Appendix Test Data

Report No.:	18220WC30174501	Test Sample No.:	1-2-2
Start Test Date:	2023.08.16	Finish Test Date:	2023.08.23
Test Engineer:	Hayman Chen	Auditor:	Rick Luo
Temperature:	23.7℃	Relative Humidity:	49%
Pressure:	101kPa		

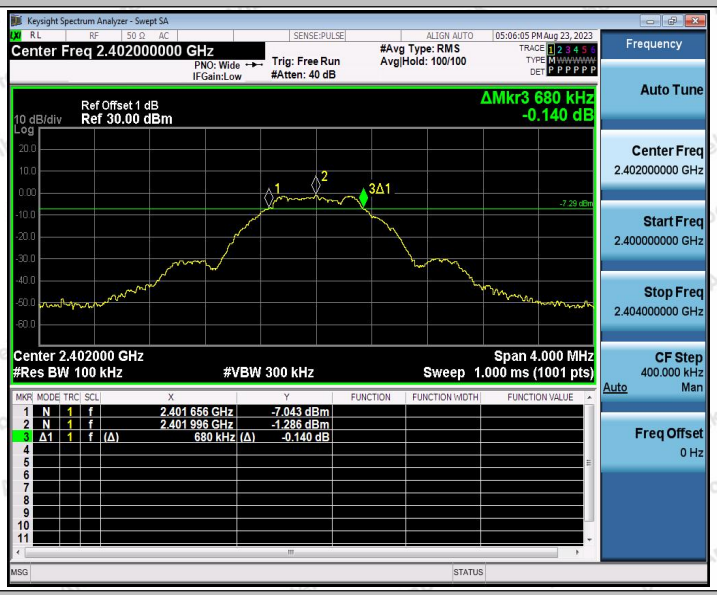
Appendix A: DTS Bandwidth

Test Result

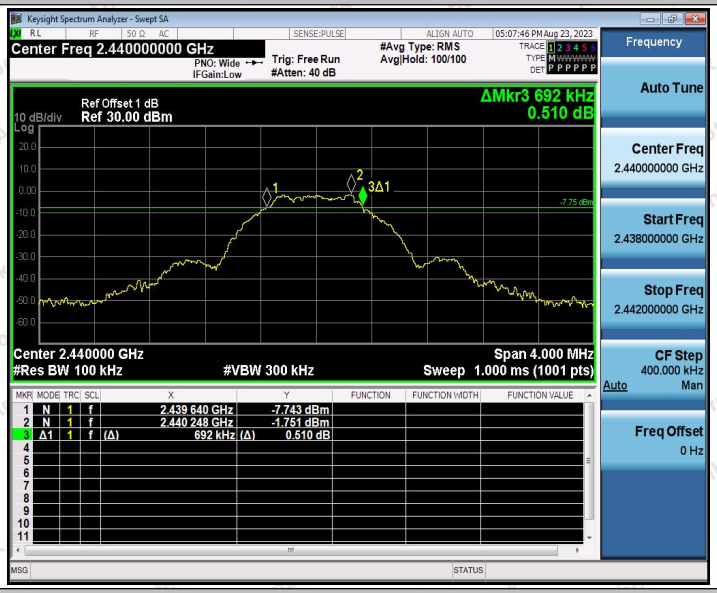
TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.680	2401.656	2402.336	0.5	PASS
		2440	0.692	2439.640	2440.332	0.5	PASS
		2480	0.692	2479.644	2480.336	0.5	PASS

Test Graphs

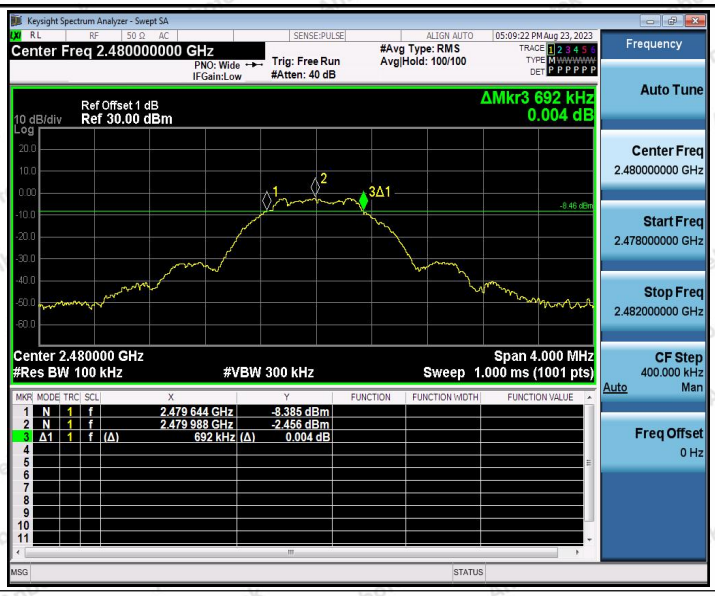
BLE_1M_Ant1_2402



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
05:09:22 PM Aug 23, 2023
Ref Offset 1 dB
10 dB/div
Ref 30.00 dBm
ΔMkr3 692 kHz
0.004 dB
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 2.479 644 GHz -8.385 dBm
2 N 1 f 2.479 988 GHz -2.456 dBm
3 Δ1 1 f (Δ) 692 kHz (Δ) 0.004 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

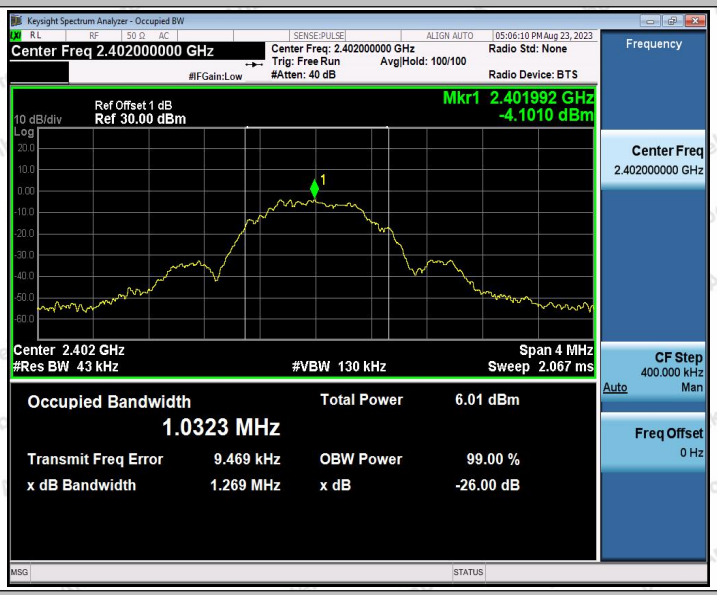
Appendix B: Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]
BLE_1M	Ant1	2402	1.0323	2401.4933	2402.5256
		2440	1.0321	2439.4931	2440.5252
		2480	1.0299	2479.4925	2480.5224

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
05:09:27 PM Aug 23, 2023
Frequency
Ref Offset 1 dB
10 dB/div
Ref 30.00 dBm
Log
Mkr1 2.479968 GHz
-4.6590 dBm
Center Freq
2.480000000 GHz
Center 2.48 GHz
#Res BW 43 kHz
#VBW 130 kHz
Span 4 MHz
Sweep 2.067 ms
CF Step
400.000 kHz
Auto
Man
Occupied Bandwidth
1.0299 MHz
Total Power
4.95 dBm
Transmit Freq Error
7.403 kHz
OBW Power
99.00 %
x dB Bandwidth
1.258 MHz
x dB
-26.00 dB
Freq Offset
0 Hz
MSG
STATUS

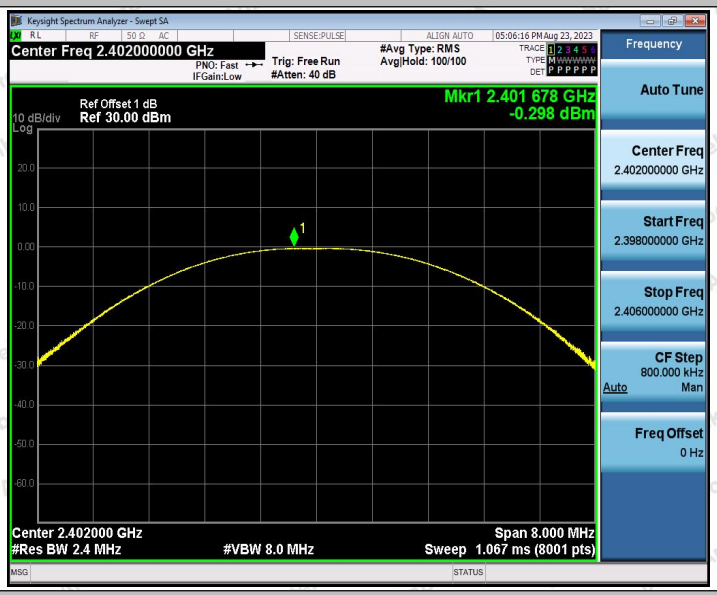
Appendix C: Maximum conducted output power

Test Result Peak

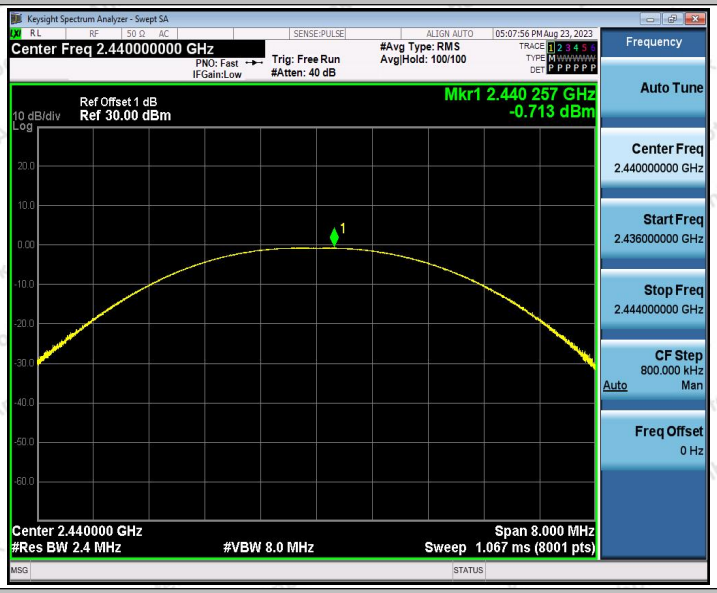
TestMode	Antenna	Frequency[MHz]	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant1	2402	-0.30	≤30	PASS
		2440	-0.71	≤30	PASS
		2480	-1.39	≤30	PASS

Test Graphs Peak

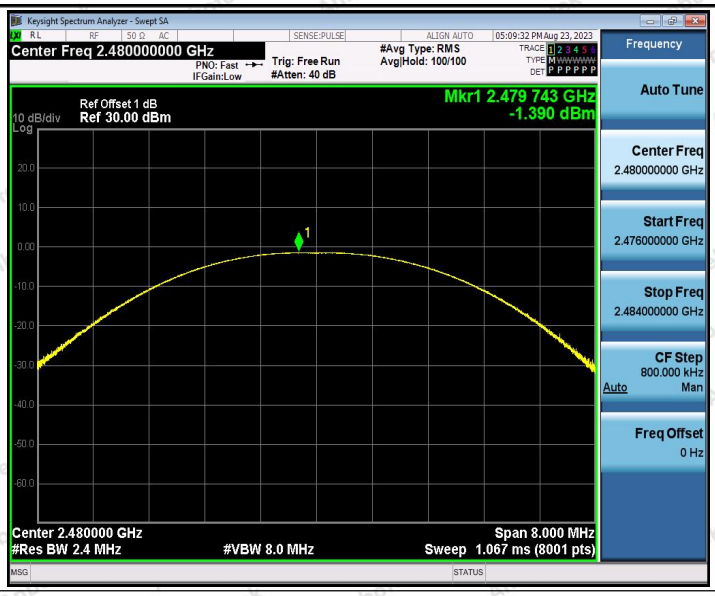
BLE_1M_Ant1_2402



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
05:09:32 PM Aug 23, 2023
Ref Offset 1 dB
10 dB/div
Ref 30.00 dBm
Log
Mkr1 2.479 743 GHz
-1.390 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

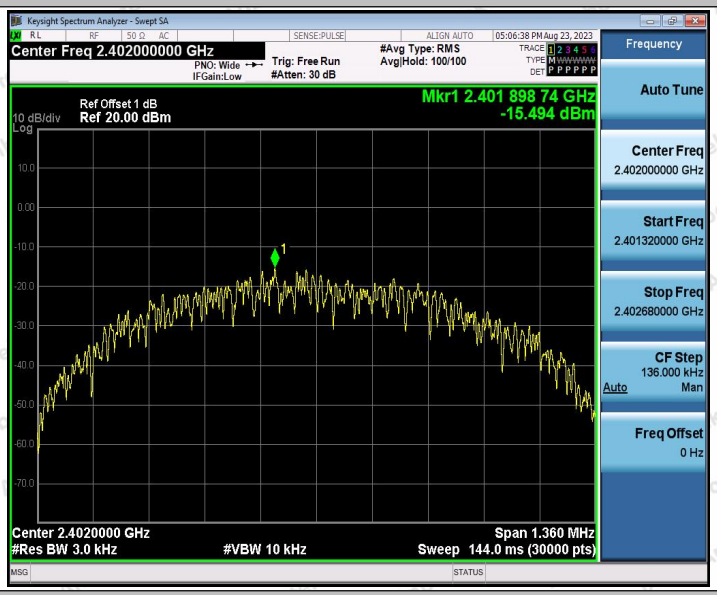
Appendix D: Maximum power spectral density

Test Result

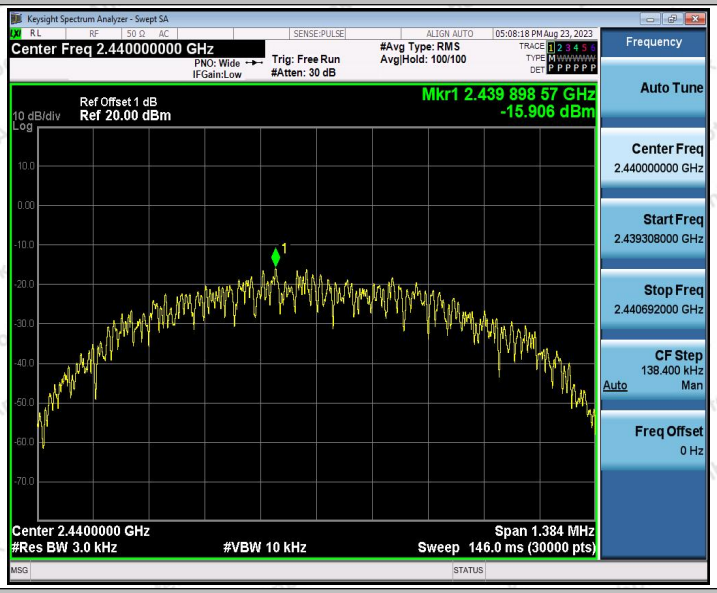
TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-15.49	≤8.00	PASS
		2440	-15.91	≤8.00	PASS
		2480	-16.61	≤8.00	PASS

Test Graphs

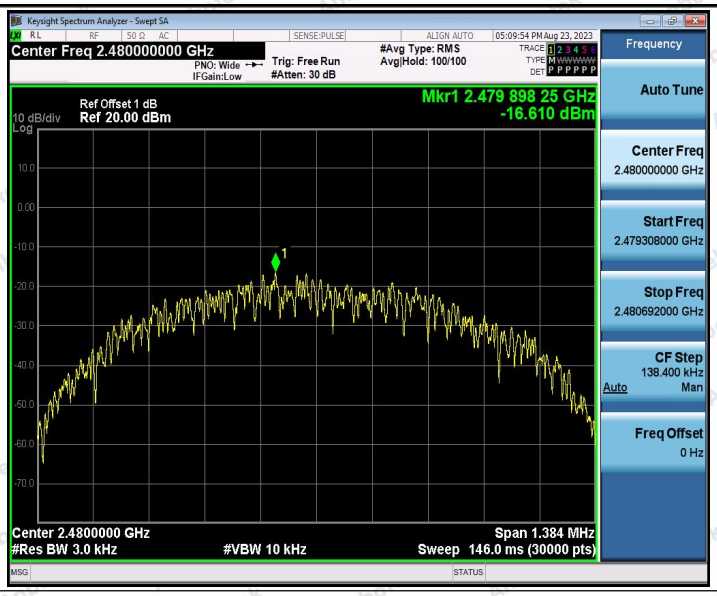
BLE_1M_Ant1_2402



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
05:09:54 PM Aug 23, 2023
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.479308000 GHz
Stop Freq
2.480692000 GHz
CF Step
138.400 kHz
Auto
Man
Freq Offset
0 Hz
Ref Offset 1 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr1 2.479 898 25 GHz
-16.610 dBm
Center 2.4800000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 1.384 MHz
Sweep 146.0 ms (30000 pts)

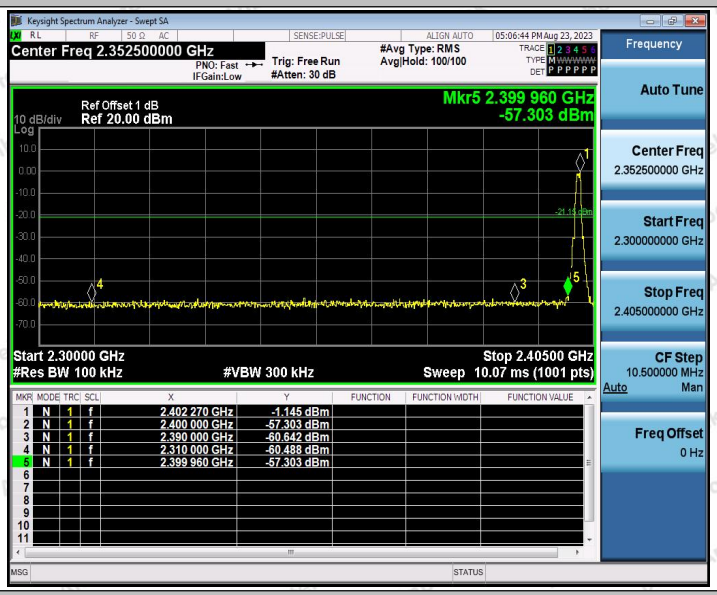
Appendix E: Band edge measurements

Test Result

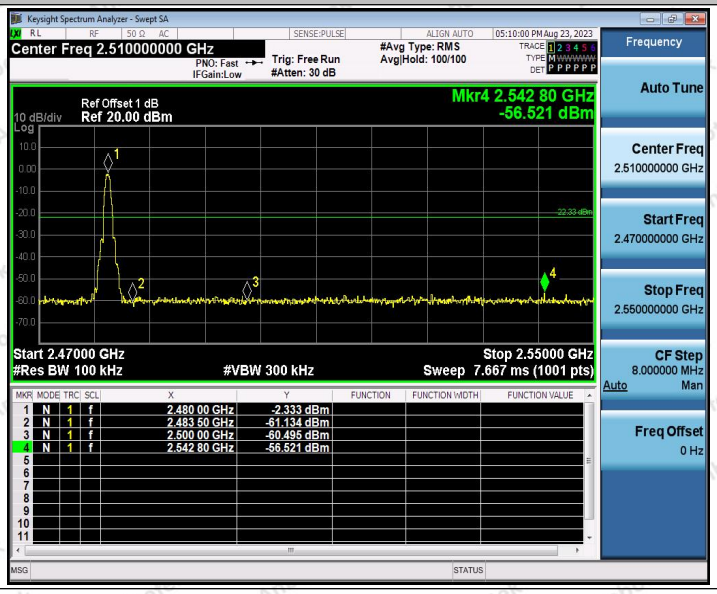
TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	-1.15	-57.3	≤-21.15	PASS
		High	2480	-2.33	-56.52	≤-22.33	PASS

Test Graphs

BLE_1M_Ant1_Low_2402



BLE_1M_Ant1_High_2480



Appendix F: Conducted Spurious Emission

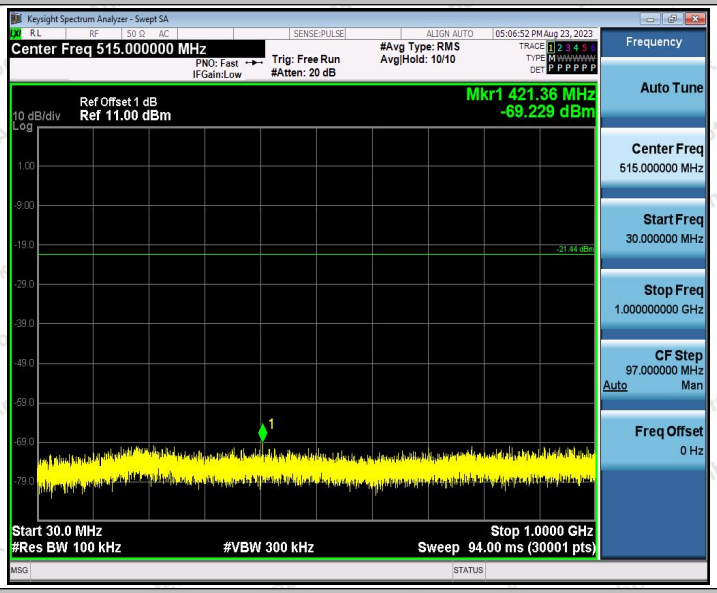
Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	-1.44	-1.44	---	PASS
			30~1000	-1.44	-69.23	≤-21.44	PASS
			1000~26500	-1.44	-54	≤-21.44	PASS
		2440	Reference	-2.32	-2.32	---	PASS
			30~1000	-2.32	-69.08	≤-22.32	PASS
			1000~26500	-2.32	-53.9	≤-22.32	PASS
		2480	Reference	-2.39	-2.39	---	PASS
			30~1000	-2.39	-68.36	≤-22.39	PASS
			1000~26500	-2.39	-53.39	≤-22.39	PASS

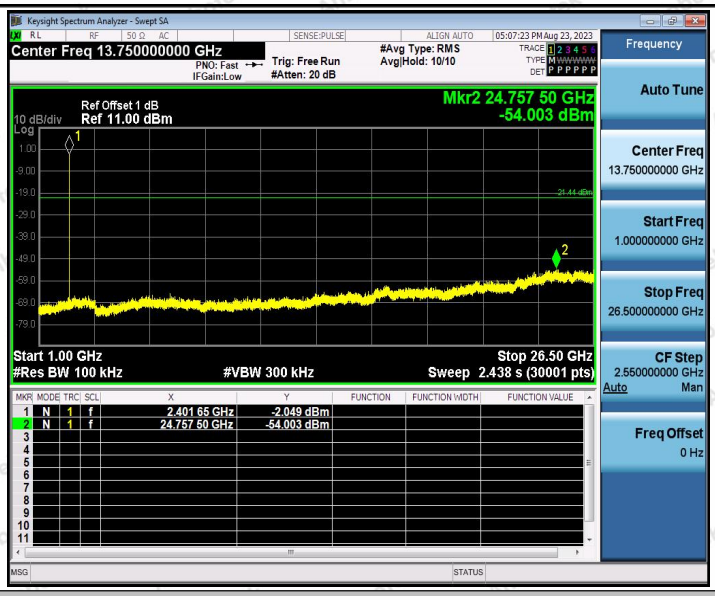
Test Graphs

BLE_1M_Ant1_2402_0~Reference

BLE_1M_Ant1_2402_30~1000

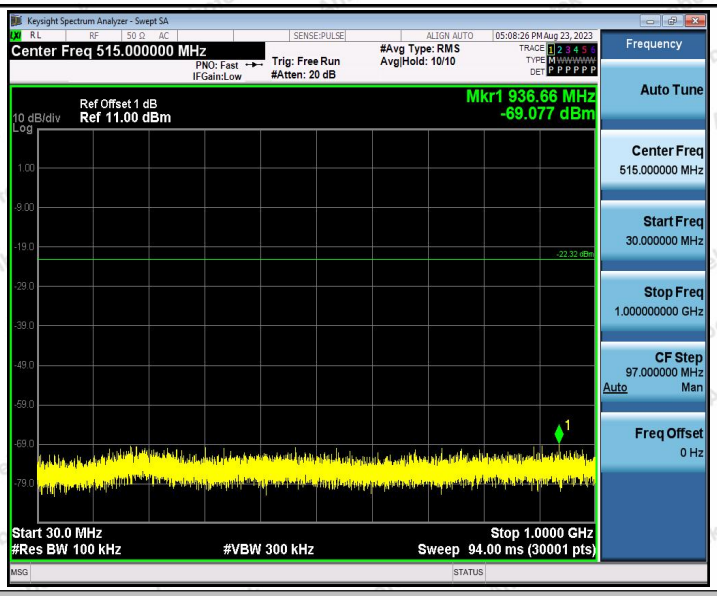


BLE_1M_Ant1_2402_1000~26500

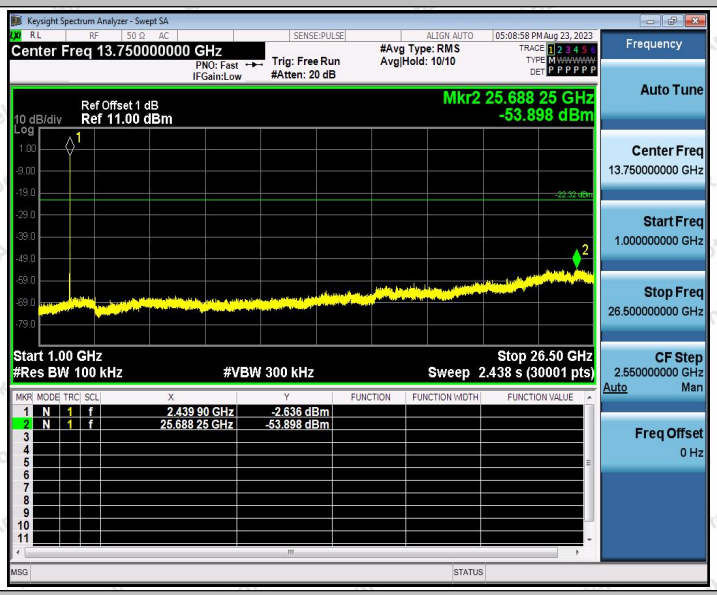


BLE_1M_Ant1_2440_0~Reference

BLE_1M_Ant1_2440_30~1000

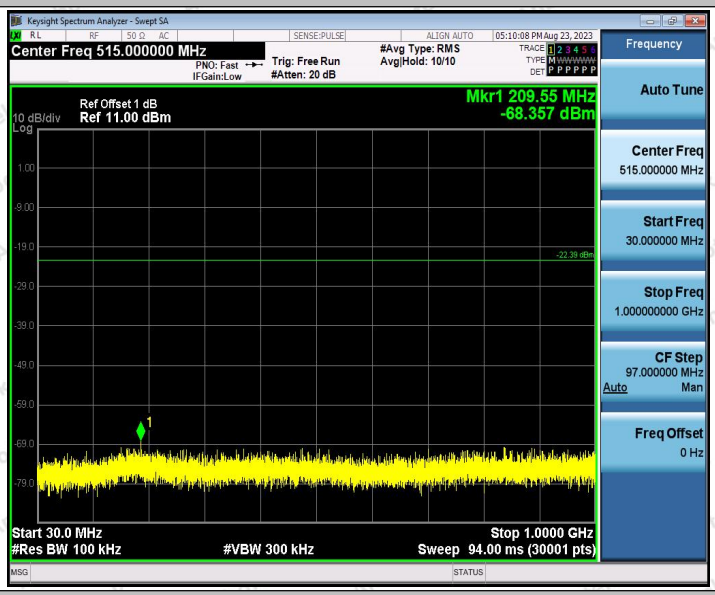


BLE_1M_Ant1_2440_1000~26500

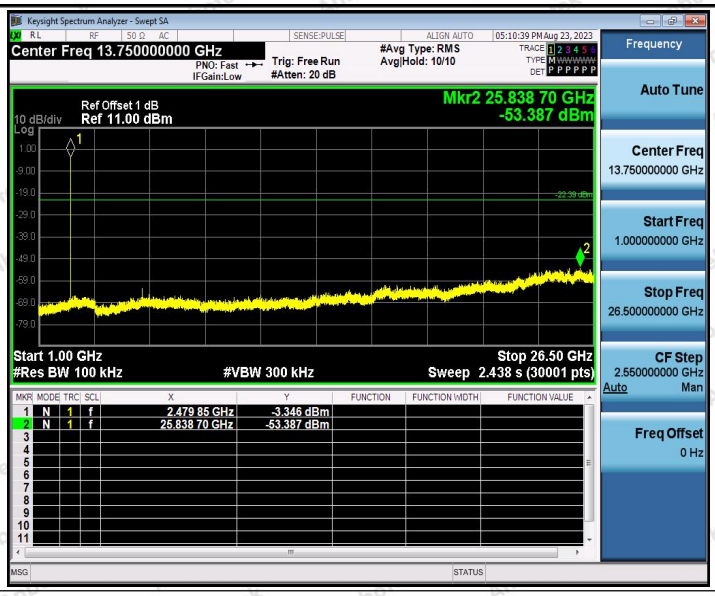


BLE_1M_Ant1_2480_0~Reference

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
05:10:39 PM Aug 23, 2023
Ref Offset 1 dB
10 dB/div
Ref 11.00 dBm
Mkr2 25.838 70 GHz
-53.387 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 -3.346 dBm
2 N 1 f 25.838 70 GHz -53.387 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

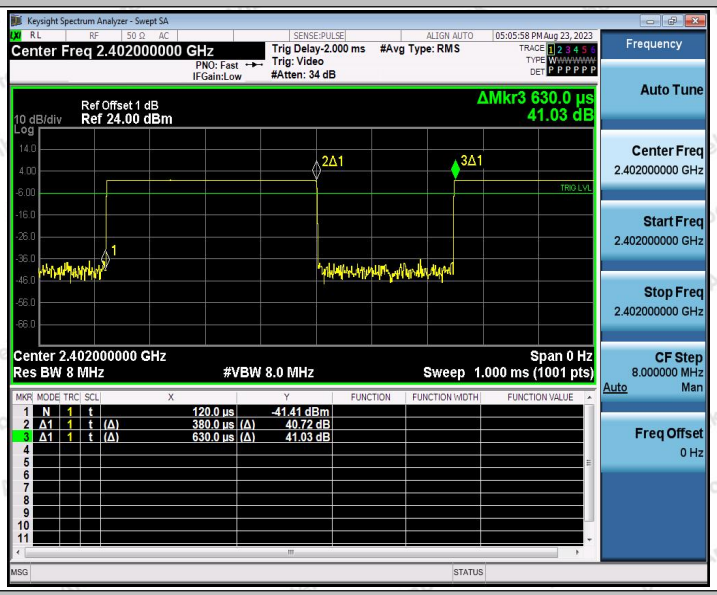
Appendix G: Duty Cycle

Test Result

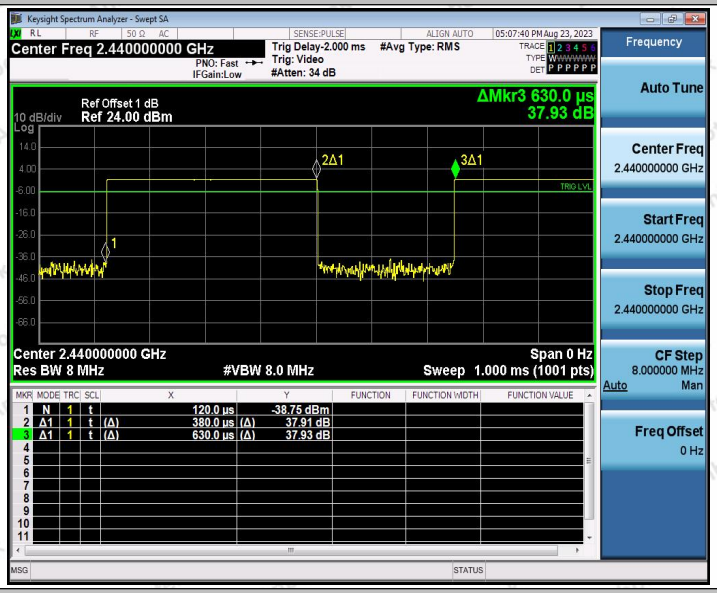
TestMode	Antenna	Frequency[MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
BLE_1M	Ant1	2402	0.38	0.63	60.32	2.20
		2440	0.38	0.63	60.32	2.20
		2480	0.38	0.63	60.32	2.20

Test Graphs

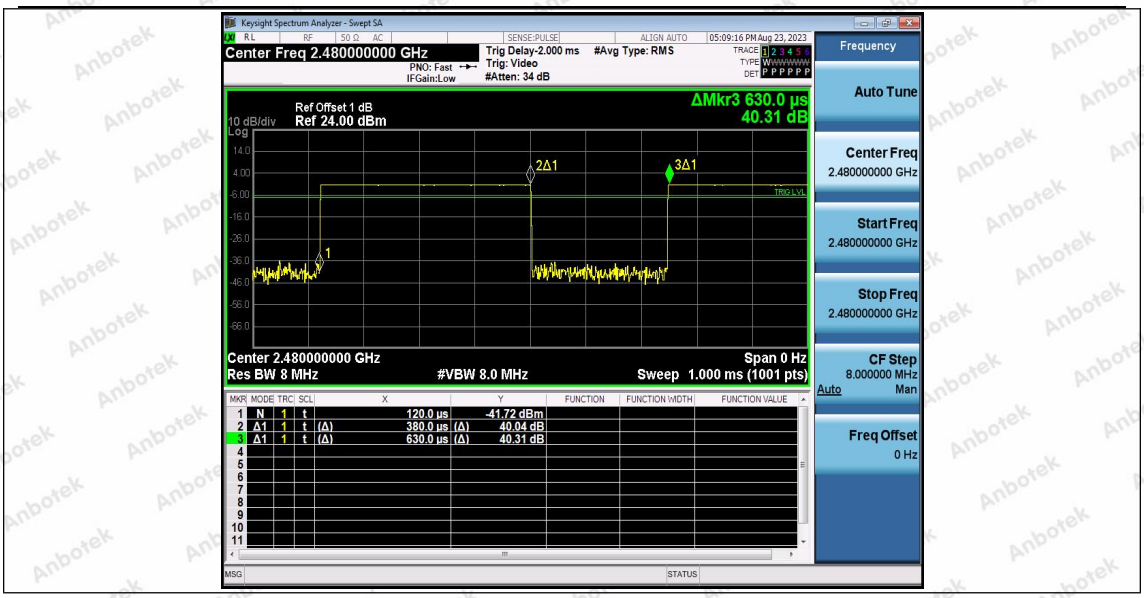
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
Trig Delay-2.000 ms
Trig: Video
#Atten: 34 dB
#Avg Type: RMS
Ref Offset 1 dB
10 dB/div
Ref 24.00 dBm
ΔMkr3 630.0 µs
40.31 dB
Center 2.480000000 GHz
Res BW 8 MHz
#VBW 8.0 MHz
Span 0 Hz
Sweep 1.000 ms (1001 pts)
1 N 1 t 120.0 µs -41.72 dBm
2 Δ1 1 t (Δ) 380.0 µs (Δ) 40.04 dB
3 Δ1 1 t (Δ) 630.0 µs (Δ) 40.31 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---