



## Features

- Surface Mount Devices
- Fully compatible with current industry standards
- Packaged per EIA 481-2 standard
- RoHS compliant\*
- Agency recognition:   

## Applications

Almost anywhere there is a low voltage power supply and a load to be protected, including:

- Computers & peripherals
- General electronics
- Automotive applications

## MF-SM 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> |                   | Max.             | Typ.                      |
| MF-SM030    | 60              | 40             | 0.30              | 0.60              | 0.90              | 4.80               | 1.5               | 3.0              | 1.7                       |
| MF-SM050    | 60              | 40             | 0.50              | 1.00              | 0.35              | 1.40               | 2.5               | 4.0              | 1.7                       |
| MF-SM075    | 30              | 80             | 0.75              | 1.50              | 0.23              | 1.00               | 8.0               | 0.3              | 1.7                       |
| MF-SM100    | 30              | 80             | 1.10              | 2.20              | 0.12              | 0.48               | 8.0               | 0.5              | 1.7                       |
| MF-SM100/33 | 33              | 40             | 1.10              | 2.20              | 0.12              | 0.41               | 8.0               | 0.5              | 1.7                       |
| MF-SM125    | 15              | 100            | 1.25              | 2.50              | 0.07              | 0.25               | 8.0               | 2.0              | 1.7                       |
| MF-SM150    | 15              | 100            | 1.50              | 3.00              | 0.06              | 0.25               | 8.0               | 5.0              | 1.9                       |
| MF-SM150/33 | 33              | 40             | 1.50              | 3.00              | 0.06              | 0.23               | 8.0               | 5.0              | 1.9                       |
| MF-SM200    | 15              | 100            | 2.00              | 4.00              | 0.045             | 0.125              | 8.0               | 12.0             | 1.9                       |
| MF-SM250    | 15              | 100            | 2.50              | 5.00              | 0.024             | 0.085              | 8.0               | 25.0             | 1.9                       |
| MF-SM260    | 6               | 100            | 2.60              | 5.20              | 0.025             | 0.075              | 8.0               | 20.0             | 1.7                       |

### Environmental Characteristics

|                                                           |                                                                 |
|-----------------------------------------------------------|-----------------------------------------------------------------|
| Operating/Storage 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. 7 days .....±5 % typical resistance change    |
| Thermal Shock .....                                       | MIL-STD-202F, Method 107G, .....±10 % typical resistance change |
|                                                           | +125 °C to -55 °C, 10 cycles                                    |
| Vibration .....                                           | MIL-STD-883C, Method 2007.1, Condition A.....No change          |

### Test Procedures And Requirements For Model MF-SM 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 .....          | MIL-STD-202F, Method 208F .....                                                                                                                                     | 95 % min. coverage                       |
| UL File Number .....         | E174545                                                                                                                                                             |                                          |
|                              | <a href="http://www.ul.com/">http://www.ul.com/</a> Follow link to Certifications, then UL File No., enter E174545                                                  |                                          |
| CSA File Number.....         | CA110338                                                                                                                                                            |                                          |
|                              | <a href="http://directories.csa-international.org/">http://directories.csa-international.org/</a> Under "Certification Record" and "File Number" enter 110338-0-000 |                                          |
| TÜV Certificate Number ..... | R 02057213                                                                                                                                                          |                                          |
|                              | <a href="http://www.tuvdotcom.com/">http://www.tuvdotcom.com/</a> Follow link to "other certificates", enter File No. 2057213                                       |                                          |

### Thermal Derating Chart - I<sub>hold</sub> / I<sub>trip</sub> (Amps)

| Model       | Ambient Operating Temperature |             |             |             |             |             |             |             |             |
|-------------|-------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|             | -40 °C                        | -20 °C      | 0 °C        | 23 °C       | 40 °C       | 50 °C       | 60 °C       | 70 °C       | 85 °C       |
| MF-SM030    | 0.45 / 0.90                   | 0.40 / 0.80 | 0.35 / 0.70 | 0.30 / 0.60 | 0.25 / 0.50 | 0.23 / 0.46 | 0.20 / 0.40 | 0.17 / 0.34 | 0.14 / 0.28 |
| MF-SM050    | 0.76 / 1.52                   | 0.67 / 1.34 | 0.59 / 1.18 | 0.50 / 1.00 | 0.42 / 0.84 | 0.38 / 0.76 | 0.33 / 0.66 | 0.29 / 0.58 | 0.23 / 0.46 |
| MF-SM075    | 1.13 / 2.26                   | 1.01 / 2.02 | 0.88 / 1.76 | 0.75 / 1.50 | 0.62 / 1.24 | 0.56 / 1.12 | 0.50 / 1.00 | 0.44 / 0.88 | 0.34 / 0.68 |
| MF-SM100    | 1.66 / 3.32                   | 1.47 / 2.94 | 1.29 / 2.58 | 1.10 / 2.20 | 0.91 / 1.82 | 0.83 / 1.66 | 0.73 / 1.46 | 0.64 / 1.28 | 0.50 / 1.00 |
| MF-SM100/33 | 1.66 / 3.32                   | 1.47 / 2.94 | 1.29 / 2.58 | 1.10 / 2.20 | 0.91 / 1.82 | 0.83 / 1.66 | 0.73 / 1.46 | 0.64 / 1.28 | 0.50 / 1.00 |
| MF-SM125    | 1.89 / 3.78                   | 1.68 / 3.36 | 1.46 / 2.92 | 1.25 / 2.50 | 1.04 / 2.08 | 0.94 / 1.88 | 0.83 / 1.66 | 0.73 / 1.46 | 0.56 / 1.12 |
| MF-SM150    | 2.27 / 4.54                   | 2.01 / 4.02 | 1.76 / 3.52 | 1.50 / 3.00 | 1.25 / 2.50 | 1.13 / 2.26 | 0.99 / 1.98 | 0.87 / 1.74 | 0.68 / 1.36 |
| MF-SM150/33 | 2.27 / 4.54                   | 2.01 / 4.02 | 1.76 / 3.52 | 1.50 / 3.00 | 1.25 / 2.50 | 1.13 / 2.26 | 0.99 / 1.98 | 0.87 / 1.74 | 0.68 / 1.36 |
| MF-SM200    | 3.02 / 6.04                   | 2.68 / 5.36 | 2.34 / 4.68 | 2.00 / 4.00 | 1.66 / 3.32 | 1.50 / 3.00 | 1.32 / 2.64 | 1.16 / 2.32 | 0.90 / 1.80 |
| MF-SM250    | 3.78 / 7.56                   | 3.35 / 6.70 | 2.93 / 5.86 | 2.50 / 5.00 | 2.08 / 4.16 | 1.88 / 3.76 | 1.65 / 3.30 | 1.45 / 2.90 | 1.13 / 2.26 |
| MF-SM260    | 3.64 / 7.28                   | 3.25 / 6.50 | 2.91 / 5.82 | 2.60 / 5.20 | 2.26 / 4.52 | 2.08 / 4.16 | 1.95 / 3.90 | 1.74 / 3.48 | 1.48 / 2.96 |

\*RoHS Directive 2002/95/EC Jan 27 2003 including Annex. Product manufactured with a date code later than April 1, 2005 is RoHS compliant.  
Specifications are subject to change without notice.  
Customers should verify actual device performance in their specific applications.

## Additional Features

- Patents pending

# MF-SM Series - PTC Resettable Fuses

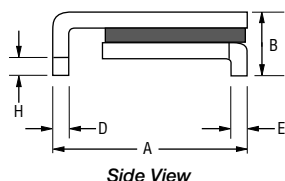
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## Product Dimensions

| Model       | A               |                 | B               | C               | D               |                 | E               |                 | F               |                 | G               |                 | H               |
|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|             | Min.            | Max.            | Max.            | Max.            | Min.            | Max.            | Min.            | Max.            | Min.            | Max.            | Min.            | Max.            | Min.            |
| MF-SM030    | 6.73<br>(0.265) | 7.98<br>(0.314) | 3.18<br>(0.125) | 5.44<br>(0.214) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 2.16<br>(0.085) | 2.41<br>(0.095) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM050    | 6.73<br>(0.265) | 7.98<br>(0.314) | 3.18<br>(0.125) | 5.44<br>(0.214) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 2.16<br>(0.085) | 2.41<br>(0.095) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM075    | 6.73<br>(0.265) | 7.98<br>(0.314) | 3.18<br>(0.125) | 5.44<br>(0.214) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 2.16<br>(0.085) | 2.41<br>(0.095) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM100    | 6.73<br>(0.265) | 7.98<br>(0.314) | 3.00<br>(0.118) | 5.44<br>(0.214) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 2.16<br>(0.085) | 2.41<br>(0.095) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM100/33 | 6.73<br>(0.265) | 7.98<br>(0.314) | 3.00<br>(0.118) | 5.44<br>(0.214) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 2.16<br>(0.085) | 2.41<br>(0.095) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM125    | 6.73<br>(0.265) | 7.98<br>(0.314) | 3.00<br>(0.118) | 5.44<br>(0.214) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 2.16<br>(0.085) | 2.41<br>(0.095) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM150    | 8.00<br>(0.315) | 9.50<br>(0.374) | 3.00<br>(0.118) | 6.71<br>(0.264) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 3.68<br>(0.145) | 3.94<br>(0.155) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM150/33 | 8.00<br>(0.315) | 9.50<br>(0.374) | 3.00<br>(0.118) | 6.71<br>(0.264) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 3.68<br>(0.145) | 3.94<br>(0.155) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM200    | 8.00<br>(0.315) | 9.50<br>(0.374) | 3.00<br>(0.118) | 6.71<br>(0.264) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 3.68<br>(0.145) | 3.94<br>(0.155) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM250    | 8.00<br>(0.315) | 9.50<br>(0.374) | 3.00<br>(0.118) | 6.71<br>(0.264) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 3.68<br>(0.145) | 3.94<br>(0.155) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM260    | 6.73<br>(0.265) | 7.98<br>(0.314) | 3.00<br>(0.118) | 5.44<br>(0.214) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 2.16<br>(0.085) | 2.41<br>(0.095) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |

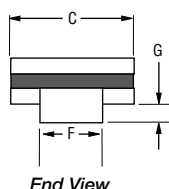
Packaging:

TAPE & REEL: MF-SM030, 050, 075, 100, 100/33, 125, 260 = 2000 pcs. per reel;  
MF-SM150, 150/33, 200, 250 = 1500 pcs. per reel.



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

Terminal material:  
Tin-plated brass



## How to Order

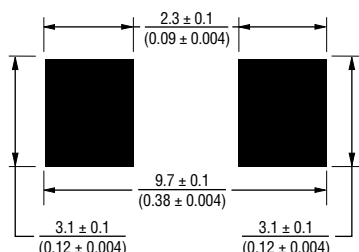
### MF - SM 100/33 - 2

Multifuse® Product  
Designator \_\_\_\_\_  
Series \_\_\_\_\_  
SM = Surface Mount Component  
Hold Current, I<sub>hold</sub>/V<sub>max</sub>\* \_\_\_\_\_  
030 - 260 (0.3 - 2.6 Amps)  
Packaging Options \_\_\_\_\_  
- 2 = Tape and Reel\*\*

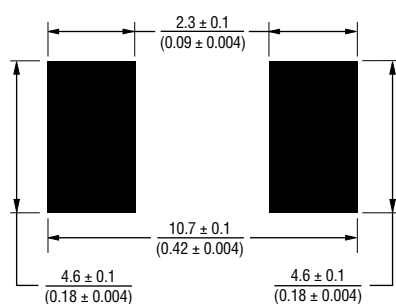
\*V<sub>max</sub> entry applies only to models MF-SM100/33 & MF-SM150/33.

\*\*Packaged per EIA-481-2

## Recommended Pad Layout MF-SM030, 050, 075, 100, 100/33, 125, 260



## Recommended Pad Layout MF-SM150, 150/33, 200, 250

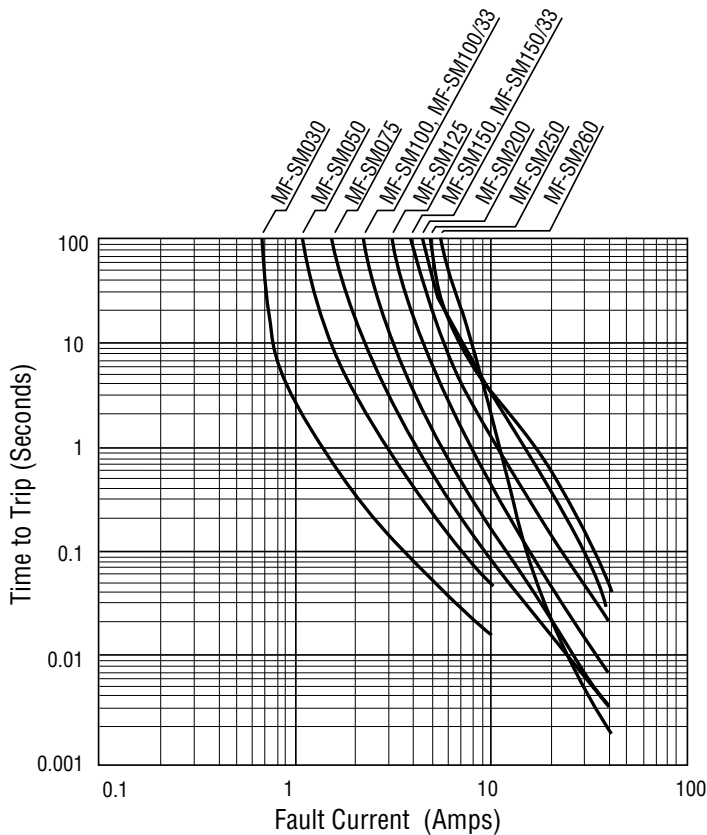


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## MF-SM Series - PTC Resettable Fuses

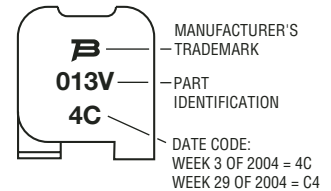
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### Typical Time to Trip at 23 °C

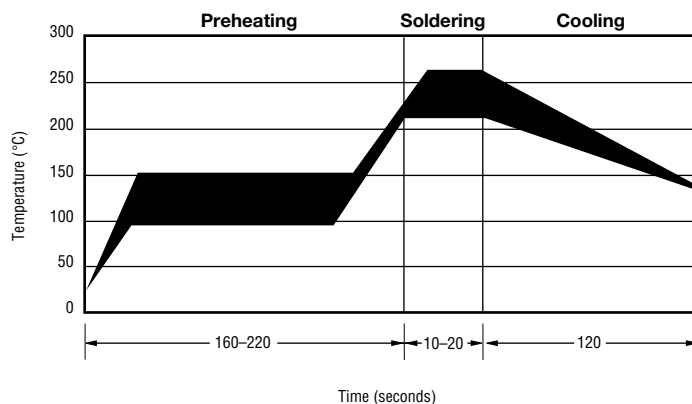


### Typical Part Marking

Represents total content. Layout may vary.



### Solder Reflow Recommendations



#### Solder reflow

- Recommended reflow methods: IR, vapor phase oven, hot air oven.
- Devices are not designed to be wave soldered to the bottom side of the board.
- Gluing the devices is not recommended.
- Recommended maximum paste thickness is 0.25 mm (.010 inch).
- Devices can be cleaned using standard industry methods and solvents.

#### Note:

- If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

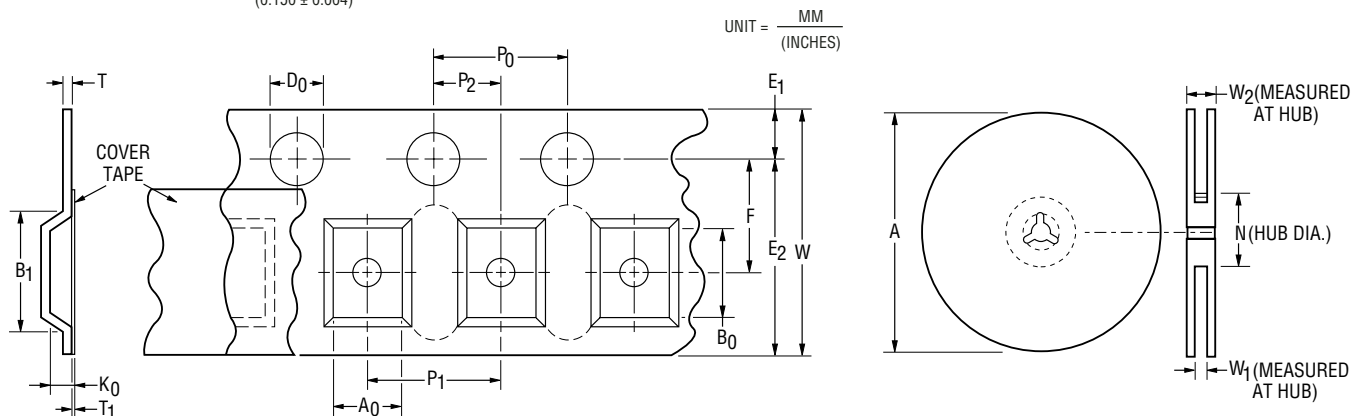
#### Rework

- A device should not be reworked.

**MF-SM, MF-SM/33 & MF-SM/250 Series Tape and Reel Specifications**
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| Tape Dimensions        | MF-SM030, 050, 075, 100, 125, 260;<br>MF-SM-100/33<br>per EIA-481-2 | MF-SM150, 200, 250;<br>MF-SM-150/33; MF-SM013/250<br>per EIA 481-2 |
|------------------------|---------------------------------------------------------------------|--------------------------------------------------------------------|
|                        |                                                                     |                                                                    |
| W                      | $\frac{16.0 \pm 0.3}{(0.630 \pm 0.012)}$                            | $\frac{16.0 \pm 0.3}{(0.630 \pm 0.012)}$                           |
| P <sub>0</sub>         | $\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$                             | $\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$                            |
| P <sub>1</sub>         | $\frac{8.0 \pm 0.1}{(0.315 \pm 0.004)}$                             | $\frac{12.0 \pm 0.1}{(0.472 \pm 0.004)}$                           |
| P <sub>2</sub>         | $\frac{2.0 \pm 0.1}{(0.079 \pm 0.004)}$                             | $\frac{2.0 \pm 0.1}{(0.079 \pm 0.004)}$                            |
| A <sub>0</sub>         | $\frac{5.7 \pm 0.1}{(0.224 \pm 0.004)}$                             | $\frac{6.9 \pm 0.1}{(0.272 \pm 0.004)}$                            |
| B <sub>0</sub>         | $\frac{8.1 \pm 0.1}{(0.319 \pm 0.004)}$                             | $\frac{9.6 \pm 0.1}{(0.378 \pm 0.004)}$                            |
| B <sub>1</sub> max.    | $\frac{12.1}{(0.476)}$                                              | $\frac{12.1}{(0.476)}$                                             |
| D <sub>0</sub>         | $\frac{1.5 \pm 0.1/-0.0}{(0.059 \pm 0.004/-0)}$                     | $\frac{1.5 \pm 0.1/-0.0}{(0.059 \pm 0.004/-0)}$                    |
| F                      | $\frac{7.5 \pm 0.1}{(0.295 \pm 0.004)}$                             | $\frac{7.5 \pm 0.1}{(0.295 \pm 0.004)}$                            |
| E <sub>1</sub>         | $\frac{1.75 \pm 0.1}{(0.069 \pm 0.004)}$                            | $\frac{1.75 \pm 0.1}{(0.069 \pm 0.004)}$                           |
| E <sub>2</sub> min.    | $\frac{14.25}{(0.561)}$                                             | $\frac{14.25}{(0.561)}$                                            |
| T max.                 | $\frac{0.6}{(0.024)}$                                               | $\frac{0.6}{(0.024)}$                                              |
| T <sub>1</sub> max.    | $\frac{0.1}{(0.004)}$                                               | $\frac{0.1}{(0.004)}$                                              |
| K <sub>0</sub>         | $\frac{3.4 \pm 0.1}{(0.134 \pm 0.004)}$                             | $\frac{3.4 \pm 0.1^*}{(0.134 \pm 0.004)^*}$                        |
| Leader min.            | $\frac{390}{(15.35)}$                                               | $\frac{390}{(15.35)}$                                              |
| Trailer min.           | $\frac{160}{(6.30)}$                                                | $\frac{160}{(6.30)}$                                               |
| <b>Reel Dimensions</b> |                                                                     |                                                                    |
| A max.                 | $\frac{360}{(14.17)}$                                               | $\frac{360}{(14.17)}$                                              |
| N min.                 | $\frac{50}{(1.97)}$                                                 | $\frac{50}{(1.97)}$                                                |
| W <sub>1</sub>         | $\frac{16.4 \pm 2.0/-0.0}{(0.646 \pm 0.079/-0)}$                    | $\frac{16.4 \pm 2.0/-0.0}{(0.646 \pm 0.079/-0)}$                   |
| W <sub>2</sub> max.    | $\frac{22.4}{(0.882)}$                                              | $\frac{22.4}{(0.882)}$                                             |

\* Model MF-SM013/250 =  $\frac{3.8 \pm 0.1}{(0.150 \pm 0.004)}$



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