

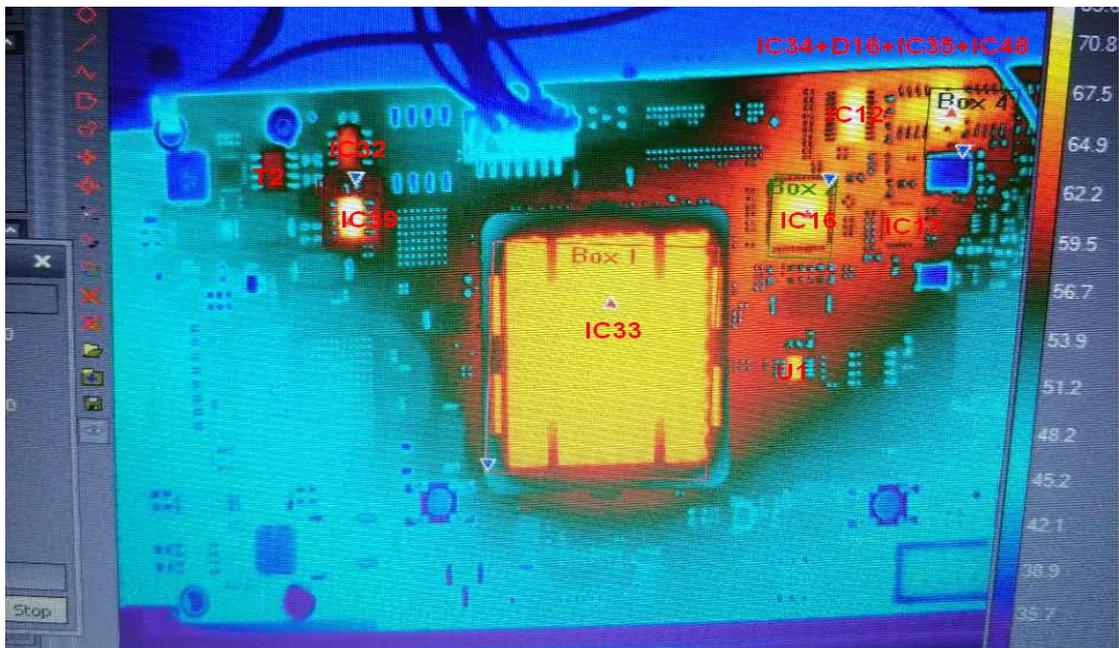
# WRS Temperature Test Report

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## Introduction

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The WRS (White Rabbit Switch) is the key equipment in WR network. It is equipped with two radiator fans to keep the switch working normally. While in some specific situations, we can't use the fans. So we have a temperature test on several main chips inside the switch to get the heat distribution, which can help us to improve the hardware without fans. The picture below is taken by FILR E6 infrared thermal camera and showed the temperature distribution of the SCB board inside the WRS. Note that to take the picture we have to open the up cover and the original WRS internal airflow is corrupted, this picture only shows the potential hotspots.



So we do a further test with thermocouple temperature recorder.

## Equipment

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### 1、NAPUI TR230X-56 Temperature Recorder with 16 channels



### 2、WR Switch v3.4



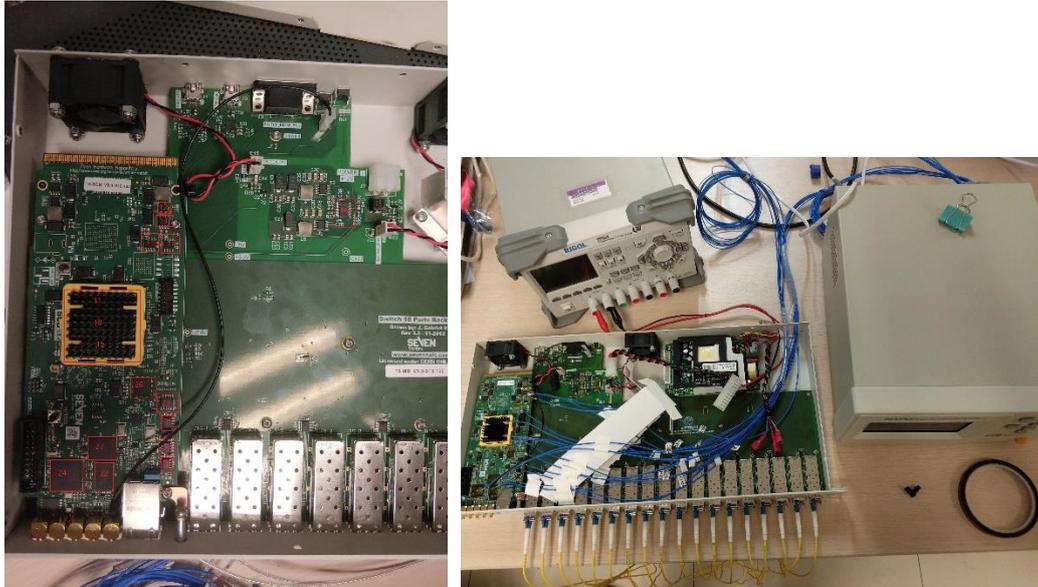
### 3、RIGOL DP832 DC Power Supply



## Process

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- 1、 Open the top shell of WR Switch, disconnect the AC-DC module and Use the RIGOL DP832 to replace the 12V supply.
- 2、 Use the thermal conduction tape to keep the thermocouple probe of NAPUI TR230X-56 in specific places, which are shown in the following picture. Keep probes touch the shell of those chips.



- 3、 Set the NAPUI TR230X-56 to record data every two second.
- 4、 Plug SFPs to all ports. Then connect each two ports with optical fiber to make the Switch work with full-load.
- 5、 Remove the power jack on the back panel for power cable and thermocouple probe wires. Fix the top shell back.
- 6、 Ture on power supply. The Switch start and the temperature is rising. Wait until the temperature become stable, finish the test. This is the test data shown as “With FAN”
- 7、 Disconnect the power supply for two fans. Wait until the temperature of chips drops to room temperature and repeat the test to get data shown as “Without FAN”.

## Result

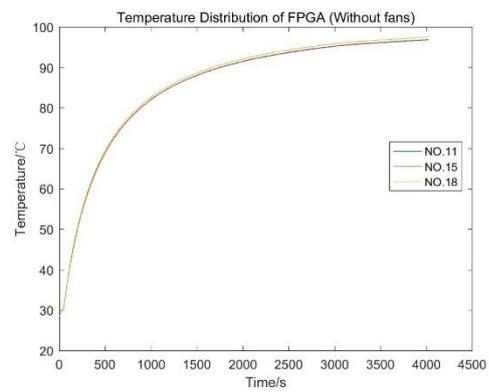
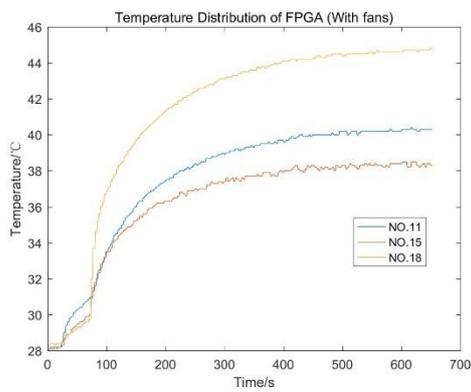
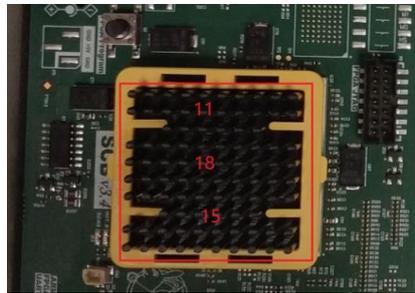
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According to the current reported from the power supply, the whole WRS consumes 14.5Watt, plus another 10Watt for the 18 SFPs.

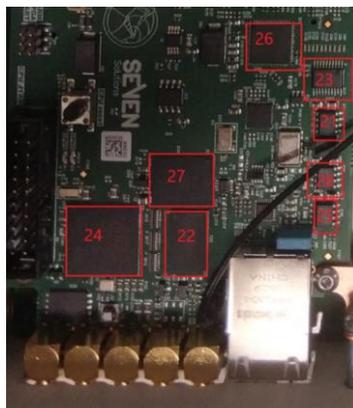
The temperature distribution is shown in the following figures. The main heat source is the FPGA chip, which can achieve about 100°C without the fans. And the two fans can significantly reduce the temperature. The room temperature is about 25°C.

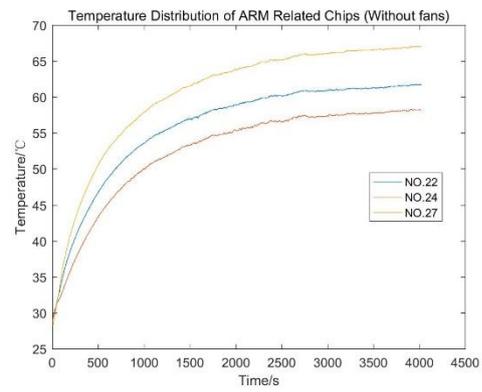
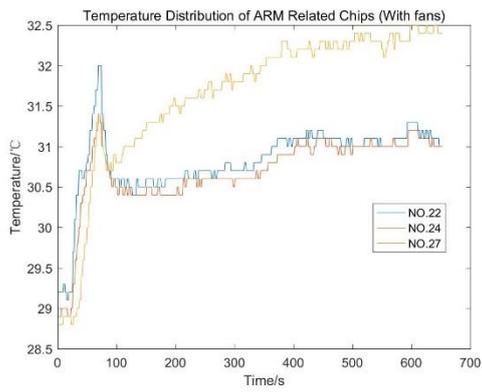
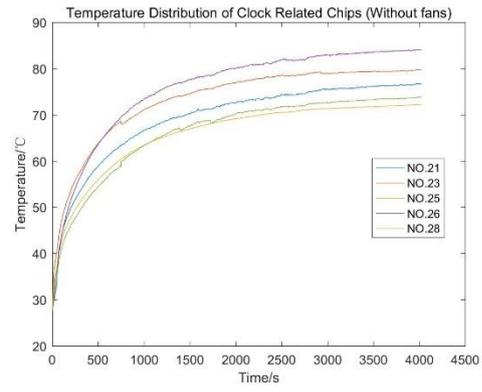
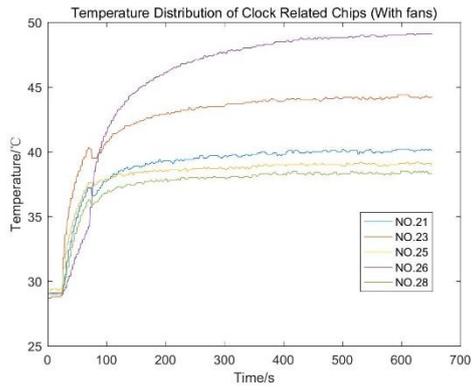
## 1、 The FPGA part

We put three probes in the cooling fin of FPGA. And the temperature can achieve about 100°C when we turn off the fans. And it reduce to about 40°C with the fans on.

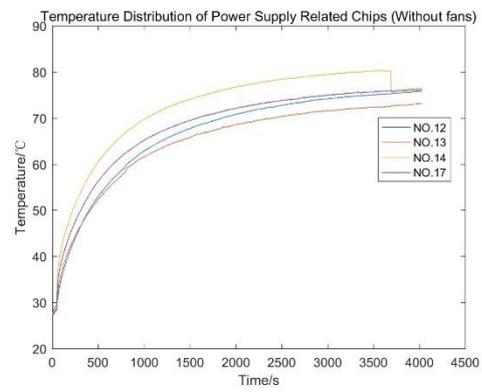
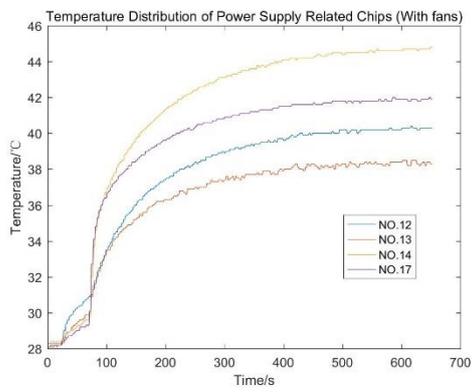
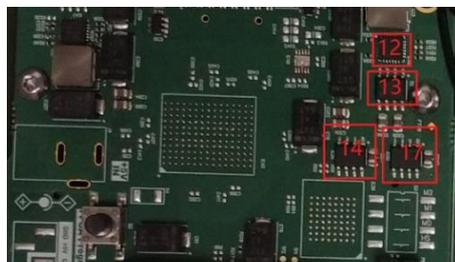


## 2、 The ARM part and clock part

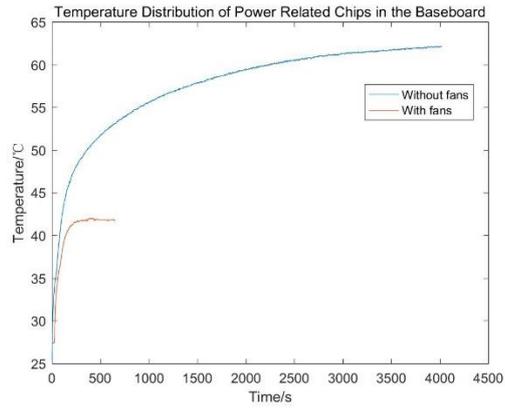
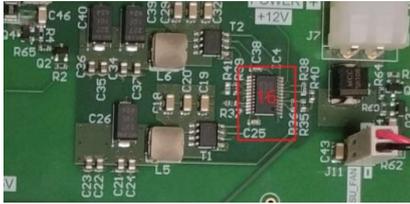




### 3、The power supply part in core board

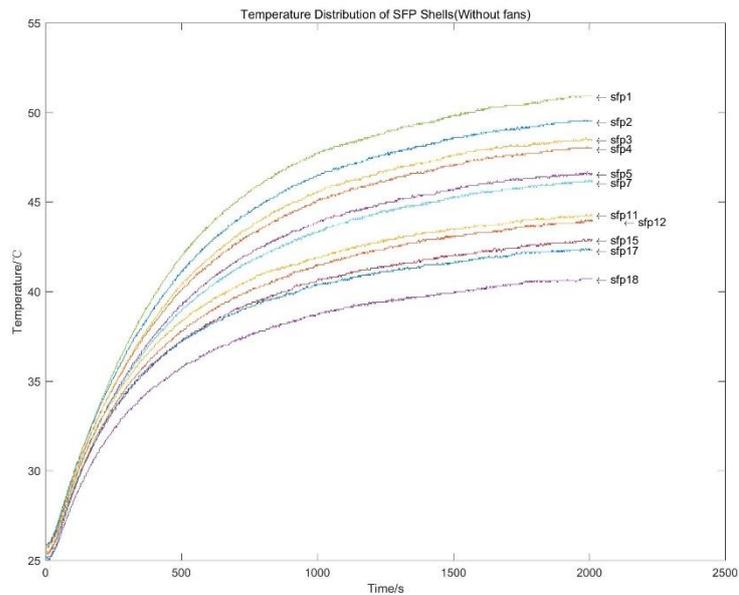


### 4、The power supply part in baseboard board



## 5、 The SFP shell

We also test the temperature distribution of SFP shells without the fans. And we find that the thermal radiation of core board affects the temperature distribution obviously.



## Summary

We have tested the WRS internal temperature distribution with thermocouple temperature recorder. The temperature is quite well controlled with the two fans.

Significant temperature increase is observed if the fans are turned off.