

NEW PRODUCT BRIEF



Bourns® Polymeric Thermal Cutoff (P-TCO) Devices

Thermal Protection for Charging Cables

INTRODUCTION

The new family of [Bourns® Polymeric Thermal Cutoff \(P-TCO\)](#) devices are designed to protect USB Type-C connectors and other charging cables from destructive and potentially dangerous thermal runaway events. Available in EIA 1210 and 1206 size SMD footprints ([P-TCO-U](#) and [P-TCO-N](#) series, respectively), the P-TCO product family provides effective over-temperature protection from heat generated in charging cable connectors due to unintended faults within the connector circuitry.

PRODUCT FIT

As connectors get smaller, their pin-to-pin spacing also shrinks. The USB-C connector features 24 pins in a smaller form factor than previous USB designs, yet it is capable of delivering up to 100 W of power. There are clear benefits to these enhanced features and capabilities, but a notable downside of this combination of increased power and extremely tight pin spacing is a heightened concern about safety hazards due to a greater possibility of thermal runaway events triggered by foreign debris entering the connector and causing a short. These faults can generate a tremendous amount of heat that can harm not only the charging cable and connector, but also the devices they charge or even the people using them. The new P-TCO model family from Bourns offers an ideal combination of compact, and ultra-low resistance thermal protection to guard against such thermal runaway events. Each P-TCO series has a 12 V maximum operating voltage rating, a 50 A maximum operating current rating, and comes in three different models designed to provide protection for unique temperature-current combinations.

APPLICATIONS

With the new Bourns® P-TCO-U & P-TCO-N model families, Bourns continues to expand its world class circuit protection product offering to address an increasing number of high-power charging cable applications where effective over-temperature protection and resettable functionality are essential. Typical applications include, but are not limited to:

- USB Type-C cable configurations:
 - USB-C to C cables
 - USB-C to B cables
 - USB-C to A cables
- USB 3.2, 3.1, 3.0 and 2.0 protocols
- Other charging cables



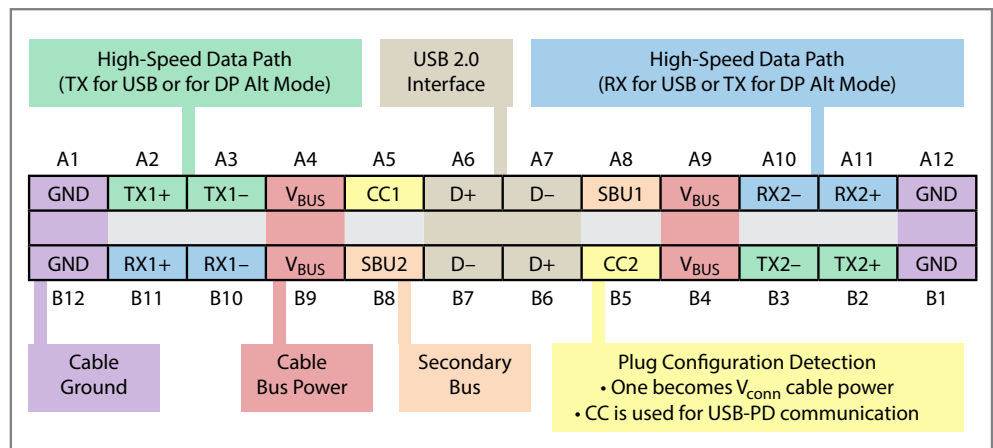
FEATURES

- Resettable thermal sensor for over-temperature & overcurrent protection
- Thermal cutoff temperatures from 75 °C to 100 °C
- Ultra-low resistance
- Up to 4.5 A I_{hold} current rating
- Up to 12 VDC/ 50 A maximum rating
- EIA 1210 & 1206 surface mount footprints
- Tape & reel packaging for automated assembly
- UL & TÜV agency listed
- RoHS compliant*, halogen free**

BENEFITS

- High current, high voltage, and high breaking capacity performance in a compact space-saving design
- High power density compared to other models in similar or larger sizes
- Supported by Bourns' world-class technical support and global supply chain
- For more information, please see the USB-C Application Note

USB TYPE-C PIN CONFIGURATION



*RoHS Directive 2015/863, Mar 31, 2015 and Annex.

** Bourns considers a product to be "halogen free" if (a) the Bromine (Br) content is 900 ppm or less; (b) the Chlorine (Cl) content is 900 ppm or less; and (c) the total Bromine (Br) and Chlorine (Cl) content is 1500 ppm or less.

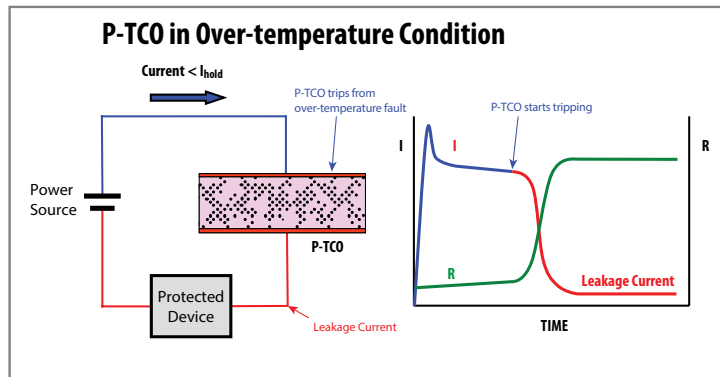
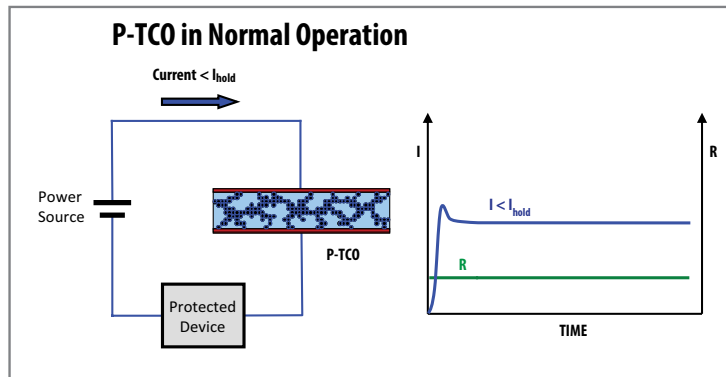


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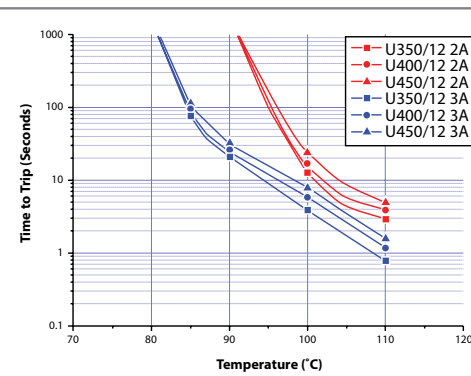
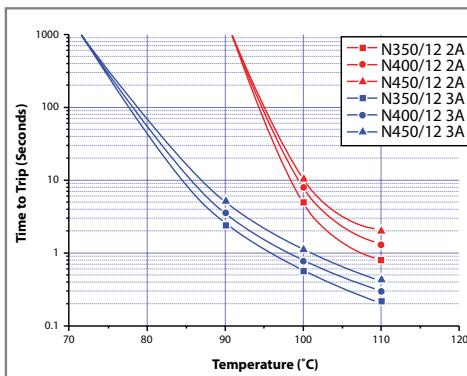
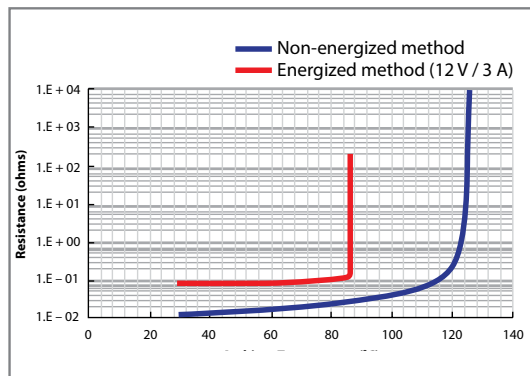
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HOW P-TCO DEVICES WORK

Bourns® P-TCO devices are specifically calibrated to trip and go into a highly resistive state when the application's ambient temperature exceeds the desired upper limit.



P-TCO RESISTANCE TEMPERATURE CURVE & TIME-TEMPERATURE-TRANSFORMATION



PRODUCT CHARACTERISTICS

Part Number	Photo	Marking	I_{hold} (A)	V_{max} (V_{dc})	I_{max} (A)	Resistance		Max. Time to Trip		Polymeric Thermal Cutoff @ 3 A	
						R1 _{min.} (Ω)	R1 _{max.} (Ω)	Current (A)	Time (Sec.)	at 3 A (°C)	at 2 A (°C)
P-TCO-N350/12		S12	3.50	12	50	0.002	0.022	8.00	5.00	75 ± 20	90 ± 15
P-TCO-N400/12		U12	4.00	12	50	0.002	0.018	10.00	5.00	80 ± 15	95 ± 15
P-TCO-N450/12		X12	4.50	12	50	0.002	0.014	22.50	2.00	85 ± 15	100 ± 10
P-TCO-U350/12		S12	3.50	12	50	0.002	0.022	17.00	5.00	75 ± 20	90 ± 20
P-TCO-U400/12		U12	4.00	12	50	0.002	0.018	20.00	5.00	80 ± 15	95 ± 15
P-TCO-U450/12		X12	4.50	12	50	0.002	0.014	22.50	2.00	85 ± 15	100 ± 10

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