

Observations after replacing 5-yr-old factory TIM with PTM7950 on Alienware m15 R1 CPU & GPU (i7-8750H, RTX-2060)

My method of documenting consisted mainly of AIDA64 screenshots of temps, power, clocks, thermal throttling, and CPU usage during AIDA64 Stability Tests, with and without TS undervolting, before and after the PTM7950. I haven’t had the time yet to digest it all to understand the nuances, and this is the first time I’ve taken a close look at this type of data. I summarized my initial observations in the form of select screen-snips below.

First, a couple of clarification notes:

1. Unlike many folks on this forum who appear focused on gaming performance, my primary focus was the over-heating and associated major fan noise I experienced while working. I realize my usage is, for the most part, far less demanding than gaming.
2. In general, keep in mind my complete lack of experience tweaking thermals and limited understanding of related configuration parameters and what data is most useful to guide & document my changes. That said, I learned a ton and certainly have more knowledge to work with now than I did prior to coming to the ThrottleStop forum!
3. For the “before & after” graphs, this is what I am comparing:

a. BEFORE = before doing anything regarding TIM/ThrottleStop, including unlocking my BIOS restrictions and getting ThrottleStop functional. However, I had already taken my laptop case apart and thoroughly cleaned the dust out, which did make a significant difference. I didn’t collect any documentation prior to the cleaning, but it was even worse than indicated by the *before* screen-snips.

b. AFTER = after I had ThrottleStop applying voltage offsets (as noted in 1. below) and after I had replaced the 5-year-old factory-applied thermal paste with 0.2mm PTM7950. Additionally, when I had the heat-sink removed I noticed there was a very thick thermal pad (I estimated 1.5mm) in close proximity to the CPU that had a lot of “excess compression” (very deep indentations) for the 4 chips it covered, possibly so that it would reach the lower-height resistors right next to each chip. Since I was having such an extreme issue with CPU temp, I replaced this pad with a 1.0mm pad to make sure it wasn’t affecting the heat-sink contact with the CPU die. This may or may not have been a smart thing to do...

Screen-snip 1 – ThrottleStop Voltage Offsets

Core i7-8750H

VID 1.1226 V

40.17 x 99.768 MHz

4007.67 MHz

Name	Mode	Voltage	Offset
CPU Core	Adaptive	Default	-0.1504
Intel GPU	Adaptive	Default	-0.1006
CPU Cache	Adaptive	Default	-0.1309
iGPU Unslice	Adaptive	Default	-0.1006
System Agent	Adaptive	Default	-0.1006
PL4		0	
Voltage ID		1.1323	
Cache Ratio		36	
Speed Shift EPP		0	

List of Screen-snips:

- 1: ThrottleStop voltage offsets
- 2 & 3: AIDA64 GPU & CPU set of benchmarks, before & after PTM7950. Note: for the before set of benchmarks, I *think* I had TS applying voltage offsets but I am not positive. This is the only screen-snip where I am not certain of the TS status.
- 4-7: ThrottleStop Temps during TS Bench, before & after PTM7950
- 8 & 9: Temps & CPU Usage/Throttling during AIDA64 Combined Stress Test, before & after PTM7950
- 10 & 11: Clocks & CPU Usage/Throttling during AIDA64 Combined Stress Test, before & after PTM7950
- 12 & 13: Power & CPU Usage/Throttling during AIDA64 Combined Stress Test, before & after PTM7950

There were also noticeable differences between the graphs with and without ThrottleStop undervolting in each case (before & after PTM7950), but I didn’t include them as I’m not certain how much info people would be interested in seeing, especially info collected by a newbie to thermal issues.

Screen-snips 2 & 3 – AIDA64 GPU/CPU Benchmarks

2. Before-PTM7950:

AIDA64 GPGPU Benchmark

☒ GPU1: NVIDIA GeForce RTX 2060 (TU106)

1200 MHz, 1920 cores, 30 CUs, Driver 551.23

☒ GPU2: Intel(R) UHD Graphics 630

1100 MHz, 96 cores, 24 CUs, Driver 31.0.101.2004

☒ CPU: Intel Core i7-8750H (Coffee Lake-H)

3900 MHz, 6 cores, 12 threads

	2 GPUs	x64 CPU
Memory Read	15405 MB/s	36398 MB/s
Memory Write	15540 MB/s	39997 MB/s
Memory Copy	297.72 GB/s	35447 MB/s
Single-Precision FLOPS	7175 GFLOPS	577.3 GFLOPS
Double-Precision FLOPS	322.3 GFLOPS	290.5 GFLOPS
24-bit Integer IOPS	6174 GIOPS	254.7 GIOPS
32-bit Integer IOPS	6264 GIOPS	254.4 GIOPS
64-bit Integer IOPS	1400 GIOPS	44.24 GIOPS
AES-256	16830 MB/s	24084 MB/s
SHA-1 Hash	75239 MB/s	5113 MB/s
Single-Precision Julia	1975 FPS	162.1 FPS
Double-Precision Mandel	97.41 FPS	81.26 FPS

AIDA64 v7.00.6700 (c) 1995-2023 FinalWire Ltd.

Save

Results

Start Benchmark

Close

3. After-PTM795:

AIDA64 GPGPU Benchmark

☒ GPU1: NVIDIA GeForce RTX 2060 (TU106)

1200 MHz, 1920 cores, 30 CUs, Driver 551.23

☒ GPU2: Intel(R) UHD Graphics 630

1100 MHz, 96 cores, 24 CUs, Driver 31.0.101.2004

☒ CPU: Intel Core i7-8750H (Coffee Lake-H)

3900 MHz, 6 cores, 12 threads

	2 GPUs	x64 CPU
Memory Read	15916 MB/s	36652 MB/s
Memory Write	16028 MB/s	39271 MB/s
Memory Copy	300.90 GB/s	35352 MB/s
Single-Precision FLOPS	7177 GFLOPS	744.8 GFLOPS
Double-Precision FLOPS	323.1 GFLOPS	372.4 GFLOPS
24-bit Integer IOPS	6272 GIOPS	333.3 GIOPS
32-bit Integer IOPS	6260 GIOPS	333.3 GIOPS
64-bit Integer IOPS	1396 GIOPS	46.53 GIOPS
AES-256	16803 MB/s	26523 MB/s
SHA-1 Hash	75021 MB/s	6656 MB/s
Single-Precision Julia	1963 FPS	246.5 FPS
Double-Precision Mandel	96.41 FPS	127.2 FPS

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Save

Results

Start Benchmark

Close

4. **After** PTM-7950, during 1st TS Bench 120, cores 1-8

Core i7-8750H

VID 1.0742 V

39.00 x 99.768 MHz

3890.93 MHz

FID	C0%	Mod	°C	Max
39.00	100.0	100.0	72°C	74°C
39.00	100.0	100.0	72°C	74°C
39.00	100.0	100.0	68°C	70°C
39.00	100.0	100.0	68°C	70°C
39.00	100.0	100.0	72°C	74°C
39.00	100.0	100.0	72°C	74°C
39.00	100.0	100.0	69°C	70°C
39.00	100.0	100.0	69°C	71°C

C0%100.073 °CMax75 °C

PKG Power54.7 WMax56.3 W

LimitsPROCHOT 100°C

FIVRTPLC10CLR-

TS BenchGPU 49°C-

5. **After** PTM-7950, during next TS Bench 120, cores 5-12

Core i7-8750H

VID 1.0719 V

39.00 x 99.768 MHz

3890.93 MHz

FID	C0%	Mod	°C	Max
39.00	100.0	100.0	73°C	75°C
39.00	100.0	100.0	73°C	75°C
39.00	100.0	100.0	66°C	71°C
39.00	100.0	100.0	66°C	71°C
39.00	100.0	100.0	69°C	71°C
39.00	100.0	100.0	69°C	71°C
39.00	100.0	100.0	68°C	69°C
39.00	100.0	100.0	68°C	69°C

C0%100.073 °CMax76 °C

PKG Power54.6 WMax55.7 W

LimitsPROCHOT 100°C

FIVRTPLC10CLR-

TS BenchGPU 49°C-

6. (Left) **After** PTM7950, max core temps over several hours (pre-PTM7950, I could only go several minutes after clearing max values for 3 (physical) cores to show max values of 100.

Core i7-8750H

VID 1.1326 V

39.45 x 99.768 MHz

3935.84 MHz

FID	C0%	Mod	°C	Max
39.45	17.2	100.0	46°C	83°C
39.54	8.1	100.0	43°C	87°C
37.37	0.3	100.0	43°C	87°C
39.41	4.6	100.0	43°C	82°C
38.39	0.4	100.0	43°C	82°C
39.43	2.7	100.0	43°C	83°C
39.59	2.6	100.0	43°C	83°C
39.10	1.6	100.0	42°C	81°C

C0%4.546 °CMax87 °C

PKG Power7.7 WMax58.9 W

LimitsPROCHOT 100°C

FIVRTPLC10CLR-

TS BenchGPU 41°C-

7. (Right) *Reference: Before* PTM7950, during TS Bench 120

Core i7-8750H

VID 0.9642 V

32.85 x 99.768 MHz

3277.36 MHz

FID	C0%	Mod	°C	Max
32.84	99.6	100.0	95°C	99°C
32.84	99.6	100.0	64°C	64°C
32.84	99.6	100.0	64°C	64°C
32.85	99.6	100.0	100°C	100°C
32.83	99.6	100.0	100°C	100°C
32.86	99.6	100.0	65°C	69°C
32.82	99.6	100.0	65°C	69°C
32.82	99.6	100.0	89°C	92°C

C0%99.6100 °CMax100 °C

PKG Power36.2 WMax46.4 W

LimitsHOTPROCHOT 100°C

FIVRTPLC10CLR-

TS BenchGPU 44°C-

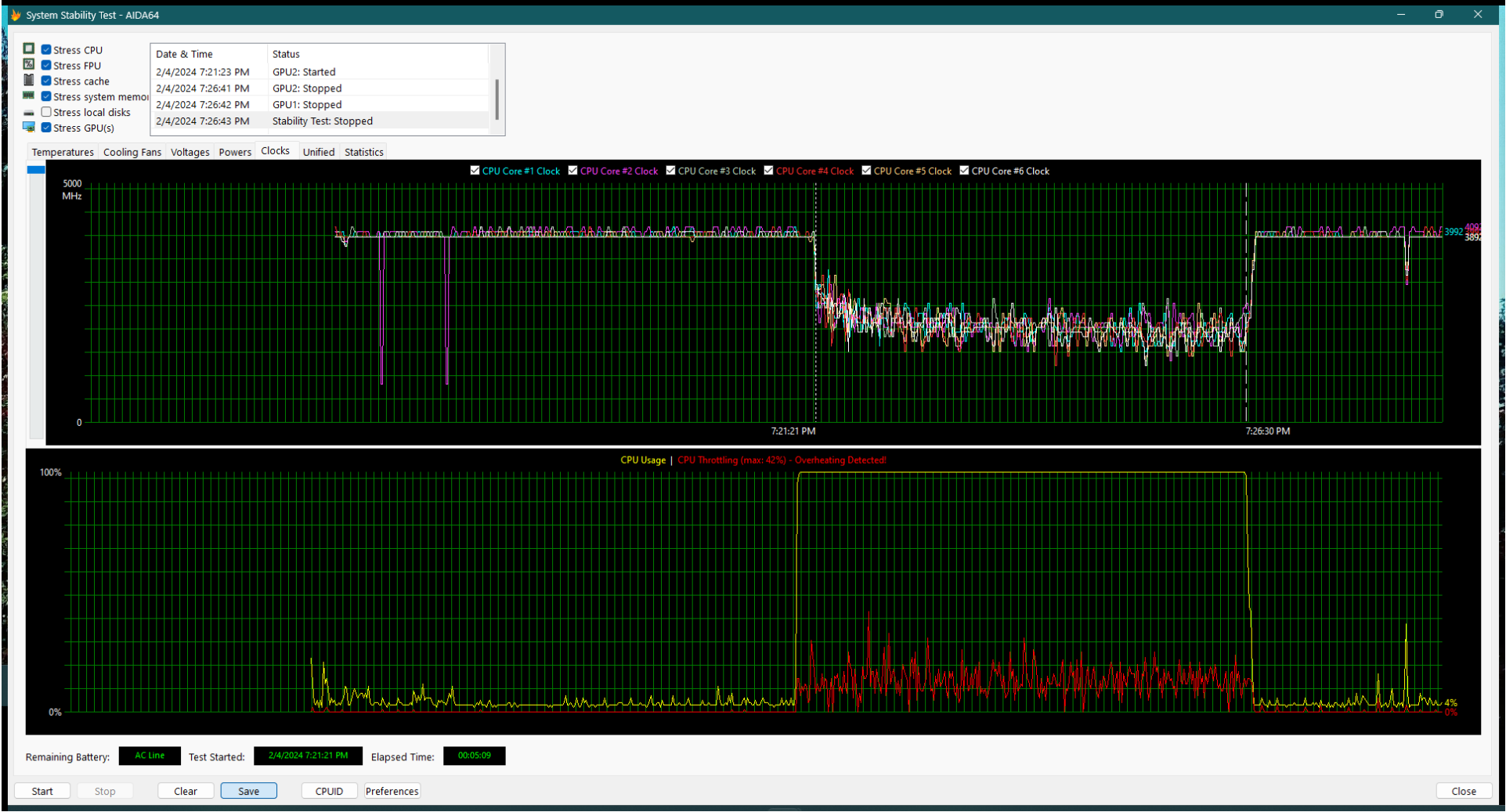
8. **Temps (top) and CPU Usage/Thermal Throttling (bottom) before** PTM7950



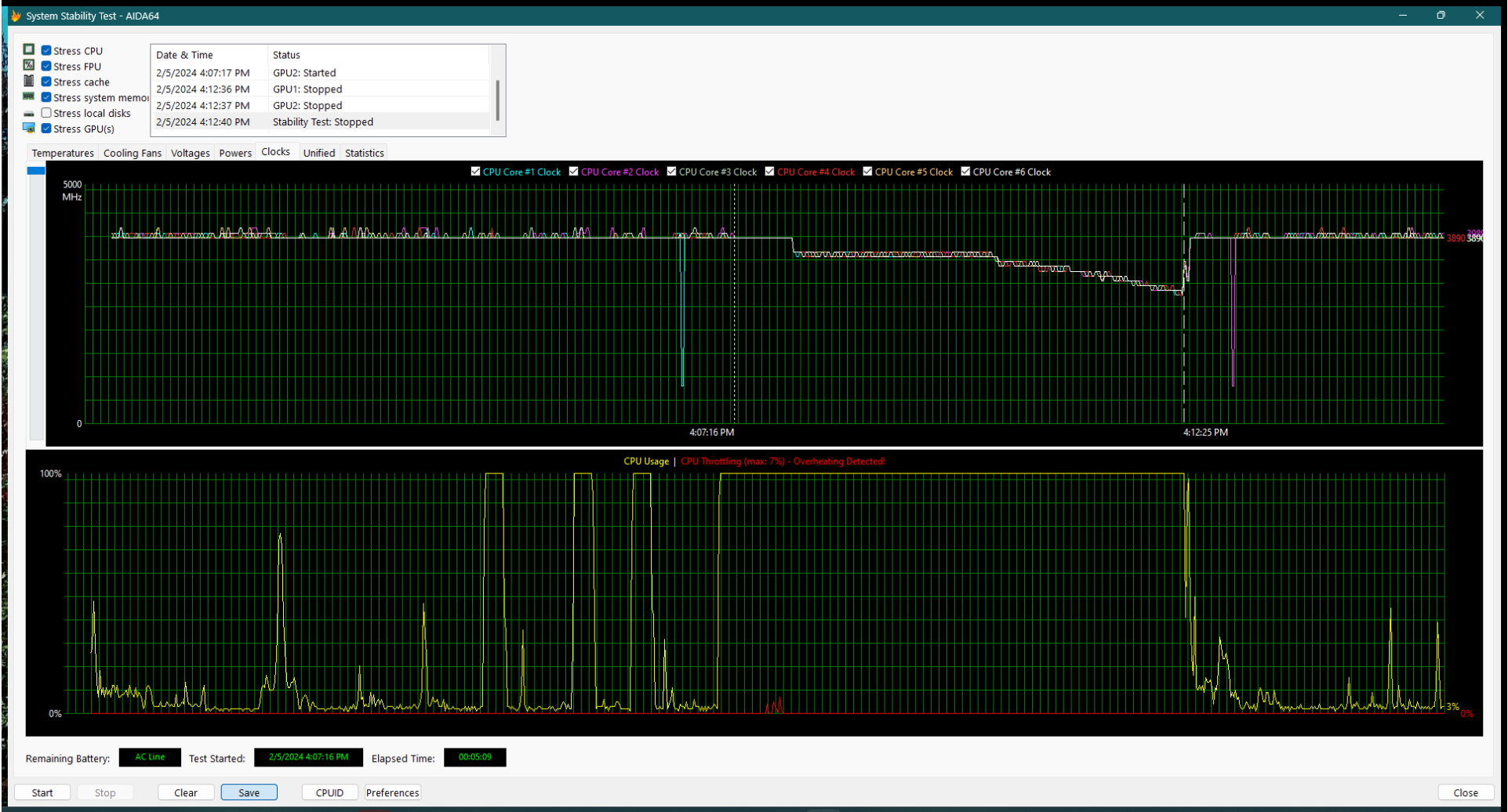
9. **Temps (top) and CPU Usage/Thermal Throttling (bottom) after** PTM7950 (Note: 3 spikes prior to AIDA64 stress tests are TS Bench 120)



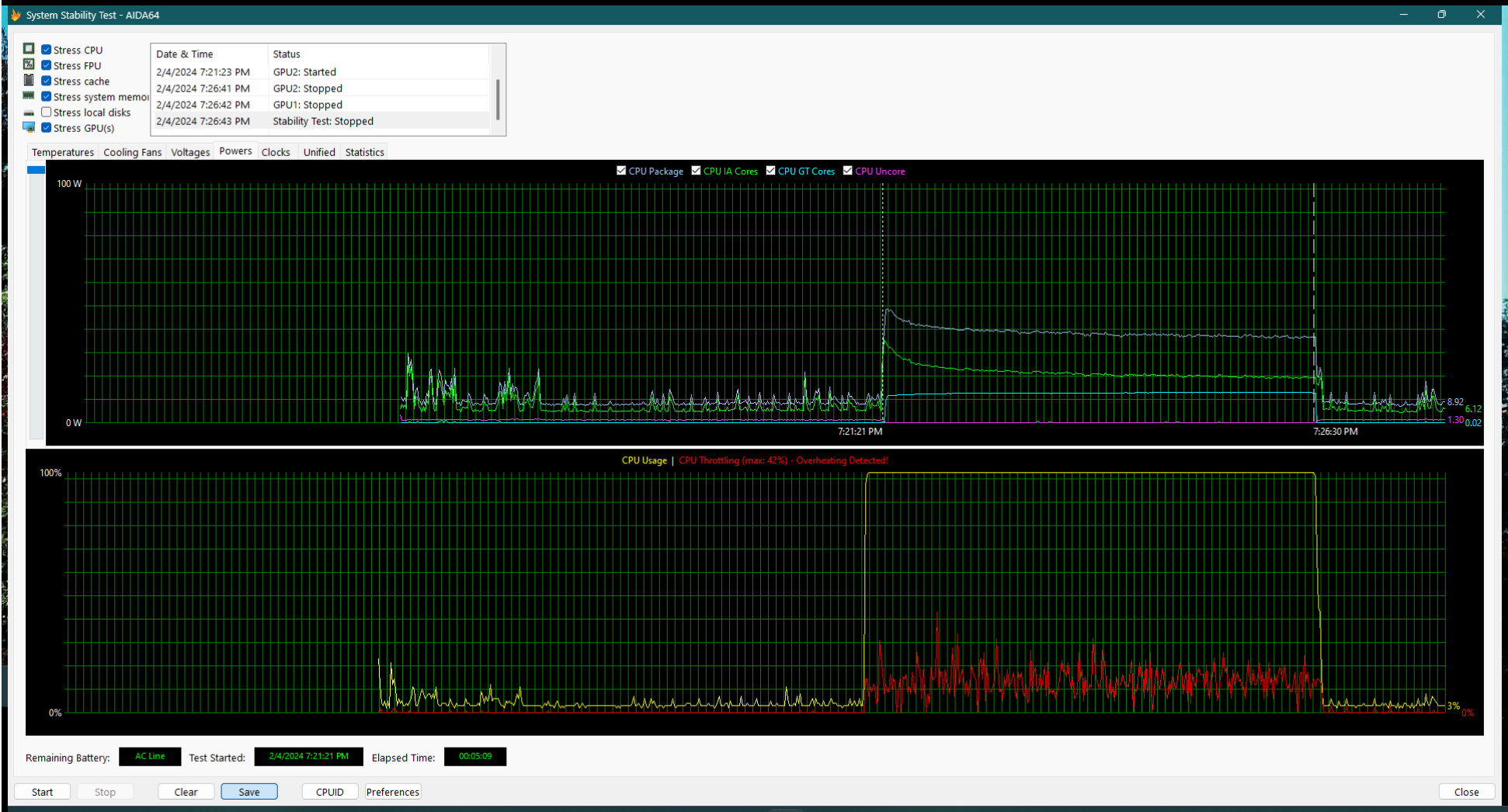
10. **Clocks (top) and CPU Usage/Thermal Throttling (bottom) before PTM7950**



11. **Clocks (top) and CPU Usage/Thermal Throttling (bottom) after PTM7950 (Note: 3 spikes prior to AIDA64 stress tests are TS Bench 120)**



12. **Power (top) and CPU Usage/Thermal Throttling (bottom) before** PTM7950



13. **Power (top) and CPU Usage/Thermal Throttling (bottom) after** PTM7950 (Note: 3 spikes prior to AIDA64 stress tests are TS Bench 120)

