

# Surface Mount PTC

## 0ZCC Series

1812 Chip  
RoHS6 Compliant & Halogen-Free

Not recommended for new applications. Please use 0ZCG



## 0ZCC Series Fuse



## Maximum Voltage

6-60V (per table)

## Temperature Range

-40°C to 85°C

## Agency Approval

TUV (Std. EN60738-1-1 , Cert. R50102117& R50102187)  
UL Component (Std. UL1434, File E305051)  
UL Conditions of Acceptability:

1. These devices have been investigated for use in safety circuits and are suitable as a limiting device.
2. These devices have been calibrated to limit the current to 8 amps within 5 seconds , per ANSI/NFPA 70, "National Electrical Code"

## Application



All high-density boards

## Product Features



1812 Chip Size , Fast Trip Time, Low DCR Resistance

## Operating (Hold Current) Range

140mA - 3A

HALOGEN FREE =   
LEAD FREE = 

## Electrical Characteristics (23°C)

	Part Number	Hold Current IH, A	Trip Current IT, A	Max Time to Trip		Maximum Current Imax, A	Rated Voltage Vmax, Vdc	Typical Power Pd, W	Resistance Tolerance		Agency Approvals	
				Current A	Time Sec				Rmin Ohms	R1max Ohms		
A	0ZCC0014FF2C	0.14	0.30	8.0	0.008	10	60	0.8	1.200	6.500	Y	Y
B	0ZCC0020FF2C	0.20	0.40	8.0	0.020	10	30	0.8	0.800	5.000	Y	Y
C	0ZCC0035FF2C	0.35	0.70	8.0	0.100	40	16	0.8	0.320	1.500	Y	Y
D	0ZCC0050FF2C	0.50	1.00	8.0	0.150	40	16	0.8	0.150	1.000	Y	Y
E	0ZCC0075FF2C	0.75	1.50	8.0	0.200	40	16	0.8	0.110	0.450	Y	Y
	0ZCC0075AF2B	0.75	1.50	8.0	0.200	40	24	1.0	0.110	0.290	Y	Y
	0ZCC0075BF2B	0.75	1.50	8.0	0.200	40	33	1.0	0.110	0.400	Y	Y
F	0ZCC0110FF2C	1.10	2.20	8.0	0.300	100	8	0.8	0.040	0.210	Y	Y
	0ZCC0110AF2C	1.10	1.95	8.0	0.500	40	16	0.8	0.040	0.180	Y	Y
	0ZCC0110BF2B	1.10	2.20	8.0	0.500	100	24	1.0	0.060	0.200	Y	Y
G	0ZCC0125FF2C	1.25	2.50	8.0	0.400	40	6	0.8	0.050	0.140	Y	Y
	0ZCC0150FF2C	1.50	3.00	8.0	0.500	40	6	0.8	0.040	0.110	Y	Y
H	0ZCC0150AF2C	1.50	3.00	8.0	0.500	100	12	1.0	0.040	0.110	Y	Y
	0ZCC0150BF2C	1.50	3.00	8.0	1.500	100	24	1.0	0.040	0.120	Y	Y
	0ZCC0160FF2C	1.60	3.20	8.0	0.500	40	6	0.8	0.030	0.100	Y	Y
I	0ZCC0160AF2C	1.60	3.20	8.0	1.000	100	12	1.0	0.030	0.100	Y	Y
	0ZCC0160BF2C	1.60	3.20	8.0	1.000	100	16	1.0	0.030	0.100	Y	Y
	0ZCC0200FF2C	2.00	3.50	8.0	2.000	100	8	1.0	0.020	0.070	Y	Y
K	0ZCC0260FF2C	2.60	5.00	8.0	2.500	100	6	1.0	0.015	0.047	Y	Y
	0ZCC0260AF2B	2.60	5.00	8.0	5.000	100	13.2	1.3	0.015	0.050	Y	Y
	0ZCC0260BF2B	2.60	5.00	8.0	5.000	100	16	1.3	0.015	0.050	Y	Y
L	0ZCC0300FF2B	3.00	5.00	8.0	4.000	100	6	1.0	0.012	0.040	Y	Y

- I<sub>H</sub> Hold Current-maximum current at which the device will not trip in still air at 23°C.  
I<sub>T</sub> Trip current-minimum current at which the device will always trip in still air at 23°C.  
I<sub>max</sub> Maximum fault current device can withstand without damage at rated voltage (V<sub>max</sub>).  
V<sub>max</sub> Maximum voltage device can withstand without damage at its rated current.  
P<sub>d</sub> Typical power dissipated by device when in tripped state in 23°C still air environment.  
R<sub>min</sub> Minimum device resistance at 23°C.  
R<sub>1max</sub> Maximum device resistance at 23°C, 1 hour after initial device trip, or after being soldered to PCB in end application.

Specifications subject to change without notice

# Surface Mount PTC

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0ZCC Apr2013C

### PTC's – Basic Theory of Operation / "Tripped" Resistance Explanation

Fundamentally, a Bel PTC consists of a block of polymeric material containing conductive filler and bonded between two conductive, planar terminations.

At currents below the device I<sub>HOLD</sub> rating, AND at temperatures below 100C, the PTC maintains a resistance value below its R<sub>1 MAX</sub> rating.

As the device's temperature approaches 130C, either due to an increase in ambient temperature or a current exceeding its I<sub>TRIP</sub> rating, volumetric expansion of the filled polymer breaks apart the majority of conductive pathways across the terminals created by chain contact of adjacent filler particles and device resistance increases sharply by several orders of magnitude.

At the much higher "Tripped" resistance, there is just enough leakage current to allow internal heating to "hold" the device in its tripped state (around 125C) until power is interrupted. Once power is removed, the PTC's core cools and contracts allowing conductive chains to reform and return the device to its low resistance state.

The catalog data for each device specifies a "**Typical Power**" value. This is the power required to exactly match the heat lost by the tripped device to its ambient surroundings at 23C. By Ohm's Law, power can be stated as:  $W = E^2/R$ . Thus the approximate resistance of a "Tripped" PTC can be determined by:

$R = E^2/W$ , where "E" is the voltage appearing across the PTC (usually the supply's open circuit voltage), and "W" is the **Typical Power** value for the particular PTC.

Since the PPTC acts to maintain a constant internal temperature, its apparent resistance will change based upon applied voltage and, to a lesser degree, ambient conditions. Consider the following example....

A PTC with a **Typical Power** of 1 watt protecting a circuit using a 60V supply will demonstrate an apparent, tripped resistance "R" of:

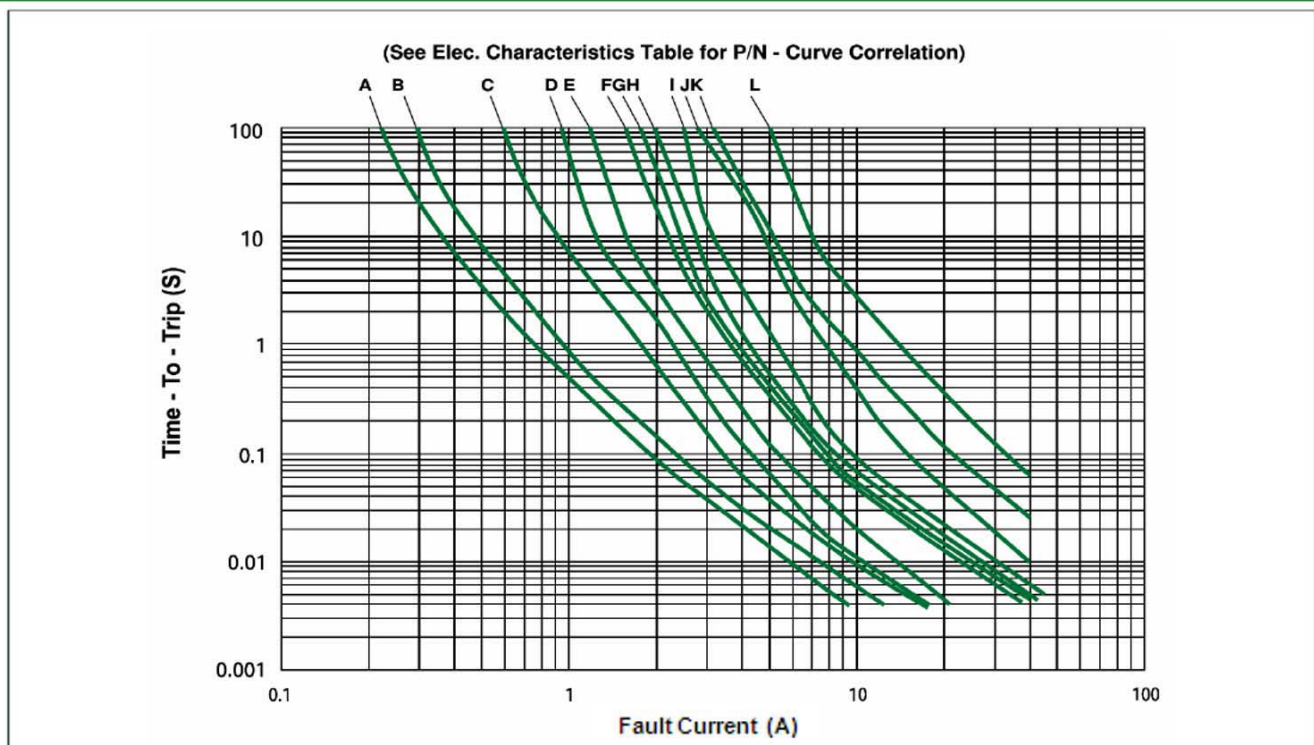
$$R = 60^2/1 = 3,600 \text{ ohms}$$

This same tripped device when used to protect a 12V circuit would now present an apparent resistance of:

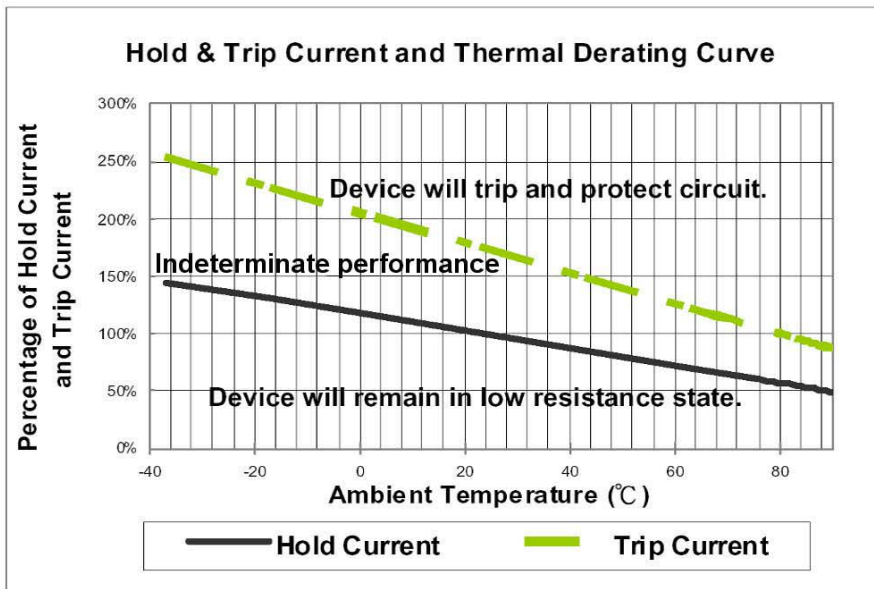
$$R = 12^2/1 = 144 \text{ ohms}$$

The value for Typical Power is "typical" because any physical factors that affect heat loss (such as ambient temperature or air convection) will somewhat alter the level of power that the PTC needs to maintain its internal temperature. In short, PTCs do not exhibit a constant, quantifiable tripped resistance value.

### Typical Time - To - Trip at 23°C



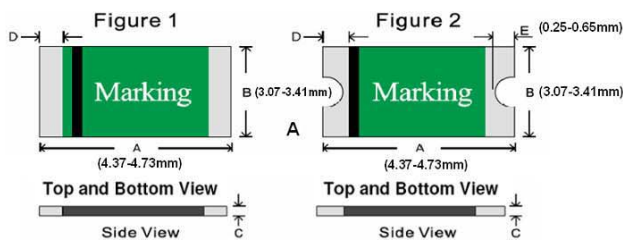
### Thermal Derating Curve



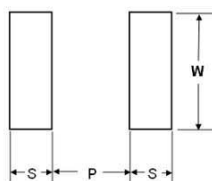
#### Cautionary Notes

1. Operation beyond the specified maximum ratings or improper use may result in damage and possible electrical arcing and/or flame.
2. These Polymer PTC (PPTC) devices are intended for protection against occasional overcurrent/ overtemperature fault conditions and may not be suitable for use in applications where repeated and/or prolonged fault conditions are anticipated.
3. Avoid contact of PTC device with chemical solvent. Prolonged contact may adversely impact the PTC performance.
4. These PTC devices may not be suitable for use in circuits with a large inductance, as the PTC trip can generate circuit voltage spikes above the PTC rated voltage.
5. These devices are intended for use in DC voltage applications only. Use in AC voltage applications should be first discussed with Bel Fuse engineering
6. Not recommended for use on potted or conformal coated PCB's. Restriction of free air flow could affect electrical performance and/or result in device failure. Consult Bel Fuse engineering.
7. In the "Indeterminate Performance / grey zone", tripping may occur but cannot be relied upon. For special circumstances considering use within this region, consult Bel Fuse Engineering.

### Mechanical Dimensions



### Pad Layout



The dimensions in the table below provide the recommended pad layout.

P		S		W	
Nominal		Nominal		Nominal	
mm	Inch	mm	Inch	mm	Inch
3.45	0.136	1.78	0.070	3.50	0.138

### PTC Marking



"b", H code.

All dimensions in mm.

Part Number	Fig.	C		D		E	
		Min	Max	Min	Max	Min	Max
0ZCC0014FF2C Thru 0ZCC0075FF2C	1	0.35	0.90	0.30	0.95	...	...
0ZCC0075AF2B	2	0.80	1.55	0.25	0.95	0.25	0.65
0ZCC0075BF2B	2	0.80	1.55	0.25	0.95	0.25	0.65
0ZCC0110FF2C	1	0.25	0.55	0.30	0.95	...	...
0ZCC0110AF2C	1	0.25	0.90	0.30	0.95	...	...
0ZCC0110BF2B	2	0.80	1.30	0.25	0.95	0.25	0.65
0ZCC0125FF2C	1	0.25	0.55	0.30	0.95	...	...
0ZCC0150FF2C	1	0.25	0.55	0.30	0.95	...	...
0ZCC0150AF2C	2	0.60	1.10	0.25	0.95	0.25	0.65
0ZCC0150BF2C	2	0.60	1.55	0.25	0.95	0.25	0.65
0ZCC0160FF2C	1	0.25	0.90	0.30	0.95	...	...
0ZCC0160AF2C	2	0.60	1.35	0.25	0.95	0.25	0.65
0ZCC0160BF2C	2	0.60	1.35	0.25	0.95	0.25	0.65
0ZCC0200FF2C	2	0.55	1.20	0.25	0.95	0.25	0.65
0ZCC0260FF2C	2	0.55	1.20	0.25	0.95	0.25	0.65
0ZCC0260AF2B	2	0.80	1.55	0.25	0.95	0.25	0.65
0ZCC0260BF2B	2	0.80	1.55	0.25	0.95	0.25	0.65
0ZCC0300FF2B	2	0.80	1.55	0.25	0.95	0.25	0.65

Part Number	Tape/Reel Qty	Code	
		bxxxx	xxx-xx
0ZCC0014FF2C	2,000	0014	
0ZCC0020FF2C	2,000	0020	
0ZCC0035FF2C	2,000	0035	
0ZCC0050FF2C	2,000	0050	
0ZCC0075FF2C	2,000	0075	
0ZCC0075AF2B	1,500		075 24
0ZCC0075BF2B	1,500		075 33
0ZCC0110FF2C	2,000	0110	
0ZCC0110AF2C	2,000		110 18
0ZCC0110BF2B	1,500		110 24
0ZCC0125FF2C	2,000	0125	
0ZCC0150FF2C	2,000	0150	
0ZCC0150AF2C	2,000		150 12
0ZCC0150BF2C	2,000		150 24
0ZCC0160FF2C	2,000	0160	
0ZCC0160AF2C	2,000		160 12
0ZCC0160BF2C	2,000		160 16
0ZCC0200FF2C	2,000		200 A
0ZCC0260FF2C	2,000	0260	
0ZCC0260AF2B	1,500		260 13
0ZCC0260BF2B	1,500		260 16
0ZCC0300FF2B	1,500	0300	

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### Termination Pad Materials

Matte Tin-plated Copper

# Surface Mount PTC

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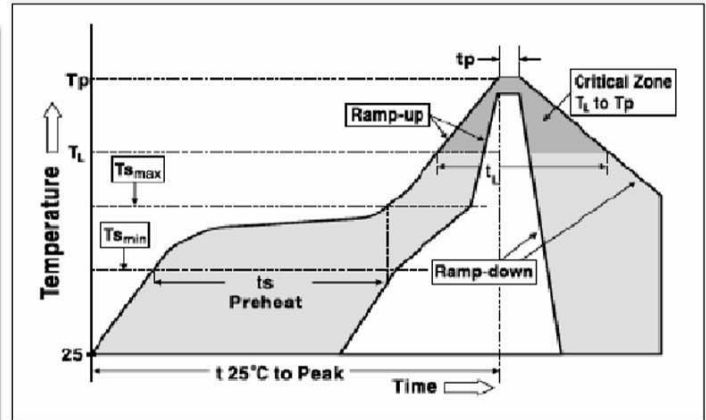
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### Solder Reflow and Rework Recommendations

Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (T <sub>smax</sub> to T <sub>p</sub> )	3 °C/second max.
<b>Preheat :</b>	
Temperature Min (T <sub>smin</sub> )	150 °C
Temperature Max (T <sub>smax</sub> )	200 °C
Time (t <sub>smin</sub> to t <sub>smax</sub> )	60-180 seconds
<b>Time maintained above:</b>	
Temperature (T <sub>L</sub> )	217 °C
Time (t <sub>L</sub> )	60-150 seconds
<b>Peak/Classification Temperature (T<sub>p</sub>) :</b>	260 °C
<b>Time within 5°C of actual Peak :</b>	
Temperature (t <sub>p</sub> )	20-40 seconds
<b>Ramp-Down Rate :</b>	6 °C/second max.
<b>Time 25 °C to Peak Temperature :</b>	8 minutes max.



### Solder Reflow

Due to "lead free / RoHS6" construction of these PTC devices, the required Temperature and Dwell Time in the "Soldering" zone of the reflow profile are greater than those used for non-RoHS devices.

1. Recommended reflow methods ; IR , vapor phase oven , hot air oven.
2. Not Recommended For Wave Solder / Direct Immersion.
3. Recommended maximum ; paste thickness is 0.25mm.
4. Devices are compatible with standard industry cleaning solvents and methods.

### Caution

If reflow temperature / dwell times exceed the recommended profile, the electrical performance of the PTC may be affected.

Rework : MIL-STD-202G Method 210F. Test Condition A.

### Standard Packaging

Part Number	Tape/Reel Qty
0ZCC0014FF2C Thru	2,000
0ZCC0075FF2C	
0ZCC0075AF2B	1,500
0ZCC0075BF2B	1,500
0ZCC0110FF2C	2,000
0ZCC0110AF2C	2,000
0ZCC0110BF2B	1,500
0ZCC0125FF2C	2,000
0ZCC0150FF2C	2,000
0ZCC0150AF2C	2,000
0ZCC0150BF2C	2,000
0ZCC0160FF2C	2,000
0ZCC0160AF2C	2,000
0ZCC0160BF2C	2,000
0ZCC0200FF2C	2,000
0ZCC0260FF2C	2,000
0ZCC0260AF2B	1,500
0ZCC0260BF2B	1,500
0ZCC0300FF2B	1,500

2000 or 1500 fuses in 7 inches dia. Reel, 8mm wide tape, 4mm pitch, per EIA-481 (equivalent IEC-286 part 3).

### P/N Explanation and Ordering Information

	0ZCC	0XXX	X	X	XX
PTC series	0ZCC, 1812 Size				
I HOLD Rating	Refer to Part Number and IH Rating in Electrical Characteristics Table on P.1.				
Electrical Characteristics	F = Standard Design A to Z (except F) = Special, customer spec, DCR sort, etc.				
Mechanical Features	F = Standard Design A to Z (except F) = Special, customer spec, lead forming, etc.				
Tape & Reel Qty	See standard packaging				

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