

AC-DC Front End Sparks New Trends In Density, Efficiency And Flexibility

Combining architecture, topology and advanced packaging, [Vicor](#) has readied a complete power-factor corrected ac-dc front-end module that is said to raise the bar on power density, conversion efficiency and flexibility while meeting harmonic noise, EMI and SELV output requirements. A complete PFC corrected ac-dc converter with universal ac input range of 85 to 264 Vac, the VI BRICK AC Front End module delivers a fully isolated and regulated 48-Vdc output.

Housed in a low-profile package measuring 3.75 in. x 1.91 in. (95.3 mm x 48.6 mm) and only 0.38 in. (9.55 mm) in height (Fig.1), the ac front-end module provides a power conversion density of 121 W/in³ (or 7.5 W/cm³) or 54 W/in³ for a complete supply that includes all necessary components including hold-up capacitance.

The ac front-end's high efficiency performance is attributed to Vicor's proprietary double-clamp zero voltage switching (DC-ZVS) architecture and patented adaptive-cell topology (Fig.2.) They enable switching frequencies in the megahertz range with a peak efficiency above 92% and greater than 90% efficiency even at 85-Vac input with no derating (Fig.3.) Also, by dynamically configuring for ac line, the adaptive-cell topology allows the ac-dc converter to operate at the same peak efficiency over the universal input range, says Vicor's senior product marketing manager Joe Sullivan.

According to Sullivan, with greater than 90% efficiency across the entire ac input voltage range, including operation down to 85 Vac, the power loss and cooling requirements are reduced by 50%.

With integrated rectification, filtering and transient protection, the ac-dc module is a complete front end system that meets IEC 61000-3-2 harmonic noise and Class B EMI conducted emission limits while supplying 330 W to external output storage capacitance.

Vicor says that the new VI BRICK ac-dc front-end module is compatible with a wide variety of downstream dc-dc converters, including the company's portfolio of high-density, high-efficiency VI Chip and VI BRICK converters. When used with downstream dc-dc converters that support secondary-side energy storage and efficient power distribution schemes, the front-end module provides superior power system performance and connectivity from the wall plug to the point of load.

The [VI BRICK AC Front End](#) modules will be offered in three temperature grades—consumer (-20°C to 100°C), telecom (-40°C to 100°C) and military (-55°C to 100°C). All three grades are available through the distributor Digi-Key.



Fig. 1. Vicor's VI BRICK AC Front End is housed in a low-profile package that measures 3.75 in. x 1.91 in. x 0.38 in.

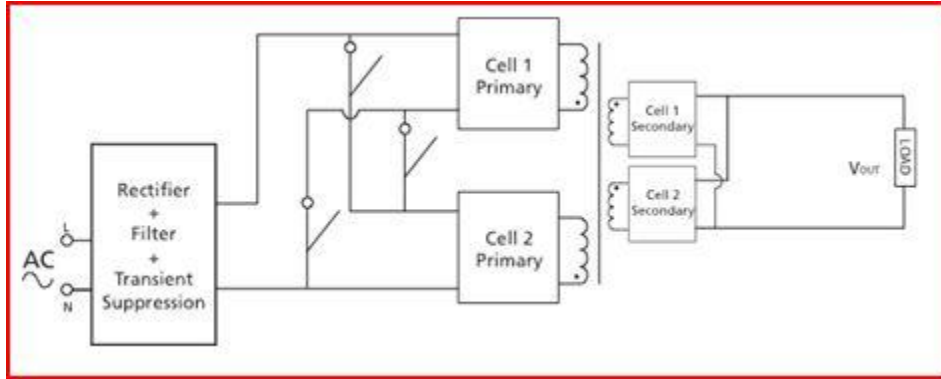


Fig. 2. Vicor's ac-dc front-end employs double-clamp zero-voltage switching (DC-ZVS) architecture with adaptive-cell topology.

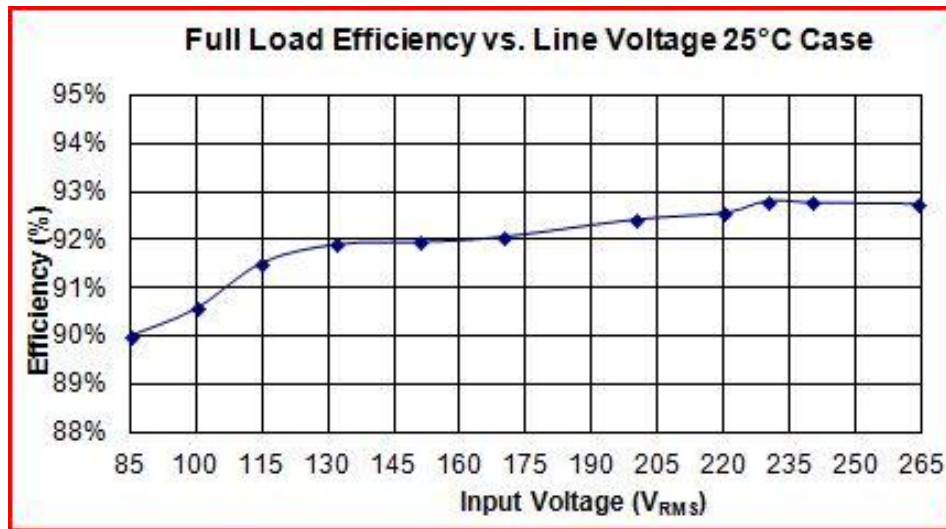


Fig. 3. The ac-dc front-end delivers high efficiency over the entire universal-input range with no derating.

—Contributed by Ashok Bindra