



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 _{hold}	I _{trip}	Resistance		Max. To	Time 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 _{Min.}	R _{1Max.}			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-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-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

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 _{min} ≤ R ≤ R _{1max}
Time to Trip	At specified current, V _{max} , 23 °C.....	T ≤ max.time to trip (seconds)
Hold Current	30 min at I _{hold}	No trip
Trip Cycle Life	V _{max} , I _{max} , 100 cycles.....	No arcing or burning
Trip Endurance	V _{max} , 48 hours.....	No arcing or burning
Solderability	ANSI/J-STD-002.....	95 % min. coverage

*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.

Specifications are subject to change without notice.

The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time.

Users should verify actual device performance in their specific applications.

PRCP-MSMF Rev.U

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-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-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

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

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.

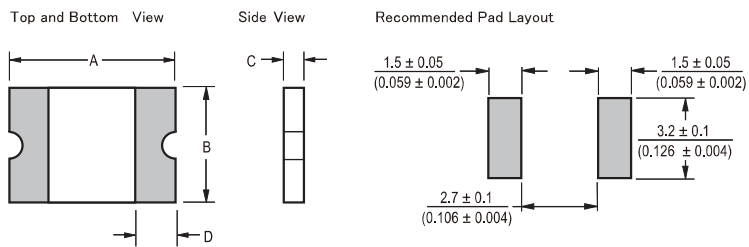
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PRCP-MSMF Series - Polymer Resettable Circuit Protectors

Product Dimensions (see previous page for dimensions)

Style 1

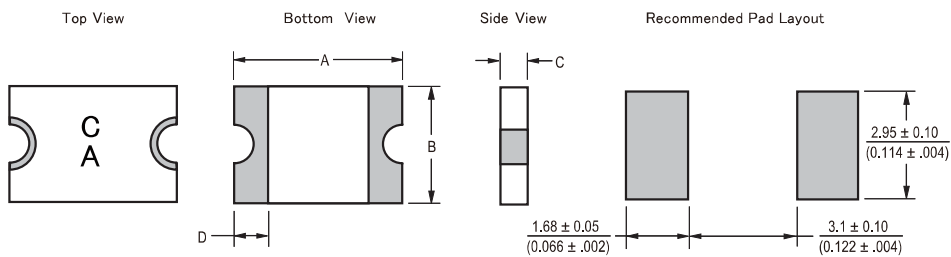


Terminal material:
Electroless Ni under immersion Au

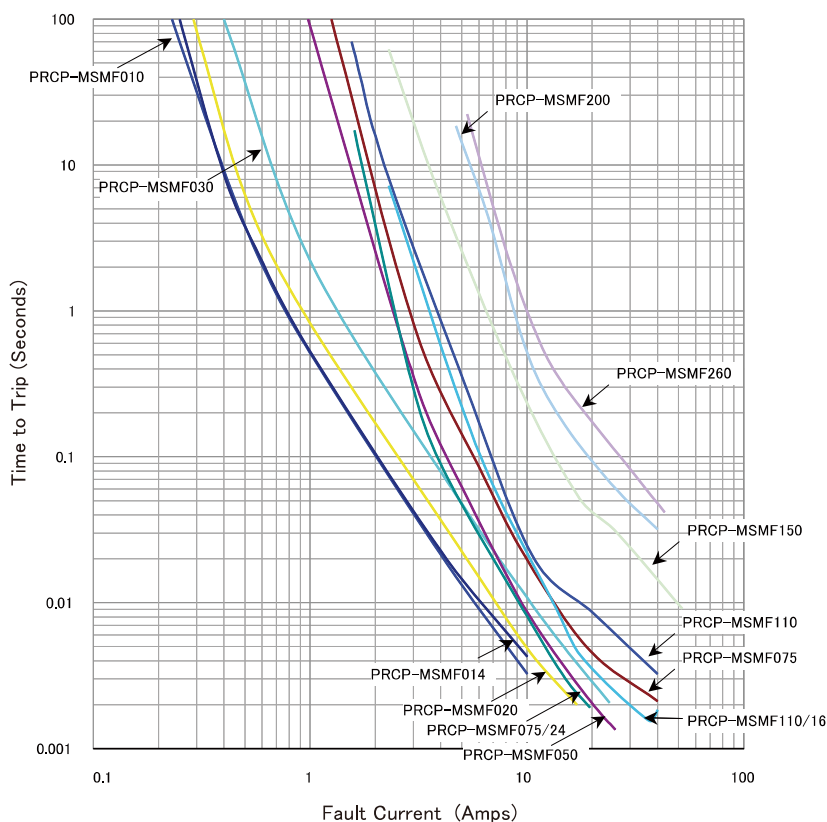
Termination pad solderability:
Standard Au finish:
Meets ANSI/J-STD-002 Category 2.

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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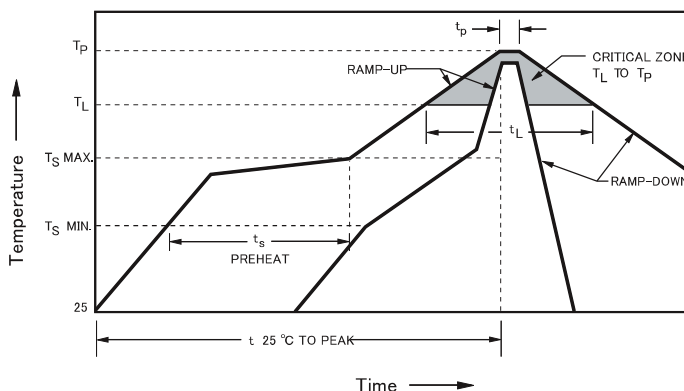
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PRCP-MSMF Series - Polymer Resettable Circuit Protectors

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-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-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 $T_{S\ max}$) (t_s)	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

PRCP - MSMF 075/24 - 2 E

Product Designator

Series

MSMF = 4532 mm (1812 mils)
Surface Mount Component

Hold Current, I_{hold}
010-260 (0.10 Amps - 2.60 Amps)

Higher Voltage Option
_ = Standard Voltage
/16 = 16 Volt Rated
/24 = 24 Volt Rated
/60 = 60 Volt Rated
X = Product Shape

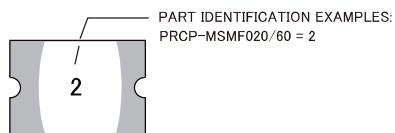
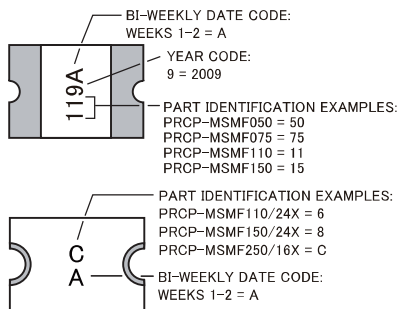
Packaging
Packaged per EIA 481-1
-2 = Tape and Reel

Halogen Free

Non Hidden Foil

Typical Part Marking

Represents total content. Layout may vary.



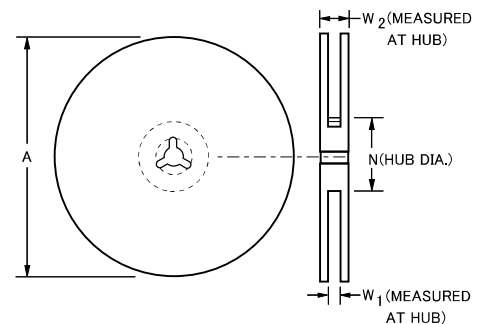
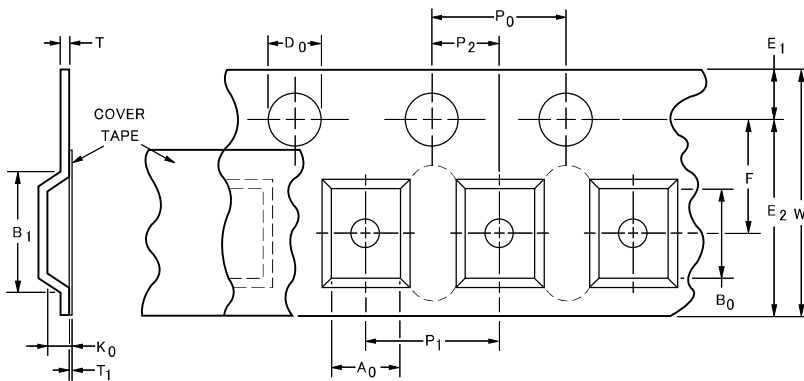
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PRCP-MSMF Series Tape and Reel Specifications

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 ± 0.30 (0.472 $\pm$ 0.012)	12.0 ± 0.30 (0.472 $\pm$ 0.012)	12.0 ± 0.30 (0.472 $\pm$ 0.012)
P ₀	4.0 ± 0.10 (0.157 $\pm$ 0.004)	4.0 ± 0.10 (0.157 $\pm$ 0.004)	4.0 ± 0.10 (0.157 $\pm$ 0.004)
P ₁	8.0 ± 0.10 (0.315 $\pm$ 0.004)	8.0 ± 0.10 (0.315 $\pm$ 0.004)	8.0 ± 0.10 (0.315 $\pm$ 0.004)
P ₂	2.0 ± 0.05 (0.079 $\pm$ 0.002)	2.0 ± 0.05 (0.079 $\pm$ 0.002)	2.0 ± 0.05 (0.079 $\pm$ 0.002)
A ₀	3.58 ± 0.10 (0.141 $\pm$ 0.004)	3.66 ± 0.15 (0.144 $\pm$ 0.006)	3.70 ± 0.10 (0.146 $\pm$ 0.004)
B ₀	4.93 ± 0.10 (0.194 $\pm$ 0.004)	4.98 ± 0.10 (0.196 $\pm$ 0.004)	5.10 ± 0.10 (0.200 $\pm$ 0.004)
B ₁ max.	5.9 (0.232)	5.9 (0.232)	5.9 (0.232)
D ₀	$1.5 + 0.10/-0.0$ (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 ± 0.05 (0.217 $\pm$ 0.002)	5.5 ± 0.05 (0.217 $\pm$ 0.002)	5.5 ± 0.05 (0.217 $\pm$ 0.002)
E ₁	1.75 ± 0.10 (0.069 $\pm$ 0.004)	1.75 ± 0.10 (0.069 $\pm$ 0.004)	1.75 ± 0.10 (0.069 $\pm$ 0.004)
E ₂ 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 ₁ max.	0.1 (0.004)	0.1 (0.004)	0.1 (0.004)
K ₀	1.30 ± 0.10 (0.051 $\pm$ 0.004)	0.95 ± 0.10 (0.037 $\pm$ 0.004)	1.50 ± 0.10 (0.059 $\pm$ 0.004)
Leader min.	390 (15.35)	390 (15.35)	390 (15.35)
Trailer min.	160 (6.30)	160 (6.30)	160 (6.30)
Reel Dimensions			
A max.	185 (7.28)	185 (7.28)	185 (7.28)
N min.	50 (1.97)	50 (1.97)	50 (1.97)
W ₁	$12.4 + 2.0/-0.0$ (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 ₂ max.	18.4 (0.724)	18.4 (0.724)	18.4 (0.724)

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



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