

AC line powers microcontroller-based fan-speed regulator

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A microcontroller requires dc operating power in the 2 to 5.5V range, an amount that a battery or a secondary power source can easily supply. However, in certain situations, a microcontroller-based product must operate directly from a 120 or 220V-ac power outlet without a step-down transformer or a heat-producing, voltage-decreasing resistor. As an alternative,

a polyester/polypropylene film capacitor rated for ac-line service can serve as a nondissipative reactance (Figure 1). Capacitor C_1 , a 2- μ F AVX (www.avxcorp.com) FFB16C0205K rated for 150V rms, provides a significant ac-voltage drop that reduces the voltage you apply to a diode-bridge rectifier, D_1 . A flameproof metal-film resistor, R_1 , limits current spikes and transient

voltages induced in the ac-power line by lightning strikes and abrupt load changes. In this application, the ac current does not exceed 100 mA rms, and a 51 Ω , 1W resistor provides adequate current limiting. R_2 , a 5W, 160 Ω Yageo (www.yageo.com) type-J resistor, and D_2 , a 1N4733A zener diode, provide 5V regulated power for the microcontroller, a Freescale (www.freescale.com) C68HC908QT2.

The schematic shows a representative circuit for a microcontroller-based fan-speed regulator in which a thermistor senses air temperature and the microcontroller drives a

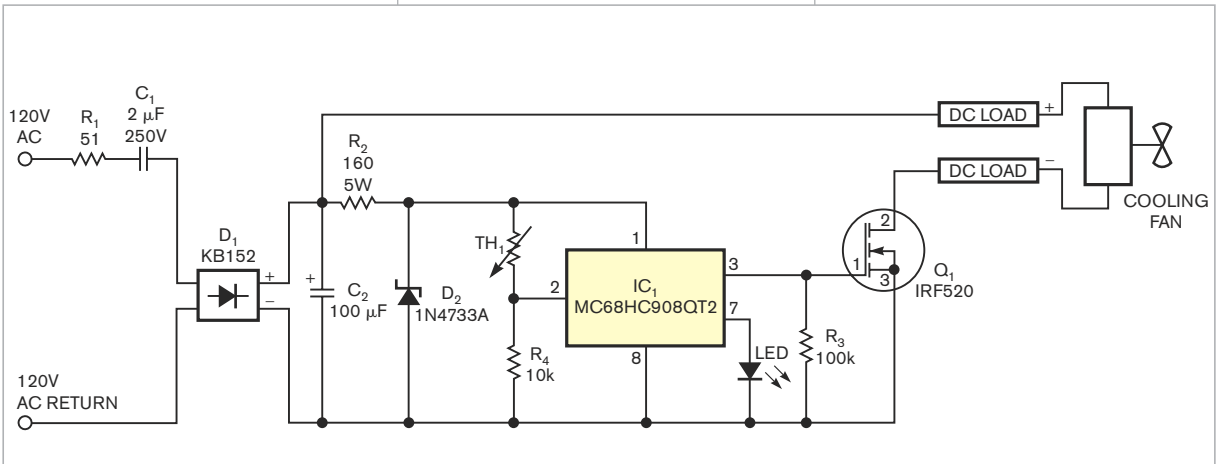


Figure 1 C_1 provides capacitive reactance, which limits ac-input current without dissipating excessive heat in this dc fan-speed controller.

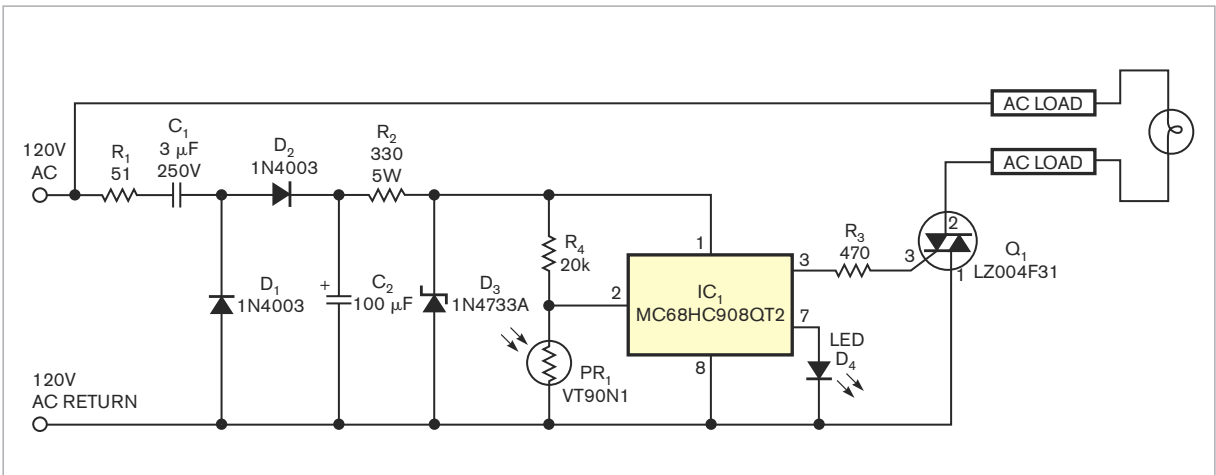


Figure 2 A two-diode rectifier and lamp-control bidirectional thyristor share a common return path to the ac line.

fan's motor. **Figure 2** illustrates a light-intensity regulator based on an inexpensive two-diode rectifier and a bidirectional-thyristor-lamp controller that share a common ground.

IC₂, a Fairchild (www.fairchildsemi.com) MOC3021-M bidirectional-thyristor-driver optoisolator, separates the lamp-return path from the microcontroller's ground return (**Fig-**

ure 3). In each of the three circuits, the Kingbright (www.kingbright.com) W934GD5V0 LED indicator includes a built-in current-limiting resistor (not shown).**EDN**

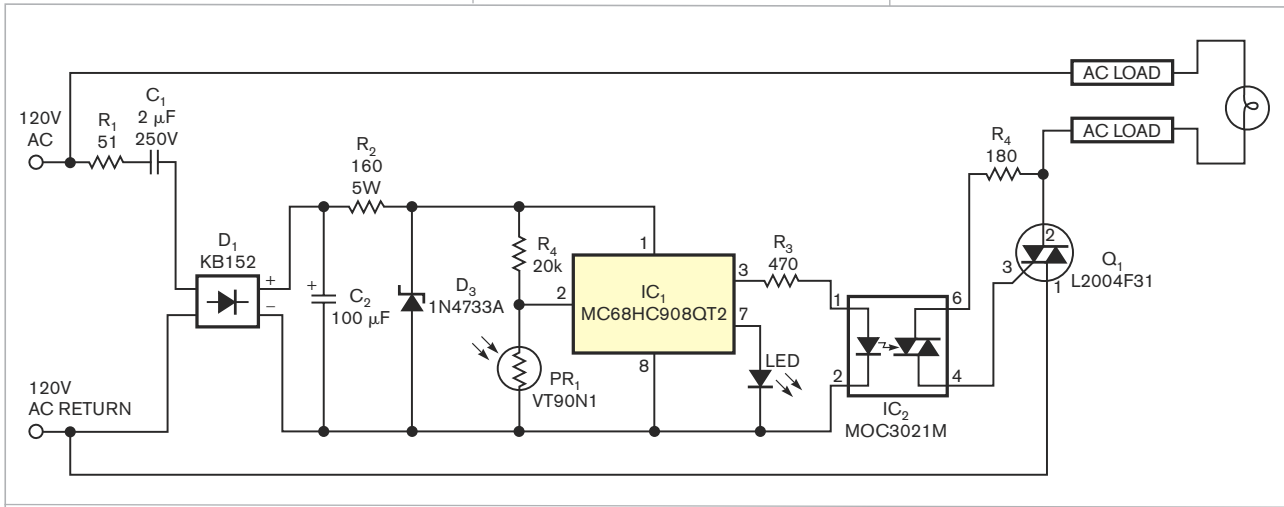


Figure 3 An optoisolator separates the bidirectional thyristor's high-current ac-line return path from the microcontroller's power supply.