

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

Additional Information



Resources



Accessories



Samples

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

Agency Approvals

Agency	Agency File Number
	E486890
	pending

Electrical Characteristics

Part Number	I_{hold} (A)	I_{trip} (A)	V_{max} (Vdc)	I_{max} (A)	P_d typ. (W)	Maximum Time To Trip		Resistance		Agency Approvals	
						Current (A)	Time (Sec.)	R_{min} (Ω)	R_{1max} (Ω)		
0402R005	0.05	0.20	9	40	0.5	0.25	1.50	1.500	20.000	X	X
0402R010SL	0.10	0.30	6	40	0.5	0.50	1.00	0.150	2.000	X	X
0402R020SL	0.20	0.50	6	40	0.5	1.00	1.00	0.100	1.250	X	X
0402R035SL	0.35	0.70	6	40	0.5	8.00	0.10	0.050	0.700	X	X
0402R050SL	0.50	1.00	6	40	0.5	8.00	0.10	0.040	0.400	X	X
0402R075SL	0.75	1.50	6	40	0.5	8.00	0.10	0.030	0.300	X	X
0402R100SL	1.00	2.00	6	40	0.5	8.00	0.20	0.030	0.250	X	X

I_{hold} = Hold current: maximum current device will pass without tripping in 20°C still air.
 I_{trip} = Trip current: minimum current at which the device will trip in 20°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 = Power dissipated from device when in the tripped state at 20°C still air.
 R_{min} = Minimum resistance of device in initial (un-soldered) state.
 R_{1max} = 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 0.020" * 1.5oz copper traces for 0402R005, 0402R010SL, 0402R020SL, 0402R035SL and 0402R050SL
 Value specified is determined by using the PWB with 0.060" * 1.5oz copper traces for 0402R075SL and 0402R100SL

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 performance 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.

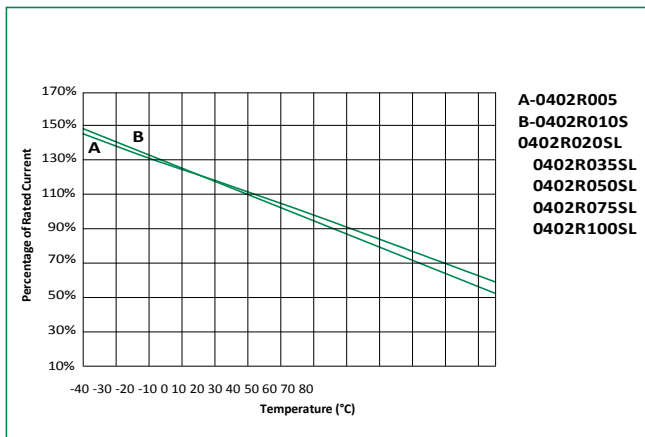
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Surface Mount

Temperature Derating

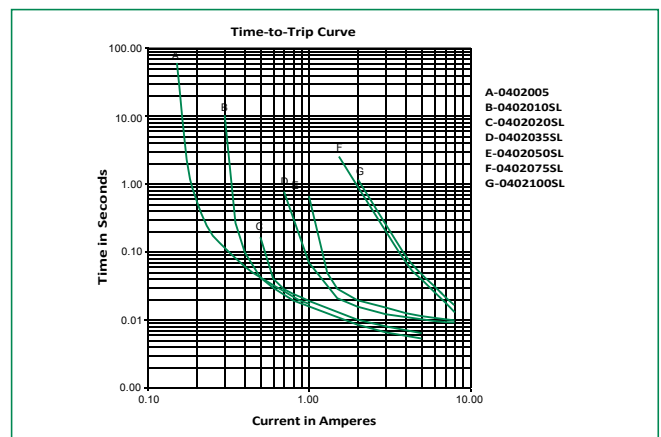
Part Number	Ambient Operation Temperature								
	-40°C	-20°C	0°C	20°C	40°C	50°C	60°C	70°C	85°C
040RR005	0.073	0.065	0.058	0.050	0.044	0.040	0.037	0.033	0.028
0402R010SL	0.14	0.13	0.11	0.10	0.09	0.08	0.07	0.06	0.05
0402R020SL	0.29	0.26	0.23	0.20	0.18	0.16	0.15	0.13	0.09
0402R035SL	0.50	0.45	0.40	0.35	0.31	0.28	0.26	0.22	0.16
0402R050SL	0.71	0.64	0.57	0.50	0.44	0.40	0.37	0.31	0.23
0402R075SL	1.05	0.95	0.85	0.75	0.65	0.60	0.55	0.45	0.30
0402R100SL	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

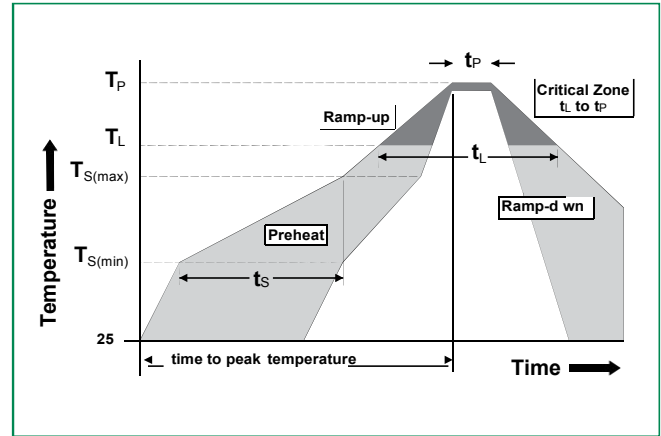


The average time current curves and Temperature Derating curve performance is affected by a number of variables, and these curves provided as guidance only. Customer must verify the performance in their application.

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Soldering Parameters

Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate ($T_{s(max)}$ to T_p)	3°C/second max
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
Time Maintained Above:	
Temperature (T_L)	217°C
Temperature (t_L)	60 – 150 seconds
Peak / Classification Temperature (T_p)	260 ^{+0/-5} °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 (T_p)	8 minutes Max.



- All temperature refer to topside of the package, measured on the package body surface
- If reflow temperature exceeds the recommended profile, devices may not meet the performance requirements
- Recommended reflow methods: IR, vapor phase oven, hot air oven, N₂ environment for lead
- Recommended maximum paste thickness is 0.25mm (0.010inch)
- Devices can be cleaned using standard industry methods and solvents
- Devices can be reworked using the standard industry practices

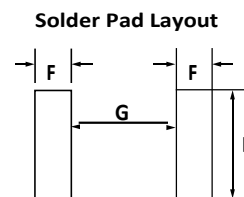
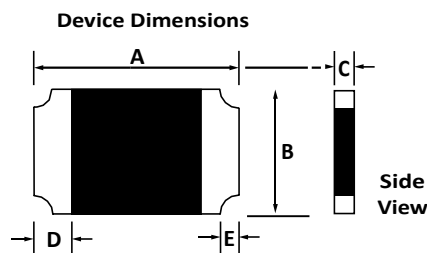
Physical Specifications

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

Environmental Specifications

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

Dimensions

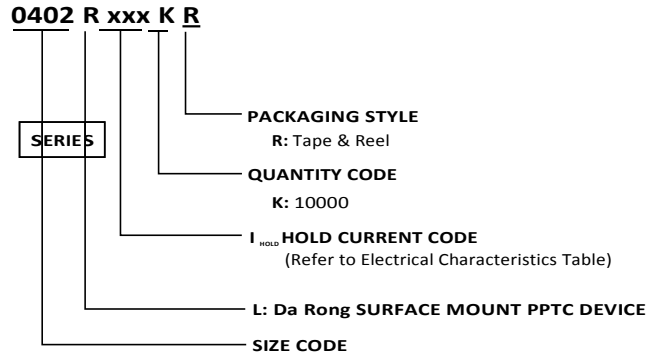


Part Number	Device Dimension												Solder Pad													
	A		B		C		D		E		F	G	H													
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm												
0402R005	0.03	0.05	0.85	1.15	0.01	0.03	0.35	0.65	0.01	0.02	0.20	0.60	0.004	0.02	0.10	0.45	-	0.02	-	0.40	0.02	0.435	0.02	0.50	0.02	0.60
0402R010SL	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
0402R020SL	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
0402R035SL	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
0402R050SL	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
0402R075SL	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
0402R100SL	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

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Part Ordering Number System



Packaging

Part Number	Ordering Number	I_{hold} (A)	I_{hold} Code	Packaging Option	Quantity	Quantity & Packaging Codes
0402R005	0402R005KR	0.05	005	Tape & Reel	10,000	KR
0402R010SL	0402R010SLKR	0.10	010		10,000	KR
0402R020SL	0402R020SLKR	0.20	020		10,000	KR
0402R035SL	0402R035SLKR	0.35	035		10,000	KR
0402R050SL	0402R050SLKR	0.50	050		10,000	KR
0402R075SL	0402R075SLKR	0.75	075		10,000	KR
0402R100SL	0402R100SLKR	1.00	100		10,000	KR

Tape and Reel Specifications

Tape Specifications: Eia-481-1 (Mm)

0402R005
0402R010SL
0402R020SL
0402R035SL
0402R050SL
0402R075SL
0402R100SL

C_t	0.05 ± 0.01
D_d	1.5 ± 0.1
D_s	4.0 ± 0.1
P_d	0.41 ± 0.1
P_h	1.12 ± 0.1
P_s	2.0 ± 0.1
P_w	0.65 ± 0.03
T_t	0.61 ± 0.1
T_w	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	$\varnothing 60 \pm 0.5$
F	$\varnothing 13.0 \pm 0.2$
C	$\varnothing 178 \pm 1$
W_1	2.2 ± 0.5
W_2	3.0 ± 0.5
W_3	4.0 ± 0.5
W_4	5.5 ± 0.5
W_4	5.5 ± 0.5

Tape and Reel Diagram

