KEEP IT SLEEK KEEP IT COOL

System Thermal Test Report

Model: **CTE E600 MX**

Version: **20231123A**

NO: RS202311230001

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1. Objective

Our objective is to find out if the **CTE E600 MX** 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 **fourteen** installed fans and a AIO 420 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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6. Thermal Stress Test
7. AIDA64 & FurMark Test
8. Graphics Performance Testing
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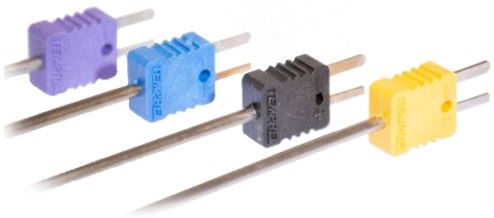
1. Laboratory Equipment



Thermocouple

Sound Level Meter

Temperature & Humidity Chamber

Thermal Imaging Camera

Temperature Data Acquisition

2. Chassis Hardware List

Component	Model
Chassis	CTE E600 MX 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 DDR5 32G (16G x 2)
SSD	Seagate SSD 120G
PSU	Toughpower GF3 1200W - TT Premium Edition
CPU Cooler	TOUGHLIQUID Ultra 420 AIO Liquid Cooler
Fans	AIO: TOUGHFAN 140mm x 3 (1800rpm) Chassis: CT 140mm x 9 (1500 rpm) CT 120mm x 2 (1500 rpm) (Front x 3 , Top x 2 , Rear x 3, Bottom x 3)
Software	1. AIDA64 Extreme 2. FurMark ROG Edition 3. CPU-Z 4. Core Temp
Full load	30 minutes
Camera	Testo 885-2 Thermal Imaging Camera

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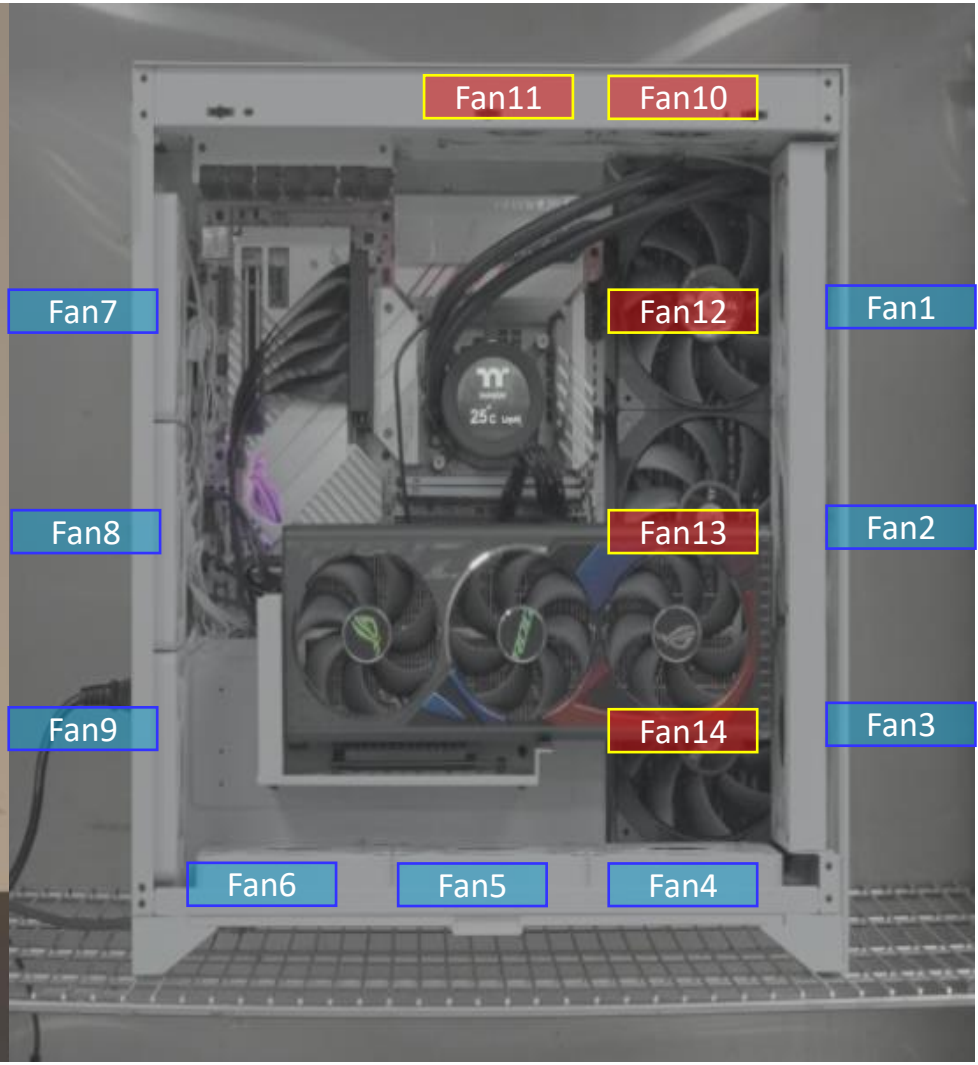
3. Chassis Fan Allocation

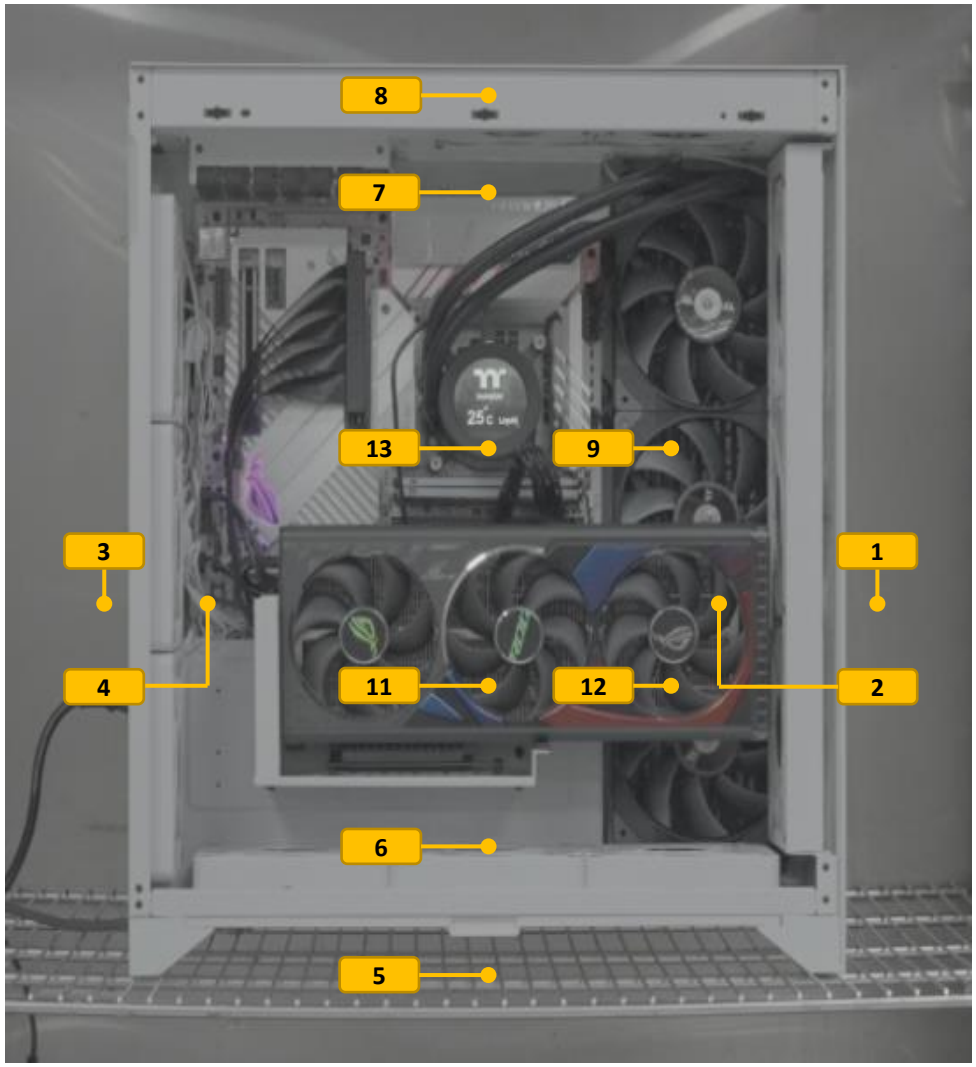


4. Chassis Thermal Airflow

Cool Airflow Inlets

Hot Airflow Exhausts

5. Chassis Measured Points

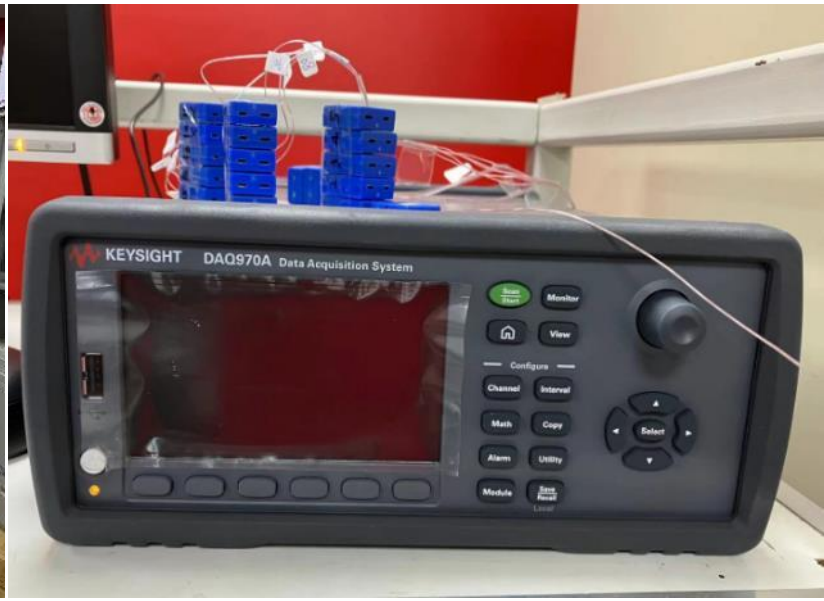


Measure Point	Description	Airflow	Thermocouple Number
1	Chassis Front External	Intake	101
2	Chassis Front Internal	Exhaust	102
3	Chassis Rear External	Intake	103
4	Chassis Rear Internal	Exhaust	104
5	Chassis Bottom External	Intake	105
6	Chassis Bottom Internal	Exhaust	106
7	Chassis Top Internal	Intake	107
8	Chassis Top External	Exhaust	108
9	Chassis Right Internal AIO	Intake	109
10	Chassis Right External AIO	Exhaust	110
11	GPU Left	Intake	113
12	GPU Right	Exhaust	114
13	AIO Top Cover	Nature	115
14	PSU Right	Intake	116
15	PSU Rear	Exhaust	118

5. Chassis Measured Points

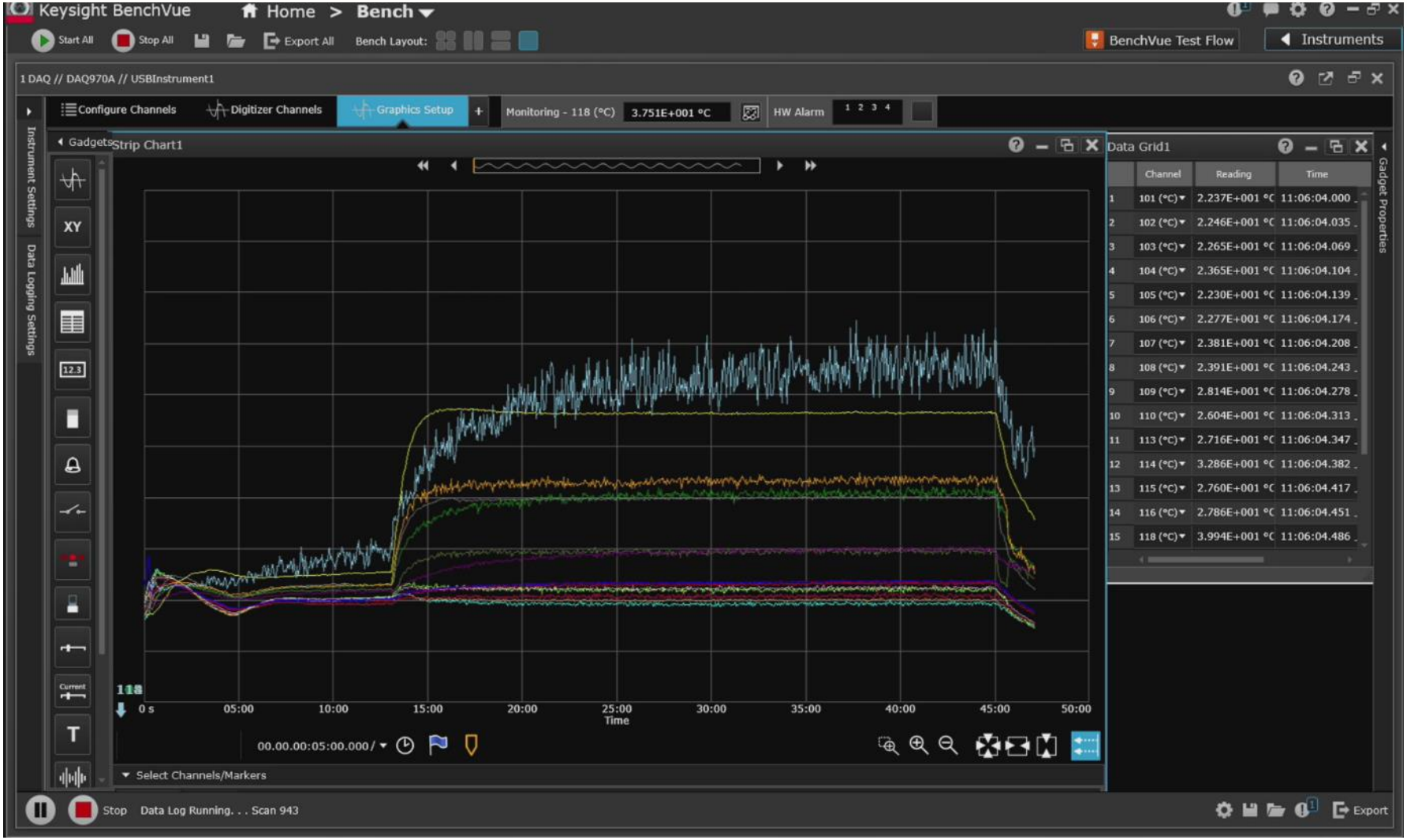
Measure Point	Description	Airflow	Thermocouple Number
1	Chassis Front External	Intake	101
2	Chassis Front Internal	Exhaust	102
3	Chassis Rear External	Intake	103
4	Chassis Rear Internal	Exhaust	104
5	Chassis Bottom External	Intake	105
6	Chassis Bottom Internal	Exhaust	106
7	Chassis Top Internal	Intake	107
8	Chassis Top External	Exhaust	108
9	Chassis Right Internal AIO	Intake	109
10	Chassis Right External AIO	Exhaust	110
11	GPU Left	Intake	113
12	GPU Right	Exhaust	114
13	AIO Top Cover	Nature	115
14	PSU Right	Intake	116
15	PSU Rear	Exhaust	118

6. Thermal Stress Test



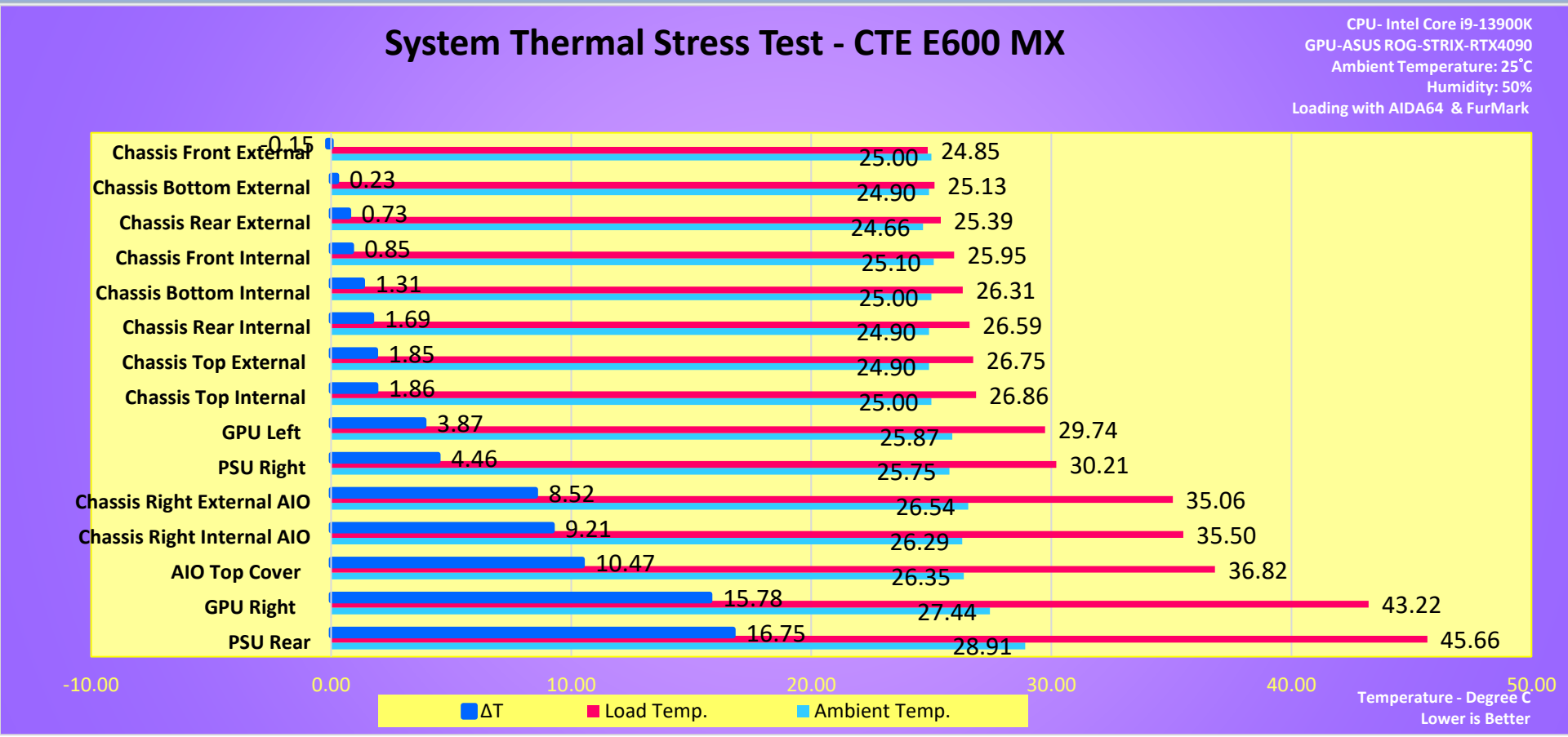
- Setting up the chamber temperature and humidity
- Temperature: 25˚C
- Humidity: 50%
- Recording Data

6. Thermal Stress Test



Temperature Data Recoding

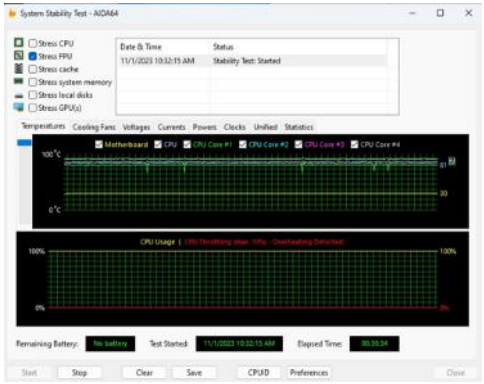
6. Thermal Stress Test



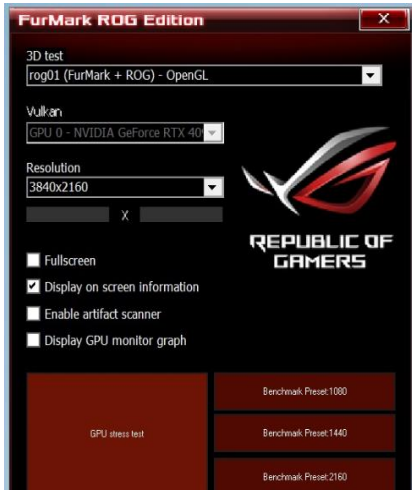
We expected to see higher temperature at the exhaust points and relatively lower temperature at the intake positions. The highest temperature was found at the AIO exhaust, which is reasonable given the CPU was running at full load. Most of the intake positions recorded a temperature lower than **43˚C** since they were drawing air from environment. Two critical positions we were looking at are **NO. 114 GPU Fan** and **NO. 115 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	11/1/2023
Time (HH:MM)	10:31 AM
CPU Clock	5500 MHz
Motherboard Name	Asus ROG Maximus Z790 Apex
BIOS Version	1402
Free Memory	24914 MB
GPU Clock	210 MHz
Motherboard	28°C
CPU	32°C
CPU Package	44°C
GPU	28°C
CPU	2045 RPM
Chassis #3	1553 RPM
AIO Pump	3206 RPM
GPU	0 RPM
CPU Core	1.323 V
GPU Core	0.885 V
CPU Package	41.76 W
GPU	17.41 W
GPU TDP%	3%

Idle

Date	11/1/2023
Time (HH:MM)	11:02 AM
CPU Clock	5201 MHz
Motherboard Name	Asus ROG Maximus Z790 Apex
BIOS Version	1402
Free Memory	25742 MB
GPU Clock	2760 MHz
Motherboard	30°C
CPU	81°C
CPU Package	92°C
GPU	69°C
CPU	2020 RPM
Chassis #3	1546 RPM
AIO Pump	3206 RPM
GPU	1901 RPM
CPU Core	1.199 V
GPU Core	1.010 V
CPU Package	252.91 W
GPU	497.54 W
GPU TDP%	100%

Full load

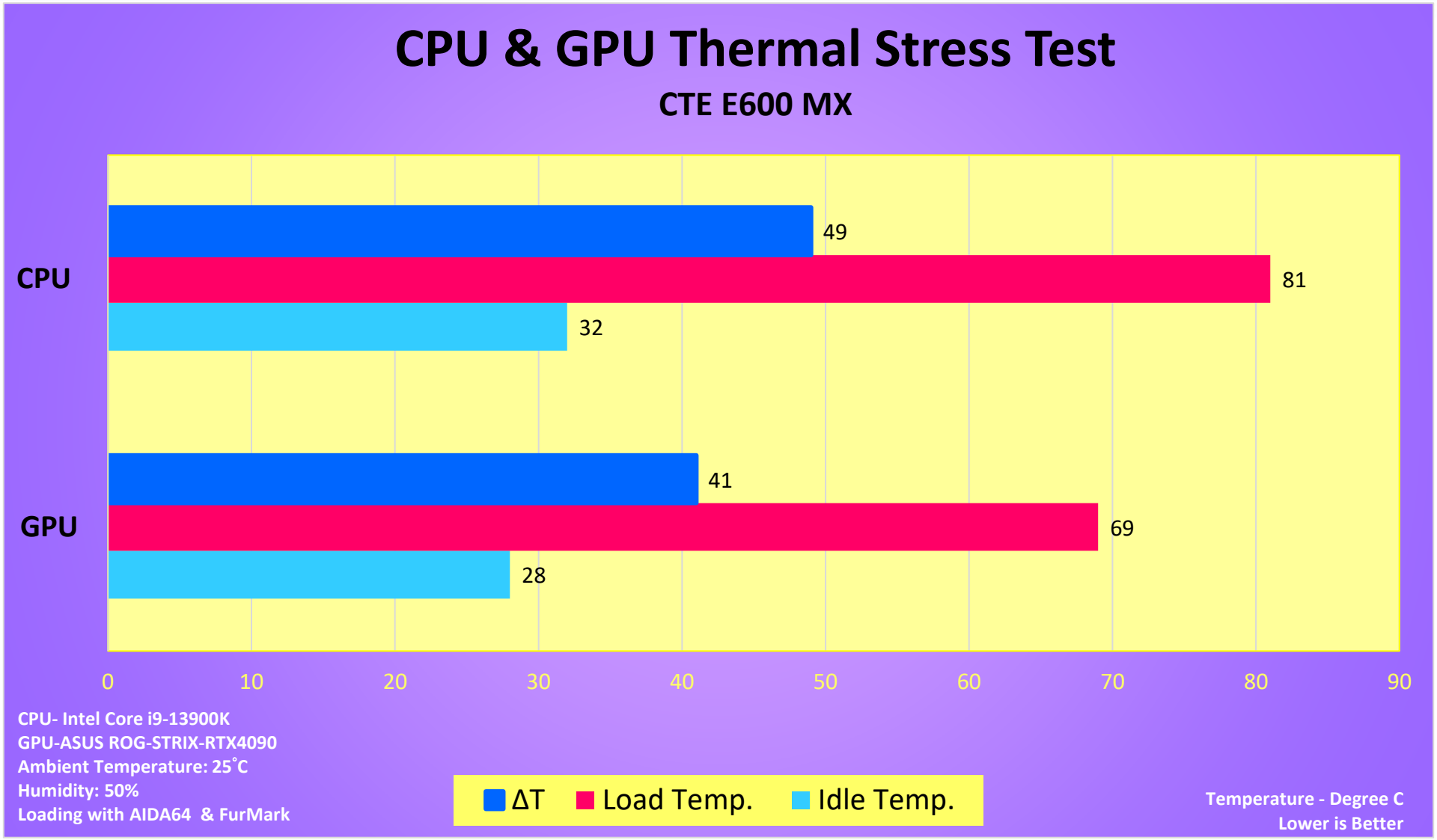
7. AIDA64 & FurMark Test

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.

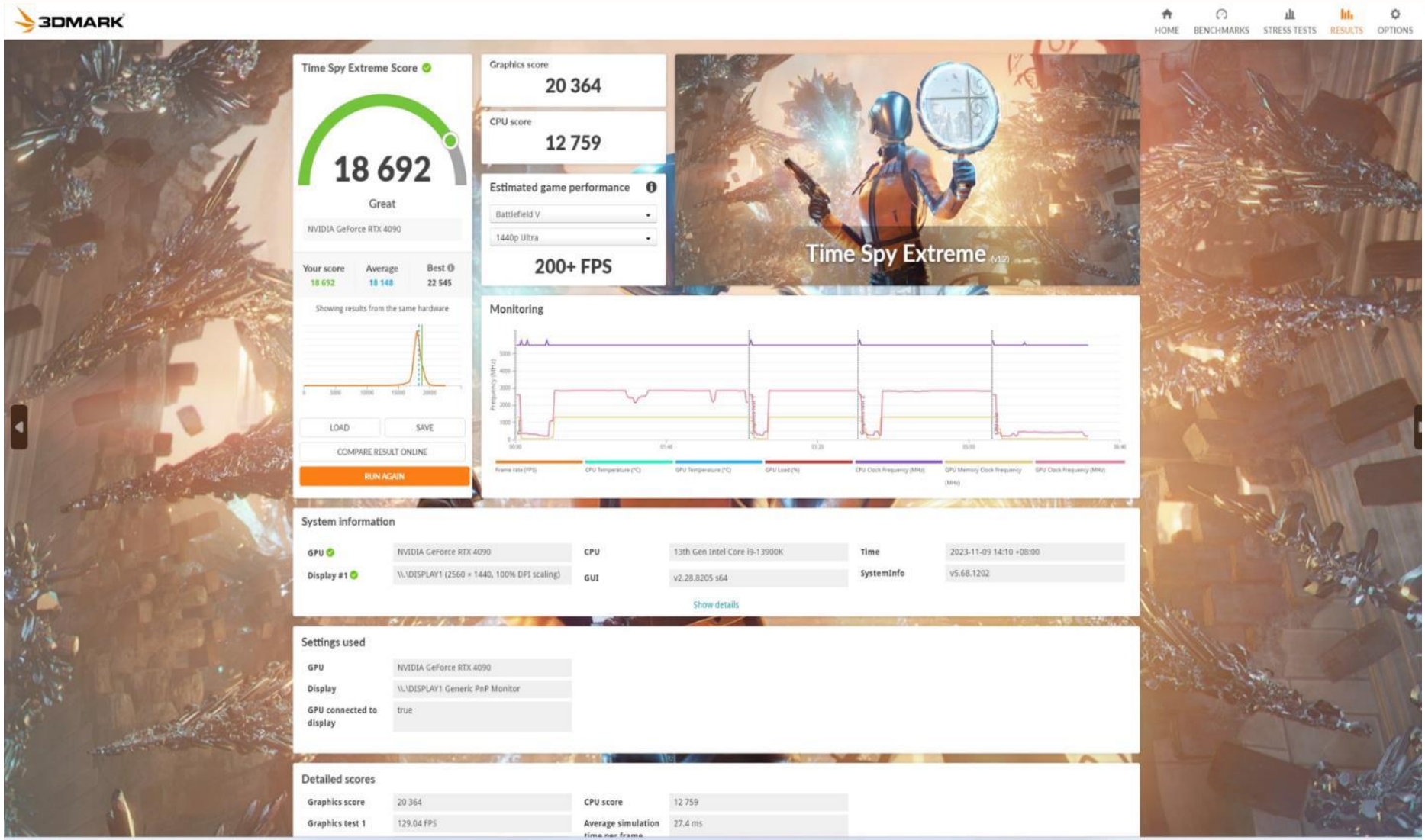
Idle

Full load

7. AIDA64 & FurMark Test

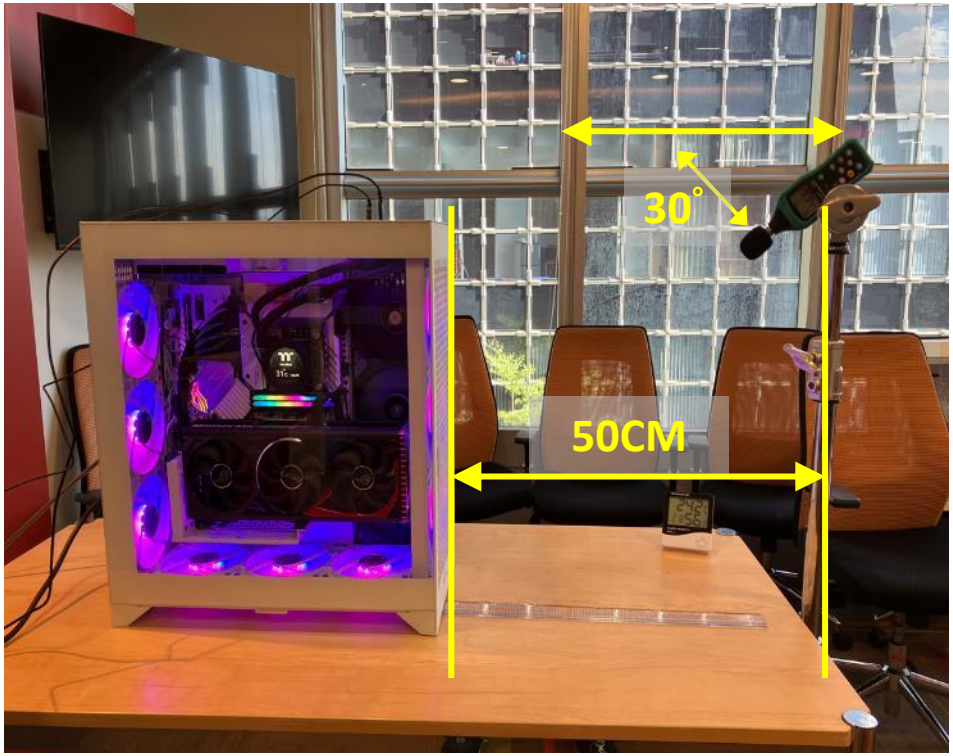


8. Graphics Performance Testing



9. Acoustic Sound Pressure Level Test

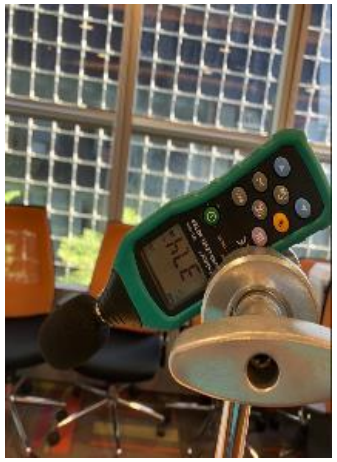
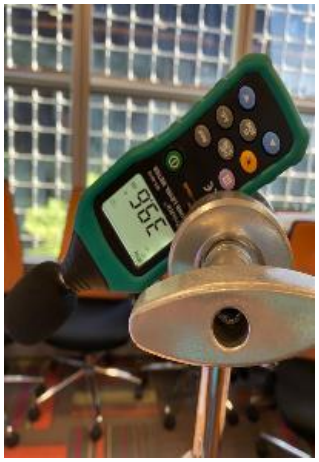
Test Environment：**Thermaltake Taipei Office**
Test Model: **CTE E600 MX**
Test Ambience: **24.2 ℃(Temperature) / 56% R.H.(Relative Humidity)**
Microphone position: **50 cm / in front of PC system**
Background Noise：**35.7 dBA.**



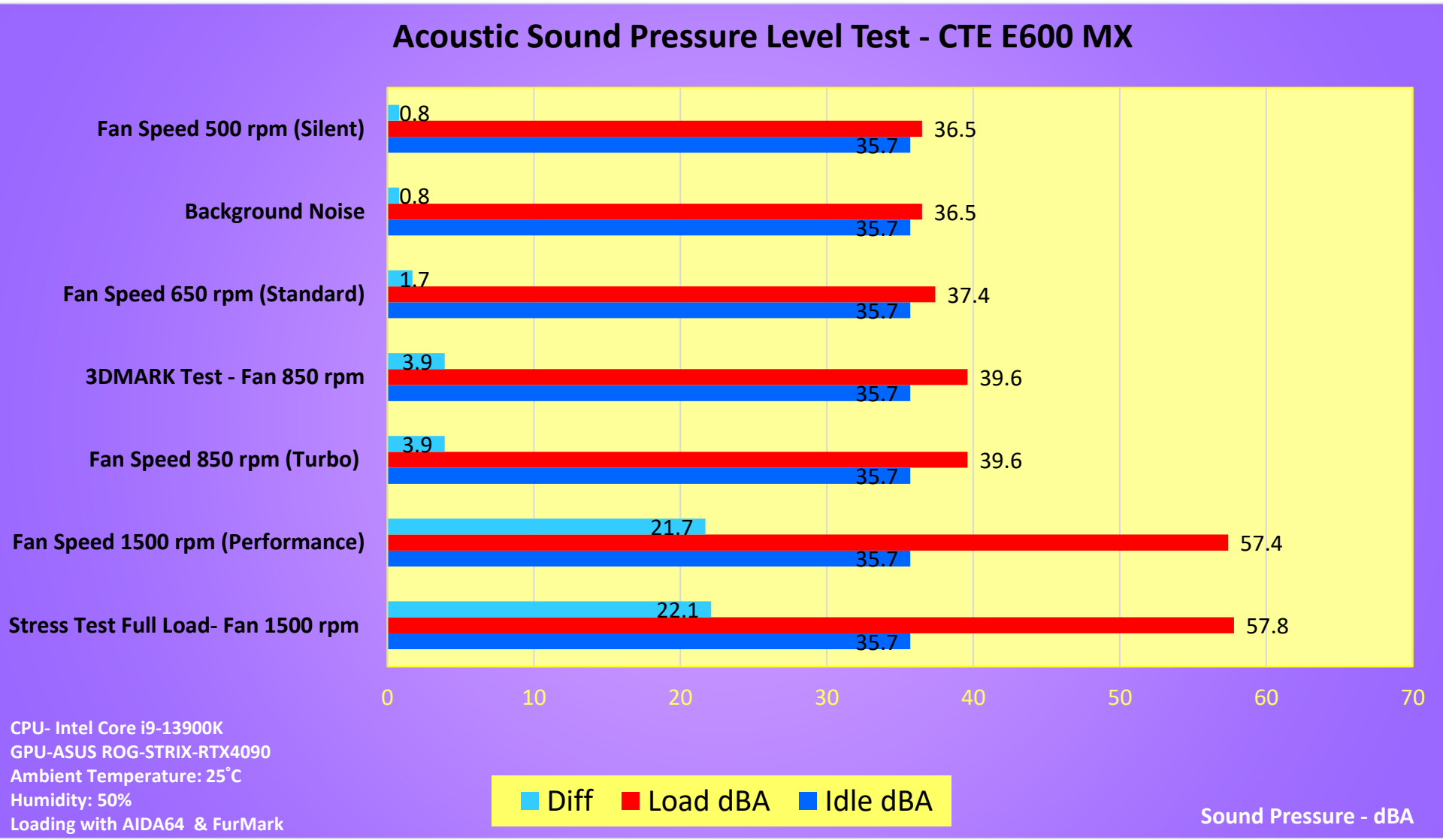
Microphone position

Test Ambience

9. Acoustic Sound Pressure Level Test

Fan Speed 500rpm – **36.5dBA**	Fan Speed 650rpm – **37.4dBA**	Fan Speed 850rpm – **39.6dBA**	Fan Speed 1500rpm – **57.4dBA**
			
Date 11/9/2023 Time (HH:MM) 1:13 PM CPU Clock 4300 MHz Motherboard Name Asus ROG Maximus Z790 Apex BIOS Version 1402 Free Memory 26787 MB GPU Clock 420 MHz Motherboard 31°C CPU 34°C CPU Package 39°C GPU 36°C CPU 460 RPM Chassis #3 535 RPM AIO Pump 2866 RPM GPU 0 RPM CPU Core 1.305 V GPU Core 0.880 V CPU Package 29.76 W GPU 14.47 W GPU TDP% 3%	Date 11/9/2023 Time (HH:MM) 1:17 PM CPU Clock 5500 MHz Motherboard Name Asus ROG Maximus Z790 Apex BIOS Version 1402 Free Memory 27039 MB GPU Clock 255 MHz Motherboard 30°C CPU 35°C CPU Package 38°C GPU 36°C CPU 498 RPM Chassis #3 670 RPM AIO Pump 2905 RPM GPU 0 RPM CPU Core 1.110 V GPU Core 0.880 V CPU Package 27.29 W GPU 16.31 W GPU TDP% 3%	Date 11/9/2023 Time (HH:MM) 1:23 PM CPU Clock 5500 MHz Motherboard Name Asus ROG Maximus Z790 Apex BIOS Version 1402 Free Memory 27473 MB GPU Clock 210 MHz Motherboard 30°C CPU 34°C CPU Package 38°C GPU 35°C CPU 773 RPM Chassis #3 823 RPM AIO Pump 3059 RPM GPU 0 RPM CPU Core 1.296 V GPU Core 0.880 V CPU Package 27.95 W GPU 10.28 W GPU TDP% 2%	Date 11/9/2023 Time (HH:MM) 2:18 PM CPU Clock 5500 MHz Motherboard Name Asus ROG Maximus Z790 Apex BIOS Version 1402 Free Memory 25478 MB GPU Clock 210 MHz Motherboard 30°C CPU 38°C CPU Package 40°C GPU 38°C CPU 2054 RPM Chassis #3 1564 RPM AIO Pump 3225 RPM GPU 0 RPM CPU Core 1.305 V GPU Core 0.875 V CPU Package 33.12 W GPU 15.29 W GPU TDP% 3%

9. Acoustic Sound Pressure Level Test



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

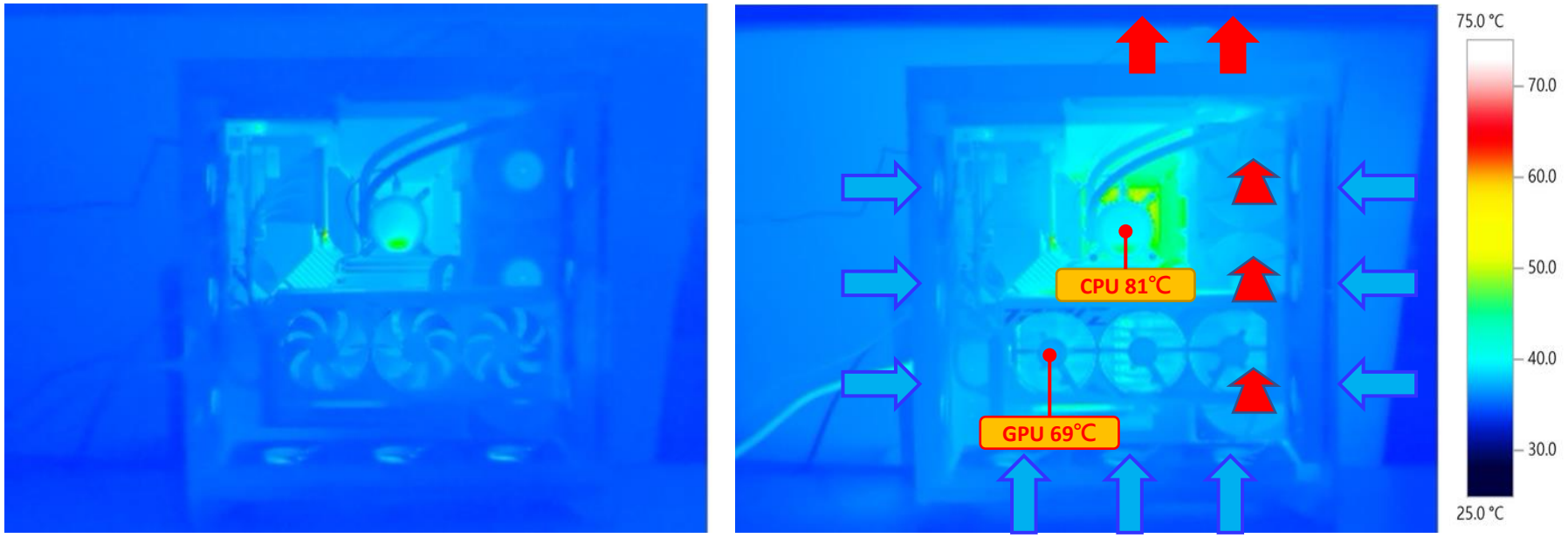
NO: RS202311230001

C. Conclusion

Idle

Left View

Full Load



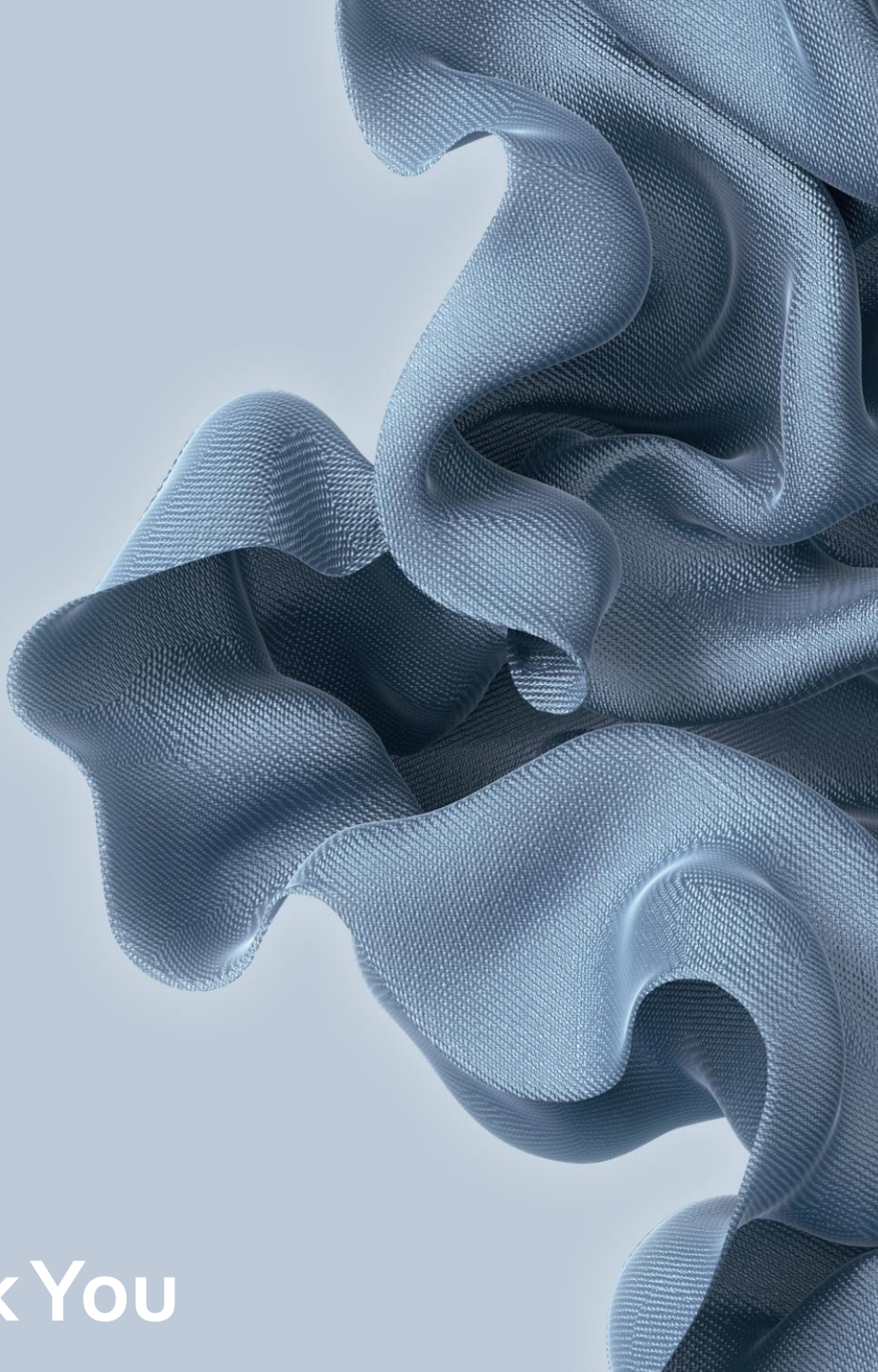
AIDA64 Extreme (stress FPU) and **FurMark ROG Edition** (**resolution: 3840 x 2160) to push 100% load** on the CPU and GPU for 30 minutes**.**

-INTEL i9 13900K / CPU Temp. (Max)：81℃ (TDP 253W)

-ASUS ROG Strix GeForce RTX® 4090 OC / GPU Temp. (Max)：69℃

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 CTE E600 MX is regarding cooling performance.

KEEP IT SLEEK
KEEP IT COOL



Thank You