

可靠性测试报告

产品名称:	Ai-WS1 系列
产品型号:	Ai-WS1-CBS-Kit
测试日期:	2024.11.18-2024.11.26
测试人:	袁南南
审核人:	安三超

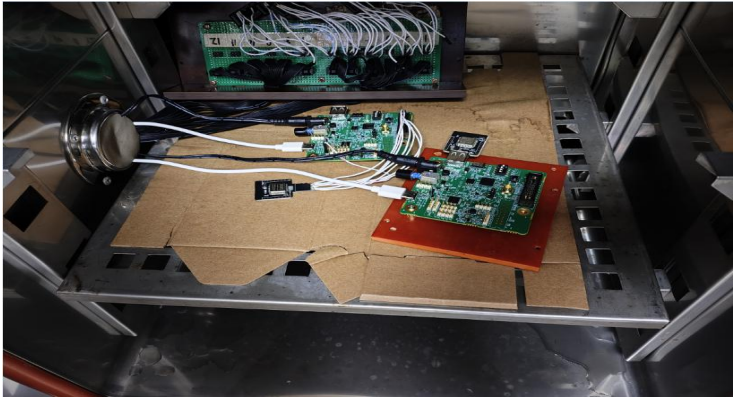
1. 检验标准

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/高常低温开关机/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

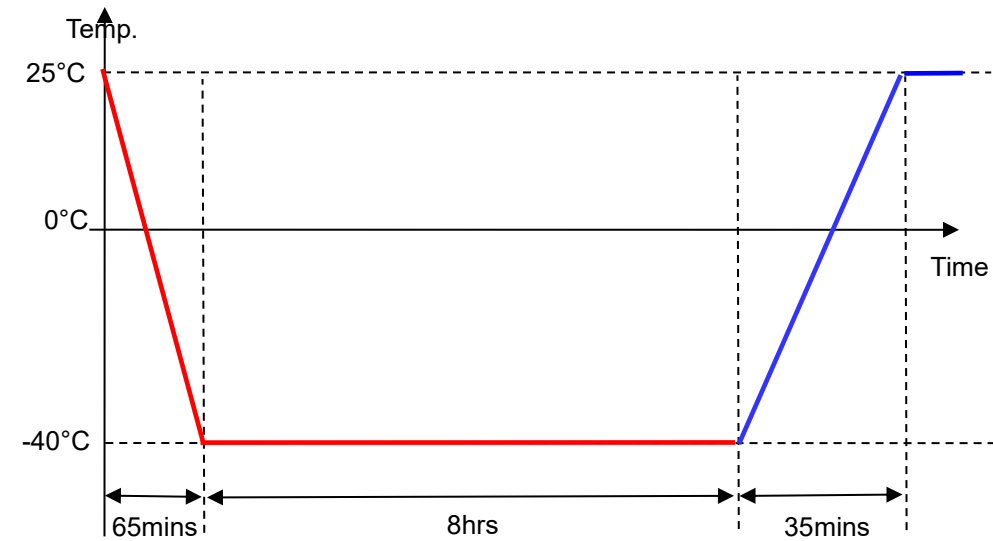
编号	项目	测试条件
1	低温存储测试 (Low temperature storage test)	测试条件：-40° C 测试时间：8hrs 在-40° C下停留1hrs后，做冷启动测试。
2	高温储存测试 (High temperature storage test)	测试条件：100° C +93%RH 测试时间：8hrs 恢复到85° C停留1hrs后，做热启动测试。
3	低温运行测试 (Low temperature operation test)	测试条件：-40° C 测试时间：24hrs
4	高温运行测试 (High temperature operation test)	测试条件：85 ° C +93%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° C +93%RH C) 温度： 85° C. +93%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 ° C+93%RH运行4hrs; B) 25 ° C+93%RH运行4hrs; 循环步骤A步骤B总共2个循环. 测试时间：循环2cycles, 16hrs
7	冷热冲击测试 (Thermal shock test)	测试条件：-40° C~100° C+93%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, 16hrs

3. 试验准备

编号	项目	图片/附件
1	可靠性说明文档	参考Ai-WS1-CBS&CBE系列模组可靠性WIFI测试说明
2	实验设备	
3	样品摆放	
4	测试原因	新品可靠性测试（90240005-NodeMCU-Ai-WS1-CBS-Kit）

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.

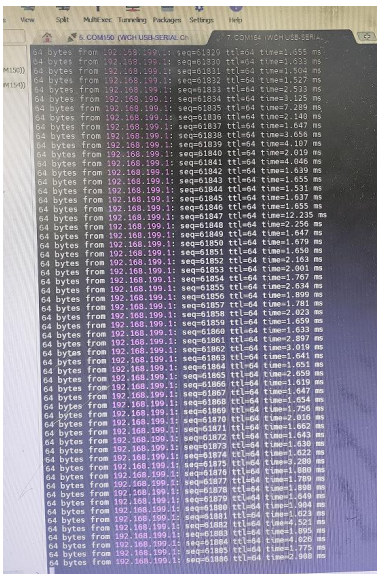


测试曲线：

Is Power Off ————
Is Power Off ————

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。

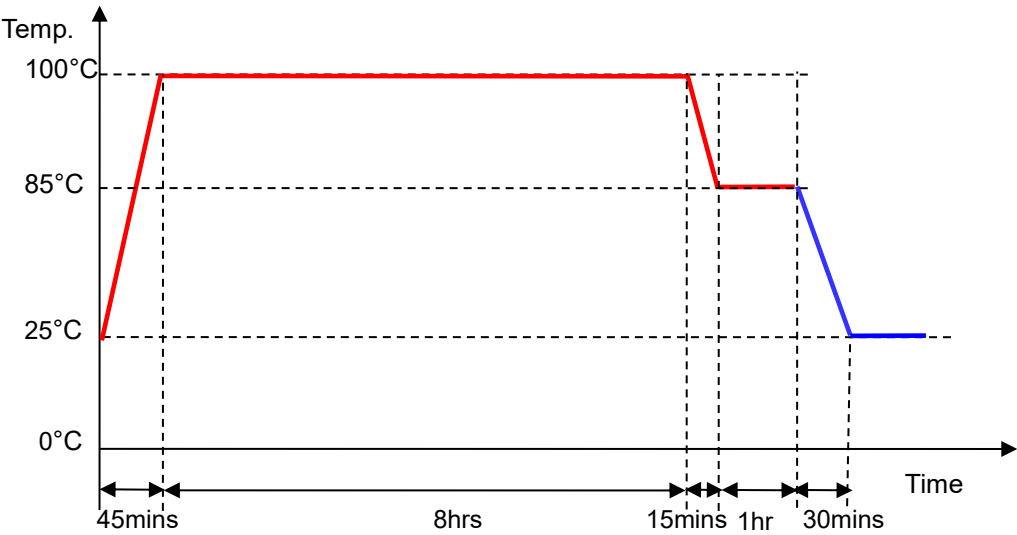
测试样机	测试数据	测试结果
1PCS		 PASS

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. 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。

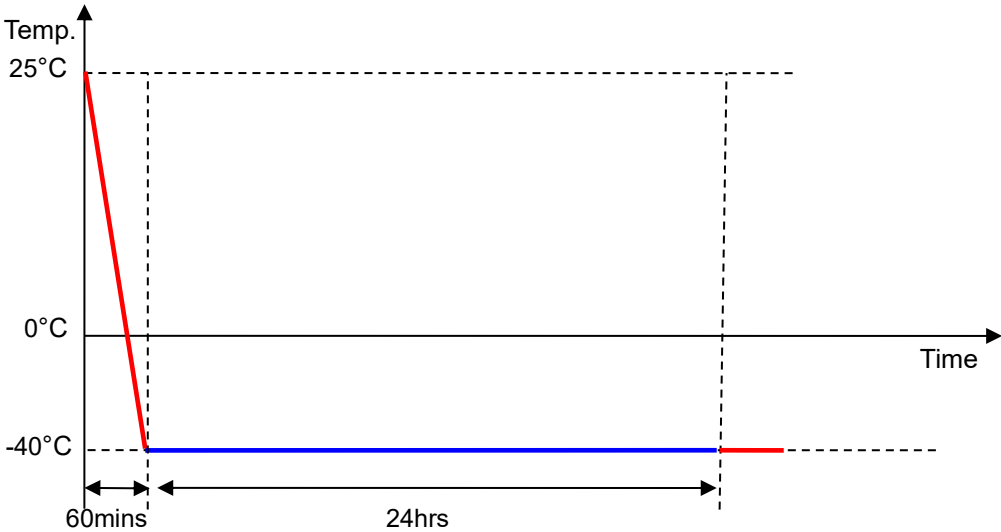
测试样机	测试数据	测试结果
1PCS	可程式恒温恒湿试验箱 Programable Constant Temperature And Humidity Test Chamber 控制器 CONTROLLER 模式选择 100.01 启动 视窗灯 电源指示 停止 通讯 故障报警 64 bytes from 192.168.199.1: seq=29040 ttl=64 time=1.588 ms 64 bytes from 192.168.199.1: seq=29041 ttl=64 time=1.588 ms 64 bytes from 192.168.199.1: seq=29042 ttl=64 time=1.438 ms 64 bytes from 192.168.199.1: seq=29043 ttl=64 time=1.556 ms 64 bytes from 192.168.199.1: seq=29044 ttl=64 time=1.541 ms 64 bytes from 192.168.199.1: seq=29045 ttl=64 time=1.301 ms 64 bytes from 192.168.199.1: seq=29046 ttl=64 time=1.498 ms 64 bytes from 192.168.199.1: seq=29047 ttl=64 time=1.563 ms 64 bytes from 192.168.199.1: seq=29048 ttl=64 time=1.625 ms 64 bytes from 192.168.199.1: seq=29049 ttl=64 time=1.590 ms 64 bytes from 192.168.199.1: seq=29050 ttl=64 time=4.724 ms 64 bytes from 192.168.199.1: seq=29051 ttl=64 time=3.771 ms 64 bytes from 192.168.199.1: seq=29052 ttl=64 time=1.537 ms 64 bytes from 192.168.199.1: seq=29053 ttl=64 time=1.945 ms 64 bytes from 192.168.199.1: seq=29054 ttl=64 time=1.495 ms 64 bytes from 192.168.199.1: seq=29055 ttl=64 time=1.468 ms 64 bytes from 192.168.199.1: seq=29056 ttl=64 time=1.435 ms 64 bytes from 192.168.199.1: seq=29057 ttl=64 time=1.931 ms 64 bytes from 192.168.199.1: seq=29058 ttl=64 time=1.465 ms 64 bytes from 192.168.199.1: seq=29059 ttl=64 time=1.257 ms 64 bytes from 192.168.199.1: seq=29060 ttl=64 time=1.476 ms 64 bytes from 192.168.199.1: seq=29061 ttl=64 time=1.496 ms 64 bytes from 192.168.199.1: seq=29062 ttl=64 time=1.474 ms 64 bytes from 192.168.199.1: seq=29063 ttl=64 time=1.468 ms 64 bytes from 192.168.199.1: seq=29064 ttl=64 time=2.564 ms 64 bytes from 192.168.199.1: seq=29065 ttl=64 time=18.231 ms 64 bytes from 192.168.199.1: seq=29066 ttl=64 time=1.490 ms 64 bytes from 192.168.199.1: seq=29067 ttl=64 time=3.450 ms 64 bytes from 192.168.199.1: seq=29068 ttl=64 time=1.477 ms 64 bytes from 192.168.199.1: seq=29069 ttl=64 time=1.490 ms 64 bytes from 192.168.199.1: seq=29070 ttl=64 time=1.607 ms 64 bytes from 192.168.199.1: seq=29071 ttl=64 time=1.554 ms 64 bytes from 192.168.199.1: seq=29072 ttl=64 time=1.596 ms 64 bytes from 192.168.199.1: seq=29073 ttl=64 time=1.606 ms 64 bytes from 192.168.199.1: seq=29074 ttl=64 time=2.709 ms 64 bytes from 192.168.199.1: seq=29075 ttl=64 time=1.593 ms 64 bytes from 192.168.199.1: seq=29076 ttl=64 time=1.773 ms 64 bytes from 192.168.199.1: seq=29077 ttl=64 time=1.794 ms 64 bytes from 192.168.199.1: seq=29078 ttl=64 time=1.598 ms 64 bytes from 192.168.199.1: seq=29079 ttl=64 time=1.488 ms 64 bytes from 192.168.199.1: seq=29080 ttl=64 time=1.554 ms 64 bytes from 192.168.199.1: seq=29081 ttl=64 time=1.456 ms 64 bytes from 192.168.199.1: seq=29082 ttl=64 time=1.487 ms 64 bytes from 192.168.199.1: seq=29083 ttl=64 time=1.738 ms 64 bytes from 192.168.199.1: seq=29084 ttl=64 time=4.555 ms	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.

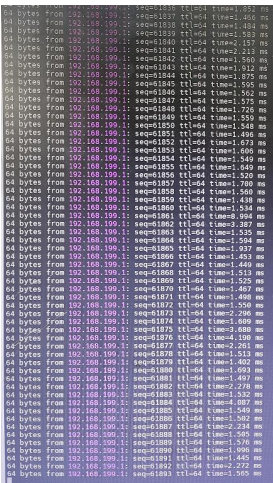
测试曲线：

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
1PCS		PASS

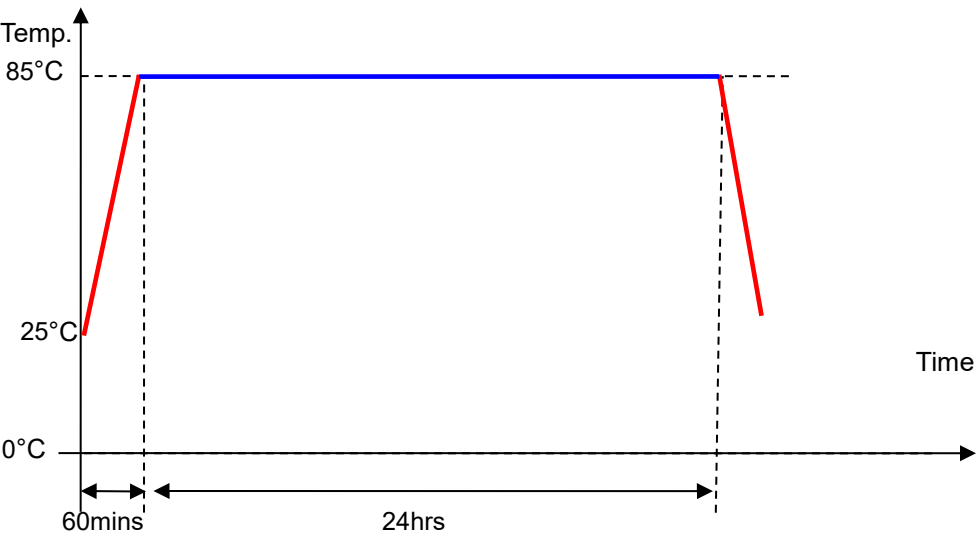
7. 高温运行测试 (High temperature operation test)

测试条件： 开机测试， 85 ° C+93%RH运行24H

测试曲线：

Is Power Off_____

Is Power On_____



测试标准：

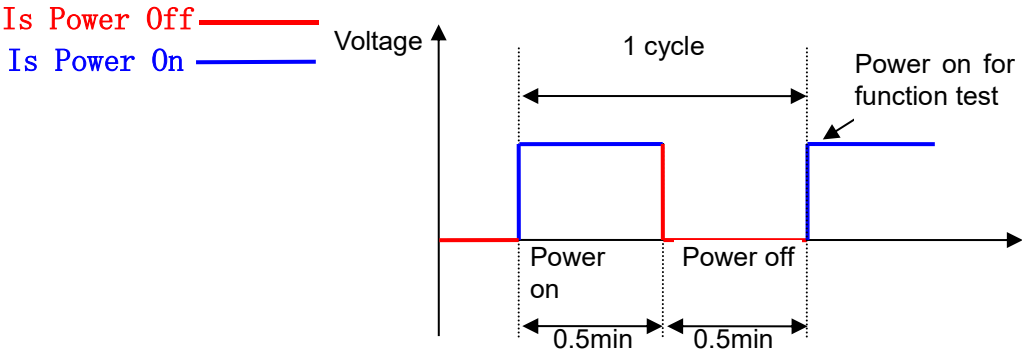
- 1. 测试过程中无断网等现象，确认 ping 包不丢失,即判定模组功能正常。
- 2. 产品测试完后没有可见的损伤，如收缩、剥离、变色等现象。

测试样机	测试数据		测试结果
1PCS			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℃, 25℃+93%RH, 85℃+93%RH。
 - 3. 循环: 每组测试条件循环 200 次。

测试曲线:



测试标准:

- 1. 连接好模组后上电发送指令即开始测试，可以观察到模组打印 LOG 信息。观察网络 ping 包正常。
- 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	1PCS		PASS

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

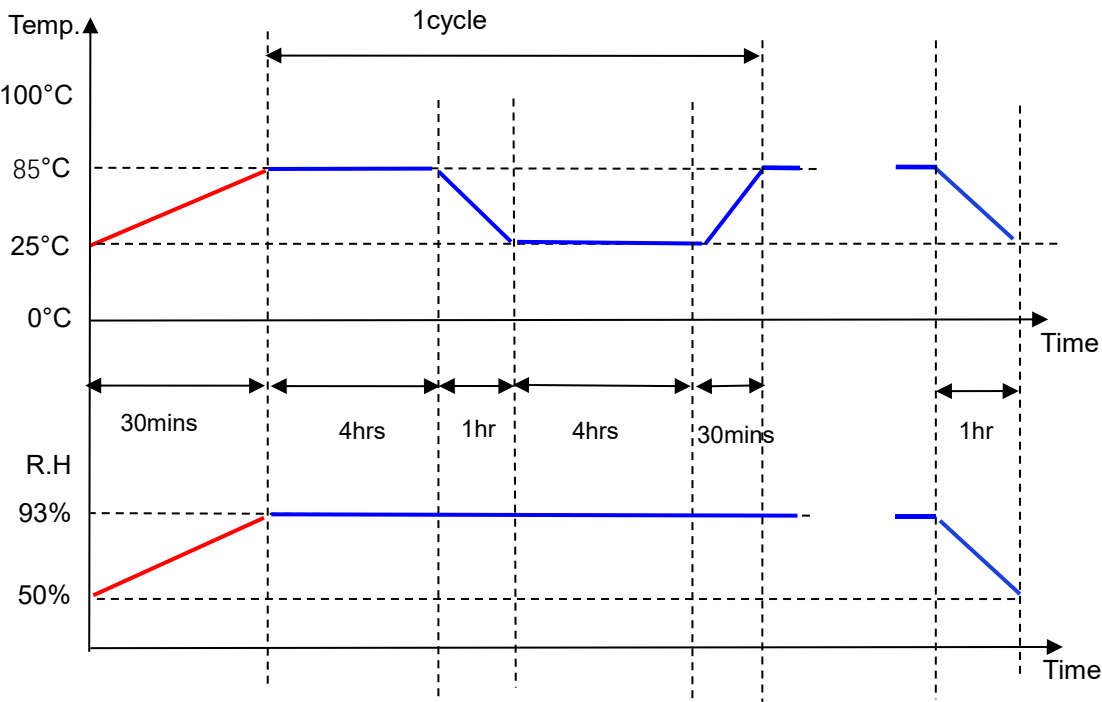
测试条件:

- 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。

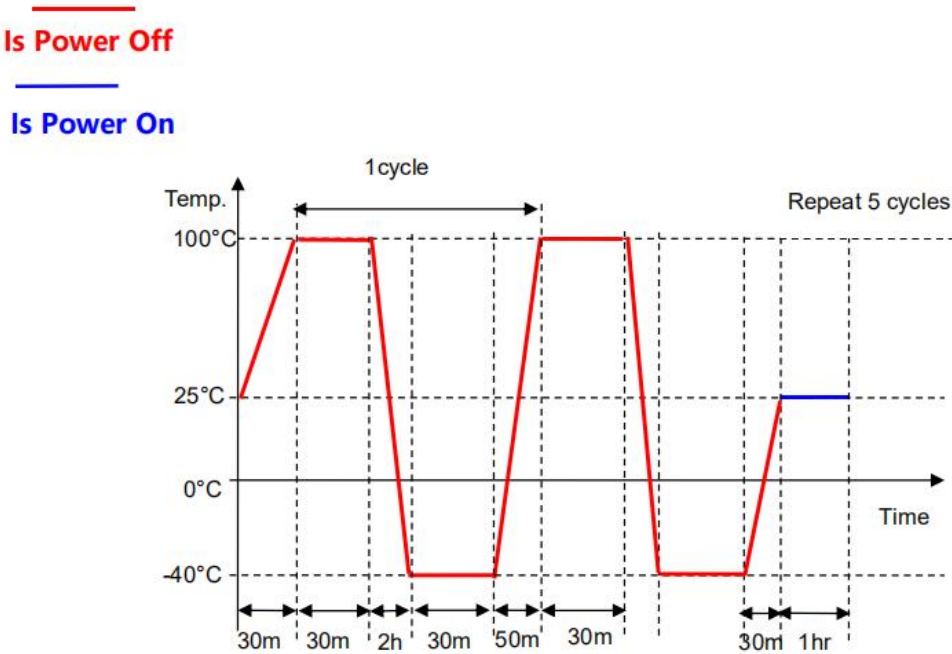
测试样机	测试数据	测试结果
1PCS		PASS

10. 冷热冲击测试 (Thermal shock test)

测试条件:

关机测试, -40° C ~ 100° C+93%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:



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
1PCS	<pre>64 bytes from 192.168.199.1: seq=61964 ttl=64 time=1.751 ms 64 bytes from 192.168.199.1: seq=61965 ttl=64 time=1.257 ms 64 bytes from 192.168.199.1: seq=61966 ttl=64 time=1.002 ms 64 bytes from 192.168.199.1: seq=61967 ttl=64 time=1.649 ms 64 bytes from 192.168.199.1: seq=61968 ttl=64 time=1.659 ms 64 bytes from 192.168.199.1: seq=61969 ttl=64 time=1.490 ms 64 bytes from 192.168.199.1: seq=61970 ttl=64 time=1.643 ms 64 bytes from 192.168.199.1: seq=61971 ttl=64 time=1.524 ms 64 bytes from 192.168.199.1: seq=61972 ttl=64 time=3.276 ms 64 bytes from 192.168.199.1: seq=61973 ttl=64 time=1.393 ms 64 bytes from 192.168.199.1: seq=61974 ttl=64 time=3.262 ms 64 bytes from 192.168.199.1: seq=61975 ttl=64 time=2.449 ms 64 bytes from 192.168.199.1: seq=61976 ttl=64 time=1.638 ms 64 bytes from 192.168.199.1: seq=61977 ttl=64 time=4.524 ms 64 bytes from 192.168.199.1: seq=61978 ttl=64 time=2.139 ms 64 bytes from 192.168.199.1: seq=61979 ttl=64 time=4.138 ms 64 bytes from 192.168.199.1: seq=61980 ttl=64 time=8.245 ms 64 bytes from 192.168.199.1: seq=61981 ttl=64 time=1.757 ms 64 bytes from 192.168.199.1: seq=61982 ttl=64 time=2.804 ms 64 bytes from 192.168.199.1: seq=61983 ttl=64 time=8.159 ms 64 bytes from 192.168.199.1: seq=61984 ttl=64 time=6.328 ms 64 bytes from 192.168.199.1: seq=61985 ttl=64 time=1.628 ms 64 bytes from 192.168.199.1: seq=61986 ttl=64 time=1.603 ms 64 bytes from 192.168.199.1: seq=61987 ttl=64 time=1.773 ms 64 bytes from 192.168.199.1: seq=61988 ttl=64 time=2.777 ms 64 bytes from 192.168.199.1: seq=61989 ttl=64 time=1.660 ms 64 bytes from 192.168.199.1: seq=61990 ttl=64 time=1.649 ms 64 bytes from 192.168.199.1: seq=61991 ttl=64 time=3.408 ms 64 bytes from 192.168.199.1: seq=61992 ttl=64 time=1.543 ms 64 bytes from 192.168.199.1: seq=61993 ttl=64 time=3.131 ms 64 bytes from 192.168.199.1: seq=61994 ttl=64 time=1.765 ms 64 bytes from 192.168.199.1: seq=61995 ttl=64 time=1.327 ms 64 bytes from 192.168.199.1: seq=61996 ttl=64 time=1.652 ms 64 bytes from 192.168.199.1: seq=61997 ttl=64 time=1.777 ms 64 bytes from 192.168.199.1: seq=61998 ttl=64 time=2.648 ms 64 bytes from 192.168.199.1: seq=61999 ttl=64 time=1.653 ms 64 bytes from 192.168.199.1: seq=62000 ttl=64 time=1.627 ms 64 bytes from 192.168.199.1: seq=62001 ttl=64 time=5.184 ms 64 bytes from 192.168.199.1: seq=62002 ttl=64 time=1.762 ms 64 bytes from 192.168.199.1: seq=62003 ttl=64 time=1.632 ms 64 bytes from 192.168.199.1: seq=62004 ttl=64 time=7.898 ms 64 bytes from 192.168.199.1: seq=62005 ttl=64 time=1.899 ms 64 bytes from 192.168.199.1: seq=62006 ttl=64 time=1.793 ms 64 bytes from 192.168.199.1: seq=62007 ttl=64 time=1.896 ms 64 bytes from 192.168.199.1: seq=62008 ttl=64 time=2.028 ms 64 bytes from 192.168.199.1: seq=62009 ttl=64 time=5.552 ms 64 bytes from 192.168.199.1: seq=62010 ttl=64 time=1.645 ms 64 bytes from 192.168.199.1: seq=62011 ttl=64 time=2.334 ms 64 bytes from 192.168.199.1: seq=62012 ttl=64 time=1.656 ms 64 bytes from 192.168.199.1: seq=62013 ttl=64 time=1.662 ms 64 bytes from 192.168.199.1: seq=62014 ttl=64 time=1.526 ms 64 bytes from 192.168.199.1: seq=62015 ttl=64 time=1.775 ms 64 bytes from 192.168.199.1: seq=62016 ttl=64 time=2.514 ms 64 bytes from 192.168.199.1: seq=62017 ttl=64 time=2.995 ms 64 bytes from 192.168.199.1: seq=62018 ttl=64 time=1.541 ms 64 bytes from 192.168.199.1: seq=62019 ttl=64 time=1.642 ms 64 bytes from 192.168.199.1: seq=62020 ttl=64 time=2.259 ms 64 bytes from 192.168.199.1: seq=62021 ttl=64 time=1.638 ms</pre>	PASS