SOT-23 Switching Regulator with Integrated 1 Amp Switch Delivers High Current Outputs

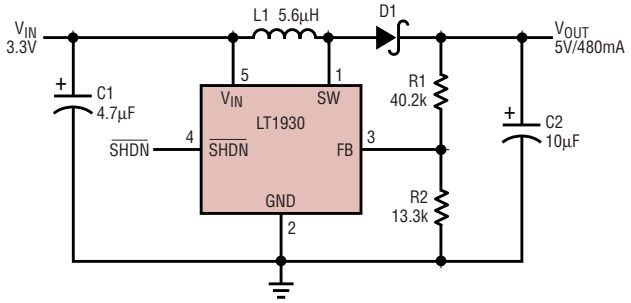
by Albert Wu

The LT1930 is the only SOT-23 switching regulator in the industry that includes an integrated 1A switch. The LT1930 utilizes a constant frequency, internally compensated, current mode PWM architecture. Its 1.2MHz switching frequency allows the use of tiny, low cost capacitors and low profile inductors. With an input voltage range of 2.6V to 16V, the LT1930 is a good fit for a variety of applications. The onboard switch features a low V_{CESAT} voltage of 400mV at 1A, resulting in very good efficiency even at high load currents.

Figure 1 shows a typical 3.3V to 5V boost converter using the LT1930. The circuit can provide an impressive output current of 480mA. The efficiency remains above 83% over a wide load current range of 60mA to 450mA, reaching 86% at 200mA. The maximum output voltage ripple of this circuit is $40mV_{P-P}$, which corresponds to less than 1% of the nominal 5V output. Figure 2 is an oscilloscope photograph of the transient response. The lower waveform represents a load step from 200mA to 300mA, the middle waveform shows the inductor current and the upper waveform shows the output voltage. The output voltage remains within 1% of the nominal value during the transient steps and displays a well damped response with little ringing.

Another typical application is a 5V to 12V boost converter, as shown in Figure 3. This circuit can provide 300mA of output current with efficiencies as high as 87%. The maximum output voltage ripple of this circuit is $60mV_{P-P}$, which corresponds to 0.05% of the nominal 12V output. Figure 4 is an oscilloscope photograph of the transient response. The lower waveform shows a load current step from 200mA to 250mA. The middle waveform displays the inductor current and the upper waveform shows the output voltage. The

continued on page 20



C1: TAIYO-YUDEN X5R JMK212BJ475MG (408) 573-4150
C2: TAIYO-YUDEN X5R JMK316BJ106ML
D1: ON SEMICONDUCTOR MBR0520 (800) 282-9855
L1: SUMIDA CR43-5R6 (847) 956-0666

Figure 1a. 3.3V to 5V/450mA step-up DC/DC converter

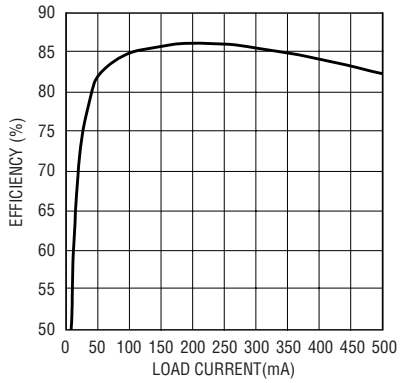


Figure 1b. Efficiency of Figure 1a's circuit

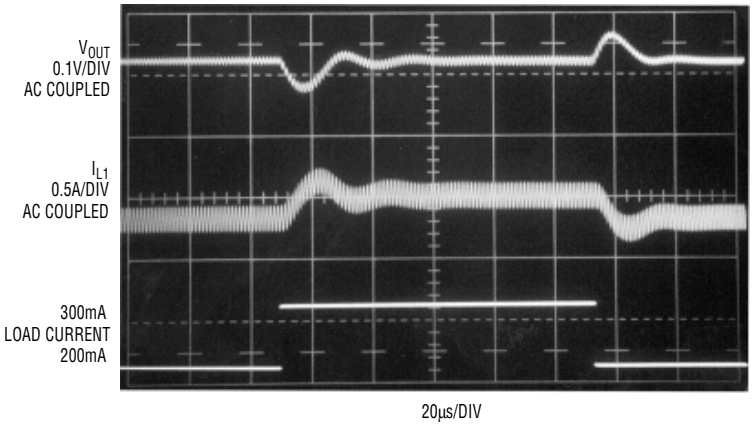
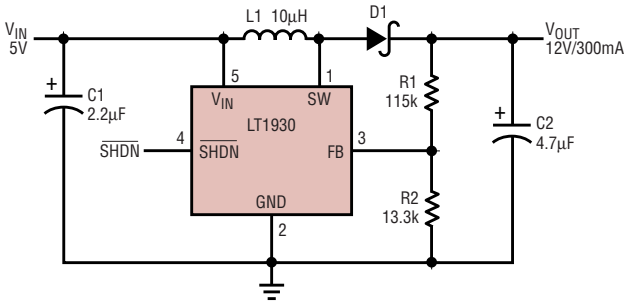


Figure 2. Transient response of Figure 1a's circuit

LT1930, continued from page 17



C1: TAIYO-YUDEN X5R LMK212BJ225MG (408) 573-4150
C2: TAIYO-YUDEN X5R EMK316BJ475ML
D1: ON SEMICONDUCTOR MBR0520 (800) 282-9855
L1: SUMIDA CR43-100 (847) 956-0667

Figure 3a. 5V to 12V/300mA step-up DC/DC converter

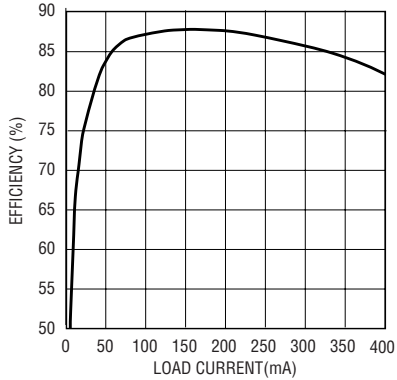


Figure 3b. Efficiency of Figure 3a's circuit

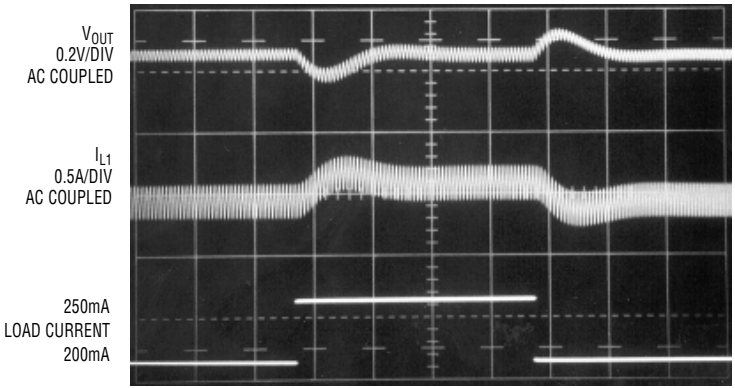


Figure 4. Transient response of Figure 3a's circuit

output voltage remains within 1% of the nominal value during both transient steps.

These applications demonstrate that the LT1930 is the industry's highest power SOT-23 switching regulator. In addition to step-up or boost converters, the LT1930 can be used in single-ended primary inductance converters (SEPIC) and flyback designs. The LT1930 is pin compatible with both the low power LT1613 and the micropower LT1615, providing a simple upgrade path for users of the older parts who need more power.