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APPLICATION NOTE 3844

Making a Voltage Inverter from a Buck (Step-Down) DC-DC Converter

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Abstract: Any step-down DC-DC converter can be used as an inverter with no changes to the operating schematic. This application note shows how to relabel the connector points to do this.

Any step-down DC-DC converter can be used as an inverter with no changes to the operating schematic. The only difference between the normal step-down application and inverting operation is the labels of the connection points. The step-down DC-DC converter's V_{OUT} node is GND in the inverter. The step-down DC-DC converter's GND node is $-V_{OUT}$ in the inverter. Input power, V_{IN} , is the same node in both circuits.

When using a step-down DC-DC converter as an inverter, there are some limitations. The voltage difference between the input and the negative output must be less than the step-down DC-DC converter's maximum operating input voltage. In essence, a step-down DC-DC converter with maximum input of 12V can be used to convert 5V to -7V, but not more.

In addition, the minimum input voltage of the inverting circuit must be greater than the minimum operating voltage of the step-down IC, minus one diode drop. That is because on start-up, there is initially no negative output voltage. Consequently, the step-down IC is biased only by the input voltage, less a diode forward drop.

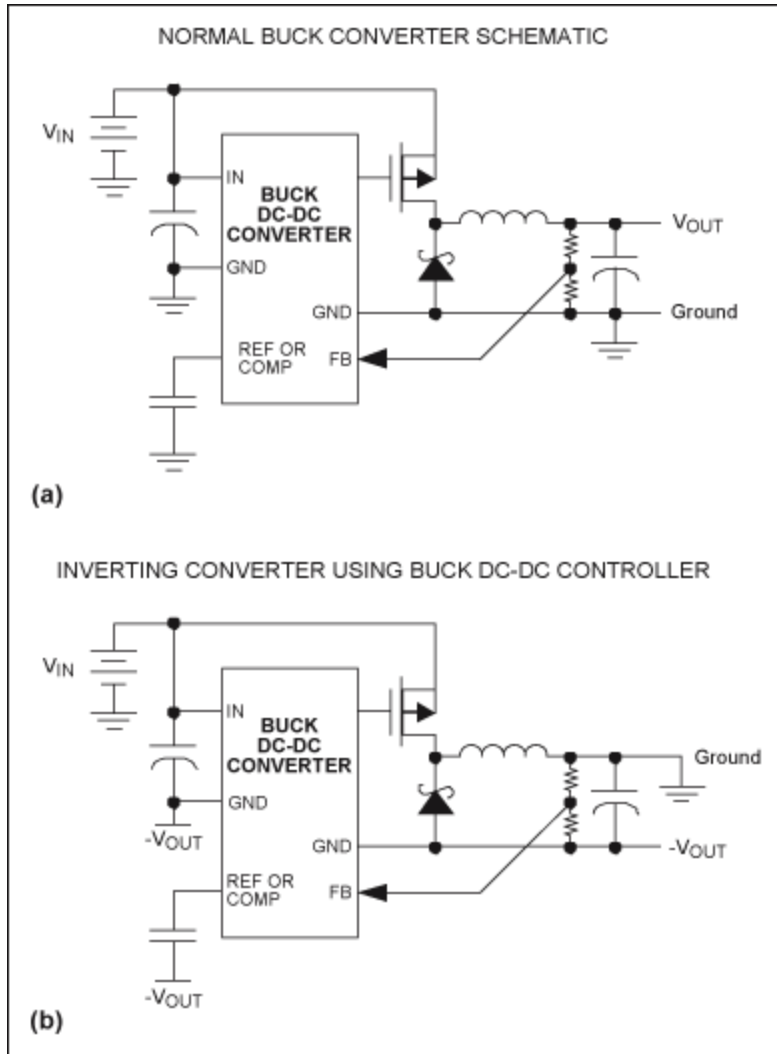


Figure 1. Block diagram shows a generic step-down DC-DC converter as both a normal step-down (Figure 1a) and connected as a negative-output voltage inverter (Figure 1b).

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