TPS61181 One-Cell Battery Application For Tablet PC Backlight

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ABSTRACT

The TPS61181 is an ideal LED driver IC for medium form factor LCD backlighting. This device has a built-in, high-efficiency boost regulator with integrated 1.5-A/40-V power MOSFET. It provides six, current-sink regulators of 25 mA. The device can support up to 60 white LEDs. In addition, the boost output automatically adjusts its voltage to total LEDs forward voltage to optimize the whole solution power efficiency.

Today's tablet PCs are powered by one-cell Li-ion batteries because they provide the best overall system efficiency and a simple battery charging solution from a USB port. Although the TPS61181 input range is 5 V to 24 V, a simple modification to the standard application circuit allows one-cell battery voltage operation. This application report explains two solutions based on the TPS61181.
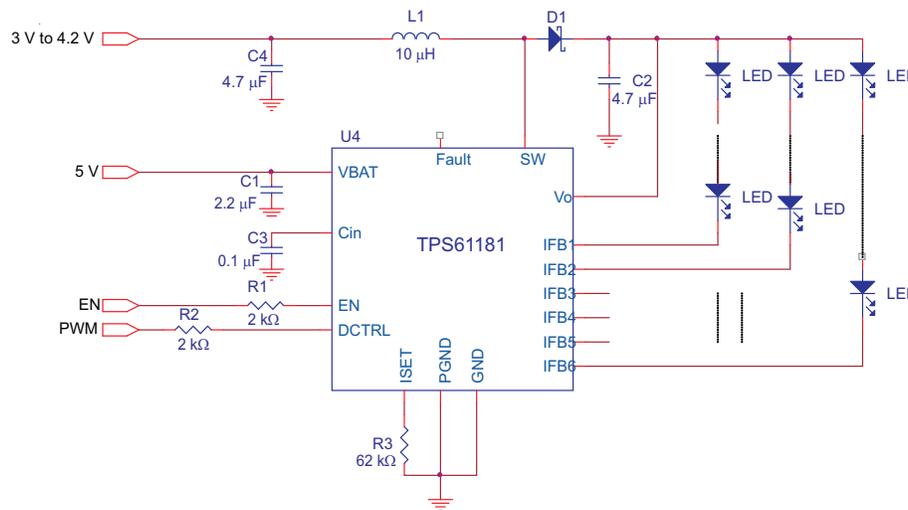
**Figure 1. Using Additional 5-V Rail for TPS61181 Input Voltage**
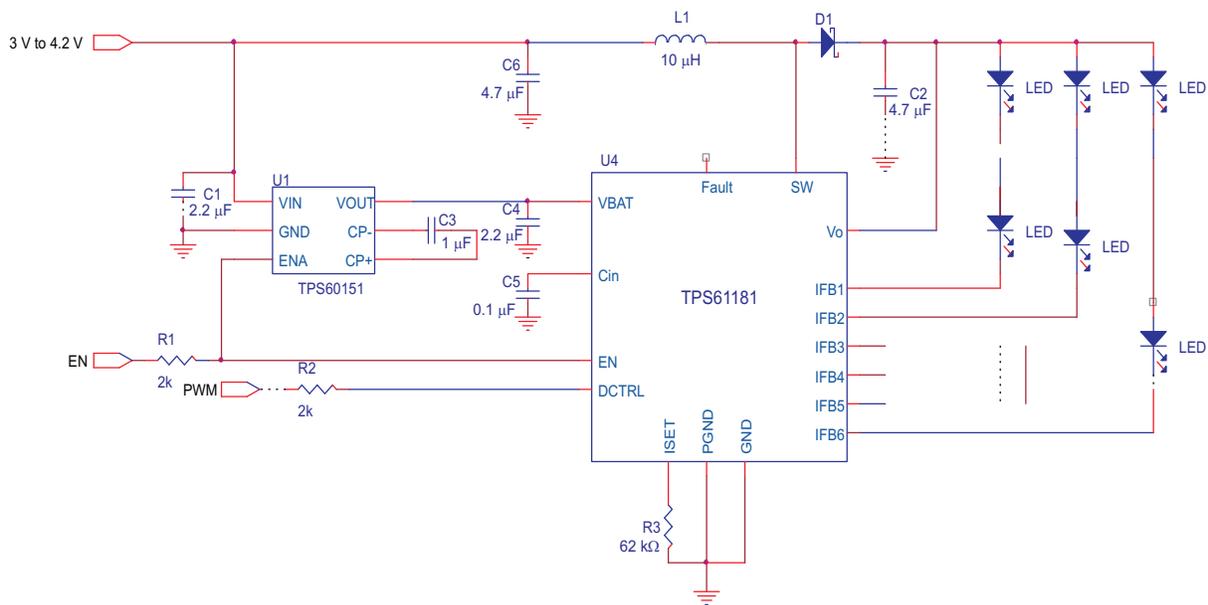
Figure 2. Using TPS60151 for TPS61181 Input Voltage

1 Design Consideration

The schematic shown in Figure 1 is a simple design. If the system has an existing power rail of 5 V that can provide up to 3 mA of the bias current for the TPS61181, then this 5-V rail can be used to provide the integrated circuit's input power. The recommended value of C1 is at least 2.2 µF.

In the schematic of Figure 2, it is assumed that the only available power rail is the input battery voltage; therefore, a boost-type regulator is needed to generate the power rail for the LED driver. In this solution, the TPS60151 charge pump device was selected in order to eliminate the additional cost of an inductor. The TPS60151 supports an input range of 2.7 V to 5.5 V and has a fixed output of 5 V. Because the quiescent current of the TPS61181 is only 3 mA in a worst-case scenario, the power dissipation of the TPS60151 has little effect on the system efficiency.

In addition to the TPS61181, users can consider the entire TPS6118x/9x device family as solutions for this application.

2 Test

Modify the TPS61181EVM-259 board (SLVU223) based on Figure 1 circuitry. The following list discloses the component values and current information not shown on the schematic.

- Each LED current = 20 mA; 36 LEDs in total with all six channels used.
- Inductor is A915AY−100M (Toko) and Schottky diode is BAT54ZFILM (ST)
- SS2P5 or P6 from Vishay
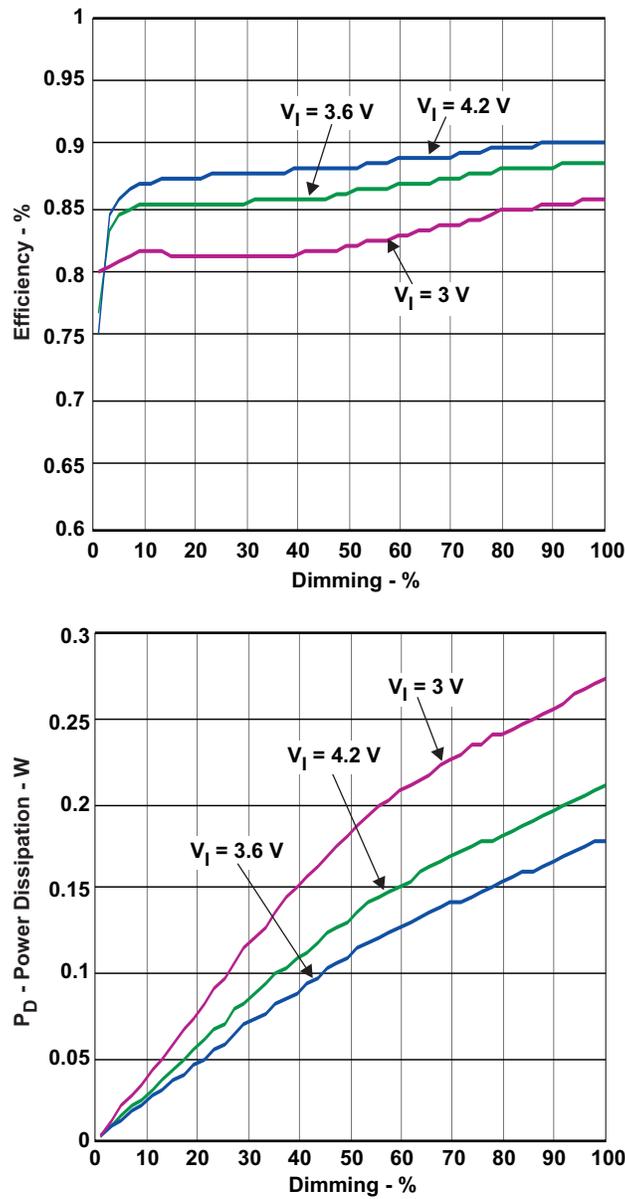
3   References

1. *Extending the Input Voltage Range of the TPS6116x/7x/8x/9x WLED Drivers* application report (SLVA338)
2. *TPS61180/1/2, WLED Driver for Notebook Display* data sheet (SLVS801)
3. *TPS61181EVM-259/TPS61182EVM-259* user's guide (SLVU223)

IMPORTANT NOTICE