CASE STUDY

A 2025 Grand Prize winner in the Electronic, Electrical category for metal additive manufactured components

Copper Heat Sink

Process:
Metal Additive Manufacturing (AM)

Material:
Copper

Density:
99.9% minimum after HIP

Outstanding thermal conductivity

End Use and Function

This designed for metal additive manufacturing copper heat sink is used in semiconductor manufacturing.

Fabrication

The copper heat sink is manufactured using a complex lattice design co-developed with the customer to enhance heat transfer efficiency and ensure printability. The self-supporting design eliminates the need for additional supports during printing, while the optimized sintering process meets specific lattice requirements, ensuring consistency. Hot isostatic pressing (HIP) processing achieves a 99.9% relative density, vital for pure copper applications. Precise machining of the outer profile guarantees a seamless fit within the final assembly.

Results

The innovative lattice design effectively minimizes thermal gradients and maximizes heat removal rates, achieving exceptional thermal conductivity essential for semiconductor applications. This advanced heat sink is a key component in a groundbreaking assembly, significantly enhancing thermal management and pushing the limits of performance within the industry.