

Creating High Voltage Outputs

When an application requires an output voltage greater than the 95V available from a single Vicor DC-DC converter, multiple converters may be used in a series output configuration to produce a single output voltage that is the sum of all of the converter outputs in the array.

The following discussion describes two approaches to producing a high voltage output. One solution provides a fixed output voltage, the other an adjustable output voltage. A variation of the second configuration also provides a solution for an adjustable split supply.

In a series array, the positive output of each module requires a series diode (D1 and D2) to prevent the array from being back-driven by load

capacitance during turn-off and to assure proper operation during start-up and dynamic loading. This diode should have a VR rating greater than the array's output voltage and an IF rating greater than the array's maximum load current. In all configurations, Diodes D3 and D4 prevent the output from going negative if only one converter is operational. (Diode D1, D2, D3 and D4 part numbers are based on output voltage and current.)

Fixed Output Voltage

For applications that require a fixed output voltage, two or more converters may be used in a series output configuration as shown in Figure 1. Total output voltage should not exceed the converter baseplate-to-output isolation rating of 500V.

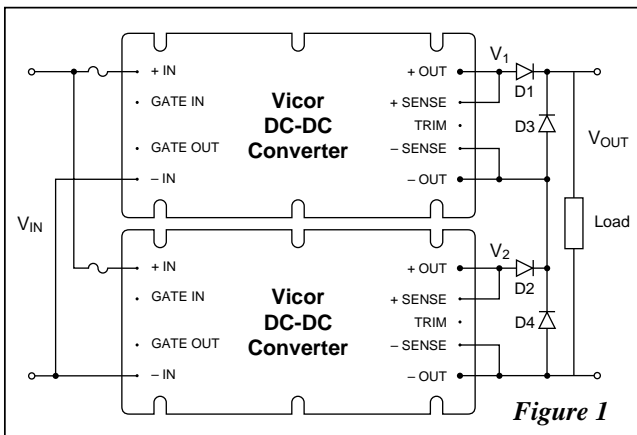


Figure 1—
Fixed high output voltage. $V_{OUT} = V_1 + V_2$.

Figure 2—Adjustable high output voltage.

Figure 3—
Split supply with adjustable output voltage.

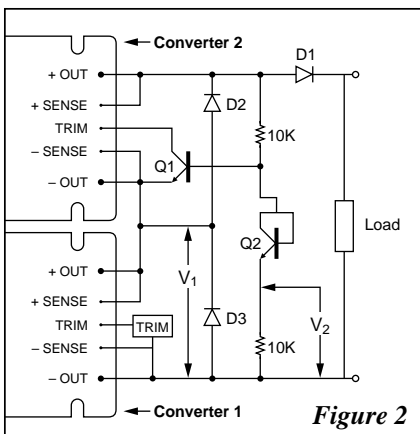


Figure 2

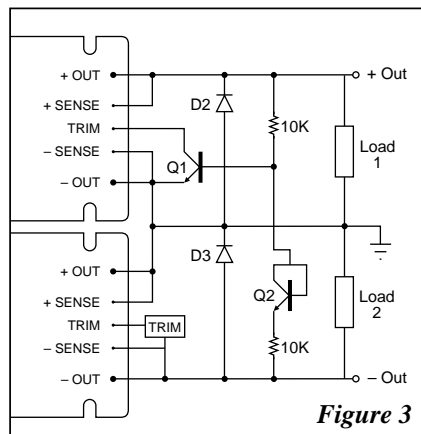


Figure 3

Adjustable Output Voltage

For applications that require an adjustable output voltage, the configuration in Figure 2 provides a simple and inexpensive solution, requiring a minimum of external components.

In this approach, when the output voltage 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 voltage and operate at virtually the same temperature, optimizing system MTBF. (Transistors Q1 and Q2: part number 2N2222.) Note: External Load Required

Adjustable Split Supply

A split supply (Figure 3) can be implemented with a variation of the Figure 2 configuration. In this solution, when the converter with the (-) output is trimmed down, the (+) output converter will adjust accordingly. Note: External Load Required. For guidelines on converter trimming, refer to the Vicor Applications Manual.

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For assistance with these or any other component power solutions, call Vicor's application engineering department at 800-735-6200.