LCD Monitor Controller/Inverter
Application Overview

Large flat panel displays designed to replace CRTs make for extremely space and power efficient displays, attractive to both consumers and businesses. At the same time, the cost of large flat panel displays is high, resulting in high customer expectations for reliability and repair. The cost of large displays is driven by the expense of the liquid crystal displays (LCD) panel, making this a key component to protect from overcurrent damage.

Current generation portable computers use backlit LCDs to take full advantage of power and size efficiency.

Cold-cathode fluorescent lamps (CCFLs) provide the highest available efficiency for backlighting the display. The lamp requires high voltage AC to operate, mandating an efficient, high voltage DC/AC converter. The LCD also requires a bias supply for contrast control. The supply's output must regulate and provide adjustment over a wide range. A wide array of monochrome and color displays are available. These displays vary in size, lamp drive current, contrast voltage polarity, operating voltage range, and power consumption. The small size and battery-powered operation often associated with LCD-equipped apparatus dictate low component count and high efficiency. Size constraints place limitations on circuit architecture and often long battery life is a priority. For laptops, all components, including PC board and hardware, must fit within the LCD enclosure with a height restriction less than 10mm.

Problem/Solution

Power for LCDs is derived from 5V and 12V buses. The LCD controller itself and the surrounding controller logic are powered from the 5V bus. The LCD inverter and other electronics on the board are powered from the 12V bus. Misconnections and mishandling either during assembly or during use of a wake-up port can cause large overloads and short-circuits to the system. In addition, component failures on the board can destroy the entire board. Isolating critical circuits with separate PolySwitch devices (as shown in Figure 1) helps prevent expensive components from being damaged during this type of fault.

Device Selection

The microSMD and miniSMD series are typically used for surface-mount applications, whereas the RXE and RUE devices are typically for thru-hole applications.

Figure 1. Typical Schematic