Thermal & Functions Test Report

TEC300P

Product Manager	System Leader	System Engineer
Vinnie Yuan	James Chan	Mike Chen

Revision Date: July 10, 2023

Thermal & Functions Test Report
TEC300P (Ampere Q64-22 CPU)

INDEX

1. SYSTEM SPEC

1-1. PRODUCT PHOTOS

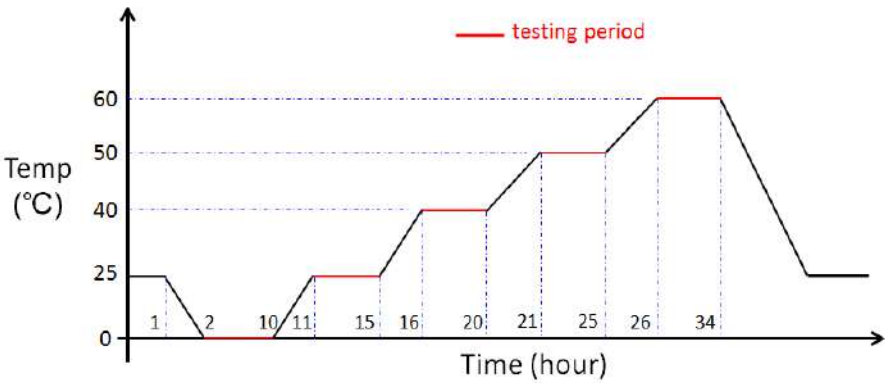## 1-2. SYSTEM COFIGURATION

System Configuration	
Motherboard	GIGABYTE MP32-AR1-00 (S/N:1/B/LIANJ000467) BIOS Ver. F32d (SCP:2.10.20220531)
CPU	Ampere ARMV8(Q64-22) AMPERE® ALTRA® FAMILY 64-BIT MULTI-CORE PROCESSORS CORES: 64 SUSTAINED PREDICTABLE FREQUENCY(GHz): 2.2 USAGE POWER GUIDE* (W): 95
Memory	Samsung M393A4K40DB3-CWE DDR4-3200 32G REG DIMM *1
SSD	7Starlake 7SLESO512GTLEW-I32-2 NVMe SSD 512GB Wide Temp: -40℃~85℃, RoHS x1 pcs
POWER BOARD	HDPLEX 400W HiFi DC-ATX Input Voltage: 16V-30VDC Operating Temperature: -10C - 70C
GPU	Integrated in Aspeed® AST2500 2D Video Graphic Adapter with PCIe bus interface 1920x1200@60Hz 32bpp

2. TEST PLAN

2.1. Thermal Measurement Process

Test Purpose	The purpose of performing thermal profile test is to identify potential thermal problem of the EUT. And it is to aid products in reliability assessment considering that semiconductor failure rates rise rapidly with increasing junction temperature In case of systems cooling, patterns will vary with stacking choices, temperature/thermal mapping can aid in the development of optimum tacking arrangements
Test Equipment	1. KSON THS-B4T-150 Chamber 2. Lutron BTM-4208SD, Thermometer.
Quantity Tested	Minimum 1 Set
Test Software	Stress-ng under Ubuntu 22.04 LTS

Test Procedure	1. Thermal pre-scan measurement:
	    Temperature: 0~60℃/85%RH
	2. Thermal actual measurement:
	    a. Select the test points according to the IR photo and attach thermocouples to the hot points
	    b. Put the EUT in thermal chamber and set the temperature profile of as test specification
	    c. Turn on the thermal chamber and power on the EUT to enter Ubuntu environment to run Max Power Test + Stress application program
	    d. After the EUT executing the test software for 4 hours, record thermal maximum value for each thermocouples point.
	    e. Turn off the thermal chamber and EUT
	    f. Verify and check recorded figure of each component to its' operating temperature
	    range listed in specification/approval sheet of each measured component

Test diagram of curves	Environment defines for 8 hours

Thermal & Functions Test Report
TEC300P (Ampere Q64-22 CPU)

2.2. TEC300P TEST RESULT<TEST ITEM>

2.2.1 TEMPERATURE CYCLE

Burn-in test under each temperature with maximum quantity of external devices on all I/O connected and full loading status on each device

Test Temperature	Test Result
0℃	PASS
25℃	PASS
40℃	PASS
50℃	PASS
60℃	PASS

2.2.2 I/O FUNCTION

#Confirm the system specifications and I/O connection to ensure that they are functioning properly

Item	Criteria	Result
USB3.0 *3	Connection 2.5" USB3.0 SSD device and transfer data test	PASS
LAN *2	Connection 1G/10G/100G SWITCH HUB transfer data test	PASS
VGA *1	Check work well	PASS

2.2.3 LOW-TEMP. BOOT-UP

#Power supply under 0℃ and ensure that the system boot up properly

Ambient Temp.	Test Result
0°C	PASS

3. THERMAL TEST POINT
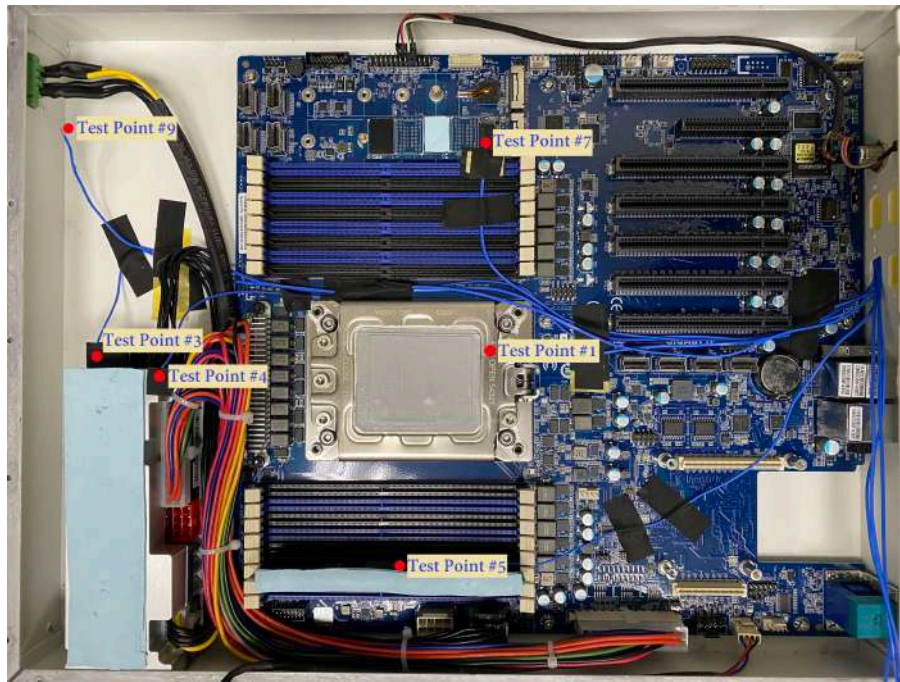
TEST POINT NO.	Test Point
1	CPU
2	CPU Heatsink
3	Power Supply
4	Power Supply Heatsink
5	DRAM
6	DRAM Heatsink
7	M.2 SSD
8	M.2 SSD Heatsink
9	Inside the Case
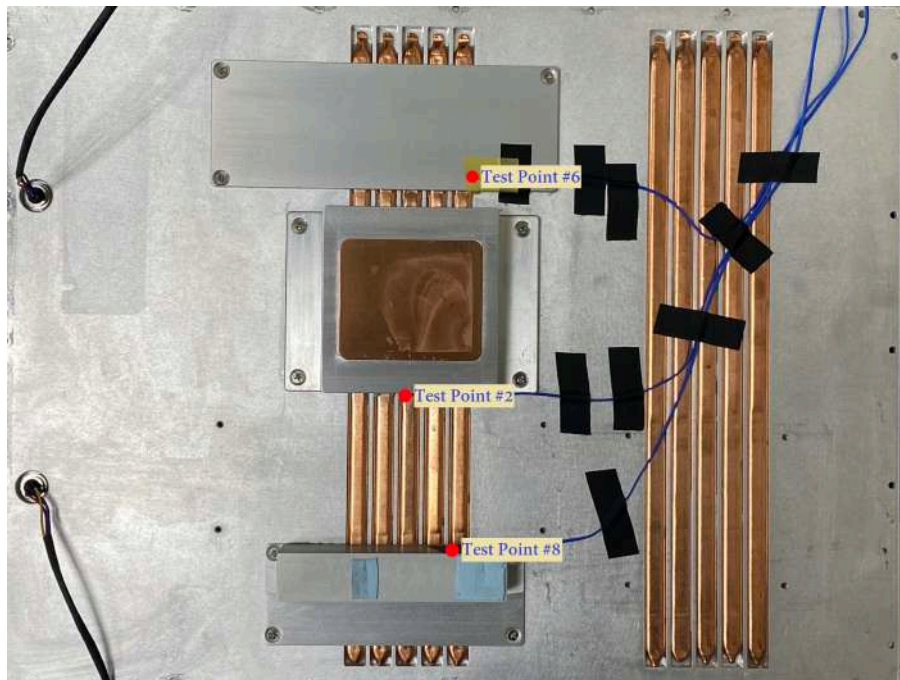
4. TEST PHOTO IN LAB

- Chamber in 0°C
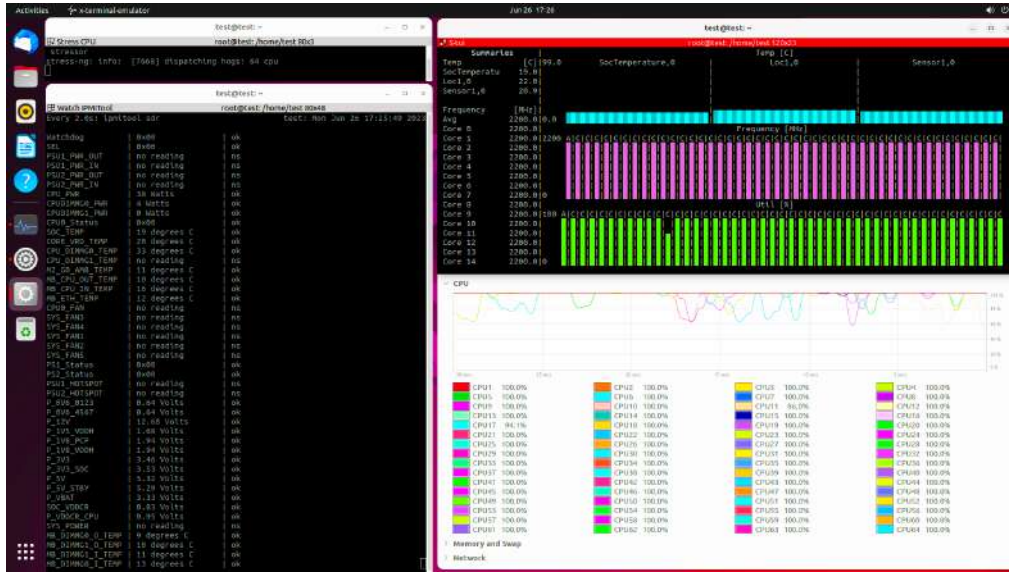
Test Point	Ambient Temp.	0°C
	CPU AVG. FRQ.	2.2GHz
	CPU Tj. (<75°C)	19.0°C
CH1	CPU	8.0°C
CH5	CPU Heatsink	4.1°C
CH2	Power Supply	3.9°C
CH6	Power Supply Heatsink	3.8°C
CH3	DRAM	14.8°C
CH7	DRAM Heatsink	4.1°C
CH4	M.2 SSD	5.4°C
CH8	M.2 SSD Heatsink	3.5°C
CH9	Inside the Case	3.2°C

Thermal & Functions Test Report
TEC300P (Ampere Q64-22 CPU)

- Chamber in 25°C
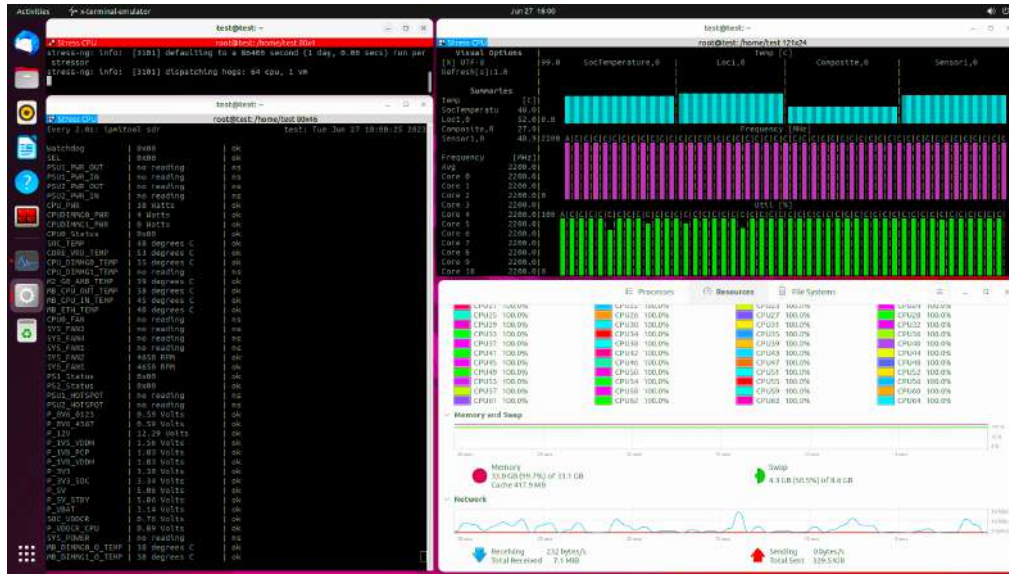
Test Point	Ambient Temp.	25°C
	CPU AVG. FRQ.	2.2GHz
	CPU Tj. (<75°C)	48.0°C
CH1	CPU	37.4°C
CH5	CPU Heatsink	34.5°C
CH2	Power Supply	34.5°C
CH6	Power Supply Heatsink	34.0°C
CH3	DRAM	44.8°C
CH7	DRAM Heatsink	33.7°C
CH4	M.2 SSD	35.9°C
CH8	M.2 SSD Heatsink	33.5°C
CH9	Inside the Case	32.9°C

7STARLAKE

Thermal & Functions Test Report
TEC300P (Ampere Q64-22 CPU)

- Chamber in 40°C
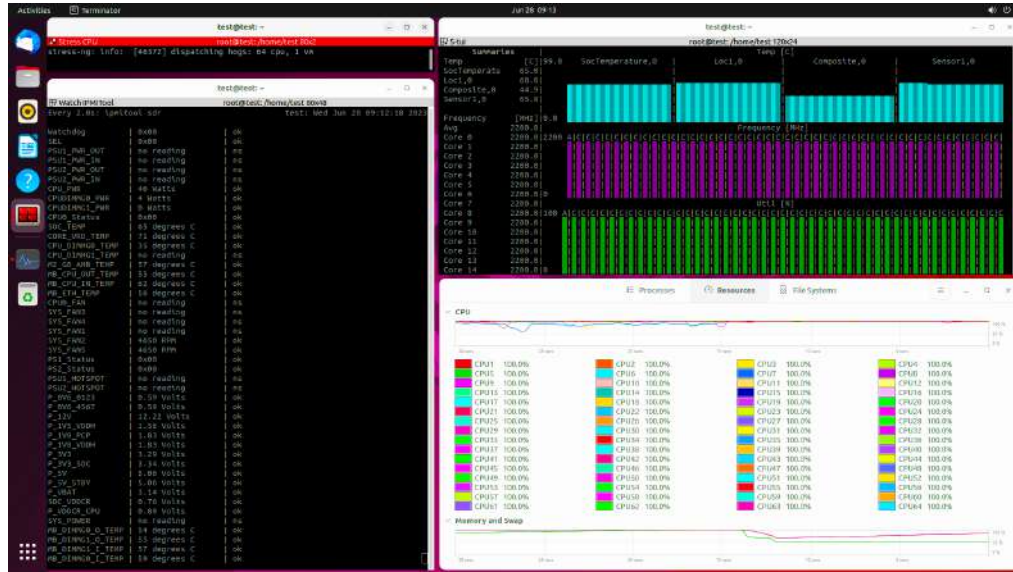
Test Point	Ambient Temp.	40°C
	CPU AVG. FRQ.	2.2GHz
	CPU Tj. (<75°C)	48.0°C
CH1	CPU	54.7°C
CH5	CPU Heatsink	51.9°C
CH2	Power Supply	51.1°C
CH6	Power Supply Heatsink	50.9°C
CH3	DRAM	61.8°C
CH7	DRAM Heatsink	50.8°C
CH4	M.2 SSD	53.4°C
CH8	M.2 SSD Heatsink	50.6°C
CH9	Inside the Case	49.6°C

7STARLAKE

Thermal & Functions Test Report
TEC300P (Ampere Q64-22 CPU)

- Chamber in 50°C
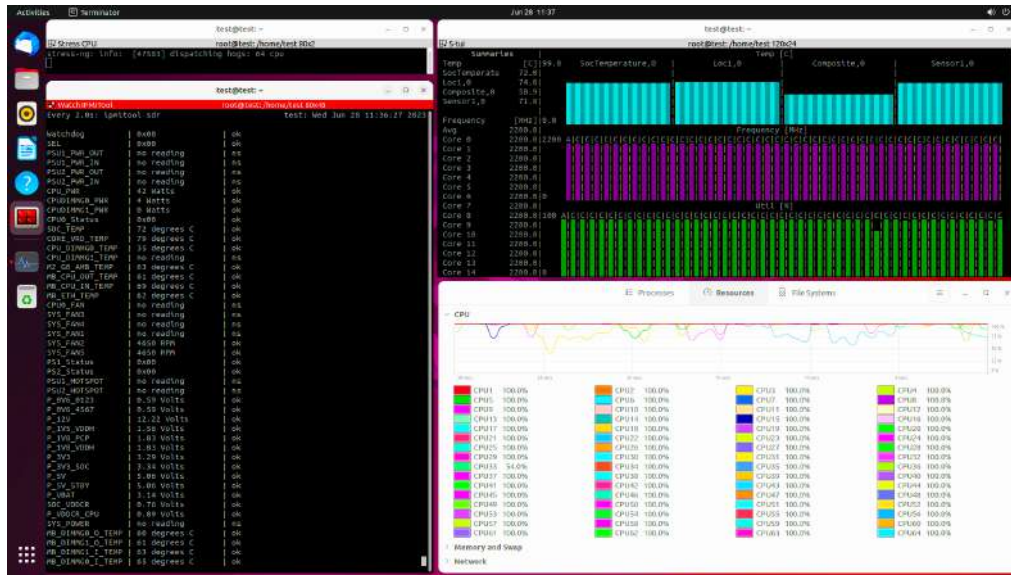
Test Point	Ambient Temp.	50°C
	CPU AVG. FRQ.	2.2GHz
	CPU Tj. (<75°C)	65.0°C
CH1	CPU	60.8°C
CH5	CPU Heatsink	57.9°C
CH2	Power Supply	57.2°C
CH6	Power Supply Heatsink	57.0°C
CH3	DRAM	67.3°C
CH7	DRAM Heatsink	56.9°C
CH4	M.2 SSD	59.3°C
CH8	M.2 SSD Heatsink	56.9°C
CH9	Inside the Case	55.7°C

Thermal & Functions Test Report
TEC300P (Ampere Q64-22 CPU)

- Chamber in 60°C
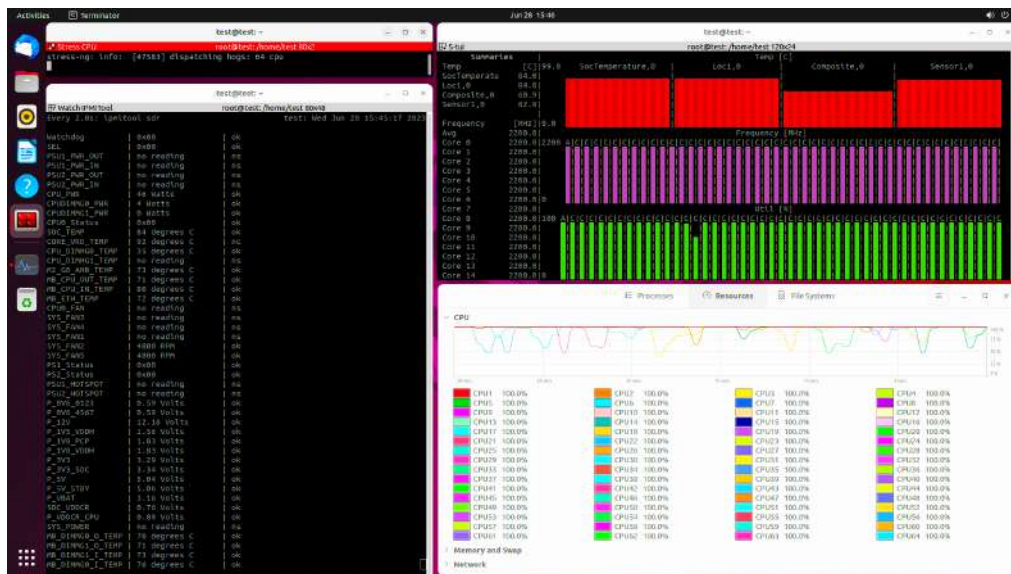
Test Point		Ambient Temp.	60°C
	CPU AVG. FRQ.		2.2GHz
	CPU Tj. (<75°C)		84.0°C
CH1	CPU		71.2°C
CH5	CPU Heatsink		68.3°C
CH2	Power Supply		67.7°C
CH6	Power Supply Heatsink		67.3°C
CH3	DRAM		77.6°C
CH7	DRAM Heatsink		67.1°C
CH4	M.2 SSD		69.7°C
CH8	M.2 SSD Heatsink		67.0°C
CH9	Inside the Case		65.6°C

Thermal & Functions Test Report
TEC300P (Ampere Q64-22 CPU)

Low Temperature SYSTEM Boot up Test
- Ambient Temp. 0°C

5. TEC300P THERMAL TEST RESULT (0~+60 DEGREE C)

CPU Temperature and Frequency						
TEST POINT NO.	Core Temp / Ambient Temp / CPU Frequency	0℃	25℃ 85%H	40℃ 85%H	50℃ 85%H	60℃ 85%H
	CPU Avg. Frequency	2200MHz	2200MHz	2200MHz	2200MHz	2200MHz
	CPU Tj. Temp (< 75℃)	19.0℃	48.0℃	65.0℃	72.0℃	84.0℃
CH1	CPU	8.0℃	37.4℃	54.7℃	60.8℃	71.2℃
CH5	CPU Heatsink	4.1℃	34.5℃	51.9℃	57.9℃	68.3℃
CH2	Power Supply	3.9℃	34.5℃	51.1℃	57.2℃	67.7℃
CH6	Power Supply Heatsink	3.8℃	34.0℃	50.9℃	57.0℃	67.3℃
CH3	DRAM	14.8℃	44.8℃	61.8℃	67.3℃	77.6℃
CH7	DRAM Heatsink	4.1℃	33.7℃	50.8℃	56.9℃	67.1℃
CH4	M.2 SSD	5.4℃	35.9℃	53.4℃	59.3℃	69.7℃
CH8	M.2 SSD Heatsink	3.5℃	33.5℃	50.6℃	56.9℃	67.0℃
CH9	Inside the Case	3.2℃	32.9℃	49.6℃	55.7℃	65.6℃

6. I/O FUNCTION TEST

6.1 VGA OUTPUT TEST

6.2 1 LAN Transfer Data Test

(1)1G/10G LAN Test

6.3 USB 3.0 Transfer Data Test