Micro Control Systems

APPLICATION NOTE
APP-036

Understanding PPTC Devices And Their Use In Protecting MCS Products

Revision History

Date	Author	Description
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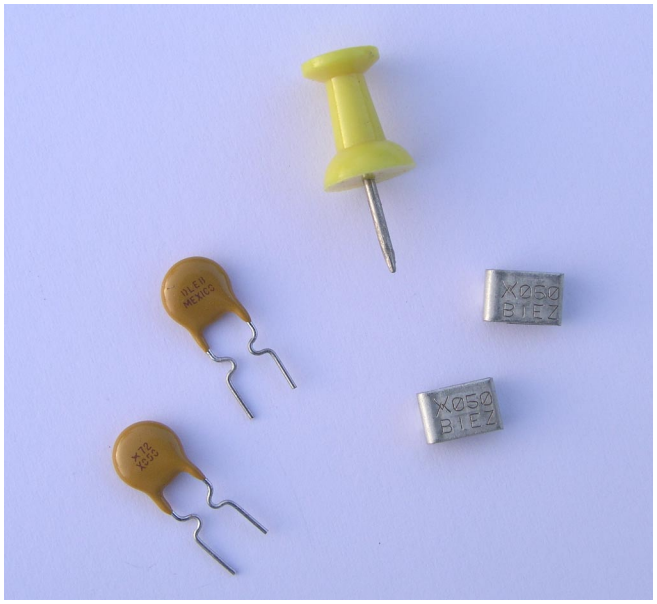
Introduction

Protecting an electronic circuit from damage due to excessive current is the primary function of many circuit protection technologies. In the past, this protection took the form of fuses or circuit breakers, but in many of today's applications resettable devices such as *polymeric positive temperature coefficient* (PPTC) devices are the preferred solution.



These devices, commonly referred to as polyswitches, polyfuses or resettable fuses do not require replacement after a fault event, and allow the circuit to return to the normal operation condition after the overcurrent condition has been eliminated. This gives them a distinct advantage over regular fuses which, once blown, must be replaced.

Although PPTC devices act as fuses, they are not technically fuses but rather non-linear thermistors that limit current. They protect a circuit by going from a low-resistance to a high-resistance state in response to an overcurrent. This is called "tripping" the device. Generally the device has a resistance that is much less than the remainder of the circuit and has little or no influence on the normal performance of the circuit. But in response to an overcurrent condition, the device increases in resistance (trips), reducing the current in the circuit. In doing so the device gives off heat and thus when hot is a clear indication of an overcurrent condition.

Protecting MCS Products

PPTC devices are used in a variety of MCS products including MCS-8, MCS-I/O and MCS-6 micro controller boards, MCS-RO8, MCS-SI8 and MCS-SI16 expansion boards. In sensor input circuits these devices are used to protect the +5vdc line going out to external sensors. At times sensors or their wiring can short to ground, creating an overcurrent condition that cause the PPTC device in that circuit to effectively open, thus preventing damage to the board. When the short is removed, the device allows the +5vdc line to return to normal automatically.

The same is true of the +12vdc line from an MCS board used to power external devices requiring +12vdc. If that line becomes shorted to ground, the PPTC device in that circuit will effectively open, again preventing damage to the board. Once the short is removed, the +12vdc line will automatically return to normal.

In addition to preventing damage from overcurrent due to shorts external to the board, these devices also protect various power supplies located on the board itself from damage due to a defect on the board. This prevents further damage to the board until the board can be repaired.

For detailed information on troubleshooting field problems related to overcurrent conditions it is recommended that you visit our website at www.mcscontrols.com and download the *MCS-8 Micro Controller Systems Simplified Description and Troubleshooting Manual* to help you in determining the source of overcurrent conditions.