System Thermal Test Report

Model: **The Tower 200**

Version: **20230511**

NO: RS202305110001

A. Introduction

1. Objective

2. Equipment

3. Procedure

thermaltake

Our objective is to find out if The Tower 200 can efficiently extract the heat generated by the latest components, so we built a system with an Intel i9-13900K and a ASUS ROG Strix GeForce RTX® 4090 OC and put it to the test. The passing criteria we set was to keep the internal temperature under **43˚C** while the system is running at full load, with **five** installed fans and a AIO 280 installed.

The equipment we used in the thermal testing includes:

1. Temperature & Humidity Chamber

2. Data Acquisition Device

3. Thermocouple

The Temp. & Humidity Chamber ensures consistency in the testing environment, particularly temperature and humidity. The **temperature** was set at **25°C** and the **humidity** at **50%** in the chamber.

The Data Acquisition Device helps us to directly collect the data through **thermocouples**, which is the most important equipment for our testing. We set up the thermocouple inside the case at various points to measure the temperature.

We used **AIDA64 Extreme** and **FurMark ROG Edition** to push 100% load on the CPU and GPU and tested for 30 minutes.

Testing steps:

1. Ready the systems

2. Place the chassis into the Temp. & Humidity Chamber

3. Set the thermocouple at the specified places

4. Set up the Temp. & Humidity Chamber - temperature at 25 $^\circ$C and the humidity at 50%

5. Turn on the Temp. & Humidity Chamber and start testing (for 30 minutes)

6. Check the data acquired from the Data Acquisition device

7. End testing

B. Test Configuration

1. Laboratory Equipment

2. Chassis Hardware List

3. Chassis Fan Allocation

4. Chassis Thermal Airflow

5. Chassis Measured Points

6. Thermal Stress Test

7. AIDA64 & FurMark Test

8. Graphics Performance Testing

9. Acoustic Test

NO: RS202305110001
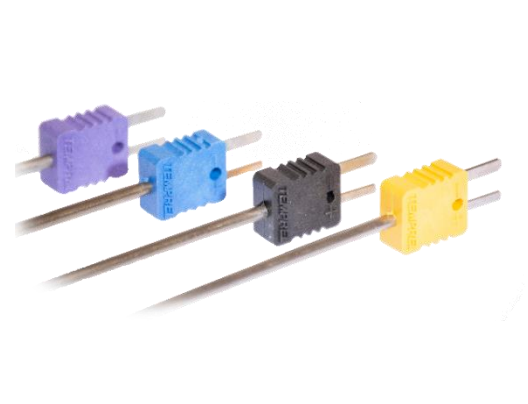
Thermocouple

Sound Level Meter

Thermal Imaging Camera

Temperature Data Acquisition

Temperature & Humidity Chamber

NO: RS202305110001

Component	Model
Chassis	The Tower 200
Motherboard	ASUS ROG STRIX Z790-i
CPU	Intel® Core™ i9-13900K Processor (TDP 253W)
GPU	ASUS ROG Strix GeForce RTX® 4090 OC 24GB GDDR6X
RAM	TOUGHRAM XG RGB DDR5 32G (16G x 2)
SSD	Seagate SSD 120G
PSU	Toughpower PF3 1200W - TT Premium Edition
CPU Cooler	TOUGHLIQUID Ultra 280 AIO Liquid Cooler
Fans	AIO:TOUGHFAN 140mm x 2 (2000rpm) Chassis: CT 140mm x 3 (1500 rpm) (Top x 1 , Rear x 2)
Software	1. AIDA64 Extreme 2. FurMark ROG Edition V0.8.14.0 3. CPU-Z Ver.2.015 x64 4. Core Temp V1.18
Full load	30 minutes
Camera	Testo 885-2 Thermal Imaging Camera

NO: RS202305110001

Cool Airflow Inlets (Active)

Hot Airflow Exhausts

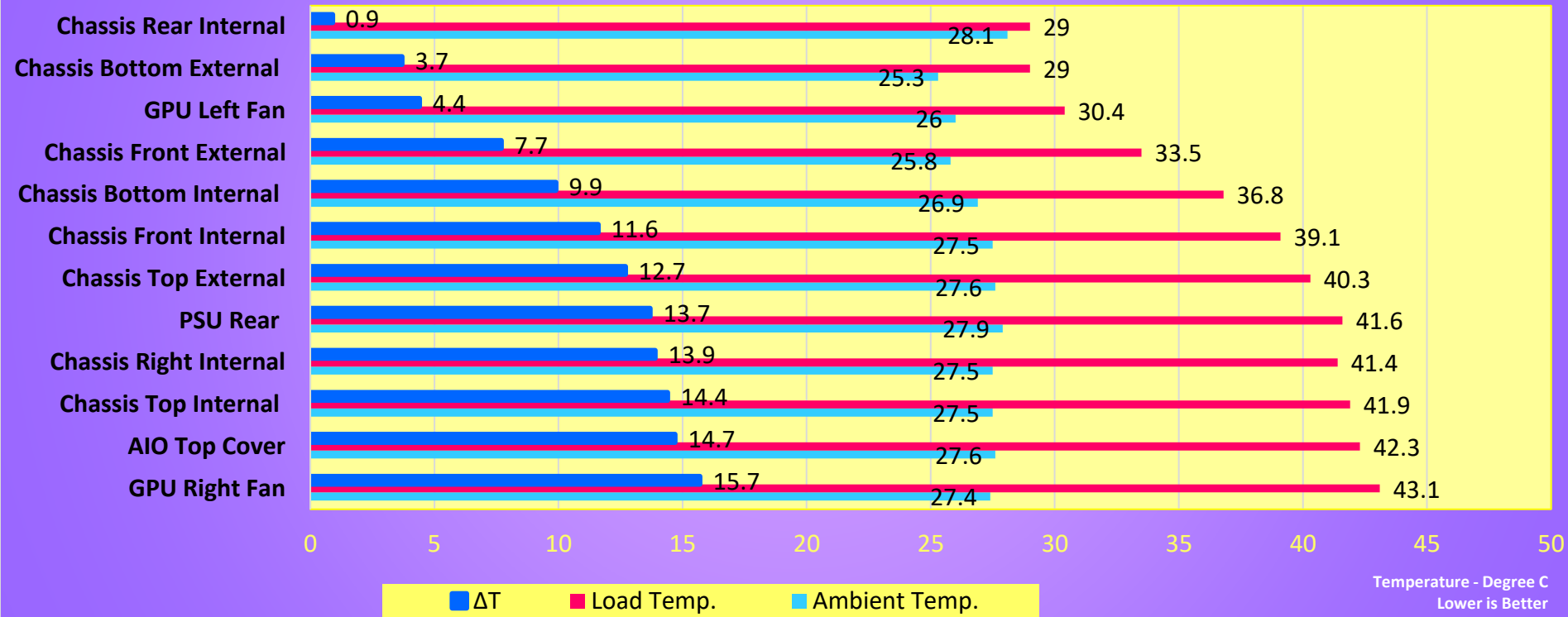| Measure Point	Description	Airflow	Thermocouple Number
1	Chassis Right External	Intake	101
2	Chassis Right Internal	Intake	102
3	Chassis Left External	Intake	103
4	GPU Right Fan	Intake	104
5	Chassis Rear Internal	Exhaust	105
6	Chassis Rear External	Exhaust	106
7	Chassis Top Internal	Exhaust	108
8	Chassis Top External	Exhaust	110
9	PSU Bottom	Intake	111
10	PSU Rear	Exhaust	112
11	AIO Top Cover	-	113
12	VGA Rear Slot	Exhaust	114
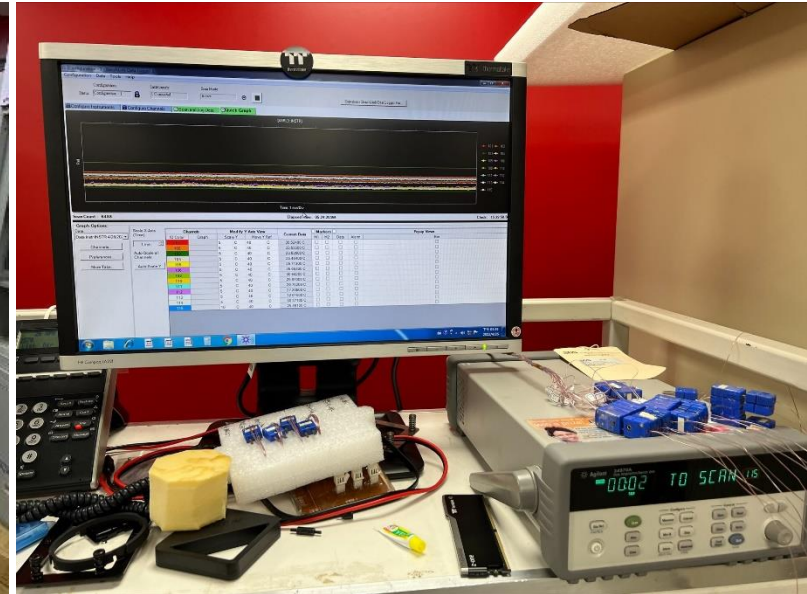
- Setting up the chamber temperature and humidity
- Temperature: 25°C
- Humidity: 50%
- Recording Data
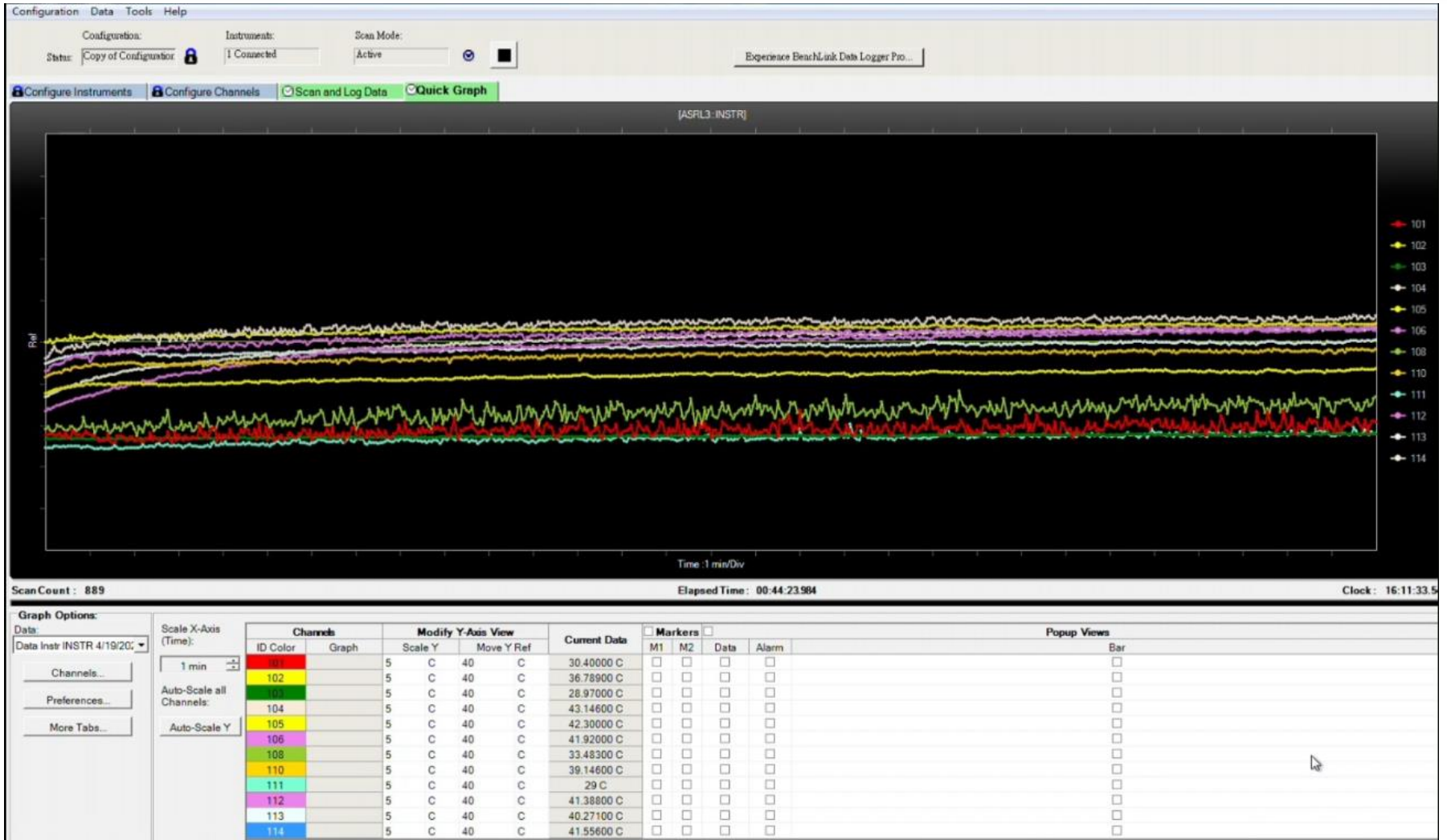
Temperature Data Recoding

NO: RS202305110001

System Thermal Stress Test - The Tower 200

CPU- Intel Core i9-13900K
GPU-ASUS ROG-STRIX-RTX4090
Ambient Temperature: 25°C
Humidity: 50%
Loading with AIDA64 & FurMark

Position	ΔT	Load Temp.	Ambient Temp.
Chassis Rear Internal	0.9	29	28.1
Chassis Bottom External	3.7	29	25.3
GPU Left Fan	4.4	30.4	26
Chassis Front External	7.7	33.5	25.8
Chassis Bottom Internal	9.9	36.8	26.9
Chassis Front Internal	11.6	39.1	27.5
Chassis Top External	12.7	40.3	27.6
PSU Rear	13.7	41.6	27.9
Chassis Right Internal	13.9	41.4	27.5
Chassis Top Internal	14.4	41.9	27.5
AIO Top Cover	14.7	42.3	27.6
GPU Right Fan	15.7	43.1	27.4

■ ΔT   ■ Load Temp.   ■ Ambient Temp.

Temperature - Degree C
Lower is Better

We expected to see higher temperature at the exhaust points and relatively lower temperature at the intake positions. The highest temperature was found at the AIO exhaust, which is reasonable given the CPU was running at full load. Most of the intake positions recorded a temperature lower than **43°C** since they were drawing air from environment. Two critical positions we were looking at are **NO. 104 GPU Fan** and **NO. 113 AIO Cover**, which were drawing internal air to cool two of the most important components.

We used **AIDA64 Extreme** (stress FPU) and **FurMark ROG Edition** (**resolution: 3840 x 2160) to push 100% load** on the CPU and GPU for 30 minutes.
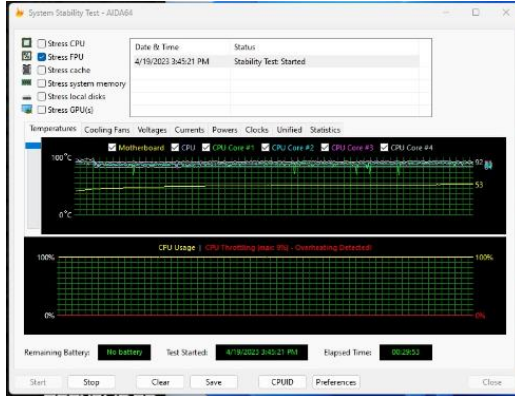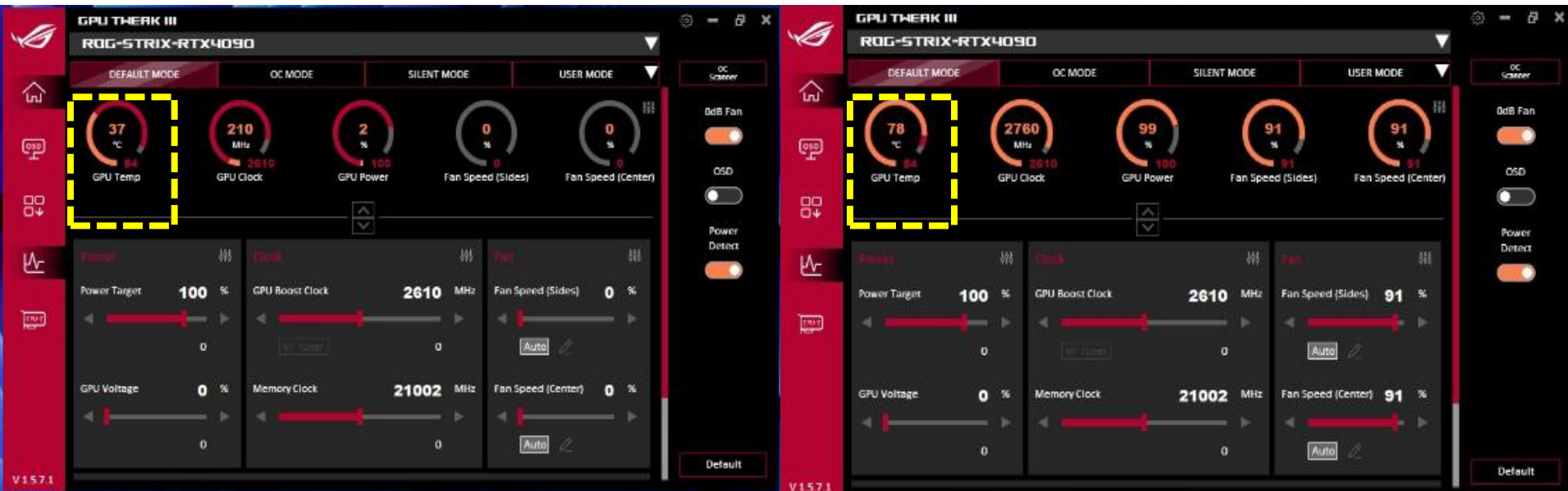

AIDA64 Extreme

FurMark

Idle

Date	4/19/2023
Time (HH:MM)	3:43 PM
CPU Clock	5487 MHz
Motherboard	Asus ROG Strix Z790-I Gaming WiFi
BIOS Version	0904
Free Memory	25729 MB
GPU Clock	210 MHz
Motherboard	34°C
CPU	32°C
CPU Package	41°C
GPU Diode	38°C
GPU Hotspot	46°C
AIO Pump	3191 RPM
CPU	2048 RPM
Chassis #1	1557 RPM
GPU	0 RPM
GPU	0%
CPU Core	1.332 V
GPU Core	0.875 V
CPU Package	34.71 W
GPU	18.09 W
GPU TDP%	4%

Full load

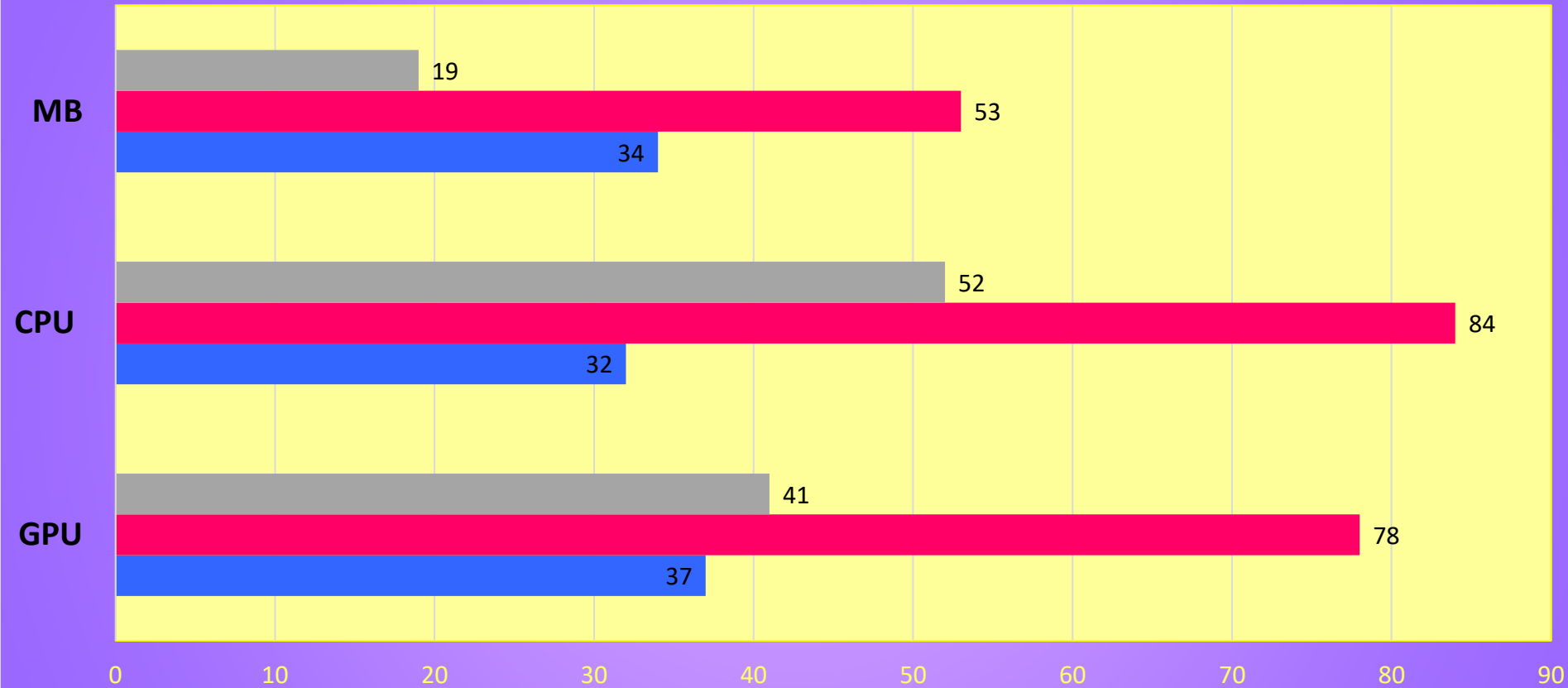|	
Date	4/19/2023
Time (HH:MM)	4:15 PM
CPU Clock	5187 MHz
Motherboard	Asus ROG Strix Z790-I Gaming WiFi
BIOS Version	0904
Free Memory	24809 MB
GPU Clock	2760 MHz
Motherboard	53°C
CPU	84°C
CPU Package	96°C
GPU Diode	84°C
GPU Hotspot	0°C
AIO Pump	3199 RPM
CPU	2051 RPM
Chassis #1	1528 RPM
GPU	2827 RPM
GPU	91%
CPU Core	1.279 V
Chassis #2	6783 RPM
GPU Core	0.000 V
CPU Package	252.85 W
GPU	496.68 W
GPU TDP%	99%

thermaltake

We used **AIDA64 Extreme** (stress FPU) and **FurMark ROG Edition** (**resolution: 3840 x 2160) to push 100% load** on the CPU and GPU for 30 minutes.


Idle

Full load

thermaltake

CPU & GPU Thermal Stress Test - The Tower 200

MB	ΔT: 19, Load Temp.: 53, Idle Temp.: 34
CPU	ΔT: 52, Load Temp.: 84, Idle Temp.: 32
GPU	ΔT: 41, Load Temp.: 78, Idle Temp.: 37

0 10 20 30 40 50 60 70 80 90

CPU- Intel Core i9-13900K
GPU-ASUS ROG-STRIX-RTX4090
Ambient Temperature: 25˚C
Humidity: 50%
Loading with AIDA64 & FurMark

☐ ΔT   ☐ Load Temp.   ☐ Idle Temp.

Temperature - Degree C
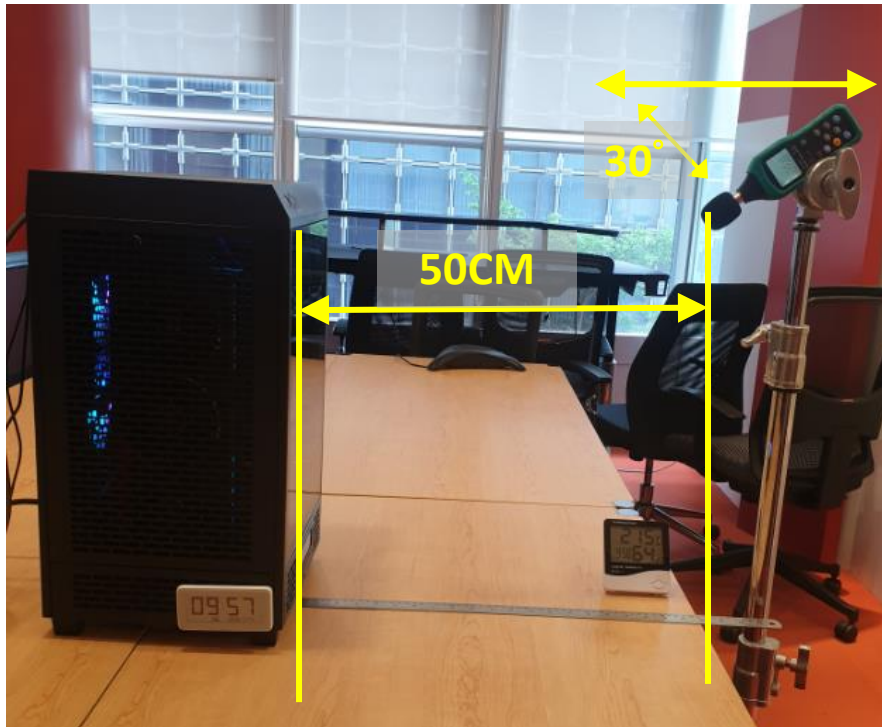**Lower is Better**

NO: RS202305110001

NO: RS202305110001
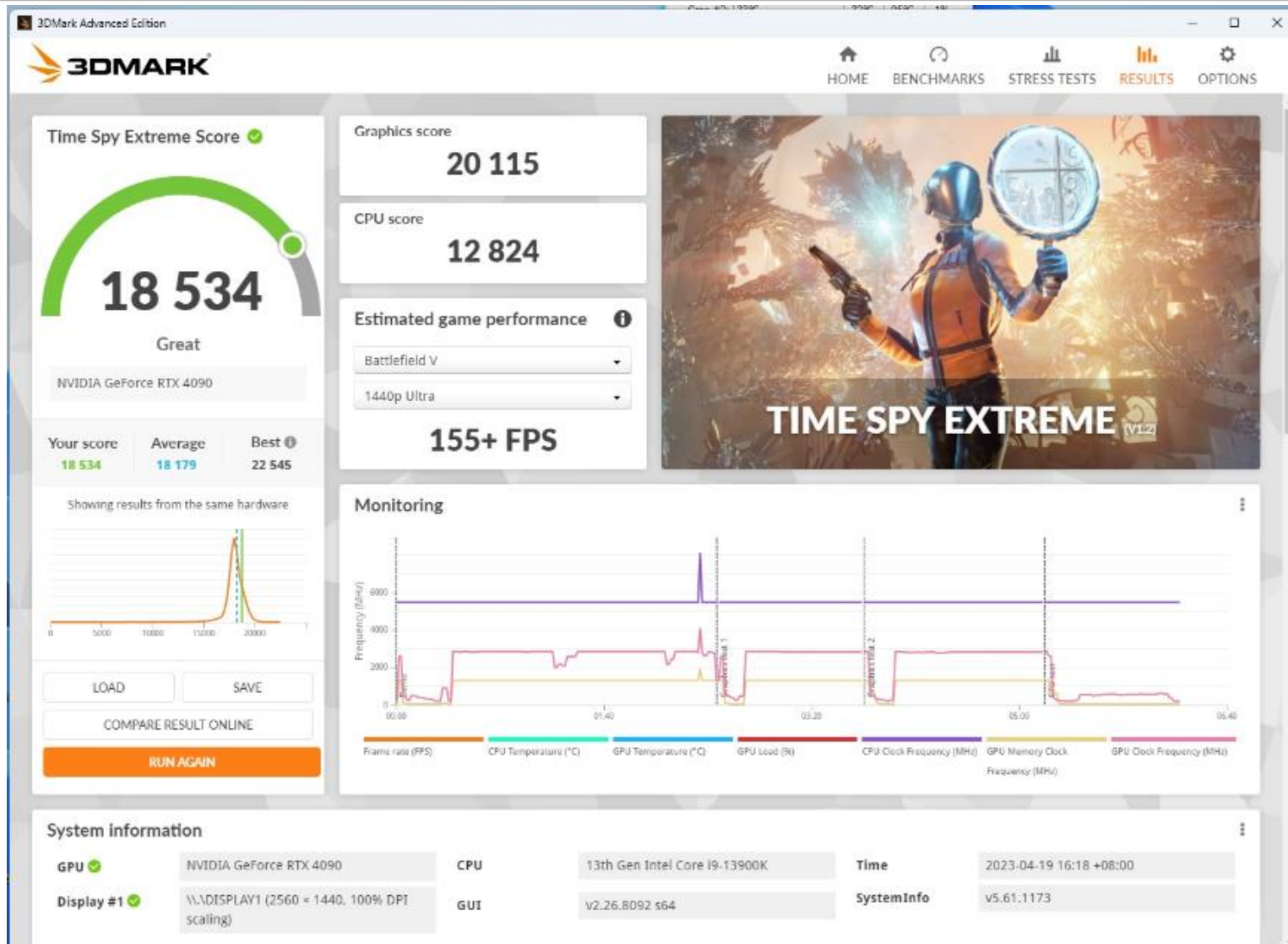
Test Environment：**Thermaltake Taipei Office**

Test Model: TOWER 200

Test Ambience: **21.5 ℃(Temperature) / 64% R.H.(Relative Humidity)**

Microphone position: **50 cm / in front of PC system**

Background Noise：**35.9 dBA**.

Microphone position

Test Ambience

Fan Speed 600rpm – **37.1dBA**	Fan Speed 700rpm – **37.8dBA**	Fan Speed 850rpm – **39.6dBA**	Fan Speed 1500rpm – **54.8dBA**

Date	5/5/2023	Date	5/5/2023	Date	5/5/2023	Date	5/5/2023
Time (HH:MM)	10:27 AM	Time (HH:MM)	10:29 AM	Time (HH:MM)	10:32 AM	Time (HH:MM)	10:34 AM
CPU Clock	2095 MHz	CPU Clock	5487 MHz	CPU Clock	5487 MHz	CPU Clock	5487 MHz
Motherboard	Asus ROG Strix Z790-I Gaming WiFi	Motherboard	Asus ROG Strix Z790-I Gaming WiFi	Motherboard	Asus ROG Strix Z790-I Gaming WiFi	Motherboard	Asus ROG Strix Z790-I Gaming WiFi
BIOS Version	0904	BIOS Version	0904	BIOS Version	0904	BIOS Version	0904
Free Memory	26047 MB	Free Memory	26041 MB	Free Memory	26125 MB	Free Memory	26131 MB
GPU Clock	255 MHz	GPU Clock	255 MHz	GPU Clock	255 MHz	GPU Clock	210 MHz
Motherboard	37°C	Motherboard	37°C	Motherboard	36°C	Motherboard	35°C
CPU	38°C	CPU	38°C	CPU	39°C	CPU	35°C
CPU Package	45°C	CPU Package	46°C	CPU Package	45°C	CPU Package	42°C
GPU Diode	38°C	GPU Diode	39°C	GPU Diode	39°C	GPU Diode	37°C
GPU Hotspot	46°C	GPU Hotspot	47°C	GPU Hotspot	47°C	GPU Hotspot	45°C
AIO Pump	2941 RPM	AIO Pump	2967 RPM	AIO Pump	3125 RPM	AIO Pump	3214 RPM
CPU	473 RPM	CPU	590 RPM	CPU	690 RPM	CPU	2645 RPM
Chassis #1	573 RPM	Chassis #1	694 RPM	Chassis #1	841 RPM	Chassis #1	1480 RPM
GPU	0 RPM	GPU	0 RPM	GPU	0 RPM	GPU	0 RPM
GPU	0%	GPU	0%	GPU	0%	GPU	0%
CPU Core	1.323 V	CPU Core	1.332 V	CPU Core	1.341 V	CPU Core	1.314 V
GPU Core	0.880 V	GPU Core	0.880 V	GPU Core	0.880 V	GPU Core	0.880 V
CPU Package	31.73 W	CPU Package	31.55 W	CPU Package	33.29 W	CPU Package	39.33 W
GPU	17.71 W	GPU	15.59 W	GPU	16.09 W	GPU	16.49 W
GPU TDP%	4%	GPU TDP%	3%	GPU TDP%	3%	GPU TDP%	3%

thermaltake

Acoustic Sound Pressure Level Test - The Tower 200
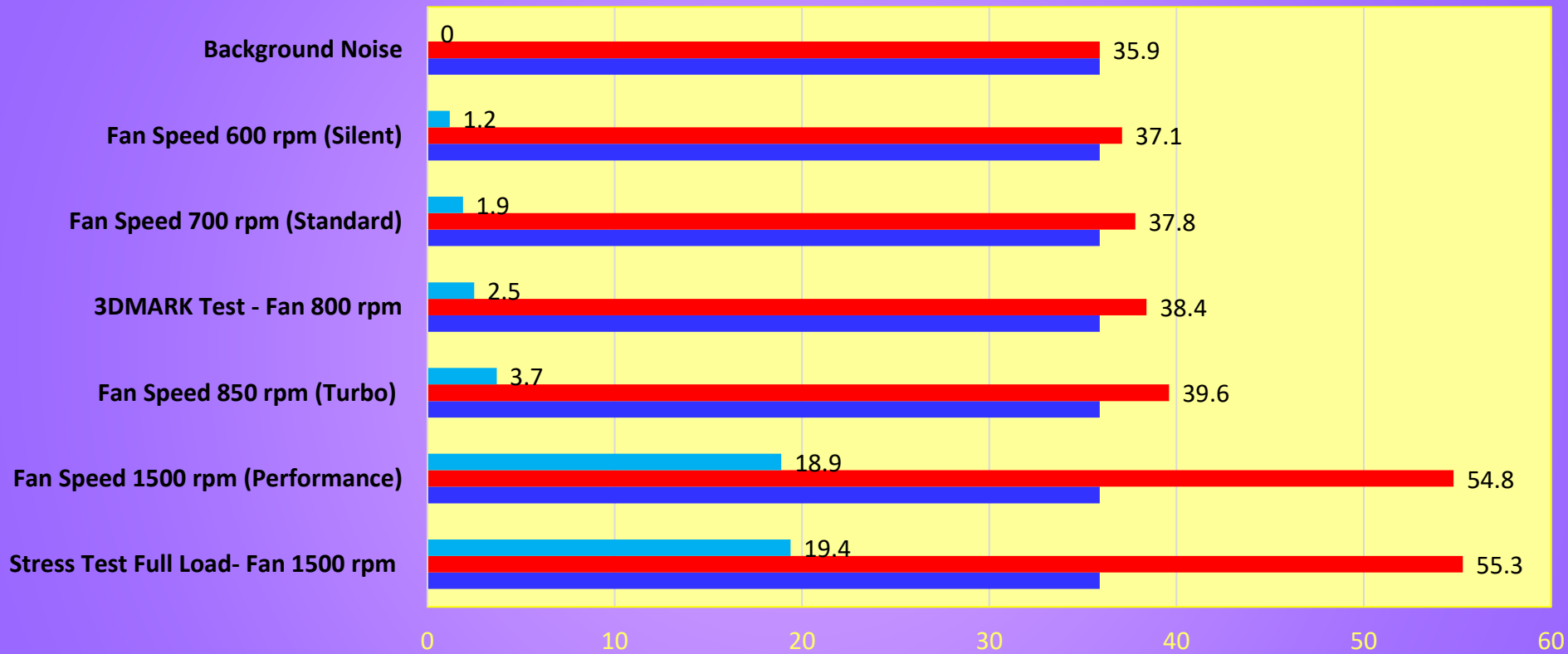
| Test	Diff	Load dBA	Idle dBA
Background Noise	0	35.9	
Fan Speed 600 rpm (Silent)	1.2	37.1	
Fan Speed 700 rpm (Standard)	1.9	37.8	
3DMARK Test - Fan 800 rpm	2.5	38.4	
Fan Speed 850 rpm (Turbo)	3.7	39.6	
Fan Speed 1500 rpm (Performance)	18.9	54.8	
Stress Test Full Load- Fan 1500 rpm	19.4	55.3	

Legend: ■ Diff ■ Load dBA ■ Idle dBA

CPU- Intel Core i9-13900K
GPU-ASUS ROG-STRIX-RTX4090
Ambient Temperature: 25°C
Humidity: 50%
Loading with AIDA64 & FurMark

Temperature - Degree C
Lower is Better

NO: RS202305110001

C. Conclusion

NO: RS202305110001

Front View

Idle

Full Load
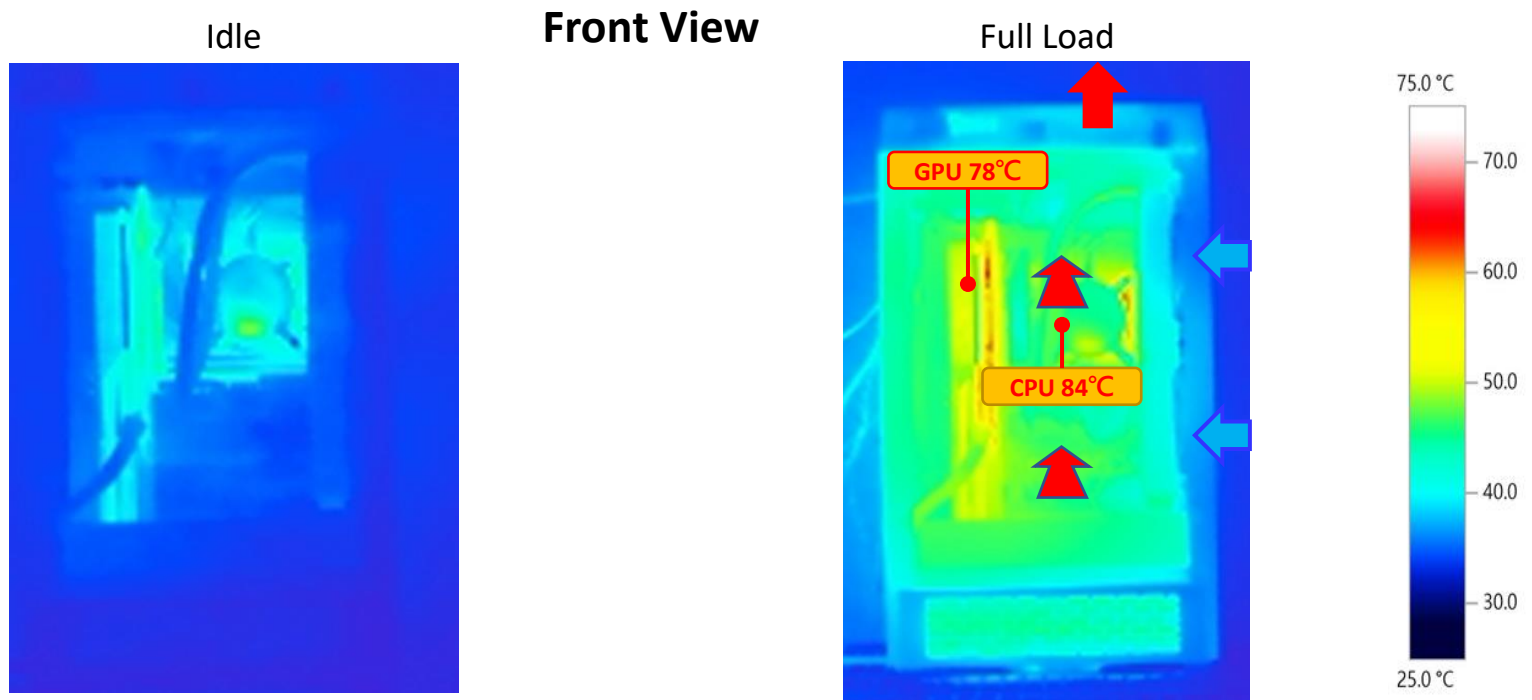
AIDA64 Extreme (stress FPU) and **FurMark ROG Edition** (**resolution: 3840 x 2160) to push 100% load** on the CPU and GPU for 30 minutes**.**
-**INTEL i9 13900K / CPU Temp. (Max)**：84℃ (TDP 253W)
-**ASUS ROG Strix GeForce RTX® 4090 OC / GPU Temp. (Max)**：78℃

Through the thermal image, we found that the internal heat was effectively directed to designated exhaustion vents, keeping the system operating at a cooler temperature. This finding validates how efficient The Tower 200 is regarding cooling performance.

NO: RS202305110001

Thank you!