Performance Test Report

AV600-RH-AB

Product Manager	R&D Leader	Mechanical Engineer	System Engineer	Test Engineer
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AV600-RH-AB


DC 18~36V
X1
X2
X3
X4
HDD
X5


DC 18~36V
X1
X2
X3
X4
HDD


DC 18~36V
X1
X2
X3
X4
HDD

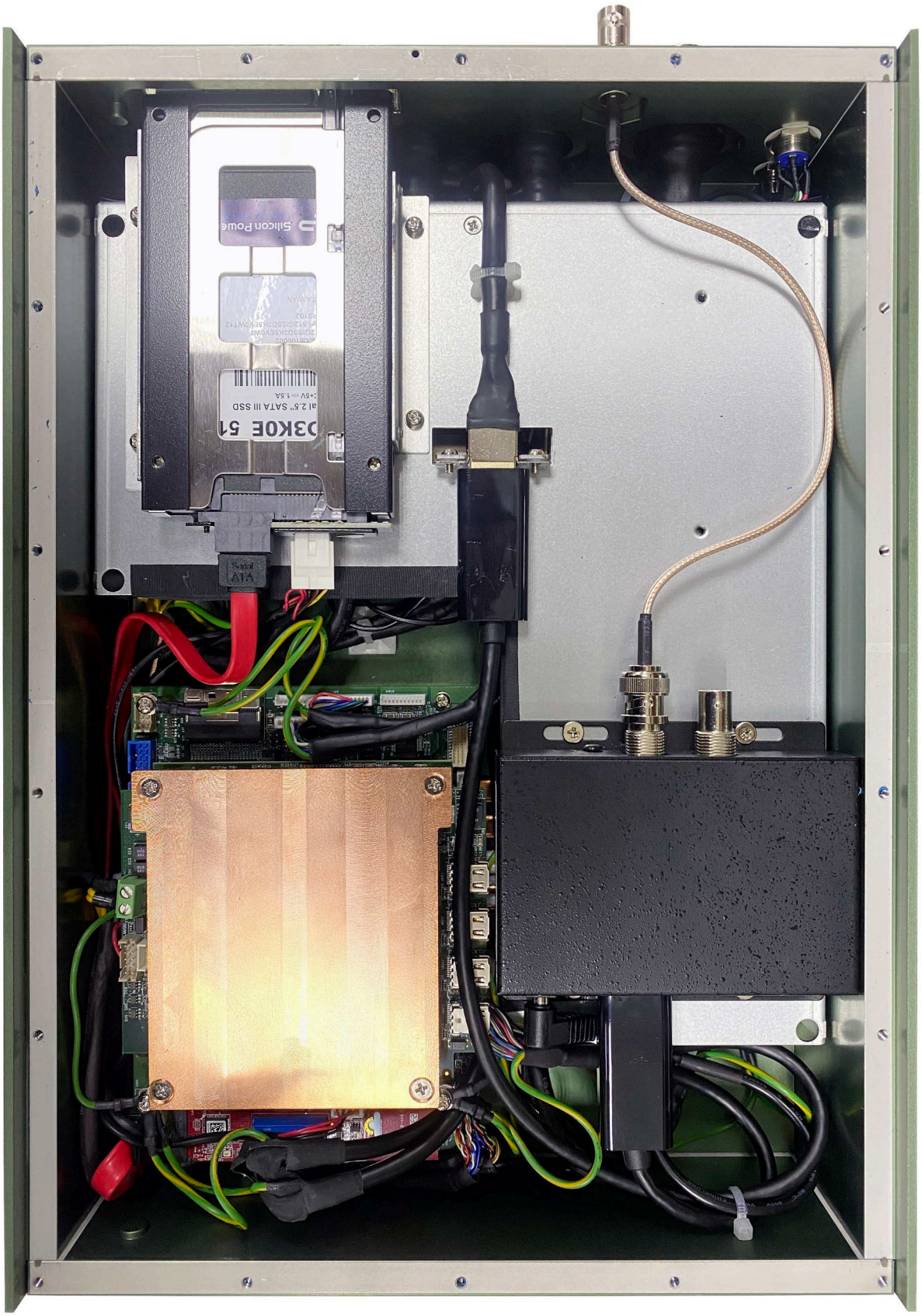
INDEX

1. SPECIFICATION

1-1. SYSTEM CONFIGURATION

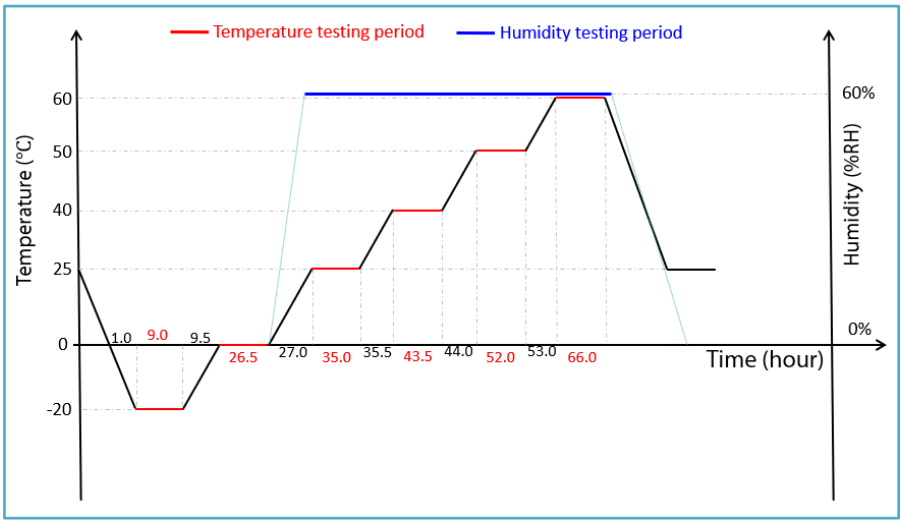
Motherboard	7Starlake SK516+PCOM-Express Type Basic Size Nodule BIOS Version: 0.0.0 SMBIOS Version: 3.6
CPU	Intel® Core™ i7-13800HRE Processor Total Cores: 14 Performance-cores: 6 Efficient-cores: 8 Total Threads: 20 Performance-core Max Turbo Frequency: 5.00 GHz Efficient-core Max Turbo Frequency: 4.00 GHz Processor Base Frequency: 2.50 GHz Processor Base Power: 45 W Maximum Turbo Power: 115 W
Memory	SAMSUNG 16GB DDR5 SO-DIMM
Storage	SP Industrial 2.5" SATA III SSD 512GB
GPU	NVIDIA RTX A2000 Embedded GPU RAM: 4GB BIOS Version: 94.07.63.00.A2 CUDA Cores: 2560 Base Clock: 607 MHz Boost Clock: 1177 MHz
SDI	SDI Multimedia controller Module

1-2. PRODUCT INTERIOR PHOTOS



2. TEST PLAN

2-1. THERMAL MEASUREMENT PROCESS

Test Purpose	The purpose of performing thermal profile testing is to identify potential thermal issues with the EUT. Considering that semiconductor failure rates rise rapidly with increasing junction temperature, it can aid product reliability assessment. As the system cools down, the mode will change with stack selection, temperature/heat. Mapping can help develop the best tracking arrangements.
Test Equipment	1. KSON THS-B4T-150 Chamber.
Quantity Tested	Minimum 1 Set
Test Software	1. Stress CPU: Passmark BurnInTest _Ver 9.0 2. Stress GPU: AIDA64_Extreme 3. LAN Speed: iPerf3
Test Procedure	1. Thermal pre-scan measurement: Temperature: **-20˚C ~60˚C** Humidity: **60%RH** 2. Actual thermal measurement: 2-1. Select the test point based on the infrared photo and connect the thermocouple to the hot spot. 2-2. Place the EUT into the hot chamber and set the test temperature curve Specification. 2-3. Open the hot cell and power up the EUT, enter the Windows 10 Pro and perform a maximum power test + stress application. 2-4. After the EUT executes the test software for 8 hours, record the maximum heat generation of each thermocouple point. 2-5. Turn off the hot cell and EUT. 2-6. Verify and check that the recorded information for each component complies with the operating temperature range listed in the specification/approval sheet for each component being tested. 3. For the Operating system software compatibility testing: 3-1.open the thermal chamber and power on the device under test. Enter the Ubuntu 24.02 LTS environment and perform the maximum power test and stress test.
Test Diagram of Curves	Environment defines for 66 hours. 

2-2. Test Result

2-2-1. Temperature Cycle

Aging test of various parts at different temperatures under maximum load and full load conditions.

Test Temperature	Test Result
-20°C	PASS
0°C	PASS
25°C / 60%RH	PASS
40°C / 60%RH	PASS
50°C / 60%RH	PASS
60°C / 60%RH	PASS

2-2-2. I/O Function

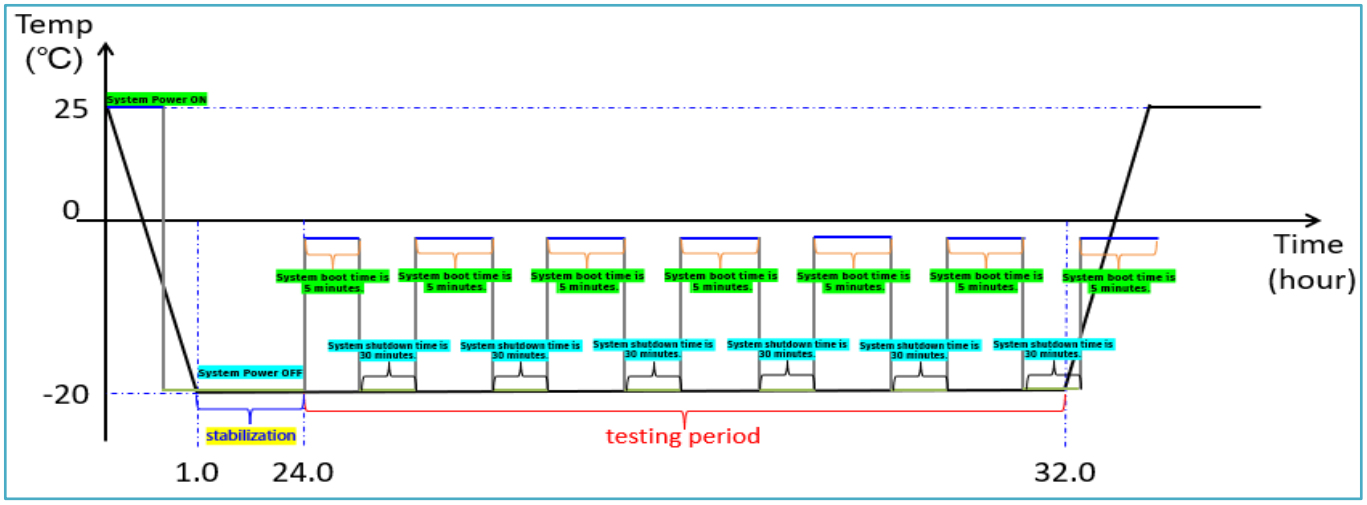
#Confirm the system specifications and I/O connection to ensure that they are functioning properly

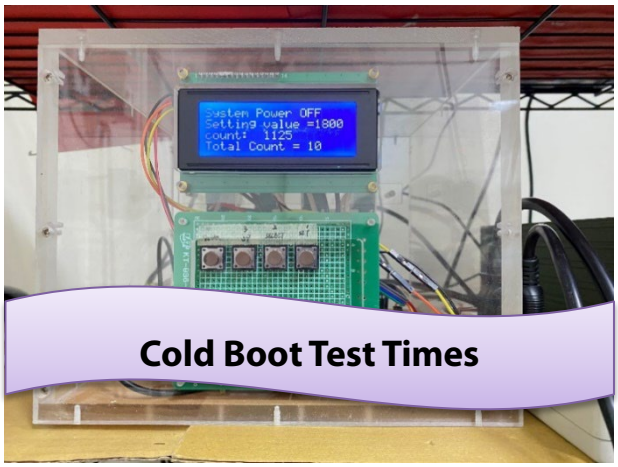
Item	Test Criteria	Result
LAN Port (1Gbps)	Connecting to a LAN switch/hub for data transmission test works properly.	PASS
USB Port (USB3.0)	Connect a PassMark USB 3.0 Loopback Plugs for testing, it can work normally.	PASS
USB Port (USB3.0)	Connect a PassMark USB 3.0 Loopback Plugs for testing, it can work normally.	PASS
Serial Port (RS232)	The two devices RS232 are connected to each other, and the data transmission test shows no loss, functioning properly.	PASS
Serial Port (RS232)	The two devices RS232 are connected to each other, and the data transmission test shows no loss, functioning properly.	PASS
DVI	Connecting a DVI monitor displays normally, indicating that the output is functioning properly."	PASS
SDI	After connecting the SDI output to an LCD monitor, the computer display will be mirrored on the screen, indicating that the SDI display function is working properly.	PASS

2-2-3. Low-temperature & Boot-up

#Power supply under -20℃ and ensure that the system boot up properly

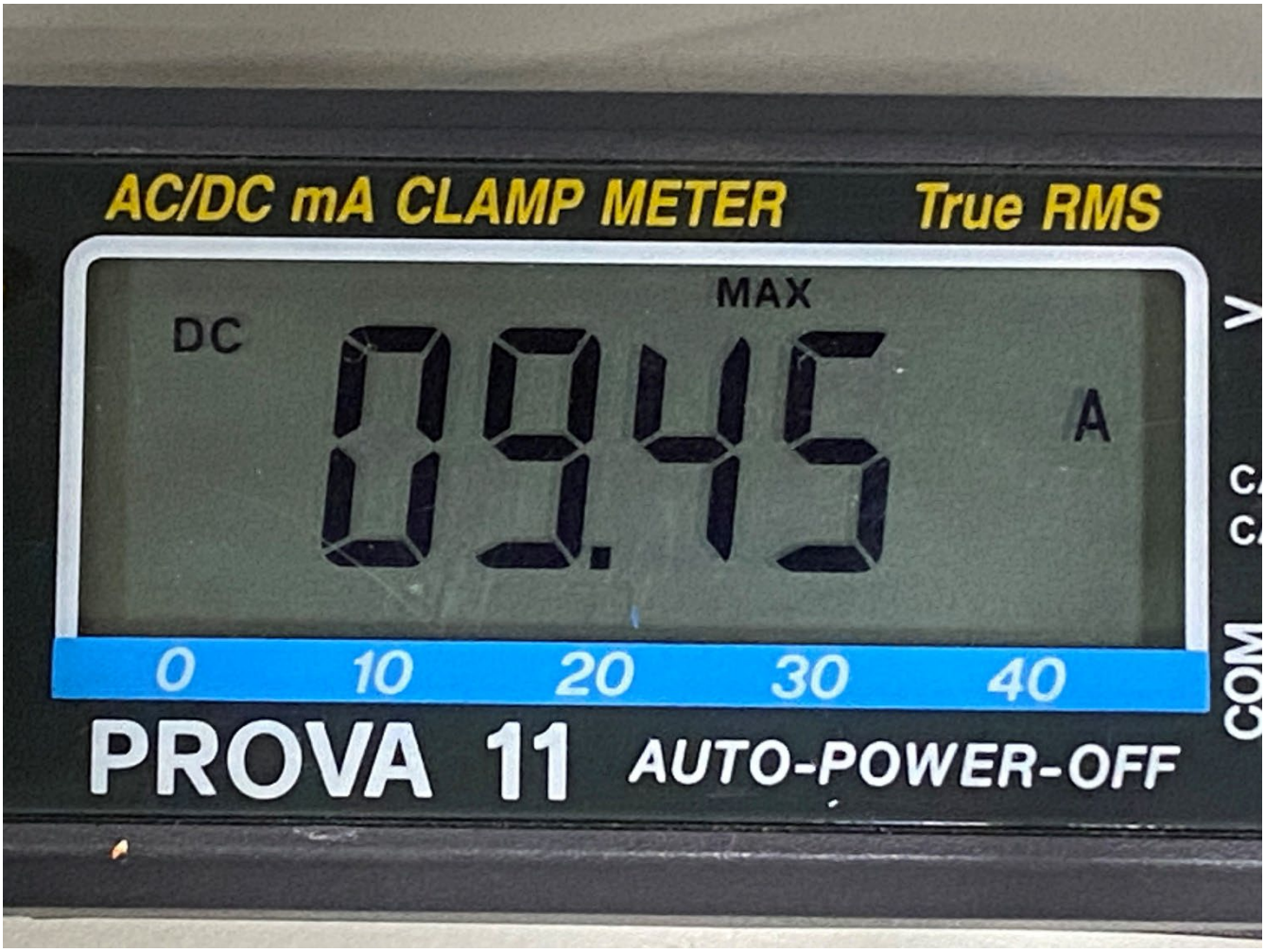
Ambient Temp.	Cold Boot Test Times	Test Result
-20℃	10 times	PASS





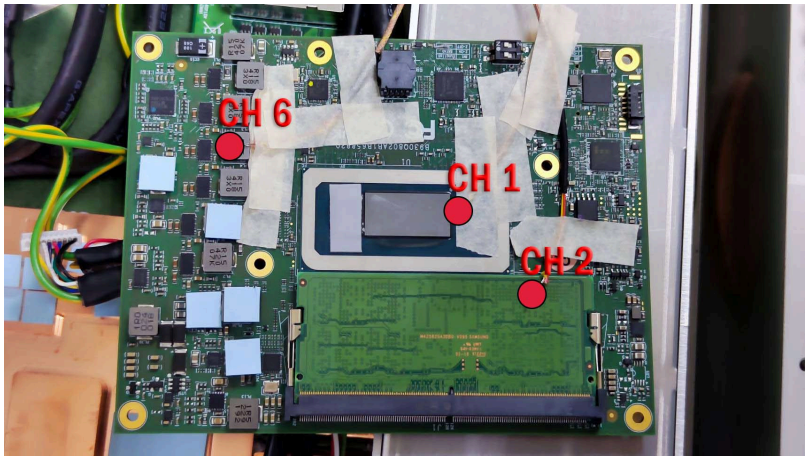
2-3. Power Consumption

Voltage	Current	Wattage
24.0V	9.45A	227W

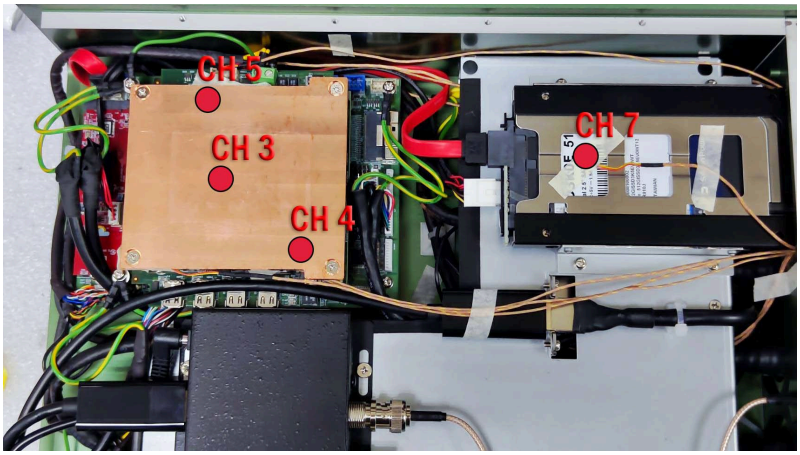


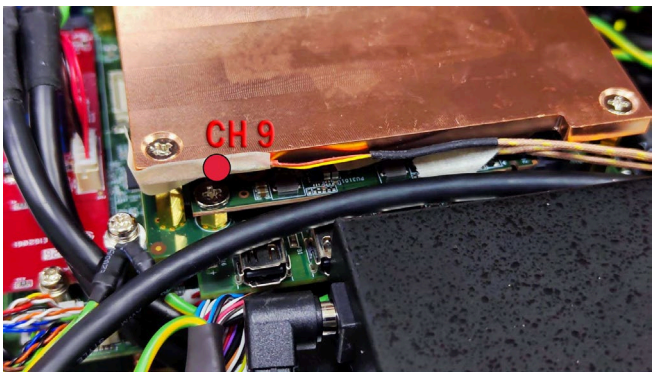
3. TEST PHOTO IN LAB

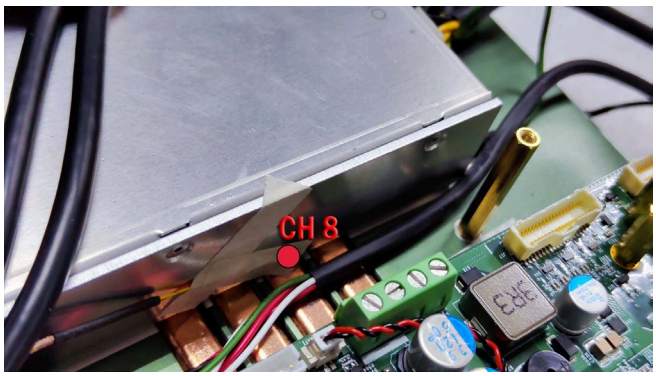
3-1. Thermocouple Placement

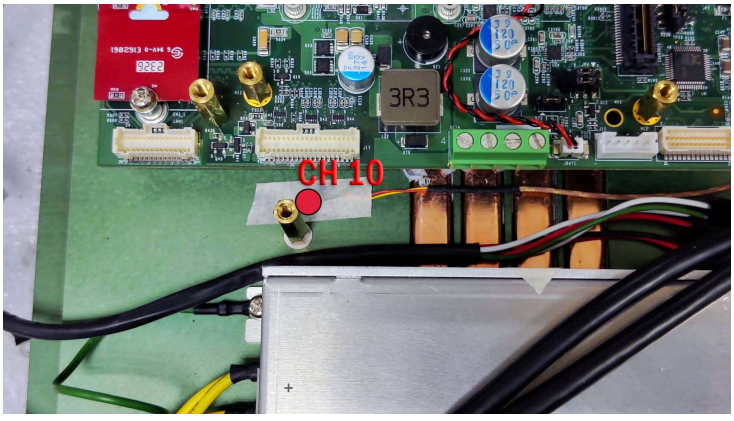


1 CPU	7 SSD
2 DRAM	8 DC-DC Power Board
3 GPU A2000	9 GPU Heatsink
4 GPU DRAM	10 TOP Heatsink
5 GPU MOSFET	11
6 PL4 MOSFET	12



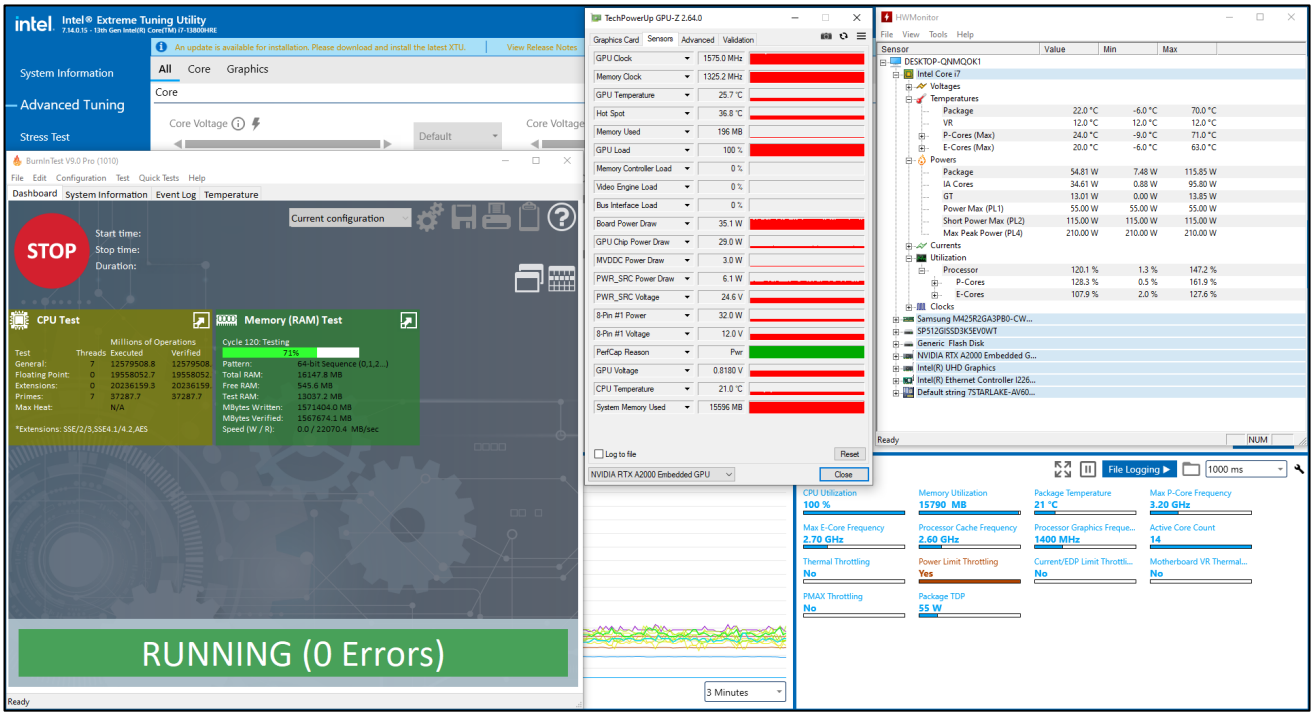






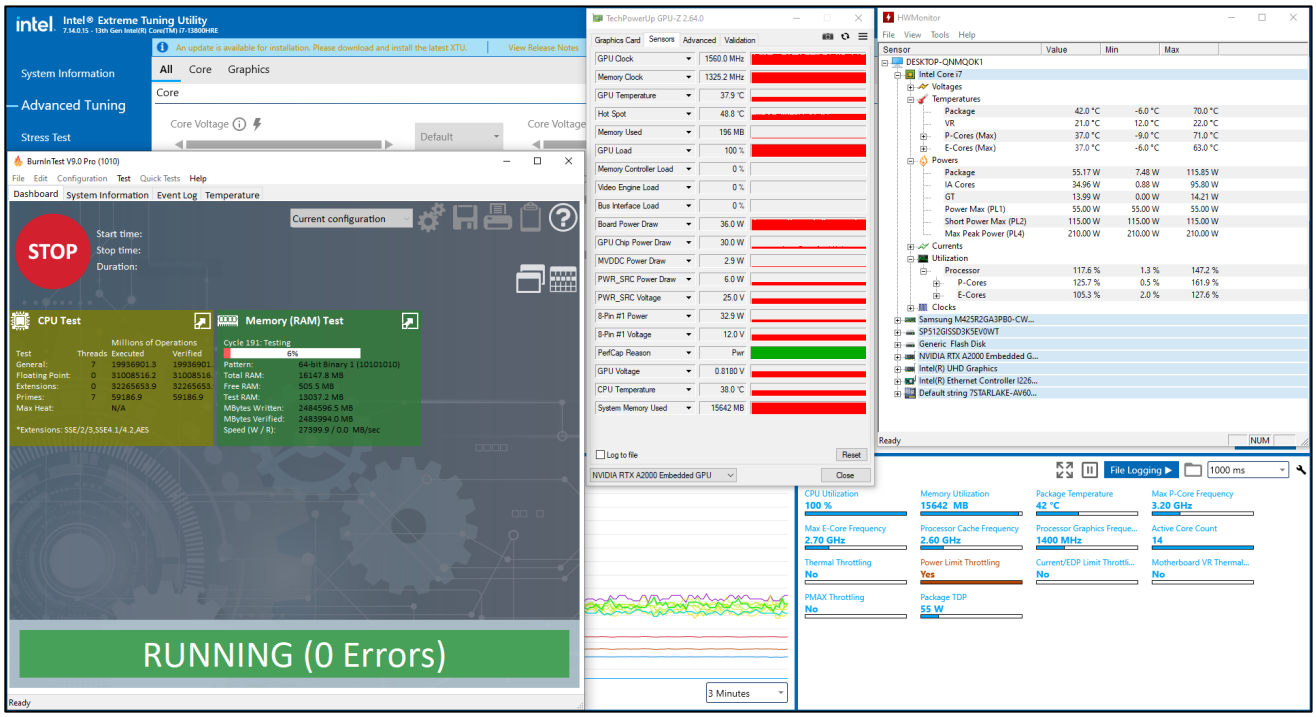
3-2. Environmental Temperature Test

- Chamber in -20°C



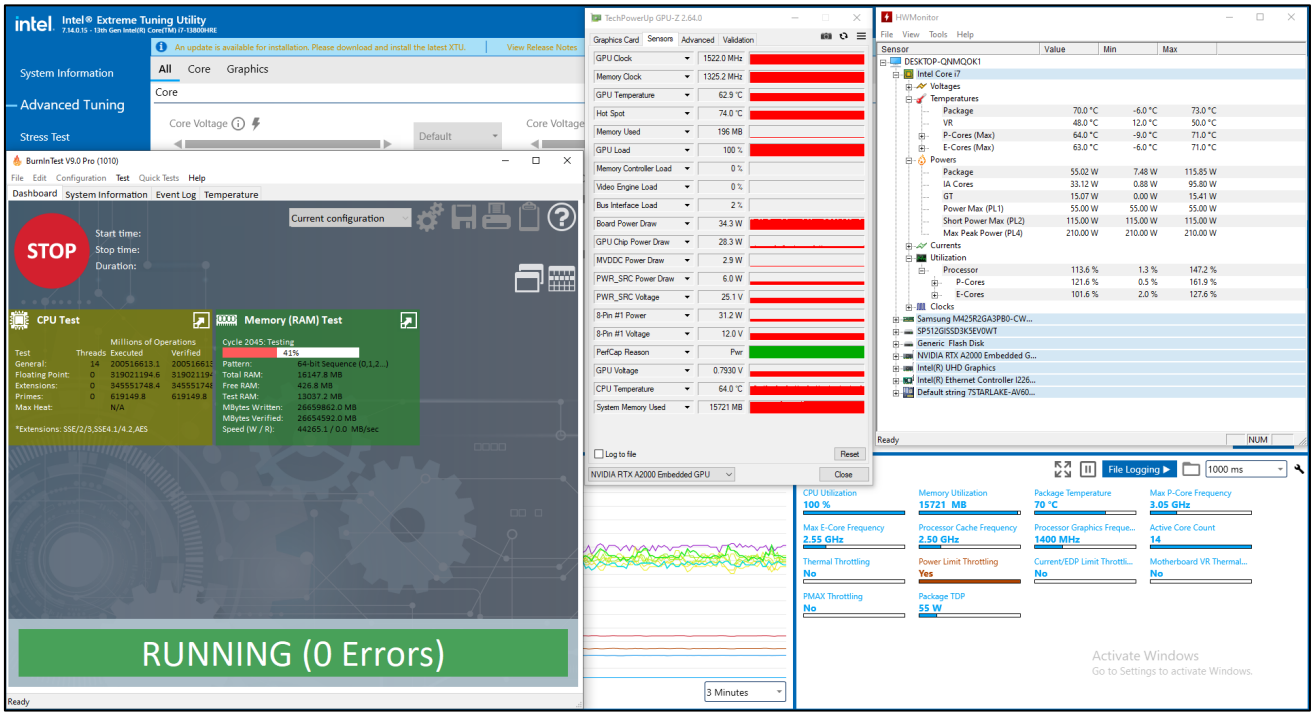
Measuring Point	Ambient Temp.	-20°C
	CPU P-Cores Max Temperature	24.0 ℃
	CPU E-Cores Max Temperature	20.0 ℃
	CPU P-Cores Frequency	3.20 GHz
	CPU E-Cores Frequency	2.70 GHz
	GPU Temperature	25.7 ℃
	GPU Hot Spot Temperature	36.8 ℃
	GPU Frequency	1575.0 MHz
CH1	CPU	-1.1 ℃
CH2	DRAM	-6.4 ℃
CH3	GPU A2000	22.5 ℃
CH4	GPU DRAM	15.8 ℃
CH5	GPU MOSFET	14.7 ℃
CH6	PL4 MOSFET	-6.9 ℃
CH7	2.5" SSD	-6.0 ℃
CH8	DC-DC Power Module	-10.1 ℃
CH9	GPU Heat sink	10.9 ℃
CH10	TOP Heat sink	-4.1 ℃

- Chamber in 0°C

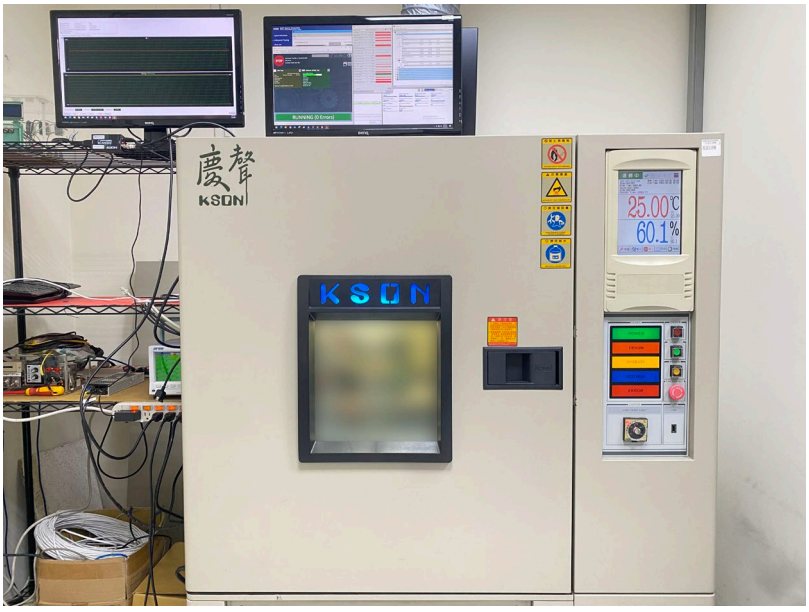


Measuring Point	Ambient Temp.	0°C
	CPU P-Cores Max Temperature	37.0 °C
	CPU E-Cores Max Temperature	37.0 °C
	CPU P-Cores Frequency	3.20 GHz
	CPU E-Cores Frequency	2.70 GHz
	GPU Temperature	37.9 °C
	GPU Hot Spot Temperature	48.8 °C
	GPU Frequency	1560.0 MHz
CH1	CPU	15.3 °C
CH2	DRAM	10.0 °C
CH3	GPU A2000	35.9 °C
CH4	GPU DRAM	29.1 °C
CH5	GPU MOSFET	28.4 °C
CH6	PL4 MOSFET	8.5 °C
CH7	2.5" SSD	10.9 °C
CH8	DC-DC Power Module	9.8 °C
CH9	GPU Heat sink	25.0 °C
CH10	TOP Heat sink	13.5 °C

- Chamber in 25°C



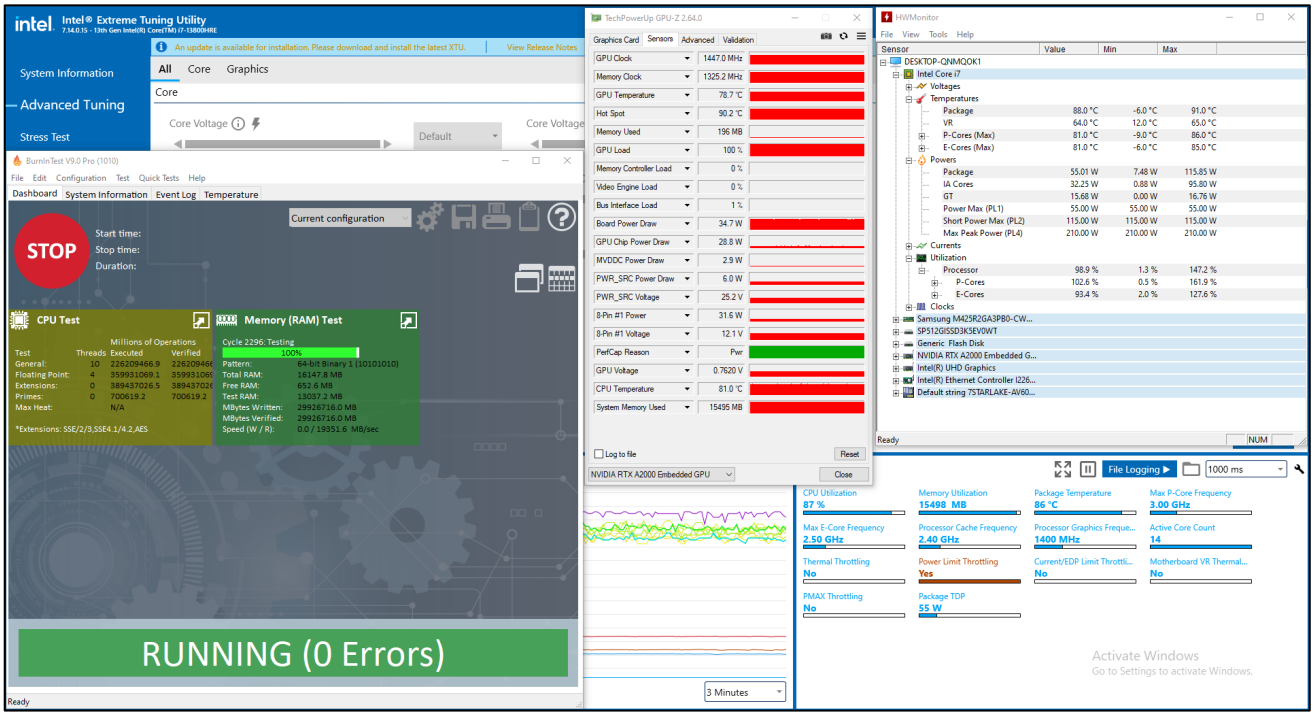
Measuring Point	Ambient Temp.	25°C
	CPU P-Cores Max Temperature	64.0 °C
	CPU E-Cores Max Temperature	63.0 °C
	CPU P-Cores Frequency	3.05 GHz
	CPU E-Cores Frequency	2.55 GHz
	GPU Temperature	62.9 °C
	GPU Hot Spot Temperature	74.0 °C
	GPU Frequency	1522.0 MHz
CH1	CPU	41.7 °C
CH2	DRAM	37.5 °C
CH3	GPU A2000	61.1 °C
CH4	GPU DRAM	54.3 °C
CH5	GPU MOSFET	53.6 °C
CH6	PL4 MOSFET	39.5 °C
CH7	2.5" SSD	37.4 °C
CH8	DC-DC Power Module	36.9 °C
CH9	GPU Heat sink	50.6 °C
CH10	TOP Heat sink	40.1 °C



Performance Test

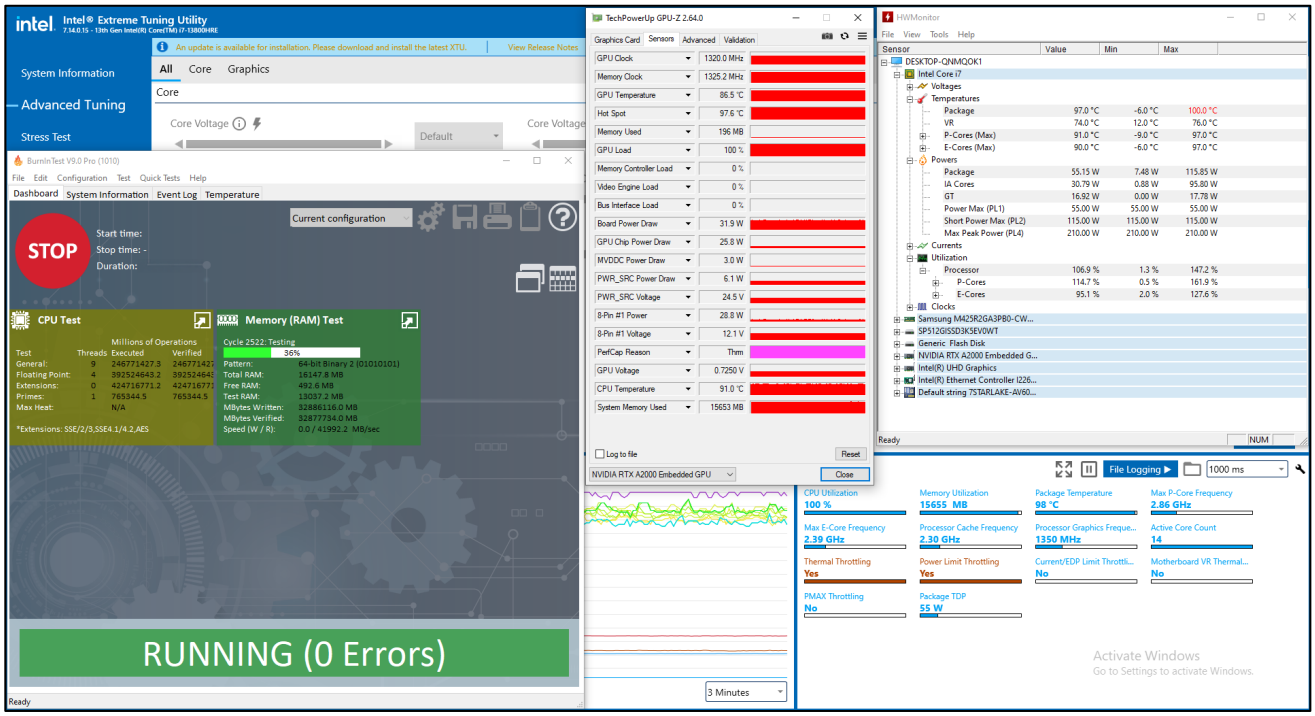
AV600-RH-AB

- Chamber in 40°C



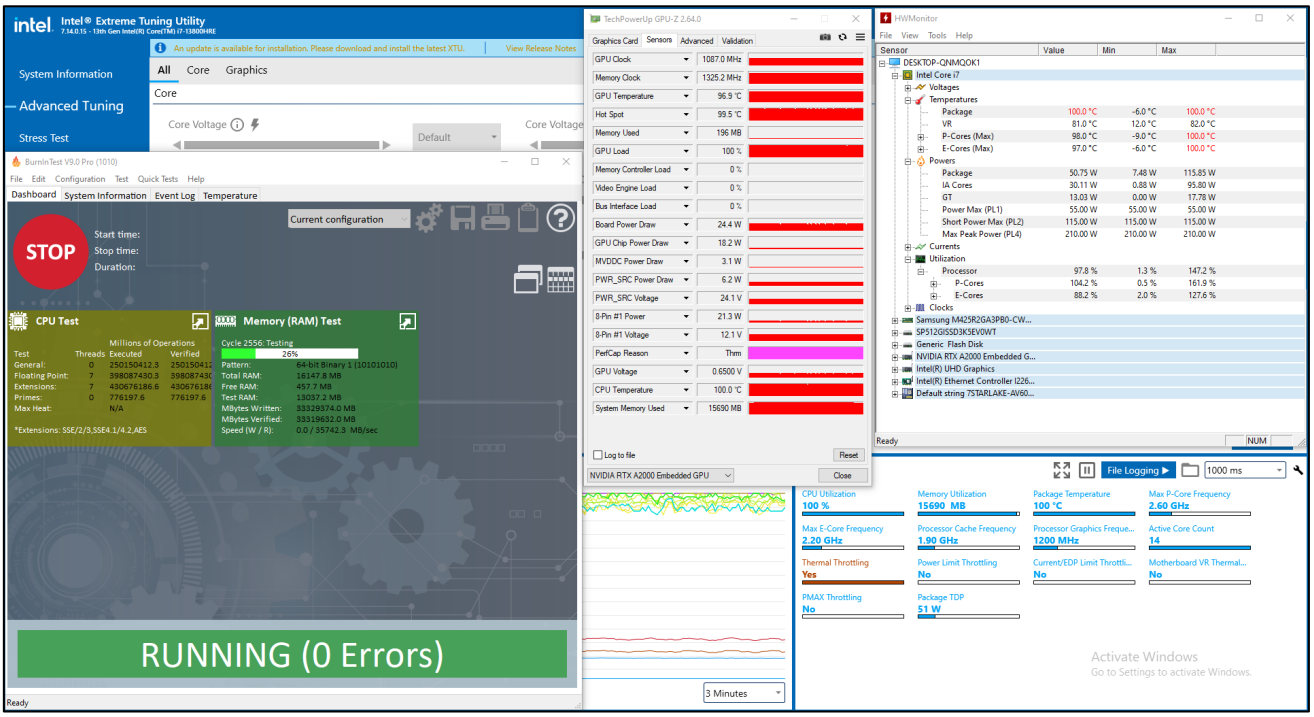
Measuring Point	Ambient Temp.	40°C
	CPU P-Cores Max Temperature	81.0 °C
	CPU E-Cores Max Temperature	81.0 °C
	CPU P-Cores Frequency	3.00 GHz
	CPU E-Cores Frequency	2.50 GHz
	GPU Temperature	78.7 °C
	GPU Hot Spot Temperature	90.2 °C
	GPU Frequency	1447.0 MHz
CH1	CPU	56.8 °C
CH2	DRAM	52.6 °C
CH3	GPU A2000	76.2 °C
CH4	GPU DRAM	69.1 °C
CH5	GPU MOSFET	68.2 °C
CH6	PL4 MOSFET	54.2 °C
CH7	2.5" SSD	52.1 °C
CH8	DC-DC Power Module	51.6 °C
CH9	GPU Heat sink	65.5 °C
CH10	TOP Heat sink	54.9 °C

- Chamber in 50°C



Measuring Point	Ambient Temp.	50°C
	CPU P-Cores Max Temperature	91.0 °C
	CPU E-Cores Max Temperature	90.0 °C
	CPU P-Cores Frequency	2.86 GHz
	CPU E-Cores Frequency	2.39 GHz
	GPU Temperature	86.5 °C
	GPU Hot Spot Temperature	97.6 °C
	GPU Frequency	1320.0 MHz
CH1	CPU	66.9 °C
CH2	DRAM	62.6 °C
CH3	GPU A2000	84.3 °C
CH4	GPU DRAM	78.0 °C
CH5	GPU MOSFET	77.0 °C
CH6	PL4 MOSFET	63.9 °C
CH7	2.5" SSD	62.3 °C
CH8	DC-DC Power Module	61.6 °C
CH9	GPU Heat sink	74.4 °C
CH10	TOP Heat sink	64.7 °C

- Chamber in 60°C



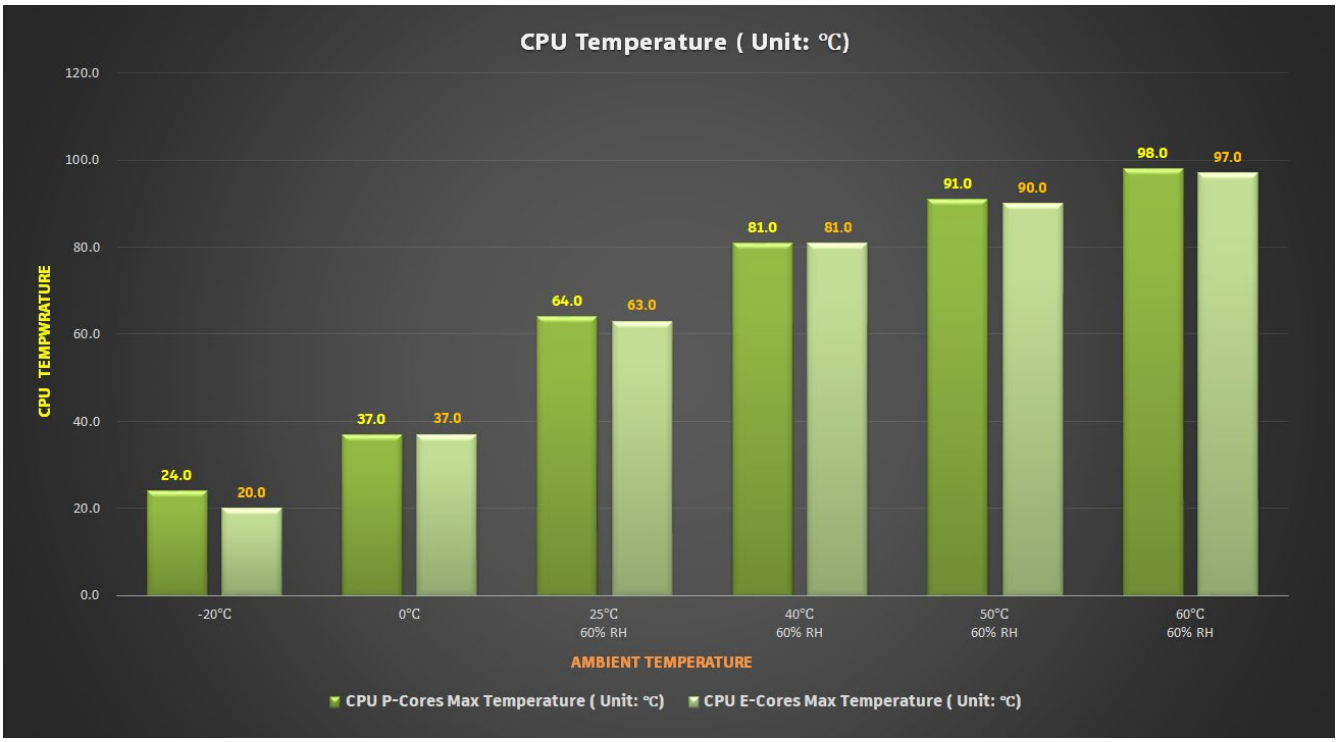
Measuring Point	Ambient Temp.	60°C
	CPU P-Cores Max Temperature	98.0 °C
	CPU E-Cores Max Temperature	97.0 °C
	CPU P-Cores Frequency	2.60 GHz
	CPU E-Cores Frequency	2.20 GHz
	GPU Temperature	96.9 °C
	GPU Hot Spot Temperature	99.5 °C
	GPU Frequency	1087.0 MHz
CH1	CPU	75.4 °C
CH2	DRAM	71.5 °C
CH3	GPU A2000	85.8 °C
CH4	GPU DRAM	81.5 °C
CH5	GPU MOSFET	80.9 °C
CH6	PL4 MOSFET	72.1 °C
CH7	2.5" SSD	71.1 °C
CH8	DC-DC Power Module	70.3 °C
CH9	GPU Heat sink	78.8 °C
CH10	TOP Heat sink	72.7 °C

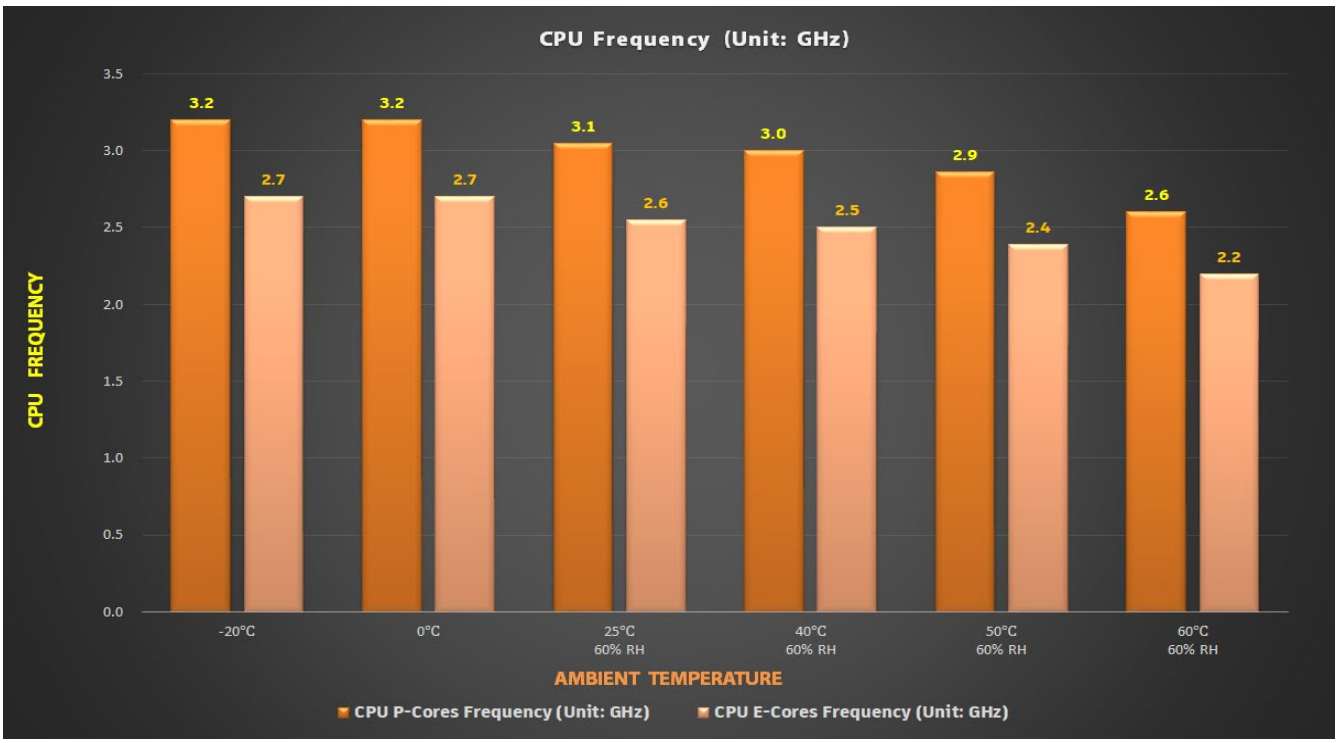
4. THERMAL TEST RESULT(-20°C ~ +60°C)

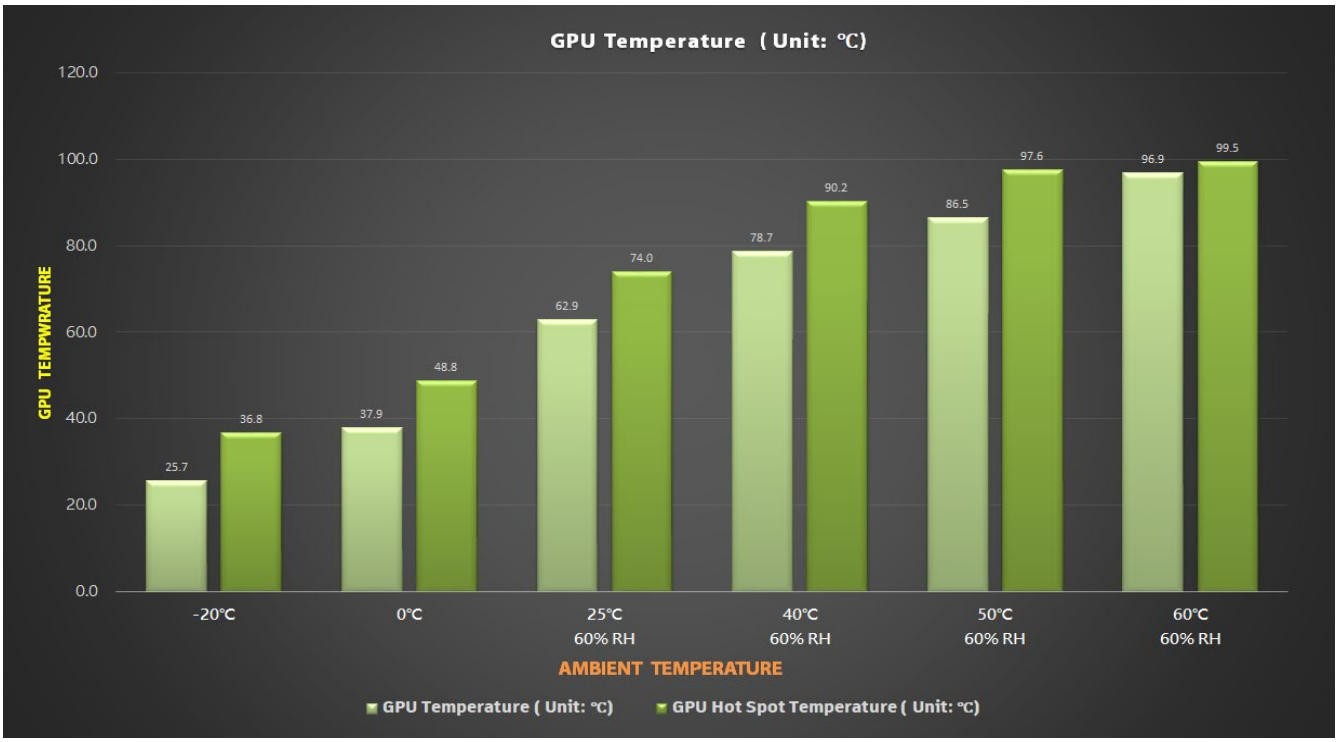
Temperature / Ambient Temp. / Frequency	-20℃	0°C	25°C 60% RH	40°C 60% RH	50°C 60% RH	60°C 60% RH
CPU P-Cores Max Temperature (Unit: °C)	24.0	37.0	64.0	81.0	91.0	98.0
CPU E-Cores Max Temperature (Unit: °C)	20.0	37.0	63.0	81.0	90.0	97.0
CPU P-Cores Frequency (Unit: GHz) Processor Base Frequency:2.5 GHz	3.20	3.20	3.05	3.00	2.86	2.60
CPU E-Cores Frequency (Unit: GHz)	2.70	2.70	2.55	2.50	2.39	2.20

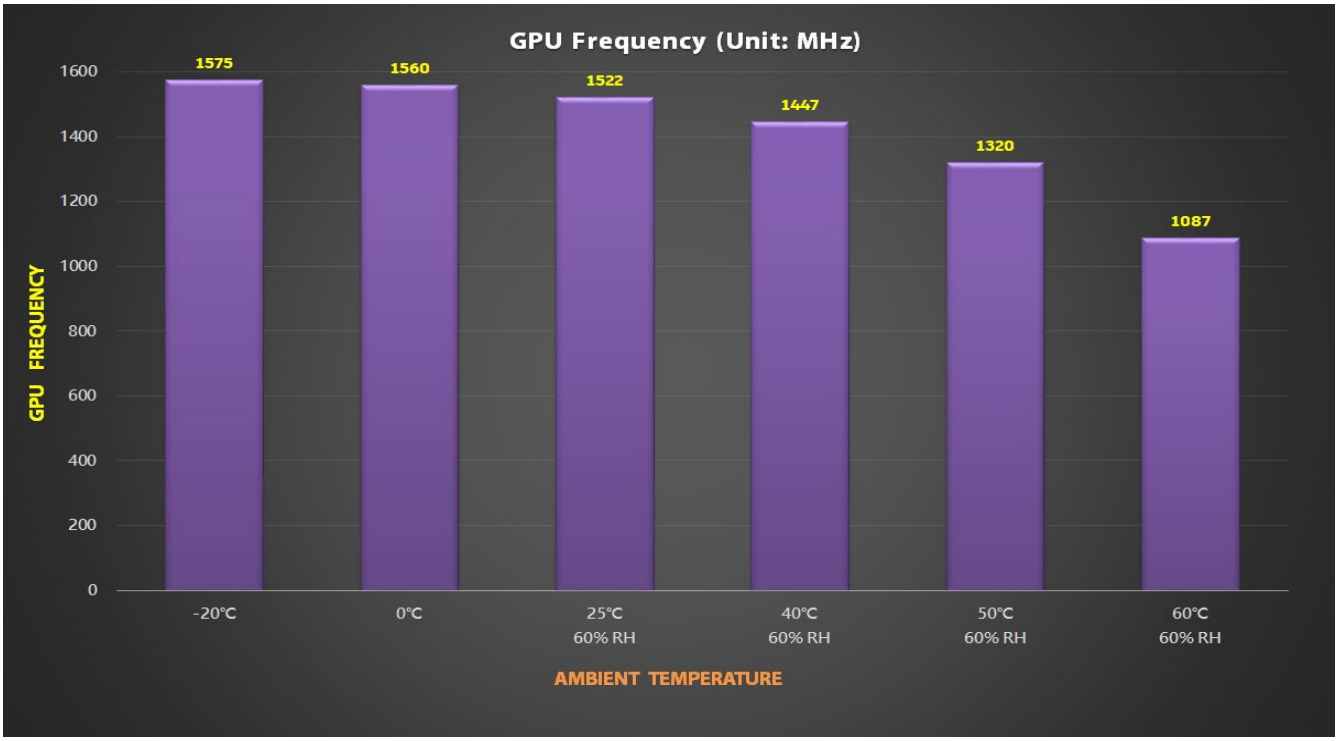
Temperature / Ambient Temp. / Frequency	-20℃	0°C	25°C 60% RH	40°C 60% RH	50°C 60% RH	60°C 60% RH
GPU Temperature (Unit: °C)	25.7	37.9	62.9	78.7	86.5	96.9
GPU Hot Spot Temperature (Unit: °C)	36.8	48.8	74.0	90.2	97.6	99.5
GPU Frequency (Unit: MHz)	1575.0	1560.0	1522.0	1447.0	1320.0	1087.0

Thermocouple measuring point / Ambient Temp.		-20℃	0°C	25°C 60% RH	40°C 60% RH	50°C 60% RH	60°C 60% RH
CH1	CPU	-1.1	15.3	41.7	56.8	66.9	75.4
CH2	DRAM	-6.4	10.0	37.5	52.6	62.6	71.5
CH3	GPU A2000	22.5	35.9	61.1	76.2	84.3	85.8
CH4	GPU DRAM	15.8	29.1	54.3	69.1	78.0	81.5
CH5	GPU MOSFET	14.7	28.4	53.6	68.2	77.0	80.9
CH6	PL4 MOSFET	-6.9	8.5	39.5	54.2	63.9	72.1
CH7	2.5" SSD	-6.0	10.9	37.4	52.1	62.3	71.1
CH8	DC-DC Power Module	-10.1	9.8	36.9	51.6	61.6	70.3
CH9	GPU Heat sink	10.9	25.0	50.6	65.5	74.4	78.8
CH10	TOP Heat sink	-4.1	13.5	40.1	54.9	64.7	72.7


CPU Temperature (Unit: ℃)
CPU TEMPWRATURE
120.0
100.0
80.0
60.0
40.0
20.0
0.0
24.0
20.0
37.0
37.0
64.0
63.0
81.0
81.0
91.0
90.0
98.0
97.0
-20°C
0°C
25°C 60% RH
40°C 60% RH
50°C 60% RH
60°C 60% RH
AMBIENT TEMPERATURE
CPU P-Cores Max Temperature (Unit: ℃)
CPU E-Cores Max Temperature (Unit: ℃)

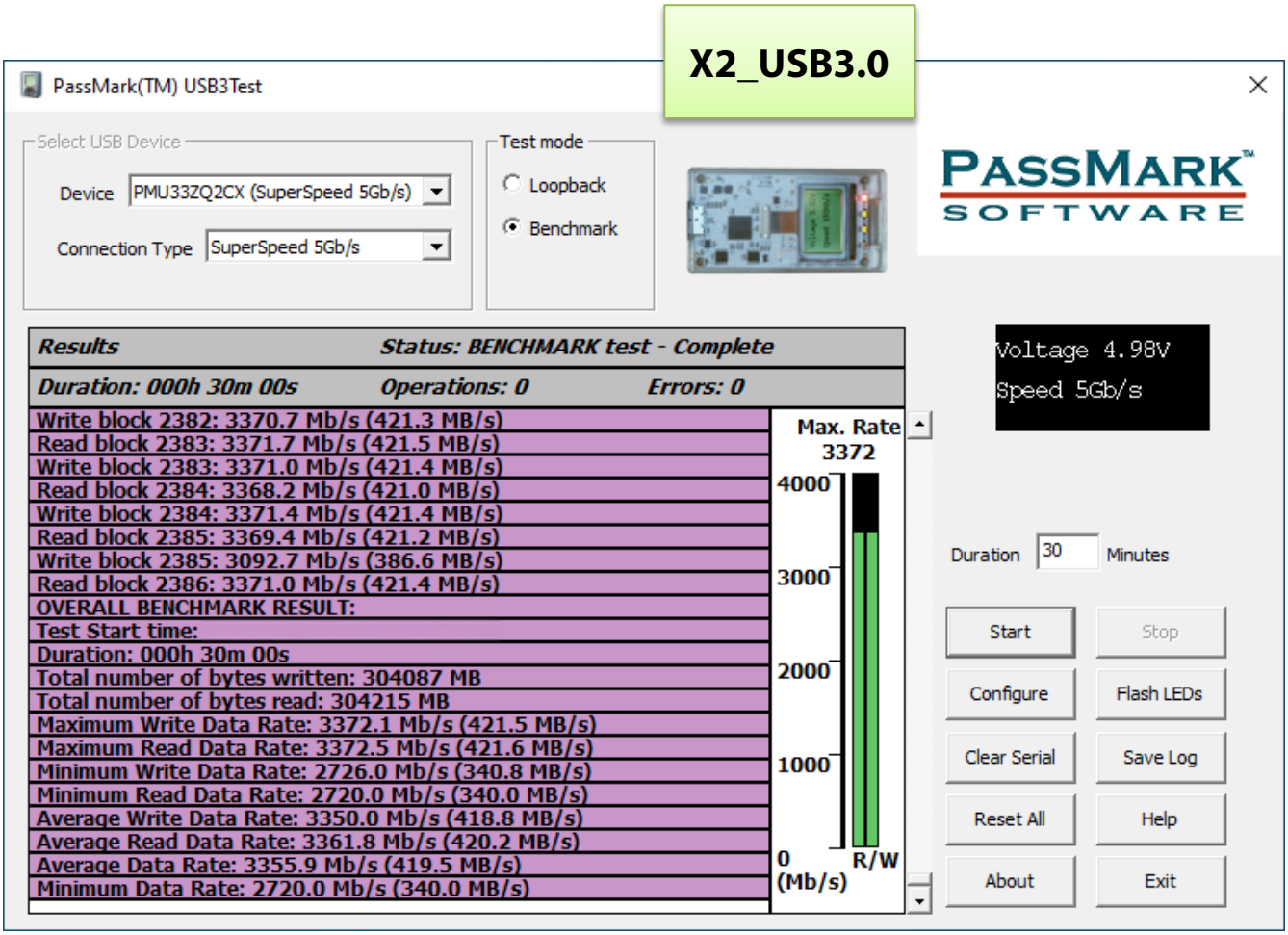

CPU Frequency (Unit: GHz)
CPU FREQUENCY
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
3.2
2.7
3.2
2.7
3.1
2.6
3.0
2.5
2.9
2.4
2.6
2.2
-20°C
0°C
25°C 60% RH
40°C 60% RH
50°C 60% RH
60°C 60% RH
AMBIENT TEMPERATURE
CPU P-Cores Frequency (Unit: GHz)
CPU E-Cores Frequency (Unit: GHz)


GPU Temperature (Unit: ℃)
120.0
100.0
80.0
60.0
40.0
20.0
0.0
GPU TEMPWRATURE
25.7
36.8
37.9
48.8
62.9
74.0
78.7
90.2
86.5
97.6
96.9
99.5
-20℃
0℃
25℃ 60% RH
40℃ 60% RH
50℃ 60% RH
60℃ 60% RH
AMBIENT TEMPERATURE
GPU Temperature (Unit: ℃)
GPU Hot Spot Temperature (Unit: ℃)

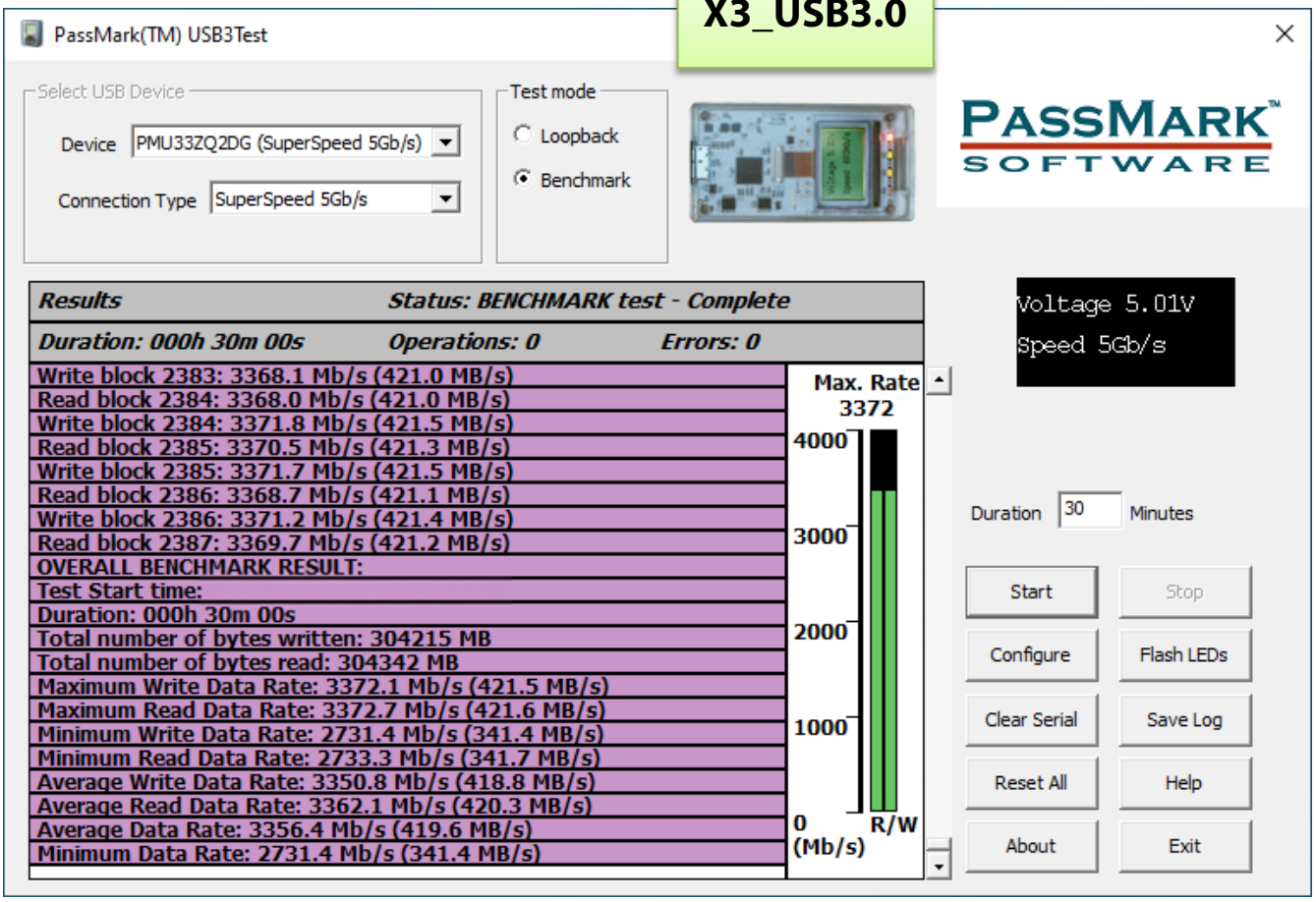

GPU Frequency (Unit: MHz)
1600
1400
1200
1000
800
600
400
200
0
GPU FREQUENCY
1575
1560
1522
1447
1320
1087
-20℃
0℃
25℃ 60% RH
40℃ 60% RH
50℃ 60% RH
60℃ 60% RH
AMBIENT TEMPERATURE

5. I/O FUNCTION TEST

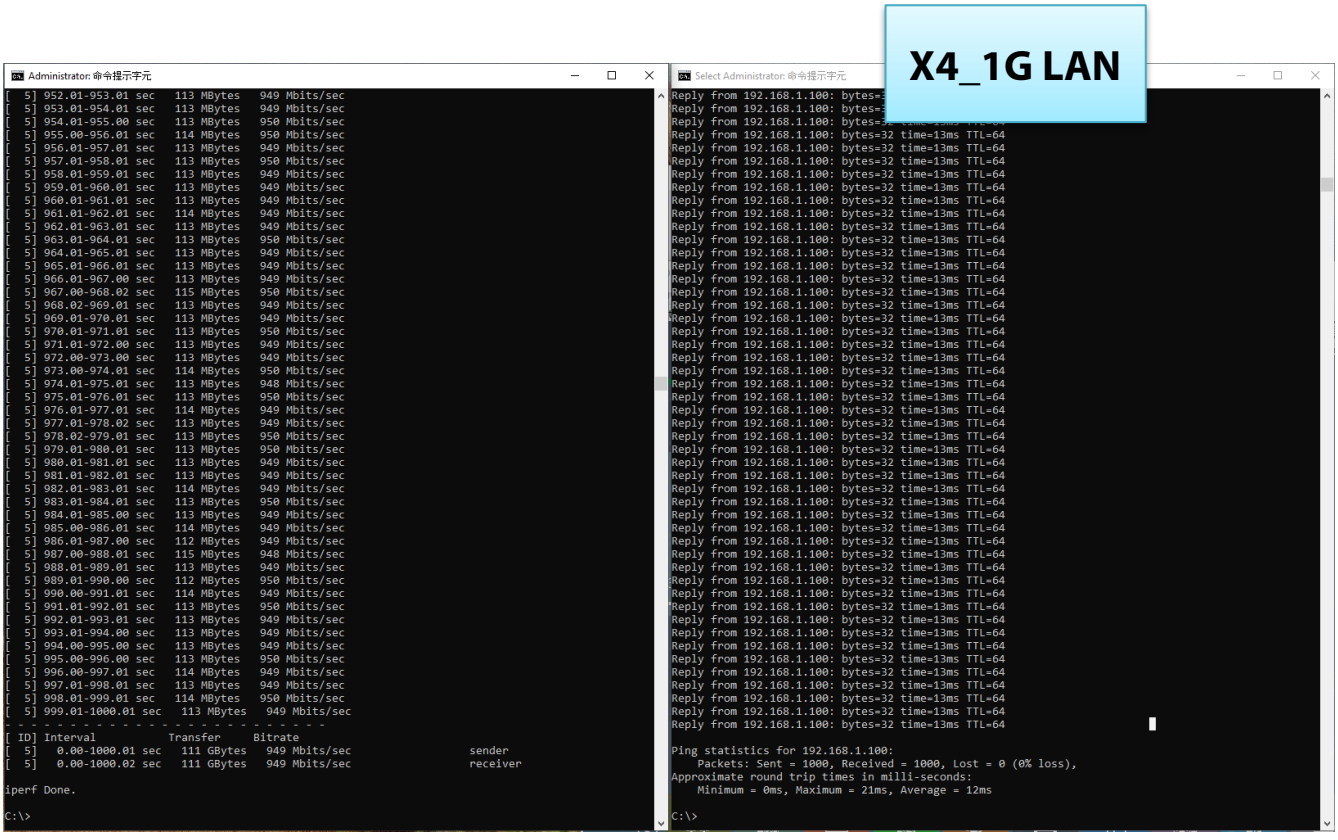
5-1. USB 3.0



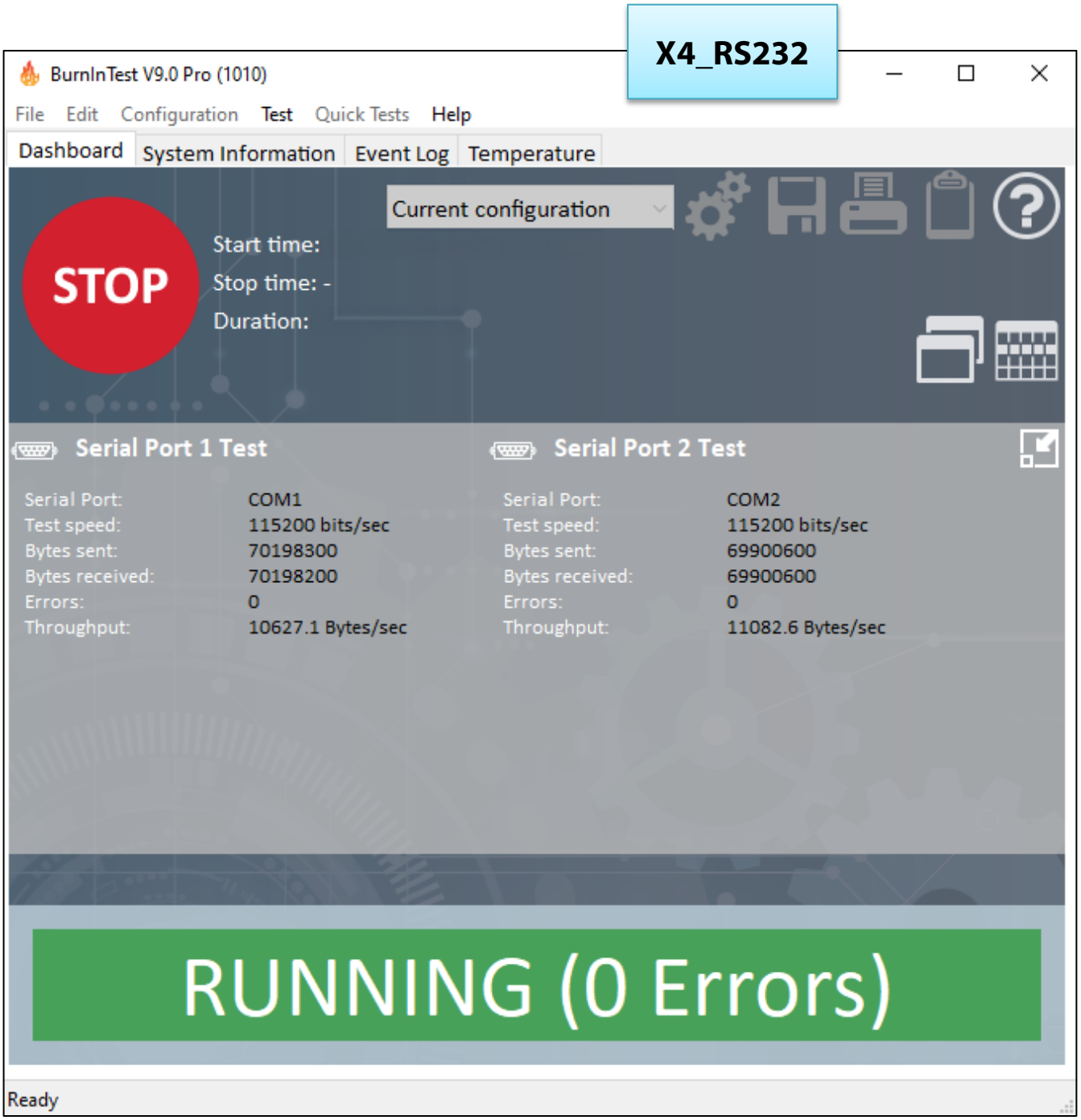
X3_USB3.0


PassMark(TM) USB3Test
Select USB Device
Device
PMU33ZQ2DG (SuperSpeed 5Gb/s)
Connection Type
SuperSpeed 5Gb/s
Test mode
Loopback
Benchmark
PASSMARK SOFTWARE
Results
Status: BENCHMARK test - Complete
Duration: 000h 30m 00s
Operations: 0
Errors: 0
Write block 2383: 3368.1 Mb/s (421.0 MB/s)
Read block 2384: 3368.0 Mb/s (421.0 MB/s)
Write block 2384: 3371.8 Mb/s (421.5 MB/s)
Read block 2385: 3370.5 Mb/s (421.3 MB/s)
Write block 2385: 3371.7 Mb/s (421.5 MB/s)
Read block 2386: 3368.7 Mb/s (421.1 MB/s)
Write block 2386: 3371.2 Mb/s (421.4 MB/s)
Read block 2387: 3369.7 Mb/s (421.2 MB/s)
OVERALL BENCHMARK RESULT:
Test Start time:
Duration: 000h 30m 00s
Total number of bytes written: 304215 MB
Total number of bytes read: 304342 MB
Maximum Write Data Rate: 3372.1 Mb/s (421.5 MB/s)
Maximum Read Data Rate: 3372.7 Mb/s (421.6 MB/s)
Minimum Write Data Rate: 2731.4 Mb/s (341.4 MB/s)
Minimum Read Data Rate: 2733.3 Mb/s (341.7 MB/s)
Average Write Data Rate: 3350.8 Mb/s (418.8 MB/s)
Average Read Data Rate: 3362.1 Mb/s (420.3 MB/s)
Average Data Rate: 3356.4 Mb/s (419.6 MB/s)
Minimum Data Rate: 2731.4 Mb/s (341.4 MB/s)
Max. Rate
3372
4000
3000
2000
1000
0
(Mb/s)
R/W
Voltage 5.01V
Speed 5Gb/s
Duration
30
Minutes
Start
Stop
Configure
Flash LEDs
Clear Serial
Save Log
Reset All
Help
About
Exit

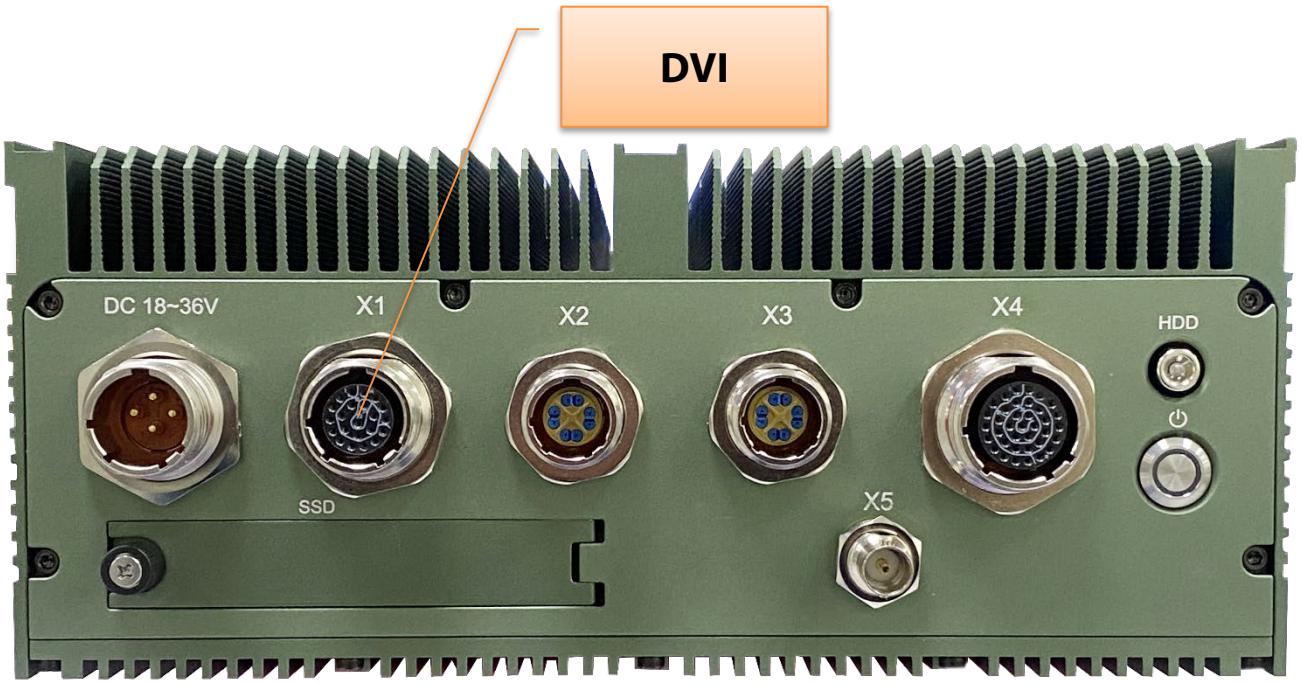
5-2. 1GbE LAN & RS232

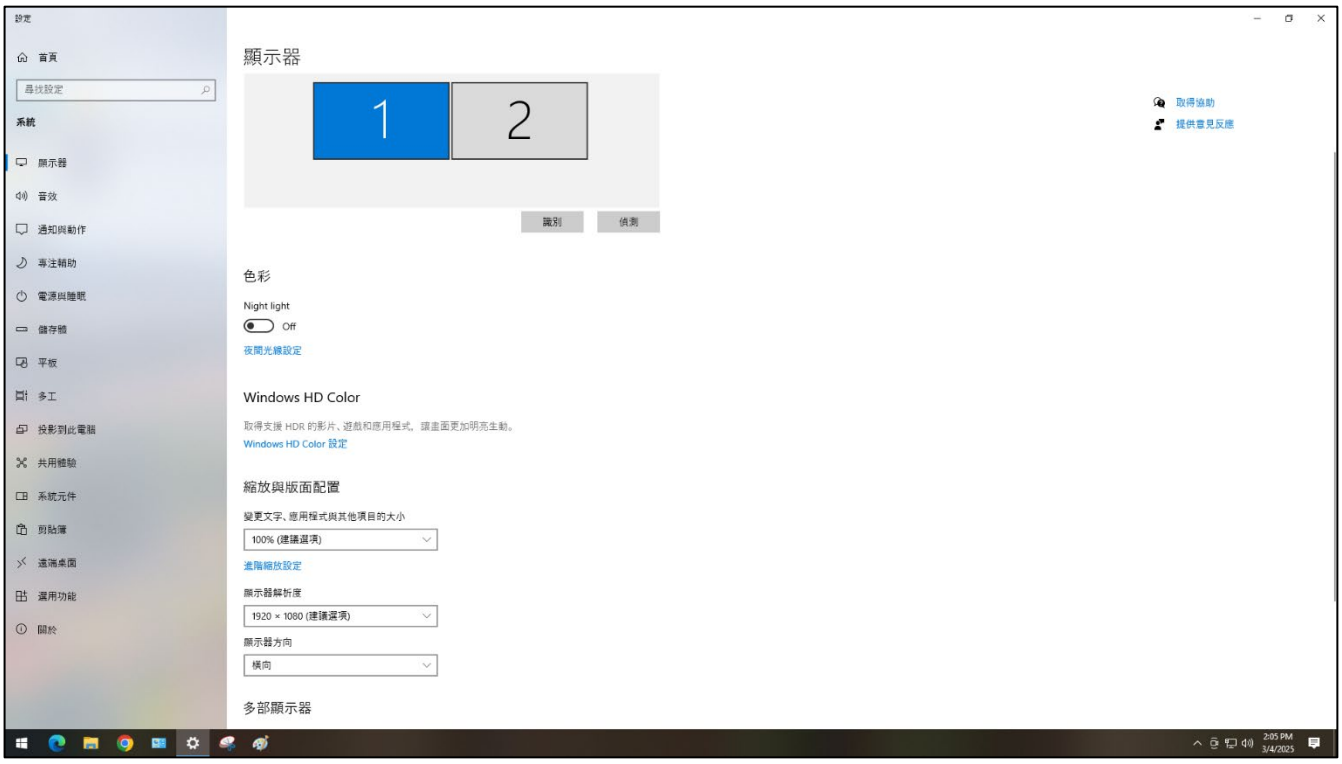


LAN Speed Test Result: Pass
LAN Data-Packet Test Result: 0 Lost (0% loss)


X4_RS232
BurnInTest V9.0 Pro (1010)
File Edit Configuration Test Quick Tests Help
Dashboard System Information Event Log Temperature
Current configuration
STOP
Start time:
Stop time: -
Duration:
Serial Port 1 Test
Serial Port: COM1
Test speed: 115200 bits/sec
Bytes sent: 70198300
Bytes received: 70198200
Errors: 0
Throughput: 10627.1 Bytes/sec
Serial Port 2 Test
Serial Port: COM2
Test speed: 115200 bits/sec
Bytes sent: 69900600
Bytes received: 69900600
Errors: 0
Throughput: 11082.6 Bytes/sec
RUNNING (0 Errors)
Ready

5-3. DVI Port


DVI
DC 18~36V
X1
X2
X3
X4
HDD
SSD
X5


設定
首頁
尋找設定
系統
顯示器
音效
通知與動作
專注輔助
電源與睡眠
儲存體
平板
多工
投影到此電腦
共用體驗
系統元件
剪貼簿
遠端桌面
選用功能
關於
顯示器
1
2
識別
偵測
取得協助
提供意見反應
色彩
Night light
Off
夜間光線設定
Windows HD Color
取得支援 HDR 的影片、遊戲和應用程式，讓畫面更加明亮生動。
Windows HD Color 設定
縮放與版面配置
變更文字、應用程式與其他項目的大小
100% (建議選項)
進階縮放設定
顯示器解析度
1920 × 1080 (建議選項)
顯示器方向
橫向
多部顯示器

5-4. SDI Port

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