

How to Select a Heat Sink

Abstract

With the increase in heat dissipation from microelectronic devices and the reduction in overall form factors, thermal management becomes a more and more important element of electronic product design.

Both the performance reliability and life expectancy of electronic equipment are inversely related to the component temperature of the equipment.

The relationship between the reliability and the operating temperature of a typical silicon semiconductor device shows that a reduction in the temperature corresponds to an exponential increase in the reliability and life expectancy of the device.

Therefore, long life and reliable performance of a component may be achieved by effectively controlling the device operating temperature within the limits set by the device design engineers.

Heat sinks are devices that enhance heat dissipation from a hot surface, usually the case of a heat generating component, to a cooler ambient, usually air.

For the following discussions, air is assumed to be the cooling fluid. In most situations, heat transfer across the interface between the solid surface and the coolant air is the least efficient within the system, and the solid-air interface represents the greatest barrier for heat dissipation.

A heat sink lowers this barrier mainly by increasing the surface area that is in direct contact with the coolant.

This allows more heat to be dissipated and/or lowers the device operating temperature.

The primary purpose of a heat sink is to maintain the device temperature below the maximum allowable temperature specified by the device manufacturer.

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