

# Blade Fuses - Illuminated



## ATO

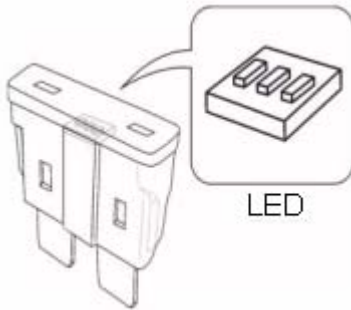
### Photo Fuse



### Features:

- The photo fuse is designed for the automobile and electrical industry.
- It has become the original equipment circuit protection standard for automobiles, trucks and low power system.
- The newer blade type is designed to include an indicating LED, which will be lighted as soon as fuse blew.
- Easy to find blown fuses in any location, quick to identify and fast to replace to save your precious time and man-power.
- Long life 1000 hours at least for LED life time.
- Safety (prevent resin melting) low temperature.
- Lower current under 5mA.
- Color coding : fuses are color coded for easy ampere identification.
- Materials : resin with zinc alloy termination.

### Construction



### Characteristics of Zinc Alloy

Termination : Zinc Alloy.

### Test Specifications

| Mechanical Testing Characteristic | Method  | Limits  |         | Actual Data |
|-----------------------------------|---------|---------|---------|-------------|
|                                   |         | Minimum | Maximum |             |
| UTS (ksi)                         | ASTM ES | 22.0    | 32.0    | 29.5        |



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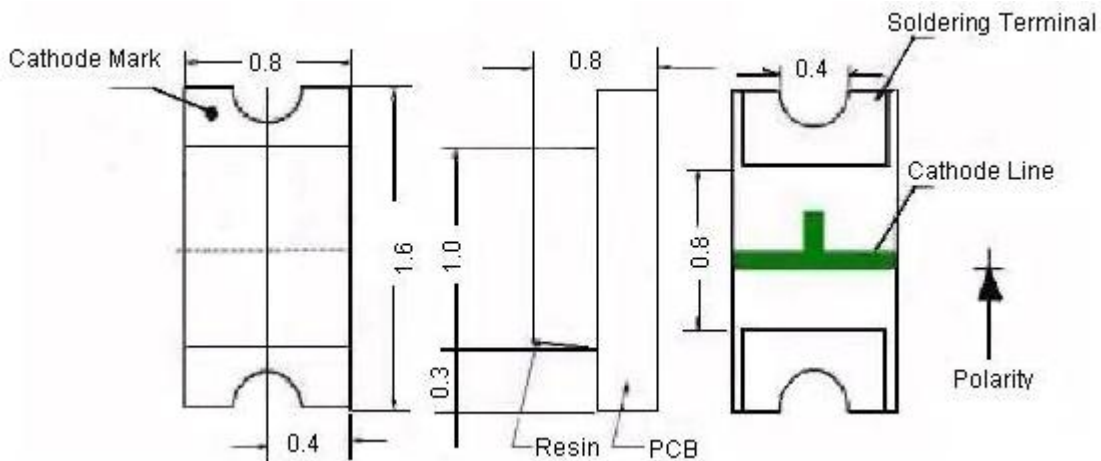
### Test Specifications

| Chemical Testing Characteristic | Method                | Limits  |         | Actual Data |
|---------------------------------|-----------------------|---------|---------|-------------|
|                                 |                       | Minimum | Maximum |             |
| Copper (Cu), ppm                | Emission Spectroscopy | 5000    | 7000    | 5440        |
| Titanium (Ti)                   |                       | 1200    | 1800    | 1522        |
| Lead (Pb)                       |                       | -       | 100     | 18          |
| Cadmium (Cd)                    |                       | -       | 50      | <5          |
| Iron (Fe)                       |                       | -       | 100     | 6           |
| Aluminum (Al)                   |                       | -       | 10      | <5          |
| Magnesium (Mg)                  |                       | -       | 5       |             |
| Manganese (Mn)                  |                       | -       | 50      |             |
| Nickel (Ni)                     |                       | -       | 10      |             |
| Tin (Sn)                        |                       | -       | 10      |             |
| Zinc (Zn)                       |                       | N/A     | Balance | -           |

### Characteristics of LED

**Voltage Rating** : 12V dc, 24V dc and 32V dc.

**Life Time** : Around 1000 hours at 60 celsius. The resin won't be melted under 130 celsius.



Dimensions : Millimetres

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### Reliability Test

| Item                                 | Frequency/Lots/Samples/<br>Failures                             | Standards<br>Reference | Conditions  |
|--------------------------------------|---|------------------------|---|
| Precondition                         | For all reliability monitoring tests according to JEDEC Level 2 | J-STD-020              | Baking at 85°C for 24 hours.<br>Moisture storage at 85°C/60% R.H. for 168 hours.  |
| Solderability                        | 1Q/1/22/0   | JESD22-B102-B          | Accelerated aging 155°C/24 hours.<br>Tinning speed : 2.5+0.5cm/s.<br>Tinning : A: 215°C/3+1s or B: 260°C/10+1s.   |
| Resistance to soldering heat         | 1/100/0   | And CNS-5068           | 3 x IR-reflow-soldering according to soldering profile.   |
| Operating life test                  | 1Q/1/40/0   | JESD22-A113            | Precondition : 85°C baking for 24 hours.<br>85°C/60%R.H. for 168 hours.<br>T <sub>amb</sub> 25°C; I <sub>F</sub> = 20mA; duration 1000 hours.                 |
| High humidity, high temperature bias | 1Q/1/45/0   | CNS-11829              | T <sub>amb</sub> : 85°C.<br>Humidity : 85% R.H., I <sub>F</sub> = 5mA.<br>Duration : 1000 hours.  |
| High temperature bias                | 1Q/1/20/0   | JESD-A101-B            | T <sub>amb</sub> : 55°C; I <sub>F</sub> = 20mA.<br>Duration : 1000 hours.   |
| Pulse life test                      | 1Q/1/40/0   | HT specs.              | T <sub>amb</sub> = 25°C, I <sub>F</sub> = 20mA, I <sub>p</sub> = 100mA,<br>Duty cycle = 0.125 (t <sub>p</sub> = 125µs, T = 1 second).<br>Duration 500 hours). |
| Temperature cycle                    | 1Q/1/76/0   | JESD-A104-A            | A cycle : -40 degree C, 15 minutes; +85 degree C, 15 minutes Thermal steady within 5 minutes.<br>300 cycles 2 chamber/air-to-air type.                        |
| High humidity storage test           | 1Q/1/40/0   | IEC 68-2-14, Nb        | 60+3°C.<br>90+5/-10% R.H. for 500 hours.  |
| High temperature storage test        | 1Q/1/40/0   | CNS-6117               | 100+10°C for 500 hours.   |
| Low temperature storage test         | 1Q/1/40/0   | CNS-554                | -40+5°C for 500 hours.  |

### Characteristics of Fuse

#### Electrical Characteristics

| Ampere Rating (%) | Current Rating (Ampere) | Operating Time |              |
|-------------------|-------------------------|----------------|--------------|
|                   |                         | Minimum        | Maximum      |
| 110               | 3 to 40                 | 100 Hours      | -            |
| 135               |                         | 0.75 Seconds   | 1800 Seconds |
| 200               |                         | 0.15 Seconds   | 5 Seconds    |
| 350               |                         | 0.08 Seconds   | 0.25 Seconds |
| 600               |                         | -              | 0.15 Seconds |



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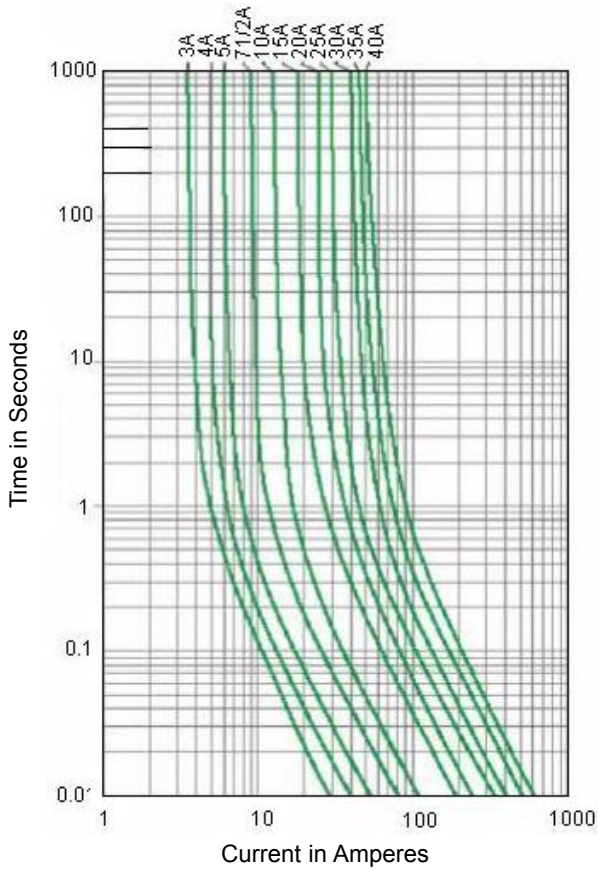
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### Color Coding

| Body Color Code | Ampere Rating (A) | Voltage Rating (V dc) | Normal Cold Resistance (Ohms) |
|-----------------|-------------------|-----------------------|-------------------------------|
| Violet          | 3.0               | 32                    | 0.0310                        |
| Pink            | 4.0               |                       | 0.0230                        |
| Tan             | 5.0               |                       | 0.0180                        |
| Brown           | 7.5               |                       | 0.0110                        |
| Red             | 10.0              |                       | 0.0077                        |
| Blue            | 15.0              |                       | 0.0048                        |
| Yellow          | 20.0              |                       | 0.0033                        |
| Natural         | 25.0              |                       | 0.0025                        |
| Green           | 30.0              |                       | 0.0018                        |
| Blue Green      | 35.0              |                       | 0.0016                        |
| Amber           | 40.0              |                       | 0.0014                        |

**Remarks:** Measuring fuse zinc alloy resistance by MO-2002 series digital/milliohm meter.

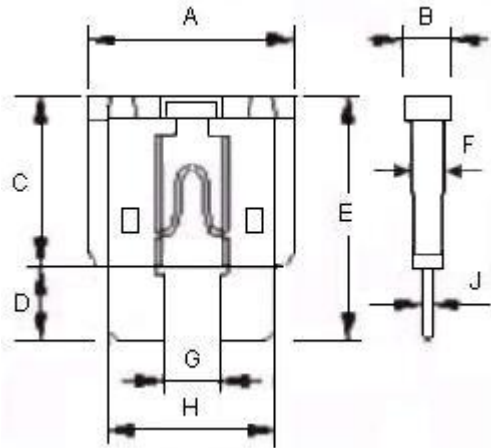
**Average Time Current Curve**



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### Outline Dimensions



|   |                 |
|---|-----------------|
| A | 18.87 to 19.30  |
| B | 4.99 to 5.25    |
| C | 12.54 (Maximum) |
| D | 6.17 to 6.67    |
| E | 18.41 to 19.05  |
| F | 3.59 to 3.80    |
| G | 3.90 to 4.13    |
| H | 14.35 to 14.61  |
| J | 0.61 to 0.69    |

Dimensions : Millimetres

### Characteristics of Resin

Body : Plastic (130°C)

### Test Specifications

| Properties                  | Basic       | Test Conditions                  |
|-----------------------------|-------------|----------------------------------|
| Specific gravity            | 1.20        | 23/23°C                          |
| Light transmission          | 88          | 3.0m/m thick                     |
| Flexural strength           | 23,000      | 23°C                             |
| Impact strength             | 85          | 1/8 inch                         |
| Heat distortion temperature | 132°C       | 18.6 Kg/cm <sup>2</sup> 120°C/hr |
| Mold shrinkage              | 0.5 to 0.7% | Parallel                         |
| Flammability                | V-2         | 1/16 inch                        |

**Remarks:** Under 24V dc power input and LED "ON" condition, the body housing is normal, not be melted under 130 celsius.

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### Part Number Table

| Description                | Part Number    |
|----------------------------|----------------|
| Fuse, Automotive, ATO, 5A  | MCATP-L-E 5A   |
| Fuse, Automotive, ATO, 7.5 | MCATP-L-E 7.5A |
| Fuse, Automotive, ATO, 10A | MCATP-L-E 10A  |
| Fuse, Automotive, ATO, 15A | MCATP-L-E 15A  |
| Fuse, Automotive, ATO, 20A | MCATP-L-E 20A  |
| Fuse, Automotive, ATO, 25A | MCATP-L-E 25A  |
| Fuse, Automotive, ATO, 30A | MCATP-L-E 30A  |



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