

Introduction

By utilizing the function generators 50 Ohm source and its ability to sink and source currents at high speeds, high speed load transients can be observed on low power voltage regulators. By adjusting the function generators offset, peak to peak voltage and frequency, a fairly wide range of transients can be observed. The current steps can be calculated by subtracting the output voltage of the regulator by the internally set function generator voltage and dividing that by the function generators 50 Ohm source impedance. The fact that the most function generators assume an external 50 Ohm impedance for the set output voltage causes us to do a little more math. For example, if the generator is set to -1V offset and 2Vpp and the output is not 50 Ohm terminated, the generator will output a -2V offset with 4Vpp or a high of 0V and a low of -4V. Since we are not terminating the generator with 50 Ohms in our configuration, these are the numbers we need to use. So, to calculate our required function generator offset and peak to peak settings can be accomplished as follows;

$$V_{\text{genHI}} = -(50\Omega \times I_{\text{OUTMin}}) + V_{\text{OUT}}$$

$$V_{\text{genLO}} = -(50\Omega \times I_{\text{OUTMax}}) + V_{\text{OUT}}$$

$$V_{\text{PP}} = \frac{(V_{\text{genHI}} - V_{\text{genLO}})}{2}$$

$$V_{\text{OFFSET}} = \frac{\left[\frac{(V_{\text{genHI}} - V_{\text{genLO}})}{2} + V_{\text{genLO}} \right]}{2}$$

The voltage waveforms below also illustrate the current and voltage waveforms involved in using the function generator as a high speed load. I recommend placing a current probe in line with the function generator (ensure this is done on a non-shielded portion of the cable) to observe the actual current step. Here, the function generator can be finely tuned to adjust for unaccounted losses that would cause deviations from the desired/calculated current.

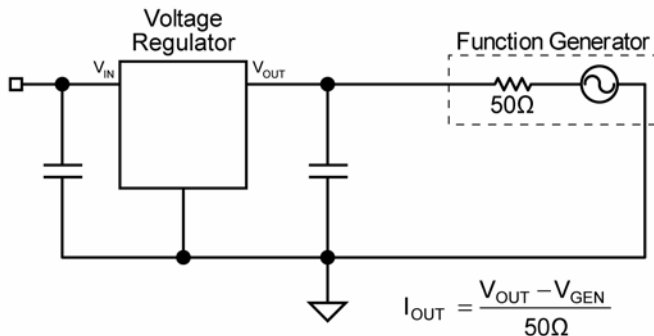


Figure 1

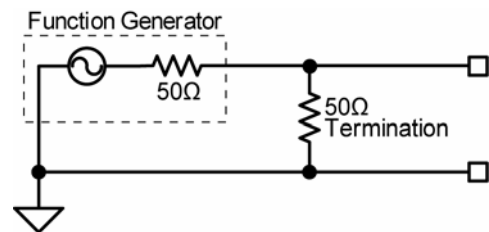


Figure 2

MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USATEL +1 (408) 944-0800 FAX +1 (408) 474-1000 WEB <http://www.micrel.com>

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