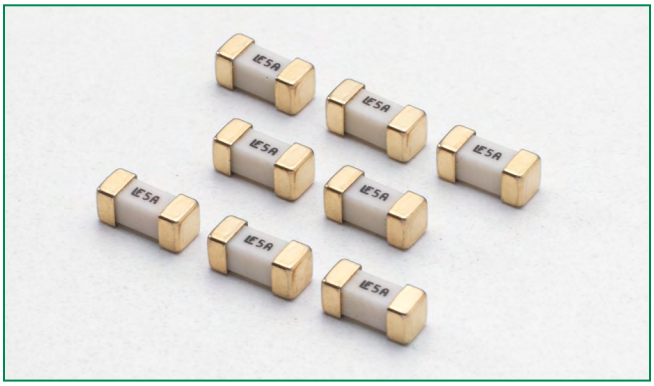
# Surface Mount Fuses

NANO2® > Very Fast-Acting Fuse > 451/453 Series

## 451/453 Series Fuse



## Agency Approvals

| AGENCY | AGENCY FILE NUMBER | AMPERE RANGE |
|---|---|---|
| cULus | E10480 | 6.3A - 20A |
| CSA | 29862 | 0.062A - 15A |
| PSE | NBK030205-E10480A/B<br>NBK101105-E184655 | 1A - 5A<br>6.3A - 15A |
| cULus | E10480 | 0.062A - 5A |

## Electrical Characteristics for Series

| % of Ampere Rating | Ampere Rating | Opening Time |
|---|---|---|
| 100% | 0.062 – 20 | 4 hours, Minimum |
| 200% | 0.062 – 10 | 5 sec., Maximum |
| | 12 – 20 | 20 sec., Maximum |

## Additional Information

**Datasheet 451 Series**
**Resources 451 Series**
**Samples 451 Series**
**Datasheet 453 Series**
**Resources 453 Series**
**Samples 453 Series**

## Description

The Nano2® SMF Fuse is a very small, Wire-in-Air (WIA) square shape surface mount fuse that was designed for secondary side circuit over-current protection applications. These fuses are designed for PCB using surface mount technology.

## Features

- Very fast-acting
- Small size
- Wide range of current rating available (0.062A to 20A)
- Wide operating temperature range
- Low temperature rerating
- RoHS compliant and Halogen Free

## Applications

- Notebook PC
- LCD/PDP TV
- LCD monitor
- LCD/PDP panel
- LCD backlight inverter
- Portable DVD player
- Power supply
- Networking
- PC server
- Cooling fan system
- Storage system
- Telecom system
- Wireless basestation
- White goods
- Game console
- Office Automation equipment
- Battery charging circuit protection
- Industrial equipment

© 2016 Littelfuse, Inc.
Specifications are subject to change without notice. Application testing is strongly recommended.
Revised: 01/04/16

## Electrical Specifications by Item

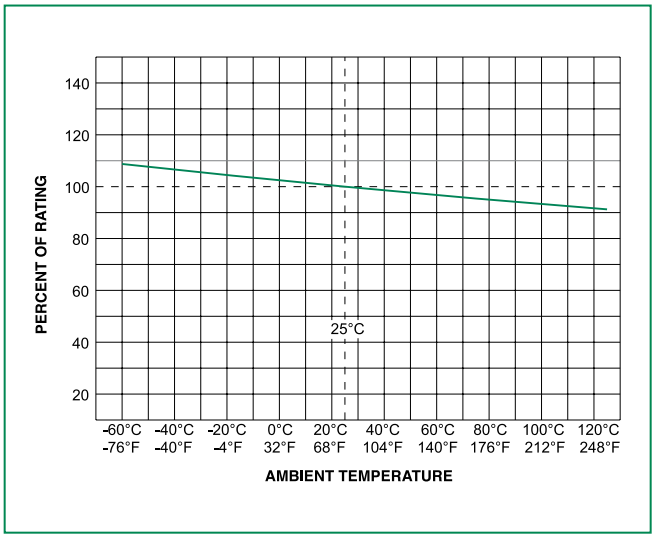
| Ampere Rating (A) | Amp Code | Max Voltage Rating (V) | Interrupting Rating | Nominal Cold Resistance (Ohms) | Nominal Melting I²t (A²sec) | Agency Approvals | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | c UL us | | PS E | c UL us |
| 0.062 | .062 | 125 | 50A @125VAC/VDC 300A @32VDC PSE: 100A @100VAC | 5.5000 | 0.00019 | | x | | x |
| 0.080 | .080 | 125 | | 4.0500 | 0.00033 | | x | | x |
| 0.100 | .100 | 125 | | 3.1000 | 0.00138 | | x | | x |
| 0.125 | .125 | 125 | | 1.7000 | 0.00286 | | x | | x |
| 0.160 | .160 | 125 | | 1.2157 | 0.0048 | | x | | x |
| 0.200 | .200 | 125 | | 0.8372 | 0.0089 | | x | | x |
| 0.250 | .250 | 125 | | 0.5765 | 0.0158 | | x | | x |
| 0.315 | .315 | 125 | | 0.3918 | 0.0311 | | x | | x |
| 0.375 | .375 | 125 | | 0.6100 | 0.0442 | | x | | x |
| 0.400 | .400 | 125 | | 0.5600 | 0.0551 | | x | | x |
| 0.500 | .500 | 125 | | 0.4200 | 0.0824 | | x | | x |
| 0.630 | .630 | 125 | | 0.3050 | 0.1381 | | x | | x |
| 0.750 | .750 | 125 | | 0.2450 | 0.2143 | | x | | x |
| 0.800 | .800 | 125 | | 0.2120 | 0.2654 | | x | | x |
| 1.00 | 001. | 125 | | 0.1530 | 0.6029 | | x | x | x |
| 1.25 | 1.25 | 125 | | 0.0780 | 0.664 | | x | x | x |
| 1.50 | 01.5 | 125 | | 0.0630 | 0.853 | | x | x | x |
| 1.60 | 01.6 | 125 | | 0.0580 | 1.060 | | x | x | x |
| 2.00 | 002. | 125 | 50A @125VAC/VDC 10,000A @75VDC 300A @32VDC PSE: 100A @100VAC | 0.0367 | 0.530 | | x | x | x |
| 2.50 | 02.5 | 125 | | 0.0286 | 1.029 | | x | x | x |
| 3.00 | 003. | 125 | | 0.0227 | 1.650 | | x | x | x |
| 3.15 | 3.15 | 125 | | 0.0215 | 1.920 | | x | x | x |
| 3.50 | 03.5 | 125 | | 0.0200 | 2.469 | | x | x | x |
| 4.00 | 004. | 125 | | 0.0160 | 3.152 | | x | x | x |
| 5.00 | 005. | 125 | | 0.0125 | 5.566 | | x | x | x |
| 6.30 | 06.3 | 125 | 50A @125VAC/VDC 400A @32VDC PSE: 100A @100VAC | 0.0096 | 9.170 | x | x | x | |
| 7.00 | 007. | 125 | | 0.0090 | 10.32 | x | x | x | |
| 8.00 | 008. | 125 | | 0.0077 | 20.23 | x | x | x | |
| 10.0 | 010. | 125 | 35A @125 VAC/ 50A @125 VDC 400A @32 VDC PSE: 100A @100VAC | 0.0056 | 26.46 | x | x | x | |
| 12.0 | 012. | 65 | 150A @65VDC 100A @65VAC 400A @32VDC | 0.0049 | 47.97 | x | x | x | |
| 15.0 | 015. | 65 | | 0.0037 | 97.82 | x | x | x | |
| 20.0 | 020. | 65 | | 0.00244 | 154 | x | | | |

Notes:
- I²t calculated at 8ms.
- Resistance is measured at 10% of rated current, 25°C


© 2016 Littelfuse, Inc.
Specifications are subject to change without notice.


Revised: 01/04/16

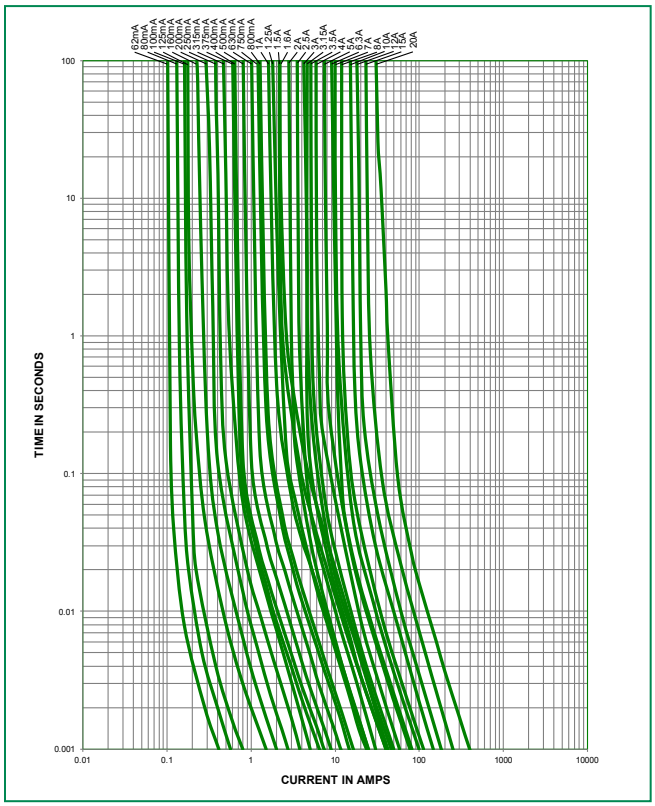
## Temperature Re-rating Curve




Note:

1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

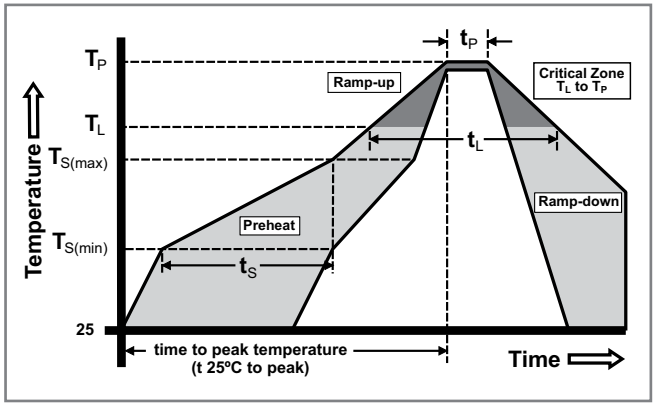
## Average Time Current Curves




## Soldering Parameters

| | | |
|---|---|---|
| Reflow Condition | | Pb – Free assembly |
| Pre Heat | -Temperature Min ($T_{s(min)}$) | 150°C |
| | -Temperature Max ($T_{s(max)}$) | 200°C |
| | -Time (Min to Max) ($t_s$) | 60 – 120 secs |
| Average ramp up rate (Liquidus Temp ($T_L$) to peak | | 5°C/second max. |
| $T_{S(max)}$ to $T_L$ - Ramp-up Rate | | 5°C/second max. |
| Reflow | -Temperature ($T_L$) (Liquidus) | 217°C |
| | -Temperature ($t_L$) | 60 – 90 seconds |
| Peak Temperature ($T_P$) | | $260^{+0/-5}$ °C |
| Time within 5°C of actual peak Temperature ($t_p$) | | 20 – 40 seconds |
| Ramp-down Rate | | 5°C/second max. |
| Time 25°C to peak Temperature ($T_P$) | | 8 minutes max. |
| Do not exceed | | 260°C |

| | |
|---|---|
| Wave Soldering Parameters | 260°C Peak Temperature, 10 seconds max. |



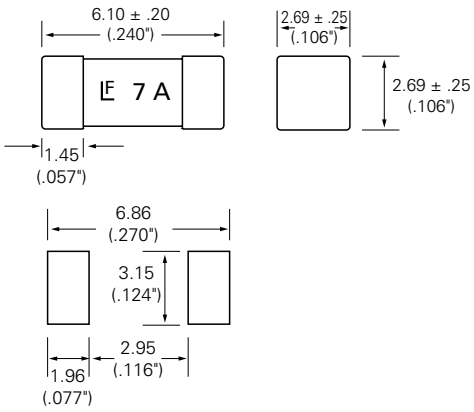

© 2016 Littelfuse, Inc.
Specifications are subject to change without notice.
Revised: 01/04/16

## Product Characteristics

| | |
|---|---|
| **Materials** | **Body:** Ceramic<br>**Terminations**:<br>Gold-Plated Caps / Sn-dipped Silver Plated Caps (451 RoHS/HF series)<br>SnPb Plated Caps (for 451 Non-RoHS series, 375mA-15A)<br>Silver-plated Caps (451MR RoHS ratings below 375mA and 453 RoHS Series) |
| **Product Marking** | Brand, Ampere Rating |
| **Operating Temperature** | –55°C to 125°C |
| **Moisture Sensitivity Level** | Level 1, J-STD-020 |
| **Solderability** | MIL-STD-202, Method 208 |
| **Insulation Resistance (after Opening)** | MIL-STD-202, Method 302, Test Condition A (10,000 ohms minimum) |

| | |
|---|---|
| **Thermal Shock** | MIL-STD-202, Method 107, Test Condition B, 5 cycles, -65°C / +125°C, 15 minutes @ each extreme |
| **Mechanical Shock** | MIL-STD-202, Method 213, Test I: Deenergized. 100G's pk amplitude, sawtooth wave 6ms duration, 3 cycles XYZ+xyz = 18 shocks |
| **Vibration** | MIL-STD-202, Method 201: 0.03" amplitude, 10-55 Hz in 1 min. 2hrs each XYZ=6hrs |
| **Moisture Resistance** | MIL-STD-202, Method 106, 10 cycles |
| **Salt Spray** | MIL-STD-202, Method 101, Test Condition B (48hrs) |
| **Resistance to Soldering Heat** | MIL-STD-202, Method 210, Test condition B (10 sec at 260°C) |

## Dimensions




Recommended pad layout

## Part Numbering System

**0451 001. M R L**

**SERIES**
451 = Gold / SnPb / Silver Plated Caps
453 = Silver Plated Caps

**AMP Code**
Refer to Electrical characteristics table

**QUANTITY Code**
M = 1000 pcs
N = 5000 pcs

**PACKAGING Code**
R = Tape and Reel

**L-RoHS Compliant & Halogen Free (Gold Plated Caps)**

**SN-RoHS Compliant & Halogen Free (Sn-dipped Caps)**

**NOTE: "L" suffix applies to 451 series only**

- 451 series may be ordered as either "RoHS and HF" ("L" suffix) or non-RoHS (no suffix) version.
- 453 series is available only as RoHS compliant version and does not require "L" suffix. Please do not include "L" suffix within 453 series ordering instructions.

## Packaging

| Packaging Option | Packaging Specification | Quantity | Quantity & Packaging Code |
|---|---|---|---|
| 12mm Tape and Reel | EIA RS-481-2 (IEC 286, part 3) | 5000 | NR |
| 12mm Tape and Reel | EIA RS-481-2 (IEC 286, part 3) | 1000 | MR |


© 2016 Littelfuse, Inc.
Specifications are subject to change without notice.


Revised: 01/04/16