LM385 Feedback Provides Regulator Isolation

National Semiconductor
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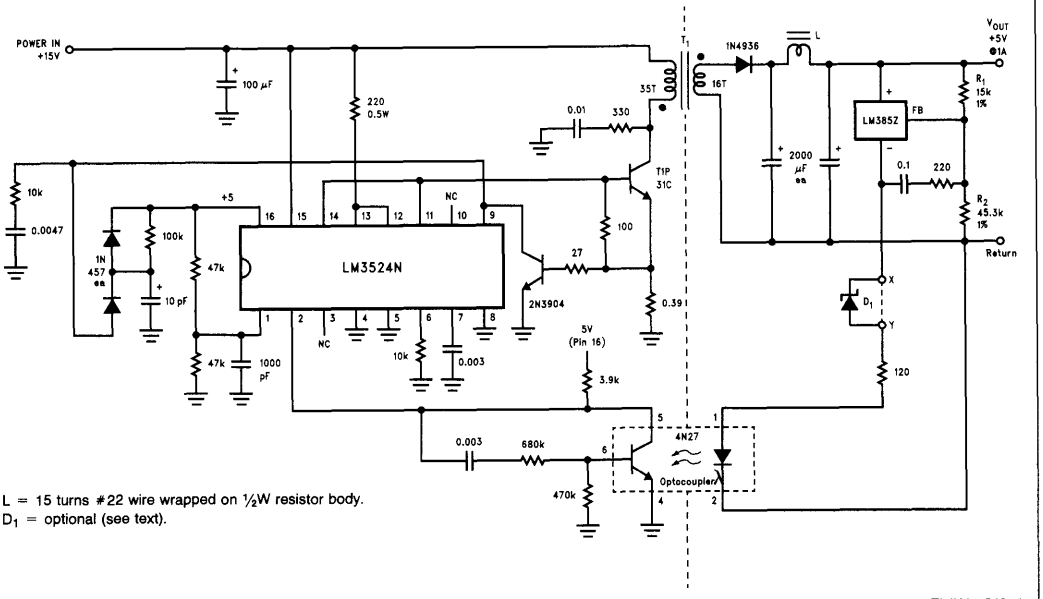
You can use a conventional 4N27 optocoupler in a feedback arrangement *(Figure 1)* to design a switching regulator with a floating output. The LM3524 switch-mode-regulator IC is configured as a simple flyback power supply with transformer-isolated output. The LM385 acts as a reference and comparison amplifier that satisifes the 4N27's current demands for balancing the dc feedback to pin 2 of the LM3524, thereby closing the loop. The LM385 automatically compensates for any LED degradation or optical-coupling loss.

The 4N27 specs a 0.1 dc to 1.6 dc gain range; the ac gain varies from 0.05 to 1.0. Fortunately, the "Miller" damper from pins 5 to 6 nullifies the effect of the wide gain variance. Moreover, the damper provides excellent loop stability for a wide range of 4N27 optocouplers from several manufacturers. In the example shown, the LM385 provides 0.5 mA to 5 mA to the optocoupler.

If the 5V output available from this circuit does not meet your needs, choose $R_2 = R_1 (V_{OUT} - 1.25)/1.25$. If V_{OUT} is greater than 6V, insert a zener diode between points X and Y, with $V_Z = V_{OUT} - 5V$; this addition prevents the voltage across the LM385 from exceeding its 5.3V max limit. The circuit is suitable for regulated output voltages from 3.2V to 25V.



L = 15 turns #22 wire wrapped on ½W resistor body.
D_1 = optional (see text).

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FIGURE 1. Optocoupler-based feedback circuit produces galvanically-isolated, regulated voltages. The heavy negative feedback compensates for wide variations in optocoupler gains. The values portrayed in this schematic yield 5V output; by varying R_2, you can obtain voltages from 3.2V to 25V.