Radial Leaded PTC

0ZRP Series

HF Pb 0ZRP Series — RoHS 2 Compliant

Application

Wide variety of electronic equipment

Product Features

- Solid state, Radial leaded product ideal for up to 60VDC
- AEC-Q Compliant
- Meets Bel automotive qualification*

  * - Largely based on internal AEC-Q test plan

Operating (Hold Current) Range

500mA - 5A

Maximum Voltage

60VDC

Temperature Range

-40℃ to 85℃

Agency Approval

UL Recognized 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”.



AEC-Q Compliant

LEAD FREE = Pb
HALOGEN FREE = HF

Electrical Characteristics (23℃)

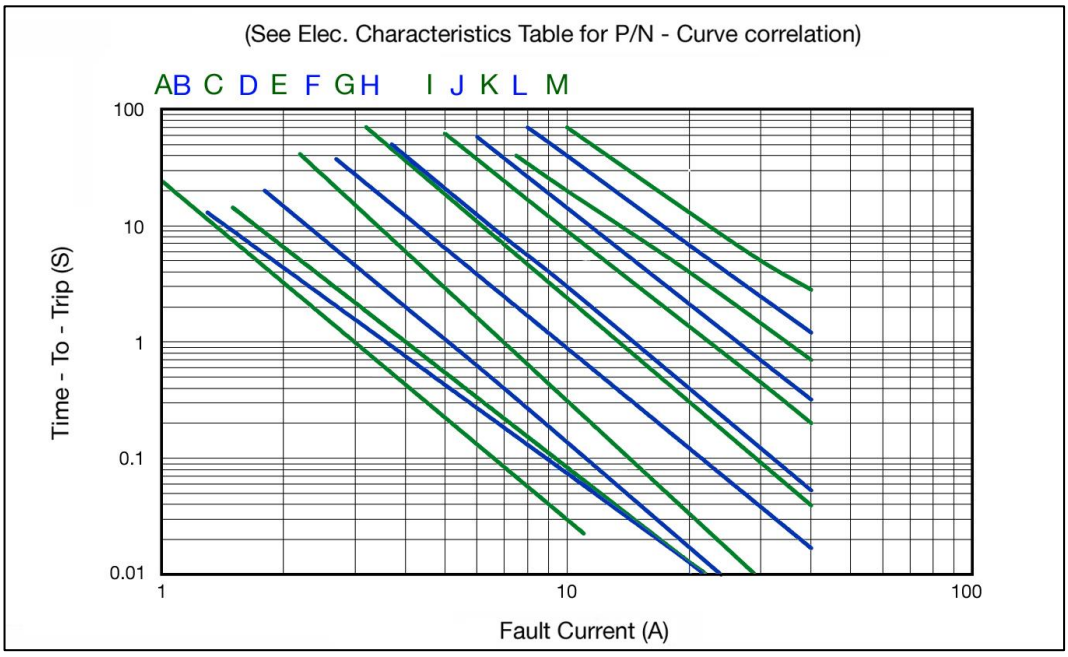
	Part Number (Bulk)	Hold Current	Trip Current	Max Time to Trip		Max Current	Rated Voltage	Typical Power	Resistance Tolerance		Agency Approvals
									Rmin	R1max	
		I_H, A	I_T, A	A	Time, Sec	I_{max}, A	V_{max}, V_{dc}	P_d, W	Ohms	Ohms	
A	0ZRP0050FF1E	0.50	1.00	8.00	0.8	40	60	1.00	0.320	0.900	Y
B	0ZRP0065FF1E	0.65	1.30	8.00	1.0	40	60	1.25	0.250	0.720	Y
C	0ZRP0075FF1E	0.75	1.50	8.00	1.5	40	60	1.40	0.200	0.640	Y
D	0ZRP0090FF1E	0.90	1.80	8.00	2.0	40	60	1.50	0.190	0.520	Y
E	0ZRP0110FF1E	1.10	2.20	8.00	3.0	40	60	2.20	0.170	0.470	Y
F	0ZRP0135FF1A	1.35	2.70	8.00	4.5	40	60	2.30	0.110	0.370	Y
G	0ZRP0160FF1A	1.60	3.20	8.20	9.0	40	60	2.40	0.100	0.320	Y
H	0ZRP0185FF1A	1.85	3.70	9.25	12.6	40	60	2.60	0.060	0.250	Y
I	0ZRP0250FF1A	2.50	5.00	12.50	15.6	40	60	2.80	0.040	0.140	Y
J	0ZRP0300FF1A	3.00	6.00	15.00	19.8	40	60	3.20	0.030	0.080	Y
K	0ZRP0375FF1A	3.75	7.50	18.75	22.0	40	60	3.40	0.017	0.060	Y
L	0ZRP0400FF1A	4.00	8.00	20.00	24.0	40	60	3.70	0.014	0.060	
M	0ZRP0500FF1A	5.00	10.00	25.00	28.0	40	60	5.00	0.012	0.050	

I_H Hold Current-maximum current at which the device will not trip in still air at 23℃.
I_T Trip current-minimum current at which the device will always trip in still air at 23℃.
Imax Maximum fault current device can withstand without damage at rated voltage (Vmax).
Vmax Maximum voltage device can withstand without damage at its rated current.
Pd Typical power dissipated by device when in tripped state in 23℃ still air environment.
Rmin Minimum device resistance at 23℃.
R1max Maximum device resistance at 23℃, 1 hour after initial device trip, or after being soldered to PCB in end application.

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 IHOLD rating, AND at temperatures below 100C, the PTC maintains a resistance value below its R1 MAX rating.
As the device's temperature approaches 130C, either due to an increase in ambient temperature or a current exceeding its I TRIP 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 or 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 ohms
This same tripped device when used to protect a 12V circuit would now present an apparent resistance of:
R = 12^2/1 = 144 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.

Type Time – To – Trip at 23℃



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Physical Specifications

Lead material:
Matte tin plated copper, size / diameter as shown in Drawings and Table under Product Dimensions.
Soldering charactcristics
MIL-STD-202, Method 208H.
Insulating coating
Flame retardant epoxy, meets UL-94-V-0 requirements.

PTC Marking

“bel” or “b”, , IH code and “RP” .

Product Dimensions

All dimensions in mm.

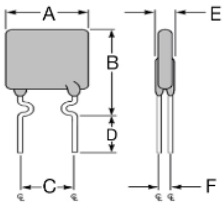


Fig.1
Lead Size :24AWG
Φ 0.51 mm Diameter

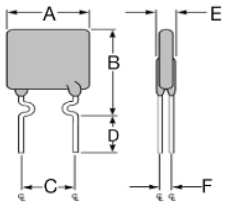


Fig.2
Lead Size : 20AWG
Φ 0.81 mm Diameter

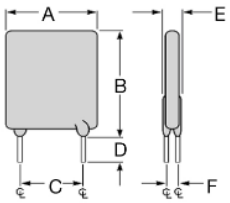
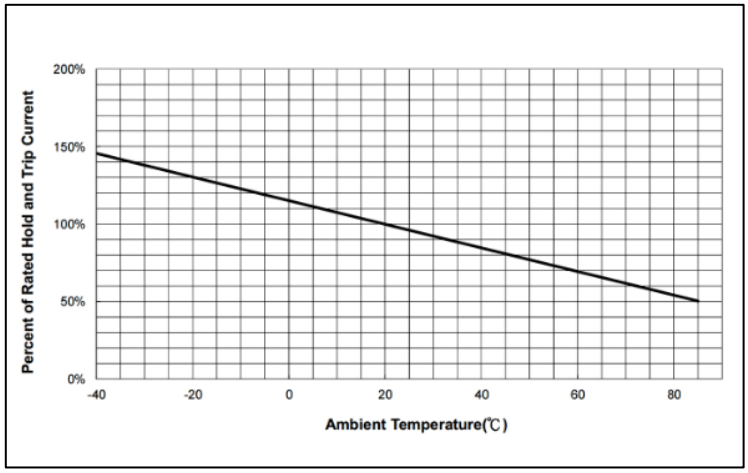


Fig.3
Lead Size : 20AWG
Φ 0.81 mm Diameter

Part Number	Fig.	A	B	C	D	E	F
		Max	Max	Typical	Min	Max	Typical
0ZRP0050FF	1	7.10	11.43	5.1	7.6	3.56	1.1
0ZRP0065FF	1	7.11	12.20	5.1	7.6	3.56	1.1
0ZRP0075FF	1	7.87	12.20	5.1	7.6	3.56	1.1
0ZRP0090FF	1	7.87	13.97	5.1	7.6	3.56	1.1
0ZRP0110FF	2	7.60	15.00	5.1	7.6	4.10	1.4
0ZRP0135FF	3	10.20	17.00	5.1	7.6	3.81	1.4
0ZRP0160FF	3	12.20	18.30	5.1	7.6	3.81	1.4
0ZRP0185FF	3	13.00	18.80	5.1	7.6	3.81	1.4
0ZRP0250FF	3	14.00	20.60	5.1	7.6	3.00	1.4
0ZRP0300FF	3	16.50	21.20	5.1	7.6	3.00	1.4
0ZRP0375FF	3	16.50	25.20	10.2	7.6	3.00	1.4
0ZRP0400FF	3	21.00	24.90	10.2	7.6	3.00	1.4
0ZRP0500FF	3	24.10	29.00	10.2	7.6	3.00	1.4

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.

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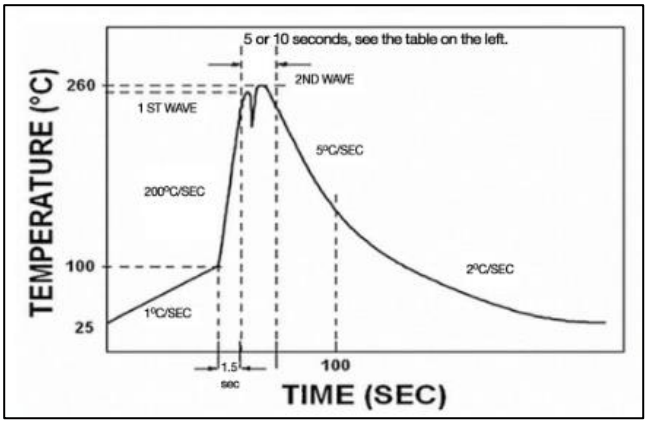
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Environmental Specifications

Temperature cycling	JESD22 Method JA-104
Biased humidity	MIL-STD-202 Method 103
Operational life	MIL-STD-202 Method 108
Terminal strength	AEC-Q200-004
Resistance to solvents	MIL-STD-202 Method 215
Mechanical shock	MIL-STD-202 Method 213
Vibration	MIL-STD-202 Method 204
Resistance to soldering heat	MIL-STD-202 Method 210
Thermal shock	MIL-STD-202 Method 107
Solderability	ANSI/J-STD-002

Soldering Parameters

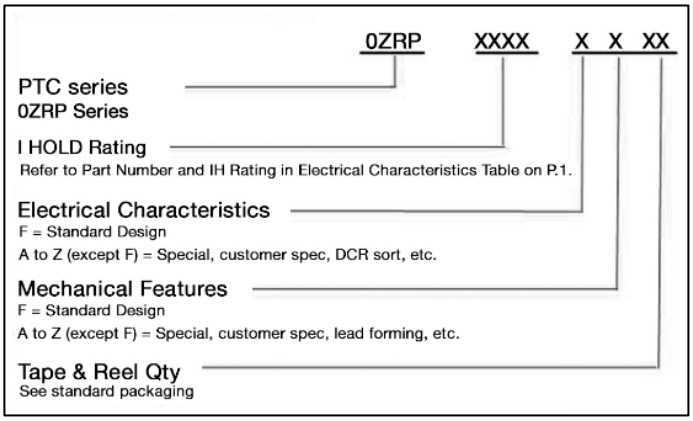
Lead-free Wave Soldering Profile	
Wave Solder Parameter	
Average ramp-up rate	200℃ / second
Heating rate during preheat	typical 1 - 2℃ / second Max 4℃ / second
Final preheat temperature	within 125℃ of soldering temperature
Peak temperature Tp	260℃
Time within +0℃ / -5℃ of actual peak temperature	0.5A-1.85A: 5 seconds; 2.5A-5A:10 seconds
Ramp-down rate	5℃ / second max.



Standard Packaging

Part Number	Bulk		Reel/Tape	
	Pcs/Box	P/N Code	Pcs/Reel	P/N Code
0ZRP0050FF - 0ZRP0075FF	3000	1E	3000	2E
0ZRP0090FF 0ZRP0110FF	3000	1E	1500	2B
0ZRP0135FF - 0ZRP0185FF	1000	1A	1500	2B
0ZRP0250FF - 0ZRP0375FF	1000	1A	1000	2A
0ZRP0400FF - 0ZRP0500FF	800	1A	1000	2A

P/N Explanation and Ordering Information



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