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Comparative Evaluation of a Carbon Fiber Heat Sink and Graphitic Foam in Boiling Heat Transfer

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Abstract

The performance enhancements and footprint decreases of advanced electronic devices result in soaring power densities which may in turn lead to elevated operating temperatures, decreased device reliability and increased thermal stresses. It is thus necessary to employ aggressive thermal management techniques to maintain an acceptable junction temperature at high power densities. For this reason, interest is growing in a variety of liquid cooling techniques.

This study analyzes an advanced engineered-material heat sink which provides significant improvements in thermal management strategies for advanced electronics. The heat sink consists of a very large number of small cross-section fins fabricated from carbon pitch fibers with high thermal conductivity which reduce the temperature drop along the length of the fin resulting in a more effective heat sink and significant increases in thermal performance over conventional heat sinks.