

APPLICATION NOTE 265

# Circuit Breaker Handles Voltages to 76V

*Abstract: A current-sense amplifier, comparator, external CMOS switch, and an external transistor can be used to create a circuit breaker.*

The simplicity of low-side current monitoring can mask the advantages of a high-side approach. You can monitor load currents in a power supply, a motor driver, or another power circuit on either the high or the low side (ground). However, you should not let the ease of low-side monitoring cause you either to overlook its dangers or the advantages of a high-side approach.

Various fault conditions can bypass the low-side monitor, thereby subjecting the load to dangerous and undetected stresses. However, a high-side monitor connected directly to the power source can detect any downstream failure and trigger the appropriate corrective action. Traditionally, such high-side monitors required a precision op amp, a boost power supply to accommodate the op amp's limited common-mode range, and some precision resistors. Now, the [MAX4080](#) IC can sense high-side currents in the presence of common-mode voltages as high as 76V (**Figure 1**).

In this application circuit the MAX4080, IC<sub>1</sub>, provides a ground-referenced voltage-source output proportional to the high-side current of interest. This output voltage is proportional to the voltage across an external sense resistor multiplied by five.

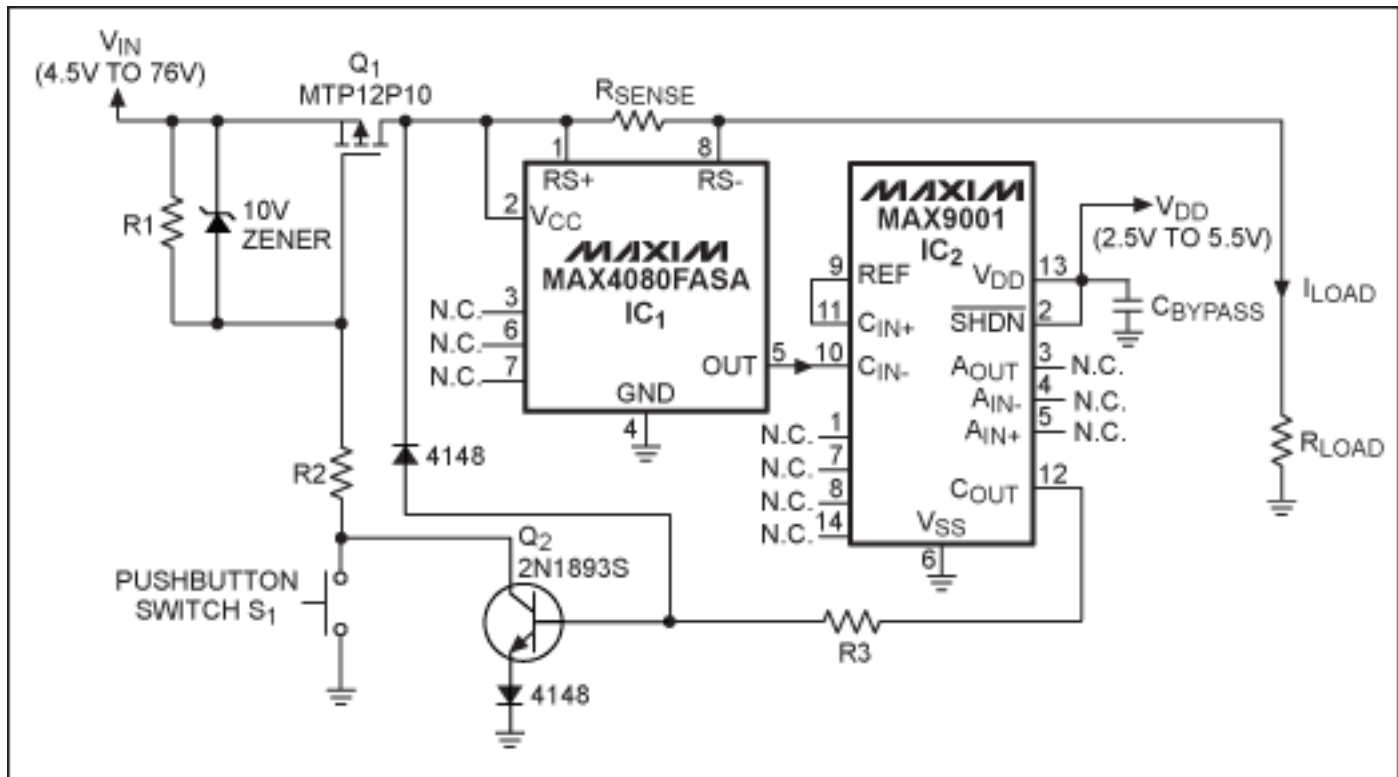


Figure 1. A current sense amplifier, comparator, and a few external components form a low-cost circuit breaker.

IC<sub>1</sub>, IC<sub>2</sub>, and a few external parts form a low-cost circuit breaker. R<sub>SENSE</sub> senses load currents, and Q<sub>1</sub> controls the currents. The design accepts inputs of 4.5V to 76V. The initial application of V<sub>IN</sub> and V<sub>DD</sub> places the breaker

in its trip state. Pressing  $S_1$  resets the breaker and connects power to the load and  $IC_1$ , thereby activating  $Q_1$ . When the voltage across  $R_{SENSE}$  is multiplied by five and exceeds 1.2V, then  $IC_2$  outputs a low signal on  $C_{OUT}$  which turns off  $Q_2$  and  $Q_1$ . Press  $S_1$  to reset the breaker.

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