



## Features

- 100 % compatible with all previous generations of 1812 SMT devices
- Compatible with Pb and Pb-free solder reflow profiles
- Surface mount packaging for automated assembly
- Agency recognition:   

## Applications

High Density Circuit Board Applications:

- Hard disk drives
- PC motherboards
- PC peripherals
- Point-of-sale (POS) equipment
- PCMCIA cards
- USB ports

## MF-MSMF Series - PTC Resettable Fuses

### Electrical Characteristics

| Model         | V max.<br>Volts | I max.<br>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.                      |
| MF-MSMF010    | 60.0            | 40             | 0.10              | 0.30              | 0.70              | 15.00              | 0.5               | 1.50             | 0.8                       |
| MF-MSMF014    | 60.0            | 40             | 0.14              | 0.34              | 0.40              | 6.50               | 1.5               | 0.15             | 0.8                       |
| MF-MSMF020    | 30.0            | 80             | 0.20              | 0.40              | 0.40              | 6.00               | 6.0               | 0.06             | 0.8                       |
| MF-MSMF030    | 30.0            | 10             | 0.30              | 0.60              | 0.30              | 3.00               | 8.0               | 0.10             | 0.8                       |
| MF-MSMF050    | 15.0            | 100            | 0.50              | 1.00              | 0.15              | 1.00               | 8.0               | 0.15             | 0.8                       |
| MF-MSMF075    | 13.2            | 100            | 0.75              | 1.50              | 0.11              | 0.45               | 8.0               | 0.20             | 0.8                       |
| MF-MSMF075/24 | 24.0            | 40             | 0.75              | 1.50              | 0.11              | 0.45               | 8.0               | 0.20             | 0.8                       |
| MF-MSMF110    | 6.0             | 100            | 1.10              | 2.20              | 0.04              | 0.21               | 8.0               | 0.30             | 0.8                       |
| MF-MSMF110/16 | 16.0            | 100            | 1.10              | 2.20              | 0.04              | 0.21               | 8.0               | 0.30             | 0.8                       |
| MF-MSMF125    | 6.0             | 100            | 1.25              | 2.50              | 0.035             | 0.14               | 8.0               | 0.40             | 0.8                       |
| MF-MSMF150    | 6.0             | 100            | 1.50              | 3.00              | 0.03              | 0.120              | 8.0               | 0.5              | 0.8                       |
| MF-MSMF160    | 8.0             | 100            | 1.60              | 2.80              | 0.035             | 0.099              | 8.0               | 2.0              | 0.8                       |
| MF-MSMF200    | 6.0             | 100            | 2.00              | 4.00              | 0.020             | 0.100              | 8.0               | 3.0              | 0.8                       |
| MF-MSMF250/16 | 16.0            | 100            | 2.50              | 5.00              | 0.015             | 0.100              | 8.0               | 5.0              | 0.8                       |
| MF-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, .....No change  
Condition A

### Test Procedures And Requirements For Model MF-MSMF Series

| Test                        | Test Conditions                                                                                                                                               | Accept/Reject Criteria                   |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Visual/Mech.....            | Verify dimensions and materials .....                                                                                                                         | Per MF 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 .....        | E174545<br>http://www.ul.com/ Follow link to Certifications, then UL File No., enter E17454                                                                   |                                          |
| CSA File Number.....        | CA110338<br>http://directories.csa-international.org/ Under "Certification Record" and "File Number" enter 110338-0-000<br>(Model MF-MSMF110 is CSA approved) |                                          |
| TÜV Certificate Number..... | R 02057213<br>http://www.tuvdotcom.com/ Follow link to "other certificates", enter File No. 2057213<br>(Model MF-MSMF110 is TÜV approved)                     |                                          |

## Additional Features

- Standard 4532 mm (1812 mils) footprint
- Symmetrical design
- Patents pending

## MF-MSMF Series - PTC Resettable Fuses

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### Product Dimensions

| Model         | A                      |                        | B                      |                        | C                      |                        | D                      |
|---------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
|               | Min.                   | Max.                   | Min.                   | Max.                   | Min.                   | Max.                   | Min.                   |
| MF-MSMF010    | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.70}{(0.028)}$ | $\frac{1.10}{(0.043)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMF014    | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.70}{(0.028)}$ | $\frac{1.10}{(0.043)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMF020    | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.70}{(0.028)}$ | $\frac{1.10}{(0.043)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMF030    | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.70}{(0.028)}$ | $\frac{1.10}{(0.043)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMF050    | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.55}{(0.015)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMF075    | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.55}{(0.015)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMF075/24 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.55}{(0.015)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMF110    | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.45}{(0.018)}$ | $\frac{0.75}{(0.030)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMF110/16 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.45}{(0.018)}$ | $\frac{0.75}{(0.030)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMF125    | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.55}{(0.015)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMF150    | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.55}{(0.015)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMF160    | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.55}{(0.015)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMF200    | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.55}{(0.015)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMF250/16 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{1.00}{(0.039)}$ | $\frac{2.00}{(0.078)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMF260    | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.48}{(0.019)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |

#### Packaging:

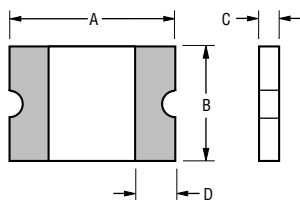
MF-MSMF010 through MF-MSMF030 = 1500 pcs. per reel.

MF-MSMF050 through MF-MSMF200 & MF-MSMF260 = 2000 pcs. per reel.

MF-MSMF250/16 = 1000 pcs. per reel.

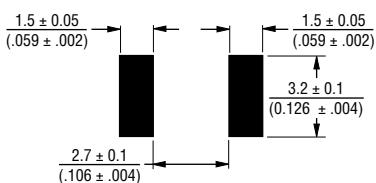
UNIT =  $\frac{\text{MM}}{(\text{INCHES})}$

Top and Bottom View



Side View

Recommended Pad Layout



#### Terminal material:

Electroless Ni under immersion Au

#### Termination pad solderability:

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

Optional Sn finish:  
Meets ANSI/J-STD-002 Category 3.

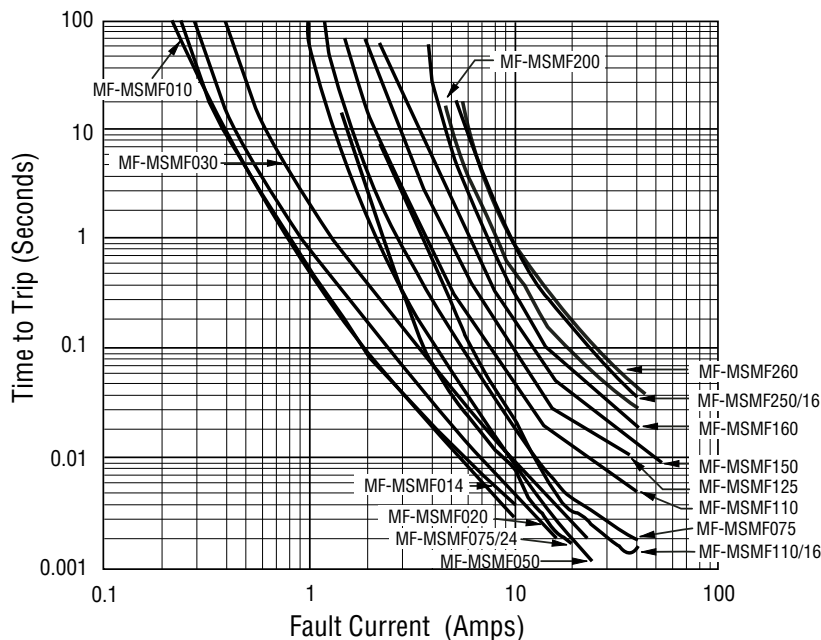
#### Recommended Storage:

40 °C max./70 % RH max.

# MF-MSMF Series - PTC Resettable Fuses

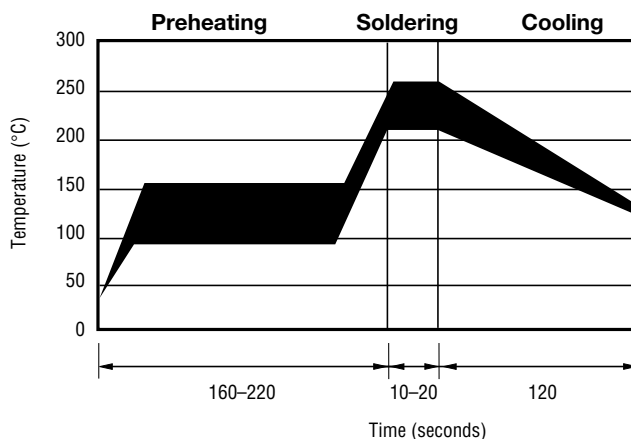
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## Typical Time to Trip at 23 °C



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.

## Solder Reflow Recommendations



### Notes:

- MF-MSMF models cannot be wave soldered.
- If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.
- Compatible with Pb and Pb-free solder reflow profiles.

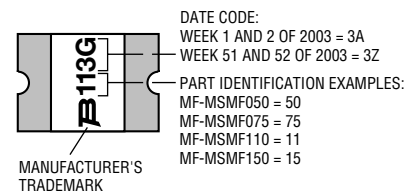
## How to Order

### MF - MSMF 075/24 T - 2

Multifuse® 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  
 Optional Terminal Finish \_\_\_\_\_  
 \_\_\_\_\_ = Standard Au Finish  
 T = Optional Sn Finish  
 Packaging \_\_\_\_\_  
 Packaged per EIA 481-1  
 -2 = Tape and Reel

## Typical Part Marking

Represents total content. Layout may vary.



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# MF-MSMF Series - PTC Resettable Fuses

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**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       |
| MF-MSMF010    | 0.16 / 0.32                   | 0.14 / 0.28 | 0.12 / 0.24 | 0.11 / 0.22 | 0.08 / 0.16 | 0.07 / 0.14 | 0.06 / 0.12 | 0.05 / 0.10 | 0.03 / 0.06 |
| MF-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 |
| MF-MSMF020    | 0.29 / 0.58                   | 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 |
| MF-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 |
| MF-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 |
| MF-MSMF075    | 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 |
| MF-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 |
| MF-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 |
| MF-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 |
| MF-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 |
| MF-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 |
| MF-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 |
| MF-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 |
| MF-MSMF250/16 | 3.9 / 7.8                     | 3.42 / 6.84 | 2.96 / 5.92 | 2.50 / 5.00 | 2.24 / 4.48 | 1.98 / 3.96 | 1.85 / 3.70 | 1.29 / 2.58 | 0.94 / 1.88 |
| MF-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 |



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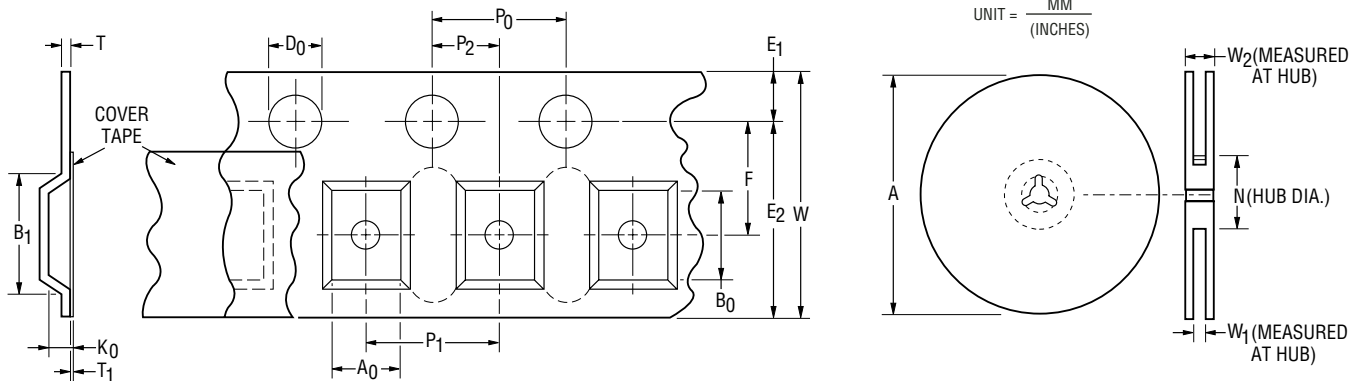
Tel: +1-909 781-5500  
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[www.bourns.com](http://www.bourns.com)

# MF-MSMF Series Tape and Reel Specifications

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| Tape Dimensions        | MF-MSMF010 - MF-MSMF030<br>per EIA-481-1       | MF-MSMF050 - MF-MSMF260<br>per EIA 481-1       | MF-MSMF250/16<br>per EIA 481-1                 |
|------------------------|------------------------------------------------|------------------------------------------------|------------------------------------------------|
| W                      | $\frac{12.0 \pm 0.30}{(0.472 \pm 0.012)}$      | $\frac{12.0 \pm 0.30}{(0.472 \pm 0.012)}$      | $\frac{12.0 \pm 0.30}{(0.472 \pm 0.012)}$      |
| P <sub>0</sub>         | $\frac{4.0 \pm 0.10}{(0.157 \pm 0.004)}$       | $\frac{4.0 \pm 0.10}{(0.157 \pm 0.004)}$       | $\frac{4.0 \pm 0.10}{(0.157 \pm 0.004)}$       |
| P <sub>1</sub>         | $\frac{8.0 \pm 0.10}{(0.315 \pm 0.004)}$       | $\frac{8.0 \pm 0.10}{(0.315 \pm 0.004)}$       | $\frac{8.0 \pm 0.10}{(0.315 \pm 0.004)}$       |
| P <sub>2</sub>         | $\frac{2.0 \pm 0.05}{(0.079 \pm 0.002)}$       | $\frac{2.0 \pm 0.05}{(0.079 \pm 0.002)}$       | $\frac{2.0 \pm 0.05}{(0.079 \pm 0.002)}$       |
| A <sub>0</sub>         | $\frac{3.58 \pm 0.10}{(0.141 \pm 0.004)}$      | $\frac{3.66 \pm 0.15}{(0.144 \pm 0.006)}$      | $\frac{3.43 \pm 0.10}{(0.135 \pm 0.004)}$      |
| B <sub>0</sub>         | $\frac{4.93 \pm 0.10}{(0.194 \pm 0.004)}$      | $\frac{4.98 \pm 0.10}{(0.196 \pm 0.004)}$      | $\frac{4.83 \pm 0.10}{(0.190 \pm 0.004)}$      |
| B <sub>1</sub> max.    | $\frac{5.9}{(0.232)}$                          | $\frac{5.9}{(0.232)}$                          | $\frac{5.9}{(0.232)}$                          |
| D <sub>0</sub>         | $\frac{1.5 + 0.10/-0.00}{(0.059 + 0.004/-0)}$  | $\frac{1.5 + 0.10/-0.00}{(0.059 + 0.004/-0)}$  | $\frac{1.5 + 0.10/-0.00}{(0.059 + 0.004/-0)}$  |
| F                      | $\frac{5.5 \pm 0.05}{(0.217 \pm 0.002)}$       | $\frac{5.5 \pm 0.05}{(0.217 \pm 0.002)}$       | $\frac{5.5 \pm 0.05}{(0.217 \pm 0.002)}$       |
| E <sub>1</sub>         | $\frac{1.75 \pm 0.10}{(0.069 \pm 0.004)}$      | $\frac{1.75 \pm 0.10}{(0.069 \pm 0.004)}$      | $\frac{1.75 \pm 0.10}{(0.069 \pm 0.004)}$      |
| E <sub>2</sub> min.    | $\frac{10.25}{(0.404)}$                        | $\frac{10.25}{(0.404)}$                        | $\frac{10.25}{(0.404)}$                        |
| T max.                 | $\frac{0.6}{(0.024)}$                          | $\frac{0.6}{(0.024)}$                          | $\frac{0.6}{(0.024)}$                          |
| T <sub>1</sub> max.    | $\frac{0.1}{(0.004)}$                          | $\frac{0.1}{(0.004)}$                          | $\frac{0.1}{(0.004)}$                          |
| K <sub>0</sub>         | $\frac{1.30 \pm 0.10}{(0.051 \pm 0.004)}$      | $\frac{0.95 \pm 0.10}{(0.037 \pm 0.004)}$      | $\frac{1.70 \pm 0.10}{(0.067 \pm 0.004)}$      |
| Leader min.            | $\frac{390}{(15.35)}$                          | $\frac{390}{(15.35)}$                          | $\frac{390}{(15.35)}$                          |
| Trailer min.           | $\frac{160}{(6.30)}$                           | $\frac{160}{(6.30)}$                           | $\frac{160}{(6.30)}$                           |
| <b>Reel Dimensions</b> |                                                |                                                |                                                |
| A max.                 | $\frac{185}{(7.28)}$                           | $\frac{185}{(7.28)}$                           | $\frac{185}{(7.28)}$                           |
| N min.                 | $\frac{50}{(1.97)}$                            | $\frac{50}{(1.97)}$                            | $\frac{50}{(1.97)}$                            |
| W <sub>1</sub>         | $\frac{12.4 + 2.0/-0.0}{(0.488 + 0.079/-0.0)}$ | $\frac{12.4 + 2.0/-0.0}{(0.488 + 0.079/-0.0)}$ | $\frac{12.4 + 2.0/-0.0}{(0.488 + 0.079/-0.0)}$ |
| W <sub>2</sub> max.    | $\frac{18.4}{(0.724)}$                         | $\frac{18.4}{(0.724)}$                         | $\frac{18.4}{(0.724)}$                         |



Specifications are subject to change without notice.  
Customers should verify actual device performance in their specific applications.