System Thermal Test Report

Model: **Ceres 300**

Version: **20230516A**

NO: RS202305160001

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1. Objective

Our objective is to find out if the Ceres 300 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 **50˚C** while the system is running at full load, with **six** installed fans and a AIO 360 installed.

2. Equipment

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.

3. Procedure

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 ˚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

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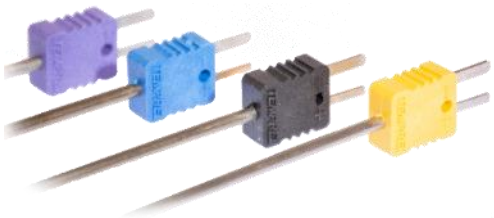
1. Laboratory Equipment



Thermocouple

Sound Level Meter

Thermal Imaging Camera

Temperature Data Acquisition

Temperature & Humidity Chamber

2. Chassis Hardware List

Component	Model
Chassis	Ceres 300 TG ARGB Snow
Motherboard	ASUS ROG MAXIMUS Z790 APEX
CPU	Intel® Core™ i9-13900K Processor (TDP 253W)
GPU	ASUS ROG Strix GeForce RTX® 4090 OC 24GB GDDR6X
RAM	TOUGHRAM Z-ONE RGB D5(16G x 2)
SSD	Seagate SSD 120G
PSU	Toughpower GF3 1200W - TT Premium Edition
CPU Cooler	TOUGHLIQUID Ultra 360 AIO Liquid Cooler
Fans	AIO:TOUGHFAN 120mm x 3 (2500rpm) Chassis: CT 140mm x 3 (1500 rpm) (Top x 2 , Rear x 1)
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

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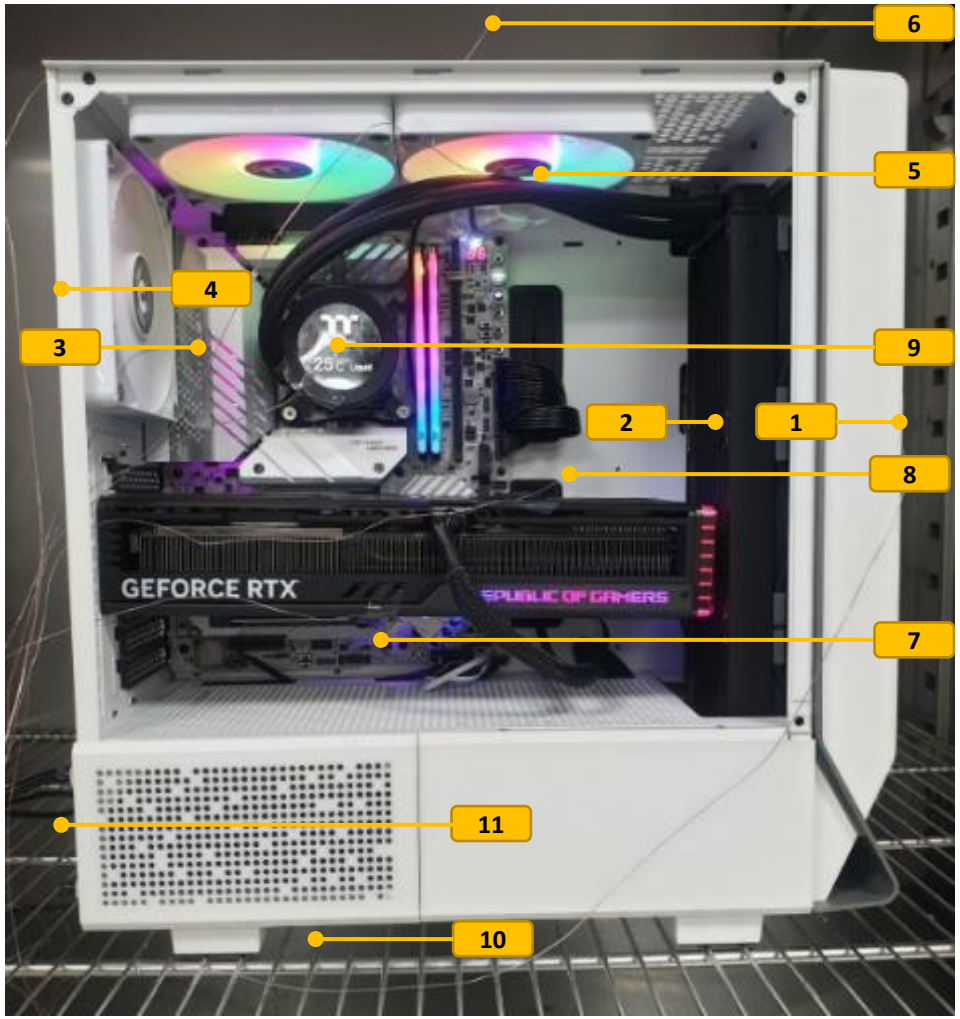
3. Chassis Fan Allocation

4. Chassis Thermal Airflow

Cool Airflow Inlets (Active)

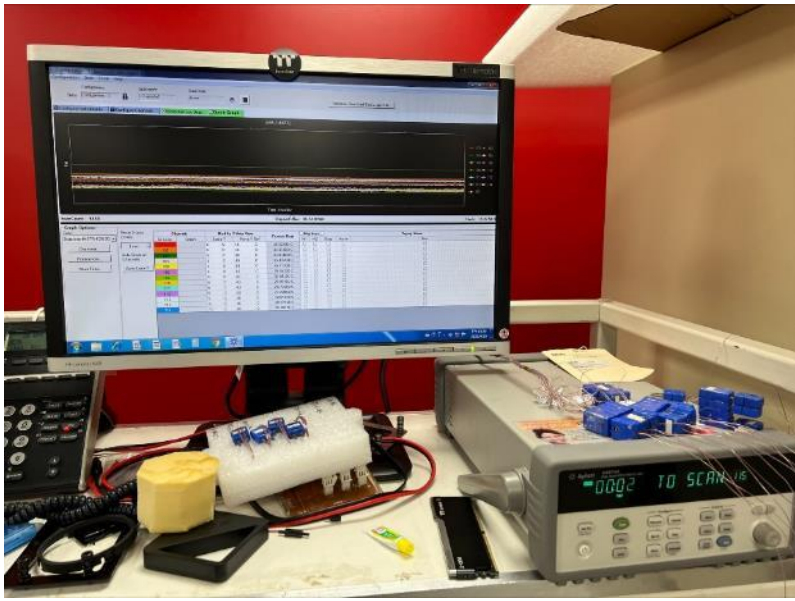
Hot Airflow Exhausts

5. Chassis Measured Points



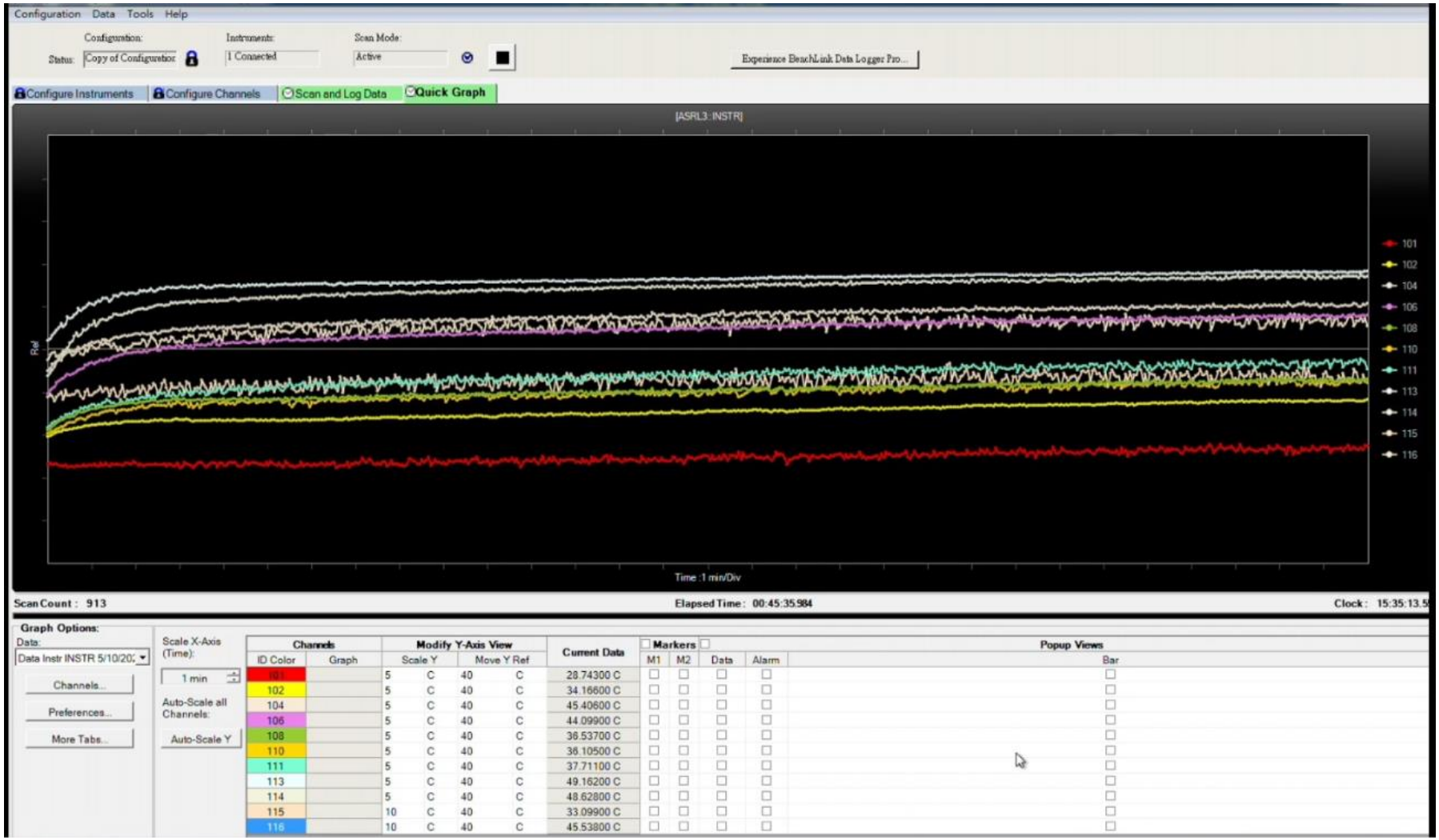
Measure Point	Description	Airflow	Thermocouple Number
1	Chassis Front External	Intake	101
2	Chassis Front Internal	Intake	102
3	Chassis Rear Internal	Exhaust	104
4	Chassis Rear External	Exhaust	106
5	Chassis Top Internal	Exhaust	108
6	Chassis Top External	Exhaust	110
7	GPU Bottom Fan	Intake	111
8	GPU Top Right	Exhaust	113
9	AIO Top Cover	-	114
10	PSU Bottom	Exhaust	115
11	PSU Rear	Intake	116

6. Thermal Stress Test



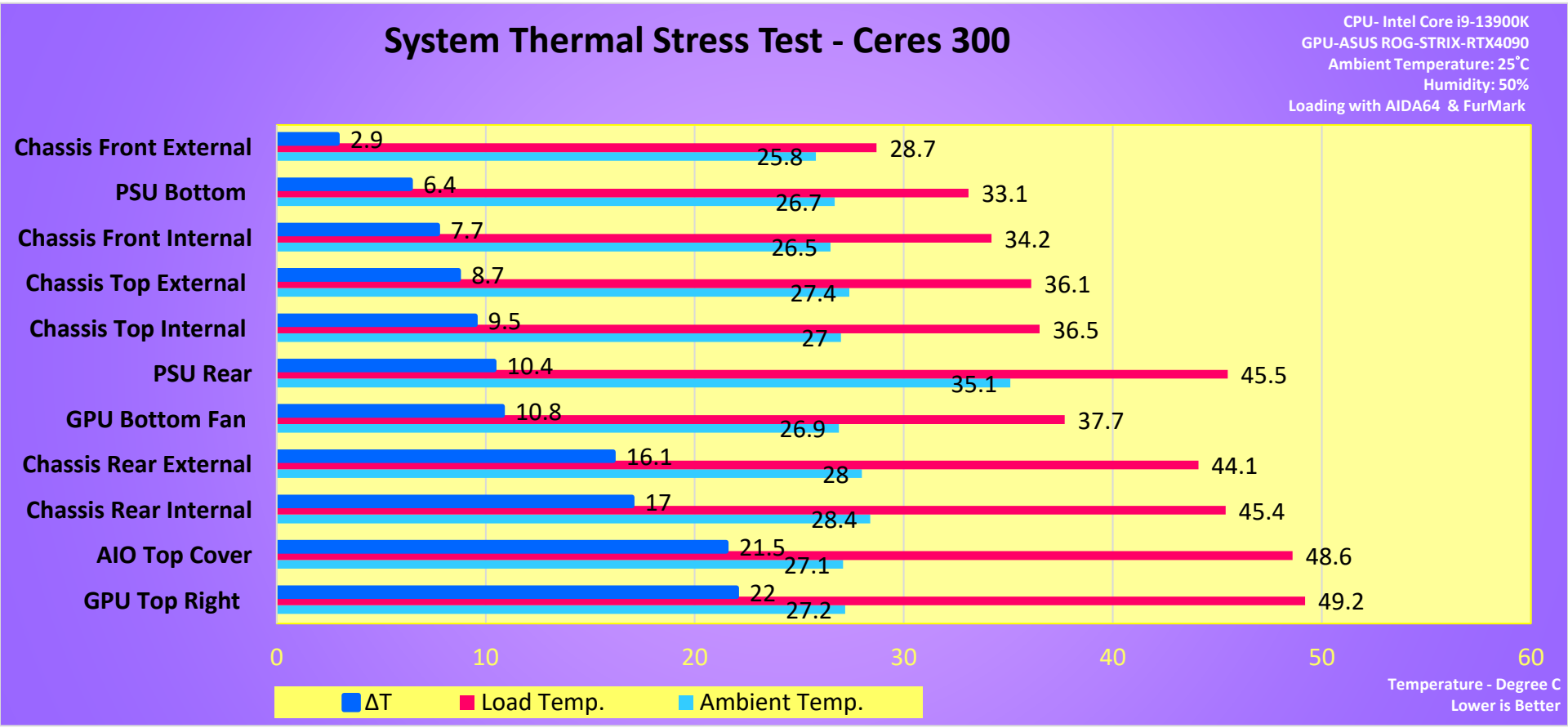
- Setting up the chamber temperature and humidity
- Temperature: 25˚C
- Humidity: 50%
- Recording Data

6. Thermal Stress Test



Temperature Data Recoding

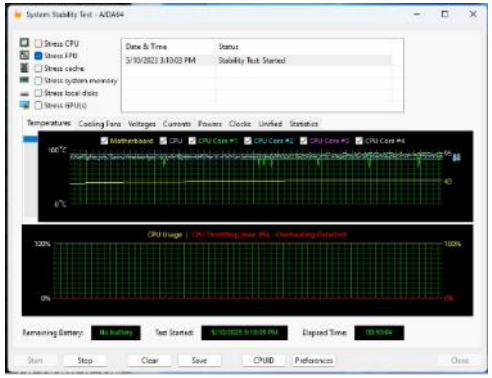
6. Thermal Stress Test



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 **49˚C** since they were drawing air from environment. Two critical positions we were looking at are **NO. 113 GPU Fan** and **NO. 114 AIO Cover**, which were drawing internal air to cool two of the most important components.

7. AIDA64 & FurMark Test

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

Date	5/10/2023
Time (HH:MM)	3:09 PM
CPU Clock	5500 MHz
Motherboard	Asus ROG Maximus Z790 Apex
BIOS Version	0812
Free Memory	26304 MB
GPU Clock	210 MHz
Motherboard	33°C
CPU	35°C
CPU Package	40°C
GPU Diode	35°C
GPU Hotspot	43°C
AIO Pump	3276 RPM
CPU	2490 RPM
Chassis #3	1535 RPM
GPU	0 RPM
GPU	0%
CPU Core	1.314 V
GPU Core	0.880 V
CPU Package	38.15 W
GPU	18.38 W
GPU TDP%	4%

Idle

Date	5/10/2023
Time (HH:MM)	3:40 PM
CPU Clock	5200 MHz
Motherboard	Asus ROG Maximus Z790 Apex
BIOS Version	0812
Free Memory	26143 MB
GPU Clock	2760 MHz
Motherboard	43°C
CPU	84°C
CPU Package	95°C
GPU Diode	80°C
GPU Hotspot	91°C
AIO Pump	3253 RPM
CPU	2528 RPM
Chassis #3	1542 RPM
GPU	2548 RPM
GPU	81%
CPU Core	1.190 V
GPU Core	0.995 V
CPU Package	253.07 W
GPU	497.73 W
GPU TDP%	100%

Full load

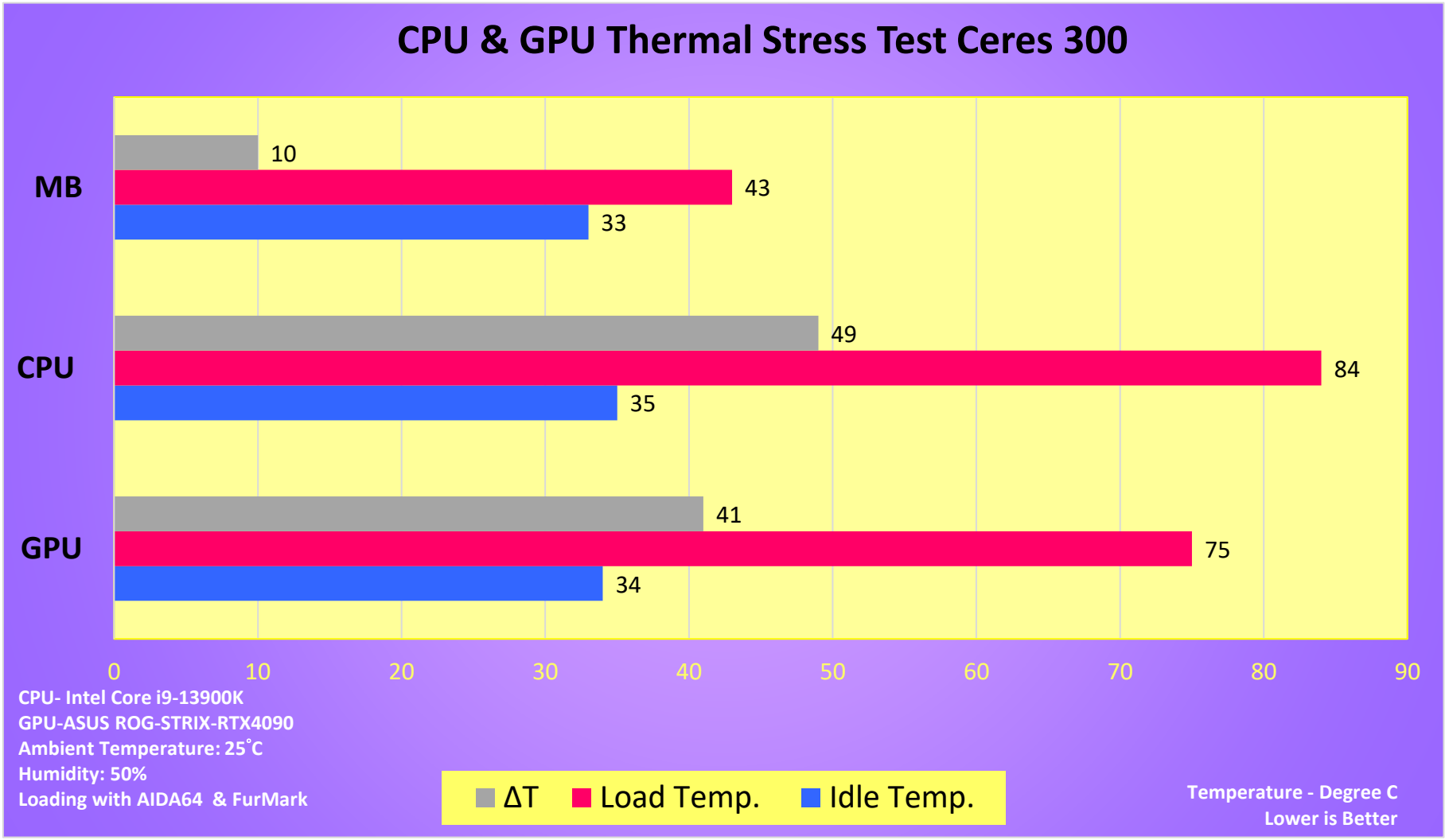
7. AIDA64 & FurMark Test

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.

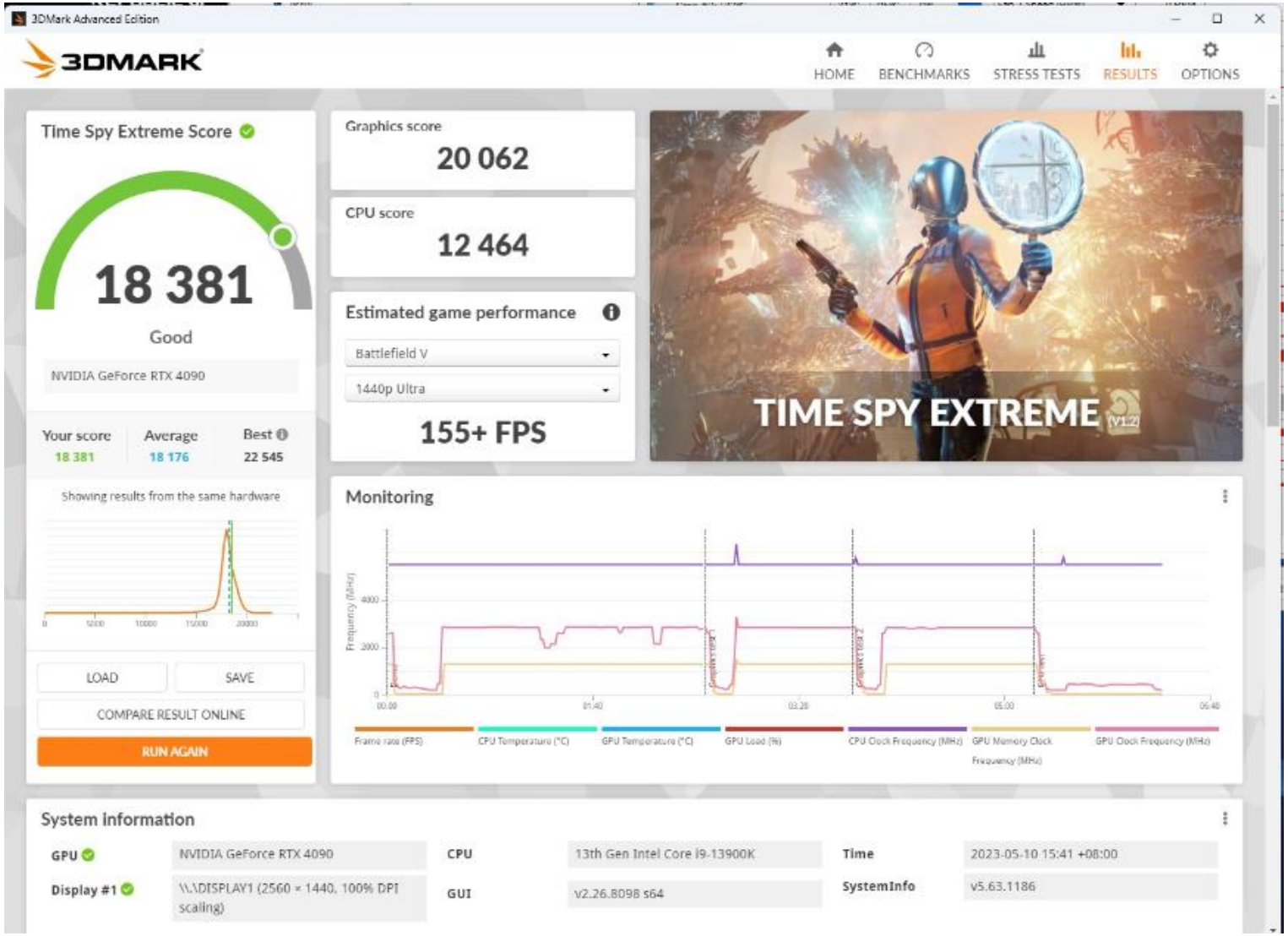
Idle

Full load

7. AIDA64 & FurMark Test

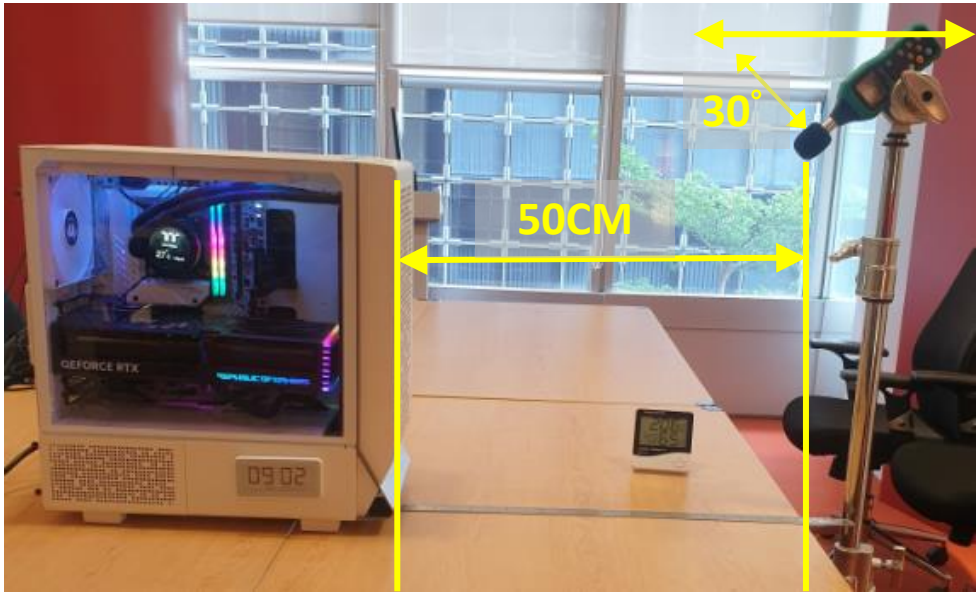


8. Graphics Performance Testing



9. Acoustic Sound Pressure Level Test

Test Environment：**Thermaltake Taipei Office**
Test Model: Ceres 300
Test Ambience: **21.5 ℃(Temperature) / 65% R.H.(Relative Humidity)**
Microphone position: **50 cm / in front of PC system**
Background Noise：**35.7 dBA.**



Microphone position

Test Ambience

9. Acoustic Sound Pressure Level Test

Fan Speed 500rpm – **37.4dBA**	Fan Speed 600rpm – **37.7dBA**	Fan Speed 800rpm – **38.1dBA**	Fan Speed 1500rpm – **53.7dBA**

Date	5/11/2023	5/11/2023	5/11/2023
Time (HH:MM)	9:15 AM	9:16 AM	9:20 AM	9:23 AM
CPU Clock	5400 MHz	5500 MHz	5500 MHz	5500 MHz
Motherboard	Asus ROG Maximus Z790 Apex	Asus ROG Maximus Z790 Apex	Asus ROG Maximus Z790 Apex	Asus ROG Maximus Z790 Apex
BIOS Version	0812	0812	0812	0812
Free Memory	26200 MB	26223 MB	26291 MB	26321 MB
GPU Clock	225 MHz	210 MHz	210 MHz	270 MHz
Motherboard	32°C	32°C	32°C	32°C
CPU	34°C	34°C	35°C	33°C
CPU Package	40°C	40°C	40°C	37°C
GPU Diode	40°C	40°C	41°C	40°C
GPU Hotspot	47°C	48°C	49°C	48°C
AIO Pump	2954 RPM	2980 RPM	3103 RPM	3276 RPM
CPU	479 RPM	485 RPM	701 RPM	2452 RPM
Chassis #3	504 RPM	634 RPM	805 RPM	1555 RPM
GPU	0 RPM	0 RPM	0 RPM	0 RPM
GPU	0%	0%	0%	0%
CPU Core	1.296 V	1.323 V	1.323 V	1.323 V
GPU Core	0.880 V	0.875 V	0.875 V	0.875 V
CPU Package	37.98 W	43.81 W	35.58 W	45.07 W
GPU	15.98 W	14.98 W	16.23 W	16.19 W
GPU TDP%	3%	3%	3%	3%

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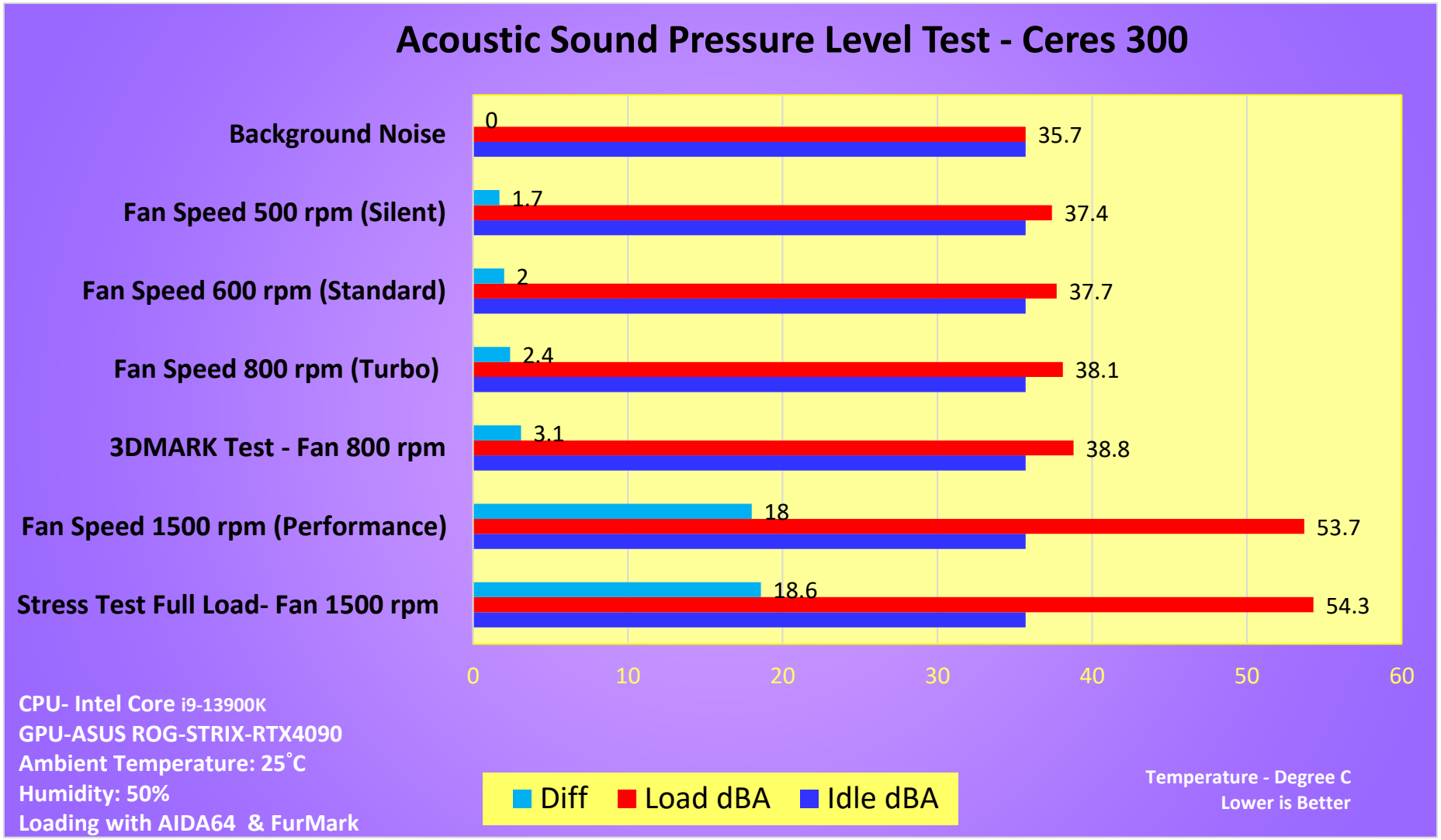
9. Acoustic Sound Pressure Level Test

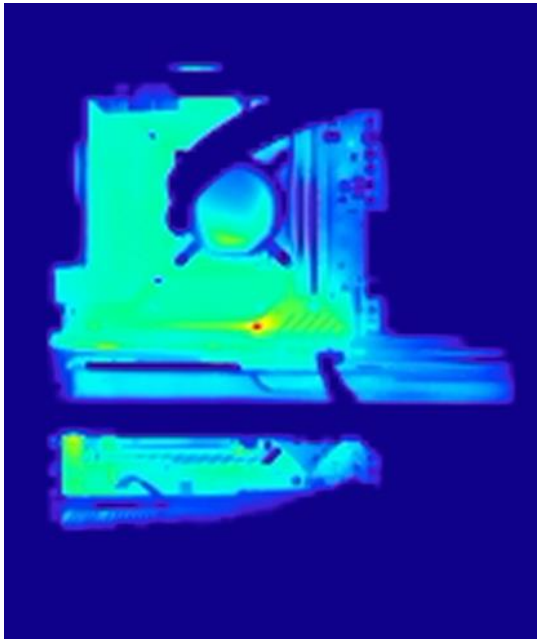


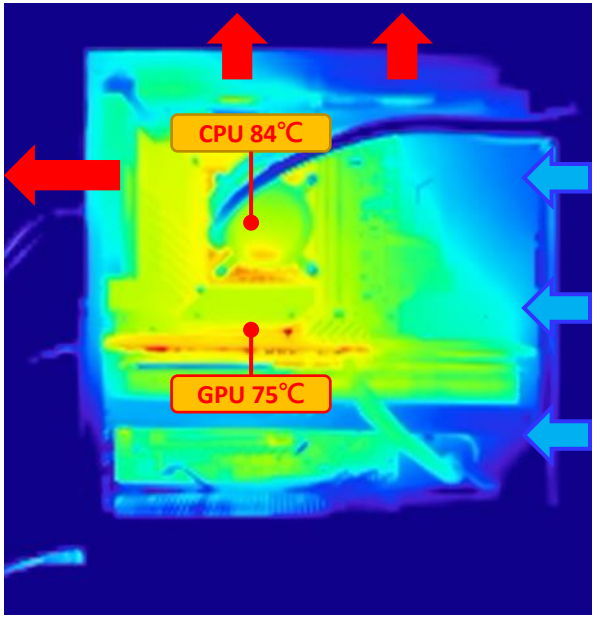
C. Conclusion

Idle

Front View

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)：75℃

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 Ceres 300 is regarding cooling performance.

thermaltake

Thank you!