Appendix Test Data

Report No.:	18220WC30167301	Test Sample No.:	1-2-2
Start Test Date:	2023.08.09	Finish Test Date:	2023.08.14
Test Engineer:	Hayman Chen	Auditor:	Rick Luo
Temperature:	25.4℃	Relative Humidity:	48%
Pressure:	1012 hPa		

Appendix A: 20dB Emission Bandwidth

Test Result

TestMode	Antenna	Frequency[MHz]	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
2.4G	Ant1	2406	4.160	2403.890	2408.050	---	---
		2442	4.150	2439.890	2444.040	---	---
		2475	4.160	2472.890	2477.050	---	---

Test Graphs

2.4G_Ant1_2406

2.4G_Ant1_2442

2.4G_Ant1_2475

Keysight Spectrum Analyzer - Swept SA
Center Freq 2.475000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 100/100
12:15:00 PM Aug 16, 2023
Ref Offset 1 dB
10 dB/div
Ref 30.00 dBm
ΔMkr3 4.16 MHz
-1.627 dB
Center 2.475000 GHz
#Res BW 51 kHz
#VBW 150 kHz
Span 10.00 MHz
Sweep 3.733 ms (1001 pts)
1 N 1 f 2.472 89 GHz -0.823 dBm
2 N 1 f 2.474 96 GHz 19.179 dBm
3 Δ1 1 f (Δ) 4.16 MHz (Δ) -1.627 dB
Frequency
Auto Tune
Center Freq
2.475000000 GHz
Start Freq
2.470000000 GHz
Stop Freq
2.480000000 GHz
CF Step
1.000000 MHz
Auto Man
Freq Offset
0 Hz

Appendix B: Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
2.4G	Ant1	2406	4.0708	2403.9399	2408.0107	---	---
		2442	4.0760	2439.9361	2444.0121	---	---
		2475	4.0742	2472.9333	2477.0075	---	---

Test Graphs

2.4G_Ant1_2406

2.4G_Ant1_2442

2.4G_Ant1_2475

Keysight Spectrum Analyzer - Occupied BW
Center Freq 2.475000000 GHz
Center Freq: 2.475000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 40 dB
Radio Std: None
Radio Device: BTS
12:15:16 PM Aug 16, 2023
Frequency
Ref Offset 1 dB
10 dB/div
Ref 30.00 dBm
Log
Mkr1 2.47495 GHz
19.167 dBm
Center 2.475 GHz
#Res BW 51 kHz
#VBW 150 kHz
Span 10 MHz
Sweep 3.733 ms
Occupied Bandwidth
4.0742 MHz
Total Power 26.5 dBm
Transmit Freq Error -29.635 kHz
OBW Power 99.00 %
x dB Bandwidth 4.251 MHz
x dB -26.00 dB
Center Freq
2.475000000 GHz
CF Step
1.000000 MHz
Auto Man
Freq Offset
0 Hz
MSG
STATUS

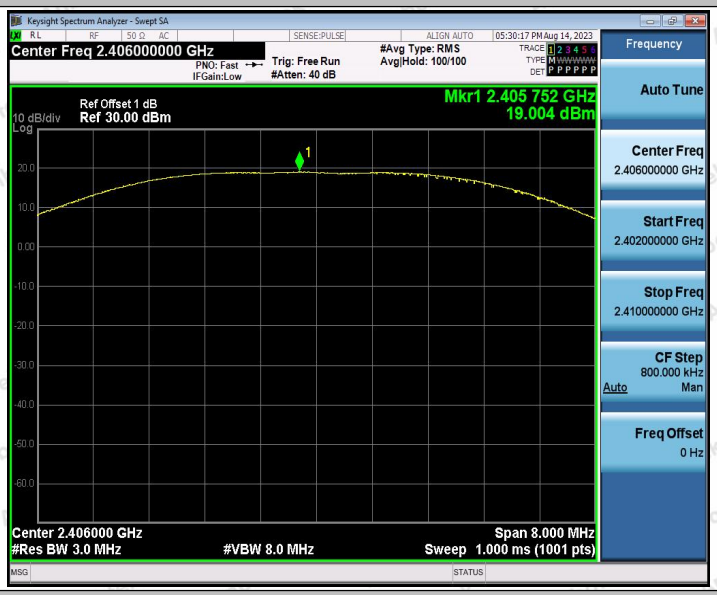
Appendix C: Maximum conducted output power

Test Result Peak

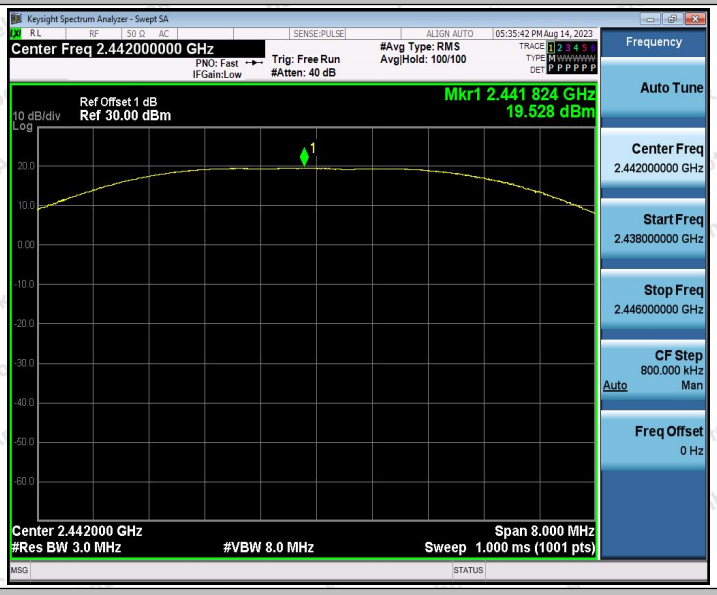
Test Mode	Antenna	Frequency[MHz]	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
2.4G	Ant1	2406	19.00	≤30	PASS
		2442	19.53	≤30	PASS
		2475	19.16	≤30	PASS

Test Graphs

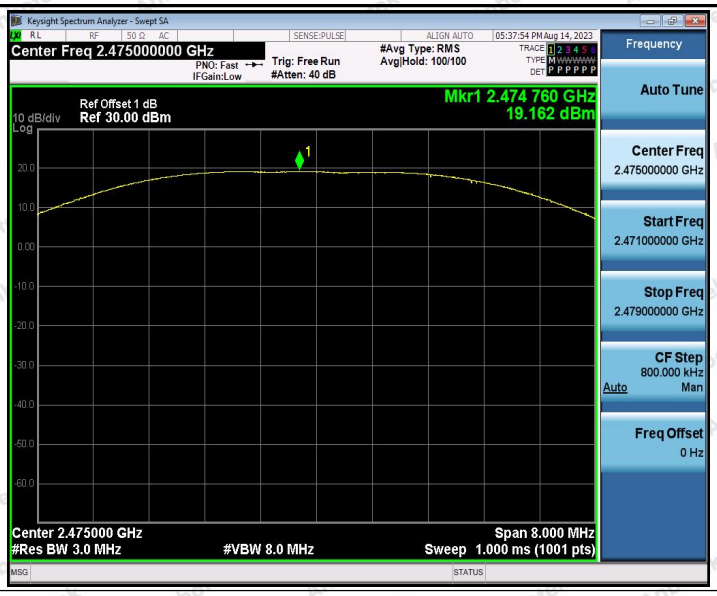
2.4G_Ant1_2406



2.4G_Ant1_2442



2.4G_Ant1_2475


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.475000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 100/100
05:37:54 PM Aug 14, 2023
Frequency
Auto Tune
Center Freq
2.475000000 GHz
Start Freq
2.471000000 GHz
Stop Freq
2.479000000 GHz
CF Step
800.000 kHz
Auto
Man
Freq Offset
0 Hz
Ref Offset 1 dB
10 dB/div
Ref 30.00 dBm
Log
Mkr1 2.474 760 GHz
19.162 dBm
Center 2.475000 GHz
#Res BW 3.0 MHz
#VBW 8.0 MHz
Span 8.000 MHz
Sweep 1.000 ms (1001 pts)

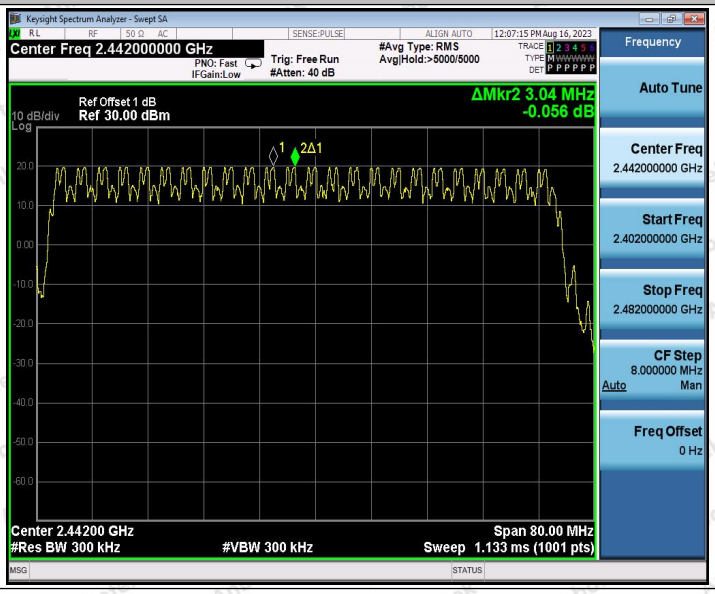
Appendix D: Carrier frequency separation

Test Result

TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
2.4G	Ant1	Hop	3.040	≥2.773	PASS

Test Graphs

2.4G_Ant1_Hop

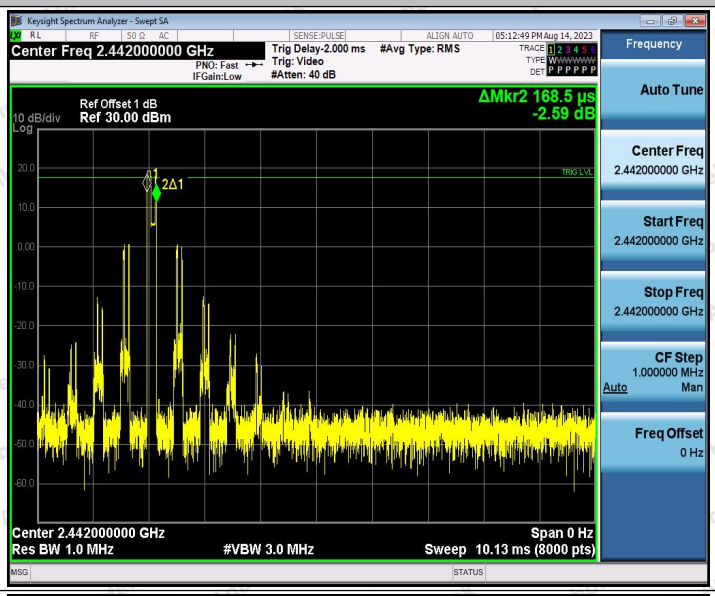
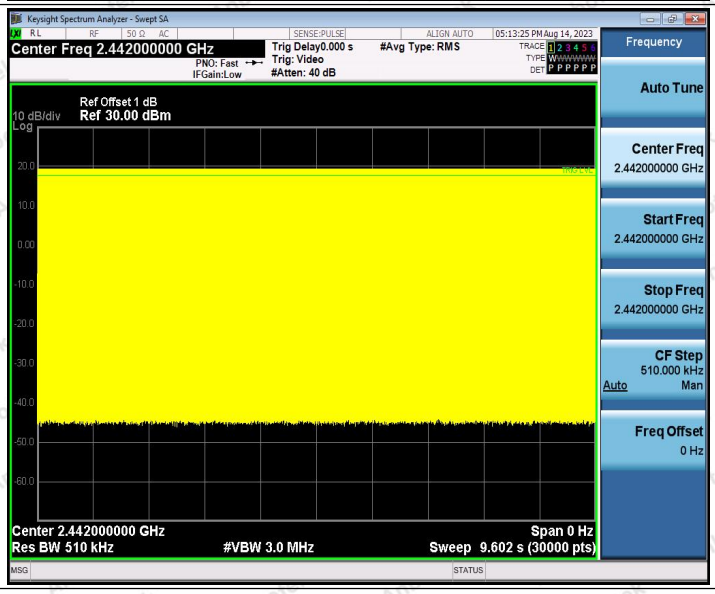


Appendix E: Time of occupancy

Test Result

TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
2.4G	Ant1	Hop	0.169	830	0.140	≤0.4	PASS

Test Graphs

2.4G_Ant1_Hop



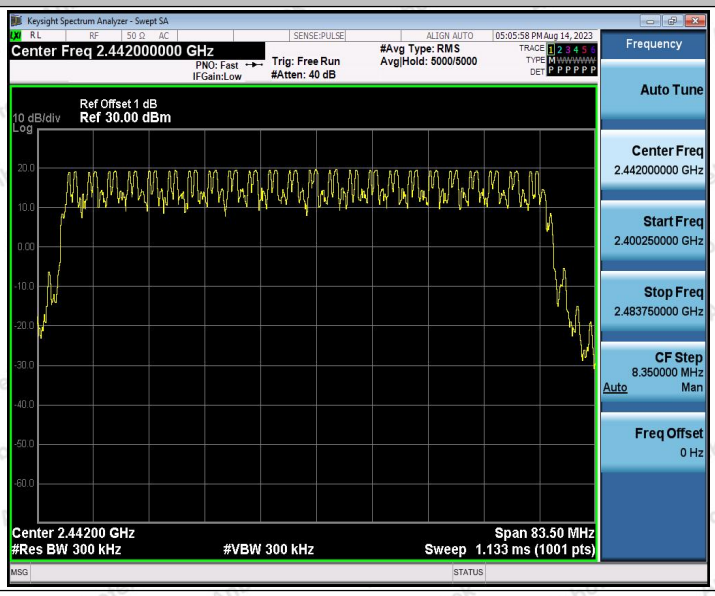
Appendix F: Number of hopping channels

Test Result

TestMode	Antenna	Frequency[MHz]	Result[Num]	Limit[Num]	Verdict
2.4G	Ant1	Hop	24	≥15	PASS

Test Graphs

2.4G_Ant1_Hop



Appendix G: Band edge measurements

Test Result

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
2.4G	Ant1	Low	2406	19.20	-14.81	≤-0.8	PASS
		High	2475	19.36	-26.15	≤-0.64	PASS
		Low	Hop_2406	19.51	-38.73	≤-0.49	PASS
		High	Hop_2475	19.56	-45.7	≤-0.44	PASS

Test Graphs

2.4G_Ant1_Low_2406

2.4G_Ant1_High_2475

2.4G_Ant1_Low_Hop_2406

2.4G_Ant1_High_Hop_2475

Appendix H: Conducted Spurious Emission

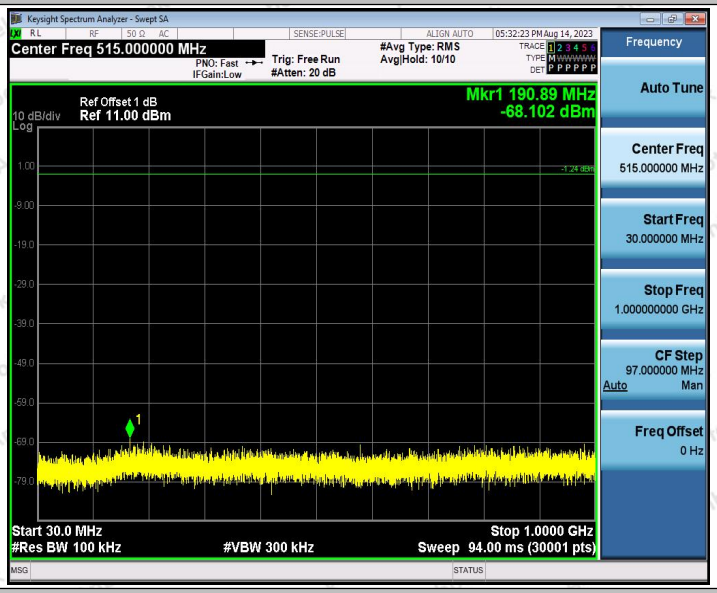
Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
2.4G	Ant1	2406	Reference	18.76	18.76	---	PASS
			30~1000	18.76	-68.1	≤-1.24	PASS
			1000~26500	18.76	-33.28	≤-1.24	PASS
		2442	Reference	19.30	19.30	---	PASS
			30~1000	19.30	-68.82	≤-0.7	PASS
			1000~26500	19.30	-33.63	≤-0.7	PASS
		2475	Reference	18.95	18.95	---	PASS
			30~1000	18.95	-69.16	≤-1.05	PASS
			1000~26500	18.95	-33.51	≤-1.05	PASS

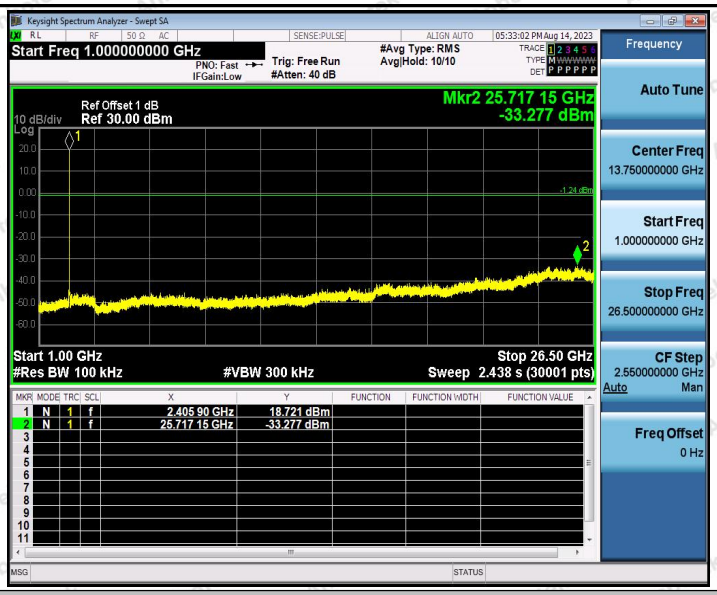
Test Graphs

2.4G_Ant1_2406_0~Reference

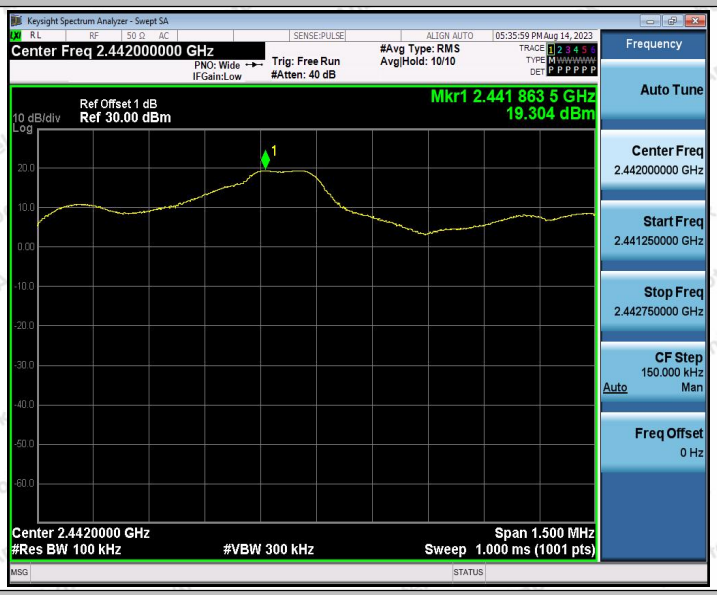
2.4G_Ant1_2406_30~1000



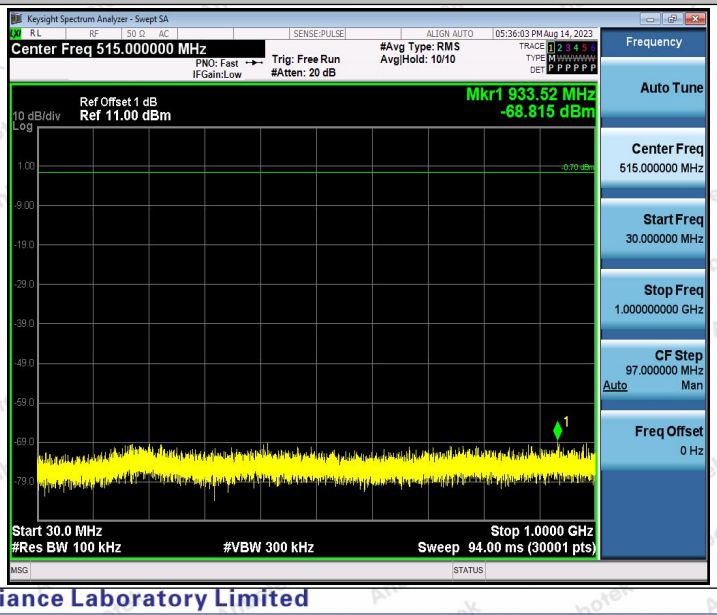
2.4G_Ant1_2406_1000~26500



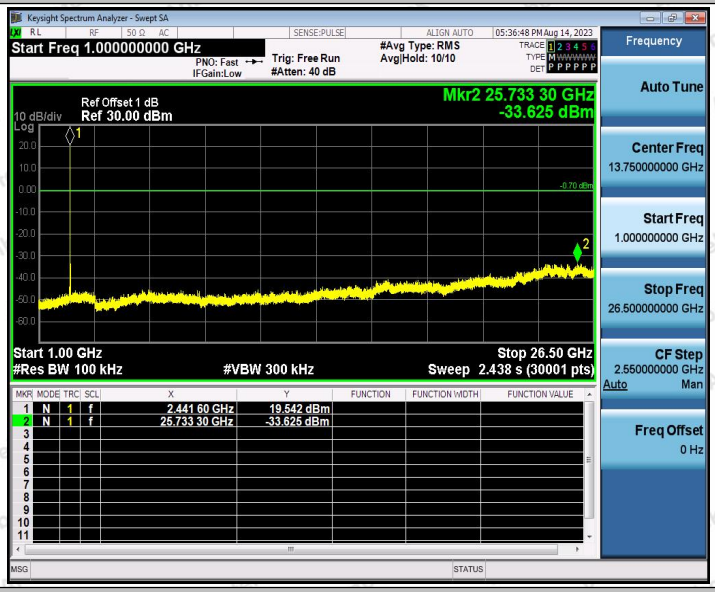
2.4G_Ant1_2442_0~Reference



2.4G_Ant1_2442_30~1000

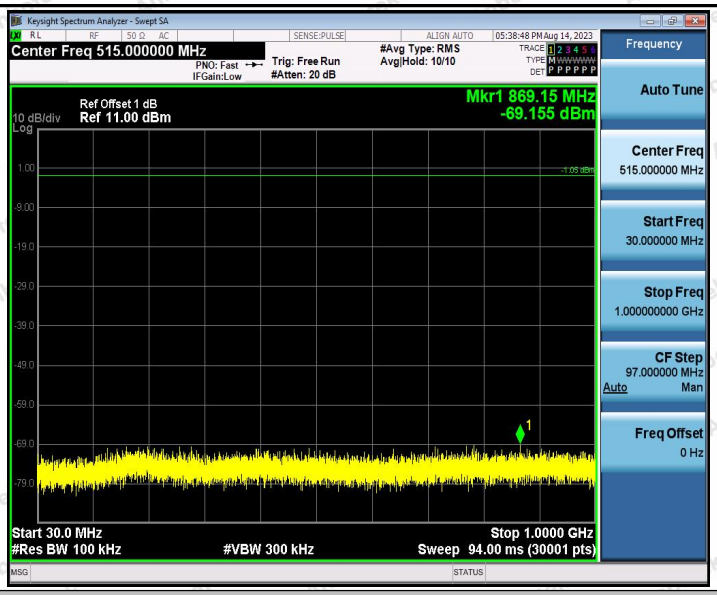


2.4G_Ant1_2442_1000~26500

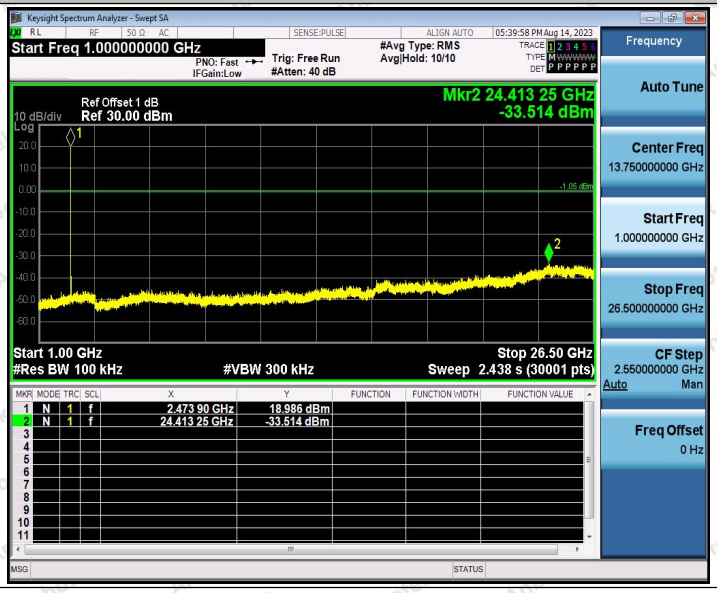


2.4G_Ant1_2475_0~Reference

2.4G_Ant1_2475_30~1000



2.4G_Ant1_2475_1000~26500



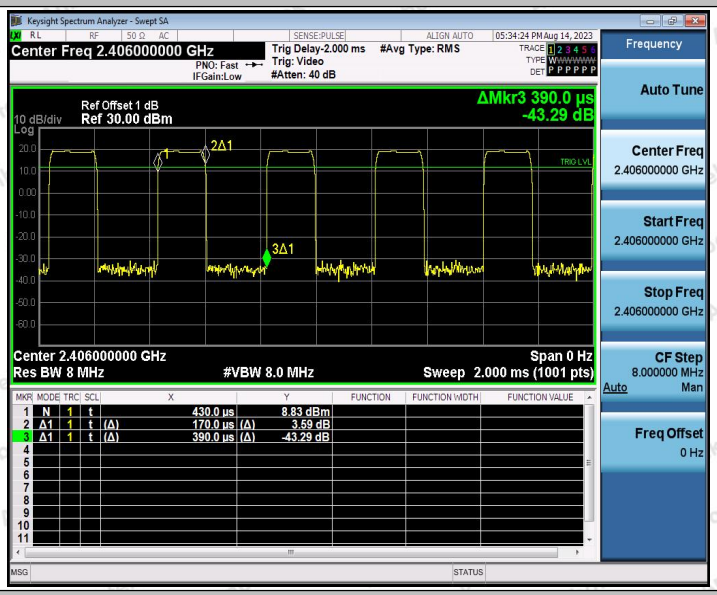
Appendix I: Duty Cycle

Test Result

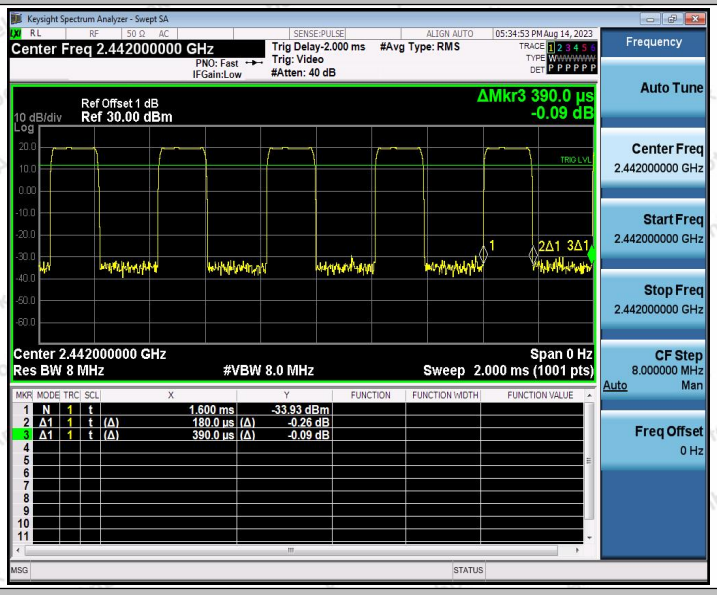
TestMode	Antenna	Frequency[MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
2.4G	Ant1	2406	0.17	0.39	43.59	3.61
		2442	0.18	0.39	46.15	3.36
		2475	0.17	0.39	43.59	3.61

Test Graphs

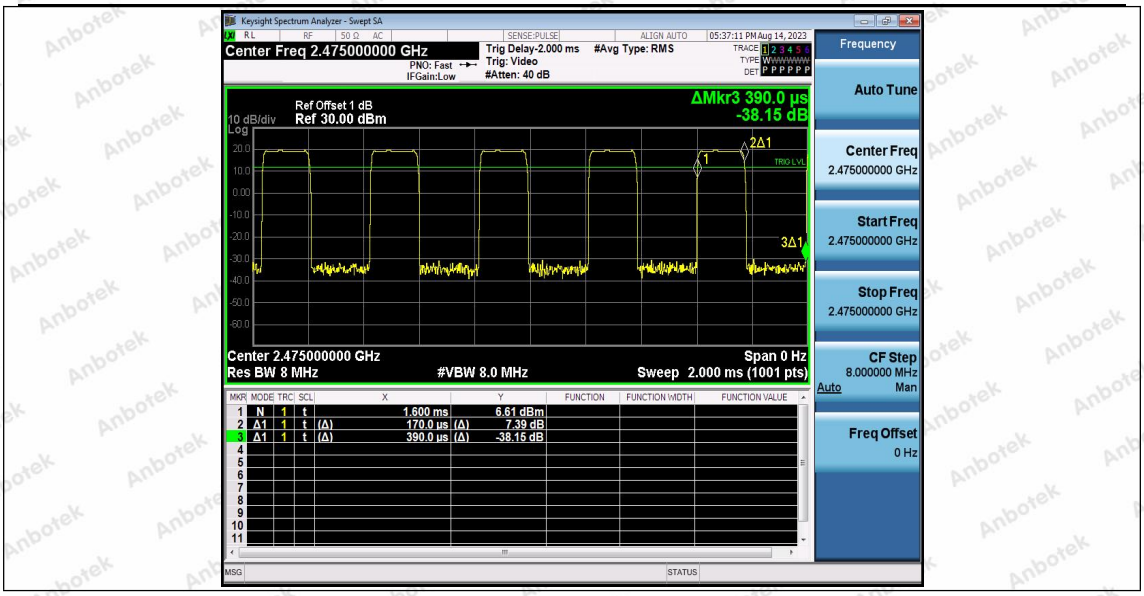
2.4G_Ant1_2406



2.4G_Ant1_2442



2.4G_Ant1_2475


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.475000000 GHz
Trig Delay-2.000 ms
Trig: Video
#Atten: 40 dB
#Avg Type: RMS
Ref Offset 1 dB
10 dB/div
Ref 30.00 dBm
ΔMkr3 390.0 µs
-38.15 dB
Center 2.475000000 GHz
Res BW 8 MHz
#VBW 8.0 MHz
Span 0 Hz
Sweep 2.000 ms (1001 pts)
1 N 1 t 1.600 ms 6.61 dBm
2 Δ1 1 t (Δ) 170.0 µs (Δ) 7.39 dB
3 Δ1 1 t (Δ) 390.0 µs (Δ) -38.15 dB
Frequency
Auto Tune
Center Freq 2.475000000 GHz
Start Freq 2.475000000 GHz
Stop Freq 2.475000000 GHz
CF Step 8.000000 MHz
Auto Man
Freq Offset 0 Hz

---End---