Step-up/step-down converter takes 2 to 16V inputs

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The circuit in **Figure 1** is a low-cost step-up/step-down dc/dc converter. By definition, its input can range above and below the regulated voltage. The circuit includes a simple switch-mode boost converter (IC_1) that contains a comparator normally used to detect low battery voltage. In this case, the comparator controls an external pnp transistor that operates as a linear regulator. IC_1 steps up V_{IN} (2V minimum) to the level of V_X, as determined by the jumper block, J_1.

A 2-3 jumper selects the internal divider, producing V_X=12V. A 2-1 jumper selects feedback resistors R_1 and R_2, producing $V_X = 1.5V(R_1+R_2)/R_2$. You should set V_X to 1 to 2V above the desired output voltage. The Q_1 linear regulator steps V_X down to an output level determined by R_3 and R_4: $V_{OUT}= 1.5V(R_3+R_4)/R_4$, where $V_X>V_{OUT}$. When $V_{IN}>V_X$, the switching regulator turns off, and the linear regulator alone controls V_{OUT}. C_6 reduces output ripple. The circuit accommodates a wide range of input and output voltages and supplies output currents as high as 500 mA (**Figure 2**). (DI #2218) EDN

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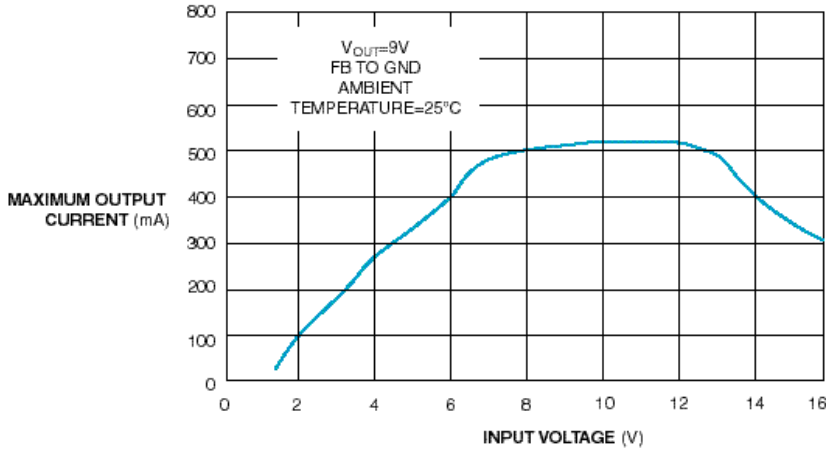
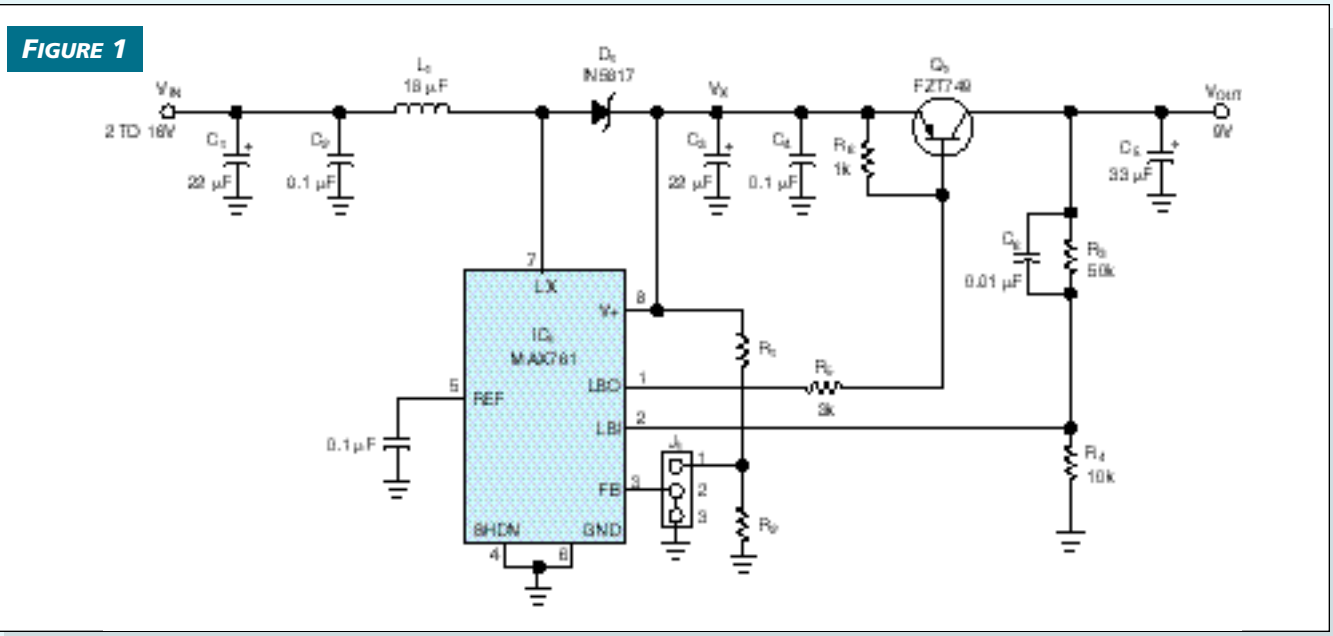
FIGURE 2



Delivering more than 100 mA over its 2 to 16V useful input-voltage range, the regulator in Figure 1 provides 500 mA over an 8 to 13V range.

FIGURE 1



Toggling between switching and linear operation, this regulator operates with input voltages above and below the desired output voltage.