

## Boost Converter Demo Board Shows Off Benefits Of Controller & GaN FETs Combo

[Efficient Power Conversion's](#) EPC9166 is a 500-W dc-dc demo board that converts a 12-V input to 48-V output. The EPC9166 demonstrates the Renesas ISL81807 80-V two-phase synchronous boost controller in combination with the latest-generation EPC2218 eGaN FETs from EPC as they achieve greater than 96.5% efficiency in a 12-V to 48 V regulated output conversion with a 500-kHz switching frequency (Figs. 1 and 2). As an alternative to generating 48 V, the demo board can be configured to generate an output of 36 V or 60 V. The board can deliver 480 W without a heatsink.

Expected uses for the design being demo'd are in data center, computing, and automotive applications. The eGaN FETs provide fast switching, high efficiency and small size to meet the stringent power density requirements of leading-edge applications.

According to EPC, the EPC2218 is the smallest and highest efficiency 100-V FET in the market. The company adds that the the ISL81807 is the industry's first 80-V dual-output/two-phase (single output) synchronous buck controller with integrated GaN driver, supporting frequencies up to 2 MHz.

The ISL81807 uses current-mode control and generates two independent outputs or one output with two interleaved phases. It supports current sharing, synchronization for paralleling more controllers/more phases, enhanced light load efficiency and low shutdown current. The ISL81807 directly drives EPC GaN FETs, ensuring easy design, low component count and solution cost (Fig. 3).

Alex Lidow, CEO of EPC commented, "The Renesas controller IC makes using GaN even easier. We are delighted to work with Renesas to combine the benefits of their advanced controllers with the performance of GaN to provide customers with a low component count solution that increases efficiency, increases power density, and reduces system cost."

"The Renesas ISL81807 is designed to fully exploit the high performance of GaN FETs for high power density solutions" said Andrew Cowell, vice president of the Mobility, Industrial and Infrastructure Power Division at Renesas. "ISL81807 reduces BOM cost for GaN solutions because it does not require an MCU, current sense op amp, external driver or bias power. It is also fully protected and integrates the GaN drivers. With the ISL81807, designing with GaN FETs is as simple as designing with silicon-based FETs."

The EPC9166 demonstration board from EPC is priced \$300.00 each and is available for immediate delivery from [Digi-Key](#). For more information on the demo board, see the EPC9166 – Evaluation Board [page](#) and see the [application note](#). More information on the ISL81807 including samples, documentation and evaluation tools is available from [Renesas](#).

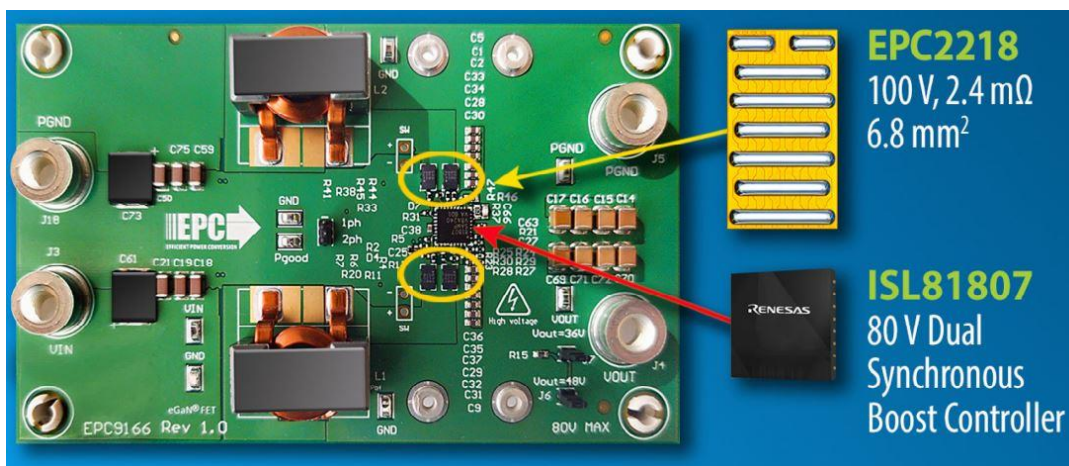


Fig. 1. The EPC9166 boost converter demo board combines Renesas's ISL81807 two-phase synchronous GaN boost controller with EPC's EPC2218 eGaN FETs to achieve high power density and low-cost dc-dc conversion. It converts 12 V to 48 V at 500 W with >96.5% efficiency at a 500-kHz switching frequency (see Fig. 2 for more on efficiency.)

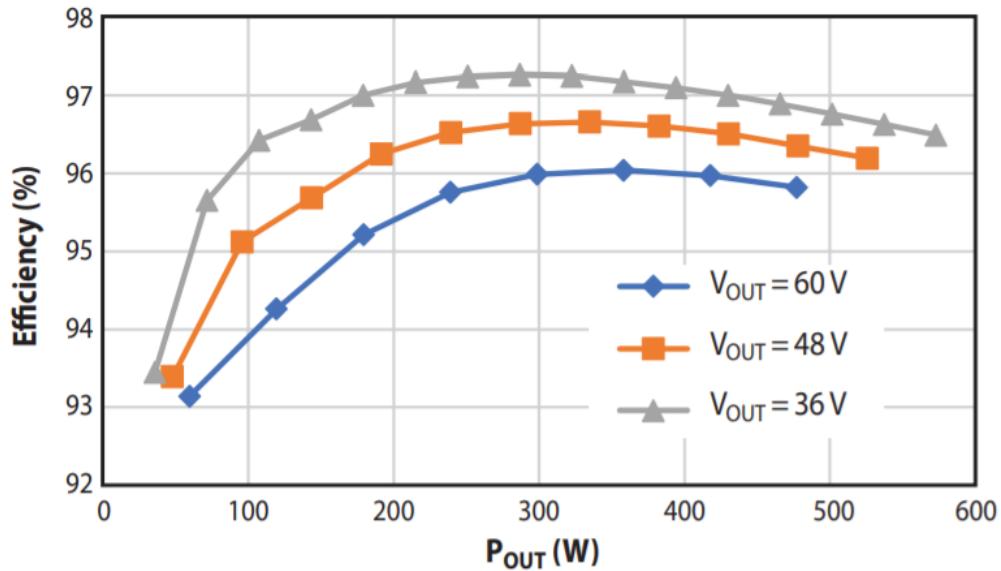


Fig. 2. Efficiency of the EPC9166 with 12-V input and the three output-voltage options.

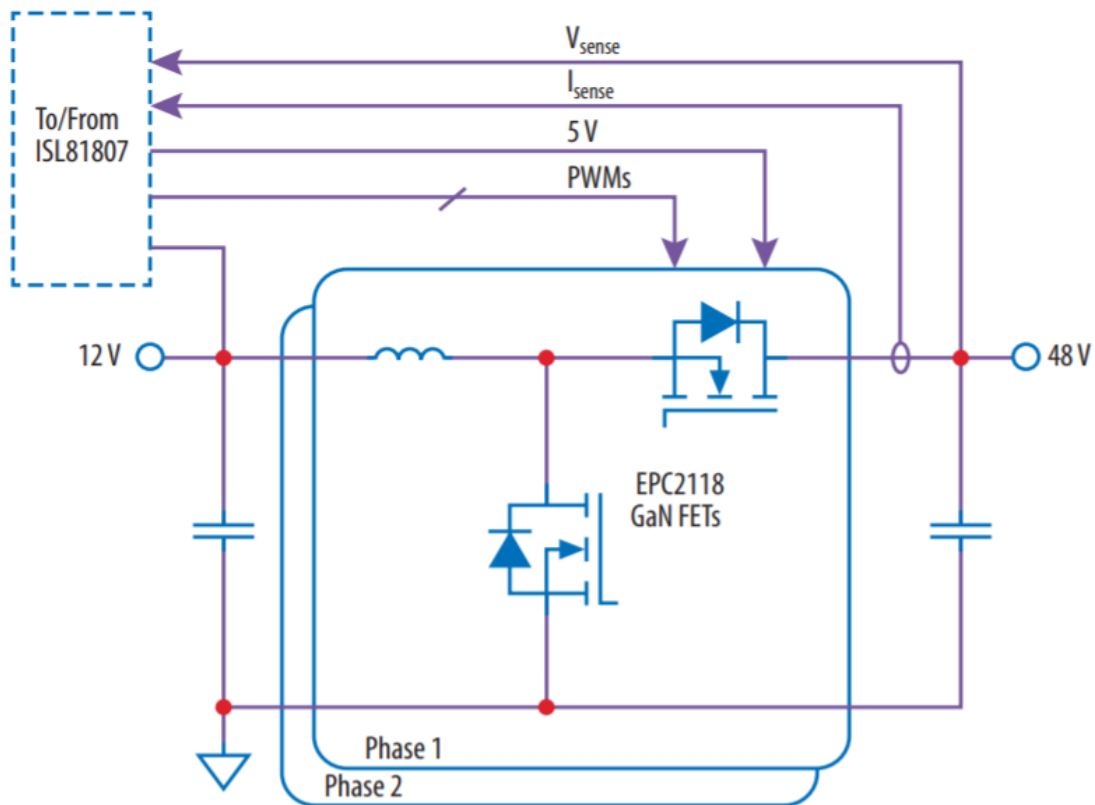


Fig. 3. The ISL81807 is an 80-V boost controller that can drive eGaN FETs directly. Compared to a digital controller solution, this analog controller solution does not need the driver IC, current sense IC, and housekeeping power IC. Thus it greatly reduces the design complexity and bill of materials count. The controller employs current-mode control with full protection features such as UVLO and overcurrent protection. The ISL81807 also allows the designer to choose between constant-current mode (CCM) or diode emulation, to improve light-load efficiency. The switching frequency of the converter is set at 500 kHz, and a 2- $\mu$ H inductor (SER2011-202 Coilcraft) with 1.3-m $\Omega$  DCR and 37-A saturation current is chosen.