



Thermal & Functions Test Report

TEC300P



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Thermal & Functions Test Report

TEC300P (Ampere Q64-22 CPU)

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1. SYSTEM SPEC

1-1. PRODUCT PHOTOS



1-2. SYSTEM COFIGURATION

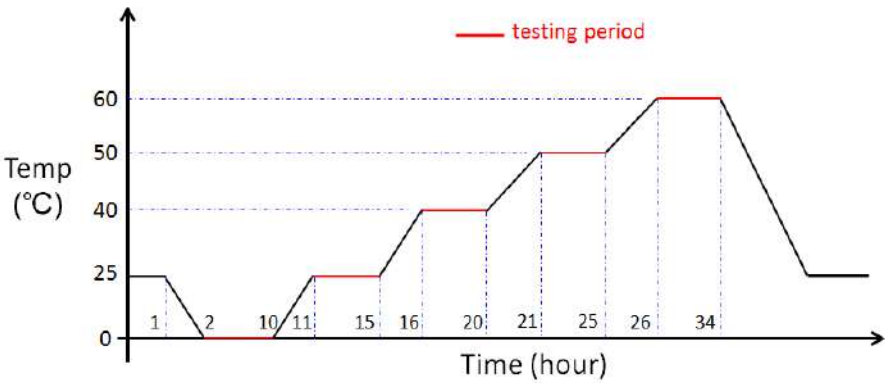
System Configuration	
Motherboard	GIGABYTE MP32-AR1-00 (S/N:1/B/LIANJ000467) BIOS Ver. F32d (SCP:2.10.20220531)
CPU	Ampere ARMV8(Q64-22) AMPERE® ALTRA® FAMILY 64-BIT MULTI-CORE PROCESSORS CORES: 64 SUSTAINED PREDICTABLE FREQUENCY(GHz): 2.2 USAGE POWER GUIDE* (W): 95
Memory	Samsung M393A4K40DB3-CWE DDR4-3200 32G REG DIMM *1
SSD	7Starlake 7SLES0512GTLEW-I32-2 NVMe SSD 512GB Wide Temp: -40°C~85°C, RoHS x1 pcs
POWER BOARD	HDPLEX 400W HiFi DC-ATX Input Voltage: 16V-30VDC Operating Temperature: -10C - 70C
GPU	Integrated in Aspeed® AST2500 2D Video Graphic Adapter with PCIe bus interface 1920x1200@60Hz 32bpp

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2. TEST PLAN

2.1. Thermal Measurement Process

Test Purpose	The purpose of performing thermal profile test is to identify potential thermal problem of the EUT. And it is to aid products in reliability assessment considering that semiconductor failure rates rise rapidly with increasing junction temperature In case of systems cooling, patterns will vary with stacking choices, temperature/thermal mapping can aid in the development of optimum tacking arrangements
Test Equipment	1. KSON THS-B4T-150 Chamber 2. Lutron BTM-4208SD, Thermometer.
Quantity Tested	Minimum 1 Set
Test Software	Stress-ng under Ubuntu 22.04 LTS
Test Procedure	1. Thermal pre-scan measurement: Temperature: 0~60°C /85%RH 2. Thermal actual measurement: a. Select the test points according to the IR photo and attach thermocouples to the hot points b. Put the EUT in thermal chamber and set the temperature profile of as test specification c. Turn on the thermal chamber and power on the EUT to enter Ubuntu environment to run Max Power Test + Stress application program d. After the EUT executing the test software for 4 hours, record thermal maximum value for each thermocouples point. e. Turn off the thermal chamber and EUT f. Verify and check recorded figure of each component to its' operating temperature range listed in specification/approval sheet of each measured component
Test diagram of curves	Environment defines for 8 hours 

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2.2. TEC300P TEST RESULT<TEST ITEM>

2.2.1 TEMPERATURE CYCLE

Burn-in test under each temperature with maximum quantity of external devices on all I/O connected and full loading status on each device

Test Temperature	Test Result
0°C	PASS
25°C	PASS
40°C	PASS
50°C	PASS
60°C	PASS

2.2.2 I/O FUNCTION

#Confirm the system specifications and I/O connection to ensure that they are functioning properly

Item	Criteria	Result
USB3.0 *3	Connection 2.5" USB3.0 SSD device and transfer data test	PASS
LAN *2	Connection 1G/10G/100G SWITCH HUB transfer data test	PASS
VGA *1	Check work well	PASS

2.2.3 LOW-TEMP. BOOT-UP

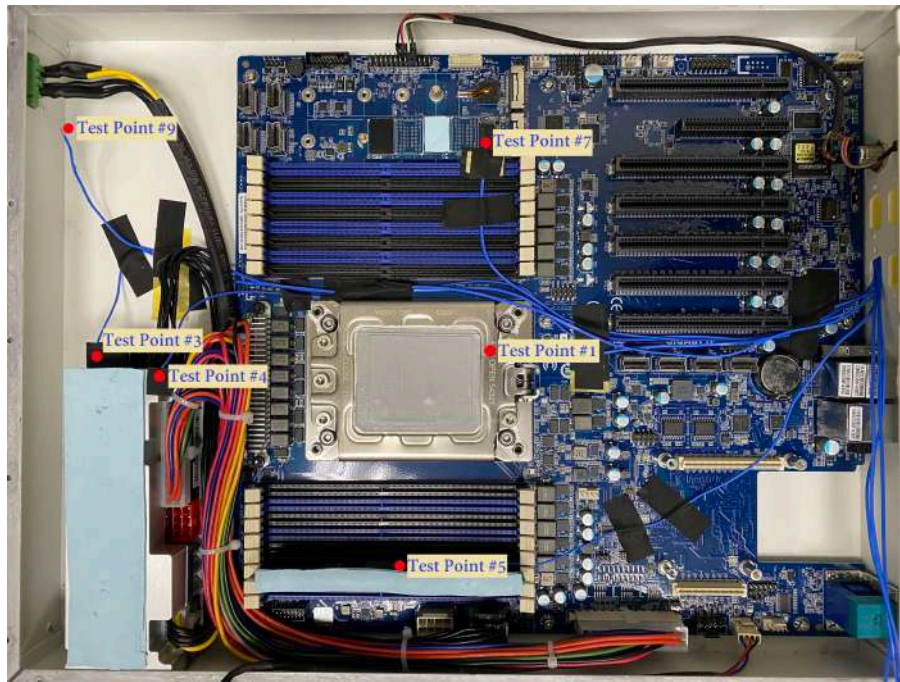
#Power supply under 0°C and ensure that the system boot up properly

Ambient Temp.	Test Result
0°C	PASS

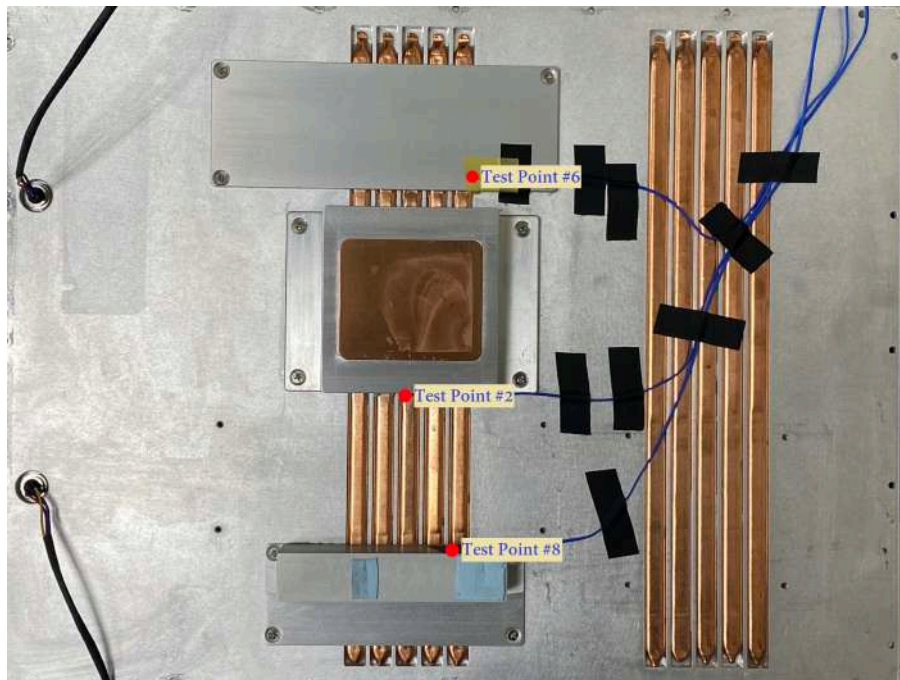
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3. THERMAL TEST POINT



TEST POINT NO.	Test Point
1	CPU
2	CPU Heatsink
3	Power Supply
4	Power Supply Heatsink
5	DRAM
6	DRAM Heatsink
7	M.2 SSD
8	M.2 SSD Heatsink
9	Inside the Case

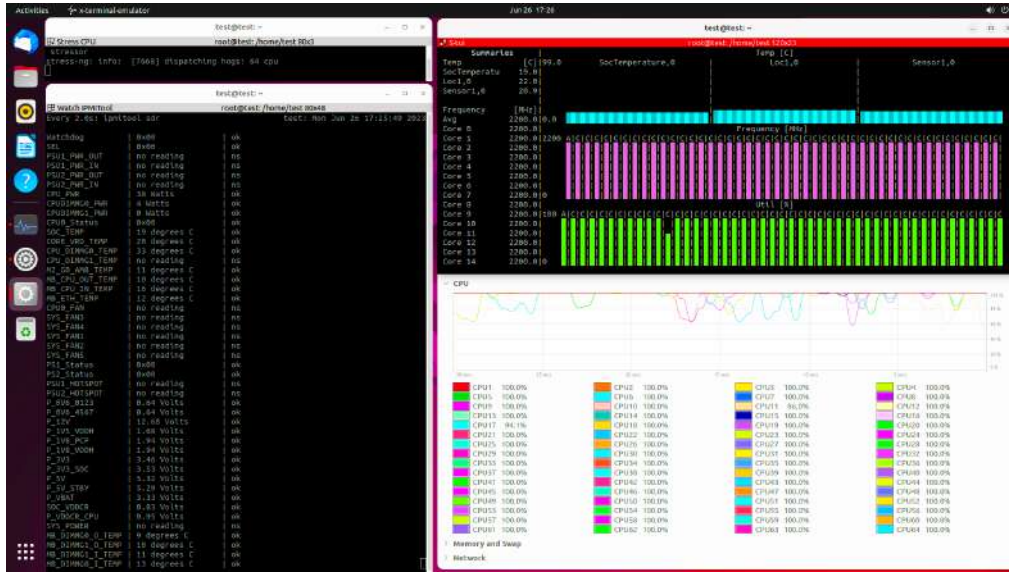


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4. TEST PHOTO IN LAB

- Chamber in 0°C

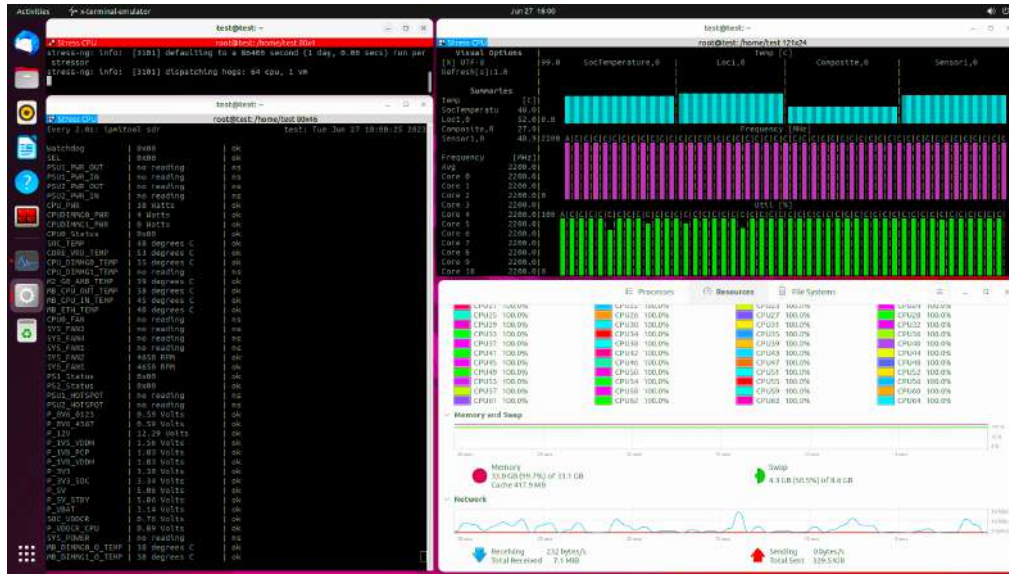


Test Point	Ambient Temp.	0°C
	CPU AVG. FRQ.	2.2GHz
	CPU Tj. (<75°C)	19.0°C
CH1	CPU	8.0°C
CH5	CPU Heatsink	4.1°C
CH2	Power Supply	3.9°C
CH6	Power Supply Heatsink	3.8°C
CH3	DRAM	14.8°C
CH7	DRAM Heatsink	4.1°C
CH4	M.2 SSD	5.4°C
CH8	M.2 SSD Heatsink	3.5°C
CH9	Inside the Case	3.2°C

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- Chamber in 25°C

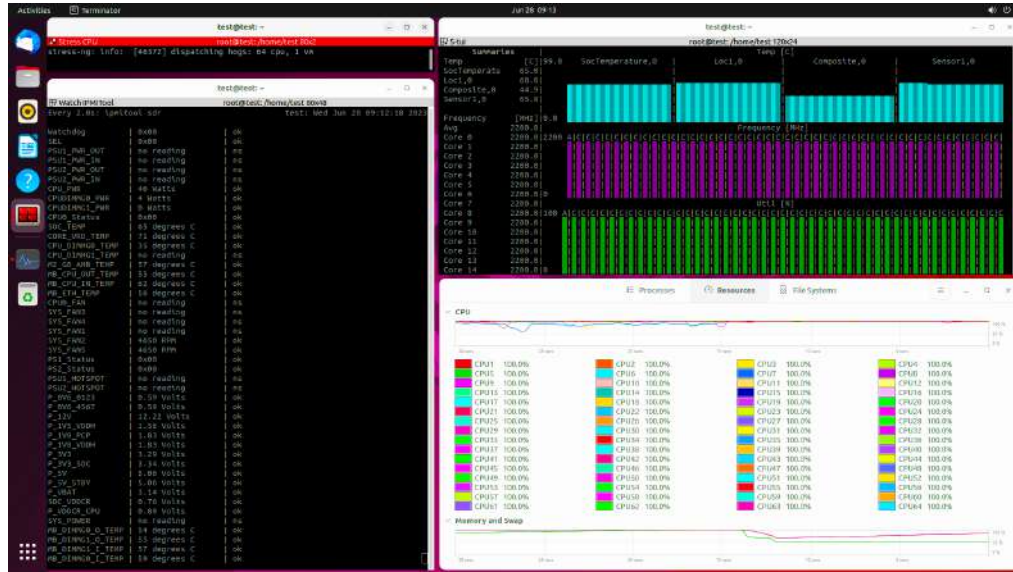


Test Point	Ambient Temp.	25°C
	CPU AVG. FRQ.	2.2GHz
	CPU Tj. (<75°C)	48.0°C
CH1	CPU	37.4°C
CH5	CPU Heatsink	34.5°C
CH2	Power Supply	34.5°C
CH6	Power Supply Heatsink	34.0°C
CH3	DRAM	44.8°C
CH7	DRAM Heatsink	33.7°C
CH4	M.2 SSD	35.9°C
CH8	M.2 SSD Heatsink	33.5°C
CH9	Inside the Case	32.9°C

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- Chamber in 40°C

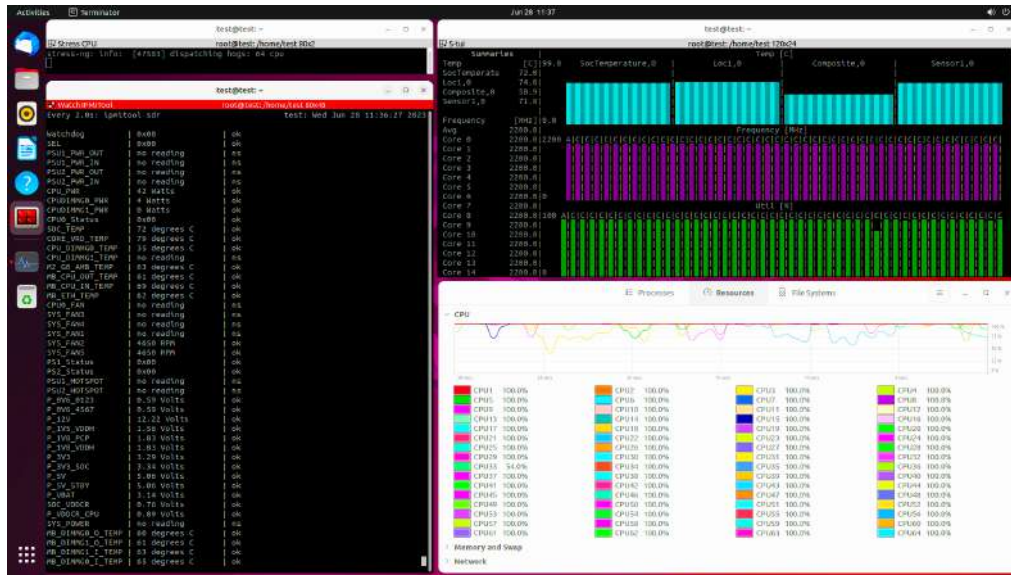


Test Point	Ambient Temp.	40°C
	CPU AVG. FRQ.	2.2GHz
	CPU Tj. (<75°C)	48.0°C
CH1	CPU	54.7°C
CH5	CPU Heatsink	51.9°C
CH2	Power Supply	51.1°C
CH6	Power Supply Heatsink	50.9°C
CH3	DRAM	61.8°C
CH7	DRAM Heatsink	50.8°C
CH4	M.2 SSD	53.4°C
CH8	M.2 SSD Heatsink	50.6°C
CH9	Inside the Case	49.6°C

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TEC300P (Ampere Q64-22 CPU)

- Chamber in 50°C

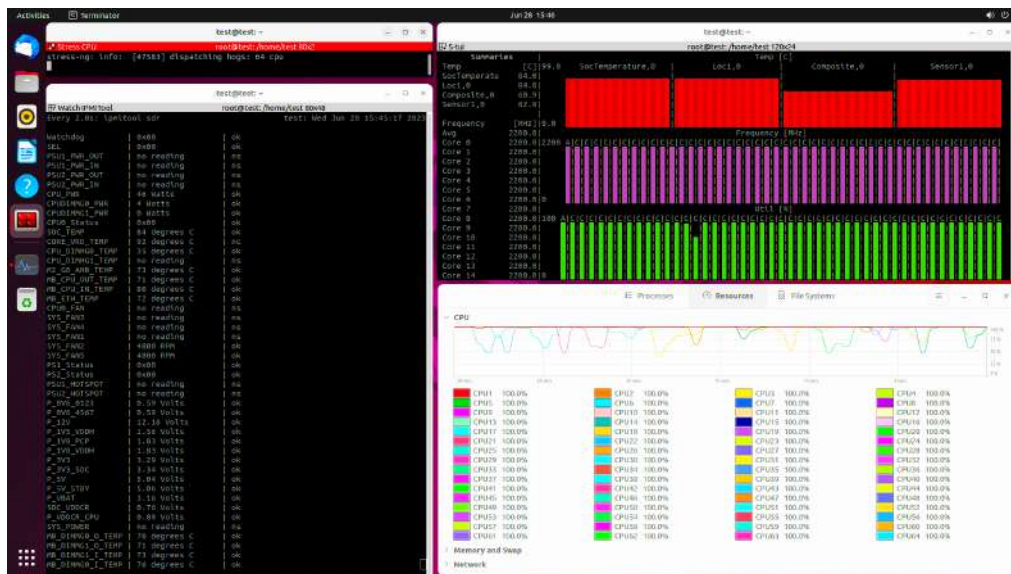


Test Point	Ambient Temp.	50°C
	CPU AVG. FRQ.	2.2GHz
	CPU Tj. (<75°C)	65.0°C
CH1	CPU	60.8°C
CH5	CPU Heatsink	57.9°C
CH2	Power Supply	57.2°C
CH6	Power Supply Heatsink	57.0°C
CH3	DRAM	67.3°C
CH7	DRAM Heatsink	56.9°C
CH4	M.2 SSD	59.3°C
CH8	M.2 SSD Heatsink	56.9°C
CH9	Inside the Case	55.7°C

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- Chamber in 60°C



Test Point	Ambient Temp.	60°C
	CPU AVG. FRQ.	2.2GHz
	CPU Tj. (<75°C)	84.0°C
CH1	CPU	71.2°C
CH5	CPU Heatsink	68.3°C
CH2	Power Supply	67.7°C
CH6	Power Supply Heatsink	67.3°C
CH3	DRAM	77.6°C
CH7	DRAM Heatsink	67.1°C
CH4	M.2 SSD	69.7°C
CH8	M.2 SSD Heatsink	67.0°C
CH9	Inside the Case	65.6°C

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Low Temperature SYSTEM Boot up Test - Ambient Temp. 0°C



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5. TEC300P THERMAL TEST RESULT (0~+60 DEGREE C)

CPU Temperature and Frequency							
TEST POINT NO.	Core Temp	Ambient Temp	0°C	25°C	40°C	50°C	60°C
	CPU Frequency			85%H	85%H	85%H	85%H
	CPU Avg. Frequency		2200MHz	2200MHz	2200MHz	2200MHz	2200MHz
	CPU Tj. Temp (< 75°C)		19.0°C	48.0°C	65.0°C	72.0°C	84.0°C
CH1	CPU		8.0°C	37.4°C	54.7°C	60.8°C	71.2°C
CH5	CPU Heatsink		4.1°C	34.5°C	51.9°C	57.9°C	68.3°C
CH2	Power Supply		3.9°C	34.5°C	51.1°C	57.2°C	67.7°C
CH6	Power Supply Heatsink		3.8°C	34.0°C	50.9°C	57.0°C	67.3°C
CH3	DRAM		14.8°C	44.8°C	61.8°C	67.3°C	77.6°C
CH7	DRAM Heatsink		4.1°C	33.7°C	50.8°C	56.9°C	67.1°C
CH4	M.2 SSD		5.4°C	35.9°C	53.4°C	59.3°C	69.7°C
CH8	M.2 SSD Heatsink		3.5°C	33.5°C	50.6°C	56.9°C	67.0°C
CH9	Inside the Case		3.2°C	32.9°C	49.6°C	55.7°C	65.6°C

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6. I/O FUNCTION TEST

6.1 VGA OUTPUT TEST



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6.2 1 LAN Transfer Data Test

(1)1G/10G LAN Test

```

root@test: /home/test/203x55
stresstest: /home/test# ./stressCPU
[ 5] 2.00-3.00 sec 112 Mbytes 942 Mb/s 0 219 Kbytes
[ 5] 3.00-4.00 sec 112 Mbytes 944 Mb/s 0 219 Kbytes
[ 5] 4.00-5.00 sec 112 Mbytes 941 Mb/s 0 219 Kbytes
[ 5] 5.00-6.00 sec 112 Mbytes 941 Mb/s 0 219 Kbytes
[ 5] 6.00-7.00 sec 112 Mbytes 940 Mb/s 0 219 Kbytes
[ 5] 7.00-8.00 sec 113 Mbytes 944 Mb/s 0 219 Kbytes
[ 5] 8.00-9.00 sec 112 Mbytes 941 Mb/s 0 219 Kbytes
[ 5] 9.00-10.00 sec 112 Mbytes 939 Mb/s 0 219 Kbytes
[ ID] Interval Transfer Bitrate Retr Cwnd
[ 5] 0.00-10.00 sec 1.10 Gbytes 942 Mb/s 0 sender
[ 5] 0.00-10.00 sec 1.10 Gbytes 941 Mb/s 0 receiver

iperf Done.
root@test: /home/test# iperf3 -c 192.168.0.41
Connecting to host 192.168.0.41, port 5201
[ 5] local 192.168.0.54 port 48726 connected to 192.168.0.41 port 5201
[ ID] Interval Transfer Bitrate Retr Cwnd
[ 5] 0.00-1.00 sec 113 Mbytes 951 Mb/s 0 221 Kbytes
[ 5] 1.00-2.00 sec 112 Mbytes 939 Mb/s 0 221 Kbytes
[ 5] 2.00-3.00 sec 112 Mbytes 941 Mb/s 0 221 Kbytes
[ 5] 3.00-4.00 sec 112 Mbytes 940 Mb/s 0 221 Kbytes
[ 5] 4.00-5.00 sec 112 Mbytes 941 Mb/s 0 221 Kbytes
[ 5] 5.00-6.00 sec 111 Mbytes 932 Mb/s 0 221 Kbytes
[ 5] 6.00-7.00 sec 112 Mbytes 941 Mb/s 0 221 Kbytes
[ 5] 7.00-8.00 sec 112 Mbytes 941 Mb/s 0 221 Kbytes
[ 5] 8.00-9.00 sec 113 Mbytes 945 Mb/s 0 221 Kbytes
[ 5] 9.00-10.00 sec 112 Mbytes 941 Mb/s 0 221 Kbytes
[ ID] Interval Transfer Bitrate Retr
[ 5] 0.00-10.00 sec 1.10 Gbytes 941 Mb/s 0 sender
[ 5] 0.00-10.00 sec 1.09 Gbytes 940 Mb/s 0 receiver

iperf Done.
root@test: /home/test# iperf3 -c 192.168.0.43
Connecting to host 192.168.0.43, port 5201
[ 5] local 192.168.0.54 port 44420 connected to 192.168.0.43 port 5201
[ ID] Interval Transfer Bitrate Retr Cwnd
[ 5] 0.00-1.00 sec 113 Mbytes 951 Mb/s 0 221 Kbytes
[ 5] 1.00-2.00 sec 112 Mbytes 940 Mb/s 0 221 Kbytes
[ 5] 2.00-3.00 sec 112 Mbytes 943 Mb/s 0 221 Kbytes
[ 5] 3.00-4.00 sec 112 Mbytes 940 Mb/s 0 221 Kbytes
[ 5] 4.00-5.00 sec 112 Mbytes 942 Mb/s 0 221 Kbytes
[ 5] 5.00-6.00 sec 112 Mbytes 941 Mb/s 0 221 Kbytes
[ 5] 6.00-7.00 sec 112 Mbytes 941 Mb/s 0 221 Kbytes
[ 5] 7.00-8.00 sec 112 Mbytes 941 Mb/s 0 221 Kbytes
[ 5] 8.00-9.00 sec 112 Mbytes 945 Mb/s 0 221 Kbytes
[ 5] 9.00-10.00 sec 112 Mbytes 941 Mb/s 0 221 Kbytes
[ ID] Interval Transfer Bitrate Retr
[ 5] 0.00-10.00 sec 1.10 Gbytes 941 Mb/s 0 sender
[ 5] 0.00-10.00 sec 1.08 Gbytes 942 Mb/s 0 receiver

iperf Done.
root@test: /home/test#
    
```

6.3 USB 3.0 Transfer Data Test

```

root@test: /mnt# dd if=/dev/zero of=./write_file bs=4M count=1024
10240 records in
10240 records out
4294967296 bytes (4.3 GB, 4.0 GiB) copied, 6.07436 s, 644 MB/s
root@test: /mnt# dd if=/dev/zero of=./write_file bs=1M count=1024
10240 records in
10240 records out
1073741824 bytes (1.1 GB, 1.0 GiB) copied, 1.77075 s, 606 MB/s
root@test: /mnt# sudo sh -c "sync && echo 1 > /proc/sys/vm/drop_caches"
root@test: /mnt# dd if=./write_file of=/dev/null bs=4k
10485760 records in
10485760 records out
4294967296 bytes (4.3 GB, 4.0 GiB) copied, 5.01078 s, 765 MB/s
root@test: /mnt# dd if=/dev/zero of=./write_file bs=4M count=1024
10240 records in
10240 records out
4294967296 bytes (4.3 GB, 4.0 GiB) copied, 6.07436 s, 644 MB/s
root@test: /mnt# dd if=/dev/zero of=./write_file bs=1M count=1024
10240 records in
10240 records out
1073741824 bytes (1.1 GB, 1.0 GiB) copied, 1.77075 s, 606 MB/s
root@test: /mnt# dd if=/dev/zero of=./write_file bs=4M count=1024
10240 records in
10240 records out
4294967296 bytes (4.3 GB, 4.0 GiB) copied, 6.02995 s, 648 MB/s
root@test: /mnt# sudo sh -c "sync && echo 3 > /proc/sys/vm/drop_caches"
root@test: /mnt# dd if=./write_file of=/dev/null bs=4k
10485760 records in
10485760 records out
4294967296 bytes (4.3 GB, 4.0 GiB) copied, 5.01078 s, 765 MB/s
root@test: /mnt# dd if=/dev/zero of=./write_file bs=4k
10485760 records in
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10240 records in
    
```