CoolIT's Patented Split-Flow™ Technology: Setting the Standard in Liquid Cooling

1 Overview

Split-Flow™ technology is a patented microchannel coldplate architecture used in all CoolIT Systems' coldplates. Superior coolant flow and heat transfer ensure liquid-cooled servers perform better, are more reliable, and last longer. Split-Flow also reduces the operating costs of liquid cooling systems. This brief explores Split-Flow technology and why selecting direct liquid cooled (DLC) servers with CoolIT coldplates matters.

2 Split-Flow Technology

Split-Flow technology works by directing coolant entering a coldplate into a groove across CoolIT's coldplates, where it disperses across the coldplate's microchannel arrays. Unlike a standard end-to-end microchannel layout, the unique patented Split-Flow design effectively halves the coolant's distance across the microchannels in the coldplate. The reduced flow path lowers flow impedance while improving thermal performance. Split-Flow is also helpful in targeting hot spots to ensure more efficient temperature distribution across the processor. The hottest part of the chip is cooled first through diverging (inside-out) or converging (outside-in) coolant flow.

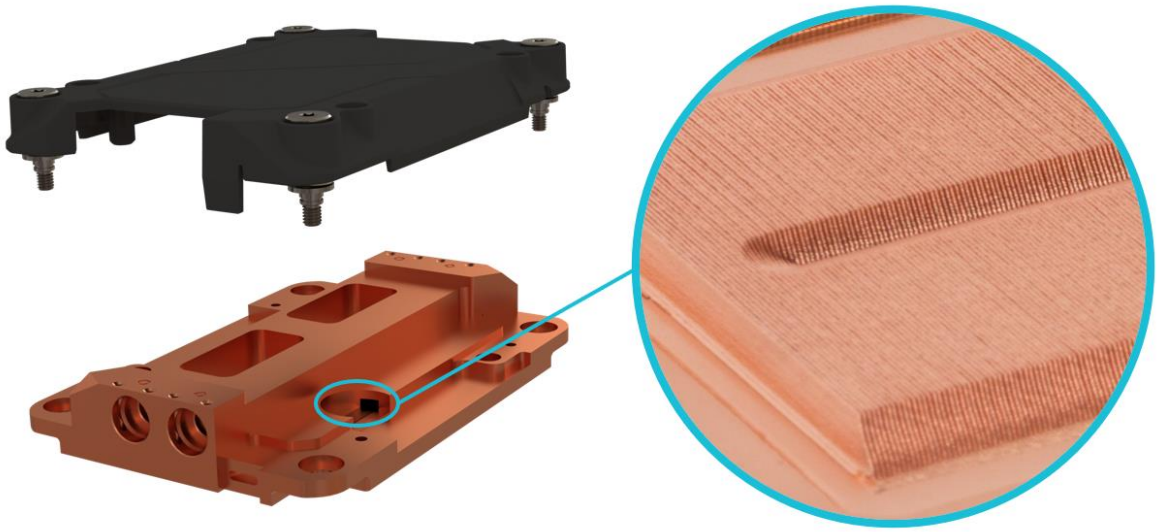

Figure 1: Microchannels inside CoolIT's OMNI™ All-Metal Coldplate, enabling patented Split-Flow technology

3 Performance

CoolIT's Split-Flow technology has several core performance benefits.

3.1 Low Pressure Drop

Liquid cooling systems with Split-Flow coldplates cost less to run. Less pump pressure from a coolant distribution unit (CDU) is needed because CoolIT's coldplates exhibit a lower pressure drop than other coldplates. Splitting the flow in two directions means only half of the total flow rate passes through half of the fin length. This reduces the energy needed to run a CDU and saves on maintenance from running a system harder. Alternatively, more DLC servers can be attached to a unit because the cooling system runs more efficiently. CDUs can cool as much as 50% more DLC servers equipped with CoolIT coldplates.

3.2 Low Thermal Resistance

Processors cooled with CoolIT's coldplates should run better and last longer. Because the Split-Flow architecture is highly effective at transferring heat due to very low thermal resistance, processors can perform optimally while reducing the risk of device failure and increasing lifespan. CoolIT's coldplates typically show upwards of 60% lower thermal resistance than standard coldplate designs. The following RQ curve from recent test results against a semiconductor manufacturer's reference coldplate illustrates OMNI coldplates' superior performance.

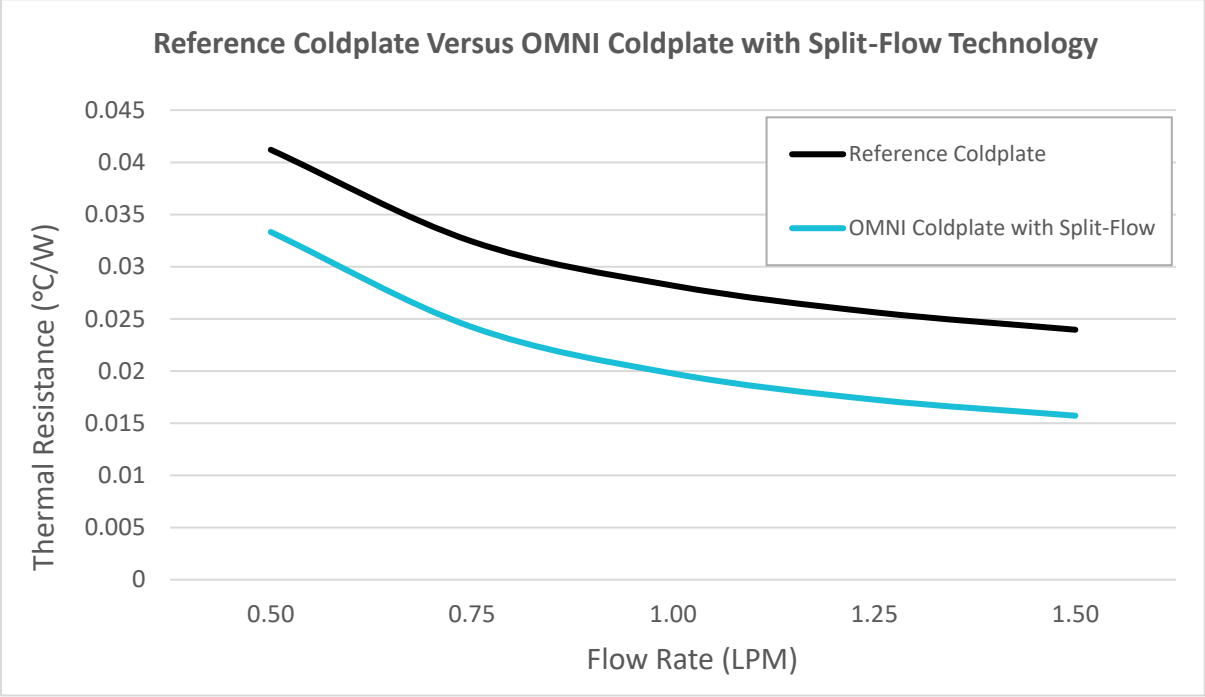

Figure 2: Thermal resistance of reference coldplate versus OMNI Coldplates

3.3 Uniform Cooling with High Heat Flux Targeting

Split-Flow makes running today's AI and HPC processors with high heat fluxes possible. Targeting processor hotspots is essential for high thermal design power (TDP) processors. Split-Flow allows for highly effective uniform cooling across a processor through microchannels while also targeting hot spots. For the current generation of CPUs and GPUs, providing both targeted flow with efficient uniform cooling is essential to their operation.

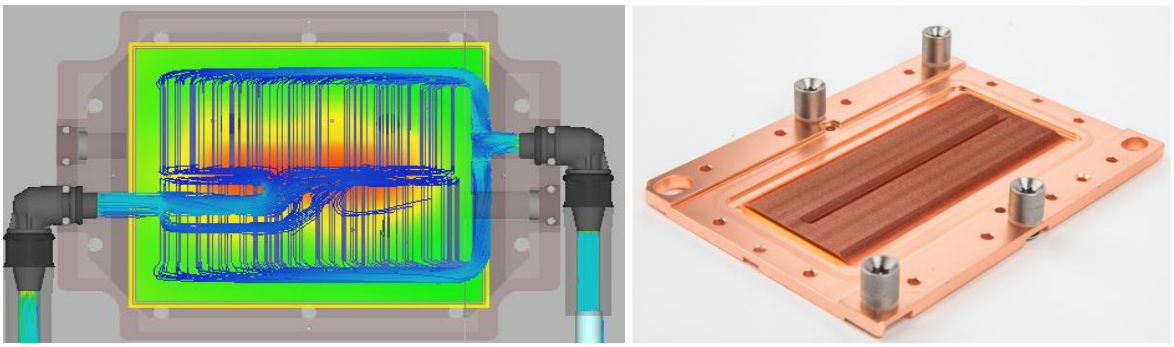

Figure 3: Targeted cooling with Split-Flow technology

4 Conclusion: Why Split-Flow Matters

CoolIT's coldplates with Split-Flow™ technology offer unmatched performance. Split-Flow matters from the dual perspectives of how well hardware performs and lasts, as well as the efficient end-to-end operation of a DLC cooling system. Low thermal resistance and uniform cooling with targeted cooling for high heat fluxes ensure processors and server systems perform their best, operate reliably and last longer. Meanwhile, a very low-pressure drop equates to savings for system operators. Lower operational expenditure (OPEX) can be achieved through reduced energy consumption and maintenance requirements. Lower capital expenditure (CAPEX) can also be realized through increased server density per CDU ratio, maximizing infrastructure investment.

For more information on CoolIT's OMNI All-Metal Coldplates—the next generation of CoolIT's coldplates with Split-Flow technology—visit www.coolitsystems.com/omni.

About CoolIT Systems

CoolIT Systems is renowned for its scalable liquid cooling solutions tailored for the world's most challenging computing contexts. In high-performance computing, AI, and enterprise data centers, CoolIT collaborates with global OEM server design leaders, formulating efficient and trustworthy liquid cooling solutions. Their modular Direct Liquid Cooling technology enables the best performance, energy efficiency, compatibility, and scalability for servers and data centers. Jointly, CoolIT and its partners are pioneering the large-scale adoption of sophisticated liquid cooling technologies.

For more information about CoolIT Systems and its technology, visit www.coolitsystems.com and follow @CoolIT Systems on LinkedIn.