Keywords: microcontroller, uC, level translator, ldo, low dropout regulator, green led, spi, i2c, 1wire, 1-wire

APPLICATION NOTE 5092

Green LED Replaces LDO Regulator

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Aug 01, 2011

Abstract: In systems in which a microcontroller must communicate with peripheral devices that operate at different supply voltages, a level translator may be necessary. This design idea explains how for low-power loads, a single green LED can replace a 1.8V LDO regulator in a level-translator circuit.

A similar version of this article appeared in the September 8, 2010 issue of *EE Times* magazine.

For systems in which a microcontroller must communicate with peripheral devices operating at different supply voltages, you may need to add a level translator (such as the MAX1840). This device requires two supply voltages (V_{CC} and DV_{CC}) to process the serial digital signals flowing between the peripheral and microcontroller. A typical requirement is to translate the logic-high level of an I²C, SPI™, or 1-Wire® channel from 3.5V to 1.8V.

Such systems often provide a low-dropout (LDO) regulator for each supply voltage, and each LDO also requires two bypass capacitors, one connected to the supply pin and one to the output pin. For portable devices constrained by low cost and limited space, however, we can eliminate the 1.8V LDO and its bypass capacitors by simply substituting a surface-mount green LED (case size 0603) across the level translator's DV_{CC} and V_{CC} pins (**Figure 1**).

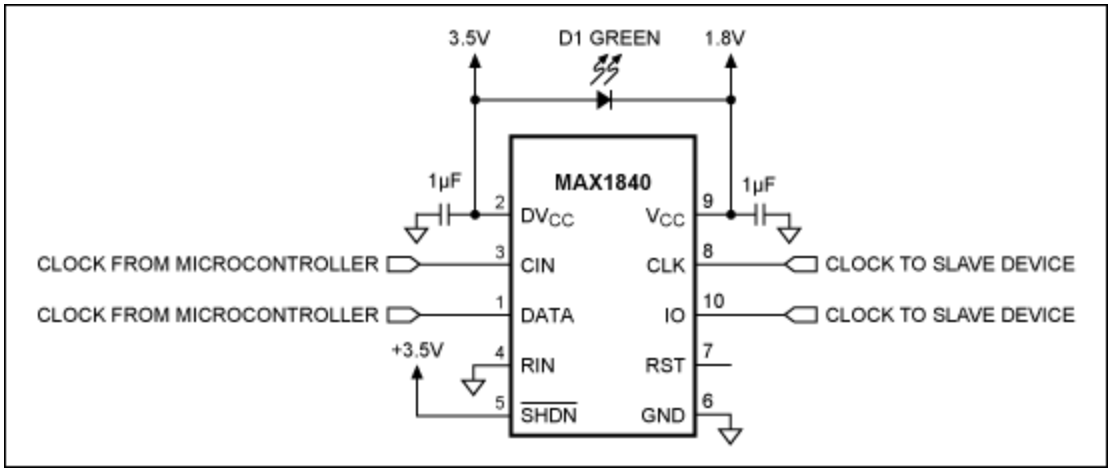

Figure 1. For low-power loads, a single green LED (D1) replaces a 1.8V LDO regulator in this level-translator circuit.

The V_{CC} pin in this configuration assumes a voltage of ~1.9V, which allows the translator to provide a 1.8V logic-high level to the slave devices. To ensure a stable V_{CC}, the slave devices should operate on low power and draw reasonably constant supply currents.

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Related Parts		
MAX1840	Low-Voltage SIM/Smart-Card Level Translators in µMAX	Free Samples

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APPLICATION NOTE 5092, AN5092, AN 5092, APP5092, Appnote5092, Appnote 5092, DI857