Application Hint 49

Implementing Soft-Start on the MIC2199 Controller

Introduction

The MIC2199 is a synchronous buck switching regulator controller. An all N-Channel synchronous architecture and powerful output drivers allow up to a 20A output current capability. The MIC2199 operates from a 4.5V to a 32V input and can be programmed for output voltage from 0.8V to 6V. The 300kHz switching frequency allows the use of smaller inductor and the external COMP pin allows different output capacitor to be used for optimum transient response. To keep the pin count to a bare minimum, the MIC2199 does not offer an external soft-start pin that allow to reduce inrush current by delaying and slowing the output voltage rise time by connecting a capacitor on this pin.

Figure 1 shows the output voltage waveform for a standard MIC2199 circuit that takes about 120µs and exhibits an output voltage overshoot for V_{IN} = 12V, V_{OUT} = 3.3V, I_{LOAD} = 0A.

Figure 2 shows a simple and inexpensive way of implementing external soft-start on the MIC2199 by using a capacitor, C1 and a diode, 1N4148 between V_{OUT} and FB pins.

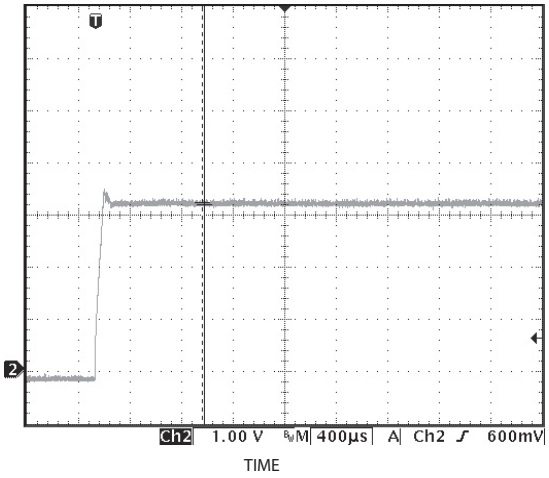

Figure 1. Output Voltage Rise Time on a Standard MIC2199 Evaluation Board for V_{IN} = 12V, V_{OUT} = 3.3V, I_{LOAD} = 0A

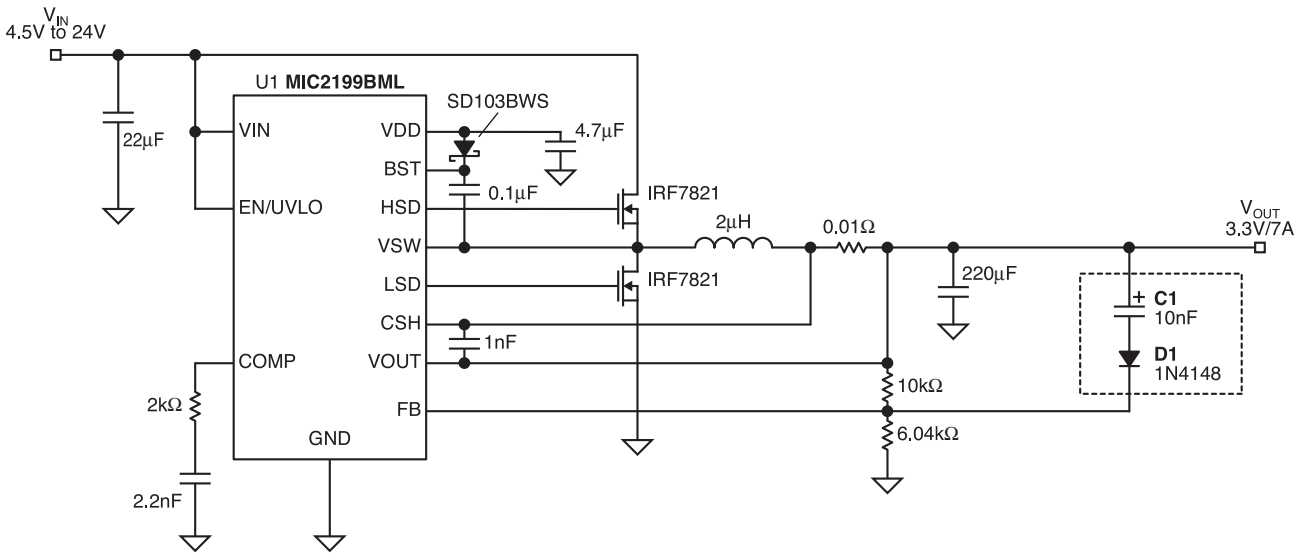

Figure 2. MIC2199 Schematic with External Soft-Start Circuit Implemented

Figure 3 shows the output voltage rise-time for the circuit in Figure 2 under the same test conditions as Figure 1. The external soft-start circuit has slowed down the 3.3V rise time from 120µs to about 400µs without any overshoot.

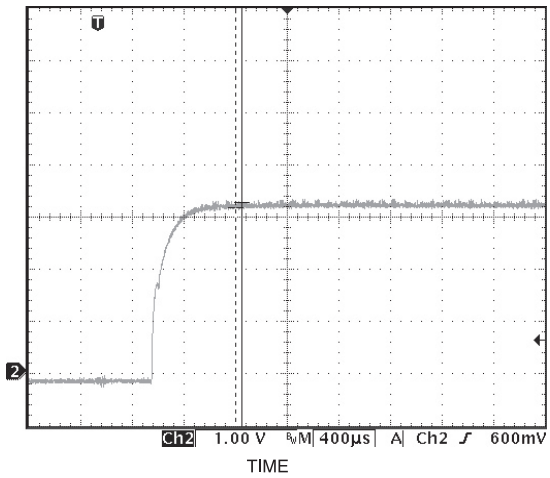

Figure 3. Output Voltage Rise Time of Figure 2 for V_{IN} = 12V, V_{OUT} = 3.3V, I_{LOAD} = 0A

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