ROGERS CORPORATION

Thermal Management Solutions

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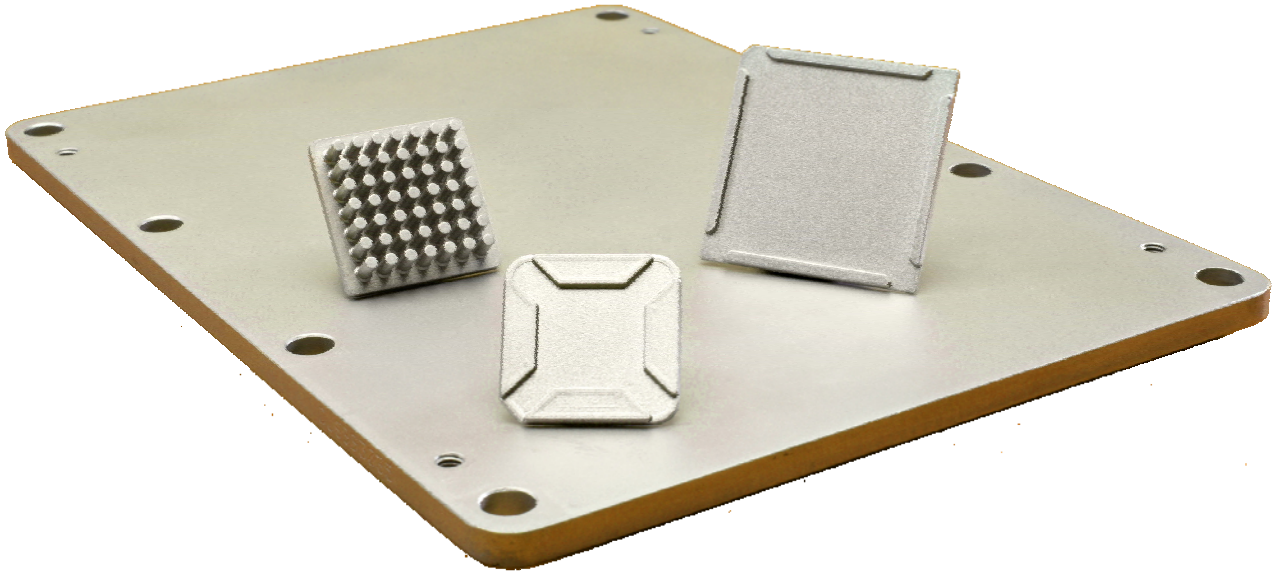
HEATWAVE™ Metal Matrix Composites (MMC): Aluminum Matrix with Silicon Carbide (AlSiC) and Silicon Carbide Diamond Reinforcement



Power Conversion and Control: AlSiC is used as base plates for Insulated Gate Bipolar Transistors (IGBTs) for traction applications, large industrial equipment, electric vehicles, industrial robotics, welding machines and power supplies for medical imaging systems, as well as in PWB cores for defense electronics applications.

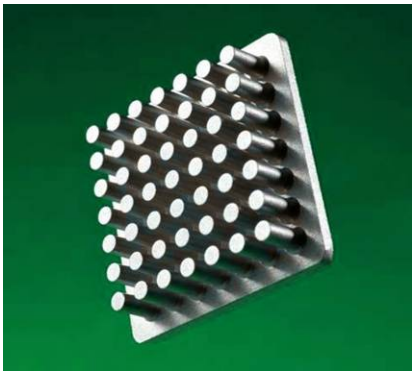
RF Power Amplifiers: Laterally diffused metal oxide semiconductors (LDMOS) are soldered directly to AlSiC.

Semiconductor Package: AlSiC is used for flip chip lids in high performance computing applications.

Key Feature	Benefit
Tailored CTE	Improves long term reliability
High Thermal Conductivity (Tc)	Reliable thermal performance
Light weight	Ease of integration into airborne or transportation applications
High Modulus	High stiffness and high mechanical strength
Aluminum skin	Allows multiple plating options and improves fracture resistance
In-situ casting of ceramics and metals	Lowers total system cost and improves thermal performance
Homogeneous constructions	Isotropic thermal and mechanical properties
Net-shape casting	Eliminates costly machining and joining

Additional information on reverse

Rogers' Metal Matrix Composites feature exceptional thermal performance and high Thermal Conductivity (Tc) from 170 W/mK to 230 W/mK.



The controlled Coefficient of Thermal Expansion (CTE) is available from 5 to 14 ppm/K. MMC materials are used in close proximity to semiconductors, where controlled thermal expansion can reduce stress during temperature cycling by matching the CTE of mating structures in the system. The result is higher reliability and better achievement of system design parameters.

Rogers offers a range of MMC materials. Whether your application calls for a simple rectangular shape, or a complex three-dimensional form, Rogers has the engineering expertise, service orientation and production capacity to meet your unique requirements. From standard to custom designs, high or low volume requirements, Rogers will work with you to achieve your objectives.

Product Offerings

AlSiC-8: Near net shape pressure cast aluminum silicon carbide MMC with nominal CTE of 8 ppm/K. Typical physical properties include thermal conductivity of 175 W/mK, density of 3.04 g/cc. Rockwell B hardness is approximately 99, Young's Modulus of 223 GPa. This material is the most common choice for PWB and IGBT base plate applications.

AlSiC-12 Near net shape pressure cast aluminum silicon carbide MMC with nominal CTE of 12 ppm/K. Castings as thin as .020" are possible.

AlSiC-14 Rolled aluminum silicon carbide MMC plate with nominal CTE of 14 ppm/K. Available in 8"x24" sheets. Can be stamped, punched, sheared and water jet cut. AlSiC-14 is a developmental material. Additional information is available on request.

AlSiC-5 Near net shape pressure cast aluminum silicon carbide MMC with nominal CTE of 5 ppm/K. AlSiC-5 is a developmental material. Additional information is available on request.

AlSiC-D3 Aluminum encapsulated silicon carbide diamond composite with nominal CTE 3. Thermal conductivity is better than 400 W/mK. AlSiC-D3 is a developmental material. Additional information is available on request.

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