

## Positive Temperature Coefficient (PTC) Data Sheet

### Description

The PTC battery protection series provides radial resettable overcurrent protection with holding current from 0.70A to 7.30A. This series is suitable for applications with higher working voltage up to 16V.

### Features

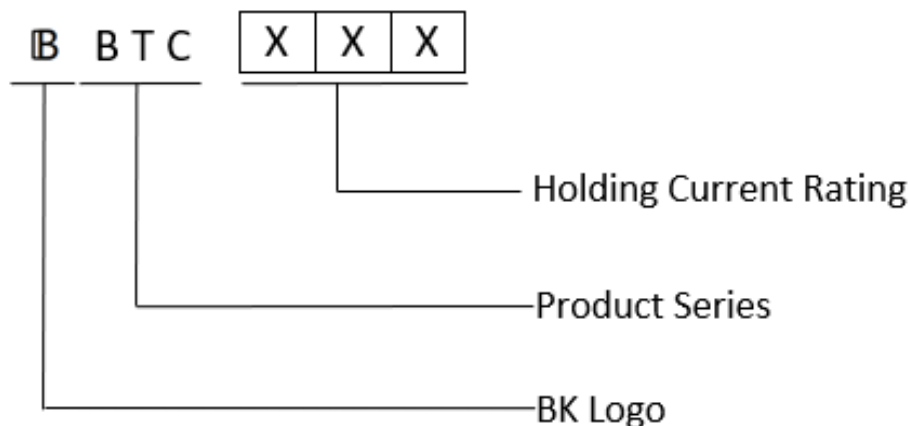
- Radial leaded devices.
- Over-current protection
- High voltage surge capabilities
- Flame retardant epoxy polymer insulating material meets UL94 V-0 requirement.
- Available in lead-free version.
- Meets MSL level 1, per J-STD-020
- Operating Temperature: -40°C~+85°C



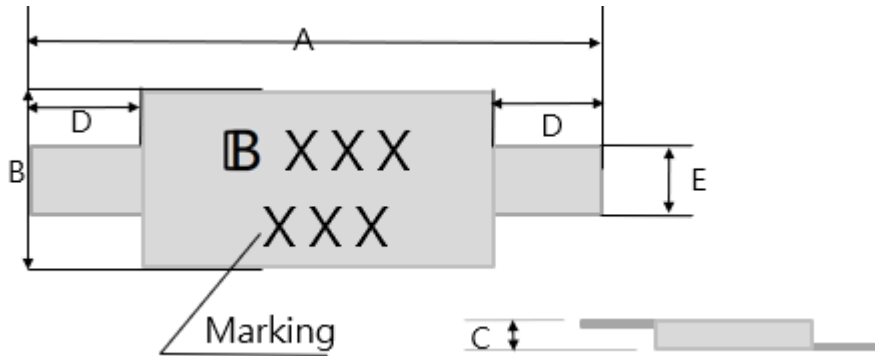
### Applications

- Mobile phone and smart phone battery packs
- Computer battery packs
- Portable media player battery packs
- Power tools (charge line)
- Mobile radio battery packs
- Digital camera battery packs
- Tablet PC battery packs

### Part Number Code and Making



**Dimensions (Unit: mm)**



Part Number	A		B		C		D		E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
BTC070	17.0	22.5	5.0	6.0	0.40	1.0	4.0	7.6	3.8	4.2
BTC100	17.0	22.5	5.0	6.0	0.40	1.0	4.0	7.6	3.8	4.2
BTC120	17.0	18.0	7.0	8.0	0.40	1.0	3.5	6.5	3.8	4.2
BTC170	21.0	23.5	5.0	6.0	0.40	1.0	3.5	6.3	3.8	4.2
BTC175	21.0	23.5	5.0	6.0	0.40	1.0	3.5	6.3	3.8	4.2
BTC200	21.0	23.5	5.0	6.0	0.40	1.0	3.5	6.3	3.8	4.2
BTC210	21.0	23.5	5.0	6.0	0.40	1.0	3.5	6.3	3.8	4.2
BTC260	21.0	23.5	5.0	6.0	0.40	1.0	3.5	6.3	3.8	4.2
BTC300	24.5	28.5	7.0	8.0	0.40	1.0	3.5	6.5	4.8	5.2
BTC350	24.5	28.5	13.0	14.0	0.40	1.0	3.5	6.5	4.8	5.2
BTC420	27.5	32.4	13.0	14.0	0.40	1.0	4.0	7.0	5.9	6.2
BTC550	27.5	37.5	7.0	8.0	0.40	1.0	4.0	7.0	4.8	5.2
BTC600	27.5	37.5	7.0	8.0	0.40	1.0	4.0	7.0	4.8	5.2
BTC730	27.5	32.0	14.0	15.0	0.40	1.0	4.2	6.5	5.9	6.2

## Electrical Characteristics

Part Number	I <sub>hold</sub>	I <sub>trip</sub>	V <sub>max</sub>	I <sub>max</sub>	P <sub>d typ.</sub>	Max. Time-to-trip		R <sub>min</sub>	R <sub>max</sub>
	(A)	(A)	(V <sub>DC</sub> )	(A)	(W)	(A)	(S)	(Ω)	(Ω)
BTC070	0.70	1.50	16	40	1.70	3.50	5.00	0.140	0.360
BTC100	1.00	2.00	16	40	1.70	5.00	7.00	0.070	0.180
BTC120	1.20	2.40	16	40	1.70	6.00	5.00	0.050	0.160
BTC170	1.70	3.40	16	40	1.80	8.50	5.00	0.030	0.120
BTC175	1.75	3.50	16	40	1.80	8.75	5.00	0.030	0.135
BTC200	2.00	4.00	16	40	1.90	10.00	4.00	0.020	0.060
BTC210	2.10	4.20	16	40	1.90	10.50	5.00	0.016	0.060
BTC260	2.60	5.20	16	40	2.00	13.00	5.00	0.015	0.050
BTC300	3.00	6.00	16	100	2.10	15.00	5.00	0.015	0.050
BTC350	3.50	7.00	16	100	2.20	17.50	5.00	0.017	0.050
BTC420	4.20	8.40	16	100	2.30	21.00	6.00	0.0132	0.036
BTC550	5.50	11.00	16	100	2.50	27.50	6.00	0.009	0.024
BTC600	6.00	12.00	16	100	2.50	27.50	6.00	0.007	0.018
BTC730	7.30	14.60	16	100	2.60	36.50	6.00	0.006	0.018

- I<sub>H</sub> = Hold current: maximum current device will pass without tripping in 25°C still air.
- I<sub>T</sub> = Trip current: minimum current at which the device will trip in 25°C still air.
- V<sub>MAX</sub> = Maximum voltage device can withstand without damage at rated current.
- I<sub>MAX</sub> = Maximum fault current device can withstand without damage at rated voltage.
- R<sub>MAX</sub> = Maximum resistance of device in initial (un-soldered) state.
- R<sub>MIN</sub> = Minimum resistance of device in initial (un-soldered) state.
- P<sub>d typ.</sub> = Typical power dissipation from device when in the tripped state at 25°C still air.

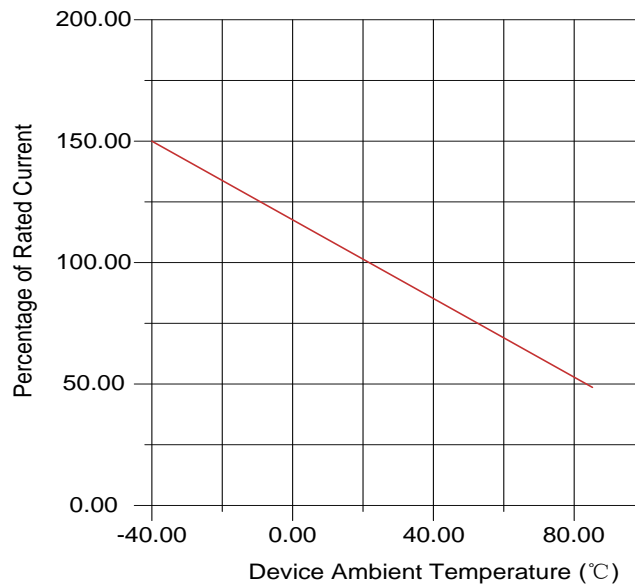
## Polymeric PTC Selecting Guide

- Determine the following operating parameters for the circuits:
  - Normal operating current ( $I_{hold}$ )
  - Maximum interrupt current ( $I_{max}$ )
  - Maximum circuit voltage ( $V_{max}$ )
  - Normal operating temperature surrounding device ( $min^{\circ}C/max^{\circ}C$ )
- Select the device from factor and dimension suitable for the application
- Compare the maximum rating for  $V_{max}$  and  $I_{max}$  of the PPTC device with the circuit in application and make sure the circuit's requirement does not exceed the device rating.
- Check that PPTC device's trip time (time-to-trip) will protect the circuit.
- Verify that the circuit operating temperature is within the PPTC device's normal operating temperature range.
- Verify that performance and suitability of the chosen PPTC device in the application.

### **WARNING**

- **Mechanical Stress**
  - PPTC devices will undergo a thermal expansion during fault condition. If PPTC devices are installed or placed in an application where the space between PPTC devices and the surrounding materials (e.g., covering materials, packaging materials, encapsulate materials and the like) is insufficient, it will cause an inhibiting effect upon the thermal expansion. Pressing, twisting, bending and other kinds of mechanical stress will also adversely affect the performance of the PPTC devices and shall not be used or applied.
- **Chemical Pollutants**
  - Silicone-based oils, oils, solvents, gels, electrolytes, fuels, acids, and the like will adversely affect the properties of PPTC devices, and shall not be used or applied.
- **Electronic and Thermal Effect**
  - PPTC devices are secondary protection devices and are used solely for sporadic, accidental over-current or over-temperature error condition, and shall NOT be used if or when constant or repeated fault conditions (such fault conditions may be caused by, among others, incorrect pin-connection of a connector) or over-extensive trip events may occur.
  - PPTC devices are different from fuses and, when a fault condition occurs, will go into high-resistance state and do not open circuit, in which case the voltage at such PPTC devices may reach a hazardous level.
  - Operation over the maximum rating or other forms of improper use may cause failure, arcing, flame and/or other damage to the PPTC devices.
  - Conductive material contamination, such as metal particle, may induce shortage, flame or arcing.
  - Due to the inductance, the operation circuits may generate a circuit voltage ( $Ldi/dt$ ) above the rated voltage of PPTC devices, which shall not be used under such circumstances.
- **General**
  - Customers shall evaluate and test the properties of PPTC devices independently to verify and ensure that their individual applications will be met.
  - The performance of PPTC devices will be adversely affected if they are improperly used under electronic, thermal and/or mechanical procedures and/or conditions non-conformant to those recommended by manufacturer.
  - Customers shall be responsible for determining whether it is necessary to have back-up, failsafe and/or fool-proof protection To avoid or minimize damage that may result from extra-ordinary, irregular function or failure of PPTC devices.
  - Any and all responsibilities and liabilities are disclaimed if any item under this notice of warning is not complied with.

**Thermal Derating Curve**



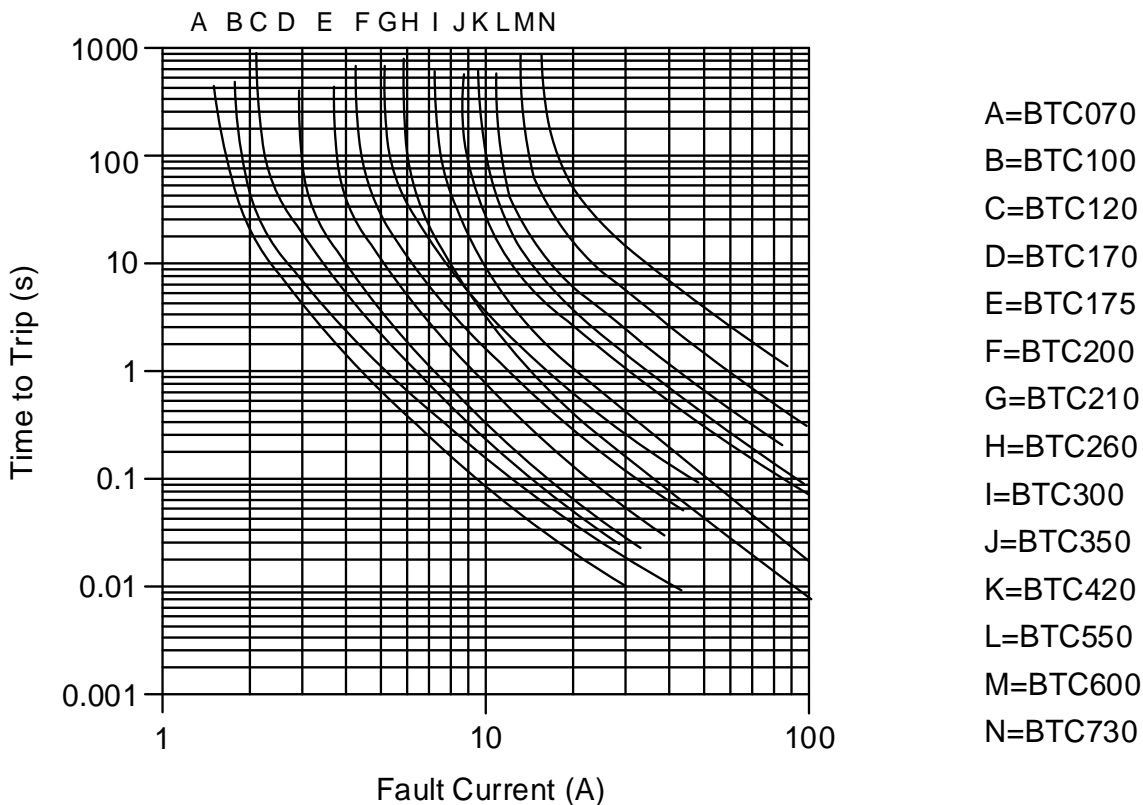
**Thermal Derating Chart – I<sub>H</sub> (A)**

Part Number	Maximum Ambient Operating Temperatures (°C)									
	-40	-20	0	25	30	40	50	60	70	85
BTC070	1.02	0.91	0.84	0.70	0.65	0.62	0.56	0.49	0.46	0.39
BTC100	1.45	1.30	1.20	1.00	0.93	0.88	0.80	0.70	0.66	0.56
BTC120	1.74	1.56	1.44	1.20	1.12	1.06	0.96	0.84	0.79	0.67
BTC170	2.47	2.21	2.04	1.70	1.58	1.50	1.36	1.19	1.12	0.95
BTC175	2.54	2.28	2.10	1.75	1.63	1.54	1.40	1.23	1.16	0.98
BTC200	2.90	2.60	2.40	2.00	1.86	1.76	1.60	1.40	1.32	1.12
BTC210	3.05	2.73	2.52	2.10	1.95	1.85	1.68	1.47	1.39	1.18
BTC260	3.77	3.38	3.12	2.60	2.42	2.29	2.08	1.82	1.72	1.46
BTC300	4.35	3.90	3.60	3.00	2.79	2.64	2.40	2.10	1.98	1.68
BTC350	5.08	4.55	4.20	3.50	3.26	3.08	2.80	2.45	2.31	1.96
BTC420	6.09	5.46	5.04	4.20	3.91	3.70	3.36	2.94	2.77	2.35
BTC550	7.98	7.15	6.60	5.50	5.12	4.84	4.40	3.85	3.63	3.08
BTC600	8.70	7.80	7.20	6.00	5.58	5.28	4.80	4.20	3.96	3.36
BTC730	10.59	9.49	8.76	7.30	6.79	6.42	5.84	5.11	4.82	4.09

**Test Procedures and Requirement**

Items	Test Conditions	Accept/Reject Criteria
Resistance	In still air @25°C	$R_{min} \leq R \leq R_{max}$
Time to Trip	Specified current, $V_{max}$ , 25°C	$T \leq \text{max. Time to trip } (T_{trip})$
Hold Current	30 min, at $I_H$	No trip
Trip Cycle Life	$V_{max}$ , $I_{max}$ , 100 cycles	No arcing or burning
Trip Endurance	$V_{max}$ , 24hours	No arcing or burning

**Typical Time-to-Trip Charts @25°C、**



## Storage Recommendations

- Storage Temperature: -10°C~+40°C
- Relative Humidity: ≤80%RH
- Keep away from corrosive atmosphere and sunlight.
- Period of Storage: 1 year.

## Installation Guidelines for the Strap Family

- PPTC devices operate by thermal expansion of the conductive polymer. If devices are placed under pressure or installed in spaces that would prevent thermal expansion, they may not properly protect against damage caused by fault conditions. Designs must be selected in such a manner that adequate space is maintained over the life of the product.
- Twisting, bending, or placing the PPTC device in tension will decrease the ability of the device to protect against damage caused by electrical faults. No residual force should remain on device after installation. Mechanical damage to the PPTC device may affect device performance and should be avoided.
- Chemical contamination of PPTC devices should be avoided. Certain greases, solvents, hydraulic fluids, fuels, industrial cleaning agents, volatile components of adhesives, silicones, and electrolytes can have an adverse effect on device performance.
- PPTC strap devices are intended to be resistance welded to battery cells or to pack interconnect straps, yet some precautions must be taken when doing so. In order for the PPTC device to exhibit its specified performance, weld placement should be a minimum of 2mm from the edge of the PPTC device, weld splatter must not touch the PPTC device, and welding conditions must not heat the PPTC device above its maximum operating temperature.
- PPTC strap devices are not intended for applications where reflow onto flex circuits or rigid circuit boards is required.
- The polyester tape on PPTC strap devices is intended for marking and identification purposes only, not for electrical insulation.

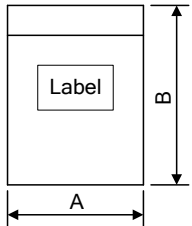
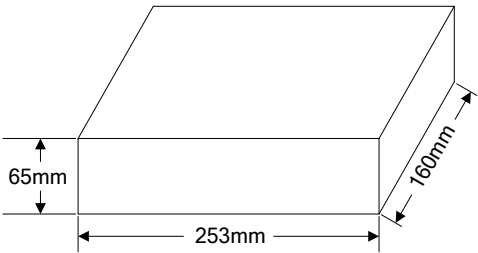
**Environmental Specifications**

Operating / Storage temperature	-40°C to +85°C
Maximum Device Surface Temperature in Tripped State	125°C
Passive Aging	+85°C, 1000 hours ±50% typical resistance change
Humidity Aging	+85°C, 85%R.H. 168 hours ±50% typical resistance change
Thermal Shock	MIL-STD-202, Method 107G +85°C/-40°C 20 time -50% typical resistance change
Vibration	MIL-STD-883C, Method 2007.1, Condition A No change
Moisture Level Sensitivity	Level 1, J-STD-020C

**Physical Specifications**

Lead material	0.125mm Nominal Thickness Quarter-hard nickel
Tape material	Polyester

**Packaging**

Bag	Part Number	Dimension A×B (mm)	Quantity		
	BTC070	150×200	1000pcs/bag 4000pcs/box		
	BTC100				
	BTC120				
	BTC170				
	BTC175				
	BTC200				
	BTC210				
	BTC260				
	BTC300			150×200	500pcs/bag 2000pcs/box
	BTC350				
	BTC420				
	BTC550				
BTC600					
BTC730					