

# DESIGN NOTES

## LT1777 High Voltage, Low Noise Buck Switching Regulator

Design Note 212

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The LT<sup>®</sup>1777 is a wide input range buck (step-down) switching regulator specially designed for low noise applications. The LT1777 can be beneficial in applications where low noise is critical, such as telecom, automotive cellular and GPS receiver power supplies. The schematic in Figure 1 highlights the capabilities of the LT1777.

The LT1777 can accept input voltages from 7.4V to 48V and has a nominal switching frequency of 100kHz. The monolithic die includes an onboard 700mA peak current switch, oscillator, control and protection circuitry. It uses current mode control that delivers excellent dynamic input supply rejection and short-circuit protection. In order to achieve low noise, the LT1777 is equipped with  $di/dt$  limiting circuitry that is programmed via a small inductor ( $L_{SENSE}$  in Figure 1) in the power path. It also contains internal circuitry to limit  $dV/dt$  during switch turn-on and turn-off.

Figure 2 shows the  $V_{SW}$  node voltage and switch current for the low noise LT1777. Figure 3 shows the  $V_{SW}$  node voltage and switch current for the high voltage LT1676 buck regulator under the same test conditions (no slew rate limiting). It can be seen from Figures 2 and 3 that the switch node voltage and current waveforms for the LT1777 are more controlled and rise and fall more slowly than those of the LT1676 regulator. Conducted and radiated EMI are dramatically reduced by slowing down the sharp

edges during turn-on and turn-off of the power switch with only modest reduction in conversion efficiency.

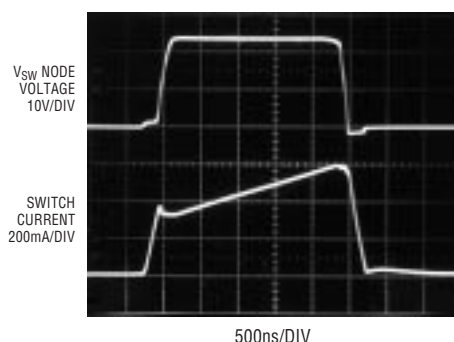


Figure 2.  $V_{SW}$  Voltage and Switch Current for the LT1777

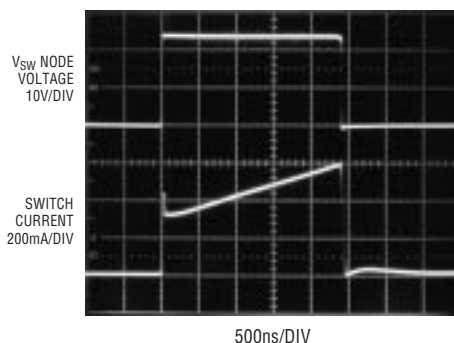


Figure 3.  $V_{SW}$  Voltage and Switch Current for the LT1676 (No Slew Control)

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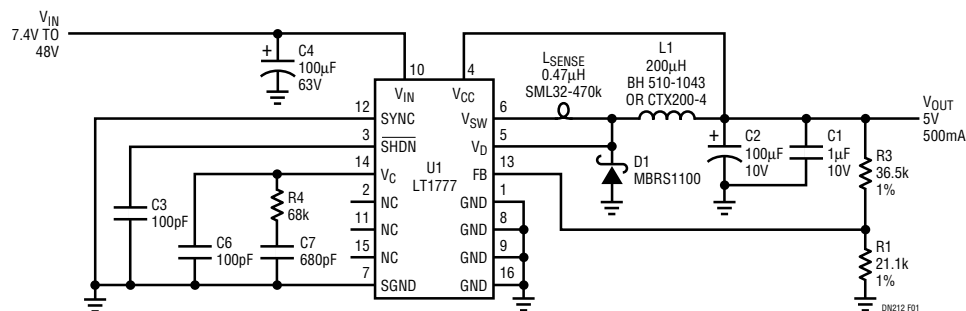


Figure 1. 100kHz Low Noise Step-Down Switching Regulator

