



## Reliability Report

Report Reference No.....: WH-REL-S2112101-1

Tested by (name + signature) .....: Mark Lai

Mark Lai

Approved by (name + signature) .....: Tony H.

Tony H.

Date of issue.....: 2021-10-20

Contents .....: 25 pages

### Testing laboratory

Name .....: WH Technology Corp.

Address.....: 7F., No.262, Sec. 3, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)

Testing location.....: No.67-22, Baoxin St., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)

### Applicant

Name .....: Cermate Technologies Inc

Address.....: 7F.-1, No.168, Liancheng Rd. Zhonghe Dist., New Taipei City 235, Taiwan (R.O.C.)

### Test item

Description.....: ES Box

Model and/or type reference.....: ES22-H1A02-P1R1/ ES20-H1A02-P1R1

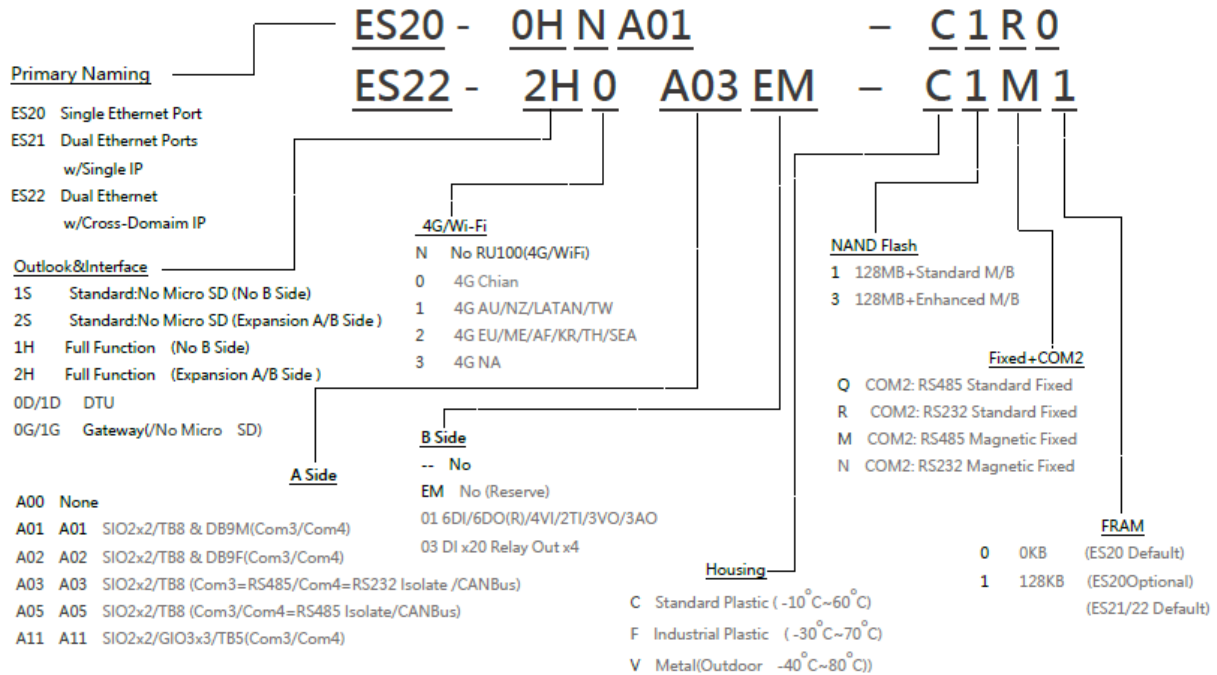
Trade name .....: N.A.



## List of Attachments (including a total number of pages in each attachment):

- Photos documentation (2 pages)

### ES Naming Rule





## Test Item

No.	Test Item	Test specification	Result	Remark
1	Hight temperature operation test	+85°C, 24hrs	Pass	
2	Low temperature operation test	-45°C, 24hrs	Pass	
3	Humidity test	+40°C 95%Rh, 48hrs	Pass	
4	High temperature & humidity storage test	+60°C 95%Rh, 24hrs	Pass	
5	High temperature storage test	+85°C, 24hrs	Pass	
6	Low temperature storage test	-45°C, 24hrs	Pass	
7	Thermal shock test	+85°C, 2hrs -45°C, 2hrs 10 cycles	Pass	
8	Power ON/OFF test	+85°C -45°C	Pass	
9	Cold start test	-45°C	Pass	
10	Thermal step stress test	Max.+100°C Min. -45°C	Pass	



## High Temperature Operation Test

**1. Test Date:** Oct. 06~07, 2021

**2. EUT:** ES Box

**3. Test equipment :** Programmable Temperature & Humidity Chamber

**Model:**JY-S-225L

**S/N**850140

**Data of Calibration:**2021/04/10

**4. Test Standard:** Reference IEC60068-2-2:2007 Testing procedures

Test item: Dry Heat Test

**5. Test Condition:**

1. Test Temperature: 85°C

2. Test Times: 24 hrs

3. Test Software: Running burning test program.(Serial signal self communication, test confirms that the communication signal and display are normal)

**6. Performance Criteria:**

Electronic function check:

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

Running program system should not have degradation in performance.

Mechanical function check:

1. The connectors and components should work properly without any interference.

2. All screws should be tightened up appropriately.

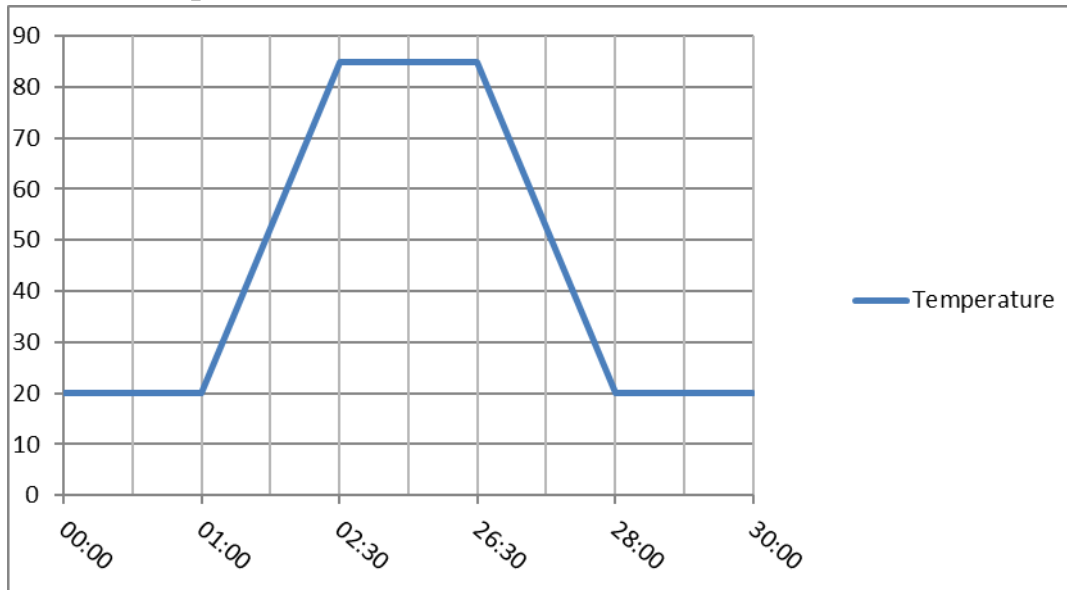
**7. Test Result:**

There is no damage in electronic and mechanical functions. Degradation has not been found.

Performance is maintained with no incurable physical damage or degradation



**8. Temperature**



**9. Test By: Mark Lai**



## Low Temperature Operation Test

**1. Test Date:** Oct 07~08, 2021

**2. EUT:** ES Box

**3. Test equipment :** Programmable Temperature & Humidity Chamber

**Model:**JY-S-225L

**S/N**850140

**Data of Calibration:**2021/04/10

**4. Test Standard:** Reference IEC60068-2-1:2007 Testing procedures

Test item: Cold Test

**5. Test Condition:**

1. Test Temperature: -45°C

2. Test Times: 24hrs

3. Test Software: Running burning test program.(Serial signal self communication, test confirms that the communication signal and display are normal)

**6. Performance Criteria:**

Electronic function check:

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

Running program system should not have degradation in performance.

Mechanical function check:

1. The connectors and components should work properly without any interference.

2. All screws should be tightened up appropriately.

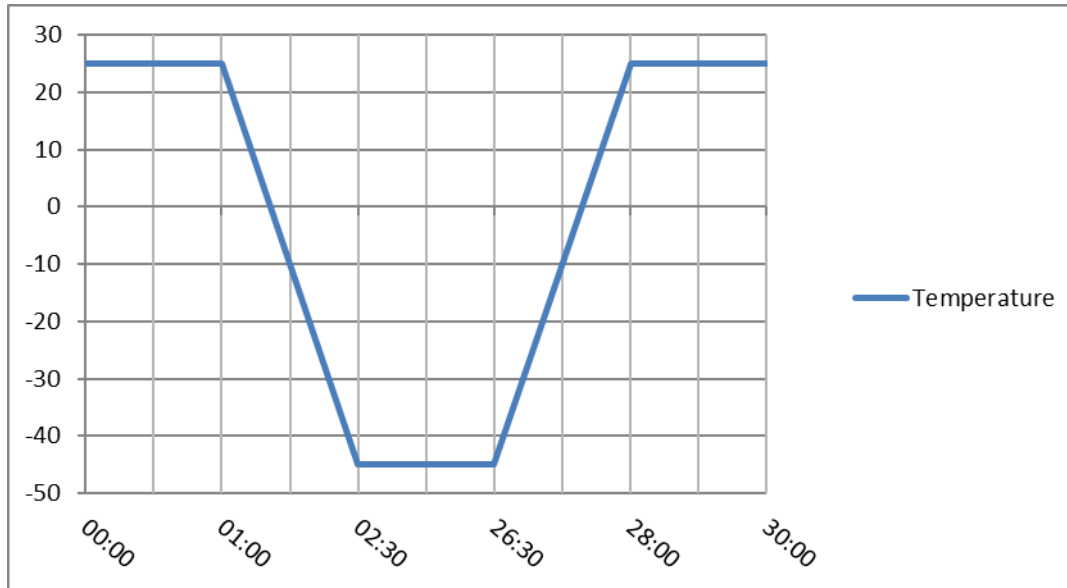
**7. Test Result:**

There is no damage in electronic and mechanical functions. Degradation has not been found.

Performance is maintained with no incurable physical damage or degradation.



**8. Temperature**



**9. Test By: Mark Lai**



## Humidity Test

**1. Test Date:** Oct 9~11, 2021

**2. EUT:** ES Box

**3. Test equipment :** Programmable Temperature & Humidity Chamber

**Model:**JY-S-225L

**S/N**850140

**Data of Calibration:**2021/04/10

**4. Test Standard:** Reference IEC60068-2-78:2012 Testing procedures

Test Cab: Damp Heat steady state Test

**5. Test Condition:**

1. Test Temperature : 40°C

2. Test Humidity: 95%

3. Test Times: 48 hrs

4. Test Software: Running burnin test program in RTOS.(Serial signal self communication, test confirms that the communication signal and LCD display are normal)

**6. Performance Criteria:**

Electronic function check:

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

Running program system should not have degradation in performance.

Mechanical function check:

3. The connectors and components should work properly without any interference.

4. All screws should be tightened up appropriately.

**7. Test Result:**

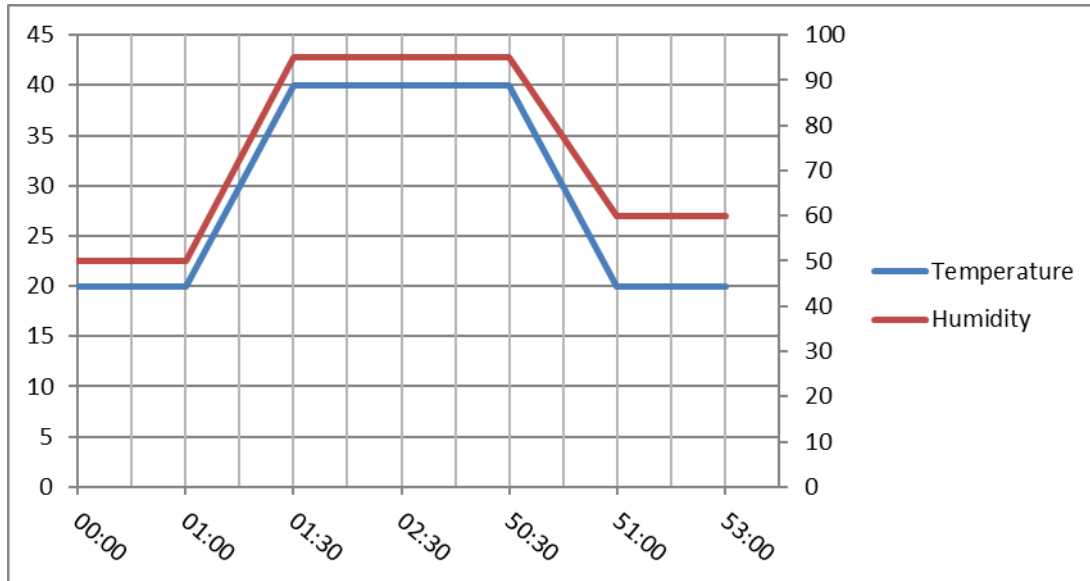
There is no damage in electronic and mechanical functions. Degradation has not been found.

Performance is maintained with no incurable physical damage or degradation.





**8. Temperature & humidity**



**9. Test By: Mark Lai**



## High Temp. & Humidity Storage Test

**1. Test Date:** Oct 11~12, 2021

**2. EUT:** ES Box

**3. Test equipment :** Programmable Temperature & Humidity Chamber

**Model:**JY-S-225L

**S/N**850140

**Data of Calibration:**2021/04/10

**4. Test Standard:** Reference IEC60068-2-78:2012 Testing procedures

Test Cab: Damp Heat Steady State Test

**5. Test Condition:**

1. Test Temperature : 60°C

2. Test Humidity: 95%

3. Test Times: 24 hrs

4. Test Software: Running burnin test program in RTOS.(Serial signal self communication, test confirms that the communication signal and LCD display are normal)

**6. Performance Criteria:**

Electronic function check:

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

Running program system should not have degradation in performance.

Mechanical function check:

5. The connectors and components should work properly without any interference.

6. All screws should be tightened up appropriately.

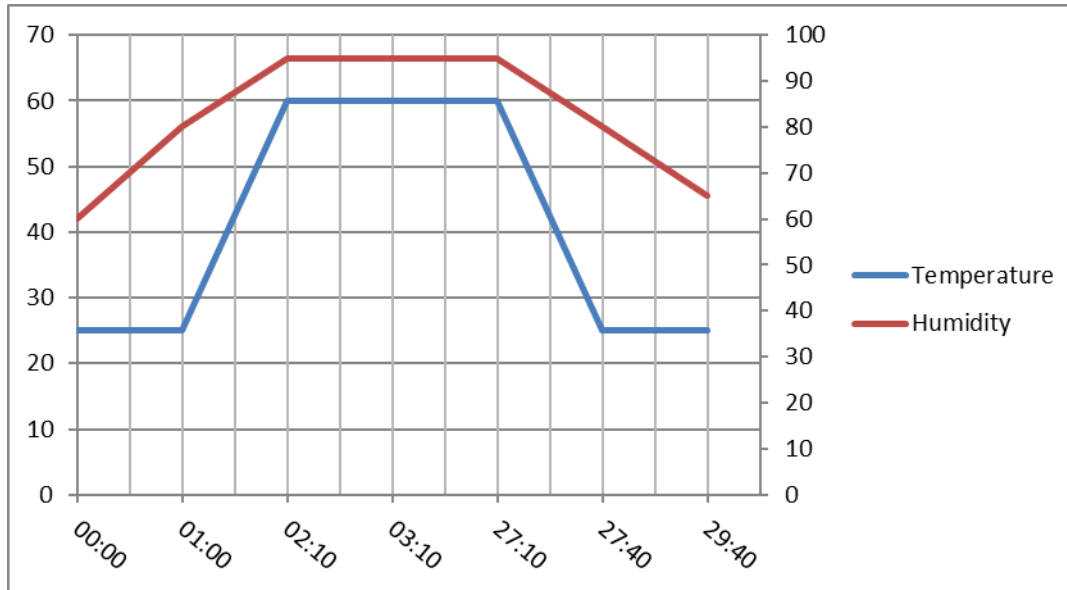
**7. Test Result:**

There is no damage in electronic and mechanical functions. Degradation has not been found.

Performance is maintained with no incurable physical damage or degradation.



**8. Temperature & humidity**



**9. Test By: Mark Lai**



## High Temp. Storage Test

**1. Test Date:** Oct 12~13, 2021

**2. EUT:** ES Box

**3. Test equipment :** Programmable Temperature & Humidity Chamber

**Model:**JY-S-225L

**S/N**850140

**Data of Calibration:**2021/04/10

**4. Test Standard:** Reference IEC60068-2-2:2007 Testing procedures

Test item: Dry Heat Test

**5. Test Condition:**

1. Test Temperature : 85°C

2. Test Times: 24 hrs

3. Test Software: Running burnin test program in RTOS.(Serial signal self communication, test confirms that the communication signal and LCD display are normal)

**6. Performance Criteria:**

Electronic function check:

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

Running program system should not have degradation in performance.

Mechanical function check:

1. The connectors and components should work properly without any interference.

2. All screws should be tightened up appropriately.

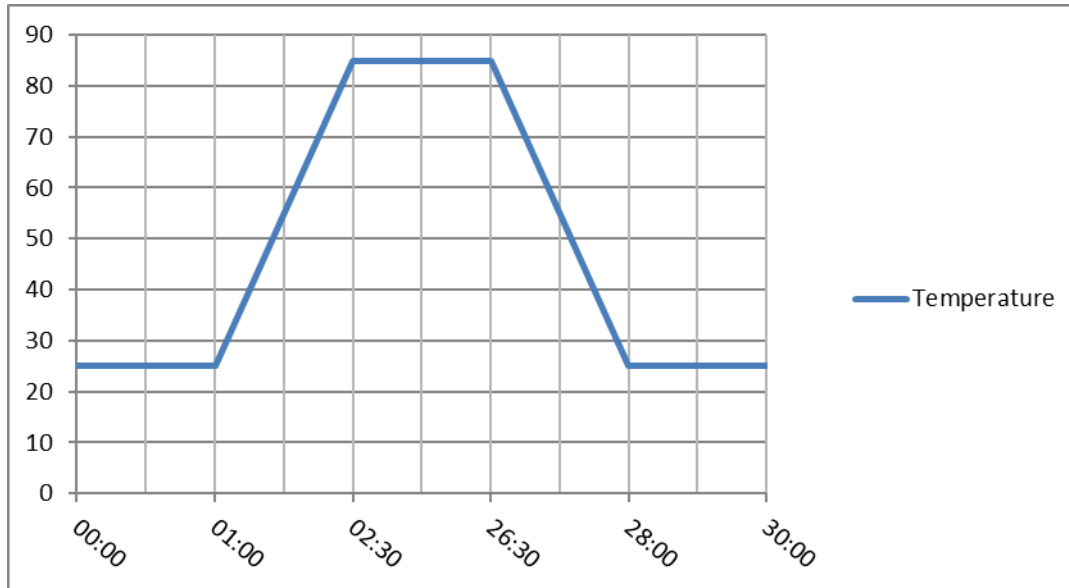
**7. Test Result:**

There is no damage in electronic and mechanical functions. Degradation has not been found.

Performance is maintained with no incurable physical damage or degradation.



**8. Temperature**



**9. Test By: Mark Lai**



## Low Temp. Storage Test

**1. Test Date:** Oct 13~14, 2021

**2. EUT:** ES Box

**3. Test equipment :** Programmable Temperature & Humidity Chamber

**Model:**JY-S-225L

**S/N**850140

**Data of Calibration:**2021/04/10

**4. Test Standard:** IEC60068-2-1:2007 Testing procedures

Test Ab: Cold Test

**5. Test Condition:**

1. Test Temperature : -45°C

2. Test Times: 24 hrs

3. Test Software: Running burnin test program in RTOS.(Serial signal self communication, test confirms that the communication signal and LCD display are normal)

**6. Performance Criteria:**

Electronic function check:

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

Running program system should not have degradation in performance.

Mechanical function check:

1. The connectors and components should work properly without any interference.

2. All screws should be tightened up appropriately.

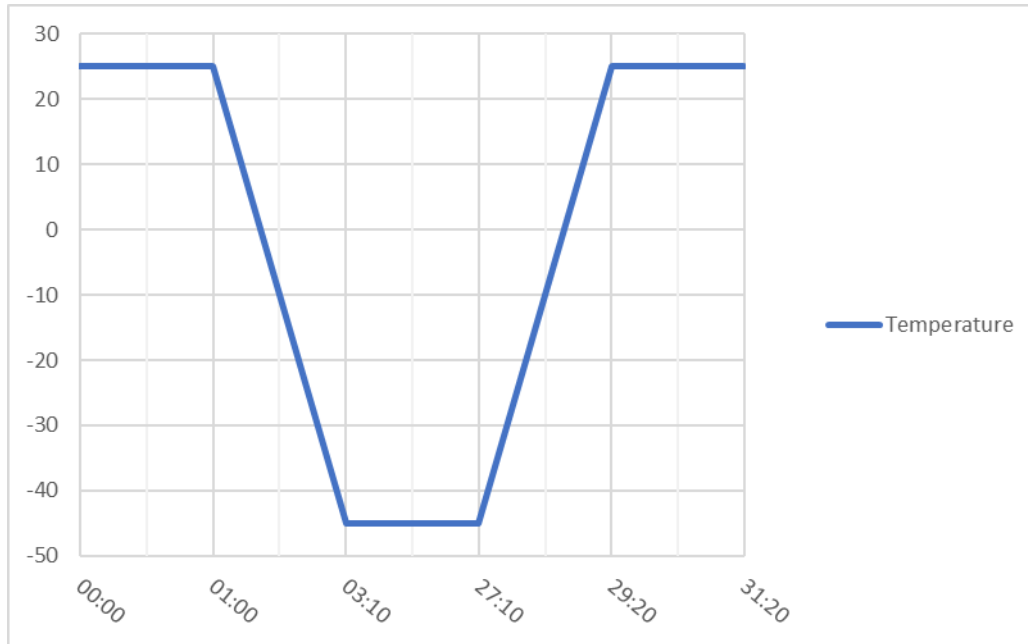
**7. Test Result:**

There is no damage in electronic and mechanical functions. Degradation has not been found.

Performance is maintained with no incurable physical damage or degradation.



**8. Temperature**



**9. Test By: Mark Lai**



## Thermal Shock Test

**1. Test Date:** Oct. 14~15, 2021

**2. EUT:** ES Box

**3. Test equipment :** Programmable Temperature & Humidity Chamber

**Model:**JY-S-225L

**S/N**850140

**Data of Calibration:**2021/04/10

**4. Test Standard:** Reference to the IEC 60068-2-14:2009 testing procedures

Test N: Change of temperature.

### **5. Test Condition:**

Test mode: Operation

1. Test Software: Running burning test program.(Serial signal self communication, test confirms that the communication signal and display are normal)

2. Test High Temperature: 85°C

3. Test Low Temperature: -45°C

4. Test dwell time: 2 hrs

5. Temperature slope: 10°C/minute

6. Test cycle: 10 cycles

### **6. Performance Criteria:**

Electronic function check:

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

Mechanical function check:

1. The connectors and components should work properly without any interference.

2. All screws should be tightened up appropriately.

### **7. Test Result:**

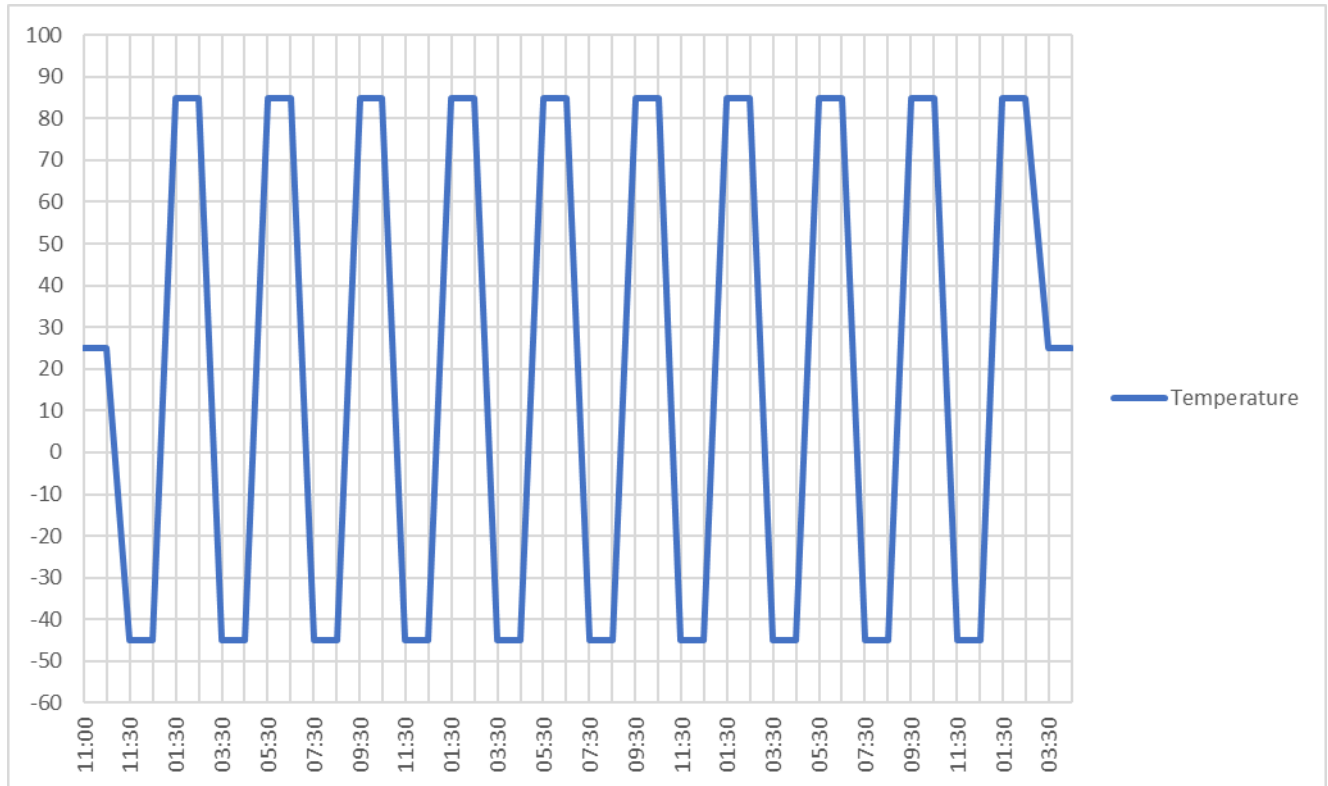
There is no damage in electronic and mechanical functions. Degradation has not been found.

Performance is maintained with no incurable physical damage or degradation





**8. Temperature**



**9. Test By: Mark Lai**



## Power ON/OFF Test

1. **Test Date:** Oct 15~16, 2021

2. **EUT:** ES Box

3. **Test equipment :** Programmable Temperature & Humidity Chamber

**Model:**JY-S-225L

**S/N**850140

**Data of Calibration:**2021/04/10

4. **Test Standard:** Reference IEC60068-2-2:2007 Testing procedures

Test Bb: Dry Heat Test

Reference IEC60068-2-1:2007 Testing procedures

Test Ab: Cold Test.

### 5. Test Condition:

1. Test Temperature: High temperature 85°C / Low temperature -45°C

2. Power ON / OFF time interval: On 0.5 minute, off 0.5 minute at high temperature On 0.5 minute, off 0.5 minute at low temperature

3. Number of test: 1000 times for each temperature

4. Test program: power counter program for RTOS

5. Test mode: AT

6. Power ON / OFF time interval curve:

### 6. Performance Criteria:

Electronic function check:

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

Mechanical function check:

1. The connectors and components should work properly without any interference.

2. All screws should be tightened up appropriately.

### 7. Test Result:

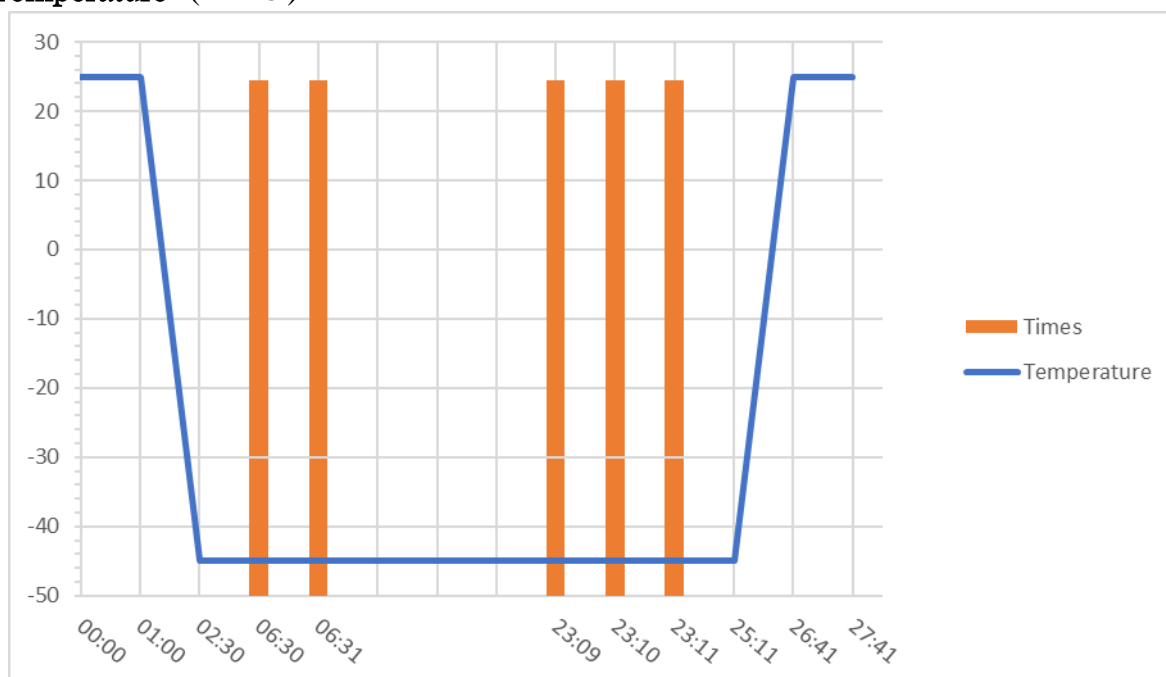
There is no damage in electronic and mechanical functions. Degradation has not been found.

Performance is maintained with no incurable physical damage or degradation



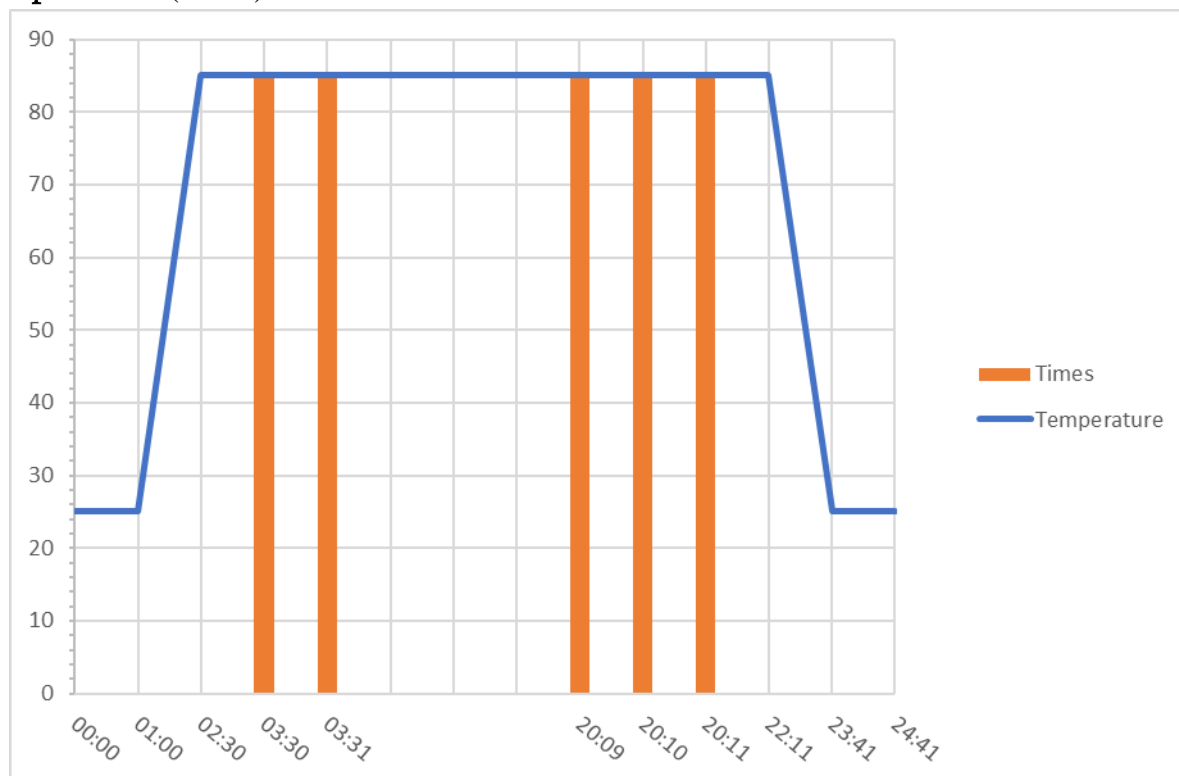
Test temperature	Test times	Test Result
-45 °C	1000 times	1000 times passed
85 °C	1000 times	1000 times passed

## 8. Temperature (-45°C)





## Temperature (85°C)



**9.Test By: Mark Lai**



## Cold Start Test

1. **Test Date:** Oct 16~17, 2021
2. **EUT:** ES Box
3. **Test equipment :** Programmable Temperature & Humidity Chamber  
**Model:**JY-S-225L  
**S/N**850140  
**Data of Calibration:**2021/04/10

4. **Test Standard:** Reference IEC60068-2-1:2007 Testing procedures  
Test Ab: Cold Test

### 5. Test Condition:

1. Test Temperature: -45°C
2. Storage times: 4 hrs
3. Power ON / OFF time interval: On 1 minute, off 1hour
4. Number of test: 20 times
5. System OS: RTOS
6. Power ON / OFF time interval curve

### 6. Performance Criteria:

Electronic function check:

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

Mechanical function check:

3. The connectors and components should work properly without any interference.
4. All screws should be tightened up appropriately.

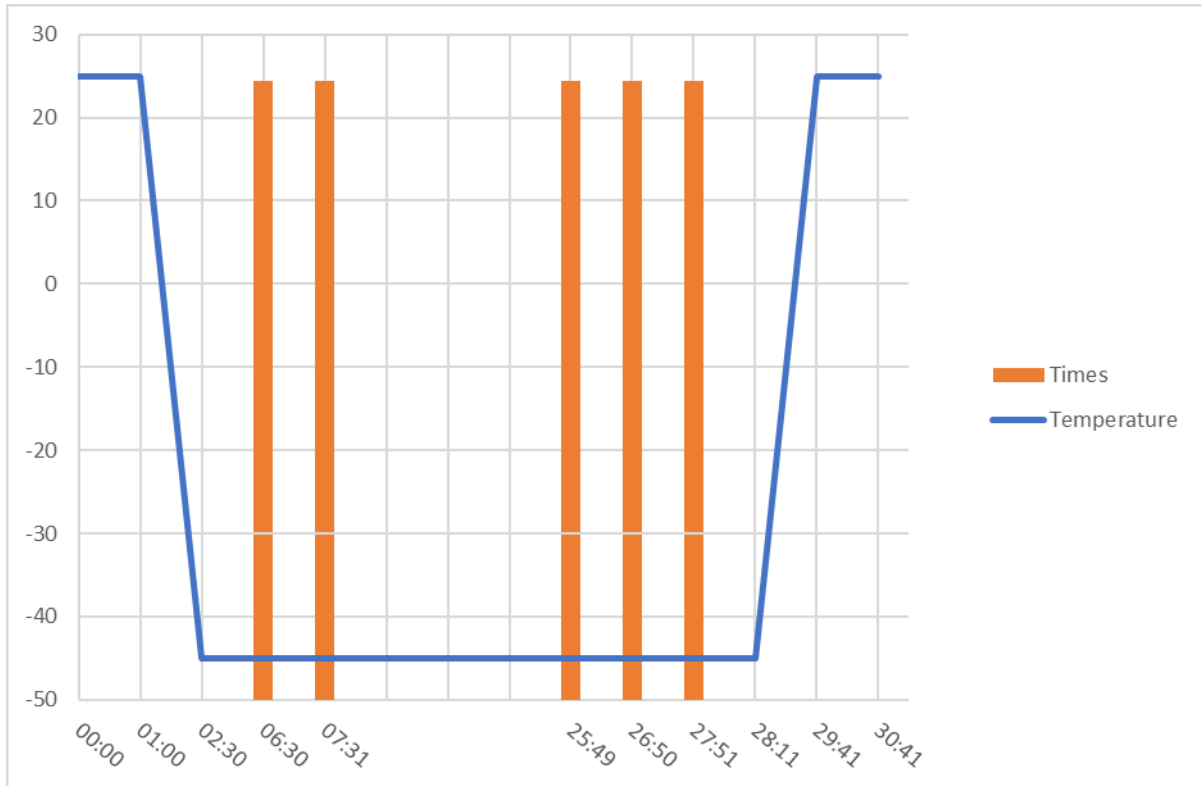
### 7. Test Result:

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

Test temperature	Test times	Test Result
-45 °C	20 times	20 times passed



**8. Temperature**



**9. Test By: Mark Lai**



## Thermal Step Stress Test

1. **Test Date:** Oct 18, 2021
2. **EUT:** ES Box
3. **Test equipment :** Programmable Temperature & Humidity Chamber  
Model: JY-S-225L  
S/N850140  
Data of Calibration: 2021/04/10

4. **Test Standard:** Reference to the Advantech HALT procedure.

5. **Test Condition:**

To find the temperature upper/lower operational limit

1. High temperature: 60C~ XX C ( the highest to 100C)
2. Low temperature: -10C~-XX C ( the lowest to -45C )
3. Temperature step scale: 10C each level
4. Power ON/OFF test 1 time for each temperature
5. Dwell time: 1 hour each level
6. Temperature gradient: 0.5C/min
7. Test Software: Running burnin test program in RTOS.(Serial signal self communication, test confirms that the communication signal and LCD display are normal)

6. **Performance Criteria:**

Electronic function check:

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

Mechanical function check:

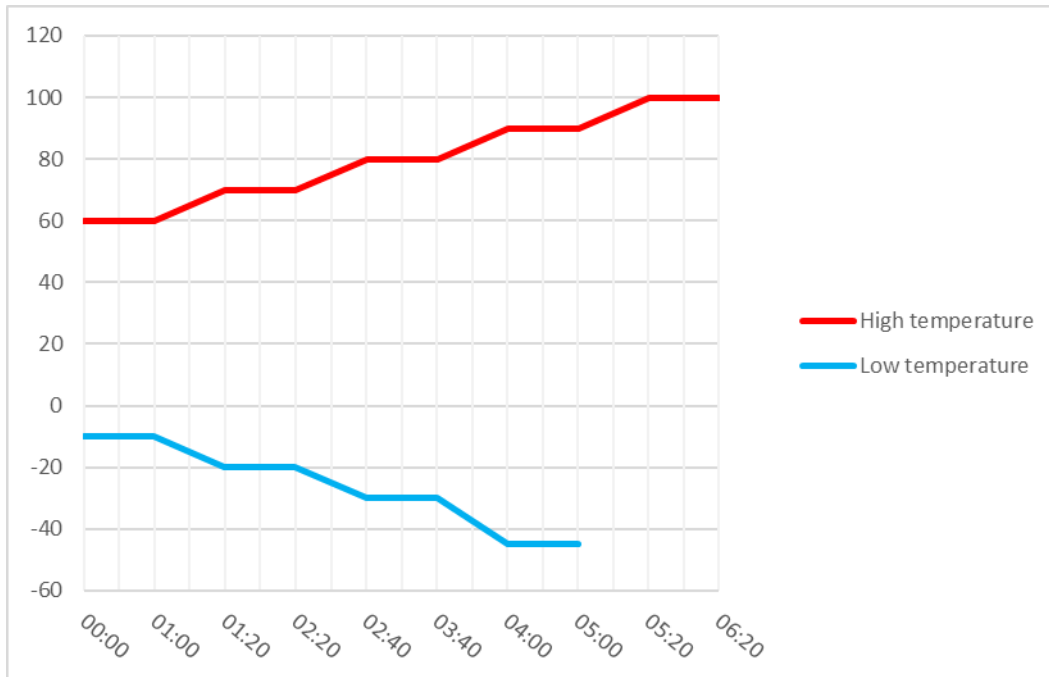
1. The connectors and components should work properly without any interference.
2. All screws should be tightened up appropriately.

7. **Test Result:**

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



## 8. Temperature



## 9. Test By: Mark Lai





PHOTOS

