

Reliability Test Report

Product Name: Ai-WB2-32S

Product Model: WB2 Series

Test Date: 2022/07/07–2022/07/12

Tested by: Liu Qun

Reviewed by: Lu Xingui


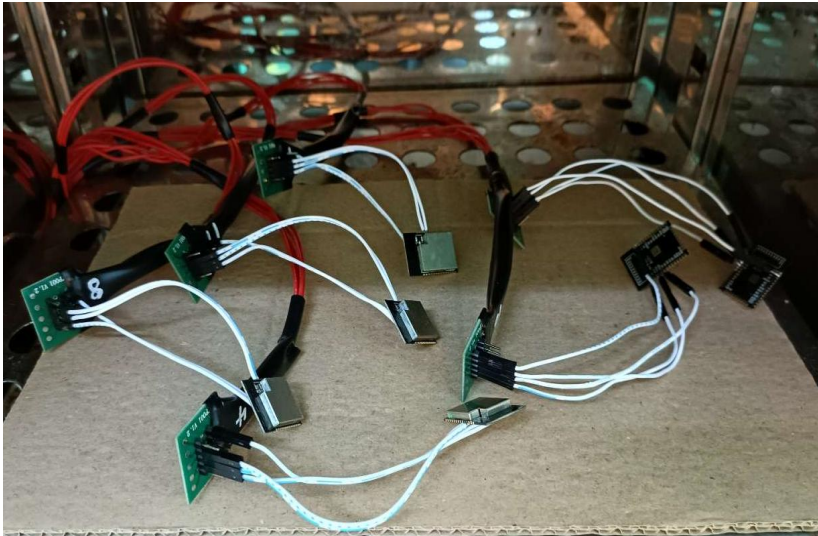
1. Inspection Plan

No.	Process Name	Inspection Item	Inspection Equipment	Sampling Level (Refer to GB/T 2828.1-2012)	Acceptable Quality Level		
					CR (Critical Defect)	MA (Major Defect)	MI (Minor Defect)
1	Reliability test	High/low temperature storage; high/room/low temperature power on/off; high/low temperature operation; alternating hot and humid; thermal shock	Constant temperature and humidity chamber	Normal single sampling, special inspection S-1	0 accept, 1 reject		

2. Test Items

No.	Item	Test Conditions
1	Low temperature storage test	Test conditions: -40°C Test duration: 8h After an 8-hour soak at -40°C, perform a cold start test.
2	High temperature storage test	Test conditions: 100°C Test duration: 8h After restoring to 85°C and a 1-hour soak, perform a hot start test.
3	Low temperature operation test	Test conditions: -40°C Test duration: 24h
4	High temperature operation test	Test conditions: 85°C Test duration: 24h
5	AC power on/off test with temperature	A) Temperature: -40°C B) Temperature: 25°C C) Temperature: 85°C Cycle each condition 200 times, with 30s ON and 30s OFF
6	Alternating hot and humid test	A) Operate at 85°C + 93% RH for 4h; B) Operate at 25°C + 93% RH for 4h; Cycle steps A and B for a total of 2 cycles.
7	Thermal shock test	Test conditions: -40°C–100°C, soak for 30min at each temperature. Temperature transition time: 50min for heating, 2h for cooling. Test duration: 5 cycles

3. Test Preparation

No.	Item	Image/Attachment
1	Reliability documentation	 WB2系列模组 可靠性WIFI&蓝牙
2	Test equipment	
3	Sample placement	
4	Test reason	New product

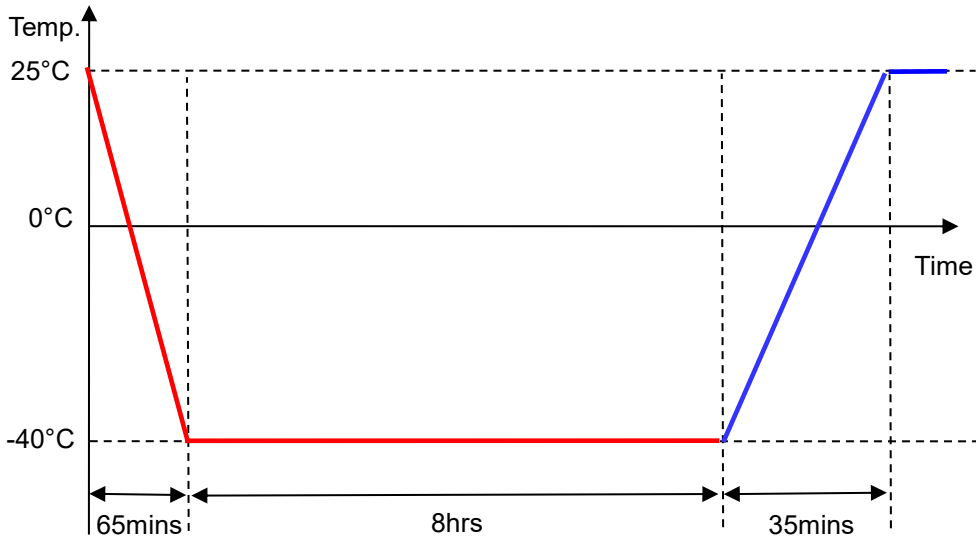
4. Low Temperature Storage Test

Test Conditions: Power-off test. Store the product at -40°C for 8h, then perform a cold start test.

Test Profile:

Is Power Off —
Is Power On —

Test Criteria:



1. During the cold start test, the module functions normally. If ping packets are confirmed not to be lost, the module is considered to be functional.
2. Test the Bluetooth functionality. Send the command AT+BLEINIT=2 to enable Bluetooth and configure the Bluetooth application name. Then open the BLE debugging assistant to search for the Bluetooth name (e.g., BL-AT1/2/3/4/5/6). If the name is not found, the test is considered to be failed.
3. After the test, the product shows no visible damage such as shrinkage, peeling, or discoloration.

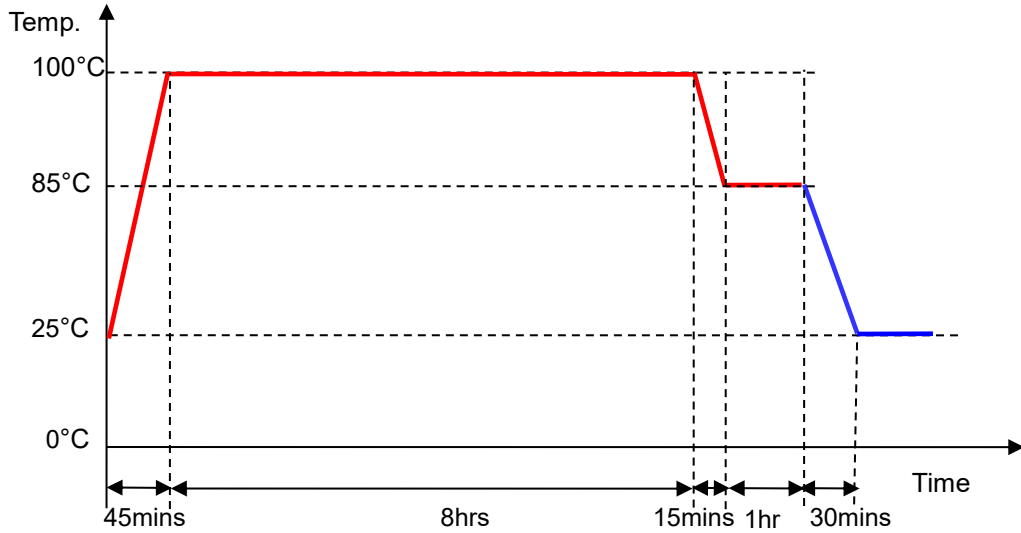
Sample Quantity	Test Data	Test Results
<p>6PCS (BL-AT1-BL-AT6)</p>	<p>The test data section contains two main parts. The top part shows six screenshots of the AT+PING command execution results. Each screenshot displays 'Ping 统计信息' (Ping Statistics) with fields for '发送包' (Packets Sent), '接收包' (Packets Received), '丢包率' (Packet Loss Rate), and '平均延迟' (Average Delay). The results show successful ping operations with 0% loss and delays around 7-8ms. The bottom part shows a screenshot of the 'BLE调试助手' (BLE Debugging Assistant) app. The 'Scanner' tab is active, listing several Bluetooth devices: BL-AT2, BL-AT4, BL-AT6, BL-AT5, BL-AT1, N/A, and BL-AT3. Each device entry includes its name, MAC address, and signal strength (e.g., -53 dBm).</p>	<p>PASS</p>

5. High Temperature Storage Test

Test Conditions: Power-off test. Store the product at 100°C for 8h, then restore it to 85°C for a 1-hour soak, and perform a hot start test.

Test Profile:

Is Power Off —
Is Power On —



Test Criteria:

1. During the hot start test, the module functions normally. If ping packets are confirmed not to be lost, the module is considered to be functional.
2. Test the Bluetooth functionality. Send the command AT+BLEINIT=2 to enable Bluetooth and configure the Bluetooth application name. Then open the BLE debugging assistant to search for the Bluetooth name (e.g., BL-AT1/2/3/4/5/6). If the name is not found, the test is considered to be failed.
3. After the test, the product shows no visible damage such as shrinkage, peeling, or discoloration.

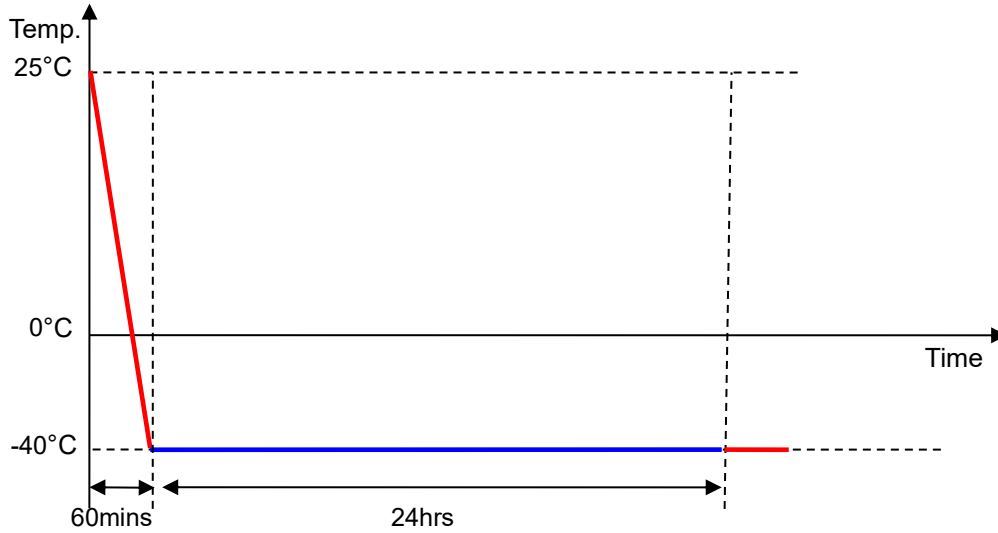
Sample Quantity	Test Data	Test Results
<p>6PCS (BL-AT1–BL-AT6)</p>	 	<p>PASS</p>

6. Low Temperature Operation Test

Test Conditions: Power-on test. Operate at -40°C for 24h.

Test Profile:

Is Power Off —
Is Power On —



Test Criteria:

1. No network disconnections occurred during the test. If ping packets are confirmed not to be lost, the module is considered to be functional.
2. During the test, open the BLE debugging assistant to search for the Bluetooth name (e.g., BL-AT1/2/3/4/5/6). If the name is not found, the test is considered to be failed.
3. After the test, the product shows no visible damage such as shrinkage, peeling, or discoloration.

Sample Quantity	Test Data	Test Results
<p style="text-align: center;">6PCS (BL-AT1-BL-AT6)</p>	<p>The test data includes screenshots of ATKXPING software showing successful ping results for multiple samples. Below, the BLE debugging assistant interface shows six discovered devices: BL-AT2, BL-AT1, BL-AT6, BL-AT4, BL-AT5, and BL-AT3, all with their respective MAC addresses and signal strengths.</p>	<p style="text-align: center; font-size: 24px;">PASS</p>

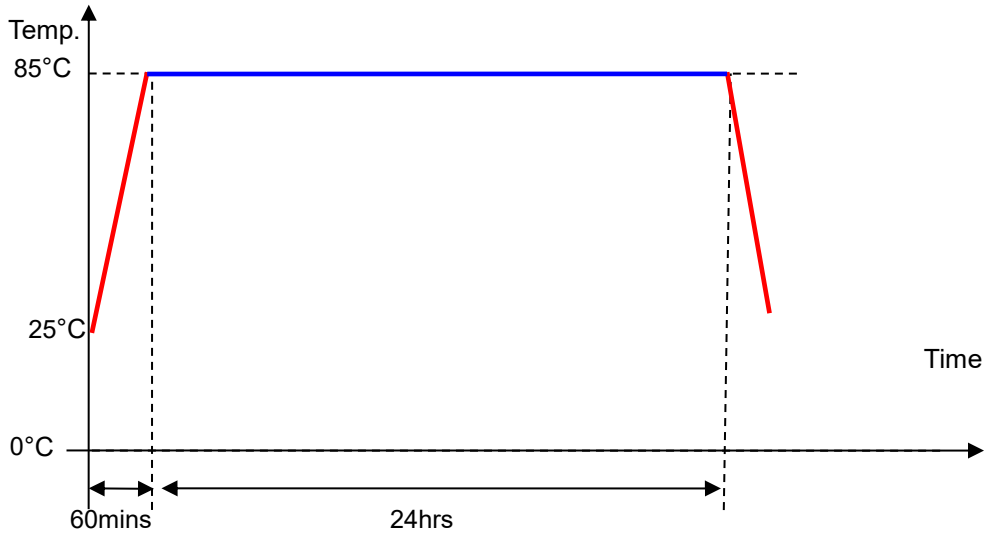
7. High Temperature Operation Test

Test Conditions: Operate at 85°C for 24h.

Test Profile:

Is Power Off _____

Is Power On _____



Test Criteria:

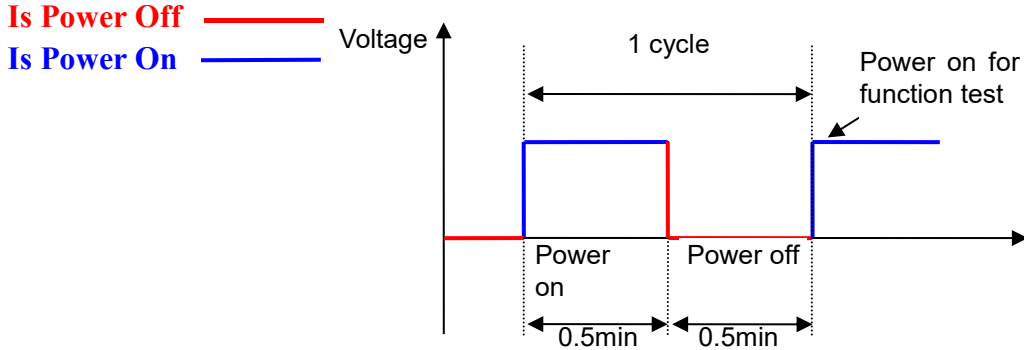
1. No network disconnections occurred during the test. If ping packets are confirmed not to be lost, the module is considered to be functional.
2. During the test, open the BLE debugging assistant to search for the Bluetooth name (e.g., BL-AT1/2/3/4/5/6). If the name is not found, the test is considered to be failed.
3. After the test, the product shows no visible damage such as shrinkage, peeling, or discoloration.

Sample Quantity	Test Data	Test Results
<p style="text-align: center;">6PCS (BL-AT1-BL-AT6)</p>	<p>The test data section contains two screenshots. The top screenshot shows six windows of AT+KCPING test results for samples BL-AT1 through BL-AT6. Each window displays statistics such as 'Ping 统计值' (Ping Statistics) and 'Ping 统计值' (Ping Statistics), including fields for 'Ping 最小值' (Ping Minimum), 'Ping 最大值' (Ping Maximum), 'Ping 平均值' (Ping Average), and 'Ping 成功率' (Ping Success Rate). The bottom screenshot shows the 'BLE调试助手' (BLE Debugging Assistant) interface with a 'Scanner' view displaying six bonded devices: BL-AT3, BL-AT5, BL-AT12, BL-AT6, BL-AT4, and BL-AT2. Each device entry includes its name, MAC address, and signal strength (dBm).</p>	<p style="text-align: center;">PASS</p>

8. AC Power On/Off Test with Temperature

- Test Conditions:**
1. Power on: 30s; power off: 30s.
 2. Temperature: -40°C, 25°C, 85°C.
 3. Cycle: Each test condition cycles 200 times.

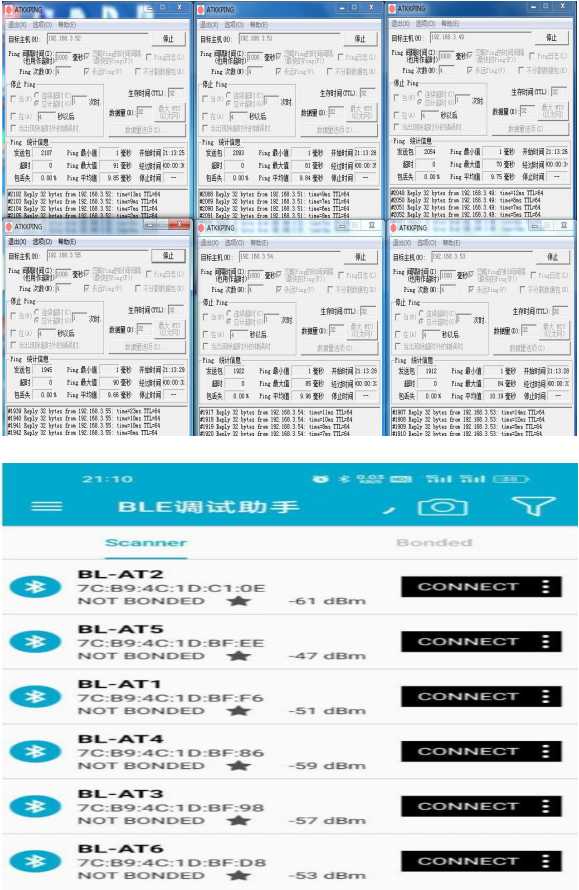
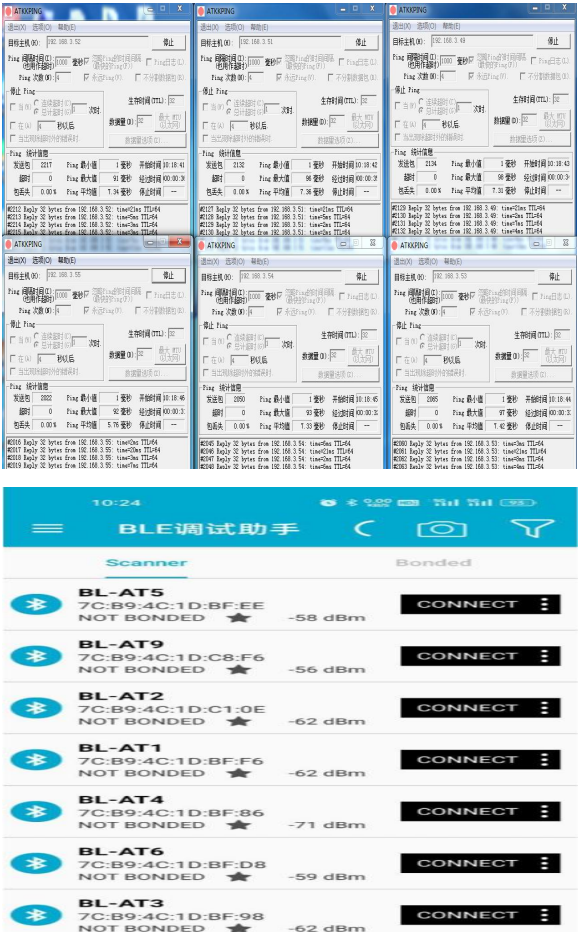
Test Profile:



Test Criteria:

1. After power-up, the module boots normally. During the test, if the module boots normally and there is connectivity for every ping packet, the module is considered to be functional.
2. Test the Bluetooth functionality. Send the command AT+BLEINIT=2 to enable Bluetooth and configure the Bluetooth application name. Then open the BLE debugging assistant to search for the Bluetooth name (e.g., BL-AT1/2/3/4/5/6). If the name is not found, the test is considered to be failed.
3. After the test, the product shows no visible damage such as shrinkage, peeling, or discoloration.

Item	Sample Quantity	Test Data	Test Results
Power on/off at room temperature	6PCS (BL-AT1–BL-AT6)		PASS

<p>Power on/off at low temperature</p>	<p>6PCS (BL-AT1-BL-AT6)</p>		<p>PASS</p>
<p>Power on/off at high temperature</p>	<p>6PCS (BL-AT1-BL-AT6)</p>		<p>PASS</p>

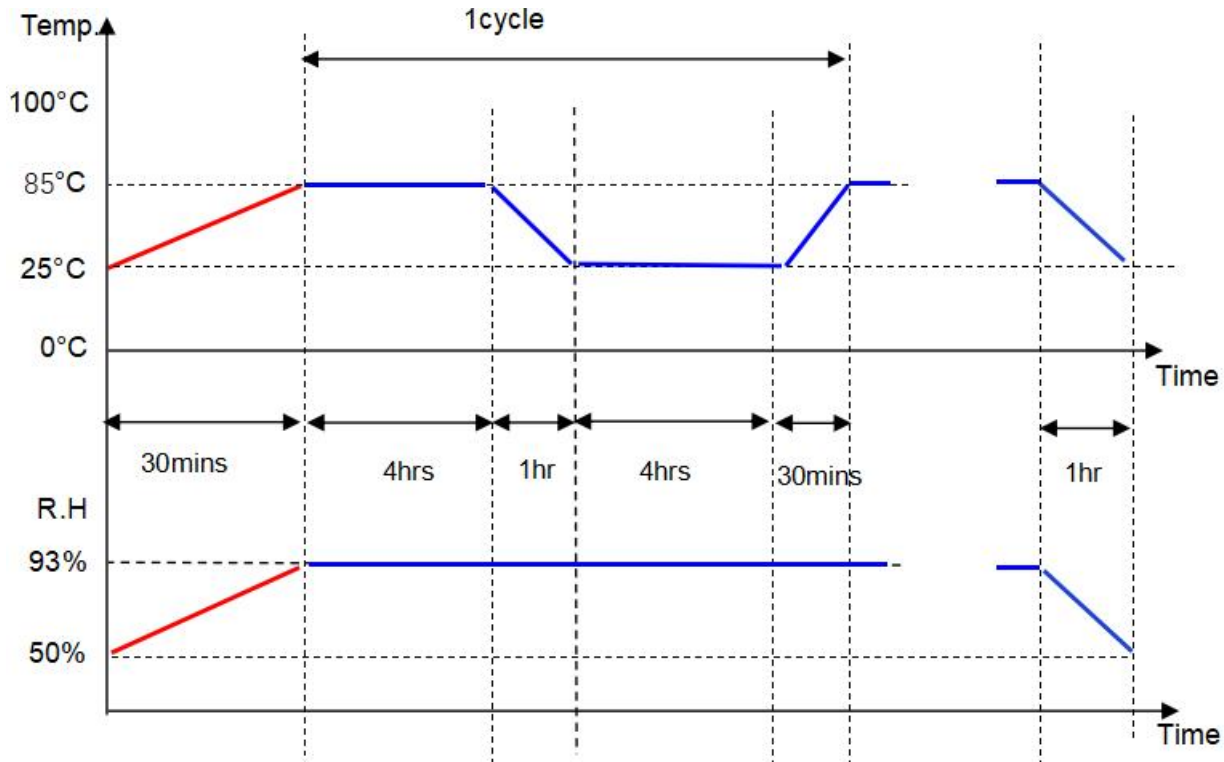
9. Alternating Hot and Humid Test

Test Conditions:

1. Operate at 85°C + 93% RH for 4h;
 2. Operate at 25°C + 93% RH for 4h;
- Cycle step 1 and step 2, a total of 2 cycles.

Test Profile:

Is Power Off —
Is Power On —



Test Criteria:

1. If the module operates normally and no ping packet loss is confirmed, the module is considered to be functional.
2. During the test, open the BLE debugging assistant to search for the Bluetooth name (e.g., BL-AT1/2/3/4/5/6). If the name is not found, the test is considered to be failed.
3. After the test, the product shows no visible damage such as shrinkage, peeling, or discoloration.

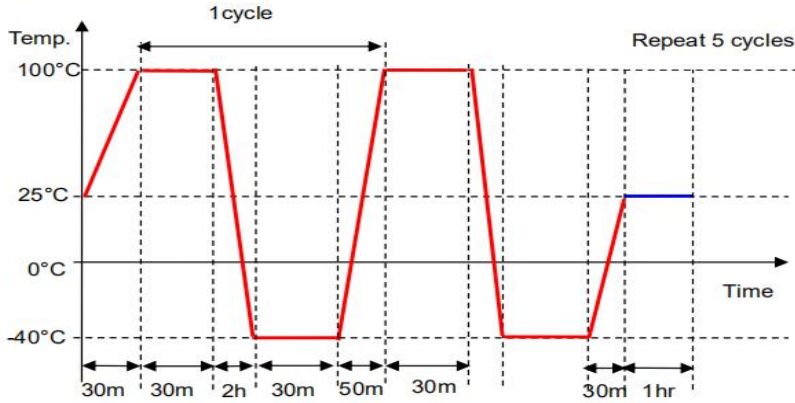
Sample Quantity	Test Data	Test Results
<p>6PCS (BL-AT1-BL-AT6)</p>		<p>PASS</p>

10. Thermal Shock Test

Test Conditions:

Power-off test. Temperature cycling between -40~100°C, with a heating time of 50min and a cooling time of 2h. Each stage is held for 30min, for a total of 5 cycles.

Is Power Off
Is Power On



Test Profile:

Test Criteria:

1. After power-up, the module boots normally. During the test, if the module boots normally and ping packets are confirmed not to be lost, the module is considered to be functional.
2. During the test, open the BLE debugging assistant to search for the Bluetooth name (e.g., BL-AT1/2/3/4/5/6). If the name is not found, the test is considered to be failed.
3. After the test, the product shows no visible damage such as shrinkage, peeling, or discoloration.

Sample Quantity	Test Data	Test Results
<p>6PCS (BL-AT1-BL-AT6)</p>		<p>PASS</p>