

## Positive Temperature Coefficient (PTC) Datasheet

### Features

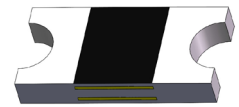
- I Hold: 0.04~0.2A
- Fast responding to fault current
- Size 0402 / 1.0\*0.5mm
- Low resistance
- Low profile
- RoHS compliant & Lead-Free & Halogen Free

I Hold  
0.04A to 0.2A

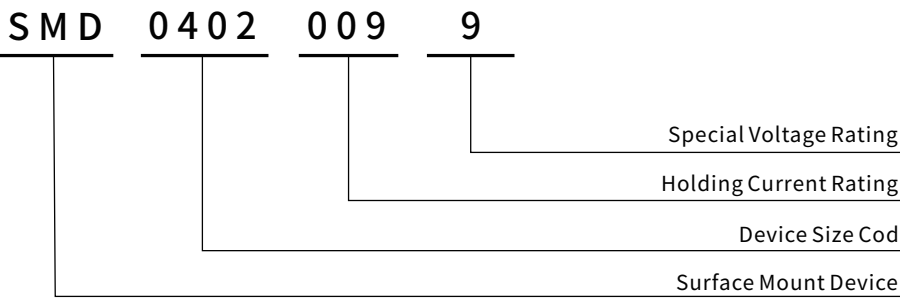
### Applications

- USB hubs, ports and peripherals
- Computer, Mobile phones, Multimedia
- General electronics
- Disk drives
- Game machines, Portable electronics, Battery
- Plug and play protection for motherboards and peripherals

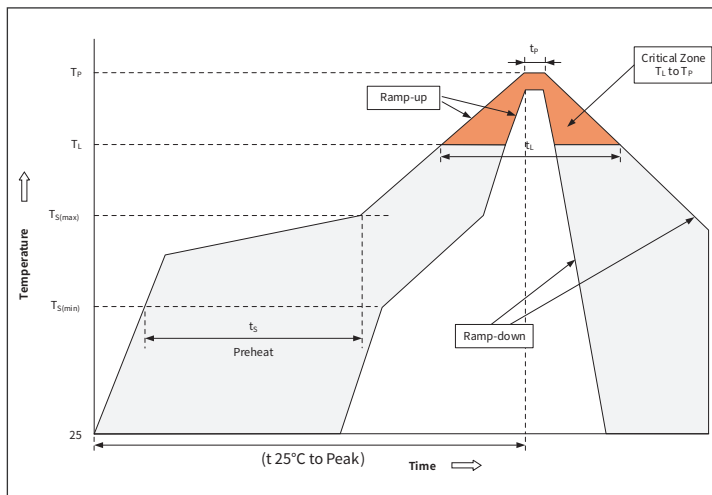
SMD0402



### Part Number Code



### Recommended Soldering Conditions



Profile Feature		Pb-Free Assembly
Pre-heat	Temperature Min ( $T_{S(min)}$ )	+150°C
	Temperature Max ( $T_{S(max)}$ )	+200°C
	Time (Min to Max) ( $t_s$ )	60-180 secs.
Average ramp up rate (Liquid us Temp ( $T_l$ ) to peak)		3°C /sec. Max
$T_{S(max)}$ to $T_l$ - Ramp-up Rate		3°C /sec. Max
Reflow	Temperature( $T_l$ )(Liquid us)	+217°C
	Temperature( $t_l$ )	60-150 secs.
Peak Temp ( $T_p$ )		+260(+0/-5)°C
Time within 5°C of actual Peak Temp ( $t_p$ )		20-40secs
Ramp-down Rate		6°C /sec. Max
Time 25°C to Peak Temp ( $T_p$ )		8 min. Max
Do not exceed		+260°C

Recommended reflow methods: IR, vapor phase oven, hot air oven, N2 environment for lead-free.

Recommended maximum paste thickness is 0.25mm.

Devices can be cleaned using standard industry methods and solvents.

Note 1: All temperature refer to topside of the package, measured on the package body surface.

Note 2: If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

## ● Electrical Characteristics (Ta=25°C Unless otherwise specified)

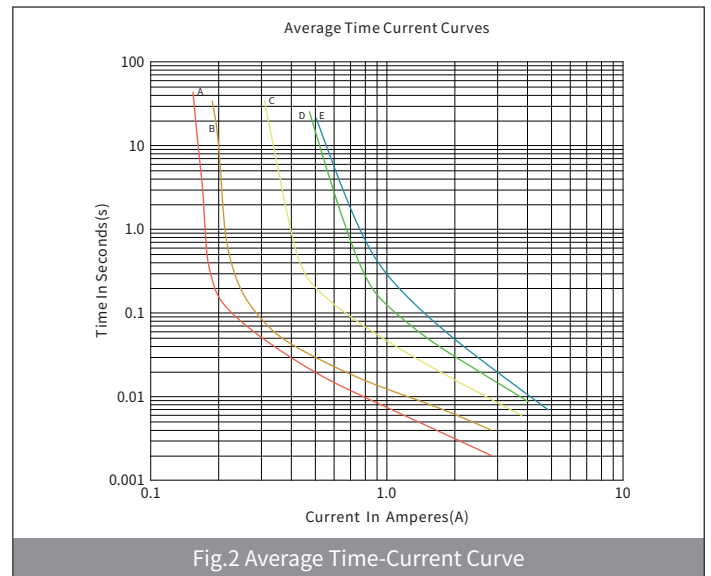
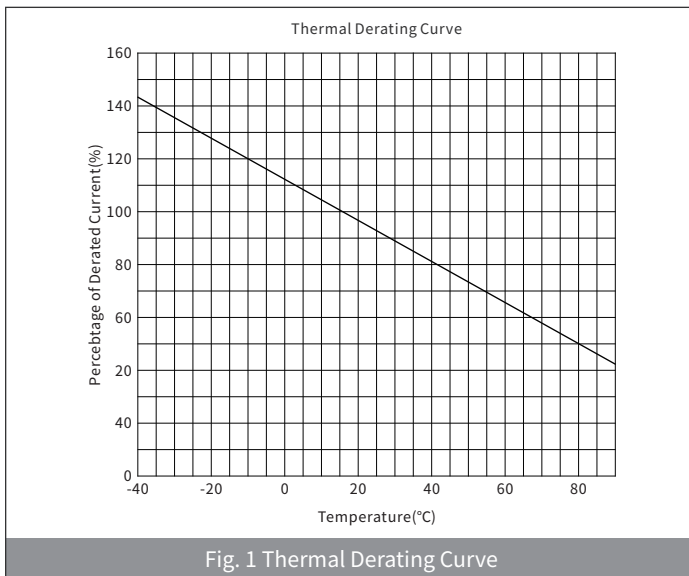
Part Number	Marking	$I_{hold}$	$I_{trip}$	$V_{max}$	$I_{max}$	$P_{d\ typ}$	Max. Time-to-trip		$R_{i\ min}$	$R_{1\ max}$
		(A)	(A)	(V)	(A)	(W)	(A)	(Sec)	( $\Omega$ )	( $\Omega$ )
SMD0402-004-12	/	0.04	0.16	12	40	0.5	0.25	1.50	3.00	30.00
SMD0402-005-9	/	0.05	0.20	9	40	0.5	0.25	1.50	1.50	20.00
SMD0402-010-6	/	0.10	0.30	6	40	0.5	0.50	1.00	0.15	2.80
SMD0402-018-6	/	0.18	0.48	6	40	0.5	1.00	1.00	0.12	2.60
SMD0402-020-6	/	0.20	0.50	6	40	0.5	1.00	1.00	0.10	1.80

## ● Vocabulary

- $I_{hold}$  = Hold current: maximum current device will pass without tripping in 25°C still air.
- $I_{trip}$  = Trip current: minimum current at which the device will trip in 25°C still air.
- $V_{max}$  = Maximum voltage device can withstand without damage at rated current ( $I_{max}$ ).
- $I_{max}$  = Maximum fault current device can withstand without damage at rated voltage ( $V_{max}$ ).
- $P_{d\ typ}$  = Typical power dissipated from device when in the tripped state at 25°C still air.
- $R_{i\ min}$  = Minimum resistance of device in initial (un-soldered) state.
- $R_{1\ max}$  = Maximum resistance of device at 25°C measured one hour after tripping or reflow soldering of 260°C for 20 sec.

Caution: Operation beyond the specified ratings may result in damage and possible arcing and flame.

## ● Ratings And Characteristics Curves (Ta=25°C Unless otherwise specified)



Note: Fig.2 Average Time-Current Curve

A: SMD0402-004 B: SMD0402-005 C: SMD0402-010 D: SMD0402-018

E: SMD0402-020

## ● Ordering Information

PACKAGE	SIZE(mm)	DELIVERY MODE	MPQ(PCS)
SMD0402	1.0×0.5	7" REEL	10,000

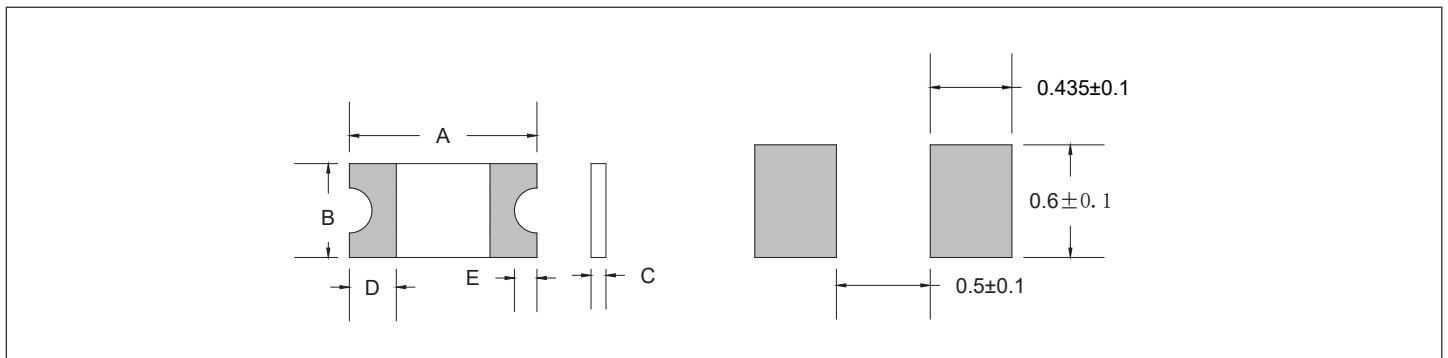
## ● Thermal Derating Chart

Part Number	Ambient operating temperature hold current(Ihold)								
	-40°C	-20°C	0°C	25°C	40°C	50°C	60°C	70°C	85°C
SMD0402-004-12	0.056	0.05	0.045	0.04	0.034	0.026	0.02	0.016	0.013
SMD0402-005-9	0.073	0.065	0.058	0.05	0.044	0.04	0.037	0.033	0.028
SMD0402-010-6	0.14	0.13	0.11	0.10	0.09	0.08	0.07	0.06	0.05
SMD0402-018-6	0.32	0.28	0.20	0.18	0.16	0.14	0.13	0.12	0.10
SMD0402-020-6	0.29	0.26	0.23	0.20	0.18	0.16	0.15	0.13	0.09

## ● Environmental Specifications

Operating / Storage temperature:	-40°C to +85°C
Passive Aging :	+85°C , 1000 hours
Humidity Aging :	+85°C , 85%R.H. 168 hours
Thermal Shock :	MIL-STD-202, Method 107G ; +85°C /-40°C 20 times
Solvent Resistance:	MIL-STD-202, Method 215 No change
Vibration:	MIL-STD-202,Method 201 No change
Maximum Device Surface Temperature in Tripped State :	125°C
Moisture Level Sensitivity	Level 1, J-STD-020C
Storage Conditions:	Light-proof, Hermetically Sealed, Moisture-proof

## ● Physical Dimensions & Recommended Pad Layout



Part Number	A		B		C		D	E
	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Max.
SMD0402-004-12	0.85	1.15	0.35	0.65	0.20	0.80	0.45	0.35
SMD0402-005-9	0.85	1.15	0.35	0.65	0.20	0.80	0.45	0.35
SMD0402-010-6	0.85	1.15	0.35	0.65	0.20	1.00	0.45	0.35
SMD0402-018-6	0.85	1.15	0.35	0.65	0.40	1.00	0.45	0.35
SMD0402-020-6	0.85	1.15	0.35	0.65	0.40	1.00	0.45	0.35

## ● Warning

- Users shall independently assess the suitability of these devices for each of their applications.
- Operation of these devices beyond the stated maximum ratings could result in damage to the devices and lead to electrical arcing and/or fire.
- These devices are intended to protect against the effects of temporary over-current or over-temperature conditions and are not intended to perform as protective devices where such conditions are expected to be repetitive or prolonged in duration.
- Exposure to silicon-based oils, solvents, electrolytes, acids, and similar materials can adversely affect the prolonged of these PPTC devices.
- These devices undergo thermal expansion under fault conditions, and thus shall be provided with adequate space and be protected against mechanical stresses.
- Circuits with inductance may generate a voltage (L di/dt) above the rated voltage of the PPTC device.