# High current inductors for DC-DC converters

The combined DC and AC loss in inductors is the next highest contributor of power loss (Figure 1).

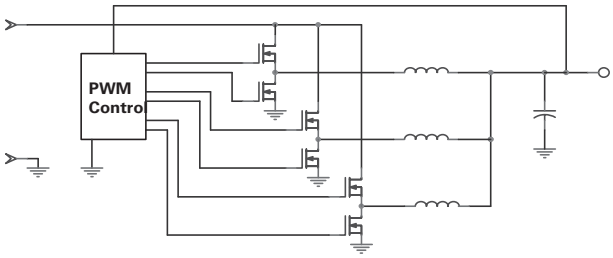


**Figure 1.** Multi-phase Voltage Regulator Module

## Overview

State-of-the-art power supply design of DC-DC converters requires maximum thermal efficiency, low switching losses and platform scalability. Overall systems efficiency can be improved by the advancements in strategic power components. When striving for maximum efficiency, low switching components losses and parasitic inductance losses are critical. This is driven by increasing performance requirements of new microprocessors ranging from 10 A to120 A and starting 50 nH.

High current inductors can be found in many DC-DC converter applications such as:

- VRM (Multi-phase for servers / desktop / notebook computers)
- DDR Memory Power Supply(Synchronous Buck and Multi-phase Converters)
- GPU Graphics cards (Buck and Multi-phase Converters)

## Multi-phase VRMs for high-end desktops, servers, and notebook computers

The evolution of today's microprocessors requires high frequency synchronous buck converters to provide highly efficient power to high current low voltage processors with fast transient response. High frequency switching translates back to increased FET losses as the major contributor to switching loss.

A roadmap of modern CPU's shows that processor current will keep increasing up to 200 Amps by 2006 (5 phases, 40 A/phase). High current inductors can positively impact the overall system's efficiency by up to 2%. A well packaged high current inductor provides higher energy density and low loss (core and copper loss) and can be available in both THT and SMT which brings flexibility to chipset developers.

- Eaton offers a wide variety of standard and customized solutions. We specialized in inductors and transformers for DC-DC power conversion and switch-mode applications requiring high frequency magnetics. Our products are used in many standard topologies including:
- EMI/ Noise Filter: Common Mode and Series Mode
- Averaging Choke: Buck and Boost

Coupled Inductors: Coupled Choke, Flyback, Sepic

Eaton's high current and flat-pac inductor product lines provide an optimal mix of innovative packaging, high efficiency and unbeatable reliability. We invest in new technologies that deliver superior performance by providing high power density and reduced inductor size when compared to conventional solutions. Core and conductor losses become more critical as higher switching frequencies are used. Our designs utilize low loss core materials, new and custom core shapes in combination with innovative construction and packaging to provide power supply designers with the highest performance parts available in the market.

Eaton's magnetic component solutions deliver high performance, innovative packaging, scalability and unbeatable reliability. Our wide variety of high current and flat-pac inductors are specifically developed for today and tomorrow's DC-DC converters. For all your high current inductor and transformer needs, Eaton is your best power magnetics solution partner.

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