PERFECTRON

SCH401

PERFECTRON SYSTEM

RELIABILITY/ENVIRONMENT TEST PLAN

Product Manager	H/W Leader	System Engineer	Testing Engineer
Stanley	Jason	Darren	Marc

Version History			
Document Release	Date	Change Item	Remarks
V1.0	**7/19/2021**	**Preliminary release**	

System Configuration	
Motherboard	SUPERMICRO X12SCZ-F
CPU	Intel® Core™ i9-10900TE Processor 1.8 GHz
PCH	Intel W480
Memory	InnoDisk 8GB SOD DDR4 2133
SATA port1	SSD 1TB
LAN1	Intel® i219 LM GbE LAN
LAN2	Intel® i210 GbE LAN

System Test Items Configuration _ Test Results Definition				
No.	Test Item	Qty	System Sample	
			No.1	Remark
1.	DC Input Voltage Function Test	1	**PASS**	
2.	IO Function Test	1	**PASS**	
3.	Operation System & Drivers Test	1	**PASS**	
4.	Power Consumption	1	**PASS**	
5.	I/O Integrated Stress Test	1	**PASS**	
6.	Temperature Alternate Operation Test	1	**PASS**	
7.	High Temperature Operating Test	1	**PASS**	
8.	High Temperature and Humidity Operating Test	1	**PASS**	
9.	Low Temperature Operation Test	1	**PASS**	
10.	High Temperature Power ON/OFF Test	1	**PASS**	
11	Low Temperature Power ON/OFF Test	1	**PASS**	
12	Thermal Measurement	1	**PASS**	

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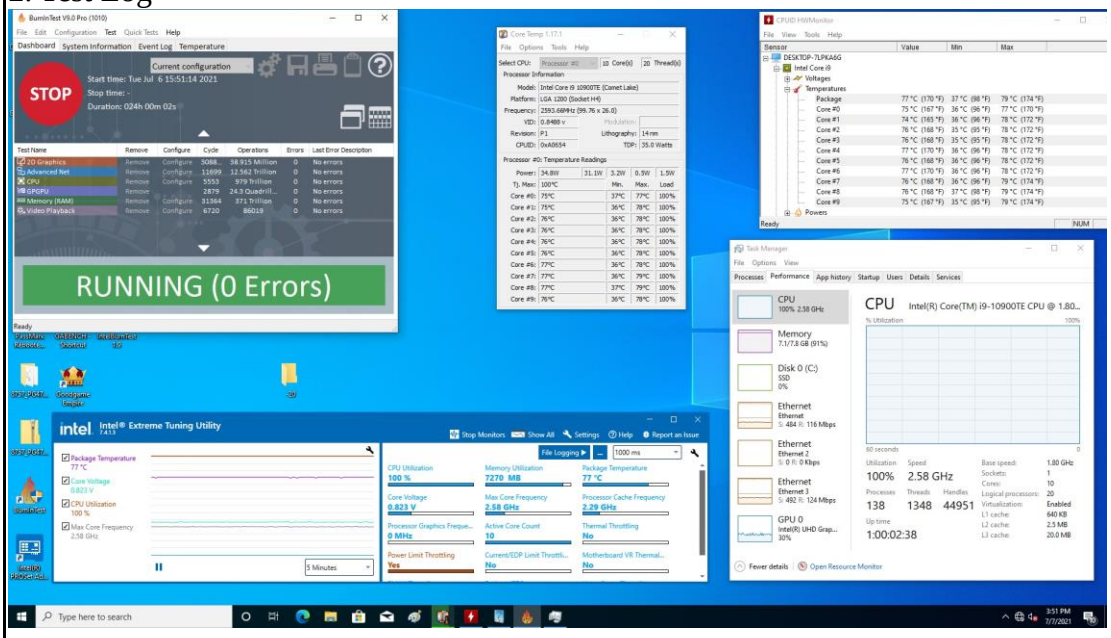
System Reliability/Environment Test table of Contents

1. DC Input Voltage Fluctuation Test

Test Purpose	To evaluate the influence on the EUT under voltage fluctuation from the DC power Source	**Test Result**	**PASS**
Test Equipment	DC power source: GWINSTEK PSW 80-13.5 Passmark USB3.0 Plug		
Quantity Tested	Minimum 1 Set		
Test Condition	Test Software: Passmark BURN-IN Test Program under Microsoft Windows 10 Test Procedure: 1. Adjust DC power source to upper limit (VDC+5%) 2. Turn on the system and perform the function test with 100% loading for a period of 1 hour at least 3. Check the functions of the system and record it 4. Change DC power source to lower limit (VDC-5%) 5. Repeat steps 2~3		
Test Criteria	All units must be pass 1 hour Burn-In test program, without any error occur. The EUT must be no damage or safety problem occurred.		

Test Log / Photo	1. DC power Adaptor  2. Test Log 

2. IO Function Test

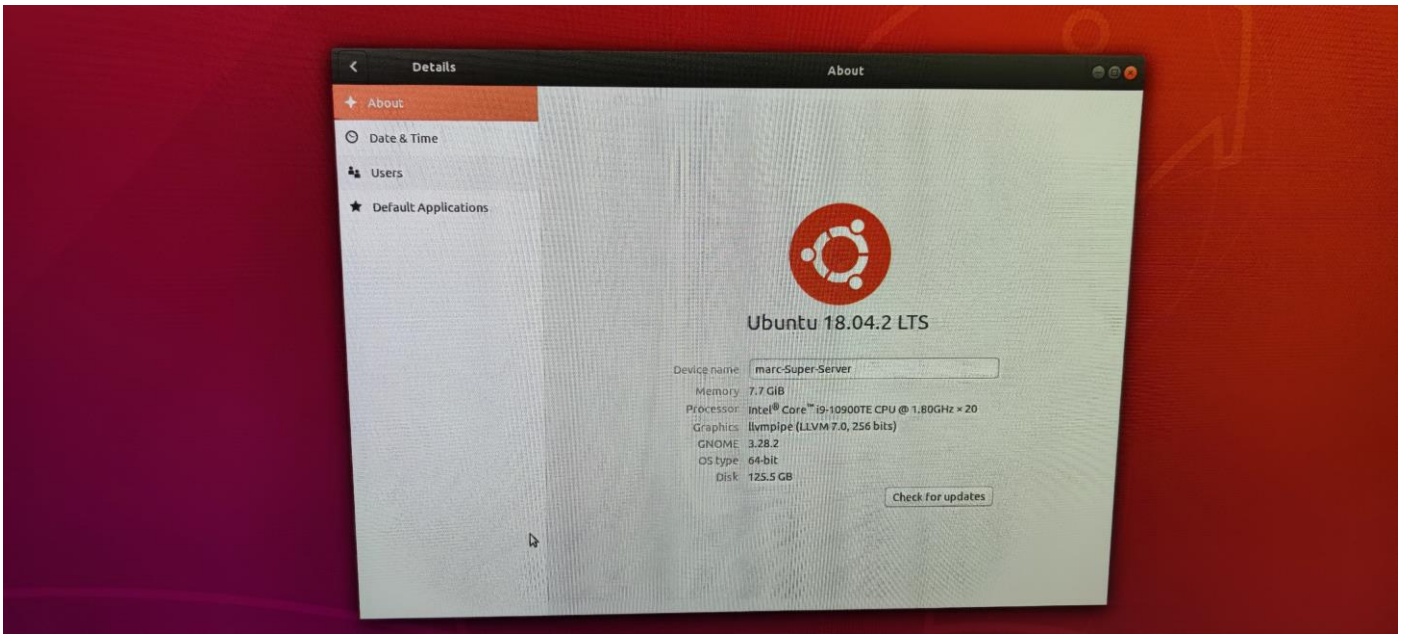
Item		Criteria	Result	Note
SATA Port 1		SATAIII Onboard SSD device Run PassMark 20 minutes with all disks	Pass	
USB1		can use any USB device	Pass	
		Loopback Plugs for USB 2.0 Trouble shooting and Testing	Pass	
USB2		can use any USB device	Pass	
		Loopback Plugs for USB 2.0 Trouble shooting and Testing	Pass	
USB1		can use any USB device	Pass	
		Loopback Plugs for USB 3.0 Trouble shooting and Testing	Pass	
USB2		can use any USB device	Pass	
		Loopback Plugs for USB 3.0 Trouble shooting and Testing	Pass	
USB3		can use any USB device	Pass	
		Loopback Plugs for USB 3.0 Trouble shooting and Testing	Pass	
USB4		can use any USB device	Pass	
		Loopback Plugs for USB 3.0 Trouble shooting and Testing	Pass	
Display output	DP	Check work well	Pass	
	DP		Pass	
	DVI		Pass	
VGA		Check work well	Pass	
LAN port1		Intel i219 LAN Function Test	Pass	
LAN port2		Intel i210 LAN Function Test	Pass	
IPMI		Check work well	Pass	
Power SWITCH		Check work well	Pass	
Power Led		Check work well	Pass	
HDD Led		Check work well	Pass	
LAN1/LAN2 LED		Check work well	Pass	
DC in		Check work well	Pass	

Operation System & Drivers Test

Publisher	Package & Version	DUT-1	**Note**
Microsoft OS	UEFI boot	Pass	
Microsoft OS	Microsoft Windows 10 64Bit	Pass	
Linux	Ubuntu18.04	Pass	

Driver and Application software	**Version / Details**	DUT-1	**Note**
INF	10.1.18415	Pass	
VGA	27.20.100.8336	Pass	
LAN	25.0.0.0	Pass	
ME	14.0.39.1339	Pass	
ASPEED	9.0.10.102		

UBUNTU18.04



Display Function Test

DP Test							
Test Method	1. Use 800x600 1024x768 1280x720(or highest solution) and 16&32 bit to test display correctly. 2. Check display with test pattern 3. check display can nothas any cross-color, water wave, and ghost.						
resolution	800x600, 60Hz	800x600, 75Hz	1024x768, 60Hz	1024x768, 75Hz	1280x720, 60Hz	1280x720, 75Hz	1920x1080, 60Hz
DP1	PASS	PASS	PASS	PASS	PASS	PASS	PASS
DP2	PASS	PASS	PASS	PASS	PASS	PASS	PASS
DVI	PASS	PASS	PASS	PASS	PASS	PASS	PASS
VGA	PASS	PASS	PASS	PASS	PASS	PASS	PASS

	Resolution test		
Monitor Model	ASUS 27” PB278Q , Maximum resolution：2560 x 1440 ASUS 23” PA238 , Maximum resolution：1920 x 1080		
Resolution	**DP1**	**DP2**	**DVI**
1024 x 768	✓	✓	✓
1280 x 1024	✓	✓	✓
1366 x 768	✓	✓	✓
1920 x 1080	✓	✓	✓
1920 x1200	✓	✓	✓
2560 x 1440	✓	✓	✓

4. Power Consumption

Test Purpose	To measure power consumption of the EUT during operation/suspend mode/power off mode
Quantity Tested	Minimum 1 Set
Test Procedure	1. Turn on the power source and set the output voltage frequency following to the test specification 2. Connect the Power Meter between EUT and power source 3. Connect maximum quantity of external devices on all I/O (ex. USB, COM, etc…), and have the full loading status on each device 4. Turn on the EUT and set the EUT on each consumption mode 5. Measure and record the power consumption value shown on Power Meter as Watt
Test Criteria	1. The Max. power consumption value must not exceed the output ability of used power supply, the derating while in high temperature environment must also to be considered 2. By following the EuP LOT 6 requirement, the power consumption of the standby mode is limited 1.0 Watt (for w/o WOL model) and 1.7Watt (for w/ WOL model)

Item	**Device Information (Full load)**
CPU	Intel® Core™ i9-10900TE Processor 1.8 GHz
PCH	Intel W480
Memory	InnoDisk 8GB SOD DDR4 2133
SATA port 1	SSD 1TB
DP	Dell U2312
LAN1 ~ LAN2	LAN (Loopback)
USB3~USB6	1A 水泥電阻
USB1~USB2	USB Keyboard & Mouse
Operating System	Windows 10 Professional 64-bit
Test Equipment	FSP060-DBAE1、PROVA 11_AC/DC mA clamp meter、Agilent U1252B
Test Software	Burnin test v9.0、、IntelBurnTest 1.9 XTU CPU STRESS,FU MARK

Power Measure (Full loading)

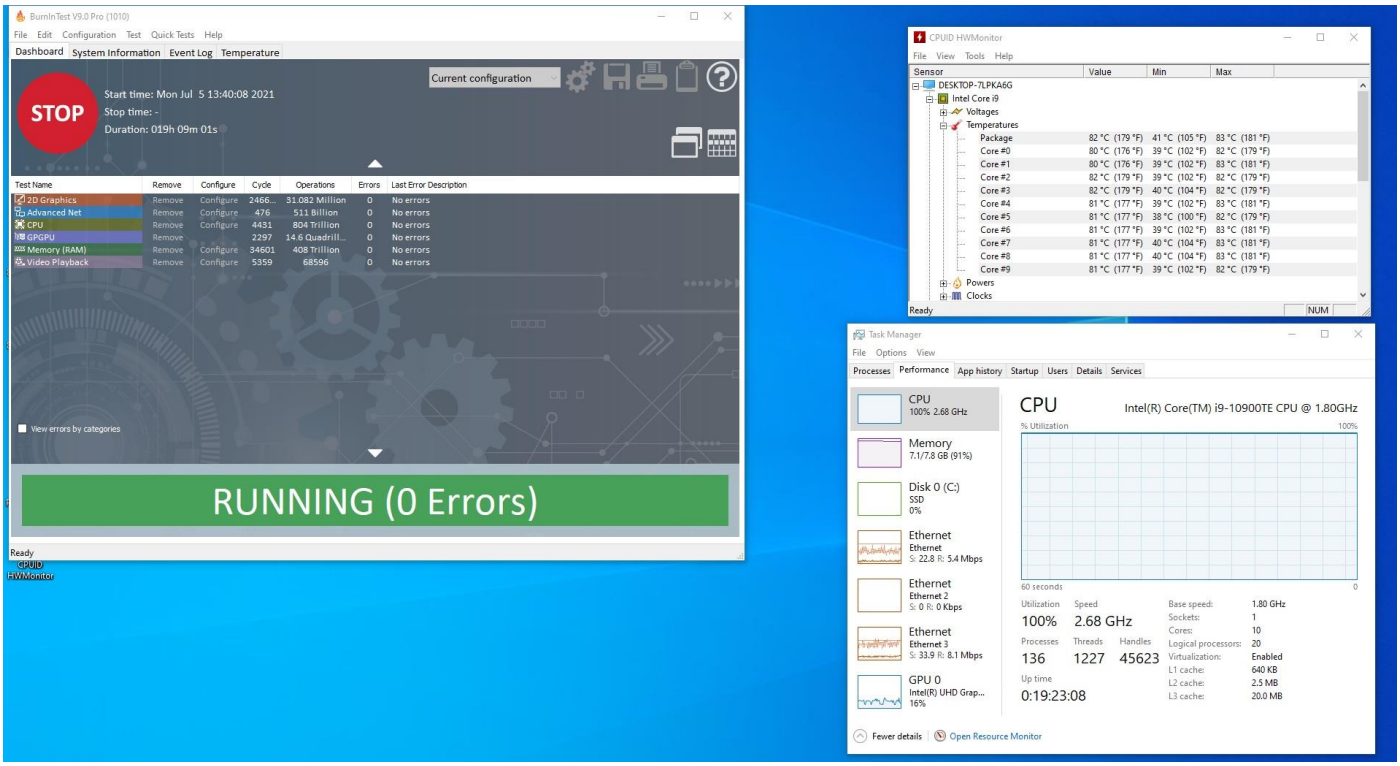
Model	Test Voltage	Voltage	Current	Power consumption
I9-10900TE	70V DC	69.96V DC	2.34A	163.7W

Power Measure (Hearvy load)								
Item	Voltage/ Condition	Win Idle	S3	S4	S5	Current	Power consumption	Note
Core I9-10900TE Processor	70 V	0.27A	0.11 A	0.11A	0.11 A	1.16 A	81.2W	

5. I/O Integrated Stress Test

System configuration					
CPU	Intel® Core™ i9-10900TE Processor 1.8 GHz				
RAM1	InnoDisk 8GB SOD DDR4 2133				
O.S.	Windows 10 SP1 Ultimate Edition 64bit				
Temperature	Room temperature				
Testing Utility and preference					
Test Software		**Test Preference**	**Test Time(Hours)**	**Result**	**Note**
PASSMARK BrunIn test (9.0)		Reference below setting	**12**	PASS	
Test item	**Loading (%)**	**Test preference**			
CPU	100	**Default preference:** **Select CPU test types:** General purpose instructions, Floating Point Unit instructions, Prime number test **Extension instructions:** MMX, 3DNow!, SSE, SSE2 **CPU affinity:** Normal task scheduling			
RAM	100	**Default preference:** **RAM test mode and test pattern:** Standard **Test:** Default(Cyclic)			
Com Port(s)	100	**Default preference:** **Detect and loopback test** **Send and receive timeout: 3500** **Port speed: 115200 Kbits/Sec**			
USB	100	**Default preference:** **USB3.0 device loopback**			
Video	100	**Default preference:** **Select video playback files:** C:\...\Clock.avi			
2D Graphics	100	**Default preference:** **2D Graphics Test:** All availiable Video Memory			
3D Graphics	100	**Default preference:** **Test window setup (Multiple monitorof testing): Number of:** 1(default) **Window placement:** Auto placement on primary monitor (default) **Window size:** 300x200 pixels (default)			
LAN port 1	100	LAN port Loopback			
LAN port 2	100	LAN port Loopback			

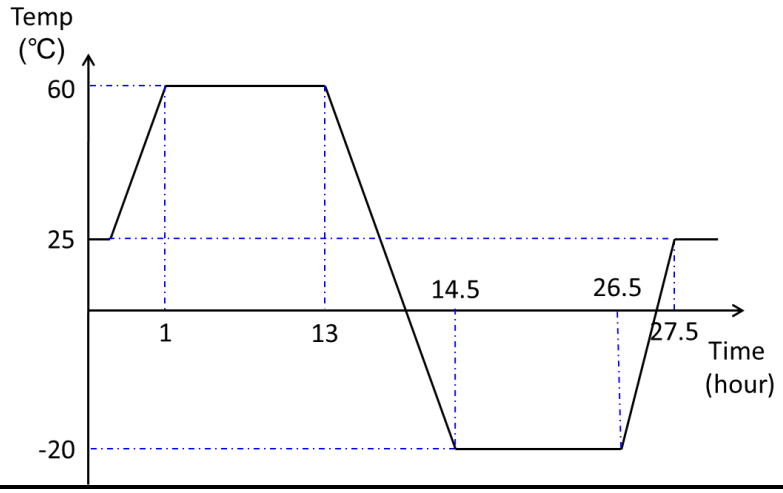
Test photo


BurnInTest V9.0 Pro (1010)
File Edit Configuration Test Quick Tests Help
Dashboard System Information Event Log Temperature
Current configuration
STOP
Start time: Mon Jul 5 13:40:08 2021
Stop time: -
Duration: 019h 09m 01s
Test Name Remove Configure Cycle Operations Errors Last Error Description
2D Graphics Remove Configure 2466... 31.082 Million 0 No errors
Advanced Net Remove Configure 476 511 Billion 0 No errors
CPU Remove Configure 4431 804 Trillion 0 No errors
GPGPU Remove 2297 14.6 Quadrill... 0 No errors
Memory (RAM) Remove Configure 34601 408 Trillion 0 No errors
Video Playback Remove Configure 5359 68596 0 No errors
View errors by categories
RUNNING (0 Errors)
Ready
CPUID HWMonitor
CPUID HWMonitor
File View Tools Help
Sensor Value Min Max
DESKTOP-7LPKA6G
Intel Core i9
Voltages
Temperatures
Package 82 °C (179 °F) 41 °C (105 °F) 83 °C (181 °F)
Core #0 80 °C (176 °F) 39 °C (102 °F) 82 °C (179 °F)
Core #1 80 °C (176 °F) 39 °C (102 °F) 83 °C (181 °F)
Core #2 82 °C (179 °F) 39 °C (102 °F) 82 °C (179 °F)
Core #3 82 °C (179 °F) 40 °C (104 °F) 82 °C (179 °F)
Core #4 81 °C (177 °F) 39 °C (102 °F) 83 °C (181 °F)
Core #5 81 °C (177 °F) 38 °C (100 °F) 82 °C (179 °F)
Core #6 81 °C (177 °F) 39 °C (102 °F) 83 °C (181 °F)
Core #7 81 °C (177 °F) 40 °C (104 °F) 83 °C (181 °F)
Core #8 81 °C (177 °F) 40 °C (104 °F) 83 °C (181 °F)
Core #9 81 °C (177 °F) 39 °C (102 °F) 82 °C (179 °F)
Powers
Clocks
Ready
NUM
Task Manager
File Options View
Processes Performance App history Startup Users Details Services
CPU
100% 2.68 GHz
Memory
7.1/7.8 GB (91%)
Disk 0 (C:)
SSD
0%
Ethernet
Ethernet
S: 22.8 R: 5.4 Mbps
Ethernet
Ethernet 2
S: 0 R: 0 Kbps
Ethernet
Ethernet 3
S: 33.9 R: 8.1 Mbps
GPU 0
Intel(R) UHD Grap...
16%
CPU
Intel(R) Core(TM) i9-10900TE CPU @ 1.80GHz
% Utilization
100%
60 seconds
0
Utilization
100%
Speed
2.68 GHz
Processes
136
Threads
1227
Handles
45623
Up time
0:19:23:08
Base speed: 1.80 GHz
Sockets: 1
Cores: 10
Logical processors: 20
Virtualization: Enabled
L1 cache: 640 KB
L2 cache: 2.5 MB
L3 cache: 20.0 MB
Fewer details
Open Resource Monitor

6. Temperature Alternate Operation Test

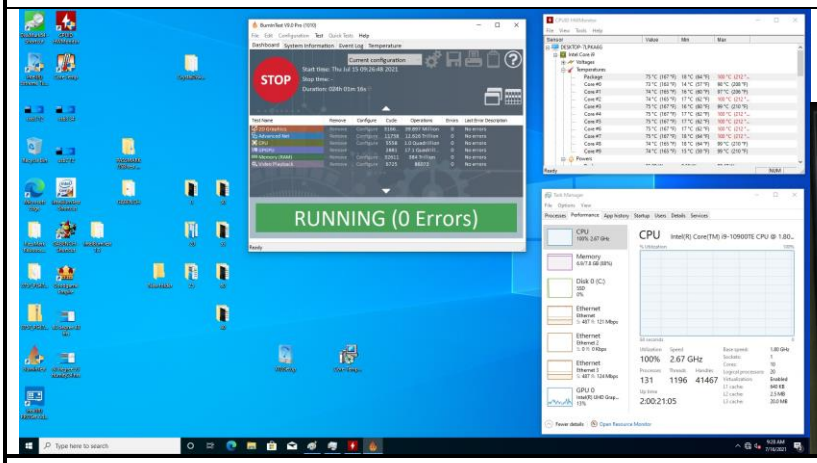
Device Model	SCH401	Test Result	PASS

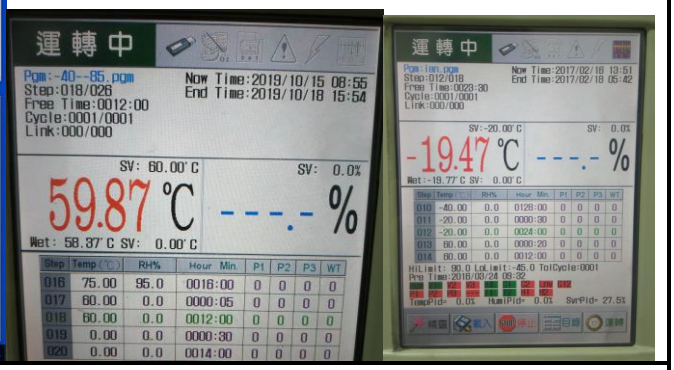
Diagram of curves



Test Temperature		Test Time
High	60℃	12h
Low	-20℃	12h
Test Standard	Reference IEC60068-2	
Test Software	Burnin test v9.0	

Test picture





Test procedure

1. This operation test is under temperature range -20℃ ~ 60℃
2. Standards is referred to IEC60068-2-14 Change of temperature
3. Have the subject inside the chamber and set up related cables.
4. Set up the temperature
5. If it's OK then rise up temperature to 60℃ and run Burnin test v9.0 for stress test
6. Keep unpowered subject for 12 hours on -20℃
7. Power on test and Perform minimum 3 power on/off cycles (to be sure that subject can reboot)
8. Observe the temperature and the subject in the test execution
9. Check the damage on the subject by visual and do function test

Note:

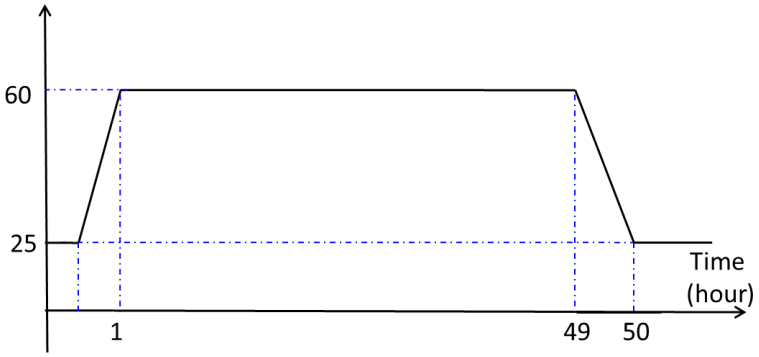
Electronic function check:
1. All system functions must be checked with appropriate testing programs and should pass the inspection.
2. Running Windows for OS, the system should not have degradation in its performance.

Mechanical function check:
1. The connectors and components should work properly without any interference.
2. All screws should be tightened up appropriately.

7. High Temperature Operating Test

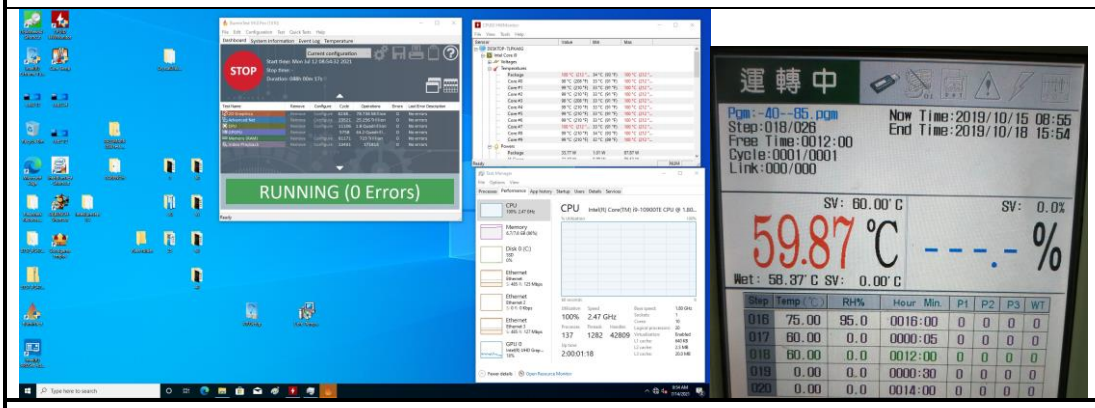
Device Model	SCH401	Test Result	PASS

Diagram of curves



Test Temperature		Test Time
High	60˚C	48Hours
Test Standard	Reference IEC-60068-2	
Test Software	Burnin test v9.0	

Test picture



Test procedure

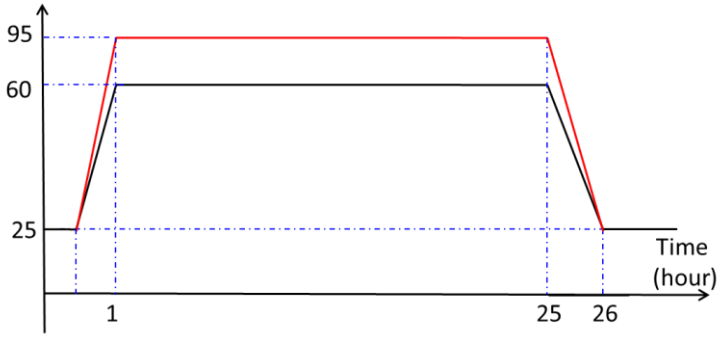
10. This operation test is under temperature range 25℃ ~ 60℃
11. Standards is referred to IEC60068-2-14 Change of temperature
12. Have the subject inside the chamber and set up related cables.
13. Set up the temperature
14. If it's OK then rise up temperature to 60℃ and run Burnin test v9.0 for stress test
15. Power on test and Perform minimum 3 power on/off cycles (to be sure that subject can reboot)
16. Observe the temperature and the subject in the test execution
17. Check the damage on the subject by visual and do function test

Note:

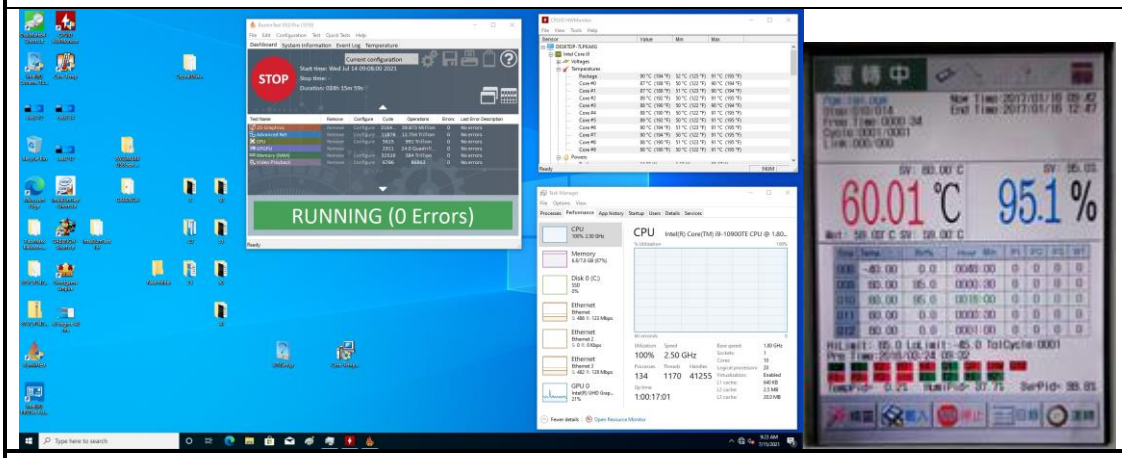
Electronic function check:
1. All system functions must be checked with appropriate testing programs and should pass the inspection.
2. Running Windows for OS, the system should not have degradation in its performance.

Mechanical function check:
1. The connectors and components should work properly without any interference.
2. All screws should be tightened up appropriately.

8. High Temperature and Humidity Operating Test

Device Model	SCH401	Test Result	PASS	
Diagram of curves		Test Temperature		Test Time
		High	60℃	24Hours
		Humidity	95%	
		Test Standard	Reference IEC60068-2	
		Test Software	Burnin test v9.0	

Test picture



Test procedure

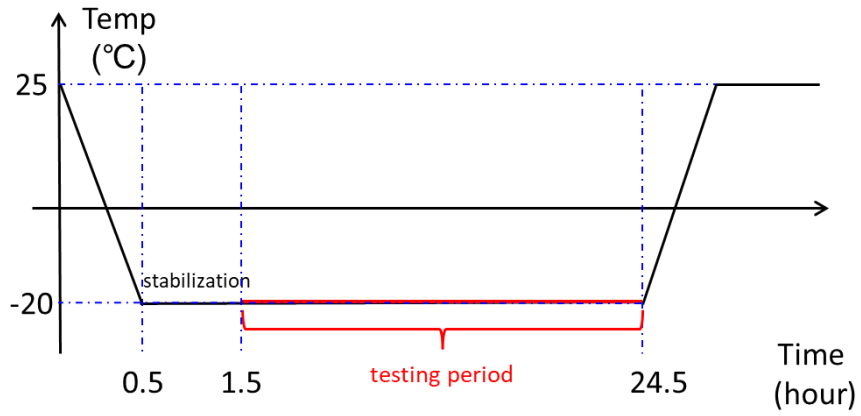
18. This operation test is under temperature range 25℃ ~ 60℃
19. Standards is referred to IEC60068-2-3 Change of temperature
20. Have the subject inside the chamber and set up related cables.
21. Set up the temperature
22. If it's OK then rise up temperature to 60℃ and run Burnin test v9.0 for stress test
23. Power on test and Perform minimum 3 power on/off cycles (to be sure that subject can reboot)
24. Observe the temperature and the subject in the test execution
25. Check the damage on the subject by visual and do function test
26. Humidity: 95%

Note:

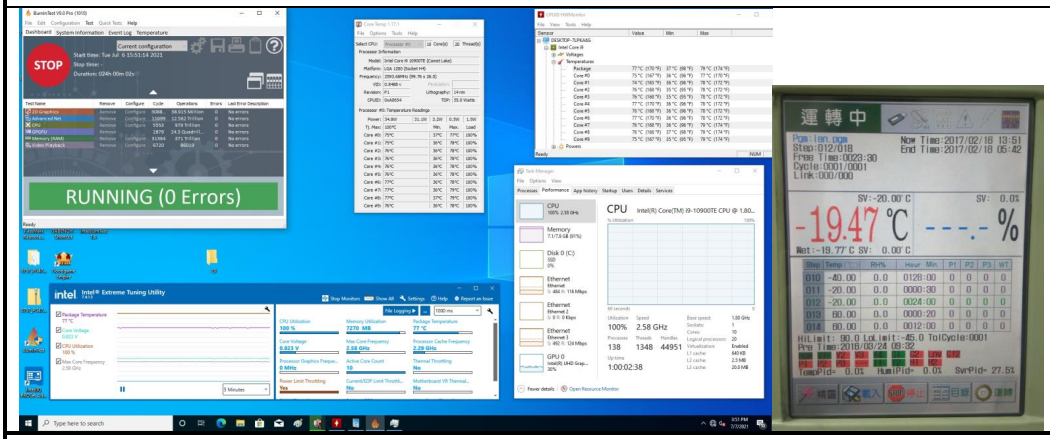
Electronic function check:
1. All system functions must be checked with appropriate testing programs and should pass the inspection.
2. Running Windows for OS, the system should not have degradation in its performance.

Mechanical function check:
1. The connectors and components should work properly without any interference.
2. All screws should be tightened up appropriately.

9. Low Temperature Operation Test

Device Model	SCH401	Test Result	PASS
Diagram of curves		Test Temperature	Test Time
		Low -20℃	24Hours
		Test Standard	Reference IEC60068-2
		Test Software	Burnin test v9.0

Test picture



Test procedure

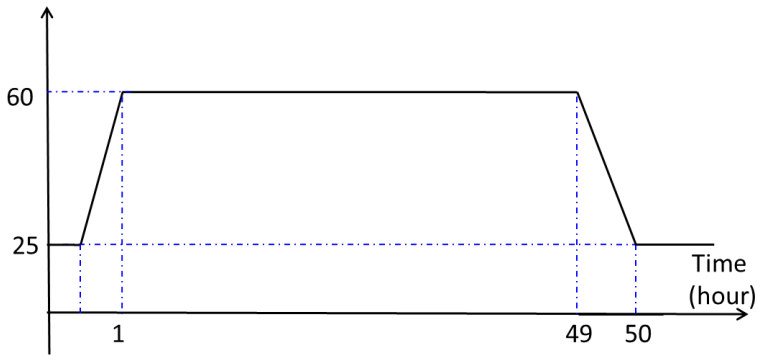
27. This operation test is under temperature range 25℃ ~ -20℃
28. Standards is referred to IEC60068-2-1 Change of temperature
29. Have the subject inside the chamber and set up related cables.
30. Set up the temperature
31. If it's OK then rise up temperature to -40℃ and run Burnin test v9.0 for stress test
32. Power on test and Perform minimum 3 power on/off cycles (to be sure that subject can reboot)
33. Observe the temperature and the subject in the test execution
34. Check the damage on the subject by visual and do function test

Note:

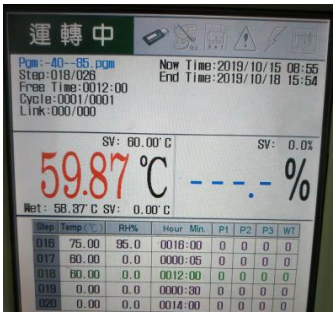
Electronic function check:
1. All system functions must be checked with appropriate testing programs and should pass the inspection.
2. Running Windows for OS, the system should not have degradation in its performance.

Mechanical function check:
1. The connectors and components should work properly without any interference.
2. All screws should be tightened up appropriately.

10. High Temperature Power ON/OFF Test

Device Model	SCH401	Test Result	PASS	
Diagram of curves		Test Temperature		Test Time
		High	60℃	8.33Hours
		Test Standard	Reference IEC60068-2	
		criteria	System can power on 10 times under high temperature On/off rule On → 10 minute/time Off → 40 minute/time Total: 50 minute/cycle	

Test picture



Test procedure

35. This operation test is under temperature range 25℃ ~ 60℃
36. Standards is referred to IEC60068-2-2 Change of temperature
37. Have the subject inside the chamber and set up related cables.
38. Set up the temperature
39. If it's OK then rise up temperature to 60℃ and DOS mode run counter.exe for test
40. Unpowered subject should be burn up to 70℃
41. Power on test and Perform minimum 3 power on/off cycles (to be sure that subject can reboot)
42. Observe the temperature and the subject in the test execution
43. Check the damage on the subject by visual and do function test

Note:

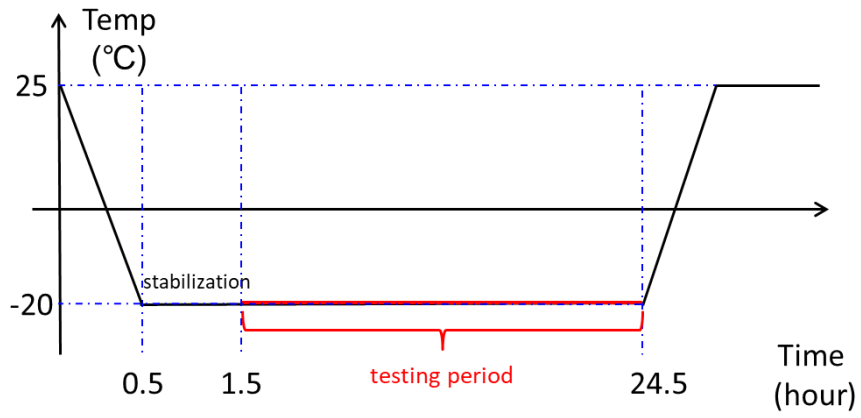
Electronic function check:
1. All system functions must be checked with appropriate testing programs and should pass the inspection.
2. Running Windows for OS, the system should not have degradation in its performance.

Mechanical function check:
1. The connectors and components should work properly without any interference.
2. All screws should be tightened up appropriately.

11. Low Temperature Power ON/OFF Test

Device Model	SCH401	Test Result	PASS

Diagram of curves



Test Temperature		Test Time
Low	-20˚C	7.5Hours
Test Standard	Reference IEC-60068-2	
Criteria	System can power on 10 times under low temperature On/off rule On → 10min/time Off → 40min/time Total: 50min/cycle	

Test picture

Test procedure

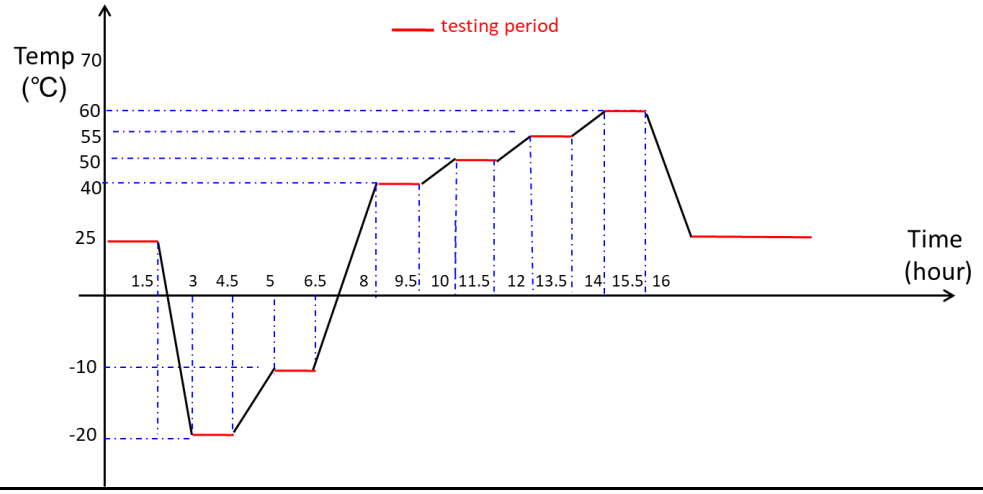
44. This operation test is under temperature range 25℃ ~ -20℃
45. Standards is referred to IEC60068-2-14 Change of temperature
46. Have the subject inside the chamber and set up related cables.
47. Set up the temperature
48. If it's OK then rise down temperature to -20℃ and DOS mode run counter.exe for test
49. Unpowered subject should be cool down to -20℃
50. Keep unpowered subject for four hours on -20℃
51. Power on test and Perform minimum 3 power on/off cycles (to be sure that subject can reboot)
52. Observe the temperature and the subject in the test execution
53. Check the damage on the subject by visual and do function test

Note:

Electronic function check:
1. All system functions must be checked with appropriate testing programs and should pass the inspection.
2. Running Windows for OS, the system should not have degradation in its performance.

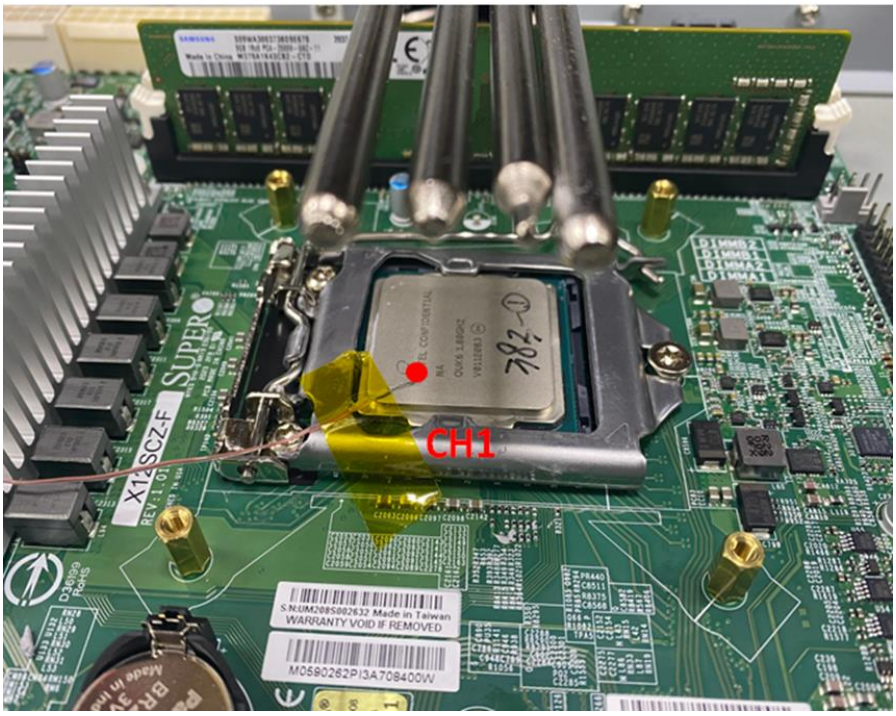
Mechanical function check:
1. The connectors and components should work properly without any interference.
2. All screws should be tightened up appropriately.

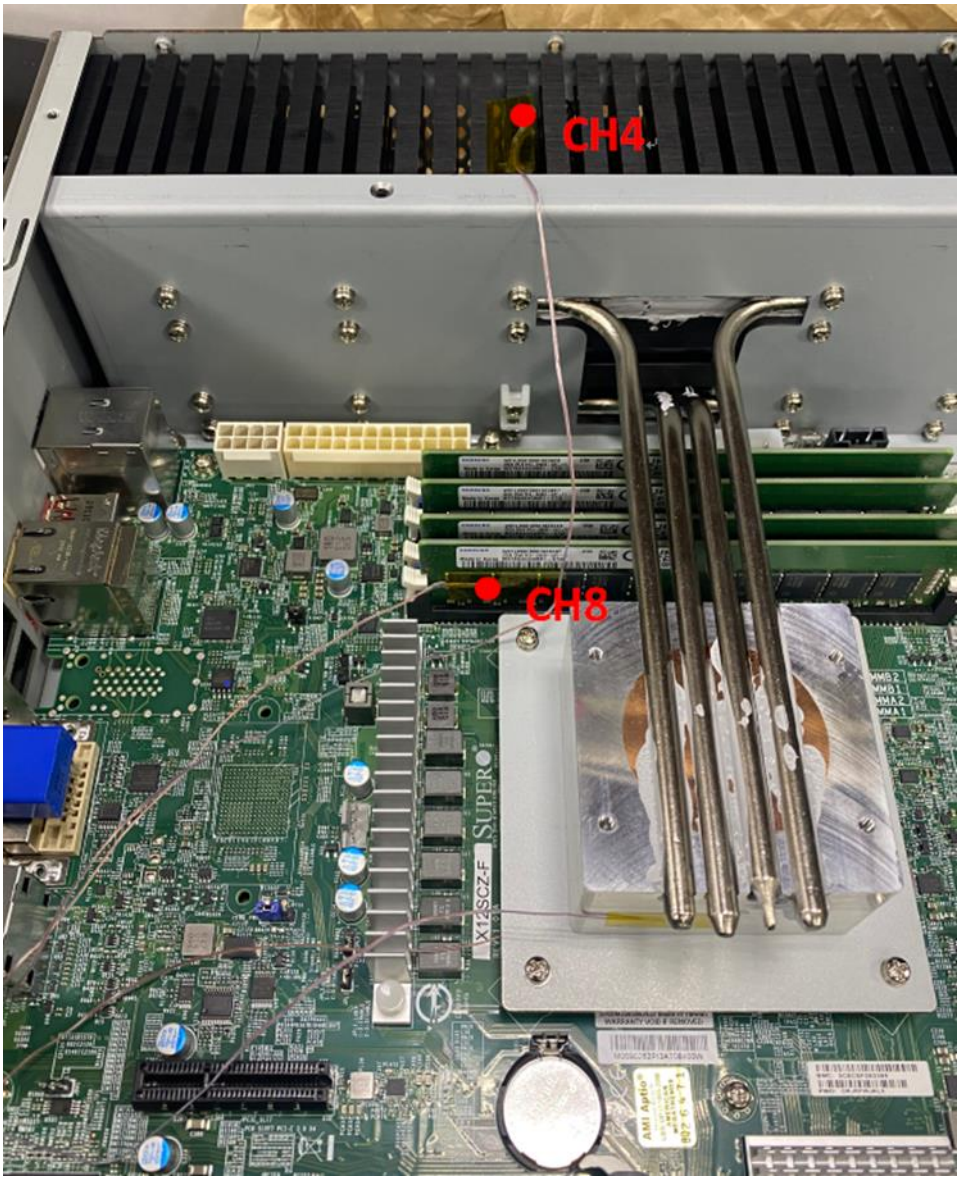
12. Thermal Measurement

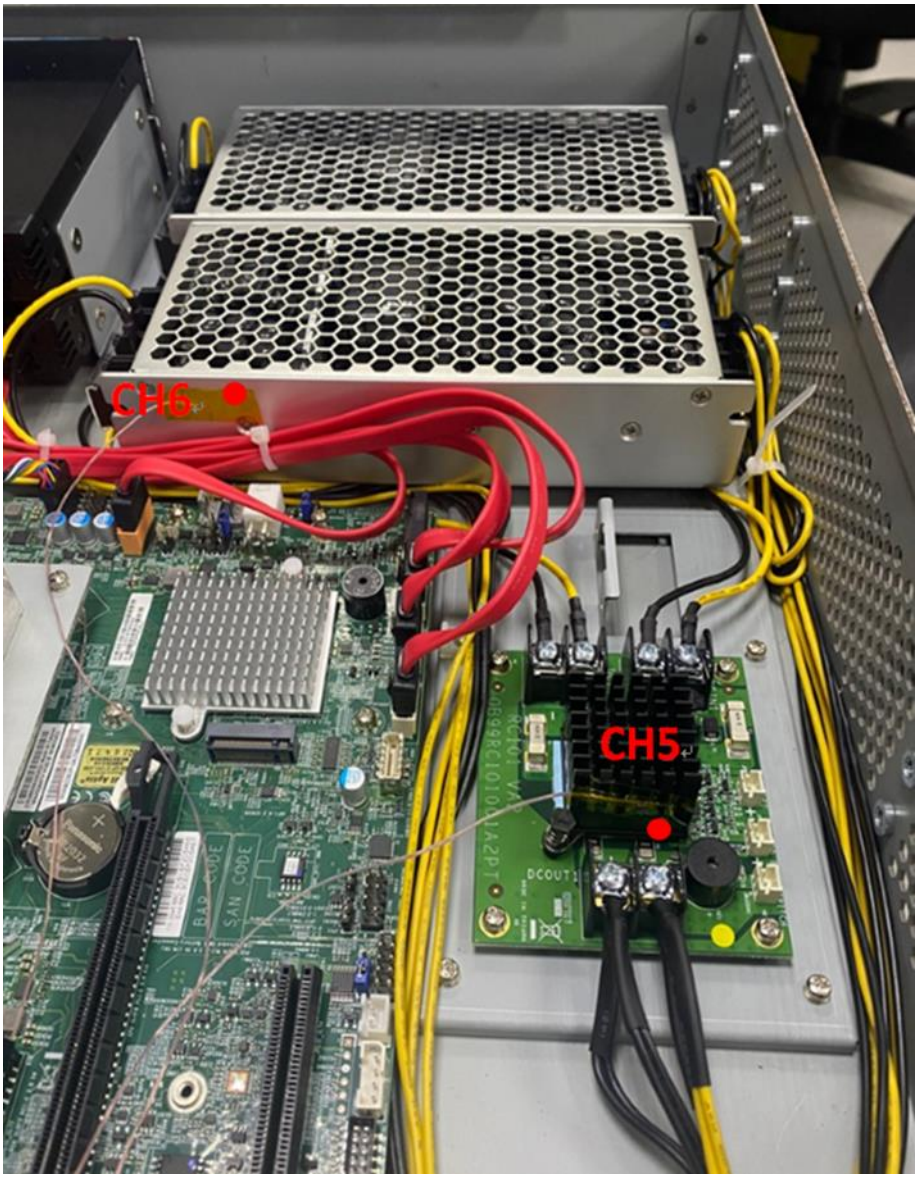
Test Purpose	The purpose of performing thermal profile test is to identify potential thermal problem of the EUT. And it is to aid products in reliability assessment considering that semiconductor failure rates rise rapidly with increasing junction temperature In case of systems cooling, patterns will 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. YOKOGAWA MV1000, Thermometer (FLUKE50D K/J) 3. Infrared thermal imaging camera Model TVS-200EX
Quantity Tested	Minimum 1 Set
Test Software	Passmark Burn-In Test under Windows 10
Test Procecedure	1. Thermal pre-scan measurement: Temperature: 24~26℃/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
Test diagram of curves	Environment defines for 8 hours 

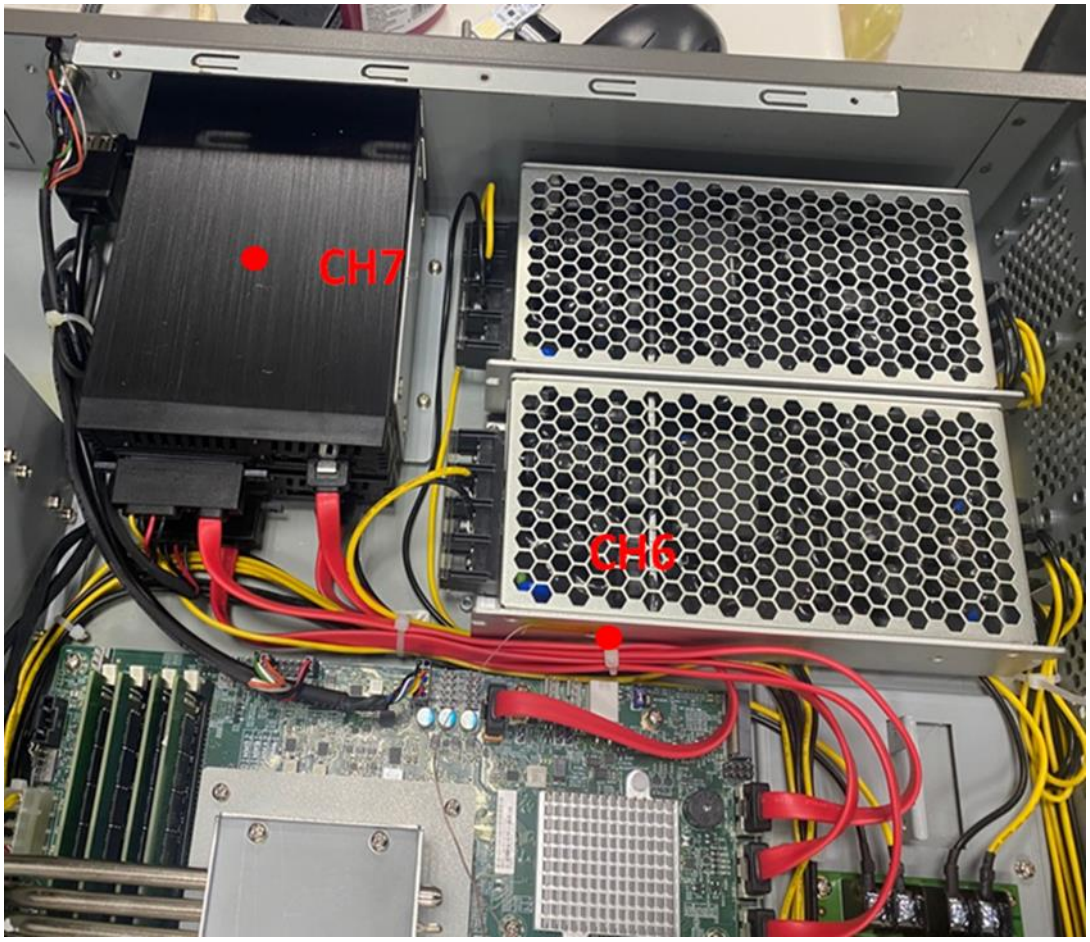
Test picture		

Thermal point




CH4
CH8
SUPER
X12SCZ-F


CH6
CH5


CH7
CH6

Test Result

Point		-20℃	0℃	25℃	50℃	55℃	60℃
CPU Frequency(GHz)		2.72	2.68	2.53	2.62	2.56	2.46
CPU T-J (℃)		10	30	78	90	95	100
1	CPU Die	6	26.6	66	77.1	82	86.2
2	CPU Heatsink	-7	17.5	54	64.8	68	73.6
4	CPU 旁 Heatsink	-2	12.2	49.5	60	64	69.7
5	RC101	-15	7.6	46.1	56.4	58	61.1
6	POWER	-10	11.9	47.2	57.5	60	64
7	SSD	26	48.6	48.3	55.6	57	61.1
8	RAM	10	30.9	69.1	80.4	85	89.3
I219 LAN 1000M/100M (Mb)		917	917	908	913	916	921
I210 LAN 1000M/100M (Mb)		945	945	948	943	944	944
SSD 1TB (Read/Write MB)		555/478	555/482	556/485	196/164	196/167	196/162