

### Overview

IEEE 1394 devices are emerging into the consumer market place at an accelerating rate. This application note describes a power supply circuit that is compliant to IEEE 1394 power distribution requirements\* and is well suited for any IEEE 1394 peripheral that can be powered from the cable such as a video camera, still camera or mass storage device. This circuit satisfies IEEE 1394 requirements with very few components to minimize space and cost. The table below is summary of IEEE 1394 requirements for cable-powered devices and the actual performance of the power supply design.

### IEEE 1394 Power Supply Circuit

The circuit shown in Figure 1 employs the MIC4680 which is a tiny 1.3A switcher in an SO-8 package. The MIC4680 supports an input voltage range of 6V to 34V which meets the IEEE 1394a requirement of 8V to 30V. In this circuit the output

provides >1.0A at 3.3V to power IEEE 1394 PHY and controller devices. A shutdown pin is provided to allow a controller to shut off power. In addition, a soft-start circuit is used to satisfy the inrush current requirements. R3 and C3 can be scaled to change the inrush current profile.

Figure 2 depicts the inrush energy, in Joules. Computation of the amount of energy is:

$$W = P \times t$$

$$W \cong \frac{V_{PEAK}}{2} \times I_{PEAK} \times t$$

where:

$$V_{PEAK} = 35V$$

$$I_{PEAK} = 20A$$

$$t = 12.5\mu s$$

therefore:

$$W = 4.38mJ.$$

	IEEE 1394a Requirements for Cable-Powered Devices*	Micrel Power Supply Specifications
Input Voltage	8V to 30V	6V to 34V
Maximum Input Current	1.5A	Design Parameter
Peak-to-Peak Input Ripple	667mA, 1A Load	40mAp-p
Inrush Energy	18mJ in 3ms	4.38mJ
Slew Rate	1A/100μs, 1A Load	5mA/100μs

Table 1. Summary of IEEE 1394 Requirements for Cable-Powered Devices

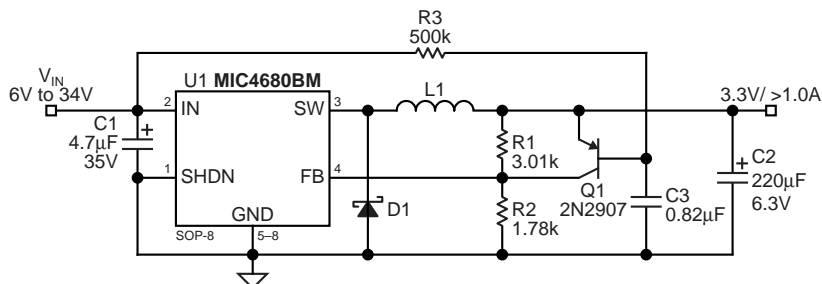
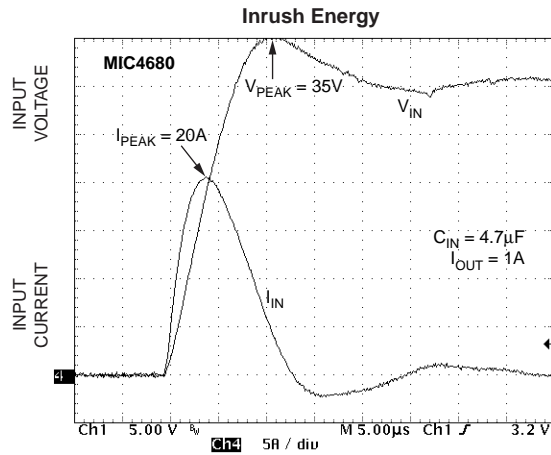


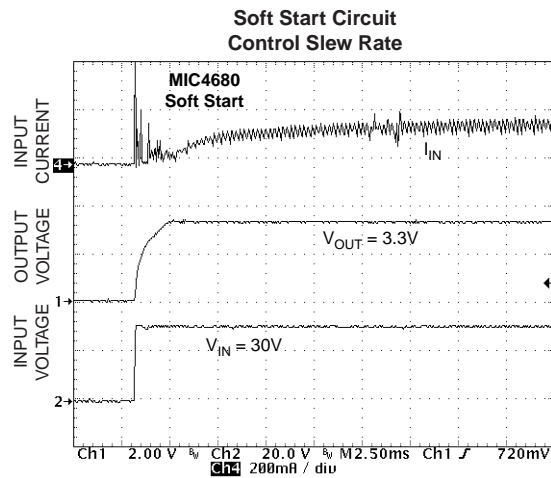
Figure 1. IEEE 1394 Device Power Supply

\* The requirements described in this application note conform to IEEE 1394a which is not yet approved as of this writing. The maximum voltage of this circuit is 34V which is below the 40V maximum of the current IEEE 1394-1995 specification.

# Waveforms



**Figure 2. Inrush Energy Waveform**



**Figure 3. Soft-Start Circuit Controls Slew Rate**

Figure 3 depicts the waveforms during turn-on of the power supply. As shown, the soft-start circuit controls the slew rate. 40mA<sub>p-p</sub> of input current is well below IEEE 1394 specifications.

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