BOURNS®

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_{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

Operating Temperature ..... -40 °C to +85 °C
Storage Condition
  Before Opening ..... +40 °C max. / 70 % RH max.
  After Opening ..... +40 °C max. / 10 % RH 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 ..... +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, Condition A ..... No change
Moisture Sensitivity Level (MSL) ..... See Note
ESD Classification - HBM ..... Class 6

Test Procedures And Requirements

Test	Test Conditions	Accept/Reject Criteria
Visual/Mech.	Verify dimensions and materials	Per MF physical description
Resistance	In still air @ 23 °C	Rmin ≤ R ≤ R1max
Time to Trip	At specified current, Vmax, 23 °C	T ≤ max. time to trip (seconds)
Hold Current	30 min. at Ihold	No trip
Trip Cycle Life	Vmax, Imax, 100 cycles	No arcing or burning
Trip Endurance	Vmax, 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

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

* 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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Users should verify actual device performance in their specific applications.
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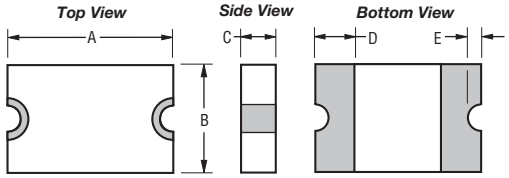
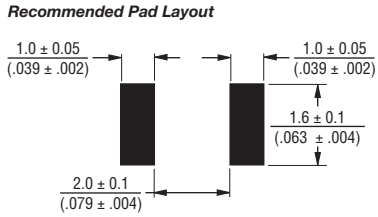
Product Dimensions

Model	A		B		C		D	E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.	Max.
MF-NSML150 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)	0.30 (0.012)	0.60 (0.024)	0.25 (0.010)	0.05 (0.002)	0.45 (0.018)
MF-NSML450 MF-NSML500 MF-NSML550 MF-NSML600	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)

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

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

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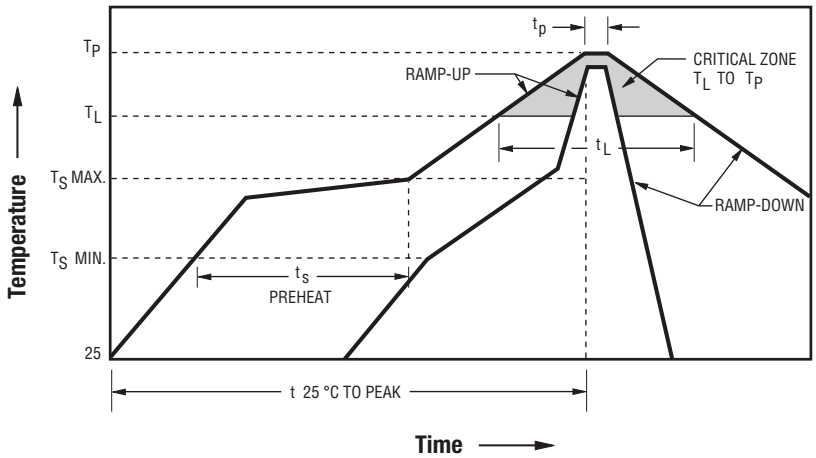
Solder Reflow Recommendations



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.

How to Order

MF - NSML 200 - 2

Multifuse® Product Designator

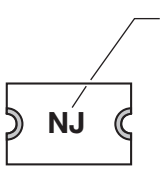
Series
NSML = 1206 Low Ohmic Surface Mount Component

Hold Current, Ihold
150 - 600 (1.50 Amps - 6.00 Amps)

Packaging
Packaged per EIA 481
-2 = Tape and Reel

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.

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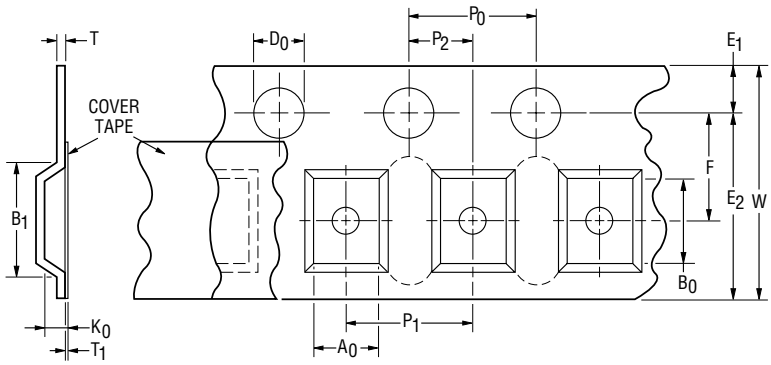
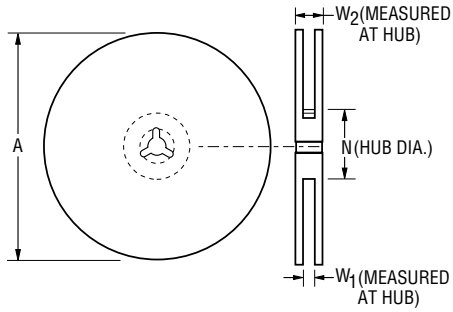
Tape Dimensions	MF-NSML Series per EIA 481
W	12.0 ± 0.30 (0.472 ± 0.012)
P_0	4.0 ± 0.10 (0.157 ± 0.004)
P_1	4.0 ± 0.10 (0.157 ± 0.004)
P_2	2.0 ± 0.05 (0.079 ± 0.002)
A_0 (MF-NSML150~MF-NSML500)	1.90 ± 0.10 (0.075 ± 0.004)
A_0 (MF-NSML550~MF-NSML600)	2.0 ± 0.05 (0.078 ± 0.002)
B_0 (MF-NSML150~MF-NSML500)	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)





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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® products are not recommended, authorized or intended for use in nuclear, lifesaving, life-critical or life-sustaining applications, nor in any other applications where failure or malfunction may result in personal injury, death, or severe property or environmental damage. Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any Bourns® products in such unauthorized applications might not be safe and thus is at the user's sole risk. Life-critical applications include devices identified by the U.S. Food and Drug Administration as Class III devices and generally equivalent classifications outside of the United States.

Bourns expressly identifies those Bourns® standard products that are suitable for use in automotive applications on such products' data sheets in the section entitled "Applications." Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any other Bourns® standard products in an automotive application might not be safe and thus is not recommended, authorized or intended and is at the user's sole risk. If Bourns expressly identifies a sub-category of automotive application in the data sheet for its standard products (such as infotainment or lighting), such identification means that Bourns has reviewed its standard product and has determined that if such Bourns® standard product is considered for potential use in automotive applications, it should only be used in such sub-category of automotive applications. Any reference to Bourns® standard product in the data sheet as compliant with the AEC-Q standard or "automotive grade" does not by itself mean that Bourns has approved such product for use in an automotive application.

Bourns® standard products are not tested to comply with United States Federal Aviation Administration standards generally or any other generally equivalent governmental organization standard applicable to products designed or manufactured for use in aircraft or space applications. Bourns expressly identifies Bourns® standard products that are suitable for use in aircraft or space applications on such products' data sheets in the section entitled "Applications." Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any other Bourns® standard product in an aircraft or space application might not be safe and thus is not recommended, authorized or intended and is at the user's sole risk.

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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PDF: http://www.bourns.com/docs/Legal/disclaimer.pdf

OCEAN CHIPS
Океан Электроники
Поставка электронных компонентов

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Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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AVIC JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).

FORSTAR®

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