

# 452/454 Series

## NANO<sup>2</sup>® > Slo-Blo<sup>®</sup> Fuse



### Description

The NANO<sup>2</sup> Slo-Blo<sup>®</sup> fuse has enhanced inrush withstand characteristics over the NANO<sup>2</sup> Fast-Acting fuse. The unique time delay feature of this fuse design helps solve the problem of nuisance “opening” by accommodating inrush currents that normally cause a fast-acting fuse to open.

### Features & Benefits

- Small size
- Wide range of current rating available (0.375A to 12A)
- Wide operating temperature range
- RoHS compliant and Halogen Free
- UL Recognized to UL/CSA/ NMX UL 248-1 and UL/CSA/ NMX UL 248-14
- Conforms to DENAN's Appendix 3
- Conforms to EN 60127-1 and EN 60127-7
- CE Mark indicates suitability for the European Market
- UKCA Mark indicates suitability for the UK Market

### 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

### Additional Information



Resources  
452 Series



Accessories  
452 Series



Samples  
452 Series



Resources  
452 Series



Accessories  
452 Series



Samples  
452 Series

### Agency Approvals

| Agency | Agency File Number | Ampere Range           |
|--------|--------------------|------------------------|
|        | E10480             | 0.375A - 12A           |
|        | 29862              | 0.375A - 12A           |
|        | NBK030205-E10480B  | 1A - 5A                |
|        | J50515033          | 0.375A - 5A, 6.3A, 10A |
|        | N/A                | 0.375A - 5A, 6.3A, 10A |
|        | N/A                | 0.375A - 5A, 6.3A, 10A |

### Electrical Characteristics for Series

| % of Ampere Rating | Opening Time                     |
|--------------------|----------------------------------|
| 100%               | 4 hours, Minimum                 |
| 200%               | 1 sec., Min.; 60 sec., Max.      |
| 300%               | 0.2 sec., Min.; 3 sec., Max      |
| 800%               | 0.002 sec., Min.; 0.1 sec., Max. |

# 452/454 Series

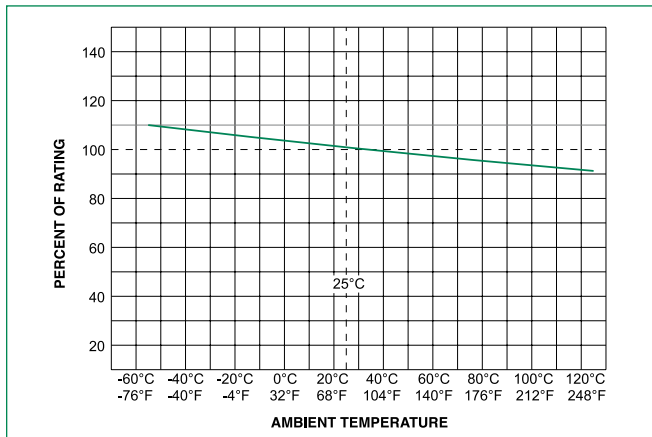
## NANO<sup>2</sup>® > Slo-Blo<sup>®</sup> Fuse

### Electrical Specifications by Item

| Ampere Rating (A) | Amp Code | Max Voltage Rating (V) | Interrupting Rating                                       | Nominal Cold Resistance (Ohms) | Nominal Melting I <sup>2</sup> t (A <sup>2</sup> sec) | Agency Approvals    |    |    |    |    |       |
|-------------------|----------|------------------------|---|--------------------------------|---|---------------------|----|----|----|----|-------|
|                   |          |                        |   |                                |   | cUL <sup>®</sup> US | SP | PS | UL | CE | UK CA |
| .375              | .375     | 125                    | 50A @ 125 VAC/VDC<br>300A @ 32 VDC<br>PSE: 100A @ 100 VAC | 1.2000                         | 0.101   | x                   | x  | -  | x  | x  | x     |
| 0.50              | .500     | 125                    |   | 0.7000                         | 0.240   | x                   | x  | -  | x  | x  | x     |
| 0.75              | .750     | 125                    |   | 0.3600                         | 0.904   | x                   | x  | -  | x  | x  | x     |
| 001.              | 001.     | 125                    |   | 0.2250                         | 1.98  | x                   | x  | x  | x  | x  | x     |
| 1.50              | 01.5     | 125                    |   | 0.0930                         | 3.65  | x                   | x  | x  | x  | x  | x     |
| 2.00              | 002.     | 125                    |   | 0.0625                         | 8.20  | x                   | x  | x  | x  | x  | x     |
| 2.50              | 02.5     | 125                    |   | 0.0450                         | 15.0  | x                   | x  | x  | x  | x  | x     |
| 3.00              | 003.     | 125                    |   | 0.0340                         | 20.16   | x                   | x  | x  | x  | x  | x     |
| 3.50              | 03.5     | 125                    |   | 0.0224                         | 26.53   | x                   | x  | x  | x  | x  | x     |
| 4.00              | 004.     | 125                    |   | 0.0186                         | 34.40   | x                   | x  | x  | x  | x  | x     |
| 5.00              | 005.     | 125                    | 0.0136  | 53.72                          | x   | x                   | x  | x  | x  | x  |       |
| 6.30              | 06.3     | 75                     | 50A @ 72 VAC<br>50A @ 60 VDC<br>100A @ 75 VDC             | 0.0123                         | 64.0  | x                   | x  | -  | x  | x  | x     |
| 7.00              | 007.     | 75                     |   | 0.0105                         | 123.83  | x                   | x  | -  | -  | -  | -     |
| 8.00              | 008.     | 75                     |   | 0.0088                         | 137.34  | x                   | x  | -  | -  | -  | -     |
| 10.0              | 010.     | 75                     |   | 0.0080                         | 195.0   | x                   | x  | -  | x  | x  | x     |
| 12.0              | 012.     | 75                     |   | 0.0061                         | 260.46  | x                   | x  | -  | -  | -  | -     |

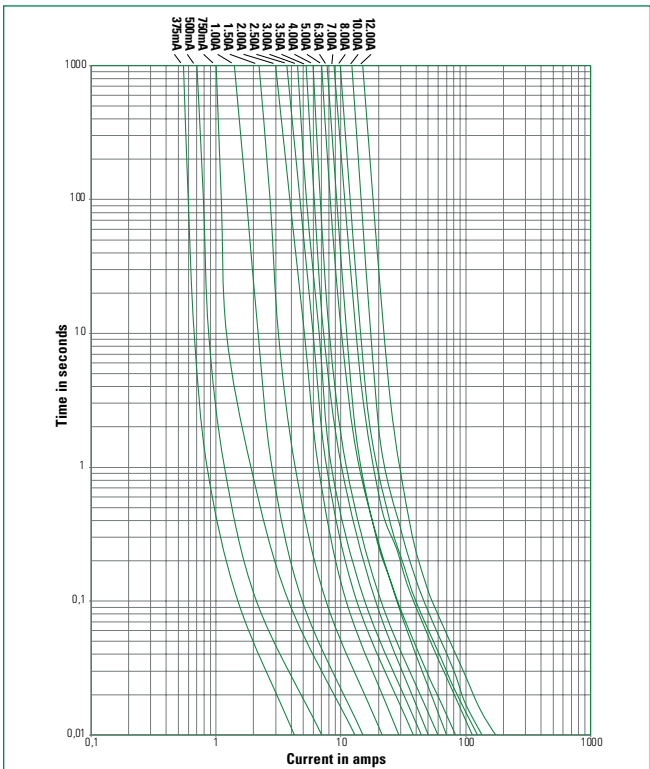
**Notes:** - I<sup>2</sup>t calculated at 8ms.  
- Resistance is measured at 10% of rated current, 25°C

### 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

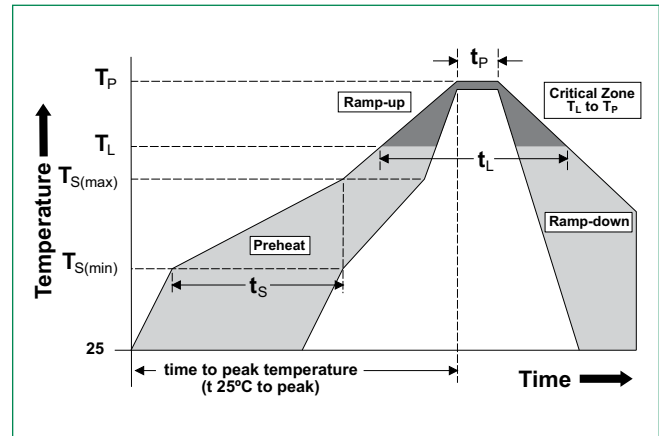


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### Soldering Parameters

|  |                                    |  |
|--|------------------------------------|--|
| <b>Reflow Condition</b>  |                                    | Pb – Free assembly                     |
| <b>Pre Heat</b>  | - Temperature Min ( $T_{s(min)}$ ) | 150°C                                  |
|  | - Temperature Max ( $T_{s(max)}$ ) | 200°C                                  |
|  | - Time (Min to Max) ( $t_s$ )      | 60 – 180 secs                          |
| <b>Average ramp up rate (Liquidus Temp (<math>T_L</math>) to peak)</b> |                                    | 5°C/second max.                        |
| <b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>      |                                    | 5°C/second max.                        |
| <b>Reflow</b>  | - Temperature ( $T_L$ ) (Liquidus) | 217°C                                  |
|  | - Temperature ( $t_L$ )            | 60 – 150 seconds                       |
| <b>Peak Temperature (<math>T_p</math>)</b>                             |                                    | 260 <sup>+0/-5</sup> °C                |
| <b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>   |                                    | 20 – 40 seconds                        |
| <b>Ramp-down Rate</b>  |                                    | 5°C/second max.                        |
| <b>Time 25°C to peak Temperature (<math>T_p</math>)</b>                |                                    | 8 minutes max.                         |
| <b>Do not exceed</b>   |                                    | 260°C                                  |
| <b>Wave Soldering Parameters</b>                                       |                                    | 260°C Peak Temperature, 3 seconds max. |



### Product Characteristics

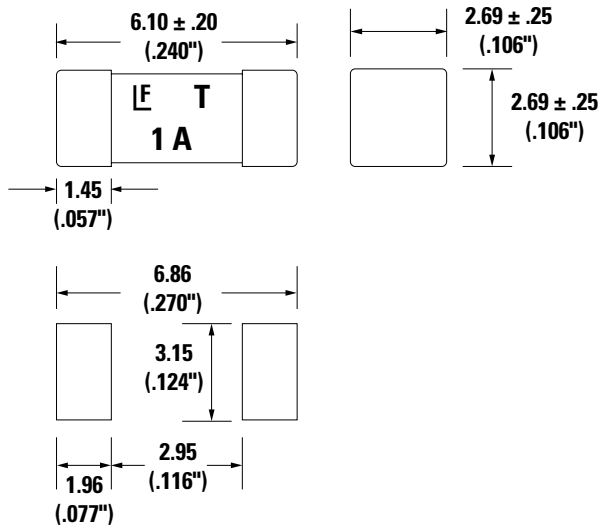
|  |   |
|--|---|
| <b>Materials</b>                             | <b>Body:</b> Ceramic<br><b>Terminations:</b><br>Gold-plated Caps / Sn-dipped Silver Plated Caps (452 Series)<br>Silver-plated Caps (454 Series) |
| <b>Product Marking</b>                       | Brand, Ampere Rating  |
| <b>Operating Temperature</b>                 | -55°C to 125°C  |
| <b>Moisture Sensitivity Level</b>            | Level 1, J-STD-020  |
| <b>Solderability</b>                         | MIL-STD-202, Method 208   |
| <b>Insulation Resistance (after Opening)</b> | MIL-STD-202, Method 302, Test Condition A (10,000 ohms minimum)   |

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

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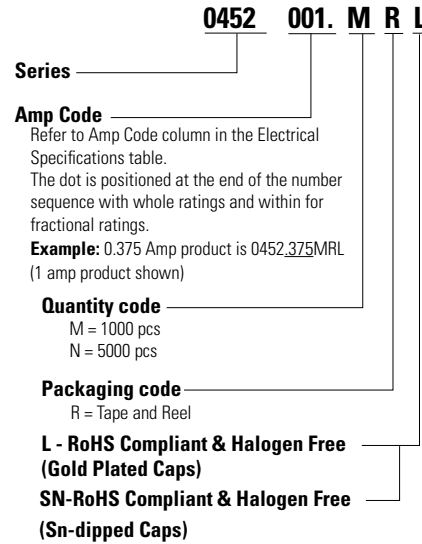
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### Dimensions



**Recommended pad layout**

### Part Numbering System



**Notes:**  
452 series may be ordered as "RoHS and HF (Gold Plated Caps)" ("L" suffix).  
454 series is available only as "RoHS and HF" version and does not require "L" suffix.  
Please do not include "L" suffix within 454 series ordering instructions.

### Packaging

| Packaging Option   | Packaging Specification | Quantity | Quantity & Packaging Code |
|--------------------|-------------------------|----------|---------------------------|
| 12mm Tape and Reel | EIA-481 IEC 60286-3     | 5000     | NR                        |
| 12mm Tape and Reel | EIA-481 IEC 60286-3     | 1000     | MR                        |

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