



## Features

- 4.5 mm SMD
- Fast tripping resettable circuit protection
- Surface mount packaging for automated assembly
- Reduced component size and resistance
- Agency recognition:   

## Applications

High Density Circuit Board Applications:

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

# MF-MSMD 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-MSMD010 | 60.0            | 40             | 0.10              | 0.30              | 0.70              | 15.00              | 0.5               | 1.5              | 1.0                       |
| MF-MSMD014 | 60.0            | 40             | 0.14              | 0.34              | 0.40              | 6.50               | 1.5               | 0.15             | 1.0                       |
| MF-MSMD020 | 30.0            | 80             | 0.20              | 0.40              | 0.40              | 6.00               | 6.0               | 0.06             | 1.0                       |
| MF-MSMD030 | 30.0            | 10             | 0.30              | 0.60              | 0.30              | 3.00               | 8.0               | 0.10             | 1.2                       |
| MF-MSMD050 | 15.0            | 100            | 0.50              | 1.00              | 0.15              | 1.00               | 8.0               | 0.15             | 1.2                       |
| MF-MSMD075 | 13.2            | 100            | 0.75              | 1.50              | 0.11              | 0.45               | 8.0               | 0.20             | 1.2                       |
| MF-MSMD110 | 6.0             | 100            | 1.10              | 2.20              | 0.04              | 0.21               | 8.0               | 0.30             | 1.2                       |
| MF-MSMD125 | 6.0             | 100            | 1.25              | 2.50              | 0.035             | 0.14               | 8.0               | 0.4              | 1.5                       |
| MF-MSMD150 | 6.0             | 100            | 1.50              | 3.00              | 0.03              | 0.120              | 8.0               | 0.5              | 1.5                       |
| MF-MSMD160 | 8.0             | 100            | 1.60              | 2.80              | 0.035             | 0.099              | 8.0               | 2.0              | 1.5                       |
| MF-MSMD200 | 6.0             | 100            | 2.00              | 4.00              | 0.020             | 0.100              | 8.0               | 3.0              | 1.5                       |
| MF-MSMD260 | 6.0             | 100            | 2.60              | 5.20              | 0.015             | 0.080              | 8.0               | 5.0              | 1.5                       |

## 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. 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-MSMD 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<br><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<br><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<br><a href="http://www.tuvdotcom.com/">http://www.tuvdotcom.com/</a> Follow link to "other certificates", enter File No. 2057213                                     |                                          |

## Additional Features

- Patents pending

## MF-MSMD Series - PTC Resettable Fuses

**BOURNS®**

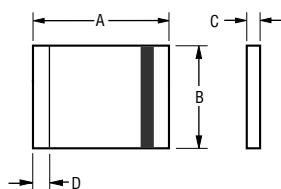
### Product Dimensions

| Model      | A                      |                        | B                      |                        | C                      |                        | D                      |
|------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
|            | Min.                   | Max.                   | Min.                   | Max.                   | Min.                   | Max.                   | Min.                   |
| MF-MSMD010 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.56}{(0.022)}$ | $\frac{0.81}{(0.032)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD014 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.56}{(0.022)}$ | $\frac{0.81}{(0.032)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD020 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.56}{(0.022)}$ | $\frac{0.81}{(0.032)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD030 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.56}{(0.022)}$ | $\frac{0.81}{(0.032)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD050 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.38}{(0.015)}$ | $\frac{0.62}{(0.024)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD075 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.38}{(0.015)}$ | $\frac{0.62}{(0.024)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD110 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.38}{(0.015)}$ | $\frac{0.62}{(0.024)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD125 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.30}{(0.012)}$ | $\frac{0.48}{(0.019)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD150 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.30}{(0.012)}$ | $\frac{0.48}{(0.019)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD160 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.30}{(0.012)}$ | $\frac{0.48}{(0.019)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD200 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.30}{(0.012)}$ | $\frac{0.48}{(0.019)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD260 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.25}{(0.010)}$ | $\frac{0.48}{(0.019)}$ | $\frac{0.30}{(0.012)}$ |

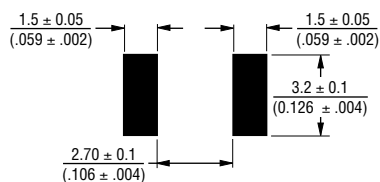
Packaging: 2000 pcs. per reel.

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

Top and Bottom View Side View

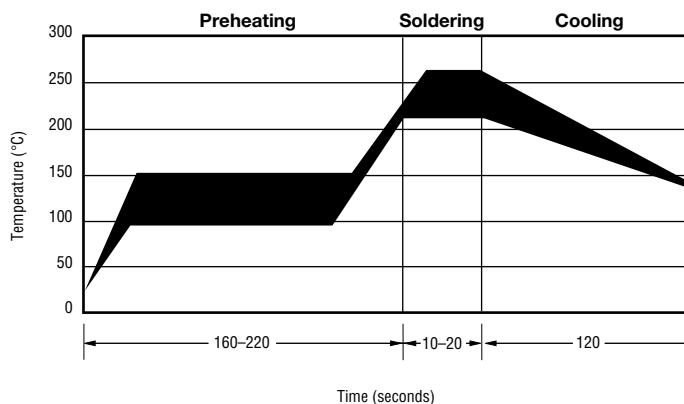


Recommended Pad Layout



Terminal material: solder-plated copper  
Termination pad solderability: Meets EIA Specification RS-186-9E, ANSI/J-STD-002 Category 3.

### Solder Reflow Recommendations



#### Note:

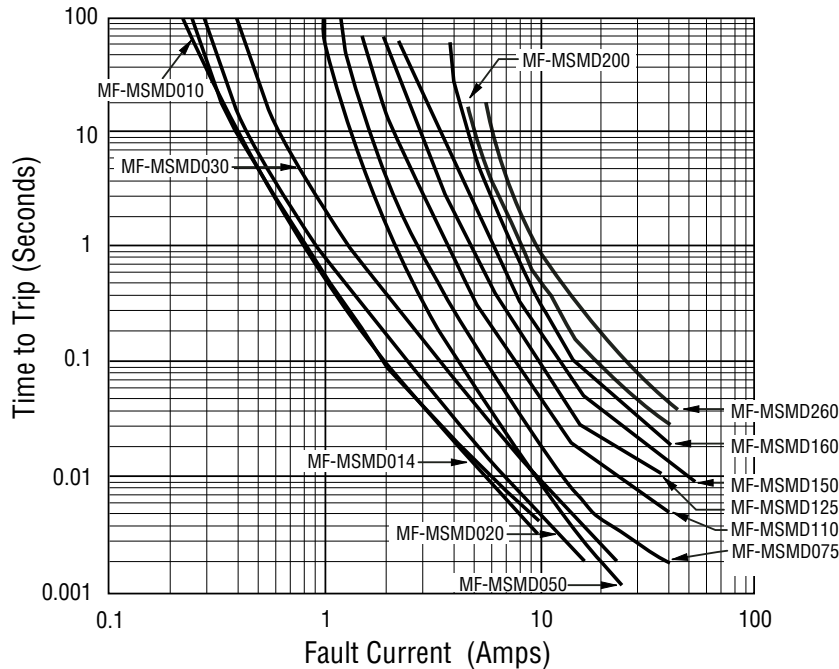
- MF-MSMD models can be wave soldered and reworked.
- If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

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

# MF-MSMD Series - PTC Resettable Fuses

**BOURNS®**

## Typical Time to Trip at 23 °C



## How to Order

**MF - MSMD 075 - 2**

Multifuse® Product Designator \_\_\_\_\_

Series \_\_\_\_\_

MSMD = 4.5 mm Surface Mount Component

Hold Current,  $I_{hold}$  \_\_\_\_\_

010-260 (0.10 Amps - 2.60 Amps)

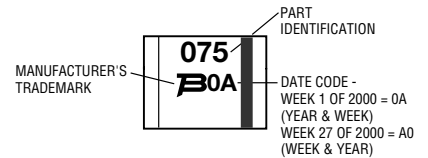
Packaging \_\_\_\_\_

Packaged per EIA 481-1

-2 = Tape and Reel

## Typical Part Marking

Represents total content. Layout may vary.



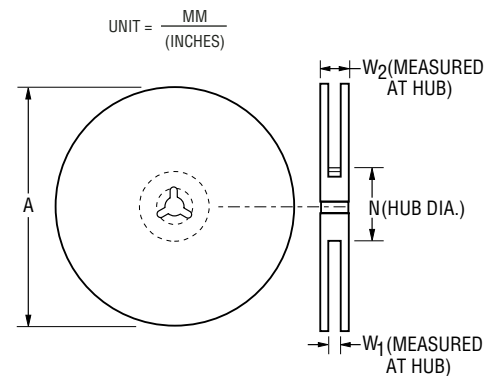
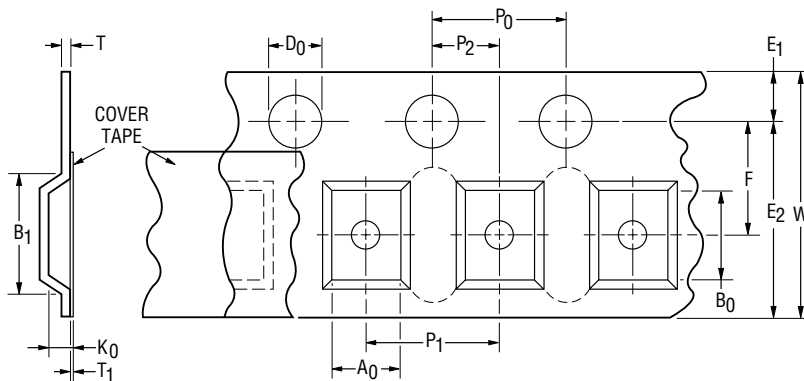
## Thermal Derating Chart - $I_{hold}$ / $I_{trip}$ (Amps)

| Model      | Ambient Operating Temperature |             |             |             |             |             |             |             |             |
|------------|-------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|            | -40 °C                        | -20 °C      | 0 °C        | 23 °C       | 40 °C       | 50 °C       | 60 °C       | 70 °C       | 85 °C       |
| MF-MSMD010 | 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-MSMD014 | 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-MSMD020 | 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-MSMD030 | 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-MSMD050 | 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-MSMD075 | 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-MSMD110 | 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-MSMD125 | 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-MSMD150 | 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-MSMD160 | 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-MSMD200 | 3.08 / 6.14                   | 2.71 / 5.39 | 2.35 / 4.62 | 2.00 / 4.01 | 1.80 / 1.61 | 1.60 / 3.19 | 1.50 / 2.98 | 1.07 / 2.12 | 0.80 / 1.58 |
| MF-MSMD260 | 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 |

# MF-MSMD, MF-USMD & MF-ESMD Series Tape and Reel Specs

**BOURNS®**

| Tape Dimensions        | MF-MSMD Series<br>per EIA-481-1                | MF-USMD Series<br>per EIA 481-1                                  | MF-ESMD Series<br>per EIA 481-2                                      |
|------------------------|------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------------------|
| W                      | $\frac{12.0 \pm 0.30}{(0.472 \pm 0.012)}$      | $\frac{8.0 \pm 0.30}{(0.315 \pm 0.012)}$                         | $\frac{24.0 \pm 0.3}{(0.945 \pm 0.012)}$                             |
| P <sub>0</sub>         | $\frac{4.0 \pm 0.10}{(0.157 \pm 0.004)}$       | $\frac{4.0 \pm 0.10}{(0.157 \pm 0.004)}$                         | $\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$                              |
| P <sub>1</sub>         | $\frac{8.0 \pm 0.10}{(0.315 \pm 0.004)}$       | $\frac{4.0 \pm 0.10}{(0.157 \pm 0.004)}$                         | $\frac{8.0 \pm 0.1}{(0.315 \pm 0.004)}$                              |
| P <sub>2</sub>         | $\frac{2.0 \pm 0.05}{(0.079 \pm 0.002)}$       | $\frac{2.0 \pm 0.05}{(0.079 \pm 0.002)}$                         | $\frac{2.0 \pm 0.1}{(0.079 \pm 0.004)}$                              |
| A <sub>0</sub>         | $\frac{3.66 \pm 0.15}{(0.144 \pm 0.006)}$      | MF-USMD005,010,020:<br>$\frac{2.76 \pm 0.10}{(0.109 \pm 0.004)}$ | MF-USMD035,050,075,110:<br>$\frac{2.93 \pm 0.15}{(0.115 \pm 0.006)}$ |
| B <sub>0</sub>         | $\frac{4.98 \pm 0.10}{(0.196 \pm 0.004)}$      | MF-USMD005,010,020:<br>$\frac{3.5 \pm 0.1}{(0.138 \pm 0.004)}$   | MF-USMD035,050,075,110:<br>$\frac{3.56 \pm 0.1}{(0.140 \pm 0.004)}$  |
| B <sub>1</sub> max.    | $\frac{5.9}{(0.232)}$                          | $\frac{4.35}{(0.171)}$                                           | $\frac{20.1}{(0.791)}$                                               |
| D <sub>0</sub>         | $\frac{1.5 + 0.10/-0.00}{(0.059 + 0.004/-0)}$  | $\frac{1.50 + 0.1/-0.0}{(0.059 + 0.004/-0)}$                     | $\frac{1.5 + 0.1/-0.0}{(0.059 + 0.004/-0)}$                          |
| F                      | $\frac{5.5 \pm 0.05}{(0.217 \pm 0.002)}$       | $\frac{3.5 \pm 0.05}{(0.138 \pm 0.002)}$                         | $\frac{11.5 \pm 0.10}{(0.453 \pm 0.004)}$                            |
| 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.    | $\frac{10.25}{(0.404)}$                        | $\frac{6.25}{(0.246)}$                                           | $\frac{22.25}{(0.876)}$                                              |
| 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>         | $\frac{0.95 \pm 0.10}{(0.037 \pm 0.004)}$      | MF-USMD005,010,020:<br>$\frac{1.07 \pm 0.10}{(0.042 \pm 0.004)}$ | MF-USMD035,050,075,110:<br>$\frac{0.75 \pm 0.10}{(0.030 \pm 0.004)}$ |
| 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.                 | $\frac{185}{(7.28)}$                           | $\frac{185}{(7.28)}$                                             | $\frac{360}{(14.17)}$                                                |
| N min.                 | $\frac{50}{(1.97)}$                            | $\frac{50}{(1.97)}$                                              | $\frac{60}{(2.36)}$                                                  |
| W <sub>1</sub>         | $\frac{12.4 + 2.0/-0.0}{(0.488 + 0.079/-0.0)}$ | $\frac{8.4 + 1.5/-0.0}{(0.331 + 0.059/-0)}$                      | $\frac{24.4 + 2.0/-0.0}{(0.961 + 0.079/-0)}$                         |
| W <sub>2</sub> max.    | $\frac{18.4}{(0.724)}$                         | $\frac{14.4}{(0.567)}$                                           | $\frac{30.4}{(1.20)}$                                                |



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