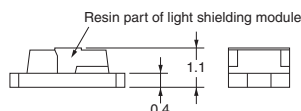
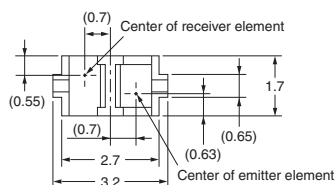


# Photomicrosensor (Reflective)

## EE-SY199

### ■ Dimensions

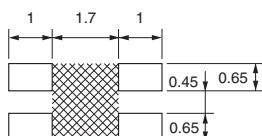
**Note:** All units are in millimeters unless otherwise indicated.



Direction pattern (NC)

| Terminal No. | Name      |
|--------------|-----------|
| A            | Anode     |
| K            | Cathode   |
| C            | Collector |
| E            | Emitter   |

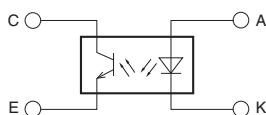
### Recommended soldering pattern



**Note 1.** The shaded portion in the above figure may cause shorting. Do not wire in this portion.

**2.** The tolerance for the recommended soldering pattern is  $\pm 0.1$  mm.

### Internal Circuit



Unless otherwise specified, the tolerances are  $\pm 0.15$  mm.

### ■ Features

- Ultra-compact model.
- PCB surface mounting type.
- RoHS Compliant.

### ■ Absolute Maximum Ratings (Ta = 25°C)

| Item                 | Symbol                    | Rated value                   |
|----------------------|---------------------------|-------------------------------|
| Emitter              | Forward current           | $I_F$ 50 mA (see note 1)      |
|                      | Reverse voltage           | $V_R$ 6 V                     |
| Detector             | Collector-Emitter voltage | $V_{CEO}$ 35 V                |
|                      | Emitter-Collector voltage | $V_{ECO}$ 6 V                 |
|                      | Collector current         | $I_C$ 20 mA                   |
|                      | Collector dissipation     | $P_C$ 75 mW (see note 1)      |
| Total Allowable Loss |                           | $P_{TOT}$ 100 mW (see note 1) |
| Ambient temperature  | Operating                 | $T_{opr}$ -25°C to 85°C       |
|                      | Storage                   | $T_{stg}$ -40°C to 100°C      |
|                      | Max. Reflow soldering     | $T_{sol}$ 260°C (see note 2)  |

**Note: 1.** Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

**2.** Complete soldering within 5 seconds. For reflow soldering, use the conditions given in the Precautions section of this datasheet.

### ■ Ordering Information

| Description                   | Model    |
|-------------------------------|----------|
| Photomicrosensor (reflective) | EE-SY199 |

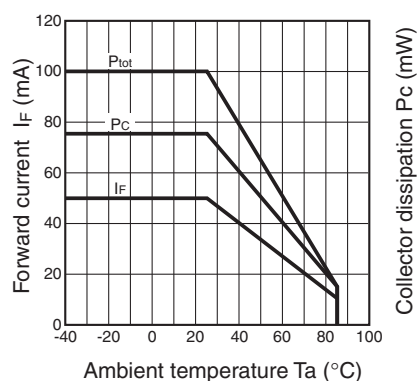
### ■ Electrical and Optical Characteristics (Ta = 25°C)

| Item         | Symbol                               | Value                                                    | Condition                                                                         |
|--------------|--------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------------|
| Emitter      | Forward voltage                      | $V_F$ 1.2 V typ., 1.4 V max.                             | $I_F = 20$ mA                                                                     |
|              | Reverse current                      | $I_R$ 10 $\mu$ A max.                                    | $V_R = 6$ V                                                                       |
|              | Peak emission wavelength             | $\lambda_P$ 950 nm typ.                                  | ---                                                                               |
| Detector     | Light current                        | $I_L$ 40 $\mu$ A min., 85 $\mu$ A typ., 130 $\mu$ A max. | Aluminum-deposited surface, $I_F = 4$ mA, $V_{CE} = 2$ V, $d = 1$ mm (see note)   |
|              | Dark current                         | $I_D$ 1 nA typ., 100 nA max.                             | $V_{CE} = 20$ V, 0 lx                                                             |
|              | Leakage current                      | $I_{LEAK}$ 500 nA max.                                   | $I_F = 4$ mA, $V_{CE} = 2$ V, with no reflection                                  |
|              | Collector-Emitter saturated voltage  | $V_{CE(sat)}$ ---                                        | ---                                                                               |
|              | Peak spectral sensitivity wavelength | $\lambda_P$ 930 nm typ.                                  | ---                                                                               |
| Rising time  | $t_r$                                | 20 $\mu$ s typ., 100 $\mu$ s max.                        | $V_{CC} = 2$ V, $R_L = 1$ k $\Omega$ , $I_L = 100$ $\mu$ A, $d = 1$ mm (see note) |
| Falling time | $t_f$                                | 20 $\mu$ s typ., 100 $\mu$ s max.                        | $V_{CC} = 2$ V, $R_L = 1$ k $\Omega$ , $I_L = 100$ $\mu$ A, $d = 1$ mm (see note) |

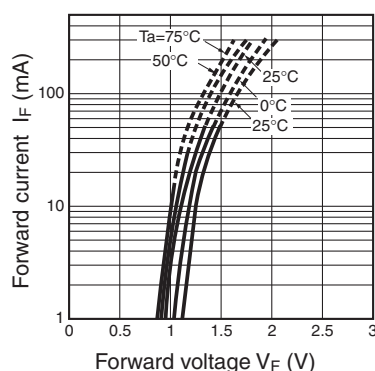
**Note:** Refer to the "Light Current Measurement Setup Diagram" in the Engineering Data section of this datasheet, regarding distance "d".

# Engineering Data

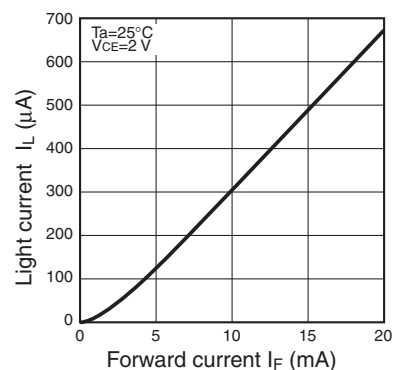
**Forward Current vs. Collector Dissipation Temperature Rating**



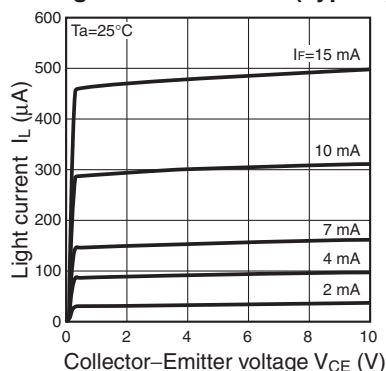
**Forward Current vs. Forward Voltage Characteristics (Typical)**



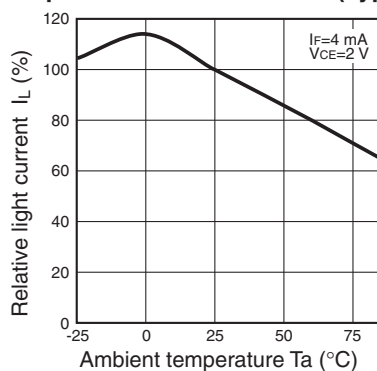
**Light Current vs. Forward Current Characteristics (Typical)**



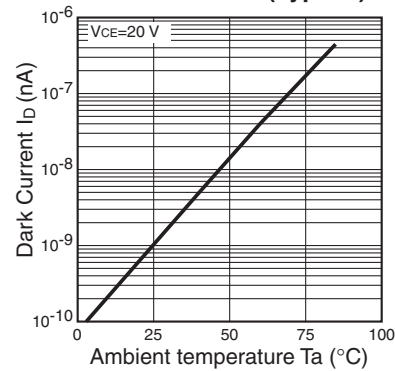
**Light Current vs. Collector–Emitter Voltage Characteristics (Typical)**



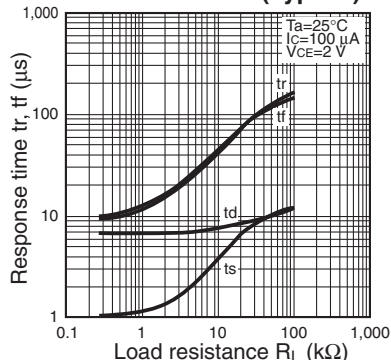
**Relative Light Current vs. Ambient Temperature Characteristics (Typical)**



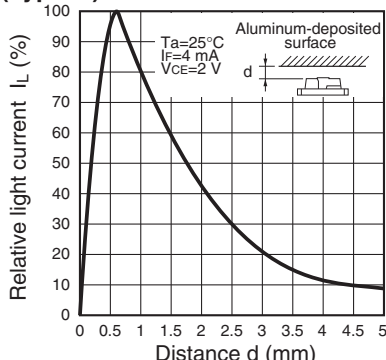
**Dark Current vs. Ambient Temperature Characteristics (Typical)**



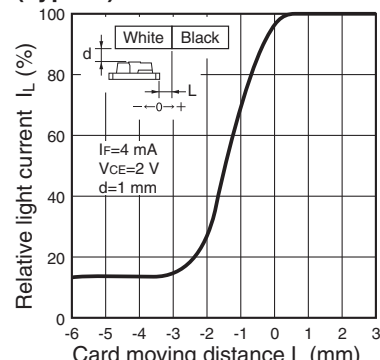
**Response Time vs. Load Resistance Characteristics (Typical)**



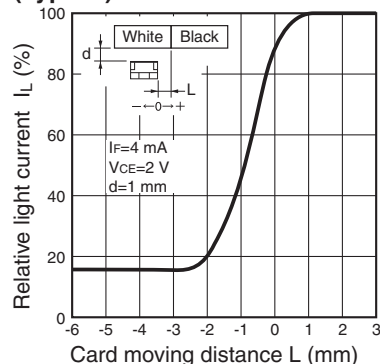
**Sensing Distance Characteristics (Typical)**



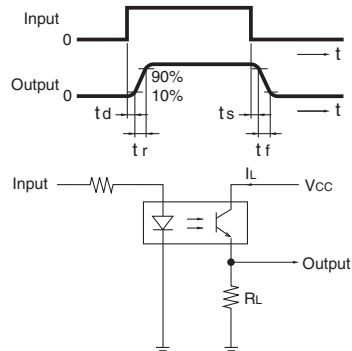
**Sensing Position Characteristics (Typical)**



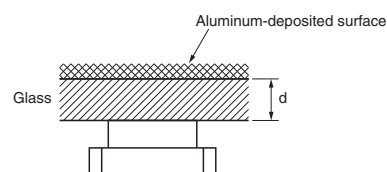
**Sensing Position Characteristics (Typical)**



**Response Time Measurement Circuit**



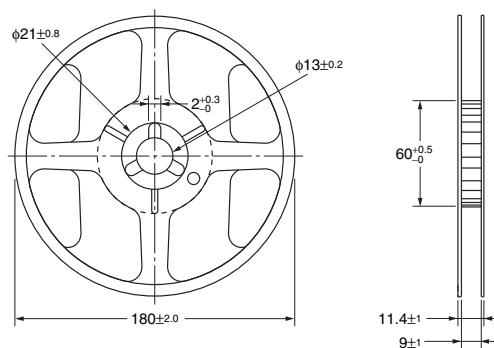
**Light Current Measurement Setup Diagram**



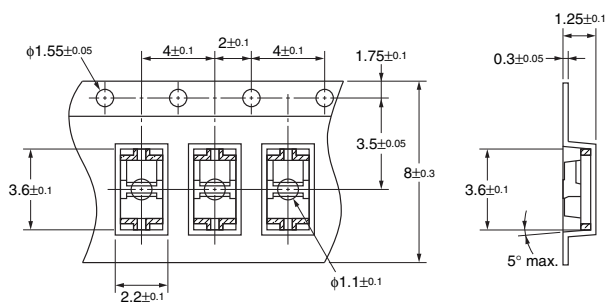
Unit: mm (inch)

## ■ Tape and Reel

### Reel

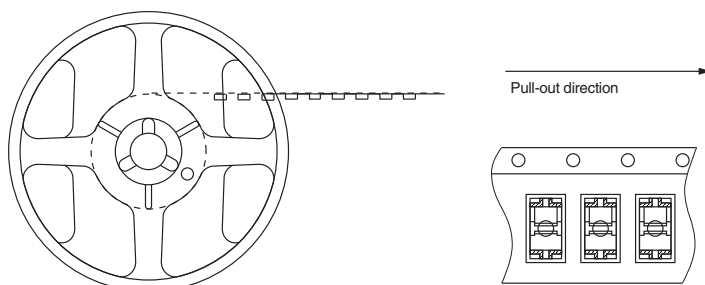


### Tape



### Tape configuration

The devices are oriented in the tape carrier so that the emitters are positioned closest to the carrier holes.



### Tape quantity / packaging

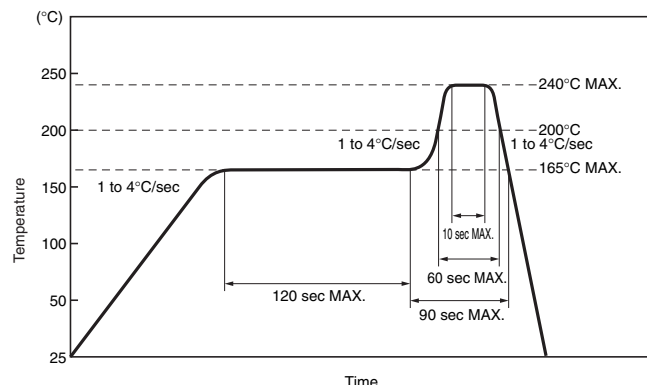
2,000 pcs./reel, with one reel sealed in an aluminum-laminated bag.

# Precautions

## ■ Soldering Information

### Reflow soldering

- Reflow no more than once.
- Adjust the amount of applied solder quantity to the product sidewall of the terminal
- When designing the pcb, avoid placing traces or other connections under the sensor, as shown in the 'Recommend Solder Pattern' diagram
- Set the reflow oven so that the temperature profile shown in the following chart is obtained for the upper surface of the product being soldered.



- Do not immerse the resin part of the sensor into the solder.
- The use of an infrared lamp can cause the temperature of the resin to rise too high. Test the soldering method under actual conditions and make sure that the process is acceptable, because the impact on the junction between the device and the PCB varies depending upon the soldering and cooling conditions.

### Storage

Store the product under the following conditions:

Temperature: 5 to 30°C

Humidity: 70% max.

To protect the product from the effects of humidity until the package is opened, dry-box storage is recommended.

Reflow soldering must be done within 48 hours after opening the aluminum-laminated bag, during which time the product must be stored between 5°C and 25°C at 60% maximum humidity.

If it is necessary to store the product for more than 48 hours after opening the bag, use dry-box storage or reseal the products in the aluminum-laminated bag with a commercially available desiccant. Then, store the sensors between 5 to 30°C at 70% max. humidity, mounting them within 2 weeks.

### Baking

If a product has remained packed in the aluminum-laminated bag for six months or more, or if more than 48 hours have lapsed since the bag was opened, then bake the product under the following conditions before use:

125°C for 16 to 24 hours (max.)

**Note:** Do not bake the sensors while they are still in their bag. Temporarily mount them to the PCB or place them in metal trays prior to baking. Subject the sensors to the baking process no more than once.

### Cleaning Conditions

|                             |                                                     |
|-----------------------------|-----------------------------------------------------|
| <b>Recommended Solvents</b> | Ethyl alcohol, methyl alcohol, or isopropyl alcohol |
| <b>Solvent Temperature</b>  | 45°C max                                            |
| <b>Immersion Time</b>       | 3 hours max                                         |

Do not use ultrasonic cleaning.

The image displays a 1000x1000 grid of small squares. Each square contains a unique combination of symbols from the set: a vertical line, a horizontal line, a top-left corner, a top-right corner, a bottom-left corner, a bottom-right corner, and a cross. The symbols are arranged in a way that each square is a unique combination of these symbols, creating a complex, non-repeating pattern across the entire grid.

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**ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.**

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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