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

## Agency Approvals

| Agency | Agency File Number | Ampere Range |
|---|---|---|
| UL | E10480 | 0.250A - 3.5A |
| CSA | 29862 | 0.250A - 3.5A |
| TÜV | E10480 | 4A - 7A |
| CSA | 29862 | 4A - 7A |
| PSE | 229 (Cartridge Form) | 1A - 3.5A<br>4A - 5A<br>6A - 7A |
| | NBK200405-E10480C<br>NBK110512-E10480A<br>NBK190619-E10480A | |
| | 230 (Axial Leaded Form) | 1A - 3.5A<br>4A - 5A<br>6A - 7A |
| | NBK200405-E10480D<br>NBK110512-E10480B<br>NBK190619-E10480B | |
| CE | 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. R efer 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
- In accordance with UL/ CSA/NMX Standard 248-14
- RoHS compliant and Lead-free
- Tripped fuse indicating option (add suffix 'S' to part number)
- Fuses are available for board washable with the additional sealing process (add suffix 'A' to part number)
- Sleeved fuse option available (contact Littelfuse for additional information)

## 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.


Revised: 11/08/19

# Axial Lead & Cartridge Fuses

2AG > Time Lag > 229/230 Series

## Electrical Characteristic Specification by Item

| Amp Code | Ampere Rating (A) | Voltage Rating (V) | Interrupting Rating | Nominal Cold Resistance (Ohms) | Nominal Melting I²t (A² sec) | Agency Approvals | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | UL | | PSE | CSA | CSA | CE |
| .250 | 0.25 | 250 | 35A@250Vac 10KA@125Vac 10KA@125Vdc 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 | | 0.2120 | 5.64 | x | | x | x | | x |
| 1.25 | 1.25 | 250 | 100A@250Vac 10KA@125Vac 10KA@125Vdc 80A@310Vac | 0.1460 | 16.8 | x | | x | x | | x |
| 01.5 | 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 10KA@125Vac 10KA@125Vdc | 0.0312 | 110.0 | x | | x | x | | x |
| 004. | 4 | 125 | 400A@125Vac 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 Specificatons

**Peak Withstand Current(Ip):** These fuses will withstand 50 repetitions of a double exponential impulse wave having peak currents(Ip) and peak voltages as listed.

| Amp Code | Ampere Rating (A) | Interrupting Rating | Nominal Cold Resistance (Ohms) | Nominal Melting I²t (A² sec) | 10×160 µs 1500V | 10×560 µs 800V | 10×1000 µs 1000V |
|---|---|---|---|---|---|---|---|
| .250 | 0.25 | 60A@600Vac 40A@600Vac 7A@600Vac 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, 2×10 microseconds, 20 repetitions


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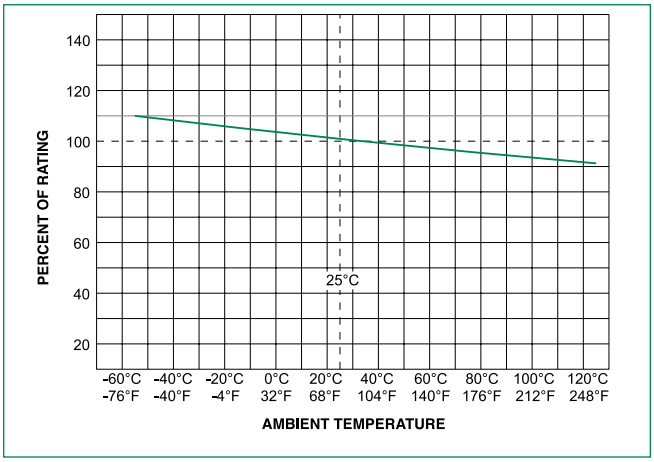
# Axial Lead & Cartridge Fuses

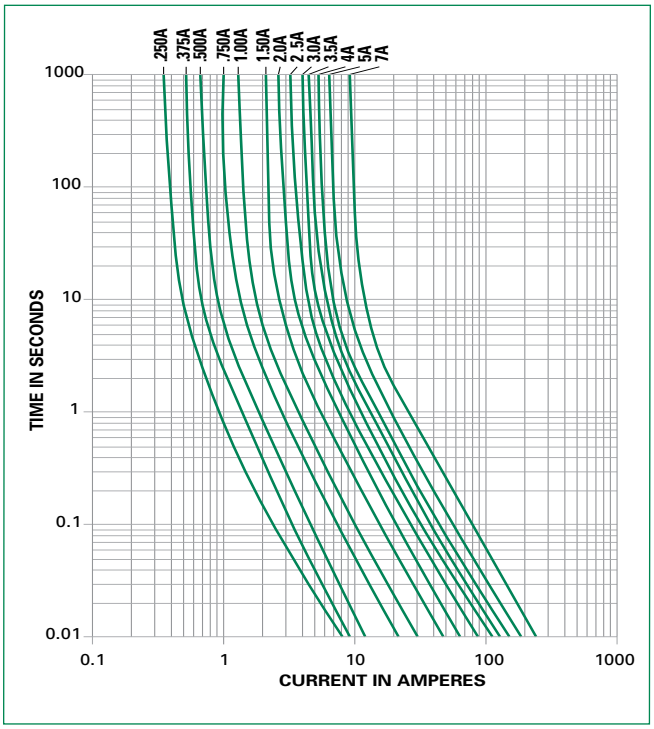
## 2AG > Time Lag > 229/230 Series

## Temperature Re-rating Curve

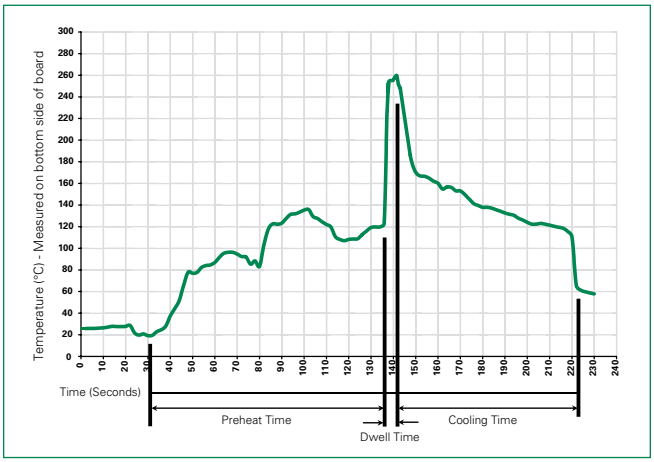



**Note:**
Rerating depicted in this curve is in addition to the industry practice derating of 25% for continuous operation.

## 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.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# Axial Lead & Cartridge Fuses

2AG > Time Lag > 229/230 Series

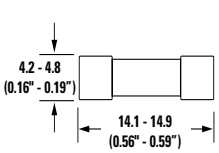
## Product Characteristics

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

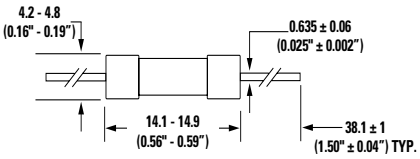
| | |
|---|---|
| **Operating Temperature** | –55°C to +125°C |
| **Thermal Shock** | MIL-STD-202, Method 107, Test Condition B: (5 cycles - -65°C to 125°C) |
| **Vibration** | MIL-STD-202, Method 201 |
| **Humidity** | MIL-STD-202, Method 103, Test Condition A: High RH (95%) and Elevated temperature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

## Dimensions

229 000P Series




230 000P Series




## Part Numbering System

**0229 xxxx M X P**

**Series**
0229 = Cartridge
0230 = Axial Leaded

**Amp Code**
Refer to Amp Code column of Electrical Characteristics Table

**Quantity Code**
M = 1000

**Packaging Code**
X = Filler

**Lead-free**

## Recommended Accessories

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

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

## Packaging

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

| Packaging Option | Packaging Specification | Quantity | Quantity & Packaging Code | Taping Width |
|---|---|---|---|---|
| **229 Series (cont.)** | | | | |
| Bulk | N/A | 100 | HXS | N/A |
| Bulk | N/A | 1000 | MX | N/A |
| Bulk | N/A | 1000 | MXS | N/A |
| **230 Series** | | | | |
| 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") |