

System Thermal Test Report

Model: CTE T500 Air

Version: 20230526A



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A. Introduction

- 1. Objective
- 2. Equipment
- 3. Procedure

1. Objective





Our objective is to find out if the CTE T500 Air 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 **40°C** while the system is running at full load, with **eight** 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.



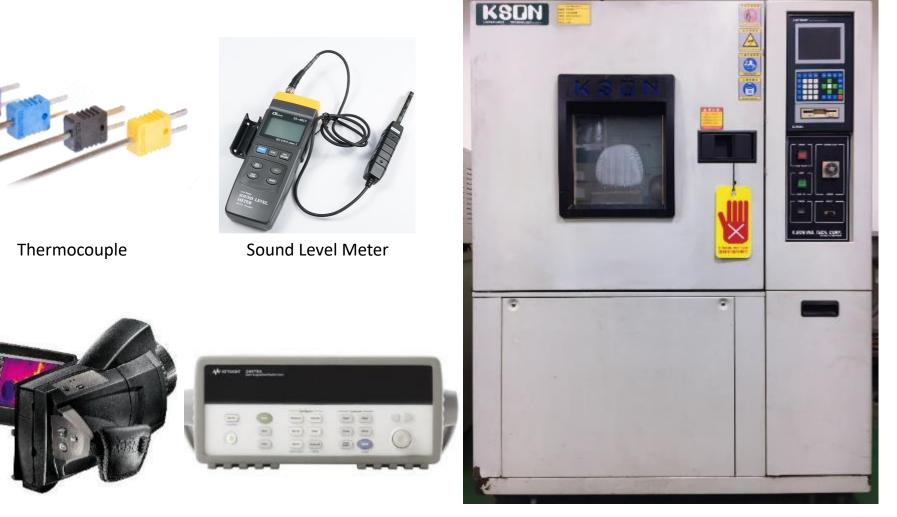
Testing steps:

- 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

- **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

1. Laboratory Equipment



Temperature Data Acquisition

Temperature & Humidity Chamber

NO: RS202305260001

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Thermal Imaging Camera

2. Chassis Hardware List

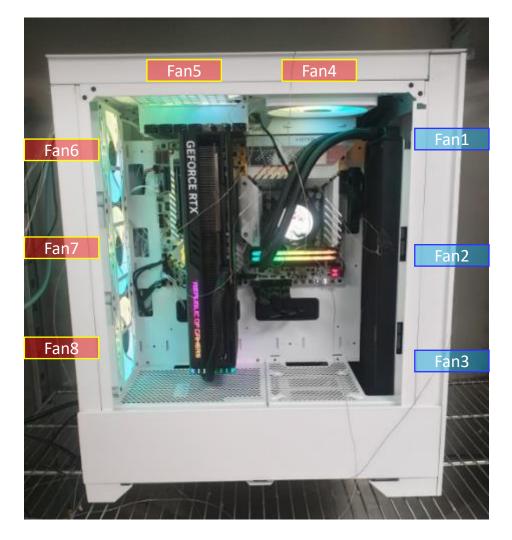
Component	Model					
Chassis	CTE T500 Air Snow					
Motherboard	ASUS ROG MAXIMUS Z790 APEX					
CPU	Intel [®] Core TM i9-13900K Processor (TDP 253W)					
GPU	ASUS ROG Strix GeForce RTX [®] 4090 OC 24GB GDDR6X					
RAM	TOUGHRAM Z-ONE RGB D5 (16G x 2)					
SSD	Seagate SSD 120G					
PSU	Toughpower GF3 1200W - TT Premium Edition					
CPU Cooler	TOUGHLIQUID Ultra 420 AIO Liquid Cooler					
Fans	AIO:TOUGHFAN 140mm x 3 (2000rpm) Chassis: CT 140mm x 5 (1500 rpm) (Top x 2 , Rear x 3)					
Software	 AIDA64 Extreme FurMark ROG Edition V0.8.14.0 CPU-Z Ver.2.015 x64 Core Temp V1.18 					
Full load	30 minutes					
Camera	Testo 885-2 Thermal Imaging Camera					





3. Chassis Fan Allocation

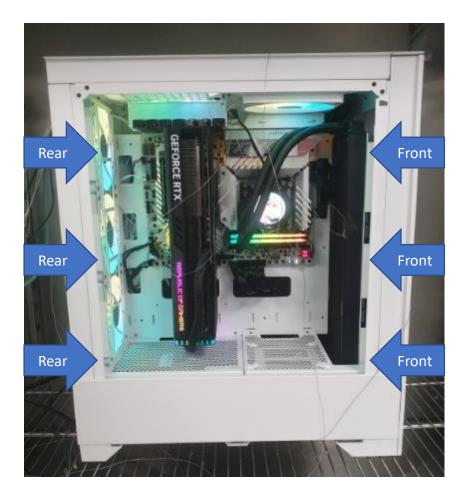




4. Chassis Thermal Airflow

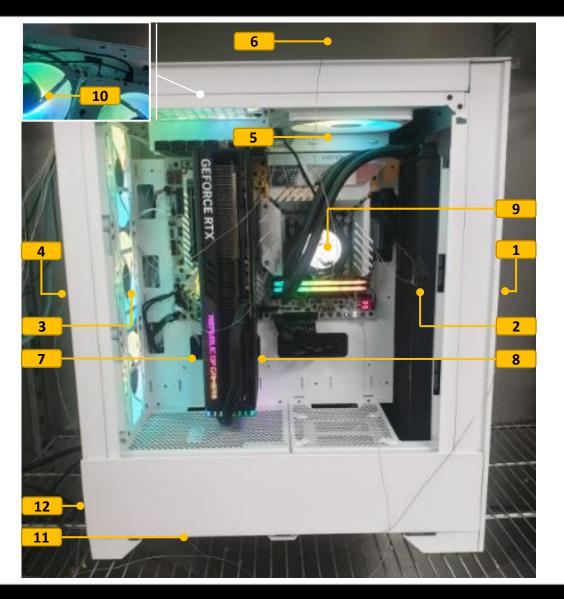
Cool Airflow Inlets (Active)

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	Intake	104
4	Chassis Rear External	Intake	106
5	Chassis Top Internal	Exhaust	108
6	Chassis Top External	Exhaust	110
7	GPU Left Fan	Intake	111
8	GPU Right	Exhaust	113
9	AIO Top Cover	-	114
10	VGA Right Slot	Exhaust	115
11	PSU Bottom	Intake	116
12	PSU Rear	Exhaust	117

6. Thermal Stress Test



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

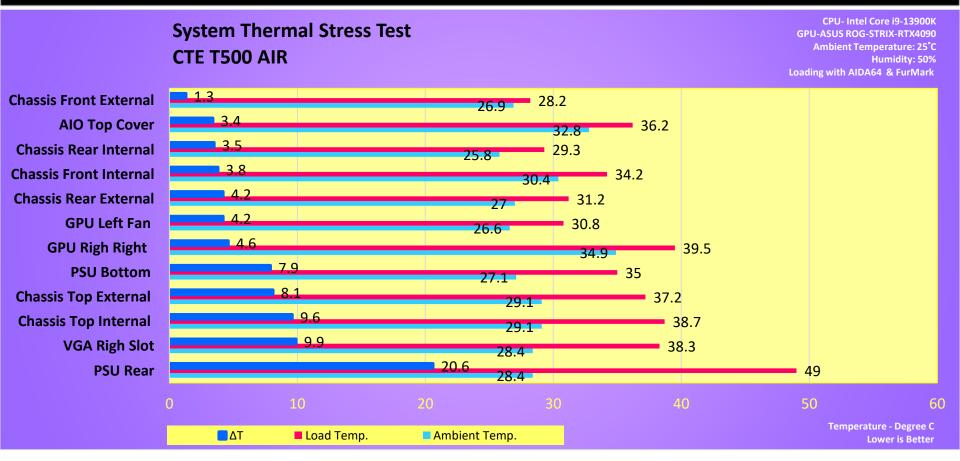
6. Thermal Stress Test

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		113		5	C	40	C	49.16200 C					0
		114		5	C	40	C	48 62800 C					
		115		10	C	40	с	33 09900 C		61			0
		126		30	C	40	c	45.53800 C	0	12	0	0	

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 **40°C** since they were drawing air from environment. Two critical positions we were looking at are **NO. 113 GPU Right 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.

Date Date



AIDA64 Extreme



Time (HH:MM) 11:10 AM	Time (HH:MM) 11:42 A
CPU Clock	5500 MHz	CPU Clock	5200 M
Motherboard	Asus ROG Maximus Z790 Apex	III Motherboard	Asus ROG Maximus Z790 Ap
BIOS Version	0812	II BIOS Version	08
= Free Memory	26678 MB	= Free Memory	26416 M
GPU Clock	240 MHz	GPU Clock	2760 M
	33°C	. Motherboard	36
🛎 CPU	38°C	CPU	84
CPU Package	43°C	CPU Package	95
GPU Diode	41°C	S GPU Diode	82
GPU Hotspot	49°C	S GPU Hotspot	91
S AlO Pump	3183 RPM	🔀 AlO Pump	3183 RF
CPU	598 RPM	CPU	1965 RF
Chassis #3	734 RPM	Chassis #3	1644 RF
🤜 GPU	0 RPM	S GPU	2716 RF
S GPU	0%	🤜 GPU	87
CPU Core	1.305 V	CPU Core	1.199
GPU Core	0.875 V	GPU Core	0.995
E CPU Package	37.74 W	CPU Package	253.97
GPU	15.08 W	r GPU	486.56
S GPU TDP%	3%	S GPU TDP%	97

5/18/2023

Date

FurMark

Full load

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AM

1Hz pex 812

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.

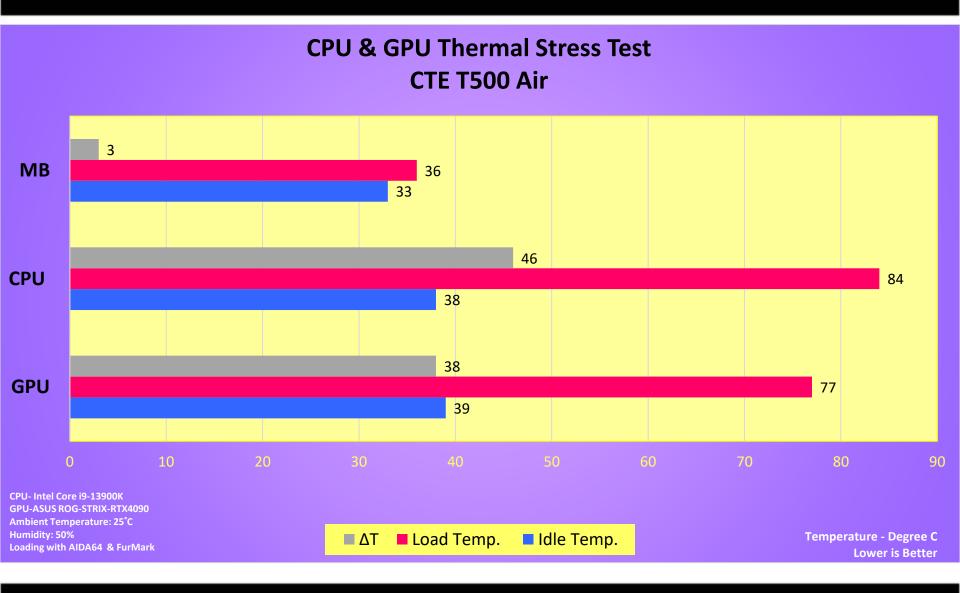


Full load

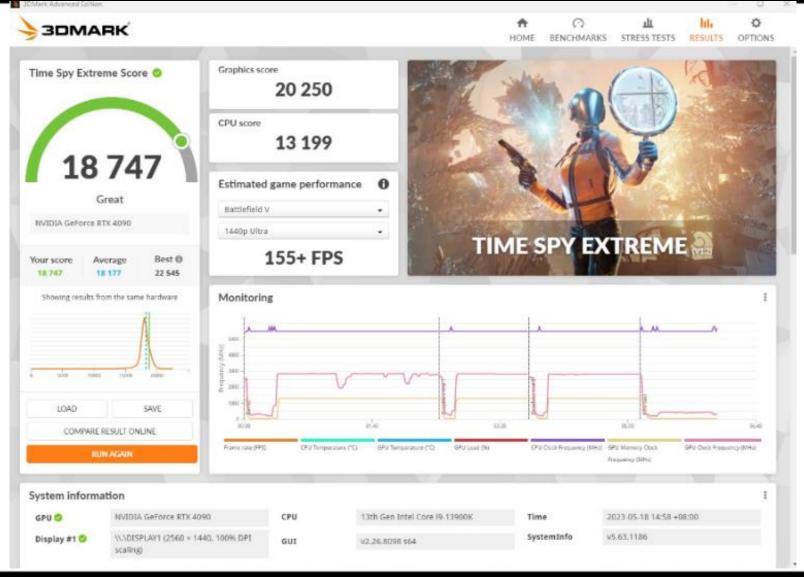
Idle



7. AIDA64 & FurMark Test



8. Graphics Performance Testing



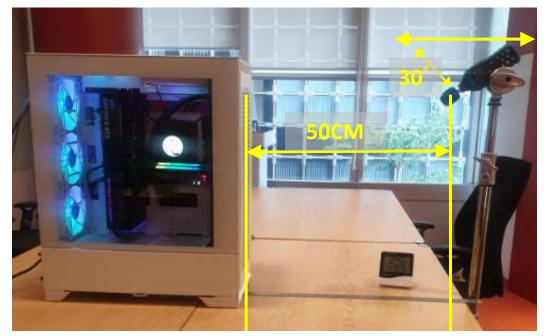


NO: RS202305260001

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9. Acoustic Sound Pressure Level Test

Test Environment : Thermaltake Taipei Office Test Model: CTE T500 AIR Test Ambience: 24.5 °C(Temperature) / 60% R.H.(Relative Humidity) Microphone position: 50 cm / in front of PC system Background Noise : 35.9 dBA.





Microphone position

Test Ambience

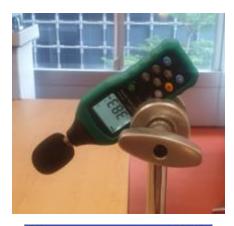
9. Acoustic Sound Pressure Level Test

Fan Speed 600rpm – 37.8dBA

[•] thermaltake



Date Date	5/22/2023
© Time (HH:MM)	2:44 PM
CPU Clock	5500 MHz
Motherboard Asus ROG	Maximus Z790 Apex
BIOS Version	0812
= Free Memory	27338 MB
GPU Clock	210 MHz
Motherboard	32"0
CPU	37*C
CPU Package	41*0
C GPU Diode	40°C
GPU Hotspot	48*0
E AIO Pump	3183 RPM
- I CPU	476 RPM
E Chassis #3	608 RPM
a colo	d refer
🕫 GPU	0
CPU Core	1.296 V
GPU Core	0.875 V
E CPU Package	31.99 W
n GPU	11.39 W
SPU TDP%	2%



Fan Speed 700rpm – **38.3dBA**

NAMES OF TAXABLE PARTY.	THE REAL PROPERTY AND ADDRESS OF THE REAL PROPERTY ADDRESS OF THE REAL PROPE
E Date	5/22/2023
© Time (HH:MM)	2:51 PM
CPU Clock	5500 MHz
Motherboard Asus R	OG Maximus Z790 Apex
III BIOS Version	0812
= Free Memory	27501 MB
GPU Clock	210 MHz
Motherboard	32°C
CPU	30°C
CPU Package	39"C
C GPU Diode	42°C
CPU Hotspot	50°C
III AIO Pump	3176 RPM
1.400	487.0014
E Chassis #3	699 RPM
T GPU	0 RPM
T GPU	016
CPU Core	1.332 V
GPU Core	0.875 V
CPU Package	24.77 W
S GPU	13.16 W
SPU TDP%	3%

Fan Speed 900rpm – 38.9dBA

E Date	5/22/2023
© Time (HH:MM)	3:02 PM
CPU Clock	5500 MHz
Motherboard Asus ROO	a Maximus 2790 Apex
al BIOS Version	0812
= Free Memory	27318 MB
GPU Clock	210 MHz
Motherboard	32°C
CPU	35°C
CPU Package	39°C
GPU Diode	40°C
I GPU Hotspot	48°C
a Alo Pump	3199 RPM
E CPU	821 RPM
I Chassis #3	916 RPM
C GPU	0%
CPU Core	1.305 V
GPU Core	0.875 V
E CPU Package	29.23 W
T GPU	12.65 W
SPU TDP%	3%

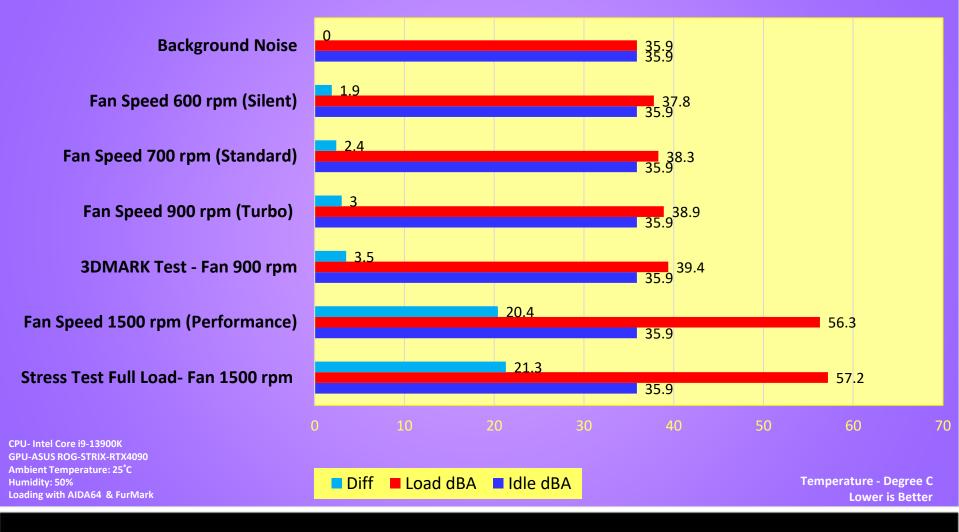
Fan Speed 1500rpm – 56.3dBA



E Date	5/22/2023
© Time (HH:MM)	3:07 PM
CPU Clock	5500 MHz
Motherboard Asus ROG	Maximus 2790 Apex
# BIOS Version	0812
= Free Memory	27487 MB
GPU Clock	210 MHz
# Motherboard	31°C
E CPU	31°C
CPU Package	38°C
GPU Diode	38°C
CPU Hotspot	46°C
M AIO Pump	3169 RPM
	2023-0008
Chassis #3	1624 RPM
GPU	0 RPM
I GPU	0%
CPU Core	1.305 V
GPU Core	0.875 V
CPU Package	29.55 W
I GPU	12.09 W
SPU TDP%	2%

9. Acoustic Sound Pressure Level Test

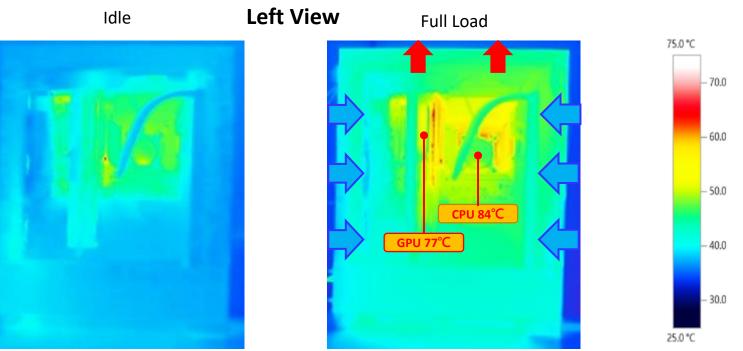
Acoustic Sound Pressure Level Test - CTE T500 Air





C. Conclusion

Conclusion



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°C (TDP 253W)
- -ASUS ROG Strix GeForce RTX[®] 4090 OC / GPU Temp. (Max) : 77°C

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 CTE T500 Air is regarding cooling performance.



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Thank you!