



### 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. 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-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  
<http://www.ul.com/> Follow link to Certifications, then UL File No., enter E174545  
 CSA File Number.....CA110338  
<http://directories.csa-international.org/> Under "Certification Record" and "File Number" enter 110338-0-000  
 TÜV Certificate Number.....R 02057213  
<http://www.tuvdotcom.com/> Follow link to "other certificates", enter File No. 2057213

## Additional Features

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

# MF-MSMF Series - PTC Resettable Fuses

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### Product Dimensions

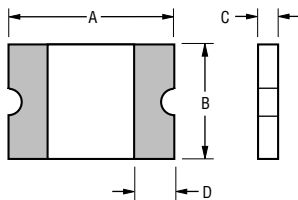
Model	A		B		C		D
	Min.	Max.	Min.	Max.	Min.	Max.	Min.
MF-MSMF010	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.70}{(0.028)}$	$\frac{1.10}{(0.043)}$	$\frac{0.30}{(0.012)}$
MF-MSMF014	$\frac{4.37}{(0.172)}$	$\frac{4.73}{(0.186)}$	$\frac{3.07}{(0.121)}$	$\frac{3.41}{(0.134)}$	$\frac{0.70}{(0.028)}$	$\frac{1.10}{(0.043)}$	$\frac{0.30}{(0.012)}$
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.

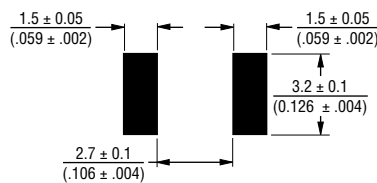
UNIT =  $\frac{\text{MM}}{\text{(INCHES)}}$

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.

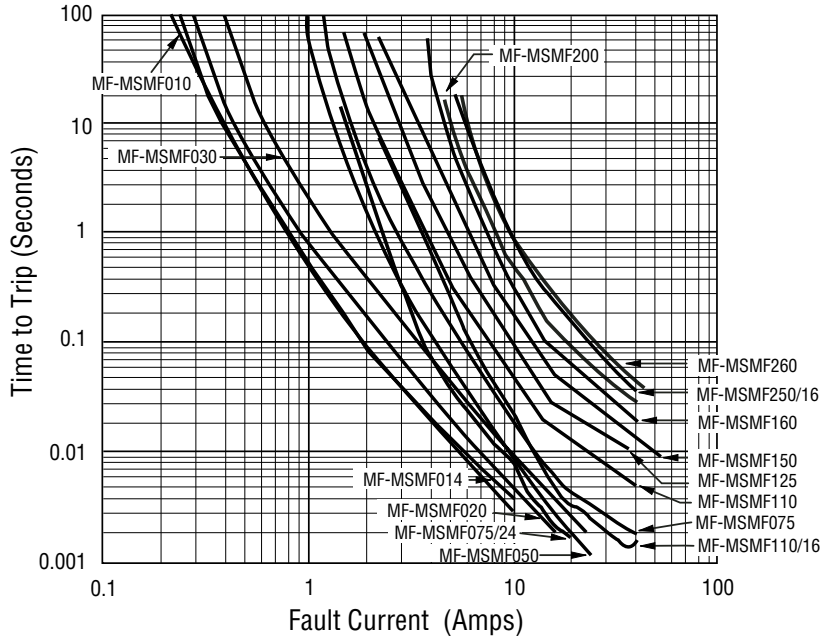
#### Recommended Storage:

40 °C max./70 % RH max.

# MF-MSMF Series - PTC Resettable Fuses

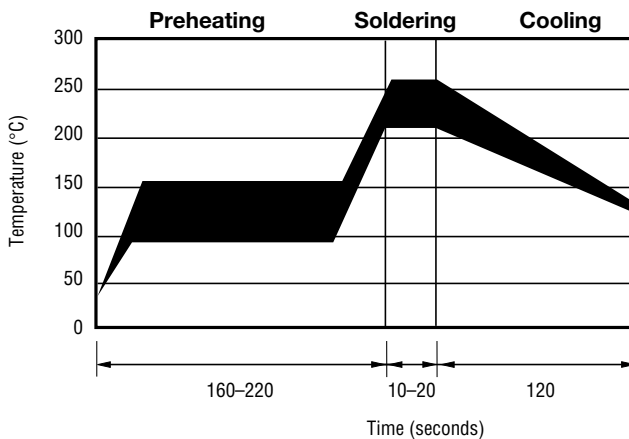
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## Typical Time to Trip at 23 °C



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)

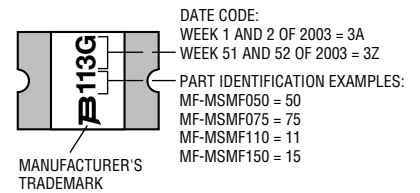
Higher Voltage Option \_\_\_\_\_  
 \_\_\_\_\_ = Standard Voltage  
 /16 = 16 Volt Rated  
 /24 = 24 Volt Rated

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.



# 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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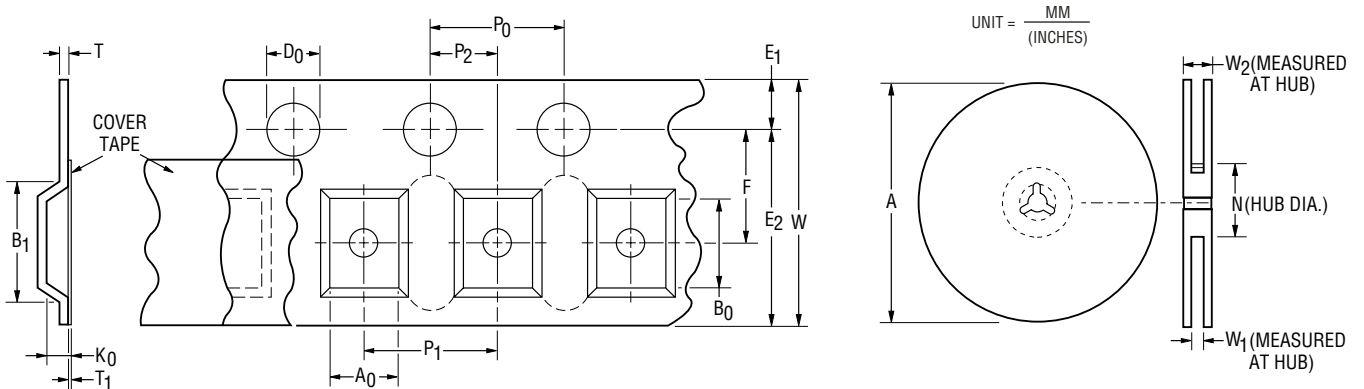
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# MF-MSMF Series Tape and Reel Specifications



Tape Dimensions	MF-MSMF010 - MF-MSMF030 per EIA-481-1	MF-MSMF050 - MF-MSMF260 per EIA 481-1	MF-MSMF250/16 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.