



ELECTRONICS

For Extreme Power Densities

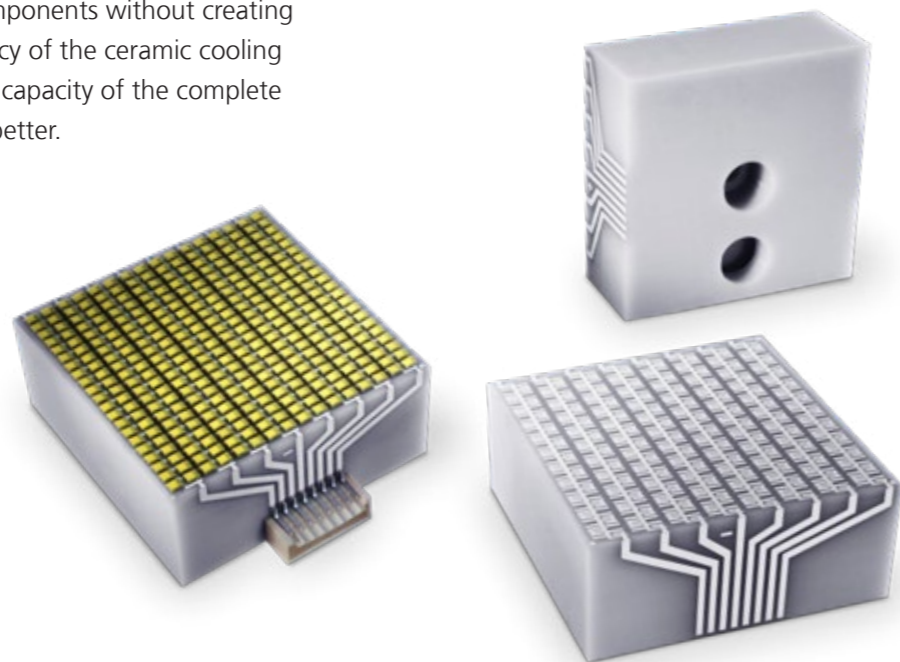
# CeramCool<sup>®</sup> Liquid Cooling

CA230124/EN/100/2304/IM



# Cooling Systems

CeramCool® Liquid Cooling is one of the most efficient and reliable cooling systems on the market. No other design can achieve this system cooling capacity and still assure such a long lifetime. The ceramic heatsink is perfectly electrically insulating and inert. Electrical circuits can be directly metalized on all its sides and can be populated with high-power components without creating any thermal barrier. The efficiency of the ceramic cooling system increases with the rising capacity of the complete power system – the hotter the better.



## Liquid cooling – Almost any cooling capacity!

- Powerful packing densities up to 170 W/cm<sup>2</sup>
- Electrical circuits without thermal barriers directly on CeramCool®
- Shortest possible thermal distance between heat source and heat drain: only 1 mm from heat slug
- Any cooling liquid, any environment
- Scalable
- Homogenous cooling
- Best break-through voltage with excellent thermal conductivity

## Ceramic Heat-sink – Highly efficient thermal management!

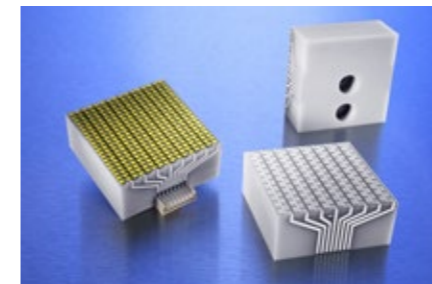
- Ceramics = electrical insulation + thermal conductivity
- CeramCool® = heat-sink + circuit board
- Chip on heat-sink
- Direct and permanent connection of components
- Increases system stability, reliability and lifetime
- Lowest total thermal resistance R<sub>tt</sub>
- Individual layouts
- UV-resistant
- Excellent EMV

# CeramCool® Liquid Cooling: For almost any Cooling Capacity!

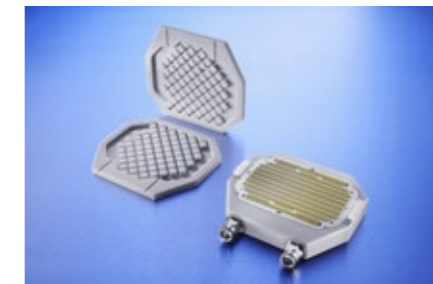
Design and number of cooling channels according to specific requirements. Even simple linear pipe systems deliver amazing cooling capacities, but complex spiral structures and honeycomb high-power systems are also possible. All sides of the heat-sink can be metalized. Custom layouts can be applied directly and densely populated with components.

The choice of ceramic material is decisive for the performance capability of the system. With the same exact geometry, Rubalit® cools 290 W while Alunit® 170 cools 640 W. All CeramCool® systems are excellently suited for UV-applications. To aid comparability of the various cooling systems, all types were simulated using Luxeon Z LEDs.

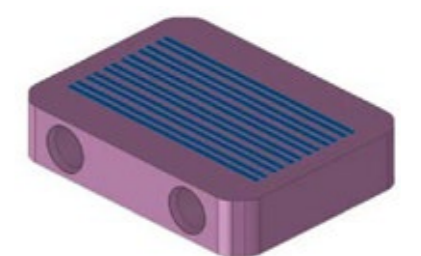
CeramCool® Liquid Cooling	Dimensions (mm)	Luminous flux (lm)	LED-Power (W)	Number of LEDs	Number of phase elements	lm/cm <sup>2</sup>	W/cm <sup>2</sup>	Supply voltage (V)	Supply current (A)	Cooling line connection	Cable terminal
Box	40 x 40 x 16	60,000	680	336	8	3,750	43	~121	5.6	bottom	side
Cell	74 x 56 x 15	80,000	870	432	6	1,900	21	~208	4.2	side	top
Honeycomb	114.5 x 99.5 x 15	186,000	2,000	1,000	10	1,900	21	~289	7	side	top



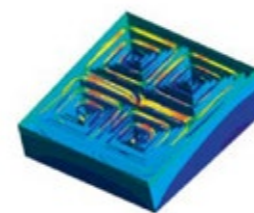
The compact CeramCool® Box is made for homogeneous and efficient cooling of high packing densities. Packing densities of up to 100 W/cm<sup>2</sup> are possible with chip on heatsink design. With 40 x 40 x 16 mm<sup>3</sup> it provides a total cooling capacity of 1,600 W at 90 °C. It is scalable in any direction. Hose connections on bottom.



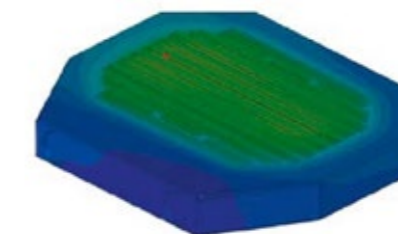
Flat CeramCool® Honeycomb with surface that can be populated with over 1,000 LEDs. In other areas of application this cooling system has been reliably cooling packing densities up to 170 W/cm<sup>2</sup> for decades. Both hose connections are on the same side for easy connection. Simple scalability.



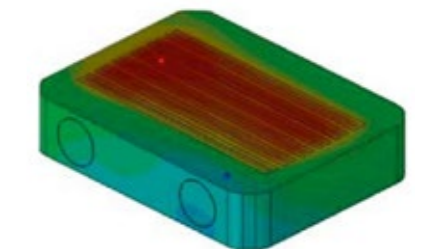
Flat, compact CeramCool® Cell for packing densities up to 21 W/cm<sup>2</sup> using Luxeon Z LEDs. Both hose connections are on the same side for easy connection. Simple scalability.



Symmetrical spiral condensers with multilevel flow paths ensure balanced cooling all the way to the exterior. Extremely homogeneous cooling.



Designed for 2,000 W with junction temperatures between 91 °C and 69 °C (180 l/h to 960 l/h). A power pack that is resistant to overload.



This CeramCool® Cell is designed for 80,000 lm and 874 W. The junction temperature remains under 80 °C with a flow rate of 180 l/h.