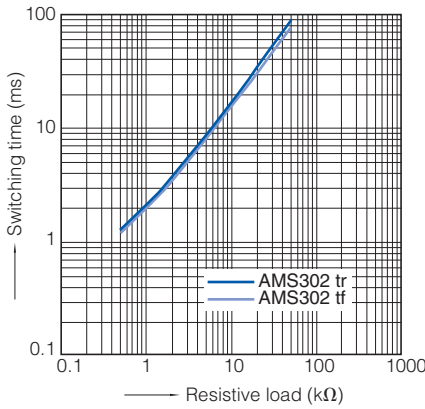


## 7. Switching time vs. resistive load characteristics

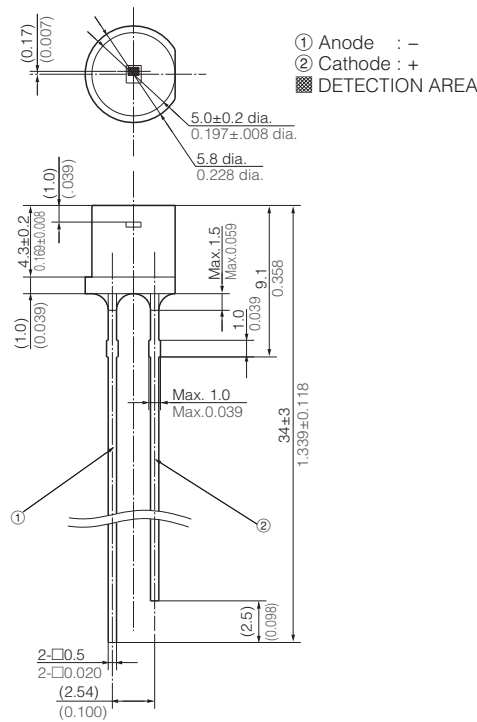
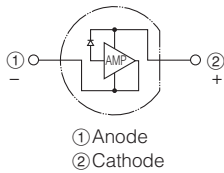
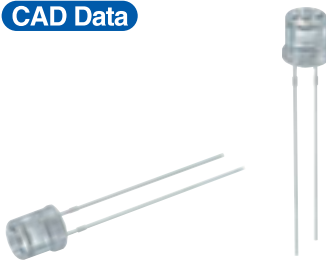
Light source : White LED  
 Power voltage : 5 V.DC  
 Resistive load voltage : 2.5 V.DC  
 Ambient temperature : 25 °C 77 °F



## Dimensions

The CAD data of the products with a **CAD Data** mark can be downloaded from: <http://industrial.panasonic.com/>

### CAD Data



General tolerance : ±0.5 ±0.020

unit : mm inch

## Safety Precautions

Follow the instructions to prevent injuries and accidents.

- Avoid use beyond the specifications.  
 Such use may generate abnormal heat, smoke and fire.

- Correctly connect terminals according to the pin arrangement in the specifications. Misconnection may invite unexpected malfunction, abnormal heat, smoke and fire.
- For safety-sensitive use, arrange appropriate protective circuits and protection devices.

## CAUTIONS FOR USE

### ■ Applying stress beyond absolute maximum rating

When voltage and current values of each terminal exceed absolute maximum rating, overvoltage and overcurrent may deteriorate the internal element. In extreme cases, such excess may melt wires or damage the silicon P/N junction. Design the product not to exceed the absolute maximum rating even momentarily.

### ■ Deterioration and damage by static electricity discharge

The phenomenon, deteriorating the internal element, is generally called electrostatic breakdown. It is caused by discharge of static electricity, arisen from multiple factors, to each terminal. Once unpacked, perform antistatic countermeasures and follow the instructions below.

- 1) Operators must wear antistatic cloths and human body grounding devices, and have the protective resistance of between 500 k $\Omega$  and 1 M $\Omega$ .
- 2) Cover the surface of workbench by electroconductive metal plates and ground measuring instruments and jigs.
- 3) Use the soldering iron which has a small leakage current or ground the soldering tip. (The soldering iron for a low voltage is recommended)
- 4) Ground the assembling equipment.
- 5) When packing printed-circuit boards and devices, avoid polymeric materials, which have electrification characteristics, such as expanded polystyrene and plastic.
- 6) When storing and transporting the sensor, choose the environment where static electricity is hardly generated (e.g., humidity between 45 and 60 %) and protect the product by using electroconductive packaging materials.

### ■ When the power is supplied, the current flowing into the sensor varies in order to stabilize the internal circuit.

### ■ Storage

The sensor is in the transparent resin package. Due to its sensitivity to humidity, the package is moisture-proof. When storing the sensor, follow the instructions below.

- 1) Promptly use after opening. (within a week, below 30 °C 86 °F/60 % R.H.)
- 2) Once unpacked, preserving in a moisture-proof manner, such as keeping in a moisture-proof bag with silica gels, is recommended for long-term storage. (use within 3 months)
- 3) Extremely bad storage conditions may deteriorate solderability or characteristics, and defect the appearance. Recommended conditions of the storage place are below.
  - Temperature : 0 to 30 °C 32 to 86 °F
  - Humidity : Below 60% R.H. (Avoid freezing and dew condensation)
  - Atmosphere: Low-dust and free from noxious chemicals such as sulfurous acid gas

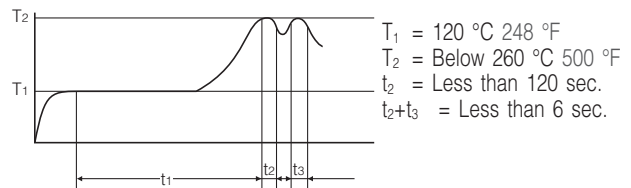
\* During soldering, when adding thermal stress in a moisture absorbing state, moisture evaporates, swells and generates stress to the internal package. To avoid swellings and cracks in the surface of the package, follow soldering conditions below.

### ■ Recommended soldering conditions

<Through-hole type>

#### 1) Recommended conditions

##### (1) Double-wave soldering method



$T_1 = 120\text{ }^\circ\text{C}\ 248\text{ }^\circ\text{F}$   
 $T_2 = \text{Below } 260\text{ }^\circ\text{C}\ 500\text{ }^\circ\text{F}$   
 $t_2 = \text{Less than } 120\text{ sec.}$   
 $t_2+t_3 = \text{Less than } 6\text{ sec.}$

##### (2) Soldering method

Tip temperature : 350 to 400 °C 662 to 752 °F  
 Wattage : 30 to 60 W  
 Soldering time : Less than 3 sec.

- 2) Keep the soldering part at a distance of 3 mm 0.118 inch or more from the root of the lead.

### ■ Mounting

- 1) When various packages are on one circuit board, temperature rise of the lead largely depends on the package size. Keep temperature of the soldered terminals of the products below the previously mentioned specifications. Before use, check the performance with actual equipment.
- 2) If mounting conditions are beyond the specifications above, such use may decrease the resin strength, increase mismatching in the thermal expansion coefficient of each component material, generate cracks in the package and break the bonding wire. Please consult us before use.

### ■ Cleaning

For flux cleaning, immersion cleaning by ASAHIKLIN AK-225 is recommended. If using ultrasonic cleaning for unavoidable reasons, implementation conditions should not be beyond the specifications below. Before use, check and ensure that there is no defect.

- Frequency : 27 to 29 kHz
- Ultrasonic outlet : Below 0.25W/cm<sup>2</sup> \*
- Cleaning time : Less than 30 sec.
- Cleaning solvent : ASAHIKLIN AK-225
- Others : In order to prevent the printedcircuit board and elements from contacting with ultrasonic oscillator, clean the flux while the sensor is suspended in the solution.

\* Ultrasonic outlet per unit area (bottom area) of cleaning tank

### ■ Transportation

Excessive vibration during transport may deform the lead or damage the sensor. Carefully handle the exterior and interior boxes.

### ■ Avoid use in the highly-humid or dusty environment, the corrosive gas, an environment where organic solvent can be adhered.

### ■ Lead-forming and cuttings

- 1) Before soldering, perform lead forming at normal temperature.
- 2) When forming or cutting the lead, keep the spot at a distance of 3 mm 0.118 inch or more from the root of the lead.
- 3) When forming and cutting, fix the root of the lead.
- 4) Avoid mounting which may cause stress on the root of the lead.