

Switched Capacitor Converter Reference Design Enables High Efficiency 48-V Power Distribution

[Infineon Technologies'](#) zero-voltage-switching (ZSC) switched capacitor converter enables a high efficiency two-stage architecture for 48-V applications to power CPUs, GPUs, SoCs, ASICs, and memory. Infineon's full system concept for a 48-V architecture paves the way for 99% efficiency. According to the company, combining a ZSC board with CoolGaN 600-V based solutions results in an optimized power flow and unparalleled performance for the datacenters of tomorrow(see the figure). It adds that the ZSC converter delivers the highest efficiency and power density for applications using 48 V.

Through capacitive energy transfer with soft switching of the power MOSFETs, it generates an intermediate bus voltage. This enables an easy and low-risk migration path for legacy 12-V systems to a 48-V infrastructure at significantly improved total cost of ownership. Combined with Infineon's best-in-class multi-phase buck regulators, it offers overall efficiency of more than 94% and high power density for 48-V input systems.

The board features microcontrollers, drivers and switches from Infineon. It comprises well-matched 25-V and 40-V OptiMOS 5 and OptiMOS 6 MOSFETs as well as EiceDRIVER 2EDi gate driver ICs. The XMC family of microcontrollers is complementing the ZSC switched capacitor converter.

It is said to be easy to implement as a voltage regulator module (VRM) or down (VRD) design depending on system requirements and limitations. The bidirectional power transfer capability of the ZSC converter offers flexibility for designers of power architectures to implement high-efficiency and compact bus converters that can provide voltage conversion from 48 V to 12 V, or vice versa.

Additionally, the converter can be easily configured to supply different conversion ratios (2:1, 4:1, 6:1, 8:1, 10:1, 12:1) with the same set of components for system-level efficiency optimization. For example, in a 4:1 configuration, the ZSC converter can achieve peak efficiency of up to 99% at 600 W with a power density of 780 W/in.².

The same design can deliver up to 1 kW with excellent thermal performance due to its high power conversion efficiency. The ZSC board is available on request. More information is available at www.infineon.com/zsc.

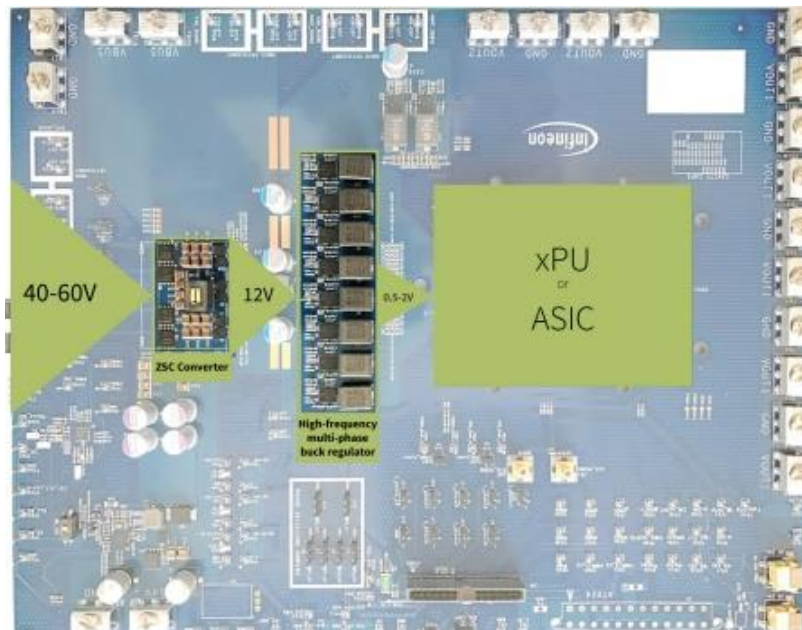


Figure. Infineon's reference design/board for a zero-voltage switching power converter for data center systems. When configured for 4:1 stepdown, the ZSC converter by itself achieves a peak efficiency up to 99% at 600 W with a power density of 780 W/in.². Combined with Infineon's best-in-class multi-phase buck regulators in a two-stage 48-V to POL architecture, it offers overall efficiency of more than 94% and high power density for 48-V input systems.

