

APPLICATION NOTE 551

Negative Buck Regulator Produces Positive Output

Though the step-down regulator of **Figure 1** normally converts a negative voltage to a lower negative voltage, this circuit's ground reference allows the output to be positive. The configuration works only if the battery terminals can float—a requirement that generally excludes systems in which multiple supply voltages are derived from the same battery.

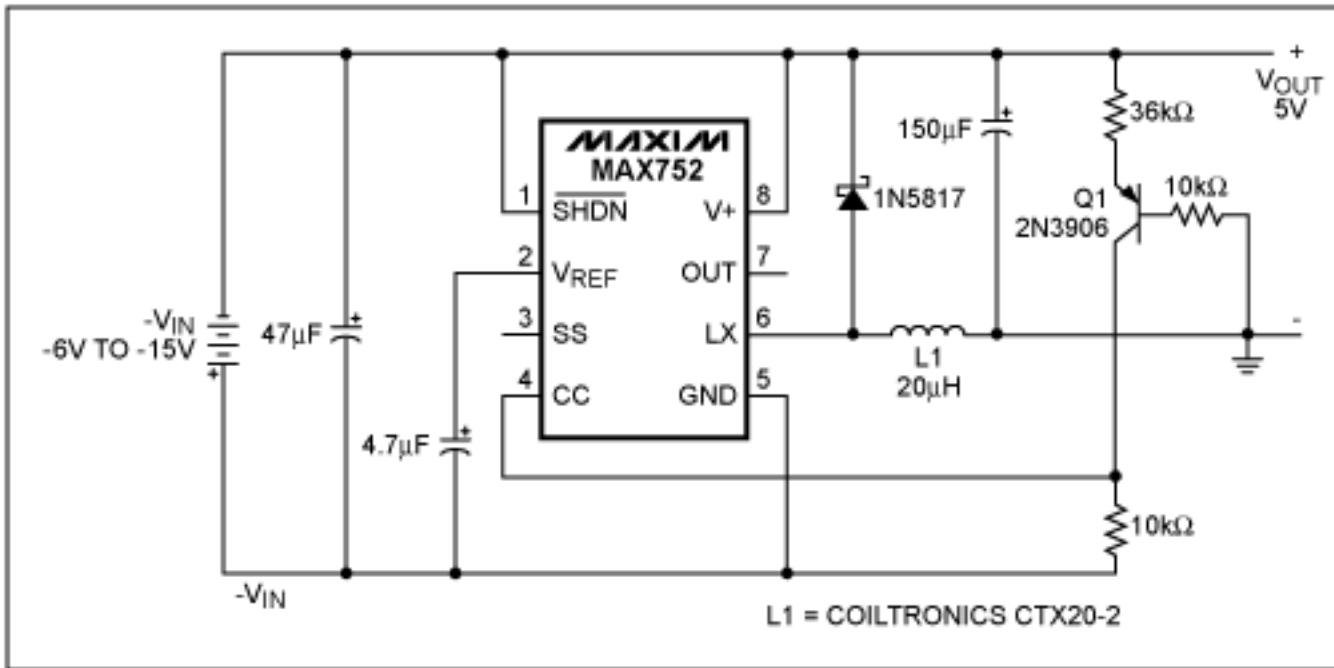


Figure 1. A floating battery allows this negative buck regulator to produce a positive (5V) output.

Transistor Q1 translates the 5V feedback signal down to the level of CC (1.23V above the negative input voltage). The circuit's power switching transistor is on the low side rather than the high side, giving it an advantage over conventional buck regulators. N-channel power transistors are preferred in this application, and the low-side connection makes them easier to drive. (The MAX752 in this circuit, operating with an internal n-channel MOSFET, provides the same performance as a MAX738 with its equivalent but larger and more expensive p-channel MOSFET.

The Figure 1 circuit supplies 500mA at 5V with excellent efficiency at higher currents (**Figure 2**). Quiescent supply current is 1.5mA, and the input-voltage range is -6V to -15V. The chip's 170kHz fixed-frequency oscillator allows small external components, and its current-mode PWM control provides precise regulation with low subharmonic noise.

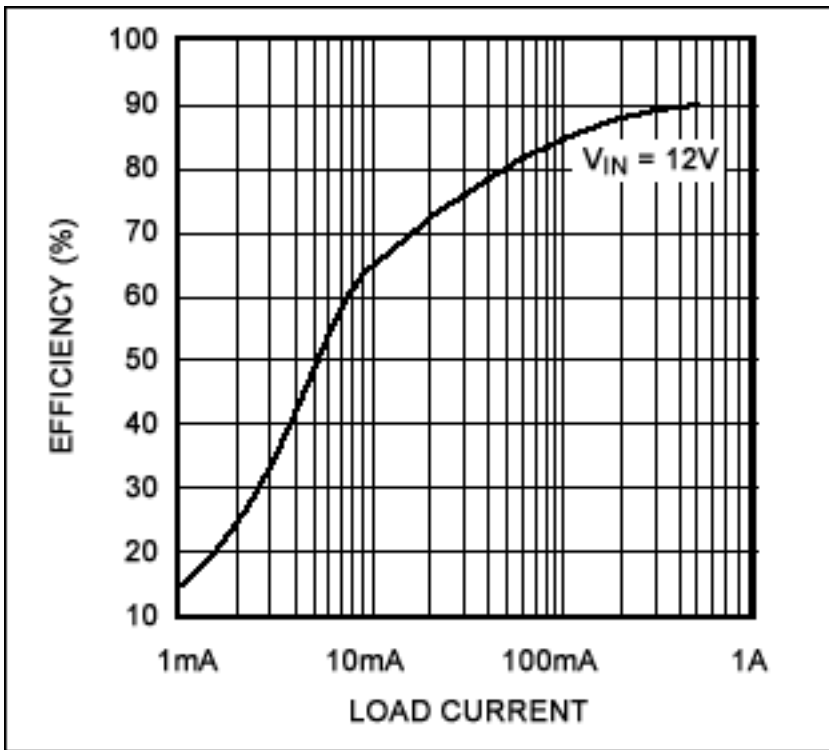


Figure 2. Efficiency for the Figure 1 circuit increases with load current.

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Related Parts

MAX752: [QuickView](#) -- [Full \(PDF\) Data Sheet](#)

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