



**Features**

- Compliant with AEC-Q200 Rev-C- Stress Test Qualification for Passive Components in Automotive Applications
- 100 % electrically compatible with all previous generations of 1812 SMT devices
- Compatible with Pb and Pb-free solder reflow profiles
- RoHS compliant\* and halogen free\*\*
- Surface mount packaging for automated assembly
- Agency recognition:  
- Standard 4532 mm (1812 mils) footprint

**PRCP-MSMF Series - Polymer Resettable Circuit Protectors**

**Electrical Characteristics**

Model	V max. Volts	I max. Amps	I <sub>hold</sub>	I <sub>trip</sub>	Resistance		Max. Time To Trip		Tripped Power Dissipation
			Amperes at 23 °C		Ohms at 23 °C		Amperes at 23 °C	Seconds at 23 °C	Watts at 23 °C
			Hold	Trip	R <sub>Min.</sub>	R <sub>1Max.</sub>			Typ.
PRCP-MSMF010	60.0	40	0.10	0.30	0.70	15.00	0.5	1.50	0.8
PRCP-MSMF014	60.0	40	0.14	0.34	0.40	6.50	1.5	0.15	0.8
PRCP-MSMF020	30.0	80	0.20	0.40	0.40	6.00	6.0	0.06	0.8
PRCP-MSMF020/60 ***	60.0	40	0.20	0.40	0.40	6.00	1.5	0.15	0.8
PRCP-MSMF030	30.0	10	0.30	0.60	0.30	3.00	8.0	0.10	0.8
PRCP-MSMF050	15.0	100	0.50	1.00	0.15	1.00	8.0	0.15	0.8
PRCP-MSMF075	13.2	100	0.75	1.50	0.11	0.45	8.0	0.20	0.8
PRCP-MSMF075/24	24.0	40	0.75	1.50	0.11	0.45	8.0	0.20	0.8
PRCP-MSMF110	6.0	100	1.10	2.20	0.04	0.21	8.0	0.30	0.8
PRCP-MSMF110/16	16.0	100	1.10	2.20	0.04	0.21	8.0	0.30	0.8
PRCP-MSMF110/24X***	24.0	20	1.10	2.20	0.06	0.18	8.0	0.50	0.8
PRCP-MSMF125	6.0	100	1.25	2.50	0.035	0.14	8.0	0.40	0.8
PRCP-MSMF150	6.0	100	1.50	3.00	0.03	0.120	8.0	0.5	0.8
PRCP-MSMF150/24X	24.0	20	1.50	3.00	0.03	0.120	8.0	1.50	1.0
PRCP-MSMF160	8.0	100	1.60	2.80	0.035	0.099	8.0	2.0	0.8
PRCP-MSMF200	8.0	40	2.00	4.00	0.020	0.080	8.0	3.0	0.8
PRCP-MSMF250/16X	16.0	100	2.50	5.00	0.015	0.100	8.0	5.0	1.2
PRCP-MSMF260	6.0	100	2.60	5.20	0.015	0.080	8.0	5.0	0.8

\*\*\* UL and TÜV

**Environmental Characteristics**

Operating Temperature	.....	-40 °C to +85 °C
Maximum Device Surface Temperature in Tripped State	.....	125 °C
Passive Aging	.....	+85 °C, 1000 hours ..... ±5 % typical resistance change
Humidity Aging	.....	+85 °C, 85 % R.H. 1000 hours ..... ±5 % typical resistance change
Thermal Shock	.....	+85 °C to -40 °C, 20 times ..... ±10 % typical resistance change
Solvent Resistance	.....	MIL-STD-202, Method 215 ..... No change
Vibration	.....	MIL-STD-883C, Method 2007.1, Condition A ..... No change

**Test Procedures And Requirements For Model PRCP-MSMF Series**

Test	Test Conditions	Accept/Reject Criteria
Visual/Mech	Verify dimensions and materials.....	Per P.R.C.P. physical description
Resistance	In still air @ 23 °C.....	R <sub>min</sub> ≤ R ≤ R <sub>1max</sub>
Time to Trip	At specified current, V <sub>max</sub> , 23 °C .....	T ≤ max.time to trip (seconds)
Hold Current	30 min at I <sub>hold</sub> .....	No trip
Trip Cycle Life	V <sub>max</sub> , I <sub>max</sub> , 100 cycles .....	No arcing or burning
Trip Endurance	V <sub>max</sub> , 48 hours .....	No arcing or burning
Solderability	ANSI/J-STD-002.....	95 % min. coverage

UL File Number ..... E300792

TÜV Certificate Number..... R50383882

\*RoHS Directive 2015/863, Mar. 31, 2015 and Annex.

\*\*NIDEC COMPONENTS is using the definition that appears to be prevalent definition used as the industry standard at this time. The NIDEC COMPONENTS definition of "halogen-free" is: Bromine(Br) content: ≤ 900 ppm; Chlorine(Cl) content: ≤ 900 ppm; Total Br + Cl content: ≤ 1500 ppm.

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Users should verify actual device performance in their specific applications.

## Applications

- Overcurrent and overtemperature protection of automotive electronics
- Hard disk drives
- PC motherboards
- PC peripherals
- Point-of-sale (POS) equipment
- PCMCIA cards
- USB port protection - USB 2.0, 3.0 & OTG
- HDMI 1.4 Source protection

## PRCP-MSMF Series - Polymer Resettable Circuit Protectors

### Product Dimensions (see next page for outline drawings)

Model	A		B		C		D	Style
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	
PRCP-MSMF010	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.70}{(0.028)}$	$\frac{1.10}{(0.043)}$	$\frac{0.30}{(0.012)}$	1
PRCP-MSMF014	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.70}{(0.028)}$	$\frac{1.10}{(0.043)}$	$\frac{0.30}{(0.012)}$	1
PRCP-MSMF020	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.70}{(0.028)}$	$\frac{1.10}{(0.043)}$	$\frac{0.30}{(0.012)}$	1
PRCP-MSMF020/60	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.70}{(0.028)}$	$\frac{1.10}{(0.043)}$	$\frac{0.30}{(0.012)}$	1
PRCP-MSMF030	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.70}{(0.028)}$	$\frac{1.10}{(0.043)}$	$\frac{0.30}{(0.012)}$	1
PRCP-MSMF050	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.55}{(0.022)}$	$\frac{0.85}{(0.033)}$	$\frac{0.30}{(0.012)}$	1
PRCP-MSMF075	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.55}{(0.022)}$	$\frac{0.85}{(0.033)}$	$\frac{0.30}{(0.012)}$	1
PRCP-MSMF075/24	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.55}{(0.022)}$	$\frac{0.85}{(0.033)}$	$\frac{0.30}{(0.012)}$	1
PRCP-MSMF110	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.45}{(0.018)}$	$\frac{0.85}{(0.033)}$	$\frac{0.30}{(0.012)}$	1
PRCP-MSMF110/16	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.45}{(0.018)}$	$\frac{0.85}{(0.033)}$	$\frac{0.30}{(0.012)}$	1
PRCP-MSMF110/24X	$\frac{4.37}{(0.172)}$	$\frac{4.83}{(0.190)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.70}{(0.028)}$	$\frac{1.60}{(0.063)}$	$\frac{0.30}{(0.012)}$	2
PRCP-MSMF125	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.55}{(0.022)}$	$\frac{0.85}{(0.033)}$	$\frac{0.30}{(0.012)}$	1
PRCP-MSMF150	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.55}{(0.022)}$	$\frac{0.85}{(0.033)}$	$\frac{0.30}{(0.012)}$	1
PRCP-MSMF150/24X	$\frac{4.37}{(0.172)}$	$\frac{4.83}{(0.190)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.70}{(0.028)}$	$\frac{1.60}{(0.063)}$	$\frac{0.30}{(0.012)}$	2
PRCP-MSMF160	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.55}{(0.022)}$	$\frac{0.85}{(0.033)}$	$\frac{0.30}{(0.012)}$	1
PRCP-MSMF200	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.55}{(0.022)}$	$\frac{0.85}{(0.033)}$	$\frac{0.30}{(0.012)}$	1
PRCP-MSMF250/16X	$\frac{4.37}{(0.172)}$	$\frac{4.83}{(0.190)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.70}{(0.028)}$	$\frac{1.60}{(0.063)}$	$\frac{0.30}{(0.012)}$	2
PRCP-MSMF260	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.48}{(0.019)}$	$\frac{0.85}{(0.033)}$	$\frac{0.30}{(0.012)}$	1

#### Packaging :

PRCP-MSMF010 through PRCP-MSMF030 = 1500 pcs. per reel.  
 PRCP-MSMF050 through PRCP-MSMF200 & PRCP-MSMF260 = 2000 pcs. per reel.  
 PRCP-MSMF110/24X, PRCP-MSMF150/24X & PRCP-MSMF250/16X = 1500 pcs. per reel.

DIMENSIONS:  $\frac{\text{MM}}{\text{(INCHES)}}$

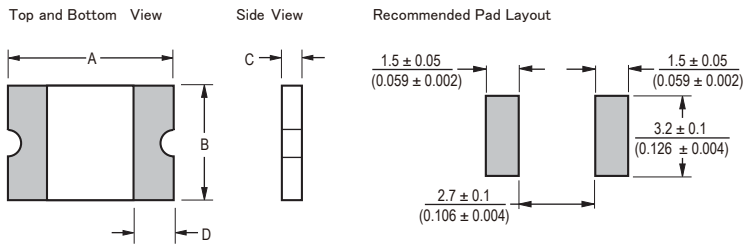
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# PRCP-MSMF Series - Polymer Resettable Circuit Protectors

## Product Dimensions (see previous page for dimensions)

### Style 1

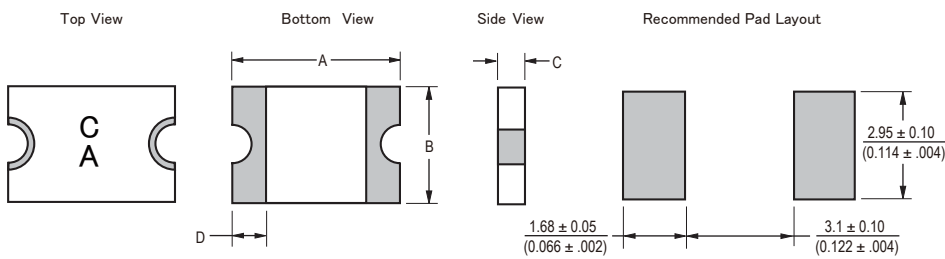


Terminal material:  
Electroless Ni under immersion Au

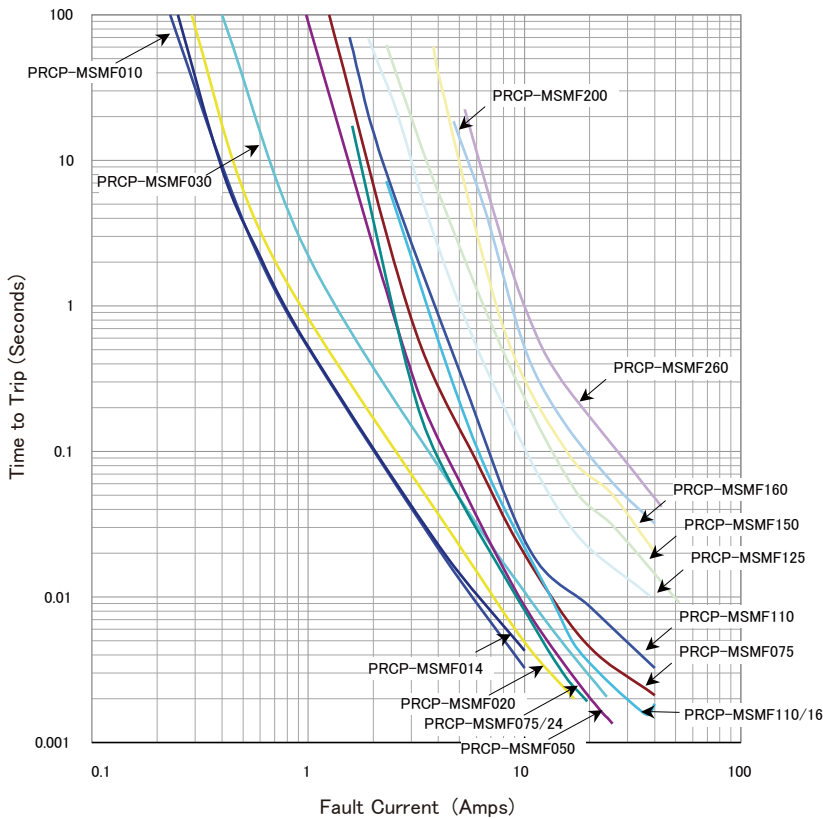
Termination pad solderability:  
Standard Au finish:  
Meets ANSI/J-STD-002 Category 2.

Recommended Storage:  
40 ° C max./70 % RH max.

### Style 2



## Typical Time to Trip at 23 °C



The Time to Trip curves represent typical performance of a device in a simulated application environment. Actual performance in specific customer applications may differ from these values due to the influence of other variables.

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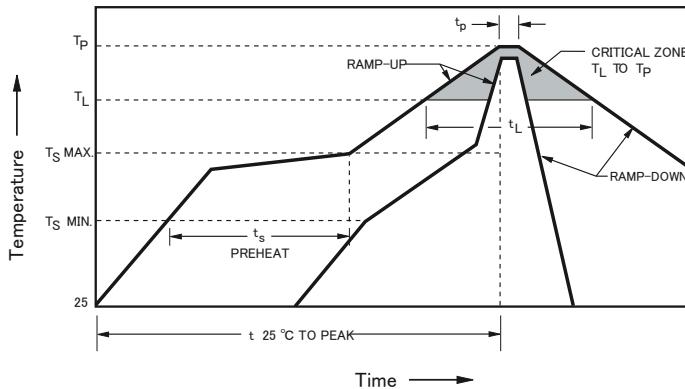
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# PRCP-MSMF Series - Polymer Resettable Circuit Protectors

Thermal Derating Chart -  $I_{hold}$  /  $I_{trip}$  (Amps)

Model	Ambient Operating Temperature								
	-40 °C	-20 °C	0 °C	23 °C	40 °C	50 °C	60 °C	70 °C	85 °C
PRCP-MSMF010	0.16 / 0.32	0.14 / 0.28	0.12 / 0.24	0.10 / 0.20	0.08 / 0.16	0.07 / 0.14	0.06 / 0.12	0.05 / 0.10	0.03 / 0.06
PRCP-MSMF014	0.23 / 0.52	0.19 / 0.45	0.17 / 0.40	0.14 / 0.34	0.12 / 0.29	0.10 / 0.25	0.09 / 0.23	0.08 / 0.21	0.06 / 0.16
PRCP-MSMF020	0.29 / 0.5	0.26 / 0.52	0.23 / 0.46	0.20 / 0.40	0.17 / 0.34	0.15 / 0.30	0.14 / 0.28	0.12 / 0.24	0.10 / 0.20
PRCP-MSMF020/60	0.29 / 0.5	0.26 / 0.52	0.23 / 0.46	0.20 / 0.40	0.17 / 0.3	0.15 / 0.30	0.14 / 0.28	0.12 / 0.24	0.10 / 0.20
PRCP-MSMF030	0.44 / 0.88	0.39 / 0.78	0.35 / 0.70	0.30 / 0.60	0.26 / 0.52	0.23 / 0.46	0.21 / 0.42	0.18 / 0.36	0.15 / 0.30
PRCP-MSMF050	0.77 / 1.54	0.68 / 1.36	0.59 / 1.18	0.50 / 1.00	0.44 / 0.88	0.40 / 0.80	0.37 / 0.74	0.33 / 0.66	0.29 / 0.58
PRCP-MSMF070	1.15 / 2.30	1.01 / 2.02	0.88 / 1.76	0.75 / 1.50	0.65 / 1.30	0.60 / 1.20	0.55 / 1.10	0.49 / 0.98	0.43 / 0.86
PRCP-MSMF075/24	1.15 / 2.30	1.01 / 2.02	0.88 / 1.76	0.75 / 1.50	0.65 / 1.30	0.60 / 1.20	0.55 / 1.10	0.49 / 0.98	0.43 / 0.86
PRCP-MSMF110	1.59 / 3.18	1.43 / 2.86	1.26 / 2.52	1.10 / 2.20	0.95 / 1.90	0.87 / 1.74	0.80 / 1.60	0.71 / 1.42	0.60 / 1.20
PRCP-MSMF110/16	1.59 / 3.18	1.43 / 2.86	1.26 / 2.52	1.10 / 2.20	0.95 / 1.90	0.87 / 1.74	0.80 / 1.60	0.71 / 1.42	0.60 / 1.20
PRCP-MSMF110/24X	2.00 / 4.00	1.70 / 3.40	1.40 / 2.80	1.10 / 2.20	0.95 / 1.90	0.88 / 1.76	0.80 / 1.60	0.73 / 1.46	0.61 / 1.22
PRCP-MSMF125	1.80 / 3.61	1.63 / 3.25	1.43 / 2.86	1.25 / 2.50	1.08 / 2.16	0.99 / 1.98	0.91 / 1.82	0.81 / 1.62	0.68 / 1.36
PRCP-MSMF150	2.17 / 4.34	1.95 / 3.90	1.72 / 3.44	1.50 / 3.00	1.30 / 2.59	1.18 / 2.37	1.09 / 2.18	0.97 / 1.94	0.82 / 1.64
PRCP-MSMF150/24	2.10 / 4.20	1.90 / 3.80	1.70 / 3.40	1.50 / 3.00	1.25 / 2.50	1.13 / 2.26	1.00 / 2.00	0.88 / 1.76	0.69 / 1.38
PRCP-MSMF160	2.30 / 5.00	2.20 / 4.40	1.90 / 3.80	1.60 / 2.80	1.45 / 2.90	1.30 / 2.60	1.15 / 2.30	1.03 / 2.06	0.91 / 1.82
PRCP-MSMF200	3.08 / 5.40	2.71 / 4.74	2.35 / 4.11	2.00 / 3.50	1.80 / 3.15	1.60 / 2.80	1.50 / 2.63	1.40 / 2.40	1.25 / 2.10
PRCP-MSMF250/16X	3.85 / 7.70	3.45 / 6.90	3.00 / 6.00	2.50 / 5.00	2.05 / 4.10	1.85 / 3.70	1.75 / 3.50	1.30 / 2.60	1.10 / 2.20
PRCP-MSMF260	4.00 / 7.98	3.52 / 7.01	3.06 / 6.09	2.60 / 5.15	2.34 / 4.64	2.08 / 4.13	1.95 / 3.87	1.39 / 2.74	1.04 / 2.05

## Solder Reflow Recommendations



Notes:

- PRCP-MSMF models are intended for reflow soldering (including, but not limited to heating plate, hot air, IR, nitrogen, and vapor phase).
- Wave soldering is permissible only if the device is on the top of the PCB, opposite the heat source.
- Hand soldering is not recommended for these devices.
- All temperatures refer to the topside of the device, measured on the device body surface.
- If reflow temperatures exceed the recommended profile, devices may not meet the published specifications.
- Compatible with Pb and Pb-free solder reflow profile.
- Excess solder may cause a short circuit.

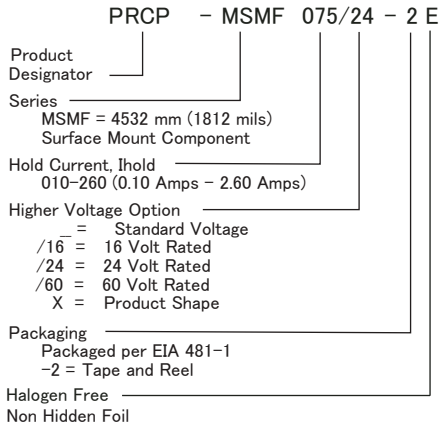
Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate ( $T_{s_{max}}$ to $T_p$ )	3 °C / second max.
PREHEAT: Temperature Min. ( $T_{s_{min}}$ ) Temperature Max. ( $T_{s_{max}}$ ) Time ( $T_{s_{min}}$ to $T_{s_{max}}$ ) (ts)	150 °C 200 °C 60~180 seconds
TIME MAINTAINED ABOVE: Temperature ( $T_L$ ) Time ( $t_L$ )	217 °C 60~150 seconds
Peak Temperature ( $T_p$ )	260 °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	8 minutes max.

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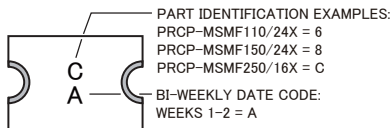
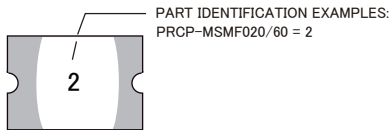
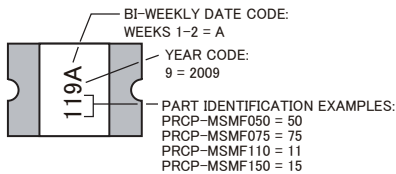
# PRCP-MSMF Series - Polymer Resettable Circuit Protectors

## How to Order



## Typical Part Marking

Represents total content. Layout may vary.

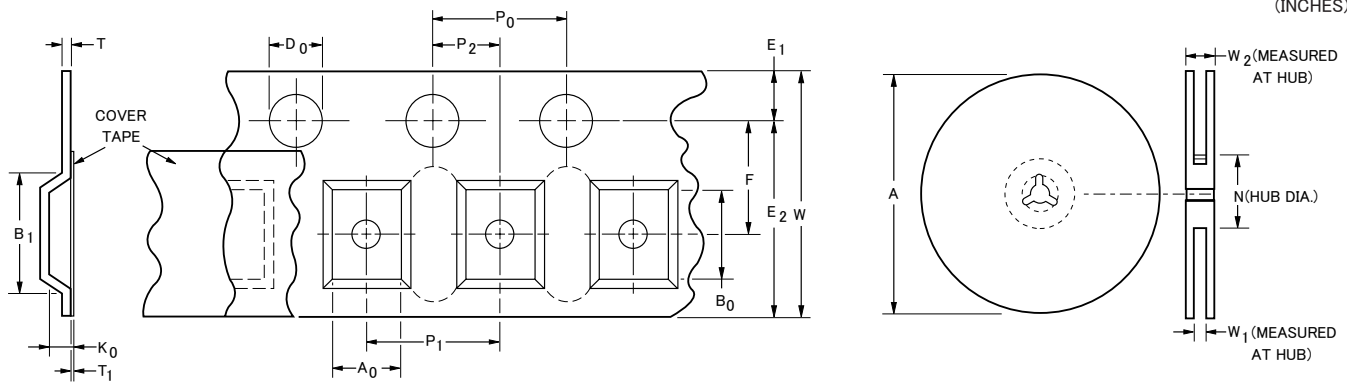


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# PRCP-MSMF Series Tape and Reel Specifications

Tape Dimensions	PRCP-MSMF010- PRCP-MSMF030 per EIA-481-1	PRCP-MSMF050- PRCP-MSMF260 per EIA 481-1	PRCP-MSMF110/24X PRCP-MSMF150/24X PRCP-MSMF250/16X per EIA 481-1
W	$12.0 \pm 0.30$ (0.472 ± 0.012)	$12.0 \pm 0.30$ (0.472 ± 0.012)	$12.0 \pm 0.30$ (0.472 ± 0.012)
P <sub>0</sub>	$4.0 \pm 0.10$ (0.157 ± 0.004)	$4.0 \pm 0.10$ (0.157 ± 0.004)	$4.0 \pm 0.10$ (0.157 ± 0.004)
P <sub>1</sub>	$8.0 \pm 0.10$ (0.315 ± 0.004)	$8.0 \pm 0.10$ (0.315 ± 0.004)	$8.0 \pm 0.10$ (0.315 ± 0.004)
P <sub>2</sub>	$2.0 \pm 0.05$ (0.079 ± 0.002)	$2.0 \pm 0.05$ (0.079 ± 0.002)	$2.0 \pm 0.05$ (0.079 ± 0.002)
A <sub>0</sub>	$3.66 \pm 0.15$ (0.144 ± 0.004)	$3.66 \pm 0.15$ (0.144 ± 0.006)	$3.70 \pm 0.10$ (0.146 ± 0.004)
B <sub>0</sub>	$4.93 \pm 0.10$ (0.194 ± 0.004)	$4.98 \pm 0.10$ (0.196 ± 0.004)	$5.10 \pm 0.10$ (0.200 ± 0.004)
B <sub>1</sub> max.	$5.9$ (0.232)	$5.9$ (0.232)	$5.9$ (0.232)
D <sub>0</sub>	$1.5 + 0.10/-0.0$ (0.059 + 0.004/-0)	$1.5 + 0.10/-0.0$ (0.059 + 0.004/-0)	$1.5 + 0.10/-0.0$ (0.059 + 0.004/-0)
F	$5.5 \pm 0.05$ (0.217 ± 0.002)	$5.5 \pm 0.05$ (0.217 ± 0.002)	$5.5 \pm 0.05$ (0.217 ± 0.002)
E <sub>1</sub>	$1.75 \pm 0.10$ (0.069 ± 0.004)	$1.75 \pm 0.10$ (0.069 ± 0.004)	$1.75 \pm 0.10$ (0.069 ± 0.004)
E <sub>2</sub> min.	$10.25$ (0.404)	$10.25$ (0.404)	$10.25$ (0.404)
T max.	$0.6$ (0.024)	$0.6$ (0.024)	$0.6$ (0.024)
T <sub>1</sub> max.	$0.1$ (0.004)	$0.1$ (0.004)	$0.1$ (0.004)
K <sub>0</sub>	$1.30 \pm 0.10$ (0.051 ± 0.004)	$0.95 \pm 0.10$ (0.037 ± 0.004)	$1.50 \pm 0.10$ (0.059 ± 0.004)
Leader min.	$390$ (15.35)	$390$ (15.35)	$390$ (15.35)
Trailer min.	$160$ (6.30)	$160$ (6.30)	$160$ (6.30)
<b>Reel Dimensions</b>			
A max.	$185$ (7.28)	$185$ (7.28)	$185$ (7.28)
N min.	$50$ (1.97)	$50$ (1.97)	$50$ (1.97)
W <sub>1</sub>	$12.4 + 2.0/-0.0$ (0.488 + 0.079/-0.0)	$12.4 + 2.0/-0.0$ (0.488 + 0.079/-0.0)	$12.4 + 2.0/-0.0$ (0.488 + 0.079/-0.0)
W <sub>2</sub> max.	$18.4$ (0.724)	$18.4$ (0.724)	$18.4$ (0.724)

DIMENSIONS:  $\frac{\text{MM}}{\text{INCHES}}$



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