Appendix Test Data

Report No.:	18220WC30206102	Test Sample No.:	1-2-2
Start Test Date:	2023.09.21	Finish Test Date:	2023.09.25
Test Engineer:	Hayman Chen	Auditor:	Rick Luo
Temperature:	25.3℃	Relative Humidity:	48.6%
Pressure:	101kPa		

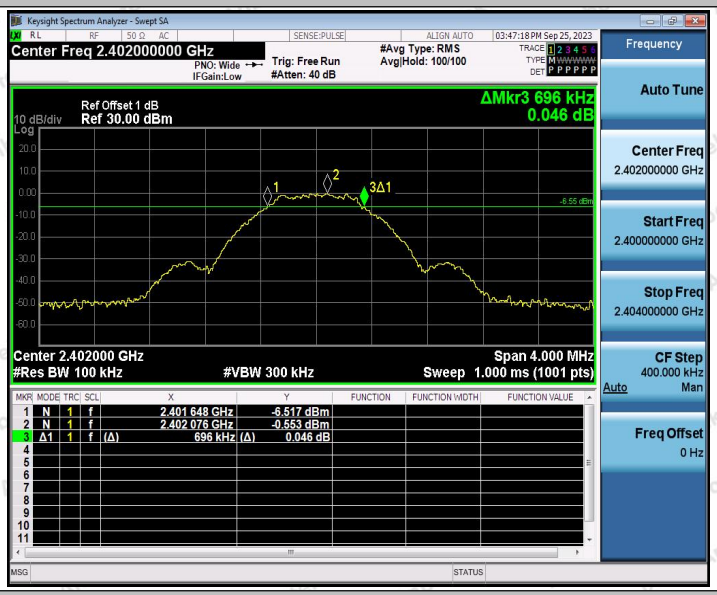
Appendix A: DTS Bandwidth

Test Result

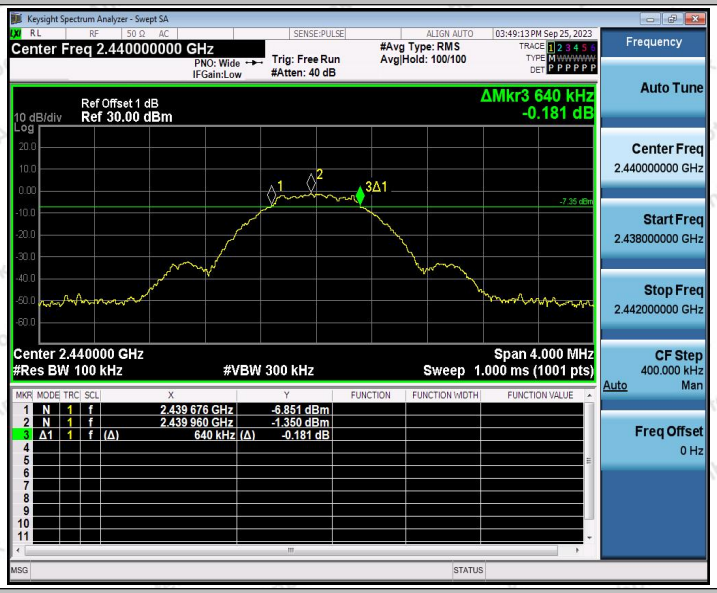
TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.696	2401.648	2402.344	0.5	PASS
		2440	0.640	2439.676	2440.316	0.5	PASS
		2480	0.640	2479.676	2480.316	0.5	PASS

Test Graphs

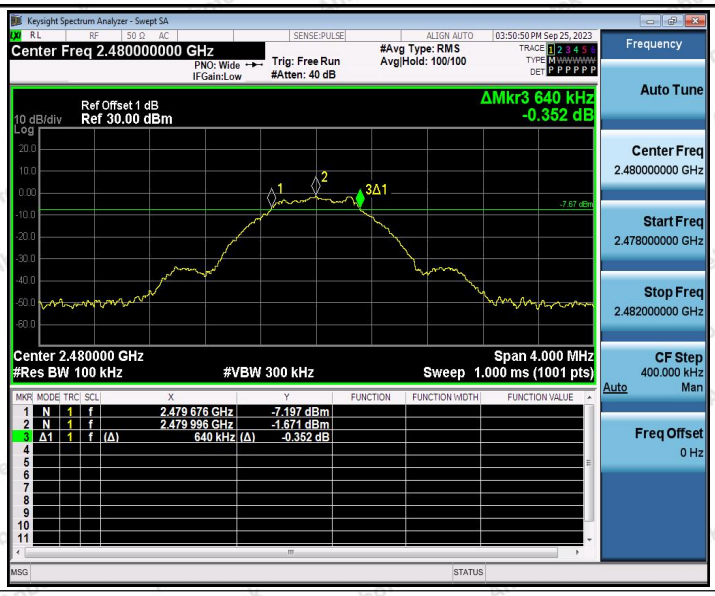
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 100/100
03:50:50 PM Sep 25, 2023
Ref Offset 1 dB
10 dB/div
Ref 30.00 dBm
ΔMkr3 640 kHz
-0.352 dB
-7.67 dBm
Center 2.480000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 4.000 MHz
Sweep 1.000 ms (1001 pts)
1 N 1 f 2.479 676 GHz -7.197 dBm
2 N 1 f 2.479 996 GHz -1.671 dBm
3 Δ1 1 f (Δ) 640 kHz (Δ) -0.352 dB
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.478000000 GHz
Stop Freq
2.482000000 GHz
CF Step
400.000 kHz
Auto Man
Freq Offset
0 Hz

Appendix B: Occupied Channel Bandwidth

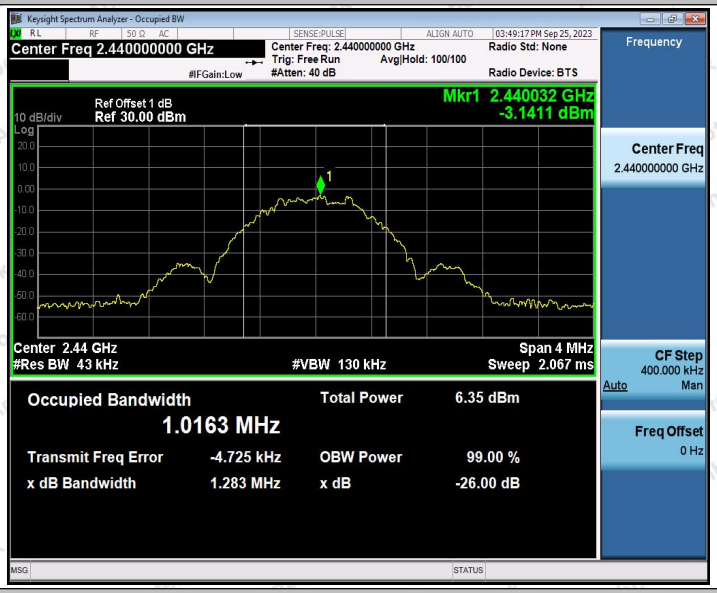
Test Result

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]
BLE_1M	Ant1	2402	1.0076	2401.4929	2402.5005
		2440	1.0163	2439.4871	2440.5034
		2480	1.0235	2479.4842	2480.5077

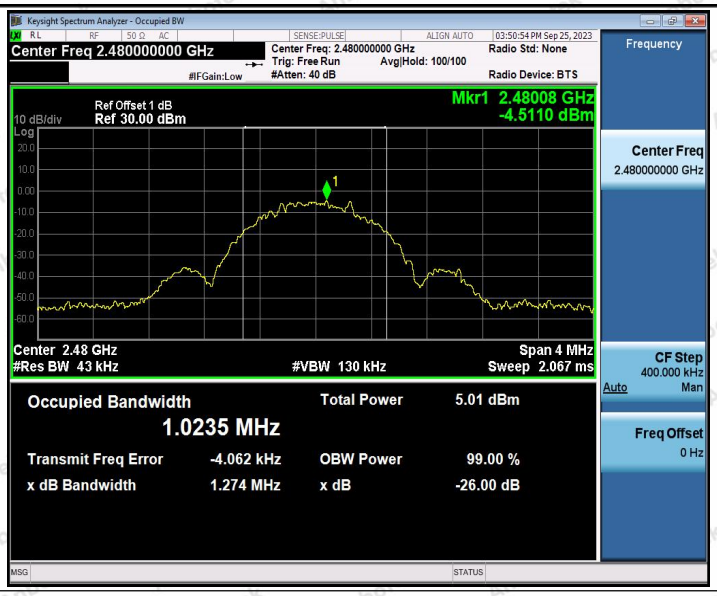
Test Graphs

BLE_1M_Ant1_2402

BLE_1M_Ant1_2440



BLE_1M_Ant1_2480


Keysight Spectrum Analyzer - Occupied BW
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 40 dB
Radio Std: None
Radio Device: BTS
03:50:54 PM Sep 25, 2023
Frequency
Ref Offset 1 dB
10 dB/div
Ref 30.00 dBm
Log
Mkr1 2.48008 GHz
-4.5110 dBm
Center 2.48 GHz
#Res BW 43 kHz
#VBW 130 kHz
Span 4 MHz
Sweep 2.067 ms
Occupied Bandwidth
1.0235 MHz
Total Power 5.01 dBm
Transmit Freq Error -4.062 kHz
OBW Power 99.00 %
x dB Bandwidth 1.274 MHz
x dB -26.00 dB
Center Freq
2.480000000 GHz
CF Step
400.000 kHz
Auto Man
Freq Offset
0 Hz
MSG
STATUS

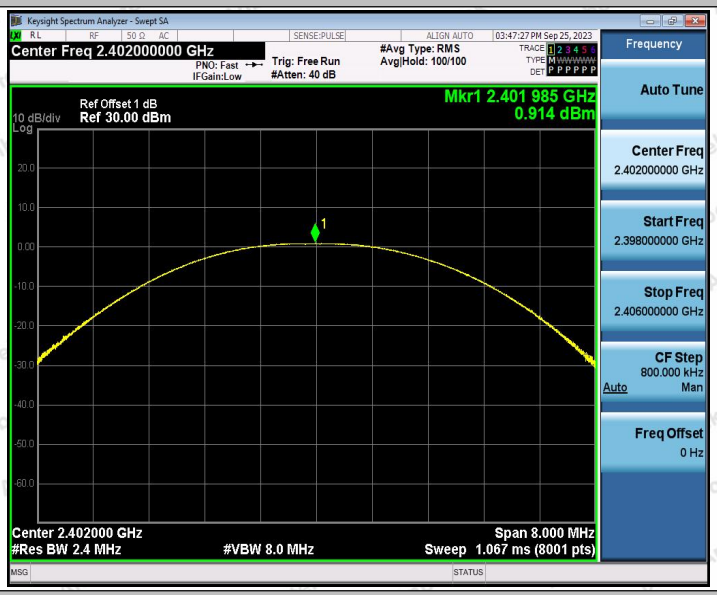
Appendix C: Maximum conducted output power

Test Result Peak

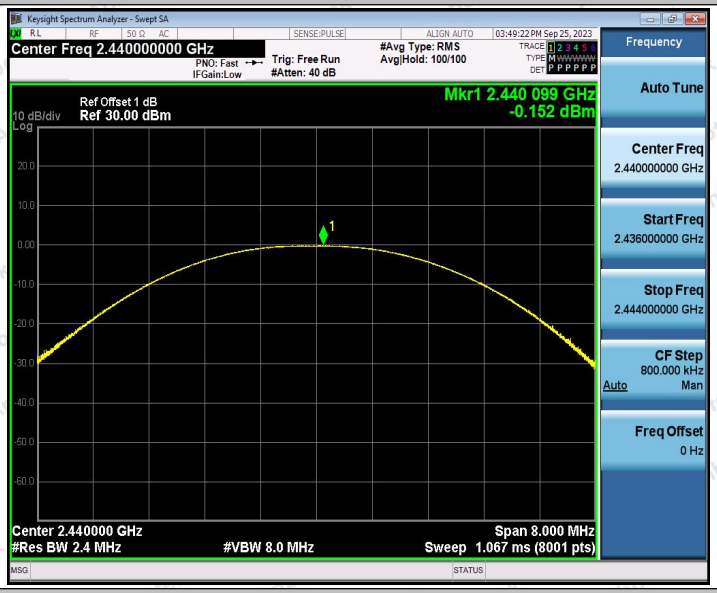
TestMode	Antenna	Frequency[MHz]	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant1	2402	0.91	≤30	PASS
		2440	-0.15	≤30	PASS
		2480	-1.18	≤30	PASS

Test Graphs Peak

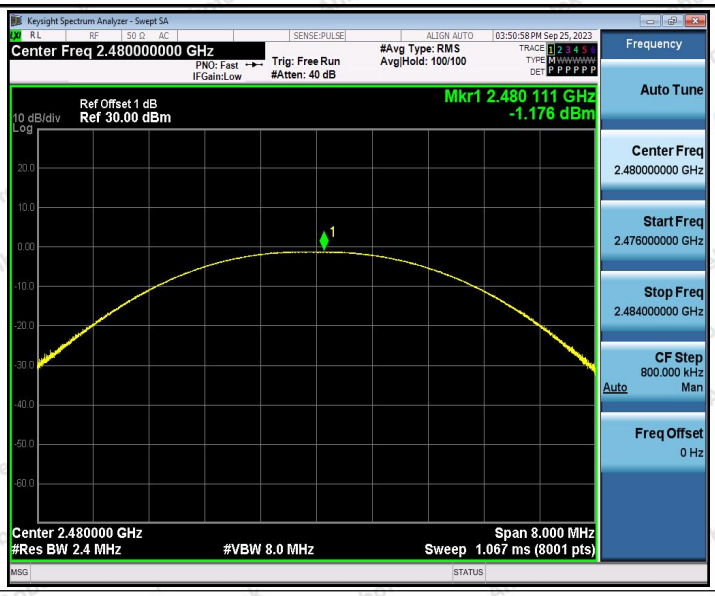
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 100/100
03:50:58 PM Sep 25, 2023
Ref Offset 1 dB
10 dB/div
Ref 30.00 dBm
Log
Mkr1 2.480 111 GHz
-1.176 dBm
Center 2.480000 GHz
#Res BW 2.4 MHz
#VBW 8.0 MHz
Span 8.000 MHz
Sweep 1.067 ms (8001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.476000000 GHz
Stop Freq
2.484000000 GHz
CF Step
800.000 kHz
Auto
Man
Freq Offset
0 Hz

Appendix D: Maximum power spectral density

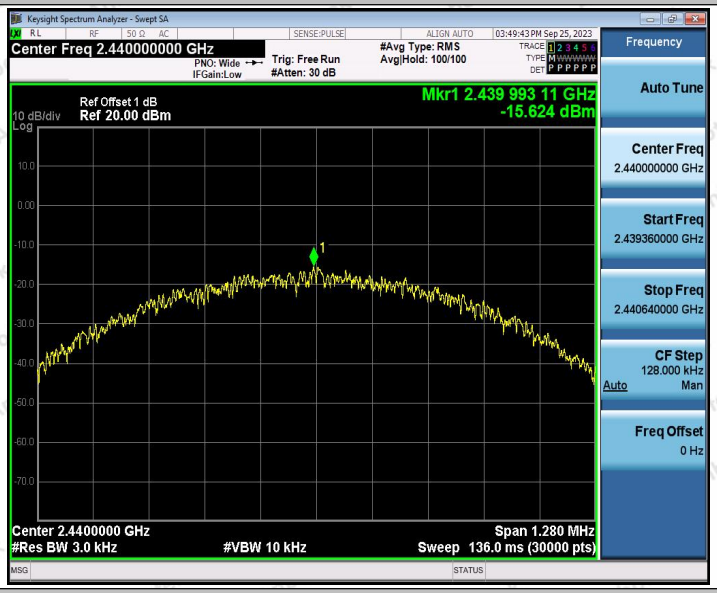
Test Result

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-14.50	≤8.00	PASS
		2440	-15.62	≤8.00	PASS
		2480	-16.53	≤8.00	PASS

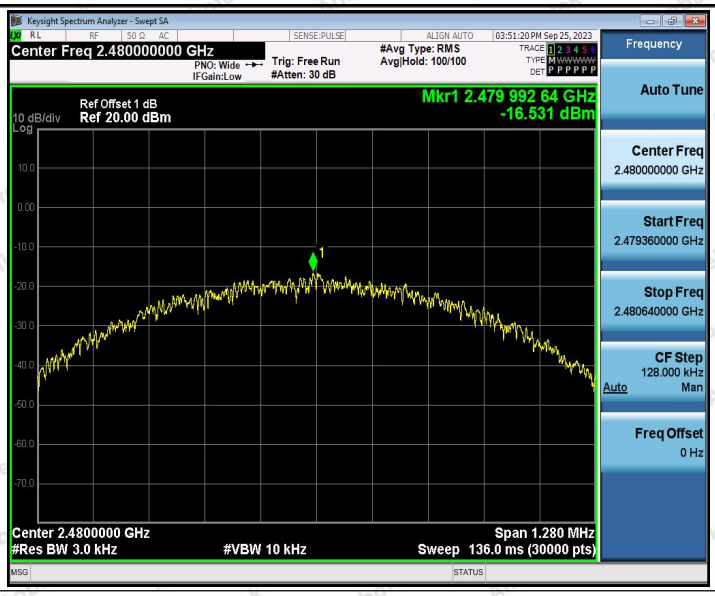
Test Graphs

BLE_1M_Ant1_2402

BLE_1M_Ant1_2440



BLE_1M_Ant1_2480


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 100/100
03:51:20 PM Sep 25, 2023
Ref Offset 1 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr1 2.479 992 64 GHz
-16.531 dBm
Center 2.4800000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 1.280 MHz
Sweep 136.0 ms (30000 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.479360000 GHz
Stop Freq
2.480640000 GHz
CF Step
128.000 kHz
Auto
Man
Freq Offset
0 Hz

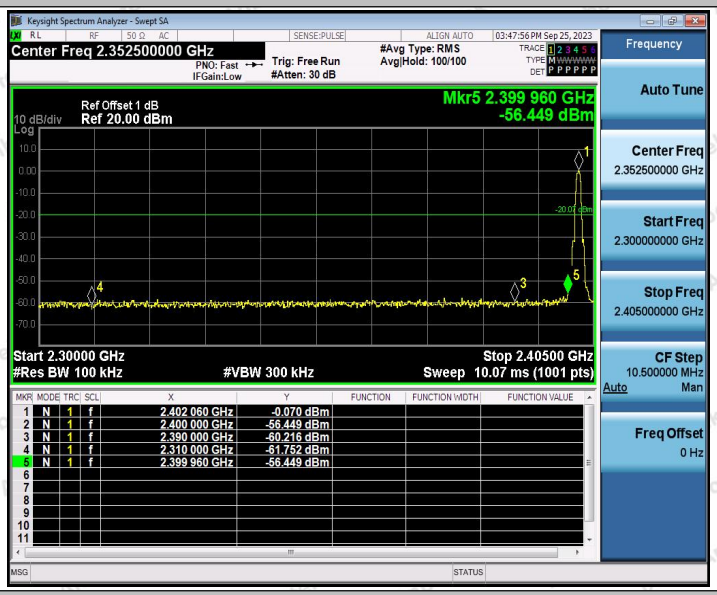
Appendix E: Band edge measurements

Test Result

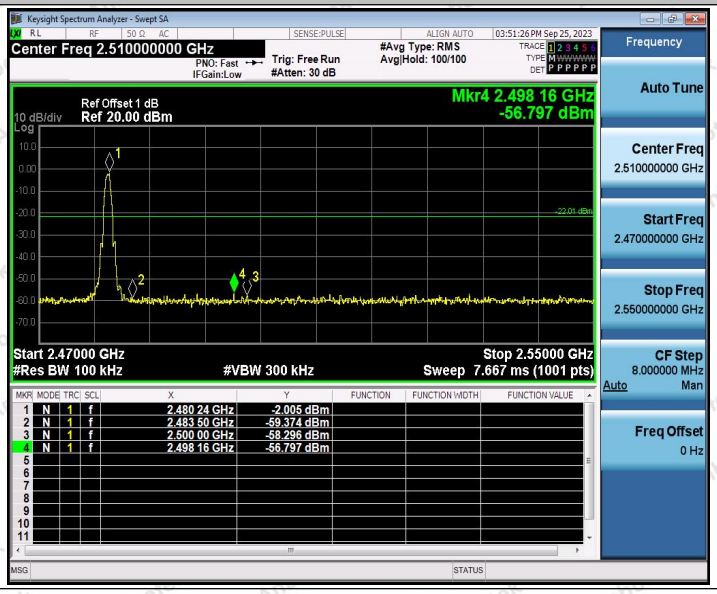
TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	-0.07	-56.45	≤-20.07	PASS
		High	2480	-2.01	-56.8	≤-22.01	PASS

Test Graphs

BLE_1M_Ant1_Low_2402



BLE_1M_Ant1_High_2480



Appendix F: Conducted Spurious Emission

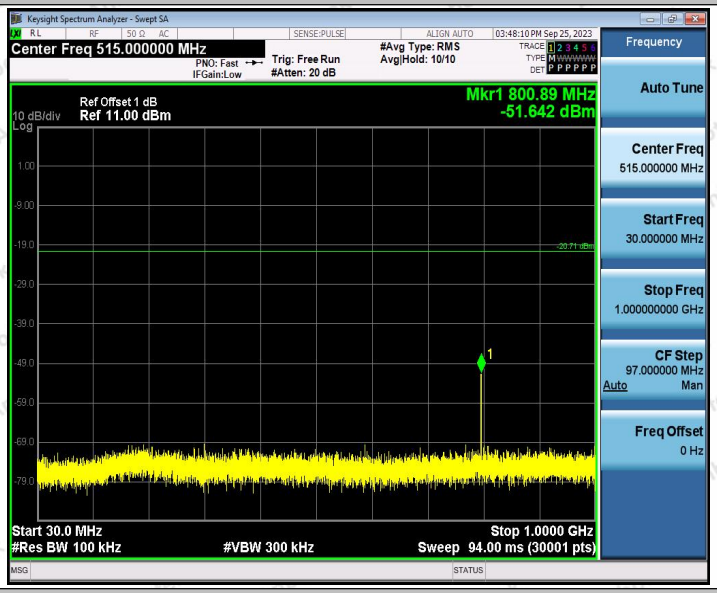
Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	-0.71	-0.71	---	PASS
			30~1000	-0.71	-51.64	≤-20.71	PASS
			1000~26500	-0.71	-48.41	≤-20.71	PASS
		2440	Reference	-0.72	-0.72	---	PASS
			30~1000	-0.72	-51.49	≤-20.72	PASS
			1000~26500	-0.72	-48.98	≤-20.72	PASS
		2480	Reference	-1.79	-1.79	---	PASS
			30~1000	-1.79	-52.17	≤-21.79	PASS
			1000~26500	-1.79	-49.61	≤-21.79	PASS

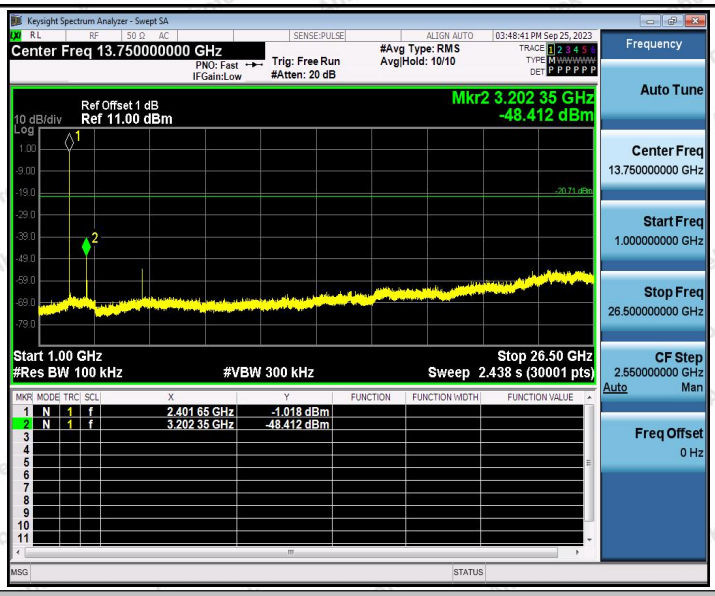
Test Graphs

BLE_1M_Ant1_2402_0~Reference

BLE_1M_Ant1_2402_30~1000

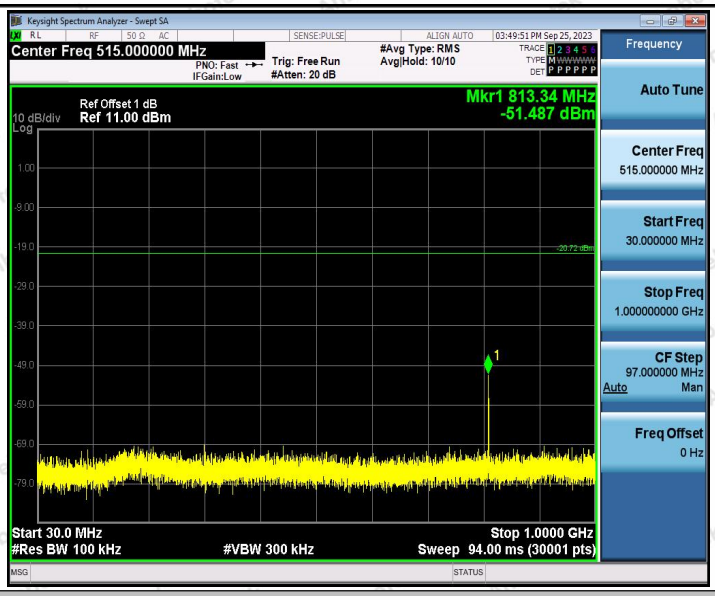


BLE_1M_Ant1_2402_1000~26500

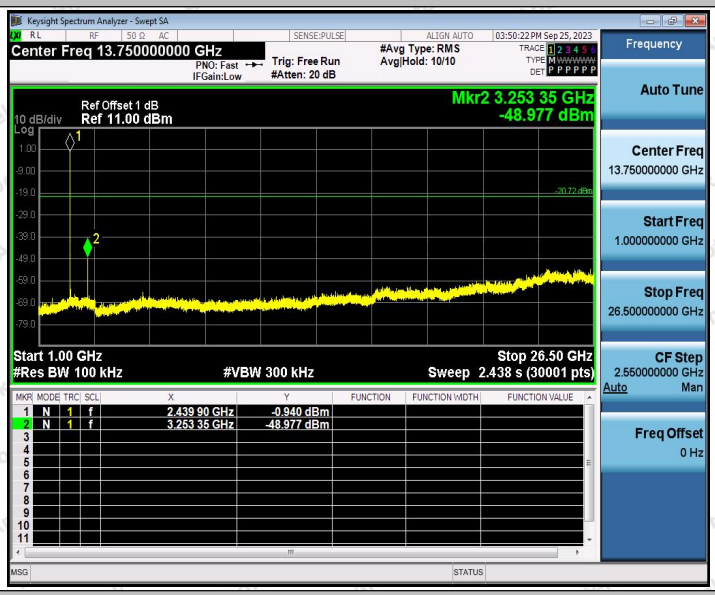


BLE_1M_Ant1_2440_0~Reference

BLE_1M_Ant1_2440_30~1000

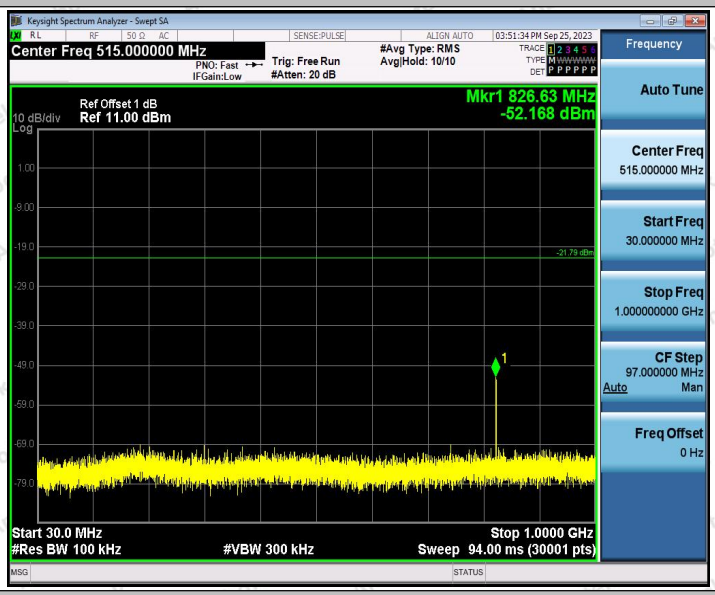


BLE_1M_Ant1_2440_1000~26500

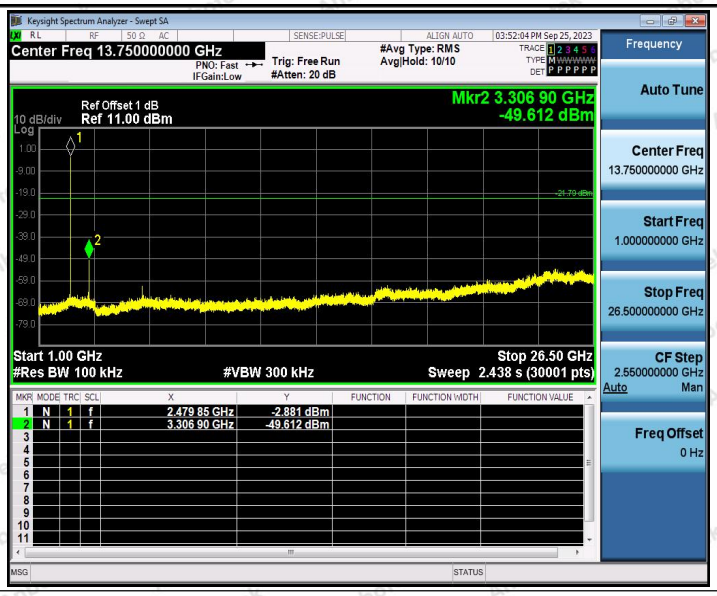


BLE_1M_Ant1_2480_0~Reference

BLE_1M_Ant1_2480_30~1000



BLE_1M_Ant1_2480_1000~26500


Keysight Spectrum Analyzer - Swept SA
Center Freq 13.750000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
Avg|Hold: 10/10
03:52:04 PM Sep 25, 2023
Ref Offset 1 dB
10 dB/div
Ref 11.00 dBm
Mkr2 3.306 90 GHz
-49.612 dBm
Start 1.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 26.50 GHz
Sweep 2.438 s (30001 pts)
1 N 1 f 2.479 85 GHz -2.881 dBm
2 N 1 f 3.306 90 GHz -49.612 dBm
Frequency
Auto Tune
Center Freq
13.750000000 GHz
Start Freq
1.000000000 GHz
Stop Freq
26.500000000 GHz
CF Step
2.550000000 GHz
Auto Man
Freq Offset
0 Hz

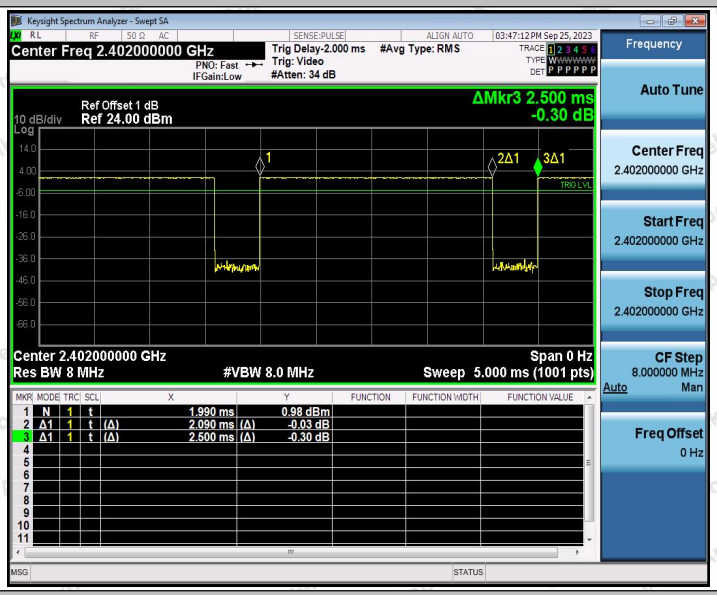
Appendix G: Duty Cycle

Test Result

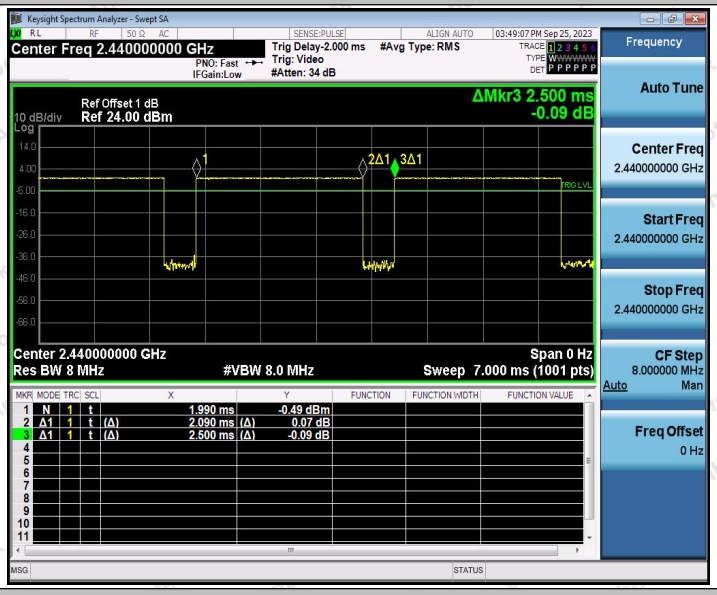
TestMode	Antenna	Frequency[MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
BLE_1M	Ant1	2402	2.09	2.50	83.60	0.78
		2440	2.09	2.50	83.60	0.78
		2480	2.09	2.50	83.60	0.78

Test Graphs

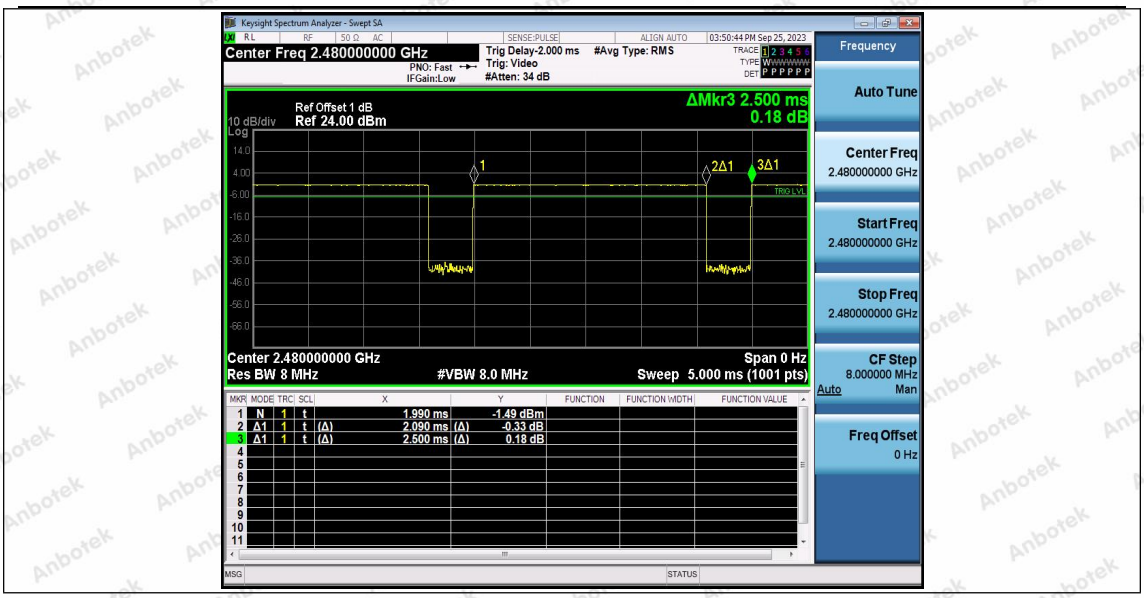
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig Delay-2.000 ms
Trig: Video
#Atten: 34 dB
#Avg Type: RMS
03:50:44 PM Sep 25, 2023
Ref Offset 1 dB
10 dB/div
Ref 24.00 dBm
Log
ΔMkr3 2.500 ms
0.18 dB
Center 2.480000000 GHz
Res BW 8 MHz
#VBW 8.0 MHz
Span 0 Hz
Sweep 5.000 ms (1001 pts)
1 N 1 t 1.990 ms -1.49 dBm
2 Δ1 1 t (Δ) 2.090 ms (Δ) -0.33 dB
3 Δ1 1 t (Δ) 2.500 ms (Δ) 0.18 dB
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.480000000 GHz
Stop Freq
2.480000000 GHz
CF Step
8.000000 MHz
Auto Man
Freq Offset
0 Hz

---End---