

Four Ways To Cool Your Power Magnetics

by David G. Morrison, Editor, [How2Power.com](#)

Your magnetic components may not be made of silicon, but they may still get hot and need cooling. [Payton Planar Magnetics](#), a company that designs and builds custom high frequency planar and nonplanar magnetics from a few watts to 100 kW in a single package—and also the sponsor of this monthly magnetics column—recently issued an announcement on the need for cooling. The company emphasizes the importance of providing cooling for all magnetics with power dissipation above 1 W.

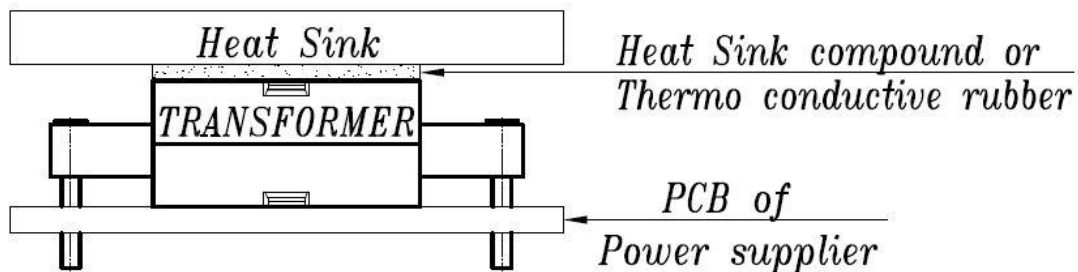
According to Payton, conduction cooling is used for most semiconductors and this cooling method is also ideal for magnetics. Planar cores are ideal for conduction cooling but even a nonplanar core, properly designed, can be kept cool, says Jim Marinos, executive VP of Payton America in Deerfield Beach, Florida. Marinos suggests four possible methods for mounting your magnetic component to an external heatsink as depicted in the figure.

Marinos also cites an example of a power converter design that illustrates the impact of proper cooling on a design with high power density. In this case, a buck converter switching at 100 kHz, includes a 10- μ H inductor carrying 160 A. That equates to 43 W of dissipation in the inductor, making proper cooling imperative.

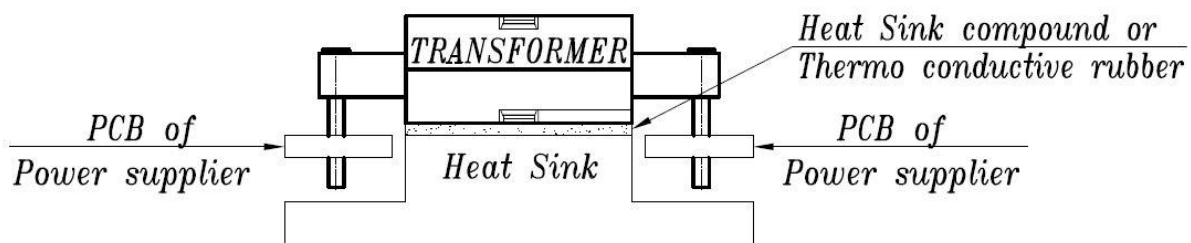
The designer mounted the inductor to a heatsink and achieved a thermal impedance from hot spot-to-heatsink of 1°C/W, which was sufficient for proper cooling. In fact, this inductor can operate with no derating at heatsink temperatures up to 100°C.

In addition to designing and producing samples of any custom planar or conventional magnetic design in as little as a few weeks, the company can assist customers with thermal management of magnetic components in the customers' designs. For more information, email jim@paytongroup.com.

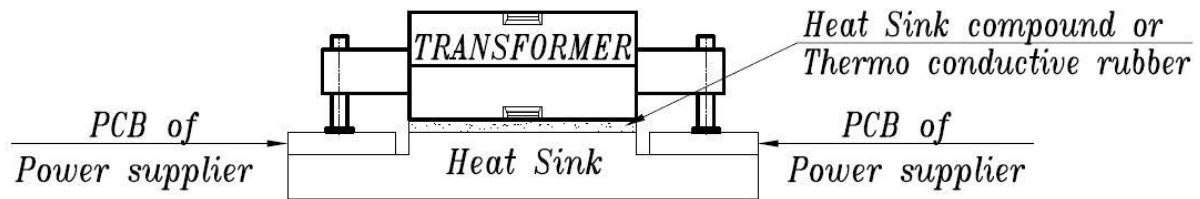
Option No.1



Option No.2



Option No.3



Option No.4

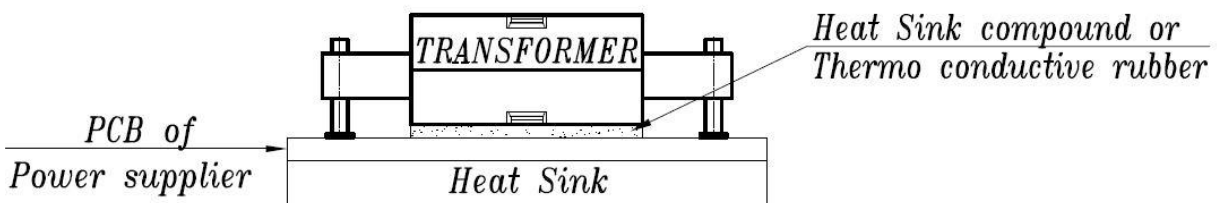


Figure. A magnetic component that dissipates more than a watt typically needs cooling. Conduction cooling can be applied by mounting a heatsink above the device (option 1) or below the device, either through a cutout in the pc board (options 2 and 3) or simply mounted to the underside of the pc board (option 4.) With option 1, the transformer can also be rotated 180° so that the heatsink is mounted to the bottom of the device.