Positive Temperature Coefficient (PTC) Data Sheet

Description

The 250V series provides radial resettable overcurrent protection with holding current from 0.03A to 2.0A. This series is suitable for applications with higher working voltage up to 250V.

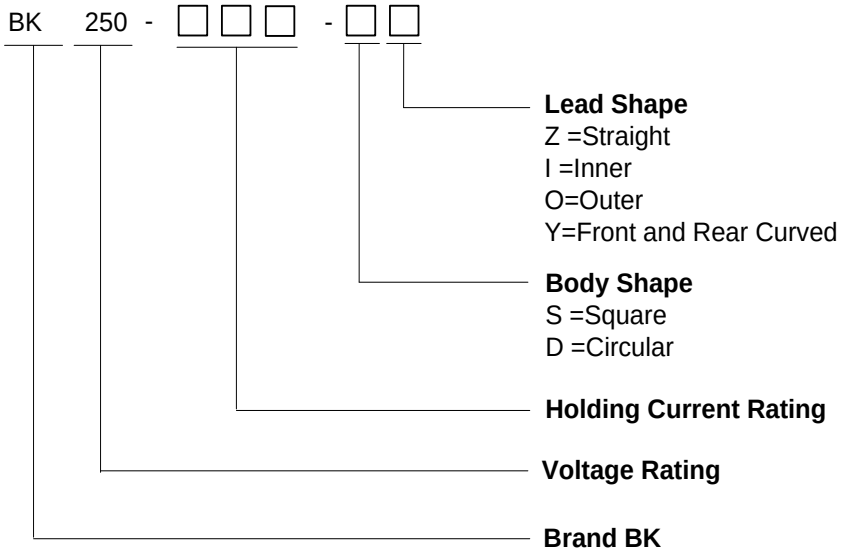
Features

- 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℃~+85℃

Applications

- IT equipment
- Access network equipment
- Central office equipment
- ISDN and xDSL equipments
- Phone set and fax machine
- LAN/WAN and VOIP cards

Part Number Code and Making



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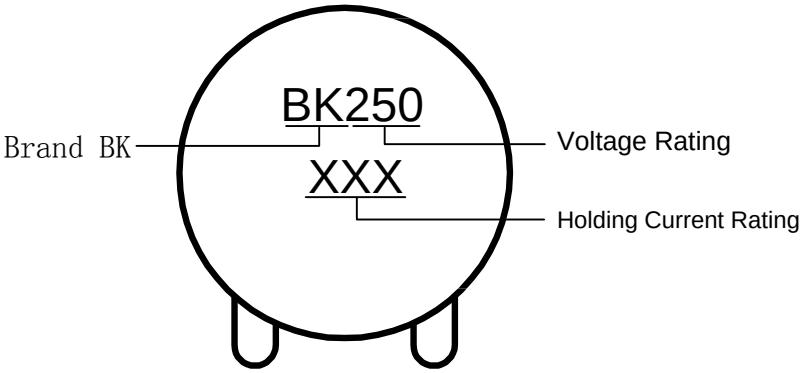
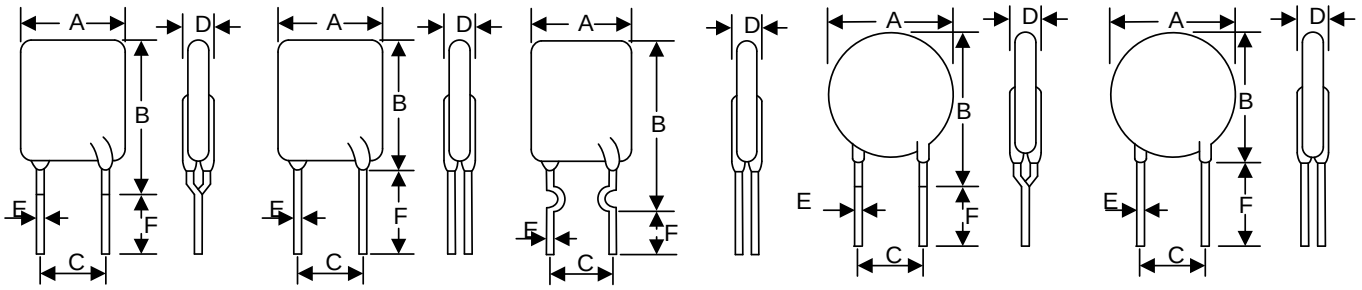


Dimensions (Unit: mm)



SY SZ SI DY DZ

Part Number	A	B	C	D	E	F	Style.
	Max.	Max.	±0.6	Max.	Typ.	Min.	
BK250-030	6.0	8.0	5.1	4.6	0.6	7.6	DZ
BK250-040	7.4	13.5 / 12.7	5.1	4.6	0.6	4.6 / 7.6	DY / DZ
BK250-060	7.4	14.5 / 12.7	5.1	4.6	0.6	4.6 / 7.6	DY / DZ
BK250-080	7.4	14.5 / 12.7	5.1	4.6	0.6	4.6 / 7.6	DY / DZ
BK250-090	7.4	14.5 / 12.7	5.1	4.6	0.6	4.6 / 7.6	DY / DZ
BK250-110	7.0	14.5 / 10.5	5.1	4.6	0.6	4.6 / 7.6	SY / SZ
BK250-120	7.0	14.5 / 10.5	5.1	4.6	0.6	4.6 / 7.6	SY / SZ
BK250-145	7.5	15.0 / 11.0	5.1	4.6	0.6	4.6 / 7.6	SY / SZ
BK250-180	10.5	18.5 / 14.5	5.1	4.6	0.6	4.6 / 7.6	SY/SZ/DZ
BK250-200	10.5	18.5/17.0	5.1	4.6	0.6	7.6	SZ / DZ
BK250-250	9.3	15.0/12.8	5.1	4.6	0.6	7.6	SY/SZ
BK250-400	11.2	17.0/19.5	5.1	4.6	0.8/0.6	7.6	SZ/SI
BK250-600	16.0	18.0	5.1	4.6	0.8	7.6	SZ
BK250-800	20.0	22.0	5.1	4.6	0.8	7.6	SZ
BK250-1000	21.1	23.6	10.2	4.6	0.8	7.6	DZ
BK250-1500	21.0	27.5	10.2	4.6	0.8	7.6	SZ
BK250-2000	26.2	32.8	10.2	4.6	0.8	7.6	SZ

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Electrical Characteristics

Part Number	IH (A)	IT (A)	Vmax (V_{AC})	Imax (A)	Pd typ. (W)	Max. Time-to-trip (A)	(S)	Rmin (Ω)	Rmax (Ω)
BK250-030	0.030	0.060	250	1	0.6	0.15	5.0	35.0	90.0
BK250-040	0.040	0.080	250	3	0.7	0.20	6.0	27.0	65.0
BK250-060	0.060	0.120	250	3	0.8	0.30	5.0	20.0	45.0
BK250-080	0.080	0.160	250	3	0.8	0.40	5.0	10.0	22.0
BK250-090	0.090	0.180	250	3	0.8	0.45	5.0	7.0	20.0
BK250-110	0.110	0.220	250	3	1.0	0.55	5.0	6.0	12.0
BK250-120	0.120	0.240	250	3	1.0	0.60	5.0	6.0	10.5
BK250-145	0.145	0.290	250	3	1.0	0.73	15.0	3.5	6.5
BK250-180	0.180	0.540	250	10	1.5	0.90	15.0	1.0	3.0
BK250-200	0.200	0.400	250	10	1.5	1.00	9.0	3.0	6.0
BK250-250	0.250	0.500	250	10	1.5	1.25	7.0	1.6	4.8
BK250-400	0.400	0.800	250	10	2.0	2.00	9.0	1.0	3.0
BK250-600	0.600	1.200	250	10	2.5	3.00	8.0	0.6	2.0
BK250-800	0.800	1.600	250	10	2.7	4.00	18.0	0.4	1.0
BK250-1000	1.000	2.000	250	10	2.9	5.00	21.0	0.3	0.8
BK250-1500	1.500	3.000	250	10	3.9	7.50	23.0	0.2	0.6
BK250-2000	2.000	4.000	250	10	4.5	10.00	28.0	0.1	0.4

- I_H = Hold current: maximum current device will pass without tripping in 25℃ still air.
- I_T = Trip current: minimum current at which the device will trip in 25℃ still air.
- V_{MAX} = Maximum voltage device can withstand without damage at rated current.
- I_{MAX} = Maximum fault current device can withstand without damage at rated voltage.
- R_{MAX} = Maximum resistance of device in initial (un-soldered) state.
- R_{MIN} = Minimum resistance of device in initial (un-soldered) state.
- $Pd_{typ.}$ = Typical power dissipation from device when in the tripped state at 25℃ still air.

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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℃/max℃)
- 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.

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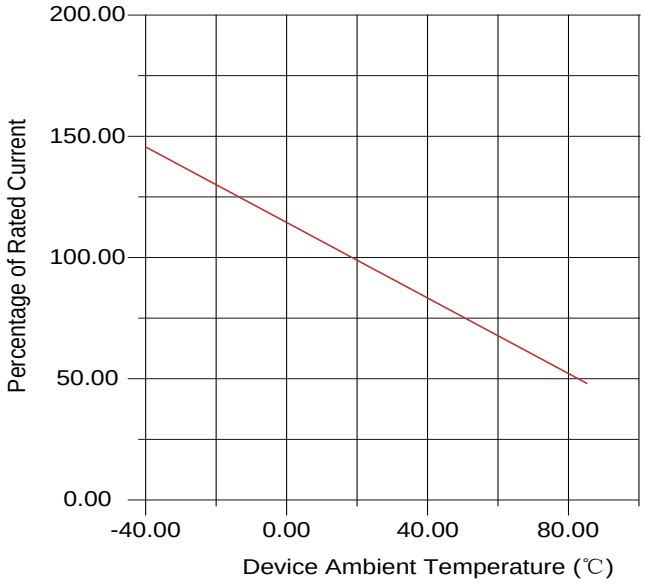
Thermal Derating Curve



Thermal Derating Chart – I_H (A)

Part Number	Maximum Ambient Operating Temperatures (℃)									
	-40	-20	0	25	30	40	50	60	70	85
BK250-030	0.044	0.040	0.035	0.030	0.027	0.025	0.023	0.020	0.017	0.013
BK250-040	0.058	0.053	0.047	0.040	0.036	0.034	0.031	0.027	0.024	0.019
BK250-060	0.085	0.079	0.070	0.060	0.055	0.051	0.046	0.041	0.037	0.029
BK250-080	0.113	0.106	0.094	0.080	0.073	0.068	0.062	0.054	0.049	0.038
BK250-090	0.131	0.119	0.105	0.090	0.082	0.077	0.069	0.061	0.055	0.043
BK250-110	0.160	0.145	0.129	0.110	0.100	0.094	0.085	0.075	0.067	0.053
BK250-120	0.172	0.158	0.140	0.120	0.109	0.102	0.092	0.082	0.073	0.058
BK250-145	0.210	0.191	0.170	0.145	0.132	0.123	0.112	0.099	0.088	0.070
BK250-180	0.260	0.238	0.211	0.180	0.164	0.153	0.139	0.122	0.110	0.086
BK250-200	0.290	0.264	0.234	0.200	0.182	0.170	0.154	0.136	0.122	0.096
BK250-250	0.390	0.340	0.300	0.250	0.230	0.210	0.180	0.160	0.140	0.100
BK250-400	0.580	0.528	0.468	0.400	0.364	0.340	0.308	0.272	0.244	0.192
BK250-600	0.870	0.792	0.702	0.600	0.546	0.510	0.462	0.408	0.366	0.288
BK250-800	1.160	1.056	0.936	0.800	0.728	0.680	0.616	0.544	0.488	0.384
BK250-1000	1.550	1.370	1.190	1.000	0.910	0.820	0.730	0.640	0.550	0.410
BK250-1500	2.400	2.100	1.800	1.500	1.365	1.300	1.150	1.020	0.880	0.660
BK250-2000	3.100	2.740	2.380	2.000	1.820	1.640	1.460	1.280	1.100	0.820

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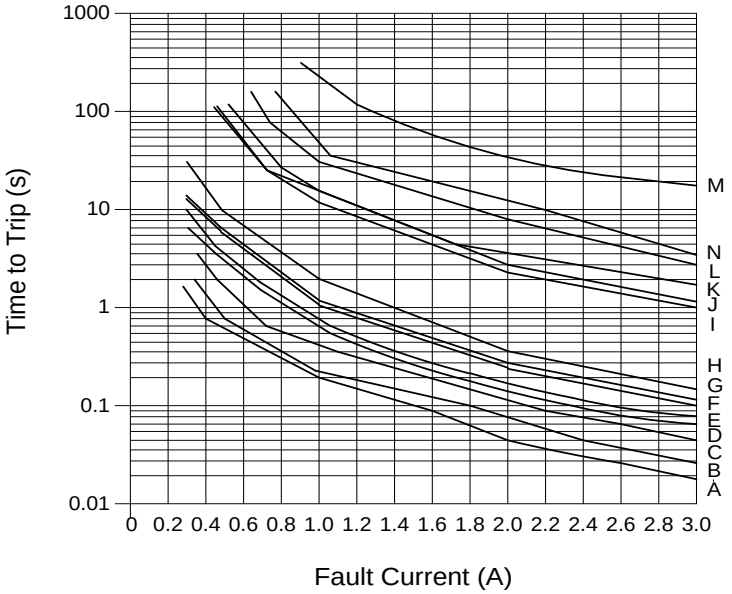
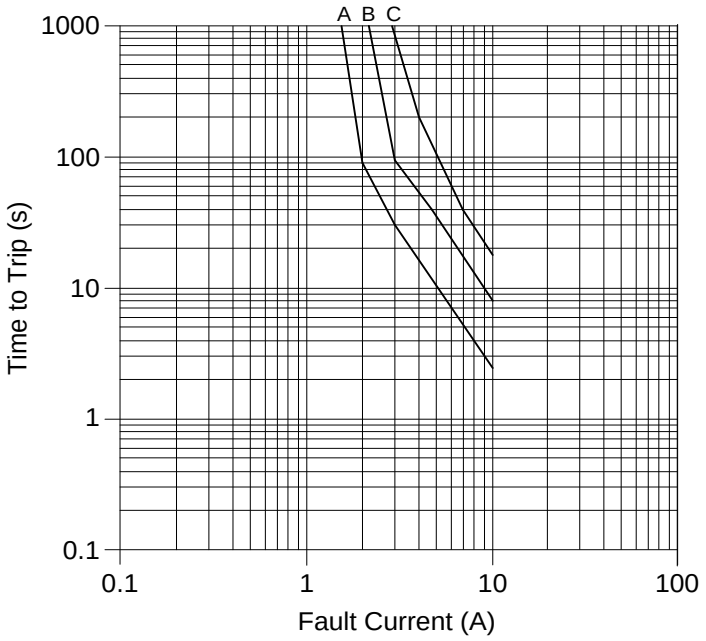
Test Procedures and Requirement

Items	Test Conditions	Accept/Reject Criteria
Resistance	In still air @25℃	$R_{min} \leq R \leq R_{max}$
Time to Trip	Specified current, V_{max}, 25℃	T ≤ 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℃



A=BK250-030
B=BK250-040
C=BK250-060
D=BK250-080
E=BK250-090
F=BK250-110
G=BK250-120
H=BK250-145
I=BK250-180
J=BK250-200
K=BK250-250
L=BK250-400
N=BK250-600
M=BK250-600



A-BK250-1000
B-BK250-1500
C-BK250-2000

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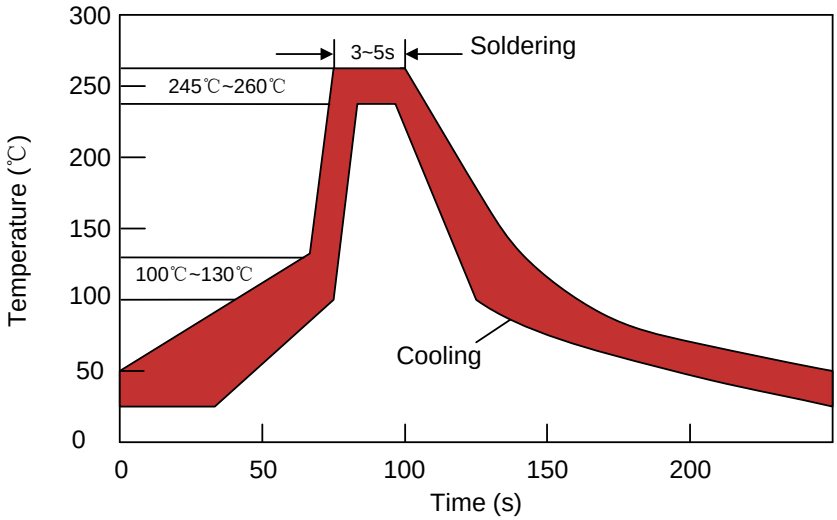
Storage Recommendations

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

Wave Soldering Recommendation Parameters



Items	Conditions
Pre-Heating Zone	Refer to the condition recommended by the flux manufacturer. Maximum ramping rate should not exceed 4℃/sec.
Soldering Zone	Maximum solder temperature should not exceed 260℃
Cooling Zone	Forced cooling

Manual Soldering Recommendation Parameters

Items	Conditions
Soldering condition	The highest power of the manual soldering iron should be 30W or less, soldering temperature should not be higher than 280℃.
Soldering time	The soldering time should be kept within 3 seconds, otherwise it might cause insulation layer cracking, and increased part resistance.
Soldering position	The distance on the leads between the soldering point and bottom of the PPTC body should be equal or greater than 4mm.
Other	The soldering iron should not contact the PPTC body except the leads. If the soldering conditions are kept to lower temperature, less time and larger distance, the outcome of the soldering will be better.

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Mechanical Characteristics

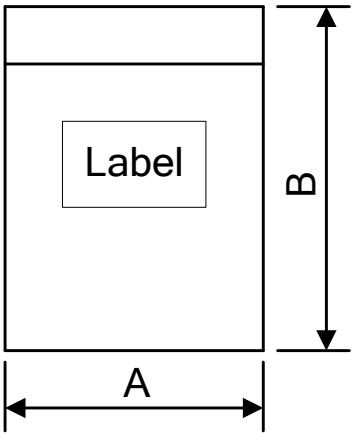
Items	Specifications	Test Conditions/Methods
Tensile strength	No visible damage	1.0Kgf, 10 seconds
Bending strength	No visible damage	0.5Kgf, 90°, 3 times
Vibration	No visible damage	Freq: 10-55Hz, Amp: 0.75mm, 1min

Reliability Test

Items	Specifications	Test Conditions/Methods
Solder ability	No visible damage，Solder OK, Solder area ≥95%	245±5℃, 2±1s, dipping depth=0.5inch max from the body
Resistance to soldering heat	No visible damage, Electrical OK, |△R/R0| ≦50%	260±5℃, 10+2/-0s
Damp heat, steady state	No visible damage, Electrical OK, |△R/R0| ≦20%	40±2℃, 90~95 % RH, total 48Hrs, after 4Hrs test electrical parameter
Temperature cycling	No visible damage, Electrical OK, |△R/R0| ≦20%	Ta＝-10+0/-1℃ 30min, Ta＝70+1/-0℃ 30min, 5cycles, after 1hr test electrical parameter

Packaging

Bag



Part Number	Dimension A×B (mm)	Quantity
BK250-030	120×150	1000pcs/bag
BK250-040		
BK250-060		
BK250-080		
BK250-090		
BK250-110		
BK250-120		
BK250-145		
BK250-180	120×150	500pcs/bag
BK250-200		
BK250-400	150×200	
BK250-600		
BK250-800		
BK250-1000	150×200	200pcs/bag
BK250-1500		
BK250-2000		100 pcs/bag

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