

# Wide-Input-Range, Low Voltage Flyback Regulator

by Kurk Mathews

Many new switching regulators are designed with a specific application or topology in mind. If your requirements happen to fall within these parameters, all is well. Unfortunately, when faced with unusual requirements, the designer is often forced to choose bare-bones, universal regulators. The LTC1624 overcomes these issues by providing a full featured regulator that can operate in the step-down (buck), step-up (boost), buck-boost or flyback mode.

The functional diagram in Figure 1 reveals the flexibility of this device.

This constant-frequency current mode controller includes a high-side differential current sense amplifier and a floating high current N-Channel MOSFET driver. In the buck mode, an external bootstrap capacitor between the BOOST and SW pins works in conjunction with the internal 5.6V regulator and diode to provide a regulated supply for a high-side driver. In the boost, buck-boost or flyback mode, the SW pin is grounded, providing drive for a low-side MOSFET.

An example of a wide-input-range flyback is shown in Figure 2. The

circuit provides  $\pm 50\text{V}$  at 75mA from a 4.75 to 24V source. The sum of line-, load- and cross-regulation is better than  $\pm 5\%$ . The SW pin voltage is controlled by the internal 5.6V regulator, allowing the input voltage to be above Q1's 16V maximum gate-to-source voltage rating. 200kHz fixed frequency operation minimizes the size of T1. The R-C snubber formed by C1 and R1 in combination with T1's low leakage inductance keeps Q1's drain voltage well below its 100V rating. To improve cross-regulation, Q2, R2 and R3 were included to disable

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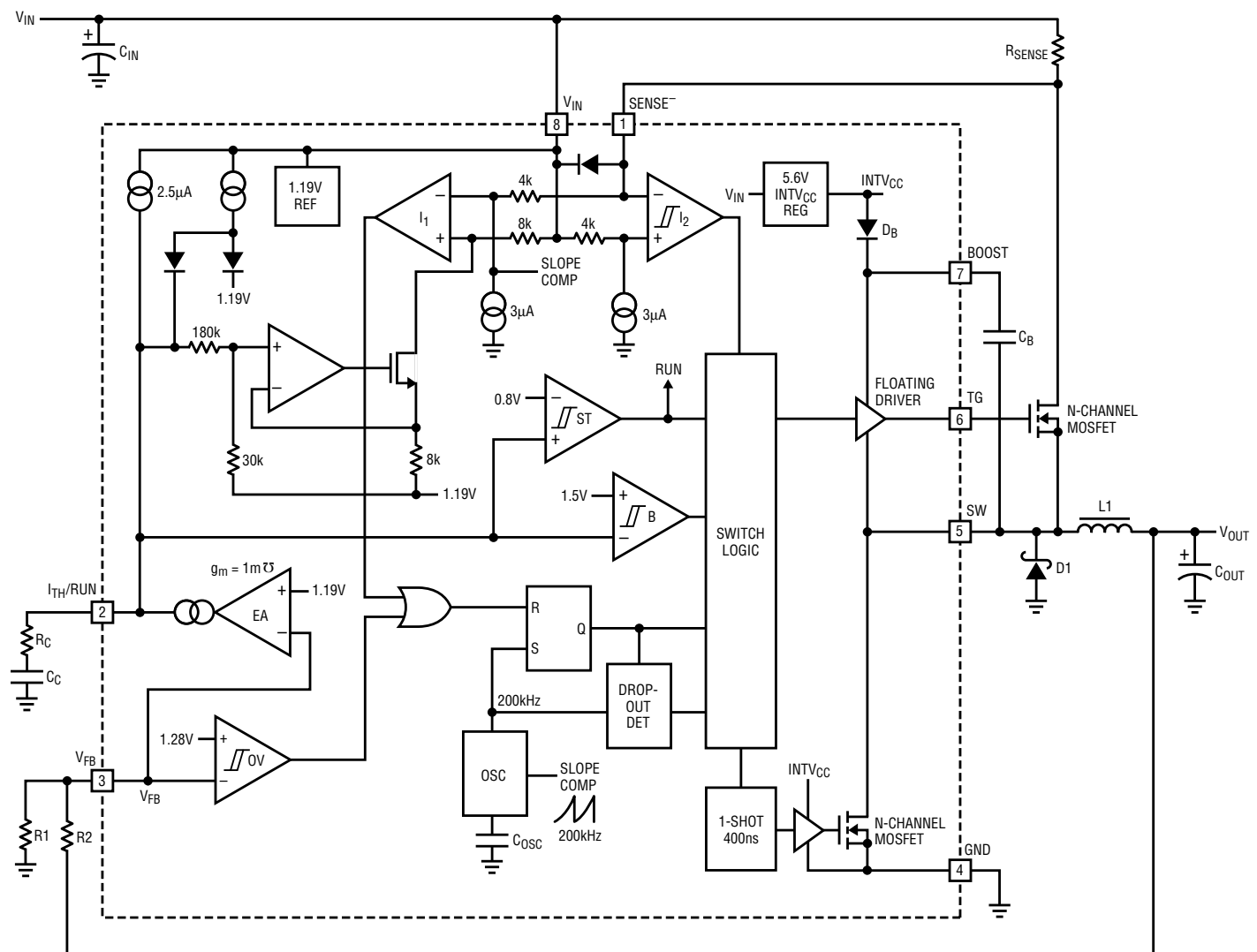
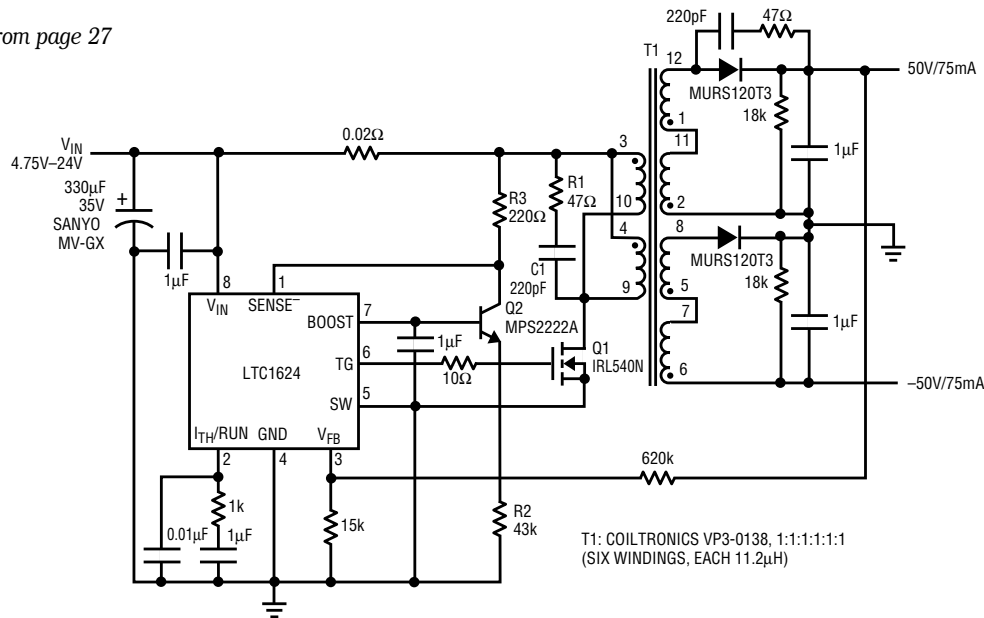


Figure 1. LTC1624 function diagram



**Figure 2. Wide-input-range flyback regulator provides  $\pm 50\text{V}$  at 75mA.**

Burst Mode™ operation (a feature that improves efficiency at light load conditions by skipping switching cycles). The LTC1624's 95% maxi-

um duty cycle accommodates the 5-to-1 input voltage range. Finally, by reconfiguring T1's secondaries, a variety of output configurations, such

as 24V out (four windings in parallel), single 50V/150mA or a single 100V output, are possible with this same basic circuit. 