

Tiny packages, new architectures rock distributed power

POWER-ONE SAYS it is changing the shape of power. Vicor could say something similar. Both companies have introduced small, low-cost, distributed-power products that are radically different—at least in packaging—from almost all others in the market. In Vicor's case, some products in its FPA (factored-power-architecture) lines differ not only in their size and power density, but also in their electrical architecture. The company calls its new family members PRM (preregulator module) and VTM (voltage-transformation module). A PRM accepts an unregulated input voltage and produces a regulated but nonisolated output voltage approximately equal to the input. A VTM accepts the PRM output, steps it down by a turns ratio to a voltage appropriate for the load, and provides isolation. With the proper connection, which does not affect the isolation, a PRM corrects for the inherently unregulated VTM's internal impedance, thus enabling the VTM to produce a regulated output.

The system achieves efficiencies greater than 95% while operating at a fixed frequency in the neighborhood of 4 MHz. Competitors have been unable to achieve acceptable efficiency at such high frequencies. In addition, FPA represents a break from Vicor's unique tradition of operating its modules at variable frequencies.

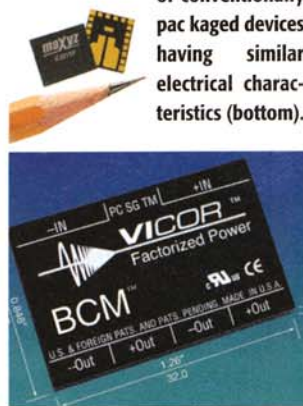
The system's apparent Achilles' heel is that designs

that use multiple low voltages incur the cost of separate isolation for each voltage, whereas conventional DPAs (distributed-power architectures) provide isolation at one point for multiple outputs. Vicor's pricing suggests, however, that FPA can often produce multiple outputs at lower cost than can conventional DPAs.

For system designers who

Despite its size, Power-One's X3015P requires only four external components to produce as much as 15A of regulated dc at 0.75 to 4V (top). Vicor's V-I Chip packaging enables this 200W-output bus converter to fit into a package that occupies approximately one-third the volume

of conventionally packaged devices having similar electrical characteristics (bottom).



are still uncomfortable with the unusual electrical architecture but like the new packaging, which Vicor calls VIC (V-I Chip), the company has also introduced a family of isolated, unregulated BCMs (bus-converter modules). The BCMs, which power nonisolated, regulated POL (point-of-load) dc/dc converters, offer small dimensions (21.5×32×6 mm for a 200W unit) and power density of 800W/

in.³ maximum. Some BCMs—and other VICs—mount in boards with cutout areas, thus reducing the above-board height to 4 mm. Prices for 200W BCMs are as low as \$24 (OEM quantities), or 12 cents/W.

Power-One's X3015P, a 15A regulated-output, nonisolated POL dc/dc converter, the first member of the maXyz family, contains 22 components yet measures just 10×12×1.5 mm. The unit, an MCM (multichip module) packaged in a 20-pin LGA (land-grid array), accepts inputs of 3 to 6V dc, produces outputs of 0.75 to 4V dc, and requires only four external components. When it receives 5V input power and produces 15A at 2.5V, the UL-recognized unit, which operates at a programmable fixed frequency of 300 to 500 kHz, dissipates less than 4W with efficiency of 90.5%. Prices are as low as \$5.50 (large OEM quantities). Philips (www.semiconductors.philips.com) and International Rectifier (www.irf.com) also manufacture MCM POL converters, but, according to Power-One, UL does not recognize either competitive unit, neither unit operates from a supply voltage as low as 3.3V, and both units require at least twice the number of external components.

—by Dan Strassberg

- ▶ **Power-One**, 1-805-987-8741, www.power-one.com. ⓄEnter No. 370 at www.edn.com/info.
- ▶ **Vicor**, 1-978-470-2900, www.vicorpower.com. ⓄEnter No. 371 at www.edn.com/info.

FORMAL-VERIFICATION PRODUCT DEBUTS

Magellan, a new hybrid formal-verification product from Synopsys, combines formal engines with the built-in VCS-simulation engine to help engineers uncover bugs. This architecture finds bugs by uniquely combining VCS's ability to reach deep into the design with the formal engines' ability to perform advanced mathematical analysis. The built-in VCS and formal engines leverage each other, reducing iterations and saving time. Formal-verification engines may report false-negative bugs, which, although real in the logic, are false because the combination of states that energize the bugs never occur in the product. Magellan's hybrid architecture handles multimillion-gate designs and provides deterministic results without false-negative errors. Magellan supports Verilog and VHDL designs and works with the emerging SystemVerilog standard.

With the addition of Magellan, the Synopsys DVP (Discovery Verification Platform) now enables hierarchical verification, a technique that allows VCS to reuse block-level assumptions and assertions as chip-level monitors. Prices for Magellan begin at \$73,500 for a one-year technology-subscription license.—by Gabe Moretti

- ▶ **Synopsys**, 1-650-584-5000, www.synopsys.com. ⓄEnter No. 372 at www.edn.com/info.

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