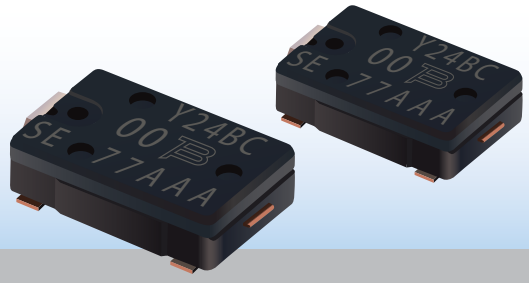
BOURNS®

Bourns® Model SE Series Mini-breaker Thermal Cutoff Devices



NEW PRODUCT BRIEF

INTRODUCTION

With the release of the new Bourns® Model SE Series, engineers get access to the next evolution in high voltage, compact mini-breaker overtemperature protection:

- Industry's smallest footprint 54 V SMD mini-breaker
- Features the same footprint as the compact Model SC Series
- Highest voltage-rated mini-breaker device at 54 V max.
- Designed to protect overheating and complies with the 240 W USB Power Delivery standard
- Offers precision temperature protection with four temperature protection values between 72 ˚C and 85 ˚C.

This new versatile overtemperature protection series further expands Bourns' advanced mini-breaker technology to a wider range of applications that include mobile phones, tablets, headphones and other personal electronics that are equipped with a USB-C connector.

PRODUCT FIT

Up to now, existing mini-breakers for thermal protection of USB connectors had a maximum working voltage of 28 V.

With the upgraded USB Power Delivery standard set at 240 W, a maximum thermal protection working voltage of 48 V is now required. In addition, USB Type-C connectors are becoming increasingly important due to the trend toward common mobile charging connectors in the EU and in other countries and regions around the globe.

The Bourns® Model SE Series helps to address these new mandates, providing an ample maximum voltage rating of 54 V. Furthermore, the series features a very low resistance of just 5 mΩ max., for a negligible impact on normal charging conditions. Importantly, its thermal sensitivity ensures that the device quickly reacts to an abnormal temperature event to limit the current to preset limits.

FEATURES

- Surface mount, industry's smallest mini-breaker footprint
- DC 54 V max. (Compatible with USB PD 240 W specification)
- Fast reacting overtemperature and overcurrent protection
- Controls abnormal, excessive current virtually instantaneously, up to rated limits

BENEFITS

- Targeted overtemperature protection within the temperature range of 72 ˚C to 85 ˚C
- Accurate overtemperature protection to within ±5 ˚C
- Can be embedded within USB cables for direct, independent overtemperature protection
- Resettable protection means the circuit is not disabled by nuisance events
- SMD format so it can be mounted directly on the flexible film heater or onto a PCB, enabling it to also protect such devices as the FET
- Small package size means the device can be used in locations where traditional large bimetal-based protectors proved too bulky

APPLICATIONS

The Bourns® Model SE Series is designed primarily for the following applications:

Overtemperature protection

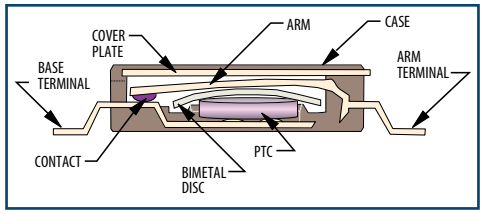
- USB Type C cables (e.g., smartphone cables, notebook AC adapters)
- Electronic cigarettes
- Heaters (consumer, industrial, low to medium risk medical*)

Battery cell protection

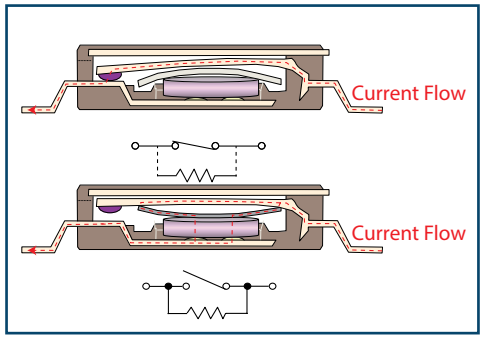
- Notebook PCs
- Tablet PCs
- Smartphones

HOW THE MINI-BREAKER WORKS

Mini-breaker devices combine two common circuit protection technologies - a PTC device and a bimetal switch. The figure below provides a simple schematic of the construction of a mini-breaker. The two terminals (arm terminal and base terminal) are connected in a normally closed position to allow current to flow through the device. The contact point between both terminals serves a critical function in supporting high precision contact resistance, which can be as low as 5 mΩ max.



Under normal conditions, current flows through the arm terminal, down through the very low resistance contact point and out through the base terminal.



The mini-breaker device can be triggered by either an increase in the environmental temperature or by excessive current flows. Once the trip temperature has been reached, the bimetal disc flexes, and this motion causes the arm to open. When the bimetal disc causes the arm to open, current flows through the bimetal disc and into the PTC device. This current causes the PTC device to act like a current-limiting heater, which provides sufficient heat to keep the bimetal disc flexed and the arm open. The combination of the bimetal disc and the PTC device prevents oscillating opening and closing of the mini-breaker arm. Instead, this design allows the arm to remain open until a lower and safer temperature level is reached and power is cycled.

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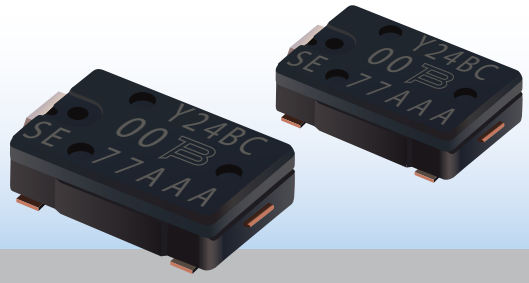


NEW PRODUCT BRIEF

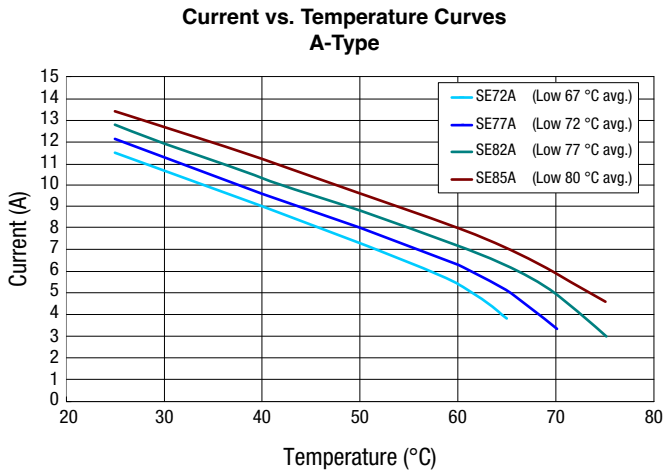
ELECTRICAL CHARACTERISTICS

Specification	A-Type			
	SE72AAA	SE77AAA	SE82AAA	SE85AAA
Trip Temperature	72 °C ± 5 °C	77 °C ± 5 °C	82 °C ± 5 °C	85 °C ± 5 °C
Reset Temperature	40 °C min.			
Contact Rating	DC9 V / 25 A, 6000 cycles			
Maximum Voltage	DC54 V / 5 A, 100 cycles			
Minimum Holding Voltage	3 V @ 25 °C for 1 minute		5 V @ 25 °C for 1 minute	
Maximum Leakage Current	200 mA max. @ 25 °C			
Resistance	5 milliohms max.			

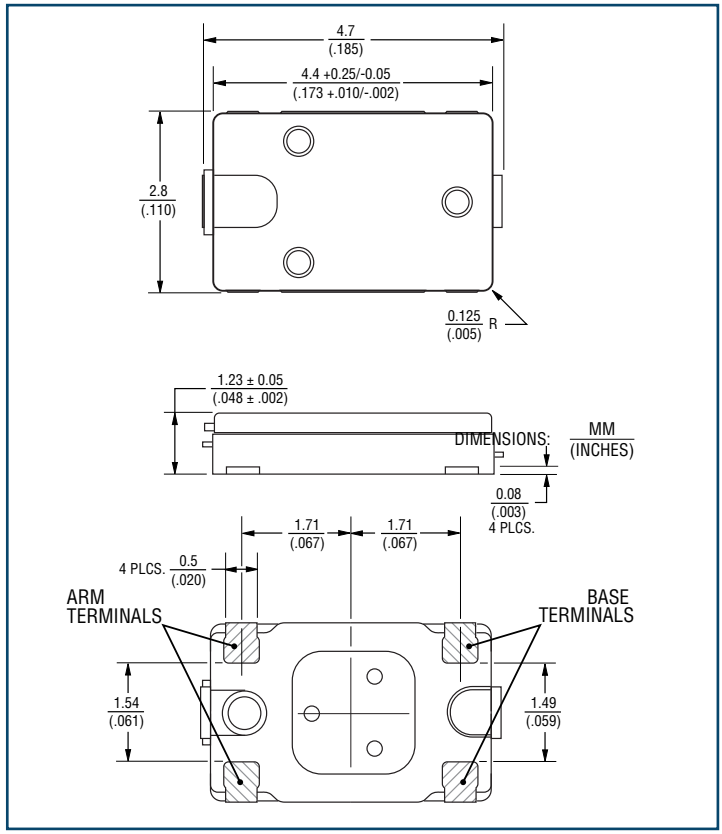
Mini-breaker TCOs reset when the following conditions are met:
- The ambient temperature has dropped by 10 °C below the minimum trip temperature; and
- Power to the TCO has been cycled (off/on)

For full characteristics, see data sheet

TYPICAL PERFORMANCE



PRODUCT DIMENSIONS



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