	Δ1	1	t	(Δ)	620.0 μs (Δ)			-10.43 dB

Frequency

Auto Tune

Center Freq
2.402000000 GHz

Start Freq
2.402000000 GHz

Stop Freq
2.402000000 GHz

CF Step
8.000000 MHz
Man

Freq Offset
0 Hz

BLE_1M_Ant1_2402

Agilent Spectrum Analyzer - Swept SA

Center Freq 2.440000000 GHz

Ref Offset 0.5 dB
Ref 20.50 dBm

Trig Delay: 2.000 ms
Trig: Video
#Atten: 30 dB

Span 0 Hz
Sweep 1.000 ms (1001 pts)

Res BW 8 MHz
#VBW 8.0 MHz

ΔMkr3 620.0 μs
-10.59 dB

1
2Δ1
3Δ1

MKR	MODE	TRIG	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t		120.0 μs			-12.56 dBm
2	Δ1	1	t	(Δ)	410.0 μs (Δ)			-19.89 dB
3	Δ1	1	t	(Δ)	620.0 μs (Δ)			-10.59 dB

Frequency

Auto Tune

Center Freq
2.440000000 GHz

Start Freq
2.440000000 GHz

Stop Freq
2.440000000 GHz

CF Step
8.000000 MHz
Man

Freq Offset
0 Hz

BLE_1M_Ant1_2440

Appendix H: Emissions in Restricted Bands

Test Result

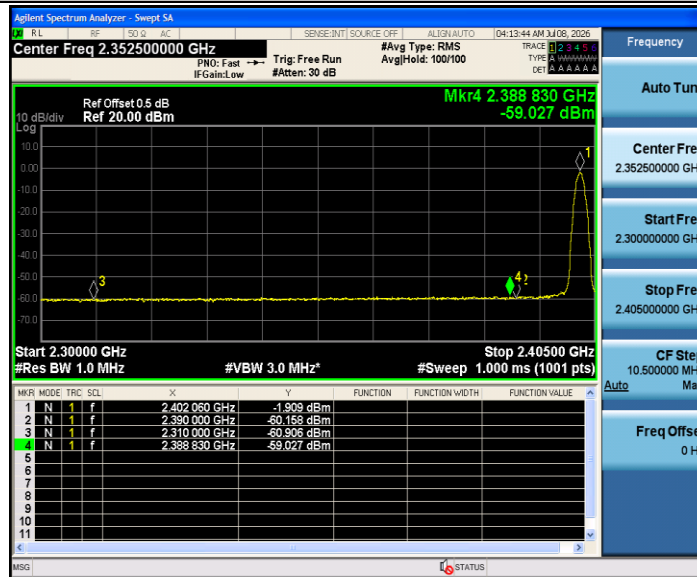
TestMode	Antenna	Channel Name	Freq(MHz)	Detector	Freq [MHz]	Result [dBm]	Gain [dB]	DC Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
BLE_1M	Ant1	Low	2402	AV	2310.000	-60.91	4.13	1.80	40.22	≤54	PASS
				AV	2388.830	-59.03	4.13	1.80	42.1	≤54	PASS
				AV	2390.000	-60.16	4.13	1.80	40.97	≤54	PASS
				Peak	2310.000	-53.28	4.13	0.00	46.05	≤74	PASS
				Peak	2316.485	-48.85	4.13	0.00	50.48	≤74	PASS
				Peak	2390.000	-50.41	4.13	0.00	48.92	≤74	PASS
		High	2480	AV	2483.500	-57.77	4.13	1.76	43.32	≤54	PASS
				AV	2484.400	-56.86	4.13	1.76	44.23	≤54	PASS
				AV	2500.000	-59.24	4.13	1.76	41.85	≤54	PASS
				Peak	2483.500	-46.6	4.13	0.00	52.73	≤74	PASS
				Peak	2485.440	-45.66	4.13	0.00	53.67	≤74	PASS
				Peak	2500.000	-52.4	4.13	0.00	46.93	≤74	PASS

Note:

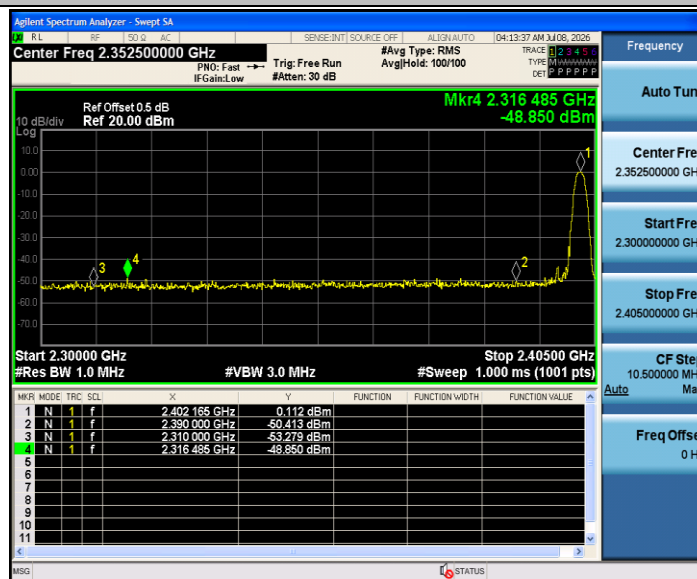
1. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

Test Graphs

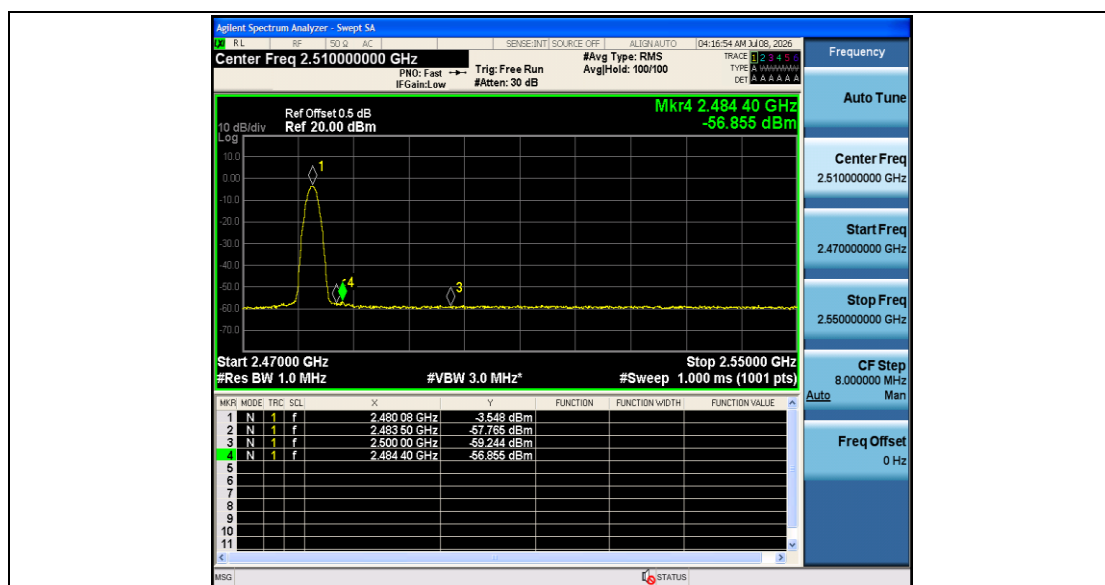
BLE_1M_Ant1_Low_2402_AV



BLE_1M_Ant1_Low_2402_Peak



BLE_1M_Ant1_High_2480_AV



BLE_1M_Ant1_High_2480_Peak

