

Reliability Test Report

Product Name: Ai-WB2-13U

Product Model: WB2 Series

Test Date: 2022/06/23–2022/06/30

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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

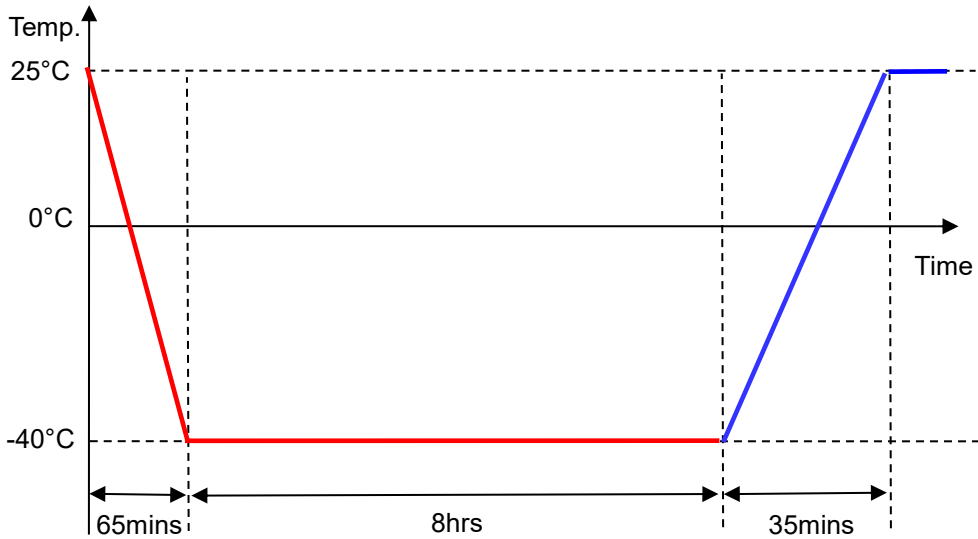
4. Low Temperature Storage Test

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-AT7/8/9/10). 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.

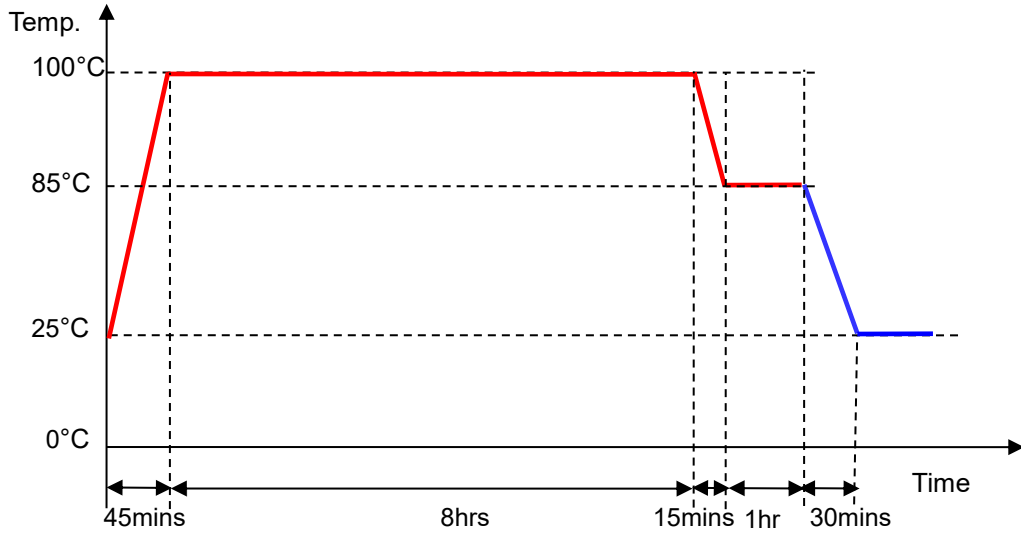
Sample Quantity	Test Data	Test Results
<p>4PCS (BL-AT7-BL-AT10)</p>	<p>The test data includes screenshots of AT command logs and a BLE scanner app interface. The scanner app shows a list of discovered Bluetooth devices:</p> <ul style="list-style-type: none"> BL-AT9: 7C:B9:4C:1D:C9:CC, NOT BONDED, -65 dBm BL-AT2: 7C:B9:4C:1D:C6:22, NOT BONDED, -43 dBm BL-AT4: 7C:B9:4C:1D:C5:F0, NOT BONDED, -56 dBm BL-AT7: 7C:B9:4C:1D:C9:D4, NOT BONDED, -44 dBm BL-AT6: 7C:B9:4C:1D:C5:FA, NOT BONDED, -58 dBm BL-AT10: 7C:B9:4C:1D:C9:7E, NOT BONDED, -59 dBm BL-AT3: 7C:B9:4C:1D:C6:1A, NOT BONDED, -56 dBm BL-AT8: 7C:B9:4C:1D:C9:BC, NOT BONDED, -47 dBm 	<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:

- 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.
- 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-AT7/8/9/10). If the name is not found, the test is considered to be failed.
- After the test, the product shows no visible damage such as shrinkage, peeling, or discoloration.

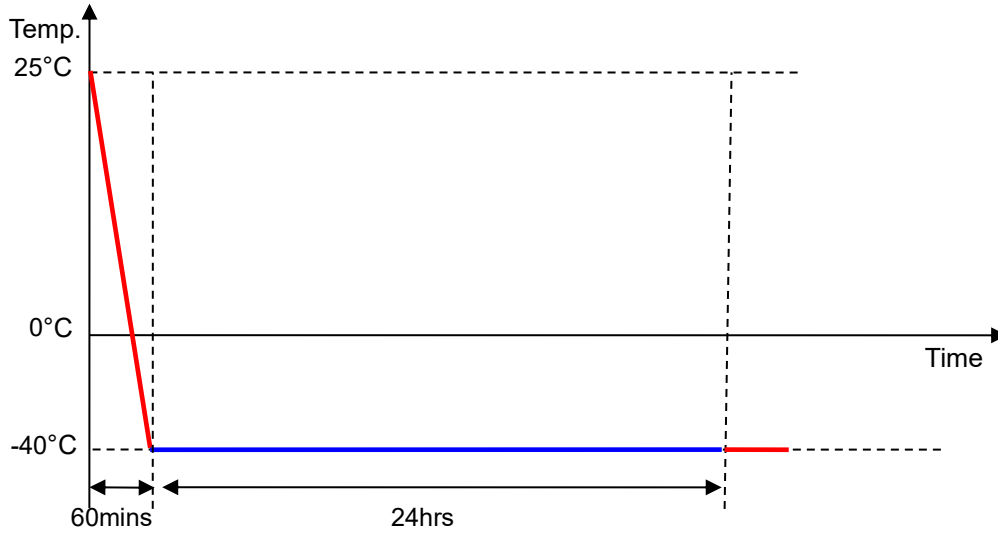
Sample Quantity	Test Data	Test Results
<p>4PCS (BL-AT7-BL-AT10)</p>		<p>PASS</p>

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:

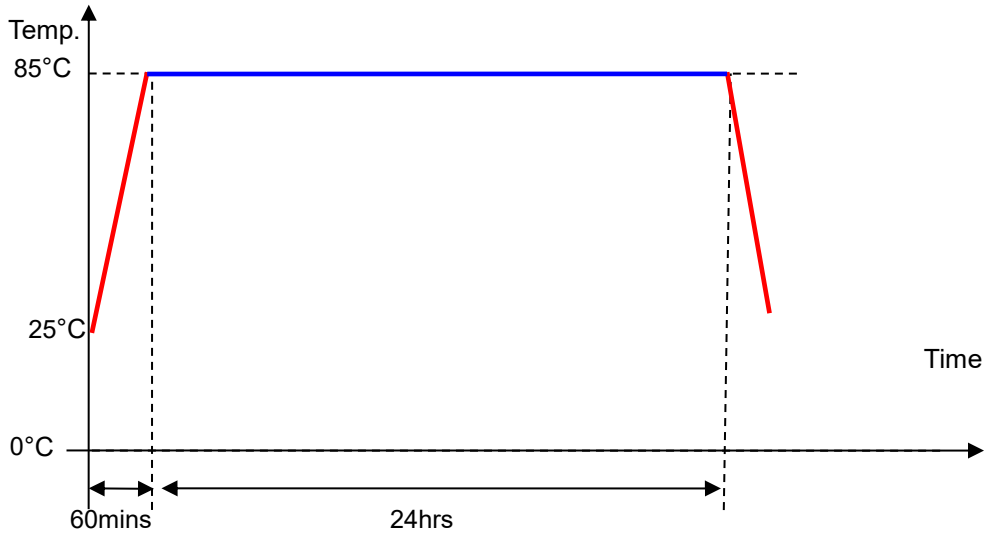
1. No network disconnections occurred during the test. If ping packets are confirmed not to be lost, the module is considered to be functional.
2. During the test, open the BLE debugging assistant to search for the Bluetooth name (e.g., BL-AT7/8/9/10). If the name is not found, the test is considered 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>4PCS (BL-AT7- BL-AT10)</p>	<p>The test data section contains four screenshots of the AT+KPPING utility. Each screenshot shows a successful ping test with a 0.00% packet loss rate and a response time of approximately 6.79 seconds. Below the screenshots is a screenshot of the 'BLE调试助手' (BLE Debugging Assistant) app. The app's 'Scanner' tab is active, displaying a list of discovered Bluetooth devices: BL-AT7, BL-AT9, BL-AT2, BL-AT6, BL-AT8, and BL-AT10. All devices are listed as 'NOT BONDED' with their respective MAC addresses and signal strengths (e.g., -51 dBm for BL-AT7).</p>	<p>PASS</p>

7. High Temperature Operation Test

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

Test Profile:



Test Criteria:

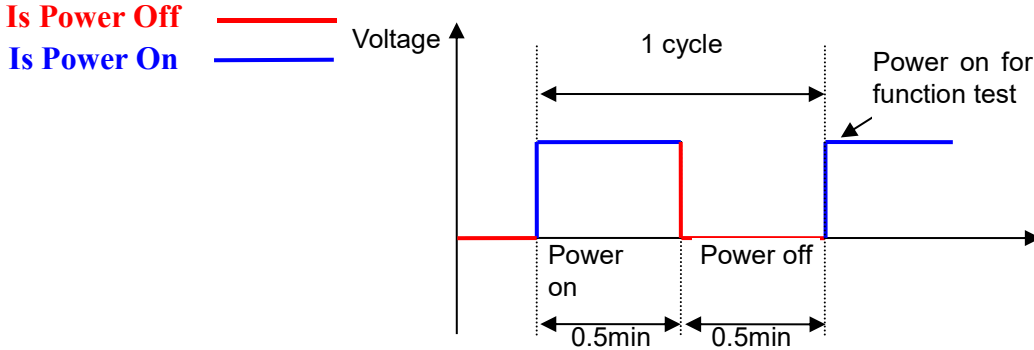
1. No network disconnections occurred during the test. If ping packets are confirmed not to be lost, the module is considered to be functional.
2. During the test, open the BLE debugging assistant to search for the Bluetooth name (e.g., BL-AT7/8/9/10). If the name is not found, the test is considered 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>4PCS (BL-AT7-BL-AT10)</p>		<p>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.

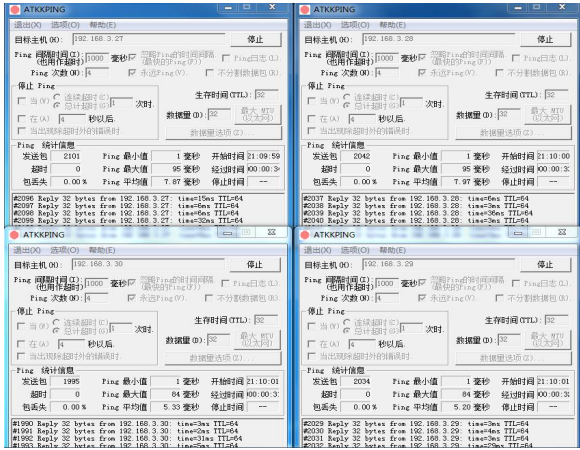
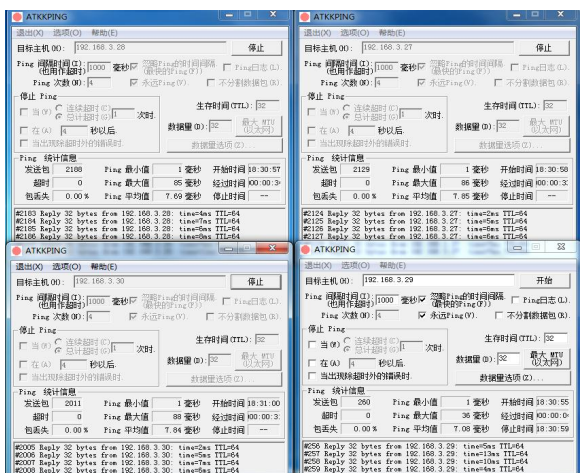
Test Profile:



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-AT7/8/9/10). 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	4PCS (BL-AT7-BL-AT10)		PASS

<p>Power on/off at low temperature</p>	<p>4PCS (BL-AT7-BL-AT10)</p>	 <p>BL-AT7 7C:B9:4C:1D:C9:D4 NOT BONDED -53 dBm</p> <p>BL-AT10 7C:B9:4C:1D:C9:7E NOT BONDED -80 dBm</p> <p>BL-AT9 7C:B9:4C:1D:C9:CC NOT BONDED -61 dBm</p> <p>BL-AT8 7C:B9:4C:1D:C9:BC NOT BONDED -56 dBm</p>	<p>PASS</p>
<p>Power on/off at high temperature</p>	<p>4PCS (BL-AT7-BL-AT10)</p>	 <p>BL-AT7 7C:B9:4C:1D:C9:D4 NOT BONDED -51 dBm</p> <p>BL-AT9 7C:B9:4C:1D:C9:CC NOT BONDED -66 dBm</p> <p>BL-AT2 7C:B9:4C:1D:C6:22 NOT BONDED -59 dBm</p> <p>BL-AT6 7C:B9:4C:1D:C5:FA NOT BONDED -61 dBm</p> <p>BL-AT8 7C:B9:4C:1D:C9:BC NOT BONDED -60 dBm</p> <p>BL-AT10 7C:B9:4C:1D:C9:7E NOT BONDED -58 dBm</p>	<p>PASS</p>

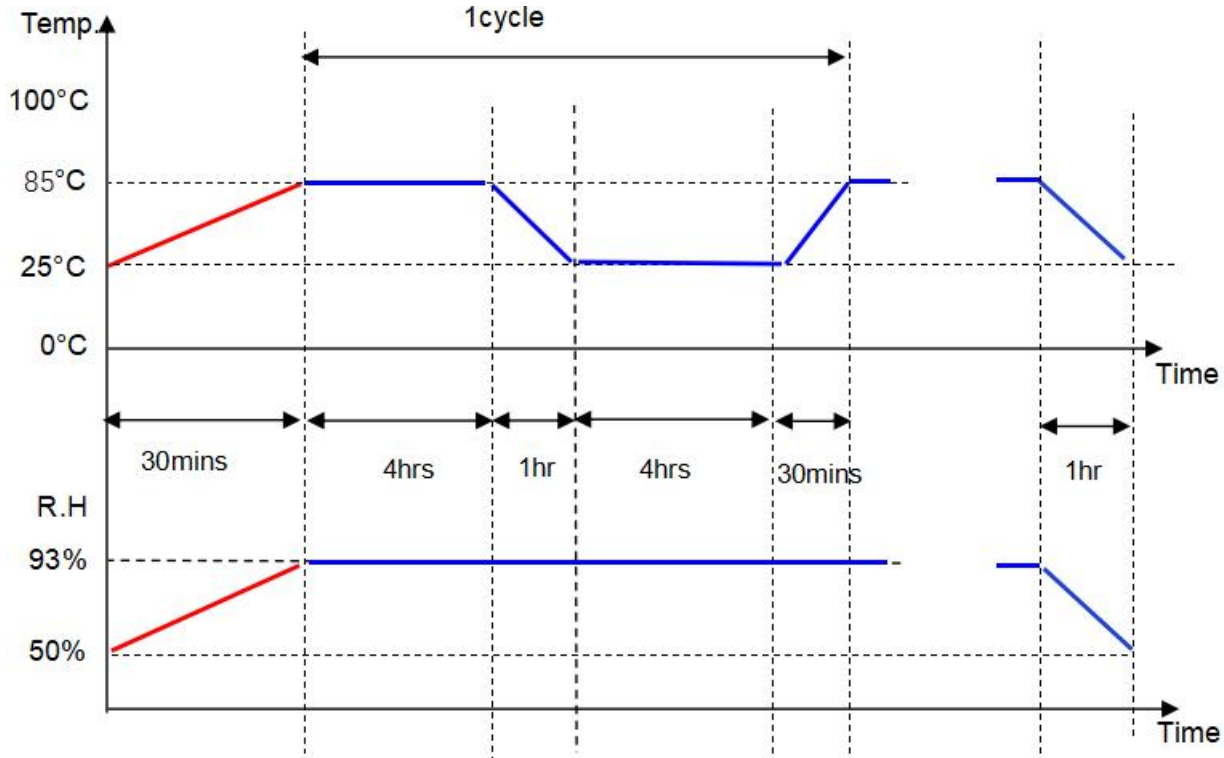
9. Alternating Hot and Humid Test

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-AT7/8/9/10). 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>4PCS (BL-AT7–BL-AT10)</p>		<p>PASS</p>

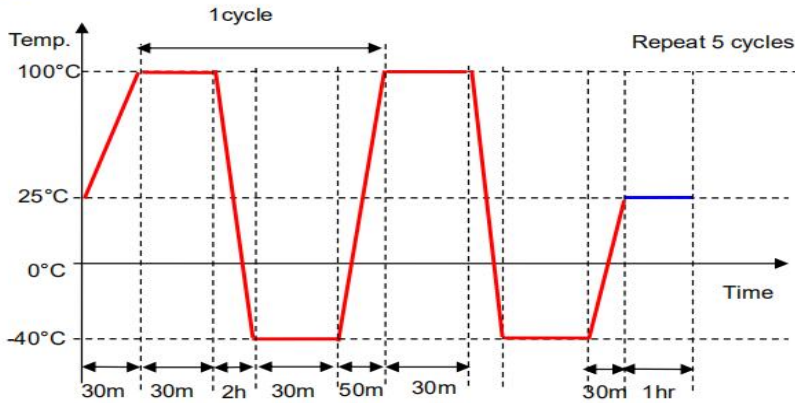
10. Thermal Shock Test

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.

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-AT7/8/9/10). 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>4PCS (BL-AT7-BL-AT10)</p>		<p>PASS</p>