Green LED Replaces LDO Regulator

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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.

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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 (VCC and DVCC) 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 DVCC and VCC pins (Figure 1).

![Diagram of MAX1840 level translator with a green LED replacing a 1.8V LDO regulator.]

Figure 1. For low-power loads, a single green LED (D1) replaces a 1.8V LDO regulator in this level-translator circuit.
The V\textsubscript{CC} pin in this configuration assumes a voltage of \(~1.9\text{V}\), which allows the translator to provide a 1.8V logic-high level to the slave devices. To ensure a stable V\textsubscript{CC}, the slave devices should operate on low power and draw reasonably constant supply currents.

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### Related Parts

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