

Creating High-Voltage Outputs

For the Micro, Mini, Maxi; VI-200, MI-200; VI-J00, MI-J00 converter families only

Application Engineering
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Introduction

For applications that require high-voltage outputs, 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 describes two approaches to produce a high-voltage output. The first solution provides a fixed output voltage, the second method, 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 resulting in unequal voltage division and to assure proper operation during start up and dynamic loading. This diode must have a reverse voltage rating greater than the array's output voltage and a forward current 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. Furthermore, D1 and D2 provide an additional voltage drop to compensate for the forward voltage drop of D3 and D4 under this condition.

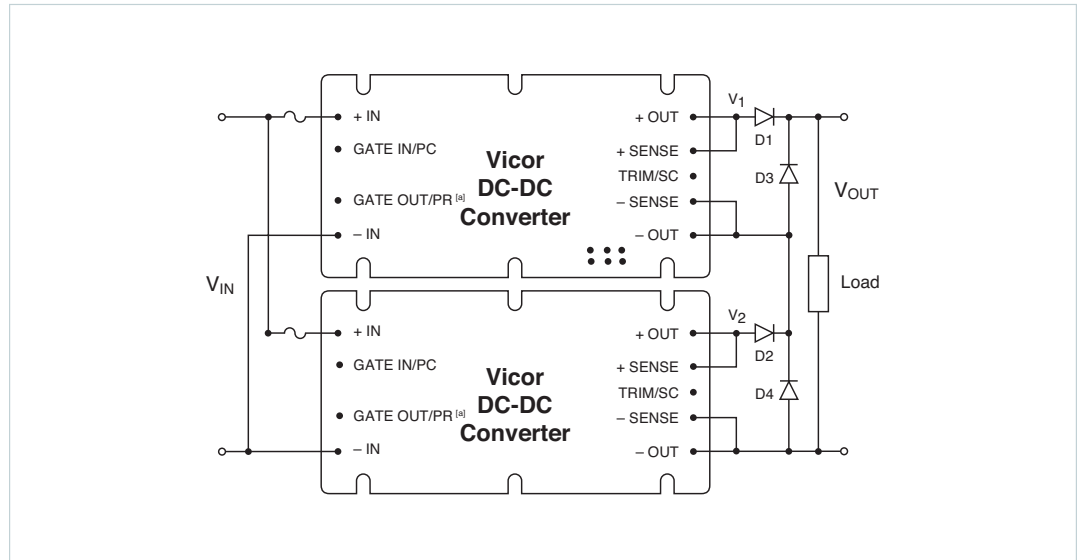
Converters should be bypassed for common and differential mode noise per any Vicor recommendations in the Design Guide and Application Manual. Bypass capacitors should be appropriately rated and located as close to the individual converters as possible. In all applications utilizing an adjustable output voltage, all recommendations regarding trim ranges and preloads must be followed.

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.

Figure 1

Fixed High Output Voltage
 $V_{OUT} = V_1 + V_2$



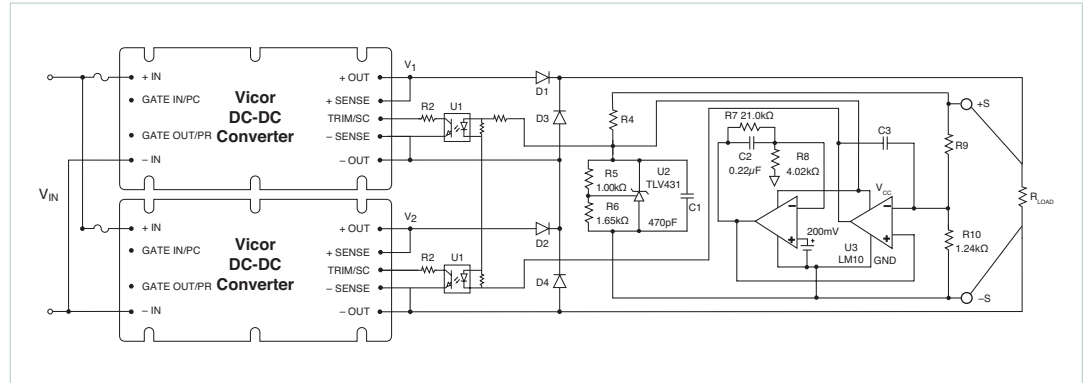
[a] GATE OUT/PR must be left floating.

Adjustable Output Voltage

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

[AN:205](#) can be used as a starting point for a design. However, given the wide range of the applications, please contact Vicor Applications Engineering for adjustable output supplies using Brick Maxi, Mini, Micro converters.

Figure 2
Adjustable High
Output Voltage



Important Notes

1. Do not series connect the output of Booster modules. Do not connect GATE OUT to GATE IN of series connected converters.
2. Do not make any connection to the GATE OUT/PR pins. The converters must run as independent voltage sources. Connecting this pin will result in unequal voltage division and module damage.
3. When series connecting the outputs of the converters, the total voltage of the series connection must not exceed 200V with respect to the baseplate. For higher voltages a $\pm 200V$ split supply can be made for a maximum differential output voltage of 400V. The midpoint of such an array must be referenced to both the baseplate and earth ground.

For constructing high-power arrays or for further information on array output voltage limitations, email Vicor Applications Engineering at: apps@vicorpower.com.

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