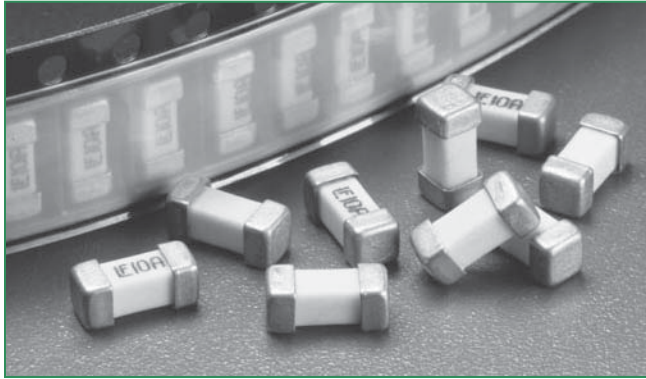


RoHS HF **451/453 Series Fuse**



Description

The Nano² SMF Fuse is a very small, Wire-in-Air (WIA) square shape surface mount fuse which is very suitable for the secondary side circuit over-current protection applications and is designed for PCB using surface mount technology.





Features

- Very fast acting
- Small size
- Wide range of current rating available (62mA to 15A)
- Wide operating temperature range
- Low temperature de-rating
- RoHS compliant
- 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
- Medical equipment
- Automotive

Agency Approvals





| AGENCY | AGENCY FILE NUMBER | AMPERE RANGE |
|--|--|-----------------------|
|  | E10480 | 6.3A - 15A |
|  | LR29862 | 62mA - 15A |
|  | NBK030205-E10480B NBK101105-E184655 | 1A - 5A 6.3A - 10A |
|  | E10480 | 62mA - 5A |

Electrical Characteristics for Series

| % of Ampere Rating | Ampere Rating | Opening Time |
|--------------------|---------------|------------------|
| 100% | 1/16 – 15 | 4 hours, Minimum |
| 200% | 1/16 – 10 | 5 sec., Maximum |
| | 12 – 15 | 20 sec., Maximum |

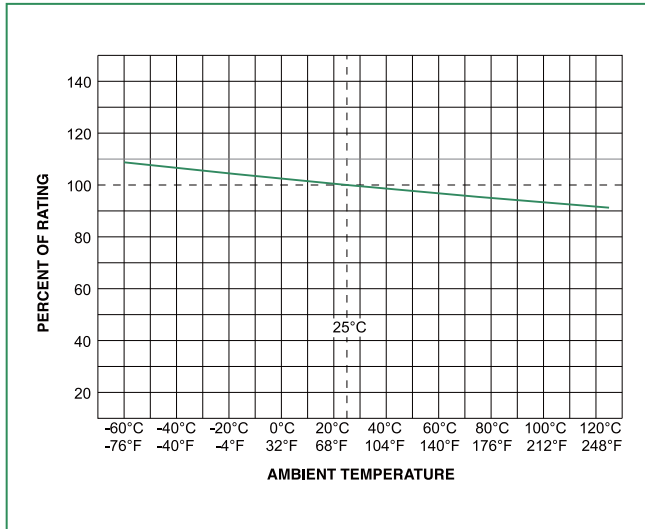
451/453 Series

Electrical Specifications by Item

| Ampere Rating (A) | Amp Code | Max Voltage Rating (V) | Interrupting Rating | Nominal Cold Resistance (Ohms) | Nominal Melting I ² t (A ² sec) | Agency Approvals | | | |
|-------------------|----------|------------------------|--|--------------------------------|---|---|---|---|---|
| | | | | | |  |  |  |  |
| 0.062 | .062 | 125 | 50 amperes @125VAC/VDC 300 amperes @32VDC PSE: 100 amperes @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 | 0.0425 | | x | | x |
| 0.400 | .400 | 125 | | 0.5600 | 0.0484 | | x | | x |
| 0.500 | .500 | 125 | | 0.4200 | 0.0795 | | x | | x |
| 0.630 | .630 | 125 | | 0.3050 | 0.143 | | x | | x |
| 0.750 | .750 | 125 | | 0.2450 | 0.185 | | x | | x |
| 0.800 | .800 | 125 | | 0.2120 | 0.271 | | x | | x |
| 1.00 | 001. | 125 | | 0.1530 | 0.459 | | 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 | | 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 | 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 | 35 amperes @125 VAC/ 50 amperes @125 VDC 300 amperes @32 VDC PSE: 100 amperes @100VAC | 0.0056 | 26.46 | x | x | x | |
| 12.0 | 012. | 65 | 50 amperes @65 VAC/VDC | 0.0049 | 47.97 | x | x | | |
| 15.0 | 015. | 65 | 300 amperes @24 VDC | 0.0037 | 97.82 | x | x | | |

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

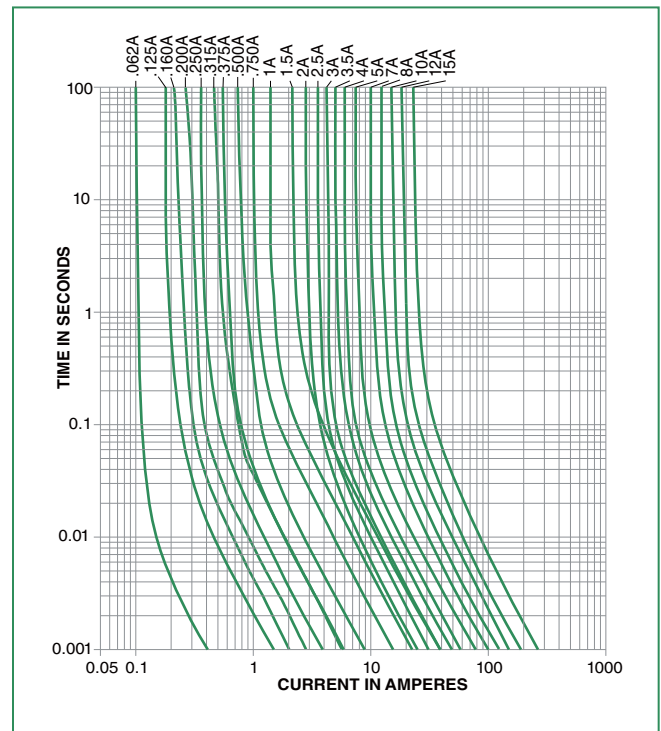
Temperature Derating Curve



Note:

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

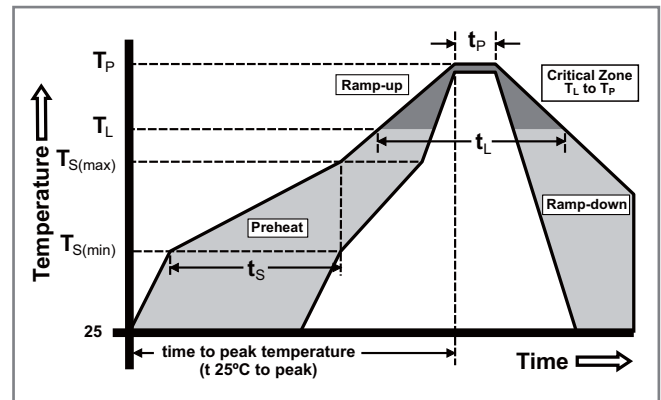
Average Time Current Curves



451/453 Series

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) | | 250 ^{+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. |

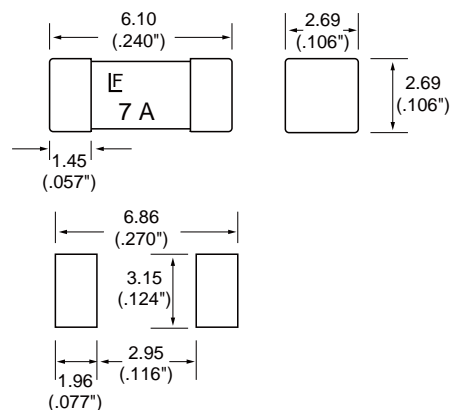


Product Characteristics

| | |
|--|--|
| Materials | Body: Ceramic Terminations: Tin-Lead Alloy RoHS Compliant Terminations: Gold-plated Caps (451 series) Silver-plated Caps (453 series) |
| Product Marking | Brand, Ampere Rating |
| Operating Temperature | -55°C to 125°C |
| Moisture Sensitivity Level | Level 1, J-STD-020C |
| Solderability | MIL-STD-202, Method 208 |
| Insulation Resistance (after Opening) | MIL-STD-202, Method 302, Test Condition A (10,000 ohms minimum) |

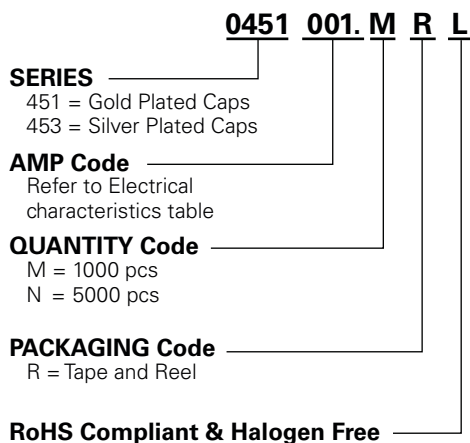
| | |
|-------------------------------------|---|
| Thermal Shock | MIL-STD-202, Method 107, Test Condition B, 5 cycles, -65°C / +125°C, 15 minutes @ each extreme |
| Mechanical Shock | MIL-STD-202, Method 213, Test I: Deenergized. 100G's pk amplitude, sawtooth wave 6ms duration, 3 cycles XYZ+xyz = 18 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



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 |