



# SCH-X403

## Micro-Grid Computer THERMAL TEST REPORT

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**Test Report**

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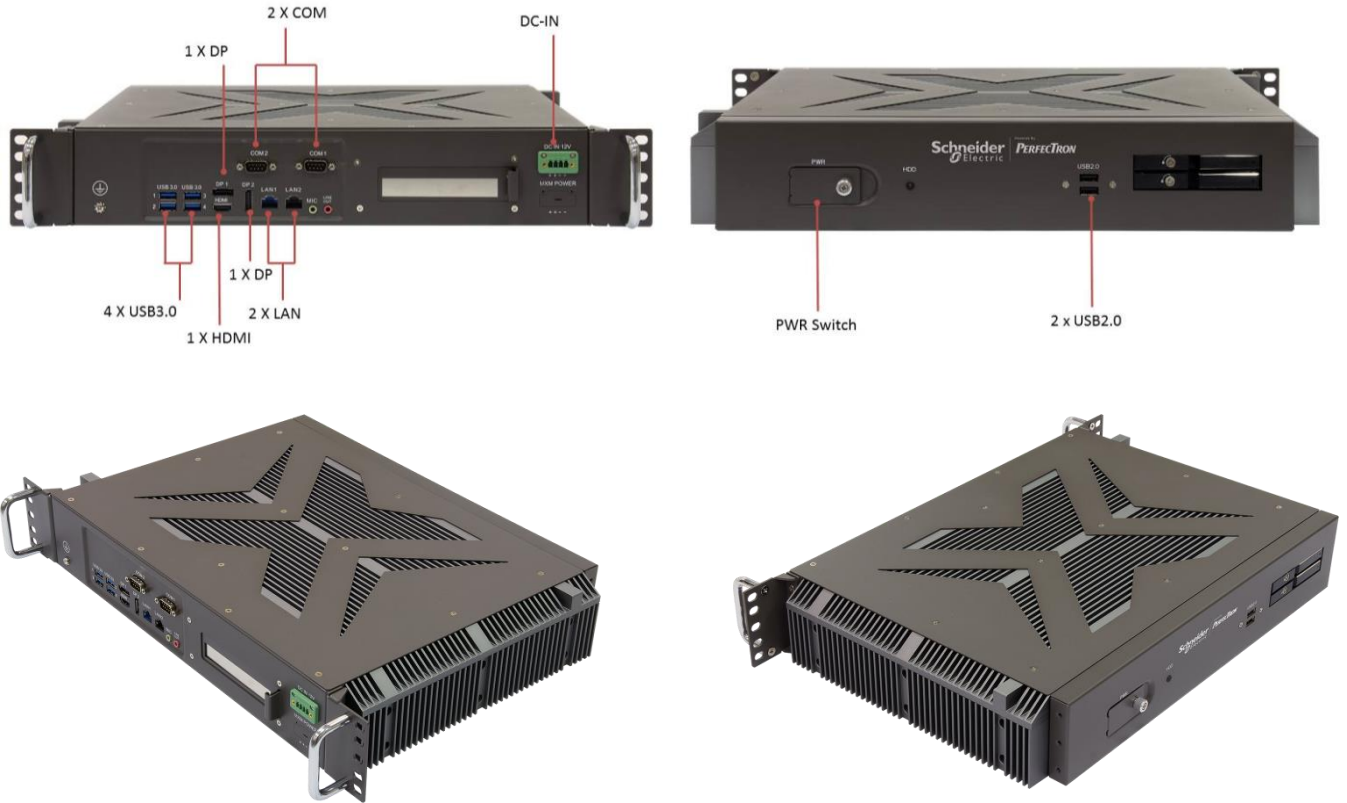
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## 1. SYSTEM SPEC

### 1-1. PRODUCT PHOTOS



### 1-2. SYSTEM COBFIGURATION

System Configuration	
Motherboard	ASROCK IMB-1222
CPU	Intel® Core™ i7-10700TE
Memory	SAMSUNG DDR4-2666 32G SODIMM(ET)
SATA port1	S11 2.5' 128G Gold F/WSBFM61.3
SATA port2	NA
LAN1	Intel I225LM with 10/100/1000/2500Mbps
LAN2	Intel I219LM with 10/100/1000/2500Mbps

## 2. Test Plan

### 2-1. Thermal Measurement Process

<b>Test Purpose</b>	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																																
<b>Test Equipment</b>	1. KSON THS-B4T-150 Chamber 2. YOKOGAWA MV1000, Thermometer (FLUKE50D K/J) 3. Infrared thermal imaging camera Model TVS-200EX																																
<b>Quantity Tested</b>	Minimum 1 Set																																
<b>Test Software</b>	Passmark Burn-In Test under Windows 10																																
<b>Test Procecedure</b>	1. Thermal pre-scan measurement: Temperature: -20~60°C / 40~60%RH Capture thermal IR photo for whole boards after the EUT execute passmark burn-in test with 100% lading during 1 hour at least. 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 windows environment to run Max Power Test + 3DMARK 2003 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 components to its' operating temperature range listed in specification/approval sheet of each measured component																																
<b>Test diagram of curves</b>	Environment defines for 8 hours <table border="1"> <caption>Temperature Profile Data</caption> <thead> <tr> <th>Time (h)</th> <th>Temperature (°C)</th> </tr> </thead> <tbody> <tr><td>0</td><td>25</td></tr> <tr><td>1.5</td><td>25</td></tr> <tr><td>3</td><td>-20</td></tr> <tr><td>4.5</td><td>-20</td></tr> <tr><td>5</td><td>-10</td></tr> <tr><td>6.5</td><td>-10</td></tr> <tr><td>8</td><td>40</td></tr> <tr><td>9.5</td><td>40</td></tr> <tr><td>10</td><td>50</td></tr> <tr><td>11.5</td><td>50</td></tr> <tr><td>12</td><td>55</td></tr> <tr><td>13.5</td><td>55</td></tr> <tr><td>14</td><td>60</td></tr> <tr><td>15.5</td><td>60</td></tr> <tr><td>16</td><td>25</td></tr> </tbody> </table>	Time (h)	Temperature (°C)	0	25	1.5	25	3	-20	4.5	-20	5	-10	6.5	-10	8	40	9.5	40	10	50	11.5	50	12	55	13.5	55	14	60	15.5	60	16	25
Time (h)	Temperature (°C)																																
0	25																																
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8	40																																
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11.5	50																																
12	55																																
13.5	55																																
14	60																																
15.5	60																																
16	25																																

## 2-2. SCH-X403 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
-20°C	PASS
0°C	PASS
25°C	PASS
40°C	PASS
50°C	PASS
60°C	PASS

#### 2-2-2. I/O FUNCTION

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

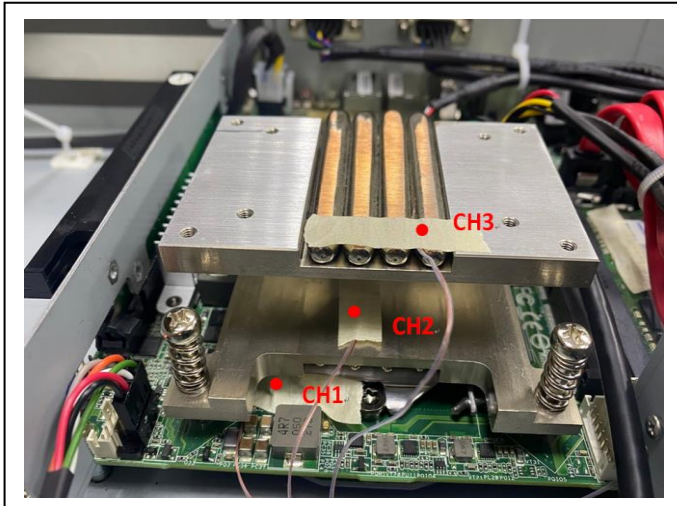
Item	Criteria	Result
USB3.0 *4	USB3.0 can use any USB device	PASS
	Loopback Plugs for USB 3.0 Trouble shooting and Testing	
USB2.0 *2	USB2.0 can use any USB device	PASS
	Loopback Plugs for USB 3.0 Trouble shooting and Testing	
DP/HDMI	Check work well	PASS
Line Out/Mic In	Check work well	PASS
COM1/COM2	Check work well	PASS

#### 2-2-3. LOW-TEMP. BOOT-UP

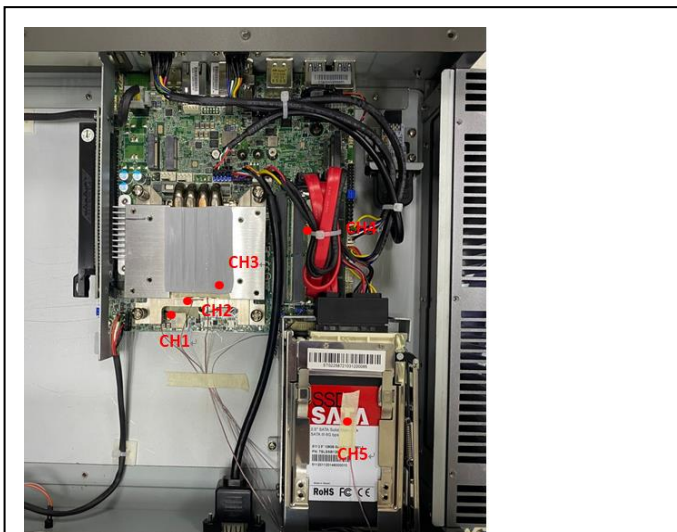
#Power supply under -20°C and ensure that the system boot up properly

Ambient Temp.	Test Result
-20°C	PASS

## 3. THERMAL TEST PHOTOS



CH1	CPU
CH2	CPU HEAT SINK
CH3	CPU TOP HEAT SINK

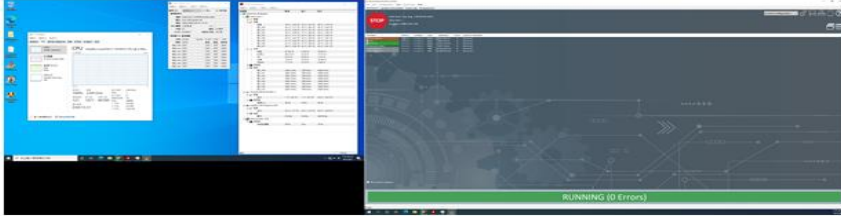


CH4	DRAM1
CH5	SSD
CH6	TOP HEAT SINK



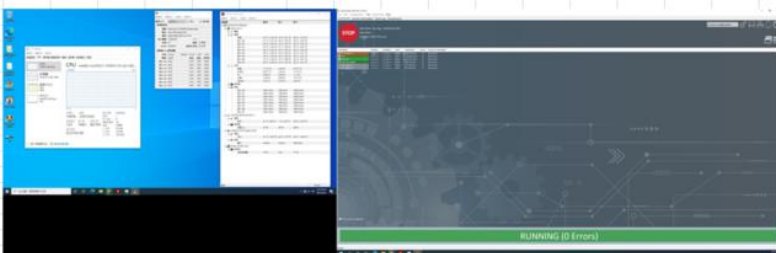
## 4. PHOTO IN LAB

### - Chamber in -20°C



TEST POINT NO.	Temp.	-20°C
CPU FRQ.		3.69GHz
CPU TJ.		39
1	CPU	17.1
2	CPU HEAT SINK	9.1
3	CPU TOP HEAT SINK	0.4
4	DRAM1	23.5
5	SSD	-6
6	TOP HEAT SINK	-10.9

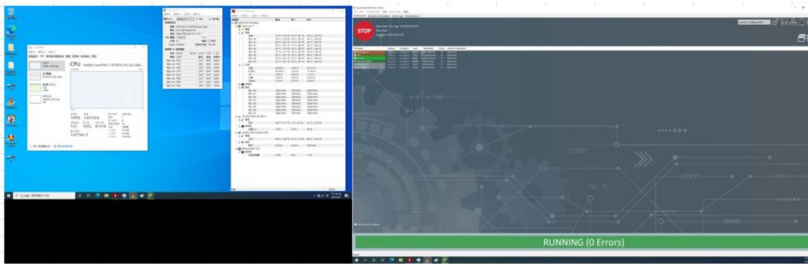
### - Chamber in 0°C



TEST POINT NO.	Temp.	0°C
CPU FRQ.		3.69GHz
CPU TJ.		57
1	CPU	33.5
2	CPU HEAT SINK	26.1
3	CPU TOP HEAT SINK	23.2
4	DRAM1	44.6
5	SSD	14.6
6	TOP HEAT SINK	9.9

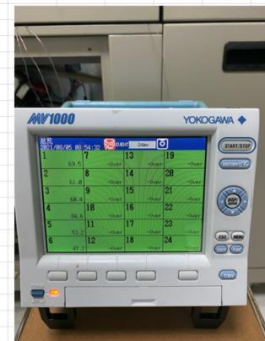
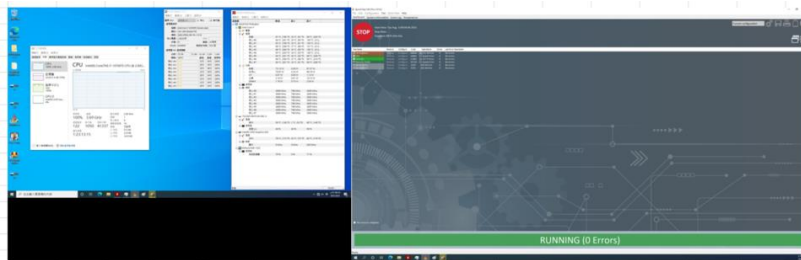
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## - Chamber in +25°C



TEST POINT NO.	Temp.	25°C
CPU FRQ.		3.69GHz
CPU TJ.		79
1	CPU	58.6
2	CPU HEAT SINK	50.1
3	CPU TOP HEAT SINK	48.7
4	DRAM1	70.1
5	SSD	38.4
6	TOP HEAT SINK	33.6

## - Chamber in +40°C

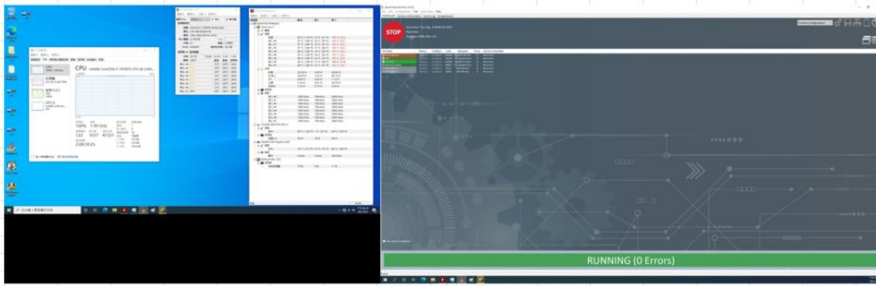


TEST POINT NO.	Temp.	40°C
CPU FRQ.		2.73Ghz
CPU TJ.		75
GPU FRQ.		1.1Ghz
GPU TJ.		63.4
1	CPU	70.3
2	DRAM A1	61
3	10G LAN X722 CHIP	58.7
4	TOP HEAT SINK 1	56.9
5	TOP HEAT SINK 2	50.6
6	GPU	62..3
7	GPURAM	59.2
8	GPU MOS	61.6
9	SK711 CHIP	57.4
10	U.2NVME	50.5
11	SSD 1	75.8
12	SSD 2	82.1



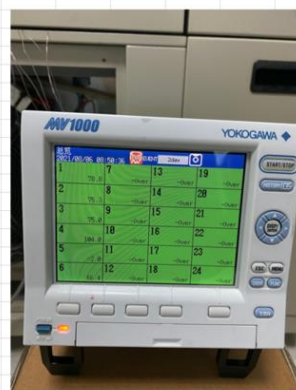
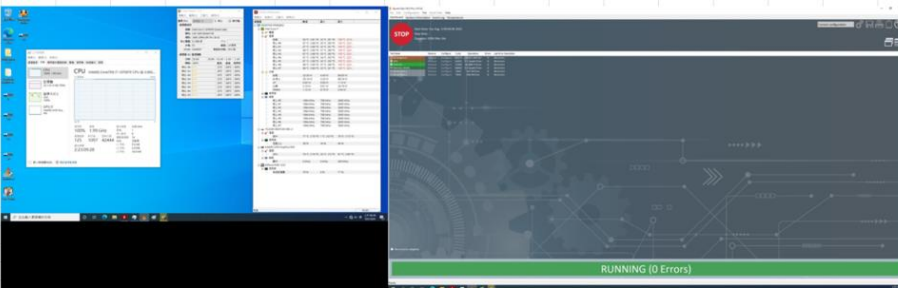
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## - Chamber in +50°C



TEST POINT NO.	Temp.	50°C
CPU FRQ.		1.99GHz
CPU TJ.		82
1	CPU	78.7
2	CPU HEAT SINK	69
3	CPU TOP HEAT SINK	69
4	DRAM1	93.9
5	SSD	62.9
6	TOP HEAT SINK	56.1

## - Chamber in +60°C



TEST POINT NO.	Temp.	60°C
CPU FRQ.		1.99GHz
CPU TJ.		83
1	CPU	78.8
2	CPU HEAT SINK	75.3
3	CPU TOP HEAT SINK	75
4	DRAM1	104
5	SSD	NA
6	TOP HEAT SINK	66.4

## Low Temperature SYSTEM Boot up Test - Ambient Temp. -20°C



## 5. SCH-X403 THERMAL TEST RESULT (-20~+60 DEGREE)

TEST POINT NO.	Temp.	-20℃	0℃	25℃	40℃	50℃	60℃
CPU FRQ.		3.69GHz	3.69GHz	3.69GHz	3.69GHz	1.99GHz	1.99GHz
CPU TJ.		39	57	79	91	82	83
1	CPU	17.1	33.5	58.6	69.5	78.7	78.8
2	CPU HEAT SINK	9.1	26.1	50.1	61	69	75.3
3	CPU TOP HEAT SINK	0.4	23.2	48.7	60.4	69	75
4	DRAM1	23.5	44.6	70.1	84.6	93.9	104
5	SSD	-6	14.6	38.4	53.2	62.9	NA
6	TOP HEAT SINK	-10.9	9.9	33.6	47.2	56.1	66.4