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ELECTRONICS INC.

Thermal Solution Test for S company/ USA

Thermal-Design Team: Bryan Lin,
Ken Chen
Dennis Chang

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Purpose:

To check if the trend/ profile meets the assumptions for resolving heat issues in current heatsink design by S company.

Method:

To set up the actual TDP 100W and related conditions needed by S company from the similar chassis of REGO's customer.

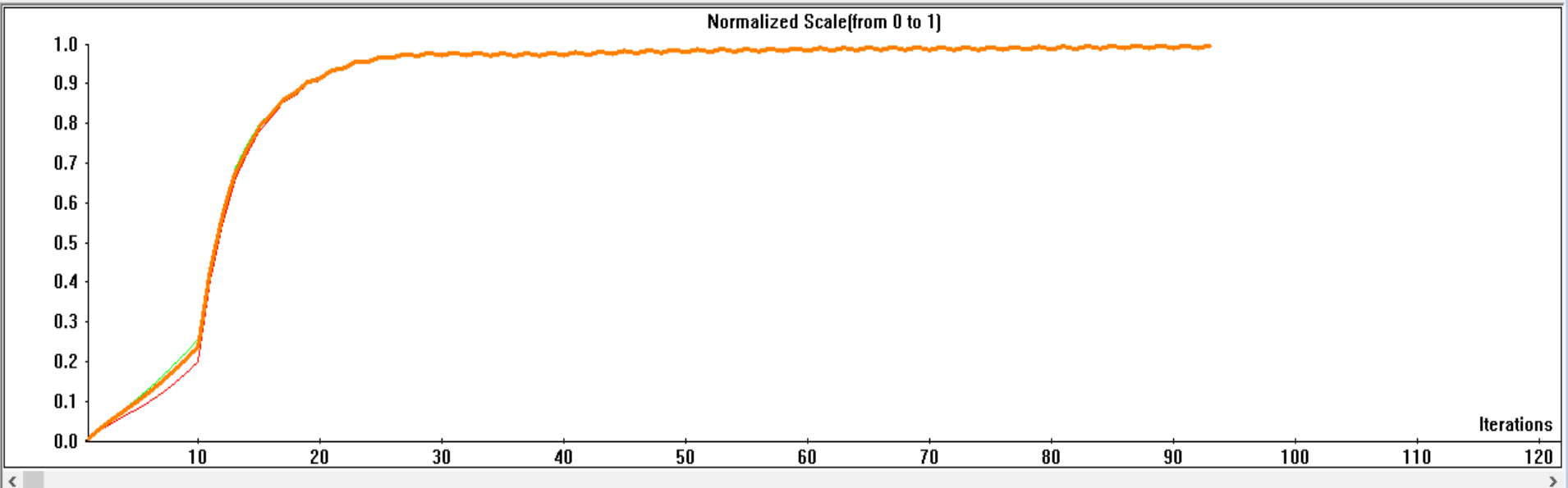
Conditions:

1. **TDP** = 100W
2. **Chip** = AMD EPYC 3000
3. **Ta** = 30°C (with 2 fans, 40x28, 21.4CFM)
4. **Tcmax shall be < 95°C (105°C is Tdie)**
5. **HS1** = Heatsink of S company, change thermal pad to thermal grease.
HS2 = Heatsink, 70x85x25 mm, with thermal grease

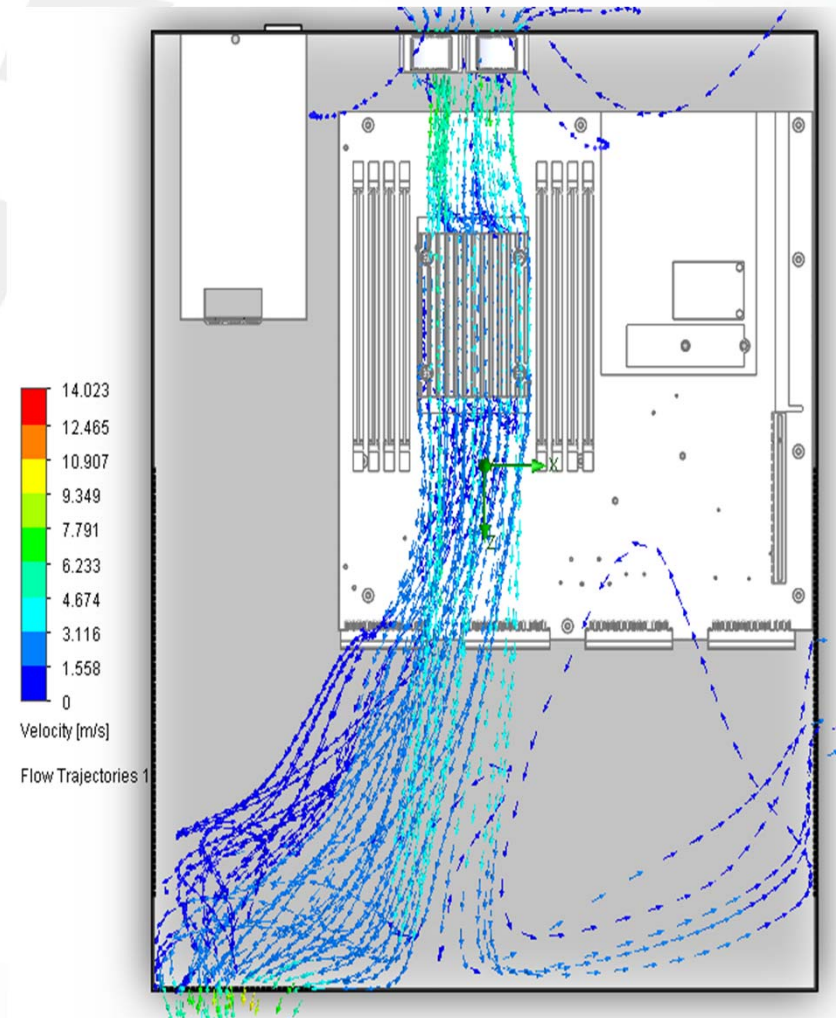
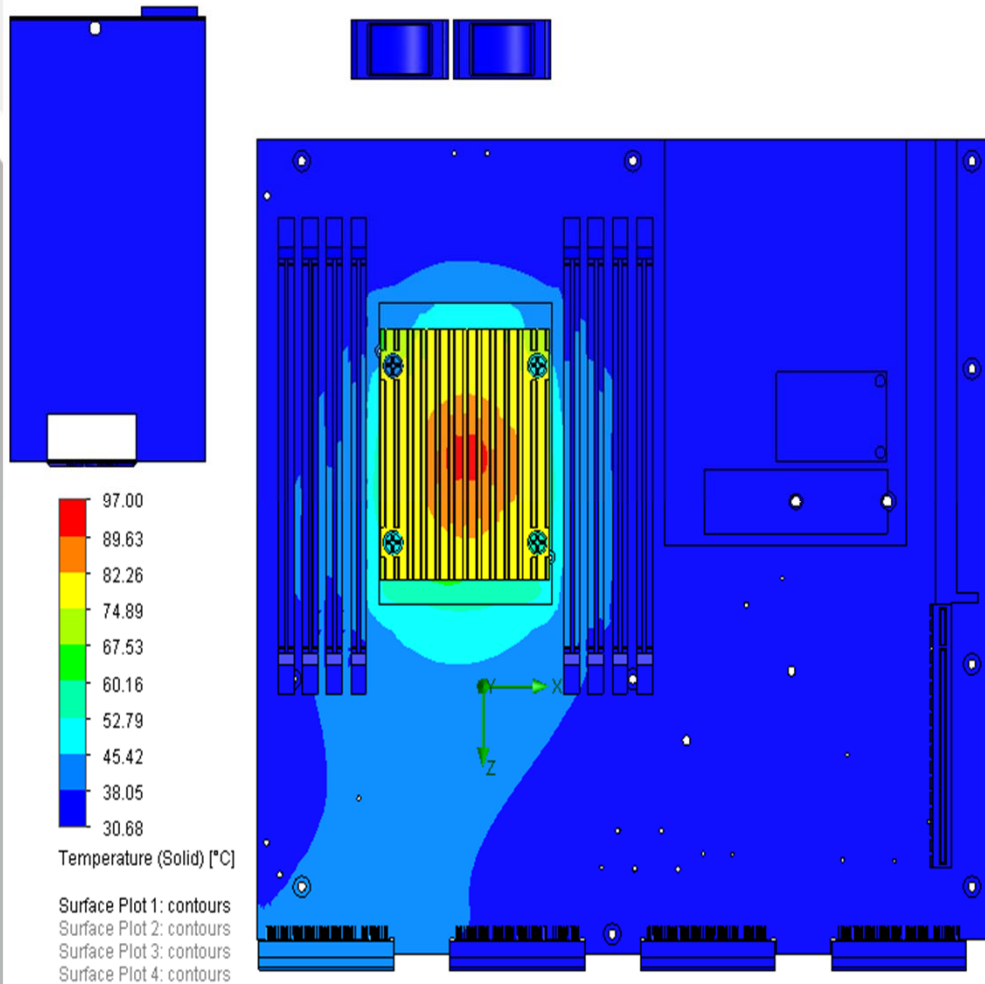
Analysis – Tcase of heat source (HS 1)

The steady T_{c1} in average is **97°C** > T_{cmax} 95°C , **FAILED**

Name	Current Value	Progress	Criterion	Comment	Averaged Value
VG Av Temperature (Solid) CPU	95.0591 °C	Achieved (IT = 93)	1.79516 °C	Checking criteria	94.5431 °C
VG Max Temperature (Solid) CPU	97.0015 °C	Achieved (IT = 93)	1.84201 °C	Checking criteria	96.5212 °C
VG Min Temperature (Solid) CPU	90.792 °C	Achieved (IT = 93)	1.69443 °C	Checking criteria	90.2633 °C



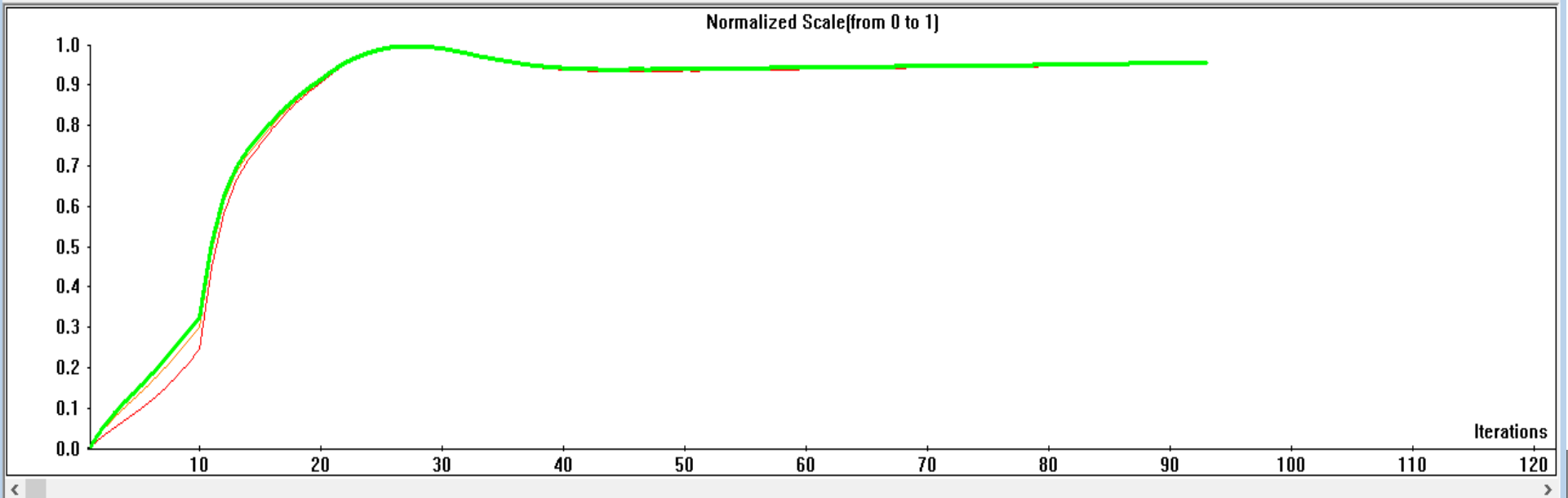
Analysis – Thermal Ranging & Air flow(HS1)



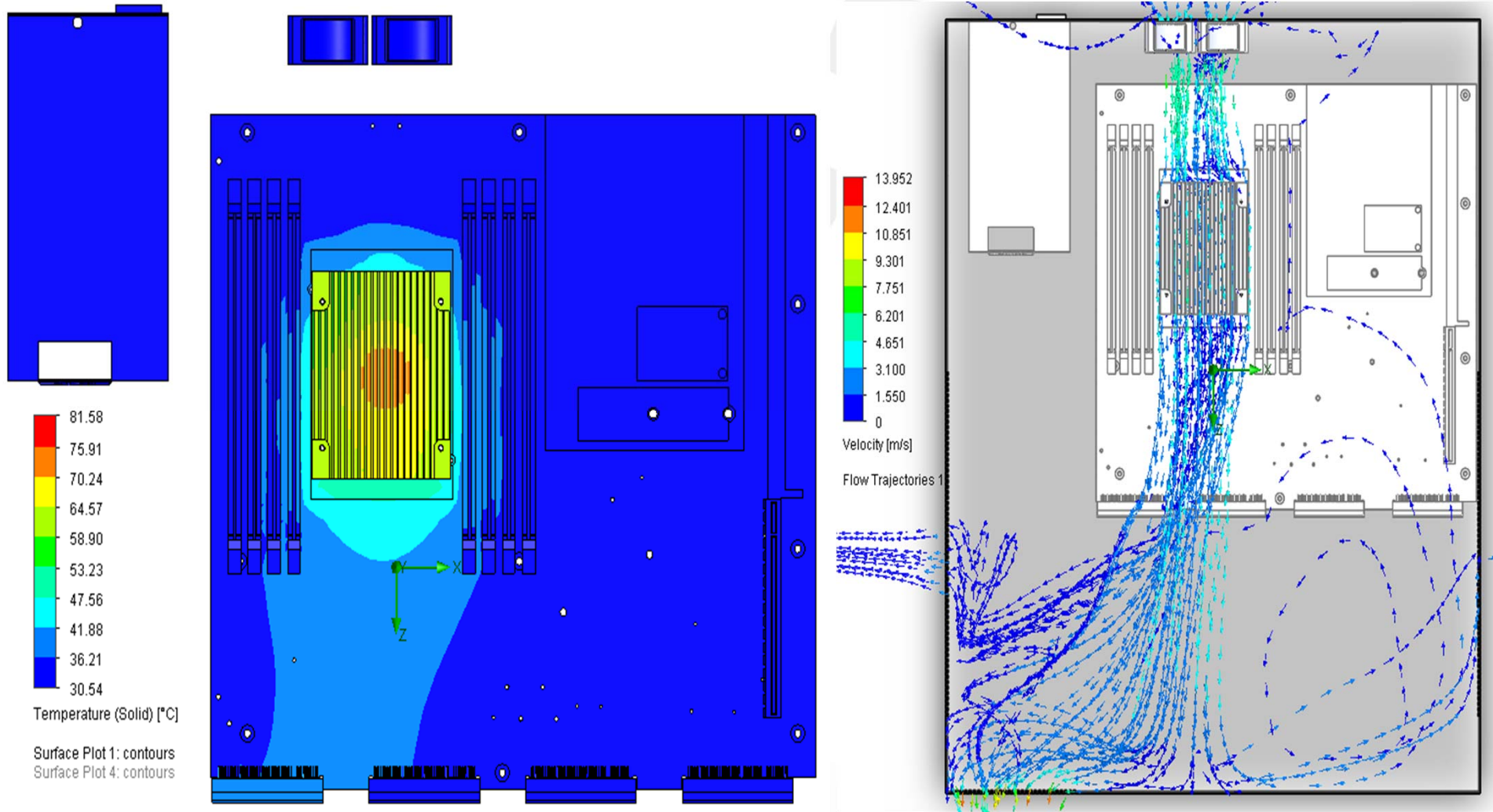
Analysis – Tcase of heat source (HS 2)

The steady T_{c2} in average is **81.58°C** < Tcmax 95°C , **PASSED**

Name	Current Value	Progress	Criterion	Comment	Averaged Value
VG Av Temperature (Solid) CPU	79.388 °C	Achieved (IT = 93)	1.36241 °C	Checking criteria	79.034 °C
VG Max Temperature (Solid) CPU	81.5827 °C	Achieved (IT = 93)	1.40087 °C	Checking criteria	81.2136 °C
VG Min Temperature (Solid) CPU	73.6728 °C	Achieved (IT = 93)	1.26136 °C	Checking criteria	73.3096 °C



Analysis – Thermal Ranging & Air flow(HS2)



Conclusion

Despite of having no actual 3D layout of S company device, we've tried to simulate the most similar conditions and environment to get closer effect as possible. Considering the actual airflow it would get, we only put 2 fans that would directly bring effective airflow as more critical condition setting (could be few degrees difference). Under such conditions, even we've changed the thermal pad to thermal grease from the HS1, the Tc1 (97°C) is still over the maximum permission ($T_{cmax}95^{\circ}C$), unless "underclocking to CPU" is acceptable in this server design.

Furthermore, even the solution we propose could meet the Tcmax ($T_{c2} 81.58^{\circ}C < 95^{\circ}C$), there's still a hidden issue we need to overcome. Generally, there would be around 25~30% difference for AMD cpu between the stated TDP and actual one (it means higher heat to be dissipated actually).

However, the good news is the buffer brought by the design we propose could provide a good opportunity to verify the effect by field testing.

Shall you still have question or other request, don't hesitate to keep us informed. We'll try to help you out.

Thank you.
REGO Thermal Design Team



THANK YOU!
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ASSIST OUR CUSTOMERS

SALES@REGO.COM.TW