

# TPS61059 powers white-light LED as photoflash or movie light

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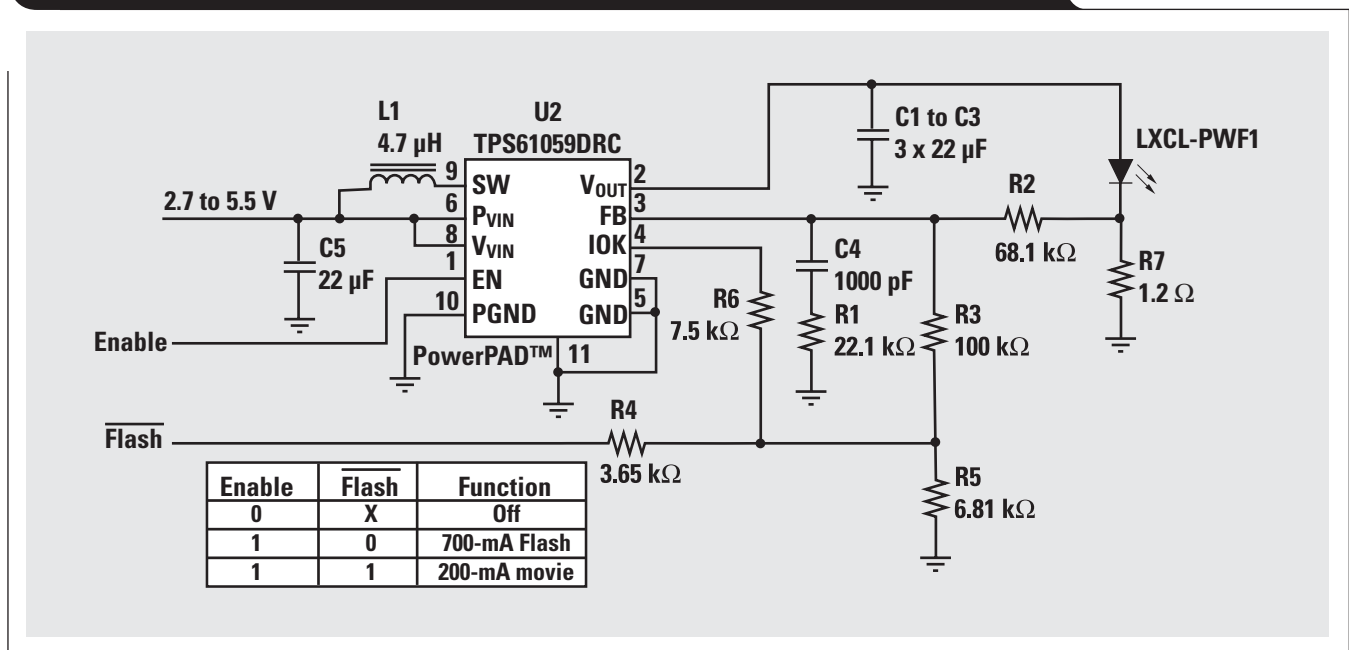
Portable Power DC/DC Applications

Manufacturers of smart phones, cell phones, and PDAs are incorporating digital camera technology into their products so they can be used as cameras as well as for their intended use. Each of these devices uses a megapixel CCD camera that generally performs poorly in low-light conditions such as indoors, on cloudy days, or in the morning or evening. To provide a photoflash function for these low-light conditions, manufacturers are starting to turn to new high-power, white-light LEDs. These LEDs output a wide light spectrum and are compact and easy to control. They operate at much lower voltages than Xenon gas-discharge tubes, which require hundreds of volts to flash. Additionally, white-light LEDs can be left on continuously to provide lighting for digital movie photography.

One challenge in using white-light LEDs is powering them with the wide input-voltage range that batteries present. A white-light LED can have a forward voltage ranging from 3.2 to 4.8 V. This falls in the middle of most battery input-voltage ranges, which means the converter needs to be able to step up or step down the input voltage to maintain the forward voltage of the LED.

The Texas Instruments (TI) TPS61058 and TPS61059 are synchronous boost converters for driving high-current LEDs for photoflash and movie-light applications. The TPS61058 can provide up to 500 mA and the TPS61059 up to 800 mA of LED current from a 3.3-V source. The TPS6105x family of boost converters has a special down mode that allows it to step down the input voltage when the input voltage is higher than the forward voltage of the LED. Thus, the TPS61058/9 can both step up and step down the input voltage, allowing these devices to drive a wide range of LEDs from a wide range of input voltages. Figure 1 shows the TPS61059 configured to provide 700 mA of current for an LED photoflash or a constant 200 mA of current for a movie light from an input battery voltage between 2.7 and 5.5 V. Two digital inputs are used to select the LED's mode of operation—off, photoflash, or movie light. The photoflash, movie-light, and soft-start current supplied by the TPS6105x are programmed by an external resistor network that allows the TPS6105x to drive a variety of high-power white-light LEDs.

Figure 1. TPS61059 configured for 700-mA LED photoflash or 200-mA LED movie light



The TPS6105x achieves up to 93% efficiency in movie-light mode and up to 81% efficiency in high-current photoflash mode (see Figure 2). During shutdown, the device completely disconnects the LED from the input source to prevent draining the battery and consumes a low 100 nA of quiescent current.

Additional features are integrated-circuit protection for soft start, thermal shutdown, and open or shorted LEDs, and an integrated anti-ringing power switch for low-EMI operation in noise-sensitive applications. All of this is packaged in a 10-pin QFN, which allows for a total solution size of less than 80 mm<sup>2</sup>.

## Reference

For more information related to this article, you can download an Acrobat Reader file at [www-s.ti.com/sc/techlit/litnumber](http://www-s.ti.com/sc/techlit/litnumber) and replace "litnumber" with the **TI Lit. #** for the materials listed below.

### Document Title

### TI Lit. #

1. "Synchronous Boost Converter with Down Mode High Power White LED Driver,"  
TPS61058/9 Datasheet .....slvs572

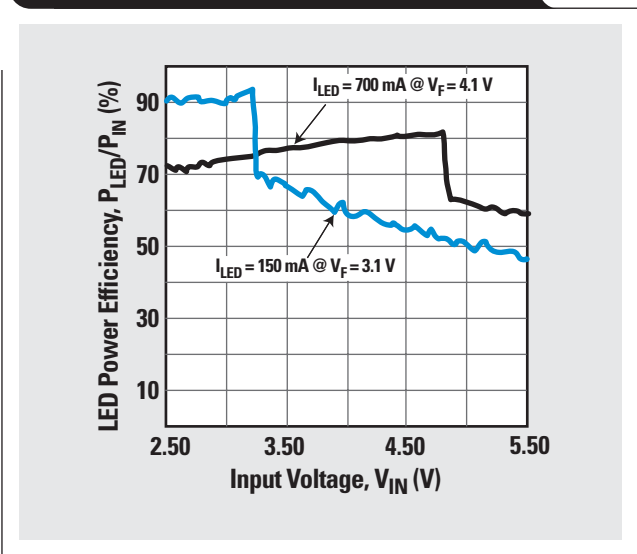
## Related Web sites

[power.ti.com](http://power.ti.com)

[www.ti.com/sc/device/TPS61058](http://www.ti.com/sc/device/TPS61058)

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**Figure 2. TPS61059 LED power efficiency versus input voltage**



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