

可靠性测试报告

产品名称:	<u>Ai-WB3-01C</u>
产品型号:	<u>WIFI 系列</u>
测试日期:	2023.4.25-2023.4.30
测试人:	刘群
审核人:	卢信桂

1. 检验标准

序号	工序名称	检验项目	检验工具	抽样水平(参考 GB/T 2828.1-2012)	允收水准		
					CR(致命缺陷)	MA(严重缺陷)	MI(轻微缺陷)
1	可靠性测试	高低温存储/高常低温关机/高低温运行/交变湿热/冷热冲击	恒温恒湿试验机	正常一次抽样, 特殊检验 S-1	0 收 1 退		

2. 试验项目

编号	项目	测试条件
1	低温存储测试 (Low temperature storage test)	测试条件: -40°C 测试时间: 8hrs 在 -40°C 下停留8hrs后, 做冷启动测试.
2	高温储存测试 (High temperature storage test)	测试条件: $100^{\circ}\text{C} +93\text{RH}$ 测试时间: 8hrs 恢复到 85°C 停留1hrs后, 做热启动测试.
3	低温运行测试 (Low temperature operation test)	测试条件: -40°C 测试时间: 24hrs
4	高温运行测试 (High temperature operation test)	测试条件: $85^{\circ}\text{C} +93\text{RH}$ 测试时间: 24hrs
5	开关机测试 (AC power on/off test with temperature)	A) 温度: -40°C . B) 温度: $25^{\circ}\text{C} +93\text{RH}$ C) 温度: $85^{\circ}\text{C} +93\text{RH}$ 每个条件循环 200次, 开30sec, 关30sec
6	交变湿热测试 (Alternating hot and humid test)	A) $85^{\circ}\text{C} +93\text{RH}$ 运行4hrs; B) $25^{\circ}\text{C} +93\text{RH}$ 运行4hrs; 循环步骤A步骤B总共2个循环.
7	冷热冲击测试 (Thermal shock test)	测试条件: $-40^{\circ}\text{C} \sim 100^{\circ}\text{C} +93\text{RH}$, 每个温度停留30mins, 温度变换时间为升温50mins, 降温2hrs. 测试时间: 循环5cycles

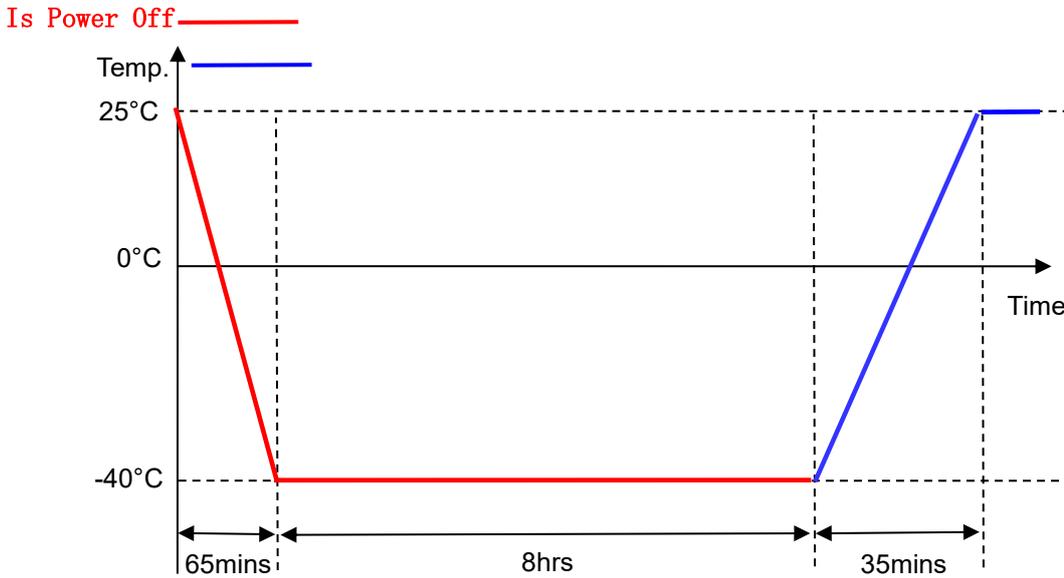
3. 试验准备

编号	项目	图片/附件
1	可靠性说明文档	 <p>WB3系列模组可靠性测试说明(1).d</p>
2	实验设备	
3	样品摆放	
4	测试原因	新产品

4. 低温存储测试 (Low temperature storage test)

测试条件: 关机测试, 让产品储存在-40° C下保持8hrs, 然后做冷启动测试.

测试曲线:



Is Power On

测试标准:

1. 冷启动时功能正常, 确认 ping 包不丢失, 即判定模组功能正常。
2. 产品测试完后没有可见的损伤, 如收缩、剥离、变色等现象。

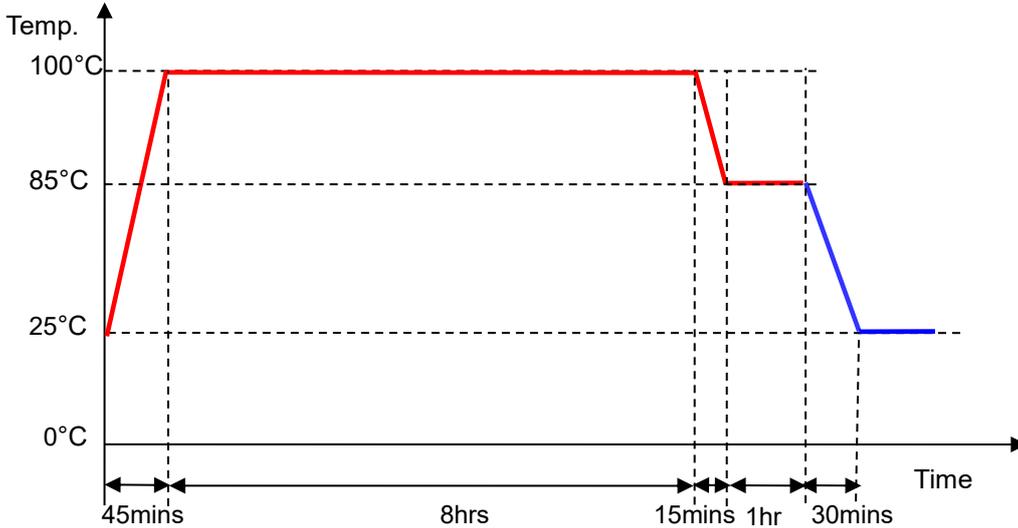
测试样机	测试数据	测试结果
6PCS	<p>The '测试数据' section contains six screenshots of the ATKPING software interface, each showing the results of a ping test for a specific unit. Each screenshot includes fields for '目标主机' (Target Host), 'Ping 间隔' (Ping Interval), 'Ping 次数' (Ping Count), and 'Ping 统计信息' (Ping Statistics). The statistics typically show 0% packet loss and successful ping times.</p>	PASS

5. 高温存储测试 (High temperature storage test)

测试条件: 关机测试, 让产品储存在 100° C+93%RH 高温下 8hrs, 然后恢复到 85° C+93%RH+93%RH 停留 1hr 后, 做热启动测试。

测试曲线:

Is Power Off ——
Is Power On ——



测试标准:

1. 热启动时功能正常, 确认 ping 包不丢失, 即判定模组功能正常。
2. 产品测试完后没有可见的损伤, 如收缩、剥离、变色等现象。

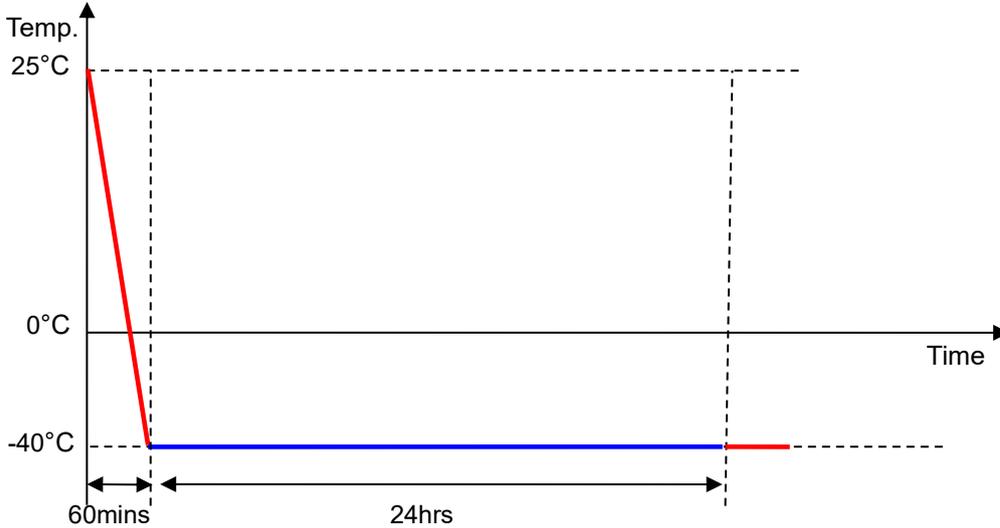
测试样机	测试数据	测试结果
6PCS	<p>The table contains six screenshots of the ATKPING software interface, arranged in a 2x3 grid. Each screenshot shows the configuration and results of a ping test. The target IP address is 192.168.3.8. The test parameters include: Ping interval: 0.000s, Ping count: 1, Ping size: 1472 bytes, Ping TTL: 255. The results for each unit are as follows:</p> <ul style="list-style-type: none"> Unit 1: 2006 packets sent, 2006 received, 0% loss, 8.98s average time. Unit 2: 1996 packets sent, 1996 received, 0% loss, 13s average time. Unit 3: 1920 packets sent, 1920 received, 0% loss, 9.31s average time. Unit 4: 1825 packets sent, 1825 received, 0% loss, 7.65s average time. Unit 5: 1820 packets sent, 1820 received, 0% loss, 11.00s average time. Unit 6: 1940 packets sent, 1940 received, 0% loss, 10.94s average time. 	PASS

6. 低温运行测试 (Low temperature operation test)

测试条件: 开机测试, 在-40° C下运行24hrs.

测试曲线:

Is Power Off ——
Is Power On ——



测试标准:

1. 测试过程中无断网等现象, 确认 ping 包不丢失, 即判定模组功能正常。
2. 产品测试完后没有可见的损伤, 如收缩、剥离、变色等现象。

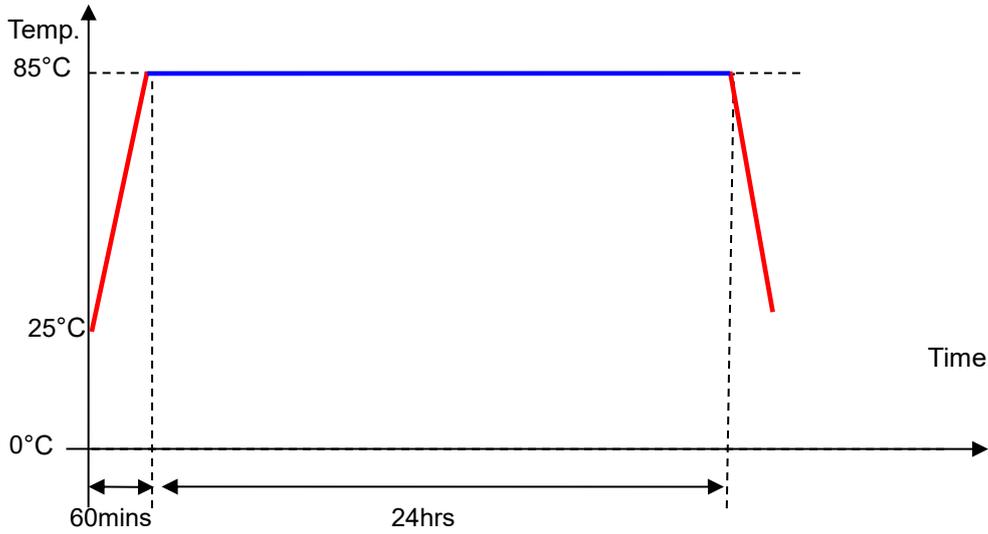
测试样机	测试数据	测试结果
6PCS	<p>The figure shows six screenshots of the ATKOPING software interface, each displaying the results of a ping test. Each screenshot includes fields for 'Ping 成功率' (Ping Success Rate), 'Ping 丢包率' (Ping Packet Loss Rate), and 'Ping 统计信息' (Ping Statistics). All six tests show a success rate of 100% and a packet loss rate of 0.01% or 0.00%. The statistics also show consistent response times and TTL values.</p>	PASS

7. 高温运行测试 (High temperature operation test)

测试条件: 步骤 85 °C+93%RH运行24H

测试曲线:

Is Power Off _____
Is Power On _____



测试标准:

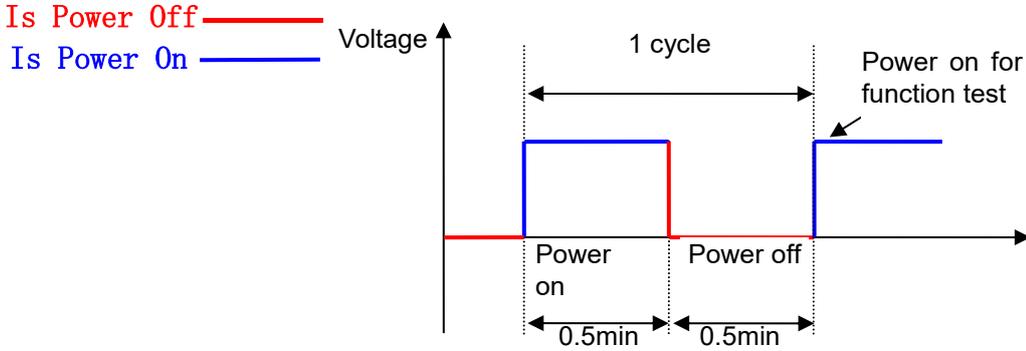
1. 测试过程中无断网等现象, 确认 ping 包不丢失, 即判定模组功能正常。
2. 产品测试完后没有可见的损伤, 如收缩、剥离、变色等现象。

测试样机	测试数据	测试结果
6PCS	<p>The table contains six screenshots of the ATKPING software interface, each showing the results of a ping test for a specific sample ID. Each screenshot includes fields for 'Ping 间隔时间' (Ping interval), 'Ping 次数' (Ping count), 'Ping 统计信息' (Ping statistics), and 'Ping 数据包' (Ping packets). The statistics show successful ping counts, minimum/maximum ping times, and average ping times. For example, the first screenshot for ID #192.168.3.8 shows 300 successful pings with an average time of 10.99 ms. The final screenshot for ID #192.168.3.14 shows 424 successful pings with an average time of 20.79 ms. All tests show 0% packet loss.</p>	PASS

8. 开关机测试 (AC power on/off test with temperature)

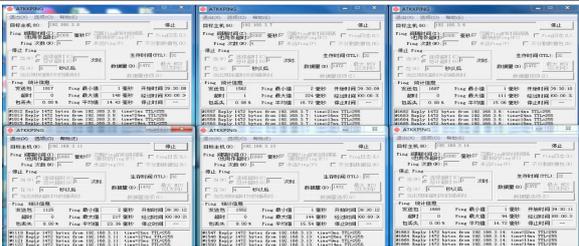
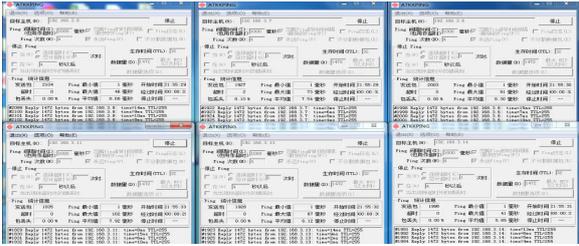
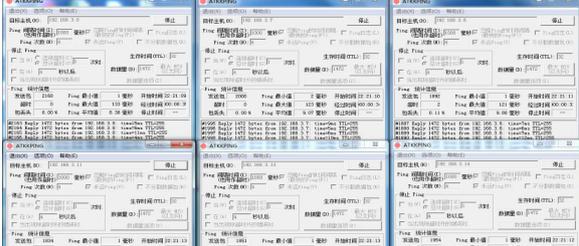
- 测试条件:
1. 开机: 30 秒; 关机: 30 秒。
 2. 温度: -40°C , $25^{\circ}\text{C}+93\%RH$, $85^{\circ}\text{C}+93\%RH$ 。
 3. 循环: 每组测试条件循环 200 次。

测试曲线:



测试标准:

1. 上电工作后能够正常启动, 测试过程中机器正常启动, 每次 ping 包都有连通, 即判定模组功能正常。
2. 产品测试后没有可见的损伤, 如收缩、剥离、变色等。

项目	测试样机	测试数据	测试结果
常温开关机	6PCS		PASS
低温开关机	6PCS		PASS
高温开关机	6PCS		PASS

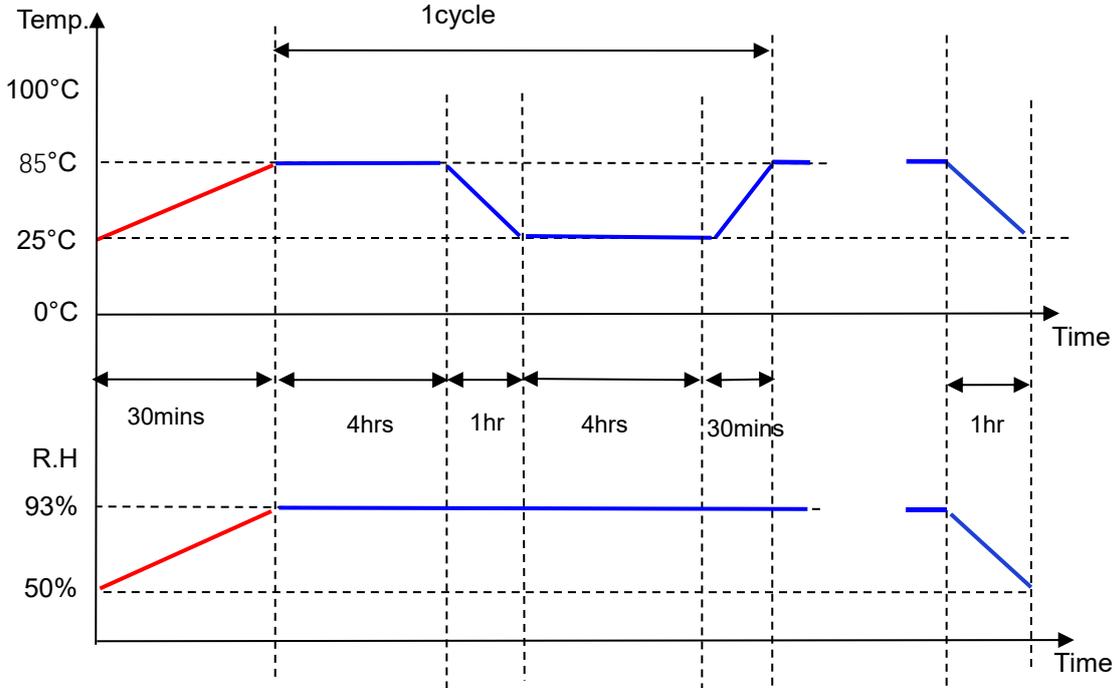
9. 交变湿热测试 (Alternating hot and humid test)

测试条件:

1. 85 ° C+93%RH 运行 4hrs;
 2. 25 ° C+93%RH 运行 4hrs;
- 循环步骤 1 步骤 2 总共 2 个循环。

测试曲线:

Is Power Off



Is Power On

测试标准:

1. 测试过程中无断网等现象, 确认 ping 包不丢失, 即判定模组功能正常。
2. 产品测试后没有可见的损伤, 如收缩、剥离、变色等。

测试样机	测试数据	测试结果
6PCS		PASS

10. 冷热冲击测试 (Thermal shock test)

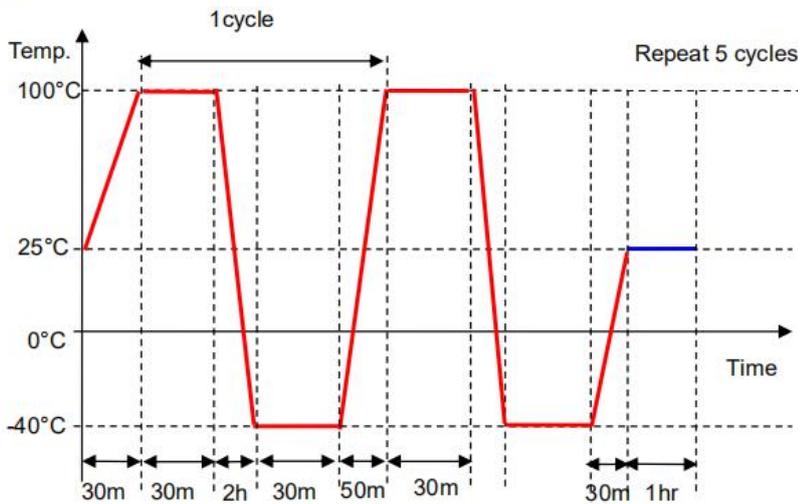
测试条件:

关机测试, $-40^{\circ}\text{C} \sim 100^{\circ}\text{C} + 93\%\text{RH}$ 转换, 温度转换时间为升温 50mins, 降温 2hrs. 每个阶段保持 30mins, 运行 5 cycles.

测试曲线:

Is Power Off

Is Power On



测试标准:

1. 上电工作后能够正常启动, 确认 ping 包不丢失, 即判定模组功能正常。
2. 产品测试后没有可见的损伤, 如收缩、剥离、变色等。

测试样机	测试数据	测试结果
6PCS		PASS