

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 |

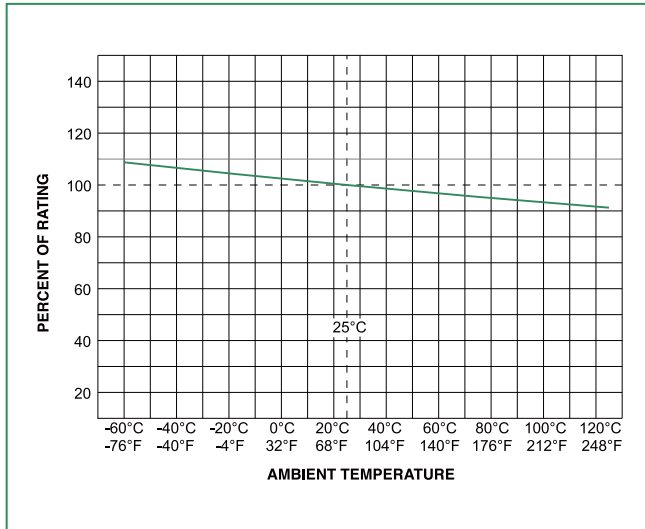
451/453 Series

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

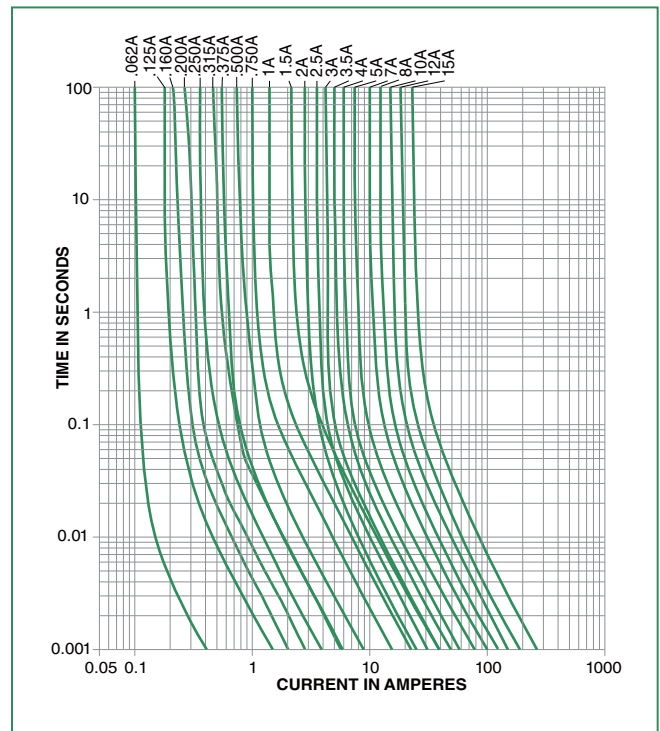
Temperature Derating Curve



Note:

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

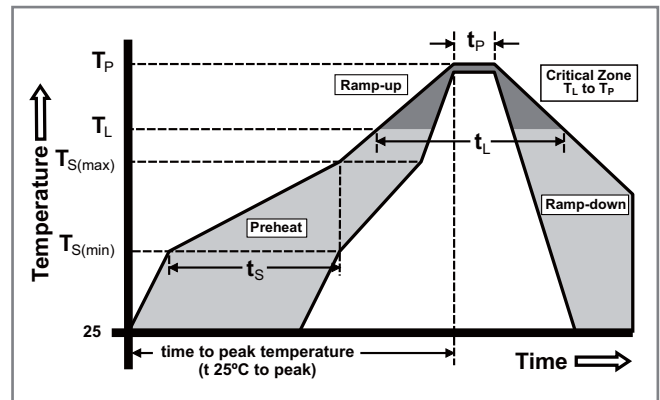
Average Time Current Curves



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. |

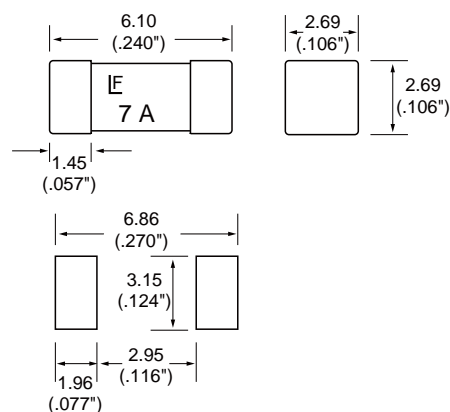


Product Characteristics

| | |
|--|--|
| Materials | Body: Ceramic Terminations: Gold-Plated Caps (for 451 RoHS/HF series) SnPb Plated Caps (for 451 Non-RoHS series) Silver-plated Caps (for 451 RoHS below 200mA Rating & 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) |

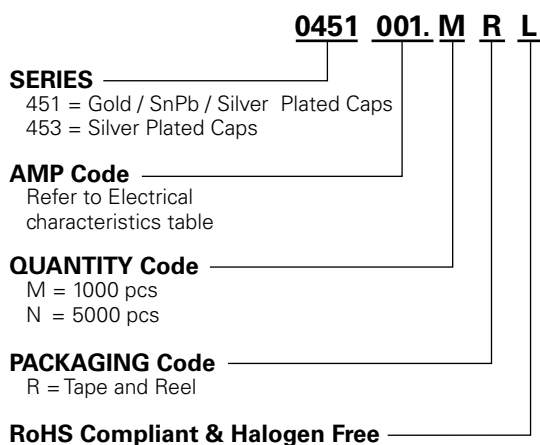
| | |
|-------------------------------------|---|
| Thermal Shock | MIL-STD-202, Method 107, Test Condition B, 5 cycles, -65°C / +125°C, 15 minutes @ each extreme |
| Mechanical Shock | MIL-STD-202, Method 213, Test I: Deenergized. 100G's pk amplitude, sawtooth wave 6ms duration, 3 cycles XYZ+xyz = 18 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.
- 453 series is only available from 200mA up to the highest rating specified. For ratings below 200mA, please use 451 series for ordering.

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 |