

Features

- Compact, space-saving 1210 footprint
- Low profile and symmetrical design
- Small size enables fast response time to thermal runaway events
- Ultra-low resistance
- RoHS compliant*
- Agency recognition:

Additional Information

Click these links for more information:

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P-TCO-U Series - Polymeric Thermal Cutoff Device

Electrical Characteristics

Model	Vmax	Imax	I_{hold}	Thermal Cutoff		Max. Time To Trip		Resistance		Certifications	
			at 23 °C	at 3 A	at 2 A	at 23 °C		Ohms at 23 °C		cUL	TÜV
	Volts	Amps	Amps	°C	°C	Amps	Seconds	$R_{Min.}$	$R_{1Max.}$	E174545	R50405491
P-TCO-U350/12	12	50	3.5	75 ±20	90 ±20	17.0	5.0	0.002	0.022	✓	✓
P-TCO-U400/12	12	50	4.0	80 ±15	95 ±15	20.0	5.0	0.002	0.018	✓	✓
P-TCO-U450/12	12	50	4.5	85 ±15	100 ±10	22.5	2.0	0.002	0.014	✓	✓

Environmental Characteristics

Operating Temperature ..... -40 °C to +85 °C
Storage Condition
  Before Opening ..... +40 °C max. / 70 % RH max.
  After Opening ..... +40 °C max. / 10 % RH max.
Floor Condition After Opening ..... Consumption within 4 weeks at floor condition +30 °C max. / 60 % RH max.
Passive Aging ..... +85 °C, 1000 hours ..... ±10 % typical resistance change
Humidity Aging ..... +85 °C, 85 % R.H. 100 hours ..... ±15 % typical resistance change
Thermal Shock ..... +85 °C to -40 °C, 20 times ..... ±30 % typical resistance change
Solvent Resistance ..... MIL-STD-202, Method 215 ..... No change (marking still legible)
Vibration ..... MIL-STD-883C, Method 2007.1, Condition A ..... No change ($R_{min}<R<R_{1max}$)
Moisture Sensitivity Level (MSL) ..... See Note
ESD Classification - HBM 6

Test Procedures and Requirements

Test	Test Conditions	Accept/Reject Criteria
Visual/Mech.	Verify dimensions and materials	Per MF physical description
Resistance	In still air @ 23 °C	$R_{min} \le R \le R_{1max}$
Time to Trip	At specified current, Vmax, 23 °C	T ≤ max. time to trip (seconds)
Hold Current	30 min. at I_{hold}	No trip
Trip Cycle Life	V_{max}, I_{max}, 100 cycles	No arcing or burning
Trip Endurance	V_{max}, 48 hours	No arcing or burning
Solderability	245 °C ±5 °C, 5 seconds	95 % min. coverage

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See www.P65Warnings.ca.gov

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Applications

- Thermal protection for USB-C 2.0, 3.0 and 3.1 cables and ports
- Mobile device fast charging port protection

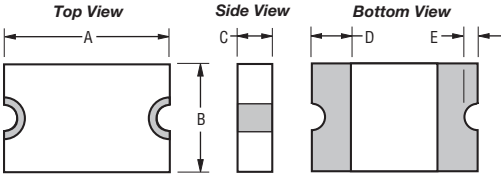
P-TCO-U Series – Polymeric Thermal Cutoff Device

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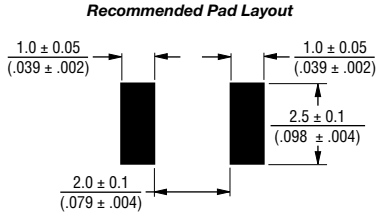
Product Dimensions

Model	A		B		C		D	E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.	Max.
P-TCO-U350/12	3.00 (0.118)	3.43 (0.135)	2.35 (0.093)	2.80 (0.110)	0.60 (0.024)	1.10 (0.043)	0.25 (0.010)	0.05 (0.002)	0.45 (0.018)
P-TCO-U400/12									
P-TCO-U450/12									

DIMENSIONS: MM / (INCHES)



Terminal material:
ENIG-plated terminals



Packaging Quantity

3500 pcs. per reel

Thermal Derating Table - I_{hold} (Amps)

Model	Ambient Operating Temperature								
	-40 °C	-20 °C	0 °C	23 °C	40 °C	50 °C	60 °C	70 °C	85 °C
P-TCO-U350/12	5.10	4.65	4.13	3.50	2.98	2.65	2.50	2.00	1.75
P-TCO-U400/12	5.80	5.25	4.70	4.00	3.40	3.10	2.80	2.28	2.00
P-TCO-U450/12	6.30	5.65	4.95	4.50	3.83	3.40	2.95	2.50	2.05

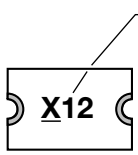
How to Order

P-TCO - U 450 / 12 - 2

- Polymeric Thermal Cutoff Device
- U = 1210 footprint Surface Mount Component
- Hold Current, I_{hold}
  350 - 450 (3.50 Amps - 4.50 Amps)
- Maximum Voltage, V_{max}
  12 = 12 Volts
- Packaging
  -2 = Tape and Reel
  Packaged per EIA 481

Typical Part Marking

Represents total content. Layout may vary.



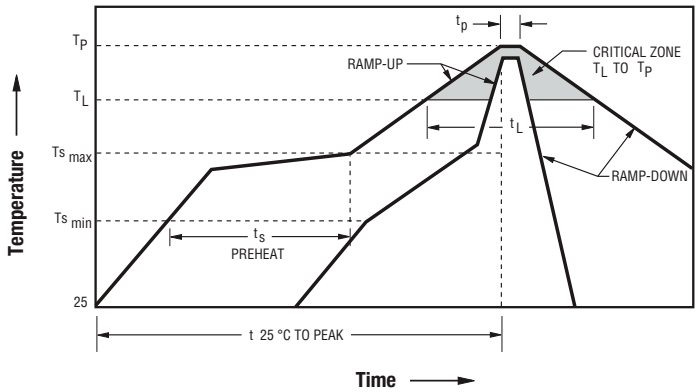
PART IDENTIFICATION:
P-TCO-U350/12 = S12
P-TCO-U400/12 = U12
P-TCO-U450/12 = X12

MANUFACTURING DATE CODE IS LOCATED ON PACKING LABEL.

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Solder Reflow Recommendations



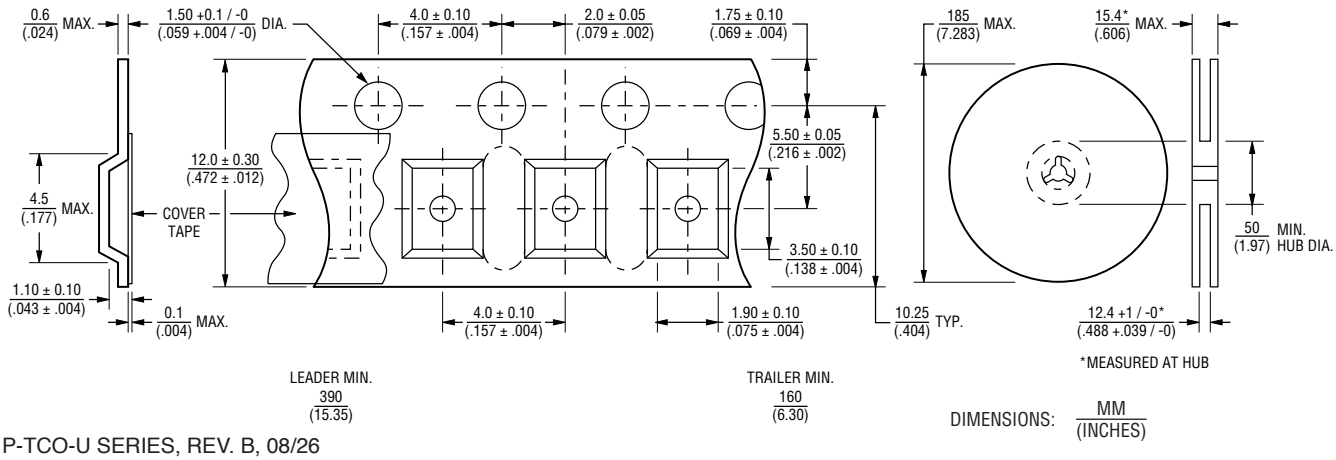
Notes:

- P-TCO-U models cannot be wave soldered or hand soldered. Please contact Bourns for soldering recommendations.
- All temperatures refer to topside of the package, measured on the package body surface.
- If reflow temperatures exceed the recommended profile, devices may not meet the published specifications.
- Compatible with Pb and Pb-free solder reflow profiles.
- Excess solder may cause a short circuit, especially during hand soldering. Please refer to the Polymeric Thermal Cutoff Soldering Recommendation guidelines.

Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (Ts_{max} to T_p)	3 °C / second max.
PREHEAT: Temperature Min. (Ts_{min}) Temperature Max. (Ts_{max}) Time (Ts_{min} to Ts_{max}) (ts)	 150 °C 200 °C 60~180 seconds
TIME MAINTAINED ABOVE: Temperature (T_L) Time (t_L)	 217 °C 60~150 seconds
Peak Temperature (T_p)	260 °C
Time within 5 °C of Actual Peak Temperature (t_p)	20~40 seconds
Ramp-Down Rate	6 °C / second max.
Time 25 °C to Peak Temperature	8 minutes max.

Packaging Specifications

P-TCO-U Series per EIA 481



P-TCO-U SERIES, REV. B, 08/26

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Bourns® Polymeric Thermal Cutoff Devices (P-TCO)

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Application Notice

Users are responsible for independent and adequate evaluation of Bourns® Polymeric Thermal Cutoff (P-TCO) devices in the user's application, including the P-TCO device characteristics stated in the applicable data sheet.

- Polymeric Thermal Cutoff devices must not be allowed to operate beyond their stated maximum ratings. Inadequate adherence to such maximum ratings could result in damage to the P-TCO device and lead to electrical arcing and/or fire. Circuits with inductance may generate a voltage above the rated voltage of the P-TCO devices and should be thoroughly evaluated within the user's application during the P-TCO selection and qualification process.
- Polymeric Thermal Cutoff devices are intended to protect against adverse effects of temporary overtemperature conditions and are not intended to serve as protective devices where such conditions are expected to be repetitive or prolonged.
- As a normal function of operation, Polymeric Thermal Cutoff devices experience thermal expansion under fault conditions. Thus, a P-TCO device must be protected against mechanical stress, and must be given adequate clearance within the user's application to accommodate such thermal expansion. Rigid potting materials or fixed housings or coverings that do not provide adequate clearance should be thoroughly examined and tested by the user, and may result in the malfunction of P-TCO devices if the thermal expansion is inhibited.
- Exposure to lubricants, silicon-based oils, solvents, gels, electrolytes, acids, and other related or similar materials may adversely affect the performance of Polymeric Thermal Cutoff devices.
- Aggressive solvents may adversely affect the performance of Polymeric Thermal Cutoff devices. Conformal coating, encapsulating, potting, molding, and sealing materials may contain aggressive solvents including but not limited to xylene and toluene, which are known to cause adverse effects on the performance of P-TCO devices. Such aggressive solvents must be thoroughly cured or baked to ensure complete removal from P-TCO devices to minimize the possible adverse effect on the device.
- Recommended storage conditions should be followed at all times. Such conditions can be found on the applicable data sheet and on the Polymeric Thermal Cutoff Device Moisture/Reflow Sensitivity Classification (MSL) note: https://www.bourns.com/docs/RoHS-MSL/msl_ptco.pdf

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- Bourns expressly identifies Bourns® standard products that are suitable for use in the typical aviation applications/systems requiring System Design Assurance Level (RTCA DO-254 DAL) of C, D or E in its publication entitled "Bourns Civilian Aerospace/Aviation Grade Component Guide." Bourns does not test its products for compliance with United States Federal Aviation Administration standards or any other generally equivalent governmental organization standard applicable to products designed or manufactured for use in aviation applications. Use of Bourns® standard components in aviation applications associated with RTCA DO-254 DAL A or B without proper approval noted above shall be at the user's sole risk.

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