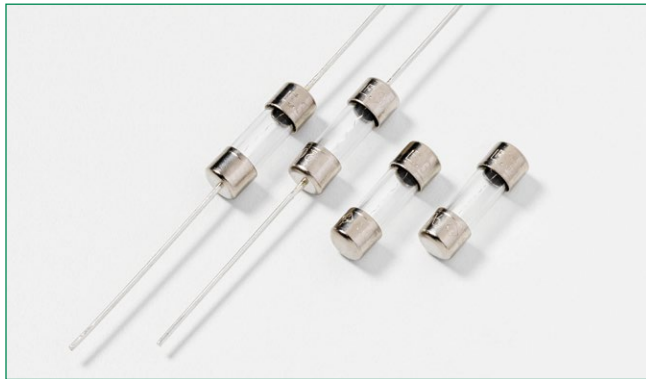




**THE DATASHEET OF**  
**023003.5HXP**



### 229/230 Series 2AG, Slo-Blo® Fuse with Indicating Option



#### Agency Approvals

| Agency | Agency File Number   | Ampere Range                    |
|--------|--|---------------------------------|
|        | E10480   | 0.250A - 3.5A                   |
|        | 29862  | 0.250A - 3.5A                   |
|        | E10480   | 4A - 7A                         |
|        | 29862  | 4A - 7A                         |
|        | 229 (Cartridge Form)<br>NBK200405-E10480C<br>NBK110512-E10480A<br>NBK190619-E10480A    | 1A - 3.5A<br>4A - 5A<br>6A - 7A |
|        | 230 (Axial Leaded Form)<br>NBK200405-E10480D<br>NBK110512-E10480B<br>NBK190619-E10480B | 1A - 3.5A<br>4A - 5A<br>6A - 7A |
|        | N/A  | 0.250A - 7A                     |

#### Electrical Characteristics for Series

| % of Ampere Rating | Opening Time        |
|--------------------|---------------------|
| 100%               | 4 hours, Minimum    |
| 135%               | 1 hour, Maximum     |
| 200%               | 3 seconds, Minimum  |
|                    | 20 seconds, Maximum |

#### Description

Littelfuse 229/230 series Slo-Blo® Fuses are available in 2AG size cartridge or axial lead form, offer tripped fuse indicating option, and offer features designed to meet rigorous Telecom industry requirements.

229/230 series product ordered with the tripped fuse indicating option show discoloration of the glass body immediately after trip. They offer the same performance characteristics as standard product, and help to reduce time locating the tripped fuse and troubleshooting circuit issues.

The 229/230 series 0.25A - 1.25A range combines conventional overcurrent protection with ability to withstand high current, short duration pulses which complies to short circuit requirements of UL 60950-1/UL 62368-1 for telephone equipment. Insulating sleeve option is also available. Refer to the Surge Withstand Specifications section of this document for additional information.

#### Features

- Available in cartridge and axial lead form, and a wide range of lead forming dimension and packaging options
- Fuses are available for board washable with the additional sealing process (add suffix 'A' to part number)
- In accordance with UL/CSA/NMX Standard 248-14
- Sleeved fuse option available (contact Littelfuse for additional information)
- RoHS compliant and Lead-free
- Tripped fuse indicating option (add suffix 'S' to part number)

#### Additional Information



**Datasheet  
229 Series**



**Resources  
229 Series**



**Samples  
229 Series**



**Accessories  
229 & 230 Series**



**Datasheet  
230 Series**



**Resources  
230 Series**



**Samples  
230 Series**

For recommended fuse accessories for this product series, see ["Recommended Accessories"](#) section.

### Electrical Characteristic Specification by Item

| Amp Code | Ampere Rating (A) | Voltage Rating (V) | Interrupting Rating                                     | Nominal Cold Resistance (Ohms) | Nominal Melting I <sup>2</sup> t (A <sup>2</sup> sec) | Agency Approvals |    |      |    |    |    |
|----------|-------------------|--------------------|---|--------------------------------|---|------------------|----|------|----|----|----|
|          |                   |                    |   |                                |   | UL               | RU | PS E | SF | SF | CE |
| .250     | 0.25              | 250                | 35A@250Vac<br>10KA@125Vac<br>10KA@125Vdc<br>80A@310Vac  | 2.4300                         | 0.339   | x                |    |      | x  |    | x  |
| .350     | 0.35              | 250                |   | 1.3100                         | 0.640   | x                |    |      | x  |    | x  |
| .375     | 0.375             | 250                |   | 1.1685                         | 0.820   | x                |    |      | x  |    | x  |
| .500     | 0.5               | 250                |   | 0.6935                         | 1.64  | x                |    |      | x  |    | x  |
| .600     | 0.6               | 250                |   | 0.4805                         | 1.75  | x                |    |      | x  |    | x  |
| .750     | 0.75              | 250                |   | 0.3430                         | 2.95  | x                |    |      | x  |    | x  |
| .800     | 0.8               | 250                |   | 0.3060                         | 3.45  | x                |    |      | x  |    | x  |
| 001.     | 1                 | 250                | 100A@250Vac<br>10KA@125Vac<br>10KA@125Vdc<br>80A@310Vac | 0.2120                         | 5.64  | x                |    | x    | x  |    | x  |
| 1.25     | 1.25              | 250                |   | 0.1460                         | 16.8  | x                |    | x    | x  |    | x  |
| 015      | 1.5               | 250                |   | 0.1077                         | 20.0  | x                |    | x    | x  |    | x  |
| 002.     | 2                 | 250                |   | 0.0698                         | 30.0  | x                |    | x    | x  |    | x  |
| 2.25     | 2.25              | 250                |   | 0.0567                         | 39.0  | x                |    | x    | x  |    | x  |
| 02.5     | 2.5               | 250                |   | 0.0502                         | 50.0  | x                |    | x    | x  |    | x  |
| 003.     | 3                 | 250                |   | 0.0383                         | 77.0  | x                |    | x    | x  |    | x  |
| 03.5     | 3.5               | 250                | 100A@250Vac<br>10KA@125Vac<br>10KA@125Vdc               | 0.0312                         | 110.0   | x                |    | x    | x  |    | x  |
| 004.     | 4                 | 125                | 400A@125Vac<br>400A@125Vdc                              | 0.0258                         | 148.0   |                  | x  | x    |    | x  | x  |
| 005.     | 5                 | 125                |   | 0.0186                         | 267   |                  | x  | x    |    | x  | x  |
| 006.     | 6                 | 125                |   | 0.0141                         | 380   |                  | x  | x    |    | x  | x  |
| 007.     | 7                 | 125                |   | 0.0116                         | 464   |                  | x  | x    |    | x  | x  |

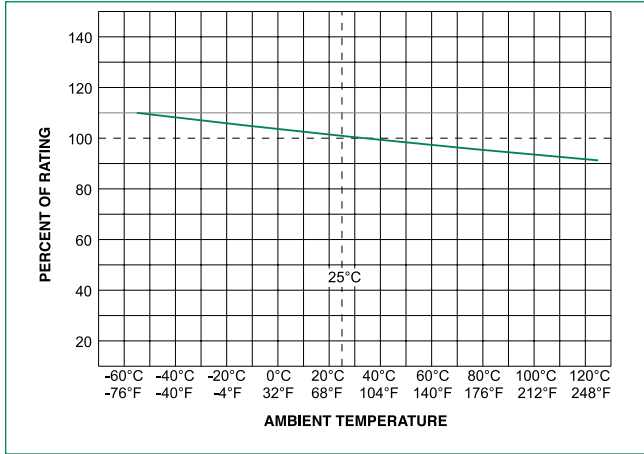
### Surge Withstand Specifications

**Peak Withstand Current(I<sub>p</sub>):** These fuses will withstand 50 repetitions of a double exponential impulse wave having peak currents(I<sub>p</sub>) and peak voltages as listed.

| Amp Code | Ampere Rating (A) | Interrupting Rating                                  | Nominal Cold Resistance (Ohms) | Nominal Melting I <sup>2</sup> t (A <sup>2</sup> sec) | 10x160 μs 1500V | 10x560 μs 800V | 10x1000 μs 1000V |
|----------|-------------------|--|--------------------------------|---|-----------------|----------------|------------------|
| .250     | 0.25              | 60A@600Vac<br>40A@600Vac<br>7A@600Vac<br>2.2A@600Vac | 2.4300                         | 0.339   | 23.0A           | 16.6A          | 12.4A            |
| .350     | 0.35              |  | 1.3100                         | 0.640   | 34.0A           | 25.8A          | 19.3A            |
| .375     | 0.375             |  | 1.1685                         | 0.820   | 40.0A           | 25.4A          | 19.0A            |
| .500     | 0.5               |  | 0.6935                         | 1.64  | 60.0A           | 37.7A          | 28.2A            |
| .600     | 0.6               |  | 0.4805                         | 1.75  | 71.0A           | 47.2A          | 35.3A            |
| .750     | 0.75              |  | 0.3430                         | 2.95  | 91.0A           | 65.5A          | 49.0A            |
| .800     | 0.8               |  | 0.3060                         | 3.45  | 104.0A          | 68.9A          | 51.6A            |
| 001.     | 1                 |  | 0.2120                         | 5.64  | 130A            | 88.6A          | 66.3A            |
| 1.25     | 1.25*             |  | 0.1460                         | 16.8  | 162.0A          | 118.1A         | 100.0A           |

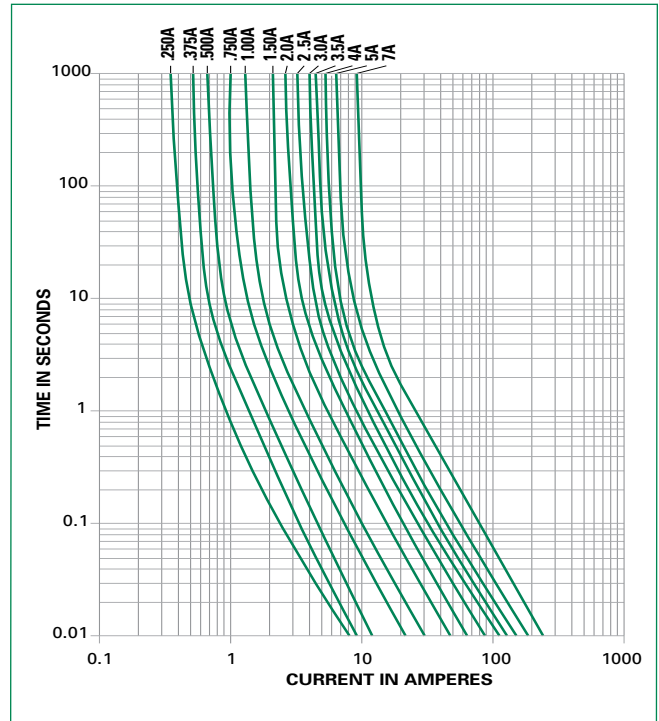
\* 500A peak, 2500V, 2x10 microseconds, 20 repetitions

### Temperature Re-rating Curve

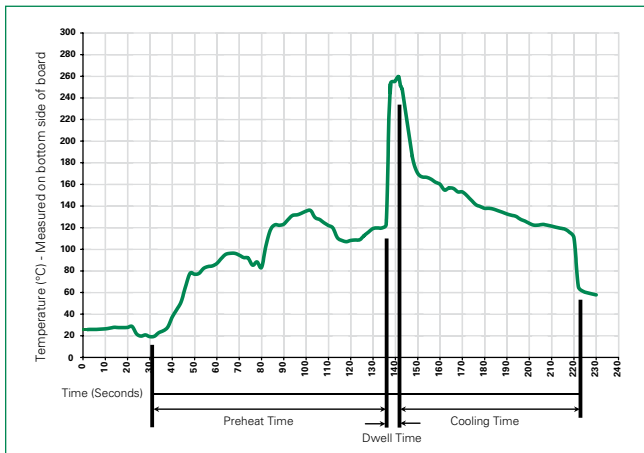


**Note:**  
Derating depicted in this curve is in addition to the industry practice derating of 25% for continuous operation.

### Average Time Current Curves



### Soldering Parameters - Wave Soldering



### Recommended Process Parameters:

| Wave Parameter                                       | Lead-Free Recommendation          |
|--|-----------------------------------|
| Preheat:<br>(Depends on Flux Activation Temperature) | (Typical Industry Recommendation) |
| Temperature Minimum:                                 | 100°C                             |
| Temperature Maximum:                                 | 150°C                             |
| Preheat Time:  | 60-180 seconds                    |
| Solder Pot Temperature:                              | 260° C Maximum                    |
| Solder Dwell Time:                                   | 2-5 seconds                       |

### Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C  
Heating Time: 5 seconds max.

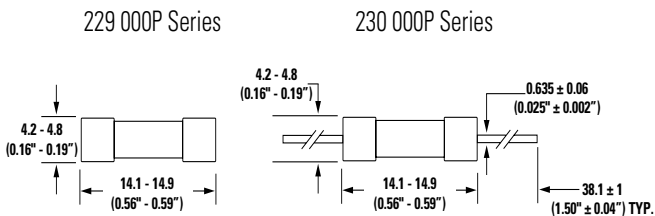
**Note:** These devices are not recommended for IR or Convection Reflow process.

### Product Characteristics

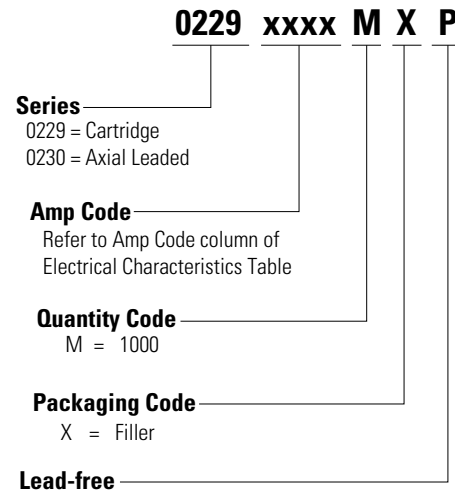
|                          |   |
|--------------------------|---|
| <b>Materials</b>         | Body: Glass<br>Cap: Nickel-plated brass<br>Leads: Tin-plated Copper                     |
| <b>Terminal Strength</b> | MIL-STD-202, Method 211, Test Condition A   |
| <b>Solderability</b>     | MIL-STD-202 method 208  |
| <b>Product Marking</b>   | Cap1: Brand logo, current and voltage ratings<br>Cap2: Series and agency approval marks |

|                              |  |
|------------------------------|--|
| <b>Operating Temperature</b> | -55°C to +125°C  |
| <b>Thermal Shock</b>         | MIL-STD-202, Method 107, Test Condition B: (5 cycles - -65°C to 125°C)                                 |
| <b>Vibration</b>             | MIL-STD-202, Method 201  |
| <b>Humidity</b>              | MIL-STD-202, Method 103, Test Condition A: High RH (95%) and Elevated temperature (40°C) for 240 hours |
| <b>Salt Spray</b>            | MIL-STD-202, Method 101, Test Condition B  |

### Dimensions



### Part Numbering System



### Recommended Accessories

| Accessory Type | Series              | Description                                | Max Application Voltage | Max Application Amperage |
|----------------|---------------------|--|-------------------------|--------------------------|
| Holder         | <a href="#">245</a> | Panel Mount Shock-Safe Fuseholder          | 300                     | 10                       |
|                | <a href="#">150</a> | In-Line Fuseholder                         | 350                     | 10                       |
|                | <a href="#">286</a> | Panel Mount Flip-Top Shock-Safe Fuseholder | 250                     | 10                       |
| Block          | <a href="#">254</a> | OMNI-BLOK® Fuse Block                      | 400                     | 10                       |
| Clip           | <a href="#">111</a> | PC Board Mount Fuse Clip                   | 250                     | 10                       |

**Notes:**

- Do not use in applications above rating.
- Please refer to fuseholder data sheet for specific re-rating information.
- Please contact factory for applications greater than the max voltage and amperage shown.

### Packaging

| Packaging Option  | Packaging Specification | Quantity | Quantity & Packaging Code | Taping Width |
|-------------------|-------------------------|----------|---------------------------|--------------|
| <b>229 Series</b> |                         |          |                           |              |
| Bulk              | N/A                     | 5        | VX                        | N/A          |
| Bulk              | N/A                     | 5        | VXS                       | N/A          |
| Bulk              | N/A                     | 100      | HX                        | N/A          |

### Packaging

| Packaging Option          | Packaging Specification | Quantity | Quantity & Packaging Code | Taping Width     |
|---------------------------|-------------------------|----------|---------------------------|------------------|
| <b>229 Series (cont.)</b> |                         |          |                           |                  |
| Bulk                      | N/A                     | 100      | HXS                       | N/A              |
| Bulk                      | N/A                     | 1000     | MX                        | N/A              |
| Bulk                      | N/A                     | 1000     | MXS                       | N/A              |
| <b>230 Series</b>         |                         |          |                           |                  |
| Bulk                      | N/A                     | 5        | VX                        | N/A              |
| Bulk                      | N/A                     | 5        | VXS                       | N/A              |
| Bulk                      | N/A                     | 100      | HX                        | N/A              |
| Bulk                      | N/A                     | 100      | HXS                       | N/A              |
| Bulk                      | N/A                     | 1000     | MX                        | N/A              |
| Bulk                      | N/A                     | 1000     | MXE                       | N/A              |
| Bulk                      | N/A                     | 1000     | MXF1                      | N/A              |
| Bulk                      | N/A                     | 1000     | MXF16                     | N/A              |
| Bulk                      | N/A                     | 1000     | MXF16O                    | N/A              |
| Bulk                      | N/A                     | 1000     | MXF17                     | N/A              |
| Bulk                      | N/A                     | 1000     | MXF17O                    | N/A              |
| Bulk                      | N/A                     | 1000     | MXF23                     | N/A              |
| Bulk                      | N/A                     | 1000     | MXF23O                    | N/A              |
| Bulk                      | N/A                     | 1000     | MXF32                     | N/A              |
| Bulk                      | N/A                     | 1000     | MXO                       | N/A              |
| Bulk                      | N/A                     | 1000     | MXS                       | N/A              |
| Reel and Tape             | EIA 296-E               | 1500     | DRT2                      | T2=63mm (2.500") |
| Reel and Tape             | EIA 296-E               | 1500     | DRT2S                     | T2=63mm (2.500") |
| Reel and Tape             | EIA 296-E               | 1500     | DRT4                      | N/A              |
| Reel and Tape             | EIA 296-E               | 2500     | ERT2                      | T2=63mm (2.500") |
| Reel and Tape             | EIA 296-E               | 2500     | ERT2S                     | T2=63mm (2.500") |
| Reel and Tape             | EIA 296-E               | 1000     | MRT1E                     | T1=53mm (2.087") |
| Reel and Tape             | EIA 296-E               | 1500     | DAT1                      | T1=53mm (2.087") |
| Reel and Tape             | EIA 296-E               | 1500     | DAT1O                     | T1=53mm (2.087") |
| Reel and Tape             | EIA 296-E               | 1500     | DRT1                      | T1=53mm (2.087") |
| Reel and Tape             | EIA 296-E               | 1500     | DRT1S                     | T1=53mm (2.087") |
| Reel and Tape             | EIA 296-E               | 1500     | DRT1SS                    | T1=53mm (2.087") |
| Reel and Tape             | EIA 296-E               | 1500     | DRT3                      | T3=73mm (2.874") |
| Reel and Tape             | EIA 296-E               | 1500     | DRT3S                     | T3=73mm (2.874") |
| Reel and Tape             | EIA 296-E               | 2500     | ERT1                      | T1=53mm (2.087") |
| Reel and Tape             | EIA 296-E               | 2500     | ERT1S                     | T1=53mm (2.087") |
| Reel and Tape             | EIA 296-E               | 2500     | ERT3                      | T3=73mm (2.874") |
| Reel and Tape             | EIA 296-E               | 2500     | ERT3S                     | T3=73mm (2.874") |

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