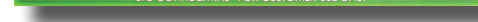


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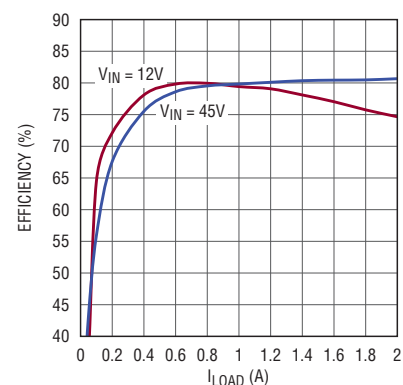
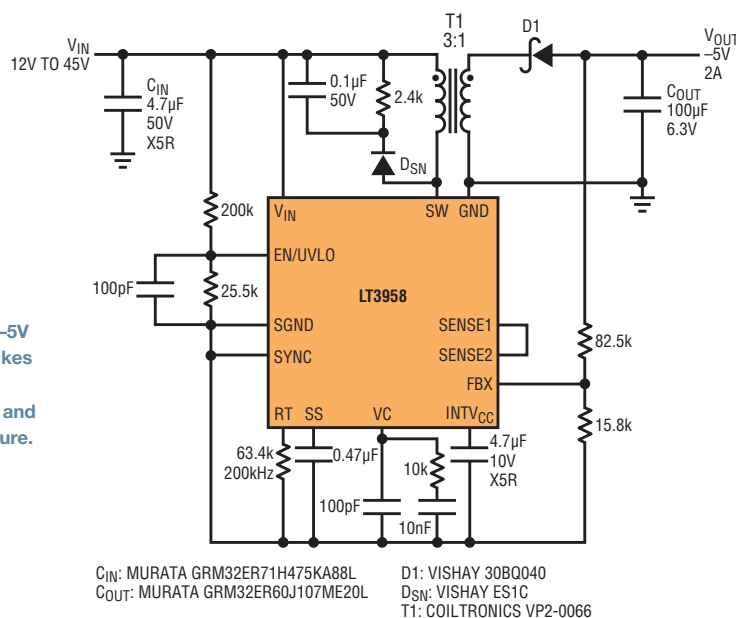


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The LT3957 and LT3958 feature a rugged low side N-channel power MOSFET rated for 5A/40V and 3.5A/80V respectively. A novel FBX pin architecture provides accurate regulated positive or negative output with a simple resistor divider.

**Figure 4. A simple and compact 12V to 45V input, -5V output flyback converter takes advantage of the LT3958's rugged 84V-rated MOSFET and the novel FBX pin architecture.**



**Figure 5. Efficiency of the converter in Figure 4**

external resistor, which allows designers to optimize component size and performance parameters, such as minimum/maximum duty cycle and efficiency.

At the heart of each of the LT3957 and LT3958 is a pair of feedback error amplifiers: one regulates a positive output and the other, a negative output. When the converter starts up, the output voltage ramps positive or negative depending on the topology selected. The appropriate error amplifier seamlessly takes over the feedback control, while the other becomes inactive. In this way, these parts can automatically regulate to the desired output voltage in different converter topologies.

The LT3957 and LT3958 contain several features to limit the peak switch currents and output voltage overshoot during start-up or recovery from a fault

condition. The ss pin voltage modulates the peak switch current, thereby allowing the output capacitor to charge gradually toward its final value while preventing switch current from reaching current limit. Selection of a capacitor on the ss pin determines the start-up/restart time. The frequency foldback function reduces the switching frequency when FBX voltage is close to 0V to ensure that the IC maintains control over the switch current. An overvoltage protection function protects both the positive and negative output converters from excessive output voltage overshoot. The internal power switch is turned off immediately when the FBX pin voltage exceeds the positive regulated voltage by 8% (typical), or negative regulated voltage by 11% (typical).

#### A 3V–6V INPUT, 12V OUTPUT BOOST CONVERTER

Figure 2 shows a 3V–6V input, 12V output boost power supply using the LT3957. To ensure the 3V minimum operation voltage, the voltage drop across the internal LDO is eliminated by connecting the INTV<sub>CC</sub> pin directly to V<sub>IN</sub> pin through a 10Ω resistor (given that the maximum V<sub>IN</sub> operating voltage of 6V is below INTV<sub>CC</sub>'s maximum voltage rating of 8V). Figure 3 shows the efficiency of this converter.

#### A 12V–45V INPUT, -5V OUTPUT FLYBACK CONVERTER

The LT3957 or LT3958 can be configured as a flyback converter for applications where the converters have multiple outputs, isolated outputs or high input/output voltage conversion ratios. The flyback converter has a very low parts count for multiple outputs, and with prudent selection of transformer turns ratio it can have high output/input voltage conversion ratios with a desirable duty cycle.

The frequency foldback feature of the LT3957 and LT3958 provides robust

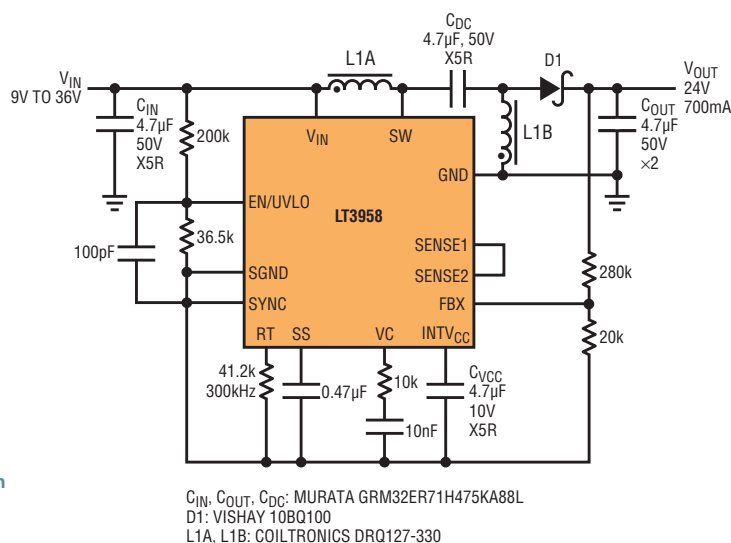


Figure 6. A simple and compact 9V–36V input, 24V output SEPIC converter with short-circuit protection

output short-circuit protection. Each IC's FBX feature allows the flyback converter to easily produce either positive or negative outputs. Figure 4 shows a LT3958 in a flyback converter that operates from a 12V to 45V input and delivers 2A to a –5V output. Figure 5 shows the efficiency of this converter at different input voltages.

#### A 9V–36V INPUT, 24V OUTPUT SEPIC CONVERTER

Figure 6 shows the LT3958 in a 9V to 36V input, 24V output SEPIC converter. This topology allows for the input to be higher, equal or lower than the desired output voltage. In a SEPIC converter, no DC path exists between the input and output, which

is an advantage for applications requiring the output to be disconnected from the input source when the circuit is shut down. This design can sustain an indefinite output short-circuit condition due to its topology and the frequency foldback feature. Figure 7 shows the efficiency of this converter at different input voltages.

#### A 4V–15V INPUT, –5V OUTPUT INVERTING CONVERTER

An inverting converter is similar to the SEPIC converter in that it can step up or step down the input, but with a negative output. It also offers output disconnect and short-circuit protection. Figure 8 shows a 4V–15V input, –5V output inverting

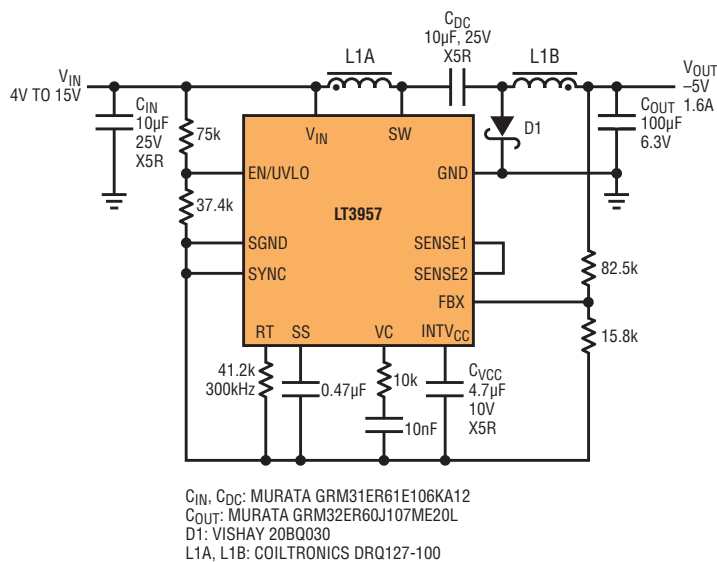


Figure 8. A simple and compact 4V–15V input, –5V output inverting converter with short-circuit protection

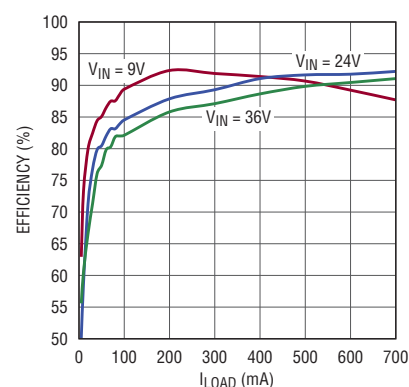


Figure 7. Efficiency of the converter in Figure 6.

converter using LT3957 as the switching regulator. Figure 9 shows the efficiency of this converter at different input voltages.

#### CONCLUSION

The LT3957 and LT3958 are versatile monolithic switching regulators that can be configured as boost, flyback, SEPIC or inverting converters accepting a wide range of input voltages. By integrating the power MOSFET and LDO, they greatly simplify converter design, shrink solution size and reduce costs. These ICs also offer low shutdown current, soft-start, frequency foldback, input UVLO, adjustable frequency and synchronization. The combination of these features makes the LT3957 and LT3958 suitable for a variety of applications ranging from battery portable electronics to automotive, industrial and telecommunications power supplies. ■

Figure 9. Efficiency of the converter in Figure 8

