Technical Article

Powering Your Small-form-factor Server Line Card

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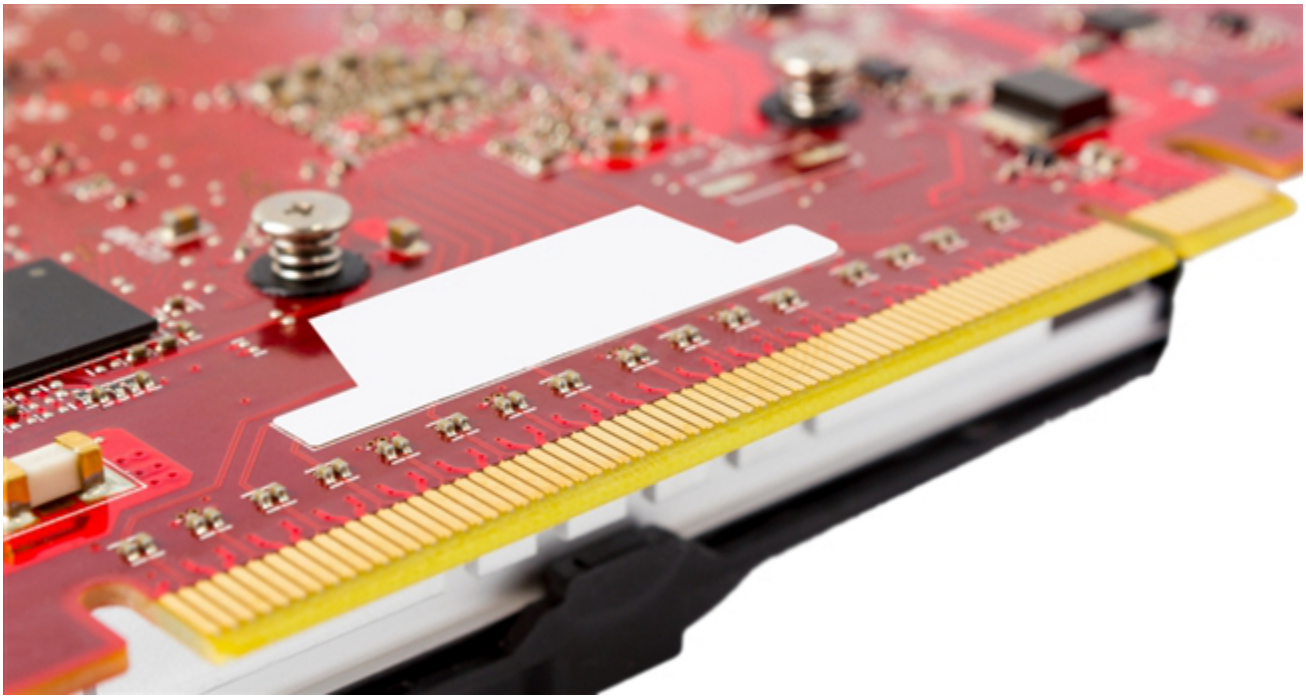
Reducing the amount of board space taken up by power devices in server line cards is important, as the cards are space-limited. In recent years, new server specifications defined by the Open Compute Project (OCP) have driven new form factors for pluggable server line cards. The new OCP standard allows server designs to be more modular and flexible. While small, simple and modular designs provide benefits in flexibility, they present challenges to board designers who need to fit a lot of functionality in a small space.



Server cards have different integrated circuits (ICs) such as serializer/deserializer, memory and system-on-chip (SoC) power rails, all with different voltage and current requirements. Designers sometimes have the option to use a custom power management IC (PMIC) or to choose a different discrete DC/DC converter for each power rail. However, TI provides another option that allows you to save cost and space. The Small Solution Size Multirail Reference Design for Server Line Card (TIDA-00596), demonstrates the new LP8758-E0, a quad-output DC/DC converter where each output can hit a peak current of 4A. It has the benefit of being in a dense 6mm² chip-scale package that expands to a 60mm² solution size with all external components. The inductors, which make up a majority of the total solution size are very low profile, being able to get to 1 or 1.2mm in height. The LP8758-E0 can use 3.3V as an input supply, which is generally available on every PCIe connector.

To improve server reliability via heat minimization, the LP8758 also features efficiencies up to 95% as shown in Figure 1 below.

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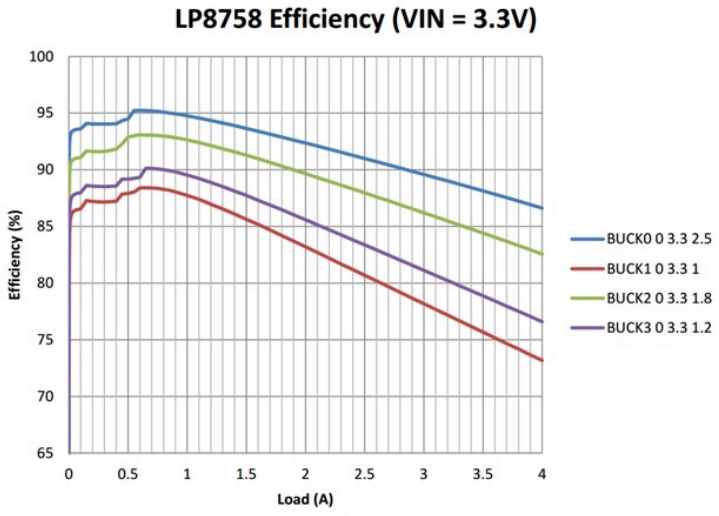

Figure 1. Output Voltage Efficiency in Auto Mode (v_{OUT} = 1V, 1.2V, 1.8V, 2.5V)

Other features in the reference design include a microcontroller that allows programming via I^2C of the output voltages, sequencing of power rails, setting current limits and reading various diagnostics. The internal sequencing in the LP8758 helps a designer avoid the additional cost and space of an external sequencer IC.

The reference design highlights how you can use the LP8758 and its integrated functionality to save space while maintaining efficiency and performance in small server line card applications. The same benefits can apply to applications such as gaming, solid state drives, and other space-constrained designs.

Additional Resources

- For other LP8758 configurations, read the application report, "LP8758 Flexible Four Core Buck Regulator."
- For a reference design on how the LP8758 can power an FPGA, see the TI Designs Xilinx Zynq 7000 Series 5W Small Efficient Low-Noise Power Solution Reference Design.

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