

Protecting Battery Chargers



The Design Challenge:

The standard mobile phone charger consists of a transformer with some type of electronic circuitry on the output side smoothing out the signal. All low voltage transformers manufactured are required to be in accordance with EN60742 and UL 1950 manufacturing standards.

Standard EN60742 specifies safety-isolating transformers should not overheat by more than 125°C when their secondary windings are short-circuited. The occurrence of a short circuit in the output circuit will result in an increase in the circuit current. The excessive current will gradually heat up and the windings of the secondary circuit, resulting in the charger not conforming to manufacturing standards.

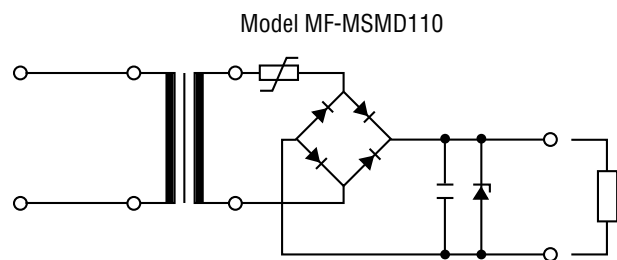


Figure 1

The Solution:

The inclusion of a Bourns Multifuse® Polymer Positive Temperature Coefficient (PPTC) in the secondary circuitry is the ideal solution. A four-decade increase in resistance is typical, and in the case of a short circuit in the secondary circuit, the Multifuse® PPTC will trip to a higher resistance. The increased resistance will ensure that the short circuit is limited to such a level that the windings will not heat up.

The circuit shown in Figure 1 has a MF-MSMD110 device integrated into the circuit, which will trip at 800 mA at 60°C, keeping a higher current from passing. Currents below 500 mA charge the majority of rechargeable battery packs so that if a charger starts to see currents in the range of 800mA, there is a problem and the current needs to be restricted.

A range of similar Multifuse® devices are available that can be matched to different charging currents.

The Benefits of PPTC Technology Include:

- **Faster time to trip.**

A PPTC has a lower thermal mass than other solutions and heats up more rapidly. As a result, it trips into the high-resistance state quicker.

- **Smaller size.**

PPTC products use up a smaller area on your board and are easier to design into the package.

- **Low initial resistance.**

With their lower resistance, PPTCs make the transformer more efficient.

- **No cycling.**

PPTC devices stay in a tripped state under a fault condition.