



Temperature Estimation Based on a Signal Oscillation

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a novel method of obtaining temperature information in parallel power converter modules without adding new sensors or communications channels.

Overview

Power converters change energy from one form to another form more suitable to a specific application. Parallel power converter modules for power sources, such as those used for computer servers, have higher failure rates at high temperatures. Thermal load sharing between parallel modules to reduce the risk of thermal failure requires that temperature information be shared between modules; however, it is cumbersome and expensive to insert special sensors into the parallel network to feed back temperature-sensing information.

The Invention

UW-Madison researchers have developed a novel method of obtaining temperature information without adding new sensors or communications channels. In a switched-mode power converter module, a semiconductor device is rapidly switched off and on. This switching introduces a ringing or oscillating signal that is a function of the temperature and the duty ratio of the module, although the two effects can be decoupled. Because loads are interleaved between modules to reduce ripple currents, operations occur in sequence rather than simultaneously across all modules. The interleaving introduces a time separation between the signals from each module, so that the ringing signal from each module can be detected and sent to a processor that estimates the temperature of that module.

Applications

- Power supply banks, such as those supporting Internet servers or telecommunications

Key Benefits

- Allows active thermal load management and reduction of temperature differences by redistributing heat-generating currents more accurately than previous technologies
- May prevent thermal failure in parallel power supplies
- Does not require the use of additional communication channels, cables or temperature sensors

Tech Fields

- [Analytical Instrumentation, Methods & Materials : Sensors](#)

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