



E L E C T R O N I C S

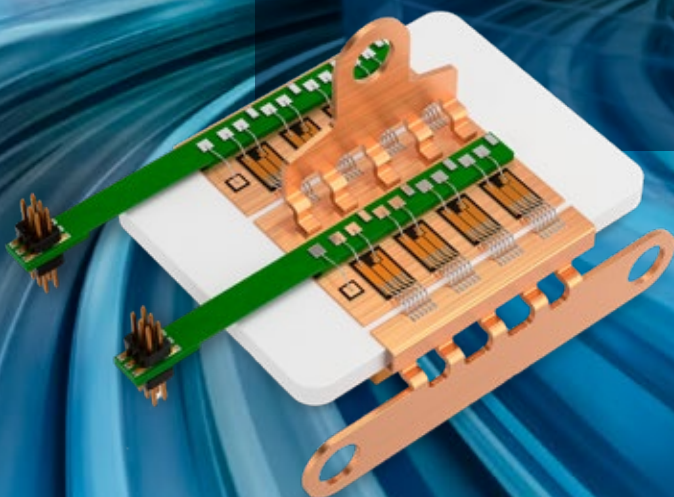
Advanced ceramic
for e-mobility

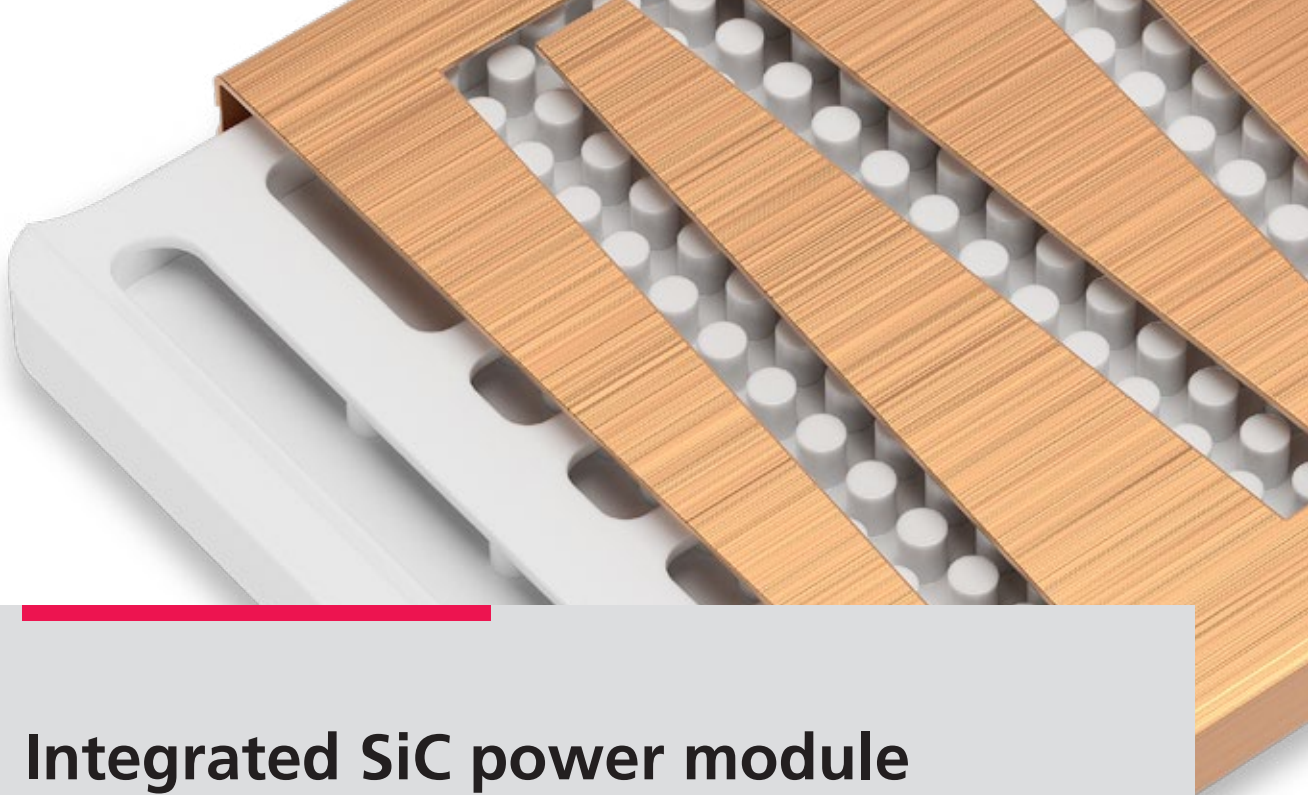
Thermal management with ceramic heatsink

Ceramic heatsink in e-mobility

The use of ceramic heatsink in power electronics, as used in various applications in e-mobility, offers significant advantages in terms of thermal and electrical performance as well as their power density compared to conventional heatsink. For this purpose, CeramTec provides ceramic heatsink with applied metallization, which make it possible to apply the electrical components directly to the ceramic heatsink (chip-on-heatsink) and thus make the best possible use of the chip surface.

High-performance ceramics offer several advantages over conventional materials such as metals and plastics. They are resistant to temperature changes, corrosion, and chemical resistance. In addition, they are characterized by a special thermal conductivity and electrical insulation as well as strength and good tribological properties. High-performance ceramic solutions can therefore be used in a variety of ways in e-mobility.

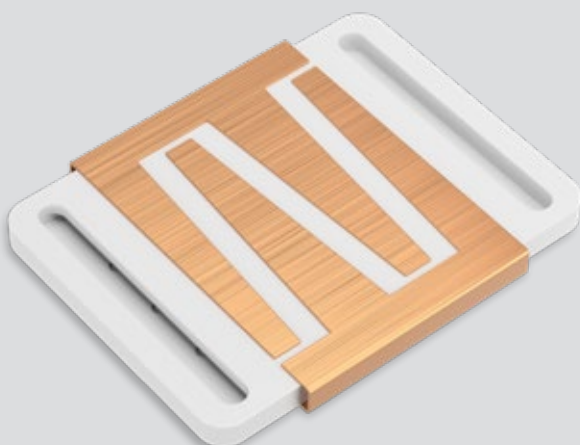




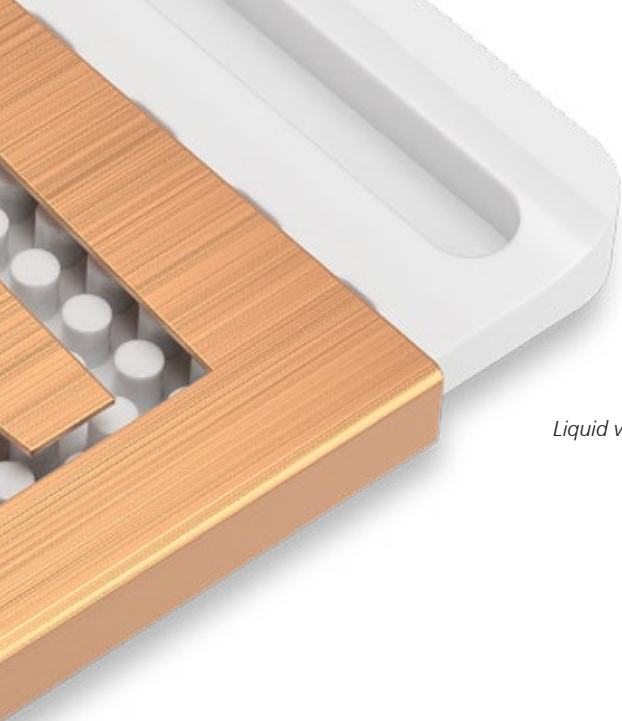
Integrated SiC power module on ceramic heat sink

The integrated SiC power module is based on CeramTec chip-on-heatsink technology. The ceramic heat sink is a cooling structure and circuit carrier in one component, which leads to a significant increase in power density. The design of the ceramic heat sink

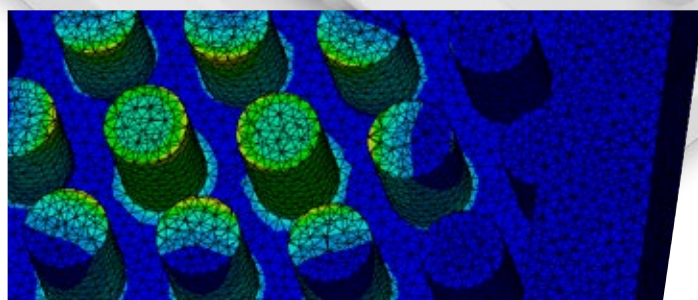
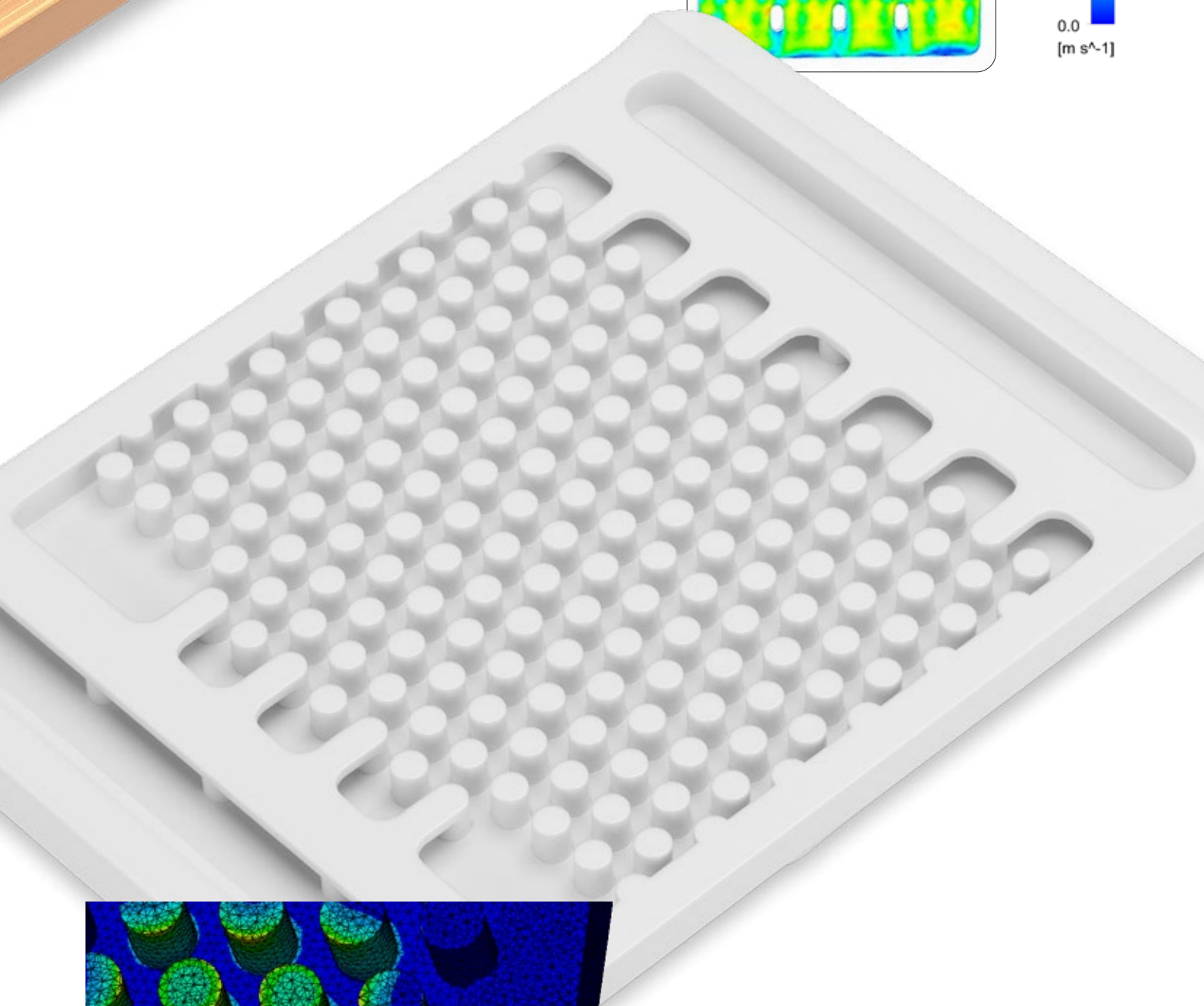
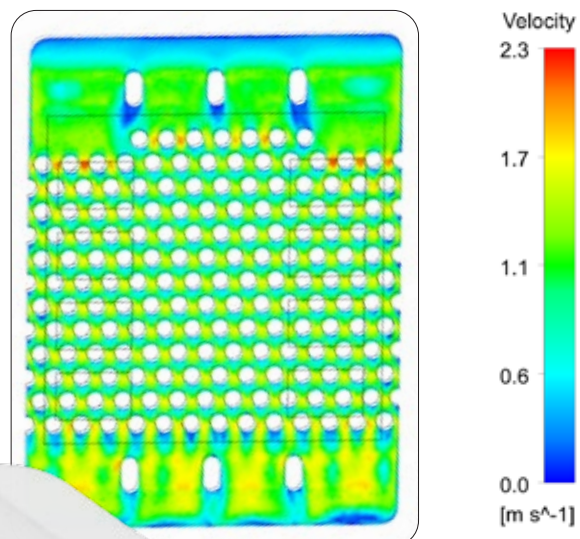
enables optimized cooling of the SiC semiconductors on the top of the heat sink. On the underside of the heat sink, the DC link capacitor is integrated with low inductance in the power module via metallization surrounding the heatsink.



Ceramic heat sinks metallized on both sides for the implementation of low-inductance electronic assemblies



Liquid velocity distribution through the ceramic heatsink



Mechanical stress on the internal structure during the sintering process

Module properties

Module-integrated AlN ceramic heatsink with chip-on heat sink

- Maximum power density with minimum weight
 - » No additional metal heatsink required
- Ceramic heatsink can be used on both sides
- Internal structure optimized for the sintering process of SiC semiconductors
- Scalable for different performance classes

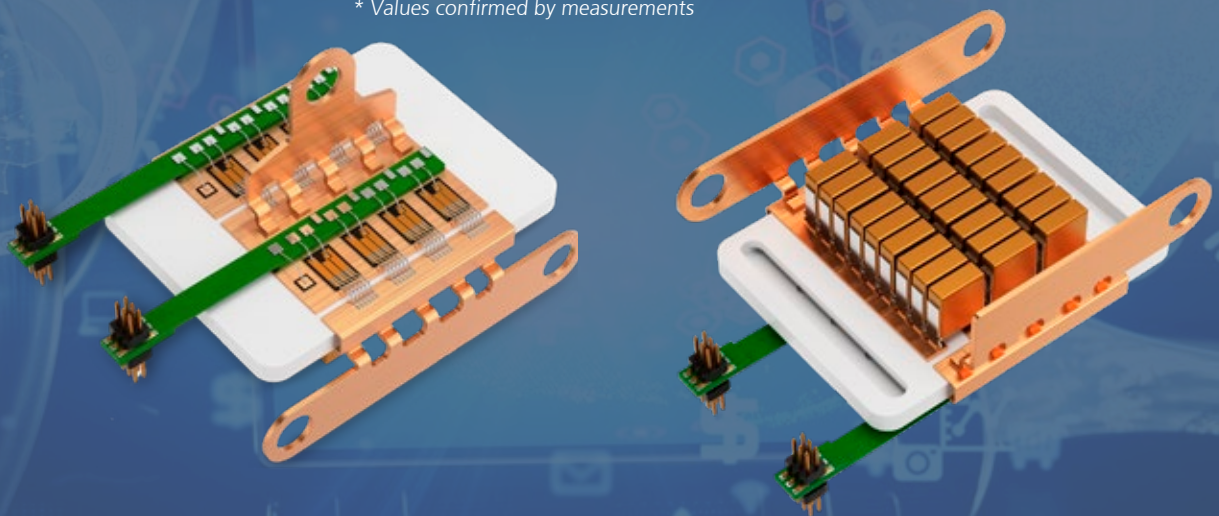
Very good thermal properties for maximum current per SiC semiconductor area

- $R_{th} = 0.15 K \cdot cm^2 / W$
- Integrated pin style structure
- Integrated capacitors thermally connected to the heatsink

Low-inductance module structure for high switching performance

- Metallization around the edges
- Module-integrated ceramic capacitor
- Optimized for the use of 1200V SiC semiconductors

** Values confirmed by measurements*





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