

APPLICATIONS INFORMATION

2. Using a DC Voltage

For some applications, the preferred method of brightness control is a variable DC voltage to adjust the LED current. The dimming control using a DC voltage is shown in Figure 7. As the DC voltage increases, the voltage drop on R2 increases and the voltage drop on R1 decreases. Thus, the LED current decreases. The selection of R2 and R3 will make the current from the variable DC source much smaller than the LED current and much larger than the FB pin bias current. For V_{DC} range from 0V to 2V, the selection of resistors in Figure 7 gives dimming control of LED current from 0mA to 15mA.

3. Using a Filtered PWM Signal

The filtered PWM signal can be considered as an adjustable DC voltage. It can be used to replace the variable DC voltage source in dimming control. The circuit is shown in Figure 8.

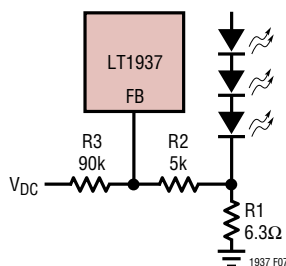


Figure 7. Dimming Control Using a DC Voltage

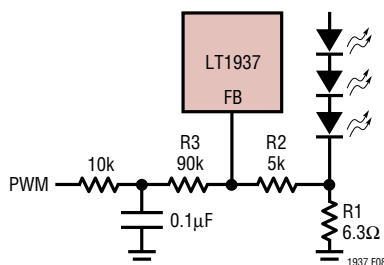


Figure 8. Dimming Control Using a Filtered PWM Signal

4. Using a Logic Signal

For applications that need to adjust the LED current in discrete steps, a logic signal can be used as shown in Figure 9. R1 sets the minimum LED current (when the NMOS is off). R_{INC} sets how much the LED current increases when the NMOS is turned on. The selection of R1 and R_{INC} follows formula (1) and Table 4.

Start-up and Inrush Current

To achieve minimum start-up delay, no internal soft-start circuit is included in LT1937. When first turned on without an external soft-start circuit, inrush current is about 200mA as shown in Figure 10. If soft-start is desired, the recommended circuit and the waveforms are shown in Figure 11. If both soft-start and dimming are used, a 10kHz PWM signal on \overline{SHDN} is not recommended. Use a lower frequency or implement dimming through the FB pin as shown in Figures 7, 8 or 9.

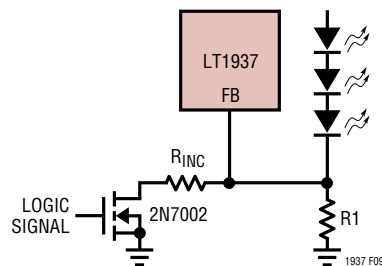


Figure 9. Dimming Control Using a Logic Signal

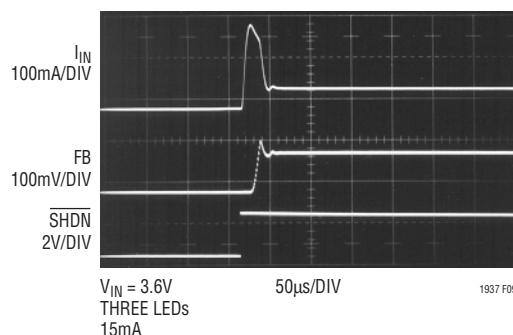
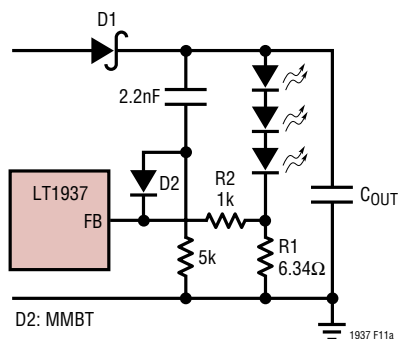
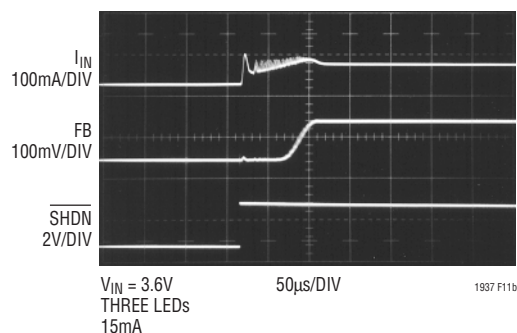


Figure 10. Start-Up Waveforms Without Soft-Startup Circuit

APPLICATIONS INFORMATION



(11a) Recommended Soft-Startup Circuit



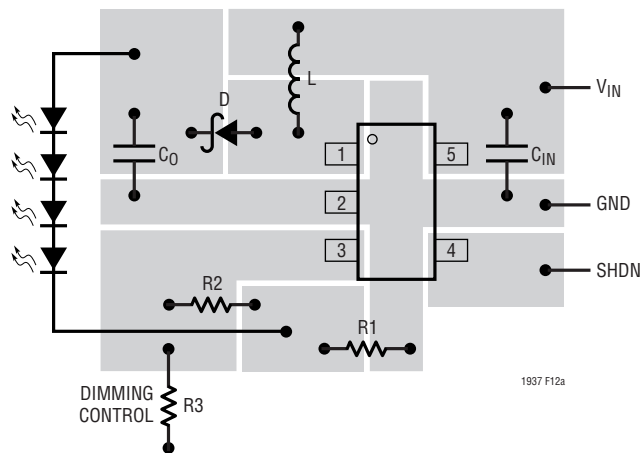
(11b) Soft-Startup Waveforms

Figure 11. Recommended Soft-Startup Circuit and Waveforms

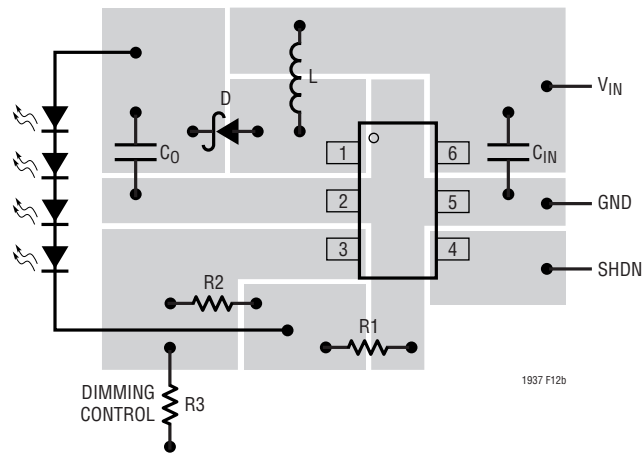
Board Layout Consideration

As with all switching regulators, careful attention must be paid to the PCB board layout and component placement. To maximize efficiency, switch rise and fall times are made as short as possible. To prevent electromagnetic interference (EMI) problems, proper layout of the high frequency switching path is essential. The voltage signal of the SW pin has sharp rise and fall edges. Minimize the length and

area of all traces connected to the SW pin and always use a ground plane under the switching regulator to minimize interplane coupling. In addition, the ground connection for the feedback resistor R1 should be tied directly to the GND pin and not shared with any other component, ensuring a clean, noise-free connection. Recommended component placement is shown in Figure 12.



(SOT-23 Package)

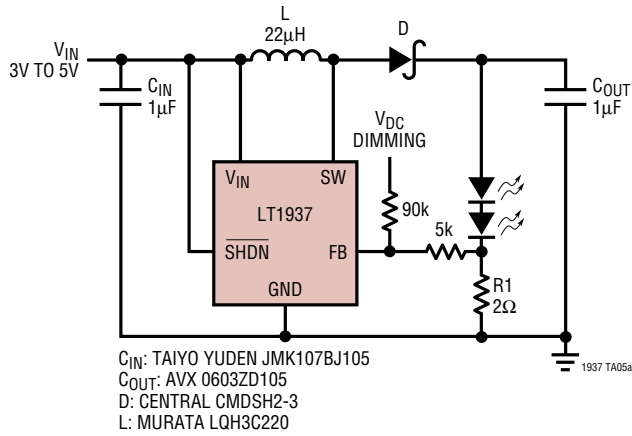


(SC70 Package)

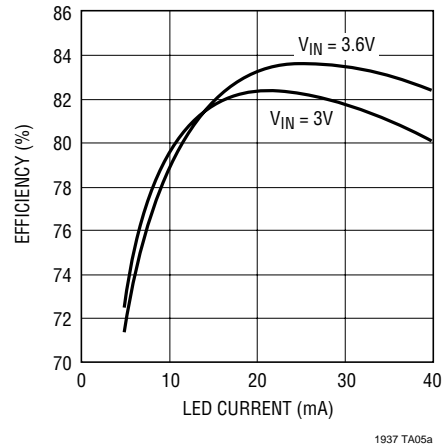
Figure 12. Recommended Component Placement

TYPICAL APPLICATIONS

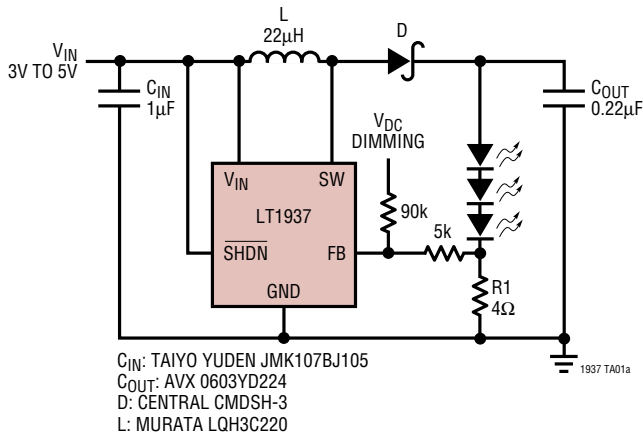
Li-Ion to Two White LEDs



Two LED Efficiency



Li-Ion to Three White LEDs



Three LED Efficiency

