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BRIEF

IC Powers White Light LED as Camera Flash

By Scot Lester • Portable Power DC-DC Applications

Introduction

Smart phone, cell phone and PDA manufacturers are incorporating digital camera technology into their products so that the user can use these devices as a camera as well as their intended use. Each of these devices uses a mega-pixel CCD camera, which generally performs poorly in low-light conditions such as indoors, cloudy days, or in the morning or evening. Manufacturers are starting to turn to new high-power, white-light LEDs to provide a photographic flash function for low light conditions. The white-light LED is compact, provides a wide light spectrum output, and is easy to control. White-light LEDs operate at much lower voltages than a Xenon gas discharge tube, which requires hundreds of volts to flash. Additionally, white light LEDs can be turned 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 volts. This forward voltage range 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.

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Texas Instruments' TPS61058 and TPS61059 are synchronous boost converters for driving high-current LEDs for movie and flash light applications. The TPS61058 can provide up to 500mA and the TPS61059 up to 800mA 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, which allows it to drive a

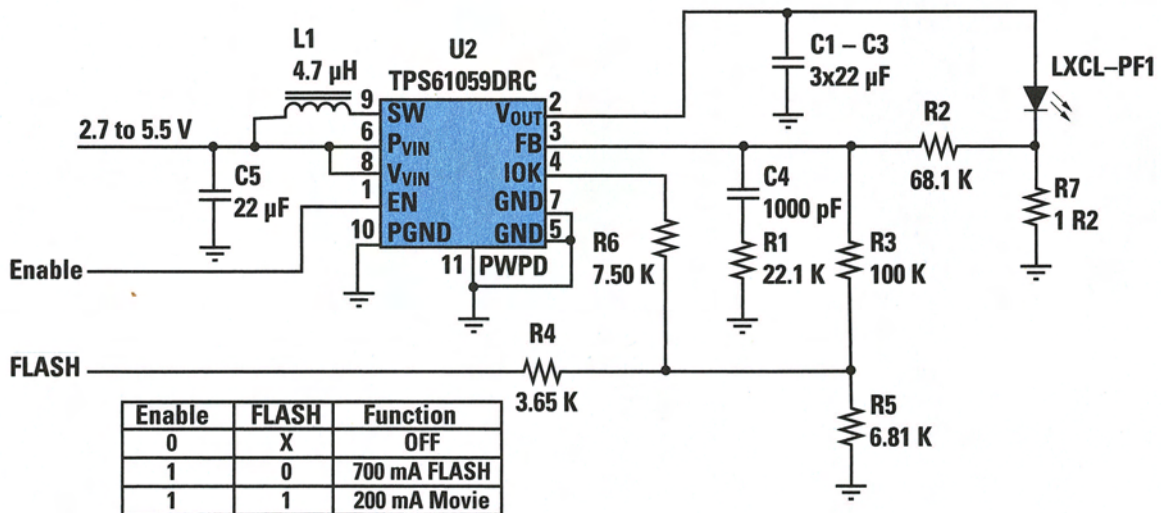
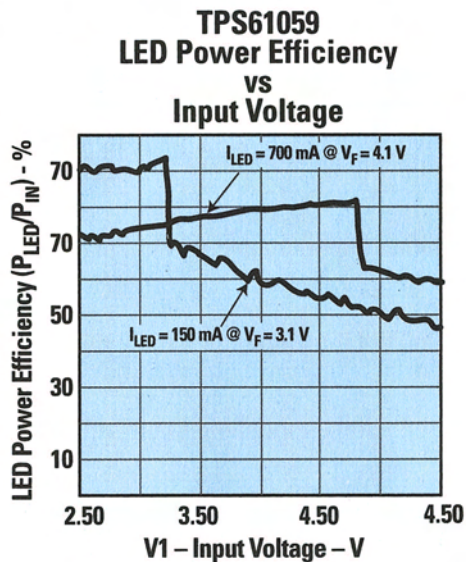


Figure 1 – TPS61059 based 200mA movie light with 700mA flash

wide range of LEDs from a wide range of input voltages. Figure 1 shows the TPS61059 configured to provide 700mA of LED current for LED flash functions or a constant 200mA of LED current for a movie light function from an input battery voltage between 2.7 to 5.5 volts. Two digital inputs are used to select the mode of operation and the current level for the LED between off, movie light and photo flash. The flash, 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.

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

Additional features are integrated circuit protections such as soft start, thermal shut-down, open LED and shorted LED protections 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 square millimeters.

Reference:

1. TPS61058 Datasheet (SLVS572B)