

448 Series Fuse



**Agency Approvals**

| Agency | Agency File Number | Ampere Range |
|--------|--------------------|--------------|
|        | E10480             | 0.062A - 15A |
|        | 29862              | 0.062A - 15A |
|        | NBK030205-E10480A  | 1A - 1.6A    |
|        | NBK030205-E10480B  | 2A - 5A      |
|        | NBK101105-E184655  | 6.3A - 10A   |

**Electrical Characteristics for Series**

| % of Ampere Rating | Ampere Rating | Opening Time     |
|--------------------|---------------|------------------|
| 100%               | 0.062A -15    | 4 hours, Minimum |
| 200%               | 0.062A -10    | 5 sec., Maximum  |
|                    | 12 -15        | 20 sec., Maximum |

**Description**

The lead-free Nano<sup>2</sup> SMF Fuse is a very small, square surface mount fuse that is RoHS compliant, Halogen Free and 100% lead-free. This product is fully compatible with lead-free solder alloys and higher temperature profiles associated with lead-free assembly.

**Features**

- RoHS compliant, Lead-free and Halogen Free
- Very fast-acting
- Small size
- Wide range of current rating available (0.062A to 15A)
- Wide operating temperature range
- UL Recognized to UL/CSA/NMX UL 248-1 and UL/CSA/NMX UL 248-14
- Conforms to DENAN's Appendix 3

**Applications**

- Notebook PC
- LCD/PDPTV
- 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**



Datasheet



Resources



Samples

### 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  |   |   |
|-------------------|----------|------------------------|--|--------------------------------|---|---|---|---|
|                   |          |                        |  |                                |   |  |  |  |
| 0.062             | .062     | 125                    | 50A @125VAC/<br>VDC<br>300A @32 VDC<br>PSE: 100A<br>@100VAC          | 5.50                           | 0.00023   | x   | x   |   |
| 0.080             | .080     | 125                    |  | 4.42                           | 0.00043   | x   | x   |   |
| 0.100             | .100     | 125                    |  | 2.90                           | 0.00082   | x   | x   |   |
| 0.125             | .125     | 125                    |  | 2.58                           | 0.00130   | x   | x   |   |
| 0.160             | .160     | 125                    |  | 1.76                           | 0.00280   | x   | x   |   |
| 0.200             | .200     | 125                    |  | 1.65                           | 0.00380   | x   | x   |   |
| 0.250             | .250     | 125                    |  | 0.95                           | 0.01520   | x   | x   |   |
| 0.315             | .315     | 125                    |  | 0.7015                         | 0.02650   | x   | x   |   |
| 0.375             | .375     | 125                    |  | 0.6155                         | 0.02400   | x   | x   |   |
| 0.400             | .400     | 125                    |  | 0.4895                         | 0.04160   | x   | x   |   |
| 0.500             | .500     | 125                    |  | 0.3800                         | 0.10000   | x   | x   |   |
| 0.630             | .630     | 125                    |  | 0.3125                         | 0.121   | x   | x   |   |
| 0.750             | .750     | 125                    |  | 0.2290                         | 0.206   | x   | x   |   |
| 0.800             | .800     | 125                    |  | 0.1907                         | 0.272   | x   | x   |   |
| 1.00              | .001.    | 125                    |  | 0.08630                        | 0.441   | x   | x   | x   |
| 1.25              | 1.25     | 125                    |  | 0.06619                        | 0.900   | x   | x   | x   |
| 1.50              | 01.5     | 125                    |  | 0.06514                        | 0.900   | x   | x   | x   |
| 1.60              | 01.6     | 125                    |  | 0.06261                        | 1.122   | x   | x   | x   |
| 2.00              | 002.     | 125                    |  | 0.03529                        | 0.812   | x   | x   | x   |
| 2.50              | 02.5     | 125                    |  | 0.02934                        | 1.156   | x   | x   | x   |
| 3.00              | 003.     | 125                    |  | 0.02445                        | 1.720   | x   | x   | x   |
| 3.15              | 3.15     | 125                    |  | 0.02300                        | 1.810   | x   | x   | x   |
| 3.50              | 03.5     | 125                    |  | 0.02100                        | 2.300   | x   | x   | x   |
| 4.00              | 004.     | 125                    |  | 0.01577                        | 3.970   | x   | x   | x   |
| 5.00              | 005.     | 125                    |  | 0.01531                        | 4.490   | x   | x   | x   |
| 6.30              | 06.3     | 125                    |  | 0.01044                        | 12.10   | x   | x   | x   |
| 7.00              | 007.     | 125                    |  | 0.00900                        | 13.92   | x   | x   | x   |
| 8.00              | 008.     | 125                    |  | 0.00780                        | 18.33   | x   | x   | x   |
| 10.00             | 010.     | 125                    | 35A @125 VAC<br>50A @125 VDC<br>300A @32 VDC<br>PSE: 100A<br>@100VAC | 0.00700                        | 28.00   | x   | x   | x   |
| 12.00             | 012.     | 85                     | 50A @65 VAC/<br>VDC  | 0.00533                        | 47.59   | x   | x   |   |
| 15.00             | 015.     | 85                     | 300A @24 VDC<br>200A @85 VDC   | 0.00394                        | 78.4  | 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**



**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                   |

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



### Product Characteristics

|  |   |
|--|---|
| <b>Materials</b>                             | Body: Ceramic<br>Terminations: Gold-plated Caps                 |
| <b>Product Marking</b>                       | Brand, Amperage 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 to 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)   |

### Dimensions



Recommended pad layout

### Part Numbering System



**\*Example:**  
1.5 amp product is 044801.5MR (1 amp product shown above).

### Packaging

| Packaging Option   | Packaging Specification     | Quantity | Quantity & Packaging Code |
|--------------------|-----------------------------|----------|---------------------------|
| 12mm Tape and Reel | EIA RS-481-1 (IEC 600286-3) | 1000     | MR                        |

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