

# 0402L Series

## Surface Mount



### Description

The 0402L Series PTC provides surface mount overcurrent protection for applications where space is at a premium and resettable protection is desired.

### Features

- RoHS compliant, lead-free and halogen free
- Fast response to fault currents
- Compact design saves board space
- Low resistance
- Low-profile
- Compatible with high temperature solders
- 0402 size- the smallest PPTC in the market compatible with high temperature solders

### Applications

- USB peripherals
- Disk drives
- CD-ROMs
- Plug and play protection for motherboards and peripherals
- PDAs / digital cameras
- Game console port protection
- Tablet and Notebook PCs
- E-readers

### Additional Information



Resources



Accessories



Samples

### Agency Approvals

Agency	Agency File Number
	E183209
	R50119118

### Electrical Characteristics

Part Number	I <sub>hold</sub> (A)	I <sub>trip</sub> (A)	V <sub>max</sub> (Vdc)	I <sub>max</sub> (A)	P <sub>d</sub> typ. (W)	Maximum Time To Trip		Resistance		Agency Approvals	
						Current (A)	Time (Sec.)	R <sub>min</sub> (Ω)	R <sub>1max</sub> (Ω)		
0402L005	0.05	0.20	9	40	0.5	0.25	1.50	1.500	20.000	X	X
0402L010SL	0.10	0.30	6	40	0.5	0.50	1.00	0.150	2.000	X	X
0402L020SL	0.20	0.50	6	40	0.5	1.00	1.00	0.100	1.250	X	X
0402L035SL	0.35	0.70	6	40	0.5	8.00	0.10	0.050	0.700	X	X
0402L050SL	0.50	1.00	6	40	0.5	8.00	0.10	0.040	0.400	X	X
0402L075SL	0.75	1.50	6	40	0.5	8.00	0.10	0.030	0.300	X	X
0402L100SL	1.00	2.00	6	40	0.5	8.00	0.20	0.030	0.250	X	X

I<sub>hold</sub> = Hold current: maximum current device will pass without tripping in 20°C still air.  
 I<sub>trip</sub> = Trip current: minimum current at which the device will trip in 20°C still air.  
 V<sub>max</sub> = Maximum voltage device can withstand without damage at rated current (I<sub>max</sub>)  
 I<sub>max</sub> = Maximum fault current device can withstand without damage at rated voltage (V<sub>max</sub>)  
 P<sub>d</sub> = Power dissipated from device when in the tripped state at 20°C still air.  
 R<sub>min</sub> = Minimum resistance of device in initial (un-soldered) state.  
 R<sub>1max</sub> = Maximum resistance of device at 20°C measured one hour after tripping or reflow soldering of 260°C for 20 sec.

**Caution:**  
 Operation beyond the specified rating may result in damage and possible arcing and flame.  
 Value specified is determined by using the PWB with 0.010" \* 1.0oz copper traces for 0402L005.  
 Value specified is determined by using the PWB with 0.020" \* 1.5oz copper traces for 0402L010SL, 0402L020SL, 0402L035SL and 0402L050SL.  
 Value specified is determined by using the PWB with 0.060" \* 1.5oz copper traces for 0402L075SL and 0402L100SL

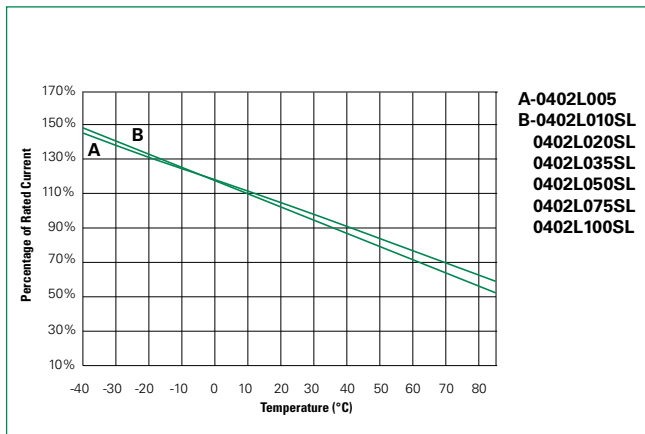
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### Temperature Derating

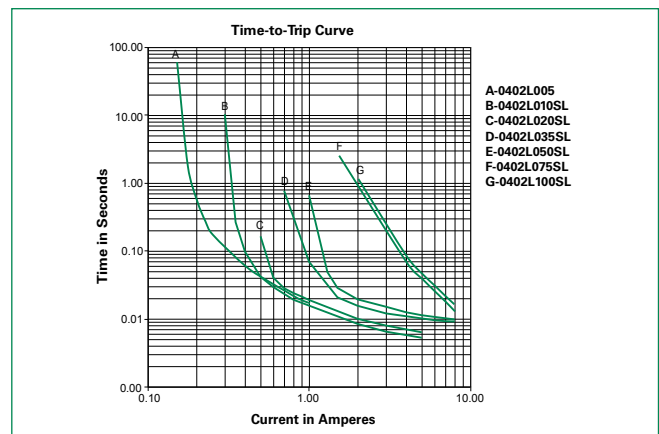
Part Number	Ambient Operation Temperature								
	-40°C	-20°C	0°C	20°C	40°C	50°C	60°C	70°C	85°C
0402L005	0.073	0.065	0.058	0.050	0.044	0.040	0.037	0.033	0.028
0402L010SL	0.14	0.13	0.11	0.10	0.09	0.08	0.07	0.06	0.05
0402L020SL	0.29	0.26	0.23	0.20	0.18	0.16	0.15	0.13	0.09
0402L035SL	0.50	0.45	0.40	0.35	0.31	0.28	0.26	0.22	0.16
0402L050SL	0.71	0.64	0.57	0.50	0.44	0.40	0.37	0.31	0.23
0402L075SL	1.05	0.95	0.85	0.75	0.65	0.60	0.55	0.45	0.30
0402L100SL	1.40	1.25	1.10	1.00	0.85	0.80	0.70	0.60	0.40

### Temperature Derating Curve



Note: Typical Temperature derating curve, refer to table for derating data

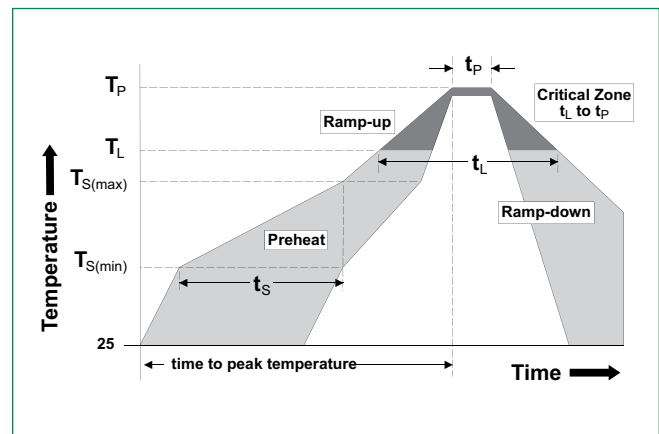
### Average Time Current Curves



The average time current curves and Temperature Derating curve performance is affected by a number of variables, and these curves provided as guidance only. Customer must verify the performance in their application.

### Soldering Parameters

<b>Profile Feature</b>	Pb-Free Assembly	
<b>Average Ramp-Up Rate (<math>T_{S(max)}</math> to <math>T_p</math>)</b>	3°C/second max	
<b>Pre Heat:</b>	<b>Temperature Min (<math>T_{s(min)}</math>)</b>	150°C
	<b>Temperature Max (<math>T_{s(max)}</math>)</b>	200°C
	<b>Time (Min to Max) (<math>t_s</math>)</b>	60 – 180 secs
<b>Time Maintained Above:</b>	<b>Temperature (<math>T_L</math>)</b>	217°C
	<b>Temperature (<math>t_L</math>)</b>	60 – 150 seconds
<b>Peak / Classification Temperature (<math>T_p</math>)</b>	260 <sup>+0/-5</sup> °C	
<b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>	20 – 40 seconds	
<b>Ramp-down Rate</b>	6°C/second max	
<b>Time 25°C to peak Temperature (<math>T_p</math>)</b>	8 minutes Max.	



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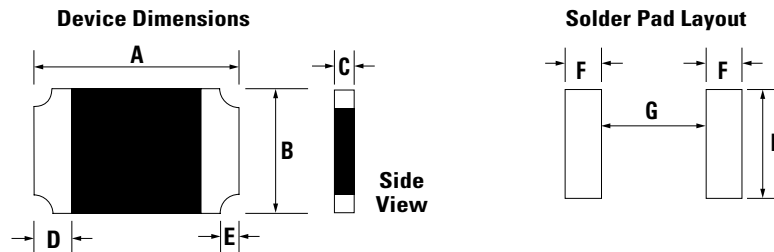
### Physical Specifications

<b>Terminal Material</b>	Solder-Plated Copper (Solder Material: Matte Tin (Sn))
<b>Lead Solderability</b>	Meets ANSI/J-STD-002, Category C.

### Environmental Specifications

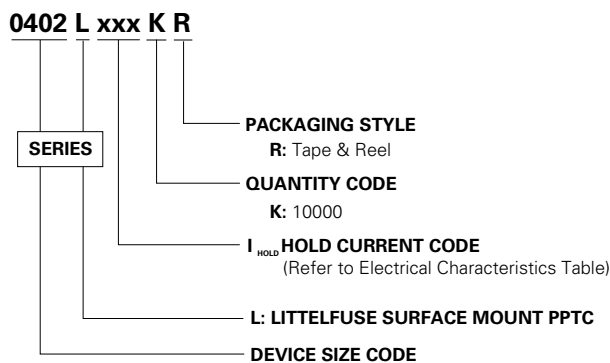
<b>Operating Temperature</b>	-40°C to +85°C
<b>Maximum Device Surface Temperature in Tripped State</b>	125°C
<b>Solvent Resistance</b>	MIL-STD-202, Method 215 No change
<b>Vibration</b>	MIL-STD-883, Method 2007, Condition A No change
<b>Moisture Sensitivity Level</b>	Level 1, J-STD-020

### Dimensions



Part Number	Device Dimension																Solder Pad									
	A		B				C				D				E				F		G		H			
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm						
0402L005	0.03	0.05	0.85	1.15	0.01	0.03	0.35	0.65	0.01	0.02	0.20	0.60	0.004	0.02	0.10	0.45	-	0.02	-	0.40	0.02	0.435	0.02	0.50	0.02	0.60
0402L010SL	0.03	0.05	0.85	1.15	0.01	0.03	0.35	0.65	0.01	0.02	0.20	0.60	0.004	0.02	0.10	0.45	-	0.02	-	0.40	0.02	0.435	0.02	0.50	0.02	0.60
0402L020SL	0.03	0.05	0.85	1.15	0.01	0.03	0.35	0.65	0.01	0.02	0.20	0.60	0.004	0.02	0.10	0.45	-	0.02	-	0.40	0.02	0.435	0.02	0.50	0.02	0.60
0402L035SL	0.03	0.05	0.85	1.15	0.01	0.03	0.35	0.65	0.01	0.02	0.20	0.60	0.004	0.02	0.10	0.45	-	0.02	-	0.40	0.02	0.435	0.02	0.50	0.02	0.60
0402L050SL	0.03	0.05	0.85	1.15	0.01	0.03	0.35	0.65	0.01	0.02	0.20	0.60	0.004	0.02	0.10	0.45	-	0.02	-	0.40	0.02	0.435	0.02	0.50	0.02	0.60
0402L075SL	0.03	0.05	0.85	1.15	0.01	0.03	0.35	0.65	0.01	0.02	0.20	0.60	0.004	0.02	0.10	0.45	-	0.02	-	0.40	0.02	0.435	0.02	0.50	0.02	0.60
0402L100SL	0.03	0.05	0.85	1.15	0.01	0.03	0.35	0.65	0.01	0.02	0.20	0.60	0.004	0.02	0.10	0.45	-	0.02	-	0.40	0.02	0.435	0.02	0.50	0.02	0.60

### Part Ordering Number System



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### Packaging

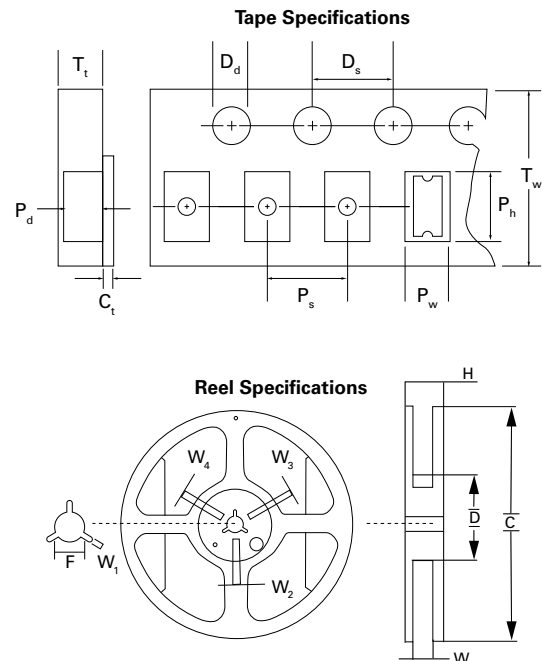
Part Number	Ordering Number	I <sub>hold</sub> (A)	I <sub>hold</sub> Code	Packaging Option	Quantity	Quantity & Packaging Codes
0402L005	0402L005KR	0.05	005	Tape & Reel	10,000	KR
0402L010SL	0402L010SLKR	0.10	010		10,000	KR
0402L020SL	0402L020SLKR	0.20	020		10,000	KR
0402L035SL	0402L035SLKR	0.35	035		10,000	KR
0402L050SL	0402L050SLKR	0.50	050		10,000	KR
0402L075SL	0402L075SLKR	0.75	075		10,000	KR
0402L100SL	0402L100SLKR	1.00	100		10,000	KR

### Tape and Reel Specifications

Tape Specifications: Eia-481-1 (Mm)	
	0402L005 0402L010SL 0402L020SL 0402L035SL 0402L050SL 0402L075SL 0402L100SL
C <sub>t</sub>	0.05 ± 0.01
D <sub>d</sub>	1.5 ± 0.1
D <sub>s</sub>	4.0 ± 0.1
P <sub>d</sub>	0.41 ± 0.1
P <sub>h</sub>	1.12 ± 0.1
P <sub>s</sub>	2.0 ± 0.1
P <sub>w</sub>	0.65 ± 0.03
T <sub>t</sub>	0.61 ± 0.1
T <sub>w</sub>	8.0 ± 0.1
Leader min.	390
Trailer min.	160

REEL DIMENSIONS EIA-481-1 (mm)	
H	12.0 ± 0.5
W	9.0 ± 0.5
D	Ø60 ± 0.5
F	Ø13.0 ± 0.2
C	Ø178 ± 1
W <sub>1</sub>	2.2 ± 0.5
W <sub>2</sub>	3.0 ± 0.5
W <sub>3</sub>	4.0 ± 0.5
W <sub>4</sub>	5.5 ± 0.5
W <sub>4</sub>	5.5+0.5

### Tape and Reel Diagram



#### Warning

- Users should independently evaluate the suitability of and test each product selected for their own application.
- Operation beyond the maximum ratings or improper use may result in device damage and possible electrical arcing and flame.
- These devices are intended for protection against damage caused by occasional overcurrent or overtemperature fault conditions and should not be used when repeated fault conditions or prolonged trip events are anticipated.
- Contamination of the PPTC material with certain silicone-based oils or some aggressive solvents can adversely impact the performance of the devices.
- Device performance can be impacted negatively if devices are handled in a manner inconsistent with recommended electronic, thermal, and mechanical procedures for electronic components.
- PPTC devices are not recommended for installation in applications where the device is constrained such that its PTC properties are inhibited, for example in rigid potting materials or in rigid housings, which lack adequate clearance to accommodate device expansion.
- Operation in circuits with a large inductance can generate a circuit voltage (Ldi/dt) above the rated voltage of the device.

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