HALA

LOOP THERMOSYPHON (LTS)
THERMAL MANAGEMENT

MAKING YOUR THERMOSYPHON MOST
EFFICIENT AND THERMALLY BEST

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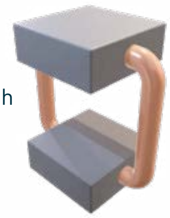
BACKGROUND

The increase in power dissipation in electronic applications has made thermal management a growing challenge from year to year. In terms of sustainability to create more energy by means of thermally efficient cooling systems, passive cooling technologies as Loop Thermosyphons have emerged as an advanced technology with high potential. Passive two-phase cooling refers to the cooling of components using a working fluid that undergoes phase change and has self-sustained motion driven by the application/extraction of heat.

GENERAL

A Loop Thermosyphon is a closed loop two-phase system capable of very efficient heat transfer from high power density heat sources and hot spots to ambient air or liquid coolant, typically with slim design and form factor.

LOOP THERMOSYPHON DESIGN AND COMPONENTS



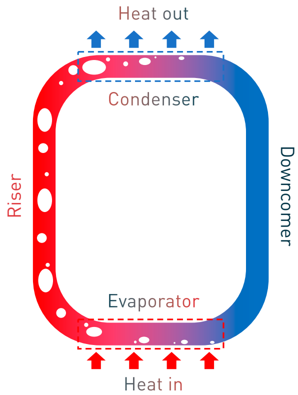
Heat enters the system at the evaporator (i.e. the heat sink base plate in contact with electronic components) where it is transferred to the working fluid, resulting in its partial evaporation. Multi-micro channel evaporator structures are typically used.

Fluid flow circulates in a tubular serpentine between evaporator and condenser areas. The riser and downcomer of the circuit can either be adiabatic or participate to heat transfer. They may also include bends and turns.

At the condenser heat exits the system, where it is removed by the coolant, resulting in total condensation and subcooling of the working fluid. The condenser can be cooled by natural or forced air/gas convection or liquid.

FUNCTIONALITY

Loop Thermosyphons gravity-driven cooling requires a positive elevation between evaporator and condenser. In the evaporator section of a closed loop, the working fluid is partially evaporated at a lower elevation. By buoyancy, the two-phase mixture reaches the condenser at a higher elevation through the riser section. It is cooled down and turns back into liquid, before finally draining into the evaporator through the downcomer section. Because the two-phase mixture's density in the riser is lower than that of the liquid in the downcomer, gravity sustains the flow, with no need to supply any mechanical work.



ADVANTAGES

1. Heat transfer up to and over 100 W/cm²

Heat transfer from very high power density hot spots, up to and over 100 W/cm².

2. Aluminum can also be used

Aluminum can also be used however not with water as working fluid. Their heat capacity (Qmax) exceeds that of conventional heat pipes, which present a a capillary limit.

3. Totally passive heat transfer solution

They are therefore suitable as a totally passive heat transfer solution for robust heat dissipation systems.

DESIGN OPTIONS

HALA and its team offer 2 principle variants of LTSs assemblies.

1. DUO-LTS (Baseline)

See extra data sheet on the inside

2. COMPACT LTS

See extra data sheet on the inside

CONCLUSION

LTS is becoming a relevant technology for thermal management in practice for their intrinsic properties mentioned above. In particular, they can take into account the increasing power density, space, distance, performance and mass requirements, which is why they have great potential e.g. for innovative air-cooled Loop Thermo Syphons for high performance 1U or 2U servers and 5G equipments.

MEET OUR EXPERTS

With our team of experts, we can help you establish a LTS as a new thermal management solution in your application.

CONTACT US NOW!

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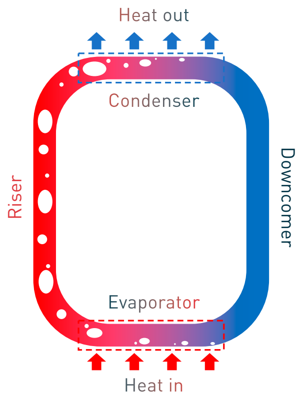
THERMOSYPHON
SINGLE LOOP FOR 2U SERVERS

MAKING YOUR LOOP THERMOSYPHON MOST EFFICIENT AND THERMALLY BEST

This is an air-cooled coldplate with an integrated two-phase thermosyphon and louvered fins for reducing fan energy consumption.

TWO-PHASE CLOSED LOOP THERMOSYPHON WORKING PRINCIPLE

In the evaporator, partial evaporation of the working fluid ensures cooling of the heat source. Due to buoyancy, the two-phase working fluid flows upward in the riser to the condenser where the vapor condenses back to liquid by exchanging heat with a secondary coolant (air, water or another working fluid). At the outlet of the condenser, the downcomer brings the fluid back to the evaporator.



PROPERTIES

- External dimensions: 96 mm width x 57 mm depth x 71 mm height
- Face area for airflow: 75 mm width x 60 mm height
- Footprint cooling area: Up to 40 mm x 40 mm
- Orientations: Horizontal and vertical (as shown)
- Material: 100% aluminum (345 g empty)

APPLICATION EXAMPLES

- Datacenter servers
- Power electronics
- Medical devices
- X-ray machines (medical and security)
- etc.

THERMAL RESISTANCE [K/W]

	HORIZONTAL ORIENTATION			VERTICAL ORIENTATION		
Watt	27 CFM	48 CFM	58 CFM	27 CFM	48 CFM	58 CFM
50 W	0.199	0.169	0.156	0.182	0.152	0.136
100 W	0.180	0.151	0.133	0.164	0.137	0.122
150 W	0.170	0.138	0.125	0.163	0.135	0.120
200 W	0.163	0.132	0.119	0.163	0.134	0.121
250 W	0.158	0.126	0.113	0.163	0.134	0.122
300 W	0.155	0.123	0.110	0.163	0.135	0.123
350 W	0.155	0.123	0.110	0.166	0.138	0.128
400 W	–	0.124	0.111	–	0.141	0.131
450 W	–	0.129	0.119	–	–	–

All data without warranty and subject to change. Please contact us for further data and information.

APPLICATION

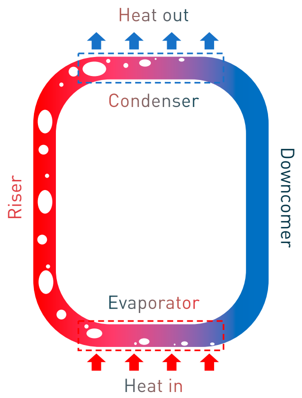
THERMOSYPHON
DUAL LOOP FOR 2U SERVERS

MAKING YOUR LOOP THERMOSYPHON MOST EFFICIENT AND THERMALLY BEST

This is an air-cooled coldplate with an integrated two-phase thermosyphon and louvered fins for reducing fan energy consumption.

TWO-PHASE CLOSED LOOP THERMOSYPHON WORKING PRINCIPLE

In the evaporator, partial evaporation of the working fluid ensures cooling of the heat source. Due to buoyancy, the two-phase working fluid flows upward in the riser to the condenser where the vapor condenses back to liquid by exchanging heat with a secondary coolant (air, water or another working fluid). At the outlet of the condenser, the downcomer brings the fluid back to the evaporator.



PROPERTIES

- External dimensions: 215 mm width x 56 mm depth x 67 mm height
- Face area for airflow: 2 x 91 mm width x 56 mm height
- Footprint cooling area: Up to 50 mm x 50 mm
- Orientations: Horizontal (as shown)
- Material: 100% aluminum (383 g empty)

APPLICATION EXAMPLES

- Datacenter servers
- Power electronics
- Medical devices
- X-ray machines (medical and security)
- etc.

THERMAL RESISTANCE [K/W]

Watt	50 CFM	100 CFM	150 CFM
50 W	0.127	0.106	0.101
100 W	0.115	0.093	0.086
200 W	0.099	0.078	0.072
300 W	0.094	0.074	0.068
400 W	0.092	0.072	0.064
500 W	0.092	0.070	0.063
600 W	0.093	0.070	0.062
700 W	0.096	0.070	0.062
750 W	0.094	0.070	0.062

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