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ADVANTECH CO., LTD.

QA Test Report

CRIT40724STF4B1
(IT407-24ST)
(Product Reliability Test)

Report No. 21S229A0

Report Date: December 14, 2021

Caspar Liang	*Tim Chang*	*Focus Chang*
Manager of QA Department	**Approval**	**Test Engineer**

Advantech QA Laboratory
台北市內湖區陽光街365巷33號1樓
1F., No.33, Ln. 365, Yangguang St., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)
TEL: 886-2-2792-7818 FAX: 886-2-2794-7305
www.advantech.com.tw

Version History

Version	Date	Handled by	iDesign ID	Comments
A0	2021/12/14	Focus Chang	2741-025	First release for DVT.

Document Version Summary

Version	Description
A0	First release for DVT.

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Figures

1. ENVIRONMENT TEST

1.01 Temperature and Humidity Storage Test

Test Date: August 30~September 3, 2021
Test Site: Advantech QA Laboratory
Performed By: Focus Chang

1.01.1.01 Test Purpose:

Evaluate whether the functions are maintained in a stable condition in different environment condition.
- High relative humidity environment.
- Low-temperature environment.
- High-temperature environment.

1.01.1.02 Test Standard:

Please refer to the following documents:
1. IEC 60068-2-78:2012 Testing procedures Test Cab: Damp Heat Steady State Test
2. IEC 60068-2-1:2007 Testing procedures Test Ab: Cold Test
3. IEC 60068-2-2:2007 Testing procedures Test Bb: Dry Heat Test

1.01.1.03 Test Equipment:

1. Programmable temperature & humidity chamber
   K.SON Co. Ltd
   Model: THS-B4C-100
   S/N: 4035
   Date of Calibration: 2020/09/24
   Next Calibration date: 2021/09/23

1.01.1.04 Sample Configuration & Quantity Under Test:

Using two pieces CRIT40724STF4B1 with the following options installed:	
1. MB Rev.	PT2070-22 V1.2 A101-2
- CPU	ARM NUC972DF71YC ARM9 32bit 300MHz 128MB LQFP216
- RAM	IC LY62L51216 TSOPII-44 512K X 16 BIT
- S/N	07I27GXSB02924 (QA1) 07I27GXSB02930 (QA2)
2. Storage	IC MX30LF1G18AC-TI NAND 1Gb X8 TSOP 48P
3. Power	Cermate DPS-30W-DC24
4. Panel	7" LED PANEL 400N 800X480(G) PN:96LEDK-L070WV40NX1
5. Touch	7" 4W RTP Touch Panel (P4T-G20-007) PN:XKDT-5734

1.01.1.05 Test Condition:

1. Chamber temperature and humidity setup:
   1.1 Humidity condition
      1.1.1 Test Temperature: 60℃
      1.1.2 Test Humidity: 95%
      1.1.3 Dwell Time: 24Hrs
      1.1.4 Temperature gradient: 30℃/hr
   1.2 Low temperature condition
      1.2.1 Test ambient temperature: -40℃
      1.2.2 Operation dwell Time: 24Hrs
      1.2.3 Temperature gradient: 30℃/hr

1.3 High temperature condition
1.3.1 Test ambient temperature: 70℃
1.3.2 Operation dwell Time: 24Hrs
1.3.3 Temperature gradient: 30℃/hr

2. OS: Windows Embeded System V4.0

3. Test software: Specific test programs (Function check after testing)

Test Software as following
Cermate test program
#LCD
#Touch
#Network
#Serial port

4. Test Environment Curve Figure 1.01.1.01 ~ 1.01.1.03

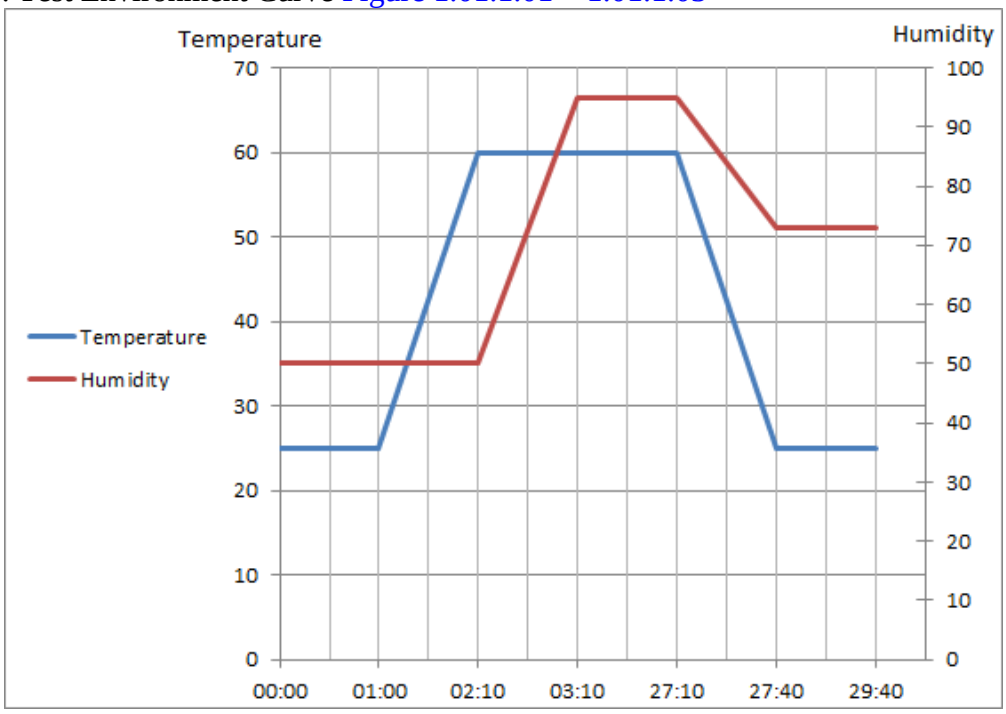


Figure 1.01.1.01 Humidity and temperature storage test curve

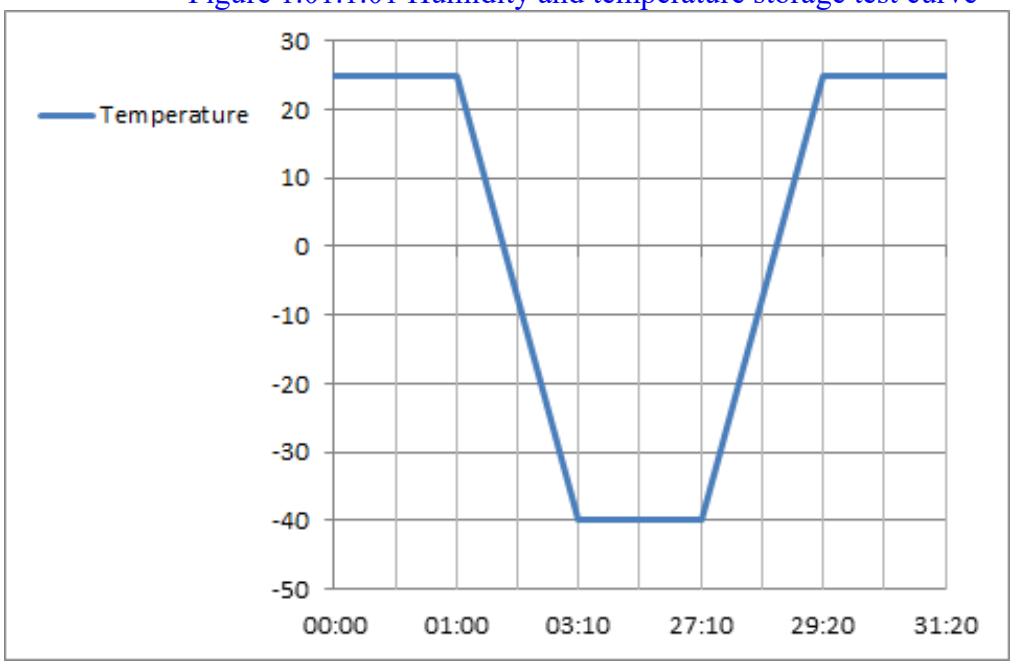


Figure 1.01.1.02 Low temperature storage test curve

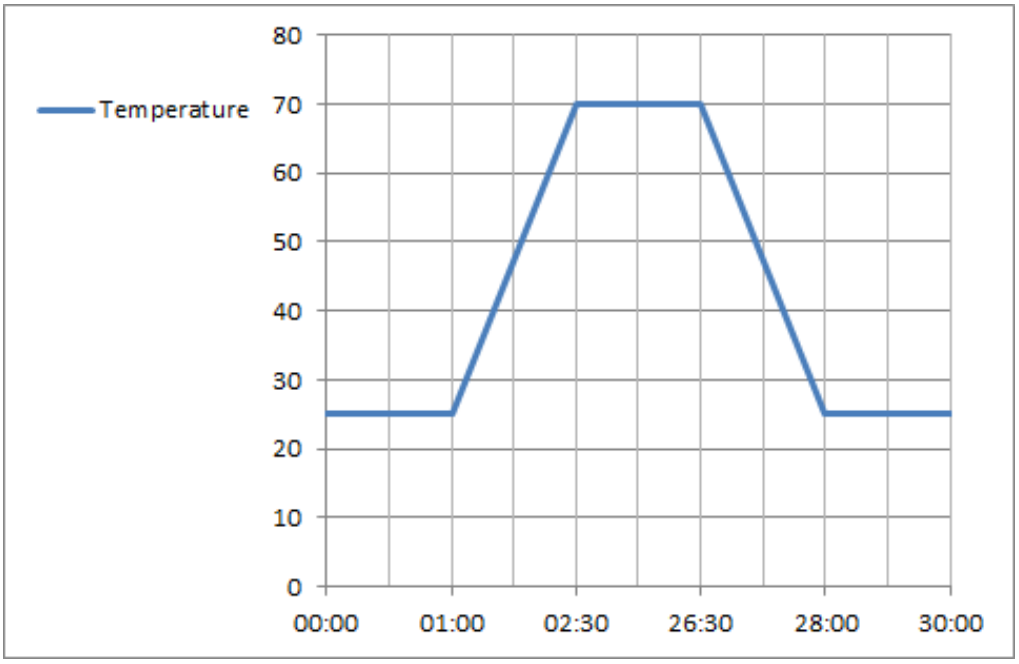


Figure 1.01.1.03 High temperature storage test curve

1.01.1.06 Test Procedure:

1. Humidity and temperature storage test
   - 1.1 Visual inspect the cosmetic mechanism and confirm the electrical functions at the room temperature and humidity.
   - 1.2 During the test, the system will be in storage mode.
   - 1.3 Set the chamber at 25℃ & 50% humidity and place the EUT in the chamber.
   - 1.4 Adjust the chamber temperature to the 60℃ & 95%±2% humidity; the temperature gradient should not be over 30℃/hr.
   - 1.5 Proceed to the 24 hours with 60℃ and 95%±2% humidity state.
   - 1.6 Adjust chamber to 25℃& 50% humidity, the temperature gradient should not be over 30℃/hr.
   - 1.7 After 2 hours visual inspect the cosmetic mechanism and power on the EUT then confirm the electrical functions.
2. Low temperature storage test
   - 2.1 Visual inspect the cosmetic mechanism and confirm the electrical functions at the room temperature and humidity.
   - 2.2 During the test, the system will be in storage mode.
   - 2.3 Set the chamber at 25℃ & 50% humidity and place the EUT in the chamber.
   - 2.4 Set chamber temperature to -40℃; the temperature gradient should not be over 30℃/hr.
   - 2.5 Proceed to the 24 hours test with low-temperature state.
   - 2.6 Adjust temperature to 25℃, the temperature gradient should not be over 30℃/hr. Humidity is not in control.
   - 2.7 After 2 hours visual inspect the cosmetic mechanism and power on the EUT then confirm the electrical functions.
3. High temperature storage test
   - 3.1 Visual inspect the cosmetic mechanism and confirm the electrical functions at the room temperature and humidity.
   - 3.2 During the test, the system will be in storage mode.
   - 3.3 Set the chamber at 25℃& 50% humidity and place the EUT in the chamber.
   - 3.4 Set chamber temperature to 70℃; the temperature gradient should not be over 30℃/hr.

3.5 Proceed to the 24 hours test with high-temperature state.
3.6 Adjust temperature to 25℃, the temperature gradient should not be over 30℃/hr. Humidity is not in control.
3.7 After 2 hours visual inspect the cosmetic mechanism and power on the EUT then confirm the electrical functions.

1.01.1.07 Evaluation Criteria:

1. The EUT shall continue to operate after the test.
2. There is no abnormality on the outward appearance and the structure. (Discolor, deformation and looseness of screws on exterior, etc.)
3. There is no rust, peeling of the coating and printing, etc.

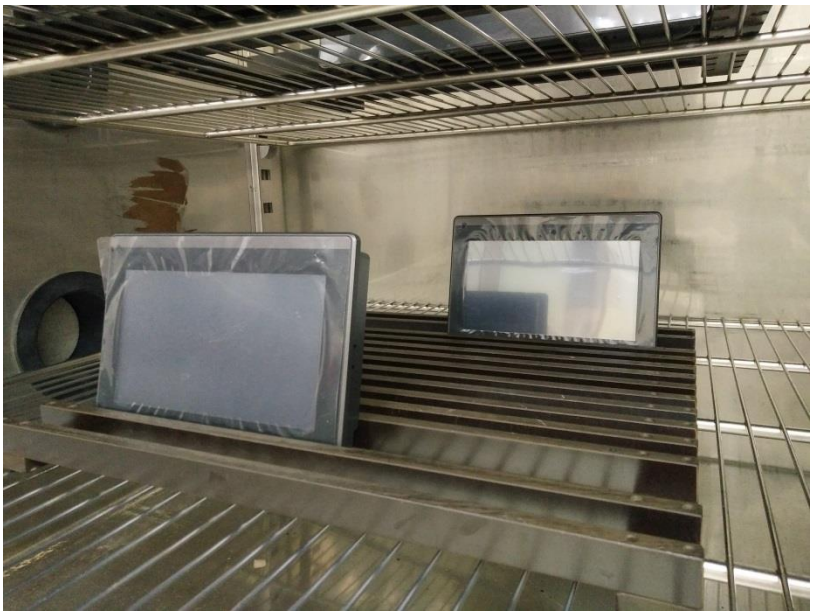
1.01.1.08 Test Result:

1. There is no damage in electronic and mechanical functions.
2. Degradation has not been found.
3. Performance is maintained with no incurable physical damage or degradation.

1.01.1.09 Conclusion:

Passed

Photo:



1.02 Operating Temperature and Relative Humidity Test

Test Date: September 14~19, 2021
Test Site: Advantech QA Laboratory
Performed By: Focus Chang

1.02.1.01 Test Purpose:

Evaluate whether the functions are maintained in a stable condition in temperature and humidity environment condition.

1.02.1.02 Test Standard:

Please refer to the following documents:
1. IEC 60068-2-78:2012 Testing procedures Test Cab: Damp Heat Steady State Test
2. IEC 60068-2-1:2007 Testing procedures Test Ae: Cold Test
3. IEC 60068-2-2:2007 Testing procedures Test Be: Dry Heat Test

1.02.1.03 Test Equipment:

1. Programmable temperature & humidity chamber
   K.SON Co. Ltd
   Model: THS-B4C-100
   S/N: 4035
   Date of Calibration: 2020/09/24
   Next Calibration date: 2021/09/23

1.02.1.04 Sample Configuration & Quantity Under Test:

Using two pieces CRIT40724STF4B1 with the following options installed:	
1. MB Rev.	PT2070-22 V1.2 A101-2
- CPU	ARM NUC972DF71YC ARM9 32bit 300MHz 128MB LQFP216
- RAM	IC LY62L51216 TSOPII-44 512K X 16 BIT
- S/N	07I27GXSB02924 (QA1) 07I27GXSB02930 (QA2)
2. Storage	IC MX30LF1G18AC-TI NAND 1Gb X8 TSOP 48P
3. Power	Cermate DPS-30W-DC24
4. Panel	7" LED PANEL 400N 800X480(G) PN:96LEDK-L070WV40NX1
5. Touch	7" 4W RTP Touch Panel (P4T-G20-007) PN:XKDT-5734

1.02.1.05 Test Condition:

1. Chamber temperature and humidity setup:
   1.1 Humidity condition
      1.1.1 Test Temperature: 40℃
      1.1.2 Test Humidity: 95%
      1.1.3 Dwell Time: 48Hrs
      1.1.4 Temperature gradient: 30℃/hr
   1.2 Low temperature condition
      1.2.1 Test ambient temperature: -25℃
      1.2.2 Operation dwell Time: 24Hrs
      1.2.3 Temperature gradient: 30℃/hr
   1.3 High temperature condition
      1.3.1 Test ambient temperature: 65℃
      1.3.2 Operation dwell Time: 24Hrs
      1.3.3 Temperature gradient: 30℃/hr
2. OS: Windows Embeded System V4.0

3. Test software: Specific test programs

Test Software as following
Cermate test program
#LCD
#Touch
#Network
#Serial port

4. Test Environment Curve Figure 1.02.1.01 ~ 1.02.1.03

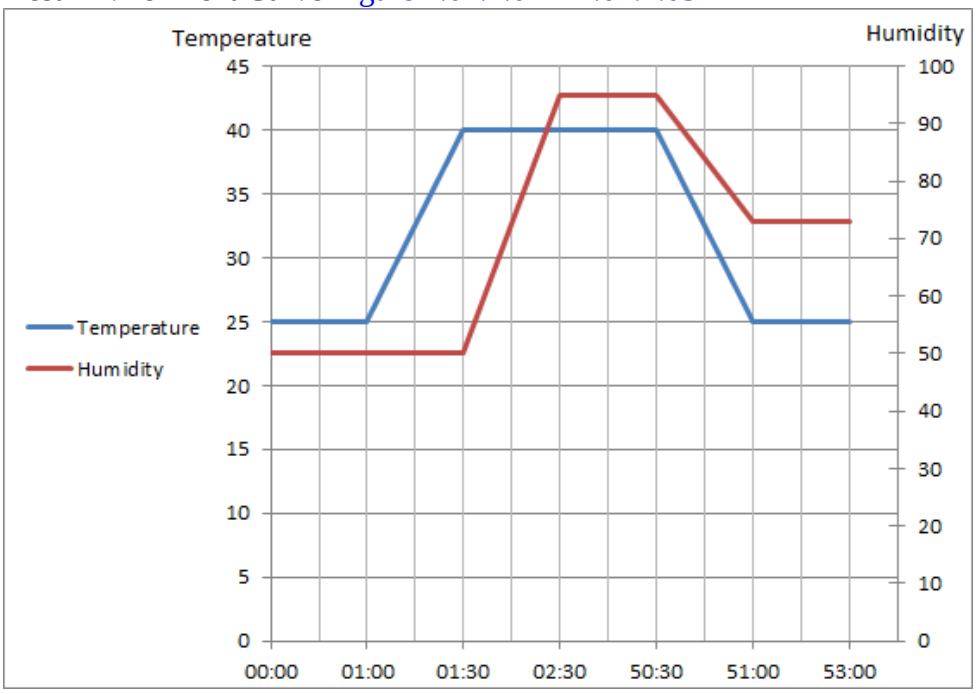


Figure 1.02.1.01 Humidity and temperature operating test curve

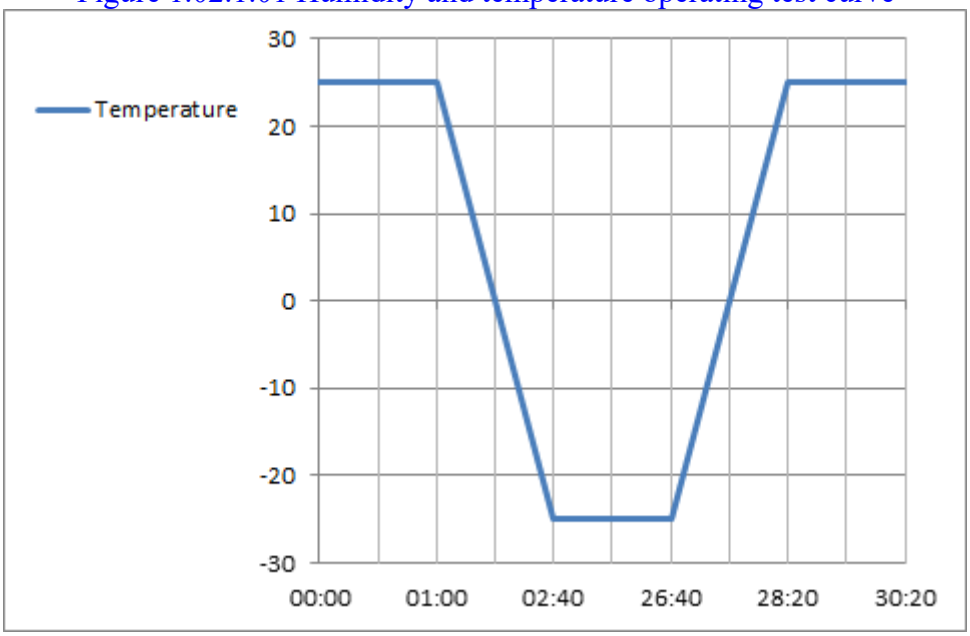


Figure 1.02.1.02 Low temperature operating test curve

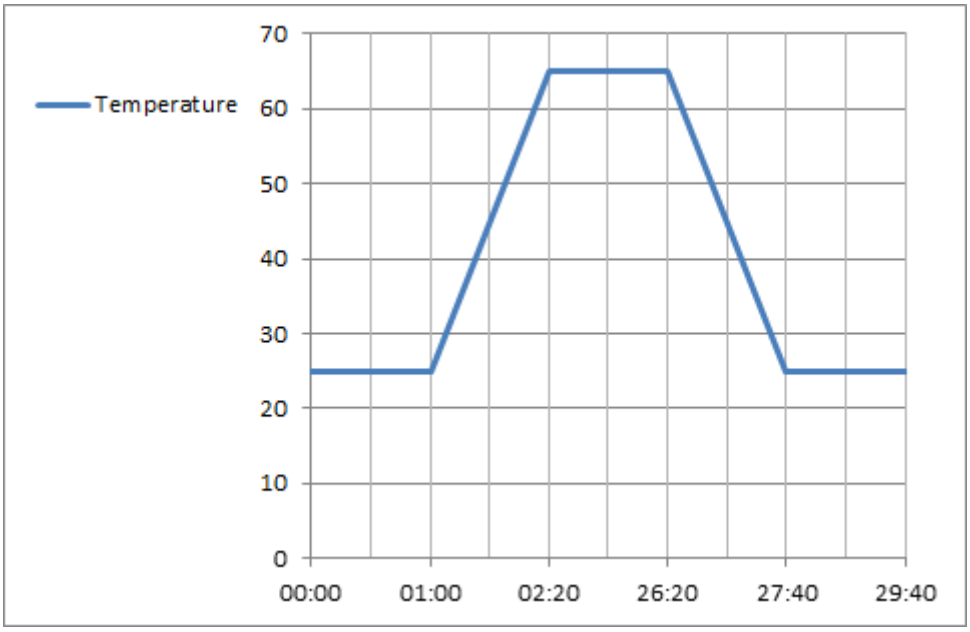


Figure 1.02.1.03 High temperature operating test curve

1.02.1.06 Test Procedure:

1. Humidity and temperature operating test
   - 1.1 Visual inspect the cosmetic mechanism and confirm the electrical functions at the room temperature and humidity.
   - 1.2 During the test, the system will be running specific test programs to make the heavy electrically loaded of system evaluation.
   - 1.3 Set the chamber at 25℃ & 50% humidity and place the EUT in the chamber.
   - 1.4 Adjust the chamber temperature to the 40℃ & 95%±2% humidity; the temperature gradient should not be over 30℃/hr.
   - 1.5 Proceed to the 48 hours with 40℃ and 95%±2% humidity state.
   - 1.6 Visual inspects the cosmetic mechanism and confirms the electrical functions under 40℃ and 95%±2% humidity state.
   - 1.7 Adjust temperature to 25℃& 50% humidity, the temperature gradient should not be over 30℃/hr.
   - 1.8 After 2 hours visual inspect the cosmetic mechanism and confirm the electrical functions.
2. Low temperature operating test
   - 2.1 Visual inspect the cosmetic mechanism and confirm the electrical functions at the room temperature and humidity.
   - 2.2 During the test, the system will be running specific test programs to make the heavy electrically loaded of system evaluation.
   - 2.3 Set the chamber at 25℃ & 50% humidity and place the EUT in the chamber.
   - 2.4 Adjust temperature to -25℃; the temperature gradient should not be over 30℃/hr.
   - 2.5 Proceed to the 24 hours test with low-temperature state.
   - 2.6 Adjust temperature to 25℃, the temperature gradient should not over be 30℃/hr. Humidity is not in control.
   - 2.7 After 2 hours visual inspect the cosmetic mechanism and power on the EUT then confirm the electrical functions.
3. High temperature operating test
   - 3.1 Visual inspect the cosmetic mechanism and confirm the electrical functions at the room temperature and humidity.
   - 3.2 During the test, the system will be running specific test program to make the heavy electrically loaded of system evaluation.
   - 3.3 Set the chamber at 25℃ & 50% humidity and place the EUT in the chamber.

3.4 Adjust temperature to 65℃; the temperature gradient should not be over 30℃/hr.
3.5 Proceed to the 24 hours test with high-temperature state.
3.6 Adjust temperature to 25℃, the temperature gradient should not be over 30℃/hr. Humidity is not in control.
3.7 After 2 hours visual inspect the cosmetic mechanism and power on the EUT then confirm the electrical functions.

1.02.1.07 Evaluation Criteria:

1. The EUT shall continue to operate during and after the test.
2. There is no abnormality on the outward appearance and the structure. (Discolor, deformation and looseness of screws on exterior, etc.)
3. There is no rust, peeling of the coating and printing, etc.
4. There should be no abnormalities, which could affect the product-specified functions and performances.

1.02.1.08 Test Result:

1. There is no damage in electronic and mechanical functions.
2. Degradation has not been found.
3. Performance is maintained with no incurable physical damage or degradation.

1.02.1.09 Conclusion:

Passed

Photo:

1.03 Thermal Shock Test

Test Date: October 5, 2021
Test Site: Advantech QA Laboratory
Performed By: Focus Chang

1.03.1.01 Test Purpose:

Evaluate whether the functions are maintained in a stable condition in temperature cycling test.

1.03.1.02 Test Standard:

1. Reference to the IEC 60068-2-14:2009 Testing procedures Test N: Change of temperature.

1.03.1.03 Test Equipment:

1. HALT Chamber
   QualMark Corp.
   Model: Typhoon 4.0
   S/N: 40T08100939
   Date of Calibration: 2021/09/17
   Next Calibration date: 2022/09/16

1.03.1.04 Sample Configuration & Quantity Under Test:

Using two pieces CRIT40724STF4B1 with the following options installed:	
1. MB Rev.	PT2070-22 V1.2 A101-2
- CPU	ARM NUC972DF71YC ARM9 32bit 300MHz 128MB LQFP216
- RAM	IC LY62L51216 TSOPII-44 512K X 16 BIT
- S/N	07I27GXSB02924 (QA1) 07I27GXSB02930 (QA2)
2. Storage	IC MX30LF1G18AC-TI NAND 1Gb X8 TSOP 48P
3. Power	Cermate DPS-30W-DC24
4. Panel	7" LED PANEL 400N 800X480(G) PN:96LEDK-L070WV40NX1
5. Touch	7" 4W RTP Touch Panel (P4T-G20-007) PN:XKDT-5734

1.03.1.05 Test Condition:

1. High temperature: 70°C
2. Low temperature: -30°C
3. Dwell time: 20 minutes each level
4. Test cycles: 6 cycles
5. Temperature gradient: 60°C/min
6. OS: Windows Embeded System V4.0
7. Test software: Specific test programs.

Test Software as following
Cermate test program
#LCD
#Touch
#Network
#Serial port

8. Test curve: Figure 1.03.1.01

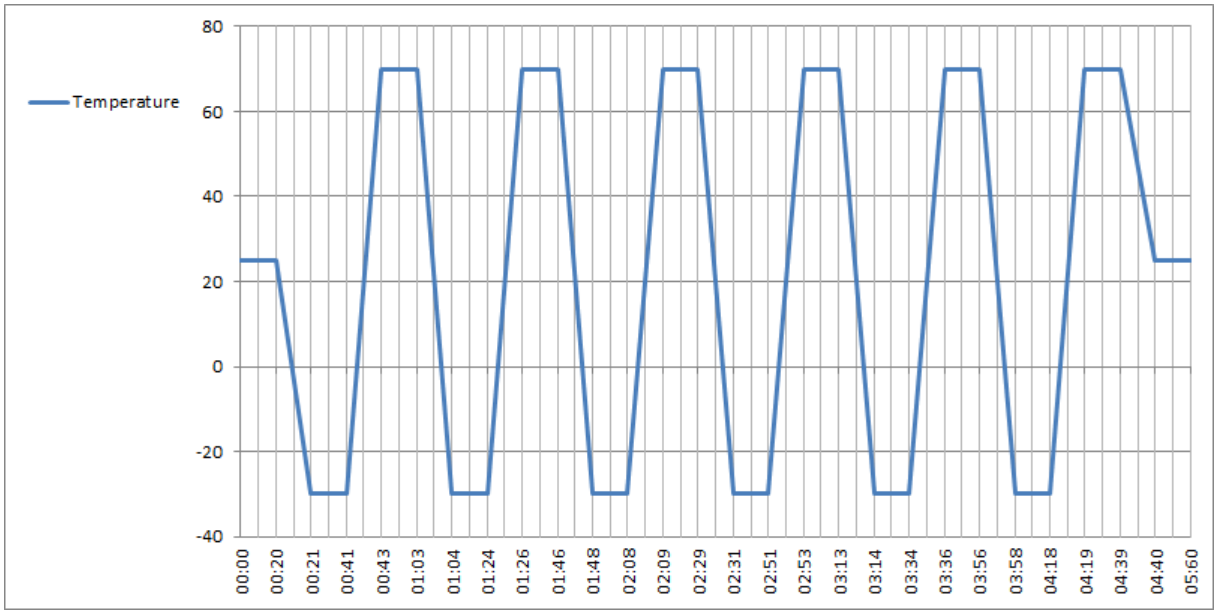


Figure 1.03.1.01 Thermal shock test curve

1.03.1.06 Test Procedure:

1. Before testing, run specific test programs to perform a functional check at room temperature and humidity.
2. During the test, the system will be running specific test programs to make heavy loading of system evaluation.
3. Set the chamber at 25℃ and place the EUT in the chamber.
4. Power on to boot up the EUT and the system will be running specific test programs and confirm the functions.
5. Decrease the chamber temperature to the -30℃; the temperature gradient is 60℃/min.
6. Proceed to the 20 minutes test with low-temperature state.
7. Increase the temperature to 70℃, the temperature gradient is 60℃/min.
8. Proceed to the 20 minutes test with high-temperature state.
9. Repeat step 5 ~ 8, for 5 cycles
10. Confirm the EUT function after 6 cycles until test ends and then turn the power off.
11. Return the temperature to room temperature.
12. Power on to boot up the EUT and running specific test programs for EUT function check.

1.03.1.07 Evaluation Criteria:

1. The EUT shall continue to operate during and after the test.
2. There is no abnormality on the outward appearance and the structure. (Discolor, deformation and looseness of screws on exterior, etc.)
3. There is no rust, peeling of the coating and printing, etc.
4. There should be no abnormalities, which could affect the product-specified functions and performances.

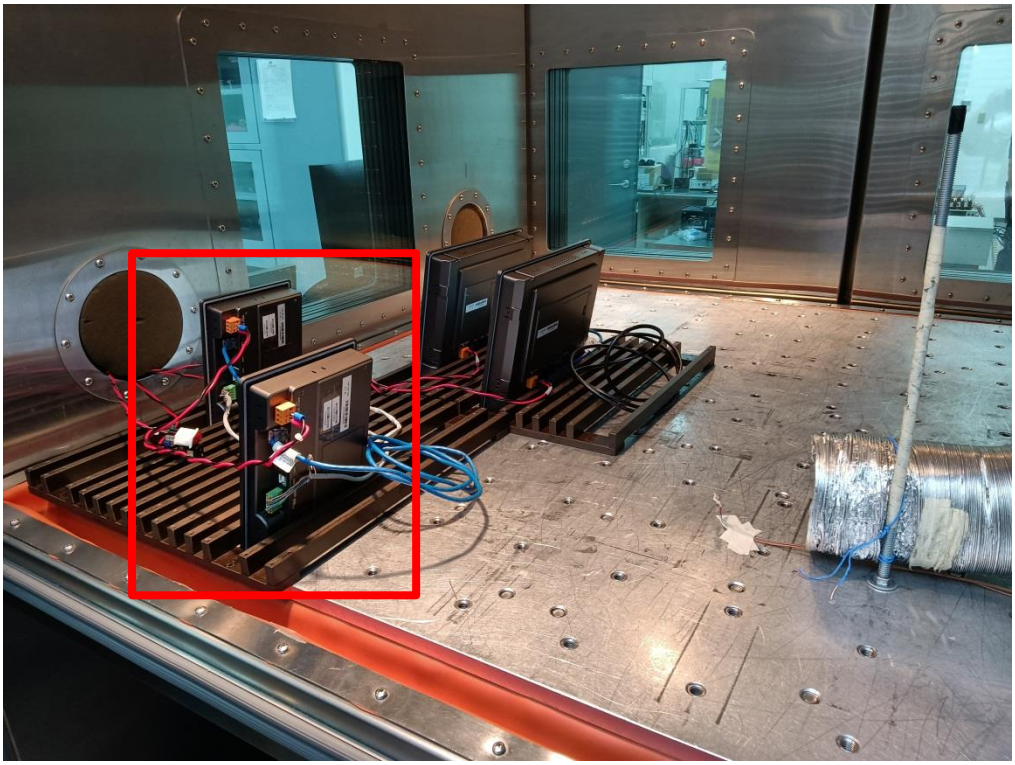
1.03.1.08 Test Result:

1. There is no damage in electronic and mechanical functions.
2. Degradation has not been found.
3. Performance is maintained with no incurable physical damage or degradation.

1.03.1.09 Conclusion:

Passed

Photo:



1.04 Thermal Profile Test

Test Date: October 13~14, 2021
Test Site: Advantech QA Laboratory
Performed By: Focus Chang

1.04.1.01 Test Purpose:

Verify whether the component temperatures exceed the specified thermal specification.

1.04.1.02 Test Standard:

Please refer to the following documents:

1. Reference Advantech QAL_PC053 Testing procedures
   Test A: Thermal Profile Test with air flow

1.04.1.03 Test Equipment:

1. Programmable temperature & humidity chamber
   K.SON Co. Ltd
   Model: THS-B4C-100
   S/N: 4035
   Date of Calibration: 2021/09/23
   Next Calibration date: 2022/09/22
2. Data recorder
   FLUKE
   Model: 2620A
   SN: 7062009
   Date of Calibration: 2021/06/28
   Next Calibration date: 2022/06/27
3. Thermocouple OMEGA K type AWG No.36
4. Thermal glue Satlon D3/PRIMER 606
5. IR camera

1.04.1.04 Sample Configuration & Quantity Under Test:

Using one piece CRIT40724STF4B1 with the following options installed:	
1. MB Rev.	PT2070-22 V1.2 A101-2
- CPU	ARM NUC972DF71YC ARM9 32bit 300MHz 128MB LQFP216
- RAM	IC LY62L51216 TSOPII-44 512K X 16 BIT
- S/N	07I27GXSB02924 (QA1)
2. Storage	IC MX30LF1G18AC-TI NAND 1Gb X8 TSOP 48P
3. Power	Cermate DPS-30W-DC24
4. Panel	7" LED PANEL 400N 800X480(G) PN:96LEDK-L070WV40NX1
5. Touch	7" 4W RTP Touch Panel (P4T-G20-007) PN:XKDT-5734

1.04.1.05 Test Condition:

1. Test temperature: 60℃, 25℃
2. Test in the chamber with air flow 0.7 m/sec
3. Dwell time: 4hrs
4. OS: Windows Embeded System V4.0
5. Test software: Specific test programs

Test Software as following
Cermate test program

#LCD
#Touch
#Network
#Serial port

6. Test item list see Table 1.04.1.01

1.04.1.06 Test Procedure:

1. Before testing, run specific test programs to perform a functional check at the room temperature and humidity.
2. During the test, the system will be running specific test programs.
3. Power on the EUT and run specific test programs to the system at room temperature.
4. Base on IR photo to decide the measuring point (including the points on surface can be touched) and set thermocouples at those measuring points (The following components temperature will be record when EUT run specific test programs after 4 hours.)
5. Place the EUT into the condition chamber.
6. Power on the EUT and run the system by specific test programs to make the heavy loading.
7. Adjust chamber temperature to 60℃.
8. Maintain this condition for 4 hours.
9. Record the temperature of each measurement component.
10. Adjust chamber temperature to 25℃.
11. Maintain this condition for 4 hours.
12. Record the temperature of each measurement component.

1.04.1.07 Test Data:

Table 1.04.1.01 Thermal Profile Test Table

NUM	Parts List	Chamber with air flow (Tc measurement)		Reference Tc	Spec from datasheet
		60℃	25℃		
		℃		℃	℃
1	U11	88.2	57.1	105	85(Ta)
2	D10	82.1	50.5	120	150(Tj)
3	D10	83.1	52.2	120	150(Tj)
4	U12	71.8	39.3	105	85(Ta)
5	U14	76.7	44.3	90	70(Ta)
6	L3	73.9	41.6	105	85(Ta)
7	TR1	65.8	35.2	170	150(Ta)
8	Air1(in case)	62.8	29.6	---	---

Remark: Ta: Ambient temperature specification
Tc: Device Case temperature specification
Tj: Device Junction temperature specification

1.04.1.08 Evaluation Criteria:

1. The EUT shall continue to operate during and after the test.
2. The temperature on the measuring points should not exceed the part-related specification temperature.

3. There should be no abnormalities, which could affect the product-specified functions and performances.

1.04.1.09 Test Result:

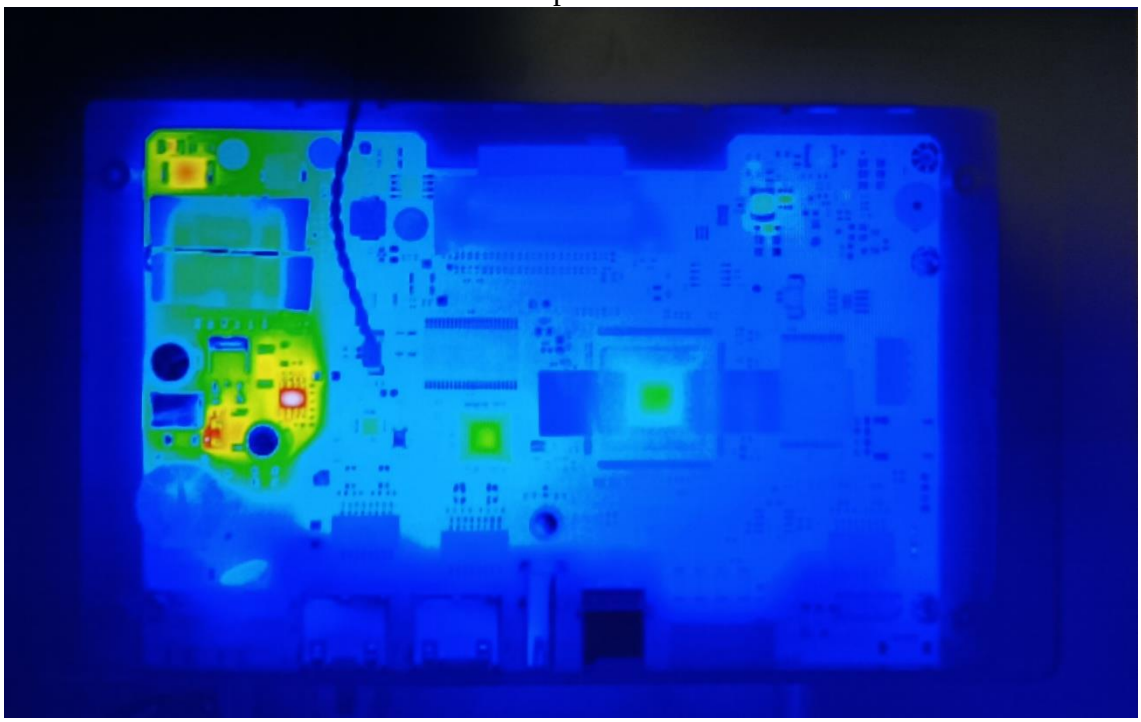
1. The system thermal specification is at 60 degree C.
2. The temperature of all the measurement points are under themselves' thermal specification when ambient is at 60 degree C.
3. There is no damage in electronic and mechanical functions.
4. Degradation has not been found.
5. Performance is maintained with no incurable physical damage or degradation.

1.04.1.10 Conclusion:

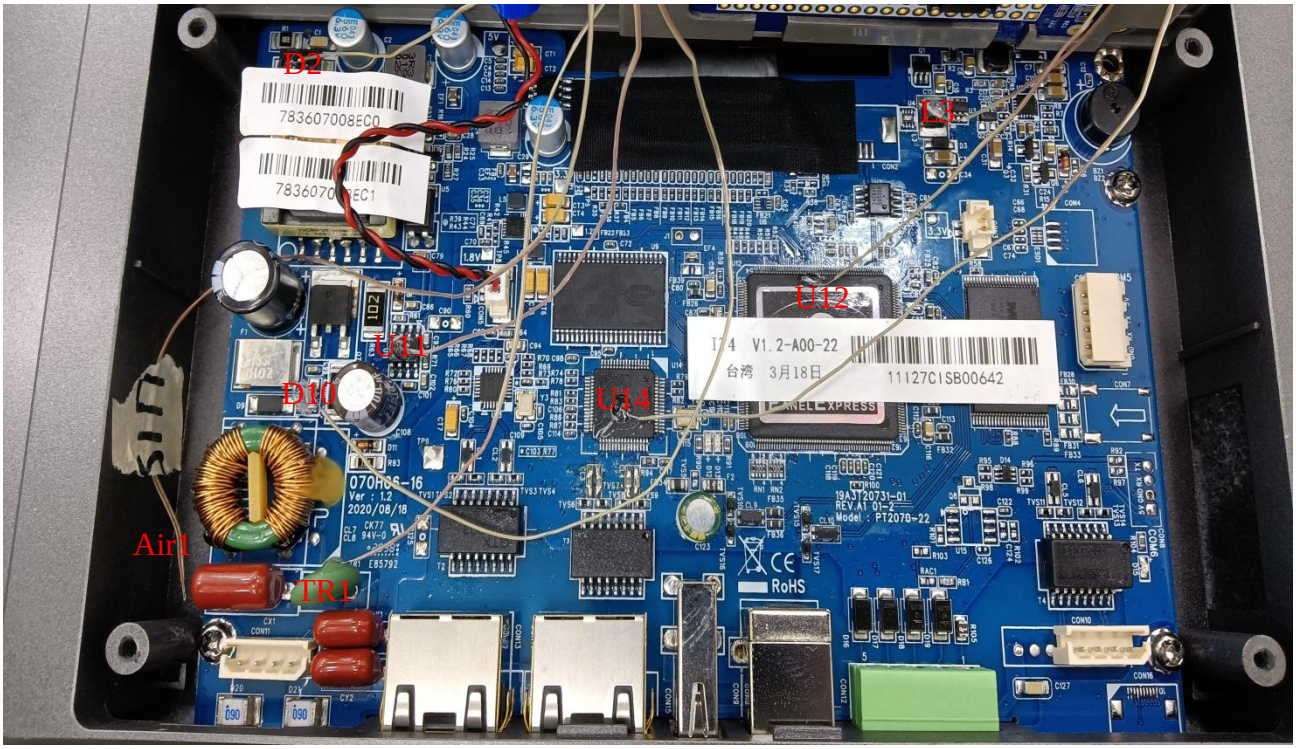
Passed

Photo:

Thermal profile test



IR Picture-Reference heat distribution (Ambient 25℃)



Test Points

1.05 Power ON/OFF Test

Test Date: September 6~12, 2021
Test Site: Advantech QA Laboratory
Performed By: Focus Chang

1.05.1.01 Test Purpose:

Evaluate whether the power ON/OFF functions are maintained in a stable condition in different environment condition.
- Low-temperature environment.
- High-temperature environment.

1.05.1.02 Test Standard:

Please refer to the following documents:
1. IEC 60068-2-1:2007 Testing procedures Test Ad: Cold Test.
2. IEC 60068-2-2:2007 Testing procedure Test Bd: Dry Heat Test.

1.05.1.03 Test Equipment:

1. Programmable temperature & humidity chamber
   K.SON Co. Ltd
   Model: THS-D7TS-150+LN2
   S/N: 4367T
   Date of Calibration: 2021/05/25
   Next Calibration date: 2022/05/24

1.05.1.04 Sample Configuration & Quantity Under Test:

Using two pieces CRIT40724STF4B1 with the following options installed:	
1. MB Rev.	PT2070-22 V1.2 A101-2
- CPU	ARM NUC972DF71YC ARM9 32bit 300MHz 128MB LQFP216
- RAM	IC LY62L51216 TSOPII-44 512K X 16 BIT
- S/N	07I27GXSB02924 (QA1) 07I27GXSB02930 (QA2)
2. Storage	IC MX30LF1G18AC-TI NAND 1Gb X8 TSOP 48P
3. Power	Cermate DPS-30W-DC24
4. Panel	7" LED PANEL 400N 800X480(G) PN:96LEDK-L070WV40NX1
5. Touch	7" 4W RTP Touch Panel (P4T-G20-007) PN:XKDT-5734

1.05.1.05 Test Condition:

1. Test temperature: -25℃, 65℃
2. Total test time: each temperature 1000 times

Condition	Test Temperature	Power ON time	Power OFF time	Test Times
I	-25℃	2 minutes	30 seconds	1000
II	65℃	2 minutes	30 seconds	1000

3. OS: Windows Embeded System V4.0
4. Power ON / OFF time interval curve
5. Test Environment Curve Figure 1.05.1.01, Figure1.05.1.02

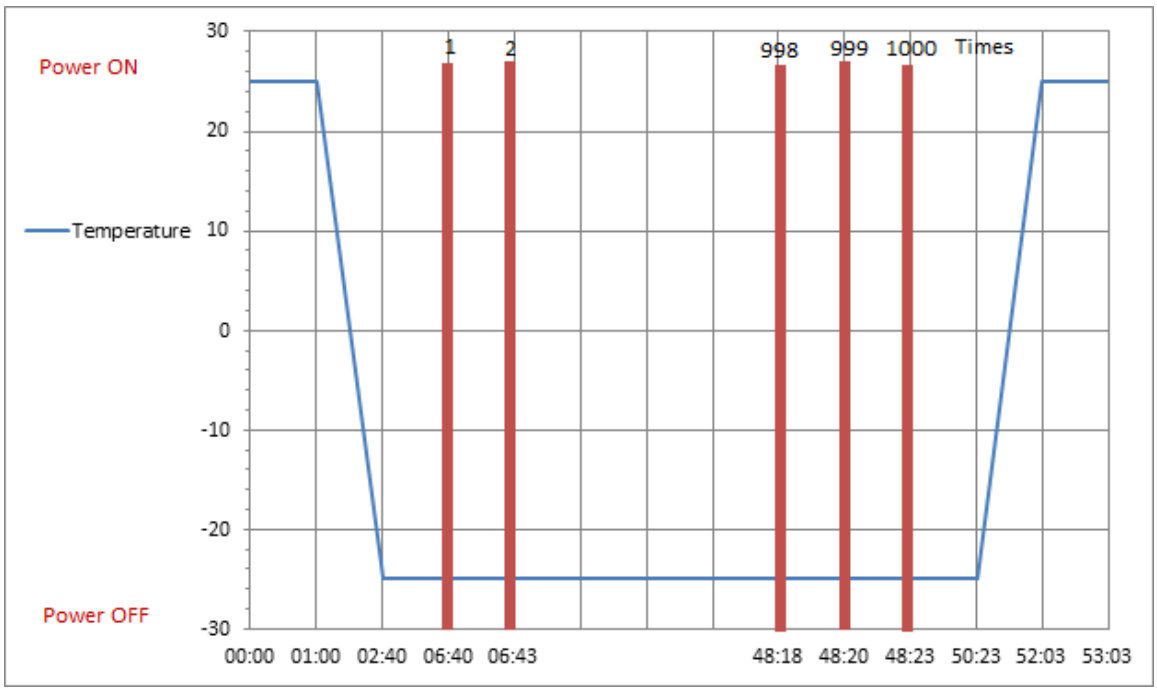


Figure 1.05.1.01 Low temperature power ON/OFF test curve

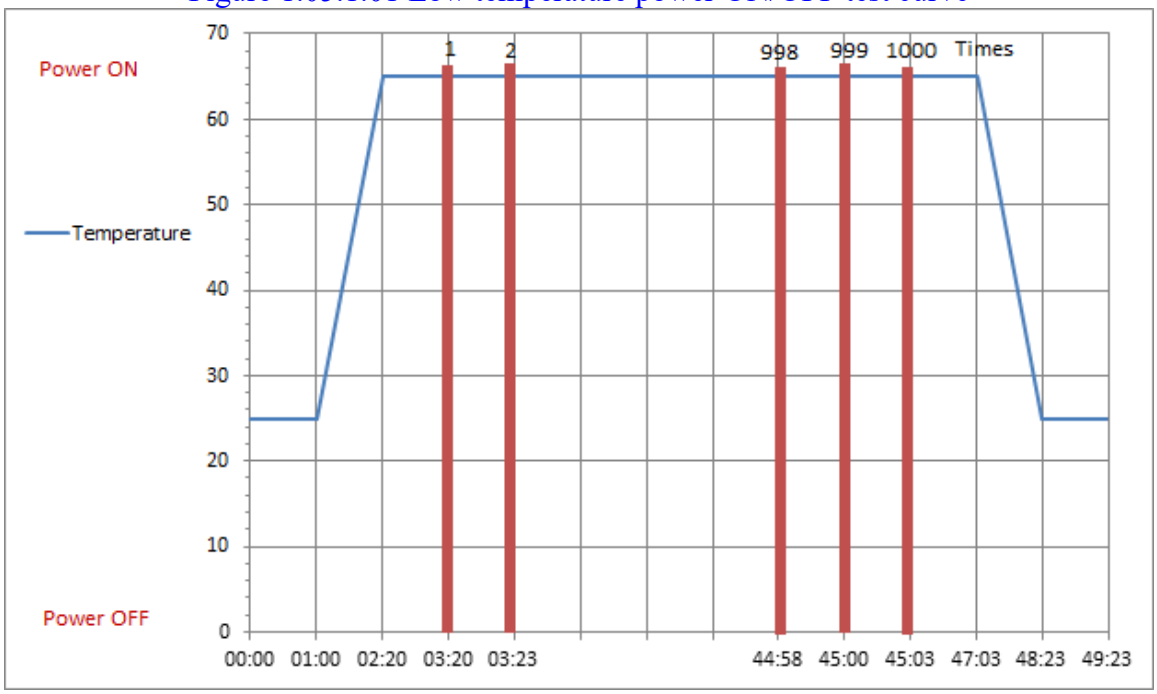


Figure 1.05.1.02 High temperature power ON/OFF test curve

1.05.1.06 Test Procedure:

1. Before testing, run specific test programs to perform a functional check at room temperature and humidity.
2. Set the chamber at 25℃ and place the EUT in the chamber.
3. Adjust the chamber temperature to the -25℃ at least for 4 hrs.
4. Use fixture to power on the system and record the number, then power off at -25℃.
5. The power on time is 2 minutes, and power off time is 30 seconds and confirms system is fully powered on and power off.
6. Do the power ON/OFF test for 1000 cycles at -25℃.
7. Increase the chamber at a rate of 30℃/hr to 25℃.Humidity is not controlled.
8. Check the EUT record which equals to counts of fixture.
9. Set the chamber at 25℃ and place the EUT in the chamber.
10. Adjust the chamber temperature to the 65℃ at least for 1 hr.

11. Use fixture to power on the system and record the number, then power off.
12. The power on time is 2 minutes, power off time is 30 seconds and confirm system is fully power on and power off.
13. Do the power ON/OFF test for 1000 cycles at 65℃.
14. Decrease the chamber at a rate of 30℃/hr to 25℃. Humidity is not controlled.
15. Check the EUT record which equals to counts of fixture.
16. Check EUT functions.

1.05.1.07 Evaluation Criteria:

1. The system should continue to operate after the test
2. There should be no any time failed during 1000 times testing.

1.05.1.08 Test Result:

Test temperature	Test times	Test Result
-25℃	1000 times	1000 times passed
65℃	1000 times	1000 times passed

1. There is no any time failure during testing.
2. There is no damage in electronic and mechanical functions.
3. Degradation has not been found.
4. Performance is maintained with no incurable physical damage or degradation.

1.05.1.09 Conclusion:

Passed

1.06 Cold Start Test

Test Date: September 13~14, 2021
Test Site: Advantech QA Laboratory
Performed By: Focus Chang

1.06.1.01 Test Purpose:

Evaluate whether the power ON/OFF functions are maintained in a stable condition in low-temperature environment.

1.06.1.02 Test Standard:

Please refer to the following documents:
1. IEC 60068-2-1:2007 Testing procedures Test Ab: Cold Test.

1.06.1.03 Test Equipment:

1. Programmable temperature & humidity chamber
   K.SON Co. Ltd
   Model: THS-D7TS-150+LN2
   S/N: 4367T
   Date of Calibration: 2021/05/25
   Next Calibration date: 2022/05/24

1.06.1.04 Sample Configuration & Quantity Under Test:

Using two pieces CRIT40724STF4B1 with the following options installed:	
1. MB Rev.	PT2070-22 V1.2 A101-2
- CPU	ARM NUC972DF71YC ARM9 32bit 300MHz 128MB LQFP216
- RAM	IC LY62L51216 TSOPII-44 512K X 16 BIT
- S/N	07I27GXSB02924 (QA1) 07I27GXSB02930 (QA2)
2. Storage	IC MX30LF1G18AC-TI NAND 1Gb X8 TSOP 48P
3. Power	Cermate DPS-30W-DC24
4. Panel	7" LED PANEL 400N 800X480(G) PN:96LEDK-L070WV40NX1
5. Touch	7" 4W RTP Touch Panel (P4T-G20-007) PN:XKDT-5734

1.06.1.05 Test Condition:

1. Test temperature: -30℃
2. Storage times: 4 hours
3. Total test time: 20 times
4. Power ON/OFF time interval: On 2 minutes, Off 1 hr
5. OS: Windows Embeded System V4.0
6. Power ON / OFF time interval curve

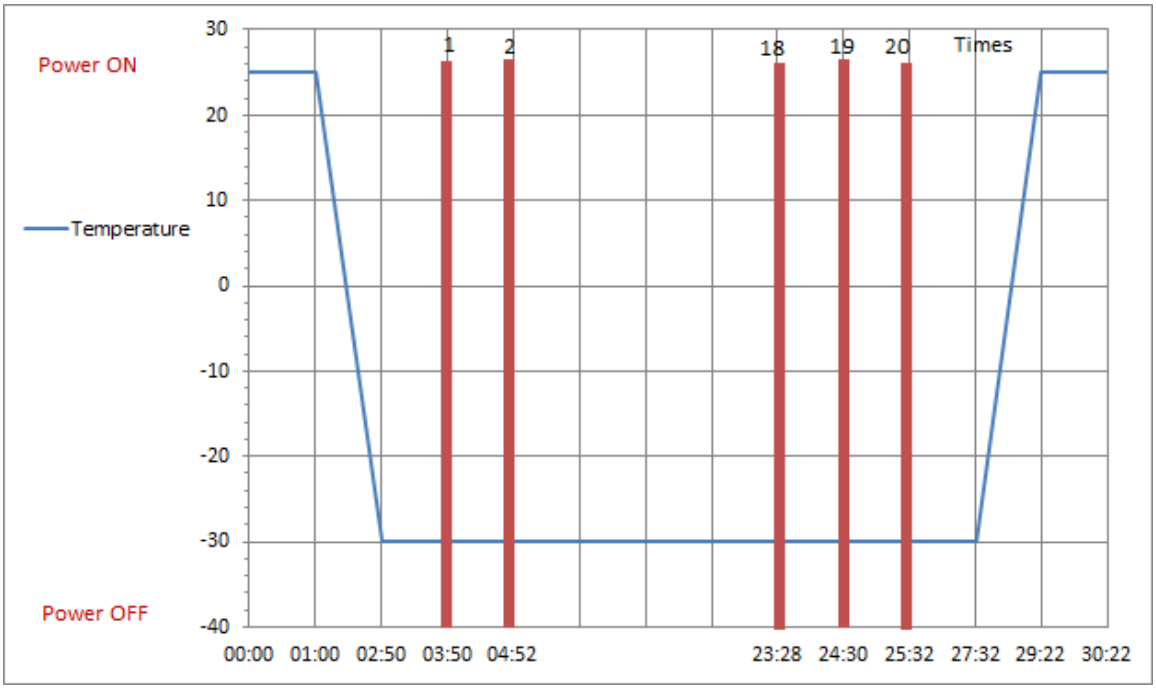


Figure 1.06.1.01 Cold start test curve

1.06.1.06 Test Procedure:

1. Before testing, run specific test programs to perform a functional check at room temperature and humidity.
2. Set the chamber at 25℃ and place the EUT in the chamber.
3. Adjust the chamber temperature to the -30℃ at least for 4 hrs.
4. Use fixture to power on the system and record the number, then power off at -30℃.
5. The power on time is 2 minutes, and power off time is 1 hr. and confirms system is fully power on and power off.
6. Do the power ON/OFF test for 20 times at -30℃.
7. Increase the chamber at a rate of 30℃/hr to 25℃. Humidity is not controlled.
8. Check the EUT record which equals to counts of fixture.
9. Check EUT functions.

1.06.1.07 Evaluation Criteria:

1. The system continues to operate as intended after the test
2. There should be no any time failed during 20 times testing.

1.06.1.08 Test Result:

Test temperature	Test times	Test Result
-30℃	20 times	20 times passed

1. There is no any time failure during testing.
2. There is no damage in electronic and mechanical functions.
3. Degradation has not been found.
4. Performance is maintained with no incurable physical damage or degradation.

1.06.1.09 Conclusion:

Passed

1.07 Thermal Step Stress Test

Test Date: September 22~24
Test Site: Advantech QA Laboratory
Performed By: Focus Chang

1.07.1.01 Test Purpose:

Evaluate the design limit of the EUT with thermal stress test to maintain operated stable.

1.07.1.02 Test Standard:

Please refer to the following documents:
1. Advantech HALT SOP (Doc. QAL-PC028)

1.07.1.03 Test Equipment:

1. HALT Chamber
   K.SON Co. Ltd
   Model: THS-D7TS-150+LN2
   S/N: 4367T
   Date of Calibration: 2021/05/25
   Next Calibration date: 2022/05/24

1.07.1.04 Sample Configuration & Quantity Under Test:

Using two pieces CRIT40724STF4B1 with the following options installed:	
1. MB Rev.	PT2070-22 V1.2 A101-2
- CPU	ARM NUC972DF71YC ARM9 32bit 300MHz 128MB LQFP216
- RAM	IC LY62L51216 TSOPII-44 512K X 16 BIT
- S/N	07I27GXSB02924 (QA1) 07I27GXSB02930 (QA2)
2. Storage	IC MX30LF1G18AC-TI NAND 1Gb X8 TSOP 48P
3. Power	Cermate DPS-30W-DC24
4. Panel	7" LED PANEL 400N 800X480(G) PN:96LEDK-L070WV40NX1
5. Touch	7" 4W RTP Touch Panel (P4T-G20-007) PN:XKDT-5734

1.07.1.05 Test Condition:

(To find the temperature Upper/Lower Operational Limit)

1. High temperature: 70℃~ XX ℃ (the highest to 150℃)
2. Low temperature: -30℃~-XX ℃ (the lowest to -70℃)
3. Temperature step scale: 10℃ each level
4. Power ON/OFF test 1 time for each temperature
5. Dwell time: 1 hour each level
6. Temperature gradient: 0.5℃/min
7. OS: Windows Embeded System V4.0
8. Test software: Specific test program
9. Test Environment Curve Figure 1.07.1.01
10. Test item list see Table 1.07.1.01

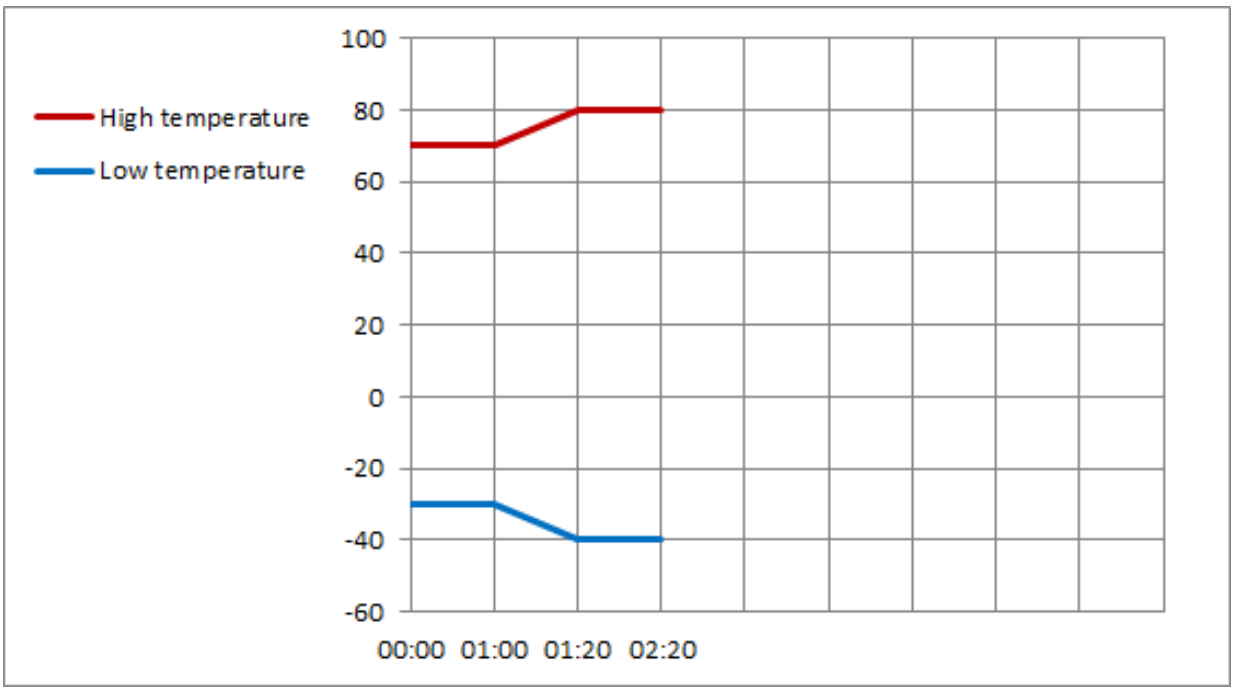


Figure 1.07.1.01 Thermal stress test curve

1.07.1.06 Test procedure:

1. Before testing, run specific test programs to perform a functional check at the room temperature and humidity.
2. Set up the EUT in the programmable temperature chamber.
3. During the test, the system will be running specific test programs to make the heavy loading of system evaluation.
4. Set up temperature condition in -30℃ and dwell 1 hour EUT burning to confirm electrical functions passed this temperature test.
5. Change temperature condition to -40℃ and dwell 1 hour EUT burning to confirm electrical functions passed this temperature test. Temperature gradient is 0.5℃/min.
6. System do power on/off test one time.
7. Repeat step 5 ~ 6, the temperature is decreased by steps of 10℃ until lower limit -70℃ is reached or find LOL.
8. Increase the chamber temperature to 70℃ and dwell 1 hour EUT burning to confirm electrical functions passed this temperature test.
9. Change temperature condition to 80℃ and dwell 1 hour EUT burning to confirm electrical functions passed this temperature test. Temperature gradient is 0.5℃/min.
10. System do power on/off test one time confirm the electrical functions.
11. Repeat step 9 ~ 10, the temperature is increased by steps of 10℃ until upper limit 150℃ is reached or find UOL.
12. Record the test result.

1.07.1.07 Test Data:

Table 1.07.1.01 Thermal stress temperature test data

Number	Criteria	Result	Judgement
1	-30℃	Passed	Passed
2	-40℃	Note 1	---
3	70℃	Passed	Passed
4	80℃	Note 2	---

Note: 1. Low temperature system can not boot up at -40℃.
Note: 2. High temperature system can not boot up at 80℃.

1.07.1.08 Evaluation Criteria:

1. The thermal step stress test is to find the temperature limit of product in the development phase.
2. The test result is for RD engineer reference to decide whether or whether not to carry out modifications of the product, and to decide the nature of the modification.

1.07.1.09 Test Result:

1. System boot up failed when operation temperature at -40℃.
2. System boot up failed when operation temperature at 80℃.
3. System of the temperature lower operational limit is at -30℃
4. System of the temperature upper operational limit is at 70℃.
5. The thermal step stress test is only to find the temperature limit of product; it is not intended to be used under such extreme temperatures.
6. In extreme high temperature environment, the components are derating that will result in product reliability and the MTBF. Please only operate the system/ board with the temperature listed in the datasheet.

1.07.1.10 Conclusion:

Reference

1.08 Operating Random Vibration Test

Test Date: October 8, 2021
Test Site: Advantech QA Laboratory
Performed By: Focus Chang

1.08.1.01 Test Purpose:

Evaluate whether the EUT functions are maintained in a stable condition when operating the product in the vibration test.

1.08.1.02 Test Standard:

Please refer to the following documents:
1. IEC 60068-2-64: 2008 Testing procedures Test Fh: Vibration broadband random test

1.08.1.03 Test Equipment:

1. Vibration simulator system
   KING DESIGN Co. LTD.
   Model: 9363EM-800F2K-40N120
   S / N: UC107142493
   Date of Calibration: 2020/11/12
   Next Calibration Date: 2021/11/11

1.08.1.04 Sample Configuration & Quantity Under Test:

Using one piece CRIT40724STF4B1 with the following options installed:	
1. MB Rev.	PT2070-22 V1.2 A101-2
- CPU	ARM NUC972DF71YC ARM9 32bit 300MHz 128MB LQFP216
- RAM	IC LY62L51216 TSOPII-44 512K X 16 BIT
- S/N	07I27GXSB02924 (QA1)
2. Storage	IC MX30LF1G18AC-TI NAND 1Gb X8 TSOP 48P
3. Power	Cermate DPS-30W-DC24
4. Panel	7" LED PANEL 400N 800X480(G) PN:96LEDK-L070WV40NX1
5. Touch	7" 4W RTP Touch Panel (P4T-G20-007) PN:XKDT-5734

1.08.1.05 Test Condition:

1. Test environment: Room temperature
2. Test acceleration: 3Grms
3. Test PSD: 0.01818 g^2/Hz, 3Grms
4. Test Frequency: 5-500Hz
5. Test Axis: X, Y and Z axes
6. Test Time: 1 hrs per axis
7. OS: Windows Embeded System V4.0
8. Test software: Specific test programs.

Test Software as following
Cermate test program
#LCD
#Touch
#Network
#Serial port

9. Test Curve Figure 1.08.1.01

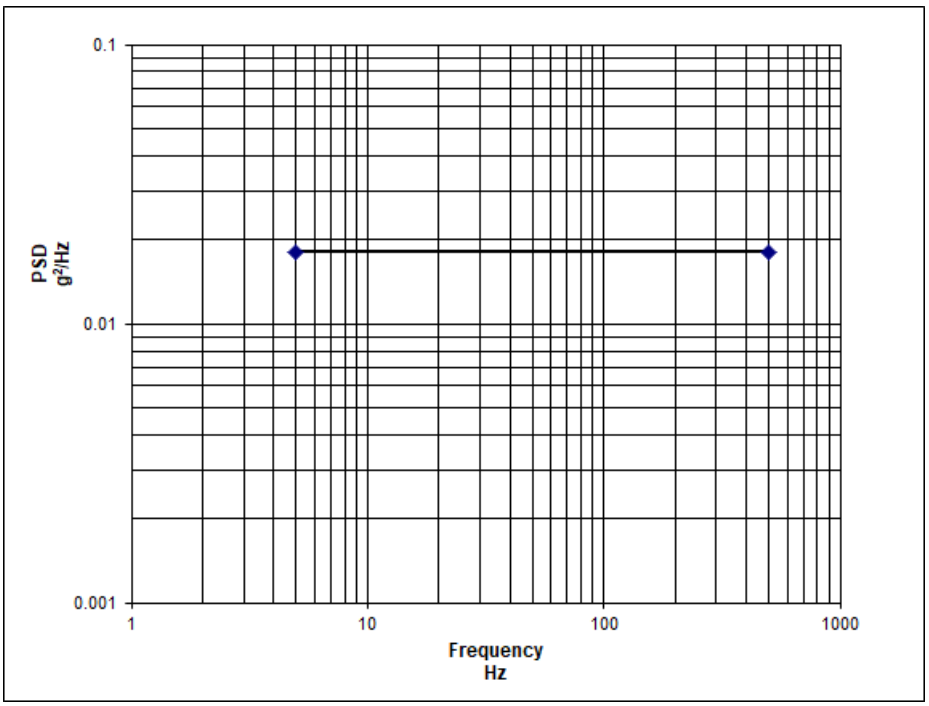


Figure 1.08.1.01 Random Vibration test curve

1.08.1.06 Test Procedure:

1. Confirm the system function with specific test programs at room temperature.
2. Set up the EUT on vibration table in operation mode and run the specific test program.
3. Set the test condition of vibration to the vibration simulator tester.
4. Run the test condition for 10 hours and check the EUT functions during the test.
5. Repeat steps 2 ~ 4 in X, Y and Z three different axis.
6. Inspection EUT mechanical function has met specification.
7. Running specific test program for system function check.

1.08.1.07 Evaluation Criteria:

Electronic function check:

1. All system functions must be checked with appropriate testing programs and should pass the inspection.

Mechanical function check:

1. The cover and connectors should work properly without any interference.
2. All screws should be tightened up appropriately.
3. All gaps on the surface are appropriately.
4. The assembling/disassembling of the system enclosure or mechanical parts must be smooth, and no deformed parts should be found.

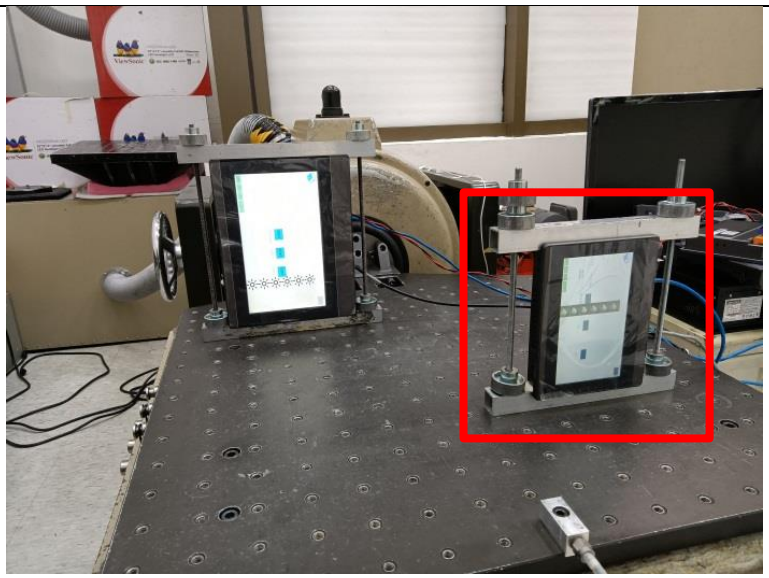
1.08.1.08 Test Result:

1. There is no damage in electronic and mechanical functions.
2. Degradation has not been found.
3. Performance is maintained with no incurable physical damage or degradation.

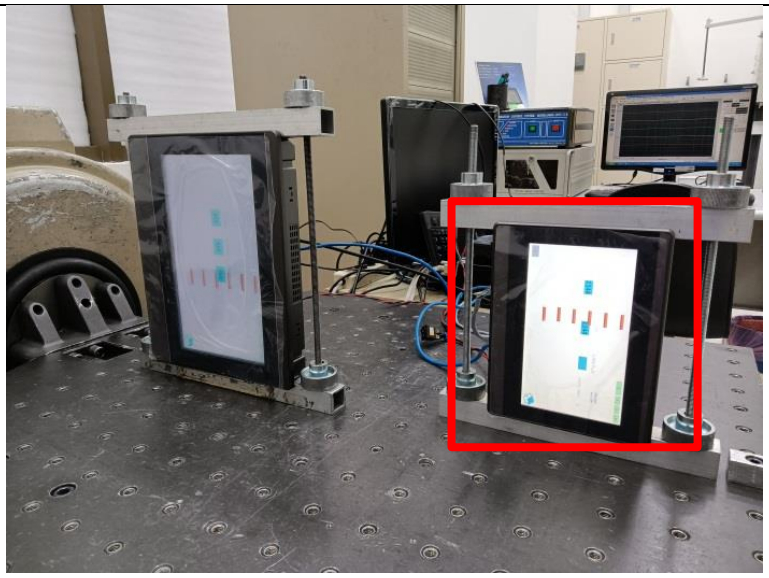
1.08.1.09 Conclusion:

Passed

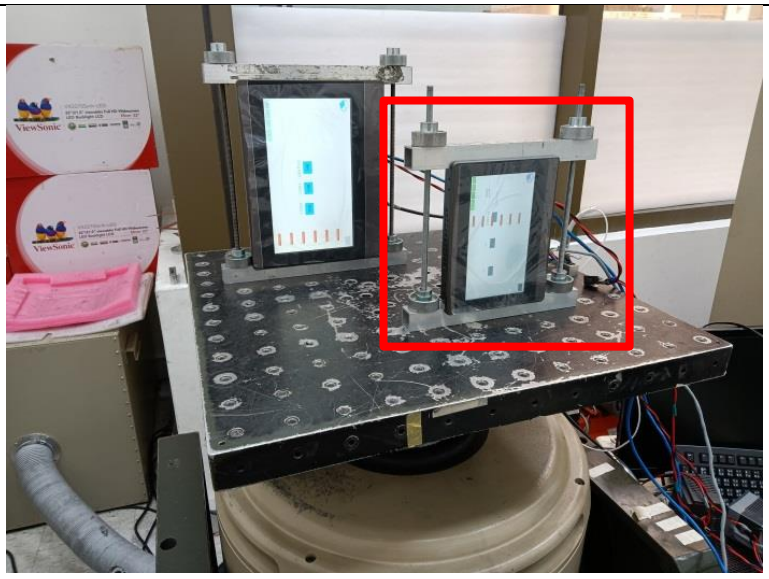
Photo:



X axis



Y axis



Z axis

1.09 Non-operating Sine Vibration Test

Test Date: October 8, 2021
Test Site: Advantech QA Laboratory
Performed By: Focus Chang

1.09.1.01 Test Purpose:

Evaluate whether the product's mechanical is strength enough in the vibration test.

1.09.1.02 Test Standard:

Please refer to the following documents:
1. IEC 60068-2-6:2007 Testing procedures Test Fc: Vibration Sinusoidal Test

1.09.1.03 Test Equipment

1. Vibration simulator system
   KING DESIGN Co. LTD.
   Model: 9363EM-800F2K-40N120
   S / N: UC107142493
   Date of Calibration: 2020/11/12
   Next Calibration Date: 2021/11/11

1.09.1.04 Sample Configuration & Quantity Under Test:

Using one piece CRIT40724STF4B1 with the following options installed:	
1. MB Rev.	PT2070-22 V1.2 A101-2
- CPU	ARM NUC972DF71YC ARM9 32bit 300MHz 128MB LQFP216
- RAM	IC LY62L51216 TSOPII-44 512K X 16 BIT
- S/N	07I27GXSB02924 (QA1)
2. Storage	IC MX30LF1G18AC-TI NAND 1Gb X8 TSOP 48P
3. Power	Cermate DPS-30W-DC24
4. Panel	7" LED PANEL 400N 800X480(G) PN:96LEDK-L070WV40NX1
5. Touch	7" 4W RTP Touch Panel (P4T-G20-007) PN:XKDT-5734

1.09.1.05 Test Condition:

1. Test environment: Room temperature
2. Test displacement amplitude & acceleration: 4.4mm @ 5 ~15Hz; 2G @ 15 ~ 500Hz
3. Test Frequency: 5-500Hz
4. Test Velocity: 1 Octave / minute
5. Test Axis: X, Y and Z axes
6. Test Time: 1 hr per axis
7. OS: Windows Embeded System V4.0
8. Test software: Specific test programs. (Function check after testing)

Test Software as following
Cermate test program
#LCD
#Touch
#Network
#Serial port

9. Test Curve Figure 1.09.1.01

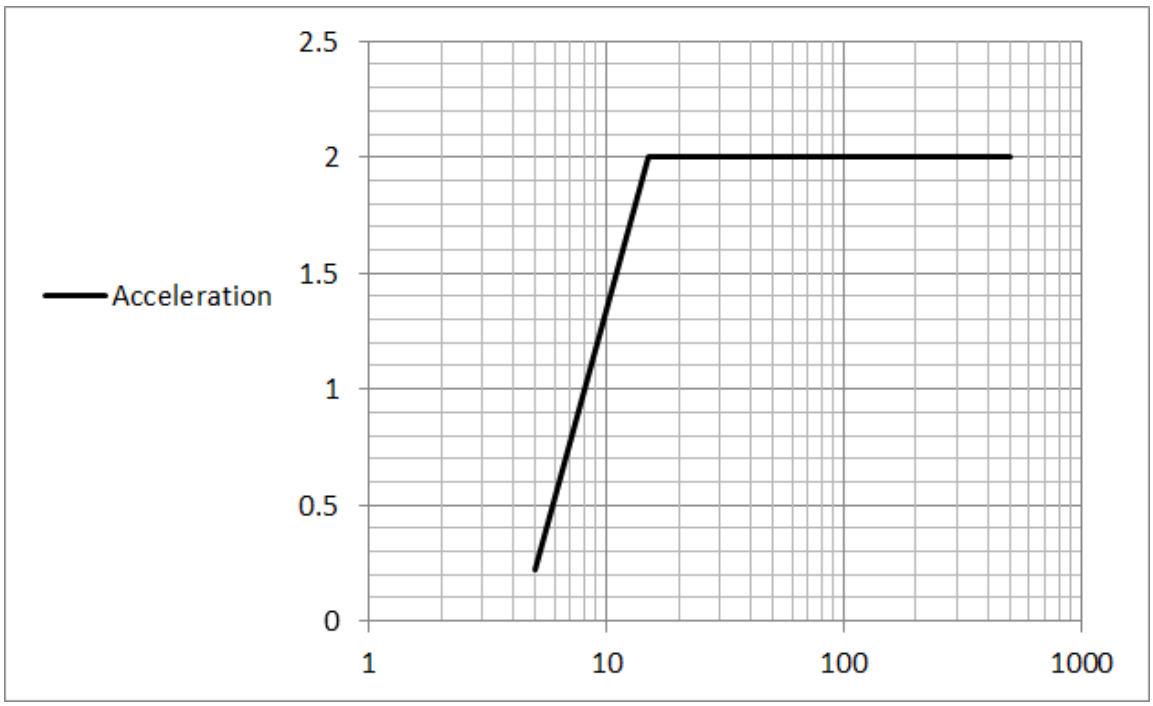


Figure 1.09.1.01 Sine vibration test curve

1.09.1.06 Test Procedure:

1. Confirm the system function with specific test programs at room temperature.
2. Set up the EUT on vibration table in non-operation mode.
3. Set the test condition of vibration to the vibration simulator tester.
4. Run the test condition for 1 hour.
5. Repeat steps 2 ~ 4 in X, Y and Z three different axes.
6. Inspection EUT mechanical function has met specification.
7. Running specific test program for system function check.

1.09.1.07 Evaluation Criteria:

1. There should be no abnormalities which could affect the product-specified functions and performance.
2. There should be no damage, wear, and deformation, scratches on the parts, circuit board or the case. Meanwhile, there should be no obvious change in the positional dimensions between the parts, which are all necessary for assuring product reliability.
3. There should be no trouble with the product-specified function and performance.
4. The switch buttons covers, and slot can work properly without any interference.
5. All screws are fastened up appropriately.
6. The heat sink should be fastened in the PCB appropriately.
7. The enclosure or mechanical parts must be smooth without any deformed parts.
8. There should be no risk of electric shock.
9. There must be no deformation-caused changes in insulating distances and no broken components.

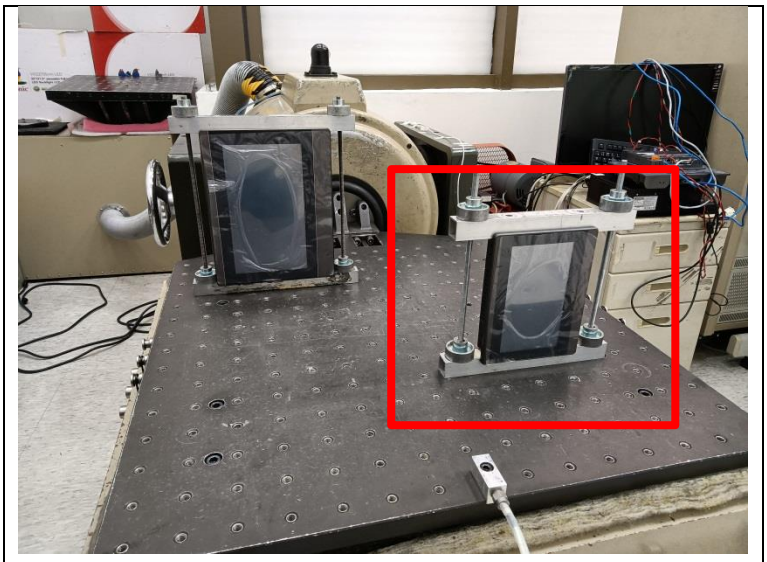
1.09.1.08 Test Result:

1. There is no damage in electronic and mechanical functions.
2. Degradation has not been found.
3. Performance is maintained with no incurable physical damage or degradation.

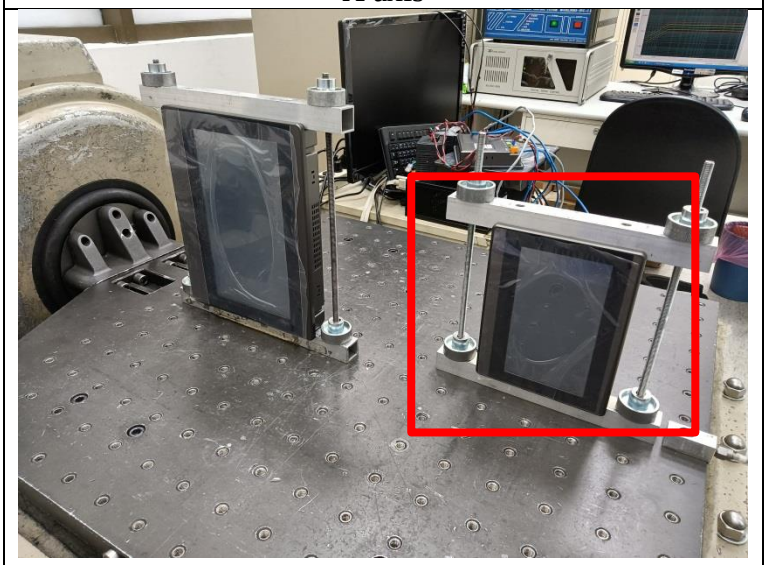
1.09.1.09 Conclusion:

Passed

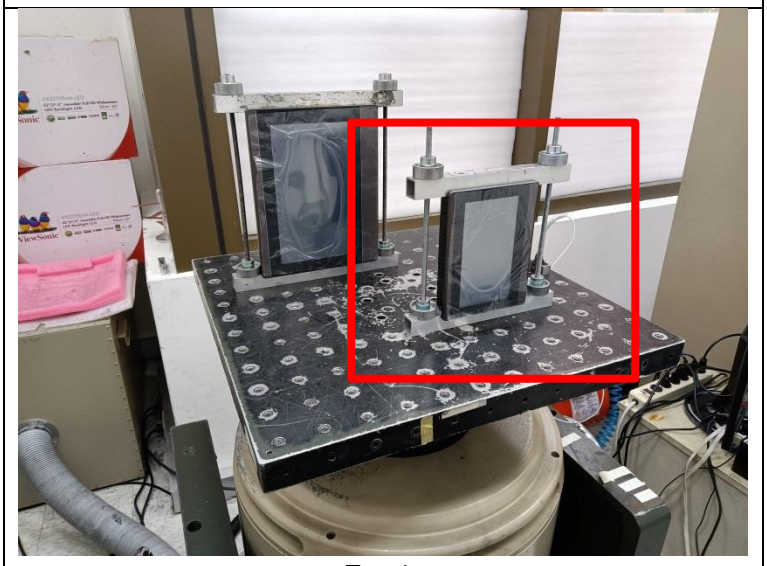
Photo:



X axis



Y axis



Z axis

1.10 Operating Shock Test

Test Date: October 8, 2021
Test Site: Advantech QA Laboratory (Linkou)
Performed By: Focus Chang

1.10.1.01 Test Purpose:

Evaluate whether the EUT functions are maintained in a stable condition when operating the product in the shock test.

1.10.1.02 Test Standard:

Please refer to the following documents:
1. IEC 60068-2-27:2008 Testing procedures Ea: Shock Test.

1.10.1.03 Test Equipment:

1. Vibration simulator system
   KING DESIGN Co. LTD.
   Model: 9363EM-800F2K-40N120
   S / N: UC107142493
   Date of Calibration: 2020/11/12
   Next Calibration Date: 2021/11/11

1.10.1.04 Sample Configuration & Quantity Under Test:

Using two pieces CRIT40724STF4B1 with the following options installed:	
1. MB Rev.	PT2070-22 V1.2 A101-2
- CPU	ARM NUC972DF71YC ARM9 32bit 300MHz 128MB LQFP216
- RAM	IC LY62L51216 TSOPII-44 512K X 16 BIT
- S/N	07I27GXSB02924 (QA1)
2. Storage	IC MX30LF1G18AC-TI NAND 1Gb X8 TSOP 48P
3. Power	Cermate DPS-30W-DC24
4. Panel	7" LED PANEL 400N 800X480(G) PN:96LEDK-L070WV40NX1
5. Touch	7" 4W RTP Touch Panel (P4T-G20-007) PN:XKDT-5734

1.10.1.05 Test Condition:

1. Test environment: Room temperature
2. Operation test:
   2.1 Test Pulse shape: Half sine wave
   2.2 Test Acceleration: 10G
   2.3 Test Pulse Duration: 11ms
3. Test side: Six sides
4. Test Times: Three times each side
5. OS: Windows Embeded System V4.0
6. Test software: Specific test programs

Test Software as following
Cermate test program
#LCD
#Touch
#Network
#Serial port

7. Test Environment Curve Figure 1.10.1.01

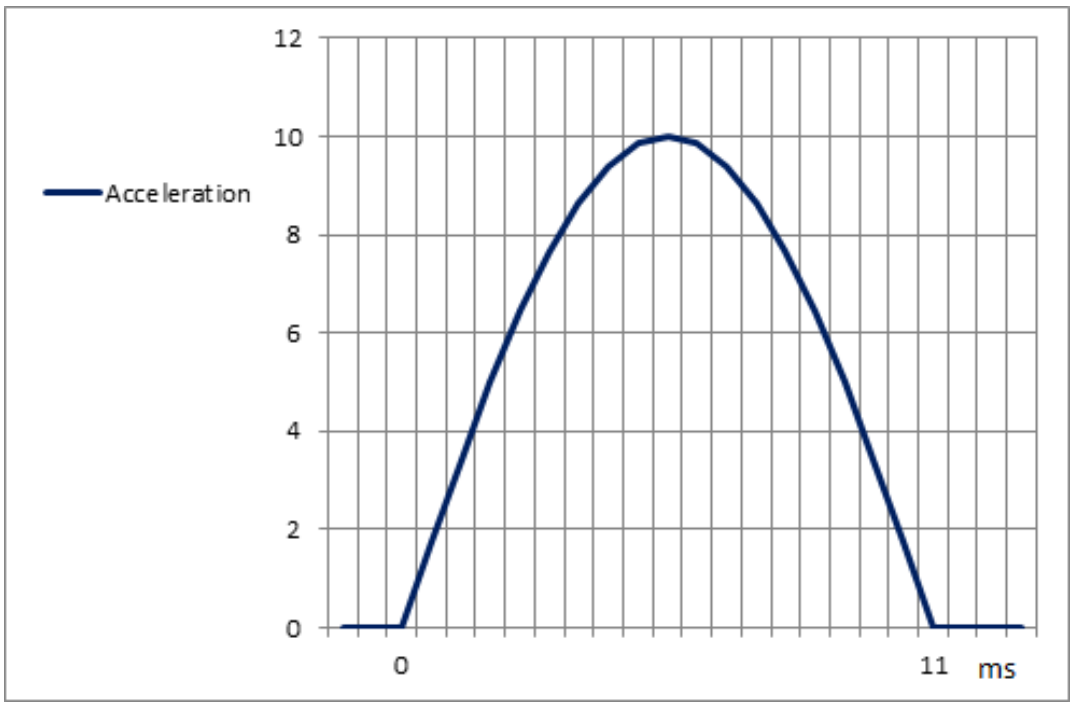


Figure 1.10.1.01 Operating Shock test curve

1.10.1.06 Test Procedure:

1. Confirm the system function with specific test programs at room temperature.
2. Set up the EUT on shock (or vibration) table in operation mode and run the specific test program.
3. Set the test condition of shock to the shock tester or vibration simulator tester.
4. Start the shock testing.
5. Shock three times for each face and confirm the EUT function during the testing.
6. Repeat steps 2 ~ 5 for the three axis with six faces shock test.
7. Inspection EUT mechanical functions have met specification.
8. Running specific test program for system function check.

1.10.1.07 Evaluation Criteria:

1. Temporary loss of function is allowed when providing the self-recoverable functions.
2. There should be no abnormalities which could affect the product-specified functions and performances.
3. In appearance, the product should have no damage, deformation, scratches, loosening of screws or other abnormality of the components or case (particularly for the boards and heat sink or plastic parts). In the mean time, there should be no obvious changes in the positional dimensions between the parts, all of above are necessary to assure the reliability of the product.
4. For the function and performance inspection, there should be no abnormality in the function and performance as specified for the product.
5. There must be no deformation-caused changes in insulating distances and no broken components.

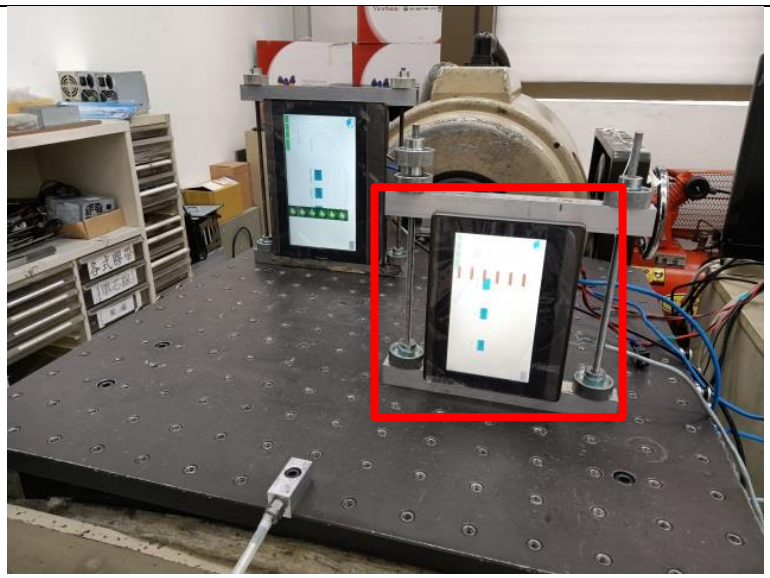
1.10.1.08 Test Result:

1. There is no damage in electronic and mechanical functions.
2. Degradation has not been found.
3. Performance is maintained with no incurable physical damage or degradation.

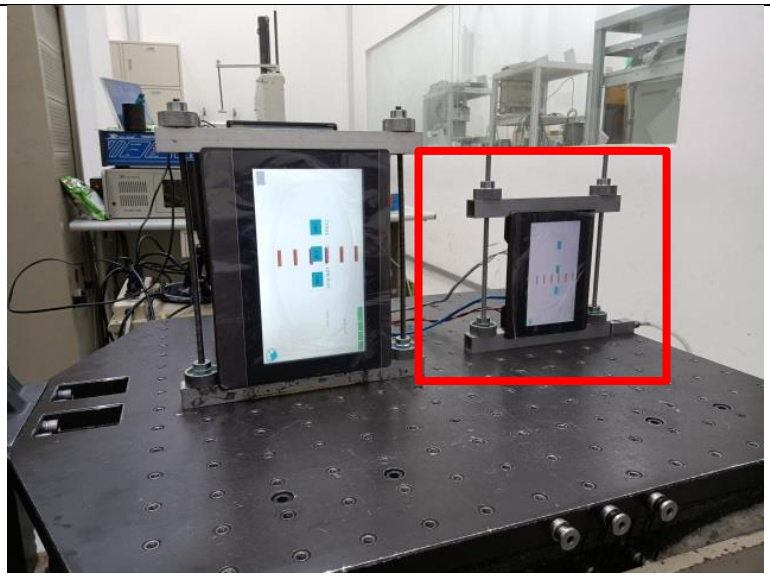
1.10.1.09 Conclusion:

Passed

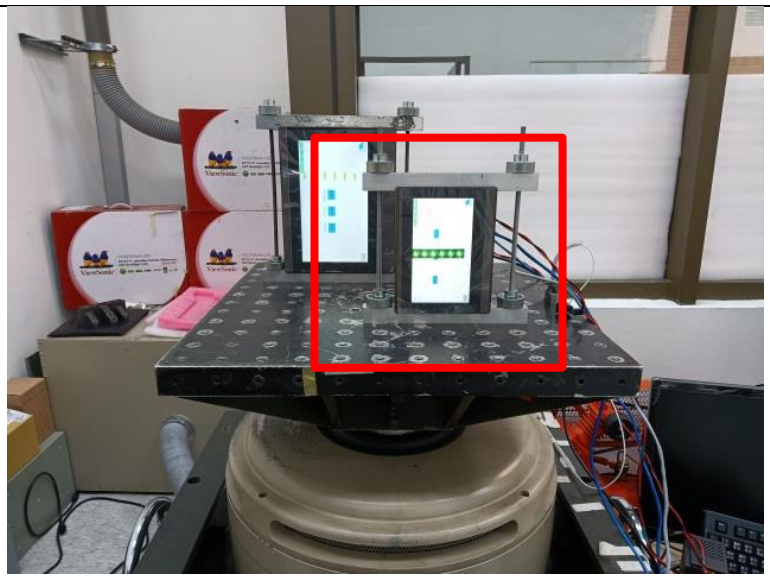
Photo:



±X axis



±Y axis



±Z axis

1.11 Package Drop Test

Test Date: August 19, 2021
Test Site: Advantech QA Laboratory
Performed By: Focus Chang

1.11.1.01 Test Purpose:

Evaluate whether the functions are maintained in a stable condition after transportation environment condition.

1.11.1.02 Test Standard:

Please refer to the following documents:
1. Federal Standard 101 Method 5007 Testing procedure B

1.11.1.03 Test Equipment:

1. Drop tester machine
   YOSHIDA SEIKI Co. LTD.
   Model: DT-100B

1.11.1.04 Sample Configuration & Quantity Under Test:

Using ten pieces CRIT40724STF4B1 with the following options installed.	
1. Carton	2100017539N010, Carton 410LX360WX270Hmm (I) ADV A(AB 16kg) Poki Paper Containers Co., Ltd.
2. PE Bag	2160000842, PE Bag 310Lx265Wx0.06Tmm AS pink KUNSHAN HUAXIN PACKAGING CO.,LTD
3. Box	2100015740T040, Box 260LX200WX70H mm (O) ADV SP Poki Paper Containers Co., Ltd.
4. EPE Foams	21CRP2Z-SH0-081, EPE Foam 177Lx70Wx55Hmm PT2070-Module Shenzhen Senhai Paper Packaging Co., Ltd.

1.11.1.05 Test Condition:

1. Test environment: Room temperature
2. Test corner: C2-3-5
3. Test edges: E2-3, E5-2, E5-3
4. Test faces: S5, S6, S4, S2, S1, S3
   (To measure the G value of Hard Disk or weak point)
5. Package Weight: 8.3 kg
6. Package Dimension: 48.0 ×32.0 × 30.9 (LxWxH/cm)
7. Test Height: 92 cm (refer to Table 1.11.1.01)
8. Test Drawing:

Table 1.11.1.01 Drop height for packed equipment

Mass	Drop height
0 kg < W < 9.5 kg	92 cm
9.5 kg < W < 23.5 kg	76 cm
23.5 kg < W < 46.5 kg	54 cm
46.5 kg < W < 68 kg	46 cm

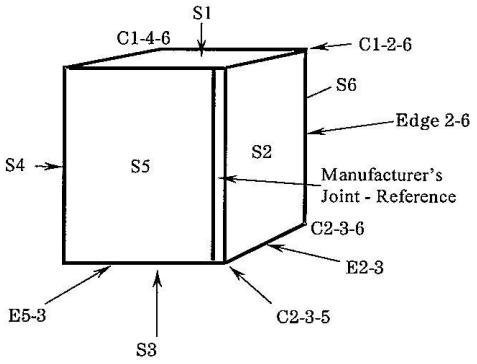


Figure 1.11.1.01 Packaged drop surface

1.11.1.06 Test Procedure:

1. Check the functions and appearance of the EUT.
2. In the position where the product hits the floor; all the dropping sequence should be listed according to the following steps. Also, the EUT should be dropped one time in one orientation.
3. Define package damage corner for the EUT, and set is C2-3-5.
4. The packaged is dropped once on each of the following Figure1.11.1.01
5. Dropping corner C2-3-5.
6. Dropping edge E2-3, E5-2, E5-3 (the shorter edge, the middle edge, the longer edge).
7. Dropping surface S5, S6, S4, S2, S1, S3 (front, rear, left, right, top, bottom)
8. Inspection EUT mechanical function has met specification.
9. Running specific test programs for system function check.

1.11.1.07 Evaluation Criteria:

1. There should be no abnormalities which could affect the product-specified functions and performance.
2. There should be no damage, wear, and deformation, scratches on the parts, circuit board or the case. Meanwhile, there should be no obvious change in the positional dimensions between the parts, which are all necessary for assuring product reliability.
3. There should be no trouble with the product-specified function and performance.
4. The switch buttons covers, and slot can work properly without any interference.
5. The enclosure or mechanical parts must be smooth without any deformed parts.
6. There must be no deformation-caused changes in insulating distances and no scattering of broken components.

1.11.1.08 Test Result:

1. There is no damage in electronic and mechanical functions.
2. Degradation has not been found.
3. Performance is maintained with no incurable physical damage or degradation.

1.11.1.09 Conclusion:

Passed

Photo:

 Structure photo	 Package drop test for corner
 Structure photo	 Package drop test for edges
 Structure photo	 Package drop test for faces

1.12 Waterproof & Dust Test

Test Date: October 28, 2021; December 2, 2021
Test Site: Advantech QA Laboratory
Performed By: Focus Chang

1.12.1.01 Test Purpose:

Evaluate whether the EUT can resist water and dust condition.

1.12.1.02 Test Standard:

Please refer to the following documents:
1. Reference IEC60529 Edition 2.1: 2001-02

1.12.1.03 Test Equipment:

1. Dust Tester chamber
   T-MACHINE
   Model: TMJ-9723C
   S/N: T-23-140205
   Date of Calibration: 2021/06/03
   Next Calibration date: 2022/06/02
2. Water Jet Hose Nozzle Set
   T-MACHINE
   Model: TMJ-9710C
   S/N: T-10-140204
   Date of Calibration: 2021/07/14
   Next Calibration date: 2022/07/13

1.12.1.04 Sample Configuration & Quantity Under Test:

Using one piece CRIT40724STF4B1 with the following options installed:	
1. MB Rev.	PT2070-22 V1.2 A101-2
- CPU	ARM NUC972DF71YC ARM9 32bit 300MHz 128MB LQFP216
- RAM	IC LY62L51216 TSOPII-44 512K X 16 BIT
- S/N	07I27GXSB02924 (QA1)
2. Storage	IC MX30LF1G18AC-TI NAND 1Gb X8 TSOP 48P
3. Power	Cermate DPS-30W-DC24
4. Panel	7" LED PANEL 400N 800X480(G) PN:96LEDK-L070WV40NX1
5. Touch	7" 4W RTP Touch Panel (P4T-G20-007) PN:XKDT-5734

1.12.1.05 Test Condition:

1. Dust test (IEC60529 IP6X)
   1-1. System condition: Non-operating
   1-2. Test area: whole system
   1-3. Dust: Talcum powder
   1-4. The amount of dust: 2kg/m³
   1-5. Maximum depression is 2KPa (20Mbar)
   1-6. The duration of the test is 8 hours.
   1-7. Lab environmental: 25℃ / 50±20%RH

2. Water proof test (IEC 60529 IPX6)
   2-1. System condition: Non-operating
   2-2. Test area: whole system
   2-3. Internal diameter of the nozzle: 12.5mm

2-4. Delivery rate: 100 L/min ±5%
2-5. Distance from nozzle to enclosure surface: Between 2.5m and 3 m.
2-6. Test duration: 1 minute / front side.
2-7. Lab environmental: 25℃ / 50±20%RH

1.12.1.06 Evaluation Criteria:

1. No dust allowed entering the enclosure.
2. No water allowed entering the enclosure.

1.12.1.07 Test Result:

There is no dust and water inside the enclosure after IP66 test.

1.12.1.08 Conclusion:

Passed

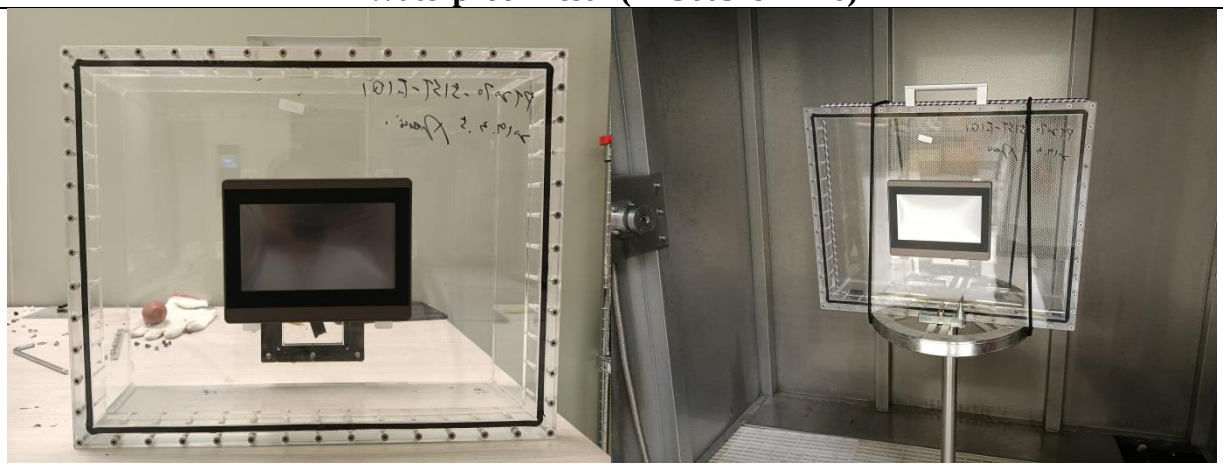
Photo:

Dust Test (IEC60529 IP6X)

EUT set up for dust test

EUT internal status after dust test

Waterproof Test - (IEC60529 IPX6)



EUT set up for waterproof test

EUT internal status after waterproof test