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ON Semiconductor Says...

First Integrated Bi-Directional OVP for Portable Electronics and OCP for Accessories

Eliminating the need for external components, the NCP370 protects portable devices against surge damage and also protects portable accessories by controlling reverse current

ON Semiconductor a leading global supplier of high performance, energy efficient silicon solutions, introduced the industry's first integrated bi-directional device, with positive and negative (+/-) overvoltage protection (OVP) for cell phones, MP3/4, PDAs and GPS systems, and overcurrent protection (OCP) for portable accessories such as FM transceiver, load speakers and flash modules.

This fully integrated solution simplifies and streamlines design in portable electronics by eliminating the need for external components that have – until now – been necessary to protect vulnerable portable devices against electrical surge damage from wall adapters and accessories, unsuitable after-market AC-DC adapters, and problems caused by inverting polarity in some USB cables.

EN-Genius Says...

There are two modes of operation for this overvoltage protection part. The first, called the direct mode by ON, will be the more common when the input is being powered from an ac-dc wall adapter. These wall warts are best designed (for price) by operating at as high an ac input voltage as possible with the simplest possible rectification and smoothing. Apart from being quite inefficient, when they go wrong they can throw higher voltages to their outputs. The ± 28 V input protection provided by the NCP370 is therefore a simple, sure, way of protecting the system.

This protection is combined with both undervoltage and overvoltage lockout systems. The lowvoltage lockout threshold is set at a nominal 2.7 V while the overvoltage is at 6.6 V (other values will be available). The output voltage, at power-up, is available as a soft-start 30 ms after the input voltage exceeds the undervoltage lockout threshold.

The second mode of operation – reverse mode in ON parlance – is a truly novel one for when an external appliance is allowed to be powered by the system's battery. In this mode the NCP370 provides overcurrent protection to the system battery that might be caused by a problem in the appliance. Reverse start-up delay is a nominal 1.2 ms and the overcurrent threshold is set at a nominal 1.75 A, but this can be reduced by an external pull-down resistor.

Thermal shutdown protection is also on-chip. All the logic control is provided from the output of a charge pump fed by the internal voltage reference.

The switching MOSFETs on-chip are both n-channel with a total $R_{ds(on)}$ at 5 V of about 130 m Ω , both forward and reverse. Input quiescent is about 200 μ A (with no load) which drops to 90 μ A in disable mode. Reverse mode current is also about 200 μ A.

Powering portable systems has become quite complex, with choices of direct battery power, or power from another system – either a wall wort or a USB supply. Throw in the presence of a battery charger within the overall system and safety issues expand another scale. The NCP370 architecture has been well thought out and yet is a simple solution to implement. I cannot immediately think of any application that I have seen where the reverse mode architecture might have been used: but the provision of that architecture might allow the development of such applications, such as powering external memory. The part will sell in extremely high volume, across the complete battery-powered product spectrum, and ON should have a nine month window in which to make a real killing.

The NCP370 is in production in Pb-free LLGA-12 and is priced at \$0.80 in 3-k piece lots.

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