



Features

- Compliant with AEC-Q200 Rev-E Stress Test Qualification for Passive Components in Automotive Applications
- Operating temperature range from -40 °C to +125 °C
- Low thermal derating factor
- High power ratings with higher hold currents at elevated temperature
- Surface mount packaging for automated assembly
- RoHS compliant* and halogen free**

MF-SMHT Series - PTC Resettable Fuses

Electrical Characteristics

Model	V _{max}	I _{max}	I _{hold}	I _{trip}	Resistance		Max. Time To Trip		Tripped Power Dissipation	AEC-Q200 Compliant
					at 23 °C		at 23 °C		Watts at 23 °C	
	Volts	Amps	Amps	R _{min}	R _{1max} ***	Amps	Sec.	Typ.		
MF-SMHT136	16	100	1.36	2.72	0.085	0.33	8.0	10	2.36	✓
MF-SMHT160	16	100	1.6	3.2	0.050	0.15	8.0	10	2.36	✓
MF-SMHT300	16	100	3.0	6.0	0.024	0.083	15.0	8.0	3.0	✓

***R_{1Max}. measured 24 hours post reflow.

Environmental Characteristics

Item	Condition	Criteria
Operating Temperature	-40 °C to +125 °C	
Recommended Storage	+40 °C max. / 70 % RH max.	
Passive Aging	+125 °C, 1000 hours	±15 % typical resistance change
Humidity Aging	+85 °C, 85 % R.H. 1000 hours	±15 % typical resistance change
Thermal Shock	-40 °C to +125 °C, 10 times	±15 % typical resistance change
Solvent Resistance	MIL-STD-202, Method 215	No change (marking still legible)
Vibration	MIL-STD-883C, Method 2007.1 Condition A	No change (R _{min} < R < R _{1max})
Moisture Sensitivity Level (MSL)	See Note	
ESD Classification	Class 6 (per AEC-Q200-2, HBM)	

Additional Information

Click these links for more information:



[PRODUCT SELECTOR](#) [TECHNICAL LIBRARY](#) [INVENTORY](#) [SAMPLES](#) [CONTACT](#)

Test Procedures and Requirements

Item	Test Condition	Accept/Reject Criteria
Visual/Mechanical	Verify dimensions and materials	Per MF physical description
Resistance	In still air @ 23 °C	R _{min} ≤ R ≤ R _{max}
Time to Trip	At specified current, V _{max} , 23 °C, still air	T ≤ max. time to trip (seconds)
Hold Current	30 min. at I _{hold} , still air	No trip
Trip Cycle Life	V _{max} , I _{max} , 100 cycles	No arcing or burning
Trip Endurance	V _{max} , 48 hours	No arcing or burning
Solderability	245 °C ±5 °C, 5 seconds	95 % min. coverage

* RoHS Directive 2015/863, Mar 31, 2015 and Annex.

** 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.

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WARNING
Cancer and Reproductive Harm
www.P65Warnings.ca.gov

Applications

- Protection of various automotive circuitries
- Overcurrent surge protection of electronic equipment operated in elevated temperatures
- Resettable fault protection of general electronic equipment
- Communication and security systems
- Body electronics
- Climate control systems

MF-SMHT Series - PTC Resettable Fuses

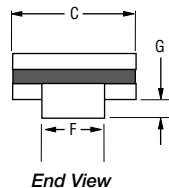
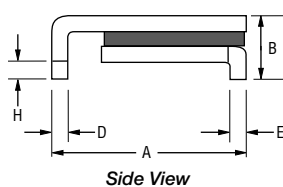
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Thermal Derating Chart - I_{hold}/I_{trip} (Amps)

Model	Ambient Operating Temperature									
	-40 °C	-20 °C	0 °C	23 °C	40 °C	50 °C	60 °C	70 °C	85 °C	125 °C
MF-SMHT136	1.91 / 3.82	1.72 / 3.44	1.54 / 3.08	1.36 / 2.72	1.18 / 2.36	1.09 / 2.18	1.00 / 2.00	0.91 / 1.82	0.77 / 1.54	0.40 / 0.80
MF-SMHT160	2.15 / 4.30	1.96 / 3.92	1.78 / 3.56	1.60 / 3.20	1.42 / 2.84	1.33 / 2.66	1.24 / 2.48	1.15 / 3.00	1.02 / 2.04	0.64 / 1.28
MF-SMHT300	4.23 / 8.46	3.84 / 7.68	3.48 / 6.96	3.00 / 6.00	2.73 / 5.46	2.52 / 5.04	2.34 / 4.68	2.16 / 4.32	1.86 / 3.72	1.11 / 2.22

Product Dimensions

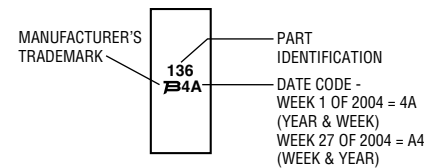
Model	A		B	C	D		E		F		G		H
	Min.	Max.	Max.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
MF-SMHT136	$\frac{6.73}{(0.265)}$	$\frac{7.98}{(0.314)}$	$\frac{3.00}{(0.118)}$	$\frac{5.44}{(0.214)}$	$\frac{0.56}{(0.022)}$	$\frac{0.71}{(0.028)}$	$\frac{0.56}{(0.022)}$	$\frac{0.71}{(0.028)}$	$\frac{2.16}{(0.085)}$	$\frac{2.41}{(0.095)}$	$\frac{0.66}{(0.026)}$	$\frac{1.37}{(0.054)}$	$\frac{0.43}{(0.017)}$
MF-SMHT160	$\frac{8.00}{(0.315)}$	$\frac{9.50}{(0.374)}$	$\frac{3.00}{(0.118)}$	$\frac{6.71}{(0.264)}$	$\frac{0.56}{(0.022)}$	$\frac{0.71}{(0.028)}$	$\frac{0.56}{(0.022)}$	$\frac{0.71}{(0.028)}$	$\frac{3.68}{(0.145)}$	$\frac{3.94}{(0.155)}$	$\frac{0.66}{(0.026)}$	$\frac{1.37}{(0.054)}$	$\frac{0.43}{(0.017)}$
MF-SMHT300	$\frac{8.00}{(0.315)}$	$\frac{9.50}{(0.374)}$	$\frac{3.00}{(0.118)}$	$\frac{6.71}{(0.264)}$	$\frac{0.56}{(0.022)}$	$\frac{0.71}{(0.028)}$	$\frac{0.56}{(0.022)}$	$\frac{0.71}{(0.028)}$	$\frac{3.68}{(0.145)}$	$\frac{3.94}{(0.155)}$	$\frac{0.66}{(0.026)}$	$\frac{1.37}{(0.054)}$	$\frac{0.43}{(0.017)}$



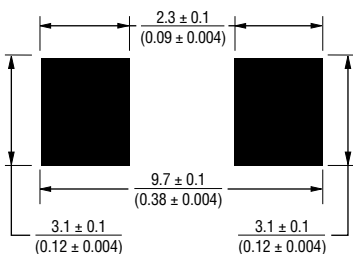
Terminal material:
Tin-plated brass

Typical Part Marking

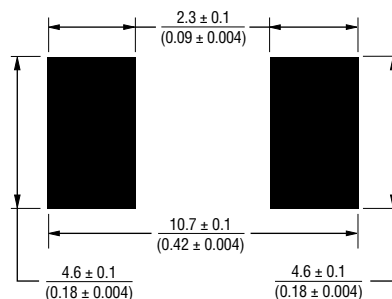
Represents total content. Layout may vary.



Recommended Pad Layout MF-SMHT136



Recommended Pad Layout MF-SMHT160 and MF-SMHT300



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

How to Order

MF - SMHT 136 - 2

Multifuse® Product
 Designator _____
 Series _____
 SMHT = Surface Mount
 High Temperature Component
 Hold Current, I_{hold} _____
 136 - 300 (1.36 - 3.0 Amps)
 Packaging Options _____
 - 2 = Tape and Reel packaged per EIA-481

Packaging Quantity

MF-SMHT136 = 2,000 pcs. per reel

MF-SMHT160 = 1,500 pcs. per reel

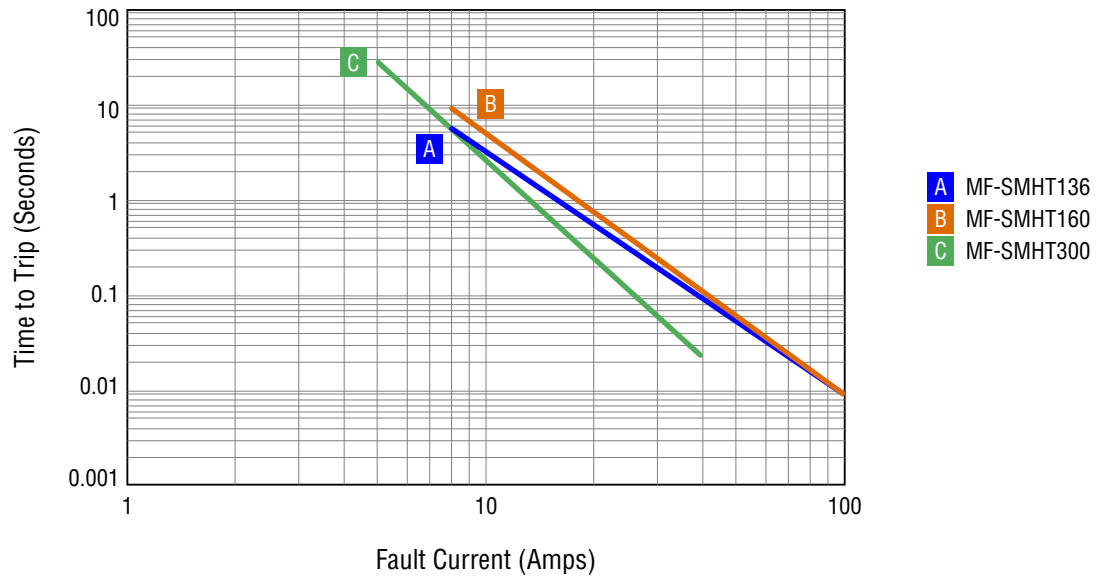
MF-SMHT300 = 1,500 pcs. per reel

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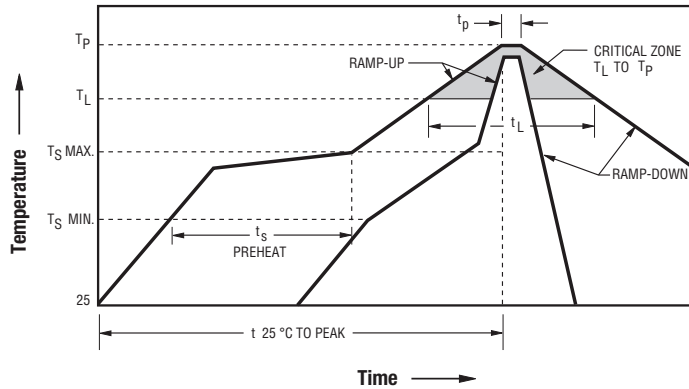
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Typical Time to Trip at 23 °C



Solder Reflow Recommendations



Notes:

- MF-SMHT models are intended for reflow soldering (including, but not limited to heating plate, hot air, IR, nitrogen, and vapor phase).
- Wave soldering is permissible only if the device is on the top of the PCB, opposite the heat source.
- Hand soldering is not recommended for these devices.
- All temperatures refer to the topside of the device, measured on the device body surface.
- If reflow temperatures exceed the recommended profile, devices may not meet the published specifications.
- Compatible with Pb and Pb-free solder reflow profiles.
- Excess solder may cause a short circuit.
- Please refer to the [Multifuse® Polymer PTC Resettable Fuse Soldering Recommendations](#) document for more details.

Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate ($T_{S_{max}}$ to T_p)	3 °C / second max.
PREHEAT: Temperature Min. ($T_{S_{min}}$) Temperature Max. ($T_{S_{max}}$) Time ($T_{S_{min}}$ to $T_{S_{max}}$) (t_s)	150 °C 200 °C 60~180 seconds
TIME MAINTAINED ABOVE: Temperature (T_L) Time (t_L)	217 °C 60~150 seconds
Peak Temperature (T_p)	260 °C
Time within 5 °C of Actual Peak Temperature (t_p)	20~40 seconds
Ramp-Down Rate	6 °C / second max.
Time 25 °C to Peak Temperature	8 minutes max.

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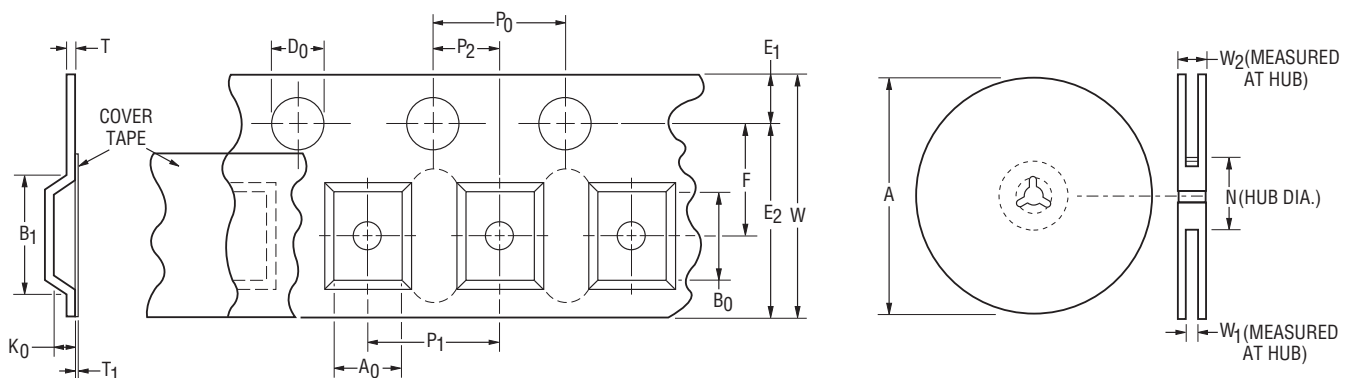
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Tape Dimensions per EIA-481	MF-SMHT136	MF-SMHT160 and MF-SMHT300
W	$\frac{16.3}{(0.642)}$	
P ₀	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$	
10 P ₀	$\frac{40.0 \pm 0.2}{(1.575 \pm 0.008)}$	
P ₁	$\frac{8.0 \pm 0.1}{(0.315 \pm 0.004)}$	$\frac{12.0 \pm 0.1}{(0.472 \pm 0.004)}$
P ₂	$\frac{2.0 \pm 0.1}{(0.079 \pm 0.004)}$	
A ₀	$\frac{5.7 \pm 0.1}{(0.224 \pm 0.004)}$	$\frac{6.9 \pm 0.1}{(0.272 \pm 0.004)}$
B ₀	$\frac{8.1 \pm 0.1}{(0.319 \pm 0.004)}$	$\frac{9.6 \pm 0.1}{(0.378 \pm 0.004)}$
B ₁ max.	$\frac{12.1}{(0.476)}$	
D ₀	$\frac{1.5 +0.10/-0}{(0.059 +0.004/-0)}$	
F	$\frac{7.5 \pm 0.1}{(0.296 \pm 0.004)}$	
E ₁	$\frac{1.75 \pm 0.1}{(0.069 \pm 0.004)}$	
E ₂ typ.	$\frac{14.25}{(0.561)}$	
T max.	$\frac{0.6}{(0.024)}$	
T ₁ max.	$\frac{0.1}{(0.004)}$	
K ₀	$\frac{3.4 \pm 0.1}{(0.134 \pm 0.004)}$	
Leader min.	$\frac{390}{(15.35)}$	
Trailer min.	$\frac{160}{(6.30)}$	
Reel Dimensions		
A max.	$\frac{360}{(14.17)}$	
N min.	$\frac{50}{(1.97)}$	
W ₁	$\frac{16.4 +2.0/-0}{(0.646 +0.079/-0)}$	
W ₂ max.	$\frac{22.4}{(0.882)}$	



MF-SMHT SERIES, REV. K, 04/24

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

Application Notice

- Users are responsible for independent and adequate evaluation of Bourns® Multifuse® Polymer PTC devices in the user's application, including the PPTC device characteristics stated in the applicable data sheet.
- Polymer PTC devices must not be allowed to operate beyond their stated maximum ratings. Operation in excess of such maximum ratings could result in damage to the PTC device and possibly lead to electrical arcing and/or fire. Circuits with inductance may generate a voltage above the rated voltage of the polymer PTC device and should be thoroughly evaluated within the user's application during the PTC selection and qualification process.
- Polymer PTC devices are intended to protect against adverse effects of temporary overcurrent or overtemperature conditions up to rated limits and are not intended to serve as protective devices where overcurrent or overvoltage conditions are expected to be repetitive or prolonged.
- In normal operation, polymer PTC devices experience thermal expansion under fault conditions. Thus, a polymer PTC device must be protected against mechanical stress, and must be given adequate clearance within the user's application to accommodate such thermal expansion. Rigid potting materials or fixed housings or coverings that do not provide adequate clearance should be thoroughly examined and tested by the user, as they may result in the malfunction of polymer PTC devices if the thermal expansion is inhibited.
- Exposure to lubricants, silicon-based oils, solvents, gels, electrolytes, acids, and other related or similar materials may adversely affect the performance of polymer PTC devices.
- Aggressive solvents may adversely affect the performance of polymer PTC devices. Conformal coating, encapsulating, potting, molding, and sealing materials may contain aggressive solvents including but not limited to xylene and toluene, which are known to cause adverse effects on the performance of polymer PTCs. Such aggressive solvents must be thoroughly cured or baked to ensure their complete removal from polymer PTCs to minimize the possible adverse effect on the device.
- Recommended storage conditions should be followed at all times. Such conditions can be found on the applicable data sheet and on the Multifuse® Polymer PTC Moisture/Reflow Sensitivity Classification (MSL) note:
https://www.bourns.com/docs/RoHS-MSL/msl_mf.pdf

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- Bourns expressly identifies Bourns® standard products that are suitable for use in the typical aviation applications/systems requiring System Design Assurance Level (RTCA DO-254 DAL) of C, D or E in its publication entitled "Bourns Civilian Aerospace/Aviation Grade Component Guide." Bourns does not test its products for compliance with United States Federal Aviation Administration standards or any other generally equivalent governmental organization standard applicable to products designed or manufactured for use in aviation applications. Use of Bourns® standard components in aviation applications associated with RTCA DO-254 DAL A or B without proper approval noted above shall be at the user's sole risk.
- Bourns will review and authorize on a case-by-case basis the use of Bourns® standard products which are at least AEC-Q compliant in space-related civil applications (rockets, satellites) with a negotiated cross-waiver and indemnity agreement.

The use and level of testing applicable to Bourns® custom products shall be negotiated on a case-by-case basis by Bourns and the user for which such Bourns® custom products are specially designed. Absent a written agreement between Bourns and the user regarding the use and level of such testing, the above provisions applicable to Bourns® standard products shall also apply to such Bourns® custom products.

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