Keywords: linear regulator, output current, load regulation

Jul 19, 2006

APPLICATION NOTE 3865

Single Resistor Provides Extra Current from a Linear Regulator

Abstract: A small resistor between the input and output of a linear regulator can boost the available output current.

Adding a 33Ω resistor between the input and output of a linear regulator, as shown in **Figure 1**, boosts the regulator's output current to 200mA. Note: this technique requires that the application draws a known minimum output current.

IC1 by itself provides a maximum output current of 150mA, but for applications that require a slightly higher maximum while maintaining a finite minimum, the small resistor offers a simple and stable solution. For the Figure 1 circuit, adding the 33Ω resistor boosts the maximum by 50mA while imposing a minimum output current (I_{MIN}) of 50mA:

$$I_{MIN} = I_{BOOST} = \frac{V_{IN} - V_{OUT}}{R}$$

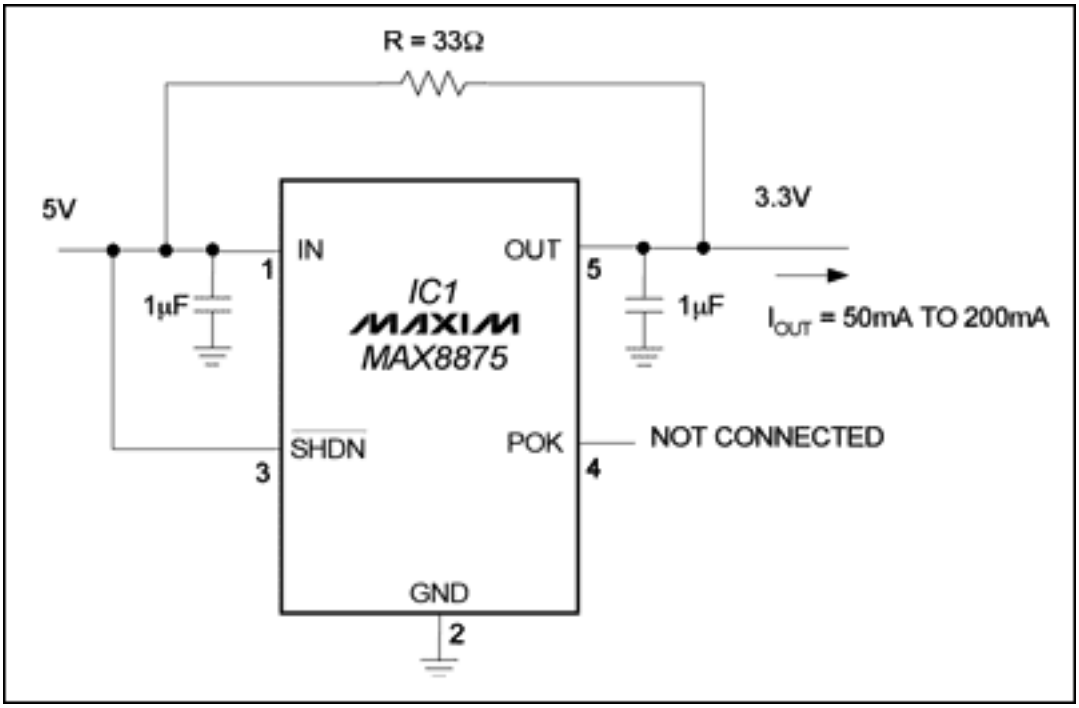

Figure 1. Adding a 33Ω resistor boosts the output current of this linear regulator from 150mA to 200mA (the application must draw a known minimum output current).

Like most linear regulators, IC1 is unable to maintain regulation by sinking current. If the output current (I_{OUT}) drops below I_{MIN}, the output voltage rises above the regulated level, as high as V_{IN}, according to Kirchoff's Law:

$$V_{OUT} = V_{IN} - I_{OUT}R$$

Figure 2 compares load regulation for the Figure 1 circuit with and without the extra resistor. The dotted line

represents output voltage (with the resistor in place) when I_{OUT} drops below I_{MIN}.

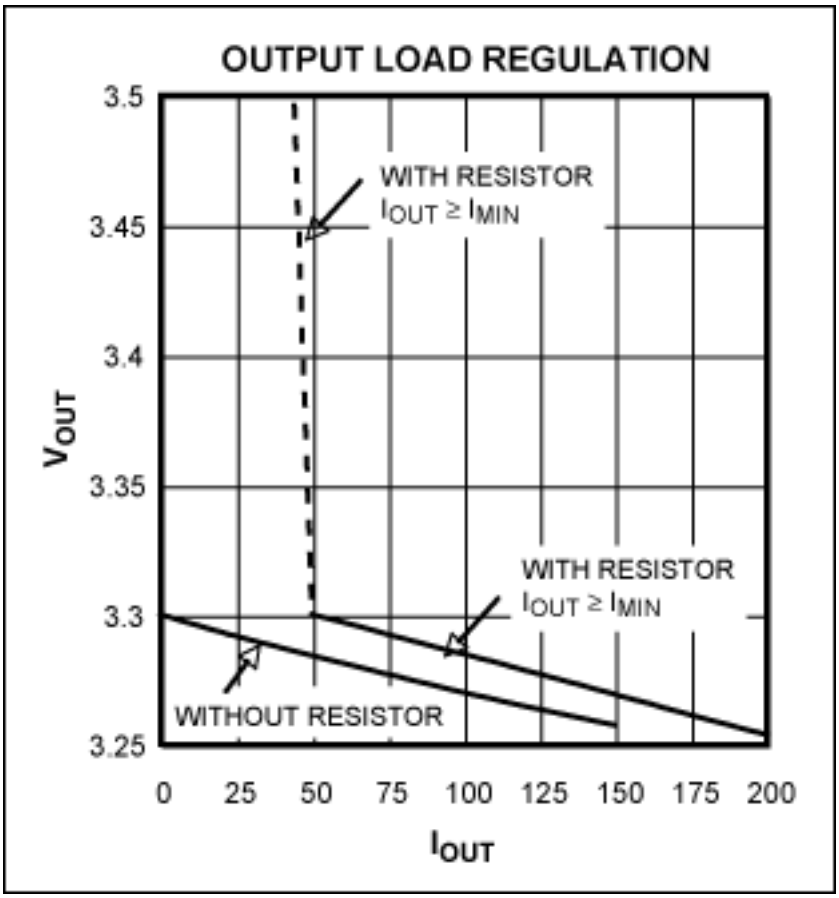

Figure 2. Output-load regulation for the Figure 1 circuit shows that the application must draw a minimum output current (50mA, in this case).

This design idea appeared in the October 2005 issue of *Electronic Techniques* (China).

Application Note 3865: www.maxim-ic.com/an3865

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