





## Features

- Surface mount packaging for automated assembly
- Small footprint size (1206) and low profile for space-constrained mobile applications
- Ultra-low resistance
- RoHS compliant\* and halogen free\*\*
- Agency recognition:  

## Applications

- Thermal protection for Li-ion & polymer battery packs
- USB port protection - USB 2.0, 3.0 & OTG
- HDMI 1.4 Source protection
- PC motherboards - Plug & Play protection
- Mobile phones - Battery & port protection
- PDAs / digital cameras
- Game console port protection

## MF-NSML Series - Low Ohmic 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-NSML150	6	50	1.50	3.00	0.0100	0.0650	8.00	0.50	0.8
MF-NSML175	6	50	1.75	3.50	0.0050	0.0400	8.00	0.50	0.8
MF-NSML190	6	50	1.90	4.90	0.0050	0.0300	8.00	1.00	0.8
MF-NSML200	6	50	2.00	4.00	0.0050	0.0300	8.00	1.00	0.8
MF-NSML260	6	50	2.60	5.20	0.0030	0.0260	8.00	4.00	0.8
MF-NSML300	6	50	3.00	6.00	0.0025	0.0200	8.00	4.00	0.8
MF-NSML350	6	50	3.50	7.00	0.0020	0.0180	8.00	5.00	0.8
MF-NSML380	6	50	3.80	8.00	0.0015	0.0140	8.00	5.00	0.8
MF-NSML400	6	50	4.00	8.00	0.0015	0.0140	8.00	5.00	0.8
MF-NSML450	6	50	4.50	9.00	0.0010	0.0140	22.5	2.00	0.8
MF-NSML500	6	50	5.00	10.0	0.0010	0.0120	25.0	2.00	0.8
MF-NSML550	6	50	5.50	11.0	0.0010	0.0110	27.5	2.00	0.8
MF-NSML600	6	50	6.00	12.0	0.0010	0.0100	30.0	2.00	0.8

### Environmental Characteristics

Operating Temperature.....	-40 °C to +85 °C	
Passive Aging.....	+85 °C, 1000 hours.....	±10 % typical resistance change
Humidity Aging.....	+85 °C, 85 % R.H. 100 hours.....	±15 % typical resistance change
Thermal Shock.....	+85 °C to -40 °C, 20 times.....	±30 % typical resistance change
Solvent Resistance.....	MIL-STD-202, Method 215.....	No change
Vibration.....	MIL-STD-883C, Method 2007.1,.....	No change
	Condition A	
Moisture Sensitivity Level (MSL).....	Level 1	
ESD Classification - HBM.....	Class 6	

### Test Procedures And Requirements For Model MF-NSML 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

cUL File Number..... E174545  
<http://www.ul.com/> Follow link to Online Certificates Directory, then enter cUL File No. E174545, or [click here](#)

TÜV Certificate Number..... R 50302873  
<http://www.tuvdotcom.com/> Follow link to "other certificates", enter File No. 50302873, or [click here](#)

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

\*\*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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# MF-NSML Series - Low Ohmic PTC Resettable Fuses

# BOURNS®

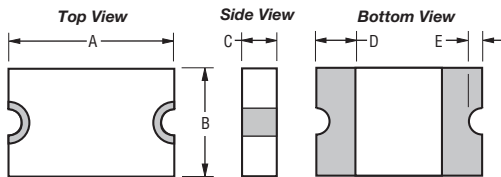
## Product Dimensions

Model	A		B		C		D	E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.	Max.
MF-NSML150	3.00 (0.118)	3.50 (0.138)	1.40 (0.055)	1.80 (0.071)	0.30 (0.012)	0.60 (0.024)	0.25 (0.010)	0.05 (0.002)	0.45 (0.018)
MF-NSML175									
MF-NSML190									
MF-NSML200									
MF-NSML260									
MF-NSML300									
MF-NSML350									
MF-NSML380									
MF-NSML400	3.00 (0.118)	3.50 (0.138)	1.40 (0.055)	1.80 (0.071)	0.60 (0.024)	1.20 (0.047)	0.25 (0.010)	0.05 (0.002)	0.45 (0.018)
MF-NSML450									
MF-NSML500									
MF-NSML550									
MF-NSML600									

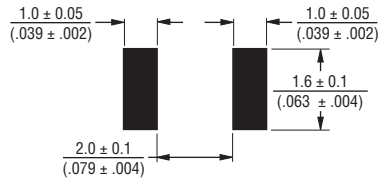
### Packaging:

MF-NSML150~MF-NSML400 = 5000 pcs. per reel  
 MF-NSML450~MF-NSML500 = 3500 pcs. per reel  
 MF-NSML550~MF-NSML600 = 3000 pcs. per reel

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



### Recommended Pad Layout



### Terminal material:

ENIG-plated terminals  
 (Tin-plated terminals available upon request).

### Termination pad solderability:

Meets ANSI/J-STD-002 Category 2.

### Recommended Storage:

40 °C max./70 % RH max.

## Thermal Derating Chart - I<sub>hold</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-NSML150	2.67	2.32	1.95	1.50	1.15	0.96	0.78	0.64	0.52
MF-NSML175	2.57	2.33	2.07	1.75	1.49	1.34	1.24	1.00	0.91
MF-NSML190	2.89	2.58	2.25	1.90	1.54	1.36	1.21	0.94	0.77
MF-NSML200	3.30	2.90	2.50	2.00	1.62	1.39	1.16	0.90	0.52
MF-NSML260	3.71	3.42	3.01	2.60	2.08	1.72	1.49	1.30	0.89
MF-NSML300	4.41	3.99	3.54	3.00	2.55	2.32	2.13	1.71	1.56
MF-NSML350	5.51	4.66	4.13	3.50	2.98	2.71	2.49	2.00	1.82
MF-NSML380	5.59	5.05	4.48	3.80	3.23	2.95	2.70	2.17	1.98
MF-NSML400	5.71	5.26	4.63	4.00	3.20	2.70	2.29	2.00	1.37
MF-NSML450	6.62	5.99	5.31	4.50	3.83	3.50	3.20	2.57	2.34
MF-NSML500	7.35	6.66	5.90	5.00	4.25	3.88	3.55	2.85	2.60
MF-NSML550	8.09	7.32	6.49	5.50	4.68	4.27	3.91	3.41	2.86
MF-NSML600	8.82	7.98	7.08	6.00	5.10	4.66	4.26	3.43	3.12

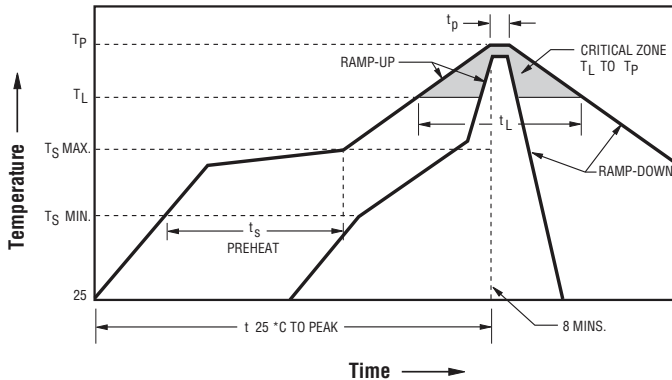
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# MF-NSML Series - Low Ohmic PTC Resettable Fuses



## Solder Reflow Recommendations



### Notes:

- MF-NSML models cannot be wave soldered or hand soldered. Please contact Bourns for soldering recommendations.
- All temperatures refer to topside of the package, measured on the package 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, especially during hand soldering. Please refer to the Multifuse® Polymer PTC Soldering Recommendation guidelines.
- Designed for single solder reflow operations.

Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate ( $T_{S\text{MAX}}$ to $T_p$ )	3 °C / second max.
PREHEAT: Temperature Min. ( $T_{S\text{MIN}}$ ) Temperature Max. ( $T_{S\text{MAX}}$ ) Time ( $t_{s\text{min}}$ to $t_{s\text{max}}$ )	150 °C 200 °C 60~180 seconds
TIME MAINTAINED ABOVE: Temperature ( $T_L$ ) Time ( $t_L$ )	217 °C 60~150 seconds
Peak / Classification 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 within 25 °C to Peak Temperature	8 minutes max.

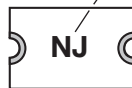
### How to Order

**MF - NSML 200 - 2**

Multifuse® Product Designator \_\_\_\_\_  
 Series \_\_\_\_\_  
 NSML = 1206 Low Ohmic Surface Mount Component  
 Hold Current, Ihold \_\_\_\_\_  
 150 - 600 (1.50 Amps - 6.00 Amps)  
 Packaging \_\_\_\_\_  
 Packaged per EIA 481-1  
 -2 = Tape and Reel

### Typical Part Marking

Represents total content. Layout may vary.



PART IDENTIFICATION:  
 MF-NSML150 = NG  
 MF-NSML175 = NH  
 MF-NSML190 = NI  
 MF-NSML200 = NJ  
 MF-NSML260 = NN  
 MF-NSML300 = NP  
 MF-NSML350 = NS  
 MF-NSML380 = NV  
 MF-NSML400 = NU  
 MF-NSML450 = NX  
 MF-NSML500 = NY  
 MF-NSML550 = N5  
 MF-NSML600 = NZ

MANUFACTURING DATE CODE IS LOCATED ON PACKING LABEL.



### Asia-Pacific:

Tel: +886-2 2562-4117  
 Email: asiacus@bourns.com

### Europe:

Tel: +36 88 520 390  
 Email: eurocus@bourns.com

### The Americas:

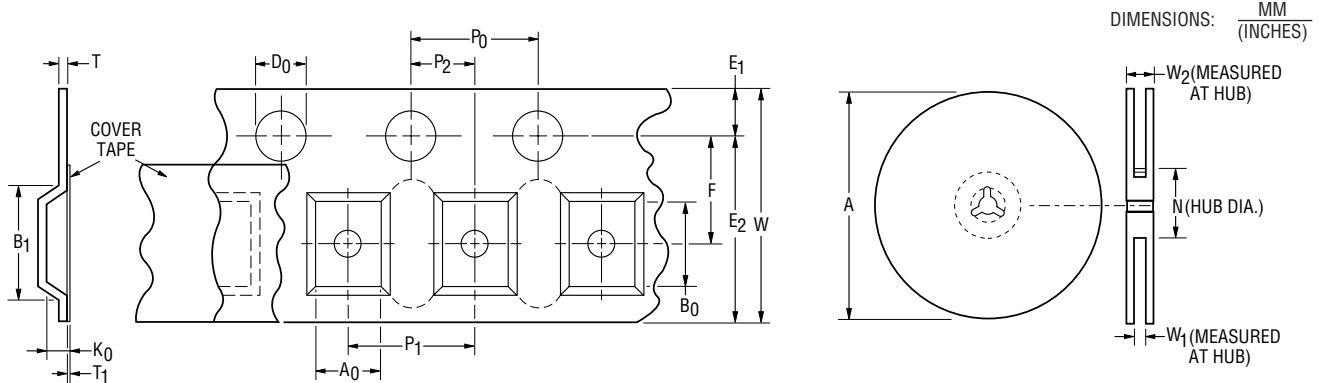
Tel: +1-951 781-5500  
 Email: americus@bourns.com

[www.bourns.com](http://www.bourns.com)

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# BOURNS®

Tape Dimensions	MF-NSML Series per EIA 481-2
W	$12.0 \pm 0.30$ (0.472 ± 0.012)
P <sub>0</sub>	$4.0 \pm 0.10$ (0.157 ± 0.004)
P <sub>1</sub>	$4.0 \pm 0.10$ (0.157 ± 0.004)
P <sub>2</sub>	$2.0 \pm 0.05$ (0.079 ± 0.002)
A <sub>0</sub> (MF-NSML150~MF-NSML500)	$1.90 \pm 0.10$ (0.075 ± 0.004)
A <sub>0</sub> (MF-NSML550~MF-NSML600)	$2.0 \pm 0.05$ (0.078 ± 0.002)
B <sub>0</sub> (MF-NSML150~MF-NSML500)	$3.50 \pm 0.10$ (0.138 ± 0.004)
B <sub>0</sub> (MF-NSML550~MF-NSML600)	$3.60 \pm 0.10$ (0.142 ± 0.004)
B <sub>1</sub> max.	$4.5$ (0.177)
D <sub>0</sub>	$1.5 + 0.10/-0.0$ (0.059 + 0.004/-0)
F	$5.5 \pm 0.05$ (0.216 + 0.002)
E <sub>1</sub>	$1.75 \pm 0.10$ (0.069 ± 0.004)
E <sub>2</sub> typ.	$10.25$ (0.404)
T max.	$0.6$ (0.024)
T <sub>1</sub> max.	$0.1$ (0.004)
K <sub>0</sub> (MF-NSML150~MF-NSML400)	$0.65 \pm 0.10$ (0.026 ± 0.004)
K <sub>0</sub> (MF-NSML450~MF-NSML500)	$1.10 \pm 0.10$ (0.043 ± 0.004)
K <sub>0</sub> (MF-NSML550~MF-NSML600)	$1.35 \pm 0.10$ (0.053 ± 0.004)
Leader min.	$390$ (15.35)
Trailer min.	$160$ (6.30)
<b>Reel Dimensions</b>	
A max.	$185$ (7.283)
N min.	$50$ (1.97)
W <sub>1</sub>	$12.4 + 1/-0$ (0.488 + 0.039/-0)
W <sub>2</sub> max.	$15.4$ (0.606)



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