

# High- and Low-Temperature Operation Testing

## Preface

MAXMAC operates ion modules under defined cold and hot conditions and records their functional and physical condition. Each stage combines powered operation, a temperature record, natural recovery to room temperature and functional inspection.

Six samples, 25#-30#, completed  $-40\text{ }^{\circ}\text{C}$  and  $+85\text{ }^{\circ}\text{C}$  operating stages, each lasting 48 hours in working mode 3.2. Both stages received a passing judgment. This note links the setup, operating sequence, original curves and sample photographs to the recorded results.

## Operating Conditions

| Parameter    | Cold operation                      | Hot operation                       |
|--------------|-------------------------------------|-------------------------------------|
| Temperature  | $-40 \pm 2\text{ }^{\circ}\text{C}$ | $+85 \pm 2\text{ }^{\circ}\text{C}$ |
| Hold time    | 48 hours                            | 48 hours                            |
| Module state | Powered; mode 3.2                   | Powered; mode 3.2                   |
| Samples      | 25#-30#; 6 pcs                      | 25#-30#; 6 pcs                      |

## Cold and Hot Operating Sequences

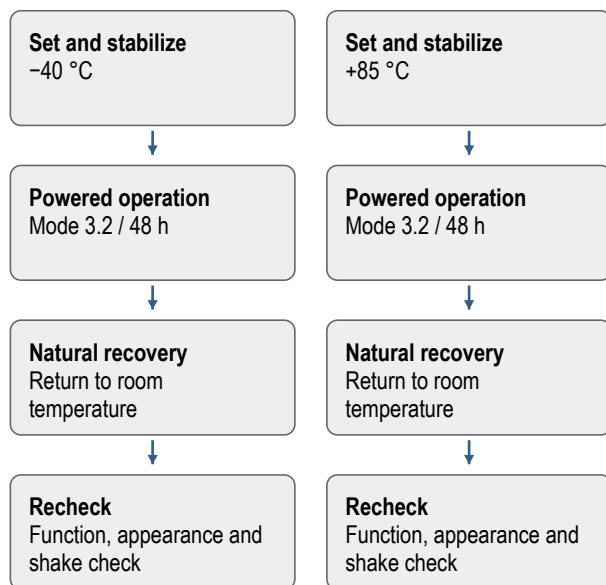
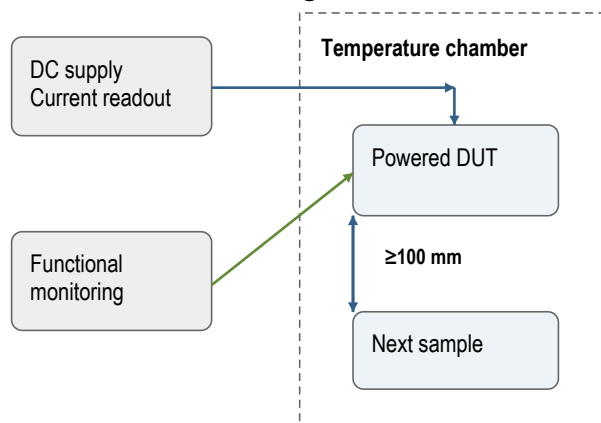


Figure 1 Cold and hot operating stages, each with its own 48-hour hold and recovery sequence.

**Cold-stage ion output:** stand for more than 2 hours and allow condensation to evaporate before ion-output measurement.

## Powered Test Arrangement



Also  $\geq 100\text{ mm}$  from chamber walls

Figure 2 Powered module connections and specified sample clearances.

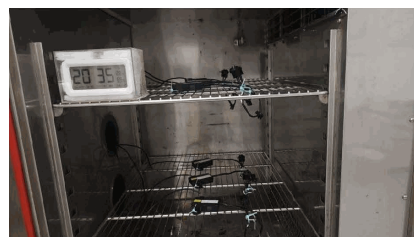


Figure 3 Original cold-stage chamber setup.



Figure 4 Original hot-stage chamber setup.

## Temperature Records and Function Checks

### Cold Operation: -40 °C / 48 h

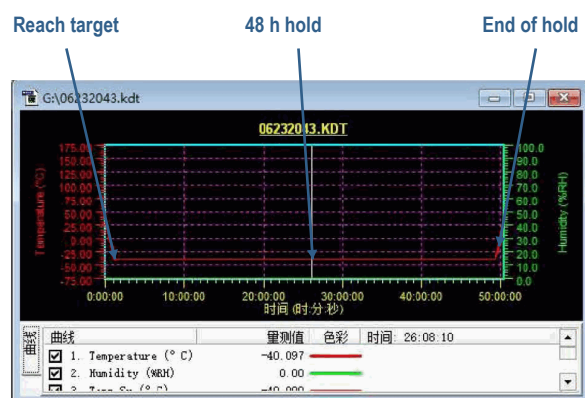


Figure 5 Original cold-stage temperature curve.

The plot records temperature against elapsed time. The marked stages identify reaching the test condition, the 48-hour hold and the end of temperature exposure.

### Hot Operation: +85 °C / 48 h

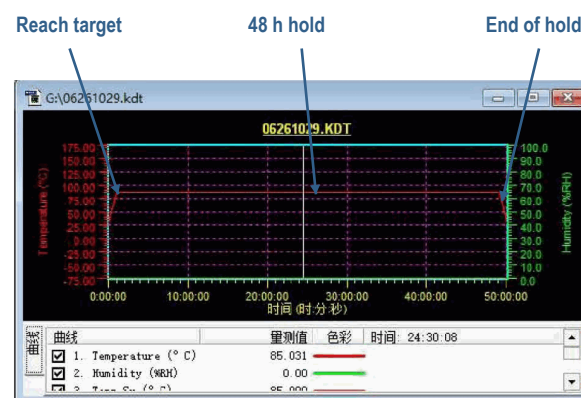


Figure 6 Original hot-stage temperature curve.

The plot records temperature against elapsed time. The marked stages identify reaching the test condition, the 48-hour hold and the end of temperature exposure.

### Sample 25#: Function Check

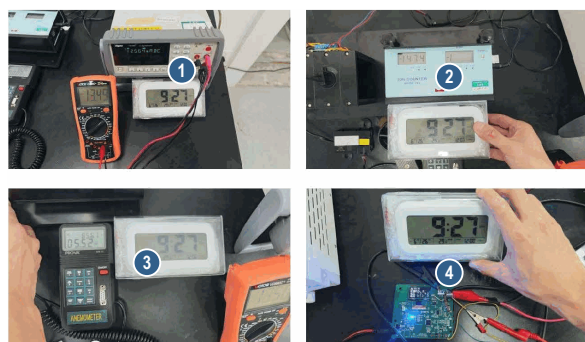


Figure 7 Sample 25#, cold-stage function record.

1 Supply / current-check instruments; 2 ion counter; 3 air-speed meter; 4 functional monitoring. The clock records time and ambient conditions.

### Sample 25#: Function Check



Figure 8 Sample 25#, hot-stage function record.

1 Supply / current-check instruments; 2 ion counter; 3 air-speed meter; 4 functional monitoring. The clock records time and ambient conditions.

## Acceptance Requirements and Recorded Observations

| Check                   | Requirement                                      | Recorded result / evidence                          |
|-------------------------|--------------------------------------------------|-----------------------------------------------------|
| Function and current    | Class A; $I \leq 0.1 \text{ A} = 100 \text{ mA}$ | Class A; Pass. Function-check records: Figures 7-8. |
| Ion-generation function | Normal ion-generation function                   | Recorded as meeting the functional requirement.     |
| Appearance              | No damage or abnormality                         | No abnormality recorded.                            |
| Shake check             | No abnormal internal sound                       | No abnormal internal sound recorded.                |

Table 1 Both the cold and hot operating stages received a passing judgment for samples 25#-30#.

## Sample Photographs and Result Traceability

The source record identifies each module individually. The photographs below align the same sample across the cold and hot operating test records.

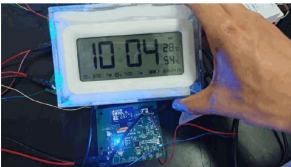
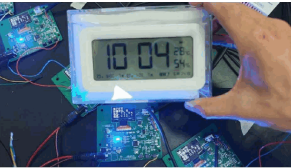
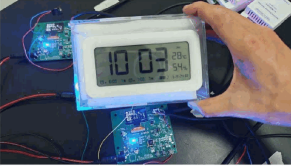
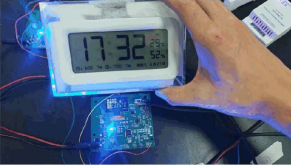
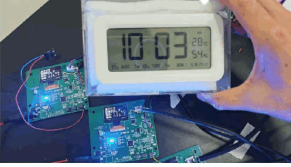
| Sample | Cold-operation record                                                               | Hot-operation record                                                                 | Source pages              |
|--------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------|
| 25#    |    |    | Cold: p. 58<br>Hot: p. 69 |
| 26#    |    |    | Cold: p. 58<br>Hot: p. 69 |
| 27#    |   |   | Cold: p. 59<br>Hot: p. 70 |
| 28#    |  |  | Cold: p. 59<br>Hot: p. 70 |
| 29#    |  |  | Cold: p. 59<br>Hot: p. 70 |
| 30#    |  |  | Cold: p. 60<br>Hot: p. 71 |

Figure 9 Original individual module photographs, indexed by sample and test stage.

### Recorded Test Results

All six modules met the Class A requirement for both operating stages. Appearance checks recorded no abnormality; shaking produced no abnormal internal sound. The completed tests were judged **Pass**.

### Test Basis and Records

Cold: **Q/MAT 5502-2023, 9.2.3.**

Hot: **Q/MAT 5502-2023, 9.3.2.**

Source: MAXMAC Leg3, cold pp. 53-63; hot pp. 64-74. Testing: Zhejiang Kezheng Electronic Information Product Inspection Co., Ltd.

**Revision 1.1:** 26 October 2026. Added setup and stage diagrams, curve annotations, sample evidence and check-to-result references.