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:

This MF-NSML series is obsolete and not recommended for new designs. The enhanced MF-NSML/X Series is recommended for new designs.

MF-NSML Series – Low Ohmic PTC Resettable Fuses

Electrical Characteristics

Model	V max. Volts	I max. Amps	I_{hold}	I_{trip}	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	$R_{Min.}$	$R_{1Max.}$			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

Item	Condition	Criteria
Operating Temperature	-40 °C to +85 °C	
Storage Condition Before Opening	+40 °C max. / 70 % R.H. max.	
Storage Condition After Opening	+40 °C max. / 10 % R.H. max.	
Floor Condition After Opening	Consumption within 4 weeks at floor condition +30 °C max. / 60 % RH max.	
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	-40 °C to +85 °C, 20 times	±30 % 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)	

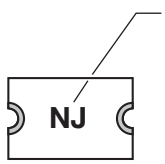
Additional Information

Click these links for more information:

PRODUCT SELECTOR | TECHNICAL LIBRARY | INVENTORY | SAMPLES | CONTACT

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.

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

* 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.

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

BOURNS®

Test Procedures and Requirements

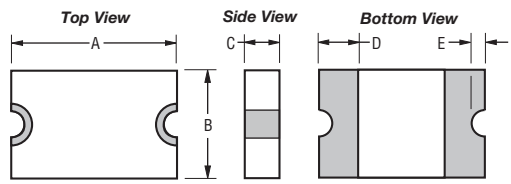
Item	Test Condition	Accept/Reject Criteria
Visual/Mechanical	Verify dimensions and materials	Per MF physical description
Resistance	In still air @ 23 °C	$R_{min} \le R \le R_{max}$
Time to Trip	At specified current, V_{max}, 23 °C	T ≤ max. time to trip (seconds)
Hold Current	30 min. at I_{hold}, still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

cUL File Number..... E174545
TÜV Certificate Number ..... R 50302873

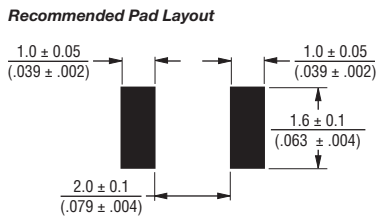
Product Dimensions

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									
MF-NSML450	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-NSML500									
MF-NSML550									
MF-NSML600									

DIMENSIONS: MM / (INCHES)



Terminal material:
ENIG-plated terminals



Packaging Specifications

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

How to Order

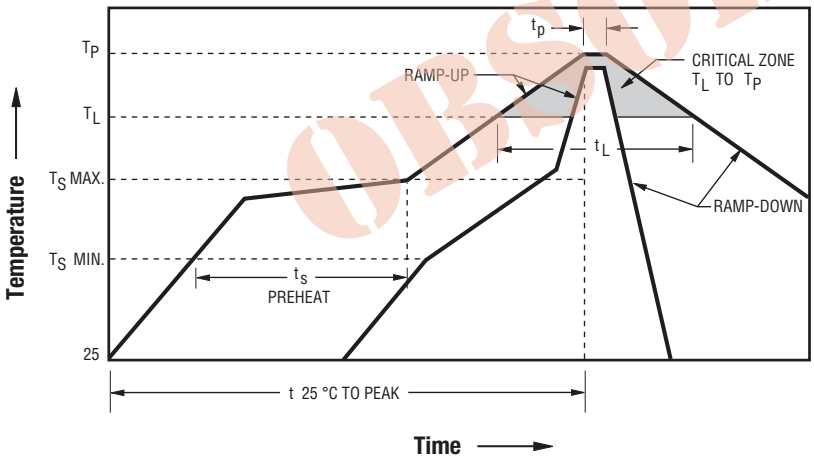
MF - NSML 200 - 2

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
-2 = Tape and Reel

Thermal Derating Table - 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-NSML150	2.20	2.00	1.77	1.50	1.28	1.15	1.07	0.85	0.70
MF-NSML175	2.57	2.33	2.07	1.75	1.49	1.34	1.24	1.00	0.80
MF-NSML190	2.80	2.55	2.25	1.90	1.60	1.46	1.35	1.09	0.90
MF-NSML200	2.94	2.65	2.35	2.00	1.70	1.53	1.42	1.14	0.93
MF-NSML260	3.82	3.46	3.07	2.60	2.21	1.95	1.85	1.48	1.20
MF-NSML300	4.41	3.99	3.54	3.00	2.55	2.32	2.13	1.71	1.38
MF-NSML350	5.15	4.66	4.13	3.50	2.98	2.71	2.49	2.00	1.65
MF-NSML380	5.59	5.05	4.48	3.80	3.23	2.95	2.60	2.15	1.75
MF-NSML400	5.80	5.25	4.65	4.00	3.40	3.10	2.65	2.20	1.80
MF-NSML450	6.10	5.40	4.70	4.50	3.60	3.15	2.70	2.25	1.85
MF-NSML500	6.80	6.00	5.25	5.00	4.00	3.50	3.00	2.50	1.90
MF-NSML550	7.50	6.60	5.80	5.50	4.40	3.85	3.30	2.75	2.10
MF-NSML600	8.15	7.20	6.35	6.00	4.80	4.20	3.60	3.00	2.30

Solder Reflow Recommendations



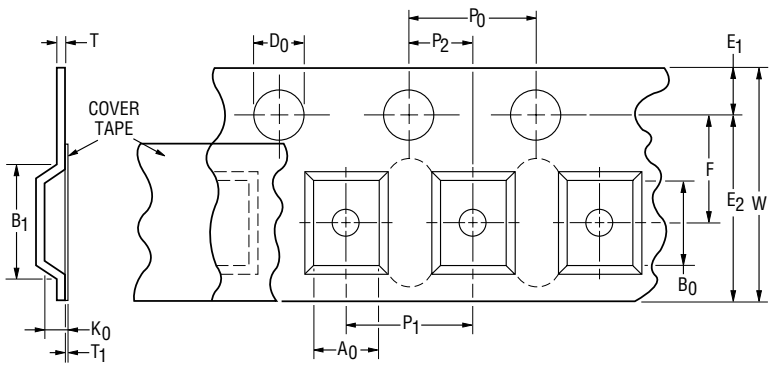
Notes:

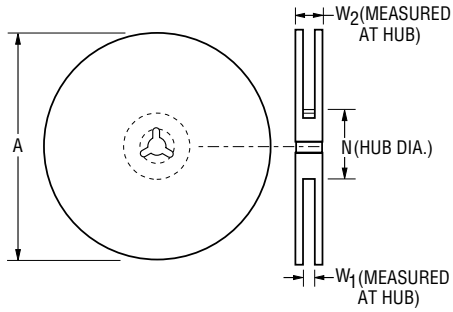
- MF-NSML models cannot be wave soldered or hand soldered. Please contact Bourns for soldering recommendations.
- All temperatures refer to topside of the package, measured on the package body surface.
- If reflow temperatures exceed the recommended profile, devices may not meet the published specifications.
- 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.

Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (Ts_{max} to T_p)	3 °C / second max.
PREHEAT: Temperature Min. (Ts_{min}) Temperature Max. (Ts_{max}) Time (Ts_{min} to Ts_{max}) (ts)	 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.

Tape Dimensions	MF-NSML Series per EIA 481
W	12.0 ± 0.30 (0.472 ± 0.012)
P_0	4.0 ± 0.10 (0.157 ± 0.004)
P_1	4.0 ± 0.10 (0.157 ± 0.004)
P_2	2.0 ± 0.05 (0.079 ± 0.002)
A_0 (MF-NSML150~MF-NSML500)	1.90 ± 0.10 (0.075 ± 0.004)
A_0 (MF-NSML550~MF-NSML600)	2.0 ± 0.05 (0.078 ± 0.002)
B_0 (MF-NSML150~MF-NSML500)	3.50 ± 0.10 (0.138 ± 0.004)
B_0 (MF-NSML550~MF-NSML600)	3.60 ± 0.10 (0.142 ± 0.004)
B_1 max.	4.5 (0.177)
D_0	1.5 + 0.10/-0.0 (0.059 + 0.004/-0)
F	5.5 ± 0.05 (0.216 + 0.002)
E_1	1.75 ± 0.10 (0.069 ± 0.004)
E_2 typ.	10.25 (0.404)
T max.	0.6 (0.024)
T_1 max.	0.1 (0.004)
K_0 (MF-NSML150~MF-NSML400)	0.65 ± 0.10 (0.026 ± 0.004)
K_0 (MF-NSML450~MF-NSML500)	1.10 ± 0.10 (0.043 ± 0.004)
K_0 (MF-NSML550~MF-NSML600)	1.35 ± 0.10 (0.053 ± 0.004)
Leader min.	390 (15.35)
Trailer min.	160 (6.30)
Reel Dimensions	
A max.	185 (7.283)
N min.	50 (1.97)
W_1	12.4 + 1/-0 (0.488 + 0.039/-0)
W_2 max.	15.4 (0.606)

DIMENSIONS: MM (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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