

## Component power approach improves design flexibility

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**Power architects**, frustrated by their inability to find the combinations of dc-to-dc converter outputs and features they need, often make do with available modules or decide to design a custom solution. Such approaches offer minimal flexibility and are often more expensive in terms of time and engineering resources. In response to that need, Vicor's suite of modular converters and associated accessories provide designers many choices and simplify the design process as well.

The flexibility of component power is especially valuable to designers whose applications involve changing power or output voltage requirements. When change is necessary, the designer simply replaces one component with another of the new power or output voltage, having the same footprint and pinout.

An additional strategy, programmable output voltages, is also available to help cope with change as well as to add design flexibility. A wide output voltage trimming range is available that offers more choices for designers. It comes with Vicor's second generation converters in three module sizes as a consequence of its zero current switching topology.

Among available converters, voltage trimming ranges of  $\pm 10\%$  are common, and converters with a range of  $\pm 20\%/50\%$  can be found. A second generation converter, however, can be adjusted or programmed from 10% to 110% of the nominal output voltage using fixed

age trimming and wide range programmability are simply accomplished by use of a multi-function pin on the module, which also provides status and control functionality.

Wide output voltage range provides designers the ability to create nonstandard output voltages and to minimize the number of different models that must be purchased and stocked. For one-time resetting of the output voltage to a known value, fixed resistor trimming is useful. A typical example of this would be an application involving two similar outputs, such as 5 and 5.2V, where it is advantageous to stock only one model. Another example would be in a system where the module is mounted on a card that can be plugged into multiple slots in a backplane, with each slot programmed via a fixed resistor on the backplane to a different voltage.

In some cases, this wide output voltage trimming range can be exploited to achieve creative design solutions. Voltage margining, for example, is used to provide functional and parametric testing for design verification and production final test. Resistors can be varied using solid-state switches under control of the system to adjust the output voltage  $+10\%$  and  $-10\%$  to check system margin levels.

One concrete example of the flexibility of component power is the Vicor 48V family. The dc input voltage, nominally 48V, has a range of 36V to 75V. The family comprises 24 modules in three package sizes. The eight modules in each package size provide outputs of 2, 3.3, 5, 12, 15, 24, 28 and 48V. Each output voltage can be adjusted or programmed from 10% to 110% of the nominal output voltage. Higher voltages, also adjustable, and power can be achieved by paralleling modules. MaxiMODs provide output power to 500W, MiniMODs to 250W and MicroMODs to 150W.



Vicor 2nd generation dc-dc converters.

resistors, potentiometers, or DACs. A 12Vout module, for example, can provide a trim range of 1.2V to 13.2V, while a module with 5V, 400W output can provide 3.3, 2 or 1.2V at 80A. Output volt-

**Higher and adjustable**

**For applications** that require a higher, but still adjustable, output voltage, the configuration shown on the left is a simple and inexpensive solution. When the output of converter 1 is trimmed down ( $V_1 < V_2$ ) Q1 is biased on and reduces the output voltage of converter 2 until  $V_1 = V_2$ . Consequently, both converters contribute equally to the total output and operate at virtually the same temperature, optimizing system MTBF.

An adjustable split supply (right) can be implemented with a variation of the left-hand configuration. In this solution, when the converter with the negative output is trimmed down, the positive output converter will adjust accordingly.



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