



## Features

- Compliant with AEC-Q200 Rev-C Stress Test Qualification for Passive Components in Automotive Applications
- Compact design to save board space - 1206 footprint
- Small size results in very fast time to react to fault events
- Symmetrical design
- Low profile
- RoHS compliant\* and halogen free\*\*
- Agency recognition: c us

## MF-NSMF Series - PTC Resettable Fuses

### 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.                      |
| MF-NSMF012      | 30.0         | 10          | 0.12              | 0.29              | 1.35              | 8.50               | 1.0               | 0.20             | 0.4                       |
| MF-NSMF020      | 24.0         | 10          | 0.20              | 0.46              | 0.60              | 2.60               | 1.0               | 0.60             | 0.6                       |
| MF-NSMF020X***  | 30.0         | 60          | 0.20              | 0.40              | 0.60              | 3.30               | 1.0               | 0.60             | 0.6                       |
| MF-NSMF035      | 6.0          | 100         | 0.35              | 0.75              | 0.30              | 1.20               | 8.0               | 0.10             | 0.6                       |
| MF-NSMF035X**** | 16.0         | 20          | 0.35              | 0.75              | 0.30              | 1.40               | 3.5               | 0.14             | 0.6                       |
| MF-NSMF050      | 13.2         | 100         | 0.50              | 1.00              | 0.15              | 0.70               | 8.0               | 0.10             | 0.4                       |
| MF-NSMF075      | 6.0          | 100         | 0.75              | 1.50              | 0.10              | 0.40               | 8.0               | 0.10             | 0.4                       |
| MF-NSMF110      | 6.0          | 100         | 1.10              | 2.20              | 0.06              | 0.20               | 8.0               | 0.10             | 0.6                       |
| MF-NSMF150      | 6.0          | 100         | 1.50              | 3.00              | 0.03              | 0.13               | 8.0               | 0.30             | 0.6                       |
| MF-NSMF200      | 6.0          | 100         | 2.00              | 4.00              | 0.02              | 0.085              | 8.0               | 1.00             | 0.7                       |

\*\*\*Features Multifuse® freeXpansion Design™ for MF-NSMF Series (TÜV pending)

\*\*\*\*Features Multifuse® freeXpansion Design™ for MF-NSMF Series

### 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-NSMF 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                                                                                                                       |                                          |
|                              | <a href="http://www.ul.com/">http://www.ul.com/</a> Follow link to Certifications, then UL File No., enter E174545            |                                          |
| 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 |                                          |

\*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.

\*\*Bourns follows the prevailing definition of "halogen free" in the industry. Bourns considers a product to be "halogen free" if (a) the Bromine (Br) content is 900 ppm or less; (b) the Chlorine (Cl) content is 900 ppm or less; and (c) the total Bromine (Br) and Chlorine (Cl) content is 1500 ppm or less. 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.

## Applications

- USB port protection - USB 2.0, 3.0 & OTG
- Automotive electronic control modules
- HDMI 1.4 Source protection
- PC motherboards - Plug and Play protection
- Mobile phones - Battery and port protection
- PDAs / digital cameras
- Game console port protection

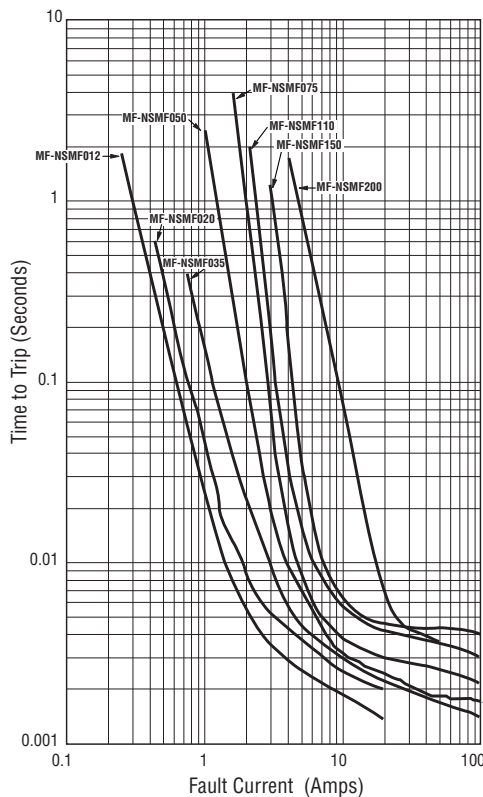
## MF-NSMF Series - PTC Resettable Fuses

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

| Model       | Ambient Operating Temperature |        |      |       |       |       |       |       |       |
|-------------|-------------------------------|--------|------|-------|-------|-------|-------|-------|-------|
|             | -40 °C                        | -20 °C | 0 °C | 23 °C | 40 °C | 50 °C | 60 °C | 70 °C | 85 °C |
| MF-NSMF012  | 0.19                          | 0.17   | 0.15 | 0.12  | 0.11  | 0.10  | 0.09  | 0.08  | 0.07  |
| MF-NSMF020  | 0.30                          | 0.27   | 0.24 | 0.20  | 0.18  | 0.16  | 0.14  | 0.12  | 0.11  |
| MF-NSMF020X | 0.30                          | 0.27   | 0.24 | 0.20  | 0.18  | 0.16  | 0.14  | 0.12  | 0.10  |
| MF-NSMF035  | 0.51                          | 0.46   | 0.40 | 0.35  | 0.30  | 0.27  | 0.24  | 0.22  | 0.18  |
| MF-NSMF035X | 0.58                          | 0.51   | 0.44 | 0.35  | 0.31  | 0.28  | 0.24  | 0.21  | 0.16  |
| MF-NSMF050  | 0.76                          | 0.68   | 0.59 | 0.50  | 0.44  | 0.40  | 0.35  | 0.32  | 0.26  |
| MF-NSMF075  | 1.11                          | 1.00   | 0.85 | 0.75  | 0.67  | 0.61  | 0.52  | 0.50  | 0.42  |
| MF-NSMF110  | 1.64                          | 1.46   | 1.30 | 1.10  | 0.92  | 0.83  | 0.80  | 0.65  | 0.52  |
| MF-NSMF150  | 2.20                          | 1.99   | 1.77 | 1.50  | 1.34  | 1.23  | 1.10  | 1.01  | 0.84  |
| MF-NSMF200  | 2.88                          | 2.61   | 2.28 | 2.00  | 1.80  | 1.66  | 1.51  | 1.39  | 1.19  |

**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.

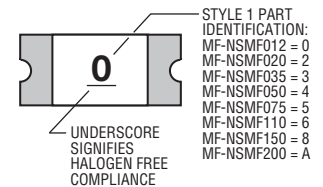
## How to Order

### MF - NSMF 020 X - 2

Multifuse® Product Designator \_\_\_\_\_  
 Series \_\_\_\_\_  
 NSMF = 1206 Surface Mount Component  
 Hold Current,  $I_{hold}$  \_\_\_\_\_  
 012-200 (0.12 Amps - 2.00 Amps)  
 Options \_\_\_\_\_  
 = Standard  
 X = Multifuse® freeXpansion Design™  
 MF-NSMF Series  
 Packaging \_\_\_\_\_  
 Packaged per EIA 481-1  
 -2 = Tape and Reel

## Typical Part Marking

Represents total content. Layout may vary.



BIWEEKLY DATE CODE WILL APPEAR ON THE PACKAGING LABEL:  
 WEEK 1 AND 2 = A  
 WEEK 51 AND 52 = Z

# MF-NSMF Series - PTC Resettable Fuses

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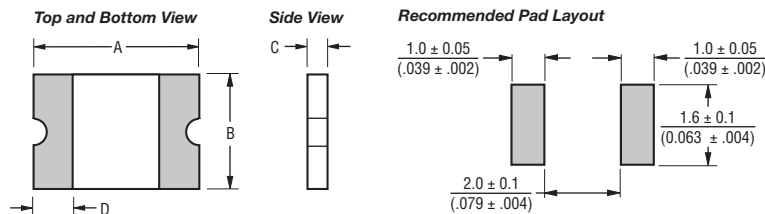
## Product Dimensions

| Model       | A                      |                        | B                      |                        | C                      |                        | D                      | Style |
|-------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-------|
|             | Min.                   | Max.                   | Min.                   | Max.                   | Min.                   | Max.                   |                        |       |
| MF-NSMF012  | $\frac{3.00}{(0.118)}$ | $\frac{3.40}{(0.134)}$ | $\frac{1.40}{(0.055)}$ | $\frac{1.80}{(0.071)}$ | $\frac{0.70}{(0.028)}$ | $\frac{1.10}{(0.043)}$ | $\frac{0.25}{(0.010)}$ | 1     |
| MF-NSMF020  | $\frac{3.00}{(0.118)}$ | $\frac{3.40}{(0.134)}$ | $\frac{1.40}{(0.055)}$ | $\frac{1.80}{(0.071)}$ | $\frac{0.48}{(0.019)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.25}{(0.010)}$ | 1     |
| MF-NSMF020X | $\frac{3.00}{(0.118)}$ | $\frac{3.40}{(0.134)}$ | $\frac{1.40}{(0.055)}$ | $\frac{1.80}{(0.071)}$ | $\frac{0.40}{(0.016)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.25}{(0.010)}$ | 2     |
| MF-NSMF035  | $\frac{3.00}{(0.118)}$ | $\frac{3.40}{(0.134)}$ | $\frac{1.40}{(0.055)}$ | $\frac{1.80}{(0.071)}$ | $\frac{0.48}{(0.019)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.25}{(0.010)}$ | 1     |
| MF-NSMF035X | $\frac{3.00}{(0.118)}$ | $\frac{3.40}{(0.134)}$ | $\frac{1.40}{(0.055)}$ | $\frac{1.80}{(0.071)}$ | $\frac{0.40}{(0.016)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.25}{(0.010)}$ | 2     |
| MF-NSMF050  | $\frac{3.00}{(0.118)}$ | $\frac{3.40}{(0.134)}$ | $\frac{1.40}{(0.055)}$ | $\frac{1.80}{(0.071)}$ | $\frac{0.48}{(0.019)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.25}{(0.010)}$ | 1     |
| MF-NSMF075  | $\frac{3.00}{(0.118)}$ | $\frac{3.40}{(0.134)}$ | $\frac{1.40}{(0.055)}$ | $\frac{1.80}{(0.071)}$ | $\frac{0.40}{(0.016)}$ | $\frac{0.70}{(0.028)}$ | $\frac{0.25}{(0.010)}$ | 1     |
| MF-NSMF110  | $\frac{3.00}{(0.118)}$ | $\frac{3.40}{(0.134)}$ | $\frac{1.40}{(0.055)}$ | $\frac{1.80}{(0.071)}$ | $\frac{0.40}{(0.016)}$ | $\frac{0.70}{(0.028)}$ | $\frac{0.25}{(0.010)}$ | 1     |
| MF-NSMF150  | $\frac{3.00}{(0.118)}$ | $\frac{3.40}{(0.134)}$ | $\frac{1.40}{(0.055)}$ | $\frac{1.80}{(0.071)}$ | $\frac{0.40}{(0.016)}$ | $\frac{0.70}{(0.028)}$ | $\frac{0.25}{(0.010)}$ | 1     |
| MF-NSMF200  | $\frac{3.00}{(0.118)}$ | $\frac{3.50}{(0.138)}$ | $\frac{1.40}{(0.055)}$ | $\frac{1.80}{(0.071)}$ | $\frac{0.70}{(0.028)}$ | $\frac{1.60}{(0.063)}$ | $\frac{0.25}{(0.010)}$ | 1     |

Packaging: 3000 pcs. per reel.

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

### Style 1



#### Terminal material:

Electroless Ni under immersion Au

#### Termination pad solderability:

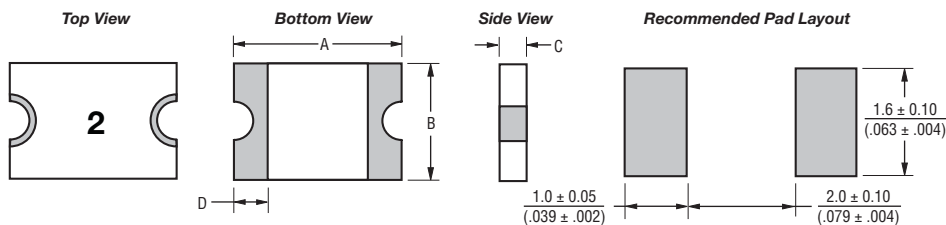
Standard Au finish:

Meets ANSI/J-STD-002 Category 2.

#### Recommended Storage:

40 °C max./70 % RH max.

### Style 2



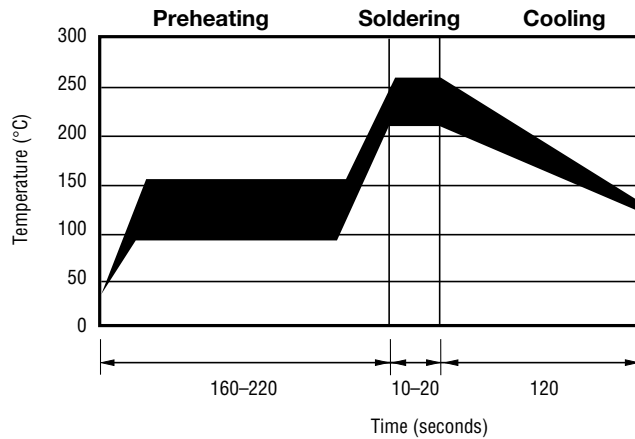
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## MF-NSMF Series - PTC Resettable Fuses

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### Solder Reflow Recommendations



#### Notes:

- MF-NSMF models cannot be wave soldered. Please contact Bourns for hand soldering recommendations.
- If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.
- Compatible with Pb and Pb-free solder reflow profiles.
- Excess solder may cause a short circuit, especially during hand soldering. Please refer to the Multifuse® Polymer PTC Soldering Recommendation guidelines.

MF-NSMF SERIES, REV. T, 08/15

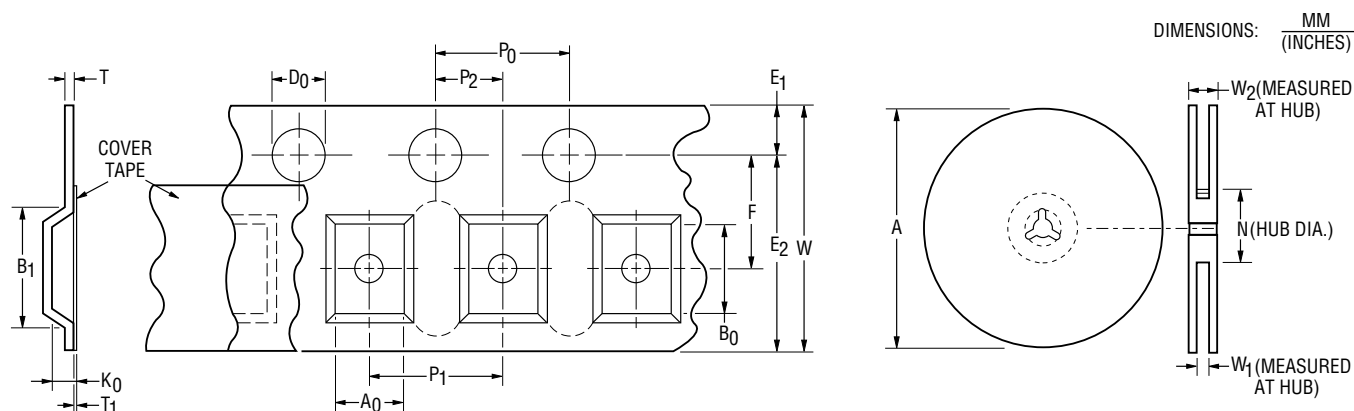
“freeXpansion Design” is a trademark of Bourns, Inc.  
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# MF-NSMF Series Tape and Reel Specifications

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| Tape Dimensions        | MF-NSMF012<br>& MF-NSMF200<br>per EIA 481-1 | MF-NSMF020 ~<br>MF-NSMF050<br>per EIA 481-1 | MF-NSMF075 ~<br>MF-NSMF150<br>per EIA 481-1 | MF-NSMF020X<br>& MF-NSMF035X<br>per EIA 481-1 |
|------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|-----------------------------------------------|
| W                      | $8.0 \pm 0.30$<br>(0.315 ± 0.012)           | $8.0 \pm 0.30$<br>(0.315 ± 0.012)           | $8.0 \pm 0.30$<br>(0.315 ± 0.012)           | $8.0 \pm 0.30$<br>(0.315 ± 0.012)             |
| P <sub>0</sub>         | $4.0 \pm 0.10$<br>(0.157 ± 0.004)           | $4.0 \pm 0.10$<br>(0.157 ± 0.004)           | $4.0 \pm 0.10$<br>(0.157 ± 0.004)           | $4.0 \pm 0.10$<br>(0.157 ± 0.004)             |
| P <sub>1</sub>         | $4.0 \pm 0.10$<br>(0.157 ± 0.004)           | $4.0 \pm 0.10$<br>(0.157 ± 0.004)           | $4.0 \pm 0.10$<br>(0.157 ± 0.004)           | $4.0 \pm 0.10$<br>(0.157 ± 0.004)             |
| P <sub>2</sub>         | $2.0 \pm 0.05$<br>(0.079 ± 0.002)           | $2.0 \pm 0.05$<br>(0.079 ± 0.002)           | $2.0 \pm 0.05$<br>(0.079 ± 0.002)           | $2.0 \pm 0.05$<br>(0.079 ± 0.002)             |
| A <sub>0</sub>         | $1.90 \pm 0.10$<br>(0.075 ± 0.004)          | $1.90 \pm 0.10$<br>(0.075 ± 0.004)          | $1.90 \pm 0.10$<br>(0.075 ± 0.004)          | $1.90 \pm 0.10$<br>(0.075 ± 0.004)            |
| B <sub>0</sub>         | $3.50 \pm 0.10$<br>(0.138 ± 0.004)          | $3.45 \pm 0.10$<br>(0.136 ± 0.004)          | $3.45 \pm 0.10$<br>(0.136 ± 0.004)          | $3.55 \pm 0.10$<br>(0.140 ± 0.004)            |
| B <sub>1</sub> max.    | $4.35$<br>(0.171)                           | $4.35$<br>(0.171)                           | $4.35$<br>(0.171)                           | $4.35$<br>(0.171)                             |
| D <sub>0</sub>         | $1.5 + 0.10/-0.0$<br>(0.059 + 0.004/-0)     | $1.5 + 0.10/-0.0$<br>(0.059 + 0.004/-0)     | $1.5 + 0.10/-0.0$<br>(0.059 + 0.004/-0)     | $1.5 + 0.10/-0.0$<br>(0.059 + 0.004/-0)       |
| F                      | $3.5 \pm 0.05$<br>(0.138 ± 0.002)           | $3.5 \pm 0.05$<br>(0.138 ± 0.002)           | $3.5 \pm 0.05$<br>(0.138 ± 0.002)           | $3.5 \pm 0.05$<br>(0.138 ± 0.002)             |
| E <sub>1</sub>         | $1.75 \pm 0.10$<br>(0.069 ± 0.004)          | $1.75 \pm 0.10$<br>(0.069 ± 0.004)          | $1.75 \pm 0.10$<br>(0.069 ± 0.004)          | $1.75 \pm 0.10$<br>(0.069 ± 0.004)            |
| E <sub>2</sub> min.    | $6.25$<br>(0.246)                           | $6.25$<br>(0.246)                           | $6.25$<br>(0.246)                           | $6.25$<br>(0.246)                             |
| T max.                 | $0.6$<br>(0.024)                            | $0.6$<br>(0.024)                            | $0.6$<br>(0.024)                            | $0.6$<br>(0.024)                              |
| T <sub>1</sub> max.    | $0.1$<br>(0.004)                            | $0.1$<br>(0.004)                            | $0.1$<br>(0.004)                            | $0.1$<br>(0.004)                              |
| K <sub>0</sub>         | $1.35 \pm 0.10$<br>(0.053 ± 0.004)          | $1.04 \pm 0.10$<br>(0.041 ± 0.004)          | $0.85 \pm 0.10$<br>(0.033 ± 0.004)          | $0.80 \pm 0.10$<br>(0.032 ± 0.004)            |
| Leader min.            | 390<br>(15.35)                              | 390<br>(15.35)                              | 390<br>(15.35)                              | 390<br>(15.35)                                |
| Trailer min.           | 160<br>(6.30)                               | 160<br>(6.30)                               | 160<br>(6.30)                               | 160<br>(6.30)                                 |
| <b>Reel Dimensions</b> |                                             |                                             |                                             |                                               |
| A max.                 | 185<br>(7.28)                               | 185<br>(7.28)                               | 185<br>(7.28)                               | 185<br>(7.28)                                 |
| N min.                 | 50<br>(1.97)                                | 50<br>(1.97)                                | 50<br>(1.97)                                | 50<br>(1.97)                                  |
| W <sub>1</sub>         | $8.4 + 1.5/-0.0$<br>(0.331 + 0.059/-0.0)    | $8.4 + 1.5/-0.0$<br>(0.331 + 0.059/-0.0)    | $8.4 + 1.5/-0.0$<br>(0.331 + 0.059/-0.0)    | $8.4 + 1.5/-0.0$<br>(0.331 + 0.059/-0.0)      |
| W <sub>2</sub> max.    | 14.4<br>(0.567)                             | 14.4<br>(0.567)                             | 14.4<br>(0.567)                             | 14.4<br>(0.567)                               |



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